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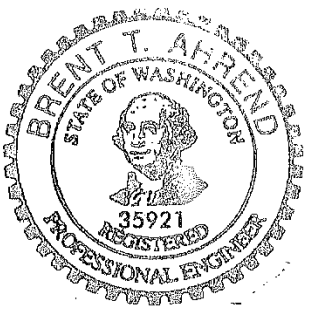
CELEBRATING 50 YEARS

TRANSPORTATION IMPACT ANALYSIS

CJ DENS CAMAS SUBDIVISION
Camas, Washington



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1. INTRODUCTION

This transportation impact analysis has been prepared for the CJ Dens Camas Subdivision on Leadbetter Road in Camas, Washington. Four contiguous parcels comprise the currently undeveloped 85-acre site bounded by Leadbetter Road to the south and west, by a firearms club and firing range property to the interior south, by undeveloped light industrial/business park properties to the north, and by partially-developed residential properties to the east. Land use zone Residential-7,500 (R-7.5), in which the proposed single-family residential subdivision is an allowed use, is applied to all four parcels. A pre-application conference was held with city staff on March 18, 2010. Figure 1 is a vicinity map indicating the subdivision location.

PROJECT DESCRIPTION

The proposed CJ Dens Camas Subdivision will consist of up to 297 single-family lots. The subdivision is anticipated to include development of all required public infrastructure, including streets, sidewalks, and utilities. This analysis assumes all lots are developed in a single phase. Access will be to Leadbetter Road via three new public street connections and one existing public street connection. Public street stubs along the north site boundary will allow for future connections to local streets when adjacent properties develop. Once connections to the north are made, access to Leadbetter Road will be eliminated to allow the city to convert the road to a trail as is indicated on the City of Camas Park, Recreation and Open Space Comprehensive Plan (dated December 17, 2007). Figure 2 presents the proposed site plan.

SCOPE OF REPORT

In conformance with the City of Camas Transportation Impact Study and Neighborhood Traffic Management Guidelines (Guidelines, dated October 28, 2002, and revised September 18, 2007), this analysis includes:

- Intersection impact analysis
- Sight distance review
- Collision history assessment
- Pedestrian and bicycle facilities review
- Transit service review
- Turn lane warrant analysis
- Signal warrant analysis
- Volume and speed surveys on Leadbetter Road to determine daily traffic volumes (ADT) and 85th percentile speeds

Based on a review of the applicable standards and discussions with city staff, the study area for this analysis includes the following intersections:

- NE Ingle Road/NE Goodwin Road
- NE 28th Street/NE 232nd Avenue
- NE Everett Street (SR 500)/NE Leadbetter Road
- NE Everett Street (SR 500)/NE 43rd Avenue
- NE Everett Street (SR 500)/NE Lake Road
- NW Leadbetter Road/NW Fargo Street (New West Site Access)

- NW Leadbetter Road/NW Benton Street (New Middle Site Access)
- Leadbetter Road/North Division Street (New East Site Access)
- NE Leadbetter Road/NE Adams Street (Existing East Site Access)

In conformance with the Guidelines, the study will analyze traffic operations during weekday AM and PM peak hour periods at the above intersections for the following development scenarios:

- 2010 Existing
- 2018 Pre-Development (Build-Out Year)
- 2018 Post-Development (Build-Out Year with Project Trips)
- 2030 Future Year

The analysis years are proposed to include build-out of the subdivision in 2018, which reflects an anticipated project approval in 2011 and a maximum seven-year phased development.

The City of Camas has not completed transportation planning for the recent north urban growth area (UGA) expansion in which the CJ Dens Camas Subdivision is located. To aid this planning, city staff requested during scoping of this analysis that additional intersections be included. The purpose was to address impacts on intersections not yet analyzed with impacts from the UGA. This subdivision is only a small percentage of the trip potential from the UGA, so any analysis would not provide a complete picture for the city.

Because the city is amid the process of updating the transportation planning for the newly annexed properties surrounding and including the site, it was determined this development would not be required to analyze the following intersections initially identified for analysis in this study:

- NE 232nd Avenue/NE 9th Street
- NE Everett Road (SR 500)/NE 3rd Street
- NE Everett Street (SR 500)/NE 38th Avenue
- NE Everett Street (SR 500)/NE 35th Avenue
- NE Everett Street (SR 500)/NE 22nd Avenue
- NE Everett Street (SR 500)/NE 19th Avenue
- NE Everett Street (SR 500)/NE 15th Avenue
- NE Everett Street (SR 500)/NE 14th Avenue
- NW Lake Road/NW Lacamas Lane
- NW Lake Road/NW Sierra Street
- NW Lake Road/NW Leadbetter Drive

The analysis scenarios beyond the 2010 existing conditions include background traffic growth and previously approved (in-process) project traffic. They do not include the new roadway alignments contemplated in the City of Camas Transportation Comprehensive Plan or the Six-Year Street Priorities, 2009-2014. The streets in the north UGA are only conceptual alignments with uncertain construction timelines. Other funded street improvements are outside of the study area and not expected to have an impact on study area intersection volumes. This study assumes only the current roadway alignments will be available to serve the full build out of the proposed subdivision. If additional roadway connections become available, the impact from this development on analyzed intersections would be less.

2. EXISTING CONDITIONS

SITE CONDITIONS

Four contiguous parcels comprise the approximately 85-acre development site. They are identified on Clark County Account Numbers 177905-000, 17906-000, 178172-000, and 178236-000. The parcels are generally undeveloped except for a small gravel parking lot that serves a boat launch on Lacamas Lake. The site surrounds three sides of an adjacent parcel owned and maintained by the Camas-Washougal Wildlife League.

TRANSPORTATION FACILITIES

The following table is a summary of the roadway functional classifications, as presented on the Clark County Arterial Atlas and the city's Comprehensive Transportation Map, and of the provided travel facilities, as identified by Group Mackenzie staff.

TABLE 1 – ROADWAY CHARACTERISTICS

Roadway	Roadway Classification (County/City)	Posted Speed	Travel Lanes	Bike Lanes	On-Street Parking	Sidewalks
NE Ingle Road	Rural Minor Collector/ 2-Lane Collector	50 mph	2	No	No	No
NE Goodwin Road	Urban Collector Arterial-Rural Major Collector/ Proposed 4- or 5-Lane Arterial	50 mph	2	No	No	No
NE 28th Street	Rural Major Collector/ Proposed 4- or 5-Lane Arterial	50 mph	2	No	No	No
NE 232nd Avenue	Rural Major Collector/ Two-Lane Arterial	45 mph / 40 mph	2	No	No	No
Leadbetter Road	Rural Major Collector/ Local Access	40 mph	2	No	No	No
NE Adams Street	(n/a) / Local Access	25 mph	2	No	Yes	Yes
NE Everett Street/ Road (SR 500)	State Route/ 2- or 3-Lane Arterial	35 mph	2/3	No	No	No
NE 43rd Avenue/ SE 15th Street	Rural Minor Collector/ 2- or 3-Lane Arterial	25 mph	2	No	No	Partial
Lake Road	(n/a) / 2- or 3-Lane Arterial	35 mph	2	Yes	No	No

NE Goodwin Road/NE Ingle Road is a "T" intersection with stop control on Ingle Road. The free movements on Goodwin Road share a single lane on each approach. The single-lane Ingle Road approach widens to provide separate lanes for left and right turns.

NE 28th Street/NE 232nd Avenue is a four-way intersection with stop control on the northbound and southbound 232nd Avenue approaches. All movements share a single lane on each approach. The southbound approach is a single-lane private street that is slightly offset from the public northbound approach.

NE Everett Street (SR 500)/NE Leadbetter Road is a "T" intersection with stop control on Leadbetter Road. A northbound center turn lane separates left turning movements from through movements. Southbound Everett Street and eastbound Leadbetter Road movements share a single lane. The Everett Street alignment curves in the vicinity of the intersection with a radius of approximately 1,000 feet, Leadbetter Road intersects on the outside of this curve. Everett Street slopes downhill from north to south at approximately 6% to 7%.

NE Everett Street (SR 500)/NE 43rd Avenue (SE 15th Street) is a "T" intersection controlled by a traffic signal. The signal operates under actuated control with a cycle length of 60 approximately seconds. Separate lanes are provided for each movement on each approach. The northbound Everett Street right-turn lane is channelized with yield control. The southbound Everett Street left-turn movement is protected. Everett Street slopes downhill from north to south at approximately 6% to 7%. 43rd Avenue slopes downhill from east to west at approximately 5% as it approaches the intersection. Traffic to and from Lacamas Heights Elementary School and Camas High School, both located east of this intersection, travels through this intersection.

NE Everett Street (SR 500)/NE Lake Road is a "T" intersection controlled by a traffic signal. The signal operates under actuated control with cycle lengths of approximately 115 seconds in the AM peak hour and 95 seconds in the PM peak hour. Separate lanes are provided for each movement on the eastbound and northbound approaches, the southbound Everett Street movements share a single lane. The northbound Everett Street left-turn movement is protected.

Existing intersection lane configurations are identified in Figure 3.

PLANNED IMPROVEMENTS

The 2011-2016 City of Camas Six-Year Street Priorities identifies five study area road segments for improvements:

- 16 – NE 43rd Avenue
- 26 – NE Goodwin Road/NE 28th Street
- 27 – NE 28th Street
- 30 – NE 232nd Avenue
- 35 – SR-500 (Everett Street/Everett Road)

The 2011-2016 City of Camas Six-Year Street Priorities additionally identifies two road segments for new construction.

- 31 – NE 9th Street
- 34 – New East/West Arterial

Because these projects are neither identified for specific improvements nor funded as part of the city's Capital Facilities Plan, they are not assumed constructed for the build-out analysis.

The subject site is within an area recently annexed by the City of Camas, and the city has yet to adopt a new TIF Study or CFP for transportation improvements for the area. As such, no specific public transportation improvements are identified for the study area at this time, and none of the planned improvements are assumed as part of the current study. Instead, the existing road alignments and lane configurations are assumed to remain in place.

Although a future east-west arterial roadway (Priority Project No. 34) has been identified north of the site as an arterial replacement for the existing Leadbetter Road alignment, the timing for construction of such a new roadway is uncertain. For this reason, our analysis will assume Leadbetter Road remains in its current location and provides access to the site. At the time the new arterial roadway is constructed, site access would then be provided to the north and Leadbetter would be closed. Analysis of this condition would be prepared by the city in conjunction with the UGA planning.

EXISTING TRAFFIC CONDITIONS

Existing traffic turning movement counts were conducted at the existing study area intersections by Quality Counts in May 2010 on midweek days during the 7:00 – 9:00 AM and 4:00 – 6:00 PM peak travel periods at three intersections. January 2010 count data were obtained for the same peak periods at two intersections on NE Everett Street (SR 500). The existing weekday AM and PM peak hour volumes are presented in Figure 4.

Twenty-four-hour surveys of traffic volumes and speeds were conducted on Leadbetter Road at two locations on two different midweek days in May 2010. The first location, west of the boat launch area, is near the proposed location of NW Fargo Street, the westernmost public street connection to Leadbetter Road. The second location, west of NE Adams Street, is approximately halfway between the two proposed eastern public street connections (NW Benton Street and North Division Street) to Leadbetter Road. The traffic volumes and speeds observed are summarized in the following table.

TABLE 2 – ROADWAY VOLUMES AND SPEEDS

Roadway Segment	Direction	85th Percentile Speed	Average Daily Traffic (ADT)
Leadbetter Road 213' West of Boat Launch Driveway	Eastbound	49 mph	626
	Westbound		627
	Total	--	1,253
Leadbetter Road 783' Northwest of NE Adams Street	Eastbound	50 mph	729
	Westbound		754
	Total	--	1,483

The average of the two days' data, 1,368 vehicles, is treated as the roadway ADT. The higher directional volumes observed during peak hours northwest of Adams Street are treated as the existing roadway peak hour volumes for operations analysis.

As identified in Table 1, the posted speed limit along this segment of Leadbetter Road is 40 mph. The higher speeds are likely a result of the current rural character of the roadway, which includes limited development and infrequent access locations. Approximately 15% of drivers exceed the posted speed by 10 mph or more. As the area develops and driver expectations change, we would expect travel speeds to reduce.

PEDESTRIAN AND BICYCLE FACILITIES

Currently, sidewalks and bike lanes are not provided along Leadbetter Road. Sidewalks will be provided along all internal streets in the subdivision. No sidewalks or bike lanes will be provided along the site frontage on Leadbetter Road as the road will be abandoned in the future for conversion to be a bike and pedestrian trail as depicted in the City of Camas Park, Recreation and Open Space Comprehensive Plan (December 2007) for this area. Development of this trail will provide pedestrian and bicycle connections to other facilities for subdivision residents.

STUDENT TRANSPORTATION

The CJ Dens Camas Subdivision lies within the Camas School District. Children living in the subdivision will likely attend Lacamas Heights Elementary, Liberty Middle School, and Camas High School. All portions of the site are located at least one-half mile's walk away from Lacamas Heights Elementary School, so school bus service will likely be provided to all students living within the subdivision. The school district will determine the specific number and location of bus stops in and around the subdivision.

TRANSIT SERVICE

Transit service in the area is provided by C-Tran. No regularly scheduled transit service is currently provided along Leadbetter Road, and no regularly serviced transit stops exist within one mile of the site. The nearest such stops are located at the Fisher's Landing Transit Center and in downtown Camas. These stops are served by routes #41 and #92.

Route #41-Camas/Washougal Limited runs on weekdays between the Delta Park/Vanport MAX Station in Portland and east Washougal. Route #92-Camas/Washougal runs on weekdays and weekends between the Fisher's Landing Transit Center and east Washougal. The Camas Connector provides transit service on a reservation basis to/from Camas High School and in the area south of the Everett Street (SR 500)/NE 43rd Avenue intersection.

COLLISION ANALYSIS

One way to gauge relative safety of an intersection or roadway segment is to identify the frequency of collisions occurring there. A simple average collision rate, the number of collisions divided by the number of years of data, can be helpful and the City of Camas requires further study be undertaken when the average rate is 2 (or more) collisions per year. Collision frequency may also consider the number of vehicles entering the intersection or roadway segment. This leads to the concept known as "collision rate," which is usually expressed in terms of the number of collisions occurring per one million vehicles entering the intersection (mev) or in terms of the number of collisions occurring per one million vehicle miles traveled along the segment (mvm). Locations having a collision rate less than 1.0/mev or 1.0/mvm are generally considered relatively safe. At collision rates higher than 1.0/mev or 1.0/mvm, consideration may be given to correcting identifiable operational problems.

Collision data for the study area were obtained from the Washington State Department of Transportation (WSDOT) for January 2007 through December 2009. Collision reports for the study area locations are summarized in the Table 3. Detailed reports are located in the appendix.

Collision rates were calculated in accordance with standard guidelines; these calculations may be found in the appendix. The following table presents calculated collision rates at the study locations for the three-year data period. Annual traffic entering the intersections or segments was estimated by multiplying the average annual daily traffic (AADT) by 365. Intersection AADT volumes were estimated as ten times the observed PM peak hour volume of the intersection. Segment AADT volumes were determined from the speed and volume surveys performed in May 2010.

TABLE 3 – ANNUAL COLLISION TOTALS AND COLLISION RATES

Intersection	2007	2008	2009	Total	Annual Average	AADT	Collision Rate per MEV
NE Ingle Road/ NE Goodwin Road	2	0	0	2	0.67	7,280	0.25
NE 28th Street/ NE 232nd Avenue	0	1	0	1	0.33	5,820	0.16
NE Everett Street (SR 500)/ NE Leadbetter Road	0	0	0	0	0.00	5,080	0.00
NE Everett Street (SR 500)/ NE 43rd Avenue	1	3	2	6	2.00	7,430	0.74
NE Everett Street (SR 500)/ NE Lake Road	1	0	1	2	0.67	11,570	0.16
Segment	**2007**	**2008**	**2009**	**Total**	**Annual Average**	**AADT**	**Collision Rate per MVM**
Leadbetter Road between NE 232nd Avenue and NE Everett Street (SR 500): Segment Length = 1.66 miles	5	4	5	14	4.67	1,368	5.63

There were a total of 25 collisions reported at the study area locations. Annual averages and collision rates at four intersections are below the threshold rates of 2.0/year and 1.0/mev, respectively, and no further consideration for safety mitigation measures is warranted at these locations.

The first of two locations with annual averages or collision rates exceeding the noted thresholds is the NE Everett Street (SR 500)/NE 43rd Avenue signalized intersection, where the annual average is 2.00/year. The collision rate is below the threshold of 1.0/mev and in one of the six reported collisions, the driver's ability was impaired by alcohol. Therefore, no further consideration for safety mitigation measures is warranted at this location.

The second of two locations with annual averages or collision rates exceeding the noted thresholds is the segment of Leadbetter Road that the CJ Dens Camas Subdivision will access. The annual average of 4.67 per year and the rate of 5.63/mvm exceed minimum thresholds for safety review.

Leadbetter Road experiences low traffic volumes with a daily average of 1,368 vehicles, so just one collision has a large impact on the collision rate. A review of the 14 collision reports provided by WSDOT for the analyzed segment of Leadbetter Road reveals the following statistics and trends.

Collision Types

- 11 of the 14 collisions are identified as fixed object collision types, which generally indicates that a vehicle left the travel lane and collided with a roadside object such as a ditch, embankment, guardrail, utility pole, sign post, or mailbox.
- Only one collision, an improper U-turn, involved more than one vehicle.

Collision Severity

- Seven of the 14 collisions resulted in injuries to vehicle occupants. One incident resulted in two injuries; the remainder resulted in a single injury.
- Two of the seven injury collisions resulted in a serious injury, four resulted in evident injury, and one resulted in possible injury.
- No fatalities were recorded in the 14 collision reports.

Contributing Circumstances

- Four of the 14 collision reports indicate alcohol may have been a contributing factor to the collisions, and another report indicates a driver was apparently asleep at the wheel.
- Excessive speed is noted as a contributing factor in four more incidents.
- Distracted drivers were involved in three incidents, including two of those involving alcohol.

With the high frequencies of single-vehicle collisions and travel speeds above the posted limit, there is little that can be done to reduce the number of collisions other than enforcement. With development of the subdivision along the north side of Leadbetter Road, we expect travel speeds would slow due to the more urban nature of the development.

City of Camas staff have indicated that Leadbetter Road will be closed in the future when the new east/west arterial, currently shown on the city's Six-Year Street Priorities, 2011-2016 map as a schematic alignment north of the CJ Dens property, opens in the future. With this eventual street closure in mind, we do not recommend applying extensive high-cost safety mitigation measures that may improve conditions for only a short period. In the interim, low-cost safety mitigation measures are recommended.

- Increased enforcement actions may reduce the number of collisions involving alcohol or excessive speed.
- Since many drivers currently exceed the posted speed limit, sight distances may be limited along the roadway. The CJ Dens Camas Subdivision development will attempt to maximize available sight distance by trimming roadside vegetation at the proposed access streets.
- The existing roadway and surroundings lend a somewhat rural characteristic to the segment. With development of the CJ Dens Camas Subdivision, the roadway will take on a more urban characteristic. The increased development density and the increased number of intersections along the roadway segment are anticipated to encourage drivers to be more alert and to reduce their speed.

These mitigation measures are anticipated to improve safety along the Leadbetter Road segment until such time as it is closed to through traffic.

3. PRE-DEVELOPMENT CONDITIONS

An estimate of future traffic conditions in the absence of the proposed development is generated for comparison to the scenario including the proposed development. The February 2010 traffic report prepared by Charbonneau Engineering for the Camas High School Expansion (CHS study) analyzed two of the study area intersections with a build-out year of 2015. At these intersections, NE Everett Street (SR 500)/NE 43rd Avenue and NE Everett Street (SR 500)/NE Lake Road, we have added three years of background growth to arrive at the 2018 future year traffic conditions. The 2015 total traffic volumes are presented in Figure 6 of the CHS study; a copy is provided in the In-Process Traffic section of the appendix. This alternate approach to forecasting future traffic conditions was judged appropriate to reduce the need for data collection and intersection analysis in this case because the CHS study was also based on traffic counts collected within the most recent 12-month period.

At all other study area intersections, recent analyses have not been conducted, so a full assessment of background growth and in-process traffic was conducted, and these were added to existing traffic counts to arrive at the pre-development scenario.

BACKGROUND TRAFFIC GROWTH

Background growth is general growth in traffic not related to traffic from specific projects. EMME/2 models provided by the Southwest Washington Regional Transportation Council (RTC) indicate recent general growth in the area of this study ranging between 1.5% and 8.0%. As a reasonable overall estimate, an annual growth rate of 2.0% will be applied for this study. Copies of the existing and future EMME/2 models are provided in the appendix.

Either three or eight years of background growth at 2.0% per year were applied to existing volumes for the 2018 future year traffic conditions. (See above for distinction between three or eight years of growth.) At all intersections an additional 12 years of growth at 2.0% per year were added to the total 2018 traffic volumes to estimate 2030 traffic conditions. Background growth traffic volumes at the study area intersections are presented in Figures 6 and 11 for the 2018 and 2030 analysis years, respectively.

IN-PROCESS TRAFFIC

In-process traffic is traffic that will be generated by approved projects that have not been completed at the time of analysis. City staff have identified 11 in-process projects that may impact intersections within the study area. These are listed along with the approximate extent of project completion reached:

- Camas High School Expansion – 0% complete
- Deerhaven Subdivision – 0% complete
- Hidden Meadows Subdivision – 0% complete
- The Hills at Round Lake – 0% complete
- Lacamas Pointe – 9% complete
- Lacamas Meadows PRD – residential homes 40% complete, Grass Valley Elementary School open at 92% capacity; applied as 76% complete in AM peak hour, 53% complete in PM peak hour

- Lakeridge North Subdivision – 22% complete
- Millshore Downs Subdivision – 0% complete
- North Hills Subdivision – 0% complete
- Two Creeks at Camas Meadows – unknown % complete, assumed to be 0%
- Vintage View on the Lake/The Village at Round Lake – 27% complete

The trip generation estimates, assignments, and/or distributions from these projects provided by city staff are included in the appendix.

Figure 5 presents a cumulative summary of the in-process traffic volumes for the AM and PM peak hours as they impact study area intersections. All the in-process volumes from projects noted above as "0% complete" are included in the summation. In-process traffic volumes from projects noted above as having been partially developed are included in the summation at a prorated rate according to the estimated extent of completion.

Because the 2015 total traffic scenario analyzed in the CHS study already accounted for in-process traffic volumes, no in-process traffic is added to the Everett Street (SR 500)/NE 43rd Avenue or Everett Street (SR 500)/NE Lake Road intersections.

PRE-DEVELOPMENT TRAFFIC VOLUMES

Pre-development traffic is the sum of existing volumes, background growth, and in-process traffic. Trips from the proposed development are not included in this scenario. Figure 7 presents the 2018 AM and PM pre-development traffic volumes.

4. SITE DEVELOPMENT

TRIP GENERATION

Trip generation calculations were prepared using the ITE *Trip Generation* Report, 8th Edition. Trip generation estimates for the site were calculated based on fitted curve equations for Land Use Code 210, Single Family Detached Housing. The following table presents the anticipated trip generation for daily, AM peak hour of adjacent street traffic, and PM peak hour of adjacent street traffic periods based on the 297 new dwelling units proposed.

TABLE 4 – TRIP GENERATION CHARACTERISTICS

Land Use (ITE Code)	Dwelling Units	ADT	AM Peak Hour		PM Peak Hour	
			Enter	Exit	Enter	Exit
Single Family Detached Housing (210)	297	2,831	54	164	176	104

For purposes of this analysis, all trips are assumed to be automobile trips.

TRIP DISTRIBUTION AND ASSIGNMENT

Distribution of site trips is based on existing EMME/2 model data provided by RTC. Specifically, the trip assignment patterns from the existing model's Transportation Analysis Zone (TAZ) 483 are used. TAZ 483 includes all four subject parcels comprising the subdivision site.

From the site accesses on Leadbetter Road, it is estimated 35% of site trips will travel to and from the north/west and 65% to and from the south/east. Further distribution is estimated as follows, and as depicted on Figure 8.

- 20% to/from the west on NE Goodwin Road
- 10% to/from the northwest on NE Ingle Road
- 5% to/from the north on NE 242nd Avenue (SR 500)
- 5% to/from the northeast toward Everett Road (SR 500) via Leadbetter Road
- 10% to/from the east on NE 43rd Avenue, primarily to and from the schools
- 40% to/from the south on NE Everett Street (SR 500), between the subdivision and downtown Camas
- 5% to/from the neighborhoods southwest of NW Lake Road
- 5% to/from the west on NW Lake Road

These distribution percentages are applied to the trip generation values to yield the site trip assignments. These are presented in Figure 9.

POST-DEVELOPMENT TRAFFIC

Post-development traffic is the sum of pre-development traffic volumes and site-generated traffic. Figure 10 presents 2018 post-development traffic volumes. Figure 12 presents 2030 future post-development traffic conditions, which add an additional 12 years of background growth to the 2018 post-development volumes.

ACCESS ANALYSIS

The site will access Leadbetter Road at four locations: Fargo Street, Benton Street, Division Street, and the existing Adams Street. The site does not have frontage on any public streets other than Leadbetter Road. Proposed internal streets will provide circulation among the subdivision parcels connected to Benton, Division, and Adams Streets. Three internal street stubs will be extended to the north site boundary to allow connections to future developments. These street stubs will serve as the primary accesses to the subdivision once the City of Camas opens a new east-west arterial north of the site and closes Leadbetter Road.

The city's General Guidelines for Geometry of Roadway from the *Design Standards Manual* indicates intersection spacing on a two-lane local neighborhood roadway should be 270 feet. Of the four access intersections the nearest two, Division Street and Adams Street, are located approximately 325 feet apart, measured along Leadbetter Road between intersecting centerlines. Spacing between other intersection pairs exceeds this distance. The intersection spacing standard is met.

SIGHT DISTANCE ANALYSIS

The city's sight distance standards reference the American Association of State Highway and Transportation Officials' *A Policy on Geometric Design of Highways and Streets* ("AASHTO"), the most recent edition published in 2004. Sight distance for left and right turns from a minor stop-controlled street are based on the vehicular speed on the major uncontrolled roadway, as described in AASHTO Exhibits 9-55 and 9-58, respectively. The sight distance recommendations provide sufficient time for the minor-street vehicle to accelerate from a stop and complete a turn without unduly interfering with major-road traffic operations.

Two speed studies on Leadbetter Road near the proposed accesses indicate the 85th percentile speed is 49 to 50 mph. Based on AASHTO, using a design speed of 50 mph, minimum sight distances of 555 feet to the west for left turns and 480 feet to the east for right turns is recommended for vehicles exiting the subdivision and entering Leadbetter Road.

Based on the review of the proposed site plan, it appears adequate site distances can be provided at the proposed intersections. The proposed subdivision will comply with the required vision clearance triangles at all access intersections. Vegetation and signage are limited by city code within the vision clearance triangles. The developer will perform vegetation clearing and limited site grading at the access points along the Leadbetter Road frontage to provide minimum sight distances when the site develops. New landscaping and roadway signs must be placed to comply with the vision clearance requirements in Camas Code such that there are no obstructions within the clear vision area.

5. INTERSECTION AND ROADWAY ANALYSIS

INTERSECTION CAPACITY AND LEVEL OF SERVICE

Intersection capacity calculations were conducted using the methodology presented in the Transportation Research Board's *Highway Capacity Manual*, 2000 edition (HCM). Synchro software, Version 7 (Trafficware Ltd. © 1993-2007), which applies HCM methodology, was used to prepare the capacity and level of service (LOS) calculations.

The City of Camas considers "C" the minimum acceptable LOS for local or minor streets and "D" the minimum acceptable LOS for collector and arterial roadways. Sites whose related traffic contributes to traffic levels exceeding the minimum LOS must identify the appropriate improvement or mitigation measures.

OPERATION ANALYSIS

Operation analyses were performed for the weekday AM and PM peak hour at study area intersections for the following four scenarios:

- 2010 Existing
- 2018 Pre-Development (Build-Out Year)
- 2018 Post-Development (Build-Out Year with Project Trips)
- 2030 Future Year

Calculation results are summarized in the following table. Results for signalized intersections are reported for the intersection as a whole. Results for unsignalized intersections are reported for the noted stop-controlled approach. Calculation sheets are included in the appendix.

Capacity results are determined based on a variety of inputs. The following assumptions were made for these analyses.

- Signal phase definitions and phase rotation patterns were provided by WSDOT. Copies of the plans are provided in the appendix.
- Duration times for minimum green, yellow (amber), all-red, and pedestrian sequences were provided by WSDOT for signalized intersections. Copies of the signal timing plans are provided in the appendix. Cycle lengths and phase splits were optimized.
- The heavy vehicle percentages observed in the 2010 existing counts for each intersection movement were applied to the same movements for all scenarios.
- The peak hour factor (PHF) was adjusted in some scenarios to reflect the attenuation of short-duration peaks as traffic volumes increase over time:
  - The PHF observed in the 2010 existing counts for each intersection as a whole was applied to the 2010 Existing scenario.
  - A PHF of at least 0.85 (AM) or 0.90 (PM) was applied to the 2018 pre-development and 2018 post-development scenarios. If the existing PHF was higher, it was applied.
  - A PHF of at least 0.90 (AM) or 0.95 (PM) was applied to the 2030 future year scenario. If the existing PHF was higher, it was applied.

TABLE 5 – INTERSECTION OPERATION ANALYSIS – AM AND PM PEAK HOURS																
Intersection	Intersection Control and Movement		Time Period	2010 Existing			2018 Pre-Development			2018 Post-Development			2030 Future Year			
				v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	
NE Ingle Road/ NE Goodwin Road	"T" Inter	SB LT	AM	0.20	11.6	B	0.26	13.0	B	0.27	13.9	B	0.35	16.1	C	
			PM	0.28	14.4	B	0.42	18.2	C	0.52	22.4	C	0.98	81.9	F	
NE 28th Street/ NE 232nd Avenue	Two-Way Stop	NB	AM	0.11	11.7	B	0.16	12.9	B	0.29	14.4	B	0.36	17.0	C	
			PM	0.13	13.1	B	0.19	15.1	C	0.29	17.5	C	0.43	24.5	C	
NE Everett Street (SR 500)/NE Leadbetter Road	"T" Inter	EB	AM	0.13	10.7	B	0.18	11.3	B	0.37	13.5	B	0.42	15.1	C	
			PM	0.07	9.6	A	0.12	10.3	B	0.23	11.6	B	0.29	12.9	B	
NE Everett Street (SR 500)/ NE 43rd Avenue	Signal-ized "T" Inter	Inte r	AM	0.49	15.1	B	0.43	12.7	B	0.48	13.5	B	0.57	15.1	B	
			PM	0.39	14.1	B	0.41	15.1	B	0.48	10.5	B	0.57	12.2	B	
NE Everett Street (SR 500)/ NE Lake Road	Signal-ized "T" Inter	Inte r	AM	0.81	31.8	C	0.80	29.3	C	0.84	34.6	C	0.98	58.2	E	
			PM	0.47	13.6	B	0.49	14.0	B	0.54	14.8	B	0.65	18.0	B	
NW Leadbetter Road Road/NW Fargo Street (New West Access)	"T" Inter	SB	AM							0.08	10.1	B	0.08	10.3	B	
			PM							0.05	10.3	B	0.05	10.6	B	
NW Leadbetter Road/ NW Benton Street (New Middle Access)	"T" Inter	SB	AM							0.04	10.0	B	0.04	10.2	B	
			PM							0.03	10.2	B	0.03	10.5	B	
Leadbetter Road/ N Division Street (New East Access)	"T" Inter	SB	AM							0.06	10.2	B	0.06	10.4	B	
			PM							0.04	10.5	B	0.04	10.8	B	
NE Leadbetter Road/NE Adams Street (Existing East Access)	"T" Inter	SB	AM				0.02	9.6	A	0.09	10.5	B	0.09	10.8	B	
			PM				0.01	9.6	A	0.06	10.9	B	0.06	11.3	B	

The **NE Ingle Road/NE Goodwin Road** intersection is anticipated to operate at acceptable levels of service through the 2018 post-development scenario. In the 2030 future year PM peak hour scenario the southbound stop-controlled Ingle Road approach is at LOS "F" and is nearly at capacity. Future plans by the City of Camas to widen Goodwin Road to five lanes may improve operations at this intersection, but as timetable for this project is indefinite, the existing lane configuration has been assumed in this analysis.

The **NE 28th Street/NE 232nd Avenue** intersection is anticipated to operate at acceptable levels of service under all scenarios.

The **NE Everett Street (SR 500)/NE Leadbetter Road** intersection is anticipated to operate at acceptable levels of service under all scenarios.

The **NE Everett Street (SR 500)/NE 43rd Avenue** intersection is anticipated to operate at acceptable levels of service under all scenarios.

The **NE Everett Street (SR 500)/NE Lake Road** intersection is anticipated to operate at acceptable levels of service through the 2018 post-development scenario. In the 2030 future year AM peak hour scenario the intersection is at LOS "E" and is nearly at capacity. Future plans by the City of Camas to widen Everett Street to three lanes may improve operations at this intersection, but as timetable for this project is indefinite, the existing lane configuration has been assumed in this analysis.

The four site access intersections on Leadbetter Road, Fargo Street, Benton Street, Division Street, and Adams Street, are anticipated to operate at acceptable levels of service under all scenarios.

Traffic generated by development of the CJ Dens Camas Subdivision is not anticipated to degrade levels of service at any existing or proposed intersections below acceptable levels, so no mitigating roadway improvements are anticipated or proposed.

SIGNAL WARRANT ANALYSIS

Guidelines for installation of traffic signals are presented in the 2009 Edition of the Federal Highway Administration's *Manual on Uniform Traffic Control Devices* (MUTCD). These guidelines are referred to as signal warrants. The MUTCD identifies nine signal warrants that present criteria for consideration of a traffic signal. Typically, an intersection will first meet the peak hour volume signal warrant (MUTCD Warrant 3). For this reason, it is the first warrant reviewed, although meeting it alone is generally not considered sufficient justification for installing a traffic signal. If the peak hour warrant is met, then other warrants may be reviewed.

Peak hour warrants were reviewed for the NE Everett Street (SR 500)/NE Leadbetter Road intersection. None of the projected peak hour volumes in any scenario meet the minimum peak hour volume thresholds for a signal. Furthermore, because most of the eastbound stop-controlled Leadbetter Road traffic turns right at the intersection, no significant delay is anticipated on this approach.

Copies of the peak hour signal warrant worksheets are provided in the appendix.

TURN LANE GUIDELINES

Exclusive left- and right-turn lanes can improve intersection operation by reducing delay for through traffic and reducing the potential for rear-end collisions. The City of Camas follows AASHTO guidelines for installation of turn lanes, which provide recommendations for two-lane local roadways such as Leadbetter Road. Except in special cases with exceptional volumes, AASHTO does not recommend auxiliary turn lanes be provided on rural local roads. For urban local roads AASHTO suggests advantages to providing auxiliary turn lanes only in commercial areas. Neither the rural criteria nor the urban criteria apply, so no auxiliary left- or right-turn lanes are warranted for Leadbetter Road with the subdivision development.

6. SUMMARY

This transportation impact analysis has been prepared in support of a 297 single-family residential subdivision in Camas, Washington named the CJ Dens Camas Subdivision. The site lies within an undeveloped area recently annexed into the City of Camas. The site will access Leadbetter Road via three new public street connections and one existing public street connection. Public street stubs along the north site boundary will allow for future connections to local streets when adjacent properties develop and Leadbetter Road is converted to a bicycle and pedestrian trail. All access streets have been designed in conformance with intersection spacing standards.

Transportation planning for this recently annexed area of the City of Camas is incomplete. Since the purpose of this study is to determine the impacts of the subdivision on transportation facilities within the vicinity, this study assumes only the current roadway alignments will be available to serve the full build out of the proposed subdivision. It is anticipated a revised study may be necessary once planning for this area is complete.

Roadway volume counts indicate ADT on Leadbetter Road is approximately 1,368 vehicles and the 85th percentile speed is approximately 50 mph. The posted speed limit is 40 mph. As the area develops and driver expectations change, it is anticipated volumes will increase and travel speeds will decrease.

This development will support alternate modes of travel with internal sidewalks and with future connections to Leadbetter Road after its conversion to a bike/pedestrian trail. The Camas School District will provide bus service to students residing in the subdivision. No transit service exists within one mile of the site.

A safety review within the study area indicates a high collision rate only along Leadbetter Road. Many of the Leadbetter Road collisions noted excessive speed or distracted/ impaired drivers as contributing circumstances. With the eventual closure of Leadbetter Road as a through route, safety improvements would not provide a long-term benefit to the traveling public. Short-term low-cost improvements are proposed below.

Subdivision development is anticipated to generate 218 weekday AM peak hour trips, 280 weekday PM peak hour trips, and 2,831 average weekday trips. Trip distribution was based on patterns shown in the existing RTC model for the local TAZ 483. In general, 35% of site trips will travel to/from the north/west and 65% to/from the south/east.

To determine the future pre-development traffic conditions, in-process traffic assignments were provided by city staff, and an annual background growth rate of 2.0% was determined from RTC models. A build-out year of 2018 was used, anticipating project approval in 2011 and a maximum seven-year phased development. Unsignalized intersection volumes were based on May 2010 counts, pro-rated in-process traffic, and eight years of background growth. Signalized intersection volumes were based on January 2010 counts, a Charbonneau Engineering study for Camas High School with a 2015 build-out year and three years of background growth.

The study analyzed traffic operations at the following intersections:

- NE Ingle Road/NE Goodwin Road
- NE 28th Street/NE 232nd Avenue

- NE Everett Street (SR 500)/NE Leadbetter Road
- NE Everett Street (SR 500)/NE 43rd Avenue – signalized
- NE Everett Street (SR 500)/NE Lake Road – signalized
- NW Leadbetter Road/NW Fargo Street (New West Site Access)
- NW Leadbetter Road/NW Benton Street (New Middle Site Access)
- Leadbetter Road/N Division Street (New East Site Access)
- NE Leadbetter Road/NE Adams Street (Existing East Site Access)

The study analyzed weekday AM and PM peak hour periods during the following scenarios:

- 2010 Existing
- 2018 Pre-Development (Build-Out Year)
- 2018 Post-Development (Build-Out Year with Project Trips)
- 2030 Future Year

The City of Camas considers "C" the minimum acceptable LOS for local or minor streets and "D" the minimum acceptable LOS for collector and arterial roadways. All study area intersections are calculated with LOS "C" or better during the 2018 post-development scenarios. The 2030 future year scenarios indicate potential future LOS deficiencies during the AM peak hour at NE Everett Street (SR 500)/NE Lake Road and during the PM peak hour at NE Ingle Road/NE Goodwin Road.

Site traffic is not anticipated to degrade LOS below acceptable levels at any study area intersection, so no mitigating roadway improvements are anticipated or proposed.

Peak hour traffic signal warrants were reviewed for the NE Everett Street (SR 500)/NE Leadbetter Road intersection. None of the projected peak hour volumes in any scenario meet the minimum peak hour volume thresholds for a signal, and no significant delay is anticipated on the eastbound stop-controlled approach. No traffic signal installations are warranted or proposed.

Turn lane warrants were reviewed at the site access intersections along Leadbetter Road. Neither the rural criteria (for the existing condition) nor the urban criteria (for the post-development condition) apply, so no auxiliary left- or right-turn lanes on Leadbetter Road are warranted or proposed.

RECOMMENDATIONS

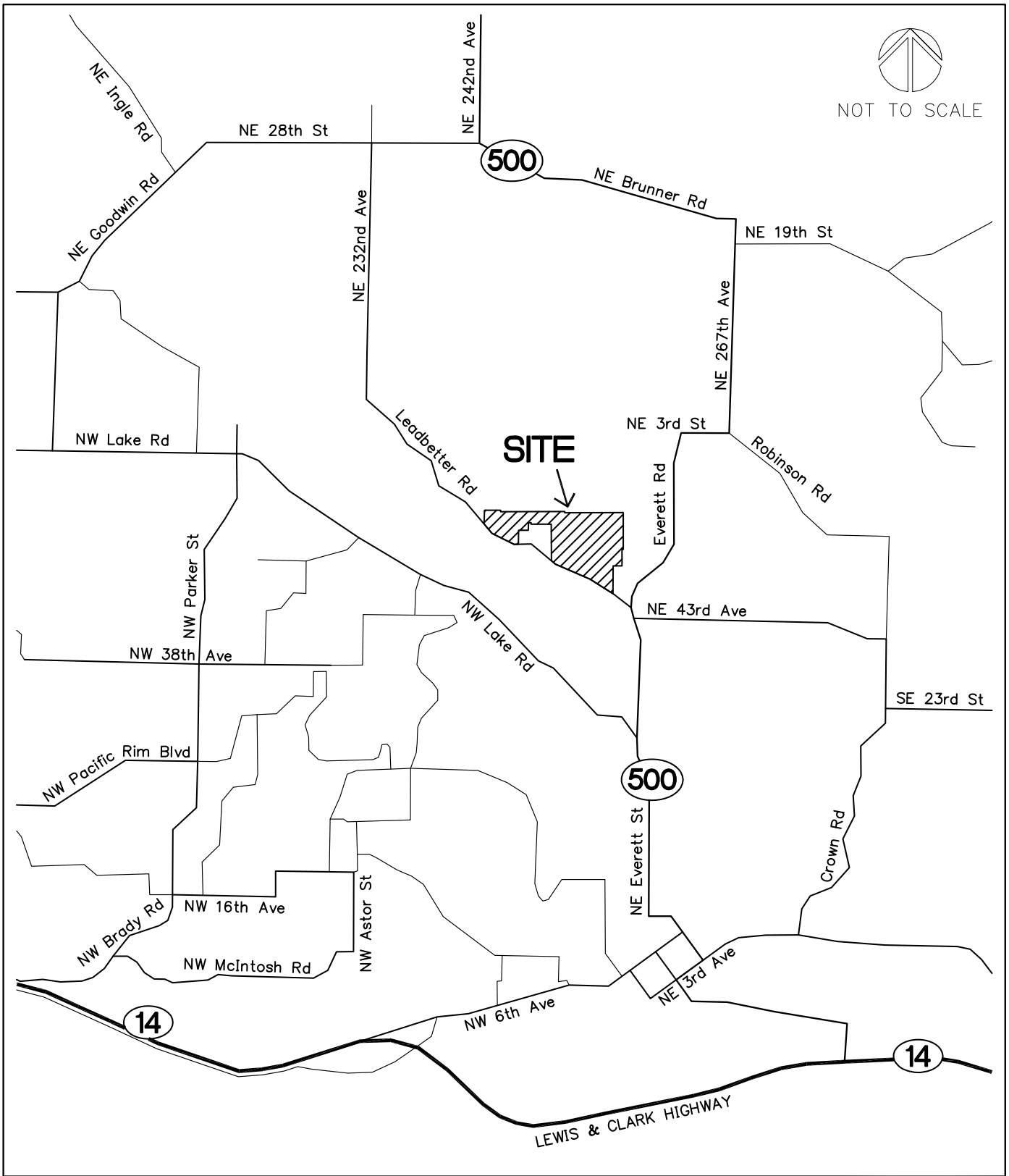
1. Increase enforcement actions along Leadbetter Road to reduce the number of collisions involving alcohol or excessive speed.
2. Clear existing roadside vegetation and perform limited site grading as is feasible along the Leadbetter Road frontage to ensure minimum sight distances, 480 feet to the east and 555 feet to the west, will be provided at each new access street (Fargo, Benton and Division Streets) when the site develops.
3. In general, intensive and/or expensive roadway improvements along Leadbetter Road are discouraged because the City of Camas has identified the road for eventual closure once a new east/west arterial opens north of the site. Any benefits derived from improvements may improve conditions for only a short period so that the cost effectiveness of such improvements would diminish.

