Alberta's Industrial Heartland Transportation Study Update 2017

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Strathcona County

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December 6, 2017

Sign-off Sheet

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PREAMBLE

This study is an update of the 2007 Strathcona Industrial Heartland Area Transportation Study necessitated by changing land use and development patterns and an update to the Area Structure Plan. Future revisions to this document may be necessitated if significant changes in land use occur and this should be considered as a living document.

The Study is intended to establish guiding principles to the effective and efficient planning of the transportation network in the Study Area, develop a high-level conceptual plan for the major internal road network and define appropriate characteristics for the roadway links. The plan needs to reflect:

- The recommendations outlined in Alberta Transportation's recently completed Highway 15 Functional Planning Study;
- Alberta Transportation's access control guidance for Highway 830 (N);
- Emergency evacuation requirements; and
- The desire of CN and CP Rail and road users in general to minimize additional at-grade railroad crossings.

The recommended plan is based on the land ownership and development plans current at the time of the Study. Its primary elements, to support the existing upgraded elements of Rge Rd 214 and Rge Rd 220, are a Spine Road developed along Rge Rd 213 connecting to Highway 15 at Rge Rd 214 and an upgraded Twp Rd 560, Twp Rd 562 and Twp Rd 564.

The general concept of the plan is expected to be adequate to accommodate likely development in the Study Area. However, it is does not necessarily address all the potential concerns raised by projects in the planning stage, which may or may not proceed in the near term as planned. Changing land ownership, consolidation of parcels and the specifics of development plans may necessitate revisions to some elements of the recommended plan. Alternative road network and access plans to accommodate specific developments would be addressed as part of the development approval process. Those plans should respect the criteria listed above and other stakeholders' interests.

Order of magnitude construction costs for the road network are estimated to provide general guidance to long-term financing needs.

1.0 INTRODUCTION

1.1 BACKGROUND

The Strathcona Industrial Heartland Area Transportation Study was originally completed in early 2007 with an update completed later in 2007 (see **Appendix A** for 2007 Transportation Study Plan). Some of the recommendations in the Transportation Study Update completed in 2007 have been implemented and many of the other recommendations are still relevant. However, since 2007 a number of major changes to probable land uses have occurred which will reduce the traffic generating characteristics of the Study Area. Furthermore, in December 2016 Alberta Transportation completed a functional planning study for Highway 15, which has implications on the recommendations of the Transportation Study (see **Appendix B** for the Hwy 15 Functional Planning Study Executive Summary). With Strathcona County's desire to update the Area Structure Plan (ASP) for this area, a concurrent update to the Transportation Study was seen to be desirable.

In June 2105, Strathcona County retained Stantec Consulting Ltd. to complete an update of the 2007 Strathcona Industrial Heartland Area Transportation Study.

1.2 STUDY AREA

Alberta's Industrial Heartland is illustrated in **Figure 1.1** and covers lands within Strathcona County, Sturgeon County, Lamont County and abuts Fort Saskatchewan and Bruderheim. The study boundaries are illustrated on **Figure 1.1** and are as follows:

- On the north by the North Saskatchewan River and Highway 38 and Highway 45
- On the west by Rge Rd 220, which is the east boundary of the City of Fort Saskatchewan
- On the south by a boundary generally located one-half section south of Highway 15
- On the east by Highway 830 north (N)

Within this area there are approximately 36 sections of land (approximately 23,000 acres). Approximately three (3) sections of land on the western edge of the Study Area are occupied by industrial uses, such as Shell's Scotford complex. While there are other land uses scattered across the Study Area, such as the Providence Grain Terminal near the eastern edge and numerous oil wells in the northern half of the Study Area, the remaining area is primarily used for agricultural purposes. Land ownership is illustrated in the figure in **Appendix C.**

1.2.1 Roadway and Railway Network

Figure 1.2 illustrates the existing roadway and rail network. The roadway network in the area is characterized by relatively narrow (approximately 6 metres wide) rural cross-section roads, which for the most part follow the original township grid system. The exceptions are:

- Rge Rd 214 from Highway 15 to Twp Rd 560, which has been upgraded to a four-lane divided cross-section within a 50 to 55 metres wide right-of-way

- Rge Rd 214 from Twp Rd 560 to Twp Rd 560A, which has been upgraded to a 10 metres wide two lane roadway in a 50 metres wide right-of-way

- Twp Rd 560A west of Rge Rd 214 to the North Saskatchewan River, which has been upgraded to a 10 metres wide two lane roadway in a 40 metres right-of-way

- Rge Road 220 from Highway 15 to Twp Road 560A, which has been upgraded to a 10 metres wide two lane roadway in a 30 metres right-of-way

Access to the Study Area is currently from Highway 15 on the south and Highway 830 (N) on the east. Access is provided primarily via signalized intersections on Highway 15 at Rge Rd 220 and Rge Rd 214 and by unsignalized intersections at Rge Rd 212 and Rge Rd 211. Minor intersections spaced approximately two miles apart are also provided on Highway 830 (N).

Both Canadian Pacific Rail (CPR) and Canadian National Rail (CN) have rail lines in the area. CPR's Scotford Subdivision enters the Study Area from the south just west of Highway 830 (N).

CPR's Willingdon Subdivision branches off the Scotford Subdivision just north of Highway 15 and heads east towards the Bruderheim area. The Scotford Subdivision heads north to the north side of an easterly projection of Twp Rd 560A and then heads west along the quarter section line to the west side of the Shell Scotford site. At this point, there is a spur line that crosses Twp Rd 560A and enters the Scotford site to the south. A currently unused right-of-way continues from this point parallel to the North Saskatchewan River in a generally southwest direction towards the Aux Sable site for approximately 3 km. CPR anticipates constructing a rail line on this right-of-way to support future industrial development in this area.

CPR's Scotford Yard is located on the section of rail line parallel to the easterly projection of Twp Rd 560A from west of Rge Rd 214 to east of Rge Rd 212.

CN's Vegreville Subdivision Line runs from the southwest corner of the Study Area to the east side of the Study Area where it crosses Highway 830 (N) just south of Twp Rd 560. From the west limit of the Study Area to near Rge Rd 213, the CN line runs adjacent and parallel to Highway 15.

CN's Scotford Yard is located on the section of rail line from west of Rge Rd 215 to Rge Rd 214. CN is planning the expansion of this yard, which may have impacts to Highway 15 access to the Scotford Yard and Rge Rd 215 at Highway 15.

There is a connecting line that joins the CPR Scotford Subdivision and the CN Vegreville Subdivision that runs parallel to and alongside Rge Rd 214. Several existing petrochemical facilities to the east are served off this line.

Figure 1-1 Location and Study Area

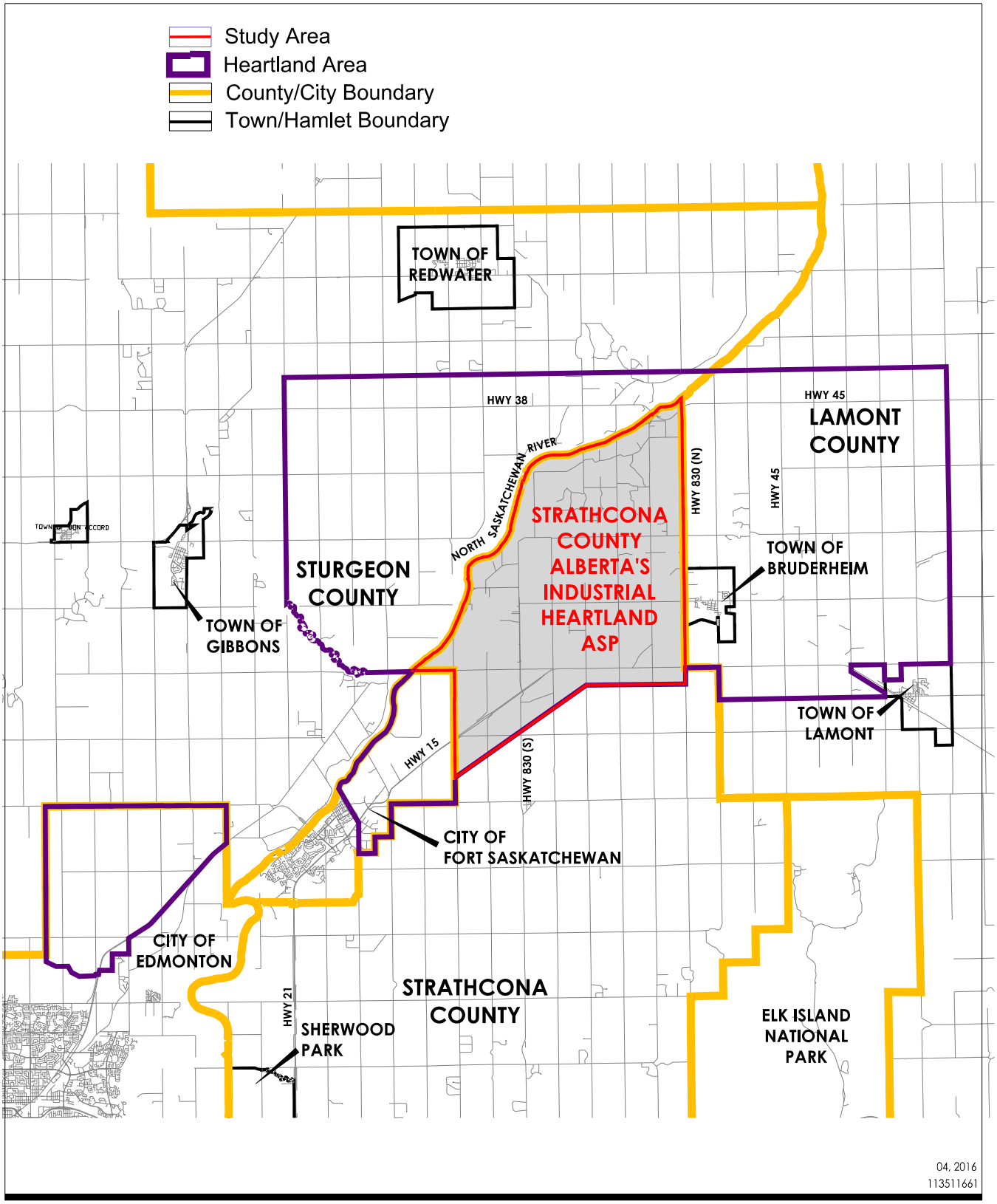

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Figure No.
1.1

Title
LOCATION PLAN AND STUDY AREA

Figure 1.2 Existing Road and Rail Network

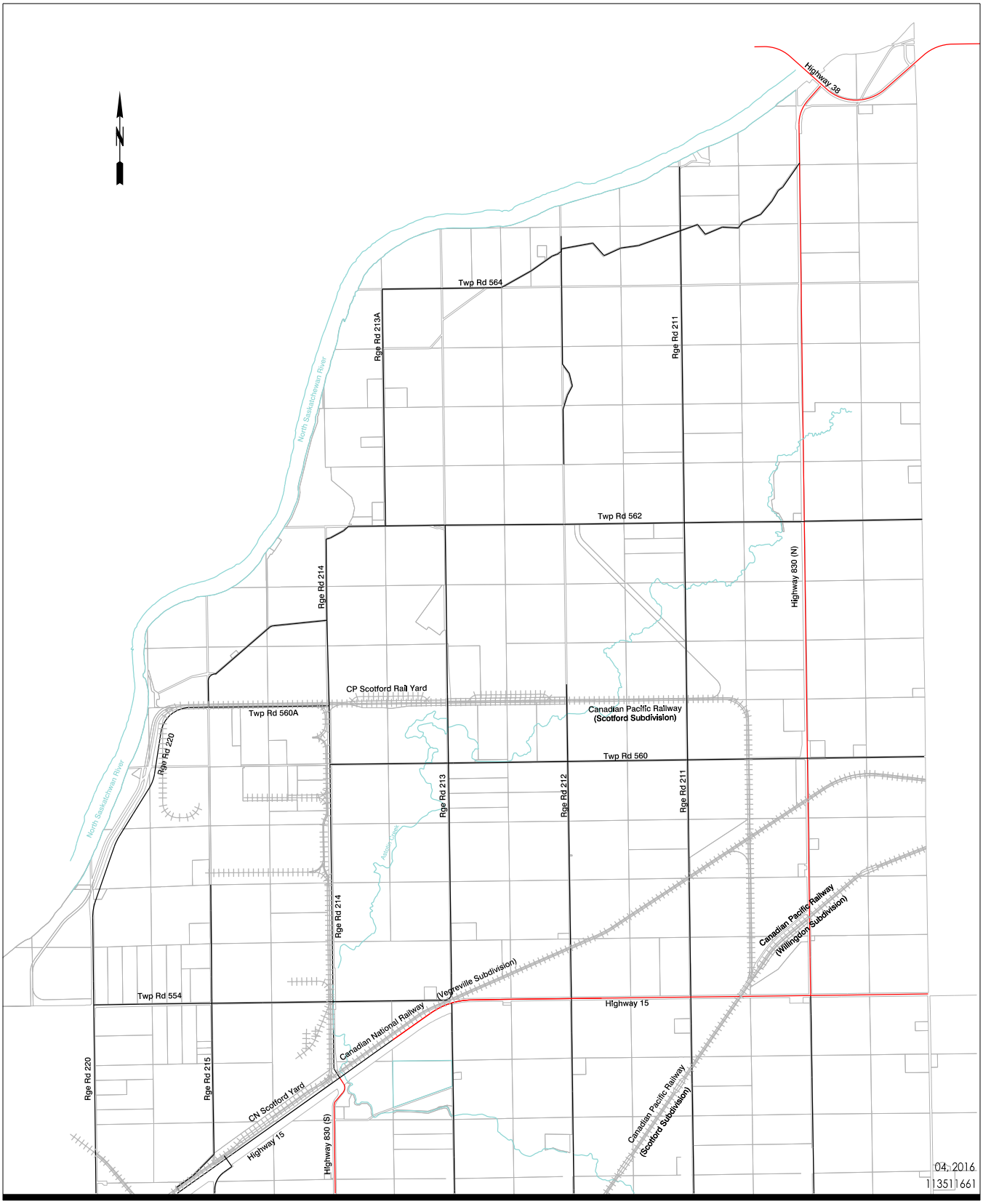

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Figure No.

1.2

Title

EXISTING ROAD AND RAIL NETWORK

1.3 STUDY OBJECTIVES

The specific objectives of this study were to:

- Develop a road network in coordination with the Area Structure Plan study being done concurrently for the Study Area respecting possible development proposals;
- Develop a conceptual major internal road network that will provide the backbone of the transportation system for the Study Area including the conceptual alignment for a connection of Rge Rd 220 from Twp Rd 560A to Twp Rd 562;
- Develop a road network that addresses evacuation route and emergency access needs by providing two alternative routes to and from developments;
- Provide recommendations for planning of emergency egress in the event of a significant disaster (e.g. Petrochemical explosion and chemical leak);
- Establish the characteristics of the roadway network elements (number of lanes, major intersection configurations, right-of-way, etc.);
- Establish major rail crossing points and criteria to define the type of crossing;
- Develop a construction staging program; and
- Identify order of magnitude construction costs for the road network.

1.4 STUDY METHODOLOGY

The study methodology included:

- A review of the 2007 Strathcona Industrial Heartland Area Transportation Study;
- Updates to land use, employment, vehicular and rail traffic information;
- Preparation of alternative road networks for discussion;
- Meetings with stakeholders facilitated by The Dagny Partnership who was retained separately by Strathcona County;
- Participation in Open Houses held as part of the Area Structure Plan Study;
- Development of preferred road network plan and recommendations for its implementation; and
- Documentation of the findings of the study.

2.0 LAND USE, EMPLOYMENT, AND TRAFFIC VOLUMES

2.1 EXISTING CONDITIONS

For employment areas, the key factor in developing a road network is typically being able to accommodate the high AM and PM peak hour requirements characteristic of these types of areas.

Table 2.1 summarizes the approximate number of Operations and Contract Workers employed at the existing facilities along Rge Rd 214.

Table 2-1 Existing Employment

Site	Day Shift Operations Workers (8:00 to 17:00)	Other Day Shift Workers (shifts with start and end times outside of 8:00 and 17:00)	Night shift Workers
Shell Scotford	1,450	300	100
Gulf Chemicals	35	7	7
Air Liquide	20	3	3
Total	**1,505**	**310**	**110**

Alberta Transportation (AT) 2015 traffic data indicates that the average annual daily traffic (AADT) on Highway 15 west of Rge Rd 214 is approximately 11,400 vehicles per day (approximately 13% commercial vehicles) and 8,700 vehicles per day (approximately 19% commercial vehicles) east of Rge Rd 214.

On Highway 830 (N) north of Highway 15 it is approximately 2,400 vehicles per day (approximately 31% commercial vehicles).

Growth in traffic volumes in recent years on Highway 15 has been very limited, but in excess of 4% per year on average on Highway 830 (N).

Within the Study Area, the AADT for Rge Rd 220 is approximately 1,000 vehicles per day while the AADT for Rage Rd 214 is approximately 5,200 vehicles per day. Other roadways within the Study Area have AADT volumes of less than 1,000. Traffic count data from Alberta Transportation and Strathcona County is included in **Appendix D.**

2.2 PROJECTED CONDITIONS

2.2.1 Proposed Facilities

When the original Transportation Study was completed in 2007, the focus of development had been the western half of the Study Area. Currently, most new projects are either under construction or being proposed for the southeast area of the Study Area, east of Rge Rd 214 and south of Twp Rd 560. These include projects by TransCanada Pipelines, MEG Energy, Gibsons Energy and ATCO Energy.

Beyond the projects currently envisaged, but probably within a 20 or so year period, expansions to the Shell Upgrader along with other ancillary developments and supporting facilities by other companies are likely. Delays in start-up dates are a possibility given the lengthy regulatory process these facilities must progress through before construction can commence on them. As well, changes in ownership may put projects on hold or change their nature.

Longer term, adequate land likely exists for at least two more major facilities south of Twp Rd 562. In addition, adequate land exists for two more major facilities north of Twp Rd 562. However, a significant number of producing oil wells are in this area and these wells would have to be exhausted before the area could be redeveloped. The remaining life span of these wells is not known, but is assumed to be some 15 to 20 years as oil recovery techniques continue to improve and lengthen the life span of many oil fields.

2.2.2 Operations Traffic

Based on the proposed facilities, estimates of Day Shift Operations Workers were made based on total plant workers including contractors. Typically, Day Shift Operations Workers would represent about 60% of the total workers, although it does vary by facility type.

It should be noted that as many of the proposed facilities are only concepts at this time, the estimates should be considered as order of magnitude only. In addition, estimates provided by industry may or may not include other Day Shift Workers with shift start and end times outside of 8:00 AM and 5:00 PM. Their inclusion would overstate peak hour traffic demands to some degree. Nonetheless, the estimates do provide a reasonable indication of the probable long-term requirements that the road network will need to accommodate on a daily basis.

Table 2.2 summarizes the estimates.

Table 2-2 Projected Long-Term Employment

Site	Day Shift Operations Workers (8:00AM to 5:00PM)	Comments
Shell Scotford	1450	Existing
Gulf Chemicals	35	Existing
Air Liquide	20	Existing
Kinder Morgan	50	Existing
CN Oil and Gas Logistics Yard	15	Existing
CP Rail Yard	15	Existing
Enbridge	15	Existing
Subtotal – Existing	**Approx. 1,600**	
TransCanada Pipelines	25	Under Construction
ATCO	25	Under Construction
Air Liquide	40	Conceptual
Enbridge Sunwest	15	conceptual
Keyera Energy	40	Conceptual
King Tech Maple Resources	20	Conceptual
TransCanada Pipelines	30	Conceptual
MEG Energy	1500	Conceptual
Gibsons Energy	30	Conceptual
Sasol	500	Conceptual
Williams Energy	50	Conceptual
Shell Upgrader Expansion 2 and 3	250	Conceptual
Shell Upgrader Expansion 4 and 5	250	Conceptual
Shell – Other Facilities	150	Conceptual
Dow and Aux Sable	40	Conceptual
Subtotal – Additional by 2035	**Approx. 3,000**	
Subtotal – Additional beyond 2035 (Various plant expansions and fill-in areas– 500) (Facilities north of TWP Rd 262 – 500)	**Approx. 1,000**	
Long-Term Total – Existing and Additional	**Approx. 5,600**	

Based on the estimates in **Table 2.2** daily operations traffic volume in the area will likely more than triple in the longer term.

2.2.3 Turnaround Traffic

Plant shutdowns or turnarounds for scheduled maintenance occur regularly (every 18 months to 3 years) for 2 to 6 weeks or longer depending on the size of the plant and the type of maintenance work to be done. **Table 2.3** summarizes current turnaround schedules at existing plants to provide an indication of the order of magnitude impacts of these events.

Table 2-3 Turnaround Workers for Typical Existing Facilities

Site	Daytime Workers (1)	Comments
Shell Chemicals	240	Every 2 years for the glycol plant and every 3 years for the styrene plant
	475	Every 10 years for power plant shutdown
Shell Refinery	650	Every 3 years
Shell Upgrader	800	Every 3 years
Gulf Chemicals	25 to 50	Every 2 years
Air Liquide	30	Every 18 months
	50	Every 3 years (coincides with Shell Chemicals styrene plant shutdown)

1. Night shift operations typically have similar numbers of workers

It should be noted that turnarounds are typically scheduled so that they do not occur concurrently, except for the Air Liquide turnaround every 3 years that occurs concurrently with the Shell Chemicals' turnaround. However, increased numbers of facilities in the area will make these events more frequent. For example, the ultimate Shell Scotford complex will by itself result in at least two turnarounds per year.

Accommodating a typical major turnaround will require accommodating an increase of 600 to 800 employees over and above the typical daily operations workforce. Furthermore, input from industry suggests that the size of the major turnarounds as well as the probability of multiple smaller turnarounds occurring simultaneously is likely to increase. For planning purposes, it was recommended that an increase of 1,200 employees over and above the typical daily operations workforce be considered. Historically, busing and other traffic demand management measures are not instituted for turnarounds and peak hour traffic volumes can be expected to increase proportionately to the number of daytime turnaround workers.

2.2.4 Construction Traffic

Upgrading of existing and construction of proposed facilities in the area will typically take 2 to 4 years, depending on their size, and can require substantial numbers of workers to complete. Estimates of construction workforces and their peak levels can realistically only be provided once the details of the project are defined and typically are included as part of the development permitting process. As a past example of the potential magnitude of the construction force for a major industrial project, construction activity for the Shell Upgrader

peaked in 2002 with a construction workforce of approximately 12,000 workers. Despite extensive traffic demand management measures, traffic congestion was severe.

In the 2007 Transportation Study, several substantial upgrader or refinery type construction projects were envisaged. While one or more of these types of projects may occur in the longer term, projects currently envisaged for the Study Area are much smaller in scale and will have work forces in the hundreds rather than the thousands for upgraders and refineries. Thus, it is considered reasonable to assume that while construction traffic will be significant, traffic congestion can likely be managed through construction project specific measures.

2.2.5 Rail Traffic

Rail traffic on CN Vegreville Subdivision, which traverses the southern portion of the Study Area, averages approximately 15 trains per day. In general, the trains vary in length from 80 to 180 cars and cannot be stopped blocking crossings on the range roads for up to five minutes at a time. While these trains are scheduled, their actual times can vary. Rail traffic along this facility is likely to increase in the coming years as activities in the Heartland area increase and the Vegreville Subdivision becomes a secondary mainline for lower priority traffic from Edmonton's mainline.

CN's Scotford Yard is located in the vicinity of Rge Rd 214. For the most part shunting operations have minimal impact on the Rge Rd 214 crossing as they are done in off-peak periods and are of relatively short duration. However, they can be more impactful on the Rge Rd 215 crossing although minimal traffic uses Rge Rd 215. In the next 5 to 10 years, CN is considering doubling the capacity of the Scotford Yard. This increased capacity is most easily provided by lengthening of the existing yard to the east across Rge Rd 214. There are limited options for lengthening the yard to the west due to the presence of a Y track to the west of Rge Rd 215 or by widening to the north due to existing pipelines. As a result, the railway crossing at Rge Rd 215 is planning to close, while the railway crossing at Rge Rd 214 would likely warrant the construction of a grade separation in the long term.

Existing traffic on CPR's Scotford Subdivision north of Twp Rd 560A and east of Rge Rd 212 averages 4 trains per day. Potential new facilities being considered for the Study Area will increase the number of trains on this line. Rail access to facilities in the north half of the Study Area will be via a spur line to the north near Rge Rd 212. CPR has proposed to extend their rail line north of the proposed Astotin Yard near Rge Rd 211 across the North Saskatchewan River and along Twp Rd 564A. West of the North Saskatchewan River they propose to develop another transload facility (Sturgeon Yard) to service industries in the Sturgeon County portion of Alberta's Heartland Industrial Area.

CPR has plans to develop the first phase of a rail to truck transload facility, the Strathcona Logistics Centre, west of Highway 830 (N) and north of Twp Rd 560. The facility is intended to serve industries in the area that do not have direct access to rail service. Vehicle movements to and from the facility will be mostly trucks, spread out through the day, and unlikely to impact peak hour traffic volumes. It is anticipated that access to the facility will be from Rge Rd 211.

CPR's Scotford Yard is located between Rge Rds 213 and 214, north of Twp Rd 560. Switching operations are currently done from the west end of the yard, which causes traffic blockages on Rge Rd 214. Shell wishes to have switching activity relocated to the east end of the yard to minimize disruptions to traffic on Rge Rd 214. CPR has plans to expand their yard to the east of Rge Rd 213 and thus, the proposed road overpass of the expanded yards on Rge Rd 213 is required to minimize disruption to both road and rail traffic.

The connecting line along Rge Rd 214 between the CN and CPR yards is used several times per day. Movements include a daily train in each direction that handles the interchange traffic between the two railways and trains into and out of various facilities on at least a once per day basis.

Proposed developments by TransCanada Pipelines, MEG Energy and Gibson's Energy in the southeast quadrant of the Study Area all include rail yards. These railyards will primarily be accessed from the CN main line. In the case of the TransCanada Pipelines' rail yard a connection to the CPR north-south rail line is also envisaged. Potential train movement information is not available at this time, but the additional trackage and trains may constrain access to the southeast quadrant of the Study Area.

In general, existing and potential increases in rail traffic can cause delays to traffic entering and exiting Alberta's Heartland Industrial Area and potentially can delay emergency vehicles. Minimizing additional at-grade railway crossing locations from new roadway or railway links is considered desirable from both a railway and roadway operations perspective.

3.0 STAKEHOLDER INPUT

Existing constraints and stakeholder concerns were significant factors in originally developing the recommended transportation network. Input received as part of the 2007 Transportation Study has been repeated below where it is relevant in updating the transportation plan. This stakeholder input has been supplemented with additional input obtained as part of this study through the following stakeholder outreach program. See **Appendix C** for current Industry Land Holdings[1] in the Study Area at the time of the study.

3.1 STAKEHOLDER WORKSHOPS

In support of both this study and the update to the Area Structure Plan (ASP), the County through the Dagny Partnership held two stakeholder workshops. These workshops were held at Strathcona Community Centre on May 1, 2015 and July 17, 2015. A summary of the attendees and issues discussed are contained in **Appendix E**.

Discussion at the workshops resulted in the following set of desirable principles to be considered in the planning of the long-term roadway network:

- Provide safe, easy access to and from all sites including:
  - Alternative access to Highway 15 and Highway 830 (N)
  - Use of straight direct routes rather than more circuitous routes
  - Ready access for emergency services from Highway 15 with at least 2 alternative routes
  - Access for construction-related truck activity
- Respect the rights of landowners to secure site operations from through traffic
- Design roads to accommodate heavy haul and over-dimensional loads
- Minimize congestion due to conflicts between road and rail traffic
- Optimize the road network in consideration of utility needs, such as for pipelines.

3.2 OPEN HOUSES

In September of 2015, the planning process to amend Alberta's Industrial Heartland ASP and transportation study update was initiated on behalf of Strathcona County. All landowners in the Study Area were notified prior to plan initiation and invited to participate in the process. Stantec prepared a Public Engagement Program (PEP), which set out the means by which key stakeholders and the public were to be engaged. This program included personalized contact with stakeholders, online media, and public engagement events.

All affected and adjacent landowners in the area, as well as adjacent municipalities, have been notified in accordance with both the Municipal Government Act (MGA) and the County's policy requirements for new statutory plans.

The following public engagement events were held as part of the consultation process.

3.2.1 Public Information Meeting 1

An Open House was held on October 14, 2015 at the Moyer Recreation Centre Hall in Josephburg, inviting the public to discuss proposed changes to the ASP and transportation study updates, confirming opportunities and challenges, and providing input. The event was advertised in the Sherwood Park / Strathcona County News. A notice was also mailed out to the affected landowners, stakeholders, and nearby municipalities. Approximately 60 people attended the open house.

3.2.2 Public Information Meeting 2

A second Open House was held on January 28, 2016 at the Moyer Recreation Centre Hall in Josephburg, inviting the public to discuss the proposed long term transportation network, the proposed ASP development concept options, and provided further input to guide the development of proposed changes. The event was advertised in the Sherwood Park / Strathcona County News. A notice was also mailed out to the affected landowners, stakeholders, and nearby municipalities. Approximately 50 people attended the open house.

The results of the Public Information Meetings are contained in **Appendix E.**

3.3 INDIVIDUAL STAKEHOLDER SESSIONS

3.3.1 Interviews and Meetings

Telephone interviews were conducted with all the major land owners in the Study Area. Additional one-on-one meetings were held with TransCanada Pipelines, Gibson Energy, MEG Energy on October 28, 2015 and Providence Grain on October 30, 2015. Based on feedback received during these meetings, the proposed network plans were sent to the four stakeholders

for input on January 6, 2016. Follow up correspondence and input on the proposed roadway network plan was received by the end of January 2016.

Follow up meetings were held with Providence Grain on February 19, 2016 and June 6, 2016 to discuss alternative road network plans. Subsequent meetings were held with TransCanada Pipelines on May 12, 2016 and with TransCanada Pipelines and MEG Energy to discuss potential alternation to the road network.

On April 11, 2016, a meeting was held with Alberta Transportation (AT) to follow up on the status of the 2016 Highway 15 Functional Planning Study and present the proposed road network. Follow up correspondence and input on the proposed roadway network plan was received (see **Appendix E**).

3.3.2 Issues

The issues identified are summarized, with the relevant input from the 2007 Transportation Study retained, as follows:

3.3.2.1 Highway 15

- Future Highway 15 twinning will be to the south with a 54 m centreline to centreline spacing as outlined in the Highway 15 Functional Planning Study.
- The 2016 Highway 15 Functional Planning Study foresees the intersection of Highway 15 with the CPR will warrant grade separation. Due to the existing grades and reduced sight distances, the intersection at Range Road 211 requires closure.
- Alberta Transportation has no concerns with providing an additional access to Highway 830 (N), north of Highway 15, as long as the proposed access is more than 1600 metres north of Highway 15.
- Alberta Transportation is supportive of a consolidated access location to Highway 15 between Range Road 212 to Range Road 211A.
- Alberta Transportation has no short-term plans to twin Highway 15 east of the current limits of the twinned section that ends east of Rge Rd 214.
- Traffic volumes on Highway 15 in peak hours during turnarounds and construction periods can cause potentially large delays at traffic signals through Fort Saskatchewan. Maintaining reasonable traffic flows, while not promoting high speeds through Fort Saskatchewan is desired.
- The City of Fort Saskatchewan, Strathcona County and industry are aware of the need for a by-pass of Fort Saskatchewan to alleviate traffic congestion through the City.
- Alberta Transportation has no current plans to construct a highway by-pass of Fort Saskatchewan.

- City of Fort Saskatchewan, City of Edmonton, Sturgeon County and Strathcona County, along with Alberta Transportation on behalf of the province are undertaking a planning study for a potential new river crossing over the North Saskatchewan River, in the northeast part of the Edmonton region. The need for this bridge was identified in a 2011 study prepared for the Capital Region Board (CRB). The CRB study also identified improved east/west connection on Twp Rd 540 to Highway 830 (S).

- In general, Alberta Transportation is not in favour of traffic signals on Highway 15 due to inherent conflicts in expectations between the high speed free-flow conditions they strive for and the impacts that traffic signals have. In the long-term they foresee Highway 15 as a four-lane divided highway.

- In the past, restricted access to the area (Rge Rd 214 was the only upgraded access) has resulted in long queues on Highway 15 when capacity is inadequate. These queues have been extremely long when coupled with delays due to presence of a train crossing Rge Rd 214 during peak hours. The upgraded access at Rge Rd 220 has relieved some of this concern.

- Highway 15 is part of the provincial designated high load corridor system and potential height restrictions, such as traffic signal davits and overpass structures must be constructed such that they do not compromise the ability to transport oversize loads along Highway 15.

3.3.2.2 Proposed Heartland Bridge at Highway 38 and North of Shell Scotford

- This new roadway connection and river crossing has some philosophical support as a traffic congestion reliever and a high/wide load corridor, but no financial support. It likely will only become a reality once other options to provide traffic capacity to the area have been utilized. Development west of the North Saskatchewan River may preclude construction of a crossing at this location.

- Current development plans restrict possible options for approaches to the bridge and investing potentially available funding in upgrading the Highway 38/Highway 830 and Highway 15 corridors to better accommodate high/wide loads is considered by some to have more merit.

Range Road 220

- Upgrading of this roadway has improved access to the west half of the Study Area and provided some relief to congestion at the Highway 15/Rge Rd 214 intersection.

- To service proposed development in the area there are plans to extend Rge Rd 220 north from Twp Rd 560A to Twp Rd 562.

Range Road 215

- The CN crossing of Rge Rd 215 just north of Highway 15 was previously relocated to reduce impacts of train shunting operations in CN's Scotford Yard. These impacts are still considered significant. Closure of Rge Rd 215 from Highway 15 to Twp Rd 554 is also considered desirable

to provide for a larger unconstrained development site between Rge Rd 220 and the CN Scotford Rail Yard west of Rge Rd 214.

Range Road 214

- Developed as a four-lane divided cross-section from Highway 15 to Twp Rd 560, it represents a significant investment that should be utilized in any road network for the Study Area.
- Rail operations across Rge Rd 214 currently impact traffic flows several times per day.
- CN is considering a major expansion to their Scotford Yard, which would likely extend up to 8 tracks to east of the Rge Rd 214 crossing. This could have a significant impact on traffic operations on Rge Rd 214 and would likely warrant the construction of a grade separation over the rail yard and related interchange on Highway 15.
- Shell is considering requesting that Strathcona County close Rge Rd 214 north of Twp Rd 560 and Twp Rd 560A west of Rge Rd 214. This impacts the extension of these roads as part of an expanded road extension of Rge Rd 220 north to Twp Rd 560.

Range Road 213

- The former Rge Rd 213 intersection on Highway 15 is closed to the north.
- A grade separated crossing on Rge Rd 213 of the CP Rail Yard adjacent to Twp Rd 560 provides an opportunity to develop a spine road in the area.

Range Road 212

- The 2016 Highway 15 Functional Planning Study foresees an intersection in the vicinity of Rge Rd 212 (between Rge Rd 212 and 211A) being the only intersection on Highway 15 between Rge Rd 214 and Highway 830 (N).
- Current development proposals south of Twp Rd 560 desire the closure of much of Rge Rd 212 north of Highway 15 and the existing Rge Rd 212 crossing of the CN tracks.
- Past development proposals typically foresaw the closure of the Rge Rd 212 right-of-way north of Twp Rd 560.

Range Road 211

- The completed 2016 Highway 15 Functional Planning Study foresees the intersection at Rge Rd 211 being realigned to an intersections location in the vicinity of Rge Rd 212 (between Rge Rd 212 and 211A).
- Current development proposals south of Twp Rd 560 desire the closure of much of Rge Rd 211 north of Highway 15.
- Access to Providence Grain Terminals, located north of the CN tracks and south of Twp Rd 560, needs to be maintained. Desirably, this would be from Rge Rd 211 and not require

additional at-grate railway crossing locations. Additional at-grade railway crossing locations may result in increased delays from train movements to vehicles accessing Providence Grain Terminals.

- Preserving the ability to provide emergency access from Highway 15 is desirable to industry and some residences due a lack of direct alternative access routes.

Township Road 554

- Twp Rd 554 provides east/west access to several proposed developments.

Township Road 560

- Development proposals north of the CN tracks and east of Rge Rd 213 foresee Twp Rd 560 as providing their main access route.

- East of the Study Area, Twp Rd 560 becomes 52 Avenue through Bruderheim and is an important east/west connection to the existing plants.

Township Road 562

- As development progresses in the north half of the Study Area, Twp Rd 562 offers the opportunity to provide access and connection to Rge Rd 220 along the west edge of the Study Area.

4.0 RECOMMENDED TRANSPORTATION NETWORK

4.1 ROADWAY NETWORK

4.1.1 Design Philosophy

In developing the recommended plan, the following philosophical point have been adopted:

- The road network should be robust enough to concurrently accommodate the typical peak hour demands of operations related traffic (4,000 dayshift workers) and one major turnaround or multiple smaller turnarounds (1,200 dayshift workers). Provision of a Level of Service D or better (average delay of 55 seconds or less per vehicle at signalized intersections and 35 seconds or less at unsignalized intersections) is desired.

- Although traffic count data from other studies may suggest otherwise, stakeholder input suggests that typical peak hour traffic can be concentrated in a 30-minute period with up to 70 to 80% of the peak hour traffic occurring in this peak 30 minutes. Typically, peak hour traffic volumes are increased by 5 to 10% to account for peaks within the peak hour. For the purposes of this study, peak hour traffic volumes have been increased by 33% to address the perceived higher amount of peaking and should be considered as a relatively conservative approach in identifying the required roadway network.

- Transportation demand measures should be considered and utilized for construction projects such that peak hour and peak direction traffic volumes in the Study Area do not exceed the volume defined by the available roadway capacity at that point in time. As part of these measures, it is recommended that major construction projects should:

    - Implement a construction worker bussing strategy with remote parking areas to minimize the potential for excessive vehicular demands on the roadway network. Careful location of these parking areas can be a key factor in the extent of their use;

    - Minimize on-site parking and encourage carpooling, where a bussing strategy is not feasible;

    - Consider the development of on-site housing for construction workers;

    - Consider adjusting start and end times of construction shifts so that they do not overlap with shift changes for operations workers; and,

    - Minimize/avoid the use of Highway 15 through the City of Fort Saskatchewan for both bussing and general truck delivery strategies to minimize impacts on the City. Alternative regional access routes to the Study Area, such as Highway 830 (S), should be considered to provide appropriate access with fewer impacts.

- Significant investments have been made in upgrading Rge Rd 214 and the intersection of Rge Rd 214 and Highway 15. In the 2007 Transportation Study it was decided to maintain the intersection of Rge Rd 214 and Highway 15 as a key element of the overall road network.

However, Shell has plans to develop multiple facilities along the east side of Rge Rd 214. This has led Shell to request development of alternate routes to Rge Rd 214 so that Rge Rd 214 can function primarily as an access road to their developments.

- The number of new at-grade railway crossing locations should be avoided due to their potential impact on both vehicular and rail operations.
- Developments in the area should have at least two points of access to the public road network for emergency purposes and to minimize potential delays due to blockage of rail crossings by trains.
- Spacing of intersections along Highway 15, currently 1 mile, should desirably be 2 miles as outlined in the 2016 Highway 15 Functional Planning Study. Based on this, the existing intersections at Rge Rd 215 and Rge Rd 211 should, if possible, be eliminated.
- While interchanges and grade-separated movements at intersections along Highway 15 will eventually be required in the long term, they are costly and should be considered only when other improvements cannot achieve the desired operations.
- Proposed closures of portions of Rge Rd 214 and Rge Rd 212 north of Twp Rd 560 and Twp Rd 560A west of Rge Rd 214 to accommodate proposed upgraders should be respected. As a result, Rge Rd 213 north of Twp Rd 560 has the opportunity to be a major element in any roadway network plan. Providing a direct and continuous connection from the Rge Rd 214 and Highway 15 intersection to Rge Rd 213 north of Twp Rd 560 will provide a central spine road for the area and is considered desirable.
- Twp Rd 560 provides an important role as an east-west connector from the west half of the Study Area to Highway 830 (N) and further east.
- Twp Rd 562 with a connection to Rge Rd 220 on the west edge of the Study Area can provide an important alternate route to Rge Rd 213 and service development in the north portion of the Study Area.

4.1.2 Roadway Assessment

In the 2007 Transportation Study, the estimated AM and PM Peak Hour traffic demand was assigned to the roadway network with 70% of the traffic assumed to access the Study Area from Highway 15 from the west and 15% from the south via Highway 830 (S). The remaining traffic is assumed to come from the east (10%) and north (5%) via Highway 45 and Highway 830 (N).

As previously mention in Section 2.2.4, the current development plans for the area are anticipated to be less intense than identified in the 2007 Transportation Study in terms of traffic generation. Thus, it was felt that the assessment completed in 2007 Transportation Study could continue to serve as a conservative estimate of the projected traffic impacts and road network needs.

Based on the 2007 Transportation Study, the Synchro software package, with saturation flows of 1,900 passenger car equivalents per hour per lane, was used to test a range of intersection

scenarios along Highway 15 and develop typical internal roadway intersection requirements. The model outputs from the 2007 Transportation Study for the key scenario results for key intersections are contained in **Appendix F**. The turnaround traffic demand scenarios assume a major turnaround at the Shell Chemical site.

Key findings are as follows:

- Both the AM and PM Peak Hour traffic movements can be the critical factors in defining the Level of Service at intersections along Highway 15 and within the Study Area.
- Provision of a second major access point into the west half of the Study Area, such as the development of Rge Rd 220 from Highway 15 to Twp Rd 562, is recommended for interim and long-term development of the Study Area. This access was subsequently constructed in 2010.
- Development of interchanges at the Highway 15 / Rge Rd 214 and Highway 15 / Rge Rd 220 intersections may be required to provide adequate capacity for the long-term daily operational and major turnaround traffic demands. Staging of these interchanges through interim use of signalized intersections as development evolves is possible.
- Twinning of Highway 15 east of its current limits (east of Rge Rd 214) does not appear to be warranted in the short term based on traffic volumes.
- Maintaining an intersection on Highway 15 between Rge Rd 212 and Rge Rd 211A is required to provide access to the proposed and existing developments in the southeast area. It is recommended that an eastbound left turn and westbound deceleration and acceleration lanes be considered to address truck turning movements at this intersection. It should be noted that relocation of the intersection to a new location between Rge Rd 212 and Rge Rd 211A would likely be required when the intersection of Highway 15 with the CPR warrants grade separation or by proposed development plans.

Figure 4.1 Recommended Long-Term Roadway Network

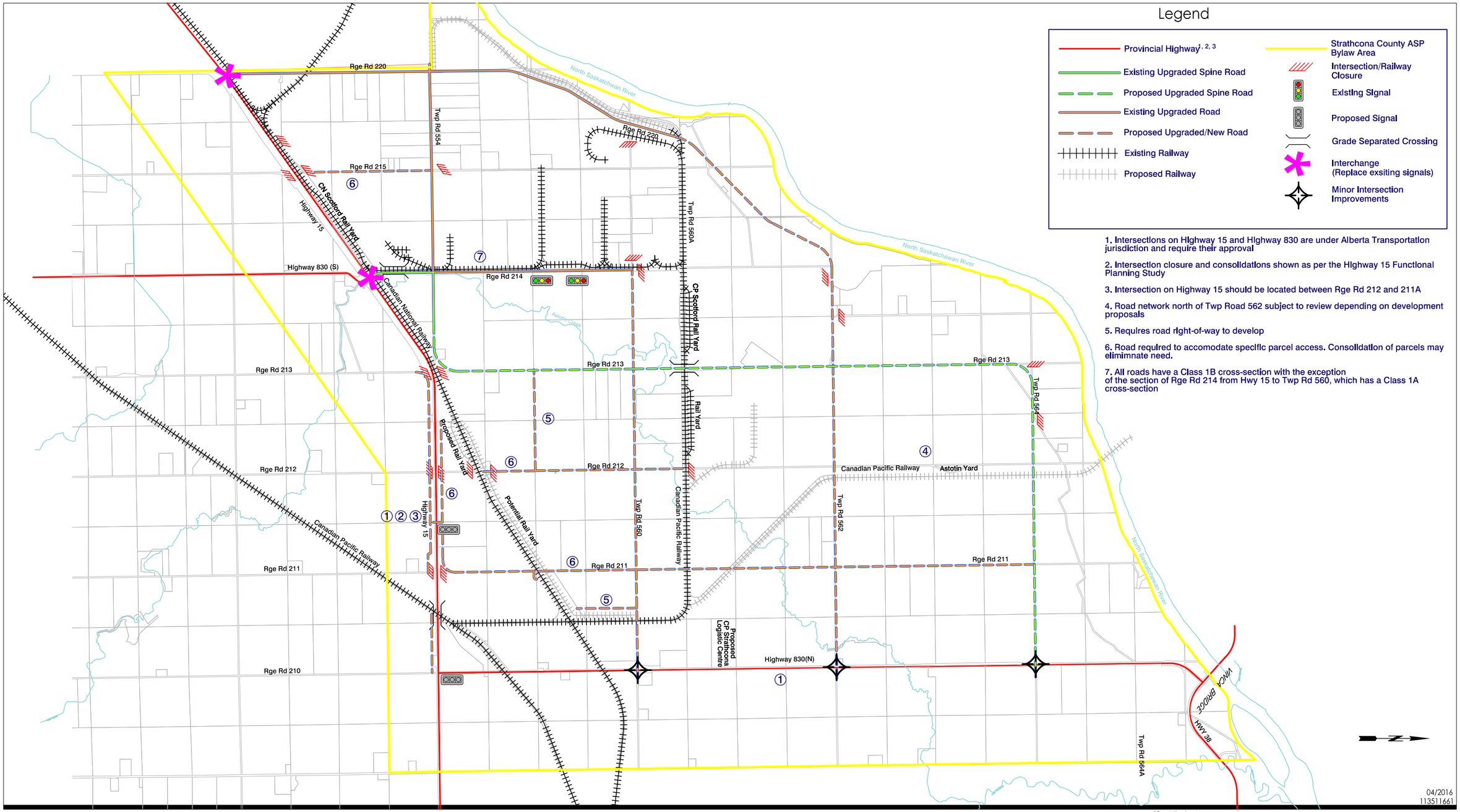

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FIGURE 4.1

Title

LONG TERM ROADWAY NETWORK

Figure 4.1 illustrates the recommended long-term roadway network for the Study Area under one scenario for development in the southeast quadrant. Key features are as follows:

- An interchange at the intersection of Highway 15 and Rge Rd 220, as identified in the 2016 Highway 15 Functional Planning Study.

- An interchange at the intersection of Highway 15 and Rge Rd 214, as identified in the Highway 15 Functional Planning Study. This interchange should be constructed either when traffic demands at this intersection warrant it or CN expands its Scotford Yard to the east across Rge Rd 214.

- Grade separation at the intersection of Highway 15 with the CPR, as identified in the 2016 Highway 15 Functional Planning Study.

- A signalized intersection upgrade including turn lanes at a new location along Highway 15 between Rge Rd 212 and Rge Rd 211A. With the addition of this intersection, the existing intersections at Rge Rd 212 and Rge Rd 211 would be realigned.

- Twinning of Highway 15 to east of Highway 830 (N).

- Development of service roads, as warranted by access needs and consistent with the concept outlined in the 2016 Highway 15 Functional Planning Study, along the north and south sides of Highway 15 from Rge Rd 213 to Highway 830 (N).

- Extension of the twinned section of Rge Rd 220 from approximately 400 metres north of Highway 15 to past the proposed entrance to development in Section 19, Twp 55. Upgrading of Twp Rd 554 to a two-lane roadway within a 40 metres wide right-of-way, is recommended except where intersection treatments are warranted. Minor improvements to existing intersections on Rge Rd 220 and Highway 15 and Rge Rd 214 and Twp Rd 554 are also likely required as part of this development.

- Replacement of Rge Rd 215 from Highway 15 to Twp Rd 554 with an access road connecting Twp Rd 554 near Rge Rd 214 with Rge Rd 220 on an alignment paralleling the CN tracks along Highway 15.

- Development of a relatively free flow alignment on Rge Rd 214 from Highway 15 to an upgraded Twp Rd 554 to the east. The intersection of Rge Rd 214 and Twp Rd 554 may require signalization and dual left turn and right turn lanes to accommodate the projected volumes of traffic accessing existing and proposed developments along Rge Rd 214. Alternatively, a multi-lane roundabout may be a suitable option for consideration.

- To connect Twp Rd 554 with Rge Rd 213 a minimum curve radius of 400 metres is recommended in order to maintain the desired design speed of 90 km/h. Intersections on curves of this radius are not recommended.

- Rge Rd 213 from Twp Rd 554 to Twp Rd 564 is recommended as a two-lane roadway within a 40 metres wide right-of-way, except where intersection treatments are warranted. The major intersections at Twp Rd 560, Twp Rd 562 and possibly the access into the former BA Energy site will warrant intersection treatments. If so, the close proximity of these intersections warrants use of a 50 metres wide right-of-way through this entire section.

- A two-lane roadway within a 40 metres wide right-of-way to connect Rge Rd 212 and Rge Rd 213 in the area between the CN tracks and Twp Rd 560 may be required for emergency access purposes depending on parcel consolidation and development plans in the area. Defining the location and the provision of this connection is assumed to be the responsibility of the developer as part of the development approval process.

- Rge Rd 212 from north of the CN tracks to south the CPR Scotford Rail Yard is recommended as a two-lane roadway within a 40 metres wide right-of-way, except where intersection treatments are warranted. Closure of Rge Rd 212 across the CPR Scotford Rail Yard could occur once the grade separated crossing of the rail yard is provided on Rge Rd 213.

- Rge Rd 211from north of the CN tracks to the consolidated intersection location on Highway 15 between Rge Rd 211A and Rge Rd 212 is recommended as a two-lane roadway within a 40 metres wide right-of-way.

- Rge Rd 211 north of the CN tracks from Twp Rd 560 to Twp Rd 562 is recommended as a two-lane roadway within a 40 metres wide right-of-way.

- Twp Rd 560 is recommended as a two-lane roadway within a 40 metres wide right-of-way except where intersection treatments are warranted (e.g. intersection with Rge Rd 213, Rge Rd 212, MEG Energy main access, Highway 830 (N)).

- Minor intersection improvements on Highway 830 (N) are recommended concurrently with upgrading of the intersecting Township Roads. Although not foreseen as a high-volume roadway, Highway 830 (N) is an important alternative access route into the Study Area. Accordingly, appropriate access control measures should be observed along Highway 830 (N) so that traffic operation is not unduly affected by increased development fronting onto and directly accessing Highway 830 (N).

- Other roadways such as Twp Rd 562, Twp Rd 564 and Rge Rds 211 and 213 north of Twp Rd 562 provide two-mile spacing for possible future development in this area. The roads are recommended as two-lane roadways within 40 metres wide rights-of-way, except where major intersections warrant intersection treatments.

- Roads shown in a location where there is currently no road right-of-way may or may not be required to accommodate development plans and maintain adequate legal and emergency access routes to various land parcels. The acquisition of required road right-of-way and provision of these roads will be a responsibility of the applicant as part of the development approval process.

It should be noted that while these improvements do address the long-term needs of the Study Area, little excess capacity is available with this plan if development is traffic intensive. Should there be increased development in the Study Area, development to the east of the Study Area or a desire to accommodate more than nominal amounts of construction related traffic, then Highway 15 may need further upgrades to provide sufficient capacity. In addition, two lane entrance/exit ramps may be required at the Rge Rd 220 and Rge Rd 214 interchanges. These changes, if eventually required, can be accommodated within the illustrated long-term plan.

In addition to the improvements shown within the Study Area, improvements to Highway 15 through Fort Saskatchewan may be required if a suitable by-pass of the City is not developed. As a minimum, it is suggested that the traffic signals through the Study Area as well as through the City of Fort Saskatchewan be coordinated through a centralized traffic control system. They can also allow for monitoring through cameras and manual overrides of timings for special events. Optimizing the proposed traffic signal system could minimize potential delays and could address in some measure, at least in the short-term, concerns expressed by the City of Fort Saskatchewan about traffic flows through the City during peak traffic periods. A more robust approach would be to develop a free-flow by-pass of the City of Fort Saskatchewan, but this is beyond the scope of this study.

The Alberta Industrial Heartland includes existing and anticipated heavy industrial operations at a scale that utilize larger tracts of land than typically seen within other areas of Strathcona County. As a result of the expected scale of development, landholdings of individual landowners have been accumulated in a manner that traverses the roadway network shown within Figure 4.1. As a result, potential development plans and consolidation of parcels may result in proposals to alter the planned roadway network.

It is acknowledged that an alteration to the roadway network shown within this study may be considered by the County upon an application for subdivision, consolidation or development. In this regard, the roadway network may be altered subject to an applicant providing sufficient information as outlined within Strathcona County's Alberta's Industrial Heartland Area Structure Plan to support a proposed alteration.

