Strathcona Area Industrial Heartland Transportation Study Update November 2007

Final Report

Prepared for: Strathcona County

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19 November 2007

Strathcona Area Industrial Heartland Transportation Study Update November 2007

Table of Contents

1.0 Introduction

1.1 STUDY AREA

The portion of the Heartland Industrial Area located within Strathcona County is illustrated in Figure 1.1 and is bounded as follows:

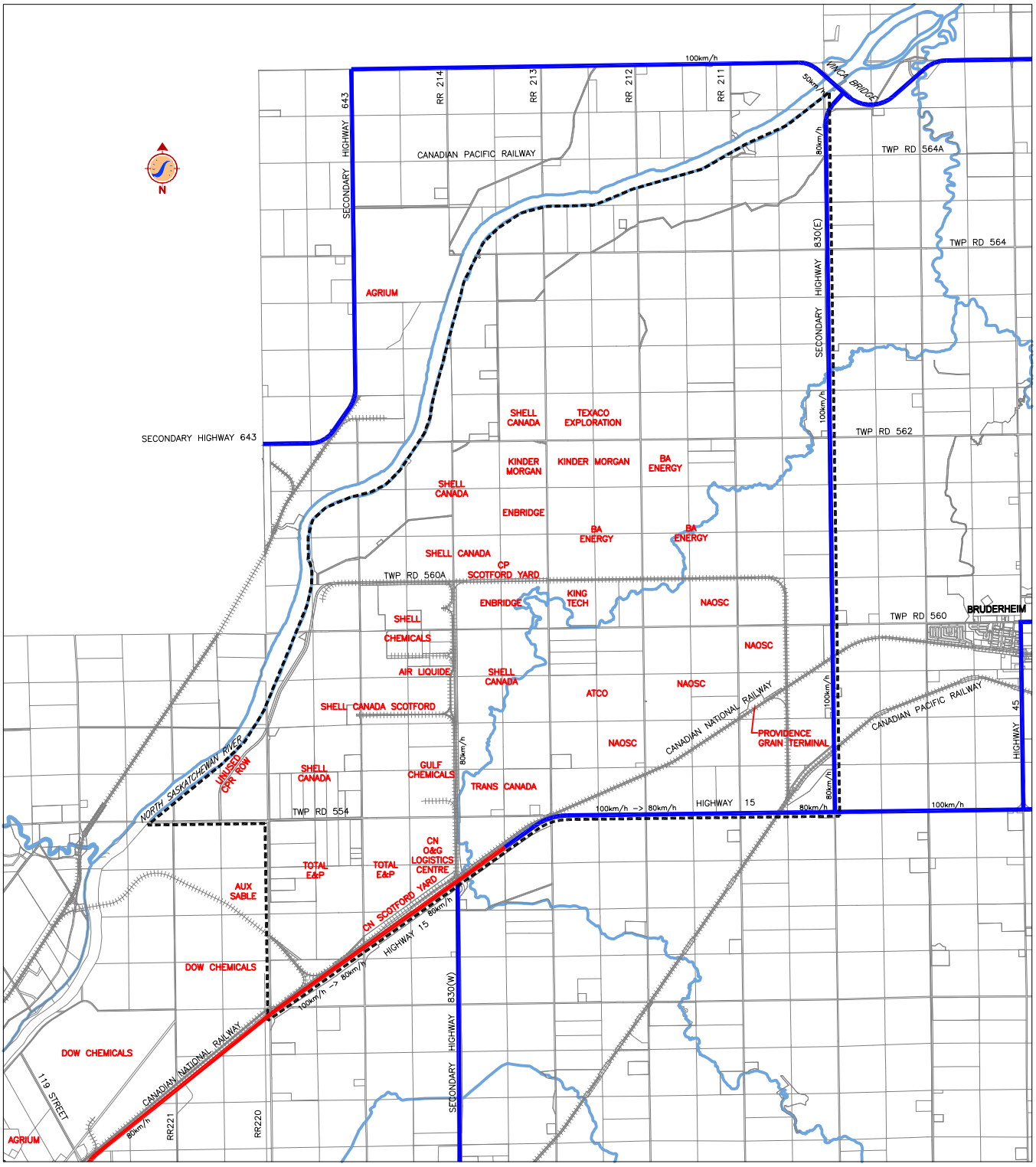
- On the north by the North Saskatchewan River and Highway 45
- On the west by RR 220, which is the east boundary of the City of Fort Saskatchewan
- On the south by Highway 15
- On the east by the east leg of Secondary Highway 830

Within this area there are approximately 36 sections of land (approximately 23,000 acres). Approximately 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.

The roadway network in the area is characterized by relatively narrow (approximately 8 metres wide) roads, which for the most part follow the original township grid system. The exceptions are:

- RR 214 which has been upgraded to a four lane divided cross-section within a 50 to 55 metres wide right-of-way from Highway 15 to Twp Rd 560
- Twp Rd 560A west of RR 214 to the North Saskatchewan River, which has been upgraded to a 10 metres wide two lane roadway in a 30 metres right-of-way
- RR 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.

Access to the Study Area is from Highway 15 on the south and Secondary Highway 830 on the east. While access is provided via intersections spaced one mile apart on Highway 15 and intersections spaced approximately 2 miles apart on Secondary Highway 830, the primary access point is the intersection on Highway 15 at RR 214. This intersection, until recently, operated with a single eastbound to northbound left turn lane and was not signalized. The configuration appeared to provide adequate capacity for typical daily operations related traffic.



Legend

- Study Area
- Provincial Highway (Four Lane)
- Provincial Highway (Two Lane)
- Railway

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Strathcona Area Industrial Heartland
Transportation Study Update

Figure 1.1
Study Area and
Existing Conditions

To accommodate the significant turn movements that are now occurring at this intersection due to construction related activities in the area, the Highway 15 / RR 214 intersection has been upgraded to include dual eastbound to northbound left turn lanes and is signalized. This signalization is considered as an interim measure, as Alberta Infrastructure and Transportation is not supportive of the installation of permanent traffic signals along Highway 15.

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 SH 830. 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 expects to construct a rail line on this right-of-way to support future industrial development in this area. RR 220 crosses this right-of-way in three places, and CPR have indicated that they would not be adverse to a realignment of the road and rail rights-of-way in order to minimize the number of road-rail crossings that will be required when the rail line is constructed in this area.

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 SH 830 just south of Twp Rd 560. From the west limit of the Study Area to near RR 213, the CN line runs adjacent and parallel to Highway 15.

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

1.2 STUDY OBJECTIVES

While the road network is currently considered adequate to support the existing land uses, two additional major industrial facilities, the Shell Upgrader Expansion Project and the BA Energy Heartland Upgrader Project, are now under construction. These projects, along with additional major and ancillary developments being proposed, will dramatically change the nature of the area and create the need for development of a master plan to accommodate the long-term traffic needs in the area. To address this need, Strathcona County retained Stantec Consulting Ltd. to undertake a transportation study in the Fall of 2007.

The specific objectives of the study were to:

- Develop a conceptual major internal road network that will provide the backbone of the transportation system for the Study Area.

- 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.
- Identify order of magnitude construction costs for the road network.
- Identify potential funding formulas for the recommended road network improvements.
- Make other public sector stakeholders, such as neighbouring municipalities, aware of the study and obtain their input into the study.

The final report for the Transportation Study was published in March, 2007. Subsequent to the report being published, a number of industry stakeholders identified a number of new developments that potentially affected the recommendations of the Transportation Study. To address these changes and keep the Transportation Study as relevant as possible within its constantly evolving context, this Transportation Study Update has been prepared. While much of the original Transportation Study remains relevant, this Transportation Study Update does involve the addition of new data and makes revisions to the recommended plan based on this data thus superseding the recommendations of the original Transportation Study.

2.0 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 Operations and Contract Workers employed at the existing facilities along RR 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 Chemicals	120	30	15
Shell Refinery	75	40	20
Shell Upgrader	150	75	35
Gulf Chemicals	35	7	7
Air Liquide	20	3	3
Total	**400**	**155**	**80**

Alberta Infrastructure and Transportation (AIT) 2005 traffic data indicates that the Average Annual Daily Traffic on Highway 15 in the vicinity of RR 214 is approximately 7,200 vehicles per day (10% trucks) and on Secondary Highway 830 north of Highway 15 it is approximately 1,400 vehicles per day (25% trucks). Growth in traffic volumes in recent years has been approximately 3% per year.

For RR 214, the Average Annual Daily Traffic estimated by AIT is approximately 1,800 vehicles per day (7% trucks).

For the AM Peak Hour, AIT estimates the traffic volume is approximately 460 (440 northbound and 20 southbound) with 2% trucks. Over 90% of the inbound and outbound traffic is coming from or going to the west. The AIT traffic data is contained in Appendix A.

Allowing for typical variations in daily traffic volumes and the estimated nature of the AIT inbound AM Peak Hour traffic volume (approximately 440), there is a close correlation with the number of Day Shift workers. Accordingly, the number of Day Shift Workers is assumed to be a reasonable estimate of the typical peak hour traffic volume demands on the road network.

2.2 PROJECTED CONDITIONS

2.2.1 Proposed Facilities

Currently, Shell is undertaking an expansion to their upgrader and BA Energy is constructing, on a three-phased basis, an upgrader. In addition to these current projects, there a number of smaller related projects such as the Enbridge Stonefell Pipeline Terminal and the King Tech Maple Resources Plant, which are likely to proceed to construction in the near future. Other major projects that are expected to move through development approvals in the next year or so are facilities proposed by North American Oil Sands Corporation (NAOSC) and Kinder Morgan. All of these facilities are assumed to be operational by 2012.

Beyond the projects currently envisaged, but within a 10 or so year period, four more expansions to the Shell Upgrader along with other ancillary developments and a Total E&P facility as well as some supporting facilities by companies such as TransCanada Pipelines and ATCO, are likely. All of these facilities are assumed to be operational by 2017. However, delays in start-up dates are a possibility given the lengthy regulatory process these facilities must progress through before they construction can commence on them.

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 17:00 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 (8:00 to 17:00)	Comments
Shell Chemicals	120	Existing
Shell Refinery	75	Existing
Shell Upgrader	150	Existing
Gulf Chemicals	35	Existing
Air Liquide	20	Existing
Subtotal – Existing (2007)	**400**	
Shell Upgrader Expansion	100	Under Construction
BA Energy Heartland Upgrader	150	Under Construction
BA Energy Heartland Upgrader Expansion	150	Proposed
North American Oil Sands Upgrader	150	Proposed
King Tech Maple Resources	20	Proposed
Kinder Morgan	50	Proposed
CN Oil and Gas Logistics Yard	15	Proposed
Enbridge	15	Proposed
Subtotal – Additional by 2012	**650**	
Shell Upgrader Expansion 2 and 3	250	Conceptual
Shell Upgrader Expansion 4 and 5	250	Conceptual
Shell – Other Facilities	150	Conceptual
BA Energy Heartland Upgrader Expansion 2 and 3	300	Conceptual
North American Oil Sands Upgrader Expansion	200	Conceptual
TransCanada Pipelines	25	Conceptual
Total E&P	150	Conceptual
Total E&P Expansion	150	Conceptual
Dow and Aux Sable	200	Conceptual
ATCO	25	Conceptual
Subtotal – Additional by 2017	**1,700**	
Subtotal – Additional beyond 2017 **(**Various plant expansions and fill-in areas– 500) (Facilities north of TWP Rd 262 – 500)	**1,000**	Conceptual
Long-Term Total – Existing and Additional	**3,750**	

Based on the estimates in Table 2.2, daily operations traffic volume in the area will likely triple in the next 5 years and increase by a factor of 6 in the next 10 years.

2.2.3 Turnaround Traffic

Plant shutdowns or turnarounds for regularly scheduled maintenance occur frequently (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 Current 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

Construction of existing and 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. For example, 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.

While none of the proposed projects envisage workforces of the size of that required for the Shell Upgrader in 2002, substantial workforces for proposed construction activities will be required. Table 2.4 summarizes the estimated peak workforce at various projects already or expected to be under construction in the next year or two.

Table 2.4
Projected Peak Construction Work Forces

Site	Peak Construction Workers
Shell Upgrader Expansion	6,400
BA Energy Heartland Upgrader	1,200
North American Oil Sands Upgrader	3,000
King Tech Maple Resources	125
Kinder Morgan	125
Enbridge	50

Approximately 70% of these workers would be expected to be working on the dayshift and overlapping with the travel demands of the Day Shift Operations Workers. In addition, unlike major turnarounds, construction activities can be expected to overlap with each other and will also overlap with turnaround activities. Current estimates are that between 4,000 and 10,000 construction workers will be working on various projects in the Study Area through the next 10 years. As such, the peak hour traffic demands associated with construction activity for major projects (3,000 to 7,000 peak hour trips) can easily overshadow the daily operations and turnaround traffic demands.

2.2.5 Rail Traffic

Traffic on CN Rail's Vegreville line averages 10 trains per day. Four of the daily trains are scheduled and vary in length from 100 to 200+ cars and can block crossings on the Range Roads for up to ten minutes at a time. A smaller train is on the line in the evenings and crosses each crossing twice (inbound and outbound). While these trains are scheduled, their actual times can vary. In addition to the scheduled trains, up to four unscheduled trains can be on the line each day. This is likely to increase as CN Rail's Scotford Yard is expected to see increased traffic in the coming years.

CN Rail's Scotford Yard is located in the vicinity of RR 214. For the most part shunting operations have minimal impact on the RR 214 crossing as they are done in off-peak periods and are of relatively short duration. However, they can have a significant impact on the RR 215 crossing although minimal traffic uses RR 215. In the short-term, CN Rail is developing their Oil and Gas Logistics Centre adjacent to the Scotford Yard. In the next 5 to 10 years, CN Rail is considering doubling the capacity of the Scotford Yard. This increased capacity is most easily be provided by lengthening of the existing yard to the east across RR 214. There are limited options for lengthening the yard to the west due to the presence of a Y track to the west of RR 215 or by widening to the north due to existing pipelines.

Existing traffic on CPR's Scotford Subdivision east of RR 212 averages 4 trains per day. New facilities under construction and planned will increase the number of trains on this line. Rail access to the BA Energy facility will be via a spur line to the north in the vicinity of RR 212. This spur line is planned for construction in 2007

CPR plans to develop a rail to truck transload facility, the Strathcona Logistics Centre, in the area between RR 211 and SH 830 (E) and north of Twp Rd 560. The first phase of this facility is expected to be constructed in 2008. 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. Access to the facility is expected to be off SH 830 (E). The location and configuration of the desired access off SH 830 (E) will need to be defined in consultation with Alberta Infrastructure and Transportation.

North of Twp Rd 562, CPR currently plans to construct the Astotin Yard, mainly for switching, staging and storing rail cars. More recently, CPR has also proposed to extend their rail line north of the proposed Astotin Yard 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 the Heartland Industrial Area.

In addition, CPR has an existing rail yard in the northwest quadrant of the intersection of Hwy 15 and SH 830 (E) that is currently undergoing a minor expansion. This expansion will require improved road access to accommodate an increase in truck movements to/from SH 830 (E).

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

The connecting line along RR 214 between the CN Rail 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.

3.0 Stakeholder Concerns, Constraints and Opportunities

Existing constraints and stakeholder concerns are significant factors in developing a transportation plan for the Heartland Industrial Area.

Stakeholders contacted include:

- Alberta Infrastructure and Transportation
- AltaLink
- ATCO
- BA Energy
- City of Fort Saskatchewan
- CNR
- County of Lamont
- Canadian Pacific
- Enbridge
- Gulf Chemicals
- Kinder Morgan
- North American Oil Sands
- Providence Grain Terminal
- Shell Canada
- Sturgeon County
- Town of Bruderheim
- Total E&P

Their issues are summarized as follows:

Highway 15

- Alberta Infrastructure and Transportation has no plans to twin Highway 15 east of the current limits of the twinned section that ends east of RR 214, although communities east of the area, such as Bruderheim and Lamont, desire this.

- Traffic volumes on Highway 15 in peak hours during turnarounds and construction periods cause large delays at signals through Fort Saskatchewan. Maintaining reasonable traffic flows, while not promoting high speeds through Fort Saskatchewan is desired.

- The City of Fort Saskatchewan and industry are supportive of constructing a by-pass of Fort Saskatchewan.

- Alberta Infrastructure and Transportation has no plans to construct a by-pass of Fort Saskatchewan, although it would not oppose plans by others to do so.

- Strathcona County has no plans to build and there has been little support for a by-pass of Fort Saskatchewan within the County's boundaries.

- In general, Alberta Infrastructure and Transportation is not in favor 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 past, restricted access to the area (RR 214 is 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 RR 214 during peak hours.

- 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

New Heartland Bridge

- 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. Protecting for its potential development at some point in the future is generally supported.

- Current development plans restrict possible options for approaches to the bridge and investing potentially available funding in upgrading the Highway 38/SH830 and Highway 15 corridors to better accommodate high/wide loads is considered by some to have more merit.

Range Road 220

- Provides access to the back of the existing plants. Utility and possibly top of bank geotechnical constraints may limit improvement options at some points, such as at Twp Rd 560A.

- Highway 15 has a four lane divided cross-section at the intersection with RR 220 and developing a major intersection is feasible with minimal cost.

- Existing rail operations across the south end of RR 220 can interfere with traffic flows.

- Construction of a rail spur along the currently unused CPR right-of-way along the top of the bank of the North Saskatchewan River will create more road-rail conflicts. Realignment of the CPR right-of-way to minimize these conflicts is considered feasible.

Range Road 215

- The crossing of RR 215 was previously relocated to reduce impacts of train shunting operations in CN Rail's Scotford Yard. These impacts are still considered significant.

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 RR 214 currently impact traffic flows several times per day.

- CN Rail is considering a major expansion to their Scotford Yard, which would likely extend up to 8 tracks to east of the RR 214 crossing. This would have a significant impact on traffic operations on RR 214.

- Shell will be requesting that Strathcona County close RR 214 north of Twp Rd 560 and Twp Rd 560A west of RR 214. This precludes extension of these roads as part of an expanded road network in the east half of the Study Area.

- Access to North American Oil Sands upgrader is conceived to be from Twp Rd 560 with access either being from SH 830 (E) or RR 214.

Range Road 213

- The RR 213 intersection on Highway 15 and rail crossing is considered less than desirable due to the road and rail geometry in the area.
- The proposal to provide a grade separated crossing on RR 213 of the CP Rail Yard adjacent to Twp Rd 560 provides an opportunity to develop a major free-flow spine road.

Range Road 212

- BA Energy proposes to request that Strathcona County close the RR 212 right-of-way north of Twp Rd 560A.

Range Road 211

- Access to Providence Grain Terminals, located north of the CNR line and south of Twp Rd 560, needs to be maintained from RR 211.
- Preserving the ability to provide emergency access from Highway 15 is desirable due to the location of the Providence Grain Terminal and some residences and a lack of direct alternative access routes.
- Providence Grain Terminal has expansion plans for their site and views the access off Highway 15 at RR 211 as important to the viability of their business, as they currently attract 4,000 truck trips per year through this intersection and expect to increase this by 25% after expansion.

Township Road 560

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

4.0 Recommended Transportation Network

4.1 ROADWAY NETWORK

4.1.1 Philosophy

In developing the Recommended Plan the following philosophical points have been adopted:

- The network must be robust enough to concurrently accommodate the typical peak hour demands of Operations related traffic (3,750 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 will be utilized for construction projects such that peak hour and peak direction traffic volumes in the Study Area do not exceed a volume defined by the available roadway capacity at that point in time. As part of these measures, it is recommended that major construction projects

    - 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.

    - In cases where a bussing strategy is not feasible, minimize on-site parking to encourage carpooling.

    - 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.

    - To minimize impacts on the City of Fort Saskatchewan, it is suggested that use of Highway 15 through the City of Fort Saskatchewan be avoided for both

bussing and general truck delivery strategies. Alternative regional access routes to the Study Area, such as SH 830, should be able to provide appropriate access with fewer impacts.

- Significant investments have been made in upgrading RR 214 and the intersection of RR 214 with Highway 15. It would be desirable to maintain RR 214 and the intersection of RR 214 and Highway 15 as a key element of the overall road network. This is especially important as the intersection of RR 213 and Highway 15 is not considered to be a desirable location to provide a major intersection. However, Shell has recently announced plans to develop multiple facilities along the east side of RR 214. This has led Shell to request development of alternate routes to RR 214 so that RR 214 can function primarily as an access road to their developments.

- Spacing of intersections along Highway 15, currently 1 mile, should desirably be 2 miles. Given the previous point regarding continued use of RR 214 and the undesirability of an intersection at RR 213 and Highway 15, this would suggest that existing intersections at RR 215, RR 213 and RR 211 should, if possible, be eliminated.

- While interchanges and grade-separated movements at intersections along Highway 15 will eventually be required, they are costly and are to be considered only when other improvements cannot achieve the desired goals.

- The ability to construct the proposed Heartland Bridge should be protected based on a possible long-term need for it. However, unless other improvements cannot achieve the desired goals, it should not form part of the recommended transportation plan, as there is little support for it.

- Proposed closures of portions of RR 214 and RR 212 north of Twp Rd 560 and Twp Rd 560A west of RR 214 to accommodate proposed upgraders should be respected. By default, this will result in RR 213 north of Twp Rd 560 being a major element in any roadway network plan. Providing a direct and continuous connection from the RR 214 and Highway 15 intersection to RR 213 north of Twp Rd 560 will provide a central spine road for the area and is considered desirable.

- The number of at-grade rail crossings should be minimized due to their potential impact on both vehicular and rail operations.

4.1.2 Assessment

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 SH 830 (W). The remaining traffic is assumed to come from the east (10%) and north (5%) via Highway 45 and SH 830 (E).

The Synchro 7 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 Synchro 7 model software outputs for the key scenario results for key intersections are contained in Appendix B. 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 RR 220 from Highway 15 to Twp Rd 562, is required for interim and long-term development of the Study Area.
- Development of interchanges at the Highway 15 / RR 214 and Highway 15 / RR 220 intersections are 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.
- Capacity adequate to service proposed developments in the east half of the Study Area, such as the North American Oil Sands upgrader, can be easily accommodated by provision of a signalized intersection of Highway 15 at RR 212. Besides providing adequate service to the east half of the Study Area, it provides additional capacity for turn around traffic should the interchanges at the RR 220 and RR 214 intersections become overly congested.
- Twinning of Highway 15 east of its current limits of twinned cross-section to the east of RR 214 does not appear to be warranted based on traffic volumes. However, provision of a signalized intersection at RR 212 will require twinning to east of RR 212.
- Maintaining an intersection on Highway 15 at RR 211 is required to address Providence Grain Terminal's current and projected increase in truck traffic off Highway 15. It is recommended that an eastbound left turn and westbound deceleration and acceleration lanes be provided to address truck turning movements at this intersection. It should be noted that elimination of the RR 211 intersection on Highway 15 would likely be necessary when Highway 15 is twinned to east of RR 212.

Figure 4.1 illustrates the recommended long-term roadway network with Figure 4.1a illustrating the Study Area at a larger scale. Key features are as follows:

- A grade separation at the intersection of Highway 15 at RR 220 after initial development of major signalized intersection similar in configuration to the intersection at RR 214.

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

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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

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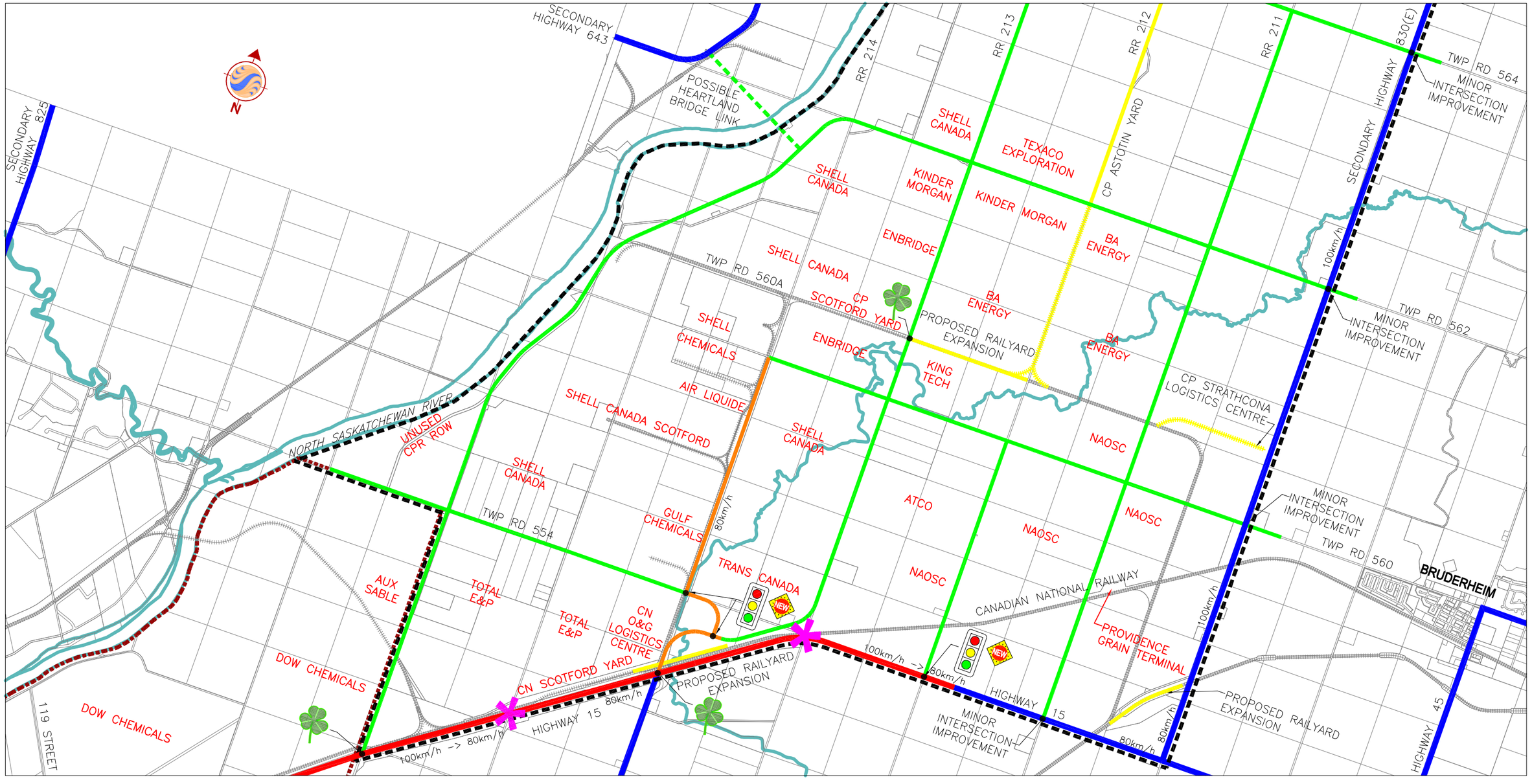
Figure 4.1
Overall Ultimate Transportation Plan



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

Stantec

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

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Figure 4.1a
Study Area
Ultimate Transportation Plan

- A grade separation at the intersection of Highway 15 near the current intersection at RR 214. This interchange should be constructed either when traffic demands at this intersection warrant it or CN Rail expands its Scotford Yard to the east across RR 214.

- A signalized intersection upgrade at the intersection of RR 212 and Highway 15.

- Twinning of Highway 15 to east of RR 212 to accommodate the signalized intersection of Highway 15 at RR 212.

- A minor intersection upgrade (left turn lanes added) at the intersection of RR 211 and Highway 15 to address existing and projected increases to truck turning volumes to the Providence Grain Terminal.

- A two lane roadway within a 40 metres wide right-of-way connecting Highway 15 at RR 220 to Twp Rd 562. Some potential utility, rail line and top of bank constraints near Twp Rd 560A need to be addressed in order to desirably eliminate a crossing of the railway spur line into the Shell Chemical facility. The proposed alignment of this road north of Twp Rd 560A and up to Twp Rd 562 was placed in the river valley below the river bank to address a request by Shell to minimize impacts on their developable lands in the area.

- Development of a four lane divided roadway with a continuous curvilinear alignment from Highway 15 at a location to be determined between RR 214 and RR 213 to an upgraded RR 213. Minimum curve radii of 400 metres on this roadway are recommended in order to maintain the desired design speed of 90 km/h. Intersections on curves of this radius are not recommended. The intersection of RR 213 and RR 214 will require signalization and dual left turn and right turn lanes to accommodate the projected volumes of traffic accessing existing and proposed developments along RR 214.

- Development of both the CN Oil and Gas Logistics centre and the Total E&P development will likely warrant the signalization of the RR 214 and Twp Rd 554 intersection.

- RR 213 from north of the new connection to RR 214 and Twp Rd 564 is recommended as a two-lane roadway within a 40 metres wide right-of-way, except where intersection treatments are warranted. Current plans suggest that access requirements to the BA Energy Upgrader and the major intersection at Twp Rd 562 will warrant intersection treatments. The close proximity of these intersections warrants use of a 50 metres wide right-of-way through this entire section.

- RR 211 and 212 from Highway 15 to Twp Rd 562 are recommended as two-lane roadways within 40 metres wide rights-of-way. To accommodate existing and projected

Providence Grain Terminal truck traffic and traffic generated by the North American Oil Sands upgrader facility.

- 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 RR 213, North American Oil Sands upgrader main access, Secondary Highway 830)

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

- Other roadways such as Twp Rd 562, Twp Rd 564 and RRs 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.

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. 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 will need to be widened to six lanes. In addition, two lane entrance/exit ramps may be required at the RR 220 and RR 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 will be required. As a minimum, it is recommended that the traffic signals through the Study Area as well as through the City of Fort Saskatchewan be controlled through a centralized traffic control system. These control systems can be fully responsive to changes in traffic patterns in terms of constantly adjusting signal timings. They can also allow for monitoring through cameras and manual overrides of timings for special events. Optimizing the proposed traffic signal system will minimize delays and will 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.

4.1.3 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 RR 214.

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 right-of-ways 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.

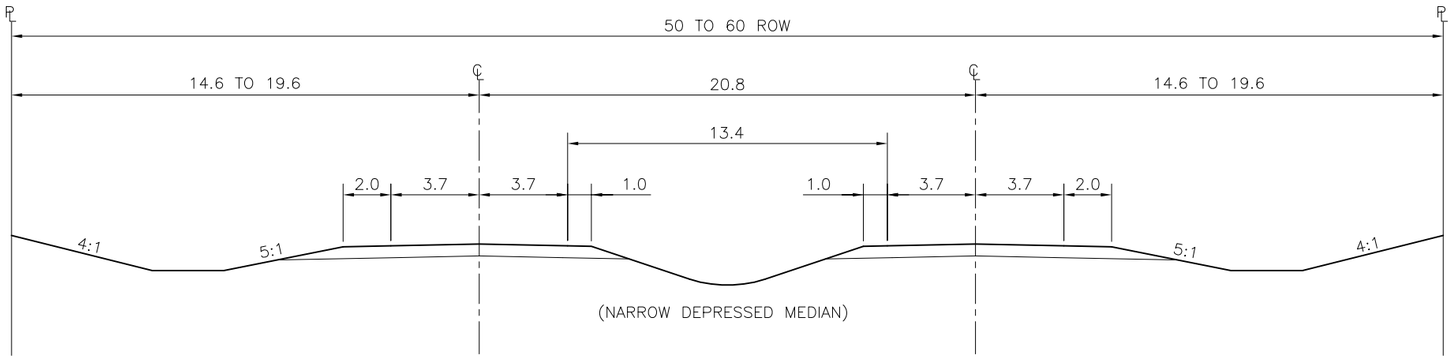
The basic cross-section recommended for developing the road network in the Study Area is a 10 metres wide roadway within a 40 metres wide right-of-way.

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:

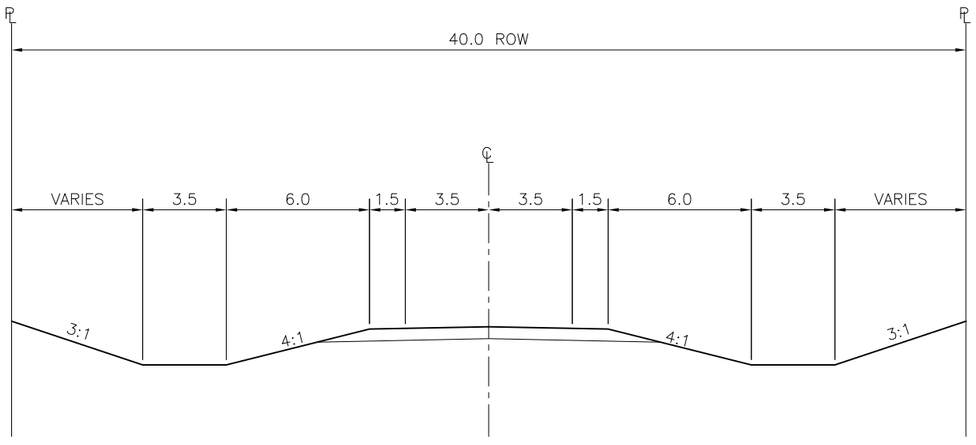
- The extent of the road widening required by the intersection.
- The relatively close proximity of two intersections suggesting one consistent right-of-way width for that section.
- Any desire to maintain adequate road right-of-way width to accommodate future undefined major access needs.

The four-lane divided cross-section within a 60 metres wide right-of-way 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 RR 214 and its realigned connection to Highway 15.

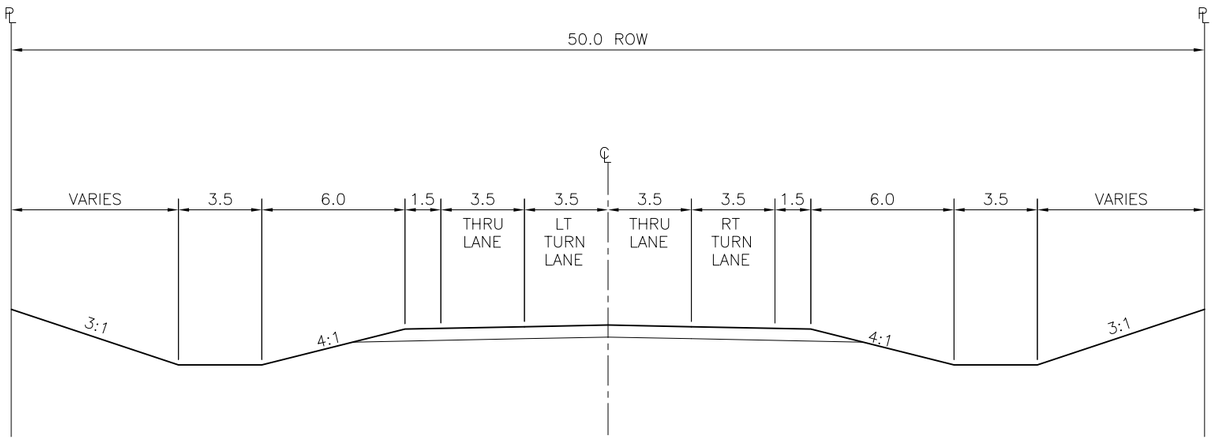
Currently, Highway 15 through the Study Area has a posted speed of 100km/h, except through the signalized RR 214 intersection and stop sign controlled SH 830 (E) intersection, which warrant a reduction in the posted speed to 80 km/h. With the recommendation being to install additional traffic signals on Highway 15 at various stages of development, additional speed reduction zones will be warranted through these signalized intersections. Rather than having multiple speed zones on Highway 15 through the Study Area, it is recommended that the speed limit for Highway 15 through the entire Study Area (RR 220 to SH 830 (E)) be 80 km/h. This is consistent with the speed limit immediately to the west through the City of Fort Saskatchewan.



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 4.2
Typical Cross–Sections

4.1.4 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 Type 1 roadways and at the primary access points to major traffic generating facilities.

For typical Daily Operations traffic volumes, except where noted in the Recommended Plan, Type 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 Type 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, signalization or police control of these intersections during the peak periods of the turnaround will 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. Figures 4.3 and 4.4 illustrate the recommended intersection treatments. Variations in these intersection treatments may be required to accommodate specific site constraints.

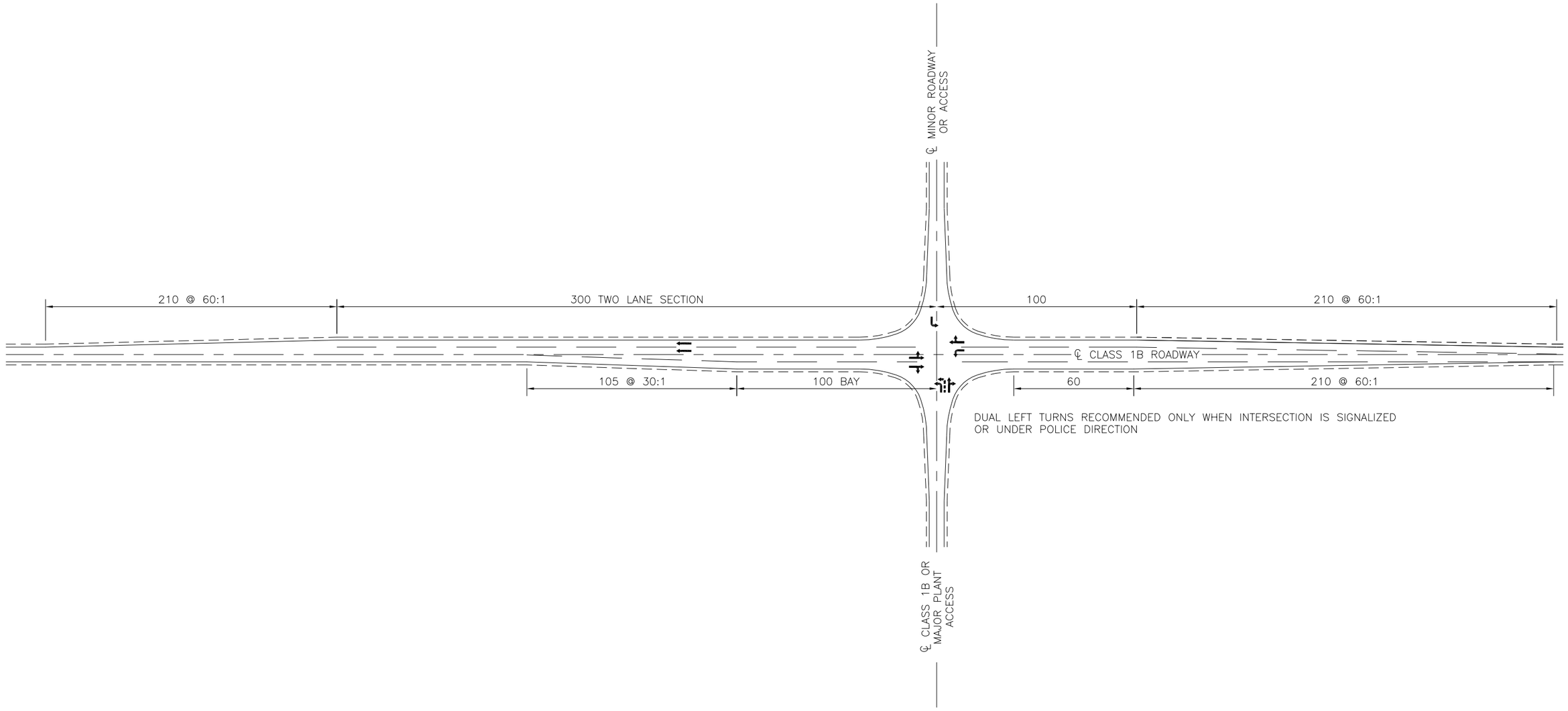
In addition to accommodating daily operational and turnaround traffic, some special design features may need to be provided to accommodate construction activities. Typically, these requirements relate to oversize loads, which require special turning radii. More generous corner radii are typically provided 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 signs 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 signs.

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 most cases gates.



