Council Meeting Date: June 12, 2007
Agenda Item #: 11.1

STRATHCONA AREA INDUSTRIAL HEARTLAND TRANSPORTATION STUDY FINAL REPORT

Report Purpose
To present the completed Strathcona Area Industrial Heartland Transportation Study to Council for information.

Recommendation
That Council receive as information the report, Strathcona Area Industrial Heartland Transportation Study, dated March, 2007, prepared for Strathcona County by Stantec Consulting Ltd.

Council History
On October 17, 2006, County Council authorized Administration to proceed with the Strathcona Area Industrial Heartland Transportation Study.

Background/Justification
Strategic Plan:

Governance		*X*	*Community Well Being*		
Community Sustainability		*X*	*Economic Viability*		*X*
Service Delivery	*X*	*Stakeholder Communication*		*Resource Management*	*X*

Legislative/Legal: Pursuant to the *Municipal Government Act*, RSA 2000 c. M-26, Section 18, a municipality has the direction, control and management of all roads within the municipality. The Municipal Development Plan and Alberta's Industrial Heartland Area Structure Plan are the primary planning documents containing guidelines and policies related to development in the Industrial Heartland area.
Economic: The Strathcona Area Industrial Heartland Transportation Study (The Study) will assist the County in prioritization of infrastructure projects in the Heartland area as well as help ensure the development of Alberta's Industrial Heartland in a coordinated and effective manner.
Social: The Study will aid in the County's ability to provide timely emergency service response and enhance safety by minimizing conflicts between transportation user groups in the Industrial Heartland area.
Environmental: n/a
***Stakeholder*:** All adjacent municipalities and Industrial Heartland industries, as well as Alberta Infrastructure and Transportation, Canadian National Railway, and Canadian Pacific Railway were given the opportunity to provide input to The Study. The Study findings and proposed road network were presented to landowners at a public information meeting on May 23, 2007.
Interdepartmental: Utilities, Engineering & Environmental Planning, Economic Development, Transportation & Agriculture Services, Corporate Planning & Intergovernmental Affairs, Planning & Development Services.

Summary
While the Industrial Heartland 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.

The specific objectives of this study were to:

- Develop a conceptual major internal road network that will provide the backbone of the transportation system for the Strathcona County's Industrial Heartland.
- Establish the characteristics of the roadway network elements (number of lanes, major intersection configurations, right-of-way, etc.).
- Identify 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.

Enclosures

Enclosure I Strathcona Area Industrial Heartland Transportation Study (March 9, 2007) (Full document with Appendices can be viewed in EDMS in the EEP Transportation Engineering library, document #22608)

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Date: May 25, 2007

Stantec

Strathcona Area Industrial Heartland Transportation Study

Final Report

Prepared for: Strathcona County

113531043

9 March 2007

Strathcona Area Industrial Heartland Transportation Study

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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:

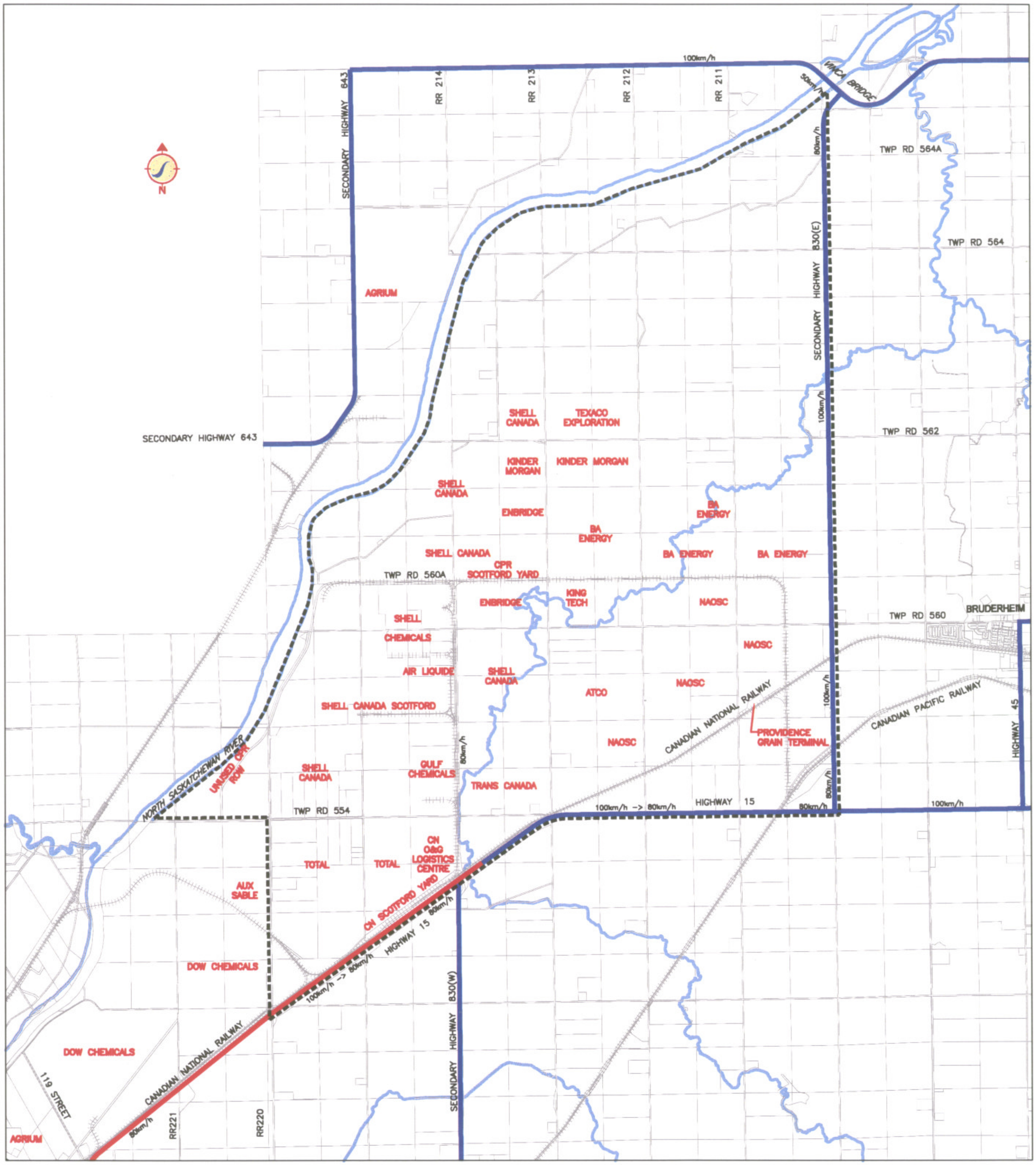
- On the north by the North Saskatchewan River and Highway 45
- On the west by RR 220, which is the east boundary of the City of Fort Saskatchewan
- On the south by Highway 15
- On the east by the east leg of Secondary Highway 830

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 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 and appeared to provide adequate capacity for typical daily operations related traffic.



Legend

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

Strathcona County
Strathcona Area Industrial Heartland
Transportation Study

Figure 1.1
Study Area

Stantec

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 for approximately 3 km. CPR has no short-term plans to utilize this right-of-way, but will retain it for possible future use. RR 220 crosses this right-of-way and the CPR would not be adverse to realigning their right-of-way in order to minimize the road-rail conflicts that would occur should they ever develop a rail line within this right-of-way.

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.

The specific objectives of this study are 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.

2.0 Employment and Traffic Volumes

2.1 EXISTING CONDITIONS

For employment areas, typically the key factor in developing a road network is 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 SA 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, although it must be recognized that delays beyond this date are a distinct possibility.

Longer term, adequate land exists for at least 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. 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 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	100	Under Construction
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	10	Proposed
Subtotal – Additional by 2012	**445**	
Shell Upgrader Expansion 2 and 3	250	Conceptual
Shell Upgrader Expansion 4 and 5	250	Conceptual
Shell – Other Facilities	150	Conceptual
TransCanada Pipelines	20	Conceptual
Total SA	150	Conceptual
ATCO	20	Conceptual
Subtotal – Additional by 2017	**840**	
Subtotal – Additional beyond 2017 (Facilities north of TWP Rd 262)	**450**	Conceptual
Long-Term Total – Existing and Additional	**2,135**	

Based on the estimates in Table 2.2, daily operations traffic volume in the area will likely double in the next 5 years and possibly quadruple 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. 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 typically takes 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

Unlike turnarounds, construction activities can be expected to overlap with each other and will also overlap with turnaround activities. As such, the traffic demands associated with construction activity for major projects 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's Scotford Yard is expected to see increased traffic in the coming years.

CN's Scotford Rail 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. CN is considering doubling the capacity of the yard in the next 5 to 10 years. 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 has plans to construct a rail to truck transload facility further north of Twp Rd 562 in the vicinity of RR 212. The facility is intended to serve industries in the area that do not have direct access to rail service. It is expected to be operational in 5 years and traffic to/from the site is expected to be almost entirely trucks. Vehicle movements to and from the facility will be spread out through the day and are unlikely to impact peak hour traffic volumes.

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 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
- CP Rail
- Enbridge
- Gulf Chemicals
- Kinder Morgan
- North American Oil Sands
- Providence Grain Terminal
- Shell Canada
- Sturgeon County
- Town of Bruderheim

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'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 (2,135 dayshift workers) and one major Turnaround (800 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 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, especially as the intersection of RR 213 and Highway 15 is not considered to be a desirable location to provide a major intersection. However, recently announced plans by Shell to develop multiple facilities along the east side of RR 214 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 provide superior capacity and are considered desirable, they are costly and are to be considered only if 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 90% of the traffic assumed to access the Study Area from Highway 15 from the west. 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 (800 workers) 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.

- The improved RR 214 and Highway 15 at-grade intersection is inadequate by itself to service the long-term Daily Operational traffic demands (approximately 2,100 vehicles per hour). Development of a second major access into the Study Area off Highway 15 will be required.

- Provision of an interchange at the RR 214 and Highway 15 intersection would provide increased capacity into and out of the Study Area. However, it would not preclude the need for an alternative major route into the Study Area as the PM Peak Hour outbound movements are too high to be accommodated through only one major intersection. It should be noted that the proposed expansion of CN's Scotford Yard east of RR 214 would by itself necessitate a grade separation at this intersection due to a significant increase in the disruption of traffic movements by the rail yard and its operations.

- Provision of a second major signalized intersection at RR 220 (dual eastbound left turn lanes and dual southbound right turn lanes) with a continuous link up to Twp Rd 562, when combined with the capacity at RR 214 provides capacity for up to 2,200 vehicles per hour off or onto Highway 15. Assuming traffic volume demands are balanced between the two intersections, this capacity is adequate to accommodate the long-term Daily Operational traffic demands and helps to distribute traffic through the Study Area rather than having it all focused on RR 214. It does not address the traffic demands of a major Turnaround.

- Development of an interchange at the Highway 15 / RR 214 intersection is required to provide adequate capacity for the long-term Daily Operational and major Turnaround traffic demands.

- Additional capacity, primarily 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 turn lanes at the intersection of Highway 15 and RR 212. Daily Operational traffic demands of approximately 150 vehicles would use this access without any need for traffic signals. Addition of traffic signals at this intersection on an interim or permanent basis would further increase capacity at the east end of the Study Area and allow turnarounds to be accommodated without significant use of Highway 45 and Secondary Highway 830. It would also provide an alternate access into the Study Area should congestion be unmanageable at the RR 220 and RR 214 intersections on Highway 15.

- When the long-term Daily Operational and a major Turnaround traffic demands occur concurrently, only very limited construction activity related traffic can be accommodated with the proposed major signalized intersections at RR 220 and RR 214 and a minor improved intersection at RR 212. However, assuming development of the proposed network over the next 5 or so years and the use of traffic signals at the RR 212 and

Highway 15 intersection on an interim basis, there is some capacity for construction related traffic prior to full build-out (approximately 500 vehicles in the AM and PM peak hours; declining as more developments become operational). Additional capacity would also be available with provision of a grade separation at the RR 214 and Highway 15 intersection.

- 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. However if desired, additional capacity into the Study Area, primarily to accommodate peak periods of construction activity, could be provided by providing dual eastbound left turn lanes and dual southbound right turn lanes at the RR 212 and Highway 15 intersection. This intersection configuration would require twinning of Highway 15 to some point east of RR 212.

- Maintaining an intersection on Highway 15 at RR 211 is required to address Providence Grain Terminals 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 if Highway 15 was 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:

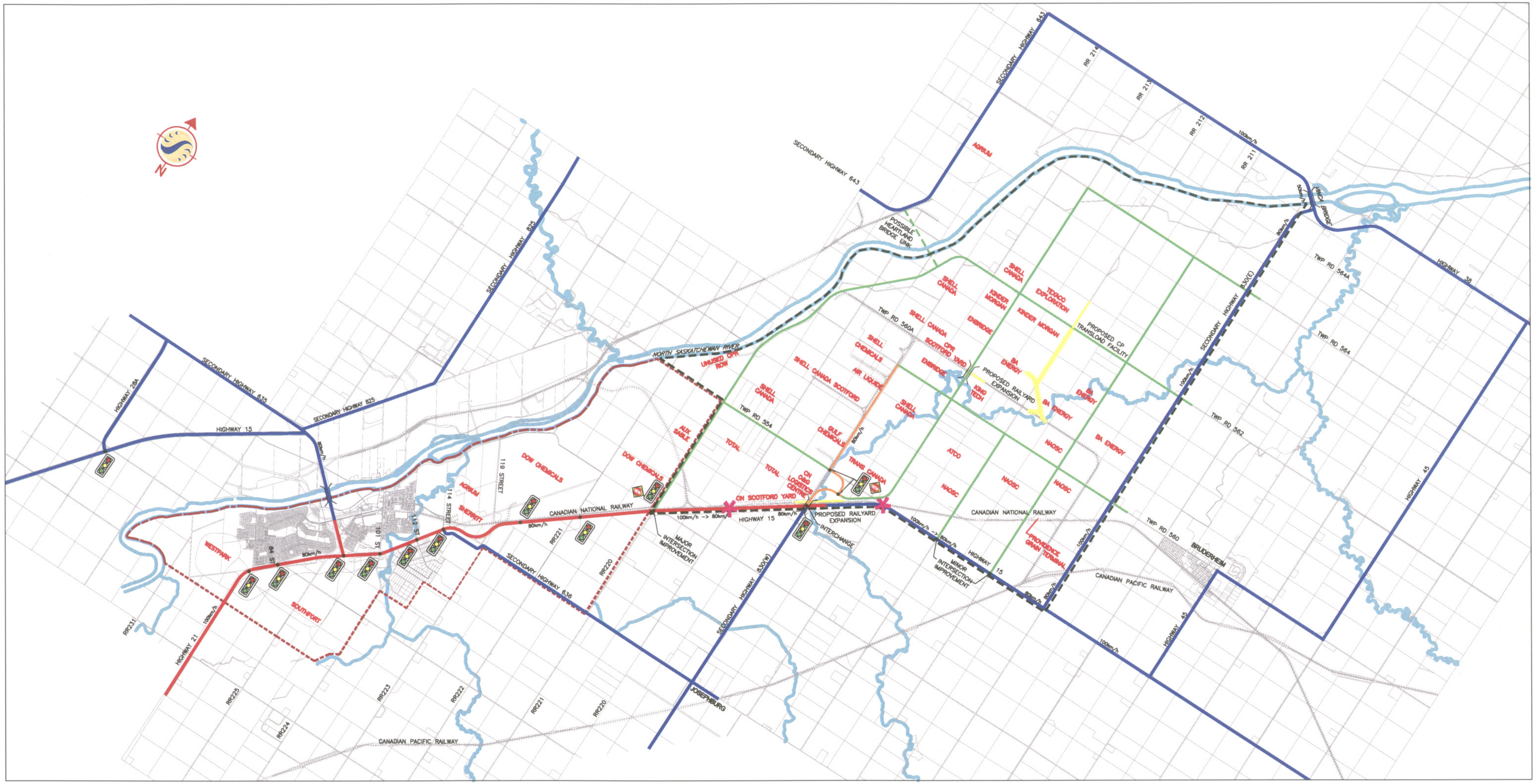
- No further twinning of Highway 15 east of its currently twinned limit to the east of RR 214.

- A grade separation at the intersection of Highway 15 at RR 214. This interchange is justified when after allowing for major Turnaround traffic demands, the area south of Twp Rd 562 approaches full development (Daily Operational traffic exceeds approximately 1,600) or when the proposed expansion of CN's Scotford Yard to the east of RR 214 becomes a reality. In the interim, retention of the recently upgraded signalized intersection in conjunction with other recommendations summarized below is considered adequate.

- A major signalized intersection on Highway 15 at RR 220 similar in configuration to the intersection at RR 214.

- A minor intersection upgrade (left turn lanes added) at the intersection of RR 212 and Highway 15. Traffic signals are not warranted at an upgraded RR 212 intersection, but could be considered to provide additional capacity at the east end of the Study Area, especially during turnarounds and periods of construction activity.

- 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.



Legend

- Study Area
- City of Fort Saskatchewan Boundary
- Highway (Four Lane)
- 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
- 100km/h Existing Speed Limit
- 100km/h -> 80km/h Proposed Speed Limit Revision

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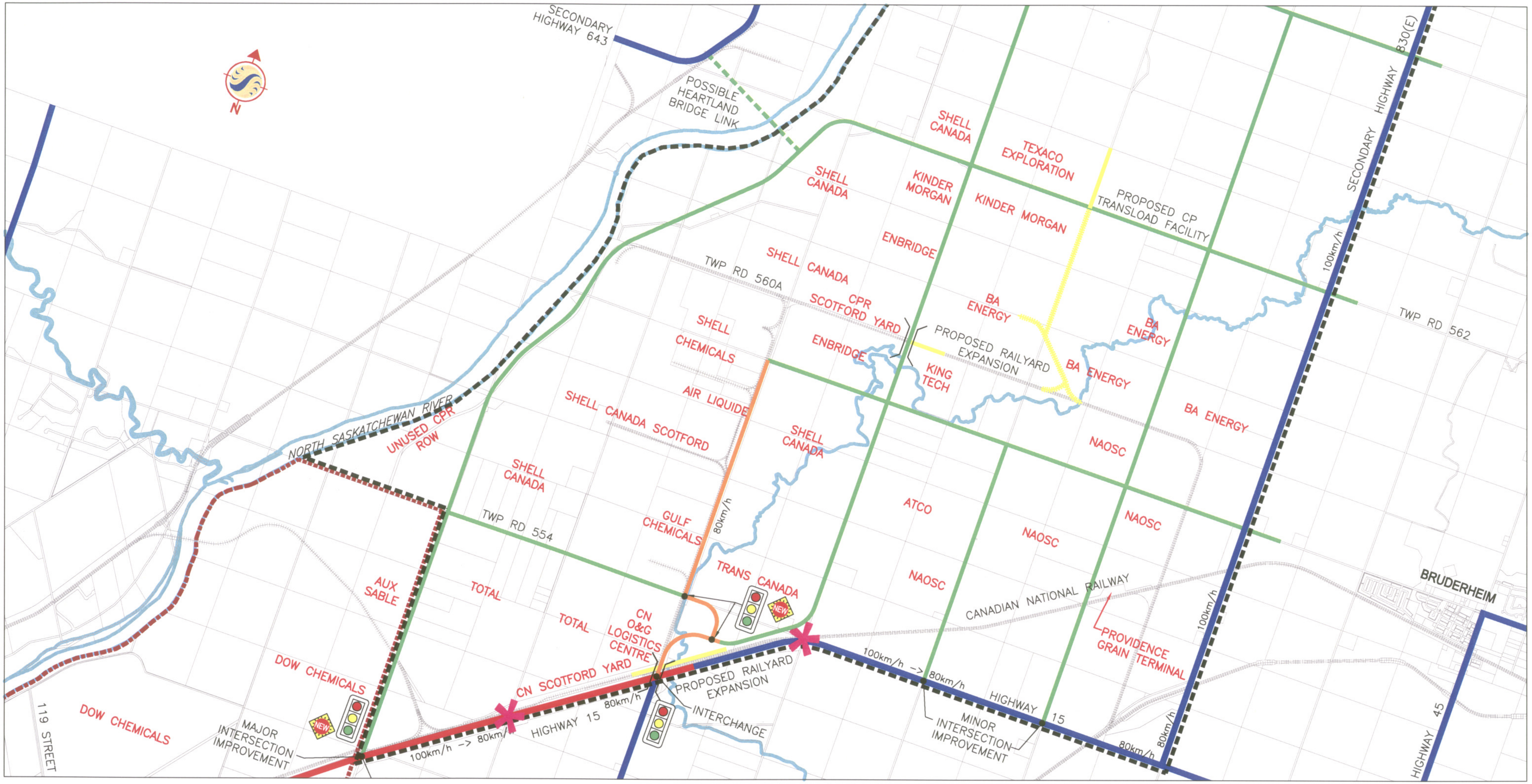
Figure 4.1
Overall Transportation Plan



Legend

- Study Area
- City of Fort Saskatchewan Boundary
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Figure 4.1a
Study Area Transportation Plan

- 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 the intersection RR 214 to Highway 15 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 possible Total S/A development will likely warrant the signalization of the RR 214 and Twp Rd 554 intersection.

- RR 213 from north of the RR 214 connection to Twp Rd 564 is recommended as a two-lane roadway within a 40 metres wide right-of-way, except where intersection treatments are warranted. 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 truck 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)

- Other roadways such as Twp Rd 562, Twp Rd 564 and RRs 211 and 213 north of Twp Rd 562 provide a 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.

In addition to these improvements shown on the plans, 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.

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.

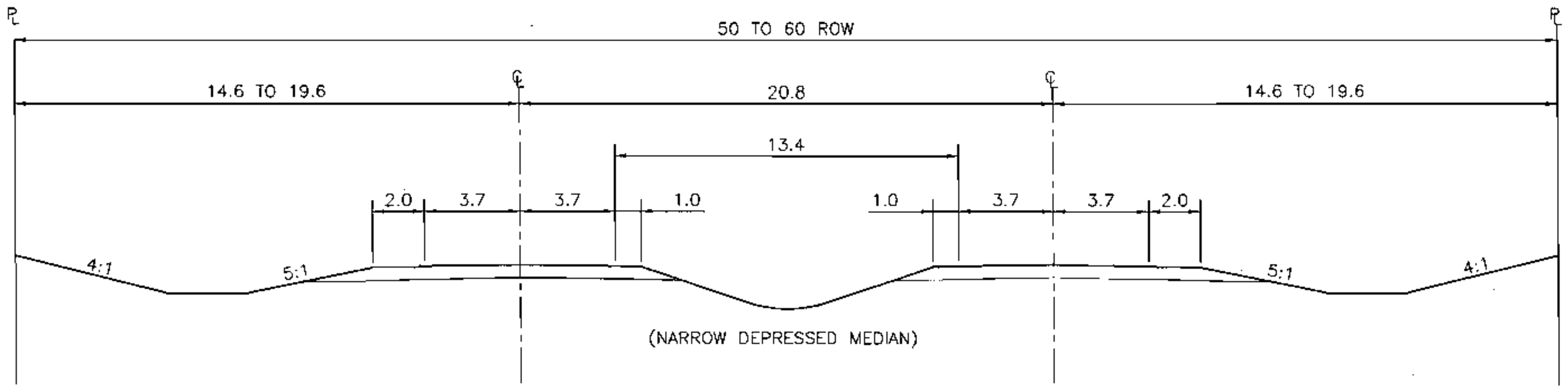
The recommended cross-sections for the road network, which will support a design speed of 90 km/h, are illustrated in Figure 4.2. Note that while the proposed right-of-ways are of adequate width to typically accommodate shallow buried utilities and municipal utilities, like potable water and telephone, 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.

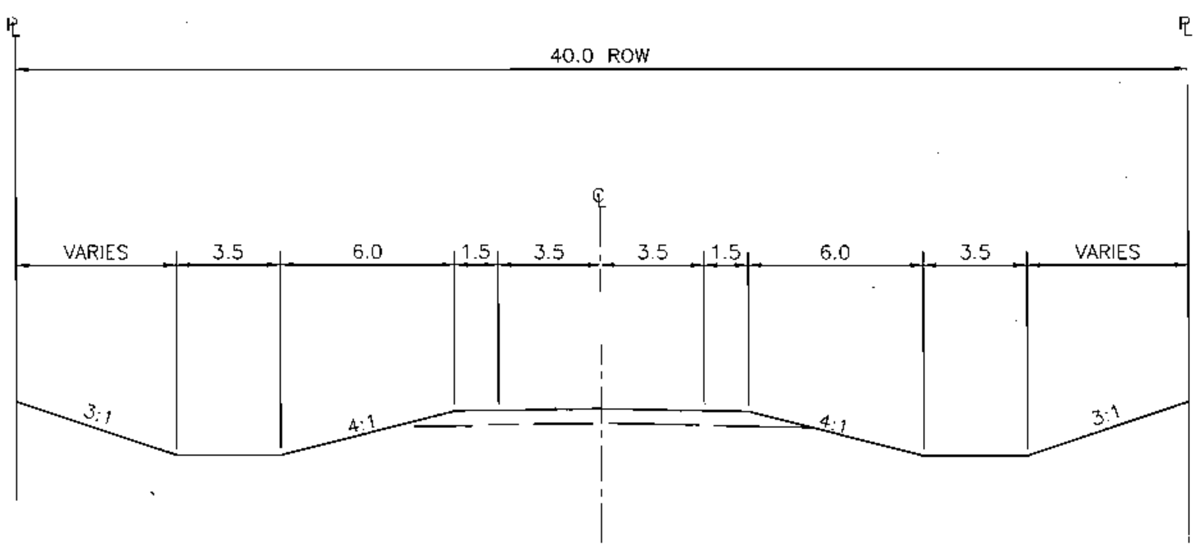
While the 40 metres wide right-of-way is typically adequate to accommodate a two-lane roadway, it is not wide enough to accommodate the additional roadway width required to provide turn lanes. Turn lanes would typically be required at all major roadway intersections and at the main access to major facilities. 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.

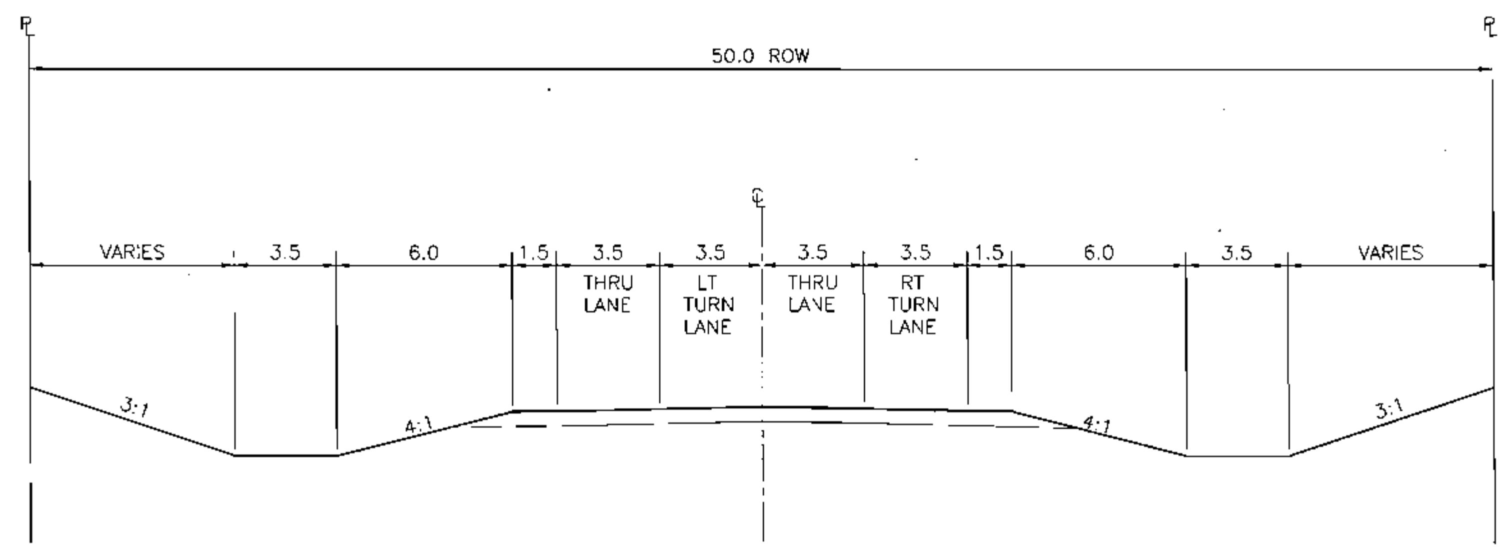
The four-lane divided cross-section within a 60 metres wide right-of-way provides a high standard, high capacity roadway that is typically only warranted where peak hour volumes exceed 800 vehicles per hour in the peak direction. With the proposed network, the four-lane divided cross-section in the 60 metres wide right-of-way is not warranted beyond the existing section on RR 214, which provides access to the Shell Scotford complex.