Further, an application proposing to alter the roadway network will be required to adhere to the following:

- Alternative alignments must not create new at-grade railway crossings.
- The planning of any new or altered roadways is the responsibility of the applicant.
- Public engagement will be required to provide a means for any person who may be affected by the proposed alteration to make suggestions and representations.
- In accordance with the Municipal Government Act, no road in a municipality that is subject to the direction, control and management of the municipality may be closed except by bylaw. Therefore, Council adoption of a road closure bylaw is required to accommodate a realignment of any portion of the roadway network shown within a road plan.
- Any alteration to the roadway network will be required to comply with any applicable federal and/or provincial statutes or municipal bylaws and/or policy. In the event of a conflict between any of the provisions of this study and the provisions of any statute, bylaw and/or policy, the provisions of the statute, bylaw and/or policy shall prevail.

4.1.3 Emergency Egress Overview

Emergency services for the Study Area are primarily provided from Station #4 (Heartland Hall) located on Highway 830 (S) just south of Highway 15. Additional emergency services are based in the Town of Bruderheim east of the Study Area.

As part of the planning principals for this study, it was determined that the roadway network should be developed so that individual sites within the Study Area could be provided with two egress routes so that if one is blocked during an emergency evacuation there is an alternative route available. The following principles were developed to provide that possibility while respecting Alberta Transportation's access control desires for Highway 15 and Hwy 830 (N), the constraints that the CP Rail and CN tracks impose and possible site specific development proposals to consolidate lands and close some of the existing grid road network.

- Retaining, for the most part, the existing grid road network provides a reasonable level of land access while providing alternative routes out of the Study Area.
- Multiple access points onto Highway 15 and Highway 830 (N) should be provided.
- At-grade rail crossings should be minimized on egress routes and where possible an alternative egress route that does not require an at-grade railway crossing of that rail line should be provided.

While these principles have been respected in the recommended overall roadway network, it is recommended that existing emergency egress plans for each stakeholder be reviewed to confirm they remain viable with the proposed roadway network. Furthermore, it is recommended that new development proposals provide an emergency egress plan that addresses both the roadway network conditions at the time of development and the recommended long term roadway network.

4.1.4 Recommended Design Standards and Cross-Sections

The recommended design speed for roadways within the Study Area is 90 km/h. This design speed will allow for a posted speed of 80 km/h, which is consistent with the current posted speed on Rge Rd 214.

The road network is divided into Class 1A and Class 1B roads based on the recommended typical cross-section for that road. The recommended cross-sections for the road network, which will support a design speed of 90 km/h, are illustrated in **Figure 4.2**. Note that while the proposed rights-of-way are of adequate width to typically accommodate shallow buried utilities and municipal utilities, like potable water and telephone, and lower voltage power lines, they do not provide adequate right-of-way for high voltage power transmission lines or pipelines. Separate rights-of-way will be needed to accommodate these types of facilities. Utility crossings of roadways and access points will need to consider vertical clearance requirements for oversize vehicles, which should be confirmed during the design phase of each utility crossing.

The basic cross-section recommended for developing the road network in the Study Area is the Class 1B cross-section. This is a 10 metres wide roadway within a 40 metres wide right-of-way.

While the 40 metres wide right-of-way is typically adequate to accommodate a two-lane roadway, it is not wide enough to accommodate the additional roadway width required to provide turn lanes. Turn lanes would typically be required at all major roadway intersections and at the main access to major facilities. In these instances, it is recommended that the road right-of-way be widened to 50 metres. The limits of the 50 metres wide right-of-way should be defined by:

- The extent of the road widening required by the intersection.
- The relatively close proximity of two intersections suggesting one consistent right-of-way width for that section.
- Any desire to maintain adequate road right-of-way width to accommodate future undefined major access needs.

The four-lane divided cross-section within a 60 metres wide right-of-way (Class 1A cross-section) provides a high standard, high capacity roadway that is typically only warranted where peak hour volumes exceed 800 vehicles per hour in the peak direction. With the proposed network, the four-lane divided cross-section in the 60 metres wide right-of-way is not warranted beyond the existing Rge Rd 214 and its realigned connection to Highway 15 and the south end of Rge Rd 220 as it approaches the connection to Highway 15.

Currently, Highway 15 through the Study Area has a posted speed of 100km/h, except through the signalized intersection of Rge Rd 220 and Rge Rd. At these locations, the posted speed is 80 km/h. The speed limit immediately to the west through the City of Fort Saskatchewan is 70km/h. With the recommendation being to install additional traffic signals on Highway 15 at various

stages of development, additional speed reduction zones will likely be warranted through these signalized intersections. Rather than having multiple speed zones on Highway 15 through the Study Area, it is suggested that the speed limit for Highway 15 through the entire Study Area (Rge Rd 220 to Highway 830 (N)) be a consistent 80 km/h.

4.1.5 Recommended Intersection Treatments

Provision of left and right turn bays on two-lane cross-section roadways will minimize impacts on through traffic. However, they are likely only warranted at intersections of major (Class 1) roadways and at the main access points to major traffic generating facilities.

The Spine Road (Twp Rd 554 and Rge Rd 213) is a key element of the roadway network and minimizing delays to traffic on this road should be a key consideration in allowing access onto the roadway. Thus, it is recommended that minor access points, in terms of traffic volumes (10 or less vehicles per day) using them, on the Spine Road be minimized. Where needed these minor access points should be provided with right turn deceleration and acceleration tapers of 25:1. Left turn lanes are unlikely to be warranted for the low volumes using these access points, but the tapers will reduce the impact of vehicles entering and exiting the minor access.

For typical daily operations traffic volumes, except where noted in the Recommended Plan, Class 1 Roadway intersections and plant accesses will likely function at a reasonable level of service under stop sign control.

During plant turnarounds, significant additional turning volumes can be added to the specific plant access and Class 1 Roadway intersections. Provision of additional left turn capacity (e.g. dual left turn lanes) will typically be required to accommodate the additional traffic volumes. Under stop sign control, dual left operations are not recommended due to possible sight line constraints from adjacent vehicles. Accordingly, temporary signalization or police control of these intersections during the peak periods of the turnaround may be required to accommodate any need for dual left turn lanes.

Since dual left turn lanes may be required from time to time, the recommended intersection treatments include a section of three-lane (one lane towards and two lanes away) roadway downstream of the location of the dual left turn lanes. After 300 metres, this section of three-lane roadway tapers back into the typical two-lane cross-section. **Figure 4.3 and Figure 4.4** illustrate the recommended intersection treatments. Variations in these intersection treatments may be required to accommodate specific site constraints.

In addition to accommodating daily operational and turnaround traffic, some special design features may need to be provided to accommodate construction activities. Typically, these requirements relate to oversize loads, which require special turning radii. More generous corner radii are typically provided on construction access routes, often resulting in very open areas of pavement. Use of medians, islands and pavement markings should be considered to help direct traffic through these areas, while still allowing wide loads and loads with wide swings to pass

though these areas. Alternatively, the use of roll faced curbs on low profile traffic control islands; so that oversize loads can travel over them can also be considered.

4.2 RAIL CROSSINGS

4.2.1 Warrants

Cross buck with a standard stop sign are used to mark rail crossings on low volume two lane roadways. Most of the existing rail crossings in the Study Area are marked with cross buck with a standard sign.

Where roadway vehicle and train traffic volumes (cross-product), sight lines and train speeds warrant, the crossing protection is typically upgraded to flashing lights and in all cases gates. Flashing lights protect the existing rail crossings of Rge Rd 214. It is recommended that flashing lights with gates be provided at all crossings where rail yards or multiple tracks crossing roadways may create sight line constraints due to stationary rail cars.

Provision of grade-separated crossings is typically recommended at new crossings when the cross product of the Average Annual Daily Traffic (AADT) and the number of trains exceeds 200,000. The grade separation on Rge Rd 213 over the expanded CPR yard is being proposed due to the large number of slow-moving trains that will cross Rge Rd 213 and the impact having to split train consists to leave the roadway open will have on yard operations. Additionally, the slow-moving trains crossing Rge Rd 213 will impact vehicle traffic using Rge Rd 213 without the grade separation in place.

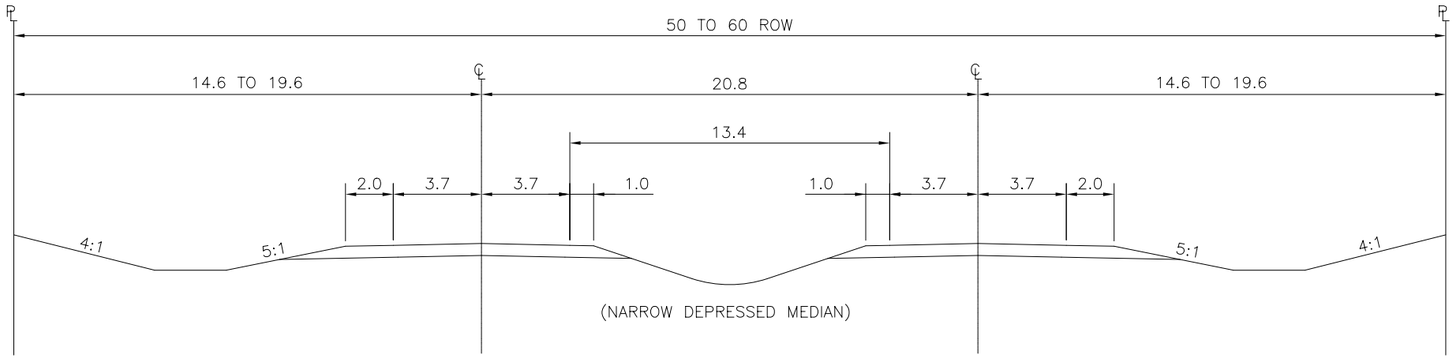
4.2.2 Recommendations

As noted in **Section 4.1.1**, one of the guiding philosophical points is to eliminate unneeded rail crossings. To this end, it would appear that the existing rail crossing on Rge Rd 215 north of Highway could be closed along with the recommended closure of the intersections on Highway 15.

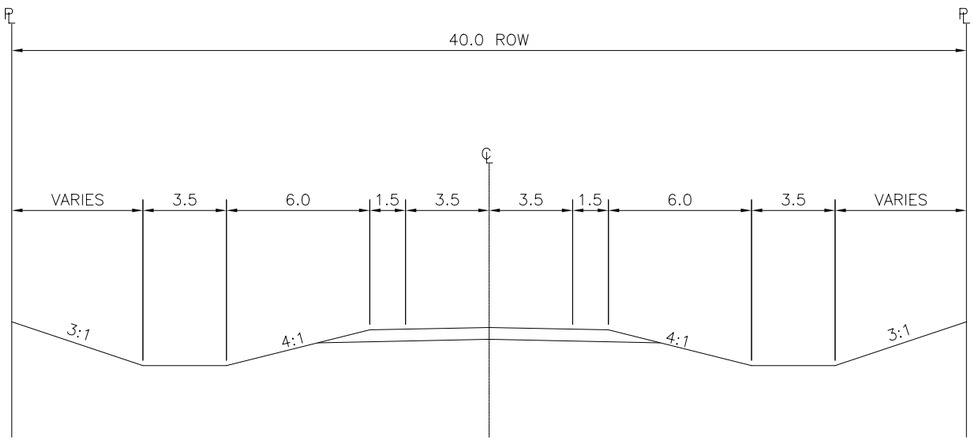
Provision of the proposed grade separated rail crossing of the expanded CP Rail yard at Rge Rd 213 is an important element in the overall plan and its construction, prior to the expanded yard being operational, is recommended.

CN's concept to expand their rail yard to the east across Rge Rd 214 north of Highway 15, creates a similar situation to CPR's yard expansion across Rge Rd 213 north of Twp Rd 560. Should this expansion proceed, a grade separation of the yard area is recommended. Given the close proximity of the rail line to Highway 15, providing a grade separated interchange of the Rge Rd 214 and Highway 15 intersection should be considered to accommodate any grade separation of the rail line. It is probable that this yard expansion will occur at a similar time frame to when traffic demands warrant construction of an interchange at Highway 15 / Rge Rd 214.

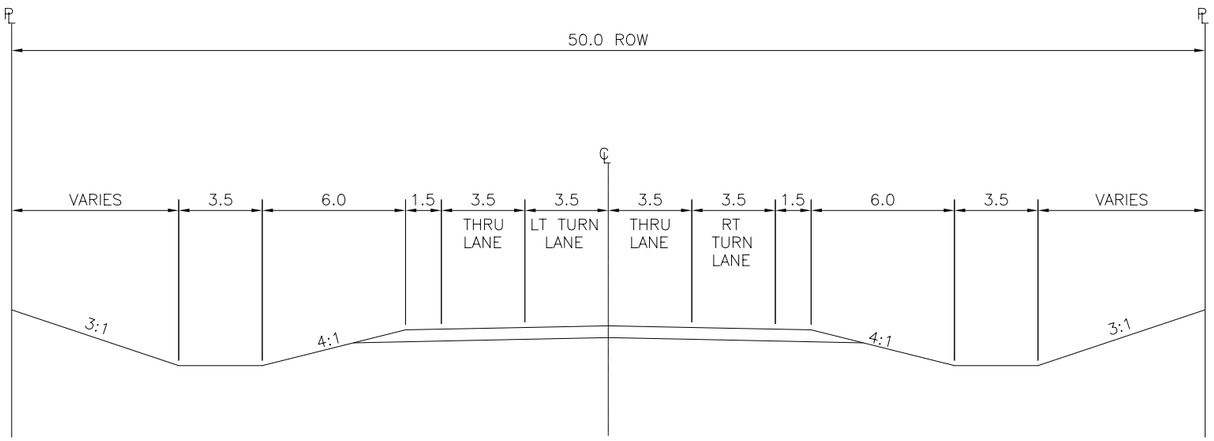
Figure 4.2 Typical Cross Sections



TYPICAL CLASS 1A DIVIDED CROSS-SECTION



TYPICAL CLASS 1B CROSS-SECTION



TYPICAL CLASS 1B CROSS-SECTION
(AT TEE INTERSECTION)

NOTE: BACKSLOPING BEYOND PROPERTY LINES MAY BE REQUIRED IN SPECIAL CASES.

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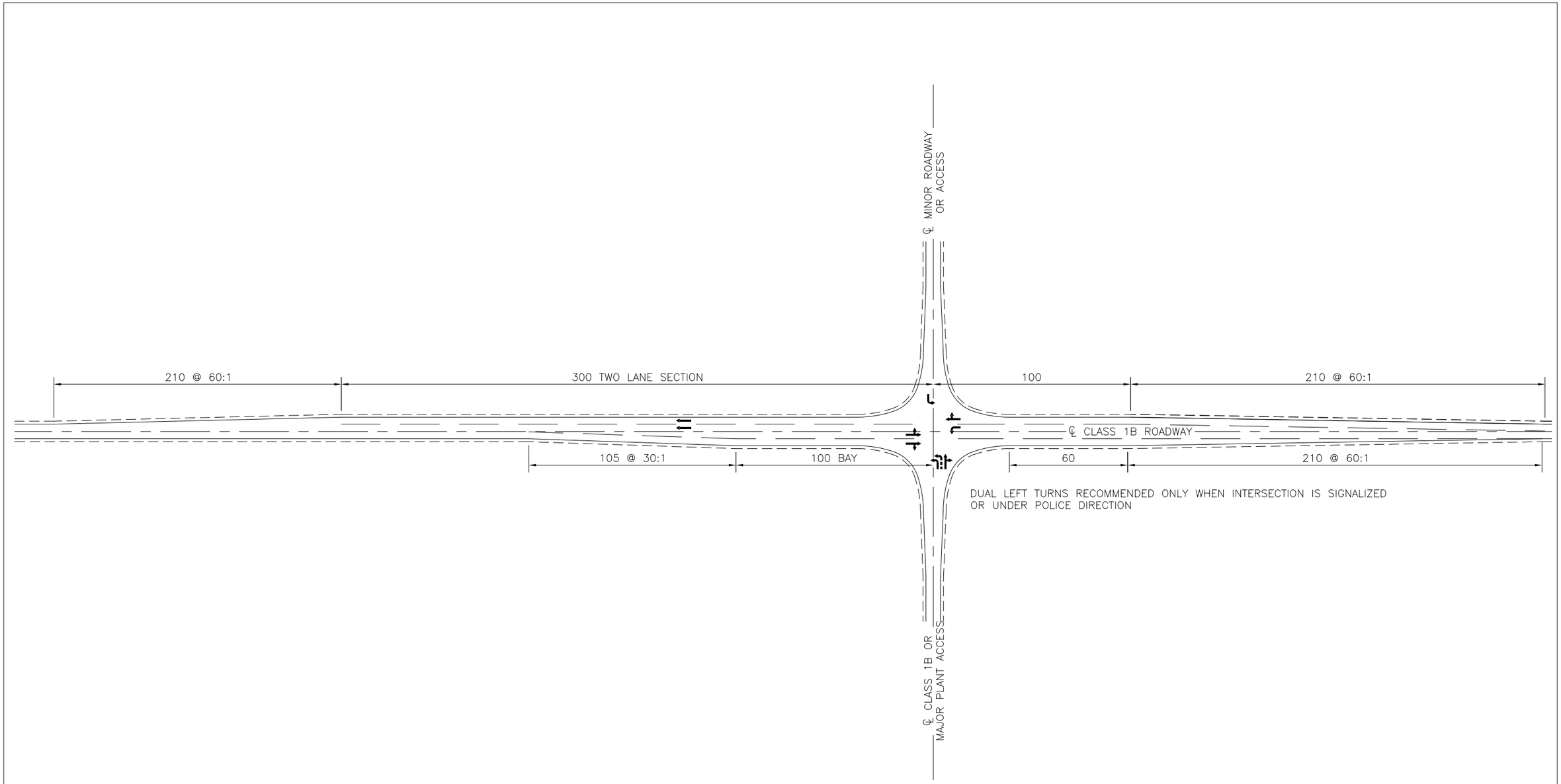
Figure No.
FIGURE 4.2

Title
TYPICAL CROSS-SECTIONS

Figure 4.3 Typical Intersection Treatment



NOTE: DESIGN SPEED = 90km/h
DRAWING NOT TO SCALE

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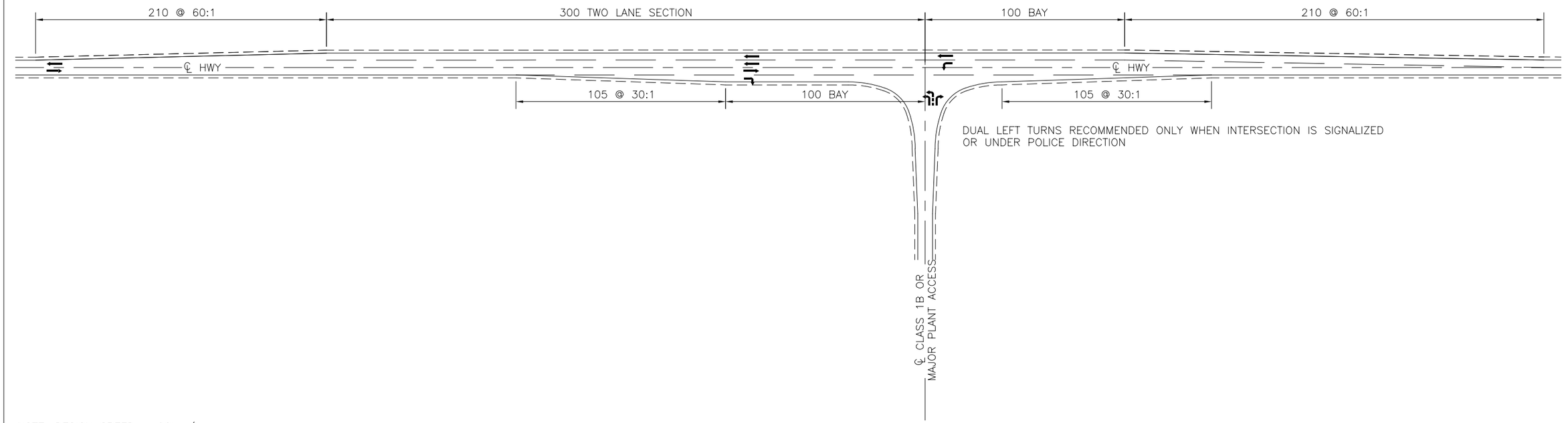
Figure No.
FIGURE 4.3

Title
TYPICAL INTERSECTION TREATMENT

Figure 4.4 Typical T-Intersection Treatment



NOTE: DESIGN SPEED = 90km/h
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Figure No.
FIGURE 4.4

Title
TYPICAL TEE INTERSECTION TREATMENT

4.3 STAGING

The proposed staging of the improvements is illustrated in **Figure 4.5**. The proposed staging is based on current expectations of the timing of individual developments. Changes in development plans and their timing will result in changes to the staging plan.

Current plans indicate a significant number of new facilities will be constructed and operational in the next 10 years. These facilities are for the most part located south of Twp Rd 562 and are heavily dependent on the proposed Rge Rd 214/213 corridor for access. Improvements along this corridor represent an initial priority and need to be completed expeditiously.

Shell's current upgrader expansion envisages the closure of Twp Rd 560A and Rge Rd 214 north of Twp Rd 560. Prior to either proposed closure in the next few years, it is recommended that the proposed Rge Rd 220 connection from Twp Rd 560A to Twp Rd 562 be constructed. The Rge Rd 220 connection provides an alternative route to the Rge Rd 214 / 213 corridor and in addition to being a key element of the long-term roadway network can address construction traffic demands through by-passing existing facilities. Its early construction is recommended.

In the longer term, after an initial upgrading and signalization of the Highway 15 / Rge Rd 220 intersection as part of the development of Rge Rd 220, an interchange will likely be required at this location as identified in the 2016 Highway 15 Functional Planning Study.

The requirement for a grade separation on Highway 15 due to increasing traffic volumes or an expansion of the CN yard at Rge Rd 214 is expected to occur in the 5 to 10-year time horizon.

The timing of proposed developments is likely the primary driver for the timing of the proposed improvements to Twp Rd 560, Rge Rd 212 and Rge Rd 211 in the southeast quadrant of the Study Area. These roadway improvements are expected to be completed concurrent with development. Longer term, the intersection of Highway 15 between Rge Rd 212 and Rge Rd 211A will likely warrant signalization.

The timing of the remaining roadway improvements, such as Twp Rds 562 and 564 and Rge Rd 211 north of Twp Rd 560 are dependent on development occurring in those areas. They are longer-term requirements beyond a 10-year horizon. The possible exception to this would be the west half of Twp Rd 562, where Kinder Morgan's site plan is not yet known and site access may necessitate some upgrading in this area.

4.4 STUDY UPDATES

The original study for this Study Area was completed early in 2007 and then updated later the same year due to significant changes in plans by several stakeholders. Since then even more changes in plans have occurred. It should be recognized that existing and new stakeholder plans will likely continue to evolve as the Study Area develops. These evolving plans may negate or change the need for some elements of this Study Update's recommended plan or its staging

and/or may result in additions to the recommended plan. Accordingly, the recommendations in this report should be treated as a guideline only and should be regularly reassessed in the context of evolving plans for development.

Figure 4.5 Staging Plan

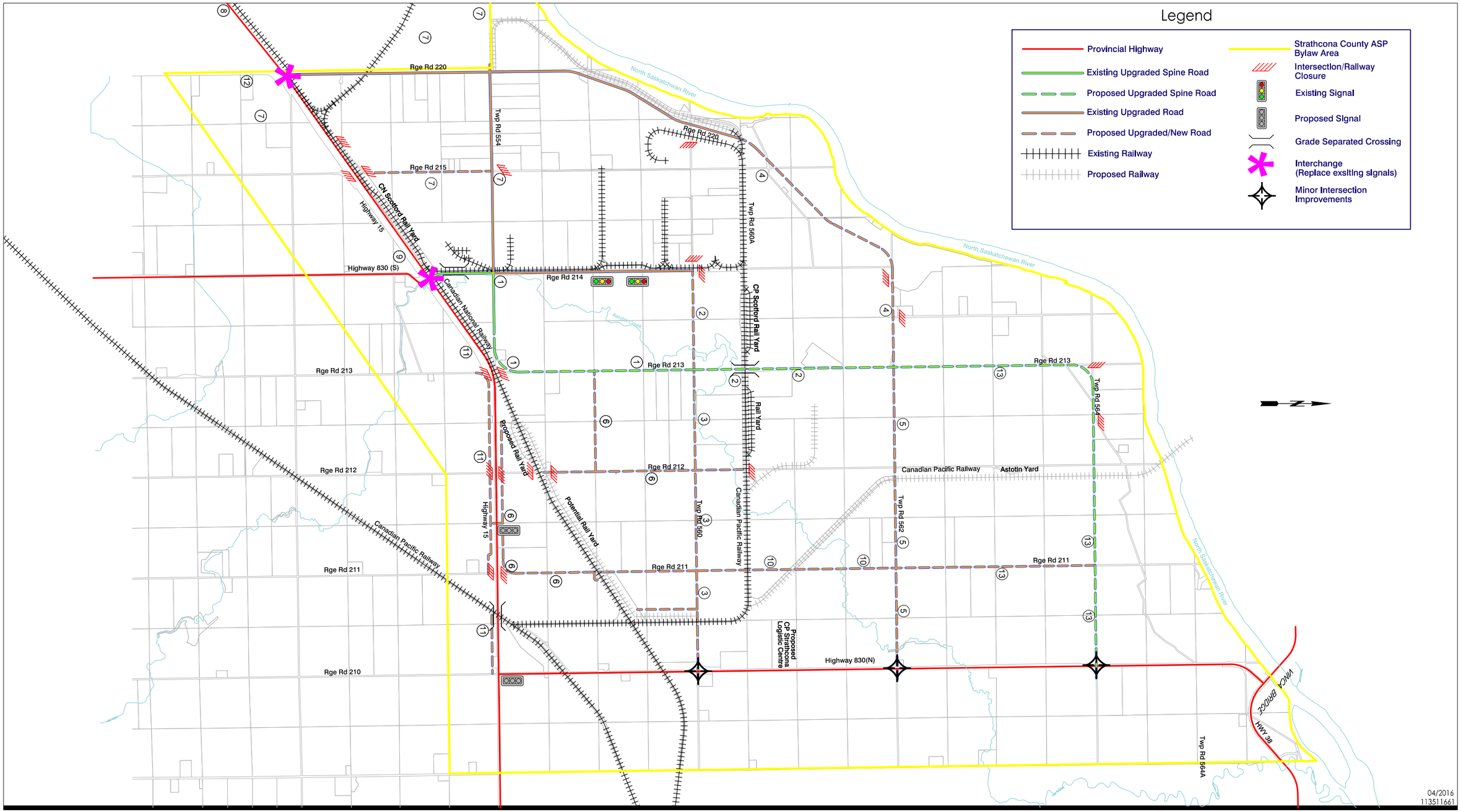

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Figure No.
FIGURE 4.5

Title
STAGING PLAN

5.0 SUMMARY OF POTENTIAL PROJECTS

5.1 POTENTIAL PROJECTS

Table 5.1 summarizes the potential projects associated with accommodating the staging of the recommended roadway network for the areas summarized in **Figure 4.5** and based on the projected long-term employment summarized in **Table 2.1** and described in **Section 4.3**. It includes Alberta Transportation's proposed upgrading of Highway 15 and development of service roads for access control purposes.

Advancement of various elements of this work may be desirable in some cases to provide improved construction access. Furthermore, portions of various sections of the work within an area may need to be done at different times to accommodate specific development proposals and funding constraints.

Table 5-1 Potential Project Elements

Stage	Improvements by 2025	Quantity
1	Rge Rd 214 / Twp Rd 554 Intersection Treatment and Signals or Roundabout	1
1	Twp Rd 554 Water Crossing	2
1	Twp Rd 554 – Rge Rd 214 to Rge Rd 213	4,300m
1	Rge Rd 213 – Twp Rd 554 to Twp Rd 560	4,300m
2	Twp Rd 560 – Rge Rd 214 to Rge Rd 213	1,600m
2	Twp Rd 560 – Water Crossing	1
2	Twp Rd 560 / Rge Rd 213 Intersection Treatment	1
2	Rge Rd 213 – Twp Rd 560 to Twp Rd 562	3,200m
2	Rge Rd 213 – Water Crossing	1
2	Rge Rd 213 / Twp Rd 562 Intersection Treatment	1
2	CP Rail Yard Grade Separation	
3	Twp Rd 560 – Rge Rd 213 to Highway 830(E)	5,000m
3	Twp Rd 560 Intersection Treatments (Highway 830 (E), Rge Rd 211, Rge Rd 212)	3
3	Twp Rd 560 Rail Crossing	1
4	Rge Rd 220 – Twp Rd 560 to Rge Rd 213	5,800m
4	Rge Rd 220 – Rail Crossing	1
5	Twp Rd 562 – Rge Rd 213 to Highway 830(E)	5,000m

Summary of Potential Projects
December 6, 2017

Stage	Improvements by 2025	Quantity
5	Twp Rd 562 – Water Crossing	1
5	Twp Rd 562 – Intersection Treatments (Rge Rd 213, Rge Rd 211, Highway 830(E))	3
6	Rge Rd 211 – Realigned from Highway 15 to CP Rail	4,200m
6	Rge Rd 211 – Rail Crossing	1
6	Rge Rd 211 / Highway 15 Intersection Improvement	1
6	Rge Rd 212 – South of Twp Rd 560 to Twp Rd 560 with connection to Rge Rd 213	3,200m
6	Providence Grain access from Twp Rd 560	800m
7	Rge Rd 220 – North of Highway 15 to Twp Rd 554	2,800m
7	Rge Rd 220 / Highway 15 Signals	1
7	Twp Rd 554 – Rge Rd 220 to Rge Rd 214	3,200m
7	Twp Rd 554 Intersection Treatments (Rge Rd 220, Rge Rd 214)	2
7	Twp Rd 554 – West of Rge Rd 220	1,600m
7	Rge Rd 215 – North of CNR tracks to Twp Rd 554	2,000m
8	Highway 15 Computerized Traffic Signal Control System (West end of Fort Saskatchewan to Highway 830 (E)) - if warranted	1
9	Rge Rd 214 / CN Yard and Highway 15 Grade Separation	
10	Rge Rd 211 – Twp Rd 560 to Township 562	3,200m
10	Rge Rd 211 – Water Crossing	1
10	Rge Rd 211 - Rail Crossing	2
Stage	**Improvements Beyond 2025**	**Quantity**
11	Highway 15 Twinning to east of Highway 830 (E) and Service Roads (From Highway 15 Functional Planning Study)	
12	Rge Rd 220 / CN Track and Highway 15 Grade Separation	
13	Rge Rd 211 – Twp Rd 562 to Twp Rd 564	3,200m
13	Rge Rd 213 – Twp Rd 562 to Twp Rd 564	3,200m
13	Twp Rd 564 – Rge Rd 213 to Highway 830 (E)	5,000m
13	Twp Rd 564 - Intersection Treatments (Rge Rd 213, Rge Rd 211, Highway 830 (E))	3

Appendix A
2007 TRANSPORTATION STUDY PLAN

NOTES:
1. LOCATION OF HWY 15 AND RR 214 INTERCHANGE SUBJECT TO FURTHER PLANNING WORK

Legend

- Study Area
- City of Fort Saskatchewan Boundary
- Provincial Highway (Four Lane)
- Provincial Highway (Two Lane)
- Class 1A Road (50m to 60m Right-of-Way)
- Class 1B Road (40m and 50m Rights-of-Way)
- Existing Railway
- Proposed Railway
- Intersection Closure
- Signals (Existing / New)
- Overpass / Interchange (Signals in Interim)
- 100km/h Existing Speed Limit
- 100km/h -> 80km/h Proposed Speed Limit Revision

Stantec

Strathcona County
Strathcona Area Industrial Heartland
Transportation Study Update

Figure 4.1
Overall Ultimate Transportation Plan

Appendix B
HIGHWAY 15 FUNCTIONAL PLANNING STUDY
EXECUTIVE SUMMARY

Stantec

Strathcona County

Functional Planning Study
Highway 15:06
From Range Road 220 to Highway 830

December 2016

E00311A

CIMA+
Partners in excellence

Executive Summary

Strathcona County, as requirement of the roadside development permit from Alberta Transportation for the intersection upgrade of Range Road 220, retained CIMA+ to conduct the Functional Planning Study of Highway 15 from Range Road 220 to Highway 830 north on Alberta Transportation's behalf. The study's objective is to determine the required interim and long term improvements to accommodate the estimated future traffic within the study area.

Existing Conditions

Highway 15 is a major provincial highway under Alberta Transportation jurisdiction that transitions from a four-lane divided highway to a two-lane undivided highway within the study area. An existing CN rail line parallels Highway 15 to the north from Range Road 220 to Range Road 213. A Canadian Pacific (CP) rail line intersects the roadway west of Range Road 210. Highway 15 provides access to the City of Fort Saskatchewan, the Hamlet of Josephburg, the Town of Bruderheim and the facilities within Alberta's Industrial Heartland. Transportation infrastructure improvements are necessary to accommodate traffic resulting from new or expanding developments.

Highway Classification

The Capital Region Board's Integrated Regional Transportation Master Plan classifies Highway 15 as an expressway. Due to the proximity to the Heartland, the highway is also a high load corridor and long combination vehicle route. Any intersection improvements must be able to accommodate these vehicles. Based on Alberta Transportation's Geometric Highway Design Guide, Highway 15 has a design designation of RAD-412.4-120. The roadway will require upgrades to meet this classification along its entire length within the study area.

Traffic

A traffic analysis was completed for 20 and 50 year design horizons to estimate the future traffic on Highway 15. The 20 year horizon traffic model relied on the comprehensive travel demand model owned by the Alberta Industrial Heartland Association (AIHA). The assumptions made in this model are still applicable to a region that is complex, uncertain and heavily influenced by developments. The 50 year scenario was modeled using a 3.0% non-compounded growth rate from the 20 year horizon model.

The 20 year traffic model assumes that a total of 10 new hydrocarbon processing facilities will be constructed by 2030. The existing model assumes the intersection at Range Road 220 is unsignalized; however it has recently been upgraded to a similar configuration to that at Range Road 214.

The AIHA model includes the Regional Ring Road and a Fort Saskatchewan bypass road, neither of which are proposed in the IRTMP. The exclusion of these roads from the traffic model did not affect traffic volumes, as the IRTMP recommends other roadway upgrades to achieve similar results.

20 Year Design Horizon

Traffic modeling showed that all intersections operate at an adequate Level of Service (LOS) and that major intersectional improvements are not required at this stage.

The accesses at Range Road 213, 215 and 215A are recommended to close during the 20 year horizon due to safety concerns. The access at Range Road 215 will continue to operate as an access into Canadian National Railway Company's (CN's) Scotford Yard. In the event that the Range Road 215 access requires closure for safety reasons, the current westbound lane of Highway 15 will become a back service road for CN. The existing eastbound lane will be repurposed for westbound traffic and a new eastbound lane will be constructed.

Twinning to an expressway is considered when the traffic volume reaches 8000 AADT. Based on traffic analysis, Highway 15 will approach this value in 2030, however the exact year of twinning should be determined based on actual traffic volumes.

Twinning Alignment Analysis

Two alignment options were considered for the remaining undivided portion of Highway 15, twinning to the north and twinning to the south. Both have a relatively equal land impact, however the north option impacts more residences and land parcels than the south alternative. Due to the proximity of Highway 15 to Alberta's Industrial Heartland, many utilities parallel and cross the Highway. The majority of the utilities are impacted by both twinning options with the exception of the Vegreville Corridor Water Services Commission. This water line is located north of Highway 15 and is a major constraint for the north twinning option.

Twinning to the south with a 54 m centerline to centerline spacing is the recommended option for Highway 15 as shown in the plans included in **Appendix C**. It meets all the design criteria, and maintains continuity with the existing twinned section of roadway west of Range Road 213. There is a lower impact to residences, land and utilities, which reduces the overall cost.

When Highway 15 is twinned, the direct property accesses will no longer be permitted and will require removal. Alternate access will be provided via service roads off of adjacent range roads, as shown in Plans P-3406-01 to P-3406-03 in **Appendix C**.

50 Year Design Horizon

As traffic increases, the intersection of Highway 15 with the CP rail line will warrant grade separation. Based on existing grades an overpass is the best option for this location. Due to a lack of available sight distance, closure of Range Road 211 intersection and redirection of traffic to the Range Road 212 intersection is recommended. An alternative approach is to close both the Range Road 211 and 212 intersections and construct a new intersection midway between these two locations. The feasibility of this option should be considered at such time upgrades to Range Road 212 and/or closure of Range Road 211 is required.

The intersections at Range Road 214 and 220 will operate at a LOS C using a 2.5% growth rate in the 50 year horizon. As both intersections operate near capacity, the protection of right-of-way for interchanges is recommended by provisions included in the Highway Development Act. The intersections at Range Road 212 and 210 will require signalization and minor configuration improvements to accommodate the increased traffic.

Long Term

Beyond the planning horizon, the intersections of Range Road 214 and 220 with Highway 15 may require grade separation. Conceptual interchange configurations have been developed and are provided in **Appendix D**. A modified Parclo B4/Diamond is the recommended configuration based on traffic volumes and land restrictions. The recommended alignment deviates from a typical Parclo B4 because of constraints such as the CN rail line paralleling Highway 15 from Range Road 220 to 213. To accommodate the interchanges, the main corridor of the highway will need to be reconstructed further south of the rail line. By constructing the majority of the structure south of the highway in agriculturally zoned lands, the overall cost of the interchange is reduced.

Right-of-Way Requirements

An additional right-of-way will be required for the south twinning of Highway 15. The new right-of-way boundary will be offset by 30 m from the eastbound lanes and will require approximately 27.7 ha of land. A right-of-way for the service roads adjacent to the highway will also need to be acquired.

It is recommended to protect the right-of-way required for future interchanges at the intersections of Range Road 214 and 220 with Highway 15.

Conceptual Cost Estimate

50 year cost estimates were completed for both the north and south twinning options and are as listed below:

- North Twinning - $39,500,000.00
- South Twinning - $31,200,000.00

Utilities

There are numerous pipelines, wells and electrical lines within close proximity of Highway 15. The majority of the oil and gas pipelines parallel the highway; however there are several crossing the roadway. The Vegreville Corridor Water Services Commission water line parallels Highway 15 from Range Road 213 to 210 along the highway's north right-of-way boundary. From Range Road 220 to 214, overhead electrical lines run parallel to the highway with a single crossing west of Range Road 214.

DRAWING P-3406-1

HIGHWAY HWY 15:06

CONTRACT

DESCRIPTION
HIGHWAY 15 TWINNING - PLAN AND PROFILE - NORTH ALTERNATIVE

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CIMA

JOB No. E00311A

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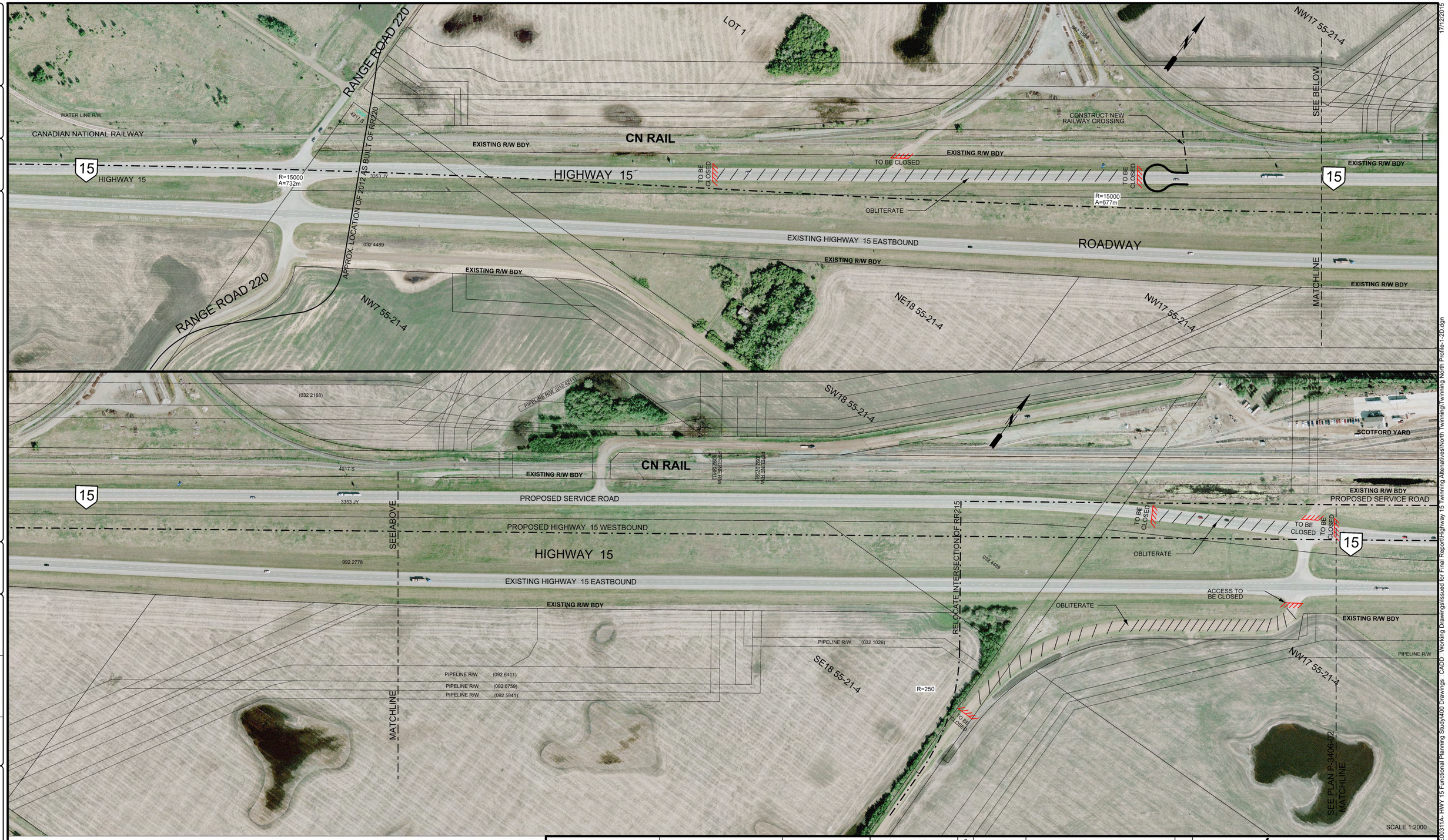

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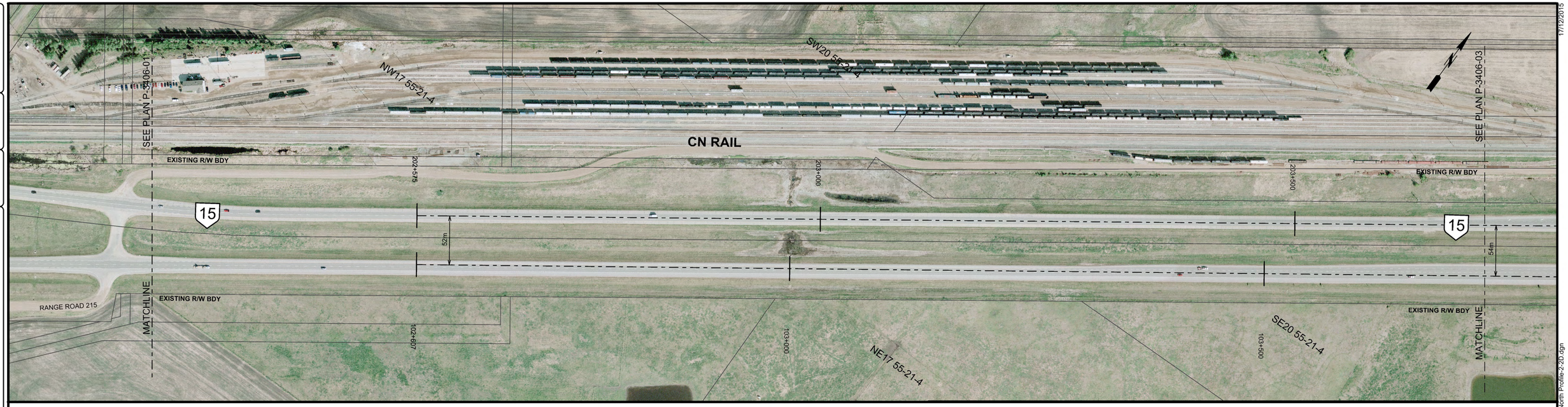

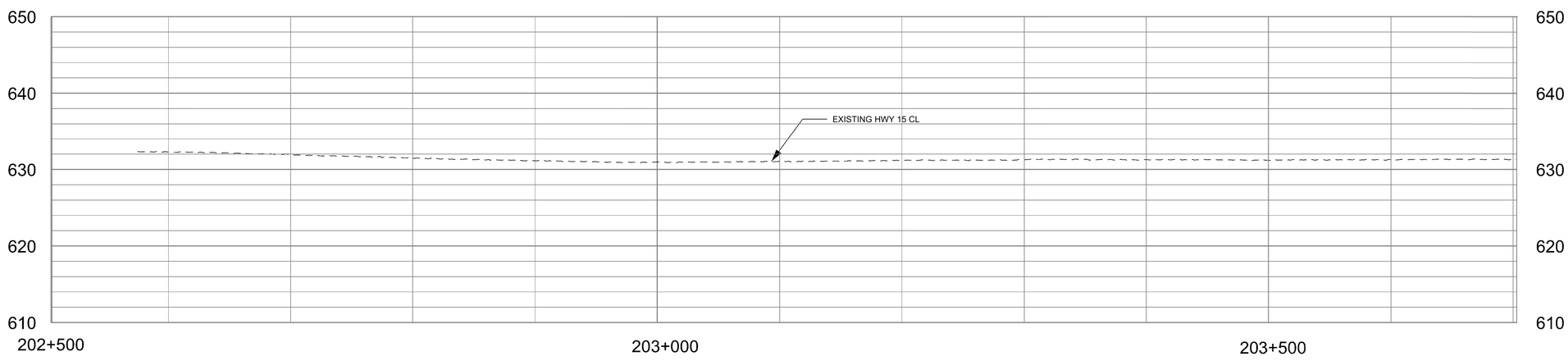

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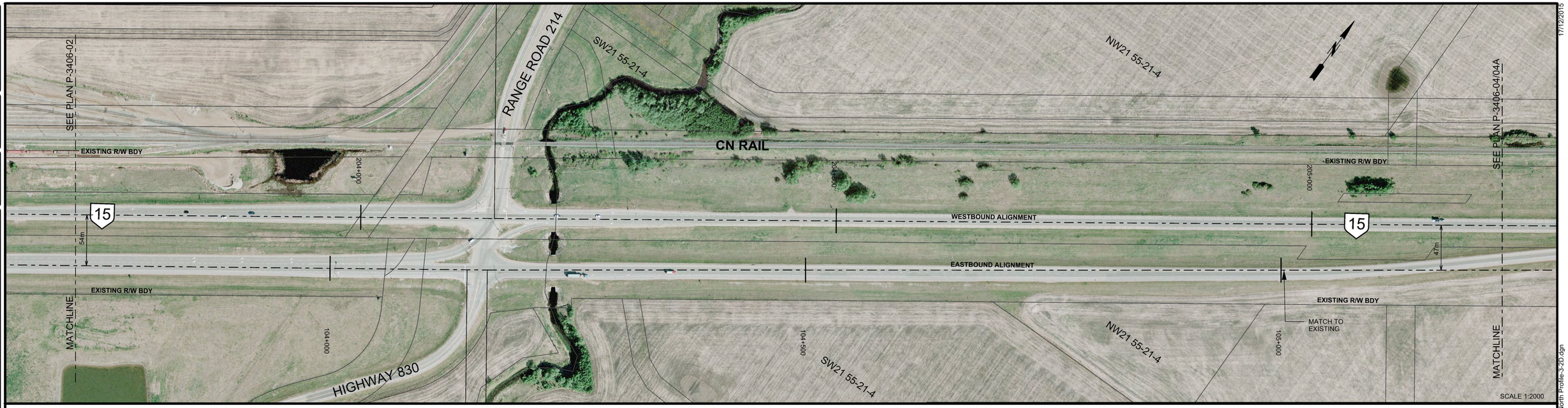

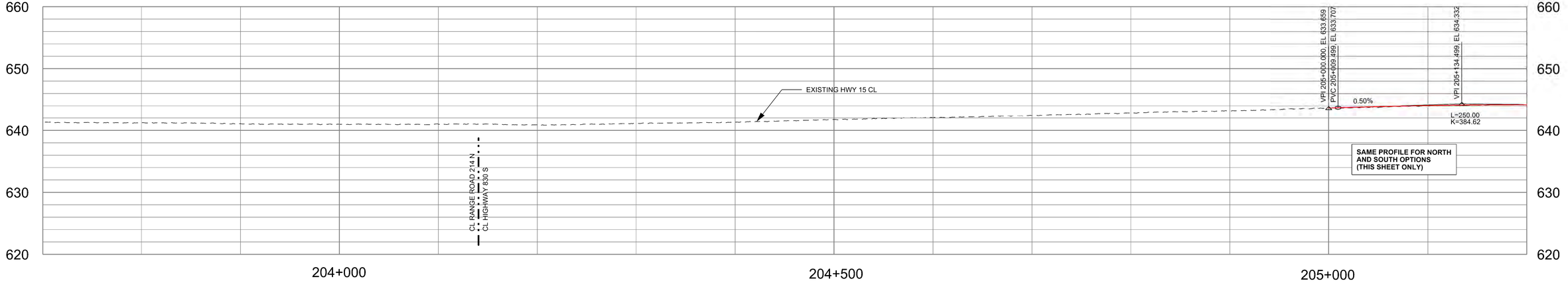

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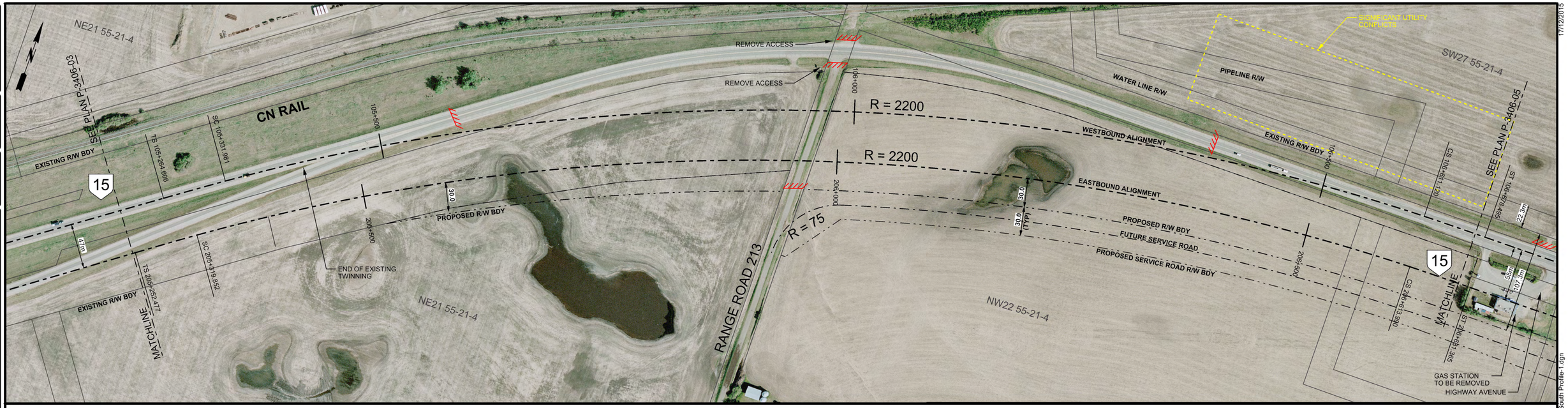