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

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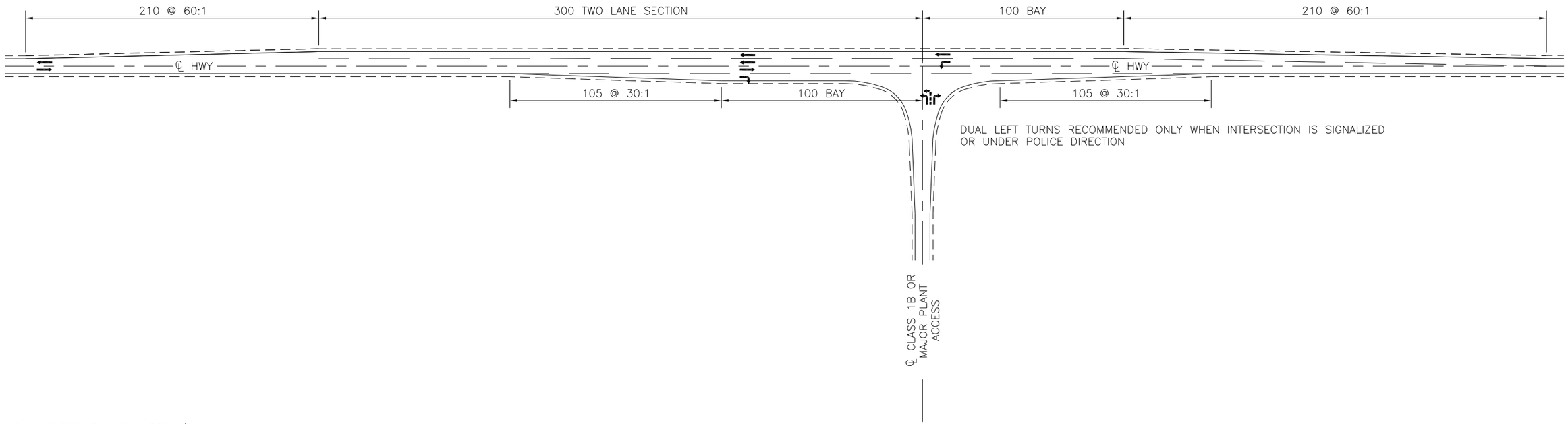
Figure 4.3
Typical Intersection Treatment



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

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Figure 4.4
Typical Tee Intersection Treatment

Flashing lights protect the existing rail crossings of RR 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 RR 213 over the expanded CPR yard is being proposed due to the large number of slow-moving trains that will cross RR 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 RR 213 will impact vehicle traffic using RR 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 existing rail crossings of RR 215 and RR 213 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 RR 213 is an important element in the overall plan and its construction, prior to the expanded yard being operational, is recommended.

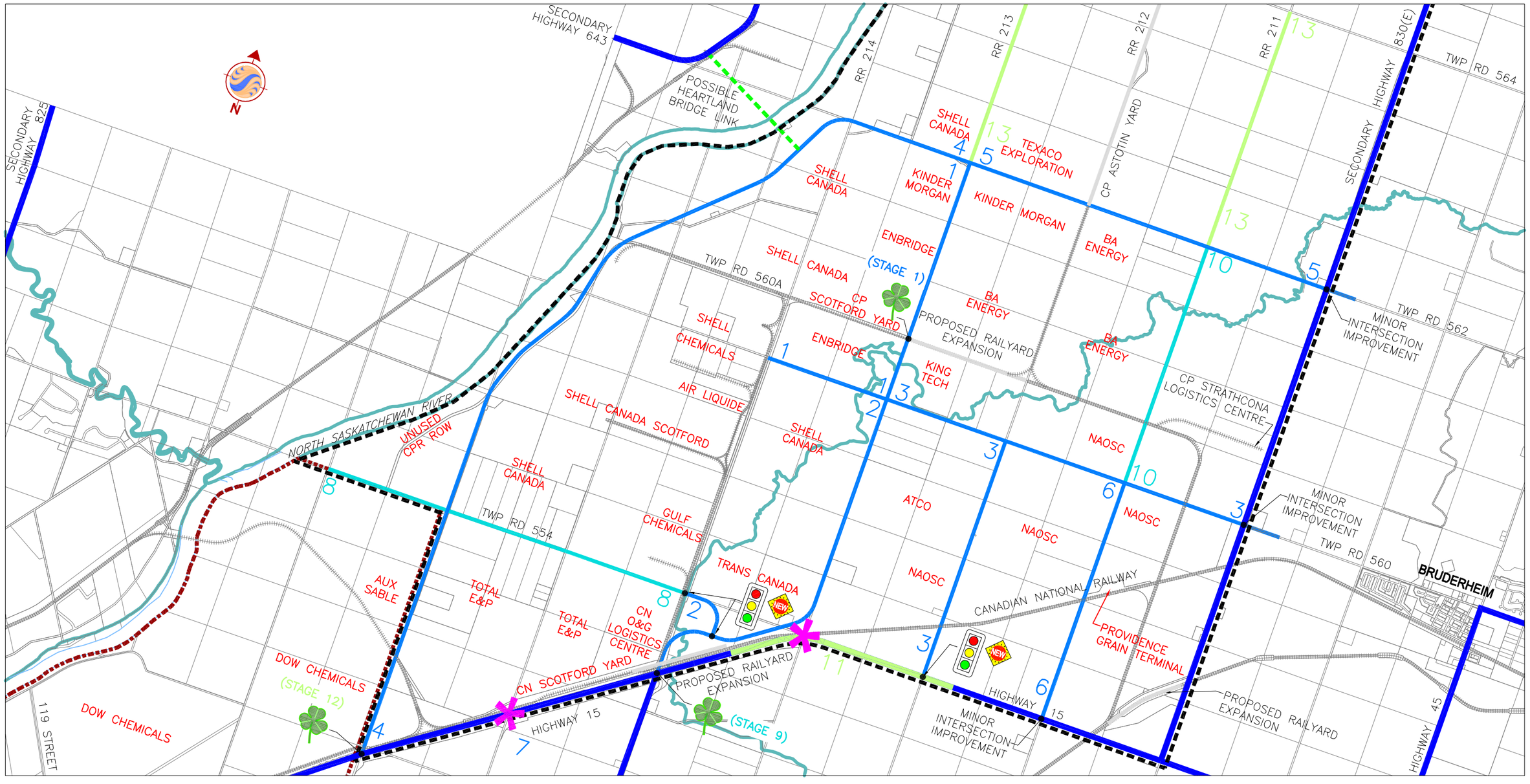
CN Rail's concept to expand their rail yard to the east across RR 214, creates a similar situation to CPR's yard expansion across RR 213. Should this expansion proceed, a grade separation of the yard area is recommended. Given the close proximity of the rail line to Highway 15, providing a grade separated interchange of the RR 214 and Highway 15 intersection will be required 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 Hwy 15 / RR 214.

4.3 STAGING

The proposed staging of the improvements is illustrated in Figure 4.5.

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 dependant on the proposed RR 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 RR 214 north of Twp Rd 560. Prior to either proposed closure in the next few years, it is recommended that the proposed RR 220 connection from Highway 15 to Twp Rd 562 be constructed. The RR 220 connection provides an alternative route to the RR 214 / 213 corridor and in addition to



Legend

- Study Area
- City of Fort Saskatchewan Boundary
- Provincial Highway
- Stages 1–7
- Stages 8–10
- Stages 11–13
- Railway (Existing / New)
- 4 Stage Number
- Intersection Closure
- Signals (Existing / New)
- Overpass / Interchange (Signals in Interim)

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Figure 4.5
Staging Plan

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 Hwy 15 / RR220 intersection as part of the development of RR 220, an interchange will be required at this location.

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

The timing of the North American Oil Sands upgrader is the primary driver of the timing of the proposed improvements to Twp Rd 560, RR 212 and RR 211 in the southeast quadrant of the Study Area. This construction is expected to be complete in the next 5 or so years and these improvements will be required by that time. Longer term, the intersection of Hwy 15 / RR212 will warrant signalization. Twinning of Hwy 15 to the east of this intersection is considered to be part of this signalization.

Similar to the situation with roads around the North American Oil Sands site, the timing of development on Total E&P site will define the need for upgrading on Twp Rd 554. Development is assumed to occur in the 5 to 10 year time frame, although the need for construction access may warrant earlier construction. The recently announced CN Oil and Gas Logistics Centre, will warrant upgrading of the east end of Twp Rd 554 in the near future.

The timing of the remaining roadway improvements, such as Twp Rds 562 and 564 and RR 211 north of Twp Rd 560 are dependant on development occurring in those areas. They are seen as 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 earlier in 2007 and funded by a group of industry stakeholders. This Study Update was necessitated by significant changes in plans by a these stakeholders that occurred shortly after the original study was completed.

It should be recognized that the plans of these stakeholders along with other stakeholders, both existing and potential, will likely continue to evolve as the Study Area develops. These evolving plans may negate 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.

5.0 Cost Estimates

5.1 UNIT COSTS

To develop order of magnitude cost estimates for the recommended roadway network, unit prices per type of improvement were developed. These costs include engineering and contingency, but do not include any allowance for major utility works, property acquisition or environmental measures to protected watercourses. Table 5.1 summarizes the unit prices developed.

Table 5.1
Improvement Unit Prices

Improvement Item	Unit	Unit Price ($2007)
Hwy 15 Twinning	Metres	2,000.00
Type 1A – Four-lane divided roadway	Metres	3,000.00
Type 1B – Two-lane roadway	Metres	1,500.00
Type 1B – Intersection Treatment and Highway 15 Minor Intersection Improvement	Each	300,000.00
Minor Water Crossing	Each	500,000.00
At-Grade Rail Crossing	Each	300,000.00
Grade Separated Rail or Road Crossing (10 m wide)	Metres	50,000.00
Highway 15 Major Intersection Improvement	Each	750,000.00
Traffic Signals with/without rail preemption	Each	300,000.00

5.2 ESTIMATED CONSTRUCTION COSTS

Table 5.2 summarizes the order of magnitude casts associated with accommodating the staging of the recommended roadway network as summarized in Figure 4.5 and based on the projected long-term employment summarized in Table 2.1 and described in Section 4.3. Advancement of

various elements of this work may be desirable in some cases to provide improved construction access.

Table 5.2
Estimated Construction Costs

Stage	Improvements By 2012	Unit Price ($)	Quantity	Estimated Cost ($)
1	Twp Rd 560 – RR 214 to RR 213	1,500	1,600	2,400,000
1	Twp Rd 560 – Water Crossing	500,000	1	500,000
1	Twp Rd 560 / RR 213 Intersection Treatment	300,000	1	300,000
1	RR 213 – Twp Rd 560 to Twp Rd 562	1,500	3,200	4,800,000
1	RR 213 / Twp Rd 562 Intersection Treatment	300,000	1	300,000
1	CP Rail Yard Grade Separation			6,000,000
2	Realigned RR 214 to RR 213	3,000	1,800	5,400,000
2	RR 214 Water Crossing	500,000	2	1,000,000
2	RR 214 / RR 213 Intersection Treatment and Signals	800,000	1	800,000
2	RR 213 – RR 214 to Twp Rd 560	1,500	4,300	6,500,000
2	RR 213 – Water Crossing	500,000	1	500,000
3	Twp Rd 560 – RR 213 to SH 830(E)	1,500	5,000	7,500,000
3	Twp Rd 560 Intersection Treatments (SH 830 (E), RR 211, RR 212)	300,000	3	900,000
3	Twp Rd 560 Rail Crossing	300,000	1	300,000

Stage	Improvements By 2012	Unit Price ($)	Quantity	Estimated Cost ($)
3	RR 212 – Hwy 15 to Twp Rd 560	1,500	3,200	4,800,000
3	RR 212 – Rail Crossing	300,000	1	300,000
3	RR 212 / Hwy 15 Intersection Improvement	300,000	1	300,000
4	RR 220 – Highway 15 to RR 213	1,700	12,000	20,400,000
4	RR 220 / Hwy 15 Improvements and Signals	1,000,000	1	1,000,000
5	Twp Rd 562 – RR 213 to SH 830(E)	1,500	5,000	7,500,000
5	Twp Rd 562 – Water Crossing	500,000	1	500,000
5	Twp Rd 562 – Intersection Treatments (RR 213, RR 211, SH 830(E))	300,000	3	900,000
6	RR 211 – Hwy 15 to Twp Rd 560	1,500	3,200	4,800,000
6	RR 211 / Hwy 15 Intersection Improvement	300,000	1	300,000
7	Hwy 15 Computerized Traffic Signal Control System (West end of Fort Saskatchewan to SH 830 (E)) - if warranted	4,000,000	1	4,000,000
	Subtotal – By 2012			**82,000,000**

Stage	Improvements By 2017	Unit Price ($)	Quantity	Estimated Cost ($)
8	Twp Rd 554 – RR 220 to RR 214	1,500	3,200	4,800,000
8	Twp Rd 554 Intersection Treatments (RR 220, RR 214)	300,000	2	600,000
8	Twp Rd 554 / RR 214 Traffic Signals	300,000	1	300,000
8	Twp Rd 554 – West of RR 220	1,500	1,600	2,400,000
9	RR 214 / CN Rail Yard and Hwy 15 Grade Separation			50,000,000
10	RR 211 – Twp Rd 560 to Township 562	1,500	3,200	4,800,000
10	RR 211 – Water Crossing	500,000	1	500,000
10	RR 211 - Rail Crossing	300,000	1	300,000
	Subtotal – By 2017			**63,700,000**
	Improvements Beyond 2017	**Unit Price ($)**	**Quantity**	**Estimated Cost ($)**
11	Hwy 15 Twinning to east of RR 212	2,000	3,200	6,400,000
11	Hwy 15 / RR 212 Traffic Signals	300,000	1	300,000
12	RR 220 / CN Rail Track and Hwy 15 Grade Separation			45,000,000
13	RR 211 – Twp Rd 562 to Twp Rd 564	1,500	3,200	4,800,000
13	RR 213 – Twp Rd 562 to Twp Rd 564	1,500	3,200	4,800,000
13	Twp Rd 564 – RR 213 to SH 830 (E)	1,500	5,000	7,500,000
13	Twp Rd 564 - Intersection Treatments (RR 213, RR 211, SH 830 (E))	300,000	3	900,000
	Subtotal – Beyond 2017			**69,700,000**
	Total			**215,400,000**

5.3 FUNDING OPTIONS

The cost estimates presented in Table 5.2 indicate that a significant amount of funding will be required to develop the desired transportation network in the area and that much of the transportation improvements are required within a 5 to 10 year period ($15 to $20 million per year on average).

In general, stakeholders agree that the developers, local municipalities and the provincial government should share in the costs associated with providing the required transportation infrastructure.

Table 5.3 provides an overview of possible funding mechanisms. Given the general agreement amongst stakeholders that costs should be shared between stakeholders, some of these funding mechanisms are not relevant.

Table 5.3
Overview of Alternative Transportation Funding Mechanisms

Measures	Description / Alternatives	Advantages	Disadvantages
Developer Pays All	Developer pays for all of the site access improvements, as well as the regional transportation improvements. There is no participation from other developers or from public funds.	Fast implementation, can open sooner No negotiations with other developers Do not have to follow process or restrictions attached to public funds	Significantly more expensive Investment in infrastructure that competition will benefit from
First Developer Pays, Others Reimburse As They Develop	First Developer pays for all site access and regional transportation improvements. An agreement is developed with local government, with a formula that determines payment by other developers as they come in. The formula can be based on a number of variables, including acreage, square footage, trip generation, truck generation, oil production, and others. First developer is then reimbursed for a significant percentage of the regional improvements.	Fast implementation, can open sooner Do not have to follow process or restrictions attached to public funds Can recoup significant portion of regional improvement investment	Must have cash to front No interest charged, so no return on investment for a significant length of time Negotiations to determine reimbursement formula
First Developer Pays, Others Reimburse As They Develop, With Interest	Same as First Developer Pays method, only interest is accrued on the regional infrastructure investment.	Fast implementation, can open sooner Do not have to follow process or restrictions attached to public funds Can recoup significant portion of regional improvement investment Can earn an interest return on regional infrastructure investments	Must have cash to front Negotiations to determine reimbursement formula

Table 5.3 (continued)

Measures	Description / Alternatives	Advantages	Disadvantages
Local Improvement Levees	A Community Finance District (or other similar tax entity) is formed, with a specifically defined area. A tax levee formula is developed, based on land use or trip generation. A special tax is generally levied annually, on each property within the district. Improvements are either implemented up-front, or more often, as tax revenue is collected. Variations include special taxes and district bonds.	Significantly less cash needed Do not pay for improvement benefits to competitors Can be used to fund any public facility with a useful life of 5 years or longer Improvements do not need to be located within the district Greater revenue certainty Easier to collect	Significantly slower and longer process to get improvements determined and improvements constructed Subject to more local and provincial regulations and processes Local laws may not permit the formation of such a district, or restrict the amount of the tax levee Requires public hearing and voter approval of property owners within the district May be considered inequitable All properties in the district contribute, including existing developments
Development Impact Fees	Infrastructure improvements are paid by public funds, with impact contributions required as a condition of development approval. The formula can be based on land use or trip generation and is generally calculated for each capital improvement required. The formula must distribute the costs equitably to the various development types. The fee is a one-time payment.	Significantly less up-front cash needed Do not pay for improvement benefits to competitors Improvement districts can cross municipal boundaries New development approval can be conditioned upon payment of fair share contribution Existing developments are not required to pay	Significantly slower and longer process to get improvements determined, impact formula developed, and improvements constructed Subject to more local and provincial regulations and processes More difficult to determine benefits and fees Requires public hearing and can only include properties that will gain benefit from the improvements

Table 5.3 (continued)

Measures	Description / Alternatives	Advantages	Disadvantages
Agency Pays All	A public agency pays for regional transportation improvements, through traditional funding sources, or non-traditional sources like tax increment financing and tolls.	No cost to developer	Funds may not be available – have to compete with other projects Public may not be willing to fund the improvements Would likely take significantly longer to get constructed

As noted in Table 5.3, developer and municipal contributions to funding transportation improvements can be calculated using a number of different variables. In the case of the Heartland Area, there are a number of factors that create challenges as follows:

- Some development already exists and has adequate transportation infrastructure to meet its needs.
- Only some of the land in the Study Area, primarily south of Twp Rd 562, is likely to be developed in the 5 to 10 year horizon and in fact land north of Twp Rd 562 may never be developed for industrial purposes due to producing oil wells.
- Industrial type owners currently do not own all of the land south of Twp Rd 562 and even land currently owned by industrial type owners may never be developed beyond its current status of an agricultural land use.
- Traffic generation varies substantially by land use (pipeline terminal versus upgrader) and some facilities, while critical to sustaining the area, do not generate any measurable products, such as barrels of oil, or only produce small quantities of higher value products.
- The impacts of proposed railway yard expansions, which are important to supporting ongoing development in the Study Area, can have significant cost implications.

Given the above, creating an equitable cost sharing formula will be difficult, although it is recommended that the following principles be adopted in any funding formula:

- Funding related to rail crossings and in particular grade separations should be negotiated separately with the specific railway and costs recovered from the railways excluded from any funding formula calculations. As a starting point, the following funding principles should be considered:
    - For existing at-grade rail crossings, there is already a well-established funding formula in place as established through the Canadian Transportation Agency (CTA) for the addition of a warning system. The Road Authority share is 62.5%, and the Railway Company share is 37.5%. Often, Transport Canada will fund up to 80% of the cost of a warning system at an existing crossing, and the Road Authority and Railway Company will share the balance, split 62.5%/37.5% on the unfunded portion.
    - For a new at-grade rail crossing, or a new grade separation where no crossing previously existed, typically whoever is constructing new would pay for the entire cost of whatever is required at the crossing or overpass.
    - For a grade separation, which replaces an existing at-grade crossing, the CTA funding formula requires the Railway Company to pay 15% of the cost of the basic structure over the tracks.

- For special cases, negotiations between the Road Authority and Railway Company can take place, which may change the percentages noted above. If the Road Authority and Railway Company cannot agree, then the CTA has the authority to determine who pays what. It is better if the parties can agree, rather than going to the CTA.

- If a funding formula disagreement does end up at the CTA for resolution, they will normally make an attempt to determine the relative benefits to each party, and apportion costs of the work accordingly. It is not likely they would deviate from the funding formulae described above unless there were special circumstances involved.

- Any Provincial Government funding or improvements in lieu of funding should be on an agreeable percentage basis of the total actual costs for all transportation improvements within the Study Area. The actual percentage considered reasonable is a philosophical issue that needs to be negotiated.

- A reasonable percentage split of the transportation costs between the Developers and Strathcona County needs to be defined. The actual percentage considered reasonable is a philosophical issue that needs to be negotiated.

Once an overall funding formula between the provincial government, Strathcona County and developers has been set on a philosophical basis, the following is recommended in defining how much each developer should contribute as part of the developer share:

- Property required for transportation improvements should be provided without charge (property acquisition is not included in the construction cost estimates) and is not credited to the developers' share of the funding requirements.

- Total development acreage, which is the only real constant variable in the area, should be used as the basis for the funding formula. Other variables, such as production volume and traffic generation, can vary significantly.

- Existing developments and their associated acreage should be excluded from any funding formula. An existing development should be defined as any facility operational as of 1 January 2007. If increased on-site development occurs, the incremental impacts created by the development, as defined by a Traffic Impact Assessment, can be addressed by site-specific mitigation measures to be funded by a cost sharing formula to be defined at that time.

- Land north of Twp Rd 562 should be excluded from the calculation of total acreage, as its development for industrial land uses is speculative at this time.

- Road, rail and pipeline rights-of-way should be excluded from the initial calculation of total acreage. Areas that cannot be developed due to environmental or geotechnical constraints should be included in the calculation as they are difficult to define given the conceptual nature of most developments in the area.

- Land owned by non-industrial users and still used for agricultural purposes should be considered as belonging to Strathcona County in defining the percentage contribution of individual private developers. If and when an industrial type landowner buys and develops this land, Strathcona County's percentage share of improvements would decrease and the new landowner would pay Strathcona County directly for their share of the funding requirements.

- Front end funding of the improvements can be either by Strathcona County or specific industrial users. A mechanism will need to be created to allow for over contributions to be recovered by the affected party. Provision of front end funding, which has a cost and some degree of uncertainty in terms of when it will be recovered, should be a consideration in defining an equitable share between Strathcona County and the developers.

- A party will need to be designated as the administrator of the acreage assessment system. The role of system administrator is typically the responsibility of the local municipality. This role includes being the arbitrator of development acreage amounts, reconciling contribution requirements based on estimated and actual construction costs, tracking payments and administering any funds in trust.

Appendix A
Traffic Data

ALBERTA HIGHWAYS 1 TO 986
TRAFFIC VOLUME, VEHICLE CLASSIFICATION, TRAVEL and ESAL STATISTICS REPORT
2005

Alberta Infrastructure & Transportation
Program Management Branch
Highway Asset Management Section

Produced 10-Mar-2006 By CornerStone Solutions Inc

Hwy	CS	TCS	Muni	From	To	From Km	To Km	Length in Km	Volume WAADT	Volume WASDT	Classifications %PV	%RV	%BU	%SU	%TT	%CM	Travel MVKM Annual	Travel MVKM Summer	ESAL / Day / Dir SU	ESAL / Day / Dir TC	ESAL / Day / Dir Total
14	16	20	Wain	E OF 897 NE OF EDGERTON	W OF 17 SASK. BORDER WJ	31.17	52.46	21.29	730	800	70.9	5.9	0.3	5.0	17.9	23.2	5.7	2.6	16.1	135.4	151.5
14	16	24	Wain	E OF 17 SASK. BORDER WJ	W OF 17 SASK. BORDER EJ	52.46	54.91	2.45	1660	1820	66.6	4.8	0.2	6.8	21.6	28.6	1.5	0.7	49.7	371.6	421.3
14	16	28	Wain	E OF 17 SASK. BORDER EJ	SASKATCHEWAN BORDER	54.91	55.56	0.65	1150	1260	72.7	5.2	0.4	6.1	15.6	22.1	0.3	0.1	30.9	185.9	216.8
14	16			E OF 41 E OF WAINWRIGHT	SASKATCHEWAN BORDER			55.56	1248	1366	77.0	4.7	0.3	6.5	11.5	18.3	25.3	11.6	35.7	148.8	184.5
14				**EDMONTON E.C.L.**	**SASKATCHEWAN BORDER**			**248.49**	**2800**	**3065**	**82.1**	**2.4**	**0.6**	**5.3**	**9.6**	**15.5**	**254.0**	**116.6**	**65.4**	**278.6**	**344.0**
15	04	08	Stur	EDMONTON E.C.L.	S OF 37 W OF FT SASKATCHEWAN	0.00	2.84	2.84	8490	9280	96.4	0.2	0.3	1.8	1.3	3.4	8.8	4.0	67.3	114.4	181.7
15	04	12	Stur	E OF 37 W OF FT SASKATCHEWAN	FT SASKATCHEWAN W.C.L.	2.84	4.94	2.10	13140	14330	92.5	0.5	0.4	2.9	3.7	7.0	10.1	4.6	167.9	503.9	671.8
15	04			EDMONTON E.C.L.	FT SASKATCHEWAN W.C.L.			4.94	10467	11427	94.2	0.4	0.4	2.4	2.6	5.4	18.9	8.6	110.7	282.1	392.8
15	06	08	Strc	FT SASKATCHEWAN E.C.L.	W OF 830 NE OF JOSEPHBURG WJ	0.00	4.00	4.00	8250	9140	84.8	2.4	0.5	4.9	7.4	12.8	12.0	5.6	178.1	632.8	810.9
15	06	12	Strc	W OF 830 NE OF JOSEPHBURG WJ	KM 5.686	4.00	5.69	1.69	7160	7970	85.4	4.3	0.2	3.5	6.6	10.3	4.4	2.1	110.9	491.9	602.8
15	06	16	Strc	KM 5.686	W OF 830 SW OF BRUDERHEIM EJ	5.69	10.92	5.23	7110	7860	83.7	4.3	0.2	4.3	7.5	12.0	13.6	6.3	134.7	552.7	687.4
15	06	20	Strc	E OF 830 SW OF BRUDERHEIM EJ	W OF 45 S OF BRUDERHEIM	10.92	14.10	3.18	5280	5860	86.1	3.3	0.3	4.1	6.2	10.6	6.1	2.9	95.4	339.3	434.7
15	06			FT SASKATCHEWAN E.C.L.	W OF 45 S OF BRUDERHEIM			14.10	7030	7785	84.7	3.5	0.3	4.4	7.1	11.8	36.2	16.8	136.3	517.3	653.6
15	08	04	Lamo	E OF 45 S OF BRUDERHEIM	W OF 637 NW OF LAMONT	0.00	6.46	6.46	4190	4610	86.2	2.5	0.5	4.1	6.7	11.3	9.9	4.6	75.7	291.0	366.7
15	08	08	Lamo	E OF 637 NW OF LAMONT	W OF 831 W OF LAMONT WJ	6.46	8.55	2.09	2780	3060	89.1	1.4	0.5	3.6	5.4	9.5	2.1	1.0	44.1	155.6	199.7
15	08	12	Lamo	E OF 831 W OF LAMONT WJ	W OF 831 AT LAMONT EJ	8.55	10.52	1.97	2010	2210	85.2	3.1	0.3	4.6	6.8	11.7	1.4	0.7	40.7	141.7	182.4
15	08	16	Lamo	E OF 831 AT LAMONT EJ	W OF 834 NW OF CHIPMAN	10.52	19.98	9.46	1410	1550	81.6	4.6	0.2	4.3	9.3	13.8	4.9	2.2	26.7	135.9	162.6
15	08	20	Lamo	E OF 834 W OF CHIPMAN	N OF 16 & 855 S OF MUNDARE	19.98	47.12	27.14	1110	1210	79.3	3.6	0.3	5.0	11.8	17.1	11.0	5.0	24.4	135.8	160.2
15	08			E OF 45 S OF BRUDERHEIM	N OF 16 & 855 S OF MUNDARE			47.12	1704	1868	82.9	3.2	0.4	4.5	9.0	13.9	29.3	13.5	33.8	159.0	192.8
15				**EDMONTON E.C.L.**	**N OF 16 & 855 S OF MUNDARE**			**66.16**	**3493**	**3843**	**86.1**	**2.7**	**0.4**	**4.0**	**6.8**	**11.2**	**84.4**	**38.9**	**51.5**	**246.2**	**307.7**
16	02	04	Yelw	JASPER PARK BOUNDARY	W OF 40 S OF ENTRANCE WJ	0.00	19.40	19.40	3600	4830	72.8	12.3	0.5	2.1	12.3	14.9	25.5	14.3	33.3	459.0	492.3
16	02	08	Yelw	E OF 40 SE OF ENTRANCE WJ	W OF 40 SW OF HINTON W.C.L. EJ	19.40	21.37	1.97	5540	6640	76.7	7.1	0.7	3.7	11.8	16.2	4.0	2.0	90.3	677.6	767.9
16	02	12	Yelw	E OF 40 SW OF HINTON W.C.L. EJ	HINTON E.C.L.	21.37	31.03	9.66	8910	10670	83.8	3.8	0.6	3.3	8.5	12.4	31.4	15.8	129.5	785.0	914.5
16	02	16	Yelw	HINTON E.C.L.	WEST OF OBED	31.03	53.06	22.03	5610	6610	73.0	1.1	0.8	4.4	20.7	25.9	45.1	22.3	108.7	1203.7	1312.4
16	02			JASPER PARK BOUNDARY	WEST OF OBED			53.06	5473	6699	76.3	4.8	0.7	3.5	14.7	18.9	106.0	54.4	84.4	833.9	918.3
16	04	04	Yelw	WEST OF OBED	W OF 47 W OF EDSON	0.00	49.55	49.55	5980	6970	69.4	6.9	0.7	4.5	18.5	23.7	108.2	52.8	118.5	1146.7	1265.2
16	04			WEST OF OBED	W OF 47 W OF EDSON			49.55	5980	6970	69.4	6.9	0.7	4.5	18.5	23.7	108.2	52.8	118.5	1146.7	1265.2
16	06	04	Yelw	E OF 47 W OF EDSON	EDSON W.C.L.	0.00	8.14	8.14	9060	10210	75.9	3.6	1.0	5.6	13.9	20.5	26.9	12.7	223.5	1305.3	1528.8
16	06	06	Yelw	EDSON W.C.L.	EDSON E.C.L.	8.14	11.66	3.52													
16	06	08	Yelw	EDSON E.C.L.	W OF 32 S OF PEERS	11.66	42.29	30.63	8460	9730	72.6	5.5	0.6	5.2	16.1	21.9	94.6	45.6	193.8	1411.8	1605.6
16	06			E OF 47 W OF EDSON	W OF 32 S OF PEERS			42.29	7871	9013	73.3	5.1	0.7	5.3	15.6	21.6	121.5	58.3	183.8	1272.7	1456.5
16	08	04	Yelw	E OF 32 SE OF PEERS	W OF 751 SW OF NOJACK	0.00	25.32	25.32	6390	7440	69.0	5.1	0.6	5.3	20.0	25.9	59.1	28.8	149.2	1324.6	1473.8
16	08	08	Yelw	E OF 751 SW OF NOJACK	W 753 E OF CHIP LAKE	25.32	36.33	11.01	5960	6950	70.5	5.7	0.4	3.8	19.6	23.8	24.0	11.7	98.8	1210.8	1310.6
16	08			E OF 32 SE OF PEERS	W 753 E OF CHIP LAKE			36.33	6260	7292	69.4	5.3	0.5	4.9	19.9	25.3	83.0	40.5	135.1	1291.2	1426.3
16	10	04	Yelw	E OF 753 E OF CHIP LAKE	W OF 16A W OF STYAL	0.00	19.04	19.04	6410	7480	71.2	5.7	0.6	4.3	18.2	23.1	44.5	21.8	121.4	1209.2	1330.6
16	10	08	Yelw	E OF 16A W OF STYAL	W OF 22 SE OF ENTWISTLE EJ	19.04	29.63	10.59	7790	9090	71.2	3.7	0.7	6.4	18.0	25.1	30.1	14.7	219.6	1453.4	1673.0
16	10			E OF 753 E OF CHIP LAKE	W OF 22 SE OF ENTWISTLE EJ			29.63	6903	8055	71.3	4.9	0.6	5.1	18.1	23.8	74.7	36.5	155.1	1295.0	1450.1
16	12	04	Park	E OF 22 SE OF ENTWISTLE EJ	W OF 757 S OF MAGNOLIA	0.00	8.56	8.56	7550	8800	73.1	2.6	0.6	6.6	17.1	24.3	23.6	11.5	219.5	1338.2	1557.7
16	12	08	Park	E OF 757 S OF MAGNOLIA	W OF 31 E OF GAINFORD	8.56	16.95	8.39	7430	8730	73.1	4.2	0.5	5.4	16.8	22.7	22.8	11.2	176.7	1293.8	1470.5
16	12	12	Park	E OF 31 E OF GAINFORD	W OF 765 E OF FALLIS	16.95	26.70	9.75	8220	9650	77.1	6.9	0.4	3.6	12.0	16.0	29.3	14.4	130.4	1022.4	1152.8

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ALBERTA HIGHWAYS 1 TO 986
TRAFFIC VOLUME, VEHICLE CLASSIFICATION, TRAVEL and ESAL STATISTICS REPORT
2005

Alberta Infrastructure & Transportation
Program Management Branch
Highway Asset Management Section

Produced 10-Mar-2006 By CornerStone Solutions Inc

Hwy	CS	TCS	Muni	From	To	From Km	To Km	Length in Km	Volume WAADT	WASDT	%PV	%RV	%BU	%SU	%TT	Classifications %CM	Travel MVKM Annual	Summer	ESAL / Day / Dir SU	TC	Total
822				**N OF 53 E OF PONOKA**	**S OF 616 SW OF HAY LAKES**			**53.08**	**371**	**440**	**74.4**	**1.7**	**1.0**	**9.6**	**13.3**	**23.9**	**7.2**	**3.6**	**15.7**	**51.1**	**66.8**
824	02	04	Strc	N OF 14 NW OF COOKING LAKE	S OF 629 NW OF COOKING LAKE	0.00	4.03	4.03	350	380	82.1	2.2	4.9	8.1	2.7	15.7	0.5	0.2	12.5	9.8	22.3
824	02	08	Strc	N OF 629 NW OF COOKING LAKE	S OF 630 S OF ARDROSSAN	4.03	10.98	6.95	790	860	87.6	2.1	2.9	5.9	1.5	10.3	2.0	0.9	20.5	12.3	32.8
824	02	12	Strc	N OF 630 S OF ARDROSSAN	S OF 16 E OF QUEENSDALE PL.	10.98	17.27	6.29	2700	2980	90.3	1.7	3.2	7.7	1.1	13.0	6.2	2.9	91.6	30.8	122.4
824	02			N OF 14 NW OF COOKING LAKE	S OF 16 E OF QUEENSDALE PL			17.27	1383	1520	86.4	1.8	3.2	7.3	1.3	11.8	8.7	4.0	44.5	18.6	63.1
824				**N OF 14 NW OF COOKING LAKE**	**S OF 16 E OF QUEENSDALE PL.**			**17.27**	**1383**	**1520**	**86.4**	**1.8**	**3.2**	**7.3**	**1.3**	**11.8**	**8.7**	**4.0**	**44.5**	**18.6**	**63.1**
825	02	04	Stur	N OF 37 W OF FT SASK	S OF 643 E OF GIBBONS	0.00	14.19	14.19	2980	3240	83.1	1.2	0.8	6.7	8.2	15.7	15.4	7.0	88.0	253.3	341.3
825	02			N OF 37 W OF FT SASK	S OF 643 E OF GIBBONS			14.19	2980	3240	83.1	1.2	0.8	6.7	8.2	15.7	15.4	7.0	88.0	253.3	341.3
825				**N OF 37 W OF FT SASK.**	**S OF 643 E OF GIBBONS**			**14.19**	**2980**	**3240**	**83.1**	**1.2**	**0.8**	**6.7**	**8.2**	**15.7**	**15.4**	**7.0**	**88.0**	**253.3**	**341.3**
827	02	04	Thor	N OF 28 S OF EGREMONT	S OF 18 S OF THORHILD	0.00	14.78	14.78	770	860	65.3	4.4	0.3	5.6	4.2	10.3	4.2	1.9	19.7	33.5	53.2
827	02	08	Thor	N OF 18 S OF THORHILD	N.C.L. OF THORHILD	14.78	15.40	0.62	2240	2480	89.7	2.2	1.3	3.8	3.0	8.1	0.5	0.2	37.5	69.7	107.2
827	02	12	Thor	N.C.L. OF THORHILD	S OF 661 NE OF MAPOVA EJ	15.40	34.29	18.89	220	250	89.2	2.4	0.0	2.4	5.4	7.8	1.5	0.7	2.3	12.3	14.6
827	02			N OF 28 S OF EGREMONT	S OF 661 NE OF MAPOVA EJ			34.29	494	553	86.8	3.7	0.3	4.8	4.4	9.5	6.2	2.9	10.4	22.5	32.9
827	04	04	Atha	N OF 661 NW OF MAPOVA WJ	TR 634	0.00	15.90	15.90	110	130	84.6	2.1	3.2	5.3	4.8	13.3	0.6	0.3	2.6	5.5	8.1
827	04	05	Atha	TR 634	S OF 663 E OF COLINTON	15.90	33.96	18.06	190	210	86.1	1.2	3.5	5.9	3.3	12.7	1.3	0.6	4.9	6.5	11.4
827	04	08	Atha	N OF 663 E OF COLINTON	S OF 55 E OF ATHABASCA	33.96	45.07	11.11	970	1080	85.5	2.5	1.3	5.8	4.9	12.0	3.9	1.8	24.8	49.3	74.1
827	04			N OF 661 NW OF MAPOVA WJ	S OF 55 E OF ATHABASCA			45.07	354	396	85.5	2.2	2.0	5.8	4.5	12.3	5.8	2.7	9.0	16.5	25.5
827				**N OF 28 S OF EGREMONT**	**S OF 55 E OF ATHABASCA**			**79.36**	**414**	**464**	**86.1**	**3.0**	**1.1**	**5.3**	**4.5**	**10.9**	**12.0**	**5.6**	**9.7**	**19.3**	**29.0**
829	02	04	Thor	N OF 644 E OF REDWATER	S OF 28 & 63 W OF RADWAY	0.00	9.76	9.76	730	840	86.0	3.4	0.7	4.6	5.3	10.6	2.6	1.3	14.8	40.1	54.9
829	02			N OF 644 E OF REDWATER	S OF 28 & 63 W OF RADWAY			9.76	730	840	86.0	3.4	0.7	4.6	5.3	10.6	2.6	1.3	14.8	40.1	54.9
829				**N OF 644 E OF REDWATER**	**S OF 28 & 63 W OF RADWAY**			**9.76**	**730**	**840**	**86.0**	**3.4**	**0.7**	**4.6**	**5.3**	**10.6**	**2.6**	**1.3**	**14.8**	**40.1**	**54.9**
830	02	04	Strc	N OF 630 WJ	S OF 16 W OF ELK ISLAND PARK	0.00	6.58	6.58	460	530	84.2	2.4	3.0	7.2	3.2	13.4	1.2	0.5	15.2	15.9	31.1
830	02	08	Strc	N OF 16 W OF ELK ISLAND PARK	S OF TWP RD 550 E OF JOSEPHBURG	6.58	22.30	15.72	860	950	78.0	1.8	1.0	13.7	5.5	20.2	4.9	2.3	51.9	49.0	100.9
830	02	12	Strc	N OF TWP RD 550 E OF JOSEPHBURG	S OF 15 NE OF JOSEPHBURG	22.30	28.26	5.96	460	510	77.1	4.3	0.7	12.4	5.5	18.6	1.0	0.5	25.1	26.2	51.3
830	02			N OF 630 WJ	S OF 15 NE OF JOSEPHBURG			28.26	667	759	78.8	2.3	1.3	12.5	5.1	18.9	7.1	3.3	37.8	36.3	74.1
830	04	04	Strc	N OF 15 NE OF FT SASK EJ	S OF 38 E OF AMELIA	0.00	12.54	12.54	1360	1510	71.9	2.8	0.5	7.4	17.4	25.3	6.2	2.9	44.3	245.3	289.6
830	04			N OF 15 NE OF FT SASK EJ	S OF 38 E OF AMELIA			12.54	1360	1510	71.9	2.8	0.5	7.4	17.4	25.3	6.2	2.9	44.3	245.3	289.6
830				**N OF 630 WJ**	**S OF 38 E OF AMELIA**			**40.80**	**894**	**990**	**75.6**	**2.5**	**0.9**	**10.1**	**10.9**	**21.9**	**13.3**	**6.2**	**39.8**	**101.0**	**140.8**
831	02	04	Lamo	ELK ISLAND NAT PARK N GATE	S OF 15 W OF LAMONT WJ	0.00	5.25	5.25	360	400	78.3	3.2	1.1	10.8	6.6	18.5	0.7	0.3	17.1	24.6	41.7
831	02			ELK ISLAND NAT PARK N GATE	S OF 15 W OF LAMONT WJ			5.25	360	400	78.3	3.2	1.1	10.8	6.6	18.5	0.7	0.3	17.1	24.6	41.7
831	04	04	Lamo	N OF 15 AT LAMONT EJ	S OF 637 AT LAMONT	0.00	2.32	2.32	1430	1580	88.8	3.5	0.5	3.9	3.3	7.7	1.2	0.6	24.8	48.9	73.5
831	04	08	Lamo	N OF 637 AT LAMONT	S OF 45 S OF SKARO	2.32	15.26	12.94	2360	2590	79.6	5.2	0.8	4.8	9.6	15.2	11.1	5.1	49.9	234.8	284.7
831	04			N OF 15 AT LAMONT EJ	S OF 45 S OF SKARO			15.26	2219	2436	80.5	5.0	0.8	4.7	9.0	14.5	12.4	5.7	45.9	207.0	252.9
831	06	04	Lamo	N OF 45 S OF SKARO	S OF 28 NW OF WASKATENAU	0.00	23.96	23.96	2280	2630	74.8	4.7	0.7	4.9	14.9	20.5	19.9	9.6	48.2	352.1	400.3
831	06			N OF 45 S OF SKARO	S OF 28 NW OF WASKATENAU			23.96	2280	2630	74.8	4.7	0.7	4.9	14.9	20.5	19.9	9.6	48.2	352.1	400.3

2005 ATR REPORT

Highway : 15
Control Section : 06
ATR Number : 50150610
Location Description : 6.7 KM W OF 15 & 45 SCOTFORD
Year : 2005
ATR Efficiency : 100.0 %

Produced : 01-Mar-2006 By CornerStone Solutions Inc.

