

# INTERMUNICIPAL DEVELOPMENT PLAN

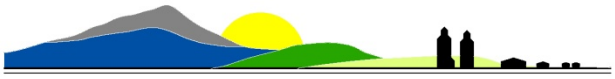
## Lethbridge County and Town of Coalhurst

**Lethbridge County Bylaw No. 1434**
**Town of Coalhurst Bylaw No. 375-14**
**Amended by Bylaw No. 20-023 & Bylaw No. 421-20**
**February 2021**





**December 2014**



OLDMAN RIVER REGIONAL SERVICES COMMISSION

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# Lethbridge County and Town of Coalhurst
# Intermunicipal Development Plan Bylaw No. 1434 & Bylaw No. 375-14 – Amendments

| Bylaw No. | Amendment Description | Legal Description | Passed |
|---|---|---|---|
| Lethbridge County Bylaw No. 20-023<br><br>Town of Coalhurst Bylaw No. 421-20 | Addition of North Coalhurst – Kipp Area Structure Plan as Appendix B, amendments and addition to text, maps and policy statements to recognize the addition of said ASP and to update some legislative references in order to align the IMDP with the modernized *Municipal Government Act*. | | 3-Dec-2020<br><br>25-Feb-2021 |

# Lethbridge County and Town of Coalhurst

# Intermunicipal Development Plan

## Bylaw No. 1434 and Bylaw No. 375-14


## *ACKNOWLEDGEMENTS*

*The following people are thanked for their assistance and contribution to the development and publishing of this Intermunicipal Development Plan:*

### LETHBRIDGE COUNTY

**Lorne Hickey – *Reeve***
**Ken Benson – *Councillor***
**Steve Campbell – *Councillor***
**Henry Doeve – *Councillor***
**Tom White – *Councillor***
**John Willms – *Councillor***
**Morris Zeinstra – *Councillor***
**Rick Robinson – *CAO***

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**Heather Caldwell – *Councillor***
**Barbara Edgecombe-Green – *Councillor***
**Marvin Slingerland – *Councillor***
**Sheldon Watson – *Councillor***
**R. Kim Hauta – *CAO***

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**Spencer Croil – *Planner***
**Barb Johnson – *Executive Secretary***
**Kaylee Kinninburgh – *CAD/GIS Technologist***

**BYLAW NO. 1434**

**LETHBRIDGE COUNTY**

**IN THE PROVINCE OF ALBERTA**

Bylaw No. 1434 of the Lethbridge County is for the purpose of adopting the Lethbridge County and Town of Coalhurst Intermunicipal Development Plan in accordance with sections 631 and 692 of the Municipal Government Act, Revised Statutes of Alberta 2000, Chapter M-26, as amended.

WHEREAS municipalities are encouraged by the province to expand intermunicipal planning efforts to address common planning issues and where the possible effects of development transcends municipal boundaries.

AND WHEREAS the Intermunicipal Development Plan outlines policies that apply to lands in the urban fringe area and within parts of the town and is to be used as a framework for decision making in each municipality with input and cooperation of the other jurisdiction.

AND WHEREAS both the Councils of Lethbridge County and the Town of Coalhurst agree that it is to their mutual benefit to establish joint planning policies, and this negotiation and agreement reflects a continuing cooperative approach between the two municipalities and the desire to see well-planned, orderly, and managed growth.

AND WHEREAS the municipality must prepare a corresponding bylaw and provide for its consideration at a public hearing.

NOW THEREFORE, under the authority and subject to the provisions of the Municipal Government Act, Revised Statutes of Alberta 2000, Chapter M-26 as amended, the Council of Lethbridge County duly assembled hereby enacts the following:

1. Council shall adopt the Lethbridge County and Town of Coalhurst Intermunicipal Development Plan in consultation and as agreed to with the Town of Coalhurst.
2. This plan, upon adoption, shall be cited as the Lethbridge County and Town of Coalhurst Intermunicipal Development Plan Bylaw No. 1434 and Bylaw No. 375-14.
3. This bylaw shall come into effect upon third and final reading thereof;

GIVEN first reading this 6th day of November, 2014.

Reeve

Chief Administrative Officer

GIVEN second reading this 4th day of December, 2014

Reeve

Chief Administrative Officer

GIVEN third reading this 4th day of December, 2014.

Reeve

Chief Administrative Officer

# BYLAW NO. 375-14

## TOWN OF COALHURST

## IN THE PROVINCE OF ALBERTA

Bylaw No. 375-14 of the Town of Coalhurst is for the purpose of adopting the Lethbridge County and Town of Coalhurst Intermunicipal Development Plan in accordance with sections 631 and 692 of the Municipal Government Act, Revised Statutes of Alberta 2000, Chapter M-26, as amended.

WHEREAS municipalities are encouraged by the province to expand intermunicipal planning efforts to address common planning issues and where the possible effects of development transcends municipal boundaries.

AND WHEREAS the Intermunicipal Development Plan outlines policies that apply to lands in the urban fringe area and within parts of the Town and is to be used as a framework for decision making in each municipality with input and cooperation of the other jurisdiction.

AND WHEREAS both the Councils of the Town of Coalhurst and Lethbridge County agree that it is to their mutual benefit to establish joint planning policies, and this negotiation and agreement reflects a continuing cooperative approach between the two municipalities and the desire to see well-planned, orderly, and managed growth.

AND WHEREAS the municipality must prepare a corresponding bylaw and provide for its consideration at a public hearing.

NOW THEREFORE, under the authority and subject to the provisions of the Municipal Government Act, Revised Statutes of Alberta 2000, Chapter M-26 as amended, the Council of the Town of Coalhurst duly assembled hereby enacts the following:

1. Council shall adopt the Lethbridge County and Town of Coalhurst Intermunicipal Development Plan in consultation and as agreed to with Lethbridge County.
2. This plan, upon adoption, shall be cited as the Lethbridge County and Town of Coalhurst Intermunicipal Development Plan Bylaw No. 1434 and Bylaw No. 375-14.
3. This bylaw shall come into effect upon third and final reading thereof.

READ a **first** time this 4TH day of NOVEMBER, 2014.

_____ R. K. Hauta

***Mayor – Dennis Cassie*** ***Chief Administrative Officer – R. Kim Hauta***

READ a **second** time this 2ND day of DECEMBER, 2014.

_____ R. K. Hauta

***Mayor – Dennis Cassie*** ***Chief Administrative Officer – R. Kim Hauta***

READ a **third** time and finally PASSED this 2ND day of DECEMBER, 2014.

_____ R. K. Hauta

***Mayor – Dennis Cassie*** ***Chief Administrative Officer – R. Kim Hauta***

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# DOCUMENTS REFERENCED IN THE IMDP

Municipal Government Act, Revised Statutes of Alberta 2000, Chapter M-26
(http://www.qp.alberta.ca/documents/acts/m26.pdf)

Lethbridge County Municipal Development Plan and Land Use Bylaw
(http://www.orrsc.com/members/counties-mds/lethbridge-county/)

Town of Coalhurst Municipal Development Plan and Land Use Bylaw
(http://www.orrsc.com/members/towns-a-m/town-of-coalhurst/)

Lethbridge County and City of Lethbridge Intermunicipal Development Plan
(http://www.orrsc.com/members/counties-mds/lethbridge-county/)

Water Act, Revised Statutes of Alberta 2000, Chapter W-3
(http://www.qp.alberta.ca/documents/Acts/w03.pdf)

Subdivision and Development Regulation, Alberta Regulation 43/2002
(http://www.qp.alberta.ca/documents/Regs/2002_043.pdf)

Provincial Land Use Policies
(http://www.municipalaffairs.alberta.ca/documents/ms/landusepoliciesmga.pdf)

Agricultural Operation Practices Act, Revised Statutes of Alberta 2000, Chapter A-7
(http://www.qp.alberta.ca/documents/Acts/A07.pdf)

Lethbridge County Engineering Guidelines and Minimum Servicing Standards
(http://www.lethcounty.ca/municipal/lethbridge/lethbridge-website.nsf/0/02F9CAFFE062E4BC872577A5006BE610?OpenDocument)

Municipal Affairs and the Alberta Association of Municipal Districts and Counties: The Model Process for Subdivision Approval and Private Sewage
(file:///C:/Users/ORRSC-Office/Downloads/Model%20Process%20Guidance%20Document%20-%20FINAL.pdf)

Alberta Private Sewage Systems Standard of Practice
(http://www.safetycodes.ab.ca/Public/Documents/PSSSOP_Handbook_Version_12_Online_Feb_21_2012b.pdf)

# COMMONLY USED LAND USE PLANNING ACRONYMS

**(which may be used/referenced within this document)**

ADRI – Animal Disease Research Institute

AER – Alberta Energy Regulator

AESRD – Alberta Environment and Sustainable Resource Development

ALSA – Alberta Land Stewardship Act

ASP – Area Structure Plan

AOPA – Agricultural Operations and Practices Act

ATR - Addition to Reserve

CFO – Confined Feeding Operation

CPR – Canadian Pacific Railway

DA – Development Authority

DP – Development Permit

EIA – Environmental Impact Assessment

ER – Environmental Reserve

ERCB – Energy Resources Conservation Board

ERE – Environmental Reserve Easement

ESA – Environmental Site Assessment

FOIP – Freedom of Information and Protection of Privacy

GIS – Geographic Information System

GCR - Grouped Country Residential

HRIA – Historical Resources Impact Assessment

HRO – Historical Resources Overview

ICSP – Integrated Community Sustainability Plan

IMDP – Intermunicipal Development Plan

JEDI - Joint Enhanced Development Areas

LEED – Leadership in Energy and Environmental Design

LID – Low Impact Development

LUB – Land Use Bylaw

LUF – Land Use Framework

MDA – Municipal Development Authority

MDP – Municipal Development Plan

MDS – Minimum Distance Separation

MGA – Municipal Government Act

MGB – Municipal Government Board

MPC – Municipal Planning Commission

MSA – Municipal Subdivision Authority

MR – Municipal Reserve

NRCB – Natural Resources Conservation Board

ORRSC – Oldman River Regional Services Commission

PUL – Public Utility Lot

RW - Right-of-Way

SA – Subdivision Authority

SDA – Subdivision and Development Authority

SDAB – Subdivision and Development Appeal Board

SR – School Reserve

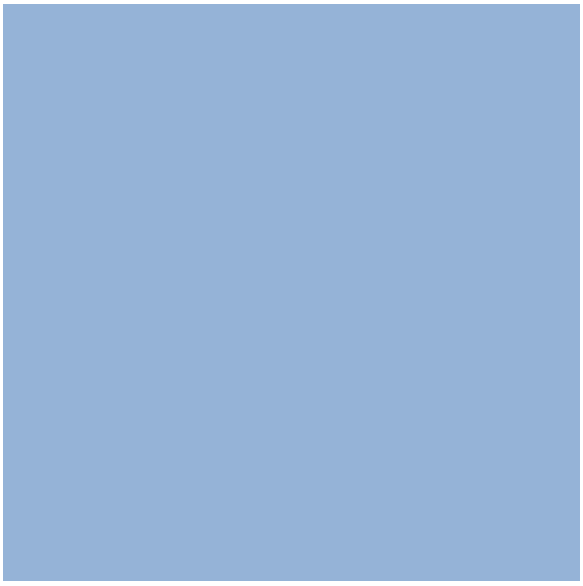
SSRP – South Saskatchewan Regional Plan

TIA – Traffic Impact Assessment / Transportation Impact Analysis

URW – Utility Right-of-Way














# PART 1: INTRODUCTION

***- Built on a foundation of trust -***

# **PART 1:** INTRODUCTION

## INTRODUCTION

Lethbridge County (County) and the Town of Coalhurst (Town) recognize that the land within the Intermunicipal Development Plan (Plan or IMDP) boundary is of mutual interest warranting a collaborative approach to planning. A complex development pattern within the Plan boundary has evolved, originating from the historic Town of Coalhurst settlement, the location of the two provincial highways on the west and east sides, the CPR rail-line corridor, irrigation canals and pipeline rights-of-way, and the close proximity to the City of Lethbridge. This unique development pattern results in complex linkages and sometimes conflicts between the land use activities in each municipality, furthering the need for enhanced coordination and cooperation to help balance municipal interests.

The general land use philosophy and policies of Lethbridge County support, protect, and encourage agricultural operations, while allowing non-agricultural development to occur in areas that do not conflict with agriculture and are already fragmented. The County also desires to diversify its agriculturally weighted tax base and wishes to consider identifying suitable areas to accommodate non-agricultural development. The Town of Coalhurst's key growth priority is to develop land that is properly managed and serviced within its boundaries. The town's tax base is heavily weighted on residential assessment and non-residential development is also desired to both diversify the local economy and to provide services and local employment opportunities for residents. As such, both municipalities desire to establish a coordinated and mutually agreeable approach to development giving due consideration to long-range planning interests.

## LEGISLATIVE REQUIREMENTS

In order to foster cooperation and mitigate conflict between municipalities, the *Municipal Government Act, Revised Statutes of Alberta 2000, Chapter M-26 with amendments (MGA)* has included two mechanisms within the planning legislation which allows a municipality to:

1. include policies regarding coordination of land use, future growth patterns and other infrastructure with adjacent municipalities in their municipal development plans [section 632(3)(iii)] if no intermunicipal development plan exists with respect to those matters;
2. complete and adopt an intermunicipal development plan with adjacent municipalities to address the above matters.

Specifically, the *MGA* states:

> *631(1) Subject to subsections (2) and (3), 2 or more councils of municipalities that have common boundaries and that are not members of a growth region as defined in section 708.01 must, by each passing a bylaw in accordance with this Part or in accordance with sections 12 and 692, adopt an intermunicipal development plan to include those areas of land lying within the boundaries of the municipalities as they consider necessary.*
>
> *631(8) An intermunicipal development plan*
>
> *(a) must address*

*(i) the future land use within the area,*

*(ii) the manner of and the proposals for future development in the area,*

*(iii) the provision of transportation systems for the area, either generally or specifically,*

*(iv) the co-ordination of intermunicipal programs relating to the physical, social and economic development of the area,*

*(v) environmental matters within the area, either generally or specifically, and*

*(vi) any other matter related to the physical, social or economic development of the area that the councils consider necessary,*

*and*

*(b) must include*

*(i) a procedure to be used to resolve or attempt to resolve any conflict between the municipalities that have adopted the plan,*

*(ii) a procedure to be used, by one or more municipalities, to amend or repeal the plan, and*

*(iii) provisions relating to the administration of the plan.*

*It is noted that the paramountcy of the IDP is established within the "Plans Consistent" (section 638) portion of the MGA:*

*638(1) In the event of a conflict or inconsistency between*

*(a) an intermunicipal development plan, and*

*(b) a municipal development plan, an area structure plan or an area redevelopment plan*

*in respect of the development of the land to which the intermunicipal development plan and the municipal development plan, the area structure plan or the area redevelopment plan, as the case may be, apply, the intermunicipal development plan prevails to the extent of the conflict or inconsistency.*

In addition to the *MGA*, the South Saskatchewan Regional Plan (SSRP) came into effect September 1, 2014. The SSRP uses a cumulative effects management approach to set policy direction for municipalities to achieve environmental, economic and social outcomes within the South Saskatchewan Region until 2024.

Pursuant to section 13 of the *Alberta Land Stewardship Act (ALSA)*, regional plans are legislative instruments. The SSRP has four key parts including the Introduction, Strategic Plan, Implementation Plan and Regulatory Details Plan. Pursuant to section 15(1) of *ALSA*, the Regulatory Details of the SSRP are enforceable as law and bind the Crown, decision makers, local governments and all other persons while the remaining portions are statements of policy to inform and are not intended to have binding legal effect.

The Regional Plan is guided by the vision, outcomes and intended directions set by the Strategic Plan portion of the SSRP, while the Implementation Plan establishes the objectives and the strategies that will be implemented to achieve the regional vision. As part of the Implementation Plan, Section 8: Community Development includes guidance regarding Planning Cooperation and Integration between municipalities with the intention to foster cooperation and coordination between neighbouring

municipalities and between municipalities and provincial departments, boards and agencies. Section 8 contains the following broad objectives and strategies:

*Objectives:*

- *Cooperation and coordination are fostered among all land use planners and decision-makers involved in preparing and implementing land plans and strategies.*
- *Knowledge sharing among communities is encouraged to promote the use of planning tools and the principles of efficient use of land to address community development in the region.*

*Strategies:*

*8.1* *Work together to achieve the shared environmental, economic, and social outcomes in the South Saskatchewan Regional Plan and minimize negative environmental cumulative effects.*

*8.2* *Address common planning issues, especially where valued natural features and historic resources are of interests to more than one stakeholder and where the possible effect of development transcends jurisdictional boundaries.*

*8.3* *Coordinate and work with each other in their respective planning activities (such as in the development of plans and policies) and development approval processes to address issues of mutual interest.*

*8.4* *Work together to anticipate, plan and set aside adequate land with the physical infrastructure and services required to accommodate future population growth and accompanying community development needs.*

*8.5* *Build awareness regarding the application of land-use planning tools that reduce the impact of residential, commercial and industrial developments on the land, including approaches and best practices for promoting the efficient use of private and public lands.*

*8.6* *Pursue joint use agreements, regional services commissions and any other joint cooperative arrangements that contribute specifically to Intermunicipal land use planning.*

*8.7* *Consider the value of intermunicipal development planning to address land use on fringe areas, airport vicinity protection plans or other areas of mutual interest.*

*8.8* *Coordinate land use planning activities with First Nations, irrigation districts, school boards, health authorities and other agencies on areas of mutual interest.*

The above strategies are to be considered by both municipalities when developing policy within this IMDP and when rendering land use decisions pertaining to development within the Plan Area. Other strategies contained in the SSRP should be considered in the context of each municipality's Municipal Development Plan, Land Use Bylaw or through policies found within this Plan**.**

## PURPOSE

This Plan has been prepared in accordance with the *MGA* and the provincial *South Saskatchewan Regional Plan (SSRP)*, which encourage cooperation and coordination between neighbouring municipalities. In keeping with the intent of the SSRP strategies, Lethbridge County and the Town of Coalhurst agree that a collaborative approach to planning, promoting coordinated and efficient

development, is necessary within this joint planning area. From the perspective of both municipalities, enhanced management of the land within the Intermunicipal Development Plan area will prove advantageous for the long-range interests of the municipalities and their residents. A detailed background review and land analysis was completed as part of the preparation of this Plan and may be found in Schedule B.

By creating a shared vision for future growth by establishing and agreeing to a long-term strategy to planning and development, the Plan attempts to balance the interests of each municipality. The Plan is intended to provide a framework for consideration of municipal interests in decision-making and establishes planning policy that applies to lands in the fringe and within the Town adjacent to the corporate boundary. Most importantly, the Plan is intended to foster on-going coordination, collaboration, and cooperation between the municipalities by providing a forum to discuss planning matters. Each municipality, however, is ultimately responsible for making decisions within their municipal jurisdiction using the policies and procedures as provided for in this Plan.

The policies of the Plan apply to land within the defined Intermunicipal Development Plan boundary delineated in Map 1 and within the Town on lands adjacent to the corporate boundary. The policies of the Plan do not apply to existing legally established land uses until such time expansion or intensification of any such existing use is proposed.

One of the SSRP's strategies is to address common planning issues, especially where the effect of development transcends jurisdictional boundaries. The intent is to ensure that land is well-managed, important aspects protected, and land use conflicts are minimized into the future. To that end, the County and Town have prepared this IMDP by cooperating and taking into consideration the land use strategies and patterns encouraged. If SSRP regional land use policies are directed by the province, the County and Town will need to comply with the adopted policies. Thus, future amendments to the Plan may be required to adhere to the requirements and policies of the South Saskatchewan Regional Plan once adopted, and both municipalities will discuss possible amendments at that time.

## GUIDING PRINCIPLES

1. Lethbridge County and the Town of Coalhurst will ensure that the policies of this Plan are consistently and reasonably implemented.
2. Lethbridge County and the Town of Coalhurst will work in good faith and attempt to reach a consensus on planning matters within the Plan area, wherever possible.
3. Lethbridge County and the Town of Coalhurst support enhanced communication and consultation with regard to planning matters that may have an impact on either municipality.
4. Lethbridge County and the Town of Coalhurst will monitor and review the policies of this Plan on a regular basis and as circumstances warrant to ensure the policies remain current, relevant and continue to meet the needs of the municipalities.

## PLAN GOALS

The intended goals of the Intermunicipal Development Plan are:

1. To provide a clear policy framework that serves to guide future planning decisions for lands located within the Plan area, affording more certainty for and better coordination of development within the Plan area.

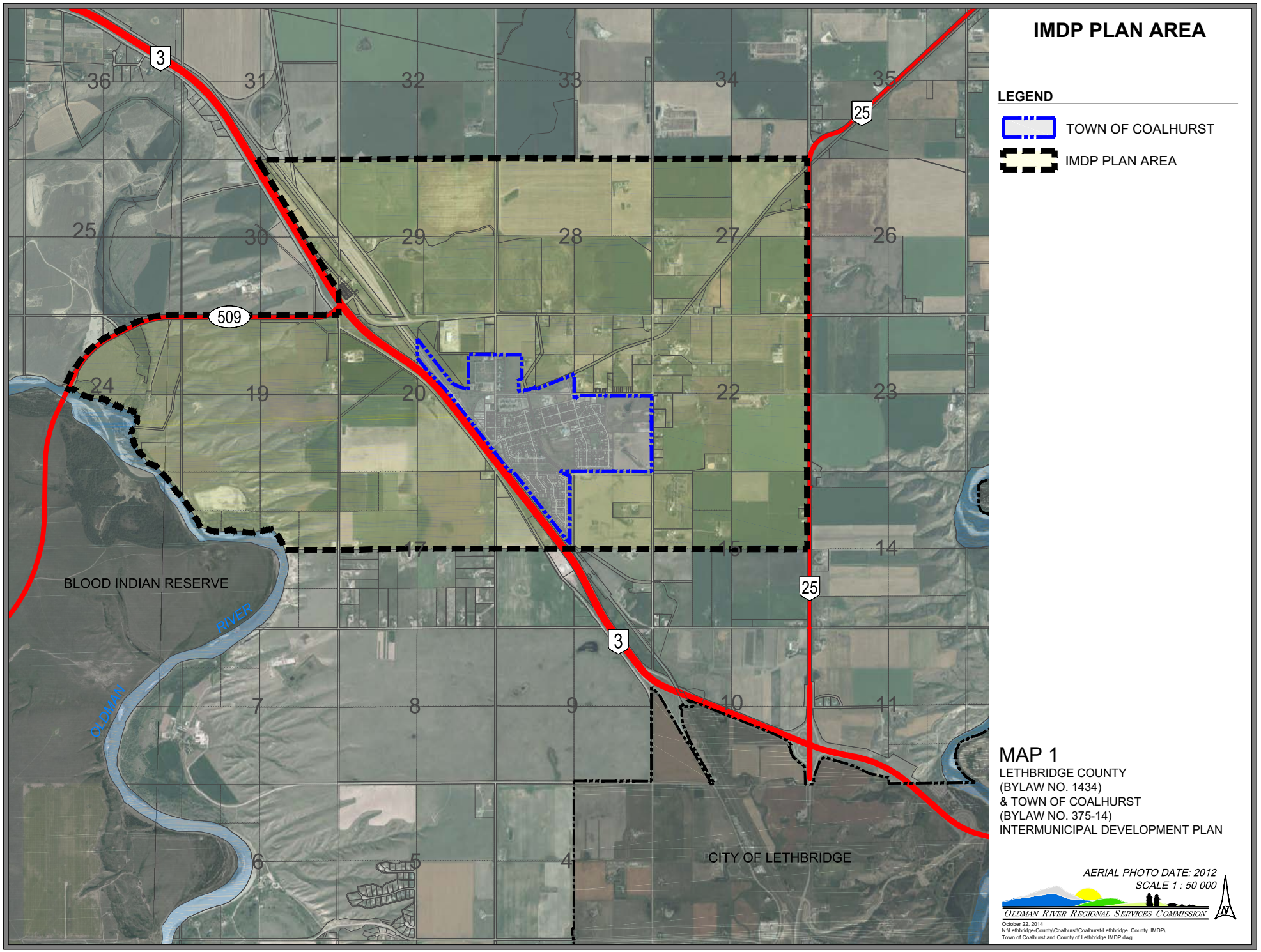
2. To promote an orderly and efficient development pattern within the Plan area that balances the long-range interests of the County and Town.

3. To enable the County to develop suitable areas for non-agricultural development, and the Town to identify logical areas to accommodate future urban growth, as agreed to by both parties.

4. To establish a planning process that promotes intermunicipal collaboration, cooperation and coordination within the Plan area.

5. To establish a mutually agreeable planning approach, defined in a land use concept, that will facilitate an integrated road network, minimize incompatible land uses, and manage density within the Plan area.

6. To address the requirements of the *Municipal Government Act* with respect to plan administration, plan amendment and dispute resolution procedures.


IMDP PLAN AREA
LEGEND
TOWN OF COALHURST
IMDP PLAN AREA
3
25
509
BLOOD INDIAN RESERVE
OLDMAN RIVER
CITY OF LETHBRIDGE
MAP 1
LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN
AERIAL PHOTO DATE: 2012
SCALE 1 : 50 000
OLDMAN RIVER REGIONAL SERVICES COMMISSION
October 22, 2014
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Town of Coalhurst and County of Lethbridge IMDP.dwg







# PART 2: ADMINISTRATION

***- For today, tomorrow, and beyond -***

# PART 2: ADMINISTRATION

## 2.1 Plan Validity and Amendment

### *Intent*

It is recognized that this Plan may require amendment from time to time to keep the Plan current. This Plan does not contain a "sunset" clause (i.e. stipulated expiry date), but rather, incorporates a method of regular review to ensure its relevancy.

### *Policies*

2.1.1 This Plan comes into effect on the date it is adopted by both the County and Town. It remains in effect until either council rescinds the Plan by bylaw after giving six months' notice, or by mutual agreement of both municipalities.

2.1.2 Amendments to this Plan may be necessary from time to time to accommodate agreed-to updates or changes and/or unforeseen situations not specifically addressed in the Plan; any amendments must be adopted by both councils using the procedures established in the *Municipal Government Act*. No amendment shall come into force until such time as both municipalities adopt the amending bylaw.

2.1.3 Requests for amendments to this Plan by parties other than the County or Town shall be made to the municipality in which the request originated and be accompanied by the applicable fee to each municipality for processing amendments to a statutory plan.

2.1.4 If agreed to by both municipalities, a joint public hearing may be held in accordance with the *Municipal Government Act* for any amendments to this Plan.

2.1.5 The Intermunicipal Committee shall review the policies of the Plan annually and discuss land use planning matters, issues and concerns on an ongoing basis. The Committee may make recommendations to be considered by the respective councils for amendment to the Intermunicipal Development Plan to ensure the policies remain current and relevant and continue to meet the needs of both municipalities.

2.1.6 Within ten years of the adoption of this Plan, the councils of both municipalities shall determine if a formal and comprehensive review of the Plan and any subsequent amendments is necessary to ensure the validity and relevancy of the Plan.

## 2.2 Intermunicipal Committee

### *Intent*

The establishment of the Intermunicipal Committee is intended to facilitate continued cooperation and, wherever possible, the resolution of potential conflict through a consensus based decision making process.

### *Policies*

2.2.1 An Intermunicipal Committee (the Committee) shall be established between the County and Town for the purposes of ensuring continued communication between the municipalities and to provide a forum to review and comment on matters that may have an impact on either municipality.

2.2.2 The Committee shall be an advisory body and may make comments or recommendations to the County and Town. In its advisory capacity, the Committee does not have decision making authority or powers with respect to planning matters in the County or Town.

2.2.3 The County and Town agree that the purpose of the Committee is to:

a. provide a forum for discussion of land use matters within the Plan area;

b. provide recommendation(s) for proposed amendments to the Plan;

c. discuss and address issues regarding Plan implementation;

d. review and provide comment on referrals under Section 2.3 and any other matters referred to the Committee;

e. provide recommendation(s) regarding intermunicipal issues in an effort to avoid a dispute;

f. provide a forum for discussion of any other matter of joint interest identified by either municipality.

2.2.4 The Committee shall be comprised of four elected officials, two from the County and two from the Town. Each municipality must also appoint an alternate member. The Committee may, at its discretion, also include whatever number of resource personnel deemed appropriate in a non-decision making capacity. Resource personnel may serve as secretary to the Committee and are responsible for recording the minutes of all Committee meetings and preparing the recommendations of the Committee.

2.2.5 Members of the Committee will make their best efforts to attend each meeting. Quorum of the Committee requires that each municipality is represented by a minimum of two of its committee members or a committee member and an alternate member.

2.2.6 Changes to the Committee format, composition, roles, responsibilities or any aspect of its existence or operation may be requested by either municipality. Council may refer any proposed changes to the Committee for recommendation. Any changes to the Plan require an

amendment to the Plan and adoption in accordance with policy 2.1.2 of Plan Validity and Amendment.

2.2.7 The Committee shall appoint a member as chair at the beginning of each meeting and the position of chair shall alternate between the two municipalities. The Committee shall determine by consensus when and where the meetings will be held.

2.2.8 Meetings of the Committee shall be held at least twice annually or more frequently as required to address items in Part 3. At least five days' notice shall be provided for the scheduling of Committee meetings and shall include an agenda package and background information, unless otherwise agreed to by both municipalities.

2.2.9 The Committee may meet on request (a "called" meeting) by either municipality to review and comment on major development or plan proposals.

2.2.10 If a matter has been referred to the Committee for review and comment as part of a special "called" meeting, the notice and supporting documentation shall be sent to Committee members prior to the meeting as outlined in policy 2.2.8.

2.2.11 Where a matter involving the two municipalities cannot be resolved to the satisfaction of the Committee, the Committee shall provide a report summarizing their discussions to each respective council. At the discretion of either council, the dispute resolution process outlined in this Plan may be initiated.

## 2.3 Intermunicipal Referrals

### *Intent*

To establish a process for consistent and transparent sharing of information necessary to make decisions consistent with the intent of this Plan.

### *Policies*

**Referral Process**

2.3.1 The following documents or applications that affect lands in the Plan area of the County or land in the Town of Coalhurst adjacent to the corporate boundary shall be forwarded to the other municipality for comment prior to a decision being made on the application or document:

- Municipal Development Plans
- Area Structure Plans
- Area Redevelopment Plans
- Conceptual Design Schemes
- Overlay (or Outline or Shadow) Plans
- Land Use Bylaws
- Subdivision Applications
- Discretionary Use Development Applications

2.3.2 The receiving municipality may request the document(s) or application(s) mentioned in 2.3.1 above be referred to the Intermunicipal Committee for comment prior to a decision being rendered.

2.3.3 Any changes to the documents or applications referred to in policy 2.3.1. that may have an impact on the Plan or municipal expansion will be re-circulated to the other municipality and if deemed necessary by either municipality, the Intermunicipal Committee prior to second reading or approval of the document. Based on the significance of the changes, the municipality processing the proposal will consider convening a new public hearing or meeting.

2.3.4 The municipalities are encouraged to refer to each other for comment major land use or planning matters that have the potential to impact the other jurisdiction, even if it involves lands that may not be located within the Plan area.

2.3.5 In the event other matters as described in previous policy 2.3.4 are forwarded onto the adjacent municipality for its consideration or comments, the response timelines as outlined in sections 2.3.6 through 2.3.8 should be respected.

**Response Timelines**

2.3.6 Unless otherwise agreed to by both municipalities, the receiving municipality shall, from the date of mailing, have the following timelines to review and provide comment on intermunicipal referrals:

a. 15 days for development applications;

b. 19 days for subdivision applications; and

c. 30 days for all other intermunicipal referrals.

2.3.7 In the event that an intermunicipal referral is forwarded to the Intermunicipal Committee for review and comment, a Committee meeting will be scheduled as soon as possible and a written Committee response shall be provided within 10 days of the Committee meeting date.

2.3.8 In the event that either municipality and/or the Committee does not reply within, or request an extension to, the response time for intermunicipal referrals stipulated in policy 2.3.3 and 2.3.4, it will be assumed that the responding municipality and/or Committee has no comment or objection to the referred planning document or application.

**Consideration of Referral Responses**

2.3.9 Comments from the receiving municipality and the Intermunicipal Development Plan Committee that are provided prior to or at the public hearing or meeting shall be considered by the municipality in which the plan, scheme, land use bylaw, subdivision application, development application or amendment is being proposed.

## 2.4 Dispute Resolution

### *Intent*

The intent of the dispute resolution process is to maximize opportunities for discussion and review in order to resolve areas of disagreement early in the process. Despite the best efforts of both municipalities it is understood that disputes may arise from time to time affecting land use within the Plan boundaries. The following process is intended to settle dispute through consensus and minimize the need for formal mediation.

### *Policies*

**General Agreement**

2.4.1 The County and Town agree that it is important to avoid dispute by ensuring that the Plan is adhered to as adopted, including full circulation of any permit or application that may affect the municipality or as required in the Plan and prompt enforcement of the Plan policies.

2.4.2 Prior to the meeting of the Committee, each municipality through its administration, will ensure the facts of the issue have been investigated and clarified, and information is made available to both parties. Staff meetings are encouraged to discuss possible solutions.

2.4.3 The Committee should discuss the issue or dispute with the intent to seek a recommended solution by consensus.

**Dispute Resolution**

In the case of a dispute, the following process will be followed to arrive at a solution:

2.4.4 When a potential intermunicipal issue comes to the attention of either municipality relating to a technical or procedural matter such as inadequate notification or prescribed timelines, acknowledgement of a misinterpretation of Plan policies, or a clerical error regarding the policies of this Plan, either municipality's land use bylaw, or any other plan affecting lands in the Plan area, it will be directed to the administrators of each municipality. The administrators will review the technical or procedural matter and if both administrators are in agreement, take action to rectify the matter.

2.4.5 Should either municipality identify an issue related to this Plan that may result in a dispute that cannot be administratively resolved under policy 2.4.4 or any other issue that may result in a dispute, the municipality should contact the other and request that an Intermunicipal Committee meeting be scheduled to discuss the issue. The Committee will review the issue and attempt to resolve the matter by consensus.

2.4.6 Should the Intermunicipal Committee be unable to arrive at a consensus, the administration of each municipality will schedule a joint meeting of the two councils to discuss possible solutions and attempt to reach consensus on the issue.

2.4.7 Should the councils be unable to resolve the matter, either municipality shall be able to initiate a formal mediation process to facilitate resolution of the issue. The conflict resolution arbitration process through the department of Municipal Affairs may be used to facilitate the mediation process.

2.4.8 If the mediation step outlined in 2.4.7 is unsuccessful, either municipality may request the Municipal Government Board to intercede and resolve the issue in accordance with policies 2.4.9 and 2.4.10.

**Filing an Intermunicipal Dispute under the *Municipal Government Act***

2.4.9 In the case of a dispute involving the adoption of a statutory plan, land use bylaw or amendment to such, within 30 days of adoption, the municipality initiating the dispute may, without prejudice, file an appeal to the Municipal Government Board under section 690(1) of the *MGA* so that the provincial statutory right and timeframe to file an appeal is not lost.

2.4.10 The appeal may then be withdrawn, without prejudice, if a solution or agreement is reached between the two municipalities (following the dispute resolution steps of this Plan) prior to the Municipal Government Board meeting. This is to acknowledge and respect that the time required to seek resolution or mediation may not be able to occur within the 30 day appeal filing process as outlined in the *MGA*.

Note: Using section 690(1) of the *MGA* is the final stage of dispute settlement, where the municipalities request the Municipal Government Board to intercede and resolve the issue.

## 2.5 Plan Implementation

### *Intent*

The County and Town agree that a collaborative approach to planning is both necessary and desirable within the Plan area. The policies in the Plan serve as the framework for decision making on subdivision and development proposals. As such, each municipality will need to review and amend their respective Municipal Development Plan and Land Use Bylaw, to achieve consistency with and to implement policies in the Plan. The *MGA* also stipulates that all statutory plans adopted by a municipality must be consistent with each other. To address this, the following process and policies will need to be implemented by each municipality.

### *Adoption*

2.5.1 The County and Town prepared the Plan in accordance with the requirements of the *Municipal Government Act*, including advertising and conducting a public consultation process, prior to passing the respective adopting bylaws.

2.5.2 This Plan comes into effect on the date it was adopted by both the County and Town, after receiving three readings of the bylaw(s).

## *Implementation*

2.5.3 The County and Town agree that they shall ensure that the policies of this Plan are properly, fairly and reasonably implemented.

2.5.4 The Land Use Bylaw and Municipal Development Plan of the County and Town will need to be amended to conform with and reflect specific policies of this Plan. Amendments may be required to address various policy actions that deal with issues such as density, plan hierarchy requirements (e.g. area structure plans, conceptual design schemes, overlay plans), standards for development and ensuring the compatibility of uses within land use districts with respect to the Land Use Concept of the Plan. To achieve conformity upon adoption of the Plan, the County and Town will each undertake the following actions:

a. review and amend the Municipal Development Plan to reflect the principles, goals and policies of this Plan;

b. review, amend and maintain the Land Use Bylaw to ensure the bylaw reflects and conforms to the policies of this Plan.

2.5.5 To achieve continued success in implementing the Plan and help ensure that the goals and coordinated land use planning approach emphasized is successful, the County and Town agree to:

a. consider and respect the Land Use Concept and associated policies outlined in the Plan when making decisions on subdivision and development proposals and when considering other municipal bylaws and plans; and

b. require that all area structure plan or conceptual design scheme proposals submitted by a developer/landowner within the Plan area conform to the principles and policies of the Plan; and

c. consult on an on-going basis and will refer to each other major land use or planning matters that have the potential to impact the other jurisdiction, even if it involves land that may not be located within the Plan area.

2.5.6 The County and Town will monitor and review the policies of the Plan to ensure the policies remain current, relevant and continue to meet the needs of both municipalities.

2.5.7 The South Saskatchewan Regional Plan (SSRP) has been completed and came into effect September 1, 2014. The County and Town are under the mandate of this legislation and will consider the following in respect of the South Saskatchewan Regional Plan legislation:

a. the County and Town agree that they will comply with the adopted regional plan strategies, and are of the opinion this Plan aligns with strategies of the SSRP;

b. after the Plan's adoption, if it is subsequently determined that additional amendments are needed to the Plan to adhere to provincial requirements of the SSRP, both municipalities will review and discuss possible amendments through the Intermunicipal Development Plan Committee.

2.5.8 When any amendments to the Plan are proposed, the municipalities must follow the process and policies as outlined in Section 2.1 of the Plan. No amendment shall come into force until such time as both municipalities adopt the amending bylaw.





# PART 3: LAND USE CONCEPTS

***- A shared vision for the future -***

# PART 3: LAND USE CONCEPTS

## 3.1 Coordinated Growth Management and Land Use Concepts

Lethbridge County and the Town of Coalhurst recognize the need for coordinated land use planning regarding subdivision and development in the fringe and have established a Land Use Concept (Map 2) which forms the basis for the policies of this Plan. The Land Use Concept is intended to efficiently manage growth in the fringe and ensure compatible development patterns that meet the needs of both municipalities. The Land Use Concept establishes a broad framework for future development in the fringe and the likely area of urban expansion for the Town. The general locations for future land uses and major transportation routes and road linkages are identified in the Plan in order to assist decision makers in the review of subdivision and development proposals within the fringe.

### *Intent*

The Land Use Concept serves as the framework for subdivision and development proposals in the fringe ensuring development takes place in an orderly and efficient manner.

### *Land Use Concept*

The Land Use Concept (Concept) establishes the general locations for future land uses, potential road network considerations and the Town's desired growth direction in the fringe. The future land uses identified in the Concept serve as a guide in locating future land uses and development in order to ensure the compatibility of uses and minimize potential negative impacts. Country residential development in the County will be primarily considered in the fragmented areas north and northeast of the Town based on land use suitability. Industrial development will be directed to the northwest which is compatible and consistent with the pattern of industrial development in proximity to Highway 3, the Kipp CPR rail-yard and the rail-line. Land use to the west of the Town and west of Highway 3 will be encouraged to remain in agricultural use consistent with the County's policies. Commercial/light industrial development may be considered along Highway 25 at specific nodal locations recognizing that these areas are not intended for purely commercial use and that other types of uses may locate in the area (i.e. agriculture, isolated residence). Any type of development along the highway will be subject to requirements of Alberta Transportation.

The Town's preferred growth directions have been identified in the Land Use Concept (Maps 7-8) and any subdivision and development proposals within these areas may, in accordance with the policies of this Plan, be subject to additional standards which are intended to create cohesive development patterns and allow for an orderly and efficient transition to urban densities in the future. Subdivisions and development in the County for this area should be limited to the agricultural land use policies.

## 3.2 General Plan Policies

### *Intent*

These policies are not limited to specific areas within the Plan, but are general policies applicable to all land, proposals and processes pertaining to the Plan.

**Policies**

3.2.1 Existing land uses with valid development permits that exist as of the date of approval of this Plan may continue to operate in accordance with the provisions of the Lethbridge County Land Use Bylaw and the *Municipal Government Act*. New applications for subdivision and development on these lands shall be subject to this Plan's policies.

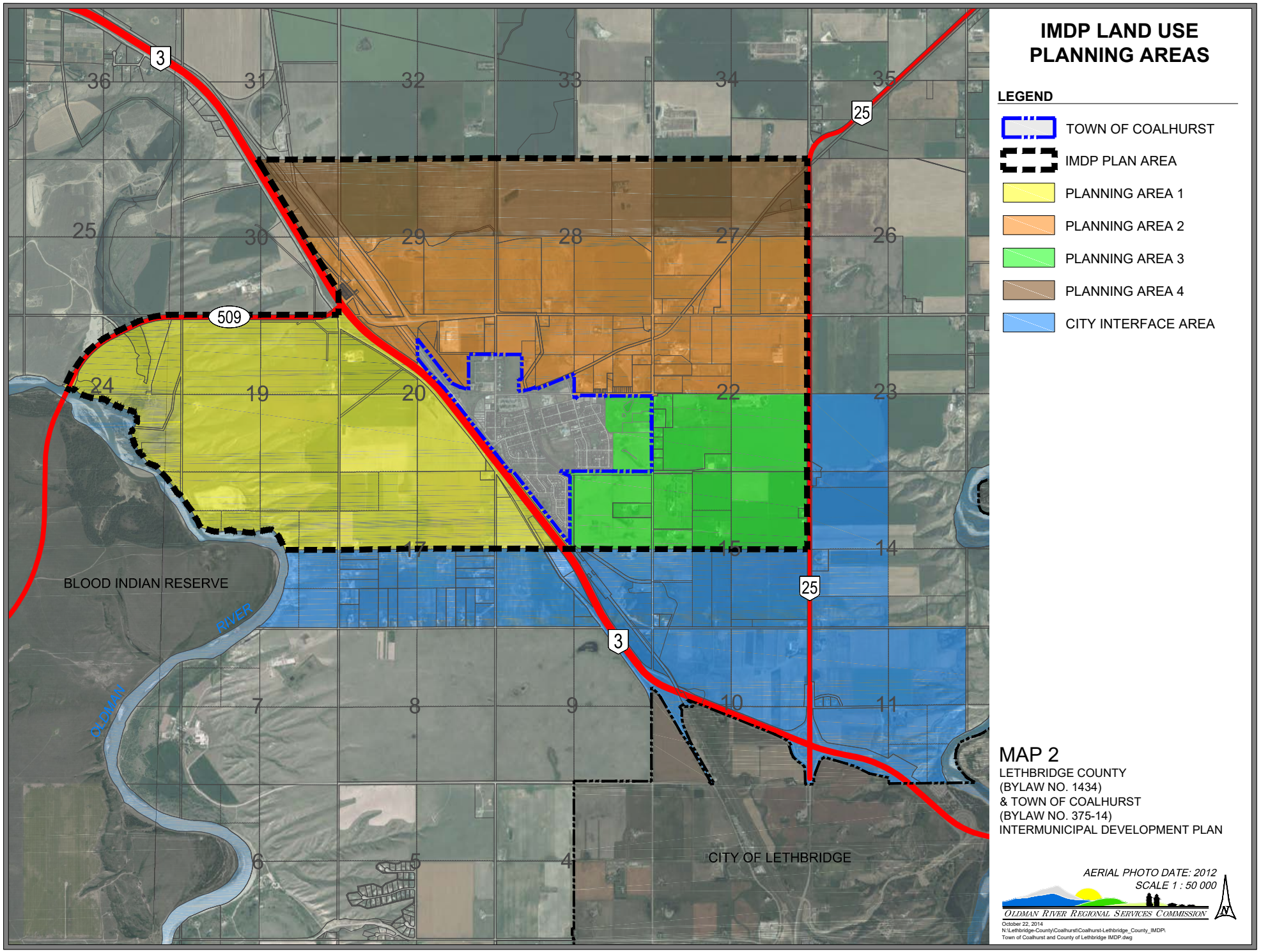
3.2.2 Any application submitted for redesignation may be required to be accompanied by a professionally prepared Area Structure Plan containing the information requirements as prescribed in the Lethbridge County Land Use Bylaw, Municipal Development Plan and Part 6 of this Plan.

3.2.3 When Area Structure Plans are required for land within the Town adjacent to the municipal boundary, and within the County in the IMDP boundary area, both municipalities shall stipulate that any of the required plans, design schemes or other reports in support of major subdivisions/developments must be professionally prepared and engineered.

3.2.4 Land use proposals that may not conform or are not clearly defined in the Plan may be discussed and considered with agreement between the two municipalities. Such proposals must be brought before a meeting of the Intermunicipal Committee for discussion and comment, and any major amendments to the Plan must be agreed to by both municipal councils and adopted in conjunction with Part 2, policy 2.1.2.

## 3.3 Planning Area 1 (West of Highway 3)

Planning Area 1 is situated on the west side of Highway 3 (eastside of the Oldman River) and primarily south of Highway 509 (Map 3). The area is mainly utilized for agriculture with some isolated country residential uses, crown land, and a CFO in the northwest portion. Near the river valley there is an approved grouped country residential development encompassing approximately 8.1 ha (20 acres) of coulee-top land located on the N½ of the NE 18-9-22-W4 [a 32.4-ha (80-acre) title], with the land designated for this and an area structure plan approved (Bluestone Developments). However, this land has been purchased by the Blood Tribe and an application for reserve status on the land has been made. Thus, this proposal may never go ahead, or if it does, it will likely be once it is part of the reserve. The Blood Tribe has obtained ownership of approximately 259.0 ha (640 acres) of land in Sections 18 and 19 of 9-22-W4, with the application for Addition to Reserve (ATR) status formally initiated on all these lands, which may be up to a 15-year process. The Blood Tribe has indicted that they do have a desire to develop for non-agricultural use the land that they have obtained in the County. This would likely need various servicing agreements with the County and Town to be realized.


IMDP LAND USE
PLANNING AREAS
LEGEND
TOWN OF COALHURST
IMDP PLAN AREA
PLANNING AREA 1
PLANNING AREA 2
PLANNING AREA 3
PLANNING AREA 4
CITY INTERFACE AREA
BLOOD INDIAN RESERVE
OLDMAN RIVER
CITY OF LETHBRIDGE
3
25
509
MAP 2
LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN
AERIAL PHOTO DATE: 2012
SCALE 1 : 50 000
OLDMAN RIVER REGIONAL SERVICES COMMISSION
October 22, 2014
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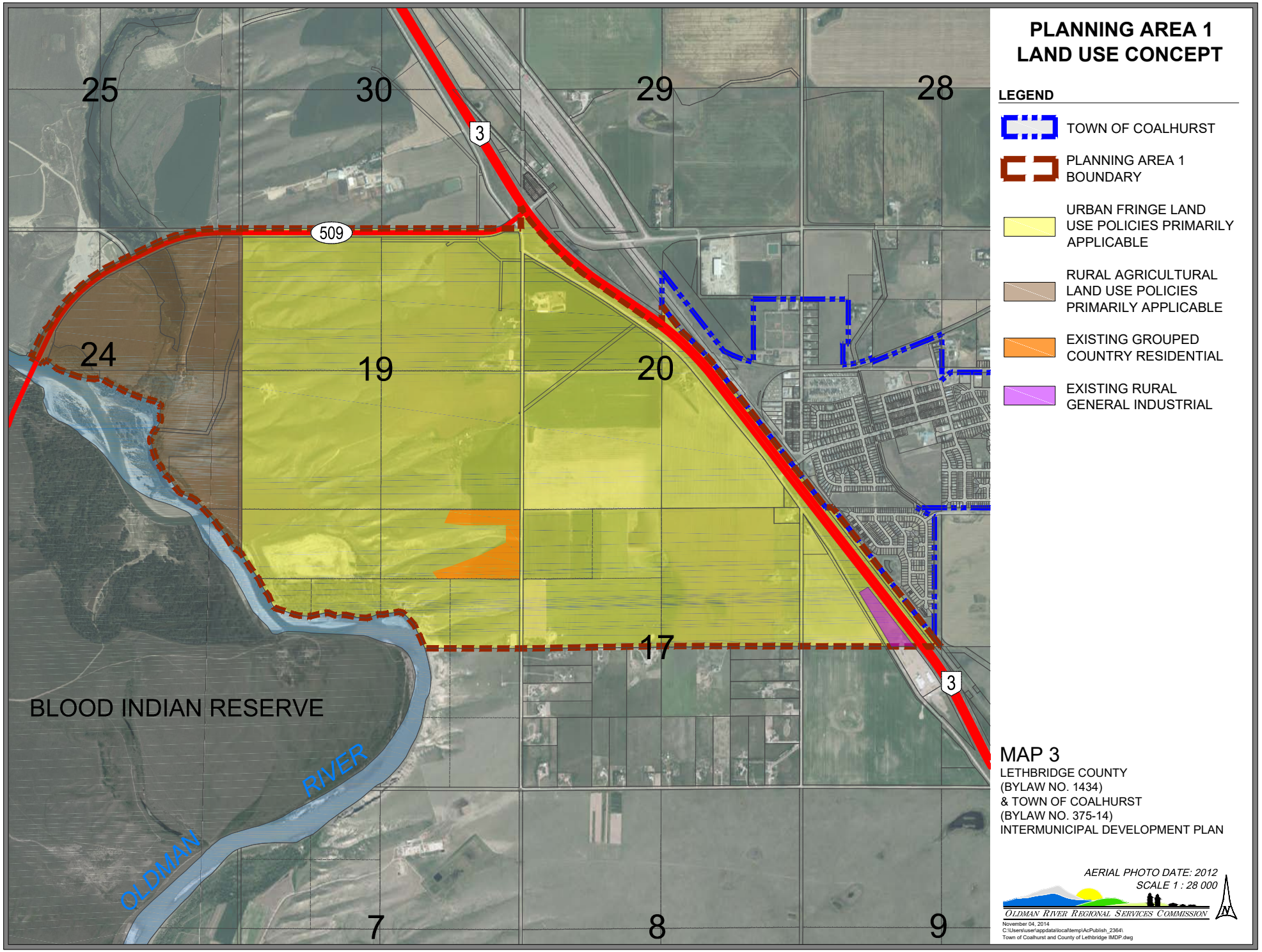


# PLANNING AREA 1
# LAND USE CONCEPT

**LEGEND**

- TOWN OF COALHURST
- PLANNING AREA 1 BOUNDARY
- URBAN FRINGE LAND USE POLICIES PRIMARILY APPLICABLE
- RURAL AGRICULTURAL LAND USE POLICIES PRIMARILY APPLICABLE
- EXISTING GROUPED COUNTRY RESIDENTIAL
- EXISTING RURAL GENERAL INDUSTRIAL

## MAP 3

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 28 000*

OLDMAN RIVER REGIONAL SERVICES COMMISSION

November 04, 2014
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Town of Coalhurst and County of Lethbridge IMDP.dwg

The vision for this west area is to continue to use these lands for primarily agricultural purposes while providing for some very limited isolated non-agricultural development in areas deemed suitable and appropriate. It is not anticipated that there would be any additional grouped country residential development located within this area. One small exception may be adjacent to the river valley, south of Highway 509, if deemed suitable with proper engineering studies and access. A concern identified with additional non-agricultural development west of Highway 3 is the safety issue with the intersection at the entrance to the Town of Coalhurst. Consideration for development should take into account the type of use proposed and any anticipated traffic volumes. An additional issue in considering appropriate land use is the Animal Disease Research Institute (ADRI) lands to the south and potential impacts to their operations. It is impractical for the Town to grow or develop on the west side of Highway 3 due to the severance of development by the highway and rail-line, access issues, and servicing constraints.

Therefore, for Planning Area 1, the County's present agricultural and urban fringe policies are to be applied, with the one exception being the application of the CFO exclusion area as prescribed in Section 4.1 of the Plan. The current Lethbridge County 'rural urban fringe' policy shall be followed in this area. Allowable uses include extensive agriculture including agricultural buildings, isolated residential dwellings, bed and breakfasts, home occupations, accessory buildings, etc. Existing applicable subdivision policy includes one subdivision per quarter section and further subdivisions on lands of 8.1 ha (20 acres) or less of farmland.

## *Policies*

3.3.1 Agricultural uses (non-intensive) shall be the primary use of land in this area. The CFO policies and exclusion area as prescribed in Section 4.1 of the Plan shall be applied.

3.3.2 Subdivision and development in Planning Area 1 is regulated by any and all applicable County agricultural policies (related to extensive agriculture) contained in the County's Municipal Development Plan and Land Use Bylaw and any other relevant policies that may be contained in this Plan.

3.3.3 Subdivision within this area shall be governed by the County's agricultural and urban fringe subdivision policies within the County's Land Use Bylaw, which generally restricts subdivision to a single title out of a quarter-section or the resubdivision of titles containing 8.1 ha (20 acres) or less of agricultural land.

3.3.4 Non-agricultural land uses or developments which are considered as noxious or hazardous uses, where such a use may negatively impact (i.e. smoke, dust, noise, vibration or glare) neighboring land uses, or heavy industrial type uses shall be prohibited from being established in this area.

3.3.5 Non-agricultural buildings and uses in Planning Area 1 (specifically commercial and industrial) shall be considered on the basis of anticipated traffic volumes and potential impacts to the intersection at Highway 3 and the Town of Coalhurst entrance, and any use which is determined to have a major traffic impact shall not be approved.

3.3.6 To soften any negative visual impacts that may exist on the highway corridor (Highway 3), consideration shall be given (at the development permit stage) to effectively and appropriately screen developments (or part thereof) from the view of the travelling public.

3.3.7 Any non-agricultural development located in either municipality that is visible from the highway corridor area (Highway 3) shall provide landscaping and architectural elements that enhance the visual/aesthetic appeal and impact along roadways for the travelling public, as per Schedule A of this Plan.

3.3.8 Non-agricultural buildings and uses (such as isolated commercial and industrial), or intensive agricultural uses or buildings that may be better located within a commercial or light industrial business park area, shall be required to locate the proposed business operation within Planning Area 2 identified sub-planning areas (or specifically Planning Area 2A, 2B, 2C or 2H as the case may be) of the Plan.

3.3.9 The County and Town agree to consult and coordinate with each other regarding any potential development plans on lands south of Highway 509 and west of Highway 3, if either municipality is approached regarding the provision of municipal services.

3.3.10 Grouped country residential development proposals adjacent to the river valley shall be considered on the basis of the servicing and infrastructure requirements of this plan being met and the provision of an acceptable Area Structure Plan being prepared.

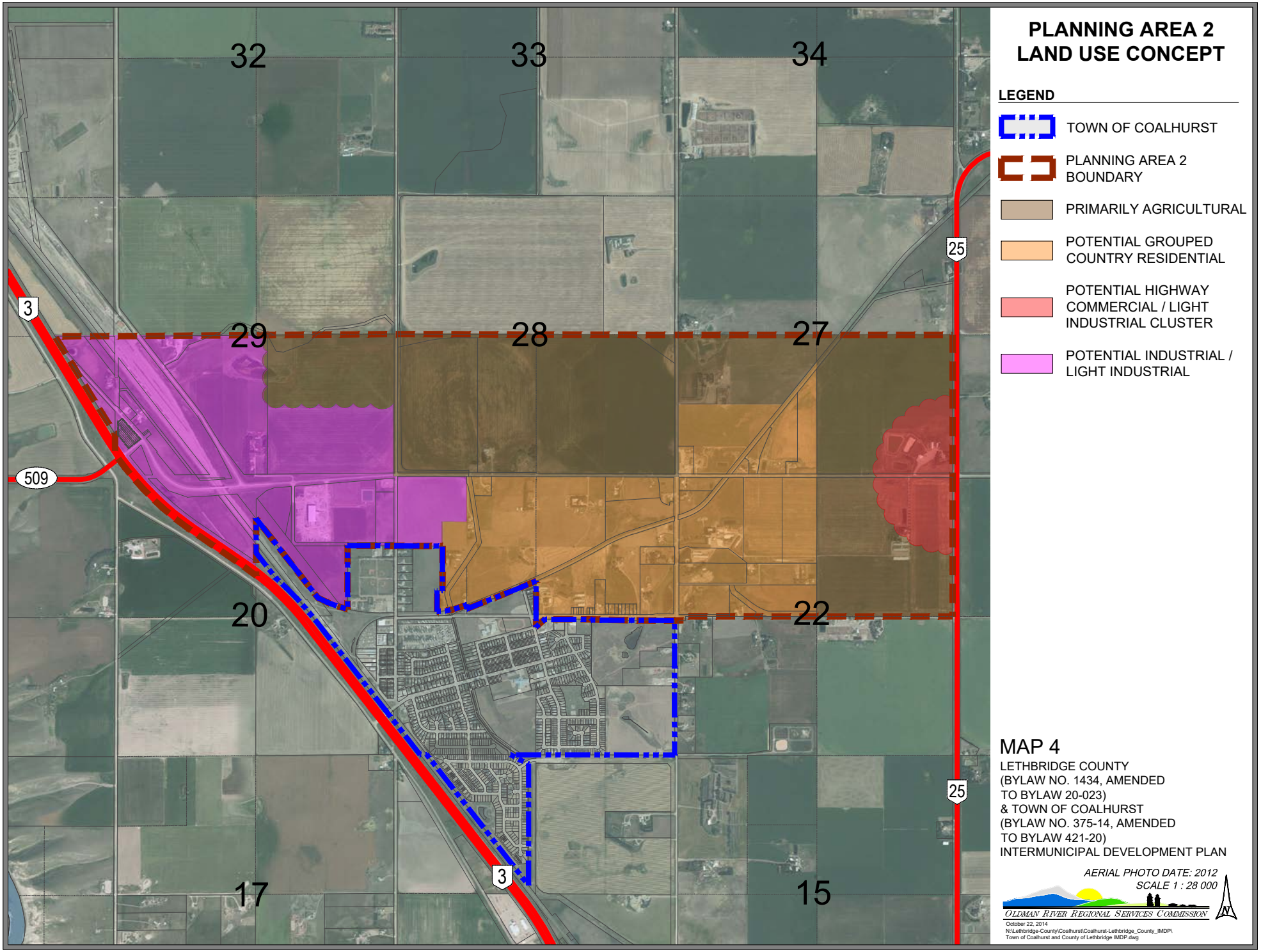
## 3.4 Planning Area 2 (North-Northeast – between Highways 3 and 25)

Planning Area 2 is located in the northern portion of the Plan area (Map 4). It is bordered on the west by Highway 3 and the CPR rail-line, and follows each quarter section on both sides of the Kipp Road out east to Highway 25. This planning area consists of approximately 641.1 ha (1,585 acres) of land which currently contains a number of land uses, including agriculture, industrial and country residential acreages.

The long-range vision for this area is illustrated within the Area Land Use Concept on Map 4 and would continue to generally provide for the development of a mix of land uses albeit in a planned and managed approach. The irrigated and larger tracts of good agricultural land are to be protected and are to remain as primarily designated for agriculture. The western portion, north of the Town and adjacent to the CPR rail-line, would be the focus for industrial type uses. The area northeast of Town could accommodate some further in-fill country residential use, while the intersection of the Kipp Road and Highway 25 may potentially allow a development cluster/node containing rural commercial, light industrial businesses restricted to the west side of the highway.

Highway 25 will be upgraded and widened in the future as part of the eventual construction of the Canamex Freeway corridor by Alberta Transportation. As part of the economic strategy of the County to increase its non-agricultural tax base, it would be beneficial to the County to have land designated for commercial/light industrial use on a highly accessible and visible transportation corridor that is paved. The types of uses deemed appropriate will be dependent on servicing capabilities/constraints. It should be noted that the development of this cluster would be based on a more detailed land use concept that would require the development of a paralleling or internal service road off Highway 25 from the Kipp Road, providing for a central access/egress point into the development area.

Planning Area 2 is the primary development area identified within the Plan boundary for County focused development, and is where future industrial/commercial type development shall be directed. Since the




# PLANNING AREA 2
# LAND USE CONCEPT

**LEGEND**

- TOWN OF COALHURST
- PLANNING AREA 2 BOUNDARY
- PRIMARILY AGRICULTURAL
- POTENTIAL GROUPED COUNTRY RESIDENTIAL
- POTENTIAL HIGHWAY COMMERCIAL / LIGHT INDUSTRIAL CLUSTER
- POTENTIAL INDUSTRIAL / LIGHT INDUSTRIAL

## MAP 4

LETHBRIDGE COUNTY
(BYLAW NO. 1434, AMENDED
TO BYLAW 20-023)
& TOWN OF COALHURST
(BYLAW NO. 375-14, AMENDED
TO BYLAW 421-20)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 28 000*

OLDMAN RIVER REGIONAL SERVICES COMMISSION

October 22, 2014
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Town of Coalhurst and County of Lethbridge IMDP.dwg

May 04, 2021

initial adoption of the IMDP in 2014, an area structure plan has been prepared by the County and Town in 2020, utilizing a collaborative approach to joint planning, for lands found within sub-planning Areas 2A, 2B and 2C, and a complete copy of the plan is attached in Appendix B. There are transition land areas adjacent to the boundary of the Town that are logical to support future town growth and may be able to connect to infrastructure lines in the future. The historically fragmented acreage area to the northeast of Town is an area identified for further country residential development subject to further planning, engineering and design work. Planning Area 2 is subject to more detailed planning policies and has been broken down into sub-planning areas to manage accordingly. As this planning area proposes the development of a number of more intensive non-agricultural land uses, any future development decisions will be made in consideration of additional planning exercises and acceptable engineering and servicing standards. In addition to the North Coalhurst – Kipp Area Structure Plan, other area structure plans (ASPs) will need to be prepared for the other identified sub-planning areas to address the principles of an orderly, managed approach to growth.

Lands within North Coalhurst – Kipp Area Structure Plan have been identified as suitable for industrial type land uses, as there are a number of such uses already established in the area. It has convenient access to major transportation routes (both highway, local pavement and rail) and the area south of the Kipp Road is in proximity to municipal services such as water and sanitary sewer that may have the potential to be extended in the future when feasible (if agreed to and available). In planning and providing for infrastructure linkages to the Town, this may be explored in the future (when warranted) or at such a time as deemed appropriate by the County and Town. It must be recognized that presently there are constraints in this area to providing infrastructure services from the south within the Town, in regards to both physical challenges (e.g. due to topography), and the cost to engineer and install the systems. In considering the provision of any services outside municipal boundaries, there are also limitations (e.g. contractual, licensing) as to what the Town can provide. The success of future development in Planning Area 2 therefore, is dependent on feasible and logical land use planning, on-going collaboration between the two municipalities, agreement on a fair and shared vision for the area, and several methods of implementation and future actions/agreements. This is further described in the North Coalhurst - Kipp Area Structure Plan (Appendix B).

## *Policies*

**General Applicability**

3.4.1 Existing land uses are “grandfathered” and may continue to operate and exist in compliance with an existing development permit approval. The intensification or a change in land use for an existing development/operation shall require a new development permit. Any and all development and subdivision proposals shall comply with this IMDP.

3.4.2 Both municipalities agree that the types of uses acceptable for northwest portion, Areas 2A and 2B (refer to Map 5 - Planning Area 2) are various industrial uses as outlined in the next section (Sub-planning Area 2A and 2B, policies 3.4.17, 3.4.20, 3.4.21) and which must conform to the additional criteria in this section of the Plan.

3.4.3 Grouped country residential uses shall be located (generally) in accordance with Map 5 (Concept – Planning Areas 2D through 2G).

3.4.4 Highway commercial type businesses and/or business/light industrial uses may be considered in the east portion of Planning Area 2, adjacent to the Kipp Road and restricted to the west side of Highway 25, as a cluster/node type development (Area 2H on Maps 4 and 5). This will require consultation with Alberta Transportation and be dependent on the types of uses proposed and servicing availability in respect of this.

3.4.5 Outside the stipulated sub-planning areas, subdivision and development of agricultural land in Planning Area 2 shall be regulated by all applicable County agricultural policies (related to extensive agriculture) contained in the County's Municipal Development Plan and Land Use Bylaw and any other relevant policies that may be contained in this Plan.

3.4.6 Subdivision within the identified agricultural land area (referenced on maps as Primarily Agricultural Land Use) shall be governed by the County's current agricultural subdivision policies within the County's Land Use Bylaw.

3.4.7 Non-agricultural buildings and uses or intensive agricultural uses that may more suitably be located within a commercial or industrial area shall be required to locate the proposed business operation within sub-planning areas 2A and 2B (or in the commercial cluster on Highway 25 as the case may be) of the Plan, and parcels outside those predetermined areas should not be considered eligible for redesignation to industrial land use districts.

3.4.8 Area Structure Plans may be required prior to multi-lot subdivision or at the redesignation stage for development proposals in any of the stipulated sub-planning areas (2D through 2G, and the area 2H Highway 25 cluster) submitted in compliance with the requirements of this Plan (Section 6.1) and the County's Municipal Development Plan. An ASP, with preliminary engineering, has been prepared for Areas 2A, 2B and 2C, and is attached in Appendix B

3.4.9 Area Structure Plans submitted by a developer/landowner must be professionally prepared at the developer's expense and shall comply with all relevant and applicable policies and schedules of this IMDP. (Note: refer to Section 6.1 which outlines the information requirements and what ASPs must address, including, but not limited to, transportation linkages, servicing, fire suppression, soil conditions, sub-surface conditions, and storm water management, etc.)

3.4.10 Developers shall provide and construct at their expense the required access, service roads, or major and minor roadways as needed in accordance with Alberta Transportation conditions, municipal requirements, and the transportation policies in Part 4, Section 4.2 and Part 5, Section 5.3 of the Plan. The County will use "*Endeavor to Assist*" agreements wherever possible to aid the initially develop to recoup planning/engineering costs that later developers may benefit from.

3.4.11 Developers shall be responsible to provide at their expense Traffic Impact Assessments that may be required by Alberta Transportation for any subdivision or development which may impact the provincial road network.

3.4.12 When considering applications for redesignation, subdivision and/or development approval for industrial, business light industrial, or commercial uses, all applications must meet or exceed the policy for minimum performance standards and development design guidelines as outlined in Schedule A of the Plan.

3.4.13 The types of industrial land use development permits approved in sub-planning Areas 2A and 2B will be dependent on the need and availability of servicing in relation to that use and will be subject to the servicing and land use provisions as stipulated in the North Coalhurst - Kipp Area Structure Plan in Appendix B.

3.4.14 Any development that either produces or is categorized as a high water user shall be required to connect to municipal water and sewer services if available, otherwise a development permit will be denied. Individual private septic systems shall not be permitted for those uses falling into this category, which may include, but is not limited to, restaurants, hotels, car/truck washes, and various manufacturing or processing facilities.

3.4.15 Developers shall provide and construct at their own expense the required servicing infrastructure (e.g. water, sewer, storm water management, fire suppression, and roads) necessary to serve a subdivision or development, as outlined in Part 5 of the Plan.

**Sub-planning Area 2A and 2B (Industrial/Business Use)**

3.4.16 As outlined in the Goals section of this Plan (see Part 1, Goal 3), the intent of this Plan is that sub-planning Area 2A (north side of Kipp Road) remains under the jurisdiction of the County, unless otherwise agreed to by both parties. Additional related policies for sub-planning Area 2A are found in the North Coalhurst - Kipp Area Structure Plan in Appendix B.

3.4.17 Sub-planning Area 2A may be designated to any of the industrial land use districts contained within the County's Land Use Bylaw, with consideration for adjacent land uses, servicing needs, and Area Structure Plan policies. Development proposal considerations shall take into account if the use is noxious or hazardous, and if such a use may negatively impact (i.e. smoke, dust, noise, vibration or glare) neighboring land uses, in determining its eligibility for approval.

3.4.18 The development or subdivision for industrial and commercial purposes of lands identified in the North Coalhurst - Kipp Area Structure Plan will occur in phases in accordance with the ASP. Until such time, area 2 (A2) is to remain primarily agricultural.

3.4.19 An exception to the aforementioned policy 3.4.18 may be considered in circumstances where there is a high need demand for a large tract of land [e.g. 8.1 ha (20 acres) or more] for development or a landowner in area 2A1 is not willing to participate in the process.

3.4.20 For sub-planning Area 2B, immediately north of the Town boundary, it shall not be designated to the Rural Heavy Industrial land use district if it is developed within the County

3.4.21 For Area 2B, only light industrial or business park type uses are acceptable, due to the location and proximity to residences. Noxious or hazardous uses, where such a use may negatively impact (i.e. smoke, dust, noise, vibration or glare) neighboring land uses, or heavy industrial type uses shall be prohibited from being established in this area.

3.4.22 The North Coalhurst - Kipp Area Structure Plan contains specific policies that must be adhered to should individual private landowners/developers choose to pursue development of the area. The plan includes a design concept for lands both north and south of Kipp Road (Sub-planning Areas 2A, 2B and 2C) and a framework to address the capacity for shared municipal service delivery of water, sewer and storm water infrastructure.

3.4.23 Sub-planning Area 2C has been included in the North Coalhurst - Kipp Area Structure Plan for planning integration and infrastructure servicing considerations. Areas 2B and 2C* may be planned and developed independently but must have regard and consideration for land use and servicing linkages to the adjacent development cell, especially roadways and drainage. (*Note: Sub-planning Area 2C was identified as agricultural land use in the 2014 IMDP adoption, but has been included in the overall planning scheme found in Appendix B).

3.4.24 At the time of subdivision or development of lands within sub-planning Area 2B, special design measures may be applied to the approval of an application including the application of increased setbacks and separations, screening, buffering, earth berming, landscaping, or fencing (or a reasonable combination thereof) for the purposes of mitigating potential nuisance impacts.

3.4.25 If either sub-planning Area 2B or 2C are developed without municipal water and/or sewer services, then all development must consider proposed transportation corridors, lot layout configuration and storm water management design plan. The ability to pursue subdivision in the future may not be permitted if it does not conform to the engineered plan found in the North Coalhurst - Kipp Area Structure Plan.

3.4.26 Lands within the Town of Coalhurst, adjacent to and immediately south of sub-planning Area 2C, have been integrated into the North Coalhurst - Kipp Area Structure Plan design concept, with specific consideration given to infrastructure planning for roads, water, and waste and storm water. This area is deemed to be included within the IMDP policy framework and the boundary of the ASP.

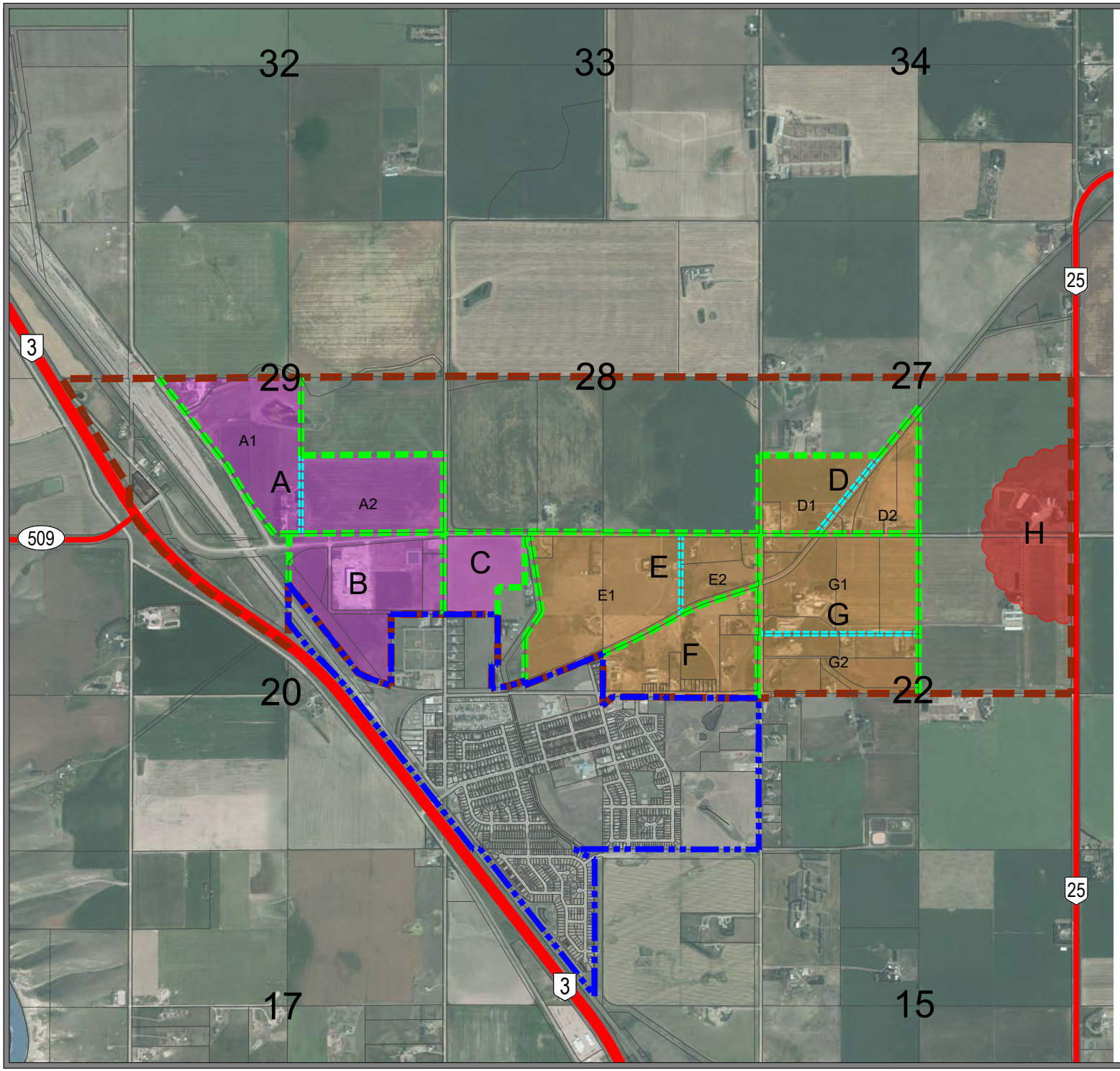
3.4.27 The North Coalhurst - Kipp Area Structure Plan in Appendix B forms part of this IDP as a statutory planning document. It may be amended from time to time by Lethbridge County and the Town of Coalhurst in accordance with the administration and implementation policies of this Plan.

3.4.28 In consideration of providing municipal services to areas or proposals agreed to between the two municipalities, the County and the Town may create and apply off-site levies, local improvement levies, development charges, and/or servicing fees to any and all development areas as part of a joint intermunicipal agreement. Developers shall be responsible for paying their applicable share of any such fees as it relates to their land or development proposal.

3.4.29 Lethbridge County and the Town of Coalhurst may need to enter into agreement(s) separate from the IMDP to address joint servicing, expenditures, or revenue sharing specific to the development of lands within the North Coalhurst - Kipp Area Structure Plan. The two municipalities recognize the expenditures component will need to address the on-going management/maintenance of municipal infrastructure for any shared venture.

**Sub-planning Area 2D - 2G (Grouped Country Residential Use)**

3.4.30 Prior to any further subdivision of parcels in sub-planning Areas 2D - 2G, redesignation applications to change the land to the “Grouped Country Residential” land use district must be submitted to the County for approval. (The re-split of an existing title that is 8.1 ha (20 acres) or less in size will not be considered without a redesignation being approved due to the fragmentation of the area and number of titles in existence.)




# PLANNING AREA 2
# SUB-PLANNING AREAS

**LEGEND**

- TOWN OF COALHURST
- PLANNING AREA 2 BOUNDARY
- SUB-PLANNING AREA BOUNDARY
- D — SUB-PLANNING AREA LABEL
- SUB-PLANNING AREA DEVELOPMENT CELL DIVISION
- D2 — SUB-PLANNING AREA DEVELOPMENT CELL LABEL
- INDUSTRIAL/ LIGHT INDUSTRIAL SUB-PLANNING AREAS
- GROUPED COUNTRY RESIDENTIAL SUB-PLANNNING AREAS
- POTENTIAL HIGHWAY COMMERCIAL / LIGHT INDUSTRIAL CLUSTER

## MAP 5

LETHBRIDGE COUNTY
(BYLAW NO. 1434, AMENDED
TO BYLAW 20-023)
& TOWN OF COALHURST
(BYLAW NO. 375-14, AMENDED
TO BYLAW 421-20)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 28 000*

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May 04, 2021

3.4.31 Applications for subdivision shall be supported by a professionally prepared Area Structure Plan that meets the requirements of Part 6 of this plan. For this area, all Area Structure Plans must address sub-surface conditions regarding underground mining activity and include a geotechnical investigation to determine any potential impacts. (Sub-planning Area 2D, north of the Kipp Road may be exempted from this requirement if determined to not be applicable.)

3.4.32 If an adjacent landowner under separate title within a defined development cell is unwilling to participate in the process, the initial developer will be required to plan for all those lands that are included in the specified ASP area, in order to create a cohesive subdivision plan. The County may use "*Endeavor to Assist*" agreements wherever possible to aid the initial developer to recoup planning/engineering costs that later developers may benefit from.

3.4.33 Land identified as "Grouped Country Residential" in sub-planning areas 2D - 2G (Map 5), will be limited to a maximum gross density of 4 lots per 4.05 ha (10 acres), with a minimum 0.81 ha (2 acres) of developable land parcel size, provided the soils are capable of supporting such a density and the proposal is consistent with the infrastructure and servicing requirements.

3.4.34 For sub-planning areas 2D1 and 2D2, separate Area Concept Plans or Area Structure Plans may be prepared individually for each development cell on either side of the railway right-of-way title.

3.4.35 For sub-planning areas 2E1 and 2E2, and 2G1 and 2G2 separate Area Structure Plans may be prepared for each development cell; however, any plan must take into consideration any servicing linkages (e.g. road alignments, access points, servicing corridors or utility rights-of-way) to the adjacent development cell, especially in regard to future roadways.

3.4.36 To address the planning integration as required in policy 3.4.30, an "overlay or shadow plan" may be required to be provided for the adjacent development cell if a plan has not been prepared for that area.

3.4.37 For sub-planning area 2G, any Area Structure Plan prepared for either area 2G1 or 2G2 must consider in the subdivision layout and design the approximate location of the required future roadways and the alignment as illustrated on Map 6.

3.4.38 For sub-planning area 2F, an Area Structure Plan must be prepared for the entire area south of rail-line which must provide for a logical internal road network to enable parcels to have direct physical road access. All Area Structure Plan requirements are applicable to this area including the provision of a geotechnical investigation to address sub-surface conditions pertaining to underground mining activity.

3.4.39 In a portion of sub-planning Area 2F, for parcels that contain (or have previously contained) a confined feeding operation, the associated buildings and infrastructure must be properly decommissioned and the soils professionally tested to verify suitability prior to permitting additional country residential subdivision on those parcels.

3.4.40 Existing titles in sub-planning Area 2F of the County that do not meet the County's 0.81-ha (2-acre) minimum lot size are ineligible to be further subdivided and development on these lots must consider and adequately address the situation of suitable septic disposal at present standards.

3.4.41 The identified "Grouped Country Residential" area shall attempt to incorporate sustainable development practices whenever possible [e.g. practices which include building orientation and siting which preserves open or rural space, Low Impact Development (LID) components for stormwater drainage, water retention, and shared access approaches, etc.]. Developers must work with neighbors and existing residents to create a cohesive unified subdivision plan.

3.4.42 Any future residential development for parcels that may be located adjacent to the railway should consider and implement special design or siting measures that will mitigate nuisance impacts such as noise and vibration that may be present from existing railway operations, such as green space and landscaped buffer areas, unless the parcel size is sufficient to allow the dwelling to be setback a minimum of 75 metres (246 ft.) from the CPR property line.

3.4.43 Individual on-site private treatment septic systems are acceptable in sub-planning Areas 2D - 2G, provided a professional soils analysis is completed with favorable results in accordance with the requirements of Part 5 of the Plan.

## 3.5 Planning Area 3 (South and East)

Planning Area 3 is south and east of the present town boundaries, as shown in Map 7, and is approximately 356.1 ha (880 acres) in size.

This area presents a number of interests for the County and Town (Map 7). The westernmost portion of Area 3 is being formally considered for annexation due to its proximity to existing urban development and ease of servicing. Portions of the SE 21 within the current Town boundary, and SW 22 and NW 15-9-22-W4M may also be suitable for future urban expansion to accommodate additional residential, commercial and industrial development for the Town (Map 8). Coalhurst's sewage lagoons are located in the east portion of Area 3, which must be considered in the overall planning for the area, especially in regard to setback requirements. The 32.4-ha (80-acre) parcel identified on Map 8 has been purchased by the Town in order that a large storm water retention pond may be sited here in the future. Conversely, the easternmost portion of Area 3 is made up of good agricultural lands that have undergone minimal fragmentation. As such, these lands may be best suited for continued agricultural use.

Constraints in Area 3 include the remnants of historic uses such as the shale pits and slag collection areas from mining operations, the prohibition of residential development within 300 metres (984 ft.) of the sewage lagoons, and drainage problems in certain locations (Map 8).

Area 3 will benefit from future planning that addresses transportation network connectivity including the alignment of necessary major and minor roadways, the identification of uses compatible with observed opportunities and constraints, and the undertaking of annexation by the Town that follows the requirements of this Plan. As the policies for this area indicate, future planning should be of sufficient detail to provide a comprehensive understanding of all proposed subdivision and development. As such, Area 3 is further divided into sub-planning areas, each of which focuses on the specific intent of the sub-area, as identified on Map 8.

## *Policies*

**General**

3.5.1 For all of Planning Area 3, the alignment of future arterial and collector roads shall be jointly identified and decided upon by the County and Town prior to multi-lot subdivision and/or major development occurring in Area 3, and that portion of Area 2 adjacent to Area 3.

3.5.2 No residential development or development related to the processing and/or preparation/ serving of food shall be permitted within 300 metres (984 ft.) of the Town's sewage lagoons, as per section 12 of the Province of Alberta's *Subdivision and Development Regulation*.

3.5.3 Any subdivision and/or development proposal on Area 3 lands within the County or Town with known constraints shall include professionally prepared reports relating to the mitigation of the constraint(s), any work required to mitigate or eliminate the constraint(s) and associated cost estimates.

3.5.4 Where feasible, the County and Town should jointly develop and implement storm water planning and infrastructure to make use of the potential cost and land use efficiencies gained through the sharing of this infrastructure.

**Sub-planning Area 3A: Proposed Annexation Area**

3.5.5 Additional subdivision, change of land use designation or development within the NE 16-9-22-W4M shall be strongly discouraged while the lands in the Proposed Annexation Area are in the County's jurisdiction.

3.5.6 If and when the Town chooses to initiate the formal process of annexation in the lands described in policy 3.5.5, all requirements of this Plan shall be met.

**Sub-planning Area 3B: Future Urban Growth Area**

3.5.7 For lands currently in the County's jurisdiction, the subdivision of lands identified as being within the Future Urban Growth area should be discouraged.

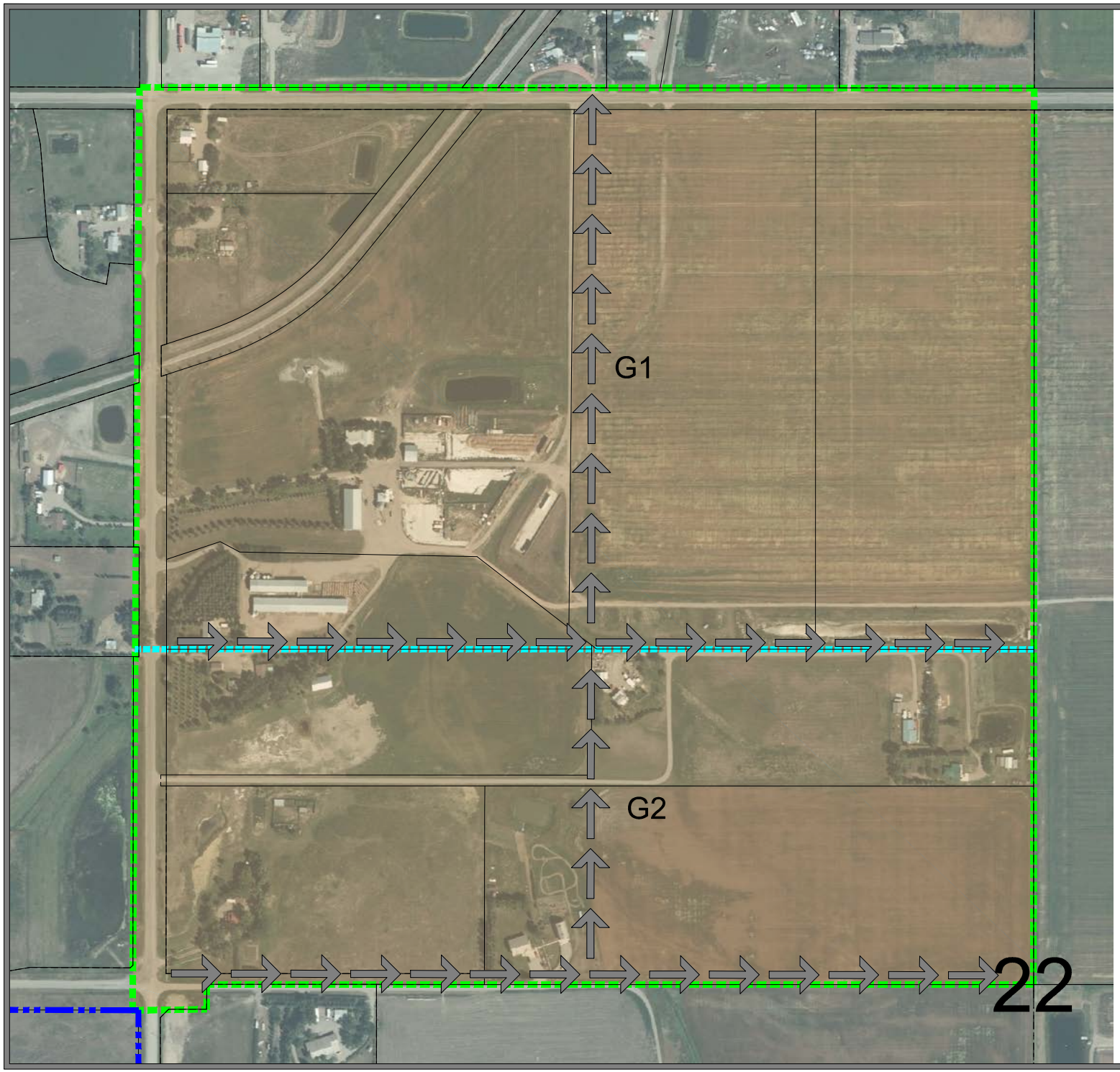
3.5.8 Notwithstanding policy 3.5.7., should the County wish to approve limited subdivision and/or development in the Future Urban Growth area, the following requirements shall apply:

a. applications for subdivision shall be supported by an approved professionally prepared Area Concept Plan or Area Structure Plan that meets the requirements of Part 6 of this Plan;

b. the subdivision of parcels should be based on considerations for permitting only larger parcels, 8.1 ha (20 acres) or greater, on titles with existing dwellings to limit additional fragmentation and enable feasible planning for future urban growth;

c. applications for a change of land use and/or development permit shall align with the uses outlined in Map 8 (Future Urban Growth land use concept);

d. transportation R-O-W required for the development of the jointly identified future road network shall be dedicated by caveat or surveyed out at the time of subdivision;




# SUB-PLANNING AREA 2G LAND USE CONCEPT DETAIL

**LEGEND**

- TOWN OF COALHURST
- SUB-PLANNING AREA 2G BOUNDARY
- SUB-PLANNING AREA DEVELOPMENT CELL DIVISION
- D2 — SUB-PLANNING AREA DEVELOPMENT CELL LABEL
- GROUPED COUNTRY RESIDENTIAL
- FUTURE ROAD (APPROXIMATE LOCATION)

## MAP 6

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 5 000*

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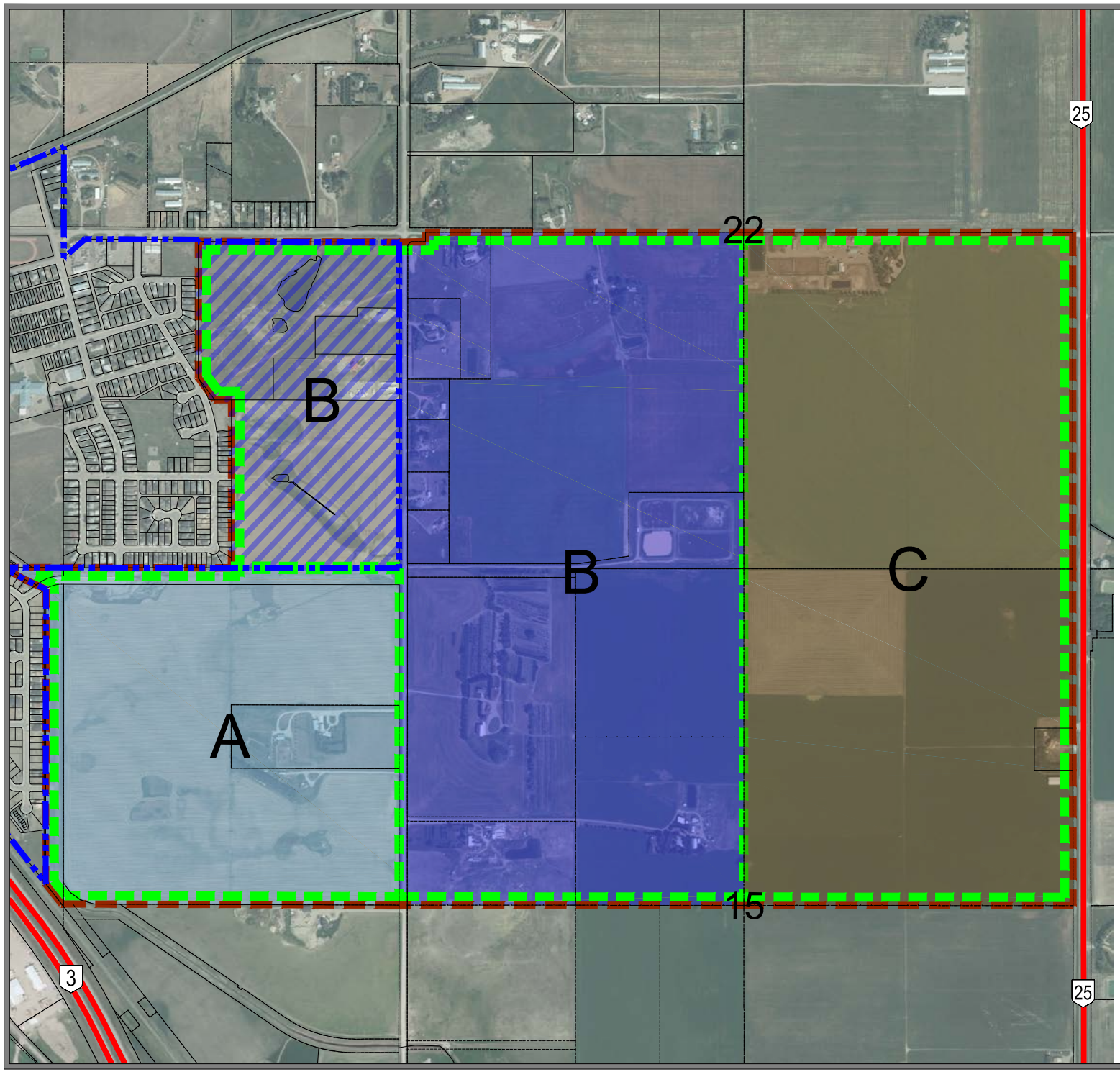


# PLANNING AREA 3
# LAND USE CONCEPT

**LEGEND**

- TOWN OF COALHURST
- PLANNING AREA 3 BOUNDARY
- SUB-PLANNING AREA BOUNDARY
- B — SUB-PLANNING AREA LABEL
- TOWN OF COALHURST ANNEXATION INTEREST
- TOWN OF COALHURST FUTURE GROWTH DIRECTION
- TOWN OF COALHURST FUTURE GROWTH (WITHIN TOWN BOUNDARIES)
- PRIMARILY AGRICULTURAL LAND USE

## MAP 7

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 13 000*

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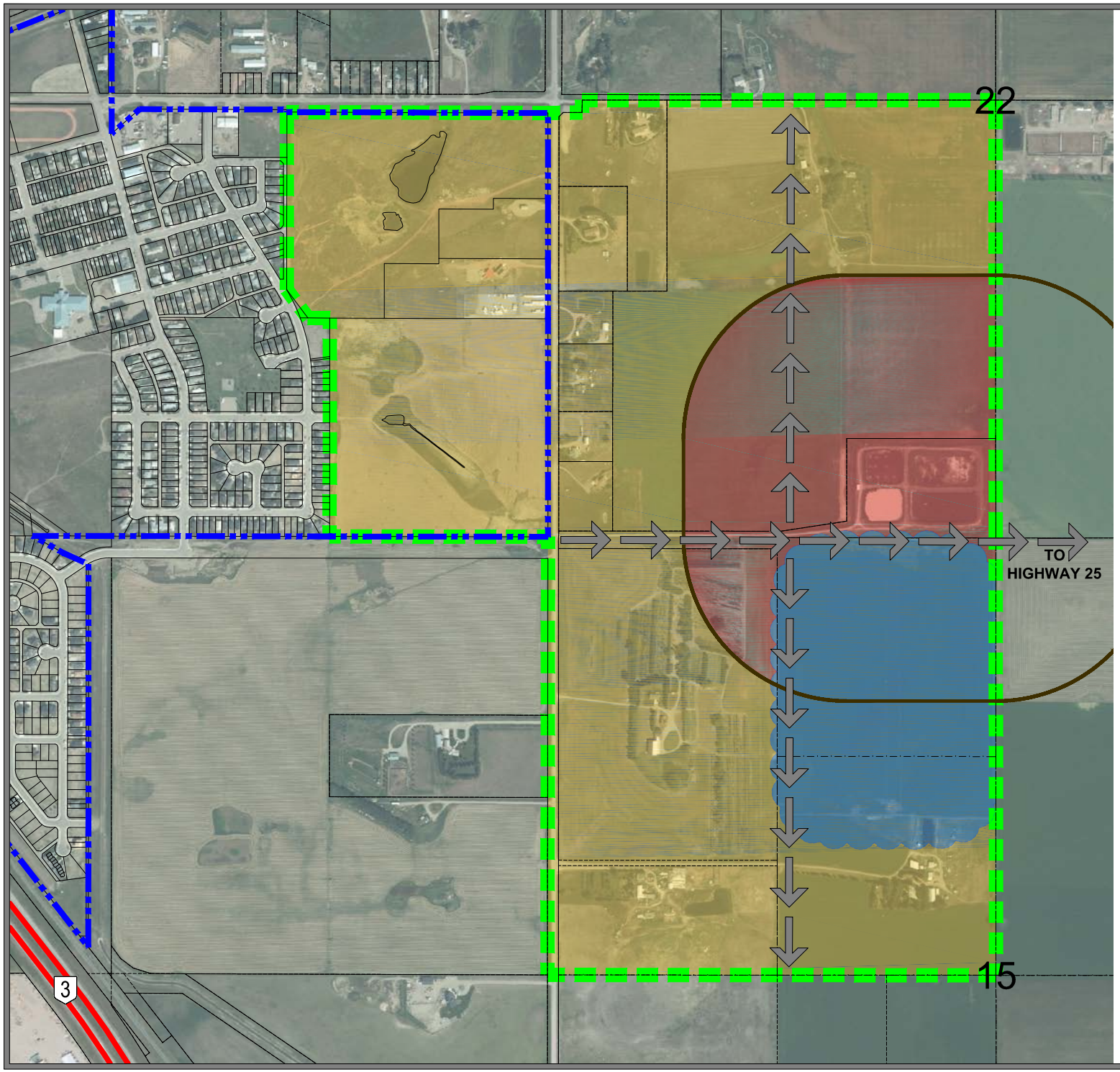


# SUB-PLANNING AREA 3B LAND USE CONCEPT DETAIL

**LEGEND**

- TOWN OF COALHURST
- SUB-PLANNING AREA 3B BOUNDARY
- RESIDENTIAL/COMMERCIAL MIX
- PUBLIC UTILITY
- COMMERCIAL/INDUSTRIAL MIX
- FUTURE ROAD (APPROXIMATE LOCATION)
- 300m SEWAGE LAGOON BUFFER FROM PLAN BOUNDARY

## MAP 8

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 10 000*

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e. development permits for commercial and/or industrial uses shall be issued on a temporary basis and shall be renewed a maximum of every three years;

f. Potential suitable land uses within the sewage lagoon's 300-metre (984-ft.) setback include those of low intensity such as, but not limited to, outdoor storage, commercial warehousing and light manufacturing.

3.5.9 For those lands in the Town's jurisdiction that are within the Future Urban Growth area, applications for subdivision shall be supported by a professionally prepared Area Concept Plan or Area Structure Plan that meet the requirements of Part 6 of this Plan.

3.5.10 When the Town determines that the annexation of lands within Sub-planning Area 3B are necessary to accommodate growth, all associated requirements of this Plan shall be followed.

**Sub-planning Area 3C: Agricultural Preservation Area**

3.5.11 For lands within the Agricultural Preservation Area (identified as Primarily Agricultural Land Use area on Map 7), the County's current subdivision policies shall apply.

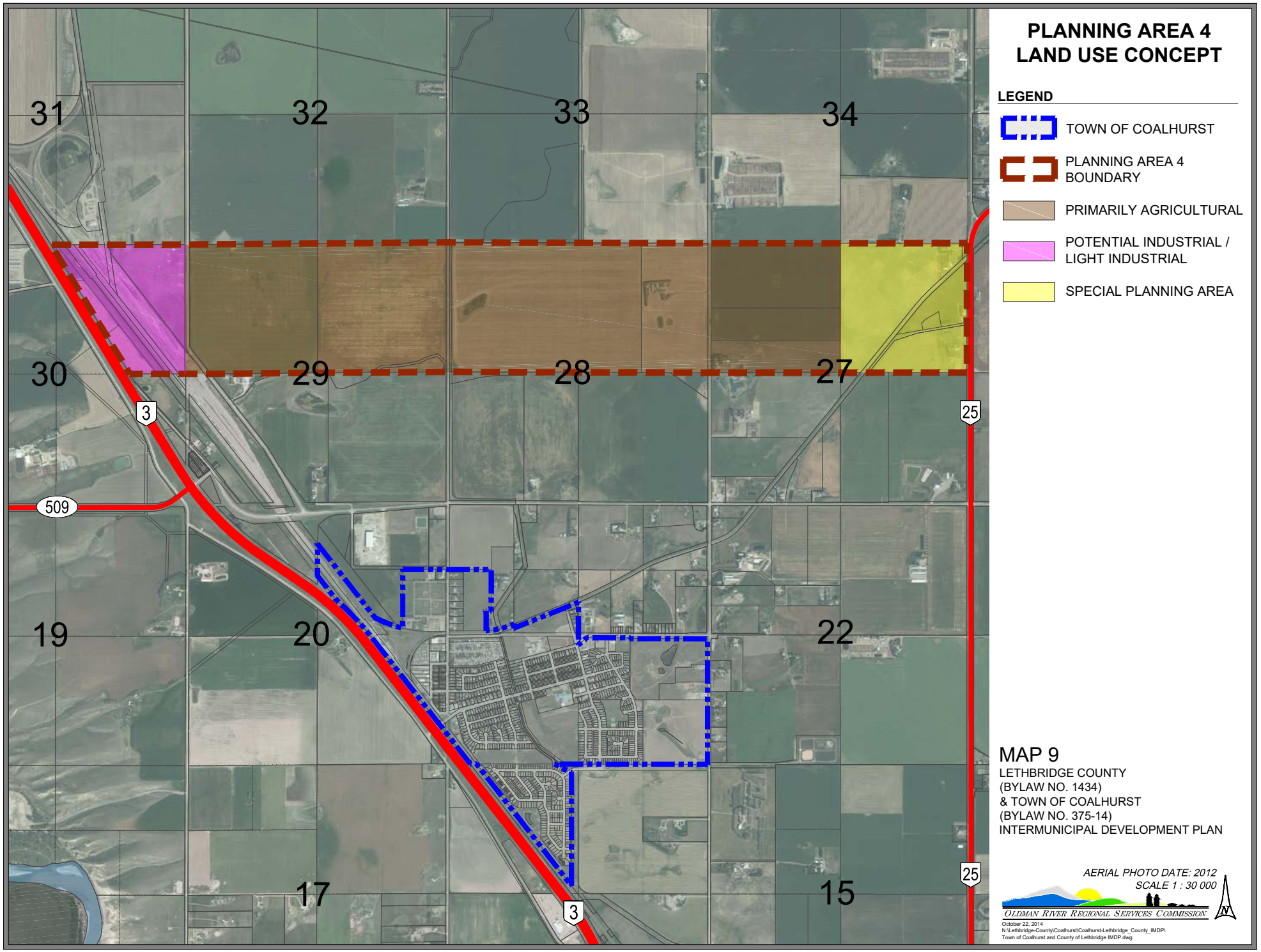
3.5.12 Any change in land use designation is discouraged until such time that the County and Town jointly identify potential suitable uses other than Agriculture and any amendments to this Plan that may be required as a result are made.

3.5.13 Should potential suitable uses other than Agriculture be identified and agreed upon by the County and Town, any proposals for multi-lot subdivision on these lands shall be supported by a professionally prepared Area Concept Plan or Area Structure plan that meets the requirements of Part 6 of this Plan.

*PLEASE NOTE: Although this IMDP would typically be amended to reflect the collaboratively developed and jointly agreed upon policies of the Committee and Councils in place at the time of any future potential annexation, it is important to note that policies 3.5.11 to 3.5.13 are intended to remain in force regardless of which jurisdiction the lands are in.*

## 3.6 Planning Area 4 (North perimeter)

Planning Area 4 includes all of the land area lying outside of the other three more defined planning areas (Areas 1 to 3) and is illustrated on Map 9, situated primarily north of Coalhurst, adjacent to the perimeter of the Plan boundary. This area encompasses approximately 455.7 ha (1,126 acres) of land within the Plan and is primarily utilized for agriculture. This Plan envisions that this area is to continue to be used primarily for agricultural purposes while providing for some isolated non-agricultural development in areas deemed suitable and appropriate (e.g. industrial adjacent to CPR rail-lines in the NE 30-9-22-W4M). For Planning Area 4, the County's present rural agricultural policies are to be applied, with the one exception being the application of the confined feeding operation (CFO) exclusion area as prescribed in Section 4.1 of the Plan. The NE 27-9-22-W4M adjacent to Highway 25 has also been examined as a potential area requiring special future planning considerations due to both impacts and development possibilities resulting from the Highway 25 and Canamex realignment in the vicinity.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PLANNING AREA 4
LAND USE CONCEPT
LEGEND
TOWN OF COALHURST
PLANNING AREA 4 BOUNDARY
PRIMARILY AGRICULTURAL
POTENTIAL INDUSTRIAL / LIGHT INDUSTRIAL
SPECIAL PLANNING AREA
MAP 9
LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN
AERIAL PHOTO DATE: 2012
SCALE 1 : 30 000
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### *Policies*

3.6.1 Agricultural uses (non-intensive) shall be the primary use of land in this area, other than the potential non-agricultural uses considered for NE 30-9-22-W4M and NE 27-9-22-W4M. The CFO policies and exclusion area as prescribed in Section 4.1 of the Plan shall be applied.

3.6.2 Subdivision and development in Planning Area 4 is regulated by any and all applicable County agricultural policies (related to extensive agriculture) contained in the County's Municipal Development Plan and Land Use Bylaw and any other relevant policies that may be contained in this Plan.

3.6.3 The existing land areas designated as either Rural General Industrial or Rural Agriculture may remain as such and are regulated by any and all applicable County Land Use Bylaw policies for those respective land use districts.

3.6.4 Non-agricultural buildings and uses (such as isolated commercial and industrial), intensive agricultural uses or agricultural related buildings and uses that may be better located within a commercial or light industrial business park area shall be required to locate the proposed business operation within sub-planning areas 2A, 2B and 2C (or in the commercial cluster on Highway 25 as the case may be) of the Plan (Map 5).

3.6.5 Future planning (e.g. ASP) will be required for the NE 27-9-22-W4M prior to considering any major land use redesignations, subdivision or development proposals with consideration made for the planned realignment of Highway 25 and its potential impacts.

## 3.7 City Interface Area

### OVERVIEW

The "City Interface Area", as shown on Map 10, is recognized by the County and Town as an area that is not only important to both municipalities, but is an area that is an interface zone to the City of Lethbridge (City). This area lies south of the Town and includes the historic McDermott subdivision to the southwest of Highway 3, and also encompasses the land southeast of the Town which is situated in between the Coalhurst Rural Urban Fringe boundary and the Highways 3 and 25 intersection. The federal government owned agricultural research lands containing the *Agriculture, Canadian Food Inspection Agency Lethbridge District, Animal Disease Research Institute (ADRI),* are located just south of McDermott (in Sections 6, 7, 8, and 9). The location of the ADRI lands acts as a buffer between the City boundary and development of private held lands in the County on the north side. Thus, it is recognized that there is little necessity for detailed planning policy decisions to apply to this special area, as the ADRI is likely to remain in its present state (i.e. native prairie grassland and research lab in the river valley) for quite some time.

More importantly, the area referred to as the "City Interface Area" in this County-Town plan is in reference to only a portion of "Area 1" of the County-City IMDP (which was adopted in 2004 and is still presently in effect, although it is in the process of being updated in 2014-2015). At the time the 2004 County-City plan was adopted, the boundary of the County-City plan had been amended from its original

draft location half-mile more north, to enable the Town to negotiate a separate intermunicipal development plan with the County. As the highlighted "City Interface Area" illustrated in this plan is within a portion of an existing IMDP which is an agreement between the County and City (of which the Town is not a party to), the policies of the County-City IMDP must be followed. The 'County of Lethbridge and City of Lethbridge IMDP (Bylaw Nos. 1254 and 5242)' is a statutory document in accordance with the *MGA* and is binding on both the City and County until it is repealed or rescinded. The Plan between the County and Town therefore cannot implement, contravene or change any content or policy that is in the County-City IMDP as only the County and the City can make an agreement to amend any planning policy in this area. Thus, the policies in place between the County and City are applicable to the portion of land described as the "City Interface Area" in this Plan.

The policies in the 2004 County-City IMDP are quite broad and general in nature for this area, however, it is anticipated that any new County-City IMDP would still include this land area. The following are some of the main County-City 2004 policies for the area that area applicable (as summarized):

- the plan outlines the circulation and referral process of many types of applications between the two municipalities;
- both municipalities shall limit the fragmentation of good quality agricultural lands as defined in the applicable land use bylaw until it is required for urban development;
- no new confined feeding operations will be allowed to locate and no expansions of animal numbers in existing confined feeding operations will be allowed;
- manure spreading will be discouraged, but in any instance shall follow and strictly adhere to the AOPA standards;
- areas serviced by rail and primary highway will be considered for uses other than agriculture;
- industrial and commercial uses will not be a permitted or discretionary use prescribed in the Lethbridge Urban Fringe district. Applications for redesignation will be required;
- the County Municipal Development Plan is encouraging commercial and industrial uses along highways, but the IMDP (City-County) will discourage those uses in the first mile from the City boundary;
- decisions regarding subdivision or development near to or adjacent to the ADRI should take into consideration comments received from the research centre upon circulation, and protect the research centre from unnecessary encroachment of uses that may limit any centre activities.

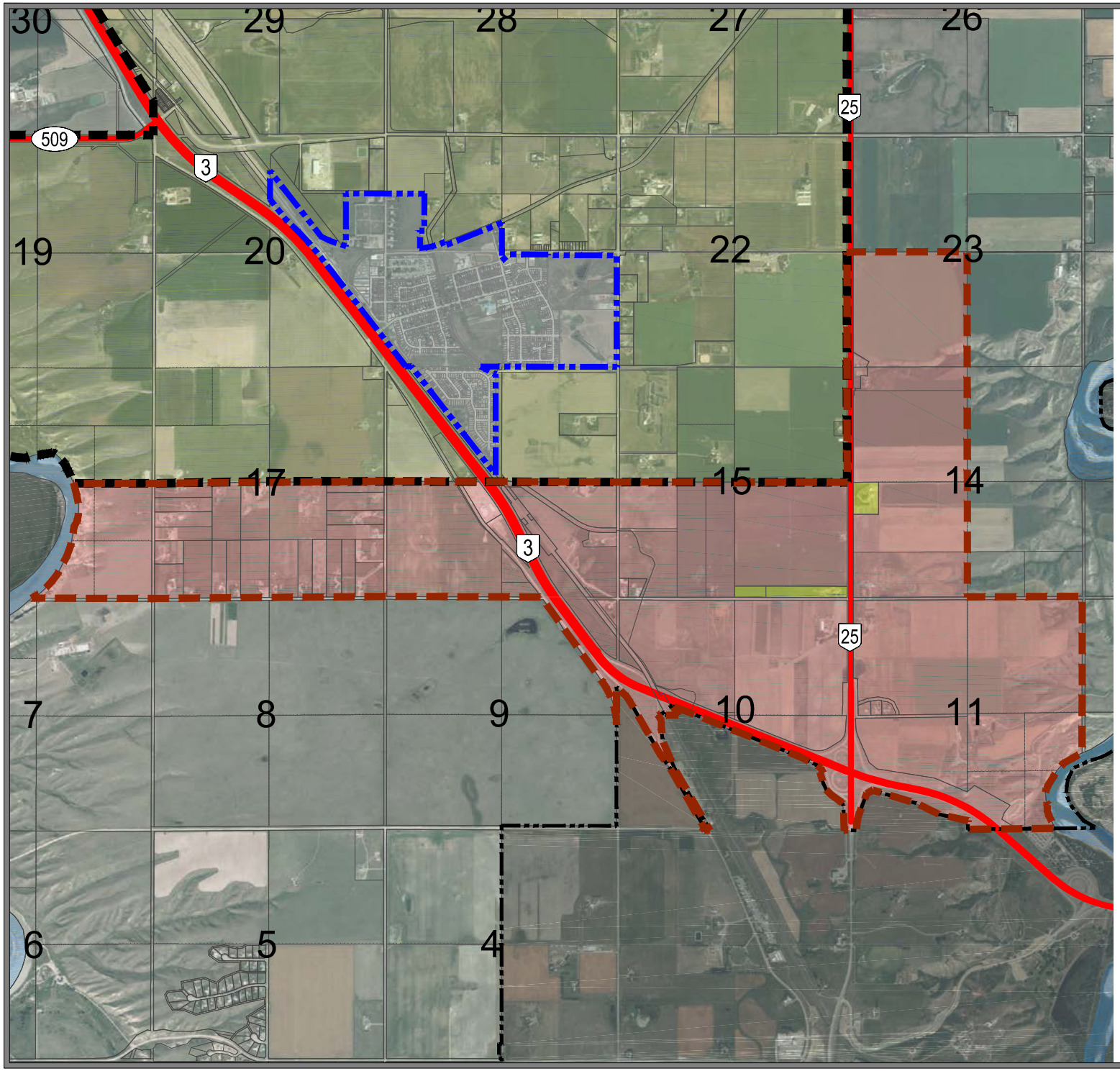
### *Intent*

The boundary of the County-Town IMDP recognizes and respects the boundary of the 2004 County-City IMDP. As such, the referenced "City Interface Area" does not comprise part of the formal statutory IMDP boundary of this Plan. However, recognizing the importance and collaborative planning approach taken by the municipal parties, and the importance of good land use and management strategies, the County and Town agree to a number of "Agreements in Principle" in consideration of the "City Interface Area".

**Note:** *The following are not formal IMDP policies in relation to the jurisdiction and plan boundary applicable to this plan, but are principles and agreements made in "good faith" between the two parties in consideration of a larger collaborative and progressive spirit regarding municipal cooperation*.

## *Agreements in Principle – City Interface Area*

- Both municipalities acknowledge the standing and jurisdiction of the City-County IMDP and will consider and respect the policies as implemented in that agreement, in decision making or any agreements between the County and Town regarding this area.
- The Town understands and recognizes that the County is in the process of preparing a new IMDP with the City of Lethbridge and that once that plan is adopted, any policies in that IMDP which may be applicable to this planning interface area must be respected.
- It is recognized in the "City Interface Area" that there are a number of municipal interests (Town, County, City) and the County and Town both recognize the value in discussing and consulting with all parties on land use matters for this area.
- The County agrees that it will continue to support the application of a confined feeding operation exclusion zone to this area, and will work with the City in ensuring any future planning agreements continue to respect this existing practice.
- The County, acting in good faith, agrees to refer discretionary use development permit applications, applications involving variances, and redesignation applications to the Town for land use proposals in "City Interface Area", as outlined in Part 2, Section 2.3 of this Plan.
- The County and Town agree that they will continue to consult and cooperate together in discussing and planning in a collaborative manner, land use and development strategies for the area with a "regional" perspective.
- Together with Alberta Transportation, the County and Town should consult with the City of Lethbridge and may consider a long-term planning strategy for the provincial highway network in the Coalhurst and City fringe areas, including the impacts or opportunities presented of any changes as a result of the trade corridor (CANAMEX) highway.




# CITY INTERFACE AREA LAND USE CONCEPT

**LEGEND**

- TOWN OF COALHURST
- IMDP PLAN AREA
- CITY INTERFACE AREA BOUNDARY
- LETHBRIDGE URBAN FRINGE POLICIES APPLICABLE
- PARCELS 20 ACRES OR LESS SUBDIVISION ELIGIBLE (WITHIN LETHBRIDGE URBAN FRINGE POLICY AREA)

## MAP 10

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 38 000*

OLDMAN RIVER REGIONAL SERVICES COMMISSION

October 22, 2014
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Town of Coalhurst and County of Lethbridge IMDP.dwg





# PART 4: GENERAL LAND USE POLICIES

***- From a balanced perspective -***

# PART 4: GENERAL LAND USE POLICIES

## 4.1 Agricultural Practices

### *Intent*

Extensive agricultural activities are to continue to operate under acceptable farming practices within the Intermunicipal Development Plan boundary. The policies will attempt to provide a consultation process to discuss and possibly negotiate solutions if problems should arise. The County and Town both recognize that it is the jurisdiction of the Natural Resources Conservation Board (NRCB) to grant approvals and regulate confined feeding operations (CFOs). However, both municipalities agree it is desirable to specifically regulate intensive agricultural operations for the defined Plan area in an attempt to minimize potential nuisance and conflict between land uses, especially residential, and CFOs within the Intermunicipal Development Plan boundary.

### *Policies*

**Extensive Agriculture**

4.1.1 Both municipalities recognize the importance of existing extensive agricultural (cultivation and grazing) uses of land found within the County's portion of the Intermunicipal Development Plan area. These agricultural activities can continue to operate under acceptable farming practices and may be protected provided they are operating in accordance with the Agricultural Operation Practices Act (AOPA).

4.1.2 The lands designated as Urban Fringe or Rural Agriculture within the County's current Land Use Bylaw shall remain designated as such until such time they may be redesignated to non-agricultural uses in accordance with this Plan. Until redesignation occurs, land uses within the plan boundary will be regulated in accordance with the Urban Fringe or Rural Agriculture district contained within the Lethbridge County Land Use Bylaw.

4.1.3 Both municipalities will attempt to work cooperatively in encouraging and supporting 'considerate' good neighbour farming practices, such as for dust, weed, and insect control adjacent to developed areas, through best management practices and Alberta Agriculture guidelines. If problems should arise and the County is notified of the issue, the County will attempt to consult with the landowner to emphasize, and enforce if needed, the Lethbridge County Agriculture Service Board or other applicable policies.

4.1.4 If disputes or complaints in either municipality should arise between ratepayers and agricultural operators, the municipality receiving the complaint will attempt to direct the affected parties to the appropriate agency, government department or municipality for consultation or resolution wherever possible.

**Livestock Operations (Confined Feeding Operations and Minor Livestock)**

4.1.5 New confined feeding operations (CFOs) are not permitted to be established within the Intermunicipal Development Plan Confined Feeding Exclusion Area as illustrated on Map 11. Any existing CFO permit holders may be allowed to expand operations within the designated CFO Exclusion Area if it is to upgrade and modernize (within the requirements of the Agricultural Operation Practices Act and Regulations), demonstrating changes will reduce negative impacts (e.g. odours) to the rural and urban residents of the area, additional environmental protection will be considered, and comments from both the County and Town are received and considered by the NRCB.

4.1.6 In regard to manure application on lands in the CFO Exclusion Area, the standards and procedures as outlined in the *Agricultural Operation Practices Act, Standards and Administration Regulation* shall be applied.

4.1.7 Both municipalities request the NRCB to circulate all applications for confined feeding operations' registrations or approvals within the Intermunicipal Development Plan Boundary to each respective municipality.

4.1.8 Both councils recognize and acknowledge that existing confined feeding operations located within the Plan area will be allowed to continue to operate under acceptable operating practices and within the requirements of the *Agricultural Operation Practices Act and Regulations*.

4.1.9 The Town agrees that it will notify and consult with the County prior to engaging the NRCB or other provincial authorities, should a problem or complaints arise regarding a CFO operator's practices.

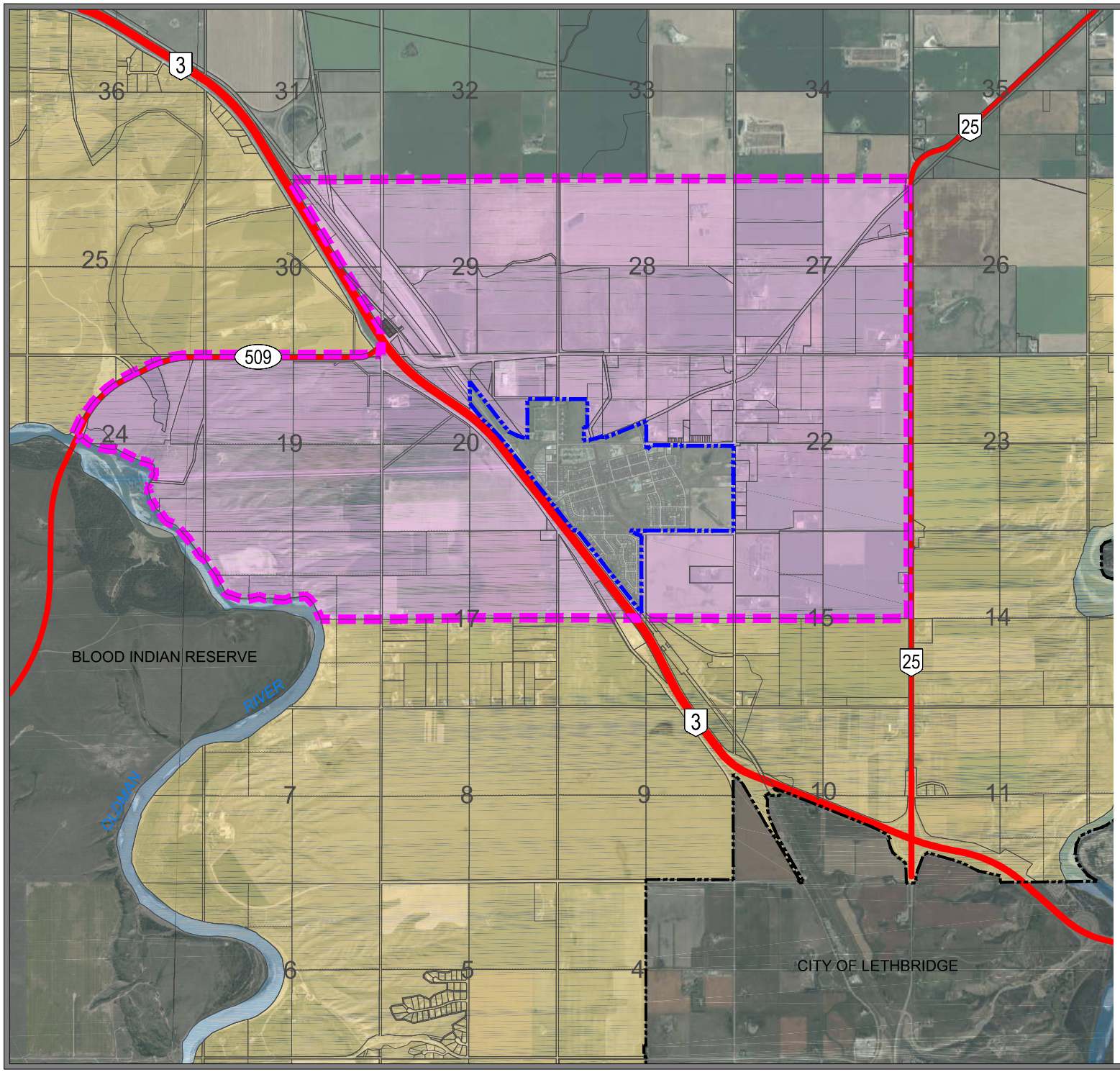
4.1.10 For statutory plan consistency, as required under the *Municipal Government Act*, the County Municipal Development Plan CFO policies and associated map shall be reviewed and should be updated to reflect the CFO Exclusion Area as defined by Map 11 within the first year of this Plan being adopted.

4.1.11 The County may review and apply restrictions or regulations to the type and number of animal units for those animal or livestock operations within the Plan area that fall below the minimum threshold criteria for registrations or approvals under the mandate of the NRCB as outlined in *Agricultural Operation Practices Act and Regulations*, and this should be regulated through policies stipulated in a separate bylaw adopted by the County.

## 4.2 Transportation and Road Network

### *Intent*

The policies should attempt to address expected development and growth pressures and provide a mechanism for consultation when dealing with transportation issues that transcend municipal borders or will impact both municipalities. There is recognition of the need to protect future road linkages in the fringe area and the efficiencies of a conceptual transportation network to guide future development in




# CONFINED FEEDING OPERATION (CFO) POLICY AND EXCLUSION AREA

**LEGEND**

- TOWN OF COALHURST
- CFO POLICY AND EXCLUSION AREA
- LETHBRIDGE COUNTY MDP BYLAW NO. 1331 AND/OR LETHBRIDGE COUNTYAND CITY OF LETHBRIDGE IMDP BYLAW NO. 1254 & BYLAW NO 5242 CFO EXCLUSION AREA

## MAP 11

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 50 000*

OLDMAN RIVER REGIONAL SERVICES COMMISSION

October 22, 2014
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Town of Coalhurst and County of Lethbridge IMDP.dwg

certain areas. Processes should also be clear on entering into and managing road agreements between the municipalities and also developers.

## *Policies*

**General**

4.2.1 Each municipality must be notified of any development or subdivision proposal in the other municipality that will result in access being required from an adjoining road under its control or management. The affected municipality must give its approval or decision in writing prior to the application being considered as complete by the other municipality. In relation to this policy, the referral time frames as stipulated in Part 2, Section 2.3 of this Plan should be respected.

4.2.2 The County or Town may require an agreement regarding the construction, repair, and maintenance of any municipal roads, which may be impacted by subdivision or development, when the development requires access to come from the adjacent municipality's road.

4.2.3 Municipal roads that may be affected by an annexation or municipal boundary change must be identified in the growth or annexation study provided in accordance with policies 4.3.3 and 4.3.8 of this Plan.

4.2.4 The County and Town agree to consult and work with Alberta Transportation regarding the implementation of this Plan and, at the time of subdivision or development, considerations for how development may impact Highways 3 and 25. When required by Alberta Transportation, developers shall conduct traffic studies with respect to impact and access onto the highways. Any upgrading identified by traffic studies conducted by developers with respect to the highways shall be implemented by the developer at its sole cost and to the satisfaction of Alberta Transportation.

4.2.5 Both the County and Town acknowledge that a Transportation Impact Analysis (TIA) will be required to be conducted prior to any intense or large-scale major development to confirm access management standards, roadway cross-sections and other functional considerations, which should be provided at the expense of the developers. For Sub-planning Areas 2A, 2B, and 2C within the 'North Coalhurst - Kipp Area Structure Plan' boundary, a preliminary TIA has been prepared but depending on the scale of development or subdivision, additional work may be required by to completed in the future (see Appendix B).