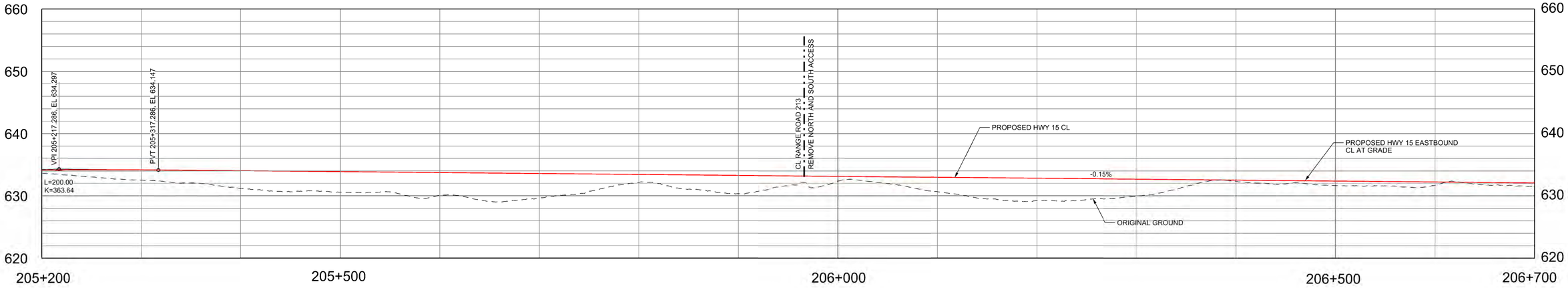

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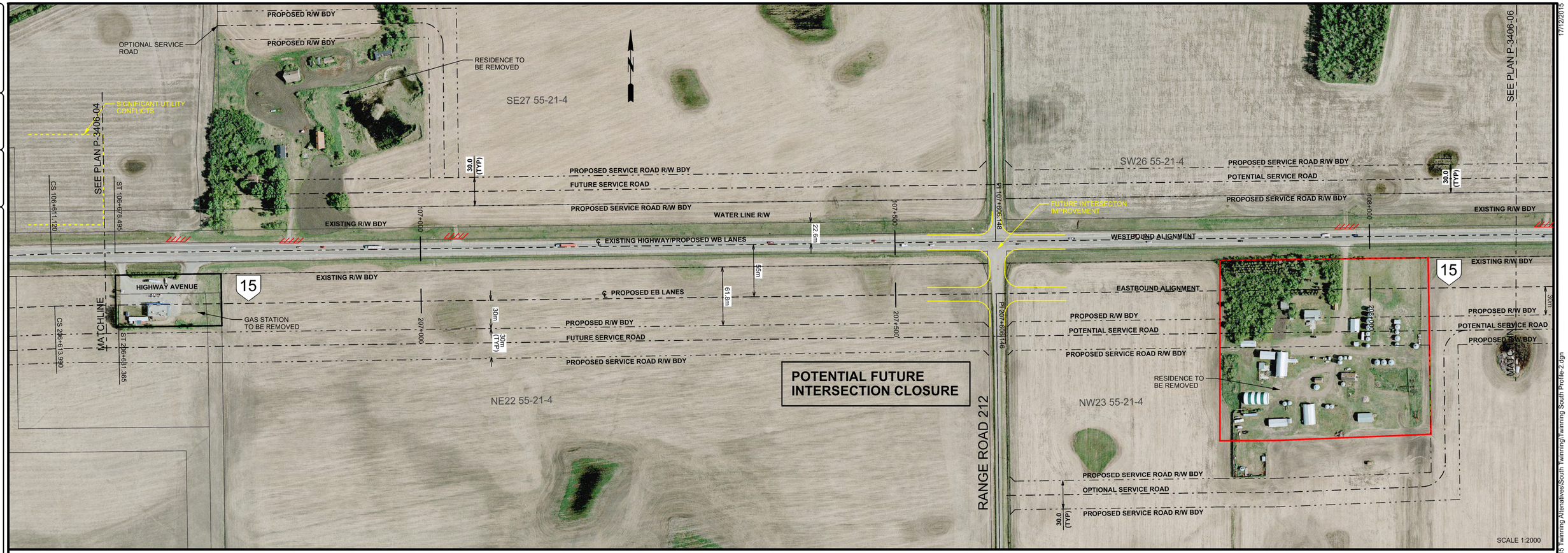

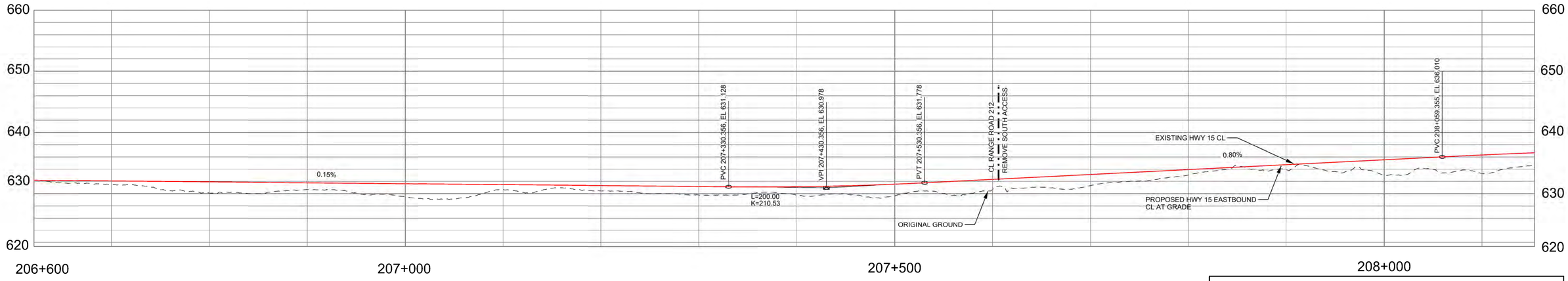

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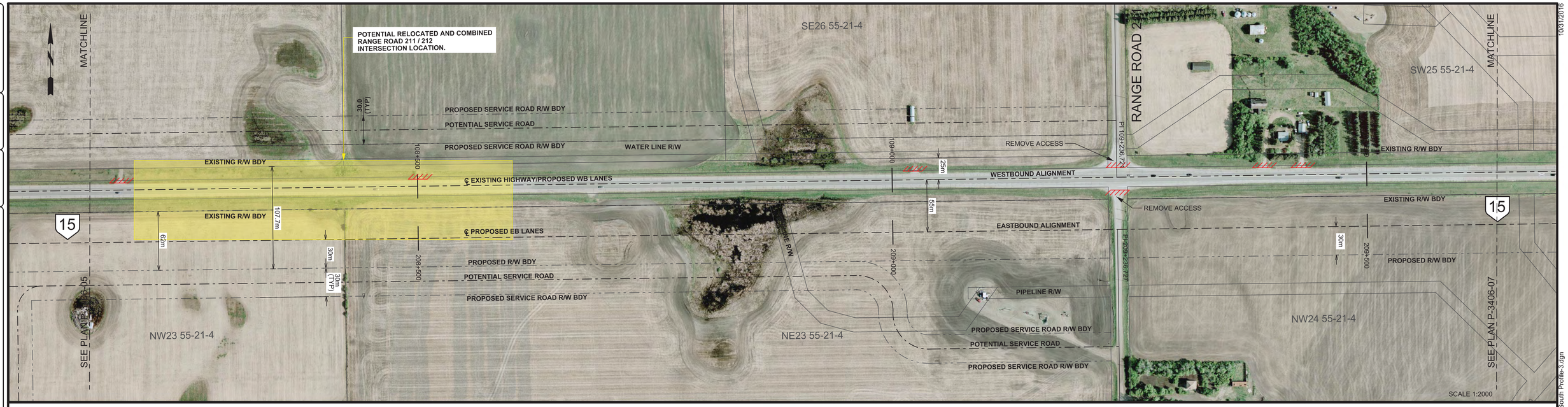

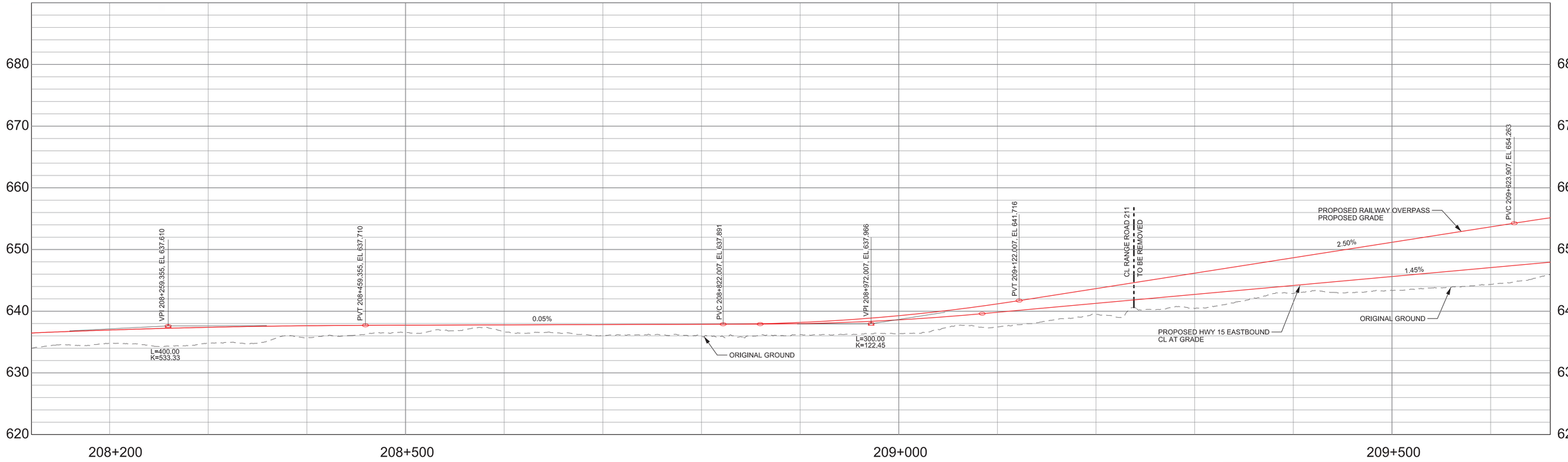

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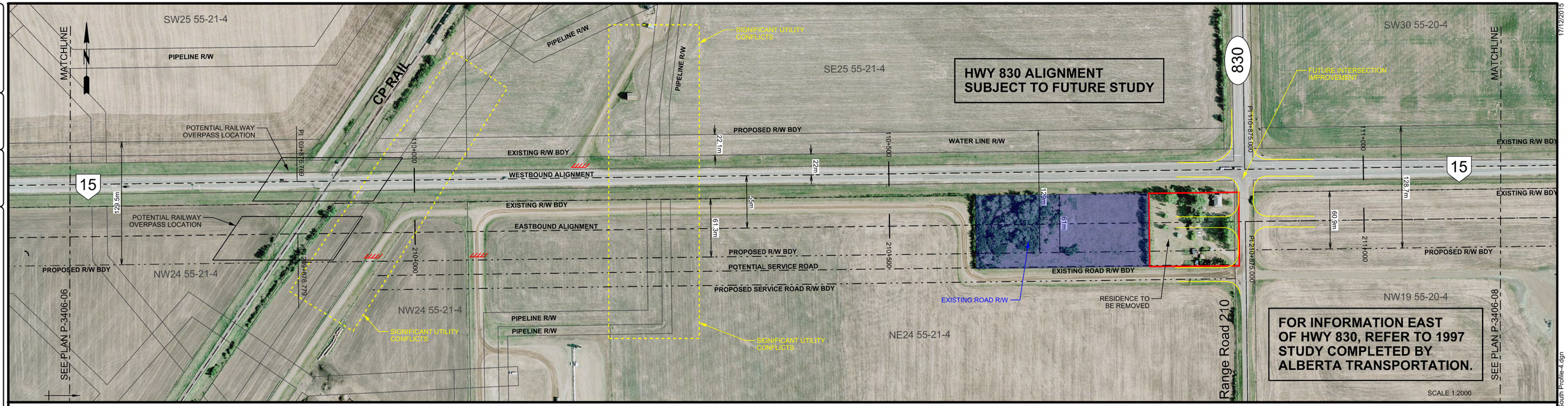

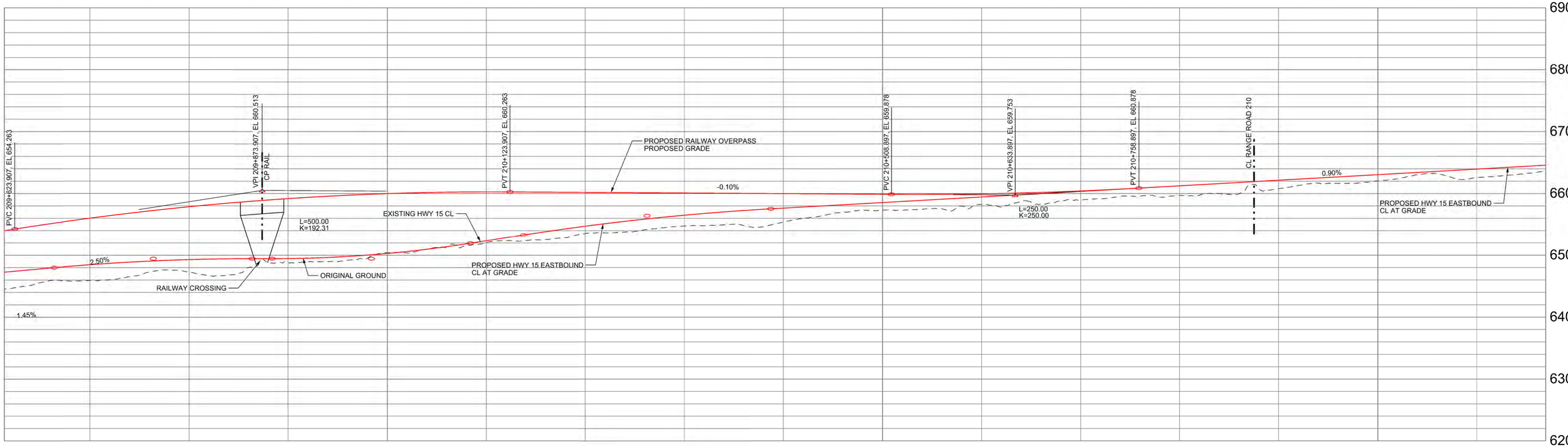

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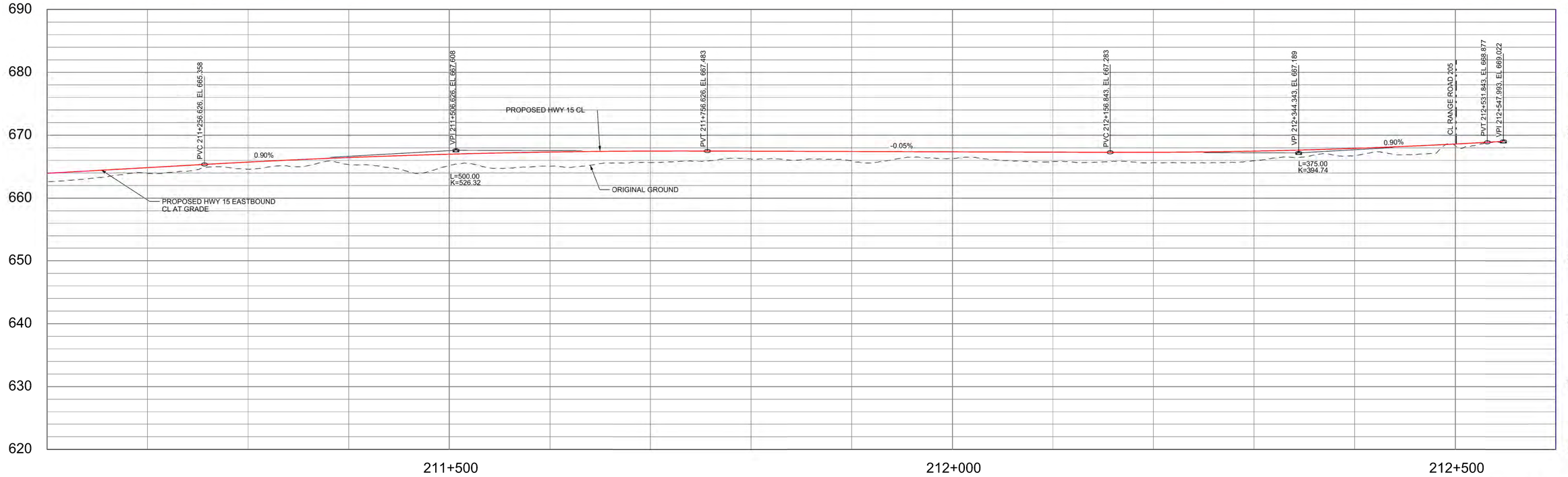

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SEE PLAN P-3406-09B

SW18 55-21-4

ROADWAY

HIGHWAY 15

CANADIAN NATIONAL RAILWAY

PROPOSED HIGHWAY 15

(032 5079)

PIPELINE R/W
OIL PIPELINE R/W (952 5272)
PETROLEUM PRODUCTS PIPELINE R/W (3859 NY)
PIPELINE R/W (822 1189)
(092 0759)

R 440

PIPELINE R/W

R 130

NW7 55-21-4

R 90

SW7 55-21-4

PETROLEUM PRODUCTS PIPELINE R/W (822 3219)
PIPELINE R/W (832 1610)
GAS PIPELINE R/W (882 0180)
PIPELINE R/W (002 4891)

R 440

R 60 R 35 R 60

R 400

LOT 1
982 0325

3353 JY

R 250

032 4489

R 190

A
5881 MC

R 60 R 35

PROPOSED RGE RD 220

(032 5079)

R 60 R 35 R 60

CNR
4217 S

R 400

PROPOSED RGE RD 220

R 400

PIPELINE R/W
(822 3219)

PIPELINE R/W

R 250

942 3533

PIPELINE R/W (122 0321)

PIPELINE R/W

(922 1591)
(032 5079)

PIPELINE R/W (052 2898)

(122 0322)

R 440

PROPOSED HIGHWAY 15

GAS PIPELINE R/W
PIPELINE R/W

S.E.13-55-22-4

METER
STATION
SITE
(922 1591)

(782 2414)

(832 1610)

4217 S

032 4489

SEE PLAN P-3406-09B

N.E.12-55-22-4

SCALE 1:2000

SCALE 1:2000
0 20 40 60 80
HOR

DESCRIPTION: PROPOSED FUTURE INTERCHANGE HWY 15 AND RGE RD 220

CONTRACT | HIGHWAY HWY 15:06 | DRAWING P-3406-09A

PHOTO | DATE | BY | SURVEYED | DEPARTMENT BAR CODE

CONSULTANT: CIMA

JOB No. E00311A

DESIGNER DATE

CHECKER DATE

REV	DATE	REVISION	BY
5			
4			
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2			
1	2016-08-12	FINAL SUBMISSION	DD

DATE | LOCATION | SITE

Alberta Transportation

HIGHWAY 15
PROPOSED FUTURE INTERCHANGE
HWY 15 AND RGE RD 220

CONTRACT	HIGHWAY	SHEET	DRAWING
	HWY 15:06	2 of 3	P-3406-09A

$DATE$

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DRAWING P-3406-09B

HIGHWAY HWY 15:06

CONTRACT

DESCRIPTION PROPOSED FUTURE INTERCHANGE HWY 15 AND RGE RD 220

PHOTO

DATE

BY

SURVEYED

DEPARTMENT BAR CODE

CANADIAN NATIONAL RAILWAY

4217 S

HIGHWAY 15

(122 0322)

PIPELINE R/W

PIPELINE R/W (832 3218)

(032 5079)

CNR 4217 S

032 4489

PROPOSED HIGHWAY 15

R 440

R 250

R 60

R 35

MATCHLINE SEE DETAIL 1 BELOW

SEE DETAIL 2 BELOW MATCHLINE

N.E.12-55-22-4

PROPOSED RGE RD 220

R 190

R 90

R 130

NW7 55-21-4

MATCHLINE

PROPOSED HIGHWAY 15

DETAIL 1

MATCHLINE

PROPOSED HIGHWAY 15

PIPELINE R/W (092 6411)

PIPELINE R/W (092 0759)

PIPELINE R/W (092 5841)

(022 6071)

PIPELINE R/W

DETAIL 2

SCALE 1:2000

SCALE 1:2000

0 20 40 60 80

HOR

CONSULTANT CIMA

JOB No. E00311A

DESIGNER

DATE

CHECKER

DATE

REV	DATE	REVISION	BY
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1	2016-08-12	FINAL SUBMISSION	DD

DATE | LOCATION | SITE

Alberta Transportation

HIGHWAY 15
PROPOSED FUTURE INTERCHANGE
HWY 15 AND RGE RD 220

CONTRACT	HIGHWAY	SHEET	DRAWING
	HWY 15:06	3 of 3	P-3406-09B

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HIGHWAY HWY 15:06
CONTRACT
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DATE
BY
SURVEYED
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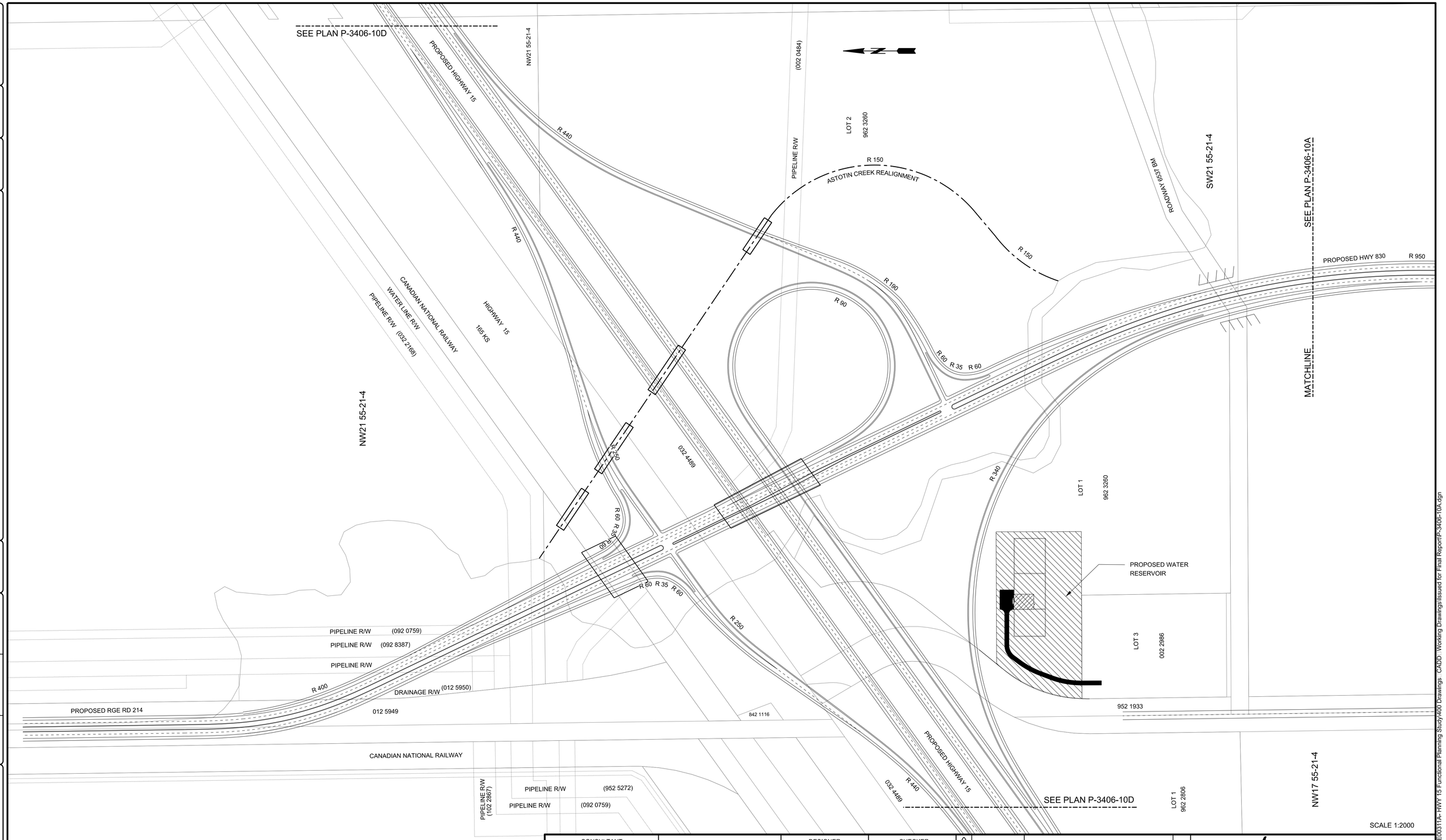

CONSULTANT CIMA
JOB No. E00311A
DESIGNER
DATE
CHECKER
DATE

REV	DATE	REVISION	BY
5			
4			
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1	2016-08-12	FINAL SUBMISSION	DD

DATE | LOCATION | SITE

Alberta Transportation

HIGHWAY 15
PROPOSED FUTURE INTERCHANGE
HWY 15 AND RGE RD 214

CONTRACT	HIGHWAY	SHEET	DRAWING
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DESCRIPTION
PROPOSED FUTURE INTERCHANGE HWY 15 AND RGE RD 214

CONTRACT

HIGHWAY
HWY 15:06

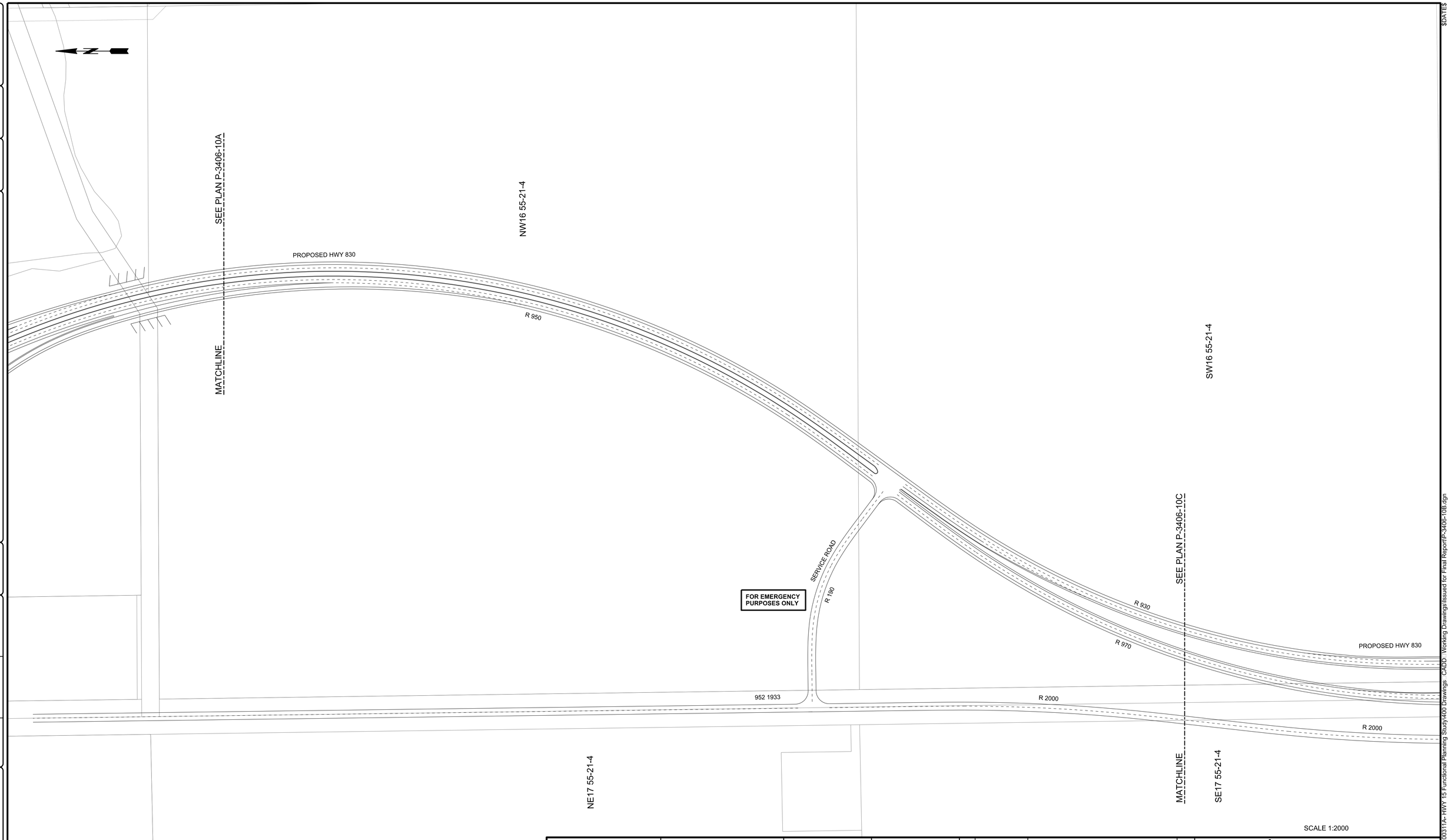
DRAWING
P-3406-10B

PHOTO

BY	DATE

SURVEYED

DEPARTMENT BAR CODE



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SCALE 1:2000
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CONSULTANT
CIMA

JOB No. E00311A

DESIGNER
DATE

CHECKER
DATE

REV	DATE	REVISION	BY
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1	2016-08-12	FINAL SUBMISSION	DD

DATE	LOCATION	SITE

Alberta Transportation

HIGHWAY 15
PROPOSED FUTURE INTERCHANGE
HWY 15 AND RGE RD 214

CONTRACT	HIGHWAY	SHEET	DRAWING
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HIGHWAY HWY 15:06

CONTRACT

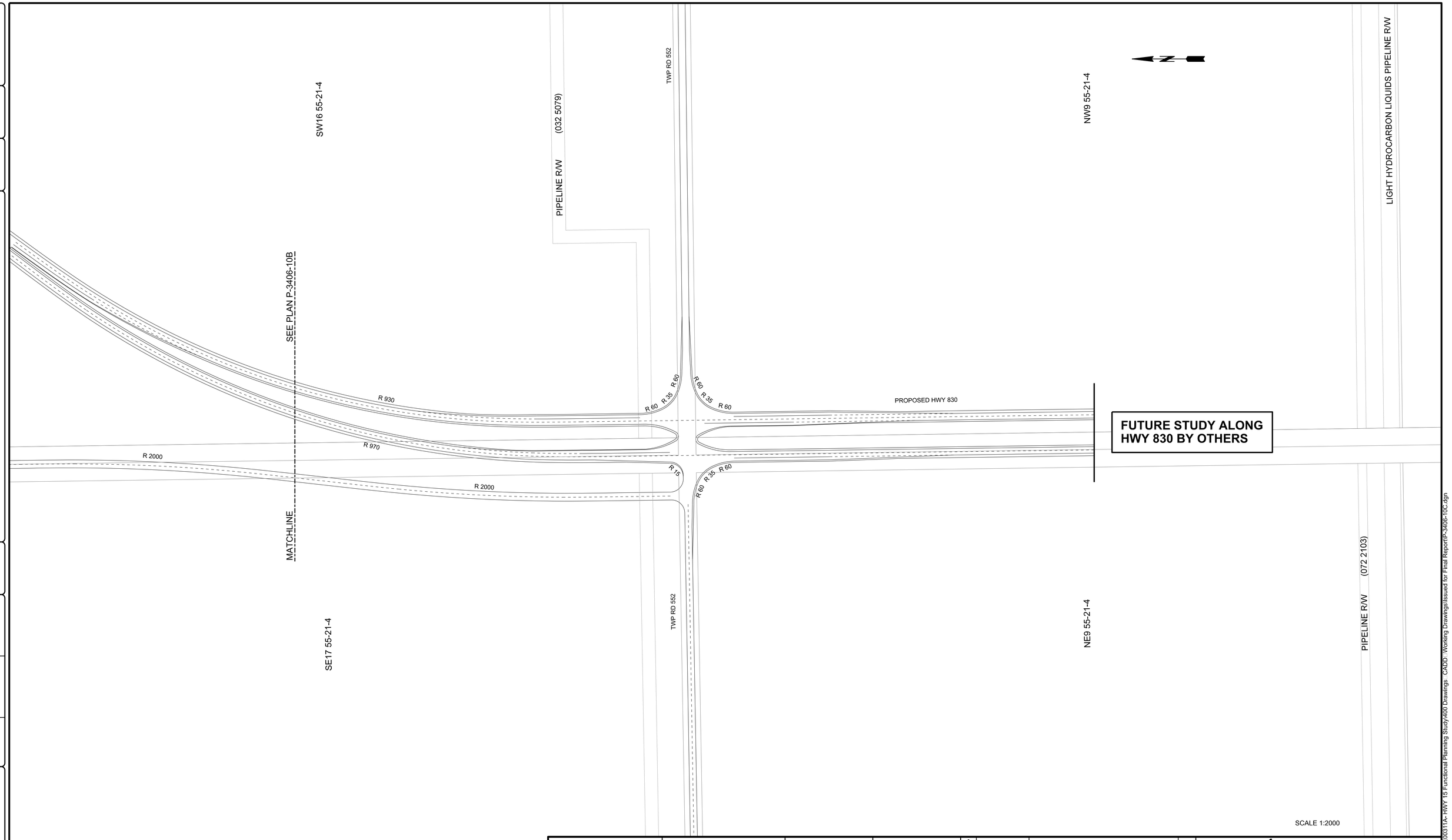
DESCRIPTION PROPOSED FUTURE HIGHWAY 830

PHOTO

BY | DATE

SURVEYED

DEPARTMENT BAR CODE



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CONSULTANT CIMA

JOB No. E00311A

DESIGNER

DATE

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REV	DATE	REVISION	BY
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1	2016-08-12	FINAL SUBMISSION	DD

DATE	LOCATION	SITE

Alberta Transportation

HIGHWAY 15
PROPOSED FUTURE HIGHWAY
HIGWAY 830

CONTRACT	HIGHWAY	SHEET	DRAWING
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DRAWING P-3406-10D

HIGHWAY HWY 15:06

CONTRACT

DESCRIPTION PROPOSED FUTURE INTERCHANGE HWY 15 AND RGE RD 214

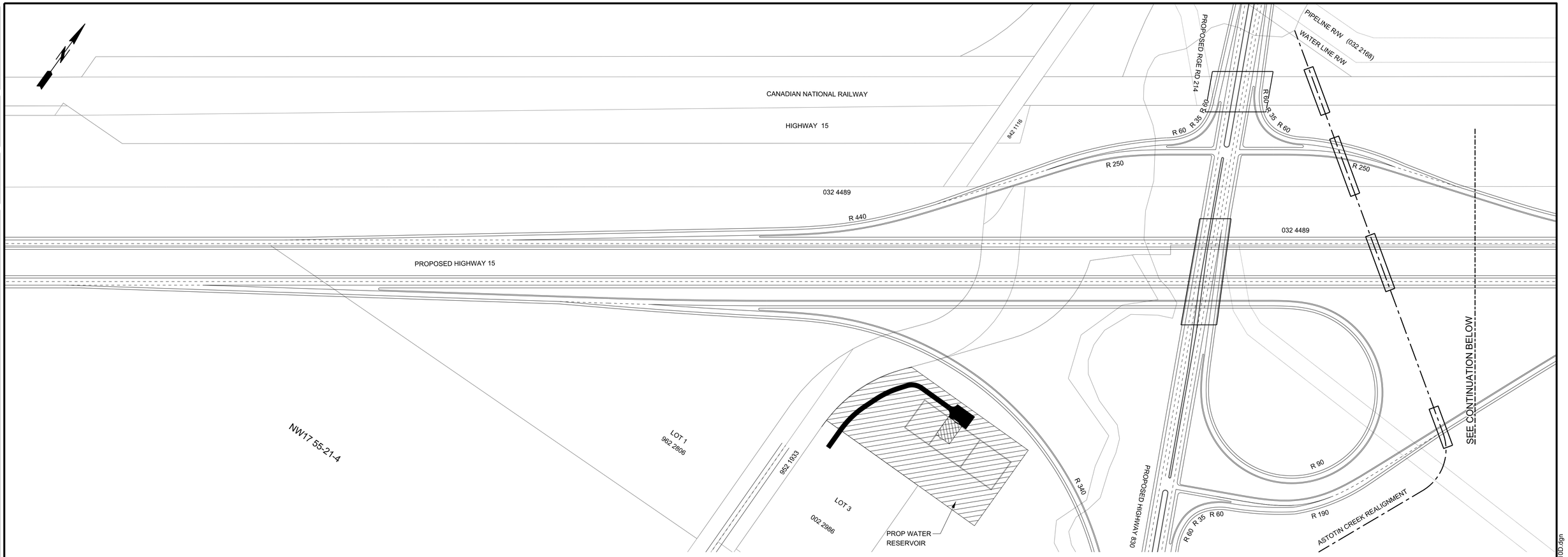
PHOTO

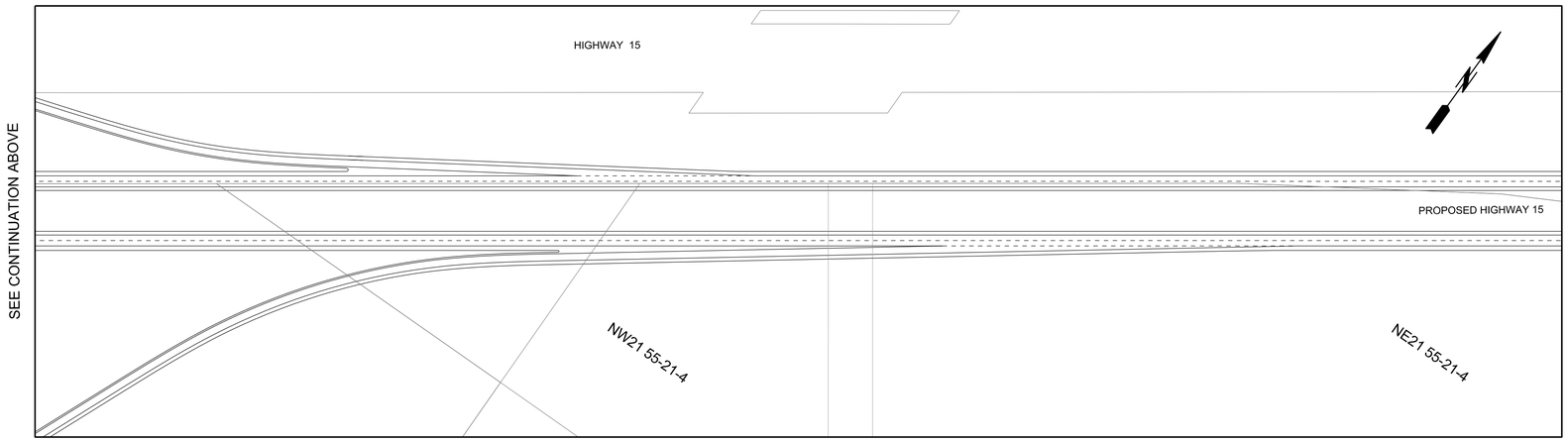
DATE

BY

SURVEYED

DEPARTMENT BAR CODE





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CONSULTANT CIMA

JOB No. E00311A

DESIGNER

DATE

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1	2016-08-12	FINAL SUBMISSION	DD

DATE | LOCATION | SITE

Alberta Transportation

HIGHWAY 15
PROPOSED FUTURE INTERCHANGE
HWY 15 AND RGE RD 214

CONTRACT	HIGHWAY	SHEET	DRAWING
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Appendix C
LAND OWNERSHIP MAP

Large Industry Land Holdings (Registered Titles)

Legend

Heartland Road Proposed Upgrades

- Proposed Road Upgrade
- Proposed Highway Twinning
- Proposed Bridge Upgrade

Existing Transportation Network

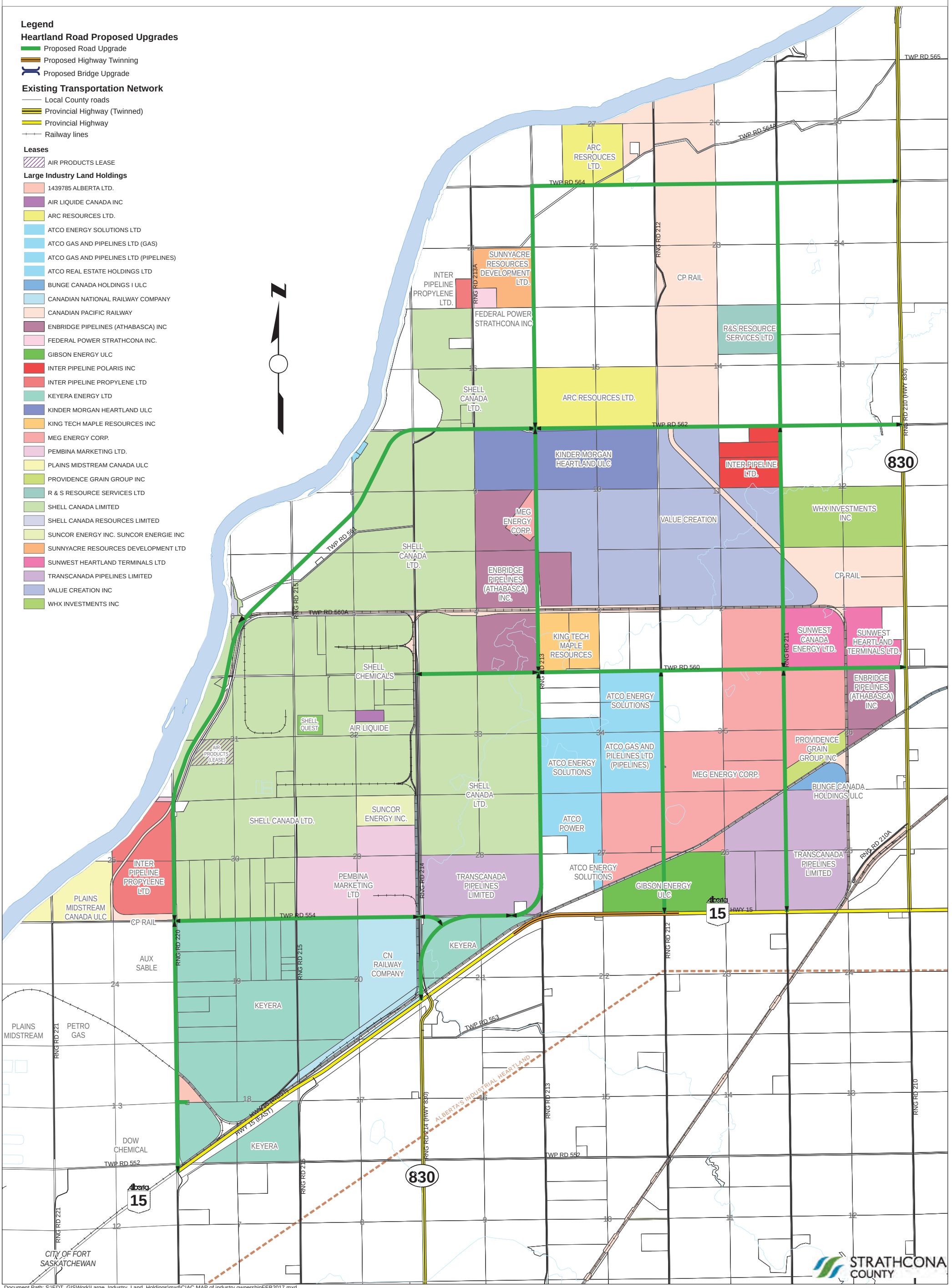
- Local County roads
- Provincial Highway (Twinned)
- Provincial Highway
- Railway lines

Leases

- AIR PRODUCTS LEASE

Large Industry Land Holdings

- 1439785 ALBERTA LTD.
- AIR LIQUIDE CANADA INC
- ARC RESOURCES LTD.
- ATCO ENERGY SOLUTIONS LTD
- ATCO GAS AND PIPELINES LTD (GAS)
- ATCO GAS AND PIPELINES LTD (PIPELINES)
- ATCO REAL ESTATE HOLDINGS LTD
- BUNGE CANADA HOLDINGS I ULC
- CANADIAN NATIONAL RAILWAY COMPANY
- CANADIAN PACIFIC RAILWAY
- ENBRIDGE PIPELINES (ATHABASCA) INC
- FEDERAL POWER STRATHCONA INC.
- GIBSON ENERGY ULC
- INTER PIPELINE POLARIS INC
- INTER PIPELINE PROPYLENE LTD
- KEYERA ENERGY LTD
- KINDER MORGAN HEARTLAND ULC
- KING TECH MAPLE RESOURCES INC
- MEG ENERGY CORP.
- PEMBINA MARKETING LTD.
- PLAINS MIDSTREAM CANADA ULC
- PROVIDENCE GRAIN GROUP INC
- R & S RESOURCE SERVICES LTD
- SHELL CANADA LIMITED
- SHELL CANADA RESOURCES LIMITED
- SUNCOR ENERGY INC. SUNCOR ENERGIE INC
- SUNNYACRE RESOURCES DEVELOPMENT LTD
- SUNWEST HEARTLAND TERMINALS LTD
- TRANSCANADA PIPELINES LIMITED
- VALUE CREATION INC
- WHX INVESTMENTS INC



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Credits: ERCB pipeline data provided by Abacus Datagraphics. Alberta Land Titles parcel data provided by Altalis.

Date: February, 2017

Appendix D
TRAFFIC COUNT DATA

Turning Movement Summary Diagram

Reference No.: 97552

Intersection of:
15 & RGE RD 220 12-55-22-400000220

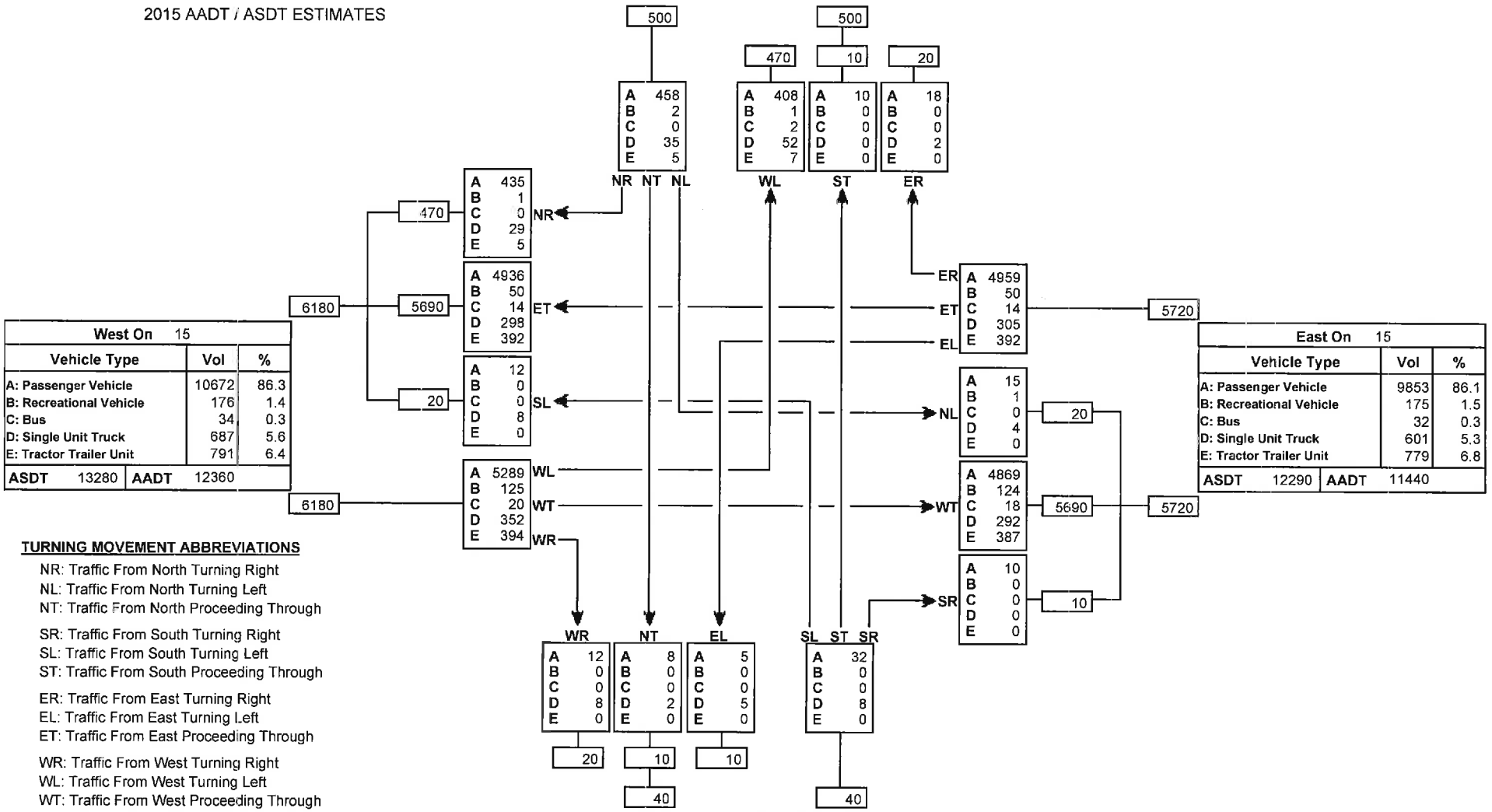
2015 AADT / ASDT ESTIMATES

North On Rge Rd 220		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	894	89.4
B: Recreational Vehicle	3	0.3
C: Bus	2	0.2
D: Single Unit Truck	89	8.9
E: Tractor Trailer Unit	12	1.2
ASDT 1070	**AADT** 1000	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	10672	86.3
B: Recreational Vehicle	176	1.4
C: Bus	34	0.3
D: Single Unit Truck	687	5.6
E: Tractor Trailer Unit	791	6.4
ASDT 13280	**AADT** 12360	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	9853	86.1
B: Recreational Vehicle	175	1.5
C: Bus	32	0.3
D: Single Unit Truck	601	5.3
E: Tractor Trailer Unit	779	6.8
ASDT 12290	**AADT** 11440	

South On Rge Rd 220		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	57	71.3
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	23	28.7
E: Tractor Trailer Unit	0	0.0
ASDT 90	**AADT** 80	



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: Average Annual 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.: 97552

Intersection of:
15 & RGE RD 220 12-55-22-400000220

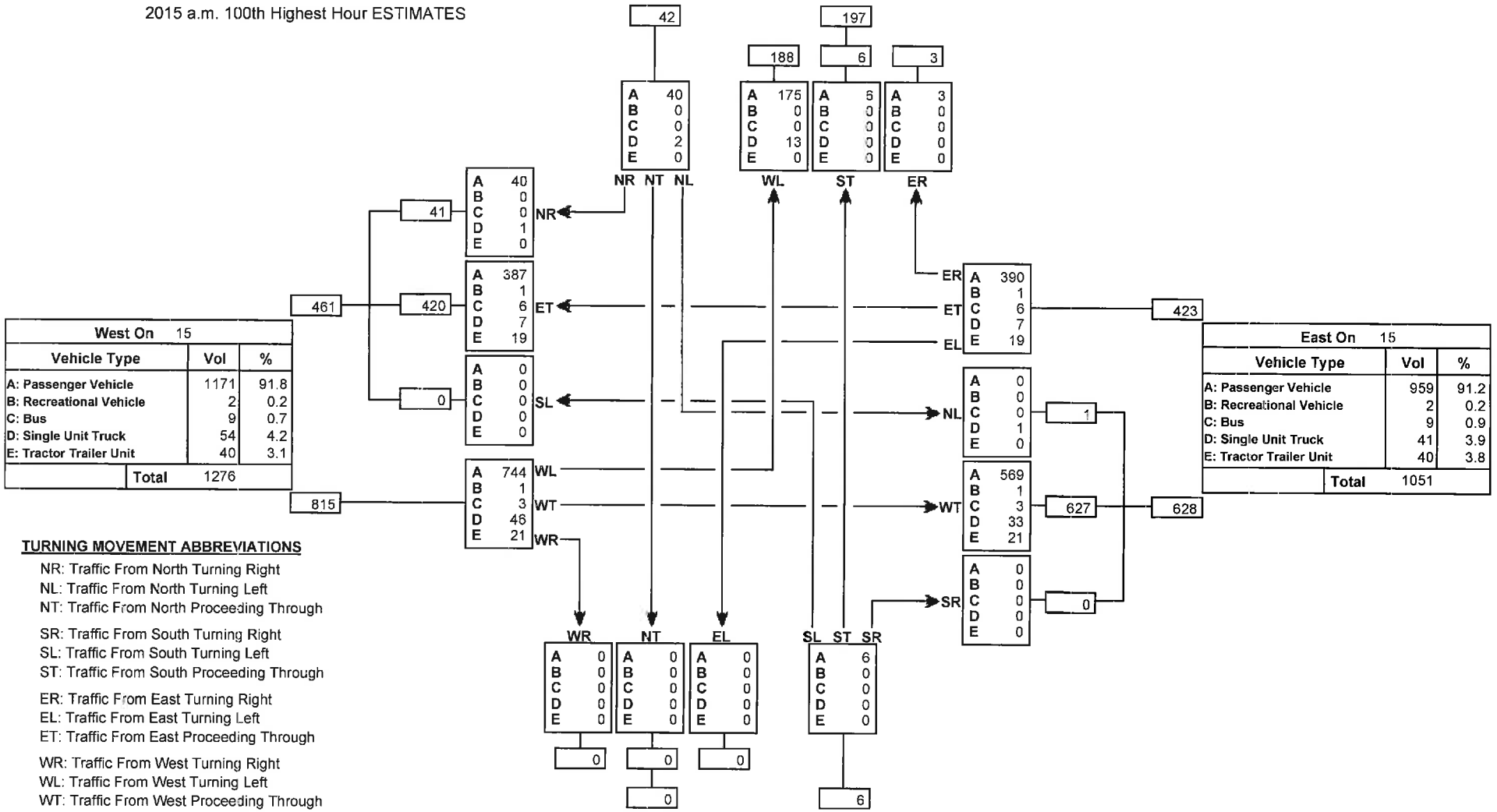
2015 a.m. 100th Highest Hour ESTIMATES

North On Rge Rd 220		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	224	93.7
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	15	6.3
E: Tractor Trailer Unit	0	0.0
Total	239	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1171	91.8
B: Recreational Vehicle	2	0.2
C: Bus	9	0.7
D: Single Unit Truck	54	4.2
E: Tractor Trailer Unit	40	3.1
Total	1276	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	959	91.2
B: Recreational Vehicle	2	0.2
C: Bus	9	0.9
D: Single Unit Truck	41	3.9
E: Tractor Trailer Unit	40	3.8
Total	1051	

South On Rge Rd 220		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	6	100.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	6	



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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.: 97552

Intersection of:

15 & RGE RD 220 12-55-22-400000220

2015 p.m. 100th Highest Hour ESTIMATES

North On Rge Rd 220		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	164	98.8
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	1	0.6
E: Tractor Trailer Unit	1	0.6
Total	166	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1177	92.1
B: Recreational Vehicle	20	1.6
C: Bus	2	0.2
D: Single Unit Truck	36	2.8
E: Tractor Trailer Unit	43	3.4
Total	1278	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1013	91.2
B: Recreational Vehicle	20	1.8
C: Bus	2	0.2
D: Single Unit Truck	34	3.1
E: Tractor Trailer Unit	42	3.8
Total	1111	

South On Rge Rd 220		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	2	66.7
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	1	33.3
E: Tractor Trailer Unit	0	0.0
Total	3	

TURNING MOVEMENT ABBREVIATIONS

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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.: 98556

Intersection of:

15 & RGE RD 215A WJ 18-55-21-406000880

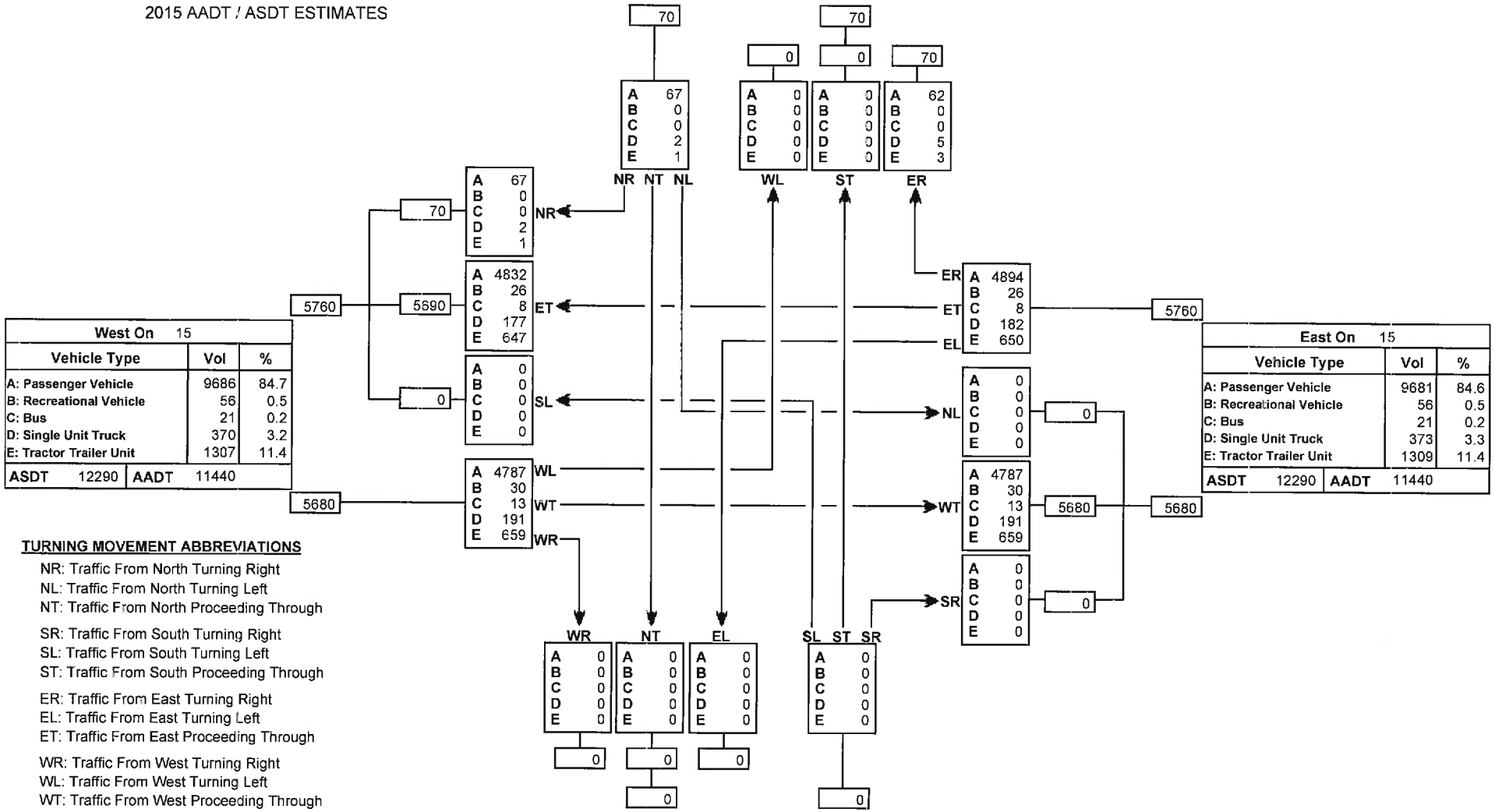
2015 AADT / ASDT ESTIMATES

North On RgeRd 215A		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	129	92.1
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	7	5.0
E: Tractor Trailer Unit	4	2.9
ASDT 150	**AADT** 140	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	9686	84.7
B: Recreational Vehicle	56	0.5
C: Bus	21	0.2
D: Single Unit Truck	370	3.2
E: Tractor Trailer Unit	1307	11.4
ASDT 12290	**AADT** 11440	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	9681	84.6
B: Recreational Vehicle	56	0.5
C: Bus	21	0.2
D: Single Unit Truck	373	3.3
E: Tractor Trailer Unit	1309	11.4
ASDT 12290	**AADT** 11440	

South On		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	0	0.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
ASDT	**AADT** 0	



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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: Average Annual 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.: 98556

Intersection of:
15 & RGE RD 215A WJ 18-55-21-406000880

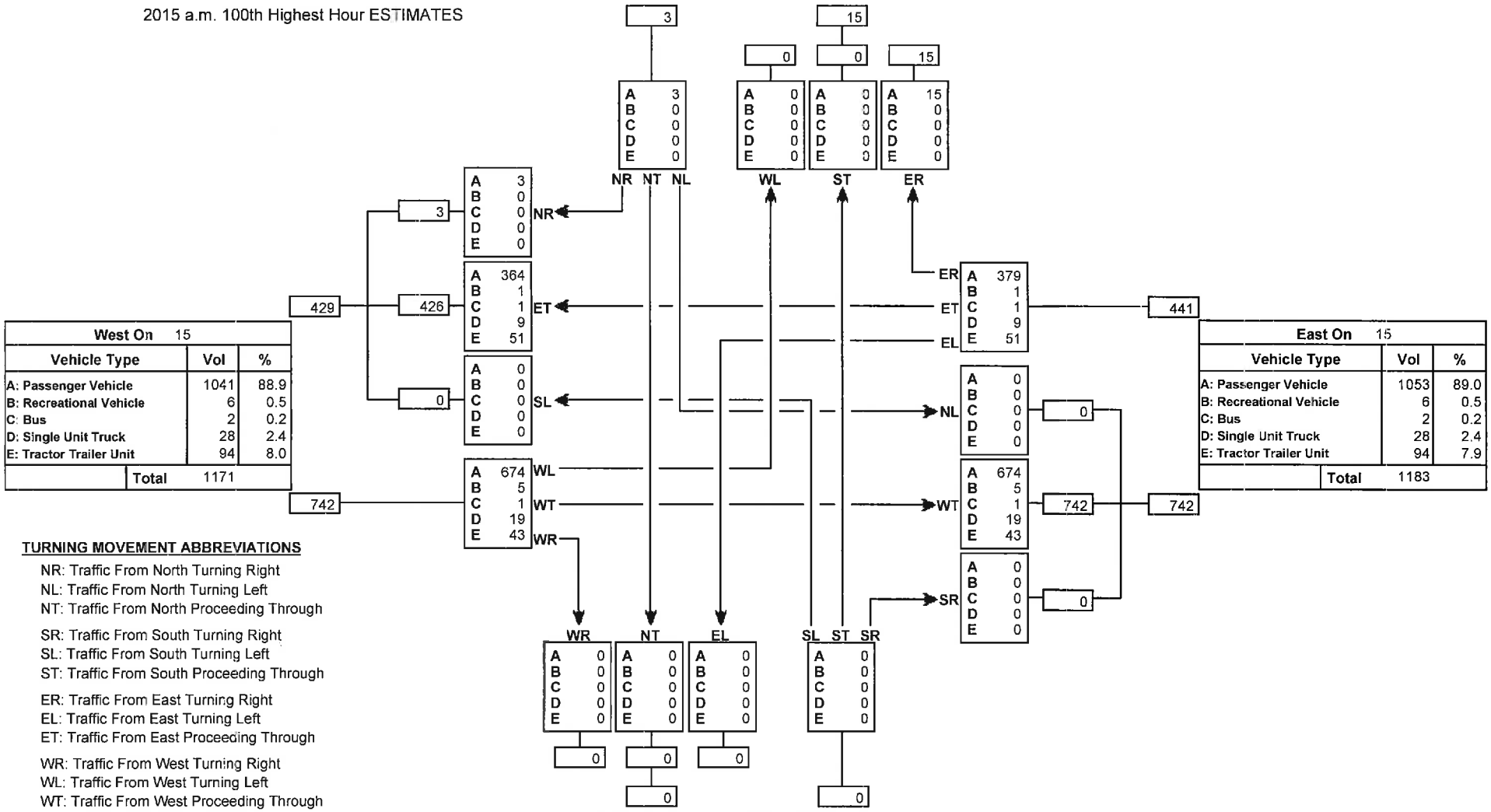
2015 a.m. 100th Highest Hour ESTIMATES

North On RgeRd 215A		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	18	100.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	18	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1041	88.9
B: Recreational Vehicle	6	0.5
C: Bus	2	0.2
D: Single Unit Truck	28	2.4
E: Tractor Trailer Unit	94	8.0
Total	1171	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1053	89.0
B: Recreational Vehicle	6	0.5
C: Bus	2	0.2
D: Single Unit Truck	28	2.4
E: Tractor Trailer Unit	94	7.9
Total	1183	

South On		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	0	0.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	0	



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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.: 98556

Intersection of:
15 & RGE RD 215A WJ 18-55-21-406000880

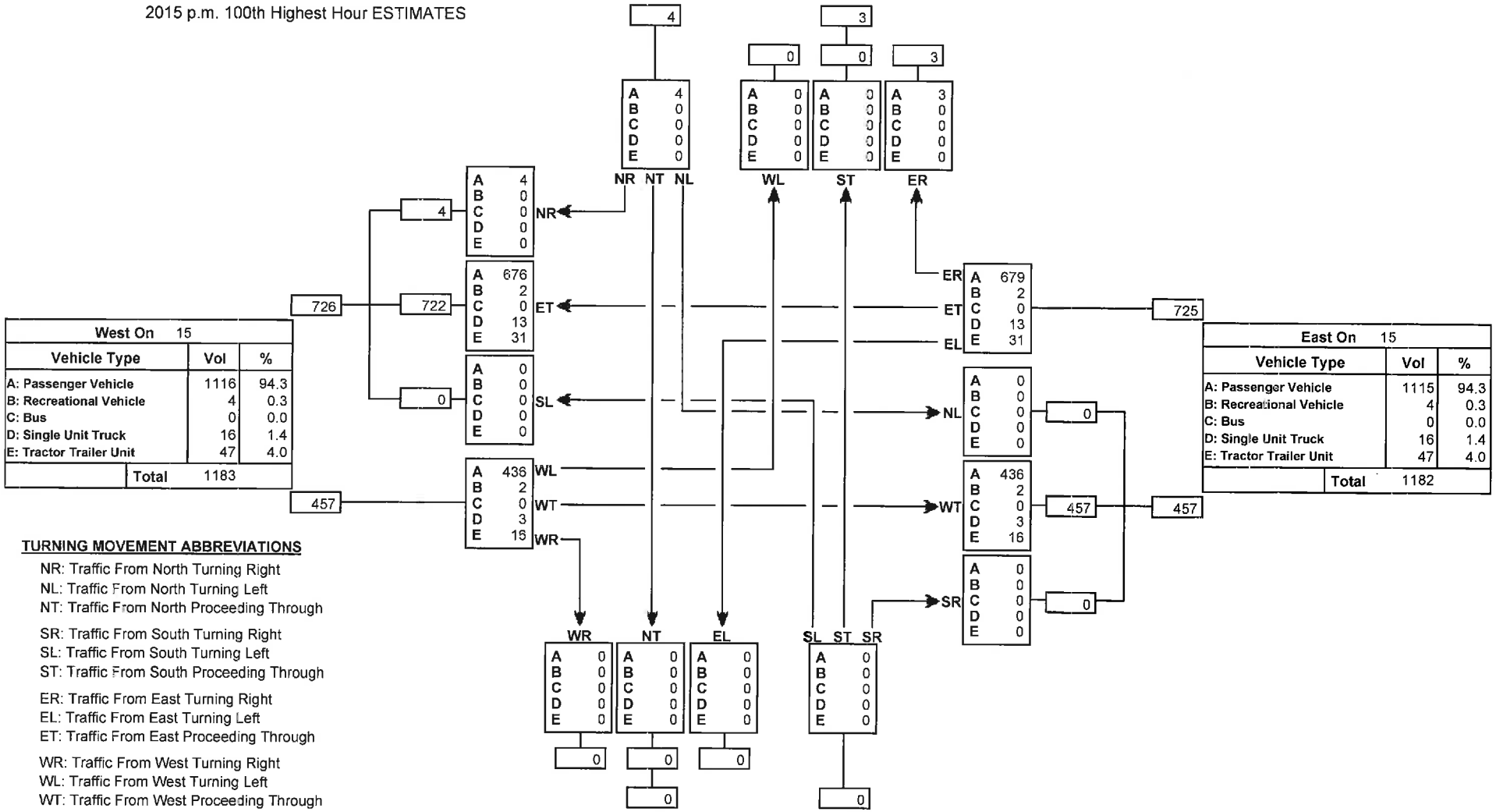
2015 p.m. 100th Highest Hour ESTIMATES

North On RgeRd 215A		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	7	100.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	7	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1116	94.3
B: Recreational Vehicle	4	0.3
C: Bus	0	0.0
D: Single Unit Truck	16	1.4
E: Tractor Trailer Unit	47	4.0
Total	1183	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1115	94.3
B: Recreational Vehicle	4	0.3
C: Bus	0	0.0
D: Single Unit Truck	16	1.4
E: Tractor Trailer Unit	47	4.0
Total	1182	

South On		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	0	0.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	0	



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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.: 70000056

Intersection of:

15 & RGE RD 215 EJ 17-55-21-412000400

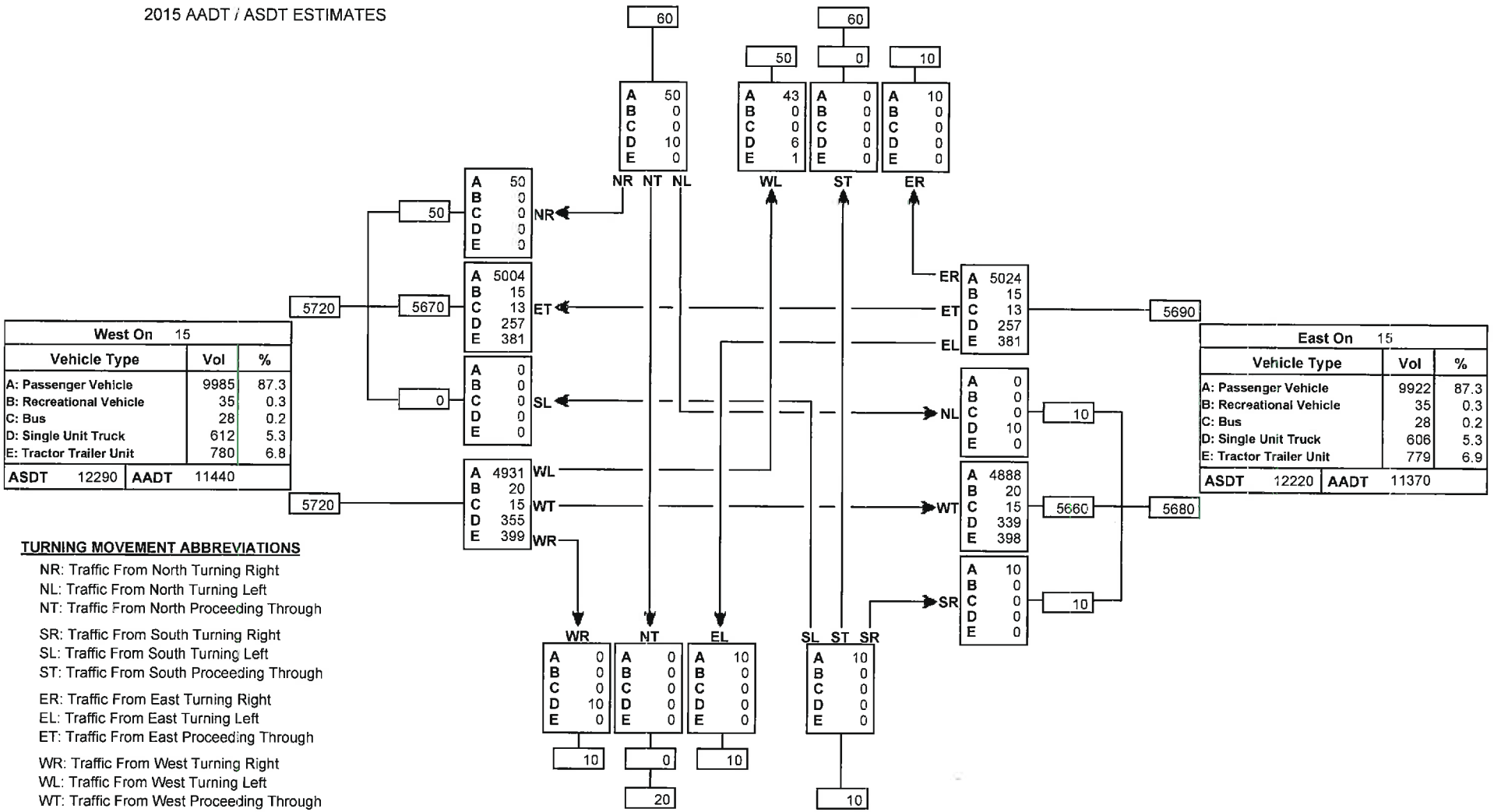
2015 AADT / ASDT ESTIMATES

North On Local Rd		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	103	85.8
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	16	13.3
E: Tractor Trailer Unit	1	0.8
ASDT 130	**AADT** 120	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	9985	87.3
B: Recreational Vehicle	35	0.3
C: Bus	28	0.2
D: Single Unit Truck	612	5.3
E: Tractor Trailer Unit	780	6.8
ASDT 12290	**AADT** 11440	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	9922	87.3
B: Recreational Vehicle	35	0.3
C: Bus	28	0.2
D: Single Unit Truck	606	5.3
E: Tractor Trailer Unit	779	6.9
ASDT 12220	**AADT** 11370	

South On Rge Rd 215		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	20	66.7
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	10	33.3
E: Tractor Trailer Unit	0	0.0
ASDT 30	**AADT** 30	



TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

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SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

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WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual 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.: 70000056

Intersection of:
15 & RGE RD 215 EJ 17-55-21-412000400

2015 a.m. 100th Highest Hour ESTIMATES

North On Local Rd		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	3	100.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	3	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1106	93.6
B: Recreational Vehicle	4	0.3
C: Bus	3	0.3
D: Single Unit Truck	45	3.8
E: Tractor Trailer Unit	23	1.9
Total	1181	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1107	93.7
B: Recreational Vehicle	4	0.3
C: Bus	3	0.3
D: Single Unit Truck	45	3.8
E: Tractor Trailer Unit	23	1.9
Total	1182	

South On Rge Rd 215		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	0	0.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	0	

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Turning Movement Summary Diagram

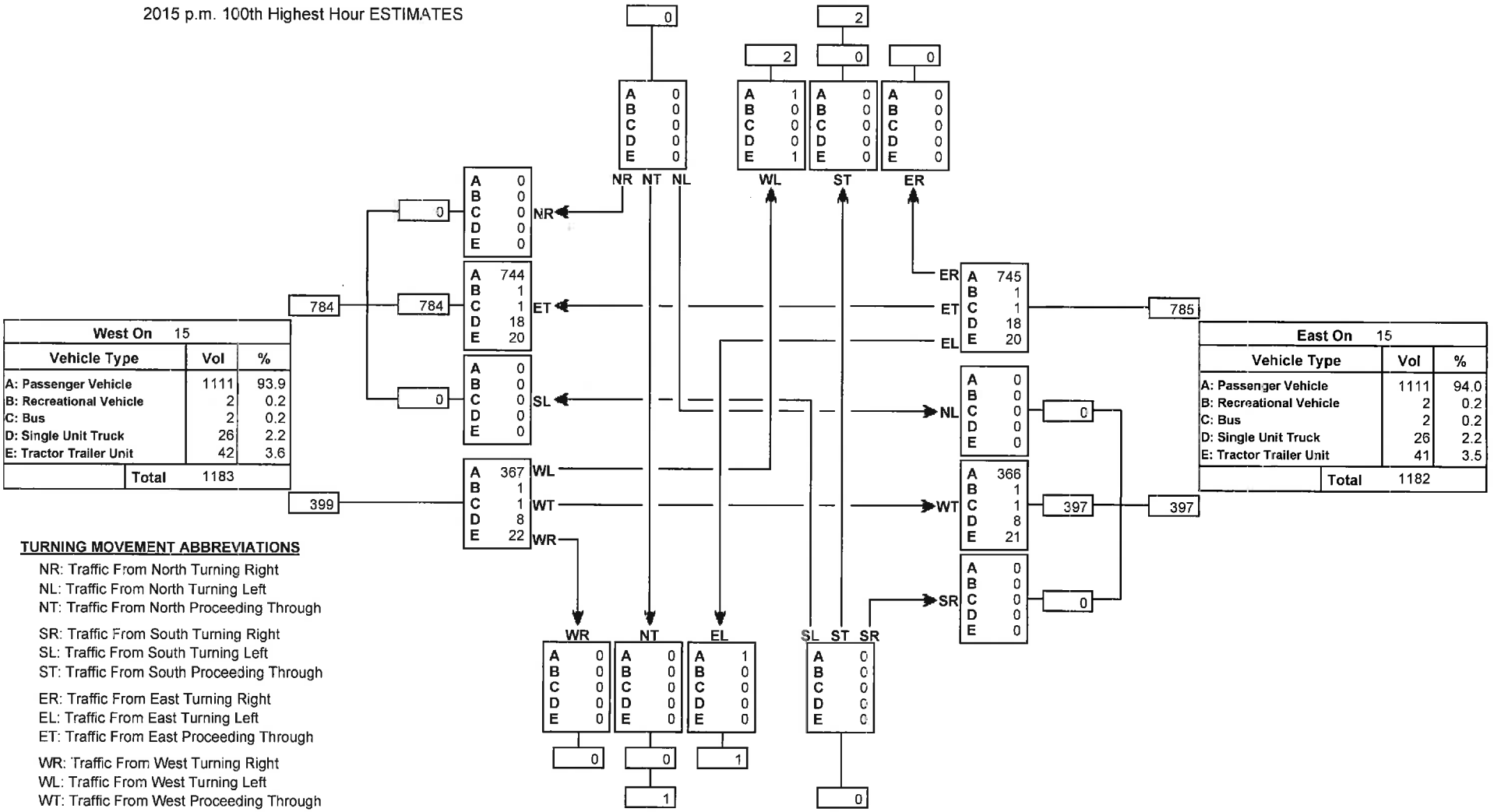
Reference No.: 70000056

Intersection of:

15 & RGE RD 215 EJ 17-55-21-412000400

2015 p.m. 100th Highest Hour ESTIMATES

North On Local Rd		
Vehicle Type	Vol	%
A: Passenger Vehicle	1	50.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	1	50.0
Total	2	



West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	1111	93.9
B: Recreational Vehicle	2	0.2
C: Bus	2	0.2
D: Single Unit Truck	26	2.2
E: Tractor Trailer Unit	42	3.6
Total	1183	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	1111	94.0
B: Recreational Vehicle	2	0.2
C: Bus	2	0.2
D: Single Unit Truck	26	2.2
E: Tractor Trailer Unit	41	3.5
Total	1182	

South On Rge Rd 215		
Vehicle Type	Vol	%
A: Passenger Vehicle	1	100.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	1	

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Turning Movement Summary Diagram

Reference No.: 98550

Intersection of:
15 & 830 N OF JOSEPHBURG WJ

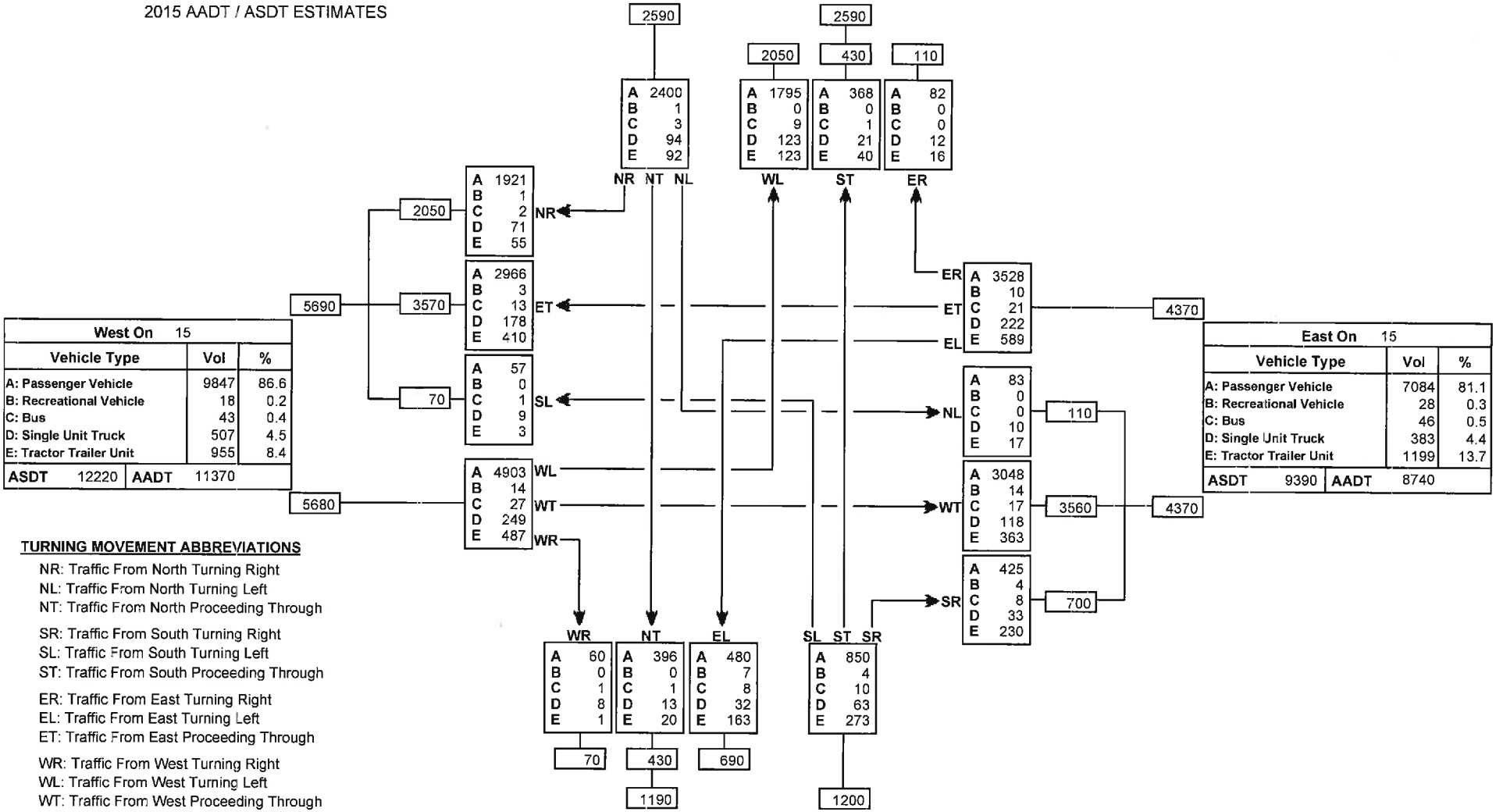
2015 AADT / ASDT ESTIMATES

North On Rge Rd 214		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	4645	89.7
B: Recreational Vehicle	1	0.0
C: Bus	13	0.3
D: Single Unit Truck	250	4.8
E: Tractor Trailer Unit	271	5.2
ASDT 5570	**AADT** 5180	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	9847	86.6
B: Recreational Vehicle	18	0.2
C: Bus	43	0.4
D: Single Unit Truck	507	4.5
E: Tractor Trailer Unit	955	8.4
ASDT 12220	**AADT** 11370	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	7084	81.1
B: Recreational Vehicle	28	0.3
C: Bus	46	0.5
D: Single Unit Truck	383	4.4
E: Tractor Trailer Unit	1199	13.7
ASDT 9390	**AADT** 8740	

South On 830		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1786	74.7
B: Recreational Vehicle	11	0.5
C: Bus	20	0.8
D: Single Unit Truck	116	4.9
E: Tractor Trailer Unit	457	19.1
ASDT 2570	**AADT** 2390	



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TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
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Turning Movement Summary Diagram

Reference No.: 98550

Intersection of:
15 & 830 N OF JOSEPHBURG WJ

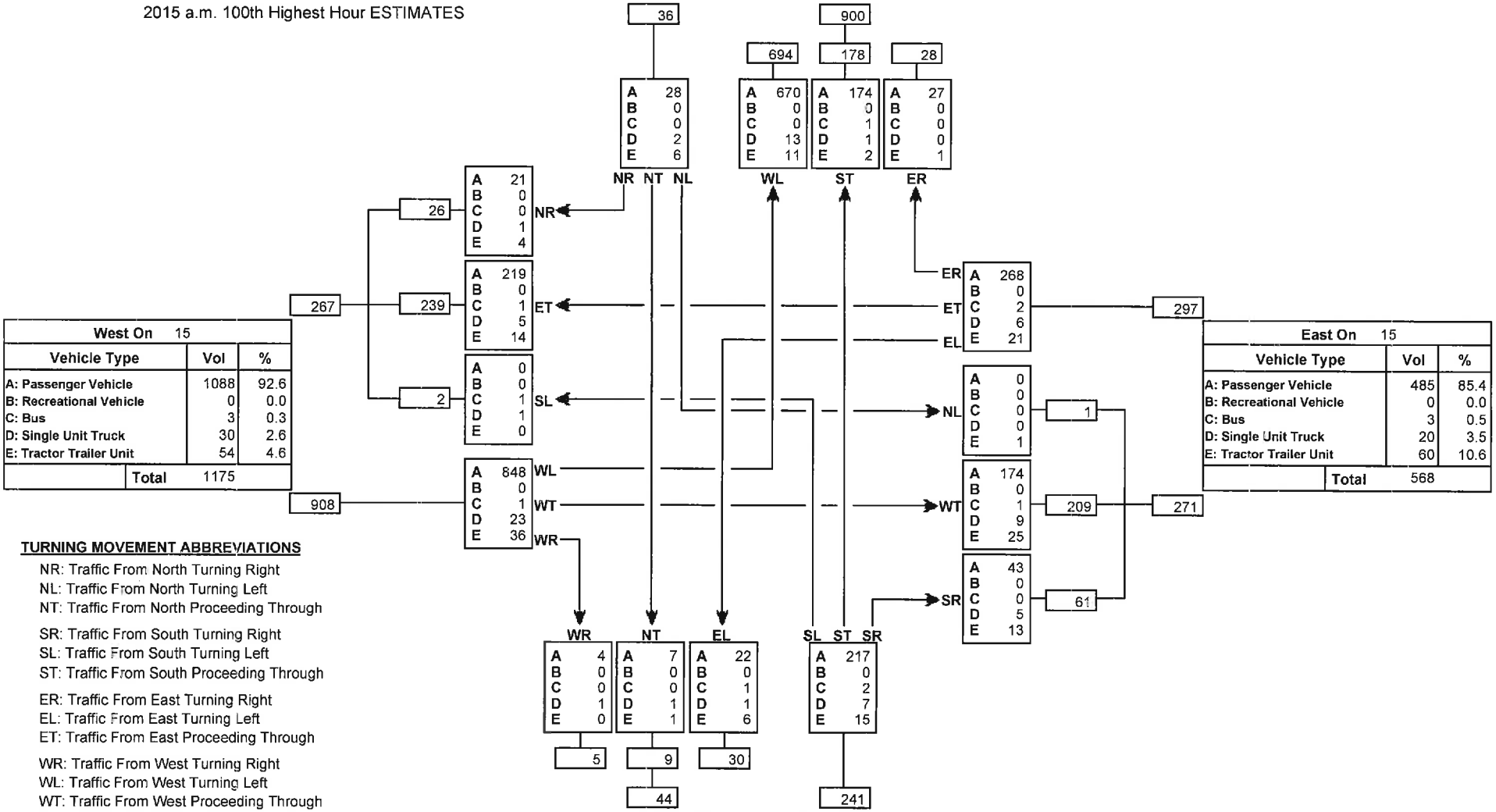
2015 a.m. 100th Highest Hour ESTIMATES

North On Rge Rd 214		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	899	96.0
B: Recreational Vehicle	0	0.0
C: Bus	1	0.1
D: Single Unit Truck	16	1.7
E: Tractor Trailer Unit	20	2.1
Total	936	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1088	92.6
B: Recreational Vehicle	0	0.0
C: Bus	3	0.3
D: Single Unit Truck	30	2.6
E: Tractor Trailer Unit	54	4.6
Total	1175	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	485	85.4
B: Recreational Vehicle	0	0.0
C: Bus	3	0.5
D: Single Unit Truck	20	3.5
E: Tractor Trailer Unit	60	10.6
Total	568	

South On 830		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	250	87.7
B: Recreational Vehicle	0	0.0
C: Bus	3	1.1
D: Single Unit Truck	10	3.5
E: Tractor Trailer Unit	22	7.7
Total	285	



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Turning Movement Summary Diagram

Reference No.: 98550

Intersection of:
15 & 830 N OF JOSEPHBURG WJ

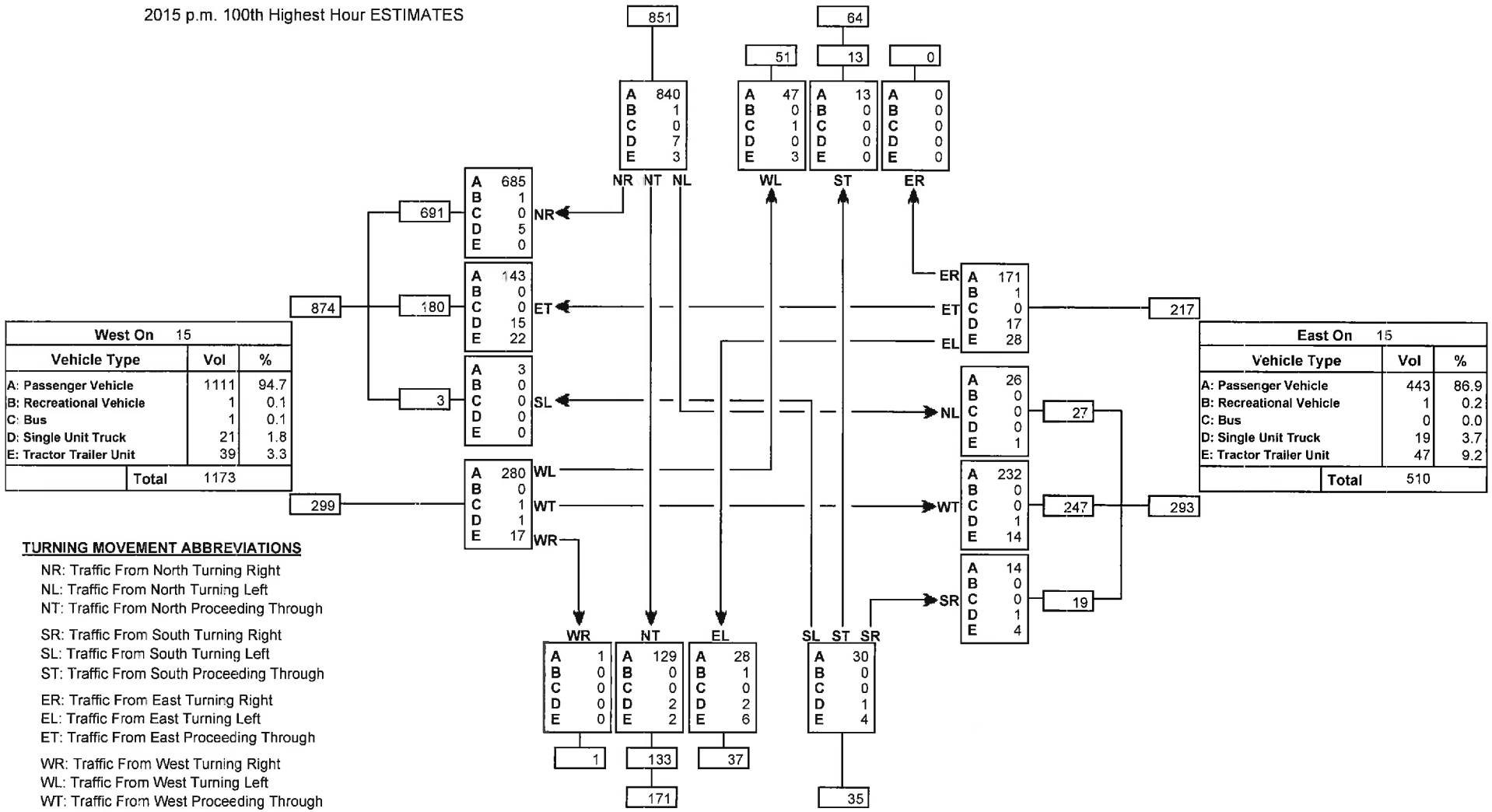
2015 p.m. 100th Highest Hour ESTIMATES

North On Rge Rd 214		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	900	98.4
B: Recreational Vehicle	1	0.1
C: Bus	1	0.1
D: Single Unit Truck	7	0.8
E: Tractor Trailer Unit	6	0.7
Total	915	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1111	94.7
B: Recreational Vehicle	1	0.1
C: Bus	1	0.1
D: Single Unit Truck	21	1.8
E: Tractor Trailer Unit	39	3.3
Total	1173	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	443	86.9
B: Recreational Vehicle	1	0.2
C: Bus	0	0.0
D: Single Unit Truck	19	3.7
E: Tractor Trailer Unit	47	9.2
Total	510	

South On 830		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	188	91.3
B: Recreational Vehicle	1	0.5
C: Bus	0	0.0
D: Single Unit Truck	5	2.4
E: Tractor Trailer Unit	12	5.8
Total	206	



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Turning Movement Summary Diagram

Reference No.: 99553

Intersection of:

15 & RGE RD 211 23-55-21-400000000

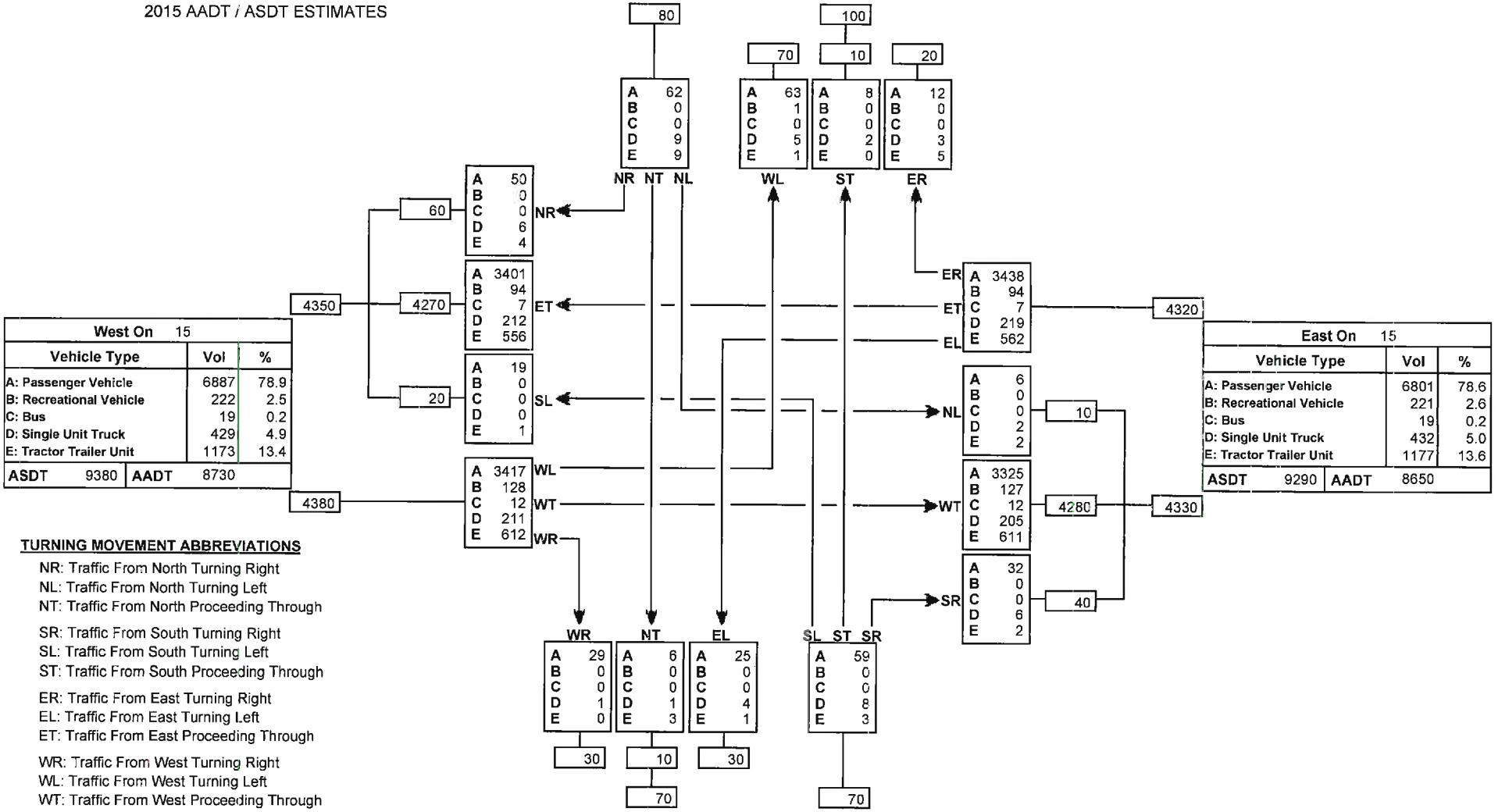
2015 AADT / ASDT ESTIMATES

North On Rge Rd 211		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	145	80.6
B: Recreational Vehicle	1	0.6
C: Bus	0	0.0
D: Single Unit Truck	19	10.6
E: Tractor Trailer Unit	15	8.3
ASDT 190	**AADT** 180	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	6887	78.9
B: Recreational Vehicle	222	2.5
C: Bus	19	0.2
D: Single Unit Truck	429	4.9
E: Tractor Trailer Unit	1173	13.4
ASDT 9380	**AADT** 8730	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	6801	78.6
B: Recreational Vehicle	221	2.6
C: Bus	19	0.2
D: Single Unit Truck	432	5.0
E: Tractor Trailer Unit	1177	13.6
ASDT 9290	**AADT** 8650	

South On Rge Rd 211		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	119	85.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	14	10.0
E: Tractor Trailer Unit	7	5.0
ASDT 150	**AADT** 140	



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TURNING MOVEMENT ABBREVIATIONS

AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day fo period of January 1 to December 31 (365 days)

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Average daily traffic expressed as vehicles per day fo period of May 1 to September 30 (153 days)

Turning Movement Summary Diagram

Reference No.: 99553

Intersection of:
15 & RGE RD 211 23-55-21-400000000

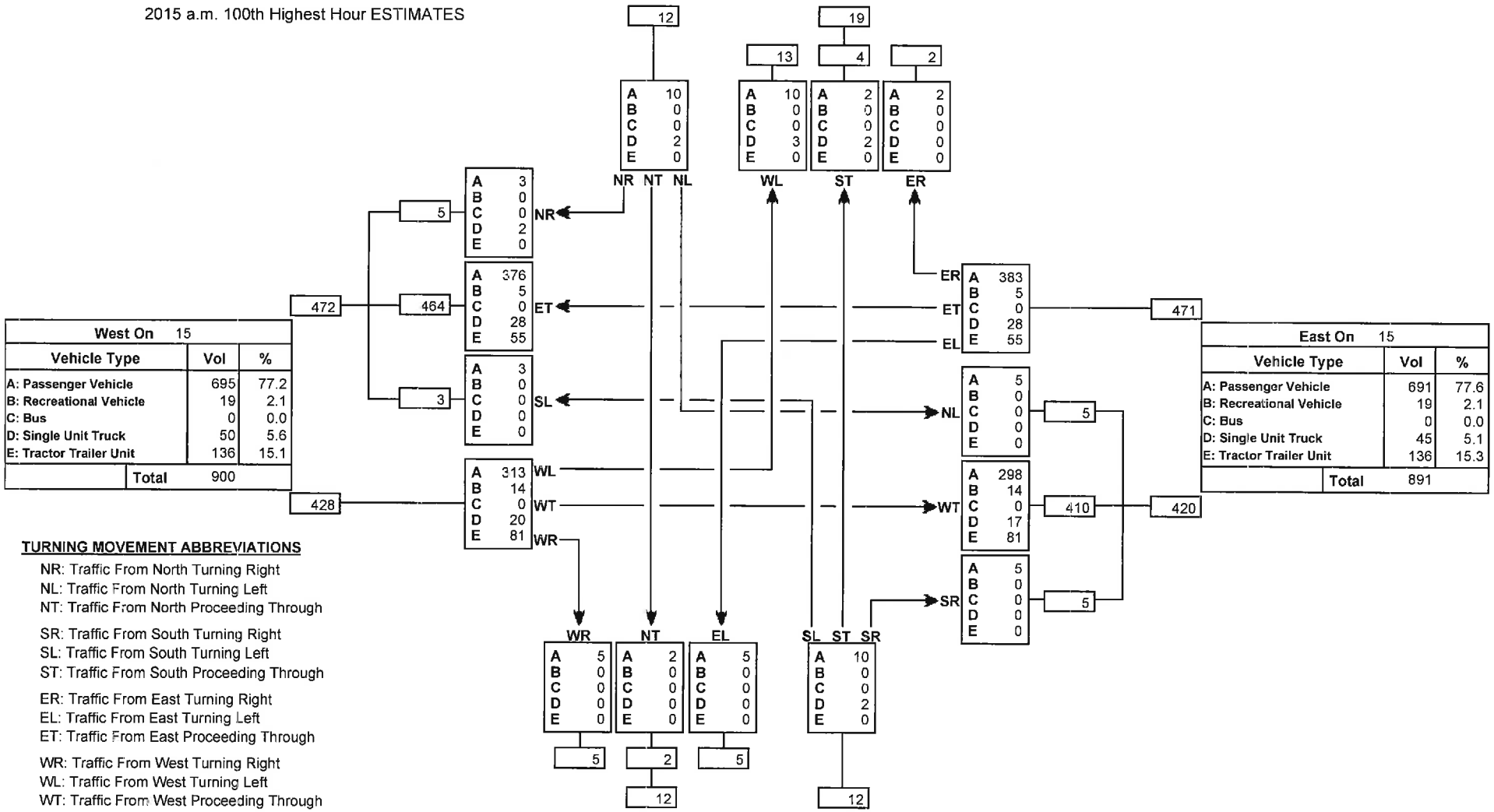
2015 a.m. 100th Highest Hour ESTIMATES

North On Rge Rd 211		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	24	77.4
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	7	22.6
E: Tractor Trailer Unit	0	0.0
Total	31	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	695	77.2
B: Recreational Vehicle	19	2.1
C: Bus	0	0.0
D: Single Unit Truck	50	5.6
E: Tractor Trailer Unit	136	15.1
Total	900	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	691	77.6
B: Recreational Vehicle	19	2.1
C: Bus	0	0.0
D: Single Unit Truck	45	5.1
E: Tractor Trailer Unit	136	15.3
Total	891	

South On Rge Rd 211		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	22	91.7
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	2	8.3
E: Tractor Trailer Unit	0	0.0
Total	24	



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Turning Movement Summary Diagram

Reference No.: 99553

Intersection of:
15 & RGE RD 211 23-55-21-400000000

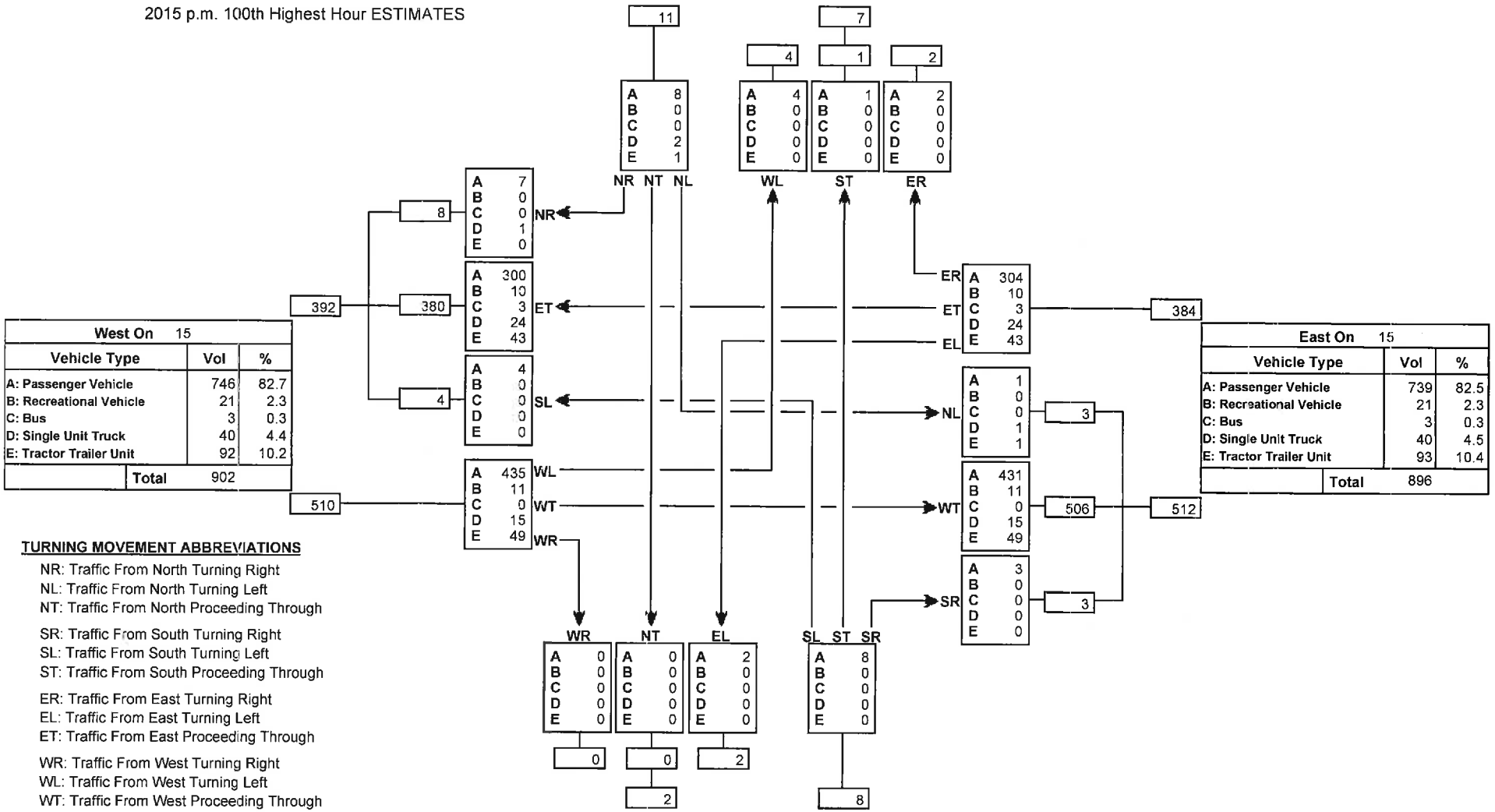
2015 p.m. 100th Highest Hour ESTIMATES

North On Rge Rd 211		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	15	83.3
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	2	11.1
E: Tractor Trailer Unit	1	5.6
Total	18	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	746	82.7
B: Recreational Vehicle	21	2.3
C: Bus	3	0.3
D: Single Unit Truck	40	4.4
E: Tractor Trailer Unit	92	10.2
Total	902	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	739	82.5
B: Recreational Vehicle	21	2.3
C: Bus	3	0.3
D: Single Unit Truck	40	4.5
E: Tractor Trailer Unit	93	10.4
Total	896	

South On Rge Rd 211		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	10	100.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	10	



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Turning Movement Summary Diagram

Reference No.: 100540

Intersection of:

15 & 830 NE OF FT SASKATCHEWAN EJ

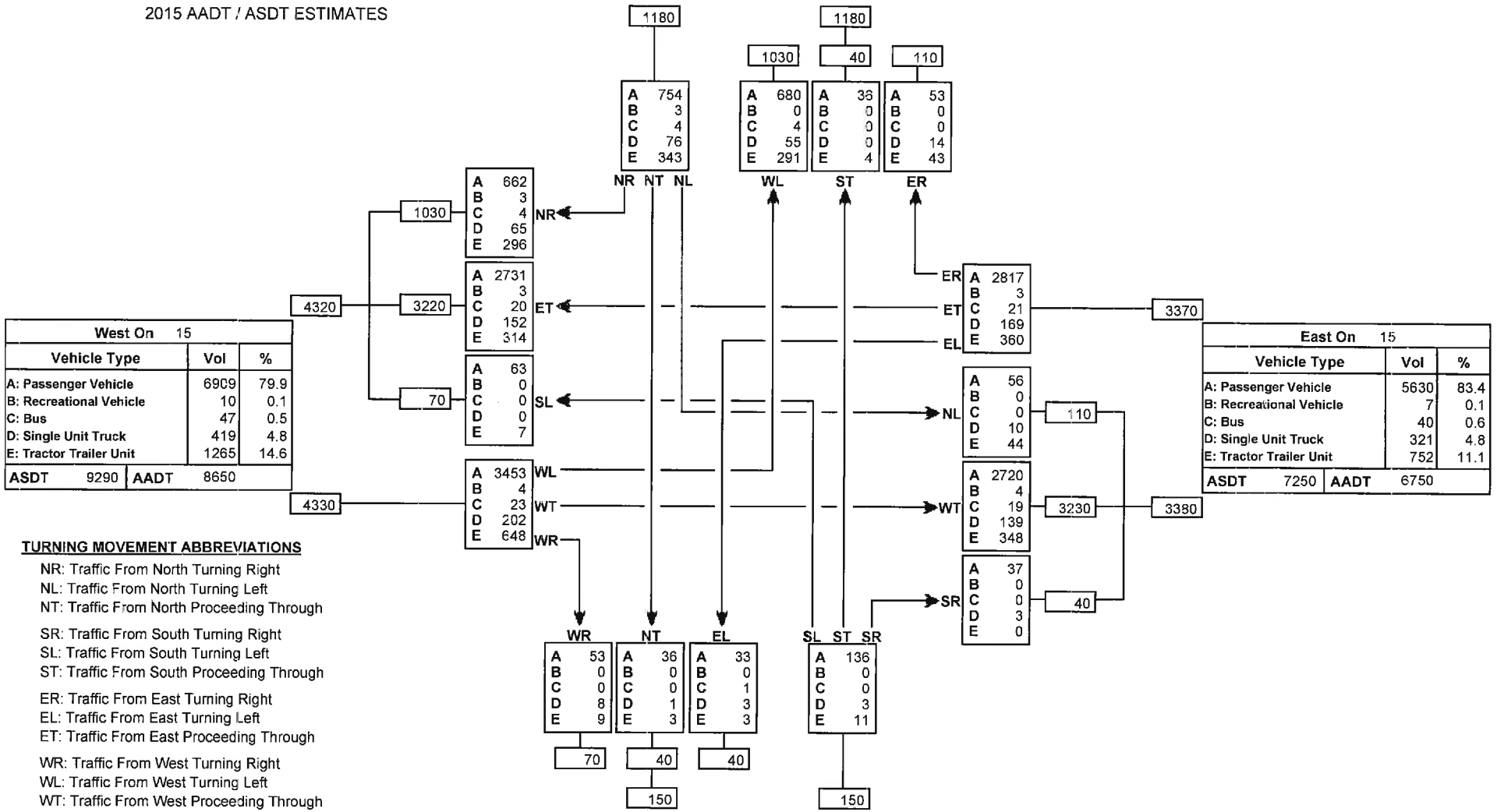
2015 AADT / ASDT ESTIMATES

North On 830		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	1523	64.5
B: Recreational Vehicle	3	0.1
C: Bus	8	0.3
D: Single Unit Truck	145	6.1
E: Tractor Trailer Unit	681	28.9
ASDT 2540	**AADT** 2360	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	6909	79.9
B: Recreational Vehicle	10	0.1
C: Bus	47	0.5
D: Single Unit Truck	419	4.8
E: Tractor Trailer Unit	1265	14.6
ASDT 9290	**AADT** 8650	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	5630	83.4
B: Recreational Vehicle	7	0.1
C: Bus	40	0.6
D: Single Unit Truck	321	4.8
E: Tractor Trailer Unit	752	11.1
ASDT 7250	**AADT** 6750	

South On Rge Rd 210		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	258	86.0
B: Recreational Vehicle	0	0.0
C: Bus	1	0.3
D: Single Unit Truck	15	5.0
E: Tractor Trailer Unit	26	8.7
ASDT 320	**AADT** 300	



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TURNING MOVEMENT ABBREVIATIONS

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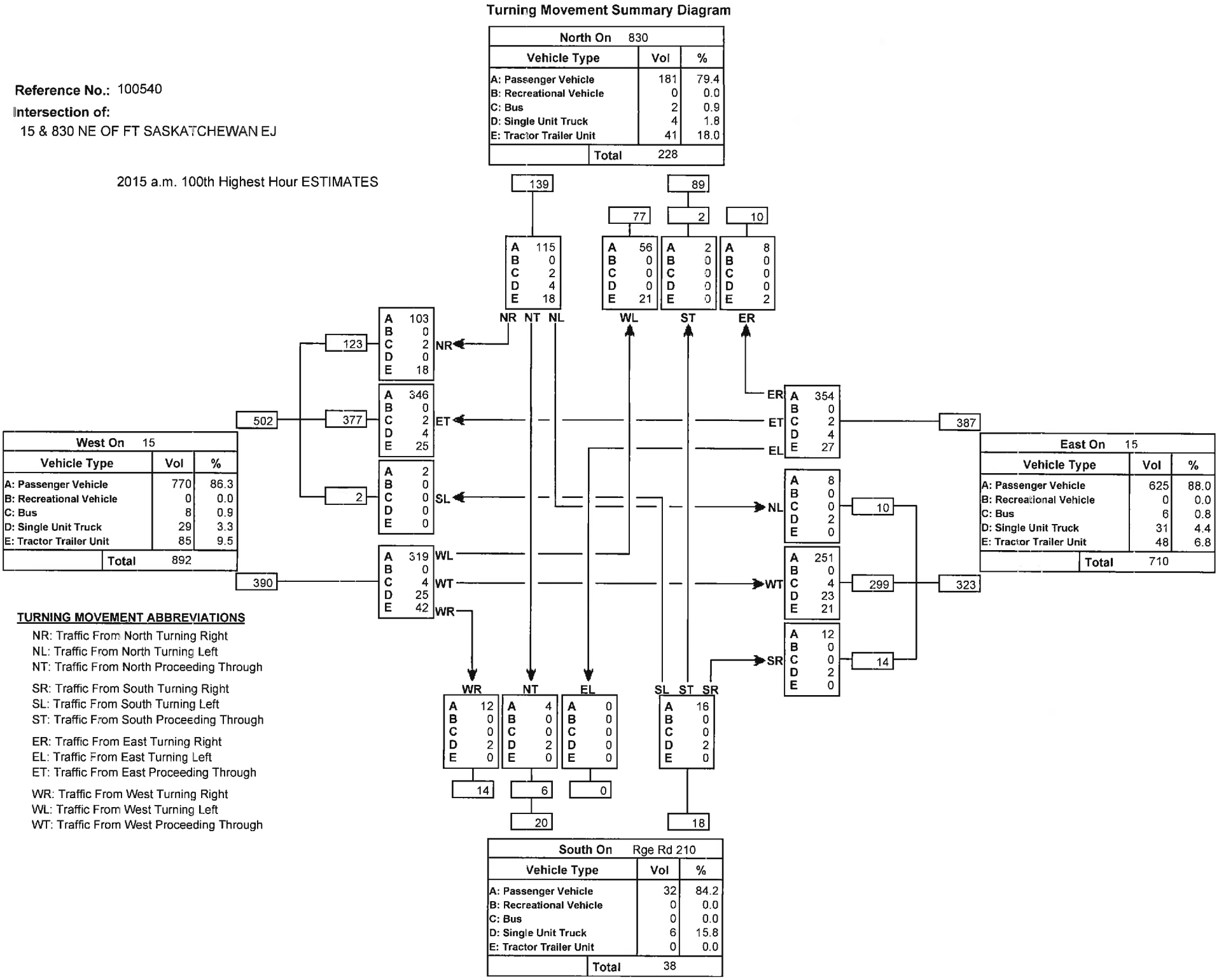
Turning Movement Summary Diagram

Reference No.: 100540

Intersection of:
15 & 830 NE OF FT SASKATCHEWAN EJ

2015 a.m. 100th Highest Hour ESTIMATES



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Turning Movement Summary Diagram

Reference No.: 100540

Intersection of:
15 & 830 NE OF FT SASKATCHEWAN EJ

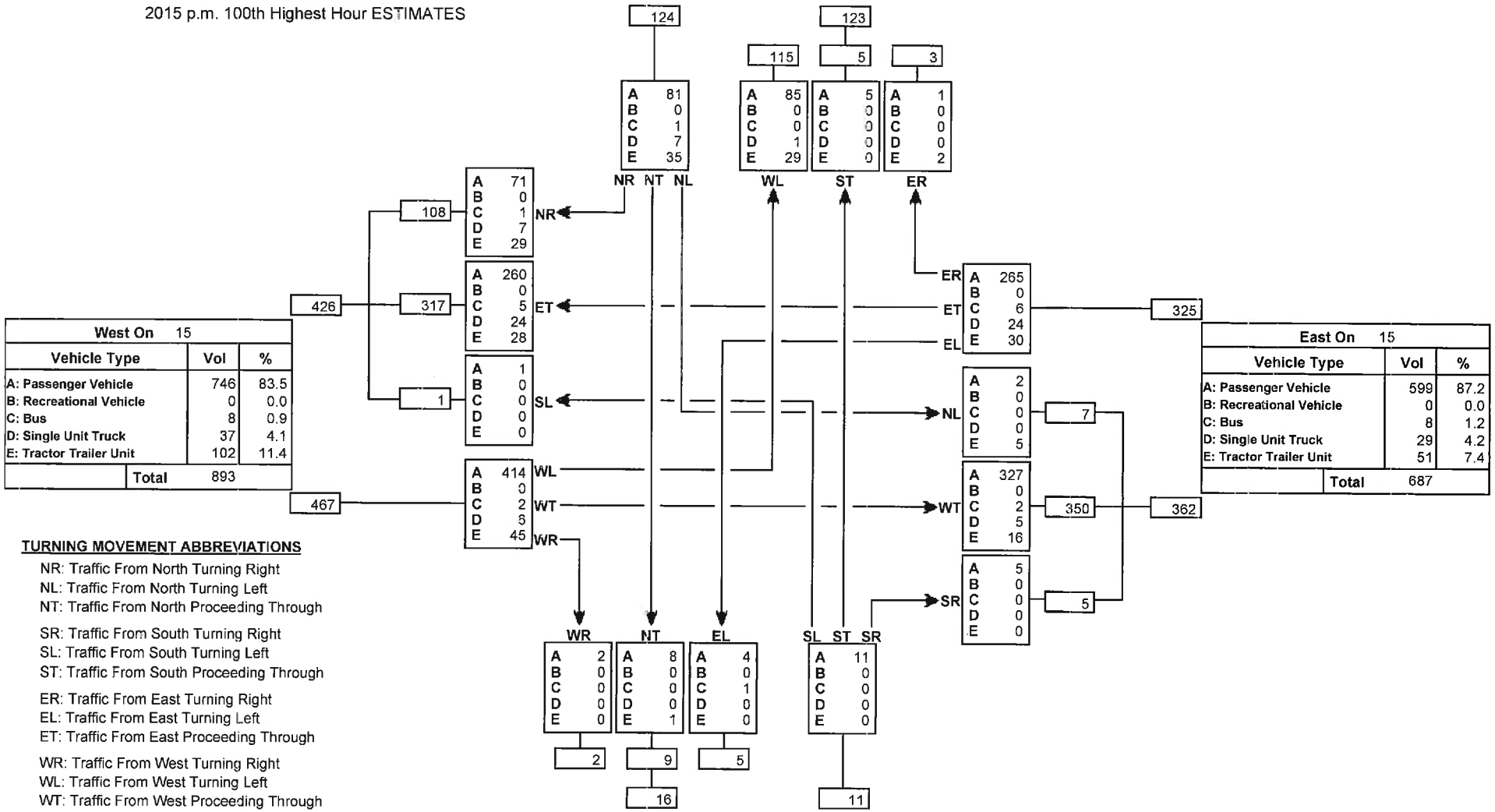
2015 p.m. 100th Highest Hour ESTIMATES

North On 830		
Vehicle Type	Vol	%
A: Passenger Vehicle	172	69.6
B: Recreational Vehicle	0	0.0
C: Bus	1	0.4
D: Single Unit Truck	8	3.2
E: Tractor Trailer Unit	66	26.7
Total	247	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	746	83.5
B: Recreational Vehicle	0	0.0
C: Bus	8	0.9
D: Single Unit Truck	37	4.1
E: Tractor Trailer Unit	102	11.4
Total	893	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	599	87.2
B: Recreational Vehicle	0	0.0
C: Bus	8	1.2
D: Single Unit Truck	29	4.2
E: Tractor Trailer Unit	51	7.4
Total	687	

South On Rge Rd 210		
Vehicle Type	Vol	%
A: Passenger Vehicle	25	92.6
B: Recreational Vehicle	0	0.0
C: Bus	1	3.7
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	1	3.7
Total	27	



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WT: Traffic From West Proceeding Through

Turning Movement Summary Diagram

Reference No.: 70000284

Intersection of:
830 & TWP RD 562 12-56-21-400000000

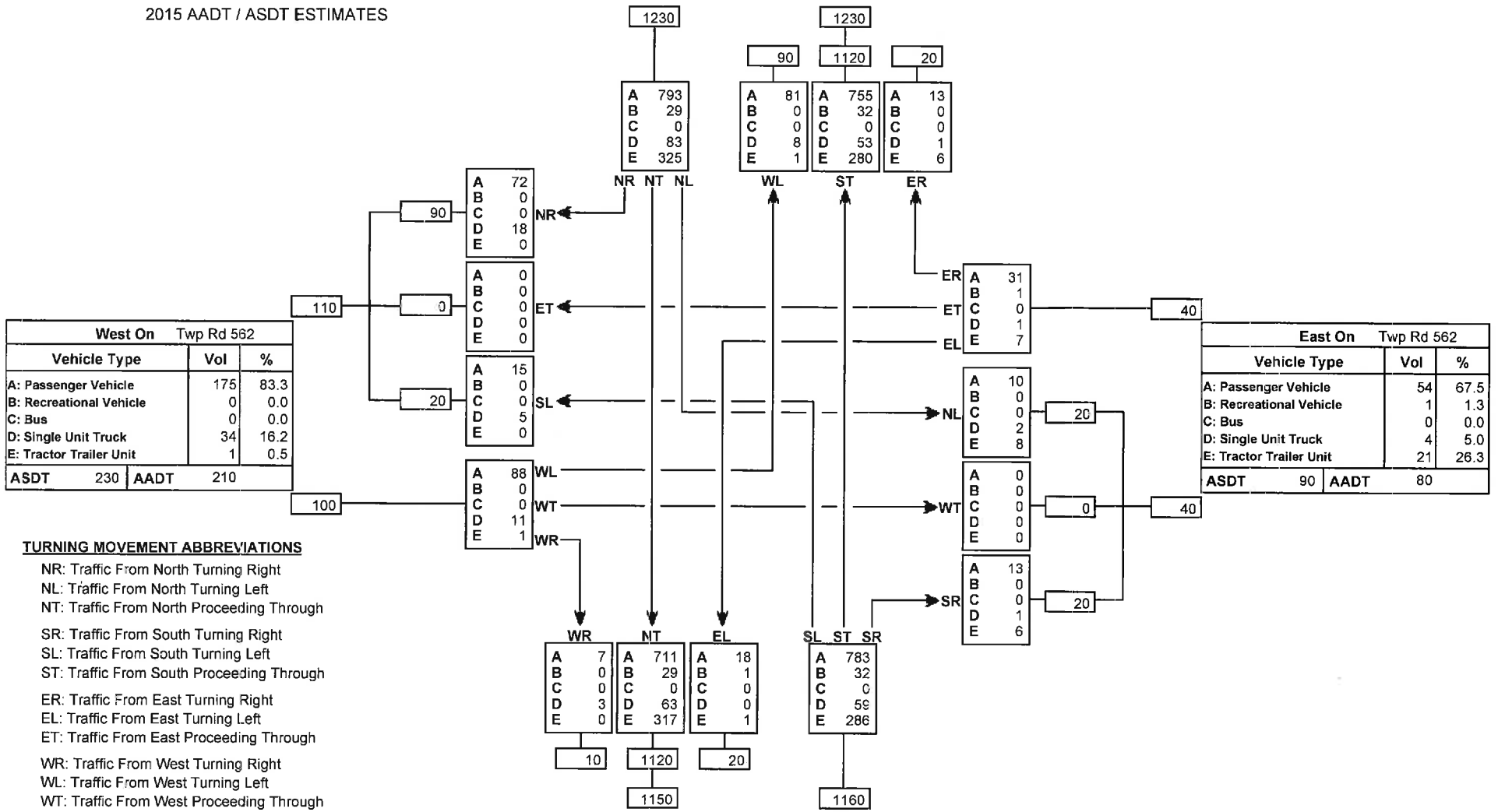
2015 AADT / ASDT ESTIMATES

North On 830		
Vehicle Type	Vol	%
A: Passenger Vehicle	1642	66.7
B: Recreational Vehicle	61	2.5
C: Bus	0	0.0
D: Single Unit Truck	145	5.9
E: Tractor Trailer Unit	612	24.9
ASDT 2640	AADT 2460	

West On Twp Rd 562		
Vehicle Type	Vol	%
A: Passenger Vehicle	175	83.3
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	34	16.2
E: Tractor Trailer Unit	1	0.5
ASDT 230	AADT 210	

East On Twp Rd 562		
Vehicle Type	Vol	%
A: Passenger Vehicle	54	67.5
B: Recreational Vehicle	1	1.3
C: Bus	0	0.0
D: Single Unit Truck	4	5.0
E: Tractor Trailer Unit	21	26.3
ASDT 90	AADT 80	

South On 830		
Vehicle Type	Vol	%
A: Passenger Vehicle	1519	65.8
B: Recreational Vehicle	62	2.7
C: Bus	0	0.0
D: Single Unit Truck	125	5.4
E: Tractor Trailer Unit	604	26.1
ASDT 2480	AADT 2310	



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: Average Annual 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.: 70000284

Intersection of:
830 & TWP RD 562 12-56-21-400000000

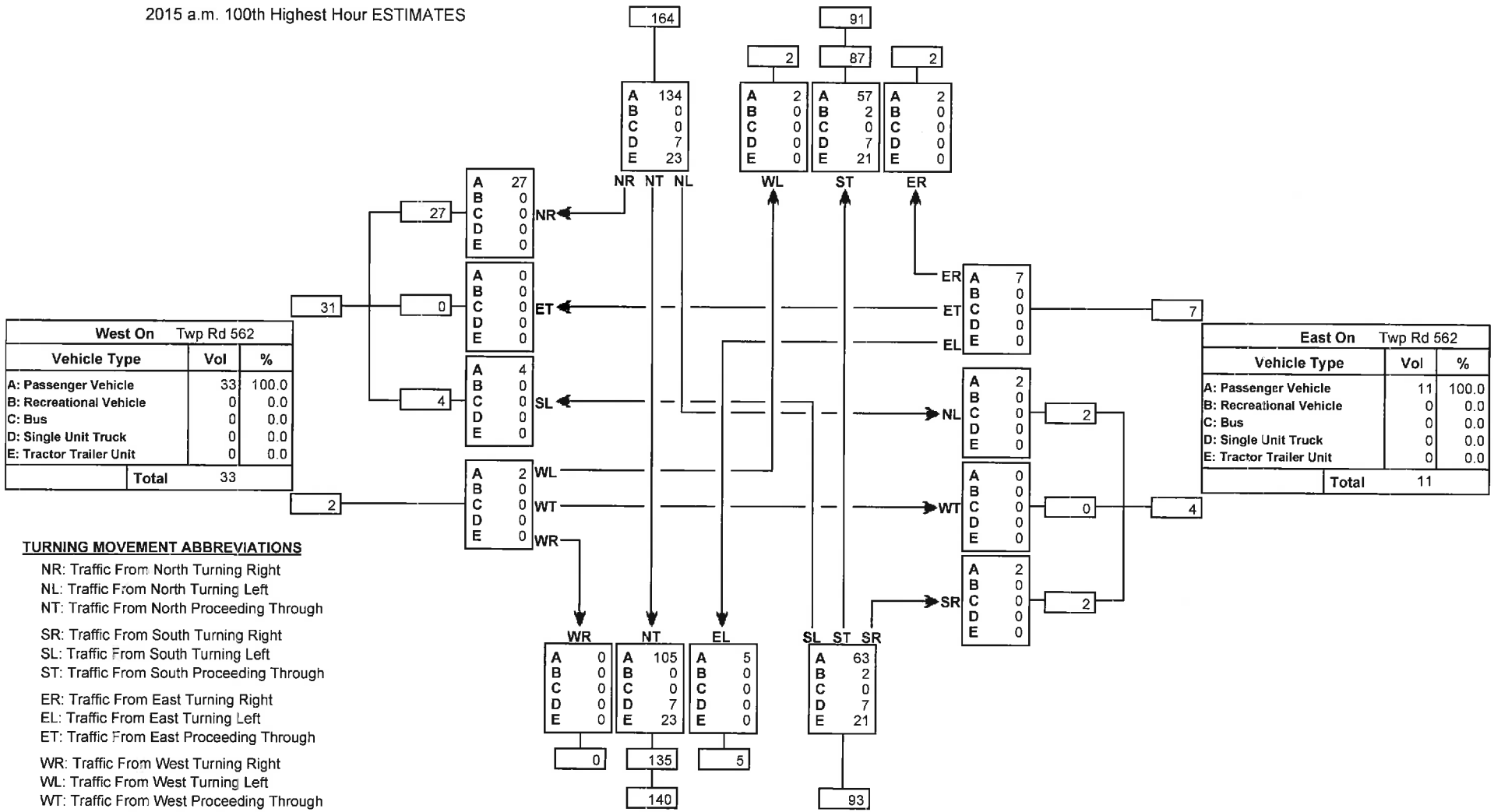
2015 a.m. 100th Highest Hour ESTIMATES

North On 830		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	195	76.5
B: Recreational Vehicle	2	0.8
C: Bus	0	0.0
D: Single Unit Truck	14	5.5
E: Tractor Trailer Unit	44	17.3
Total	255	

West On Twp Rd 562		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	33	100.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	33	

East On Twp Rd 562		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	11	100.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	11	

South On 830		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	173	74.2
B: Recreational Vehicle	2	0.9
C: Bus	0	0.0
D: Single Unit Truck	14	6.0
E: Tractor Trailer Unit	44	18.9
Total	233	



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Turning Movement Summary Diagram

Reference No.: 70000284

Intersection of:
830 & TWP RD 562 12-56-21-400000000

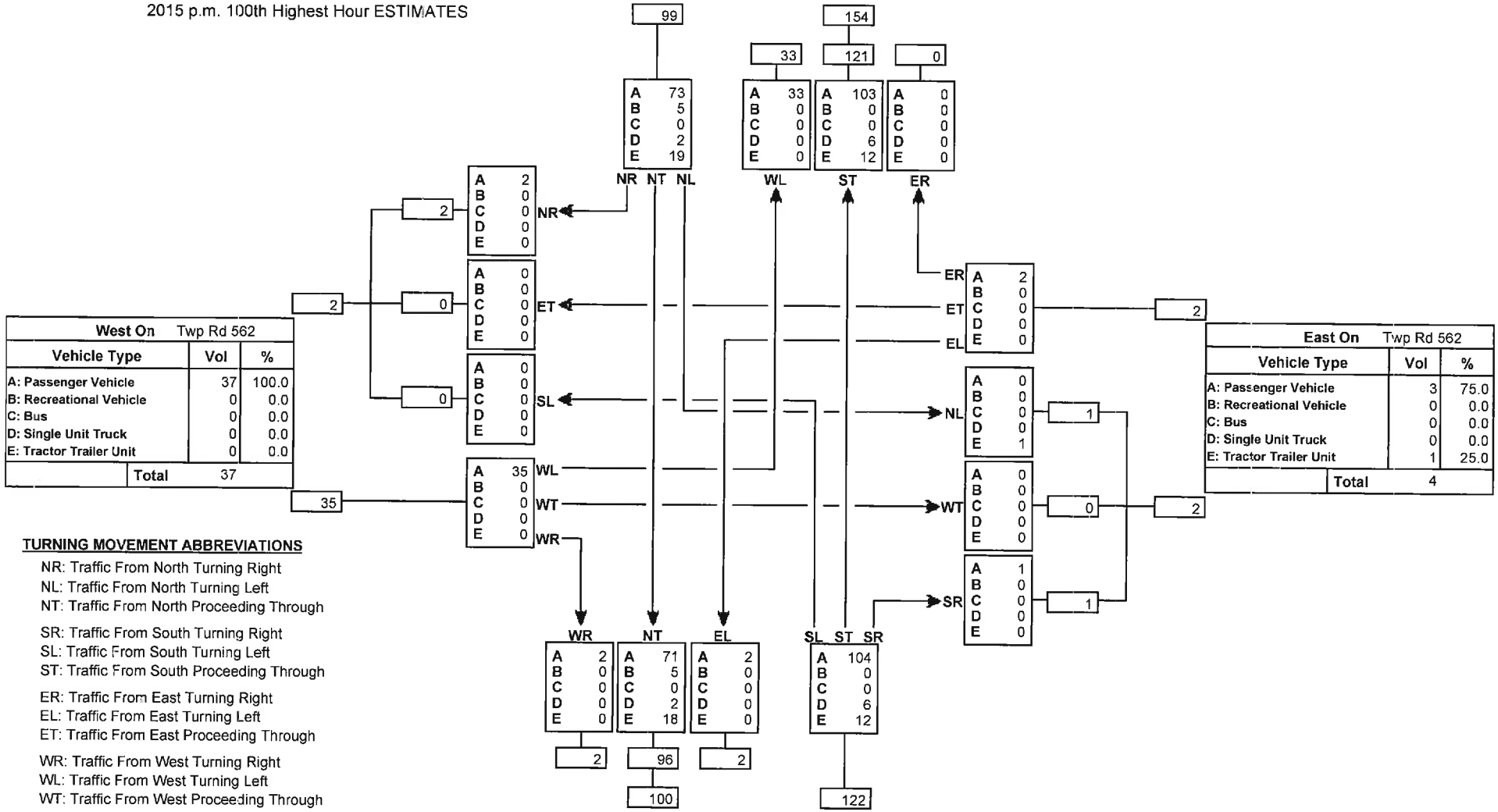
2015 p.m. 100th Highest Hour ESTIMATES

North On 830		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	209	82.6
B: Recreational Vehicle	5	2.0
C: Bus	0	0.0
D: Single Unit Truck	8	3.2
E: Tractor Trailer Unit	31	12.3
Total	253	

West On Twp Rd 562		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	37	100.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	37	

East On Twp Rd 562		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	3	75.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	1	25.0
Total	4	

South On 830		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	179	80.6
B: Recreational Vehicle	5	2.3
C: Bus	0	0.0
D: Single Unit Truck	8	3.6
E: Tractor Trailer Unit	30	13.5
Total	222	



TURNING MOVEMENT ABBREVIATIONS

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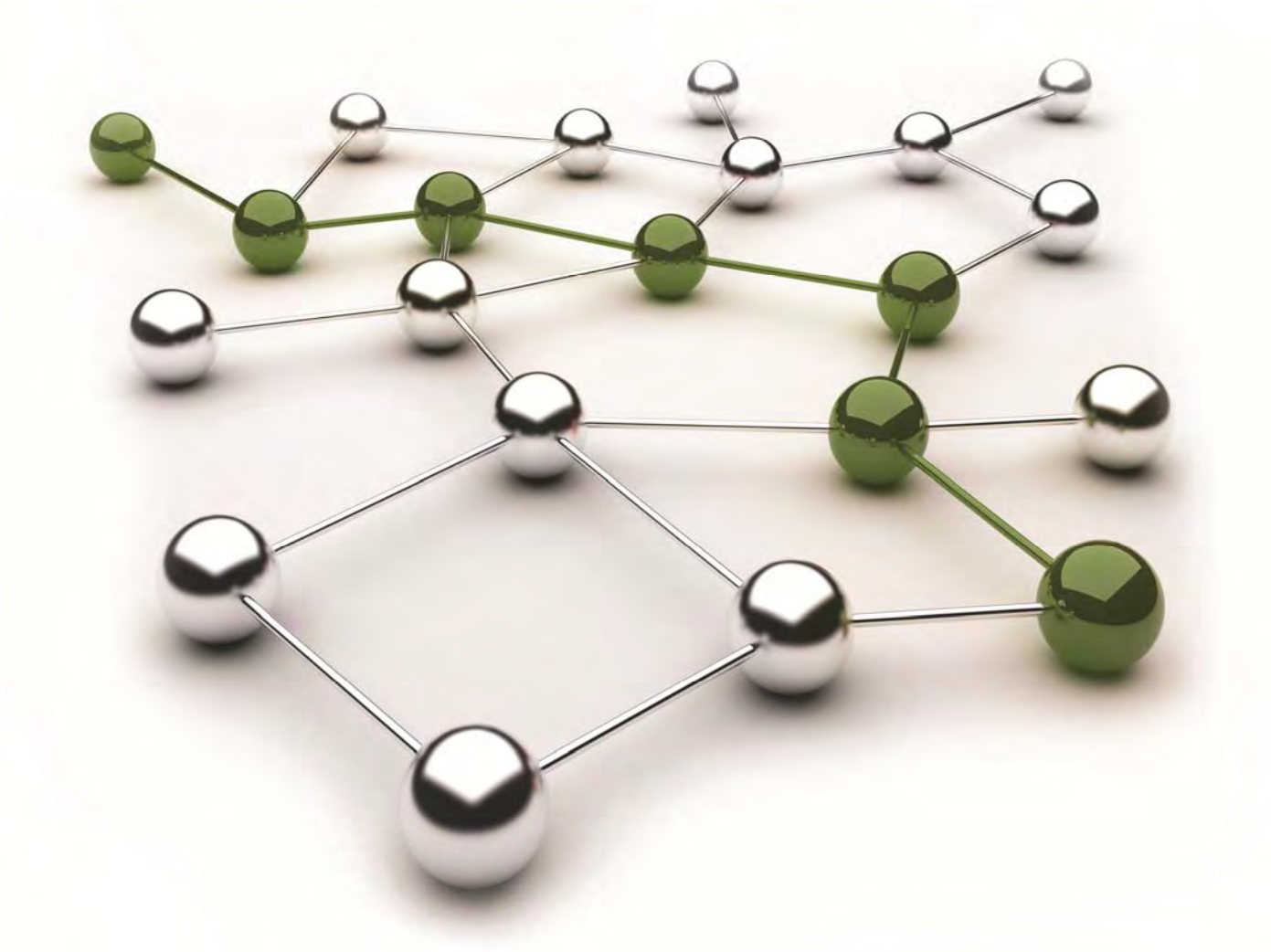
Appendix E
STAKEHOLDER WORKSHOP SUMMARIES AND STAKEHOLDER INPUT

Strathcona County

AIH Road Network East Rge Rd 213 - Hwy 830

Stakeholder Workshops Final Report

August 12, 2015



the DAGNY partnership

STRATEGIC COMMUNICATION SOLUTIONS

BACKGROUND

Strathcona County is currently undertaking a major update to both its Municipal Development Plan (MDP) and its 2007 Transportation Plan. While these planning activities will address the County's needs, the smaller area between Rge Rd 213 and Hwy 830 and between Hwy 15 and Twp Rd 562 had been identified as having some specific and unique challenges that merited a focused discussion with the industry landowners.

Also impacting this specific area is the current Hwy 15 study being done by Strathcona County on behalf of the Province of Alberta regarding potential future changes to this section of the highway that will reduce access points between Rge Rd 214 and Hwy 830.

To develop a clearer understanding of industry needs and priorities, Strathcona County hired The DAGNY Partnership (TDP) to facilitate two workshops with representatives of all the landowners in the impacted areas.

A half-day workshop was convened on May 1, 2015 to share Strathcona County's transportation planning considerations especially relating to the minimum emergency egress requirements of two routes and to draw out industry's preliminary issues and ideas, which are summarized in a report in the Appendix. The results were shared with County staff on June 4, 2015. Subsequently, staff from the Strathcona County's Capital Planning and Construction unit and Economic Development and Tourism met with Dagny Alston of TDP to review the results identified: a proposed Spine Network option and three options regarding the Hwy 15 connection.

Participants were invited to a second workshop on the morning of July 17 and were provided the Workshop 1 report, the Spine Network proposal and three options prior to the meeting to review and consider. The second workshop was held at County Hall and was facilitated by Dagny Alston and Wendy Campbell of TDP. The following report captures the results of this discussion and highlights any outstanding issues that will merit more one-on-one discussion.

PARTICIPANTS

Attended July 17, 2015 workshop:

- Landowners representing
  - ATCO Energy Solutions (Curtis Bauer),
  - CAC Recycling (Colby Jamieson)
  - CN Rail (Julianne Threlfall, Karen Anne Jensen),
  - Enbridge (Jeff Hurd, Ken Furrie, Todd Whillius),
  - Interprovincial (Michelle Dawson),
  - MEG Energy (Tom Corscadden),
  - Providence Grain (Bob Ruzicka, Rick Gregg),
  - TransCanada (Lindsay Mucka, Kristen Monzingo),
  - Value Creation (VCI) (Jason Zhong),
- County Staff and Consultants
  - Stantec (Scott Cole, Carl Clayton) – Strathcona County Transportation Planning Consultant
  - Strathcona County (Gerry Gabinet, Bosco Tong, David Churchill, Ryan Wilson, Scott Sillers, Richard Dekker, Tony Maghee, Radhika Brown, Dale Miller, Dan Schibe, Joanne McKinnon, Karolina Haggerty, Lori Mills)
- Facilitators
  - Dagny Alston, The DAGNY Partnership
  - Wendy Campbell, The DAGNY Partnership

WORKSHOP 2 OBJECTIVES

The workshop was designed to solicit input from the major industrial landowners located within the defined area between Rge Rd 213 and Hwy 830 and between Hwy 15 and Twp Rd 562 regarding the design and functionality of the road network. Specific workshop objectives were to:

- recap with stakeholders a summary of the first workshop input and written submissions, key planning assumptions and timelines including the Hwy 15 Alberta Transportation planning, and how feedback has been integrated into alternatives for followup discussion, and
- solicit input from industry landowners/ stakeholders located in the targeted areas related to three specific alternatives designed around the 15 – 20 year planning horizon including:
  - their level of support for each alternative,
  - identification of any 'show stopper barriers',
  - identification of any additional considerations that need to be factored in that aren't present in the current options, and
  - identification of a preferred alternative (with or without changes).

WORKSHOP 2 OVERALL APPROACH

The second workshop was designed to build off the discussion from the first session. It was focused around how key road network planning principles and priority considerations that emerged from the first workshop were applied to a proposed spine road network solution and the three specific options relating to Hwy 15 access. Landowner representatives were also probed on any alternative solutions that they felt would better fit their needs.

The landowner representatives were broken into two groups with a TDP facilitator capturing notes, suggestions, outstanding issues and levels of support.

While the workshop was not envisioned as a decision-making forum, it was designed to provide an opportunity to test and troubleshoot specific transportation design and access options both collectively with the group of owner representatives and individually around site-specific access issues.

County staff were not active participants in the discussion but were on hand to hear the stakeholder comments directly and, in some cases, clarify specific technical considerations that supported the round table discussion.

The following report highlights the scenarios presented and the results of the industry landowners' discussion.

UNDERLYING PRINCIPLES

In designing the road network, a series of principles emerged from the stakeholder discussion in Workshop 1 as important to consider in the long-term road network design. These are:

- provide safe, easy access to and from all sites including:
    - to Hwy 15 and Hwy 830,
    - optimizing straight routes where possible rather than a network based on more circuitous routings,
    - appropriate and timely access for emergency services (2 options), and
    - access routes to facilitate construction-related trucking,
- respect the rights of the landowners to secure site operations from flow-through traffic,
- accommodate heavy haul and over-dimensional loads (high, long and heavy),
- minimize congestion/conflict between road and rail flow,
- optimize, where possible, the road network for the placement of other utilities such as pipeline.

Stakeholders recognized that while it is important to strive to find solutions that meets all these needs, the nature of the area may require some compromise to find a fair balance between rights and responsibilities of an individual landowner and the County's role to service the greater good.

It is with this in mind that the workshop probed both 'best fit alternatives' as well as 'could work' options. This provides the County with a starting point for further one-on-one discussions that may be needed to resolve a site-specific issue.

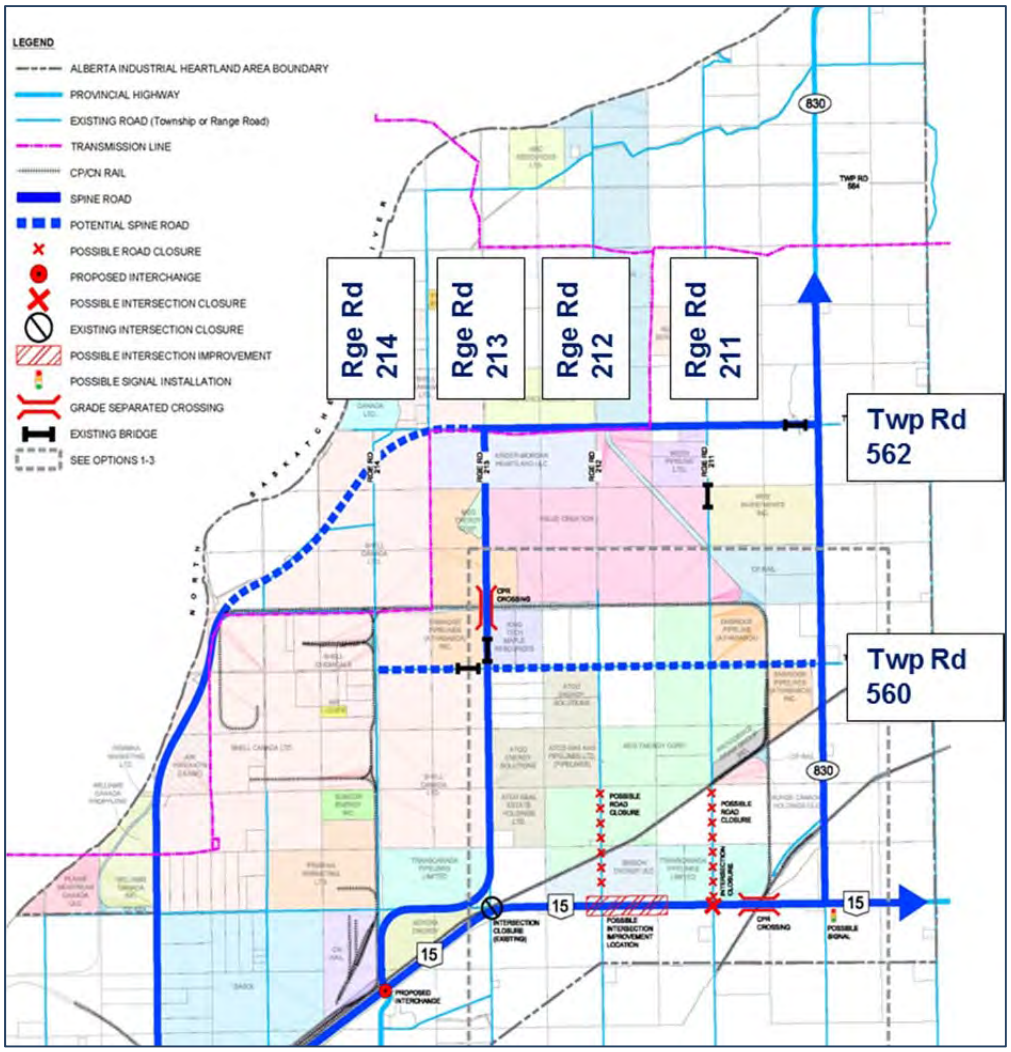
SPINE NETWORK DESIGN GARNERS SUPPORT

The Spine Network illustrated below is considered the primary access and egress roads for the land parcels in this area. The dark blue lines are the recommended routes and would be upgraded as needed to ensure high and heavy load capacity.

The dotted blue line along Twp Rd 560 was an optional consideration based on input from the first workshop and was specifically probed as to its 'need to have' or 'nice to have'.

Other features noted that have not been previously planned for include:

- a rail grade separation on Hwy 15 past Rge Rd 211,
- a signalized intersection on Hwy 15 at Hwy 830
- an upgraded intersection on Hwy 15 either on Rge Rd 212 or between the Rge Rd 211 and Rge Rd 212, and
- specific southern sections of Rge Rd 211 and Rge Rd 212 closed to public traffic.



Map 1 - Proposed Spine Network, Strathcona County, July 2015

The specifics of the new intersection location, any new bypass roads and/or Rge Rd 211 rail grade separations are covered in the three options following.

SPINE NETWORK GARNERS SUPPORT
(cont.)

Summary of stakeholder discussion on proposed spine network

- Overall there was general support for the spine roads proposed (Rge Rd 213, Twp Rd 562, Hwy 830 and Hwy 15) with the inclusion of Twp Rd 560 as an upgraded spine road. This network was seen as offering fairly direct access to most of the sites, especially with the inclusion of Twp Rd 560.
- The proposed rail grade separation and lighted intersection on Hwy 15 was generally supported.
- Some offered the concern that the large curve from the proposed intersection at Hwy 15 and Rge Rd 214 wasn't as functional as using Rge Rd 214 as the spine road. Several points were raised to explain why the Rge Rd 214 option isn't being considered. These included:
    1. A significant portion of Rge Rd 214 between Hwy 15 and Twp Rd 562 splits a current operating site. When construction is complete, parts of Rge Rd 214 may be closed to public traffic to provide the ability for the landowner to secure more of its site.
    2. The landowner involved has already committed funds to upgrade the curved road that connects Rge Rd 220 to Twp Rd 562.
    3. Proximity to the specific rail spur is not ideal for the location of a major spine road as it can sterilize the land between the road and the rail line and potentially limit the landowner's ability to develop or connect into rail service from their own land.
    4. The CPR crossing at Rge Rd 214 is a far more complicated crossing because of the nature of the lines that come together at that location.
- A few specific issues were raised resulting from direct impact to specific landowners.
    - Twp Rd 560 and Rge Rd 211 (northern section) cuts through one of the major landowners.
    - Closing Rge Rd 211/Hwy 15 intersection was raised as a concern albeit stakeholders realized that the length require for the proposed rail grade separation would likely drive the closure of the intersection for practical and safety reasons.
    - The proposed closure of Rge Rd 211 south of the railway line to Hwy 15 would create longer and more complicated routing to and from Hwy 15 for the two property owners who saddle the CN railway line on Rge Rd 211.
    - Turning across Hwy 830 to access Twp Rd 560 may cause undue delays and/or traffic backups for trucking. With proposed closure of the southern part of Rge Rd 211, this may be the only access option for properties located north of the railway line on Rge Rd 211.
    - For property owners near Rge Rd 211 north of the CN track, accessing Hwy 15 via Twp Rd 560 (east) and south on Hwy 830 requires three at-grade rail crossings that may create truck backup while accessing Hwy 15 via Twp Rd 560 (west) and south on Rge Rd 213 is a significantly longer and more complex route for routine truck traffic.
    - In considering the other existing county roads still noted on the map as open for public access, most felt that they were appropriate and provided the needed access to the various properties in the area. Three exceptions were noted and are as follows:
        1. Rge Rd 211 north of the CN rail line to Twp Rd 560 bisects an owner's site.

SPINE NETWORK GARNERS SUPPORT
(cont.)

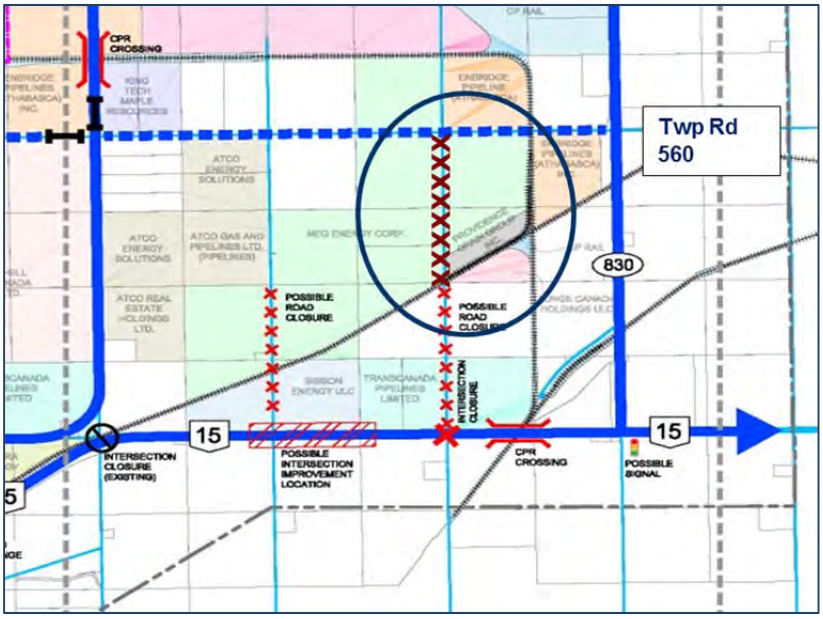
2. If parts of Rge Rd 211 and Rge Rd 212 (south of the CN tracks) are closed and a bypass road with a grade separation isn't created, properties north of the CN tracks will have no direct access south to Hwy 15 between the two spine roads.
3. Retaining Rge Rd 211 north of Twp Rd 560 to Twp Rd 562 as a public road with the capacity for industrial traffic is important to provide access to several sites.

The general tone of the discussion infers that ***any issues raised around the spine network were 'workable;' however, support for this primary connection network may be influenced by final recommendations relating to Hwy 15 access***.

Alternative alignment to key County road (Rge Rd 211) proposed

To address the issue of ensuring appropriate public access for landowners north of the CN railway line and the concern relating to a public road (Rge Rd 211) dissecting a major landowner's operation, the following suggestion was made and is illustrated on Map 2 below in the circled area.

- Close public access on the current alignment of Rge Rd 211 north of the railway.
- Negotiate with the property owner to move Rge Rd 211 north of the rail line to the eastern edge of the property line on the west side of the rail line
- Assess and align new connection to Twp Rd 560 in light of the proximity to the level crossing of the CPR rail spur.
- Road and turning radius would need to take into consideration both left- and right-hand turning close to a grade rail crossing.
- As noted earlier, review consideration for a controlled intersection at Twp Rd 560 and Hwy 830 to accommodate the operational truck traffic from existing and future operations.



Map 2 - Alternative to Proposed Spine Network, July 2015

HWY 15 ACCESS ALTERNATIVES

A key consideration in this specific area is the impact that the current Hwy 15 corridor study will have on the adjacent landowners and their access to Hwy 15. While there still appears to be some room for discussion about where access might be located, the direction that there will only be one potential access point between Rge Rd 214 and Hwy 830 is confirmed.

The need for, and nature of, the proposed grade separation over the CPR line drives the decision to close the intersection at Rge Rd 211. It is currently envisioned that, because of the geography of the area, the length of the bridge at the grade separation crossing of the CPR line on Hwy 15 would be too close to Rge Rd 211 to create a safe intersection.

Current and anticipated growth in rail traffic would indicate that the grade separation is an important enhancement for the future planning of Hwy 15.

The current thinking within the Hwy 15 project team was focused around Rge Rd 212; however, this specific alignment is still open for discussion.

With these considerations and input from the first workshop, Strathcona County's Capital Planning and Construction staff generated three alternatives. Each was presented, highlighting the respective specific features and was then discussed by the two working groups as a potential solution. Participants were asked to consider how effectively it addressed the principles highlighted earlier such as:

- ensures appropriate access to all landowners,
- directness of the route,
- safe, easy access for a range of trucking needs,
- respects integrity of the landowners to secure their site from public access, and
- minimizes rail /road congestion or choke points.

They also considered any 'show stoppers' that would impact their company's support for the option and any alternatives that they might suggest to overcome 'show stopper' barriers.

Stakeholder overall reaction

None of the three alternatives presented were strongly supported albeit Alternative 1 had four of the landowners note that they 'could support' the option as is or with some modifications. One landowner representative noted 'some support' coupled with some 'show stopper access issues' that would have to be resolved for this to work for their organization.

Alternative 2 and 3 were ranked as 'show stoppers' by all the stakeholders for a variety of specific reasons that will be summarized in the following sections.

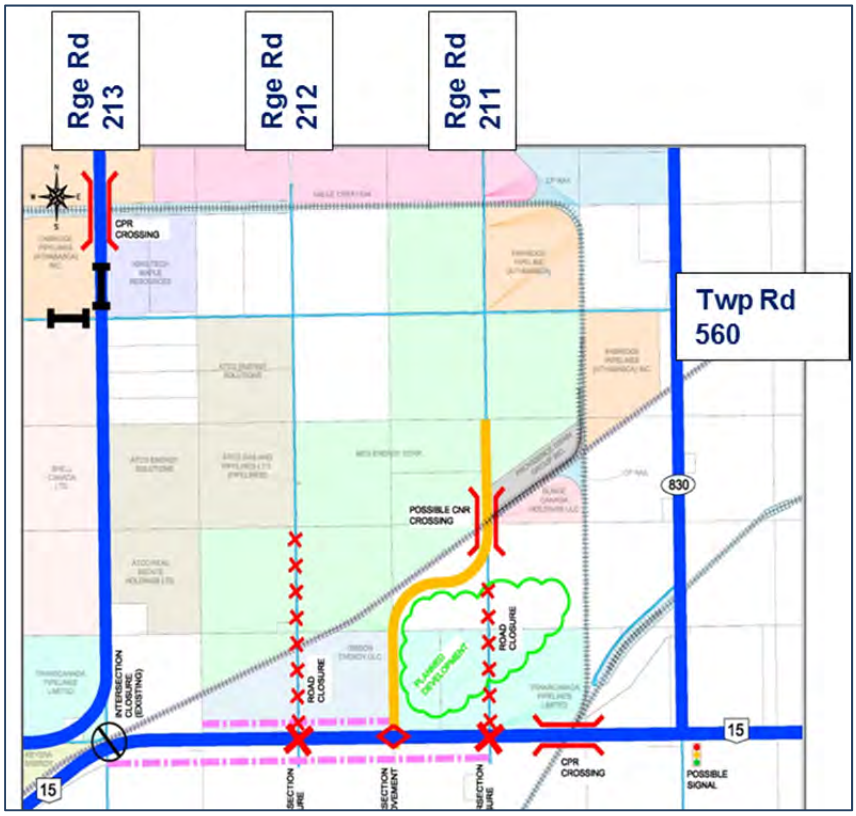
Several general themes emerged that impacted all three alternatives presented. These were:

1. Every alternative, especially Alternative 2, required a ***notable portion of land to be given up by the landowner for the construction of the bypass road between Hwy 15 over the CN rail line***. Not only does a public access road which cuts diagonally across the property create a challenge to secure the site, it can sterilize the kind of development that can go on some parts of the site. Secondly, aligning the road to run parallel to the CN line could cut off south side access to the CN rail line for this landowner.
2. If Rge Rd 211 north of the CN tracks is the only egress for the property owners located on the east side of Rge Rd 211 – both north and south of the tracks — then the ***design of the grade separation in both Alternatives 1 and 3 must provide for access*** to these sites either directly onto the bypass road or through a service road that connects to Rge Rd 211.
3. The ***proposed grade separation on Rge Rd 211 may not be possible to do given the current development proposed*** on the western side of Rge Rd 211.
4. All the alternatives presented continue to ***keep Rge Rd 211 open as a public road which would result in the site being permanently split.***

ALTERNATIVE 1

In addition to the features illustrated in the Spine Road Network section, the key features of Alternative 1 are illustrated in Map 3 below. They propose:

- A service road (pink dotted line) to support access across the properties paralleling Hwy 15 to the corner parcel south of the rail line and southern side of Hwy 15.
- Bypass road (yellow line) to be built to provide access north between property owners with two bends to join up prior to rail way crossing.
- Rail grade separation on Rge Rd 211 would need to be wide long enough to cover the diagonal nature of the line as it crosses Rge Rd 211.
- Access to Rge Rd 211 (north of the CN rail line) & bypass road for properties straddling the track and east of Rge Rd 211.



Map 3 - Alternative 1, Strathcona County, July 2015

This option addresses three general principles:

- The Hwy 15 access and bypass road south of the CN rail line is aligned between two property owners and is envisioned as being aligned around proposed development but near the edge of the property.
- Rail grade separation and bypass would be designed to facilitate access from property north of the rail line to Rge Rd 211.
- Design is reasonably direct with two wide bends.

ALTERNATIVE 1 – STAKEHOLDER COMMENTS

Of the three alternatives presented, this option had **some support** and the least number of objections because:

- access point to Hwy 15 and the road alignment along property line is the preferred routing,
- the bypass road has fewest bends,
- it provides reasonable access to/from Hwy 15 for properties east of Rge Rd 212 and north of the CN tracks,
- a grade separation across the CN line will better accommodate expanded rail traffic, minimizing potential road/rail delays regarding this rail crossing, and
- the service roads are on the edge of the property, minimizing impact to the current property owners.