	Two Way	Westbound	Eastbound
Average Annual Daily Traffic	7394	3639	3755
Average Summer Daily Traffic	8049	3965	4084
Average Daily Traffic by Month			
January	5829	2832	2997
February	6556	3213	3343
March	6674	3306	3368
April	7151	3508	3643
May	7964	3911	4053
June	8172	4017	4155
July	8177	4036	4141
August	8115	4010	4105
September	7813	3848	3965
October	7695	3778	3917
November	7435	3660	3775
December	7098	3523	3575

Peak Hour Traffic	Year Mo Da Hour	Two Way	Westbound	Eastbound
30th Highest Hour	2005.05.23.1300	810	560	250
100th Highest Hour	2005.07.28.1700	747	399	348
90th %ile Hour	2005.04.05.1800	571	193	378

ALBERTA HIGHWAYS 1 TO 986
TRAFFIC VOLUME HISTORY 1996 - 2005

Alberta Infrastructure and Transportation
Program Management Branch
Highway Asset Management Section

Produced 03-Mar-2006 By CornerStone Solutions Inc.

Hwy	CS	TCS	Muni	From	1996 AADT	1997 AADT	1998 AADT	1999 AADT	2000 AADT	2001 AADT	2002 AADT	2003 AADT	2004 AADT	2005 AADT	2005 ASDT
14	16	4	Wain	E OF 41 E OF WAINWRIGHT	1980	2100	2110	2110	2080	2230	2310	2310	2330	2350	2570
14	16	4	Wain	W OF 610 NW OF HEATH	1710	1800	1560	1560	1540	1660	1680	1680	1700	1710	1870
14	16	8	Wain	E OF 610 NW OF HEATH	1590	1510	1310	1310	1290	1390	1260	1260	1280	1290	1410
14	16	8	Wain	W OF 894 E OF WAINWRIGHT WJ	1290	1470	1280	1170	1170	1270	1250	1250	1280	1300	1420
14	16	12	Wain	E OF 894 E OF WAINWRIGHT WJ	1260	1440	1250	1150	1130	1230	1210	1210	1240	1240	1360
14	16	12	Wain	W OF 894 N OF EDGERTON EJ	1120	1280	1120	1130	1130	1230	1210	1210	1240	1240	1360
14	16	16	Wain	E OF 894 N OF EDGERTON EJ	820	940	820	840	840	890	940	940	980	990	1080
14	16	16	Wain	W OF 897 NE OF EDGERTON	750	850	730	810	830	830	880	880	890	960	1050
14	16	20	Wain	E OF 897 NE OF EDGERTON	680	760	660	730	700	700	740	740	750	730	800
14	16	20	Wain	W OF 17 SASK BORDER WJ	730	820	700	680	700	680	710	710	720	720	790
14	16	24	Wain	E OF 17 SASK BORDER WJ	1370	1530	1310	1400	1470	1450	1520	1630	1630	1660	1820
14	16	24	Wain	W OF 17 SASK BORDER EJ	1370	1530	1160	1240	1360	1450	1520	1630	1630	1660	1820
14	16	28	Wain	E OF 17 SASK BORDER EJ	840	940	590	630	700	940	1050	1140	1150	1150	1260
14	16	28	Prov	ALTA - SASK BORDER	840	940	810	870	910	1000	1070	1160	1140	1150	1260
15	4	8	Stur	S OF 37 W OF FT SASK	7010	7360	7850	7460	7540	7930	8400	8130	8010	8490	9280
15	4	12	Stur	N OF 37 W OF FT SASK	10590	11120	11870	12110	12260	12830	13600	12800	12670	12970	14170
15	4	12	Stur	W OF LAMOUREAUX DR 32-54-22-412700750					12470	13040	13800	13000	12880	13180	14400
15	4	12	Stur	E OF LAMOUREAUX DR 32-54-22-412700750					12790	13380	14170	13350	13210	13510	14760
15	4	12	Stur	2.0 KM W 15 & 21 FORT SASKATCHEWAN	11630	12210	13030	12630	12790	13380	14330	13050	13200	13730	14760
15	5	99	CoFS	W OF RGE RD 220 12-55-22-400000220	6400	6910	7130	7170	6690	7080	7850	8070	8040	8400	9310
15	6	8	Strc	E OF RGE RD 220 12-55-22-400000220	6300	6800	7030	7030	6560	6940	7710	7990	7920	8280	9180
15	6	8	Strc	W OF RGE RD 215A WJ 18-55-21-406000880	6310	6780	7010	7300	6820	7210	7690	7970	7900	8260	9160
15	6	8	Strc	E OF RGE RD 215A WJ 18-55-21-406000880	6220	6670	6930	7220	6740	7130	7680	7960	7880	8240	9140
15	6	8	Strc	W OF RGE RD 215 EJ 17-55-21-412000400							7680	7960	7880	8240	9140
15	6	8	Strc	E OF RGE RD 215 EJ 17-55-21-412000400							7640	7920	7840	8200	9090
15	6	8	Strc	W OF 830 N OF JOSEPHBURG WJ	6220	6670	6930	7240	6770	7160	7640	7920	7840	8200	9090
15	6	12	Strc	E OF 830 N OF JOSEPHBURG WJ	5480	5880	6110	6130	5730	6070	6510	6570	6870	7190	7970
15	6	12	Strc	W OF RGE RD 212 22-55-21-400000000	5460	5880	6020	6040	5640	5960	6570	6570	6870	7190	7970
15	6	12	Strc	E OF RGE RD 212 22-55-21-400000000	5380	5730	5870	5890	5490	5810	6520	6560	6860	7180	7960
15	6	12	Strc	6 7 KM W OF 15 & 45 SCOTFORD	5440	5800	5950	6520	6090	6440	6610	6760	6960	7390	8050
15	6	12	Strc	W OF RGE RD 211 23-55-21-400000000	5420	5690	5690	5680	5320	5620	6450	6500	6790	7090	7860
15	6	12	Strc	E OF RGE RD 211 23-55-21-400000000	5410	5680	5680	5680	5310	5610	6410	6460	6750	7050	7820
15	6	12	Strc	W OF 830 NE OF FT SASK EJ	5080	5300	5390	5240	5020	5310	5900	5940	6200	6490	7200
15	6	20	Strc	E OF 830 NE OF FT SASK EJ	4650	4850	4820	4690	4510	4780	4900	4940	5160	5320	5900
15	6	20	Lamo	W OF 45 S OF BRUDERHEIM	4590	4820	4820	4670	4470	4720	4850	4870	5090	5240	5810
15	8	4	Lamo	E OF 45 S OF BRUDERHEIM	3550	3750	4070	3940	3770	3960	4070	4100	4190	4240	4660
15	8	4	Lamo	W OF 637 NW OF LAMONT	3520	3720	3740	5980	5920	6220	4100	4060	4090	4140	4550
15	8	8	Lamo	E OF 637 NW OF LAMONT	2080	2200	2220	3540	3500	3680	2420	2400	2730	2760	3030
15	8	8	Lamo	W OF 831 W OF LAMONT WJ	2130	2250	2270	2290	2270	2370	2450	2430	2770	2800	3080
15	8	12	Lamo	E OF 831 W OF LAMONT WJ	2100	2220	2220	2240	2230	2330	2390	2370	2560	2820	3100
15	8	12	Lamo	W OF 831 W OF LAMONT EJ			1110	1110	1110	1190	1100	1090	1170	1190	1310

ALBERTA HIGHWAYS 1 TO 986
TRAFFIC VOLUME HISTORY 1996 - 2005

Alberta Infrastructure and Transportation
Program Management Branch
Highway Asset Management Section

Produced: 03-Mar-2006 By CornerStone Solutions Inc

Hwy	CS	TCS	Muni	From	1996 AADT	1997 AADT	1998 AADT	1999 AADT	2000 AADT	2001 AADT	2002 AADT	2003 AADT	2004 AADT	2005 AADT	2005 ASDT
15	8	16	Lamo	E OF 831 W OF LAMONT EJ			1560	1560	1560	1640	1450	1440	1440	1480	1630
15	8	16	Lamo	W OF 834 NW OF CHIPMAN	1050	1120	1120	1120	1120	1280	1310	1290	1290	1340	1470
15	8	20	Lamo	E OF 834 NW OF CHIPMAN	910	970	970	970	970	1090	1120	1100	1100	1140	1250
15	8	20	Lamo	3.2 KM W OF 15 & 855 MUNDARE	720	760	750	760	760	770	800	780	780	820	890
15	8	20	Lamo	W OF 855 AT MUNDARE NJ	980	1030	900	910	910	930	950	940	950	980	1080
15	8	20	Lamo	S OF 855 AT MUNDARE NJ	2380	2590	2200	2660	2680	2720	2800	2790	3070	3180	3490
15	8	20	Lamo	N OF 16 & 855 S OF MUNDARE	2410	2630	2700	2370	2370	2410	2450	2440	2630	2730	3000
16	2	4	Yelw	JASPER PARK GATES	3100	3220	3360	3380	3360	3410	3530	3310	3440	3650	4840
16	2	4	Yelw	W OF FOLDING MTN W ACC 19-49-26-505000500			3290	3320	3300	3340	3480	3210	3350	3510	4710
16	2	4	Yelw	E OF FOLDING MTN W ACC 19-49-26-505000500			3270	3310	3290	3330	3470	3200	3340	3500	4690
16	2	4	Yelw	W OF FOLDING MTN E ACC 19-49-26-501500425			3270	3310	3290	3350	3470	3220	3360	3520	4720
16	2	4	Yelw	E OF FOLDING MTN E ACC 19-49-26-501500425			3320	3360	3340	3400	3520	3270	3410	3570	4790
16	2	4	Yelw	W OF JASPER/HINTON AIRPORT ACC 14-50-26-509000450							3550	3290	3440	3610	4840
16	2	4	Yelw	W OF JASPER/HINTON AIRPORT ACC 14-50-26-509000450							3570	3310	3460	3630	4870
16	2	4	Yelw	W OF 40 SE OF ENTRANCE WJ	3260	3380	3570	3600	3660	3720	3890	3610	3780	3660	4910
16	2	8	Yelw	E OF 40 SE OF ENTRANCE WJ	4800	4940	5210	5200	5020	5020	5240	5000	5100	5540	6640
16	2	8	Yelw	W OF 40 SW OF HINTON EJ	4800	4940	5190	5200	5020	5110	5240	5000	5100	5540	6640
16	2	12	Yelw	E OF 40 SW OF HINTON EJ	5660	5800	6110	6090	5780	5860	5950	5690	5810	6450	7730
16	2	12	Yelw	W OF PARKWEST MALL E ACC 9-51-25-505701300	4560	4680	4910	4900	5080	5350	5430	5190	5300	6070	7270
16	2	12	Yelw	E OF PARKWEST MALL E ACC 9-51-25-505701300	9100	9330	9800	9770	10130	9860	10220	9770	9980	10910	13070
16	2	12	Yelw	W OF MOUNTAIN ST IN HINTON 10-51-25-509680074		9010	9470	9450	9800	9970	11880	11360	11600	12680	15190
16	2	12	Yelw	E OF MOUNTAIN ST IN HINTON 10-51-25-509680074		8650	9090	9070	9400	9570	12140	11600	11850	12950	15510
16	2	12	Yelw	W OF SWITZER DR WJ IN HINTON 15-51-25-500001090		8890	9340	9320	9650	9820	12770	12210	12460	13630	16330
16	2	12	Yelw	E OF SWITZER DR WJ IN HINTON 15-51-25-500001090		6270	6590	6570	6810	6930	7970	7620	7900	8640	10350
16	2	12	Yelw	W OF BROOKHART ST IN HINTON 13-51-25-508002000	4820	5150	5410	5390	5600	6530	7470	7160	7420	8120	9730
16	2	12	Yelw	E OF BROOKHART ST IN HINTON 13-51-25-508002000	4740	5070	5310	5290	5480	6320	7230	6920	7220	7900	9460
16	2	12	Yelw	W OF SWITZER DR IN HINTON 19-51-24-508050500							7230	6920	7220	7900	9460
16	2	16	Yelw	E OF SWITZER DR IN HINTON 19-51-24-508050500							4990	4770	5050	5530	6620
16	2	16	Yelw	10 KM E OF 16 & 40 HINTON EJ	4130	4400	4640	4620	4790	4960	4910	4820	5110	5680	6600
16	4	4	Yelw	W OF OBED RD 8-53-22-505001150	3750	3990	4200	4200	4350	4550	4600	4570	4840	5290	6340
16	4	4	Yelw	E OF OBED RD 8-53-22-505001150	3730	3970	4180	4180	4330	4530	4590	4550	4820	5270	6310
16	4	4	Yelw	W OF 47 W OF EDSON	4430	4620	5320	5280	5580	5870	5760	5720	6120	6850	7770
16	6	4	Yelw	E OF 47 W OF EDSON	5850	6360	6680	6640	7070	7400	7280	7220	7730	8640	9800
16	6	4	Yelw	1.6 KM E OF 16 & 47 EDSON	5850	6360	6680	6630	7070	7400	7190	7400	7900	8900	9800
16	6	4	Yelw	W OF SCHICK RD 11-53-18-500000000	5850	6360	6670	6630	7070	7390	7280	7220	7730	8640	9800
16	6	4	Yelw	E OF SCHICK RD 11-53-18-500000000	6150	6990	7340	7300	7700	8060	7780	7720	8270	9250	10490
16	6	8	Yelw	W OF 748 IN EDSON 23-53-17-500001420	7640	8230	8560	8430	8780	9000	9960	9820	10290	11250	12960
16	6	8	Yelw	E OF 748 IN EDSON 23-53-17-500001420	6600	7120	7440	7330	7640	7840	8060	7950	8330	9110	10500
16	6	8	Yelw	W OF WOLF CREEK RD WEST ACC 13-53-17-500000000	6380	6880	7160	7040	7340	7410	7610	7450	7810	8530	9830
16	6	8	Yelw	E OF WOLF CREEK RD WEST ACC 13-53-17-500000000	5590	6030	6270	6170	6430	6610	6770	6630	6950	7590	8750
16	6	8	Yelw	W OF WOLF CREEK RD EAST ACC 18-53-15-515900600		5970	6310	6290	6570	6470	6730	6590	6910	7560	8710

ALBERTA HIGHWAYS 1 TO 986
TRAFFIC VOLUME HISTORY 1996 - 2005

Alberta Infrastructure and Transportation
Program Management Branch
Highway Asset Management Section

Produced: 03-Mar-2006 By CornerStone Solutions Inc.

Hwy	CS	TCS	Muni	From	1996 AADT	1997 AADT	1998 AADT	1999 AADT	2000 AADT	2001 AADT	2002 AADT	2003 AADT	2004 AADT	2005 AADT	2005 ASDT
822	2	4	Weta	S OF 611 NW OF FERINTOSH EJ		170	190	230	230	230	230	230	280	280	330
822	4	4	Weta	N OF 611 E OF HOBBEMA WJ		320	330	390	400	420	420	420	760	760	910
822	4	4	Weta	S OF 613 E OF WETASKIWIN WJ				770	790	810	810	810	860	860	1030
822	6	4	Weta	N OF 613 S OF GWYNNE EJ		140	140	100	110	110	110	110	140	140	160
822	6	4	Weta	E OF LOCAL RD 24-46-23-404650060		230					210	210	210	210	240
822	6	4	Weta	N OF LOCAL RD 24-46-23-404650060		150	150	150	150	160	160	160	160	160	180
822	6	4	Weta	S OF 13 N OF GWYNNE	200	200	200	200	200	170	170	170	170	170	190
822	6	8	Weta	N OF 13 N OF GWYNNE	180	180	180	180	180	180	180	180	180	180	200
822	6	8	Ledc	S OF 616 SW OF HAY LAKES		60	70	90	100	120	120	120	120	120	140
824	2	4	Strc	N OF 14 NW OF COOKING LAKE	350	380	310	320	320	320	330	330	340	340	370
824	2	4	Strc	S OF 629 NW OF COOKING LAKE		340	340	330	350	370	380	340	350	350	380
824	2	8	Strc	N OF 629 NW OF COOKING LAKE		340	340	340	350	370	380	320	330	330	360
824	2	8	Strc	S OF 630 S OF ARDROSSAN		1400	1540	1270	1170	1230	1260	1260	1240	1250	1360
824	2	12	Strc	N OF 630 S OF ARDROSSAN		2050	2250	1870	1710	1830	1880	1880	2070	2110	2330
824	2	12	Strc	S OF 16 E OF QUEENSDALE PL	2350	2500	2630	2650	2600	2710	3180	3180	3200	3280	3630
825	2	4	Stur	N OF 37 W OF FT SASK	2970	3180	3400	3450	3430	3600	3820	3770	3770	4010	4380
825	2	4	Stur	S OF BOYSDALE RD 9-55-22-414500250				3460	3440	3590	3820	3770	3490	3690	4030
825	2	4	Stur	N OF BOYSDALE RD 9-55-22-414500250				3140	3130	3260	3450	3400	3180	3360	3670
825	2	4	Stur	S OF 643 E OF GIBBONS		1640	1670	1850	1940	1960	1960	1960	1990	1990	2130
827	2	4	Thor	N OF 28 S OF EGREMONT	770	790	790	730	750	790	790	800	800	820	930
827	2	4	Thor	S OF 18 S OF THORHILD	850	850	850	1490	1490	1530	1530	710	710	710	790
827	2	8	Thor	N OF 18 S OF THORHILD	2210	2220	2200	3830	3830	3970	3970	2200	2200	2240	2480
827	2	12	Thor	S OF 661 NE OF MAPOVA EJ		100	100	240	270	270	270	220	220	220	250
827	4	4	Thor	N OF 661 NW OF MAPOVA WJ		100	110	70	80	80	80	90	90	90	100
827	4	4	Atha	S OF NEW PINE CREEK RD 24-63-22-400000250	130	80	80	80	100	120	120	130	130	130	150
827	4	4	Atha	N OF NEW PINE CREEK RD 24-63-22-400000250	120	90	90	90	100	160	140	150	150	150	170
827	4	4	Atha	S OF 663 E OF COLINTON	200	200	200	190	210	220	220	230	220	220	250
827	4	8	Atha	N OF 663 E OF COLINTON	860	880	880	680	760	790	770	780	810	810	910
827	4	8	Atha	S OF 55 E OF ATHABASCA	820	840	910	930	990	1070	1070	1120	1120	1120	1250
829	2	4	Stur	N OF 644 E OF REDWATER		630	630	630	870	890	890	900	900	840	970
829	2	4	Thor	S OF LOCAL RD 10-58-21-400000000		630	630	630	650	670	670	680	680	680	790
829	2	4	Thor	N OF LOCAL RD 10-58-21-400000000		620	620	630	650	630	630	640	640	640	740
829	2	4	Thor	S OF 28 & 63 W OF RADWAY	440	480	600	700	720	760	760	770	680	680	790
830	2	4	Strc	N OF 630 W OF UNCAS		260	300	280	380	410	440	440	440	460	510
830	2	4	Strc	S OF TWP RD 530 (BLN RD EXT) 31-52-21-400000000			370	350	380	400	420	420	420	440	490
830	2	4	Strc	N OF TWP RD 530 (BLN RD EXT) 31-52-21-400000000			270	260	260	280	460	460	460	480	530
830	2	4	Strc	S OF 16 W OF ELK ISLAND PARK	370	390	390	570	590	620	630	630	540	540	600
830	2	8	Strc	N OF 16 W OF ELK ISLAND PARK	770	810	830	790	830	870	890	890	1250	1270	1400
830	2	8	Strc	S OF TWP RD 550 31-54-21-400000000		410	410	380	380	420	430	420	440	440	490
830	2	12	Strc	N OF TWP RD 550 31-54-21-400000000		310	310	320	320	340	350	440	460	460	510
830	2	12	Strc	S OF TWP RD 552 8-55-21-400000000						460	260	380	400	480	530

ALBERTA HIGHWAYS 1 TO 986
TRAFFIC VOLUME HISTORY 1996 - 2005

Alberta Infrastructure and Transportation
Program Management Branch
Highway Asset Management Section

Produced 03-Mar-2006 By CornerStone Solutions Inc.

Hwy	CS	TCS	Muni	From	1996 AADT	1997 AADT	1998 AADT	1999 AADT	2000 AADT	2001 AADT	2002 AADT	2003 AADT	2004 AADT	2005 AADT	2005 ASDT
830	2	12	Strc	N OF TWP RD 552 8-55-21-400000000						440	260	380	400	460	510
830	2	12	Strc	S OF 15 N OF JOSEPHBURG WJ	280	290	310	400	400	410	450	400	420	440	490
830	4	4	Strc	N OF 15 NE OF FT SASK EJ	710	730	1100	1080	1040	1100	1140	1140	1150	1190	1320
830	4	4	Strc	S OF 38 E OF AMELIA	790	790	880	880	1240	1370	1410	1400	1400	1520	1690
831	2	4	Lamo	S OF 15 W OF LAMONT WJ	310	310	310	310	330	330	330	330	340	360	400
831	4	4	Lamo	N OF 15 W OF LAMONT EJ			1490	1490	1490	1570	1240	1240	1240	1280	1410
831	4	4	Lamo	S OF 637 AT LAMONT	1570	1650	1670	1660	1650	1710	1710	1540	1540	1580	1740
831	4	8	Lamo	N OF 637 AT LAMONT	1490	1570	1590	2000	2000	2090	2090	2190	2190	2230	2450
831	4	8	Lamo	S OF 45 S OF SKARO	1450	1470	1550	1510	1450	2500	2500	2420	2430	2480	2730
831	6	4	Lamo	N OF 45 S OF SKARO	1570	1590	1670	1610	1540	2600	2600	2520	2530	2620	3030
831	6	4	Lamo	S OF VICTORIA TR 32-58-19-400000150										2050	2370
831	6	4	Lamo	N OF VICTORIA TR 32-58-19-400000150										2030	2340
831	6	4	SmkL	S OF 28 NW OF WASKATENAU	1080	1160	1160	1160	1390	1490	1490	1500	1510	2060	2380
831	8	4	SmkL	N OF 28 NW OF WASKATENAU	1230	1350	1350	1360	1450	1600	1630	1730	1760	2220	2800
831	8	4	SmkL	S OF 656 AT SPRUCEFIELD		1250	1260	1580	1710	1920	1940	2030	2070	2290	2890
831	8	8	SmkL	N OF 656 AT SPRUCEFIELD		980	980	1300	1420	1610	1630	1730	1790	1990	2510
831	8	8	Thor	S OF 661 E OF NEWBROOK		1020	1020	1130	1210	1360	1380	1470	1600	1780	2240
831	10	4	Thor	N OF 661 E OF NEWBROOK		1060	1060	1160	1250	1410	1430	1520	1570	1730	2180
831	10	4	Thor	27 0 KM S OF BOYLE	950	1040	1090	1150	1240	1390	1430	1540	1530	1740	2130
831	10	4	Thor	S OF PR 104 (LONG LAKE PP ACC) 9-63-19-400001045										1720	2170
831	10	4	Thor	N OF PR 104 (LONG LAKE PP ACC) 9-63-19-400001045										1720	2170
831	10	4	Atha	S OF 663 AT BOYLE	910	970	970	1250	1350	1410	1430	1520	1920	2110	2660
831	10	8	Atha	N OF 663 AT BOYLE	1330	1420	1420	1210	1290	1350	1370	1460	2100	2310	2910
831	10	8	Atha	S OF 63 AT BOYLE NJ	1580	1680	1720	1770	1410	1590	1610	1710	2030	2240	2820
833	2	4	Camr	S OF LOCAL RD 10-47-20-400000000		1850	1890	2650	2650	2710	2710	2530	2530	2530	2850
833	2	4	Camr	N OF LOCAL RD 10-7-20-400000000		1700	1740	2610	2610	2670	2670	2610	2610	2610	2940
833	2	4	Camr	S OF 617 SW OF KINGMAN WJ		1050	1050	1070	1480	1540	1540	1540	1540	1390	1570
833	4	8	Beav	S OF TWP RD 510 35-50-20-400000000		180	210	190	230	250	250	260	260	210	230
833	4	8	Beav	N OF TWP RD 510 35-50-20-400000000		260	310	280	410	450	450	460	460	480	520
833	4	8	Strc	S OF 14 & 630 W OF TOFIELD	390	340	400	210	210	260	260	480	480	490	530
834	1	4	Camr	N OF 13 & 56 W OF OHATON	90	100					490	510	510	510	590
834	1	4	Camr	S OF 26 E OF CAMROSE		100	660	660	680	710	450	440	480	480	570
834	2	4	Camr	N OF 26 E OF CAMROSE EJ	810	860	860	780	760	800	820	830	820	820	890
834	2	4	Beav	S OF 617 NW OF ROUND HILL		660	660	1310	1310	1370	1370	640	640	640	700
834	2	8	Beav	N OF 617 NW OF ROUND HILL		640	640	1330	1340	1400	1400	720	720	720	780
834	2	8	Beav	S OF 14 E OF TOFIELD EJ	650	690	720	880	880	920	920	740	740	740	810
834	4	4	Beav	N OF 14 IN TOFIELD WJ	2130	2290	2330	2480	2460	2540	2540	2380	2400	2430	2640
834	4	4	Beav	W OF 626 AT TOFIELD		950	970	990	1750	1790	1790	1720	1730	1780	1940
834	4	4	Beav	N OF 626 AT TOFIELD		760	780	790	1180	1200	1200	1160	1170	1410	1530
834	4	8	Lamo	S OF 16 E OF ELK ISLAND PK	420	470	470	490	490	470	470	470	470	470	530
834	6	4	Lamo	N OF 16 E OF ELK ISLAND PK	230	240	240	240	240	350	350	350	350	350	390

Turning Movement Summary Diagram

Reference No.: 97530
Intersection of:
15 & 21 AT FT SASK

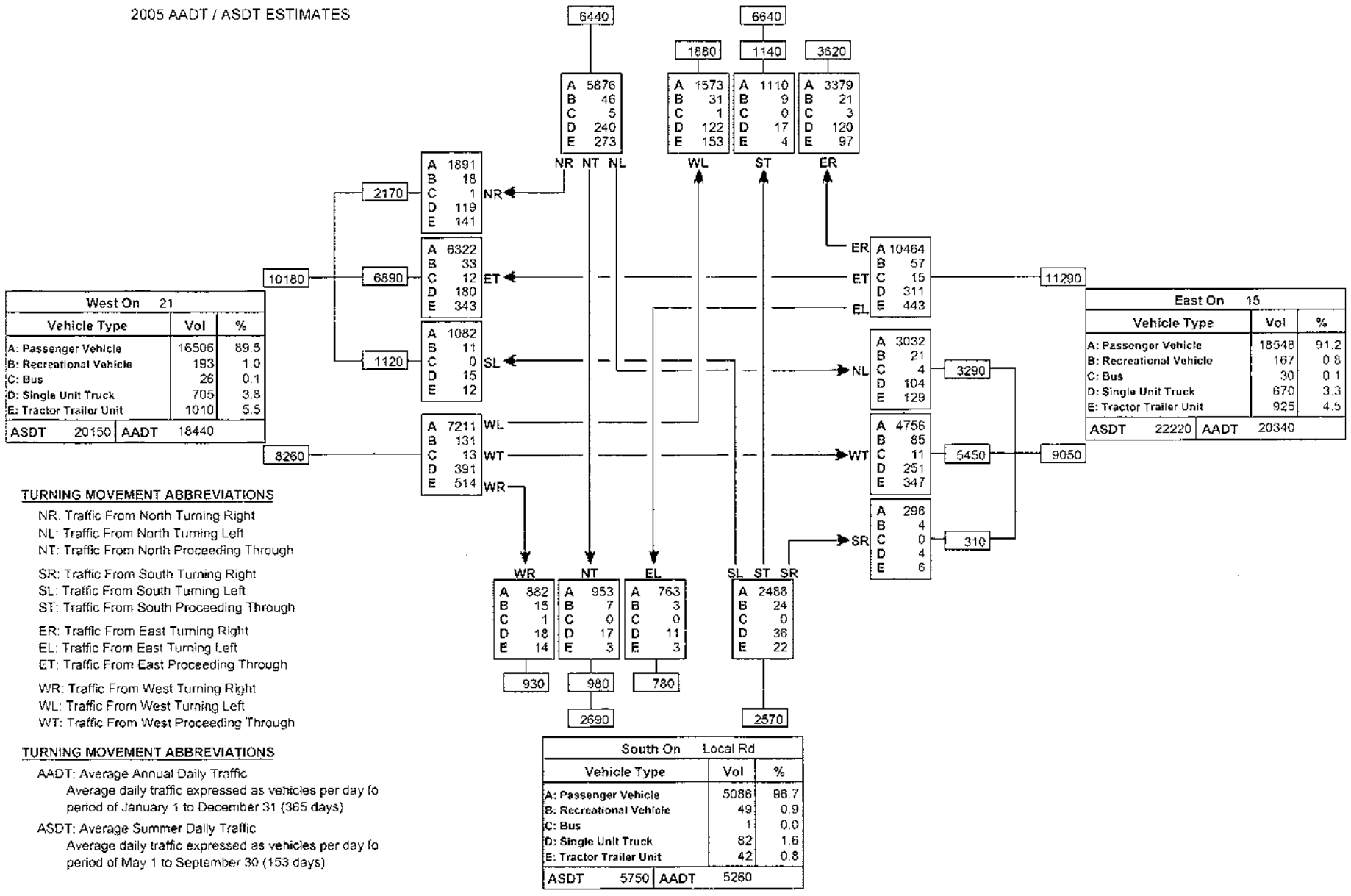
2005 AADT / ASDT ESTIMATES

North On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	11938	91.3
B: Recreational Vehicle	107	0.8
C: Bus	9	0.1
D: Single Unit Truck	499	3.8
E: Tractor Trailer Unit	527	4.0
ASDT 14290	AADT 13080	

West On 21		
Vehicle Type	Vol	%
A: Passenger Vehicle	16506	89.5
B: Recreational Vehicle	193	1.0
C: Bus	26	0.1
D: Single Unit Truck	705	3.8
E: Tractor Trailer Unit	1010	5.5
ASDT 20150	AADT 18440	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	18548	91.2
B: Recreational Vehicle	167	0.8
C: Bus	30	0.1
D: Single Unit Truck	670	3.3
E: Tractor Trailer Unit	925	4.5
ASDT 22220	AADT 20340	

South On Local Rd		
Vehicle Type	Vol	%
A: Passenger Vehicle	5086	96.7
B: Recreational Vehicle	49	0.9
C: Bus	1	0.0
D: Single Unit Truck	82	1.6
E: Tractor Trailer Unit	42	0.8
ASDT 5750	AADT 5260	



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
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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.: 97530
Intersection of:
15 & 21 AT FT SASK

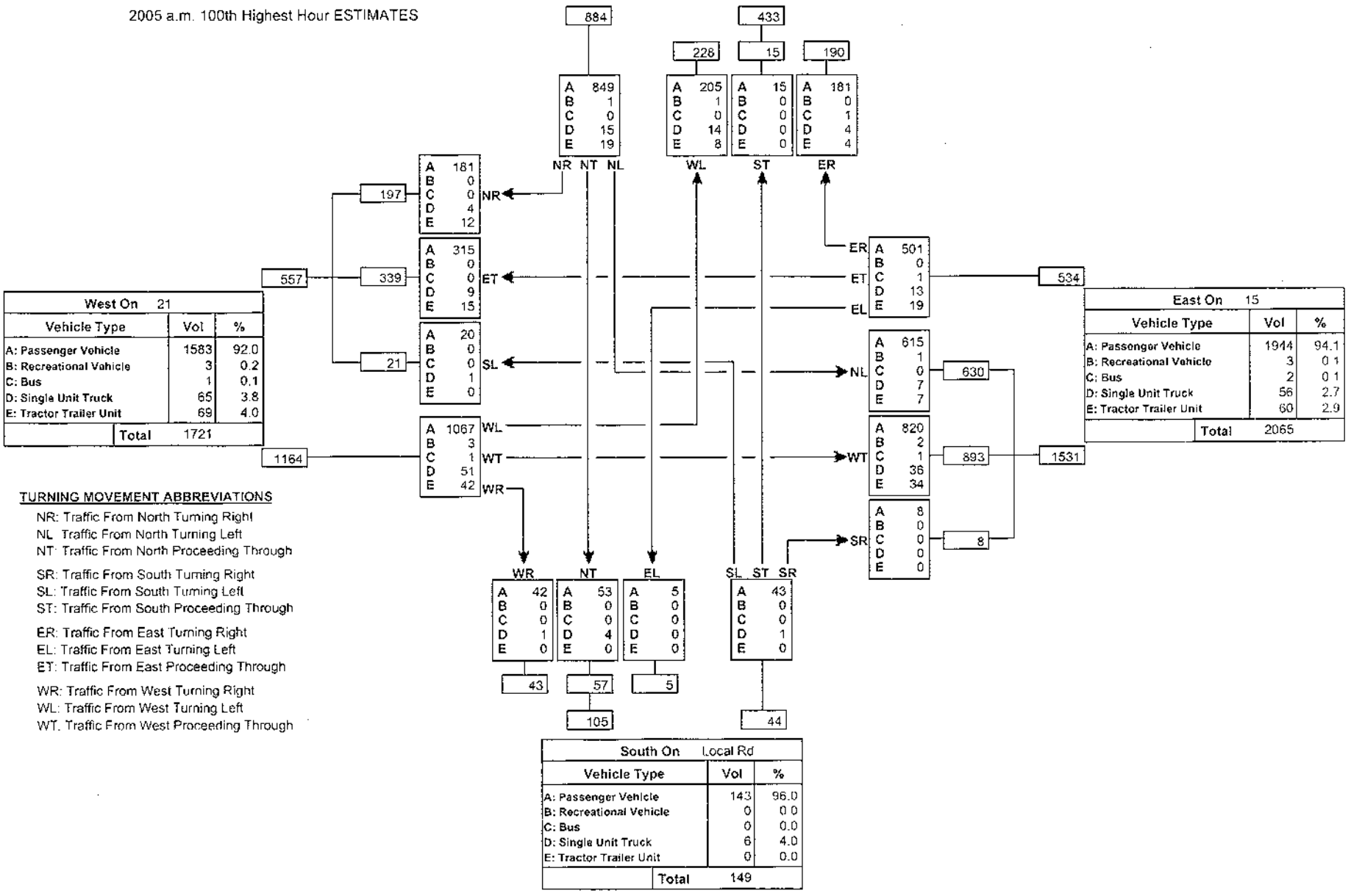
2005 a.m. 100th Highest Hour ESTIMATES

North On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	1250	94.9
B: Recreational Vehicle	2	0.2
C: Bus	1	0.1
D: Single Unit Truck	33	2.5
E: Tractor Trailer Unit	31	2.4
Total	1317	

West On 21		
Vehicle Type	Vol	%
A: Passenger Vehicle	1583	92.0
B: Recreational Vehicle	3	0.2
C: Bus	1	0.1
D: Single Unit Truck	65	3.8
E: Tractor Trailer Unit	69	4.0
Total	1721	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	1944	94.1
B: Recreational Vehicle	3	0.1
C: Bus	2	0.1
D: Single Unit Truck	56	2.7
E: Tractor Trailer Unit	60	2.9
Total	2065	

South On Local Rd		
Vehicle Type	Vol	%
A: Passenger Vehicle	143	96.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	6	4.0
E: Tractor Trailer Unit	0	0.0
Total	149	



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WT: Traffic From West Proceeding Through

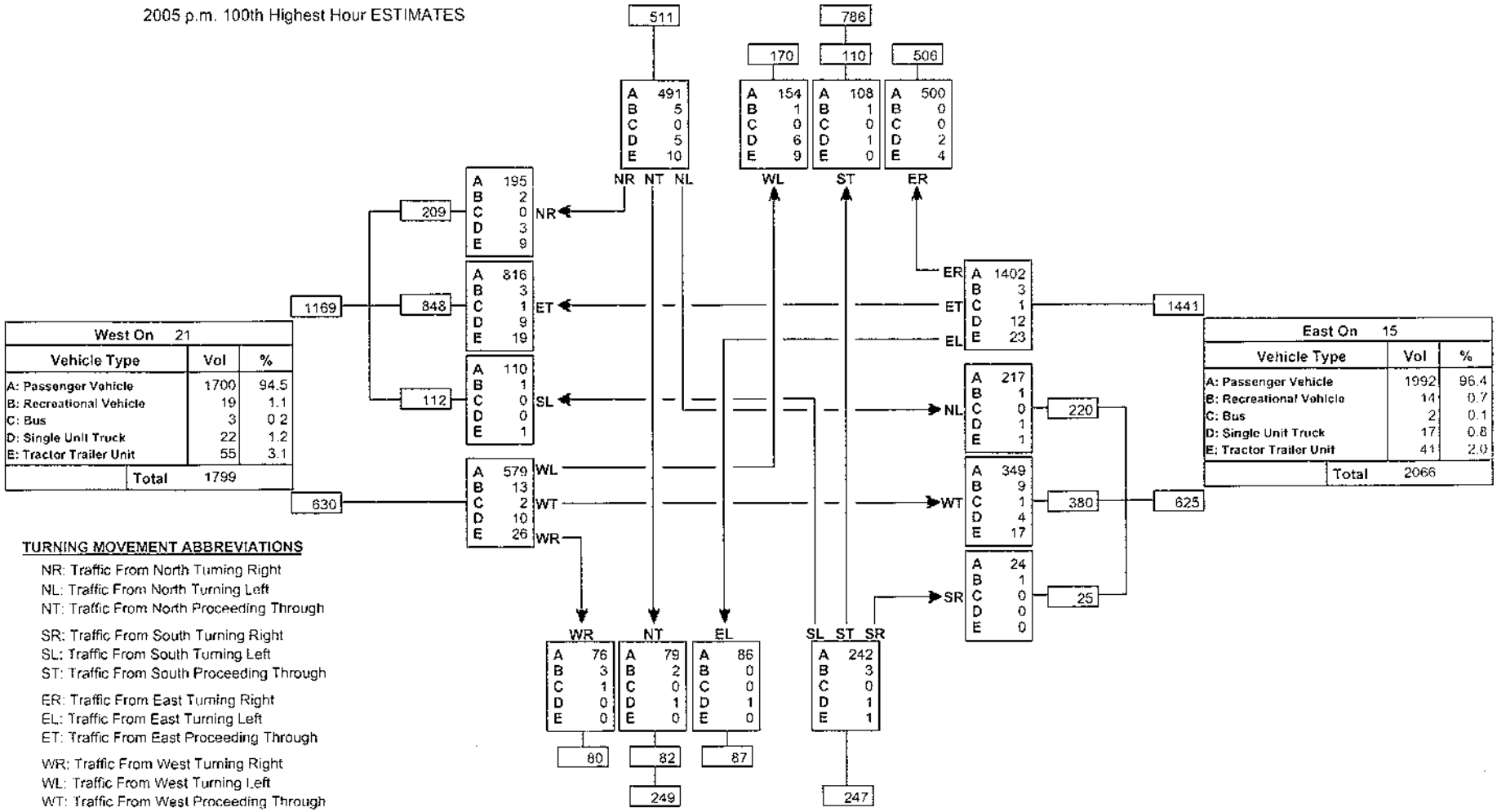
Turning Movement Summary Diagram

Reference No.: 97530

Intersection of:
15 & 21 AT FT SASK

2005 p.m. 100th Highest Hour ESTIMATES

North On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	1253	96.6
B: Recreational Vehicle	7	0.5
C: Bus	0	0.0
D: Single Unit Truck	14	1.1
E: Tractor Trailer Unit	23	1.8
Total	1297	