7. APPENDIX

A. Figures
B. Traffic Count Summaries
C. Collision Rate Calculations and Reports
D. In-Process Traffic
E. Background Growth (RTC Model)
F. Signal Plans
G. Capacity Calculations
H. Warrant Analysis
I. Scoping

APPENDIX A

Figures



GROUP MACKENZIE

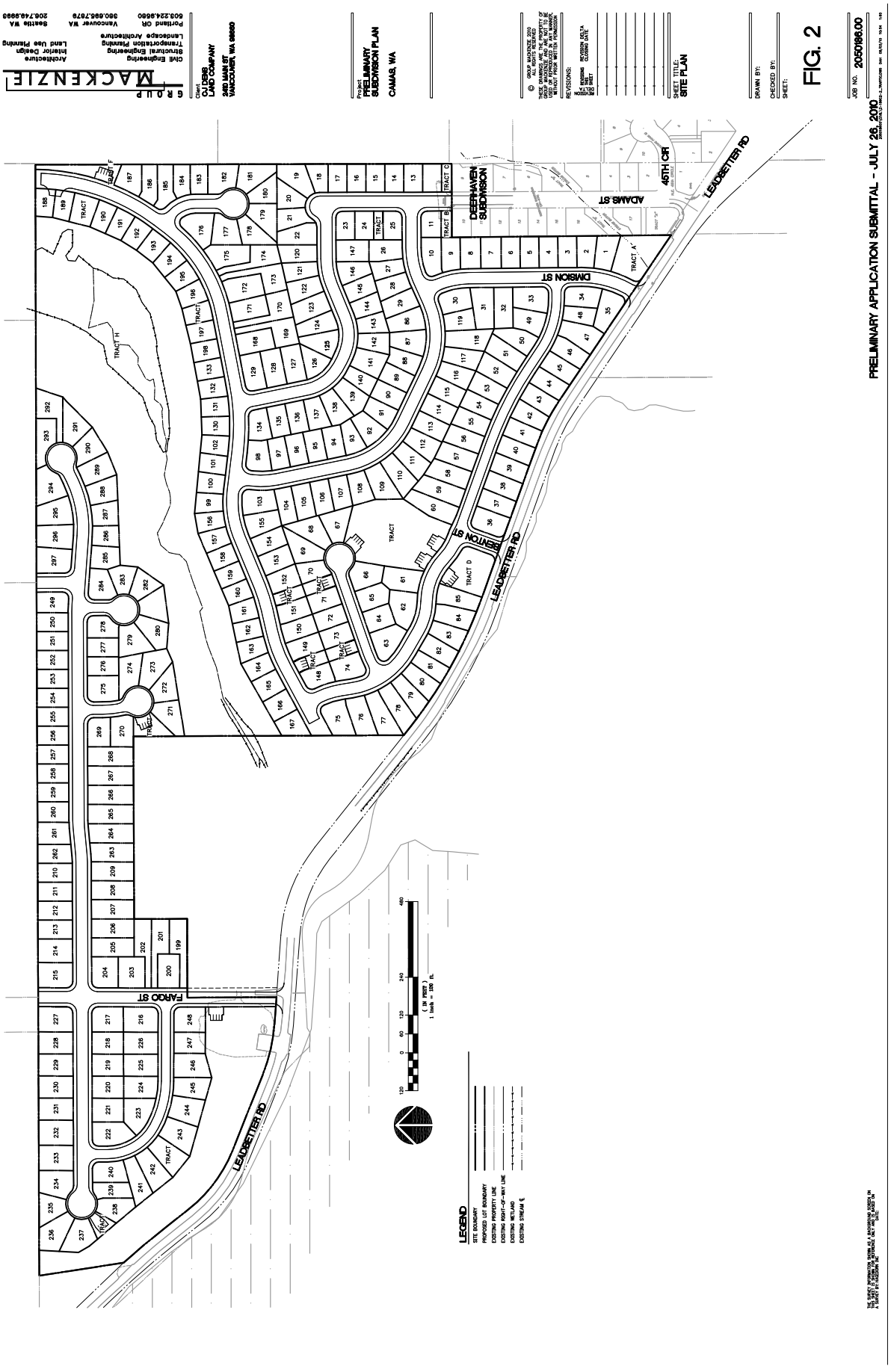
Portland OR 503.224.9560 Vancouver WA 360.695.7879 Seattle WA 206.749.9993

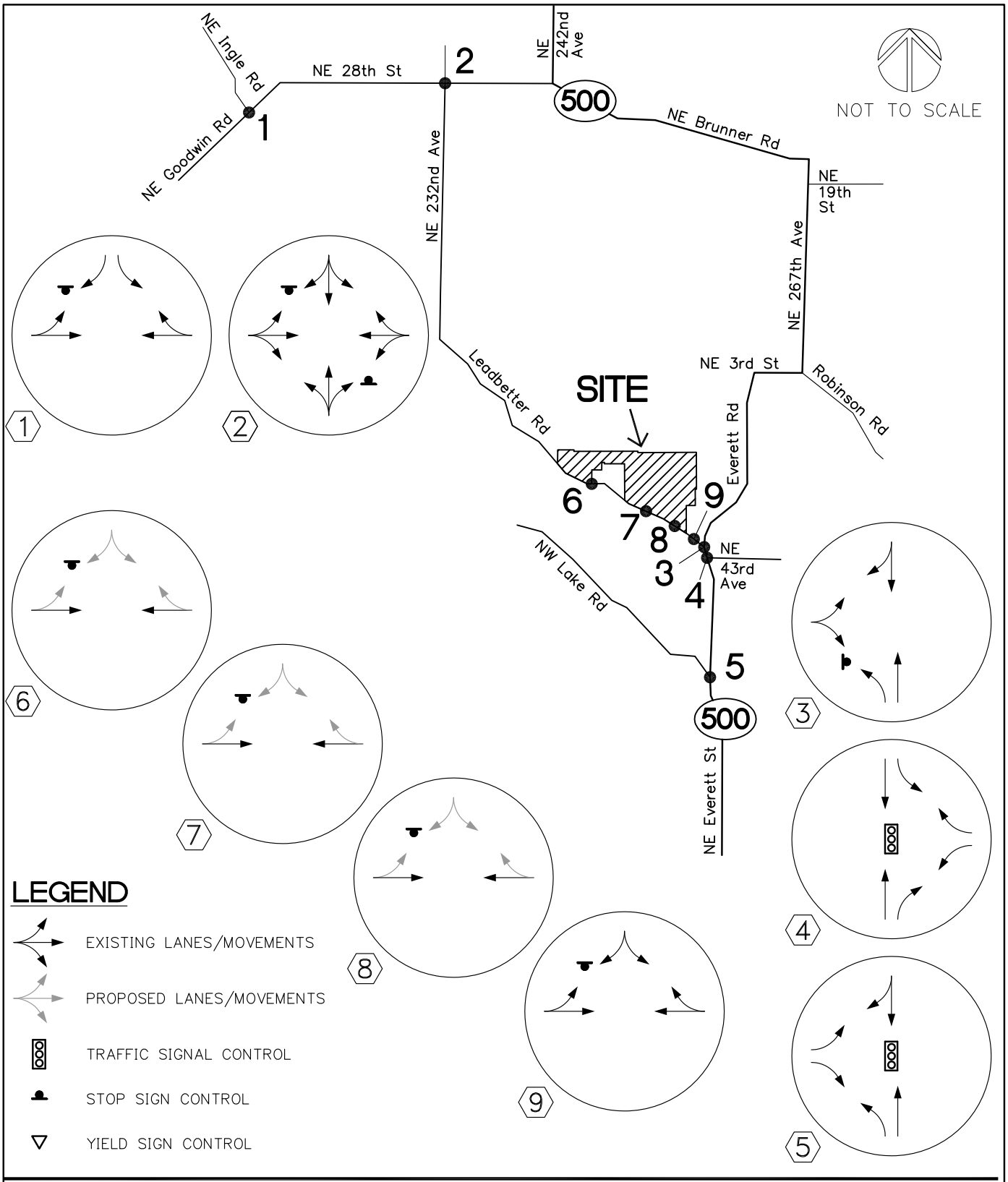
DATE: 08.03.10
DRAWN BY: DAH
CHECKED BY: BTA
JOB NO: 2050186.01

VICINITY MAP

CJ DENS RESIDENTIAL SUBDIVISION
CAMAS, WASHINGTON

FIGURE 1


MACKENZIE
Civil Engineering
Structural Engineering
Transportation Planning
Landscape Architecture
Architecture
Interior Design
Land Use Planning
Portland OR 503.224.9560
Vancouver WA 360.695.7879
Seattle WA 206.749.9993
Client:
OLDEN LAND COMPANY
2401 MAIN ST
VANCOUVER, WA 98660
Project:
PRELIMINARY SUBDIVISION PLAN
CAMAS, WA
SHEET TITLE:
SITE PLAN
REVISIONS:
DRAWN BY:
CHECKED BY:
SHEET:
FIG. 2
JOB NO. 2050198.00
PRELIMINARY APPLICATION SUBMITTAL - JULY 28, 2020
DEERHAVEN SUBDIVISION
LEADBETTER RD
ADAMS ST
45TH CIR
DIVISION ST
BENTON ST
FARGO ST
TRACT A
TRACT B
TRACT C
TRACT D
TRACT H
LEGEND
SITE BOUNDARY
PROPOSED LOT BOUNDARY
EXISTING PROPERTY LINE
EXISTING RIGHT-OF-WAY LINE
EXISTING WETLAND
EXISTING STREAM



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EXISTING TRAFFIC CONTROL AND LANE CONFIGURATIONS

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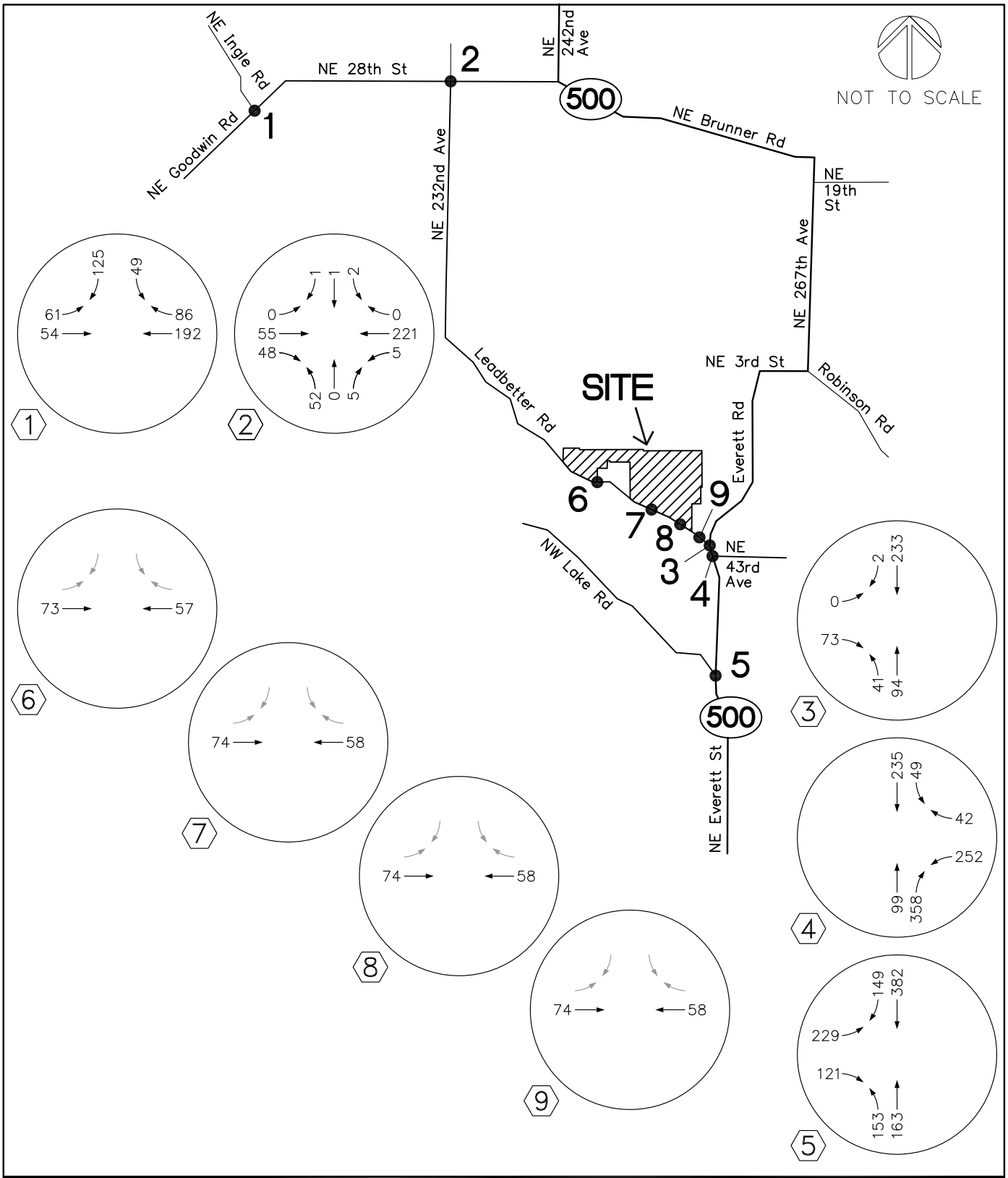
FIGURE 3



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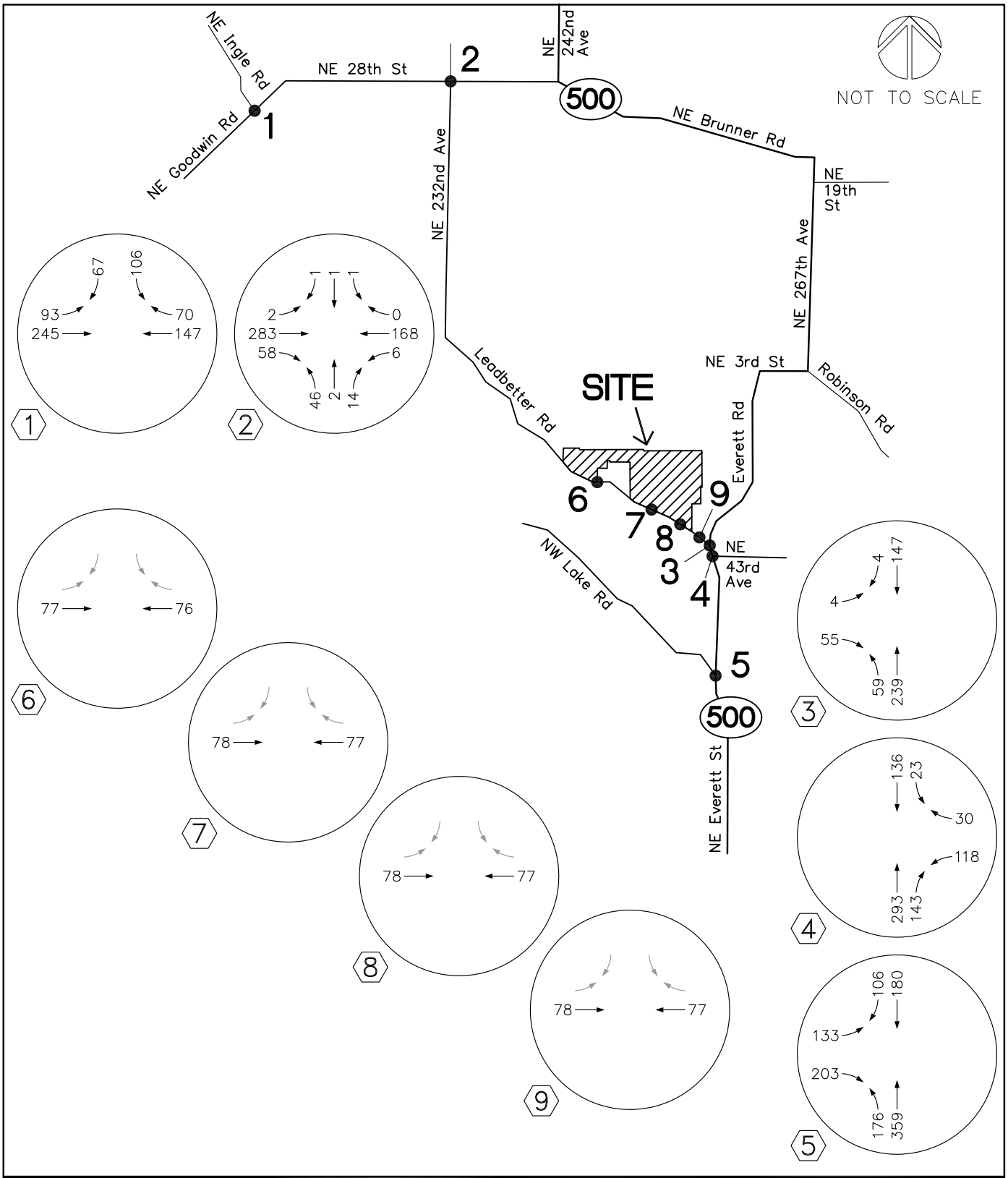
2010 EXISTING TRAFFIC VOLUMES - AM PEAK HOUR

CJ DENS RESIDENTIAL SUBDIVISION
CAMAS, WASHINGTON

FIGURE 4A



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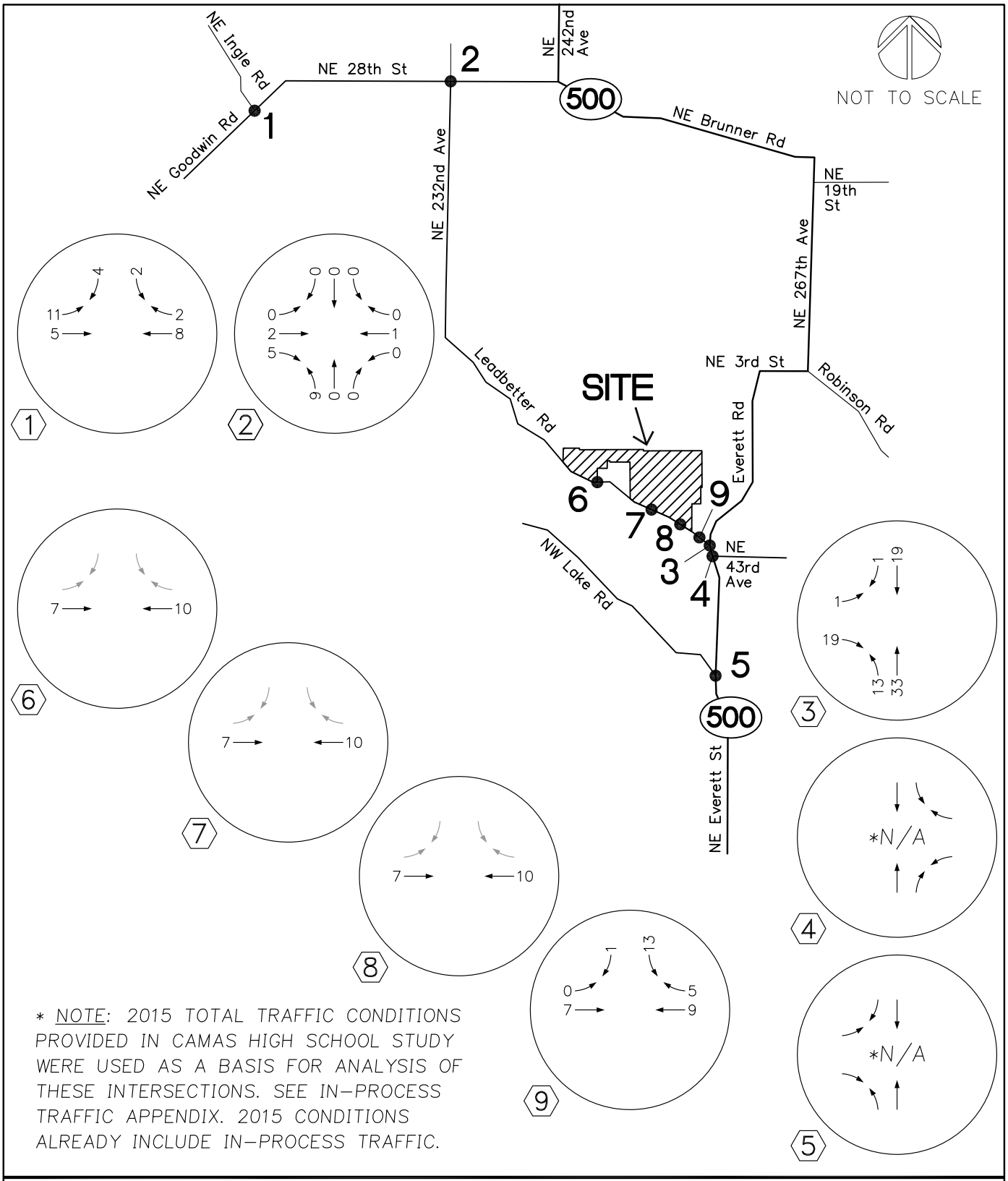
2010 EXISTING TRAFFIC VOLUMES - PM PEAK HOUR

CJ DENS RESIDENTIAL SUBDIVISION
CAMAS, WASHINGTON

FIGURE 4B



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IN-PROCESS TRAFFIC VOLUMES - AM PEAK HOUR

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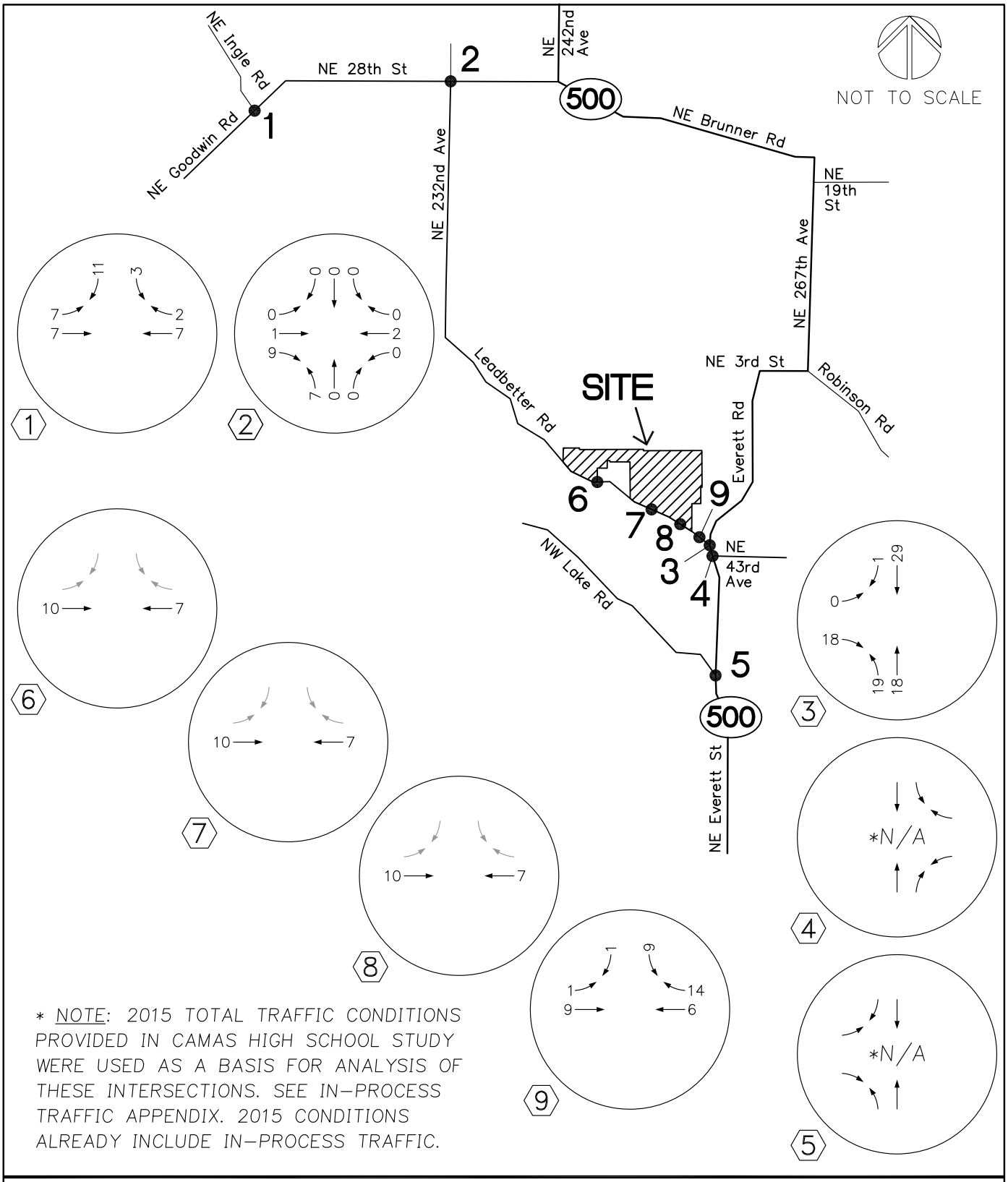
CAMAS, WASHINGTON

FIGURE 5A



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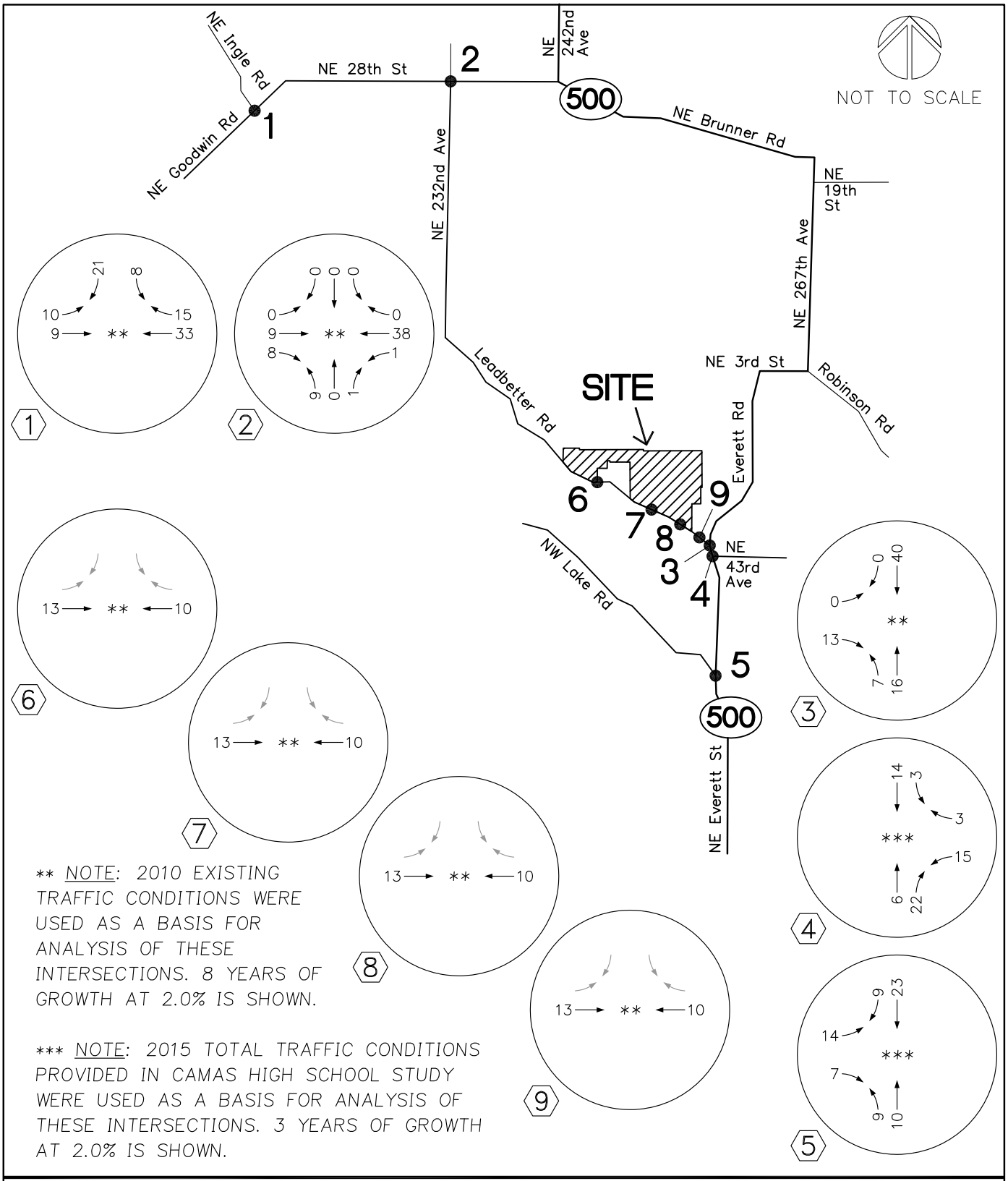
IN-PROCESS TRAFFIC VOLUMES - PM PEAK HOUR

CJ DENS RESIDENTIAL SUBDIVISION
CAMAS, WASHINGTON

FIGURE 5B



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BACKGROUND GROWTH VOLUMES - AM PEAK HOUR

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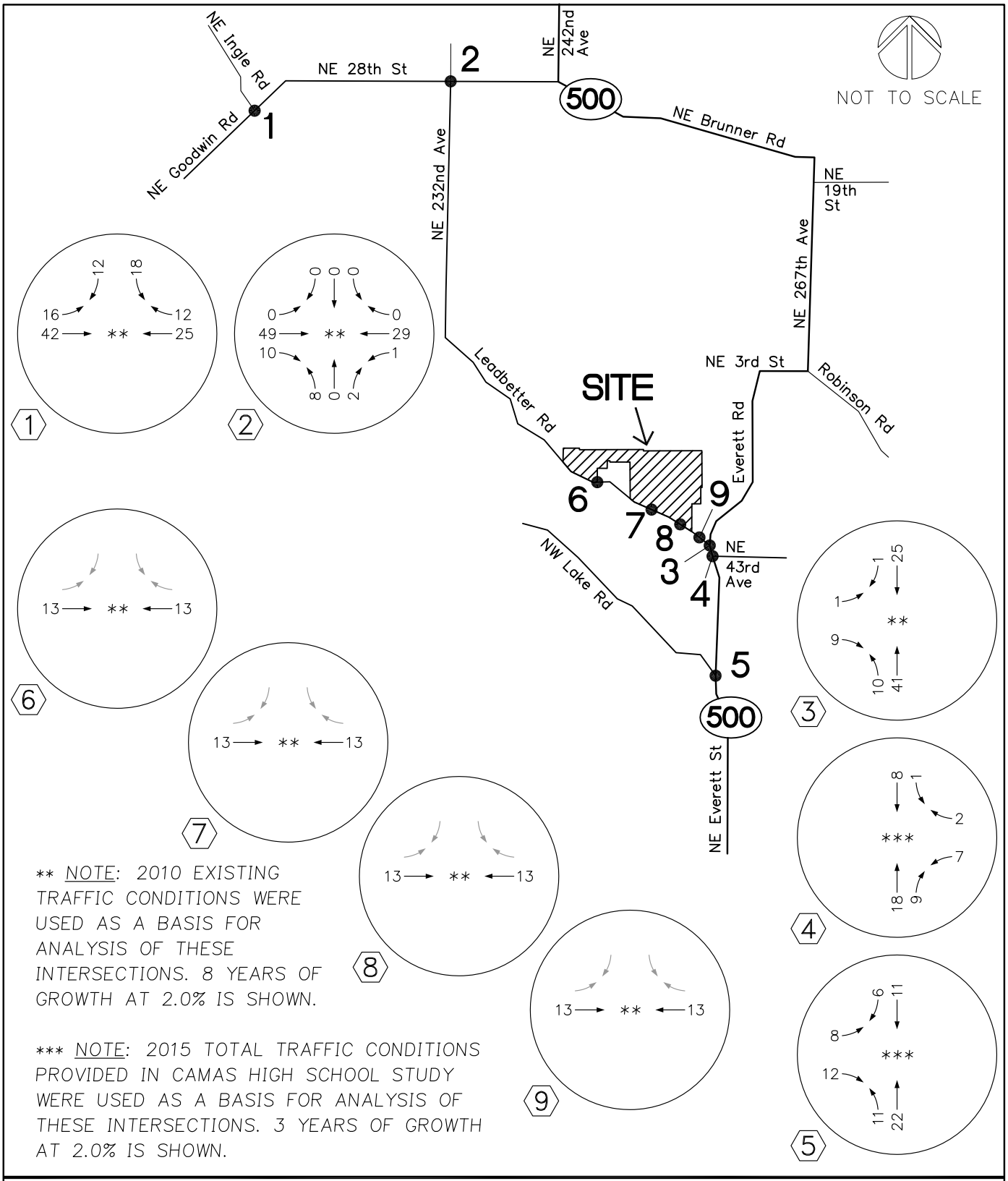
FIGURE 6A



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BACKGROUND GROWTH VOLUMES - PM PEAK HOUR

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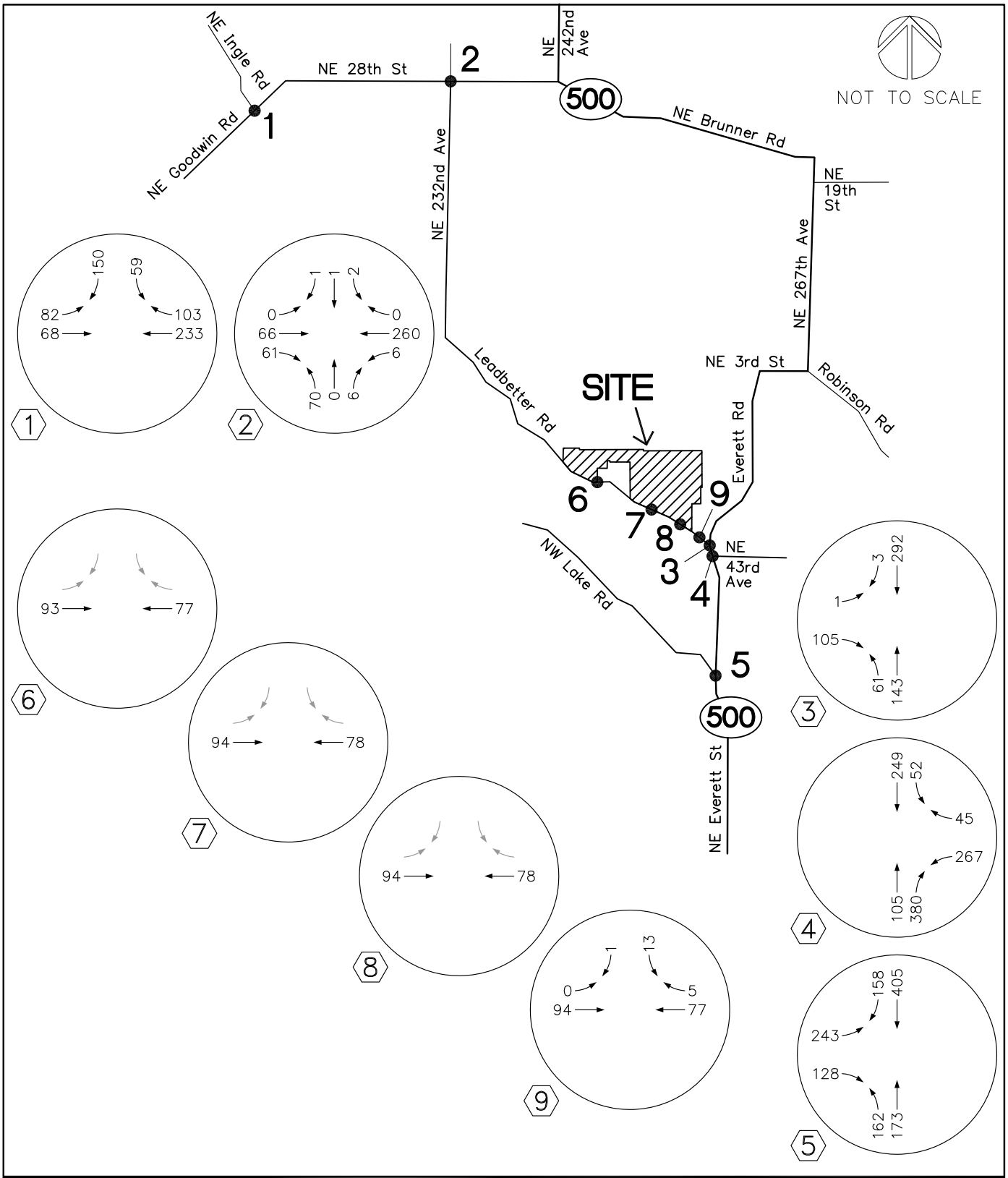
FIGURE 6B



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2018 PRE-DEVELOPMENT VOLUMES - AM PEAK HOUR

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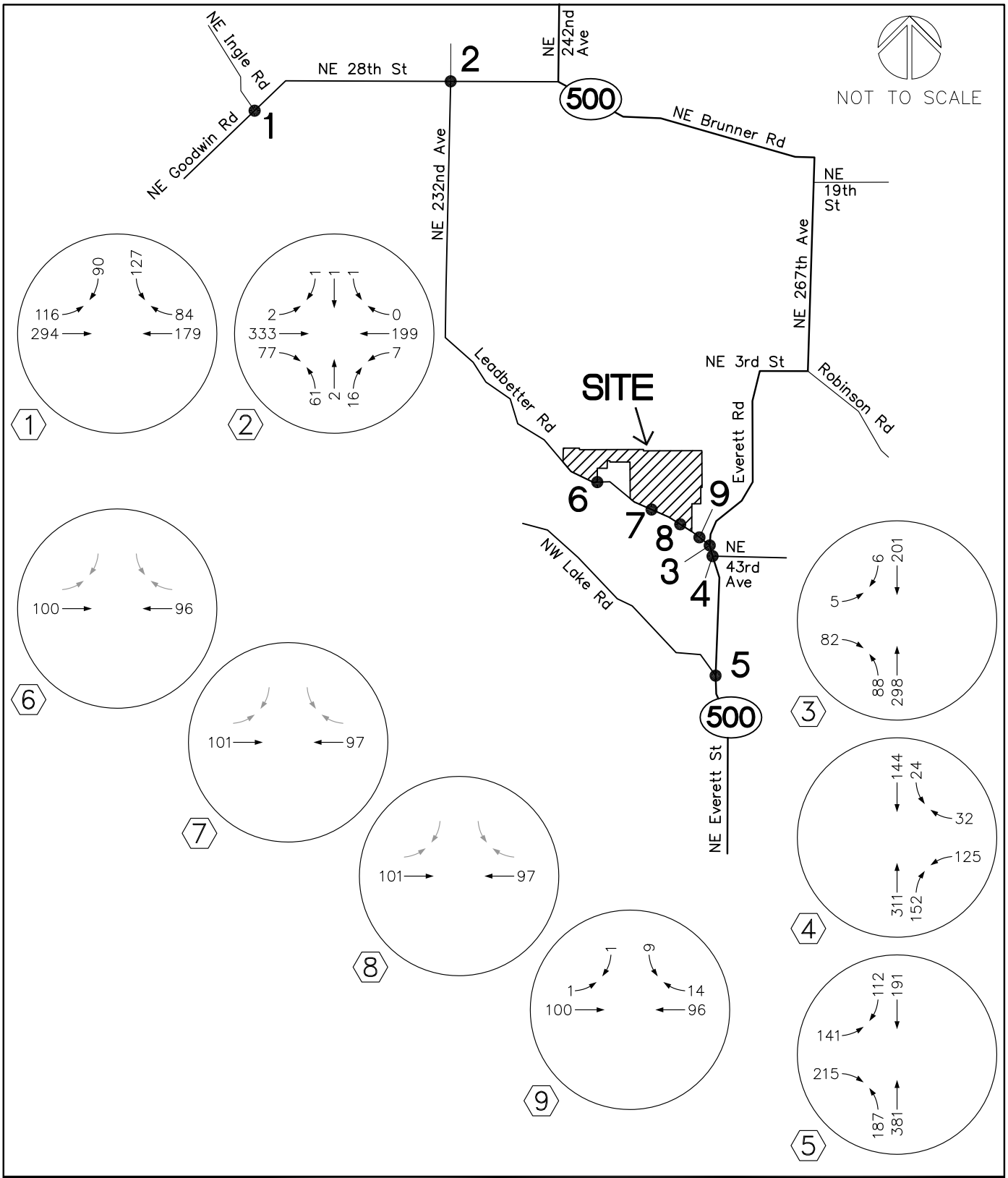
FIGURE 7A



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2018 PRE-DEVELOPMENT VOLUMES - PM PEAK HOUR

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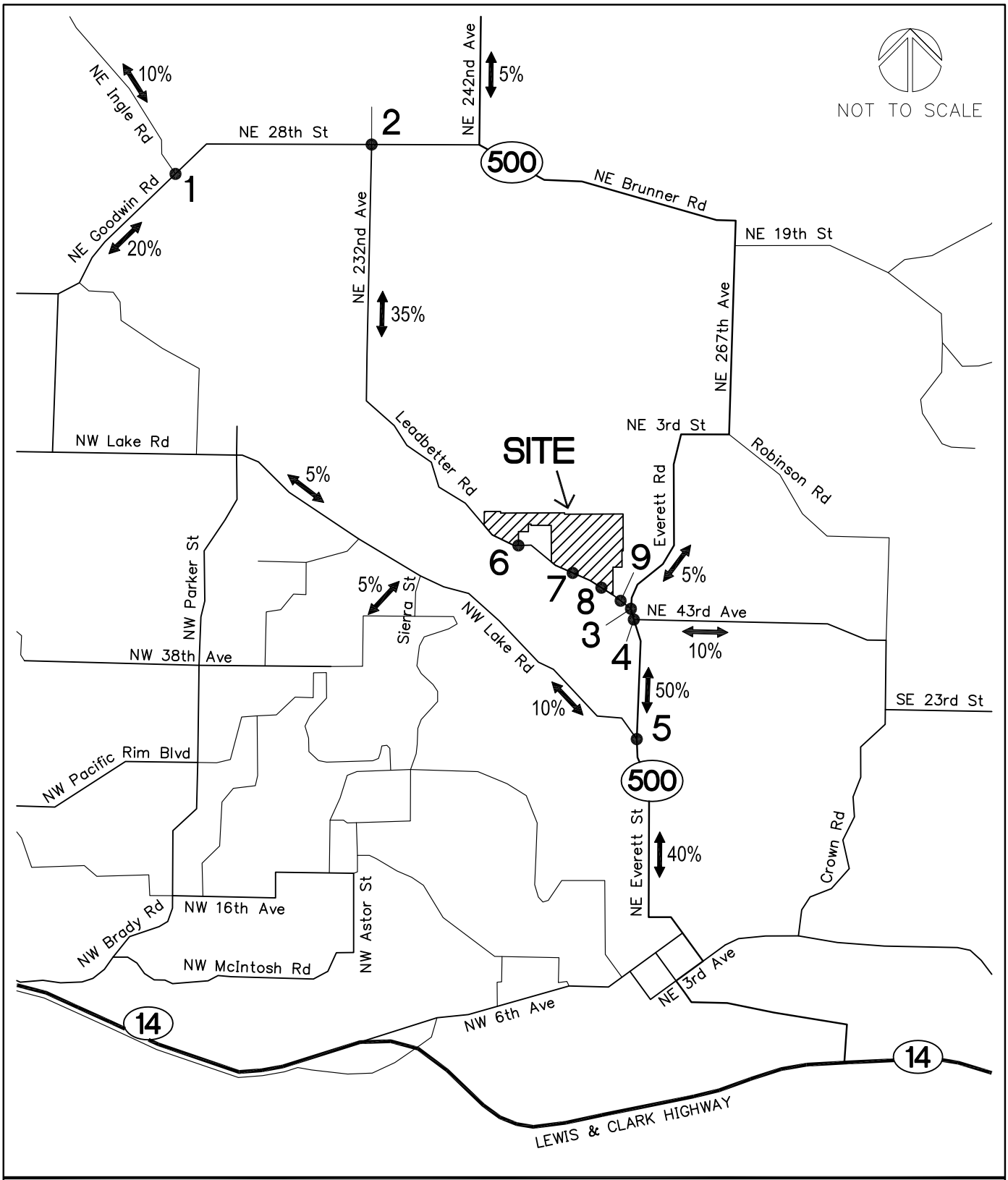
FIGURE 7B



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SITE TRIP DISTRIBUTION

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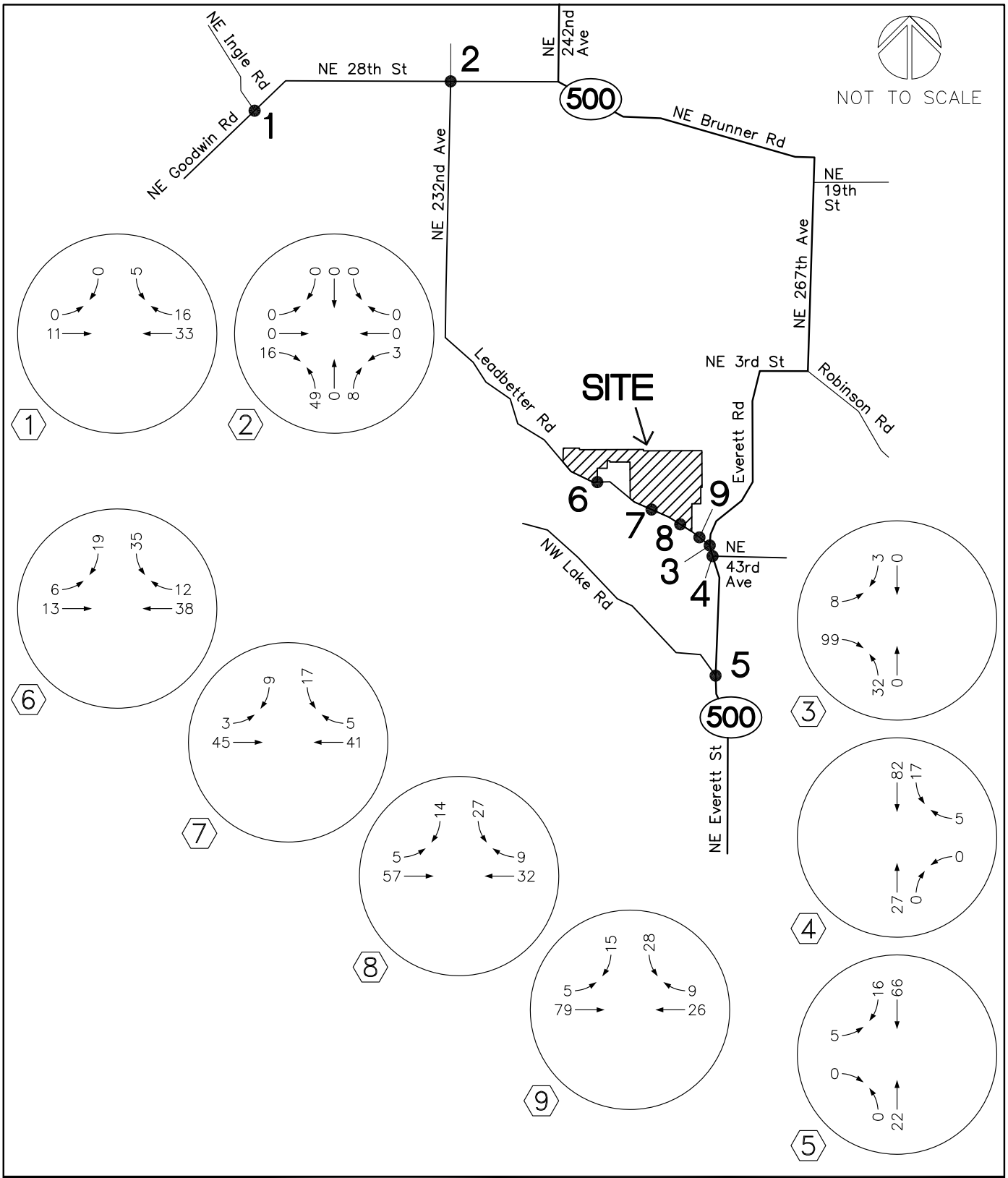
FIGURE 8



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SITE TRIP ASSIGNMENTS - AM PEAK HOUR

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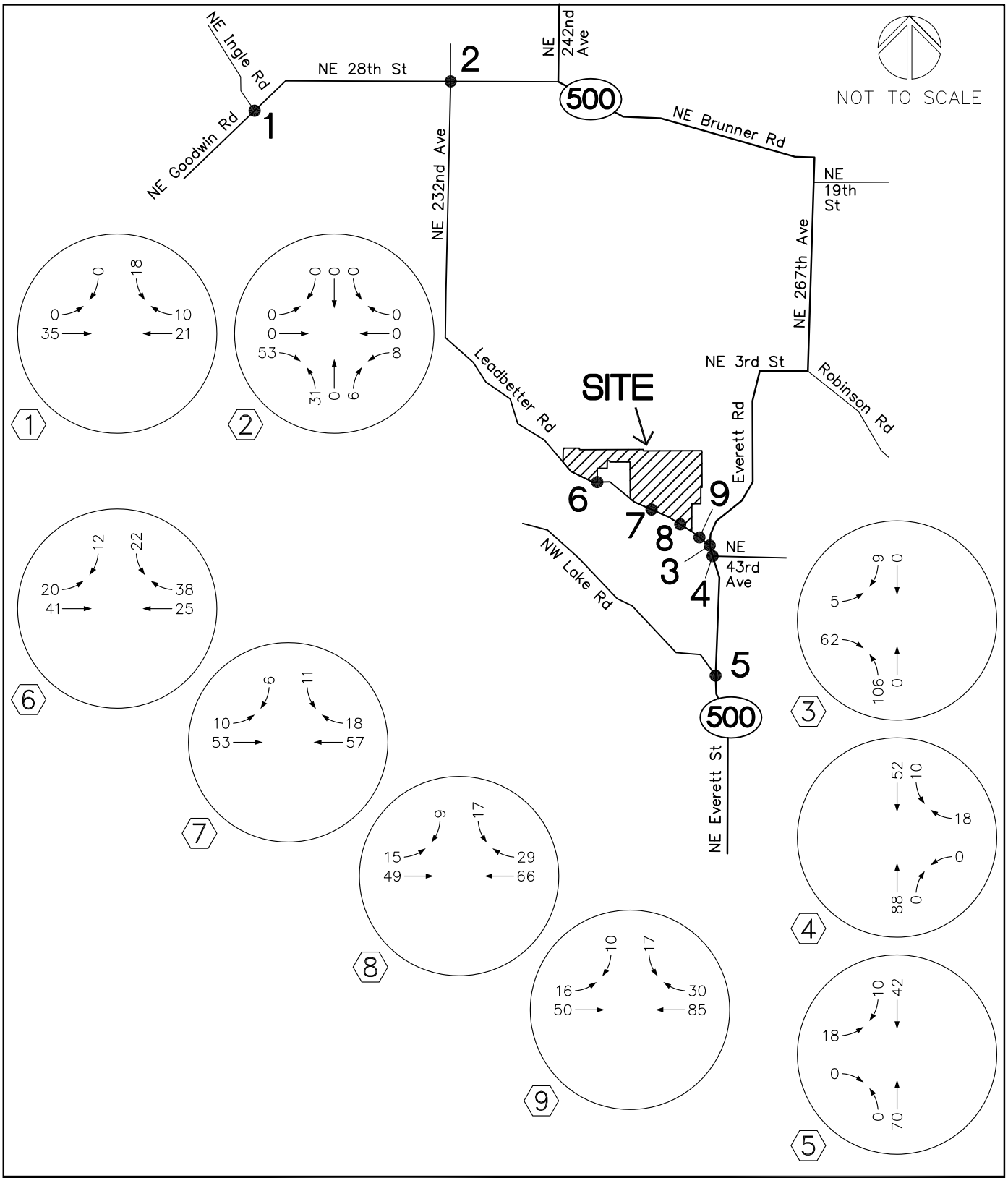
FIGURE 9A



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SITE TRIP ASSIGNMENTS - PM PEAK HOUR

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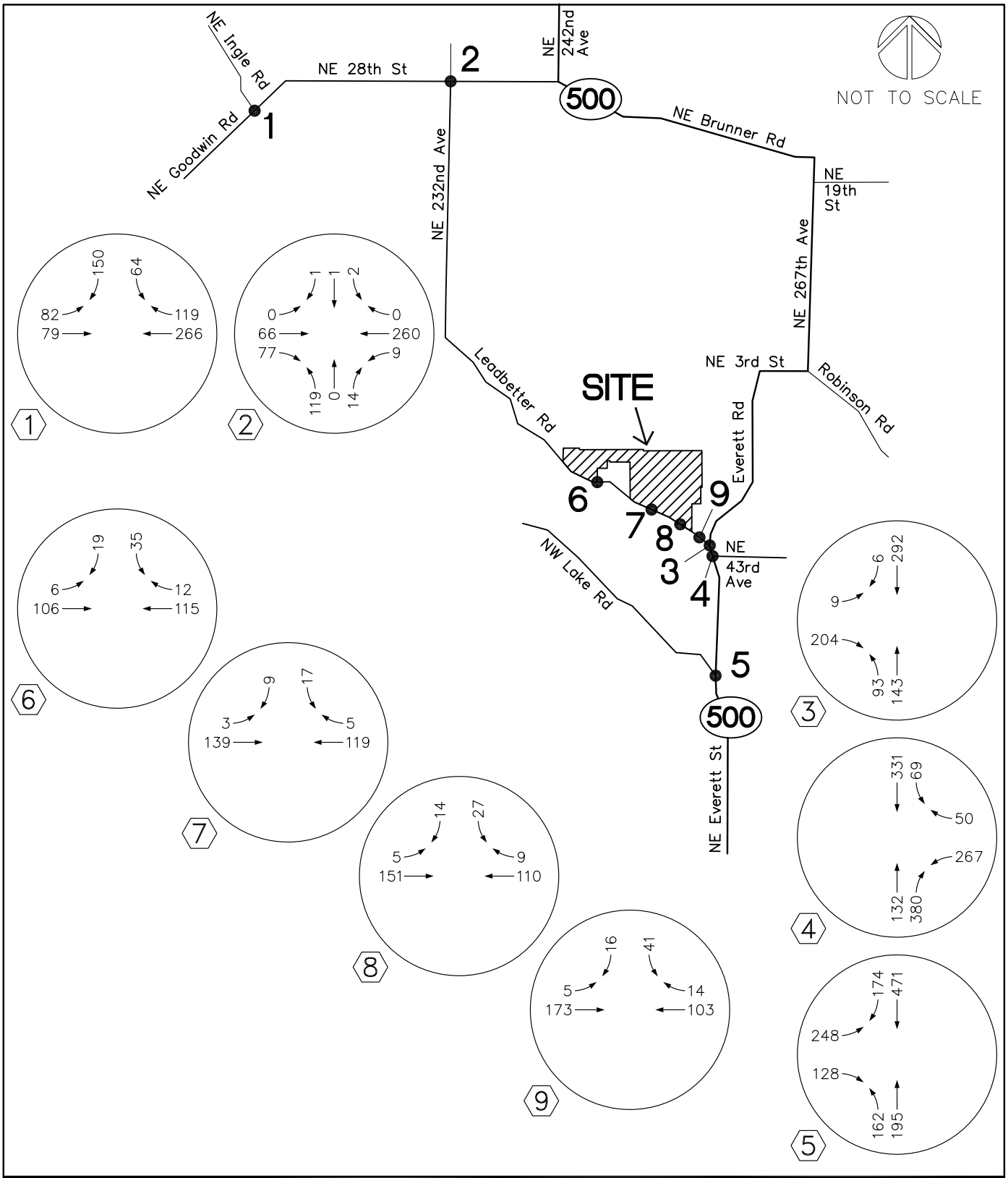
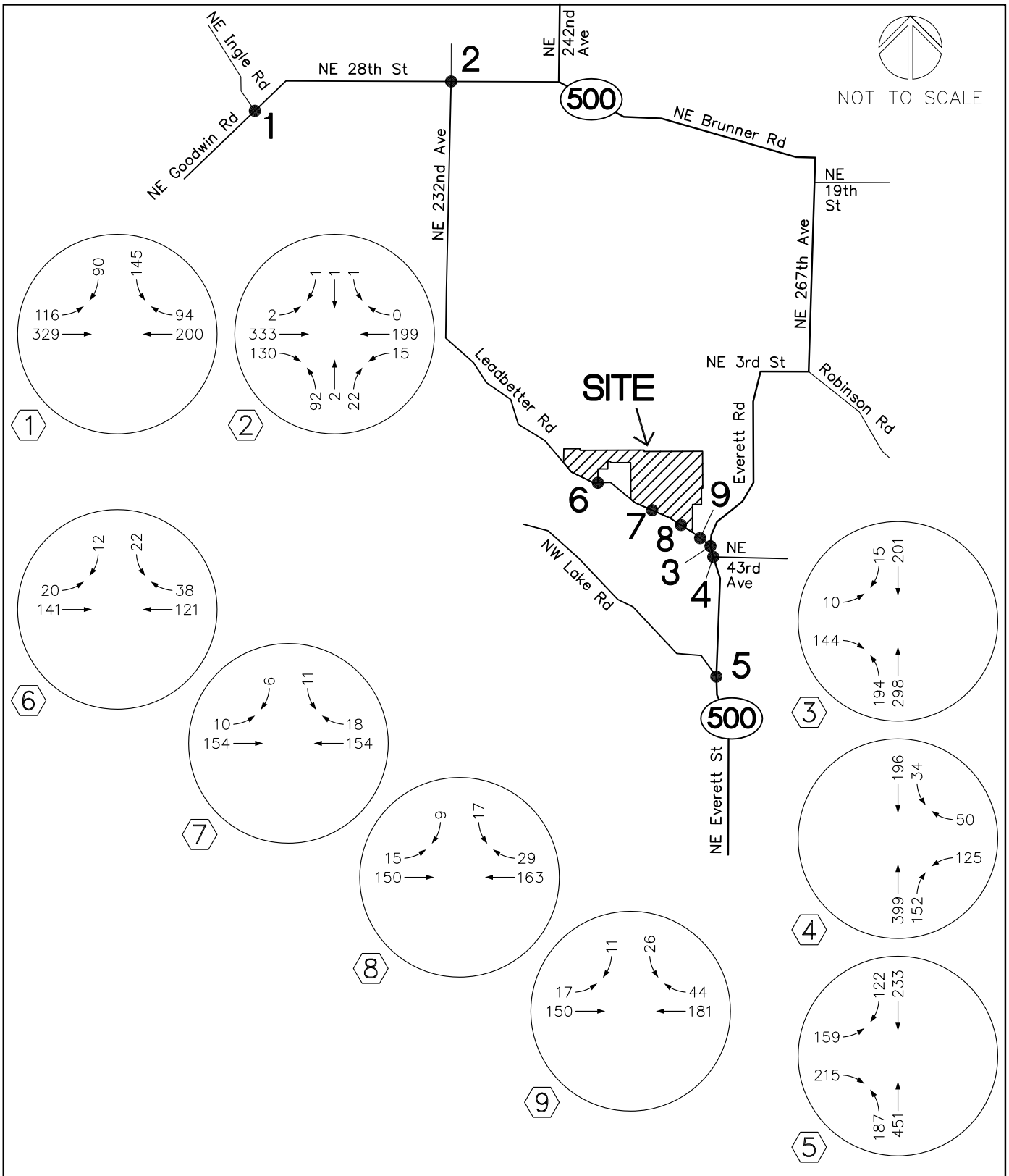
FIGURE 9B