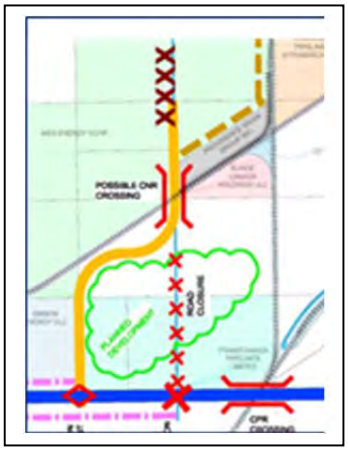
Stakeholder concerns included:

- depending on the final design the road alignment parallel to the CN line across to Rge Rd 211, may sterilize a significant portion of land,
- road alignment on the south side of the railway right-of-way may limit landowners' access to the south side of the CN line west of Rge Rd 211,
- potential impacts or complications in planning pipeline infrastructure on property south of the rail line,
- bypass/ Rge Rd 211 would split a major landowner's property north of the rail line,
- concerns about whether this bypass would accommodate heavy load requirement during construction or operations on sites north of the rail line and east of Rge Rd 212,
- design of the grade separation bridge and how it may limit or eliminate access to properties on the east side of Rge Rd 211 both north and south of the rail line, and
- design of grade separation bridge may conflict with potential rail marshalling/spur line development on property west of Rge Rd 211 and north of the rail line.

It was noted that without a grade separation over the tracks there would be concerns re: traffic delays, especially for emergency vehicles, if rail traffic continues to increase.

One suggested bypass re-alignment

An alternate alignment for the bypass road was suggested. It would see the bypass road head northeast after the grade separation following the property line and then north running parallel with the CP rail line as illustrated with the dotted yellow line on Map 4.

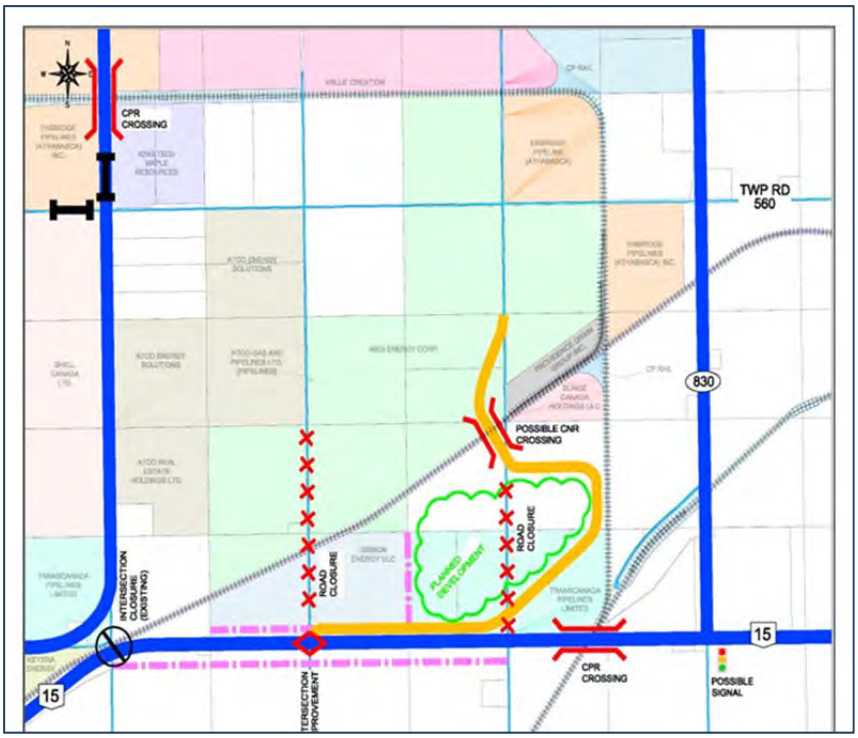


Map 4 - Realignment suggestion, July 2015

ALTERNATIVE 2

In addition to the features illustrated in the Spine Road Network section, the key features of Alternative 2 are illustrated in Map 5 below.

- Access to Hwy 15 at Rge Rd 212.
- A service road (pink dotted line) to support access across properties paralleling Hwy 15 to corner parcel south of the rail line, north between property owners and on the southern side of Hwy 15.
- Bypass road (yellow line) crossing diagonally through several parcels and at least two landowners is proposed to provide access north on Rge Rd 211. It is the most complex design with four bends prior to railway crossing.
- Rail grade separation moved west to a cross perpendicular to the track, reducing the potential length and cost of the grade separation.
- Retain access to Rge Rd 211 (north of the CN rail line) for landowners straddling the track and east on Rge Rd 211



Map 5 - Alternative 2, Strathcona County, July 2015

This option addresses two general principles:

- Rail grade separation and bypass would be designed to facilitate access from property north of the rail line to Rge Rd 211 and is a shorter, more cost-effective solution at this location.
- The service road location minimizes intrusion on the sites and provides additional access to the furthest-south corner of the property bracketing the rail line.

ALTERNATIVE 2 STAKEHOLDER COMMENTS

Of the three alternatives presented, this option **had no support** and the **most number of objections**; however, there were a couple of minor points of merit which include:

- retains existing access north to Twp Rd 560 on Rge Rd 211 for properties straddling the CN line,
- provides access south to Hwy 15 for properties both north and south (via the service road) of the CN rail line, and
- offers a shorter and potentially cheaper grade separation for the CN rail line.

Stakeholder concerns included:

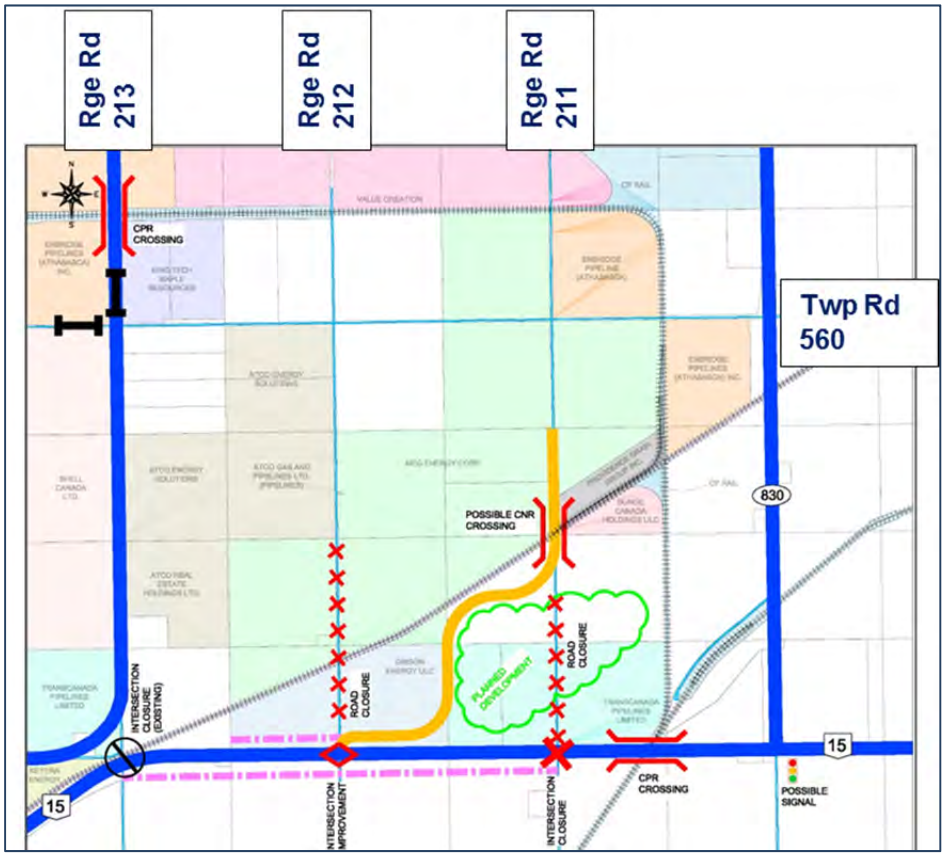
- access to Hwy 15 via Rge Rd 212 is furthest away and requires an immediate sharp turn at the intersection for all traffic — either continuing on the bypass road or accessing the proposed service road,
- the bypass road alignment:
    - is the longest,
    - Is most convoluted,
    - sterilizes the greatest amount of land for several landowners,
    - passes through areas with active wells, and
    - conflicts with upgrader and rail development north of the rail line and east of Rge Rd 211, and
- the bypass road design has a lot of bends which would be much more difficult for long loads to drive on.

This option was seen ***so negatively by a few stakeholders that it was described as 'killing their development plans'***.

ALTERNATIVE 3

In addition to the features illustrated in the Spine Road Network section, Alternative 3 is illustrated in Map 6 below and is very similar to Alternative 1. The only differences are:

- access to Hwy 15 would be at Rge Rd 212 rather than between the property line, and
- the only service road north of Hwy 15 is to connect the islanded parcel south of the CN rail line.



Map 6 – Alternative 3, Strathcona County, July 2015

This option addresses three general principles:

- The bypass road is aligned along the edge of one property and follows the property line north between two property owners and is envisioned as being aligned around proposed development but near the edge of the property.
- Rail grade separation and bypass would be designed to facilitate access from property north of the rail line to Rge Rd 211.
- The design has a sharp turn off the access intersection but the rest of the road is reasonably direct with two wide bends.

ALTERNATIVE 3 STAKEHOLDER COMMENTS

Alternative 3 garnered **a very small amount of support** primarily **driven by the elements noted in Alterative 1 but, overall, stakeholders ranked this negatively.**

Areas that garnered positive comments and are consistent with Alternative 1 included:

- the bypass road alignment going north towards the CN rail line follows along the property line,
- it provides reasonable access to/from Hwy 15 for some properties east of Rge Rd 212 and north of the CN tracks,
- a grade separation across the CN line will better accommodate expanded rail traffic, minimizing potential road/rail delays regarding this rail crossing, and
- the service road is on the edge of the property, minimizing impact to property owners.

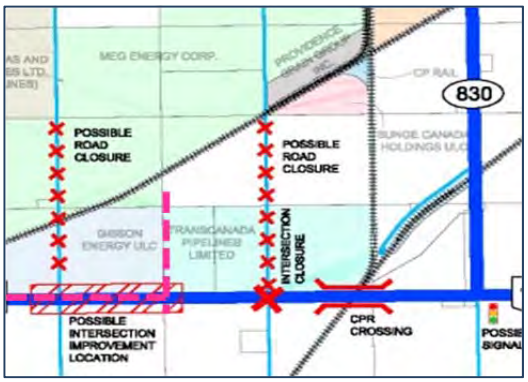
Stakeholder concerns included many of the same items as raised in Alternative 1 or 2. Concerns are:

- access to Hwy 15 via Rge Rd 212 is furthest away and requires an immediate sharp turn at the intersection for all traffic — either continuing on the bypass road or accessing the proposed service road,
- the bypass road has more bends than Alternative 1,
- depending on the final design the road alignment parallel to the CN line across to Rge Rd 211, it may sterilize a significant portion of land,
- road alignment on the south side of the railway right-of-way may limit landowners' access to the south side of the CN line west of Rge Rd 211,
- bypass would split a major landowner's property north of the rail line along Rge Rd 211, and
- the design of the grade separation bridge would limit or reduce access to properties on the east side of Rge Rd 211 both north and south of the rail line.

OUTSTANDING ISSUES AND IDEAS TO CONSIDER

Most of the outstanding issues relate around a couple of landowners bordering on Rge Rd 211 near the CN rail crossing and how the legal and/or required access can be met. The three alternatives presented by Strathcona County created a bypass option through the area; however, as noted, stakeholders had a lot of issues relating to this approach. In some cases, landowners felt that it would actually limit access to either road or rail rather than facilitate it.

1. **No bypass road option** -- One option suggested was to eliminate the bypass road completely and provide the needed access to properties parallel to Hwy 15 through two service roads (pink dotted lines) as noted on Map 7. This option could eliminate the need for a grade separation of the CN line at Rge Rd 211; however, would necessitate either continued use of Rge Rd 211 north to Twp Rd 560 or a re-alignment of Rge Rd 211 as described in the Spine Network discussion.



Map 7 - No bypass stakeholder suggestion, July 2015

OUTSTANDING ISSUES AND IDEAS TO CONSIDER (cont.)

2. **Eliminating a midway access point south for properties north of the rail line** — One major landowner whose property is primarily north of the CN line and south of Twp Rd 560 is looking for an egress south between Rge Rd 213 and Hwy 830. While the two required routes are available going north from their property, it would be challenging to cross the CN rail line to connect with the suggested service road noted in Map 7. Whether a public grade separation or bypass road is a 'need to have' requirement or whether private access for emergency or construction purposes is appropriate might need to be explored further.
3. **Upgraded traffic control at Twp Rd 560 and Hwy 830** — If Rge Rd 211 between Hwy 15 and the CN line is closed for public access and there is no bypass road to connect properties north of the rail line with a midpoint intersection on Hwy 15, then the closest Hwy 15 access for these properties (north of the CN line and on the east side of Rge Rd 211) will be north via Rge Rd 211 to Twp Rd 560 and south on Hwy 830 to Hwy 15. Concerns have been expressed about truck delays crossing the highway. The proposed solution was noted as an additional signalized intersection at Twp Rd 560 and Hwy 830..
4. **Re-alignment of Rge Rd 211 north of the CN line to run northeast along the property line and north parallel to the CP rail right away** — While this alignment reduces the conflicts between a public road alignment and the integrity of site operations, careful consideration would need to be given to the location of the new intersection between the realigned Rge Rd 211 and Twp Rd 560 given the proximity of the at-grade CP rail crossing on Twp Rd 560.
5. **Service road access to Hwy 830 for property south of the CN line and east of Rge Rd 211** — Access directly east (as shown in the pink dotted lines in Map 8) may be the most practical option to provide access to this property albeit it crosses the CP rail line at grade to reach Hwy 830.
6. **Road/rail delays due to at-grade crossings on Hwy 830** — A question was raised as to why a grade separation on Rge Rd 211 but two at-grade crossings left on the spine road Hwy 830 – especially if this road is going to see more traffic as others may be close.

Map 8, Service road suggestion, July 2015

Lastly, it is important to note that the focus of this discussion was defined by Hwy 830 to the east and didn't pursue any options that involved travelling further east on Twp Rd 560 before turning south to Hwy 15.

For those landowners whose operations have more traffic to and from the east of this area there may be other options that involve fewer rail crossings east of this area.

CONCLUSION

The two workshops provided a forum for industry representatives to share issues and ideas relating to specific current and future road network transportation needs in this section of Strathcona County and Alberta's Industrial Heartland. There was a constructive dialogue around the key priorities and an understanding of the need to ensure appropriate access for all property owners.

While all the options presented required some compromise by some landowners, the Spine Network garnered support from all the stakeholders present. The illustrated road network (including upgraded Twp Rd 560) was seen by all the landowner representatives as providing the needed access to all sites in the area.

The three Hwy 15 access alternatives garnered far less support and in two of the three cases, opposition. Landowners nominally impacted by the alternatives were somewhat ambivalent to the solutions; however, landowners directly impacted held strong views to the options as presented.

While none of the alternatives as presented relating to Hwy 15 access between Rge Rd 214 and Hwy 830 provided a supportable option, there were elements that were supported and several alternative suggestions from stakeholders that merit one-on-one negotiations with the few impacted landowners.

The outstanding issues are very site specific for four landowners and, as such, will need site-specific negotiations to finalize solutions that could be workable for those involved and stay true to the desired principles underpinning the transportation planning for the area.

APPENDIX

Strathcona County AIH (east) Road Network Workshop 1
Stakeholder Discussion Summary, June 2, 2015

Strathcona County
Road Network - Heartland
(East of Rge Rd 213 & South of Twp Rd 562 to Hwy 15)

Industry Stakeholder Input Workshop Summary Report

June 4, 2015

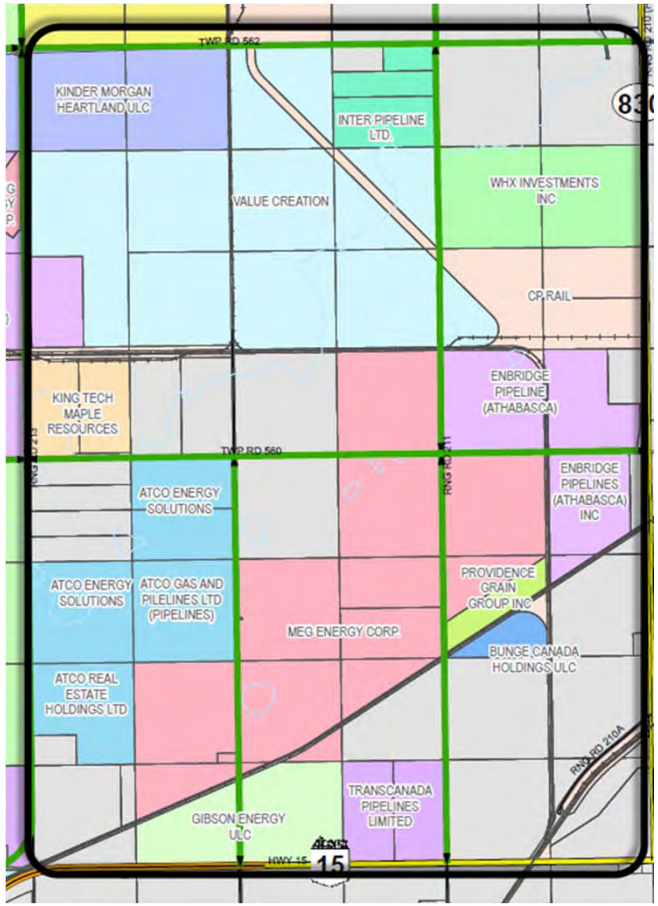
Introduction & Background

- Supporting a series of County land use and transportation planning activities, impacted stakeholders/landowners were invited to a half-day workshop that:
  - provided an update to stakeholders on the County and provincial transportation planning activities with specific focus on the Hwy 15 study,
  - shared key transportation and emergency planning criteria that need to be considered in any changes to the road network, and
  - Provided an opportunity to understand the issues, needs and expectations of industry for the road network serving the area east of Rge Rd 213, west of Hwy 830 & south of Twp Rd 562 to Hwy 15.
- The DAGNY Partnership was hired to plan and facilitate the workshop and summarize the discussion and any additional written input provided.
- The results of the discussion will be considered by County staff as they frame the going-forward options for industry's reaction and feedback.

Introduction & Background

- The workshop was held on May 1, 2015 from 12:30 – 4:00 p.m. at County Hall.
- Attendees included representatives from the following:
  - CN Rail – Karen Jensen
  - Gibsons – John Stewart, Rod Odegaard
  - Kinder Morgan – Darryl Roberts
  - Providence Grain – Rick Gregg, Bob Ruzick
  - CAC Metal Recycling – Colby Jamieson
  - CP Rail – Pete Bayerle
  - MEG Energy – Jim Fowers, Bonnie Jones
  - TransCanada – Scott Clark
  - Enbridge – Tony King
  - Interpipeline Ltd. – Tim Saunders, Michelle Dawson
  - Value Creation – Elton Mather
  - Bunge Canada – Norm Czibere
  - ATCO – Curtis Bauer
  - Strathcona County staff (Economic Development, Capital Planning & Construction, Planning and Development, Emergency Services) and Consultants (Stantec)

Workshop Objectives



- The workshop specifically probed with industry land owners/ stakeholders located in targeted area the identification of:
  - current alignment and access solutions, issues, concerns and options or alternatives,
  - the development horizon – what is needed in next 10 years or 15 – 20 years, and
  - industry's priorities for short- and mid-term development,
  - 'principles' to underpin future road planning, and
  - desired outcomes that the network needs to deliver to support industry operations and growth.
- Stakeholders were invited to share their views both in the group discussion forum as well as through private, written feedback to the discussion questions.

Planning initiatives

- **While this workshop is focused towards a specific area, there is a series of wider land use or transportation planning initiatives underway including:**
  - Municipal Development Plan (MDP) update
    - provides a comprehensive and long-term land use policy framework that will direct growth and development in the County.
  - Area Structure Plan (ASP) update for Strathcona County's Portion of Alberta's Industrial Heartland that will be passed as a bylaw and will provide a framework that describes:
    - proposed land uses,
    - density of population,
    - sequence of development,
    - general locations of major roadways and public utilities that could be in the area, and
    - any additional requirements that Council may require.
  - Cumulative Risk Assessment update for Strathcona County's Portion of Alberta's Industrial Heartland will be included in the ASP update.
  - Heartland Roadway Network Planning update includes:
    - a review of this particular area of the Heartland road network, and
    - an analysis of the entire network in Strathcona County's portion of the Heartland.
  - Individual applications for industrial development as it occurs.

Road network planning

- **County staff shared the following information and considerations that will influence road network design from their perspective:**
  - **Emergency Services:**
    - All large industrial developments should have at least 2 access routes for emergency services.
    - Consideration should be made to minimize response time impacts for any road construction or closures.
    - Any traffic lights should be made to have traffic signal pre-emption for emergency services vehicles.
  - **Planning and Development Services:**
    - Any changes to the roadway network will have impacts on private landowners with various results; therefore important to consider how a new alignment may impact lands and landowners in the area.
    - Contribution in Aid of Construction (CIAC) rates may change based on changes of the roadway network.

Road network planning

- **County staff shared the following information and considerations that will influence road network design from their perspective:**
  - **Capital Planning and Construction's points will stem mainly on the following:**
    - update to the 2007 transportation network document,
    - update on road design and/or construction projects,
    - impacts of the Alberta Transportation Hwy 15 FPS document on access to Hwy 15 for Rge. Rd 211,
    - need to maintain effective emergency egress routes (sufficient road networks unhindered by rail blockages), and
    - desire to seek best solutions in a collaborative manner with all stakeholders.
  - Capital Planning and Construction staff shared with stakeholders the current Hwy 15 Plan and Profile recently discussed with Alberta Transportation that includes:
    - the north twinning and future service roads,
    - access points at Rge Rd 212 and Hwy 830, and
    - closure of Hwy 15 access from/to Rge Rd 211.

Stakeholders' desired transportation outcomes from the road network

For the road network to successfully support the operations in the area, stakeholders felt it MUST:

- accommodate heavy haul year round including over dimensional loads (high, long and heavy),
- provide ease of uninterrupted access and exit from sites
  - to Hwy 15 and Hwy 830,
  - access points to facilitate construction,
  - appropriate emergency access (2 options),
- minimize conflict or congestion between road and rail,
- integrate appropriate safety and signage considerations, and
- be designed to effectively handle current and near future road capacity demands.

Stakeholders' desired outcomes from the road network

For the road network to successfully support the operations in the area, stakeholders felt it SHOULD:

- **be developed collaboratively with industry to ensure the planning and implementation meets the timing and the transportation needs of local industry,**
- **be designed,**
  - **to reflect the roads that are really needed,**
  - **to accommodate the full range of trucking needs – long, high and heavy,**
- **offer the option for a higher standard of maintenance based on a user pay option for selected roads,**
- **utilize the road network as a backbone for full range of transportation needs including,**
  - **pipeline placement on road rights-of-way,**
  - **integration of road, pipeline and utilities into transportation corridors,**
- **plan for future rail and transit service, and**
- **respect local residents' needs and find the right balance between public access and industry site security.**

Stakeholders' desired outcomes from the road network

For the road network to successfully support the operations in the area, stakeholders felt it MUST NOT:

- restrict development,
- cut through lands once developed,
- shut off access for heavy haul to any facility/site,
- constrain access for
  - pipelines, or
  - the movement of goods and services,
- ignore industry's need to secure and manage access to their sites,
- force unreasonable routings (major detours),
- ignore the potential negative image if general access is really constrained.

Area stakeholders felt it SHOULD NOT:

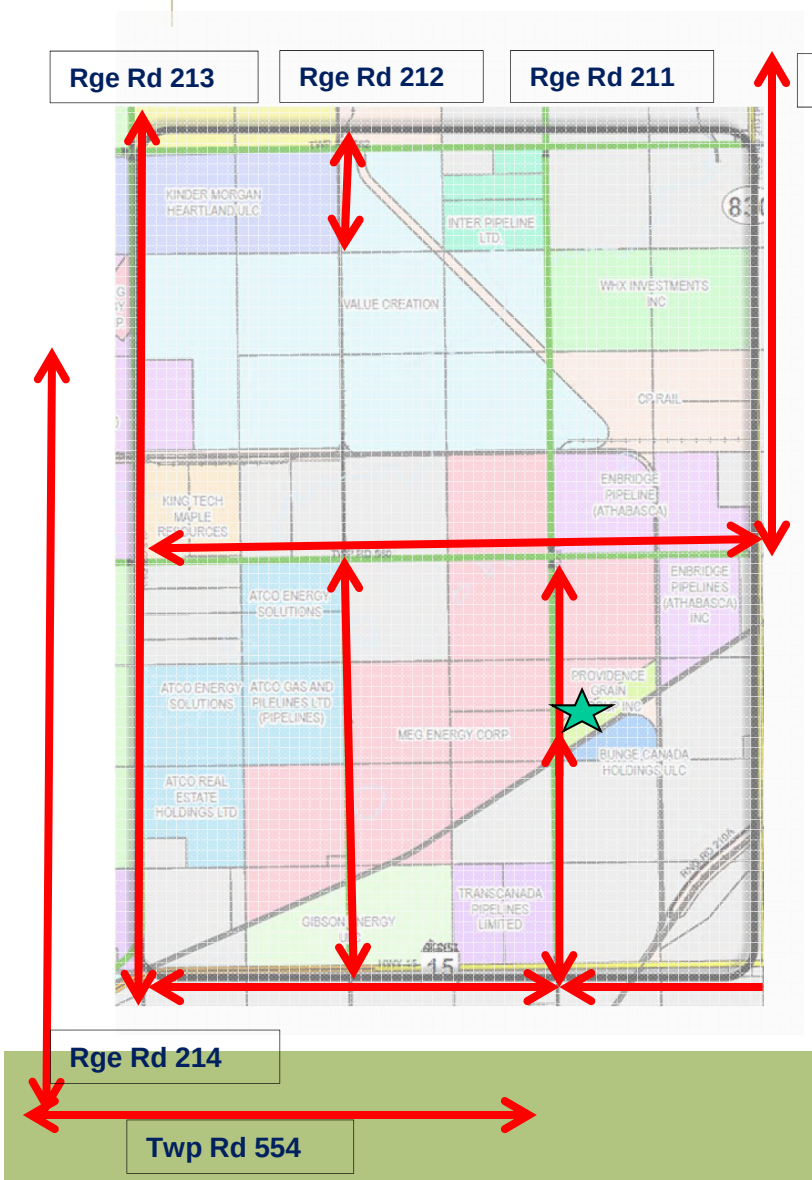
- have congestion points.

Stakeholders' desired outcomes from the road network

Priority Considerations

- ***To DO*** **- Ensure effective access to and from sites but especially as it relates to Hwy 15.**
- ***To AVOID*** **- Minimize delays due to road or rail backups.**

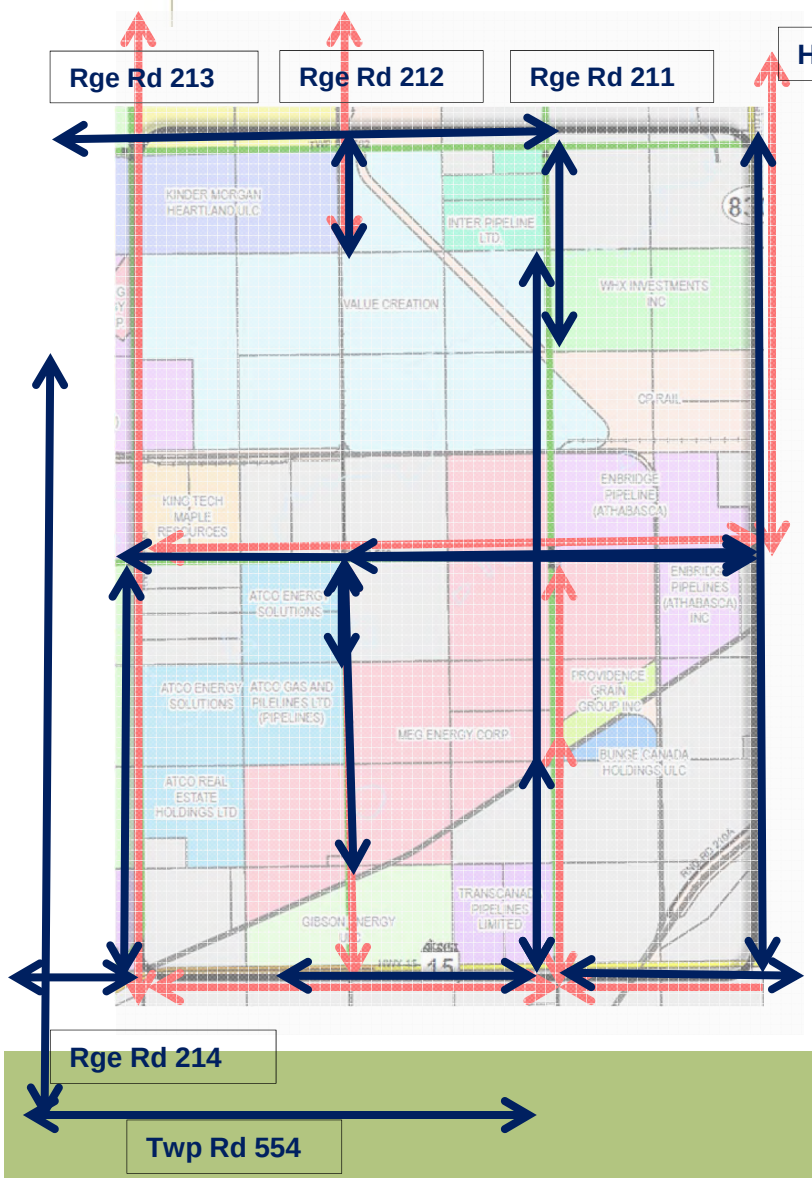
Current road network demand



Current operations:

- Current demand is limited to a few active operations with approximately 80 staff during a day shift and less than 30 on site during evening/night shifts.
- Peak travel time is between 6:00 and 8:00 a.m. and 4:00 and 6:00 p.m.
- The majority of traffic is:
  - cars,
  - light pickup trucks, and
  - approximately 150 trucks inbound and outbound daily moving product on Rge Rd 211 and Hwy 15.
- Current patterns for operational traffic flows are in red

Projected road network demand – construction phase



Current and projected construction-related travel:

- Projected construction traffic estimated at between 1,000 and 2,500 per year between 2015 – 2020.
- Construction/major maintenance is seen as extending well beyond 2020.
- Peak travel time is between 6:00 and 8:00 a.m. and 4:00 and 6:00 p.m.
- The majority of this incremental traffic is:
  - some cars,
  - light pickup trucks,
  - construction crew buses, and
  - heavy and long haul trucks delivering construction material and equipment.
- Current patterns for construction-related traffic flows in blue

Stakeholder input on issues and options

- Stakeholders were split into two working groups based on the location of their sites and discussed specific issues and future needs

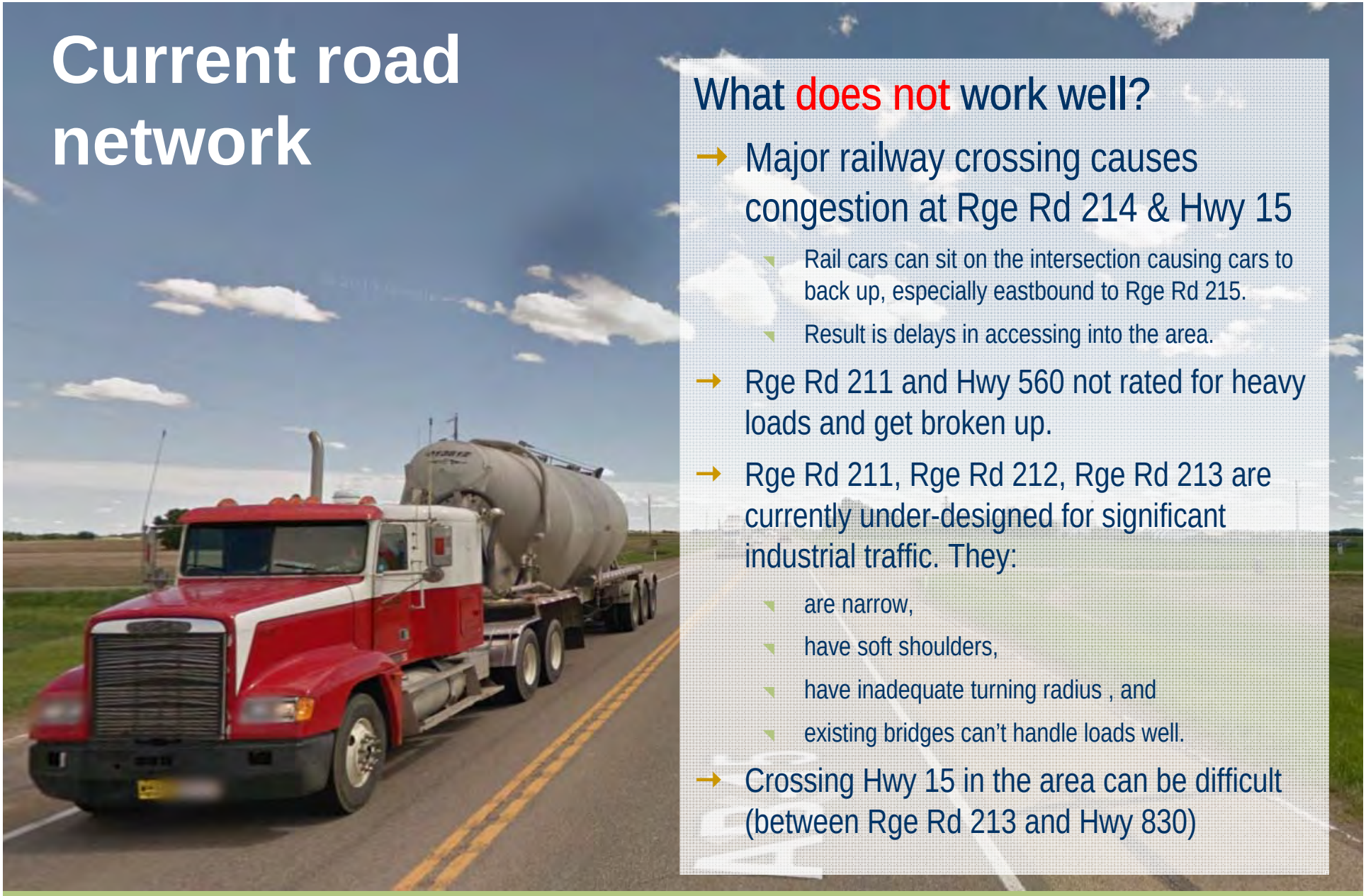
  - Group A
    - *Kinder Morgan*
    - *CAC Metal Recycling*
    - *CP*
    - *MEG Energy (split reps)*
    - *TransCanada*
    - *Enbridge/ Phoenix Land (split reps)*
    - *Interpipeline*
    - *Value Creation*
  - Group B
    - *CN Rail*
    - *Gibsons*
    - *Providence Grain*
    - *MEG Energy (split reps)*
    - *TransCanada*
    - *Enbridge (split reps)*
    - *Bunge*
    - *Atco*

Current road network

What works well?

- Current heavy haul road works well (Rge Rd 214) because it is:
  - built to accommodate the size and weight,
  - provides direct access N/S between Hwy 15 and Twp Rd 562
  - doesn't have any power issues – set up to swing out of the way.
- Access to Hwy 15 because access is frequent, easy and short distance between access points especially turning north from westbound traffic and turning west from southbound traffic.
- Road and rail currently work well at selected points

Current road network



What does not work well?

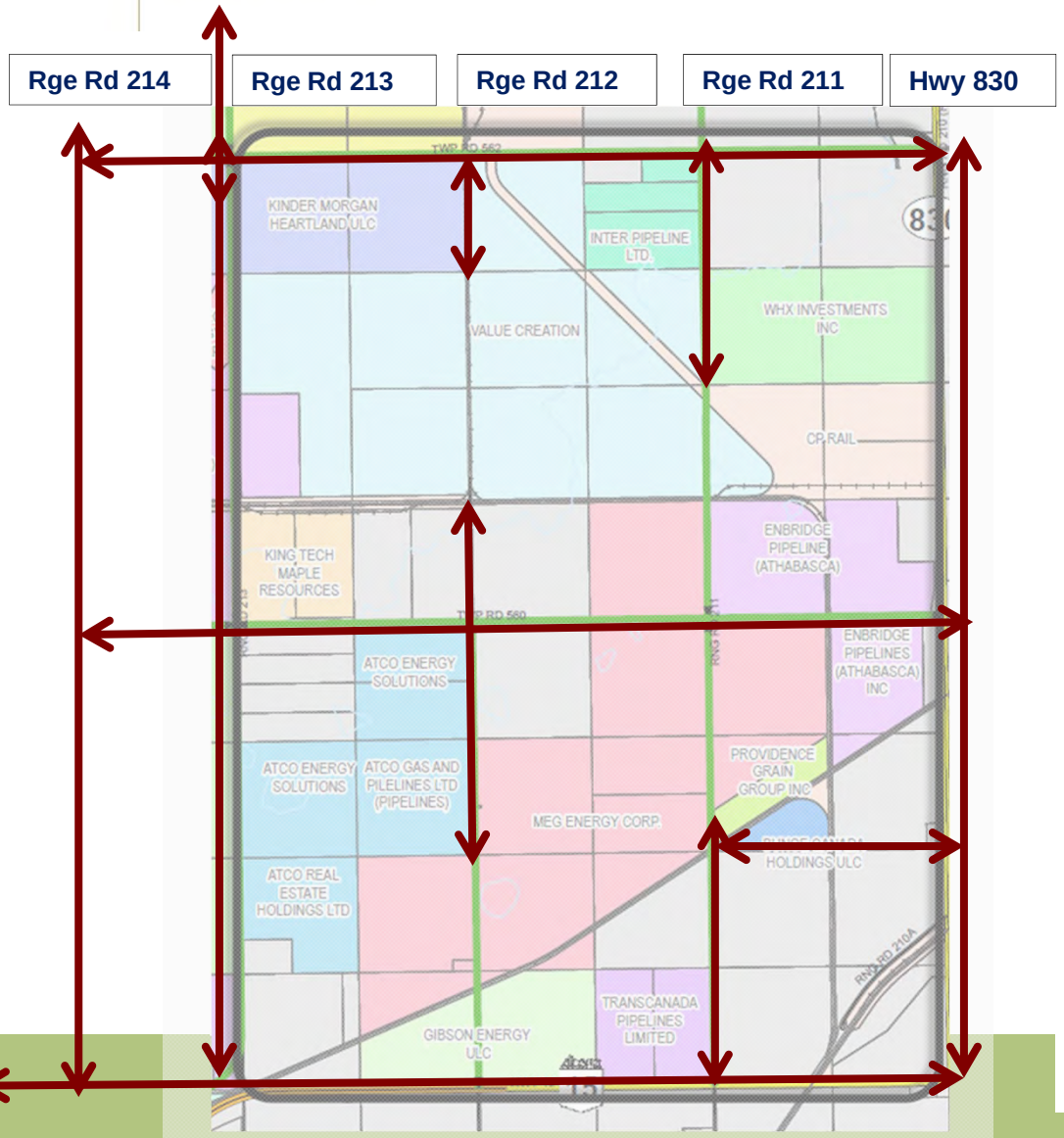
- Major railway crossing causes congestion at Rge Rd 214 & Hwy 15
  - Rail cars can sit on the intersection causing cars to back up, especially eastbound to Rge Rd 215.
  - Result is delays in accessing into the area.
- Rge Rd 211 and Hwy 560 not rated for heavy loads and get broken up.
- Rge Rd 211, Rge Rd 212, Rge Rd 213 are currently under-designed for significant industrial traffic. They:
  - are narrow,
  - have soft shoulders,
  - have inadequate turning radius , and
  - existing bridges can't handle loads well.
- Crossing Hwy 15 in the area can be difficult (between Rge Rd 213 and Hwy 830)

Principals to guide road network design

In designing the road network the following principles should be considered to guide the network design decisions:

- provide safe, easy access to and from all sites:
  - to Hwy 15 and Hwy 830,
  - that optimizes straight routes where possible rather than a network based on more circuitous routings,
  - appropriate and timely access for emergency services (2 options), and
  - access routes to facilitate construction-related trucking,
- respect the rights of the landowners to secure site operations from flow-through traffic,
- accommodate heavy haul and over dimensional loads (high, long and heavy),
- minimize congestion/conflict between road and rail flow,
- optimize, where possible, the road network for the placement of other utilities such as pipeline.

Road network suggestions

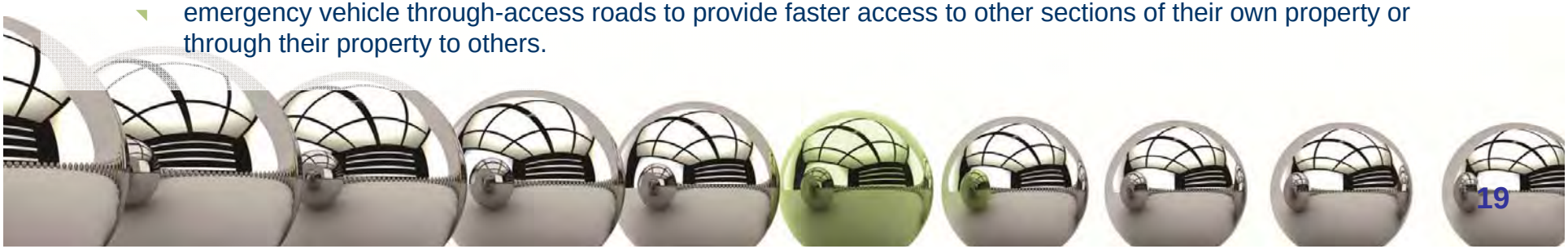


The following were highlighted as needed improvements and/or suggestions for access or upgrades:

- Rail grade separation improvements
  - Rge Rd 214 and Hwy 15, Rge Rd 214 and Twp Rd 560, Rge R 212 and Twp Rd 562 and Hwy 15 between Rge Rd 211 and Hwy 830 (CP)
- Improved access to Hwy 15 (proposed at Rge Rd 212 by AT)
- With closure of Rge Rd 211 to Hwy 15
  - Upgrade Twp Rd 560 and Twp Rd 562 so that traffic can use Rge Rd 214 north (or upgraded Rge Rd 213 or 212) to access northern sites
- Upgrade Rge Rd 211, 212 and 213
- Add lights at intersection of Twp Rd 562 and Hwy 830

Summary of discussion

- The suggestions:
  - were not tested formally against the principles that emerged as important, and
  - do not necessarily represent a consensus of opinion; however, no strong opposition to any of them was noted.
- Overall stakeholders accepted/understood the need to limit access to Hwy 15, especially if it meant improvements to the flow of traffic from and to Hwy 15.
  - With the proposed closing of Hwy 15 access to Rge Rd 211, access to some sites may need further investigation.
- The general sentiment of the group was to create ‘box’ with:
  - Hwy 830 to the east,
  - Rge Rd 214 to the east (based on current standard of the Rge Rd 214 being an effective heavy haul route north and continuing to be open)
  - Hwy 15 to the south, and
  - Twp Rd 562 to the north and additional access via Twp Rd 560 between Rge Rd 214/13 and Hwy 830.
- Key access roads should be upgraded to an appropriate standard to withstand both routine and construction-related traffic.
- The network should be designed to mitigate congestion created by current and future rail/road traffic.
- Some landowners *may be* open to:
  - a road that intersects land holdings if the development of this parcel is limited or not integral to other site operations (such as boggy with limited development options), and/or
  - emergency vehicle through-access roads to provide faster access to other sections of their own property or through their property to others.



Open House No. 1 Exit Survey

1. **What is not working well with the current road network in the Industrial Heartland? Rank the three most important areas, with #1 as the most critical.**

	1st	2nd	3rd	4th	5th
Traffic Volume and Congestion (number of vehicles on the road)	**3**	**3**	**3**		
Accommodation of Heavy Haul and Over-dimensional Loads	**5**				
Noise Levels	**3**				**1**
Delays/Travel Time	**3**	**2**	**2**		
Amount of Shortcutting	**3**				
Railway Crossings	**5**	**3**			
Speeding	**3**				**1**
Emergency Evacuation Routes	**1**	**3**			
Appropriate and Safe signage	**1**	**2**			
Traffic Signals	**1**	**1**			
Safe Access to/from Highway 15	**5**		**1**	**1**	
Bridge Structures	**2**	**1**			
Transit		**2**			
Other					

2. **Do you think the proposed spine network meets the requirements of the area?**

Strongly disagree	3
Disagree	3
Neither Agree/Disagree	3
Agree	
Strongly Agree	

- Ensure landowners have “as-good” or better emergency access
- The intersection of Hwy 830 north and Hwy 15 is a very unsafe intersection with the volume of traffic today
- Does not work without coordination of future increases in traffic created by changing zoning and approving new project in transition hands

- Twin highway 15
- Not a good solution for RR211. Need a better solution for grain elevator.
- Access to Hwy 15 limited for heavy load traffic – farm vehicles, etc – forcing too many left hand turns

3. **Could the Policy Areas within the Industrial Heartland Area be updated to better achieve their purpose? If so, how?**
   - No change
   - Leave them alone too much traffic now!
   - By making the north side of Highway 15 all heavy industrial
   - Initial plan looks good outside of spine road system
   - Construct another bridge over North Sask River to reduce traffic congestion on Vinca Bridge and at Fort Saskatchewan.
   - Yes, Zone heavy south of Hwy 15
   - Makes no sense to discuss proposed changes without factoring the new industrial-heavy- changes proposed to the heartland. Transportation will be altered considerably with new industrial development.
4. **Are there constraints/challenges with the current Area Structure Plan that need to be addressed in the update? If so, what are they and how can they be resolved?**
   - Consider pipeline corridors at choke points
   - Only low traffic uses; rail or road should be approved in this area too much traffic already!
   - By moving all Home owners out of the area. In doing this most complaints would subside. This must be done by using fair Market Values for their homes not assessment values as most have no mortgage and do not want one.
   - Strong kickback with closing highway 15 access to RR 211
   - Geotechnical – poor subgrade in area, going down from the north will not work
   - Do not close RR 211 North of Hwy 15
   - Heavy traffic has damaged many of the roads and are in need of repair. Also the narrow road on 213 and Victoria Trail needs to be wider because it's a danger to pass on them as is.
   - Zoning south of Hwy 15 should be Heavy industry
   - Left hand turns Hwy 15 from 830 very difficult in late afternoon. Train causes huge congestion, backup in this area.
5. **What businesses/industries would be appropriate and beneficial to consider within the Transition Zone?**
   - Office/Commercial
   - Only low traffic uses, rail or road should be approved in this area too much traffic already
   - Heavy Industrial
   - Gibsons, MEG, TransCanada
   - Rezone to light/med/heavy
   - Hwy 15 Bridge – bottle neck

- Changing zoning of buffer zone to heavy as a resident we are surrounded by industry. On the south side of highway 15.
- Agricultural support businesses, processing of various products.
- Will we be able to continue to farm in this area? It is prime #1 Alberta soil – turned to concrete trail – so sad.

Open House No. 1 Map comments

First Alberta's Industrial Heartland Transportation Study Update Proposed Spine Network Map

- Junction of Hwy 15 and Hwy 830: Backup at intersection in all directions
- Left of Junction Hwy 15 and Hwy 830 on grade separated crossing: Train delay
- North of Junction Hwy 15 on Hwy 830: Train delay
- Northwest of the grade separated crossing on Hwy 15: Access as close as possible to RR211 – Main grain access operations on existing road
- West of Hwy 830, south of Twp Rd 560: missing track
- East of Hwy 15: *convenient Access x2 (providence)

Existing Strathcona County Alberta's Industrial Heartland Area Structure Plan Map

- Flooding of Astotin Creek
- Remove/Replace transition with Heavy/med/light Industrial

Second Alberta's Industrial Heartland Transportation Study Update Proposed Spine Network Map

- By Hwy 38: Add County Municipal Boundaries
- South of Twp Rd 564: Need to fix river crossing bottleneck in Fort. Sask. – that is the start of all the transportation problems in area
- West of Hwy 15 on RR211: And how do you propose 2 access points to Providence Grain (SW36-55-21) with the closure of RR211, especially given the intended development of MEG Energy & TransCanada Pipelines?
- Slightly east of junction Hwy 15 and Hwy 830: These new rail projects will force the overpass on Hwy 15 to become needed much sooner than 50 years! Closing 211 could be postponed if Land left as transition lands!
- South of Hwy 15 on RR213: Most dangerous intersection from Hwy 15 to RR 213

STRATHCONA COUNTY

CAPITAL PLANNING & CONSTRUCTION
Meeting with Alberta Transportation (AT)
April 11, 2016 at 9:30 am - 11:00 am
Alberta Transportation Stony Plain District Office
4709-44 Avenue, Stony Plain, AB

MEETING NOTES

PRESENT: **Alberta Transportation:**
Paul Buryn
Patty Urban
Dean Litke
Terry Sonmor

Stantec:
Carl Clayton
Rhonda Shewchuk

Strathcona County:
Karolina Haggerty – Planning & Development Services
Steven Johnson – Capital Planning & Construction
Dan Schilbe – Capital Planning & Construction
Bosco Tong – Capital Planning & Construction

REGRETS: Tony Maghee – Capital Planning & Construction

1. **Overview of Area Development – Strathcona County Transportation Study Update**
   - Dan thanked AT for their time to meet with the County on the subject.
   - Dan introduced the topic and gave an overview of Strathcona County's (SC) projects in the Alberta Transportation Highway 15 corridor in the Industrial Heartland Area (IHA). Major developments in the area continued to happen. There were many issues and moving targets on transportation in the IHA due to the uncertainty of timing in particular of four developments in the area including Meg, Gibson, TransCanada, and Providence Grain.
   - The purpose of the meeting was to explore how the different related studies in the area including the Highway 15 functional planning study (FPS) by CIMA+; SC's transportation study update by Stantec; other related planning documents related to the transportation development in the IHA; and how the overall development within the County in this area tied in with each other, with all the issues and constraints.
   - SC council has recently voted for the choice of Bremner over Colchester as the next growth node which might trigger or influence certain transportation decisions affecting AT, e.g., the NE river crossing.
   - Dan provided some background of the history and status of the Highway 15 FPS. The study was a requirement from AT, with an earlier and previous study in 1997 (by Reid Crowther), and the current study by CIMA+ in 2011.

2. Update from Alberta Transportation (AT)

- The Highway 16/Highway 824 study to Elk Island Park has been provided in draft form.
- There were some discussions on Cambrian and the West of Highway 21 development.
- The traffic signal for the first stage of development in the area on Highway 21 and Township Road 534 was discussed. Carl/Dan to provide AT with the Highway 21/Township Road 534 interim intersection correspondence and previous approvals.
- Paul mentioned that AT has been contacted by some developers concerning the future changes on Highway 21; the discussion of a possible grade separation interchange and what would trigger the construction of the interchange. AT was not necessarily objecting to signalization at intersections on the Highway as an interim measure.
- Michael Botros of AT was working on a MOU (memorandum of understanding) with Jordan Betteridge at the County. As a high level document, Michael Botros envisions the MOU to provide direction for future resolution processes rather than specific details.
- Paul enquired about the levy process on funding and how much money would be collected from the developers for the future construction of the interchange. Dan said that the future funding scenario appointment was based on traffic and on a best estimate.

3. Update of the Highway 15 FPS

- The Highway 15 FPS started in 2011 has certain recommendations affecting access to the regional developments including accesses on Range Roads 220 to 211.
- Paul said that Highway 830 North was not part of the Highway 15 study.
- Dan mentioned that Providence Grains has expressed concern and has voiced objections to the potential changes to access the Highway network surrounding the Highway 15 corridor. SC was uncertain of the position of Providence Grain and might consider not completing the update of the transportation study until the issues with the various developers were resolved.

4. Stantec's Update on the IHA Transportation Study

- Carl talked about the transportation study update and spoke on the proposed preferred transportation network after consultation with the public and the key stakeholders, at two workshops and two public open houses.
- For the Highway 15 FPS, one access was assumed between Highway 830 north and south. The FPS has identified that the access from Range Road 212 was to be relocated. CIMA+ was however to add an appendix to the FPS that the relocation of Range Road 212 would take place in a range of stations rather than to limit it at one location. The relocation of Range Road 212 might be a concern to Highway 15 south side residents. However residents did not raise the issue at open houses.
- Range Road 211needs to be closed due to factors associated with the future rail grade separation (grade difference and east bound trucks starting on an uphill gradient) and the one mile spacing requirement for an expressway. The new shifted intersection proposed would be between Range Road 211 and 212. For discussion purposes it might be referred to as Range Road 211A.
- To maintain reasonable access to the Providence Grain operation, the existing minor intersection on Highway 830 about one mile to the north of Highway 15 might have to be upgraded to include a westbound left turn from Highway 830.

5. AT's Requirements and Restrictions

- Paul said that he was yet to familiarize himself with all the details in the Highway 15 FPS and that he would have to come back to the County with some directions once he has a chance to study all the implications of the various moving parts in the area.
- SC would need directions from AT on possible accesses to finalize its own study.
- AT would take up to 3-4 weeks to come up with an assessment of the proposed Highway 830 intersection (one mile north of Highway 15) access to Providence Grain. Preliminary assessment suggested that this would not present a problem.