West On 21		
Vehicle Type	Vol	%
A: Passenger Vehicle	1700	94.5
B: Recreational Vehicle	19	1.1
C: Bus	3	0 2
D: Single Unit Truck	22	1.2
E: Tractor Trailer Unit	55	3.1
Total	1799	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	1992	96.4
B: Recreational Vehicle	14	0.7
C: Bus	2	0.1
D: Single Unit Truck	17	0.8
E: Tractor Trailer Unit	41	2.0
Total	2066	

South On Local Rd		
Vehicle Type	Vol	%
A: Passenger Vehicle	483	97.4
B: Recreational Vehicle	8	1.6
C: Bus	1	0.2
D: Single Unit Truck	3	0.6
E: Tractor Trailer Unit	1	0.2
Total	496	

TURNING MOVEMENT ABBREVIATIONS

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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

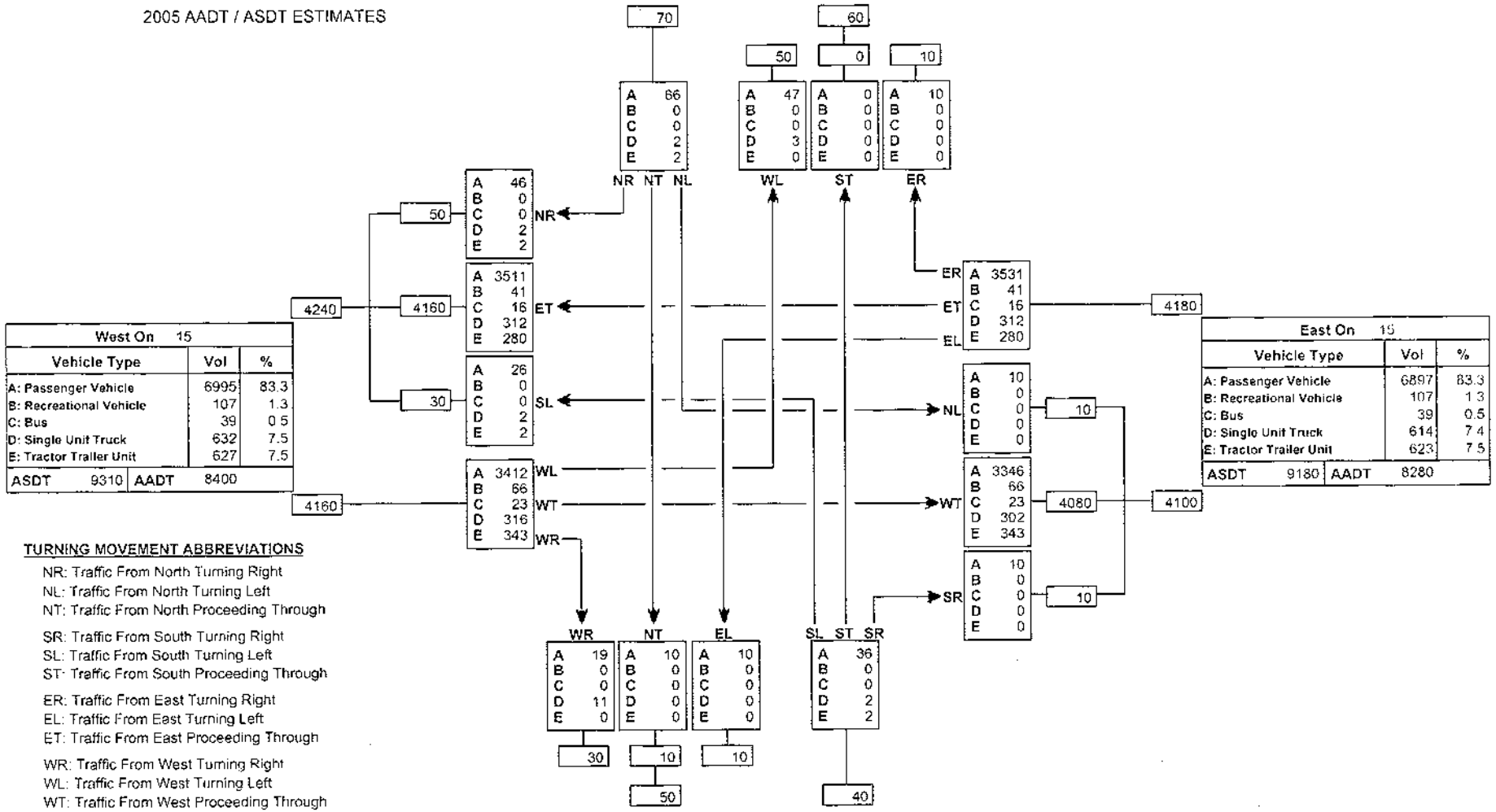
2005 AADT / ASDT ESTIMATES

North On Rge Rd 220		
Vehicle Type	Vol	%
A: Passenger Vehicle	123	94.6
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	5	3.8
E: Tractor Trailer Unit	2	1.5
ASDT 140	AADT 130	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	6995	83.3
B: Recreational Vehicle	107	1.3
C: Bus	39	0.5
D: Single Unit Truck	632	7.5
E: Tractor Trailer Unit	627	7.5
ASDT 9310	AADT 8400	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	6897	83.3
B: Recreational Vehicle	107	1.3
C: Bus	39	0.5
D: Single Unit Truck	614	7.4
E: Tractor Trailer Unit	623	7.5
ASDT 9180	AADT 8280	

South On Rge Rd 220		
Vehicle Type	Vol	%
A: Passenger Vehicle	75	83.3
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	13	14.4
E: Tractor Trailer Unit	2	2.2
ASDT 100	AADT 90	



TURNING MOVEMENT ABBREVIATIONS

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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)

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

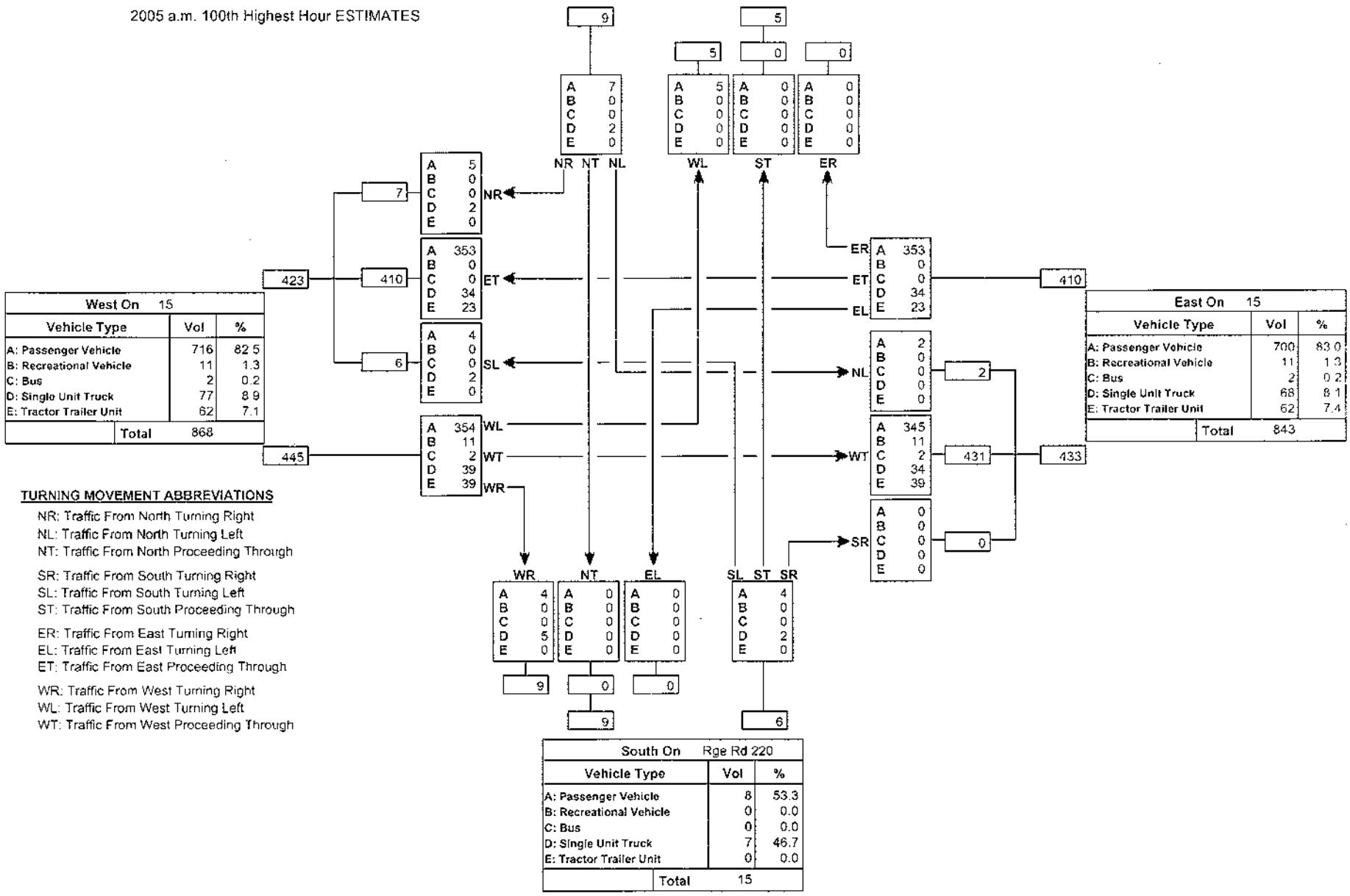
2005 a.m. 100th Highest Hour ESTIMATES

North On Rge Rd 220		
Vehicle Type	Vol	%
A: Passenger Vehicle	12	85.7
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	2	14.3
E: Tractor Trailer Unit	0	0.0
Total	14	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	716	82.5
B: Recreational Vehicle	11	1.3
C: Bus	2	0.2
D: Single Unit Truck	77	8.9
E: Tractor Trailer Unit	62	7.1
Total	868	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	700	83.0
B: Recreational Vehicle	11	1.3
C: Bus	2	0.2
D: Single Unit Truck	68	8.1
E: Tractor Trailer Unit	62	7.4
Total	843	

South On Rge Rd 220		
Vehicle Type	Vol	%
A: Passenger Vehicle	8	53.3
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	7	46.7
E: Tractor Trailer Unit	0	0.0
Total	15	



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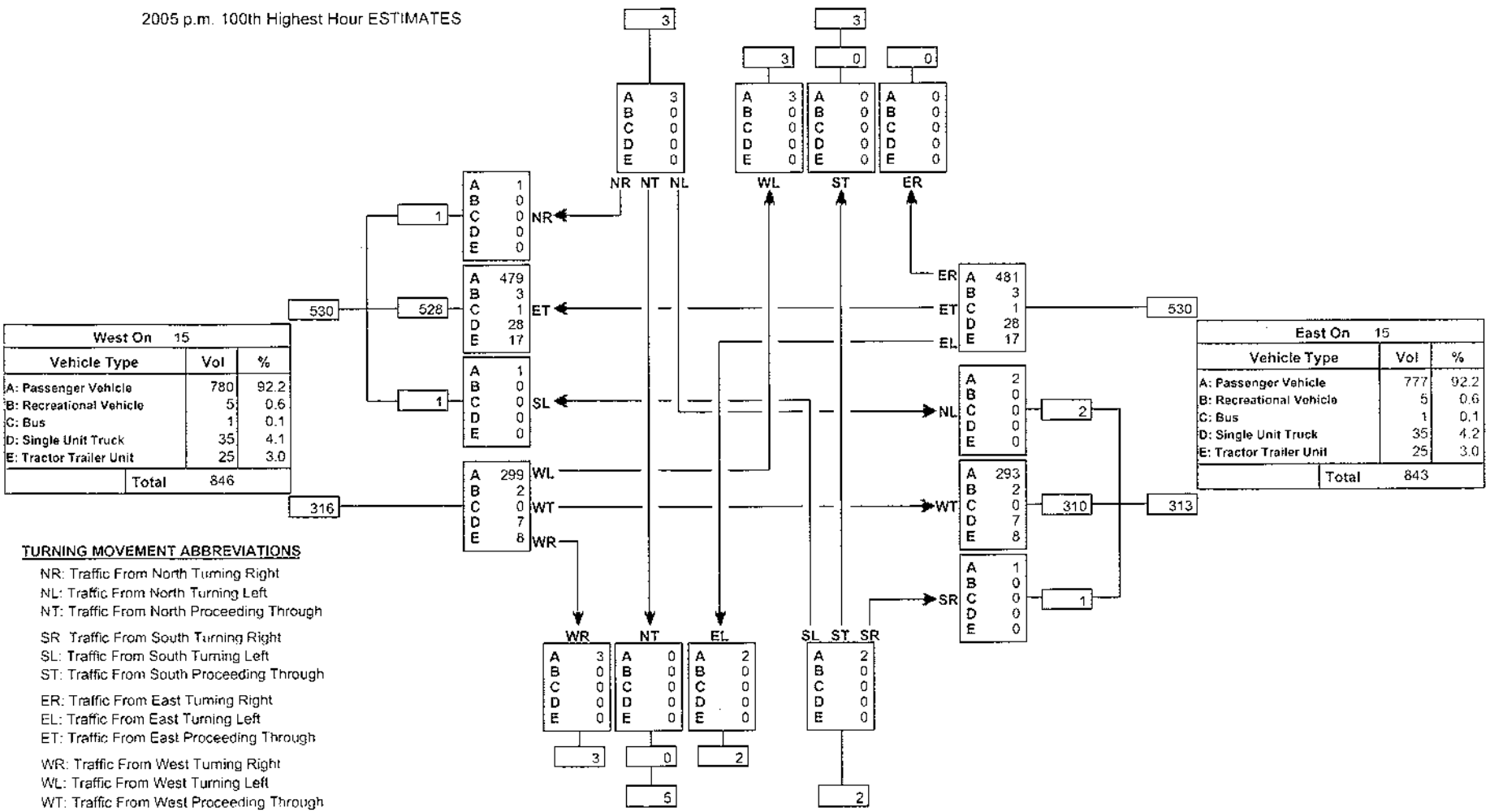
Turning Movement Summary Diagram

Reference No.: 97552

Intersection of:

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

2005 p.m. 100th Highest Hour ESTIMATES



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

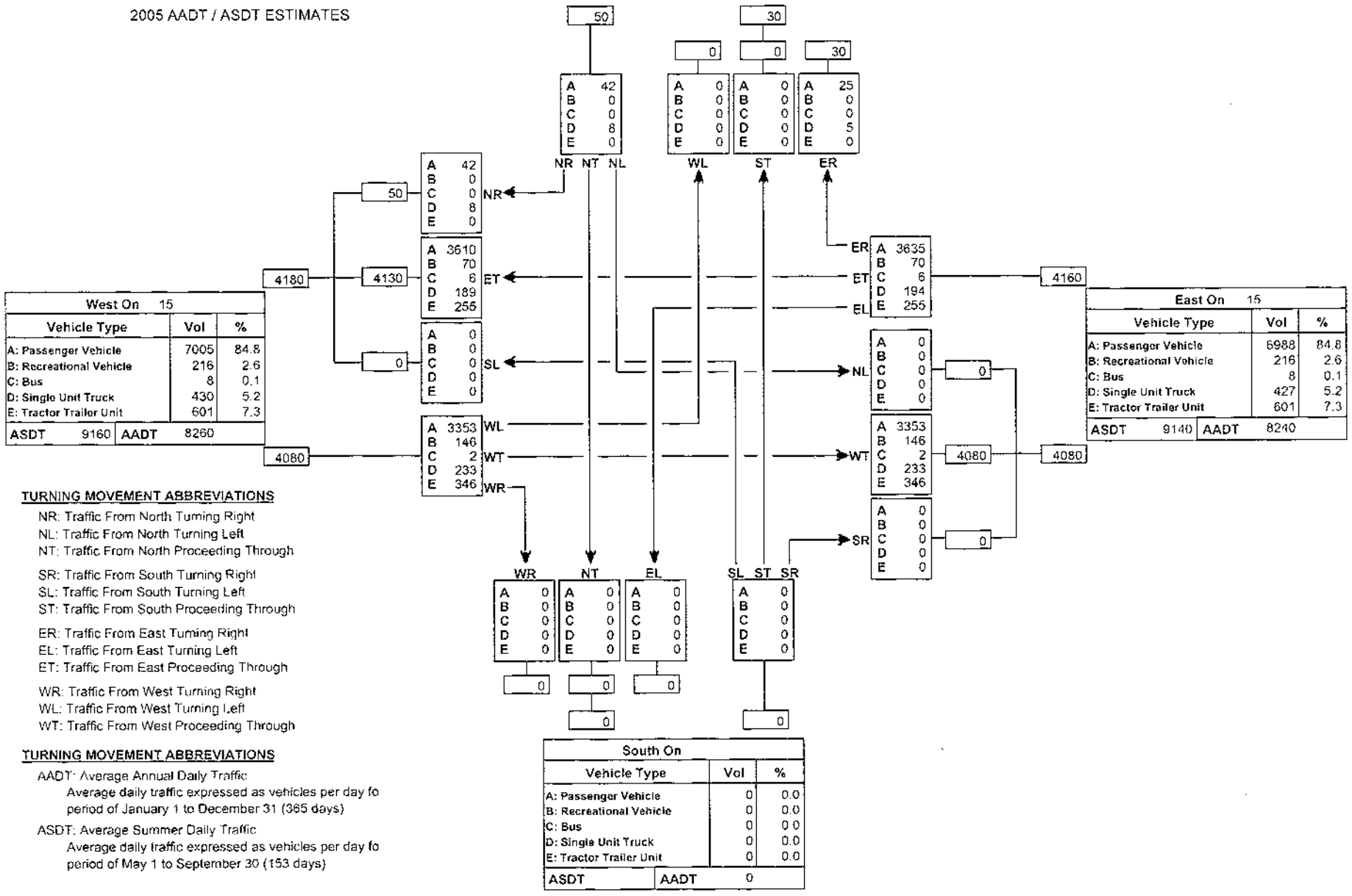
Turning Movement Summary Diagram

Reference No.: 98556

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

2005 AADT / ASDT ESTIMATES

North On RgeRd 215A		
Vehicle Type	Vol	%
A: Passenger Vehicle	67	83.8
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	13	16.3
E: Tractor Trailer Unit	0	0.0
ASDT 90	AADT 80	



West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	7005	84.8
B: Recreational Vehicle	216	2.6
C: Bus	8	0.1
D: Single Unit Truck	430	5.2
E: Tractor Trailer Unit	601	7.3
ASDT 9160	AADT 8260	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	6988	84.8
B: Recreational Vehicle	216	2.6
C: Bus	8	0.1
D: Single Unit Truck	427	5.2
E: Tractor Trailer Unit	601	7.3
ASDT 9140	AADT 8240	

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	

TURNING MOVEMENT ABBREVIATIONS

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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)

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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.: 98556

Intersection of:

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

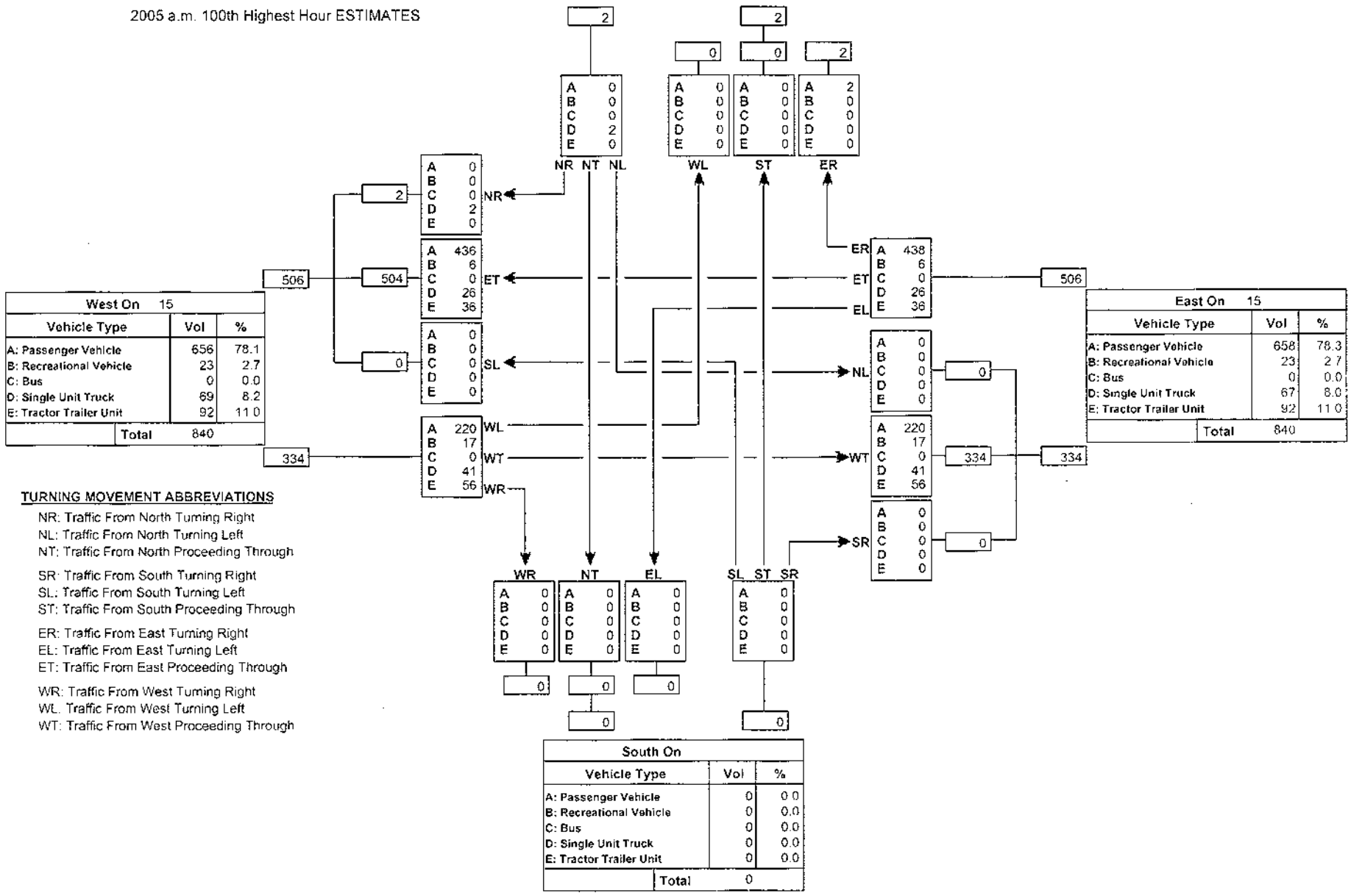
2005 a.m. 100th Highest Hour ESTIMATES

North On RgeRd 215A		
Vehicle Type	Vol	%
A: Passenger Vehicle	2	50.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	2	50.0
E: Tractor Trailer Unit	0	0.0
Total	4	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	656	78.1
B: Recreational Vehicle	23	2.7
C: Bus	0	0.0
D: Single Unit Truck	69	8.2
E: Tractor Trailer Unit	92	11.0
Total	840	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	658	78.3
B: Recreational Vehicle	23	2.7
C: Bus	0	0.0
D: Single Unit Truck	67	8.0
E: Tractor Trailer Unit	92	11.0
Total	840	

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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Turning Movement Summary Diagram

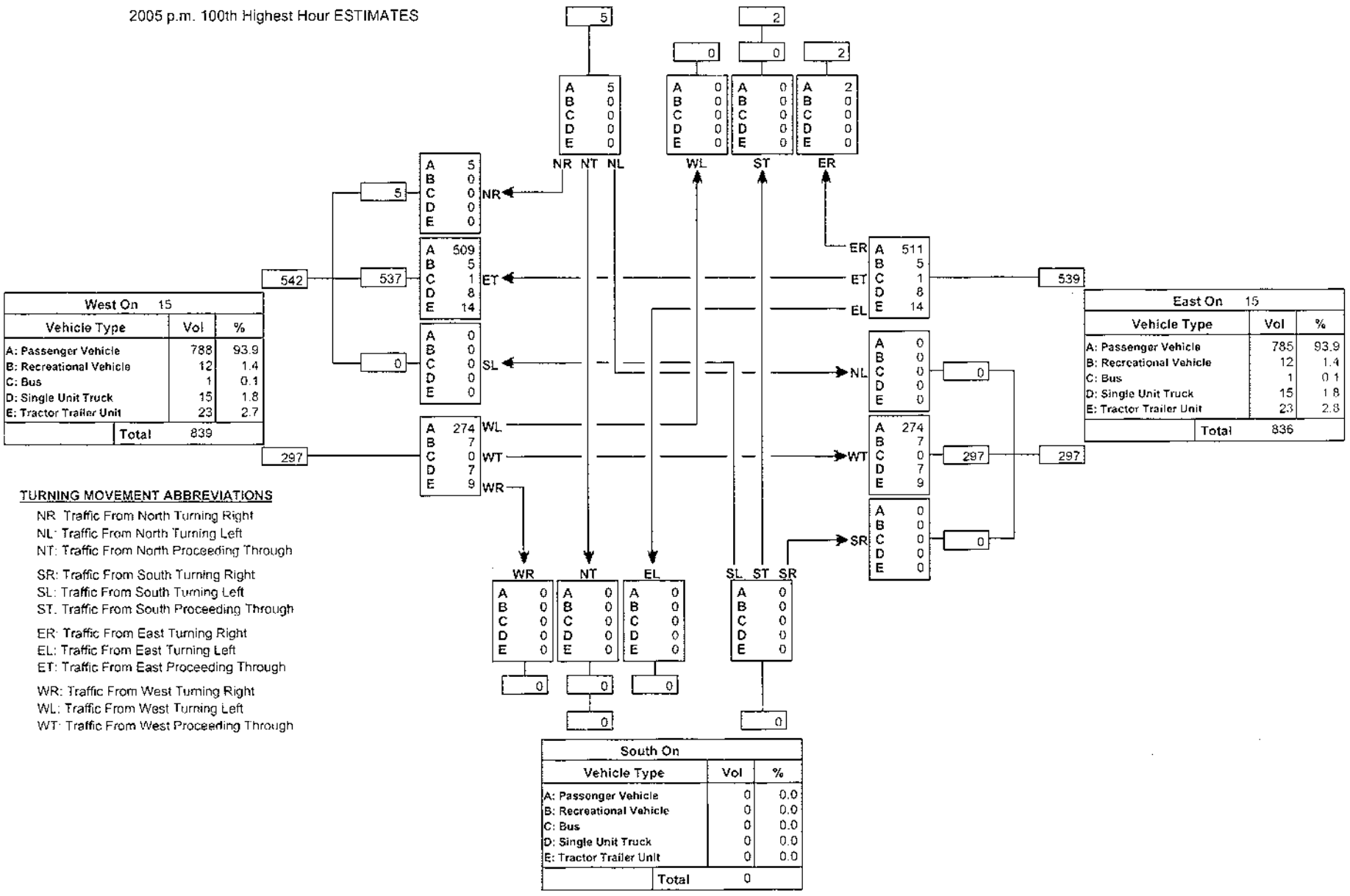
Reference No.: 98556

Intersection of:

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

2005 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	788	93.9
B: Recreational Vehicle	12	1.4
C: Bus	1	0.1
D: Single Unit Truck	15	1.8
E: Tractor Trailer Unit	23	2.7
Total	839	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	785	93.9
B: Recreational Vehicle	12	1.4
C: Bus	1	0.1
D: Single Unit Truck	15	1.8
E: Tractor Trailer Unit	23	2.8
Total	836	

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.: 70000056

Intersection of:

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

2005 AADT / ASDT ESTIMATES

North On Local Rd		
Vehicle Type	Vol	%
A: Passenger Vehicle	17	85.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	3	15.0
E: Tractor Trailer Unit	0	0.0
ASDT 20	AADT 20	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	7063	85.7
B: Recreational Vehicle	160	1.9
C: Bus	85	1.0
D: Single Unit Truck	433	5.3
E: Tractor Trailer Unit	499	6.1
ASDT 9140	AADT 8240	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	7026	85.7
B: Recreational Vehicle	160	2.0
C: Bus	85	1.0
D: Single Unit Truck	430	5.2
E: Tractor Trailer Unit	490	6.1
ASDT 9090	AADT 8200	

South On Rge Rd 215		
Vehicle Type	Vol	%
A: Passenger Vehicle	20	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
ASDT 20	AADT 20	

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WT: Traffic From West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

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Turning Movement Summary Diagram

Reference No.: 70000056

Intersection of:

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

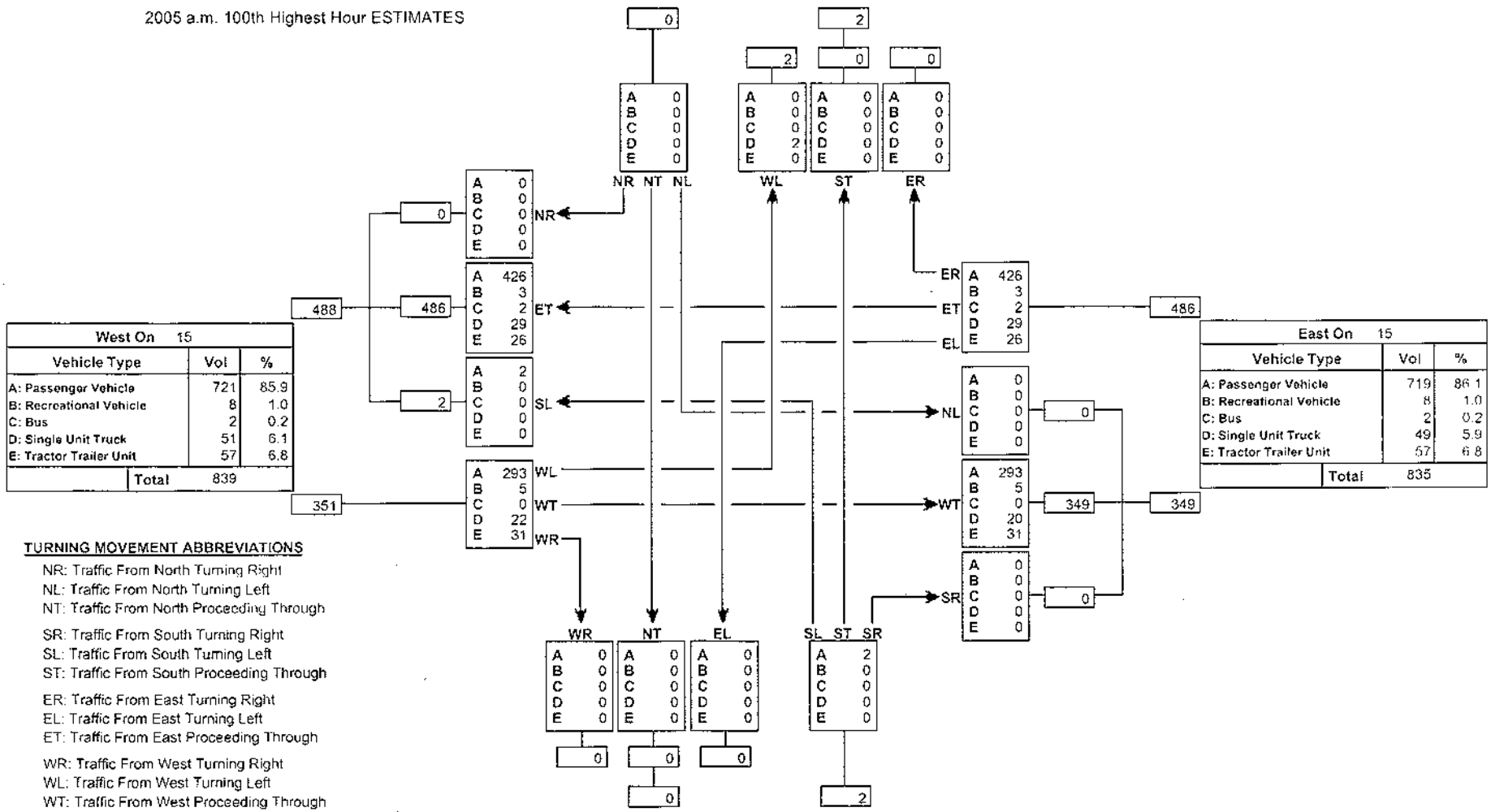
2005 a.m. 100th Highest Hour ESTIMATES

North On Local Rd		
Vehicle Type	Vol	%
A: Passenger Vehicle	0	0.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	2	100.0
E: Tractor Trailer Unit	0	0.0
Total	2	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	721	85.9
B: Recreational Vehicle	8	1.0
C: Bus	2	0.2
D: Single Unit Truck	51	6.1
E: Tractor Trailer Unit	57	6.8
Total	839	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	719	86.1
B: Recreational Vehicle	8	1.0
C: Bus	2	0.2
D: Single Unit Truck	49	5.9
E: Tractor Trailer Unit	57	6.8
Total	835	

South On Rge Rd 215		
Vehicle Type	Vol	%
A: Passenger Vehicle	2	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	2	



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Turning Movement Summary Diagram

Reference No.: 70000056

Intersection of:

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

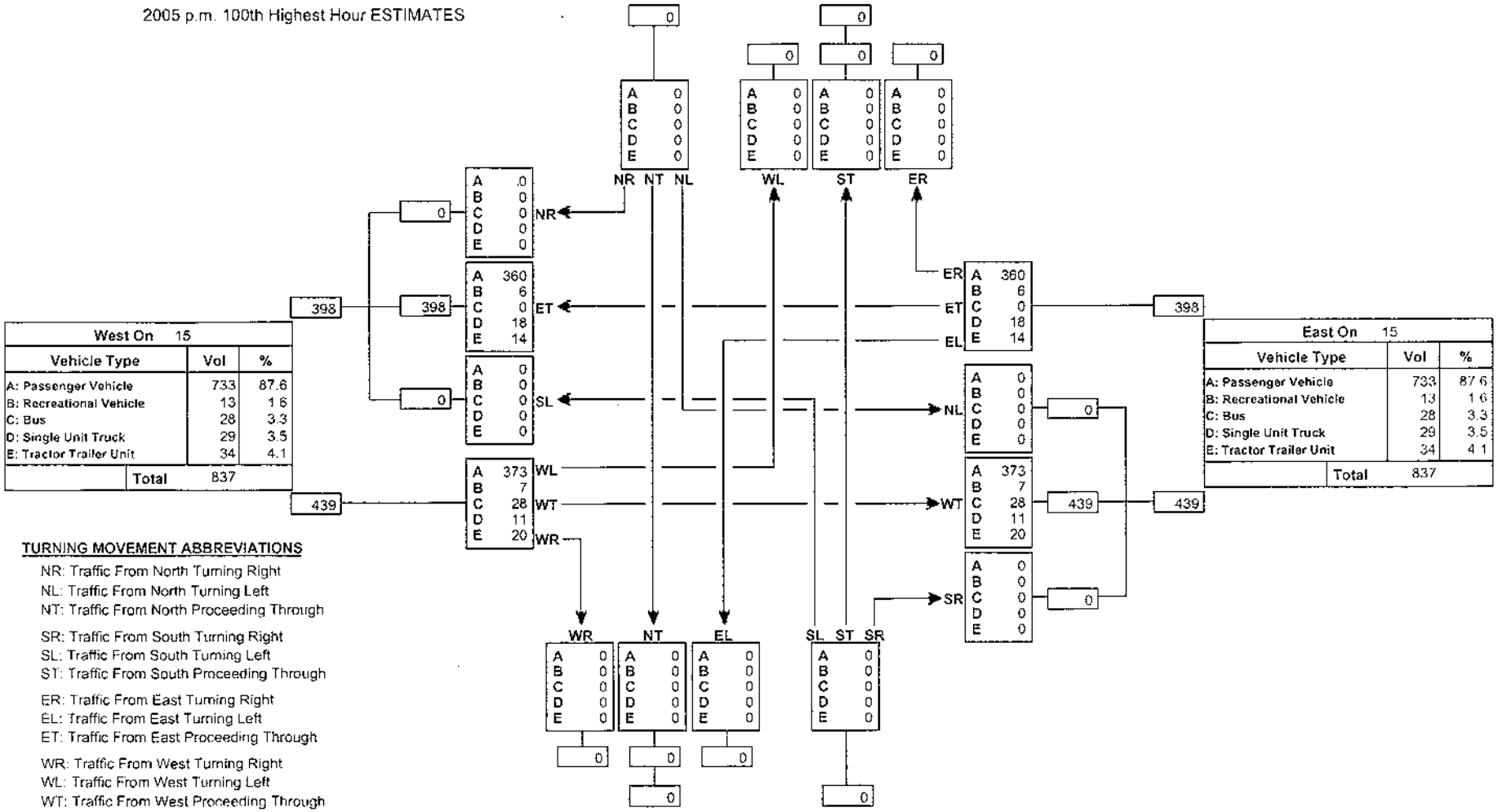
2005 p.m. 100th Highest Hour ESTIMATES

North On Local Rd		
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	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	733	87.6
B: Recreational Vehicle	13	1.6
C: Bus	28	3.3
D: Single Unit Truck	29	3.5
E: Tractor Trailer Unit	34	4.1
Total	837	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	733	87.6
B: Recreational Vehicle	13	1.6
C: Bus	28	3.3
D: Single Unit Truck	29	3.5
E: Tractor Trailer Unit	34	4.1
Total	837	