4.2.6 To address a road or access management issue between both municipalities, an *"Assignment of Jurisdiction"* as it applies to public roads may be discussed and agreed to, in consultation with and approval by Alberta Transportation, if all three parties agree that it is an appropriate mechanism to deal with the particular road issue.

**Transportation Concept / Future Road**

4.2.7 The County and Town are both supportive of the principle of protecting identified future major road linkages in portions of the fringe area and as illustrated on the various Transportation Concept Maps (Maps 6 and 8).

4.2.8 The proposed roadway system depicted in the Transportation Concept maps are conceptual and must be defined in more detail at the Area Structure Plan and subdivision stage as prepared by developers/landowners, or municipality if applicable.

4.2.9 Integrating future local roadway systems to the internal roads pattern networks within the adjacent Town system to provide logical and efficient access to all parts of the east and north development area is important. The grid system roadway network should be implemented wherever possible as this provides for both sustainable and efficient vehicular and pedestrian circulation and future extension of municipal water and wastewater infrastructure.

4.2.10 In areas where existing buildings or structures are located in future road alignments as shown on the Transportation Concept, the developer/landowner must consult with the County and prepare an alternative transportation plan that suitably addresses road linkages to the satisfaction of the County and Town.

4.2.11 Roadways within the Plan area of the County shall be developed to provide access to all lots and future blocks and these shall be provided to conform to the Lethbridge County *Engineering Guidelines and Minimum Servicing Standards* at the expense of the developer when required by the County in accordance with this Plan, and any subsequent Area Structure Plan or subdivision approval.

4.2.12 Roadways within the Plan area of the Town should be designed to integrate with existing and future local roadway systems within the adjacent County road network, and shall be provided to conform to the Town's engineering standards at the expense of the developer.

4.2.13 In relation to policy 4.2.11, the dedicated road right-of-way must be constructed to County standards as a condition of subdivision approval. Reviewed on a case-by-case basis and in consideration for the location, type or density of subdivision proposed in the Plan area, the County may allow the dedicated road right-of-way to be developed (constructed) at a later subdivision or development stage subject to a deferred servicing/development agreement with the County. As part of the terms of the agreement, the developer/landowner shall be required to maintain the undeveloped road area until such time it is developed as a municipal road.

4.2.14 The County or Town may use *Endeavour to Assist Clauses* in Development Agreements, to compensate initial developers who may be required to construct a public road as a condition of a subdivision or development approval to provide access, and where other developers or landowners may later benefit from or use the road that was constructed at the initial developer's expense.

## 4.3 Urban Growth and Annexation

### *Intent*

The identification of the Town's preferred directions for growth will assist decision makers in both jurisdictions when dealing with discretionary situations. At some point, planning for annexation will need to occur in consultation with the County. The annexation procedure needs to be clearly defined

for both parties to successfully guide the process. Annexation involves a number of stakeholders that need to be involved in the process including:

- land owners directly affected by the application who must be part of the negotiation process;
- the Town, who must make the detailed case for annexation and be a major participant in any negotiations;
- the County, who must evaluate the annexation application and supporting documentation for the impact on its financial status and land base as well as ratepayer issues;
- government authorities such as Alberta Transportation and Alberta Environment;
- utility and service providers; and
- the Municipal Government Board (MGB), who will evaluate the application and responses from the stakeholders.

Plan policies are provided to outline a clear process to guide annexation while also ensuring the opinions of all affected stakeholders into the expansion process are considered.

## *Policies*

4.3.1 In order to allow for the planning and installing of costly infrastructure, the County and Town have identified in the Plan the general and long-term directions for growth. Future annexation of any of these lands will occur in the framework and context of long-range planning documents and in consultation with the County.

4.3.2 Identification of the Town's likely directions and type of growth (Map 7) is to assist decision makers in both jurisdictions when dealing with discretionary situations. Attempts to protect these lands from conflicting or incompatible land uses will be taken into consideration in decision making.

4.3.3 To facilitate cooperation and assist in the annexation process the Town, when it determines that annexation of land is necessary to accommodate growth, will prepare and share with the County a growth study or report which indicates the necessity of the land, outlines proposed uses of the land, servicing implications and any identified financial impacts to both municipalities.

4.3.4 Notwithstanding policy 4.3.3, the County or Town may initiate an application for annexation without the need for a detailed growth study or annexation report being prepared, if the proposal is for a minor boundary adjustment to accommodate existing title property line reconfigurations, roads, canals, or utility rights-of-way that may be split by municipal jurisdiction boundaries and the two municipalities agree the annexation proposed is minor and logical.

4.3.5 Within 60 days of receiving a growth study or report to review, and prior to the County or Town submitting a notice of intent to annex land with the Municipal Government Board, the County or Town shall indicate in writing whether or not it has objections or concerns, or whether it requires additional clarification on any matters within the report or study.

4.3.6 In relation to policy 4.3.5, if concerns are brought forward the Committee can be requested by either municipality to meet to discuss the concerns raised or conclusions presented and attempt

to arrive at a consensus on the issue. If the committee is unable to achieve consensus, the dispute resolution mechanism processes in accordance with this Plan may be initiated.

4.3.7 In respect of annexation discussions the County or Town may request as part of the agreements, consideration for, but not limited to:

a. property taxes of ratepayers, including provisions for reasonable assessment/taxation policy/adjustment formulas for impacted property owners, unless otherwise agreed to by the affected ratepayer;

b. the use of land continuing as agriculture until needed for urban development.

4.3.8 Any growth study or annexation report proposed must include a detailed description of County roads that may be affected by the annexation or municipal boundary change. Proposed annexation boundaries should be based on the principle of including the outer limits of any adjacent road right-of-way boundary so that adjacent parcels identified to accommodate Town urban growth (i.e. parcels being the subject of the annexation) will be under the control and management of the urban municipality and the rural jurisdiction will not be affected or responsible for any future management or maintenance issues resulting from urban expansion.

4.3.9 It is recognized that the Municipal Government Board prefers that proposed annexation boundaries follow existing legal boundaries and, wherever possible, this will be attempted to avoid creating fragmented patterns or titles with split municipal jurisdiction.

4.3.10 Within one year upon a Municipal Board Order approving an annexation:

a. the IMDP Committee shall review the Intermunicipal Development Plan boundary to determine whether a need to amend the Plan boundary is warranted; and

b. if the Plan boundary is amended, the IMDP Committee shall review the land use designation(s) within the area affected by the boundary change to ensure consistency with the intent of the Plan and make a recommendation to both Councils for amendment if deemed necessary;

so that all plans, boundaries and described areas are in conformity with each other.

# PART 5: INFRASTRUCTURE & SERVICING





*- Responsible and equitable for all -*

# PART 5: INFRASTRUCTURE & SERVICING

All development must adhere to the requirements and standards as outlined in this Plan (Part 5, Infrastructure and Servicing) to be provided at the developer's expense.

## 5.1 Utilities and Servicing

### *Intent*

Policies are intended to foster enhanced coordination in the provision of utilities and services to ensure that these systems are functional, compatible and effective in order to facilitate orderly and planned growth and development that does not compromise future development potential in each jurisdiction. Both municipalities desire quality development with consistent, efficient and acceptable servicing standards that account for and manage cumulative impacts.

### *Policies*

5.1.1 Due to the fragmentation of parcels in the fringe and the proximity to the Town, both municipalities recognize the importance of ensuring that adequate infrastructure is provided by the developer/landowner to support their subdivision and development proposals.

5.1.2 If a private sewage treatment system is proposed to serve a new subdivision, the applicant shall be required to undertake a professional soil test/analysis and report prior to a decision being made on the application in order to determine the cumulative impact and site suitability of the private sewage system and to ensure that any applicable provincial and municipal regulations can be met.

5.1.3 Subdivision applications creating five or more lots that propose to install a private sewage system shall be required to conduct at a minimum a level 3 assessment in accordance with *The AAMDC/Municipal Affairs: Model Process for Subdivision Approval and Private Sewage* in order to determine the suitability and viability of the private sewage system prior to approval of the subdivision application.

5.1.4 The County or Town may use *Endeavour to Assist Clauses* in Development Agreements, to compensate developers/landowners who may be required to oversize or install infrastructure to service their development, where later developments may access or tie-in to those services. (Note: Endeavour to Assist Agreements are put in place to assist developers who install infrastructure as a front-end service that will be a benefit to adjacent developers in the future. Any cost recovery required through such agreements is over and above the off-site levies attached to any specific parcel.)

5.1.5 The County or Town may implement a bylaw and collect an off-site levy, development charge or user fee to address monetary costs applicable to developers, which impact or are required to pay for any roads or intersection improvements, water, wastewater, stormwater management

systems, fire suppression facilities, or any other municipal infrastructure that is installed and applicable to the Plan area.

5.1.6 For servicing, it is envisioned that utilities shall be located within a road right-of-way. Alternatively, utility corridors may be utilized in the event the road network is not fully developed, which may involve a strategy of protecting and registering utility easements or right-of-way plans over private land in favour of the County. Utility locations and design shall be provided to the satisfaction of the County.

5.1.7 Both municipalities recognize the importance of efficient provision of utilities and services and agree to coordinate, wherever possible, to determine appropriate locations and alignments of any utility or servicing infrastructure required to serve a proposed subdivision or development within the Plan area.

5.1.8 The County and Town recognize that there may be areas of mutual benefit in the provision of infrastructure and other services and agree to discuss these opportunities and may enter into separate agreements to address this.

5.1.9 The County's *Engineering Guidelines and Minimum Servicing Standards* manual shall apply as a minimum stipulation to all development proposals on any lands within the County jurisdiction of this Plan, and the County may impose additional requirements and standards if they determine it is required and appropriate. Any additional standards as stipulated in Schedule A of this plan shall also apply.

5.1.10 The Town's engineering standards and requirements shall be applied to all development proposals on any lands within the Town's jurisdiction. Any additional standards as stipulated in Schedule A of this Plan shall also apply.

## 5.2 Stormwater Drainage

### *Intent*

Both municipalities will require landowners/developers to address stormwater management as it pertains to their developments and parcels of land. Developers will be obliged to prepare stormwater management plans required as per the policies of this plan, which must be professionally prepared by a licensed, qualified engineer.

### *Policies*

5.2.1 Where required in accordance with this Plan (within County or Town jurisdiction) or either municipalities' Municipal Development Plan, developers shall be responsible to provide at their expense an engineered stormwater management plan and obtain any necessary approvals under the *Water Act*. In consideration of this requirement, the following policies are also applicable:

a. A preliminary engineered stormwater management plan has been prepared for Planning Area 2, Sub-planning areas 2A, 2B and 2C, as outlined within the North Coalhurst - Kipp Area

Structure Plan that must be followed (refer to Appendix B). Developers may be required to provide more detailed design engineering and construction plans at the subdivision or development stage to address stormwater management and ensure conformity with the higher level SWMF plan. Planning Area 2, Sub-planning areas 2D - 2G must provide a stormwater management plan for each development cell as outlined in this Plan.

b. Developers may work with neighbors and develop stormwater management systems for a larger area than the minimum development cell as prescribed in this plan, provided it is feasible and professionally engineered.

c. Future planning for vacant lands within the Town of Coalhurst, described as Planning Area 3, must address the handling of stormwater and include a professional stormwater management plan.

d. The incorporation of Best Management Practices in the design of stormwater management facilities is to be pursued, where possible.

5.2.2 For lands within the County, developers shall be responsible to provide stormwater management for their parcel as it pertains to a proposed development, or for a larger design or subdivision area, to the satisfaction of the County. Post-development runoff rates shall not exceed pre-development runoff rates as per Lethbridge County *Engineering Guidelines and Minimum Servicing Standards*.

5.2.3 If the two municipalities agree to collaborate and formally undertake a more detailed study and process to develop a regional stormwater management plan, any consulting and engineering requirements or costs involved in creating a plan for a prescribed area, will be through a separate agreement between the two municipalities prior to engaging in any such process.

## 5.3 Road Networks

### *Intent*

Policies are intended to foster enhanced coordination in the provision of linked road networks to ensure that these roads are functional, compatible and logical in order to facilitate orderly and planned growth that does not compromise future development.

### *Policies*

5.3.1 Roads must be provided and constructed by the developers to applicable County or Town standards to provide physical access to a subdivision or development proposal in consideration for the sub-planning areas and adjacent land uses as outlined in this Plan. Road network linkage considerations are paramount and must be addressed.

5.3.2 For any subdivision proposal where a municipal road is needed to provide access, and in conformity with Transportation policies 4.2.11 and 4.2.13, when road right-of-way is required to be dedicated at the time of subdivision, the road alignment shall be illustrated on the tentative plan of subdivision prepared by the applicant's surveyor.

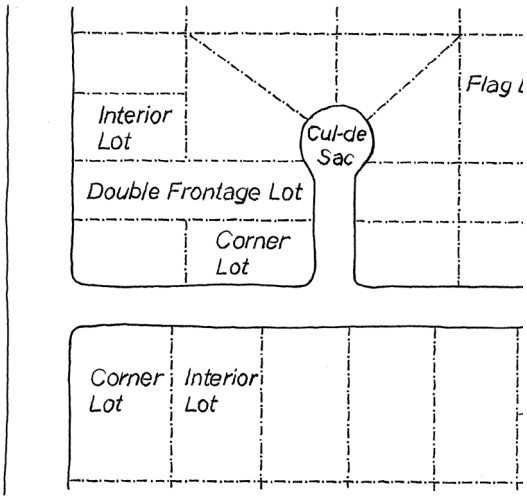
5.3.3 The illustrated potential future road network areas are conceptual to demonstrate the general location and required connection points to adjacent areas and must be refined further at the Area Structure Plan stage.

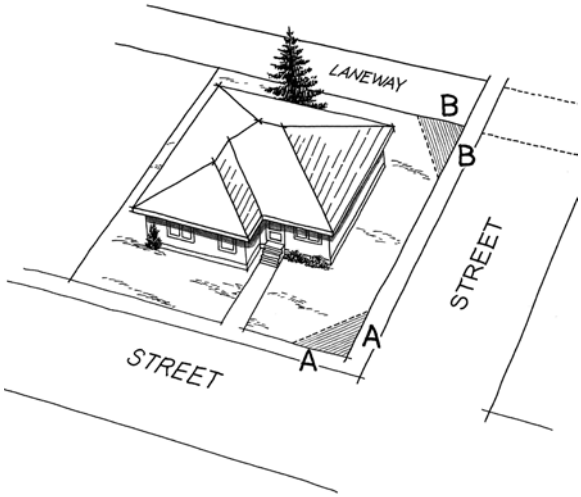
5.3.4 Traffic Impact Assessments (TIAs) prepared by a qualified professional, may be required as stipulated in this Plan at the Area Structure Plan, subdivision or development stage, and may be requested by the respective municipality within which jurisdiction it is the approval authority or by Alberta Transportation, and shall be provided at the expense of the developer. For Sub-planning Areas 2A, 2B, and 2C within the plan boundary of North Coalhurst - Kipp Area Structure Plan, a preliminary TIA has been prepared, but dependant on the scale of development or subdivision additional work may be required to be completed in the future (Appendix B).

5.3.5 All roads to be constructed by developers shall be in accordance with Lethbridge County's *Engineering Guidelines and Minimum Servicing Standards* for roads within the County's jurisdiction, and to the Town's minimum urban standard requirements for roads within the Town. For roads that transcend/connect between the two municipalities, the required standard of road construction to be provided should be coordinated between the County and Town for consistency.

5.3.6 A conceptual future road network for Planning Area 2, Sub-planning areas 2A, 2B and 2C has been designed as outlined in the North Coalhurst - Kipp Area Structure Plan (Appendix B) that must be followed by developers at the subdivision stage. The municipalities will require all new roads to be paved to an industrial traffic standard at the developer's expense.

# PART 6: PLANNING & DESIGN REQUIREMENTS




***- Accountability and quality control -***

# PART 6: PLANNING & DESIGN REQUIREMENTS

## Area Structure Plans, Conceptual Design Schemes and Overlay Plans

## 6.1 Planning Requirements

### *Intent*

Any Area Structure Plan, Conceptual Design Scheme, subdivision or development permit application shall comply with and be subject to the goals, policies, standards and guidelines as stipulated in this Plan. Any inconsistency that may arise with respect to this Plan and the Land Use Bylaw, this Plan shall prevail.

To effectively plan for the orderly, efficient, and beneficial development of lands located within the IMDP boundary, a variety of planning instruments are necessary to be utilized. The Plan provides that more detailed information will be required to address subdivision and development proposals in relation to the types of land use (development) allowed in conjunction with the location, density, layout, and road network.

### *Policies*

6.1.1 Information that may be requested for an Area Structure Plan or Conceptual Design Scheme in the County shall be in accordance with the requirements of Lethbridge County's Municipal Development Plan, Land Use Bylaw and this Plan, and may include: site plans, lot density and layout, sewer and water systems, roadways and access points, utilities and services, surface drainage and storm water management, fire suppression, soil conditions, geotechnical investigations (subsurface conditions), municipal reserve, development concept, staging of development, development specifications, overlay plans, and any other matters deemed necessary by the County.

6.1.2 An Area Structure Plan or Conceptual Design Scheme required within the Town's jurisdiction (e.g. adjacent to the municipal boundary or Planning Area 3) should also be required to include the information as outlined in policy 6.1.1 above and the Town's Municipal Development Plan.

6.1.3 When an Area Structure Plan or Conceptual Design Scheme is required in accordance with this Plan, it must be professionally prepared at the developer's/landowner's expense and shall comply with any and all relevant and applicable policies and schedules of this Plan.

6.1.4 Where one developer/landowner is proposing subdivision within an identified sub-planning area or development cell as outlined in this Plan which may contain existing titles owned by different individuals, the developer/landowner may be required to prepare an "overlay plan" for those lands under separate title that may be part of an adjacent Area Structure Plan area where no plan has been completed as stipulated by this Plan.

6.1.5 All Area Structure Plans or Conceptual Design Schemes (in either municipality) shall be circulated to the other municipality in accordance with the referral policies and timelines

stipulated in the Plan (refer to Part 2, Section 2.3.). When an Area Structure Plan or Conceptual Design Scheme is required, it must be submitted and approved by the respective municipality prior to making a decision on a subdivision, development or the redesignation of a parcel of land located within the Plan area.

6.1.6 To ensure any concerns over the suitability of land for development are satisfied, the provision of a professional geotechnical investigation/test and report to ensure the site is suitable in terms of topography, stability (i.e. underground mining), soil characteristics, flooding or drainage subsidence, and sanitary sewerage servicing will be required as part of the Area Structure Plan. Areas known to have no underground mining activity, or as otherwise stipulated in this Plan, may be exempted from providing a geotechnical investigation for sub-surface conditions if deemed to be unnecessary.

6.1.7 For any subdivision proposal within the IMDP boundary where a professionally prepared Overlay Plan is required to be provided by developers/landowners, it must be submitted in conjunction with the subdivision application if not previously provided at the Area Structure Plan stage. The Overlay Plan is to illustrate:

a. the proposed subdivision design or lot layout to show alignment with adjacent parcels of land;

b. the future road network alignment, based on either the Transportation Concept or how it fits into the overall development (in accordance with Transportation policies 4.2.7 and 4.2.9);

c. the future lot property lines illustrated at the appropriate density of development; and

d. the building envelopes for the proposed and future lots, based on the applicable land use district setbacks clearly illustrated on the plan.

6.1.8 Within the County, the density (or number of lots) proposed in a plan of subdivision shall determine which type of higher level design plan is required in conjunction with a subdivision proposal:

a. For subdivision of a single lot, an Overlay Plan may be required that includes a surveyor's sketch identifying any existing buildings or structures on the parcel.

b. For three to four lots, a Conceptual Design Scheme will be required to be submitted by the developer/landowner. The Conceptual Design Scheme must address land use, lot sizes and layout, servicing, roadways and access points, and any other matters deemed necessary by the County.

c. For five or more lots, or as otherwise specifically required by the policies of this Plan, a more detailed Area Structure Plan will be required in conformity with the County Municipal Development Plan requirements and this Plan. The Overlay Plan diagram may form part of the Area Structure Plan document.

6.1.9 Lethbridge County and the Town of Coalhurst have prepared North Coalhurst - Kipp Area Structure Plan for lands both north and south of Kipp Road (Sub-planning Areas 2A, 2B and 2C) and a framework to address servicing and storm water infrastructure**.** Prior to applying for redesignation or subdivision, landowners/developers will be responsible, at their expense, for

preparing additional Engineering Detail Plans that will include more detailed engineering and construction information as it pertains to their land or development.

## 6.2 Additional Subdivision and Development Standards

### *Intent*

In addition to the other policies of this Plan and Lethbridge County land use standards and requirements, the following development standards apply to subdivision and development in the Plan area. The standards in this section are intended to further enhance the compatibility, cohesiveness and efficiency of land use within the Plan area.

### *Policies*

**General**

6.2.1 Redesignation, subdivision or development of land for uses involving schools, hospitals, food establishments or residential uses, shall not be approved within 300 metres (984 ft.) of the Town of Coalhurst sewage lagoons as long as they remain active for such use.

6.2.2 Subdivision and development will be required to demonstrate consistency with the intent of the Land Use Concept and any Transportation Concept Plans.

6.2.3 Development in the area near the shale piles should not occur without engineering analysis.

6.2.4 Various professional geotechnical analysis may be required to be provided by developers to determine site suitability which may involve soil profile, stability and characteristics, groundwater depth or location, underground mining activity, etc.

6.2.5 The policies and requirements in Section 6.2 are also applicable to lands within the Town adjacent to the municipal boundary.

**Subdivision Applications**

6.2.6 In addition to the standard application requirements for all subdivisions, the developer/applicant shall be responsible at their own expense for submitting:

a. a tentative plan of subdivision, prepared by an Alberta Land Surveyor as part of the application, with the plan clearly illustrating dimensioned lots, roads, and utility rights-of-way; and,

b. for any existing buildings or structures on site, a surveyor's sketch prepared by an Alberta Land Surveyor as part of the subdivision application to illustrate the location, setbacks or encroachments of any buildings or structures on the parcel.

6.2.7 The subdivision plan shall dedicate the area required for municipal roadways, including service roads, in conformity with the Plan and any requirements of Alberta Transportation.

6.2.8 For any subdivision proposal which requires an Area Structure Plan in accordance with the Plan, the Area Structure Plan must be approved by the respective municipal Council prior to a decision by the Subdivision Authority.

6.2.9 All subdivision proposals shall conform to the approved Conceptual Design Scheme or Area Structure Plan.

**Development Applications**

6.2.10 Development will be required to maintain adequate setbacks from potential road rights-of-way consistent with the Transportation Concept and the applicable policies in Parts 4.2 and 5.3.

6.2.11 When preparing a development permit application, applicants must consider:

a. building orientation with respect to future subdivision potential, municipal reserve, the Land Use Concept and the Transportation Concept;

b. placing accessory structures to the rear or side of the principal structure; and

c. siting shelterbelts, dugouts, and development that may not require a development permit in a manner such that maximizes future subdivision and development potential having regard to the Transportation Concept.

6.2.12 Applicants for a development permit application must provide a clear and accurate site plan illustrating at a minimum, the location (with setbacks) of all existing buildings and improvements on the parcel, proposed buildings and structures, utility easements, access/egress to the parcel, location of on-site private septic systems, and any other information the Development Authority deems relevant to make an informed decision and determine compliance to this Plan.

**Architectural Controls**

6.2.13 A detailed set of Architectural Controls establishing building envelopes to serve as a building scheme for the subdivision may be required to ensure buildings and improvements are suitably located on the land in relation to future roadways and development. The Architectural Controls are to be approved by the County and prepared at the developer's/landowner's expense and registered on title. The Architectural Controls must be provided in conjunction with the Conceptual Design Scheme or Area Structure Plan, or as a condition of subdivision or development approval.

6.2.14 The Architectural Controls may also be required to establish specified or minimum design standards to ensure a quality, controlled development occurs. These standards may include, but are not limited to, exterior building materials and finishes, building orientation and siting, building square footage restrictions, setback variations, storage and screening, and landscaping.

# SCHEDULE A:  DEVELOPMENT DESIGN GUIDELINES

# SCHEDULE A: Development Design Guidelines

The following may be applied, in accordance with the policies of the Plan, to any future development proposal or area identified for commercial/industrial type land use.

## *Policies*

**Administrative**

1. The development design guidelines contained within this section shall apply to commercial and industrial development in the areas of Lethbridge County and Town of Coalhurst as shown on Map 12 (Joint Enhanced Development Areas or JEDA) and specifically for those parcels on the north and east sides of Kipp Road and Range Road 224, all development within 200 metres (656 ft.) of the road right-of-way.

2. When considering applications for redesignation, subdivision or development permit approval of commercial or industrial uses in the JEDA, all applications must meet or exceed the minimum development design guidelines as outlined in this IMDP.

3. Architectural controls shall be established and provided at the redesignation stage consistent with this IMDP and any approved Area Structure Plan that may apply to specific lands within the IMDP. The approved architectural controls shall be implemented at the development permit stage.

4. Implementation of the approved architectural controls will be carried out by the developer (registered as an instrument on title in the form of a restrictive covenant) at the subdivision stage.

5. All applications for a development permit shall not be deemed to be complete applications and will not be accepted by the County or Town without prior written confirmation of compliance with the approved architectural controls. At the time of the submission of a development permit application to the County or Town, the applicant shall provide written documentation from an architectural professional confirming that the proposed development project complies with the approved architectural controls.

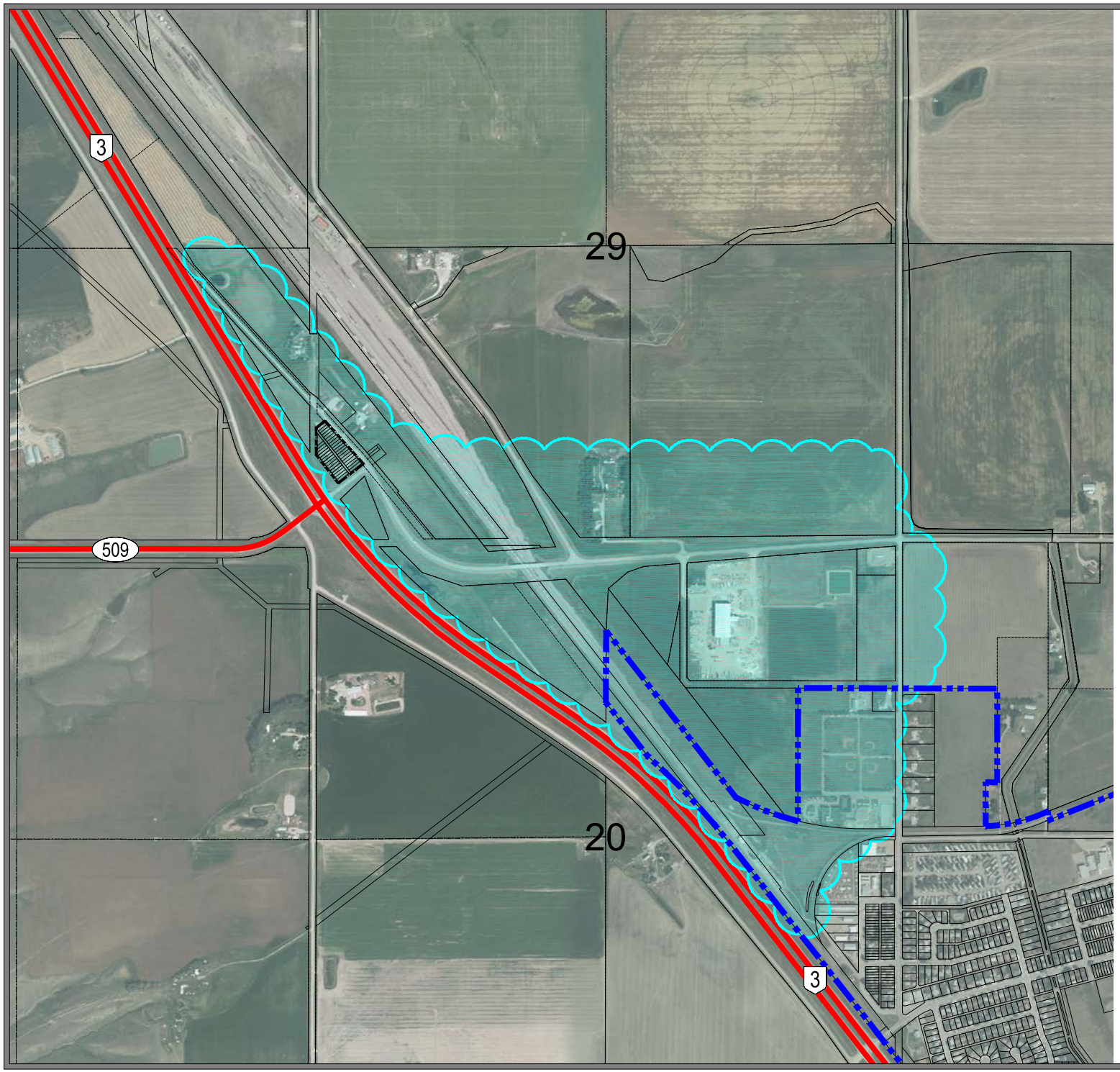
**Building /Site Design**

6. The design, character and appearance of all buildings in the JEDA shall be acceptable to the County and Town and shall demonstrate sensitivity to the highly visible nature of development occurring along transportation corridors considered to have a significant visual impact, notably in the area shown on Map 12.

7. Highway 3 shall be considered as the western gateway or entranceway to the Town of Coalhurst, and Range Road 224 south of Kipp Road the northern gateway, and therefore the area around both require special design consideration with respect to acceptable and high-

quality building design and site design (inclusive of but not limited to landscaping, signage, outside storage and screening).

8. Principal buildings associated with commercial and industrial development located within the JEDA, shall provide a building design and site design consistent with the following:
    a. All building elevations considered to be highly visible shall provide for an attractive appearance through the provision of a desirable and superior quality design aesthetic.
    b. The front elevation (elevation facing a highway or road) of any principal building shall ensure it effectively addresses the highly visible and sensitive nature of the interface within the JEDA. In the case of an approved lot layout that proposes two highly visible frontages (e.g. a corner lot or a lot that may contain double frontage onto a highway and an internal subdivision road) the lot shall be deemed to have two front yards and will be required to implement the appropriate setbacks and higher levels of architectural and landscaping treatment accordingly.
    c. The front elevation of the principal building shall be considered the elevation that faces the Highway, Kipp Road and Range Road 224 as identified in Map 11. This front elevation shall be visible and shall not be screened from view with outside display, landscaping or fencing and the principal building shall remain prominent and proud with respect to its placement, design and view from Highway 3 and Range Road 224 south of Kipp Road.
    d. In an effort to minimize large monolithic building facades or elevations, exterior designs that encourage visual breaks in the wall (i.e. projection, recession, parapets, revels, articulation, design finish, outcrops, window glazing, paint lines, and/or materials combination, etc.) should be utilized in providing for a high-quality design aesthetic in creating interesting and attractive buildings.
    e. Ancillary or accessory buildings or other structures shall be designed, constructed and finished in a manner compatible or complimentary with the character and appearance of the principle building(s) or other similar buildings on the parcel.
    f. Accessory buildings shall not be located in the front yard of a principal building.
    g. A high-quality landscape plan/design shall be used to compliment and augment the building and site designs for those developments adjacent and fronting onto Highway 3, Kipp Road and Range Road 224 south of Kipp Road. The landscaping plan must take into consideration the following:
        i. a minimum of 10 percent of the parcel/lot area shall be required to be provided as soft landscaping;
        ii. soft landscaping is highly encouraged to be provided in the form of xeriscaping or xerigardening;
        iii. if water is readily available, soft landscape consisting of vegetation such as trees, shrubs, hedges, grass and ground cover may be provided, with consideration for using native plant species wherever possible;
        iv. a minimum 6-metre (19.7 ft.) landscaped buffer shall be provided adjacent to any road or highway, which shall be soft landscape consisting of vegetation such as trees, shrubs, hedges, grass and ground cover or xeriscaping/xerigardening (as the case may be); and




# JOINT ENHANCED DEVELOPMENT AREA

**LEGEND**

TOWN OF COALHURST

JOINT ENHANCED DEVELOPMENT AREA

## MAP 12

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 15 000*

OLDMAN RIVER REGIONAL SERVICES COMMISSION

October 22, 2014
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Town of Coalhurst and County of Lethbridge IMDP.dwg

v. Any trees, hedges or other vegetation must be sited so as not to impede the corner site triangle, parcel approach access site lines or visibility of adjacent roadways.

h. Access approaches, parking/loading areas and display areas that may be located in the front yard of a principal building shall be paved or hard surfaced (to the satisfaction of the County).

i. Landscaping provided shall be focused in those areas of a site determined to be highly visible in providing for a high-quality design aesthetic within the JEDA. Any landscaping approved in a development permit is required to be maintained for the life of the development project.

j. Any additional landscaping that may be required at the discretion of the County may include, but is not limited to, the following:

i. additional separation, or buffering, between adjacent land uses;

ii. the use of trees, shrubs, fences, walls, and berms to buffer or screen uses of negative impact; and

iii. the use of trees, shrubs, planting beds, street furniture and surface treatments to enhance the appearance of a proposed development.

9. Proposed commercial and business light industrial buildings and uses that may be adjacent to existing or future cluster residential development areas shall demonstrate through their design how the proposal will successfully mitigate any potential negative impacts. In these areas (as determined by the County or Town) suggested mitigation techniques may be implemented through the use of the following: restriction or prohibition of specific land uses, increased development setbacks, maximum building heights, increased architectural and landscape treatments (or a combination of all of the above).

10. In areas where commercial and industrial developments are adjacent to existing and future country residential or urban residential uses, it is recommended that the commercial or industrial development be of a lower density and residential in scale and intensity (comparatively). Additional architectural and landscaping treatment and increased development setbacks may also be required in such locations to effectively address any potential negative impacts and interface issues that may exist.

11. Landscaping shall be required for all proposed developments as per the County's Land Use Bylaw or the Town's Land Use Bylaw, and the approved architectural controls. Proposed landscaping shall enhance the visual attractiveness and appearance of a site and building from all highways or roads.

12. If water is not available, xeriscaping (which refers to landscaping and gardening in ways that reduce or eliminate the need for supplemental water from irrigation and emphasizes plants whose natural requirements are appropriate to the local climate) shall be highly encouraged. Xeriscaping or xerigardening may include incorporating rocks, mulch or boulders in the design, but it must also focus on including some form of greenery (plants) that require less water.

13. If water is readily available, xeriscaping is still highly encouraged as a water-saving measure, but if soft landscaping is proposed, guidelines pertaining to more typical or traditional forms of landscaping (not including xeriscaping or xerigardening) is suggested to be provided in consistency with following (at a minimum):

    a. Trees should be planted in the overall minimum ratio of one tree per 130 $m^2$ (1400 $ft^2$)of landscaped area provided.

    b. The mixture of tree sizes at the time of planting should be equivalent to a minimum of 50 percent larger trees.

    c. The mixture of tree sizes at the time of planting should be equivalent to 2/3 trees with an option of providing 1/3 remaining with shrubs with no less than 3.0 shrubs per tree.

    d. All plant materials should be planted according to good horticultural practice.

    e. Selection of plant varieties should be based on regional climatic conditions, constraints of location, effectiveness in screening (if required), resistance to disease and insect attack, cleanliness, appearance and ease of maintenance.

    f. Wherever space permits, trees should be planted in groups.

    g. If trees are planted, the minimum requirements for tree sizes at the time of planting should be:

| TREE TYPE | CALLIPER / HEIGHT |
|---|---|
| Deciduous trees (small) | 40 mm calliper |
| Deciduous trees (large) | 80 mm calliper |
| Coniferous trees (small) | 1.5 metres height |
| Coniferous trees (large) | 2.5 metres height |
| Shrubs | 0.5 metres height or spread |

14. Landscape securities shall be provided if requested by the Development Authority, with the minimum deposit amount as determined sufficient by the Development Authority, which shall be held until an inspection has been completed by the municipality to determine compliance.

15. Outside storage including the storage of trucks, trailers, recreational vehicles, and other vehicles may be permitted adjacent to the side or rear of a principal building provided such storage areas are not located within a minimum required side or rear yard setback and the storage is visually screened (all year long) from any adjacent existing or future country or urban residential area and the highly visible interface within the JEDA. All storage must be related to and be an integral part of the commercial or business light industrial operation located on the subject site. Outside storage is prohibited in the front yard of a principal building. Whenever possible, storage shall be highly encouraged to be located inside buildings.

16. Extended vehicle parking and/or vehicle storage (e.g. storage of product inventory) is not permitted in the front yard of a principal building. All parking must be provided on-site, as parking shall not be permitted on adjacent municipal roadways.

17. Outside display areas are permitted provided that they are limited to examples of equipment, products, vehicles or items sold by the commercial or business light industrial use located on the subject site containing the display area, are not located within any required setback, and are not located on any required and approved landscaping area.

18. A vehicle or equipment which is in a dilapidated or dismantled condition shall not be allowed to remain outside a building or on a vacant lot in any commercial or industrial district.

19. Fencing shall only be utilized for the visual screening of outside storage, waste/garbage, equipment, product, vehicles or for security purposes provided it is located in the side or rear yards of the principal building. Decorative fencing may be permitted in the front yard of a principal building in compliance with the County's Land Use Bylaw or the Town's Land Use Bylaw and the approved architectural controls.

20. Accessory buildings are not permitted to be located in the front yard of a principal building.

21. Site lighting shall incorporate "night sky" lighting with fixtures to direct light towards the ground and minimize impact on adjacent sites and uses.

22. Signs shall be limited to only two fascia or free-standing signs per lot/parcel, or one multi-tenant sign is permitted.

23. Billboard signs are prohibited within the JEDA.

24. No signage shall be illuminated by way of any flashing, intermittent or animated illumination within the IMDP area.

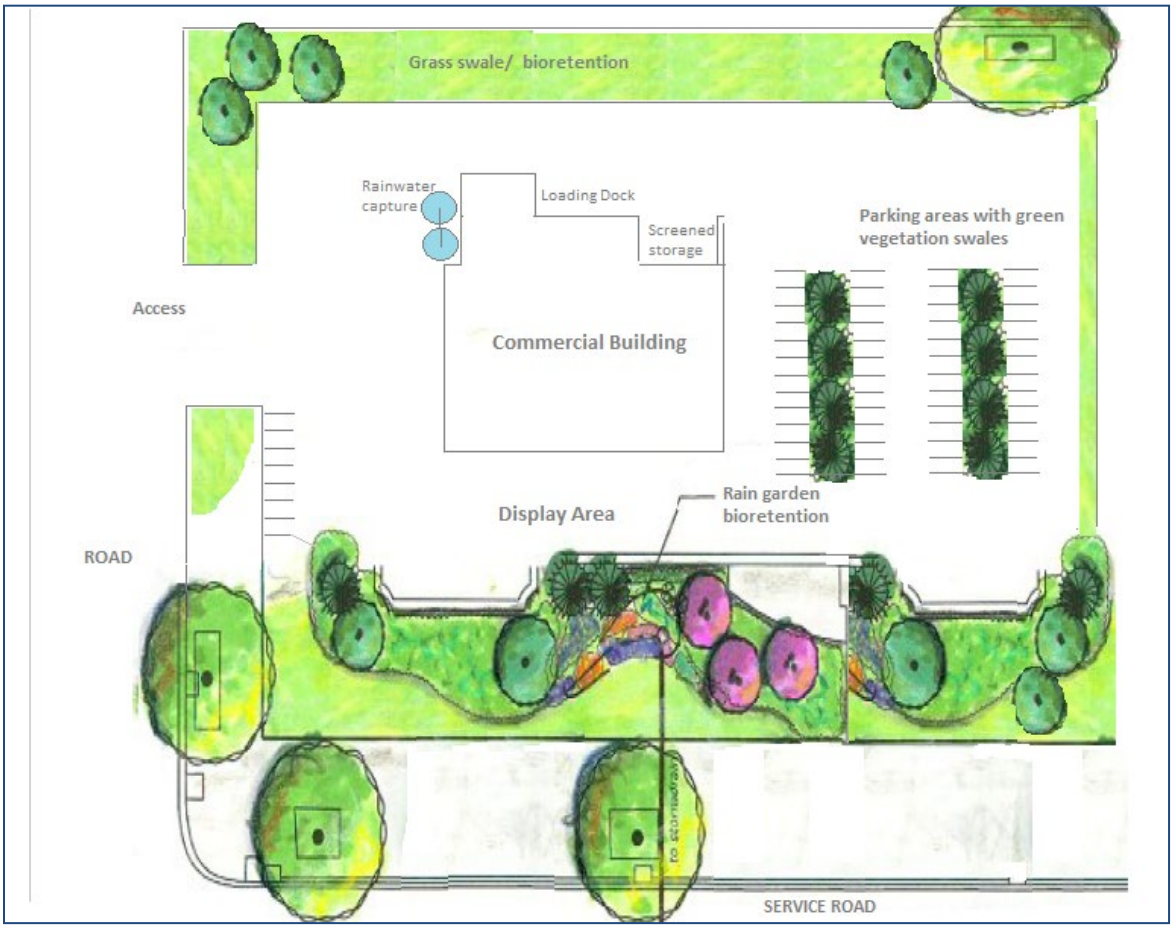
25. Architectural Controls shall comply with this section of the IMDP and inform the quality of the built environment and shall include but not be limited to the following (at a minimum):
    a. building design and orientation,
    b. building interface treatments,
    c. on-site parking and loading,
    d. site lighting,
    e. outside storage,
    f. outside display,
    g. landscaping,
    h. fencing and screening,
    i. signage,
    j. interface / transition / buffer conditions and design (between differing uses, highly visible areas, etc.).

26. Where appropriate and feasible, the County and Town strongly encourage construction and site/building design best management practices, including Low Impact Development (LID) initiatives and Leadership in Energy and Environmental Design (LEED).

27. All development within the development control zone [300 metres (984 ft.) from the right-of-way or within 800 metres (2,625 ft.) of the centerline of an intersection] of Highway 3 shall require a roadside development permit from Alberta Transportation or alternatively, written authorization from Alberta Transportation stating that a roadside development permit is not required as part of the proposed development project. This information shall be submitted by an applicant at the time of submission of a development permit application to the County.

28. As a condition of any development or subdivision approval, the County may stipulate that any or all of the aforementioned standards and guidelines be included in Architectural Controls to be registered as a restrictive covenant on title(s) by the developer.

## Low Impact Development (LID) Concept Examples




Source: ORRSC

Photos of LID design and parking lots:





Source: Minnesota Pollution Control Agency

## Development and Design Examples
## Encouraged Minimum Site/Building/Design “Quality” & Standards







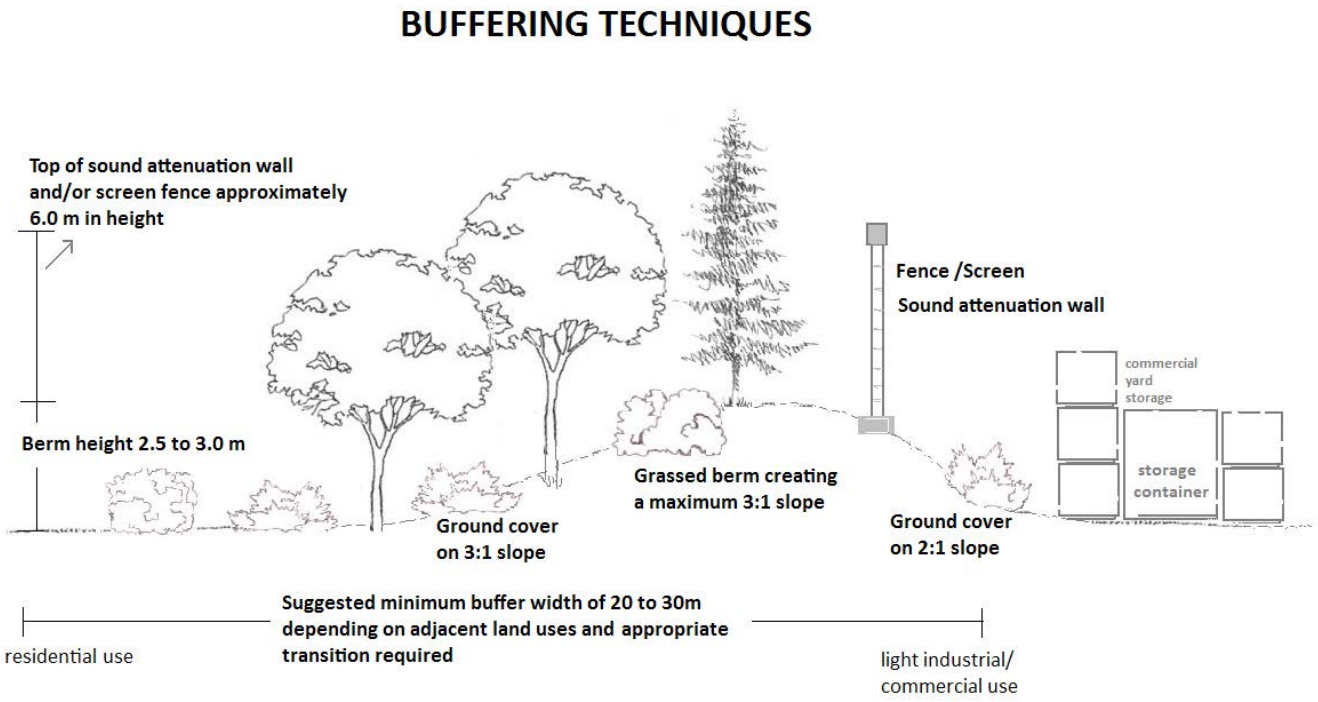








## Development and Design Example
## Encouraged Buffering/Transition Techniques




Source: ORRSC
Note: Drawing not to scale and to be used for illustrative purposes only.

# SCHEDULE B:  BACKGROUND & ANALYSIS

# **SCHEDULE B:** Background & Analysis of the Study Area

This schedule includes an executive summary of the background review, information, data and analysis of land, physical features and development in the defined Plan study area that formed the basis for this Plan. A comprehensive review was undertaken of various planning documents, mapping and geographical information data, land forms, existing land use, subdivision and development activity, cadastral and title mapping information, soils and topography, and various municipal engineering documents, to highlight a few of the main study areas. There was also consultation and discussion with various stakeholders, including government departments and agencies, with interests or whom may be affected by the Plan or its policies. The following is an overview of some of the main findings and relevant information pertaining to the IMDP study area for this Plan.

## PLAN PREPARATION PROCESS

The County and Town engaged the Oldman River Regional Services Commission (ORRSC) to prepare an Intermunicipal Development Plan (IMDP) for the two municipalities. The formation of the Plan was to be guided by a Project Steering Committee (to act as the Intermunicipal Development Plan Committee) as established by the respective municipalities. The Project Steering Committee was composed of three council members from the County and three council members from the Town. Senior administration from both municipalities were also involved with the Project Steering Committee throughout the process, however, their role was limited to that of technical advisors only. With respect to committee decision making, both parties agreed at the outset of the process that their chosen decision-making model would be based on reaching consensus on the issues discussed.

Subsequent to the establishment of a general process, a background and study area analysis was undertaken which served as the foundation from which both municipalities could review the existing land use conditions and determine the relevant issues, goals, objectives, and implementation for the Intermunicipal Development Plan. The background review provided an analysis of the existing circumstances, attempted to identify issues and opportunities that have emerged from the analysis of the preliminary information, and acted as an agenda for discussions by the Project Steering Committee. Prior to identifying areas of issue and areas of commonality with the committee, planners from the ORRSC met with each municipality privately to clarify their municipal perspectives on general issues.

Once each municipality's perspectives for the referenced topics were identified, those perspectives were brought back to the Project Steering Committee for their review and agreement, which resulted in the generation of draft ideas/concepts. The project purpose, process, ideas and concepts were then reviewed with affected landowners, stakeholders and the general public at an Open House meeting on June 25, 2014 in the Coalhurst Community Center. Upon review of any and all comments by the Project Steering Committee, a final draft document was prepared, complete with policies and maps**.**

## BACKGROUND AND STUDY AREA

With the steady population and development growth experienced in Alberta over the last decade, it has become increasingly clear that municipalities cannot make land use decisions in isolation. An Intermunicipal Development Plan recognizes that the fringe area of an urban area, such as a town, is subject to different pressures, problems, conflicts and opportunities than a purely rural or urban area.

The size of the area to be studied was determined in consultation with the Intermunicipal Plan Committee, encompasses approximately 8,010 ha (19,793 acres) in size and contains nearly 22 sections of land. The background and analysis of the area was undertaken to provide an understanding of the existing circumstances, attempt to identify the issues and opportunities that have emerged from the analysis of the preliminary information, and act as an agenda for discussions by the Project Steering Committee.

Maps 13 to 24 help in providing a basic understanding of the existing conditions as they illustrate existing land uses, existing zoning, topography (contours/elevations), soils, roads and infrastructure systems within the Study area (Map 13).

## NATURAL FEATURES

The Study Area has many natural features that exert influence on the landscape. The land located in the centre of the area of the Study Area is a plateau between the valleys of the Oldman River, which border the study on both the west and east sides. This area may be considered relatively flat to gently undulating/rolling as the land transitions to the river valley (Map 14). The gently rolling topography creates areas of low elevation that during wet years can be collectors for stormwater run-off.

## MAN-MADE FEATURES

The area is traversed by several provincial highways (Highways 3, 25, and 509) and a grid County road network with provides good quality transportation system for the area. The main Canadian Pacific Railway line bisects the area from southeast to northwest, paralleling the right-of-way for Highway 3. In addition, a secondary rail line is located north east of the Town of Coalhurst which travels to Highway 25 where it parallels the highway right-of-way further north.

The Study Area falls within the Lethbridge Northern Irrigation District and as such is traversed by canal system. In addition, potable water infrastructure (such as municipal and cooperative water lines) wastewater infrastructure (including the Town lagoons and existing sewer line to the City of Lethbridge), a high pressure gas pipeline, and existing and abandoned oil and gas well and pipelines also are located within the Study area and represent both opportunities and constraints to future development.

## EXISTING LAND USE

The primary use of the majority of the land within the Study Area is for agricultural activities. However, other uses include residences, farm buildings, several confined feeding operations, and numerous commercial and industrial businesses. Subdivision of land within the Plan area has primarily occurred east and north of Highway 3, with the majority of lands west of the highway remaining full quarter sections with the exception of the McDermott residential subdivision. Typically, an urban fringe area (such as the Plan area) will experience pressure to accommodate a variety of different land uses as there are many advantages to being located in close proximity to an urban center such as Coalhurst and the City of Lethbridge.

## LAND USE ZONING

The majority of the land within the Plan area is zoned Rural Agriculture (RA) and Rural Urban Fringe (RUF). Other land use zonings within the Plan area include Grouped Country Residential (GCR) and Rural General Industrial (RGI). Map 15 illustrates existing zoning within the Plan area.

## AGRICULTURAL PRACTICES

Map 16 indicates the Canada Land Inventory (CLI) soil classification and agricultural capability of the land (see *Definitions* for soil classifications) for all lands within the Plan area. The majority of the land in the Plan area is of a high quality, class 2 (moderate limitations), which are considered to be moderately-high to high in productivity for a fairly wide range of crops. A portion of the land is categorized as class 2 (with severe limitations) described as wet or water present.

## FRINGE AREA SUBDIVISION AND FRAGMENTATION

Over the last decade, the most common type of subdivision activity within the Plan area has been the subdivision of farmsteads or country residential parcels from an unsubdivided quarter section.

Between 1995 and 2008 there were a total of 22 subdivision applications within the Study Area (Table 8), with a significant number of applications, approximately 77 percent, for the purpose of creating single lots for country residential development. In the most recent period (2006-2008), the number of applications to create agricultural parcels has decreased to zero (0) and the first industrial lots within the study were created. This is an important development in terms of the impact on the County and Town as it represents a shift away from traditional agricultural/residential use of the surrounding area.

**Table 8**
**Town of Coalhurst Growth Study**
**Subdivision Activity within the Study Area**

| Year | No. of Applications | Type of Application | | |
|---|---|---|---|---|
| | | Agricultural | Country | Industrial |
| 1995-1999 | 7 | 1 | 6 | 0 |
| 2000-2005 | 10 | 2 | 8 | 0 |
| 2006-2008 | 5 | 0 | 3 | 2 |
| TOTAL | 22 | 3 | 17 | 2 |

*Table from the Town of Coalhurst Growth Study*

Overall, the west, north and easternmost portions of the Plan area remain unfragmented quarter sections. Exceptions include lands for roads and other infrastructural improvements, and the zoning of the majority of a quarter section to the west for the purposes of grouped country residential development. To the date of the approval of this Plan, no development of the lands zoned for grouped country residential development has occurred. Proximate to the Town, subdivisions have historically occurred for the purposes of country residential development and other suitable uses.

Due to the orientation of Highway 3 and CPR rights-of-way, a number of narrow and long subdivisions have occurred along these transportation routes in the past.

## INFRASTRUCTURE

Map 18 illustrates infrastructure currently within the Plan area. The County and Town benefit from separate servicing agreements with the City regarding the provision of treated potable water, while sewer service is directed to the Town's lagoons east of Coalhurst. A sanitary main has been installed that connects Coalhurst's sewage outflow to the City's system, and during the preparation of this Plan the line become operational.

Future Town development will need to be reviewed in the context of the agreement for treated potable water between Coalhurst and Lethbridge in place at the time of annexation.

## TRANSPORTATION AND ROAD NETWORKS

A number of major and minor road and rail transportation systems are present within the Plan area. As shown on Map 17, Highways 3, 25 and 509, and CPR mainlines provide access to and through the Plan area and specifically:

- Highway 3

  Provides direct and efficient access to the north and south of Coalhurst and specifically the Canada/US border to the south, and major markets to the north including Calgary and Edmonton.

- Highway 25

  Provides access from Coalhurst to Highway 526 and the Hamlet of Enchant, intersecting Highways 519, 521, 843 and 845 along the way, giving access to a number of hamlets and the Town of Picture Butte. Highway 25 is important to local agricultural operations and access to and from a number of smaller urbanized areas north and east of Coalhurst.

- Highway 509

  Provides access to and from Stand Off and the Blood Reserve. Highway 509 is also an important local connector for agricultural operations and the linkage between the Reserve and the major route provided by Highway 3.

- CPR mainlines

  While parts of the track system north and east of Coalhurst have been discontinued as mainline and are now used primarily for storage, the mainline and yard proximate to Coalhurst provide shipping access to local industry that reaches across Canada.

Due to the location of the Plan area to these major transportation linkages, development pressure for additional (and more intensive) subdivision and development in proximity to the highways and rail has been requested by the land development community/industry.

Conversely, the location of the CPR mainline and Highway 3 to the west of Coalhurst continue to challenge growth and access planning for the Town due to safety and servicing issues.

## CURRENT DEVELOPMENT

2013 data indicates that nearly 90 percent of all development inside of the Study Area is residential in nature with country residential development accounting for 64.2 percent of the residential development with the remaining 25.3 percent utilized by traditional farm residences (Map 23).

**Table 7**
**Town of Coalhurst Growth Study**
**Existing Land Use Inventory within the Study Area**

| Type of Land Use | | Number of Uses | Percent of Total Uses |
|---|---|---|---|
| Residential: | Country Residence | 61 | 64.2 |
| | Farmstead | 24 | 25.3 |
| | Residence Total | 85 | 89.5 |
| Utility: | | 2 | 2.1 |
| Industrial: | | 5 | 5.2 |
| Commercial: | | 3 | 3.2 |
| TOTAL | | 95 | 100.0 |

*Table from the Town of Coalhurst Growth Study*

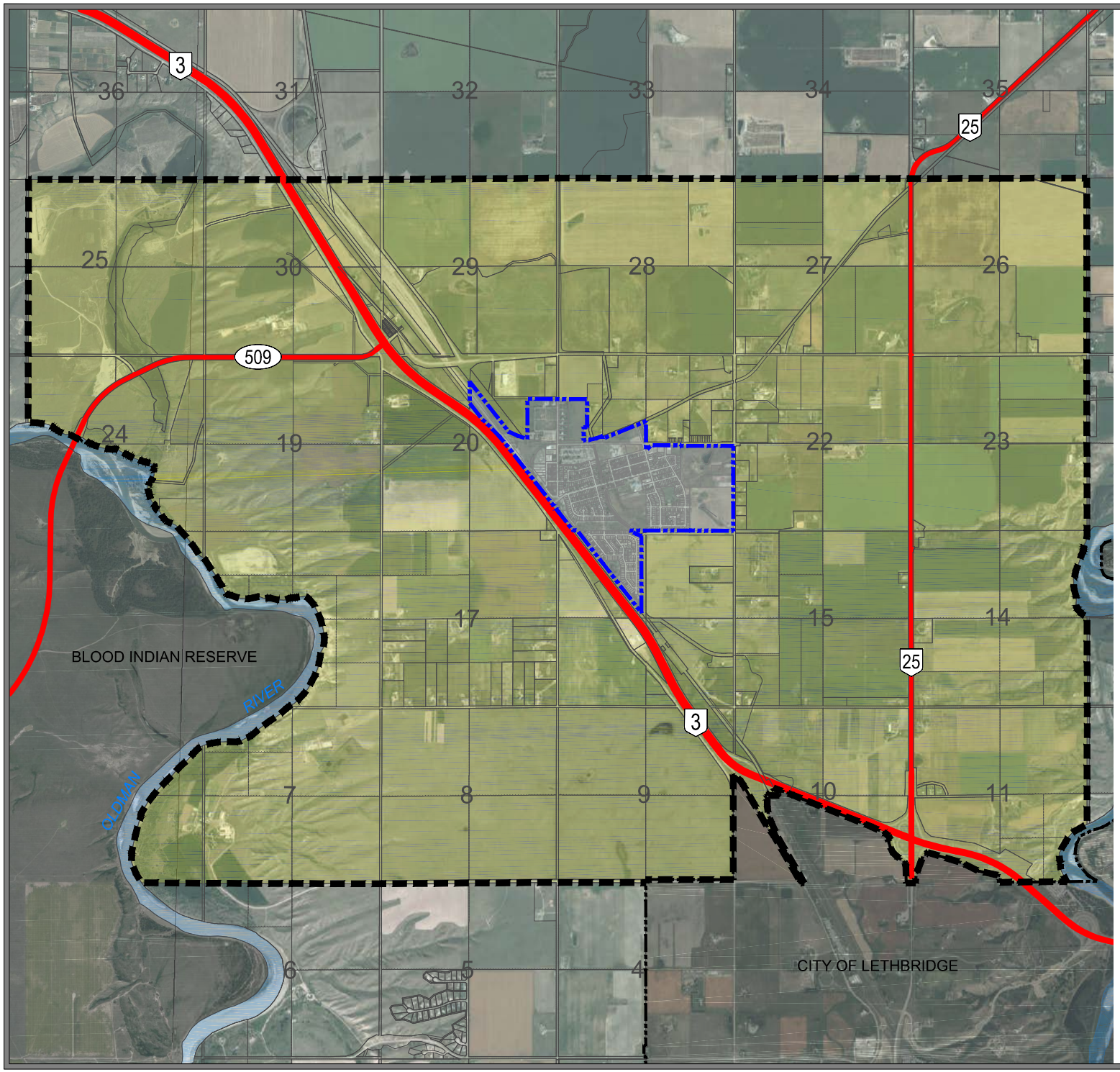
## TOWN GROWTH CONSTRAINTS AND PRESSURES

Physical growth constraints exist west and east of the Town in the form of the transportation networks discussed above, and the Town's sewage lagoons to the east, which require a minimum setback buffer of 300 meters (984 ft.) from certain types of developments (e.g. a residence, food establishment, hospitals, and schools). While urban development to the north of Coalhurst is challenged by topography and servicing costs, lands to the south and east provide more effective opportunities for urban expansion.

In light of the physical constraints of the transportation networks and topography to the west and north, the desired growth direction for the Town continues to be to the south and east. In addition to urban expansion, there is continuing pressure for the growth of country residential development to the north and east of the Town. Due to constraints regarding urban servicing in this area, it is anticipated that a lower intensity form of development such as country residential is more suitable.

## SUMMARY

Ultimately, in consideration of identified growth challenges and opportunities, this Plan provides a venue for cooperation so that both municipalities may develop this land area in accordance with mutually agreed to planning principles, philosophies and goals, while accommodating their ratepayers' needs for the preservation and betterment of the local economy and quality of life in the area.




# IMDP STUDY AREA

**LEGEND**

TOWN OF COALHURST

IMDP STUDY AREA

## MAP 13

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 50 000*

OLDMAN RIVER REGIONAL SERVICES COMMISSION

October 22, 2014
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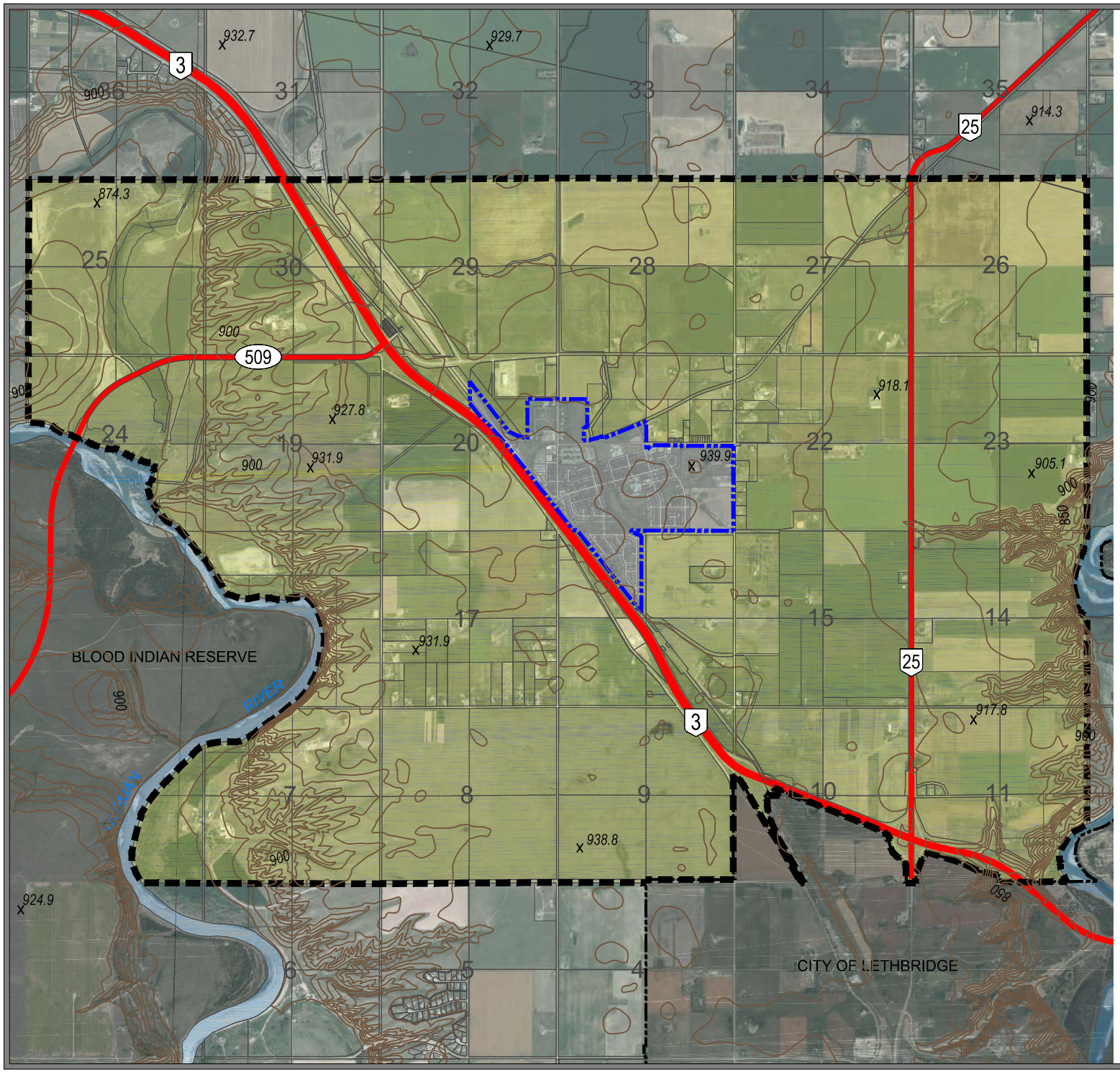


# TOPOGRAPHY

**LEGEND**

- TOWN OF COALHURST
- IMDP STUDY AREA
- CONTOURS (10m)*

**Data Source: National Topographic Maps of Canada*

## MAP 14

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 50 000*

OLDMAN RIVER REGIONAL SERVICES COMMISSION

October 22, 2014
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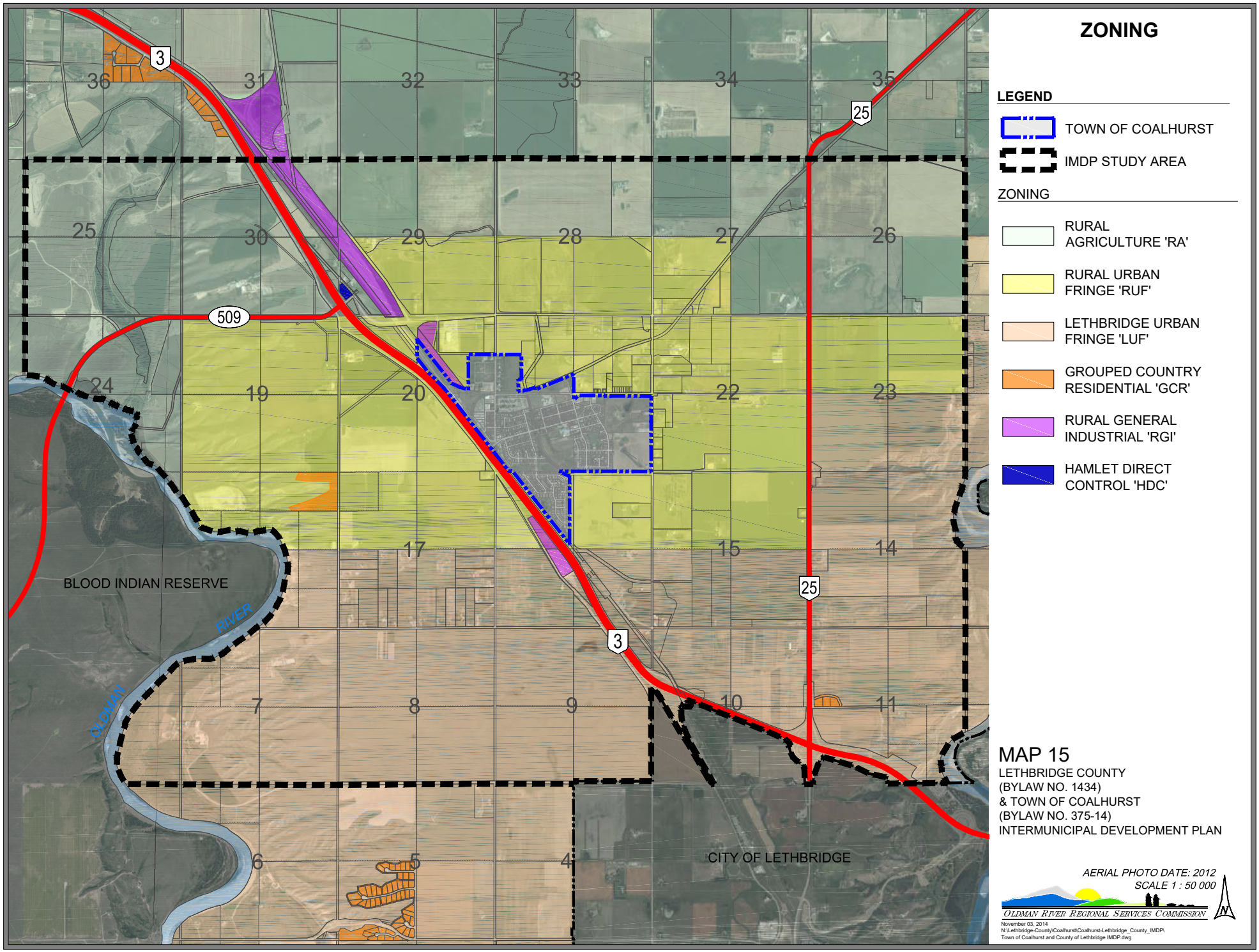
ZONING
LEGEND
TOWN OF COALHURST
IMDP STUDY AREA
ZONING
RURAL AGRICULTURE 'RA'
RURAL URBAN FRINGE 'RUF'
LETHBRIDGE URBAN FRINGE 'LUF'
GROUPED COUNTRY RESIDENTIAL 'GCR'
RURAL GENERAL INDUSTRIAL 'RGI'
HAMLET DIRECT CONTROL 'HDC'
BLOOD INDIAN RESERVE
OLDMAN RIVER
CITY OF LETHBRIDGE
3
25
509
MAP 15
LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN
AERIAL PHOTO DATE: 2012
SCALE 1 : 50 000
OLDMAN RIVER REGIONAL SERVICES COMMISSION
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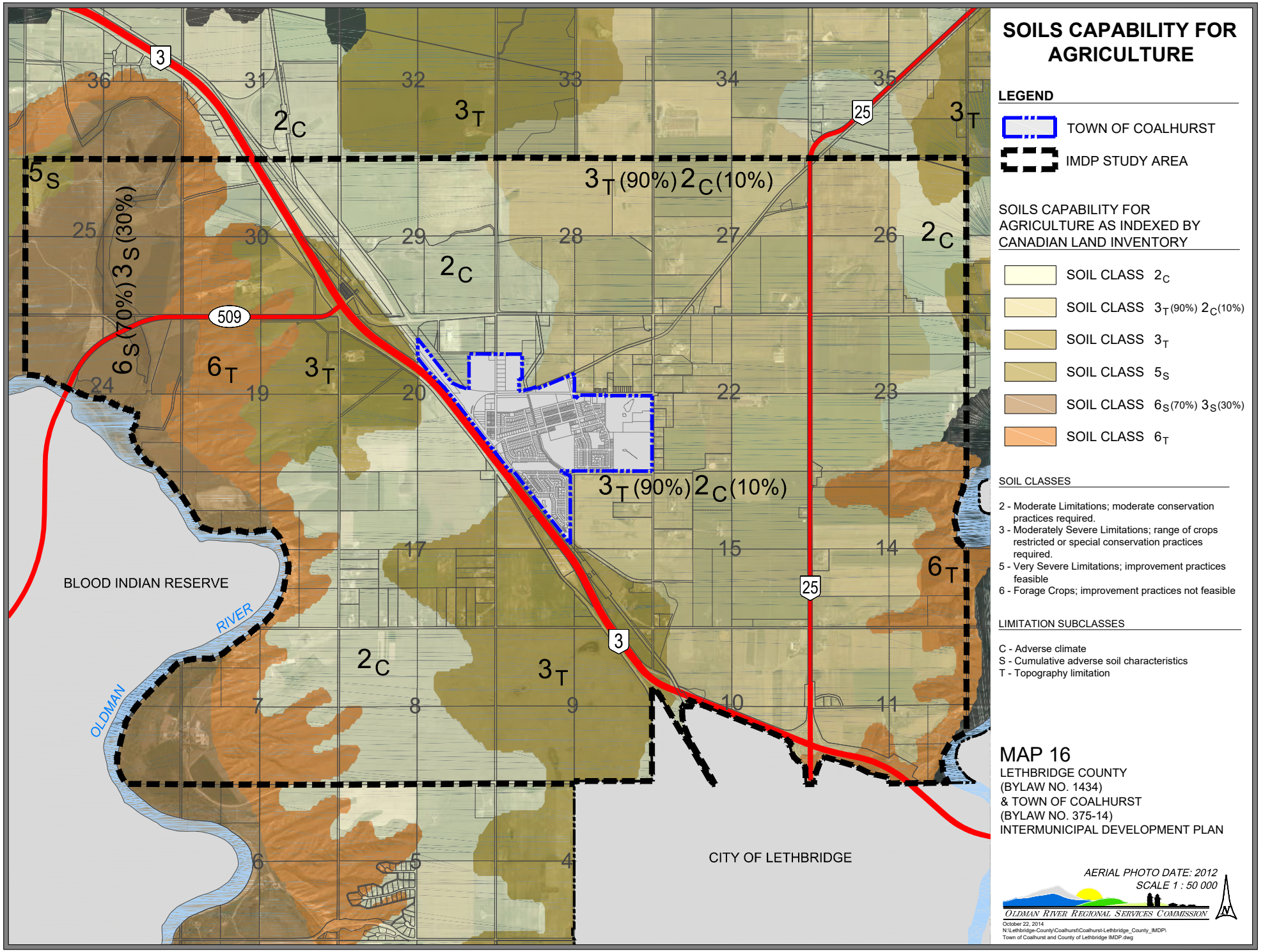


# SOILS CAPABILITY FOR AGRICULTURE

## LEGEND

- TOWN OF COALHURST
- IMDP STUDY AREA

SOILS CAPABILITY FOR AGRICULTURE AS INDEXED BY CANADIAN LAND INVENTORY

- SOIL CLASS $2_C$
- SOIL CLASS $3_T(90\%)\ 2_C(10\%)$
- SOIL CLASS $3_T$
- SOIL CLASS $5_S$
- SOIL CLASS $6_S(70\%)\ 3_S(30\%)$
- SOIL CLASS $6_T$

## SOIL CLASSES

2 - Moderate Limitations; moderate conservation practices required.
3 - Moderately Severe Limitations; range of crops restricted or special conservation practices required.
5 - Very Severe Limitations; improvement practices feasible
6 - Forage Crops; improvement practices not feasible

## LIMITATION SUBCLASSES

C - Adverse climate
S - Cumulative adverse soil characteristics
T - Topography limitation

# MAP 16

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 50 000*

OLDMAN RIVER REGIONAL SERVICES COMMISSION

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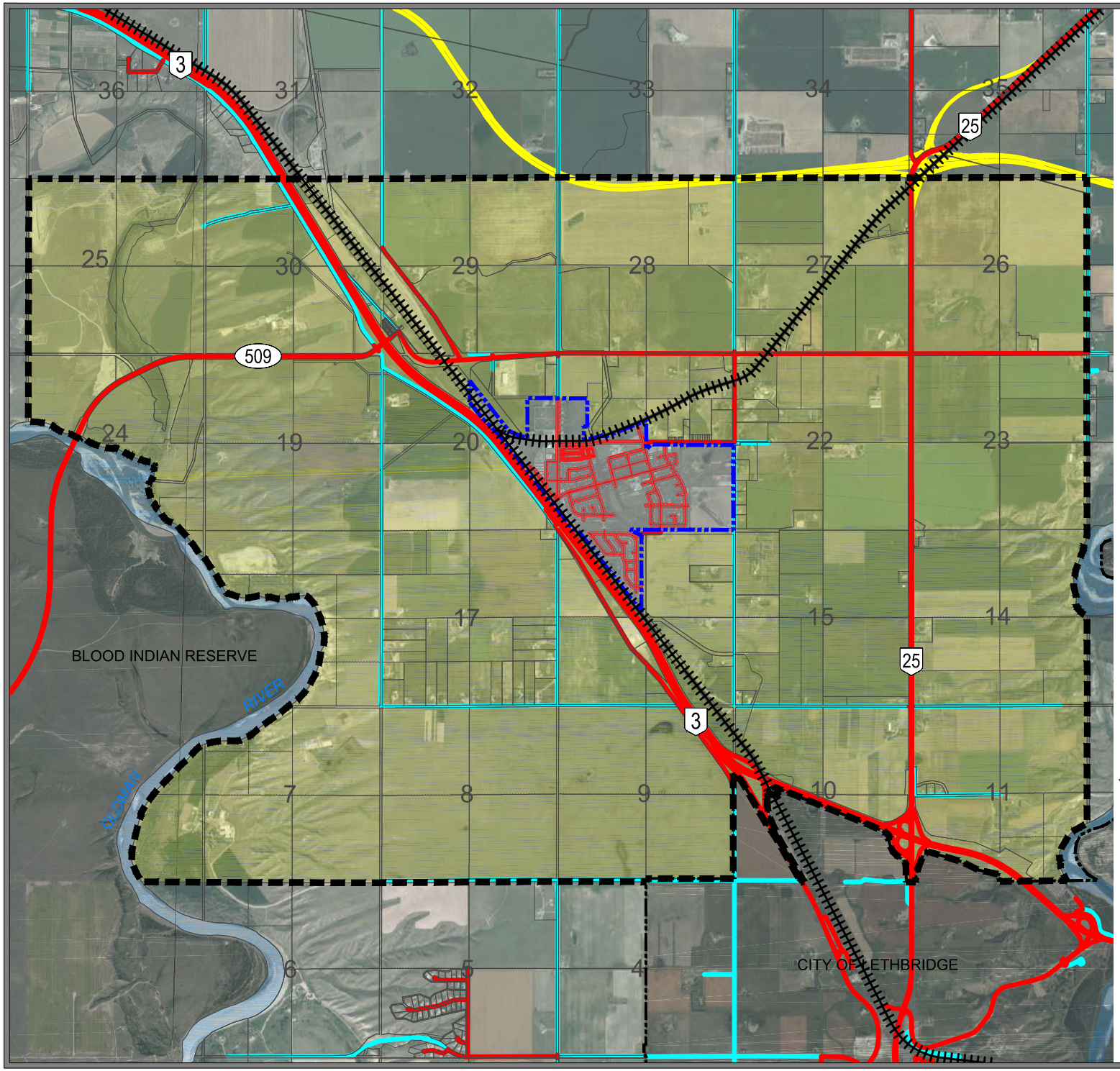


# TRANSPORTATION NETWORK

**LEGEND**

- TOWN OF COALHURST
- IMDP STUDY AREA

TRANSPORTATION NETWORK

- PAVED ROAD*
- UNPAVED ROAD*
- PROPOSED CANAMEX HIGHWAY
- RAILWAY

*Data source:
*National Road Network, Alberta Edition 9.0 (GeoBase)*

## MAP 17

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

*AERIAL PHOTO DATE: 2012*
*SCALE 1 : 50 000*

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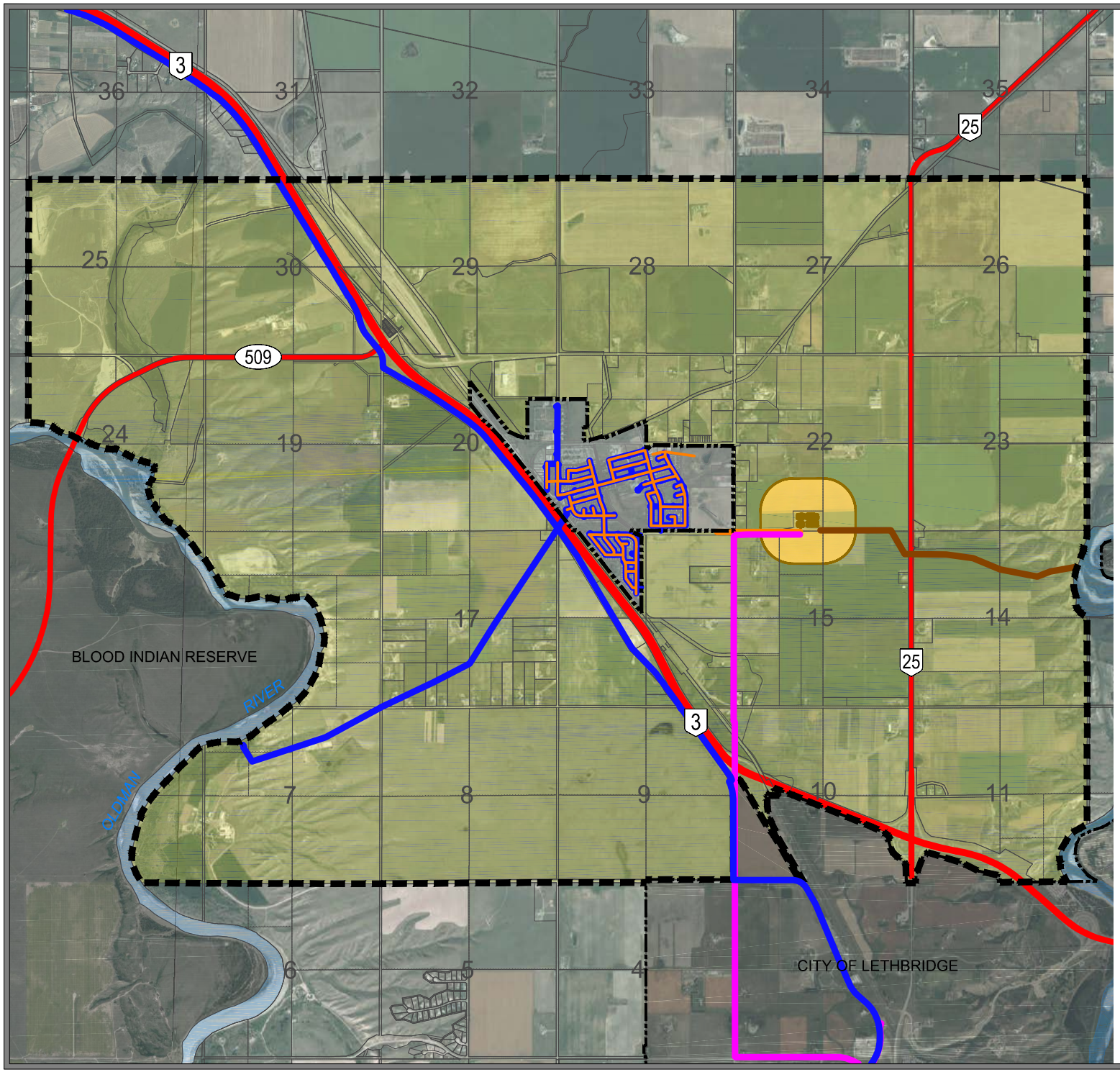


# INFRASTRUCTURE

**LEGEND**

- TOWN OF COALHURST
- IMDP STUDY AREA

SANITARY AND WATER INFRASTRUCTURE*

- SANITARY GRAVITY MAIN
- SANITARY FORCE MAIN
- SANITARY OUTFALL MAIN
- WATER PRESSURE MAIN
- 300m SEWAGE LAGOON BUFFER FROM PLAN BOUNDARY

**Sanitary and water infrastructure data within the IMDP study area is supplied by MPE Engineering and the County of Lethbridge and is intended to be used as a visual representation only.*

## MAP 18

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

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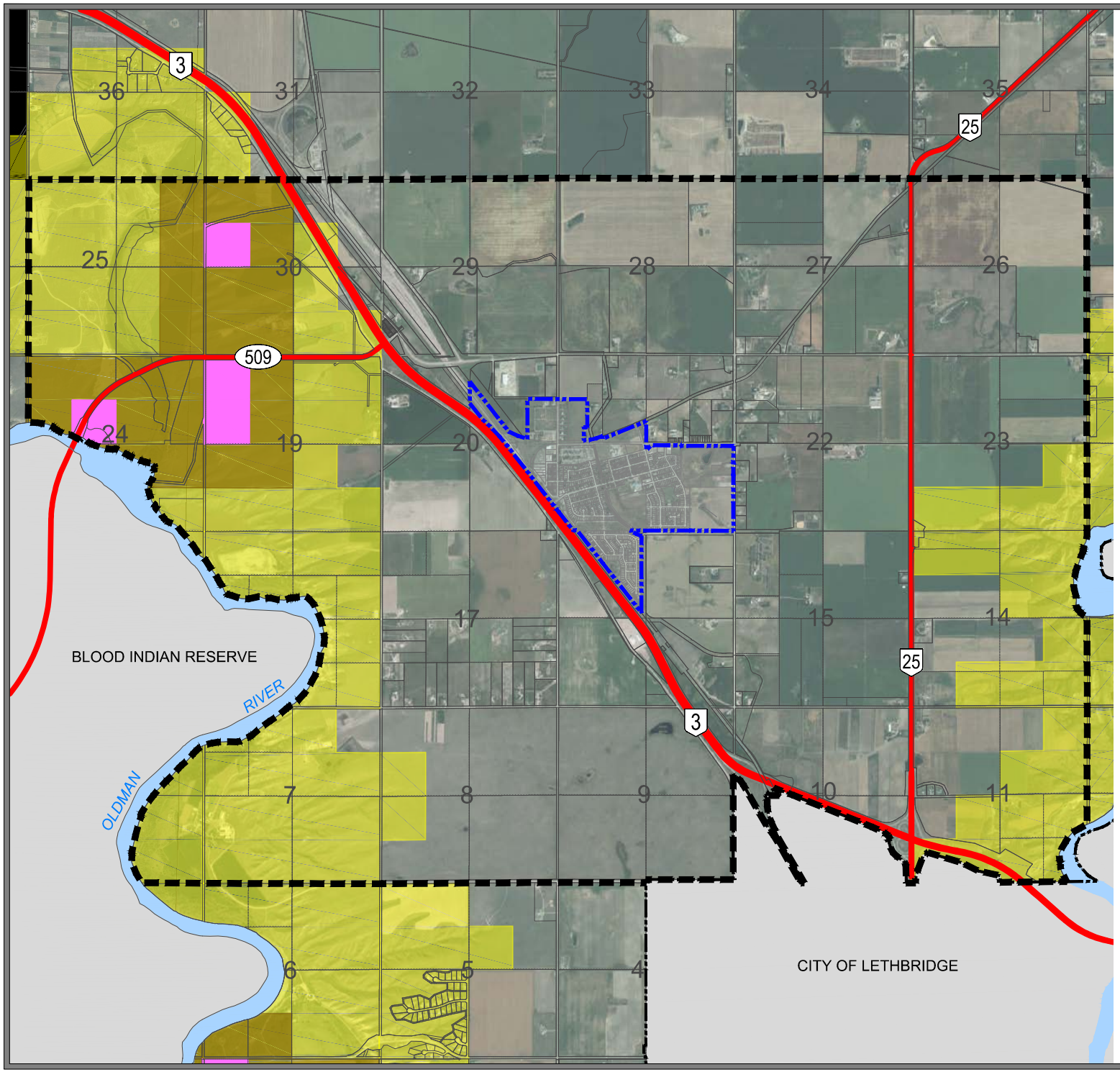


# HISTORIC RESOURCES

## LEGEND

TOWN OF COALHURST

IMDP STUDY AREA

HISTORIC RESOURCE VALUE AND CATEGORY*

4A

5A

5P

HISTORIC RESOURCE VALUE

4 - Contains a historic resource that may require avoidance
5 - Believed to contain a historic resource

HISTORIC RESOURCE CATEGORY

A - Archaeological
P - Palaeontological

*Data Source:
*Alberta Culture*
*Listing of Historic Resources*
*Release date: September 2012*
*(http://culture.alberta.ca/heritage/resourcemanagement/landuseplanning/default.aspx)*

## MAP 19

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

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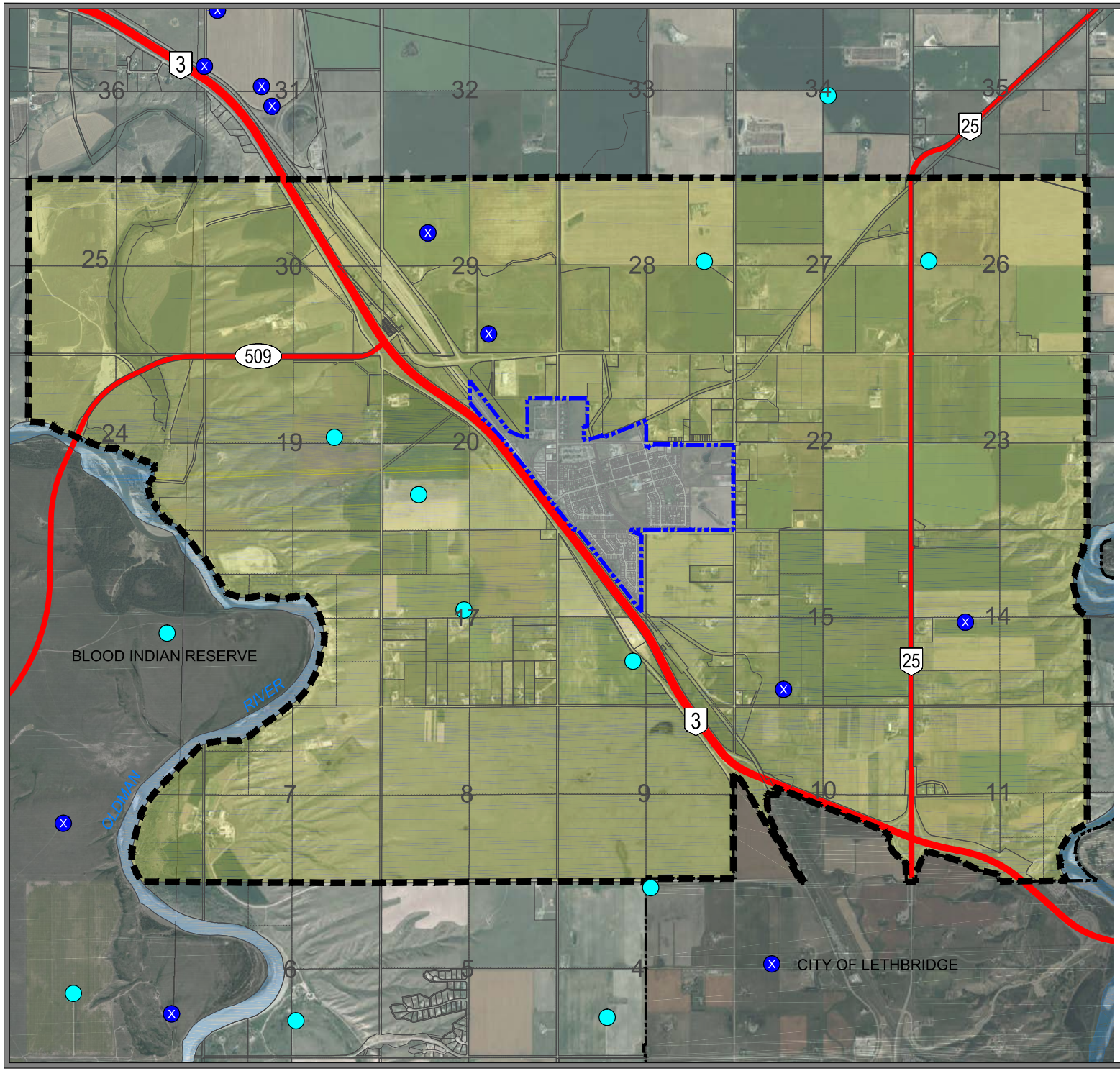


# OIL AND GAS WELLS

**LEGEND**

TOWN OF COALHURST

IMDP STUDY AREA

WELLS*

WELL

WELL - ABANDONED

*Data Source: Abacus Datagraphics Ltd.

## MAP 20

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

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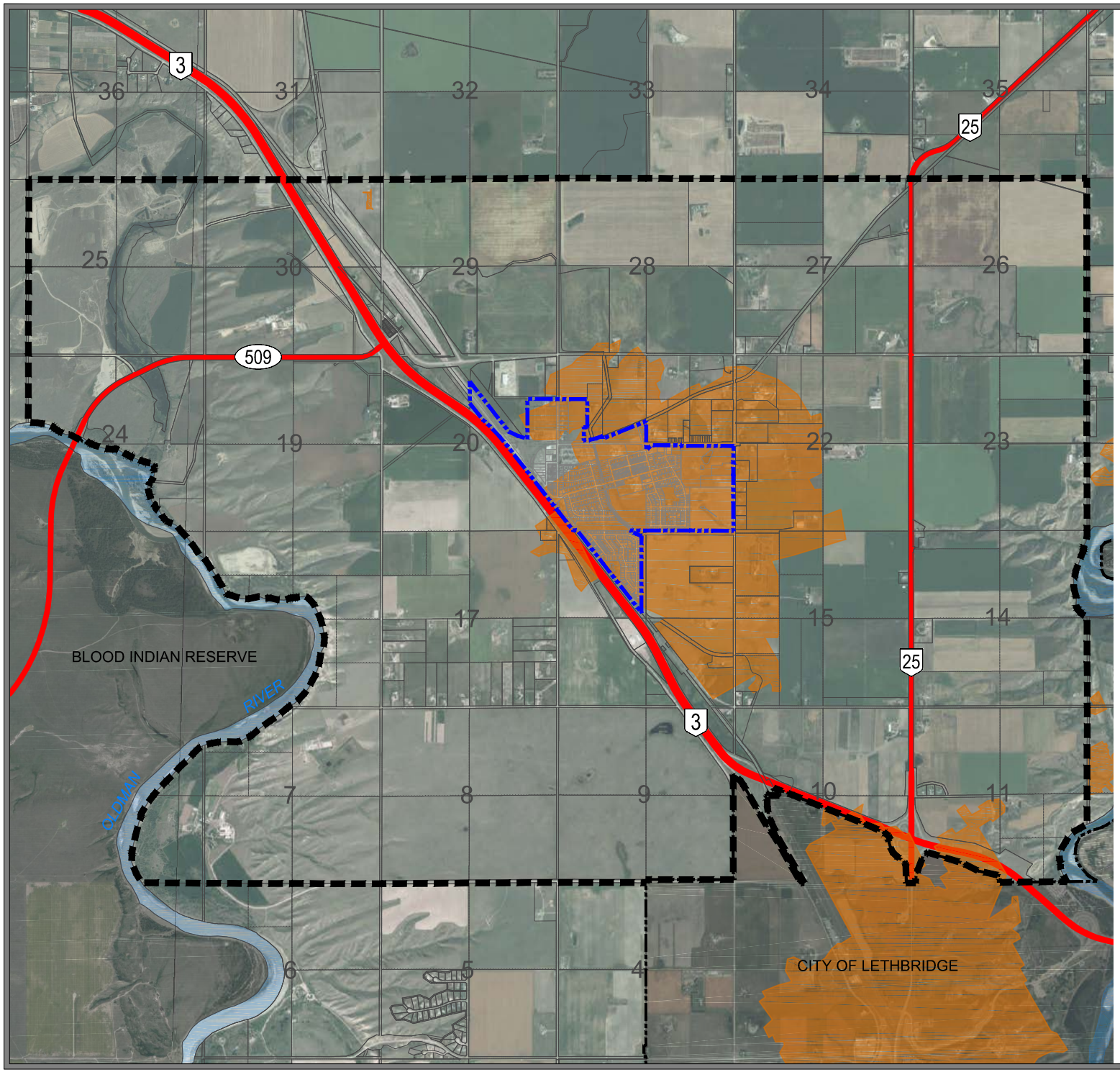


# UNDERGROUND COAL MINES

**LEGEND**

- TOWN OF COALHURST
- IMDP STUDY AREA
- UNDERGROUND COAL MINE*

*Data Source: ERCB*

*Disclaimer: The abandoned coal mine information is for informative purposes and represents the best data available to the ERCB at this time but its accuracy cannot be guaranteed. The ERCB is not responsible for damages caused by the use of this information.*

*(http://culture.alberta.ca/heritage/resourcemanagement/landuseplanning/default.aspx)*

## MAP 21

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

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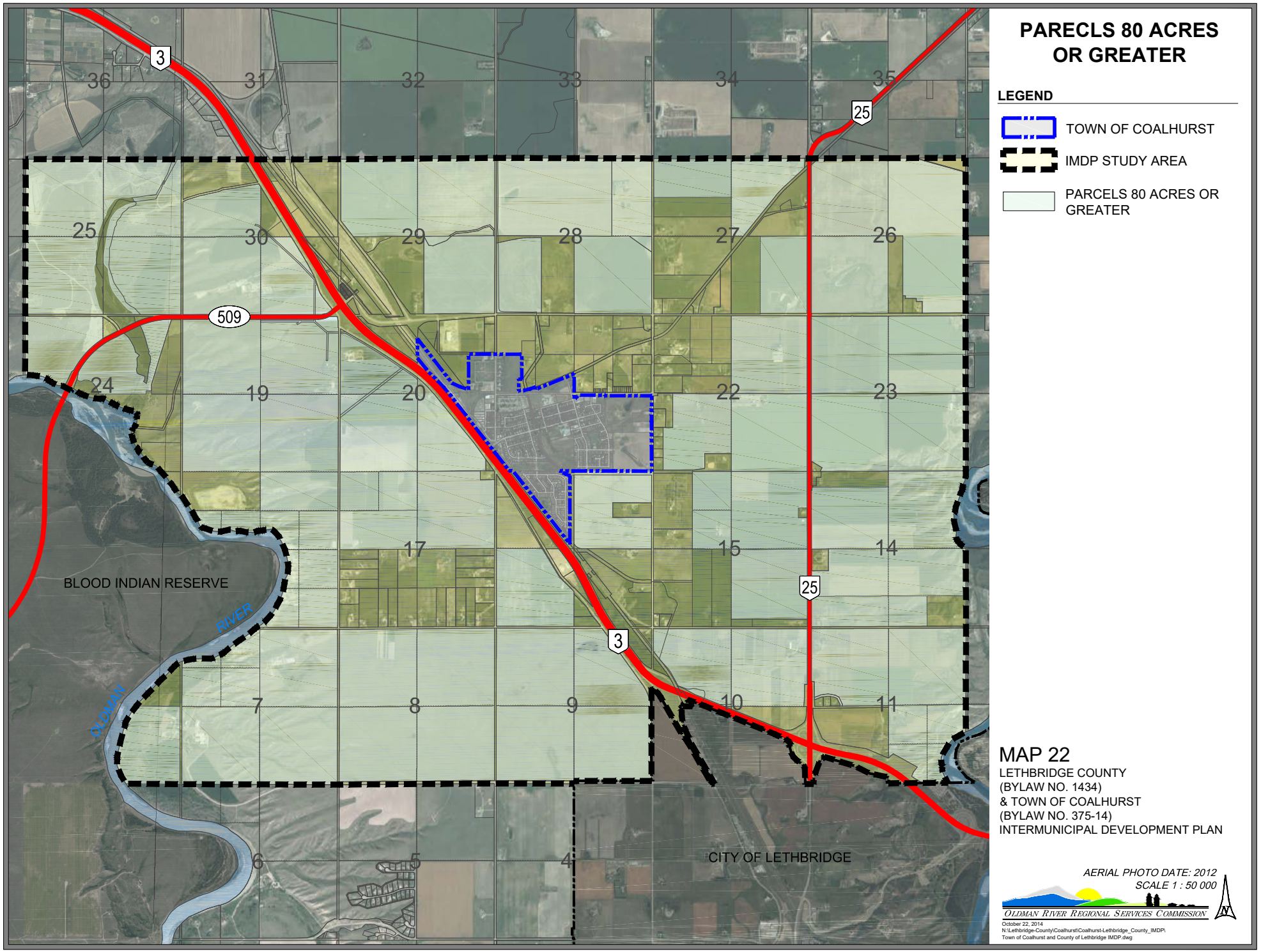
PARECLS 80 ACRES OR GREATER
LEGEND
TOWN OF COALHURST
IMDP STUDY AREA
PARCELS 80 ACRES OR GREATER
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509
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BLOOD INDIAN RESERVE
OLDMAN RIVER
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5
4
CITY OF LETHBRIDGE
MAP 22
LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN
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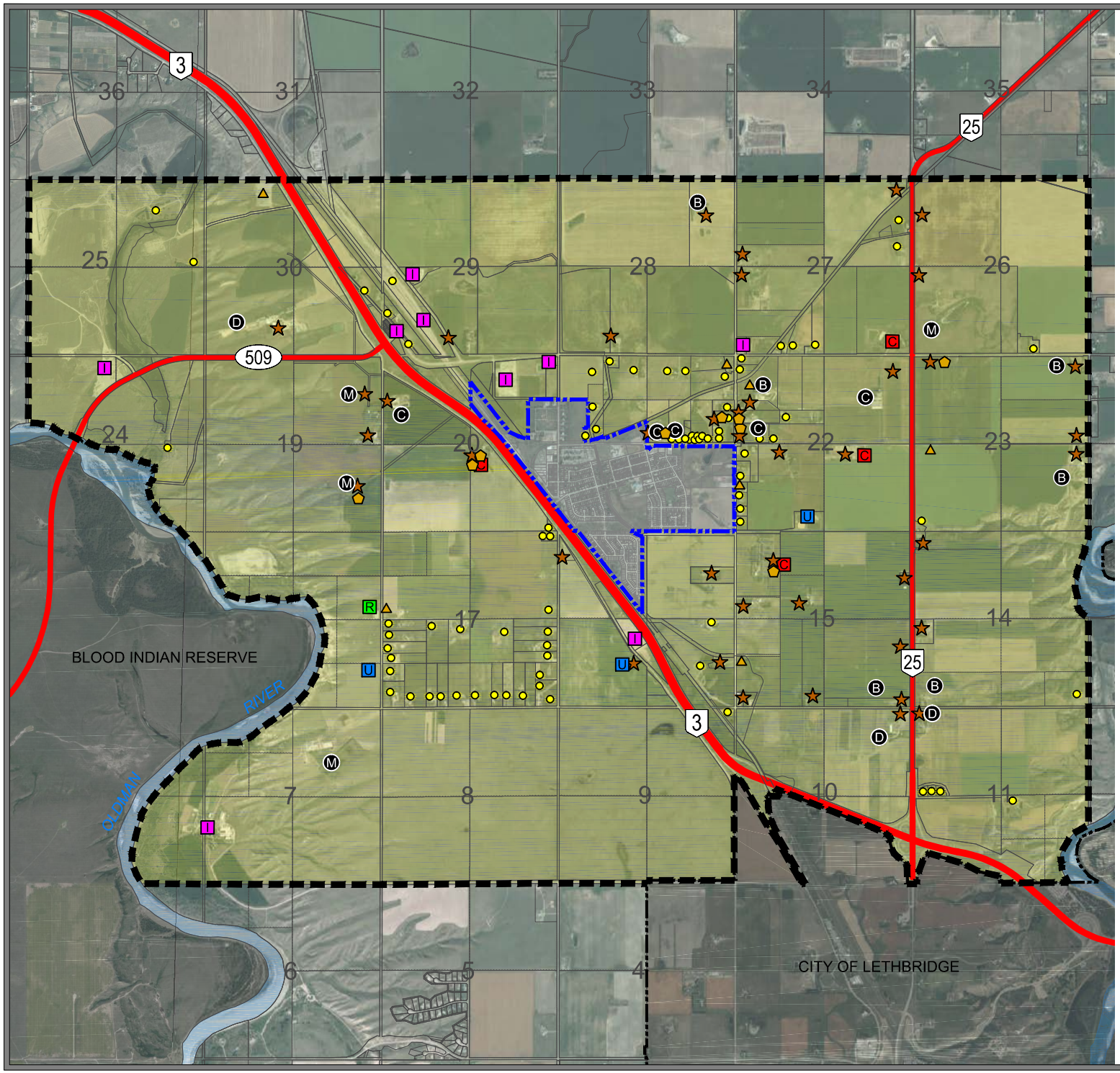


# EXISTING LAND USE WITHIN IMDP STUDY AREA

## LEGEND

- TOWN OF COALHURST
- IMDP STUDY AREA

### EXISTING LAND USE

- COUNTRY RESIDENCE
- FARMSTEAD
- ANCILLARY FARM RESIDENCE
- FARM BUILDING
- C — COMMERCIAL
- I — INDUSTRIAL
- U — UTILITY
- R — RECREATION

### CONFINED FEEDING OPERATION

- B — BEEF
- C — CHICKEN
- D — DAIRY
- M — MIXED

## MAP 23

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

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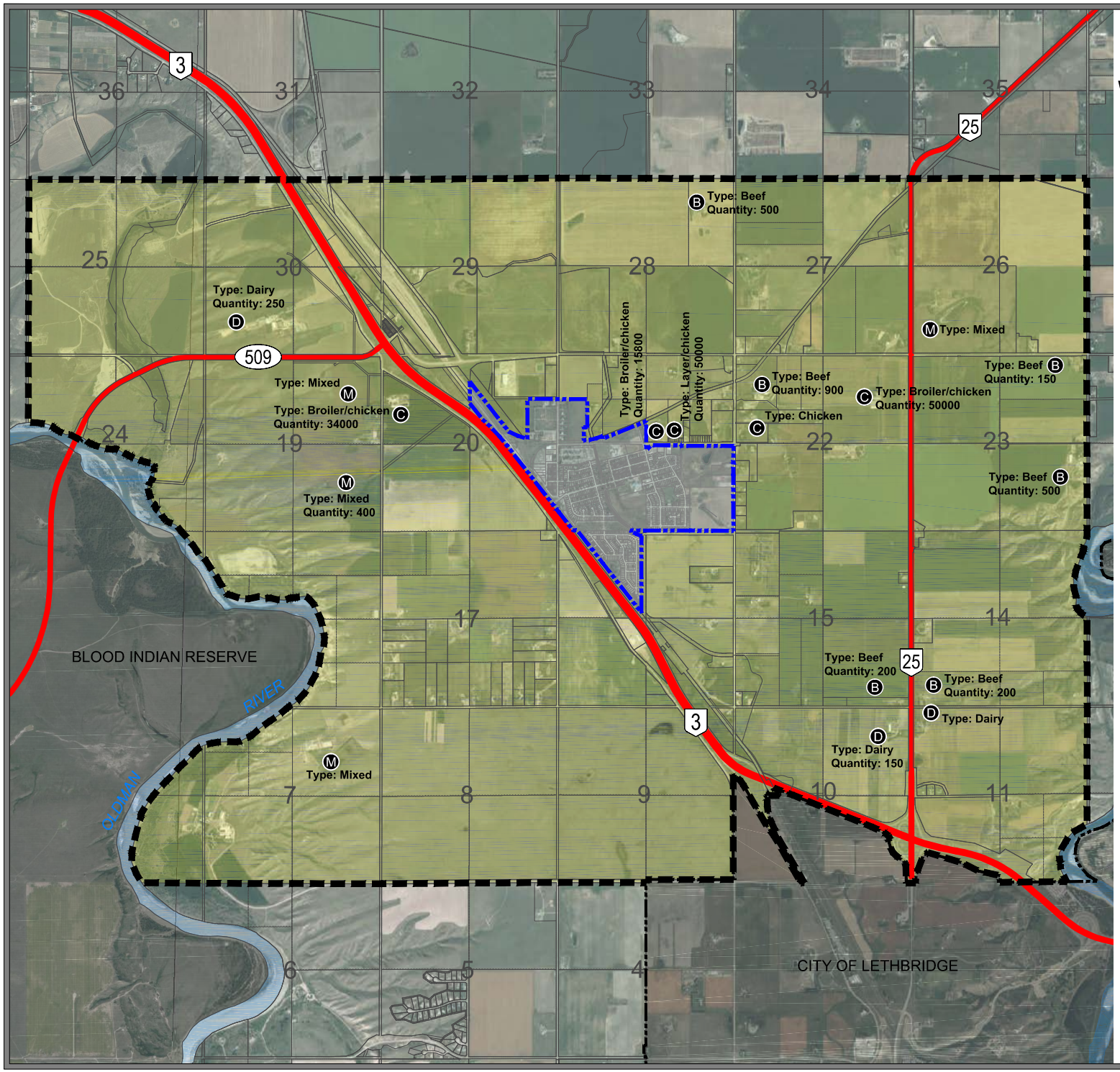


# CONFINED FEEDING OPERATIONS WITHIN IMDP STUDY AREA

## LEGEND

- TOWN OF COALHURST
- IMDP STUDY AREA

CONFINED FEEDING OPERATION

- B — BEEF
- C — CHICKEN
- D — DAIRY
- M — MIXED

## MAP 24

LETHBRIDGE COUNTY
(BYLAW NO. 1434)
& TOWN OF COALHURST
(BYLAW NO. 375-14)
INTERMUNICIPAL DEVELOPMENT PLAN

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# SCHEDULE C: DEFINITIONS

# SCHEDULE C: Definitions

**Accessory Building** means a building or structure, incidental, subordinate and located on the same lot as the principal building, but does not include a building or structure used for human habitation.

**Accessory Use** means a use of a building or land, which is incidental to and subordinate to the principal use of the site on which it is located.

**Adjacent Land** means land that abuts or is contiguous to the parcel of land that is being described and includes land that would be contiguous if not for a highway, road, lane, walkway, watercourse, utility lot, pipeline right-of-way, power line, railway, or similar feature and any other land identified in a land use bylaw as adjacent for the purpose of notifications under the *Municipal Government Act*.

**Agreements in Principle** means agreements and acknowledged principles made in good faith between two parties in consideration of intermunicipal cooperation, but in regards to the Plan they do not form part of the formal Plan policies in relation to the jurisdiction and applicable Plan boundary.

**Agricultural Land, Higher Quality** means:

(a) land having a Canada Land Inventory (CLI) classification of 1-4, comprising 64.8 ha (160 acre) parcels of dryland or 32.4 ha (80 acre) parcels of irrigated land;

(b) land contained in an irrigable unit;

(c) land having a CLI classification of 5-7 with permanent water rights, with the exception of:

  (i) cut-off parcels of 4.0 ha (10 acres) or less. To be considered a cut-off, a parcel must be separated by:
    - a permanent irrigation canal as defined by the irrigation district,
    - a permanent watercourse normally containing water throughout the year,
    - a railway,
    - a graded public roadway or highway,
    - an embankment, or
    - some other physical feature,

  which makes it impractical to farm or graze either independently or as part of a larger operation, including nearby land;

  (ii) land which is so badly fragmented by existing use or ownership that the land has a low agricultural productivity or cannot logically be used for agricultural purposes. For the purpose of subdivision, fragmented land may be considered to be land containing 8.1 ha (20 acres) or less of farmable agricultural land in CLI classes 1-4.

**Agricultural Operation** means an agricultural activity conducted on agricultural land for gain or reward or in the hope or expectation of gain or reward, and includes:

(a) the cultivation of land;

(b) the raising of livestock, including game-production animals within the meaning of the "Livestock Industry Diversification Act" and poultry;

(c) the raising of fur-bearing animals, pheasants or fish;

(d) the production of agricultural field crops;

(e) the production of fruit, vegetables, sod, trees, shrubs and other specialty horticultural crops;

(f) the production of eggs and milk;

(g) the production of honey (apiaries);

(h) the operation of agricultural machinery and equipment, including irrigation pumps on site;

(i) the application of fertilizers, insecticides, pesticides, fungicides and herbicides, including application by ground and aerial spraying, for agricultural purposes;

(j) the collection, transportation, storage, application, use transfer and disposal of manure; and

(k) the abandonment and reclamation of confined feeding operations and manure storage facilities.

**Agricultural Service Board** means the Lethbridge County board which provides agricultural services, information and new technology in liaison with other governments, jurisdictions, agencies and industry by establishing policy that insures statutory requirements and the collective interests of clients are met. Several key pieces of provincial government legislation that are enforced are the *Weed Control Act*; the *Agricultural Service Board Act*; the *Soil Conservation Act*; the *Agricultural Pests Act* and the *Agricultural Chemicals Act*.

**Architectural Controls** means special standards or controls applied to development which are often restrictive in nature. Typically this includes a specified building scheme that applies to building details, such as building types, finish, colors and materials, fences or landscaping. These controls may be registered by a Restrictive Covenant at the time a plan of survey is filed with Land Titles Office.

**Area Concept** means a defined area within this Plan where various land uses have been envisioned to occur in accordance with the policies of the Plan, and future non-agricultural development has been clustered/ concentrated or outlined in an identified area of the Plan for future development in a planned, managed and orderly manner.

**Area Structure Plan** means a statutory plan in accordance with the *Municipal Government Act* and the Lethbridge County Municipal Development Plan for the purpose of providing a framework for subsequent subdivision and development of an area of land in a municipality. The plan typically provides a design that integrates land uses with the requirements for suitable parcel densities, transportation patterns (roads), stormwater drainage, fire protection and other utilities across the entire plan area.

**Assignment of Jurisdiction** means the same as the provincial department of Transportation meaning and refers to Alberta Transportation allowing a portion of public road located in one municipal jurisdiction to be signed over by agreement to another municipal jurisdiction for control and maintenance.

**Best Management Practices (BMPs)** means practices and methods of managing stormwater drainage for adequate flood control and pollutant reduction by using the most cost-effective and practicable means that are economically acceptable to the community. Typically, BMPs are stormwater management methods that attempt to replicate as much of the 'natural" run-off characteristics and infiltration components of the undeveloped system as possible and reduce or prevent water quality degradation.

**Buffering or buffer strips** means an area of land including landscaping, berms, walls, fences, or a combination thereof, that is located between land use districts and land uses of different character and is intended to mitigate negative impacts through the physical and visual separation and sound attenuation of the more intense use (e.g. commercial or industrial) from uses such as residential or public institutional.

**Building Site** means a specific portion of the land that is the subject of an application on which a building can or may be constructed (Subdivision and Development Regulation AR 43/2002).

**Clustered Development** means a design technique that concentrates buildings and/or uses in specific areas on a site(s) to allow the remaining land to be used for recreation, open space, transitional/buffer area, or the preservation of historically or environmentally sensitive features.

**Commercial Use** means the use of land and/or buildings for the purpose of public sale, display and storage of goods, merchandise, substances, materials and/or services on the premises. Any on-premises manufacturing, processing or refining of materials is typically incidental to the sales operation.

- **Commercial Establishment** means a building, or part thereof, for the sale of goods or services to the general public.
- **Commercial, Highway** means commercial development located adjacent to a provincial highway whereby the primary purpose and intent is to provide for a broad range of commercial uses to serve the convenience needs of the travelling public and local residents.
- **Commercial, Isolated** means the same as the Lethbridge County Land Use Bylaw definition.
- **Commercial, Retail** means the retail sales with the use of a building, or part of a building, where goods, wares, merchandise, substances, articles, food, or things are stored and are for sale at retail price and includes storage on the premises of limited quantities of such goods, wares, merchandise, substances, articles, food, or things sufficient only to service such store. Examples of this use may include but not be limited to, department stores, hardware stores, convenience stores, pharmacies, grocery stores, clothing stores, shoe stores, and gift stores.

**Committee** means the Intermunicipal Development Plan or Intermunicipal Committee established in this Plan.

**Concept Plan** means a generalized plan indicating the boundaries of a parcel or parcels of land which identifies (at a minimum) the proposed land use, land-use intensity, and road and infrastructure servicing alignments and/or linkages.

**Conceptual Design Scheme** means a general site layout plan which provides for the orderly development of a parcel or group of parcels, usually for less than five lots. It is a planning tool which is a type of "mini" area structure plan, usually less detailed, typically illustrating lot layouts and sizes, roads, topography and general servicing information. It is usually not adopted by bylaw, but may be if the municipality desires to do so.

**CFO Exclusion Area** means the area within the Intermunicipal Development Plan where new confined feeding operations (CFOs) are not permitted to be established or existing operations allowed to expand.

**Confined Feeding Operation (CFO)** means an activity on land that is fenced or enclosed or within buildings where livestock is confined for the purpose of growing, sustaining, finishing or breeding by means other than grazing and requires registration or approval under the conditions set forth in the *Agricultural Operation Practices Act (AOPA),* as amended from time to time, but does not include seasonal feeding and bedding sites.

**Country Residential, Grouped** means existing or proposed residential uses on more than two adjacent parcels of less than the minimum extensive agricultural parcel size, and may consist of the yard site of a former farmstead.

**Country Residential**, **Isolated** means one or two existing or proposed country residential uses.

**Country Residential Use** means a use of land, the primary purpose of which is for a dwelling or the establishment of a dwelling in a rural area, whether the dwelling is occupied seasonally, for vacation purposes or otherwise, or permanently.

**County** means Lethbridge County.

**Deferred Servicing/Development Agreement** means an agreement made in consideration of sections 650 or 654 of the *Municipal Government Act*, between a developer and the municipality for the provision of services to serve the development, whereby the municipality may agree to have the developer delay or defer the requirements to provide or construct those services at a later date (as defined in the agreement); or, to require the developer to tie-in to major municipal infrastructure at any time in the future whereby it may be installed to or past the property line of the parcel or development project, when the services were not initially installed or available in the location of where the development occurred.

**Development** means:

(a) an excavation or stockpile and the creation of either but does not include turning over soil with no immediate activity on the land in the near future; or

(b) a building or an addition to, or replacement or repair of a building and the construction or placing of any of them in, on, over or under land; or

(c) a change of use, or a building, or an act done in relation to land or a building that results in, or is likely to result in, a change in the use of the land or building; or

(d) a change in the intensity of use of land or a building or an act done in relation to land or a building that results in, or is likely to result in, a change in the intensity of use of the land.

**Development Cells** mean those individual and defined development areas that are referred to in this Plan (and associated mapping) in providing for the orderly and managed growth through the appropriate staging or sequencing of development of those specified lands as articulated in this Plan.

**Discretionary Use** means the use of land or a building in a land use district for which a development permit may be approved at the discretion of the Development Authority with or without conditions.

**Dispute Settlement or Resolution** means a formal process that provides the means by which differences of view between the parties can be settled, in a peaceful and cooperative manner. These differences may be over their opinions, interpretations, or actions of one party in regards to decision making in the IMDP plan area or interpretation of the IMDP policies.

**District** means a defined area of a municipality as set out in the land use district schedule of uses and indicated on the Land Use District Map.

**Dwelling Unit** means self-contained living premises occupied or designed to be occupied by an individual or by a family as an independent and separate housekeeping establishment and in which facilities are provided for cooking and sanitation. Such units include single-detached dwellings, modular homes, manufactured homes and moved-in buildings for residential use.

**Endeavour to Assist** means an agreement and process used by a municipality to compensate initial developers who may oversize or install infrastructure to service their development, where later developments may access or tie-in to those services, and is typically addressed through clauses in the Development Agreement. These Endeavour to Assist Agreements are put in place to assist developers who install infrastructure as a front end service that will be a benefit to adjacent developers in the future. Any cost recovery required through such agreements is over and above the off-site levies attached to any specific parcel.

**Extensive Agriculture** means the general raising of crops and grazing of livestock in a non-intensive nature, typically on existing titles or proposed parcels usually 64.8 ha (160 acres) on dryland or 32.4 ha (80 acres) on irrigated land.

**Farming** means the use of land or buildings for the raising or producing of crops and/or livestock but does not include a confined feeding operation for which a registration or approval is required from the Natural Resources Conservation Board.

**Farmstead** means an area in use or formerly used for a farm home or farm buildings or both and which is impractical to farm because of the existing buildings, vegetation or other constraints.

**First Parcel Out** means the first subdivision to create a standalone certificate of title from a previously unsubdivided quarter section of land. The subdivision authority may consider a quarter section to be unsubdivided if the previous subdivisions were for the purpose of public or quasi-public use.

**Fringe or Urban Fringe** means the approximate one- to two-mile area around the municipal boundary of an urban municipality and includes the designated Rural Urban Fringe district of the Lethbridge County Land Use Bylaw in the vicinity of the Town of Coalhurst.

**Grandfathered Use or Land Uses** means a use in existence at the time of adopting a bylaw but once the bylaw takes effect, may no longer conform or comply to the policies, standards or requirements of the bylaw, but they are legally allowed to exist until a change or intensification of the use occurs, at which time the use then must conform to the bylaw.

**Growth Study** means a report or analysis to identify the land requirements to accommodate future population and urban growth and is a guide for municipal decision-making regarding future land use needs. This study is not a statutory plan but it is often used as the basis for a formal annexation application being submitted to the Province. Typically the report will examine historic demographic trends, growth influences, land consumption, land and servicing constraints and municipal transportation and utility capacities.

**Industrial Land Use**:

- **Business Light Industrial** means industrial uses that provide for a high-quality development and that operate in such a manner that no nuisance factor is created or apparent outside of an enclosed building. Limited outdoor activities (loading, service, storage, display, or the like) that are accessory to a principal use may occur providing the scale of such activities does not unduly conflict with the primary purpose, character or nature of a business light industrial use/district or dominate the use of the site. Business light industrial use areas are intended for sites typically located in a planned business centre or office park environment that are located in highly visible and accessible locations and display a higher standard of design and appearance (inclusive of site, building and landscape designs). Examples of this use may include but not be limited to, automotive and recreation vehicle storage, sales, rentals and service; machinery and equipment sales, rental and service; farm service product sales; bulk fuel storage and sales; car/truck wash; warehousing; storage and distribution, light industrial processing and manufacturing; garden centres; offices; professional services; and business support services.
- **Industrial** means development used for manufacturing, fabricating, processing, assembly, production or packaging of goods or products, as well as administrative offices and warehousing and wholesale distribution use which are accessory uses to the above, provided that the use does not generate any detrimental impact, potential health or safety hazard, or any nuisance beyond the boundaries of the developed portion of the site or lot upon which it is situated.
- **Isolated Light Industrial** means industrial uses located or proposed to be located on parcels of land not adjacent to other proposed or existing industrial uses, and that, in the opinion of the Development Authority, would not substantially change the agricultural characteristics of an area.
- **Noxious or Heavy Industrial** means industry which involves processing of an extractive or agricultural resource which is deemed to be hazardous, noxious, unsightly or offensive (smoke, dust, glare) and cannot therefore be compatibly located in proximity of a residential environment. Examples should include, but are not limited to: anhydrous ammonia storage, abattoirs, oil and gas plants, seed cleaning plants, bulk fuel depots, livestock sales yards, gravel/sand puts or stone quarries, auto wreckers or other such uses determined by the Development Authority to be similar in nature.

**Intensive Agriculture** means any concentrated method used to raise crops or to rear or keep livestock, animals, poultry or their products for market, including such operations as horse riding stables, poultry farms, pastures, rabbitries, fur farms, greenhouses, tree farms, sod farms, apiaries, dairies, nurseries and similar specialty uses conducted as the principal use of a building or site.

**Intermunicipal Committee (the Committee)** means the members assigned by each respective council to the Joint Intermunicipal Committee for the purposes of administering and monitoring the Intermunicipal Development Plan.

**Intermunicipal Development Plan (IMDP) Boundary** means the agreed-to area the IMDP will govern and is the referral area for the plan and all development applications and statutory bylaw amendments on lands within the identified plan area that will be referred to the IMDP Committee.

**Joint Enhanced Development Areas (JEDI**) means an area identified in the Plan where development design guidelines of the Plan shall apply to commercial and industrial development in areas of both Lethbridge County and the Town of Coalhurst.

**LEED (Leadership in Energy and Environmental Design)** means a set of rating systems for the design, construction, operation, and maintenance of green buildings, homes and neighborhoods. LEED concentrates its efforts on improving performance across five key areas of environmental and human health: energy efficiency, indoor environmental quality, materials selection, sustainable site development and water savings. Developed by the U.S. Green Building Council (USGBC), LEED is intended to help building owners and operators be environmentally responsible and use resources efficiently.

**Low Impact Development or Design** means a term used to describe a land planning and engineering design approach to manage stormwater runoff which emphasizes consideration and use of on-site natural features to protect water quality. It uses a set of best management practices (BMPs) which seek to reduce stormwater quantity and improve stormwater quality at its source.

**Major Tracts of Land** means primarily undeveloped lands or parcels that are intended to be subdivided and are not what would normally be considered part of present developed areas.

**May** means, within the context of a policy, that a discretionary action is permitted.

***MGA*** means the *Municipal Government Act Revised Statutes of Alberta 2000, Chapter M-26*, as amended.

**Mixed Use** means the land or a identified parcel may be used or designated for more than one specific type of land use, and typically involves some type of residential use mixed with commercial and/or public/institutional.

**Municipal Council** within the municipal boundary of the Town of Coalhurst means the Coalhurst Council, and within the municipal boundary of Lethbridge County means the County Council.

**Municipal Development Plan** means a statutory plan, formerly known as a general municipal plan, adopted by bylaw in accordance with section 632 of the *Municipal Government Act*, which is used by municipalities as a long-range planning tool.

**Noxious Use** means a use, usually industrial or commercial in nature which, by reason of emissions (i.e. air, water, glare or noise), is hazardous to human health, safety or well-being and cannot reasonably be expected to co-exist in proximity to population concentrations.

**Nuisance** means any use, prevailing condition or activity which adversely affects the use or enjoyment of property or endangers personal health or safety.

**Off-Site Levy** means the rate established by a municipal council that will be imposed upon owners and/or developers who are increasing the use of utility services, traffic services, and other services directly attributable to the changes that are proposed to the private property. The revenues from the off-site levies will be collected by the municipality and used to offset the future capital costs for expanding utility services, transportation network, and other services that have to be expanded in order to service the needs that are proposed for the change in use of the property.

**Overlay Plan** means the same as **Shadow Plan**.

**Permitted Use** means the use of land or a building in a land use district for which a Development Authority shall issue a development permit with or without conditions providing all other provisions of the Bylaw are conformed with.

**Plan** means the Lethbridge County and Town of Coalhurst Intermunicipal Development Plan.

**Principal Building or Use** means the building or use of land or buildings that constitutes the dominant structure or activity of the lot.