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

Currently, Highway 15 through the Study Area has a posted speed of 100km/h, except through the RR 214 intersection, where the presence of traffic signals and the SH 830 (E) intersection warrant a reduction in the posted speed to 80 km/h. With the recommendation being to also install traffic signals on Highway 15 at the RR 220 intersection and possibly the RR 212 intersection, additional speed reduction zones will be warranted through these 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.

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 facilities.

For typical Daily Operations traffic volumes, 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.

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.

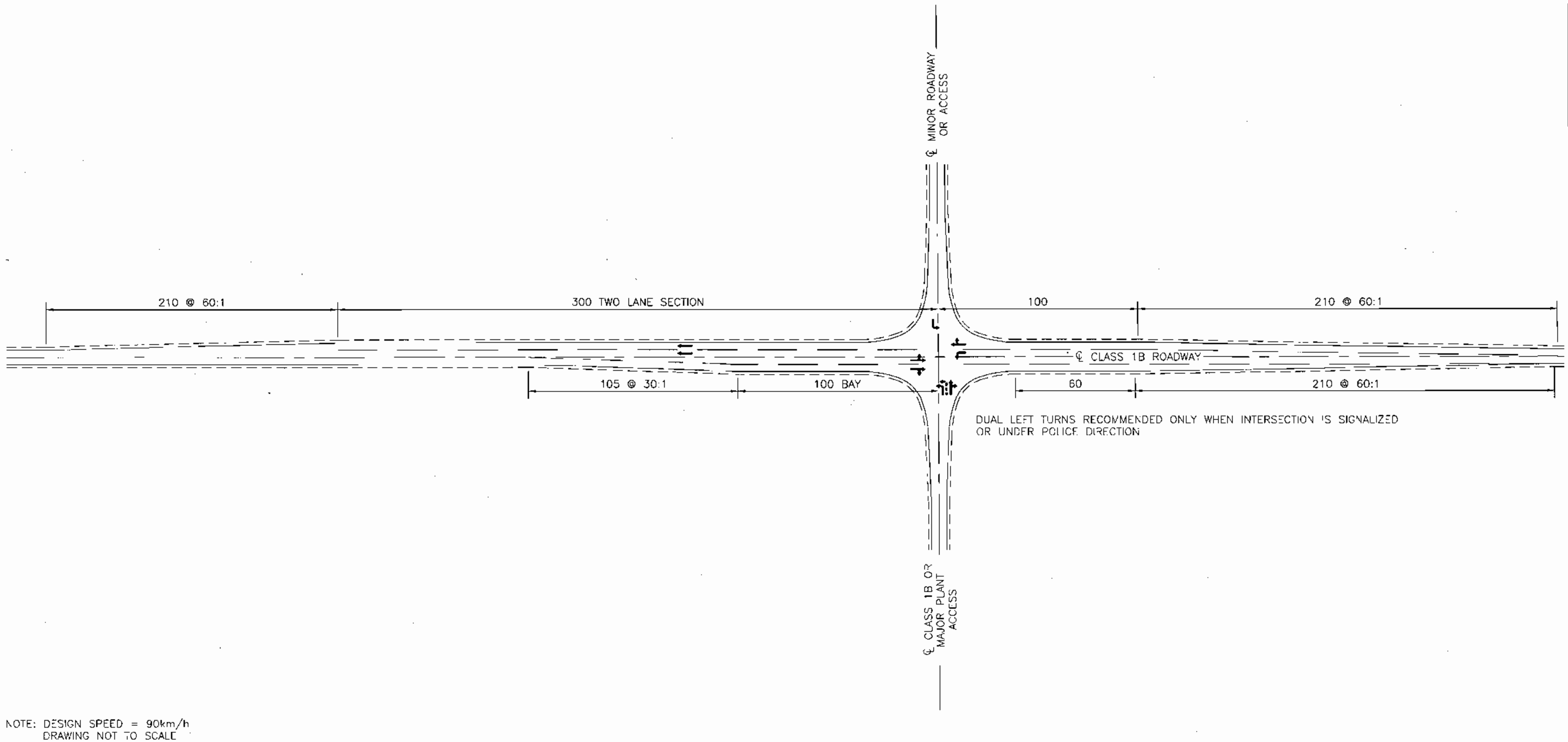

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Figure 4.3
Typical Intersection Treatment

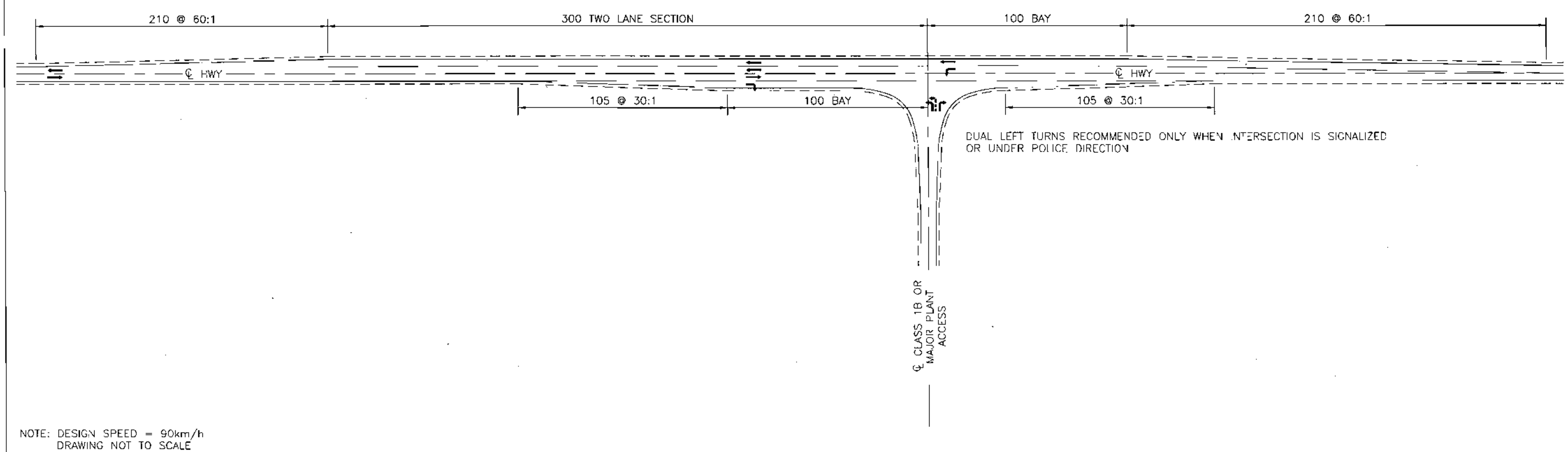

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Figure 4.4
Typical Tee Intersection Treatment

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. Flashing lights protects the existing rail crossings of RR 214.

Provision of grade-separated crossings is typically recommended 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 CP Rail yard is being proposed due to the large number of trains that will cross RR 213 and the impact having to split train consists to leave the roadway open will have on yard operations.

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'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 should be noted that the provision of a grade separation at RR 214 and Highway 15 due to rail yard crossing requirements or eventually the traffic demands of the Study Area does not eliminate the need for providing the RR 220 connection or the development of an improved intersection on Highway 15 at RR 212.

4.3 STAGING

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 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.

The requirement for a grade separation over an expanded CN rail yard at RR 214 is expected to occur in the 5 to 10 year time horizon. In the longer term increasing traffic volume demand in the Study Area will also warrant its construction.

The timing of 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.

Similar to the situation with roads around the North American Oil Sands site, the timing of development on Total SA site will define the need for upgrading on Twp Rd 554. Development is assumed to occur in the 5 to 10 year time frame. Prior to that, the recently announced CN Oil and Gas Logistics Centre, will warrant upgrading of the east end of Twp Rd 554.

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.

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 ($2006)
Type 1A – Four-lane divided roadway	Metres	2,600.00
Type 1B – Two-lane roadway	Metres	1,200.00
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	40,000.00
Highway 15 Major Intersection Improvement	Each	750,000.00
Traffic Signals with 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 based on the projected long-term employment summarized in Table 2.1 and described in Section 4.3.

Table 5.2
Estimated Construction Costs

Improvement	Unit Price ($)	Quantity	Estimated Cost ($)
RR 214 / CN Rail Yard and Hwy 15 Grade Separation			50,000,000
RR 220 – Highway 15 to RR 213	1,500	12,000	18,000,000
RR 220 / Hwy 15 Improvements and Signals	1,000,000	1	1,000,000
Realigned RR 214 to RR 213	2,600	1,800	4,700,000
RR 214 Water Crossing	500,000	1	500,000
RR 214 / RR 213 Intersection Treatment	500,000	1	500,000
RR 213 – RR 214 to Twp Rd 560	1,200	4,300	5,200,000
Twp Rd 560 – RR 214 to RR 213	1,200	1,600	2,000,000
Twp Rd 560 – Water Crossing	500,000	1	500,000
Twp Rd 560 / RR 213 Intersection Treatment	300,000	1	300,000
Twp Rd 560 – RR 213 to SH 830(E)	1,200	5,000	6,000,000
Twp Rd 560 Intersection Treatments (SH 830, RR 211, RR 212)	300,000	3	900,000
Twp Rd 560 Rail Crossing	300,000	1	300,000
RR 212 – Hwy 15 to Twp Rd 560	1,200	3,200	3,900,000
RR 212 – Rail Crossing	300,000	1	300,000
RR 212 / Hwy 15 Intersection Improvement	300,000	1	300,000
RR 211 – Hwy 15 to Twp Rd 560	1,200	3,200	2,000,000
RR 212 / Hwy 15 Intersection Improvement	300,000	1	300,000
RR 213 – Twp Rd 560 to Twp Rd 562	1,200	3,200	3,900,000

Table 5.2 Continued

Improvement	Unit Price ($)	Quantity	Estimated Cost ($)
RR 213 / Twp Rd 562 Intersection Treatment	300,000	1	300,000
CP Rail Yard Grade Separation	40,000	60	2,400,000
Twp Rd 554 – RR 220 to RR 214	1,200	3,200	3,900,000
Twp Rd 554 Intersection Treatments	300,000	2	600,000
Twp Rd 554 / RR 214 Traffic Signals	300,000	1	300,000
Hwy 15 Computerized Traffic Signal System (West end of Fort Saskatchewan to SH 830 (E))	4,000,000	1	4,000,000
Subtotal – Prior to 2017			**112,100,000**
Twp Rd 562 – RR 213 to SH 830(E)	1,200	5,000	6,000,000
RR 211 – Twp Rd 560 to Township 564	1,200	6,500	7,800,000
RR 213 – Twp Rd 562 to Twp Rd 564	1,200	3,200	3,900,000
Twp Rd 564 – RR 213 to SH 830 (E)	1,200	5,000	6,000,000
Intersection Treatments	300,000	6	1,800,000
Water Course Crossings	500,000	2	1,000,000
Rail Crossings	300,000	1	300,000
Subtotal – Longer Term			**26,800,000**
Total			**138,900,000**

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 ($10 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. It is also recommended that any cost sharing formula developed between the three groups of stakeholders be consistent with one to be developed for the portion of the Heartland Area located in Sturgeon County. Consistency between the two areas will simplify negotiations with the provincial government. However, this does not preclude different mechanisms being used by each group of stakeholders to pay for their share of the total amount.

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
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	TC	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			55.58	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**	**3066**	**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	7190	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	2760	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**	**61.5**	**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	6910	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	99.8	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	9850	77.1	6.9	0.4	3.6	12.0	16.0	29.3	14.4	130.4	1022.4	1152.8

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	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	86.3	1.7	3.2	7.7	1.1	12.0	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	85.3	4.4	0.3	5.8	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	89.8	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	0.8	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	480	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	687	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	24.6	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	49.2	352.1	401.3
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	49.2	352.1	401.3

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 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	5690	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 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.

					1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
Hwy	CS	TCS	Muni	From	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT	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	360	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

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					1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
Hwy	CS	TCS	Muni	From	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT	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	260	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

Reference No.: 97530

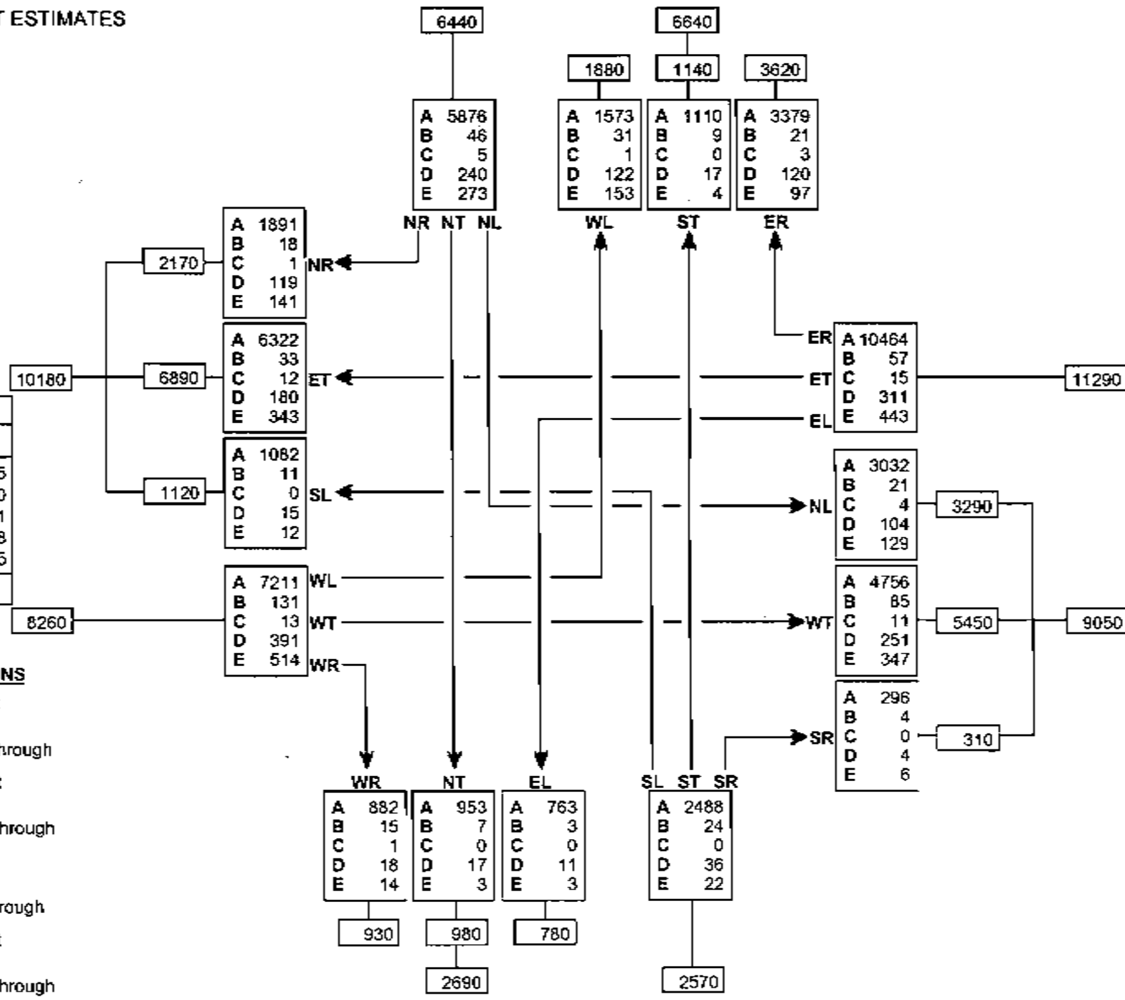
Intersection of:
15 & 21 AT FT SASK

2005 AADT / ASDT ESTIMATES

Turning Movement Summary Diagram

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
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)

Reference No.: 97530

Intersection of:

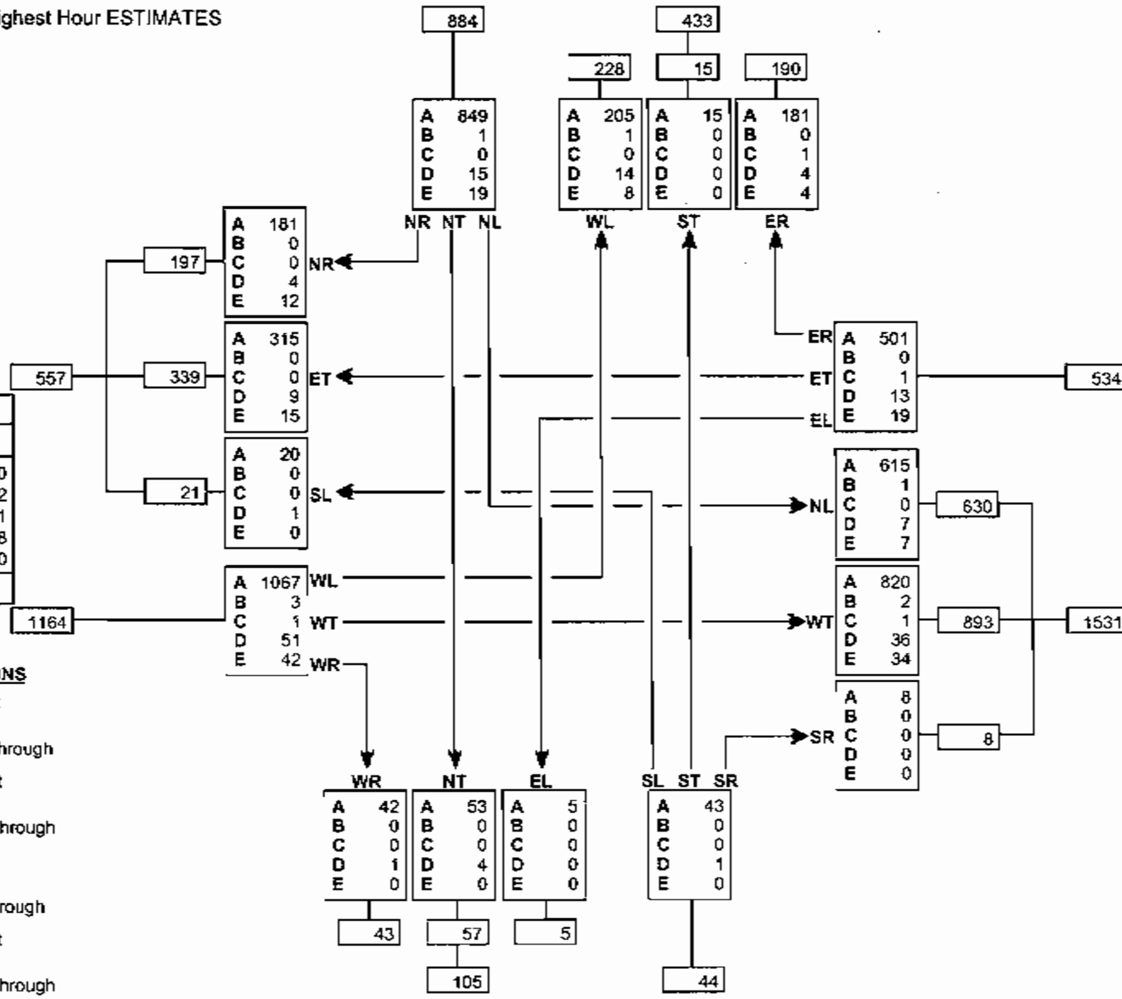
15 & 21 AT FT SASK

2005 a.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram

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	C	0.0
C: Bus	0	0.0
D: Single Unit Truck	6	4.0
E: Tractor Trailer Unit	0	0.0
Total	149	

TURNING MOVEMENT ABBREVIATIONS

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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.: 97530

Intersection of:
15 & 21 AT FT SASK

2005 p.m. 100th Highest Hour ESTIMATES

North On 15

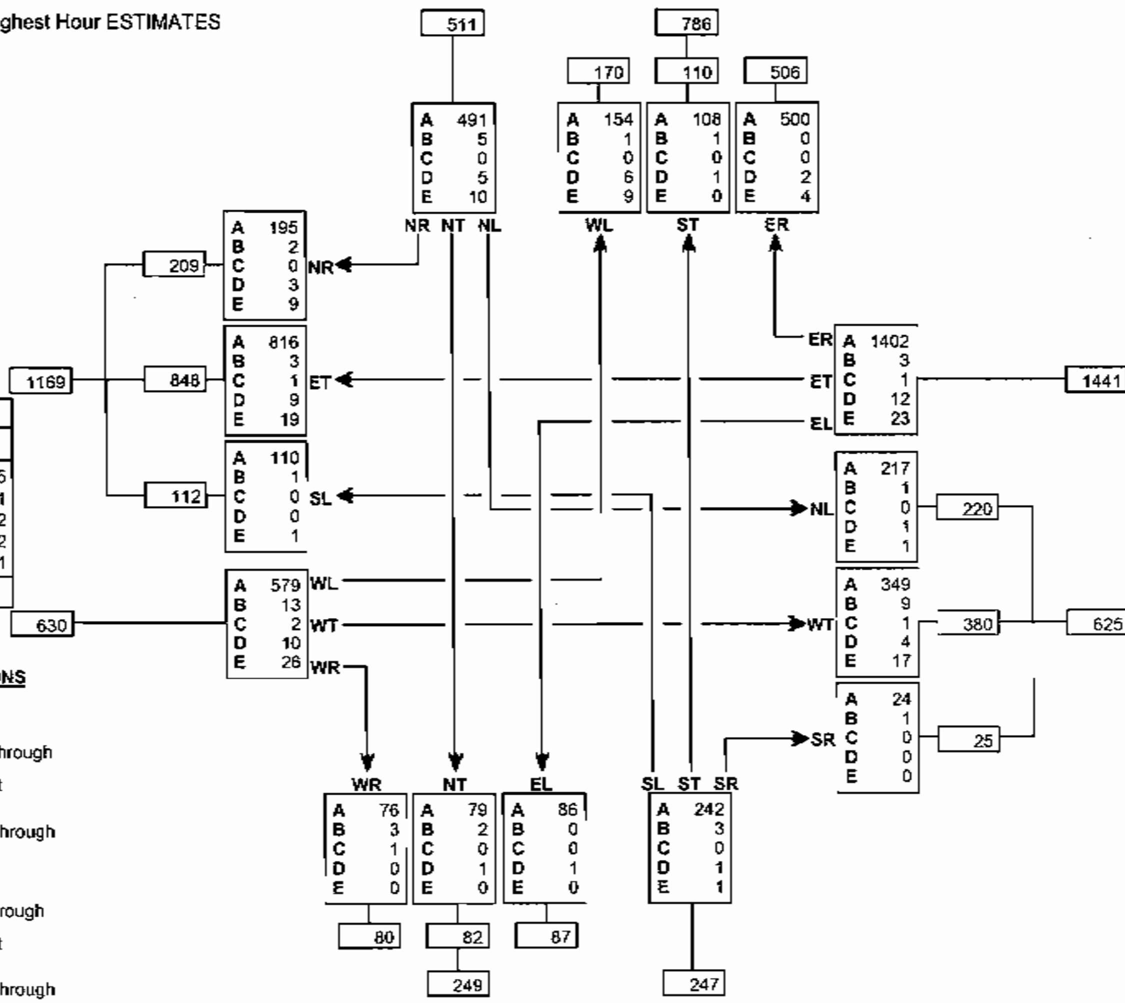
Vehicle Type	Vol	%
A: Passenger Vehicle	1253	96.6
B: Recreational Vehicle	7	0.5
C: Bus	0	0.0
D: Single Unit Truck	14	1.1
E: Tractor Trailer Unit	23	1.8
Total	1297	

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	



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

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	

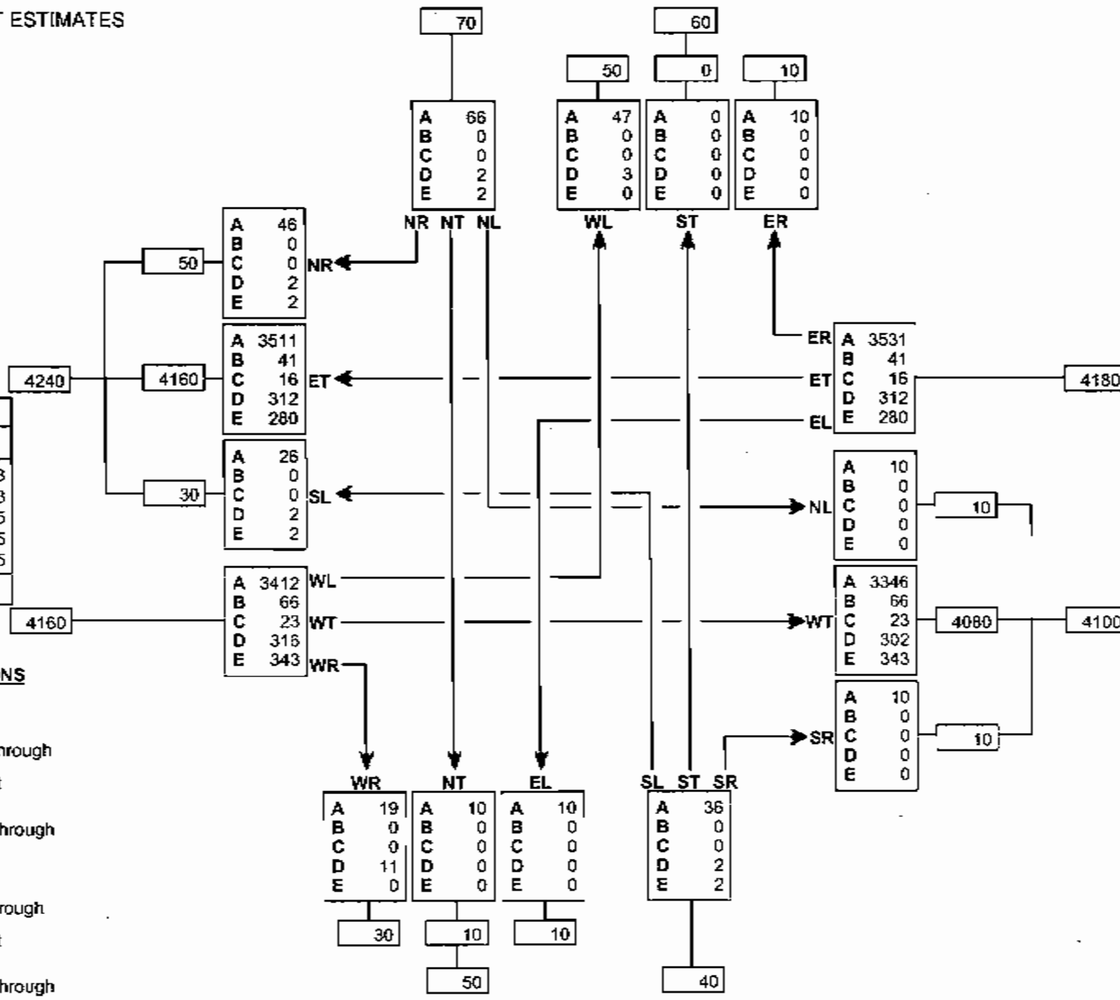
Turning Movement Summary Diagram

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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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)