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	



TURNING MOVEMENT ABBREVIATIONS

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

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

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

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

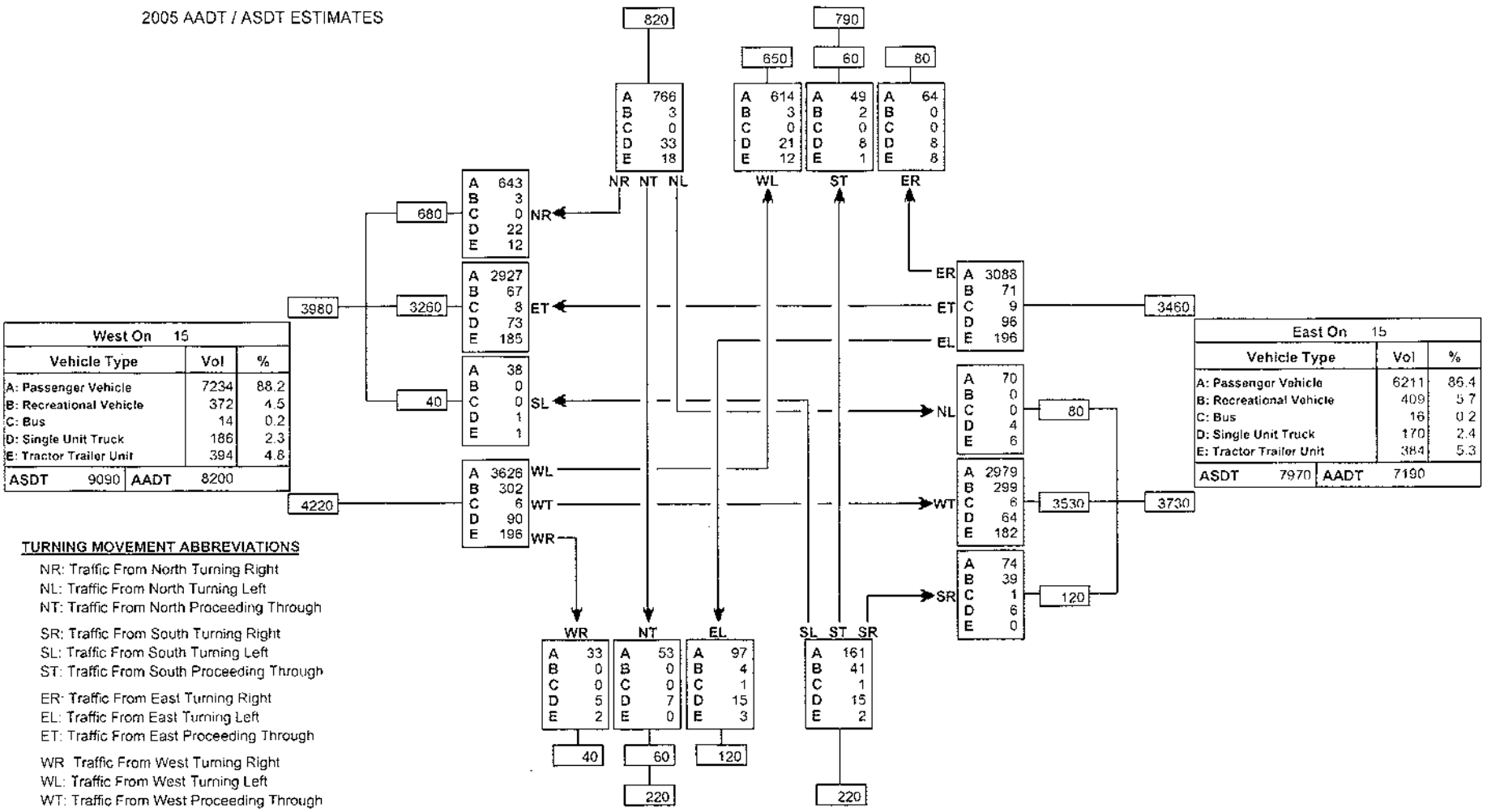
Turning Movement Summary Diagram

Reference No.: 98550

Intersection of:

15 & 830 N OF JOSEPHBURG WJ

2005 AADT / ASDT ESTIMATES



North On Rge Rd 214		
Vehicle Type	Vol	%
A: Passenger Vehicle	1493	92.7
B: Recreational Vehicle	8	0.5
C: Bus	0	0.0
D: Single Unit Truck	70	4.3
E: Tractor Trailer Unit	39	2.4
ASDT 1790	AADT 1610	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	7234	88.2
B: Recreational Vehicle	372	4.5
C: Bus	14	0.2
D: Single Unit Truck	186	2.3
E: Tractor Trailer Unit	394	4.8
ASDT 9090	AADT 8200	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	6211	86.4
B: Recreational Vehicle	409	5.7
C: Bus	16	0.2
D: Single Unit Truck	170	2.4
E: Tractor Trailer Unit	384	5.3
ASDT 7970	AADT 7190	

South On 830		
Vehicle Type	Vol	%
A: Passenger Vehicle	344	78.2
B: Recreational Vehicle	45	10.2
C: Bus	2	0.5
D: Single Unit Truck	42	9.5
E: Tractor Trailer Unit	7	1.6
ASDT 490	AADT 440	

TURNING MOVEMENT ABBREVIATIONS

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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.: 98550

Intersection of:
15 & 830 N OF JOSEPHBURG WJ

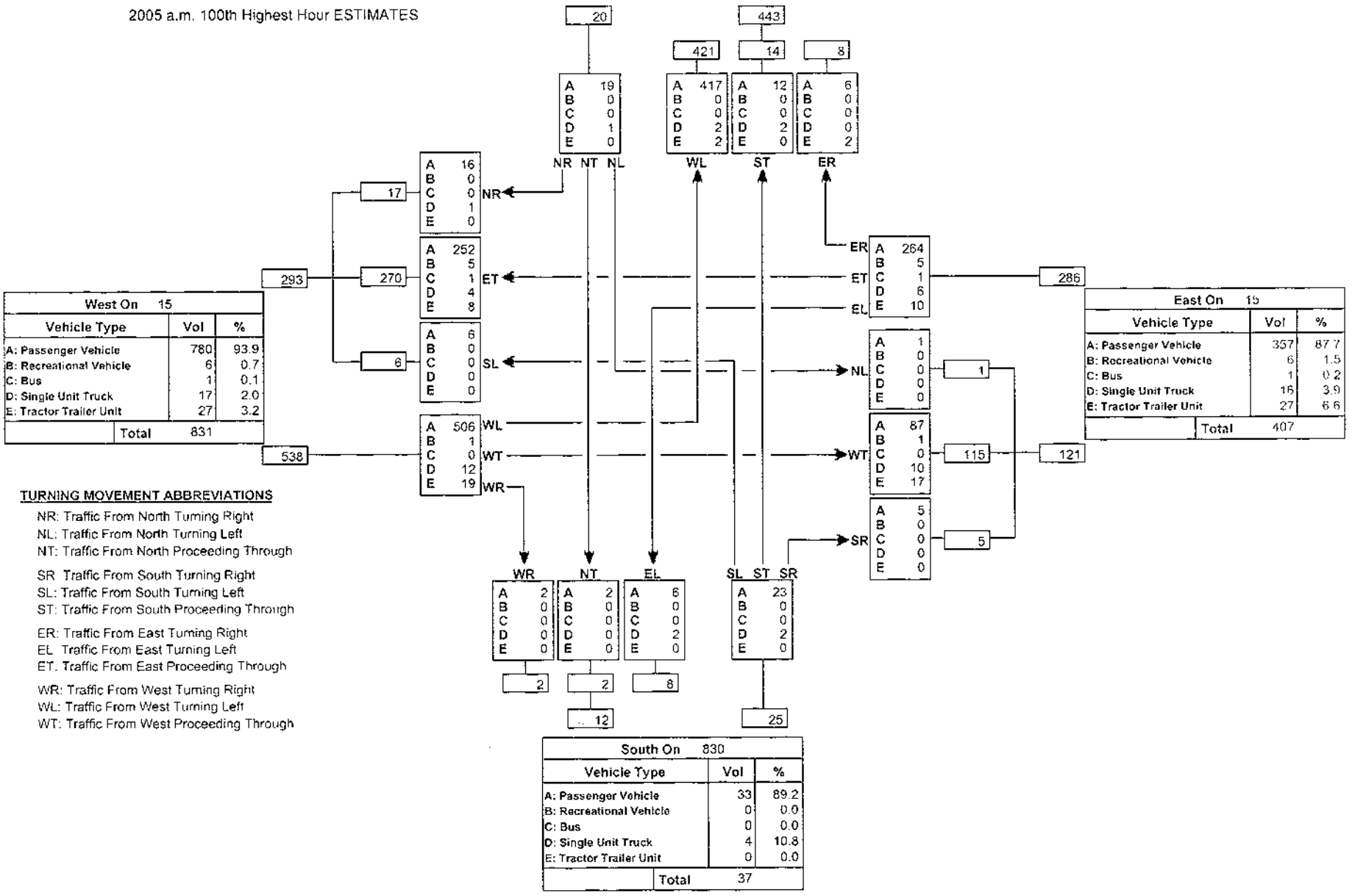
2005 a.m. 100th Highest Hour ESTIMATES

North On Rge Rd 214		
Vehicle Type	Vol	%
A: Passenger Vehicle	454	98.1
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	5	1.1
E: Tractor Trailer Unit	4	0.9
Total	463	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	780	93.9
B: Recreational Vehicle	6	0.7
C: Bus	1	0.1
D: Single Unit Truck	17	2.0
E: Tractor Trailer Unit	27	3.2
Total	831	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	357	87.7
B: Recreational Vehicle	6	1.5
C: Bus	1	0.2
D: Single Unit Truck	16	3.9
E: Tractor Trailer Unit	27	6.6
Total	407	

South On 830		
Vehicle Type	Vol	%
A: Passenger Vehicle	33	89.2
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	4	10.8
E: Tractor Trailer Unit	0	0.0
Total	37	



TURNING MOVEMENT ABBREVIATIONS

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SR Traffic From South Turning Right
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ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL Traffic From East Turning Left
ET. Traffic From East Proceeding Through

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

Turning Movement Summary Diagram

Reference No.: 98550

Intersection of:
15 & 830 N OF JOSEPHBURG WJ

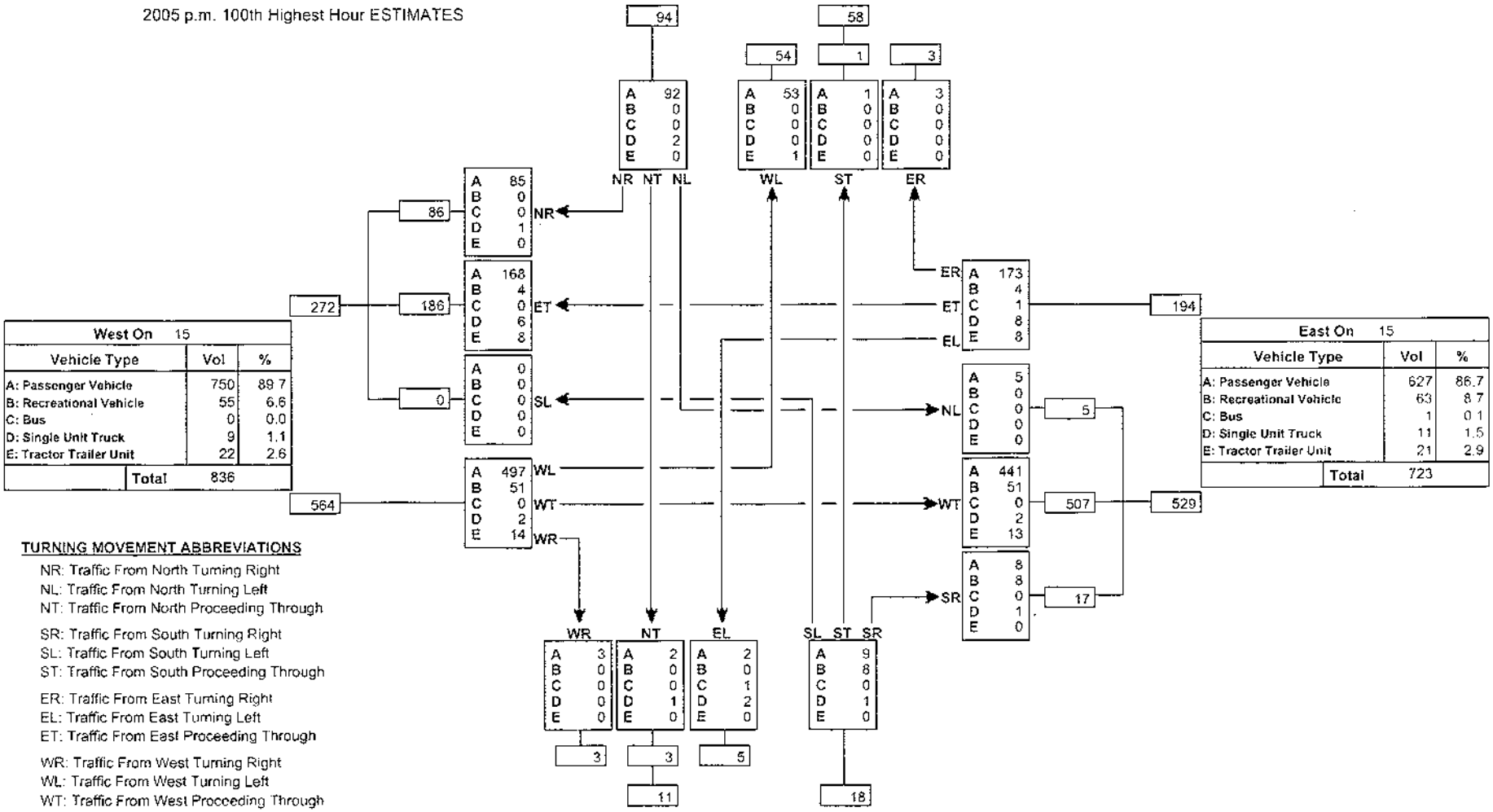
2005 p.m. 100th Highest Hour ESTIMATES

North On Rge Rd 214		
Vehicle Type	Vol	%
A: Passenger Vehicle	149	98.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	2	1.3
E: Tractor Trailer Unit	1	0.7
Total	152	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	750	89.7
B: Recreational Vehicle	55	6.6
C: Bus	0	0.0
D: Single Unit Truck	9	1.1
E: Tractor Trailer Unit	22	2.6
Total	836	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	627	86.7
B: Recreational Vehicle	63	8.7
C: Bus	1	0.1
D: Single Unit Truck	11	1.5
E: Tractor Trailer Unit	21	2.9
Total	723	

South On 830		
Vehicle Type	Vol	%
A: Passenger Vehicle	16	55.2
B: Recreational Vehicle	8	27.6
C: Bus	1	3.4
D: Single Unit Truck	4	13.8
E: Tractor Trailer Unit	0	0.0
Total	29	



TURNING MOVEMENT ABBREVIATIONS

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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.: 99550

Intersection of:

15 & RGE RD 212 22-55-21-400000000

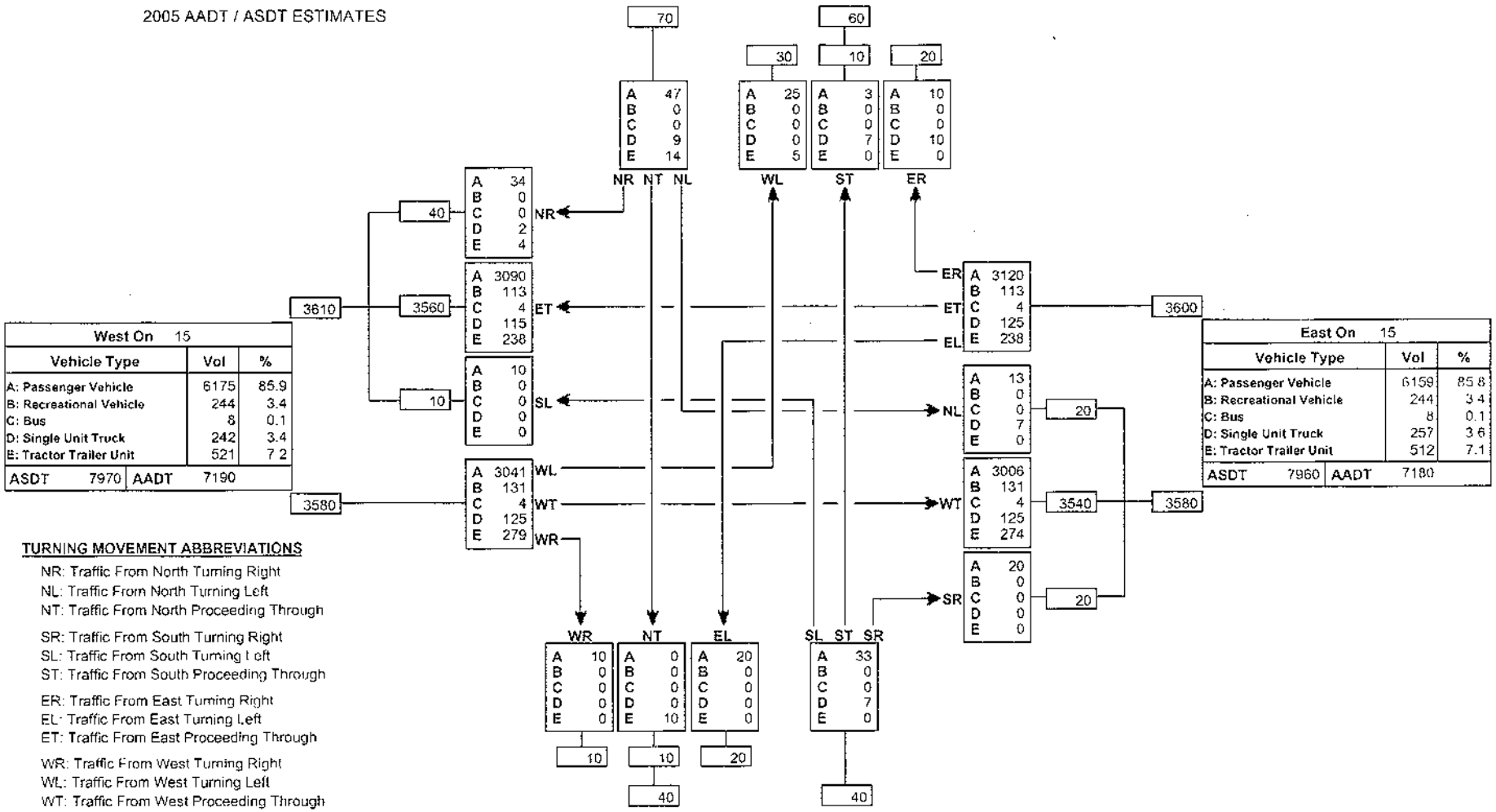
2005 AADT / ASDT ESTIMATES

North On Rge Rd 212		
Vehicle Type	Vol	%
A: Passenger Vehicle	85	65.4
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	26	20.0
E: Tractor Trailer Unit	19	14.6
ASDT 140	AADT 130	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	6175	85.9
B: Recreational Vehicle	244	3.4
C: Bus	8	0.1
D: Single Unit Truck	242	3.4
E: Tractor Trailer Unit	521	7.2
ASDT 7970	AADT 7190	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	6159	85.8
B: Recreational Vehicle	244	3.4
C: Bus	8	0.1
D: Single Unit Truck	257	3.6
E: Tractor Trailer Unit	512	7.1
ASDT 7960	AADT 7180	

South On Rge Rd 212		
Vehicle Type	Vol	%
A: Passenger Vehicle	63	78.8
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	7	8.8
E: Tractor Trailer Unit	10	12.5
ASDT 90	AADT 80	



TURNING MOVEMENT ABBREVIATIONS

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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.: 99550

Intersection of:
15 & RGE RD 212 22-55-21-400000000

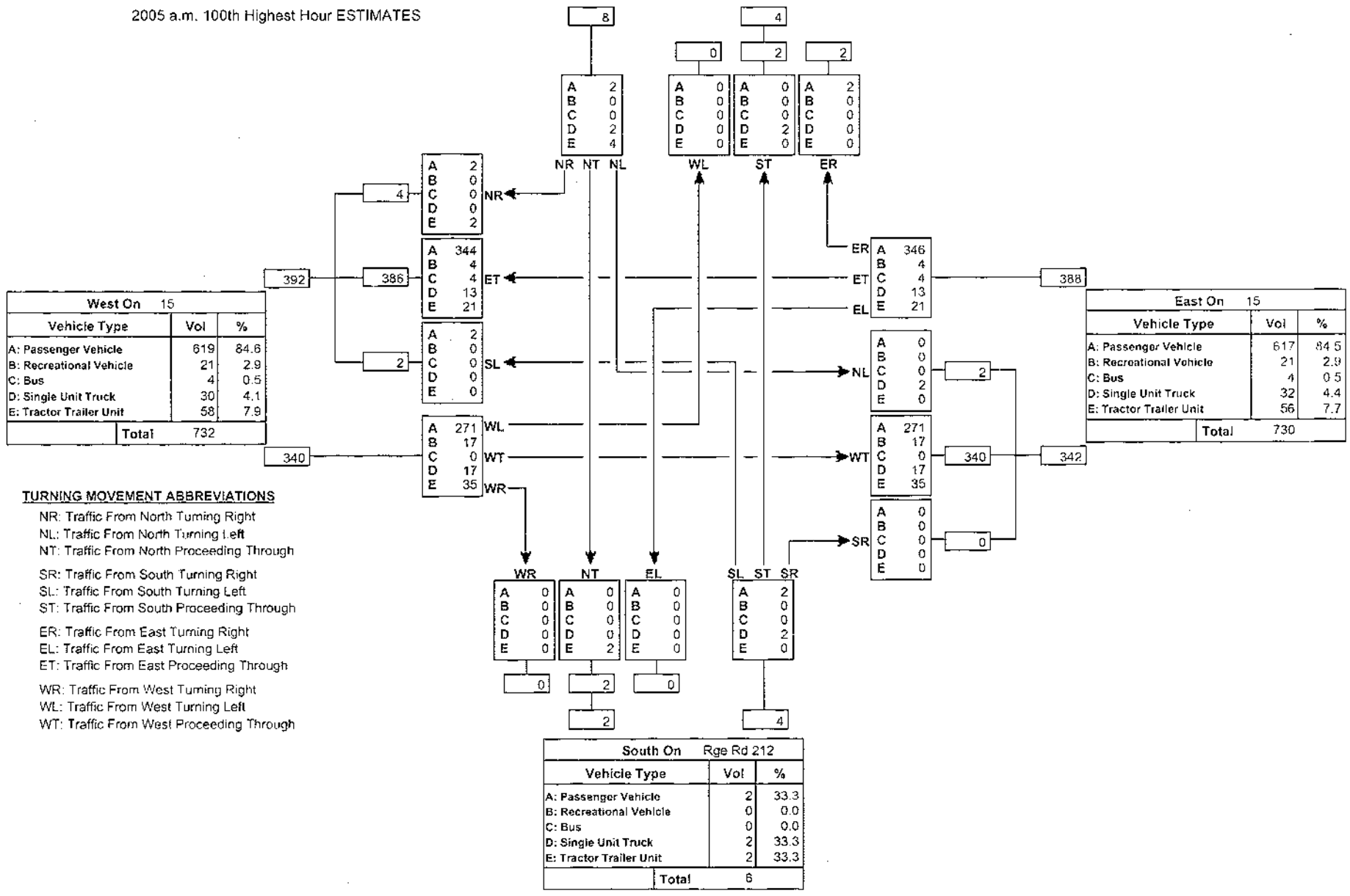
2005 a.m. 100th Highest Hour ESTIMATES

North On Rge Rd 212		
Vehicle Type	Vol	%
A: Passenger Vehicle	4	33.3
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	4	33.3
E: Tractor Trailer Unit	4	33.3
Total	12	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	619	84.6
B: Recreational Vehicle	21	2.9
C: Bus	4	0.5
D: Single Unit Truck	30	4.1
E: Tractor Trailer Unit	58	7.9
Total	732	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	617	84.5
B: Recreational Vehicle	21	2.9
C: Bus	4	0.5
D: Single Unit Truck	32	4.4
E: Tractor Trailer Unit	56	7.7
Total	730	

South On Rge Rd 212		
Vehicle Type	Vol	%
A: Passenger Vehicle	2	33.3
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	2	33.3
E: Tractor Trailer Unit	2	33.3
Total	6	



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
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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.: 99550

Intersection of:

15 & RGE RD 212 22-55-21-400000000

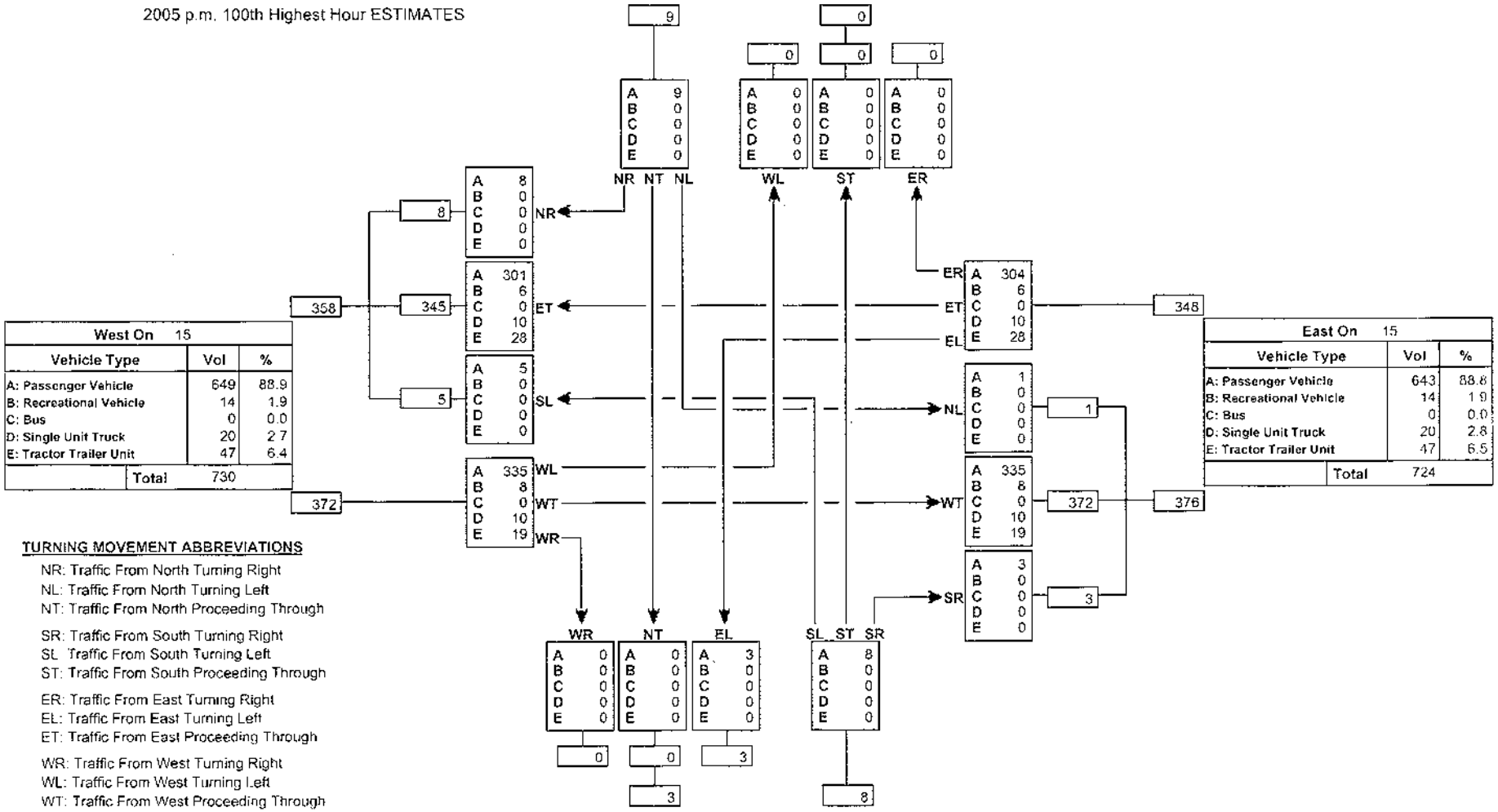
2005 p.m. 100th Highest Hour ESTIMATES

North On Rge Rd 212		
Vehicle Type	Vol	%
A: Passenger Vehicle	9	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	9	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	649	88.9
B: Recreational Vehicle	14	1.9
C: Bus	0	0.0
D: Single Unit Truck	20	2.7
E: Tractor Trailer Unit	47	6.4
Total	730	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	643	88.8
B: Recreational Vehicle	14	1.9
C: Bus	0	0.0
D: Single Unit Truck	20	2.8
E: Tractor Trailer Unit	47	6.5
Total	724	

South On Rge Rd 212		
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	



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EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

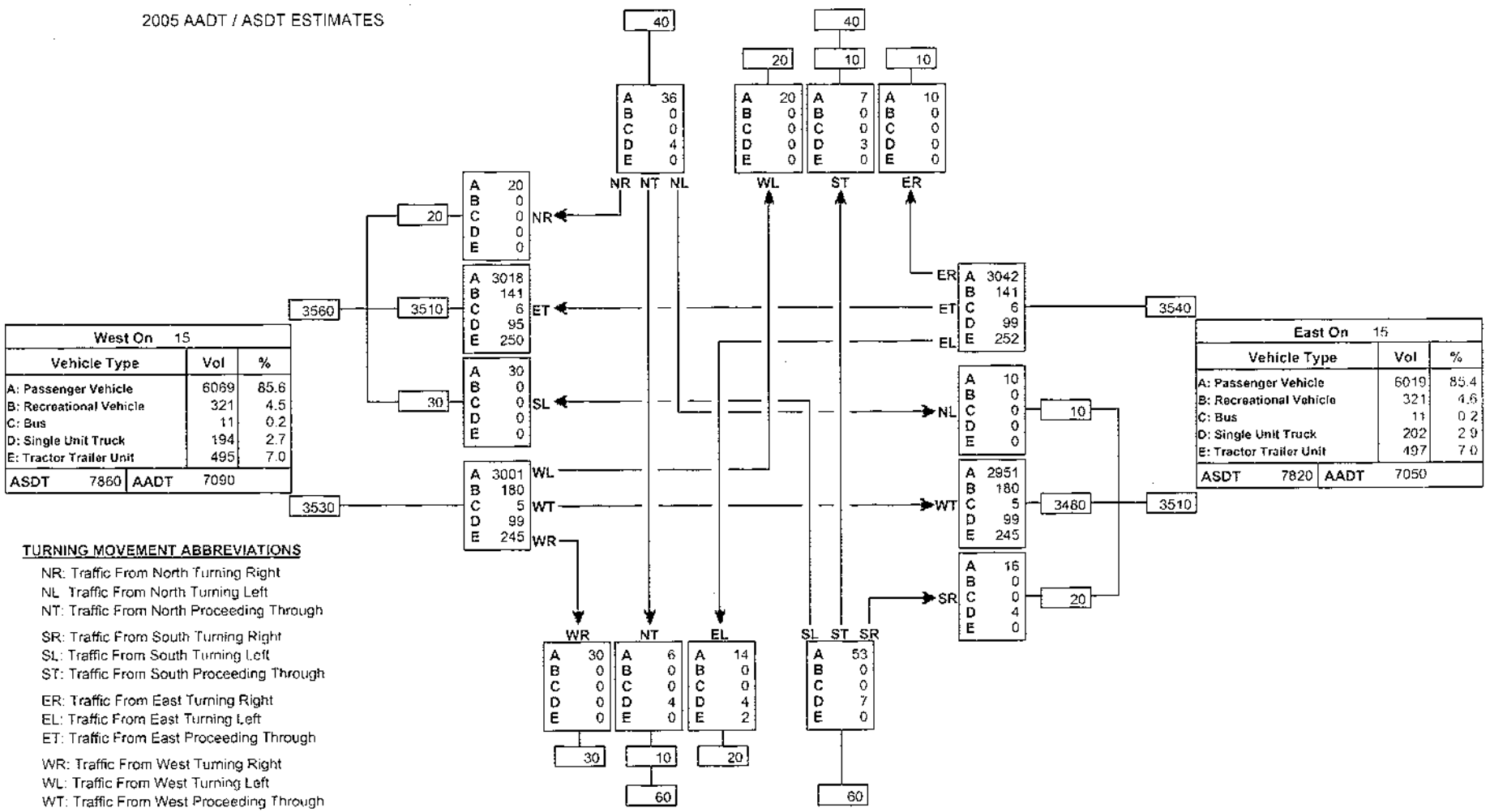
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

Turning Movement Summary Diagram

Reference No.: 99553

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

2005 AADT / ASDT ESTIMATES



TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
NL Traffic From North Turning Left
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EL: Traffic From East Turning Left
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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.: 99553

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

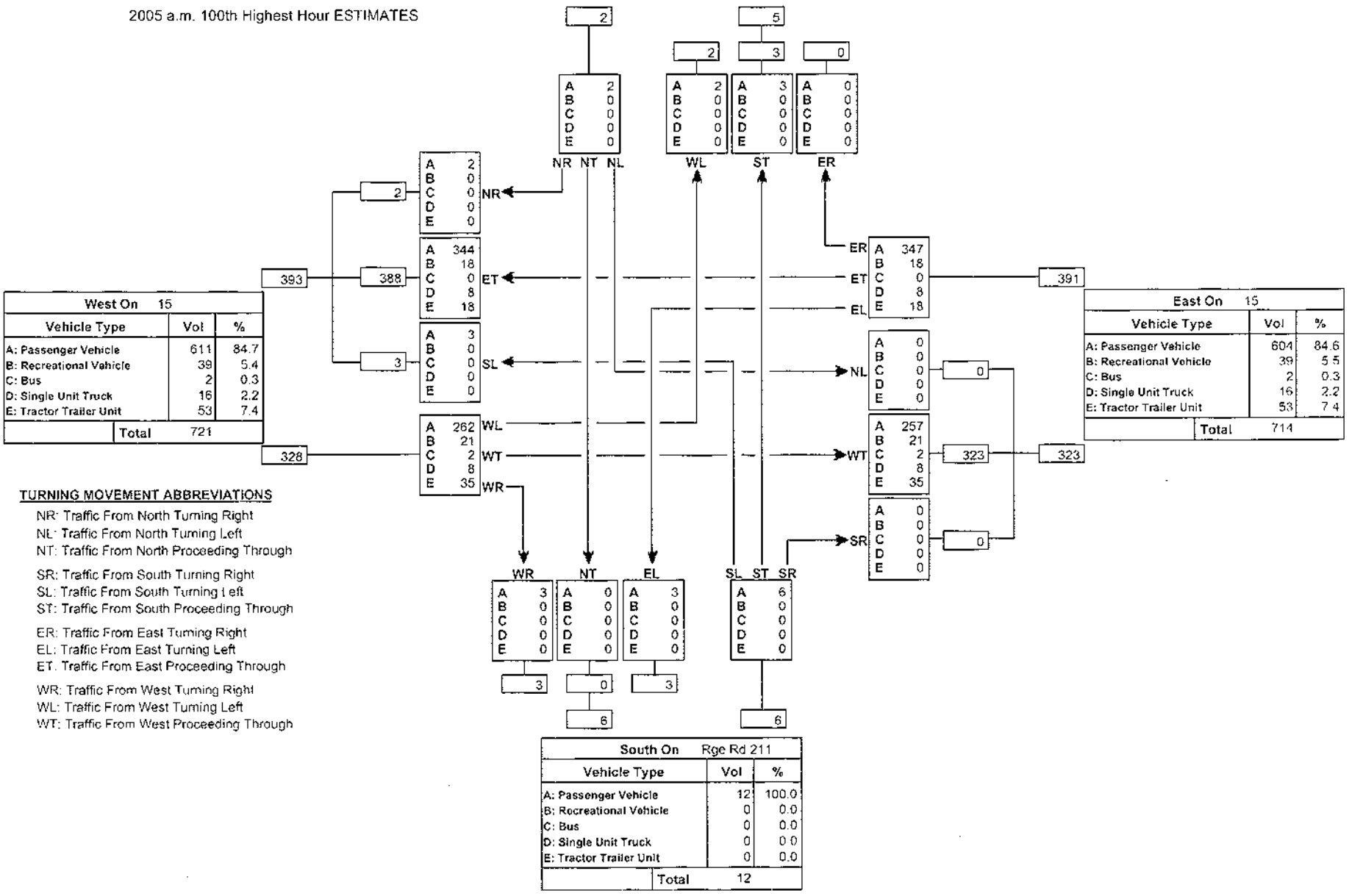
2005 a.m. 100th Highest Hour ESTIMATES

North On Rge Rd 211		
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	611	84.7
B: Recreational Vehicle	39	5.4
C: Bus	2	0.3
D: Single Unit Truck	16	2.2
E: Tractor Trailer Unit	53	7.4
Total	721	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	604	84.6
B: Recreational Vehicle	39	5.5
C: Bus	2	0.3
D: Single Unit Truck	16	2.2
E: Tractor Trailer Unit	53	7.4
Total	714	

South On Rge Rd 211		
Vehicle Type	Vol	%
A: Passenger Vehicle	12	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	12	



TURNING MOVEMENT ABBREVIATIONS

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Turning Movement Summary Diagram

Reference No.: 99553

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

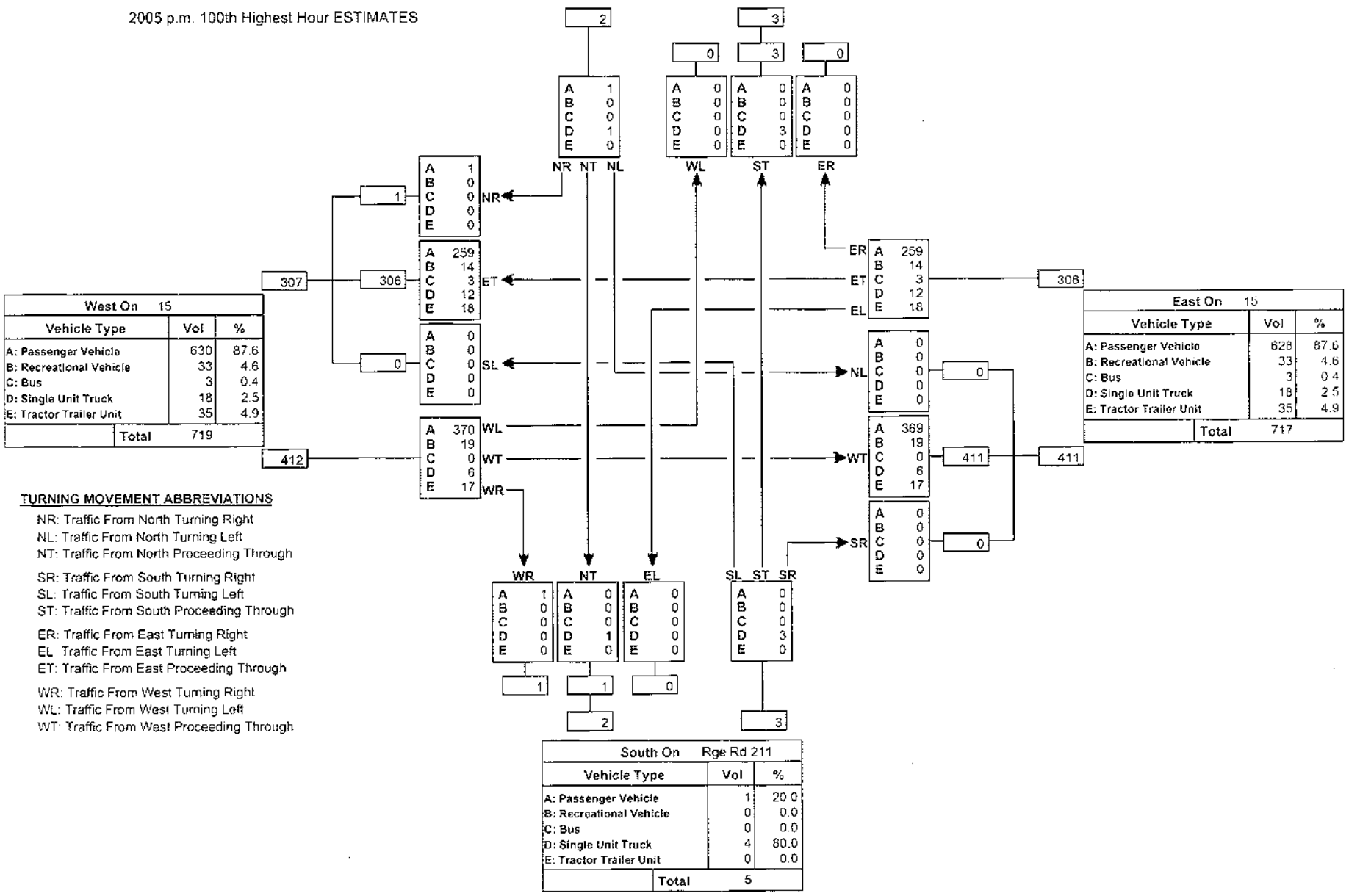
2005 p.m. 100th Highest Hour ESTIMATES

North On Rge Rd 211		
Vehicle Type	Vol	%
A: Passenger Vehicle	1	20.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	4	80.0
E: Tractor Trailer Unit	0	0.0
Total	5	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	630	87.6
B: Recreational Vehicle	33	4.6
C: Bus	3	0.4
D: Single Unit Truck	18	2.5
E: Tractor Trailer Unit	35	4.9
Total	719	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	628	87.6
B: Recreational Vehicle	33	4.6
C: Bus	3	0.4
D: Single Unit Truck	18	2.5
E: Tractor Trailer Unit	35	4.9
Total	717	