- AT has received all the comments from Tony Magee of SC and would hope to finalize the Highway 15 FPS report in the next couple of weeks.
- Locations of the proposed Range Road 211A intersection seemed to meet with the Highway 830 (S) interchange spacing requirements of 4,000m.
- Paul inquired as to when SC planned to talk to TransCanada and to Gibson and Providence Grain. Dan said that it would follow soon after SC received some guidelines from AT to the access issues.

6. TransCanada's Proposed Development

- TransCanada's development figuration was introduced. It showed a loop of railroad tracks with required radius for operational maneuvers.
- The proposed development might not proceed as fast as the Gibson's development to the west. TransCanada has not submitted a formal Development Permit (DP) application yet.

7. Gibson's Proposed Development

- Gibson had submitted a TIA report by Associated Engineering (AE) on the proposed Transload of bitumen. On transportation, AE's report did not discuss improvement timelines and what would trigger offsite improvements.
- No formal DP application has been filed yet.
- Paul said that AT was in general not against any temporary and interim access on Highway 15 to Gibson's property but would need to review the final and updated TIA before offering any comments. SC/Gibson would come up with a proposal with triggers for further upgrades and minimize any throw away costs for AT to consider. A MOU might be signed at that point.
- Steven mentioned that the proposed improvement on the Range Road 212 intersection was a Type IV improvement.
- Improvement costs on Highway caused by developments would have to be borne by the developers.
- On service roads on Highway 15 for the Hutterite parcel to Gibson's property, AT was in general not supportive of cross accesses between the Gibson and Hutterite Parcels. Timing of the Hutterite access closure would be an AT call, may not be required at this time but will in the future.

8. Meg's Proposed Development

- Meg's proposed facility north of the CN tracks was complex but was less advanced in the development process.

9. Closure

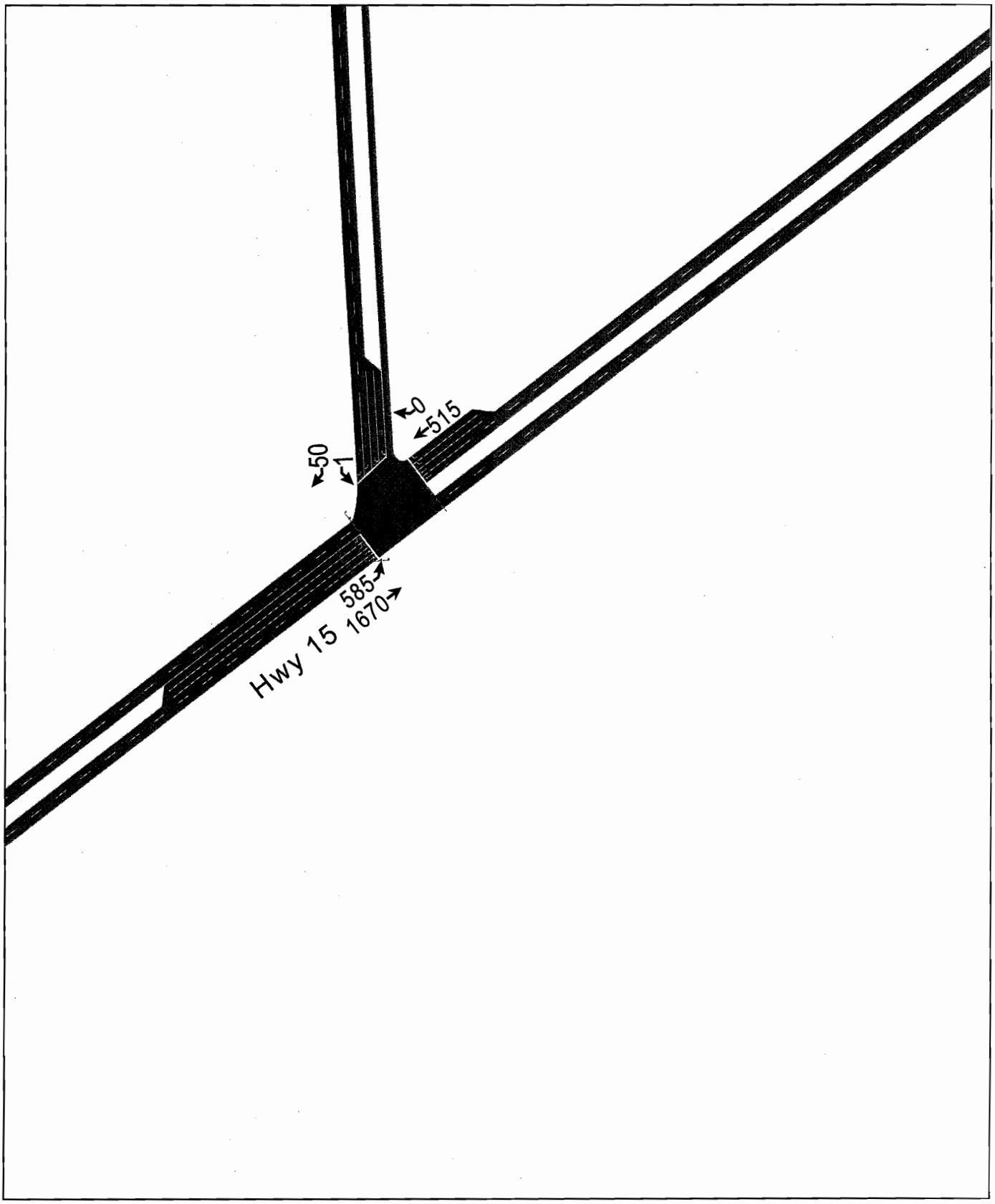
- AT would like to see the final copy of SC's transportation study report only (not the draft copy). The report should be sent to Patty Urban and to Dean Litke.
- In response to Bosco's comment on whether the Highway 15 FPS was a "set in stone" policy, or a "best information/guideline" document, Paul and Dean commented that the functional planning document was certainly an important guiding principle document on which other planning initiates would be based on. Strathcona County waiting for Alberta Transportation's ruling.
- Paul stated that irrespective of potential law suits, the Province would make changes in good faith to the highway network system anyway and anytime it sees fit for the better interest of the public as a whole. AT would try to work with stakeholders but understood that changes to the existing network might cause disruption and inconvenience to certain land and property owners and businesses.

Meeting adjourned 11:45 am

Appendix F
2007 SYNCHRO MODEL OUTPUTS

AM Peak Hour Build-Out – Operations Only

Map - C:\Documents and Settings\tgolly\Desktop\Heartlands\AM Full Build Operations.syn
Volumes 3/13/2007



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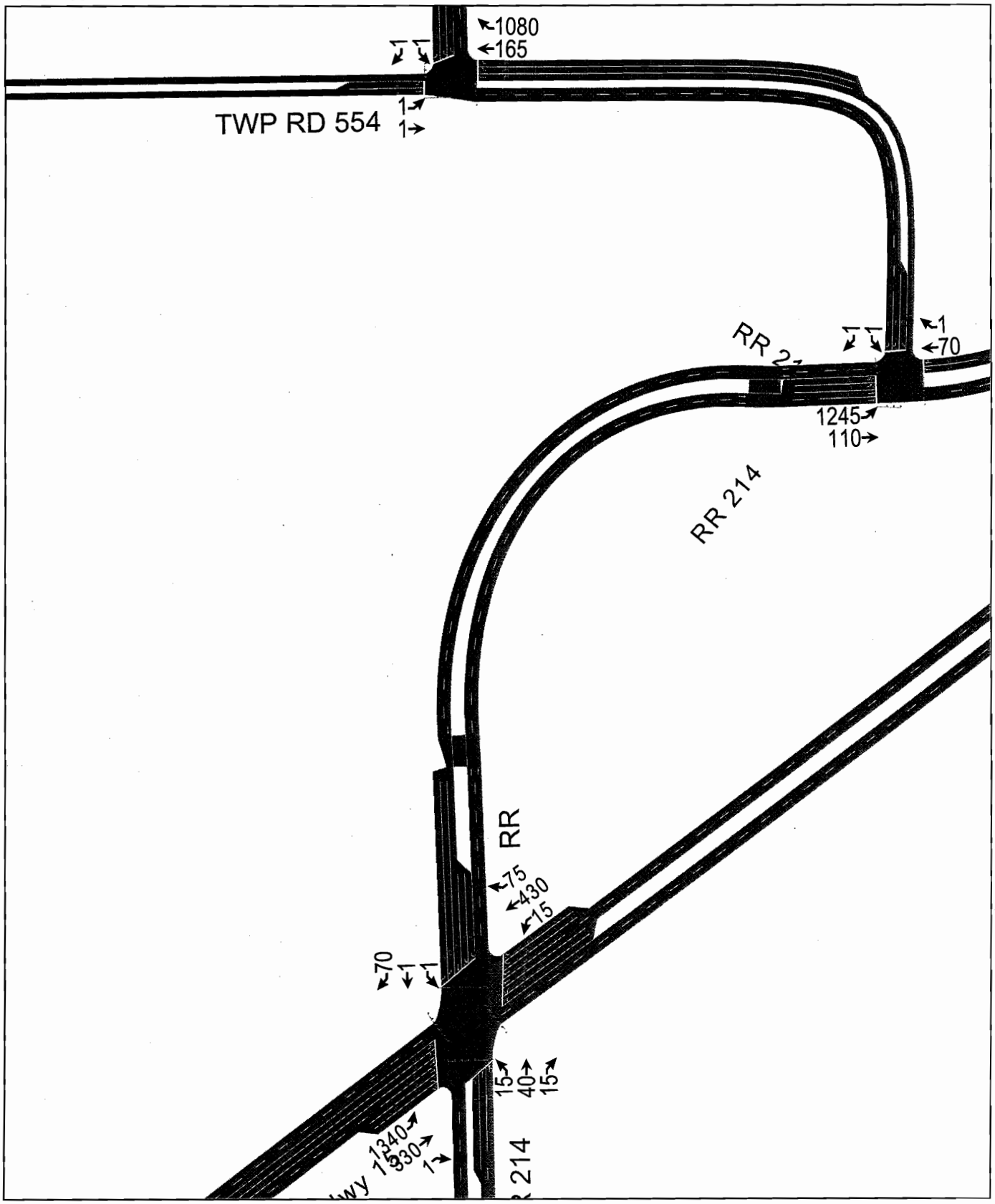

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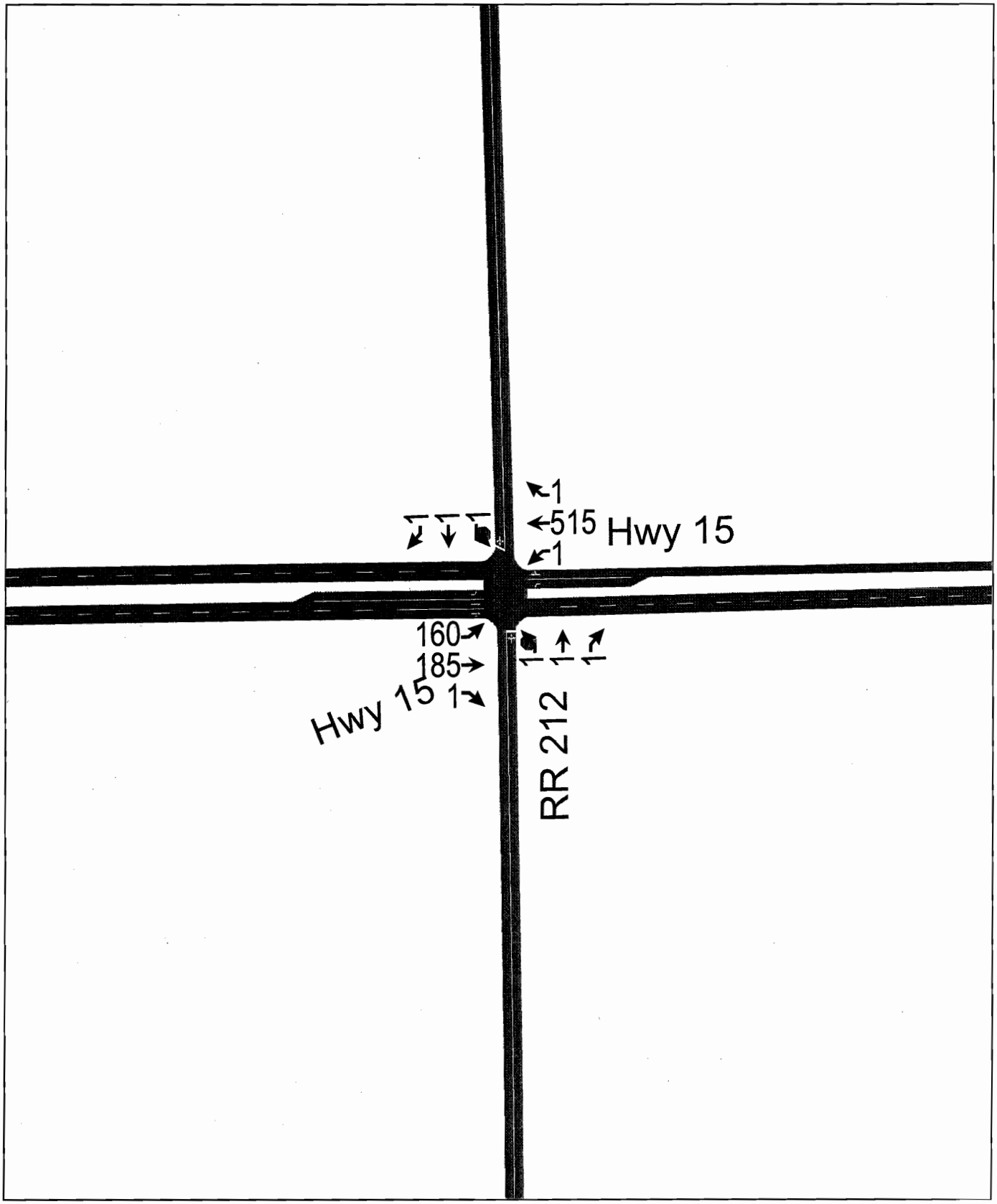

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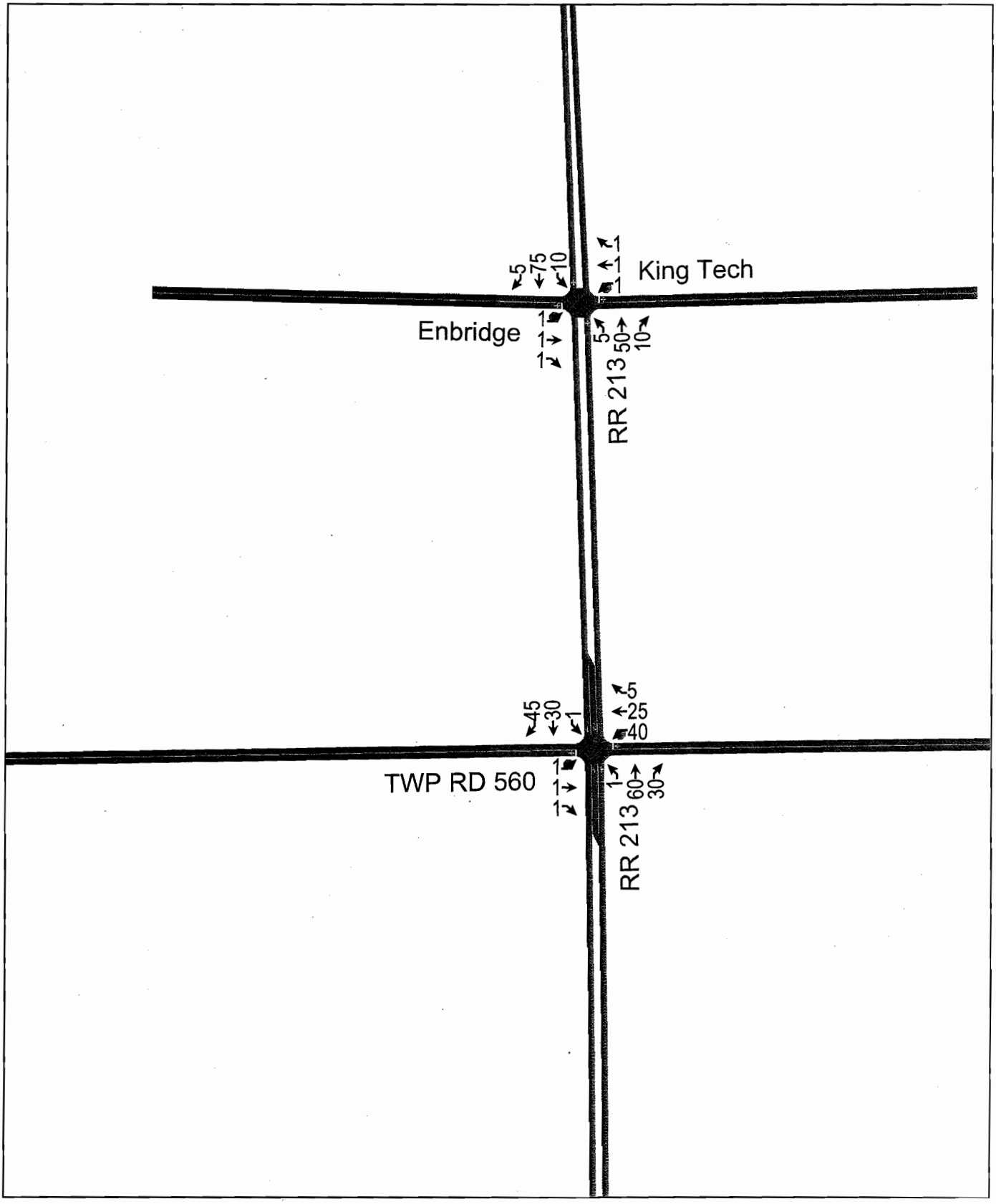

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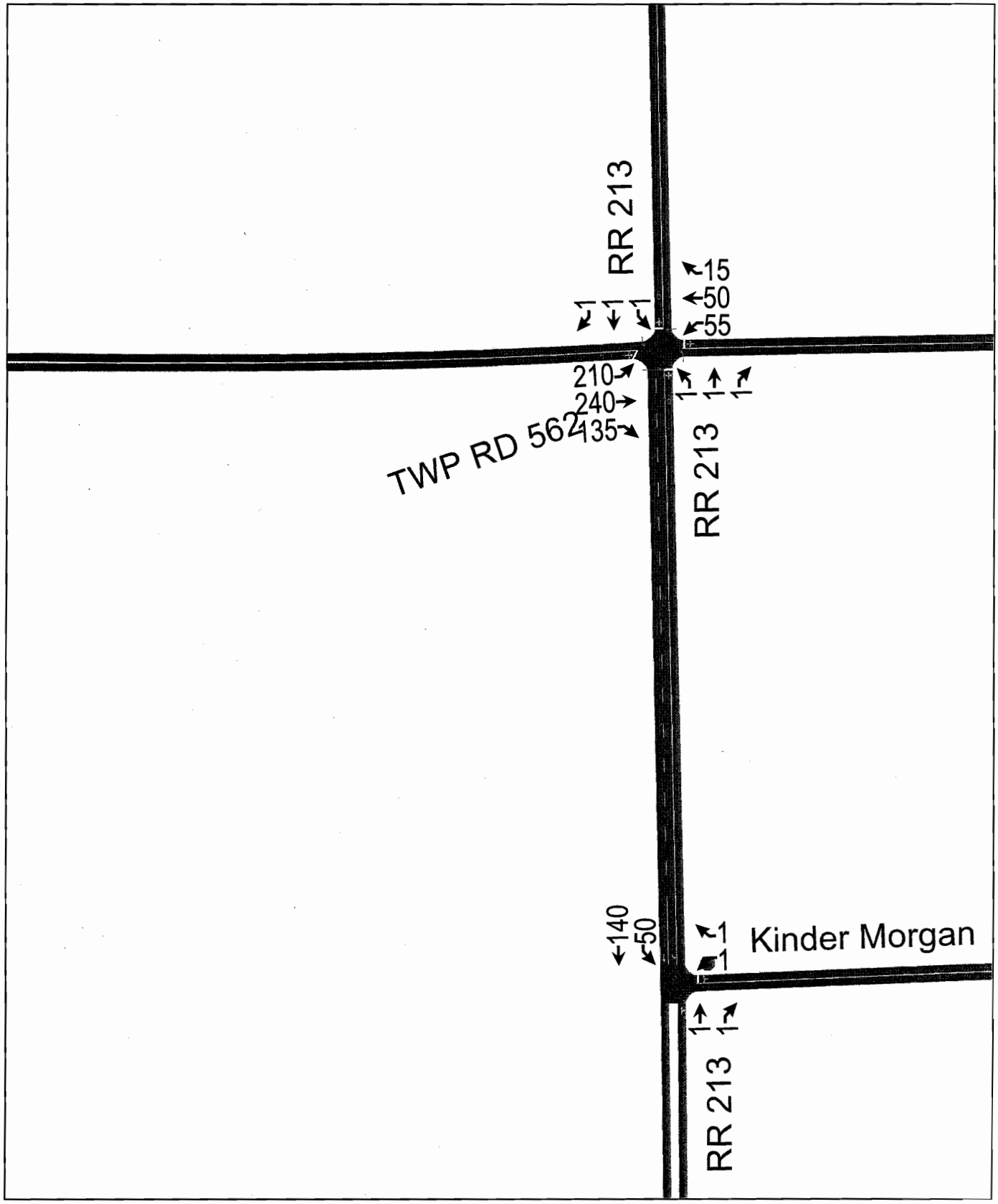

AM Peak Hour Build-Out - Operations Only
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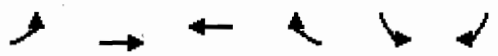
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	15	40	15	1	1	70	1340	330	1	15	430	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	40.0		0.0	40.0		200.0	220.0		40.0	40.0		40.0
Storage Lanes	1		0	2		2	2		2	2		2
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		48			48			100			100	
Link Distance (m)		768.6			143.8			2155.7			1778.4	
Travel Time (s)		57.6			10.8			77.6			64.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Act Effct Green (s)	6.0	6.0		6.0	6.0	6.0	30.0	46.0	45.0	12.0	12.0	11.0
Actuated g/C Ratio	0.10	0.10		0.10	0.10	0.10	0.50	0.77	0.75	0.20	0.20	0.18
v/c Ratio	0.14	0.21		0.00	0.01	0.26	1.06	0.17	0.00	0.06	0.82	0.17
Control Delay	27.3	21.1		30.0	30.0	25.6	48.4	0.2	0.0	20.0	35.3	6.4
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	27.3	21.1		30.0	30.0	25.6	48.4	0.2	0.0	20.0	35.3	6.4
LOS	C	C		C	C	C	D	A	A	B	D	A
Approach Delay		22.4			25.7			38.9			30.7	
Approach LOS		C			C			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 36.2		Intersection LOS: D	
Intersection Capacity Utilization 67.6%		ICU Level of Service C	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	1	1	165	1080	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	40.0			200.0	200.0	0.0
Storage Lanes	1			2	2	1
Taper Length (m)	7.5			7.5	7.5	7.5
Right Turn on Red				Yes		Yes
Link Speed (k/h)		48	48		48	
Link Distance (m)		318.7	376.0		250.8	
Travel Time (s)		23.9	28.2		18.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	21.8	21.8	21.8	21.8	30.2	30.2
Actuated g/C Ratio	0.36	0.36	0.36	0.36	0.50	0.50
v/c Ratio	0.00	0.00	0.33	0.75	0.00	0.00
Control Delay	7.0	7.0	10.7	4.3	13.0	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.0	7.0	10.7	4.3	13.0	11.0
LOS	A	A	B	A	B	B
Approach Delay		7.0	5.2		12.0	
Approach LOS		A	A		B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 13 (22%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 5.2		Intersection LOS: A	
Intersection Capacity Utilization 47.8%		ICU Level of Service A	
Analysis Period (min) 15			

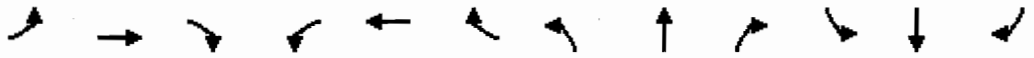
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	160	185	1	1	515	1	1	1	1	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	213	247	1	1	687	1	1	1	1	1	1	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	688			248			1365	1365	124	1242	1365	687
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	688			248			1365	1365	124	1242	1365	687
tC, single (s)	4.2			4.2			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.4	3.6	4.0	3.4
p0 queue free %	76			100			98	99	100	99	99	100
cM capacity (veh/h)	882			1293			83	108	894	103	108	382

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	213	164	84	1	688	4	4
Volume Left	213	0	0	1	0	1	1
Volume Right	0	0	1	0	1	1	1
cSH	882	1700	1700	1293	1700	134	139
Volume to Capacity	0.24	0.10	0.05	0.00	0.40	0.03	0.03
Queue Length 95th (m)	7.2	0.0	0.0	0.0	0.0	0.7	0.7
Control Delay (s)	10.4	0.0	0.0	7.8	0.0	32.8	31.7
Lane LOS	B			A		D	D
Approach Delay (s)	4.8			0.0		32.8	31.7
Approach LOS						D	D

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
14: TWP RD 562 & RR 213

3/12/2007



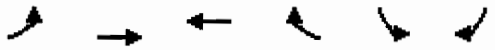
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	210	240	135	55	50	15	1	1	1	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	280	320	180	73	67	20	1	1	1	1	1	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	87			500			1105	1113	320	1105	1283	77
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	87			500			1105	1113	320	1105	1283	77
tC, single (s)	4.1			4.1			7.2	6.6	6.2	7.2	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			93			99	99	100	99	99	100
cM capacity (veh/h)	1491			1049			149	155	714	149	123	976

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1
Volume Total	600	180	160	1	3	4
Volume Left	280	0	73	1	0	1
Volume Right	0	180	20	0	1	1
cSH	1491	1700	1049	149	255	189
Volume to Capacity	0.19	0.11	0.07	0.01	0.01	0.02
Queue Length 95th (m)	5.2	0.0	1.7	0.2	0.2	0.5
Control Delay (s)	4.7	0.0	4.3	29.4	19.3	24.4
Lane LOS	A		A	D	C	C
Approach Delay (s)	3.6		4.3	22.6		24.4
Approach LOS				C		C

Intersection Summary				
Average Delay	3.9			
Intersection Capacity Utilization	44.2%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Volume (vph)	1	50	585	1670	515	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	40.0	0.0	120.0			40.0
Storage Lanes	2	2	2			2
Taper Length (m)	7.5	7.5	7.5			7.5
Right Turn on Red		Yes				Yes
Link Speed (k/h)	60			100	100	
Link Distance (m)	4995.7			599.1	2155.7	
Travel Time (s)	299.7			21.6	77.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	6.0	22.2	46.0	46.0	29.8	
Actuated g/C Ratio	0.10	0.37	0.77	0.77	0.50	
v/c Ratio	0.00	0.06	0.60	0.84	0.40	
Control Delay	24.0	6.6	4.3	8.4	2.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.0	6.6	4.3	8.4	2.9	
LOS	C	A	A	A	A	
Approach Delay	6.9			7.4	2.9	
Approach LOS	A			A	A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 43 (72%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 6.5		Intersection LOS: A	
Intersection Capacity Utilization 56.2%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	1245	110	70	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	200.0			0.0	40.0	0.0
Storage Lanes	2			0	1	2
Taper Length (m)	7.5			7.5	7.5	7.5
Right Turn on Red				Yes		Yes
Link Speed (k/h)		48	48		48	
Link Distance (m)		72.9	181.5		376.0	
Travel Time (s)		5.5	13.6		28.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	35.2	43.2	6.0		8.8	48.8
Actuated g/C Ratio	0.59	0.72	0.10		0.15	0.81
v/c Ratio	0.84	0.06	0.27		0.00	0.00
Control Delay	3.9	0.5	7.8		21.0	1.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	3.9	0.5	7.8		21.0	1.0
LOS	A	A	A		C	A
Approach Delay		3.6	7.8		11.0	
Approach LOS		A	A		B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 40 (67%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 3.9		Intersection LOS: A	
Intersection Capacity Utilization 52.2%		ICU Level of Service A	
Analysis Period (min) 15			

AM Peak Hour Build-Out – Turnaround

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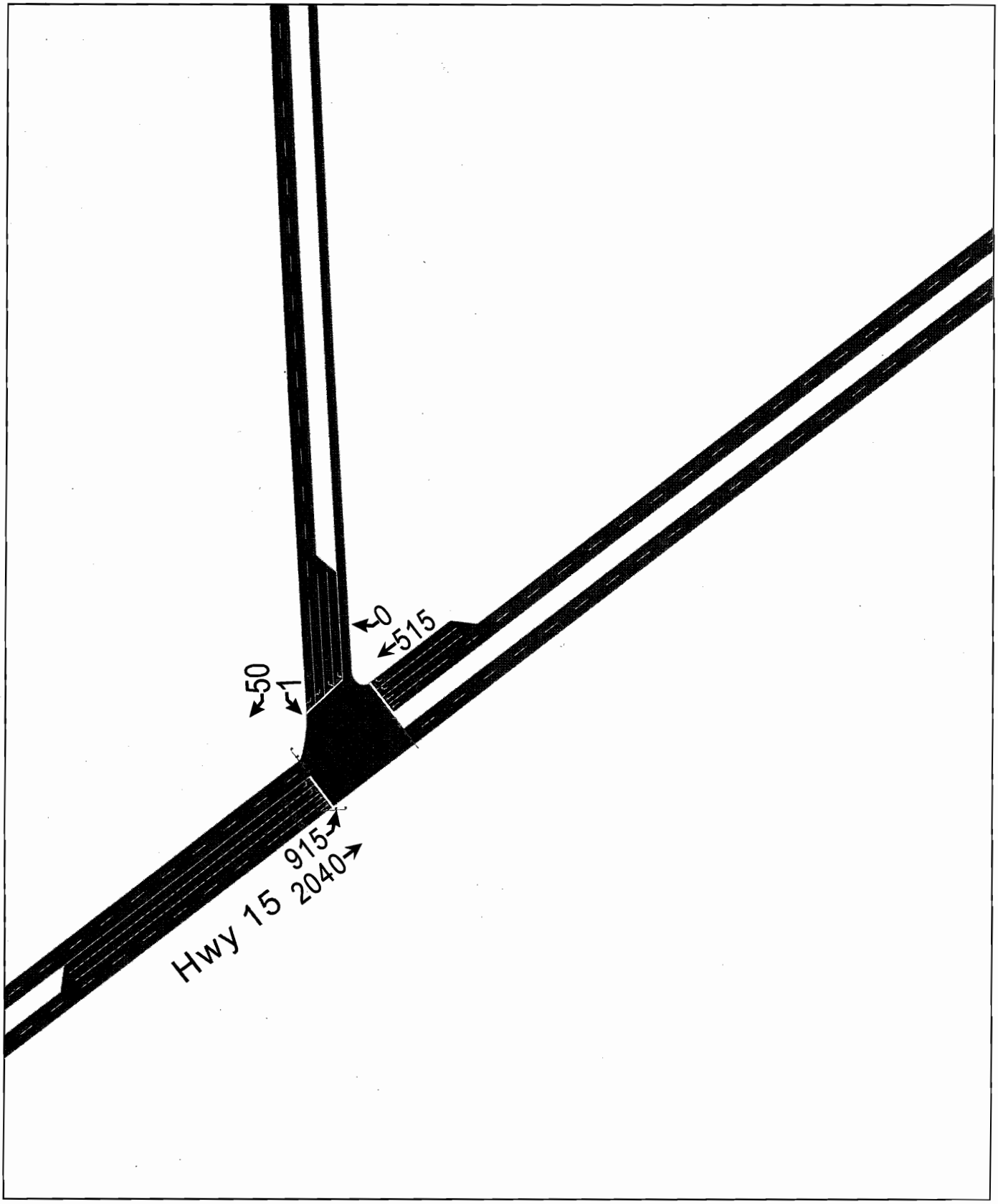

AM Peak Hour Build-Out - Turnaround
Stantec Consulting Ltd.

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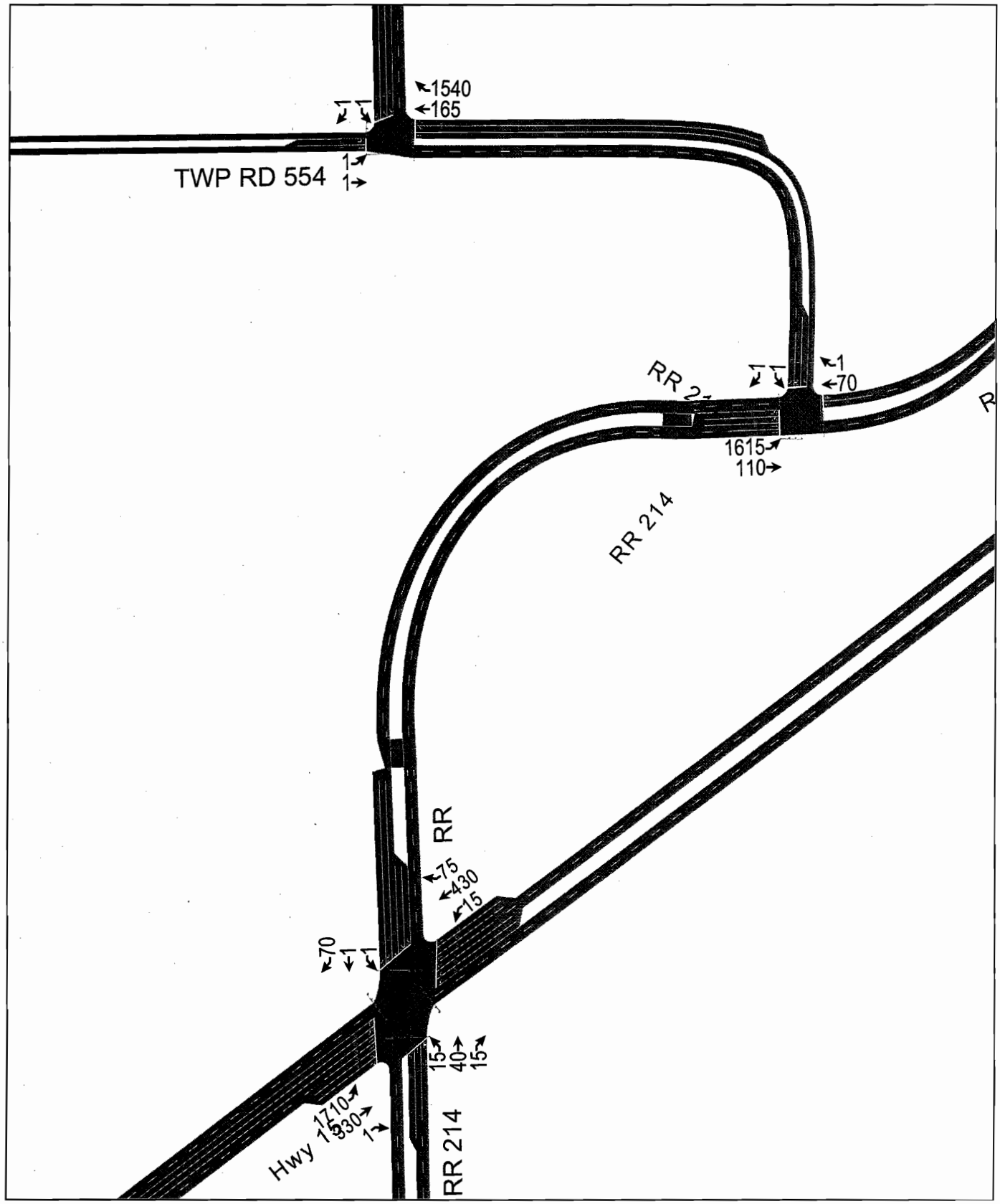

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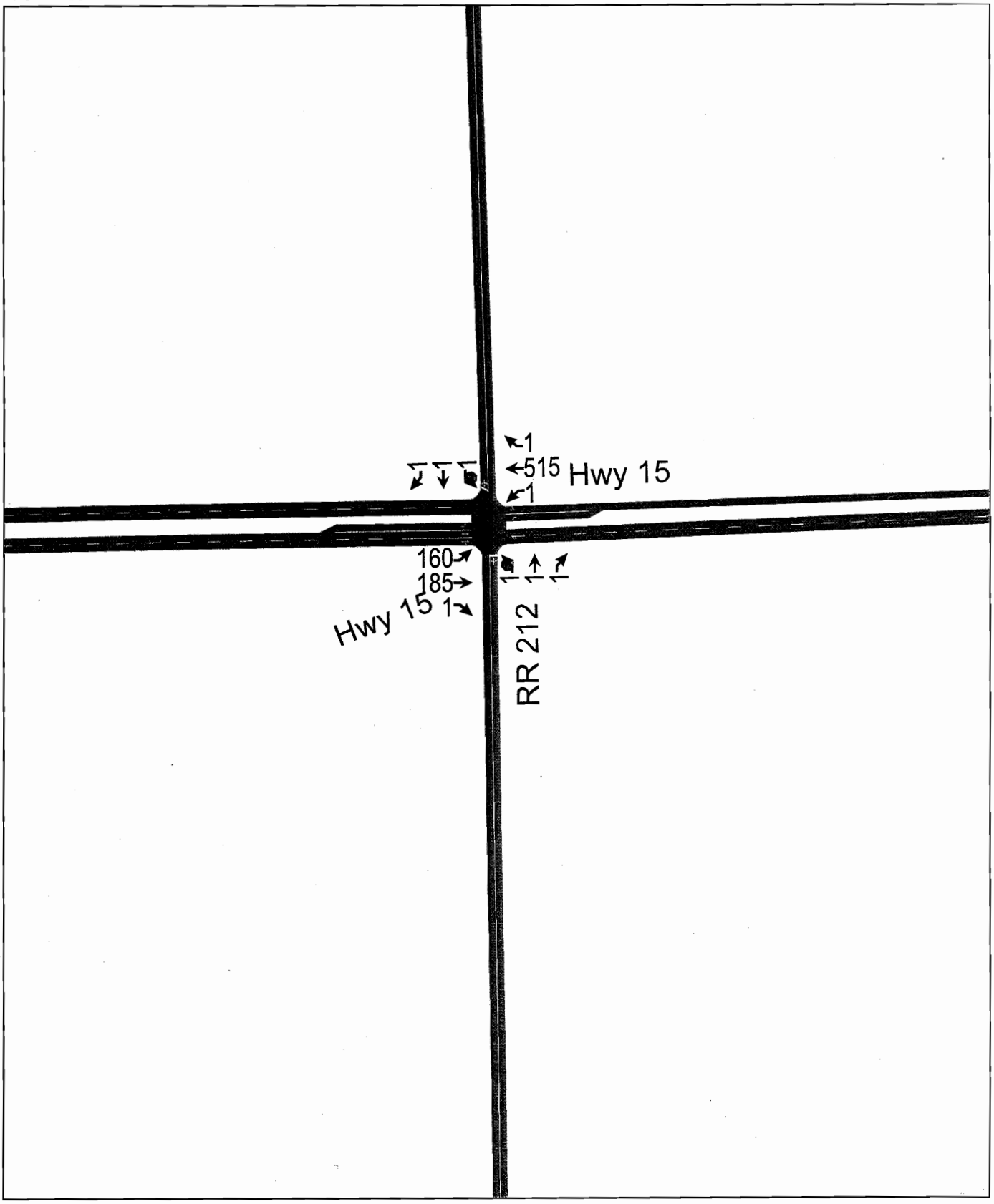

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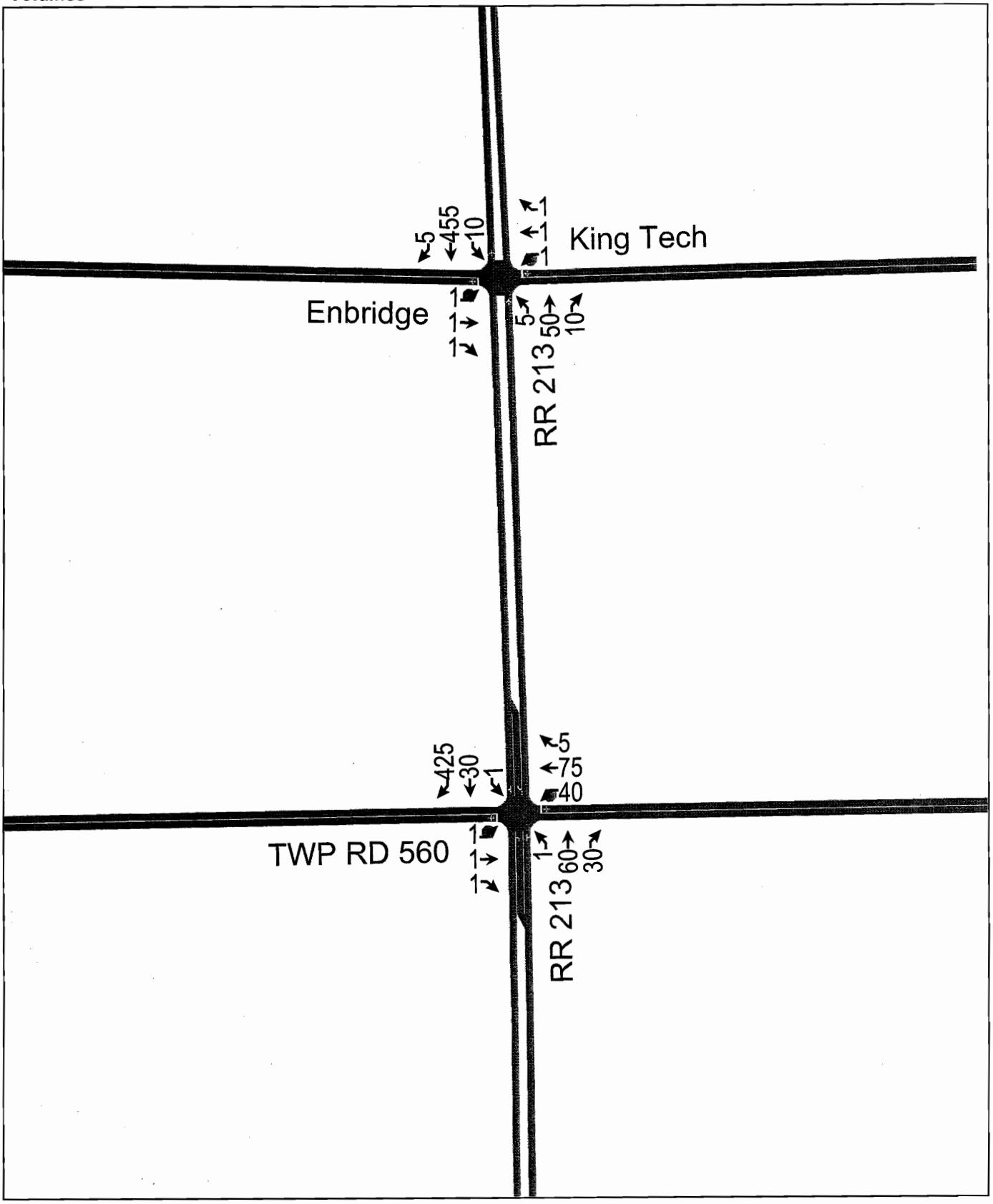
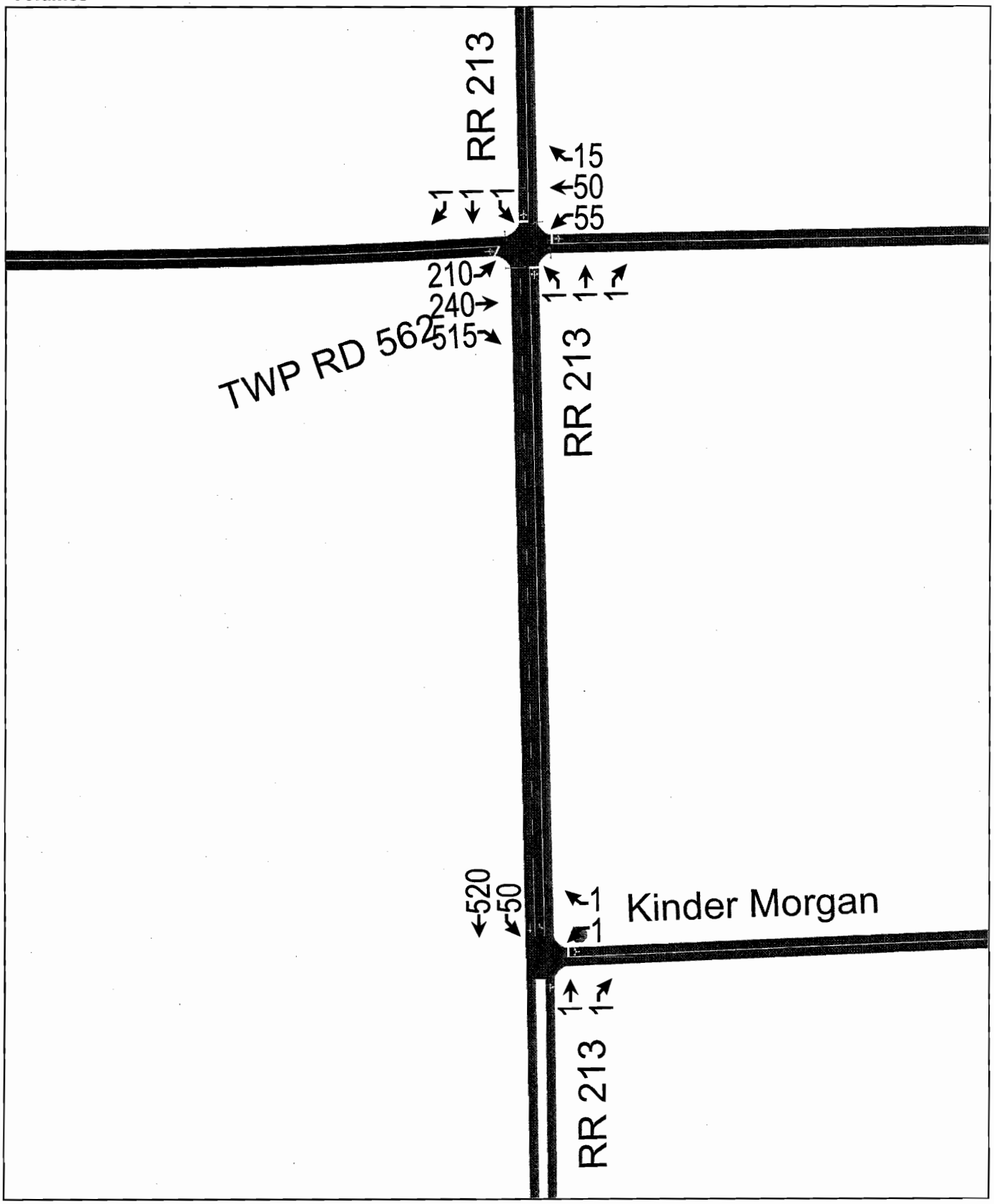
Volumes

3/13/2007



AM Peak Hour Build-Out - Turnaround
Stantec Consulting Ltd.

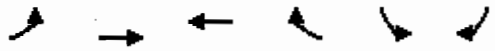
Map - C:\Documents and Settings\tgolly\Desktop\Heartlands\AM Full Build Turnaround.syn
Volumes 3/13/2007



AM Peak Hour Build-Out - Turnaround
Stantec Consulting Ltd.

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	15	40	15	1	1	70	1710	330	1	15	430	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	40.0		0.0	40.0		200.0	220.0		40.0	40.0		40.0
Storage Lanes	1		0	2		2	2		2	2		2
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		48			48			100			100	
Link Distance (m)		768.6			143.8			2155.7			1778.4	
Travel Time (s)		57.6			10.8			77.6			64.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Act Effct Green (s)	7.0	7.0		7.0	7.0	7.0	33.0	45.0	44.0	8.0	8.0	7.0
Actuated g/C Ratio	0.12	0.12		0.12	0.12	0.12	0.55	0.75	0.73	0.13	0.13	0.12
v/c Ratio	0.12	0.18		0.00	0.00	0.23	1.23	0.17	0.00	0.08	1.24	0.25
Control Delay	25.8	20.0		29.0	29.0	24.7	118.0	1.0	1.0	23.9	151.7	8.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.8	20.0		29.0	29.0	24.7	118.0	1.0	1.0	23.9	151.7	8.2
LOS	C	B		C	C	C	F	A	A	C	F	A
Approach Delay		21.2			24.8			99.1			127.3	
Approach LOS		C			C			F			F	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.24			
Intersection Signal Delay: 100.5		Intersection LOS: F	
Intersection Capacity Utilization 78.2%		ICU Level of Service D	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	1	1	165	1540	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	40.0			200.0	200.0	0.0
Storage Lanes	1			2	2	1
Taper Length (m)	7.5			7.5	7.5	7.5
Right Turn on Red				Yes		Yes
Link Speed (k/h)		48	48		48	
Link Distance (m)		318.7	376.0		250.8	
Travel Time (s)		23.9	28.2		18.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	32.4	32.4	32.4	32.4	19.6	19.6
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.33	0.33
v/c Ratio	0.00	0.00	0.22	0.87	0.00	0.00
Control Delay	2.0	2.0	3.7	7.2	23.0	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	2.0	3.7	7.2	23.0	20.0
LOS	A	A	A	A	C	B
Approach Delay		2.0	6.8		21.5	
Approach LOS		A	A		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 19 (32%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 6.9		Intersection LOS: A	
Intersection Capacity Utilization 63.9%		ICU Level of Service B	
Analysis Period (min) 15			

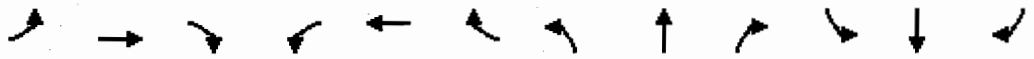
HCM Unsignalized Intersection Capacity Analysis
3: Hwy 15 & RR 212

3/12/2007

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	160	185	1	1	515	1	1	1	1	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	213	247	1	1	687	1	1	1	1	1	1	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	688			248			1365	1365	124	1242	1365	687
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	688			248			1365	1365	124	1242	1365	687
tC, single (s)	4.2			4.2			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.4	3.6	4.0	3.4
p0 queue free %	76			100			98	99	100	99	99	100
cM capacity (veh/h)	882			1293			83	108	894	103	108	382

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	213	164	84	1	688	4	4
Volume Left	213	0	0	1	0	1	1
Volume Right	0	0	1	0	1	1	1
cSH	882	1700	1700	1293	1700	134	139
Volume to Capacity	0.24	0.10	0.05	0.00	0.40	0.03	0.03
Queue Length 95th (m)	7.2	0.0	0.0	0.0	0.0	0.7	0.7
Control Delay (s)	10.4	0.0	0.0	7.8	0.0	32.8	31.7
Lane LOS	B			A		D	D
Approach Delay (s)	4.8			0.0		32.8	31.7
Approach LOS						D	D

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	49.4%	ICU Level of Service		A
Analysis Period (min)	15			



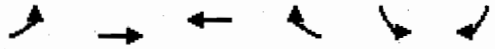
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	210	240	515	55	50	15	1	1	1	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	280	320	687	73	67	20	1	1	1	1	1	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	87			1007			1105	1113	320	1105	1790	77
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	87			1007			1105	1113	320	1105	1790	77
tC, single (s)	4.1			4.1			7.2	6.6	6.2	7.2	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			89			99	99	100	99	98	100
cM capacity (veh/h)	1491			677			143	149	714	145	58	976

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1
Volume Total	600	687	160	1	3	4
Volume Left	280	0	73	1	0	1
Volume Right	0	687	20	0	1	1
cSH	1491	1700	677	143	247	119
Volume to Capacity	0.19	0.40	0.11	0.01	0.01	0.03
Queue Length 95th (m)	5.2	0.0	2.8	0.2	0.2	0.8
Control Delay (s)	4.7	0.0	5.7	30.4	19.8	36.4
Lane LOS	A		A	D	C	E
Approach Delay (s)	2.2		5.7	23.3		36.4
Approach LOS				C		E

Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	51.8%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Volume (vph)	1	50	915	2040	515	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	40.0	0.0	120.0			40.0
Storage Lanes	2	2	2			2
Taper Length (m)	7.5	7.5	7.5			7.5
Right Turn on Red		Yes				Yes
Link Speed (k/h)	60			100	100	
Link Distance (m)	4995.7			599.1	2155.7	
Travel Time (s)	299.7			21.6	77.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	6.0	60.0	46.0	46.0	22.0	
Actuated g/C Ratio	0.10	1.00	0.77	0.77	0.37	
v/c Ratio	0.00	0.02	0.81	1.02	0.54	
Control Delay	24.0	0.0	11.7	32.5	3.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.0	0.0	11.7	32.5	3.4	
LOS	C	A	B	C	A	
Approach Delay	0.4			26.1	3.4	
Approach LOS	A			C	A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 46 (77%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.02			
Intersection Signal Delay: 22.4		Intersection LOS: C	
Intersection Capacity Utilization 66.4%		ICU Level of Service C	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	1615	110	70	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	200.0			0.0	40.0	0.0
Storage Lanes	2			0	1	2
Taper Length (m)	7.5			7.5	7.5	7.5
Right Turn on Red				Yes		Yes
Link Speed (k/h)		48	48		48	
Link Distance (m)		72.9	181.5		376.0	
Travel Time (s)		5.5	13.6		28.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	38.0	46.0	6.0		6.0	48.8
Actuated g/C Ratio	0.63	0.77	0.10		0.10	0.81
v/c Ratio	1.01	0.06	0.27		0.01	0.00
Control Delay	15.6	0.3	8.3		33.0	5.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	15.6	0.3	8.3		33.0	5.0
LOS	B	A	A		C	A
Approach Delay		14.6	8.3		19.0	
Approach LOS		B	A		B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 41 (68%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.01			
Intersection Signal Delay: 14.4		Intersection LOS: B	
Intersection Capacity Utilization 62.7%		ICU Level of Service B	
Analysis Period (min) 15			

PM Peak Hour Build-Out – Operations Only

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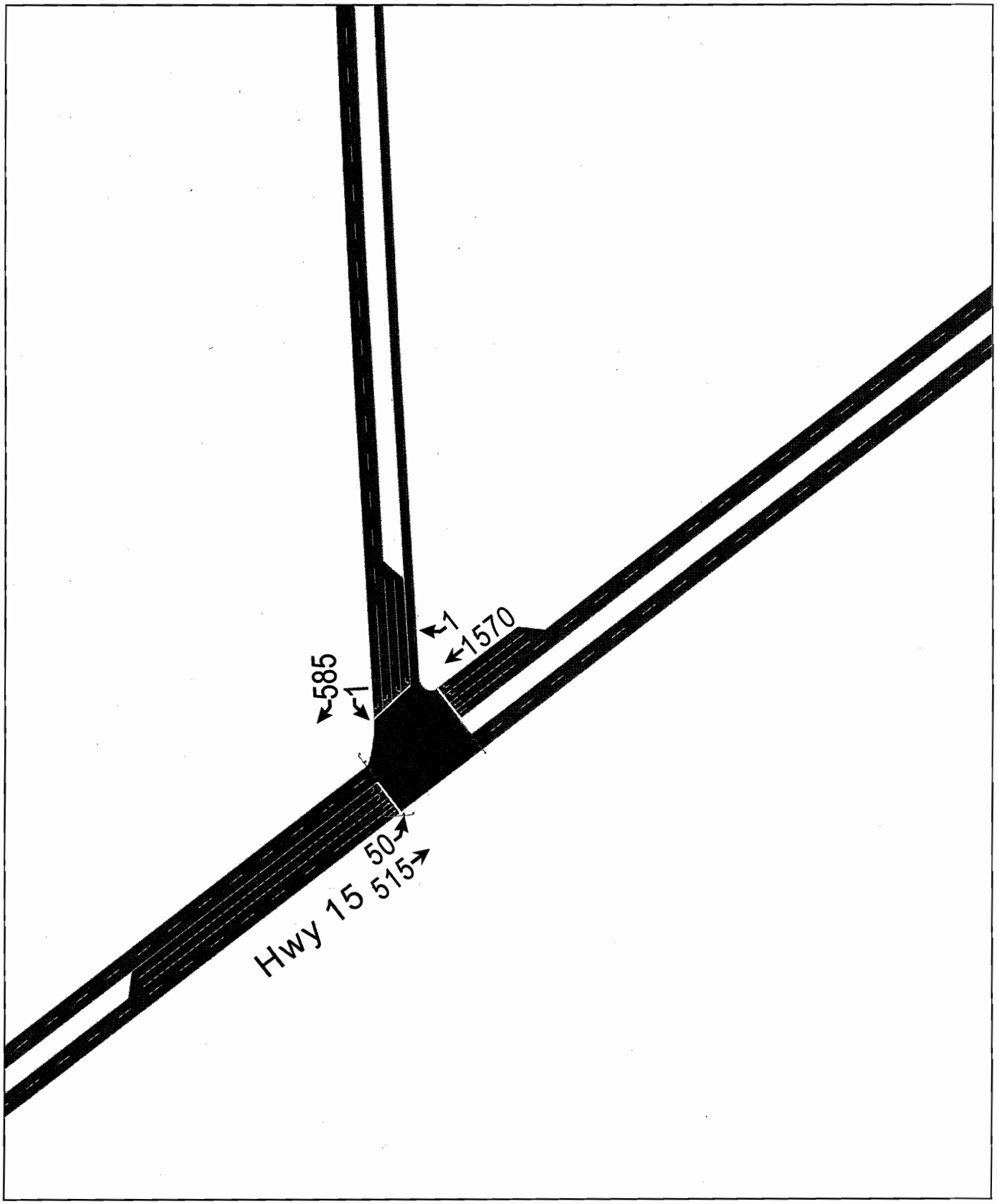
Volumes 3/13/2007



PM Peak Hour Build-Out - Operations Only
Stantec Consulting Ltd.