GROUP MACKENZIE Portland OR 503.224.9560 Vancouver WA 360.695.7879 Seattle WA 206.749.9993	DATE: 08.03.10 DRAWN BY: DAH/KLA CHECKED BY: BTA JOB NO: 2050186.01	2018 POST-DEVELOPMENT VOLUMES - AM PEAK HOUR CJ DENS RESIDENTIAL SUBDIVISION CAMAS, WASHINGTON	FIGURE 10A



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2018 POST-DEVELOPMENT VOLUMES - PM PEAK HOUR

CJ DENS RESIDENTIAL SUBDIVISION
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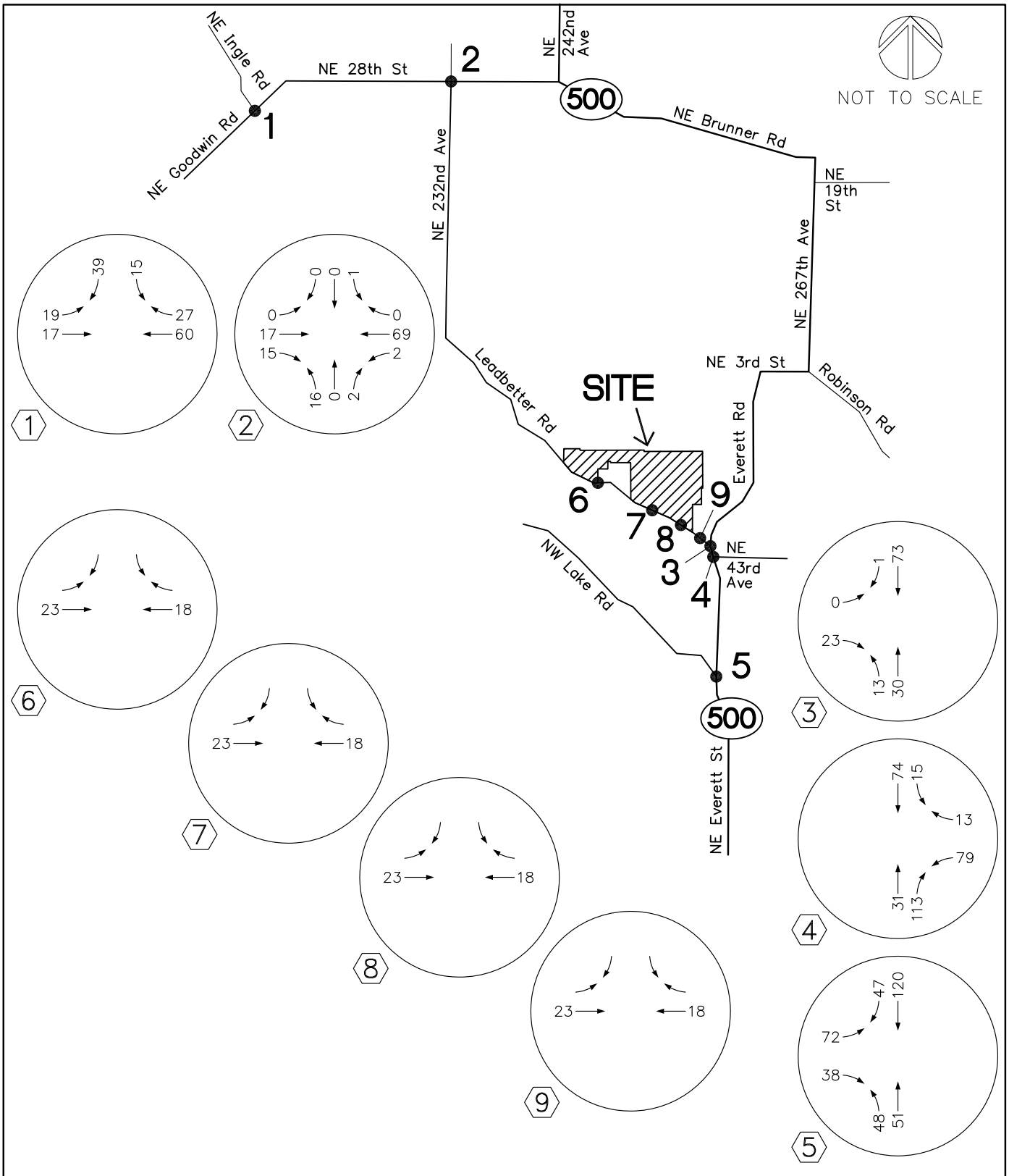
FIGURE 10B



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DATE: 08.03.10
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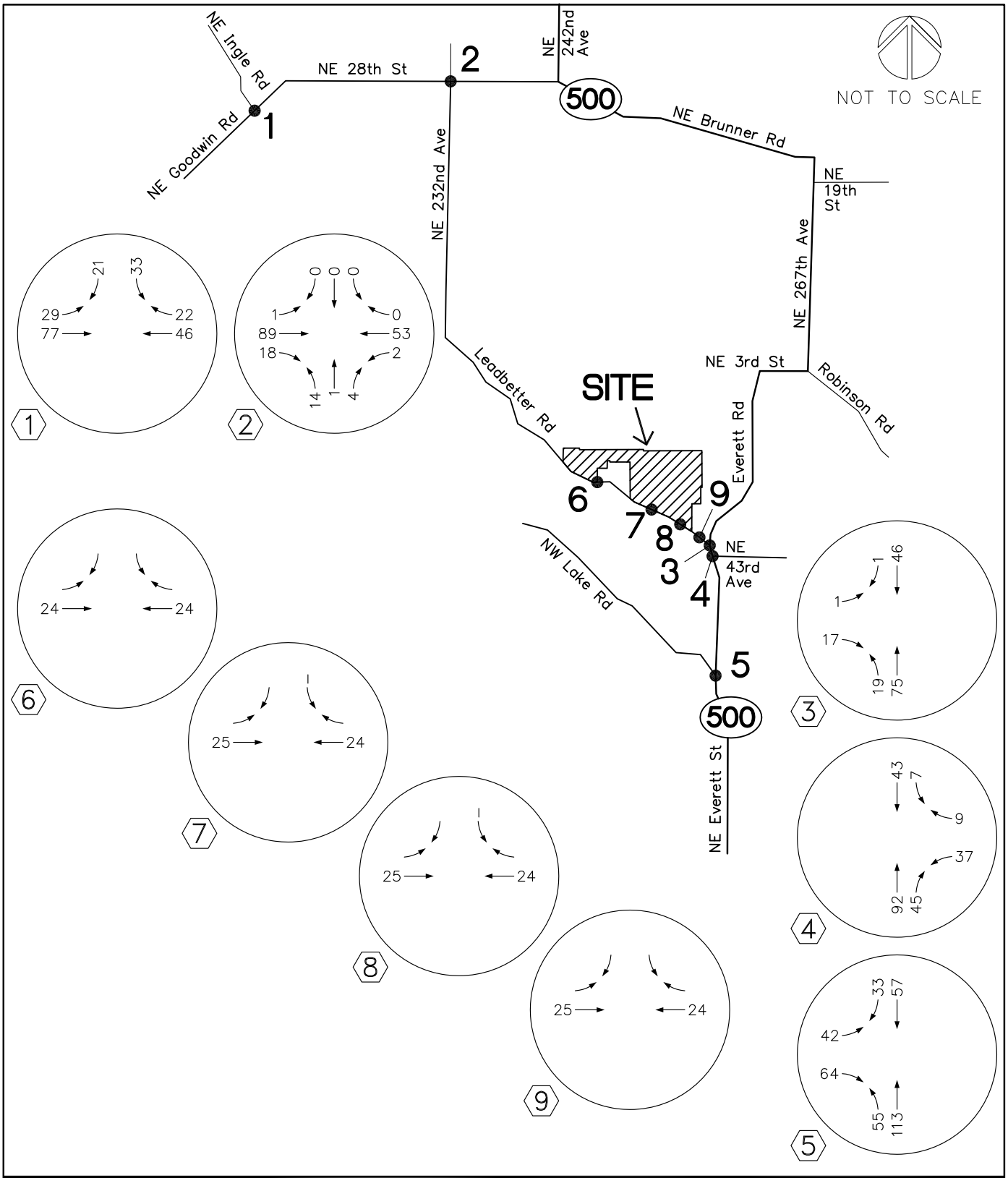
BACKGROUND GROWTH VOLUMES (12 YEARS AT 2.0%) - AM PEAK HOUR

CJ DENS RESIDENTIAL SUBDIVISION
CAMAS, WASHINGTON

FIGURE 11A



GROUP MACKENZIE

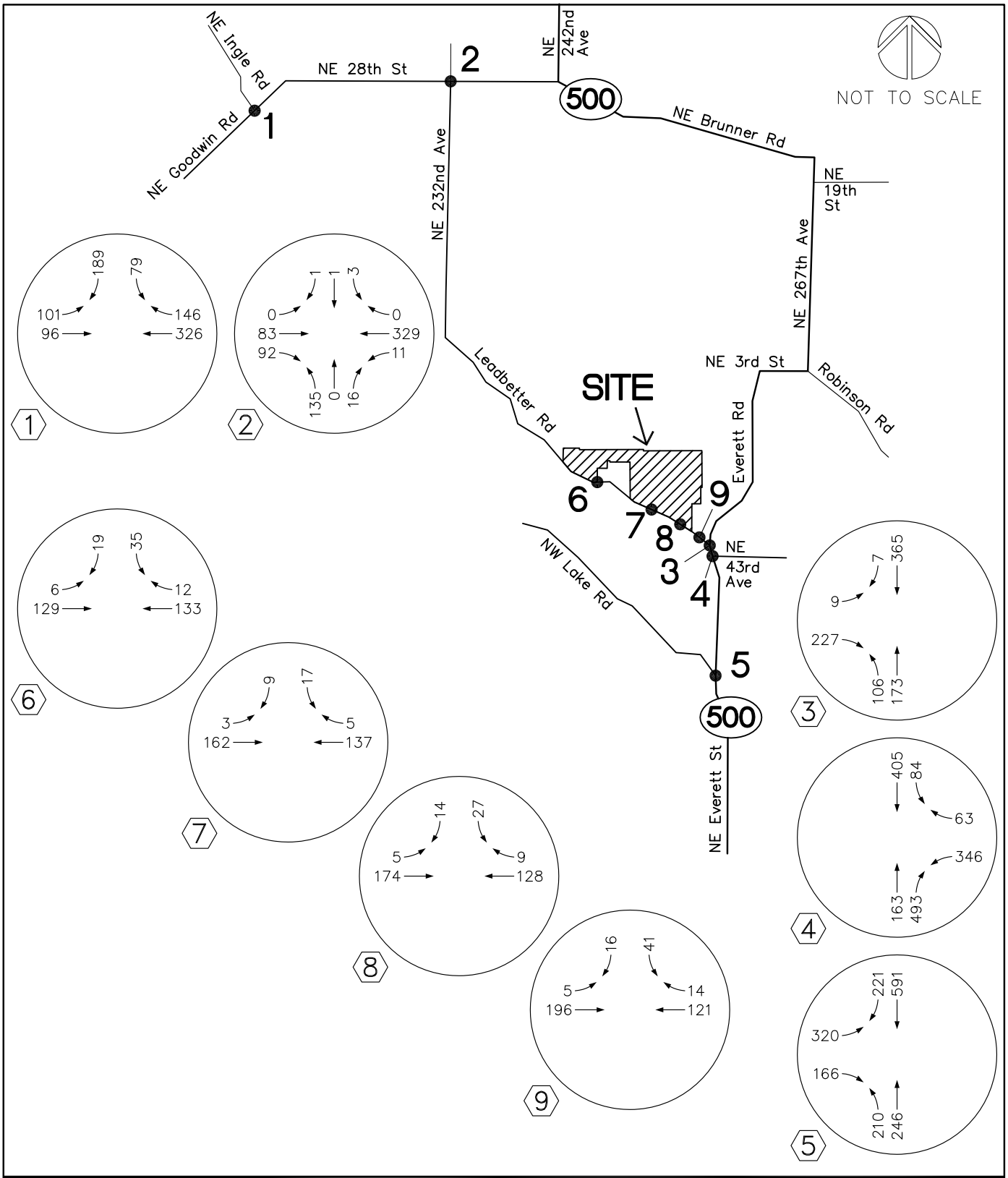
Portland OR 503.224.9560 Vancouver WA 360.695.7879 Seattle WA 206.749.9993

DATE: 08.03.10
DRAWN BY: DAH/KLA
CHECKED BY: BTA
JOB NO: 2050186.01

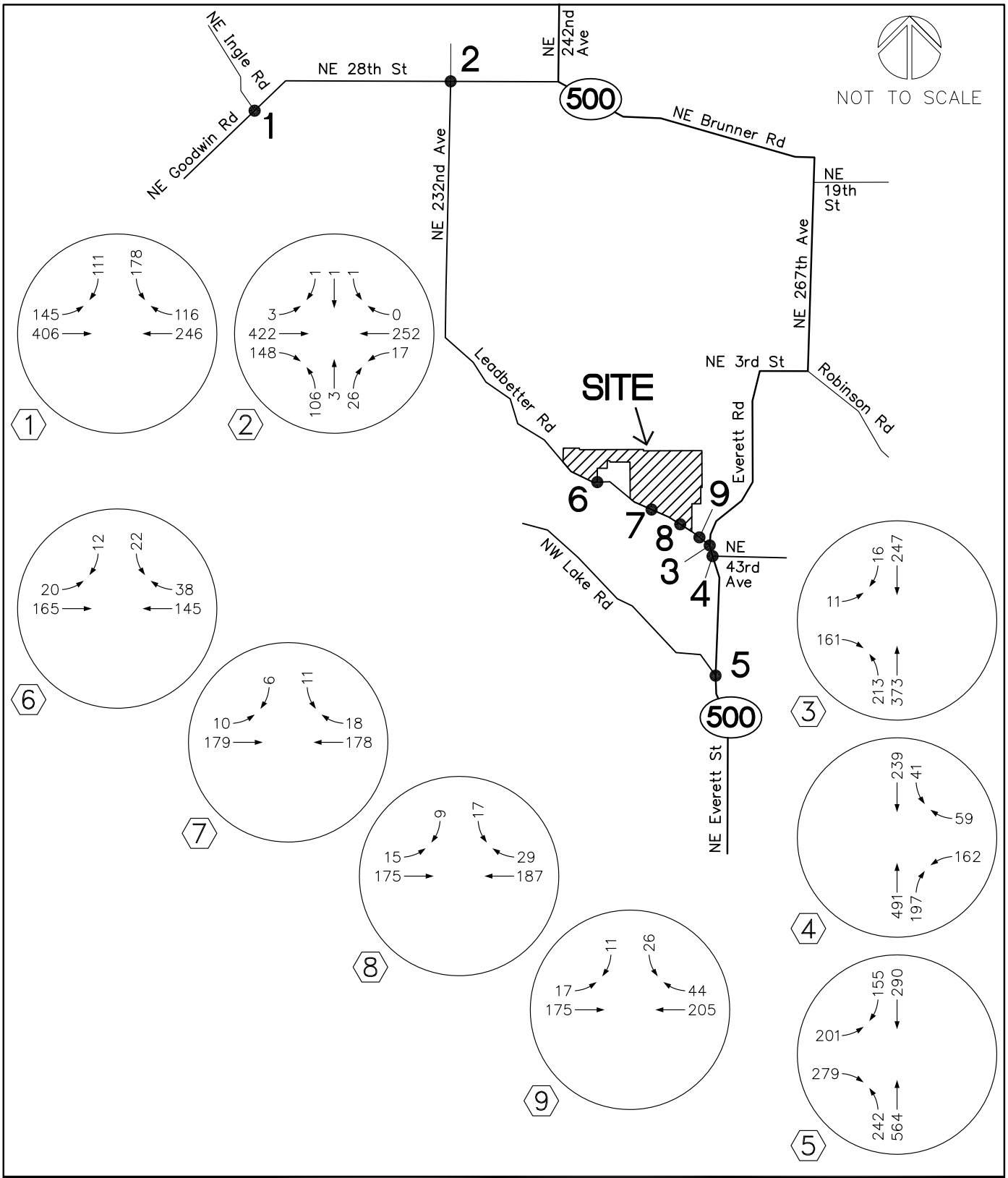
BACKGROUND GROWTH VOLUMES (12 YEARS AT 2.0%) - PM PEAK HOUR

CJ DENS RESIDENTIAL SUBDIVISION
CAMAS, WASHINGTON

FIGURE 11B



GROUP MACKENZIE Portland OR 503.224.9560 Vancouver WA 360.695.7879 Seattle WA 206.749.9993	DATE: 08.03.10 DRAWN BY: DAH/KLA CHECKED BY: BTA JOB NO: 2050186.01	2030 FUTURE VOLUMES - AM PEAK HOUR CJ DENS RESIDENTIAL SUBDIVISION CAMAS, WASHINGTON	FIGURE 12A



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DATE: 08.03.10
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CHECKED BY: BTA
JOB NO: 2050186.01

2030 FUTURE VOLUMES - PM PEAK HOUR

CJ DENS RESIDENTIAL SUBDIVISION
CAMAS, WASHINGTON

FIGURE 12B

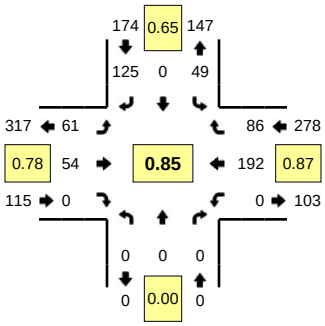
APPENDIX B

Traffic Count Summaries

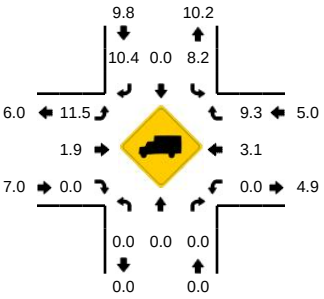
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

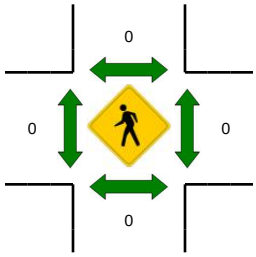
LOCATION: Ingle Rd -- Goodwin Rd
CITY/STATE: Camas, WA

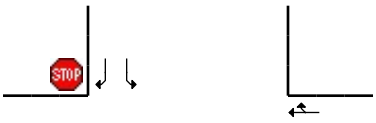
QC JOB #: 10502001
DATE: 5/6/2010

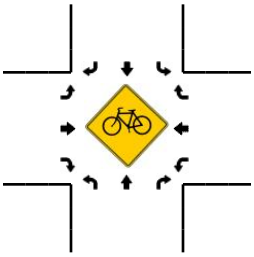


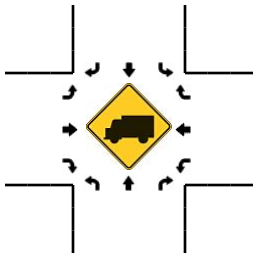
Peak-Hour: 7:05 AM -- 8:05 AM
Peak 15-Min: 7:25 AM -- 7:40 AM

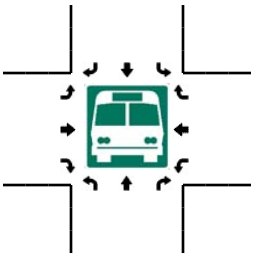












5-Min Count Period Beginning At	Ingle Rd (Northbound)			Ingle Rd (Southbound)			Goodwin Rd (Eastbound)			Goodwin Rd (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
7:00 AM	0	0	0	2	0	7	3	6	0	0	9	6	33	
7:05 AM	0	0	0	6	0	4	2	6	0	0	9	7	34	
7:10 AM	0	0	0	5	0	8	4	8	0	0	14	8	47	
7:15 AM	0	0	0	3	0	14	0	6	0	0	13	10	46	
7:20 AM	0	0	0	2	0	9	4	3	0	0	21	7	46	
7:25 AM	0	0	0	3	0	18	5	5	0	0	21	6	58	
7:30 AM	0	0	0	5	0	17	6	4	0	0	17	8	57	
7:35 AM	0	0	0	1	0	23	5	5	0	0	12	6	52	
7:40 AM	0	0	0	4	0	10	6	3	0	0	12	8	43	
7:45 AM	0	0	0	8	0	7	12	6	0	0	24	8	65	
7:50 AM	0	0	0	5	0	5	5	3	0	0	21	7	46	
7:55 AM	0	0	0	2	0	4	6	3	0	0	13	2	30	557
8:00 AM	0	0	0	5	0	6	6	2	0	0	15	9	43	567
8:05 AM	0	0	0	3	0	7	2	3	0	0	12	4	31	564
8:10 AM	0	0	0	2	0	5	1	6	0	0	9	9	32	549
8:15 AM	0	0	0	4	0	7	0	6	0	0	19	3	39	542
8:20 AM	0	0	0	1	0	3	1	6	0	0	12	4	27	523
8:25 AM	0	0	0	0	0	7	4	6	0	0	18	5	40	505
8:30 AM	0	0	0	1	0	8	4	2	0	0	8	1	24	472
8:35 AM	0	0	0	0	0	8	1	5	0	0	16	13	43	463
8:40 AM	0	0	0	2	0	3	4	9	0	0	13	1	32	452
8:45 AM	0	0	0	2	0	7	3	5	0	0	13	6	36	423
8:50 AM	0	0	0	6	0	6	5	4	0	0	16	5	42	419
8:55 AM	0	0	0	3	0	5	2	4	0	0	10	5	29	418

Peak 15-Min Flowrates	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
All Vehicles	0	0	0	36	0	232	64	56	0	0	200	80	668
Heavy Trucks	0	0	0	0	0	8	12	0	0	0	12	0	32
Pedestrians		0			0			0			0		0
Bicycles													
Railroad													
Stopped Buses													

Comments:

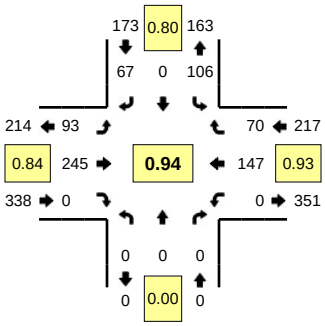
Report generated on 5/11/2010 11:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

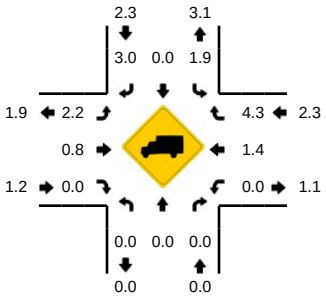
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

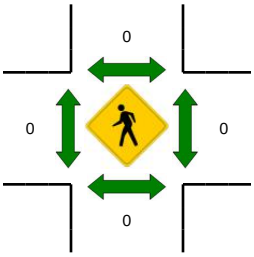
LOCATION: Ingle Rd -- Goodwin Rd
CITY/STATE: Camas, WA

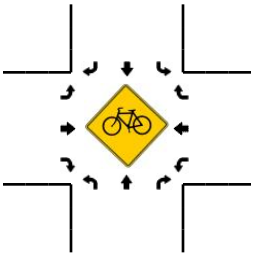
QC JOB #: 10502002
DATE: 5/5/2010

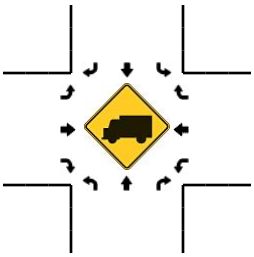


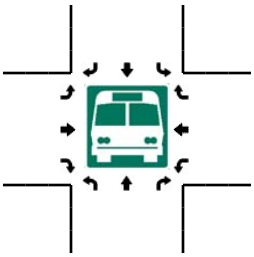
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:00 PM -- 5:15 PM











5-Min Count Period Beginning At	Ingle Rd (Northbound)				Ingle Rd (Southbound)				Goodwin Rd (Eastbound)				Goodwin Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	5	0	4	0	9	21	0	0	0	10	3	0	52	
4:05 PM	0	0	0	0	6	0	5	0	13	13	0	0	0	12	5	0	54	
4:10 PM	0	0	0	0	4	0	5	0	9	14	0	0	0	6	4	0	42	
4:15 PM	0	0	0	0	16	0	2	0	4	15	0	0	0	11	2	0	50	
4:20 PM	0	0	0	0	11	0	7	0	9	19	0	0	0	18	4	0	68	
4:25 PM	0	0	0	0	9	0	10	0	2	17	0	0	0	15	4	0	57	
4:30 PM	0	0	0	0	5	0	10	0	7	23	0	0	0	13	4	0	62	
4:35 PM	0	0	0	0	6	0	3	0	6	12	0	0	0	7	7	0	41	
4:40 PM	0	0	0	0	4	0	4	0	9	19	0	0	0	13	5	0	54	
4:45 PM	0	0	0	0	9	0	6	0	5	25	0	0	0	15	5	0	65	
4:50 PM	0	0	0	0	4	0	0	0	8	22	0	0	0	13	3	0	50	
4:55 PM	0	0	0	0	17	0	5	0	2	20	0	0	0	11	4	0	59	654
5:00 PM	0	0	0	0	6	0	6	0	3	25	0	0	0	14	13	0	67	669
5:05 PM	0	0	0	0	7	0	5	0	18	18	0	0	0	7	9	0	64	679
5:10 PM	0	0	0	0	6	0	4	0	10	27	0	0	0	12	4	0	63	700
5:15 PM	0	0	0	0	8	0	11	0	6	16	0	0	0	16	4	0	61	711
5:20 PM	0	0	0	0	14	0	6	0	5	19	0	0	0	10	6	0	60	703
5:25 PM	0	0	0	0	14	0	6	0	6	21	0	0	0	14	7	0	68	714
5:30 PM	0	0	0	0	6	0	5	0	4	21	0	0	0	5	3	0	44	696
5:35 PM	0	0	0	0	6	0	6	0	14	12	0	0	0	19	7	0	64	719
5:40 PM	0	0	0	0	9	0	7	0	12	19	0	0	0	11	5	0	63	728
5:45 PM	0	0	0	0	10	0	11	0	5	19	0	0	0	8	4	0	57	720
5:50 PM	0	0	0	0	7	0	6	0	5	19	0	0	0	11	5	0	53	723
5:55 PM	0	0	0	0	6	0	3	0	8	13	0	0	0	8	4	0	42	706

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	76	0	60	0	124	280	0	0	0	132	104	0	776
Heavy Trucks	0	0	0		0	0	0		4	4	0		0	4	4		16
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

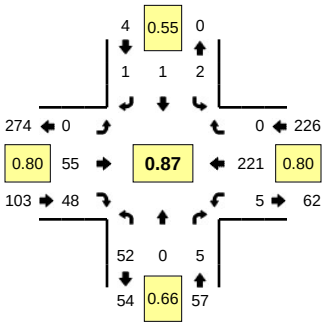
Report generated on 5/11/2010 11:22 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

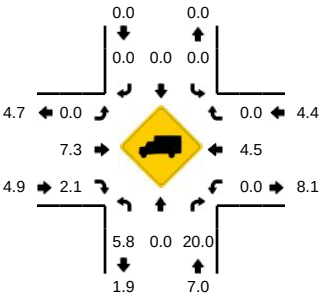
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

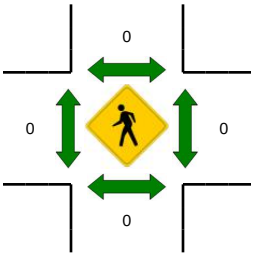
LOCATION: 232nd Ave -- 28th St
CITY/STATE: Camas, WA

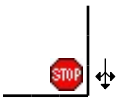
QC JOB #: 10502003
DATE: 5/6/2010

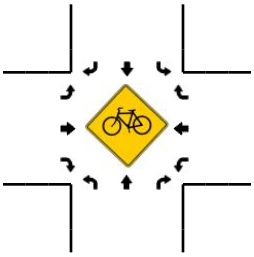


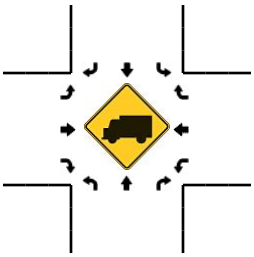
Peak-Hour: 7:05 AM -- 8:05 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

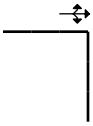


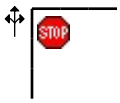


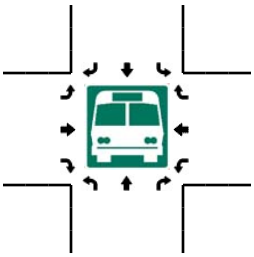












5-Min Count Period Beginning At	232nd Ave (Northbound)				232nd Ave (Southbound)				28th St (Eastbound)				28th St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	4	0	0	0	0	0	1	0	0	8	5	0	0	8	0	0	26	
7:05 AM	5	0	1	0	0	0	0	0	0	4	3	0	1	16	0	0	30	
7:10 AM	2	0	3	0	1	0	0	0	0	8	6	0	0	15	0	0	35	
7:15 AM	9	0	0	0	1	0	0	0	0	4	9	0	0	15	0	0	38	
7:20 AM	7	0	0	0	0	0	0	0	0	4	2	0	1	22	0	0	36	
7:25 AM	6	0	0	0	0	0	0	0	0	5	2	0	3	20	0	0	36	
7:30 AM	2	0	0	0	0	0	1	0	0	5	4	0	0	19	0	0	31	
7:35 AM	3	0	0	0	0	0	0	0	0	4	1	0	0	16	0	0	24	
7:40 AM	4	0	0	0	0	0	0	0	0	1	4	0	0	21	0	0	30	
7:45 AM	6	0	0	0	0	0	0	0	0	5	7	0	0	22	0	0	40	
7:50 AM	1	0	0	0	0	0	0	0	0	5	8	0	0	28	0	0	42	
7:55 AM	4	0	1	0	0	0	0	0	0	3	2	0	0	8	0	0	18	386
8:00 AM	3	0	0	0	0	1	0	0	0	7	0	0	0	19	0	0	30	390
8:05 AM	2	0	0	0	0	1	1	0	0	4	0	0	2	14	0	0	24	384
8:10 AM	5	0	0	0	0	1	0	0	0	7	3	0	0	15	0	0	31	380
8:15 AM	2	0	0	0	0	0	2	0	0	7	1	0	0	12	0	0	24	366
8:20 AM	5	0	1	0	0	0	0	0	0	6	4	0	0	12	0	0	28	358
8:25 AM	1	0	0	0	0	0	1	0	0	6	3	0	0	18	0	0	29	351
8:30 AM	1	0	1	0	0	0	0	0	0	1	1	0	0	8	0	0	12	332
8:35 AM	4	0	1	0	0	0	1	0	0	1	3	0	0	20	0	0	30	338
8:40 AM	2	0	1	0	0	0	0	0	0	6	3	0	0	15	0	0	27	335
8:45 AM	4	0	0	0	0	0	1	0	0	8	2	0	1	11	0	0	27	322
8:50 AM	3	0	1	0	0	0	0	0	0	3	2	0	2	17	0	0	28	308
8:55 AM	2	1	0	0	0	0	2	0	0	5	3	0	0	10	0	0	23	313

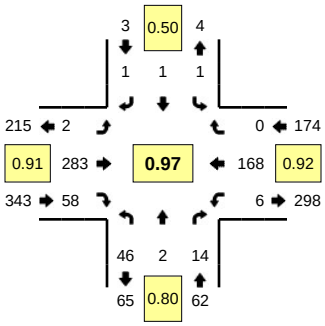
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	44	0	0	0	0	0	0	0	0	44	76	0	0	284	0	0	448
Heavy Trucks	4	0	0		0	0	0		0	0	0		0	16	0		20
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

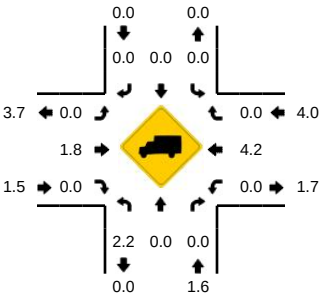
Report generated on 5/11/2010 11:22 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

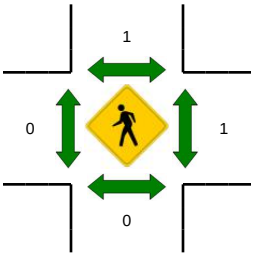
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

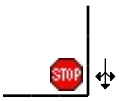
LOCATION: 232nd Ave -- 28th St | **QC JOB #:** 10502004
CITY/STATE: Camas, WA | **DATE:** 5/5/2010

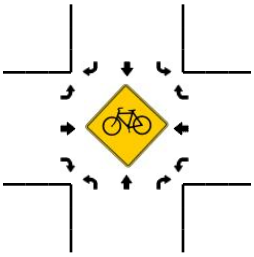


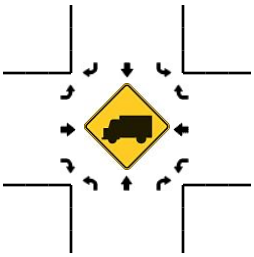
Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 4:55 PM -- 5:10 PM

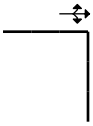


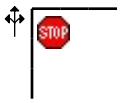


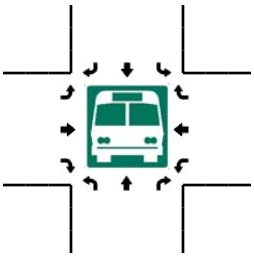












5-Min Count Period Beginning At	232nd Ave (Northbound)				232nd Ave (Southbound)				28th St (Eastbound)				28th St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	4	0	1	0	0	0	1	0	0	23	2	0	1	12	0	0	44	
4:05 PM	2	0	1	0	0	0	0	0	0	12	7	0	1	11	0	0	34	
4:10 PM	1	1	1	0	0	0	1	0	2	18	1	0	0	9	0	0	34	
4:15 PM	5	1	0	0	0	0	0	0	0	22	11	0	0	7	0	0	46	
4:20 PM	4	0	1	0	0	0	0	0	0	20	2	0	0	18	0	0	45	
4:25 PM	4	0	2	0	0	1	0	0	0	17	7	0	1	19	0	0	51	
4:30 PM	4	0	1	0	0	0	0	0	0	25	3	0	0	11	0	0	44	
4:35 PM	0	1	0	0	0	0	0	0	0	15	7	0	0	15	0	0	38	
4:40 PM	8	0	3	0	0	1	0	0	0	24	1	0	2	12	0	0	51	
4:45 PM	3	1	0	0	0	0	0	0	0	29	5	0	0	18	0	0	56	
4:50 PM	5	0	0	0	0	0	0	0	1	19	1	0	0	11	0	0	37	
4:55 PM	3	1	0	0	0	0	0	0	0	29	10	0	0	13	0	0	56	536
5:00 PM	6	0	0	0	0	0	0	0	0	22	6	0	0	22	0	0	56	548
5:05 PM	4	0	3	0	1	0	0	0	0	18	3	0	0	9	0	0	38	552
5:10 PM	2	0	2	0	0	0	0	0	0	34	2	0	0	16	0	0	56	574
5:15 PM	1	0	0	0	0	0	1	0	0	23	6	0	1	13	0	0	45	573
5:20 PM	4	0	1	0	0	0	0	0	0	18	7	0	0	14	0	0	44	572
5:25 PM	4	0	3	0	0	0	0	0	0	27	8	0	0	10	0	0	52	573
5:30 PM	3	0	1	0	0	0	0	0	0	20	8	0	0	15	0	0	47	576
5:35 PM	3	0	1	0	0	0	0	0	1	20	1	0	3	15	0	0	44	582
5:40 PM	3	0	0	0	0	0	0	0	0	23	2	0	0	14	0	0	42	573
5:45 PM	5	0	0	0	0	0	1	0	0	17	2	0	1	10	0	0	36	553
5:50 PM	3	0	0	0	0	0	0	0	0	22	7	0	2	6	0	0	40	556
5:55 PM	2	0	0	0	0	0	0	0	0	15	6	0	1	9	0	0	33	533

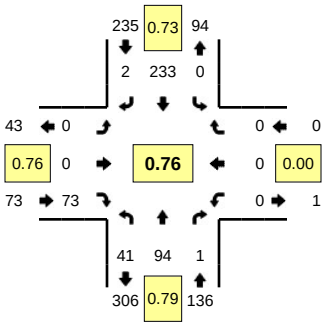
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	52	4	12	0	4	0	0	0	0	276	76	0	0	176	0	0	600
Heavy Trucks	4	0	0		0	0	0		0	0	0		0	4	0		8
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

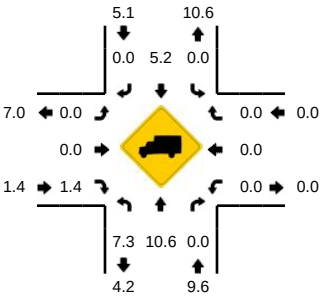
Report generated on 5/11/2010 11:22 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

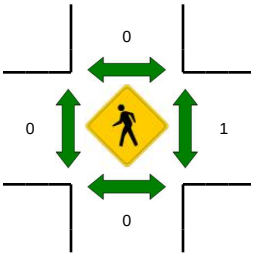
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

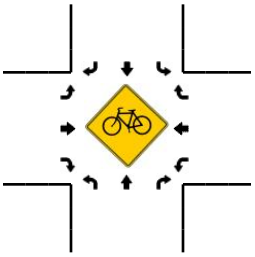
LOCATION: NE Everett St/SR-500 -- Leadbetter Rd | **QC JOB #:** 10502005
CITY/STATE: Camas, WA | **DATE:** 5/6/2010

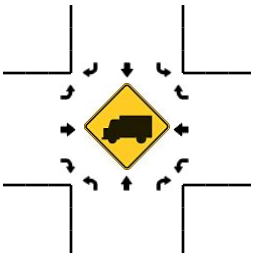


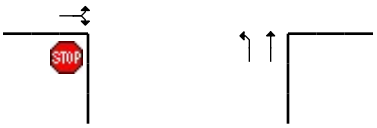
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:15 AM -- 7:30 AM

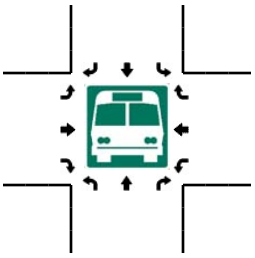












5-Min Count Period Beginning At	NE Everett St/SR-500 (Northbound)				NE Everett St/SR-500 (Southbound)				Leadbetter Rd (Eastbound)				Leadbetter Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	2	6	0	0	0	17	0	0	0	0	3	0	0	0	0	0	28	
7:05 AM	4	5	0	0	0	23	0	0	0	0	5	0	0	0	0	0	37	
7:10 AM	4	8	0	0	0	11	0	0	0	0	5	0	0	0	0	0	28	
7:15 AM	6	13	0	0	0	21	1	0	0	0	6	0	0	0	0	0	47	
7:20 AM	4	7	0	0	0	27	0	0	0	0	9	0	0	0	0	0	47	
7:25 AM	3	10	0	0	0	32	0	0	0	0	7	0	0	0	0	0	52	
7:30 AM	2	9	0	0	0	17	0	0	0	0	7	0	0	0	0	0	35	
7:35 AM	4	5	0	0	0	19	1	0	0	0	4	0	0	0	0	0	33	
7:40 AM	5	8	1	0	0	14	0	0	0	0	3	0	0	0	0	0	31	
7:45 AM	3	5	0	0	0	19	0	0	0	0	4	0	0	0	0	0	31	
7:50 AM	1	12	0	0	0	22	0	0	0	0	11	0	0	0	0	0	46	
7:55 AM	3	6	0	0	0	11	0	0	0	0	9	0	0	0	0	0	29	444
8:00 AM	2	2	0	0	0	12	1	0	0	0	2	0	0	0	0	0	19	435
8:05 AM	2	9	0	0	0	12	0	0	1	0	3	0	0	0	0	0	27	425
8:10 AM	3	4	0	0	0	14	0	0	0	0	3	0	0	0	0	0	24	421
8:15 AM	5	5	0	0	0	18	0	0	0	0	5	0	0	0	0	0	33	407
8:20 AM	1	4	0	0	0	15	0	0	0	0	0	0	0	0	0	0	20	380
8:25 AM	1	10	0	0	0	15	0	0	0	0	4	0	0	0	0	0	30	358
8:30 AM	4	11	0	1	0	18	0	0	0	0	4	0	0	0	0	0	38	361
8:35 AM	2	7	0	0	0	17	0	0	2	0	0	0	0	0	0	0	28	356
8:40 AM	2	7	0	0	0	8	2	0	2	0	1	0	0	0	0	0	22	347
8:45 AM	1	8	0	0	0	15	1	0	2	0	3	0	0	0	0	0	30	346
8:50 AM	3	9	0	0	0	15	0	0	0	0	7	0	0	0	0	0	34	334
8:55 AM	3	10	0	0	0	22	0	0	0	0	2	0	0	0	0	0	37	342

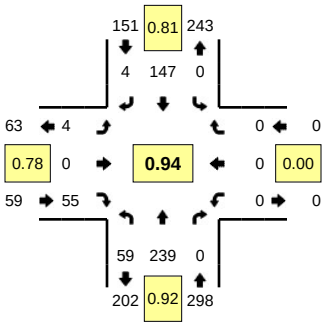
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	52	120	0	0	0	320	4	0	0	0	88	0	0	0	0	0	584
Heavy Trucks	4	8	0		0	4	0		0	0	0		0	0	0		16
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

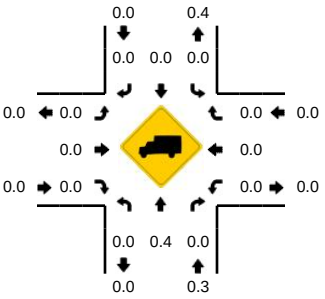
Report generated on 5/11/2010 11:22 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

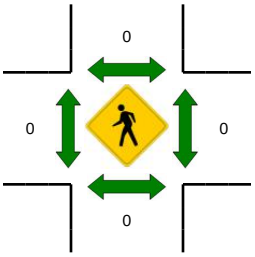
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

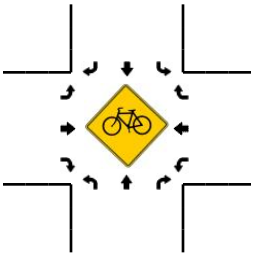
LOCATION: NE Everett St/SR-500 -- Leadbetter Rd | **QC JOB #:** 10502006
CITY/STATE: Camas, WA | **DATE:** 5/5/2010

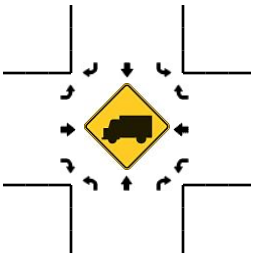


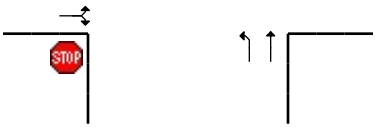
Peak-Hour: 4:05 PM -- 5:05 PM
Peak 15-Min: 4:10 PM -- 4:25 PM

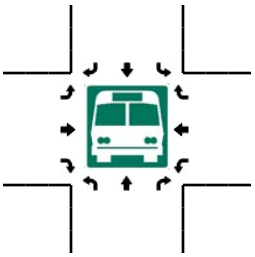












5-Min Count Period Beginning At	NE Everett St/SR-500 (Northbound)				NE Everett St/SR-500 (Southbound)				Leadbetter Rd (Eastbound)				Leadbetter Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	4	16	0	0	0	16	0	0	0	0	2	0	0	0	0	0	38	
4:05 PM	5	19	0	0	0	14	1	0	0	0	3	0	0	0	0	0	42	
4:10 PM	3	26	0	0	0	14	1	0	1	0	8	0	0	0	0	0	53	
4:15 PM	6	13	0	0	0	15	1	0	0	0	1	0	0	0	0	0	36	
4:20 PM	5	16	0	0	0	16	0	0	1	0	8	0	0	0	0	0	46	
4:25 PM	4	20	0	0	0	8	1	0	0	0	5	0	0	0	0	0	38	
4:30 PM	2	19	0	0	0	15	0	0	0	0	5	0	0	0	0	0	41	
4:35 PM	11	21	0	0	0	13	0	0	1	0	5	0	0	0	0	0	51	
4:40 PM	2	22	0	0	0	6	0	0	1	0	6	0	0	0	0	0	37	
4:45 PM	5	20	0	0	0	11	0	0	0	0	3	0	0	0	0	0	39	
4:50 PM	3	22	0	0	0	12	0	0	0	0	3	0	0	0	0	0	40	
4:55 PM	5	22	0	0	0	9	0	0	0	0	1	0	0	0	0	0	37	498
5:00 PM	8	19	0	0	0	14	0	0	0	0	7	0	0	0	0	0	48	508
5:05 PM	4	18	0	0	0	10	0	0	0	0	3	0	0	0	0	0	35	501
5:10 PM	3	22	0	0	0	14	0	0	0	0	4	0	0	0	0	0	43	491
5:15 PM	4	15	0	0	0	16	0	0	0	0	1	0	0	0	0	0	36	491
5:20 PM	5	19	0	0	0	7	0	0	0	0	6	0	0	0	0	0	37	482
5:25 PM	6	18	0	0	0	9	0	0	0	0	6	0	0	0	0	0	39	483
5:30 PM	5	11	0	0	0	5	0	0	0	0	9	0	0	0	0	0	30	472
5:35 PM	4	16	0	0	0	8	0	0	0	0	4	0	0	0	0	0	32	453
5:40 PM	6	19	0	0	0	12	0	0	0	0	2	0	0	0	0	0	39	455
5:45 PM	6	15	0	0	0	11	0	0	0	0	2	0	0	0	0	0	34	450
5:50 PM	1	16	0	0	0	15	0	0	0	0	8	0	0	0	0	0	40	450
5:55 PM	4	13	0	0	0	6	0	0	0	0	3	0	0	0	0	0	26	439

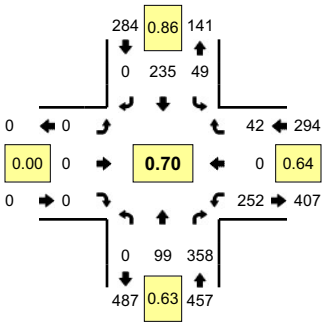
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	56	220	0	0	0	180	8	0	8	0	68	0	0	0	0	0	540
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

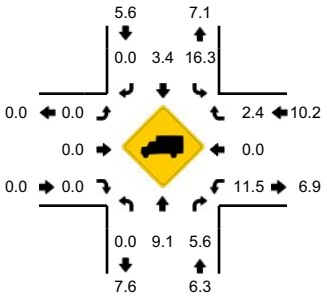
Report generated on 5/11/2010 11:22 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

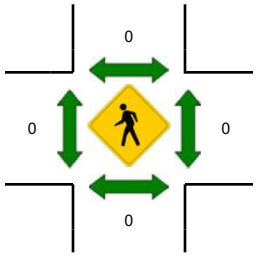
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

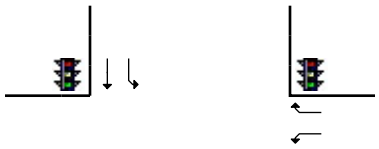
LOCATION: SR 500/NE Everett St -- NE 43rd Ave/SE 15th St | **QC JOB #:** 10475503
CITY/STATE: Camas, WA | **DATE:** 1/22/2010