South On Rge Rd 211		
Vehicle Type	Vol	%
A: Passenger Vehicle	1	20.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	4	80.0
E: Tractor Trailer Unit	0	0.0
Total	5	



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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

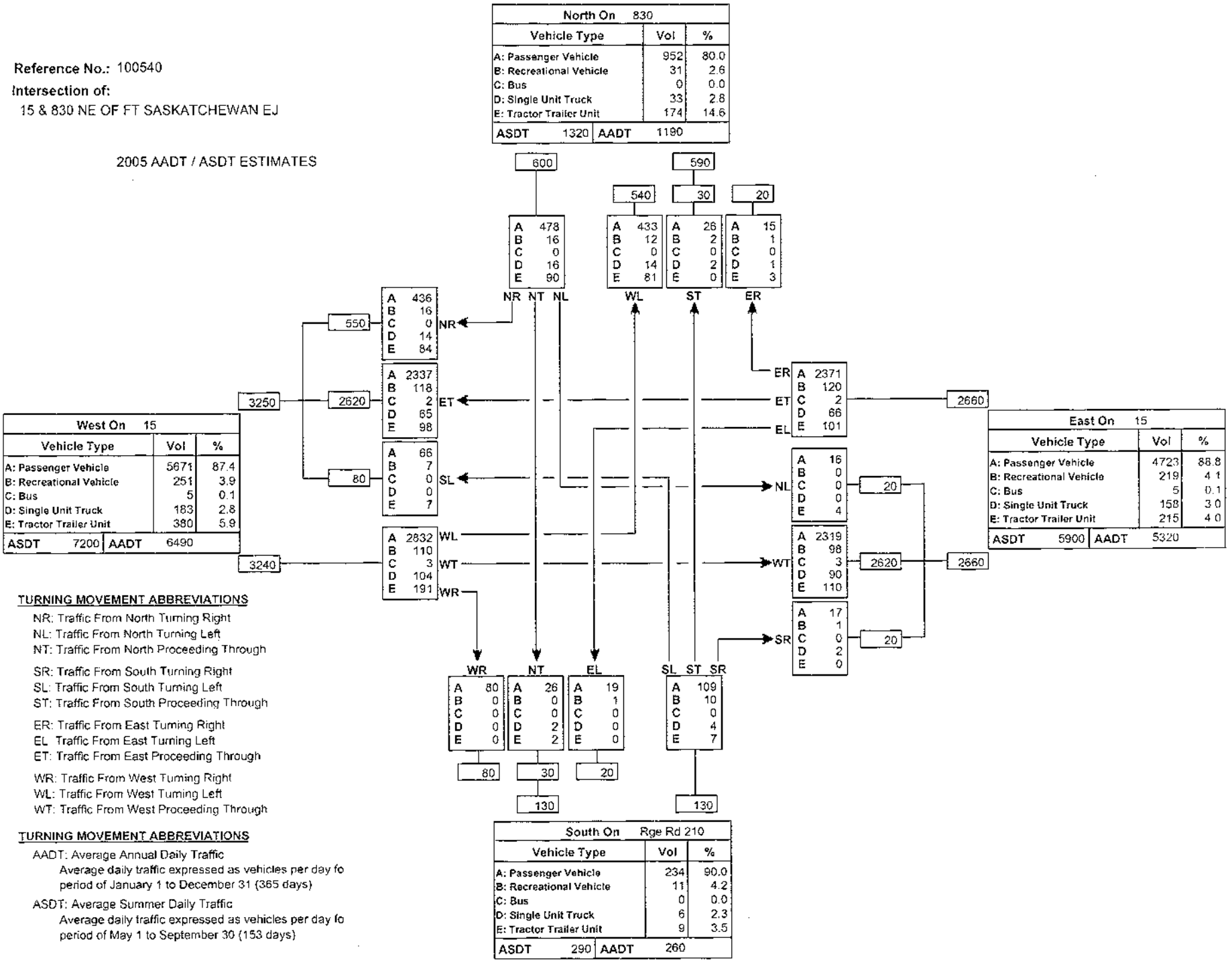
Turning Movement Summary Diagram

Reference No.: 100540

Intersection of:

15 & 830 NE OF FT SASKATCHEWAN EJ

2005 AADT / ASDT ESTIMATES



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EL Traffic From East Turning Left
ET: Traffic From East 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.: 100540

Intersection of:

15 & 830 NE OF FT SASKATCHEWAN EJ

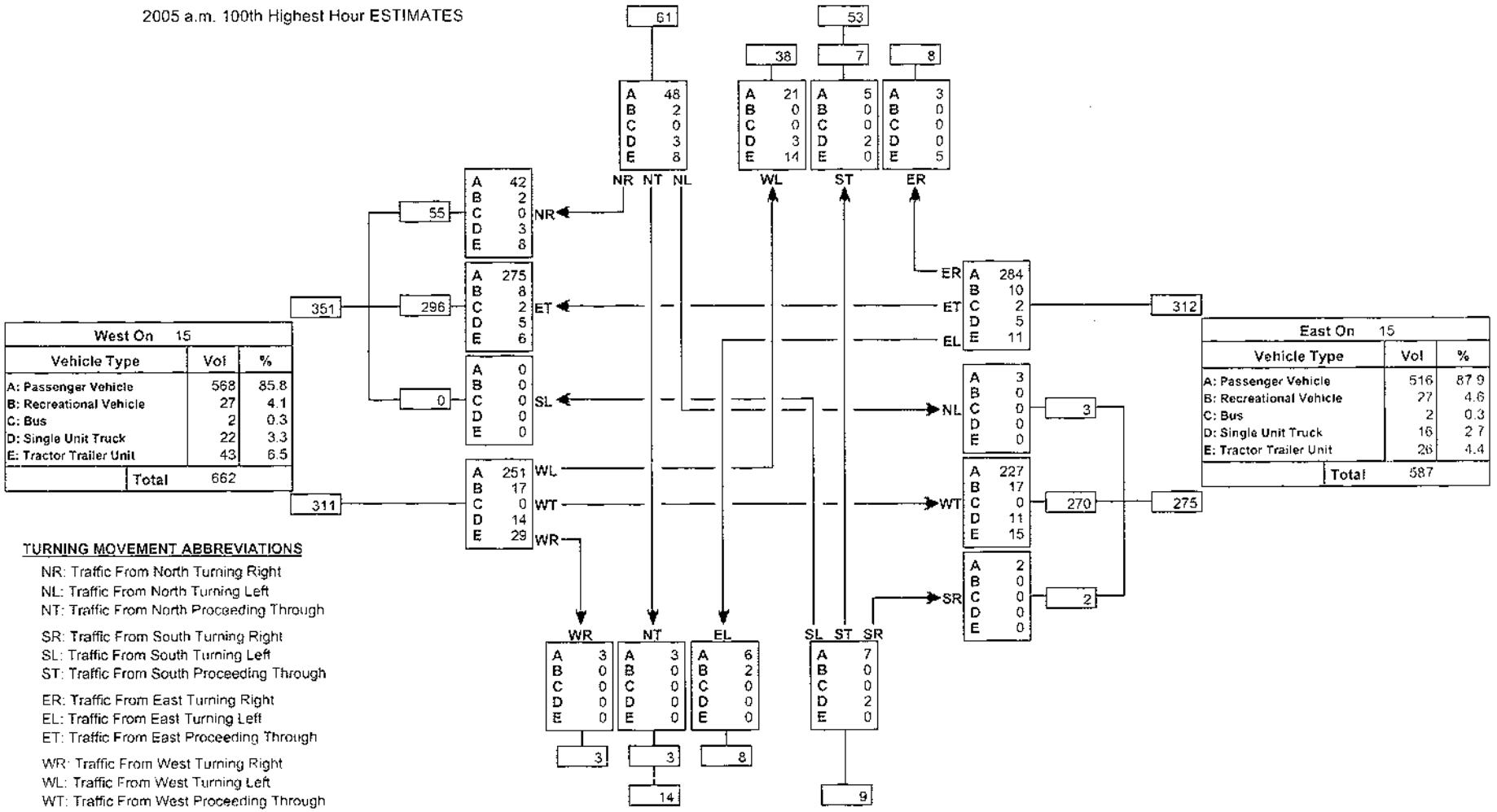
2005 a.m. 100th Highest Hour ESTIMATES

North On 830		
Vehicle Type	Vol	%
A: Passenger Vehicle	77	67.5
B: Recreational Vehicle	2	1.8
C: Bus	0	0.0
D: Single Unit Truck	8	7.0
E: Tractor Trailer Unit	27	23.7
Total	114	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	568	85.8
B: Recreational Vehicle	27	4.1
C: Bus	2	0.3
D: Single Unit Truck	22	3.3
E: Tractor Trailer Unit	43	6.5
Total	662	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	516	87.9
B: Recreational Vehicle	27	4.6
C: Bus	2	0.3
D: Single Unit Truck	16	2.7
E: Tractor Trailer Unit	26	4.4
Total	587	

South On Rge Rd 210		
Vehicle Type	Vol	%
A: Passenger Vehicle	19	82.6
B: Recreational Vehicle	2	8.7
C: Bus	0	0.0
D: Single Unit Truck	2	8.7
E: Tractor Trailer Unit	0	0.0
Total	23	



TURNING MOVEMENT ABBREVIATIONS

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

Turning Movement Summary Diagram

Reference No.: 100540

Intersection of:
15 & 830 NE OF FT SASKATCHEWAN EJ

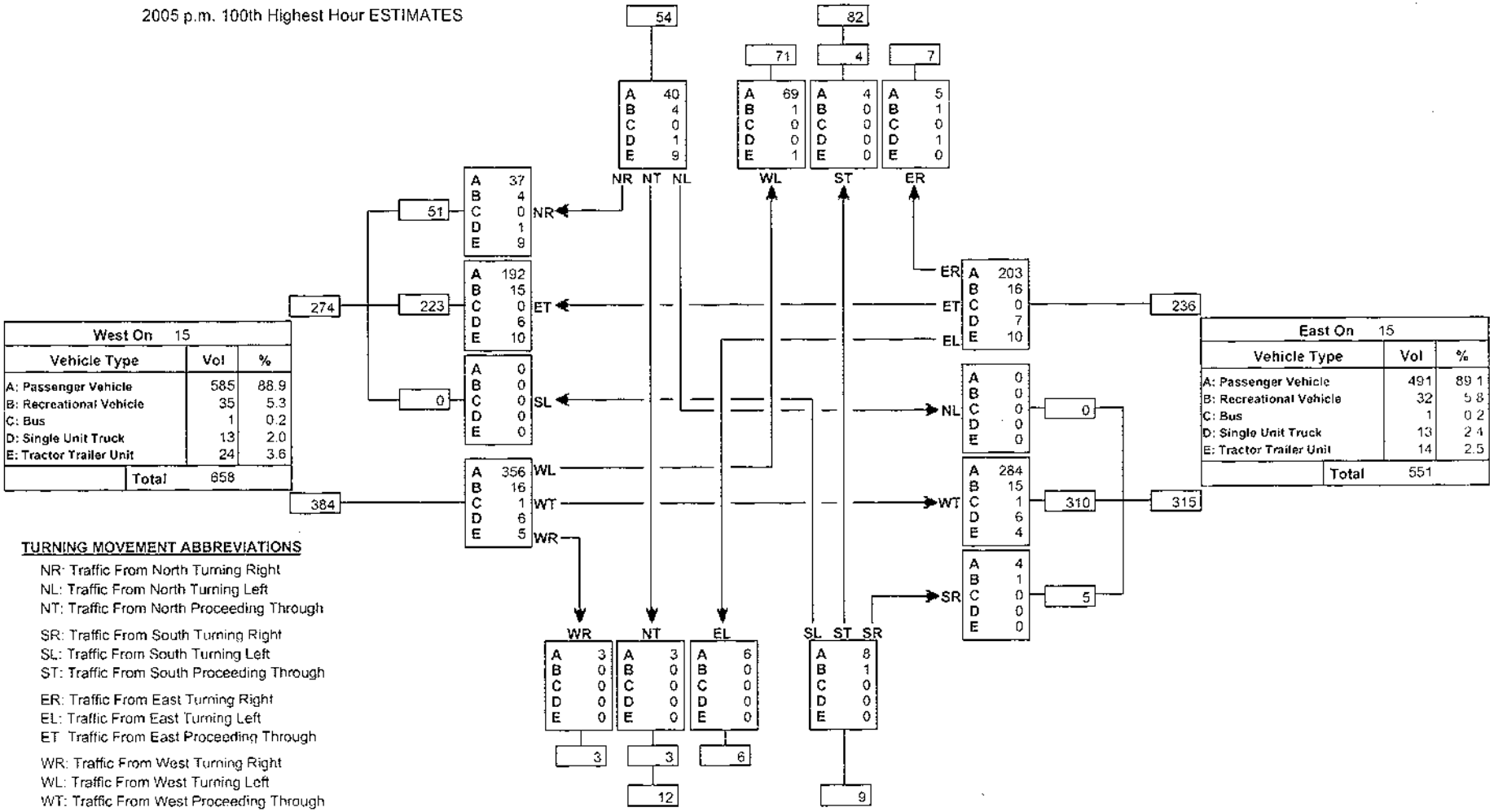
2005 p.m. 100th Highest Hour ESTIMATES

North On 830		
Vehicle Type	Vol	%
A: Passenger Vehicle	118	86.8
B: Recreational Vehicle	6	4.4
C: Bus	0	0.0
D: Single Unit Truck	2	1.5
E: Tractor Trailer Unit	10	7.4
Total	136	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	585	88.9
B: Recreational Vehicle	35	5.3
C: Bus	1	0.2
D: Single Unit Truck	13	2.0
E: Tractor Trailer Unit	24	3.6
Total	658	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	491	89.1
B: Recreational Vehicle	32	5.8
C: Bus	1	0.2
D: Single Unit Truck	13	2.4
E: Tractor Trailer Unit	14	2.5
Total	551	

South On Rge Rd 210		
Vehicle Type	Vol	%
A: Passenger Vehicle	20	95.2
B: Recreational Vehicle	1	4.8
C: Bus	0	0.0
D: Single Unit Truck	0	0.0
E: Tractor Trailer Unit	0	0.0
Total	21	



TURNING MOVEMENT ABBREVIATIONS

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SL: Traffic From South Turning Left
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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.: 101540

Intersection of:
15 & 45 S OF BRUDERHEIM

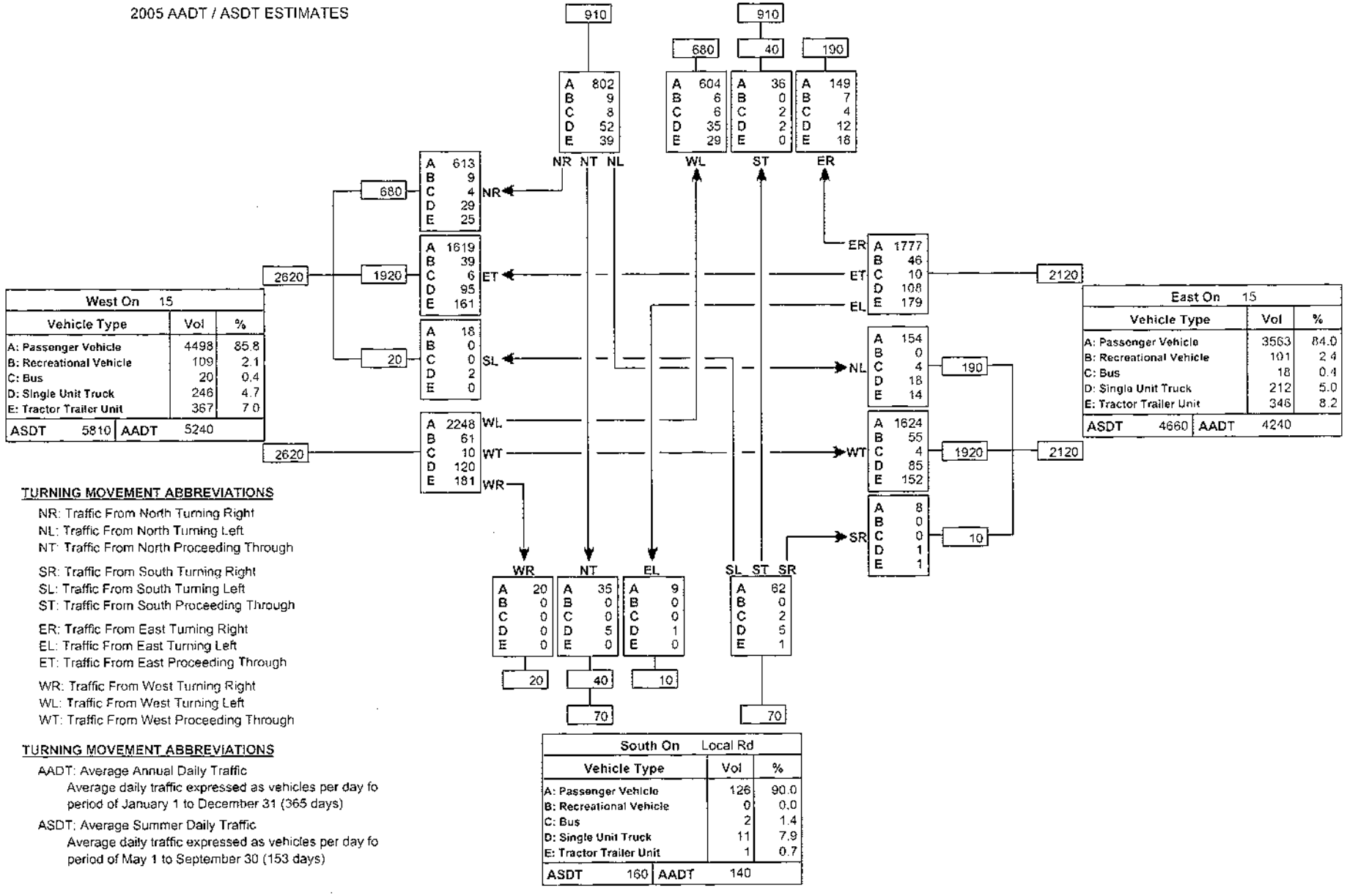
2005 AADT / ASDT ESTIMATES

North On 45		
Vehicle Type	Vol	%
A: Passenger Vehicle	1591	87.4
B: Recreational Vehicle	22	1.2
C: Bus	20	1.1
D: Single Unit Truck	101	5.5
E: Tractor Trailer Unit	86	4.7
ASDT 1990	AADT 1820	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	4498	85.8
B: Recreational Vehicle	109	2.1
C: Bus	20	0.4
D: Single Unit Truck	246	4.7
E: Tractor Trailer Unit	367	7.0
ASDT 5810	AADT 5240	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	3563	84.0
B: Recreational Vehicle	101	2.4
C: Bus	18	0.4
D: Single Unit Truck	212	5.0
E: Tractor Trailer Unit	346	8.2
ASDT 4660	AADT 4240	

South On Local Rd		
Vehicle Type	Vol	%
A: Passenger Vehicle	126	90.0
B: Recreational Vehicle	0	0.0
C: Bus	2	1.4
D: Single Unit Truck	11	7.9
E: Tractor Trailer Unit	1	0.7
ASDT 160	AADT 140	



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.: 101540

Intersection of:
15 & 45 S OF BRUDERHEIM

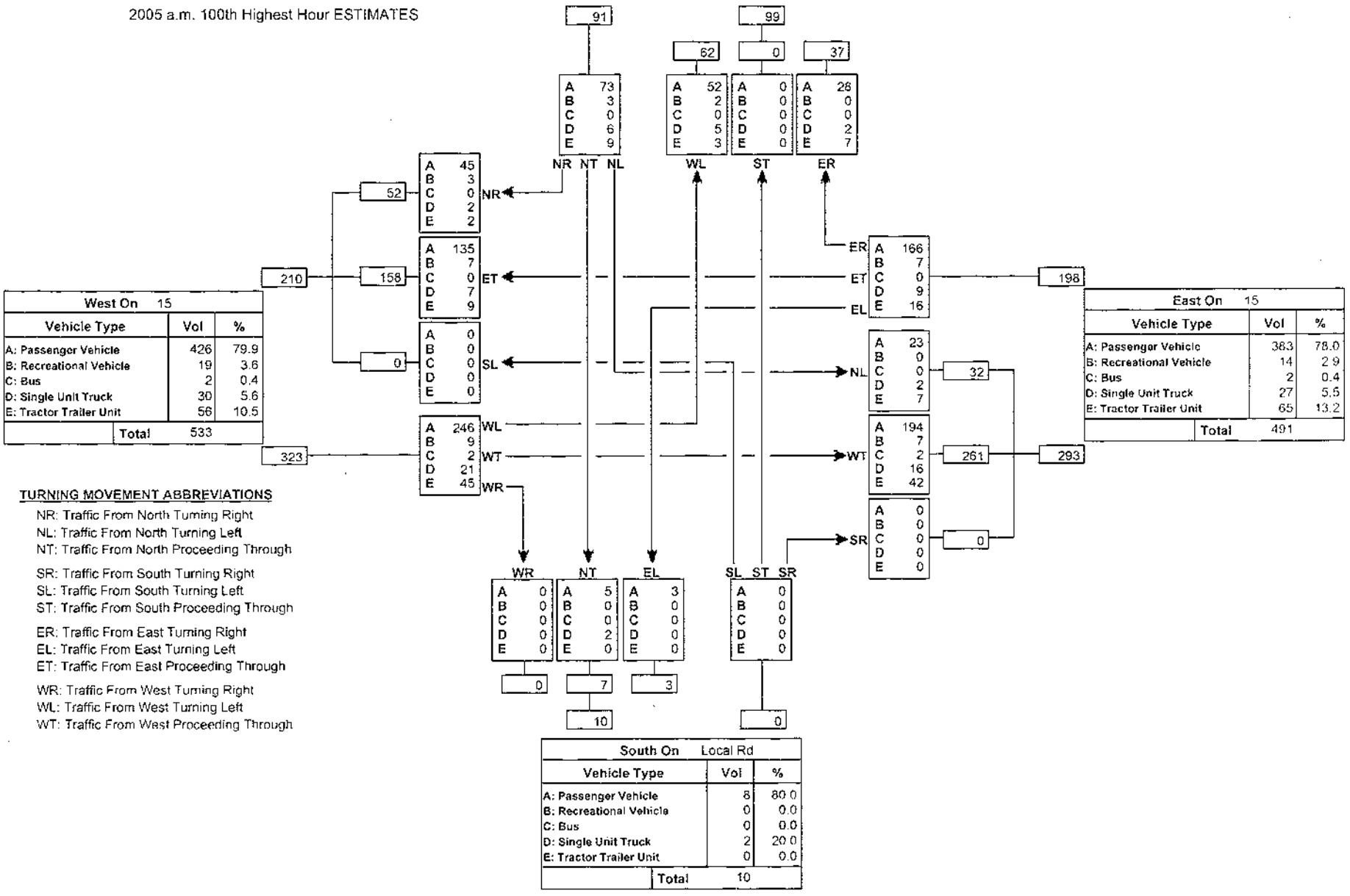
2005 a.m. 100th Highest Hour ESTIMATES

North On 45		
Vehicle Type	Vol	%
A: Passenger Vehicle	153	80.5
B: Recreational Vehicle	5	2.6
C: Bus	0	0.0
D: Single Unit Truck	13	6.8
E: Tractor Trailer Unit	19	10.0
Total	190	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	426	79.9
B: Recreational Vehicle	19	3.6
C: Bus	2	0.4
D: Single Unit Truck	30	5.6
E: Tractor Trailer Unit	56	10.5
Total	533	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	383	78.0
B: Recreational Vehicle	14	2.9
C: Bus	2	0.4
D: Single Unit Truck	27	5.5
E: Tractor Trailer Unit	65	13.2
Total	491	

South On Local Rd		
Vehicle Type	Vol	%
A: Passenger Vehicle	8	80.0
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	2	20.0
E: Tractor Trailer Unit	0	0.0
Total	10	



TURNING MOVEMENT ABBREVIATIONS

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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.: 101540

Intersection of:
15 & 45 S OF BRUDERHEIM

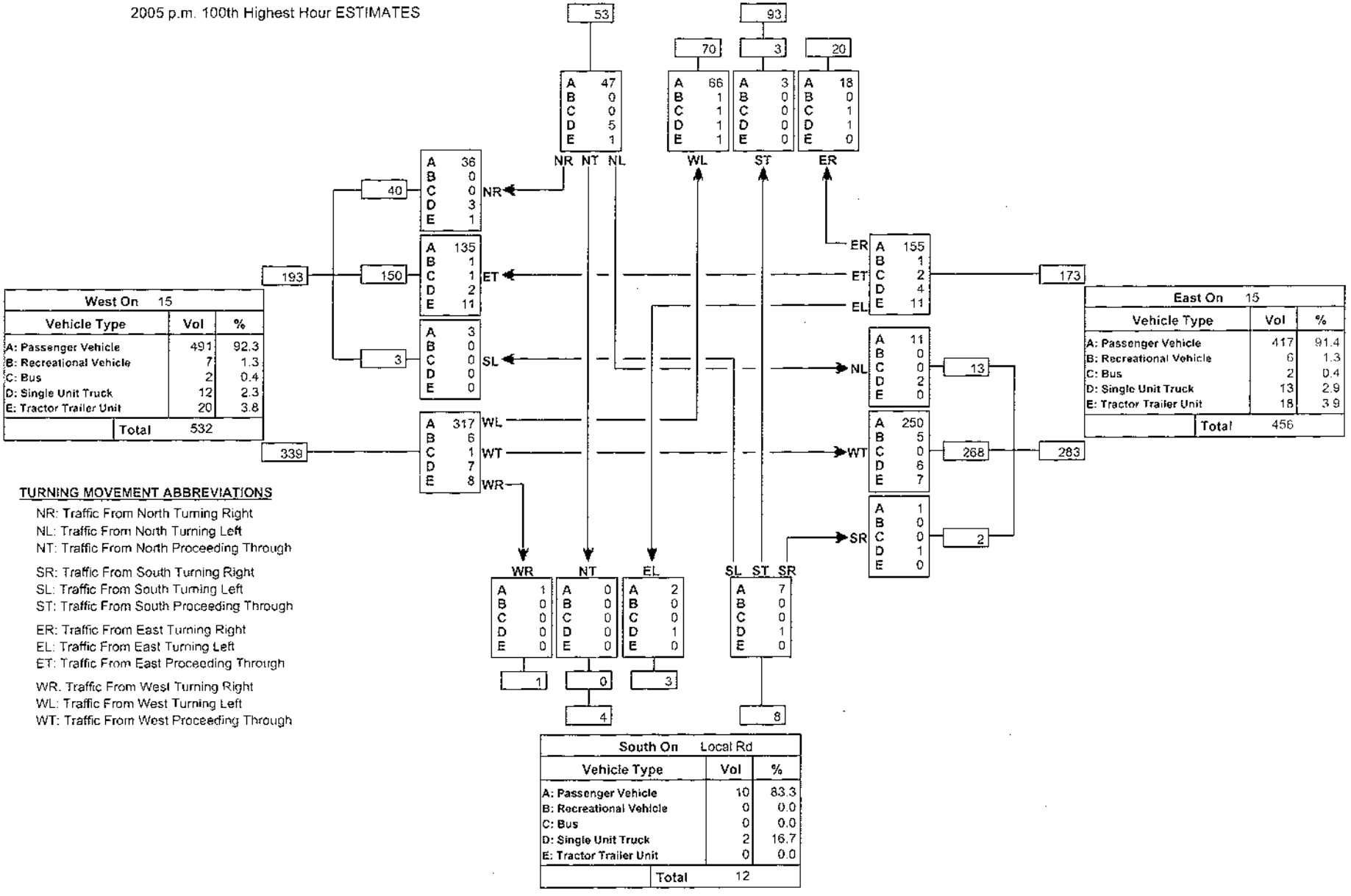
2005 p.m. 100th Highest Hour ESTIMATES

North On 45		
Vehicle Type	Vol	%
A: Passenger Vehicle	134	91.8
B: Recreational Vehicle	1	0.7
C: Bus	2	1.4
D: Single Unit Truck	7	4.8
E: Tractor Trailer Unit	2	1.4
Total	146	

West On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	491	92.3
B: Recreational Vehicle	7	1.3
C: Bus	2	0.4
D: Single Unit Truck	12	2.3
E: Tractor Trailer Unit	20	3.8
Total	532	

East On 15		
Vehicle Type	Vol	%
A: Passenger Vehicle	417	91.4
B: Recreational Vehicle	6	1.3
C: Bus	2	0.4
D: Single Unit Truck	13	2.9
E: Tractor Trailer Unit	18	3.9
Total	456	

South On Local Rd		
Vehicle Type	Vol	%
A: Passenger Vehicle	10	83.3
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	2	16.7
E: Tractor Trailer Unit	0	0.0
Total	12	



TURNING MOVEMENT ABBREVIATIONS

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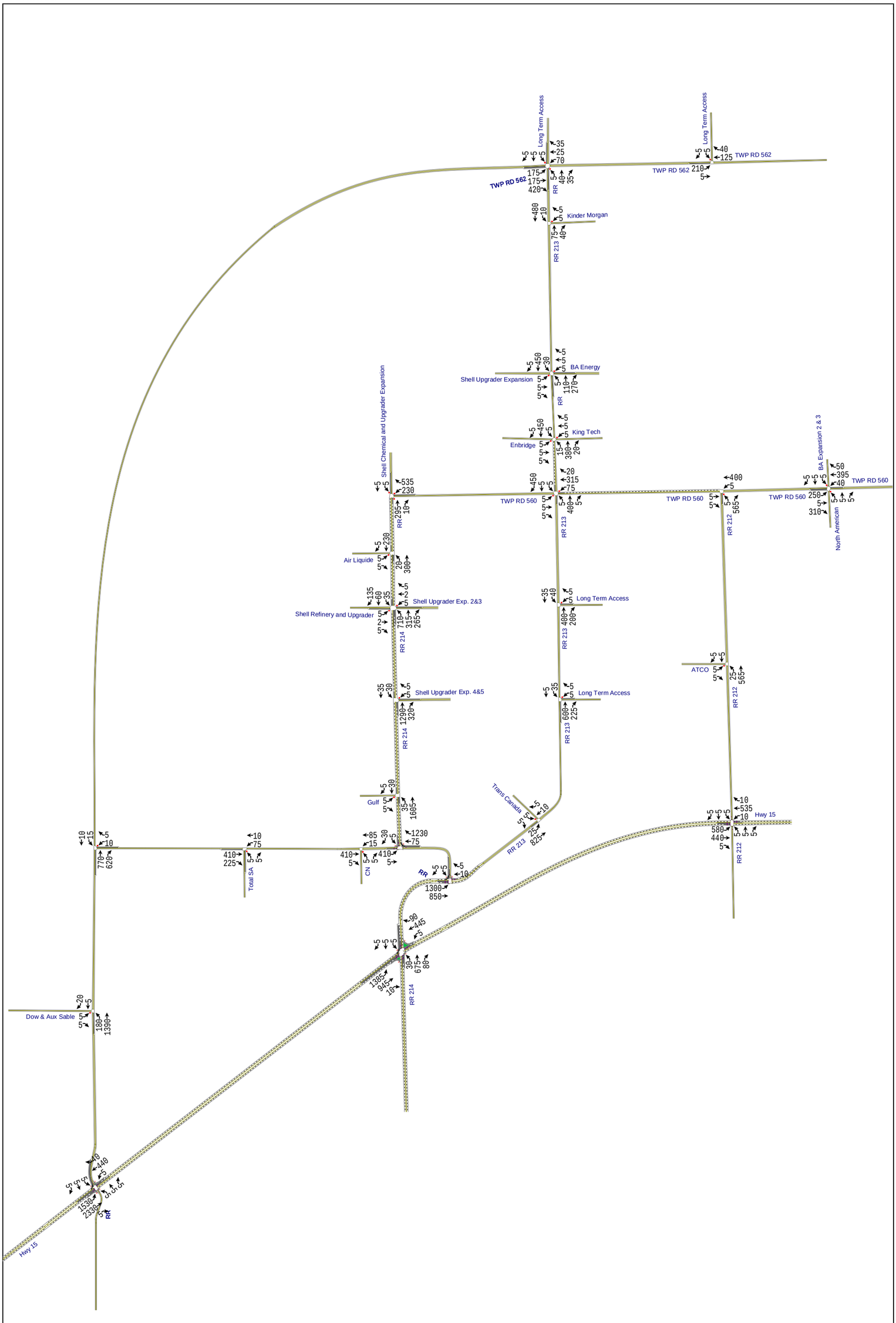
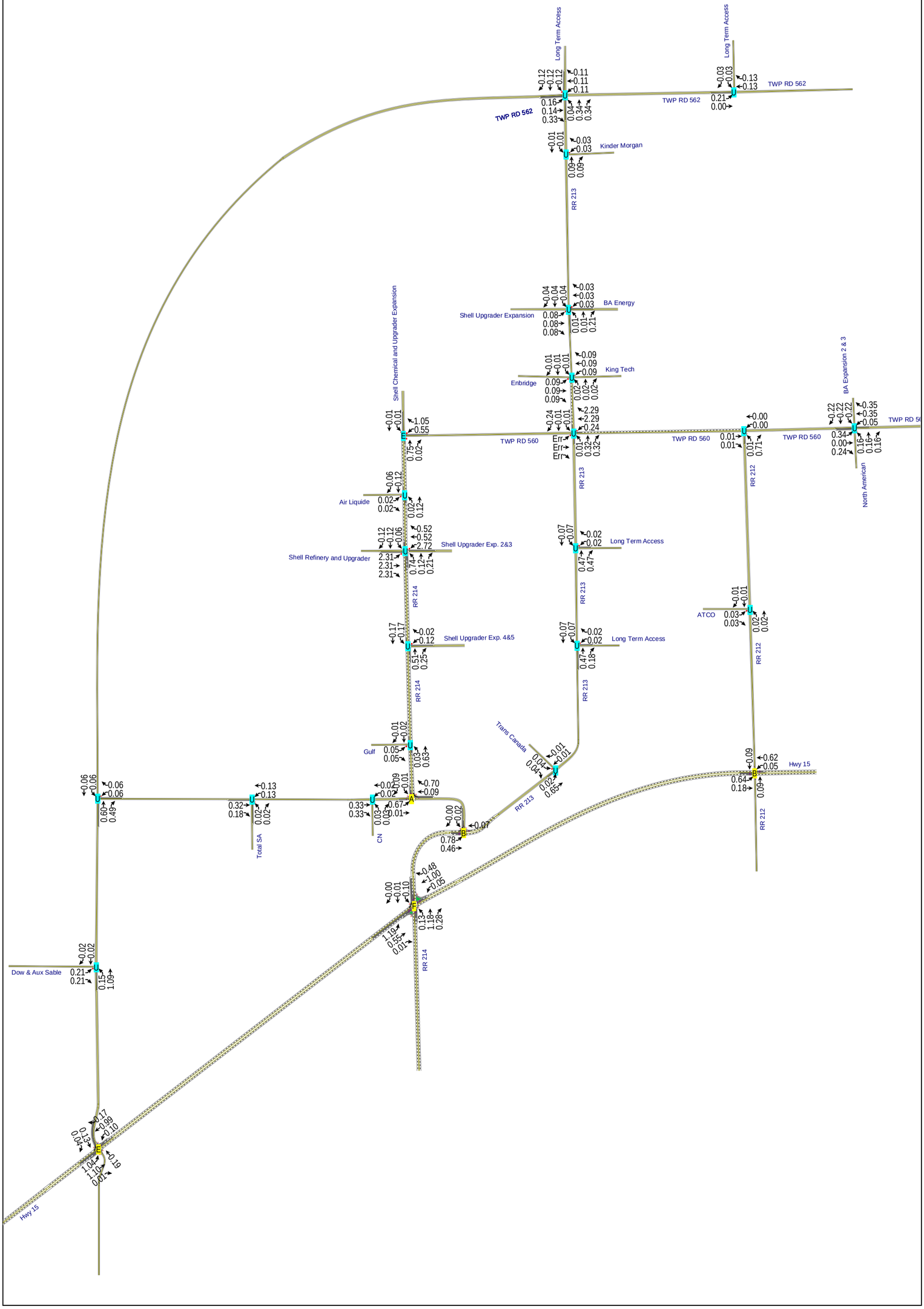
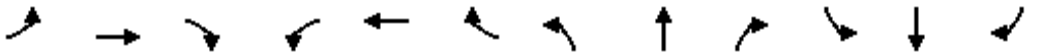
WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

Appendix B
Synchro Model Outputs

AM Peak Hour


Long Term Access
TWP RD 562
Kinder Morgan
RR 213
BA Energy
Shell Upgrader Expansion
King Tech
Enbridge
Shell Chemical and Upgrader Expansion
TWP RD 560
BA Expansion 2 & 3
North American
Air Liquide
Shell Upgrader Exp. 2&3
Shell Refinery and Upgrader
RR 214
Long Term Access
RR 212
Shell Upgrader Exp. 4&5
ATCO
Gulf
Trans Canada
Hwy 15
Total SA
CN
RR
Dow & Aux Sable


TWP RD 562
TWP RD 560
RR 213
RR 214
RR 212
Long Term Access
Kinder Morgan
BA Energy
Shell Upgrader Expansion
King Tech
Enbridge
Shell Chemical and Upgrader Expansion
Air Liquide
Shell Upgrader Exp. 2&3
Shell Refinery and Upgrader
Long Term Access
Shell Upgrader Exp. 4&5
Long Term Access
Gulf
Trans Canada
ATCO
BA Expansion 2 & 3
North American
Total SA
CN
Dow & Aux Sable
Hwy 15



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1530	2330	5	5	440	40	5	5	5	5	5	5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	0.88
Frt			0.850			0.850		0.955				0.850
Flt Protected	0.950			0.950				0.984			0.976	
Satd. Flow (prot)	3372	3476	1555	1738	3476	1555	0	1719	0	0	1786	2737
Flt Permitted	0.950			0.235				0.883			0.831	
Satd. Flow (perm)	3372	3476	1555	430	3476	1555	0	1543	0	0	1520	2737
Satd. Flow (RTOR)			6			53		5				7
Adj. Flow (vph)	2040	3107	7	7	587	53	7	7	7	7	7	7
Lane Group Flow (vph)	2040	3107	7	7	587	53	0	21	0	0	14	7
Turn Type	Prot		Perm	Perm		Perm	Perm			Perm		Perm
Protected Phases	5	2			6			8			4	
Permitted Phases			2	6		6	8			4		4
Total Split (s)	64.0	87.0	87.0	23.0	23.0	23.0	13.0	13.0	0.0	13.0	13.0	13.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0
Act Effct Green (s)	58.0	81.0	81.0	17.0	17.0	17.0		7.0			7.0	7.0
Actuated g/C Ratio	0.58	0.81	0.81	0.17	0.17	0.17		0.07			0.07	0.07
v/c Ratio	1.04	1.10	0.01	0.10	0.99	0.17		0.19			0.13	0.04
Control Delay	54.8	65.6	1.2	26.4	55.5	20.9		40.4			46.8	25.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	54.8	65.6	1.2	26.4	55.5	20.9		40.4			46.8	25.2
LOS	D	E	A	C	E	C		D			D	C
Approach Delay		61.2			52.3			40.4			39.6	
Approach LOS		E			D			D			D	
Queue Length 50th (m)	~222.0	~362.6	0.0	0.0	65.0	6.4		3.0			2.6	0.0
Queue Length 95th (m)	163.6	188.5	0.5	m1.7	m65.3	m6.9		8.5			7.2	1.8
Internal Link Dist (m)		274.3			1833.4			144.2			181.3	
Turn Bay Length (m)	100.0		50.0	75.0		50.0						120.0
Base Capacity (vph)	1956	2816	1261	73	591	308		113			106	198
Starvation Cap Reductn	0	0	0	0	0	0		0			0	0
Spillback Cap Reductn	0	0	0	0	0	0		0			0	0
Storage Cap Reductn	0	0	0	0	0	0		0			0	0
Reduced v/c Ratio	1.04	1.10	0.01	0.10	0.99	0.17		0.19			0.13	0.04

Intersection Summary		
Cycle Length: 100		
Actuated Cycle Length: 100		
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.10		
Intersection Signal Delay: 60.1	Intersection LOS: E	
Intersection Capacity Utilization 91.1%	ICU Level of Service F	
Analysis Period (min) 15		
~ Volume exceeds capacity, queue is theoretically infinite.		
Queue shown is maximum after two cycles.		
m Volume for 95th percentile queue is metered by upstream signal.		