Reference No.: 97552

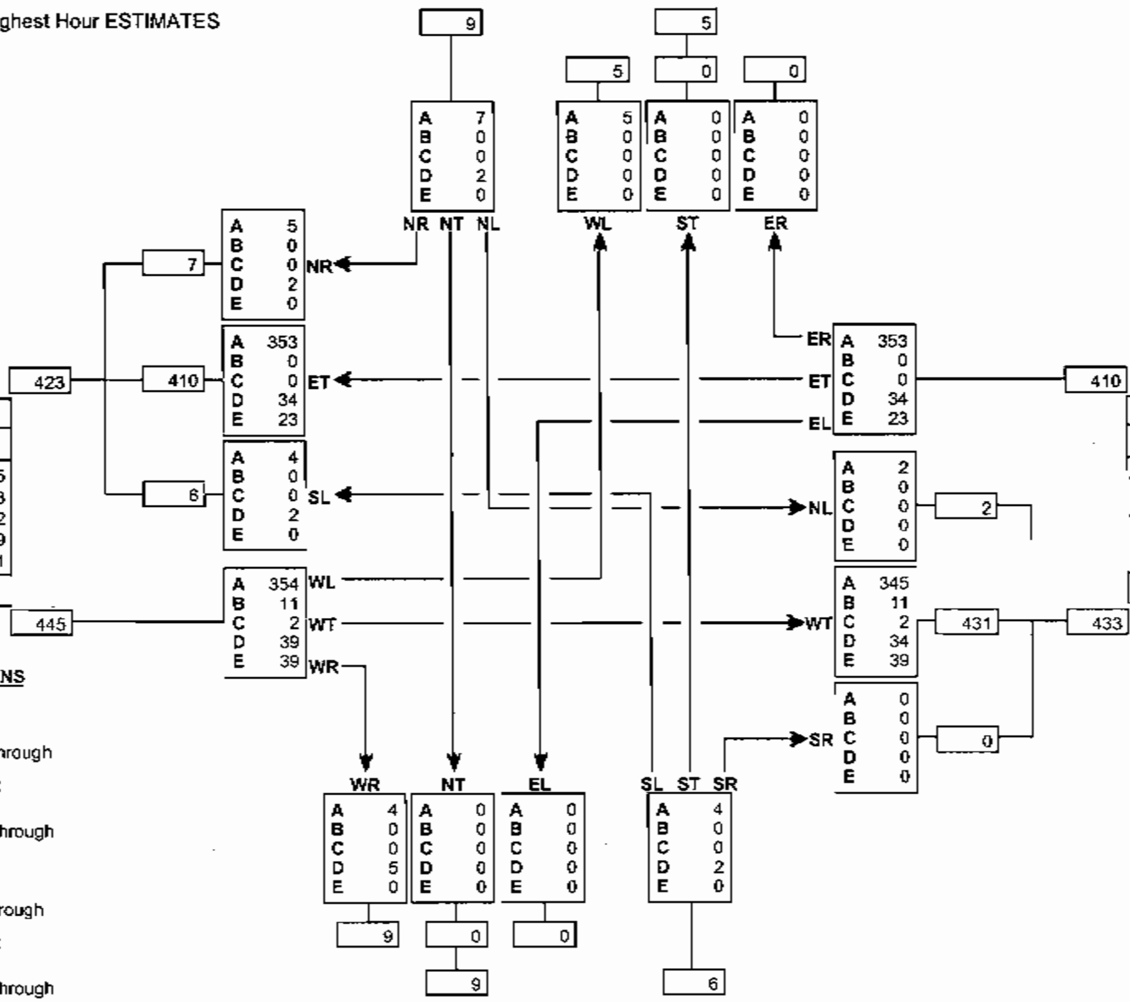
Intersection of:
15 & RGE RD 220 12-55-22-400000220

2005 a.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram

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	

TURNING MOVEMENT ABBREVIATIONS

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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

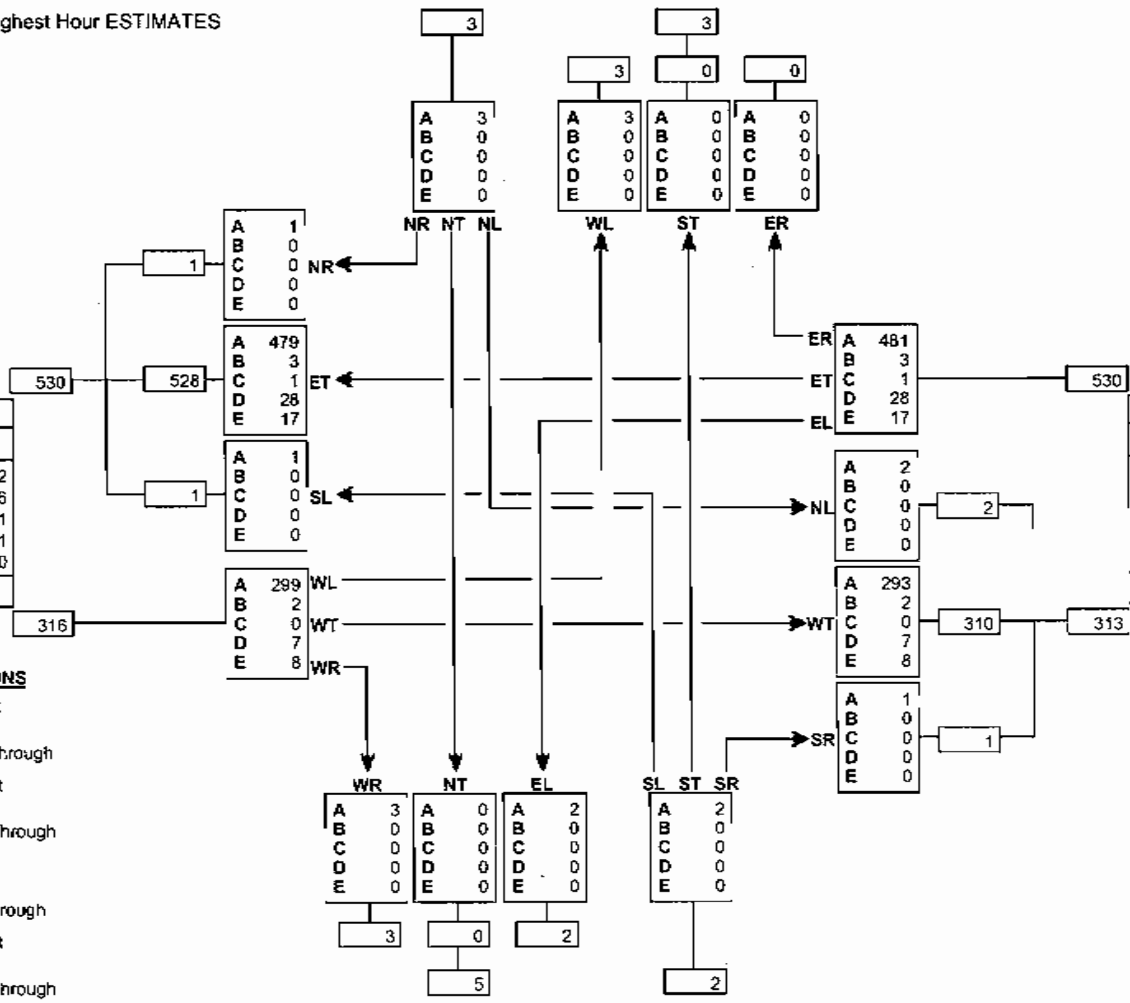
Reference No.: 97552

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

2005 p.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram

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



West On	15	
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	780	92.2
B: Recreational Vehicle	5	0.6
C: Bus	1	0.1
D: Single Unit Truck	35	4.1
E: Tractor Trailer Unit	25	3.0
Total	846	

East On	15	
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	777	92.2
B: Recreational Vehicle	5	0.6
C: Bus	1	0.1
D: Single Unit Truck	35	4.2
E: Tractor Trailer Unit	25	3.0
Total	843	

South On	Rge Rd 220	
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	

TURNING MOVEMENT ABBREVIATIONS

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ST: Traffic From South Proceeding Through

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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

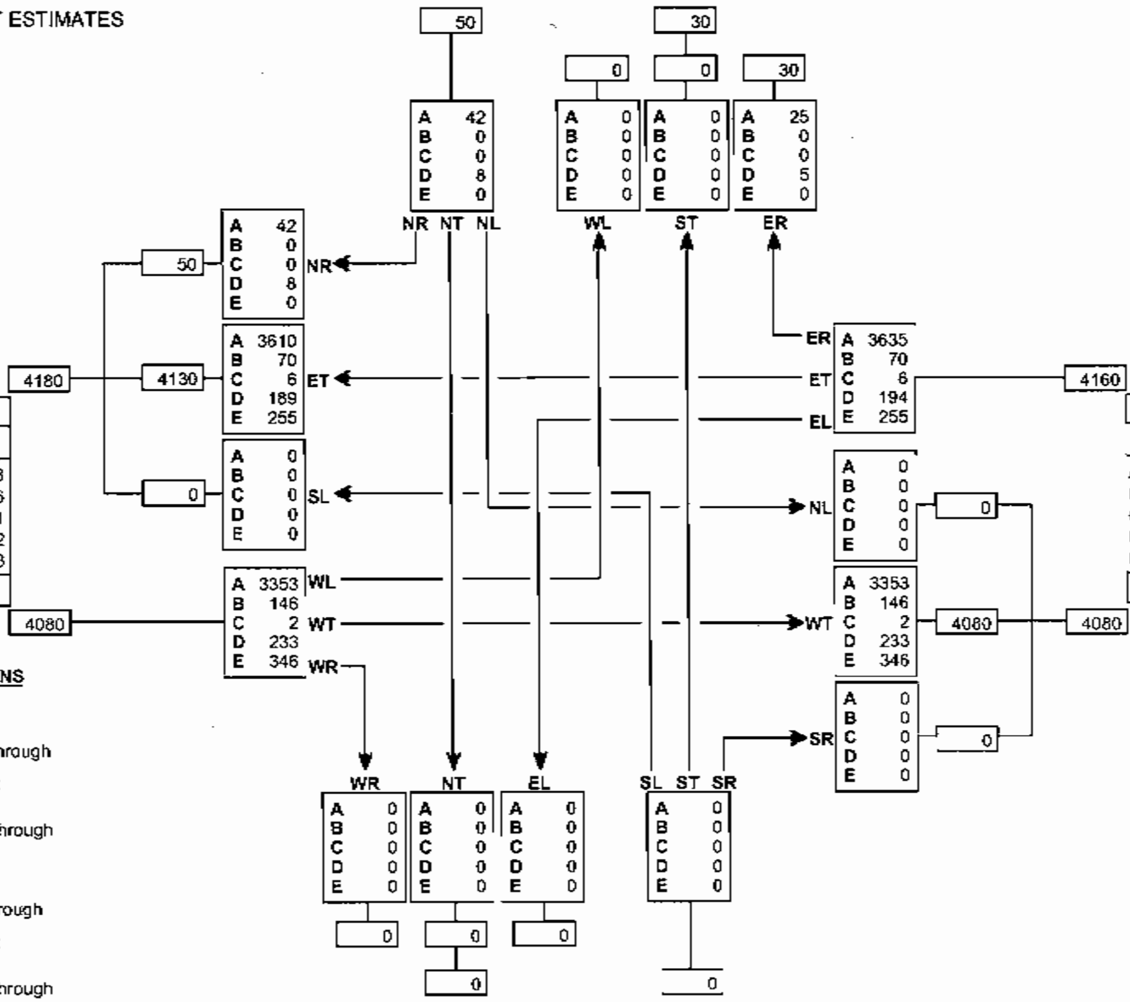
Reference No.: 98556

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

2005 AADT / ASDT ESTIMATES

Turning Movement Summary Diagram

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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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

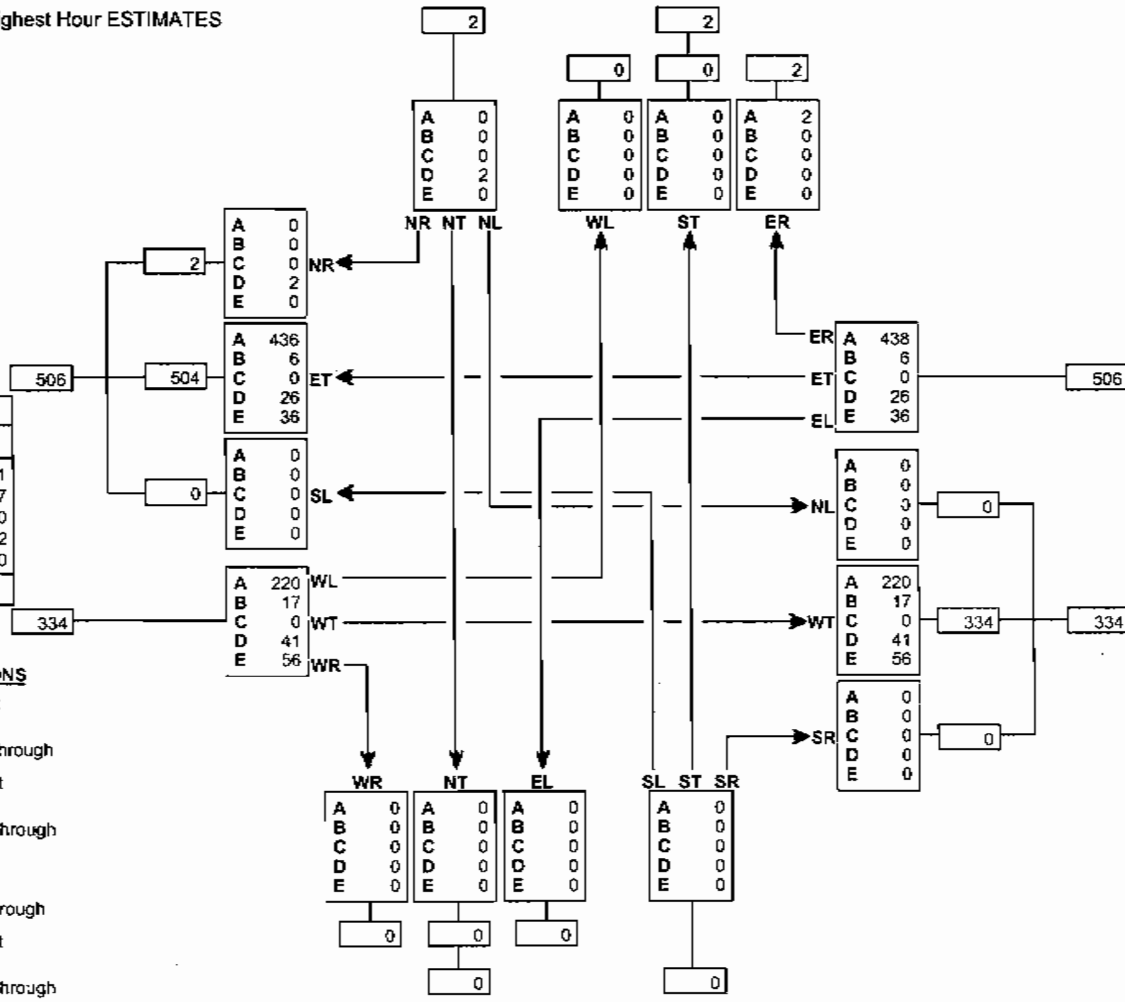
Reference No.: 98556

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	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
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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

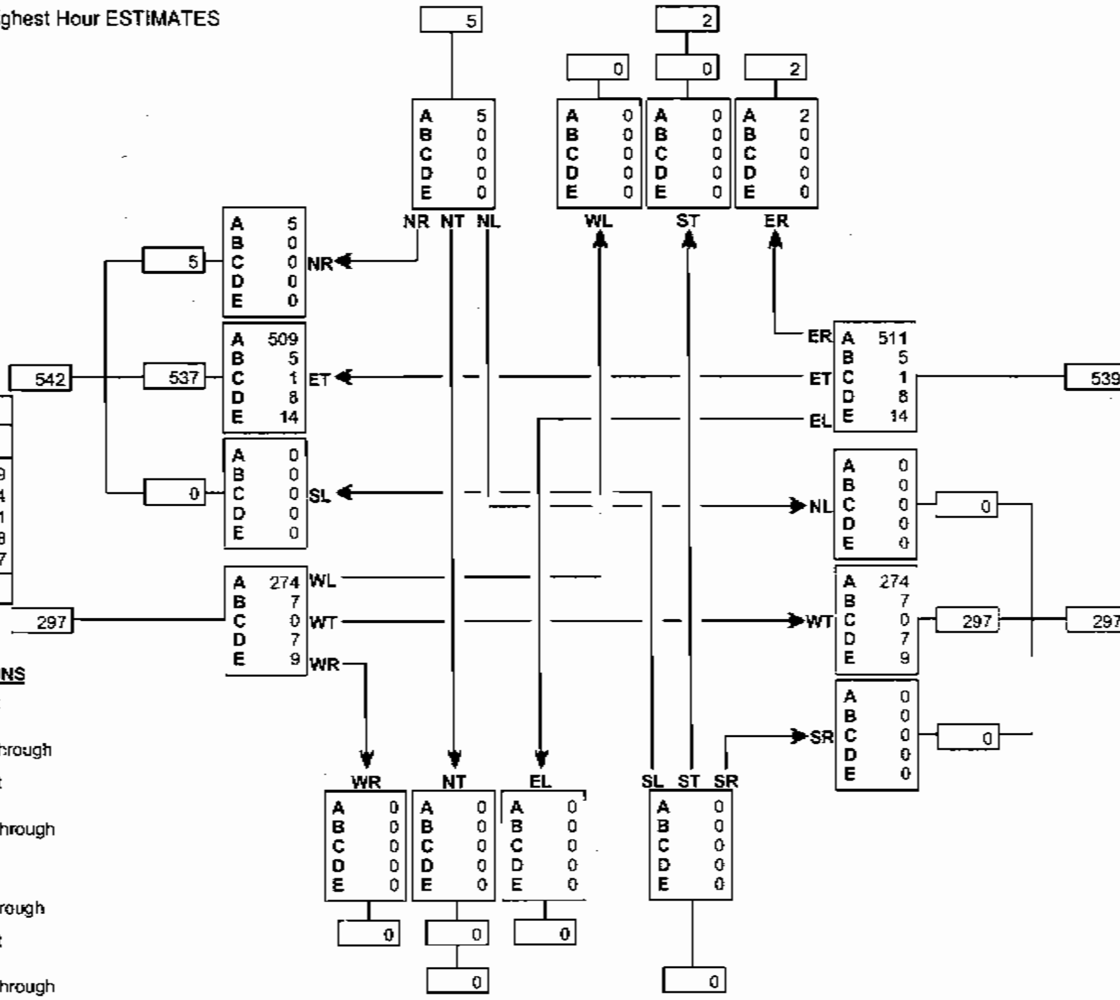
Reference No.: 98556

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

2005 p.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram

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	

TURNING MOVEMENT ABBREVIATIONS

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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

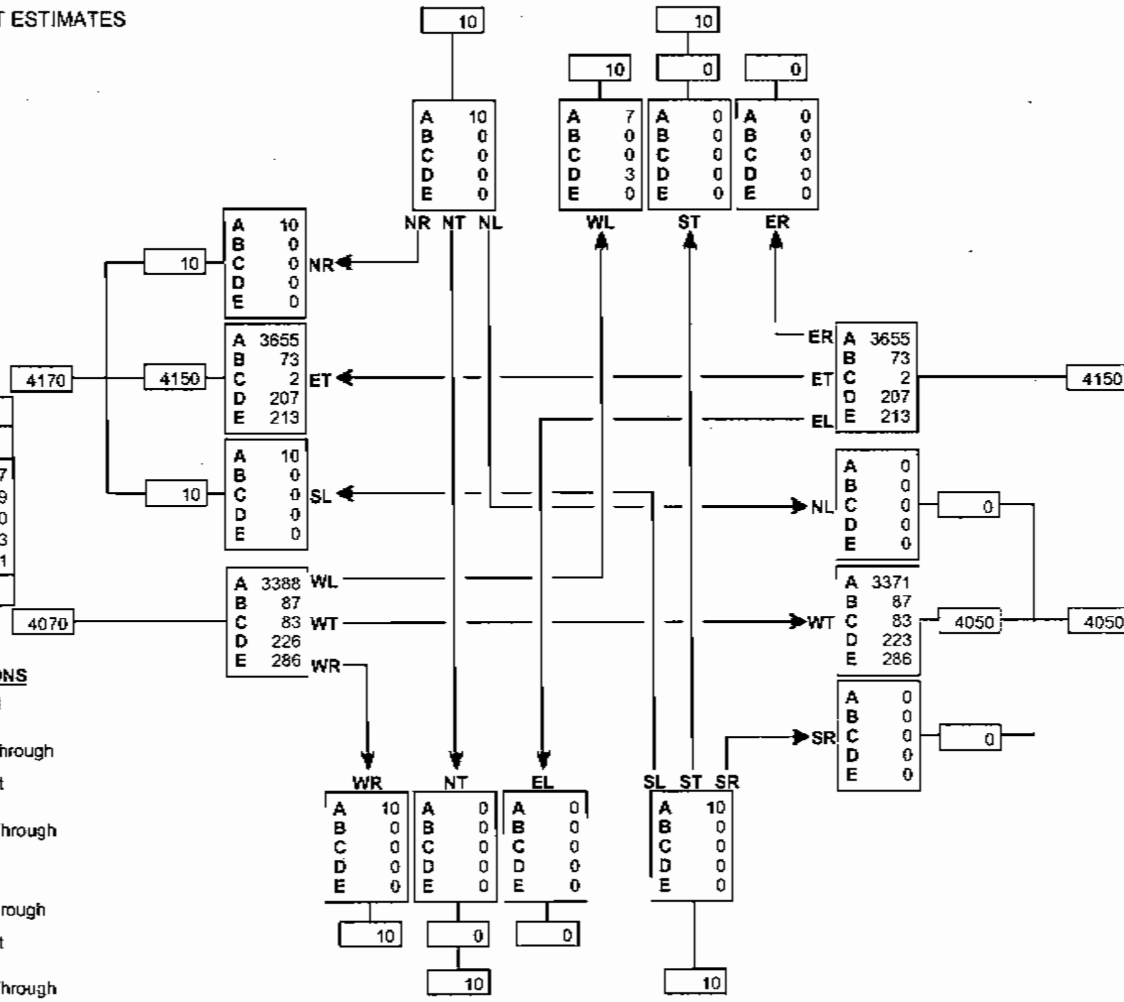
Reference No.: 70000056

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	499	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	

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
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Reference No.: 70000056

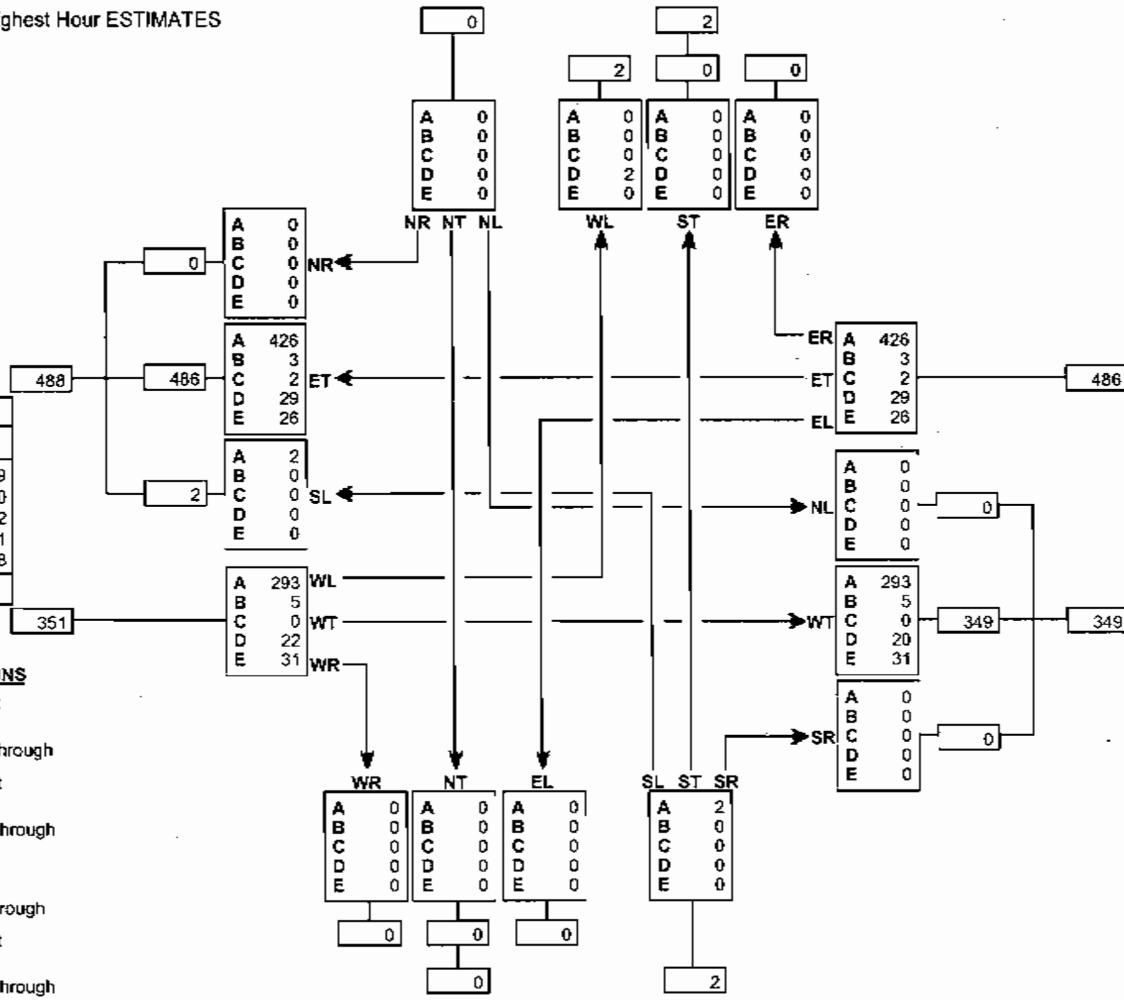
Intersection of:
15 & RGE RD 215 EJ 17-55-21-412000400

2005 a.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram

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	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
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SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