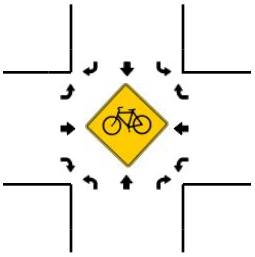


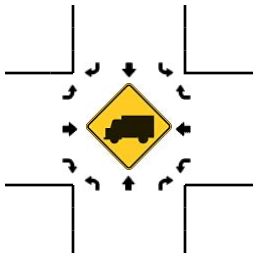
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

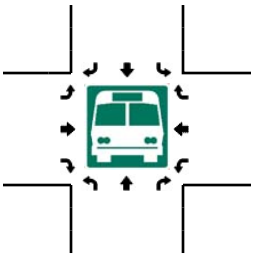












5-Min Count Period Beginning At	SR 500/NE Everett St (Northbound)				SR 500/NE Everett St (Southbound)				NE 43rd Ave/SE 15th St (Eastbound)				NE 43rd Ave/SE 15th St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	5	22	0	5	12	0	0	0	0	0	0	8	0	1	0	53	
7:05 AM	0	6	30	0	10	15	0	0	0	0	0	0	8	0	1	0	70	
7:10 AM	0	6	32	0	6	19	0	0	0	0	0	0	23	0	0	0	86	
7:15 AM	0	6	10	0	2	19	0	0	0	0	0	0	31	0	3	0	71	
7:20 AM	0	7	10	0	1	29	0	0	0	0	0	0	20	0	2	0	69	
7:25 AM	0	6	16	0	0	18	0	0	0	0	0	0	11	0	1	0	52	
7:30 AM	0	12	19	0	2	31	0	0	0	0	0	0	10	0	6	0	80	
7:35 AM	0	10	41	0	5	19	0	0	0	0	0	0	14	0	2	0	91	
7:40 AM	0	7	66	0	3	23	0	0	0	0	0	0	27	0	6	0	132	
7:45 AM	0	14	43	0	4	19	0	0	0	0	0	0	30	0	7	0	117	
7:50 AM	0	9	39	0	5	18	0	0	0	0	0	0	42	0	7	0	120	
7:55 AM	0	11	30	0	6	13	0	0	0	0	0	0	28	0	6	0	94	1035
8:00 AM	0	10	7	0	0	9	0	0	0	0	0	0	18	0	3	0	47	1029
8:05 AM	0	6	5	0	0	17	0	0	0	0	0	0	4	0	1	0	33	992
8:10 AM	0	7	6	0	0	18	0	0	0	0	0	0	3	0	0	0	34	940
8:15 AM	0	2	5	0	0	21	0	0	0	0	0	0	3	0	2	0	33	902
8:20 AM	0	7	6	0	0	21	0	0	0	0	0	0	8	0	0	0	42	875
8:25 AM	0	6	8	0	1	20	0	0	0	0	0	0	9	0	0	0	44	867
8:30 AM	0	4	7	0	0	16	0	0	0	0	0	0	11	0	2	0	40	827
8:35 AM	0	7	12	0	2	11	0	0	0	0	0	0	13	0	1	0	46	782
8:40 AM	0	5	5	0	0	15	0	0	0	0	0	0	11	0	0	0	36	686
8:45 AM	0	7	12	0	1	17	0	0	0	0	0	0	11	0	2	0	50	619
8:50 AM	0	11	6	0	0	30	0	0	0	0	0	0	13	0	3	0	63	562
8:55 AM	0	16	8	0	2	20	0	0	0	0	0	0	9	0	0	0	55	523

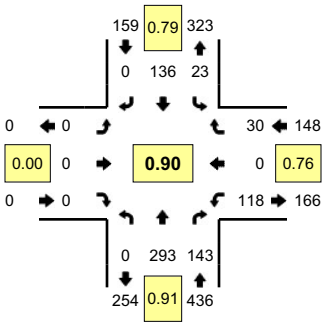
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	120	592	0	48	240	0	0	0	0	0	0	396	0	80	0	1476
Heavy Trucks	0	16	0		0	8	0		0	0	0		0	0	0		24
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

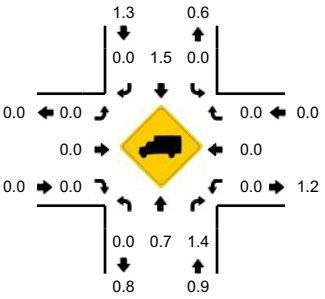
Report generated on 1/26/2010 4:38 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

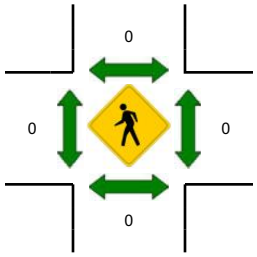
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

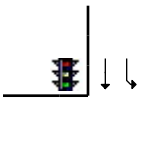
LOCATION: SR 500/NE Everett St -- NE 43rd Ave/ SE 15th St | **QC JOB #:** 10475504
CITY/STATE: Camas, WA | **DATE:** 1/20/2010

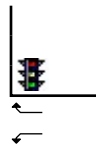


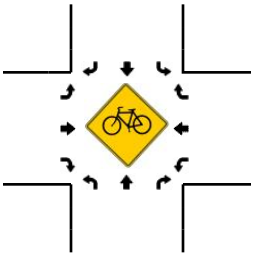
Peak-Hour: 4:20 PM -- 5:20 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

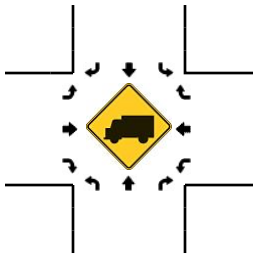


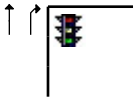


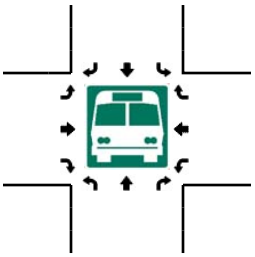












5-Min Count Period Beginning At	SR 500/NE Everett St (Northbound)				SR 500/NE Everett St (Southbound)				NE 43rd Ave/ SE 15th St (Eastbound)				NE 43rd Ave/ SE 15th St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	15	10	0	1	18	0	0	0	0	0	0	10	0	2	0	56	
4:05 PM	0	18	16	0	1	16	0	0	0	0	0	0	9	0	4	0	64	
4:10 PM	0	19	11	0	0	10	0	0	0	0	0	0	9	0	3	0	52	
4:15 PM	0	20	10	0	0	17	0	0	0	0	0	0	3	0	0	0	50	
4:20 PM	0	19	7	0	5	23	0	0	0	0	0	0	7	0	3	0	64	
4:25 PM	0	21	13	0	1	11	0	0	0	0	0	0	13	0	4	0	63	
4:30 PM	0	21	12	0	2	11	0	0	0	0	0	0	14	0	1	0	61	
4:35 PM	0	29	14	0	1	17	0	0	0	0	0	0	14	0	3	0	78	
4:40 PM	0	24	16	0	3	12	0	0	0	0	0	0	9	0	1	0	65	
4:45 PM	0	22	12	0	6	8	0	0	0	0	0	0	9	0	7	0	64	
4:50 PM	0	30	12	0	1	10	0	0	0	0	0	0	8	0	7	0	68	
4:55 PM	0	25	7	0	0	7	0	0	0	0	0	0	4	0	3	0	46	731
5:00 PM	0	17	15	0	2	8	0	0	0	0	0	0	7	0	0	0	49	724
5:05 PM	0	30	12	0	0	10	0	0	0	0	0	0	10	0	1	0	63	723
5:10 PM	0	27	10	0	1	9	0	0	0	0	0	0	13	0	0	0	60	731
5:15 PM	0	28	13	0	1	10	0	0	0	0	0	0	10	0	0	0	62	743
5:20 PM	0	23	5	0	0	9	0	0	0	0	0	0	7	0	0	0	44	723
5:25 PM	0	19	5	0	3	5	0	0	0	0	0	0	5	0	1	0	38	698
5:30 PM	0	27	9	0	0	15	0	0	0	0	0	0	6	0	2	0	59	696
5:35 PM	0	22	6	0	0	17	0	0	0	0	0	0	4	0	0	0	49	667
5:40 PM	0	21	3	0	3	12	0	0	0	0	0	0	9	0	1	0	49	651
5:45 PM	0	20	7	0	2	10	0	0	0	0	0	0	6	0	5	0	50	637
5:50 PM	0	21	12	0	1	10	0	0	0	0	0	0	7	0	2	0	53	622
5:55 PM	0	13	11	0	2	18	0	0	0	0	0	0	8	0	1	0	53	629

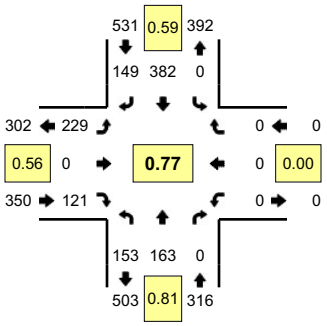
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	300	168	0	40	148	0	0	0	0	0	0	128	0	44	0	828
Heavy Trucks	0	0	0		0	8	0		0	0	0		0	0	0		8
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

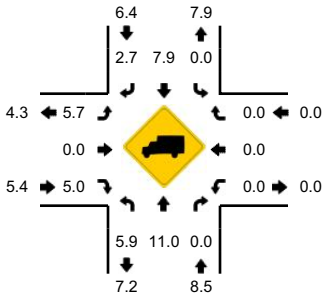
Report generated on 1/26/2010 4:38 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

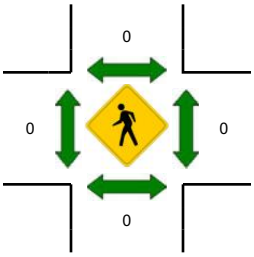
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

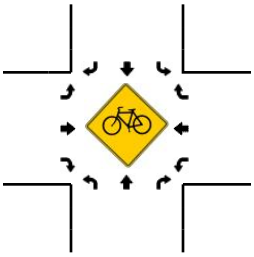
LOCATION: SR 500/NE Everett St -- NE Lake Rd | **QC JOB #:** 10475505
CITY/STATE: Camas, WA | **DATE:** 1/20/2010

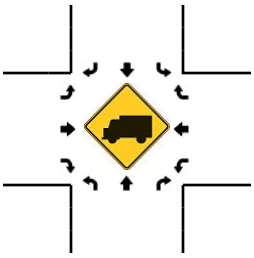


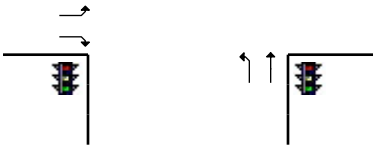
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:10 AM -- 7:25 AM

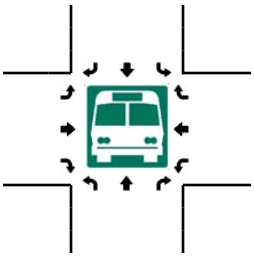












5-Min Count Period Beginning At	SR 500/NE Everett St (Northbound)				SR 500/NE Everett St (Southbound)				NE Lake Rd (Eastbound)				NE Lake Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	6	15	0	0	0	16	4	0	35	0	4	0	0	0	0	0	80	
7:05 AM	8	25	0	0	0	19	7	0	47	0	4	0	0	0	0	0	110	
7:10 AM	11	23	0	0	0	28	5	0	57	0	4	0	0	0	0	0	128	
7:15 AM	10	17	0	0	0	45	21	0	34	0	10	0	0	0	0	0	137	
7:20 AM	8	4	0	0	0	57	29	0	15	0	12	0	0	0	0	0	125	
7:25 AM	12	10	0	0	0	52	22	0	5	0	5	0	0	0	0	0	106	
7:30 AM	9	14	0	0	0	42	21	0	7	0	21	0	0	0	0	0	114	
7:35 AM	17	10	0	0	0	24	9	0	4	0	16	0	0	0	0	0	80	
7:40 AM	21	13	0	0	0	15	7	0	8	0	11	0	0	0	0	0	75	
7:45 AM	23	13	0	0	0	35	8	0	6	0	14	0	0	0	0	0	99	
7:50 AM	11	7	0	0	0	25	9	0	7	0	12	0	0	0	0	0	71	
7:55 AM	17	12	0	0	0	24	7	0	4	0	8	0	0	0	0	0	72	1197
8:00 AM	10	11	0	0	0	13	6	0	2	0	9	0	0	0	0	0	51	1168
8:05 AM	17	6	0	0	0	17	4	0	0	0	6	0	0	0	0	0	50	1108
8:10 AM	14	7	0	0	0	22	7	0	0	0	4	0	0	0	0	0	54	1034
8:15 AM	11	11	0	0	0	22	6	0	3	0	10	0	0	0	0	0	63	960
8:20 AM	12	9	0	0	0	21	7	0	4	0	4	0	0	0	0	0	57	892
8:25 AM	10	7	0	0	0	15	5	0	3	0	6	0	0	0	0	0	46	832
8:30 AM	12	6	0	0	0	22	3	0	6	0	10	0	0	0	0	0	59	777
8:35 AM	11	17	0	0	0	25	19	0	6	0	10	0	0	0	0	0	88	785
8:40 AM	6	11	0	0	0	20	8	0	5	0	14	0	0	0	0	0	64	774
8:45 AM	17	19	0	0	0	26	6	0	6	0	20	0	0	0	0	0	94	769
8:50 AM	16	13	0	0	0	33	12	0	1	0	16	0	0	0	0	0	91	789
8:55 AM	9	10	0	0	0	19	7	0	5	0	26	0	0	0	0	0	76	793

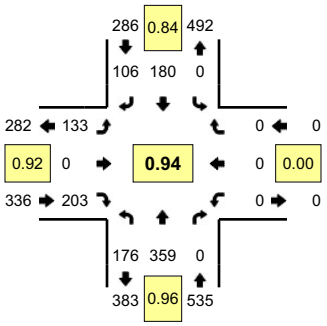
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	116	176	0	0	0	520	220	0	424	0	104	0	0	0	0	0	1560
Heavy Trucks	8	28	0		0	96	12		20	0	8		0	0	0		172
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

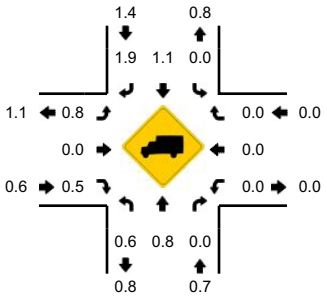
Report generated on 1/26/2010 4:38 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

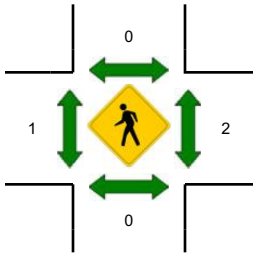
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

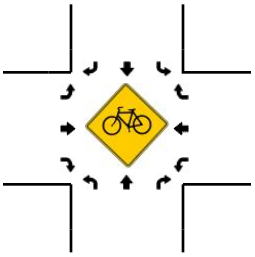
LOCATION: SR 500/NE Everett St -- NE Lake Rd | **QC JOB #:** 10475506
CITY/STATE: Camas, WA | **DATE:** 1/20/2010

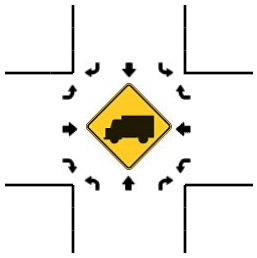


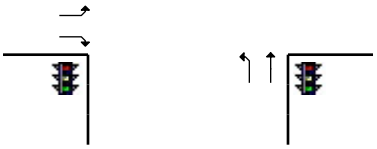
Peak-Hour: 4:20 PM -- 5:20 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

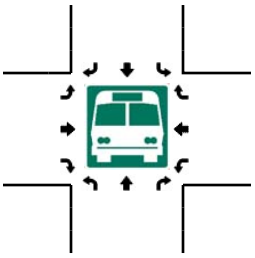












5-Min Count Period Beginning At	SR 500/NE Everett St (Northbound)				SR 500/NE Everett St (Southbound)				NE Lake Rd (Eastbound)				NE Lake Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	10	22	0	0	0	22	13	0	10	0	14	0	0	0	0	0	91	
4:05 PM	21	27	0	0	0	16	11	0	13	0	19	0	0	0	0	0	107	
4:10 PM	6	30	0	0	0	11	11	0	10	0	17	0	0	0	0	0	85	
4:15 PM	16	20	0	0	0	16	3	0	7	0	23	0	0	0	0	0	85	
4:20 PM	11	26	0	0	0	26	5	0	8	0	20	0	0	0	0	0	96	
4:25 PM	14	36	0	0	0	16	9	0	11	0	18	0	0	0	0	0	104	
4:30 PM	8	18	0	0	0	17	11	0	19	0	16	0	0	0	0	0	89	
4:35 PM	14	39	0	0	0	27	10	0	8	0	14	0	0	0	0	0	112	
4:40 PM	22	23	0	0	0	10	9	0	15	0	17	0	0	0	0	0	96	
4:45 PM	14	31	0	0	0	14	13	0	11	0	16	0	0	0	0	0	99	
4:50 PM	18	28	0	0	0	13	8	0	9	0	18	0	0	0	0	0	94	
4:55 PM	18	35	0	0	0	9	3	0	7	0	19	0	0	0	0	0	91	1149
5:00 PM	10	28	0	0	0	9	6	0	8	0	16	0	0	0	0	0	77	1135
5:05 PM	16	30	0	0	0	14	8	0	15	0	16	0	0	0	0	0	99	1127
5:10 PM	21	38	0	0	0	13	15	0	9	0	17	0	0	0	0	0	113	1155
5:15 PM	10	27	0	0	0	12	9	0	13	0	16	0	0	0	0	0	87	1157
5:20 PM	19	27	0	0	0	19	4	0	7	0	18	0	0	0	0	0	94	1155
5:25 PM	22	17	0	0	0	8	6	0	13	0	18	0	0	0	0	0	84	1135
5:30 PM	16	30	0	0	0	18	6	0	7	0	18	0	0	0	0	0	95	1141
5:35 PM	20	31	0	0	0	18	5	0	3	0	17	0	0	0	0	0	94	1123
5:40 PM	9	24	0	0	0	18	9	0	12	0	23	0	0	0	0	0	95	1122
5:45 PM	13	26	0	0	0	15	6	0	7	0	13	0	0	0	0	0	80	1103
5:50 PM	17	19	0	0	0	8	7	0	15	0	10	0	0	0	0	0	76	1085
5:55 PM	3	14	0	0	0	23	12	0	11	0	19	0	0	0	0	0	82	1076

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	200	372	0	0	0	204	128	0	136	0	188	0	0	0	0	0	1228
Heavy Trucks	4	0	0		0	4	4		0	0	0		0	0	0		12
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 1/26/2010 4:38 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of report: Tube Count - Single Page Summary

LOCATION: Leadbetter Road 213' West of Boat Launch Dwy
QC JOB #: 10502402
SPECIFIC LOCATION: 10 ft from
DIRECTION: EB/WB
CITY/STATE: Camas, WA
DATE: May 05 2010

VOLUME DATA (EB/WB)

Start Time	EB Morning	EB Evening	Hourly Totals Morning	Hourly Totals Evening	WB Morning	WB Evening	Hourly Totals Morning	Hourly Totals Evening	Combined Totals Morning	Combined Totals Evening
12:00	0	8			0	3				
12:15	0	9			0	11				
12:30	0	5			0	8				
12:45	0	8	0	30	0	8	0	30	0	60
01:00	0	4			1	12				
01:15	1	10			0	7				
01:30	2	12			1	4				
01:45	0	18	3	44	0	7	2	30	5	74
02:00	0	8			0	15				
02:15	0	12			0	14				
02:30	0	9			0	13				
02:45	0	7	0	36	0	20	0	62	0	98
03:00	0	10			0	18				103
03:15	1	15			0	15				107
03:30	0	12			0	16				113
03:45	0	11	1	48	0	22	0	71	1	119
04:00	0	11			0	14				116
04:15	1	14			0	15				115
04:30	1	19			1	20				126
04:45	1	8	3	52	0	15	1	64	4	116
05:00	2	13		54	0	15		65		119
05:15	1	14			4	11				115
05:30	2	15			1	13				104
05:45	0	13	5	55	1	12	6	51	11	106
06:00	8	11			2	17				
06:15	9	9			3	13				
06:30	12	4			5	9				
06:45	22	8	51	32	7	7	17	46	68	78
07:00	13	4			8	6				
07:15	22	7			16	6			105	
07:30	14	7			8	6			110	
07:45	23	8	72	26	10	10	42	28	114	54
08:00	9	2			7	18			109	
08:15	9	5			8	9			88	
08:30	10	5			6	9				
08:45	15	4	43	16	8	7	29	43	72	59
09:00	4	3			9	9				
09:15	5	3			6	5				
09:30	6	1			4	5				
09:45	3	2	18	9	5	1	24	20	42	29
10:00	11	2			7	1				
10:15	10	4			4	1				
10:30	6	0			13	1				
10:45	10	2	37	8	7	1	31	4	68	12
11:00	6	0			3	3				
11:15	5	0			4	0				
11:30	10	1			9	2				
11:45	13	2	34	3	5	0	21	5	55	8
Day Total	267	359	626		173	454	627		440	813
Percent	42.7%	57.3%			27.6%	72.4%			35.1%	64.9%

PM PEAK

AM PEAK

PM

AM

EB Totals		WB Totals		Combined Totals	
PEAK HOUR (7-9 AM):	72	PEAK HOUR (7-9 AM):	42	PEAK HOUR (7-9 AM):	114
PEAK HOUR (4-6 PM):	55	PEAK HOUR (4-6 PM):	64	PEAK HOUR (4-6 PM):	116
PEAK HOUR (AM):	7:00 AM	PEAK HOUR (AM):	7:00 AM	PEAK HOUR (AM):	7:00 AM
PEAK HOUR (PM):	5:00 PM	PEAK HOUR (PM):	3:00 PM	PEAK HOUR (PM):	3:00 PM

Report generated on 5/11/2010 11:41 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

LOCATION: Leadbetter Road 213' West of Boat Launch Dwy **QC JOB #:** 10502402
SPECIFIC LOCATION: 10 ft from **DIRECTION:** EB/WB
CITY/STATE: Camas, WA **DATE:** May 05 2010

FHWA VEHICLE CLASSIFICATION DATA (EB/WB)

Start Time	1	2	3	4	5	6	7	8	9	10	11	12	13	None
12:00 AM	0	0	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	**0**	0
1:00 AM	0	5	0	0	0	0	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4:00 AM	**1**	3	0	0	0	0	0	0	0	0	0	0	0	0
5:00 AM	0	3	7	0	1	0	0	0	0	0	0	0	0	0
6:00 AM	1	50	11	1	5	0	0	0	0	0	0	0	0	0
7:00 AM	0	**76**	**27**	1	7	**2**	0	0	0	0	0	0	0	**1**
8:00 AM	0	54	13	**2**	1	2	0	0	0	0	0	0	0	0
9:00 AM	0	24	13	0	4	1	0	0	0	0	0	0	0	0
10:00 AM	0	47	16	0	3	2	0	0	0	0	0	0	0	0
11:00 AM	0	33	10	0	**9**	1	0	**1**	0	0	0	0	0	1
12:00 PM	0	41	17	0	1	0	**0**	1	**0**	**0**	**0**	**0**	**0**	0
1:00 PM	0	53	19	0	1	**1**	0	0	0	0	0	0	0	0
2:00 PM	0	64	22	**2**	**7**	1	0	0	0	0	0	0	0	**2**
3:00 PM	0	76	**38**	1	4	0	0	0	0	0	0	0	0	0
4:00 PM	0	**83**	26	0	5	0	0	**2**	0	0	0	0	0	0
5:00 PM	**2**	77	22	0	4	0	0	0	0	0	0	0	0	1
6:00 PM	0	57	17	0	3	0	0	1	0	0	0	0	0	0
7:00 PM	0	35	15	0	2	0	0	1	0	0	0	0	0	1
8:00 PM	0	42	16	0	1	0	0	0	0	0	0	0	0	0
9:00 PM	0	20	7	0	2	0	0	0	0	0	0	0	0	0
10:00 PM	0	9	2	0	1	0	0	0	0	0	0	0	0	0
11:00 PM	0	4	3	0	1	0	0	0	0	0	0	0	0	0
Day Total	4	857	301	7	62	10	0	6	0	0	0	0	0	6
Percent	0.3%	68.4%	24.0%	0.6%	4.9%	0.8%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%

SPEED DATA (EB/WB)

Start Time	1-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	71-75	76-999
12:00 AM	0	**0**	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**
1:00 AM	0	0	0	0	0	1	2	2	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	2	0	1	1	0	0	0	0	0
5:00 AM	0	0	0	0	0	3	1	3	3	1	0	0	0	0
6:00 AM	0	0	0	0	1	7	28	22	10	0	0	0	0	0
7:00 AM	**1**	0	0	1	1	6	**36**	**45**	**21**	2	**1**	0	0	0
8:00 AM	0	0	0	1	4	8	30	22	4	**3**	0	0	0	0
9:00 AM	0	0	**1**	1	1	12	11	9	5	2	0	0	0	0
10:00 AM	0	0	1	2	**5**	**18**	22	12	6	2	0	0	0	0
11:00 AM	1	0	0	**3**	4	10	22	11	3	1	0	0	0	0
12:00 PM	0	0	**0**	0	3	11	27	13	6	0	0	**0**	**0**	**0**
1:00 PM	0	0	0	1	**6**	**18**	23	22	4	0	0	0	0	0
2:00 PM	**2**	0	0	1	3	14	35	29	6	**8**	0	0	0	0
3:00 PM	0	0	0	0	3	16	37	**44**	17	1	1	0	0	0
4:00 PM	0	0	0	2	5	12	38	39	**18**	2	0	0	0	0
5:00 PM	1	0	0	0	1	8	**41**	42	10	2	1	0	0	0
6:00 PM	0	0	0	2	4	10	23	28	8	1	**2**	0	0	0
7:00 PM	1	**1**	0	**3**	1	11	16	15	4	2	0	0	0	0
8:00 PM	0	0	0	3	1	11	32	12	0	0	0	0	0	0
9:00 PM	0	0	0	0	2	11	8	7	0	1	0	0	0	0
10:00 PM	0	0	0	0	0	1	5	4	2	0	0	0	0	0
11:00 PM	0	0	0	0	1	0	3	2	2	0	0	0	0	0
Day Total	6	1	2	20	46	190	440	385	130	28	5	0	0	0
Percent	0.5%	0.1%	0.2%	1.6%	3.7%	15.2%	35.1%	30.7%	10.4%	2.2%	0.4%	0.0%	0.0%	0.0%

VOLUME DATA (EB/WB)

Start Time	EB	WB	Total
12:00 AM	0	0	0
1:00 AM	3	2	5
2:00 AM	0	0	0
3:00 AM	1	0	1
4:00 AM	3	1	4
5:00 AM	5	6	11
6:00 AM	51	17	68
7:00 AM	**72**	**42**	**114**
8:00 AM	43	29	72
9:00 AM	18	24	42
10:00 AM	37	31	68
11:00 AM	34	21	55
12:00 PM	30	30	60
1:00 PM	44	30	74
2:00 PM	36	62	98
3:00 PM	48	**71**	**119**
4:00 PM	52	64	116
5:00 PM	**55**	51	106
6:00 PM	32	46	78
7:00 PM	26	28	54
8:00 PM	16	43	59
9:00 PM	9	20	29
10:00 PM	8	4	12
11:00 PM	3	5	8
Day Total	626	627	1253
Percent	50.0%	50.0%	

PEAK HOUR (AM): 7:00 AM
PEAK HOUR (PM): 3:00 PM

AVERAGE SPEED: 43 MPH
MODAL SPEED: 43 MPH
MEDIAN SPEED: 44 MPH
85th PERCENTILE: 49 MPH
POSTED SPEED: 0 MPH

TOTAL TRUCKS: 85 (6.8%)
(Class 4 thru 13)

Type of report: Tube Count - Single Page Summary

LOCATION: Leadbetter Road 783' NW of NE Adams St
SPECIFIC LOCATION: 0 ft from
CITY/STATE: Camas,, WA

QC JOB #: 10502401
DIRECTION: EB/WB
DATE: May 12 2010

VOLUME DATA (EB/WB)

Start Time	EB Morning	EB Evening	Hourly Totals Morning	Hourly Totals Evening	WB Morning	WB Evening	Hourly Totals Morning	Hourly Totals Evening	Combined Totals Morning	Combined Totals Evening
12:00	2	9			0	10				
12:15	0	8			0	5				
12:30	1	4			1	11				
12:45	1	12	4	33	0	10	1	36	5	69
01:00	3	5			0	4				
01:15	0	6			0	8				
01:30	0	5			0	9				
01:45	2	9	5	25	0	9	0	30	5	55
02:00	1	15			1	12				
02:15	0	11			0	25				
02:30	1	10			0	17				
02:45	0	21	2	57	0	16	1	70	3	127
03:00	1	8			0	19				
03:15	0	19			0	15				125
03:30	0	22			0	32				152
03:45	0	8	1	57	0	29	0	95	1	152
04:00	1	14			0	19				158
04:15	0	14			1	16				154
04:30	0	27			1	14				141
04:45	0	16	1	71	0	21	2	70	3	141
05:00	2	15			0	17				140
05:15	2	20		(78)	1	25	PM PHF=0.95	(77)		155 ←
05:30	0	16			1	15				145
05:45	0	17	4	68	1	16	3	73	7	141
06:00	4	11			1	14				134
06:15	7	17			7	17				123
06:30	9	17			6	6				
06:45	19	12	39	57	9	8	23	45	62	102
07:00	11	9			12	10				
07:15	22	13	AM PHF=0.87		12	18			100	
07:30	17	13			20	10			122	
07:45	24	7	(74)	42	14	10	(58)	48	132 ← AM	90
08:00	14	5			8	11			131	
08:15	14	12			13	8			124	
08:30	7	3			10	7				
08:45	10	5	45	25	6	13	37	39	82	64
09:00	9	5			8	3				
09:15	8	3			7	2				
09:30	7	4			9	4				
09:45	2	4	26	16	12	2	36	11	62	27
10:00	6	4			5	7				
10:15	11	0			5	4				
10:30	4	1			8	1				
10:45	7	1	28	6	7	4	25	16	53	22
11:00	5	2			4	1				
11:15	5	1			8	2				
11:30	7	4			8	0				
11:45	15	1	32	8	9	4	29	7	61	15
Day Total	261	465	726		215	540	755		476	1005
Percent	36.0%	64.0%			28.5%	71.5%			32.1%	67.9%

PM PEAK

AM PEAK

EB Totals		WB Totals		Combined Totals	
PEAK HOUR (7-9 AM):	74	PEAK HOUR (7-9 AM):	58	PEAK HOUR (7-9 AM):	132
PEAK HOUR (4-6 PM):	71	PEAK HOUR (4-6 PM):	73	PEAK HOUR (4-6 PM):	141
PEAK HOUR (AM):	7:00 AM	PEAK HOUR (AM):	7:00 AM	PEAK HOUR (AM):	7:00 AM
PEAK HOUR (PM):	4:00 PM	PEAK HOUR (PM):	3:00 PM	PEAK HOUR (PM):	3:00 PM

Report generated on 5/14/2010 3:31 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

LOCATION: Leadbetter Road 783' NW of NE Adams St **QC JOB #:** 10502401
SPECIFIC LOCATION: 0 ft from **DIRECTION:** EB/WB
CITY/STATE: Camas,, WA **DATE:** May 12 2010

FHWA VEHICLE CLASSIFICATION DATA (EB/WB)

Start Time	1	2	3	4	5	6	7	8	9	10	11	12	13	None
12:00 AM	0	5	0	0	0	0	**0**	0	**0**	**0**	**0**	**0**	**0**	0
1:00 AM	0	5	0	0	0	0	0	0	0	0	0	0	0	0
2:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4:00 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	0
5:00 AM	**2**	2	1	0	2	0	0	0	0	0	0	0	0	0
6:00 AM	1	45	10	**1**	3	0	0	**2**	0	0	0	0	0	0
7:00 AM	1	**91**	**30**	0	**8**	**1**	0	0	0	0	0	0	0	1
8:00 AM	1	57	19	1	2	1	0	1	0	0	0	0	0	0
9:00 AM	2	37	18	0	3	0	0	0	0	0	0	0	0	**2**
10:00 AM	2	41	8	0	0	0	0	1	0	0	0	0	0	1
11:00 AM	0	40	15	0	4	0	0	1	0	0	0	0	0	1
12:00 PM	3	37	19	0	3	**1**	**0**	4	**0**	**0**	**0**	**0**	**0**	2
1:00 PM	5	29	17	0	2	0	0	0	0	0	0	0	0	2
2:00 PM	6	86	26	**1**	3	0	0	2	0	0	0	0	0	**3**
3:00 PM	10	92	**40**	1	**7**	0	0	1	0	0	0	0	0	1
4:00 PM	8	**98**	25	0	3	0	0	**6**	0	0	0	0	0	1
5:00 PM	**14**	96	25	0	3	0	0	2	0	0	0	0	0	1
6:00 PM	14	70	16	0	2	0	0	0	0	0	0	0	0	0
7:00 PM	11	65	14	0	2	0	0	0	0	0	0	0	0	0
8:00 PM	0	57	7	0	0	0	0	0	0	0	0	0	0	0
9:00 PM	1	18	6	0	2	0	0	0	0	0	0	0	0	0
10:00 PM	0	18	4	0	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	9	6	0	0	0	0	0	0	0	0	0	0	0
Day Total	81	1004	307	4	49	3	0	20	0	0	0	0	0	15
Percent	5.5%	67.7%	20.7%	0.3%	3.3%	0.2%	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%

SPEED DATA (EB/WB)

Start Time	1-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	71-75	76-999
12:00 AM	0	0	0	0	0	0	2	1	0	2	0	**0**	0	**0**
1:00 AM	0	0	0	0	0	0	1	3	0	0	**1**	0	0	0
2:00 AM	0	0	0	0	0	0	2	0	0	0	1	0	0	0
3:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	1	1	1	0	0	0	0	0
5:00 AM	0	0	0	0	0	1	2	3	0	1	0	0	0	0
6:00 AM	0	**1**	0	1	2	8	13	15	**20**	2	0	0	0	0
7:00 AM	1	0	0	0	2	9	**42**	**53**	19	**5**	0	0	**1**	0
8:00 AM	0	0	0	1	2	7	26	29	14	2	1	0	0	0
9:00 AM	**2**	0	**1**	1	2	**13**	14	16	9	4	0	0	0	0
10:00 AM	0	0	0	1	2	7	17	20	5	1	0	0	0	0
11:00 AM	0	0	0	**2**	**3**	7	25	12	10	2	0	0	0	0
12:00 PM	1	0	**1**	1	2	17	24	13	9	1	0	0	0	0
1:00 PM	1	1	0	3	3	11	23	7	3	2	0	1	0	0
2:00 PM	**3**	**3**	0	4	**8**	**24**	31	36	13	5	0	0	0	0
3:00 PM	1	1	0	2	8	17	**60**	41	**16**	4	**2**	0	0	0
4:00 PM	1	1	0	2	4	24	36	**53**	16	3	0	0	**1**	0
5:00 PM	1	1	0	**6**	6	16	45	49	13	2	2	0	0	0
6:00 PM	1	1	0	6	4	16	34	24	7	**6**	1	1	1	0
7:00 PM	1	1	0	0	6	11	34	21	12	3	0	**2**	0	**1**
8:00 PM	0	0	0	0	4	9	16	25	5	4	1	0	0	0
9:00 PM	0	0	0	0	1	2	13	8	1	2	0	0	0	0
10:00 PM	0	0	0	0	1	1	13	3	2	2	0	0	0	0
11:00 PM	0	0	0	0	0	2	6	5	2	0	0	0	0	0
Day Total	13	10	2	30	61	202	480	438	177	53	9	4	3	1
Percent	0.9%	0.7%	0.1%	2.0%	4.1%	13.6%	32.4%	29.5%	11.9%	3.6%	0.6%	0.3%	0.2%	0.1%

VOLUME DATA (EB/WB)

Start Time	EB	WB	Total
12:00 AM	4	1	5
1:00 AM	5	0	5
2:00 AM	2	1	3
3:00 AM	1	0	1
4:00 AM	1	2	3
5:00 AM	4	3	7
6:00 AM	39	23	62
7:00 AM	**74**	**58**	**132**
8:00 AM	45	37	82
9:00 AM	26	36	62
10:00 AM	28	25	53
11:00 AM	32	29	61
12:00 PM	33	36	69
1:00 PM	25	30	55
2:00 PM	57	70	127
3:00 PM	57	**95**	**152**
4:00 PM	**71**	70	141
5:00 PM	68	73	141
6:00 PM	57	45	102
7:00 PM	45	47	92
8:00 PM	25	39	64
9:00 PM	16	11	27
10:00 PM	6	16	22
11:00 PM	8	7	15
Day Total	729	754	1483
Percent	49.2%	50.8%	

PEAK HOUR (AM): 7:00 AM
PEAK HOUR (PM): 3:00 PM

AVERAGE SPEED: 44 MPH
MODAL SPEED: 43 MPH
MEDIAN SPEED: 44 MPH
85th PERCENTILE: 50 MPH
POSTED SPEED: 35 MPH

TOTAL TRUCKS: 76 (5.1%)
(Class 4 thru 13)

APPENDIX C

Collision Rate Calculations and Reports

COLLISION RATE CALCULATIONS

NE Goodwin Road / NE Ingle Road (Unsignalized)

Existing 2010 PM Peak Hour Volume = 728 vehicles

Million Entering Vehicles (MEV) =

$$\left(\frac{ADT*365}{1{,}000{,}000}\right) \approx \left(\frac{Peak\,Hour\,Volume*10*365}{1{,}000{,}000}\right) = \left(\frac{728*10*365}{1{,}000{,}000}\right) = 2.66 \text{ MEV}$$

Collision Rate per Year (using WSDOT data Jan. 2007 – Dec. 2009) =

$$\left(\frac{\left(Total\ number\ of\ collisions \,/\, Number\ of\ Years\right)}{MEV}\right) = \left(\frac{2\,collisions \,/\, 3\,years}{2.66\,MEV}\right) = \mathbf{0.25}$$

NE 28th Street / NE 232nd Avenue (Unsignalized)

Average Daily Traffic Volume = 582 vehicles

Million Entering Vehicles (MEV) =

$$\left(\frac{ADT*365}{1{,}000{,}000}\right) = \left(\frac{582*10*365}{1{,}000{,}000}\right) = 2.12 \text{ MEV}$$

Collision Rate per Year (using WSDOT data Jan. 2007 – Dec. 2009) =

$$\left(\frac{\left(Total\ number\ of\ collisions \,/\, Number\ of\ Years\right)}{MEV}\right) = \left(\frac{1\,collision \,/\, 3\,years}{2.12\,MEV}\right) = \mathbf{0.16}$$

COLLISION RATE CALCULATIONS

SR 500 (NE Everett Street) / NE Leadbetter Road (Unsignalized)

PM Peak Hour Volume = 508 vehicles

Million Entering Vehicles (MEV) =

$$\left(\frac{ADT*365}{1{,}000{,}000}\right) \approx \left(\frac{Peak\,Hour\,Volume*10*365}{1{,}000{,}000}\right) = \left(\frac{508*10*365}{1{,}000{,}000}\right) = 1.85 \text{ MEV}$$

No collisions reported by WSDOT Jan. 2007 – Dec. 2009.
Collision Rate per Year = **0.00**

SR 500 (NE Everett Street) / NE 43rd Avenue (Signalized)

PM Peak Hour Volume = 743 vehicles

Million Entering Vehicles (MEV) =

$$\left(\frac{ADT*365}{1{,}000{,}000}\right) \approx \left(\frac{Peak\,Hour\,Volume*10*365}{1{,}000{,}000}\right) = \left(\frac{743*10*365}{1{,}000{,}000}\right) = 2.71 \text{ MEV}$$

Collision Rate per Year (using WSDOT data Jan. 2007 – Dec. 2009) =

$$\left(\frac{\left(Total\ number\ of\ collisions \,/\, Number\ of\ Years\right)}{MEV}\right) = \left(\frac{6\,collisions \,/\, 3\,years}{2.71\,MEV}\right) = \mathbf{0.74}$$

COLLISION RATE CALCULATIONS

SR 500 (NE Everett Street) / NE Lake Road (Signalized)

PM Peak Hour Volume = 1,157 vehicles

Million Entering Vehicles (MEV) =

$$\left(\frac{ADT*365}{1{,}000{,}000}\right)\approx\left(\frac{Peak\,Hour\,Volume*10*365}{1{,}000{,}000}\right)=\left(\frac{1{,}157*10*365}{1{,}000{,}000}\right)=4.22\ \text{MEV}$$

Collision Rate per Year (using WSDOT data Jan. 2007 – Dec. 2009) =

$$\left(\frac{\left(Total\ number\ of\ collisions \,/\, Number\ of\ Years\right)}{MEV}\right)=\left(\frac{2\ collisions \,/\, 3\ years}{4.22\ MEV}\right)=\mathbf{0.16}$$

NE Leadbetter Road, between NE Everett Street (SR 500) and NE 232nd Avenue (Segment)

Annual Daily Traffic Volume (average of two 24-hour counts) = (1,253 + 1,483) / 2 = 1,368 vehicles

Million Vehicle-Miles (MVM) =

$$\left(\frac{ADT*365*Segment\,Length}{1{,}000{,}000}\right)=\left(\frac{1{,}368*365*1.66}{1{,}000{,}000}\right)=0.83\ \text{MVM}$$

Collision Rate per Year (using WSDOT data Jan. 2007 – Dec. 2009) =

$$\left(\frac{\left(Total\ number\ of\ collisions \,/\, Number\ of\ Years\right)}{MVM}\right)=\left(\frac{14\ collisions \,/\, 3\ years}{0.83\ MVM}\right)=\mathbf{5.63}$$

REPORTED COLLISIONS THAT OCCURRED AT OR ON THE FOLLOWING INTERSECTIONS/ROAD SEGMENTS (SEE COLUMN B "INTERSECTION OR SEGMENT")
01/01/04 - 12/31/09

NE GOODWIN ROAD / NE INGLE ROAD

*REPORT NUMBER	INTERSECTION OR SEGMENT	JURIS-DICTION	PRIMARY TRAFFIC-WAY	MILE POST	INTERSEC-TING TRAFFIC-WAY	CO ONLY: INTERSEC-TING COUNTY ROAD MILEPOST	DATE	TIME	MOST SEVERE SOBRIETY TYPE	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDAL	FIRST COLLISION TYPE	FIRST OBJECT STRUCK	SECOND COLLISION TYPE	SECOND OBJECT STRUCK	JUNCTION RELATION-SHIP	WEATHER	ROADWAY SURFACE CONDITIONS	LIGHTING CONDITIONS	VEHICLE 1 TYPE	VEHICLE 2 TYPE	VEH 1 ACTION	VEH 2 ACTION	PEDCYCLIST ACTION (UNIT 1)	PEDCYCLIST CONT CIRC 1 (UNIT 1)	MV DRIVER CONT CIRC 1 (UNIT 1)	MV DRIVER CONT CIRC 1 (UNIT 2)	VEH 1 COMP DIR FROM	VEH 1 COMP DIR TO	VEH 2 COMP DIR FROM	VEH 2 COMP DIR TO
2737462	NE GOODWIN RD AND NE INGLE RD	County Road	93350	2.240	30730	1.870	01/22/07	11:21 PM	Had NOT Been Drinking	Possible Injury	4	0	1		Fixed object	Roadway Ditch			At Intersection and Related	Fog or Smog or Smoke	Dry	Dark-Street Lights On	Truck (Flatbed, Van, etc.)		Going Straight Ahead				Other		North-west	South-east		
2983759	NE GOODWIN RD AND NE INGLE RD	County Road	93350	2.240	30730	1.870	07/30/07	12:24 PM	Had NOT Been Drinking	No Injury	0	0	2		From same direction - both going straight - one stopped - rear-end				At Intersection and Related	Clear or Partly Cloudy	Dry	Daylight	Passenger Car	Passenger Car	Going Straight Ahead	Stopped for Traffic			Driver Interacting with Passengers, Anim	None	West	East	West	Vehicle Stopped

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REPORTED COLLISIONS THAT OCCURRED AT OR ON THE FOLLOWING INTERSECTIONS/ROAD SEGMENTS (SEE COLUMN B "INTERSECTION OR SEGMENT")
01/01/04 - 12/31/09

NE 28TH STREET / NE 232ND AVENUE

*REPORT NUMBER	INTERSECTION OR SEGMENT	JURIS-DICTION	PRIMARY TRAFFIC-WAY	MILE POST	INTER-SECTING TRAFFIC-WAY	CO ONLY: INTERSECTING COUNTY ROAD MILEPOST	DATE	TIME	MOST SEVERE SOBRIETY TYPE	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	FIRST COLLISION TYPE	FIRST OBJECT STRUCK	SECOND COLLISION TYPE	SECOND OBJECT STRUCK	JUNCTION RELATIONSHIP	WEATHER	ROADWAY SURFACE CONDITIONS	LIGHTING CONDITIONS	VEHICLE 1 TYPE	VEHICLE 2 TYPE	VEH 1 ACTION	VEH 2 ACTION	MV DRIVER CONT CIRC 1 (UNIT 1)	MV DRIVER CONT CIRC 1 (UNIT 2)	VEH 1 COMP DIR FROM	VEH 1 COMP DIR TO	VEH 2 COMP DIR FROM	VEH 2 COMP DIR TO
3166051	NE 28TH ST AND NE 232ND AVE	County Road	93350	3.090	30950	2.890	08/16/08	1:33 PM	Had NOT Been Drinking	No Injury	0	0	3	Entering at angle		One car leaving driveway access		At Intersection and Related	Clear or Partly Cloudy	Dry	Daylight	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	Making Left Turn	Going Straight Ahead	Did Not Grant RW to Vehicle	None	South	West	West	East

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REPORTED COLLISIONS THAT OCCURRED AT OR ON THE FOLLOWING INTERSECTIONS/ROAD SEGMENTS (SEE COLUMN B "INTERSECTION OR SEGMENT")
01/01/04 - 12/31/09

NE EVERETT STREET (STATE ROUTE 500) / NE 43RD AVENUE (SE 15TH STREET)

*REPORT NUMBER	INTERSECTION OR SEGMENT	JURIS-DICTION	CITY	MILE POST	DATE	TIME	MOST SEVERE SOBRIETY TYPE	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	FIRST COLLISION TYPE	FIRST OBJECT STRUCK	SECOND COLLISION TYPE	SECOND OBJECT STRUCK	JUNCTION RELATION-SHIP	WEATHER	ROAD-WAY SURFACE CONDI-TIONS	LIGHT-ING CONDI-TIONS	SR ONLY: IMPACT LOCATION	SR ONLY: VEH 1 COMP DIR	SR ONLY: VEH 1 MP DIR	SR ONLY: VEH 1 MOVE-MENT	SR ONLY: VEH 2 COMP DIR	SR ONLY: VEH 2 MP DIR	SR ONLY: VEH 2 MOVE-MENT	VEH 1 TYPE	VEH 2 TYPE	VEH 1 ACTION	VEH 2 ACTION	MV DRIVER CONT CIRC 1 (UNIT 1)	MV DRIVER CONT CIRC 2 (UNIT 1)	MV DRIVER CONT CIRC 1 (UNIT 2)	VEH 1 COMP DIR FROM	VEH 1 COMP DIR TO	VEH 2 COMP DIR FROM	VEH 2 COMP DIR TO
2474337	SR 500 AT MP 17.26 (INTERSECTION OF LEADBETTER ROAD)	State Route	Camas	17.33	02/18/07	3:02 AM	HBD - Ability Impaired	Evident Injury	1	0	1	Fixed object	Curb, Raised Traffic Island or Raised Median Curb	Fixed object	Wood Sign Post	At Inter-section and Related	Raining	Wet	Dark-Street Lights On	Right Shoulder Decreasing Milepost	North	Decreasing milepost of major roadway	Moving Straight	Unknown	Unknown or Not Applicable	Unknown or Not Applicable	Pickup, Panel Truck or Vanette under 10,000 lb		Going Straight Ahead		Under Influence of Alcohol			South	North		
2983969	SR 500 AT MP 17.26 (INTERSECTION OF LEADBETTER ROAD)	State Route	Camas	17.33	03/21/08	2:35 PM	Had NOT Been Drinking	No Injury	0	0	3	From same direction - both going straight - both moving - rear-end				At Inter-section and Not Related	Overcast	Dry	Daylight	Lane 1 Increasing Milepost	S	Increasing milepost of major roadway	Moving Straight	S	Increasing milepost of major roadway	Moving Straight	Passenger Car	Passenger Car	Slowing	Going Straight Ahead	None		Follow Too Closely	North	South	North	South
2755311	SR 500 AT MP 17.26 (INTERSECTION OF LEADBETTER ROAD)	State Route	Camas	17.33	05/21/08	1:30 PM	Had NOT Been Drinking	Evident Injury	1	0	2	From opposite direction - one left turn - one straight				At Inter-section and Related	Overcast	Dry	Daylight	Lane 1 Decreasing Milepost	S	Increasing milepost of major roadway	Turning Left	N	Decreasing milepost of major roadway	Moving Straight	School Bus	Passenger Car	Making Left Turn	Going Straight Ahead	Did Not Grant RW to Vehicle	Other Driver Distractions Inside Vehicle	None	North	East	South	North
2984105	SR 500 AT MP 17.26 (INTERSECTION OF LEADBETTER ROAD)	State Route	Camas	17.33	06/12/08	11:20 AM	Had NOT Been Drinking	No Injury	0	0	2	From opposite direction - one left turn - one straight				At Inter-section and Related	Clear or Partly Cloudy	Dry	Daylight	Lane 1 Decreasing Milepost	South	Increasing milepost of major roadway	Turning Left	North	Decreasing milepost of major roadway	Moving Straight	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	Making Left Turn	Going Straight Ahead	Did Not Grant RW to Vehicle		None	North	East	South	North
E018209	SR 500 AT MP 17.26 (INTERSECTION OF LEADBETTER ROAD)	State Route	Camas	17.33	04/14/09	6:20 PM	Had NOT Been Drinking	No Injury	0	0	2	From opposite direction - one left turn - one straight				At Inter-section and Related	Raining	Wet	Daylight	Lane 1 Decreasing Milepost	South	Increasing milepost of major roadway	Turning Left	North	Decreasing milepost of major roadway	Moving Straight	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	Making Left Turn	Going Straight Ahead	Disregard Yield Sign - Flashing Yellow	Inattention	None	North	East	South	North
E031616	SR 500 AT MP 17.26 (INTERSECTION OF LEADBETTER ROAD)	State Route	Camas	17.33	11/02/09	7:11 AM	Had NOT Been Drinking	Evident Injury	1	0	2	From opposite direction - one left turn - one straight				At Inter-section and Related	Clear or Partly Cloudy	Dry	Daylight	Lane 1 Decreasing Milepost	North	Decreasing milepost of major roadway	Moving Straight	South	Increasing milepost of major roadway	Turning Left	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	Going Straight Ahead	Making Left Turn	None		Did Not Grant RW to Vehicle	South	North	North	East