Splits and Phases: 1: Highway 15 & RR 220

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1385	945	10	5	445	90	30	675	80	5	5	5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3372	3476	1555	1738	3476	1555	1738	3476	1555	1738	3476	2737
Flt Permitted	0.950			0.950			0.753			0.182		
Satd. Flow (perm)	3372	3476	1555	1738	3476	1555	1378	3476	1555	333	3476	2737
Satd. Flow (RTOR)			12			4			78			7
Adj. Flow (vph)	1847	1260	13	7	593	120	40	900	107	7	7	7
Lane Group Flow (vph)	1847	1260	13	7	593	120	40	900	107	7	7	7
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		pt+ov
Protected Phases	7	4		3	8			2			6	6 7
Permitted Phases			4			8	2		2	6		
Total Split (s)	51.0	60.0	60.0	13.0	22.0	22.0	27.0	27.0	27.0	27.0	27.0	78.0
Total Lost Time (s)	5.0	5.0	6.0	5.0	5.0	6.0	5.0	5.0	6.0	5.0	5.0	5.0
Act Effct Green (s)	46.0	65.4	64.4	8.0	17.0	16.0	22.0	22.0	21.0	22.0	22.0	73.0
Actuated g/C Ratio	0.46	0.65	0.64	0.08	0.17	0.16	0.22	0.22	0.21	0.22	0.22	0.73
v/c Ratio	1.19	0.55	0.01	0.05	1.00	0.48	0.13	1.18	0.28	0.10	0.01	0.00
Control Delay	115.0	14.6	6.7	43.4	80.4	44.0	32.8	128.9	14.1	25.8	22.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	115.0	14.6	6.7	43.4	80.4	44.0	32.8	128.9	14.1	25.8	22.2	0.0
LOS	F	B	A	D	F	D	C	F	B	C	C	A
Approach Delay		74.0			73.9			113.5			16.0	
Approach LOS		E			E			F			B	
Queue Length 50th (m)	~233.0	81.2	0.3	1.3	~61.4	20.6	6.3	~110.4	4.6	0.8	0.4	0.0
Queue Length 95th (m)	m#195.1	m102.7	m0.3	4.6	#70.3	30.9	12.4	#109.8	12.8	2.1	1.0	0.0
Internal Link Dist (m)		1833.4			207.8			744.6			119.8	
Turn Bay Length (m)	220.0		50.0	50.0		50.0	50.0		50.0	50.0		120.0
Base Capacity (vph)	1551	2274	1006	139	591	252	303	765	388	73	765	2000
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.19	0.55	0.01	0.05	1.00	0.48	0.13	1.18	0.28	0.10	0.01	0.00

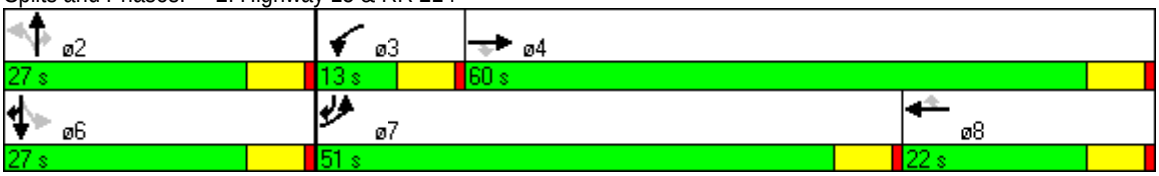
Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.19	
Intersection Signal Delay: 82.2	Intersection LOS: F
Intersection Capacity Utilization 83.0%	ICU Level of Service E
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

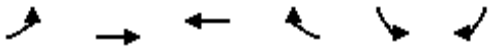
Splits and Phases: 2: Highway 15 & RR 214



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	580	440	5	10	535	10	5	5	5	5	5	5
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.997			0.955			0.955	
Flt Protected	0.950			0.950				0.984			0.984	
Satd. Flow (prot)	3372	3469	0	1738	3466	0	0	1719	0	0	1719	0
Flt Permitted	0.950			0.428								
Satd. Flow (perm)	3372	3469	0	783	3466	0	0	1747	0	0	1747	0
Satd. Flow (RTOR)		4			2			7			7	
Adj. Flow (vph)	773	587	7	13	713	13	7	7	7	7	7	7
Lane Group Flow (vph)	773	594	0	13	726	0	0	21	0	0	21	0
Turn Type	Prot			Perm			Perm			Perm		
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2			6		
Total Split (s)	38.0	60.0	0.0	22.0	22.0	0.0	15.0	15.0	0.0	15.0	15.0	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0
Act Effct Green (s)	17.3	45.3		16.4	16.4			7.2			7.2	
Actuated g/C Ratio	0.36	0.94		0.34	0.34			0.12			0.12	
v/c Ratio	0.64	0.18		0.05	0.62			0.09			0.09	
Control Delay	15.8	1.2		16.8	19.5			22.4			22.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	15.8	1.2		16.8	19.5			22.4			22.4	
LOS	B	A		B	B			C			C	
Approach Delay		9.4			19.4			22.4			22.4	
Approach LOS		A			B			C			C	
Queue Length 50th (m)	24.0	0.0		0.6	21.8			0.9			0.9	
Queue Length 95th (m)	42.8	12.5		4.4	52.3			6.0			6.0	
Internal Link Dist (m)		1471.7			262.6			433.8			738.4	
Turn Bay Length (m)	60.0			40.0								
Base Capacity (vph)	1739	3283		270	1195			269			269	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.44	0.18		0.05	0.61			0.08			0.08	

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 48.1	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 13.1	Intersection LOS: B
Intersection Capacity Utilization 52.5%	ICU Level of Service A
Analysis Period (min) 15	

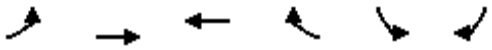
Splits and Phases: 3: Hwy 15 & RR 212



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	1300	850	10	5	5	5
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	0.88
Frt			0.948			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3372	3476	3296	0	1738	2737
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3372	3476	3296	0	1738	2737
Satd. Flow (RTOR)			7			7
Adj. Flow (vph)	1733	1133	13	7	7	7
Lane Group Flow (vph)	1733	1133	20	0	7	7
Turn Type	Prot					pt+ov
Protected Phases	7	4	8		6	6 7
Permitted Phases						
Total Split (s)	73.0	86.0	13.0	0.0	14.0	87.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0
Act Effct Green (s)	65.8	71.0	8.0		19.0	92.8
Actuated g/C Ratio	0.66	0.71	0.08		0.19	0.93
v/c Ratio	0.78	0.46	0.07		0.02	0.00
Control Delay	15.5	8.4	33.1		60.4	0.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	15.5	8.4	33.1		60.4	0.0
LOS	B	A	C		E	A
Approach Delay		12.7	33.1		30.2	
Approach LOS		B	C		C	
Queue Length 50th (m)	126.1	68.7	1.2		1.4	0.0
Queue Length 95th (m)	m102.7	m32.0	3.9		4.9	0.0
Internal Link Dist (m)		49.7	157.5		352.0	
Turn Bay Length (m)	200.0				40.0	100.0
Base Capacity (vph)	2293	2816	270		329	2525
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.76	0.40	0.07		0.02	0.00

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 12.9	Intersection LOS: B
Intersection Capacity Utilization 57.9%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: RR 214 & RR 213

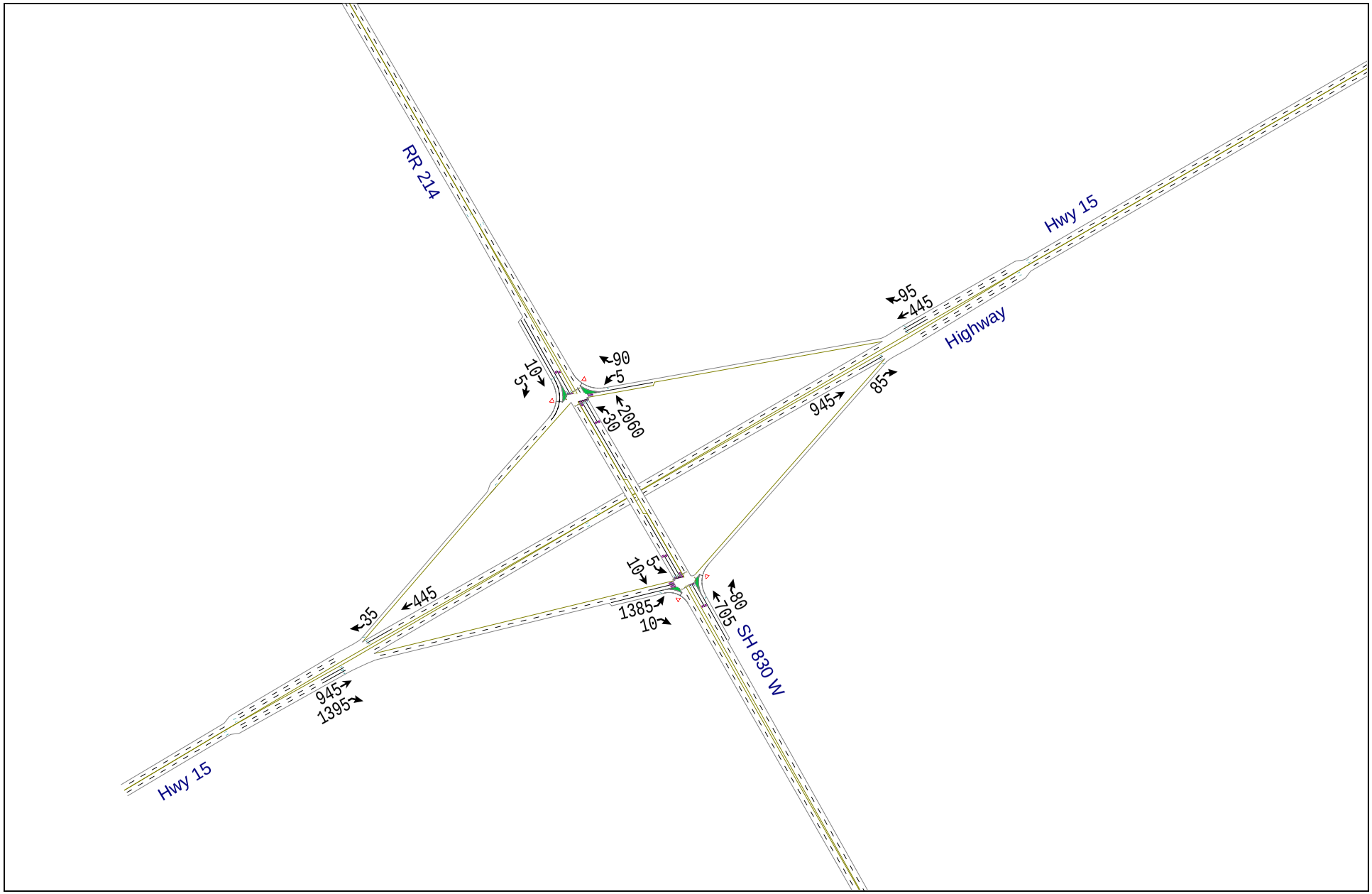


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	410	5	75	1230	5	30
Lane Util. Factor	1.00	1.00	1.00	0.88	0.97	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1738	1830	1830	2737	3372	1555
Flt Permitted	0.692				0.950	
Satd. Flow (perm)	1266	1830	1830	2737	3372	1555
Satd. Flow (RTOR)				1640		40
Adj. Flow (vph)	547	7	100	1640	7	40
Lane Group Flow (vph)	547	7	100	1640	7	40
Turn Type	Perm			Perm		Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Total Split (s)	83.0	83.0	83.0	83.0	17.0	17.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	64.1	64.1	64.1	64.1	25.9	25.9
Actuated g/C Ratio	0.64	0.64	0.64	0.64	0.26	0.26
v/c Ratio	0.67	0.01	0.09	0.70	0.01	0.09
Control Delay	21.3	4.4	5.9	6.0	38.8	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.3	4.4	5.9	6.0	38.8	14.2
LOS	C	A	A	A	D	B
Approach Delay		21.1	6.0		17.9	
Approach LOS		C	A		B	
Queue Length 50th (m)	94.6	0.7	6.2	18.8	0.5	0.0
Queue Length 95th (m)	m58.3	m0.4	m5.5	7.5	2.3	6.9
Internal Link Dist (m)		157.7	352.0		226.8	
Turn Bay Length (m)	50.0			80.0		50.0
Base Capacity (vph)	996	1441	1441	2504	898	443
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.00	0.07	0.65	0.01	0.09

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 9.8	Intersection LOS: A
Intersection Capacity Utilization 74.1%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

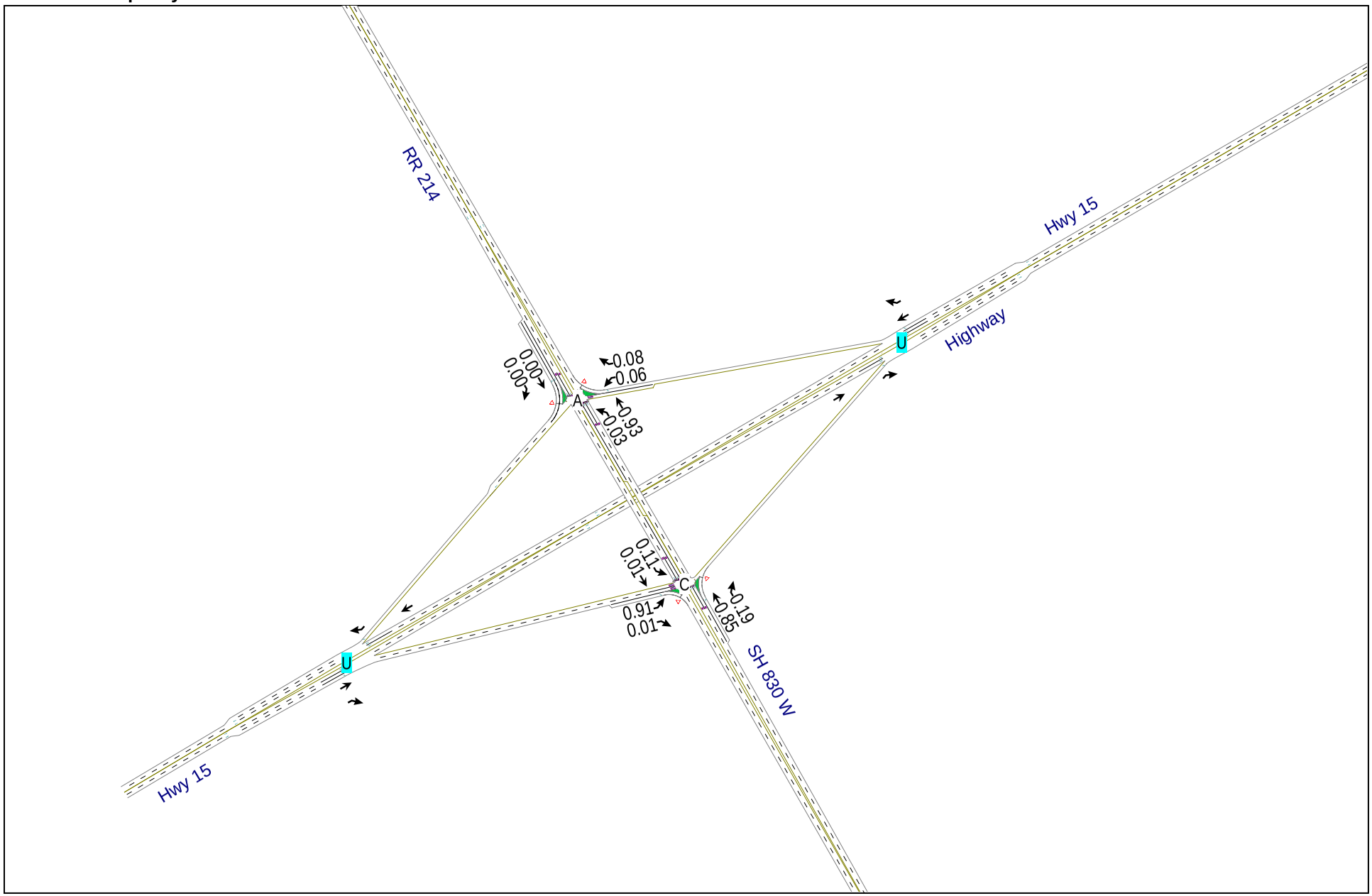
Splits and Phases: 5: TWP RD 554 & RR 214

Map - Strathcona County Heartland Industrial Area Transportation Study (1135 31043)
Volumes **10/25/2007**



Ultimate (Including 1200 Turnaround Trips) **Timing Plan: AM Peak**
W:\active\113531043\analysis\synchro\2007-09\hwy 15 - RR 214_Ultimate_am.syn **Stantec Consulting Ltd.**

Map - Strathcona County Heartland Industrial Area Transportation Study (1135 31043)
Volume to Capacity Ratios **10/25/2007**



Ultimate (Including 1200 Turnaround Trips) **Timing Plan: AM Peak**
W:\active\113531043\analysis\synchro\2007-09\hwy 15 - RR 214_Ultimate_am.syn **Stantec Consulting Ltd.**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	5	0	90	30	2060	0	0	10	5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1738	0	1555	1738	3476	0	0	3476	2737
Flt Permitted				0.950			0.749					
Satd. Flow (perm)	0	0	0	1738	0	1555	1370	3476	0	0	3476	2737
Satd. Flow (RTOR)						91						7
Adj. Flow (vph)	0	0	0	7	0	120	40	2747	0	0	13	7
Lane Group Flow (vph)	0	0	0	7	0	120	40	2747	0	0	13	7
Turn Type				custom		Free	Perm					Perm
Protected Phases								2			6	
Permitted Phases				8		Free	2					6
Total Split (s)	0.0	0.0	0.0	12.0	0.0	0.0	108.0	108.0	0.0	0.0	108.0	108.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	4.0	4.0	6.0	6.0
Act Effct Green (s)				8.0		120.0	102.0	102.0			102.0	102.0
Actuated g/C Ratio				0.07		1.00	0.85	0.85			0.85	0.85
v/c Ratio				0.06		0.08	0.03	0.93			0.00	0.00
Control Delay				53.8		0.1	0.1	8.9			1.4	0.8
Queue Delay				0.0		0.0	0.0	0.3			0.0	0.0
Total Delay				53.8		0.1	0.1	9.2			1.4	0.8
LOS				D		A	A	A			A	A
Approach Delay								9.1			1.2	
Approach LOS								A			A	
Queue Length 50th (m)				1.2		0.0	0.0	103.6			0.2	0.0
Queue Length 95th (m)				4.1		0.0	0.0	78.2			0.3	0.1
Internal Link Dist (m)		120.0			351.7			218.8			209.9	
Turn Bay Length (m)				75.0			100.0					100.0
Base Capacity (vph)				116		1555	1165	2955			2955	2328
Starvation Cap Reductn				0		0	0	30			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.06		0.08	0.03	0.94			0.00	0.00

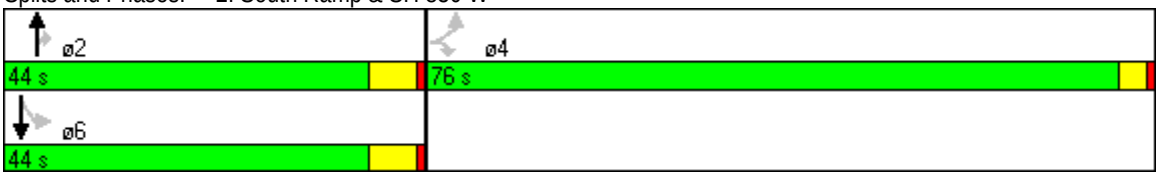
Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 22 (18%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Control Type: Pretimed	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 8.8	Intersection LOS: A
Intersection Capacity Utilization 80.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: North Ramp & RR 214

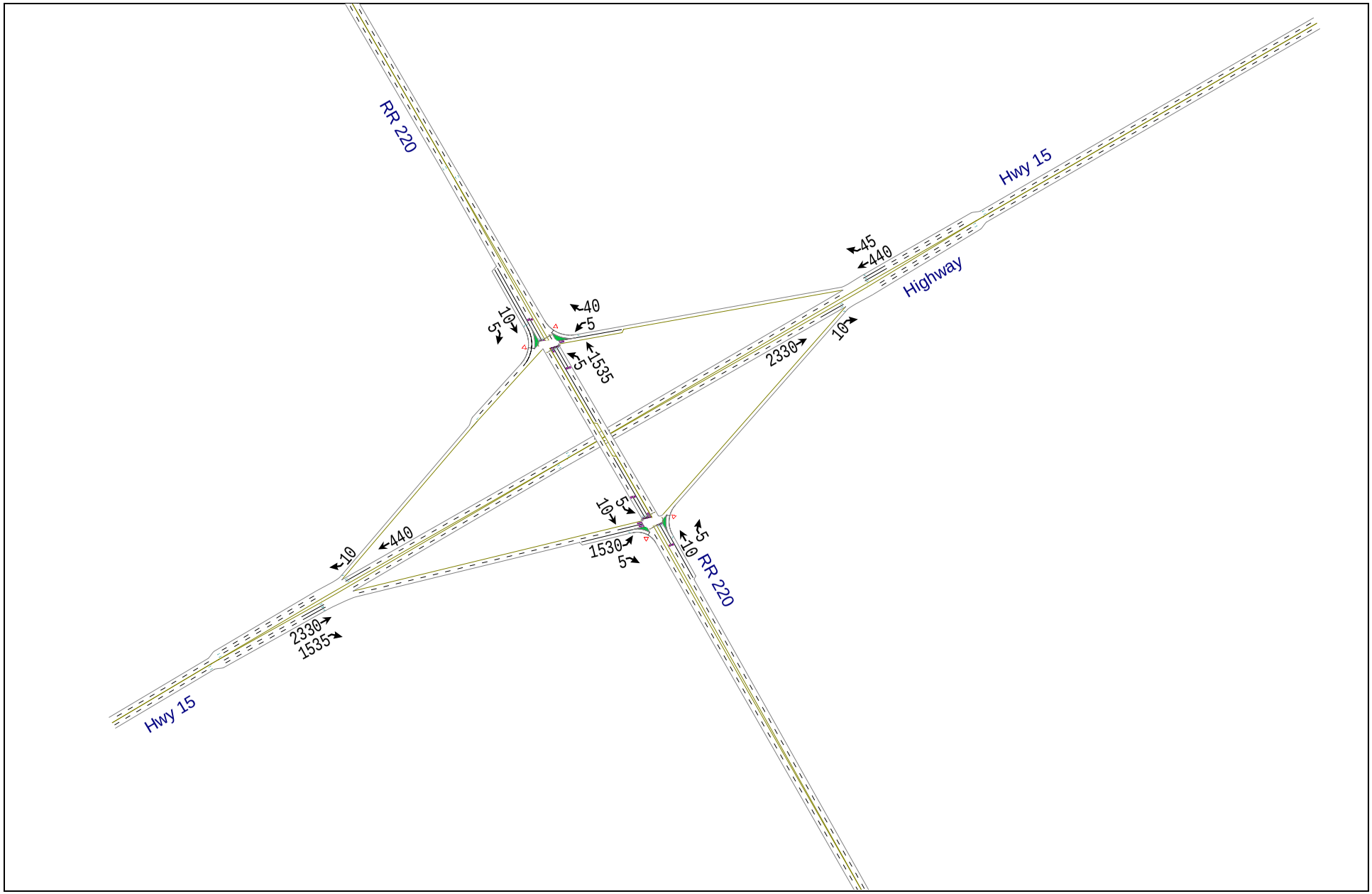
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1385	0	10	0	0	0	0	705	80	5	10	0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850						0.850			
Flt Protected	0.950									0.950		
Satd. Flow (prot)	3372	0	1555	0	0	0	0	3476	1555	1738	3476	0
Flt Permitted	0.950									0.105		
Satd. Flow (perm)	3372	0	1555	0	0	0	0	3476	1555	192	3476	0
Satd. Flow (RTOR)			13						107			
Adj. Flow (vph)	1847	0	13	0	0	0	0	940	107	7	13	0
Lane Group Flow (vph)	1847	0	13	0	0	0	0	940	107	7	13	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								2			6	
Permitted Phases	4		4						2	6		
Total Split (s)	76.0	0.0	76.0	0.0	0.0	0.0	0.0	44.0	44.0	44.0	44.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	6.0	6.0	4.0
Act Effct Green (s)	72.0		72.0					38.0	38.0	38.0	38.0	
Actuated g/C Ratio	0.60		0.60					0.32	0.32	0.32	0.32	
v/c Ratio	0.91		0.01					0.85	0.19	0.11	0.01	
Control Delay	29.7		4.5					47.3	6.4	3.8	22.2	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	29.7		4.5					47.3	6.4	3.8	22.2	
LOS	C		A					D	A	A	C	
Approach Delay								43.1			15.8	
Approach LOS								D			B	
Queue Length 50th (m)	147.4		0.0					85.8	0.0	0.0	1.0	
Queue Length 95th (m)	120.3		1.5					82.4	5.6	0.0	3.4	
Internal Link Dist (m)		372.0			346.6			500.7			218.8	
Turn Bay Length (m)			75.0						75.0	80.0		
Base Capacity (vph)	2023		938					1101	566	61	1101	
Starvation Cap Reductn	0		0					0	0	0	0	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.91		0.01					0.85	0.19	0.11	0.01	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Control Type: Pretimed	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 34.3	Intersection LOS: C
Intersection Capacity Utilization 80.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: South Ramp & SH 830 W

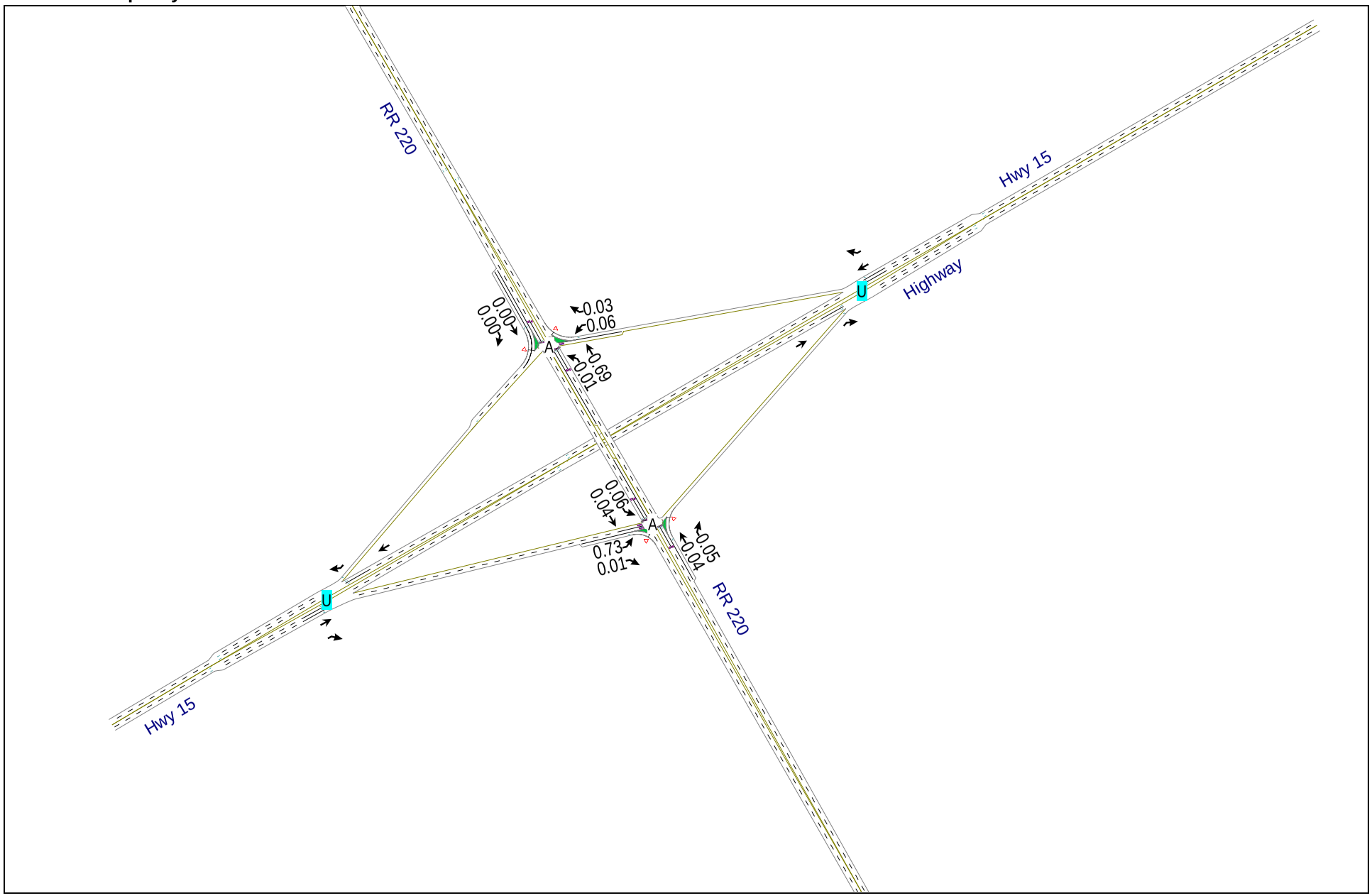


Map - Strathcona County Heartland Industrial Area Transportation Study (1135 31043)
Volumes **10/25/2007**



Ultimate (Including 1200 Turnaround Trips) **Timing Plan: AM Peak**
W:\active\113531043\analysis\synchro\2007-09\hwy 15 - RR 220_Ultimate_am.syn **Stantec Consulting Ltd.**

Map - Strathcona County Heartland Industrial Area Transportation Study (1135 31043)
Volume to Capacity Ratios **10/25/2007**



Ultimate (Including 1200 Turnaround Trips) **Timing Plan: AM Peak**
W:\active\113531043\analysis\synchro\2007-09\hwy 15 - RR 220_Ultimate_am.syn **Stantec Consulting Ltd.**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	5	0	40	5	1535	0	0	10	5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1738	0	1555	1738	3476	0	0	3476	2737
Flt Permitted				0.950			0.749					
Satd. Flow (perm)	0	0	0	1738	0	1555	1370	3476	0	0	3476	2737
Satd. Flow (RTOR)						53						7
Adj. Flow (vph)	0	0	0	7	0	53	7	2047	0	0	13	7
Lane Group Flow (vph)	0	0	0	7	0	53	7	2047	0	0	13	7
Turn Type				custom		Free	Perm					Perm
Protected Phases								2			6	
Permitted Phases				8		Free	2					6
Total Split (s)	0.0	0.0	0.0	12.0	0.0	0.0	108.0	108.0	0.0	0.0	108.0	108.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	4.0	4.0	6.0	6.0
Act Effct Green (s)				8.0		120.0	102.0	102.0			102.0	102.0
Actuated g/C Ratio				0.07		1.00	0.85	0.85			0.85	0.85
v/c Ratio				0.06		0.03	0.01	0.69			0.00	0.00
Control Delay				53.8		0.0	0.0	0.9			1.4	0.8
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				53.8		0.0	0.0	0.9			1.4	0.8
LOS				D		A	A	A			A	A
Approach Delay								0.9			1.2	
Approach LOS								A			A	
Queue Length 50th (m)				1.2		0.0	0.0	0.2			0.2	0.0
Queue Length 95th (m)				4.1		0.0	0.0	0.2			0.3	0.1
Internal Link Dist (m)		106.5			351.7			218.8			209.9	
Turn Bay Length (m)				75.0			100.0					100.0
Base Capacity (vph)				116		1555	1165	2955			2955	2328
Starvation Cap Reductn				0		0	0	24			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.06		0.03	0.01	0.70			0.00	0.00

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 13 (11%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Control Type: Pretimed	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 1.1	Intersection LOS: A
Intersection Capacity Utilization 73.6%	ICU Level of Service D
Analysis Period (min) 15	

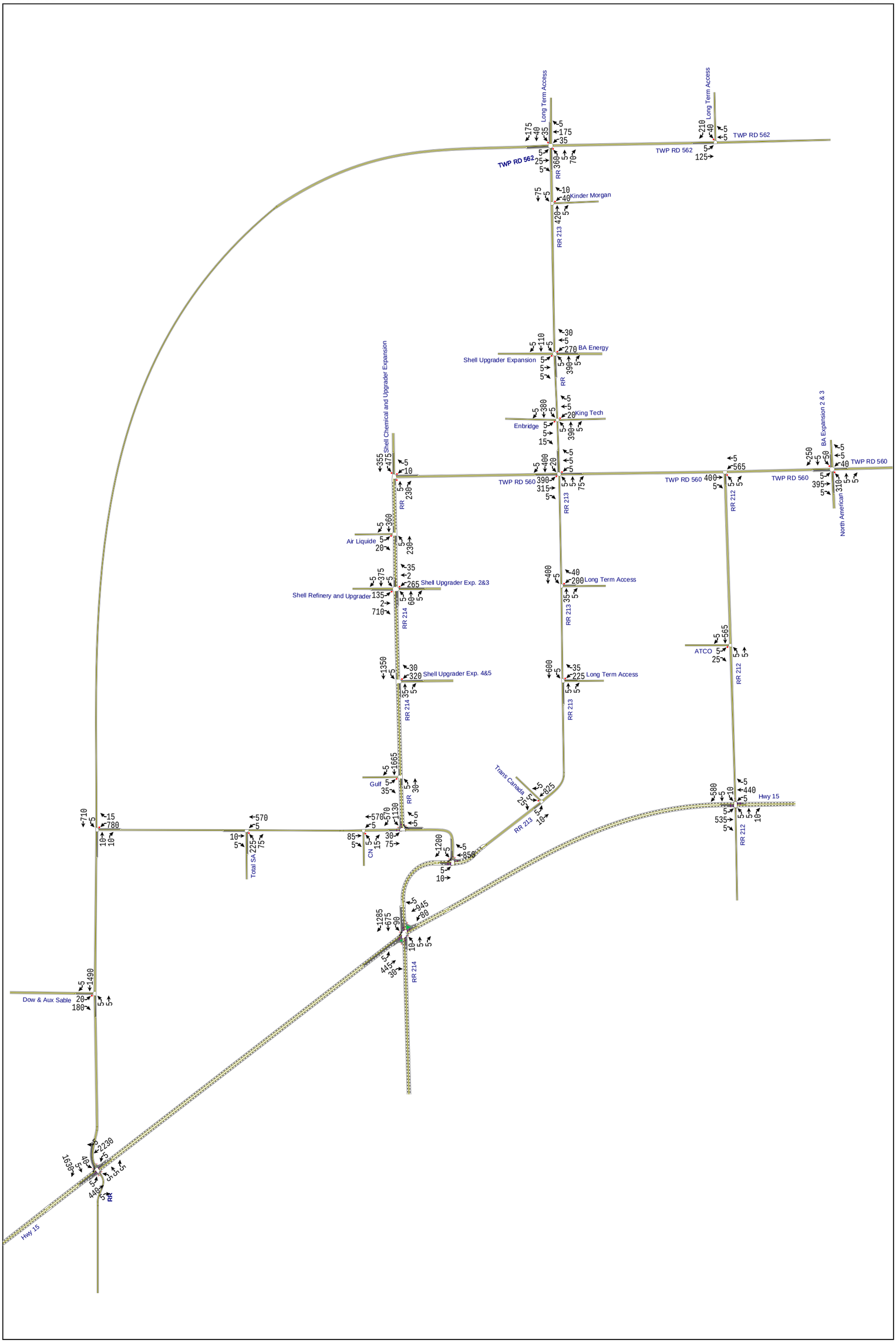
Splits and Phases: 1: North Ramp & RR 220

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1530	0	5	0	0	0	0	10	5	5	10	0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850						0.850			
Flt Protected	0.950									0.950		
Satd. Flow (prot)	3372	0	1555	0	0	0	0	3476	1555	1738	3476	0
Flt Permitted	0.950									0.749		
Satd. Flow (perm)	3372	0	1555	0	0	0	0	3476	1555	1370	3476	0
Satd. Flow (RTOR)			7						7			
Adj. Flow (vph)	2040	0	7	0	0	0	0	13	7	7	13	0
Lane Group Flow (vph)	2040	0	7	0	0	0	0	13	7	7	13	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								2			6	
Permitted Phases	4		4						2	6		
Total Split (s)	103.0	0.0	103.0	0.0	0.0	0.0	0.0	17.0	17.0	17.0	17.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	6.0	6.0	4.0
Act Effct Green (s)	99.0		99.0					11.0	11.0	11.0	11.0	
Actuated g/C Ratio	0.82		0.82					0.09	0.09	0.09	0.09	
v/c Ratio	0.73		0.01					0.04	0.05	0.06	0.04	
Control Delay	6.6		1.0					50.1	28.8	0.8	59.1	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	6.6		1.0					50.1	28.8	0.8	59.1	
LOS	A		A					D	C	A	E	
Approach Delay								42.6			38.7	
Approach LOS								D			D	
Queue Length 50th (m)	66.7		0.0					1.2	0.0	0.0	1.6	
Queue Length 95th (m)	52.1		0.4					3.1	2.8	0.0	6.2	
Internal Link Dist (m)		372.0			346.6			500.7			218.8	
Turn Bay Length (m)			75.0						75.0	80.0		
Base Capacity (vph)	2782		1284					319	149	126	319	
Starvation Cap Reductn	0		0					0	0	0	0	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.73		0.01					0.04	0.05	0.06	0.04	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 108 (90%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Control Type: Pretimed	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 7.2	Intersection LOS: A
Intersection Capacity Utilization 73.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: South Ramp & RR 220