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

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

Turning Movement Summary Diagram

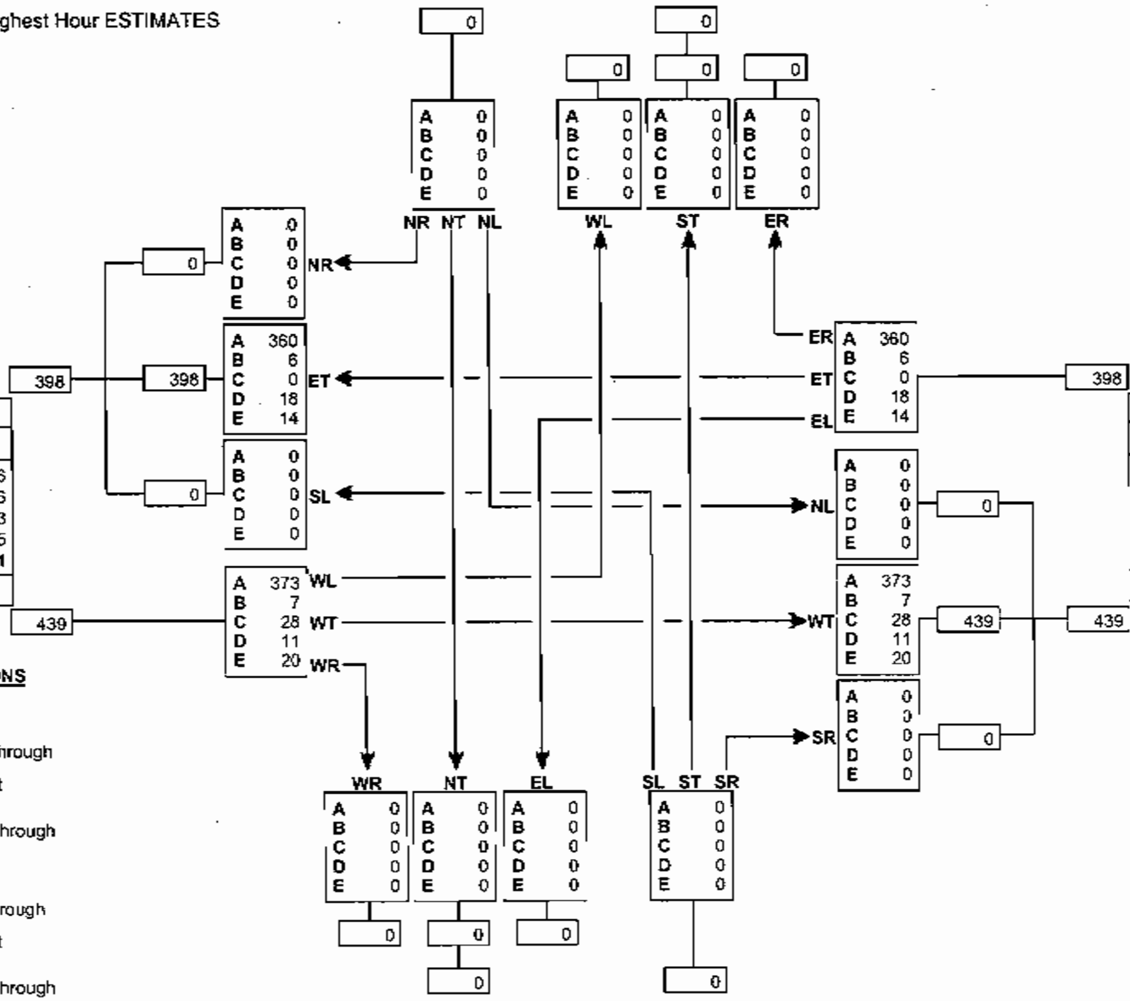
Reference No.: 70000056

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

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

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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

Reference No.: 98550

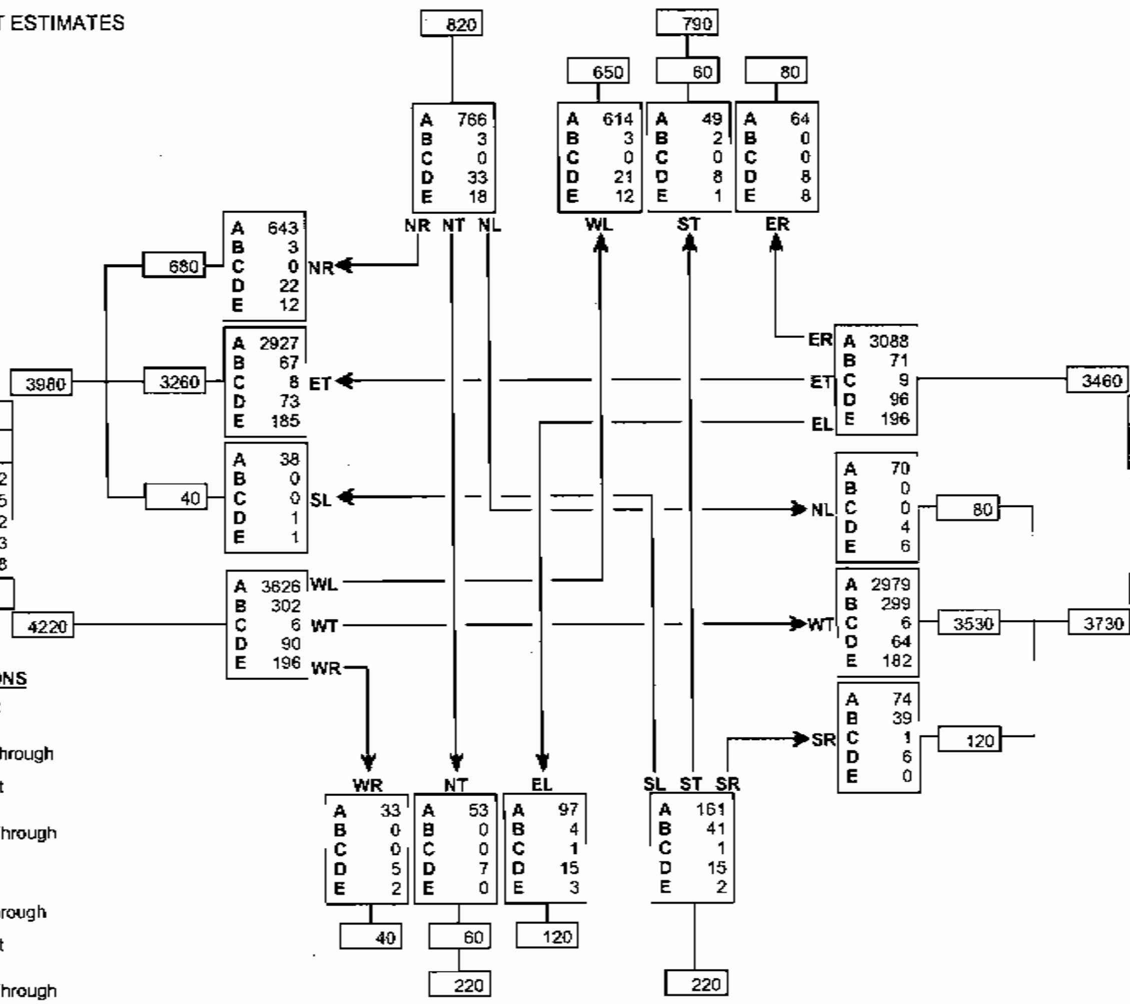
Intersection of:
15 & 830 N OF JOSEPHBURG WJ

2005 AADT / ASDT ESTIMATES

Turning Movement Summary Diagram

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

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)

Reference No.: 98550

Intersection of:

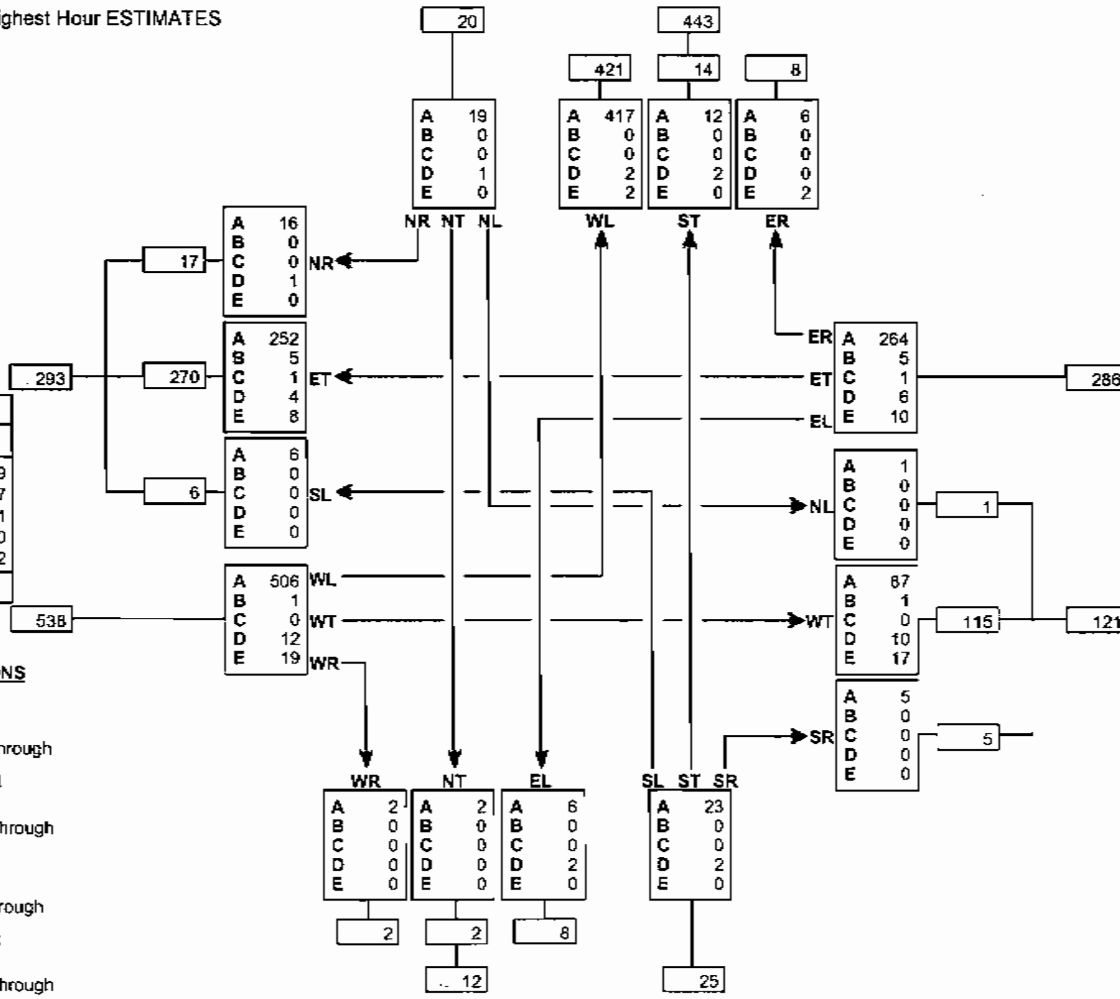
15 & 830 N OF JOSEPHBURG WJ

2005 a.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram

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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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

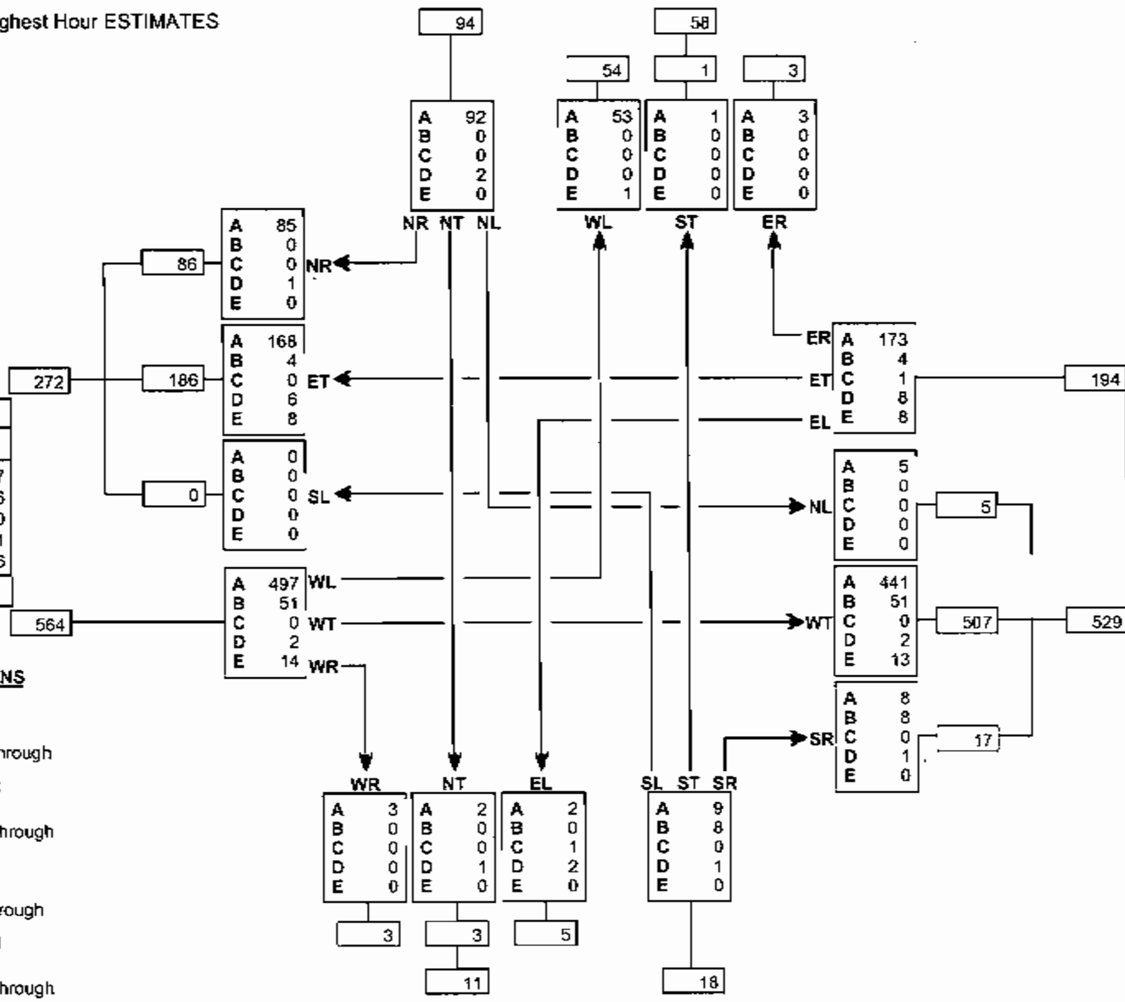
Reference No.: 98550

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	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
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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

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	

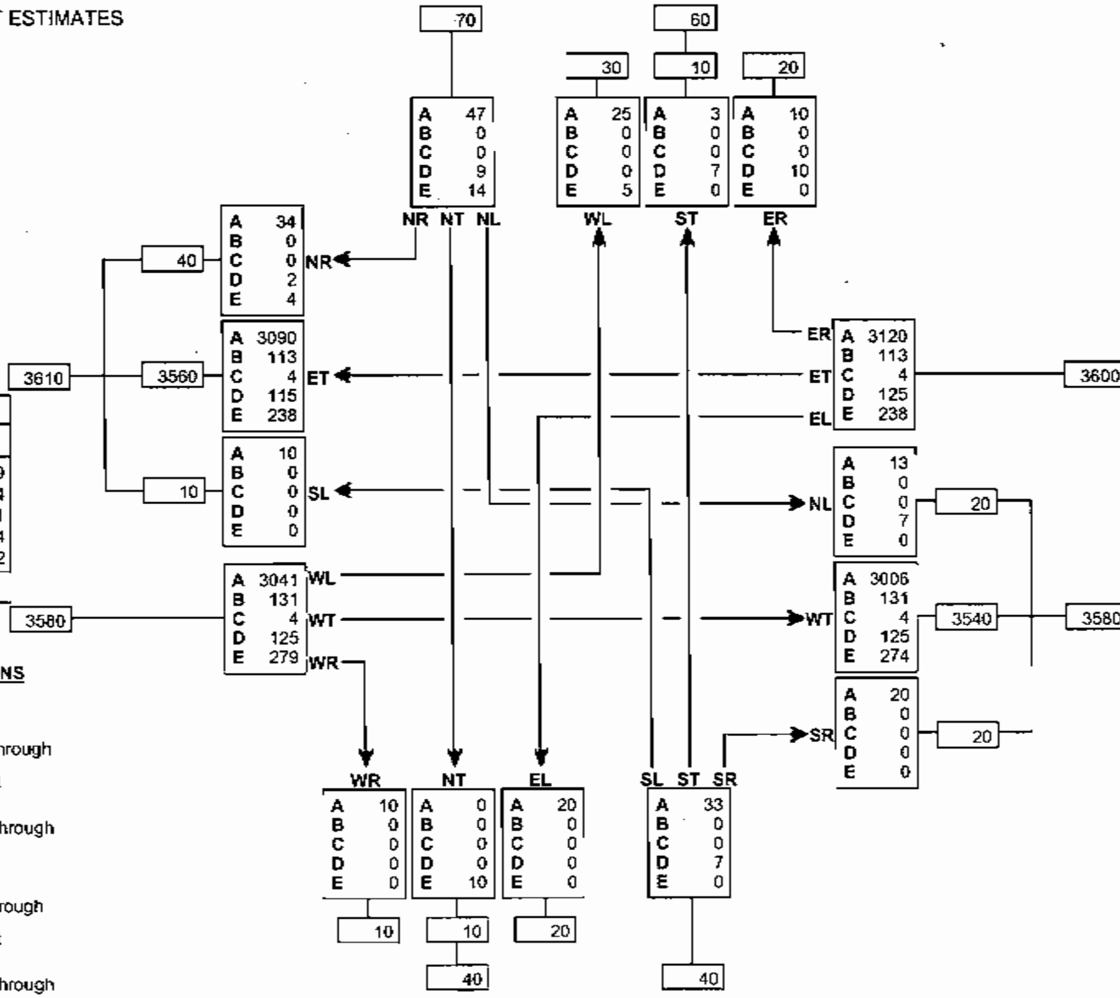
Reference No.: 99550

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

2005 AADT / ASDT ESTIMATES

Turning Movement Summary Diagram

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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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)

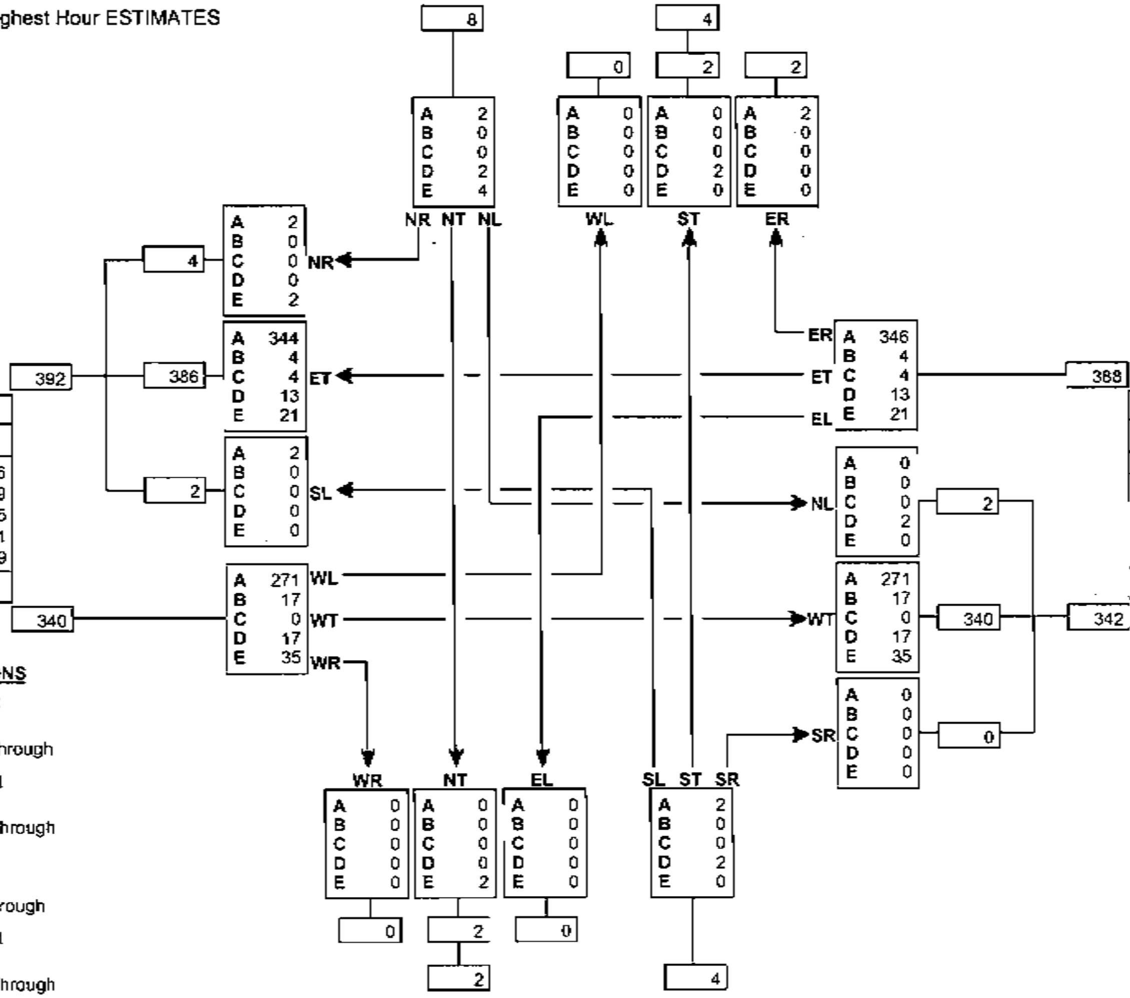
Turning Movement Summary Diagram

Reference No.: 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

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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

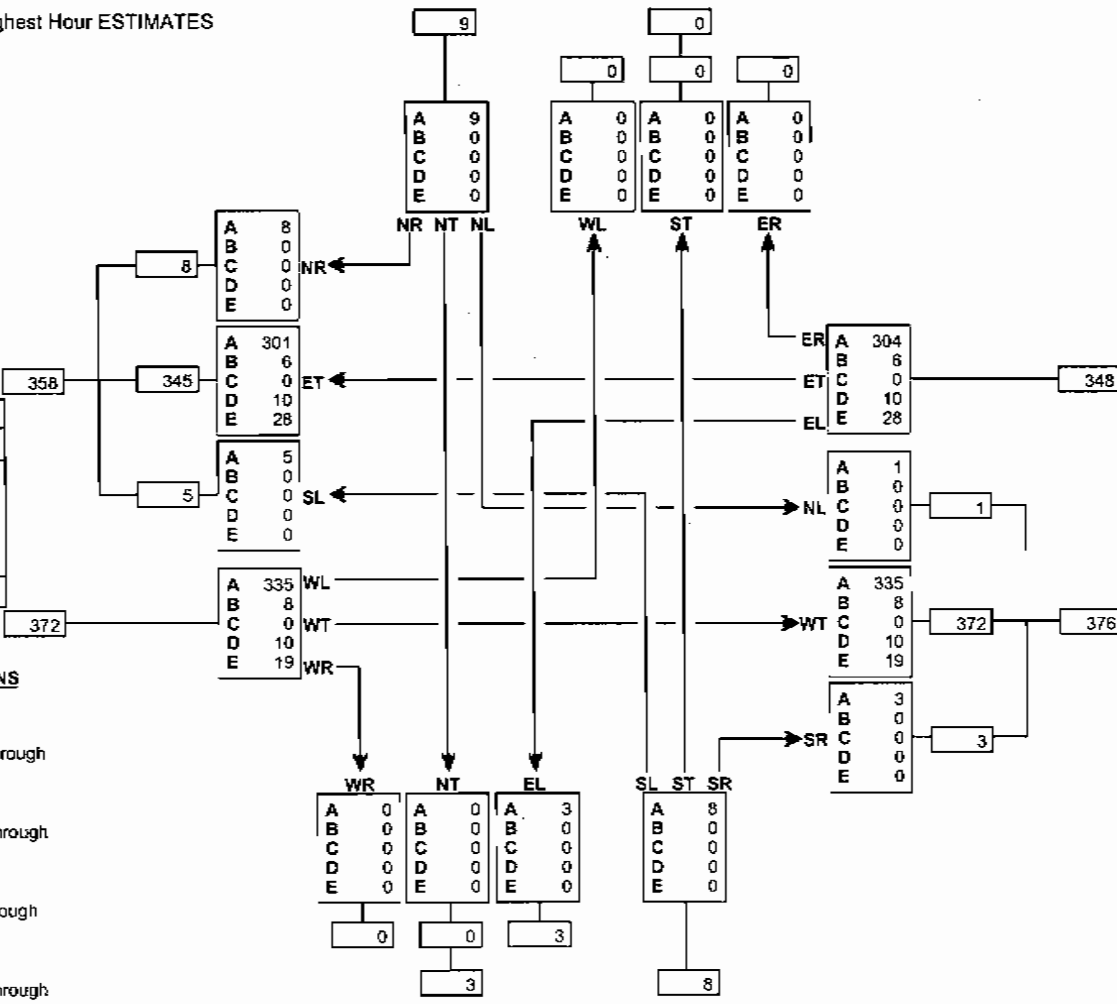
Reference No.: 99550

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	

TURNING MOVEMENT ABBREVIATIONS

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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

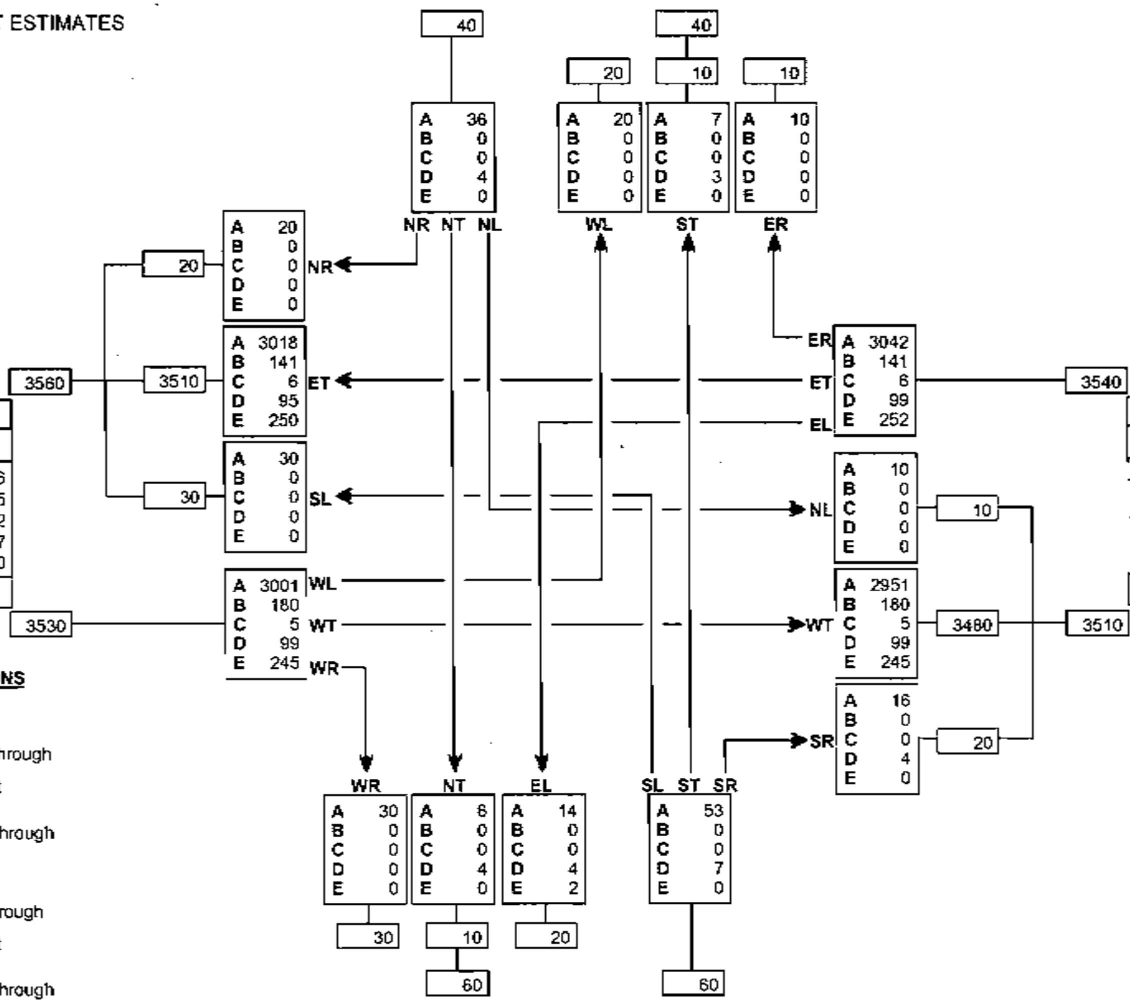
Reference No.: 99553

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

2005 AADT / ASDT ESTIMATES

North On Rge Rd 211		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	73	91.3
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	7	8.8
E: Tractor Trailer Unit	0	0.0
ASDT 90	**AADT** 80	