**Provincial Highway** means a road development as such by Ministerial Order pursuant to the *Highway Traffic Act* and described by plates published in the Alberta Gazette pursuant to Alberta Reg. 164/69 as 500, 600, 700 and 800 series or Highways 1 and 36.

**Provincial Land Use Policies** means those policies adopted by the Minister of Municipal Affairs pursuant to section 622(1) of the *Municipal Government Act*.

**Public and Quasi-Public Building and Uses** means a building or use which is available to or for the greater public for the purpose of assembly, instruction, culture or community activity and includes, but is not limited to, such uses as a school, church, cemetery, community hall, educational facility, parks or government facilities.

**Public Roadway** means:

(a) the right-of-way of all or any of the following:
    (i) a local road or statutory road allowance,
    (ii) a service road,
    (iii) a street,
    (iv) an avenue, or
    (v) a lane,
    (vi) that is or is intended for public use; or

(b) a road, street or highway pursuant to the *Public Highways Development Act*.

**Public Utility** means a system, works, plant, equipment or service owned and operated by a municipality or corporation under agreement with or franchised by the municipality, or by a corporation licensed under a Federal or Provincial Statute and which furnishes services and facilities to the public and includes, but is not limited to:

(a) communication by way of telephone, television or other electronic means;

(b) public transportation by bus or other means; and

(c) production, transmission, delivery or furnishing of water, gas or electricity to the general public.

**Retail-node** means an identifiable commercial/retail grouping or cluster of uses subsidiary and dependent upon a larger grouping of similar or related uses.

**Road Network Concept** means a conceptual plan for the future road network in the plan area which identifies the general location, layout, intersections and access points, and also integrates/aligns with the adjacent Town of Coalhurst road system and adjacent highway systems.

**Setback** means the perpendicular distance that a development must be set back from the front, side, or rear property lines of the building site as specified in the particular district in which the development is located.

**Shadow Plan** means a conceptual design drawing which indicates how parcels of land may be further subdivided and typically illustrates minimum sized urban lots, road alignments to adjacent road networks, servicing corridors and building pockets as to where dwellings should be located, so as not to fragment land or interfere with urban growth plans.

**Shall or Must** means, within the context of a policy, that the action is mandatory.

**Should** means within the context of a policy that the action is strongly encouraged but it is not mandatory.

**Site** means a lot, a group of contiguous lots or portion of a lot on which a building or use exists or which is, in the opinion of the Development Authority, the subject of an application for a Development Permit.

**Smart Growth or Compact Design** is a term used to describe approaches to managing the growth and development of communities that aim to improve environmental, economic and social sustainability, particularly by reducing urban sprawl and dependence on the automobile for transportation. It means more compact, higher-density and promotes mixed-use, especially along connecting corridors. Smart growth policies are intended to integrate land-use and infrastructure planning, fiscal and taxation measures, sustainable energy and regional governance.

**Soils Classifications** means the classification of soils in accordance with the Canadian Land Inventory on the basis of soil survey information, and are based and intensity, rather than kind, of their limitations for agriculture. The classes as indicated on Map 16 include:

*Class 1* – Soils in this class have no significant limitations in use for crops.

*Class 2* – Soils in this class have moderate limitations that restrict the range of crops or require moderate conservation practices.

*Class 3* - Soils in this class have moderately severe limitations that restrict the range of crops or require special conservation practices.

*Subclass S* - limitations meaning adverse soil characteristics which include one or more of: undesirable structure, low permeability, a restricted rooting zone because of soil characteristics, low natural fertility, low moisture holding capacity, salinity.

*Subclass T* - limitations meaning adverse topography, either steepness or the pattern of slopes limits agriculture.

*Subclass W* - limitations meaning excess water – excess water other than from flooding limits use for agriculture. The excess water may be due to poor drainage, a high water table, seepage or runoff from surrounding areas.

**Stormwater Management Plan (SWMP)** means a plan completed by a licensed professional engineer that proposes to manage the quality and quantity of stormwater, or run-off, collected and/or released from a parcel(s) into the watershed.

**Town** means the Town of Coalhurst.

**Traffic Impact Assessment (TIA) or Transportation Impact Analysis** means an evaluation or analysis completed by a licensed professional engineer (typically specializing in traffic) of the effect(s) of traffic generated by a development on the capacity, operations, and safety of a public road or highway and generally includes summary of any mitigation measures or roadway improvements required. The analysis should provide a basis for determining the developer's responsibility for specific off-site improvements.

**Transition** means an area of land in the process of changing from one use to another or an area which functions as a buffer between land uses of different types or intensity.

**Waiver or Variance** means a relaxation of the numerical standard(s) required of a development as established in the Land Use Bylaw. A waiver cannot be granted for use.

**Working Area** means those areas that are currently being used or that still remain to be used for the placing of waste material, or where waste processing or a burning activity is conducted in conjunction with a hazardous waste management facility, landfill or storage site (Subdivision and Development Regulation AR 43/2002).

**Xeriscaping (xerigardening**) means landscaping and gardening in ways that reduce or eliminate the need for supplemental water from irrigation and includes plants whose natural requirements are appropriate to the local climate are emphasized. Xeriscaping refers to a set of principles that are practical and environmentally friendly, and while it may incorporate rocks and gravel it does not focus on it, but on greenery**.**

# APPENDIX A: IMPLEMENTATION STRATEGY

| Lethbridge County/Town of Coalhurst IMDP: Implementation Strategy | | |
|---|---|---|
| The following outlined strategies are to act as a guide to help successfully implement the plan and they do not form part of the plan policy or act as a formal requirement of the plan | | Applicable Plan Policy / Action Reference |
| **Ongoing needs (today on ward)** | IMDP policies enacted for all subdivision/development activity from the date of the Plan approval | Policy 2.1.1 & 2.5.2 |
| | Plan tracking (redesignation, subdivisions, permits, etc.) | Best practice |
| **Short-term needs (today – 1 year)** | Amend both municipalities' Land Use Bylaws and Municipal Development Plans as required so that all planning instruments are in conformity | Policy 2.5.4 |
| | Continued annexation discussions and the filing of a formal annexation application from the Town | Policy 4.3.3 & On-going intermunicipal discussion |
| | Mutually agreed route for road development to Highway 25 | On-going intermunicipal discussion |
| | Joint cost-sharing and revenue sharing strategy drafted for areas proposed for non-residential development to the north of the Town | Policy 5.1.8 & On-going intermunicipal discussion |
| **Mid-term needs (1 – 5 years)** | Plan review (tracking and analysis of Plan effectiveness) | Policy 2.5.6 |
| | Review of Design Guidelines/success of implementation | See Schedule A / Best practice |
| | Road development to Highway 25 completed | On-going intermunicipal discussion |
| | Town should prepare a growth & development/ design strategy to plan for internal development areas and future growth areas (for any land annexed into town boundary) | Section 3.5 & Policy 3.5.9 |
| | Planning/design completed for the joint commercial mixed-use hub at the intersection of Highway 25 and Kipp Road or alternative alignment | Policy 3.4.4 |
| | Approach and discuss with City of Lethbridge 3-way joint planning initiative for City Interface Area | Policy 3.5.3 |
| | Joint economic development strategy for areas north of the Town (Planning Area 2, sub-planning areas 2A -2C) | On-going intermunicipal discussion |
| **Long-term needs (6+ years)** | Consultation and review of status of Highway 25 upgrades and CANAMEX corridor development | Policy 3.5.8 |
| | Review of each municipalities land use and development strategy / success of implementation | Best Practice |
| | On-going monitoring of plan and policies (analysis of Plan effectiveness) | Policy 2.1.5, 2.1.6 & 2.5.6 |

# APPENDIX B: NORTH COALHURST – KIPP AREA STRUCTURE PLAN

# North Coalhurst - Kipp

## AREA STRUCTURE PLAN

### Appendix B: Intermunicipal Development Plan

### Lethbridge County & Town of Coalhurst

Adopted by Amending Bylaw No. 20-023 & Bylaw No. 421-20
to Intermunicipal Development Plan Bylaw No. 1434 & 375-14







OLDMAN RIVER REGIONAL SERVICES COMMISSION

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**Prepared for Lethbridge County & Town of Coalhurst**

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# PART 1

# PART 1: INTRODUCTION

## 1.1 Intent of the Project

Lethbridge County and the Town of Coalhurst have partnered to develop a cooperative planning document focused on the development of a shared industrial park located adjacent to the Lethbridge County and Town of Coalhurst municipal boundary. Both municipalities have identified as part of their economic development strategy the benefits of having land designated for business/light industrial use on a highly accessible and visible transportation corridor that is paved. By creating a shared vision for future industrial development at this location, the preparation of an Area Structure Plan for the lands identified will attempt to balance the interests of each municipality and the landowners.

This Area Structure Plan (ASP) provides an opportunity to develop a high level policy document which will direct the future development of the lands into a regional economic hub to the mutual benefit of the two adjacent municipalities. The Plan is intended to provide a framework for future planning of this specific area and outlines the steps needed when developing the land in the future. The content of the plan will include the preparation of a design concept for lands both north and south of Kipp Road, explore the capacity for shared municipal service delivery of water, sewer and stormwater infrastructure and formulate guiding policy should the individual private landowners choose to pursue development of the area.

## 1.2 Guiding Principles

1. Lethbridge County and the Town of Coalhurst agree to work in collaboration for the mutually beneficial economic development and growth of both municipalities through the adoption and administration of the ASP.

2. Lethbridge County and the Town of Coalhurst will work in good faith and attempt to reach a consensus on planning and managing matters through administering the ASP.

3. Both municipalities agree to establish a mutually agreeable planning approach, defined in the land use concept and ASP, which will facilitate an integrated road network, minimize incompatible land uses, establish logical servicing, and manage density within the ASP area.

4. Lethbridge County and the Town of Coalhurst will ensure that the policies of this ASP are consistently and reasonably adhered to and implemented.

5. Lethbridge County and the Town of Coalhurst will monitor and review the policies and implementation of this ASP and as circumstances warrant, to ensure the ASP remains current, relevant and continues to meet the needs of the two partnering municipalities.

## 1.3 Area Structure Plan Legislative Requirements

An Area Structure Plan is a land use strategy for future development in a defined area. The strategy reflects the interests of both the landowners and stakeholders of the Plan Area, as well as the interests of Lethbridge County and the Town of Coalhurst. The ASP provides long-range, decision-making guidance to Council and the County for land use, subdivision and development applications, while providing landowners and developers with a sense of what logical and desirable future development will look like. An ASP, when adopted as a bylaw by an individual municipality, is a statutory document under the legislation of the *Municipal Government Act*, which makes it a legal document and also stipulates the process that must be adhered to. As the MGA does not have provisions to jointly adopt an ASP that transcends municipal borders, both the County and the Town have agreed to amend the Intermunicipal Development Plan and include the ASP in an appendix. This will grant the plan policy statutory status and be a recognized plan by both parties.

The ASP provides direction for future redesignation, subdivision, and development within the Plan Area. The policy statements serve to bring the strategy to life and address specific aspects of future development. They also provide guidance to subsequent decisions that have to be made as development proceeds.

### Municipal Government Act

According to the *Municipal Government Act*, an Area Structure Plan must describe the following:

- the sequence of development proposed for the area;
- the land uses proposed for the area, either generally or with respect to specific parts of the area;
- the density of population proposed for the area either generally or with respect to specific parts of the area;
- the general location of major transportation routes and public utilities.

It may also address any other matters Council deems necessary. An ASP must also be consistent with other statutory documents, such as the Municipal Development Plan. The *Municipal Government Act* also authorizes a notification and circulation process pursuant to section 636, which states that while preparing a statutory plan, a municipality must:

- provide a means for any person who may be affected by the plan to make suggestions (i.e. notify the public), this also includes utility companies;
- notify the school authorities and provide opportunities for suggestions and representations; and
- if the land is adjacent to another municipality, notify the municipality and provide opportunities for suggestions.

Although the ASP is not being adopted by a separate bylaw, the above criteria have been applied in the preparation of the planning document.

### South Saskatchewan Regional Plan

The Area Structure Plan must take into consideration and conform to the strategies of the South Saskatchewan Regional Plan (SSRP) which came into effect September 1, 2014. The SSRP uses a cumulative effects management approach to set policy direction for municipalities to achieve environmental, social, and economic outcomes within the South Saskatchewan Region through to 2024. The four main sections of the SSRP include the Introduction, Strategic Plan, Implementation Plan and Regulatory Details Plan. As part of the Implementation Plan, Section 5: Efficient Use of Land provides a strategic direction of encouraging efficient land use for an outcome of minimizing the development of land where possible.

The Area Structure Plan will consider and be in compliance with the South Saskatchewan Regional Plan.

## 1.4 Relationship to Existing Intermunicipal Development Plan

The land, which is the focus of the ASP, is subject to the County and Town Intermunicipal Development Plan (IDP) (Bylaw Nos. 1434 & 375-14) and the policies of the ASP have been prepared to conform to the IDP policies. As the completed ASP has been integrated into the Intermunicipal Development Plan, forming Appendix B, the ASP policies are considered policies of the IDP.

The long-range vision for this area is to provide for the development of a mix of land uses with the prime focus identified for the development of industrial and business light industrial type uses. The lands included in this ASP have been identified within Planning Area 2 of the IDP, which is bordered on the west by Highway 3 and the CPR rail-line. The IDP recognized that this area is subject to more opportunity and detailed planning policies, and broke down the area into sub-planning areas to manage accordingly. The IDP also identified that ASPs will need to be prepared to address the principles of an orderly, managed approach to growth. Planning Area 2 is the primary development area identified within the IDP boundary for County focused development, and is where future industrial/commercial type development are directed. The IDP also identified that there are transition land areas adjacent to the boundary of the Town that are logical to support future Town growth and may be able to connect to infrastructure lines in the future.

The IDP identified this planning area as suitable for industrial type land uses, as there are a number of such uses already established in the area. It has convenient access to major transportation routes (both highway, local pavement and rail) and the area south of the Kipp Road is in proximity to Town municipal services such as water and sanitary sewer that may have the potential to be extended in the future when feasible (if agreed to and available).

However, it must be recognized that presently there are constraints in this area to providing infrastructure services from the south within the Town, in regards to physical challenges, costs, and contractual limitations as to what the Town can provide. The success of future development is dependent on feasible and logical land use planning, on-going collaboration between the two municipalities, agreement on a logistical, fair and shared vision for the area, and several methods of implementation and future actions/agreements.

# PART 2

PLAN

# PART 2: PLAN

## 2.1 Overview

Lethbridge County and the Town of Coalhurst recognize the need for coordinated land use planning regarding subdivision and development in this area. The Land Use Concept is intended to efficiently manage non-residential growth in the fringe and ensure compatible development patterns that meet the needs of both municipalities. The ASP establishes a broad framework for future development and the general locations for land uses and road linkages in order to assist decision makers in the review of subdivision and development proposals within this specific area.

### Location and Design Concept

The Plan Area is located north of the existing Town of Coalhurst boundary and encompasses land both north and south of the Kipp Road (TWP RD 9-4), extending in to the S½ of 29-9-22-W4M and east to include a portion of the NW¼ 21-9-22-W4M. The area is bordered on the west by Highway 3 and the CPR rail-line (refer to Map 1). The identified Plan Area boundary generally respects an area that was identified in the 2014 Lethbridge County and Town of Coalhurst Intermunicipal Development Plan as areas suitable for industrial development. The ASP boundary includes an additional 29.5 ha (73 acres) of land in the N½ of SE 29-9-22 W4M not identified in the IDP, which was identified through the ASP preparation process, needed to accommodate storm water drainage.

The ASP has been divided into two design and policy areas, Planning Area 1 (south of Kipp Road) and Planning Area 2 (north of Kipp Road). Both areas will be discussed in more detail in the following sections but it is generally proposed that the development to the south will be connected to municipal services from the Town of Coalhurst and development north of Kipp Road will be larger rural lots to be serviced by private on-site services. In addition to the two main business industrial clusters, lands adjacent to and within the Town of Coalhurst have also been identified for residential infill and transitional uses. These additional lands have been integrated into the overall design plan as the lands were considered in the comprehensive infrastructure plan for roads, water, and waste and storm water. The area, at final build out, is envisioned to be a mix of municipal-serviced and privately-serviced lots of various sizes suitable for a variety of manufacturing, warehousing, light fabrication, and storage developments. The design incorporates a transportation system which integrates with the existing traffic connectivity to both Highway 3 and Highway 25 via Kipp Road.

The total planning area consists of approximately 155.46 ha (384.14 acres) of titled land with approximately 61.97 ha (153.11 acres) located on the south side of Kipp Road (including approximately 6.34 ha (15.66 acres) within the Town corporate boundary) and 93.5 ha (231.03 acres) located north of Kipp Road, entirely within Lethbridge County.

## Existing Conditions

The ASP area currently has a number of industrial land uses already established in the area. It has convenient access to major transportation routes (both highway, local pavement and rail) and the area south of Kipp Road is in proximity to municipal services such as water and sanitary sewer that may have the potential to be extended in the future when feasible.

In planning and providing for infrastructure linkages to the Town, it must be recognized that presently there are constraints in this area to providing infrastructure services from the south within the Town including:

- physical challenges (due to topography and the elevations),
- the cost to engineer and install the infrastructure systems,
- capacity issues in regards to water availability with respect to licensing allocations, and
- limitations of current contractual and licensing agreements of services the Town can provide outside of their corporate boundaries.

There are also some challenges present regarding the existing fragmentation of lands south of Kipp Road and the need to provide integrated and cost-effective methods of managing storm water drainage for the entire area.

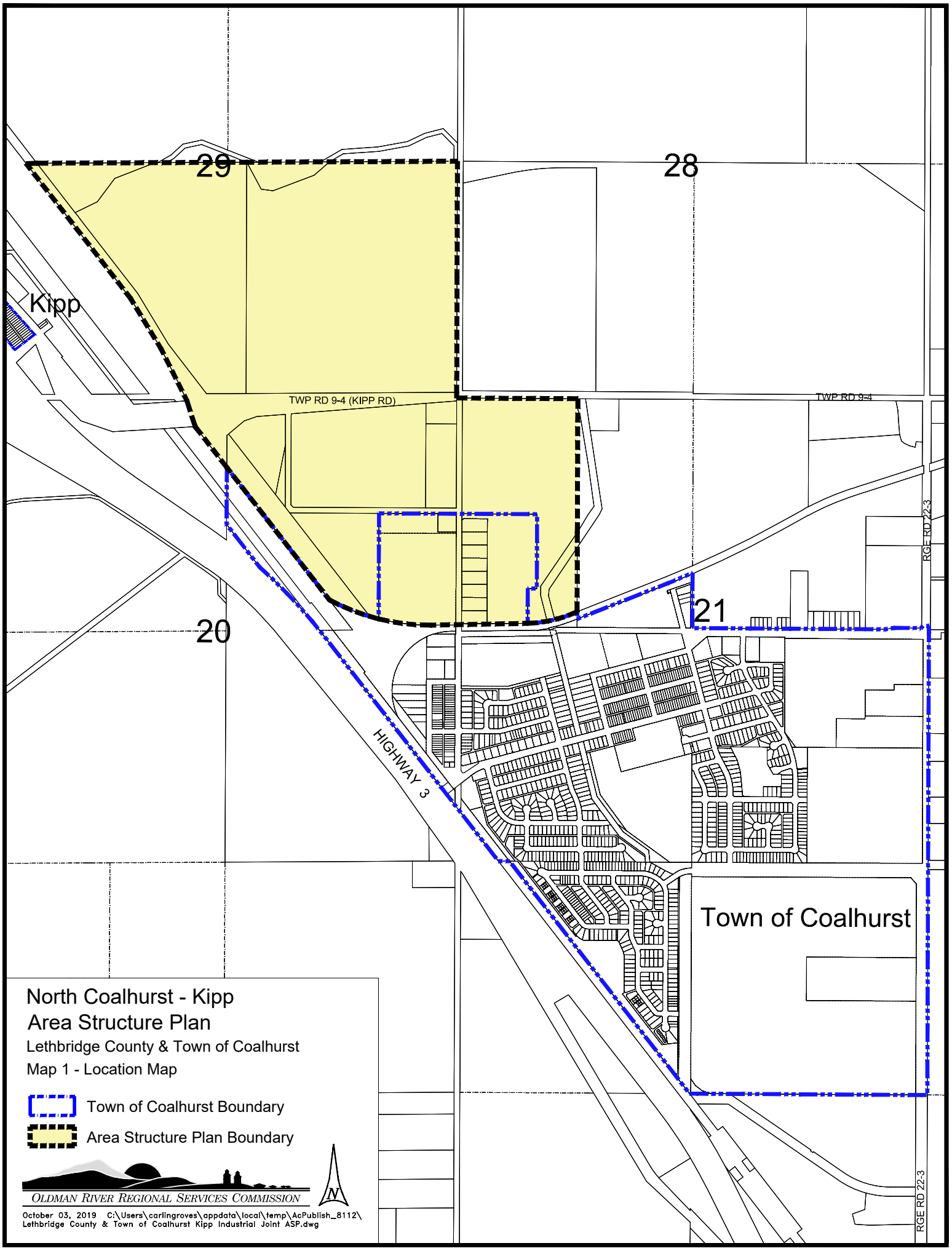
## Contours and Elevations

The land on the south side of Kipp Road generally slopes from the northwest corner near the rail tracks to the southeast with elevations from approximately 934 m to 931 m (3064 ft. to 3055 ft.) for an approximate decrease in elevation of 2.7 m to 3.0 m (9 ft. to 10 ft.) over a distance of 650 m (2,132 ft.) The lowest lying area is situated immediately west of the Town of Coalhurst campground and Miner's Park. The south side drains to the southeast and into the Town of Coalhurst's current catchment area.

The land on the north side of Kipp Road is situated at a slightly higher elevation than the south side of the road, with the exception of the southwest portion right adjacent to Kipp Road. The north side Plan Area generally slopes from the southeast corner of the quarter section (at an elevation of approximately 936 m (3071 ft.) to the west at 932 m (3056 ft.), and ultimately northwest at 928 m (3045 ft.), with an approximate 6.0 to 8.0 m (26 ft. to 30 ft.) change in elevation. A natural low-lying wetland area exists at the north end at an elevation of approximately 926 m (3041 ft.) in the lowest point. The natural drainage on the north side of Kipp Road ultimately drains to the north and into the existing wetland, and eventually flows to the northeast with no identifiable outlet, towards the LNID canal.

## General Transportation

The main transportation and access road in the ASP area is the Kipp Road (Township Road 9-4) north of Coalhurst within Lethbridge County. Kipp Road is an asphalt-surfaced roadway which connects Highway 3 (Highway 3 and 509 intersection) to Highway 25 to the east. The posted travel speed on this road is 80 km. The existing road is exhibiting signs of deterioration and the County currently enforces a permanent year-round ban on the road at 75% to prevent further deterioration. In 2018, Lethbridge




# North Coalhurst - Kipp Area Structure Plan

Lethbridge County & Town of Coalhurst

Map 1 - Location Map

Town of Coalhurst Boundary

Area Structure Plan Boundary

OLDMAN RIVER REGIONAL SERVICES COMMISSION

October 03, 2019 C:\Users\carlingroves\appdata\local\temp\AcPublish_8112\Lethbridge County & Town of Coalhurst Kipp Industrial Joint ASP.dwg

County engaged ISL Engineering and Land Services Ltd. to complete a study to determine upgrades and asphalt overlays that may be required for the road. The potential creation of an industrial area utilizing Kipp Road will put additional heavy traffic loading onto the roadway which further adds to the need for an upgrade to occur.

Transportation planning must also consider potential traffic impacts to the provincial highway system. Alberta Transportation has completed an intersection improvement design for the future upgrading of the Highway 3:08 and 509:02 intersection that must be a consideration in the planning process. As part of the ASP preparation, MPE Engineering Ltd. was engaged to complete a Traffic Impact Assessment (TIA). The complete report is found in Schedule B and recommendations from the report will need to be applied as the area is built out over time.

Generally, the TIA has identified that initially intersection improvements will not be needed. However, as additional phases of development occur, certain upgrades will need to be instigated. The Highway 25 intersection with Kipp Road is currently in good condition and can manage anticipated traffic. However, depending on the future land uses developed, some minor upgrades will need to be implemented and the timing of those improvements will be directly related to development. Minimal impacts are expected to be realized at the Highway 3 and Kipp Road junction until full industrial build-out. Overall, the development of the North Coalhurst - Kipp ASP area will require on-going consultation and coordination with Alberta Transportation as development occurs. A detailed description of the transportation and traffic assessment and a summary of the recommendations are found in Section 2.4 of this ASP.

### Historical and Cultural Resources Considerations

Provincial legislation requires subdivision and development proposals to address potential impacts to historical and cultural resources. If the subject lands contain such resources, part of the process would involve submitting development or subdivision proposals to Alberta Culture to obtain clearance. Alberta Culture recommends that ASPs be submitted for review through the Online Permitting and Clearance System (OPaC) to obtain guidance on development strategies, but it is not a requirement. A review of provincial data and the *Listing of Alberta Historical Resources* was undertaken in the preparation of this ASP to identify any potential historical and cultural resources and revealed there are no provincially identified Historical or Cultural Resources on lands subject to the ASP boundary. As such, an application to obtain clearance from Alberta Culture will not be required.

### Environmental Considerations

A provincial data review also indicates the land within the ASP boundary has:

- no Environmentally Significant Areas (ESA) identified;
- no known contaminated or nuisance lands, such as old landfills or service stations, identified or found documented.

There is one provincially identified wetland located in the northern portion of the S½ 29-9-22-W4M, classified as Type C2 wetland. In respect of this, a professional desk-top based wetland assessment study was completed by Aquality Environmental Consulting Ltd. with the full report found in Schedule C. The assessment concluded the following:

- Based on the Alberta Merged Wetland Inventory, Aquality Environmental Consulting Ltd. calculates the wetlands within the subject property are estimated to have a "C" value, which would require a 2:1 compensation ratio, however the Province makes the final determination about wetland value.
- The wetland is believed to meet the requirements for an assertion of ownership by the Crown. If the wetland is to be disturbed, submission of a crown claimability / wetland permanence assessment to Public Lands would be required, and further approvals under the *Public Lands Act* may be required.
- If the wetland is completely avoided, then there are no consequences to the wetland being assessed as permanent or claimed by the Crown.
- If activities that will result in the permanent loss of wetland area will be carried out on the site, a field assessment will be required to confirm wetland boundaries and classification, and to determine the value of the wetlands in question.
- The report emphasizes that under the Province's *"Stepping Back from the Water"* riparian management best practices guide, the minimum recommended setback for this class of wetland is 20 metres on fine-textured substrates with slopes <5%. Depending upon the nature and proximity of the proposed activity, additional avoidance mechanisms such as larger setbacks or the placement of erosion and sediment control structures may be warranted. In consideration of this, the 20-metre setback has been identified and is illustrated in the design and on the maps in the ASP.

The ASP layout for the north of Kipp Road (Planning Area 2) has incorporated the wetland area into the design, and the road and lot layout avoids the wetland area and applies the recommended 20-metre setback. As part of the storm water management plan recommends using and adding to the natural low wetland area (refer to Section 2.3 of ASP), requirements for environmental approvals will depend upon the final proposed project. An application and approval under the *Water Act* and *Public Lands Act* would be required prior to the alteration or disturbance of any wetland.

### Other Land Use Considerations

- **Gas wells:** The Alberta Energy Regulator (AER) abandoned gas well data repository identifies one abandoned gas well in the area, located just to the north side of Kipp Road in the SE¼ 29-9-22-W4M. Provincial regulatory setbacks of 5 m to the well head will need to be applied to future developments.
- **Abandoned coal mining:** There is an indication of historical abandoned coal mining activity occurring in the south and easterly portion of the Plan Area, specifically the Town of Coalhurst Miner's Park and most of the lands east of 2 Street, which is provided for informative purposes and represents the best data available to the Alberta Energy Regulator (AER) at this time but its accuracy is not guaranteed. Future developments on lands will need to further examine soil stability through geotechnical investigations.
- **Anhydrous ammonia storage:** At the time of the initial land analysis, an anhydrous ammonia bulk fertilizer storage tank site was located in Block A, Plan 8411273 in the NE¼ 20-9-22-W4M. It had

been at this location for 20-plus years. However, at some point in 2019 this use was removed. These types of uses require special setback requirements to residential dwellings or other sensitive uses in consideration of Alberta Environment's *Guidelines for the Location of Stationary Bulk Ammonia Storage Facilities* and Lethbridge County's land use bylaw. For industrial land uses occurring in proximity, the setbacks are not applicable.

## 2.2 Planning Area 1 Design Concept (South of Kipp Road)

The planning concept for the lands south of Kipp Road, referred to as Planning Area 1 of the ASP, is for the future development of the lands to be serviced with municipal infrastructure from the Town of Coalhurst. The main land uses would be business light industrial land use with some limited residential adjacent to the existing town residential. The provision of municipal services will allow for a higher density of development to occur and enable businesses to be established that may benefit from or require municipal water and sewer services. The Town's current servicing agreements with the City of Lethbridge for both water and sewer limits the municipality's ability to provide services outside of their corporate boundary. However, the Town has been in discussions with the City to amend the agreement to allow less restrictive servicing provisions. As a collaborative joint project, the Town and County would both like to see more flexibility in servicing options through a new agreement with the City. If this present agreement the Town has with the City is not changed, then the two municipal partners may need to consider other arrangements to service the land to urban standards.

### Land Ownership

**Parcels (titles) included in Planning Area 1 (South Kipp Road Area)**

| | **Municipality** | **Landowner** (May 2020) | **Legal Description** | **Ha** | **Ac** |
|---|---|---|---|---|---|
| **1** | Lethbridge County | Precon Manufacturing | Lot 1, Block 1, Plan 091 4636 | 3.14 | 7.77 |
| **2** | Lethbridge County | Precon Manufacturing | Pt. NE 20-9-22-W4M | 10.17 | 25.12 |
| **3** | Lethbridge County | 941864 Alberta Ltd. | Block 1, Plan 861 0180 | 5.34 | 13.20 |
| **4** | Lethbridge County | Precon Manufacturing | Lot 1, Block 2, Plan 091 0890 | 16.09 | 39.75 |
| **5** | Lethbridge County | R & S Sandham | Block A, Plan 841 1273 | 0.81 | 2.00 |
| **6** | Lethbridge County | 1553201 Alberta Ltd. | Pt. LSD 13, NW 21-9-22-W4M | 14.22 | 35.14 |
| **7** | Lethbridge County | Van Rootselaar | Pt. NW 21-9-22-W4M | 4.94 | 12.21 |
| **8** | Lethbridge County | LNID | Canal R/W Block A, Plan 9110804 | 0.92 | 2.26 |
| **9** | Town of Coalhurst | 2184498 Alberta Ltd. | Block B, Plan 841 0339 | 6.34 | 15.66 |
| **Total** | | | | **61.97** | **153.11** |

The lands subject to the South of Kipp Road Design Concept are shown on Maps 5 - 8. The total planning area contains 61.97 ha (153.11 acres) of titled land (refer to Map 4).

## Lot Layout

The design concept for Planning Area 1 on the south of Kipp Road is based on standard-sized industrial lots on municipal servicing. While the initial scope of the project was to focus on lands in the County north of the Town boundary and west of 2 Street, it was prudent to expand the area for long-term planning purposes to include those vacant lands east of 2 Street both within and adjacent to the Town's corporate limits. This includes a potential town new residential area to the east of the existing large lot residential parcels. The inclusion of the additional lands will allow for the planning of deep services and the considerations of transportation and storm water management facilities which will be sized appropriately for full build-out in the future. The residential lots will also help financially contribute to the provision of infrastructure and any off-site or local development levies needed to be put in place.

Two layout options have been presented for Planning Area 1. Option 1 utilizes the existing road network established around Precon Manufacturing's parcel, while Option 2 is based on considerations of the location of existing title boundaries for parcels situated between Lot 1, Block 2, Plan 091 0890 and the CPR railway lands to the west to enable each land owner opportunity to develop independently. The stipulation would be for whatever design was initially implemented for the south side Planning Area 1, either east or west of 2 Street, that design would be completed. MPE Engineering Ltd. prepared a servicing analysis with consideration for both layouts.

Additionally, a 14.22 ha (35.14 acre) parcel in the NW¼ 21-9-22-W4M has two design layouts, with Option 1 allowing for a flexible "swing site" land use possibility of either limited grouped country residential or business light industrial land use.

## Density

### Business Light Industrial Lots

The urban light industrial lots vary from 0.3 to 1.0 ha (0.75 to 2.50 acres) in size, designed with typical market considerations in mind. The Town of Coalhurst Land Use Bylaw allows industrial lots with a minimum 0.23 acres (10,000 sq. ft.) in area. The ASP illustrates there could potentially be 50 to 58 lots at full build-out and density. There may likely be less if larger lot sizes are preferred. Potential developers could readily combine adjacent lots to create a larger square footage if desired.

### Residential Lots

The lots depicted are considered larger-sized urban residential lots, illustrated at approximately 0.4 acres (over 17,000 sq. ft.) in size on average. The Town of Coalhurst Land Use Bylaw stipulates a minimum residential lot size of 5,000 sq. ft. for municipally serviced lots. The plan layout illustrates that there could be up to 23 residential lots within the cul-de-sac.

## Roads

A layout of the proposed local road network is shown in Maps 5-8. The Option 1 layout is based on existing title ownership title lines west of the Precon Manufacturing site (Lot 1, Block 2, Plan 091 0890) while the Option 2 layout would utilize the existing municipal road plan registered along the west perimeter of Lot 1, Block 2, Plan 091 0890 and would require the two separate landowners to collaborate and develop their land together. Again, whichever Option is initiated it would need to be followed and completed.

New roads constructed will comply with Coalhurst requirements based on Town of Coalhurst Engineering and Development Standards for a 20 m right-of-way industrial collector and industrial local road throughout with no sidewalks. All roads will be paved and will meet the Town of Coalhurst standards to allow for truck weight and circulation/access. The required transportation infrastructure improvements will be paid for by the developer.

A Traffic Impact Assessment (TIA) study has been completed by MPE Engineering Ltd. for the proposed ASP based on the projected land use and layouts shown in Maps 5 to 8. The north access road into the Town, 2 Street, is inadequate and would need to be upgraded to handle both heavy trucks and larger volumes of traffic. Although the TIA does indicate this development is feasible, there are future improvements that are suggested for the full build-out. (Refer to Section 2.4 of this ASP for a summary of the TIA and additional transportation policies.) Both existing roads and also new municipal roads are needed to accommodate access for the additional lots that may be subdivided in respect of the Plan.

## Water

Extending the Town of Coalhurst water distribution system to meet the demands of the study area was assessed by MPE Engineering Ltd. (refer to Schedule A). However, due to the agreement with the City of Lethbridge, only area South of Kipp Road (if annexed into town) have been designed to access Town water as water can efficiently be delivered to the area and would be the only proposed source of potable water.

A 20-year design horizon was used, based on ORRSC population projections. The engineering assessment supports that a looped water line from the south within the Town of Coalhurst can be extended into this area. A preliminary conceptual design water layout has been prepared by MPE Engineering Ltd as illustrated in Schedule A. For town water to be provided for fire protection purposes, extra storage capacity will need to be addressed. The water mains are assumed to be 200 mm (8") Ø PVC and fire hydrants would be located and spaced every 150 m unless otherwise stipulated by the municipality and their engineers.

A crucial issue that needs to be addressed concerning Town of Coalhurst water delivery is capacity and allocation. MPE's review of the Town's agreement with the City of Lethbridge, existing water license allocation, and projected growth needs anticipates a lack of water availability. The MPE assessment indicates, that based on the estimated MDD[1] of 1,626 $m^3$/day for the area South of Kipp, there is insufficient allowance within the City agreement to serve the development area. The study further indicates that:

[1] Maximum Day Demand

- Additional water license allocation will be required within the next 5 to 11 years in order to provide sufficient potable water for the Town itself, based on 5 and 20-year growth patterns.
- The Town of Coalhurst will also need to secure additional water license allocation in order to adequately serve the full demand of the area South of Kipp Road (Planning Area 1) of the ASP. The water license allocation situation is a critical servicing component that will need to be addressed prior to allowing the area to be subdivided and developed.
- Many of the water criteria (e.g. water allocation, agreement with City, storage capacity, distribution, etc.) which require upgrading for the south Planning Area 1 will also require upgrading to meet anticipated growth within the Town of Coalhurst. As such, it is suggested that required upgrades for the Town could be planned to coincide with those required for development of Planning Area 1.

### Waste Water

Similar to the water circumstances, only the areas South of Kipp Road were considered in the MPE assessment for waste water service due to the agreement with the City of Lethbridge. MPE reviewed the existing agreement between the City of Lethbridge (City) and the Town of Coalhurst (Town), whereby waste water from the Town is pumped to the City for treatment. The agreement stipulates that no other entities outside corporate limits of the Town of Coalhurst shall be supplied with waste water disposal by the Town, including delivery by truck. The agreement terminates January 31, 2035.

Extending the Town of Coalhurst waste water system to meet the demands of the study area was assessed by MPE Engineering Ltd., and Planning Area 1 can efficiently be serviced with the Town's waste water collection system. Based on the estimated Average Daily Flow (ADF) for the area South of Kipp Road, there may be sufficient allowance for the development at the end of the agreement (2035) and in the 20-year horizon based on the past 20-year growth rate; however, based on the town's 5-year growth rate additional allocation may be required as soon as 2027.

The existing Coalhurst wet weather storage of 15,860 $m^3$ is anticipated to be sufficient for the next 20 years including the South of Kipp Road development. The engineering report finds that the Town's current wastewater lift station consists of two 25 HP pumps, and unless the agreement with the City is amended to allow for greater flow, the pumps should not need to be upgraded. MPE also determined, that based on existing topology, a lift station will be required to pump waste water from the area South of Kipp Road to the Town of Coalhurst's existing gravity collection system. Sanitary sewer mains will consist of 200 mm (8") and 250 mm (10") Ø PVC unless otherwise stipulated by the municipality and their engineers.

### Storm Water Management

The MPE storm water analysis indicates that for Planning Area 1, storm water run-off can be directed southeast though the Town system and stormwater volumes may be included with the Town's *Water Act* approval. Through a series of constructed ponds, drainage can be routed to the Town of Coalhurst main east storm pond, which is beneficial as the pond has a treatment system. All drainage onsite must conform to municipal and Alberta Environment and Parks (AEP) requirements. In order to achieve a zero

release runoff rate at all outlets, Storm Water Management Facilities (SWMFs) will need to be created for the post development scenarios for both Options 1 and 2.

Planning Area 1 will require a number of SWMFs at various catchment locations that will receive storm water runoff from the subdivision by means of overland drainage and a piped storm main system constructed within the development area. MPE indicates that a preliminary cursory review of elevations and topography reveals that it is feasible to construct a storm main from all of the SWMFs located on the south of Kipp Highway to a future SWMF planned for the west side of the Coalhurst High School. A schematic rendering of the potential layout of the storm mains is shown in the MPE storm water analysis in Schedule A, on Figures 2 and 3. Primary channels for storm drainage within the proposed development will also need to be provided within the internal road rights-of-way. Developers will need to consult with the Town during preliminary and detailed design of the developments to confirm connection feasibility, and any connection requirements the Town may have. If the Town is not able to accept the runoff, alternative outlets would be required. The new SWMFs will require approval from and registration with Alberta Environment prior to construction.

**POLICIES**

2.2.1 The landowner/developer, not the municipality, will be responsible for the costs associated with the transportation improvements and the construction of any required roads. At the time of subdivision, the developer/landowner will be required to enter into a development agreement which will establish any transportation improvements and the road construction requirements including the assignment of costs.

2.2.2 Landowners/developers shall dedicate a minimum 20 metres for road right-of-way, as stipulated in this Plan, at the time of subdivision. It is recognized that the Town or County will not be responsible for the purchase or acquisition of any road right-of-way in the Plan Area.

2.2.3 The provision of any required public roadways is to adhere to the overall plan and is based on aligning with the existing and proposed road network through the area.

2.2.4 The asphalt road grade and base must be prepared and constructed to proper municipal specifications in accordance with *Town of Coalhurst Engineering and Development Standards*.

2.2.5 The landowner/developer will be responsible for contributing their share of any development service fees, off-site levies, or local improvement fees that will be applied toward future road an intersection upgrades required in consideration of the TIA and Alberta Transportation requirements.

2.2.6 The area South of Kipp Road (Planning Area 1) is to be developed with Town of Coalhurst municipal water services.

2.2.7 Developer's water services distribution and collection plans are to consider the MPE analysis and recommended servicing systems to be installed (refer to Schedule A).

2.2.8 The developers shall provide at their expense engineered plans for the detailed design of water service in the design of the subdivision(s). Developers of the subdivision, as per any agreement

entered into with the municipality, will be required to provide the mechanisms or infrastructure needed for water infrastructure, at their expense.

2.2.9 The Town of Coalhurst's limitations regarding the available capacity and allocation of water under their license will need to be addressed prior to allowing the area to be subdivided and developed.

2.2.10 The area South of Kipp Road (Planning Area 1) is to be developed with Town of Coalhurst municipal waste water services.

2.2.11 Developer's waste water services distribution and collection plans are to consider the MPE analysis and recommended servicing systems to be installed (refer to Schedule A).

2.2.12 The developers shall provide at their expense engineered plans for the detail design of waste water systems in the design of the subdivision(s). Developers of the subdivision, as per any agreement entered into with the municipality, will be required to provide the mechanisms or infrastructure needed for waste water infrastructure, at their expense.

2.2.13 The detailed storm water management plan(s) are to consider the MPE analysis and recommended storm water management facilities to be created (refer to Schedule A).

2.2.14 The developers shall provide at their expense an engineered detail storm water management plan as actual SWMF sizes and locations are to be determined and finalized in the design of the development/subdivision. In order to achieve a zero release runoff rate at all outlets, SWMFs will need to be created for the post development scenarios for layout Options 1 and 2.

2.2.15 Developers of the subdivision, as per any agreement entered into with the municipality, will be required to provide the mechanisms or infrastructure needed for storm water management, at their expense.

2.2.16 The downstream (east portion) SWMF are a first priority to develop, as the SWMFs to the west would need to interconnect and drain into the various ponds/facilities to the east as water is routed to the east main Town storm pond.

2.2.17 If a developer is dependent on a storm water facility that is required and is proposed to be situated on an adjacent downstream title, the landowners must work together to ensure the land and infrastructure can be put in place to accommodate any subdivision or development proposals.

2.2.18 Any storm water management facilities put in place to accommodate subdivision, will be dedicated as a Public Utility Lot (PUL) to the municipality as part of the subdivision plan registration.

2.2.19 An overall subdivision grading plan must be provided by developers that should specify design elevations, surface gradients, lot types, swale locations, and other drainage related information required for lot grading as well as establish the drainage relationship between adjacent properties.

2.2.20 Developers will be responsible for securing any necessary authorizations/approvals from the municipality and AEP for the storm water management plan, which may include obtaining AEP approval under the *Water Act*. (Note: If the storm water management plan can be included under the Town of Coalhurst's *Water Act* approval, this step may not be required for developers.)

2.2.21 It is recognized that one landowner owns a significant amount of land within Planning Area 1 (in a Ptn. of NE 20-9-22-W4M) which is currently developed for an industrial operation. If redevelopment of the site occurs in the future, the design concept plan and road network layout is still applicable for the lands, and will be applied in the event that future subdivision of lands occurs.

## 2.3 Planning Area 2 Design Concept (North of Kipp Road)

The planning concept for North of Kipp Road, referred to as Planning Area 2 of the ASP, is for the future development of larger rural industrial lots to be serviced by private on-site services. Private services are considered in this location due to a number of challenges, including topography, the cost to engineer, the install and maintenance of the infrastructure systems, as well as the limitations of the current contractual and licensing agreements of services the Town can provide outside of their corporate boundaries. The plan is based on the assumption the land would remain within the County's municipal jurisdiction. The type of businesses to establish in this area would be those that do not require major servicing including storage yards, shop buildings, machinery/equipment dealerships, or those that are low volume water users and could be self-sufficient with private services. The type of land use proposed for the area would be rural general industrial.

### Land Ownership

The lands subject to the North of Kipp Road Design Concept are shown on Maps 5 - 8. The area incorporates lands from Range Road 22-4 west to Range Road 22-5 adjacent to the Canadian Pacific Railway Marshalling Yard (SE¼ 29-9-22-W4M and the SW¼ 29-9-22-W4M). The total planning area contains 93.50 ha (231.03 acres) of land, consisting of three separate parcels of titled property.

**Parcels included in Planning Area 2 (North Kipp Road Area)**

| | **Municipality** | **Landowner** (March 2019) | **Legal Description** | **Ha** | **Ac** |
|---|---|---|---|---|---|
| 1 | Lethbridge County | R. & S. Sandham | SE¼ 29-9-22 W4M | 59.09 | 146.00 |
| 2 | Lethbridge County | Double 'A' Fertilizer Service Ltd. | Lot 1, Block 1, Plan 821 1541 in SW¼ 29-9-22-W4M | 3.28 | 8.11 |
| 3 | Lethbridge County | R. & S. Sandham | Lot 2, Block 1, Plan 821 1541 within SW¼ 29-9-22-W4M | 31.13 | 76.92 |
| **Total** | | | | **93.50** | **231.03** |

### Lot Layout

The design concept for Planning Area 2 is based on larger lots, 0.8 ha (2.0 acres) or greater, with no municipal servicing. The proposed design incorporates an existing farmstead, an acreage and a wetland area. The area has the future ability to expand to the north as demand allows and a transportation road access network has been designed to accommodate future development. The layout is a basic grid design; however, the portion in the SW¼ 29-9-22-W4M is laid out at an angle to account for the current alignment of the west road adjacent to the CPR rail line. The lands adjacent to Range Rd 22-5 and Kipp Road should be developed first with internal phasing to occur as demand warrants the need. This will also help preserve the larger agricultural lands in the SE¼ 29-9-22-W4M for as long possible.

### Density

The plan conceptual layout illustrates that there could be up to 40 industrial lots (Maps 7 and 8) but it is more likely that between 20 to 30 lots would in fact be developed at full build-out as some businesses or industries may desire a larger parcel. The average lots range from 0.85 to 1.25 ha (2.1 to over 3 acres) in size. It is anticipated that some individual lots could range in size from 1.6 to 4.1 ha (4 to 10 acres) and lot owners could amalgamate adjacent lots to achieve even larger lot sizes. All lots in Planning Area 2 would be required to be a minimum of 0.8 ha (2.0 acres) in size, unless some type of suitable servicing was provided where a reduced lot size could be considered.

### Roads

A layout of the road concept is shown in Maps 7 to 8. The Planning Area 2 transportation concept is to reduce and limit additional individual access points onto the adjacent south Kipp Road. Existing lots developed adjacent to the main road may be allowed temporary direct access, however upon the development of future phases it is proposed that all new lots gain access solely from a new internal local subdivision road. Access would be provided from the east County road allowance (Range Road 22-4) and would provide an east-west linkage over to the west public road (Range Road 22-5) that runs parallel to the CPR rail line. A new north access and intersection is proposed to provide access into the SE¼ 29-9-22-W4M which could be developed so that it aligns with the existing roadway to the south that provides access to the west-side of the Precon Manufacturing plant site.

As the area subdivides and develops over time, the Traffic Impact Assessment (TIA) will need to be considered (refer to Schedule B). Although the TIA does indicate this development is feasible, there are future improvements suggested for the full build out. (Refer to Section 2.4 Transportation for a summary and additional transportation policies.) Both existing roads and also new municipal roads are needed to accommodate access for the additional lots that may be subdivided in respect of the Plan. The County will require new roads to be paved to an industrial traffic standard.

### Water

As previously described, water delivery from the Town of Coalhurst is not an option for Planning Area 2 due to contractual limitations and the lack of available water under the Town's water license. In addition,

the topography also makes it challenging. Therefore, alternative options for the delivery of water will need to be considered.

As the area on the north side of Kipp Road is planned to remain in Lethbridge County and be at a rural industrial standard, the resulting types of business and land uses to occur will need to be less intense water users. Possible methods of water delivery may be water privately hauled to individual cisterns or through the Lethbridge Northern Irrigation District (LNID) if allowed. It will be at the discretion of the County whether individual cisterns with hauled water will be permitted or not, which will be dependent on the type of land use proposed.

It is noted the Lethbridge County North Rural Water Association provides water delivery to the Kipp area. The co-op water delivery is primarily intended for household water delivery (not industrial); however, for small volume users this option may be further explored to determine feasibility. Industrial large volume water users requiring water for processing operations would not be able to access this option.

### Waste Water

The lands in Planning Area 2 are not easily serviced by municipal sewer services from the Town of Coalhurst, as described in the MPE Engineering Ltd. Servicing Study. Any uses in the north area that require sewer disposal will need to be dependent on an individual on-site treatment/disposal system, or alternatively, the developers could investigate the feasibility of a communal system to serve the area. For low volume water users/producers, the use of an individual holding (pump-out) tank may be acceptable.

For individual on-site treatment systems, the provincial private sewage treatment standards require a soils analysis for ascertaining soil suitability for on-site private septic treatment. A soils analysis will be required at the time of subdivision and all soils tests/reports shall be undertaken in consideration of the provincial Safety Codes Council's *Alberta Private Sewage Systems Standard of Practice 2015 (or subsequent update)* to verify suitability for private septic treatment sewage systems. Additionally, at the time of development a more detailed site specific analysis as it relates to the use and size of building will need to be provided. The location and depth of ground water, potential percolation or seepage issues, soil profiles, etc., are matters that need to be considered in the overall analysis.

### Storm Water Management

A preliminary storm water management analysis has been prepared by MPE Engineering Ltd. (see Schedule A). If the north Planning Area 2 lands are further developed for industrial use, the additional lots would add to the surface runoff experienced within the local area. The post development 1:5 year runoff rate cannot exceed the pre-development 1:5 year runoff rate and any runoff in excess of this must be stored for later release at a controlled rate. Storage is typically required for runoff from all storms up to the 1:100 year design storm.

The MPE storm water analysis indicates that within Planning Area 2, storm water runoff on the north side of Kipp Road drains to the north and northeast into a trapped low. Storm water run-off cannot be easily moved southeast though the Town system, as it is very difficult to get water from the north side of Kipp Road to be directed south without major pumping. The pumping cost, along with need for a large

evaporation pond which would still need to be pumped out and released, makes such a proposal impractical and unfeasible.

As noted by the engineers, all storm water runoff within the ASP north area is conveyed by overland drainage. The system relies on surface drainage along swales, ditches, and culverts, with the various catchment areas draining to low areas with no apparent outlets. The majority of drainage for this area flows along road ditches and through fields to a low wetland area east of the Canadian Pacific Railway (CPR) marshalling yard. This is a trap low area with no natural outlet in a 1:100 year event. Generally, the natural drainage on the north side of Kipp Road ultimately drains to the north and into the existing wetland, and eventually flows to the northeast with no identifiable outlet, towards the LNID canal. MPE Engineering Ltd. analysis of the Lidar data of the surrounding area reveals that the natural topography of the area is not conducive to the construction of a gravity storm main.

All storm water runoff within the north area will need to be conveyed to a storm catchment pond through a system of swales, ditches, and culverts and appropriately lot grading. The engineers' recommend that the existing wetland area should be enlarged to function as part of the drainage system and enhanced in an easterly direction to create sufficient storm water runoff storage and protect the adjacent lots. Discussion with the LNID will be needed to obtain permission for the LNID canal to be used as an eventual outlet.

**POLICIES**

2.3.1 The landowner/developer, not the County, will be responsible for the costs associated with the construction of any required roads. At the time of subdivision, the developer/landowner will be required to enter into a development agreement which will establish the road construction requirements and the assignment of costs.

2.3.2 Landowners/developers shall dedicate a minimum 20 m for road right-of-way, as stipulated in this Plan, at the time of subdivision. It is recognized that the County will not be responsible for the purchase or acquisition of any road right-of-way in the Plan Area.

2.3.3 The provision of any required public roadways is to adhere to the overall plan and is based on aligning with the existing and proposed road network through the area.

2.3.4 The asphalt road grade and base must be prepared and constructed to proper municipal specifications in accordance with *Lethbridge County's Engineering Guidelines and Minimum Servicing Standards*.

2.3.5 The landowner/developers will be responsible for contributing their share of any development service fees, off-site levies, or local improvement fees that will be applied toward future road and intersection upgrades required in consideration of the TIA and Alberta Transportation requirements.

2.3.6 Each landowner/developer who desires to subdivide or develop their title(s) within the north Kipp Road Plan Area shall be required to undertake at their expense a soils analysis prepared by a qualified accredited professional on their own parcel(s) proposed for subdivision or development, prior to a decision being made on the application. The developer must submit

the soils analysis report to the subdivision or Development Authority, with the results being found acceptable to the relevant approval authority.

2.3.7 The use of a private holding tank may be acceptable depending on the proposed use. An open discharge system or lagoon are not considered sustainable and may also not be practical in consideration of the proximity to residential uses and the Town of Coalhurst.

2.3.8 Subdivision or development application approvals may be denied by the municipality where site and soil conditions on the property or proposed parcel are not able to support a self-sustaining on-site private sewage treatment system.

2.3.9 The use of a communal sewage treatment system may only be considered with confirmation of the facility meeting the provincially regulated 300 m setback requirements to a wastewater treatment facility to any nearby residential dwelling, or be able to obtain a setback waiver approval from Alberta Environment and Parks.

2.3.10 A communal system may be considered, at the discretion of Lethbridge County, and is subject to the following:

(a) Such a system must be engineered to fit the proposal and anticipated land uses, with the system details and maintenance information provided to Lethbridge County's satisfaction.

(b) The type of system proposed and how it operates must be acceptable to the municipality, and the viability of operation and on-going maintenance will be considered in determining the suitability.

(c) All communal sewage treatment systems must be acceptable to and approved by Alberta Environment and Parks.

(d) The communal sewage treatment system must be installed, tested and operational prior to the satisfaction of Lethbridge County and Alberta Environment and Parks, prior to any development permits being issued for new dwellings.

(e) If a communal sewage treatment system is approved by the municipality and Alberta Environment and Parks, Lethbridge County, at its discretion, may agree to take over the facility and land as a Public Utility Lot (PUL).

2.3.11 The developers shall provide at their expense an engineered detail storm water management plan to demonstrate a zero release runoff rate as finalized in the design of the development/ subdivision.

2.3.12 The storm water management plan(s) are to consider the MPE analysis and recommended storm water management facilities to be created (refer to Schedule A).

2.3.13 The developer will be responsible for enlarging the existing wetland area to function as part of the drainage system and enhance it in an easterly direction to create sufficient storm water runoff storage. The developers will be responsible for securing all necessary authorizations/

approvals from the municipality and Alberta Environment and Parks for the storm water management plan, and potential discharge options, which may include obtaining AEP approval under the *Water Act.*

2.3.14 Landowners/developers of the subdivision, as per any agreement entered into with the municipality, will be required to provide the mechanisms or infrastructure needed for storm water management, at their expense.

2.3.15 Any storm water management facilities put in place to accommodate subdivision may be dedicated as a Public Utility Lot (PUL) to the municipality as part of the subdivision plan registration.

2.3.16 For multi-lot subdivisions or land developed in phases, an overall Subdivision Grading Plan must be provided by landowners/developers that should specify design elevations, surface gradients, lot types, easements or swale locations, and other drainage related information required for lot grading as well as establish the drainage relationship between adjacent properties.

2.3.17 The Lethbridge Northern Irrigation District must grant written permission to any plans or use of the LNID canal as a controlled outlet source for the drainage.

2.3.18 For the use and expansion of the identified wetland to accommodate storm water drainage, the developer is responsible for meeting the recommendations of the Aquality Environmental Consulting Ltd. assessment (refer to Schedule C.). If further approvals under the *Public Lands Act* are needed, the developer shall be responsible for undertaking that process.

2.3.19 If any drainage easements are needed in respect of the functioning of the engineered storm water system and conveyance of drainage water, the securing and registering of those documents and plans shall be provided by the developer, to the satisfaction of Lethbridge County.

## 2.4 Transportation Infrastructure

The development of both Planning Areas 1 and 2 will affect the area transportation network and future impacts and required upgrades must be addressed as the area develops over time. The following is a general summary of MPE Engineering Ltd.'s main findings and recommendations and the complete Traffic Impact Assessment (TIA) is found in Schedule B.

The TIA outlines the required upgrades for both the intersection of Highway 3 and Kip Road/Highway 509 and the intersection of Highway 25 and Kipp Road. The upgrades are required to either maintain or improve the level of service considering the anticipated volumes and movement patterns generated from the ASP development options. The reports' traffic estimates and system analysis reflected a 20-year horizon where development phasing was assumed to occur. A warrant review process was undertaken for capacity design, turn lanes, signalization, and to determine if intersection illumination were warranted. The TIA projected that the proposed ASP is expected to generate between 8,042 and 8,145 trips per day, and between 1,299 and 1,363 trips per hour during peak hours. The study projects that around 30% of the industrial and 50% of the residential trips are anticipated to remain internal. Overall, the findings of

the analysis indicate that future infrastructure upgrades on traffic control and/or intersection geometry will be required at the Highway 3 and Kipp Road/Highway 509 intersections if the development moves forward. Also, some minor intersection improvements will be eventually warranted for the Highway 25 and Kipp Road intersection.

In 2018, Lethbridge County contracted ISL Engineering Ltd. to complete an assessment on an asphalt overlay for Kipp Road (Twn Rd 9-4). The report and project planning timeframes will also need to be considered with respect to the implementation of the ASP and eventual increase in truck traffic.

### Highways 3 and Highway 509/Kipp Road

The capacity analysis of the Highway 3 and Highway 509/Kipp Road intersection indicates that based on capacity alone, this intersection does not warrant immediate improvements. However, the report states improvements to traffic control and intersection geometry should be implemented prior to the development of 50% of the area. It is noted that even under background conditions, this intersection will require geometric and operational upgrades to service the expected population growth. The TIA states that at full build-out, projected traffic volume increases result in a complete failure of the intersection.

As a result, a number of mitigation options were examined for this intersection. The analysis finds that signalization is warranted at the intersection of Highway 3 and Highway 509/Kipp Road for the *2029* and *2039* background and post-development scenarios. Generally, the intersection is anticipated to operate at acceptable ratios as a signalized intersection. Intersection improvements are therefore anticipated at the intersection of Highway 3 and Highway 509/Kipp Road based on the capacity and traffic simulation for background and post-development traffic volumes by *2029* and *2039*. It is noted that even without the ASP proposal, this intersection will be impacted by Alberta Transportation's future plans regarding Highway 3 and the CANAMEX. Construction of a Highway 3 bypass as a part of the CANAMEX corridor upgrades would significantly impact the development.

### Highway 25 and Kipp Road

The capacity analysis of the Highway 25 and Kipp Road intersection illustrates that under background traffic the intersection operates with an acceptable ratio and even at half build-out also does not warrant upgrades.

No changes on traffic control or intersection layout are anticipated at the intersection of Highway 25 and Kipp Road. At the present time the capacity of the intersection far exceeds the demand. Intersection improvements are not anticipated at the intersection of Highway 25 and Kipp Road, based on the capacity analysis and traffic simulation for the background and post-development traffic volumes by both *2029* and *2039* study horizons.

In reviewing the transportation analysis details, the MPE Engineering Ltd. report states that geometry and traffic control upgrades at Highway 25 and Kipp Road are not anticipated based on the capacity analysis. However, a left-turn treatment is warranted under the *2029* and *2039* background, with additional storage length required under post-development traffic conditions. The TIA finds that whether or not the proposed development is built; additional storage for the northbound left-turn lane on Highway 25 is required based on the traffic distribution and movement. The report also indicates that assuming the

existing traffic controls remain in place, it is estimated that at the intersection will require a designated right-turn lane on Kipp Road to accommodate post-development traffic volumes. However, a signalized intersection is not theoretically justified until the full build-out anticipated in 2039. At the intersection of Highway 25 and Kipp Road it was found that delineation lighting to illuminate pedestrians or cross street traffic is warranted for the *2029* and *2039* study horizons.

**POLICIES**

2.4.1 As the proposed ASP land use types and intensities become more detailed over time, a review of the internal municipal road network will need to be completed.

2.4.2 Kipp Road is under Lethbridge County's jurisdiction and will need to be upgraded in order to accommodate the capacity and weight of increased industrial traffic. This matter should be discussed and coordinated between the municipalities in respect of the recommendations of the ISL Engineering Ltd. report completed for Lethbridge County.

2.4.3 Over the next few years, the usage of the Highway 25 and Kipp Road intersection should be actively monitored as it is assumed that more Town and area residents will access Highway 3 and the City via the Southeast Corridor (Highway 25 at Township Road 9-3).

2.4.4 The phasing of this development and eventual construction is connected to some of Alberta Transportation's future plans. Construction of a Highway 3 bypass as a part of the CANAMEX corridor upgrades would significantly impact the development. Both Lethbridge County and the Town of Coalhurst should coordinate with Alberta Transportation on the potential effects of the CANAMEX corridor on the Highway 3 and Highway 509/Kipp Road intersection and improvements to satisfy the needs of both parties should be discussed in detail.

2.4.5 As the ASP is developed, the municipalities should review pavement future needs at key intersections and roadways such as Kipp Road and 2 Street to ensure local and internal roads are constructed to handle increased capacity and weight.

2.4.6 The partnering municipalities should review and consider implementing the recommendations as outlined in section 7.2 (7.21 through 7.2.5) of the TIA as prepared by MPE Engineering Ltd.

2.4.7 The County and Town will consult with Alberta Transportation regarding the implementation of this Plan, and over time as the area develops out in phases.

2.4.8 The intersections of Highway 3 and Highway 509/Kipp Road and Highway 25 and Kipp Road will be subject to future upgrades/improvements when warranted by the Traffic Impact Assessment (TIA) as the area further develops out. Any upgrading identified by the TIA will be implemented at the sole cost of the developer(s)/landowner(s) and to the satisfaction of Alberta Transportation.

2.4.9 Local improvement or off-site levies may be developed and applied to developers to help pay for the eventual future intersection upgrades required to facilitate traffic at full ASP build out.

## 2.5 Other Servicing, Subdivision and Development Considerations

The following are general servicing and development considerations that are applicable to all lands in the defined ASP area, both Planning Areas 1 and 2.

### Municipal Reserve

As a primarily industrial/business area, the ASP illustrates that only some potential buffer strips or possibly land abutting storm water management facilities will be used as municipal reserve land dedications. Municipal and/or school reserve will be provided in accordance with section 666 of the *Municipal Government Act* at the time of subdivision.

- Unless otherwise specified and agreed to by the municipality, municipal reserve will be provided as cash in lieu of land. An exception to this is where dedicated land may be provided where the plan illustrates land may be appropriate for buffer strips.
- If land is proposed to be developed in phases, a deferred reserve caveat may be considered by the municipality and registered on title to be addressed at future subdivision stages.

### Third Party Shallow Utilities

The Plan Area will be provided shallow utilities, such as electrical and gas service, at the time of subdivision or development. At the subdivision stage, the developer of the subdivision shall be responsible for installing electrical and gas services to each lot. FortisAlberta provides infrastructure to the area for electrical power and ATCO Gas is the gas franchisee providing gas service. A utility servicing detail plan prepared in consultation with each of the respective utility providers is the responsibility of the developer. The following are applicable:

1. Any utility rights-of-way registered on lots should be shared between utility providers and the right-of-way plan and documents should be registered in the applicable municipality's name.
2. A utility servicing detail plan prepared in consultation with each of the respective utility providers is the responsibility of the developer.
3. The developer will pay for the installation of natural gas distribution infrastructure to each lot.
4. The developer will coordinate with FortisAlberta to determine connection locations during the detailed design phase.
5. At the time of subdivision, telephone, cable or fiber-optic provisions will need to be coordinated by developers with Telus, Shaw or other such area service providers, and each individual owner must apply for the service when building.

### Fire Protection

Fire protection in the area is provided by the Town of Coalhurst and District Fire Services. This is an entity jointly managed through an agreement between the Town of Coalhurst and Lethbridge County. Lands and new subdivisions or developments within Town corporate boundaries that are serviced with municipal water will be designed to receive pressurized fire hydrant services as provided through the

municipality. It is assumed fire hydrants would be located and spaced every 150 m unless otherwise stipulated.

For land within Lethbridge County, site specific fire protection will be provided as required by Lethbridge County at a rural servicing level. Buildings or business owners may be required, as part of the building process, to provide mechanical fire suppression means in the design (e.g. sprinkler systems), or other methods that meet Lethbridge County requirements and provincial fire code standards.

### Street Lights

Developers of new subdivision areas will be responsible for installing street lights to municipal standards. It is preferential if light stands are installed on one side of the road only. Street and roadway lighting luminaires shall be dark-sky friendly and reduce light trespass onto abutting property, as best practical. All street lighting shall not have light emitted above 90 degrees, unless specifically exempted (i.e. ornamental lighting), or as otherwise specified by the municipality. Luminaires shall generally be of the full cut-off type or better.

### Garbage Disposal

All lot owners will be responsible for solid waste disposal in conjunction with the approved method of the municipality having jurisdiction over the lands. County lot owners will be responsible for waste disposal like all other County residents or business owners in the area and will need to coordinate private pick-up or haul it themselves to a municipal waste collection/disposal site. Town of Coalhurst lot owners will receive waste collection services as provided by the Town and charged as per the Town's utility fee bylaw/schedule. This servicing scenario could change based on any separate service delivery agreements put in place between the two municipalities.

### Geotechnical Evaluation

At this higher ASP level stage, no detailed geotechnical investigative evaluations were completed to ensure that overall the site soil conditions are amenable to site development and building construction for foundations. Depending on a proposed land use, the needs related to soil stability requirements may vary. Prior to subdivision and development, test pits and boreholes should be advanced to approximately 10 m depth, or as recommended by an engineer, to determine the depth to ground water, soil stability, and to ascertain if there is a presence of underground abandoned coal mining activity for the south side of Kipp Road. The following are applicable to developers:

1. At the time of development, the developer is responsible for providing additional analysis on each site to allow for proper foundation design. Sieve analysis and Atterberg limits should be conducted on each proposed site soils to evaluate grain size distribution and plastic and liquid limits at the time of development.

2. Future developments on lands associated with former coal mining activity will need to further examine soil stability through geotechnical investigations (refer to Map 3).

### Development Agreements / Security

The provision of infrastructure services required to support further subdivision will be addressed through the requirement of landowners/developers to enter into Development Agreements with the applicable municipality. The roadways, utility servicing, storm water management infrastructure that will be required over the Plan Area shall be provided at the landowner's/developer's expense. The municipalities may also take security to ensure the terms of any agreement are carried out (refer to section 4.2).

### Architectural Controls / Design Guidelines

At the time of subdivision, architectural design controls as approved by the two municipalities (see section 3.2 and Appendix B) shall be registered on title in the form of a restrictive covenant. This is to ensure a high quality of development occurs and that prospective lot purchasers are aware of any restrictions, including the application of the joint *Development Design Guidelines* as outlined in Schedule A of the IDP (as shown on Map 1 in Appendix A) and specifically for those parcels on the north and east sides of Kipp Road and Range Road 22-4, for all development within 200 m (656 ft.) of the road right-of-way. The approved architectural controls shall be implemented at the development permit stage.

### Phasing of Development

The subdivision and development of the ASP area may be undertaken in logical phases over time, as it is not anticipated the local market and economy would support the entire ASP area being fully developed in the short term, but rather, would be a long-term project built out over many years. Any phasing would be considered in relation to the layout and road network plan, servicing capabilities and connections, storm water management facilities required, and the transportation infrastructure needed as outlined in the Traffic Impact Assessment.

Although some flexibility may be afforded based on infrastructure considerations, the proposed phasing should conform to the general phasing areas as outlined on Map 9. The proposed phasing plan is based on the following considerations:

1. For Planning Area 1 south of Kipp Road, the phasing plan is based on the need for the storm water management facilities and the water and sewer infrastructure to be linked.

2. The west area in Planning Area 1, identified as Phase 2, could potentially be developed earlier if the SWMF at the south end to the west of the Coalhurst ball diamonds is developed first.

3. For Planning Area 2 north of Kipp Road, the proposed phasing plan is based on established land use, conservation of agricultural land as long as possible, and the ability to use existing roads for temporary access prior to new internal roads needing to be constructed.

Developers' proposals that may differ from the phasing plan may be discussed by both municipalities and considered on their own merits based on a suitable infrastructure plan, submitted by the developer, that will need to be approved by both municipalities.

### Off-site Levies and Development Servicing Fees

At the time of subdivision or development, landowners/developers will be required to financially contribute to provide their applicable share of any off-site levies, local improvements or development servicing fees that may be implemented by Lethbridge County and the Town of Coalhurst, as they apply to municipal infrastructure that services and benefits the defined ASP area. (Refer to section 4.2)

# North Coalhurst - Kipp
# Area Structure Plan
Lethbridge County & Town of Coalhurst

**Map 2 - Existing Zoning**

Town of Coalhurst Boundary

Area Structure Plan Boundary

Lethbridge County Existing Zoning

- Rural Urban Fringe – RUF
- Rural General Industrial – RGI
- Business Light Industrial – BLI

Town of Coalhurst Existing Zoning

- Large Lot Residential – LLR
- Parks & Recreation – PR
- Public Institutional – PI
- Transitional – T

HIGHWAY 3
HIGHWAY 509
KIPP
TWP RD 9-4 (KIPP RD)
TWP RD 9-4
RANGE RD 22-5
RANGE RD 22-4
CANAL
55 AVE
53 AVE
52 AVE
51 AVE
NW21 9-22-4
SW21 9-22-4
PIPELINE R/W
GAS PIPELINE R/W
TRANSMISSION LINE R/W
PIPELINE RIGHT OF WAY
IRRIGATION R/W

OLDMAN RIVER REGIONAL SERVICES COMMISSION

0 Metres 200 400 600 800

N

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Lethbridge County & Town of Coalhurst Kipp Industrial Joint ASP.dwg

# North Coalhurst - Kipp
# Area Structure Plan
Lethbridge County & Town of Coalhurst

**Map 3 - Land Analysis**

Town of Coalhusrt Boundary

Area Structure Plan Boundary

Underground Coal Mine[1]

Existing Land Use

Country Residence

Farmstead

Ancillary Farm Residence

Commercial

Industrial

Confined Feeding Operations

Beef

Chicken

Dairy

Mixed

Wells[2]

Well

Well - Abandoned

[1]*Data Source: ERCB*
*Disclaimer: The abandoned coal mine information is for informative purposes and represents the best data available to the ERCB at this time but its accuracy cannot be guaranteed. The ERCB is not responsible for damages caused by the use of this information.*
*(http://culture.alberta.ca/heritage/resourcemanagement/landuseplanning/default.aspx)*

[2]*Data Source: Abacus Datagraphics Ltd.*
*Aerial Photo Date: 2015*

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# North Coalhurst - Kipp Area Structure Plan

Lethbridge County & Town of Coalhurst

## Map 4 - Ownership

Town of Coalhurst Boundary

Area Structure Plan Boundary

Ownership, May 2020

- Owner 1 (224.92±ac)
- Owner 2 (8.11±ac)
- Owner 3 (13.20±ac)
- Owner 4 (72.68±ac)
- Owner 5 (35.14±ac)
- Owner 6 (12.21±ac)
- Owner 7 (15.66±ac)
- Owner 8 (2.26±ac)

8.11±ac
1

IRRIGATION R/W
IRR905CU

1 2
8211541

76.92±ac

146.00±ac
SE29 9-22-4

1
9310404
1A

8410013

A
8510040

CANADIAN PACIFIC RAILWAY

B
605AE

4736BM

1906EZ

RY157

A
605AE

8410013

NW20

8410014 TWP RD 9-4 (KIPP RD)

2.00±ac
A
8411273

7.77±ac
1
0914636

39.79±ac
2
0910890

NE20 9-22-4
(in 3 parts)

NE20 9-22-4
(in 3 parts)

35.14±ac
NW21 9-22-4

0012948

8610865 CANAL R/W

LOT 1
9210241

8610180

13.20±ac

UTILITY R/W (0910891)

25.12±ac
(in 3 parts)
NE20 9-22-4

A
9512317

A
8410339

2 ST

B
9512312
(9512313)

B
8410339
15.66±ac
(area derived using cadastral mapping)

12.21±ac

0012948 CANAL R/W

CANAL

2.26±ac

5
9111812

(0716104)

B B C
9110804

NW21

TRANSMISSION LINE R/W (7654JK)

PIPELINE RIGHT OF WAY

TRANSMISSION LINE R/W (7654JK) (RW238DS)

PIPELINE R/W (0312269)

HIGHWAY 3

CANADIAN PACIFIC RAILWAY

TRANSMISSION LINE R/W

TRANSMISSION LINE R/W

(7654JK) (RW238DS)

NW20 9-22-4

9011212

NW20 9-22-4

NW20 9-22-4

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# North Coalhurst - Kipp Area Structure Plan

Lethbridge County & Town of Coalhurst

**Map 5 - Planning Areas**

Town of Coalhurst Boundary

Area Structure Plan Boundary

Planning Areas

Planning Area 1

Planning Area 2

IRRIGATION R/W
IRR905CU

8411013

1₂
8211541

SE29 9-22-4

A
8510040

CANADIAN PACIFIC RAILWAY

B
605AE

4736EM

1906EZ

RY157

A
605AE

8410013

NW20

8410013

TWP RD 9-4 (KIPP RD)

A
8411273

1₁
0914636

2₁
0910890

NE20 9-22-4

NW21 9-22-4

0012948

8610865 CANAL R/W

LOT 1
9210242

8610180

NW20

TRANSMISSION LINE R/W (7654JK)

PIPELINE RIGHT OF WAY

NW20 9-22-4

TRANSMISSION LINE R/W (7654JK) (RW238DS)

HIGHWAY 3

PIPELINE R/W (9312269)

UTILITY R/W (0910891)

A
9512317

1

NE20 9-22-4

A
8410339

2 ST

9312312
(9312313)

B
8410339

CANAL

0012948

CANADIAN PACIFIC RAILWAY

TRANSMISSION LINE R/W

TRANSMISSION LINE R/W

TRANSMISSION LINE R/W (7654JK) (RW238DS)

5₁
9111812

9011212

NW20 9-22-4

NW21

B

C

9110804

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# North Coalhurst - Kipp Area Structure Plan

Lethbridge County & Town of Coalhurst

**Map 6 - Option 1 Concept Plan**

FUTURE WETLAND STORM WATER EXPANSION AREA

TWP RD 9-4 (KIPP RD)

HIGHWAY 3

TRANSMISSION LINE R/W (7654JK)

PIPELINE RIGHT OF WAY

TRANSMISSION LINE R/W (7654JK) (RW2380S)

PIPELINE R/W (0312269)

UTILITY R/W (0910891)

TRANSMISSION LINE R/W

TRANSMISSION LINE R/W

TRANSMISSION LINE R/W

2 ST

CANAL

NW21

- Town of Coalhurst Boundary
- Area Structure Plan Boundary
- Wetland - Provincial Inventory
- 20m Buffer from Wetland
- Storm Pond Area
- Proposed Road
- Greenspace
- Rural General Industrial
- Business Light Industrial
- Residential
- Swing Site (GCR or BLI)

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# North Coalhurst - Kipp Area Structure Plan

Lethbridge County & Town of Coalhurst

**Map 7 - Option 2 Concept**

FUTURE WETLAND STORM WATER EXPANSION AREA

TWP RD 9-4 (KIPP RD)

HIGHWAY 3

TRANSMISSION LINE R/W (7654JK)

TRANSMISSION LINE R/W (7654JK) (RW238DS)

PIPELINE RIGHT OF WAY

PIPELINE R/W (0312269)

UTILITY R/W (0910891)

TRANSMISSION LINE R/W

TRANSMISSION LINE R/W

TRANSMISSION LINE R/W

2 ST

CANAL

NW 21

- Town of Coalhurst Boundary
- Area Structure Plan Boundary
- Wetland - Provincial Inventory
- 20m Buffer from Wetland
- Storm Pond Area
- Proposed Road
- Greenspace
- Rural General Industrial
- Business Light Industrial
- Residential

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# North Coalhurst - Kipp Area Structure Plan

Lethbridge County & Town of Coalhurst

**Map 8 - Option 1**

- Town of Coalhurst Boundary
- Area Structure Plan Boundary
- Proposed Lot Lines
- Wetland - Provincial Inventory
- 20m Buffer from Wetland
- Storm Pond Area
- Municipal Reserve or PUL
- Proposed Road

EXISTING WETLAND

FUTURE WETLAND STORM WATER EXPANSION AREA

3.80±ac
4.40±ac
4.06±ac
2.63±ac
2.53±ac
2.57±ac
2.63±ac
2.68±ac
3.48±ac
3.74±ac
2.98±ac
6.15±ac
10.11±ac
3.05±ac
3.27±ac
3.28±ac
3.30±ac
2.12±ac
2.13±ac
2.11±ac

TWP RD 9-4 (KIPP RD)

STORM POND

1.07±ac
1.32±ac
1.28±ac
1.35±ac
0.83±ac
0.74±ac
0.95±ac
1.21±ac
0.91±ac
0.92±ac
1.55±ac
1.52±ac
1.28±ac
1.27±ac

STORM POND

UTILITY R/W (0910891)

1.56±ac
1.74±ac
1.47±ac
1.25±ac
1.22±ac
1.36±ac
0.81±ac
0.81±ac

STORM POND

TOWN OF COALHURST

2 ST

0.90±ac
1.59±ac
0.80±ac
1.04±ac
1.07±ac
0.89±ac
0.91±ac
0.90±ac
0.79±ac
0.85±ac
0.98±ac
0.99±ac
0.99±ac
0.98±ac
0.94±ac
0.93±ac
0.66±ac
0.65±ac
0.80±ac
0.79±ac

STORM POND

0.40±ac
0.41±ac
0.42±ac
0.48±ac
0.70±ac
0.43±ac
0.51±ac

STORM POND

CANAL

TRANSMISSION LINE R/W (7654JK)

TRANSMISSION LINE R/W (RW23805)

PIPELINE RIGHT OF WAY

PIPELINE R/W (0312269)

HIGHWAY 3

TRANSMISSION LINE R/W

TRANSMISSION LINE R/W

TRANSMISSION LINE R/W

*AERIAL PHOTO DATE: 2015*

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0 Metres 100 200 300 400

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# North Coalhurst - Kipp Area Structure Plan

Lethbridge County & Town of Coalhurst

**Map 9 - Option 2**

- Town of Coalhurst Boundary
- Area Structure Plan Boundary
- Proposed Lot Lines
- Wetland - Provincial Inventory
- 20m Buffer from Wetland
- Storm Pond Area
- Municipal Reserve or PUL
- Proposed Road

EXISTING WETLAND

FUTURE WETLAND STORM WATER EXPANSION AREA

3.80±ac 4.40±ac 4.06±ac 2.63±ac 2.53±ac 2.57±ac 2.63±ac 2.68±ac 6.15±ac 10.11±ac 3.48±ac 3.74±ac 2.98±ac 3.05±ac 3.27±ac 3.28±ac 3.28±ac 2.12±ac 2.13±ac 2.11±ac

TWP RD 9-4 (KIPP RD)

STORM POND

0.70±ac 0.75±ac 1.31±ac 1.35±ac 1.63±ac 1.28±ac 1.27±ac

STORM POND

UTILITY R/W (0910891)

1.46±ac 1.44±ac 2.54±ac 0.99±ac 1.00±ac 1.10±ac 1.11±ac 1.83±ac 1.84±ac 1.61±ac 1.31±ac 1.33±ac

STORM POND

1.20±ac 1.43±ac 1.60±ac 1.08±ac 0.75±ac

TOWN OF COALHURST

STORM POND

0.40±ac 0.41±ac 0.42±ac 0.48±ac 0.70±ac 0.43±ac

STORM POND

2 ST

CANAL

TRANSMISSION LINE R/W

PIPELINE RIGHT OF WAY

TRANSMISSION LINE R/W (7654JK)

TRANSMISSION LINE R/W (7654JK) (RW23805)

PIPELINE R/W (0312269)

HIGHWAY 3

TRANSMISSION LINE R/W

NW 21

*AERIAL PHOTO DATE: 2015*

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0 Metres 100 200 300 400

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# North Coalhurst - Kipp Joint Area Structure Plan

Lethbridge County & Town of Coalhurst

**Map 10 - Potential Phasing Sequence Logical Development Areas**

- Town of Coalhurst Boundary
- Area Structure Plan Boundary
- Wetland - Provincial Inventory
- 20m Buffer from Wetland
- Phasing Boundary - North
- Phasing Boundary - South
- Rural General Industrial
- Business Light Industrial
- Residential

PHASE 3 NORTH

PHASE 1 NORTH

PHASE 2 NORTH

TWP RD 9-4 (KIPP RD)

PHASE 1 OR 2 SOUTH

PHASE 1 SOUTH

PHASE 2 SOUTH

PHASE 3 SOUTH

CANAL

2 ST

HIGHWAY 3

TRANSMISSION LINE R/W (7654JK)

TRANSMISSION LINE R/W (7654JK) (RW23805)

PIPELINE RIGHT OF WAY

PIPELINE R/W (0312259)

TRANSMISSION LINE R/W

TRANSMISSION LINE R/W

TRANSMISSION LINE R/W

NW21

OLDMAN RIVER REGIONAL SERVICES COMMISSION

0 Metres 100 200 300 400

N

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Lethbridge County & Town of Coalhurst Kipp Industrial Joint ASP.dwg

# PART 3

LANDOWNER / DEVELOPER IMPLEMENTATION AND POLICY

# PART 3: LANDOWNER / DEVELOPER IMPLEMENTATION

## *PROCESS AND POLICIES FOR LANDOWNERS / DEVELOPERS*

### 3.1 Engineering Detail Plans

**Process**

After the Intermunicipal Development Plan has been amended by both Councils to include the concept plan and policies found within this Area Structure Plan, landowners/developers will be responsible, at their expense, for preparing additional Engineering Detail Plans prior to applying for redesignation or subdivision.

**POLICIES**

3.1.1 An Engineering Detail Plan must be prepared and engineered for the subdivision area as outlined in the Area Structure Plan, and to the satisfaction of the municipality.

3.1.2 The Engineering Detail Plan and its associated engineering information must be approved by the municipality prior to an individual applying for a redesignation or applying to subdivide for more than a single isolated development.

3.1.3 The Engineering Detail Plan will typically include more detailed engineering and construction information pertaining to road networks, drainage and storm water management, utility provisions and rights-of-way, fire suppression, geotechnical and soils analysis, subdivision lot grading plans, etc.

3.1.4 The Subdivision Grading Plan should specify design elevations, surface gradients, lot types, swale locations, and other drainage related information required for lot grading as well as establish the drainage relationship between adjacent properties, and will need to be approved by the applicable municipality.

### 3.2 Reclassification (Redesignation) of Land

**Process**

Once the Area Structure Plan has been approved by both Councils, the majority of the land eligible to be subdivided within the Plan Area must be redesignated to the appropriate industrial, light industrial or other land use in accordance with the municipality having jurisdiction's Land Use Bylaw. The process for reclassification, as outlined in the *Municipal Government Act*, provides for advertising of the proposal and holding a public hearing where affected landowners may comment on the proposal. Council will make the final decision to redesignate a parcel and there is no appeal of this decision.

**POLICIES**

3.2.1 Prior to consideration of any subdivision applications, the Land Use Bylaw must be amended to provide for redesignation of the land to Rural General Industrial, Business Light Industrial in the County, or Industrial or Residential within the Town of Coalhurst in conformity to the ASP.

3.2.2 The respective Council should give consideration to the conformity of the proposal to the overall ASP requirements, prior to making any changes from the current designation.

3.2.3 A redesignation application made to either municipality shall be referred to the other partnering municipality in accordance with the policies of the ASP and the IDP.

3.2.4 Proposals for reclassification of lands from shall follow the process outlined in the *Municipal Government Act, Revised Statutes of Alberta 2000, Chapter M-26*.

3.2.5 Any subdivision or development proposals as proposed by landowners or developers must adhere to the general layout and road network as stipulated in this ASP.

3.2.6 There is no obligation on the part of either Council to rezone any parcel of land, and they will review each application on its own merits.

## 3.3 Subdivision

**Process**

With the appropriate Engineering Detail Plan and land use designation in place, the developer or landowner may apply for subdivision of the parcel into separate titles. The landowner or developer will have certain costs to consider associated with the subdivision process. These include: subdivision application fees, municipal reserve payments, survey costs and Land Titles Office registration costs. Any required infrastructure to be installed to service the subdivision will be in addition to this.

**POLICIES**

3.3.1 The Area Structure Plan is to be used as a guideline for subdivision when a landowner/ developer decides they want to subdivide any land affected by this Plan. The proposed density and minimum lot size shall be adhered to when subdividing a lot.

3.3.2 A landowner/developer is responsible for the costs of subdividing and developing parcels affected by this Plan, and the municipality shall not be responsible for executing the Plan or any associated costs.

3.3.3 As a condition of subdivision approval, the landowner or developer will be required to enter into a Development Agreement with the applicable municipality.

3.3.4 Costs of infrastructure/utilities shall be borne by the persons owning and developing land in the Plan Area.

3.3.5 As a condition of subdivision approval, the developer must provide a plan of survey from a certified Alberta Land Surveyor that certifies the location and dimensions of any existing buildings and the exact dimensions of the lot(s) to be subdivided.

3.3.6 Subdivision proposals will be reviewed in terms of conformity to the Area Structure Plan design. Prior to the application or survey of the subdivision proposal, developers are encouraged to consult with the municipality and their planning staff to determine if the proposal is in compliance with the ASP.

3.3.7 Any major proposed deviations in the lot layout will require an amendment to this Area Structure Plan by both Councils through the IDP amending process, if acceptable. However, the overall road layout, design pattern, land uses and density shall be adhered to.

3.3.8 Any utility easements and rights-of-way as required by utility companies or either municipality shall be established prior to finalization of the subdivision application.

3.3.9 All subdivision applications will be required to include a site plan or surveyors sketch that identifies:

(a) existing buildings or structures and the location of any utility lines or easements, drainage ditches or swales, dugouts or ponds, etc.;

(b) any storm water management facilities, existing and/or proposed, to ensure that the location and interconnecting of the facilities is feasibly developed in accordance with the storm water management plan;

(c) any other information required by the Subdivision Authority, the ASP or under the municipality's Land Use Bylaw.

3.3.10 At the time of subdivision, architectural controls as approved by the two municipalities (see section 3.2 and Appendix B) shall be registered on title in the form of a restrictive covenant. The approved architectural controls shall be implemented at the development permit stage. Either municipality will not be responsible for managing or enforcing any such controls once registered.

3.3.11 The provision of any applicable Municipal Reserve must be provided by the developer as required on the subdivision approval resolution.

## 3.4 Development of Land / Lots

**Process**

Once the parcel has been subdivided and separate titles issued, the individual land owner can apply to the applicable municipality having jurisdiction, for a development permit to develop on an individual lot a permitted or discretionary use as listed in the land use district as contained in the municipality's Land Use Bylaw.

The development approval process will include the following:

1. The land owner will be required to submit an application form, a fee, and a site plan showing the location of the building on the lot. Professional drawn building plans and a grading plan are preferred.

2. Once the application, applicable fee and any required information have been submitted, the Designated Officer will review and make a decision on the application.

3. If a proposed development conforms to this Plan, engineering requirements and the Land Use Bylaw, the Designated Officer will issue a development permit with or without conditions for a permitted use. If the application is for a development permit for a discretionary use, the Designated Officer shall notify persons likely to be affected by the issuance of the development permit, prior to rendering a decision.

**POLICIES**

3.4.1 This Area Structure Plan is to be used as a guideline for development in conjunction with the Land Use Bylaw when considering a development permit application.

3.4.2 All Town of Coalhurst residential dwellings shall be required to connect to both a municipal potable water system and approved sewage system. Commercial/industrial uses will be assessed on the proposed use and the estimated need for water and sewer services.

3.4.3 The landowner/developer will be required to submit an application form, a fee, a site plan showing the location of the proposed building on the lot, building plans and a grading plan as requested by the municipality. Legal access and egress from a lot shall be indicated on a site plan and shall be at a location to the satisfaction of the Designated Officer or the Development Authority.

3.4.4 Any costs associated with survey or engineering work that may be required shall be at the expense of the developer.

3.4.5 The Development Authority may require that as a condition of issuing a development permit, the applicant enter into a development agreement with the municipality.

3.4.6 If a development permit is issued by the municipality, the developer/applicant is responsible for applying for and securing the necessary building permits and any other safety code approvals that may be required.

3.4.7 Landowners will be required to provide and adhere to the storm water drainage management plan as applicable to their land parcel and proposed development.

3.4.8 Builders/developers must give proper consideration to lot grades when choosing a building design. The final building grades must respect the approved Subdivision Lot Grading Plan as approved. Landscaping may be required to the satisfaction of the Designated Officer or the Development Authority in accordance with the Land Use Bylaw.

3.4.9 The Development Authority may require the developer to provide additional standards of development (landscaping, screening of storage/goods, etc.) in conjunction with the Land Use Bylaw.

3.4.10 The developer/applicant is responsible for contacting the applicable private utility companies prior to undertaking any excavation or development work.

3.4.11 Within Lethbridge County, the applicant must have the private sewage system installed by a certified installer/agency or engineer accredited under Alberta Labour (Municipal Affairs) to meet the *Alberta Private Sewage System Guidelines* and be compatible with the results of the soils profile and analysis. The system must be inspected by a certified Safety Codes officer with a copy of an approval or certification filed with the municipal office.

# PART 4

MUNICIPAL IMPLEMENTATION

# Part 4: MUNICIPAL IMPLEMENTATION

In order to efficiently and fairly implement and manage the ASP and joint venture project between Lethbridge County and the Town of Coalhurst, the following policies are to guide the process for the two municipalities. Ultimately, the management of the ASP area and joint business park project will be as outlined in the terms of a subsequent agreement between the two municipalities.

## 4.1 Policies and Process Guide

**POLICIES**

4.1.1 Councils of Lethbridge County and the Town of Coalhurst will adopt the ASP by amending the Intermunicipal Development Plan (Bylaw No. 1434 & No. 375-14) by bylaw to add the complete ASP as an appendix to the document using the process as outlined in the *Municipal Government Act*.

4.1.2 Any proposed amendments to the ASP are to be reviewed and agreed to by both municipalities through the consultation process as outlined in the IDP. If a disagreement arises with respect to administering the plan, the dispute resolution process of the IDP is to be used to negotiate the issue.

4.1.3 Councils of Lethbridge County and the Town of Coalhurst will decide on redesignation of land proposals for parcels within the ASP boundary within their own jurisdiction with respect for conformity to the ASP.

4.1.4 Each municipality is responsible for managing and processing subdivision and development proposals in their respective jurisdictions and will make decisions in respect of this ASP and the applicable policies.

4.1.5 Redesignation, subdivision and development applications processed by a municipality will be referred to each other as outlined in the referral process of the IDP.

4.1.6 The respective Councils and administrations of Lethbridge County and the Town of Coalhurst will need to discuss the servicing issues and make an agreement on how to manage such infrastructure, especially as it relates to the provision and allocation of water.

4.1.7 The South of Kipp Road area (Planning Area 1) may not be subdivided to smaller lot holdings until municipal water, waste water, and storm water infrastructure are adequately planned for and able to be provided by the municipality.

4.1.8 The North of Kipp Road area (Planning Area 2) may be developed and subdivided independently of the South area, but the joint management agreement should be in place to address infrastructure management and revenue sharing. If an isolated development is permitted to proceed prior to such an agreement, then the terms should retroactively be applied once the negotiated agreement is in place between the two municipalities.

4.1.9 Lethbridge County and the Town of Coalhurst will collaboratively work together to find a solution to obtaining additional water allocation for the Town of Coalhurst to accommodate growth and to service the ASP with municipal services for the areas as outlined in the Plan.

4.1.10 Both municipalities recognize that the South of Kipp Road area (Planning Area 1) may need to be annexed into the Town's municipal boundary in order to be serviced with Town of Coalhurst municipal water and waste water services.

4.1.11 In order to manage the joint venture of the ASP and business park area, Lethbridge County and the Town of Coalhurst will need to enter into a joint intermunicipal agreement(s), to address items such as servicing, expenditures, revenue sharing, etc. The expenditures component will need to address the on-going management/maintenance of municipal infrastructure.

4.1.12 Councils of Lethbridge County and the Town of Coalhurst should discuss in good faith and make a joint agreement on the accepted method /formula of addressing expenditures and revenue sharing in the joint venture area, prior to allowing any developers to proceed with proposals.

4.1.13 In consideration of providing municipal services to areas or proposals agreed to between the two municipalities, the County and the Town will need to discuss the necessity to create and apply off-site levies, local improvement levies, development charges, and/or servicing fees to any and all development areas as part of a joint agreement.

4.1.14 In providing municipal services and managing a joint venture business park, Lethbridge County and the Town of Coalhurst must consider the Intermunicipal Collaborative Framework (ICF) agreement negotiated and entered into between the two municipalities and how this may affect the joint management model.

## 4.2 Recommendations on Implementation

### Development Agreements / Security

The partnering municipalities will address the provision of infrastructure services required to support further subdivision, through requirement of landowners/developers to enter into Development Agreements with the applicable municipality within which the land is located. Both municipalities shall require that the security to be provided at the signing of a development agreement shall be 110% of the estimated construction costs as provided by the consulting engineer. The following policies are applicable:

**POLICIES**

4.2.1 The landowner or developer or both shall be required to enter into a Development Agreement with the governing municipality as the landowner shall be responsible for all development and servicing costs, and any applicable municipal infrastructure associated with servicing the subdivision or development proposal.

4.2.2 The municipality will specify through the terms of the Development Agreement the obligations on the developer for the provision of required infrastructure necessary to serve the subdivision or Plan Area, and the specified standards of such infrastructure.

4.2.3 The provision of sufficient security, in a form and amount acceptable to the municipality, may be required in conjunction with a Development Agreement with the municipality at the time of subdivision and/or development applicable to covering the costs of installation of any required infrastructure to service the development, particularly as it applies to the construction of any required roadways, water, waste water and storm water drainage management system works.

### Off-site Levies / Local Improvement Levies

At the time of subdivision or development, landowners/developers will be required to financially contribute to provide their applicable share of any off-site levies, local improvements or development servicing fees that may be implemented by Lethbridge County and the Town of Coalhurst, as they apply to municipal infrastructure that services and benefits the defined ASP area.

### Endeavour to Assist

Either municipality may, at their discretion, use an 'endeavour to assist' clause through the terms of a Development Agreement to assist developers who front-end required servicing infrastructure improvements or pay for engineering plans applicable to a larger area (i.e. beyond their own parcel) that other landowners/developers may later utilize or benefit from. Both municipalities should have the term limited to not more than 15 years, unless both municipalities are in agreement that special circumstances are present that warrant a longer period of consideration.

## 4.3 Future Management of Joint Venture

In order to manage the joint venture of the North Coalhurst and Kipp Area Structure Plan and business park area, Lethbridge County and the Town of Coalhurst will need to enter into an intermunicipal agreement(s) for on-going land management. The agreement(s) are to address items such as cost sharing expenditures, servicing, infrastructure maintenance over time, marketing, etc., and revenue sharing based on a fair and equitable agreement. Consideration for the Intermunicipal Collaborative Framework (ICF) agreement as negotiated between the two municipalities must also be considered, and may also require future amendments based on the final joint business park servicing and management model agreed to.

The terms and provisions of those intermunicipal agreements are the prerogative and entitlement of Lethbridge County and the Town of Coalhurst, which may be reviewed and amended over time, and will be considered separate agreements to this ASP document. If any agreed to terms of the joint intermunicipal agreements are determined to materially affect the policies or implementation of this ASP, then the ASP should be amended through the *Municipal Government Act* statutory process by both parties to conform to any agreements made.

# Schedule A

SERVICING ANALYSIS

## Water Assessment

### Estimated Water Demand

The area of proposed development is broken into two areas for this assessment, namely South of Kipp Road and North of Kipp Road. From discussions with ORRSC about the Area Structure Plan it is understood that the lots South of Kipp Road and currently within the Town of Coalhurst boundaries are designated as residential, and all other proposed lots South of Kipp Road are designated as light industrial. Lots North of Kipp Road are designated as rural light industrial.

Estimated water demand was prepared using the City of Lethbridge Design Standards (2016) with an assumed maximum day demand (MDD) of two time the average day demand (ADD). Estimated demands are presented in Table 1.

**Table 1. Estimated Water Demand**

| Location | Option | Development Type | Area | ADD | MDD |
|---|---|---|---|---|---|
| | | | ha | m3/d | m3/d |
| South of Kipp | 1 | Light Industrial | 21.8 | 654 | 1308 |
| | | Residential | 8.1 | 101 | 202 |
| | | Total | **29.9** | **755** | **1510** |
| | 2 | Light Industrial | 24.9 | 747 | 1494 |
| | | Residential | 5.3 | 66 | 132 |
| | | Total | **30.2** | **813** | **1626** |
| North of Kipp | 1 or 2 | Rural Light Industrial | 46.8 | 702 | 1404 |

Supply of water services to Precon Manufacturing Ltd. was not included in this assessment. It should be noted that Precon is supplied with non-potable water through a 150mm pipeline that would require realignment if the area North of Kipp Road is developed.

### Provision of Water

Extending the Town of Coalhurst water distribution system to meet the demands of the study area was assessed. A 20 year design horizon was used, with population projections for Coalhurst obtained from ORRSC. Two population growth scenarios are addressed hereafter, namely a 20 year growth rate and a 5 year growth rate. A summary of these projections is presented in Table 2.

**Table 2. Coalhurst Population Projections**

| Growth Rate | 2038 Population |
|---|---|
| Past 20 Year Growth | 4,284 |
| Past 5 Year Growth | 6,157 |

The existing agreement between the City of Lethbridge and the Lethbridge Regional Water Services Commission, whereby the Town of Coalhurst is supplied with potable water from the City of Lethbridge, was reviewed. The agreement, which terminates January 31, 2030, states that Coalhurst is to be provided with 4.0 million litres per day (46.3 litres per second) through the West Water Feedermain. Under the agreement the Town of Coalhurst is required to satisfy certain requirements, including but not limited to:

- Obtain allocation with Alberta Environment Water Resources for 115% of the water volume and rate required. (See Agreement section 4.2)
- Provide potable water obtained from the City of Lethbridge only to entities within corporate limits of the Town and to the rural customers of the Town at the time the agreement was made, unless there is sufficient surplus in the agreement to provide water and consent is obtained from the City Manager. (See Agreement sections 5.1, 5.2, 5.7)
- Maintain distribution storage capacity of 2.3 Million Litres. (See Agreement section 10.4)
- Maintain minimum storage capacity at an average day supply including fire protection. (See Agreement section 10.4)
- Operate distribution storage facilities, in coordination with the City, to satisfy demands in excess of 3.0 times the average daily demand of the previous year. (See Agreement section 10.4)

The feasibility of providing potable water to areas North and South of Kipp Road was assessed. Five criteria for the expansion were identified, and a discussion on each criteria is presented hereafter.

1. Capacity within the Agreement with the City of Lethbridge
2. Capacity of Water Allocation
3. Capacity of Potable Water Storage Facilities
4. Capacity of Distribution Pumping
5. Capacity of Existing Distribution Piping

Finally, a conceptual layout of the water distribution system for the study area was prepared.

**1. Capacity Within Agreement**

As the agreement specifies a daily, not yearly, flow and daily demand varies on a seasonal basis, historical flows during high use months between 2013 and 2018 were reviewed. The maximum day demand (MDD) as defined by Alberta Environment and Parks is the maximum three consecutive day demand average[1]. Based on this definition the historical MDD was calculated to be 744 litres per person per day (L/p/d). Using this demand and population projections for the Town water demand was projected.

Part of the Town's agreement capacity is used to provide water to rural customers of the Town who were being serviced at the time of the Agreement. From discussion with Kevin Lewis from the Town, it was determined that a conservative amount of 30,000$m^3$ per year be allocated for these rural customers and for water losses through the pipeline prior to reaching the Coalhurst potable water storage facility. In 2017 the acreages and water losses accounted for approximately 28,000$m^3$ of water usage. The maximum day demand from this area is estimated to be 266$m^3$/day based on flow records available. This amount is a fixed amount in the projections due to the requirement that any additional connections outside of the Town be approved by the City.

Figure 1 presents the projected water demand.

[1] Alberta Environment and Parks. *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems*. 2012, pp.2-ix.

**Figure 1**

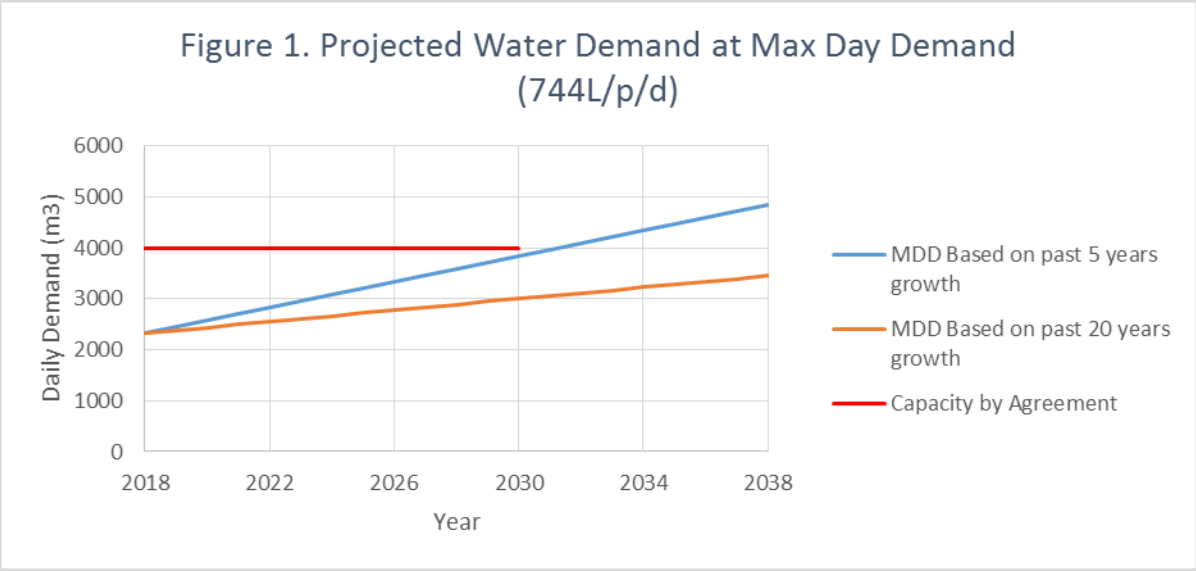



Table 3 summarizes the surplus available with the existing agreement volume of 4,000 m3 per day based on the 20 year growth trend and the 5 year growth trend.

**Table 3. Agreement Surplus**

| Year | Surplus | |
|---|---|---|
| | 20 yr growth | 5 yr growth |
| | m3 | m3 |
| 2018 | 1675 | 1675 |
| 2030 | 998 | 162 |
| 2038 | 547 | -847 |

Based on the estimated MDD of 1,626m3/day for the area South of Kipp, there is insufficient allowance within the agreement for the development. The agreement would require revision with an increase in water for Coalhurst in order to provide potable water to the North Kipp development in the 20 year design horizon. To provide additional water under a revised agreement construction of a booster station along the existing pipeline from the City would be required.

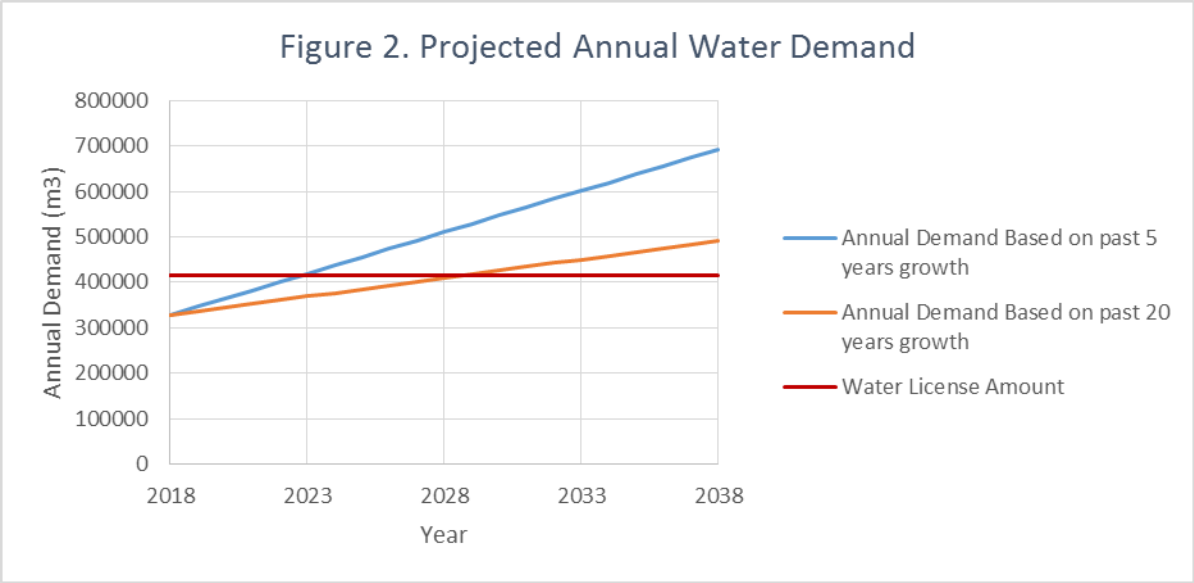
To service the area South of Kipp Road with water either approval from the City Manager would need to be obtained or the land would need to be annexed. The area North of Kipp Road would be subject to the same requirement. As there is limited surplus in the agreement and the area North of Kipp Road is not likely to be annexed the provision of potable water is not further addressed in this study. If potable water is to be supplied to the area North of Kipp Road a connection to North County water co-op system may be one option.

## 2. Capacity of Water Allocation

A review of water licences held by the Town of Coalhurst was conducted. It was found that the Town currently holds two licences to divert water from the Oldman River (Priority Numbers 1910-07-11-02 and 1981-09-24-001). These licenses allow for a total annual raw water volume of 476,544m3 and a maximum allowable flow rate of 3.72 MLD. The equivalent volume of potable water that can be supplied based on these existing licenses and the requirement in the agreement for raw water licences totalling 115% of the potable water needs is 414,386m3/yr.

As the water licenses are based on annual, not daily, flow, peak flows do not have to be accounted for and the average day demand (ADD) from the full year can be used for demand projections. Based on available water records from 2013 to 2018 the ADD is approximately 295L/p/d. From discussion with Kevin Lewis from the Town it is understood that the water license allocation capacity is also used to provide water to rural customers of the Town who were being serviced at the time of the Agreement. As discussed in section 1, a conservative amount of 30,000m3 per year is allocated for these rural customers and for water losses through the pipeline before reaching the Coalhurst potable water storage facility. Figure 2 presents the projected water demands and the water license amount.

**Figure 2**




As can be seen from Figure 2 additional Water License allocation will be required within the next 5 to 11 years in order to provide sufficient potable water for the Town, based on 5 and 20 year growth patterns, respectively. It is recommended that the Town obtain additional Water Licenses to meet projected demands

Water License allocation will be required for the full demand of the area South of Kipp. The equivalent volume of raw water for diversion that will be required is 341,257m3 annually.

Water allocation transfers are subject to the Water Conservation Objective, which allows the government to holdback up to 10 percent of the water in the allocation transfer. Provision for the 10 percent holdback should be included when considering the volume of water license allocation to be acquired.

### 3. Capacity of Potable Water Storage Facilities

The agreement with the City of Lethbridge requires 2300m3 (2.3 Million Litres) distribution storage capacity be maintained, and that the storage capacity also be sufficient to provide average day supply including fire protection. Currently the Town of Coalhurst operates one potable water storage facility with a volume of 2300m3.

Fire flow calculations were completed as part of the Town of Coalhurst Infrastructure Master Plan, and a fire flow of 9,300L/min at the high school was calculated[2]. These calculations were reviewed and found to still be applicable. A corresponding fire storage of 1,116$m^3$ is required for the Town. Based on this volume and an estimated current ADD of 816$m^3$/d the Town currently requires approximately 1,932$m^3$ of distribution storage; the existing storage of 2,300$m^3$ exceeds the current required volume. The Town will require additional storage to meet its own growth, beginning in 2026 based on 5 year growth and 2035 based on 20 year growth. Accordingly, storage in the full amount of the ADD is required for the South of Kipp Road development, amounting to an additional 813m3.

The Alberta Guidelines for Municipal Waterworks recommends treated water storage be constructed in phases for projected demand of no more than 10 years to minimize operational problems[3]. As the area South of Kipp Road is developed additional storage could be included in work completed by the Town to meet its own needs.

### 4. Capacity of Distribution Pumping

The Town distribution pumping consists of three 40 horsepower (HP) vertical turbine pumps on variable frequency drives (VFD's) and one 125 HP vertical turbine pump capable of providing fire flow. Each 40 HP pump is rated for 2,763L/min at 52m Total Dynamic Head (TDH) and the 125 HP pump is rated for 9,464L/min at 52m TDH. Operationally, either the three 40 HP pumps can be in operation or the 125 HP pump can be in operation; all four pumps cannot operate at the same time. With the largest pump (125 HP) out of service the rated available flow is 8,289L/min.

The Fire Underwriters Survey suggests distribution pumping be sized to provide sufficient flow and pressure for MDD and fire flow with the largest pump out of service. Table 4 presents the current and projected pumping requirements based on the criteria of MDD and fire flow.

**Table 4. Distribution Pumping Requirements**

| Year | MDD + Fire Flow (L/min) | Pump Capacity Deficit (L/min) |
|---|---|---|
| 2018 | 10730 | 2441 |
| 2038 (20 year growth) | 11514 | 3225 |
| 2038 (5 year growth) | 12482 | 4193 |

[2] MPE Engineering Ltd. *Town of Coalhurst Infrastructure Master Plan*. 2006, pp. 23.
[3] Alberta Environment and Parks. *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems*. 2012, pp.2-46.

Servicing South Kipp will require an estimated additional 1,129 L/min of pumping capacity. This capacity could be included in pumping upgrades the Town undertakes.

### 5. Capacity of Existing Distribution Piping

As part of the conceptual layout of the distribution piping for the South Kipp area connection points to the Town water distribution system were assessed and distribution piping to these locations was also assessed. Upgrading the existing 150mm waterline on 4th Street between 51 Ave and 53 Ave to 200mm would be advantageous both to the South Kipp development and to the Town, as it would provide greater fire protection to the South Kipp development and the High School (in conjunction with an increase in pumping capacity). This work could be completed with other work the Town has planned for 4th Street for cost savings. No other upgrades to Town owned existing water distribution piping are required to provide adequate fire flows throughout the Town.

Canadian Pacific Rail owns a 300mm potable water line that connects to the Town distribution system near 55 Ave and 2 St and runs northwest roughly paralleling the train track. There is potential for cost savings if the South Kipp Development is able to tie in to this private water line, rather than constructing a new separate water line along a similar alignment. There may be benefit to CP Rail if the line is utilized more, as the Town has reported low chlorine residuals in the pipeline due to low usage.

**Summary**

Table 5 summarizes the criteria and required upgrades to accommodate growth in the South Kipp area, based on 20 year projections for the Town of Coalhurst. The letter "Y" indicates there is sufficient capacity, "N" indicates there is insufficient capacity.

**Table 5. Criteria Summary**

| Criteria | Year | | | Upgrades Required for S Kipp |
|---|---|---|---|---|
| | 2018 | 2038[1] | 2038[1] + S Kipp | |
| 1. Agreement with City of Lethbridge | Y | Y | N | 1,692 m3/d |
| 2. Water Licence Allocation | Y | N | N | 341,257 m3/yr |
| 3. Potable Water Storage | Y | N | N | 813 m3 |
| 4. Distribution Pumping | N | N | N | 1,129 L/min |
| 5. Distribution Piping | N | N | N | See Figures 1 and 2 |

Notes: 1. Based on Town of Coalhurst past 20 year growth rate and historical water demand.

As can be seen from Table 5, many of the criteria which require upgrading for the South Kipp area will also require upgrading to meet anticipated growth within the Town of Coalhurst. Necessary upgrades for the Town could be planned to coincide with those required for development of the South Kipp area. For a more detailed explanation of current capacity, future capacity, and projected demands, please consult the individual criteria sections.

**Conceptual Layout**

Figures 1 and 2 present conceptual layouts for the South of Kipp Road Development. With the proposed layout and the piping and pumping upgrades outlined in this report, a fire flow of approximately 6,000 L/min will be available throughout the South of Kipp Road development.

LEGEND

EXISTING PIPELINE

200mm PIPELINE

MPE Engineering Ltd.

OLDMAN RIVER REGIONAL SERVICES COMMISSION

NORTH COALHURST-KIPP JOINT AREA STRUCTURE PLAN
WATER DISTRIBUTION PLAN OPTION 1

| SCALE: 1:10 000 | DATE: SEPTEMBER 2018 | JOB: 0191-003-00 | FIGURE: 1 |
|---|---|---|---|

LEGEND

EXISTING PIPELINE

200mm PIPELINE

MPE Engineering Ltd.

OLDMAN RIVER REGIONAL SERVICES COMMISSION

NORTH COALHURST-KIPP JOINT AREA STRUCTURE PLAN
WATER DISTRIBUTION PLAN OPTION 2

| SCALE: 1:10 000 | DATE: SEPTEMBER 2018 | JOB: 0191-003-00 | FIGURE: 2 |
|---|---|---|---|

## Wastewater Assessment

### Estimated Wastewater Generation

In the same manner as for the Water Assessment, the area of proposed development is broken into two areas for this assessment, namely South of Kipp Road and North of Kipp Road. From discussions with ORRSC about the Area Structure Plan it is understood that the lots South of Kipp Road and currently within the Town of Coalhurst boundaries are designated as residential, and all other proposed lots South of Kipp Road are designated as light industrial. Lots North of Kipp Road are designated as rural light industrial.

Estimated wastewater generation was prepared using the City of Lethbridge Design Standards (2016) with Harmons Peaking factor applied to the residential lots and a peaking factor of two applied to the light industrial lots. An allowance for inflow and infiltration of 500L/p/d for residential areas and 7.5m3/ha/d for light industrial areas was included. Due to the agreement with the City of Lethbridge discussed later in this report, only areas South of Kipp Road are considered in this assessment. Estimated Average Day Flows (ADF) and Peak Wet Weather Flows (PWWF) are presented in Table 1.

**Table 1. Estimated Wastewater Generation Rates**

| Location | Option | Development Type | Area | ADF | PWWF |
|---|---|---|---|---|---|
| | | | ha | m3/d | m3/d |
| South of Kipp | 1 | Light Industrial | 21.8 | 654 | 1472 |
| | | Residential | 8.1 | 97 | 522 |
| | | Total | **29.9** | **751** | **1993** |
| | 2 | Light Industrial | 24.9 | 747 | 1681 |
| | | Residential | 5.3 | 64 | 346 |
| | | Total | **30.2** | **811** | **2026** |

Wastewater generation from Precon Manufacturing Ltd. was not included in this assessment.

### Collection of Wastewater

Extending the Town of Coalhurst water distribution system to meet the demands of the study area was assessed. A 20 year design horizon was used, with population projections for Coalhurst obtained from ORRSC. Two population growth scenarios are addressed hereafter, namely a 20 year growth rate and a 5 year growth rate. A summary of these projections is presented in Table 2.

**Table 2. Coalhurst Population Projections**

| Growth Rate | 2038 Population |
|---|---|
| Past 20 Year Growth | 4,284 |
| Past 5 Year Growth | 6,157 |

The existing agreement between the City of Lethbridge (City) and the Town of Coalhurst (Town) whereby wastewater from the Town is pumped to the City for treatment was reviewed. The agreement, which terminates January 31, 2035, states that the Town of Coalhurst is allocated 2.5 million litres per day (MLD) of wastewater disposal. Under the agreement the Town of Coalhurst is required to satisfy certain requirements, including but not limited to:

- Wastewater BOD, TSS, Grease and COD remain below limits set forth for commercial customers in the City's sewerage bylaw. (See Agreement section 7.2)
- Maintaining overflow storage capacity to accommodate increase in flow during wet weather events, sized to hold wet weather volumes for up to 20 days. (See Agreement section 16.1, 16.2)
- No other entities outside corporate limits of the Town of Coalhurst shall be supplied with wastewater disposal by the Town, including delivery by truck. (See Agreement section 5.1, 5.2)

The feasibility of providing wastewater collection to the Area South of Kipp was assessed. Four criteria were identified, and a discussion on each criteria is presented hereafter.

1. Capacity within the Agreement with the City of Lethbridge
2. Capacity of Wet Weather Flow Storage
3. Capacity of Wastewater Pumping
4. Capacity of Existing Gravity Sewer Collection System

Finally, a conceptual layout of the wastewater collection system for the study area was prepared.

**1. Capacity Within Agreement**

As the agreement specifies a daily, not yearly flow, and wastewater generated can vary from month to month, historical flows during high wastewater generation months between 2013 and 2018 were reviewed. The maximum flow month was June of 2014, during which the average daily flow was 936m3/day, or 393 litres per person per day (L/p/d). Using this rate and population projections for the Town based on the past 5 and 20 year population growth wastewater generation was projected. Figure 1 presents these projections.

**Figure 1**

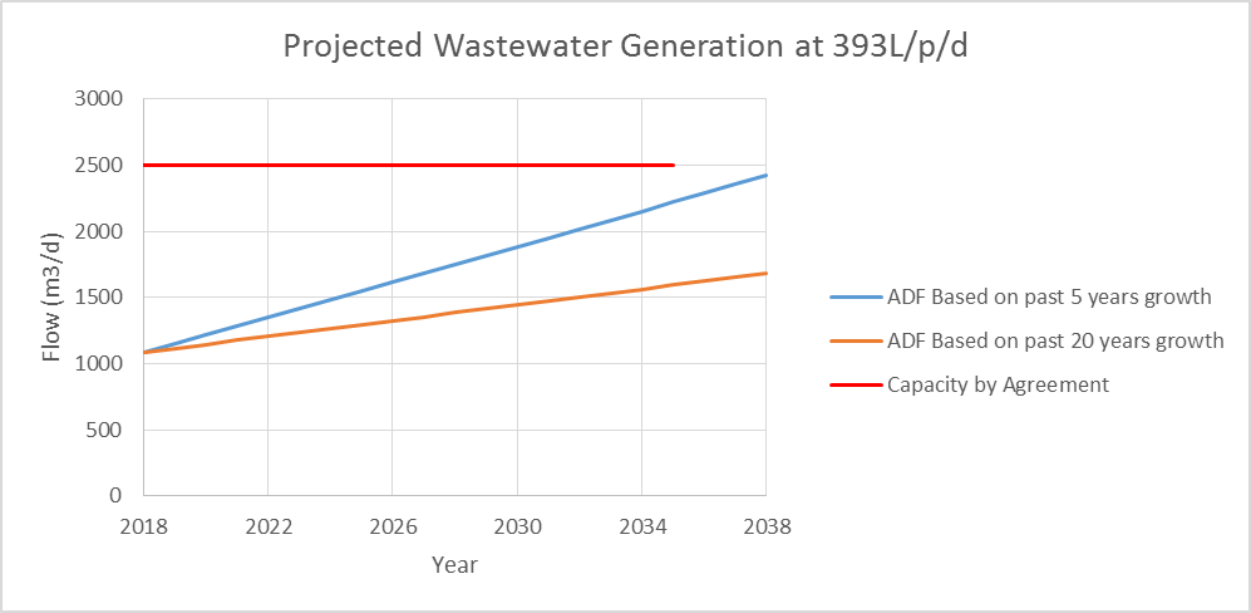



Table 3 summarizes the surplus available with the existing agreement volume of 2,500 m3 per day based on the 20 year growth trend and the 5 year growth trend.

**Table 3. Agreement Surplus**

| Year | Surplus | |
|---|---|---|
| | 20 yr growth | 5 yr growth |
| | m3 | m3 |
| 2018 | 1413 | 1413 |
| 2035 | 906 | 280 |
| 2038 | 816 | 80 |

Based on the estimated ADF of 811m3/day for the area South of Kipp, there may be sufficient allowance for the development at the end of the agreement (2035) and in the 20 year horizon based on the past 20 year growth rate, however based on the 5 year growth rate additional allocation may be required as soon as 2027. Such additional need should be assessed several years before the end of the agreement.

Consideration to the nature of wastewater being produced by the industrial developments should be given to ensure BOD, TSS, Grease and COD limits in the agreement are not exceeded. This should be assessed on a case by case basis at the time of development.

The agreement between the Town of Coalhurst and the City of Lethbridge stipulates that no other entities outside corporate limits of the Town of Coalhurst shall be supplied with wastewater disposal by the Town, unless agreed to in writing by the City. Accordingly, to provide wastewater collection services to the area South of Kipp Road either the City would have to make an allowance for such or the land would need to be annexed. As it is unlikely the area North of Kipp Road will be annexed the provision of wastewater collection is not further addressed in this study.

### 2. Capacity of Wet Weather Storage

The Town of Coalhurst currently has three wet weather storage ponds, two of which with a volume of 5,500m3 and the third having a volume of 4,860m3, for a total wet weather storage volume of 15,860m3. During the June 2014 flood both 5,500m3 storage cells were near capacity. It should be noted that the wastewater pumps pumping effluent to the City of Lethbridge were undersized during the June 2014 event and have since been replaced with pumps capable of pumping the maximum allowed discharge to the City.

A number of variables make it difficult to predict future needs for wet weather flow storage, including the installation of stormwater infrastructure and efforts by the Town to reduce inflow and infiltration (I/I) through disconnection of downspout and tile drains to the sanitary system. Newer construction areas typically experience significantly less I/I when compared with older areas. The wet weather flow anticipated from the North Kipp development is estimated to be approximately 285m3/d. Assuming two wet weather flow days in 20, additional wet weather storage of 570m3 is required. The existing wet weather storage of 15,860m3 is believed to be sufficient for the next 20 years including the South of Kipp Road development.

### 3. Capacity of Wastewater Pumping

The Town wastewater lift station consists of two 25 HP pumps each capable of pumping approximately 29L/s through the forcemain to the City and two 25 HP wet weather pumps each capable of pumping approximately 134L/s to the wet weather storage ponds. One forcemain pump provides the maximum

flow rate allowed as per the agreement; unless the agreement is amended to allow for greater flow the pumps should not be upgraded, and are adequate.

**4. Capacity of Existing Gravity Sewer Collection System**

As part of the conceptual layout of the wastewater collection system for the area South of Kipp Road several connection points to the Town of Coalhurst wastewater collection system were assessed using the existing SewerGEMS model. It was determined based on existing topology that a lift station will be required to pump wastewater from the area South of Kipp Road to the Town of Coalhurst gravity collection system. Three feasible connection manholes for discharge in close proximity to the proposed South of Kipp Road lift station were identified based on current Peak Wet Weather Flows:

- 3rd Street and North of McDermott Road
- 4th Street and 51st Avenue
- 4th Street and 53rd Avenue

Any necessary upgrades to gravity sewer infrastructure to allow for the connections was also assessed. A connection to 3rd Street and North of McDermott Road would require first upgrading the 200mm sanitary pipe between McDermott and 52 Ave to 300mm sanitary pipe. A connection to 4th Street and 51st Avenue would not require any upgrades to the sanitary collection system. A connection to 4th Street and 53rd Avenue would not require any upgrades to the sanitary collection system.

It should be noted that with a connection to any of the three manholes described above the existing infrastructure will be at capacity for much of the flow path from the manhole to the Town of Coalhurst lift station. When considering potential areas of growth within the Town that will require sanitary capacity, a connection to the 4th Street and 53rd Avenue Manhole appears to be the most reasonable location for the connection.

**Summary**

Table 4 summarizes the criteria and required upgrades to accommodate growth in the South Kipp area, based on 20 year projections for the Town of Coalhurst. Y indicates there is sufficient capacity, N indicates there is insufficient capacity.

**Table 4. Criteria Summary**

| Criteria | Year | | | Upgrades Required for S Kipp |
|---|---|---|---|---|
| | 2018 | 2038[1] | 2038[1] + S Kipp | |
| 1. Agreement with City of Lethbridge | Y | Y | Y | N/A |
| 2. Wet Weather Storage | Y | Y | Y | N/A |
| 3. Wastewater Pumping | Y | Y | Y | N/A |
| 4. Gravity Collection | Y | Y | Y[2] | See Figures 1 and 2 |

Notes: 1. Based on Town of Coalhurst past 20 year growth rate and historical wastewater generation.
2. Sufficient capacity if forcemain from S Kipp discharges to 4th Street and 53rd Avenue manhole.