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Prepared by:
WSDOT / TDO / CDAB / MB
June 23, 2010

REPORTED COLLISIONS THAT OCCURRED AT OR ON THE FOLLOWING INTERSECTIONS/ROAD SEGMENTS (SEE COLUMN B "INTERSECTION OR SEGMENT")
01/01/04 - 12/31/09

NE EVERETT STREET (STATE ROUTE 500) / NE LAKE ROAD

*REPORT NUMBER	INTERSECTION OR SEGMENT	JURIS-DICTION	CITY	MILE POST	DATE	TIME	MOST SEVERE SOBRIETY TYPE	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	FIRST COLLISION TYPE	FIRST OBJECT STRUCK	SECOND COLLISION TYPE	JUNCTION RELATION-SHIP	WEATHER	ROAD-WAY SURFACE CONDI-TIONS	LIGHT-ING CONDI-TIONS	SR ONLY: IMPACT LOCATION	SR ONLY: VEH 1 COMP DIR	SR ONLY: VEH 1 MP DIR	SR ONLY: VEH 1 MOVE-MENT	SR ONLY: VEH 2 COMP DIR	SR ONLY: VEH 2 MP DIR	SR ONLY: VEH 2 MOVE-MENT	VEH 1 TYPE	VEH 2 TYPE	VEH 1 ACTION	VEH 2 ACTION	MV DRIVER CONT CIRC 1 (UNIT 1)	MV DRIVER CONT CIRC 2 (UNIT 1)	MV DRIVER CONT CIRC 1 (UNIT 2)	VEH 1 COMP DIR FROM	VEH 1 COMP DIR TO	VEH 2 COMP DIR FROM	VEH 2 COMP DIR TO
2474349	SR 500 AT MP 17.90 (INTERSECTION OF LAKE ROAD)	State Route	Camas	17.90	04/17/07	3:50 PM	Unknown	Possible Injury	1	0	2	From same direction - one right turn - one straight			At Inter-section and Related	Raining	Wet	Daylight	Intersecting Road Increasing Milepost	East	Entering major roadway from the right	Moving Straight	East	Entering major roadway from the right	Stopped in Traffic - Legally Standing	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	Going Straight Ahead	Stopped for Traffic	Follow Too Closely		None	West	East	West	Vehicle Stopped
3253038	SR 500 AT MP 17.90 (INTERSECTION OF LAKE ROAD)	State Route	Camas	17.90	02/24/09	3:00 PM	Unknown	No Injury	0	0	2	Same direction -- both turning right -- both moving -- sideswipe			At Inter-section and Related	Raining	Wet	Daylight	Lane 1 Increasing Milepost	East	Entering major roadway from the right	Turning Right	East	Entering major roadway from the right	Turning Right	Pickup, Panel Truck or Vanette under 10,000 lb	Passenger Car	Making Right Turn	Making Right Turn	Improper Passing	Improper Turn	None	West	South	West	South

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REPORTED COLLISIONS THAT OCCURRED AT OR ON THE FOLLOWING INTERSECTIONS/ROAD SEGMENTS (SEE COLUMN B "INTERSECTION OR SEGMENT")
01/01/04 - 12/31/09

SEGMENT OF LEADBETTER ROAD BETWEEN NE 232ND AVENUE (NW END) AND EVERETT STREET/STATE ROUTE 500 (SE END)

>> CITY OF CAMAS COLLISION REPORTS <<

LOCATION AND JURISDICTION	*REPORT NUMBER	INTERSECTION OR SEGMENT	JURISDICTION	CITY	PRIMARY TRAFFIC-WAY	BLOCK NUMBER	MILE POST	DIST FROM REF POINT	MI or FT	COMP DIR FROM REF POINT	REFERENCE POINT NAME	DATE	TIME	MOST SEVERE SOBRIETY TYPE	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDAL	FIRST COLLISION TYPE	FIRST OBJECT STRUCK	SECOND COLLISION TYPE	SECOND OBJECT STRUCK	JUNCTION RELATIONSHIP	WEATHER	ROADWAY SURFACE CONDITIONS	LIGHTING CONDITIONS	VEHICLE 1 TYPE	VEHICLE 2 TYPE	VEH 1 ACTION	VEH 2 ACTION	PEDCYCLIST ACTION (UNIT 2)	MV DRIVER CONT CIRC 1 (UNIT 1)	MV DRIVER CONT CIRC 2 (UNIT 1)	VEH 1 COMP DIR FROM	VEH 1 COMP DIR TO	VEH 2 COMP DIR FROM	VEH 2 COMP DIR TO
NW END OF LEADBETTER ROAD (232nd)	2983865	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	City Street	Camas	NE LEADBETTER RD AT NE 232 AVE	23200						03/21/09	2:38 PM	Had NOT Been Drinking	No Injury	0	0	2		From same direction - all others				At Driveway	Clear or Partly Cloudy	Dry	Daylight	Pickup, Panel Truck or Vanette under 10,000 lb	Pickup, Panel Truck or Vanette under 10,000 lb	Making U-Turn	Going Straight Ahead		Improper U-Turn		South	South	South	North
	2984039	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	City Street	Camas	NE LEADBETTER RD	100		0.2	M	S	SE 232 AVE	09/01/08	2:45 AM	HBD - Sobriety Unknown	Serious Injury	2	0	1		Fixed object	Mailbox	Fixed object	Guardrail - Face	Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Dark-No Street Lights	Pickup, Panel Truck or Vanette under 10,000 lb		Going Straight Ahead			Other		South	North		
	E015413	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	City Street	Camas	SE LEADBETTER RD	811						02/21/09	10:30 PM	HBD - Ability Impaired	No Injury	0	0	1		Fixed object	Roadway Ditch			At Driveway but Not Related	Overcast	Dry	Dark-No Street Lights	Pickup, Panel Truck or Vanette under 10,000 lb		Going Straight Ahead			Under Influence of Alcohol	Driver Operating Handheld Telecom-munications	East	West		
	E016767	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	City Street	Camas	SE LEADBETTER	811						03/20/09	8:00 PM	Had NOT Been Drinking	Possible Injury	1	0	1		Fixed object	Earth Bank or Ledge			Not at Intersection and Not Related	Raining	Wet	Dark-No Street Lights	Passenger Car		Going Straight Ahead			Driver Distractions Outside Vehicle		East	West		
	2984030	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	City Street	Camas	SE LEADBETTER DR	808						06/30/08	1:46 PM	Had NOT Been Drinking	Evident Injury	1	0	1		Vehicle over-turned				Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight	Truck (Flatbed,Van,etc)		Going Straight Ahead			Other		East	West		
	2984099	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	City Street	Camas	SE LEADBETTER RD	800						09/18/09	4:19 PM	Had NOT Been Drinking	No Injury	0	0	1		Fixed object	Guardrail - Face	Fixed object	Guardrail - Through, Over or Under	Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight	Pickup, Panel Truck or Vanette under 10,000 lb		Going Straight Ahead			Exceeding Reas. Safe Speed		South-east	West		
	2984084	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	City Street	Camas	NE LEADBETTER RD	1000		0.6	M	W	NE ADAMS ST	09/06/08	3:05 PM	HBD - Ability Impaired	No Injury	0	0	1		Fixed object	Roadway Ditch	Fixed object	Earth Bank or Ledge	Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight	Pickup, Panel Truck or Vanette under 10,000 lb		Going Straight Ahead			Under Influence of Alcohol		East	West		
	2984046	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	City Street	Camas	SE LEADBETTER RD	800		0.25	F	W	NE EVERETT ST	11/10/08	9:40 PM	HBD - Ability Impaired	No Injury	0	0	1		Fixed object	Guardrail - Face			Not at Intersection and Not Related	Clear or Partly Cloudy	Wet	Dark-No Street Lights	Pickup, Panel Truck or Vanette under 10,000 lb		Going Straight Ahead			Under Influence of Alcohol	Driver Eating or Drinking	East	West		
SE END OF LEADBETTER ROAD (SR 500)	2983890	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	City Street	Camas	SE LEADBETTER RD	811		800	F	N	NE EVERETT ST	12/15/09	7:18 PM	Had NOT Been Drinking	Evident Injury	1	0	1		Fixed object	Wood Sign Post	Vehicle over-turned		Not at Intersection and Not Related	Raining	Wet	Dark-No Street Lights	Passenger Car		Going Straight Ahead			Other		South	North		

Prepared by:
WSDOT / TDO / CDAB / MB
June 23, 2010

REPORTED COLLISIONS THAT OCCURRED AT OR ON THE FOLLOWING INTERSECTIONS/ROAD SEGMENTS (SEE COLUMN B "INTERSECTION OR SEGMENT")
01/01/04 - 12/31/09

SEGMENT OF LEADBETTER ROAD BETWEEN NE 232ND AVENUE (NW END) AND EVERETT STREET/STATE ROUTE 500 (SE END)

LOCATION AND JURISDICTION	*REPORT NUMBER	INTERSECTION OR SEGMENT	JURISDICTION	CITY	PRIMARY TRAFFICWAY	BLOCK NUMBER	MILE POST	DIST FROM REF POINT	MI or FT	COMP DIR FROM REF POINT	REFERENCE POINT NAME	DATE	TIME	MOST SEVERE SOBRIETY TYPE	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDAL	FIRST COLLISION TYPE	FIRST OBJECT STRUCK	SECOND COLLISION TYPE	SECOND OBJECT STRUCK	JUNCTION RELATIONSHIP	WEATHER	ROADWAY SURFACE CONDITIONS	LIGHTING CONDITIONS	VEHICLE 1 TYPE	VEHICLE 2 TYPE	VEH 1 ACTION	VEH 2 ACTION	PEDCYCLIST ACTION (UNIT 2)	MV DRIVER CONT CIRC 1 (UNIT 1)	MV DRIVER CONT CIRC 2 (UNIT 1)	VEH 1 COMP DIR FROM	VEH 1 COMP DIR TO	VEH 2 COMP DIR FROM	VEH 2 COMP DIR TO
SE END OF LEADBETTER ROAD (SR 500)	2577621	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	County Road		30950		0.25					02/05/07	10:46 AM	Had NOT Been Drinking	No Injury	0	0	1		Fixed object	Utility Pole			Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight	Passenger Car		Going Straight Ahead			Apparently Asleep		West	East		
>> CLARK COUNTY COLLISION REPORTS <<	2983767	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	County Road		30950		0.65					09/30/07	11:26 AM	Had NOT Been Drinking	No Injury	0	0	1		Fixed object	Roadway Ditch			Not at Intersection and Not Related	Raining	Wet	Daylight	Passenger Car		Going Straight Ahead			None		South-west	North		
	2577329	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	County Road		30950		0.75					12/08/07	1:30 AM	Unknown	Serious Injury	1	0	1		Fixed object	Guardrail - Through, Over or Under	Vehicle over-turned		Not at Intersection and Not Related	Overcast	Dry	Dark-No Street Lights	Pickup, Panel Truck or Vanette under 10,000 lb		Going Straight Ahead			Exceeding Stated Speed Limit		East	West		
	2736620	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	County Road		30950		0.95					09/12/07	6:16 PM	Had NOT Been Drinking	Evident Injury	1	0	1		Fixed object	Roadway Ditch	Vehicle over-turned		Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight	Motorcycle		Going Straight Ahead			Exceeding Reas. Safe Speed		North-west	South-east		
NW END OF LEADBETTER ROAD (232nd)	2737987	NE LEADBETTER RD FROM SR 500 TO NE 232ND AVE	County Road		30950		1.66					02/13/07	3:13 PM	Had NOT Been Drinking	Evident Injury	1	0	1		Vehicle over-turned				Not at Intersection and Not Related	Clear or Partly Cloudy	Wet	Daylight	Passenger Car		Going Straight Ahead			Exceeding Reas. Safe Speed		East	North		

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APPENDIX D

In-Process Traffic

AM

Project	Consultant	Note
Camas HS Expansion	Charbonneau	(Full project trip assignment shown.)
Deerhaven	Charbonneau	(Full project trip assignment shown.)
Hidden Meadows	CTS	(Full project trip assignment shown.)
The Hills @ Round Lake	Charbonneau	(Full project trip assignment shown.)
Lacamas Pointe	CTS	(Full project trip assignment shown.)
Lacamas Meadows PRD	Charbonneau	(Full project trip assignment shown.)
Lakeridge North	CTS	(Full project trip assignment shown.)
Millshore Downs	HDJ	(Full project trip assignment shown.)
North Hills	HLA	(Full project trip assignment shown.)
Two Creeks at Camas Meadows		(Full project trip assignment shown.)
Vintage View/The Village at Round Lake	CTS	(Full project trip assignment shown.)
TOTAL IN-PROCESS TRIPS		**(Totals for partially complete projects are prorated for this sum.)**

1 — NE Goodwin Road / NE Ingle Road

Project	Top	Left	Center	Right
Camas HS Expansion	0 1	0 2	4	0 1
Deerhaven	0 0	0 0	1	0 1
Hidden Meadows	0 0	0 0	0	0 0
The Hills @ Round Lake	0 0	0 0	0	0 0
Lacamas Pointe	0 0	0 0	0	0 0
Lacamas Meadows PRD	8 0	10 0	18	0 0
Lakeridge North	1 0	3 0	4	0 0
Millshore Downs	0 1	0 1	9	2 5
North Hills	0 0	0 0	0	0 0
Two Creeks at Camas Meadows	1 0	7 2	11	0 1
Vintage View/The Village at Round Lake	0 0	0 0	0	0 0
TOTAL	**4 2**	**11 5**	**32**	**2 8**

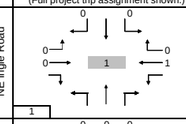
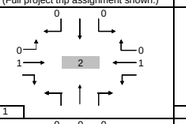
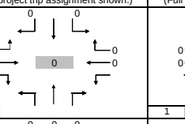
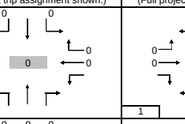
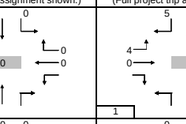
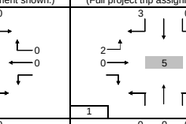
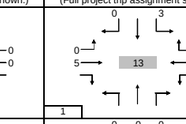
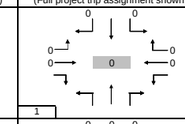
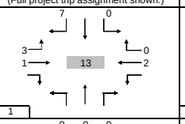
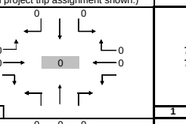
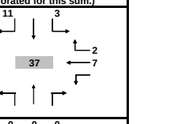
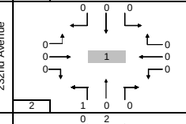
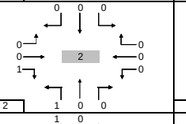
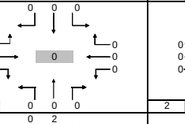
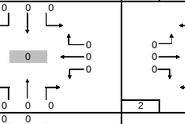
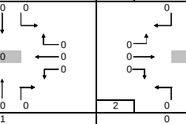
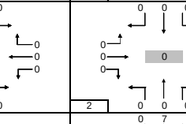
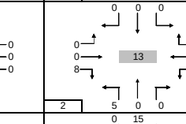
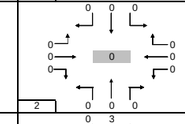
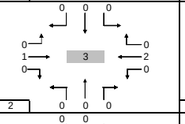
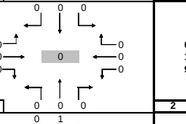
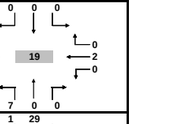
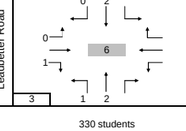
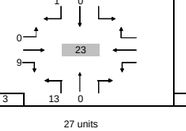
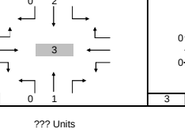
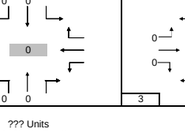
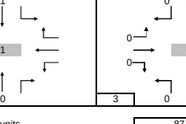
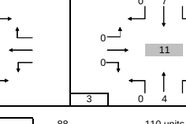
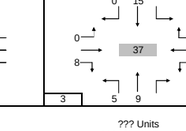
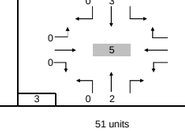
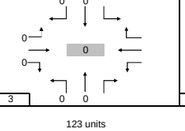
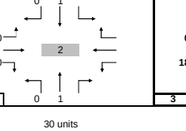
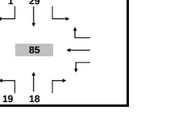
2 — NE 28th Street / NE 232nd Avenue

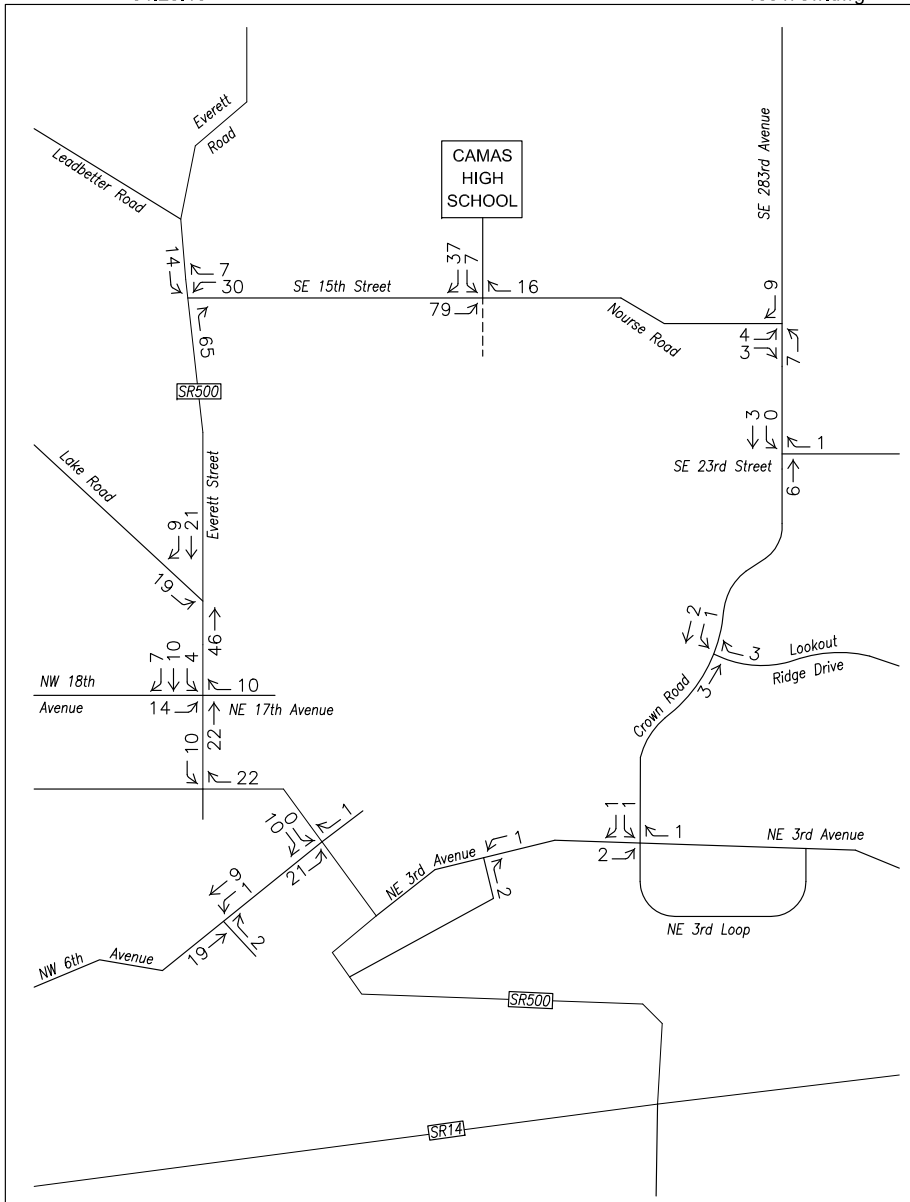
Project	Top	Left	Center	Right	Bottom
Camas HS Expansion	0 0 0	0 0 3	4	0 0 0	1 0 0
Deerhaven	0 0 0	0 0 0	1	0 0 0	1 0 0
Hidden Meadows	0 0 0	0 0 0	0	0 0 0	0 0 0
The Hills @ Round Lake	0 0 0	0 0 0	0	0 0 0	0 0 0
Lacamas Pointe	0 0 0	0 0 0	0	0 0 0	0 0 0
Lacamas Meadows PRD	0 0 0	0 0 0	0	0 0 0	0 0 0
Lakeridge North	0 0 0	0 0 0	0	0 0 0	0 0 0
Millshore Downs	0 0 0	0 0 2	9	0 0 0	7 0 0
North Hills	0 0 0	0 0 0	0	0 0 0	0 0 0
Two Creeks at Camas Meadows	0 0 0	0 2 0	3	0 1 0	0 0 0
Vintage View/The Village at Round Lake	0 0 0	0 0 0	0	0 0 0	0 0 0
TOTAL	**0 0 0**	**0 2 5**	**17**	**0 1 0**	**9 0 0**

3 — Everett (SR 500) / Leadbetter Road

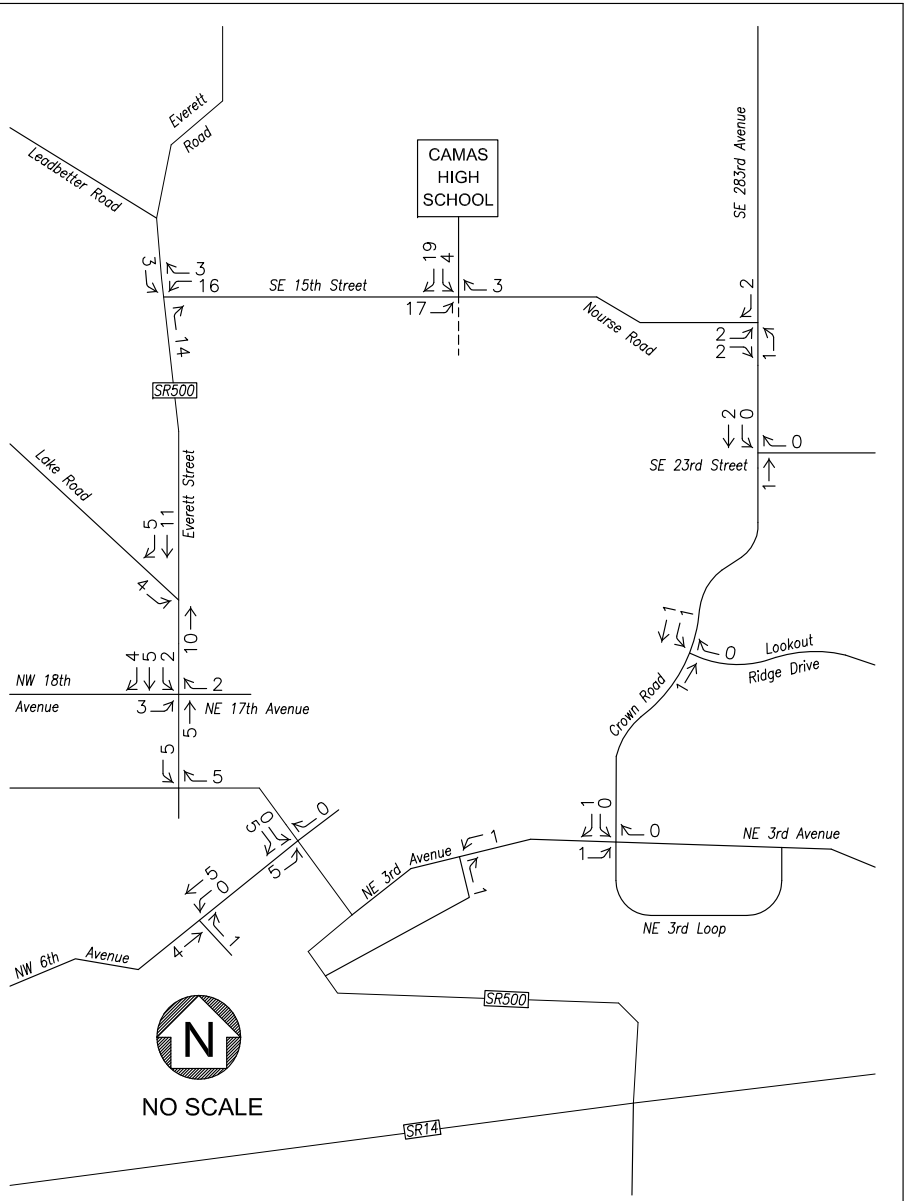
Project	Top	Left	Center	Bottom
Camas HS Expansion	0 9	0 5	21	2 5
Deerhaven	1 0	1 12	18	4 0
Hidden Meadows	0 0	0 0	2	0 2
The Hills @ Round Lake	0 0	0 0	0	0 0
Lacamas Pointe	0 0	0 0	1	0 1
Lacamas Meadows PRD	0 8	0 0	17	0 9
Lakeridge North	0 2	0 0	8	0 6
Millshore Downs	0 5	0 2	28	7 14
North Hills	0 1	0 0	4	0 3
Two Creeks at Camas Meadows	0 0	0 0	0	0 0
Vintage View/The Village at Round Lake	0 0	0 0	1	0 1
TOTAL	**1 19**	**1 19**	**86**	**13 33**

Project	Size / Land Use	Status
Camas HS Expansion	330 students; #530: High School	0% complete
Deerhaven	27 units; #210: Single-Family Detached Housing	0% complete
Hidden Meadows	??? Units; ??? ITE Code	0% complete
The Hills @ Round Lake	??? Units; #210: Single-Family Detached Housing & #220: Apartment	0% complete
Lacamas Pointe	22 units; #210: Single-Family Detached Housing	9% complete
Lacamas Meadows PRD	87 units; #210: Single-Family Detached Housing (65 AM peak hour trips)	41% complete
	84 units; #230: Residential Condo/Townhouse (37 AM peak hour trips)	39% complete
	600 students; #520: Elementary School (252 AM peak hour trips)	92% complete
	Entire Development	77% complete
Lakeridge North	110 units; #210: Single-Family Detached Housing	22% complete
Millshore Downs	??? Units; #210: Single-Family Detached Housing	0% complete
North Hills	51 units; #210: Single-Family Detached Housing	0% complete
Two Creeks at Camas Meadows	123 units; #230: Residential Condominium/ Townhouse	0% complete
Vintage View/The Village at Round Lake	30 units; #210: Single-Family Detached Housing	27% complete

PM	Camas HS Expansion Charbonneau (Full project trip assignment shown.)	Deerhaven Charbonneau (Full project trip assignment shown.)	Hidden Meadows CTS (Full project trip assignment shown.)	The Hills @ Round Lake Charbonneau (Full project trip assignment shown.)	Lacamas Pointe CTS (Full project trip assignment shown.)	Lacamas Meadows PRD Charbonneau (Full project trip assignment shown.)	Lakeridge North CTS (Full project trip assignment shown.)	Millshore Downs HDJ (Full project trip assignment shown.)	North Hills HLA (Full project trip assignment shown.)	Two Creeks at Camas Meadows (Full project trip assignment shown.)	Vintage View/The Village at Round Lake CTS (Full project trip assignment shown.)	**TOTAL IN-PROCESS TRIPS (Totals for partially complete projects are prorated for this sum.)**
NE Goodwin Road / NE Ingle Road												
NE 28th Street / NE 232nd Avenue												
Everett (SR 500) / Leadbetter Road												
	330 students #530: High School 0% complete	27 units #210: Single-Family Detached Housing 0% complete	??? Units ??? ITE Code 0% complete	??? Units #210: Single-Family Detached Housing & #220: Apartment 0% complete	22 units #210: Single-Family Detached Housing 9% complete	87 units #210: Single-Family Detached Housing 41% complete 84 units #230: Residential Condo/Townhouse 39% complete 600 students #520: Elementary School 92% complete Entire Development 53% complete	110 units #210: Single-Family Detached Housing 22% complete	??? Units #210: Single-Family Detached Housing 0% complete	51 units #210: Single-Family Detached Housing 0% complete	123 units #230: Residential Condominium/ Townhouse 0% complete	30 units #210: Single-Family Detached Housing 27% complete	88 PM peak hour trips 44 PM peak hour trips 44 PM peak hour trips



AM PEAK HOUR



PM PEAK HOUR

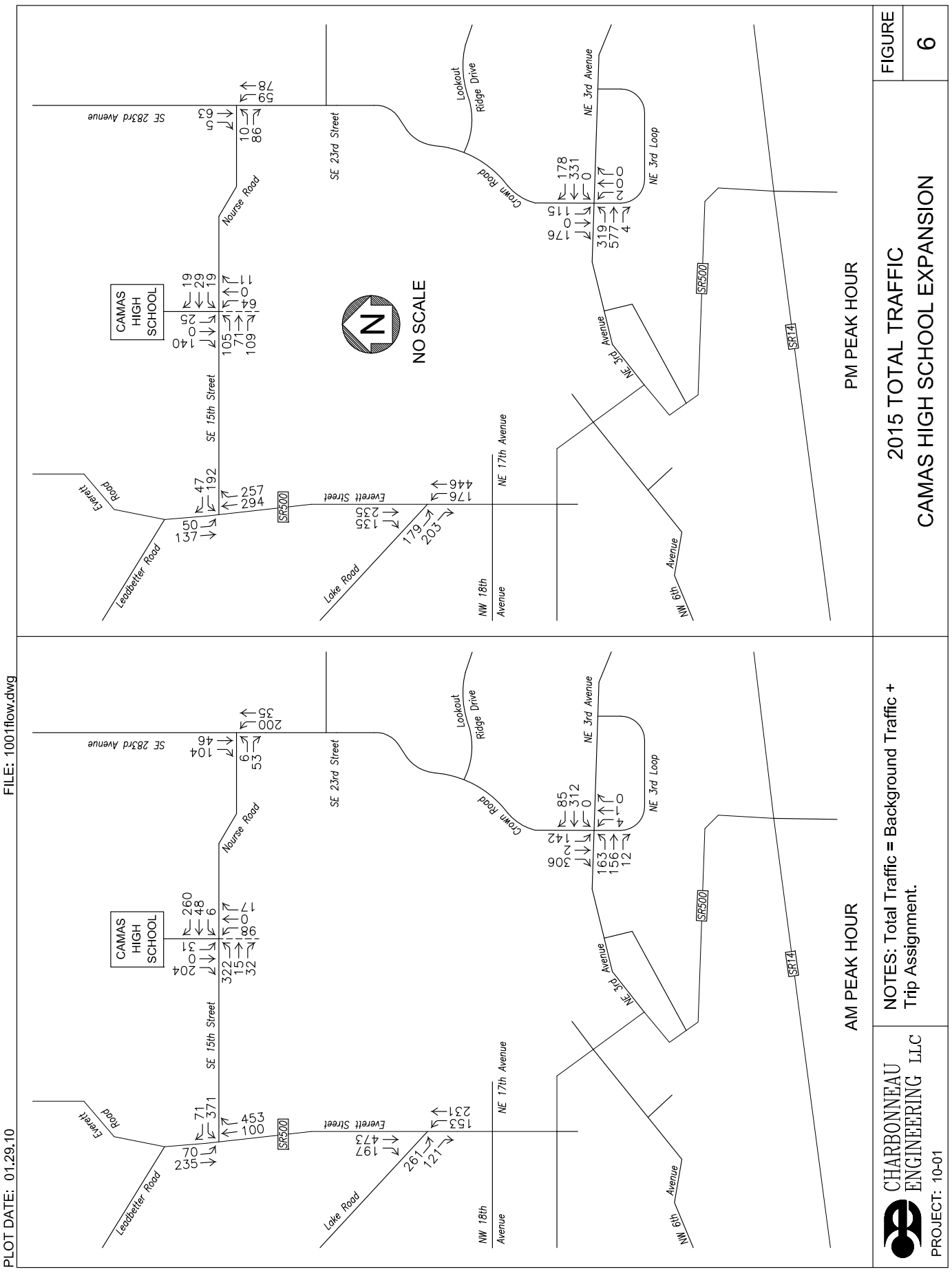
CHARBONNEAU ENGINEERING LLC

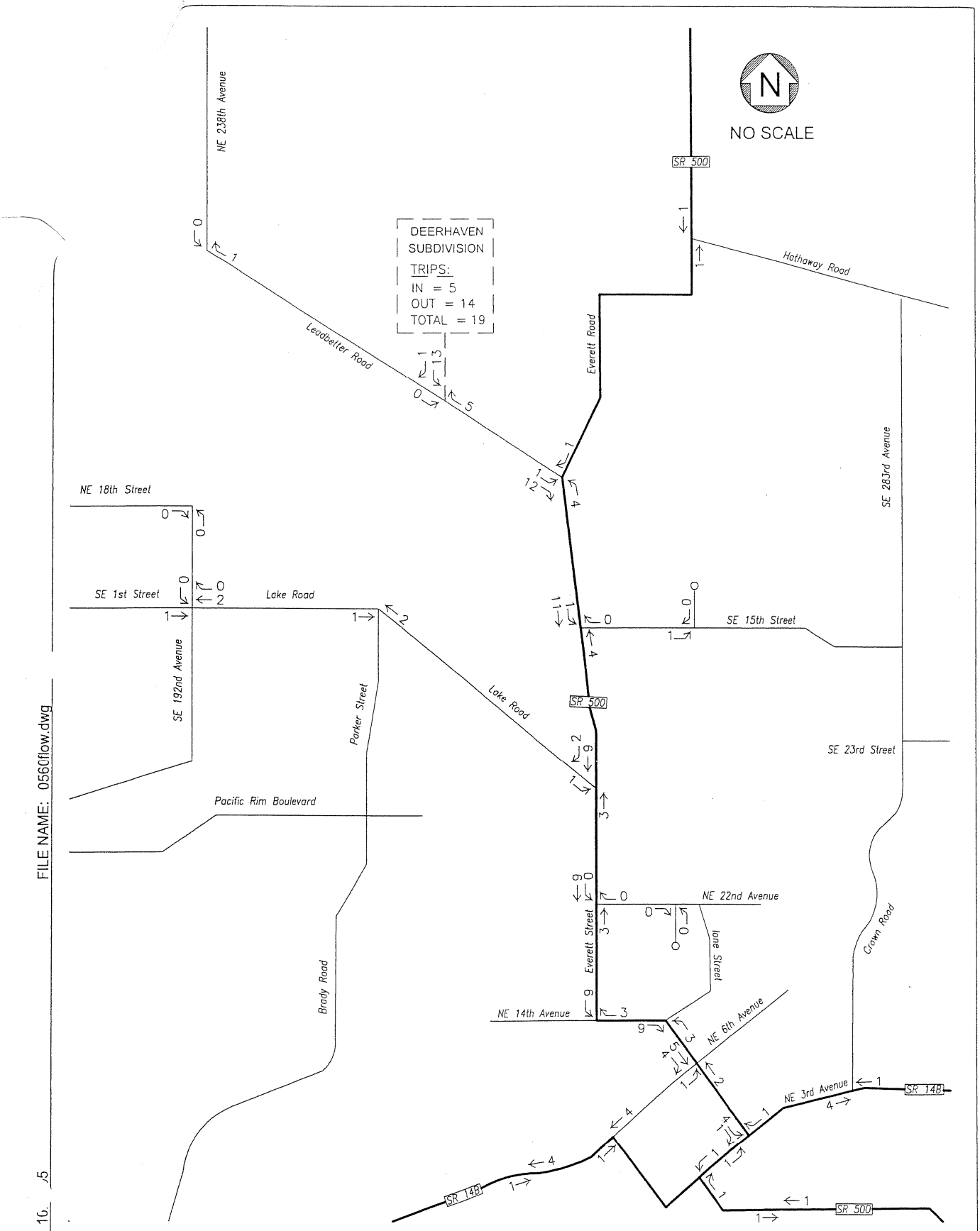
PROJECT: 10-01

NOTES: Trip generation based on High School (ITE 530) trip rates.

TRIP ASSIGNMENT
CAMAS HIGH SCHOOL EXPANSION

FIGURE 5


PLOT DATE: 01.29.10
FILE: 1001flow.dwg
AM PEAK HOUR
PM PEAK HOUR
NO SCALE
CAMAS HIGH SCHOOL
SE 283rd Avenue
Nourse Road
SE 15th Street
SE 23rd Street
Lookout Ridge Drive
Crown Road
NE 3rd Avenue
NE 3rd Loop
NE 5th Avenue
NE 17th Avenue
NW 18th Avenue
NW 6th Avenue
Everett Street
Lake Road
Leadbetter Road
SR500
SR14
CHARBONNEAU ENGINEERING LLC
PROJECT: 10-01
NOTES: Total Traffic = Background Traffic + Trip Assignment.
2015 TOTAL TRAFFIC
CAMAS HIGH SCHOOL EXPANSION
FIGURE 6

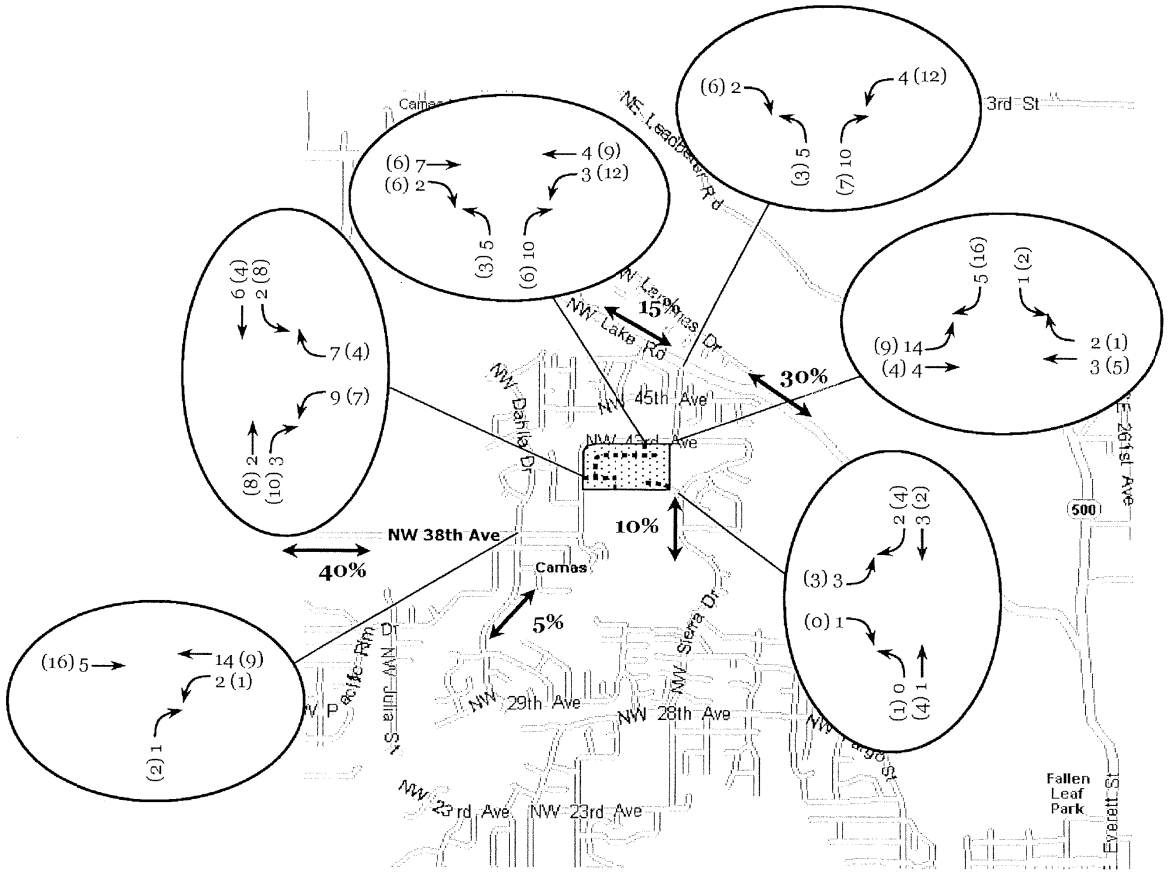


FILE NAME: 0560flow.dwg

PLOT DATE: 10.15

CHARBONNEAU ENGINEERING LLC PROJECT: 05-60	NOTES: Trip generation based on Single-Family Residential (ITE 210) trip rates.	TRIP ASSIGNMENT AM PEAK HOUR DEERHAVEN SUBDIVISION	FIGURE 5a

Figure 8: Weekday Peak Hour Traffic Volumes Generated By Hidden Meadows



Generated Site Traffic

	In	Out
AM Peak	12	35
PM Peak	40	23

CTS ENGINEERS

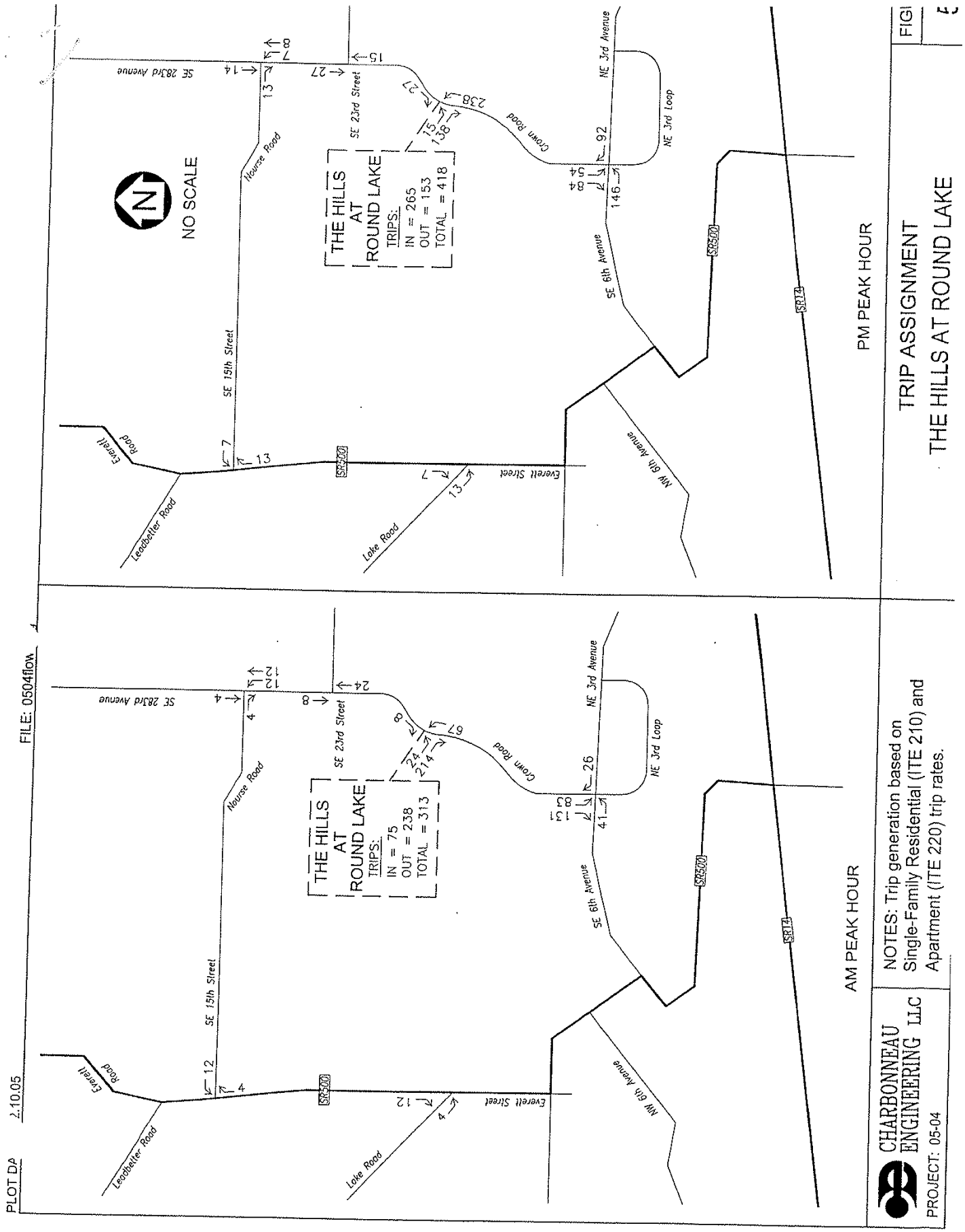
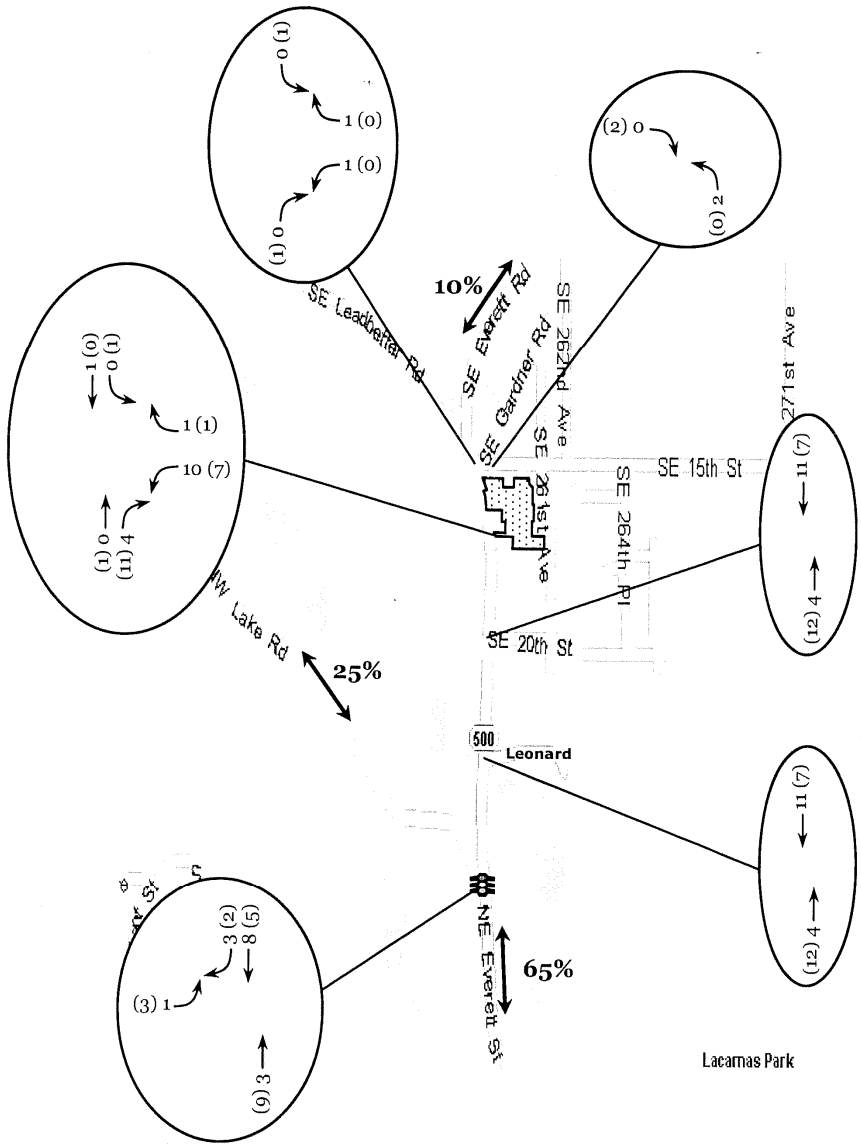

TRIP ASSIGNMENT
THE HILLS AT ROUND LAKE
PM PEAK HOUR
AM PEAK HOUR
NO SCALE
THE HILLS AT ROUND LAKE
TRIPS:
IN = 265
OUT = 153
TOTAL = 418
THE HILLS AT ROUND LAKE
TRIPS:
IN = 75
OUT = 238
TOTAL = 313
SE 23rd Street
Nourse Road
SE 15th Street
SE 28Jrd Avenue
Crown Road
NE 3rd Avenue
NE 3rd Loop
SE 6th Avenue
NW 6th Avenue
Everett Street
Lake Road
Leadbetter Road
Everett Road
SR500
SR14
NOTES: Trip generation based on Single-Family Residential (ITE 210) and Apartment (ITE 220) trip rates.
CHARBONNEAU ENGINEERING LLC
PROJECT: 05-04
FILE: 0504flow
2.10.05
PLOT DA

Figure 8: Weekday Peak Hour Traffic Volumes Generated By La Camas Pointe



N

Drawing Not To Scale

Site Generated Traffic

	In	Out
AM Peak	4	13
PM Peak	14	8

Traffic Signal

Stop Sign

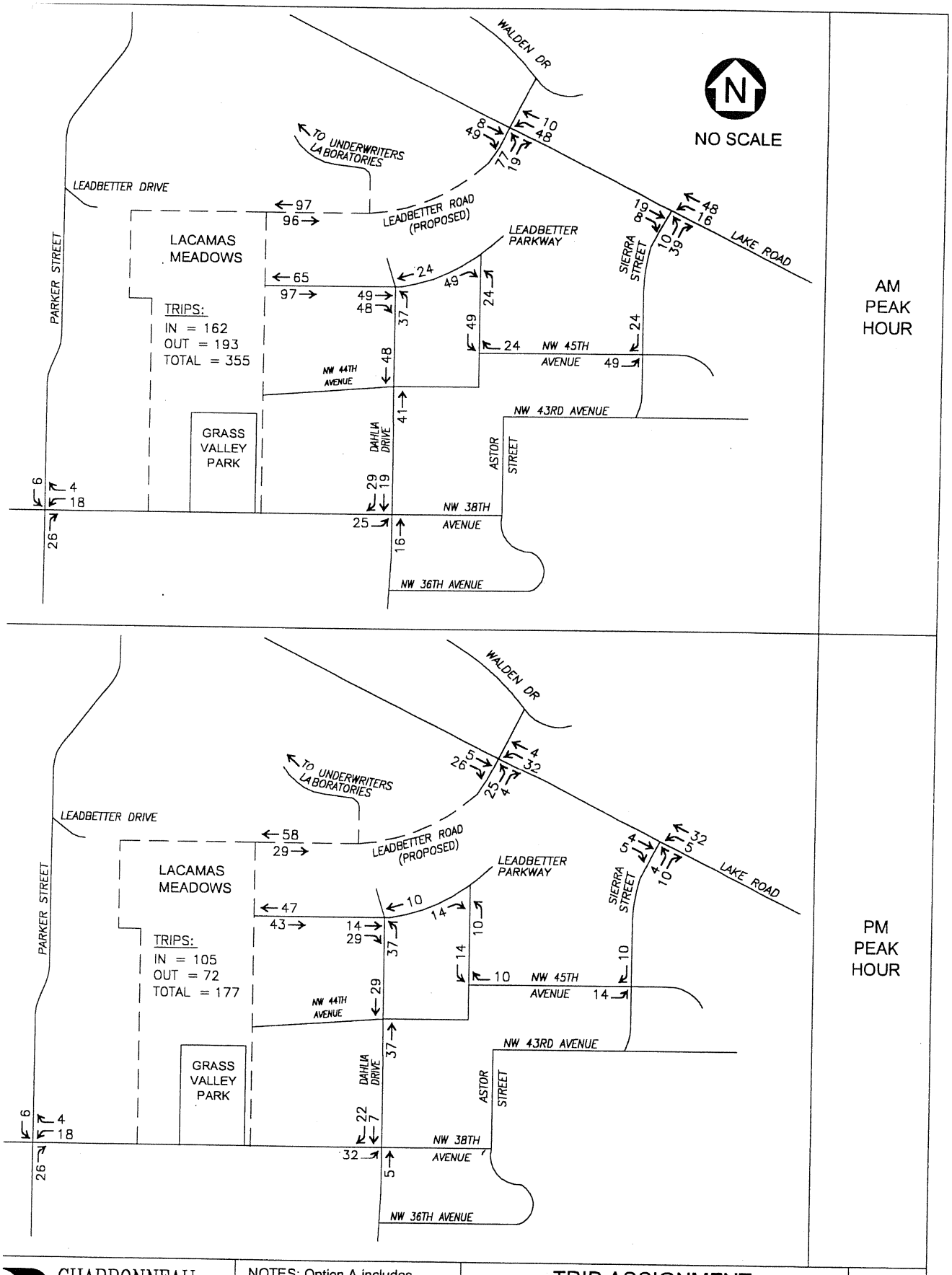
Proposed Site

Proposed Roadway

AM(PM) Peak Hour Volumes

CTS ENGINEERS

OR05.034.T01 La Camas Pointe



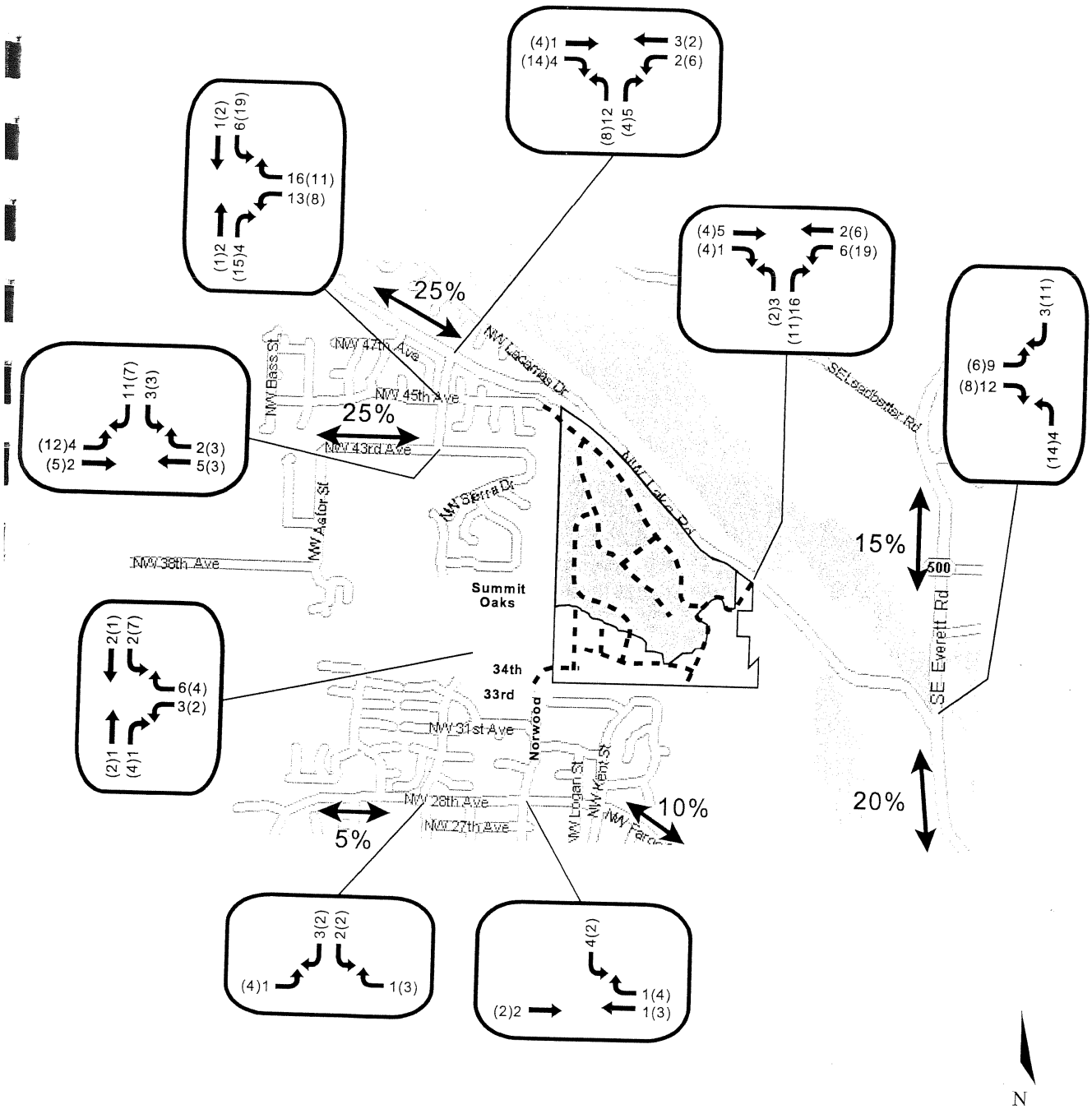
CHARBONNEAU ENGINEERING LLC
PROJECT: 04-35

NOTES: Option A includes development of an elementary school, residential homes and the Leadbetter Road alignment.