West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	6069	85.6
B: Recreational Vehicle	321	4.5
C: Bus	11	0.2
D: Single Unit Truck	194	2.7
E: Tractor Trailer Unit	495	7.0
ASDT 7860	**AADT** 7090	



East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	6019	85.4
B: Recreational Vehicle	321	4.6
C: Bus	11	0.2
D: Single Unit Truck	202	2.9
E: Tractor Trailer Unit	497	7.0
ASDT 7820	**AADT** 7050	

TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
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SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

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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)

South On Rge Rd 211		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	103	85.8
B: Recreational Vehicle	0	0.0
C: Bus	0	0.0
D: Single Unit Truck	15	12.5
E: Tractor Trailer Unit	2	1.7
ASDT 130	**AADT** 120	

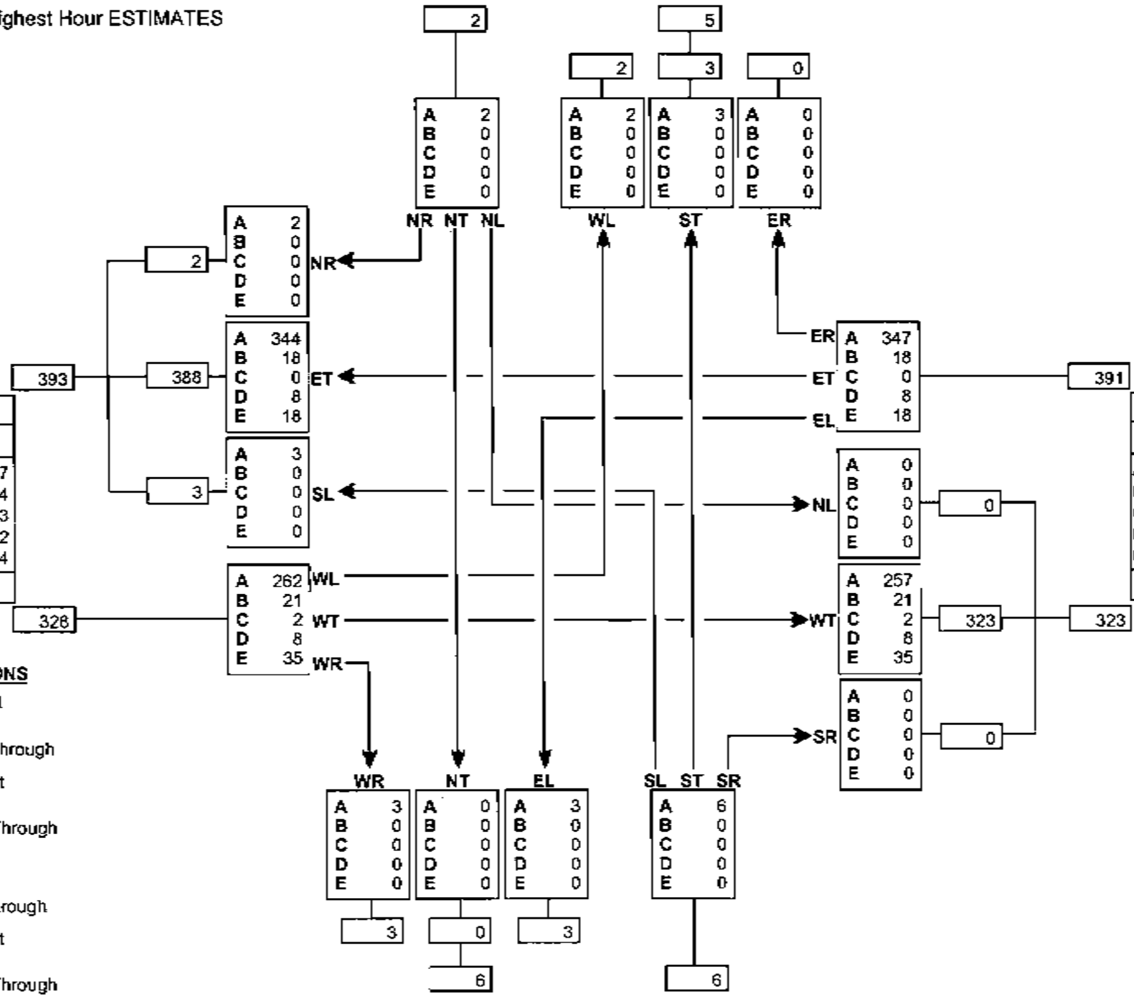
Reference No.: 99553

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

2005 a.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram

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

Turning Movement Summary Diagram

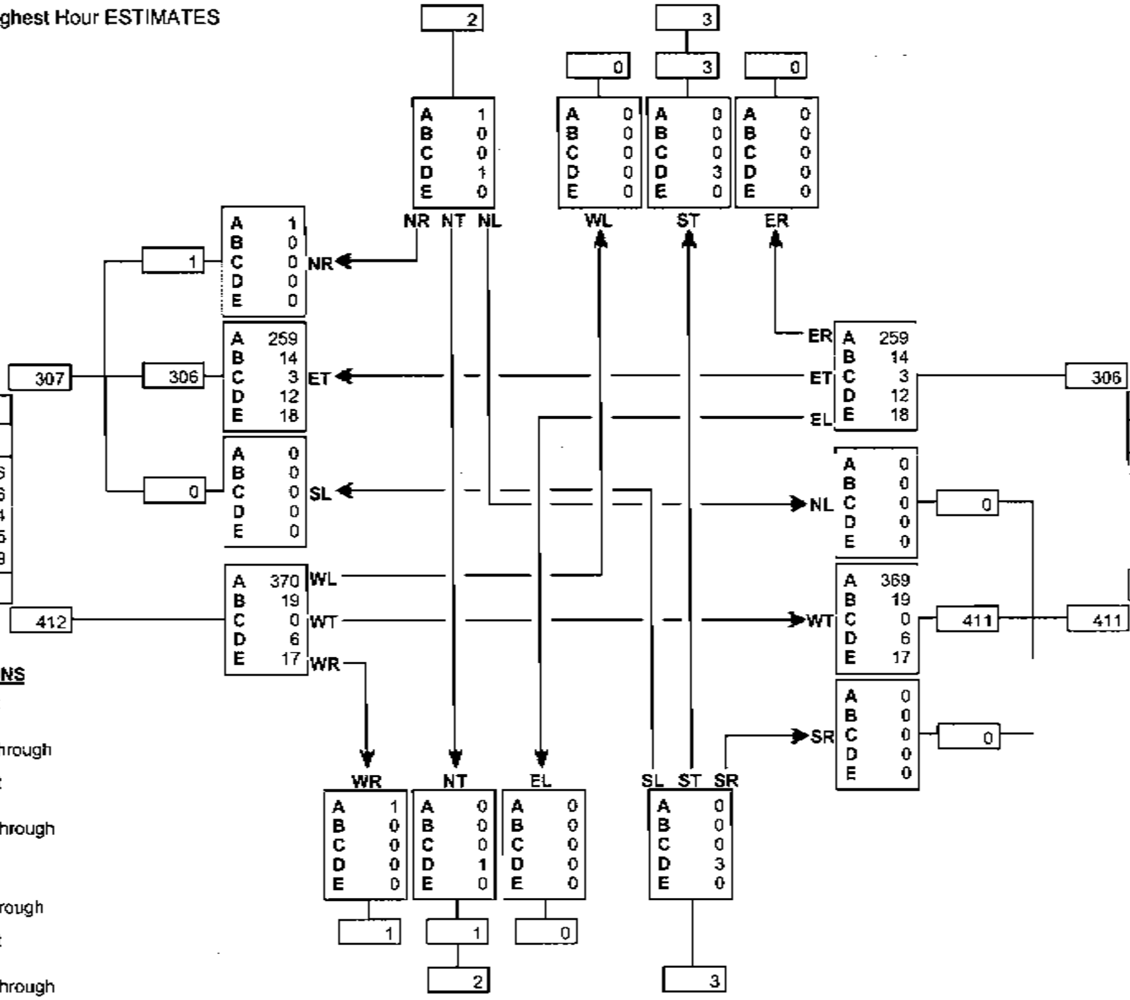
Reference No.: 99553
Intersection of:
15 & RGE RD 211 23-55-21-400000000

2005 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	

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

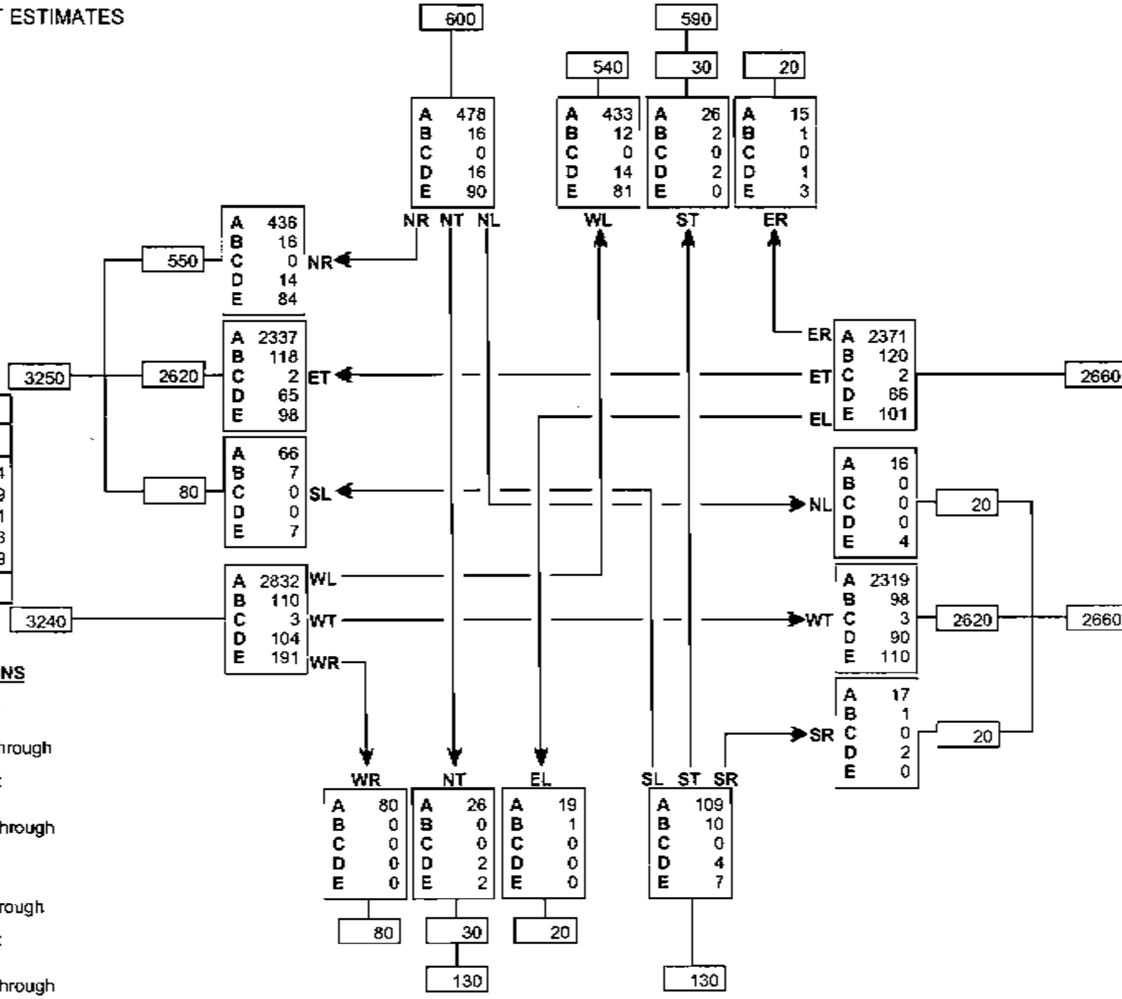
Turning Movement Summary Diagram

Reference No.: 100540

Intersection of:
15 & 830 NE OF FT SASKATCHEWAN EJ

2005 AADT / ASDT ESTIMATES

North On 830		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	952	80.0
B: Recreational Vehicle	31	2.6
C: Bus	0	0.0
D: Single Unit Truck	33	2.8
E: Tractor Trailer Unit	174	14.6
ASDT 1320	**AADT** 1190	



West On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	5671	87.4
B: Recreational Vehicle	251	3.9
C: Bus	5	0.1
D: Single Unit Truck	183	2.8
E: Tractor Trailer Unit	380	5.9
ASDT 7200	**AADT** 6490	

East On 15		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	4723	88.8
B: Recreational Vehicle	219	4.1
C: Bus	5	0.1
D: Single Unit Truck	158	3.0
E: Tractor Trailer Unit	215	4.0
ASDT 5900	**AADT** 5320	

South On Rge Rd 210		
Vehicle Type	**Vol**	**%**
A: Passenger Vehicle	234	90.0
B: Recreational Vehicle	11	4.2
C: Bus	0	0.0
D: Single Unit Truck	6	2.3
E: Tractor Trailer Unit	9	3.5
ASDT 290	**AADT** 260	

TURNING MOVEMENT ABBREVIATIONS

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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)

Reference No.: 100540

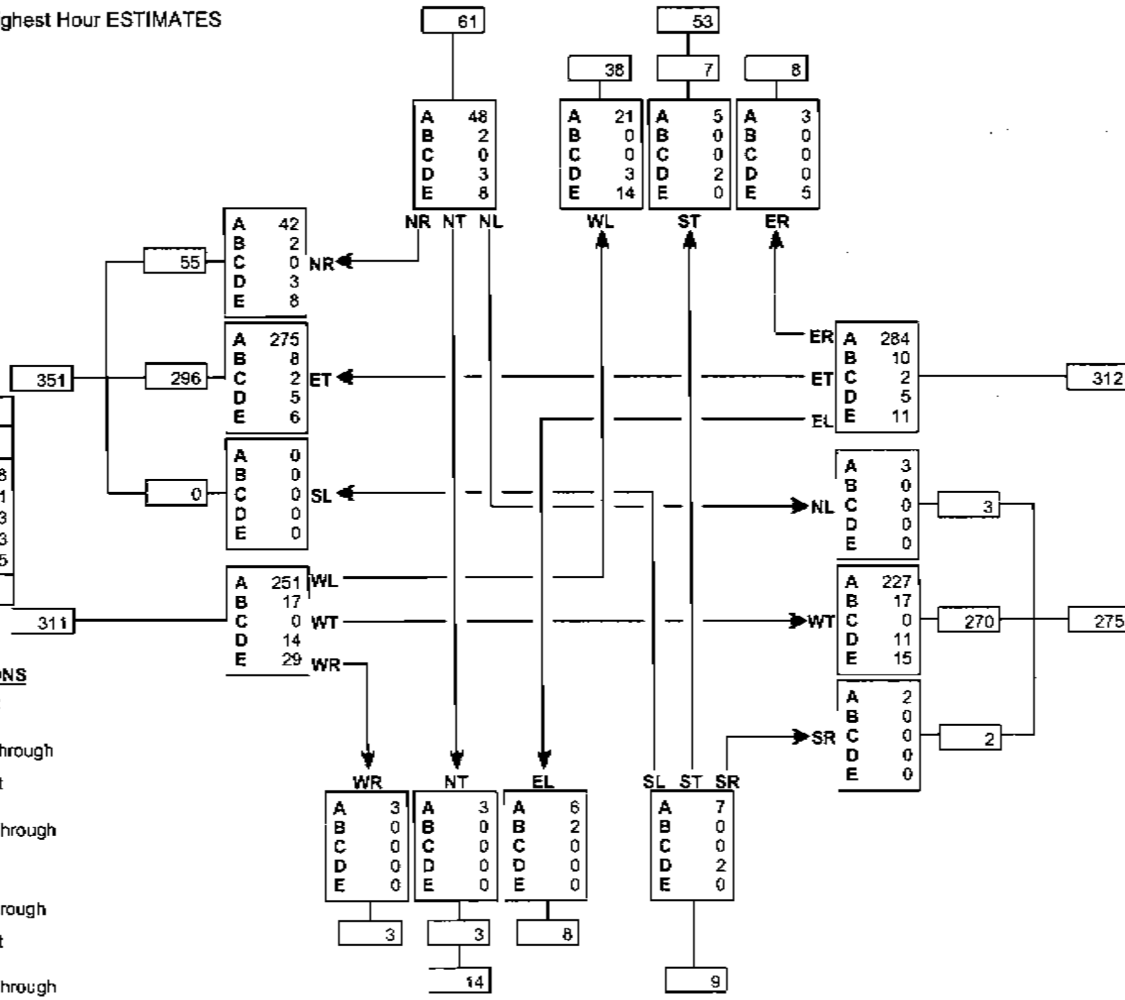
Intersection of:

15 & 830 NE OF FT SASKATCHEWAN EJ

2005 a.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram

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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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

Reference No.: 100540

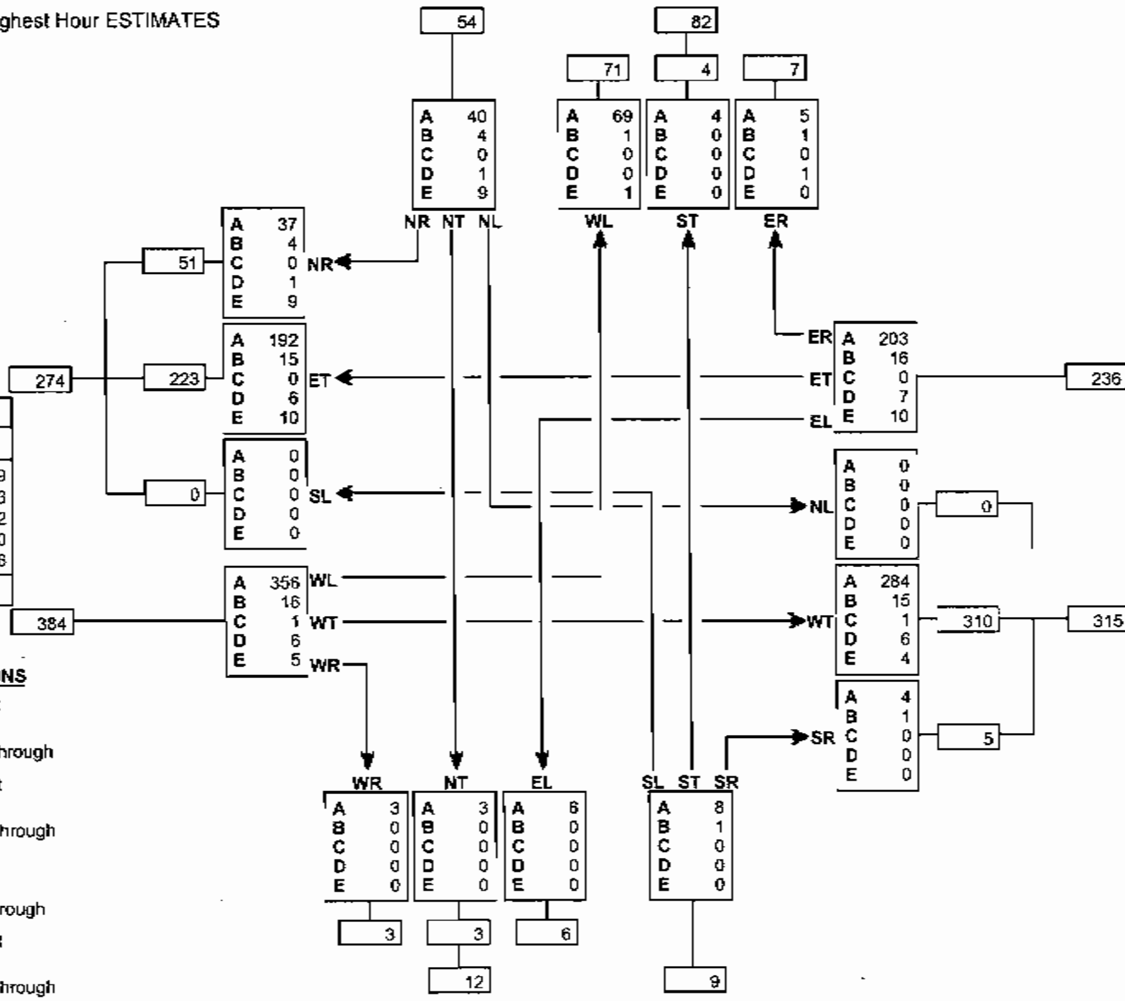
Intersection of:
15 & 830 NE OF FT SASKATCHEWAN EJ

2005 p.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram

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

- 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

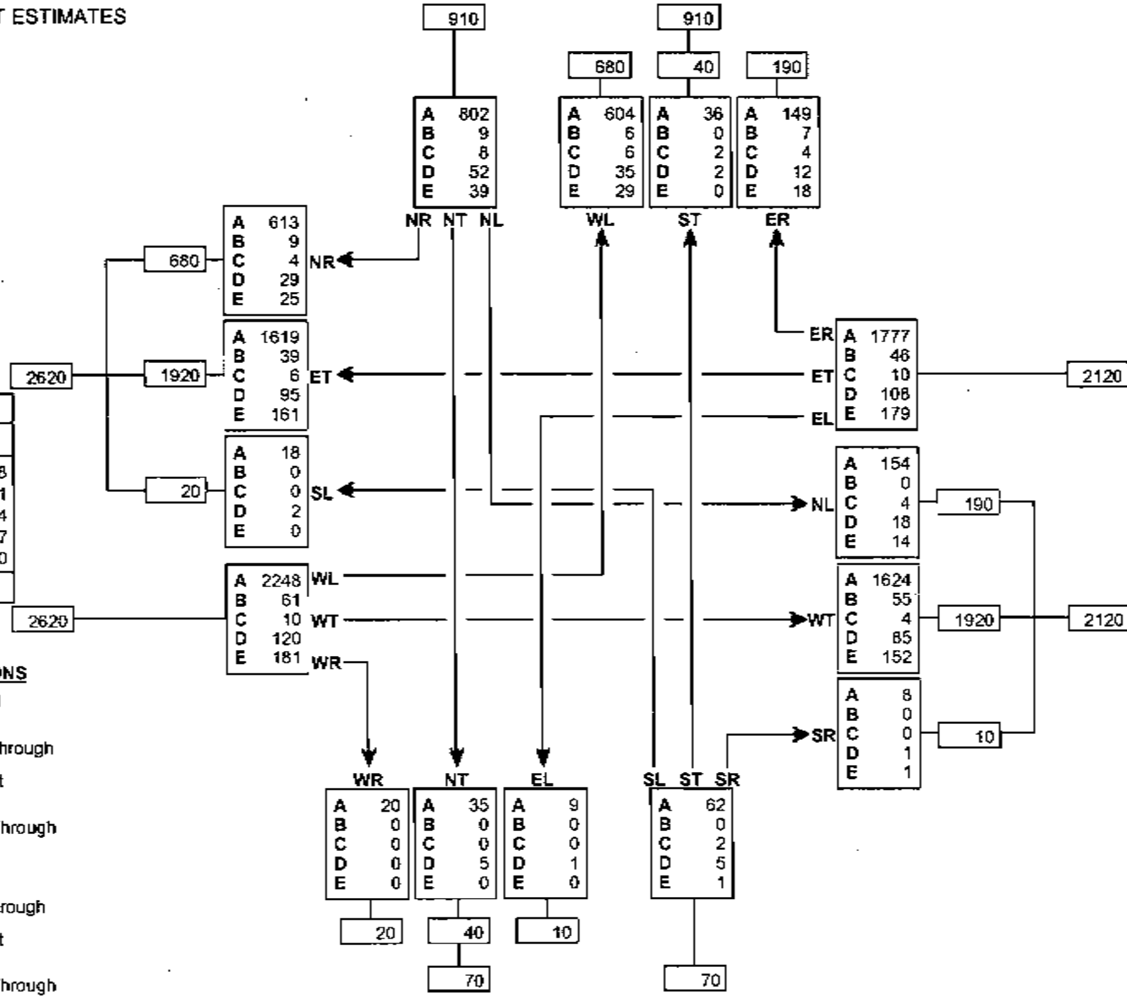
Reference No.: 101540

Intersection of:
15 & 45 S OF BRUDERHEIM

2005 AADT / ASDT ESTIMATES

Turning Movement Summary Diagram

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

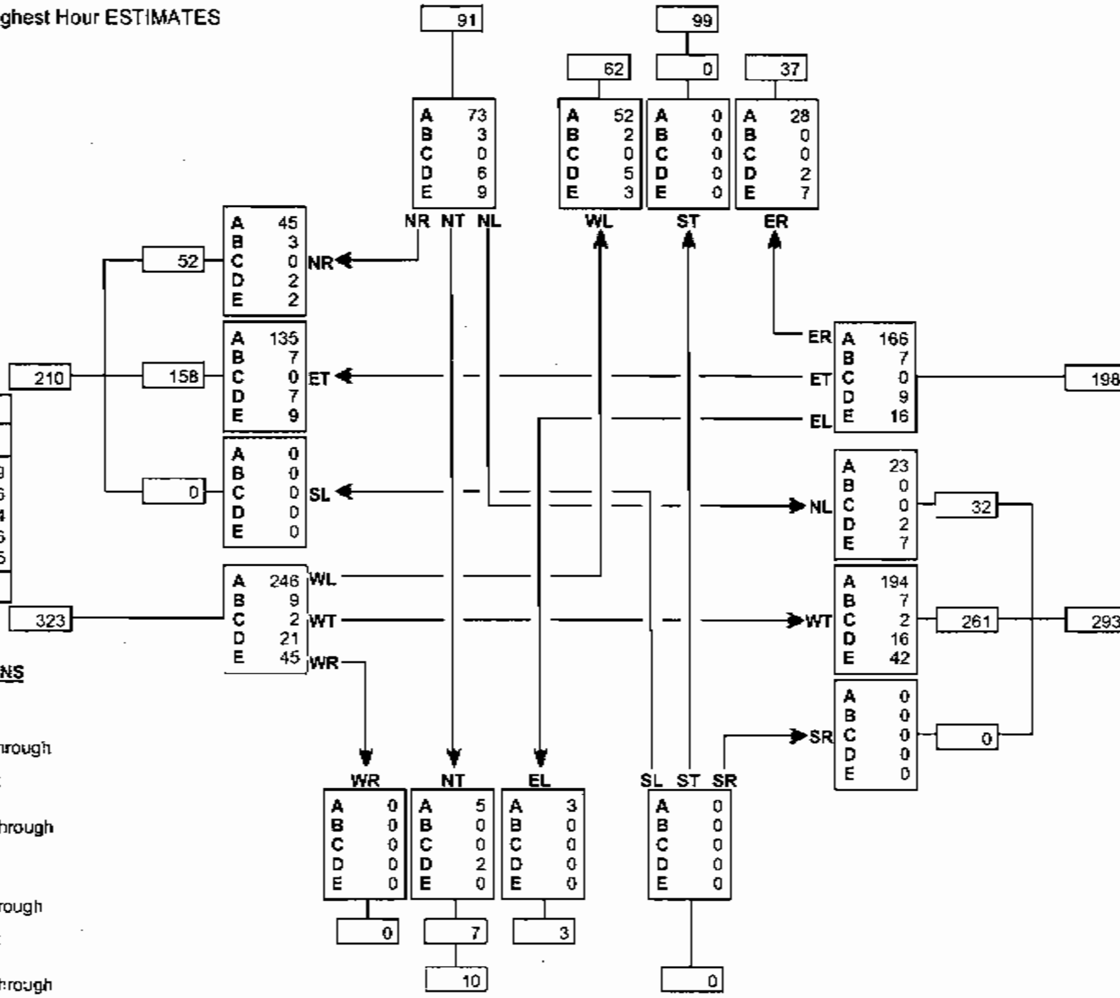
2005 a.m. 100th Highest Hour ESTIMATES

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

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
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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