**Conceptual Layout**

Figures 1 and 2 present conceptual layouts for the South of Kipp Road wastewater collection system.

LEGEND

- EXISTING PIPELINE
- 200mm PIPELINE
- 250mm PIPELINE
- FORCEMAIN
- LIFT STATION

MPE Engineering Ltd.

OLDMAN RIVER REGIONAL SERVICES COMMISSION

NORTH COALHURST-KIPP JOINT AREA STRUCTURE PLAN
WASTEWATER COLLECTION SYSTEM OPTION 1

| SCALE: 1:10 000 | DATE: SEPTEMBER 2018 | JOB: 0191-003-00 | FIGURE: 1 |
|---|---|---|---|

LEGEND

- EXISTING PIPELINE
- 200mm PIPELINE
- 250mm PIPELINE
- FORCEMAIN
- LIFT STATION

MPE Engineering Ltd.

OLDMAN RIVER REGIONAL SERVICES COMMISSION

NORTH COALHURST-KIPP JOINT AREA STRUCTURE PLAN
WASTEWATER COLLECTION SYSTEM OPTION 2

| SCALE: 1:10 000 | DATE: SEPTEMBER 2018 | JOB: 0191-003-00 | FIGURE: 2 |
|---|---|---|---|

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*Lethbridge, AB T1J 0V1*
*Phone: 403-329-3442*
*1-866-329-3442*
*Fax: 403-329-9354*

MPE Engineering Ltd.

Oldman River Regional Services Commission
3105 – 16th Avenue N.
Lethbridge, Alberta
T1H 5E8

October 24, 2018
File: N:\0191\003-00\L01-1.0

**Attention:** Steve Harty,
Senior Planner

Dear Steve:

**Re: North Coalhurst – Kipp Joint Area Structure Plan Storm Water Analysis**

**Background**

As requested, we have undertaken a storm water analysis for the North Coalhurst – Kipp Joint Area Structure Plan. The study area is the Area Structure Plan (ASP) boundary and surrounding areas that contribute overland storm water runoff. The analysis of the study area included field observations of the storm water systems and drainage patterns, as well as developing a computer model to determine pre and post development runoff and storm water storage requirements.

The existing land uses include agriculture, isolated industrial and farmstead/acreages. It is understood that future development for the area will be light industrial with two small sections of residential in the southeast corner of the study area. For the purposes of this report, we have assumed the development to include a gravel road network with lot sizes varying from 0.5 to 0.75 acres south of Kipp Road and a minimum lot size of 2 acres north of Kipp Road.

**Storm Water System**

All storm water runoff within the study area is conveyed by overland drainage. The system relies on surface drainage along swales, ditches, and culverts. The current drainage path and catchment areas are outlined in Figure 1 (Attached).

The study area has been divided into ten catchment areas, the majority draining to low areas with no apparent outlets. Catchment A is the area north of Kipp Road and encompasses the majority of the study area. Drainage for this area flows along road ditches and through fields to a low wetland area east of the Canadian Pacific Railway (CPR) marshalling yard. This is a trap low area with no natural outlet in a 1:100 year event. There is also a small portion of the catchment (A3) located on the south side of Kipp Road, which drains across the road through a culvert to the north.

Catchment B is a small area south of Kipp Road and west of the Precon Manufacturing (Precon) site. Drainage flows to a low area at the west side of the catchment and outlets onto the CPR marshalling yard.

Catchment C is a large area in the southwest corner of the study area, located south of Kipp Road and west of 2nd Street. The catchment includes the Precon site and Miners Memorial Park. The area drains to a low area west of the park. This is a trap low area with no defined outlet.

Catchment D is a large area in the east portion of the study area. Drainage for this area flows to a low area in the southeast portion of the catchment. This is also trap low area with no defined outlet.

Catchment E is a small catchment located on the east side of the Lethbridge Northern Irrigation District (LNID) canal. Drainage for this area flows to the open field at the east. No development is planned for this catchment.

Catchment OS1 is a large area north of Kipp Road and encompasses the CPR marshalling yard. This area flows east across RGE RD 225 through a 600 mm culvert with a sluice gate on the west side. On-site CPR personnel were not aware of the operation of the sluice gate or the layout and operation of the drainage system in the CPR marshalling yard. There is an unknown volume of storm water runoff storage located on the west side of the RGE RD 225. This storm water runoff ultimately flows into the trap low of Catchment A.

There is an elevated berm running along the west side of Catchment OS1, which appears to prevent any runoff from Highway 3 from entering the CPR marshalling yard. Field observations revealed a culvert in the Highway 3 ROW west of the CPR marshalling yard that appears to direct flow from the east ditch of the westbound lane across the highway to the eastbound lane ditch. Lidar information supports this conclusion. Access to the CPR site for further drainage investigation was denied. Further field investigations and discussions with CPR is recommended to determine the full extents and characteristics of the catchment and

the impacts to the ASP.

**Storm Water Analysis**

Storm water management is an integral part of land development. The general principle for storm water management is that runoff from a developed area cannot exceed the runoff that occurred prior to development. The benchmark is the runoff from a storm that has a 20% probability of occurring each year (1:5 year storm). The post development 1:5 year runoff rate cannot exceed the pre-development 1:5 year runoff rate. Any runoff in excess of this must be stored for later release at a controlled rate. Storage is typically required for runoff from all storms up to the 1:100 year design storm.

The City of Lethbridge design storms were adopted for the present analysis. The following formula defines the intensity-duration-frequency (IDF) curves for various storms, with the coefficients varying according to the return period (frequency), the storm intensity, and the storm duration. Rainfall intensity is calculated as:

$$i = \frac{a}{(t+b)^c}$$

Where:

***i*** is the rainfall intensity (mm/hour).
***t*** is time (minutes).
***a, b*** and ***c*** are the constants for the respective design storm return period.

The design storms used in this analysis are the 4-hour 1:5 year storm and the 24-hour 1:100 year storm. The coefficients for the City of Lethbridge design storms, which were used in this study, are presented in Table 1.

**Table 1 – IDF Equation Coefficients**

| Return Period | *a* | *b* | *c* |
|---|---|---|---|
| 1 in 5 Year | 440.69 | 0 | 0.696 |
| 1 in 100 Year | 1019.20 | 0 | 0.731 |

The 4-hour, 1:5 year design storm for the City of Lethbridge produces approximately 39 mm of precipitation. The 24 hour, 1:100 year design storm produces approximately 120 mm of precipitation.

A storm water analysis of the study area was undertaken using the hydrologic modeling program PCSWMM. The model was used to aid in determination of runoff volumes, peak flow rates, and to size Storm Water Management Facilities (SWMF) for storage of runoff.

**Proposed Drainage Work**

Most of the storm water runoff in the study area drains to a series of trap low areas with no defined outlets. Outlets will need to be created or defined in order to release any of the storm water runoff. This can be accomplished utilizing gravity storm mains where topography allows and via a storm water pump station where the topography does not allow. As there are currently no defined outlets for the existing trap lows, all proposed SWMF in this report are sized for a post event discharge with a zero release runoff rate during events.

In order to achieve a zero release runoff rate at all outlets, SWMFs will need to be created for the post-development scenarios for Options 1 and 2 as shown in the attached Figures 2 and 3 respectively. The SWMFs range in size depending on the total runoff volume of the contributing catchments. Proposed locations of SWMFs are approximate and are based upon existing topography constraints determined by Lidar. Actual locations are to be determined and finalized in the design of the development.

SWMF F would collect approximately 131,000 $m^3$ of storm water runoff from Catchments F1, F2, F3, and F4. SWMF F is located in a large trap low with no outlet. There is an existing wetland in this location. The wetland should be expanded in an easterly direction to create sufficient storm water runoff storage and protect the adjacent lots. An analysis of the Lidar data of the surrounding area reveals that the natural topography of the area is not conducive to the construction of a gravity storm main. The storm water runoff will need to be pumped to a location where it can flow by gravity. A large diameter forcemain and high flow pumps would be required to pump the storm water runoff out of the SWMF in a reasonable amount of time (3-5 days) following a major event. Potential discharge options include the LNID canal to the east; a ditch west of Highway 3; and the Town of Coalhurst (Town) storm water collection system. All these potential discharge options will require Alberta Environment and Parks approvals. Further investigations of the CPR marshalling yard drainage is required in the design of SWMF F.

SWMF G would collect 5,100 $m^3$ of storm water runoff from Catchment G. A visual site inspection was conducted to determine where the runoff would flow after being released from the SWMF. Storm water

runoff flows overland to the low area at the northwest corner of the catchment where it would build up and eventually spill onto the CPR property. The increase in runoff volume and operation of the SWMF should be discussed with the impacted downstream users and a Water Act approval may be necessary for the development. If the downstream user is not willing to accept the increased runoff volumes, an alternative outlet will need to be defined.

SWMF H will be privately owned and operated by Precon. Precon is in the process of constructing SWMF H 4,300 $m^3$ SWMF with a release rate of 0.39 $m^3/s$. SWMF H will ultimately drain to SWMF I. Initial discussions between the Town and Precon indicate that the valve at the outlet of the SWMF H will be closed during normal operations. In the event that the valve needs to be opened, Precon would contact the Town to determine if there is capacity downstream and whether the valve can be opened. SWMF H needs 7,800 $m^3$ more storage to be sufficiently sized for a zero release runoff rate.

SWMF I would collect 16,750 $m^3$ of storm water runoff from Catchment I (7,800 $m^3$ more storage is required if SWMF H is not operated with a zero release runoff rate). SWMF I also does not have a defined outlet. A visual site inspection was conducted to determine where the runoff would flow after being released from the SWMF. No culverts were found that cross the CPR tracks to the south and west of the low area. In a major storm event, the storm water must build up and eventually spill east across 2nd street.

SWMF J would collect 26,100 $m^3$ of storm water runoff from Catchment J1 on the west side of 2nd Street and Catchment J2 on the east side of 2nd Street. The existing topography of the area does not allow storm water runoff to be routed overland to Catchment K without fills in excess of 1.0 m.

SMWF K would collect 9,700 $m^3$ of storm water runoff from Catchment K. Catchment K does not have a defined outlet. Storm water runoff flows overland to a low area in the southeast portion of the catchment. In a major storm event, the water must build up and eventually spill to the LNID canal and across 55th Avenue.

There is no further development planned for catchment L and as a result, no SWMF is required.

A preliminary cursory review of elevations and topography reveals that it is feasible to construct a storm main from all of the SWMFs located on the south of Kipp Highway (G, H, I, J, and K) to a future SWMF planned for the west side of the Coalhurst High School. A schematic rendering of the potential layout of the storm mains is shown on Figures 2 and 3. The developer should consult with the Town during preliminary

and detailed design of the developments to confirm connection feasibility, if the Town will accept the runoff, and any connection requirements the Town may have. If the Town will not accept the runoff, alternative outlets would be required.

Consideration of the potential drainage impacts caused by the development of this section should be assessed prior to the development. This would include a detailed storm water management plan which would analyse the storm water catchments upstream and downstream (outside the ASP boundary) of the development and would likely require agreements to satisfy regulatory requirements of Alberta Environment and Parks.

If you have any questions, comments or require further clarification of our submission, please contact the undersigned at 403-329-3442.

Yours truly,

**MPE ENGINEERING LTD.**

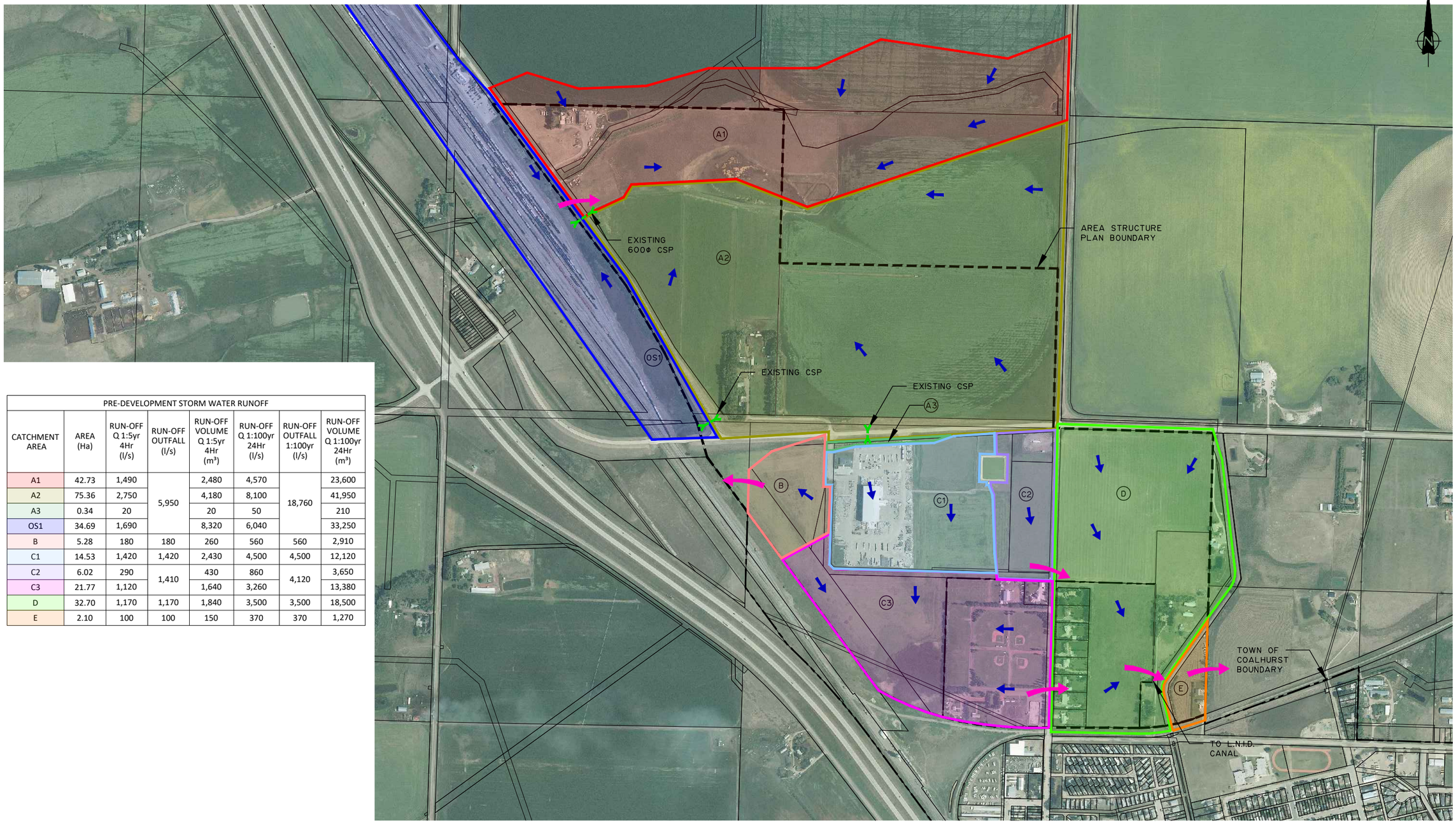


Blake Smith, C.E.T.
Design Technologist

:bs

Enclosure

| PRE-DEVELOPMENT STORM WATER RUNOFF | | | | | | | |
|---|---|---|---|---|---|---|---|
| CATCHMENT AREA | AREA (Ha) | RUN-OFF Q 1:5yr 4Hr (l/s) | RUN-OFF OUTFALL (l/s) | RUN-OFF VOLUME Q 1:5yr 4Hr ($m^3$) | RUN-OFF Q 1:100yr 24Hr (l/s) | RUN-OFF OUTFALL 1:100yr (l/s) | RUN-OFF VOLUME Q 1:100yr 24Hr ($m^3$) |
| A1 | 42.73 | 1,490 | 5,950 | 2,480 | 4,570 | 18,760 | 23,600 |
| A2 | 75.36 | 2,750 | | 4,180 | 8,100 | | 41,950 |
| A3 | 0.34 | 20 | | 20 | 50 | | 210 |
| OS1 | 34.69 | 1,690 | | 8,320 | 6,040 | | 33,250 |
| B | 5.28 | 180 | 180 | 260 | 560 | 560 | 2,910 |
| C1 | 14.53 | 1,420 | 1,420 | 2,430 | 4,500 | 4,500 | 12,120 |
| C2 | 6.02 | 290 | 1,410 | 430 | 860 | 4,120 | 3,650 |
| C3 | 21.77 | 1,120 | | 1,640 | 3,260 | | 13,380 |
| D | 32.70 | 1,170 | 1,170 | 1,840 | 3,500 | 3,500 | 18,500 |
| E | 2.10 | 100 | 100 | 150 | 370 | 370 | 1,270 |




LEGEND

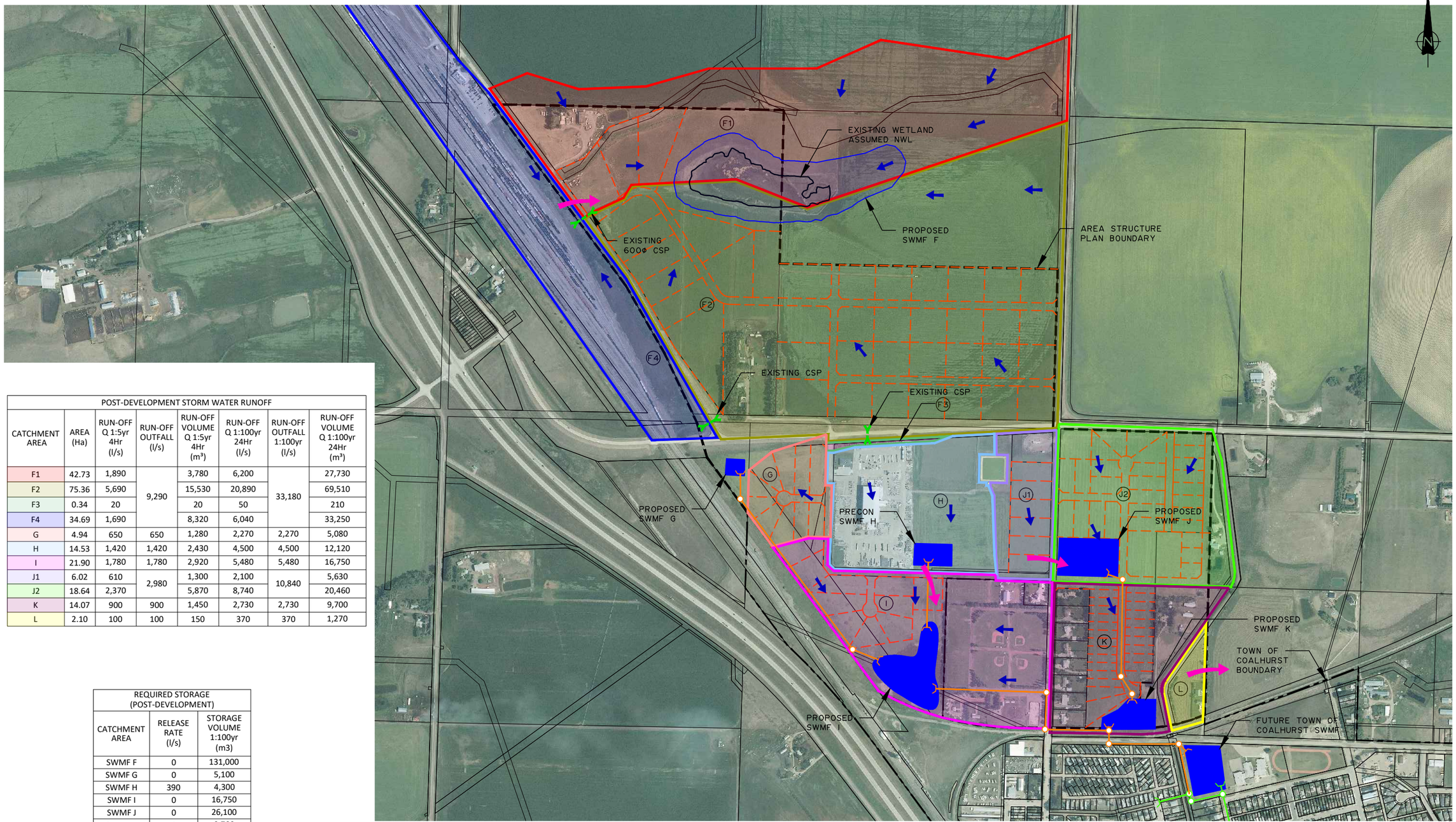
- CATCHMENT AREA BOUNDARY
- EXISTING CULVERT
- DRAINAGE FLOW ARROWS
- OUTLET FLOW ARROWS
- (A) CATCHMENT AREA LABEL

MPE Engineering Ltd.

OLDMAN RIVER REGIONAL SERVICES COMMISSION

NORTH COALHURST-KIPP JOINT AREA STRUCTURE PLAN STORM WATER ANALYSIS
EXISTING DRAINAGE (PRE-DEVELOPMENT)

| SCALE: 1:10 000 | DATE: SEPTEMBER 2018 | JOB: 0191-003-00 | FIGURE: 1 |
|---|---|---|---|




| POST-DEVELOPMENT STORM WATER RUNOFF | | | | | | | |
|---|---|---|---|---|---|---|---|
| CATCHMENT AREA | AREA (Ha) | RUN-OFF Q 1:5yr 4Hr (l/s) | RUN-OFF OUTFALL (l/s) | RUN-OFF VOLUME Q 1:5yr 4Hr ($m^3$) | RUN-OFF Q 1:100yr 24Hr (l/s) | RUN-OFF OUTFALL 1:100yr (l/s) | RUN-OFF VOLUME Q 1:100yr 24Hr ($m^3$) |
| F1 | 42.73 | 1,890 | 9,290 | 3,780 | 6,200 | 33,180 | 27,730 |
| F2 | 75.36 | 5,690 | | 15,530 | 20,890 | | 69,510 |
| F3 | 0.34 | 20 | | 20 | 50 | | 210 |
| F4 | 34.69 | 1,690 | | 8,320 | 6,040 | | 33,250 |
| G | 4.94 | 650 | 650 | 1,280 | 2,270 | 2,270 | 5,080 |
| H | 14.53 | 1,420 | 1,420 | 2,430 | 4,500 | 4,500 | 12,120 |
| I | 21.90 | 1,780 | 1,780 | 2,920 | 5,480 | 5,480 | 16,750 |
| J1 | 6.02 | 610 | 2,980 | 1,300 | 2,100 | 10,840 | 5,630 |
| J2 | 18.64 | 2,370 | | 5,870 | 8,740 | | 20,460 |
| K | 14.07 | 900 | 900 | 1,450 | 2,730 | 2,730 | 9,700 |
| L | 2.10 | 100 | 100 | 150 | 370 | 370 | 1,270 |

| REQUIRED STORAGE (POST-DEVELOPMENT) | | |
|---|---|---|
| CATCHMENT AREA | RELEASE RATE (l/s) | STORAGE VOLUME 1:100yr (m3) |
| SWMF F | 0 | 131,000 |
| SWMF G | 0 | 5,100 |
| SWMF H | 390 | 4,300 |
| SWMF I | 0 | 16,750 |
| SWMF J | 0 | 26,100 |
| SWMF K | 0 | 9,700 |

LEGEND

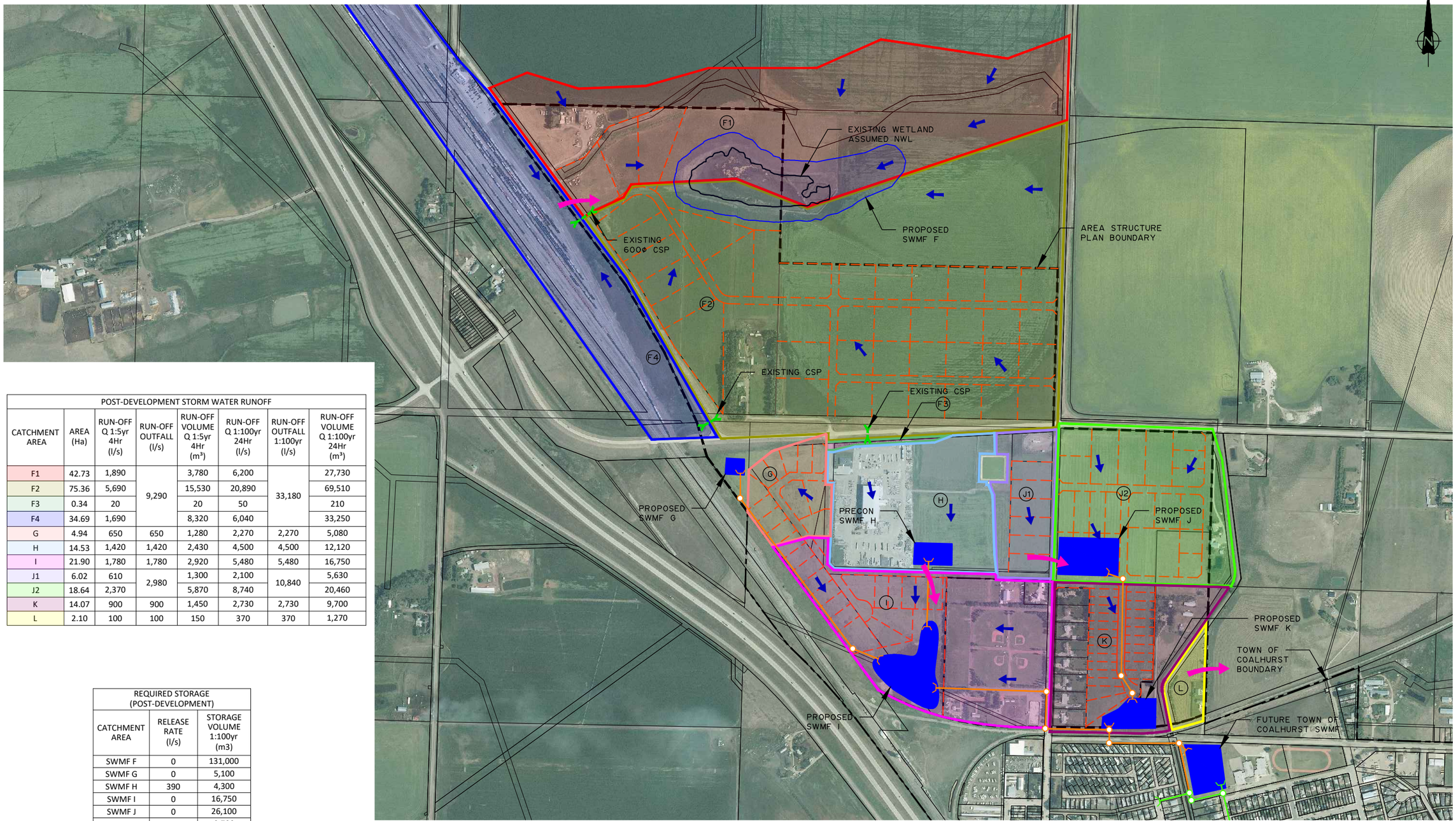
- CATCHMENT AREA BOUNDARY
- EXISTING CULVERT
- DRAINAGE FLOW ARROWS
- OUTLET FLOW ARROWS
- (A) CATCHMENT AREA LABEL
- PROPOSED STORM MAIN
- FUTURE STORM MAIN

MPE Engineering Ltd.

OLDMAN RIVER REGIONAL SERVICES COMMISSION

NORTH COALHURST-KIPP JOINT AREA STRUCTURE PLAN STORM WATER ANALYSIS
PROPOSED DRAINAGE (POST-DEVELOPMENT)
OPTION 1

SCALE: 1:10 000 | DATE: SEPTEMBER 2018 | JOB: 0191-003-00 | FIGURE: 2




| POST-DEVELOPMENT STORM WATER RUNOFF | | | | | | | |
|---|---|---|---|---|---|---|---|
| CATCHMENT AREA | AREA (Ha) | RUN-OFF Q 1:5yr 4Hr (l/s) | RUN-OFF OUTFALL (l/s) | RUN-OFF VOLUME Q 1:5yr 4Hr ($m^3$) | RUN-OFF Q 1:100yr 24Hr (l/s) | RUN-OFF OUTFALL 1:100yr (l/s) | RUN-OFF VOLUME Q 1:100yr 24Hr ($m^3$) |
| F1 | 42.73 | 1,890 | 9,290 | 3,780 | 6,200 | 33,180 | 27,730 |
| F2 | 75.36 | 5,690 | | 15,530 | 20,890 | | 69,510 |
| F3 | 0.34 | 20 | | 20 | 50 | | 210 |
| F4 | 34.69 | 1,690 | | 8,320 | 6,040 | | 33,250 |
| G | 4.94 | 650 | 650 | 1,280 | 2,270 | 2,270 | 5,080 |
| H | 14.53 | 1,420 | 1,420 | 2,430 | 4,500 | 4,500 | 12,120 |
| I | 21.90 | 1,780 | 1,780 | 2,920 | 5,480 | 5,480 | 16,750 |
| J1 | 6.02 | 610 | 2,980 | 1,300 | 2,100 | 10,840 | 5,630 |
| J2 | 18.64 | 2,370 | | 5,870 | 8,740 | | 20,460 |
| K | 14.07 | 900 | 900 | 1,450 | 2,730 | 2,730 | 9,700 |
| L | 2.10 | 100 | 100 | 150 | 370 | 370 | 1,270 |

| REQUIRED STORAGE (POST-DEVELOPMENT) | | |
|---|---|---|
| CATCHMENT AREA | RELEASE RATE (l/s) | STORAGE VOLUME 1:100yr (m3) |
| SWMF F | 0 | 131,000 |
| SWMF G | 0 | 5,100 |
| SWMF H | 390 | 4,300 |
| SWMF I | 0 | 16,750 |
| SWMF J | 0 | 26,100 |
| SWMF K | 0 | 9,700 |

LEGEND

- CATCHMENT AREA BOUNDARY
- EXISTING CULVERT
- DRAINAGE FLOW ARROWS
- OUTLET FLOW ARROWS
- (A) CATCHMENT AREA LABEL
- PROPOSED STORM MAIN
- FUTURE STORM MAIN

MPE Engineering Ltd.

OLDMAN RIVER REGIONAL SERVICES COMMISSION

NORTH COALHURST-KIPP JOINT AREA STRUCTURE PLAN STORM WATER ANALYSIS
PROPOSED DRAINAGE (POST-DEVELOPMENT)
OPTION 2

SCALE: 1:10 000 | DATE: SEPTEMBER 2018 | JOB: 0191-003-00 | FIGURE: 3

# Schedule B

*Draft Report for:*

# NORTH COALHURST – KIPP JOINT AREA STRUCTURE PLAN TRAFFIC IMPACT ASSESSMENT


**Prepared By:**
Jorge Arango
Transportation Engineer

**Revised and Approved By:**
Eric Dyson
Transportation Manager

MPE Engineering Ltd.
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Lethbridge, AB
P: (403) 317-3603
Email: edyson@mpe.ca


**Date: December 6, 2018**
**Project #: 0191-004-00**

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Oldman River Regional Services Commission
3105 16th Avenue North
Lethbridge, AB T1H 5E8

December 6, 2018
File: N:\0191-004-00\R01-1.0

**Attention:** Diane Horvath, Senior Planner

Dear Ms. Horvath:

**Re: North Coalhurst – Kipp Joint Area Structure Plan Traffic Impact Assessment**
**Draft Report**

We are pleased to submit a draft of the Traffic Impact Assessment in support of the proposed Area Structure Plans for an industrial and residential mixed-land-use development of the lands located on the North boundary of Coalhurst, within Lethbridge County, in Alberta.

All traffic projections, analysis, and recommendations included herein were prepared by MPE Engineering Ltd. in accordance to Alberta Transportation, Lethbridge County and the Town of Coalhurst guidelines.

We appreciate the opportunity to provide our services for this project. Should you have any questions or require additional information, please contact the undersigned at (403) 317-3603.

Yours truly,

**MPE ENGINEERING LTD.**

Eric Dyson, P.L.(Eng.)
Transportation Manager

:ed

Enclosure

cc: John Thomas, Alberta Transportation; Rick Bacon Lethbridge County; R. Kim Hauta, Town of Coalhurst

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# 1 INTRODUCTION

MPE Engineering Ltd. (MPE) was retained by the Oldman River Regional Services Commission (ORRSC) to prepare a Traffic Impact Assessment (TIA) in support of the proposed Area Structure Plans (ASP) of approximately 161.26 ha (398.49 ac) for a light industrial and residential mixed land use development. All traffic projections, analysis, and recommendations included herein were prepared by MPE in accordance to Alberta Transportation (AT), Lethbridge County and the Town of Coalhurst requirements and guidelines.

## 1.1 BACKGROUND

This TIA was conducted to support the planning and eventual development of the selected option from the two (2) ASPs. The study area for this TIA is bounded to the west by Highway 3, to the east by Highway 25, to the north by Township Road 100, and to the south by 55 Avenue. Intersections for analysis in this TIA are:

- Highway 3 & Kipp Road
- Highway 25 & Kipp Road

This preliminary assessment does not include the analysis of ASP's internal and adjacent roadways, nor the Town's existing internal local roadway network. This report outlines intersection upgrades required to maintain or improve the level of service considering anticipated volumes and movement patterns generated from the development options described in **Table 1.1**.

**Table 1.1: Development New Land Uses and Intensities**

| Option | Residential | Rural Light Industrial | Light Industrial |
|---|---|---|---|
| **Option 1** | 20.03 ac (8.11 ha) | 115.70 ac (46.82 ha) | 53.85 ac (21.79 ha) |
| **Option 2** | 13.07 ac (5.29 ha) | 115.68 ac (46.81 ha) | 61.41 ac (24.85 ha) |

Site plans provided by ORRSC are included in **Appendix A – Location and Site Plans.**

## 1.2 STUDY HORIZONS

To satisfy the AT requirements for TIA, traffic estimates and system analysis reflected a 20-year horizon where development phasing was assumed based on discussions with *ORRSC*. For the purpose of this report, it was assumed that by the year 2029, half (50%) of the facilities proposed in both Options 1 and 2 to be complete and occupied; a full-buildout is anticipated within the 20-year horizon (*2039*).

## 1.3 SCOPE OF WORK

The scope of work for this study was confirmed through correspondence with AT and ORRSC in the fall of 2018. In brief, the scope of this study is to:

- Assess existing conditions through undertaking a review of existing technical information available from AT, Lethbridge County and the Town of Coalhurst.
- Forecast traffic growth for key roads within the study area.
- Provide estimates of trip generation associated with the proposed development and assign the site traffic to the road network.
- Evaluate traffic operations at each study area intersection under background and post-development traffic conditions.
- Undertake turn lane, signalization and illumination warrant reviews.
- Document anticipated road network improvements required to accommodate future projections.

## 1.4 OTHER DEVELOPMENTS AND STUDIES IN THE AREA

The approving authorities did not identify any other developments that can significantly impact future anticipated background traffic volumes in the study area. Consideration in the impact assessment of this analysis does not consider the CANAMEX Corridor expansion plans or the variation of traffic movement from the Southeast Corridor, rather the direct implications to the proposed northwest industrial development to the major intersections within the study area.

# 2 EXISTING TRANSPORTATION NETWORK

Characteristics of the existing transportation network were observed and measured during a site visit conducted in the summer of 2018. The following roads are considered part of the study area and are described briefly below:

- **Highway 3:8 (Hwy 3)** is a four-lane divided highway under the jurisdiction of AT. Hwy 3 has a Level 1 service classification and a functional roadway classification of Expressway Highway. In the area, Hwy 3 is primarily oriented north-south and has a posted speed limit of 110 km/h. The northbound typical two lane cross section of Hwy 3 is 12.0 m wide and includes approximately 3.75 m wide travel lanes and 2.3 m wide shoulders with rumble strips, while the southbound is 10.95 m wide and includes approximately 3.75 m wide travel lanes and 1.7 m wide shoulders with rumble strips. The geometry of the intersection of Hwy 3 & Hwy 509 (Township Road 94/Kipp Road) is classified as a Type 10C[1] intersection (two-way-stop controlled intersection with stop signs on the east/west approaches).

- **Highway 25:2 (Hwy 25)** is a two-lane undivided highway under the jurisdiction of AT. Hwy 25 has a Level 3 service classification and is consider a main roadway with a functional roadway classification of Arterial. In the area, Hwy 25 is primarily oriented north-south and has a posted speed limit of 100 km/h. The typical two lane cross section of Hwy 25 is approximately 10.0 m wide and includes 3.75 m wide travel lanes and 1.3 m wide shoulders. The geometry of the intersection of Hwy 25 & Township Road 94 (Kipp Road) most resembles that of AT's standard Type IVb intersection treatment (two-way-stop controlled intersection with stop signs on the east/west approaches.

- **Township Road 94 (Kipp Road)** is also known as Kipp Cut Off Road, 205 Urban Access Road, Mountain Avenue and ***Hwy 509*** *(at the intersection with Hwy 3)*. It is a rural two-lane undivided road with a Collector functional roadway classification. It is oriented east-west with a posted speed limit of 80 km/h west of Hwy 25 and 60 km/h east of Hwy 25. The roadway is paved. The typical cross section is approximately 9.0 m wide with 3.70 m wide travel lanes and 0.8 m wide shoulders.

The existing lane configuration and traffic controls for each study area intersection are illustrated in **Appendix B – Traffic Diagrams**.

Photographs of the site are provided in **Appendix C – Site Photographs**.

[1] Alberta Transportation TIMS Network Expansion Support System (NESS); TIMS Geometric Report.

# 3 TRAFFIC VOLUMES

## 3.1 GROWTH PROJECTIONS

Historical traffic growth rates on Hwy 3 and Hwy 25 were obtained from AT's Transportation Infrastructure Management System (TIMS) and are listed in Table 3.1. Non-compounded annual growth rates of 1.7 percent were selected for Hwy 3, and 1.5% for Hwy 25 & Kipp Road to forecast background traffic growth. Traffic growth reports are provided in **Appendix D – Traffic Data**.

**Table 3.1: Growth Rate**

| Roadway | Growth Rate | | |
|---|---|---|---|
| | Historical 20-Year Linear Regression | Historical 10-Year | Selected for Traffic Projections |
| **Hwy 3** | 1.64% | 1.40% | ***1.7%*** |
| **Hwy 25** | 1.35% | 2.16% | ***1.5%*** |
| **Kipp Road** | N/A | N/A | ***1.5%*** |

## 3.2 BACKGROUND TRAFFIC

The volume of traffic on the road network adjacent to the site will change over time, whether or not the proposed development is built. Establishing background traffic volumes provides a baseline for comparison with post-development conditions. Background traffic volumes associated with the *2029* and *2039* study horizons were developed and are shown in **Appendix B – Traffic Diagrams**.

## 3.3 SITE TRAFFIC

Estimating traffic volumes from new development is done with the design aid published by the Institute of Transportation Engineers *Trip Generation Manual*[2] (TGM). This continually updated publication is used to anticipate traffic volume based on years of data, statistical analysis and traffic monitoring. The land use intensity for both development options are listed below in **Table 3.2.**

**Table 3.2: Summary of Land Use Intensity – By Development Option**

| Option | Development Name | Representative ITE Land Use | Intensity |
|---|---|---|---|
| **Option 1** | Light Industrial | General Light Industrial (LU #110) | 169.55 Acres |
| | Residential | Single Family Dwelling Housing (LU #210) | 243 Persons |
| **Option 2** | Light Industrial | General Light Industrial (LU #110) | 177.09 Acres |
| | Residential | Single Family Dwelling Housing (LU #210) | 159 Persons |

[2] Institute of Transportation Engineers. (2012). *Trip Generation Manual*, 9th edition. Washington, D.C.

### *3.3.1 Trip Generation*

Trip generation for industrial and commercial land is determined by area and intensity, whereas for residential developments, the amount of trips generated is based on population projections. Trip generation rates, and resultant estimates are provided below in **Tables 3.3** and **3.4**.

**Table 3.3: Site Trip Generation Rate**

| Option | Land Use | Independent Variable, X | Time Period | Trip Rate | Split | |
|---|---|---|---|---|---|---|
| | | | | | In | Out |
| Option 1 | General Light Industrial (LU 110) [2] | Acres | AM Peak | 7.51 (X) | 83% | 17% |
| | | | PM Peak | 7.26 (X) | 22% | 78% |
| | | | Weekday | 42.22 (X) + 263.11 | 50% | 50% |
| | Residential – Single Family Detached Housing (LU 210) [1] | Persons | AM Peak | 0.21 (X) | 31% | 69% |
| | | | PM Peak | 0.28 (X) | 66% | 34% |
| | | | Weekday | 2.55 (X) | 50% | 50% |
| Option 2 | General Light Industrial (LU 110) [2] | Acres | AM Peak | 7.51 (X) | 83% | 17% |
| | | | PM Peak | 7.26 (X) | 22% | 78% |
| | | | Weekday | 42.22 (X) + 263.11 | 50% | 50% |
| | Residential – Single Family Detached Housing (LU 210) [1] | Persons | AM Peak | 0.21 (X) | 31% | 69% |
| | | | PM Peak | 0.28 (X) | 66% | 34% |
| | | | Weekday | 2.55 (X) | 50% | 50% |
| **1** | *Number of persons is estimated based on the City of Lethbridge standard of 30 people per hectare.* | | | | | |
| **2** | *The independent variable average is around 30 acres for the ITE trip land use data sample. The proposed development size is considerably bigger than the independent variable average, typically resulting in less precise generation estimates.* | | | | | |

**Table 3.4: Site Trip Generation Estimates**

| Land Use | Land Use Intensity | AM Peak Trips | | | PM Peak Trips | | | Weekday Trips | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | In | Out | Total | In | Out | Total | In | Out | Total |
| **General Light Industrial (LU 110) [2]** | 169.55 ac | 1057 | 216 | **1273** | 271 | 960 | **1231** | 3711 | 3711 | **7422** |
| **Residential – Single Family Detached Housing (LU 210) [1]** | 243 persons | 16 | 35 | **51** | 45 | 23 | **68** | 310 | 310 | **620** |
| ***OPTION 1 - Total Development:*** | | ***1073*** | ***251*** | ***1324*** | ***316*** | ***983*** | ***1299*** | ***4021*** | ***4021*** | ***8042*** |
| **General Light Industrial (LU 110) [2]** | 177.09 ac | 1104 | 226 | **1330** | 283 | 1003 | **1286** | 3870 | 3870 | **7740** |
| **Residential – Single Family Detached Housing (LU 210) [1]** | 159 persons | 10 | 23 | **33** | 30 | 15 | **45** | 203 | 202 | **405** |
| ***OPTION 2 - Total Development:*** | | ***1114*** | ***249*** | ***1363*** | ***313*** | ***1018*** | ***1331*** | ***4073*** | ***4072*** | ***8145*** |
| **Trip Generation Difference between Options:** | | **41** | **2** | 39 | **3** | **80** | 32 | **52** | **51** | 103 |

Option 2 light industrial site traffic volumes are estimated to be slightly higher than those of Option 1 (around 4%) as result of a higher light industrial development.

### 3.3.2 Trip Distribution and Assignment

Given the existing traffic patterns, municipal land use plan, type of development, road network, and main population centres, trip distribution patterns are assumed as follows:

**Industrial Development:**

- Approximately 16% of the new trips are expected to/from the north
  - (10% along **Hwy 3** and 6% along **Hwy 25**).
- Approximately 54% of the new trips are expected to/from the south
  - (45% along **Hwy 3** and 9% along **Hwy 25**).
- Approximately 30% of the new trips are expected to use the internal roadway network.

The proposed industrial development is expected to generate a bulk figure around 7,500 trips per day. In addition, it is reasonable to expect that some of the proposed industrial development trips will have the origin/destination of future residential areas. Accounting for the Town's growth, it is assumed that 30% of the new industrial trips (+/- 2250) have origin/destination on the new or existing residential areas of the town, and will use the town internal road network.

**Residential Development:**

- Approximately 6% of the new trips are expected to/from the north
  - (Along **Hwy 3** at **51 Avenue**).
- Approximately 43% of the new trips are expected to/from the south
  - (Along **Hwy** 3 at **51 Avenue**.)
- Approximately 1% of the new trips are expected to/from the west along **51 Avenue**.
- Approximately 50% of the new trips are expected to use the internal roadway network

The proposed residential development will generate a bulk figure around 500 trips per day. It was assumed that 50% of these trips will be external (with origin/destination outside the town), and will use **51 Avenue** to exit/enter the town. Regardless of the assumption, whether 100% or 50% of the residential trips are internal, these trips are expected to stay within the town's internal road network therefore, none of the new residential trips are assigned to either of the study intersections. Future studies, at a more detailed stage, should analyze the potential impact on the town internal road network and major intersections following the opening of the Southeast Corridor. Based on these assumptions, trip distribution patterns were established and site trips were assigned to the existing road network, as illustrated in **Appendix B – Traffic Diagrams**.

## 3.4 POST-DEVELOPMENT TRAFFIC

Post-development traffic volumes are a combination of site and background traffic, and are representative of conditions with the proposed ASP development. Post-development traffic volumes associated with the *2019* and *2039* study horizons are shown in **Appendix B – Traffic Diagrams**.

# 4 TRAFFIC ANALYSIS

## 4.1 ANALYSIS COMPONENTS AND HORIZONS

The following sections present the analysis of intersection capacity as well as turn-lane, signalization and illumination warrants, shown below in **Table 4.1**.

**Table 4.1: Traffic Analysis Scenarios**

| Analysis Period | Traffic Conditions | Description |
|---|---|---|
| **2019** [1] | Background | 2019 Background Traffic (No Development Traffic and Historical Growth Rate) |
| **2029** | Background | 2029 Background Traffic (No Development Traffic and Historical Growth Rate) |
| | Post Development | 2029 Background Traffic and 50% of Proposed Development Traffic |
| **2039** | Background | 2039 Background Traffic (No Development Traffic and Historical Growth Rate) |
| | Post Development | 2039 Background Traffic and Proposed Development Traffic (Full Development) |
| **1. Only intersection capacity analysis was done for the 2019 Background traffic conditions.** | | |

## 4.2 INTERSECTION CAPACITY ANALYSIS

### *4.2.1 Definitions and Procedures*

Intersection capacity analysis was undertaken using the Trafficware Synchro/SimTraffic 10 software package. Each of the above-noted software tools employ methods set forth in the *Highway Capacity Manual (HCM)*[3]. The performance of an intersection is commonly reported in terms of Level of Service (LOS), which is a measure of how well a traffic movement is facilitated and is based on the average vehicle control delay. Qualitatively, the spectrum of LOS conditions can be described as follows:

- **Unsignalized Intersections:** a LOS of 'A' represents ideal conditions with minimal delays to minor street traffic, while a LOS of 'F' represents a scenario where insufficient gaps are available to minor street motorists to complete their movements without experiencing significant delays.
- **Signalized Intersections:** a LOS of 'A' represents conditions with no congestion where all vehicles clear the intersection in a single signal cycle, while a LOS of 'F' represents severe congestion, or breakdown of traffic flow requiring vehicles to wait through multiple signal cycles to clear the intersection.
- **Roundabout Intersections:** a LOS of 'A' represents minimal delays to motorists, while a LOS of 'F' represents a scenario with an insufficient number of gaps on the circulating flow for motorists to enter the roundabout without significant delays.

[3] Transportation Research Board, National Research Council. (2010). *Highway Capacity Manual 2010*. Washington, D.C.

In general, a LOS of 'D' is representative of "normal" peak hour congestion, while a LOS of 'E' is representative of an intersection nearing its capacity. For rural areas, a LOS of 'C' is generally considered as an acceptable standard for operations, and a LOS of 'D' may be accepted where limited to certain low-volume movements. LOS criteria for various intersection types are shown in **Table 4.2**.

**Table 4.2: LOS Criteria for Various Intersection Types**

| Level of Service (LOS) | Average Control Delay per Vehicle | |
|---|---|---|
| | Unsignalized/Roundabout Intersection | Signalized Intersection |
| **A** | ≤ 10 seconds | ≤ 10 seconds |
| **B** | 10 to 15 seconds | 10 to 20 seconds |
| **C** | 15 to 25 seconds | 20 to 35 seconds |
| **D** | 25 to 35 seconds | 35 to 55 seconds |
| **E** | 35 to 50 seconds | 55 to 80 seconds |
| **F** | > 50 seconds | > 80 seconds |

Another performance measure calculated by HCM methods is the volume to capacity (V/C) ratio. An intersection movement operating with a V/C ratio of 1.0 is operating at full capacity and does not have the ability to facilitate any additional vehicles. A V/C ratio of 0.85 or lower for all intersection movements is a generally accepted standard for peak hour operations. Any traffic movement with a V/C ratio of 1.0 or greater has a LOS of 'F' regardless of delay.

Study area intersections were modeled based on existing roadway geometry and operational characteristics in relation to background and post-development traffic estimates.

Detailed Synchro output is provided in **Appendix E– Capacity Analysis Output**.

### *4.2.2 Highway 3 & Highway 509*

The capacity analysis of the **Hwy 3/Hwy 509** intersection is summarized below in **Table 4.3**.

**Table 4.3: Highway 3 and Highway 509 Intersection Capacity Analysis**

| Intersection | Analysis Period | Traffic Conditions | Intersection | | | Worst Movement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | LOS | Delay (s/veh) | Max V/C | Movement | LOS | Delay (s) | 95% Queue[2] | 95% Queue/ Max Queue[3] (m) |
| **Hwy 3 & Hwy 509** *(Unignalized)* | 2019 AM | Background | - | 3.0 | 0.43 | WB-LT | F | **120.3** | 1.6 veh | 14.1/19.0 |
| | | | | | 0.11 | EB-L | F | **83.8** | 0.3 veh | 13.8/18.6 |
| | 2019 PM | Background | - | 3.9 | 0.58 | WB-LT | F | **135.5** | 2.3 veh | 21.4/26.4 |
| | | | | | 0.08 | EB-L | F | **74.6** | 0.2 veh | 26.3/42.4 |
| | 2029 AM | Background | | 5.5 | 0.84 | WB-LT | F | **298.2** | 2.8 veh | |
| | | Post-Development | | **58.2** | **>>1** | **WB-LT** | F | **>900** | **11 veh** | |
| | 2029 PM | Background | | 8 | 1.09 | WB-LT | F | **358.9** | 3.9 veh | |
| | | Post-Development | | **429** | **>>1** | **WB-LT** | F | **>900** | **35 veh** | |
| | 2039 AM | Background | - | 11.4 | 1.63 | WB-LT | F | **755.3** | 4.1 veh | 26.5/34.5 |
| | | PD – Option 1 | - | **463** | **>>1** | **WB-LT** | F | **>900** | **19 veh** | - |
| | | PD – Option 2 | - | **498** | **>>1** | **WB-LT** | F | **>900** | **19 veh** | - |
| | 2039 PM | Background | - | 18.3 | 2.12 | WB-LT | F | **921.8** | 5.6 veh | 55.1/68.4 |
| | | PD – Option 1 | - | **2268** | **>>1** | **WB-LT** | F | **>900** | **65 veh** | - |
| | | PD – Option 2 | - | **2588** | **>>1** | **WB-LT** | F | **>900** | **68 veh** | - |

***LOS** = Level of Service; **V/C** = Volume to Capacity Ratio*
***EB** = Eastbound; **WB** = Westbound; **NB** = Northbound; **SB** = Southbound; **L** = Left; **T** = Through; **R** = Right*

| | |
|---|---|
| *1* | *Results are shown in **bold and red** where the **LOS is "D" or lower, Max V/C ratio is ≥ 0.85**, or **95% Queue** is **higher than 10 veh**.* |
| *2* | **Queue lengths are reported in vehicles where the average stored vehicle length is assumed to be 8.0 m. Reported queues may be preceded by a character that provides additional detail: 'm' indicates that the queue length is metered by an upstream signal; '#' indicates that the volume for the 95th percentile cycle exceeds capacity after two simulated cycles; and "~" indicates that the approach volume exceeds capacity, and the queue length could be longer growing with each cycle.** |
| *3* | **Traffic simulation queue length, both 95th percentile queue (average of 5 runs) and maximum observed queue (in the five run), are reported in meters. Traffic simulation was done using SimTraffic software.** |

Under background conditions the intersection of Hwy 3 & Hwy 509 is experiences acceptable v/c ratios but LOS F at both minor approaches. The east leg cited control delays of 120 and 136 seconds during the AM Peak and PM Peak hours, respectively. This is not unusual on minor approaches with relatively small volumes at two-way stop-controlled intersections (in this case, 20 and 30 vehicles per hour in the WB-LT lane, during each peak hour).

It is also common in this scenario for there to be high collision rates from users who make an unsafe move, in haste, crossing lanes of oncoming traffic rather than wait for a larger gap or opening. The traffic simulation shows that the anticipated 95th percentile queue and maximum queue are relatively short (less than 26 meters) and easily accommodated within the east leg road segment.

The upstream T-intersection (Mountain Ave & Kipp Road) experiences relative short queues that will not block upstream vehicular traffic due to the available storage length in the background condition. Based on capacity alone, this intersection does not warrant immediate improvements. However, AT may consider implementing a monitoring strategy for the traffic control and geometry at this intersection in the short-term to maintain their own standards regarding LOS and v/c ratios.

Based on results from the Synchro model, the LOS and V/C ratio increase beyond acceptable service thresholds. Improvements to traffic control and intersection geometry should be implemented prior to 50% build-out.

At full build-out, traffic volume increases result in a complete failure of the intersection. Even under background conditions, this intersection will require geometric and operational upgrades to service the expected population growth.

Based on results from the Synchro model, unacceptable LOS and v/c ratios for all scenarios at the *2039* horizon are anticipated at the Hwy 3 & Hwy 509 intersection. Improvements are required at the minor approaches where LOS F and delays higher than 300 seconds are expected for the background (undeveloped) traffic scenario. At the westbound approach the v/c ratios are higher than 1 indicating the need of additional lanes; the eastbound approach is expected to fail even when v/c ratios are lower than 0.5 – indicating the need of revising the traffic controls

Traffic volumes for Option 1 and Option 2 are assumed as the same at the *2029* Horizon. Option 2 proposes a higher density of residential lots, but at 50% build-out the variance in expected traffic is negligible, the larger expected number of trips (Option 2) was used in the analysis.

### *4.2.3 Highway 25 & Kipp Road*

The capacity analysis of the Hwy 25 & Kipp Road intersection is summarized below in **Table 4.4**.

**Table 4.4: Highway 25 and Kipp Road - Intersection Capacity Analysis**

| Intersection | Analysis Period | Traffic Conditions | Intersection | | | Worst Movement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | LOS | Delay (s/veh) | Max V/C | Movement | LOS | Delay (s) | 95% Queue[2] | 95% Queue/ Max Queue[3] (m) |
| **Hwy 25 & Kipp Road** *(Unignalized)* | 2019 AM | Background | - | 3.4 | 0.13 | EB-LT | C | 15.2 | 0.5 veh | 17.5/20.0 |
| | | - | - | - | - | - | - | - | - | - |
| | 2019 PM | Background | - | 3.1 | 0.13 | WB-LTR | C | 15.9 | 0.1 veh | 13.6/19.6 |
| | | - | - | - | - | - | - | - | - | - |
| | 2029 AM | Background | - | 3.7 | 0.18 | EB-LT | C | 17.3 | 0.6 veh | |
| | | Post-Development | - | 4.6 | 0.24 | EB-LT | C | 21.4 | 0.9 veh | |
| | 2029 PM | Background | - | 3.3 | 0.15 | EB-LT | C | 15.9 | 0.3 veh | |
| | | Post-Development | - | 4.5 | 0.21 | EB-LT | C | 17.9 | 0.7 veh | |
| | 2039 AM | Background | - | 4.1 | 0.23 | EB-LT | C | 20.1 | 0.9 veh | 21.7/22.8 |
| | | PD – Option 1 | - | 6.4 | 0.41 | EB-LT | **D** | **34.0** | 1.9 veh | 28.6/37.9 |
| | | PD – Option 2 | - | 6.5 | 0.43 | EB-LT | **E** | **35.2** | 2.0 veh | 27.0/35.2 |
| | 2039 PM | Background | - | 3.5 | 0.18 | EB-LT | C | 17.7 | 0.4 veh | 20.3/23.9 |
| | | PD – Option 1 | - | 6.1 | 0.34 | EB-LT | C | 24.1 | 1.5 veh | 32.5/41.7 |
| | | PD – Option 2 | - | 6.2 | 0.35 | EB-LT | C | 24.4 | 1.5 veh | 29.5/36.2 |

***LOS** = Level of Service; **V/C** = Volume to Capacity Ratio*
***EB** = Eastbound; **WB** = Westbound; **NB** = Northbound; **SB** = Southbound; **L** = Left; **T** = Through; **R** = Right*

| | |
|---|---|
| ***1*** | *Results are shown in **bold and red** where the **LOS is "D" or lower, Max V/C ratio is ≥ 0.85**, or **95% Queue** is **higher than 10 veh**.* |
| **2** | **Queue lengths are reported in vehicles where the average stored vehicle length is assumed to be 8.0 m. Reported queues may be preceded by a character that provides additional detail: 'm' indicates that the queue length is metered by an upstream signal; '#' indicates that the volume for the 95th percentile cycle exceeds capacity after two simulated cycles; and "~" indicates that the approach volume exceeds capacity, and the queue length could be longer growing with each cycle.** |
| ***3*** | **Traffic simulation queue length, both 95th percentile queue (average of 5 runs) and maximum observed queue (in the five run), are reported in meters. Traffic simulation was done using SimTraffic software.** |

Under background traffic, the intersection of Hwy 25 & Kipp Rd is operates with an acceptable LOS and v/c ratio.

Based on results from the Synchro model, LOS and v/c ratios at half-buildout also do not warrant upgrades. The overall delay is anticipated to increase about 1.2 seconds under post-development conditions, a very small increase over 10 years. Movement at the Hwy 25 & Kipp Road intersection remains within acceptable levels at full-buildout, with an approximate increase in delays of 2.5 seconds.

Post-development level of service for a westbound approached decrease to D/E corresponding to a control delay of 34 and 35.2 seconds for Option 1 and Option 2, respectively – about 1 second increase on delay; while the eastbound shared left-turn/through lane is anticipated to experience LOS D at post-development conditions. Traffic volumes are very low on the westbound approach, therefore it is assumed that LOS D is acceptable at this approach. Findings from both Option 1 and Option 2 are similar with an increase of overall intersection delay of only 0.1 seconds per vehicle.

Geometry and traffic control upgrades at Hwy 25 & Kipp Rd are not anticipated based on the capacity analysis, and given that v/c ratios are below 0.50 on critical movements and expected queues are not too long.

## 4.3 TURN LANE WARRANT REVIEW - HIGHWAY 25 & KIPP ROAD

HCM methods quantify the level of service of an intersection based on free-flowing movement and delays. The AT *Highway Geometric Design Guide* specifies the boundary conditions to warrant isolated travel lanes for turning vehicles.

Detailed worksheets for the turn lane analysis are provided in **Appendix E –Turn Lane Warrant**.

### *4.3.1 Left Turn Warrant*

The left turn warrant considers the operational and safety impacts of left turning vehicles on the highway. Inputs in the left turn warrant include the opposing volume, advancing volume, and the number of left turning vehicles. Left turn warrant analysis was undertaken for each analysis scenario assuming that the existing traffic controls remain unchanged. Results of the analysis are summarized in **Table 4.5.**

**Table 4.5: Left-Turn Warrant Summary**

| Intersection | Movement | Analysis Period | Traffic Conditions | Left Turn Warrant | Additional Storage (m) | |
|---|---|---|---|---|---|---|
| | | | | | S | $S_t$ |
| **Hwy 25 & Kipp Rd (Option 1)** | NB-L | 2029 | Background | **Type IV** | 0 | 0 |
| | | | Post-Development | **Type IV** | 10 | 0 |
| | | 2039 | Background | **Type IV** | 0 | 0 |
| | | | Post-Development | **Type IV** | 15 | 0 |
| **Hwy 25 & Kipp Rd (Option 2)** | NB-L | 2029 | Background | **Type IV** | 0 | 0 |
| | | | Post-Development | **Type IV** | 10 | 0 |
| | | 2039 | Background | **Type IV** | 0 | 0 |
| | | | Post-Development | **Type IV** | 15 | 0 |

***EB** = Eastbound; **WB** = Westbound; **NB** = Northbound; **SB** = Southbound; **L** = Left; **T** = Through; **R** = Right*

***S** = Additional storage length required in addition to the standard storage length provided in a Type IV intersection treatment;*

***$S_t$** = Additional storage length required for trucks for a Type IV intersection treatment;*

| | |
|---|---|
| ***1*** | *Results are shown in **bold and red** where the warrant indicates that the existing left turn treatment is inadequate and may require improvements.* |

A left-turn treatment is warranted under *2029* and *2039* background, with additional storage length required under post-development traffic conditions. Whether or not the proposed development is built; additional storage for the northbound left-turn lane is required based on the traffic distribution and movement at Hwy 25 & Kipp Rd.

### *4.3.2 Right Turn Warrant*

Right turning vehicles can cause interference to through movements in the advancing lane as they decelerate and as they turn. To warrant an exclusive right turn lane at a two-lane highway intersection, all three of the following conditions must be met:

1. Main (or through) road AADT ≥ 1800
2. Intersecting road AADT ≥ 900
3. Right Turn Daily Traffic Volume ≥ 360

As with the left turn warrant analysis, it was assumed that the existing traffic controls remain in place for each analysis period. Results of the analysis are summarized in **Table 4.6**.

**Table 4.6: Right Turn Warrant Summary**

| Intersection | Movement | Analysis Period | Traffic Conditions | Right Turn Warrant Met |
|---|---|---|---|---|
| **Hwy 25 & Kipp Rd (Option 1)** | SB-R | 2029 | Background | ***No*** |
| | | | Post-Development | ***Yes*** |
| | | 2039 | Background | ***No*** |
| | | | Post-Development | ***Yes*** |
| **Hwy 25 & Kipp Rd (Option 2)** | SB-R | 2029 | Background | ***No*** |
| | | | Post-Development | ***Yes*** |
| | | 2039 | Background | ***No*** |
| | | | Post-Development | ***Yes*** |
| ***EB** = Eastbound; **WB** = Westbound; **NB** = Northbound; **SB** = Southbound; **L** = Left; **T** = Through; **R** = Right;* | | | | |
| ***1*** | *Results are shown in **bold and red** where the warrant indicates that the existing right turn treatment is inadequate and may require improvements.* | | | |

Assuming that existing traffic controls remain in place, it is estimated that at the intersection of Hwy 25 & Kipp Rd will require a designated right-turn lane to accommodate post-development traffic volumes.

## 4.4 SIGNALIZATION WARRANT REVIEW

Signalization warrant analysis was undertaken for both study intersections by applying methods described in the *Traffic Signal Warrant Handbook*[4], using a point system to determine the need for signalization. In this warrant system, a cumulative score of 100 points is considered the minimum value required to warrant a traffic signal.

The traffic signal warrant is built to use six-hour design hour volumes by using count data collected during the AM peak, midday peak, and PM peak periods. Design hour volumes were not available for the midday peak; therefore, combined AM and PM design hour volumes were adjusted by factors developed using raw traffic counts from AT to calculate six-hour design hour volumes.

The signalization warrant analysis was undertaken assuming that the existing roadway geometry and operational characteristics remain unchanged. Results for the analysis are provided in **Table 4.77.** Signalization warrant worksheets are provided in **Appendix F-Signalization Warrant**.

**Table 4.7: Signalization Warrant Summary**

| Intersection | Analysis Period | Traffic Conditions | Warrant Points | Warrant Met? |
|---|---|---|---|---|
| **Hwy 3 & Hwy 509** | 2029 | Background | 145 | ***Yes*** |
| | | Post-Development | 298 | ***Yes*** |
| | 2039 | Background | 188 | ***Yes*** |
| | | Post-Development | 554 | ***Yes*** |
| **Hwy 25 & Kipp Rd** | 2029 | Background | 43 | ***No*** |
| | | Post-Development | 62 | ***No*** |
| | 2039 | Background | 55 | ***No*** |
| | | Post-Development | 102 | ***Yes*** |
| ***1*** | *Results shown in **bold and red** exceed the signalization warrant threshold.* | | | |

Signalization is warranted at the intersection of Hwy 3 & Hwy 509 for the *2029* and *2039* background and post-development scenarios.

At Hwy 25 & Kipp Road, a signalized intersection is not theoretically justified until the full-buildout (*2039*).

[4] Transportation Association of Canada. (2007). *Traffic Signal Warrant Handbook*. Ottawa, ON.

## 4.5 ILLUMINATION WARRANT REVIEW

Illumination requirements were considered for the intersection of Hwy 25 & Kipp Rd using guidelines set forth by AT[5] and the TAC[6]. A warrant for illumination considers the geometric, operational, environmental and safety characteristics of an intersection. Only night time collisions that may be attributed to the lack of illumination are considered in the safety portion of the warrant.

Similar to the warrant process for signalization, a point system is used to determine if illumination is warranted. A score greater than 240 indicates that full illumination is warranted; a score between 120 and 240 indicates that partial and/or delineation lighting is warranted; and a score less than 120 indicates that lighting is not warranted. Partial lighting refers to the illumination of key decision areas on the approach to an intersection; delineation lighting refers to "sentry" lighting that marks an intersection location for approaching traffic and illuminates vehicles or pedestrians on the cross street. Illumination is always warranted for signalized intersections. Results for the illumination warrant analysis are provided in **Table 4.8.** Illumination warrant worksheets are provided in **Appendix G – Illumination Warrant** along with diagrams showing AT's typical roadway lighting requirements for intersections.

**Table 4.8: Illumination Warrant Summary**

| Intersection | Analysis Period | Traffic Conditions | Warrant Points | Lighting Warranted |
|---|---|---|---|---|
| **Hwy 25 & Kipp Rd** | 2029 | Background | **151** | **Delineation lighting** |
| | | Post-Development A | **171** | **Delineation lighting** |
| | 2039 | Background | **151** | **Delineation lighting** |
| | | Post-Development A | **171** | **Delineation lighting** |
| **1** | *Results in **bold and blue** exceed the illumination warrant threshold for **partial and/or delineation lighting** (120<=Score<=240).* | | | |
| **2** | Results shown in **bold and red** exceed the illumination warrant threshold for **full illumination** (Score >= 240)**.** | | | |
| **3** | ** Denotes **Signalization Warranted** which would require **full illumination**.* | | | |

At the intersection of Hwy 25 & Kipp Rd, it was found that delineation lighting to illuminate pedestrians or cross street traffic is warranted for the *2029* and *2039* study horizons. Moreover, signalization is warranted for the *2039* post-development scenario and in such case full illumination is required.

[5] Alberta Transportation. (2003). *Highway Lighting Guide*. Edmonton, AB.
[6] Transportation Association of Canada. (2001). *Illumination of Isolated Rural Intersections*. Ottawa, ON

# 5 MITIGATION SOLUTIONS

The findings of the analysis indicate that infrastructure upgrades on traffic control and/or intersection geometry are required at the study intersections. By next year, the intersection of Hwy 25 & Kipp Rd is anticipated to do not required any upgrades. Hwy 3 & Hwy 509 will experience LOS F at the minor approaches traffic control upgrade is required if AT wish to maintain their own LOS and v/c ratios operational standards at this intersection. In line with the analysis from **Section 4** the following mitigation options, or control scenarios, were run through the same simulation as the existing layout to explore the feasibility and impact selected intersection upgrades

### *5.1.1 Highway 25/ Kipp Road*

No changes on traffic control or intersection layout are anticipated at the Intersection of Hwy 25 & Kipp Rd due to the following:

- Under background conditions, the current intersection layout and traffic control is anticipated to operate at acceptable LOS and v/c ratios.
- Post-Development, the minor approaches are expected to experience LOS D and v/c ratios less than 0.5. The worst movement is the WB. However, the volumes are very low and therefore it is not recommended to introduce changes to this approach. Similarly, the EB movement will experience LOS D and v/c ratios below 0.5. Because the EB-LT movement is less than 100 vehicles, an auxiliary LT lane may still be not necessary. In addition, the anticipated queues are reasonable accommodated at the intersection. Furthermore, providing an auxiliary LT lane for the eastbound approach will slightly improve the v/c ratio but will still maintain a LOS D. In conclusion, no changes are recommended at this intersection.

At the present time the capacity of the intersection far exceeds the demand. Driver attitudes in the area, and traffic monitoring over the next few years will help determine the additional traffic volumes accessing the town via Hwy 25.

### *5.1.2 Highway 3 and Highway 509*

At half-buildout (*2029*) the following control was used to mitigate the critical left-turn movement:

- Actuated-Uncoordinated traffic signal with cycle lengths of 110 and 80 seconds in the AM and PM peak hour, respectively. During the AM and PM peak all LT are code as permitted except the westbound LT which is coded as protected-permitted during the PM peak hour.
- The analysis is based on the Option 2 traffic volumes. By this horizon, both Option 1 and Option 2 volumes are very similar with Option 2 having slightly higher volumes.

**Table 5.1: 2029 Capacity Analysis Results - Improvements**

| Intersection | Analysis Period | Traffic Conditions | Intersection | | | Worst Movement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | LOS | Delay (s/veh) | Max V/C | Movement | LOS | Delay (s) | 95% Queue[2] | 95% Queue/ Max Queue[3] (m) |
| **A1 Hwy 3 & Hwy 509** *(Signalized)* | 2029 AM | | | | | | | | | |
| | | Post-Development | A | 7.2 | 0.49 | WB-LT | C | 22.7 | 19 m | 36.6/46.4 |
| | 2029 PM | | | | | | | | | |
| | | Post-Development | B | 15.5 | 0.74 | WB-LT | C | 32.4 | 57 m | 66.1/80.4 |

***LOS** = Level of Service; **V/C** = Volume to Capacity Ratio*
***EB** = Eastbound; **WB** = Westbound; **NB** = Northbound; **SB** = Southbound; **L** = Left; **T** = Through; **R** = Right*
*Post-Development traffic conditions are those of Option 2 and represented both Option 1 and Option 2.*

| | |
|---|---|
| *1* | *Results are shown in **bold and red** where the **LOS is "D" or lower**, **Max V/C ratio is ≥ 0.85**, or **95% Queue** is **higher than 10 veh**.* |
| *2* | **Queue lengths are reported in vehicles where the average stored vehicle length is assumed to be 8.0 m. Reported queues may be preceded by a character that provides additional detail: 'm' indicates that the queue length is metered by an upstream signal; '#' indicates that the volume for the 95th percentile cycle exceeds capacity after two simulated cycles; and "~" indicates that the approach volume exceeds capacity, and the queue length could be longer growing with each cycle.** |
| *3* | **Traffic simulation queue length, both 95th percentile queue (average of 5 runs) and maximum observed queue (in one run), are reported in meters. Traffic simulation was done using SimTraffic software.** |

The addition of an actuated-uncoordinated time signal with no geometrical changes significantly lowered the wait times for the critical left-turn movement. A full-stop on **Hwy 3** would mitigate the high-conflict movement at this juncture but would interrupt traffic flow on the major highway. Under full-buildout conditions, upgrades listed from **Table 5.2** were considered for analysis:

**Table 5.2: Full Buildout (2039) - Mitigation Options**

| | Geometry | Signalization |
|---|---|---|
| **Background** | No changes on the intersection layout. | Actuated-Uncoordinated traffic signal with a cycle length of 60 seconds in both AM and PM peak hours. All left-turns are coded as permitted |
| **Layout 1 *(2039)*** | The westbound approach layout is one LT lane, one shared LT-Thru lane, and one auxiliary RT lane (26 meters). All other approaches as they are. | Actuated-Uncoordinated traffic signal with cycle lengths of 90 and 100 seconds in the AM and PM peak hour, respectively. During the AM peak all LT are permitted except the westbound LT which is coded as protected; During the PM peak all LT are permitted except the westbound LT (protected) and the northbound LT (protected-permitted). |
| **Layout 2 (2039)** | The westbound approach layout is one auxiliary LT lane (90 m), one LT lane, one through lane, and one auxiliary RT lane (26 meters). All other approaches as they are. | Actuated-Uncoordinated traffic signal with cycle lengths of 120 and 110 seconds in the AM and PM peak hour, respectively. During the AM peak all LT are permitted except the westbound LT which is coded as protected; During the PM peak all LT are permitted except the westbound LT (protected) and the northbound LT (protected-permitted). |

**Table 5.3: 2039 Capacity Analysis Results - Improvements**

| Signalized Intersection | Analysis Period | Traffic Conditions | Intersection | | | Worst Movement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | LOS | Delay (s/veh) | Max V/C | Movement | LOS | Delay (s) | 95% Queue[2] | 95% Queue/ Max Queue[3] (m) |
| **A1 Hwy 3 & Hwy 509** *(Layout 1)* | 2039 AM | Background | A | 7.3 | 0.49 | WB-LT | C | 21.3 | 9.2m | 18.8/25.6 |
| | | PD – Option 1 | B | 15.1 | 0.72 | **WB-LT** | **D** | **44.0** | **30.8 m** | 31.3/35.1 |
| | | PD – Option 2 | B | 14.9 | 0.72 | **WB-LT** | **D** | **45.1** | **31.8 m** | 28.7/31.7 |
| | 2039 PM | Background | A | 9.2 | 0.52 | WB-LT | C | 22.5 | 12 m | 19.8/23.4 |
| | | PD – Option 1 | C | 32.2 | 0.91 | **WB-LT** | **E** | **61.4** | **#101 m** | 66.1/73.5 |
| | | PD – Option 2 | C | 33.1 | 0.91 | **WB-LT** | **E** | **63.3** | **#103.4** | 66.2/73.8 |
| **A1 Hwy 3 & Hwy 509** *(Layout 2)* | 2039 AM | Background | A | 7.3 | 0.49 | WB-LT | C | 21.3 | 9.2m | 18.8/25.6 |
| | | PD – Option 1 | B | 11.8 | 0.65 | **WB-LT** | **D** | **45.4** | **23.6 m** | 23.8/32.4 |
| | | PD – Option 2 | B | 11.8 | 0.66 | **WB-LT** | **D** | **46.2** | **24.3 m** | 23.8/32.7 |
| | 2039 PM | Background | A | 9.2 | 0.52 | WB-LT | C | 22.5 | 12 m | 19.8/23.4 |
| | | PD – Option 1 | C | 27.8 | 0.85 | **WB-LT** | **D** | **50.2** | **#79 m** | 58.1/67.4 |
| | | PD – Option 2 | C | 28.2 | 0.85 | **WB-LT** | **D** | **51.6** | **#84 m** | 76.8/86.9 |

***PD = Post-Development***

***LOS** = Level of Service; **V/C** = Volume to Capacity Ratio*

***EB** = Eastbound; **WB** = Westbound; **NB** = Northbound; **SB** = Southbound; **L** = Left; **T** = Through; **R** = Right*

| | |
|---|---|
| ***1*** | *Results are shown in **bold and red** where the **LOS is "D" or lower, Max V/C ratio is ≥ 0.85**, or **95% Queue** is **higher than 10 veh**.* |
| **2** | **Queue lengths are reported in vehicles where the average stored vehicle length is assumed to be 8.0 m. Reported queues may be preceded by a character that provides additional detail: 'm' indicates that the queue length is metered by an upstream signal; '#' indicates that the volume for the 95th percentile cycle exceeds capacity after two simulated cycles; and "~" indicates that the approach volume exceeds capacity, and the queue length could be longer growing with each cycle.** |
| ***3*** | **Traffic simulation queue length, both 95th percentile queue (average of 5 runs) and maximum observed queue (in one run), are reported in meters. Traffic simulation was done using SimTraffic software.** |

The intersection is anticipated to operate at acceptable LOS and v/c ratios, as a signalized intersection. At the PM peak hour is expected that the LT-NB approach will experience a 95th percentile queue of 33.7 meters or longer. Moreover, SimTraffic results shown 43.9 meters and 59.5 meters for the 95th percentile and maximum queue, respectively. This is accommodated within the existing LT bay length.

**Layout 1:** The signalized intersection is anticipated to operate at approach LOS D or better and v/c ratios 0.91 or better. With the proposed changes, the following is expected:

- Westbound LT movement is expected to operate at LOS E and v/c ratio of 0.83/0.85 during the PM Peak and LOS D and v/c ratio of 0.25/0.27 during the AM Peak.
- Northbound LT movement on Hwy 3 will required a protected-permitted phase on the PM peak hour. It is expected to operate at LOS C and v/c ratio of 0.55 on both

AM and PM Peaks. However, the protected phase on the afternoon will negatively impact the southbound through movement which is anticipated to operate at LOS D and v/c ratio of 0.91 on the PM peak.

- Southbound LT movement on Hwy 3 is expected to operate at LOS D and v/c ratio of 0.72 during the AM peak, and LOS C and v/c ratio of 0.33 during the PM peak.
- Based on Synchro and SimTraffic findings, potential queues at all approaches seems to be accommodated within the intersection layout.

These geometric and signal upgrades accommodate the expected traffic volumes (both development Options 1 and 2) although some movements might experience LOS E or v/c ratios of 0.91. According to the AT standards this are unacceptable LOS and v/c ratios; however, It is not necessary unexpected on a busy intersection during peak hours and on an "urban environment".

**Layout 2:** This configuration results in better traffic operations. Based on results from the Synchro model at full buildout, the intersection is anticipated to operate at approach LOS D or better and v/c ratios 0.85 or better, as a signalized intersection. With the proposed changes, the following is expected:

- Westbound LT movement is expected to operate at LOS D and v/c ratio of 0.80/0.82 during the PM Peak and LOS D and v/c ratio of 0.33/0.34 during the AM Peak.
- Northbound LT movement on Hwy 3 will required a protected-permitted phase on the PM peak hour.
- Eastbound LT/through movements are expected to operate at LOS D and v/c ratio of 0.03 during the AM and PM peaks. Given the low traffic volumes at these movements further improvements are not considered.
- Based on Synchro and SimTraffic findings, potential queues at all approaches seems to be accommodated within the intersection layout.

**Layout 2** better accommodates the traffic volumes (both development Option 1 and 2) compared to its counterpart. High traffic volumes entering and exiting Kipp Road introduce congestion into the intersection, resembling intersections around urban environments where LOS D or E and v/c ratios over 0.90 are common during peak hours.

At a glance it is clear that the service provided by the improvements from **Layout 2**. The addition of an auxiliary lane for left-turning vehicles also provides increased safety but limits the access and movement through the area. Increased signal times also benefit the approaches to the intersection, however the impacts of introducing either 90 second or 120 second stop-intervals on Hwy 3 was not included as a part of this analysis and would be required in the detail design stage of an upgrade of this nature.

### 5.1.3 Roundabout Option

As described in AT's *Design Bulletin #68*, "roundabouts shall be considered as the first option for intersection designs… where a greater degree of traffic control than a two-way stop is required on a paved roadway."[7]

Although a greater degree of traffic control than a two-way stop is required for the intersection of Hwy 3 & Hwy 509, this study will not look at a detailed roundabout modelling or Benefit Cost Analysis. Nevertheless, roundabout modelling and a Benefit Cost Analysis may be required at the time that a development application is submitted. Nevertheless, a cursory check was completed for the traffic volumes that would be present if the intersection of Hwy 3 & Hwy 509 were converted to a roundabout at full-buildout. Results of the check are as follows:

- A single-lane roundabout is anticipated to be adequate for all scenarios except for the *2036 p*ost-development scenario, where the sum of entering and circulating traffic volumes from the westbound approach may exceed 1,100 vehicles, the threshold where a two-lane entry should be considered. Therefore, a two lane entry for the westbound approach may ultimately be needed.

The affect on Hwy 3 traffic was not included in the cursory roundabout warrant check. The additional right-of-way requirements are limited to the intersection area and do not include requirements for the twinning and widening of the approaching lanes. Right of way acquisition for a roundabout intersection treatment would be larger than that of a signalized intersection. A detailed design of the intersection would provide a more detailed right-of-way requirement and review the potential of realigning the intersection to the north minimizing the encroachment of developed residential properties.

[7] Alberta Transportation. (last updated June 2016). Design Bulletin #68. Edmonton, AB.

# 6 OTHER CONSIDERATIONS

## 6.1 RAIL CROSSING

Currently there are various at-grade railway crossing that will need further analysis. In addition, there is a railway underpass under Kipp Road in the proximity to Hwy 3. The railway facility at this location may also limit the available right-of-way for potential future improvements to the intersection of Hwy 3 & Hwy 509 such as grade separation of traffic conflicting movements (Interchange). Development will require application to CP Rail for approvals. At a more detailed level, a comprehensive analysis may look at future require upgrades to the track crossings (i.e. signalizations, signage and markings, illumination, etc.).

## 6.2 INTERNAL ROADWAY

The proposed ASP is expected to generate between 8,042 and 8,145 trips per day, and between 1,299 and 1,363 trips during the peak hours. Around 30% of the industrial and 50% of the residential trips are anticipated to remain internal. These anticipated traffic volumes will potentially trigger geometry and traffic control upgrades on ASP's accesses, internal and adjacent roadways and intersections. As the proposed ASP land use type and intensities become more detailed a review of the internal road network will need to be completed.

### *6.2.1 Pavement Considerations*

Pavement future needs of the internal and adjacent roadways that will be likely impacted by the proposed ASP, both existing and proposed. Due to potential high load traffic from the industrial development, a detailed pavement design is anticipated to provide recommendations on an appropriate road structures at key study roadways and site access.

### *6.2.2 Southeast Corridor*

Following the completion of the Type IV intersection treatment upgrades on Hwy 25 at Township Road 93, a detailed traffic study of the internal and inter-city movement of vehicles along this corridor will quantify the affected traffic patterns from the Town along Kipp Road and the traffic demands of the Hwy 3 access points within the town boundary. The impact on the expected increased use of Hwy 25 to access the Town should be considered. Over the next few years, it is assumed that more residents will access Hwy 3 via the Southeast Corridor. The usage of the Hwy25/Kipp Road Intersection should be actively monitored.

### *6.2.3 Right of Way*

A detailed design of the intersection would provide a more detailed right-of-way requirement and review the potential of realigning the intersection to the north minimizing the encroachment of developed residential properties.

# 7 CONCLUSIONS

## 7.1 FINDINGS

Key findings of the study are as follows:

### *7.1.1 Traffic Volumes*

At full built-out, the proposed development is expected to generate 1,324 new trips in the AM peak hour, 1,299 new trips in the PM peak hour, and 8,042 trips on an average weekday (**Option 1**); or 1,363 new AM peak hour trips, 1,331 new PM peak hour trips and 8,145 new total weekday trips **(Option 2**).

### *7.1.2 Traffic analysis*

By the year *2019*, looking at the background traffic volumes, intersection improvements are not anticipated at the study intersection based on capacity analysis and traffic simulation; however, the intersection of Hwy 3 & Hwy 509 will experiences LOS F at the minor approaches. Because the traffic volumes at the minor approaches are relatively small (less than 50 vehicles per hour), upgrades are not anticipated at the moment. However, a traffic control upgrade is required if AT wish to maintain their own capacity standards. Intersection improvements are anticipated at the intersection of Hwy 3 & Hwy 509 based on the capacity and traffic simulation for background and post-development traffic volumes by *2029* and *2039*.

Intersection improvements are not anticipated at the intersection of Hwy 25 & Kipp Road based on the capacity analysis and traffic simulation for the background and post-development traffic volumes by both *2029* and *2039* study horizons. However, LOS D/E may be expected for minor approaches by the *2039* post-development traffic volumes.

### *7.1.3 Highway 3 & Highway 509 Intersection Upgrades*

By the year *2029*, the following improvements are anticipated for the intersection of Hwy 3 & Hwy 509 for post-development conditions:

- No changes on the intersection layout.
- Actuated-Uncoordinated traffic signal with cycle lengths of 110 and 80 seconds in the AM and PM peak hour, respectively. During the AM and PM peak all LT are code as permitted except the westbound LT which is coded as protected-permitted during the PM peak hour.

By the year *2039*, the following improvements are anticipated for the intersection of Hwy 3 & Hwy 509 for background conditions:

- No changes on the intersection layout.
- Actuated-Uncoordinated traffic signal with a cycle length of 60 seconds in both AM and PM peak hours. All left-turns are coded as permitted.

By the year *2039*, the following alternative set of improvements (**Layout 2**) are anticipated for the intersection of Hwy 3 & Hwy 509 for post-development conditions; which will result in reasonable traffic operations but LOS D in some movements and better v/c ratios:

- The westbound approach layout is one auxiliary LT lane (90 m), one LT lane, one through lane, and one auxiliary RT lane (26 meters).
- All other approaches as they are.
- Actuated-Uncoordinated traffic signal with cycle lengths of 120 and 110 seconds in the AM and PM peak hour, respectively. During the AM peak all LT are permitted except the westbound LT which is coded as protected; During the PM peak all LT are permitted except the westbound LT (protected) and the northbound LT (protected-permitted).

The *2039* post-development scenario (**Layout 2**) seems to better accommodate the traffic volumes (both development **Option 1** and **2**) compared to the **Layout 1**.

### *7.1.4 Turn-Lane Analysis*

Hwy 25 & Kipp Road turn lane warrants indicate the need for a **Type IVb** intersection with *2029* and *2039* background and post-development traffic volumes. Additional 10 and 15 meters for the Left turn lane is required for the *2029* and *2039* post-development traffic volumes, respectively. In addition, a southbound right turn lane is warranted for both post-development study scenarios.

### *7.1.5 Signalization*

Signalization is warranted at the intersection of Hwy 3 & Hwy 509 for the *2029* and *2039* background and post-development scenarios. Signalization is warranted at the intersection of Hwy 25 & Kipp Road by *2039*, post-development.

### *7.1.6 Illumination*

Delineation lighting to illuminate pedestrians or cross street traffic is warranted for the *2029* and *2039* study horizons at the intersection of Hwy 25 & Kipp Rd**.** Moreover, signalization is also warranted for the *2039* post-development scenario and in such case full illumination will be warranted.

## 7.2 RECOMMENDATIONS

When considering the development and traffic conditions of present day 10 and 20-year periods, the following recommendations are developed in response to the analysis.

### *7.2.1 Highway 3 and Highway 509*

Minor movements (both low volumes and minor approaches) are expected to experience LOS F under all background traffic volumes. By *2029*, traffic control upgrades (signalization) are anticipated based on the capacity analysis. Under post-development traffic conditions the intersection capacity deteriorate which result in the need of traffic control upgrades.

- The Recommended configuration for the intersection is:
  - The westbound approach layout is one auxiliary LT lane (90 m), one LT lane, one through lane, and one auxiliary RT lane (26 meters).
  - All other approaches as they are.
  - Actuated-Uncoordinated traffic signal with cycle lengths of 120 and 110 seconds in the AM and PM peak hour, respectively. During the AM peak all LT are permitted except the westbound LT which is coded as protected; During the PM peak all LT are permitted except the westbound LT (protected) and the northbound LT (protected-permitted).
- Full illumination.
- It is recommended to investigate other options when signalization is anticipated such as roundabout and grade separation.

### *7.2.2 Highway 25 and Kipp Road*

The geometry of the intersection of Hwy 25 & Kipp Road most resembles that of AT's standard **Type IV** intersection treatment (two-way-stop controlled intersection with stop signs on the east/west approaches. The turn lane analysis confirmed a **Type IVb** treatment is warranted with standard plus 15 meters storage for the northbound left turn lane under *2039* post-development traffic, as well as a southbound right turn lane.

- Consider signalization by the *2039* post-development horizon as signalization is warranted.
- Investigate other options when signalization is anticipated such as roundabout and grade separation.
- Provide delineation lighting to illuminate pedestrians or cross street traffic for the *2029* and *2039* study horizons. Moreover, when and if traffic control is upgraded to traffic signals, full illumination is required.
- Continuously monitor traffic moving through this intersection. Upgrades to the surrounding infrastructure completed over the past few years were completed anticipating the growing use of Hwy 25 as a primary access for the Town/ Hwy 3.

### *7.2.3 Additional Considerations*

- Review at-grade railway crossings at key locations such as the railway crossing at Kipp Rd (east of the intersection at Range Road 223), the railway crossing at Range Road 223 (south of the intersection at Kipp Rd), the railway crossing at 2nd Street (north of intersection at 55 Avenue), and the railway crossing at 51 Avenue (west of the intersection at 2nd Street).
- Complete a traffic impact assessment that include analysis at external intersections (such as Hwy 3 & Hwy 509, Hwy 25 & Kipp Rd and Hwy 3 & 51 Avenue), internal intersections (Kipp Rd & 2nd Street, 51 Avenue & 2nd Street), and the internal and adjacent road networks.
- Review pavement future needs at key intersections and roadways such as Kipp Rd and 2nd Street.
- Align the plan to other potential upgrades of the town's road network that could impact trip distribution and assignment such as the development of a south-east collector connecting Hwy 25 & Township Rd 92.
- Identify the design vehicle, based on land use, and to ensure it is accommodated at the study intersections and accesses.
- Development plans to follow the MDP requirements regarding active transportation, mobility and connectivity.
- The Town should consider developing a Transportation Master Plan for the community to better address the growing demands of the Towns internal road network.

### *7.2.4 External Considerations*

The phasing of this development and eventual construction is connected to some of Alberta Transportation's future plans. Construction of a Hwy 3 bypass as a part of the CANAMEX corridor upgrades would significantly impact the development. We recommend coordination with AT on the potential effects of the CANAMEX Corridor on this intersection. This intersection is currently experiencing low LOS, improvements to satisfy the needs of both parties should be discussed in detail.

### *7.2.5 Intersection Monitoring – Highway 25 & Kipp Road*

Throughout each phase of the development, and independently in the coming years, we recommend to closely monitor the intersection at Hwy 25 and Kipp Road.

# *APPENDIX A:*

## *LOCATION AND SITE PLAN*

MPE Engineering Ltd.

# North Coalhurst - Kipp Joint Area Structure Plan

Lethbridge County & Town of Coalhurst

Option 1

- Area Structure Plan Boundary
- Proposed Lot Lines
- Wetland - Provincial Inventory
- 20m Buffer from Wetland
- Storm Pond Area
- Future Road Connection
- Municipal Reserve
- Proposed Road

EXISTING WETLAND

3.80±ac
4.40±ac
4.06±ac
2.63±ac
2.53±ac
2.57±ac
2.63±ac
2.68±ac
6.15±ac
10.11±ac
3.48±ac
3.74±ac
2.98±ac
3.05±ac
3.27±ac
3.28±ac
3.30±ac
2.12±ac
2.13±ac
2.11±ac

TWP RD 9-4 (KIPP RD)

1.07±ac
1.32±ac
1.28±ac
1.35±ac
0.83±ac
0.74±ac
0.95±ac
1.21±ac
0.91±ac
0.92±ac
1.55±ac
1.52±ac
1.56±ac
1.74±ac
1.47±ac
1.25±ac
1.22±ac
1.36±ac
0.81±ac
1.28±ac
1.27±ac

POND

UTILITY R/W (0910891)

TRANSMISSION LINE R/W (7654JK)

TRANSMISSION LINE R/W (7654JK) (RW258DS)

PIPELINE R/W (0312269)

T OF WAY

TOWN OF COALHURST

STORM POND

TRANSMISSION LINE R/W

2 ST

1.59±ac
0.90±ac
0.80±ac
1.04±ac
1.07±ac
0.79±ac
0.89±ac
0.91±ac
0.85±ac
0.98±ac
0.99±ac
0.97±ac
0.66±ac
0.65±ac
0.53±ac
0.52±ac
STORM POND
0.40±ac
0.41±ac
0.42±ac
0.43±ac
0.48±ac
0.70±ac
1.07±ac
1.02±ac
0.67±ac
0.51±ac

PIPELINE R/W

AERIAL PHOTO DATE: 2015

OLDMAN RIVER REGIONAL SERVICES COMMISSION

0 Metres 100 200 300 400

May 17, 2018 N:\Lethbridge-County\Lethbridge-County-Projects\Lethbridge County & Town of Coalhurst Kipp Industrial Joint ASP.dwg

# North Coalhurst - Kipp Joint Area Structure Plan

Lethbridge County & Town of Coalhurst

Concept Plan - Option 2

- Area Structure Plan Boundary
- Proposed Lot Lines
- Wetland - Provincial Inventory
- 20m Buffer from Wetland
- Storm Pond Area
- Future Road Connection
- Municipal Reserve
- Proposed Road

EXISTING WETLAND

TWP RD 9-4 (KIPP RD)

STORM POND

STORM POND

STORM POND

TOWN OF COALHURST

2 ST

TRANSMISSION LINE R/W (7654JK)

TRANSMISSION LINE R/W (7654JK) (RW258DS)

PIPELINE R/W (0312269)

UTILITY R/W (0910891)

TRANSMISSION LINE R/W

PIPELINE R/W

3.80±ac
4.40±ac
4.06±ac
2.63±ac
2.53±ac
2.57±ac
2.63±ac
2.68±ac
6.15±ac
10.11±ac
3.48±ac
3.74±ac
2.98±ac
3.05±ac
3.27±ac
3.28±ac
3.28±ac
2.12±ac
2.13±ac
2.11±ac
0.70±ac
0.75±ac
0.67±ac
1.35±ac
1.31±ac
1.63±ac
1.28±ac
1.27±ac
1.20±ac
1.43±ac
1.60±ac
1.08±ac
1.46±ac
2.54±ac
1.44±ac
0.99±ac
1.00±ac
1.10±ac
1.11±ac
1.09±ac
1.54±ac
1.55±ac
1.35±ac
0.94±ac
0.92±ac
0.40±ac
0.41±ac
0.42±ac
0.43±ac
0.48±ac
0.70±ac
1.07±ac
1.02±ac

AERIAL PHOTO DATE: 2015

OLDMAN RIVER REGIONAL SERVICES COMMISSION

0 Metres 100 200 300 400

May 17, 2018 N:\Lethbridge-County\Lethbridge-County-Projects\Lethbridge County & Town of Coalhurst Kipp Industrial Joint ASP.dwg

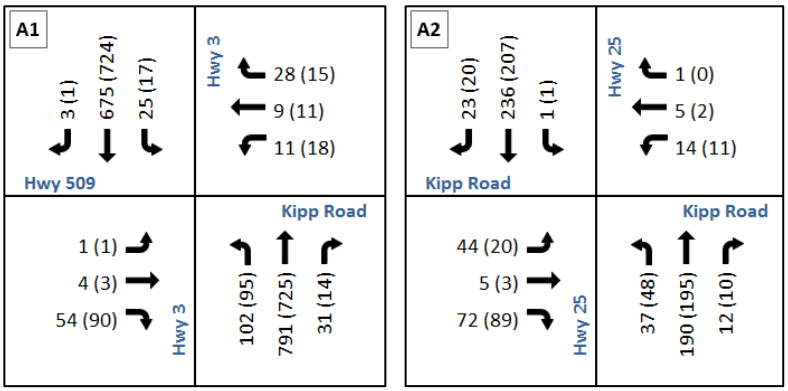
# *APPENDIX B:*

## *TRAFFIC DIAGRAMS*

MPE Engineering Ltd.

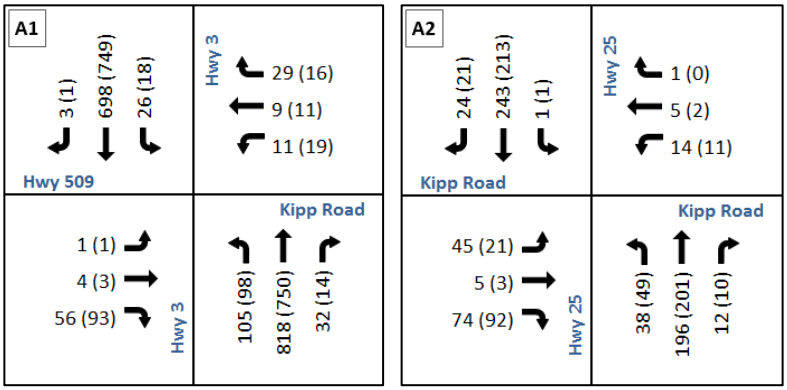
*Format for traffic volumes is **AM Peak Hour (PM Peak Hour)***

## 2017 EXISTING TRAFFIC COUNTS:



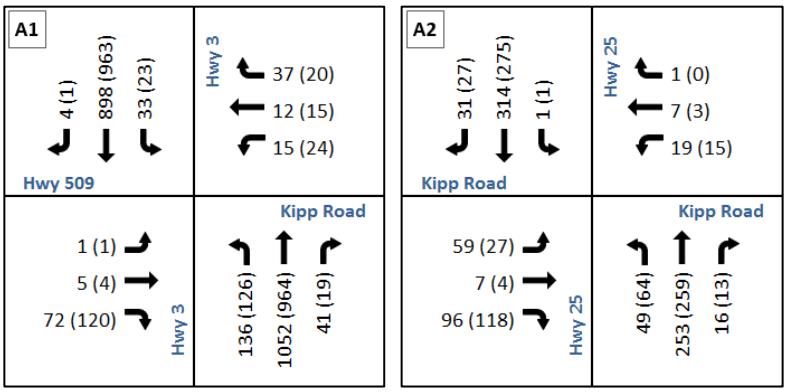

| AADT Estimates | Intersection | South | North | West | East |
|---|---|---|---|---|---|
| | **A1** | 16560 | 15040 | 1630 | 950 |
| | **A2** | 5240 | 4660 | 1380 | 320 |

## 2019 BACKGROUND TRAFFIC:




| AADT Estimates | Intersection | South | North | West | East |
|---|---|---|---|---|---|
| | **A1** | 17060 | 15490 | 1680 | 980 |
| | **A2** | 5400 | 4800 | 1420 | 330 |

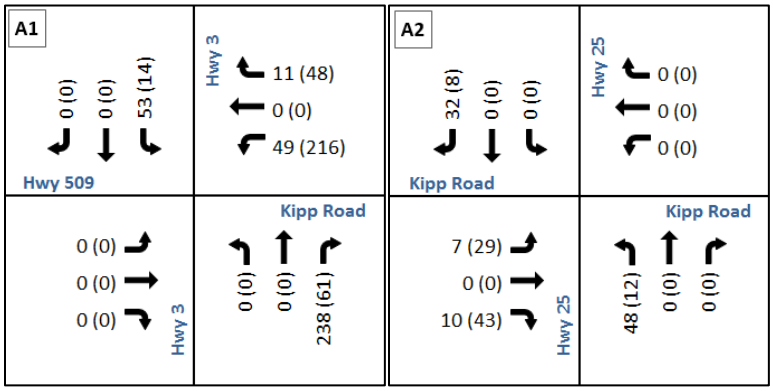
## 2039 BACKGROUND TRAFFIC:



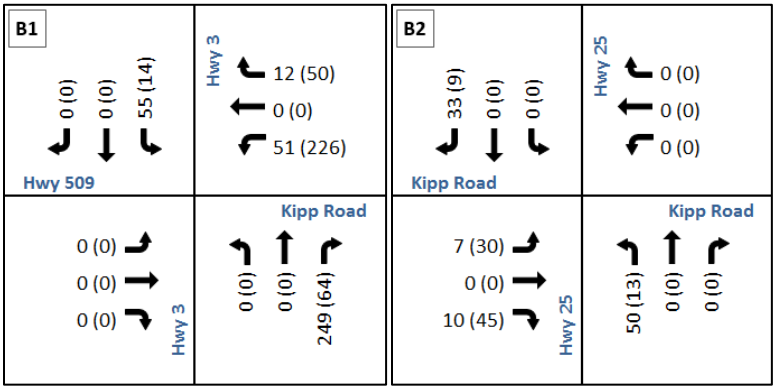

| AADT Estimates | Intersection | South | North | West | East |
|---|---|---|---|---|---|
| | **A1** | 22020 | 20000 | 2170 | 1260 |
| | **A2** | 6970 | 6200 | 1840 | 430 |

## SITE TRAFFIC

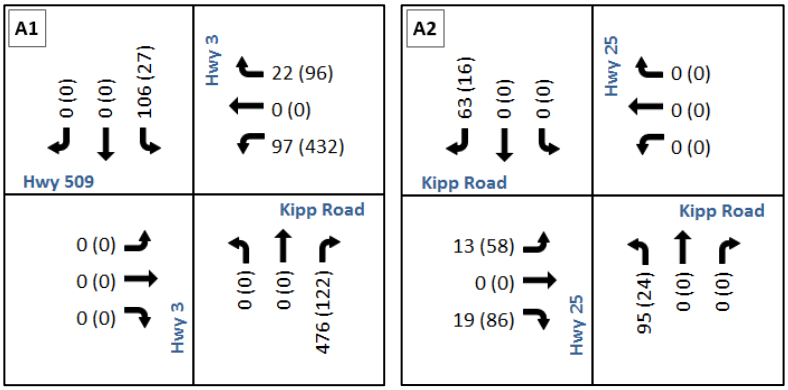
### 2019 HORIZON (OPTION 1):



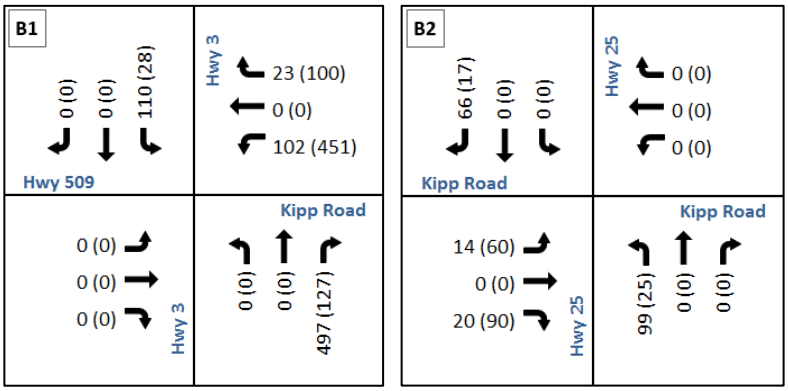
## 2019 HORIZON (OPTION 2):




## 2039 HORIZON (OPTION 1):

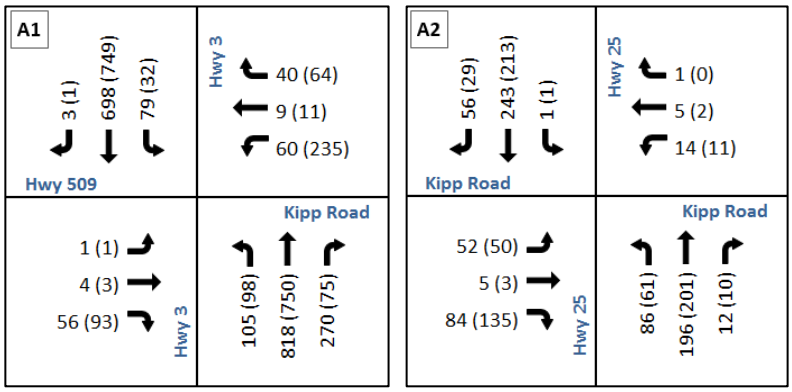



## 2039 HORIZON (OPTION 2):



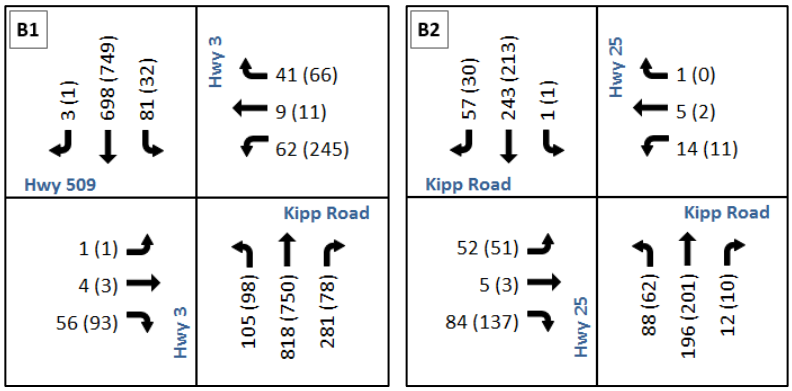
## 2019 POST-DEVELOPMENT TRAFFIC

### 2019 HORIZON (OPTION 1):




| OPTION 1 AADT Estimates | Intersection | South | North | West | East |
|---|---|---|---|---|---|
| | **A1** | 18730 | 15860 | 1680 | 3020 |
| | **A2** | 5730 | 5020 | 1980 | 330 |

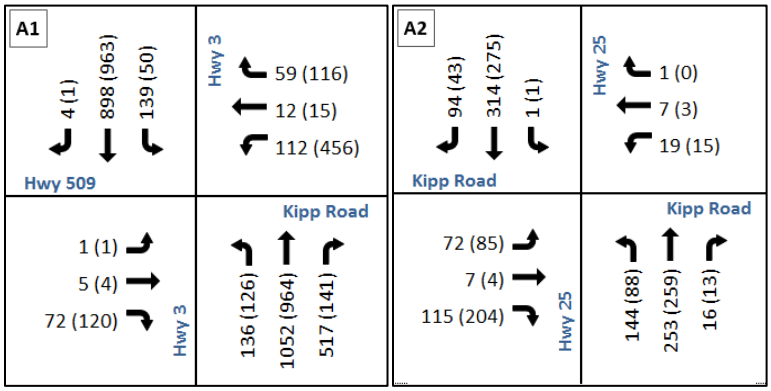
### 2019 HORIZON (OPTION 2):




| OPTION 2 AADT Estimates | Intersection | South | North | West | East |
|---|---|---|---|---|---|
| | **A1 (B1)** | 18800 | 15880 | 1680 | 3110 |
| | **A2 (B2)** | 5750 | 5030 | 2000 | 330 |

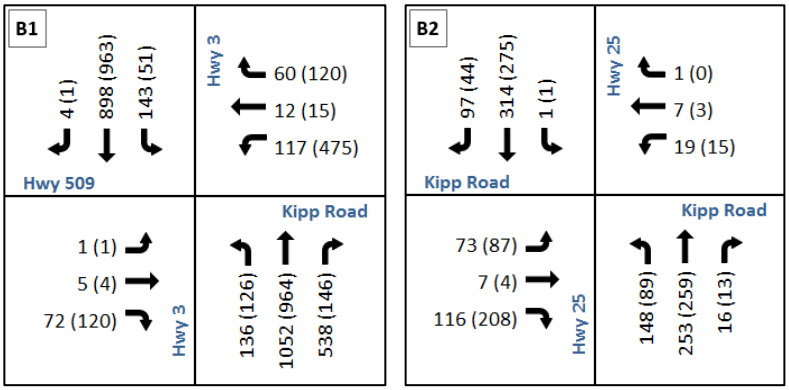
## 2039 POST-DEVELOPMENT TRAFFIC

### 2039 HORIZON (OPTION 1):



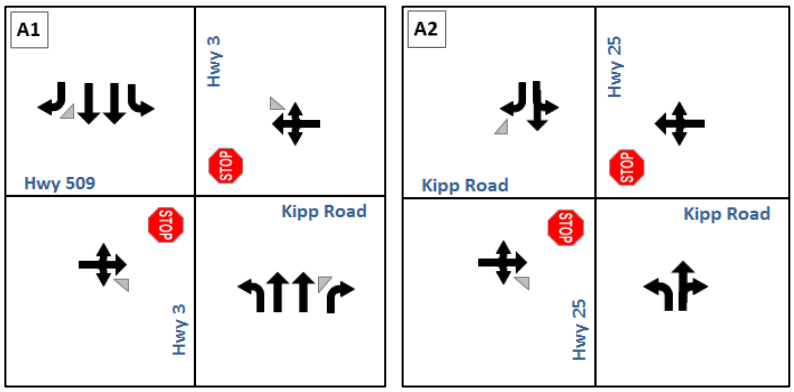

| OPTION 1 AADT Estimates | Intersection | South | North | West | East |
|---|---|---|---|---|---|
| | **A1** | 25360 | 20740 | 2170 | 5340 |
| | **A2** | 7640 | 6640 | 2950 | 430 |

### 2039 HORIZON (OPTION 2):

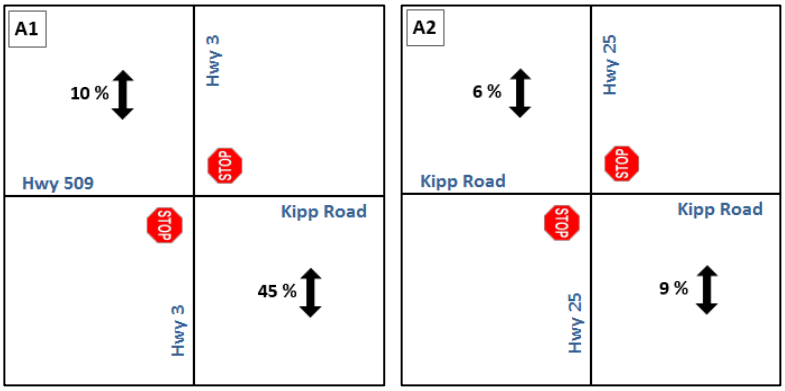



| OPTION 2 AADT Estimates | Intersection | South | North | West | East |
|---|---|---|---|---|---|
| | **A1 (B1)** | 25510 | 20780 | 2170 | 5520 |
| | **A2 (B2)** | 7670 | 6660 | 3000 | 430 |

## INTERSECTION LAYOUT AND TRAFFIC CONTROL




## NEW SITE TRIP GENERATION DISTRIBUTION (INDUSTRIAL LAND USE)



# *APPENDIX D:*

## *TRAFFIC DATA*

## Turning Movement Summary Diagram

**Reference No.:** 100060

**Intersection of:**
3 & 509 AT KIPP

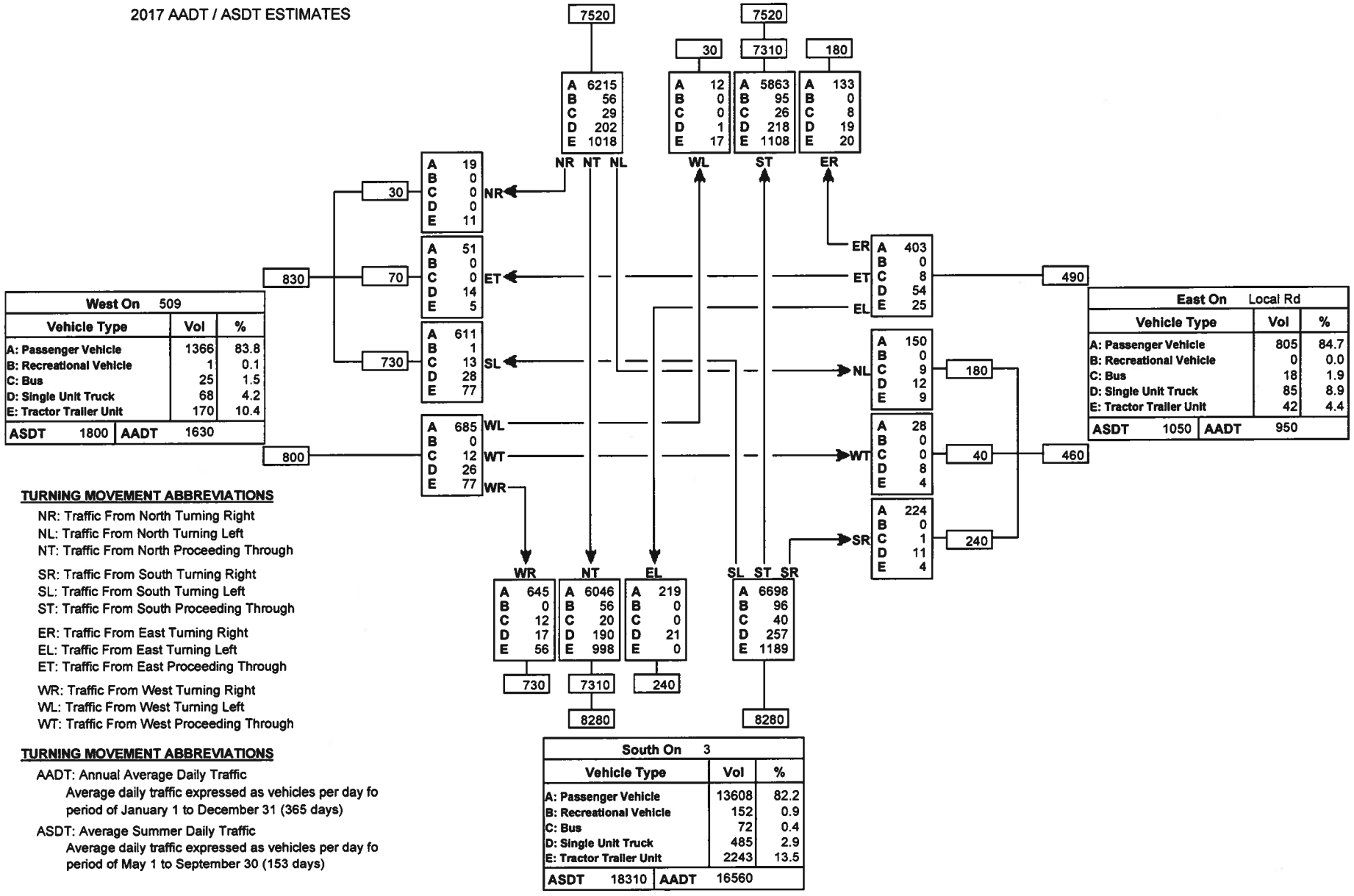
2017 AADT / ASDT ESTIMATES

| North On 3 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 12223 | 81.3 |
| B: Recreational Vehicle | 151 | 1.0 |
| C: Bus | 63 | 0.4 |
| D: Single Unit Truck | 440 | 2.9 |
| E: Tractor Trailer Unit | 2163 | 14.4 |
| **ASDT** 16630 | **AADT** | 15040 |

| West On 509 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 1366 | 83.8 |
| B: Recreational Vehicle | 1 | 0.1 |
| C: Bus | 25 | 1.5 |
| D: Single Unit Truck | 68 | 4.2 |
| E: Tractor Trailer Unit | 170 | 10.4 |
| **ASDT** 1800 | **AADT** | 1630 |

| East On Local Rd | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 805 | 84.7 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 18 | 1.9 |
| D: Single Unit Truck | 85 | 8.9 |
| E: Tractor Trailer Unit | 42 | 4.4 |
| **ASDT** 1050 | **AADT** | 950 |

| South On 3 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 13608 | 82.2 |
| B: Recreational Vehicle | 152 | 0.9 |
| C: Bus | 72 | 0.4 |
| D: Single Unit Truck | 485 | 2.9 |
| E: Tractor Trailer Unit | 2243 | 13.5 |
| **ASDT** 18310 | **AADT** | 16560 |




### TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

### TURNING MOVEMENT ABBREVIATIONS

AADT: Annual Average Daily Traffic
Average daily traffic expressed as vehicles per day fo
period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehicles per day fo
period of May 1 to September 30 (153 days)

## Turning Movement Summary Diagram

**Reference No.:** 100060

**Intersection of:**
3 & 509 AT KIPP

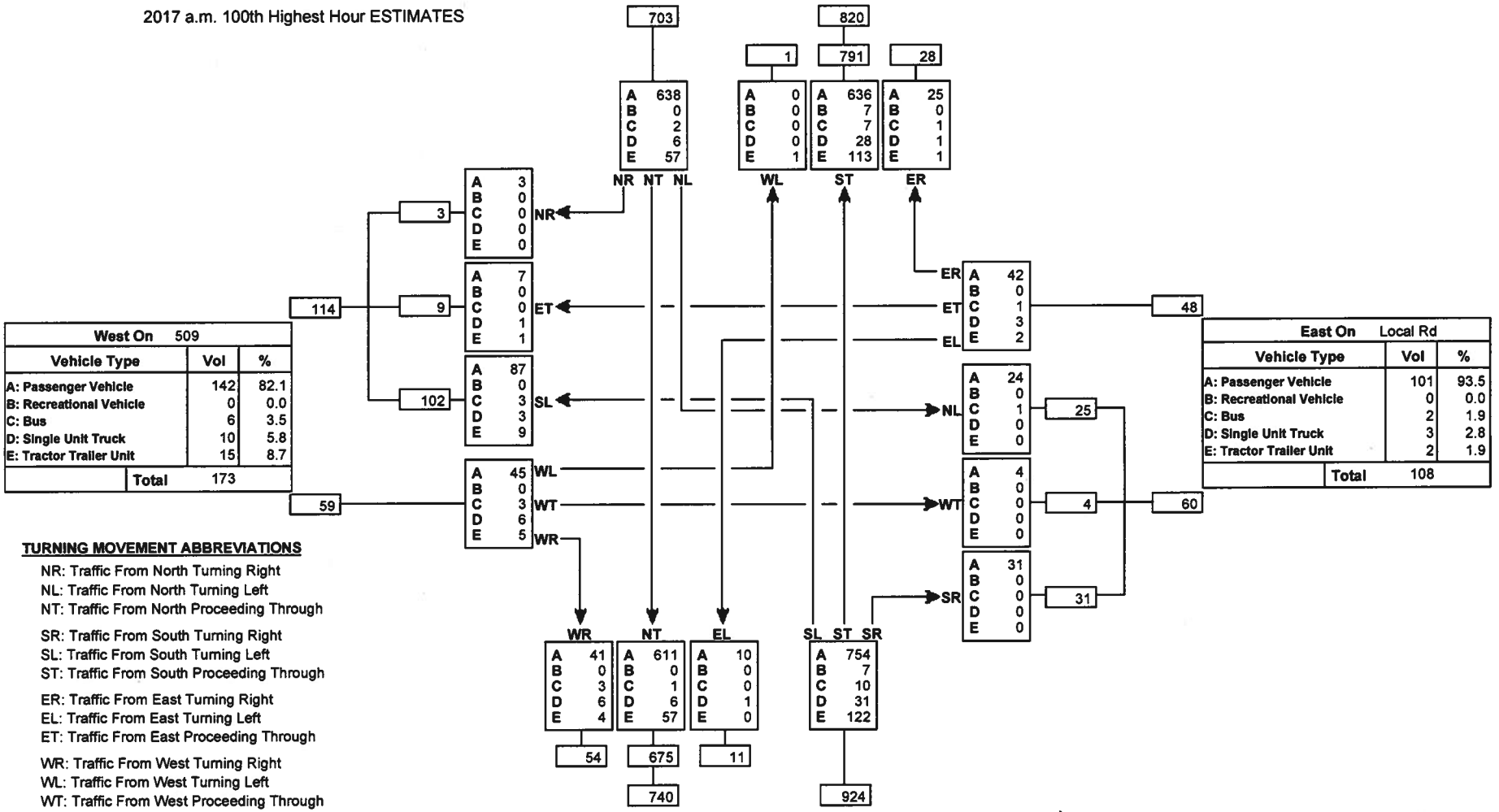
2017 a.m. 100th Highest Hour ESTIMATES

| North On 3 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 1299 | 85.3 |
| B: Recreational Vehicle | 7 | 0.5 |
| C: Bus | 10 | 0.7 |
| D: Single Unit Truck | 35 | 2.3 |
| E: Tractor Trailer Unit | 172 | 11.3 |
| **Total** | 1523 | |

| West On 509 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 142 | 82.1 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 6 | 3.5 |
| D: Single Unit Truck | 10 | 5.8 |
| E: Tractor Trailer Unit | 15 | 8.7 |
| **Total** | 173 | |

| East On Local Rd | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 101 | 93.5 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 2 | 1.9 |
| D: Single Unit Truck | 3 | 2.8 |
| E: Tractor Trailer Unit | 2 | 1.9 |
| **Total** | 108 | |

| South On 3 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 1416 | 85.1 |
| B: Recreational Vehicle | 7 | 0.4 |
| C: Bus | 14 | 0.8 |
| D: Single Unit Truck | 44 | 2.6 |
| E: Tractor Trailer Unit | 183 | 11.0 |
| **Total** | 1664 | |




**TURNING MOVEMENT ABBREVIATIONS**

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

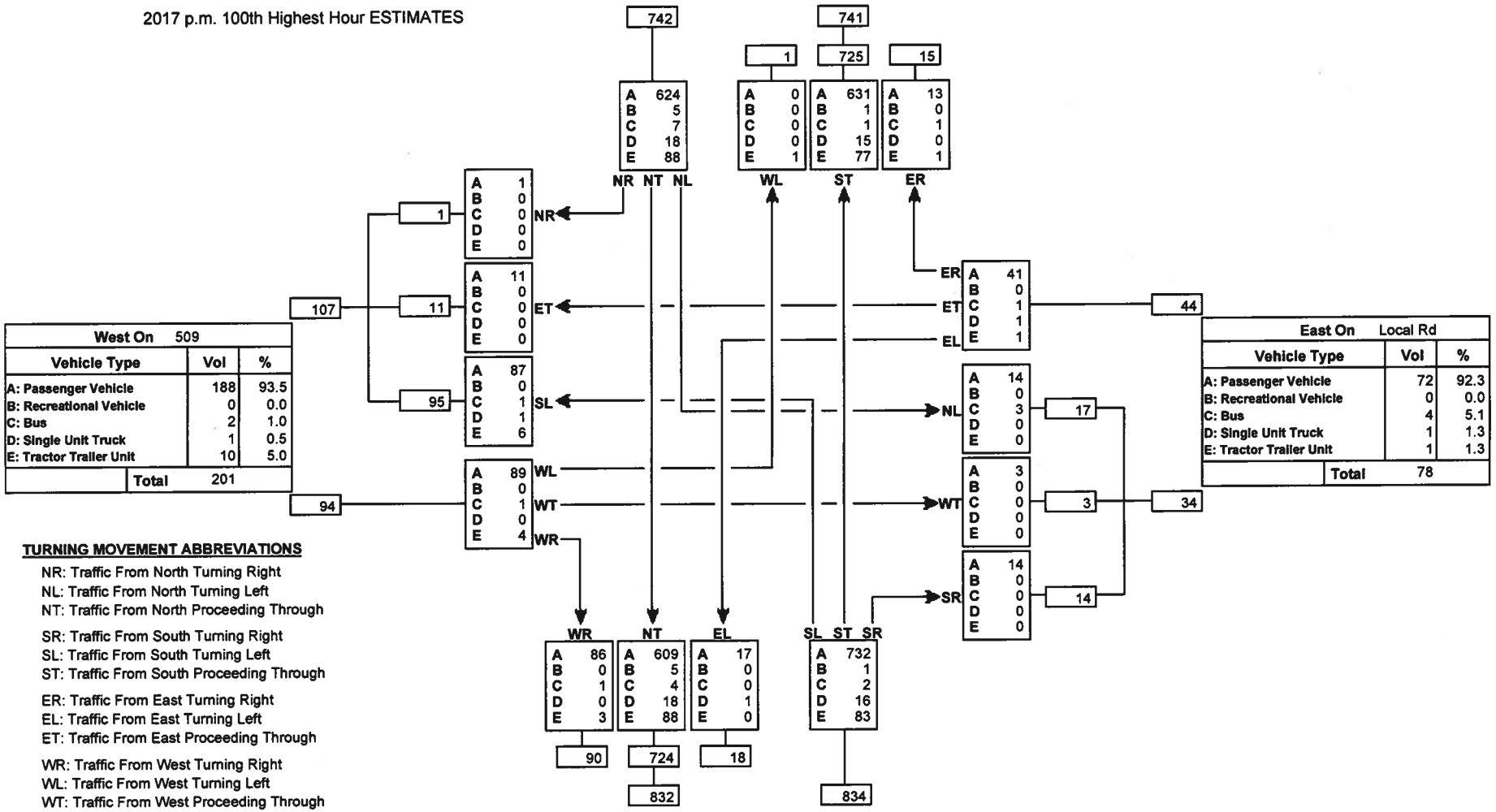
## Turning Movement Summary Diagram

**Reference No.:** 100060

**Intersection of:**
3 & 509 AT KIPP

2017 p.m. 100th Highest Hour ESTIMATES

| North On 3 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 1268 | 85.5 |
| B: Recreational Vehicle | 6 | 0.4 |
| C: Bus | 9 | 0.6 |
| D: Single Unit Truck | 33 | 2.2 |
| E: Tractor Trailer Unit | 167 | 11.3 |
| **Total** | 1483 | |




| West On 509 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 188 | 93.5 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 2 | 1.0 |
| D: Single Unit Truck | 1 | 0.5 |
| E: Tractor Trailer Unit | 10 | 5.0 |
| **Total** | 201 | |

| East On Local Rd | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 72 | 92.3 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 4 | 5.1 |
| D: Single Unit Truck | 1 | 1.3 |
| E: Tractor Trailer Unit | 1 | 1.3 |
| **Total** | 78 | |

| South On 3 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 1444 | 86.7 |
| B: Recreational Vehicle | 6 | 0.4 |
| C: Bus | 7 | 0.4 |
| D: Single Unit Truck | 35 | 2.1 |
| E: Tractor Trailer Unit | 174 | 10.4 |
| **Total** | 1666 | |