TRIP ASSIGNMENT
- OPTION A -
LACAMAS MEADOWS

FIGURE
5a

Figure 7: Weekday Peak Hour Traffic Volumes Generated by Lakeridge North Subdivision (110 Single-Family Homes)



	IN	OUT
AM	21	62
PM	71	40

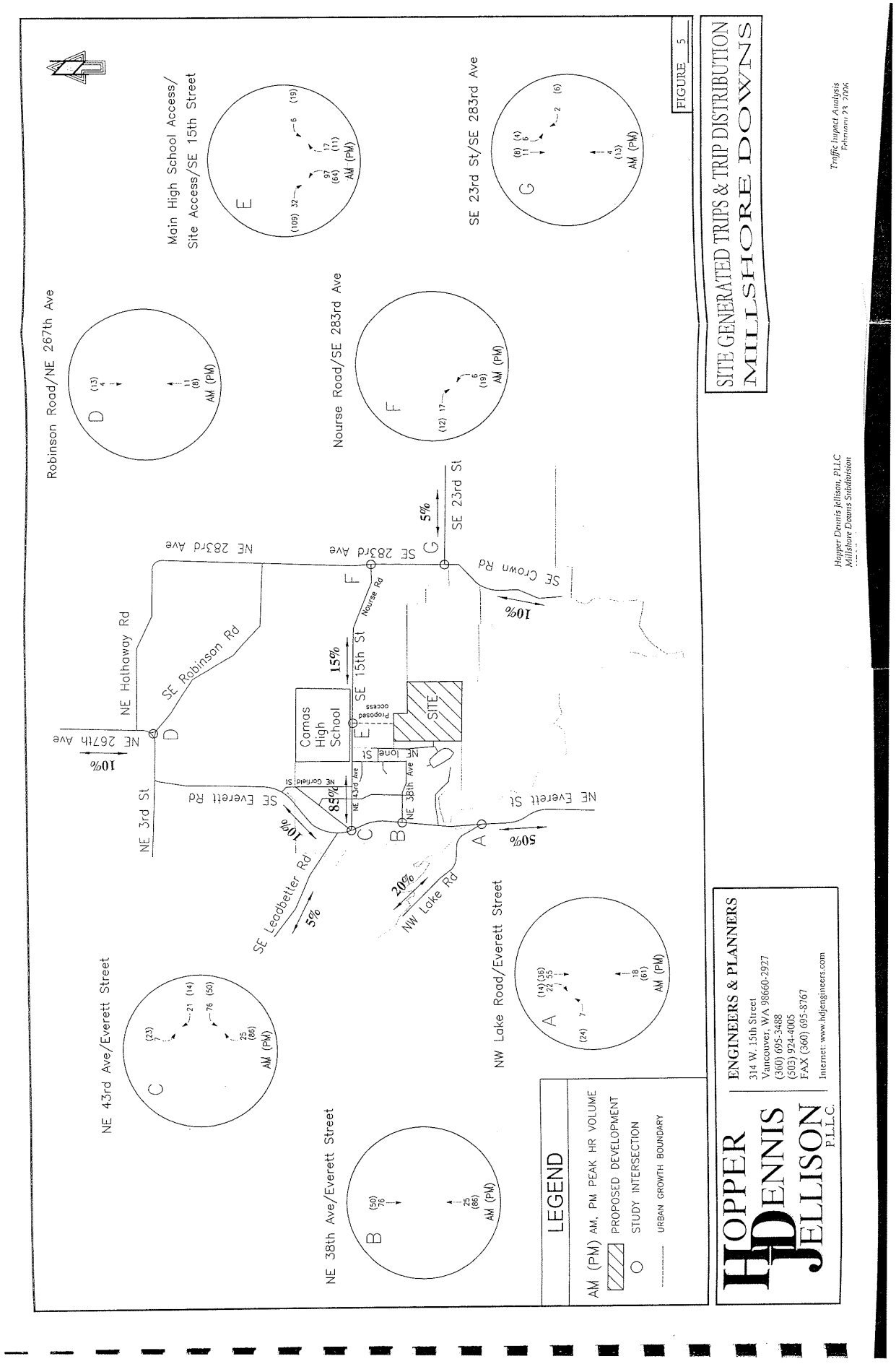
Proposed Site
Lakeridge Site

Traffic Signal
Stop Sign
Proposed Roadway
AM(PM) Peak Hour Volumes

Drawing not to scale.

ıkeridge North Subdivision

CTS


SITE GENERATED TRIPS & TRIP DISTRIBUTION
MILLSHORE DOWNS
FIGURE 5
Robinson Road/NE 267th Ave
Main High School Access/
Site Access/SE 15th Street
Nourse Road/SE 283rd Ave
SE 23rd St/SE 283rd Ave
NE 43rd Ave/Everett Street
NE 38th Ave/Everett Street
NW Lake Road/Everett Street
NE Holloway Rd
SE Robinson Rd
NE 267th Ave
NE 3rd St
SE Everett Rd
NE Everett St
SE Leadbetter Rd
NW Lake Rd
SE 15th St
Nourse Rd
SE 283rd Ave
NE 283rd Ave
SE 23rd St
SE Crown Rd
Comas High School
Proposed access
SITE
NE Ione St
NE 38th Ave
NE 43rd Ave
NE Garfield St
10%
15%
8%
5%
20%
50%
LEGEND
AM (PM) AM, PM PEAK HR VOLUME
PROPOSED DEVELOPMENT
STUDY INTERSECTION
URBAN GROWTH BOUNDARY
HOPPER DENNIS JELLISON P.L.L.C.
ENGINEERS & PLANNERS
314 W. 15th Street
Vancouver, WA 98660-2927
(360) 695-3488
(503) 924-4005
FAX (360) 695-8767
Internet: www.hdjengineers.com
Traffic Impact Analysis
February 24, 2006
Hopper Dennis Jellison, PLLC
Millshore Downs Subdivision

NE 43rd Avenue/SE Nourse Road is a two-lane arterial roadway with additional turn pockets at major intersections. The posted speed limit is 25 mph from NE Everett Street to SE 271st Avenue. East of SE 271st Avenue, the speed limit changes to 40 mph. Intermittent sidewalks exist along both sides of the roadway.

SE 283rd Avenue/SE Crown Road is a two-lane arterial roadway with a posted speed limit of 40 mph. Some intermittent shoulders exist along the roadway.

NE 3rd Avenue is a four-lane arterial roadway with additional turn pockets at major intersections. The posted speed limit is 25 mph west of East First Avenue. East of East First Avenue, the speed limit changes to 40 mph. Sidewalks exist along both sides of the roadway.

TRIP GENERATION

Estimates of daily, A.M. peak hour, and P.M. peak hour trips generated by the proposed project were developed from rates published in "Trip Generation, 8th Edition" (Institute of Transportation Engineers, 2008). The proposed development is expected to generate 478 new daily trips, 37 new A.M. peak hour (10 in, 27 out), and 51 new P.M. peak hour (32 in, 19 out) trips. Table 1 summarizes the trip generation for North Hills Subdivision developmentt.

Table 1. Trip Generation Summary for North Hills Subdivision

	Average Daily	A.M. Peak			P.M. Peak		
		In	Out	Total	In	Out	Total
Single Family Residential (ITE Code 210)							
Rate per unit	9.57	0.19	0.56	0.75	0.64	0.37	1.01
	488	10	28	38	33	19	52
Existing Single family (ITE Code 210)							
Rate per unit	9.57	0.19	0.56	0.75	0.64	0.37	1.01
1 existing single family unit	10	0	1	1	1	0	1
Net new trips	478	10	27	37	32	19	51

TRIP DISTRIBUTION

A generalized trip distribution pattern for the A.M. and P.M. peak hour was developed from the existing traffic counts, previous traffic studies, locations of major employment centers, and logical travel paths to and from major travel corridors. The trip distribution patter is listed below:

- SE 283rd Avenue to and from the north – 5%
- NE Everett Street to and from the north – 10%
- Camas High School – 5%
- NE Lake Road – 10%
- NE Everett Street to and from the south – 20%
- SE Crown Road to and from the south – 50%

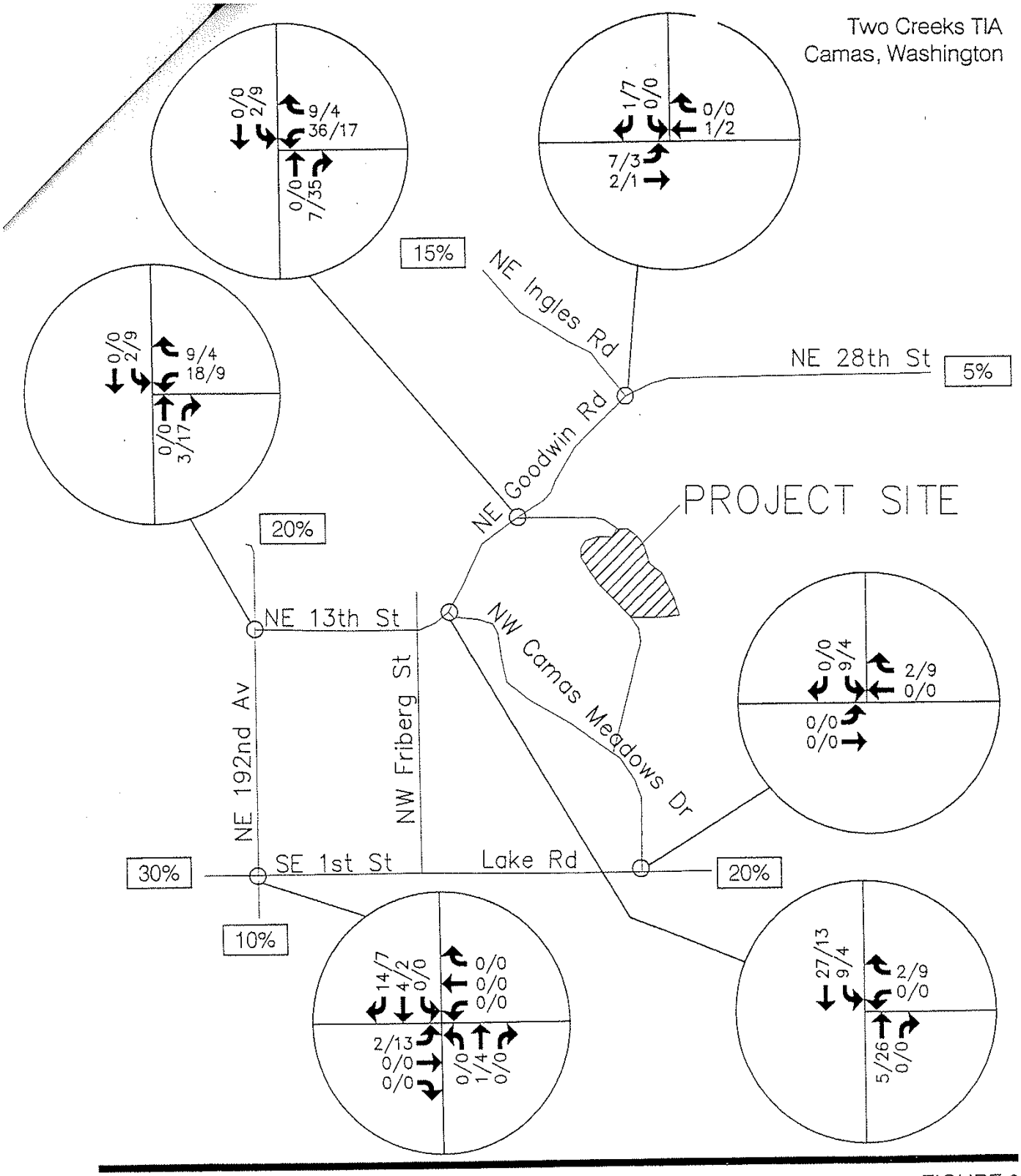
Based on the trip distribution pattern above, the project-generated trip impact at the following study area intersection was calculated:

- NE Everett Street (SR 500)/NE 43rd Avenue
- NE Everett Street (SR 500)/NE Lake Road
- SE 277th Avenue/ SE Nourse Road
- SE 283rd Avenue/SE Crown Road/SE Nourse Road
- SE Crown Road/NE 3rd Avenue

Table 2 summarizes the A.M. and P.M. peak hour traffic impacts created by the North Hills Subdivision at the study area intersections.

Table 2. Project Trip Impact Summary

	A.M. Peak			P.M. Peak		
	In	Out	Total	In	Out	Total
NE Everett St/NE 43rd Av	4	11	15	12	8	20
NE Everett St/NE Lake Rd	3	8	11	9	6	15
SE 277th Av/SE Nourse Rd	10	27	37	32	19	51
SE 283rd Av/SE Crown Rd/SE Nourse Rd	5	15	20	18	10	28
SE Crown Rd/NE 3rd Av	5	14	19	16	9	25



LEGEND

5/10 A.M. and P.M. Peak Hour Traffic Volumes

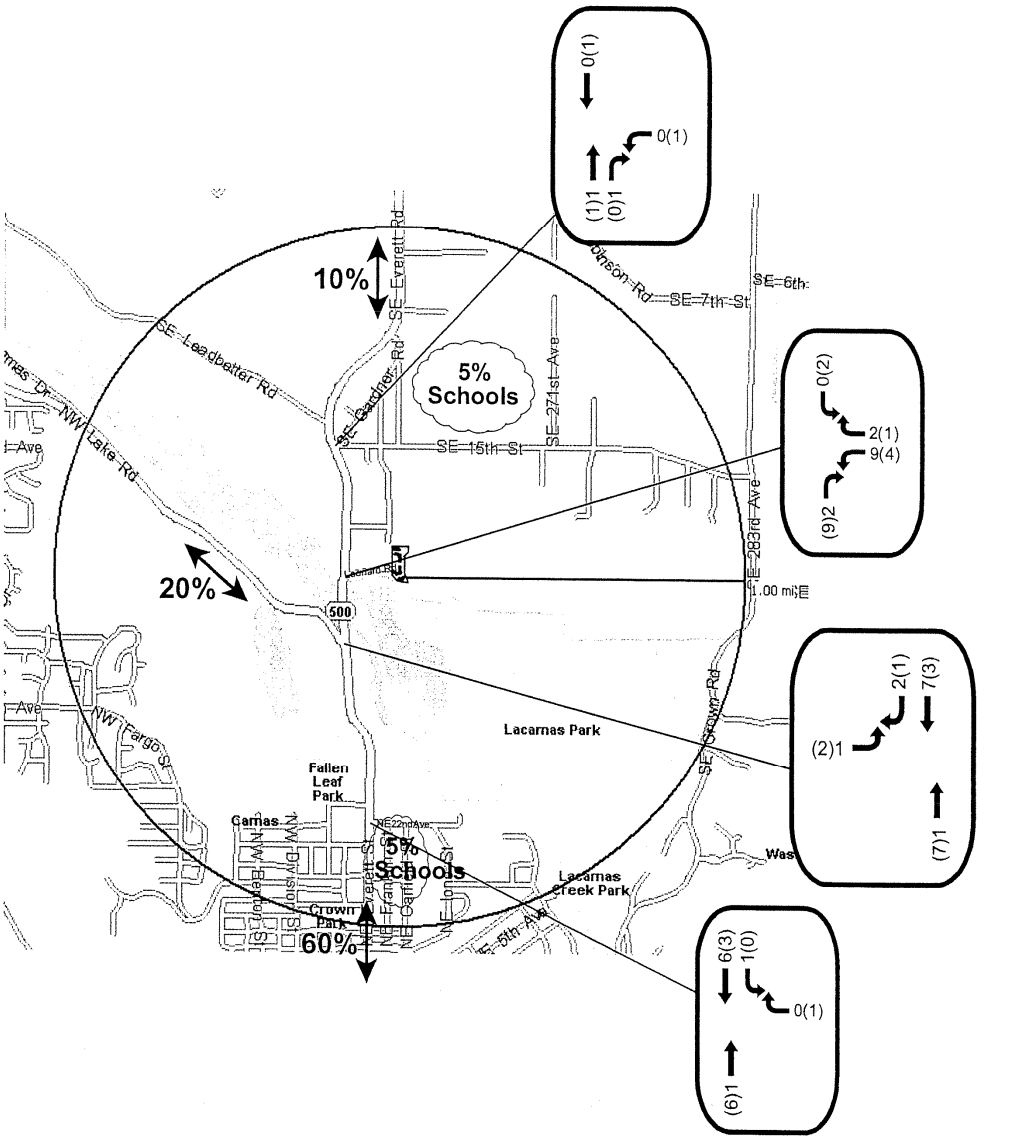
40% A.M. and P.M. Peak Hour Trip Distribution

NOT TO SCALE

FIGURE 6
Trip Distribution and Assignment
Alternative 2 (123 UNITS)
ALT. #1 WAS 112 UNITS

304031.0Figures.dwg

Figure 7: Weekday Peak Hour Traffic Volumes Generated By Vintage View On The Lake



	IN	OUT
AM	2	11
PM	11	5

Traffic Signal
Stop Sign
Proposed Roadway
AM(PM) Peak Hour Volumes

Project Site

Drawing Not To Scale

Vintage View PUD

CTS Engineers, Inc.

APPENDIX E

Background Growth (RTC Models)

RTC

RECEIVED
APR 27 2010
VANCOUVER
GROUP MACKENZIE

MEMORANDUM

To: David Holt, Group Mackenzie
From: Mark Harrington, Transportation Analyst
Date: April 23, 2010
Subject: **Select Zone of TAZ 483 – CJ Dens Camas Subdivision – Project 2050186.01**

Enclosed are plots showing auto volumes and distributions (additional volumes) during the PM peak 1 hour for the years 2000 and 2030. TAZ 483 was selected for auto assignment. These assignments are based on the 2030 MTP model. If you have any questions, please contact me.

- Scenario 4210: 2000 Base HWY w/ 2000 Demand – TAZ 483 (12 plots)
- Scenario 9010: 2030 MTP w/ 2030 GMA Demand – TAZ 483 (12 plots)
- TAZ Map
- Land Use

TAZ	2000 HH	2000 Retail	2000 Other	2000 Total	2030 HH	2030 Retail	2030 Other	2030 Total
483	81	12	12	24	936	846	2,573	3,419

An invoice will be sent to you under a separate cover for 2 hours of staff time and other costs.

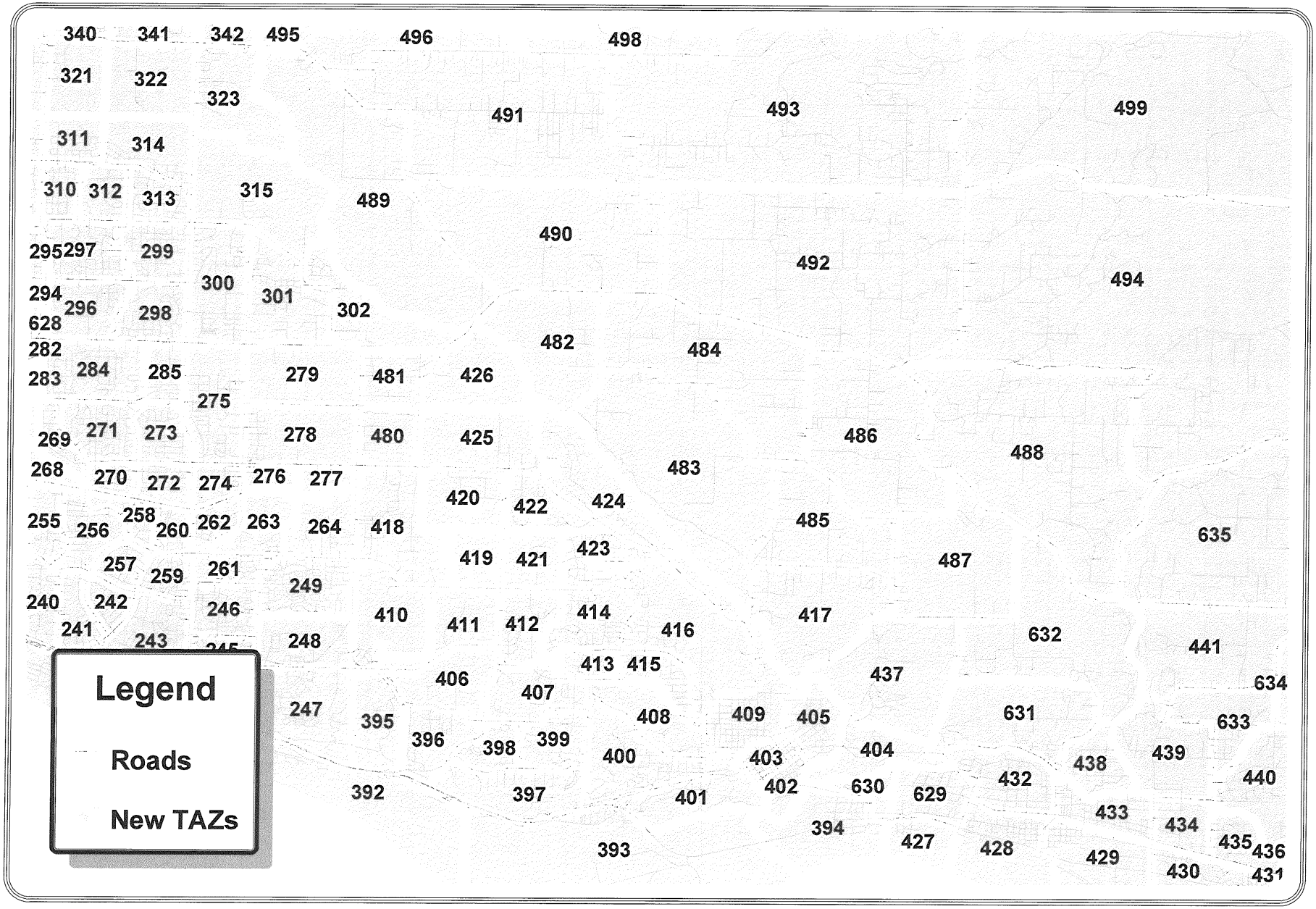
If you have any questions, please let me know.

Enclosures:

cc: Patty Raedy, RTC

Southwest Washington Regional Transportation Council
1300 Franklin Street, Floor 4 P.O. Box 1366 Vancouver, Washington 98666-1366 360-397-6067 fax: 360-397-6132 http://www.rtc.wa.gov/