Reference No.: 101540

Intersection of:

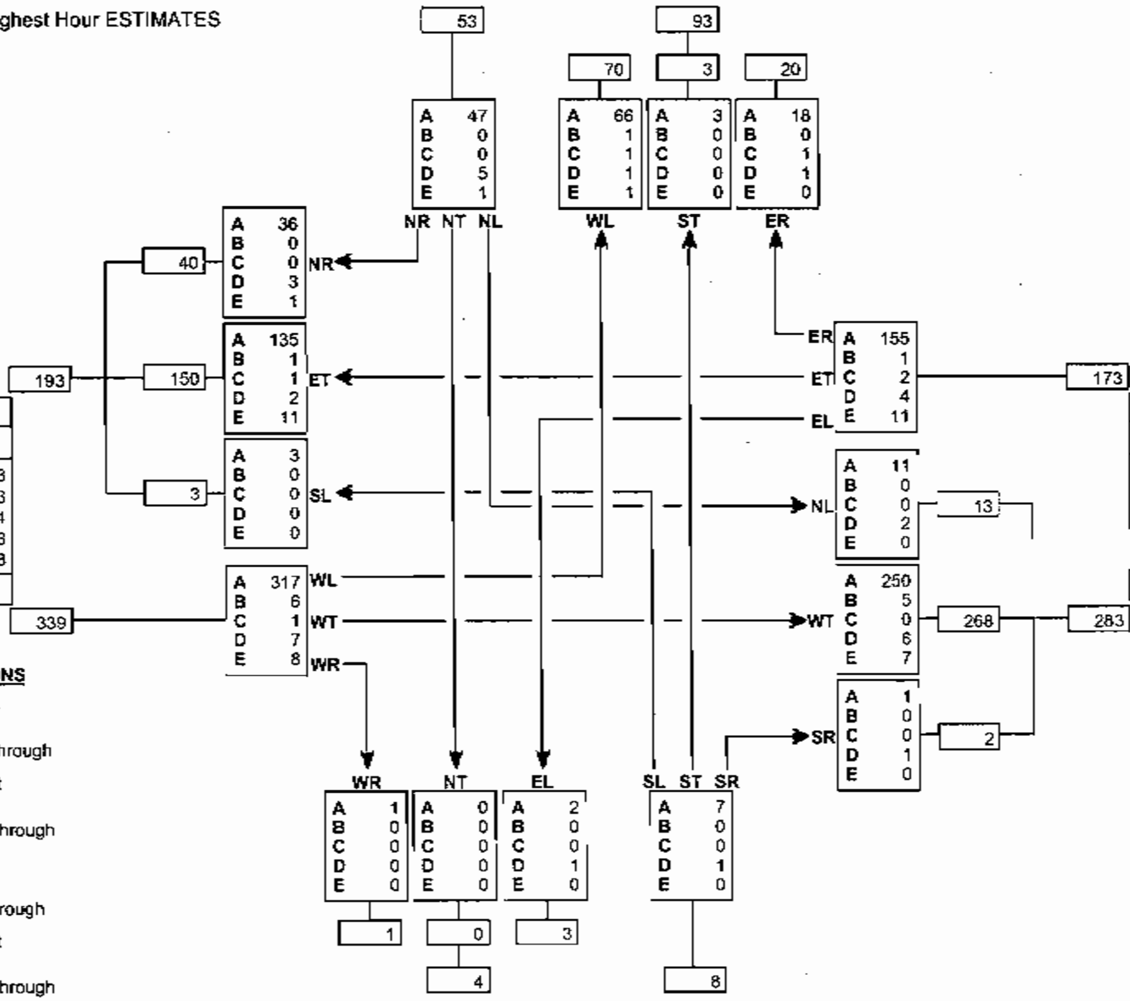
15 & 45 S OF BRUDERHEIM

2005 p.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram

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

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

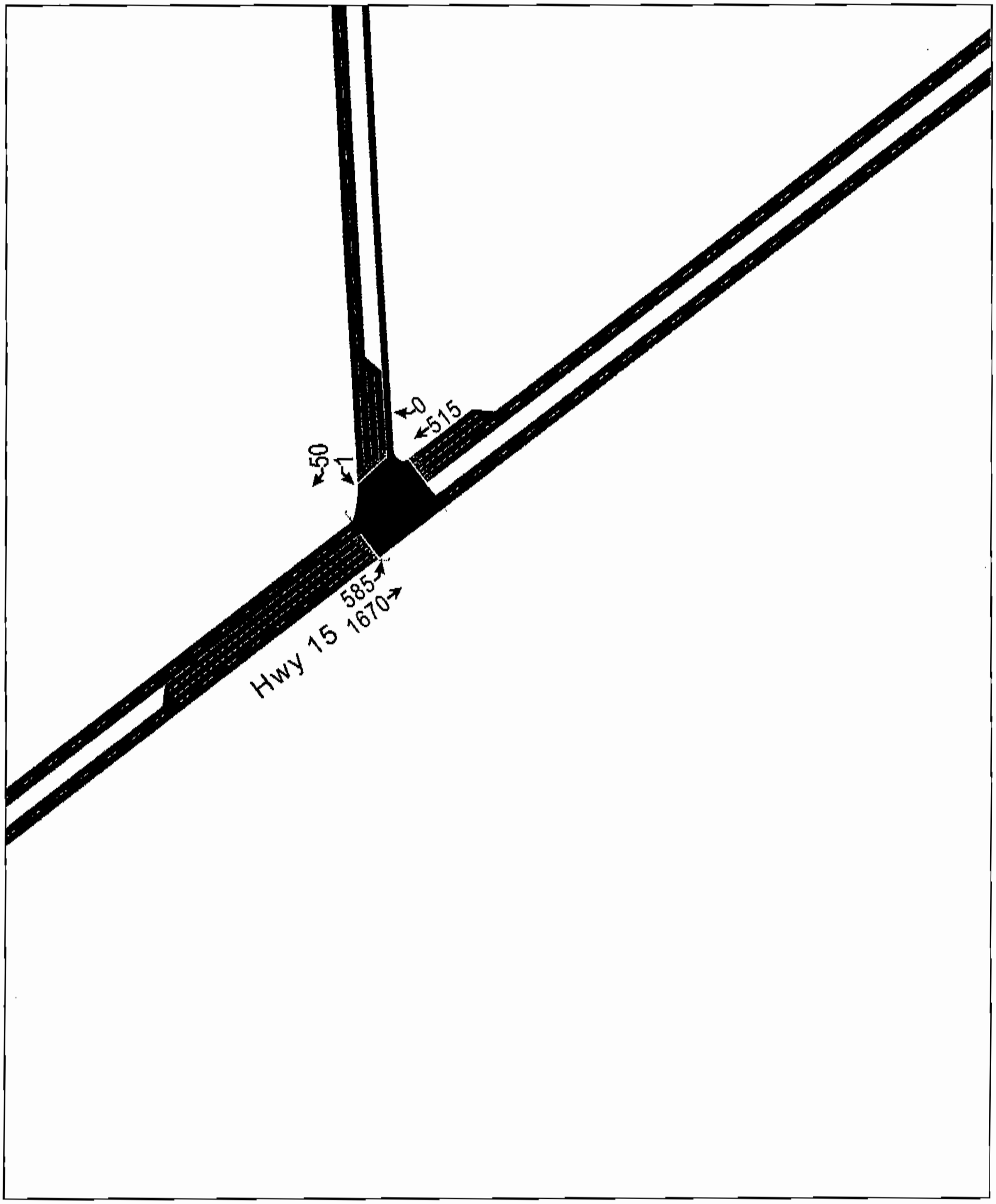
ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

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

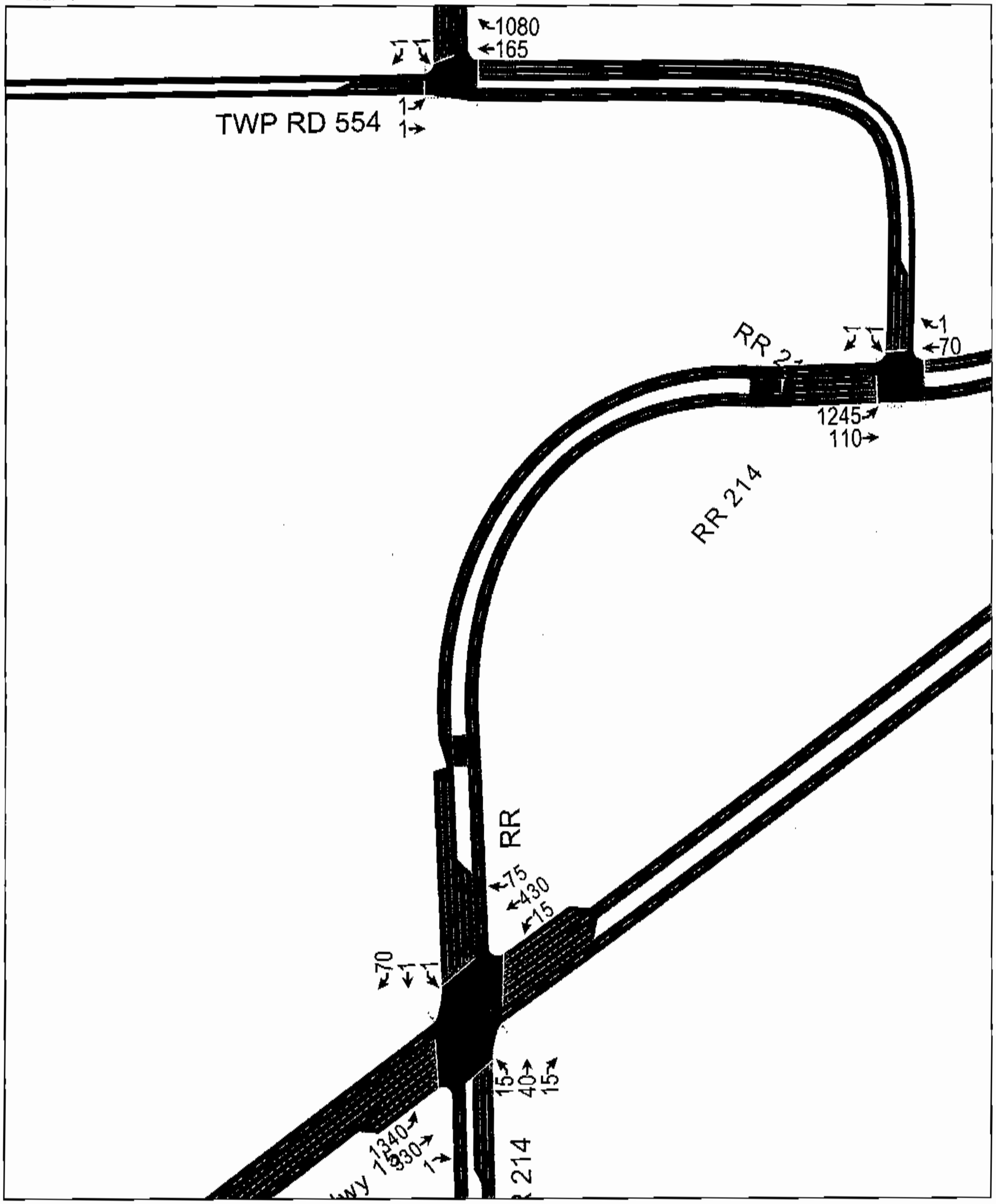
Appendix B
Synchro Model Outputs

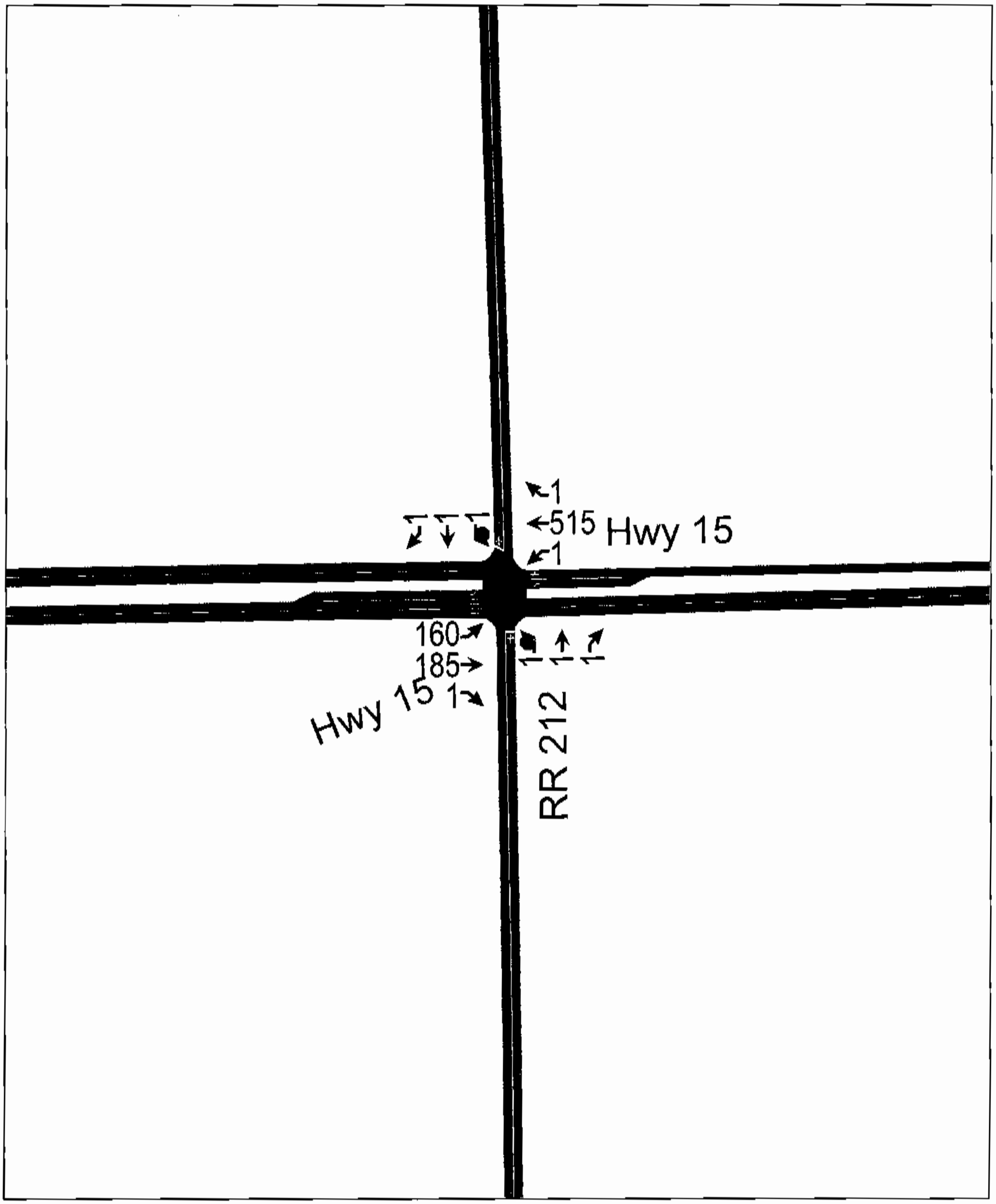
AM Peak Hour Build-Out – Operations Only

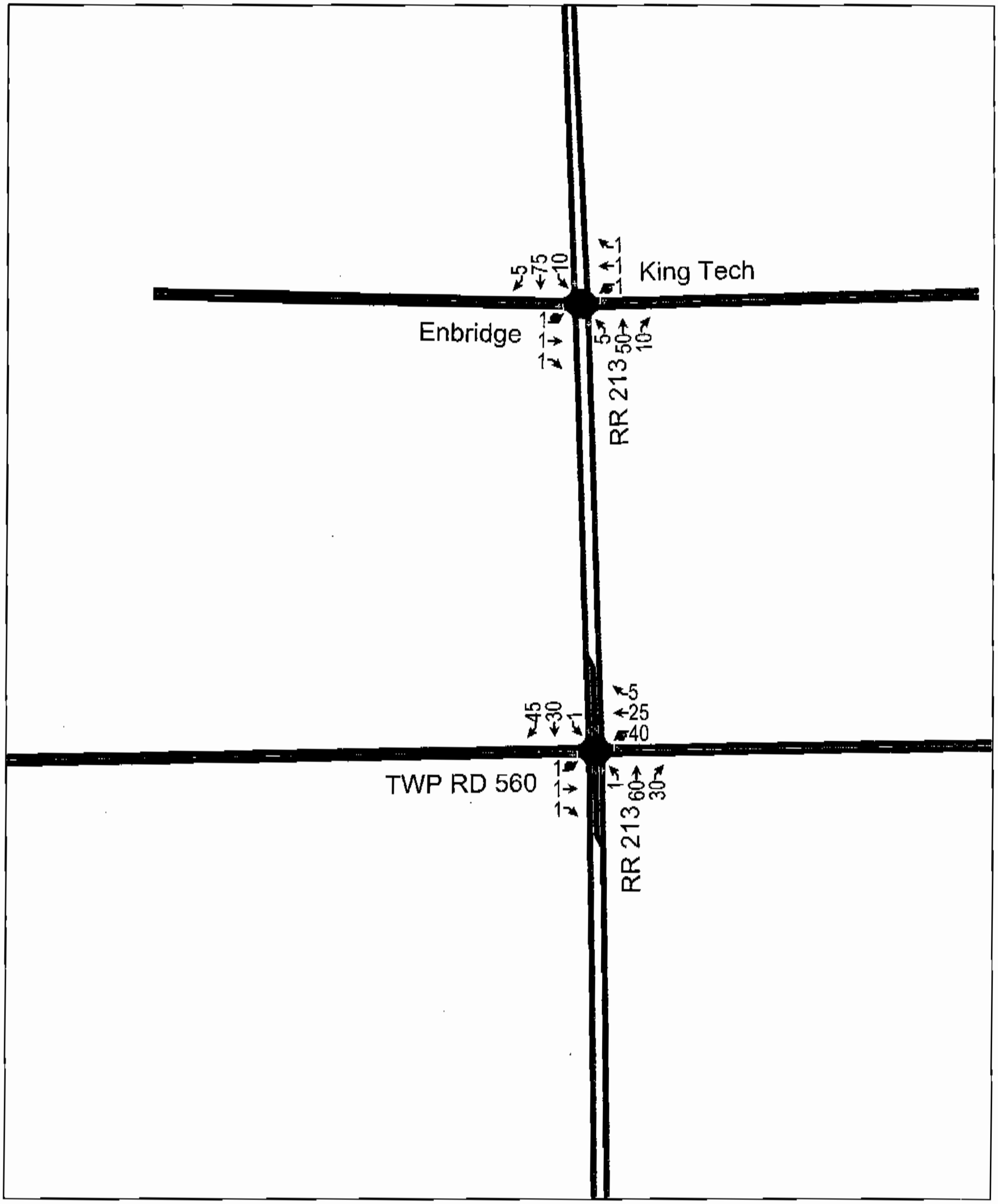
Map - C:\Documents and Settings\tgolly\Desktop\Heartlands\AM Full Build Operations.syn
Volumes **3/13/2007**

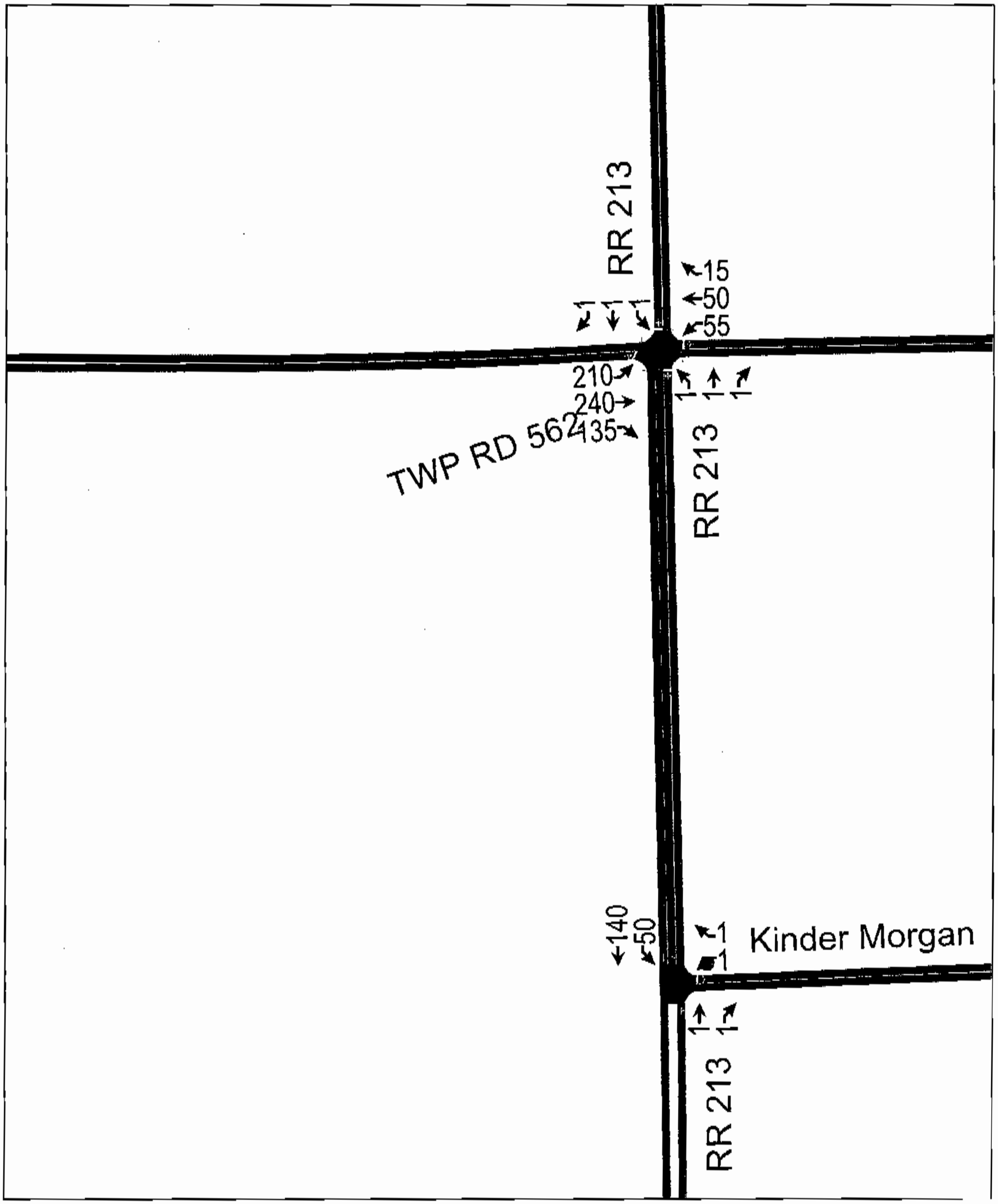


AM Peak Hour Build-Out - Operations Only
Stantec Consulting Ltd.


1080
165
1
1
TWP RD 554
1
1
RR 21
1
1
1
70
1245
110
RR 214
RR
75
430
15
70
1
1
15
40
15
1340
330
1
R 214


1
515
1
Hwy 15
160
185
1
Hwy 15
1
1
1
RR 212


King Tech
Enbridge
RR 213
TWP RD 560
RR 213
5
75
10
1
1
1
1
1
1
5
50
10
45
30
1
5
25
40
1
1
1
1
60
30


RR 213
15
50
55
1
1
1
210
240
135
1
1
1
TWP RD 562
RR 213
140
50
1
1
Kinder Morgan
1
1
RR 213

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

Intersection Summary

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

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

Intersection Summary

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

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

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

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

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

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

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

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

Intersection Summary

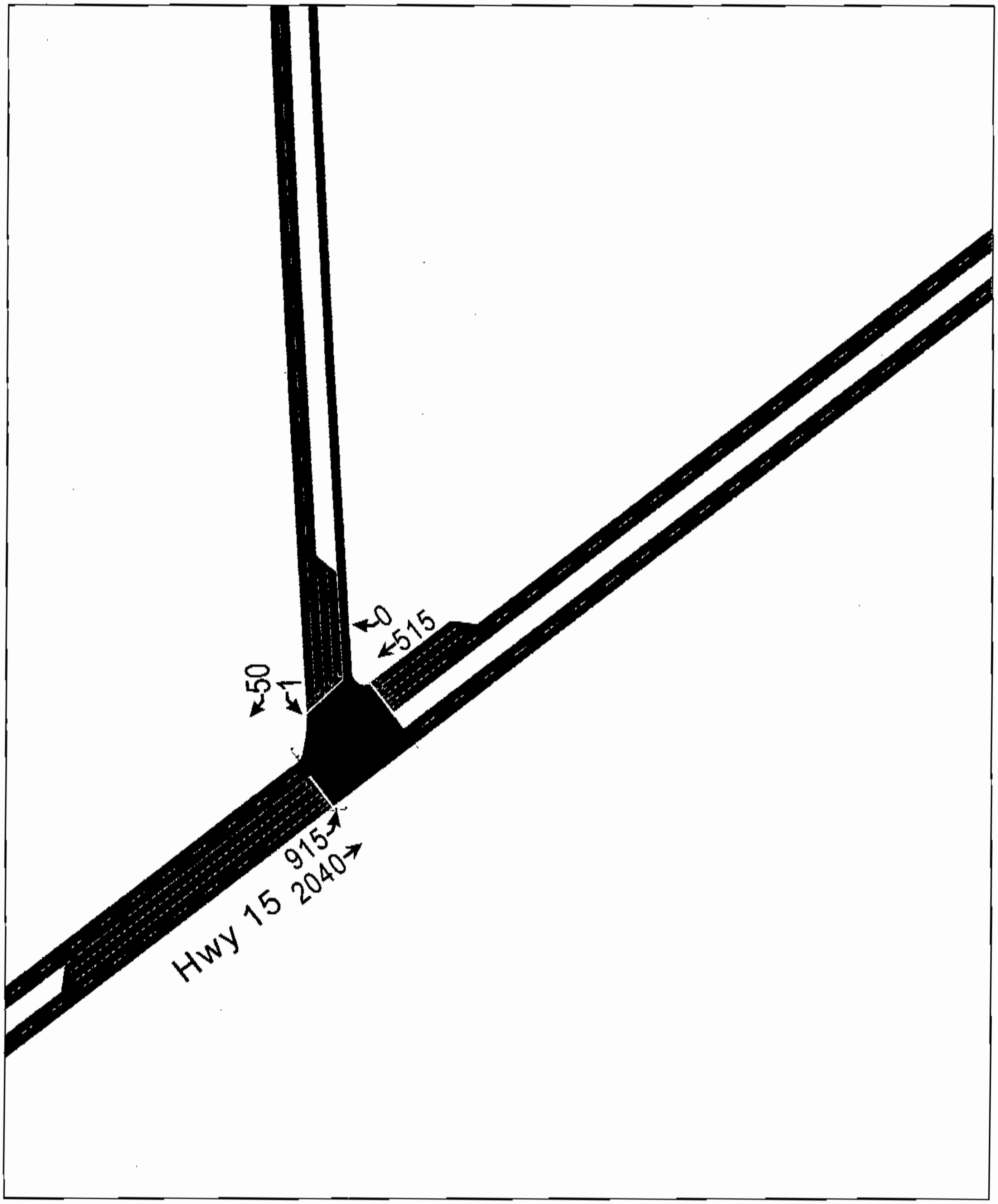
Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 43 (72%), Referenced to phase 2: and 6:SBL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 6.5 Intersection LOS: A
Intersection Capacity Utilization 56.2% ICU Level of Service B
Analysis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