**TURNING MOVEMENT ABBREVIATIONS**

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

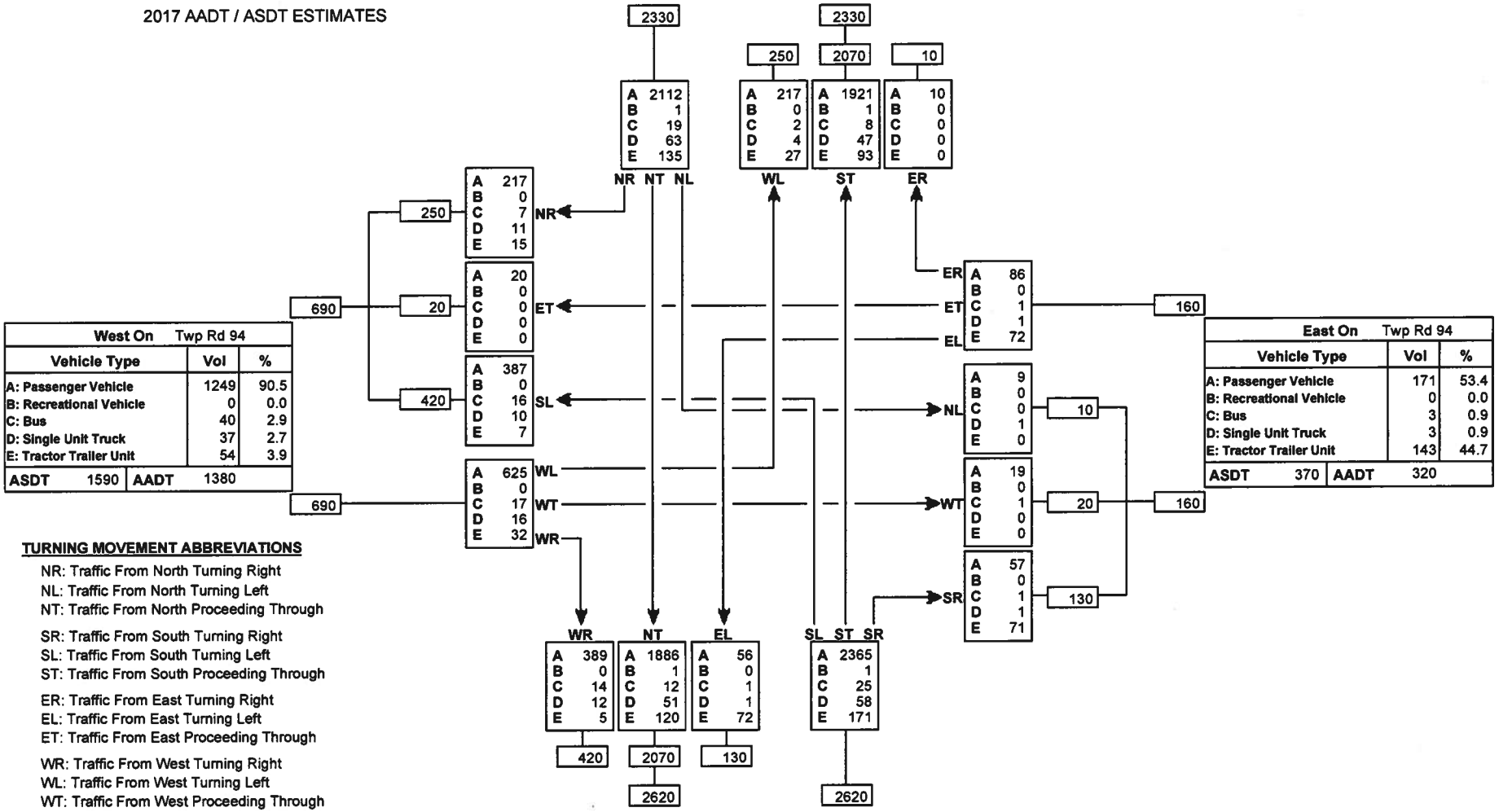
## Turning Movement Summary Diagram

**Reference No.:** 102062

**Intersection of:**
25 & KIPP RD 22-9-22-400000000

2017 AADT / ASDT ESTIMATES

| North On 25 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 4260 | 91.4 |
| B: Recreational Vehicle | 2 | 0.0 |
| C: Bus | 29 | 0.6 |
| D: Single Unit Truck | 114 | 2.4 |
| E: Tractor Trailer Unit | 255 | 5.5 |
| **ASDT** 5360 | **AADT** 4660 | |




| West On Twp Rd 94 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 1249 | 90.5 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 40 | 2.9 |
| D: Single Unit Truck | 37 | 2.7 |
| E: Tractor Trailer Unit | 54 | 3.9 |
| **ASDT** 1590 | **AADT** 1380 | |

| East On Twp Rd 94 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 171 | 53.4 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 3 | 0.9 |
| D: Single Unit Truck | 3 | 0.9 |
| E: Tractor Trailer Unit | 143 | 44.7 |
| **ASDT** 370 | **AADT** 320 | |

| South On 25 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 4696 | 89.6 |
| B: Recreational Vehicle | 2 | 0.0 |
| C: Bus | 52 | 1.0 |
| D: Single Unit Truck | 122 | 2.3 |
| E: Tractor Trailer Unit | 368 | 7.0 |
| **ASDT** 6030 | **AADT** 5240 | |

**TURNING MOVEMENT ABBREVIATIONS**

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

**TURNING MOVEMENT ABBREVIATIONS**

AADT: Annual Average Daily Traffic
Average daily traffic expressed as vehicles per day fo
period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehicles per day fo
period of May 1 to September 30 (153 days)

## Turning Movement Summary Diagram

**Reference No.:** 102062

**Intersection of:**
25 & KIPP RD 22-9-22-400000000

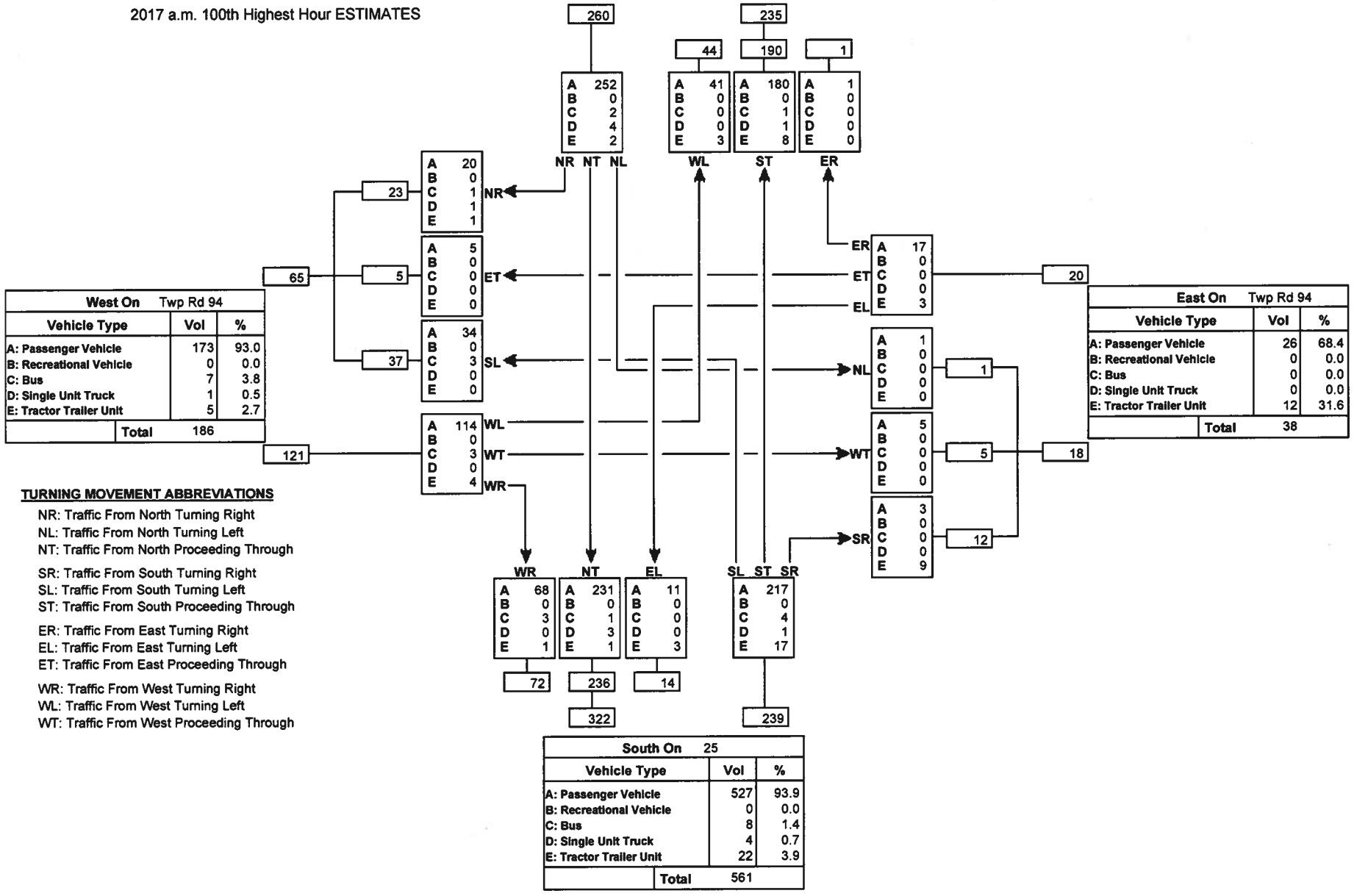
2017 a.m. 100th Highest Hour ESTIMATES

| North On 25 | | |
|---|---|---|
| Vehicle Type | Vol | % |
| A: Passenger Vehicle | 474 | 95.8 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 3 | 0.6 |
| D: Single Unit Truck | 5 | 1.0 |
| E: Tractor Trailer Unit | 13 | 2.6 |
| Total | 495 | |

| West On Twp Rd 94 | | |
|---|---|---|
| Vehicle Type | Vol | % |
| A: Passenger Vehicle | 173 | 93.0 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 7 | 3.8 |
| D: Single Unit Truck | 1 | 0.5 |
| E: Tractor Trailer Unit | 5 | 2.7 |
| Total | 186 | |

| East On Twp Rd 94 | | |
|---|---|---|
| Vehicle Type | Vol | % |
| A: Passenger Vehicle | 26 | 68.4 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 0 | 0.0 |
| D: Single Unit Truck | 0 | 0.0 |
| E: Tractor Trailer Unit | 12 | 31.6 |
| Total | 38 | |

| South On 25 | | |
|---|---|---|
| Vehicle Type | Vol | % |
| A: Passenger Vehicle | 527 | 93.9 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 8 | 1.4 |
| D: Single Unit Truck | 4 | 0.7 |
| E: Tractor Trailer Unit | 22 | 3.9 |
| Total | 561 | |




**TURNING MOVEMENT ABBREVIATIONS**

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

## Turning Movement Summary Diagram

**Reference No.:** 102062

**Intersection of:**
25 & KIPP RD 22-9-22-400000000

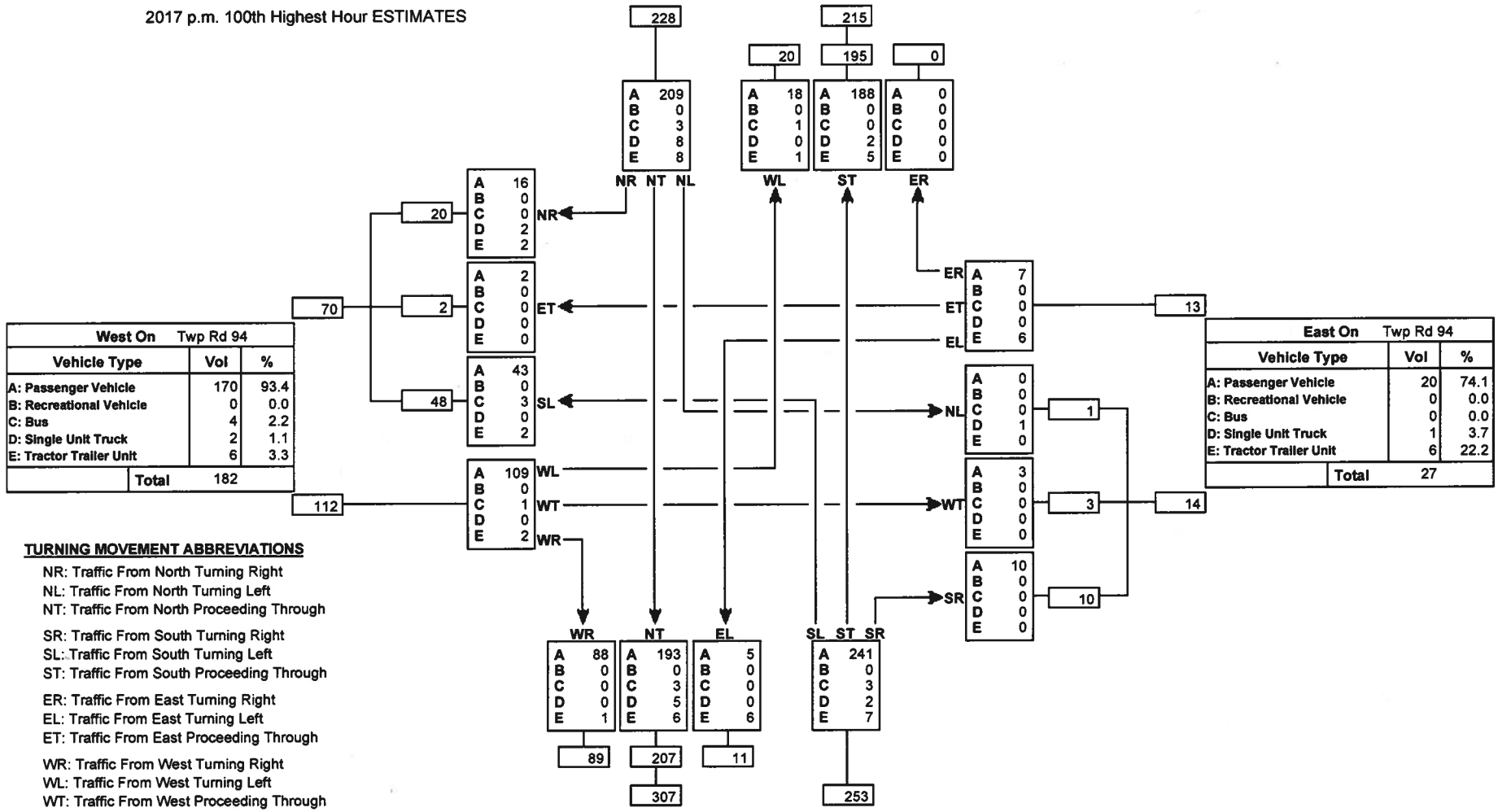
2017 p.m. 100th Highest Hour ESTIMATES

| North On 25 | | |
|---|---|---|
| Vehicle Type | Vol | % |
| A: Passenger Vehicle | 415 | 93.7 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 4 | 0.9 |
| D: Single Unit Truck | 10 | 2.3 |
| E: Tractor Trailer Unit | 14 | 3.2 |
| Total | 443 | |

| West On Twp Rd 94 | | |
|---|---|---|
| Vehicle Type | Vol | % |
| A: Passenger Vehicle | 170 | 93.4 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 4 | 2.2 |
| D: Single Unit Truck | 2 | 1.1 |
| E: Tractor Trailer Unit | 6 | 3.3 |
| Total | 182 | |

| East On Twp Rd 94 | | |
|---|---|---|
| Vehicle Type | Vol | % |
| A: Passenger Vehicle | 20 | 74.1 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 0 | 0.0 |
| D: Single Unit Truck | 1 | 3.7 |
| E: Tractor Trailer Unit | 6 | 22.2 |
| Total | 27 | |

| South On 25 | | |
|---|---|---|
| Vehicle Type | Vol | % |
| A: Passenger Vehicle | 527 | 94.1 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 6 | 1.1 |
| D: Single Unit Truck | 7 | 1.3 |
| E: Tractor Trailer Unit | 20 | 3.6 |
| Total | 560 | |

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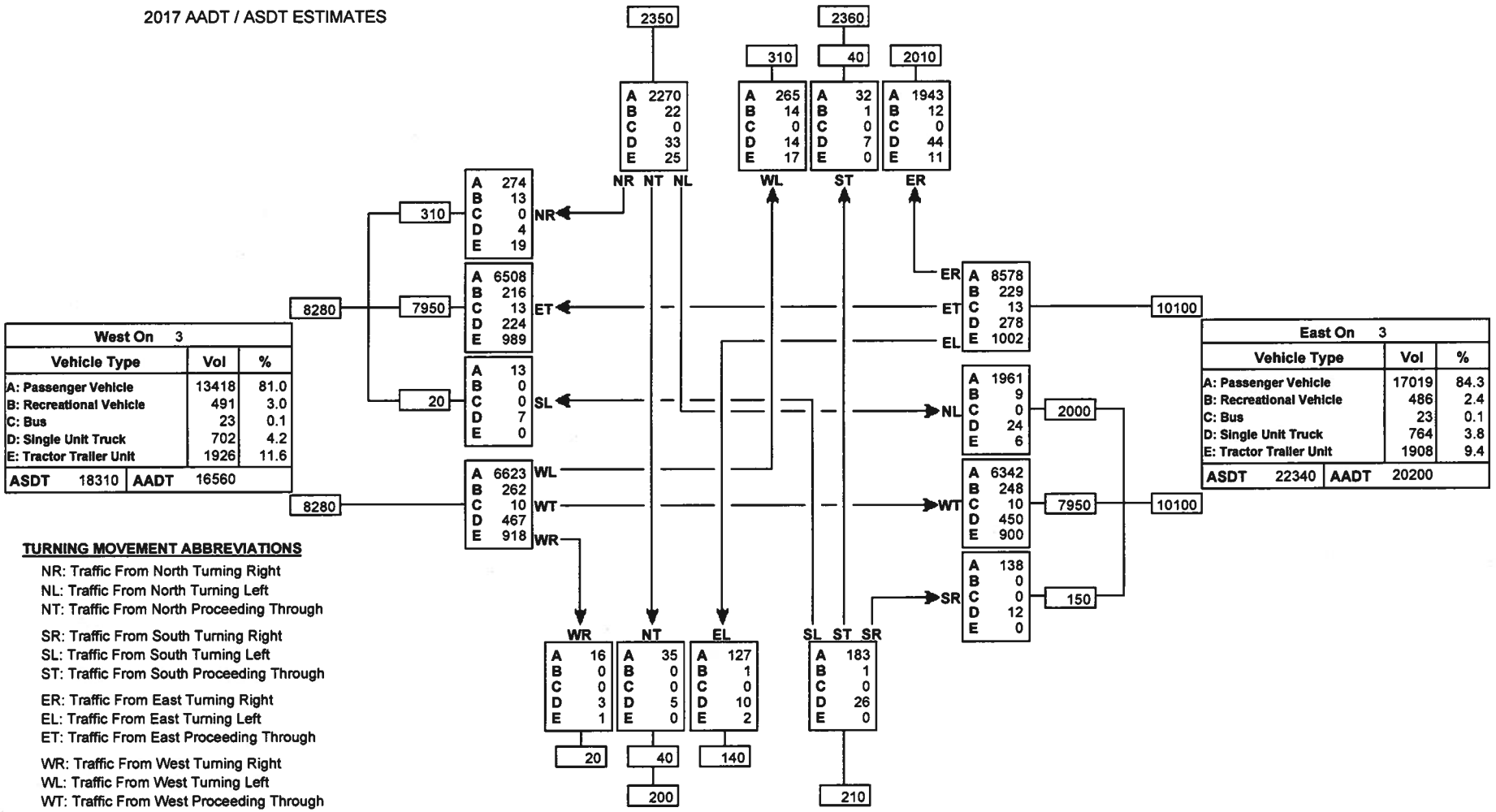
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

# Turning Movement Summary Diagram

**Reference No.:** 990090

**Intersection of:**
3 & COALHURST ACC 17-9-22-400000200

2017 AADT / ASDT ESTIMATES




## TURNING MOVEMENT ABBREVIATIONS

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WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

## TURNING MOVEMENT ABBREVIATIONS

AADT: Annual Average Daily Traffic
Average daily traffic expressed as vehicles per day fo
period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehicles per day fo
period of May 1 to September 30 (153 days)

## Turning Movement Summary Diagram

**Reference No.:** 990090

**Intersection of:**
3 & COALHURST ACC 17-9-22-400000200

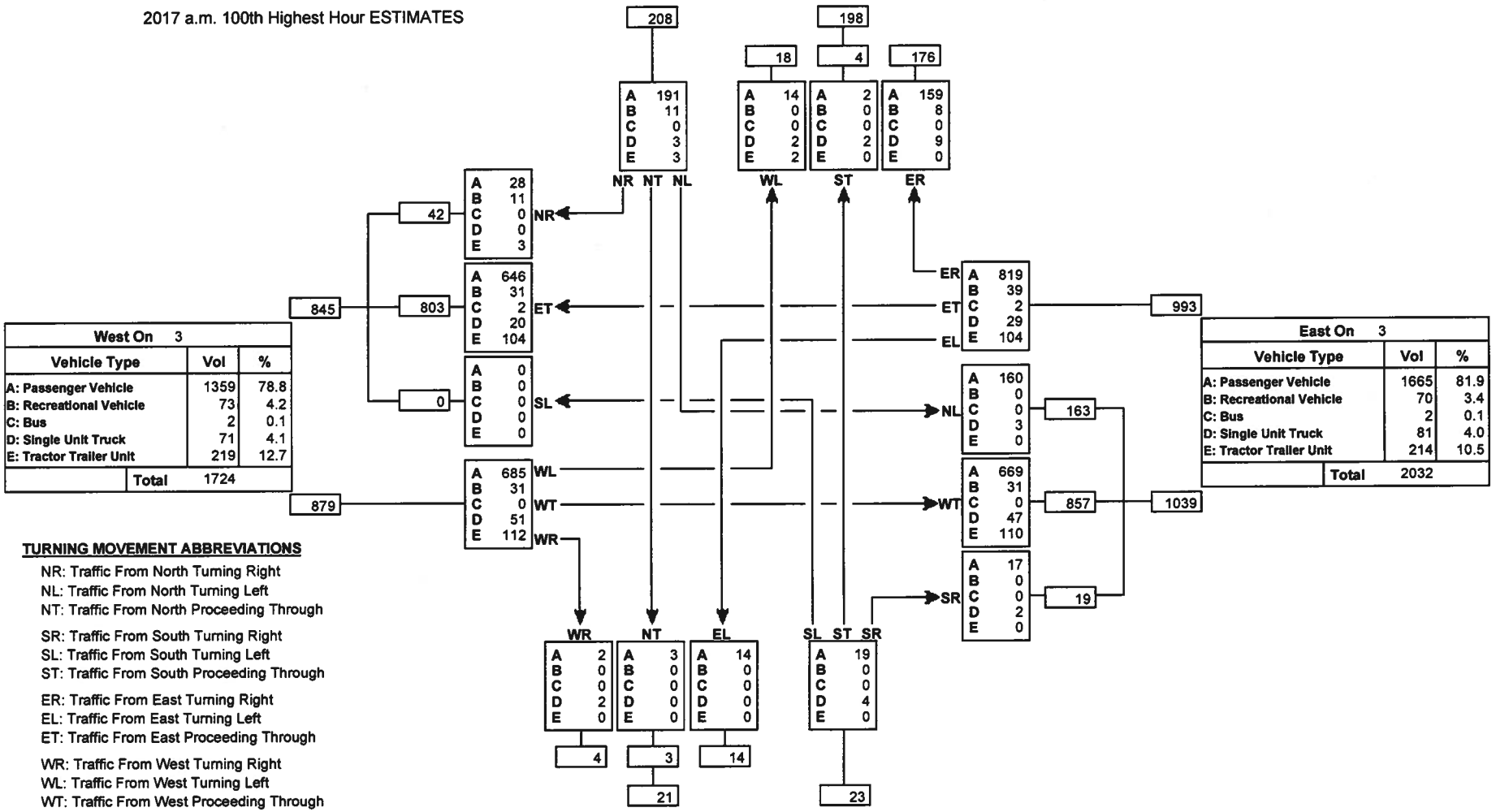
2017 a.m. 100th Highest Hour ESTIMATES

| North On 51 Ave | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 366 | 90.1 |
| B: Recreational Vehicle | 19 | 4.7 |
| C: Bus | 0 | 0.0 |
| D: Single Unit Truck | 16 | 3.9 |
| E: Tractor Trailer Unit | 5 | 1.2 |
| **Total** | 406 | |

| West On 3 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 1359 | 78.8 |
| B: Recreational Vehicle | 73 | 4.2 |
| C: Bus | 2 | 0.1 |
| D: Single Unit Truck | 71 | 4.1 |
| E: Tractor Trailer Unit | 219 | 12.7 |
| **Total** | 1724 | |

| East On 3 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 1665 | 81.9 |
| B: Recreational Vehicle | 70 | 3.4 |
| C: Bus | 2 | 0.1 |
| D: Single Unit Truck | 81 | 4.0 |
| E: Tractor Trailer Unit | 214 | 10.5 |
| **Total** | 2032 | |

| South On RiverRdgRd | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 38 | 86.4 |
| B: Recreational Vehicle | 0 | 0.0 |
| C: Bus | 0 | 0.0 |
| D: Single Unit Truck | 6 | 13.6 |
| E: Tractor Trailer Unit | 0 | 0.0 |
| **Total** | 44 | |

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## Turning Movement Summary Diagram

**Reference No.:** 990090

**Intersection of:**
3 & COALHURST ACC 17-9-22-400000200

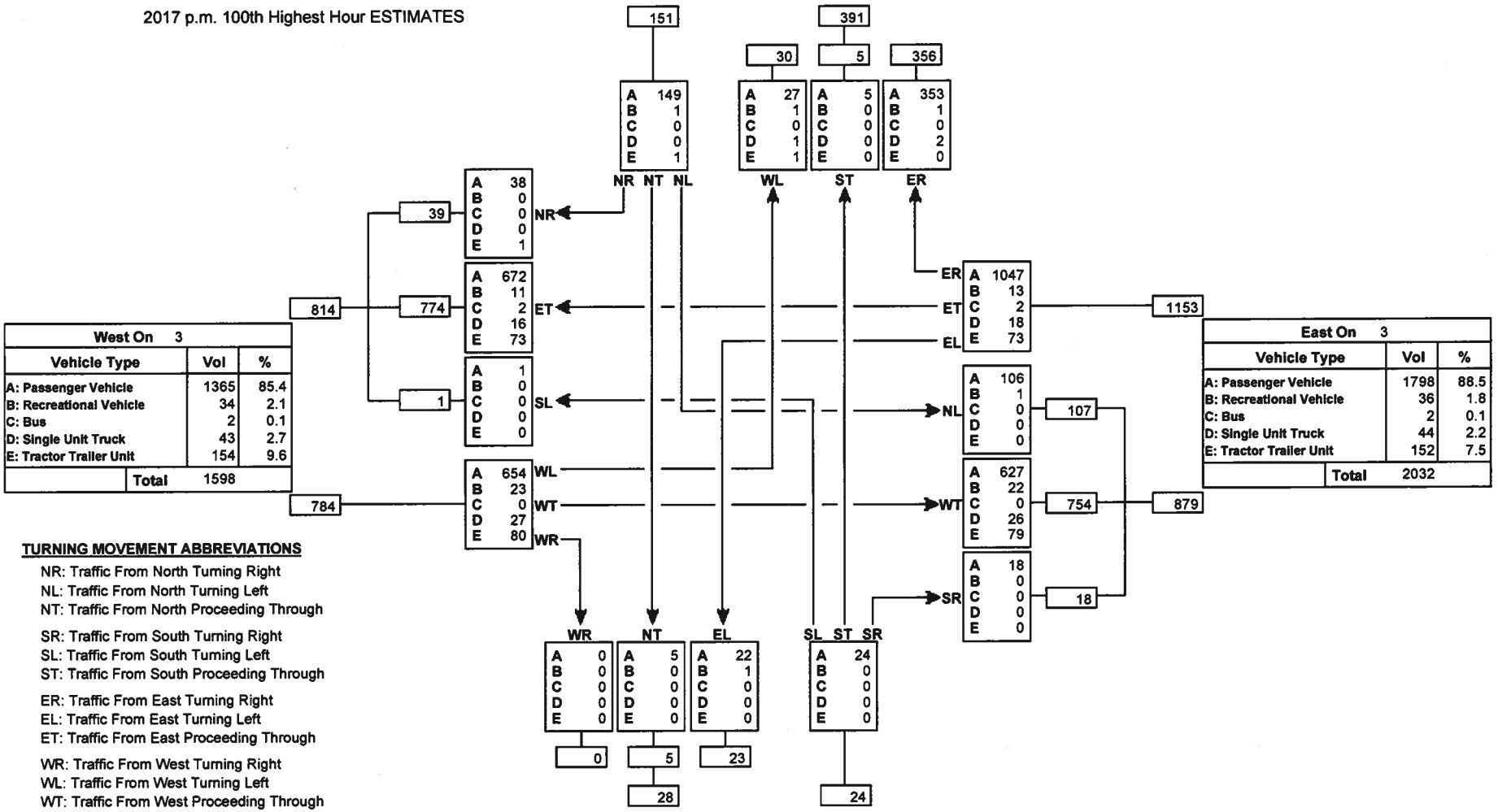
2017 p.m. 100th Highest Hour ESTIMATES

| North On 51 Ave | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 534 | 98.5 |
| B: Recreational Vehicle | 3 | 0.6 |
| C: Bus | 0 | 0.0 |
| D: Single Unit Truck | 3 | 0.6 |
| E: Tractor Trailer Unit | 2 | 0.4 |
| **Total** | 542 | |

| West On 3 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 1365 | 85.4 |
| B: Recreational Vehicle | 34 | 2.1 |
| C: Bus | 2 | 0.1 |
| D: Single Unit Truck | 43 | 2.7 |
| E: Tractor Trailer Unit | 154 | 9.6 |
| **Total** | 1598 | |

| East On 3 | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 1798 | 88.5 |
| B: Recreational Vehicle | 36 | 1.8 |
| C: Bus | 2 | 0.1 |
| D: Single Unit Truck | 44 | 2.2 |
| E: Tractor Trailer Unit | 152 | 7.5 |
| **Total** | 2032 | |

| South On RiverRdgRd | | |
|---|---|---|
| **Vehicle Type** | **Vol** | **%** |
| A: Passenger Vehicle | 51 | 98.1 |
| B: Recreational Vehicle | 1 | 1.9 |
| C: Bus | 0 | 0.0 |
| D: Single Unit Truck | 0 | 0.0 |
| E: Tractor Trailer Unit | 0 | 0.0 |
| **Total** | 52 | |

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WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

# Roadway Summary



## Segments included within the Report

| LRS | Length |
|---|---|
| 3:08 L1 0.000 - 47.159 | 47.159 |
| 3:08 L2 4.792 - 5.077 | 0.285 |
| 3:08 R1 0.000 - 47.487 | 47.487 |
| 25:02 C1 0.995 - 52.724 | 51.729 |
| 25:02 L1 0.000 - 0.994 | 0.994 |
| 25:02 R1 0.000 - 0.995 | 0.995 |
| **Total** | **148.649** |

## Length of Roadway (in Km) by Service Class

| Service Class | Length |
|---|---|
| LV 1 | 94.931 |
| LV 3 | 53.718 |

## Length of Paved and Gravel Roads (in Km)

| Surface | Length |
|---|---|
| PAVED | 148.649 |
| Total | 148.649 |

## Collision Summary for years 2012-2016

| | Total | Non Animal |
|---|---|---|
| Collision Rate in C/100MVKM | 64.34 | 43.27 |
| # of Fatal Collisions | 13 | 13 |
| # of Injury Collisions | 132 | 125 |
| # of Property Damage Only Collisions | 594 | 359 |
| Total # of collisions | 739 | 497 |

## Existing Width and Curve Summary

| | Typical | Weighted | Max | Min | Total |
|---|---|---|---|---|---|
| Existing Width | 10.50 | 10.9 | 20.40 | 5.20 | |
| Existing WAADT | 890.00 | 6,423 | 17,216.00 | 890.00 | |
| Growth Rate % | 1.5 | 1.8 | 2.2 | 0.5 | |
| Speed | 110 | | 110 | 50 | |
| Horizontal Curve Radius | | | 12,700 | 152 | 62 |
| Vertical Curve k (Crest) | | | 970 | 45 | 107 |
| Vertical Curve k (Sag) | | | 1,860 | 39 | 123 |

## Paving History

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

## Intersection Summary Report



| LRS | Intersection Site # | Description | Type |
|---|---|---|---|
| 3:08 L1 0.001 | 32 | HIGHWAY 2:08 AND 3:06 AND 3:08 | DR |
| 3:08 L1 1.641 | 1916 | HIGHWAY 3:08 AND SERVICE ROAD IN FORT MACLEOD | AG |
| 3:08 L1 2.523 | 1915 | HIGHWAY 3:08 AND LYNDON ROAD AND 21 STREET | AG |
| 3:08 L1 2.858 | 8155 | HIGHWAY 3:08 (WESTBOUND) AND 23 STREET | AG |
| 3:08 L1 2.965 | 8156 | HIGHWAY 3:08 (WESTBOUND) AND 2 AVENUE | AG |
| 3:08 L1 3.171 | 8157 | HIGHWAY 3:08 (WESTBOUND) AND 3 AVENUE | AG |
| 3:08 L1 3.374 | 8159 | HIGHWAY 3:08 (WESTBOUND) AND 4 AVENUE | AG |
| 3:08 L1 3.578 | 8161 | HIGHWAY 3:08 (WESTBOUND) AND 5 AVENUE | AG |
| 3:08 L1 3.777 | 4132 | HIGHWAY 3:08 WESTBOUND AND 811:02 | AG |
| 3:08 L1 4.047 | 1971 | HIGHWAY 3:08 AND FORT MACLEOD HOSPITAL ACCESS | AG |
| 3:08 L1 4.385 | 8163 | HIGHWAY 3:08 AND SERVICE ROAD ACCESS | AG |
| 3:08 L1 4.588 | 1972 | HIGHWAY 3:08 AND 18 STREET | AG |
| 3:08 L1 4.975 | 1973 | HIGHWAY 3:08 AND 2:06 | AG |
| 3:08 L1 6.858 | 1981 | HIGHWAY 3:08 AND ORTON ROAD | AG |
| 3:08 L1 9.079 | 8164 | HIGHWAY 3:08 AND MUNICIPAL ROAD | AG |
| 3:08 L1 10.114 | 8165 | HIGHWAY 3:08 AND MUNICIPAL ROAD | AG |
| 3:08 L1 12.413 | 8166 | HIGHWAY 3:08 AND MUNICIPAL ROAD | AG |
| 3:08 L1 15.594 | 8167 | HIGHWAY 3:08 AND MUNICIPAL ROAD | AG |
| 3:08 L1 17.399 | 1168 | HIGHWAY 3:08 AND RANGE ROAD 250 | AG |
| 3:08 L1 19.030 | 8168 | HIGHWAY 3:08 AND MUNICIPAL ROAD | AG |
| 3:08 L1 20.660 | 8169 | HIGHWAY 3:08 AND MUNICIPAL ROAD | AG |
| 3:08 L1 22.381 | 8170 | HIGHWAY 3:08 AND MUNICIPAL ROAD | AG |
| 3:08 L1 23.970 | 8171 | HIGHWAY 3:08 AND MUNICIPAL ROAD | AG |
| 3:08 L1 25.777 | 1159 | HIGHWAY 3:08 AND 3A:08 AND MOON RIVER ACCESS ROAD | AG |
| 3:08 L1 31.086 | 80 | HIGHWAY 3:08 AND 3A:08 | DR |
| 3:08 L1 35.736 | 8172 | HIGHWAY 3:08 AND MUNICIPAL ROAD | AG |
| 3:08 L1 40.318 | 241 | HIGHWAY 3:08 AND 509:02 AND MUNICIPAL ROAD (URBAN ACCESS ROAD 205) | TYPE 10C |
| 3:08 L1 45.680 | 76 | HIGHWAY 3:08 AND 3A:09 | DR |
| 3:08 R1 2.907 | 2566 | HIGHWAY 3:08 EASTBOUND AND 2 AVENUE | AG |
| 3:08 R1 3.106 | 8158 | HIGHWAY 3:08 (EASTBOUND) AND 3 AVENUE | AG |
| 3:08 R1 3.310 | 8160 | HIGHWAY 3:08 (EASTBOUND) AND 4 AVENUE | AG |
| 3:08 R1 3.512 | 8162 | HIGHWAY 3:08 (EASTBOUND) AND 5 AVENUE | AG |
| 3:08 R1 3.707 | 24681 | HIGHWAY 3:08 EASTBOUND AND 811:02 | AG |
| 25:02 C1 1.059 | 13508 | HIGHWAY 25:02 AND TOWNSHIP ROAD 91B | AG |
| 25:02 C1 1.618 | 13509 | HIGHWAY 25:02 AND TOWNSHIP ROAD 92 | AG |
| 25:02 C1 4.045 | 347 | HIGHWAY 25:02 AND COALHURST ACCESS ROAD (OLD APPROACH ROAD 179) | TYPE 4A |
| 25:02 C1 4.860 | 4657 | HIGHWAY 25:02 AND KIPP ROAD | AG |
| 25:02 C1 6.619 | 227 | HIGHWAY 25:02 AND PARK ROAD 101 | AG |
| 25:02 C1 8.708 | 13510 | HIGHWAY 25:02 AND RANGE ROAD 221 | AG |
| 25:02 C1 9.755 | 13511 | HIGHWAY 25:02 AND MUNICIPAL ROAD | AG |
| 25:02 C1 10.911 | 13513 | HIGHWAY 25:02 AND BULYEA AVENUE IN COUNTY OF LETHBRIDGE | AG |
| 25:02 C1 11.336 | 1767 | HIGHWAY 25:02 AND MCKECHNEY AVENUE | AG |
| 25:02 C1 12.390 | 13514 | HIGHWAY 25:02 AND WOOD AVENUE | AG |

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# Width Sufficiency Report



## Report Notes

| | |
|---|---|
| Number of results found | 53 |
| WSI | WIDTH COLLISION COST PER KILOMETER |
| WSNA | WIDTH NON-ANIMAL COLLISION RATE |
| WNT | WIDTH TOTAL COLLISION RATE |

Width collision data is obtained from the overlapping safety segment

Collision Cost in $/km (M) over 5 years

Collision Rate in C/100MVKM

Collision rate is calculated as (sum total collisions over 5 years * 100 Mil) / (sum of AADT history for the same 5 years * 365.25 * length (km))

Collision cost is calculated as (sum of collisions involving a fatality * $9,120,367) + (sum of collisions involving a serious injury * $66,744) + (sum of collisions involving a minor injury * $66,744) + (sum of the property damage only collisions * $5,851)/km)

Growth Rate in %

| | | | | | Grade Widening Deltas | | | | | | | | HPMA First Rehab | | | | | Worst Safety Delta | | Year 0 | | | | Region |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LRS | Len | Exist Width | Serv Class | # Lanes | Need Year | Sch Year | Pred Width | 3R 4R BM | Δ | NC BM | Pred WAADT | Notes | Need Year | Pred Width | 3R 4R | WAADT | PL/CL | Type | Δ | Pred Width | 3R 4R | WAADT | Growth Rate | |
| 3:08 L1 0.000 - 0.040 | 0.04 | | LV 1 | 2 | | | | | | | | | | | | | | | | | | 9,490 | 1.20 | 1 |
| 3:08 L1 0.040 - 0.860 | 0.82 | 12.80 | LV 1 | 2 | | | | | | 12 | | | 2028 | 12.20 | 9.5 | 5,375 | | WNT | -6.3 | 12.80 | 9.5 | 9,490 | 1.20 | 1 |
| 3:08 L1 0.860 - 2.130 | 1.27 | | LV 1 | 2 | | | | | | | | | | | | | | | | | | 9,490 | 1.20 | 1 |
| 3:08 L1 2.130 - 3.840 | 1.71 | | LV 1 | 2 | | | | | | | | | | | | | | | | | | 9,490 | 1.20 | 1 |
| 3:08 L1 3.840 - 5.077 | 1.237 | 12.60 | LV 1 | 2 | | | | | | 12 | | | 2028 | 12.00 | 9.5 | 5,375 | | WNT | 83.2 | 12.60 | 9.5 | 9,490 | 1.20 | 1 |
| 3:08 L1 5.077 - 5.810 | 0.733 | 11.30 | LV 1 | 2 | 2067 | 2067 | 9 | 9.5 | -0.8 | 12 | 20,418 | | 2028 | 10.30 | 9.5 | 5,086 | | WSNA | 5.9 | 11.30 | 9.5 | 8,180 | 2.20 | 1 |
| 3:08 L1 5.810 - 6.260 | 0.45 | 13.40 | LV 1 | 2 | | | | | | 12 | | | 2028 | 12.80 | 9.5 | 5,086 | | WSNA | 3.1 | 13.40 | 9.5 | 8,180 | 2.20 | 1 |
| 3:08 L1 6.260 - 8.000 | 1.74 | 11.30 | LV 1 | 2 | 2067 | 2067 | 9 | 9.5 | -0.4 | 12 | 20,418 | | 2028 | 10.70 | 9.5 | 5,086 | | WSI | -1.8 | 11.30 | 9.5 | 8,180 | 2.20 | 1 |
| 3:08 L1 8.000 - 13.447 | 5.447 | 11.40 | LV 1 | 2 | 2067 | 2067 | 9 | 9.5 | -0.3 | 12 | 20,418 | | 2025 | 10.80 | 9.5 | 4,807 | | WSI | -1.8 | 11.40 | 9.5 | 8,180 | 2.20 | 1 |
| 3:08 L1 13.447 - 16.460 | 3.013 | 12.00 | LV 1 | 2 | | | | | | 12 | | | 2025 | 11.40 | 9.5 | 4,807 | | WSNA | 24.7 | 12.00 | 9.5 | 8,180 | 2.20 | 1 |
| 3:08 L1 16.460 - 19.100 | 2.64 | 11.10 | LV 1 | 2 | 2067 | 2067 | 9 | 9.5 | -0.6 | 12 | 20,418 | | 2025 | 10.50 | 9.5 | 4,807 | | WNT | 49.6 | 11.10 | 9.5 | 8,180 | 2.20 | 1 |
| 3:08 L1 19.100 - 20.810 | 1.71 | 11.70 | LV 1 | 2 | | | | | | 12 | | | 2025 | 11.10 | 9.5 | 4,807 | | WNT | -21.3 | 11.70 | 9.5 | 8,180 | 2.20 | 1 |
| 3:08 L1 20.810 - 26.112 | 5.302 | 12.40 | LV 1 | 2 | | | | | | 12 | | | 2028 | 11.80 | 9.5 | 5,086 | | WNT | -21.3 | 12.40 | 9.5 | 8,180 | 2.20 | 1 |
| 3:08 L1 26.112 - 32.281 | 6.169 | 12.40 | LV 1 | 2 | | | | | | 12 | | | 2028 | 11.80 | 9.5 | 4,501 | | WNT | -21.3 | 12.40 | 9.5 | 7,720 | 1.50 | 1 |
| 3:08 L1 32.281 - 33.330 | 1.049 | 12.80 | LV 1 | 2 | | | | | | 12 | | | 2028 | 12.20 | 9.5 | 9,457 | | WNT | 25.7 | 12.80 | 9.5 | 16,220 | 1.50 | 1 |
| 3:08 L1 33.330 - 38.350 | 5.02 | 12.00 | LV 1 | 2 | | | | | | 12 | | | 2028 | 11.40 | 9.5 | 9,457 | | WSI | 0.7 | 12.00 | 9.5 | 16,220 | 1.50 | 1 |
| 3:08 L1 38.350 - 38.850 | 0.5 | 11.90 | LV 1 | 2 | | | | | | 12 | | | 2028 | 11.30 | 9.5 | 9,457 | | WSI | 0.7 | 11.90 | 9.5 | 16,220 | 1.50 | 1 |
| 3:08 L1 38.850 - 45.136 | 6.286 | 12.00 | LV 1 | 2 | | | | | | 12 | | | 2028 | 11.40 | 9.5 | 9,457 | | WSI | 0.7 | 12.00 | 9.5 | 16,220 | 1.50 | 1 |
| 3:08 L1 45.136 - 47.159 | 2.023 | 11.50 | LV 1 | 2 | 2067 | 2067 | 9 | 9.5 | -0.2 | 12 | 35,490 | | 2028 | 10.90 | 9.5 | 10,207 | | WSI | -4.1 | 11.50 | 9.5 | 17,216 | 1.67 | 1 |
| 3:08 L2 4.792 - 5.077 | 0.285 | | LV 1 | 2 | | | | | | | | | | | | | | | | | | 9,490 | 1.20 | 1 |
| 3:08 R1 0.000 - 2.120 | 2.12 | 11.30 | LV 1 | 2 | 2067 | 2067 | 9 | 9.5 | -0.6 | 12 | 16,322 | | 2028 | 10.50 | 9.5 | 5,375 | | WNT | 10.4 | 11.30 | 9.5 | 9,490 | 1.20 | 1 |
| 3:08 R1 2.120 - 4.501 | 2.381 | | LV 1 | 2 | | | | | | | | | | | | | | | | | | 9,490 | 1.20 | 1 |
| 3:08 R1 4.501 - 4.754 | 0.253 | 12.60 | LV 1 | 2 | | | | | | 12 | | | 2028 | 11.50 | 9.5 | 5,375 | | WNT | 34.9 | 12.60 | 9.5 | 9,490 | 1.20 | 1 |
| 3:08 R1 4.754 - 5.077 | 0.323 | 12.60 | LV 1 | 2 | | | | | | 12 | | | 2028 | 11.50 | 9.5 | 5,375 | | WNT | -63.5 | 12.60 | 9.5 | 9,490 | 1.20 | 1 |

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

Alberta Transportation

# TIMS Network Expansion Support System (NESS)

## TIMS Geometric Report

Eric Dyson
2018 Oct 01 15:18

| | | | | | Grade Widening Deltas | | | | | | | | HPMA First Rehab | | | | | Worst Safety Delta | | Year 0 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LRS | Len | Exist Width | Serv Class | # Lanes | Need Year | Sch Year | Pred Width | 3R 4R BM | Δ | NC BM | Pred WAADT | Notes | Need Year | Pred Width | 3R 4R | WAADT | PL/CL | Type | Δ | Pred Width | 3R 4R | WAADT | Growth Rate | Region |
| 25:02 C1 31.350 - 52.724 | 21.374 | 10.50 | LV 3 | 2 | | | | | | 10 | | | 2026 | 9.90 | 7.4 | 963 | | WSNA | 22.9 | 10.50 | 7.4 | 890 | 0.86 | 1 |
| 25:02 L1 0.000 - 0.994 | 0.994 | 5.20 | LV 3 | 1 | | | | | | | | | 2029 | 4.40 | | 2,663 | | WSNA | -11.0 | 5.20 | | 4,650 | 1.20 | 1 |
| 25:02 R1 0.000 - 0.995 | 0.995 | 5.20 | LV 3 | 1 | | | | | | | | | 2029 | 4.40 | | 2,663 | | WSI | -9.1 | 5.20 | | 4,650 | 1.20 | 1 |

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

# Width Safety Report



## Report Notes

Number of results found 39

Collision Cost in $/km (M) over 5 years

Collision Rate in C/100MVKM

Collision rate is calculated as (sum total collisions over 5 years * 100 Mil) / (sum of AADT history for the same 5 years * 365.25 * length (km))

Collision cost is calculated as (sum of collisions involving a fatality * $9,120,367) + (sum of collisions involving a serious injury * $66,744) + (sum of collisions involving a minor injury * $66,744) + (sum of the property damage only collisions * $5,851)/km)

| | | Existing | | | Collision Frequency | | | | Total Rate | | | Non Animal Rate | | | Collision Cost (M) | | | Safety | Region |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LRS | Len | WAADT | Width | Paved Y/N | Total | Fatal | Injury | Non Animal | Actual | BM | Δ | Actual | BM | Δ | Actual | BM | Δ | Issues | |
| 3:08 L1 0.000 - 0.040 | 0.04 | 9,490 | | Y | 0 | 0 | 0 | 0 | | | | | | | | | | No | 1 |
| 3:08 L1 0.040 - 0.860 | 0.82 | 9,490 | 12.80 | Y | 4 | 0 | 0 | 0 | 63.2 | 57.0 | -6.3 | 0.0 | 33.9 | 33.9 | 0.029 | 1.003 | 0.975 | Yes | 1 |
| 3:08 L1 0.860 - 2.130 | 1.27 | 9,490 | | Y | 2 | 1 | 0 | 1 | | | | | | | | | | No | 1 |
| 3:08 L1 2.130 - 3.840 | 1.71 | 9,490 | | Y | 16 | 0 | 2 | 11 | | | | | | | | | | No | 1 |
| 3:08 L1 3.840 - 5.077 | 1.237 | 9,490 | 12.60 | Y | 10 | 0 | 1 | 4 | 104.8 | 188.0 | 83.2 | 41.9 | 177.0 | 135.0 | 0.097 | 1.003 | 0.907 | No | 1 |
| 3:08 L1 5.077 - 5.810 | 0.733 | 8,180 | 11.30 | Y | 2 | 0 | 0 | 2 | 37.8 | 65.4 | 27.6 | 37.8 | 43.7 | 5.9 | 0.016 | 0.816 | 0.800 | No | 1 |
| 3:08 L1 5.810 - 6.260 | 0.45 | 8,180 | 13.40 | Y | 1 | 0 | 0 | 1 | 30.8 | 57.0 | 26.2 | 30.8 | 33.9 | 3.1 | 0.013 | 1.003 | 0.990 | No | 1 |
| 3:08 L1 6.260 - 13.447 | 7.187 | 8,180 | 11.40 | Y | 22 | 2 | 2 | 11 | 42.4 | 65.4 | 23.0 | 21.2 | 43.7 | 22.5 | 2.571 | 0.816 | -1.755 | Yes | 1 |
| 3:08 L1 13.447 - 16.460 | 3.013 | 8,180 | 12.00 | Y | 3 | 0 | 1 | 2 | 13.8 | 57.0 | 43.2 | 9.2 | 33.9 | 24.7 | 0.026 | 0.794 | 0.768 | No | 1 |
| 3:08 L1 16.460 - 19.100 | 2.64 | 8,180 | 11.10 | Y | 3 | 0 | 0 | 1 | 15.7 | 65.4 | 49.6 | 5.2 | 43.7 | 38.5 | 0.007 | 0.816 | 0.810 | No | 1 |
| 3:08 L1 19.100 - 32.281 | 13.181 | 7,970 | 12.30 | Y | 76 | 0 | 11 | 32 | 79.5 | 58.2 | -21.3 | 33.5 | 32.2 | -1.3 | 0.085 | 0.794 | 0.709 | Yes | 1 |
| 3:08 L1 32.281 - 33.330 | 1.049 | 16,220 | 12.80 | Y | 4 | 0 | 1 | 1 | 26.3 | 52.0 | 25.7 | 6.6 | 36.2 | 29.6 | 0.080 | 1.003 | 0.923 | No | 1 |
| 3:08 L1 33.330 - 45.136 | 11.806 | 16,220 | 12.00 | Y | 86 | 0 | 15 | 65 | | | | | | | 0.120 | 0.794 | 0.674 | No | 1 |
| 3:08 L1 45.136 - 47.159 | 2.023 | 17,216 | 11.50 | Y | 41 | 1 | 9 | 38 | 130.4 | 59.7 | -70.7 | 120.8 | 46.6 | -74.2 | 4.895 | 0.816 | -4.079 | Yes | 1 |
| 3:08 L2 4.792 - 5.077 | 0.285 | 9,490 | | Y | 0 | 0 | 0 | 0 | | | | | | | | | | No | 1 |
| 3:08 R1 0.000 - 2.120 | 2.12 | 9,490 | 11.30 | Y | 9 | 0 | 0 | 3 | 55.0 | 65.4 | 10.4 | 18.3 | 43.7 | 25.4 | 0.025 | 0.816 | 0.791 | No | 1 |
| 3:08 R1 2.120 - 4.500 | 2.38 | 9,490 | | Y | 32 | 0 | 6 | 31 | | | | | | | | | | No | 1 |
| 3:08 R1 4.500 - 4.754 | 0.254 | 9,490 | 12.60 | Y | 3 | 0 | 1 | 2 | 153.1 | 188.0 | 34.9 | 102.1 | 177.0 | 74.9 | 0.309 | 1.003 | 0.694 | No | 1 |
| 3:08 R1 4.754 - 5.077 | 0.323 | 9,490 | 12.60 | Y | 3 | 0 | 1 | 1 | 120.4 | 57.0 | -63.5 | 40.1 | 33.9 | -6.2 | 0.243 | 1.003 | 0.760 | Yes | 1 |
| 3:08 R1 5.077 - 13.630 | 8.553 | 8,180 | 12.60 | Y | 29 | 1 | 7 | 19 | 47.0 | 57.0 | 10.0 | 30.8 | 33.9 | 3.1 | 1.135 | 1.003 | -0.132 | Yes | 1 |
| 3:08 R1 13.630 - 15.120 | 1.49 | 8,180 | 12.40 | Y | 0 | 0 | 0 | 0 | 0.0 | 57.0 | 57.0 | 0.0 | 33.9 | 33.9 | 0.000 | 0.794 | 0.794 | No | 1 |
| 3:08 R1 15.120 - 21.090 | 5.97 | 8,180 | 12.60 | Y | 9 | 0 | 2 | 8 | 20.9 | 57.0 | 36.1 | 18.6 | 33.9 | 15.3 | 0.029 | 1.003 | 0.974 | No | 1 |
| 3:08 R1 21.090 - 32.281 | 11.191 | 7,928 | 12.10 | Y | 48 | 1 | 10 | 24 | 59.1 | 58.2 | -0.9 | 29.6 | 32.2 | 2.6 | 0.894 | 0.794 | -0.100 | Yes | 1 |
| 3:08 R1 32.281 - 34.080 | 1.799 | 16,220 | 15.40 | Y | 7 | 0 | 1 | 4 | 26.8 | 52.0 | 25.2 | 15.3 | 36.2 | 20.8 | 0.057 | 1.010 | 0.953 | No | 1 |
| 3:08 R1 34.080 - 47.487 | 13.407 | 16,414 | 11.00 | Y | 77 | 3 | 11 | 53 | 39.0 | 59.7 | 20.7 | 26.8 | 46.6 | 19.8 | 2.123 | 0.816 | -1.307 | Yes | 1 |
| 25:02 C1 0.995 - 10.199 | 9.204 | 4,650 | 9.60 | Y | 73 | 1 | 12 | 44 | 97.0 | 91.7 | -5.4 | 58.5 | 43.3 | -15.2 | 1.116 | 0.519 | -0.597 | Yes | 1 |
| 25:02 C1 10.199 - 19.824 | 9.625 | 3,540 | 9.70 | Y | 39 | 0 | 10 | 28 | 64.1 | 92.8 | 28.7 | 46.0 | 41.1 | -4.9 | 0.087 | 0.519 | 0.432 | Yes | 1 |
| 25:02 C1 19.824 - 20.500 | 0.676 | 4,120 | 10.40 | Y | 6 | 0 | 3 | 6 | 119.0 | 91.6 | -27.3 | 119.0 | 42.2 | -76.8 | 0.322 | 0.519 | 0.197 | Yes | 1 |
| 25:02 C1 20.500 - 21.400 | 0.9 | 4,120 | 11.00 | Y | 2 | 0 | 2 | 2 | 29.8 | 80.1 | 50.3 | 29.8 | 40.7 | 10.9 | 0.148 | 0.816 | 0.668 | No | 1 |
| 25:02 C1 21.400 - 23.361 | 1.961 | 4,120 | 12.00 | Y | 7 | 1 | 0 | 5 | 47.8 | 74.8 | 26.9 | 34.2 | 34.3 | 0.2 | 4.669 | 0.794 | -3.875 | Yes | 1 |

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

Alberta Transportation

# TIMS Network Expansion Support System (NESS)

## TIMS Geometric Report

Eric Dyson
2018 Oct 01 15:18

| | | Existing | | | Collision Frequency | | | | Total Rate | | | Non Animal Rate | | | Collision Cost (M) | | | Safety | Region |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LRS | Len | WAADT | Width | Paved Y/N | Total | Fatal | Injury | Non Animal | Actual | BM | Δ | Actual | BM | Δ | Actual | BM | Δ | Issues | |
| 25:02 C1 23.361 - 23.720 | 0.359 | 4,120 | 12.00 | Y | 3 | 0 | 1 | 3 | 112.0 | 188.0 | 76.0 | 112.0 | 177.0 | 65.0 | 0.219 | 0.794 | 0.575 | ~~No~~ | 1 |
| 25:02 C1 23.720 - 24.310 | 0.59 | 4,120 | 13.40 | Y | 2 | 0 | 0 | 2 | 45.4 | 188.0 | 142.5 | 45.4 | 177.0 | 131.5 | 0.020 | 1.003 | 0.983 | ~~No~~ | 1 |
| 25:02 C1 24.310 - 24.889 | 0.579 | 4,120 | 20.40 | Y | 3 | 0 | 0 | 2 | 69.4 | 188.0 | 118.5 | 46.3 | 177.0 | 130.7 | 0.030 | 1.010 | 0.980 | ~~No~~ | 1 |
| 25:02 C1 24.889 - 30.148 | 5.259 | 1,470 | 10.60 | Y | 10 | 1 | 3 | 9 | 70.9 | 118.1 | 47.2 | 63.8 | 42.0 | ***-21.8*** | 1.779 | 0.816 | ***-0.963*** | Yes | 1 |
| 25:02 C1 30.148 - 31.350 | 1.202 | 1,030 | 10.60 | Y | 2 | 0 | 0 | 1 | 87.9 | 118.1 | 30.2 | 44.0 | 42.0 | ***-2.0*** | 0.010 | 0.816 | 0.806 | Yes | 1 |
| 25:02 C1 31.350 - 42.406 | 11.056 | 1,030 | 10.50 | Y | 4 | 0 | 0 | 4 | 19.1 | 118.1 | 99.0 | 19.1 | 42.0 | 22.9 | 0.002 | 0.519 | 0.517 | ~~No~~ | 1 |
| 25:02 C1 42.406 - 52.724 | 10.318 | 740 | 10.50 | Y | 6 | 0 | 2 | 5 | 44.7 | 135.2 | 90.5 | 37.3 | 46.6 | 9.3 | 0.015 | 0.519 | 0.504 | ~~No~~ | 1 |
| 25:02 L1 0.000 - 0.994 | 0.994 | 4,650 | 5.20 | Y | 2 | 0 | 1 | 2 | 49.2 | 68.2 | 19.0 | 49.2 | 38.2 | ***-11.0*** | 0.073 | 0.378 | 0.305 | Yes | 1 |
| 25:02 R1 0.000 - 0.995 | 0.995 | 4,650 | 5.20 | Y | 13 | 1 | 4 | 12 | 319.7 | 68.2 | ***-251.4*** | 295.1 | 38.2 | ***-256.8*** | 9.482 | 0.378 | ***-9.104*** | Yes | 1 |

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

# Multilane Report



## Report Notes

| | |
|---|---|
| Number of results found | 18 |
| 4 Lane - Lv 1 | 7500 |
| 4 Lane - Lv 2 | 9300 |
| 4 Lane - Lv 3 | 11200 |
| 4 Lane - Lv 4 | 11200 |
| 6 Lane | 31000 |
| 8 Lane | 50000 |
| Growth Rate in % | |
| Collision Cost in $/km (M) over 5 years | |
| Collision Rate in C/100MVKM | |

Collision rate is calculated as (sum total collisions over 5 years * 100 Mil) / (sum of AADT history for the same 5 years * 365.25 * length (km))

Collision cost is calculated as (sum of collisions involving a fatality * $9,120,367) + (sum of collisions involving a serious injury * $66,744) + (sum of collisions involving a minor injury * $66,744) + (sum of the property damage only collisions * $5,851)/km)

| | | | | WAADT | | LOS | | | NESS Sched | | 4 lane | | 6 lane | | 8 lane | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LRS | Len | Serv Class | # Lanes | Year 0 | Year 20 | Year 0 | Year 20 | Growth Rate | 1st Work Year | WAADT | Need Year | WAADT | Need Year | WAADT | Need Year | WAADT | Notes | Region |
| 3:08 L1 0.000 - 2.130 | 2.13 | LV 1 | 4 | 9,490 | 11,770 | A | A | 1.20 | | | | | | | | | | 1 |
| 3:08 L1 2.130 - 4.820 | 2.69 | LV 1 | 4 | 9,490 | 11,770 | A | A | 1.20 | | | | | | | | | | 1 |
| 3:08 L1 4.820 - 5.077 | 0.257 | LV 1 | 4 | 9,490 | 11,770 | A | A | 1.20 | | | | | | | | | | 1 |
| 3:08 L1 5.077 - 26.112 | 21.035 | LV 1 | 4 | 8,180 | 11,780 | A | A | 2.20 | 2068 | | 2068 | | 2068 | | | | | 1 |
| 3:08 L1 26.112 - 32.281 | 6.169 | LV 1 | 4 | 7,720 | 10,040 | A | A | 1.50 | | | | | | | | | | 1 |
| 3:08 L1 32.281 - 34.248 | 1.967 | LV 1 | 4 | 16,220 | 21,090 | A | A | 1.50 | 2066 | | | | 2066 | | | | | 1 |
| 3:08 L1 34.248 - 34.784 | 0.536 | LV 1 | 5 | 16,220 | 21,090 | A | A | 1.50 | 2066 | | | | 2066 | | | | | 1 |
| 3:08 L1 34.784 - 46.008 | 11.224 | LV 1 | 4 | 16,220 | 21,090 | A | A | 1.50 | 2066 | | | | 2066 | | | | | 1 |
| 3:08 L1 46.008 - 47.159 | 1.151 | LV 1 | 4 | 17,970 | 24,440 | A | B | 1.80 | 2066 | | | | 2066 | | | | | 1 |
| 25:02 L1 0.000 - 0.478 | 0.478 | LV 3 | 3 | 4,650 | 5,766 | C | C | 1.20 | | | | | | | | | | 1 |
| 25:02 L1 0.478 - 0.994 | 0.516 | LV 3 | 2 | 4,650 | 5,766 | C | C | 1.20 | | | | | | | | | | 1 |
| 25:02 C1 0.995 - 10.199 | 9.204 | LV 3 | 2 | 4,650 | 5,766 | C | C | 1.20 | | | | | | | | | | 1 |
| 25:02 C1 10.199 - 19.824 | 9.625 | LV 3 | 2 | 3,540 | 4,390 | C | C | 1.20 | | | | | | | | | | 1 |
| 25:02 C1 19.824 - 23.361 | 3.537 | LV 3 | 2 | 4,120 | 5,109 | C | D | 1.20 | | | | | | | | | | 1 |
| 25:02 C1 23.361 - 24.889 | 1.528 | LV 3 | 2 | 4,120 | 5,109 | C | D | 1.20 | | | | | | | | | | 1 |
| 25:02 C1 24.889 - 30.148 | 5.259 | LV 3 | 2 | 1,470 | 1,823 | A | A | 1.20 | | | | | | | | | | 1 |
| 25:02 C1 30.148 - 42.406 | 12.258 | LV 3 | 2 | 1,030 | 1,277 | A | A | 1.20 | | | | | | | | | | 1 |
| 25:02 C1 42.406 - 52.724 | 10.318 | LV 3 | 2 | 740 | 814 | A | A | 0.50 | | | | | | | | | | 1 |

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

INT #:8172 **LRS: 3:08 L1 35.736**

**Location: HIGHWAY 3:08 AND MUNICIPAL ROAD**

Lv 2 Work Activity Summary | Lv 3 Work Activity Summary

Major Road Details | TMD Ref: | Veh/day | Growth

Int. Type: AG | Posted Speed: 110 | Maj Rd: 3-EB/WB | 16,220 | 1.5%
Service Class: LV 1 | Lit: N Sig: N Div: Y Radius: 1,760.00 | Min Rd:

| Collision Frequency | | | | Collision Rate | | | | Collision Cost | |
|---|---|---|---|---|---|---|---|---|---|
| Total | Fatal | Inj | Non-An | Total | BM | Non-An | BM | Cost (in $M) | BM |
| 1 | 0 | 0 | 1 | 3.4 | 64.7 | 3.4 | 64.3 | 0.006 | 1.292 |

| Approach | LT Lane | LT Len | LT BM | RT Lane | RT Len | RT BM | Chan | Yr LT | Vo | Vl | BM | Va | Undiv BM | Pk | Yr RT | RT AADT | Yr Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-EB | Y | *143* | 210 | Y | *130* | 210 | N | | | | | | | | | | |
| 3-WB | Y | *47* | 210 | Y | *115* | 210 | N | | | | | | | | | | |

| Yr Signal | TS | Ang. Coll | Yr IC | TS | LT vph | Yr Light. | Day | Night | N/D Col% | Near VC |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | | | | 1 | 0 | 0.00 | Y |

INT #:241 LRS: 3:08 L1 40.318

**Location: HIGHWAY 3:08 AND 509:02 AND MUNICIPAL ROAD (URBAN ACCESS ROAD 205)**

Lv 2 Work Activity Summary | Lv 3 Work Activity Summary

**2022** CONSTRUCT INTERCHANGE

**2013** INTERSECTION IMPROVEMENT

*INTERSECTION*

*IMPROVEMENT*

Major Road Details | TMD Ref: 100060 | Veh/day | Growth

Int. Type: TYPE 10C | Posted Speed: 110 | Maj Rd: 3-SB/NB | 16,560 | 1.5%
Service Class: LV 1 | Lit: Y Sig: N Div: Y Radius: 1,730.00 | Min Rd: 509-WB/EB | 1,630 | 1.3%

| Collision Frequency | | | | Collision Rate | | | | Collision Cost | |
|---|---|---|---|---|---|---|---|---|---|
| Total | Fatal | Inj | Non-An | Total | BM | Non-An | BM | Cost (in $M) | BM |
| 9 | 2 | 2 | 9 | 31.6 | 59.8 | 31.6 | 55.0 | *18.403* | 1.205 |

| Approach | LT Lane | LT Len | LT BM | RT Lane | RT Len | RT BM | Chan | Yr LT | Vo | Vl | BM | Va | Undiv BM | Pk | Yr RT | RT AADT | Yr Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-SB | Y | *140* | 210 | Y | *143* | 210 | N | | 834 | 17 | 90 | 17 | | pm | | 30 | |
| 3-NB | | | | | | | | | | | | | | | | | 2047 |

| Yr Signal | TS | Ang. Coll | Yr IC | TS | LT vph | Yr Light. | Day | Night | N/D Col% | Near VC |
|---|---|---|---|---|---|---|---|---|---|---|
| | 53 | 4 | | | | | 4 | 5 | 125.00 | |

INT #:76 LRS: 3:08 L1 45.680

**Location: HIGHWAY 3:08 AND 3A:09**

Lv 2 Work Activity Summary | Lv 3 Work Activity Summary

Major Road Details | TMD Ref: 101060 | Veh/day | Growth

Int. Type: DR | Posted Speed: 110 | Maj Rd: 3-WB/EB | 20,200 | 1.8%
Service Class: LV 1 | Lit: N Sig: N Div: Y Radius: | Min Rd: 3A-SB/NB | 2,230 | 1.5%

| Collision Frequency | | | | Collision Rate | | | | Collision Cost | |
|---|---|---|---|---|---|---|---|---|---|
| Total | Fatal | Inj | Non-An | Total | BM | Non-An | BM | Cost (in $M) | BM |
| 27 | 0 | 10 | 27 | 79.7 | 119.5 | 79.7 | 98.6 | 0.767 | 1.996 |

| Approach | LT Lane | LT Len | LT BM | RT Lane | RT Len | RT BM | Chan | Yr LT | Vo | Vl | BM | Va | Undiv BM | Pk | Yr RT | RT AADT | Yr Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-WB | | | | | | | | | | | | | | | | | |
| 3-EB | | | | | | | Y | | | | | | | | | | |

| Yr Signal | TS | Ang. Coll | Yr IC | TS | LT vph | Yr Light. | Day | Night | N/D Col% | Near VC |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 15 | 11 | | Y |

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

INT #:13509 **LRS: 25:02 C1 1.618**

**Location: HIGHWAY 25:02 AND TOWNSHIP ROAD 92**

| Lv 2 Work Activity Summary | Lv 3 Work Activity Summary |
|---|---|
| | **2016** INTERSECTION IMPROVEMENT |
| | *INTERSECTION IMPROVEMENT* |

Major Road Details — TMD Ref:

| | | | Veh/day | Growth |
|---|---|---|---|---|
| Int. Type: AG | Posted Speed: 100 | Maj Rd: 25 | 4,650 | 1.2% |
| Service Class: LV 3 | Lit: N Sig: N Div: N Radius: | Min Rd: | | |

| Collision Frequency | | | | Collision Rate | | | | Collision Cost | |
|---|---|---|---|---|---|---|---|---|---|
| Total | Fatal | Inj | Non-An | Total | BM | Non-An | BM | Cost (in $M) | BM |
| 6 | 0 | 0 | 6 | ***70.3*** | 61.1 | ***70.3*** | 52.7 | 0.035 | 0.479 |

| Approach | LT Lane | LT Len | LT BM | RT Lane | RT Len | RT BM | Chan | Yr LT | Vo | Vl | BM | Va | Undiv BM | Pk | Yr RT | RT AADT | Yr Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | |

| Yr Signal | TS | Ang. Coll | Yr IC | TS | LT vph | Yr Light. | Day | Night | N/D Col% | Near VC |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | | | | 5 | 1 | 20.00 | |

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INT #:347 LRS: 25:02 C1 4.045

**Location: HIGHWAY 25:02 AND COALHURST ACCESS ROAD (OLD APPROACH ROAD 179)**

| Lv 2 Work Activity Summary | Lv 3 Work Activity Summary |
|---|---|

Major Road Details — TMD Ref:

| | | | Veh/day | Growth |
|---|---|---|---|---|
| Int. Type: TYPE 4A | Posted Speed: 100 | Maj Rd: 25 | 4,650 | 1.2% |
| Service Class: LV 3 | Lit: N Sig: N Div: N Radius: | Min Rd: | | |

| Collision Frequency | | | | Collision Rate | | | | Collision Cost | |
|---|---|---|---|---|---|---|---|---|---|
| Total | Fatal | Inj | Non-An | Total | BM | Non-An | BM | Cost (in $M) | BM |
| 1 | 0 | 0 | 1 | 12.0 | 61.1 | 12.0 | 52.7 | 0.006 | 0.479 |

| Approach | LT Lane | LT Len | LT BM | RT Lane | RT Len | RT BM | Chan | Yr LT | Vo | Vl | BM | Va | Undiv BM | Pk | Yr RT | RT AADT | Yr Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | |

| Yr Signal | TS | Ang. Coll | Yr IC | TS | LT vph | Yr Light. | Day | Night | N/D Col% | Near VC |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | | | | | 1 | 0 | 0.00 | Y |

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INT #:4657 LRS: 25:02 C1 4.860

**Location: HIGHWAY 25:02 AND KIPP ROAD**

| Lv 2 Work Activity Summary | Lv 3 Work Activity Summary |
|---|---|
| | **2018** LEFT TURN LANE (INTERSECTION) |
| | **2042** LEFT TURN LANE (INTERSECTION) |
| | **2057** CHANNELIZATION (INTERSECTION) |

Major Road Details — TMD Ref: 102062

| | | | Veh/day | Growth |
|---|---|---|---|---|
| Int. Type: AG | Posted Speed: 100 | Maj Rd: 25-SB/NB | 5,240 | 1.2% |
| Service Class: LV 3 | Lit: N Sig: N Div: N Radius: | Min Rd: Twp Rd 94-WB/EB | 1,380 | |

| Collision Frequency | | | | Collision Rate | | | | Collision Cost | |
|---|---|---|---|---|---|---|---|---|---|
| Total | Fatal | Inj | Non-An | Total | BM | Non-An | BM | Cost (in $M) | BM |
| 4 | 0 | 0 | 4 | 40.1 | 62.3 | 40.1 | 56.1 | 0.023 | 0.479 |

| Approach | LT Lane | LT Len | LT BM | RT Lane | RT Len | RT BM | Chan | Yr LT | Vo | Vl | BM | Va | Undiv BM | Pk | Yr RT | RT AADT | Yr Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25-SB | | | | | | | | | | | | | | | | | 2057 |
| 25-NB | | | | | | | | 2017 | ***228*** | ***48*** | | ***253*** | 169 | pm | | 130 | |

| Yr Signal | TS | Ang. Coll | Yr IC | TS | LT vph | Yr Light. | Day | Night | N/D Col% | Near VC |
|---|---|---|---|---|---|---|---|---|---|---|
| | 27 | 1 | | | | | 0 | 4 | 100.00 | |

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

Alberta Transportation

**TIMS Network Expansion Support System (NESS)**

**TIMS Geometric Report**

Eric Dyson
2018 Oct 01 15:18

| LRS | Access Type | Access Count | Road Side | Int # | Int Type | Speed | Roadside Class | MD Name | Distance Last Access | Distance Last Public |
|---|---|---|---|---|---|---|---|---|---|---|
| 3:08 L1 4.736 | FIELD | 1 | L | | | 50 | freeway | FORT MACLEOD | 0.445 | |
| 3:08 R1 4.916 | HWY | | | 1973 | AG | 70 | freeway | FORT MACLEOD | 0.371 | 0.487 |
| 3:08 L1 5.181 | HWY | | | 1973 | AG | 70 | freeway | FORT MACLEOD | 1.676 | 1.676 |
| 3:08 L1 6.857 | MUNICIPAL ROAD | | | 1981 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 2.221 | 2.221 |
| 3:08 R1 7.219 | MUNICIPAL ROAD | 1 | R | 1981 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 2.303 | 2.303 |
| 3:08 L1 9.078 | MUNICIPAL ROAD | | | 8164 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 0.016 | 0.016 |
| 3:08 L1 9.094 | MUNICIPAL ROAD | 1 | L | | | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.019 | 1.019 |
| 3:08 R1 9.444 | MUNICIPAL ROAD | | | 8164 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 2.225 | 2.225 |
| 3:08 R1 9.459 | MUNICIPAL ROAD | 1 | R | | | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 0.015 | 0.015 |
| 3:08 L1 10.113 | MUNICIPAL ROAD | 1 | L | 8165 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 2.298 | 2.298 |
| 3:08 R1 10.478 | MUNICIPAL ROAD | 1 | R | 8165 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.019 | 1.019 |
| 3:08 L1 12.411 | MUNICIPAL ROAD | | | 8166 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 0.012 | 0.012 |
| 3:08 L1 12.423 | MUNICIPAL ROAD | 1 | L | | | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 3.170 | 3.170 |
| 3:08 R1 12.787 | MUNICIPAL ROAD | 1 | R | 8166 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 2.309 | 2.309 |
| 3:08 L1 15.593 | MUNICIPAL ROAD | 1 | L | 8167 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.805 | 1.805 |
| 3:08 R1 15.961 | MUNICIPAL ROAD | 1 | R | 8167 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 3.174 | 3.174 |
| 3:08 L1 17.398 | MUNICIPAL ROAD | 1 | L | 1168 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.631 | 1.631 |
| 3:08 R1 17.745 | MUNICIPAL ROAD | 1 | R | 1168 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.784 | 1.784 |
| 3:08 L1 19.029 | MUNICIPAL ROAD | 1 | L | 8168 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.630 | 1.630 |
| 3:08 R1 19.376 | MUNICIPAL ROAD | 1 | R | 8168 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.631 | 1.631 |
| 3:08 L1 20.659 | MUNICIPAL ROAD | 1 | L | 8169 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.693 | 1.693 |
| 3:08 R1 21.006 | MUNICIPAL ROAD | 1 | R | 8169 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.630 | 1.630 |
| 3:08 L1 22.352 | MUNICIPAL ROAD | 1 | L | | | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 0.028 | 0.028 |
| 3:08 L1 22.380 | MUNICIPAL ROAD | | | 8170 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.589 | 1.589 |
| 3:08 R1 22.715 | MUNICIPAL ROAD | | | 8170 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.709 | 1.709 |
| 3:08 R1 22.725 | MUNICIPAL ROAD | 1 | R | | | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 0.010 | 0.010 |
| 3:08 L1 23.969 | MUNICIPAL ROAD | 1 | L | 8171 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.807 | 1.807 |
| 3:08 R1 24.310 | MUNICIPAL ROAD | 1 | R | 8171 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.585 | 1.585 |
| 3:08 L1 25.776 | MUNICIPAL ROAD | | | 1159 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 5.744 | 5.744 |
| 3:08 R1 26.109 | MUNICIPAL ROAD | 1 | R | 1159 | AG | 110 | freeway | M.D. OF WILLOW CREEK NO. 26 | 1.799 | 1.799 |
| 3:08 L1 31.520 | HWY | | | 80 | DR | 110 | freeway | COUNTY OF LETHBRIDGE | 4.216 | 4.216 |
| 3:08 R1 31.811 | HWY | | | 80 | DR | 110 | freeway | COUNTY OF LETHBRIDGE | 5.702 | 5.702 |
| 3:08 L1 35.736 | MUNICIPAL ROAD | | | 8172 | AG | 110 | freeway | COUNTY OF LETHBRIDGE | 0.011 | 0.011 |
| 3:08 L1 35.747 | MUNICIPAL ROAD | 1 | L | | | 110 | freeway | COUNTY OF LETHBRIDGE | 4.570 | 4.570 |
| 3:08 R1 36.068 | MUNICIPAL ROAD | 1 | R | 8172 | AG | 110 | freeway | COUNTY OF LETHBRIDGE | 4.257 | 4.257 |
| 3:08 L1 40.317 | MUNICIPAL ROAD | 1 | L | 241 | TYPE 10C | 110 | freeway | COUNTY OF LETHBRIDGE | 2.146 | 2.146 |
| 3:08 R1 40.632 | MUNICIPAL ROAD | 1 | R | 241 | TYPE 10C | 110 | freeway | COUNTY OF LETHBRIDGE | 4.564 | 4.564 |
| 3:08 L1 42.463 | MUNICIPAL ROAD | | | 2118 | AG | 110 | freeway | COUNTY OF LETHBRIDGE | 0.011 | 0.011 |
| 3:08 L1 42.474 | MUNICIPAL ROAD | 1 | L | | | 110 | freeway | COUNTY OF LETHBRIDGE | 2.953 | 2.953 |
| 3:08 R1 42.780 | MUNICIPAL ROAD | 1 | R | 2118 | AG | 110 | freeway | COUNTY OF LETHBRIDGE | 2.148 | 2.148 |
| 3:08 L1 45.427 | HWY | | | 76 | DR | 110 | freeway | COUNTY OF LETHBRIDGE | 1.734 | 1.734 |
| 3:08 R1 45.718 | HWY | | | 76 | DR | 110 | freeway | COUNTY OF LETHBRIDGE | 2.938 | 2.938 |
| 25:02 R1 0.408 | HWY | | | 75 | PC | 100 | major art | COUNTY OF LETHBRIDGE | | |
| 25:02 L1 0.414 | HWY | | | 75 | PC | 100 | major art | COUNTY OF LETHBRIDGE | 0.626 | 0.626 |
| 25:02 C1 1.041 | MUNICIPAL ROAD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.633 | 0.633 |

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Alberta Transportation

# TIMS Network Expansion Support System (NESS)

## TIMS Geometric Report

Eric Dyson
2018 Oct 01 15:18

| LRS | Access Type | Access Count | Road Side | Int # | Int Type | Speed | Roadside Class | MD Name | Distance Last Access | Distance Last Public |
|---|---|---|---|---|---|---|---|---|---|---|
| 25:02 C1 1.059 | MUNICIPAL ROAD | | | 13508 | AG | 100 | major art | COUNTY OF LETHBRIDGE | 0.018 | 0.018 |
| 25:02 C1 1.344 | FARM | 2 | R&L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.285 | |
| 25:02 C1 1.619 | MUNICIPAL ROAD | 2 | R&L | 13509 | AG | 100 | major art | COUNTY OF LETHBRIDGE | 0.275 | 0.560 |
| 25:02 C1 2.037 | FARM | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.418 | |
| 25:02 C1 2.338 | FARM | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.301 | |
| 25:02 C1 2.443 | FIELD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.105 | |
| 25:02 C1 2.817 | FIELD | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.374 | |
| 25:02 C1 3.024 | FIELD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.207 | |
| 25:02 C1 3.085 | FARM | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.061 | |
| 25:02 C1 3.250 | FARM | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.165 | |
| 25:02 C1 3.843 | FIELD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.593 | |
| 25:02 C1 4.045 | MUNICIPAL ROAD | 2 | R&L | 347 | TYPE 4A | 100 | major art | COUNTY OF LETHBRIDGE | 0.202 | 2.426 |
| 25:02 C1 4.860 | MUNICIPAL ROAD | 2 | R&L | 4657 | AG | 100 | major art | COUNTY OF LETHBRIDGE | 0.815 | 0.815 |
| 25:02 C1 5.315 | FARM | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.455 | |
| 25:02 C1 5.699 | FIELD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.384 | |
| 25:02 C1 6.009 | FARM | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.310 | |
| 25:02 C1 6.021 | FIELD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.012 | |
| 25:02 C1 6.619 | MUNICIPAL ROAD | 1 | L | 227 | AG | 100 | major art | COUNTY OF LETHBRIDGE | 0.598 | 1.759 |
| 25:02 C1 7.206 | FIELD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.587 | |
| 25:02 C1 7.491 | FIELD | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.285 | |
| 25:02 C1 8.677 | MUNICIPAL ROAD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 1.186 | 2.058 |
| 25:02 C1 8.707 | MUNICIPAL ROAD | 1 | L | 13510 | AG | 100 | major art | COUNTY OF LETHBRIDGE | 0.030 | 0.030 |
| 25:02 C1 9.387 | FIELD | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.680 | |
| 25:02 C1 9.718 | MUNICIPAL ROAD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.331 | 1.011 |
| 25:02 C1 9.734 | FIELD | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.016 | |
| 25:02 C1 9.754 | MUNICIPAL ROAD | 1 | L | 13511 | AG | 100 | major art | COUNTY OF LETHBRIDGE | 0.020 | 0.036 |
| 25:02 C1 10.837 | FIELD | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 1.083 | |
| 25:02 C1 10.910 | MUNICIPAL ROAD | 2 | R&L | 13513 | AG | 100 | major art | COUNTY OF LETHBRIDGE | 0.073 | 1.156 |
| 25:02 C1 11.048 | RESIDENTIAL | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.138 | |
| 25:02 C1 11.115 | RESIDENTIAL | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.067 | |
| 25:02 C1 11.168 | RESIDENTIAL | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.053 | |
| 25:02 C1 11.336 | MUNICIPAL ROAD | 2 | R&L | 1767 | AG | 100 | major art | COUNTY OF LETHBRIDGE | 0.168 | 0.426 |
| 25:02 C1 11.599 | FARM | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.263 | |
| 25:02 C1 11.625 | FIELD | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.026 | |
| 25:02 C1 11.725 | FARM | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.100 | |
| 25:02 C1 11.900 | FARM | 2 | R&L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.175 | |
| 25:02 C1 12.263 | FIELD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.363 | |
| 25:02 C1 12.390 | MUNICIPAL ROAD | 2 | R&L | 13514 | AG | 100 | major art | COUNTY OF LETHBRIDGE | 0.127 | 1.054 |
| 25:02 C1 12.529 | FIELD | 1 | L | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.139 | |
| 25:02 C1 12.625 | FIELD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.096 | |
| 25:02 C1 13.078 | FARM | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.453 | |
| 25:02 C1 13.215 | MUNICIPAL ROAD | 2 | R&L | 13515 | AG | 100 | major art | COUNTY OF LETHBRIDGE | 0.137 | 0.825 |
| 25:02 C1 13.237 | FIELD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.022 | |
| 25:02 C1 13.614 | FARM | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.377 | |
| 25:02 C1 14.027 | FIELD | 1 | R | | | 100 | major art | COUNTY OF LETHBRIDGE | 0.413 | |

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## Traffic Growth



### Table of ATR's included within the report by location

| Hwy | CS | Label | From | To | ATR # |
|---|---|---|---|---|---|
| 2 | 6 | L1 | 27.543 | 28.165 | 60020610 |
| 2 | 8 | L1 | 0.000 | 2.224 | 60020810 |
| 23 | 4 | L1 | 0.000 | 2.353 | 60230410 |
| 25 | 2 | C1 | 0.995 | 10.200 | 60250250 |
| 25 | 2 | C1 | 10.200 | 19.825 | 60250250 |
| 25 | 2 | C1 | 19.825 | 24.890 | 60250250 |
| 25 | 2 | C1 | 24.890 | 30.149 | 60250250 |
| 25 | 2 | C1 | 30.149 | 42.408 | 60250250 |
| 25 | 2 | C1 | 42.408 | 52.724 | 60250450 |
| 25 | 2 | L1 | 0.000 | 0.994 | 60250250 |
| 25 | 4 | C1 | 0.000 | 19.432 | 60250450 |
| 3 | 6 | C1 | 15.089 | 43.060 | 50030610 |
| 3 | 6 | L1 | 43.060 | 43.858 | 50030610 |
| 3 | 8 | L1 | 0.000 | 5.077 | 60020610 |
| 3 | 8 | L1 | 5.077 | 26.113 | 50030850 |
| 3 | 8 | L1 | 26.113 | 32.282 | 50030810 |
| 3 | 8 | L1 | 32.282 | 46.008 | 50030810 |
| 3 | 8 | L1 | 46.008 | 47.159 | 50030910 |
| 3 | 8 | L2 | 4.792 | 5.077 | 60020610 |
| 3 | 9 | L1 | 0.000 | 3.102 | 50030910 |
| 3A | 8 | C1 | 0.000 | 5.099 | 60230410 |
| 3A | 9 | C1 | 0.000 | 0.647 | 50030810 |
| 509 | 2 | C1 | 4.591 | 50.285 | 65050210 |
| 519 | 4 | C1 | 0.243 | 17.700 | 60360610 |
| 519 | 6 | C1 | 0.000 | 12.176 | 60360610 |
| 521 | 2 | C1 | 0.000 | 21.213 | 60360610 |
| 811 | 2 | C1 | 0.000 | 17.423 | 50030850 |
| 843 | 4 | C1 | 0.000 | 8.767 | 55470250 |
| 845 | 4 | C1 | 16.202 | 24.877 | 60250250 |
| 845 | 6 | C1 | 0.000 | 21.207 | 60360610 |

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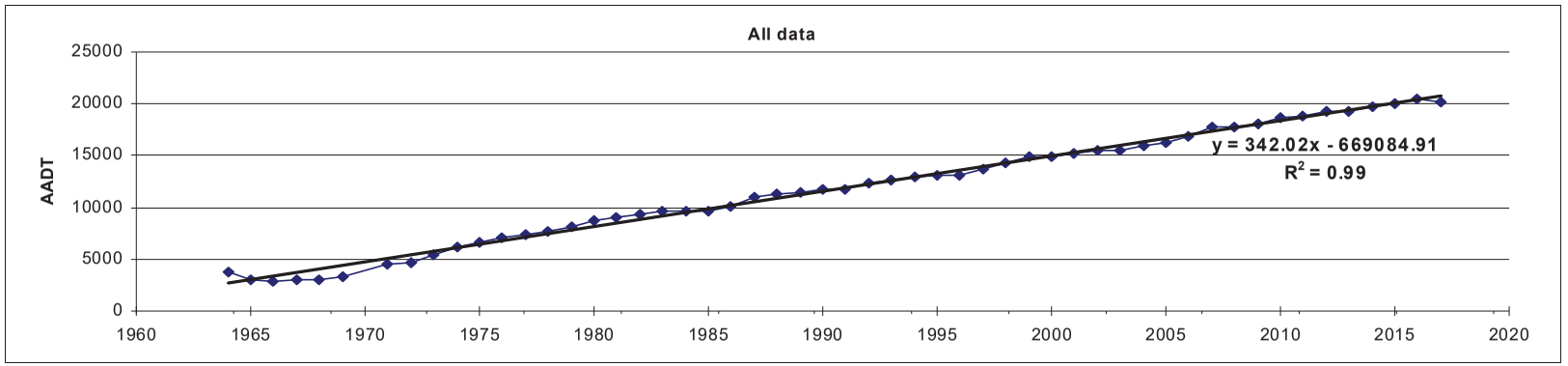
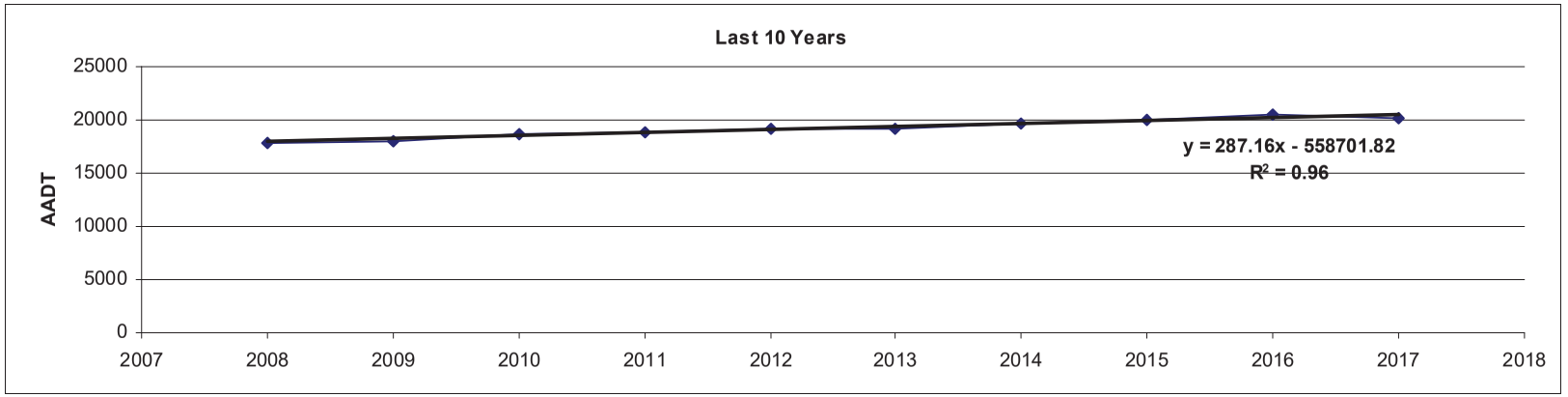
ATR NUMBER: 50030810 3:08:L1 km 44.801 - 2.4 KM W OF 3 & 25 COALHURST




| Growth rate | Since | Two points | Diff to historical | linear regression | Diff to historical | r square |
|---|---|---|---|---|---|---|
| Historical: | 1964 | 1.53 | | 1.65 | | 0.994 |
| 20 yrs: | 1998 | 1.54 | 0.01 | 1.64 | -0.01 | 0.984 |
| 10 yrs: | 2008 | 1.31 | -0.22 | 1.4 | -0.25 | 0.958 |
| 5 yrs: | 2013 | 1.16 | -0.37 | 1.3 | -0.35 | 0.796 |

| Other Calculation | Two points | Diff to historical | linear regression | Diff to historical | r square |
|---|---|---|---|---|---|
| Start yr: | | | | | |
| End yr: | | | | | |
| # yr: | | | | | |

| Year | AADT | ASDT | % diff |
|---|---|---|---|
| 2017 | 20,175 | 22,335 | 10.7 |
| 2016 | 20,429 | 21,945 | 7.4 |
| 2015 | 20,066 | 21,379 | 6.5 |
| 2014 | 19,655 | 21,070 | 7.2 |
| 2013 | 19,237 | 20,677 | 7.5 |
| 2012 | 19,235 | 20,554 | 6.9 |
| 2011 | 18,784 | 20,342 | 8.3 |
| 2010 | 18,711 | 19,993 | 6.9 |
| 2009 | 18,068 | 19,552 | 8.2 |
| 2008 | 17,790 | 18,859 | 6 |

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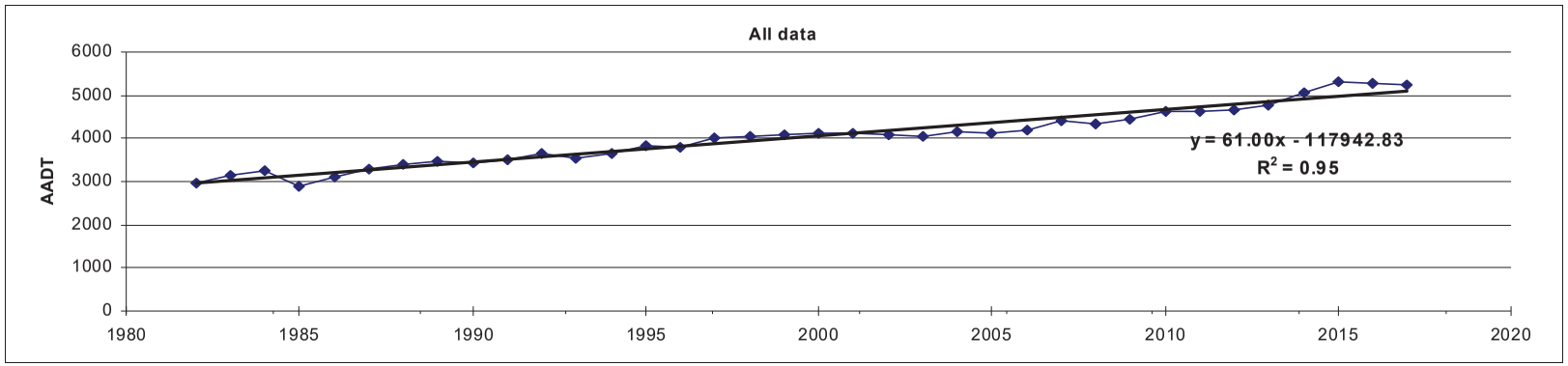
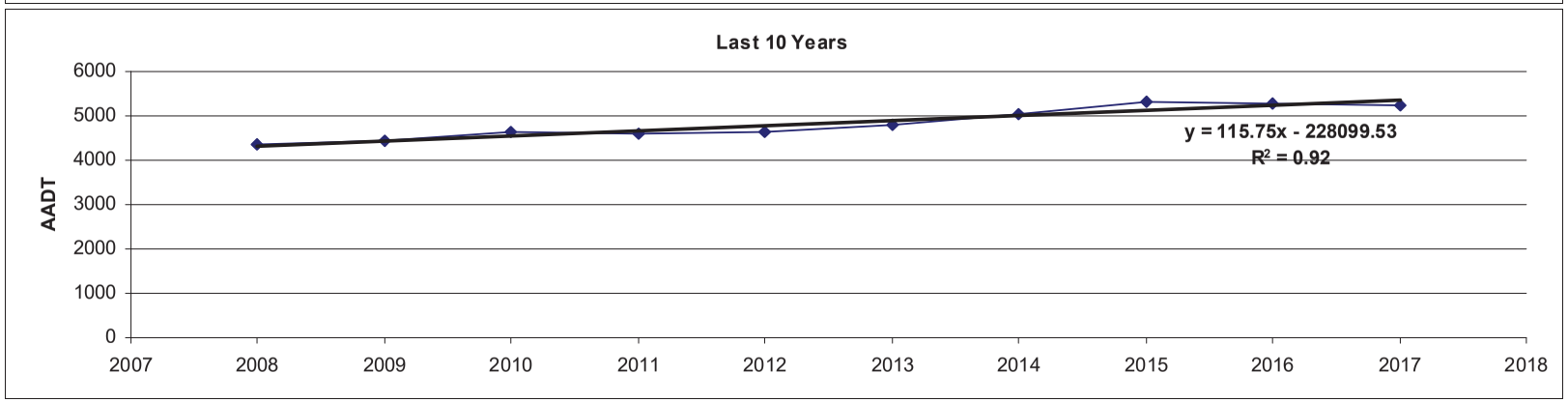
ATR NUMBER: 60250250 25:02:C1 km 3.853 - 3.4 KM N OF 3 & 25 LETHBRIDGE




| Growth rate | Since | Two points | Diff to historical | linear regression | Diff to historical | r square |
|---|---|---|---|---|---|---|
| Historical: | 1982 | 1.24 | | 1.2 | | 0.953 |
| 20 yrs: | 1998 | 1.2 | -0.04 | 1.35 | 0.15 | 0.869 |
| 10 yrs: | 2008 | 1.93 | 0.69 | 2.16 | 0.96 | 0.922 |
| 5 yrs: | 2013 | 2.22 | 0.98 | 2.18 | 0.98 | 0.676 |

| Other Calculation | Two points | Diff to historical | linear regression | Diff to historical | r square |
|---|---|---|---|---|---|
| Start yr: | | | | | |
| End yr: | | | | | |
| # yr: | | | | | |

| Year | AADT | ASDT | % diff |
|---|---|---|---|
| 2017 | 5,255 | 6,047 | 15.1 |
| 2016 | 5,288 | 5,764 | 9 |
| 2015 | 5,329 | 5,799 | 8.8 |
| 2014 | 5,052 | 5,507 | 9 |
| 2013 | 4,788 | 5,242 | 9.5 |
| 2012 | 4,648 | 5,115 | 10 |
| 2011 | 4,609 | 5,166 | 12.1 |
| 2010 | 4,624 | 5,131 | 11 |
| 2009 | 4,447 | 4,946 | 11.2 |
| 2008 | 4,342 | 4,727 | 8.9 |

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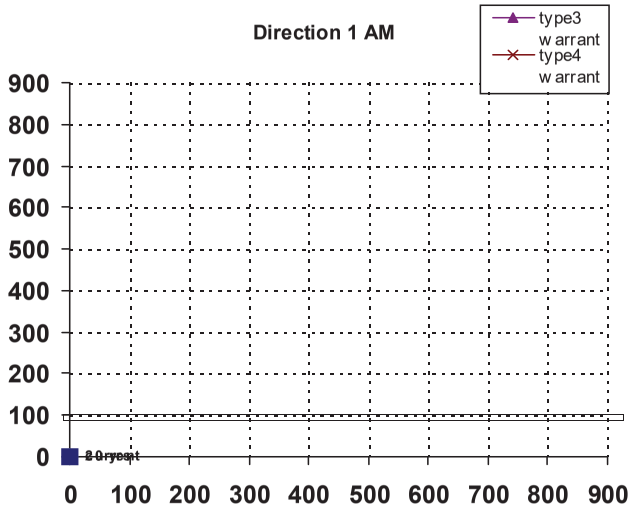


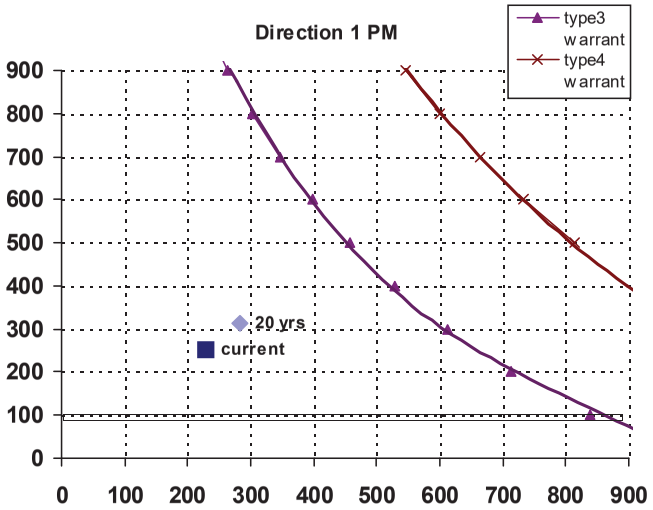


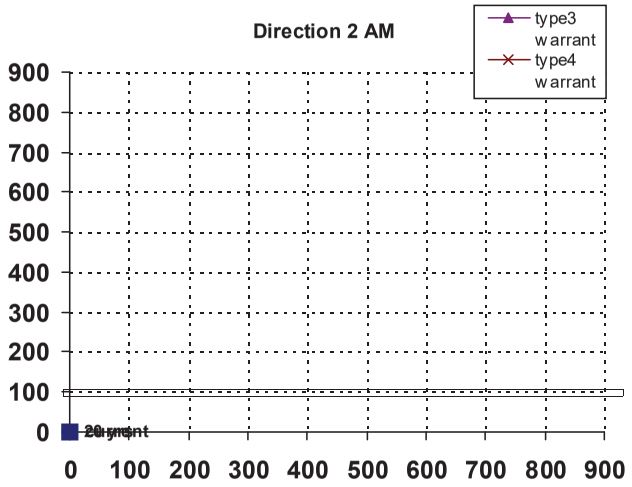


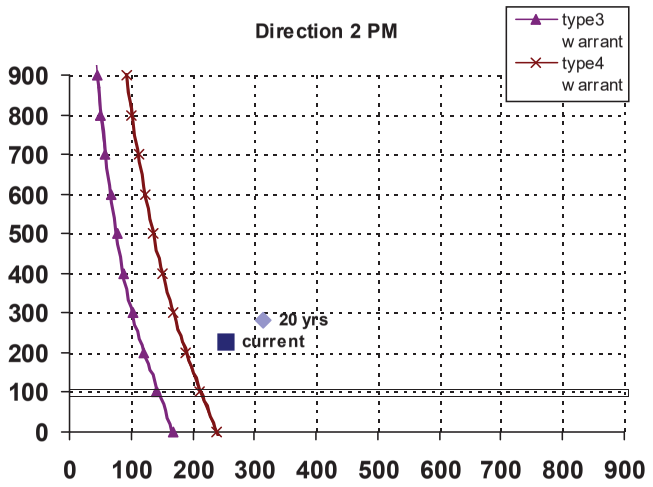


**INT 4657**
25:02 km 4.86

**HIGHWAY 25:02 AND KIPP ROAD**

INT Summary Info

Maj road: 25
Min road: Twp Rd 94

2017 AADT
Maj road: 5240
Min road: 1380
growth: 1.2

Design speed: 110

INT Warrant Yr

Yr type I:
Yrtype II:
Yr type III:
Yr type IV: 0
Yr right turn: 37

# Non Animal Collision

Collision yr: 2016
FATAL: 0
MAJOR: 0
MINOR: 0
PDO: 4
Total: 4

| | Rate | Delta |
|---|---|---|
| Non Ani.: | 40.203 | 15.9 |

SML yr: 2005
SML_type:
REAR END (3),

| Road | | | Yr0 veh/h | Vl | Va | Vo |
|---|---|---|---|---|---|---|
| 25 | dir1 | am | NL | 0 | 0 | 0 |
| 25 | dir1 | pm | NL | 1 | 228 | 253 |
| 25 | dir2 | am | SL | 0 | 0 | 0 |
| 25 | dir2 | pm | SL | 48 | 253 | 228 |

Def Type III IV

| Def Yr | | | Des Spd | Vl | Va | Vo | Type |
|---|---|---|---|---|---|---|---|
| 0 | pm | SL | 110 | 48 | 253 | 228 | 4 |

* further analysis is required if Vo is less than 100 vhp

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INT # **241-1** INT type TYPE 10C

Region: SOUTHERN REGION
Classification: LV 1 Signalized: N Last paved yr: 2015 INT Effective Date: 01-Oct-00
Posted speed: 110 Lit: Y Last paved road name: 3 Divided: Y
TM number: 100060

Location: **HIGHWAY 3:08 AND 509:02 AND MUNICIPAL ROAD (URBAN ACCESS**

## NESS Safety Calculations (2012 - 2016)

| | Actual | BM | Deltas |
|---|---|---|---|
| Total rate: | 29.164 | 64.7 | 35.5 |
| Non animal rate: | 29.164 | 64.3 | 35.1 |
| Collision cost ($ x M): | 18.403 | 1.292 | -17.111 |

Total (ani + non ani) # Daytime: 4 # Nightime: 5

| Non-animal | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Daytime | | 1 | | 2 | 1 |
| Nightime | 1 | 1 | 1 | | 2 |
| Unknown | | | | | |

Modify Outliners for Non Animal Collision

| | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| F and Maj Inj. | 0 | 1 | 0 | 1.3 | 0 |
| Min. Inj. | 0 | 0 | 0 | 0 | 0.3 |
| Non ani | 1 | 2 | 1 | 2 | 2.3 |

## Three Similar Collisions Over Five Yrs Period

(excluding off road and animal collision)

Year: 2016
Prim. evt.: RIGHT ANGLE (4),

## Collision Frequency Over Last 15 Yrs

| Severity - non ani. | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Last 5 yrs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FATAL | | | | | | | 1 | | 1 | 1 | | | | 2 | | **2** |
| MAJOR | 1 | | | 1 | 1 | | | | | | | 1 | | | | **1** |
| MINOR | | | 1 | | | | | | 2 | 1 | | | | | 1 | **1** |
| PDO | 1 | | 1 | | 1 | 1 | 2 | 1 | 4 | 4 | 1 | 1 | 1 | | 2 | **5** |
| TOTAL | **2** | **0** | **2** | **1** | **2** | **1** | **3** | **1** | **7** | **6** | **1** | **2** | **1** | **2** | **3** | **9** |
| TOTAL-non ani. | **2** | **0** | **2** | **1** | **2** | **1** | **3** | **1** | **7** | **6** | **1** | **2** | **1** | **2** | **3** | **9** |

## Collision Summary Last 5 Yrs (2012 - 2016)

(Non animal collisions)

| Month | Freq | Hour | AM | PM | Weekday | Freq |
|---|---|---|---|---|---|---|
| Jan: | 2 | 0: | | | Mon: | 3 |
| Feb: | 1 | 1: | | | Tue: | |
| Mar: | | 2: | | 1 | Wed: | 1 |
| Apr: | | 3: | | 1 | Thu: | |
| May: | 1 | 4: | | | Fri: | 2 |
| Jun: | 1 | 5: | | | Sat: | 1 |
| Jul: | | 6: | | 1 | Sun: | 2 |
| Aug: | 1 | 7: | | 1 | unknown: | |
| Sep: | | 8: | | 1 | | |
| Oct: | | 9: | 1 | 1 | | |
| Nov: | 1 | 10: | | | | |
| Dec: | 2 | 11: | 1 | 1 | | |
| unknown: | | unknown: | | | | |

INT polygon yr: 31-Mar-2017

| Collision event | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Last 5 yrs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANIMAL | | | | | | | | | | | | | | | | **0** |
| BACKING | | | | | | | | | 1 | | | | | | | **0** |
| HEAD ON | | | | | | | | | | | | | | | | **0** |
| LEFT TURN:ACROSS PATH | | | | 1 | | 1 | | | | | | | | | | **0** |
| OFF ROAD LEFT | | | | | | | | 1 | | 1 | | | | | 1 | **1** |
| OFF ROAD RIGHT | 1 | | | | | | 1 | | 1 | | | | | | | **0** |
| OTHER | | | | | | | | | | | | | | | 1 | **1** |
| PASSING:LEFT TURN | | | | | | | | | | | | | | | | **0** |
| PASSING:RIGHT TURN | | | | | | | | | | | | | | | | **0** |
| PEDESTRIAN | | | | | | | | | | | | | | | | **0** |
| REAR END | | | 1 | | 1 | | | | | 1 | | | | | 1 | **1** |
| RIGHT ANGLE | 1 | | 1 | | 1 | | 1 | | 3 | 3 | 1 | 2 | | 1 | | **4** |
| SIDESWIPE:OPP DIR | | | | | | | 1 | | | | | | | | | **0** |
| SIDESWIPE:SAME DIR | | | | | | | | | 2 | 1 | | | 1 | | | **1** |
| STRUCK OBJECT | | | | | | | | | | | | | | 1 | | **1** |
| UNKNOWN | | | | | | | | | | | | | | | | **0** |

*The number of collision in this report are collisions at and near the intersection and is calculated using intersection polygon in TIMS.
*Cost of PDO collision had increased from $1,000 to $2,000 in 2011

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

INT # **4657-1** INT type AT GRADE - TYPE UNKNOWN

Region: SOUTHERN REGION

INT Effective Date: 01-Oct-00

Classification: LV 3 Signalized: N Last paved yr: 2003 Divided: N

Posted speed: 100 Lit: N Last paved road name: 25 TM number: 102062

Location: **HIGHWAY 25:02 AND KIPP ROAD**

## NESS Safety Calculations (2012 - 2016)

| | Actual | BM | Deltas |
|---|---|---|---|
| Total rate: | 40.203 | 62.3 | 22.1 |
| Non animal rate: | 40.203 | 56.1 | 15.9 |
| Collision cost ($ x M): | 0.023 | 0.479 | 0.456 |

| Total (ani + non ani) | | Non-animal | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| # Daytime: | 0 | Daytime | | | | | |
| # Nightime: | 4 | Nightime | | 1 | 1 | 2 | |
| | | Unknown | | | | | |

| Modify Outliners for Non Animal Collision | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| F and Maj Inj. | 0 | 0 | 0 | 0 | 0 |
| Min. Inj. | 0 | 0 | 0 | 0 | 0 |
| Non ani | 0 | 1 | 1 | 1.3 | 0 |

## Three Similar Collisions Over Five Yrs Period

(excluding off road and animal collision)

Year: 2005

Prim. evt.: REAR END (3),

## Collision Frequency Over Last 15 Yrs

| Severity - non ani. | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | **Last 5 yrs** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FATAL | | | | | | | | | | | | | | | | **0** |
| MAJOR | | | | | | | | | | | | | | | | **0** |
| MINOR | 1 | | 2 | | | | | | | | | | | | | **0** |
| PDO | | | | | | | | 1 | | | | 1 | 1 | 2 | | **4** |
| TOTAL | **1** | **0** | **2** | **0** | **0** | **0** | **0** | **1** | **0** | **0** | **0** | **1** | **1** | **2** | **0** | **4** |
| TOTAL-non ani. | **1** | **0** | **2** | **0** | **0** | **0** | **0** | **1** | **0** | **0** | **0** | **1** | **1** | **2** | **0** | **4** |

## Collision Summary Last 5 Yrs (2012 - 2016)

(Non animal collisions)

| Month | Freq | Hour | AM | PM | Weekday | Freq |
|---|---|---|---|---|---|---|
| Jan: | 1 | 0: | | | Mon: | |
| Feb: | | 1: | | | Tue: | |
| Mar: | | 2: | | | Wed: | 1 |
| Apr: | | 3: | | | Thu: | 1 |
| May: | | 4: | | | Fri: | |
| Jun: | | 5: | | 1 | Sat: | 1 |
| Jul: | | 6: | 2 | 1 | Sun: | 1 |
| Aug: | | 7: | | | unknown: | |
| Sep: | | 8: | | | | |
| Oct: | | 9: | | | | |
| Nov: | 3 | 10: | | | | |
| Dec: | | 11: | | | | |
| unknown: | | unknown: | | | | |

INT polygon yr: 31-Mar-2017

| Collision event | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | **Last 5 yrs** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANIMAL | | | | | | | | | | | | | | | | **0** |
| BACKING | | | | | | | | | | | | | | | | **0** |
| HEAD ON | | | | | | | | | | | | | | | | **0** |
| LEFT TURN:ACROSS PATH | | | | | | | | | | | | | | | | **0** |
| OFF ROAD LEFT | | | | | | | | | | | | | 1 | | | **1** |
| OFF ROAD RIGHT | | | | | | | | 1 | | | | | | 1 | | **1** |
| OTHER | | | | | | | | | | | | | | | | **0** |
| PASSING:LEFT TURN | | | | | | | | | | | | | | | | **0** |
| PASSING:RIGHT TURN | | | | | | | | | | | | | | | | **0** |
| PEDESTRIAN | | | | | | | | | | | | | | | | **0** |
| REAR END | 1 | | 1 | | | | | | | | | 1 | | | | **1** |
| RIGHT ANGLE | | | 1 | | | | | | | | | | | 1 | | **1** |
| SIDESWIPE:OPP DIR | | | | | | | | | | | | | | | | **0** |
| SIDESWIPE:SAME DIR | | | | | | | | | | | | | | | | **0** |
| STRUCK OBJECT | | | | | | | | | | | | | | | | **0** |
| UNKNOWN | | | | | | | | | | | | | | | | **0** |

*The number of collision in this report are collisions at and near the intersection and is calculated using intersection polygon in TIMS.

*Cost of PDO collision had increased from $1,000 to $2,000 in 2011

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

INT #: 241 LOCATION: HIGHWAY 3:08 AND 509:02 AND MUNICIPAL ROAD (URBAN ACCESS ROAD 205)



## 2012 - 2016 Collision Objects: Vehicle 1 and 2 Travel Direction Summary

| All non animal: | **NB** | NE | **EB** | SE | **SB** | SW | **WB** | NW | U |
|---|---|---|---|---|---|---|---|---|---|
| FATAL | | 1 | | 3 | | | | | |
| MAJOR | | 1 | | 1 | | | | | |
| MINOR | | | | 1 | | | | | |
| PDO | | 1 | | 4 | | 1 | | 4 | |
| Total | 0 | 3 | 0 | 9 | 0 | 1 | 0 | 4 | 0 |

| Right angle | **NB** | NE | **EB** | SE | **SB** | SW | **WB** | NW | U |
|---|---|---|---|---|---|---|---|---|---|
| FATAL | | 1 | | 1 | | | | | |
| MAJOR | | 1 | | 1 | | | | | |
| MINOR | | | | | | | | | |
| PDO | | 1 | | | | 1 | | 2 | |
| Total | 0 | 3 | 0 | 2 | 0 | 1 | 0 | 2 | 0 |

| Left turn across path | **NB** | NE | **EB** | SE | **SB** | SW | **WB** | NW | U |
|---|---|---|---|---|---|---|---|---|---|
| FATAL | | | | | | | | | |
| MAJOR | | | | | | | | | |
| MINOR | | | | | | | | | |
| PDO | | | | | | | | | |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Rear end | **NB** | NE | **EB** | SE | **SB** | SW | **WB** | NW | U |
|---|---|---|---|---|---|---|---|---|---|
| FATAL | | | | | | | | | |
| MAJOR | | | | | | | | | |
| MINOR | | | | | | | | | |
| PDO | | | | | | | | 2 | |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |

| Other collisions | **NB** | NE | **EB** | SE | **SB** | SW | **WB** | NW | U |
|---|---|---|---|---|---|---|---|---|---|
| BACKING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OFF ROAD LEFT | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| OFF ROAD RIGHT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| PASSING:LEFT TURN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PASSING:RIGHT TURN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SIDESWIPE:OPP DIR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SIDESWIPE:SAME DIR | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| STRUCK OBJECT | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| UNKNOWN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Collision with no dir. data # coll

*U: unknown direction

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

INT #: 4657 LOCATION: HIGHWAY 25:02 AND KIPP ROAD



## 2012 - 2016 Collision Objects: Vehicle 1 and 2 Travel Direction Summary

| All non animal: | **NB** | NE | **EB** | SE | **SB** | SW | **WB** | NW | U |
|---|---|---|---|---|---|---|---|---|---|
| FATAL | | | | | | | | | |
| MAJOR | | | | | | | | | |
| MINOR | | | | | | | | | |
| PDO | 3 | | 1 | | 2 | | | | |
| Total | 3 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 |

| Right angle | **NB** | NE | **EB** | SE | **SB** | SW | **WB** | NW | U |
|---|---|---|---|---|---|---|---|---|---|
| FATAL | | | | | | | | | |
| MAJOR | | | | | | | | | |
| MINOR | | | | | | | | | |
| PDO | | | 1 | | 1 | | | | |
| Total | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |

| Left turn across path | **NB** | NE | **EB** | SE | **SB** | SW | **WB** | NW | U |
|---|---|---|---|---|---|---|---|---|---|
| FATAL | | | | | | | | | |
| MAJOR | | | | | | | | | |
| MINOR | | | | | | | | | |
| PDO | | | | | | | | | |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Rear end | **NB** | NE | **EB** | SE | **SB** | SW | **WB** | NW | U |
|---|---|---|---|---|---|---|---|---|---|
| FATAL | | | | | | | | | |
| MAJOR | | | | | | | | | |
| MINOR | | | | | | | | | |
| PDO | 2 | | | | | | | | |
| Total | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Other collisions | **NB** | NE | **EB** | SE | **SB** | SW | **WB** | NW | U |
|---|---|---|---|---|---|---|---|---|---|
| BACKING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HEAD ON | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OFF ROAD LEFT | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| OFF ROAD RIGHT | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PASSING:LEFT TURN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PASSING:RIGHT TURN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PEDESTRIAN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SIDESWIPE:OPP DIR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SIDESWIPE:SAME DIR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| STRUCK OBJECT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| UNKNOWN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Collision with no dir. data # coll

*U: unknown direction

The information provided herein is considered 'calculated data' for network screening purposes, based on the best available information within the TIMS inventory at the time of publishing. Project level engineering assessment is required to further develop the identified locations into strategies and engineering solutions for programming purposes.

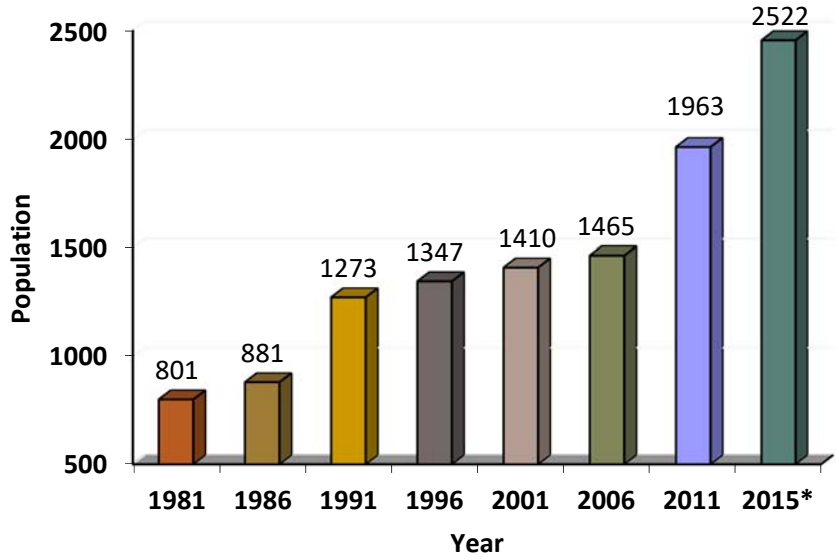
# Community Context

The Town of Coalhurst is located within Lethbridge County which is a diversified agricultural area that features a variety of agri-businesses alongside the traditional production of grains and livestock. Located 10 km west of the City of Lethbridge, adjacent to Highway 3, the short commuting distance between Coalhurst and the City has made the community an attractive location to live for those employed in local businesses, farming operations, or attending post-secondary school.

## *Demographics*

Coalhurst, incorporated as a Village in 1979, has faced considerable change over the years and has experienced both stable and rapid population growth. Between 1981 and 2006, the Town has experienced a slow but steady increase in population. Federal Census data revealed that since the 2006 federal census the population of the community has increased significantly, representing a 72.2 percent increase in total population in the past ten years or an average of 8.0 percent increase per year. The latest municipal census, completed in June 2015, recorded the population of Coalhurst at 2,522, growing by 28.5 percent from the 2011 population of 1,963.