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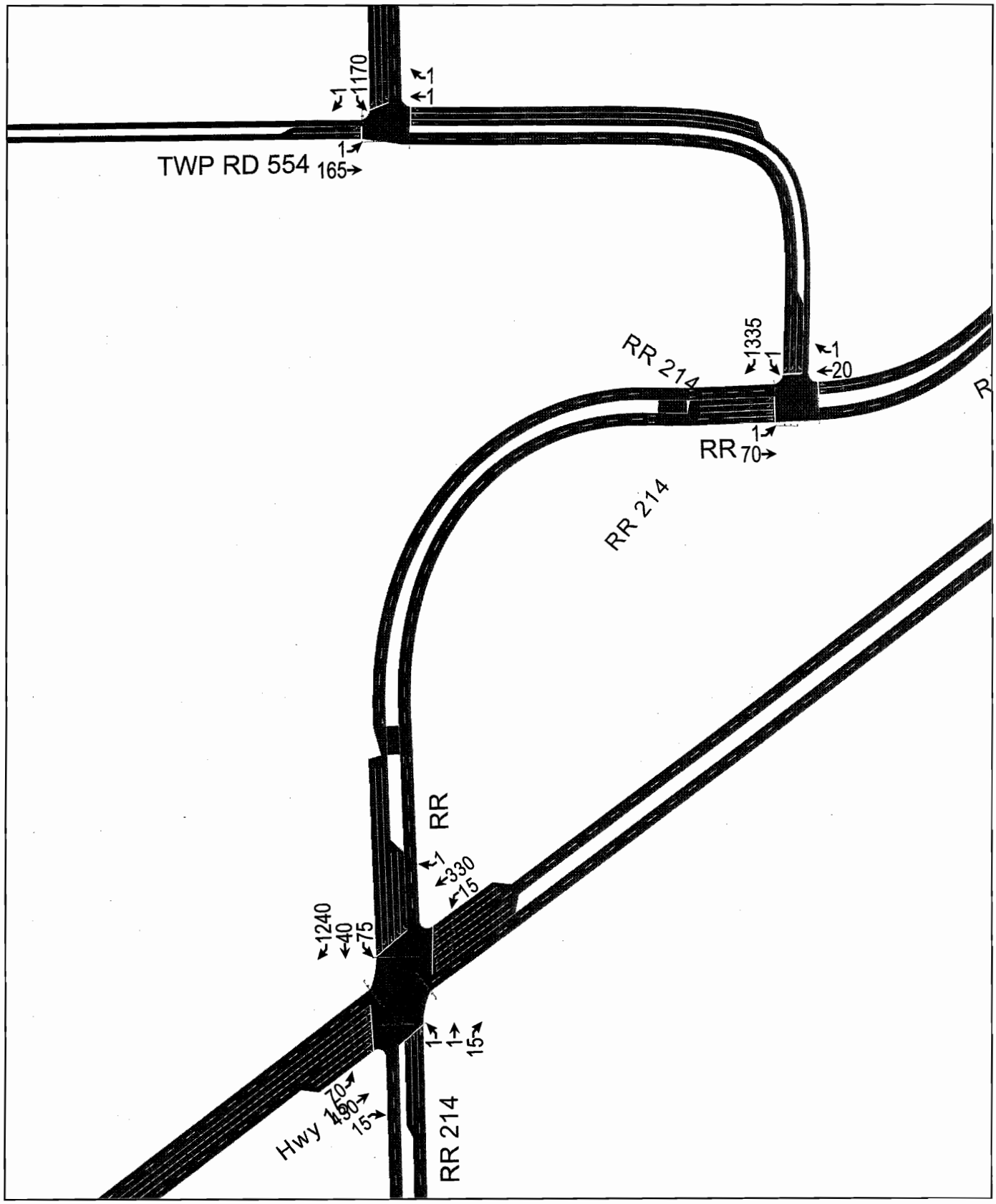
Volumes 3/13/2007



PM Peak Hour Build-Out - Operations Only
Stantec Consulting Ltd.

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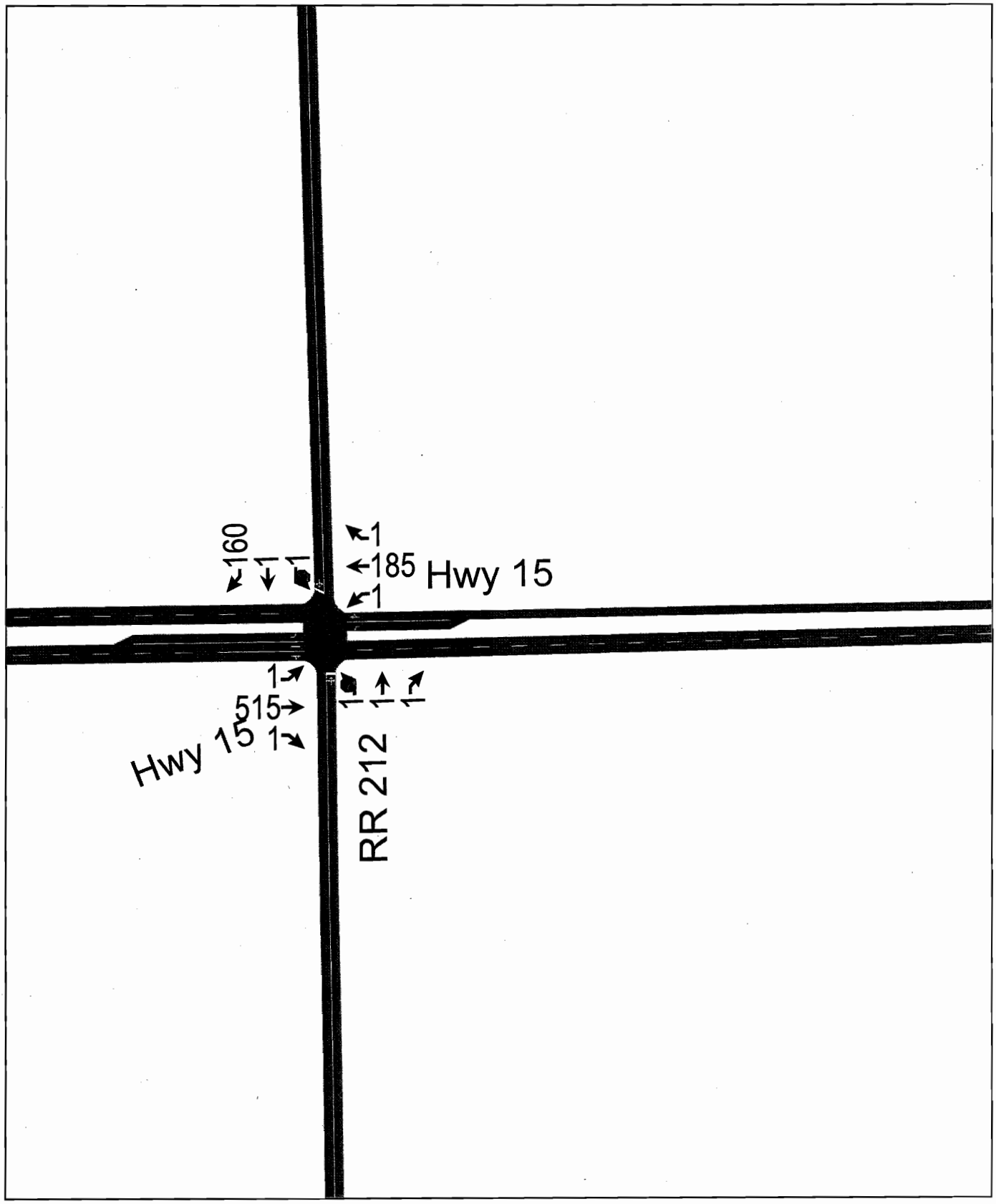
Volumes 3/13/2007



PM Peak Hour Build-Out - Operations Only
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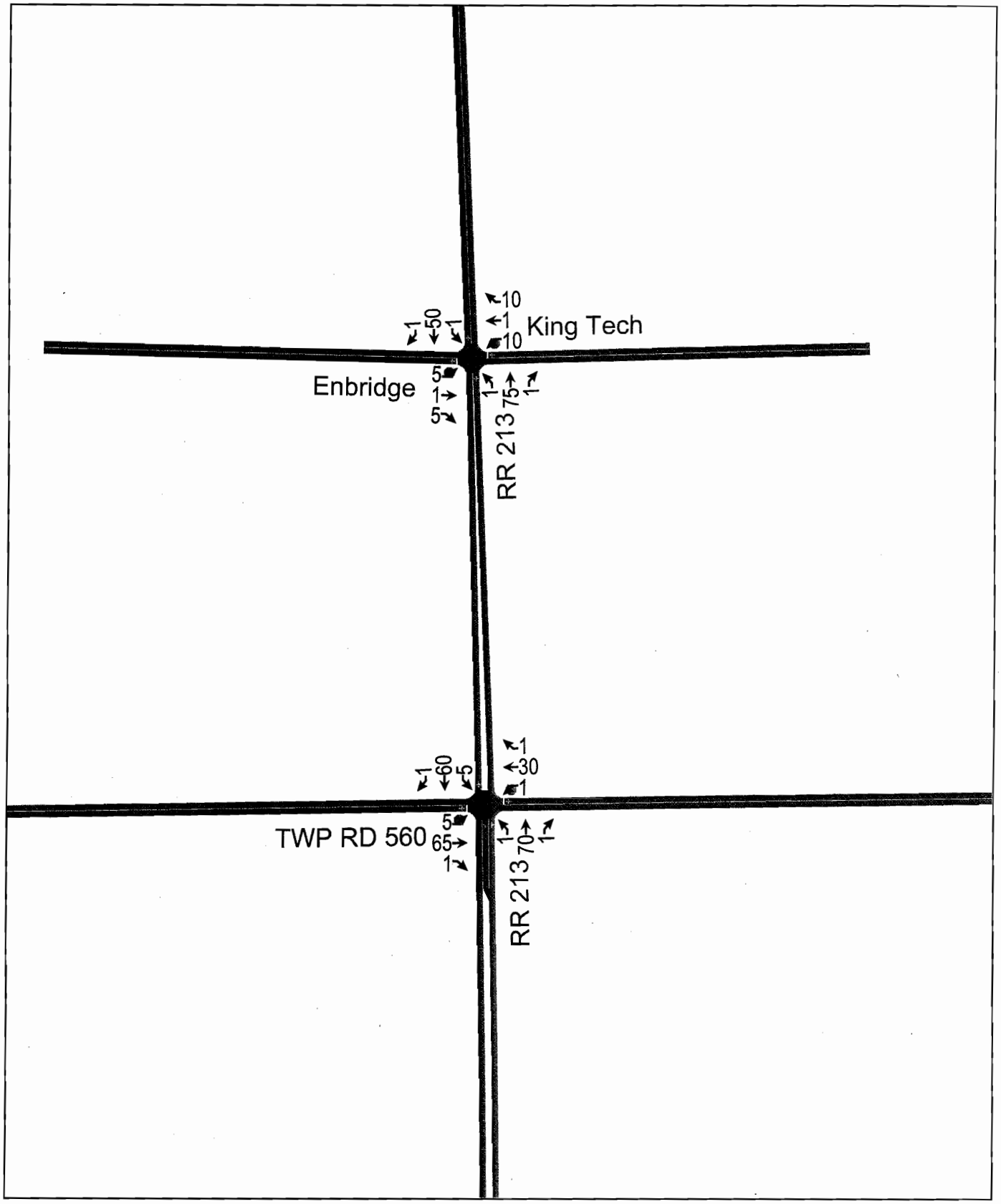
Map - C:\Documents and Settings\tgolly\Desktop\Heartlands\PM Full Build Operations.syn
Volumes

3/13/2007



PM Peak Hour Build-Out - Operations Only
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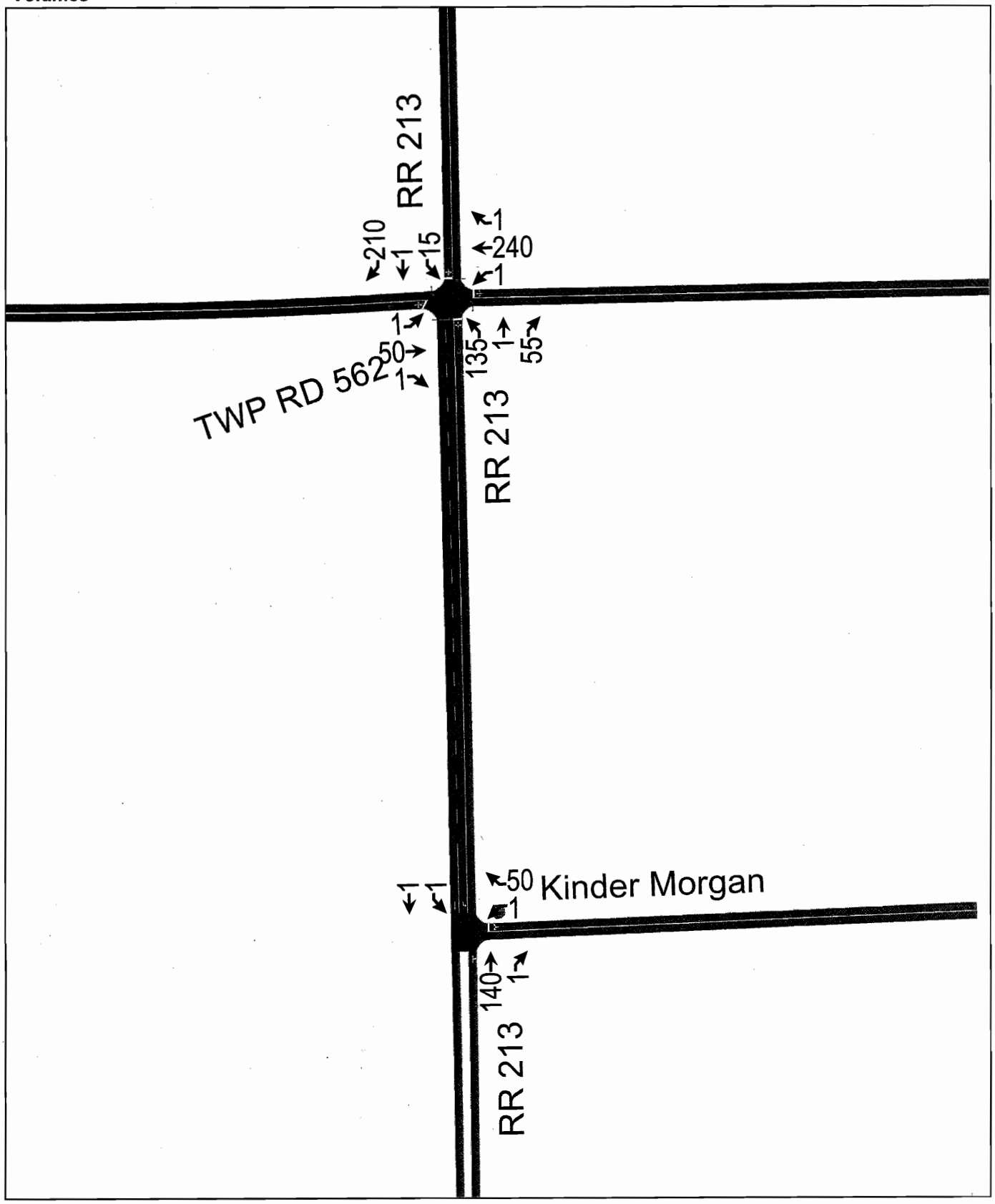
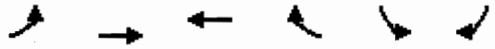
Volumes 3/13/2007



PM Peak Hour Build-Out - Operations Only
Stantec Consulting Ltd.

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	1	1	15	75	40	1240	70	430	15	15	330	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	40.0		0.0	40.0		200.0	220.0		40.0	40.0		40.0
Storage Lanes	1		0	2		2	2		2	2		2
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		48			48			100			100	
Link Distance (m)		768.6			143.8			2155.7			1778.4	
Travel Time (s)		57.6			10.8			77.6			64.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Act Effct Green (s)	35.2	35.2		35.2	35.2	35.2	5.0	16.8	15.8	9.6	9.6	8.6
Actuated g/C Ratio	0.59	0.59		0.59	0.59	0.59	0.08	0.28	0.26	0.16	0.16	0.14
v/c Ratio	0.00	0.01		0.06	0.05	0.88	0.33	0.59	0.03	0.08	0.79	0.00
Control Delay	6.0	0.0		4.2	4.2	8.7	26.2	18.0	5.7	23.1	37.7	19.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.0	0.0		4.2	4.2	8.7	26.2	18.0	5.7	23.1	37.7	19.0
LOS	A	A		A	A	A	C	B	A	C	D	B
Approach Delay		0.3			8.3			18.8			37.0	
Approach LOS		A			A			B			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 15.1		Intersection LOS: B	
Intersection Capacity Utilization 65.8%		ICU Level of Service C	
Analysis Period (min) 15			

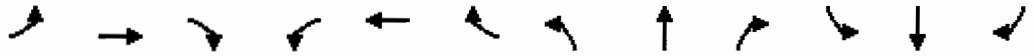


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	1	165	1	1	1170	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	40.0			200.0	200.0	0.0
Storage Lanes	1			2	2	1
Taper Length (m)	7.5			7.5	7.5	7.5
Right Turn on Red				Yes		Yes
Link Speed (k/h)		48	48		48	
Link Distance (m)		318.7	376.0		250.8	
Travel Time (s)		23.9	28.2		18.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	12.3	12.3	12.3	12.3	39.7	39.7
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.66	0.66
v/c Ratio	0.00	0.59	0.00	0.00	0.70	0.00
Control Delay	18.0	28.0	6.0	4.0	9.0	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.0	28.0	6.0	4.0	9.0	3.0
LOS	B	C	A	A	A	A
Approach Delay		27.9	5.0		9.0	
Approach LOS		C	A		A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 53 (88%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 11.3		Intersection LOS: B	
Intersection Capacity Utilization 48.7%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
3: Hwy 15 & RR 212

3/12/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	515	1	1	185	1	1	1	1	1	1	160
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	1	687	1	1	247	1	1	1	1	1	1	213
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	248			688			1153	941	344	598	941	247
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	248			688			1153	941	344	598	941	247
tC, single (s)	4.2			4.2			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.4	3.6	4.0	3.4
p0 queue free %	100			100			99	99	100	100	99	71
cM capacity (veh/h)	1293			882			105	256	643	377	256	744

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	1	458	230	1	248	4	216
Volume Left	1	0	0	1	0	1	1
Volume Right	0	0	1	0	1	1	213
cSH	1293	1700	1700	882	1700	201	731
Volume to Capacity	0.00	0.27	0.14	0.00	0.15	0.02	0.30
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.5	9.4
Control Delay (s)	7.8	0.0	0.0	9.1	0.0	23.3	12.0
Lane LOS	A			A		C	B
Approach Delay (s)	0.0			0.0		23.3	12.0
Approach LOS						C	B

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
14: TWP RD 562 & RR 213

3/12/2007

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	50	1	1	240	1	135	1	55	15	1	210
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	1	67	1	1	320	1	180	1	73	20	1	280
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	321			68			673	393	67	467	394	321
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	321			68			673	393	67	467	394	321
tC, single (s)	4.1			4.1			7.2	6.6	6.2	7.2	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			18	100	93	96	100	61
cM capacity (veh/h)	1222			1514			221	537	989	463	537	713

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1
Volume Total	68	1	323	180	75	301
Volume Left	1	0	1	180	0	20
Volume Right	0	1	1	0	73	280
cSH	1222	1700	1514	221	974	687
Volume to Capacity	0.00	0.00	0.00	0.82	0.08	0.44
Queue Length 95th (m)	0.0	0.0	0.0	46.0	1.9	17.0
Control Delay (s)	0.2	0.0	0.0	67.6	9.0	14.3
Lane LOS	A		A	F	A	B
Approach Delay (s)	0.2		0.0	50.4		14.3
Approach LOS				F		B

Intersection Summary			
Average Delay	18.1		
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Volume (vph)	1	585	50	515	1570	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	40.0	0.0	120.0			40.0
Storage Lanes	2	2	2			2
Taper Length (m)	7.5	7.5	7.5			7.5
Right Turn on Red		Yes				Yes
Link Speed (k/h)	60			100	100	
Link Distance (m)	4995.7			599.1	2155.7	
Travel Time (s)	299.7			21.6	77.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	9.0	18.0	43.0	43.0	34.0	34.0
Actuated g/C Ratio	0.15	0.30	0.72	0.72	0.57	0.57
v/c Ratio	0.00	0.94	0.13	0.28	1.06	0.00
Control Delay	22.0	42.4	3.0	3.3	47.8	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	42.4	3.0	3.3	47.8	2.0
LOS	C	D	A	A	D	A
Approach Delay	42.4			3.3	47.7	
Approach LOS	D			A	D	

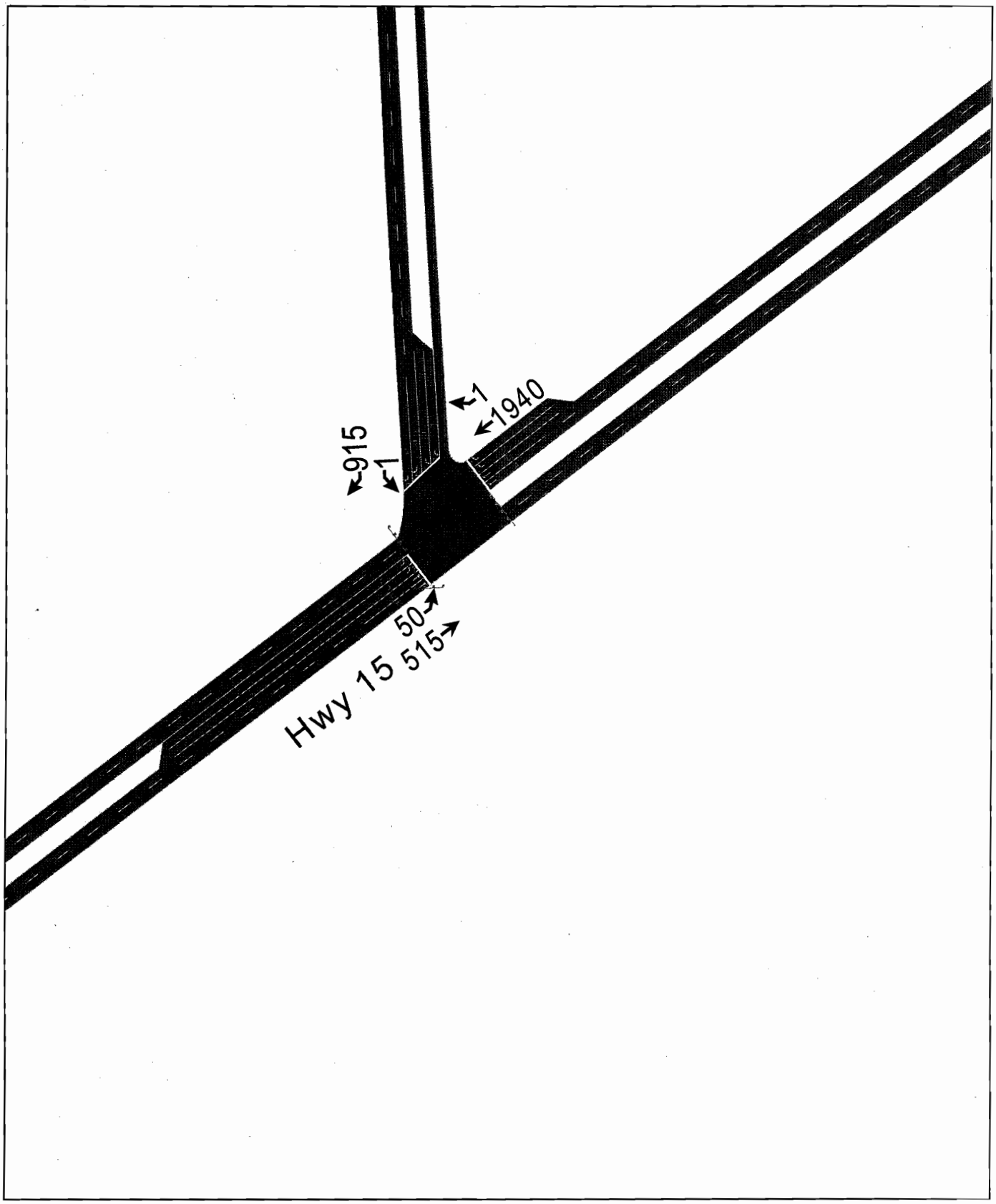
Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 7 (12%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 37.4		Intersection LOS: D	
Intersection Capacity Utilization 70.5%		ICU Level of Service C	
Analysis Period (min) 15			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	1	70	20	1	1	1335
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	200.0			0.0	40.0	0.0
Storage Lanes	2			0	1	2
Taper Length (m)	7.5			7.5	7.5	7.5
Right Turn on Red				Yes		Yes
Link Speed (k/h)		48	48		48	
Link Distance (m)		72.9	181.5		376.0	
Travel Time (s)		5.5	13.6		28.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	6.4	10.4	6.0		41.6	54.4
Actuated g/C Ratio	0.11	0.17	0.10		0.69	0.91
v/c Ratio	0.00	0.16	0.08		0.00	0.68
Control Delay	31.0	33.0	16.8		2.0	2.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	31.0	33.0	16.8		2.0	2.9
LOS	C	C	B		A	A
Approach Delay		33.0	16.8		2.9	
Approach LOS		C	B		A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 21 (35%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 4.6		Intersection LOS: A	
Intersection Capacity Utilization 56.7%		ICU Level of Service B	
Analysis Period (min) 15			

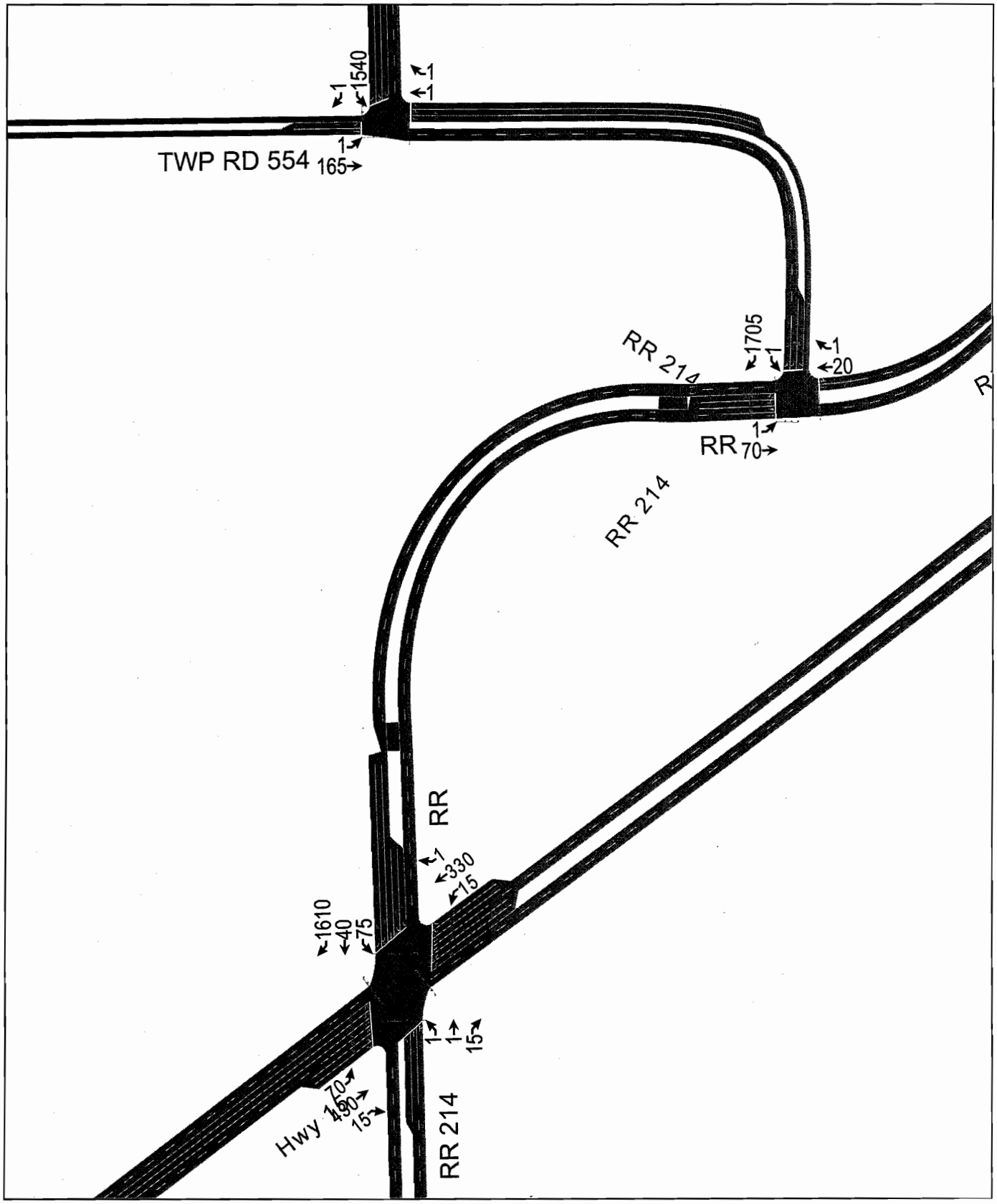
PM Peak Hour Build-Out – Turnaround

Map - C:\Documents and Settings\tgolly\Desktop\Heartlands\PM Full Build Turnaround.syn
Volumes 3/13/2007



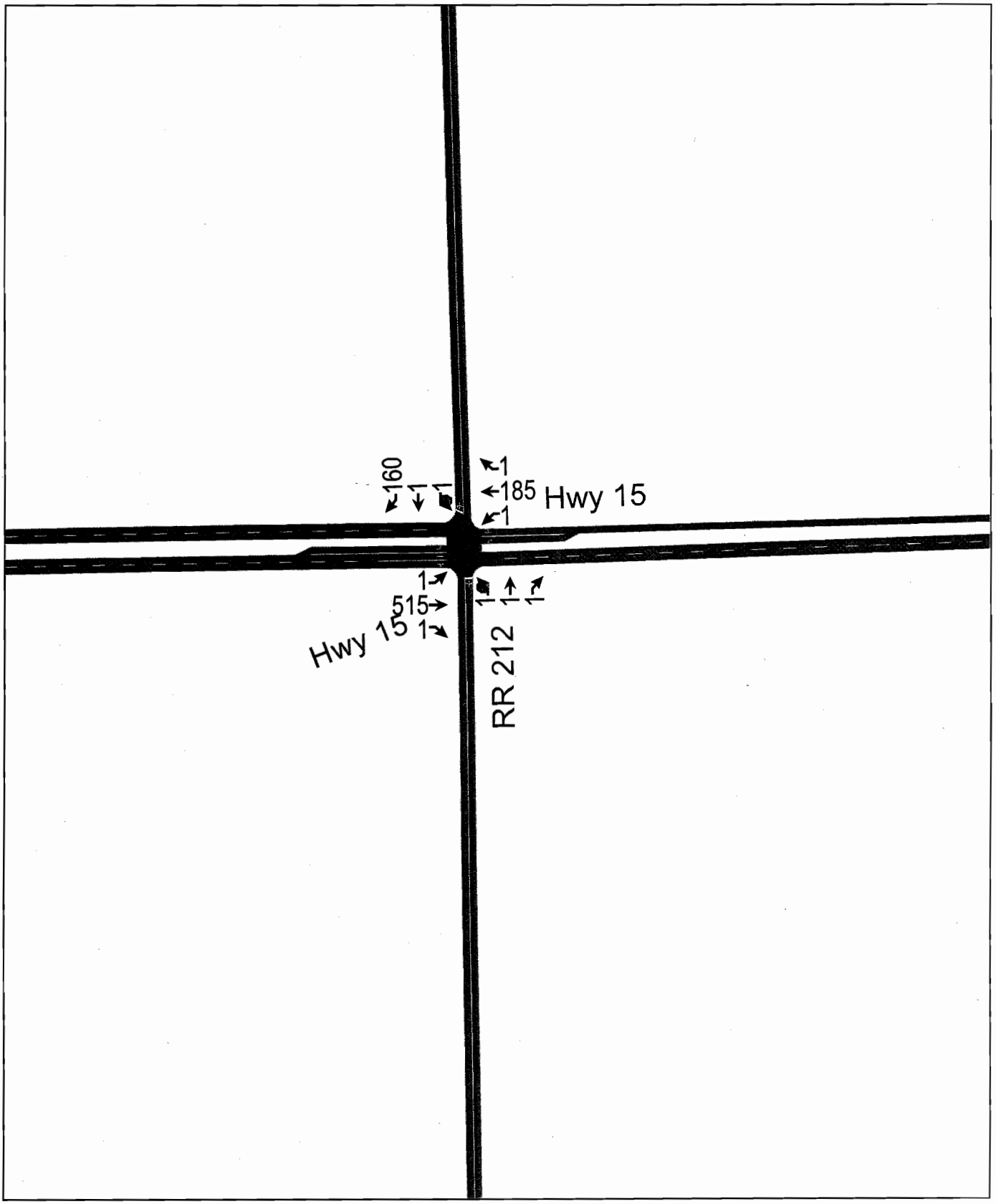
PM Peak Hour Build-Out - Turnaround
Stantec Consulting Ltd.

Map - C:\Documents and Settings\tgolly\Desktop\Heartlands\PM Full Build Turnaround.syn
Volumes 3/13/2007



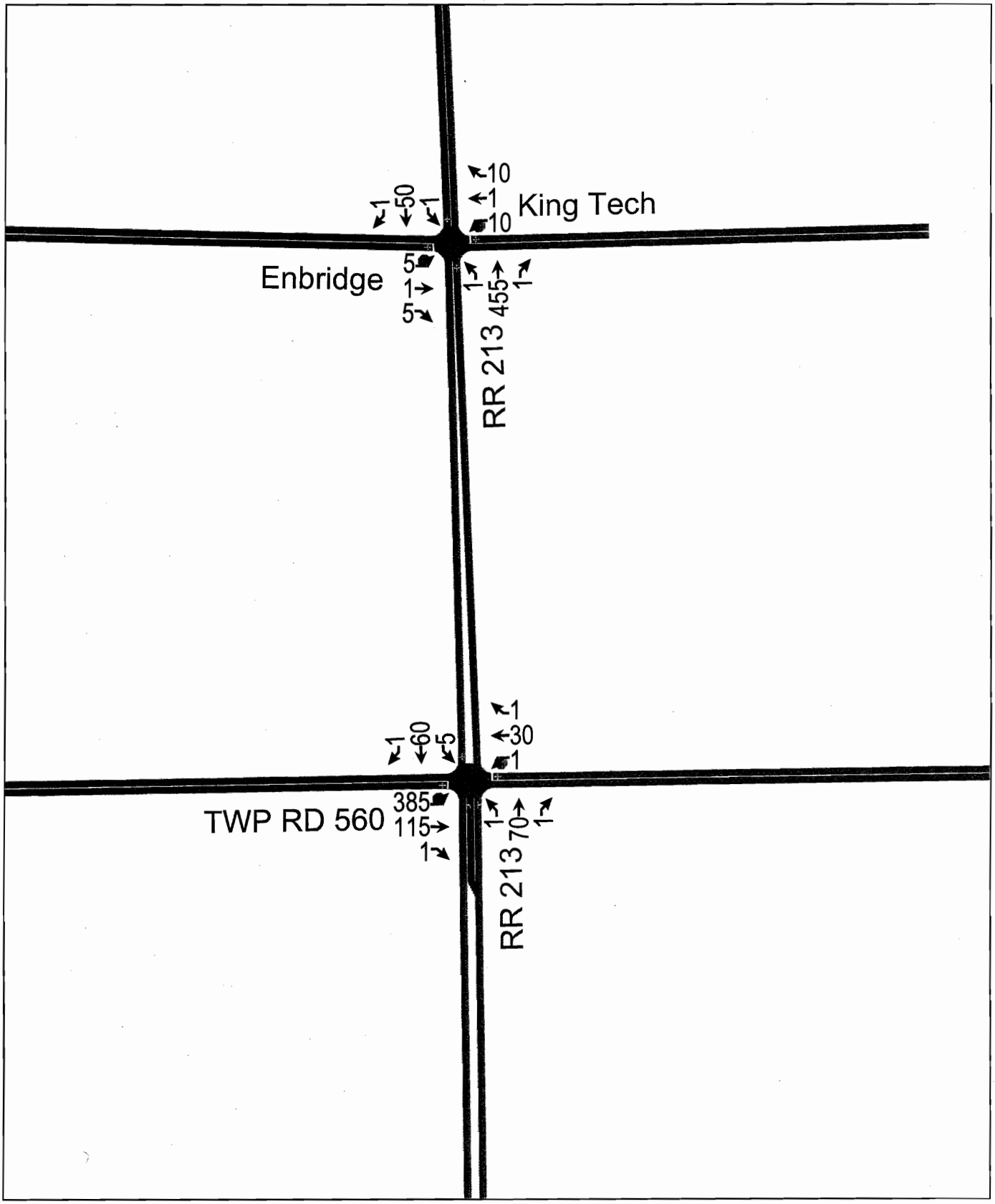
PM Peak Hour Build-Out - Turnaround
Stantec Consulting Ltd.

Map - C:\Documents and Settings\tgolly\Desktop\Heartlands\PM Full Build Turnaround.syn
Volumes 3/13/2007



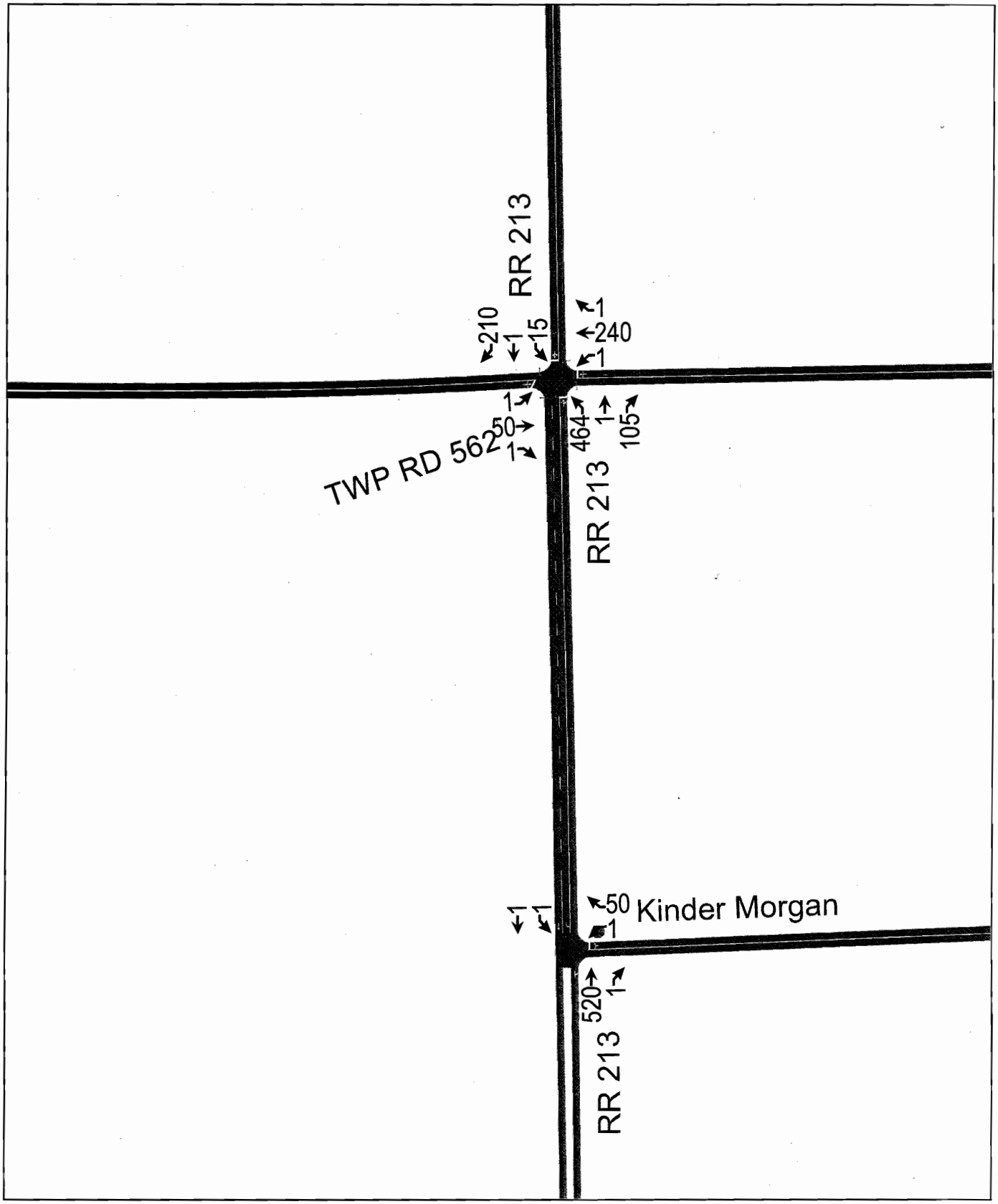
PM Peak Hour Build-Out - Turnaround
Stantec Consulting Ltd.

Map - C:\Documents and Settings\tgolly\Desktop\Heartlands\PM Full Build Turnaround.syn
Volumes 3/13/2007



PM Peak Hour Build-Out - Turnaround
Stantec Consulting Ltd.

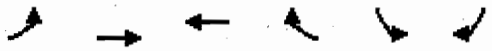
Map - C:\Documents and Settings\tgolly\Desktop\Heartlands\PM Full Build Turnaround.syn
Volumes 3/13/2007



PM Peak Hour Build-Out - Turnaround
Stantec Consulting Ltd.

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	1	1	15	75	40	1610	70	430	15	15	330	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	40.0		0.0	40.0		200.0	220.0		40.0	40.0		40.0
Storage Lanes	1		0	2		2	2		2	2		2
Taper Length (m)	7.5		7.5	7.5		7.5	7.5		7.5	7.5		7.5
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		48			48			100			100	
Link Distance (m)		768.6			143.8			2155.7			1778.4	
Travel Time (s)		57.6			10.8			77.6			64.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Act Effct Green (s)	28.0	28.0		28.0	28.0	43.0	11.0	24.0	23.0	9.0	9.0	8.0
Actuated g/C Ratio	0.47	0.47		0.47	0.47	0.72	0.18	0.40	0.38	0.15	0.15	0.13
v/c Ratio	0.00	0.01		0.08	0.06	1.09	0.15	0.41	0.02	0.08	0.84	0.00
Control Delay	9.0	0.0		9.2	9.1	54.8	19.7	12.0	4.7	23.1	42.3	19.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.0	0.0		9.2	9.1	54.8	19.7	12.0	4.7	23.1	42.3	19.0
LOS	A	A		A	A	D	B	B	A	C	D	B
Approach Delay		0.4			51.7			12.8			41.4	
Approach LOS		A			D			B			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.09			
Intersection Signal Delay: 42.3		Intersection LOS: D	
Intersection Capacity Utilization 78.8%		ICU Level of Service D	
Analysis Period (min) 15			

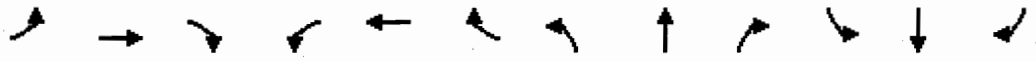


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	1	165	1	1	1540	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	40.0			200.0	200.0	0.0
Storage Lanes	1			2	2	1
Taper Length (m)	7.5			7.5	7.5	7.5
Right Turn on Red				Yes		Yes
Link Speed (k/h)		48	48		48	
Link Distance (m)		318.7	376.0		250.8	
Travel Time (s)		23.9	28.2		18.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	9.0	9.0	9.0	9.0	43.0	43.0
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.72	0.72
v/c Ratio	0.00	0.80	0.00	0.00	0.85	0.00
Control Delay	22.0	49.1	6.0	4.0	11.0	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	49.1	6.0	4.0	11.0	2.0
LOS	C	D	A	A	B	A
Approach Delay		49.0	5.0		11.0	
Approach LOS		D	A		B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 56 (93%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 14.6		Intersection LOS: B	
Intersection Capacity Utilization 59.3%		ICU Level of Service B	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
3: Hwy 15 & RR 212

3/12/2007



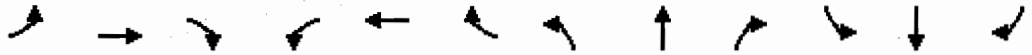
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	515	1	1	185	1	1	1	1	1	1	160
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	1	687	1	1	247	1	1	1	1	1	1	213
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	248			688			1153	941	344	598	941	247
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	248			688			1153	941	344	598	941	247
tC, single (s)	4.2			4.2			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.4	3.6	4.0	3.4
p0 queue free %	100			100			99	99	100	100	99	71
cM capacity (veh/h)	1293			882			105	256	643	377	256	744

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	1	458	230	1	248	4	216
Volume Left	1	0	0	1	0	1	1
Volume Right	0	0	1	0	1	1	213
cSH	1293	1700	1700	882	1700	201	731
Volume to Capacity	0.00	0.27	0.14	0.00	0.15	0.02	0.30
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.5	9.4
Control Delay (s)	7.8	0.0	0.0	9.1	0.0	23.3	12.0
Lane LOS	A			A		C	B
Approach Delay (s)	0.0			0.0		23.3	12.0
Approach LOS						C	B

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
14: TWP RD 562 & RR 213

3/12/2007



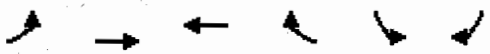
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	50	1	1	240	1	464	1	105	15	1	210
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	1	67	1	1	320	1	619	1	140	20	1	280
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	321			68			673	393	67	533	394	321
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	321			68			673	393	67	533	394	321
tC, single (s)	4.1			4.1			7.2	6.6	6.2	7.2	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			0	100	86	95	100	61
cM capacity (veh/h)	1222			1514			221	537	989	387	537	713

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1
Volume Total	68	1	323	619	141	301
Volume Left	1	0	1	619	0	20
Volume Right	0	1	1	0	140	280
cSH	1222	1700	1514	221	981	675
Volume to Capacity	0.00	0.00	0.00	2.80	0.14	0.45
Queue Length 95th (m)	0.0	0.0	0.0	410.6	3.8	17.5
Control Delay (s)	0.2	0.0	0.0	856.9	9.3	14.6
Lane LOS	A		A	F	A	B
Approach Delay (s)	0.2		0.0	699.3		14.6
Approach LOS				F		B

Intersection Summary			
Average Delay	368.7		
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Volume (vph)	1	915	50	515	1940	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	40.0	0.0	120.0			40.0
Storage Lanes	2	2	2			2
Taper Length (m)	7.5	7.5	7.5			7.5
Right Turn on Red		Yes				Yes
Link Speed (k/h)	60			100	100	
Link Distance (m)	4995.7			599.1	2155.7	
Travel Time (s)	299.7			21.6	77.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	6.0	60.0	4.0	46.0	41.2	41.2
Actuated g/C Ratio	0.10	1.00	0.07	0.77	0.69	0.69
v/c Ratio	0.00	0.45	0.30	0.26	1.08	0.00
Control Delay	24.0	0.5	30.3	2.3	52.1	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.0	0.5	30.3	2.3	52.1	2.0
LOS	C	A	C	A	D	A
Approach Delay	0.5			4.8	52.0	
Approach LOS	A			A	D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 6 (10%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.08			
Intersection Signal Delay: 30.5		Intersection LOS: C	
Intersection Capacity Utilization 63.6%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	1	70	20	1	1	1705
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	200.0			0.0	40.0	0.0
Storage Lanes	2			0	1	2
Taper Length (m)	7.5			7.5	7.5	7.5
Right Turn on Red				Yes		Yes
Link Speed (k/h)		48	48		48	
Link Distance (m)		72.9	181.5		376.0	
Travel Time (s)		5.5	13.6		28.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Act Effct Green (s)	11.0	15.0	6.0		37.0	54.4
Actuated g/C Ratio	0.18	0.25	0.10		0.62	0.91
v/c Ratio	0.00	0.11	0.08		0.00	0.87
Control Delay	7.0	0.7	12.0		2.0	7.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	7.0	0.7	12.0		2.0	7.0
LOS	A	A	B		A	A
Approach Delay		0.8	12.0		7.0	
Approach LOS		A	B		A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 29 (48%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 6.8		Intersection LOS: A	
Intersection Capacity Utilization 69.6%		ICU Level of Service C	
Analysis Period (min) 15			