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

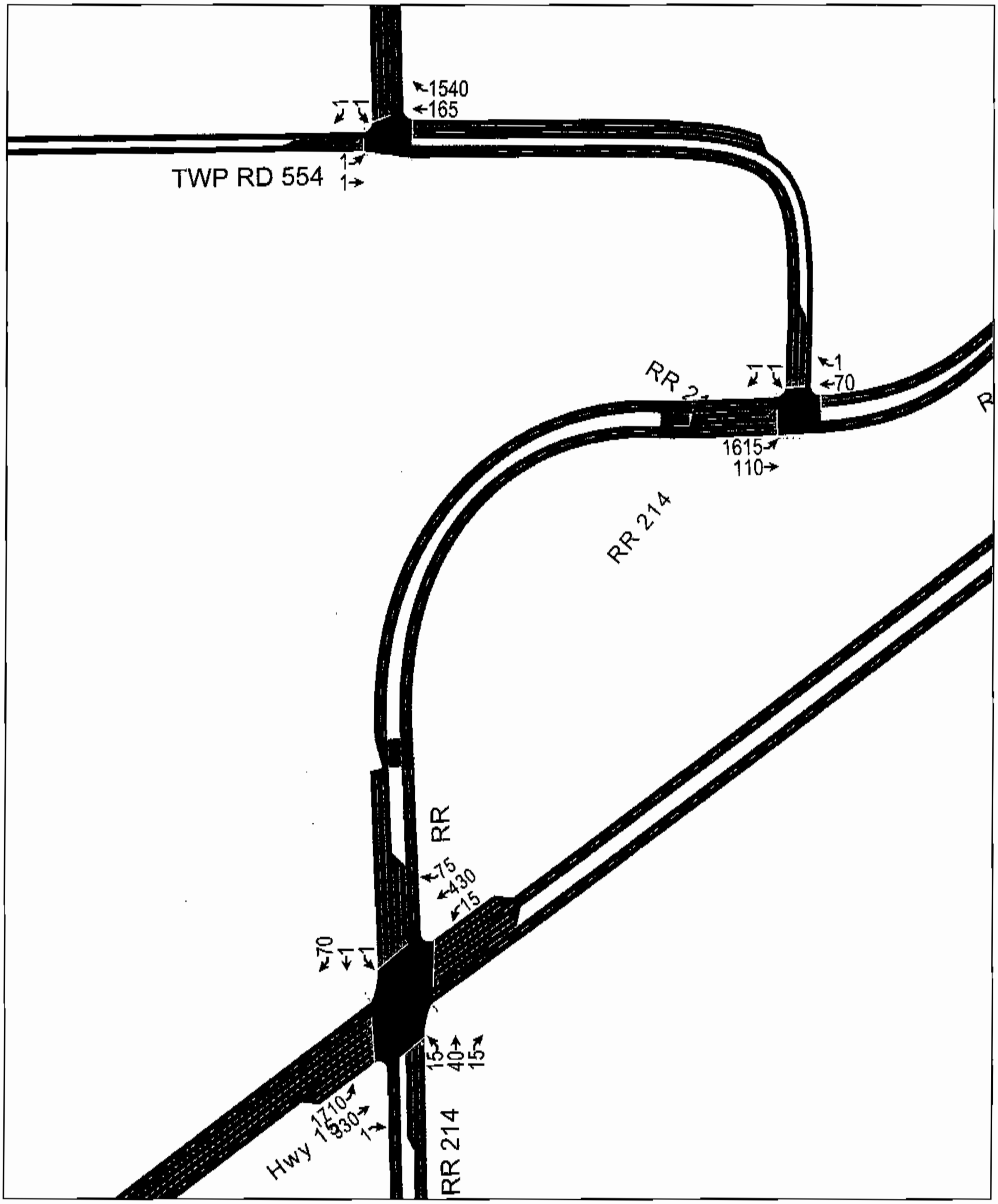
Intersection Summary

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

AM Peak Hour Build-Out – Turnaround

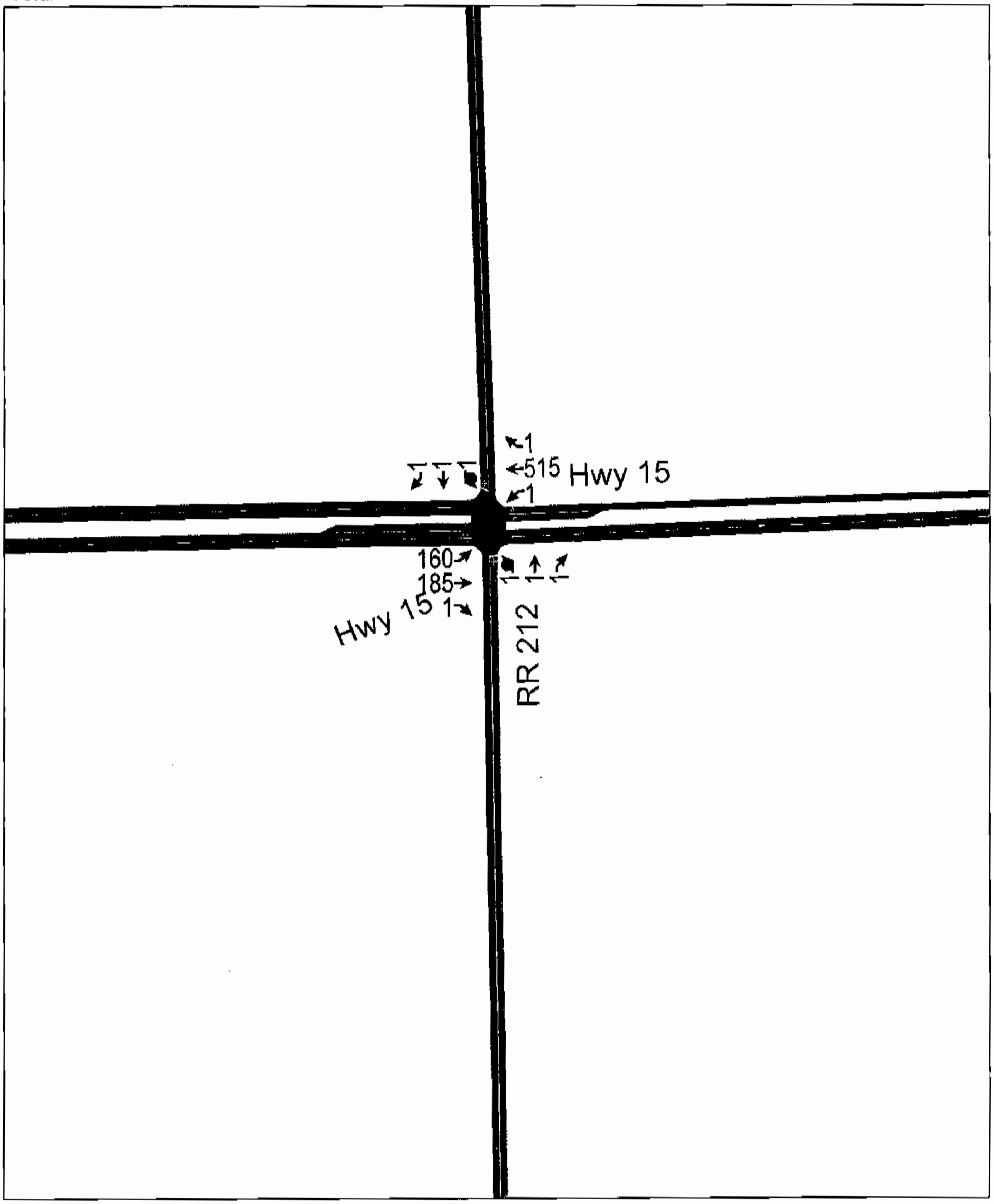

0
515
50
1
915
2040
Hwy 15

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

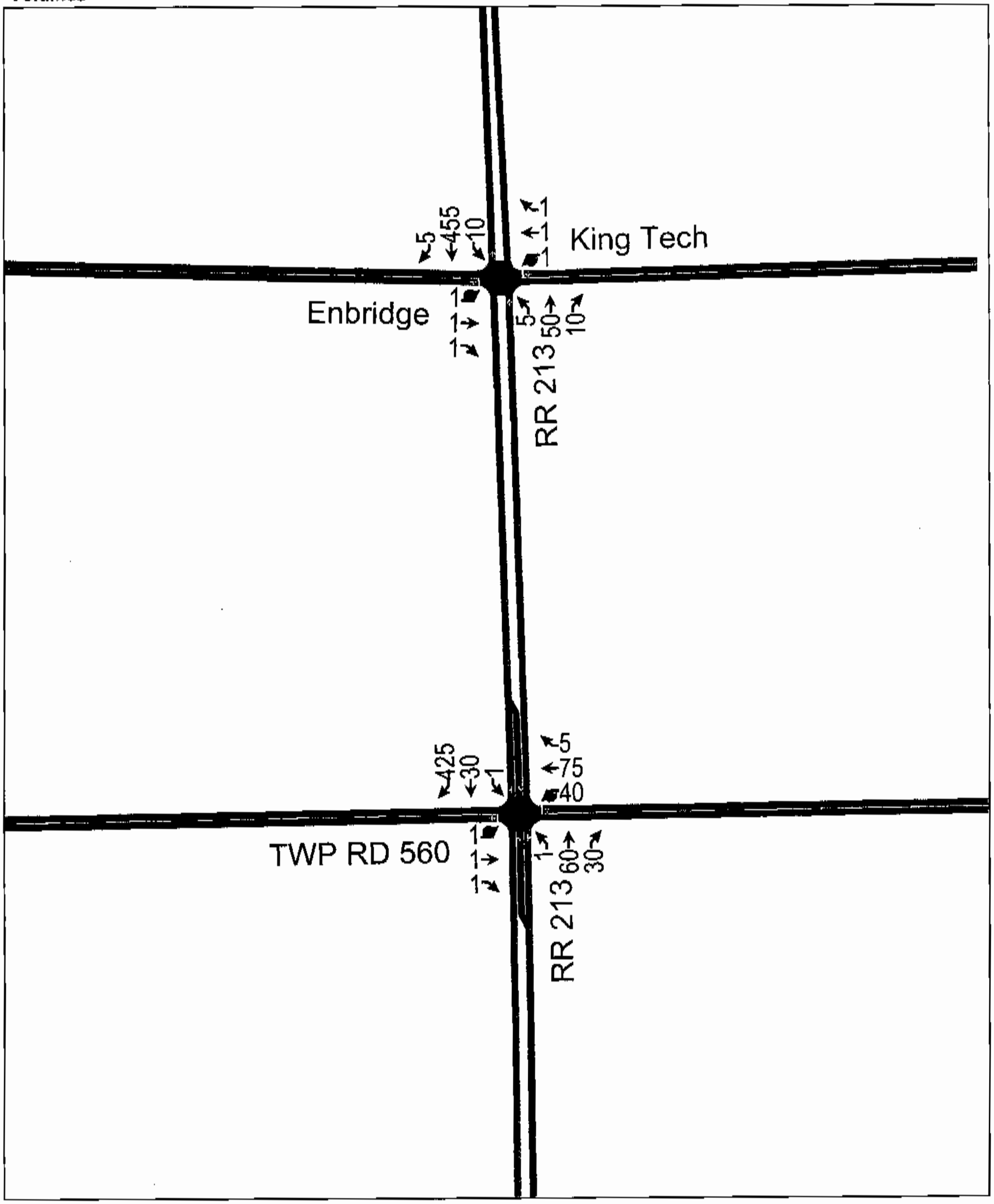


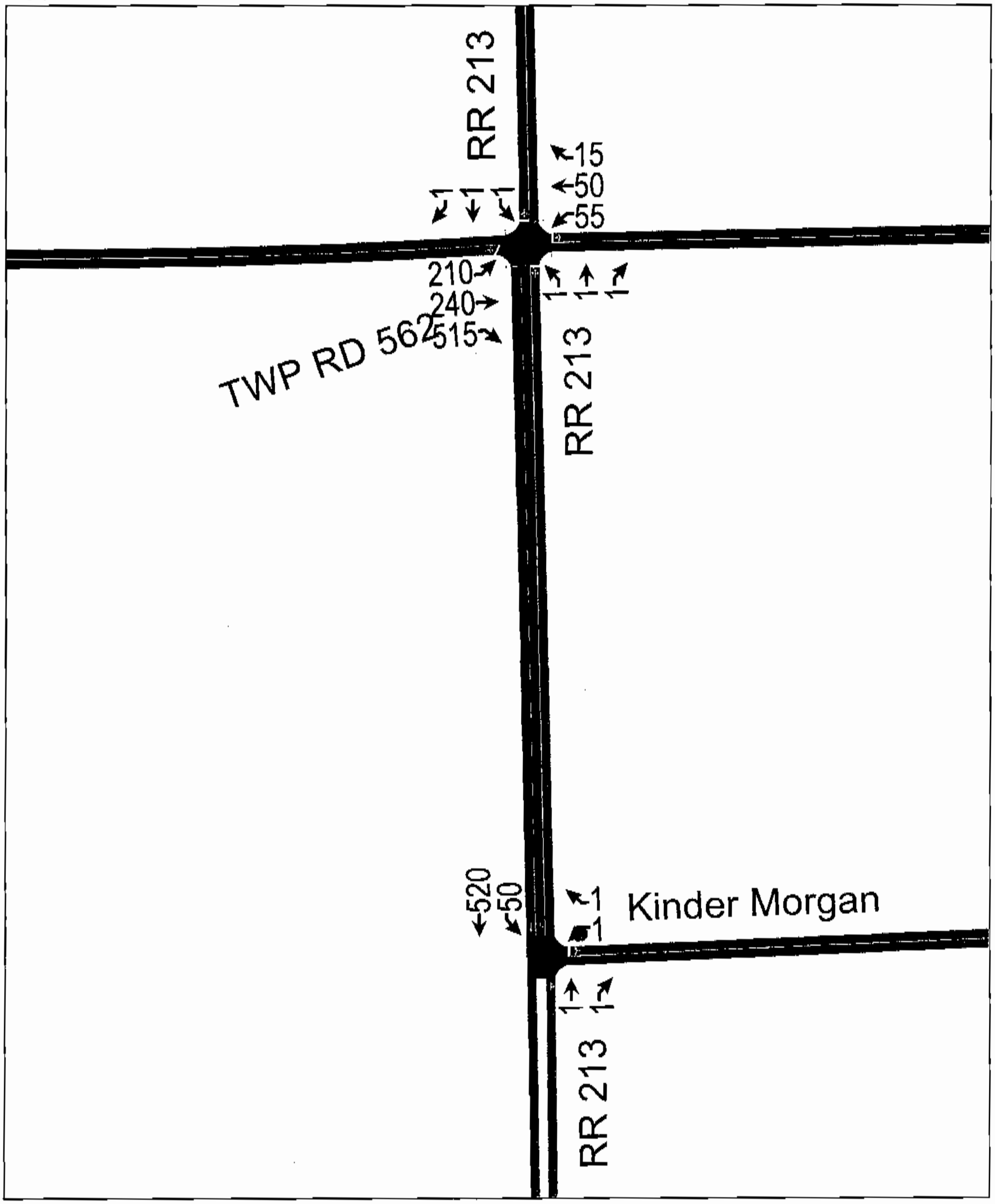
AM Peak Hour Build-Out - Turnaround
Stantec Consulting Ltd.

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



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


5
455
10
1
1
1
King Tech
Enbridge
1
1
1
5
50
10
RR 213
425
30
1
5
75
40
TWP RD 560
1
1
1
1
60
30
RR 213


RR 213
15
50
55
1
1
1
210
240
515
1
1
1
TWP RD 562
RR 213
520
50
1
1
Kinder Morgan
1
1
RR 213

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

Intersection Summary

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

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

Intersection Summary

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

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

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

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

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

3/12/2007

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

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

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

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

Intersection Summary

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

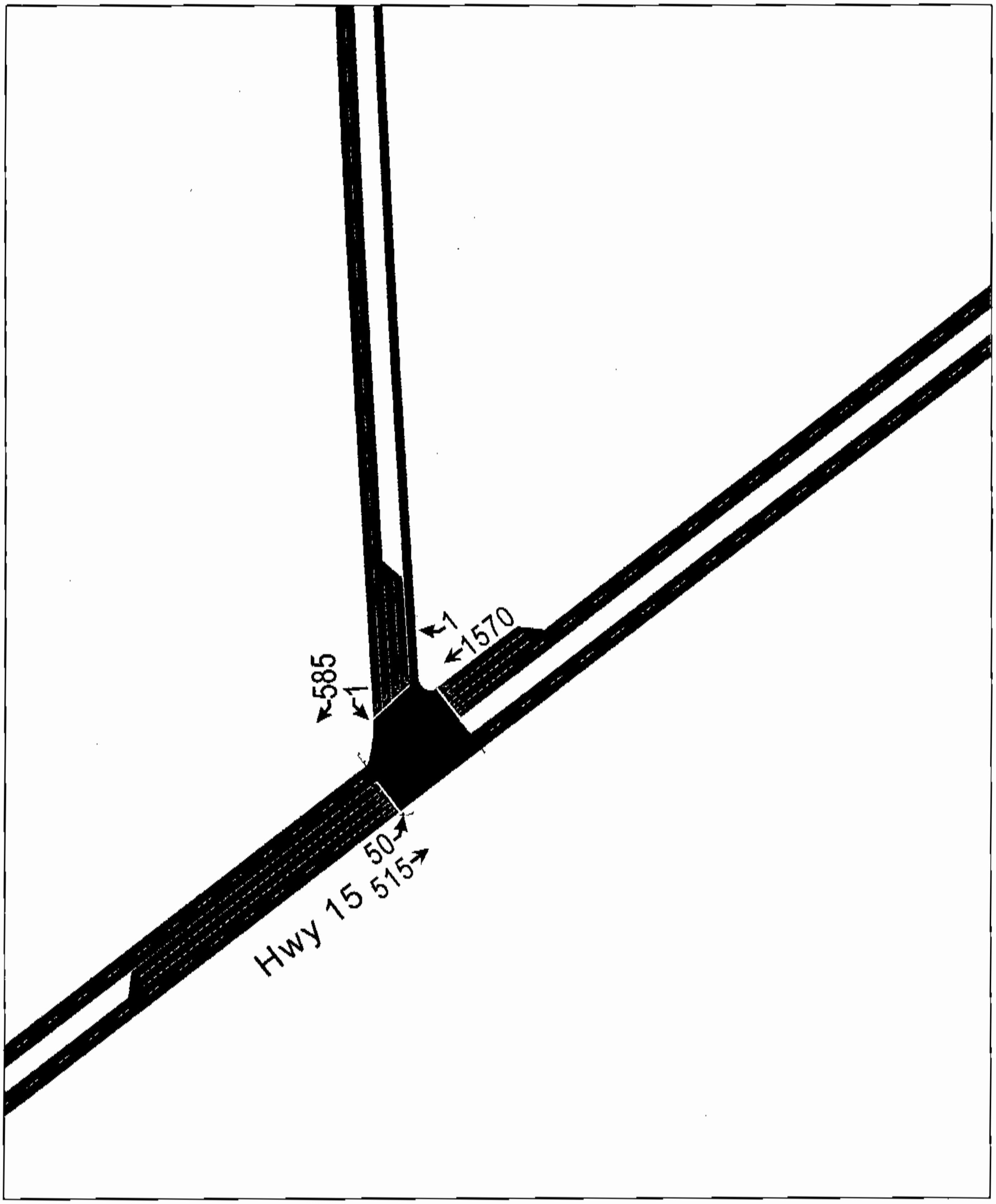
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰↰	↑↑	↑↱		↰	↱↱
Volume (vph)	1615	110	70	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	200.0			0.0	40.0	0.0
Storage Lanes	2			0	1	2
Taper Length (m)	7.5			7.5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

Intersection Summary

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

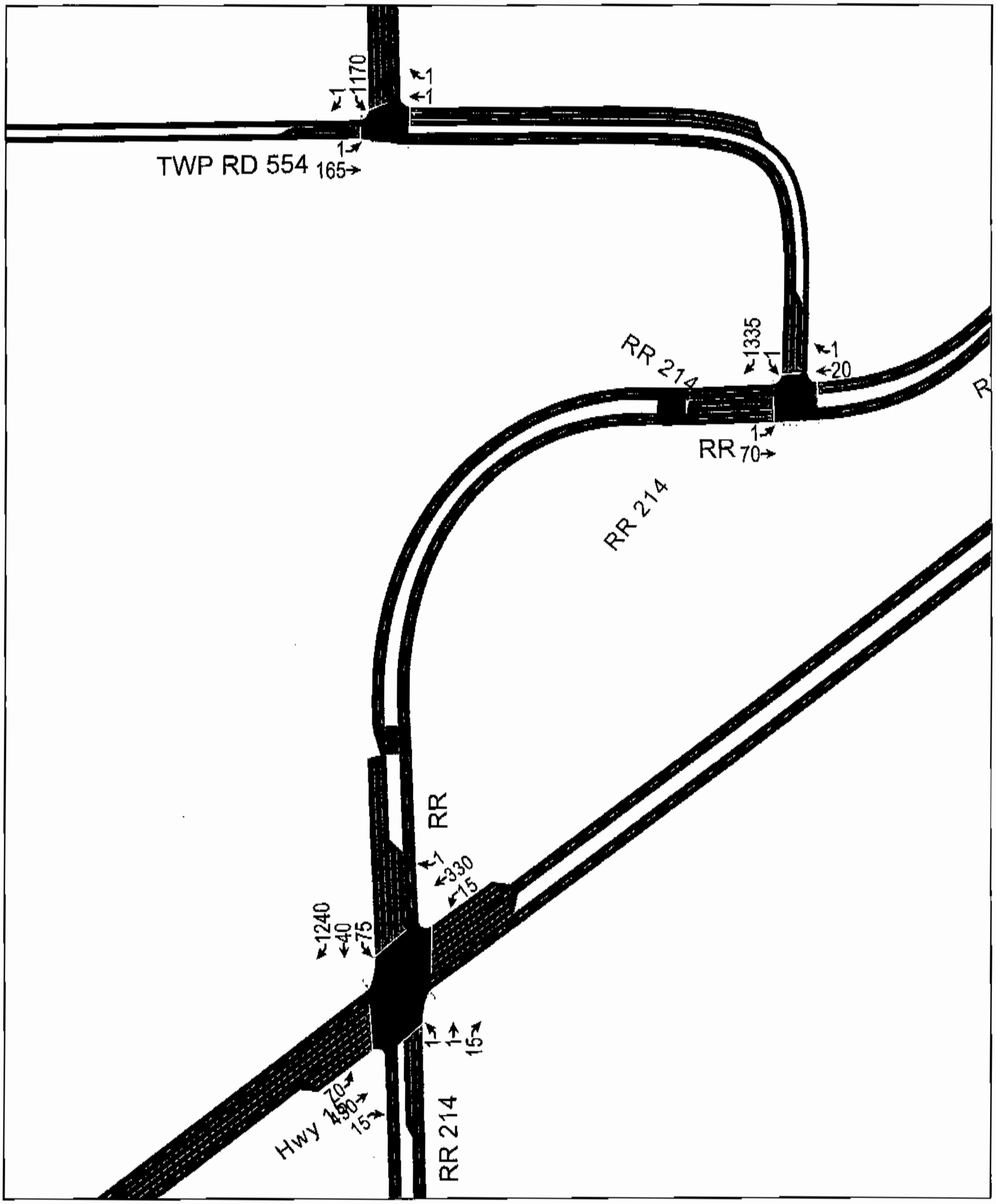
PM Peak Hour Build-Out – Operations Only