**Historic Population 1981 – 2011**



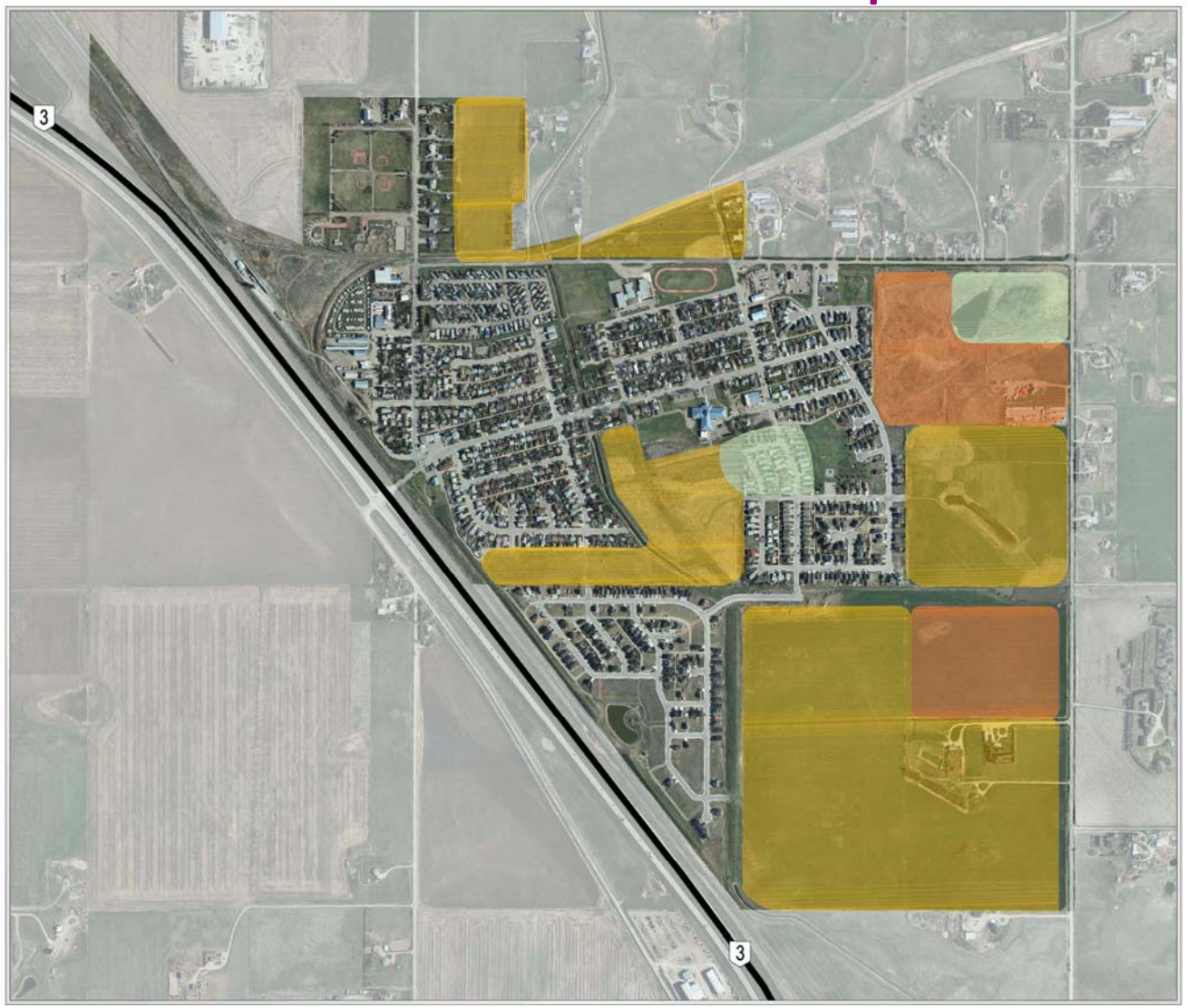

***The population of the community has increased significantly, representing a 72.2 percent increase in total population in the past ten years or an average of 8.0 percent increase per year.***

# MAP 1 Future Land Use Concept

New Living Areas

New Employment Areas

Additional Planning Areas




*The Land Use Areas depicted are conceptual and are to be used for planning purposes only. The land use concept represents general areas for development and redevelopment and is not intended to prescribe exact locations.*

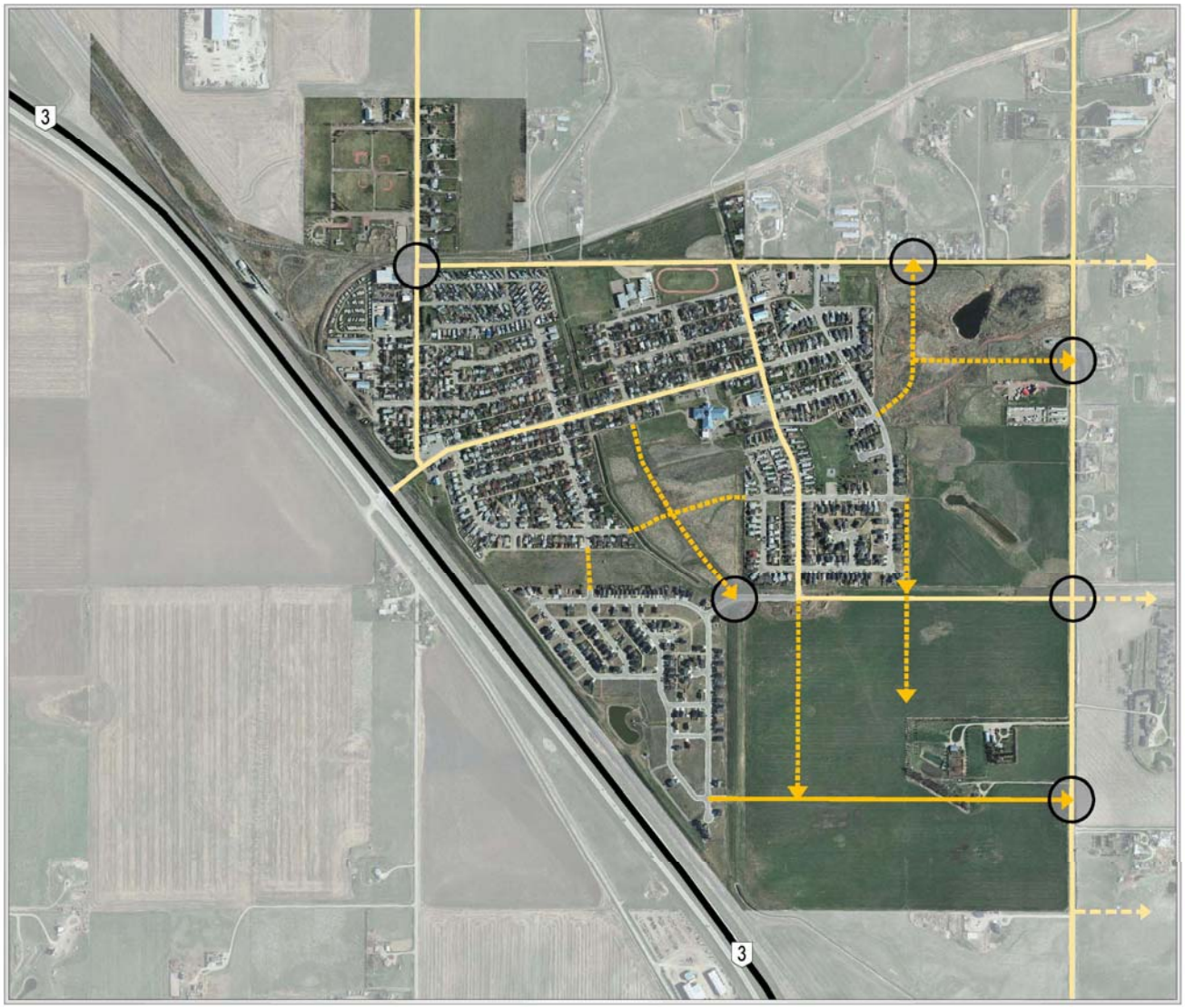
# MAP 2 Open Space and Primary Pathway Plan




Proposed Pathways

*The Open Space and Primary Pathway Plan depicted is conceptual and are to be used for planning purposes only. The plan represents general areas for development of trails and park space and is not intended to prescribe exact locations.*

# MAP 3 Mobility Plan




Major Road

Future Major Road

Future Road

Intersection

*The Transportation concept depicted is conceptual and is to be used for planning purposes only. Potential roads will be determined in more detail at the Area Structure Plan, Conceptual Design Scheme or subdivision/development stage with consideration for matters such as, but not limited to, existing road alignments, parcel boundaries, topography, improvements, circulation needs, etc.*

# *APPENDIX E:*

## *CAPACITY ANALYSIS OUTPUT*

MPE Engineering Ltd.

| Intersection | |
|---|---|
| Int Delay, s/veh | 3 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 26 | 698 | 3 | 105 | 818 | 32 | 1 | 4 | 56 | 11 | 9 | 29 |
| Future Vol, veh/h | 26 | 698 | 3 | 105 | 818 | 32 | 1 | 4 | 56 | 11 | 9 | 29 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 28 | 759 | 3 | 114 | 889 | 35 | 1 | 4 | 61 | 12 | 10 | 32 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 889 | 0 | - | 759 | 0 | 0 | 1493 | 1932 | 379 | 1555 | 1932 | 445 |
| Stage 1 | - | - | - | - | - | - | 815 | 815 | - | 1117 | 1117 | - |
| Stage 2 | - | - | - | - | - | - | 678 | 1117 | - | 438 | 815 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 681 | - | 0 | 768 | - | 0 | 81 | 61 | 602 | 72 | 61 | 544 |
| Stage 1 | - | - | 0 | - | - | 0 | 325 | 375 | - | 211 | 269 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 394 | 269 | - | 552 | 375 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 681 | - | - | 768 | - | - | 56 | 50 | 602 | 52 | 50 | 544 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 56 | 50 | - | 52 | 50 | - |
| Stage 1 | - | - | - | - | - | - | 312 | 360 | - | 202 | 229 | - |
| Stage 2 | - | - | - | - | - | - | 303 | 229 | - | 470 | 360 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 0.4 | 1.2 | 17.6 | 56.2 |
| HCM LOS | | | C | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 51 | 602 | 768 | - | 681 | - | 51 | 544 |
| HCM Lane V/C Ratio | 0.107 | 0.101 | 0.149 | - | 0.041 | - | 0.426 | 0.058 |
| HCM Control Delay (s) | 83.8 | 11.7 | 10.5 | - | 10.5 | - | 120.3 | 12 |
| HCM Lane LOS | F | B | B | - | B | - | F | B |
| HCM 95th %tile Q(veh) | 0.3 | 0.3 | 0.5 | - | 0.1 | - | 1.6 | 0.2 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.4 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 45 | 5 | 74 | 14 | 5 | 1 | 38 | 196 | 12 | 1 | 243 | 24 |
| Future Vol, veh/h | 45 | 5 | 74 | 14 | 5 | 1 | 38 | 196 | 12 | 1 | 243 | 24 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 32 | 32 | 32 | 6 | 6 | 6 | 4 | 4 | 4 |
| Mvmt Flow | 49 | 5 | 80 | 15 | 5 | 1 | 41 | 213 | 13 | 1 | 264 | 26 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 571 | 575 | 264 | 571 | 568 | 220 | 264 | 0 | 0 | 226 | 0 | 0 |
| Stage 1 | 266 | 266 | - | 302 | 302 | - | - | - | - | - | - | - |
| Stage 2 | 305 | 309 | - | 269 | 266 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.42 | 6.82 | 6.52 | 4.16 | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.788 | 4.288 | 3.588 | 2.254 | - | - | 2.236 | - | - |
| Pot Cap-1 Maneuver | 424 | 422 | 763 | 390 | 394 | 750 | 1277 | - | - | 1331 | - | 0 |
| Stage 1 | 728 | 680 | - | 647 | 613 | - | - | - | - | - | - | 0 |
| Stage 2 | 694 | 651 | - | 675 | 637 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 408 | 408 | 763 | 337 | 381 | 750 | 1277 | - | - | 1331 | - | - |
| Mov Cap-2 Maneuver | 408 | 408 | - | 337 | 381 | - | - | - | - | - | - | - |
| Stage 1 | 705 | 679 | - | 626 | 593 | - | - | - | - | - | - | - |
| Stage 2 | 665 | 630 | - | 598 | 636 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 12.3 | 15.7 | 1.2 | 0 |
| HCM LOS | B | C | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1277 | - | - | 408 | 763 | 357 | 1331 | - |
| HCM Lane V/C Ratio | 0.032 | - | - | 0.133 | 0.105 | 0.061 | 0.001 | - |
| HCM Control Delay (s) | 7.9 | - | - | 15.2 | 10.3 | 15.7 | 7.7 | 0 |
| HCM Lane LOS | A | - | - | C | B | C | A | A |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 0.5 | 0.4 | 0.2 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 49 | 0 | 0 | 62 |
| Future Vol, veh/h | 0 | 0 | 49 | 0 | 0 | 62 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 53 | 0 | 0 | 67 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NE | NE | SW | SW |
|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | LT | R | LT | R |
| Maximum Queue (m) | 13.4 | 3.0 | 1.0 | 22.2 | 18.6 | 17.8 | 19.0 | 16.7 |
| Average Queue (m) | 2.1 | 0.1 | 0.0 | 5.6 | 3.3 | 10.8 | 4.1 | 7.8 |
| 95th Queue (m) | 8.0 | 1.6 | 0.6 | 15.1 | 13.8 | 18.6 | 14.1 | 17.5 |
| Link Distance (m) | | 276.1 | 276.1 | | 59.2 | | 126.4 | |
| Upstream Blk Time (%) | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | 8.0 | | 8.0 |
| Storage Blk Time (%) | | | | | 4 | 7 | 10 | 4 |
| Queuing Penalty (veh) | | | | | 3 | 0 | 3 | 1 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB | SB |
|---|---|---|---|---|---|
| Directions Served | LT | R | LTR | L | LT |
| Maximum Queue (m) | 20.0 | 20.1 | 20.2 | 10.2 | 1.3 |
| Average Queue (m) | 8.5 | 11.4 | 5.8 | 1.3 | 0.0 |
| 95th Queue (m) | 17.5 | 17.7 | 16.4 | 6.3 | 0.0 |
| Link Distance (m) | | | 1596.4 | | 124.5 |
| Upstream Blk Time (%) | | | | | |
| Queuing Penalty (veh) | | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 | |
| Storage Blk Time (%) | 4 | 7 | | | |
| Queuing Penalty (veh) | 3 | 3 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 17.8 | 2.6 |
| Average Queue (m) | 7.4 | 0.1 |
| 95th Queue (m) | 15.3 | 1.9 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | |
| Queuing Penalty (veh) | | |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.9 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 18 | 749 | 1 | 98 | 750 | 14 | 1 | 3 | 93 | 19 | 11 | 16 |
| Future Vol, veh/h | 18 | 749 | 1 | 98 | 750 | 14 | 1 | 3 | 93 | 19 | 11 | 16 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 20 | 814 | 1 | 107 | 815 | 15 | 1 | 3 | 101 | 21 | 12 | 17 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 815 | 0 | - | 814 | 0 | 0 | 1480 | 1881 | 407 | 1476 | 1881 | 408 |
| Stage 1 | - | - | - | - | - | - | 853 | 853 | - | 1028 | 1028 | - |
| Stage 2 | - | - | - | - | - | - | 627 | 1028 | - | 448 | 853 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 730 | - | 0 | 730 | - | 0 | 82 | 66 | 577 | 83 | 66 | 576 |
| Stage 1 | - | - | 0 | - | - | 0 | 308 | 360 | - | 240 | 297 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 424 | 297 | - | 544 | 360 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 730 | - | - | 730 | - | - | 58 | 55 | 577 | 57 | 55 | 576 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 58 | 55 | - | 57 | 55 | - |
| Stage 1 | - | - | - | - | - | - | 300 | 350 | - | 233 | 253 | - |
| Stage 2 | - | - | - | - | - | - | 334 | 253 | - | 432 | 350 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 0.2 | 1.2 | 15.2 | 92.3 |
| HCM LOS | | | C | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 56 | 577 | 730 | - | 730 | - | 56 | 576 |
| HCM Lane V/C Ratio | 0.078 | 0.175 | 0.146 | - | 0.027 | - | 0.582 | 0.03 |
| HCM Control Delay (s) | 74.6 | 12.6 | 10.8 | - | 10.1 | - | 135.5 | 11.4 |
| HCM Lane LOS | F | B | B | - | B | - | F | B |
| HCM 95th %tile Q(veh) | 0.2 | 0.6 | 0.5 | - | 0.1 | - | 2.3 | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 21 | 3 | 92 | 11 | 2 | 0 | 49 | 201 | 10 | 1 | 213 | 21 |
| Future Vol, veh/h | 21 | 3 | 92 | 11 | 2 | 0 | 49 | 201 | 10 | 1 | 213 | 21 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 26 | 26 | 26 | 6 | 6 | 6 | 6 | 6 | 6 |
| Mvmt Flow | 23 | 3 | 100 | 12 | 2 | 0 | 53 | 218 | 11 | 1 | 232 | 23 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 566 | 570 | 232 | 565 | 564 | 224 | 232 | 0 | 0 | 229 | 0 | 0 |
| Stage 1 | 234 | 234 | - | 330 | 330 | - | - | - | - | - | - | - |
| Stage 2 | 332 | 336 | - | 235 | 234 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.36 | 6.76 | 6.46 | 4.16 | - | - | 4.16 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.734 | 4.234 | 3.534 | 2.254 | - | - | 2.254 | - | - |
| Pot Cap-1 Maneuver | 427 | 425 | 795 | 401 | 403 | 759 | 1312 | - | - | 1316 | - | 0 |
| Stage 1 | 758 | 702 | - | 636 | 605 | - | - | - | - | - | - | 0 |
| Stage 2 | 671 | 633 | - | 717 | 669 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 412 | 407 | 795 | 337 | 386 | 759 | 1312 | - | - | 1316 | - | - |
| Mov Cap-2 Maneuver | 412 | 407 | - | 337 | 386 | - | - | - | - | - | - | - |
| Stage 1 | 727 | 701 | - | 610 | 581 | - | - | - | - | - | - | - |
| Stage 2 | 641 | 607 | - | 623 | 668 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 11.1 | 15.9 | 1.5 | 0 |
| HCM LOS | B | C | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1312 | - | - | 411 | 795 | 344 | 1316 | - |
| HCM Lane V/C Ratio | 0.041 | - | - | 0.063 | 0.126 | 0.041 | 0.001 | - |
| HCM Control Delay (s) | 7.9 | - | - | 14.4 | 10.2 | 15.9 | 7.7 | 0 |
| HCM Lane LOS | A | - | - | B | B | C | A | A |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 0.2 | 0.4 | 0.1 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 46 | 0 | 0 | 35 |
| Future Vol, veh/h | 0 | 0 | 46 | 0 | 0 | 35 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 50 | 0 | 0 | 38 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | NW | NW | NE | NE | SW | SW |
|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | L | T | LT | R | LT | R |
| Maximum Queue (m) | 12.3 | 1.7 | 22.4 | 0.1 | 42.4 | 22.3 | 26.4 | 18.6 |
| Average Queue (m) | 1.5 | 0.1 | 6.8 | 0.0 | 8.4 | 13.1 | 9.1 | 5.6 |
| 95th Queue (m) | 6.5 | 1.2 | 16.8 | 0.1 | 26.3 | 20.6 | 21.4 | 16.5 |
| Link Distance (m) | | 276.1 | | 194.9 | 59.2 | | 126.4 | |
| Upstream Blk Time (%) | | | | | 0 | | | |
| Queuing Penalty (veh) | | | | | 0 | | | |
| Storage Bay Dist (m) | 60.0 | | 89.0 | | | 8.0 | | 8.0 |
| Storage Blk Time (%) | | | | | 5 | 13 | 26 | 2 |
| Queuing Penalty (veh) | | | | | 5 | 1 | 4 | 1 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB | SB |
|---|---|---|---|---|---|
| Directions Served | LT | R | LTR | L | LT |
| Maximum Queue (m) | 21.2 | 22.4 | 19.6 | 9.6 | 1.4 |
| Average Queue (m) | 7.3 | 11.7 | 4.2 | 1.5 | 0.0 |
| 95th Queue (m) | 18.8 | 19.2 | 13.6 | 6.5 | 0.0 |
| Link Distance (m) | | | 1596.4 | | 124.5 |
| Upstream Blk Time (%) | | | | | |
| Queuing Penalty (veh) | | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 | |
| Storage Blk Time (%) | 2 | 8 | | | |
| Queuing Penalty (veh) | 2 | 2 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 23.3 | 3.3 |
| Average Queue (m) | 9.0 | 0.1 |
| 95th Queue (m) | 18.3 | 1.7 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.5 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 30 | 797 | 4 | 120 | 933 | 37 | 1 | 5 | 64 | 13 | 11 | 33 |
| Future Vol, veh/h | 30 | 797 | 4 | 120 | 933 | 37 | 1 | 5 | 64 | 13 | 11 | 33 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 33 | 866 | 4 | 130 | 1014 | 40 | 1 | 5 | 70 | 14 | 12 | 36 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1014 | 0 | - | 866 | 0 | 0 | 1706 | 2207 | 433 | 1776 | 2207 | 507 |
| Stage 1 | - | - | - | - | - | - | 932 | 932 | - | 1275 | 1275 | - |
| Stage 2 | - | - | - | - | - | - | 774 | 1275 | - | 501 | 932 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 607 | - | 0 | 696 | - | 0 | 55 | 41 | 554 | 49 | 41 | 495 |
| Stage 1 | - | - | 0 | - | - | 0 | 275 | 330 | - | 168 | 225 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 344 | 225 | - | 505 | 330 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 607 | - | - | 696 | - | - | 30 | 32 | 554 | 31 | 32 | 495 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 30 | 32 | - | 31 | 32 | - |
| Stage 1 | - | - | - | - | - | - | 260 | 312 | - | 159 | 183 | - |
| Stage 2 | - | - | - | - | - | - | 243 | 183 | - | 410 | 312 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 0.4 | 1.3 | 23.7 | 133 |
| HCM LOS | | | C | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 32 | 554 | 696 | - | 607 | - | 31 | 495 |
| HCM Lane V/C Ratio | 0.204 | 0.126 | 0.187 | - | 0.054 | - | 0.842 | 0.072 |
| HCM Control Delay (s) | 144.3 | 12.4 | 11.4 | - | 11.3 | - | 298.2 | 12.8 |
| HCM Lane LOS | F | B | B | - | B | - | F | B |
| HCM 95th %tile Q(veh) | 0.6 | 0.4 | 0.7 | - | 0.2 | - | 2.8 | 0.2 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.7 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 52 | 6 | 85 | 17 | 6 | 1 | 44 | 224 | 14 | 1 | 278 | 27 |
| Future Vol, veh/h | 52 | 6 | 85 | 17 | 6 | 1 | 44 | 224 | 14 | 1 | 278 | 27 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 32 | 32 | 32 | 6 | 6 | 6 | 4 | 4 | 4 |
| Mvmt Flow | 57 | 7 | 92 | 18 | 7 | 1 | 48 | 243 | 15 | 1 | 302 | 29 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 655 | 658 | 302 | 655 | 651 | 251 | 302 | 0 | 0 | 259 | 0 | 0 |
| Stage 1 | 304 | 304 | - | 347 | 347 | - | - | - | - | - | - | - |
| Stage 2 | 351 | 354 | - | 308 | 304 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.42 | 6.82 | 6.52 | 4.16 | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.788 | 4.288 | 3.588 | 2.254 | - | - | 2.236 | - | - |
| Pot Cap-1 Maneuver | 372 | 378 | 726 | 341 | 352 | 720 | 1237 | - | - | 1294 | - | 0 |
| Stage 1 | 695 | 654 | - | 611 | 585 | - | - | - | - | - | - | 0 |
| Stage 2 | 655 | 622 | - | 642 | 612 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 355 | 363 | 726 | 285 | 338 | 720 | 1237 | - | - | 1294 | - | - |
| Mov Cap-2 Maneuver | 355 | 363 | - | 285 | 338 | - | - | - | - | - | - | - |
| Stage 1 | 668 | 653 | - | 587 | 562 | - | - | - | - | - | - | - |
| Stage 2 | 621 | 598 | - | 554 | 611 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 13.4 | 17.9 | 1.3 | 0 |
| HCM LOS | B | C | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1237 | - | - | 356 | 726 | 305 | 1294 | - |
| HCM Lane V/C Ratio | 0.039 | - | - | 0.177 | 0.127 | 0.086 | 0.001 | - |
| HCM Control Delay (s) | 8 | - | - | 17.3 | 10.7 | 17.9 | 7.8 | 0 |
| HCM Lane LOS | A | - | - | C | B | C | A | A |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 0.6 | 0.4 | 0.3 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 57 | 0 | 0 | 72 |
| Future Vol, veh/h | 0 | 0 | 57 | 0 | 0 | 72 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 62 | 0 | 0 | 78 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 8 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 20 | 854 | 1 | 112 | 856 | 17 | 1 | 4 | 106 | 21 | 13 | 18 |
| Future Vol, veh/h | 20 | 854 | 1 | 112 | 856 | 17 | 1 | 4 | 106 | 21 | 13 | 18 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 22 | 928 | 1 | 122 | 930 | 18 | 1 | 4 | 115 | 23 | 14 | 20 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 930 | 0 | - | 928 | 0 | 0 | 1688 | 2146 | 464 | 1684 | 2146 | 465 |
| Stage 1 | - | - | - | - | - | - | 972 | 972 | - | 1174 | 1174 | - |
| Stage 2 | - | - | - | - | - | - | 716 | 1174 | - | 510 | 972 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 656 | - | 0 | 657 | - | 0 | 57 | 44 | 529 | 58 | 44 | 528 |
| Stage 1 | - | - | 0 | - | - | 0 | 260 | 316 | - | 194 | 252 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 374 | 252 | - | 499 | 316 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 656 | - | - | 657 | - | - | 32 | 35 | 529 | 34 | 35 | 528 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 32 | 35 | - | 34 | 35 | - |
| Stage 1 | - | - | - | - | - | - | 251 | 305 | - | 187 | 205 | - |
| Stage 2 | - | - | - | - | - | - | 273 | 205 | - | 372 | 305 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 0.2 | 1.4 | 18.9 | 238.9 |
| HCM LOS | | | C | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 34 | 529 | 657 | - | 656 | - | 34 | 528 |
| HCM Lane V/C Ratio | 0.16 | 0.218 | 0.185 | - | 0.033 | - | 1.087 | 0.037 |
| HCM Control Delay (s) | 130.1 | 13.7 | 11.7 | - | 10.7 | - | $ 358.9 | 12.1 |
| HCM Lane LOS | F | B | B | - | B | - | F | B |
| HCM 95th %tile Q(veh) | 0.5 | 0.8 | 0.7 | - | 0.1 | - | 3.9 | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 24 | 4 | 105 | 13 | 2 | 0 | 57 | 230 | 12 | 1 | 244 | 24 |
| Future Vol, veh/h | 24 | 4 | 105 | 13 | 2 | 0 | 57 | 230 | 12 | 1 | 244 | 24 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 26 | 26 | 26 | 6 | 6 | 6 | 6 | 6 | 6 |
| Mvmt Flow | 26 | 4 | 114 | 14 | 2 | 0 | 62 | 250 | 13 | 1 | 265 | 26 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 649 | 654 | 265 | 650 | 647 | 257 | 265 | 0 | 0 | 263 | 0 | 0 |
| Stage 1 | 267 | 267 | - | 380 | 380 | - | - | - | - | - | - | - |
| Stage 2 | 382 | 387 | - | 270 | 267 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.36 | 6.76 | 6.46 | 4.16 | - | - | 4.16 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.734 | 4.234 | 3.534 | 2.254 | - | - | 2.254 | - | - |
| Pot Cap-1 Maneuver | 376 | 380 | 762 | 351 | 360 | 727 | 1276 | - | - | 1278 | - | 0 |
| Stage 1 | 728 | 679 | - | 596 | 574 | - | - | - | - | - | - | 0 |
| Stage 2 | 630 | 601 | - | 686 | 646 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 360 | 361 | 762 | 285 | 342 | 727 | 1276 | - | - | 1278 | - | - |
| Mov Cap-2 Maneuver | 360 | 361 | - | 285 | 342 | - | - | - | - | - | - | - |
| Stage 1 | 693 | 678 | - | 567 | 546 | - | - | - | - | - | - | - |
| Stage 2 | 597 | 572 | - | 579 | 645 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 11.7 | 18.1 | 1.5 | 0 |
| HCM LOS | B | C | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1276 | - | - | 360 | 762 | 291 | 1278 | - |
| HCM Lane V/C Ratio | 0.049 | - | - | 0.085 | 0.15 | 0.056 | 0.001 | - |
| HCM Control Delay (s) | 8 | - | - | 15.9 | 10.6 | 18.1 | 7.8 | 0 |
| HCM Lane LOS | A | - | - | C | B | C | A | A |
| HCM 95th %tile Q(veh) | 0.2 | - | - | 0.3 | 0.5 | 0.2 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 52 | 0 | 0 | 41 |
| Future Vol, veh/h | 0 | 0 | 52 | 0 | 0 | 41 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 57 | 0 | 0 | 45 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 11.4 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 33 | 898 | 4 | 136 | 1052 | 41 | 1 | 5 | 72 | 15 | 12 | 37 |
| Future Vol, veh/h | 33 | 898 | 4 | 136 | 1052 | 41 | 1 | 5 | 72 | 15 | 12 | 37 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 36 | 976 | 4 | 148 | 1143 | 45 | 1 | 5 | 78 | 16 | 13 | 40 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1143 | 0 | - | 976 | 0 | 0 | 1922 | 2487 | 488 | 2002 | 2487 | 572 |
| Stage 1 | - | - | - | - | - | - | 1048 | 1048 | - | 1439 | 1439 | - |
| Stage 2 | - | - | - | - | - | - | 874 | 1439 | - | 563 | 1048 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 538 | - | 0 | 628 | - | 0 | 38 | 27 | 510 | 33 | 27 | 448 |
| Stage 1 | - | - | 0 | - | - | 0 | 233 | 290 | - | 132 | 186 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 299 | 186 | - | 463 | 290 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 538 | - | - | 628 | - | - | 12 | 19 | 510 | 17 | 19 | 448 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 12 | 19 | - | 17 | 19 | - |
| Stage 1 | - | - | - | - | - | - | 217 | 271 | - | 123 | 142 | - |
| Stage 2 | - | - | - | - | - | - | 189 | 142 | - | 358 | 271 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 0.4 | 1.4 | 36.5 | $ 326.6 |
| HCM LOS | | | E | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 17 | 510 | 628 | - | 538 | - | 18 | 448 |
| HCM Lane V/C Ratio | 0.384 | 0.153 | 0.235 | - | 0.067 | - | 1.63 | 0.09 |
| HCM Control Delay (s) | $ 314.3 | 13.3 | 12.5 | - | 12.2 | - | $ 755.3 | 13.8 |
| HCM Lane LOS | F | B | B | - | B | - | F | B |
| HCM 95th %tile Q(veh) | 1 | 0.5 | 0.9 | - | 0.2 | - | 4.1 | 0.3 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 59 | 7 | 96 | 19 | 7 | 1 | 49 | 253 | 16 | 1 | 314 | 31 |
| Future Vol, veh/h | 59 | 7 | 96 | 19 | 7 | 1 | 49 | 253 | 16 | 1 | 314 | 31 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 32 | 32 | 32 | 6 | 6 | 6 | 4 | 4 | 4 |
| Mvmt Flow | 64 | 8 | 104 | 21 | 8 | 1 | 53 | 275 | 17 | 1 | 341 | 34 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 738 | 742 | 341 | 737 | 733 | 284 | 341 | 0 | 0 | 292 | 0 | 0 |
| Stage 1 | 343 | 343 | - | 390 | 390 | - | - | - | - | - | - | - |
| Stage 2 | 395 | 399 | - | 347 | 343 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.42 | 6.82 | 6.52 | 4.16 | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.788 | 4.288 | 3.588 | 2.254 | - | - | 2.236 | - | - |
| Pot Cap-1 Maneuver | 327 | 338 | 690 | 299 | 314 | 689 | 1196 | - | - | 1258 | - | 0 |
| Stage 1 | 662 | 629 | - | 578 | 559 | - | - | - | - | - | - | 0 |
| Stage 2 | 620 | 594 | - | 611 | 587 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 309 | 323 | 690 | 241 | 300 | 689 | 1196 | - | - | 1258 | - | - |
| Mov Cap-2 Maneuver | 309 | 323 | - | 241 | 300 | - | - | - | - | - | - | - |
| Stage 1 | 633 | 628 | - | 552 | 534 | - | - | - | - | - | - | - |
| Stage 2 | 583 | 568 | - | 512 | 586 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 14.8 | 20.5 | 1.3 | 0 |
| HCM LOS | B | C | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1196 | - | - | 310 | 690 | 261 | 1258 | - |
| HCM Lane V/C Ratio | 0.045 | - | - | 0.231 | 0.151 | 0.112 | 0.001 | - |
| HCM Control Delay (s) | 8.2 | - | - | 20.1 | 11.1 | 20.5 | 7.9 | 0 |
| HCM Lane LOS | A | - | - | C | B | C | A | A |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 0.9 | 0.5 | 0.4 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 64 | 0 | 0 | 79 |
| Future Vol, veh/h | 0 | 0 | 64 | 0 | 0 | 79 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 70 | 0 | 0 | 86 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NE | NE | SW | SW |
|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | LT | R | LT | R |
| Maximum Queue (m) | 18.6 | 1.2 | 1.8 | 23.6 | 1.6 | 43.1 | 19.3 | 34.5 | 19.9 |
| Average Queue (m) | 3.1 | 0.0 | 0.1 | 7.8 | 0.1 | 9.7 | 11.1 | 10.6 | 9.6 |
| 95th Queue (m) | 10.8 | 0.6 | 0.7 | 18.1 | 1.2 | 32.9 | 20.2 | 26.5 | 20.0 |
| Link Distance (m) | | 276.1 | 276.1 | | 194.9 | 59.2 | | 126.4 | |
| Upstream Blk Time (%) | | | | | | 2 | | | |
| Queuing Penalty (veh) | | | | | | 0 | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 8.0 | | 8.0 |
| Storage Blk Time (%) | | | | | | 14 | 12 | 31 | 7 |
| Queuing Penalty (veh) | | | | | | 10 | 1 | 12 | 2 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB | NB |
|---|---|---|---|---|---|
| Directions Served | LT | R | LTR | L | TR |
| Maximum Queue (m) | 22.8 | 20.3 | 23.9 | 12.1 | 0.7 |
| Average Queue (m) | 12.6 | 12.9 | 6.8 | 2.0 | 0.0 |
| 95th Queue (m) | 21.7 | 18.8 | 18.8 | 7.3 | 0.5 |
| Link Distance (m) | | | 1596.4 | | 808.0 |
| Upstream Blk Time (%) | | | | | |
| Queuing Penalty (veh) | | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 | |
| Storage Blk Time (%) | 9 | 11 | | | |
| Queuing Penalty (veh) | 8 | 7 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 22.5 | 5.2 |
| Average Queue (m) | 9.4 | 0.2 |
| 95th Queue (m) | 17.5 | 2.6 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 18.3 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 23 | 963 | 1 | 126 | 964 | 19 | 1 | 4 | 120 | 24 | 15 | 20 |
| Future Vol, veh/h | 23 | 963 | 1 | 126 | 964 | 19 | 1 | 4 | 120 | 24 | 15 | 20 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 25 | 1047 | 1 | 137 | 1048 | 21 | 1 | 4 | 130 | 26 | 16 | 22 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1048 | 0 | - | 1047 | 0 | 0 | 1903 | 2419 | 523 | 1898 | 2419 | 524 |
| Stage 1 | - | - | - | - | - | - | 1097 | 1097 | - | 1322 | 1322 | - |
| Stage 2 | - | - | - | - | - | - | 806 | 1322 | - | 576 | 1097 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 588 | - | 0 | 588 | - | 0 | 39 | 29 | 483 | 39 | 29 | 483 |
| Stage 1 | - | - | 0 | - | - | 0 | 217 | 275 | - | 157 | 213 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 329 | 213 | - | 455 | 275 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 588 | - | - | 588 | - | - | 11 | 21 | 483 | ~ 19 | 21 | 483 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 11 | 21 | - | ~ 19 | 21 | - |
| Stage 1 | - | - | - | - | - | - | 208 | 263 | - | 150 | 163 | - |
| Stage 2 | - | - | - | - | - | - | 217 | 163 | - | 313 | 263 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 0.3 | 1.5 | 25.6 | $ 613.7 |
| HCM LOS | | | D | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 18 | 483 | 588 | - | 588 | - | 20 | 483 |
| HCM Lane V/C Ratio | 0.302 | 0.27 | 0.233 | - | 0.043 | - | 2.12 | 0.045 |
| HCM Control Delay (s) | 275.6 | 15.2 | 13 | - | 11.4 | -$ | 921.8 | 12.8 |
| HCM Lane LOS | F | C | B | - | B | - | F | B |
| HCM 95th %tile Q(veh) | 0.8 | 1.1 | 0.9 | - | 0.1 | - | 5.6 | 0.1 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.5 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 27 | 4 | 118 | 15 | 3 | 0 | 64 | 259 | 13 | 1 | 275 | 27 |
| Future Vol, veh/h | 27 | 4 | 118 | 15 | 3 | 0 | 64 | 259 | 13 | 1 | 275 | 27 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 26 | 26 | 26 | 6 | 6 | 6 | 6 | 6 | 6 |
| Mvmt Flow | 29 | 4 | 128 | 16 | 3 | 0 | 70 | 282 | 14 | 1 | 299 | 29 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 730 | 736 | 299 | 731 | 729 | 289 | 299 | 0 | 0 | 296 | 0 | 0 |
| Stage 1 | 301 | 301 | - | 428 | 428 | - | - | - | - | - | - | - |
| Stage 2 | 429 | 435 | - | 303 | 301 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.36 | 6.76 | 6.46 | 4.16 | - | - | 4.16 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.734 | 4.234 | 3.534 | 2.254 | - | - | 2.254 | - | - |
| Pot Cap-1 Maneuver | 332 | 340 | 729 | 309 | 322 | 697 | 1240 | - | - | 1243 | - | 0 |
| Stage 1 | 697 | 656 | - | 561 | 546 | - | - | - | - | - | - | 0 |
| Stage 2 | 594 | 572 | - | 658 | 624 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 315 | 320 | 729 | 241 | 304 | 697 | 1240 | - | - | 1243 | - | - |
| Mov Cap-2 Maneuver | 315 | 320 | - | 241 | 304 | - | - | - | - | - | - | - |
| Stage 1 | 658 | 655 | - | 529 | 515 | - | - | - | - | - | - | - |
| Stage 2 | 557 | 540 | - | 538 | 623 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 12.4 | 20.6 | 1.5 | 0 |
| HCM LOS | B | C | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1240 | - | - | 316 | 729 | 250 | 1243 | - |
| HCM Lane V/C Ratio | 0.056 | - | - | 0.107 | 0.176 | 0.078 | 0.001 | - |
| HCM Control Delay (s) | 8.1 | - | - | 17.7 | 11 | 20.6 | 7.9 | 0 |
| HCM Lane LOS | A | - | - | C | B | C | A | A |
| HCM 95th %tile Q(veh) | 0.2 | - | - | 0.4 | 0.6 | 0.3 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 59 | 0 | 0 | 46 |
| Future Vol, veh/h | 0 | 0 | 59 | 0 | 0 | 46 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 64 | 0 | 0 | 50 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NE | NE | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | LT | R | LT | R |
| Maximum Queue (m) | 11.2 | 4.2 | 2.8 | 35.8 | 3.0 | 0.1 | 51.7 | 21.4 | 68.4 | 18.7 |
| Average Queue (m) | 2.2 | 0.1 | 0.1 | 10.6 | 0.1 | 0.0 | 17.0 | 14.7 | 22.5 | 5.9 |
| 95th Queue (m) | 8.6 | 2.0 | 1.5 | 25.3 | 2.2 | 0.1 | 40.8 | 20.0 | 55.1 | 17.8 |
| Link Distance (m) | | 276.1 | 276.1 | | 194.9 | 194.9 | 59.2 | | 126.4 | |
| Upstream Blk Time (%) | | | | | | | 0 | | | |
| Queuing Penalty (veh) | | | | | | | 0 | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | | 8.0 | | 8.0 |
| Storage Blk Time (%) | | | | | | | 18 | 27 | 57 | 3 |
| Queuing Penalty (veh) | | | | | | | 22 | 1 | 11 | 1 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB |
|---|---|---|---|---|
| Directions Served | LT | R | LTR | L |
| Maximum Queue (m) | 23.9 | 20.8 | 19.3 | 10.7 |
| Average Queue (m) | 8.9 | 13.1 | 5.0 | 2.3 |
| 95th Queue (m) | 20.3 | 19.5 | 15.1 | 7.8 |
| Link Distance (m) | | | 1596.4 | |
| Upstream Blk Time (%) | | | | |
| Queuing Penalty (veh) | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 |
| Storage Blk Time (%) | 3 | 11 | | |
| Queuing Penalty (veh) | 4 | 4 | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 20.5 | 7.3 |
| Average Queue (m) | 8.3 | 0.5 |
| 95th Queue (m) | 16.5 | 3.7 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 58.2 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 85 | 797 | 4 | 120 | 933 | 286 | 1 | 5 | 64 | 64 | 11 | 45 |
| Future Vol, veh/h | 85 | 797 | 4 | 120 | 933 | 286 | 1 | 5 | 64 | 64 | 11 | 45 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 92 | 866 | 4 | 130 | 1014 | 311 | 1 | 5 | 70 | 70 | 12 | 49 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1014 | 0 | - | 866 | 0 | 0 | 1825 | 2326 | 433 | 1896 | 2326 | 507 |
| Stage 1 | - | - | - | - | - | - | 1051 | 1051 | - | 1275 | 1275 | - |
| Stage 2 | - | - | - | - | - | - | 774 | 1275 | - | 621 | 1051 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 607 | - | 0 | 696 | - | 0 | 45 | 34 | 554 | ~ 40 | 34 | 495 |
| Stage 1 | - | - | 0 | - | - | 0 | 232 | 289 | - | 168 | 225 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 344 | 225 | - | 427 | 289 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 607 | - | - | 696 | - | - | 19 | 23 | 554 | ~ 22 | 23 | 495 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 19 | 23 | - | ~ 22 | 23 | - |
| Stage 1 | - | - | - | - | - | - | 197 | 245 | - | 143 | 183 | - |
| Stage 2 | - | - | - | - | - | - | 236 | 183 | - | 310 | 245 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 1.2 | 1.3 | 30.8 | $ 992.1 |
| HCM LOS | | | D | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 22 | 554 | 696 | - | 607 | - | 22 | 495 |
| HCM Lane V/C Ratio | 0.296 | 0.126 | 0.187 | - | 0.152 | - | 3.706 | 0.099 |
| HCM Control Delay (s) | 226.9 | 12.4 | 11.4 | - | 12 | - | $ 1579.5 | 13.1 |
| HCM Lane LOS | F | B | B | - | B | - | F | B |
| HCM 95th %tile Q(veh) | 0.9 | 0.4 | 0.7 | - | 0.5 | - | 10.4 | 0.3 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 59 | 6 | 95 | 17 | 6 | 1 | 94 | 224 | 14 | 1 | 278 | 60 |
| Future Vol, veh/h | 59 | 6 | 95 | 17 | 6 | 1 | 94 | 224 | 14 | 1 | 278 | 60 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 32 | 32 | 32 | 6 | 6 | 6 | 4 | 4 | 4 |
| Mvmt Flow | 64 | 7 | 103 | 18 | 7 | 1 | 102 | 243 | 15 | 1 | 302 | 65 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 763 | 767 | 302 | 763 | 759 | 251 | 302 | 0 | 0 | 259 | 0 | 0 |
| Stage 1 | 304 | 304 | - | 455 | 455 | - | - | - | - | - | - | - |
| Stage 2 | 459 | 463 | - | 308 | 304 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.42 | 6.82 | 6.52 | 4.16 | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.788 | 4.288 | 3.588 | 2.254 | - | - | 2.236 | - | - |
| Pot Cap-1 Maneuver | 315 | 327 | 726 | 287 | 303 | 720 | 1237 | - | - | 1294 | - | 0 |
| Stage 1 | 695 | 654 | - | 531 | 521 | - | - | - | - | - | - | 0 |
| Stage 2 | 572 | 556 | - | 642 | 612 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 289 | 300 | 726 | 227 | 278 | 720 | 1237 | - | - | 1294 | - | - |
| Mov Cap-2 Maneuver | 289 | 300 | - | 227 | 278 | - | - | - | - | - | - | - |
| Stage 1 | 638 | 653 | - | 487 | 478 | - | - | - | - | - | - | - |
| Stage 2 | 517 | 510 | - | 545 | 611 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 15.1 | 21.4 | 2.3 | 0 |
| HCM LOS | C | C | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1237 | - | - | 290 | 726 | 245 | 1294 | - |
| HCM Lane V/C Ratio | 0.083 | - | - | 0.244 | 0.142 | 0.106 | 0.001 | - |
| HCM Control Delay (s) | 8.2 | - | - | 21.4 | 10.8 | 21.4 | 7.8 | 0 |
| HCM Lane LOS | A | - | - | C | B | C | A | A |
| HCM 95th %tile Q(veh) | 0.3 | - | - | 0.9 | 0.5 | 0.4 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 120 | 0 | 0 | 376 |
| Future Vol, veh/h | 0 | 0 | 120 | 0 | 0 | 376 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 130 | 0 | 0 | 409 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 428.5 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 34 | 854 | 1 | 112 | 856 | 81 | 1 | 4 | 106 | 247 | 13 | 68 |
| Future Vol, veh/h | 34 | 854 | 1 | 112 | 856 | 81 | 1 | 4 | 106 | 247 | 13 | 68 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 37 | 928 | 1 | 122 | 930 | 88 | 1 | 4 | 115 | 268 | 14 | 74 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 930 | 0 | - | 928 | 0 | 0 | 1718 | 2176 | 464 | 1714 | 2176 | 465 |
| Stage 1 | - | - | - | - | - | - | 1002 | 1002 | - | 1174 | 1174 | - |
| Stage 2 | - | - | - | - | - | - | 716 | 1174 | - | 540 | 1002 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 656 | - | 0 | 657 | - | 0 | 54 | 42 | 529 | ~ 55 | 42 | 528 |
| Stage 1 | - | - | 0 | - | - | 0 | 249 | 305 | - | ~ 194 | 252 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 374 | 252 | - | 479 | 305 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 656 | - | - | 657 | - | - | 25 | 32 | 529 | ~ 32 | 32 | 528 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 25 | 32 | - | ~ 32 | 32 | - |
| Stage 1 | - | - | - | - | - | - | 235 | 288 | - | ~ 183 | 205 | - |
| Stage 2 | - | - | - | - | - | - | 244 | 205 | - | 348 | 288 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 0.4 | 1.4 | 19.8 | $ 2986.6 |
| HCM LOS | | | C | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 30 | 529 | 657 | - | 656 | - | 32 | 528 |
| HCM Lane V/C Ratio | 0.181 | 0.218 | 0.185 | - | 0.056 | - | 8.832 | 0.14 |
| HCM Control Delay (s) | 149.9 | 13.7 | 11.7 | - | 10.8 | - | $ 3764.3 | 12.9 |
| HCM Lane LOS | F | B | B | - | B | - | F | B |
| HCM 95th %tile Q(veh) | 0.6 | 0.8 | 0.7 | - | 0.2 | - | 34.4 | 0.5 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.5 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 54 | 4 | 150 | 13 | 2 | 0 | 70 | 230 | 12 | 1 | 244 | 33 |
| Future Vol, veh/h | 54 | 4 | 150 | 13 | 2 | 0 | 70 | 230 | 12 | 1 | 244 | 33 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 26 | 26 | 26 | 6 | 6 | 6 | 6 | 6 | 6 |
| Mvmt Flow | 59 | 4 | 163 | 14 | 2 | 0 | 76 | 250 | 13 | 1 | 265 | 36 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 677 | 682 | 265 | 679 | 676 | 257 | 265 | 0 | 0 | 263 | 0 | 0 |
| Stage 1 | 267 | 267 | - | 409 | 409 | - | - | - | - | - | - | - |
| Stage 2 | 410 | 415 | - | 270 | 267 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.36 | 6.76 | 6.46 | 4.16 | - | - | 4.16 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.734 | 4.234 | 3.534 | 2.254 | - | - | 2.254 | - | - |
| Pot Cap-1 Maneuver | 360 | 366 | 762 | 335 | 346 | 727 | 1276 | - | - | 1278 | - | 0 |
| Stage 1 | 728 | 679 | - | 574 | 557 | - | - | - | - | - | - | 0 |
| Stage 2 | 609 | 584 | - | 686 | 646 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 342 | 344 | 762 | 249 | 325 | 727 | 1276 | - | - | 1278 | - | - |
| Mov Cap-2 Maneuver | 342 | 344 | - | 249 | 325 | - | - | - | - | - | - | - |
| Stage 1 | 685 | 678 | - | 540 | 524 | - | - | - | - | - | - | - |
| Stage 2 | 570 | 549 | - | 535 | 645 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 12.9 | 20 | 1.8 | 0 |
| HCM LOS | B | C | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1276 | - | - | 342 | 762 | 257 | 1278 | - |
| HCM Lane V/C Ratio | 0.06 | - | - | 0.184 | 0.214 | 0.063 | 0.001 | - |
| HCM Control Delay (s) | 8 | - | - | 17.9 | 11 | 20 | 7.8 | 0 |
| HCM Lane LOS | A | - | - | C | B | C | A | A |
| HCM 95th %tile Q(veh) | 0.2 | - | - | 0.7 | 0.8 | 0.2 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 328 | 0 | 0 | 119 |
| Future Vol, veh/h | 0 | 0 | 328 | 0 | 0 | 119 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 357 | 0 | 0 | 129 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 462.9 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 139 | 898 | 4 | 136 | 1052 | 517 | 1 | 5 | 72 | 112 | 12 | 59 |
| Future Vol, veh/h | 139 | 898 | 4 | 136 | 1052 | 517 | 1 | 5 | 72 | 112 | 12 | 59 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 151 | 976 | 4 | 148 | 1143 | 562 | 1 | 5 | 78 | 122 | 13 | 64 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1143 | 0 | - | 976 | 0 | 0 | 2152 | 2717 | 488 | 2232 | 2717 | 572 |
| Stage 1 | - | - | - | - | - | - | 1278 | 1278 | - | 1439 | 1439 | - |
| Stage 2 | - | - | - | - | - | - | 874 | 1439 | - | 793 | 1278 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 538 | - | 0 | 628 | - | 0 | 25 | 19 | 510 | ~ 22 | 19 | 448 |
| Stage 1 | - | - | 0 | - | - | 0 | 167 | 224 | - | 132 | 186 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 299 | 186 | - | 335 | 224 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 538 | - | - | 628 | - | - | - | 10 | 510 | ~ 7 | ~ 10 | 448 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | - | 10 | - | ~ 7 | ~ 10 | - |
| Stage 1 | - | - | - | - | - | - | 120 | 161 | - | ~ 95 | 142 | - |
| Stage 2 | - | - | - | - | - | - | 178 | 142 | - | 197 | 161 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 1.9 | 1.4 | | $ 6268.7 |
| HCM LOS | | | - | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | - | 510 | 628 | - | 538 | - | 7 | 448 |
| HCM Lane V/C Ratio | - | 0.153 | 0.235 | - | 0.281 | - | 19.255 | 0.143 |
| HCM Control Delay (s) | - | 13.3 | 12.5 | - | 14.3 | - | $ 9244.6 | 14.4 |
| HCM Lane LOS | - | B | B | - | B | - | F | B |
| HCM 95th %tile Q(veh) | - | 0.5 | 0.9 | - | 1.1 | - | 18.7 | 0.5 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.4 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 72 | 7 | 115 | 19 | 7 | 1 | 144 | 253 | 16 | 1 | 314 | 94 |
| Future Vol, veh/h | 72 | 7 | 115 | 19 | 7 | 1 | 144 | 253 | 16 | 1 | 314 | 94 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 32 | 32 | 32 | 6 | 6 | 6 | 4 | 4 | 4 |
| Mvmt Flow | 78 | 8 | 125 | 21 | 8 | 1 | 157 | 275 | 17 | 1 | 341 | 102 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 944 | 948 | 341 | 944 | 940 | 284 | 341 | 0 | 0 | 292 | 0 | 0 |
| Stage 1 | 343 | 343 | - | 597 | 597 | - | - | - | - | - | - | - |
| Stage 2 | 601 | 605 | - | 347 | 343 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.42 | 6.82 | 6.52 | 4.16 | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.788 | 4.288 | 3.588 | 2.254 | - | - | 2.236 | - | - |
| Pot Cap-1 Maneuver | 237 | 256 | 690 | 214 | 235 | 689 | 1196 | - | - | 1258 | - | 0 |
| Stage 1 | 662 | 629 | - | 441 | 447 | - | - | - | - | - | - | 0 |
| Stage 2 | 479 | 480 | - | 611 | 587 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 207 | 222 | 690 | 153 | 204 | 689 | 1196 | - | - | 1258 | - | - |
| Mov Cap-2 Maneuver | 207 | 222 | - | 153 | 204 | - | - | - | - | - | - | - |
| Stage 1 | 575 | 628 | - | 383 | 388 | - | - | - | - | - | - | - |
| Stage 2 | 407 | 417 | - | 494 | 586 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 20.6 | 30.7 | 3 | 0 |
| HCM LOS | C | D | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1196 | - | - | 208 | 690 | 169 | 1258 | - |
| HCM Lane V/C Ratio | 0.131 | - | - | 0.413 | 0.181 | 0.174 | 0.001 | - |
| HCM Control Delay (s) | 8.5 | - | - | 34 | 11.4 | 30.7 | 7.9 | 0 |
| HCM Lane LOS | A | - | - | D | B | D | A | A |
| HCM 95th %tile Q(veh) | 0.5 | - | - | 1.9 | 0.7 | 0.6 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 183 | 0 | 0 | 661 |
| Future Vol, veh/h | 0 | 0 | 183 | 0 | 0 | 661 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 199 | 0 | 0 | 718 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NW | NE | NE | B10 | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | R | LT | R | T | LT | R |
| Maximum Queue (m) | 41.0 | 6.8 | 5.4 | 27.3 | 5.1 | 8.1 | 48.4 | 87.1 | 19.6 | 84.3 | 130.0 | 16.4 |
| Average Queue (m) | 12.4 | 0.3 | 0.3 | 9.4 | 0.2 | 0.3 | 6.0 | 37.5 | 9.2 | 17.4 | 127.2 | 4.1 |
| 95th Queue (m) | 28.3 | 3.2 | 2.5 | 21.1 | 2.1 | 3.8 | 29.4 | 92.3 | 21.3 | 70.0 | 129.4 | 15.3 |
| Link Distance (m) | | 276.1 | 276.1 | | 194.9 | 194.9 | | 59.2 | | 260.7 | 126.4 | |
| Upstream Blk Time (%) | | | | | | | | 33 | | | 94 | |
| Queuing Penalty (veh) | | | | | | | | 0 | | | 172 | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 89.0 | | 8.0 | | | 8.0 |
| Storage Blk Time (%) | | | | | | | | 66 | 15 | | 99 | 3 |
| Queuing Penalty (veh) | | | | | | | | 48 | 1 | | 58 | 4 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB | NB | SB | SB |
|---|---|---|---|---|---|---|---|
| Directions Served | LT | R | LTR | L | TR | LT | R |
| Maximum Queue (m) | 37.9 | 20.3 | 23.5 | 19.8 | 0.7 | 1.3 | 3.1 |
| Average Queue (m) | 14.9 | 13.6 | 7.4 | 5.9 | 0.0 | 0.0 | 0.1 |
| 95th Queue (m) | 28.6 | 19.6 | 18.9 | 14.3 | 0.5 | 1.0 | 2.2 |
| Link Distance (m) | | | 1596.4 | | 808.0 | 124.5 | |
| Upstream Blk Time (%) | | | | | | | |
| Queuing Penalty (veh) | | | | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 | | | 90.0 |
| Storage Blk Time (%) | 14 | 12 | | | | | |
| Queuing Penalty (veh) | 16 | 9 | | | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE | NE |
|---|---|---|---|
| Directions Served | LT | L | R |
| Maximum Queue (m) | 61.4 | 62.7 | 21.7 |
| Average Queue (m) | 51.6 | 3.6 | 11.3 |
| 95th Queue (m) | 59.0 | 38.1 | 17.3 |
| Link Distance (m) | | 126.4 | |
| Upstream Blk Time (%) | | 0 | |
| Queuing Penalty (veh) | | 1 | |
| Storage Bay Dist (m) | | | 8.0 |
| Storage Blk Time (%) | | | 3 |
| Queuing Penalty (veh) | | | 0 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2267.3 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 50 | 963 | 1 | 126 | 964 | 141 | 1 | 4 | 120 | 456 | 15 | 116 |
| Future Vol, veh/h | 50 | 963 | 1 | 126 | 964 | 141 | 1 | 4 | 120 | 456 | 15 | 116 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 54 | 1047 | 1 | 137 | 1048 | 153 | 1 | 4 | 130 | 496 | 16 | 126 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1048 | 0 | - | 1047 | 0 | 0 | 1961 | 2477 | 523 | 1956 | 2477 | 524 |
| Stage 1 | - | - | - | - | - | - | 1155 | 1155 | - | 1322 | 1322 | - |
| Stage 2 | - | - | - | - | - | - | 806 | 1322 | - | 634 | 1155 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 588 | - | 0 | 588 | - | 0 | 35 | 27 | 483 | ~ 36 | 27 | 483 |
| Stage 1 | - | - | 0 | - | - | 0 | 200 | 257 | - | ~ 157 | 213 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 329 | 213 | - | ~ 420 | 257 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 588 | - | - | 588 | - | - | 6 | 19 | 483 | ~ 17 | 19 | 483 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 6 | 19 | - | ~ 17 | 19 | - |
| Stage 1 | - | - | - | - | - | - | 182 | 233 | - | ~ 143 | 163 | - |
| Stage 2 | - | - | - | - | - | - | 168 | 163 | - | ~ 273 | 233 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 0.6 | 1.5 | 31.2 | $ 10862.5 |
| HCM LOS | | | D | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 13 | 483 | 588 | - | 588 | - | 17 | 483 |
| HCM Lane V/C Ratio | 0.418 | 0.27 | 0.233 | - | 0.092 | - | 30.115 | 0.261 |
| HCM Control Delay (s) | $ 414.1 | 15.2 | 13 | - | 11.7 | $ 13534 | | 15.1 |
| HCM Lane LOS | F | C | B | - | B | - | F | C |
| HCM 95th %tile Q(veh) | 1 | 1.1 | 0.9 | - | 0.3 | - | 64.8 | 1 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 85 | 4 | 204 | 15 | 3 | 0 | 88 | 259 | 13 | 1 | 275 | 43 |
| Future Vol, veh/h | 85 | 4 | 204 | 15 | 3 | 0 | 88 | 259 | 13 | 1 | 275 | 43 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 26 | 26 | 26 | 6 | 6 | 6 | 6 | 6 | 6 |
| Mvmt Flow | 92 | 4 | 222 | 16 | 3 | 0 | 96 | 282 | 14 | 1 | 299 | 47 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 783 | 788 | 299 | 783 | 781 | 289 | 299 | 0 | 0 | 296 | 0 | 0 |
| Stage 1 | 301 | 301 | - | 480 | 480 | - | - | - | - | - | - | - |
| Stage 2 | 482 | 487 | - | 303 | 301 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.36 | 6.76 | 6.46 | 4.16 | - | - | 4.16 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.734 | 4.234 | 3.534 | 2.254 | - | - | 2.254 | - | - |
| Pot Cap-1 Maneuver | 305 | 318 | 729 | 284 | 300 | 697 | 1240 | - | - | 1243 | - | 0 |
| Stage 1 | 697 | 656 | - | 524 | 516 | - | - | - | - | - | - | 0 |
| Stage 2 | 556 | 542 | - | 658 | 624 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 284 | 293 | 729 | 184 | 276 | 697 | 1240 | - | - | 1243 | - | - |
| Mov Cap-2 Maneuver | 284 | 293 | - | 184 | 276 | - | - | - | - | - | - | - |
| Stage 1 | 643 | 655 | - | 483 | 476 | - | - | - | - | - | - | - |
| Stage 2 | 509 | 500 | - | 454 | 623 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 15.7 | 25.5 | 2 | 0 |
| HCM LOS | C | D | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1240 | - | - | 284 | 729 | 195 | 1243 | - |
| HCM Lane V/C Ratio | 0.077 | - | - | 0.341 | 0.304 | 0.1 | 0.001 | - |
| HCM Control Delay (s) | 8.1 | - | - | 24.1 | 12.1 | 25.5 | 7.9 | 0 |
| HCM Lane LOS | A | - | - | C | B | D | A | A |
| HCM 95th %tile Q(veh) | 0.2 | - | - | 1.5 | 1.3 | 0.3 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 587 | 0 | 0 | 195 |
| Future Vol, veh/h | 0 | 0 | 587 | 0 | 0 | 195 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 638 | 0 | 0 | 212 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NE | NE | B10 | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | R | LT | R | T | LT | R |
| Maximum Queue (m) | 22.1 | 4.2 | 6.5 | 31.6 | 6.1 | 3.2 | 54.6 | 21.0 | 14.6 | 130.4 | 15.6 |
| Average Queue (m) | 5.4 | 0.1 | 0.3 | 10.2 | 0.2 | 0.1 | 21.5 | 14.0 | 1.4 | 128.2 | 5.4 |
| 95th Queue (m) | 15.0 | 2.6 | 2.7 | 23.5 | 3.2 | 2.4 | 58.0 | 20.4 | 13.8 | 130.8 | 17.5 |
| Link Distance (m) | | 276.1 | 276.1 | | 194.9 | | 59.2 | | 260.7 | 126.4 | |
| Upstream Blk Time (%) | | | | | | | 7 | | | 88 | |
| Queuing Penalty (veh) | | | | | | | 0 | | | 516 | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | 89.0 | | 8.0 | | | 8.0 |
| Storage Blk Time (%) | | | | | | | 25 | 30 | | 98 | 3 |
| Queuing Penalty (veh) | | | | | | | 30 | 2 | | 114 | 16 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB | SB |
|---|---|---|---|---|---|
| Directions Served | LT | R | LTR | L | LT |
| Maximum Queue (m) | 41.7 | 23.8 | 22.6 | 12.0 | 2.7 |
| Average Queue (m) | 18.6 | 15.7 | 5.6 | 3.4 | 0.0 |
| 95th Queue (m) | 32.5 | 20.7 | 17.1 | 9.4 | 1.0 |
| Link Distance (m) | | | 1596.4 | | 124.5 |
| Upstream Blk Time (%) | | | | | |
| Queuing Penalty (veh) | | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 | |
| Storage Blk Time (%) | 12 | 22 | | | |
| Queuing Penalty (veh) | 26 | 20 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 62.8 | 12.7 |
| Average Queue (m) | 53.3 | 2.8 |
| 95th Queue (m) | 60.0 | 10.1 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 497.7 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 143 | 898 | 4 | 136 | 1052 | 538 | 1 | 5 | 72 | 117 | 12 | 60 |
| Future Vol, veh/h | 143 | 898 | 4 | 136 | 1052 | 538 | 1 | 5 | 72 | 117 | 12 | 60 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 155 | 976 | 4 | 148 | 1143 | 585 | 1 | 5 | 78 | 127 | 13 | 65 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1143 | 0 | - | 976 | 0 | 0 | 2161 | 2726 | 488 | 2241 | 2726 | 572 |
| Stage 1 | - | - | - | - | - | - | 1287 | 1287 | - | 1439 | 1439 | - |
| Stage 2 | - | - | - | - | - | - | 874 | 1439 | - | 802 | 1287 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 538 | - | 0 | 628 | - | 0 | 25 | 18 | 510 | ~ 21 | 18 | 448 |
| Stage 1 | - | - | 0 | - | - | 0 | 165 | 222 | - | 132 | 186 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 299 | 186 | - | 331 | 222 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 538 | - | - | 628 | - | - | - | 10 | 510 | ~ 7 | ~ 10 | 448 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | - | 10 | - | ~ 7 | ~ 10 | - |
| Stage 1 | - | - | - | - | - | - | 117 | 158 | - | ~ 94 | 142 | - |
| Stage 2 | - | - | - | - | - | - | 177 | 142 | - | 193 | 158 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 2 | 1.4 | | $ 6552.9 |
| HCM LOS | | | - | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | - | 510 | 628 | - | 538 | - | 7 | 448 |
| HCM Lane V/C Ratio | - | 0.153 | 0.235 | - | 0.289 | - | 20.031 | 0.146 |
| HCM Control Delay (s) | - | 13.3 | 12.5 | - | 14.4 | - | $ 9594.1 | 14.4 |
| HCM Lane LOS | - | B | B | - | B | - | F | B |
| HCM 95th %tile Q(veh) | - | 0.5 | 0.9 | - | 1.2 | - | 19.4 | 0.5 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.5 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 73 | 7 | 116 | 19 | 7 | 1 | 148 | 253 | 16 | 1 | 314 | 97 |
| Future Vol, veh/h | 73 | 7 | 116 | 19 | 7 | 1 | 148 | 253 | 16 | 1 | 314 | 97 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 32 | 32 | 32 | 6 | 6 | 6 | 4 | 4 | 4 |
| Mvmt Flow | 79 | 8 | 126 | 21 | 8 | 1 | 161 | 275 | 17 | 1 | 341 | 105 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 953 | 957 | 341 | 952 | 948 | 284 | 341 | 0 | 0 | 292 | 0 | 0 |
| Stage 1 | 343 | 343 | - | 605 | 605 | - | - | - | - | - | - | - |
| Stage 2 | 610 | 614 | - | 347 | 343 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.42 | 6.82 | 6.52 | 4.16 | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.42 | 5.82 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.788 | 4.288 | 3.588 | 2.254 | - | - | 2.236 | - | - |
| Pot Cap-1 Maneuver | 234 | 253 | 690 | 211 | 233 | 689 | 1196 | - | - | 1258 | - | 0 |
| Stage 1 | 662 | 629 | - | 437 | 443 | - | - | - | - | - | - | 0 |
| Stage 2 | 473 | 475 | - | 611 | 587 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 203 | 219 | 690 | 151 | 201 | 689 | 1196 | - | - | 1258 | - | - |
| Mov Cap-2 Maneuver | 203 | 219 | - | 151 | 201 | - | - | - | - | - | - | - |
| Stage 1 | 573 | 628 | - | 378 | 383 | - | - | - | - | - | - | - |
| Stage 2 | 401 | 411 | - | 493 | 586 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 21.1 | 31.1 | 3 | 0 |
| HCM LOS | C | D | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1196 | - | - | 204 | 690 | 167 | 1258 | - |
| HCM Lane V/C Ratio | 0.135 | - | - | 0.426 | 0.183 | 0.176 | 0.001 | - |
| HCM Control Delay (s) | 8.5 | - | - | 35.2 | 11.4 | 31.1 | 7.9 | 0 |
| HCM Lane LOS | A | - | - | E | B | D | A | A |
| HCM 95th %tile Q(veh) | 0.5 | - | - | 2 | 0.7 | 0.6 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 189 | 0 | 0 | 686 |
| Future Vol, veh/h | 0 | 0 | 189 | 0 | 0 | 686 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 205 | 0 | 0 | 746 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NW | NE | NE | B10 | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | R | LT | R | T | LT | R |
| Maximum Queue (m) | 42.6 | 22.0 | 6.4 | 31.9 | 8.7 | 4.0 | 65.3 | 57.6 | 20.7 | 7.8 | 130.2 | 16.9 |
| Average Queue (m) | 14.8 | 0.8 | 0.2 | 10.1 | 0.3 | 0.2 | 13.2 | 16.5 | 11.3 | 0.6 | 127.5 | 4.5 |
| 95th Queue (m) | 39.2 | 13.9 | 2.7 | 23.0 | 5.9 | 2.2 | 44.6 | 51.8 | 21.3 | 7.9 | 129.9 | 16.3 |
| Link Distance (m) | | 276.1 | 276.1 | | 194.9 | 194.9 | | 59.2 | | 260.7 | 126.4 | |
| Upstream Blk Time (%) | | | | | | | | 5 | | | 94 | |
| Queuing Penalty (veh) | | | | | | | | 0 | | | 178 | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 89.0 | | 8.0 | | | 8.0 |
| Storage Blk Time (%) | 3 | | | | | | 0 | 27 | 17 | | 99 | 2 |
| Queuing Penalty (veh) | 13 | | | | | | 0 | 19 | 1 | | 59 | 3 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB | SB |
|---|---|---|---|---|---|
| Directions Served | LT | R | LTR | L | R |
| Maximum Queue (m) | 35.2 | 20.2 | 24.6 | 16.6 | 6.1 |
| Average Queue (m) | 14.9 | 13.9 | 7.6 | 6.2 | 0.1 |
| 95th Queue (m) | 27.0 | 19.2 | 20.3 | 14.4 | 2.2 |
| Link Distance (m) | | | 1596.4 | | |
| Upstream Blk Time (%) | | | | | |
| Queuing Penalty (veh) | | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 | 90.0 |
| Storage Blk Time (%) | 13 | 13 | | | |
| Queuing Penalty (veh) | 16 | 10 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE | NE |
|---|---|---|---|
| Directions Served | LT | L | R |
| Maximum Queue (m) | 62.0 | 67.2 | 18.4 |
| Average Queue (m) | 52.3 | 2.7 | 11.7 |
| 95th Queue (m) | 59.1 | 29.9 | 16.4 |
| Link Distance (m) | | 126.4 | |
| Upstream Blk Time (%) | | 0 | |
| Queuing Penalty (veh) | | 0 | |
| Storage Bay Dist (m) | | | 8.0 |
| Storage Blk Time (%) | | | 3 |
| Queuing Penalty (veh) | | | 0 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2589.7 |

| Movement | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 51 | 963 | 1 | 126 | 964 | 146 | 1 | 4 | 120 | 475 | 15 | 120 |
| Future Vol, veh/h | 51 | 963 | 1 | 126 | 964 | 146 | 1 | 4 | 120 | 475 | 15 | 120 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | Free | - | - | Free | - | - | None | - | - | None |
| Storage Length | 600 | - | 600 | 890 | - | 890 | - | - | 80 | - | - | 80 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 15 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 55 | 1047 | 1 | 137 | 1048 | 159 | 1 | 4 | 130 | 516 | 16 | 130 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1048 | 0 | - | 1047 | 0 | 0 | 1964 | 2480 | 523 | 1958 | 2480 | 524 |
| Stage 1 | - | - | - | - | - | - | 1158 | 1158 | - | 1322 | 1322 | - |
| Stage 2 | - | - | - | - | - | - | 806 | 1322 | - | 636 | 1158 | - |
| Critical Hdwy | 4.4 | - | - | 4.4 | - | - | 7.66 | 6.66 | 7.06 | 7.66 | 6.66 | 7.06 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.66 | 5.66 | - | 6.66 | 5.66 | - |
| Follow-up Hdwy | 2.35 | - | - | 2.35 | - | - | 3.58 | 4.08 | 3.38 | 3.58 | 4.08 | 3.38 |
| Pot Cap-1 Maneuver | 588 | - | 0 | 588 | - | 0 | 35 | 27 | 483 | ~ 35 | 27 | 483 |
| Stage 1 | - | - | 0 | - | - | 0 | 199 | 257 | - | ~ 157 | 213 | - |
| Stage 2 | - | - | 0 | - | - | 0 | 329 | 213 | - | ~ 418 | 257 | - |
| Platoon blocked, % | | - | | | - | | | | | | | |
| Mov Cap-1 Maneuver | 588 | - | - | 588 | - | - | 6 | 19 | 483 | ~ 16 | 19 | 483 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 6 | 19 | - | ~ 16 | 19 | - |
| Stage 1 | - | - | - | - | - | - | 180 | 233 | - | ~ 142 | 163 | - |
| Stage 2 | - | - | - | - | - | - | 166 | 163 | - | ~ 271 | 233 | - |

| Approach | SE | NW | NE | SW |
|---|---|---|---|---|
| HCM Control Delay, s | 0.6 | 1.5 | 31.2 | $ 12042.5 |
| HCM LOS | | | D | F |

| Minor Lane/Major Mvmt | NELn1 | NELn2 | NWL | NWT | SEL | SET | SWLn1 | SWLn2 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 13 | 483 | 588 | - | 588 | - | 16 | 483 |
| HCM Lane V/C Ratio | 0.418 | 0.27 | 0.233 | - | 0.094 | - | 33.288 | 0.27 |
| HCM Control Delay (s) | $ 414.1 | 15.2 | 13 | - | 11.8 | $ 14988 | | 15.2 |
| HCM Lane LOS | F | C | B | - | B | - | F | C |
| HCM 95th %tile Q(veh) | 1 | 1.1 | 0.9 | - | 0.3 | - | 67.5 | 1.1 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 87 | 4 | 208 | 15 | 3 | 0 | 89 | 259 | 13 | 1 | 275 | 44 |
| Future Vol, veh/h | 87 | 4 | 208 | 15 | 3 | 0 | 89 | 259 | 13 | 1 | 275 | 44 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | Free |
| Storage Length | - | - | 80 | - | - | - | 1900 | - | - | - | - | 900 |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 7 | 7 | 7 | 26 | 26 | 26 | 6 | 6 | 6 | 6 | 6 | 6 |
| Mvmt Flow | 95 | 4 | 226 | 16 | 3 | 0 | 97 | 282 | 14 | 1 | 299 | 48 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 785 | 790 | 299 | 785 | 783 | 289 | 299 | 0 | 0 | 296 | 0 | 0 |
| Stage 1 | 301 | 301 | - | 482 | 482 | - | - | - | - | - | - | - |
| Stage 2 | 484 | 489 | - | 303 | 301 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.17 | 6.57 | 6.27 | 7.36 | 6.76 | 6.46 | 4.16 | - | - | 4.16 | - | - |
| Critical Hdwy Stg 1 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.17 | 5.57 | - | 6.36 | 5.76 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.563 | 4.063 | 3.363 | 3.734 | 4.234 | 3.534 | 2.254 | - | - | 2.254 | - | - |
| Pot Cap-1 Maneuver | 304 | 317 | 729 | 283 | 299 | 697 | 1240 | - | - | 1243 | - | 0 |
| Stage 1 | 697 | 656 | - | 523 | 515 | - | - | - | - | - | - | 0 |
| Stage 2 | 555 | 541 | - | 658 | 624 | - | - | - | - | - | - | 0 |
| Platoon blocked, % | | | | | | | | - | - | | - | |
| Mov Cap-1 Maneuver | 283 | 292 | 729 | 181 | 275 | 697 | 1240 | - | - | 1243 | - | - |
| Mov Cap-2 Maneuver | 283 | 292 | - | 181 | 275 | - | - | - | - | - | - | - |
| Stage 1 | 642 | 655 | - | 482 | 475 | - | - | - | - | - | - | - |
| Stage 2 | 508 | 499 | - | 450 | 623 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 15.8 | 25.9 | 2 | 0 |
| HCM LOS | C | D | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1240 | - | - | 283 | 729 | 192 | 1243 | - |
| HCM Lane V/C Ratio | 0.078 | - | - | 0.35 | 0.31 | 0.102 | 0.001 | - |
| HCM Control Delay (s) | 8.1 | - | - | 24.4 | 12.1 | 25.9 | 7.9 | 0 |
| HCM Lane LOS | A | - | - | C | B | D | A | A |
| HCM 95th %tile Q(veh) | 0.3 | - | - | 1.5 | 1.3 | 0.3 | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0 |

| Movement | SET | SER | NWL | NWT | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 0 | 0 | 587 | 0 | 0 | 195 |
| Future Vol, veh/h | 0 | 0 | 587 | 0 | 0 | 195 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | 80 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 8 | 8 | 8 | 8 | 8 | 8 |
| Mvmt Flow | 0 | 0 | 638 | 0 | 0 | 212 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 0 | 0 | 0 | 0 |
| Stage 1 | 0 | - | 0 | 0 | - | - |
| Stage 2 | 0 | - | 0 | 0 | - | - |
| Critical Hdwy | - | - | - | - | - | - |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | - | - |
| Pot Cap-1 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | - |
| Mov Cap-1 Maneuver | - | - | - | - | - | - |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - | - |

| Approach | SE | NW | NE |
|---|---|---|---|
| HCM Control Delay, s | 0 | | 0 |
| HCM LOS | A | - | |

| Minor Lane/Major Mvmt | NEL | NER | NWLn1 | SELn1 |
|---|---|---|---|---|
| Capacity (veh/h) | - | - | - | - |
| HCM Lane V/C Ratio | - | - | - | - |
| HCM Control Delay (s) | 0 | - | - | 0 |
| HCM Lane LOS | A | - | - | A |
| HCM 95th %tile Q(veh) | - | - | - | - |

## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NW | NE | NE | B10 | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | R | LT | R | T | LT | R |
| Maximum Queue (m) | 17.4 | 0.6 | 9.4 | 31.1 | 0.3 | 0.3 | 4.1 | 66.0 | 20.9 | 13.0 | 130.4 | 19.9 |
| Average Queue (m) | 4.3 | 0.0 | 0.6 | 10.3 | 0.0 | 0.0 | 0.4 | 20.5 | 14.4 | 1.1 | 128.1 | 5.2 |
| 95th Queue (m) | 12.5 | 0.6 | 4.5 | 23.0 | 0.2 | 0.0 | 4.4 | 51.6 | 20.4 | 10.0 | 130.5 | 17.5 |
| Link Distance (m) | | 276.1 | 276.1 | | 194.9 | 194.9 | | 59.2 | | 260.7 | 126.4 | |
| Upstream Blk Time (%) | | | | | | | | 4 | | | 88 | |
| Queuing Penalty (veh) | | | | | | | | 0 | | | 517 | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 89.0 | | 8.0 | | | 8.0 |
| Storage Blk Time (%) | | | | | | | | 21 | 32 | | 99 | 2 |
| Queuing Penalty (veh) | | | | | | | | 24 | 2 | | 118 | 12 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB | SB |
|---|---|---|---|---|---|
| Directions Served | LT | R | LTR | L | LT |
| Maximum Queue (m) | 36.2 | 20.3 | 18.0 | 12.0 | 1.5 |
| Average Queue (m) | 17.5 | 14.8 | 4.4 | 3.4 | 0.1 |
| 95th Queue (m) | 29.5 | 19.0 | 13.8 | 9.4 | 1.1 |
| Link Distance (m) | | | 1596.4 | | 124.5 |
| Upstream Blk Time (%) | | | | | |
| Queuing Penalty (veh) | | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 | |
| Storage Blk Time (%) | 11 | 21 | | | |
| Queuing Penalty (veh) | 22 | 19 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 66.3 | 11.7 |
| Average Queue (m) | 53.4 | 2.3 |
| 95th Queue (m) | 60.3 | 9.3 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

# *APPENDIX F:*

## *TURN LANE WARRANTS*

# Alberta Transportation Turn Lane Warrant Analysis

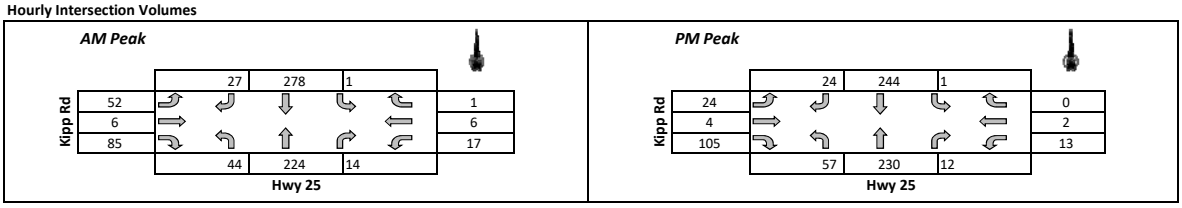
**ANALYSIS DETAILS**

Analysis Horizon: ***2029***
Traffic Conditions: ***Background***
Analysis Date: ***25/10/2018***
Analyst: ***JAD***

**INTERSECTION**

Main Street: ***Hwy 25***
Side Street: ***Kipp Rd***
Design Speed: ***110 km/h***
Direction (EW or NS): ***NS***
Direction (EW or NS): ***EW***

**Hourly Intersection Volumes**

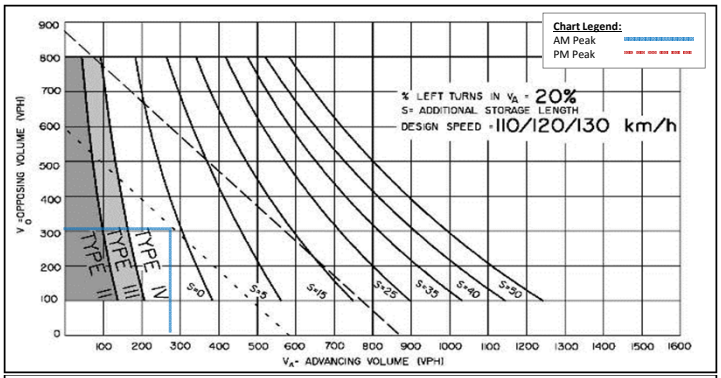


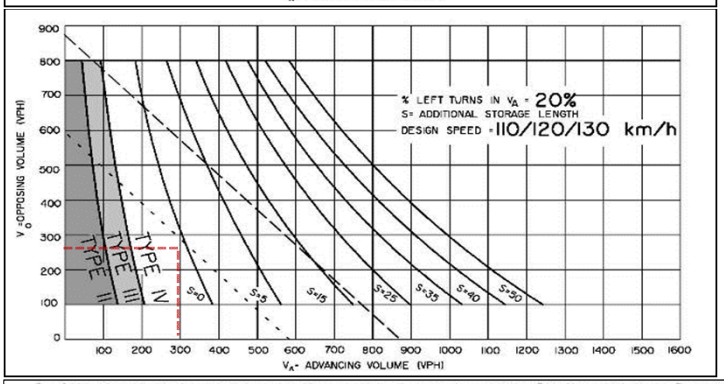

**Warrant for Left Turn Lane (Hwy 25)**

When making a left turn onto the side street, a turning vehicle may be delayed by a vehicle or vehiclesin the opposing stream. Through vehicles in the advancing stream following the left-turning vehicle may be delayed by, or exposed to collision with the turning vehicle. The interference caused by the standing left turning vehicles in the through advancing traffic can reduce capacity and create a safety hazard.

The amount of interference is dependent onthe opposing volume (Vo), advancing volume (Va), and the number of left-turning vehicles (V*ℓ*). The proportion of left turning vehicles (L) is used when entering the appropriate design chart in the Alberta Transportation Highway Geometric Design Guide.

| Direction | Period | V*ℓ* | Va | L | Vo | Chart L | Chart Reference | Treatment Warranted |
|---|---|---|---|---|---|---|---|---|
| NB | AM Peak | 44 | 282 | 16% | 306 | 20% | D-7.6-7b | Type IV, S=0 |
| NB | PM Peak | 57 | 299 | 19% | 269 | 20% | D-7.6-7b | Type IV, S=0 |




S = Additional storage length required, that is, in addition to what is shown on the appropriate Type IV standard drawing. Designers should check additional storage requirements for trucks, also see Table D.7.6a.
- - - - Traffic signals may be warranted in rural areas, or urban areas, with restricted flow.
— — — Traffic signals may be warranted in "free flow" urban areas.

Notes:
1. The traffic signal warrant lines are provided for reference only. For detailed analysis of the requirements for signals, contact Roadway Engineering Branch.
2. Warrant for Type I treatment is shown in Figure D-7.4.

**Warrant for Right Turn Lane**

To warrant an exclusive right turn lane at a two-lane highway intersection in Alberta, three conditions must be met as shown below. All three conditions must be met for the right turn lane to be warranted.

**Direction:** Hwy 25 NB

| Condition | Estimated Value | Condition Met? |
|---|---|---|
| a. Main Road (Hwy 25) AADT ≥ 1800 | 6180 | TRUE |
| b. Intersecting Road (Kipp Rd) AADT ≥ 900 | 1630 | TRUE |
| c. Right-Turn Daily Traffic ≥ 360 | 153 | FALSE |

**Result:** An exclusive right-turn lane is NOT warranted

Hwy 25 SB

| | Estimated Value | Condition Met? |
|---|---|---|
| a. Main Road (Hwy 25) AADT ≥ 1800 | 5500 | TRUE |
| b. Intersecting Road (Kipp Rd) AADT ≥ 900 | 1630 | TRUE |
| c. Right-Turn Daily Traffic ≥ 360 | 295 | FALSE |

**Direction** Hwy 25 NB

An exclusive right-turn lane is NOT warranted **Direction** Hwy 25 SB

# Alberta Transportation Turn Lane Warrant Analysis

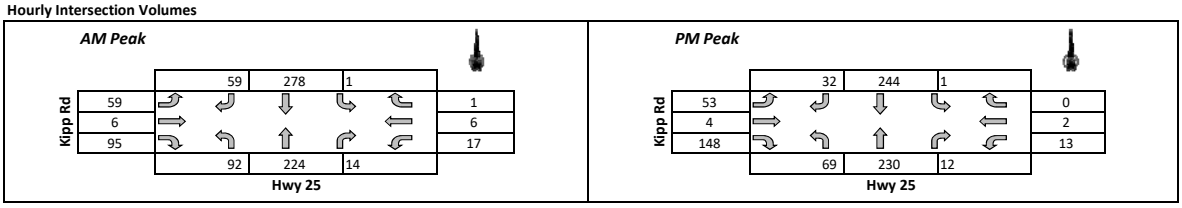
**ANALYSIS DETAILS**

Analysis Horizon: ***2029***
Traffic Conditions: ***Post-Development***
Analysis Date: ***25/10/2018***
Analyst: ***JAD***

**INTERSECTION**

Main Street: ***Hwy 25***
Side Street: ***Kipp Rd***
Design Speed: ***110 km/h***
Direction (EW or NS): ***NS***
Direction (EW or NS): ***EW***

**Hourly Intersection Volumes**

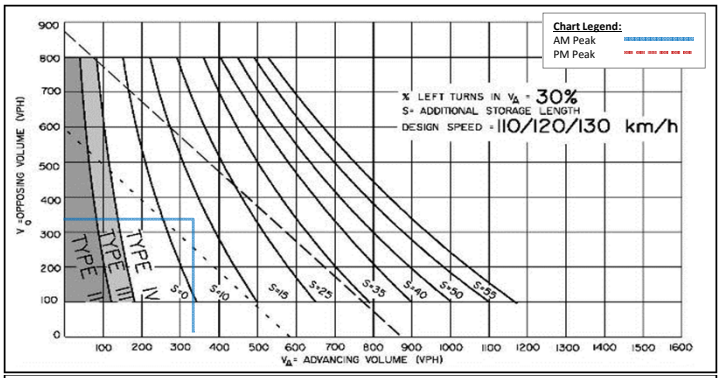


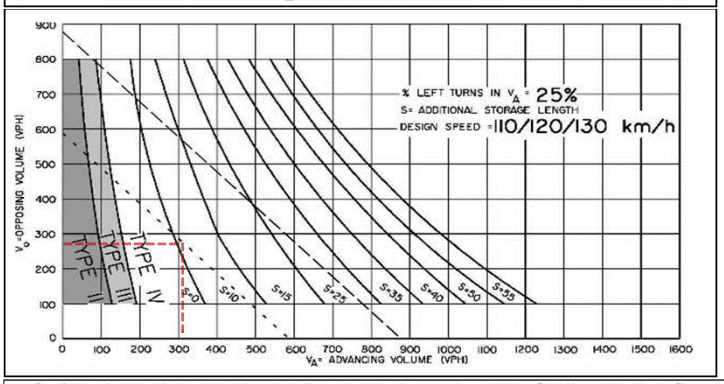

**Warrant for Left Turn Lane (Hwy 25)**

When making a left turn onto the side street, a turning vehicle may be delayed by a vehicle or vehiclesin the opposing stream. Through vehicles in the advancing stream following the left-turning vehicle may be delayed by, or exposed to collision with the turning vehicle. The interference caused by the standing left turning vehicles in the through advancing traffic can reduce capacity and create a safety hazard.

The amount of interference is dependent onthe opposing volume (Vo), advancing volume (Va), and the number of left-turning vehicles (V*ℓ*). The proportion of left turning vehicles (L) is used when entering the appropriate design chart in the Alberta Transportation Highway Geometric Design Guide.

| Direction | Period | V*ℓ* | Va | L | Vo | Chart L | Chart Reference | Treatment Warranted |
|---|---|---|---|---|---|---|---|---|
| NB | AM Peak | 92 | 330 | 28% | 338 | 30% | D-7.6-7c | **Type IV, S=10** |
| NB | PM Peak | 69 | 311 | 22% | 277 | 25% | D-7.6-7c | **Type IV, S=10** |




S = Additional storage length required, that is, in addition to what is shown on the appropriate Type IV standard drawing. Designers should check additional storage requirements for trucks, also see Table D.7.6a.
– – – – Traffic signals may be warranted in rural areas, or urban areas, with restricted flow.
— — — — Traffic signals may be warranted in "free flow" urban areas.

Notes:
1. The traffic signal warrant lines are provided for reference only. For detailed analysis of the requirements for signals, contact Roadway Engineering Branch.
2. Warrant for Type I treatment is shown in Figure D-7.4.

**Warrant for Right Turn Lane**

To warrant an exclusive right turn lane at a two-lane highway intersection in Alberta, three conditions must be met as shown below. All three conditions must be met for the right turn lane to be warranted.

**Direction:** Hwy 25 NB

| Condition | Estimated Value | Condition Met? |
|---|---|---|
| a. Main Road (Hwy 25) AADT ≥ 1800 | 6520 | TRUE |
| b. Intersecting Road (Kipp Rd) AADT ≥ 900 | 2190 | TRUE |
| c. Right-Turn Daily Traffic ≥ 360 | 153 | FALSE |

**Result:** **An exclusive right-turn lane is NOT warranted**

Hwy 25 SB

| Condition | Estimated Value | Condition Met? |
|---|---|---|
| a. Main Road (Hwy 25) AADT ≥ 1800 | 5720 | TRUE |
| b. Intersecting Road (Kipp Rd) AADT ≥ 900 | 2190 | TRUE |
| c. Right-Turn Daily Traffic ≥ 360 | 407 | TRUE |

**Direction** Hwy 25 NB

**An exclusive right-turn lane IS warranted** **Direction** Hwy 25 SB

# Alberta Transportation Turn Lane Warrant Analysis

**ANALYSIS DETAILS** OPTION 2

Analysis Horizon: ***2029*** Analysis Date: ***25/10/2018***

Traffic Conditions: ***Post-Development*** Analyst: ***JAD***

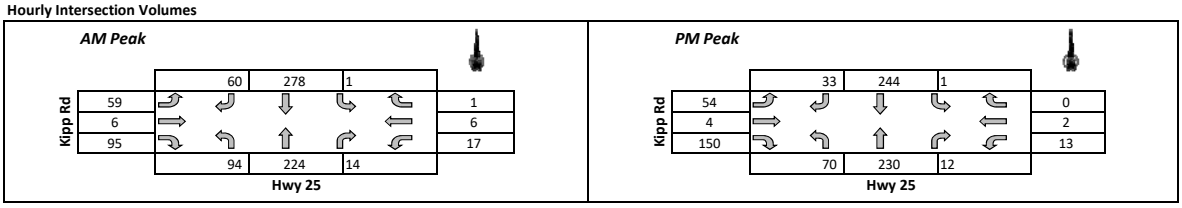
**INTERSECTION**

Main Street: ***Hwy 25*** Direction (EW or NS): ***NS***

Side Street: ***Kipp Rd*** Direction (EW or NS): ***EW***

Design Speed: ***110 km/h***

**Hourly Intersection Volumes**

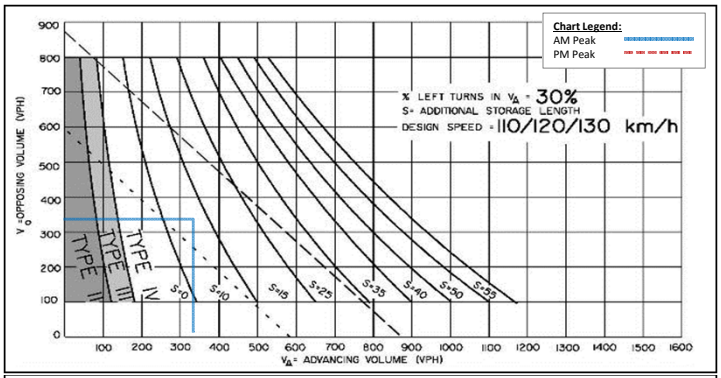


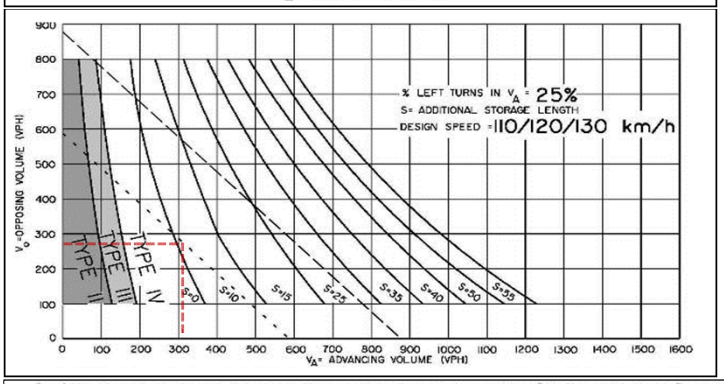

**Warrant for Left Turn Lane (Hwy 25)**

When making a left turn onto the side street, a turning vehicle may be delayed by a vehicle or vehiclesin the opposing stream. Through vehicles in the advancing stream following the left-turning vehicle may be delayed by, or exposed to collision with the turning vehicle. The interference caused by the standing left turning vehicles in the through advancing traffic can reduce capacity and create a safety hazard.

The amount of interference is dependent onthe opposing volume (Vo), advancing volume (Va), and the number of left-turning vehicles (V*ℓ*). The proportion of left turning vehicles (L) is used when entering the appropriate design chart in the Alberta Transportation Highway Geometric Design Guide.

| Direction | Period | V*ℓ* | Va | L | Vo | Chart L | Chart Reference | Treatment Warranted |
|---|---|---|---|---|---|---|---|---|
| NB | AM Peak | 94 | 332 | 28% | 339 | 30% | D-7.6-7c | Type IV, S=10 |
| NB | PM Peak | 70 | 312 | 22% | 278 | 25% | D-7.6-7c | Type IV, S=10 |




S = Additional storage length required, that is, in addition to what is shown on the appropriate Type IV standard drawing. Designers should check additional storage requirements for trucks, also see Table D.7.6a.
- - - - Traffic signals may be warranted in rural areas, or urban areas, with restricted flow.
— — — Traffic signals may be warranted in "free flow" urban areas.

Notes:
1. The traffic signal warrant lines are provided for reference only. For detailed analysis of the requirements for signals, contact Roadway Engineering Branch.
2. Warrant for Type I treatment is shown in Figure D-7.4.

**Warrant for Right Turn Lane**

To warrant an exclusive right turn lane at a two-lane highway intersection in Alberta, three conditions must be met as shown below. All three conditions must be met for the right turn lane to be warranted.

**Direction:** Hwy 25 NB Hwy 25 SB

| Condition | Estimated Value | Condition Met? | Estimated Value | Condition Met? |
|---|---|---|---|---|
| a. Main Road (Hwy 25) AADT ≥ 1800 | 6530 | TRUE | 5730 | TRUE |
| b. Intersecting Road (Kipp Rd) AADT ≥ 900 | 2210 | TRUE | 2210 | TRUE |
| c. Right-Turn Daily Traffic ≥ 360 | 153 | FALSE | 411 | TRUE |

**Result:** **An exclusive right-turn lane is NOT warranted** **Direction** Hwy 25 NB

**An exclusive right-turn lane IS warranted** **Direction** Hwy 25 SB

# Alberta Transportation Turn Lane Warrant Analysis

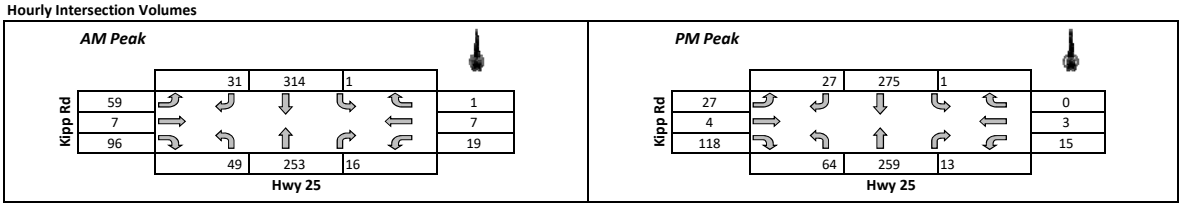
**ANALYSIS DETAILS**

Analysis Horizon: ***2039***
Traffic Conditions: ***Background***
Analysis Date: ***25/10/2018***
Analyst: ***JAD***

**INTERSECTION**

Main Street: ***Hwy 25***
Side Street: ***Kipp Rd***
Design Speed: ***110 km/h***
Direction (EW or NS): ***NS***
Direction (EW or NS): ***EW***

**Hourly Intersection Volumes**

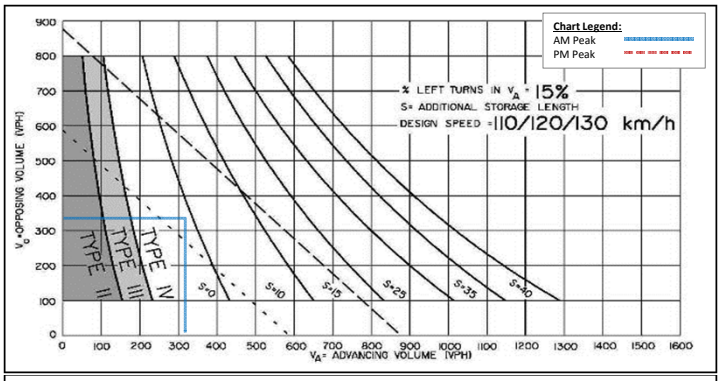


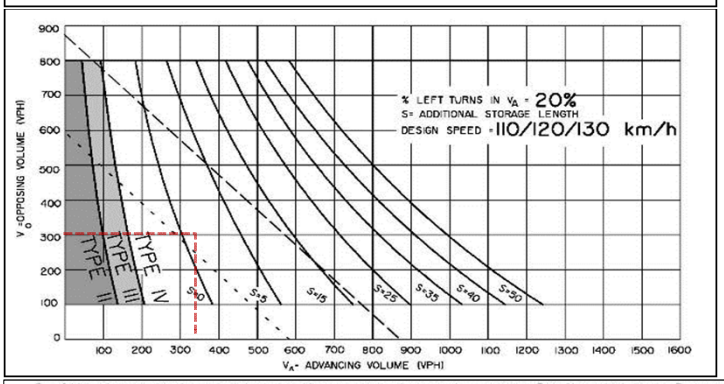

**Warrant for Left Turn Lane (Hwy 25)**

When making a left turn onto the side street, a turning vehicle may be delayed by a vehicle or vehiclesin the opposing stream. Through vehicles in the advancing stream following the left-turning vehicle may be delayed by, or exposed to collision with the turning vehicle. The interference caused by the standing left turning vehicles in the through advancing traffic can reduce capacity and create a safety hazard.

The amount of interference is dependent onthe opposing volume (Vo), advancing volume (Va), and the number of left-turning vehicles (V*ℓ*). The proportion of left turning vehicles (L) is used when entering the appropriate design chart in the Alberta Transportation Highway Geometric Design Guide.

| Direction | Period | V*ℓ* | Va | L | Vo | Chart L | Chart Reference | Treatment Warranted |
|---|---|---|---|---|---|---|---|---|
| NB | AM Peak | 49 | 318 | 15% | 346 | 15% | D-7.6-7b | **Type IV, S=0** |
| NB | PM Peak | 64 | 336 | 19% | 303 | 20% | D-7.6-7b | **Type IV, S=0** |




S = Additional storage length required, that is, in addition to what is shown on the appropriate Type IV standard drawing. Designers should check additional storage requirements for trucks, also see Table D.7.6a.
– – – – Traffic signals may be warranted in rural areas, or urban areas, with restricted flow.
— — — — Traffic signals may be warranted in "free flow" urban areas.

Notes:
1. The traffic signal warrant lines are provided for reference only. For detailed analysis of the requirements for signals, contact Roadway Engineering Branch.
2. Warrant for Type I treatment is shown in Figure D-7.4.

**Warrant for Right Turn Lane**

To warrant an exclusive right turn lane at a two-lane highway intersection in Alberta, three conditions must be met as shown below. All three conditions must be met for the right turn lane to be warranted.

**Direction:** Hwy 25 NB

| Condition | Estimated Value | Condition Met? |
|---|---|---|
| a. Main Road (Hwy 25) AADT ≥ 1800 | 6970 | TRUE |
| b. Intersecting Road (Kipp Rd) AADT ≥ 900 | 1840 | TRUE |
| c. Right-Turn Daily Traffic ≥ 360 | 173 | FALSE |

**Result:** **An exclusive right-turn lane is NOT warranted**

Hwy 25 SB

| Condition | Estimated Value | Condition Met? |
|---|---|---|
| a. Main Road (Hwy 25) AADT ≥ 1800 | 6200 | TRUE |
| b. Intersecting Road (Kipp Rd) AADT ≥ 900 | 1840 | TRUE |
| c. Right-Turn Daily Traffic ≥ 360 | 333 | FALSE |

**Direction** Hwy 25 NB

**An exclusive right-turn lane is NOT warranted**

**Direction** Hwy 25 SB

# Alberta Transportation Turn Lane Warrant Analysis

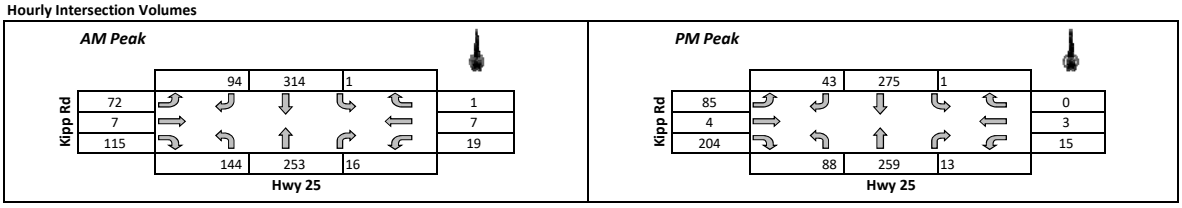
**ANALYSIS DETAILS**

Analysis Horizon: ***2039***
Traffic Conditions: ***Post-Development***
Analysis Date: ***25/10/2018***
Analyst: ***JAD***

**INTERSECTION**

Main Street: ***Hwy 25***
Side Street: ***Kipp Rd***
Design Speed: ***110 km/h***
Direction (EW or NS): ***NS***
Direction (EW or NS): ***EW***

**Hourly Intersection Volumes**

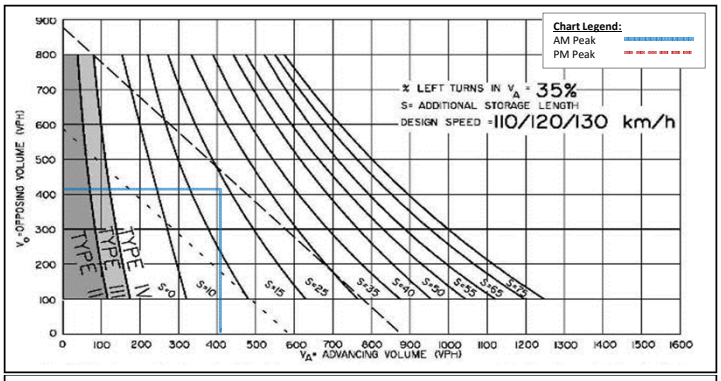


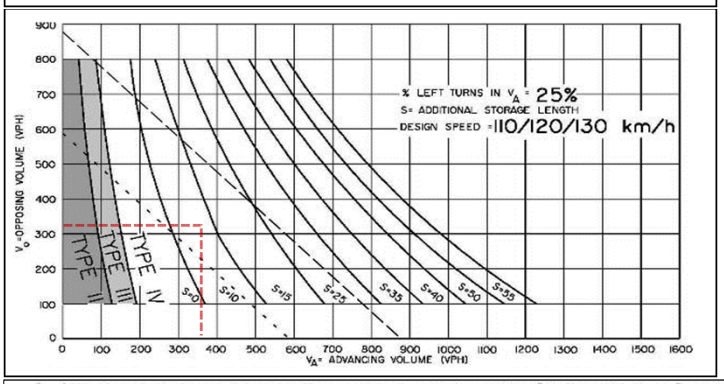

**Warrant for Left Turn Lane (Hwy 25)**

When making a left turn onto the side street, a turning vehicle may be delayed by a vehicle or vehiclesin the opposing stream. Through vehicles in the advancing stream following the left-turning vehicle may be delayed by, or exposed to collision with the turning vehicle. The interference caused by the standing left turning vehicles in the through advancing traffic can reduce capacity and create a safety hazard.

The amount of interference is dependent onthe opposing volume (Vo), advancing volume (Va), and the number of left-turning vehicles (V*ℓ*). The proportion of left turning vehicles (L) is used when entering the appropriate design chart in the Alberta Transportation Highway Geometric Design Guide.

| Direction | Period | V*ℓ* | Va | L | Vo | Chart L | Chart Reference | Treatment Warranted |
|---|---|---|---|---|---|---|---|---|
| NB | AM Peak | 144 | 413 | 35% | 409 | 35% | D-7.6-7d | **Type IV, S=15** |
| NB | PM Peak | 88 | 360 | 24% | 319 | 25% | D-7.6-7c | **Type IV, S=0** |




S = Additional storage length required, that is, in addition to what is shown on the appropriate Type IV standard drawing. Designers should check additional storage requirements for trucks, also see Table D.7.6a.
- - - - Traffic signals may be warranted in rural areas, or urban areas, with restricted flow.
— — — Traffic signals may be warranted in "free flow" urban areas.

Notes:
1. The traffic signal warrant lines are provided for reference only. For detailed analysis of the requirements for signals, contact Roadway Engineering Branch.
2. Warrant for Type I treatment is shown in Figure D-7.4.

**Warrant for Right Turn Lane**

To warrant an exclusive right turn lane at a two-lane highway intersection in Alberta, three conditions must be met as shown below. All three conditions must be met for the right turn lane to be warranted.

**Direction:** Hwy 25 NB

| Condition | Estimated Value | Condition Met? |
|---|---|---|
| a. Main Road (Hwy 25) AADT ≥ 1800 | 7640 | TRUE |
| b. Intersecting Road (Kipp Rd) AADT ≥ 900 | 2950 | TRUE |
| c. Right-Turn Daily Traffic ≥ 360 | 173 | FALSE |

**Result:** **An exclusive right-turn lane is NOT warranted**

Hwy 25 SB

| Estimated Value | Condition Met? |
|---|---|
| 6640 | TRUE |
| 2950 | TRUE |
| 556 | TRUE |

**Direction** Hwy 25 NB

**An exclusive right-turn lane IS warranted** **Direction** Hwy 25 SB

# Alberta Transportation Turn Lane Warrant Analysis

**ANALYSIS DETAILS** OPTION 2

Analysis Horizon: ***2039*** Analysis Date: ***25/10/2018***

Traffic Conditions: ***Post-Development*** Analyst: ***JAD***

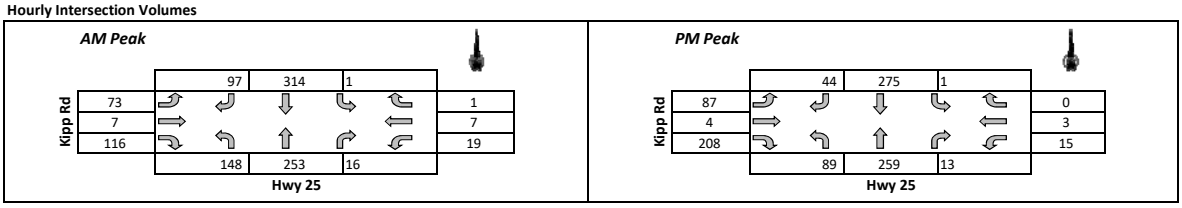
**INTERSECTION**

Main Street: ***Hwy 25*** Direction (EW or NS): ***NS***

Side Street: ***Kipp Rd*** Direction (EW or NS): ***EW***

Design Speed: ***110 km/h***

**Hourly Intersection Volumes**

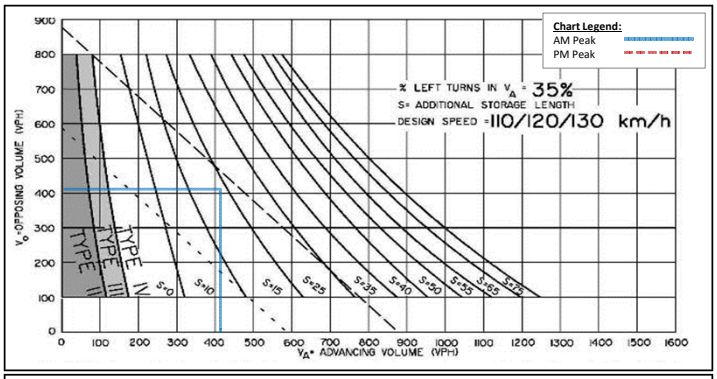


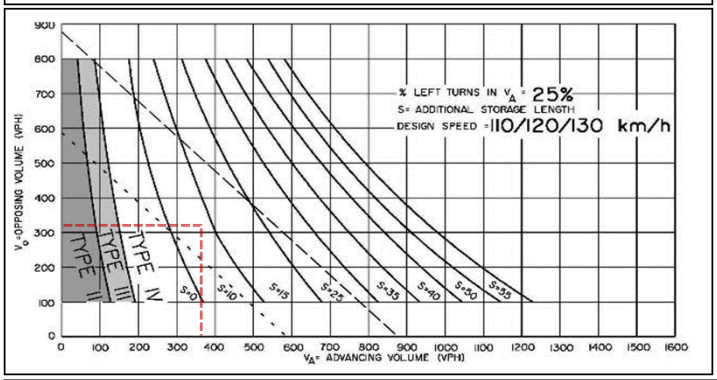

**Warrant for Left Turn Lane (Hwy 25)**

When making a left turn onto the side street, a turning vehicle may be delayed by a vehicle or vehiclesin the opposing stream. Through vehicles in the advancing stream following the left-turning vehicle may be delayed by, or exposed to collision with the turning vehicle. The interference caused by the standing left turning vehicles in the through advancing traffic can reduce capacity and create a safety hazard.

The amount of interference is dependent onthe opposing volume (Vo), advancing volume (Va), and the number of left-turning vehicles (V*ℓ*). The proportion of left turning vehicles (L) is used when entering the appropriate design chart in the Alberta Transportation Highway Geometric Design Guide.

| Direction | Period | V*ℓ* | Va | L | Vo | Chart L | Chart Reference | Treatment Warranted |
|---|---|---|---|---|---|---|---|---|
| NB | AM Peak | 148 | 417 | 35% | 412 | 35% | D-7.6-7d | **Type IV, S=15** |
| NB | PM Peak | 89 | 361 | 25% | 320 | 25% | D-7.6-7c | **Type IV, S=0** |




S = Additional storage length required, that is, in addition to what is shown on the appropriate Type IV standard drawing. Designers should check additional storage requirements for trucks, also see Table D.7.6a.
- - - - Traffic signals may be warranted in rural areas, or urban areas, with restricted flow.
— — — Traffic signals may be warranted in "free flow" urban areas.

Notes:
1. The traffic signal warrant lines are provided for reference only. For detailed analysis of the requirements for signals, contact Roadway Engineering Branch.
2. Warrant for Type I treatment is shown in Figure D-7.4.

**Warrant for Right Turn Lane**

To warrant an exclusive right turn lane at a two-lane highway intersection in Alberta, three conditions must be met as shown below. All three conditions must be met for the right turn lane to be warranted.

**Direction:** Hwy 25 NB Hwy 25 SB

| Condition | Estimated Value | Condition Met? | Estimated Value | Condition Met? |
|---|---|---|---|---|
| a. Main Road (Hwy 25) AADT ≥ 1800 | 7670 | TRUE | 6660 | TRUE |
| b. Intersecting Road (Kipp Rd) AADT ≥ 900 | 3000 | TRUE | 3000 | TRUE |
| c. Right-Turn Daily Traffic ≥ 360 | 173 | FALSE | 565 | TRUE |

**Result:** **An exclusive right-turn lane is NOT warranted** **Direction** Hwy 25 NB

**An exclusive right-turn lane IS warranted** **Direction** Hwy 25 SB

# *APPENDIX G:*

## *TRAFFIC SIGNAL WARRANTS*

MPE Engineering Ltd.