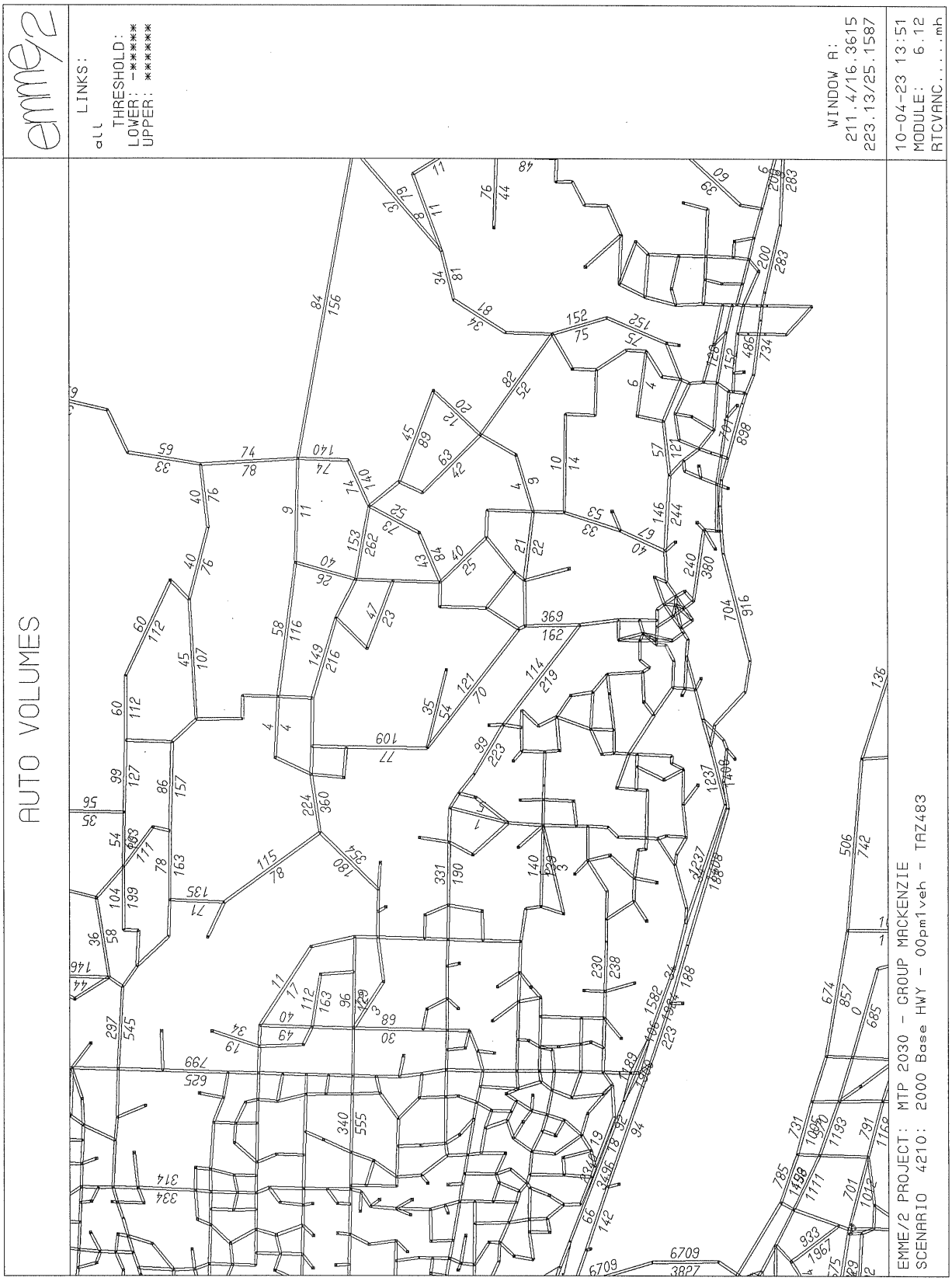
TAZ MAP



Legend

Roads

New TAZs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THRESHOLD:
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UPPER: *****
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223.13/25.1587
10-04-23 13:51
MODULE: 6.12
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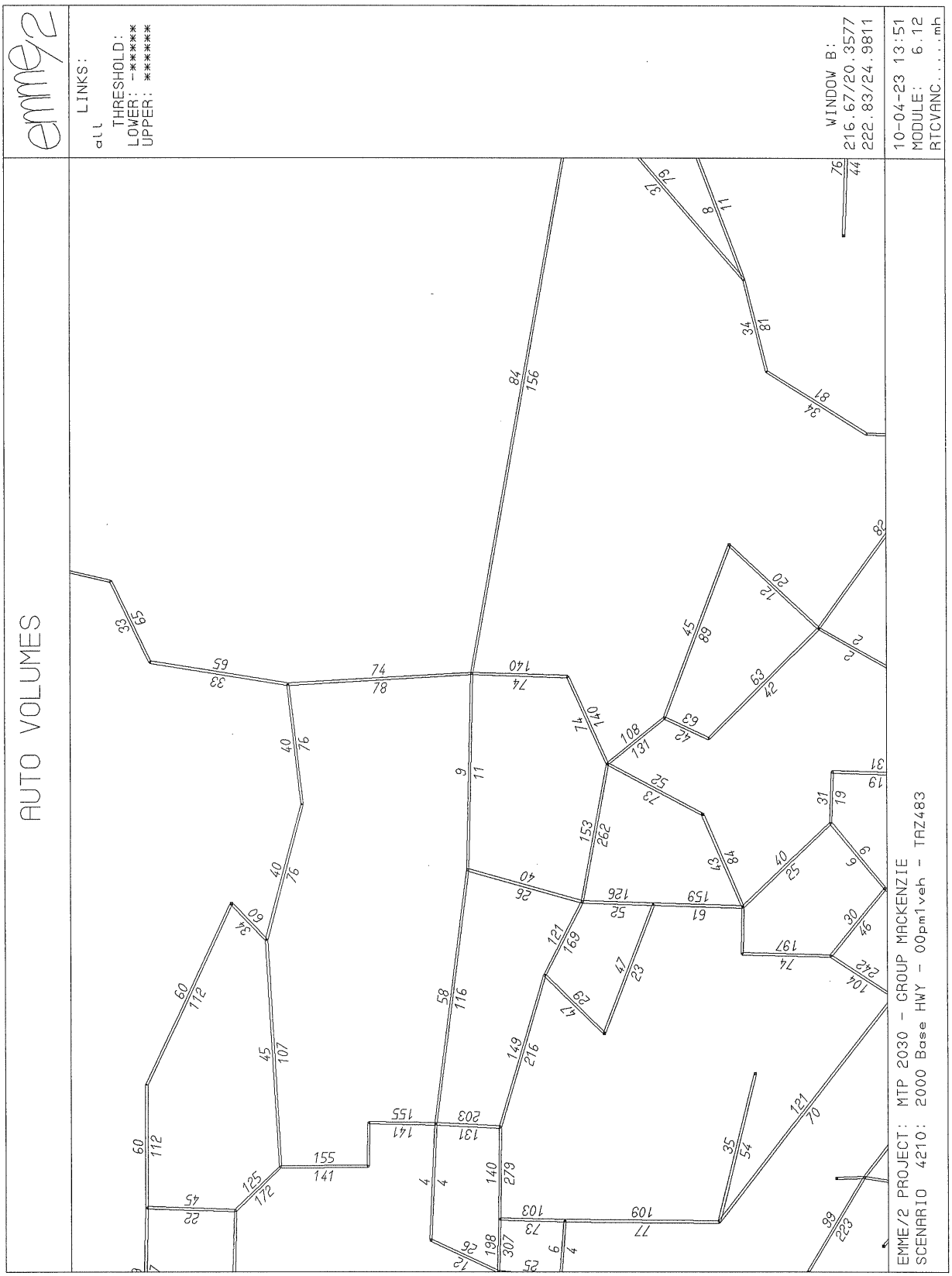
SCENARIO 4210: 2000 Base HWY - 00pm1veh - TAZ483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UPPER: ******
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216.67/20.3577
222.83/24.9811
10-04-23 13:51
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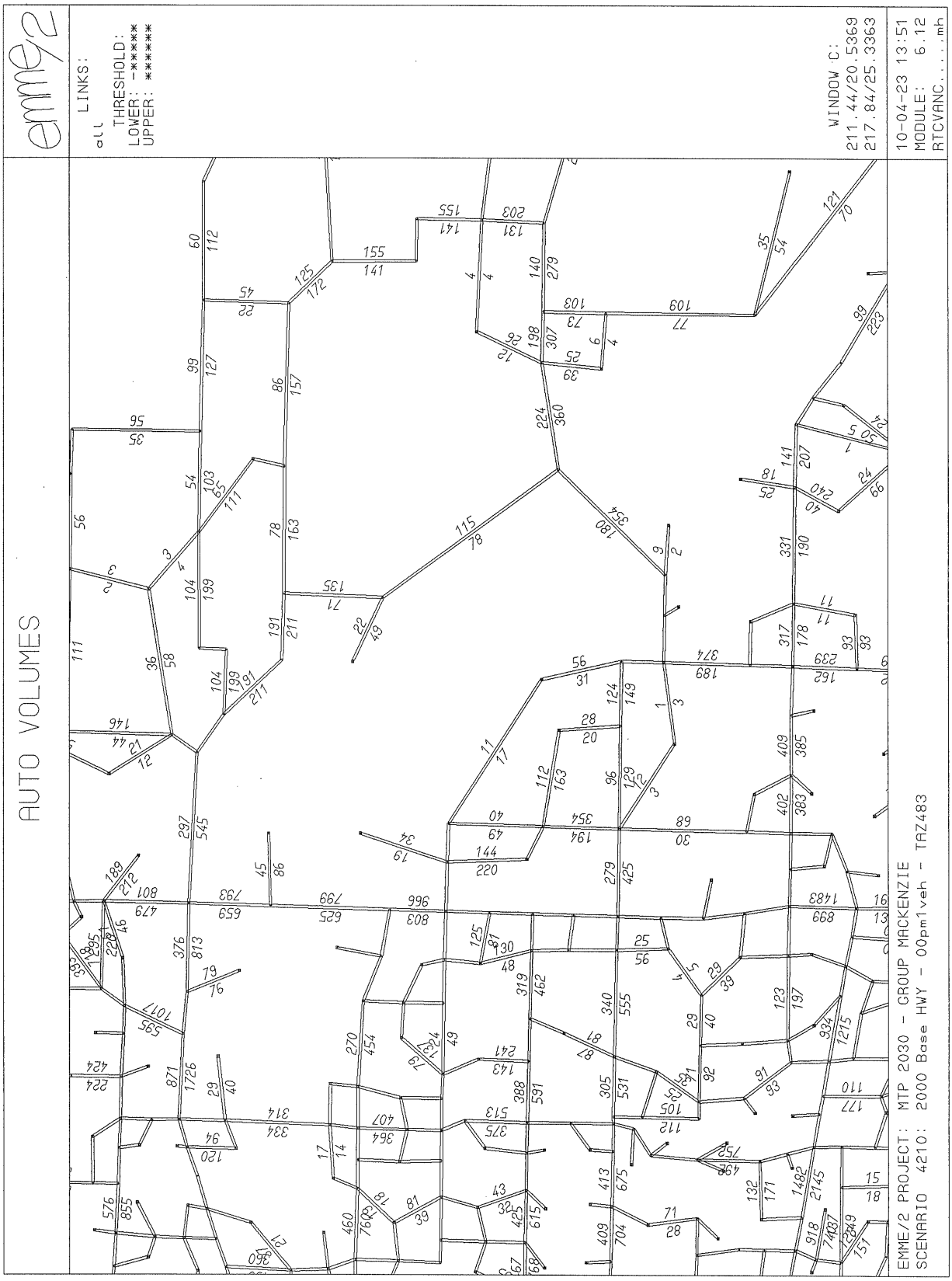
SCENARIO 4210: 2000 Base HWY - 00pm1veh - TAZ483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217.84/25.3363
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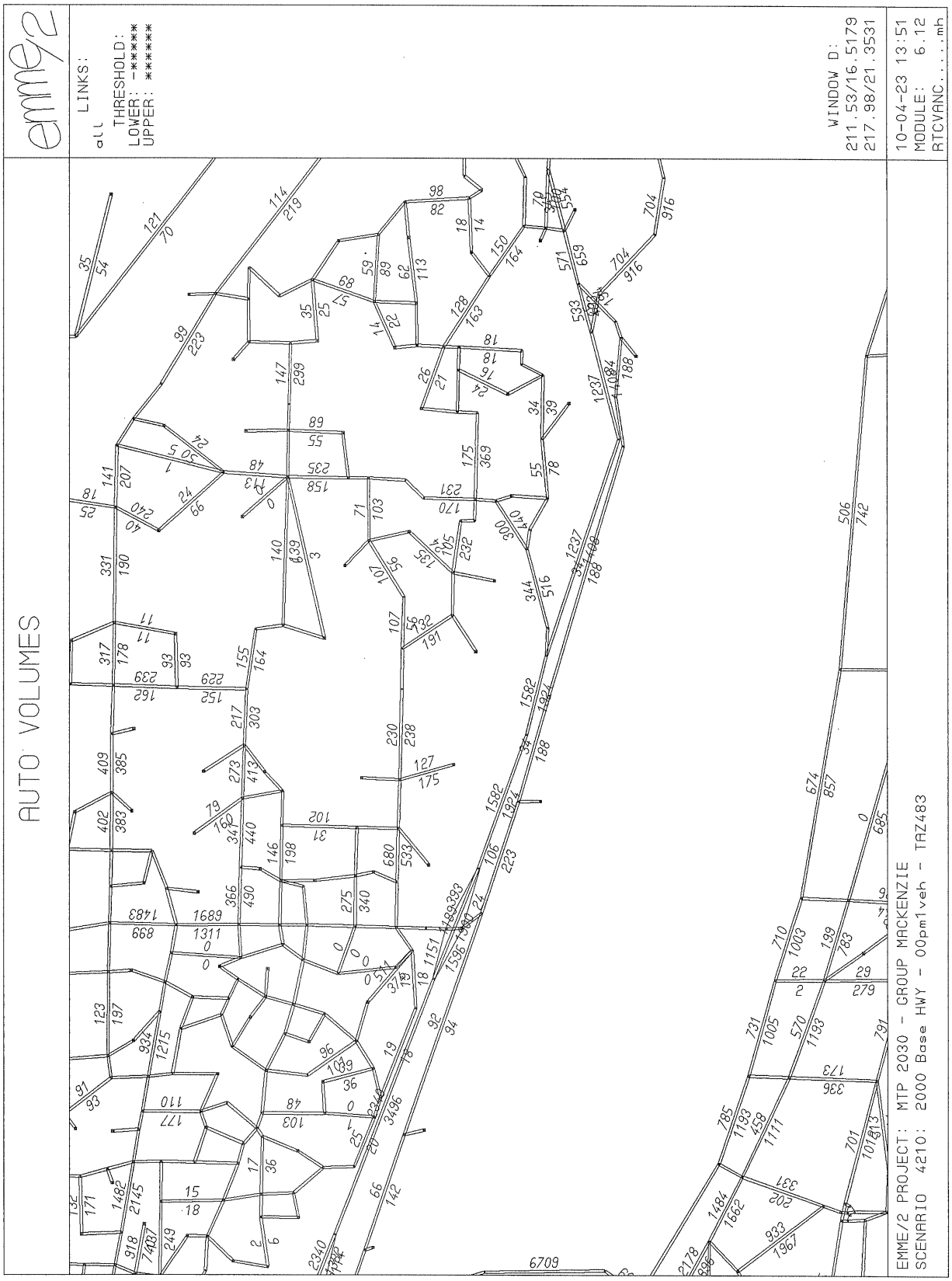
SCENARIO 4210: 2000 Base HWY - 00pm1veh - TAZ483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217.98/21.3531
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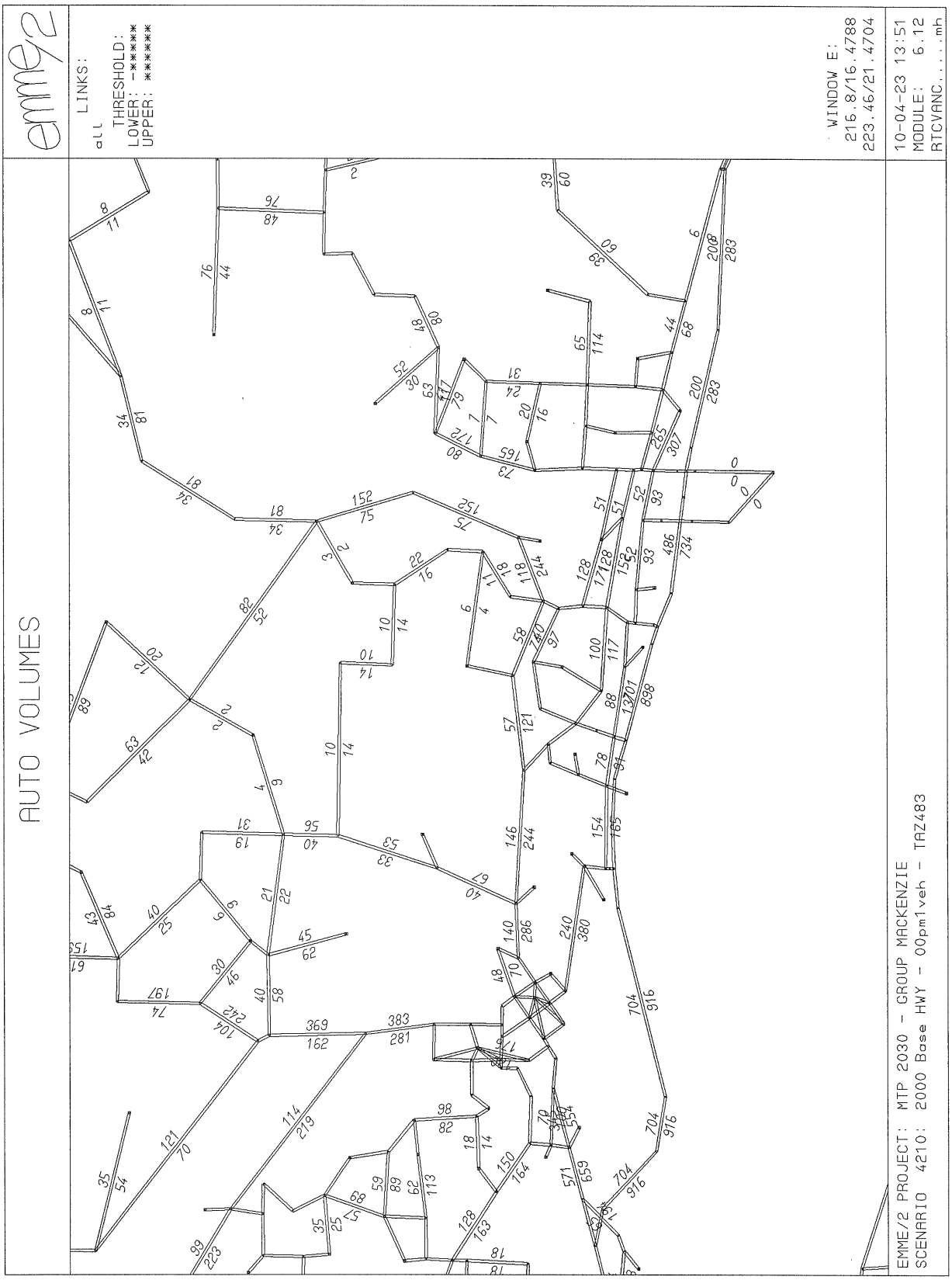
SCENARIO 4210: 2000 Base HWY - 00pm1veh - TAZ483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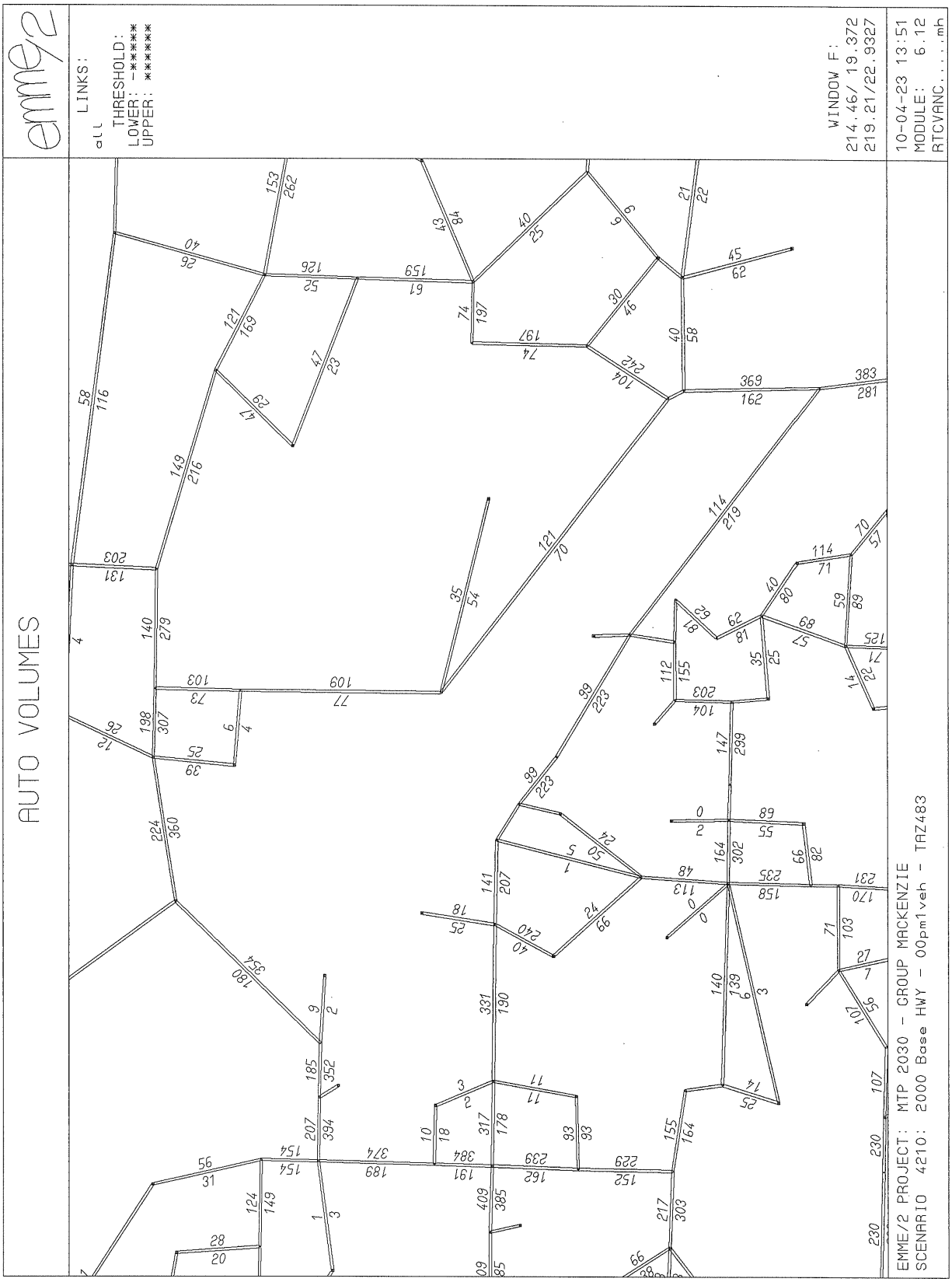
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219.21/22.9327
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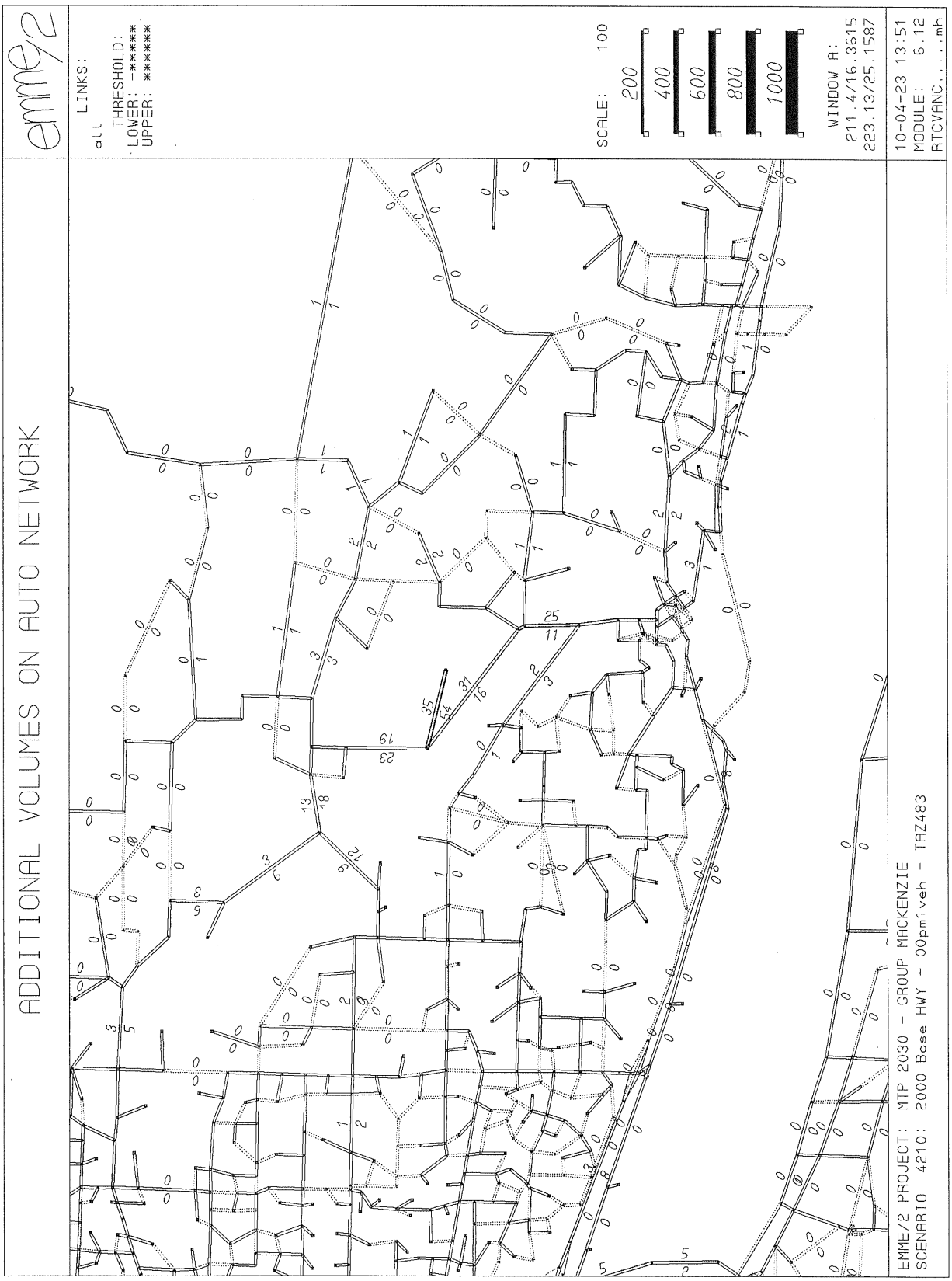
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223.13/25.1587
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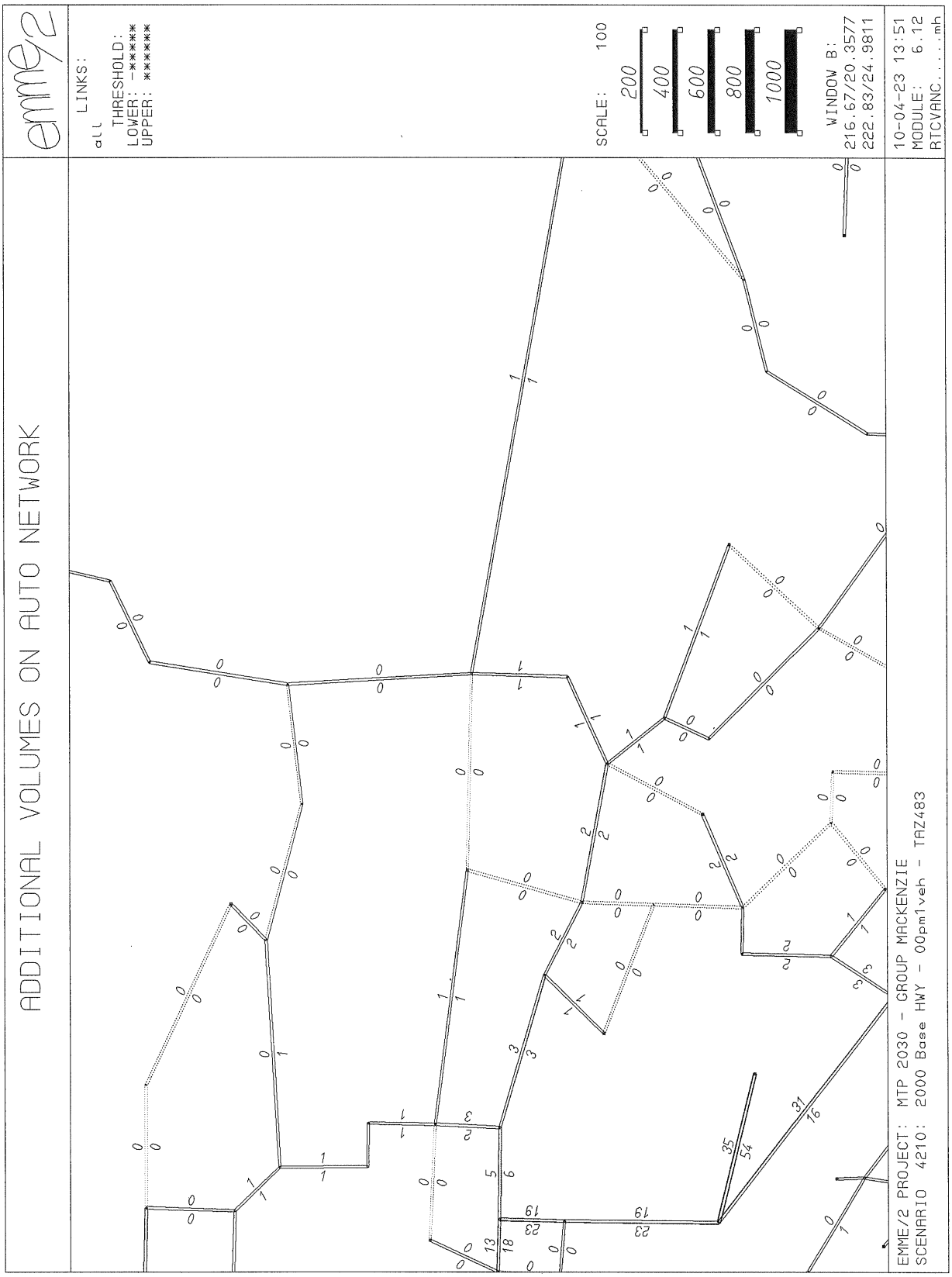
SCENARIO 4210: 2000 Base HWY - 00pm1veh - TAZ483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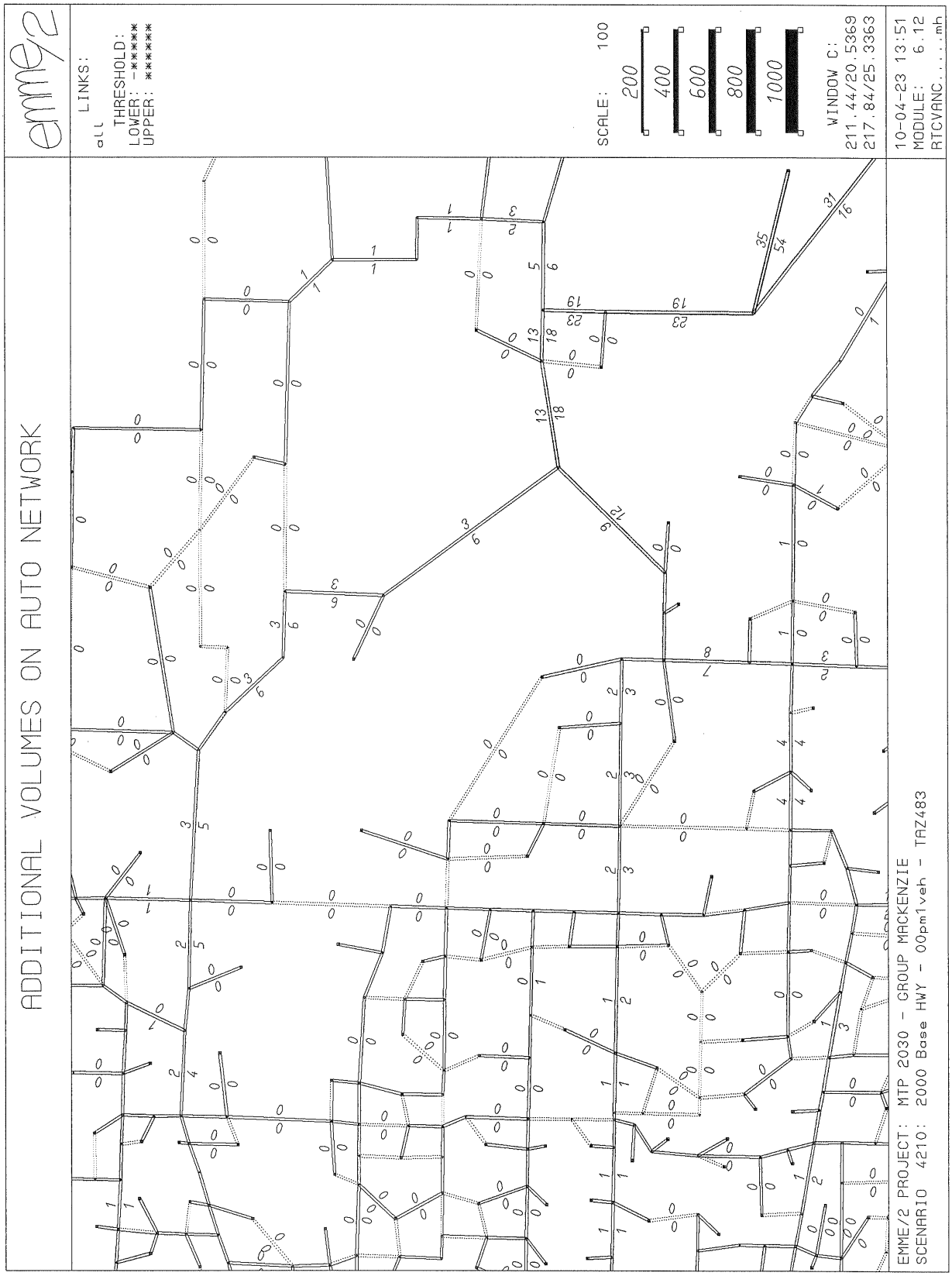
SCENARIO 4210: 2000 Base HWY - 00pm1veh - TAZ483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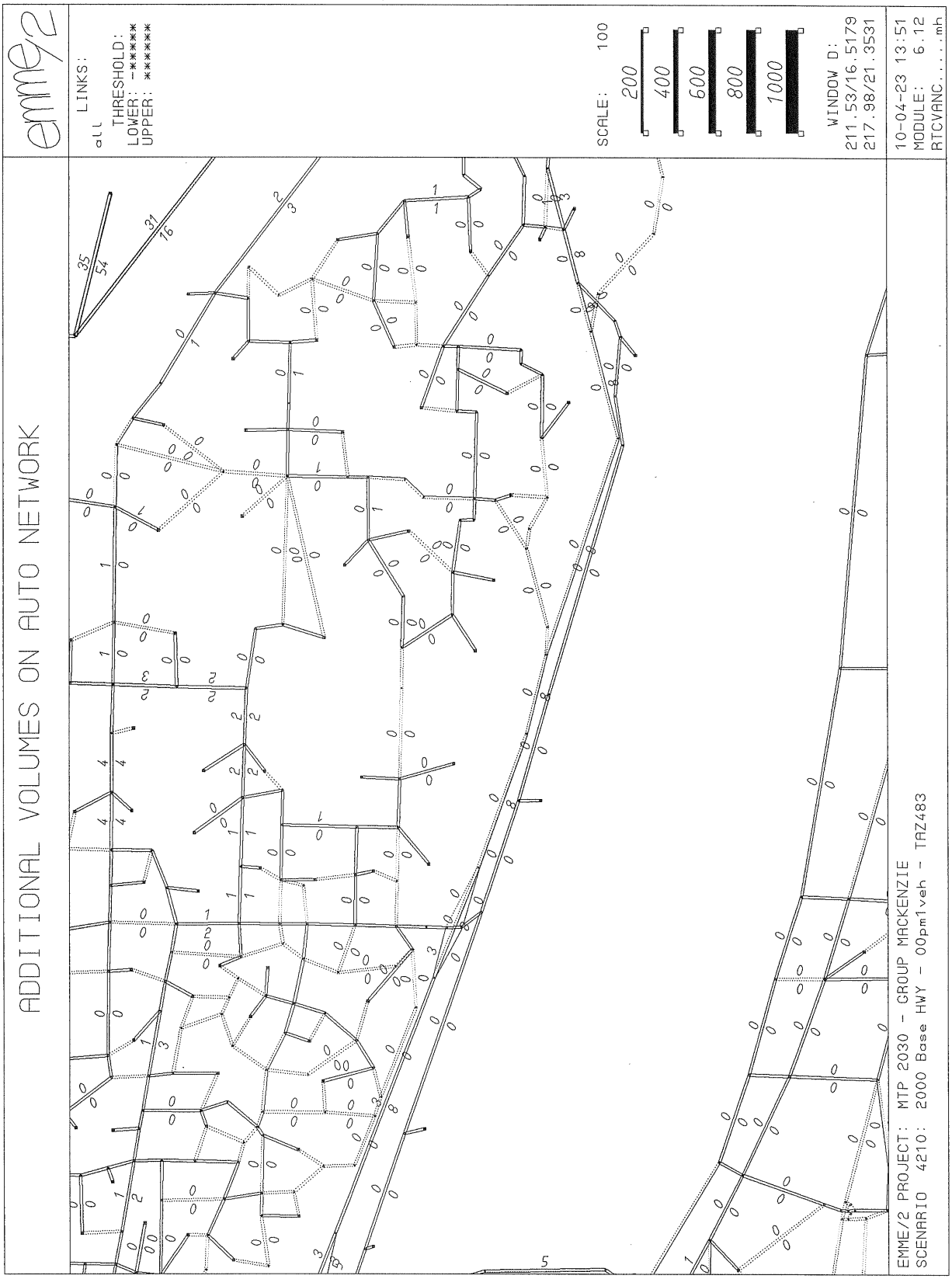
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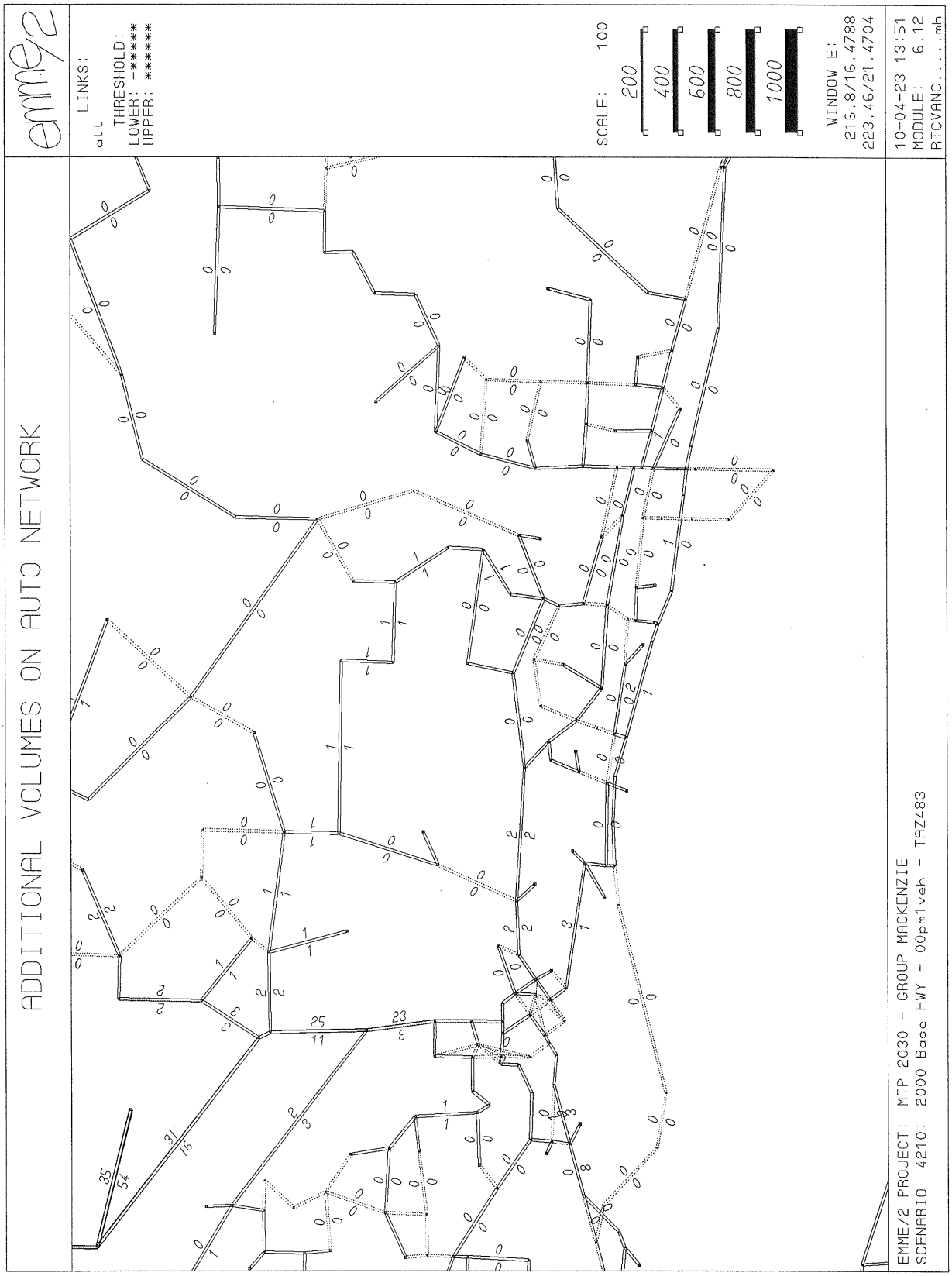
SCENARIO 4210: 2000 Base HWY - 00pm1veh - TAZ483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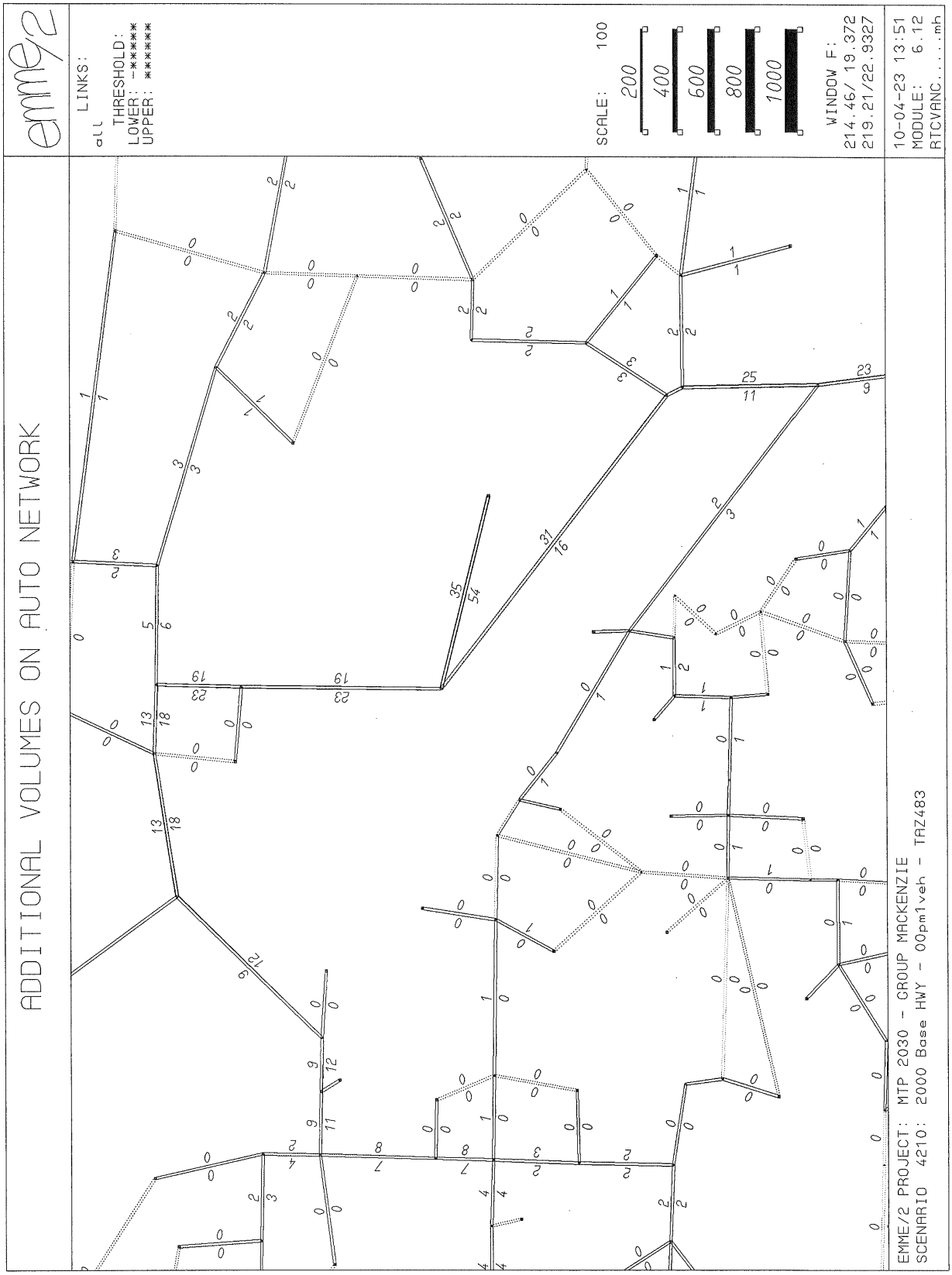
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219.21/22.9327
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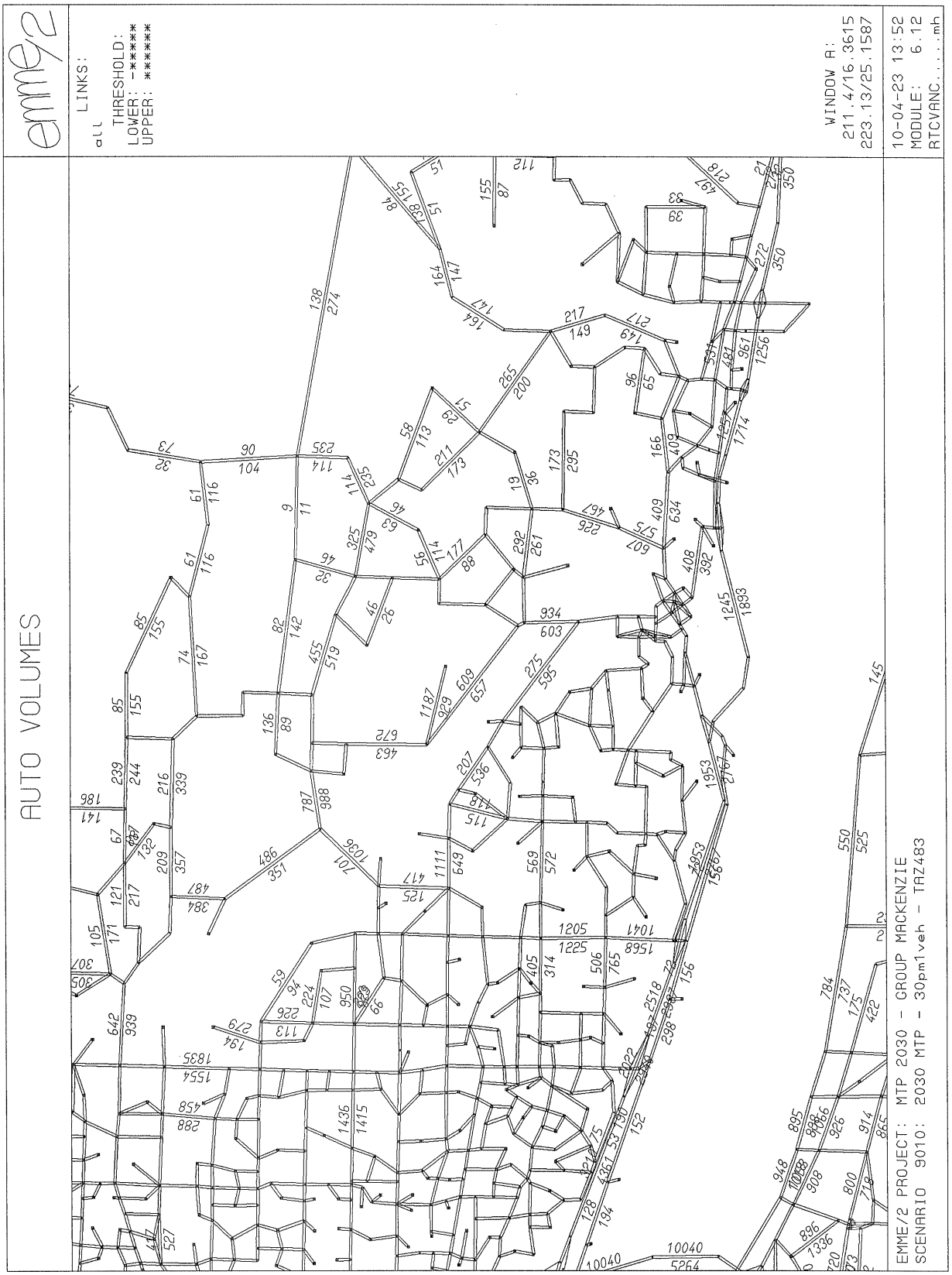
SCENARIO 4210: 2000 Base HWY - 00pm1veh - TAZ483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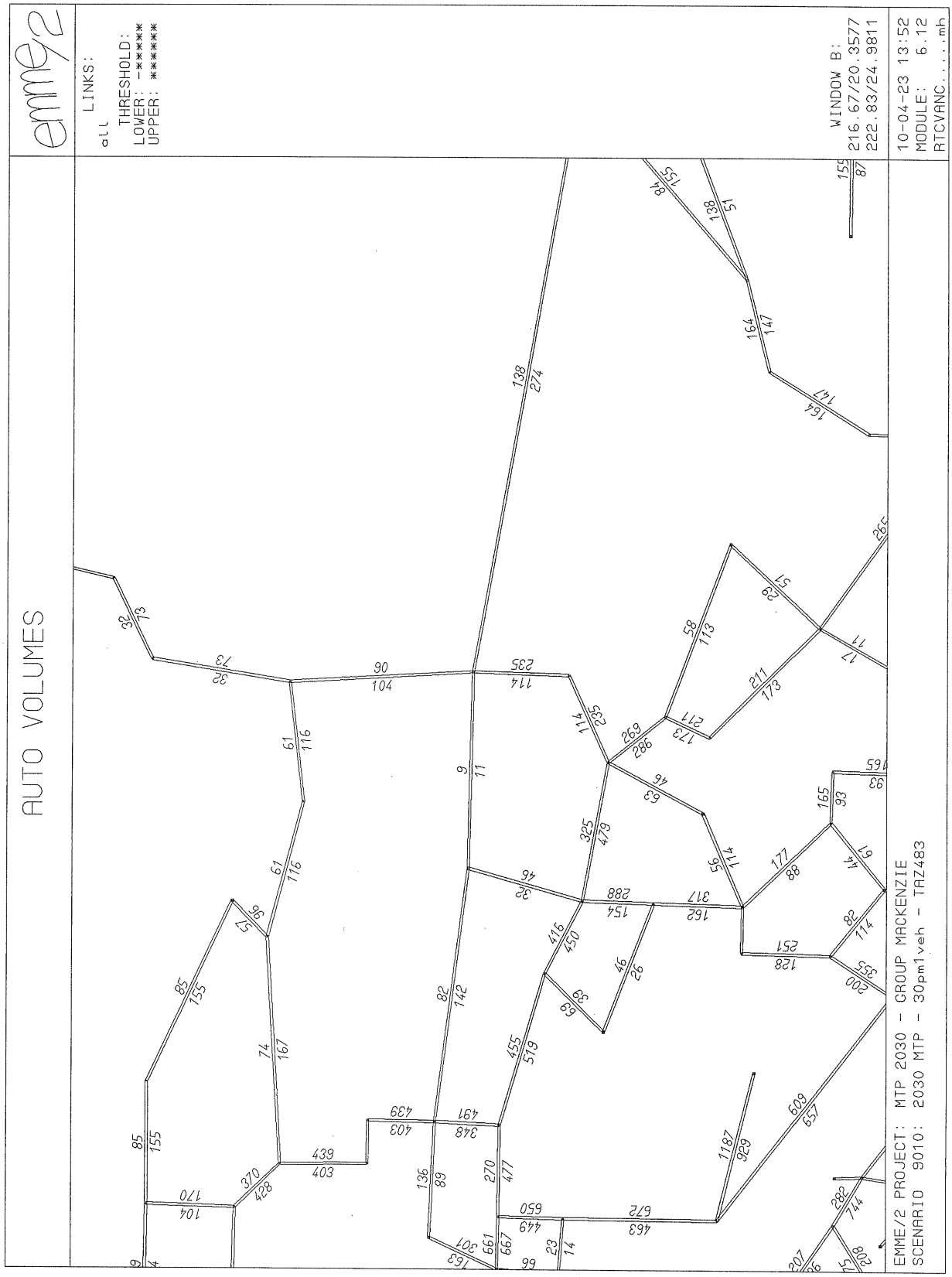
SCENARIO 9010: 2030 MTP - 30pm1veh - TAZ483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222.83/24.9811
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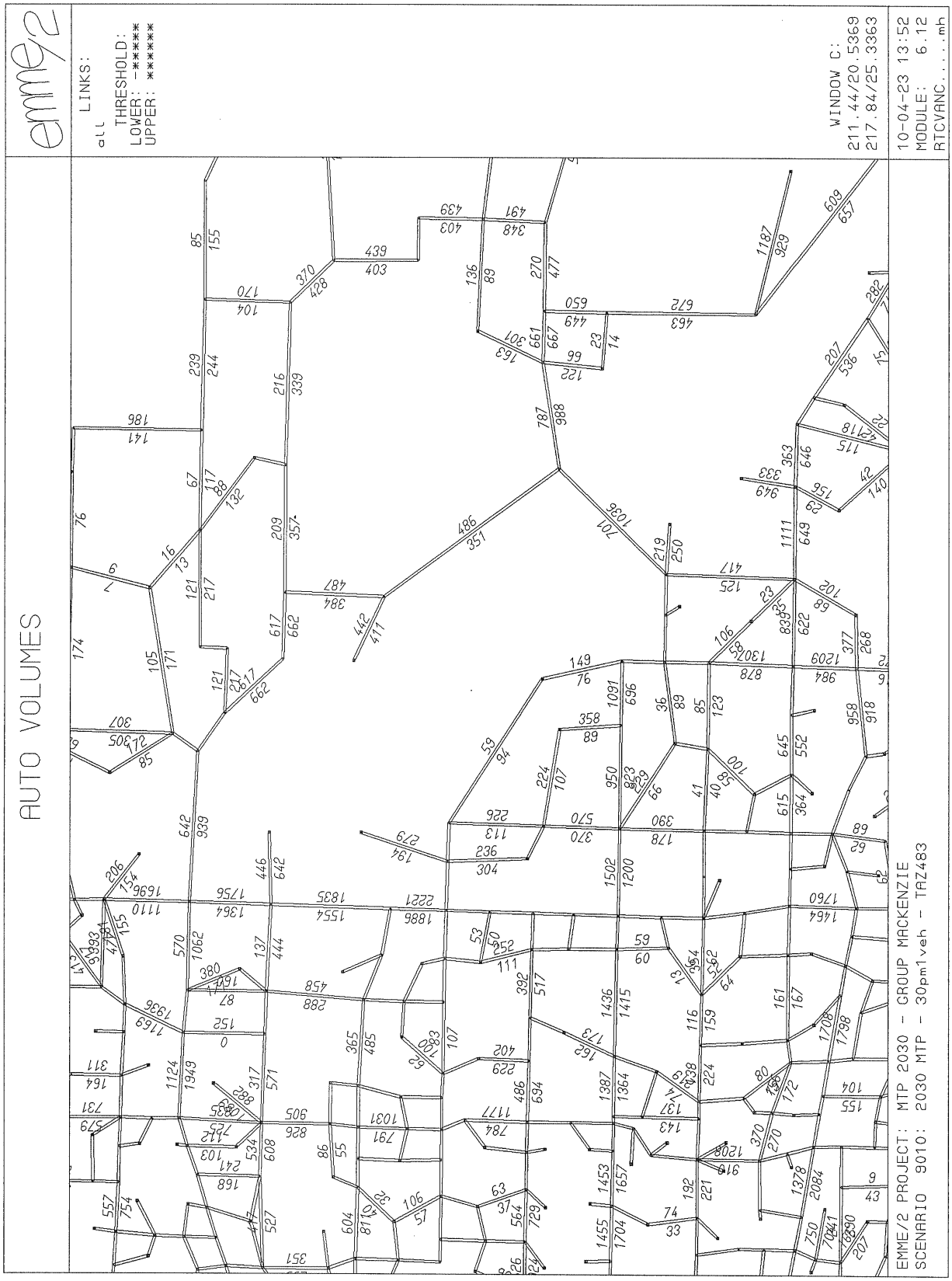
SCENARIO 9010: 2030 MTP - 30pm1veh - TAZ483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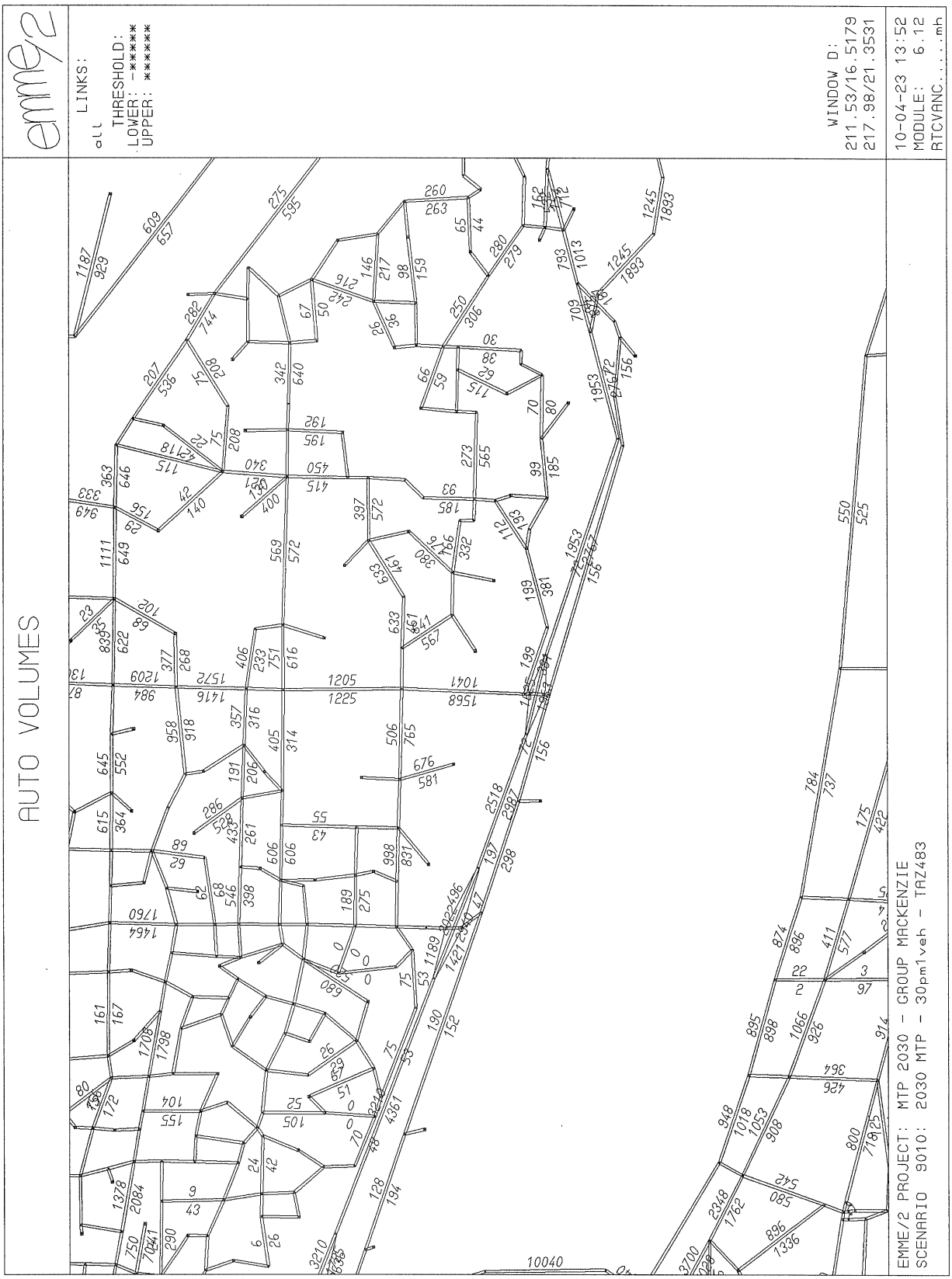
SCENARIO 9010: 2030 MTP - 30pm1veh - TAZ483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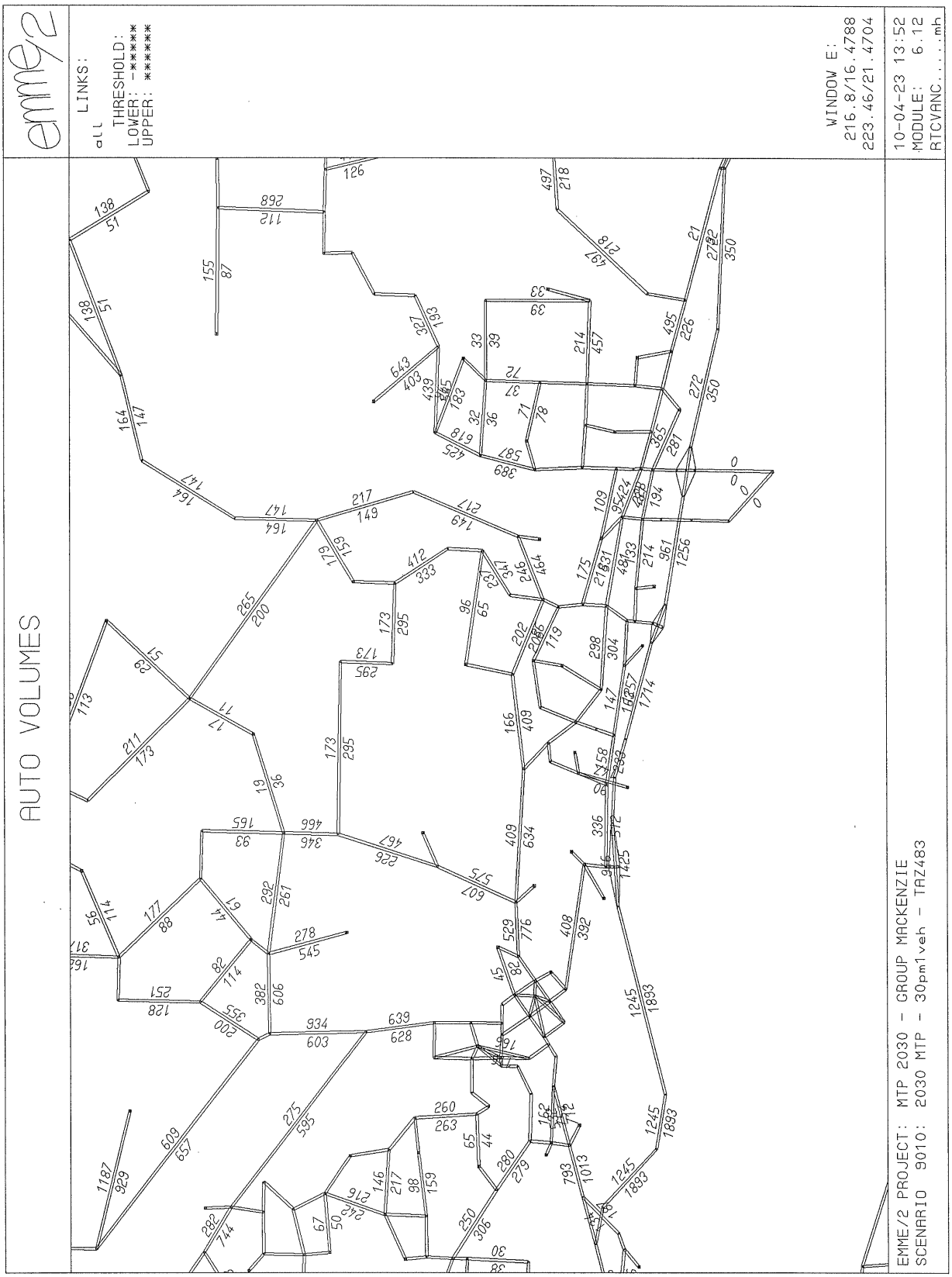
SCENARIO 9010: 2030 MTP - 30pm1veh - TAZ483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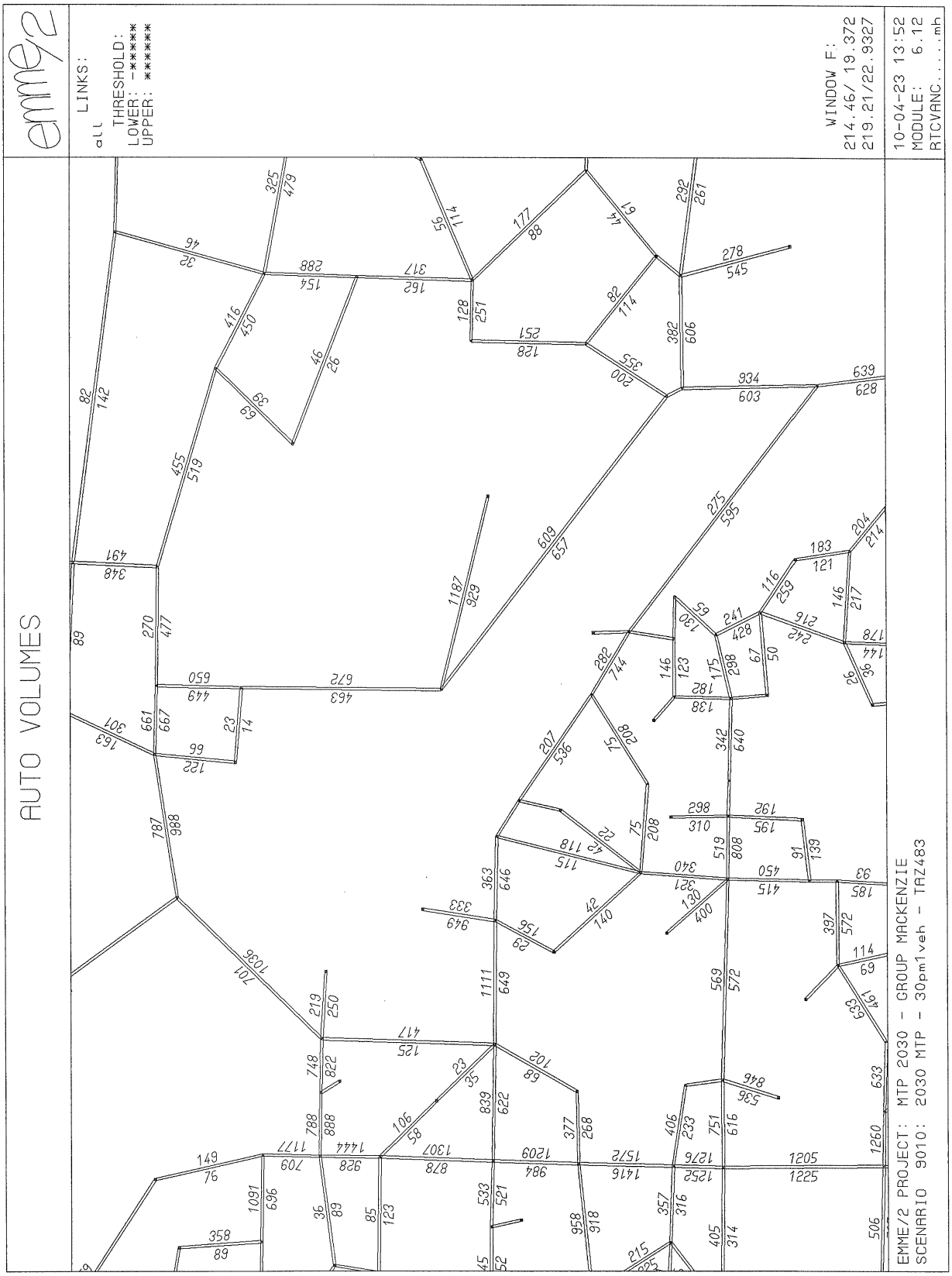
SCENARIO 9010: 2030 MTP - 30pm1veh - TAZ483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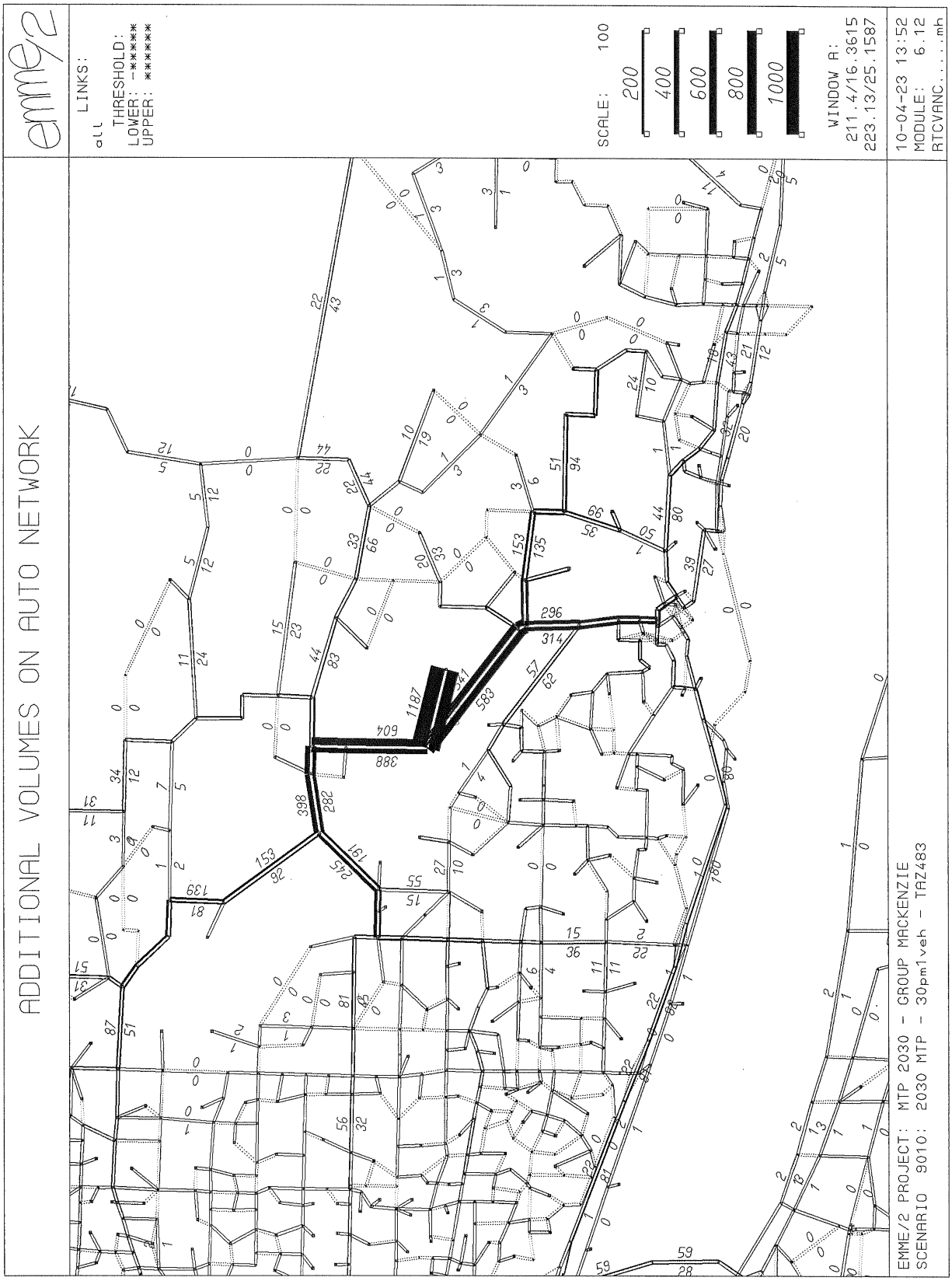
SCENARIO 9010: 2030 MTP - 30pm1veh - TAZ483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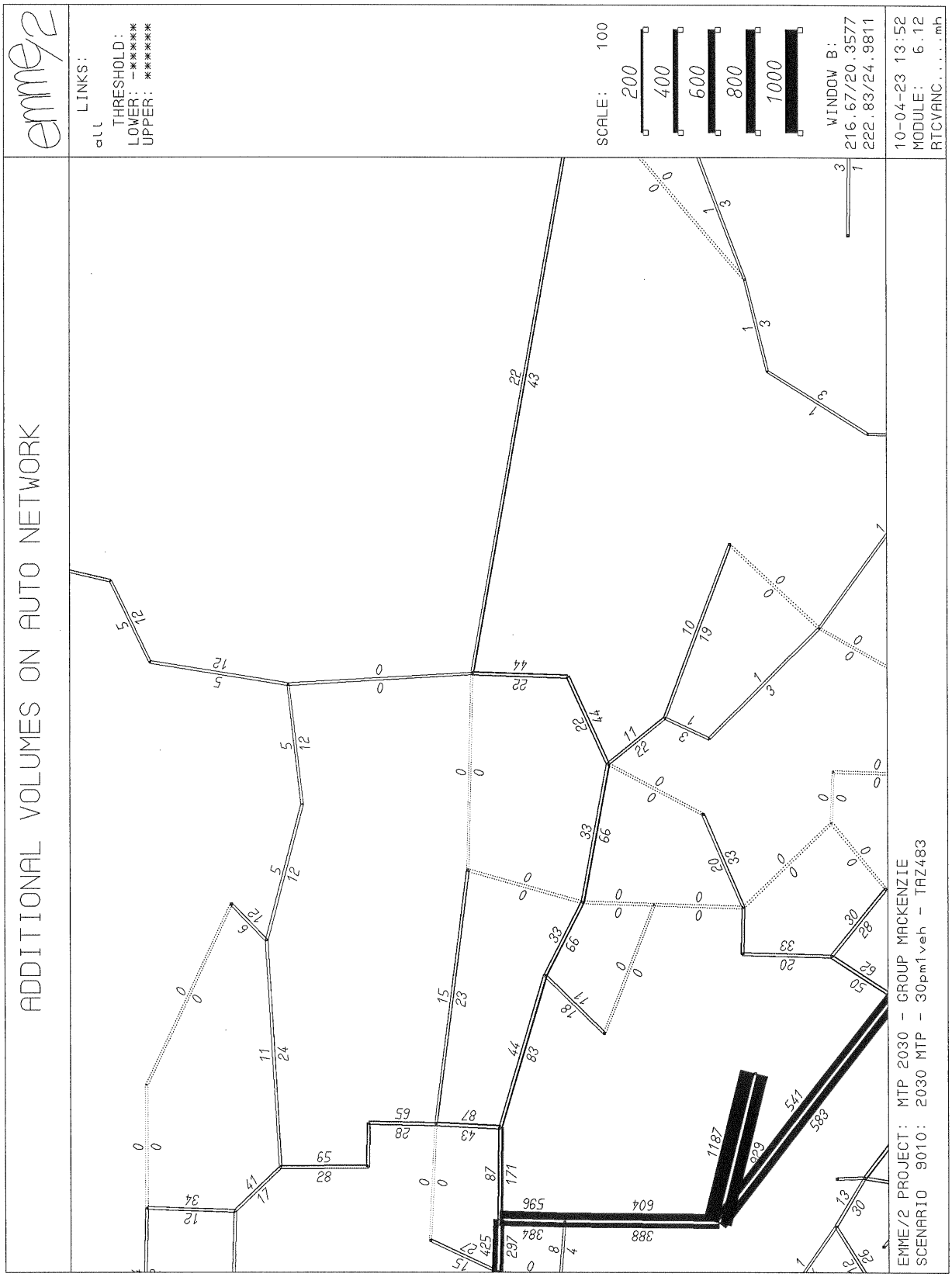
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222.83/24.9811
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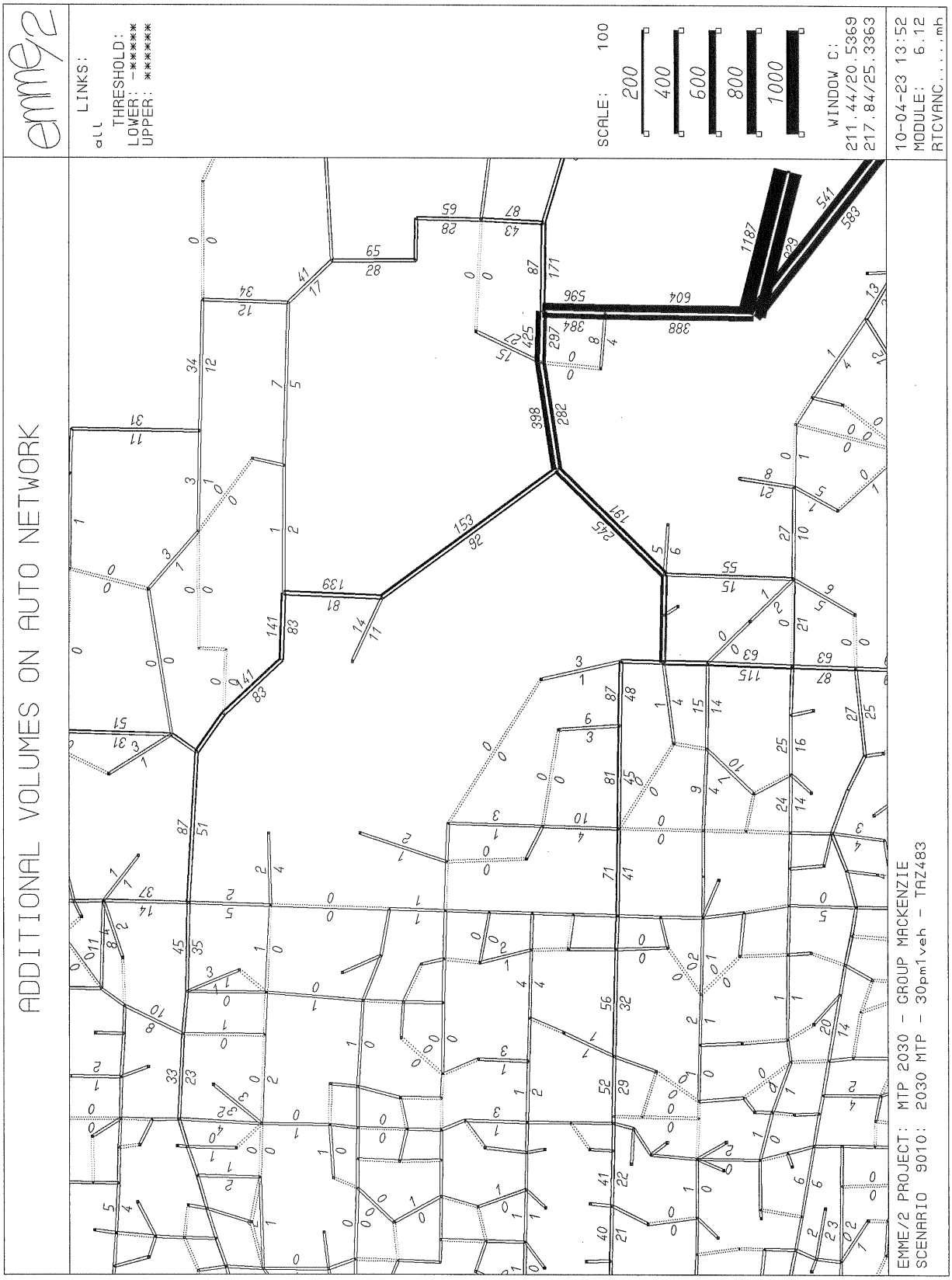
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217.84/25.3363
10-04-23 13:52
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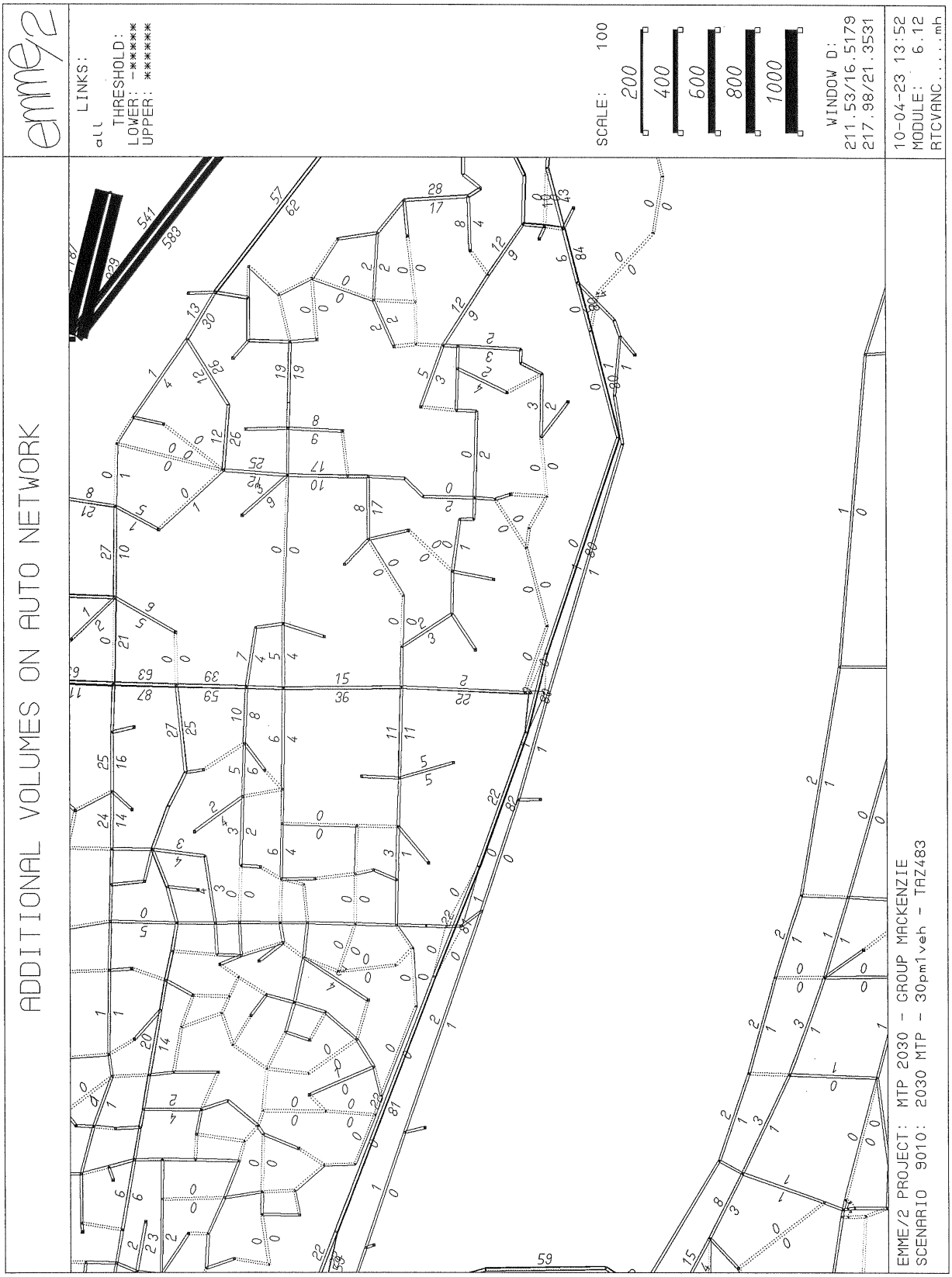
EMME/2 PROJECT: MTP 2030 - CROUP MACKENZIE
SCENARIO 9010: 2030 MTP - 30pm1veh - TAZ483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217.98/21.3531
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EMME/2 PROJECT: MTP 2030 - GROUP MACKENZIE
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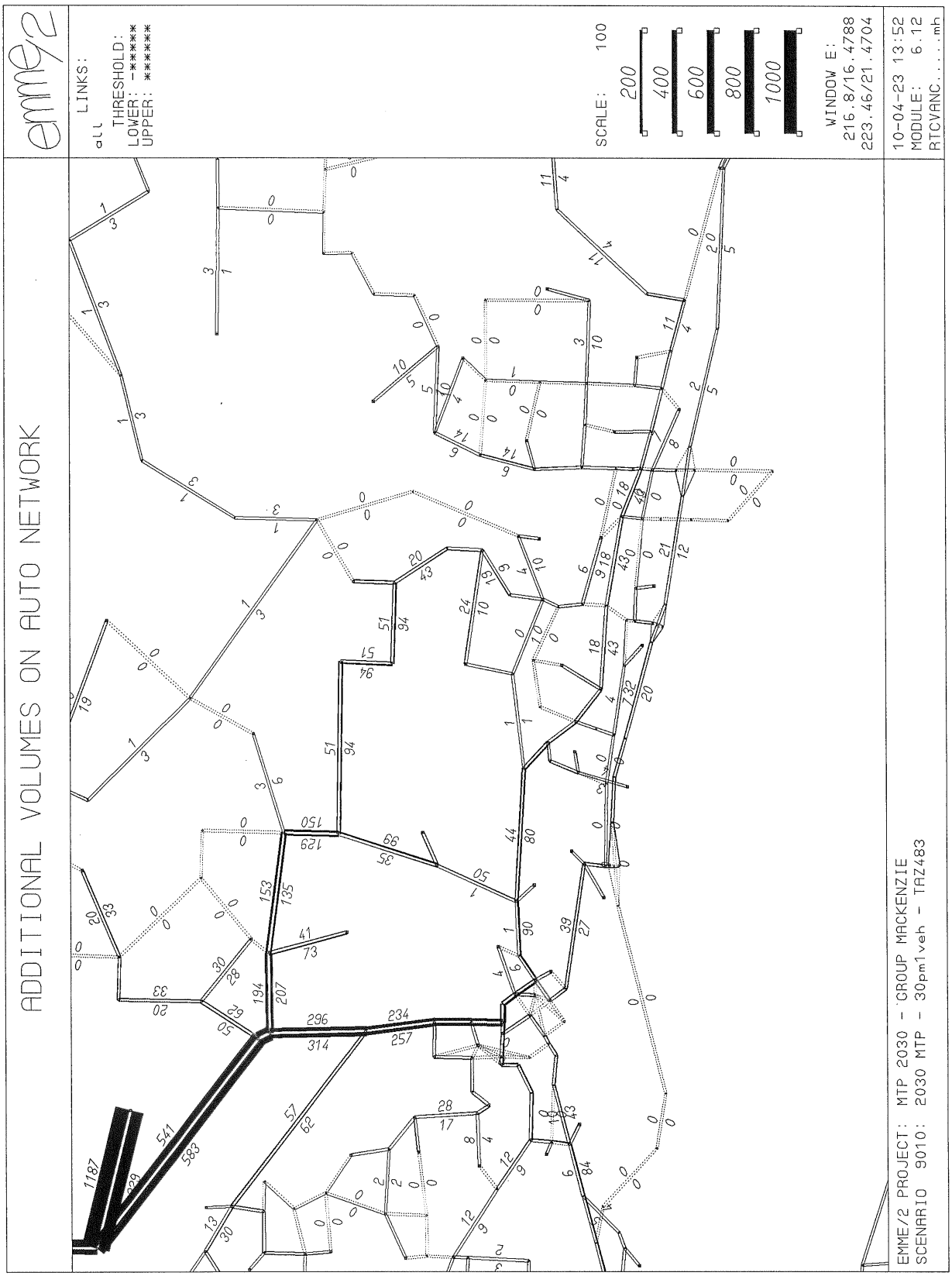
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WINDOW E:
216.8/16.4788
223.46/21.4704
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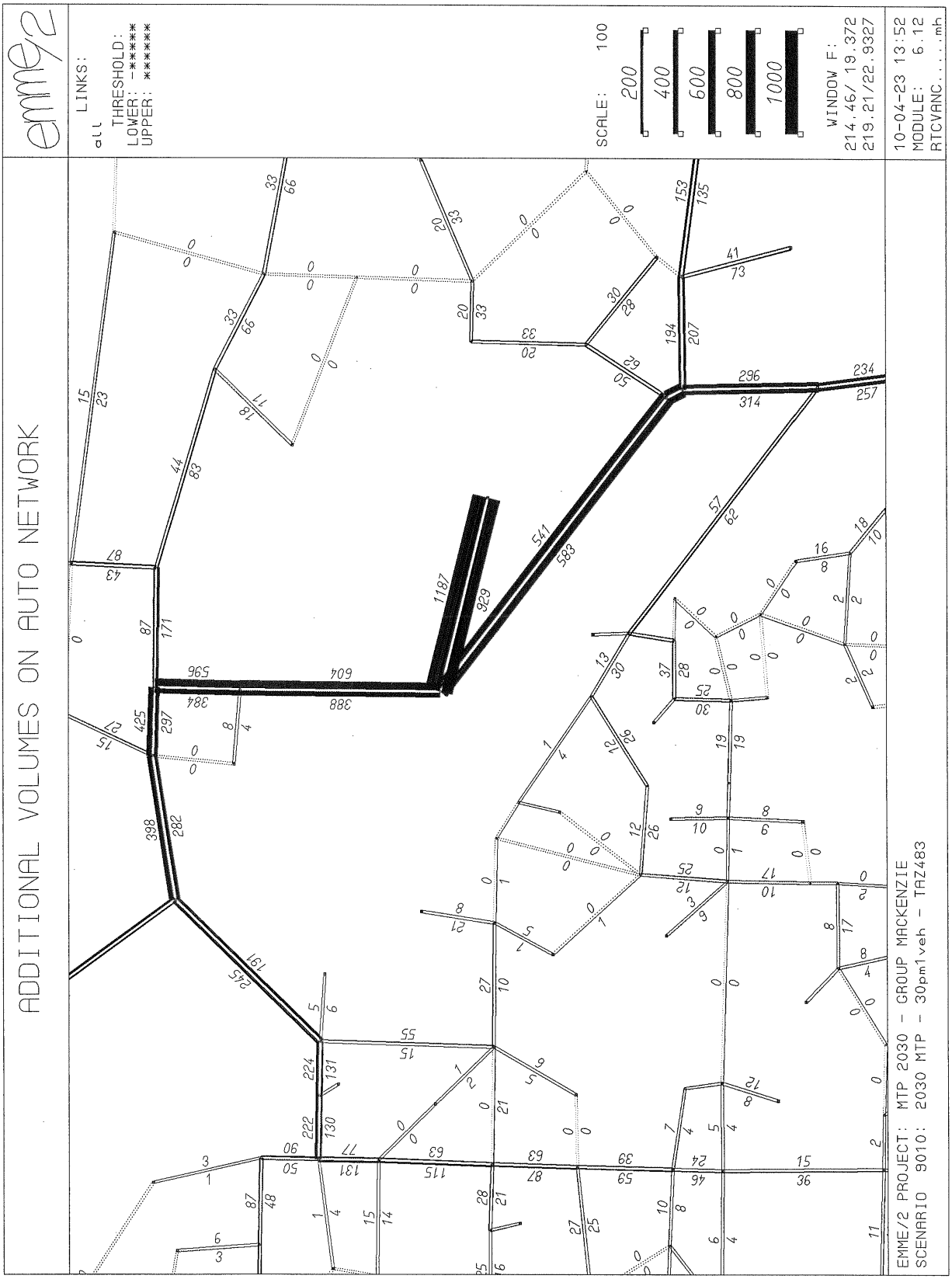
SCENARIO 9010: 2030 MTP - 30pm1veh - TAZ483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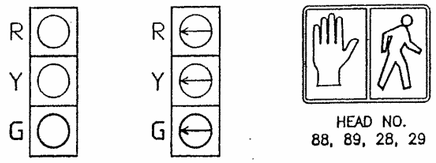
214.46/ 19.372
219.21/22.9327
10-04-23 13:52
MODULE: 6.12
RTCVANC.....mh
EMME/2 PROJECT: MTP 2030 - GROUP MACKENZIE
SCENARIO 9010: 2030 MTP - 30pm1veh - TAZ483