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



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

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



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

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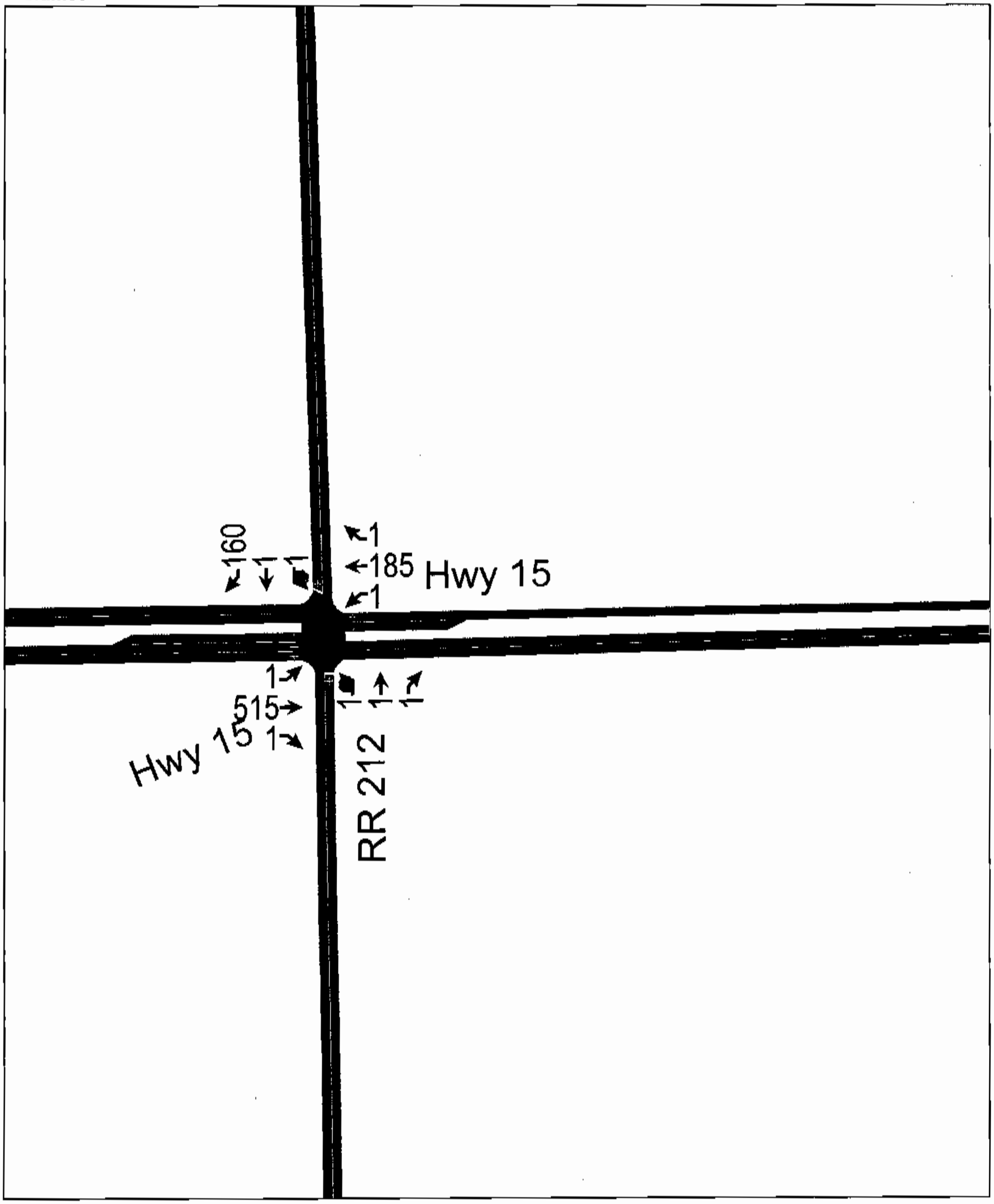
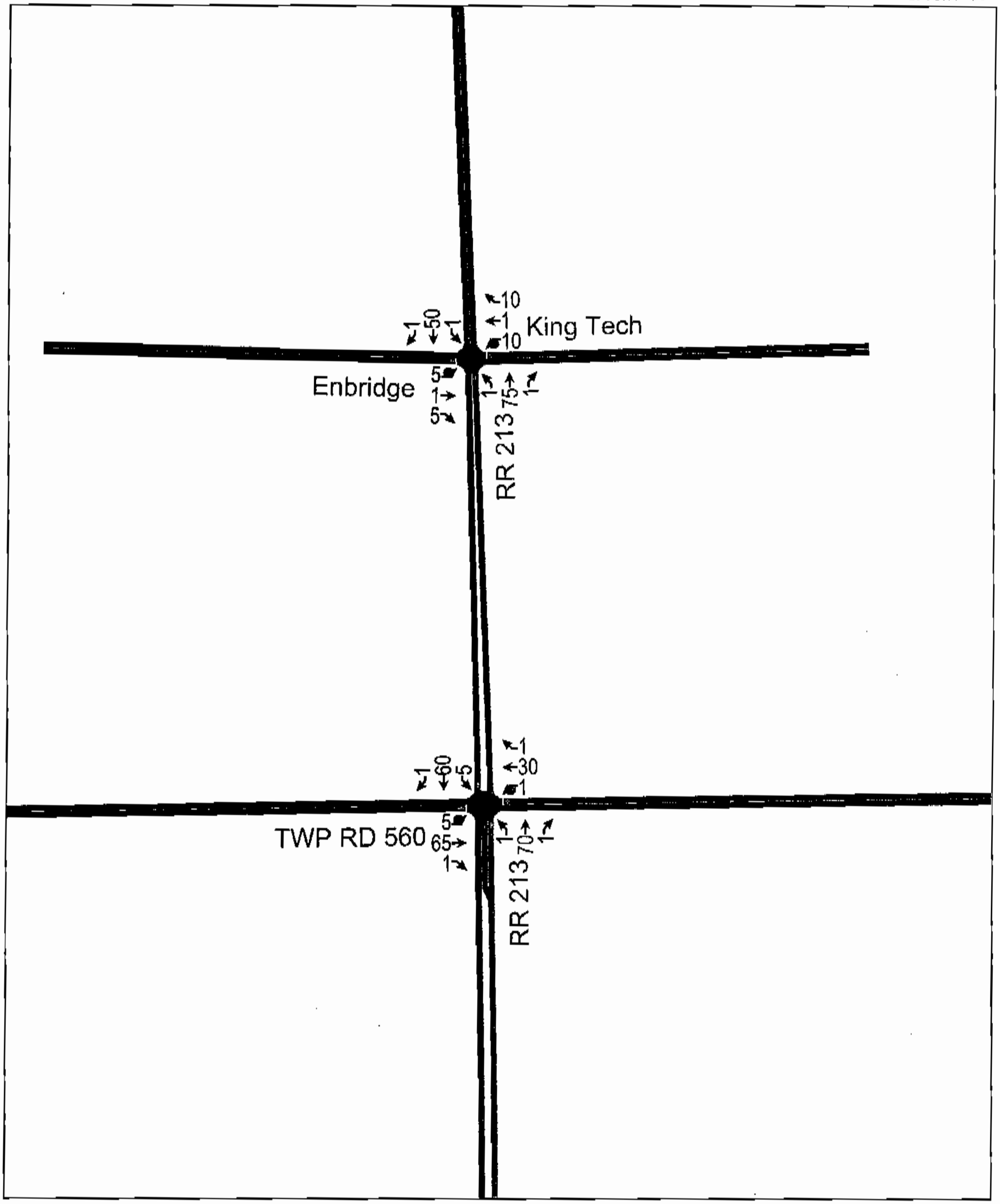
Volumes 3/13/2007



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


King Tech
Enbridge
RR 213
TWP RD 560
RR 213
10
1
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1
50
1
5
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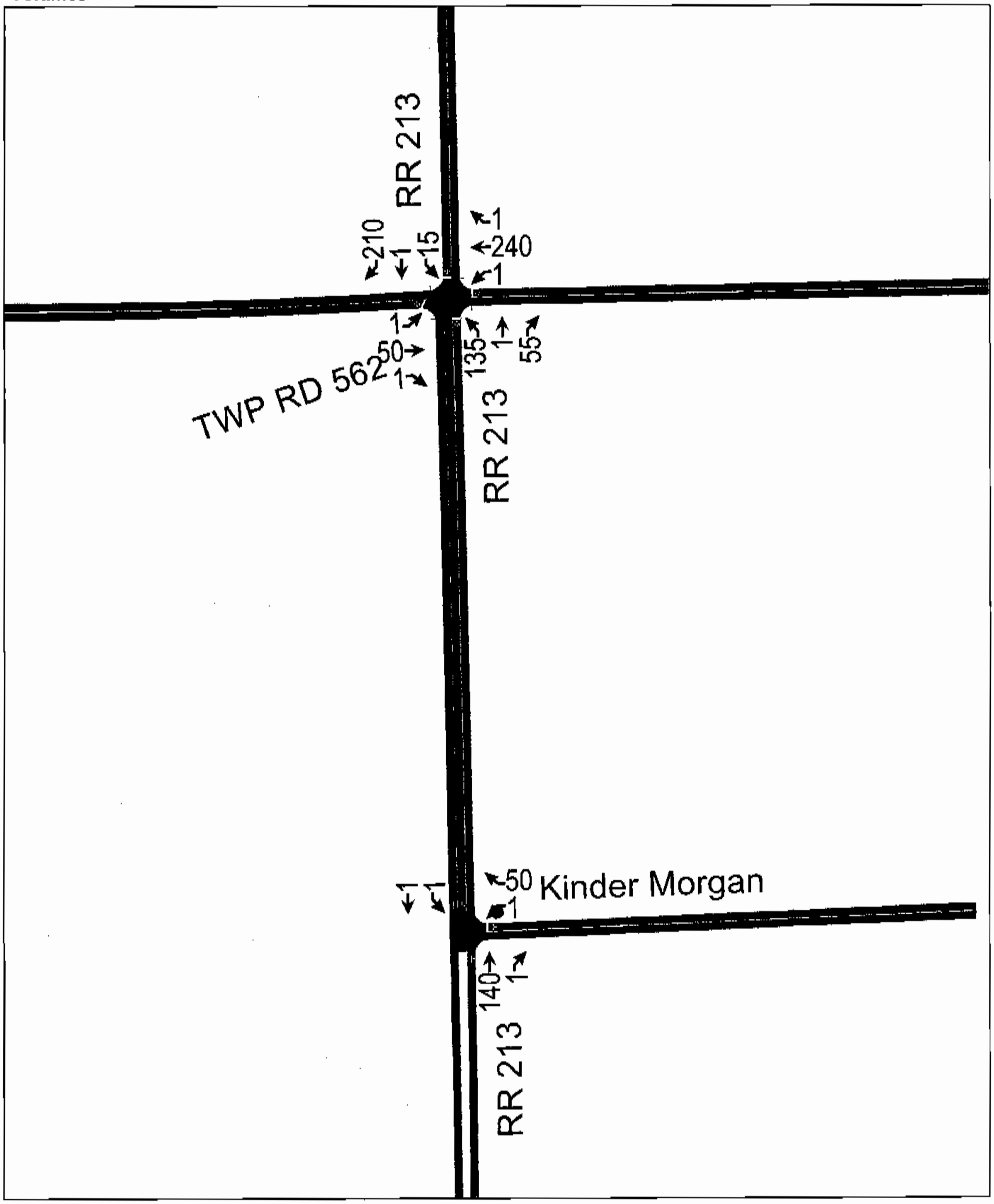
5
1
75
1
1
30
1
1
60
5
5
65
1
1
70
1

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



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

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

Intersection Summary

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

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

Intersection Summary

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

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

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

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

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

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

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

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

Intersection Summary

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

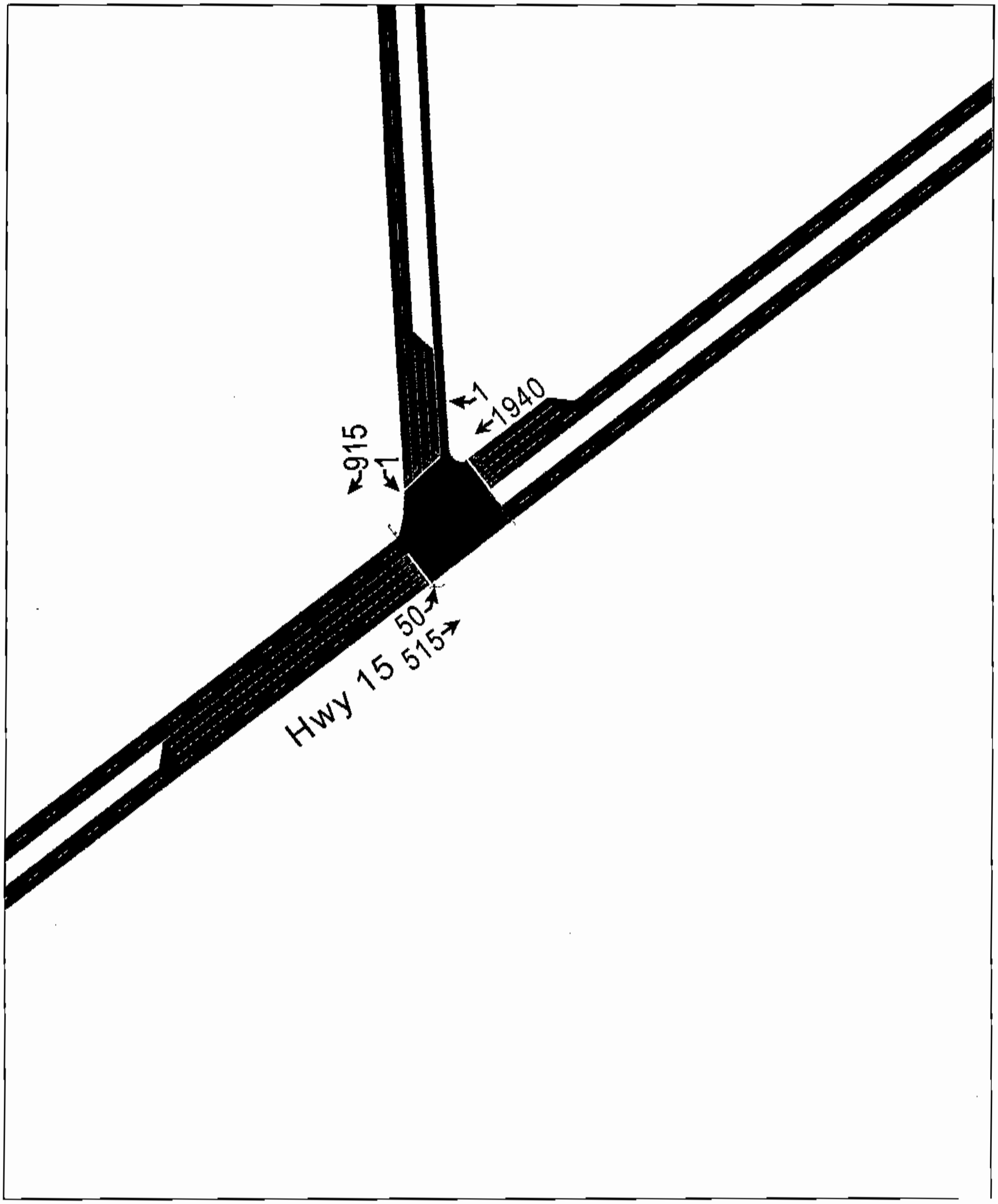
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰↰	↑↑	↑↱		↰	↱↱
Volume (vph)	1	70	20	1	1	1335
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	200.0			0.0	40.0	0.0
Storage Lanes	2			0	1	2
Taper Length (m)	7.5			7.5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

Intersection Summary

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

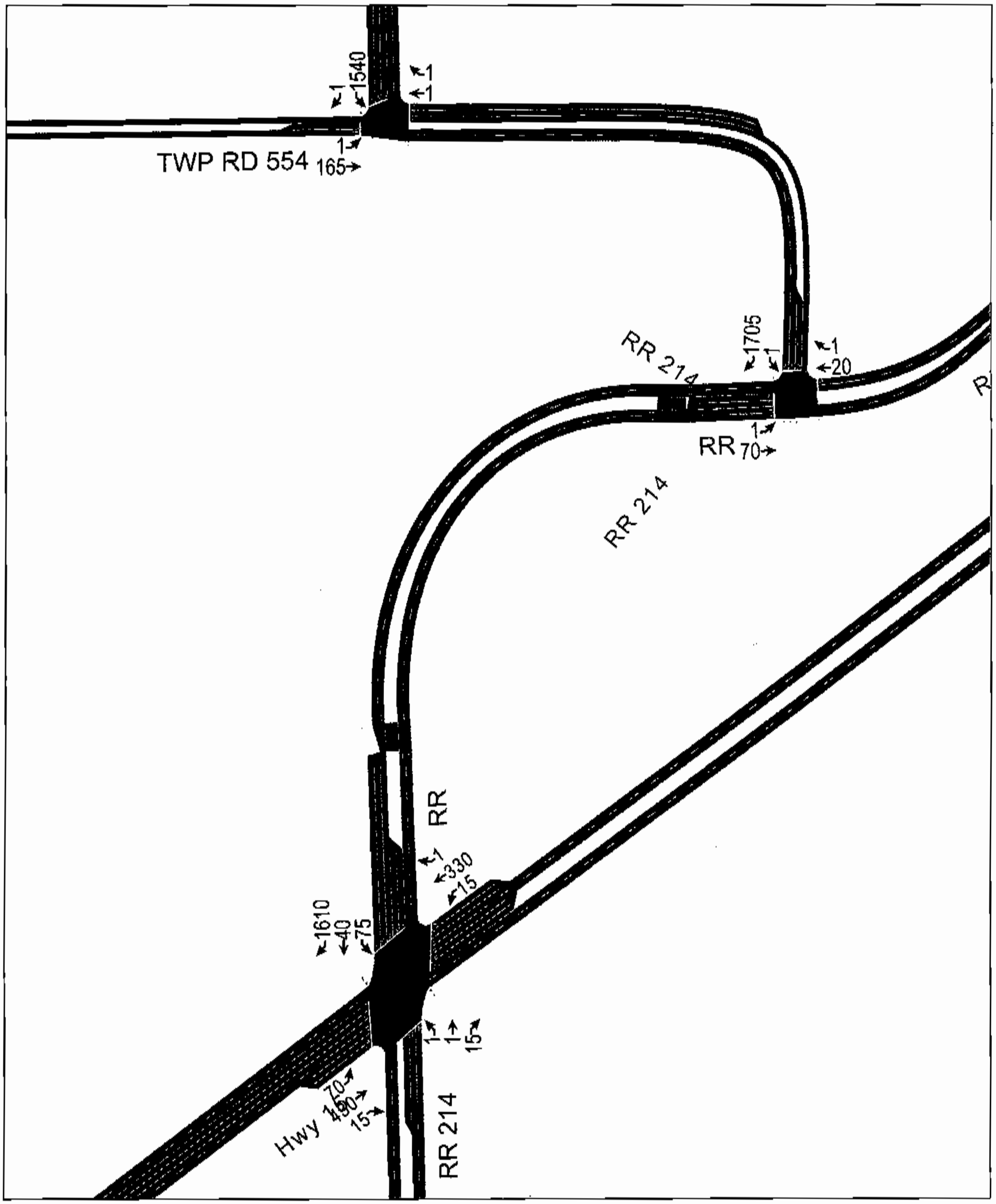
PM Peak Hour Build-Out – Turnaround

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



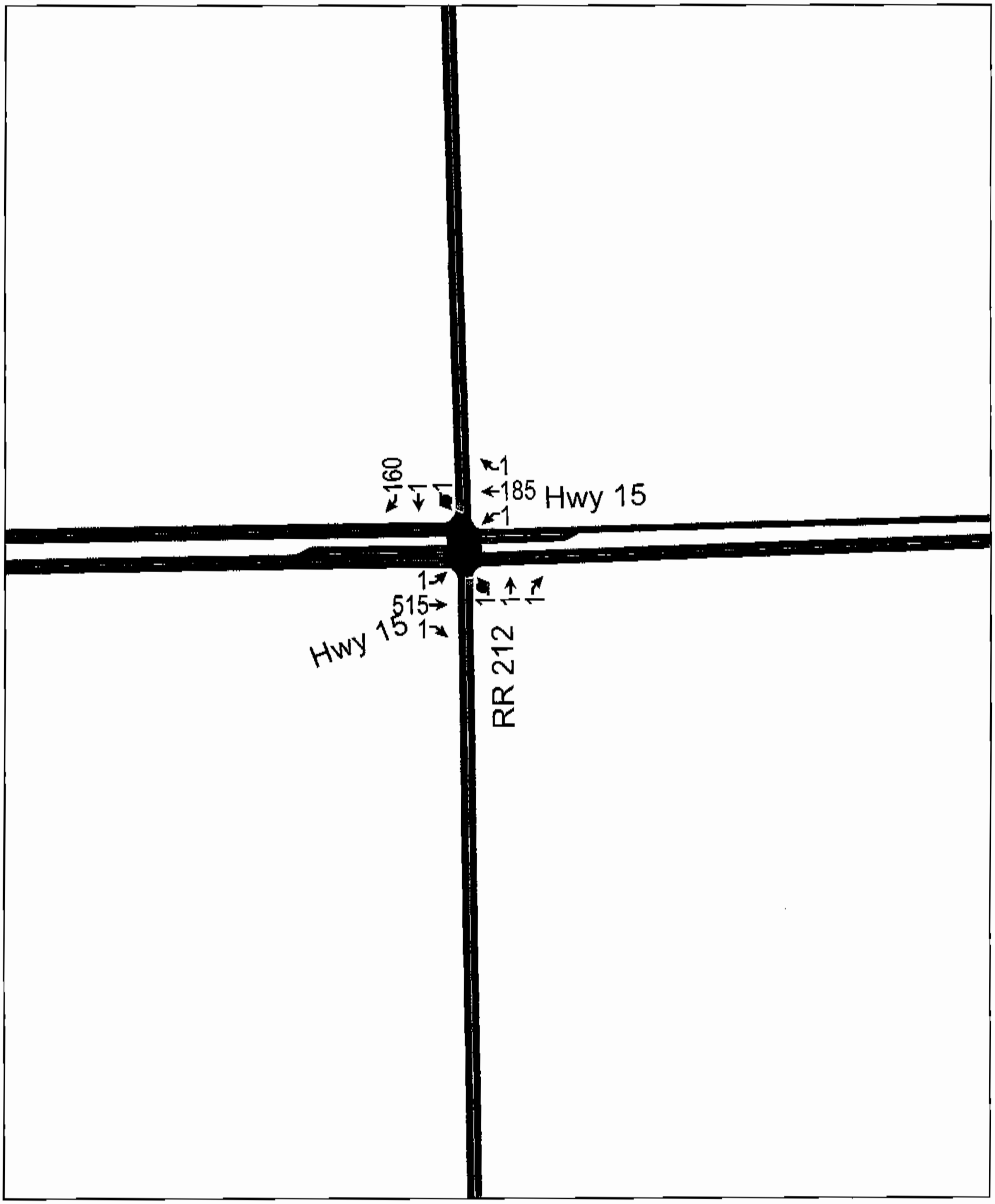
PM Peak Hour Build-Out - Turnaround
Stantec Consulting Ltd.

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

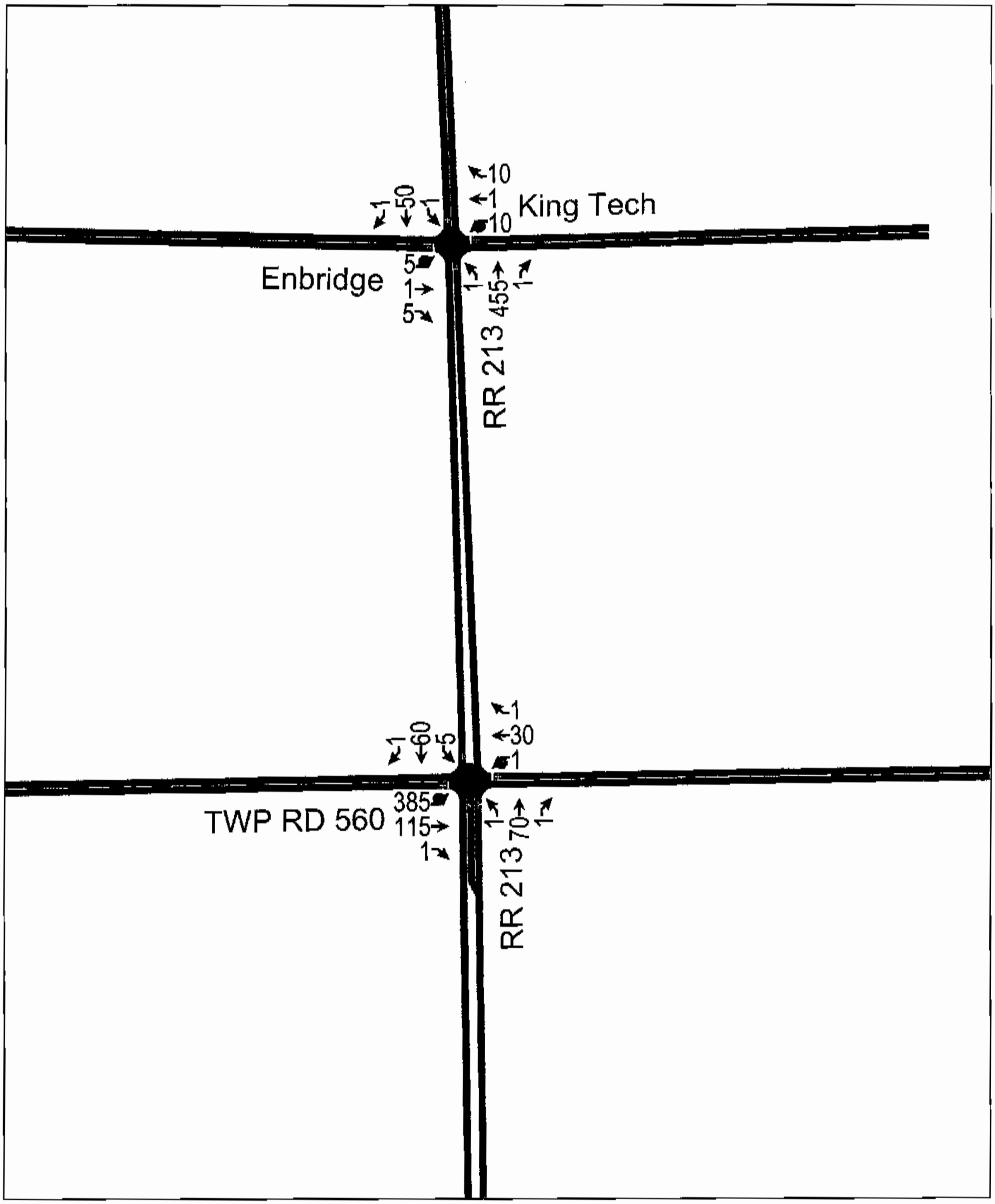


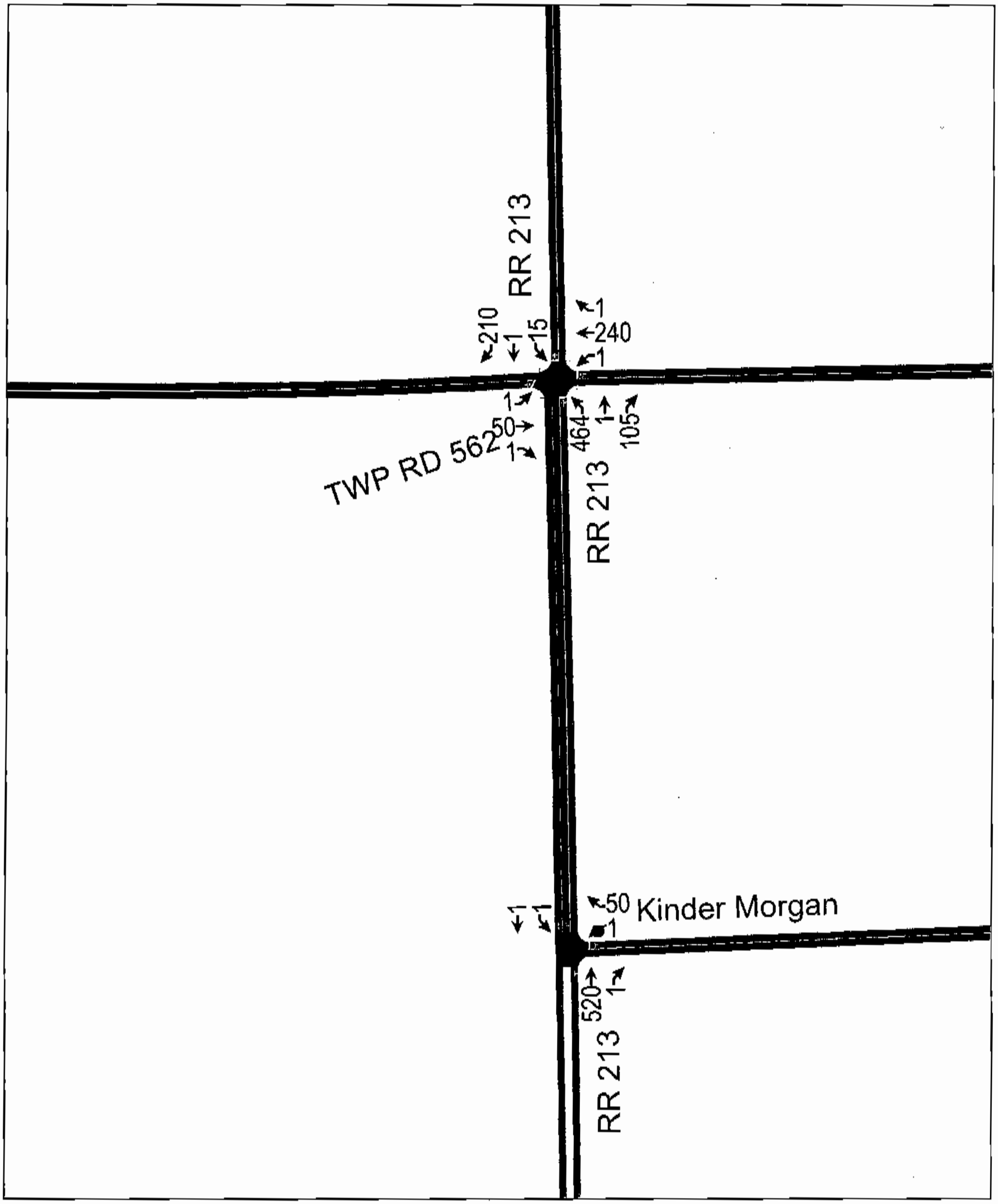
PM Peak Hour Build-Out - Turnaround
Stantec Consulting Ltd.

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



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


10
1
King Tech
10
1
50
1
5
Enbridge
1
5
1
455
1
RR 213
1
30
1
1
60
5
385
TWP RD 560
115
1
1
70
1
RR 213


RR 213
210
1
15
1
240
1
1
50
1
464
1
105
TWP RD 562
RR 213
1
1
50
Kinder Morgan
1
520
1
RR 213

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

Intersection Summary

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

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

Intersection Summary

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

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

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

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

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

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

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

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

Intersection Summary

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

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

Intersection Summary

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