# Alberta Transportation - Traffic Signal Warrant Analysis

| | | | | | |
|---|---|---|---|---|---|
| Main Street (name) | Hwy 3 | Direction (EW or NS) | NS | Road Authority: | Alberta Transportation |
| Side Street (name) | Hwy 509 | Direction (EW or NS) | EW | City: | Rural |
| Quadrant / Int # | A1 | Comments | OPTION 2 6-Hour Peak Adjustment: 2.867549 x (am + pm DHV) | Analysis Date: | 2018 Oct 26, Fri |
| for Warrant Calculation Results, please hit 'Page Down' | CHECK SHEET | | | Count Date: | 2029 Background (am + pm) |
| | | | | Date Entry Format: | (yyyy-mm-dd) |

| Lane Configuration | | Excl LT | Th & LT | Through | Th+RT+LT | Th & RT | Excl RT | UpStream Signal (m) | # of Thru Lanes |
|---|---|---|---|---|---|---|---|---|---|
| Hwy 3 | NB | 1 | | 2 | | | 1 | 4,000 | 2 |
| Hwy 3 | SB | 1 | | 2 | | | 1 | 4,000 | 2 |
| Hwy 509 | WB | | | | 1 | | | | |
| Hwy 509 | EB | | | | 1 | | | | |
| Are the Hwy 509 WB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |
| Are the Hwy 509 EB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |

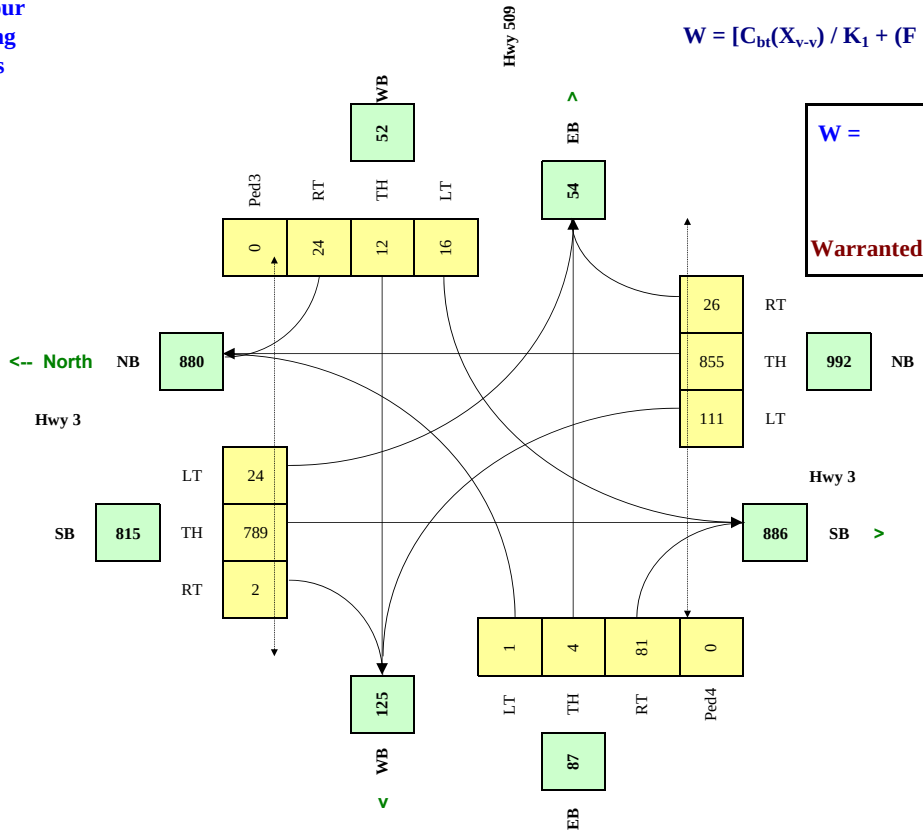
| Demographics | | |
|---|---|---|
| Elem. School/Mobility Challenged | (y/n) | n |
| Senior's Complex | (y/n) | n |
| Pathway to School | (y/n) | n |
| Metro Area Population | (#) | 4,289 |
| Central Business District | (y/n) | n |

| Other input | | Speed (Km/h) | Truck % | Bus Rt (y/n) | Median (m) |
|---|---|---|---|---|---|
| Hwy 3 | NS | 110 | 20.0% | n | 11.0 |
| Hwy 509 | EW | | 17.0% | n | |

Set Peak Hours

| Traffic Input | NB | | | SB | | | WB | | | EB | | | Ped1 NS | Ped2 NS | Ped3 EW | Ped4 EW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | Th | RT | LT | Th | RT | LT | Th | RT | LT | Th | RT | W Side | E Side | N Side | S Side |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Total (6-hour peak) | 665 | 5130 | 155 | 143 | 4734 | 14 | 97 | 69 | 146 | 6 | 26 | 487 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **Total (6-hour peak)** | **665** | **5,130** | **155** | **143** | **4,734** | **14** | **97** | **69** | **146** | **6** | **26** | **487** | **0** | **0** | **0** | **0** |
| **Average (6-hour peak)** | **111** | **855** | **26** | **24** | **789** | **2** | **16** | **12** | **24** | **1** | **4** | **81** | **0** | **0** | **0** | **0** |

## Average 6-hour Peak Turning Movements




$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$

| W = | 145 | 145 | 0 |
|---|---|---|---|
| | | *Veh* | *Ped* |

**Warranted**

RESET SHEET

# Alberta Transportation - Traffic Signal Warrant Analysis

| | | | | | |
|---|---|---|---|---|---|
| Main Street (name) | Hwy 3 | Direction (EW or NS) | NS | Road Authority: | Alberta Transportation |
| Side Street (name) | Hwy 509 | Direction (EW or NS) | EW | City: | Rural |
| Quadrant / Int # | A1 | Comments | OPTION 2 6-Hour Peak Adjustment: 2.867549 x (am + pm DHV) | Analysis Date: | 2018 Oct 26, Fri |
| for Warrant Calculation Results, please hit 'Page Down' | CHECK SHEET | | | Count Date: | 2029 Post-Development (am + pm) |
| | | | | Date Entry Format: | (yyyy-mm-dd) |

| Lane Configuration | | Excl LT | Th & LT | Through | Th+RT+LT | Th & RT | Excl RT | UpStream Signal (m) | # of Thru Lanes |
|---|---|---|---|---|---|---|---|---|---|
| Hwy 3 | NB | 1 | | 2 | | | 1 | 4,000 | 2 |
| Hwy 3 | SB | 1 | | 2 | | | 1 | 4,000 | 2 |
| Hwy 509 | WB | | | | 1 | | | | |
| Hwy 509 | EB | | | | 1 | | | | |
| Are the Hwy 509 WB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |
| Are the Hwy 509 EB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |

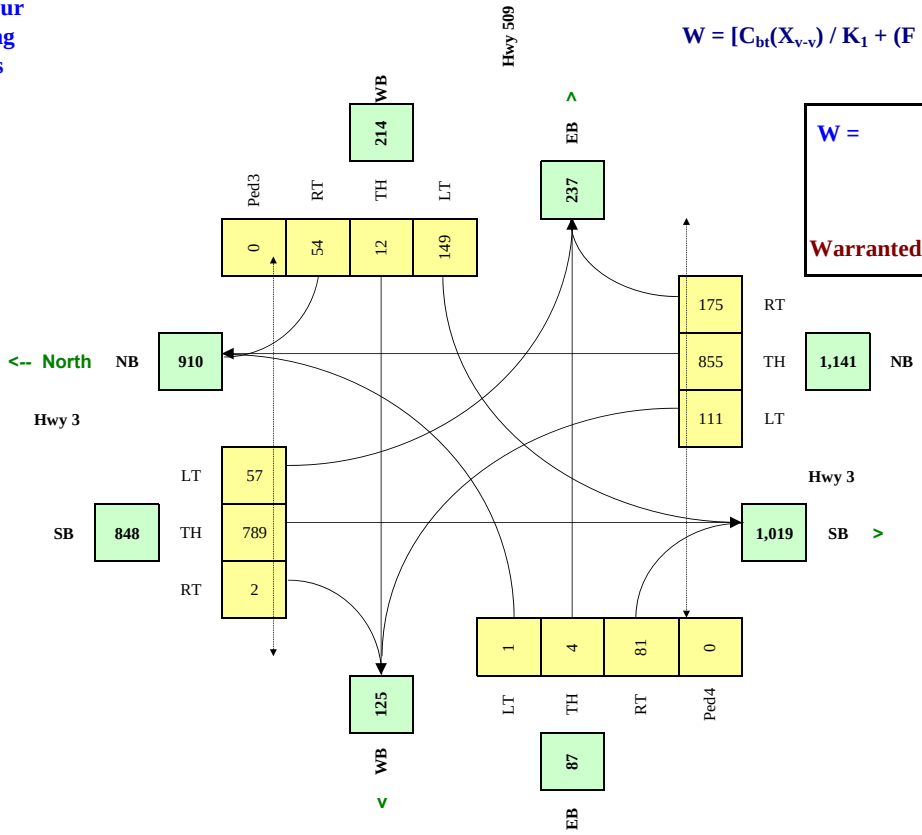
| Demographics | | |
|---|---|---|
| Elem. School/Mobility Challenged | (y/n) | n |
| Senior's Complex | (y/n) | n |
| Pathway to School | (y/n) | n |
| Metro Area Population | (#) | 4,289 |
| Central Business District | (y/n) | n |

| Other input | | Speed (Km/h) | Truck % | Bus Rt (y/n) | Median (m) |
|---|---|---|---|---|---|
| Hwy 3 | NS | 110 | 20.0% | n | 11.0 |
| Hwy 509 | EW | | 17.0% | n | |

Set Peak Hours

| Traffic Input | NB | | | SB | | | WB | | | EB | | | Ped1 NS | Ped2 NS | Ped3 EW | Ped4 EW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | Th | RT | LT | Th | RT | LT | Th | RT | LT | Th | RT | W Side | E Side | N Side | S Side |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Total (6-hour peak) | 665 | 5130 | 1052 | 341 | 4734 | 14 | 892 | 69 | 324 | 6 | 26 | 487 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **Total (6-hour peak)** | **665** | **5,130** | **1,052** | **341** | **4,734** | **14** | **892** | **69** | **324** | **6** | **26** | **487** | **0** | **0** | **0** | **0** |
| **Average (6-hour peak)** | **111** | **855** | **175** | **57** | **789** | **2** | **149** | **12** | **54** | **1** | **4** | **81** | **0** | **0** | **0** | **0** |

## Average 6-hour Peak Turning Movements




$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$

| | | | |
|---|---|---|---|
| W = | 298 | 298 | 0 |
| | | *Veh* | *Ped* |

**Warranted**

RESET SHEET

# Alberta Transportation - Traffic Signal Warrant Analysis

| | | | | | |
|---|---|---|---|---|---|
| Main Street (name) | Hwy 3 | Direction (EW or NS) | NS | Road Authority: | Alberta Transportation |
| Side Street (name) | Hwy 509 | Direction (EW or NS) | EW | City: | Rural |
| Quadrant / Int # | A1 | Comments | OPTION 2 6-Hour Peak Adjustment: 2.867549 x (am + pm DHV) | Analysis Date: | 2018 Oct 26, Fri |
| for Warrant Calculation Results, please hit 'Page Down' | CHECK SHEET | | | Count Date: | 2039 Background (am + pm) |
| | | | | Date Entry Format: | (yyyy-mm-dd) |

| Lane Configuration | | Excl LT | Th & LT | Through | Th+RT+LT | Th & RT | Excl RT | UpStream Signal (m) | # of Thru Lanes |
|---|---|---|---|---|---|---|---|---|---|
| Hwy 3 | NB | 1 | | 2 | | | 1 | 4,000 | 2 |
| Hwy 3 | SB | 1 | | 2 | | | 1 | 4,000 | 2 |
| Hwy 509 | WB | | | | 1 | | | | |
| Hwy 509 | EB | | | | 1 | | | | |
| Are the Hwy 509 WB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |
| Are the Hwy 509 EB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |

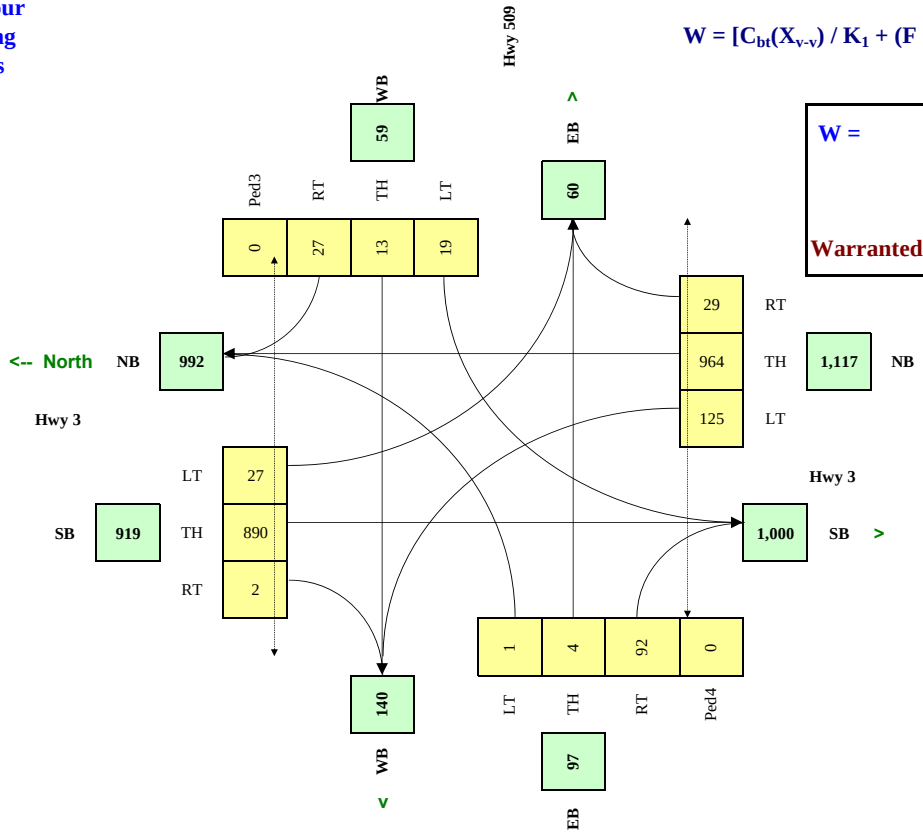
| Demographics | | |
|---|---|---|
| Elem. School/Mobility Challenged | (y/n) | n |
| Senior's Complex | (y/n) | n |
| Pathway to School | (y/n) | n |
| Metro Area Population | (#) | 5,672 |
| Central Business District | (y/n) | n |

| Other input | | Speed (Km/h) | Truck % | Bus Rt (y/n) | Median (m) |
|---|---|---|---|---|---|
| Hwy 3 | NS | 110 | 20.0% | n | 11.0 |
| Hwy 509 | EW | | 17.0% | n | |

Set Peak Hours

| Traffic Input | NB | | | SB | | | WB | | | EB | | | Ped1 NS | Ped2 NS | Ped3 EW | Ped4 EW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | Th | RT | LT | Th | RT | LT | Th | RT | LT | Th | RT | W Side | E Side | N Side | S Side |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Total (6-hour peak) | 751 | 5781 | 172 | 161 | 5337 | 14 | 112 | 77 | 163 | 6 | 26 | 551 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **Total (6-hour peak)** | **751** | **5,781** | **172** | **161** | **5,337** | **14** | **112** | **77** | **163** | **6** | **26** | **551** | **0** | **0** | **0** | **0** |
| **Average (6-hour peak)** | **125** | **964** | **29** | **27** | **890** | **2** | **19** | **13** | **27** | **1** | **4** | **92** | **0** | **0** | **0** | **0** |

## Average 6-hour Peak Turning Movements




$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$

| W = | 188 | 188 | 0 |
|---|---|---|---|
| | | *Veh* | *Ped* |

**Warranted**

RESET SHEET

*Traffic Signal Warrant Spreadsheet - v3H © 2007 Transportation Association of Canada*

# Alberta Transportation - Traffic Signal Warrant Analysis

| | | | | | |
|---|---|---|---|---|---|
| Main Street (name) | Hwy 3 | Direction (EW or NS) | NS | Road Authority: | Alberta Transportation |
| Side Street (name) | Hwy 509 | Direction (EW or NS) | EW | City: | Rural |
| Quadrant / Int # | A1 | Comments | OPTION 2 6-Hour Peak Adjustment: 2.867549 x (am + pm DHV) | Analysis Date: | 2018 Oct 26, Fri |
| for Warrant Calculation Results, please hit 'Page Down' | CHECK SHEET | | | Count Date: | 2039 Post-Development (am + pm) |
| | | | | Date Entry Format: | (yyyy-mm-dd) |

| Lane Configuration | | Excl LT | Th & LT | Through | Th+RT+LT | Th & RT | Excl RT | UpStream Signal (m) | # of Thru Lanes |
|---|---|---|---|---|---|---|---|---|---|
| Hwy 3 | NB | 1 | | 2 | | | 1 | 4,000 | 2 |
| Hwy 3 | SB | 1 | | 2 | | | 1 | 4,000 | 2 |
| Hwy 509 | WB | | | | 1 | | | | |
| Hwy 509 | EB | | | | 1 | | | | |
| Are the Hwy 509 WB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |
| Are the Hwy 509 EB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |

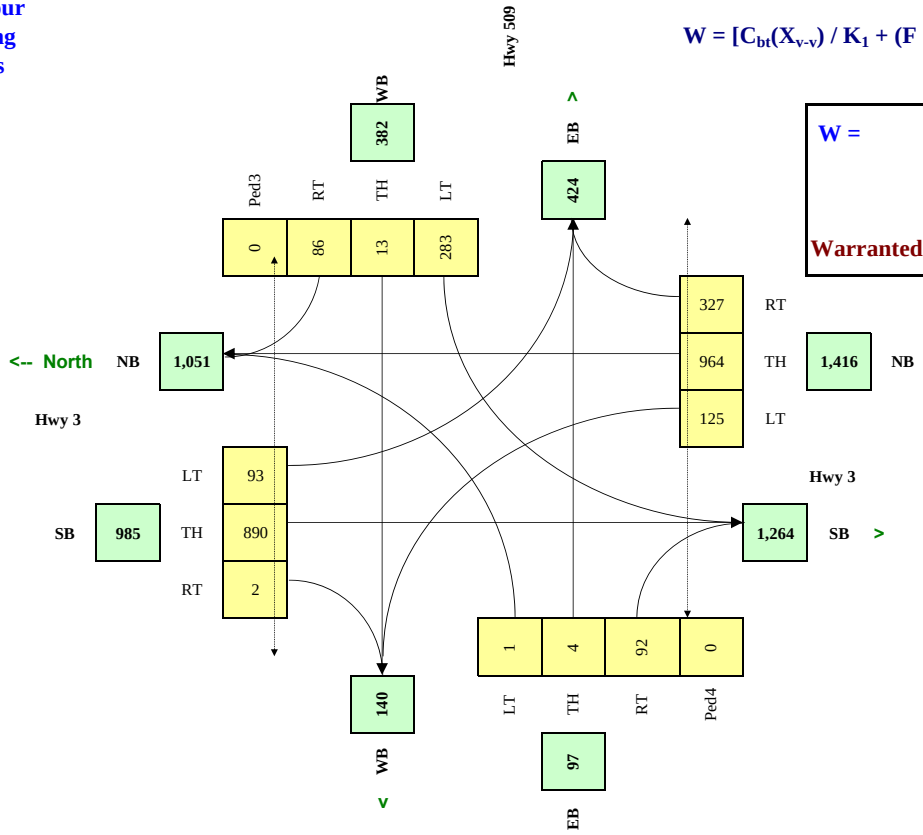
| Demographics | | |
|---|---|---|
| Elem. School/Mobility Challenged | (y/n) | n |
| Senior's Complex | (y/n) | n |
| Pathway to School | (y/n) | n |
| Metro Area Population | (#) | 5,672 |
| Central Business District | (y/n) | n |

| Other input | | Speed (Km/h) | Truck % | Bus Rt (y/n) | Median (m) |
|---|---|---|---|---|---|
| Hwy 3 | NS | 110 | 20.0% | n | 11.0 |
| Hwy 509 | EW | | 17.0% | n | |

Set Peak Hours

| Traffic Input | NB | | | SB | | | WB | | | EB | | | Ped1 NS | Ped2 NS | Ped3 EW | Ped4 EW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | Th | RT | LT | Th | RT | LT | Th | RT | LT | Th | RT | W Side | E Side | N Side | S Side |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Total (6-hour peak) | 751 | 5781 | 1961 | 556 | 5337 | 14 | 1698 | 77 | 516 | 6 | 26 | 551 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **Total (6-hour peak)** | **751** | **5,781** | **1,961** | **556** | **5,337** | **14** | **1,698** | **77** | **516** | **6** | **26** | **551** | **0** | **0** | **0** | **0** |
| **Average (6-hour peak)** | **125** | **964** | **327** | **93** | **890** | **2** | **283** | **13** | **86** | **1** | **4** | **92** | **0** | **0** | **0** | **0** |

**Average 6-hour Peak Turning Movements**




$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$

| | | | |
|---|---|---|---|
| W = | 554 | 554 | 0 |
| | | *Veh* | *Ped* |

**Warranted**

RESET SHEET

*Traffic Signal Warrant Spreadsheet - v3H © 2007 Transportation Association of Canada*

# Alberta Transportation - Traffic Signal Warrant Analysis

| | | | | | |
|---|---|---|---|---|---|
| Main Street (name) | Hwy 25 | Direction (EW or NS) | NS | Road Authority: | Alberta Transportation |
| Side Street (name) | Kipp Rd | Direction (EW or NS) | EW | City: | Rural |
| Quadrant / Int # | A1 | Comments | OPTION 2 6-Hour Peak Adjustment: 2.867549 x (am + pm DHV) | Analysis Date: | 2018 Oct 26, Fri |
| for Warrant Calculation Results, please hit 'Page Down' | CHECK SHEET | | | Count Date: | 2029 Background (am + pm) |
| | | | | Date Entry Format: | (yyyy-mm-dd) |

| Lane Configuration | | Excl LT | Th & LT | Through | Th+RT+LT | Th & RT | Excl RT | UpStream Signal (m) | # of Thru Lanes |
|---|---|---|---|---|---|---|---|---|---|
| Hwy 25 | NB | 1 | | | | 1 | | 4,000 | 1 |
| Hwy 25 | SB | | 1 | | | | 1 | 4,000 | 1 |
| Kipp Rd | WB | | | | 1 | | | | |
| Kipp Rd | EB | | | | 1 | | | | |
| Are the Kipp Rd WB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |
| Are the Kipp Rd EB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |

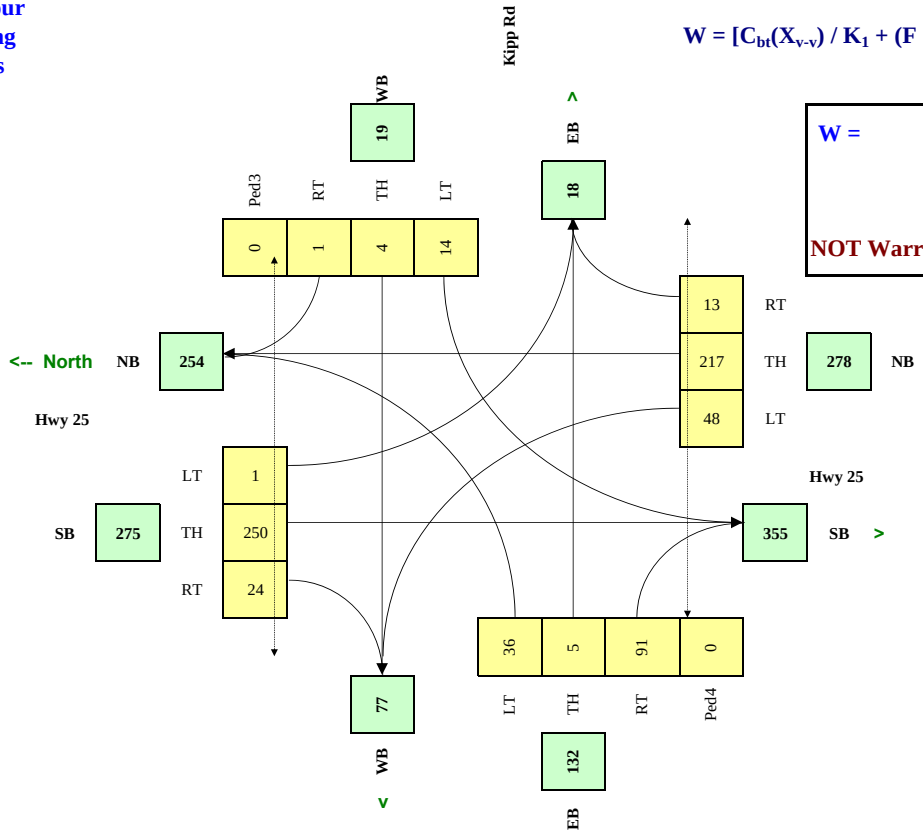
| Demographics | | |
|---|---|---|
| Elem. School/Mobility Challenged | (y/n) | n |
| Senior's Complex | (y/n) | n |
| Pathway to School | (y/n) | n |
| Metro Area Population | (#) | 4,289 |
| Central Business District | (y/n) | n |

| Other input | | Speed (Km/h) | Truck % | Bus Rt (y/n) | Median (m) |
|---|---|---|---|---|---|
| Hwy 25 | NS | 100 | 11.0% | n | 0.0 |
| Kipp Rd | EW | | 10.0% | n | |

Set Peak Hours

| Traffic Input | NB | | | SB | | | WB | | | EB | | | Ped1 NS | Ped2 NS | Ped3 EW | Ped4 EW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | Th | RT | LT | Th | RT | LT | Th | RT | LT | Th | RT | W Side | E Side | N Side | S Side |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Total (6-hour peak) | 290 | 1302 | 75 | 6 | 1497 | 146 | 86 | 23 | 3 | 218 | 29 | 545 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **Total (6-hour peak)** | **290** | **1,302** | **75** | **6** | **1,497** | **146** | **86** | **23** | **3** | **218** | **29** | **545** | **0** | **0** | **0** | **0** |
| **Average (6-hour peak)** | **48** | **217** | **13** | **1** | **250** | **24** | **14** | **4** | **1** | **36** | **5** | **91** | **0** | **0** | **0** | **0** |

## Average 6-hour Peak Turning Movements




$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$

| W = | 43 | 43 | 0 |
|---|---|---|---|
| | | *Veh* | *Ped* |

**NOT Warranted**

RESET SHEET

# Alberta Transportation - Traffic Signal Warrant Analysis

| | | | | | |
|---|---|---|---|---|---|
| Main Street (name) | Hwy 25 | Direction (EW or NS) | NS | Road Authority: | Alberta Transportation |
| Side Street (name) | Kipp Rd | Direction (EW or NS) | EW | City: | Rural |
| Quadrant / Int # | A1 | Comments | OPTION 2 6-Hour Peak Adjustment: 2.867549 x (am + pm DHV) | Analysis Date: | 2018 Oct 26, Fri |
| for Warrant Calculation Results, please hit 'Page Down' | CHECK SHEET | | | Count Date: | 2029 Post-Development (am + pm) |
| | | | | Date Entry Format: | (yyyy-mm-dd) |

| Lane Configuration | | Excl LT | Th & LT | Through | Th+RT+LT | Th & RT | Excl RT | UpStream Signal (m) | # of Thru Lanes |
|---|---|---|---|---|---|---|---|---|---|
| Hwy 25 | NB | 1 | | | | 1 | | 4,000 | 1 |
| Hwy 25 | SB | | 1 | | | | 1 | 4,000 | 1 |
| Kipp Rd | WB | | | | 1 | | | | |
| Kipp Rd | EB | | | | 1 | | | | |
| Are the Kipp Rd WB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |
| Are the Kipp Rd EB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |

| Demographics | | |
|---|---|---|
| Elem. School/Mobility Challenged | (y/n) | n |
| Senior's Complex | (y/n) | n |
| Pathway to School | (y/n) | n |
| Metro Area Population | (#) | 4,289 |
| Central Business District | (y/n) | n |

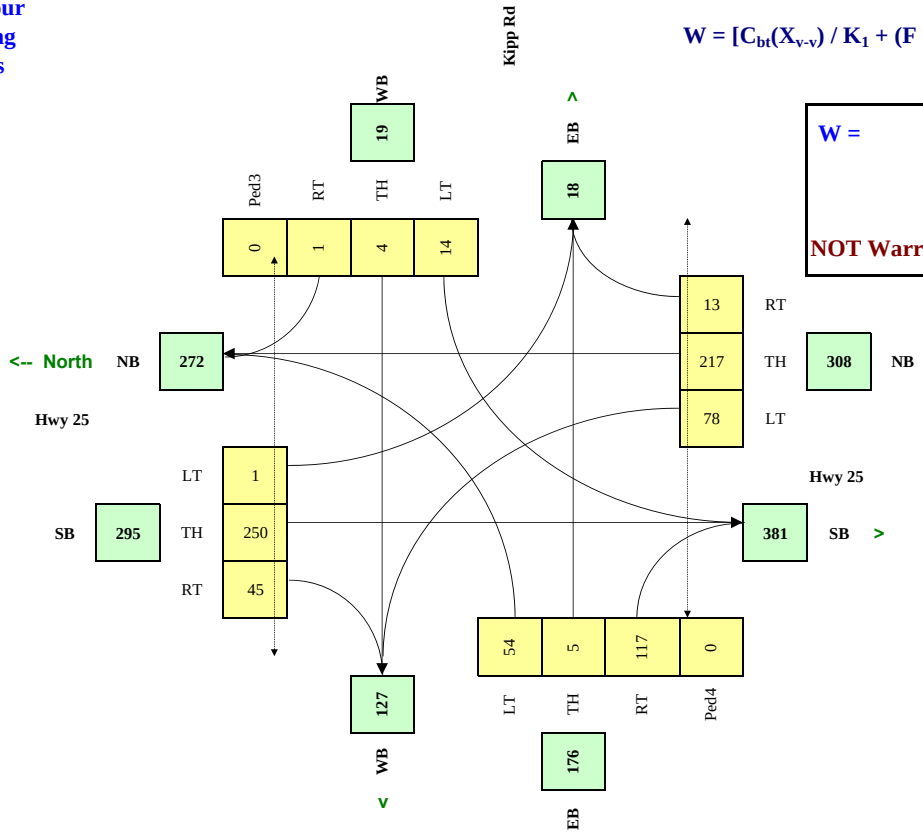
| Other input | | Speed (Km/h) | Truck % | Bus Rt (y/n) | Median (m) |
|---|---|---|---|---|---|
| Hwy 25 | NS | 100 | 11.0% | n | 0.0 |
| Kipp Rd | EW | | 10.0% | n | |

Set Peak Hours

| Traffic Input | NB | | | SB | | | WB | | | EB | | | Ped1 NS | Ped2 NS | Ped3 EW | Ped4 EW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | Th | RT | LT | Th | RT | LT | Th | RT | LT | Th | RT | W Side | E Side | N Side | S Side |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Total (6-hour peak) | 470 | 1302 | 75 | 6 | 1497 | 267 | 86 | 23 | 3 | 324 | 29 | 703 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **Total (6-hour peak)** | **470** | **1,302** | **75** | **6** | **1,497** | **267** | **86** | **23** | **3** | **324** | **29** | **703** | **0** | **0** | **0** | **0** |
| **Average (6-hour peak)** | **78** | **217** | **13** | **1** | **250** | **45** | **14** | **4** | **1** | **54** | **5** | **117** | **0** | **0** | **0** | **0** |

**Average 6-hour Peak Turning Movements**

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$




| W = | 62 | 62 | 0 |
|---|---|---|---|
| | | *Veh* | *Ped* |

**NOT Warranted**

RESET SHEET

*Traffic Signal Warrant Spreadsheet - v3H © 2007 Transportation Association of Canada*

# Alberta Transportation - Traffic Signal Warrant Analysis

| | | | | | |
|---|---|---|---|---|---|
| Main Street (name) | Hwy 25 | Direction (EW or NS) | NS | Road Authority: | Alberta Transportation |
| Side Street (name) | Kipp Rd | Direction (EW or NS) | EW | City: | Rural |
| Quadrant / Int # | A1 | Comments | OPTION 2 6-Hour Peak Adjustment: 2.867549 x (am + pm DHV) | Analysis Date: | 2018 Oct 26, Fri |
| for Warrant Calculation Results, please hit 'Page Down' | CHECK SHEET | | | Count Date: | 2039 Background (am + pm) |
| | | | | Date Entry Format: | (yyyy-mm-dd) |

| Lane Configuration | | Excl LT | Th & LT | Through | Th+RT+LT | Th & RT | Excl RT | UpStream Signal (m) | # of Thru Lanes |
|---|---|---|---|---|---|---|---|---|---|
| Hwy 25 | NB | 1 | | | | 1 | | 4,000 | 1 |
| Hwy 25 | SB | | 1 | | | | 1 | 4,000 | 1 |
| Kipp Rd | WB | | | | 1 | | | | |
| Kipp Rd | EB | | | | 1 | | | | |
| Are the Kipp Rd WB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |
| Are the Kipp Rd EB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |

| Demographics | | |
|---|---|---|
| Elem. School/Mobility Challenged | (y/n) | n |
| Senior's Complex | (y/n) | n |
| Pathway to School | (y/n) | n |
| Metro Area Population | (#) | 5,672 |
| Central Business District | (y/n) | n |

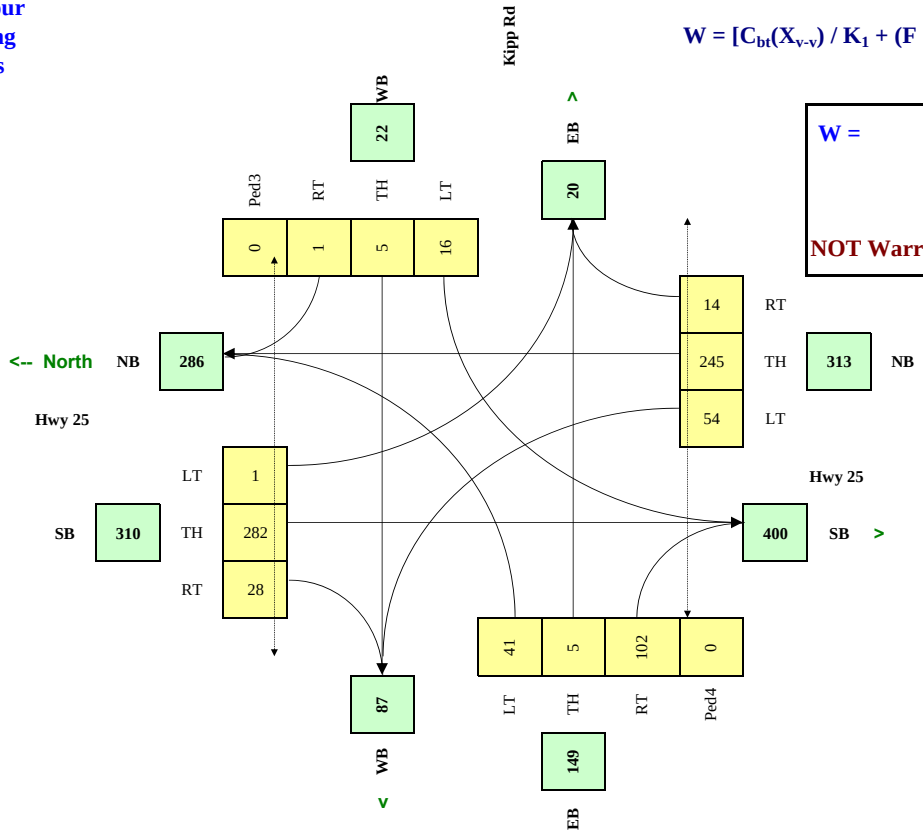
| Other input | | Speed (Km/h) | Truck % | Bus Rt (y/n) | Median (m) |
|---|---|---|---|---|---|
| Hwy 25 | NS | 100 | 11.0% | n | 0.0 |
| Kipp Rd | EW | | 10.0% | n | |

Set Peak Hours

| Traffic Input | NB | | | SB | | | WB | | | EB | | | Ped1 NS | Ped2 NS | Ped3 EW | Ped4 EW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | Th | RT | LT | Th | RT | LT | Th | RT | LT | Th | RT | W Side | E Side | N Side | S Side |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Total (6-hour peak) | 324 | 1468 | 83 | 6 | 1689 | 166 | 97 | 29 | 3 | 247 | 32 | 614 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **Total (6-hour peak)** | **324** | **1,468** | **83** | **6** | **1,689** | **166** | **97** | **29** | **3** | **247** | **32** | **614** | **0** | **0** | **0** | **0** |
| **Average (6-hour peak)** | **54** | **245** | **14** | **1** | **282** | **28** | **16** | **5** | **1** | **41** | **5** | **102** | **0** | **0** | **0** | **0** |

**Average 6-hour Peak Turning Movements**

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$




| W = | 55 | 55 | 0 |
|---|---|---|---|
| | | *Veh* | *Ped* |

**NOT Warranted**

RESET SHEET

*Traffic Signal Warrant Spreadsheet - v3H © 2007 Transportation Association of Canada*

# Alberta Transportation - Traffic Signal Warrant Analysis

| | | | | | |
|---|---|---|---|---|---|
| Main Street (name) | Hwy 25 | Direction (EW or NS) | NS | Road Authority: | Alberta Transportation |
| Side Street (name) | Kipp Rd | Direction (EW or NS) | EW | City: | Rural |
| Quadrant / Int # | A1 | Comments | OPTION 2 6-Hour Peak Adjustment: 2.867549 x (am + pm DHV) | Analysis Date: | 2018 Oct 26, Fri |
| for Warrant Calculation Results, please hit 'Page Down' | CHECK SHEET | | | Count Date: | 2039 Post-Development (am + pm) |
| | | | | Date Entry Format: | (yyyy-mm-dd) |

| Lane Configuration | | Excl LT | Th & LT | Through | Th+RT+LT | Th & RT | Excl RT | UpStream Signal (m) | # of Thru Lanes |
|---|---|---|---|---|---|---|---|---|---|
| Hwy 25 | NB | 1 | | | | 1 | | 4,000 | 1 |
| Hwy 25 | SB | | 1 | | | | 1 | 4,000 | 1 |
| Kipp Rd | WB | | | | 1 | | | | |
| Kipp Rd | EB | | | | 1 | | | | |
| Are the Kipp Rd WB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |
| Are the Kipp Rd EB right turns significantly impeded by through movements? (y/n) | | | | | | | n | | |

| Demographics | | |
|---|---|---|
| Elem. School/Mobility Challenged | (y/n) | n |
| Senior's Complex | (y/n) | n |
| Pathway to School | (y/n) | n |
| Metro Area Population | (#) | 5,672 |
| Central Business District | (y/n) | n |

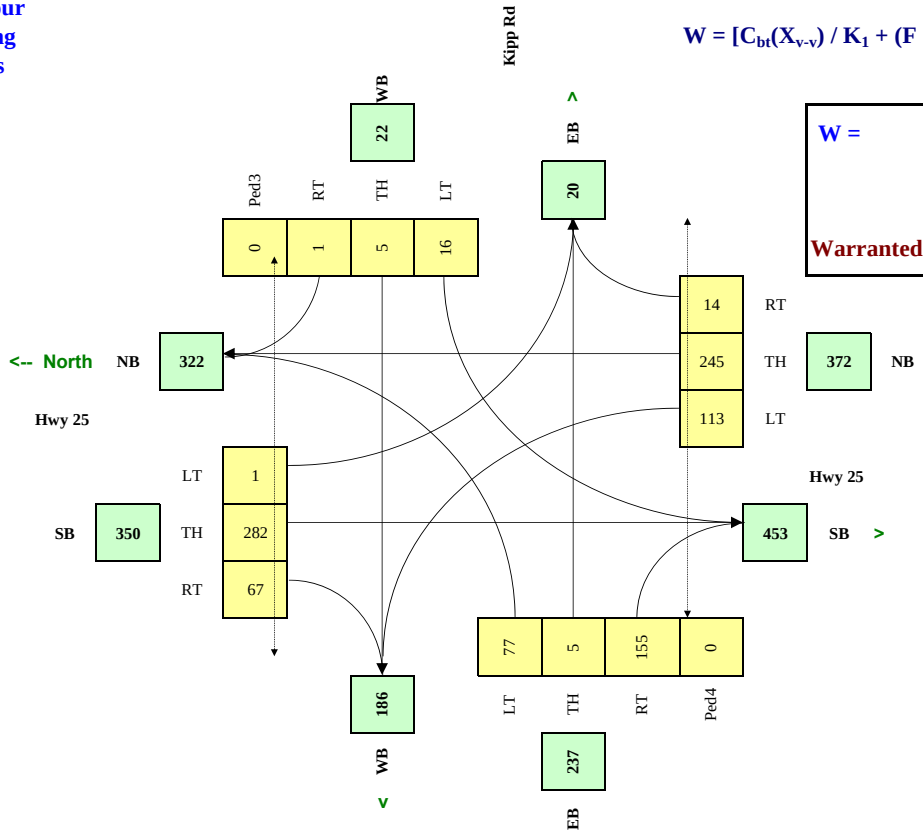
| Other input | | Speed (Km/h) | Truck % | Bus Rt (y/n) | Median (m) |
|---|---|---|---|---|---|
| Hwy 25 | NS | 100 | 11.0% | n | 0.0 |
| Kipp Rd | EW | | 10.0% | n | |

Set Peak Hours

| Traffic Input | NB | | | SB | | | WB | | | EB | | | Ped1 NS | Ped2 NS | Ped3 EW | Ped4 EW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | Th | RT | LT | Th | RT | LT | Th | RT | LT | Th | RT | W Side | E Side | N Side | S Side |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Total (6-hour peak) | 680 | 1468 | 83 | 6 | 1689 | 404 | 97 | 29 | 3 | 459 | 32 | 929 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **Total (6-hour peak)** | **680** | **1,468** | **83** | **6** | **1,689** | **404** | **97** | **29** | **3** | **459** | **32** | **929** | **0** | **0** | **0** | **0** |
| **Average (6-hour peak)** | **113** | **245** | **14** | **1** | **282** | **67** | **16** | **5** | **1** | **77** | **5** | **155** | **0** | **0** | **0** | **0** |

**Average 6-hour Peak Turning Movements**

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$




| W = | 102 | 102 | 0 |
|---|---|---|---|
| | | *Veh* | *Ped* |

**Warranted**

RESET SHEET

*Traffic Signal Warrant Spreadsheet - v3H © 2007 Transportation Association of Canada*

# *APPENDIX H:*

## *ILLUMINATION WARRANT*

MPE Engineering Ltd.

# Illumination of Isolated Rural Intersections
## LIGHTING WARRANT SPREADSHEET

**This spreadsheet is to be used in conjunction with *Illumination of Isolated Rural Intersections* , Transportation Association of Canada, February 2001.**

**Please enter information in the cells with yellow background**

**INTERSECTION CHARACTERISTICS**

| | |
|---|---|
| Hwy 25 | Main Road |
| Kipp Rd | Minor Road |
| Town of Coalhurst | City/Town |

**Date** October 26, 2018
**Other** Scenario: 2029 Background

## GEOMETRIC FACTORS

| | Value | Rating | Weight | Comments | Check | Score |
|---|---|---|---|---|---|---|
| Channelization Rating | Descriptive | 0 | | Refer to Table 1(A) to determine rating value | OK | |
| Presence of raised channelization? ( Y / N ) | n | | | | OK | |
| Highest operating speed on raised, channelized approach (km/h) | 0 | | 5 | | OK | |
| Channelization Factor | | | | | OK | 0 |
| Approach Sight Distance on most constrained approach (%) | 100 | 0 | 10 | Relative to the recommended minimum sight distance | OK | 0 |
| Posted Speed limit (in 10's of km/h) | 100 | | | | OK | |
| Radius of Horizontal Curve (m) | T | | | Enter "T" for tangent (no horizontal curve at the intersection) | OK | |
| Posted Speed Category = | | 0 | | | | |
| Posted Speed Category = | B | 0 | | | | |
| Posted Speed Category = | | 0 | | | | |
| Posted Speed Category = | | 0 | | | | |
| Horizontal Curvature Factor | | 0 | 5 | | OK | 0 |
| Angle of Intersection (10's of Degrees) | 90 | 0 | 5 | | OK | 0 |
| Downhill Approach Grade (x.x%) | 0.0 | 0 | 3 | Rounded to nearest tenth of a percent | OK | 0 |
| Number of Intersection Legs | 4 | 2 | 3 | Number of legs = 3 or more | OK | 6 |
| | | | | | **Geometric Factors Subtotal** | **6** |

## OPERATIONAL FACTORS

| | | | | | | |
|---|---|---|---|---|---|---|
| Is the intersection signalized ? ( Y/ N ) | n | | | Calculate the Signalization Warrant Factor | | |
| AADT on Major Road (2-way) | 6180 | 4 | 10 | Either Use the two AADT inputs **OR** the Descriptive Signalization Warrant (Unused values should be set to Zero) Refer to Table 1(B) for description and rating values for signalization warrant. | OK | 40 |
| AADT on Minor Road (2-way) | 1630 | 3 | 20 | | OK | 60 |
| Signalization Warrant | Descriptive | 0 | 30 | | OK | 0 |
| | | | | | OK | |
| Night-Time Hourly Pedestrian Volume | 0 | 0 | 10 | Refer to Table 1(B), note #2, to account for children and seniors | OK | 0 |
| Intersecting Roadway Classification | Descriptive | 0 | 5 | Refer to Table 1(B) for ratings. | OK | 0 |
| Operating Speed or Posted Speed on Major Road (km/h) | 100 | 4 | 5 | Refer to Table 1(B), note #3 | OK | 20 |
| Operating Speed on Minor Road (km/h) | 60 | 1 | 5 | Refer to Table 1(B), note #3 | OK | 5 |
| | | | | | **Operational Factors Subtotal** | **125** |

## ENVIRONMENTAL FACTOR

| | | | | | | |
|---|---|---|---|---|---|---|
| Lighted Developments within 150 m radius of intersection | 1 | 1 | 5 | Maximum of 4 quadrants | OK | 5 |
| | | | | | **Environmental Factor Subtotal** | **5** |

## COLLISION HISTORY

| | | | | | | |
|---|---|---|---|---|---|---|
| Average Annual night-time collision frequency due to inadequate lighting (collisions/yr, rounded to nearest whole # ) | 1.0 | 1 | 15 | Enter **either** the annual frequency (See Table 1(C), note #4) | OK | 15 |
| **OR** | | | | **OR** the number of collisions / MEV | | |
| Collision Rate over last 3 years, due to inadequate lighting (/MEV) | 0 | 0 | 0 | (Unused values should be set to Zero) | OK | 0 |
| Is the average ratio of **all** night to day collisions >= 1.5 (Y/N) | n | 0 | | | OK | |
| | | | | | OK | |
| | | | | | **Collision History Subtotal** | **15** |

**Check Intersection Signalization:**
**Intersection is not Signalized**

## ILLUMINATION WARRANTED
**DELINEATION LIGHTING TO ILLUMINATE PEDESTRIANS OR CROSS STREET TRAFFIC**

| SUMMARY | |
|---|---|
| Geometric Factors Subtotal | 6 |
| Operational Factor Subtotal | 125 |
| Environmental Factor Subtotal | 5 |
| Collision History Subtotal | 15 |
| **TOTAL POINTS** | **151** |

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# Illumination of Isolated Rural Intersections
## LIGHTING WARRANT SPREADSHEET

**This spreadsheet is to be used in conjunction with *Illumination of Isolated Rural Intersections* , Transportation Association of Canada, February 2001.**

**Please enter information in the cells with yellow background**

**INTERSECTION CHARACTERISTICS**

| | |
|---|---|
| Hwy 25 | Main Road |
| Kipp Rd | Minor Road |
| Town of Coalhurst | City/Town |

**Date** October 26, 2018
**Other** Scenario: 2029 Post-Development

## GEOMETRIC FACTORS

| | Value | Rating | Weight | Comments | Check | Score |
|---|---|---|---|---|---|---|
| Channelization Rating | Descriptive | 0 | | Refer to Table 1(A) to determine rating value | OK | |
| Presence of raised channelization? ( Y / N ) | n | | | | OK | |
| Highest operating speed on raised, channelized approach (km/h) | 0 | | 5 | | OK | |
| Channelization Factor | | | | | OK | 0 |
| Approach Sight Distance on most constrained approach (%) | 100 | 0 | 10 | Relative to the recommended minimum sight distance | OK | 0 |
| Posted Speed limit (in 10's of km/h) | 100 | | | | OK | |
| Radius of Horizontal Curve (m) | T | | | Enter "T" for tangent (no horizontal curve at the intersection) | OK | |
| Posted Speed Category = | | 0 | | | | |
| Posted Speed Category = | B | 0 | | | | |
| Posted Speed Category = | | 0 | | | | |
| Posted Speed Category = | | 0 | | | | |
| Horizontal Curvature Factor | | 0 | 5 | | OK | 0 |
| Angle of Intersection (10's of Degrees) | 90 | 0 | 5 | | OK | 0 |
| Downhill Approach Grade (x.x%) | 0.0 | 0 | 3 | Rounded to nearest tenth of a percent | OK | 0 |
| Number of Intersection Legs | 4 | 2 | 3 | Number of legs = 3 or more | OK | 6 |
| | | | | | **Geometric Factors Subtotal** | **6** |

## OPERATIONAL FACTORS

| | | | | | | |
|---|---|---|---|---|---|---|
| Is the intersection signalized ? ( Y/ N ) | n | | | Calculate the Signalization Warrant Factor | | |
| AADT on Major Road (2-way) | 6530 | 4 | 10 | Either Use the two AADT inputs **OR** the Descriptive Signalization Warrant (Unused values should be set to Zero) Refer to Table 1(B) for description and rating values for signalization warrant. | OK | 40 |
| AADT on Minor Road (2-way) | 2210 | 4 | 20 | | OK | 80 |
| Signalization Warrant | Descriptive | 0 | 30 | | OK | 0 |
| | | | | | OK | |
| Night-Time Hourly Pedestrian Volume | 0 | 0 | 10 | Refer to Table 1(B), note #2, to account for children and seniors | OK | 0 |
| Intersecting Roadway Classification | Descriptive | 0 | 5 | Refer to Table 1(B) for ratings. | OK | 0 |
| Operating Speed or Posted Speed on Major Road (km/h) | 100 | 4 | 5 | Refer to Table 1(B), note #3 | OK | 20 |
| Operating Speed on Minor Road (km/h) | 60 | 1 | 5 | Refer to Table 1(B), note #3 | OK | 5 |
| | | | | | **Operational Factors Subtotal** | **145** |

## ENVIRONMENTAL FACTOR

| | | | | | | |
|---|---|---|---|---|---|---|
| Lighted Developments within 150 m radius of intersection | 1 | 1 | 5 | Maximum of 4 quadrants | OK | 5 |
| | | | | | **Environmental Factor Subtotal** | **5** |

## COLLISION HISTORY

| | | | | | | |
|---|---|---|---|---|---|---|
| Average Annual night-time collision frequency due to inadequate lighting (collisions/yr, rounded to nearest whole # ) | 1.0 | 1 | 15 | Enter **either** the annual frequency (See Table 1(C), note #4) | OK | 15 |
| **OR** | | | | **OR** the number of collisions / MEV | | |
| Collision Rate over last 3 years, due to inadequate lighting (/MEV) | 0 | 0 | 0 | (Unused values should be set to Zero) | OK | 0 |
| Is the average ratio of **all** night to day collisions >= 1.5 (Y/N) | n | 0 | | | OK | |
| | | | | | OK | |
| | | | | | **Collision History Subtotal** | **15** |

**Check Intersection Signalization:**
**Intersection is not Signalized**

## ILLUMINATION WARRANTED
**DELINEATION LIGHTING TO ILLUMINATE PEDESTRIANS OR CROSS STREET TRAFFIC**

| SUMMARY | |
|---|---|
| Geometric Factors Subtotal | 6 |
| Operational Factor Subtotal | 145 |
| Environmental Factor Subtotal | 5 |
| Collision History Subtotal | 15 |
| **TOTAL POINTS** | **171** |

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# Illumination of Isolated Rural Intersections
## LIGHTING WARRANT SPREADSHEET

**This spreadsheet is to be used in conjunction with *Illumination of Isolated Rural Intersections* , Transportation Association of Canada, February 2001.**

**Please enter information in the cells with yellow background**

**INTERSECTION CHARACTERISTICS**

| | |
|---|---|
| Hwy 25 | Main Road |
| Kipp Rd | Minor Road |
| Town of Coalhurst | City/Town |

**Date** October 26, 2018
**Other** Scenario: 2039 Background

### GEOMETRIC FACTORS

| | Value | Rating | Weight | Comments | Check | Score |
|---|---|---|---|---|---|---|
| Channelization Rating | Descriptive | 0 | | Refer to Table 1(A) to determine rating value | OK | |
| Presence of raised channelization? ( Y / N ) | n | | | | OK | |
| Highest operating speed on raised, channelized approach (km/h) | 0 | | 5 | | OK | |
| Channelization Factor | | | | | OK | 0 |
| Approach Sight Distance on most constrained approach (%) | 100 | 0 | 10 | Relative to the recommended minimum sight distance | OK | 0 |
| Posted Speed limit (in 10's of km/h) | 100 | | | | OK | |
| Radius of Horizontal Curve (m) | T | | | Enter "T" for tangent (no horizontal curve at the intersection) | OK | |
| Posted Speed Category = | | 0 | | | | |
| Posted Speed Category = | B | 0 | | | | |
| Posted Speed Category = | | 0 | | | | |
| Posted Speed Category = | | 0 | | | | |
| Horizontal Curvature Factor | | 0 | 5 | | OK | 0 |
| Angle of Intersection (10's of Degrees) | 90 | 0 | 5 | | OK | 0 |
| Downhill Approach Grade (x.x%) | 0.0 | 0 | 3 | Rounded to nearest tenth of a percent | OK | 0 |
| Number of Intersection Legs | 4 | 2 | 3 | Number of legs = 3 or more | OK | 6 |
| | | | | | **Geometric Factors Subtotal** | **6** |

### OPERATIONAL FACTORS

| | | | | | | |
|---|---|---|---|---|---|---|
| Is the intersection signalized ? ( Y/ N ) | n | | | Calculate the Signalization Warrant Factor | | |
| AADT on Major Road (2-way) | 6970 | 4 | 10 | Either Use the two AADT inputs **OR** the Descriptive Signalization Warrant (Unused values should be set to Zero) Refer to Table 1(B) for description and rating values for signalization warrant. | OK | 40 |
| AADT on Minor Road (2-way) | 1840 | 3 | 20 | | OK | 60 |
| Signalization Warrant | Descriptive | 0 | 30 | | OK | 0 |
| | | | | | OK | |
| Night-Time Hourly Pedestrian Volume | 0 | 0 | 10 | Refer to Table 1(B), note #2, to account for children and seniors | OK | 0 |
| Intersecting Roadway Classification | Descriptive | 0 | 5 | Refer to Table 1(B) for ratings. | OK | 0 |
| Operating Speed or Posted Speed on Major Road (km/h) | 100 | 4 | 5 | Refer to Table 1(B), note #3 | OK | 20 |
| Operating Speed on Minor Road (km/h) | 60 | 1 | 5 | Refer to Table 1(B), note #3 | OK | 5 |
| | | | | | **Operational Factors Subtotal** | **125** |

### ENVIRONMENTAL FACTOR

| | | | | | | |
|---|---|---|---|---|---|---|
| Lighted Developments within 150 m radius of intersection | 1 | 1 | 5 | Maximum of 4 quadrants | OK | 5 |
| | | | | | **Environmental Factor Subtotal** | **5** |

### COLLISION HISTORY

| | | | | | | |
|---|---|---|---|---|---|---|
| Average Annual night-time collision frequency due to inadequate lighting (collisions/yr, rounded to nearest whole # ) | 1.0 | 1 | 15 | Enter **either** the annual frequency (See Table 1(C), note #4) | OK | 15 |
| **OR** | | | | **OR** the number of collisions / MEV | | |
| Collision Rate over last 3 years, due to inadequate lighting (/MEV) | 0 | 0 | 0 | (Unused values should be set to Zero) | OK | 0 |
| Is the average ratio of **all** night to day collisions >= 1.5 (Y/N) | n | 0 | | | OK | |
| | | | | | OK | |
| | | | | | **Collision History Subtotal** | **15** |

**Check Intersection Signalization:**
**Intersection is not Signalized**

## ILLUMINATION WARRANTED
**DELINEATION LIGHTING TO ILLUMINATE PEDESTRIANS OR CROSS STREET TRAFFIC**

| SUMMARY | |
|---|---|
| Geometric Factors Subtotal | 6 |
| Operational Factor Subtotal | 125 |
| Environmental Factor Subtotal | 5 |
| Collision History Subtotal | 15 |
| **TOTAL POINTS** | **151** |

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# Illumination of Isolated Rural Intersections
## LIGHTING WARRANT SPREADSHEET

**This spreadsheet is to be used in conjunction with *Illumination of Isolated Rural Intersections* , Transportation Association of Canada, February 2001.**

**Please enter information in the cells with yellow background**

**INTERSECTION CHARACTERISTICS**

| | |
|---|---|
| Hwy 25 | Main Road |
| Kipp Rd | Minor Road |
| Town of Coalhurst | City/Town |

**Date** October 26, 2018
**Other** Scenario: 2039 Post-Development

### GEOMETRIC FACTORS

| | Value | Rating | Weight | Comments | Check | Score |
|---|---|---|---|---|---|---|
| Channelization Rating | Descriptive | 0 | | Refer to Table 1(A) to determine rating value | OK | |
| Presence of raised channelization? ( Y / N ) | n | | | | OK | |
| Highest operating speed on raised, channelized approach (km/h) | 0 | | 5 | | OK | |
| Channelization Factor | | | | | OK | 0 |
| Approach Sight Distance on most constrained approach (%) | 100 | 0 | 10 | Relative to the recommended minimum sight distance | OK | 0 |
| Posted Speed limit (in 10's of km/h) | 100 | | | | OK | |
| Radius of Horizontal Curve (m) | T | | | Enter "T" for tangent (no horizontal curve at the intersection) | OK | |
| Posted Speed Category = | | 0 | | | | |
| Posted Speed Category = | B | 0 | | | | |
| Posted Speed Category = | | 0 | | | | |
| Posted Speed Category = | | 0 | | | | |
| Horizontal Curvature Factor | | 0 | 5 | | OK | 0 |
| Angle of Intersection (10's of Degrees) | 90 | 0 | 5 | | OK | 0 |
| Downhill Approach Grade (x.x%) | 0.0 | 0 | 3 | Rounded to nearest tenth of a percent | OK | 0 |
| Number of Intersection Legs | 4 | 2 | 3 | Number of legs = 3 or more | OK | 6 |
| | | | | | **Geometric Factors Subtotal** | **6** |

### OPERATIONAL FACTORS

| | | | | | | |
|---|---|---|---|---|---|---|
| Is the intersection signalized ? ( Y/ N ) | n | | | Calculate the Signalization Warrant Factor | | |
| AADT on Major Road (2-way) | 7670 | 4 | 10 | Either Use the two AADT inputs **OR** the Descriptive Signalization Warrant (Unused values should be set to Zero) Refer to Table 1(B) for description and rating values for signalization warrant. | OK | 40 |
| AADT on Minor Road (2-way) | 3000 | 4 | 20 | | OK | 80 |
| Signalization Warrant | Descriptive | 0 | 30 | | OK | 0 |
| | | | | | OK | |
| Night-Time Hourly Pedestrian Volume | 0 | 0 | 10 | Refer to Table 1(B), note #2, to account for children and seniors | OK | 0 |
| Intersecting Roadway Classification | Descriptive | 0 | 5 | Refer to Table 1(B) for ratings. | OK | 0 |
| Operating Speed or Posted Speed on Major Road (km/h) | 100 | 4 | 5 | Refer to Table 1(B), note #3 | OK | 20 |
| Operating Speed on Minor Road (km/h) | 60 | 1 | 5 | Refer to Table 1(B), note #3 | OK | 5 |
| | | | | | **Operational Factors Subtotal** | **145** |

### ENVIRONMENTAL FACTOR

| | | | | | | |
|---|---|---|---|---|---|---|
| Lighted Developments within 150 m radius of intersection | 1 | 1 | 5 | Maximum of 4 quadrants | OK | 5 |
| | | | | | **Environmental Factor Subtotal** | **5** |

### COLLISION HISTORY

| | | | | | | |
|---|---|---|---|---|---|---|
| Average Annual night-time collision frequency due to inadequate lighting (collisions/yr, rounded to nearest whole # ) | 1.0 | 1 | 15 | Enter **either** the annual frequency (See Table 1(C), note #4) | OK | 15 |
| **OR** | | | | **OR** the number of collisions / MEV | | |
| Collision Rate over last 3 years, due to inadequate lighting (/MEV) | 0 | 0 | 0 | (Unused values should be set to Zero) | OK | 0 |
| Is the average ratio of **all** night to day collisions >= 1.5 (Y/N) | n | 0 | | | OK | |
| | | | | | OK | |
| | | | | | **Collision History Subtotal** | **15** |

**Check Intersection Signalization:**
**Intersection is not Signalized**

## ILLUMINATION WARRANTED
**DELINEATION LIGHTING TO ILLUMINATE PEDESTRIANS OR CROSS STREET TRAFFIC**

| SUMMARY | |
|---|---|
| Geometric Factors Subtotal | 6 |
| Operational Factor Subtotal | 145 |
| Environmental Factor Subtotal | 5 |
| Collision History Subtotal | 15 |
| **TOTAL POINTS** | **171** |

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# *APPENDIX I:*

## *IMPROVEMENTS CAPACITY ANALYSIS OUTPUTS*

MPE Engineering Ltd.

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 33 | 898 | 4 | 136 | 1052 | 41 | 1 | 5 | 72 | 15 | 12 | 37 |
| Future Volume (vph) | 33 | 898 | 4 | 136 | 1052 | 41 | 1 | 5 | 72 | 15 | 12 | 37 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 0.0 | | 8.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 0 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.992 | | | 0.973 | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1745 | 1495 | 0 | 1712 | 1495 |
| Flt Permitted | 0.229 | | | 0.287 | | | | 0.935 | | | 0.825 | |
| Satd. Flow (perm) | 378 | 3139 | 1404 | 474 | 3139 | 1404 | 0 | 1645 | 1495 | 0 | 1451 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 82 | | | 82 | | | 82 | | | 82 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 36 | 976 | 4 | 148 | 1143 | 45 | 1 | 5 | 78 | 16 | 13 | 40 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 36 | 976 | 4 | 148 | 1143 | 45 | 0 | 6 | 78 | 0 | 29 | 40 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | L NA | Left | Right | L NA | Left | Right | L NA | Left | R NA | L NA | Left | R NA |
| Median Width(m) | | 25.0 | | | 25.0 | | | 0.0 | | | 0.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (k/h) | 40 | | 20 | 40 | | 20 | 40 | | 20 | 40 | | 20 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | | 6 | | | 2 | | | 4 | | | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | 8 | | 8 |
| Detector Phase | 6 | 6 | 6 | 2 | 2 | 2 | 4 | 4 | 4 | 8 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| Total Split (s) | 42.5 | 42.5 | 42.5 | 42.5 | 42.5 | 42.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| Total Split (%) | 70.8% | 70.8% | 70.8% | 70.8% | 70.8% | 70.8% | 29.2% | 29.2% | 29.2% | 29.2% | 29.2% | 29.2% |
| Maximum Green (s) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Yellow Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| All-Red Time (s) | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Lost Time (s) | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | | 7.5 | 7.5 | | 7.5 | 7.5 |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | Min | Min | Min | None | None | None | None | None | None |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Act Effct Green (s) | 39.9 | 39.9 | 39.9 | 39.9 | 39.9 | 39.9 | | 10.1 | 10.1 | | 10.1 | 10.1 |
| Actuated g/C Ratio | 0.74 | 0.74 | 0.74 | 0.74 | 0.74 | 0.74 | | 0.19 | 0.19 | | 0.19 | 0.19 |
| v/c Ratio | 0.13 | 0.42 | 0.00 | 0.42 | 0.49 | 0.04 | | 0.02 | 0.23 | | 0.11 | 0.12 |
| Control Delay | 7.4 | 6.5 | 0.0 | 12.5 | 7.3 | 0.7 | | 20.3 | 7.8 | | 21.3 | 2.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | 7.4 | 6.5 | 0.0 | 12.5 | 7.3 | 0.7 | | 20.3 | 7.8 | | 21.3 | 2.7 |
| LOS | A | A | A | B | A | A | | C | A | | C | A |
| Approach Delay | | 6.5 | | | 7.6 | | | 8.7 | | | 10.5 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Queue Length 50th (m) | 1.7 | 31.4 | 0.0 | 9.1 | 40.0 | 0.0 | | 0.5 | 0.0 | | 2.6 | 0.0 |
| Queue Length 95th (m) | 5.8 | 45.5 | 0.0 | 27.3 | 57.5 | 1.5 | | 3.3 | 9.4 | | 9.2 | 2.7 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | | | 8.0 |
| Base Capacity (vph) | 290 | 2413 | 1098 | 364 | 2413 | 1098 | | 306 | 345 | | 270 | 345 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Reduced v/c Ratio | 0.12 | 0.40 | 0.00 | 0.41 | 0.47 | 0.04 | | 0.02 | 0.23 | | 0.11 | 0.12 |

**Intersection Summary**

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 54.1
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 7.3 — Intersection LOS: A
Intersection Capacity Utilization 81.2% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NE | NE | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | LT | R | LT | R |
| Maximum Queue (m) | 19.3 | 37.2 | 43.8 | 58.4 | 38.7 | 43.5 | 27.4 | 20.3 | 25.6 | 19.3 |
| Average Queue (m) | 4.6 | 14.7 | 17.3 | 18.9 | 14.5 | 18.0 | 5.7 | 11.2 | 6.5 | 8.2 |
| 95th Queue (m) | 13.5 | 30.4 | 34.9 | 41.6 | 31.6 | 35.7 | 19.9 | 19.2 | 18.8 | 18.4 |
| Link Distance (m) | | 276.1 | 276.1 | | 194.9 | 194.9 | 59.2 | | 126.4 | |
| Upstream Blk Time (%) | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | | 8.0 | | 8.0 |
| Storage Blk Time (%) | | | | | | | 2 | 12 | 9 | 8 |
| Queuing Penalty (veh) | | | | | | | 2 | 1 | 3 | 2 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB | SB |
|---|---|---|---|---|---|
| Directions Served | LT | R | LTR | L | LT |
| Maximum Queue (m) | 30.7 | 21.6 | 18.9 | 12.0 | 1.6 |
| Average Queue (m) | 11.8 | 12.7 | 6.6 | 2.1 | 0.1 |
| 95th Queue (m) | 23.3 | 19.3 | 17.2 | 7.7 | 1.6 |
| Link Distance (m) | | | 1596.4 | | 124.5 |
| Upstream Blk Time (%) | | | | | |
| Queuing Penalty (veh) | | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 | |
| Storage Blk Time (%) | 7 | 10 | | | |
| Queuing Penalty (veh) | 7 | 6 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 22.5 | 9.3 |
| Average Queue (m) | 9.5 | 0.6 |
| 95th Queue (m) | 17.4 | 4.1 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 23 | 963 | 1 | 126 | 964 | 19 | 1 | 4 | 120 | 24 | 15 | 20 |
| Future Volume (vph) | 23 | 963 | 1 | 126 | 964 | 19 | 1 | 4 | 120 | 24 | 15 | 20 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 0.0 | | 8.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 0 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.990 | | | 0.970 | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1742 | 1495 | 0 | 1706 | 1495 |
| Flt Permitted | 0.253 | | | 0.253 | | | | 0.919 | | | 0.809 | |
| Satd. Flow (perm) | 418 | 3139 | 1404 | 418 | 3139 | 1404 | 0 | 1617 | 1495 | 0 | 1423 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 82 | | | 82 | | | 101 | | | 82 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 25 | 1047 | 1 | 137 | 1048 | 21 | 1 | 4 | 130 | 26 | 16 | 22 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 25 | 1047 | 1 | 137 | 1048 | 21 | 0 | 5 | 130 | 0 | 42 | 22 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | | 6 | | | 2 | | | 4 | | | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | 8 | | 8 |
| Detector Phase | 6 | 6 | 6 | 2 | 2 | 2 | 4 | 4 | 4 | 8 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| Total Split (s) | 42.5 | 42.5 | 42.5 | 42.5 | 42.5 | 42.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| Total Split (%) | 70.8% | 70.8% | 70.8% | 70.8% | 70.8% | 70.8% | 29.2% | 29.2% | 29.2% | 29.2% | 29.2% | 29.2% |
| Maximum Green (s) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| All-Red Time (s) | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Lost Time (s) | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | | 7.5 | 7.5 | | 7.5 | 7.5 |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | Min | Min | Min | None | None | None | None | None | None |
| Act Effct Green (s) | 36.3 | 36.3 | 36.3 | 36.3 | 36.3 | 36.3 | | 10.0 | 10.0 | | 10.0 | 10.0 |
| Actuated g/C Ratio | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 | | 0.18 | 0.18 | | 0.18 | 0.18 |
| v/c Ratio | 0.09 | 0.51 | 0.00 | 0.51 | 0.52 | 0.02 | | 0.02 | 0.37 | | 0.17 | 0.07 |
| Control Delay | 6.9 | 8.4 | 0.0 | 17.3 | 8.4 | 0.1 | | 20.6 | 11.5 | | 22.5 | 0.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | 6.9 | 8.4 | 0.0 | 17.3 | 8.4 | 0.1 | | 20.6 | 11.5 | | 22.5 | 0.4 |
| LOS | A | A | A | B | A | A | | C | B | | C | A |
| Approach Delay | | 8.4 | | | 9.3 | | | 11.8 | | | 14.9 | |
| Approach LOS | | A | | | A | | | B | | | B | |
| Queue Length 50th (m) | 1.1 | 34.9 | 0.0 | 8.6 | 35.0 | 0.0 | | 0.5 | 2.6 | | 3.8 | 0.0 |
| Queue Length 95th (m) | 4.2 | 50.1 | 0.0 | #33.7 | 50.3 | 0.0 | | 3.0 | 15.9 | | 12.0 | 0.0 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | | | 8.0 |
| Base Capacity (vph) | 289 | 2174 | 998 | 289 | 2174 | 998 | | 289 | 350 | | 254 | 334 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Reduced v/c Ratio | 0.09 | 0.48 | 0.00 | 0.47 | 0.48 | 0.02 | | 0.02 | 0.37 | | 0.17 | 0.07 |

## Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 56
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 9.2 Intersection LOS: A
Intersection Capacity Utilization 79.2% ICU Level of Service D
Analysis Period (min) 15
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NE | NE | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | LT | R | LT | R |
| Maximum Queue (m) | 15.0 | 45.3 | 49.0 | 59.5 | 31.6 | 32.5 | 40.5 | 21.3 | 23.4 | 17.2 |
| Average Queue (m) | 3.7 | 19.0 | 21.3 | 19.1 | 12.8 | 14.4 | 11.9 | 13.5 | 8.3 | 5.0 |
| 95th Queue (m) | 11.6 | 37.8 | 40.9 | 43.9 | 26.2 | 28.9 | 29.9 | 20.6 | 19.8 | 15.8 |
| Link Distance (m) | | 276.1 | 276.1 | | 194.9 | 194.9 | 59.2 | | 126.4 | |
| Upstream Blk Time (%) | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | | 8.0 | | 8.0 |
| Storage Blk Time (%) | | 0 | 0 | | | | 2 | 22 | 15 | 3 |
| Queuing Penalty (veh) | | 0 | 0 | | | | 3 | 1 | 3 | 1 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB |
|---|---|---|---|---|
| Directions Served | LT | R | LTR | L |
| Maximum Queue (m) | 22.6 | 20.3 | 23.2 | 11.2 |
| Average Queue (m) | 9.5 | 13.1 | 5.1 | 2.0 |
| 95th Queue (m) | 21.1 | 18.6 | 15.9 | 7.0 |
| Link Distance (m) | | | 1596.4 | |
| Upstream Blk Time (%) | | | | |
| Queuing Penalty (veh) | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 |
| Storage Blk Time (%) | 3 | 11 | | |
| Queuing Penalty (veh) | 4 | 3 | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 22.8 | 7.6 |
| Average Queue (m) | 9.1 | 0.3 |
| 95th Queue (m) | 18.4 | 3.2 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 139 | 898 | 4 | 136 | 1052 | 517 | 1 | 5 | 72 | 112 | 12 | 59 |
| Future Volume (vph) | 139 | 898 | 4 | 136 | 1052 | 517 | 1 | 5 | 72 | 112 | 12 | 59 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 0.0 | | 20.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 1 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.992 | | 0.950 | 0.961 | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1745 | 1495 | 1588 | 1606 | 1495 |
| Flt Permitted | 0.195 | | | 0.249 | | | | 0.932 | | 0.950 | 0.814 | |
| Satd. Flow (perm) | 322 | 3139 | 1404 | 411 | 3139 | 1404 | 0 | 1640 | 1495 | 1588 | 1360 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 82 | | | 562 | | | 82 | | | 64 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 151 | 976 | 4 | 148 | 1143 | 562 | 1 | 5 | 78 | 122 | 13 | 64 |
| Shared Lane Traffic (%) | | | | | | | | | | 45% | | |
| Lane Group Flow (vph) | 151 | 976 | 4 | 148 | 1143 | 562 | 0 | 6 | 78 | 67 | 68 | 64 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | Perm |
| Protected Phases | | 6 | | | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | | | 8 |
| Detector Phase | 6 | 6 | 6 | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 7.0 | 10.0 | 10.0 |
| Minimum Split (s) | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 24.0 | 24.0 | 24.0 | 16.0 | 24.0 | 24.0 |
| Total Split (s) | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 24.0 | 24.0 | 24.0 | 16.0 | 40.0 | 40.0 |
| Total Split (%) | 66.7% | 66.7% | 66.7% | 66.7% | 66.7% | 66.7% | 20.0% | 20.0% | 20.0% | 13.3% | 33.3% | 33.3% |
| Maximum Green (s) | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 18.0 | 18.0 | 18.0 | 11.0 | 34.0 | 34.0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Lead/Lag | | | | | | | Lead | Lead | Lead | Lag | | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | Yes | Yes | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | Min | Min | Min | None | None | None | None | None | None |
| Walk Time (s) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | | 7.0 | 7.0 |
| Flash Dont Walk (s) | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | | 11.0 | 11.0 |
| Pedestrian Calls (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Act Effct Green (s) | 63.5 | 63.5 | 63.5 | 63.5 | 63.5 | 63.5 | | 11.1 | 11.1 | 16.4 | 13.0 | 37.7 |
| Actuated g/C Ratio | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 | | 0.11 | 0.11 | 0.17 | 0.13 | 0.39 |
| v/c Ratio | 0.72 | 0.47 | 0.00 | 0.55 | 0.56 | 0.50 | | 0.03 | 0.32 | 0.25 | 0.32 | 0.10 |
| Control Delay | 41.1 | 13.4 | 0.0 | 24.9 | 14.8 | 2.5 | | 50.2 | 14.6 | 44.0 | 46.5 | 8.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 41.1 | 13.4 | 0.0 | 24.9 | 14.8 | 2.5 | | 50.2 | 14.6 | 44.0 | 46.5 | 8.5 |
| LOS | D | B | A | C | B | A | | D | B | D | D | A |
| Approach Delay | | 17.0 | | | 11.9 | | | 17.1 | | | 33.5 | |
| Approach LOS | | B | | | B | | | B | | | C | |
| Queue Length 50th (m) | 25.3 | 66.2 | 0.0 | 20.6 | 84.1 | 0.0 | | 1.2 | 0.0 | 13.3 | 13.6 | 0.0 |
| Queue Length 95th (m) | #70.5 | 82.8 | 0.0 | 47.4 | 104.3 | 13.4 | | 5.8 | 14.4 | 30.8 | 31.3 | 10.7 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | | | 20.0 |
| Base Capacity (vph) | 243 | 2369 | 1080 | 310 | 2369 | 1197 | | 337 | 372 | 293 | 215 | 619 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.62 | 0.41 | 0.00 | 0.48 | 0.48 | 0.47 | | 0.02 | 0.21 | 0.23 | 0.32 | 0.10 |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 120 | | | |
| Actuated Cycle Length: 97 | | | |
| Natural Cycle: 90 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.72 | | | |
| Intersection Signal Delay: 15.1 | | Intersection LOS: B | |
| Intersection Capacity Utilization 80.3% | | ICU Level of Service D | |
| Analysis Period (min) 15 | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NW | NE | NE | SW | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | R | LT | R | L | LT | R |
| Maximum Queue (m) | 57.2 | 61.7 | 64.8 | 60.4 | 57.9 | 55.4 | 55.2 | 28.6 | 22.1 | 35.1 | 40.9 | 27.4 |
| Average Queue (m) | 23.4 | 17.7 | 23.0 | 21.6 | 20.7 | 21.7 | 10.7 | 6.8 | 12.2 | 17.8 | 12.8 | 10.5 |
| 95th Queue (m) | 48.7 | 42.8 | 46.9 | 49.3 | 44.5 | 44.3 | 37.0 | 21.3 | 20.5 | 31.3 | 30.4 | 22.5 |
| Link Distance (m) | | 274.0 | 274.0 | | 193.6 | 193.6 | | 59.3 | | 126.1 | 126.1 | |
| Upstream Blk Time (%) | | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 89.0 | | 8.0 | | | 20.0 |
| Storage Blk Time (%) | 1 | 0 | 0 | | | | | 10 | 17 | | 4 | 1 |
| Queuing Penalty (veh) | 4 | 0 | 0 | | | | | 7 | 1 | | 2 | 1 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | EB | WB | NB | SB |
|---|---|---|---|---|---|---|
| Directions Served | L | T | R | LTR | L | R |
| Maximum Queue (m) | 24.4 | 27.8 | 19.5 | 19.6 | 18.6 | 7.8 |
| Average Queue (m) | 10.9 | 6.0 | 12.7 | 7.6 | 4.9 | 0.3 |
| 95th Queue (m) | 19.0 | 20.0 | 17.5 | 18.0 | 12.5 | 4.2 |
| Link Distance (m) | | | | 1596.7 | | |
| Upstream Blk Time (%) | | | | | | |
| Queuing Penalty (veh) | | | | | | |
| Storage Bay Dist (m) | 20.0 | | 8.0 | | 190.0 | 90.0 |
| Storage Blk Time (%) | 1 | 1 | 13 | | | |
| Queuing Penalty (veh) | 1 | 2 | 10 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE | NE |
|---|---|---|---|
| Directions Served | LT | L | R |
| Maximum Queue (m) | 29.3 | 34.3 | 20.8 |
| Average Queue (m) | 15.0 | 1.2 | 12.3 |
| 95th Queue (m) | 24.4 | 21.9 | 17.5 |
| Link Distance (m) | | 126.1 | |
| Upstream Blk Time (%) | | 0 | |
| Queuing Penalty (veh) | | 0 | |
| Storage Bay Dist (m) | | | 8.0 |
| Storage Blk Time (%) | | | 3 |
| Queuing Penalty (veh) | | | 0 |

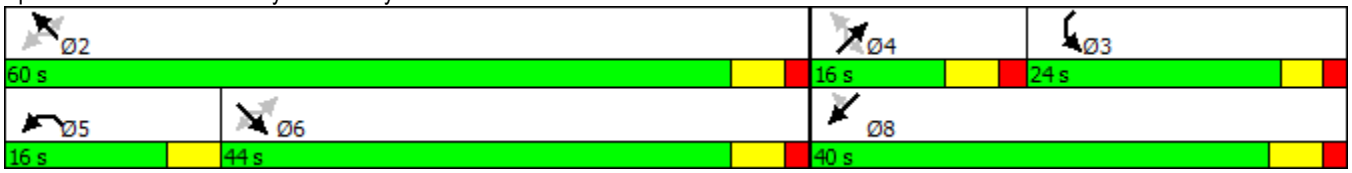
| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 50 | 963 | 1 | 126 | 964 | 141 | 1 | 4 | 120 | 456 | 15 | 116 |
| Future Volume (vph) | 50 | 963 | 1 | 126 | 964 | 141 | 1 | 4 | 120 | 456 | 15 | 116 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 0.0 | | 20.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 1 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.990 | | 0.950 | 0.955 | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1742 | 1495 | 1588 | 1596 | 1495 |
| Flt Permitted | 0.273 | | | 0.101 | | | | 0.764 | | 0.950 | 0.736 | |
| Satd. Flow (perm) | 451 | 3139 | 1404 | 167 | 3139 | 1404 | 0 | 1344 | 1495 | 1588 | 1230 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 142 | | | 153 | | | 142 | | | 83 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 54 | 1047 | 1 | 137 | 1048 | 153 | 1 | 4 | 130 | 496 | 16 | 126 |
| Shared Lane Traffic (%) | | | | | | | | | | 48% | | |
| Lane Group Flow (vph) | 54 | 1047 | 1 | 137 | 1048 | 153 | 0 | 5 | 130 | 258 | 254 | 126 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | Prot | NA | Perm |
| Protected Phases | | 6 | | 5 | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | | | 8 |
| Detector Phase | 6 | 6 | 6 | 5 | 2 | 2 | 4 | 4 | 4 | 3 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 10.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 7.0 | 10.0 | 10.0 |
| Minimum Split (s) | 36.0 | 36.0 | 36.0 | 16.0 | 36.0 | 36.0 | 16.0 | 16.0 | 16.0 | 13.0 | 16.0 | 16.0 |
| Total Split (s) | 44.0 | 44.0 | 44.0 | 16.0 | 60.0 | 60.0 | 16.0 | 16.0 | 16.0 | 24.0 | 40.0 | 40.0 |
| Total Split (%) | 44.0% | 44.0% | 44.0% | 16.0% | 60.0% | 60.0% | 16.0% | 16.0% | 16.0% | 24.0% | 40.0% | 40.0% |
| Maximum Green (s) | 38.0 | 38.0 | 38.0 | 12.0 | 54.0 | 54.0 | 10.0 | 10.0 | 10.0 | 19.0 | 34.0 | 34.0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | 6.0 | 4.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Lead/Lag | Lag | Lag | Lag | Lead | | | Lead | Lead | Lead | Lag | | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes | Yes | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | None | Min | Min | None | None | None | None | None | None |
| Act Effct Green (s) | 35.6 | 35.6 | 35.6 | 52.7 | 50.7 | 50.7 | | 10.0 | 10.0 | 19.0 | 18.0 | 34.0 |
| Actuated g/C Ratio | 0.37 | 0.37 | 0.37 | 0.54 | 0.52 | 0.52 | | 0.10 | 0.10 | 0.20 | 0.19 | 0.35 |
| v/c Ratio | 0.33 | 0.91 | 0.00 | 0.55 | 0.64 | 0.19 | | 0.04 | 0.46 | 0.83 | 0.86 | 0.22 |
| Control Delay | 28.7 | 41.4 | 0.0 | 22.5 | 18.5 | 2.5 | | 41.4 | 11.9 | 61.4 | 66.2 | 10.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 28.7 | 41.4 | 0.0 | 22.5 | 18.5 | 2.5 | | 41.4 | 11.9 | 61.4 | 66.2 | 10.4 |
| LOS | C | D | A | C | B | A | | D | B | E | E | B |
| Approach Delay | | 40.7 | | | 17.1 | | | 13.0 | | | 53.3 | |
| Approach LOS | | D | | | B | | | B | | | D | |
| Queue Length 50th (m) | 7.6 | 102.2 | 0.0 | 12.7 | 73.6 | 0.0 | | 1.0 | 0.0 | 53.7 | 53.4 | 5.9 |
| Queue Length 95th (m) | 19.0 | #142.1 | 0.0 | 29.5 | 94.7 | 9.1 | | 4.6 | 15.2 | #100.7 | #101.6 | 19.0 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | | | 20.0 |
| Base Capacity (vph) | 177 | 1233 | 637 | 265 | 1753 | 851 | | 139 | 282 | 311 | 297 | 579 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.31 | 0.85 | 0.00 | 0.52 | 0.60 | 0.18 | | 0.04 | 0.46 | 0.83 | 0.86 | 0.22 |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 100 | | | |
| Actuated Cycle Length: 96.8 | | | |
| Natural Cycle: 85 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.91 | | | |
| Intersection Signal Delay: 32.2 | | Intersection LOS: C | |
| Intersection Capacity Utilization 86.3% | | ICU Level of Service E | |
| Analysis Period (min) 15 | | | |

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NW | NE | NE | SW | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | R | LT | R | L | LT | R |
| Maximum Queue (m) | 37.4 | 101.9 | 108.8 | 43.1 | 74.1 | 68.1 | 9.3 | 48.9 | 20.6 | 73.5 | 79.7 | 27.5 |
| Average Queue (m) | 9.8 | 47.7 | 54.7 | 17.3 | 33.2 | 35.2 | 0.4 | 14.2 | 14.4 | 41.8 | 43.2 | 18.5 |
| 95th Queue (m) | 21.5 | 85.4 | 93.5 | 36.1 | 63.2 | 61.8 | 5.5 | 35.3 | 19.6 | 66.1 | 73.0 | 34.3 |
| Link Distance (m) | | 274.0 | 274.0 | | 193.6 | 193.6 | | 59.3 | | 126.1 | 126.1 | |
| Upstream Blk Time (%) | | | | | | | | 0 | | | | |
| Queuing Penalty (veh) | | | | | | | | 0 | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 89.0 | | 8.0 | | | 20.0 |
| Storage Blk Time (%) | | 3 | 6 | | 0 | | | 6 | 33 | | 31 | 4 |
| Queuing Penalty (veh) | | 2 | 0 | | 0 | | | 7 | 2 | | 36 | 9 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | EB | WB | NB | SB |
|---|---|---|---|---|---|---|
| Directions Served | L | T | R | LTR | L | LT |
| Maximum Queue (m) | 23.6 | 38.7 | 21.6 | 17.5 | 13.8 | 1.4 |
| Average Queue (m) | 11.2 | 11.9 | 15.1 | 5.3 | 3.7 | 0.1 |
| 95th Queue (m) | 18.9 | 28.2 | 20.1 | 14.5 | 10.2 | 1.1 |
| Link Distance (m) | | | | 1596.7 | | 122.7 |
| Upstream Blk Time (%) | | | | | | |
| Queuing Penalty (veh) | | | | | | |
| Storage Bay Dist (m) | 20.0 | | 8.0 | | 190.0 | |
| Storage Blk Time (%) | 1 | 1 | 22 | | | |
| Queuing Penalty (veh) | 1 | 3 | 20 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 60.6 | 12.6 |
| Average Queue (m) | 34.4 | 2.7 |
| 95th Queue (m) | 55.9 | 9.8 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 139 | 898 | 4 | 136 | 1052 | 517 | 1 | 5 | 72 | 112 | 12 | 59 |
| Future Volume (vph) | 139 | 898 | 4 | 136 | 1052 | 517 | 1 | 5 | 72 | 112 | 12 | 59 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 90.0 | | 20.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 1 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.992 | | 0.950 | | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1745 | 1495 | 3242 | 1759 | 1495 |
| Flt Permitted | 0.205 | | | 0.259 | | | | 0.945 | | 0.950 | | |
| Satd. Flow (perm) | 339 | 3139 | 1404 | 428 | 3139 | 1404 | 0 | 1663 | 1495 | 3242 | 1759 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 73 | | | 562 | | | 78 | | | 64 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 151 | 976 | 4 | 148 | 1143 | 562 | 1 | 5 | 78 | 122 | 13 | 64 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 151 | 976 | 4 | 148 | 1143 | 562 | 0 | 6 | 78 | 122 | 13 | 64 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | Perm |
| Protected Phases | | 6 | | | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | | | 8 |
| Detector Phase | 6 | 6 | 6 | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 7.0 | 10.0 | 10.0 |
| Minimum Split (s) | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 24.0 | 24.0 | 24.0 | 16.0 | 24.0 | 24.0 |
| Total Split (s) | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 24.0 | 24.0 | 24.0 | 16.0 | 40.0 | 40.0 |
| Total Split (%) | 66.7% | 66.7% | 66.7% | 66.7% | 66.7% | 66.7% | 20.0% | 20.0% | 20.0% | 13.3% | 33.3% | 33.3% |
| Maximum Green (s) | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 18.0 | 18.0 | 18.0 | 11.0 | 34.0 | 34.0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Lead/Lag | | | | | | | Lag | Lag | Lag | Lead | | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | Yes | Yes | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | Min | Min | Min | None | None | None | None | None | None |
| Walk Time (s) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | | 7.0 | 7.0 |
| Flash Dont Walk (s) | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | | 11.0 | 11.0 |
| Pedestrian Calls (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Act Effct Green (s) | 58.0 | 58.0 | 58.0 | 58.0 | 58.0 | 58.0 | | 11.4 | 11.4 | 9.6 | 21.9 | 21.9 |
| Actuated g/C Ratio | 0.68 | 0.68 | 0.68 | 0.68 | 0.68 | 0.68 | | 0.13 | 0.13 | 0.11 | 0.26 | 0.26 |
| v/c Ratio | 0.65 | 0.45 | 0.00 | 0.51 | 0.53 | 0.49 | | 0.03 | 0.29 | 0.33 | 0.03 | 0.15 |
| Control Delay | 29.7 | 9.9 | 0.0 | 18.4 | 10.9 | 2.2 | | 45.3 | 14.5 | 45.4 | 32.0 | 9.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 29.7 | 9.9 | 0.0 | 18.4 | 10.9 | 2.2 | | 45.3 | 14.5 | 45.4 | 32.0 | 9.8 |
| LOS | C | A | A | B | B | A | | D | B | D | C | A |
| Approach Delay | | 12.5 | | | 8.9 | | | 16.7 | | | 33.1 | |
| Approach LOS | | B | | | A | | | B | | | C | |
| Queue Length 50th (m) | 18.2 | 49.7 | 0.0 | 15.1 | 63.1 | 0.0 | | 1.0 | 0.0 | 10.5 | 1.7 | 0.0 |
| Queue Length 95th (m) | #61.2 | 67.4 | 0.0 | 37.4 | 84.9 | 11.4 | | 5.7 | 14.7 | 23.6 | 7.7 | 11.3 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | 90.0 | | 20.0 |
| Base Capacity (vph) | 282 | 2614 | 1181 | 356 | 2614 | 1263 | | 401 | 420 | 478 | 802 | 717 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.54 | 0.37 | 0.00 | 0.42 | 0.44 | 0.44 | | 0.01 | 0.19 | 0.26 | 0.02 | 0.09 |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 120 | | | |
| Actuated Cycle Length: 84.8 | | | |
| Natural Cycle: 90 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.65 | | | |
| Intersection Signal Delay: 11.8 | | Intersection LOS: B | |
| Intersection Capacity Utilization 80.3% | | ICU Level of Service D | |
| Analysis Period (min) 15 | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NW | NE | NE | SW | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | R | LT | R | L | L | T |
| Maximum Queue (m) | 75.0 | 68.2 | 66.0 | 54.9 | 58.7 | 67.5 | 62.9 | 32.5 | 20.5 | 32.4 | 42.0 | 24.9 |
| Average Queue (m) | 28.9 | 22.0 | 19.3 | 21.2 | 21.8 | 23.9 | 10.5 | 8.5 | 12.7 | 8.3 | 19.4 | 4.0 |
| 95th Queue (m) | 63.0 | 54.3 | 48.5 | 43.5 | 44.9 | 48.7 | 38.3 | 25.0 | 20.2 | 23.8 | 34.4 | 14.0 |
| Link Distance (m) | | 272.2 | 272.2 | | 192.3 | 192.3 | | 59.4 | | | 126.1 | 126.1 |
| Upstream Blk Time (%) | | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 89.0 | | 8.0 | 90.0 | | |
| Storage Blk Time (%) | 5 | 0 | 0 | | | 0 | 0 | 6 | 19 | | | 1 |
| Queuing Penalty (veh) | 21 | 0 | 0 | | | 0 | 0 | 4 | 1 | | | 0 |

## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SW |
|---|---|
| Directions Served | R |
| Maximum Queue (m) | 24.2 |
| Average Queue (m) | 9.4 |
| 95th Queue (m) | 20.6 |
| Link Distance (m) | |
| Upstream Blk Time (%) | |
| Queuing Penalty (veh) | |
| Storage Bay Dist (m) | 20.0 |
| Storage Blk Time (%) | 1 |
| Queuing Penalty (veh) | 0 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | EB | WB | NB | NB | SB | SB |
|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | R | LTR | L | TR | LT | R |
| Maximum Queue (m) | 23.3 | 23.0 | 23.2 | 28.1 | 21.3 | 0.7 | 5.0 | 5.6 |
| Average Queue (m) | 10.7 | 6.2 | 13.2 | 7.5 | 6.4 | 0.0 | 0.1 | 0.3 |
| 95th Queue (m) | 19.8 | 19.0 | 18.4 | 20.3 | 14.6 | 0.5 | 1.9 | 4.8 |
| Link Distance (m) | | | | 1596.7 | | 806.2 | 122.7 | |
| Upstream Blk Time (%) | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | |
| Storage Bay Dist (m) | 20.0 | | 8.0 | | 190.0 | | | 90.0 |
| Storage Blk Time (%) | 1 | 1 | 12 | | | | | |
| Queuing Penalty (veh) | 1 | 3 | 9 | | | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE | NE |
|---|---|---|---|
| Directions Served | LT | L | R |
| Maximum Queue (m) | 35.5 | 67.7 | 20.7 |
| Average Queue (m) | 15.2 | 2.9 | 12.3 |
| 95th Queue (m) | 25.3 | 29.8 | 17.9 |
| Link Distance (m) | | 126.1 | |
| Upstream Blk Time (%) | | 0 | |
| Queuing Penalty (veh) | | 0 | |
| Storage Bay Dist (m) | | | 8.0 |
| Storage Blk Time (%) | | | 3 |
| Queuing Penalty (veh) | | | 0 |

## Intersection: 12: 2nd Street & Kipp Road

| Movement |
|---|
| Directions Served |
| Maximum Queue (m) |
| Average Queue (m) |
| 95th Queue (m) |
| Link Distance (m) |
| Upstream Blk Time (%) |
| Queuing Penalty (veh) |
| Storage Bay Dist (m) |
| Storage Blk Time (%) |
| Queuing Penalty (veh) |

## Network Summary

Network wide Queuing Penalty: 40

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 50 | 963 | 1 | 126 | 964 | 141 | 1 | 4 | 120 | 456 | 15 | 116 |
| Future Volume (vph) | 50 | 963 | 1 | 126 | 964 | 141 | 1 | 4 | 120 | 456 | 15 | 116 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 90.0 | | 20.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 1 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.990 | | 0.950 | | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1742 | 1495 | 3242 | 1759 | 1495 |
| Flt Permitted | 0.272 | | | 0.117 | | | | 0.950 | | 0.950 | | |
| Satd. Flow (perm) | 449 | 3139 | 1404 | 193 | 3139 | 1404 | 0 | 1671 | 1495 | 3242 | 1759 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 129 | | | 153 | | | 130 | | | 92 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 54 | 1047 | 1 | 137 | 1048 | 153 | 1 | 4 | 130 | 496 | 16 | 126 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 54 | 1047 | 1 | 137 | 1048 | 153 | 0 | 5 | 130 | 496 | 16 | 126 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | Prot | NA | Perm |
| Protected Phases | | 6 | | 5 | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | | | 8 |
| Detector Phase | 6 | 6 | 6 | 5 | 2 | 2 | 4 | 4 | 4 | 3 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 10.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 7.0 | 10.0 | 10.0 |
| Minimum Split (s) | 36.0 | 36.0 | 36.0 | 14.0 | 36.0 | 36.0 | 16.0 | 16.0 | 16.0 | 13.0 | 16.0 | 16.0 |
| Total Split (s) | 54.0 | 54.0 | 54.0 | 14.0 | 68.0 | 68.0 | 16.0 | 16.0 | 16.0 | 26.0 | 42.0 | 42.0 |
| Total Split (%) | 49.1% | 49.1% | 49.1% | 12.7% | 61.8% | 61.8% | 14.5% | 14.5% | 14.5% | 23.6% | 38.2% | 38.2% |
| Maximum Green (s) | 48.0 | 48.0 | 48.0 | 10.0 | 62.0 | 62.0 | 10.0 | 10.0 | 10.0 | 21.0 | 36.0 | 36.0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | 6.0 | 4.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Lead/Lag | Lag | Lag | Lag | Lead | | | Lead | Lead | Lead | Lag | | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes | Yes | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | None | Min | Min | None | None | None | None | None | None |
| Act Effct Green (s) | 38.9 | 38.9 | 38.9 | 55.1 | 53.1 | 53.1 | | 10.1 | 10.1 | 18.9 | 34.0 | 34.0 |
| Actuated g/C Ratio | 0.39 | 0.39 | 0.39 | 0.56 | 0.54 | 0.54 | | 0.10 | 0.10 | 0.19 | 0.34 | 0.34 |
| v/c Ratio | 0.31 | 0.85 | 0.00 | 0.55 | 0.62 | 0.19 | | 0.03 | 0.48 | 0.80 | 0.03 | 0.22 |
| Control Delay | 26.5 | 35.1 | 0.0 | 21.5 | 18.1 | 2.4 | | 45.0 | 15.0 | 50.2 | 24.1 | 9.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 26.5 | 35.1 | 0.0 | 21.5 | 18.1 | 2.4 | | 45.0 | 15.0 | 50.2 | 24.1 | 9.9 |
| LOS | C | D | A | C | B | A | | D | B | D | C | A |
| Approach Delay | | 34.7 | | | 16.7 | | | 16.1 | | | 41.6 | |
| Approach LOS | | C | | | B | | | B | | | D | |
| Queue Length 50th (m) | 7.6 | 102.6 | 0.0 | 13.3 | 77.1 | 0.0 | | 1.0 | 0.0 | 50.1 | 2.2 | 4.6 |
| Queue Length 95th (m) | 18.3 | 130.1 | 0.0 | 27.0 | 97.7 | 8.9 | | 4.9 | 18.4 | #79.0 | 7.6 | 19.2 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | 90.0 | | 20.0 |
| Base Capacity (vph) | 219 | 1532 | 751 | 247 | 1979 | 941 | | 169 | 269 | 692 | 644 | 605 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.25 | 0.68 | 0.00 | 0.55 | 0.53 | 0.16 | | 0.03 | 0.48 | 0.72 | 0.02 | 0.21 |

**Intersection Summary**

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 99.2
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 27.8 Intersection LOS: C
Intersection Capacity Utilization 86.3% ICU Level of Service E
Analysis Period (min) 15
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NW | NE | NE | SW | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | R | LT | R | L | L | T |
| Maximum Queue (m) | 28.4 | 96.8 | 96.2 | 56.9 | 72.1 | 72.4 | 6.7 | 44.0 | 21.8 | 67.4 | 78.8 | 36.2 |
| Average Queue (m) | 9.9 | 48.4 | 51.8 | 17.7 | 31.5 | 34.1 | 0.5 | 16.7 | 14.6 | 36.0 | 47.5 | 5.4 |
| 95th Queue (m) | 24.0 | 81.2 | 87.3 | 38.7 | 60.0 | 62.2 | 4.9 | 37.6 | 19.9 | 58.1 | 68.2 | 21.3 |
| Link Distance (m) | | 272.2 | 272.2 | | 192.3 | 192.3 | | 59.4 | | | 126.1 | 126.1 |
| Upstream Blk Time (%) | | | | | | | | 0 | | | | |
| Queuing Penalty (veh) | | | | | | | | 0 | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 89.0 | | 8.0 | 90.0 | | |
| Storage Blk Time (%) | | 4 | 4 | 0 | | | | 6 | 40 | 0 | 0 | 1 |
| Queuing Penalty (veh) | | 2 | 0 | 0 | | | | 7 | 2 | 0 | 0 | 1 |

## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SW |
|---|---|
| Directions Served | R |
| Maximum Queue (m) | 26.9 |
| Average Queue (m) | 14.6 |
| 95th Queue (m) | 25.8 |
| Link Distance (m) | |
| Upstream Blk Time (%) | |
| Queuing Penalty (veh) | |
| Storage Bay Dist (m) | 20.0 |
| Storage Blk Time (%) | 5 |
| Queuing Penalty (veh) | 1 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | EB | WB | NB |
|---|---|---|---|---|---|
| Directions Served | L | T | R | LTR | L |
| Maximum Queue (m) | 24.1 | 36.5 | 23.6 | 19.3 | 14.0 |
| Average Queue (m) | 11.9 | 12.0 | 14.8 | 5.9 | 3.5 |
| 95th Queue (m) | 20.9 | 29.9 | 19.8 | 16.1 | 10.0 |
| Link Distance (m) | | | | 1596.7 | |
| Upstream Blk Time (%) | | | | | |
| Queuing Penalty (veh) | | | | | |
| Storage Bay Dist (m) | 20.0 | | 8.0 | | 190.0 |
| Storage Blk Time (%) | 1 | 1 | 23 | | |
| Queuing Penalty (veh) | 2 | 2 | 21 | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 57.8 | 13.9 |
| Average Queue (m) | 32.7 | 2.7 |
| 95th Queue (m) | 53.2 | 10.1 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

## Intersection: 12: 2nd Street & Kipp Road

| Movement |
|---|
| Directions Served |
| Maximum Queue (m) |
| Average Queue (m) |
| 95th Queue (m) |
| Link Distance (m) |
| Upstream Blk Time (%) |
| Queuing Penalty (veh) |
| Storage Bay Dist (m) |
| Storage Blk Time (%) |
| Queuing Penalty (veh) |

## Intersection: 25: Bend

| Movement | NB |
|---|---|
| Directions Served | T |
| Maximum Queue (m) | 3.2 |
| Average Queue (m) | 0.1 |
| 95th Queue (m) | 2.4 |
| Link Distance (m) | 122.7 |
| Upstream Blk Time (%) | |
| Queuing Penalty (veh) | |
| Storage Bay Dist (m) | |
| Storage Blk Time (%) | |
| Queuing Penalty (veh) | |

## Network Summary

Network wide Queuing Penalty: 37

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 85 | 797 | 4 | 120 | 933 | 286 | 1 | 5 | 64 | 64 | 11 | 45 |
| Future Volume (vph) | 85 | 797 | 4 | 120 | 933 | 286 | 1 | 5 | 64 | 64 | 11 | 45 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 0.0 | | 8.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 0 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.992 | | | 0.959 | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1745 | 1495 | 0 | 1687 | 1495 |
| Flt Permitted | 0.261 | | | 0.319 | | | | 0.940 | | | 0.753 | |
| Satd. Flow (perm) | 431 | 3139 | 1404 | 527 | 3139 | 1404 | 0 | 1654 | 1495 | 0 | 1325 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 30 | | | 311 | | | 70 | | | 49 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 92 | 866 | 4 | 130 | 1014 | 311 | 1 | 5 | 70 | 70 | 12 | 49 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 92 | 866 | 4 | 130 | 1014 | 311 | 0 | 6 | 70 | 0 | 82 | 49 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | | 6 | | | 2 | | | 4 | | | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | 8 | | 8 |
| Detector Phase | 6 | 6 | 6 | 2 | 2 | 2 | 4 | 4 | 4 | 8 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| Total Split (s) | 81.0 | 81.0 | 81.0 | 81.0 | 81.0 | 81.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| Total Split (%) | 73.6% | 73.6% | 73.6% | 73.6% | 73.6% | 73.6% | 26.4% | 26.4% | 26.4% | 26.4% | 26.4% | 26.4% |
| Maximum Green (s) | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | Min | Min | Min | None | None | None | None | None | None |
| Act Effct Green (s) | 35.3 | 35.3 | 35.3 | 35.3 | 35.3 | 35.3 | | 10.4 | 10.4 | | 10.4 | 10.4 |
| Actuated g/C Ratio | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 | | 0.20 | 0.20 | | 0.20 | 0.20 |
| v/c Ratio | 0.32 | 0.42 | 0.00 | 0.37 | 0.49 | 0.30 | | 0.02 | 0.20 | | 0.32 | 0.15 |
| Control Delay | 10.2 | 6.6 | 0.0 | 10.5 | 7.3 | 1.7 | | 18.2 | 7.6 | | 22.7 | 8.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | 10.2 | 6.6 | 0.0 | 10.5 | 7.3 | 1.7 | | 18.2 | 7.6 | | 22.7 | 8.1 |
| LOS | B | A | A | B | A | A | | B | A | | C | A |
| Approach Delay | | 7.0 | | | 6.4 | | | 8.4 | | | 17.2 | |
| Approach LOS | | A | | | A | | | A | | | B | |
| Queue Length 50th (m) | 4.2 | 22.4 | 0.0 | 6.1 | 28.0 | 0.0 | | 0.5 | 0.0 | | 7.0 | 0.0 |
| Queue Length 95th (m) | 14.3 | 37.2 | 0.0 | 19.1 | 46.3 | 8.0 | | 3.1 | 8.6 | | 18.7 | 7.3 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | | | 8.0 |
| Base Capacity (vph) | 431 | 3139 | 1404 | 527 | 3139 | 1404 | | 716 | 687 | | 574 | 675 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Reduced v/c Ratio | 0.21 | 0.28 | 0.00 | 0.25 | 0.32 | 0.22 | | 0.01 | 0.10 | | 0.14 | 0.07 |

**Intersection Summary**

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 53.2
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 7.2 Intersection LOS: A
Intersection Capacity Utilization 76.6% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NW | NE | NE | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | R | LT | R | LT | R |
| Maximum Queue (m) | 32.0 | 38.9 | 40.1 | 31.3 | 35.9 | 45.2 | 18.6 | 26.3 | 21.8 | 46.4 | 21.8 |
| Average Queue (m) | 11.9 | 11.4 | 17.6 | 13.2 | 14.1 | 16.1 | 1.5 | 6.0 | 11.4 | 18.0 | 10.7 |
| 95th Queue (m) | 26.5 | 27.1 | 34.1 | 26.5 | 28.9 | 33.7 | 10.2 | 20.1 | 19.7 | 36.6 | 20.9 |
| Link Distance (m) | | 276.1 | 276.1 | | 194.9 | 194.9 | | 59.2 | | 126.4 | |
| Upstream Blk Time (%) | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 89.0 | | 8.0 | | 8.0 |
| Storage Blk Time (%) | | | | | | | | 4 | 11 | 31 | 9 |
| Queuing Penalty (veh) | | | | | | | | 2 | 1 | 14 | 7 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB | SB |
|---|---|---|---|---|---|
| Directions Served | LT | R | LTR | L | LT |
| Maximum Queue (m) | 24.4 | 20.9 | 21.0 | 20.0 | 1.2 |
| Average Queue (m) | 12.2 | 12.4 | 6.1 | 4.3 | 0.0 |
| 95th Queue (m) | 22.4 | 18.6 | 17.1 | 12.5 | 0.9 |
| Link Distance (m) | | | 1596.4 | | 124.5 |
| Upstream Blk Time (%) | | | | | |
| Queuing Penalty (veh) | | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 | |
| Storage Blk Time (%) | 8 | 9 | | | |
| Queuing Penalty (veh) | 8 | 6 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE | NE |
|---|---|---|---|
| Directions Served | LT | L | R |
| Maximum Queue (m) | 32.7 | 28.2 | 15.5 |
| Average Queue (m) | 12.7 | 1.0 | 7.0 |
| 95th Queue (m) | 23.4 | 20.6 | 15.0 |
| Link Distance (m) | | 126.4 | |
| Upstream Blk Time (%) | | 0 | |
| Queuing Penalty (veh) | | 0 | |
| Storage Bay Dist (m) | | | 8.0 |
| Storage Blk Time (%) | | | 0 |
| Queuing Penalty (veh) | | | 0 |

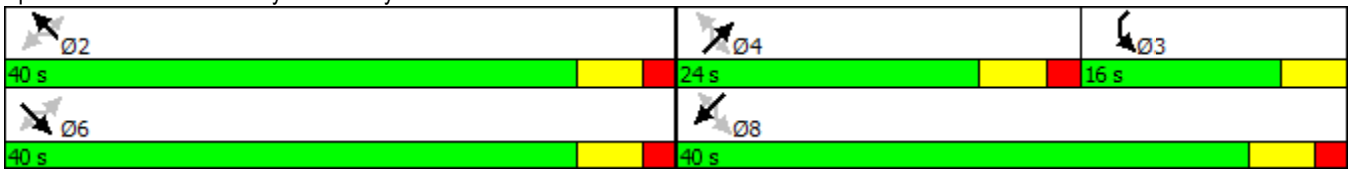
| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 34 | 854 | 1 | 112 | 856 | 81 | 1 | 4 | 106 | 247 | 13 | 68 |
| Future Volume (vph) | 34 | 854 | 1 | 112 | 856 | 81 | 1 | 4 | 106 | 247 | 13 | 68 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 0.0 | | 8.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 0 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.990 | | | 0.955 | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1742 | 1495 | 0 | 1680 | 1495 |
| Flt Permitted | 0.255 | | | 0.256 | | | | 0.945 | | | 0.733 | |
| Satd. Flow (perm) | 421 | 3139 | 1404 | 423 | 3139 | 1404 | 0 | 1663 | 1495 | 0 | 1290 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 123 | | | 123 | | | 123 | | | 41 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 37 | 928 | 1 | 122 | 930 | 88 | 1 | 4 | 115 | 268 | 14 | 74 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 37 | 928 | 1 | 122 | 930 | 88 | 0 | 5 | 115 | 0 | 282 | 74 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | | 6 | | | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | 8 | | 8 |
| Detector Phase | 6 | 6 | 6 | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 24.0 | 24.0 | 24.0 | 16.0 | 24.0 | 24.0 |
| Total Split (s) | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 24.0 | 24.0 | 24.0 | 16.0 | 40.0 | 40.0 |
| Total Split (%) | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% | 30.0% | 30.0% | 30.0% | 20.0% | 50.0% | 50.0% |
| Maximum Green (s) | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | 18.0 | 18.0 | 18.0 | 12.0 | 34.0 | 34.0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 |
| Lead/Lag | | | | | | | Lead | Lead | Lead | Lag | | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | Yes | Yes | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | Min | Min | Min | None | None | None | None | None | None |
| Act Effct Green (s) | 32.7 | 32.7 | 32.7 | 32.7 | 32.7 | 32.7 | | 19.0 | 19.0 | | 19.0 | 19.0 |
| Actuated g/C Ratio | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | | 0.30 | 0.30 | | 0.30 | 0.30 |
| v/c Ratio | 0.17 | 0.58 | 0.00 | 0.56 | 0.58 | 0.11 | | 0.01 | 0.22 | | 0.74 | 0.16 |
| Control Delay | 13.3 | 13.8 | 0.0 | 27.3 | 13.8 | 1.6 | | 14.8 | 4.2 | | 32.4 | 9.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | 13.3 | 13.8 | 0.0 | 27.3 | 13.8 | 1.6 | | 14.8 | 4.2 | | 32.4 | 9.5 |
| LOS | B | B | A | C | B | A | | B | A | | C | A |
| Approach Delay | | 13.8 | | | 14.3 | | | 4.7 | | | 27.6 | |
| Approach LOS | | B | | | B | | | A | | | C | |
| Queue Length 50th (m) | 2.3 | 38.5 | 0.0 | 9.5 | 38.6 | 0.0 | | 0.5 | 0.0 | | 32.1 | 3.0 |
| Queue Length 95th (m) | 9.7 | 74.9 | 0.0 | #40.5 | 75.2 | 4.3 | | 2.4 | 8.5 | | 56.6 | 11.0 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | | | 8.0 |
| Base Capacity (vph) | 227 | 1698 | 816 | 228 | 1698 | 816 | | 555 | 581 | | 697 | 827 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | 0 |
| Reduced v/c Ratio | 0.16 | 0.55 | 0.00 | 0.54 | 0.55 | 0.11 | | 0.01 | 0.20 | | 0.40 | 0.09 |

**Intersection Summary**

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 63.9
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 15.5 Intersection LOS: B
Intersection Capacity Utilization 86.0% ICU Level of Service E
Analysis Period (min) 15
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NE | NE | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | LT | R | LT | R |
| Maximum Queue (m) | 25.3 | 65.1 | 63.0 | 44.9 | 48.3 | 58.2 | 36.0 | 20.3 | 80.4 | 20.8 |
| Average Queue (m) | 5.7 | 23.4 | 30.9 | 18.9 | 21.5 | 22.8 | 9.0 | 12.9 | 40.3 | 11.2 |
| 95th Queue (m) | 16.2 | 49.6 | 54.1 | 41.1 | 41.2 | 47.4 | 27.2 | 19.3 | 66.1 | 21.2 |
| Link Distance (m) | | 276.1 | 276.1 | | 194.9 | 194.9 | 59.2 | | 126.4 | |
| Upstream Blk Time (%) | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | | 8.0 | | 8.0 |
| Storage Blk Time (%) | | 0 | 0 | | | | 1 | 19 | 53 | 6 |
| Queuing Penalty (veh) | | 0 | 0 | | | | 1 | 1 | 36 | 16 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | WB | NB |
|---|---|---|---|---|
| Directions Served | LT | R | LTR | L |
| Maximum Queue (m) | 33.7 | 22.4 | 20.7 | 10.4 |
| Average Queue (m) | 13.7 | 14.1 | 5.6 | 2.2 |
| 95th Queue (m) | 27.1 | 19.8 | 17.1 | 7.4 |
| Link Distance (m) | | | 1596.4 | |
| Upstream Blk Time (%) | | | | |
| Queuing Penalty (veh) | | | | |
| Storage Bay Dist (m) | | 8.0 | | 190.0 |
| Storage Blk Time (%) | 6 | 15 | | |
| Queuing Penalty (veh) | 10 | 9 | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 36.5 | 9.8 |
| Average Queue (m) | 19.9 | 1.1 |
| 95th Queue (m) | 31.2 | 6.0 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 143 | 898 | 4 | 136 | 1052 | 538 | 1 | 5 | 72 | 117 | 12 | 60 |
| Future Volume (vph) | 143 | 898 | 4 | 136 | 1052 | 538 | 1 | 5 | 72 | 117 | 12 | 60 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 0.0 | | 20.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 1 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.992 | | 0.950 | 0.961 | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1745 | 1495 | 1588 | 1606 | 1495 |
| Flt Permitted | 0.197 | | | 0.251 | | | | 0.932 | | 0.950 | 0.807 | |
| Satd. Flow (perm) | 325 | 3139 | 1404 | 415 | 3139 | 1404 | 0 | 1640 | 1495 | 1588 | 1349 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 82 | | | 585 | | | 82 | | | 65 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 155 | 976 | 4 | 148 | 1143 | 585 | 1 | 5 | 78 | 127 | 13 | 65 |
| Shared Lane Traffic (%) | | | | | | | | | | 45% | | |
| Lane Group Flow (vph) | 155 | 976 | 4 | 148 | 1143 | 585 | 0 | 6 | 78 | 70 | 70 | 65 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | Perm |
| Protected Phases | | 6 | | | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | | | 8 |
| Detector Phase | 6 | 6 | 6 | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 7.0 | 10.0 | 10.0 |
| Minimum Split (s) | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 24.0 | 24.0 | 24.0 | 16.0 | 24.0 | 24.0 |
| Total Split (s) | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 24.0 | 24.0 | 24.0 | 16.0 | 40.0 | 40.0 |
| Total Split (%) | 66.7% | 66.7% | 66.7% | 66.7% | 66.7% | 66.7% | 20.0% | 20.0% | 20.0% | 13.3% | 33.3% | 33.3% |
| Maximum Green (s) | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 18.0 | 18.0 | 18.0 | 11.0 | 34.0 | 34.0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Lead/Lag | | | | | | | Lead | Lead | Lead | Lag | | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | Yes | Yes | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | Min | Min | Min | None | None | None | None | None | None |
| Walk Time (s) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | | 7.0 | 7.0 |
| Flash Dont Walk (s) | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | | 11.0 | 11.0 |
| Pedestrian Calls (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Act Effct Green (s) | 65.4 | 65.4 | 65.4 | 65.4 | 65.4 | 65.4 | | 11.1 | 11.1 | 16.4 | 13.0 | 37.7 |
| Actuated g/C Ratio | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 | | 0.11 | 0.11 | 0.17 | 0.13 | 0.38 |
| v/c Ratio | 0.72 | 0.47 | 0.00 | 0.54 | 0.55 | 0.52 | | 0.03 | 0.32 | 0.27 | 0.33 | 0.11 |
| Control Delay | 41.0 | 13.1 | 0.0 | 24.0 | 14.4 | 2.6 | | 50.5 | 14.6 | 45.1 | 47.7 | 8.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 41.0 | 13.1 | 0.0 | 24.0 | 14.4 | 2.6 | | 50.5 | 14.6 | 45.1 | 47.7 | 8.5 |
| LOS | D | B | A | C | B | A | | D | B | D | D | A |
| Approach Delay | | 16.9 | | | 11.5 | | | 17.2 | | | 34.4 | |
| Approach LOS | | B | | | B | | | B | | | C | |
| Queue Length 50th (m) | 26.4 | 66.2 | 0.0 | 20.5 | 84.1 | 0.0 | | 1.3 | 0.0 | 14.8 | 14.9 | 0.0 |
| Queue Length 95th (m) | #72.1 | 82.8 | 0.0 | 46.8 | 104.3 | 13.6 | | 5.8 | 14.4 | 31.8 | 32.1 | 10.9 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | | | 20.0 |
| Base Capacity (vph) | 241 | 2330 | 1063 | 307 | 2330 | 1193 | | 332 | 367 | 288 | 211 | 612 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.64 | 0.42 | 0.00 | 0.48 | 0.49 | 0.49 | | 0.02 | 0.21 | 0.24 | 0.33 | 0.11 |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 120 | | | |
| Actuated Cycle Length: 98.6 | | | |
| Natural Cycle: 100 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.72 | | | |
| Intersection Signal Delay: 14.9 | | Intersection LOS: B | |
| Intersection Capacity Utilization 81.6% | | ICU Level of Service D | |
| Analysis Period (min) 15 | | | |

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NW | NE | NE | SW | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | R | LT | R | L | LT | R |
| Maximum Queue (m) | 70.8 | 67.3 | 66.2 | 48.0 | 55.5 | 58.2 | 49.3 | 30.9 | 19.0 | 31.7 | 33.3 | 26.6 |
| Average Queue (m) | 28.0 | 16.4 | 21.0 | 18.8 | 22.2 | 22.0 | 10.0 | 7.9 | 12.8 | 17.1 | 9.9 | 12.0 |
| 95th Queue (m) | 58.9 | 46.9 | 46.9 | 39.1 | 46.2 | 45.6 | 32.8 | 24.1 | 19.3 | 28.7 | 25.6 | 24.3 |
| Link Distance (m) | | 274.0 | 274.0 | | 193.6 | 193.6 | | 59.3 | | 126.1 | 126.1 | |
| Upstream Blk Time (%) | | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 89.0 | | 8.0 | | | 20.0 |
| Storage Blk Time (%) | 4 | 0 | | | | | | 6 | 19 | | 2 | 2 |
| Queuing Penalty (veh) | 16 | 0 | | | | | | 4 | 1 | | 1 | 1 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | EB | WB | NB | NB | SB |
|---|---|---|---|---|---|---|---|
| Directions Served | L | T | R | LTR | L | TR | R |
| Maximum Queue (m) | 25.4 | 30.2 | 20.9 | 21.9 | 16.2 | 0.7 | 6.6 |
| Average Queue (m) | 11.2 | 6.8 | 13.4 | 6.9 | 6.1 | 0.1 | 0.4 |
| 95th Queue (m) | 20.7 | 21.7 | 19.1 | 18.0 | 13.6 | 0.8 | 4.3 |
| Link Distance (m) | | | | 1596.7 | | 806.2 | |
| Upstream Blk Time (%) | | | | | | | |
| Queuing Penalty (veh) | | | | | | | |
| Storage Bay Dist (m) | 20.0 | | 8.0 | | 190.0 | | 90.0 |
| Storage Blk Time (%) | 1 | 1 | 13 | | | | |
| Queuing Penalty (veh) | 2 | 3 | 11 | | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE | NE |
|---|---|---|---|
| Directions Served | LT | L | R |
| Maximum Queue (m) | 26.4 | 39.8 | 19.7 |
| Average Queue (m) | 13.9 | 1.4 | 12.0 |
| 95th Queue (m) | 22.4 | 21.0 | 16.8 |
| Link Distance (m) | | 126.1 | |
| Upstream Blk Time (%) | | 0 | |
| Queuing Penalty (veh) | | 0 | |
| Storage Bay Dist (m) | | | 8.0 |
| Storage Blk Time (%) | | | 3 |
| Queuing Penalty (veh) | | | 0 |

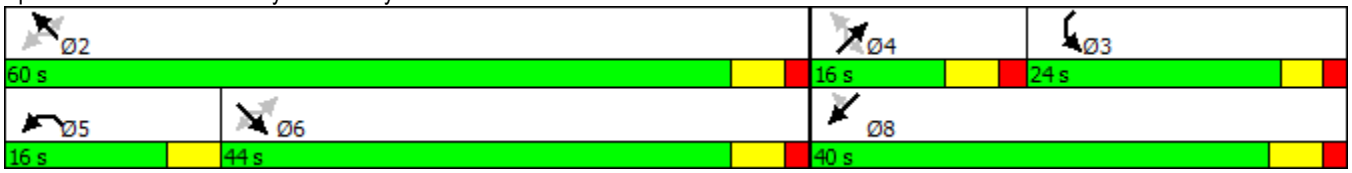
| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 51 | 963 | 1 | 126 | 964 | 146 | 1 | 4 | 120 | 475 | 15 | 120 |
| Future Volume (vph) | 51 | 963 | 1 | 126 | 964 | 146 | 1 | 4 | 120 | 475 | 15 | 120 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 0.0 | | 20.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 1 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.990 | | 0.950 | 0.955 | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1742 | 1495 | 1588 | 1596 | 1495 |
| Flt Permitted | 0.273 | | | 0.101 | | | | 0.697 | | 0.950 | 0.735 | |
| Satd. Flow (perm) | 451 | 3139 | 1404 | 167 | 3139 | 1404 | 0 | 1226 | 1495 | 1588 | 1228 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 142 | | | 159 | | | 142 | | | 83 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 55 | 1047 | 1 | 137 | 1048 | 159 | 1 | 4 | 130 | 516 | 16 | 130 |
| Shared Lane Traffic (%) | | | | | | | | | | 49% | | |
| Lane Group Flow (vph) | 55 | 1047 | 1 | 137 | 1048 | 159 | 0 | 5 | 130 | 263 | 269 | 130 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | Prot | NA | Perm |
| Protected Phases | | 6 | | 5 | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | | | 8 |
| Detector Phase | 6 | 6 | 6 | 5 | 2 | 2 | 4 | 4 | 4 | 3 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 10.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 7.0 | 10.0 | 10.0 |
| Minimum Split (s) | 36.0 | 36.0 | 36.0 | 16.0 | 36.0 | 36.0 | 16.0 | 16.0 | 16.0 | 13.0 | 16.0 | 16.0 |
| Total Split (s) | 44.0 | 44.0 | 44.0 | 16.0 | 60.0 | 60.0 | 16.0 | 16.0 | 16.0 | 24.0 | 40.0 | 40.0 |
| Total Split (%) | 44.0% | 44.0% | 44.0% | 16.0% | 60.0% | 60.0% | 16.0% | 16.0% | 16.0% | 24.0% | 40.0% | 40.0% |
| Maximum Green (s) | 38.0 | 38.0 | 38.0 | 12.0 | 54.0 | 54.0 | 10.0 | 10.0 | 10.0 | 19.0 | 34.0 | 34.0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | 6.0 | 4.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Lead/Lag | Lag | Lag | Lag | Lead | | | Lead | Lead | Lead | Lag | | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes | Yes | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | None | Min | Min | None | None | None | None | None | None |
| Act Effct Green (s) | 35.6 | 35.6 | 35.6 | 52.7 | 50.7 | 50.7 | | 10.0 | 10.0 | 19.0 | 18.0 | 34.0 |
| Actuated g/C Ratio | 0.37 | 0.37 | 0.37 | 0.54 | 0.52 | 0.52 | | 0.10 | 0.10 | 0.20 | 0.19 | 0.35 |
| v/c Ratio | 0.33 | 0.91 | 0.00 | 0.55 | 0.64 | 0.20 | | 0.04 | 0.46 | 0.85 | 0.91 | 0.22 |
| Control Delay | 28.8 | 41.4 | 0.0 | 22.5 | 18.5 | 2.5 | | 41.6 | 11.9 | 63.3 | 74.0 | 10.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 28.8 | 41.4 | 0.0 | 22.5 | 18.5 | 2.5 | | 41.6 | 11.9 | 63.3 | 74.0 | 10.8 |
| LOS | C | D | A | C | B | A | | D | B | E | E | B |
| Approach Delay | | 40.7 | | | 17.0 | | | 13.0 | | | 57.3 | |
| Approach LOS | | D | | | B | | | B | | | E | |
| Queue Length 50th (m) | 7.7 | 102.2 | 0.0 | 12.7 | 73.6 | 0.0 | | 1.0 | 0.0 | 54.9 | 57.2 | 6.4 |
| Queue Length 95th (m) | 19.2 | #142.1 | 0.0 | 29.5 | 94.7 | 9.2 | | 4.6 | 15.2 | #103.4 | #109.7 | 20.0 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | | | 20.0 |
| Base Capacity (vph) | 177 | 1233 | 637 | 265 | 1753 | 854 | | 126 | 282 | 311 | 297 | 579 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.31 | 0.85 | 0.00 | 0.52 | 0.60 | 0.19 | | 0.04 | 0.46 | 0.85 | 0.91 | 0.22 |

## Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 96.8
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 33.1 Intersection LOS: C
Intersection Capacity Utilization 86.9% ICU Level of Service E
Analysis Period (min) 15
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NW | NE | NE | SW | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | R | LT | R | L | LT | R |
| Maximum Queue (m) | 38.8 | 94.5 | 99.9 | 43.6 | 65.9 | 72.8 | 2.9 | 44.5 | 20.7 | 73.8 | 79.6 | 27.5 |
| Average Queue (m) | 9.2 | 49.6 | 52.7 | 16.3 | 32.4 | 32.6 | 0.1 | 16.5 | 14.8 | 43.9 | 45.1 | 20.0 |
| 95th Queue (m) | 27.6 | 83.4 | 87.3 | 33.9 | 59.6 | 59.1 | 2.1 | 37.2 | 19.1 | 66.2 | 71.1 | 34.5 |
| Link Distance (m) | | 274.0 | 274.0 | | 193.6 | 193.6 | | 59.3 | | 126.1 | 126.1 | |
| Upstream Blk Time (%) | | | | | | | | 0 | | | | |
| Queuing Penalty (veh) | | | | | | | | 0 | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 89.0 | | 8.0 | | | 20.0 |
| Storage Blk Time (%) | | 4 | 5 | | | | | 4 | 39 | | 33 | 4 |
| Queuing Penalty (veh) | | 2 | 0 | | | | | 5 | 2 | | 40 | 11 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | EB | WB | NB | SB |
|---|---|---|---|---|---|---|
| Directions Served | L | T | R | LTR | L | LT |
| Maximum Queue (m) | 23.1 | 38.1 | 23.8 | 21.9 | 13.6 | 2.8 |
| Average Queue (m) | 11.6 | 11.8 | 15.3 | 5.8 | 3.3 | 0.1 |
| 95th Queue (m) | 21.1 | 30.8 | 21.1 | 16.7 | 9.7 | 1.5 |
| Link Distance (m) | | | | 1596.7 | | 122.7 |
| Upstream Blk Time (%) | | | | | | |
| Queuing Penalty (veh) | | | | | | |
| Storage Bay Dist (m) | 20.0 | | 8.0 | | 190.0 | |
| Storage Blk Time (%) | 1 | 1 | 22 | | | |
| Queuing Penalty (veh) | 2 | 3 | 20 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 61.7 | 10.8 |
| Average Queue (m) | 36.4 | 3.2 |
| 95th Queue (m) | 58.4 | 10.4 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 143 | 898 | 4 | 136 | 1052 | 538 | 1 | 5 | 72 | 117 | 12 | 60 |
| Future Volume (vph) | 143 | 898 | 4 | 136 | 1052 | 538 | 1 | 5 | 72 | 117 | 12 | 60 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 90.0 | | 20.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 1 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.992 | | 0.950 | | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1745 | 1495 | 3242 | 1759 | 1495 |
| Flt Permitted | 0.206 | | | 0.260 | | | | 0.944 | | 0.950 | | |
| Satd. Flow (perm) | 340 | 3139 | 1404 | 430 | 3139 | 1404 | 0 | 1661 | 1495 | 3242 | 1759 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 73 | | | 585 | | | 78 | | | 65 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 155 | 976 | 4 | 148 | 1143 | 585 | 1 | 5 | 78 | 127 | 13 | 65 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 155 | 976 | 4 | 148 | 1143 | 585 | 0 | 6 | 78 | 127 | 13 | 65 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | Perm |
| Protected Phases | | 6 | | | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | | | 8 |
| Detector Phase | 6 | 6 | 6 | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 7.0 | 10.0 | 10.0 |
| Minimum Split (s) | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 24.0 | 24.0 | 24.0 | 16.0 | 24.0 | 24.0 |
| Total Split (s) | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 24.0 | 24.0 | 24.0 | 16.0 | 40.0 | 40.0 |
| Total Split (%) | 66.7% | 66.7% | 66.7% | 66.7% | 66.7% | 66.7% | 20.0% | 20.0% | 20.0% | 13.3% | 33.3% | 33.3% |
| Maximum Green (s) | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 18.0 | 18.0 | 18.0 | 11.0 | 34.0 | 34.0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Lead/Lag | | | | | | | Lag | Lag | Lag | Lead | | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | Yes | Yes | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | Min | Min | Min | None | None | None | None | None | None |
| Walk Time (s) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | | 7.0 | 7.0 |
| Flash Dont Walk (s) | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | | 11.0 | 11.0 |
| Pedestrian Calls (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Act Effct Green (s) | 59.6 | 59.6 | 59.6 | 59.6 | 59.6 | 59.6 | | 11.6 | 11.6 | 9.9 | 22.1 | 22.1 |
| Actuated g/C Ratio | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | | 0.13 | 0.13 | 0.11 | 0.26 | 0.26 |
| v/c Ratio | 0.66 | 0.45 | 0.00 | 0.50 | 0.53 | 0.51 | | 0.03 | 0.29 | 0.34 | 0.03 | 0.15 |
| Control Delay | 30.2 | 9.8 | 0.0 | 18.0 | 10.8 | 2.3 | | 45.8 | 14.5 | 46.2 | 32.3 | 9.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 30.2 | 9.8 | 0.0 | 18.0 | 10.8 | 2.3 | | 45.8 | 14.5 | 46.2 | 32.3 | 9.8 |
| LOS | C | A | A | B | B | A | | D | B | D | C | A |
| Approach Delay | | 12.5 | | | 8.7 | | | 16.7 | | | 33.8 | |
| Approach LOS | | B | | | A | | | B | | | C | |
| Queue Length 50th (m) | 19.2 | 50.1 | 0.0 | 15.2 | 63.6 | 0.0 | | 1.0 | 0.0 | 11.7 | 1.8 | 0.0 |
| Queue Length 95th (m) | #63.5 | 67.4 | 0.0 | 37.2 | 84.9 | 11.5 | | 5.7 | 14.7 | 24.3 | 7.7 | 11.3 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | 90.0 | | 20.0 |
| Base Capacity (vph) | 280 | 2584 | 1169 | 354 | 2584 | 1259 | | 400 | 419 | 477 | 801 | 716 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.55 | 0.38 | 0.00 | 0.42 | 0.44 | 0.46 | | 0.01 | 0.19 | 0.27 | 0.02 | 0.09 |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 120 | | | |
| Actuated Cycle Length: 86.2 | | | |
| Natural Cycle: 100 | | | |
| Control Type: Actuated-Uncoordinated | | | |
| Maximum v/c Ratio: 0.66 | | | |
| Intersection Signal Delay: 11.8 | | Intersection LOS: B | |
| Intersection Capacity Utilization 81.6% | | ICU Level of Service D | |
| Analysis Period (min) 15 | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NW | NE | NE | SW | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | R | LT | R | L | L | T |
| Maximum Queue (m) | 60.8 | 59.1 | 51.2 | 57.1 | 56.0 | 54.6 | 57.0 | 23.7 | 19.4 | 32.7 | 39.9 | 17.6 |
| Average Queue (m) | 27.4 | 18.1 | 17.1 | 22.6 | 21.6 | 24.2 | 10.8 | 7.4 | 12.2 | 7.8 | 19.6 | 3.6 |
| 95th Queue (m) | 50.4 | 42.2 | 41.2 | 48.2 | 44.5 | 49.7 | 36.4 | 21.6 | 20.4 | 23.8 | 32.7 | 12.1 |
| Link Distance (m) | | 272.2 | 272.2 | | 192.3 | 192.3 | | 59.4 | | | 126.1 | 126.1 |
| Upstream Blk Time (%) | | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | 89.0 | | 8.0 | 90.0 | | |
| Storage Blk Time (%) | 1 | 0 | 0 | | | | | 6 | 18 | | | 0 |
| Queuing Penalty (veh) | 6 | 0 | 0 | | | | | 5 | 1 | | | 0 |

## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SW |
|---|---|
| Directions Served | R |
| Maximum Queue (m) | 24.5 |
| Average Queue (m) | 9.9 |
| 95th Queue (m) | 20.5 |
| Link Distance (m) | |
| Upstream Blk Time (%) | |
| Queuing Penalty (veh) | |
| Storage Bay Dist (m) | 20.0 |
| Storage Blk Time (%) | 1 |
| Queuing Penalty (veh) | 0 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | EB | WB | NB | SB | SB |
|---|---|---|---|---|---|---|---|
| Directions Served | L | T | R | LTR | L | LT | R |
| Maximum Queue (m) | 24.3 | 30.3 | 21.0 | 29.8 | 18.9 | 2.9 | 8.8 |
| Average Queue (m) | 11.1 | 5.7 | 13.0 | 7.9 | 6.1 | 0.1 | 0.5 |
| 95th Queue (m) | 20.3 | 20.3 | 18.8 | 21.1 | 14.3 | 1.5 | 6.0 |
| Link Distance (m) | | | | 1596.7 | | 122.7 | |
| Upstream Blk Time (%) | | | | | | | |
| Queuing Penalty (veh) | | | | | | | |
| Storage Bay Dist (m) | 20.0 | | 8.0 | | 190.0 | | 90.0 |
| Storage Blk Time (%) | 1 | 1 | 13 | | | | |
| Queuing Penalty (veh) | 1 | 2 | 10 | | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE | NE |
|---|---|---|---|
| Directions Served | LT | L | R |
| Maximum Queue (m) | 26.9 | 55.4 | 19.6 |
| Average Queue (m) | 14.6 | 3.1 | 12.0 |
| 95th Queue (m) | 23.3 | 36.0 | 17.4 |
| Link Distance (m) | | 126.1 | |
| Upstream Blk Time (%) | | 0 | |
| Queuing Penalty (veh) | | 1 | |
| Storage Bay Dist (m) | | | 8.0 |
| Storage Blk Time (%) | | | 3 |
| Queuing Penalty (veh) | | | 0 |

## Intersection: 12: 2nd Street & Kipp Road

| Movement |
|---|
| Directions Served |
| Maximum Queue (m) |
| Average Queue (m) |
| 95th Queue (m) |
| Link Distance (m) |
| Upstream Blk Time (%) |
| Queuing Penalty (veh) |
| Storage Bay Dist (m) |
| Storage Blk Time (%) |
| Queuing Penalty (veh) |

## Network Summary

Network wide Queuing Penalty: 25

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 51 | 963 | 1 | 126 | 964 | 146 | 1 | 4 | 120 | 475 | 15 | 120 |
| Future Volume (vph) | 51 | 963 | 1 | 126 | 964 | 146 | 1 | 4 | 120 | 475 | 15 | 120 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | 0.0 | | 8.0 | 90.0 | | 20.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 1 | 1 | | 1 |
| Taper Length (m) | 40.0 | | | 50.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.990 | | 0.950 | | |
| Satd. Flow (prot) | 1570 | 3139 | 1404 | 1570 | 3139 | 1404 | 0 | 1742 | 1495 | 3242 | 1759 | 1495 |
| Flt Permitted | 0.270 | | | 0.116 | | | | 0.950 | | 0.950 | | |
| Satd. Flow (perm) | 446 | 3139 | 1404 | 192 | 3139 | 1404 | 0 | 1671 | 1495 | 3242 | 1759 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 129 | | | 159 | | | 130 | | | 92 |
| Link Speed (k/h) | | 110 | | | 110 | | | 50 | | | 50 | |
| Link Distance (m) | | 296.6 | | | 217.0 | | | 92.9 | | | 159.2 | |
| Travel Time (s) | | 9.7 | | | 7.1 | | | 6.7 | | | 11.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 15% | 15% | 15% | 15% | 15% | 15% | 8% | 8% | 8% | 8% | 8% | 8% |
| Adj. Flow (vph) | 55 | 1047 | 1 | 137 | 1048 | 159 | 1 | 4 | 130 | 516 | 16 | 130 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 55 | 1047 | 1 | 137 | 1048 | 159 | 0 | 5 | 130 | 516 | 16 | 130 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | Perm | pm+pt | NA | Perm | Perm | NA | Perm | Prot | NA | Perm |
| Protected Phases | | 6 | | 5 | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | 6 | | 6 | 2 | | 2 | 4 | | 4 | | | 8 |
| Detector Phase | 6 | 6 | 6 | 5 | 2 | 2 | 4 | 4 | 4 | 3 | 8 | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 30.0 | 10.0 | 30.0 | 30.0 | 10.0 | 10.0 | 10.0 | 7.0 | 10.0 | 10.0 |
| Minimum Split (s) | 36.0 | 36.0 | 36.0 | 14.0 | 36.0 | 36.0 | 16.0 | 16.0 | 16.0 | 13.0 | 16.0 | 16.0 |
| Total Split (s) | 54.0 | 54.0 | 54.0 | 14.0 | 68.0 | 68.0 | 16.0 | 16.0 | 16.0 | 26.0 | 42.0 | 42.0 |
| Total Split (%) | 49.1% | 49.1% | 49.1% | 12.7% | 61.8% | 61.8% | 14.5% | 14.5% | 14.5% | 23.6% | 38.2% | 38.2% |
| Maximum Green (s) | 48.0 | 48.0 | 48.0 | 10.0 | 62.0 | 62.0 | 10.0 | 10.0 | 10.0 | 21.0 | 36.0 | 36.0 |

| Lane Group | SEL | SET | SER | NWL | NWT | NWR | NEL | NET | NER | SWL | SWT | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 0.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 6.0 | 6.0 | 6.0 | 4.0 | 6.0 | 6.0 | | 6.0 | 6.0 | 5.0 | 6.0 | 6.0 |
| Lead/Lag | Lag | Lag | Lag | Lead | | | Lead | Lead | Lead | Lag | | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes | Yes | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | Min | Min | None | Min | Min | None | None | None | None | None | None |
| Act Effct Green (s) | 39.0 | 39.0 | 39.0 | 55.2 | 53.1 | 53.1 | | 10.1 | 10.1 | 19.2 | 34.4 | 34.4 |
| Actuated g/C Ratio | 0.39 | 0.39 | 0.39 | 0.55 | 0.53 | 0.53 | | 0.10 | 0.10 | 0.19 | 0.35 | 0.35 |
| v/c Ratio | 0.32 | 0.85 | 0.00 | 0.56 | 0.63 | 0.19 | | 0.03 | 0.49 | 0.82 | 0.03 | 0.23 |
| Control Delay | 26.8 | 35.3 | 0.0 | 21.8 | 18.2 | 2.4 | | 45.0 | 15.0 | 51.6 | 24.1 | 10.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 26.8 | 35.3 | 0.0 | 21.8 | 18.2 | 2.4 | | 45.0 | 15.0 | 51.6 | 24.1 | 10.3 |
| LOS | C | D | A | C | B | A | | D | B | D | C | B |
| Approach Delay | | 34.9 | | | 16.7 | | | 16.1 | | | 42.8 | |
| Approach LOS | | C | | | B | | | B | | | D | |
| Queue Length 50th (m) | 7.8 | 102.9 | 0.0 | 13.3 | 77.3 | 0.0 | | 1.0 | 0.0 | 52.5 | 2.2 | 5.2 |
| Queue Length 95th (m) | 18.9 | 130.1 | 0.0 | 27.2 | 97.7 | 9.1 | | 4.9 | 18.4 | #84.4 | 7.6 | 19.9 |
| Internal Link Dist (m) | | 272.6 | | | 193.0 | | | 68.9 | | | 135.2 | |
| Turn Bay Length (m) | 60.0 | | 60.0 | 89.0 | | 89.0 | | | 8.0 | 90.0 | | 20.0 |
| Base Capacity (vph) | 216 | 1524 | 748 | 245 | 1969 | 940 | | 169 | 268 | 688 | 640 | 603 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.25 | 0.69 | 0.00 | 0.56 | 0.53 | 0.17 | | 0.03 | 0.49 | 0.75 | 0.03 | 0.22 |

## Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 99.6
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 28.2 Intersection LOS: C
Intersection Capacity Utilization 86.9% ICU Level of Service E
Analysis Period (min) 15
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hwy 509 & Hwy 3



## Intersection: 1: Hwy 509 & Hwy 3

| Movement | SE | SE | SE | NW | NW | NW | NE | NE | SW | SW | SW | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directions Served | L | T | T | L | T | T | LT | R | L | L | T | R |
| Maximum Queue (m) | 30.7 | 88.1 | 98.4 | 42.1 | 70.8 | 80.4 | 43.9 | 20.8 | 76.0 | 86.9 | 25.4 | 25.7 |
| Average Queue (m) | 10.1 | 50.3 | 52.3 | 17.2 | 30.9 | 33.0 | 16.6 | 14.4 | 41.7 | 52.4 | 4.9 | 14.4 |
| 95th Queue (m) | 24.3 | 83.9 | 87.8 | 33.2 | 57.3 | 60.5 | 37.5 | 20.1 | 68.2 | 76.8 | 18.8 | 25.1 |
| Link Distance (m) | | 272.2 | 272.2 | | 192.3 | 192.3 | 59.4 | | | 126.1 | 126.1 | |
| Upstream Blk Time (%) | | | | | | | 0 | | | | | |
| Queuing Penalty (veh) | | | | | | | 0 | | | | | |
| Storage Bay Dist (m) | 60.0 | | | 89.0 | | | | 8.0 | 90.0 | | | 20.0 |
| Storage Blk Time (%) | | 4 | 5 | | | 0 | 6 | 38 | 0 | 0 | 0 | 3 |
| Queuing Penalty (veh) | | 2 | 0 | | | 0 | 7 | 2 | 0 | 0 | 0 | 0 |

## Intersection: 2: Hwy 25 & Kipp Road

| Movement | EB | EB | EB | WB | NB | SB |
|---|---|---|---|---|---|---|
| Directions Served | L | T | R | LTR | L | LT |
| Maximum Queue (m) | 26.0 | 44.3 | 23.1 | 19.8 | 14.1 | 2.6 |
| Average Queue (m) | 12.8 | 14.3 | 14.9 | 5.2 | 3.5 | 0.1 |
| 95th Queue (m) | 22.2 | 31.9 | 19.9 | 15.2 | 10.2 | 1.4 |
| Link Distance (m) | | | | 1596.7 | | 122.7 |
| Upstream Blk Time (%) | | | | | | |
| Queuing Penalty (veh) | | | | | | |
| Storage Bay Dist (m) | 20.0 | | 8.0 | | 190.0 | |
| Storage Blk Time (%) | 1 | 1 | 25 | | | |
| Queuing Penalty (veh) | 2 | 3 | 22 | | | |

## Intersection: 11: Hwy 509 & Kipp Road

| Movement | NW | NE |
|---|---|---|
| Directions Served | LT | R |
| Maximum Queue (m) | 59.9 | 11.7 |
| Average Queue (m) | 36.8 | 2.6 |
| 95th Queue (m) | 56.5 | 9.6 |
| Link Distance (m) | | |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | 8.0 |
| Storage Blk Time (%) | | 0 |
| Queuing Penalty (veh) | | 0 |

# Schedule C

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Environmental Consulting Ltd.