PM Peak Hour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Long Term Access
Kinder Morgan
RR 213
BA Energy
Shell Upgrader Expansion
King Tech
Enbridge
Shell Chemical and Upgrader Expansion
TWP RD 560
BA Expansion 2 & 3
North American
RR 212
Air Liquide
Shell Upgrader Exp. 2&3
Shell Refinery and Upgrader
RR 214
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ATCO
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Gulf
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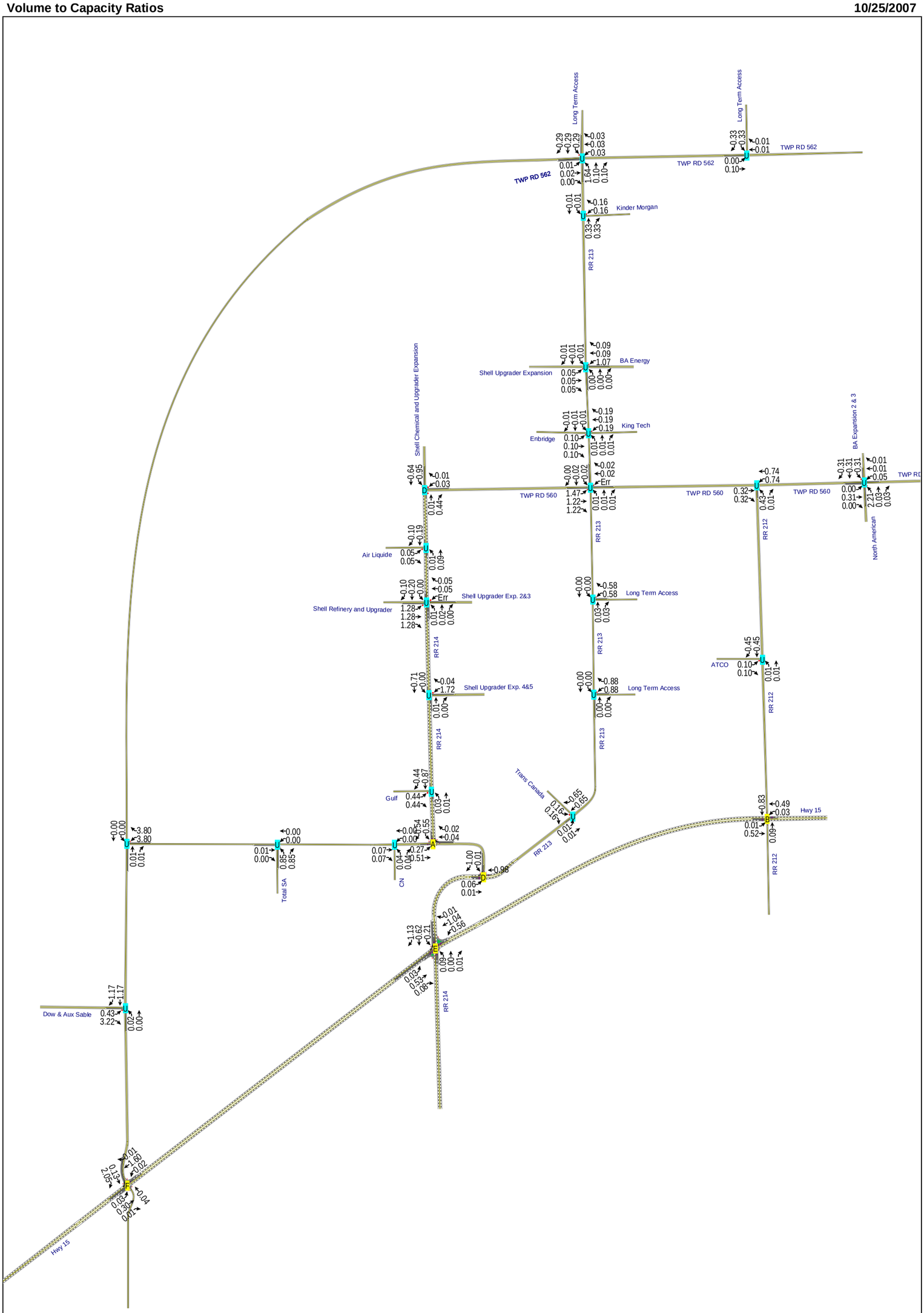
RR 213
Hwy 15
Total SA
CN
Dow & Aux Sable


TWP RD 562
Long Term Access
Kinder Morgan
RR 213
Shell Upgrader Expansion
BA Energy
Enbridge
King Tech
Shell Chemical and Upgrader Expansion
TWP RD 560
BA Expansion 2 & 3
North American
Air Liquide
Shell Refinery and Upgrader
Shell Upgrader Exp. 2&3
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ATCO
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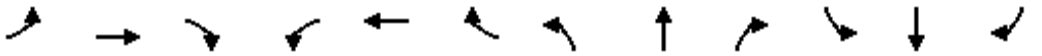
Gulf
Trans Canada
Hwy 15
Dow & Aux Sable
Total SA
CN



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	440	5	5	2230	5	5	5	5	40	5	1630
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	0.88
Frt			0.850			0.850		0.955				0.850
Flt Protected	0.950			0.950				0.984			0.958	
Satd. Flow (prot)	3372	3476	1555	1738	3476	1555	0	1719	0	0	1753	2737
Flt Permitted	0.950			0.431				0.939			0.775	
Satd. Flow (perm)	3372	3476	1555	789	3476	1555	0	1641	0	0	1418	2737
Satd. Flow (RTOR)			7			2		7				269
Adj. Flow (vph)	7	587	7	7	2973	7	7	7	7	53	7	2173
Lane Group Flow (vph)	7	587	7	7	2973	7	0	21	0	0	60	2173
Turn Type	Prot		Perm	Perm		Perm	Perm			Perm		Perm
Protected Phases	5	2			6			8			4	
Permitted Phases			2	6		6	8			4		4
Total Split (s)	13.0	62.0	62.0	49.0	49.0	49.0	38.0	38.0	0.0	38.0	38.0	38.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0
Act Effct Green (s)	7.0	56.0	56.0	53.4	53.4	53.4		32.0			32.0	32.0
Actuated g/C Ratio	0.07	0.56	0.56	0.53	0.53	0.53		0.32			0.32	0.32
v/c Ratio	0.03	0.30	0.01	0.02	1.60	0.01		0.04			0.13	2.05
Control Delay	43.8	12.2	5.6	11.8	292.7	10.2		18.2			25.2	497.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	43.8	12.2	5.6	11.8	292.7	10.2		18.2			25.2	497.7
LOS	D	B	A	B	F	B		B			C	F
Approach Delay		12.5			291.4			18.3			485.0	
Approach LOS		B			F			B			F	
Queue Length 50th (m)	0.6	29.8	0.0	0.5	~428.8	0.4		1.9			8.2	~362.0
Queue Length 95th (m)	2.3	31.8	1.5	m0.7	m#403.9	m0.5		5.8			14.4	#315.5
Internal Link Dist (m)		274.3			1833.4			144.2			181.3	
Turn Bay Length (m)	100.0		50.0	75.0		50.0						120.0
Base Capacity (vph)	236	1947	874	421	1857	832		530			454	1059
Starvation Cap Reductn	0	0	0	0	0	0		0			0	0
Spillback Cap Reductn	0	0	0	0	0	0		0			0	0
Storage Cap Reductn	0	0	0	0	0	0		0			0	0
Reduced v/c Ratio	0.03	0.30	0.01	0.02	1.60	0.01		0.04			0.13	2.05

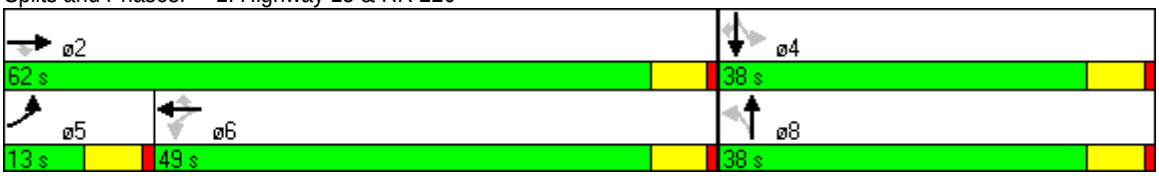
Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 2.05	
Intersection Signal Delay: 335.7	Intersection LOS: F
Intersection Capacity Utilization 139.5%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Highway 15 & RR 220



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	445	30	80	945	5	10	5	5	90	675	1285
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3372	3476	1555	1738	3476	1555	1738	3476	1555	1738	3476	2737
Flt Permitted	0.950			0.950			0.198			0.753		
Satd. Flow (perm)	3372	3476	1555	1738	3476	1555	362	3476	1555	1378	3476	2737
Satd. Flow (RTOR)			40			4			7			13
Adj. Flow (vph)	7	593	40	107	1260	7	13	7	7	120	900	1713
Lane Group Flow (vph)	7	593	40	107	1260	7	13	7	7	120	900	1713
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		pt+ov
Protected Phases	7	4		3	8			2			6	6 7
Permitted Phases			4			8	2		2	6		
Total Split (s)	13.0	36.0	36.0	17.0	40.0	40.0	47.0	47.0	47.0	47.0	47.0	60.0
Total Lost Time (s)	5.0	5.0	6.0	5.0	5.0	6.0	5.0	5.0	6.0	5.0	5.0	5.0
Act Effct Green (s)	8.0	32.1	31.1	10.9	35.0	34.0	42.0	42.0	41.0	42.0	42.0	55.0
Actuated g/C Ratio	0.08	0.32	0.31	0.11	0.35	0.34	0.42	0.42	0.41	0.42	0.42	0.55
v/c Ratio	0.03	0.53	0.08	0.56	1.04	0.01	0.09	0.00	0.01	0.21	0.62	1.13
Control Delay	52.8	21.0	4.4	53.9	68.3	16.6	19.5	17.0	10.0	19.7	25.0	92.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.8	21.0	4.4	53.9	68.3	16.6	19.5	17.0	10.0	19.7	25.0	92.7
LOS	D	C	A	D	E	B	B	B	A	B	C	F
Approach Delay		20.4			66.9			16.4			67.2	
Approach LOS		C			E			B			E	
Queue Length 50th (m)	0.7	26.2	0.3	19.7	~139.1	0.4	1.5	0.4	0.0	14.4	70.1	~220.8
Queue Length 95th (m)	m2.4	27.7	1.9	29.9	121.4	2.7	4.5	1.4	2.0	21.5	69.8	#192.4
Internal Link Dist (m)		1833.4			207.8			744.6			119.8	
Turn Bay Length (m)	220.0		50.0	50.0		50.0	50.0		50.0	50.0		120.0
Base Capacity (vph)	270	1115	511	209	1217	531	152	1460	642	579	1460	1511
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.53	0.08	0.51	1.04	0.01	0.09	0.00	0.01	0.21	0.62	1.13

Intersection Summary		
Cycle Length: 100		
Actuated Cycle Length: 100		
Offset: 45 (45%), Referenced to phase 4:EBT and 8:WBT, Start of Green		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.13		
Intersection Signal Delay: 60.6	Intersection LOS: E	
Intersection Capacity Utilization 89.4%	ICU Level of Service E	
Analysis Period (min) 15		
~ Volume exceeds capacity, queue is theoretically infinite.		
Queue shown is maximum after two cycles.		
# 95th percentile volume exceeds capacity, queue may be longer.		
Queue shown is maximum after two cycles.		
m Volume for 95th percentile queue is metered by upstream signal.		

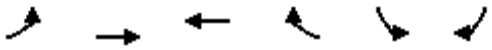
Splits and Phases: 2: Highway 15 & RR 214

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	535	5	5	440	5	5	5	10	10	5	580
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.998			0.935			0.868	
Flt Protected	0.950			0.950				0.987			0.999	
Satd. Flow (prot)	3372	3473	0	1738	3469	0	0	1688	0	0	1587	0
Flt Permitted	0.950			0.378				0.671			0.994	
Satd. Flow (perm)	3372	3473	0	692	3469	0	0	1148	0	0	1579	0
Satd. Flow (RTOR)		3			1			13			736	
Adj. Flow (vph)	7	713	7	7	587	7	7	7	13	13	7	773
Lane Group Flow (vph)	7	720	0	7	594	0	0	27	0	0	793	0
Turn Type	Prot			Perm			Perm			Perm		
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2			6		
Total Split (s)	38.0	60.0	0.0	22.0	22.0	0.0	15.0	15.0	0.0	15.0	15.0	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0
Act Effct Green (s)	7.0	14.3		12.5	12.5			9.3			9.3	
Actuated g/C Ratio	0.15	0.40		0.35	0.35			0.26			0.26	
v/c Ratio	0.01	0.52		0.03	0.49			0.09			0.83	
Control Delay	18.2	9.1		10.0	11.6			11.4			13.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	18.2	9.1		10.0	11.6			11.4			13.2	
LOS	B	A		A	B			B			B	
Approach Delay		9.2			11.6			11.4			13.2	
Approach LOS		A			B			B			B	
Queue Length 50th (m)	0.2	15.1		0.2	11.9			0.6			2.3	
Queue Length 95th (m)	1.3	17.8		2.1	27.2			4.8			#12.9	
Internal Link Dist (m)		1471.7			262.6			433.8			738.4	
Turn Bay Length (m)	60.0			40.0								
Base Capacity (vph)	1512	2501		283	1423			306			954	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.00	0.29		0.02	0.42			0.09			0.83	

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 36	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 11.3	Intersection LOS: B
Intersection Capacity Utilization 62.2%	ICU Level of Service B
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

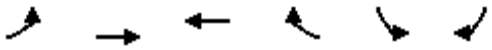
Splits and Phases: 3: Hwy 15 & RR 212



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	5	10	850	5	5	1200
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	0.88
Frt			0.999			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3372	3476	3473	0	1738	2737
Flt Permitted	0.100				0.950	
Satd. Flow (perm)	355	3476	3473	0	1738	2737
Satd. Flow (RTOR)			1			18
Adj. Flow (vph)	7	13	1133	7	7	1600
Lane Group Flow (vph)	7	13	1140	0	7	1600
Turn Type	Perm					Perm
Protected Phases		4	8		6	
Permitted Phases	4					6
Total Split (s)	45.0	45.0	45.0	0.0	75.0	75.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0
Act Effct Green (s)	40.0	40.0	40.0		70.0	70.0
Actuated g/C Ratio	0.33	0.33	0.33		0.58	0.58
v/c Ratio	0.06	0.01	0.98		0.01	1.00
Control Delay	29.2	26.9	62.9		12.2	47.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	29.2	26.9	62.9		12.2	47.7
LOS	C	C	E		B	D
Approach Delay		27.7	62.9		47.5	
Approach LOS		C	E		D	
Queue Length 50th (m)	0.5	1.1	139.4		0.7	168.5
Queue Length 95th (m)	2.0	2.8	129.3		m1.5	197.2
Internal Link Dist (m)		49.7	157.5		352.0	
Turn Bay Length (m)	200.0				40.0	100.0
Base Capacity (vph)	118	1159	1158		1014	1604
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.06	0.01	0.98		0.01	1.00

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 53.7	Intersection LOS: D
Intersection Capacity Utilization 74.0%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: RR 214 & RR 213

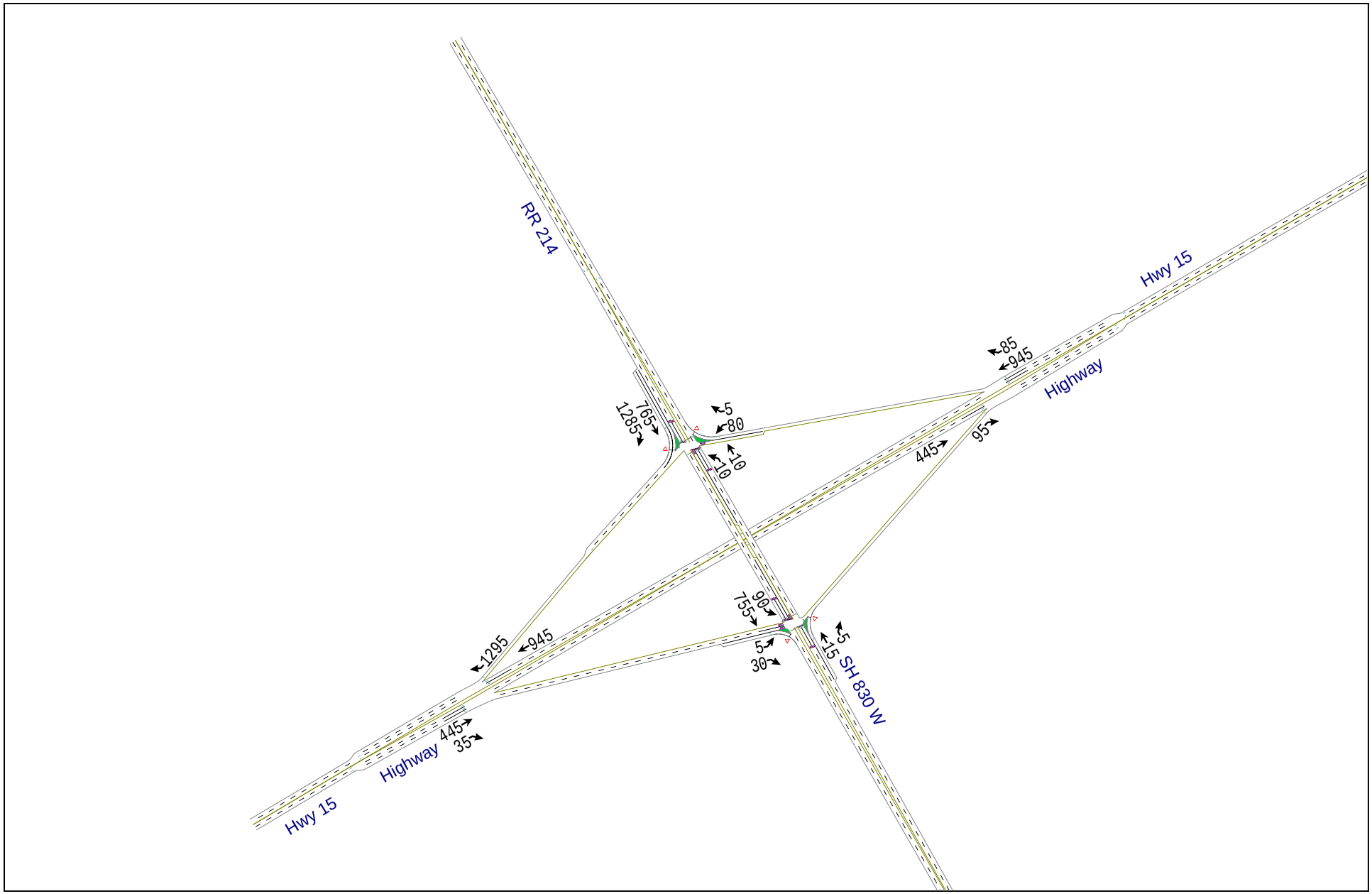


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	30	75	5	5	1130	570
Lane Util. Factor	1.00	1.00	1.00	0.88	0.97	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1738	1830	1830	2737	3372	1555
Flt Permitted	0.753				0.950	
Satd. Flow (perm)	1378	1830	1830	2737	3372	1555
Satd. Flow (RTOR)				7		760
Adj. Flow (vph)	40	100	7	7	1507	760
Lane Group Flow (vph)	40	100	7	7	1507	760
Turn Type	Perm			Perm		Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Total Split (s)	22.0	22.0	22.0	22.0	98.0	98.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	12.9	12.9	12.9	12.9	97.1	97.1
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.81	0.81
v/c Ratio	0.27	0.51	0.04	0.02	0.55	0.54
Control Delay	52.5	59.0	28.0	24.0	5.1	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	59.0	28.0	24.0	5.1	1.8
LOS	D	E	C	C	A	A
Approach Delay		57.2	26.0		4.0	
Approach LOS		E	C		A	
Queue Length 50th (m)	8.8	22.6	1.3	0.5	50.2	0.0
Queue Length 95th (m)	15.8	31.7	m4.0	m1.8	55.2	0.0
Internal Link Dist (m)		157.7	352.0		226.8	
Turn Bay Length (m)	50.0			80.0		50.0
Base Capacity (vph)	196	260	260	395	2731	1404
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.38	0.03	0.02	0.55	0.54

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.55			
Intersection Signal Delay: 7.2		Intersection LOS: A	
Intersection Capacity Utilization 49.5%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

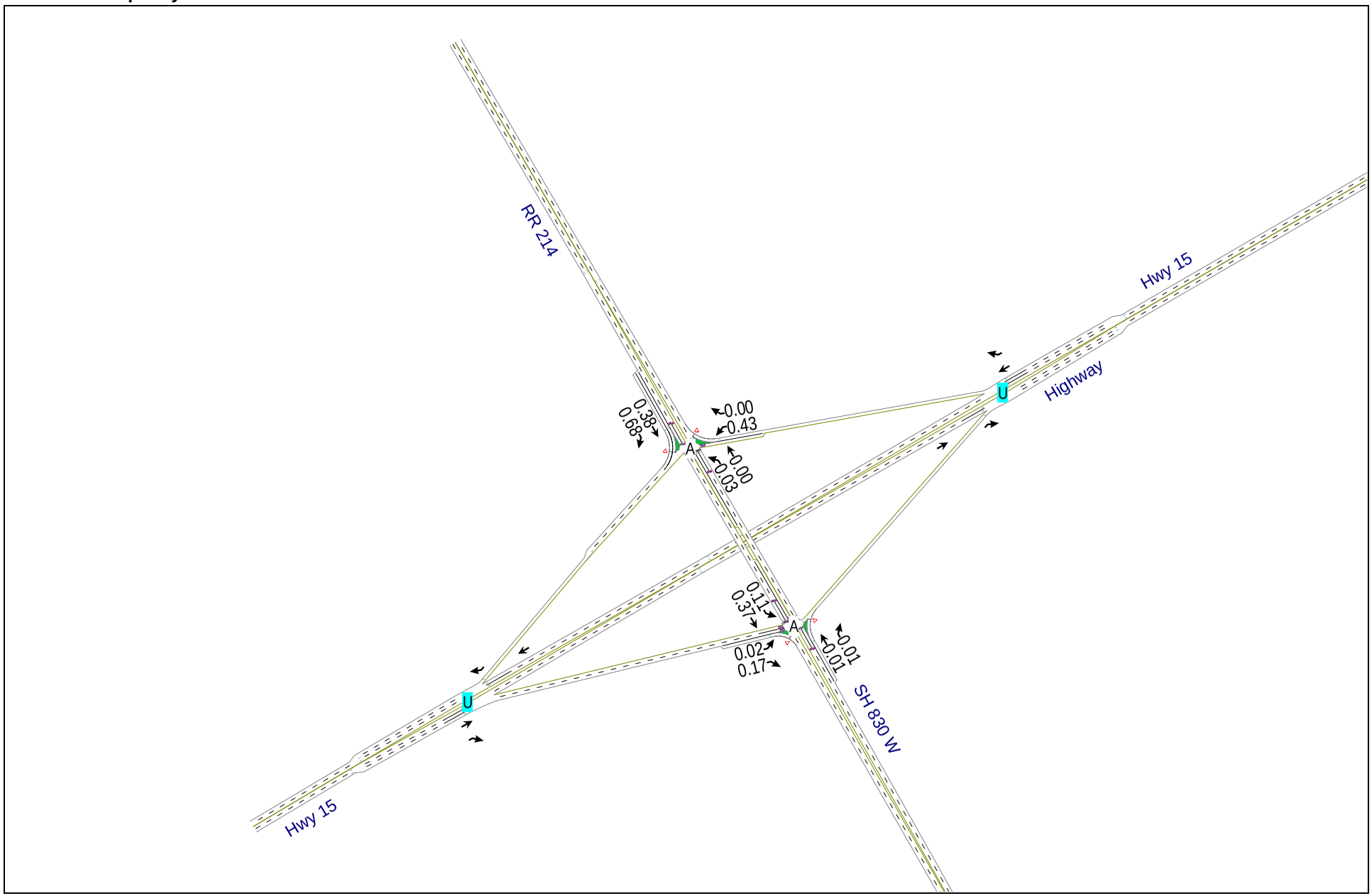
Splits and Phases: 5: TWP RD 554 & RR 214

Map - Strathcona County Heartland Industrial Area Transportation Study (1135 31043)
Volumes **10/25/2007**



Ultimate (Including 1200 Turnaround Trips) **Timing Plan: PM Peak**
W:\active\113531043\analysis\synchro\2007-09\hwy 15 - RR 214_Ultimate_pm.syn **Stantec Consulting Ltd.**

Map - Strathcona County Heartland Industrial Area Transportation Study (1135 31043)
Volume to Capacity Ratios **10/25/2007**

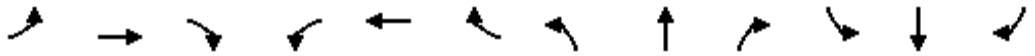


Ultimate (Including 1200 Turnaround Trips) **Timing Plan: PM Peak**
W:\active\113531043\analysis\synchro\2007-09\hwy 15 - RR 214_Ultimate_pm.syn **Stantec Consulting Ltd.**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	80	0	5	10	10	0	0	765	1285
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1738	0	1555	1738	3476	0	0	3476	2737
Flt Permitted				0.950			0.264					
Satd. Flow (perm)	0	0	0	1738	0	1555	483	3476	0	0	3476	2737
Satd. Flow (RTOR)						7						1713
Adj. Flow (vph)	0	0	0	107	0	7	13	13	0	0	1020	1713
Lane Group Flow (vph)	0	0	0	107	0	7	13	13	0	0	1020	1713
Turn Type				custom		Free	Perm					Perm
Protected Phases								2			6	
Permitted Phases				8		Free	2					6
Total Split (s)	0.0	0.0	0.0	21.0	0.0	0.0	99.0	99.0	0.0	0.0	99.0	99.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	4.0	4.0	6.0	6.0
Act Effct Green (s)				17.0		120.0	93.0	93.0			93.0	93.0
Actuated g/C Ratio				0.14		1.00	0.78	0.78			0.78	0.78
v/c Ratio				0.43		0.00	0.03	0.00			0.38	0.68
Control Delay				53.3		0.0	0.2	3.8			4.8	1.7
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				53.3		0.0	0.2	3.8			4.8	1.7
LOS				D		A	A	A			A	A
Approach Delay								2.0			2.9	
Approach LOS								A			A	
Queue Length 50th (m)				18.4		0.0	0.0	0.7			26.6	0.0
Queue Length 95th (m)				26.5		0.0	0.0	4.2			25.2	0.0
Internal Link Dist (m)		152.5			351.7			218.8			209.9	
Turn Bay Length (m)				75.0			100.0					100.0
Base Capacity (vph)				246		1555	374	2694			2694	2507
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.43		0.00	0.03	0.00			0.38	0.68

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 83 (69%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Control Type: Pretimed	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 4.7	Intersection LOS: A
Intersection Capacity Utilization 71.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: North Ramp & RR 214

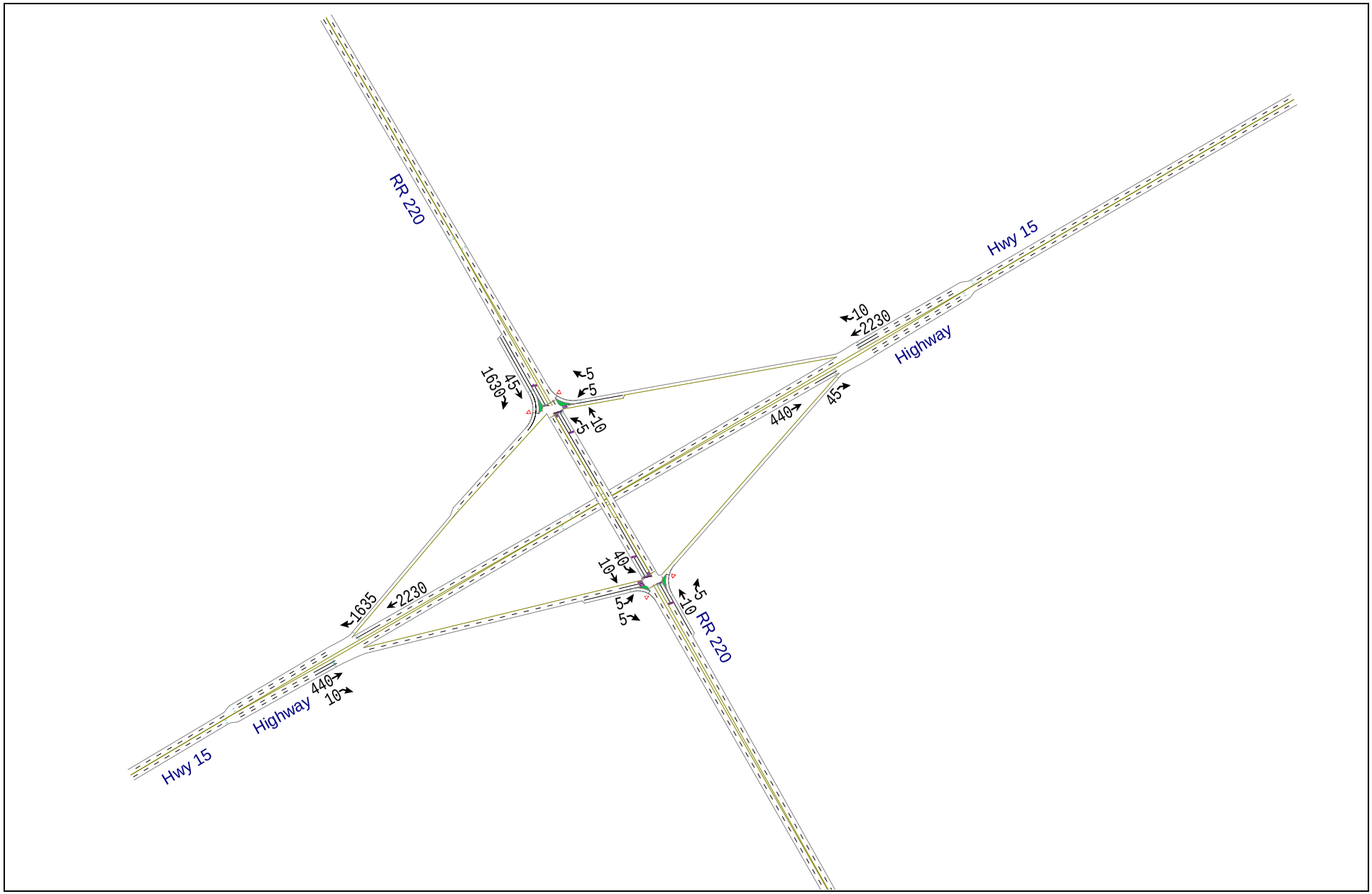


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	0	30	0	0	0	0	15	5	90	755	0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850						0.850			
Flt Protected	0.950									0.950		
Satd. Flow (prot)	3372	0	1555	0	0	0	0	3476	1555	1738	3476	0
Flt Permitted	0.950									0.744		
Satd. Flow (perm)	3372	0	1555	0	0	0	0	3476	1555	1361	3476	0
Satd. Flow (RTOR)			40						7			
Adj. Flow (vph)	7	0	40	0	0	0	0	20	7	120	1007	0
Lane Group Flow (vph)	7	0	40	0	0	0	0	20	7	120	1007	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								2			6	
Permitted Phases	4		4						2	6		
Total Split (s)	20.0	0.0	20.0	0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	6.0	6.0	4.0
Act Effct Green (s)	16.0		16.0					94.0	94.0	94.0	94.0	
Actuated g/C Ratio	0.13		0.13					0.78	0.78	0.78	0.78	
v/c Ratio	0.02		0.17					0.01	0.01	0.11	0.37	
Control Delay	45.4		15.5					2.9	1.6	0.2	3.0	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	45.4		15.5					2.9	1.6	0.2	3.0	
LOS	D		B					A	A	A	A	
Approach Delay								2.5			2.7	
Approach LOS								A			A	
Queue Length 50th (m)	0.5		0.0					0.3	0.0	0.0	19.5	
Queue Length 95th (m)	1.9		5.5					0.7	0.6	0.0	20.1	
Internal Link Dist (m)		372.0			346.6			500.7			218.8	
Turn Bay Length (m)			75.0						75.0	80.0		
Base Capacity (vph)	450		242					2723	1220	1066	2723	
Starvation Cap Reductn	0		0					0	0	0	0	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.02		0.17					0.01	0.01	0.11	0.37	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 83 (69%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Control Type: Pretimed	
Maximum v/c Ratio: 0.37	
Intersection Signal Delay: 3.4	Intersection LOS: A
Intersection Capacity Utilization 71.6%	ICU Level of Service C
Analysis Period (min) 15	

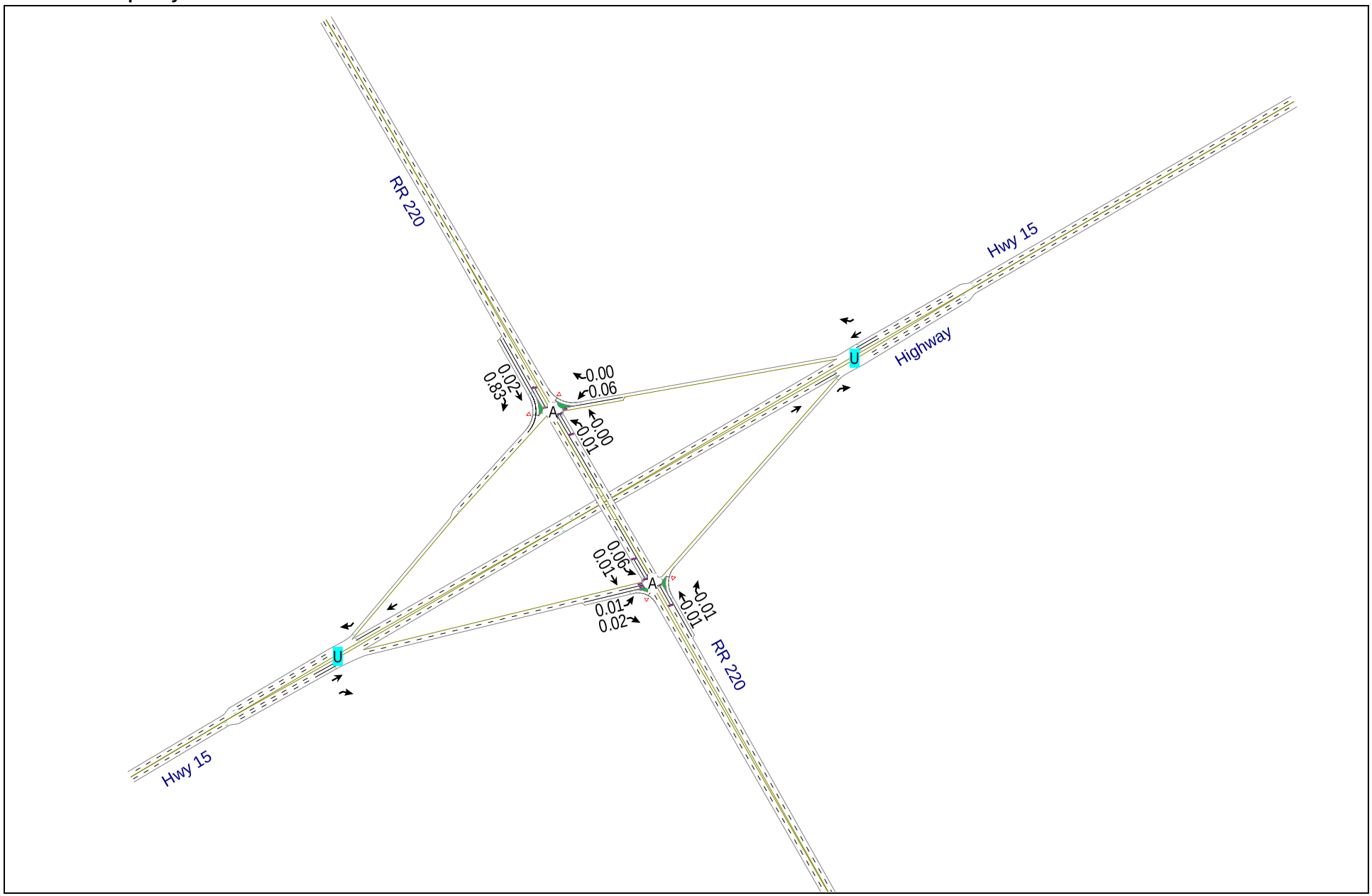
Splits and Phases: 2: South Ramp & SH 830 W

Map - Strathcona County Heartland Industrial Area Transportation Study (1135 31043)
Volumes **10/25/2007**



Ultimate (Including 1200 Turnaround Trips) **Timing Plan: PM Peak**
W:\active\113531043\analysis\synchro\2007-09\hwy 15 - RR 220_Ultimate_pm.syn **Stantec Consulting Ltd.**

Map - Strathcona County Heartland Industrial Area Transportation Study (1135 31043)
Volume to Capacity Ratios **10/25/2007**



Ultimate (Including 1200 Turnaround Trips) **Timing Plan: PM Peak**
W:\active\113531043\analysis\synchro\2007-09\hwy 15 - RR 220_Ultimate_pm.syn **Stantec Consulting Ltd.**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	5	0	5	5	10	0	0	45	1630
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.88
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1738	0	1555	1738	3476	0	0	3476	2737
Flt Permitted				0.950			0.716					
Satd. Flow (perm)	0	0	0	1738	0	1555	1310	3476	0	0	3476	2737
Satd. Flow (RTOR)						7						1920
Adj. Flow (vph)	0	0	0	7	0	7	7	13	0	0	60	2173
Lane Group Flow (vph)	0	0	0	7	0	7	7	13	0	0	60	2173
Turn Type				custom		Free	Perm					Perm
Protected Phases								2			6	
Permitted Phases				8		Free	2					6
Total Split (s)	0.0	0.0	0.0	12.0	0.0	0.0	108.0	108.0	0.0	0.0	108.0	108.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	4.0	4.0	6.0	6.0
Act Effct Green (s)				8.0		120.0	102.0	102.0			102.0	102.0
Actuated g/C Ratio				0.07		1.00	0.85	0.85			0.85	0.85
v/c Ratio				0.06		0.00	0.01	0.00			0.02	0.83
Control Delay				53.8		0.0	0.0	1.6			1.4	3.7
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				53.8		0.0	0.0	1.6			1.4	3.7
LOS				D		A	A	A			A	A
Approach Delay								1.0			3.6	
Approach LOS								A			A	
Queue Length 50th (m)				1.2		0.0	0.0	0.4			0.6	3.1
Queue Length 95th (m)				4.1		0.0	0.0	1.6			1.0	0.2
Internal Link Dist (m)		152.5			351.7			218.8			209.9	
Turn Bay Length (m)				75.0			100.0					100.0
Base Capacity (vph)				116		1555	1114	2955			2955	2614
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.06		0.00	0.01	0.00			0.02	0.83

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 83 (69%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Control Type: Pretimed	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 3.7	Intersection LOS: A
Intersection Capacity Utilization 83.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: North Ramp & RR 220

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	0	5	0	0	0	0	10	5	40	10	0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850						0.850			
Flt Protected	0.950									0.950		
Satd. Flow (prot)	3372	0	1555	0	0	0	0	3476	1555	1738	3476	0
Flt Permitted	0.950									0.749		
Satd. Flow (perm)	3372	0	1555	0	0	0	0	3476	1555	1370	3476	0
Satd. Flow (RTOR)			7						7			
Adj. Flow (vph)	7	0	7	0	0	0	0	13	7	53	13	0
Lane Group Flow (vph)	7	0	7	0	0	0	0	13	7	53	13	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								2			6	
Permitted Phases	4		4						2	6		
Total Split (s)	33.0	0.0	33.0	0.0	0.0	0.0	0.0	87.0	87.0	87.0	87.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	6.0	6.0	4.0
Act Effct Green (s)	29.0		29.0					81.0	81.0	81.0	81.0	
Actuated g/C Ratio	0.24		0.24					0.68	0.68	0.68	0.68	
v/c Ratio	0.01		0.02					0.01	0.01	0.06	0.01	
Control Delay	34.8		19.6					6.4	3.6	0.1	5.9	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	34.8		19.6					6.4	3.6	0.1	5.9	
LOS	C		B					A	A	A	A	
Approach Delay								5.4			1.3	
Approach LOS								A			A	
Queue Length 50th (m)	0.5		0.0					0.3	0.0	0.0	1.6	
Queue Length 95th (m)	1.7		2.3					1.0	0.9	0.0	24.7	
Internal Link Dist (m)		372.0			346.6			500.7			218.8	
Turn Bay Length (m)			75.0						75.0	80.0		
Base Capacity (vph)	815		381					2346	1052	925	2346	
Starvation Cap Reductn	0		0					0	0	0	0	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.01		0.02					0.01	0.01	0.06	0.01	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 66 (55%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Control Type: Pretimed	
Maximum v/c Ratio: 0.06	
Intersection Signal Delay: 5.7	Intersection LOS: A
Intersection Capacity Utilization 83.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: South Ramp & RR 220