# Desktop Wetland Assessment for Oldman River Regional Services Commission

## Portions of S ½ 29 – 009 – 22 W4, Lethbridge County

Prepared for:

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28 March 2018

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# 1 Introduction

Aquality Environmental Consulting Ltd. (Aquality) was retained by the Oldman River Regional Services Commission to perform a desktop-based wetland assessment in portions of NE 20 – 040 – 20 W4, north of the Town of Coalhurst (Figure 1). The property in question is proposed to become an industrial park in a joint venture between the Town of Coalhurst and Lethbridge County.

## 1.1 Current and Historical Land Use

The subject property is located within Lethbridge County, Alberta. The property is currently zoned as Rural Urban Fringe (RUF) and Rural General Industrial.

The majority of the subject property is currently and has been over the historical record under agricultural production, and is currently irrigated for crop production.

The bed and shore of the existing wetland have experienced historical modification due to the construction of drainage channels and other hydrological modifications.


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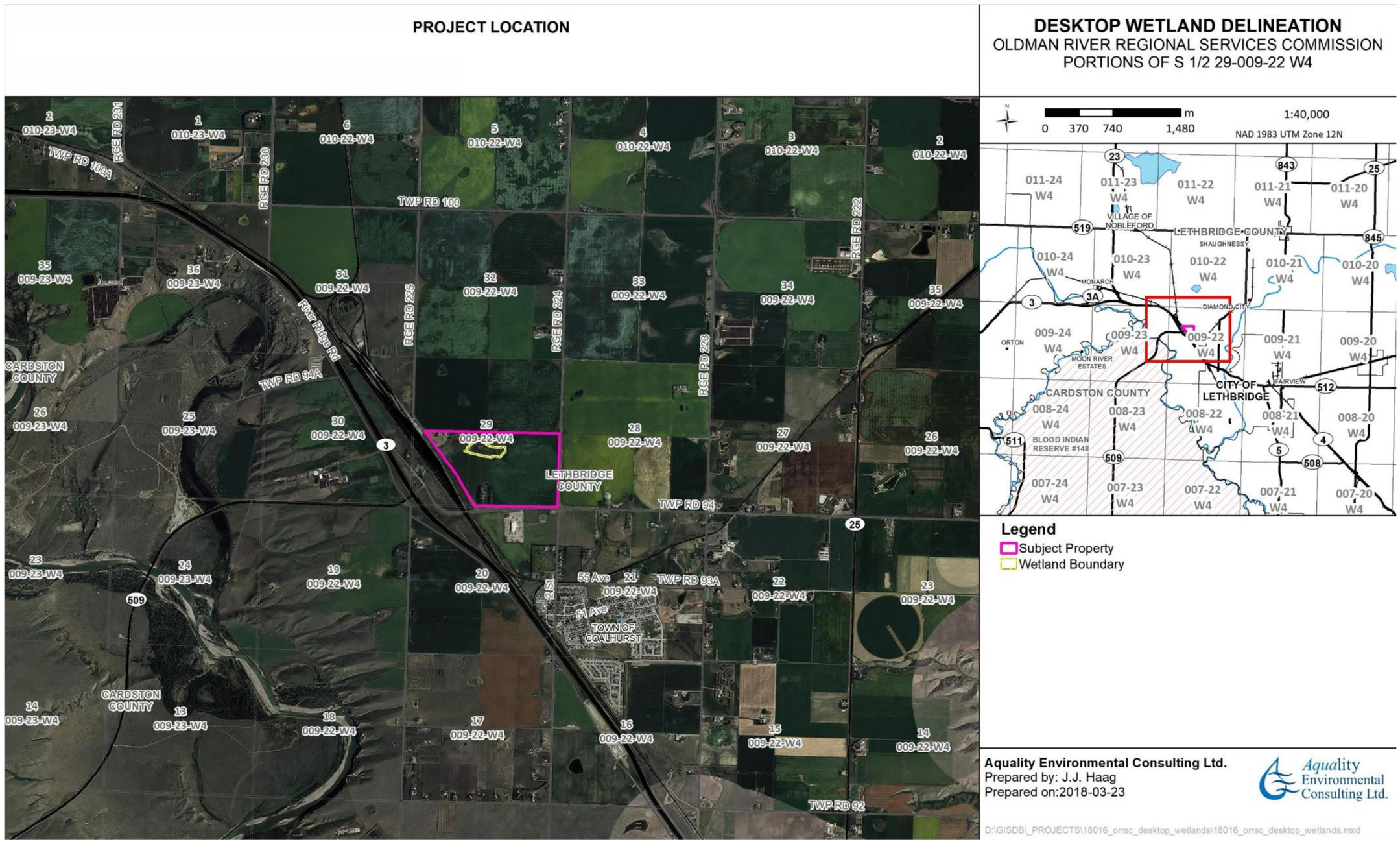


Figure 1. Project location lands proposed for industrial park development in S ½ 29 – 009 – 22 W4.


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# 2 Methods

## 2.1 Desktop Wetland Assessment

A wetland is defined as land saturated with water long enough to promote the formation of water altered soils, the growth of water tolerant vegetation, and supports various kinds of biological activity that is adapted to the wet environment. Wetlands were identified and delineated according to the Alberta Wetland Identification and Delineation Directive (Government of Alberta, 2015). The subject wetlands were initially identified using aerial photographs available from the Provincial Air Photo Library following the methodology detailed in *The Guide for Assessing Permanence of Wetland Basins* (Alberta Environment and Parks, 2014).

Wetlands were classified in accordance to the *Alberta Wetland Classification System* (AWCS) (Government of Alberta, 2015). The AWCS was developed and implemented by the Government of Alberta and is specifically tailored to wetlands in Alberta. There are five classes of wetlands under the AWCS: bogs, fens, marshes, shallow open water, and swamps. These classes align with the *Canadian Wetland Classification System* (National Wetlands Working Group, 1997). The five wetland classes are further divided into "forms" based on vegetation structure and these forms are further subdivided into "types" based on the length of time surface water is at or above surface level. The Stewart and Kantrud Classification System (Stewart & Kantrud, 1971) for mineral wetlands is captured at the sublevel of wetland types. Overall, wetlands in Alberta are divided into two broad groups: peatlands (bogs and fens) and mineral wetlands (marshes, fens, and shallow open water). A summary of the Alberta Wetland Classification System can be found in Table 1.


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Table 1. Wetland classes, forms, and types in the Alberta Wetland Classification System (Government of Alberta 2015b).

| Class | Form | Type | | |
|---|---|---|---|---|
| | | Salinity | Water Permanence | Acidity-alkalinity |
| Bog [B] | Wooded, coniferous [Wc], Shrubby [S], Graminoid [G] | Freshwater [f] | - | Acidic [a] |
| Fen [F] | Wooded, coniferous [Wc], Shrubby [S], Graminoid [G] | Freshwater [f] --to slightly brackish [sb] - | - | Poor [p] Moderate rich [mr] Extremely rich [er] |
| Marsh [M] | Graminoid [G] | Freshwater [f] | Temporary [II] | - |
| | | Freshwater [f] | Seasonal [III] | - |
| | | Freshwater [f] to slightly brackish [sb] | Semi-permanent [IV] | - |
| Shallow Open Water [W] | Submersed and/or aquatic vegetation [A] or bare [B] | Freshwater [f] to moderately brackish [mb] | Seasonal [III} | - |
| | | Freshwater [f] to sub-saline [ss] | Semi-permanent [IV] | - |
| | | Slightly brackish [sb] to subsaline [ss] | Permanent [V] | - |
| | [A] | Saline [s] | Intermittent [VI] | - |
| Swamp [S] | Wooded coniferous [Wc], wooded mixedwood [Wm], wooded deciduous [Wd], Shrubby [S] | Freshwater [f] to slightly brackish [sb][2] | Temporary [II] | - |
| | | Freshwater [f] to slightly brackish [sb][2] | Seasonal [III] | - |
| | | Moderately brackish [mb] to sub-saline [ss][2] | Seasonal [III] | - |

### 2.1.1 Agricultural Regions of Alberta Soil Inventory Database (AGRASID)

AGRASID is a soil distribution database from the Alberta Soil Information Centre (ASIC) of the Government of Alberta that provides digital and spatial representation of soil landscape information in Alberta (Alberta Soil Information Centre, 2001). Aquality reviewed the database, using the Soil Information Viewer (Government of Alberta, 2017) on 16 March 2018, to determine the types of soils that have been mapped within the assessment area.

### 2.1.2 Landscape Analysis Tool (LAT)

The LAT is a spatial tool that allows users to plan activities on public land (Government of Alberta, 2017). This tool allows users to look at the siting of the project activity and identify any areas of operational constraints that may apply to the project. Aquality completed a search of the subject property using the LAT on 16 March 2018.


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### 2.1.3 Environmentally Significant Areas (ESA)

Environmentally Significant Areas (ESA) reporting and mapping identifies areas within Alberta that are important to maintaining biological diversity, landscape features and other natural processes over the long-term, on both local and regional scales. The most recent update of the ESA report and mapping was completed in 2014, which updated the 2009 ESA data and incorporated the 2010 Aquatic Environmentally Significant Areas (AESA) to eliminate overlap and incorporate new data (Fiera Biological Consulting Ltd., 2014). The GIS output product for the 2014 update provided the ESA scores for each quarter section in Alberta, and this information was reviewed to determine the score of the subject property. Scores given in the ESA map and report range from 0.001 at the lowest end, (indicating an area least suitable as an ESA), to values >0.189 (given to areas that are considered ESAs).

### 2.1.4 Fisheries and Wildlife Management System (FWMIS)

FWMIS is the Fisheries and Wildlife database administered by the Government of Alberta (Alberta Environment and Parks, 2017). It provides information on recorded historical fish and wildlife species occurrences within the property and the surrounding areas. A search of this database within a 2-km radius of the subject property was completed on 16 March 2018.

### 2.1.5 Alberta Conservation Information Management System (ACIMS)

ACIMS is a provincial government organization that maintains a database and tracks information on species, communities, and sites of conservation interest (Alberta Conservation Information Management System, 2017). A search of the ACIMS online database for the section containing the property was completed for rare plant species and/or communities in, or adjacent to, the property on 16 March 2018.

## 2.2 Wetland Permanence Assessment

Aerial photographs and satellite imagery from approximately decadal intervals from (1951 to 2015) were selected for analysis based on a search of the Air Photo Record System (APRS) available for the Provincial Air Photo Distribution Office, and other electronic sources for satellite imagery. Photos were selected to provide a range of seasons in both wet and dry years to ensure a complete picture of the conditions on the property could be reviewed. Selection of wet/dry/normal years was aided with the use of precipitation data interpolated to Township 009 and Range 22, West of the Fourth Meridian (Appendix B: Precipitation Data). Analysis of historical aerial photos provides a record of changing land use and conditions over time. Aerial photographs and satellite imagery were also used to delineate and determine wetland permanence as per the *Guide for Assessing Wetland Permanence of Wetland Basins* (Alberta Environment and Parks, 2014).


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# 3 Results

## 3.1 Database Search Results

### 3.1.1 Agricultural Regions of Alberta Soil Inventory Database (AGRASID)

The project area is located the soil polygons 5821 and 5891 within AGRASID. The soil landscape is dominated by Dark Brown Chernozems formed on medium-textured sediments deposited by wind and water. The area has a hummocky landform with low relief and includes regolithic (exposed bedrock) areas (Appendix C: Search Results - AGRASID).

### 3.1.2 Landscape Analysis Tool (LAT)

The Landscape Analysis Tool (LAT) report identified that the assessment area is located within the Grassland and Parkland Natural Region and is within a sensitive raptor range, sensitive amphibian range, a sharp-tailed grouse survey range, and other sensitive and endangered species ranges. Construction and related activities taking place on the subject property must adhere to the restrictions (including restricted activity periods and prescribed species surveys) identified within the LAT Report (Appendix C: Search Results - LAT). This includes requirements for wildlife sweeps and minimum setback distances for activities to occur on the property. Restricted Activity Periods and required setbacks for sensitive species identified in the LAT report are presented in Table 2.

Table 2. LAT Report summary of restricted activity periods and required setbacks.

| Sensitivity | Restricted Activity Period | Setback or Mitigation |
|---|---|---|
| General Wildlife | - | Wildlife sweep of the immediate area (site plus 100 metres) prior to entry and construction to identify wildlife features |
| Sensitive Wildlife Features | - | 100m undisturbed vegetation, where an established buffer does not already exist (e.g. Species at Risk). |
| Sensitive Raptor Species | March 15th – July 15th | 1000 m setback from an active sensitive raptor species nest |
| Sensitive Raptor Species | July 16th – March 14th | 100 m setback from an active sensitive raptor species nest |
| Sharptailed Grouse | March 15th – October 30th | Setbacks, noise restrictions, and daily activity restrictions apply |
| Sensitive Amphibian Species | | No activities in areas identified as sensitive amphibian ranges within 100 metres of non-permanent seasonal wetlands |
| Other Sensitive and Endangered Species | April 15th – August 15th | No activities on native grassland unless grassland bird surveys are completed |


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### 3.1.3 Environmentally Significant Areas (ESA)

The subject property does not occur within any mapped Provincial Environmentally Significant Areas.

### 3.1.4 Fisheries and Wildlife Management System (FWMIS)

The FWMIS search identified no fish species as occurring within the 2 km search radius. Two records for wildlife were identified within the 2 km search radius, for Prairie Falcon and Western Small-Footed Bat.

The complete FWMIS search results report is presented in Appendix C: Search Results - FWMIS.

### 3.1.5 Alberta Conservation Information Management System (ACIMS)

The ACIMS database search revealed one sensitive element occurrence with the presence of *Yucca glauca* found within the township containing the subject property. This does not indicate that this species is necessarily present within the subject property, but should be verified with a vegetation survey prior to any development or by confirmation of the exact location of the record with Alberta Environment and Parks to avoid any incidental disturbance to a sensitive species. If this or other sensitive species are identified on the property, then appropriate mitigation and avoidance strategies will need to be determined in concert with Alberta Environment and Parks.

The complete ACIMS search results report is presented in Appendix C: Search Results - ACIMS.

## 3.2 Wetland Classification

Field assessments must be completed to confirm delineations and classifications. However, inferences can be made on the classification based on the results of the air photo assessment.

One wetland was identified within the subject property, and this was delineated and classified to determine any potential setback requirements (Figure 2). The wetland is classified as a Marsh, Graminoid, slightly brackish, semi-permanent (M-G-sb-iv) under the Alberta Wetland Classification System (Government of Alberta, 2015).

The determination of wetland class is inferred from the following:

- The wetlands surface water present in all years from the historical record, and in areas with an absence of surface water had a strong wetland vegetation signature
- An apparent whitish crust on the margins of the wetland sediment indicates the presence of higher levels of salinity
- Vegetation stature indicates dominance by graminoid (grass-like) species

## 3.3 Wetland Permanence Assessment

Wetland permanence was assessed using *The Guide for Assessing Permanence of Wetland Basins* (Alberta Environment and Parks, 2014). Wetland permanence was determined through analysis of


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historical air photos obtained from the Air Photo Library located in Edmonton, Alberta (Appendix A: Historical Air Photo Assessment).

Surface water was present in all years examined in the historical record, though in some periods the extent of surface water was minimal. Based on the classification of the wetland as a semi-permanent body of water and the continued presence of surface water, this wetland is believed to meet the requirements for an assertion of ownership by the Crown. If the wetland is to be disturbed, submission of a crown claimability / wetland permanence assessment to Public Lands would be required, and further approvals under the *Public Lands Act* may be required. If the wetland is completely avoided, then there are no consequences to the wetland being assessed as permanent or claimed by the Crown.


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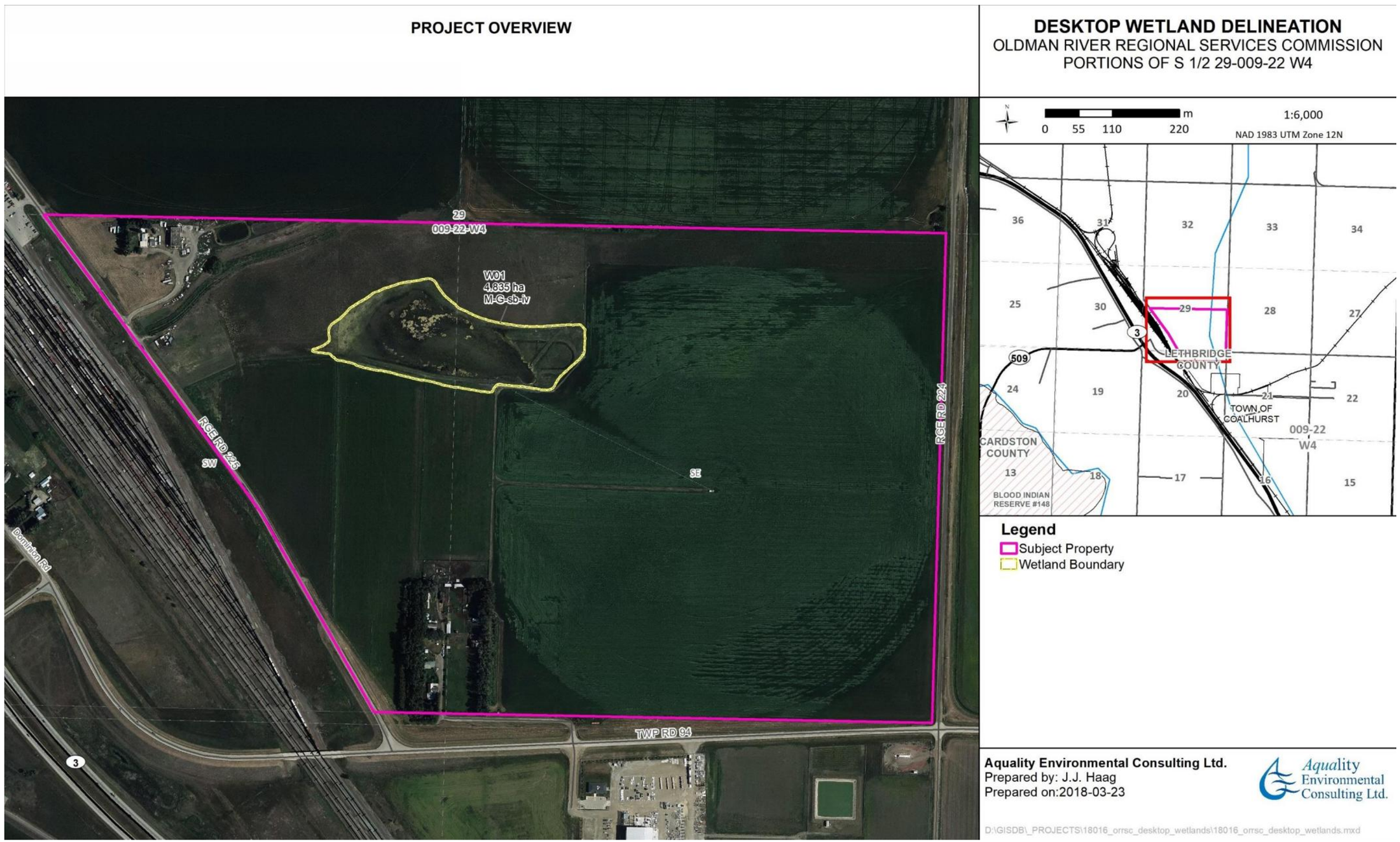


Figure 2. Identification and desktop delineation for wetlands within the project area.


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# 4 Requirements for Development

The following sections outline requirements for any development impacting wetlands in Alberta and are contingent on approval from Alberta Environment and Parks under the *Water Act*. If activities that will result in the permanent loss of wetland area will be carried out on the site, a field assessment will be required to confirm wetland boundaries and classification, and to determine the value of the wetlands in question. This value, in combination with the total area delineated in the field, will determine the monetary amount of compensation that will be required, by providing a replacement ratio ranging from 1:1 (lowest value 'D' wetlands) to 8:1 (highest value 'A' wetlands).

## 4.1 Wetland Avoidance and Recommended Setbacks

Under the Wetland Policy (Government of Alberta, 2013), the preferred option for wetland management is avoidance. If avoidance is chosen, the proponent of a project must demonstrate and document that the proposed measures for avoidance will be adequate and not result in unintended or indirect impacts to the wetland.

Under the Province's *"Stepping Back from the Water"* riparian management best practices guide (Government of Alberta, 2012), the minimum recommended setback for this class of wetland is 20 m on fine-textured substrates with slopes <5%. Depending upon the nature and proximity of the proposed activity, additional avoidance mechanisms such as larger setbacks or the placement of erosion and sediment control structures may be warranted. If a smaller buffer is chosen, then a field assessment is recommended and application under the *Water Act* may still be required.

## 4.2 Wetland Assessment and Evaluation

If avoidance is not chosen as the proposed wetland management strategy, then any proposed impacts to wetlands will require the completion of a field wetland assessment, and submission of a *Water Act* application and Wetland Assessment and Impact Report, in accordance with the Alberta Wetland Policy (Government of Alberta, 2013). These assessments and reports will require adherence to the *Alberta Wetland Identification and Delineation Directive* (Government of Alberta, 2015) and the *Alberta Wetland Classification System* (Government of Alberta, 2015).

## 4.3 Wetland Valuation

Completion of Alberta Wetland Rapid Evaluation Tool (ABWRET, Alberta Wetland Rapid Evaluation Tool Guide) (Government of Alberta, 2015) will be required for submission to AEP to obtain a final wetland value category (i.e., A, B, C, or D). The category is intended to assist the applicant and AEP in decisions about wetland avoidance, minimization, and replacement, as well as determine the replacement ratios for wetland replacement where impacts cannot be avoided or mitigated. As well, higher value wetlands


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require a higher threshold of protection. The replacement ratio information is critical for determining compensation amounts that may be prescribed under the Wetland Policy.

## 4.4 Wetland Mitigation and Replacement Plan Development

If the proposed project will ultimately result in the permanent loss of wetland habitat, the proponent must demonstrate avoidance and/or minimization before considering compensation measures. Higher value wetlands (identified through the field-based ABWRET score) must have higher levels of scrutiny and show greater efforts at avoidance. If wetlands cannot be avoided during development, then either replacement or an in-lieu compensation payment would be required. The wetlands in question are located in Relative Wetland Value Assessment Unit (RWVAU) 21, with rates of compensation of $17,700 per hectare, multiplied by a replacement ratio factor based on relative wetland value. These ratios vary from 1:1 for low value "D" wetlands to 8:1 for high value "A" wetlands (based on ABWRET scores).

Based on the Alberta Merged Wetland Inventory, the wetlands within the subject property are estimated to have a "C" value, which would require an 2:1 compensation ratio. The Province makes the final determination about wetland value, following the ABWRET scores derived from the field assessment.

## 4.5 Environmental Approvals

Requirements for environmental approvals will depend upon the final proposed project. Application and approval under the *Water Act* and *Public Lands Act* would be required prior to the alteration or disturbance of any wetland.


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# 6 Appendix A: Historical Air Photo Assessment

Table 3. Imagery sources for wetland delineation and classification of permanence of the wetlands identified in the study.

| ID | Legal Land Desc. | Photo Date | Photo ID | Image Source | Resolution (1:x) | AWCS Class | Season | Precipitation Year (1) | Open Water or Wetland Vegetation Signature (2) | Assessment of Permanence (3) |
|---|---|---|---|---|---|---|---|---|---|---|
| W01 | S ½ 29 – 009 – 22 W4 | 1950/05/10 | AS0180 205 | Air Photo Library BW Digital | | M-G-sb-iv | Spring | N | W | Y |
| W01 | S ½ 29 – 009 – 22 W4 | 1961/08/23 | AS0812 196 | Air Photo Library BW Digital | | M-G-sb-iv | Fall | N | W | Y |
| W01 | S ½ 29 – 009 – 22 W4 | 1974/06/17 | AS1314 037 | Air Photo Library BW Digital | | M-G-sb-iv | Summer | N | W | Y |
| W01 | S ½ 29 – 009 – 22 W4 | 1985/06/17 | AS3200 239 | Air Photo Library BW Digital | | M-G-sb-iv | Summer | W | W | Y |
| W01 | S ½ 29 – 009 – 22 W4 | 1993/08/08 | AS4373 228 | Air Photo Library BW Digital | | M-G-sb-iv | Summer | N | W | Y |
| W01 | S ½ 29 – 009 – 22 W4 | 2001/06/21 | AS5160 037 | Air Photo Library BW Digital | | M-G-sb-iv | Summer | D | W | Y |
| W01 | S ½ 29 – 009 – 22 W4 | 2015/--/-- | - | ESRI World Imagery | | M-G-sb-iv | Summer | D | W | Y |

1 - D=Dry Year; N=Normal Year; W=Wet Year; n/a=not available

2 - W=Open Water; D=Dry; DV= Dry, vegetated (consistent with wetland class); DVI= Dry, vegetated, indistinguishable

3 - Y=Yes; N=No


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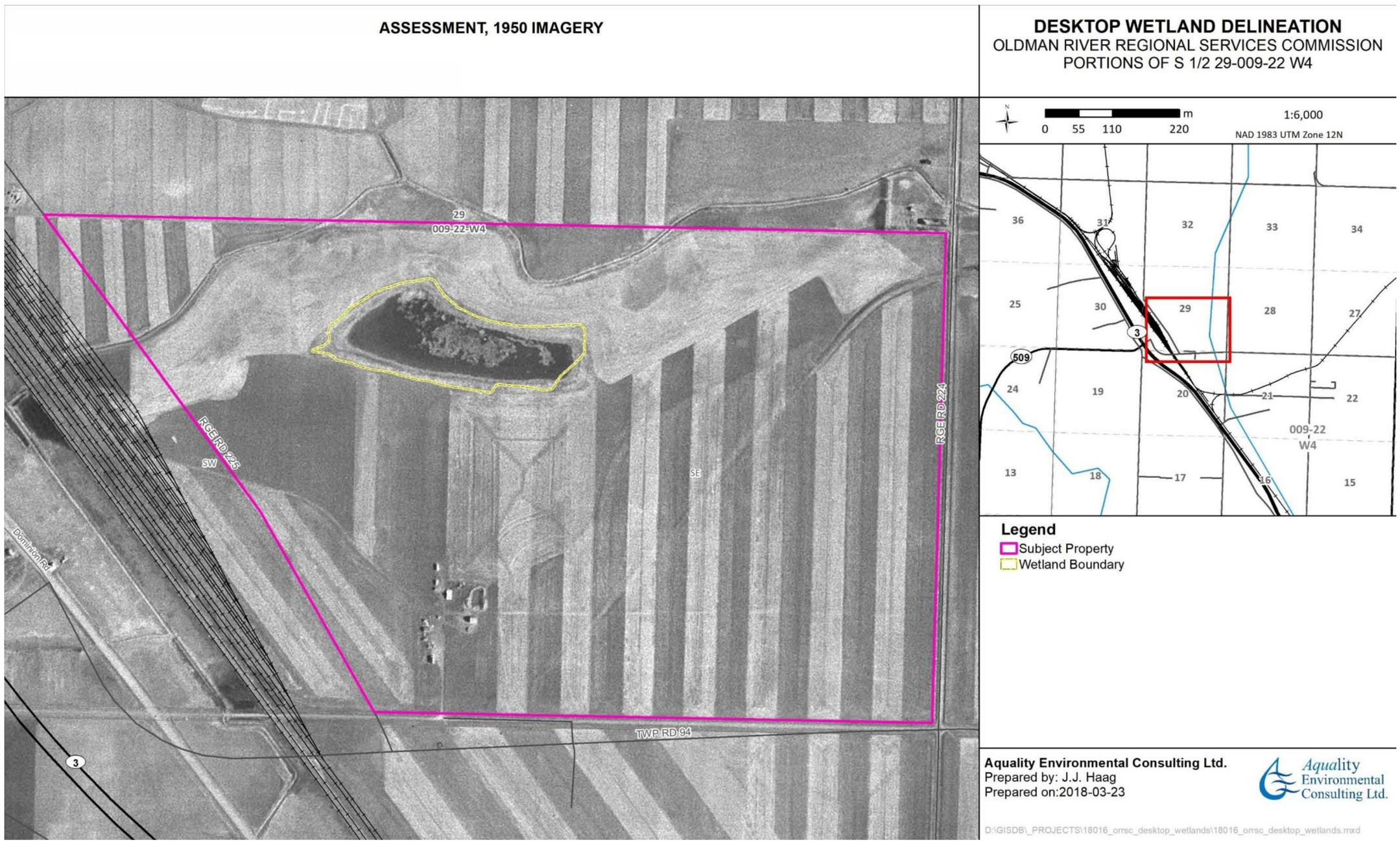


Figure 3. Historical imagery from 1950.


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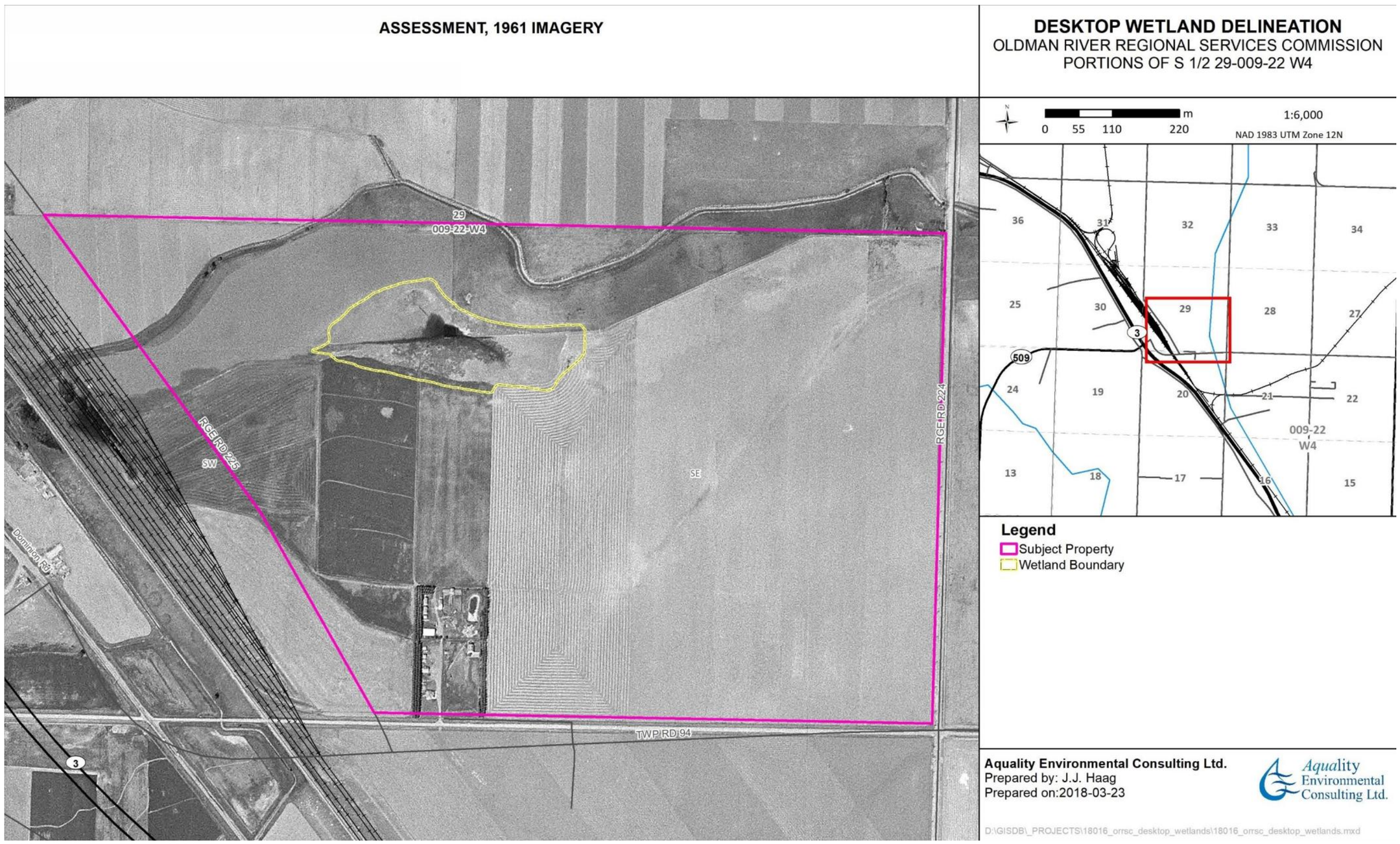


Figure 4. Historical imagery from 1961.


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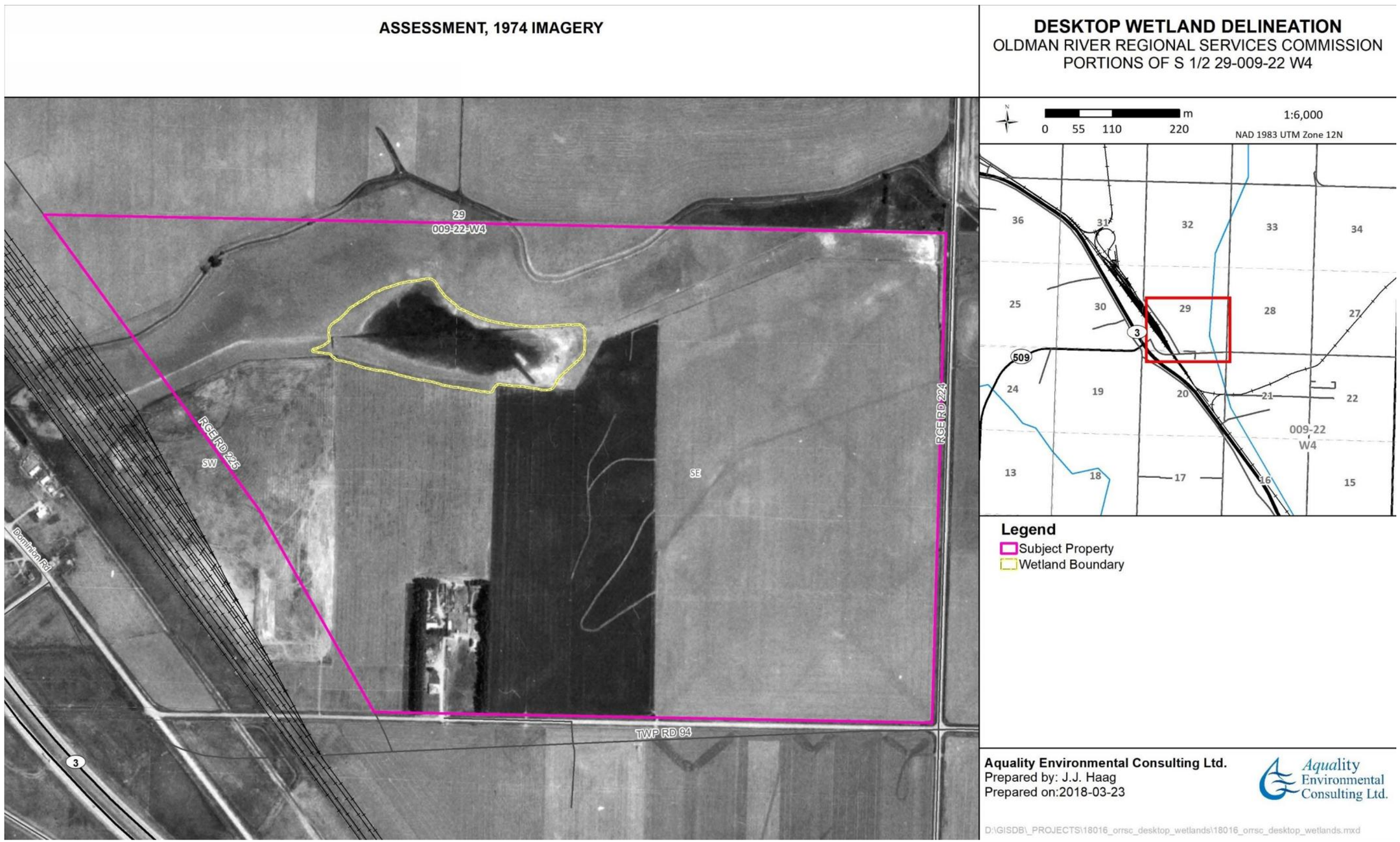


Figure 5. Historical imagery from 1974.


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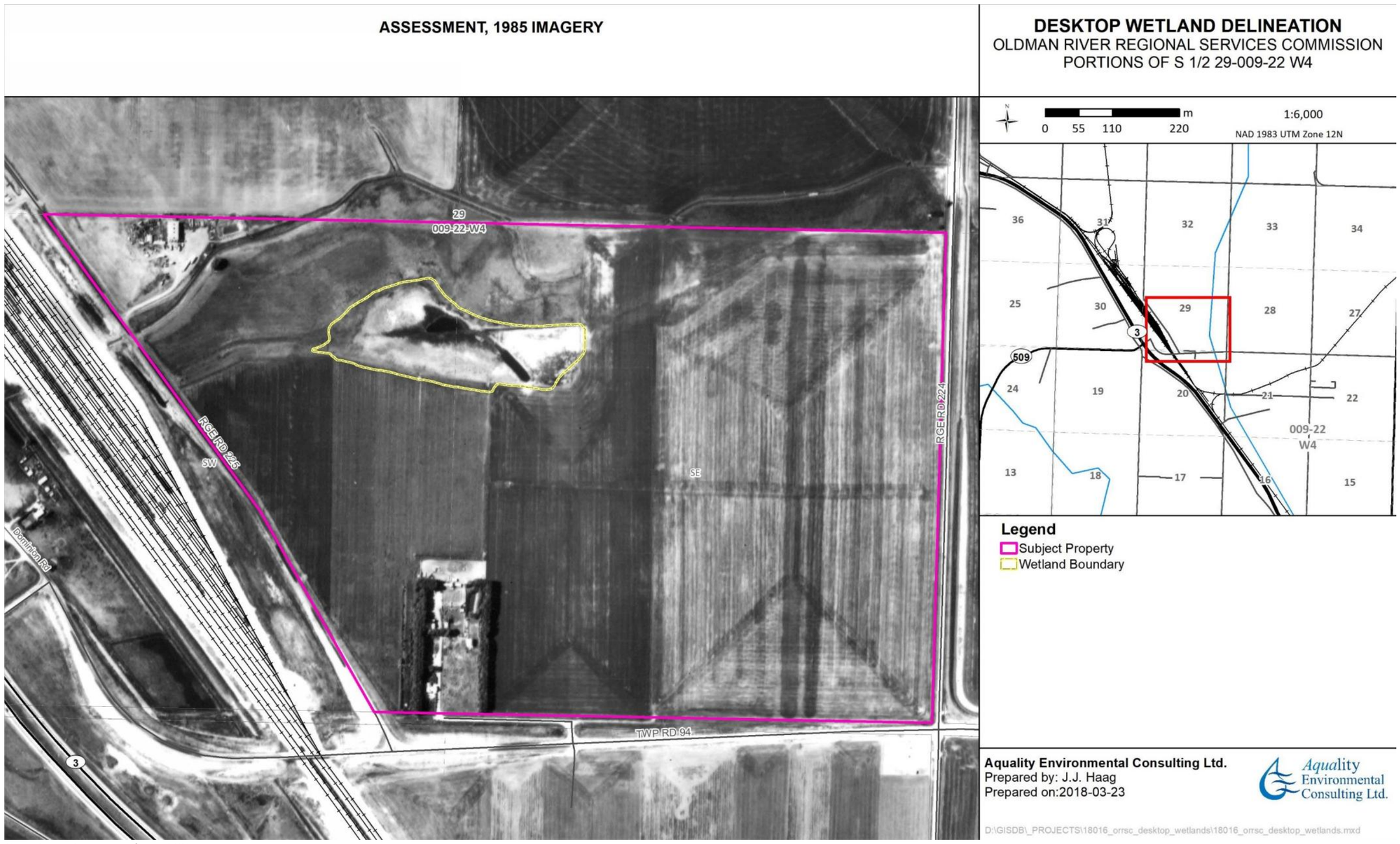


Figure 6. Historical imagery from 1985.


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Figure 7. Historical imagery from 1993.


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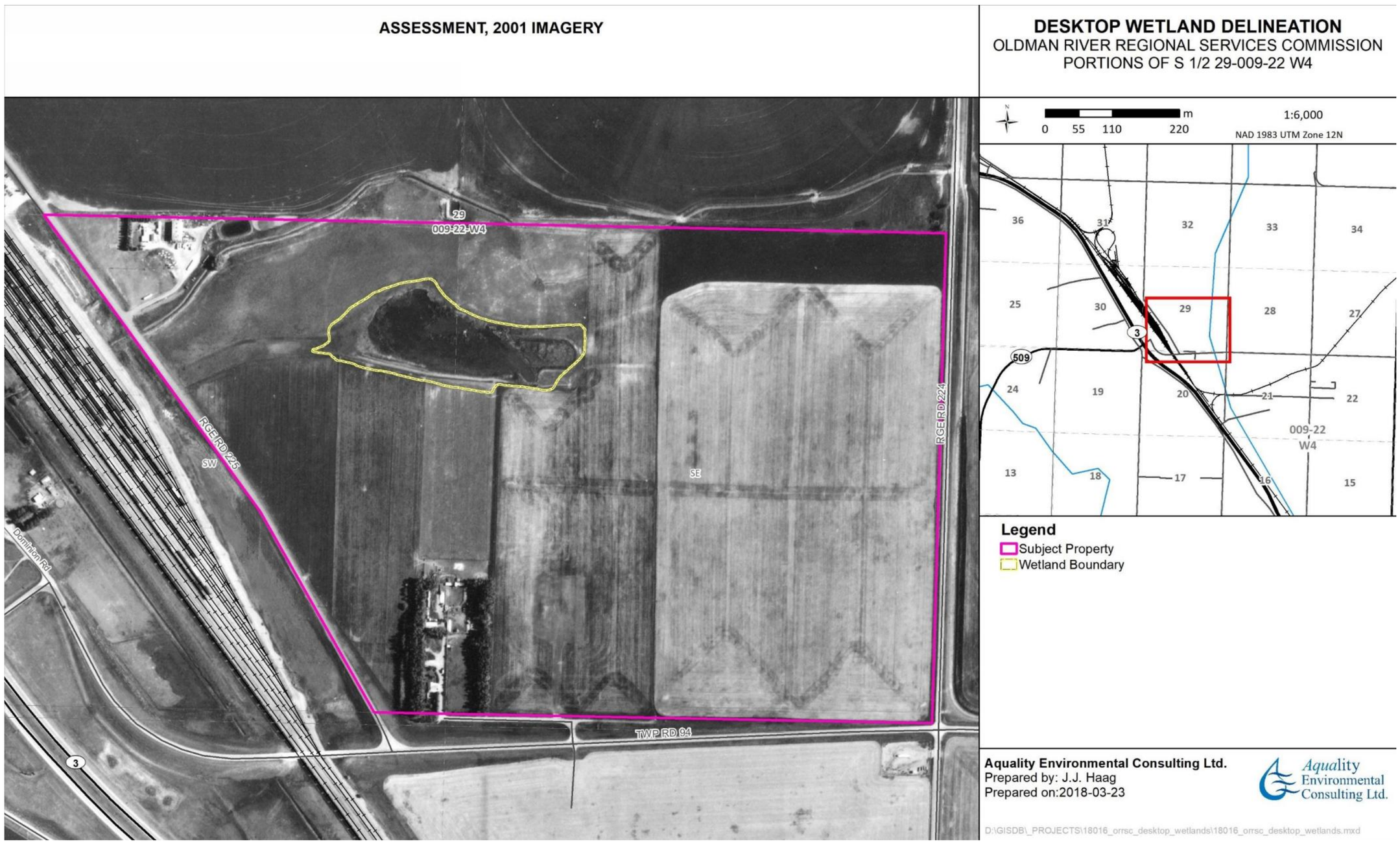


Figure 8. Historical imagery from 2001.


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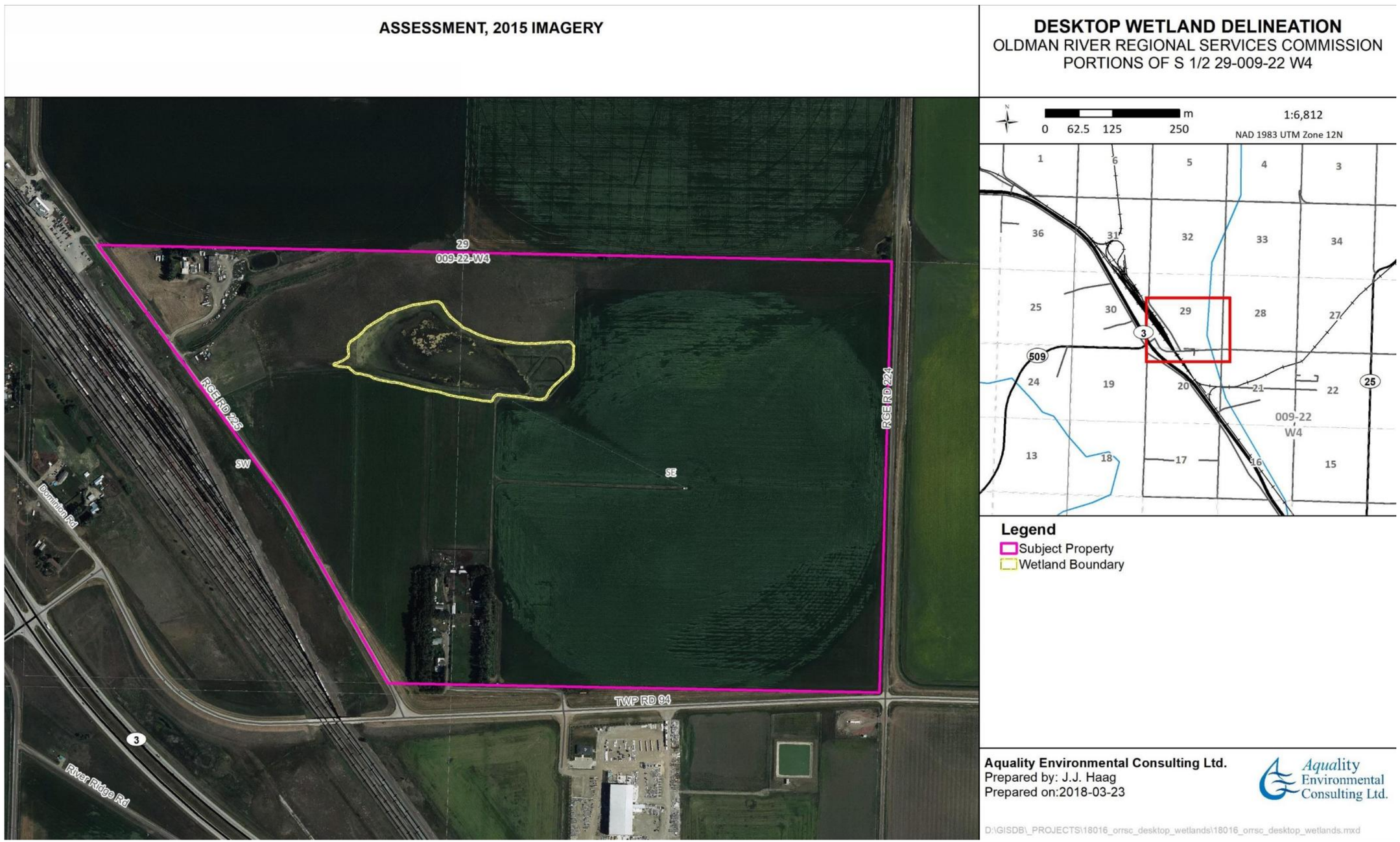


Figure 9. Historical imagery from 2015.


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# 7 Appendix B: Precipitation Data

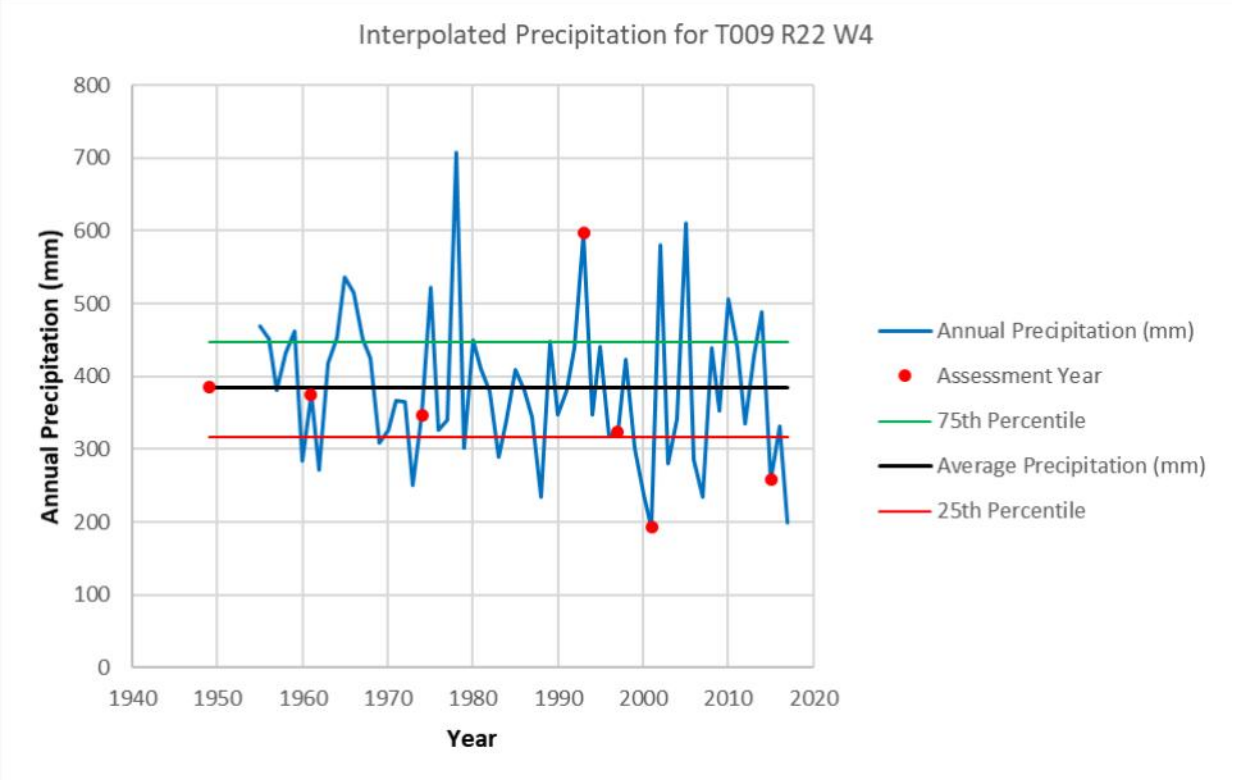


Figure 10. Precipitation data from 1955-2017 interpolated to Township 009 and Range 22 W4 from the Alberta Climate Information System (Alberta Agriculture and Forestry, 2017).


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# 8 Appendix C: Search Results


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## 8.1 AGRASID


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# Report on Soil Polygon: 5821

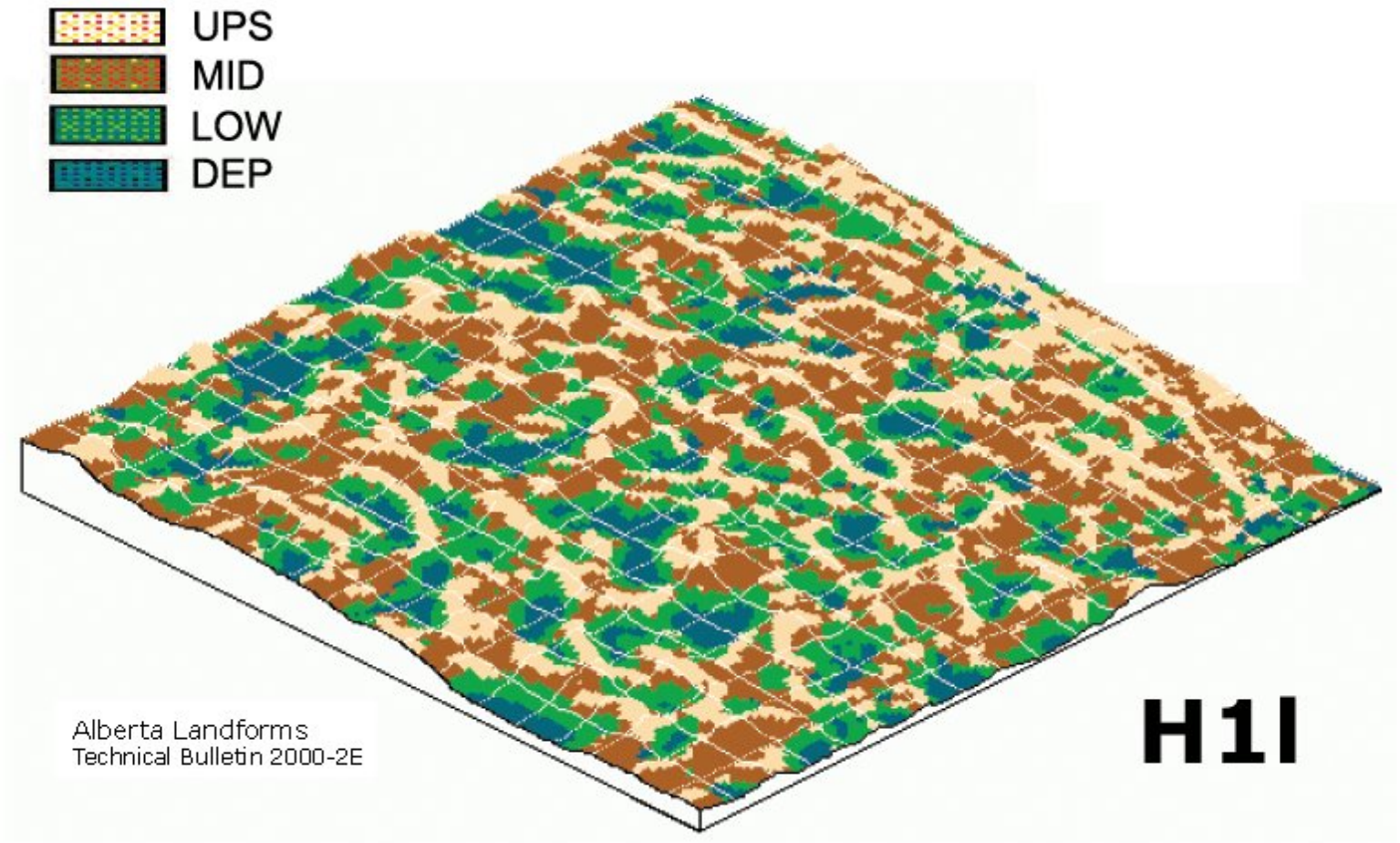
| Variable | Value |
|---|---|
| POLY_ID | 5821 |
| Map Unit Name | LEWN4/H1l |
| Landform | H1l - hummocky - low relief |
| LSRS Rating (Spring Grains) | 3MT(10) |

**Landscape Model Descriptions:**
Orthic Dark Brown Chernozem on medium textured (L, SiL) sediments deposited by wind and water (LET).
Orthic Dark Brown Chernozem on medium textured (L, SiCL, CL) materials over medium (L, CL) or fine (C) textured till (WNY).
The polygon includes soils with Rego profiles (4).
Hummocky, low relief landform with a limiting slope of 6% (H1l).

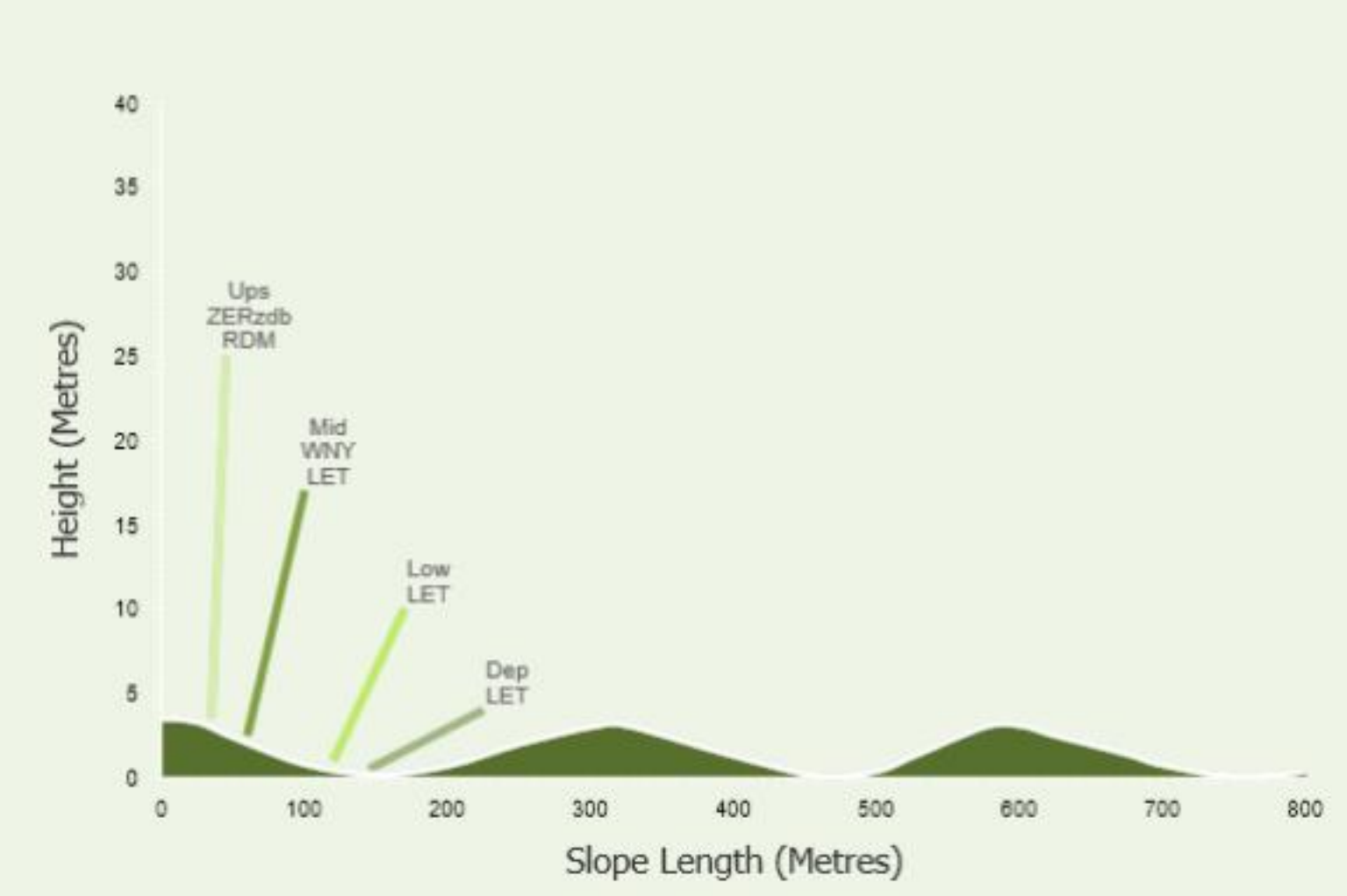
**Image:**



**Landform Model:**



**Landform Profile:**

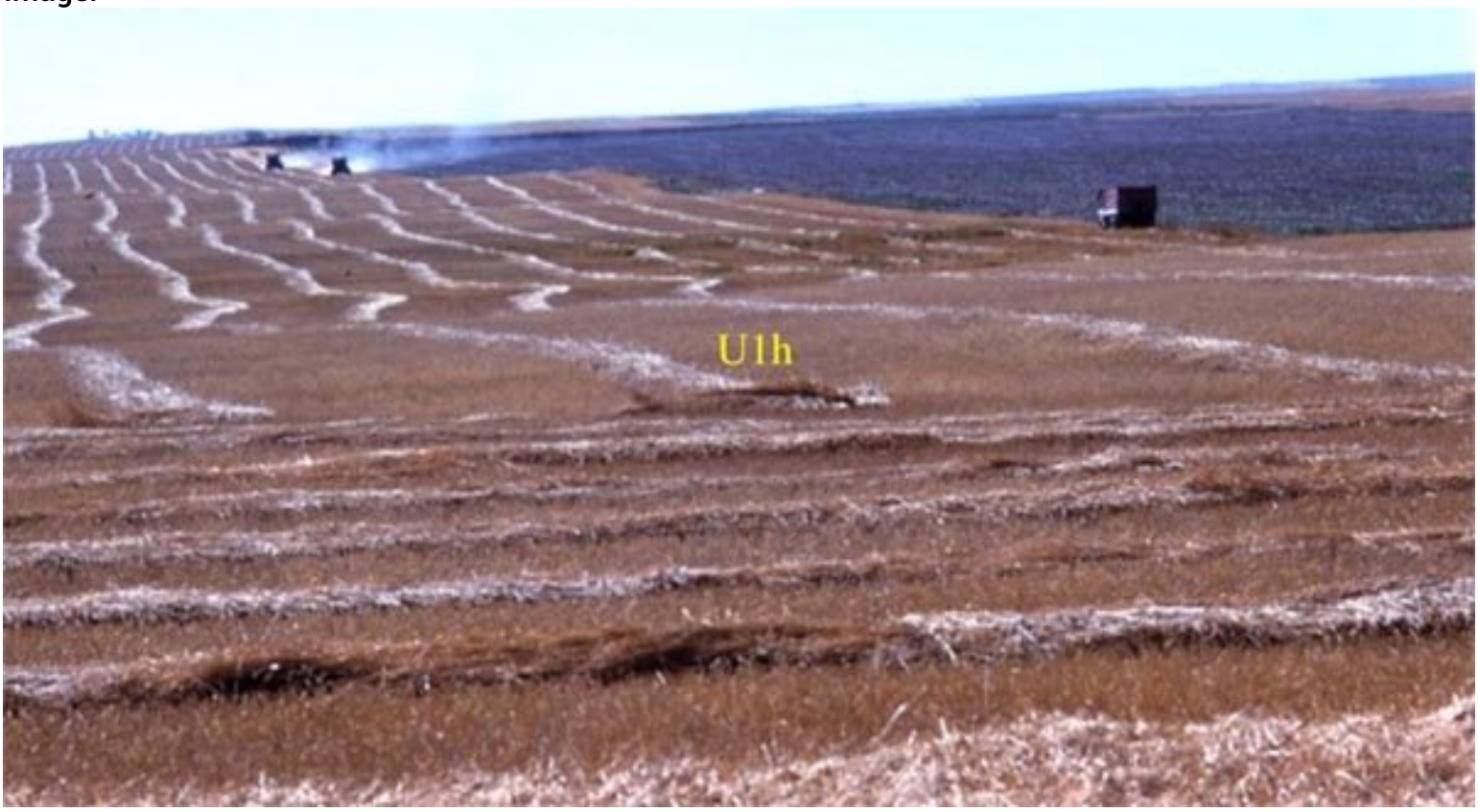


# Report on Soil Polygon: 5891

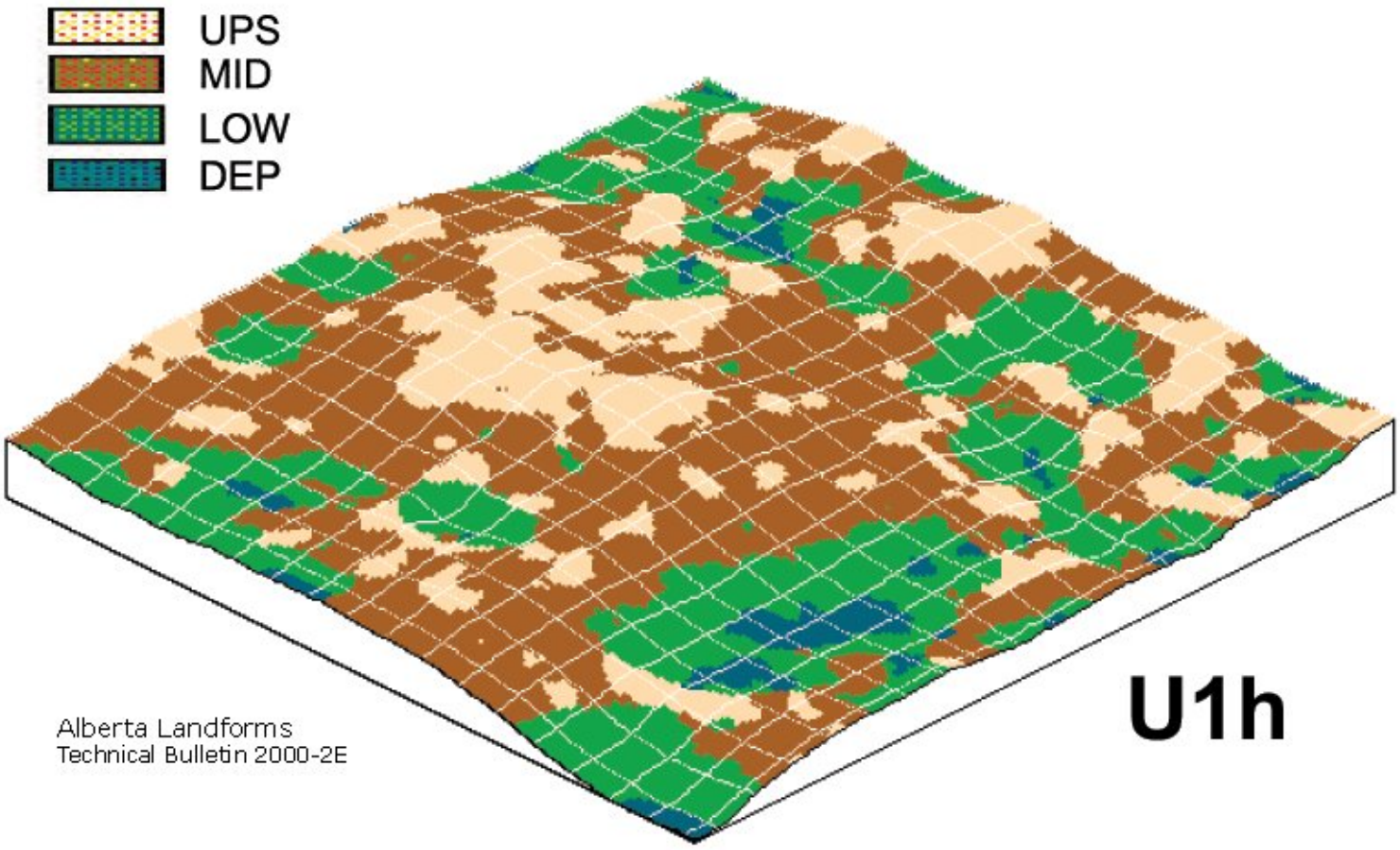
| Variable | Value |
|---|---|
| POLY_ID | 5891 |
| Map Unit Name | LET1/U1h |
| Landform | U1h - undulating - high relief |
| LSRS Rating (Spring Grains) | 3M(10) |

**Landscape Model Descriptions:**
Orthic Dark Brown Chernozem on medium textured (L, SiL) sediments deposited by wind and water (LET). The polygon may include soils that are not strongly contrasting from the dominant or co-dominant soils (1). Undulating, high relief landform with a limiting slope of 4% (U1h).

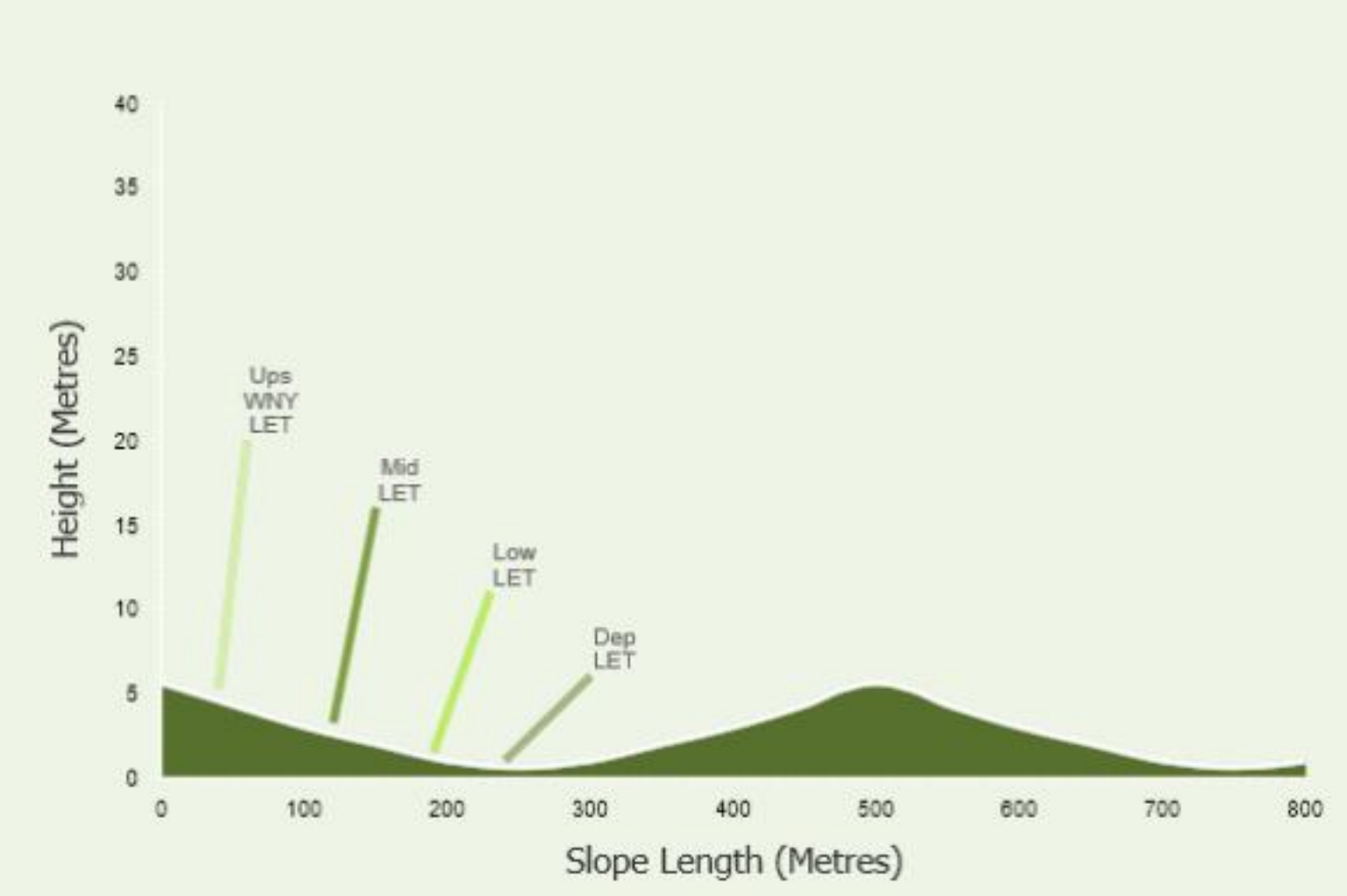
**Image:**



**Landform Model:**



**Landform Profile:**



## 8.2 FWMIS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# Fish and Wildlife Internet Mapping Tool (FWIMT)

(source database: Fish and Wildlife Management Information System (FWMIS))

## Species Summary Report

**Report Created:** 16-Mar-2018 14:10

### Species present within the current extent :

| Fish Inventory | Wildlife Inventory | Stocked Inventory |
|---|---|---|
| No Species Found in Search Extent | PRAIRIE FALCON | No Species Found in Search Extent |
| | WESTERN SMALL-FOOTED BAT | |

### Buffer Extent

| Centroid (X,Y): | Projection | Centroid: (Qtr Sec Twp Rng Mer) | Radius or Dimensions |
|---|---|---|---|
| 647734, 5511821 | 10-TM AEP Forest | SE 29 9 22 4 | 2 kilometers |

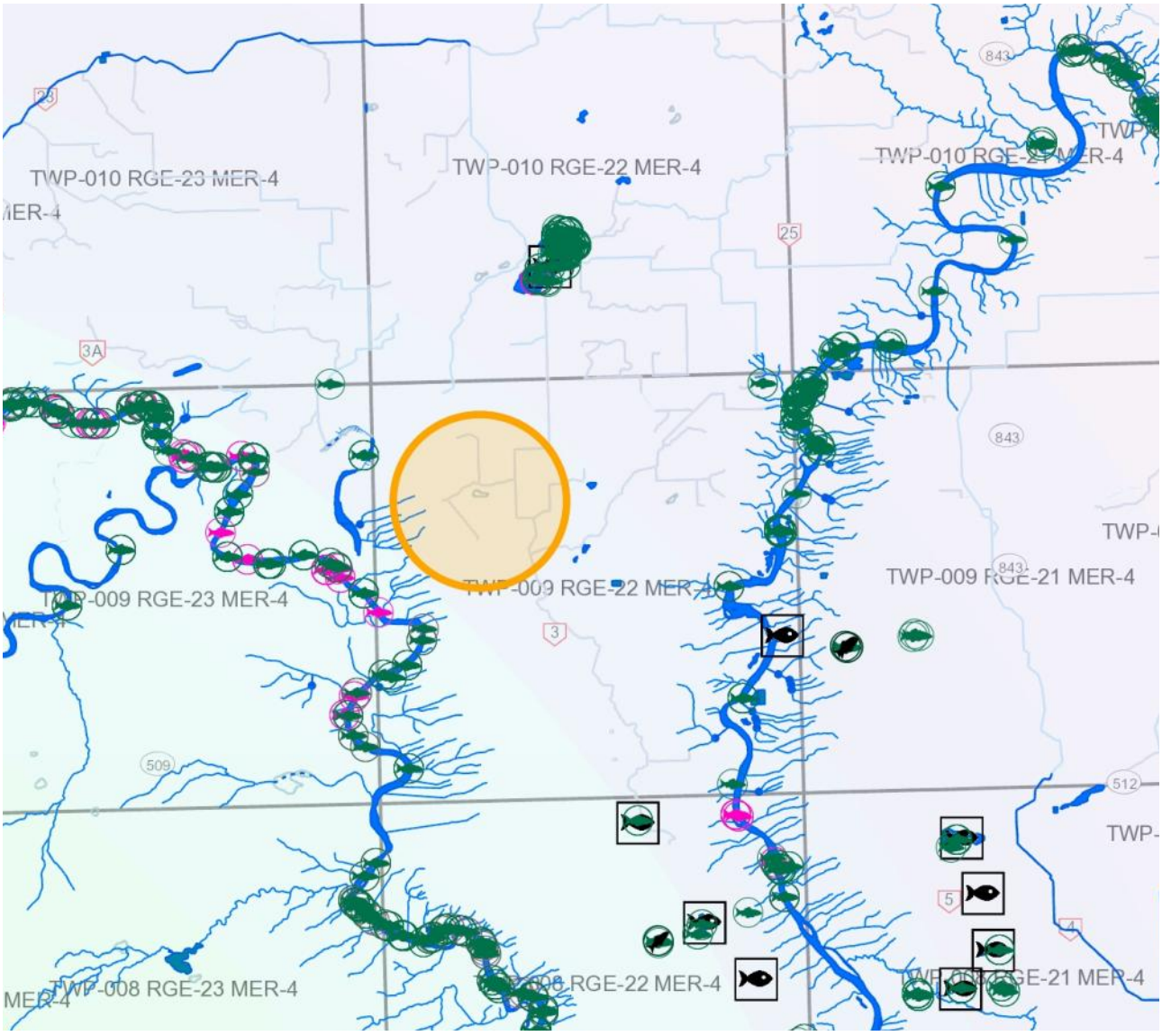
### Contact Information

For contact information, please visit:

http://aep.alberta.ca/about-us/contact-us/fisheries-wildlife-management-area-contacts.aspx

16-Mar-2018 14:10

**Map Results**




Display may contain: Base Map Data provided by the Government of Alberta under the Alberta Open Government Licence. Cadastral and Dispositions Data provided by Alberta Data Partnerships.©GeoEye, all rights reserved. Information as depicted is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.

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## 8.3 ACIMS


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# Search ACIMS Data

**Date**: 16/3/2018
**Requestor**: Consultant
**Reason for Request**: Environmental Assessment
**SEC:** 29 **TWP:** 009 **RGE:** 22 **MER:** 4

Alberta Parks

## Non-sensitive EOs: 0 (*Data Updated:October 2017* )

| M-RR-TTT-SS | EO_ID | ECODE | S_RANK | SNAME | SCOMNAME | LAST_OBS_D |
|---|---|---|---|---|---|---|

**No Non-sensitive EOs Found: Next Steps - See FAQ**

## Sensitive EOs: 1 (*Data Updated:October 2017*)

| M-RR-TTT | EO_ID | ECODE | S_RANK | SNAME | SCOMNAME | LAST_OBS_D |
|---|---|---|---|---|---|---|
| 4-22-009 | 11371 | PMAGA0B0F0 | S1 | Yucca glauca | soapweed | 2000-XX-XX |

**Next Steps: See FAQ**

## Protected Areas: 0 (*Data Updated:October 2017* )

| M-RR-TTT-SS | PROTECTED AREA NAME | TYPE | IUCN |
|---|---|---|---|

**No Protected Areas Found**

## Crown Reservations/Notations: 0 (*Data Updated:October 2017* )

| M-RR-TTT-SS | NAME | TYPE |
|---|---|---|

**No Crown Reservations/Notations Found**

## 8.4 LAT


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# Landscape Analysis Tool (LAT) Report



| | | | |
|---|---|---|---|
| **LAT Number:** | 000004FE08 | **LAT Date:** 2018-03-16 | 14:09:12 |
| **Project Name:** | 18-016 ORRSC | | |
| **Project Description:** | 18-016 ORRSC | | |
| **Disposition Type:** | DLO | License of Occupation | |
| **Purpose Type:** | GRTA | Habitat Management | |
| **Activity Type:** | GRTA01DLOP | Mineral Wetland Habitat | |

## Responsibility of Applicants:

It is the applicant's responsibility to conduct a full review of the generated LAT Report, ensuring that you are aware and have a full understanding of the identified standards and conditions, and any additional limitations that may also be imposed by an approved higher level plan, reservation or notation or any other law or Order of the Province or the Government of Canada that may impact the placement, construction or operation of the proposed disposition, purpose and activity.

The applicant must assess if the proposed disposition, purpose and activity can meet the applicable standards, conditions and any limitations which will subsequently determine if the application can be submitted to the regulatory body. Applicants should complete a thorough review of regulatory and application processes including supporting procedural documents and the generated LAT Reports prior to making this determination.

Where the applicant chooses not to meet, or is not able to meet, one or more Approval Standards or higher level plans within the generated LAT Report as submitted as part of the application, or any affected reservations as identified within the land status report, the applicant is required to complete the appropriate mitigation as part of their supplement submission that addresses individually each of the items not being met.

The information provided within the LAT Tool is a spatial representation of features provided to the applicant for activity and land use planning. The accuracy of these layers varies depending on the resource value being represented. The regulatory body insists that site visits, wildlife surveys and groundtruthing efforts are completed to ensure that you, the applicant can meet the procedures detailed within the *Pre-Application Requirements for Formal Dispositions*, the identified approval standards, operating conditions and *Best Management Practices* as represented within the *Master Schedule of Standards and Conditions*.

## Proximity to Watercourse/Waterbodies:

Applicants will ensure that standards or conditions for Watercourse/Waterbody features as identified within the generated LAT Report are followed. It is the responsibility of the applicant to ensure the identified setbacks and buffers are properly established through a pre-site assessment and maintained.

**NOTE:** Be aware that the submission of a LAT Report as part of an application submission does not infer approval of the activity. The standards and conditions identified within the LAT Report may be subject to change based on regulatory review.

## Base Features

| | | | |
|---|---|---|---|
| Green/White Area: | White Area | FMA: | |
| Municipality: | Lethbridge County | | |
| Higher Level Plans: | | FMU: | |
| | | Provincial Grazing Reserve: | |
| | | Rocky Mountain Forest Reserve: | |
| | | PLUZ Areas: | |

### Provincial Sanctuaries

| | | | |
|---|---|---|---|
| Wildlife Corridors: | | Game Bird: | Zone 6 |
| Restricted Area: | | Seasonal: | |

## Additional Application Requirements

| | | | |
|---|---|---|---|
| Wildlife Survey | Yes | DND Area | |

## Sensitive Features

### Wildlife and Other Sensitive Species

| | Intersected | | Intersected |
|---|---|---|---|
| Burrowing Owl Range | | Piping Plover Waterbodies | |
| Caribou Range | | Sensitive Amphibians Ranges | Yes |
| Colonial Nesting Birds | | Sensitive Raptor Range | Yes |
| Eastern Short-horned Lizard Range | | Sensitive Snake Species Range | |
| Endangered and Threatened Plants Ranges | | Sharp-tailed Grouse Leks and Buffer | |
| Greater Sage Grouse Range | | Sharp-tailed Grouse Survey | Yes |
| Greater Sage Grouse Leks and Buffer | | Special Access Zone | |
| Grizzly Bear Zone | | Swift Fox Range | |
| Key Wildlife and Biodiversity Areas | | Trumpeter Swan Buffer | |
| Mountain Goat and Sheep Areas | | Trumpeter Swan Waterbodies/Watercourse | |
| Ord's Kangaroo Rat Range | | | |
| Other Sensitive and Endangered Species | Yes | | |

### Federal Orders:

| | Intersected |
|---|---|
| Greater Sage Grouse | |

### Grassland and Parkland Natural Region:

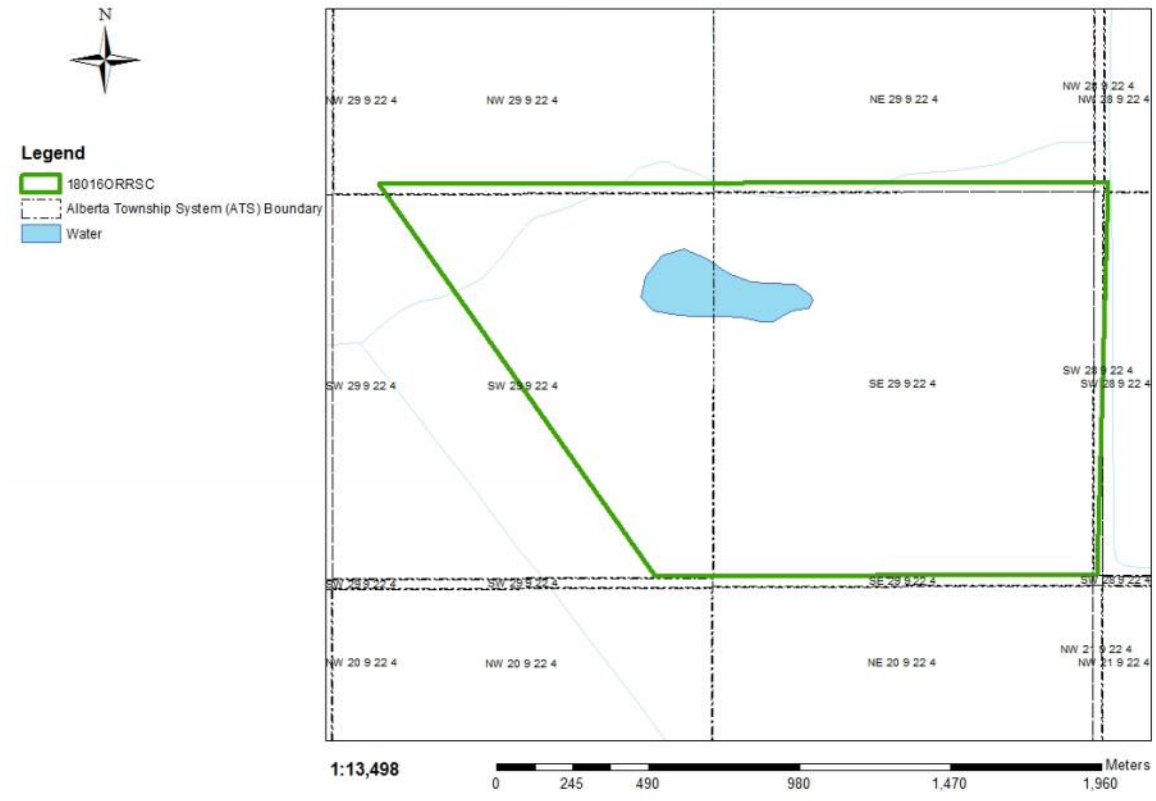
| | Intersected |
|---|---|
| Grassland and Parkland Natural Region | Yes |

## Alberta Township System (ATS) Land List

| Quarter | Section | Township | Range | Meridian | Road Allow. | Sensitive Features Identified |
|---|---|---|---|---|---|---|
| SE | 29 | 9 | 22 | 4 | | Grassland and Parkland Natural Region,Sensitive Amphibians Ranges,Sensitive Raptor Range,Sharp-tailed Grouse Survey,Other Sensitive and Endangered Species |
| NW | 28 | 9 | 22 | 4 | RW | Grassland and Parkland Natural Region,Sensitive Amphibians Ranges,Sensitive Raptor Range,Sharp-tailed Grouse Survey,Other Sensitive and Endangered Species |
| SW | 29 | 9 | 22 | 4 | | Grassland and Parkland Natural Region,Sensitive Amphibians Ranges,Sensitive Raptor Range,Sharp-tailed Grouse Survey,Other Sensitive and Endangered Species |
| SW | 28 | 9 | 22 | 4 | | Grassland and Parkland Natural Region,Sensitive Amphibians Ranges,Sensitive Raptor Range,Sharp-tailed Grouse Survey,Other Sensitive and Endangered Species |
| NW | 29 | 9 | 22 | 4 | | Grassland and Parkland Natural Region,Sensitive Amphibians Ranges,Sensitive Raptor Range,Sharp-tailed Grouse Survey,Other Sensitive and Endangered Species |
| NW | 28 | 9 | 22 | 4 | | Grassland and Parkland Natural Region,Sensitive Amphibians Ranges,Sensitive Raptor Range,Sharp-tailed Grouse Survey,Other Sensitive and Endangered Species |
| SW | 28 | 9 | 22 | 4 | RW | Grassland and Parkland Natural Region,Sensitive Amphibians Ranges,Sensitive Raptor Range,Sharp-tailed Grouse Survey,Other Sensitive and Endangered Species |
| NE | 29 | 9 | 22 | 4 | | Grassland and Parkland Natural Region,Sensitive Amphibians Ranges,Sensitive Raptor Range,Sharp-tailed Grouse Survey,Other Sensitive and Endangered Species |

# Landscape Analysis Tool (LAT) Report





## Land Management

| Report ID | Approval | Condition |
|---|---|---|
| 1 | 1011-AS | Incidental Activities as referenced on the associated supplement that fall within the sizing parameters, as defined within the PLAR Approvals and Authorizations Administrative Procedure's as amended, identified at the time of application are subject to the conditions of the associated disposition and shall be available for use for a term of four years from date of disposition approval. |
| 2 | 1013-AS | Where an Integrated Resource Plan or a Reservation/Protective Notation identifies a greater set back, the greater set back shall prevail. |
| 3 | 1014-AS | Additional applications for access will not be permitted if access under disposition already exists. |
| 4 | 1015-AS | Where a Higher Level Plan exists, the direction provided within that plan shall be followed. |
| 5 | 1017-AS | For activities that fall within any Protective Notation (PNT) lands with a purpose code 400 Series encompassing a section of land (259 hectares) or less, located in the Provincial White Area (i.e., Provincial settled lands), all construction activities shall be built and occur within lands developed as range improvement. Where no range improvement exists, activities shall occur within 100 metres of the perimeter (i.e., outside boundary), with the following exceptions:<br>• pipeline construction activities |
| 6 | 1023 | The disposition holder shall repair or replace any identified improvements (e.g., fences, water control structures, and signage) that were damaged as a result of industry activities on the land to pre-existing condition within 30 days of entry or immediately if occupied by livestock. |
| 7 | 1024 | The disposition holder shall maintain all activities for proper drainage of surface water. |
| 8 | 1026 | For activities that occur on Canadian Forces Bases, the disposition holder shall coordinate all activities through Energy Industry Control at (780) 842-5850 for activity on Canadian Forces Base/Area Support Unit, Wainwright, and (780) 573-7206 for activity on Canadian Forces Base/Area Support Unit, Cold Lake. |
| 9 | 1028 | The disposition holder shall comply with all requirements and direction as defined within the Pre-Application Requirements for Formal Dispositions as amended. |
| 10 | 1030 | The disposition holder shall not cause surface disturbance in coulees or through river benchland areas-excluding access, pipelines and linear easements crossing the watercourse feature.. |
| 11 | 1032 | In addition to complying with Federal, provincial and local laws and regulations respecting the environment, including release of substances, the disposition holder shall, to the regulatory body's satisfaction, take necessary precautions to prevent contamination of land, water bodies and the air with particulate and gaseous matter, which, in the opinion of the regulatory body in its sole discretion, is or may be harmful. |

| | | |
|---|---|---|
| 12 | 1033 | The disposition holder shall remove all garbage and waste material from this site to the satisfaction of the regulatory body, in its sole discretion. |
| 13 | 1037 | Entry is not allowed within the boundaries of any research or sample plot. |
| 14 | 1038 | When planned activities cross designated or recreation trail(s) or when operations encroach on those trail(s), the disposition holder shall ensure that:<br>• Lines crossing trail(s) are constructed in a manner that will not remove snow from the trail(s), produce ruts in the trail(s), or otherwise adversely affect travel.<br>• No mechanical equipment is permitted to travel along the trail(s), unless approved in writing by an officer of the regulatory body.<br>• Warning signs are posted along trail(s) during construction and reclamation activities advising trail users of the upcoming crossing location.<br>• Any recording devices or equipment laid along the trail(s) are placed off of the travel portion so that the geophones do not interfere with travel. |
| 15 | 1046 | Where a Wildfire Prevention Plan and/or FireSmart Plan is required for review and approval by the Wildfire Management Branch, the disposition holder shall ensure any proposed clearing on public land has been agreed to by the regulatory body. |

## Vegetation

| Report ID | Approval | Condition |
|---|---|---|
| 16 | 1101 | Manage all weeds as per the Weed Control Act. |
| 17 | 1105 | Chemical application for the purpose of vegetation control, shall occur in accordance with the Pesticide Regulation and Environmental Code of Practice for Pesticides. |
| 18 | 1106 | The disposition holder shall salvage all merchantable timber and haul to the location of end use unless a request for waiver is approved under the Forests Act. |
| 19 | 1107 | The disposition holder shall salvage timber according to the utilization standards for the overlapping timber disposition(s) (i.e., FMA, CTL, DTL) or, where no overlapping timber disposition exists, as per the approved forest management plan. |
| 20 | 1108 | The disposition holder must slash, limb and buck flat to the ground all woody debris and leaning trees created by the activity. The length of slashed woody debris shall not exceed 2.4 metres. |
| 21 | 1109 | On forested lands, the disposition holder shall dispose of excess coarse woody debris remaining after rollback or stockpiling for interim/final reclamation. |
| 22 | 1110 | The disposition holder shall dispose of coarse woody debris within FireSmart Community Zones by burning unless a Debris Management Plan has been approved under the Forest and Prairie Protection Act. |
| 23 | 1112 | The disposition holder shall not allow timber storage piles or windrows to encroach into standing timber. |

## Soil

| Report ID | Approval | Condition |
|---|---|---|
| 24 | 1130-AS | Permafrost degradation is not permitted. Onsite permafrost depth must be maintained to the same depth as offsite control. |
| 25 | 1131-AS | In permafrost areas, surface stripping shall not occur. |
| 26 | 1133 | The Disposition holder shall suspend all activities during adverse ground conditions. |
| 27 | 1134 | The disposition holder shall prevent and control erosion (surface and subsurface) and sedimentation on all disturbed lands. |
| 28 | 1135 | The disposition holder must install and maintain erosion control measures (e.g., silt fences, matting, gravel, and check dams). |
| 29 | 1136 | The disposition holder shall not remove soil from the disposition unless authorized. This includes all soil horizons and all soil types (e.g. leaf litter, organic soils such as muskeg, and clay fill material are all included). |
| 30 | 1137 | The Disposition holder must not bury topsoil. |
| 31 | 1138 | Where soil disturbance occurs from site construction or linear trenching of a minimum of 12 inches or greater, the disposition holder must salvage all topsoil if present (topsoil includes the leaf litter layer (LFH) and the A horizon) as follows;<br>• Where two-lift stripping occurs, topsoil and part or all of the upper subsoil (B horizon) must be stripped and stored separately.<br>• Where topsoil is less than 15 centimetres, conservation shall include the topsoil plus part of the upper subsoil (B horizon) up to a total depth of 15 centimetres (unless the B horizon is considered chemically unsuitable as outlined in the May 2001 Salt Contamination Assessment Guidelines, as amended). |
| 32 | 1139 | The disposition holder shall store reclamation materials separately (topsoil, subsoil,) on the disposition, such that it can be distributed evenly over the disturbed area for progressive (interim) and/or final reclamation. LFH and coarse woody debris are suitable for storage with topsoil. Reclamation materials must not be buried. |
| 33 | 1140 | Wood chips shall not be mixed with forest floor and/or surface soil. It cannot be spread to a depth greater than 5 cm as defined in the directive ID 2009-01 Management of Wood Chips on Public Land. |
| 34 | 1141 | Storage piles/windrows of reclamation material shall not encroach into standing timber. |
| 35 | 1142 | Soil sterilants are prohibited. |
| 36 | 1144 | In permafrost areas, the disposition holder shall utilize snow (natural or man-made) to establish a level surface. |

## Watercourse / Waterbody

| Report ID | Approval | Condition |
|---|---|---|
| 37 | 1171-AS | The disposition holder shall not interrupt natural drainage (including ephemeral and fens), block water flow or alter the water table. |
| 38 | 1179 | The disposition holder shall not deposit or place debris, soil or other deleterious materials into or through any watercourse and/or waterbody, or on the ice of any watercourse and/or waterbody. |
| 39 | 1184 | Access (off-disposition) for water withdrawal requires an Approval or Authorization from the regulatory body. |
| 40 | 1186 | Where surface disturbance will occur and a risk of surface erosion exists, the disposition holder shall install and maintain sediment control structures to dissipate the flow of water and capture sediment prior to it entering a watercourse or waterbody. |
| 41 | 1194 | The disposition holder shall not remove or use water from dugouts, surface ponds, springs, or water wells within the grazing disposition unless an approval is issued from the Environment and Parks (GoA) agrologist. |
| 42 | 1196 | All licences, authorizations and approvals issued under the Alberta Environmental Protection and Enhancement Act, Water Act or Public Lands Act should not be taken to mean the proponent (applicant) has complied with federal legislation. Proponents should contact Habitat Management, Fisheries and Oceans in relation to the application of federal laws relating to the Fisheries Act (Canada).<br>Fisheries Protection Program, Fisheries and Oceans Canada<br>867 Lakeshore Road, Burlington, Ontario, L7R 4A6<br>Telephone: 1-855-852-8320<br>Email: Fisheriesprotection@dfo-mpo.gc.ca<br>Web address: www.dfo-mpo.gc.ca<br>Proponents should also contact the Navigation Protection Program, Canadian Coast Guard, 4253-97 Street, Edmonton, Alberta, T6E 5Y7, phone: (780) 495-4220, relating to the Navigation Protection Act. |

## Reclamation

| Report ID | Approval | Condition |
|---|---|---|
| 43 | 1202 | The disposition holder shall utilize natural recovery, on all native landscapes (forested, wetlands, riparian, and peatlands) for all areas of the site, not required for operations or padded with clay. Natural recovery is to be implemented within 1 growing season of completions (post-drill) or for sites that are not drilled within 1 growing season of construction.<br>Assisted natural recovery is allowed on high erosion sites, sites prone to weeds, agronomic invasion, or padded sites (forested and peatland).<br>a) During assisted natural recovery when reseeding with herbaceous seed native to the Natural Subregion or agronomic annuals and seed mixes as approved by the regulatory body, shall be free of the species listed in the Weed Control Act. A seed certificate (under the rules and regulation of the Canada Seeds Act) for each species shall be provided to the regulatory body upon request.<br>b) Assisted natural recovery can be used for planting woody species for the purpose of accelerated reclamation. The woody species must be native to the Natural Subregion and follow the Alberta Forest Genetic Resource Management and Conservation Standards as amended. |
| 44 | 1203 | The disposition holder shall when seeding pasture or cultivated lands, use agronomic or forage seed that meets or exceeds Certified #1 as outlined in the Canada Seeds Act and Seeds Regulations. Seed mixes are to be free of species listed in the Weed Control Act. A seed certificate (under the rules and regulation of the Canada Seeds Act) for each species shall be provided to the regulatory body upon request. |
| 45 | 1204 | Revegetation with trees or shrubs within the Green Area shall be consistent with the Alberta Forest Genetic Resource Management and Conservation Standards document. |
| 46 | 1210 | Upon cancellation and abandonment, the disposition holder shall contour the disturbed land to an acceptable land form using chemically suitable overburden and/or subsoil. The disposition holder shall replace topsoil and restore the natural drainage by removing any culverts and fills. |
| 47 | 1211 | Upon abandonment or as directed by the regulatory body, the disposition holder shall reclaim the disposition to the pre-disturbance land use (forested, grassland, cultivated, mineral wetland and peatlands) unless a change in land use is approved in writing by the regulatory body. |

## Wildlife

| Report ID | Approval | Condition |
|---|---|---|
| 48 | 1280 | The disposition holder is required to conduct a wildlife sweep of the immediate area (site plus 100 metres) prior to entry and construction to identify wildlife features. All observations must be reported to the regional AEP Wildlife Biologist, the issuing regulatory body, and entered into the Fisheries and Wildlife Management Information System (FWMIS). |

| | | |
|---|---|---|
| 49 | 1281-AS | Where the presence of an important wildlife feature including; mineral licks, raptor nests, active den sites, and hibernacula, is known or identified through a Wildlife Sweep, the disposition holder shall leave a buffer zone of a minimum width of 100m undisturbed vegetation, where an established buffer does not already exist (e.g. Species at Risk).<br>If species are identified during the wildlife sweep, the disposition holder must produce the Wildlife Sweep to the regulatory body for review before continuing with the approved activity. Results from Wildlife Sweeps must be provided to the regulatory body upon request. |
| 50 | 1286 | All licences, authorizations and approvals issued under the Alberta Environmental Protection and Enhancement Act, Water Act or Public Lands Act should not be taken to mean the proponent (applicant) has complied with federal legislation. Proponents should contact Environment Canada, Canadian Wildlife Service in relation to the application of federal laws relating to the Migratory Birds Convention Act (protection of eggs and nests) and the Species at Risk Act.<br><br>Environmental Stewardship Branch \| Prairie & Northern Region<br>Environment Canada<br>Eastgate Offices, 9250 – 49th Street<br>Edmonton, Alberta T6B 1K5<br>Telephone: 1-780-951-8600<br>Email: Enviroinfo@ec.gc.ca<br>Web address: http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=AB36A082-1<br>Web address: http://www.sararegistry.gc.ca/ |

## Sensitive Raptor Range

| Report ID | Approval | Condition |
|---|---|---|
| 51 | 1310-AS | The disposition holder shall conduct appropriate pre-construction wildlife surveys for all activities occurring within the identified Species At Risk ranges of the Landscape Analysis Tool, as per the direction of the Pre-Application Requirements for Formal Dispositions as amended.<br>Any and all observed Species At Risk features (such as leks, nests, dens, etc.,) shall be buffered by the setbacks and timing restrictions specified on the LAT Report for that species at risk. |
| 52 | 1312-AS | The disposition holder shall not conduct any activities within 1000 metres from an active sensitive raptor species nest with the following exception:<br>• When construction and operational work/maintenance occurs between July 16th and March 14th, the activity may occur up to 100 metres from an active sensitive raptor species nest. |

## Sharp-Tailed Grouse Survey / Leks and Buffers

| Report ID | Approval | Condition |
|---|---|---|
| 53 | 1350-AS | The disposition holder shall conduct appropriate pre-construction wildlife surveys for all activities occurring within the identified Species At Risk ranges of the Landscape Analysis Tool, as per the direction of the Pre-Application Requirements for Formal Dispositions as amended with the following exception;<br>a) Activities that occur between October 31st and March 15th can occur without a sharp-tailed grouse survey.<br>Any and all observed Species At Risk features (such as leks, nests, dens, etc.,) shall be buffered by the setbacks and timing restrictions specified on the LAT Report for that species at risk. |
| 54 | 1352-AS | The disposition holder shall not conduct any activities within 100 meters of the perimeter of any known or identified active sharp-tailed grouse lek sites. |
| 55 | 1354-AS | The disposition holder shall use noise reduction equipment to muffle or otherwise control noise so that operational noise will not exceed 49 decibels measured at 10 metres from the source within 500 metres of a lek. |
| 56 | 1356-AS | The disposition holder shall not conduct any activities shall not occur within 500 metres from the perimeter of an active sharp-tailed grouse lek with the following exception:<br>a) When construction and operational work/maintenance occurs between the period of June 16th and March 14th, the disposition holder may conduct activities up to but not within 100 metres of an active sharp-tailed grouse lek. |
| 57 | 1357-AS | During the lekking season (March 15th to June 15th), the disposition holder shall restrict any activity within 500 metres of a sharp-tailed grouse lek to the portions of the day after 10:00 a.m. and before 4:00 p.m. |

## Sensitive Amphibians Ranges

| Report ID | Approval | Condition |
|---|---|---|
| 58 | 1400-AS | The disposition holder shall not conduct any activities in areas identified as sensitive amphibian ranges within 100 metres of non-permanent seasonal wetlands as defined within the Pre-Application Requirements for Formal Dispositions as amended. |

## Other Sensitive and Endangered Species

| Report ID | Approval | Condition |
|---|---|---|
| 59 | 1420-AS | The disposition holder shall not construct activities on native grassland within the Grassland and Parkland Natural Region between April 15th and August 15th , unless grassland bird surveys are completed as per the Sensitive Species Inventory Protocol as amended. |

| | | |
|---|---|---|
| 60 | 1421-AS | The disposition holder shall not conduct any activities within 100 meters of an active nest site between April 15th and August 15th for the following species:<br>• short-eared owl<br>• mountain plover<br>• long-billed curlew<br>• upland sandpiper<br>• Sprague's pipit<br>• Chestnut-collared longspur<br>• Loggerhead Shrike<br>• Bank Swallow |

## Grassland and Parkland Natural Region

| Report ID | Approval | Condition |
|---|---|---|
| 61 | 1500-AS | The disposition holder shall locate activities outside of Fescue Grasslands by using existing disturbances or locate adjacent to existing occupied dispositions (e.g., transportation corridors, cultivated lands, existing access trails, previously disturbed and/or non-native cover areas). |
| 62 | 1501-AS | The disposition holder shall not conduct activities on Fescue Grasslands in the Montane and Foothills Fescue Natural subregions from Dec16th to July 31st |
| 63 | 1503 | The disposition holder shall only straw crimp on native grasslands where native species from the same ecological range site are used, tested and in compliance with the Weed Control Act. A seed certificate (under the rules and regulation of the Canada Seeds Act) shall be provided to the regulatory body prior to approval and application. |
| 64 | 1504 | The disposition holder shall use mechanical equipment that will not cause adverse impacts to the land in coulees or through river benchland areas. |

| | | |
|---|---|---|
| 65 | 1505 | The disposition holder shall in all native grasslands, re-vegetate using natural recovery techniques on all minimal disturbance activities except as follows:<br>a) In the Dry Mixed Grass Natural subregion on high erosion and/or sites with soil disturbance greater than 50m2: Assisted Natural Recovery is allowed. The application rate is a 50:50 ratio of no greater than 1/2 bushel (25-30 lbs/ac) of Fall rye and flax only. A seed certificate (under the rules and regulation of the Canada Seeds Act) for each species shall be provided to the regulatory body prior to approval and application.<br>b) In the Dry Mixed Grass subregion on sites prone to invasion from agronomic or weed species: Seed mixes are to be designed based on adjacent native plant communities within the immediate vicinity and must correspond with the onsite ecological range site (refer to the Range Plant Community Guide and Recovery Strategies for Industrial Development in the Dry Mixed Grass manuals).<br>c) Native Grasslands found outside of the Dry Mixed Grass subregion (eg. Foothills fescue, Montane, Central Parkland subregions) where sites are located in high erosion areas, prone to invasion from agronomic or weed: Seed mixes are to be designed based on adjacent native plant communities within the immediate vicinity and must correspond with the onsite ecological range site (refer to the Range Plant Community Guide and Recovery Strategies for Industrial Development for the appropriate subregion). Rationale for seeding and seed mix must be submitted to the regulatory body for approval. Seed mixes are to be free of species listed in the Weed Control Act. Seed mixes are to be free of all agronomic species (excepting those identified for assisted recovery techniques). A seed certificate (under the rules and regulation of the Canada Seeds Act) for each species shall be provided to the issuing regulatory body prior to seed mix approval. |
| 66 | 1509 | The disposition holder shall not construct activities on native grassland within the Grassland and Parkland Natural Region between April 15th and August 15th, unless grassland bird surveys are completed as per the Sensitive Species Inventory Guidelines Protocol as amended. |
| 67 | 1510 | The disposition holder shall not conduct any activities within 100 meters of an active nest site between April 15th and August 15th for the following species:<br>• short-eared owl<br>• mountain plover<br>• long-billed curlew<br>• upland sandpiper<br>• Sprague’s pipit<br>• Chestnut-collared longspur<br>• Loggerhead Shrike<br>• Bank Swallow |
| 68 | 1511 | The disposition holder shall locate activities outside of loamy soils in native grasslands within the Central Parkland and Northern Fescue layer by using existing disturbances or locate adjacent to existing occupied dispositions (e.g., transportation corridors, cultivated lands, existing access trails, previously disturbed and/or non-native cover areas). |

| | | |
|---|---|---|
| 69 | 1512 | The disposition holder shall within the Central Parkland and Northern Fescue layer conduct an assessment of pre-disturbance vegetation composition and soils, and documentation must be provided to the regulatory body upon request. |

# APPENDIX A

# APPENDIX A of ASP

## DEVELOPMENT DESIGN GUIDELINES

The following may be applied, in accordance with the policies of the ASP, to any future development proposal or area identified for commercial/industrial type land use.

## POLICIES

**Administrative**

1. The development design guidelines contained within this section shall apply to commercial and industrial development in the Area Structure Plan areas of Lethbridge County and Town of Coalhurst as shown on Map 1 below (excerpt of Map 12 of the IDP) and specifically for those parcels on the north and east sides of Kipp Road and Range Road 224, all development within 200 metres (656 ft.) of the road right-of-way (Joint Enhanced Development Areas or JEDA).

2. When considering applications for redesignation, subdivision or development permit approval of commercial or industrial uses in the JEDA, all applications must meet or exceed the minimum development design guidelines as outlined in this ASP.

3. Architectural controls shall be established and provided at the redesignation stage consistent with the approved Area Structure Plan. The approved architectural controls shall be implemented at the development permit stage.

4. Implementation of the approved architectural controls will be carried out by the developer (registered as an instrument on title in the form of a restrictive covenant) at the subdivision stage.

5. All applications for a development permit shall not be deemed to be complete applications and will not be accepted by the County or Town without prior written confirmation of compliance with the approved architectural controls. At the time of the submission of a development permit application to the County or Town, the applicant shall provide written documentation from an architectural professional confirming that the proposed development project complies with the approved architectural controls.

**Building /Site Design**

6. The design, character and appearance of all buildings in the JEDA shall be acceptable to the County and Town and shall demonstrate sensitivity to the highly visible nature of development occurring along transportation corridors considered to have a significant visual impact, notably in the area shown on Map 12 of the IDP.

**7.** Highway 3 shall be considered as the western gateway or entranceway to the Town of Coalhurst, and Range Road 224 south of Kipp Road the northern gateway, and therefore the area around both require special design consideration with respect to acceptable and high-quality building design and site design (inclusive of but not limited to landscaping, signage, outside storage and screening).

**8.** Principal buildings associated with commercial and industrial development located within the JEDA shall provide a building design and site design consistent with the following:

a. All building elevations considered to be highly visible shall provide for an attractive appearance through the provision of a desirable and superior quality design aesthetic.

b. The front elevation (elevation facing a highway or road) of any principal building shall ensure it effectively addresses the highly visible and sensitive nature of the interface within the JEDA. In the case of an approved lot layout that proposes two highly visible frontages (e.g. a corner lot or a lot that may contain double frontage onto a highway and an internal subdivision road), the lot shall be deemed to have two front yards and will be required to implement the appropriate setbacks and higher levels of architectural and landscaping treatment accordingly.

c. The front elevation of the principal building shall be considered the elevation that faces the Highway, Kipp Road and Range Road 224 as identified in the IDP Map 11. This front elevation shall be visible and shall not be screened from view with outside display, landscaping or fencing and the principal building shall remain prominent and proud with respect to its placement, design and view from Highway 3 and Range Road 22-4 south of Kipp Road.

d. In an effort to minimize large monolithic building facades or elevations, exterior designs that encourage visual breaks in the wall (i.e. projection, recession, parapets, revels, articulation, design finish, outcrops, window glazing, paint lines, and/or materials combination, etc.) should be utilized in providing for a high-quality design aesthetic in creating interesting and attractive buildings.

e. Ancillary or accessory buildings or other structures shall be designed, constructed and finished in a manner compatible or complementary with the character and appearance of the principal building(s) or other similar buildings on the parcel.

f. Accessory buildings shall not be located in the front yard of a principal building.

g. A high-quality landscape plan/design shall be used to complement and augment the building and site designs for those developments adjacent and fronting onto Highway 3, Kipp Road and Range Road 224 south of Kipp Road. The landscaping plan must take into consideration the following:

    i. a minimum of 10 percent of the parcel/lot area shall be required to be provided as soft landscaping;

    ii. soft landscaping is highly encouraged to be provided in the form of xeriscaping or xerigardening;

iii. if water is readily available, soft landscape consisting of vegetation such as trees, shrubs, hedges, grass and ground cover may be provided, with consideration for using native plant species wherever possible;

iv. a minimum 6-metre (19.7 ft.) landscaped buffer shall be provided adjacent to any road or highway, which shall be soft landscape consisting of vegetation such as trees, shrubs, hedges, grass and ground cover or xeriscaping/xerigardening (as the case may be); and

v. any trees, hedges or other vegetation must be sited so as not to impede the corner site triangle, parcel approach access site lines or visibility of adjacent roadways.

h. Access approaches, parking/loading areas and display areas that may be located in the front yard of a principal building shall be paved or hard surfaced (to the satisfaction of the municipality).

i. Landscaping provided shall be focused in those areas of a site determined to be highly visible in providing for a high-quality design aesthetic within the JEDA. Any landscaping approved in a development permit is required to be maintained for the life of the development project.

j. Any additional landscaping that may be required at the discretion of the municipality may include, but is not limited to, the following:

i. additional separation, or buffering, between adjacent land uses;

ii. the use of trees, shrubs, fences, walls, and berms to buffer or screen uses of negative impact; and

iii. the use of trees, shrubs, planting beds, street furniture and surface treatments to enhance the appearance of a proposed development.

**9.** Proposed commercial and business light industrial buildings and uses that may be adjacent to existing or future cluster residential development areas shall demonstrate through their design how the proposal will successfully mitigate any potential negative impacts. In these areas (as determined by the County or Town), suggested mitigation techniques may be implemented through the use of the following: restriction or prohibition of specific land uses, increased development setbacks, maximum building heights, increased architectural and landscape treatments (or a combination of all of the above).

**10.** In areas where commercial and industrial developments are adjacent to existing and future country residential or urban residential uses, it is recommended that the commercial or industrial development be of a lower density and residential in scale and intensity (comparatively). Additional architectural and landscaping treatments and increased development setbacks may also be required in such locations to effectively address any potential negative impacts and interface issues that may exist.

**11.** Landscaping shall be required for all proposed developments as per the County's or the Town's Land Use Bylaw, and the approved architectural controls. Proposed landscaping shall enhance the visual attractiveness and appearance of a site and building from all highways or roads.

**12.** If water is not available, xeriscaping (which refers to landscaping and gardening in ways that reduce or eliminate the need for supplemental water from irrigation and emphasizes plants whose natural requirements are appropriate to the local climate) shall be highly encouraged. Xeriscaping or xerigardening may include incorporating rocks, mulch or boulders in the design, but it must also focus on including some form of greenery (plants) that require less water.

**13.** If water is readily available, xeriscaping is still highly encouraged as a water-saving measure, but if soft landscaping is proposed, guidelines pertaining to more typical or traditional forms of landscaping (not including xeriscaping or xerigardening) is suggested to be provided in consistency with following (at a minimum):

a. Trees should be planted in the overall minimum ratio of one tree per 130 $m^2$ (1400 $ft^2$) of landscaped area provided.

b. The mixture of tree sizes at the time of planting should be equivalent to a minimum of 50 percent larger trees.

c. The mixture of tree sizes at the time of planting should be equivalent to 2/3 trees with an option of providing 1/3 remaining with shrubs with no less than 3.0 shrubs per tree.

d. All plant materials should be planted according to good horticultural practice.

e. Selection of plant varieties should be based on regional climatic conditions, constraints of location, effectiveness in screening (if required), resistance to disease and insect attack, cleanliness, appearance and ease of maintenance.

f. Wherever space permits, trees should be planted in groups.

g. If trees are planted, the minimum requirements for tree sizes at the time of planting should be:

| TREE TYPE | CALLIPER / HEIGHT |
|---|---|
| Deciduous trees (small) | 40 mm calliper |
| Deciduous trees (large) | 80 mm calliper |
| Coniferous trees (small) | 1.5 metres height |
| Coniferous trees (large) | 2.5 metres height |
| Shrubs | 0.5 metres height or spread |

**14.** Landscape securities shall be provided if requested by the Development Authority, with the minimum deposit amount as determined sufficient by the Development Authority, which shall be held until an inspection has been completed by the municipality to determine compliance.

**15.** Outside storage including the storage of trucks, trailers, recreational vehicles, and other vehicles may be permitted adjacent to the side or rear of a principal building provided such storage areas are not located within a minimum required side or rear yard setback and the storage is visually screened (all year long) from any adjacent existing or future country or urban residential area and the highly visible interface within the JEDA. All storage must be related to and be an integral part of the commercial or business light industrial operation located on the subject site. Outside storage is prohibited in the front yard of a principal building. Whenever possible, storage shall be highly encouraged to be located inside buildings.

**16.** Extended vehicle parking and/or vehicle storage (e.g. storage of product inventory) is not permitted in the front yard of a principal building. All parking must be provided on-site, as parking shall not be permitted on adjacent municipal roadways.

**17.** Outside display areas are permitted provided that they are limited to examples of equipment, products, vehicles or items sold by the commercial or business light industrial use located on the subject site containing the display area, are not located within any required setback, and are not located on any required and approved landscaping area.

**18.** A vehicle or equipment which is in a dilapidated or dismantled condition shall not be allowed to remain outside a building or on a vacant lot in any commercial or industrial district.

**19.** Fencing shall only be utilized for the visual screening of outside storage, waste/garbage, equipment, product, vehicles or for security purposes provided it is located in the side or rear yards of the principal building. Decorative fencing may be permitted in the front yard of a principal building in compliance with the County's Land Use Bylaw or the Town's Land Use Bylaw and the approved architectural controls.

**20.** Accessory buildings are not permitted to be located in the front yard of a principal building.

**21.** Site lighting shall incorporate "night sky" lighting with fixtures to direct light towards the ground and minimize impact on adjacent sites and uses.

**22.** Signs shall be limited to only two fascia or free-standing signs per lot/parcel, or one multi-tenant sign is permitted.

**23.** Billboard signs are prohibited within the JEDA.

**24.** No signage shall be illuminated by way of any flashing, intermittent or animated illumination within the IDP area.

**25.** Architectural Controls shall comply with this section of the ASP and inform the quality of the built environment and shall include but not be limited to the following (at a minimum):

a. building design and orientation,

b. building interface treatments,

c. on-site parking and loading,

d. site lighting,

e. outside storage,

f. outside display,

g. landscaping,

h. fencing and screening,

i. signage,

j. interface / transition / buffer conditions and design (between differing uses, highly visible areas, etc.).

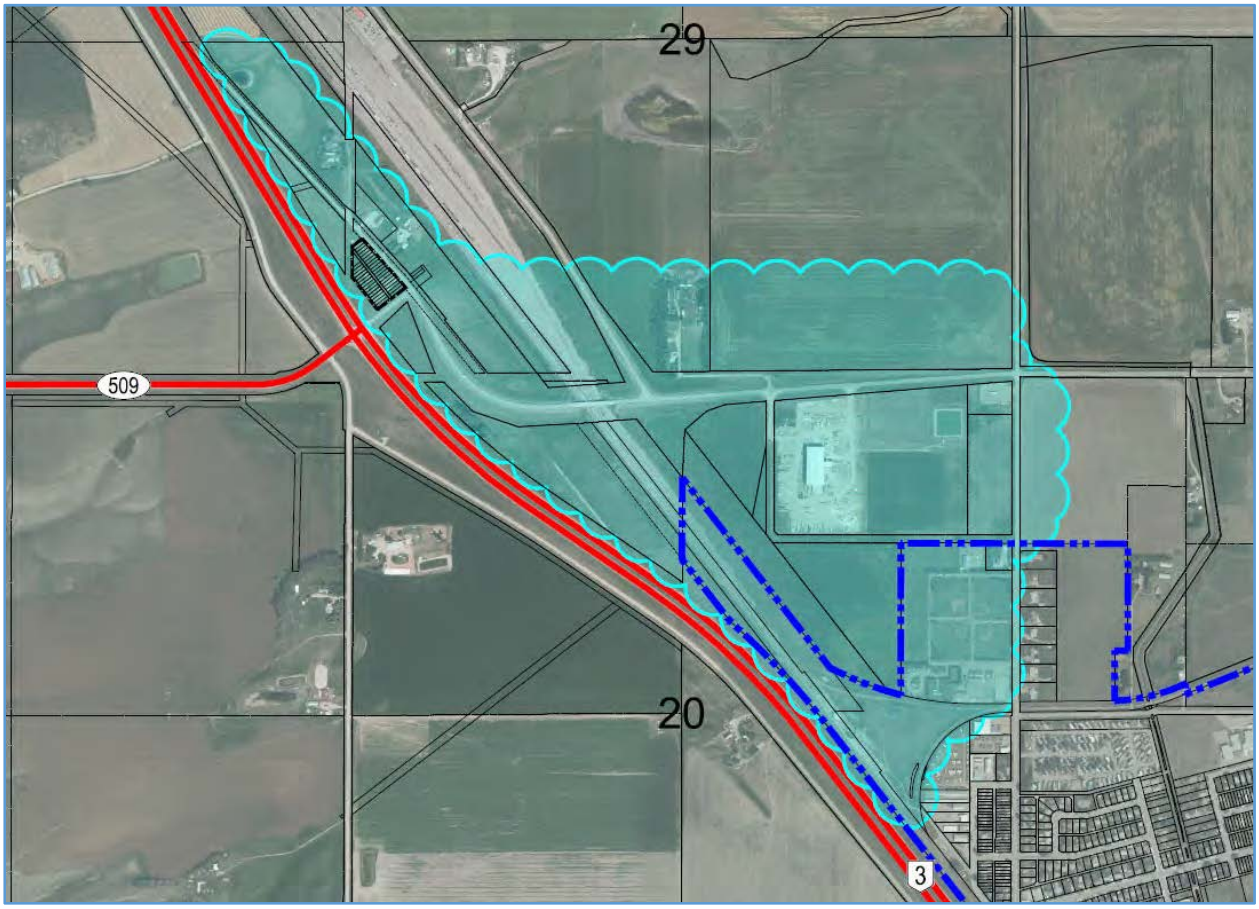
**26.** Where appropriate and feasible, the County and Town strongly encourage construction and site/building design best management practices, including Low Impact Development (LID) initiatives and Leadership in Energy and Environmental Design (LEED).

**27.** All development within the development control zone [300 m (984 ft.)] from the right-of-way or within 800 m (2,625 ft.) of the centerline of an intersection] of Highway 3 shall require a roadside development permit from Alberta Transportation or alternatively, written authorization from Alberta Transportation stating that a roadside development permit is not required as part of the proposed development project. This information shall be submitted by an applicant at the time of submission of a development permit application to the municipality.

**28.** As a condition of any development or subdivision approval, the municipality may stipulate that any or all of the aforementioned standards and guidelines be included in Architectural Controls to be registered as a restrictive covenant on title(s) by the developer.

## Map 1 - Development Design Guidelines

### Joint Enhanced Development Areas or JEDA



# APPENDIX B

LANDOWNERS CONSULTATION SUMMARY

# APPENDIX B of ASP

## LANDOWNERS CONSULTATION SUMMARY

### LETHBRIDGE COUNTY – TOWN OF COALHURST AREA STRUCTURE PLAN

LANDOWNERS FEEDBACK SUMMARY

**Consultation process summary:**

- All the private land owners who held title to lands within the ASP boundary area were contacted in the spring of 2017 to determine the interest in land development and their long term plans for their lands (i.e. remain in agriculture or plan to develop for non-agricultural use). [There are twelve affected separate parcels with eight different private land owners.]
- Planners and municipal administrative representatives from the County and Town met with three of the owners in person. The landowners indicated they were receptive to land being converted for development (non-agricultural use) but they generally were not interested in preparing a plan themselves and were desirous of the municipalities undertaking such a process.
- After a final draft ASP was prepared, the affected landowners within the ASP area were contacted in fall of 2020 and consulted on the proposed ASP and the intention to include it as an Appendix into the IDP.

**Landowner comments (summary):**

- Owner: Block 1, Plan 861 0180
    - Expressed support for the Option 2 Concept Plan although they do not have any immediate development plans. They did have some concerns with not being able to subdivide until municipal services are adequately planned for and the idea of rezoning from RGI to BLI, as they felt it was more restrictive on opportunities.
- Owner: Pt. LSD 13, NW 21-9-22-W4M
    - Thought the future development should be more open ended on lot sizes and configuration. Felt it would have been better to have some consultation with landowners before the development of the ASP. Also looked for some clarification on the servicing and if no development could occur until an agreement was reached with Lethbridge on the water supply. Was of the opinion that different development should have different levels of servicing available to them. Also inquired as to what point land may be annexed into Coalhurst.
- Owner: SW & SE¼ 29-9-22 W4M
    - Expressed general support for the plan and initiative of the municipalities to undertake it.
- All the landowners who submitted written comments were subsequently contacted or sent follow-up information to try and address the comments or questions they raised.
- All affected landowners and the general public were notified of the February 25, 2021 joint municipal virtual public hearing to adopt the ASP as an amendment to the IDP (Bylaw No. 20-023 & Bylaw No. 421-20).