APPENDIX F

Signal Plans

ALL VEHICLE SIGNAL DISPLAYS SHALL HAVE 12" LENSES, LED TYPE, LOUVERED BACKPLATES AND POLYCARBONATE TUNNEL VISORS. VEHICLE HEADS SHALL HAVE TYPE M MOUNTS, J-6G. ALL PEDESTRIAN SIGNAL HEADS SHALL BE LED TYPE WITH TYPE E MOUNTS, J-6F.

SIGNAL DISPLAYS



HEAD NO.
21, 22
61, 62
81, 82

HEAD NO.
11

HEAD NO.
88, 89, 28, 29

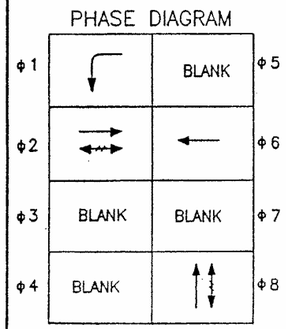
LEGEND

- VEHICLE SIGNAL DISPLAY
- PED. SIGNAL DISPLAY
- SIGNAL STANDARD, TYPE PS
- SIGNAL STANDARD, TYPE PPB
- SIGNAL STANDARD, TYPE II
- SIGNAL STANDARD, TYPE III
- JUNCTION BOX TYPE 1
- JUNCTION BOX TYPE 2
- JUNCTION BOX TYPE 3
- MODIFIED TYPE 2 DETECTOR LOOP
- MODIFIED TYPE 1 DETECTOR LOOP
- CONSTRUCTION NOTE
- SIGNAL STANDARD NOTE, SEE SIGNAL STANDARD DETAIL CHART, SHEET C6.4.
- WIRE NOTE
- SIGN MOUNTED ON MAST ARM
- INSTALL CONTROLLER CABINET ON PAD FOUNDATION.
- INSTALL MODIFIED TYPE B SERVICE CABINET. SEE DETAILS SHEET C6.7 AND C6.8.
- PRE-EMPT DETECTOR & INDICATOR
- EXISTING UTILITY POLE
- CONDUIT & CONDUCTOR
- CROSSWALK

CONSTRUCTION NOTES

1. INSTALL TYPE II SIGNAL STANDARD COMPLETE WITH VEHICLE SIGNAL DISPLAYS, TERMINAL CABINET, PRE-EMPT DETECTOR/INDICATOR, SIGN PER DETAIL SHEET C6.4.
2. INSTALL TYPE II SIGNAL STANDARD COMPLETE WITH VEHICLE SIGNAL DISPLAYS, PED SIGNAL DISPLAY, TERMINAL CABINET, PRE-EMPT DETECTOR/INDICATOR, SIGNS PER DETAILS ON SHEET C6.4.
3. INSTALL TYPE III SIGNAL STANDARD COMPLETE WITH VEHICLE SIGNAL DISPLAYS, PED SIGNAL DISPLAYS, TWO PPB-M PED PUSHBUTTONS, TERMINAL CABINET, PRE-EMPT DETECTOR/INDICATOR, 400 WATT HPS TYPE III LUMINAIRE WITH MEDIUM CUTOFF, SIGN PER DETAIL ON SHEET C6.4.
4. INSTALL TYPE PS SIGNAL STANDARD COMPLETE WITH PED SIGNAL DISPLAY, ONE PPB-M PED PUSHBUTTON.
5. CONSTRUCT CONTROLLER CABINET FOUNDATION, SEE DETAIL SHEETS C6.7, C6.8 AND STANDARD PLAN J-6C. INSTALL CONTROLLER CABINET AND WSDOT APPROVED CONTROLLER. (REFER TO SPECIAL PROVISIONS).
6. INSTALL MODIFIED TYPE B SERVICE. SEE DETAILS ON SHEETS C6.7 AND C6.8. SEE BREAKER SCHEDULE, SHEET C6.6.
7. INSTALL MODIFIED TYPE 1 LOOP DETECTOR SET (50'). SEE SHEET C6.6
8. INSTALL MODIFIED TYPE 1 LOOP DETECTOR SET (30'). SEE SHEET C6.6
9. INSTALL MODIFIED TYPE 2 LOOP DETECTOR. SEE SHEET C6.6
10. INSTALL TYPE 1 JUNCTION BOX, STANDARD PLAN J-11a.
11. INSTALL TYPE 2 JUNCTION BOX., STANDARD PLAN J-11a.
12. INSTALL TYPE 3 JUNCTION BOX (DUAL LID). SEE SHEET C6.5 AND STANDARD PLAN J-11a.
13. INSTALL TYPE PPB PED PUSH-BUTTON STANDARD COMPLETE WITH ONE PPB-M PED PUSH BUTTON.
14. CONTRACTOR TO INSTALL 3" DIA. 24" RADIUS SWEEP FROM PEDESTAL TO UTILITY POLE AS DIRECTED BY CLARK P.U.
15. INSTALL PEDESTAL, TYPE AS SPECIFIED BY CLARK P.U. PEDESTAL TO BE LOCATED 3 FT. WEST OF EXISTING UTILITY POLE.

PHASE DIAGRAM



EMERGENCY VEHICLE PRE-EMPTION ASSIGNMENTS

A = φ2
C = φ1 & φ6

WIRING SCHEDULE

	RACEWAY / CONDUIT SIZE	2cs LOOPS	2cs PED. W.B.	5c PED. HEADS	2cs P.E. INDICAT.	4cs P.E. DETECT.	5c VEHICLE HEADS	#8 ILLUM. POWER	6pcc INTER-CONNECT
1	M/A						1		
2	M/A				1	1	1		
3	M/A						2		
4	M/A				1	1	2		
5	M/A				1	1	3		
6	2"				1	1	2		
7	2"			1	1	1	1		
8	2"		2	1	1	1	1		
9	1¼"		1	1					
10	1"	1							
11	1"	2							
12	1½"	4							
13	2½"	6	1	1	1	1	1		
14	2"	5	2	1	1	1	1		
15	3"	6	1	1	2	2	3		
16	2-3"	13	4	3	3	3	4		
17	2-3"	15	4	3	3	3	4		
18	1¼"	POWER TO CONTROLLER 2-#6							
19	3"	POWER TO SERVICE CABINET 3-#2							
20	1¼"							2	
21	1"		1						
22	3"	POWER TO SERVICE CABINET BY P.U.D.							
23	2"	SPARE							
24									
25									
26									

FOR APPROVAL 6/3/02

CHARBONNEAU ENGINEERING LLC
8270 SW Cheadle Road, Suite 411 Portland, OR 97223
TEL (503)293-1119 FAX (503)293-1119

NO.	DATE	BY	REVISION COMMENTS	Design	Drawn	Checked	Date	Initial Issue Date:
				TAR	JKC	FRC		

REGISTERED PROFESSIONAL ENGINEER
FRANK R. CHARBONNEAU
17388
OREGON
Expires: September 30, 2002

CAMAS HIGH SCHOOL SR500 IMPROVEMENTS

TRAFFIC SIGNAL PLAN
SR500 & SE 15TH ST.

otak Incorporated
105 W Evergreen Blvd. #300
Vancouver, Wa 98660-3123
Phone: (360) 737-9615
FAX (360) 737-9651
Internet: WWW.Otak.COM

10642 0642C61
Project No. Drawing No.

C6.1 OF
Sheet No.

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Phase Times [1.1.1]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Grn	4	5				5		4								
Gap, Ext	3.5	4.5				4.5		3.5								
Max 1	20	40				40		40								
Max 2	15	33				52		20								
Yel Clr	3	4				4		3								
Red Clr	2	1				1		1								
Walk		7						7								
Ped Clr		12						12								
Red Revt	2	2				2		2								
Add Init		2				2										
Max Init	4	20				20		4								
Gap Reduction																
Time B4		20				20										
Cars B4																
Time To		10				10										
ReducBy																
Min Gap	3.5	3.5				3.5		3.5								
DyMaxLim																
Max Step																

Phase Options [1.1.2]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Enable	1	1				1		1								
Min Recall		1				1										
Max Recall																
Ped Recall																
Soft Recall																
Lock Calls																
A Flash Entry																
A Flash Exit																
Dual Entry																
Enable Sim Gap																
Gaur Passage																
Rest In Walk																
Cond Service																
Non-Act 1																
Non-Act 2																
Add Init Calc																

WIRING SCHEDULE

RUN NO.	RACEWAY CONDUIT SIZE	#14 LOOP WIRES	2cs LOOPS	2cs PED. BUTTON	5c PED. HEADS	2cs PE INDICAT.	4cs PE DETECT.	5c VEHICLE HEADS	#8 ILLUM. POWER	#2 POWER	#6 POWER	#10pb ILLUM.
1	MAST ARM					1	1	1				
2	MAST ARM					1	1	2				
3	MAST ARM					1	1	3				
4	MAST ARM											2
5	ILLUMINATION	2										
6	1.5" PVC		1									
7	2" PVC		2									
8	2" PVC		2									
9	4" PVC (e)		2									
10	4" PVC (e)		3									
11	1.5" PVC	8										
12	1.5" PVC	4		2	1	1	1	2				
13	4" RGS								2			
14	1.5" RGS											
15	1.5" PVC	11										
16	3" PVC (e)		2	2	1	1	1	2				
17	2" PVC (e)		2	3	2	2	2	4	2 (e)			
18	4" RGS (e)		2						2			
19	2" PVC (e)			1	1	1	1	2				
20	3" RGS			2	1							
21	2" RGS			2	1							
22	3" RGS (e)		2	2								
23	2" PVC (e)		1									
24	4" PVC (e)		6									
25	4" RGS		2	3	2	2	2	4				
26	4" RGS		2	3	2	2	2	3				
27	2" RGS (e)								4 2 (e)			
28	2" RGS									3		
29	1" RGS										2	
30	2" PVC (e)		2						2			
31	2" PVC								6 4 (e)			
32	2" RGS											
33	3" RGS			1	1	2	2	3				
34	MAST ARM							2				
35	MAST ARM							3				
36	2" RGS (e)	FOR FUTURE USE										
37	3" RGS (e)	FOR FUTURE USE										
38	4" RGS (e)	FOR FUTURE USE										
39	4" RGS (e)	FOR FUTURE USE										
40	2" RGS (e)	FOR FUTURE USE										
41	4" PVC (e)	FOR FUTURE USE										
42	1" PVC	FOR TELEPHONE SERVICE										

BREAKER SCHEDULE

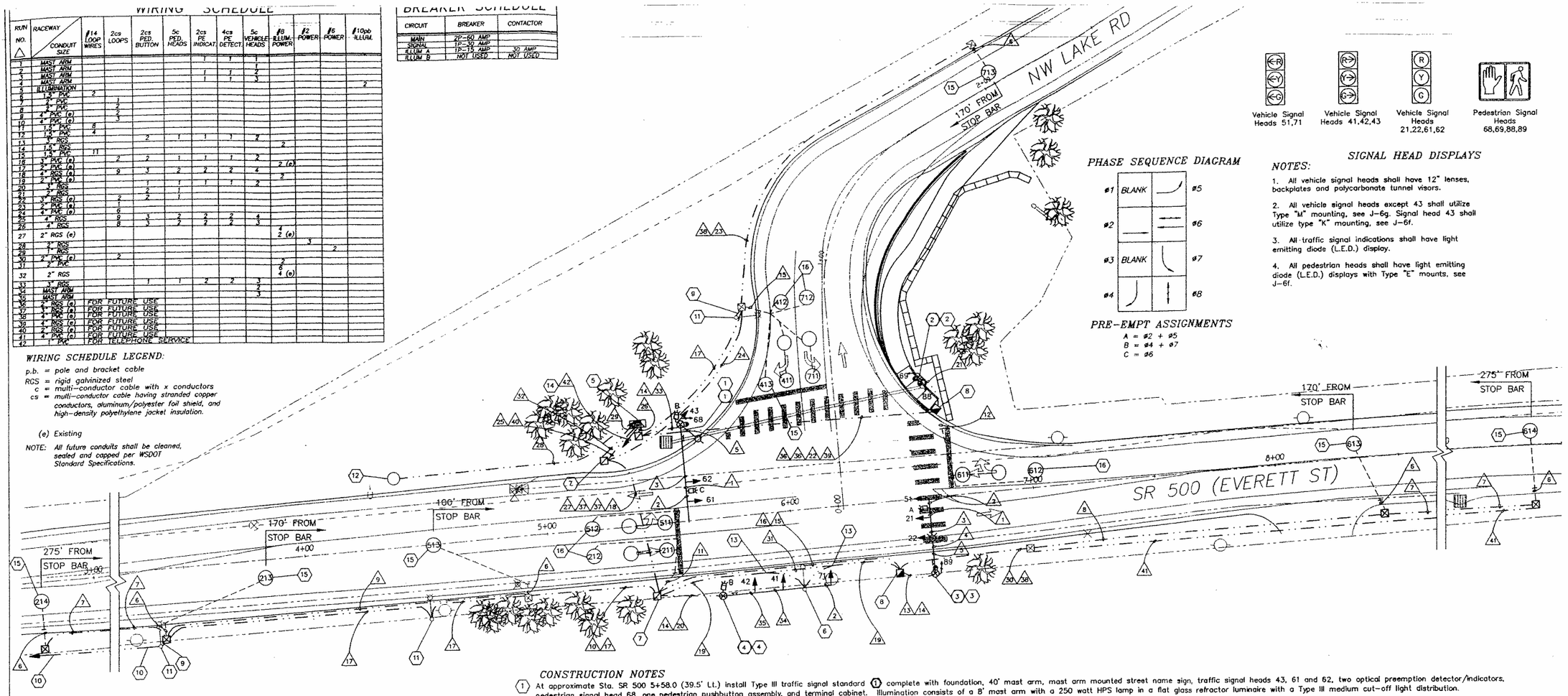
CIRCUIT	BREAKER	CONTACTOR
MAIN	2P-60 AMP	
SIGNAL	1P-30 AMP	
ILLUM A	1P-15 AMP	30 AMP
ILLUM B	NOT USED	NOT USED

WIRING SCHEDULE LEGEND:

p.b. = pole and bracket cable
RGS = rigid galvinized steel
c = multi-conductor cable with x conductors
cs = multi-conductor cable having stranded copper conductors, aluminum/polyester foil shield, and high-density polyethylene jacket insulation.

(e) Existing

NOTE: All future conduits shall be cleaned, sealed and capped per WSDOT Standard Specifications.



Vehicle Signal Heads 51,71

Vehicle Signal Heads 41,42,43

Vehicle Signal Heads 21,22,61,62

Pedestrian Signal Heads 68,69,88,89

PHASE SEQUENCE DIAGRAM

PRE-EMPT ASSIGNMENTS

A = ø2 + ø5
B = ø4 + ø7
C = ø6

SIGNAL HEAD DISPLAYS

NOTES:

1. All vehicle signal heads shall have 12" lenses, backplates and polycarbonate tunnel visors.
2. All vehicle signal heads except 43 shall utilize Type "M" mounting, see J-6g. Signal head 43 shall utilize type "K" mounting, see J-6f.
3. All traffic signal indications shall have light emitting diode (L.E.D.) display.
4. All pedestrian heads shall have light emitting diode (L.E.D.) displays with Type "E" mounts, see J-6f.

LEGEND

- TYPE III TRAFFIC SIGNAL STANDARD WITH TERMINAL CABINET
- TYPE 1 TRAFFIC SIGNAL STANDARD
- CONTROLLER CABINET SERVICE CABINET
- EXISTING TYPE 1 ELECTRICAL JUNCTION BOX.
- TYPE 1 ELECTRICAL JUNCTION BOX, SEE STANDARD PLAN J-11a
- TYPE 2 ELECTRICAL JUNCTION BOX, SEE STANDARD PLAN J-11a
- TYPE 3 ELECTRICAL JUNCTION BOX, SEE STANDARD PLAN J-11a AND TRAFFIC SIGNAL DETAILS SHEET 10.
- PEDESTRIAN PUSHBUTTON
- PEDESTRIAN DISPLAY
- VEHICLE SIGNAL DISPLAY SECTIONS
- STREET NAME SIGN
- OPTICAL PREEMPTION DETECTOR & INDICATOR
- CONDUIT & CONDUCTOR
- CROSSWALK STRIPE, SEE STANDARD PLAN H-5c
- STOP BAR
- (XXX) MODIFIED TYPE1 DETECTOR LOOP, SEE SHEET 11.
- (XXX) MODIFIED TYPE 2 DETECTOR LOOP, SEE SHEET 11.
- (X) CONSTRUCTION NOTE
- X WIRE NOTE
- (X) SIGNAL STANDARD NOTE, SEE TRAFFIC SIGNAL DETAIL SHEET 9.

CONSTRUCTION NOTES

1. At approximate Sta. SR 500 5+58.0 (39.5' Lt.) install Type III traffic signal standard (1) complete with foundation, 40' mast arm, mast arm mounted street name sign, traffic signal heads 43, 61 and 62, two optical preemption detector/indicators, pedestrian signal head 68, one pedestrian pushbutton assembly, and terminal cabinet. Illumination consists of a 8' mast arm with a 250 watt HPS lamp in a flat glass refractor luminaire with a Type III medium cut-off light distribution.
2. At approximate Sta. SR 500 6+57.4 (48.5' Lt.) install Type 1 signal standard (2) complete with foundation, pedestrian signal heads 69 and 88 and two pedestrian pushbutton assemblies.
3. At approximate Sta. SR 500 6+56.9 (31.2' Rt.) install Type III traffic signal standard (3) complete with foundation, 31' mast arm, mast arm mounted street name sign, traffic signal heads 21, 22 and 51, optical preemption detector/indicator, pedestrian signal head 89, one pedestrian pushbutton assembly and terminal cabinet. Illumination consists of a 16' mast arm with a 250 watt HPS lamp in a flat glass refractor luminaire with a Type III medium cut-off light distribution.
4. At approximate Sta. SR 500 5+69.0 (31.7' Rt.) install Type III traffic signal standard (4) complete with foundation, 45' mast arm, mast arm mounted street name sign, traffic signal heads 41, 42 and 71, optical preemption detector/indicator and terminal cabinet. Signal standard shall be designed to accept future 16' luminaire arm mounted at 35 feet. See traffic signal detail sheet. Provide wiring for future luminaire, but do not connect to power source. Future luminaire wiring shall be labeled.
5. At approximate Sta. SR 500 5+40.0 (40.6' Lt.) install controller/service cabinet on a new foundation, see detail Sheet 9. Service shall be a Type B modified, see standard detail J-3b.
6. Remove existing aluminum street light pole, luminaire arm, luminaire fixture, and screw in foundation. Hole left by pole removal shall be backfilled and compacted according to section 2-09.3(1) of the WSDOT Standard Specifications. Remove existing street light wiring between light pole and splice point located in adjacent junction box. Protect existing conduit stubouts during pole removal. See note (13).
7. Remove and replace existing junction box with new Type III junction box. Trim or extend conduit stubouts to provide a minimum 6 inches of clearance between stubout and junction box lid.
8. Remove and replace existing junction box with new Type II junction box. Trim or extend conduit stubouts to provide a minimum 6 inches of clearance between stubout and junction box lid.
9. Maintain and protect existing street light wiring.
10. Disconnect existing service wire from power source and street light pole. Abandon wiring.
11. Maintain and protect existing street light pole.
12. Run specified conduit and wire to CPU power pole. Attach 10' of RGS conduit to utility pole with stand-offs, per Clark Public Utility requirements. Contractor to provide the Utility Company with 25 feet of RGS conduit , stand-offs, and weather head to complete the installation. Coil 30' of extra wire. Coordinate in advance with CPU for power connection
13. Trim existing conduit and connect in new conduit to form a straight continous pathway between junction boxes. Abandon sections of conduit not re-used. See note (6) .
14. Install conduit for telephone connection from controller cabinet to nearest verizon utility pole or service point on east side of SR 500. Contractor shall utilize one of the existing empty 3" RGS conduits to run the new 1" conduit across the south leg of SR 500. See note (37). No trenching across SR 500 will be allowed. Contractor to insure connection is operational at system turn on. Coordinate service in advance with Randy Scriber, Verizon (503-666-6154).
15. Modified 6' Dia. type 2 detector loop. See loop detail Sheet 11.
16. Modified 30' Dia. type 1 detector loop. See loop detail Sheet 11.

20' 10' 0' 20' 40'

SCALE: 1" = 20'

DKS Associates
TRANSPORTATION SOLUTIONS
1400 SW Fifth Avenue, Suite 500 Telephone: (503) 243-3500
Portland, Oregon 97201-5592 Fax: (503) 243-1934

JAMES R. SCRIBER — STATE OF WASHINGTON — 39179 — REGISTERED PROFESSIONAL ENGINEER
EXPIRES: MAY 24, 2005

CITY OF CAMAS
616 NE 4th AVE. CAMAS, WA 98607 PH:(360) 834-3451

DEPARTMENT OF PUBLIC WORKS
SR 500 AND LAKE ROAD
TRAFFIC SIGNAL PLAN

SCALE: 1"=20'	DATE: 9/22/2003	SHT. 5 of 14
DRAWN BY: JCLD	PROJECT NO.	DRAWING NO.
DESIGNED BY: RXS/DMB	S-335A	600-43
APPROVED BY: DMB		

Phase Times [1.1.1]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Grn		5		4	4	5	4	4								
Gap, Ext		4.5		3.5	3.5	4.5	3.5	3.5								
Max 1		45		35	25	50	35	20								
Max 2		50		40	30	50	40	20								
Yel Clr		4		3	3	4	3	3								
Red Clr		1		1	2	1	1	1								
Walk						7		7								
Ped Clr						16		12								
Red Revt		2		2	2	2	2	2								
Add Init		2				2										
Max Init		20		4	4	20	4	4								
Gap Reduction																
Time B4		20				20										
Cars B4																
Time To		10				10										
ReducBy																
Min Gap		3.5		3.5	3.5	3.5	3.5	3.5								
DyMaxLim																
Max Step																

Phase Options [1.1.2]

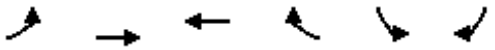
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Enable		1		1	1	1	1	1								
Min Recall		1				1										
Max Recall																
Ped Recall																
Soft Recall																
Lock Calls																
A Flash Entry																
A Flash Exit																
Dual Entry																
Enable Sim Gap																
Gaur Passage																
Rest In Walk																
Cond Service																
Non-Act 1																
Non-Act 2																
Add Init Calc																

APPENDIX G

Capacity Calculations

HCM Unsignalized Intersection Capacity Analysis
1: NE Goodwin Rd & NE Ingle Rd

8/17/2010



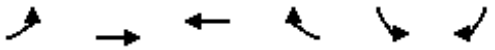
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	61	54	192	86	49	125
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	72	64	226	101	58	147
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	327				484	276
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	327				484	276
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	94				88	80
cM capacity (veh/h)	1178				499	744

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	135	327	205
Volume Left	72	0	58
Volume Right	0	101	147
cSH	1178	1700	1035
Volume to Capacity	0.06	0.19	0.20
Queue Length 95th (ft)	5	0	18
Control Delay (s)	4.6	0.0	11.6
Lane LOS	A		B
Approach Delay (s)	4.6	0.0	11.6
Approach LOS			B

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: NE Goodwin Rd & NE Ingle Rd

8/18/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	93	245	147	70	106	67
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	99	261	156	74	113	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	231				652	194
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	231				652	194
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				72	92
cM capacity (veh/h)	1337				401	845

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	360	231	184
Volume Left	99	0	113
Volume Right	0	74	71
cSH	1337	1700	654
Volume to Capacity	0.07	0.14	0.28
Queue Length 95th (ft)	6	0	29
Control Delay (s)	2.7	0.0	14.4
Lane LOS	A		B
Approach Delay (s)	2.7	0.0	14.4
Approach LOS			B

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: NE 28th St & NE 232nd Ave

8/17/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	55	48	5	221	1	52	1	5	2	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	1	63	55	6	254	1	60	1	6	2	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	255			118			361	360	91	366	387	255
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	255			118			361	360	91	366	387	255
tC, single (s)	4.1			4.1			7.2	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			100			90	100	99	100	100	100
cM capacity (veh/h)	1322			1482			583	568	919	588	548	789

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	120	261	67	5
Volume Left	1	6	60	2
Volume Right	55	1	6	1
cSH	1322	1482	602	616
Volume to Capacity	0.00	0.00	0.11	0.01
Queue Length 95th (ft)	0	0	9	1
Control Delay (s)	0.1	0.2	11.7	10.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.2	11.7	10.9
Approach LOS			B	B

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	26.9%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
2: NE 28th St & NE 232nd Ave

8/18/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	283	58	6	168	1	46	2	14	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	2	292	60	6	173	1	47	2	14	1	1	1
Pedestrians					1						1	
Lane Width (ft)					12.0						8.0	
Walking Speed (ft/s)					4.0						4.0	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	175			352			513	513	323	529	543	175
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	175			352			513	513	323	529	543	175
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	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			99			90	100	98	100	100	100
cM capacity (veh/h)	1413			1218			468	464	722	449	447	873

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	354	180	64	3
Volume Left	2	6	47	1
Volume Right	60	1	14	1
cSH	1413	1218	508	535
Volume to Capacity	0.00	0.01	0.13	0.01
Queue Length 95th (ft)	0	0	11	0
Control Delay (s)	0.1	0.3	13.1	11.8
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.3	13.1	11.8
Approach LOS			B	B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Leadbetter Rd & Everett Rd (SR 500)

8/17/2010

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	1	73	41	94	233	2
Sign Control	Stop			Free	Free	
Grade	0%			6%	-7%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	1	96	54	124	307	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				360		
pX, platoon unblocked						
vC, conflicting volume	539	308	309			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	539	308	309			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	100	87	96			
cM capacity (veh/h)	484	734	1223			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	97	54	124	309
Volume Left	1	54	0	0
Volume Right	96	0	0	3
cSH	729	1223	1700	1700
Volume to Capacity	0.13	0.04	0.07	0.18
Queue Length 95th (ft)	11	3	0	0
Control Delay (s)	10.7	8.1	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.7	2.5		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Leadbetter Rd & Everett Rd (SR 500)

8/18/2010

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	4	55	59	239	147	4
Sign Control	Stop			Free	Free	
Grade	0%			6%	-7%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	4	59	63	254	156	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				360		
pX, platoon unblocked	0.99					
vC, conflicting volume	538	159	161			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	527	159	161			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	93	96			
cM capacity (veh/h)	487	892	1431			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	63	63	254	161
Volume Left	4	63	0	0
Volume Right	59	0	0	4
cSH	844	1431	1700	1700
Volume to Capacity	0.07	0.04	0.15	0.09
Queue Length 95th (ft)	6	3	0	0
Control Delay (s)	9.6	7.6	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.6	1.5		0.0
Approach LOS	A			

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	24.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
4: NE 43rd Ave & NE Everett St (SR 500)

8/17/2010

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	252	42	99	358	49	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-7%		5%			-6%
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1668	1639	1700	1485	1603	1900
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1668	1639	1700	1485	1603	1900
Peak-hour factor, PHF	0.70	0.70	0.70	0.70	0.70	0.70
Adj. Flow (vph)	360	60	141	511	70	336
RTOR Reduction (vph)	0	41	0	342	0	0
Lane Group Flow (vph)	360	19	141	169	70	336
Heavy Vehicles (%)	12%	2%	9%	6%	16%	3%
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	14.8	14.8	15.5	15.5	2.5	23.0
Effective Green, g (s)	14.8	14.8	15.5	15.5	2.5	23.0
Actuated g/C Ratio	0.32	0.32	0.33	0.33	0.05	0.49
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.5	3.5	4.5	4.5	3.5	4.5
Lane Grp Cap (vph)	527	518	563	492	86	934
v/s Ratio Prot	c0.22		0.08		c0.04	c0.18
v/s Ratio Perm		0.01		0.11		
v/c Ratio	0.68	0.04	0.25	0.34	0.81	0.36
Uniform Delay, d1	14.0	11.1	11.4	11.8	21.9	7.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	0.0	0.4	0.7	43.2	0.4
Delay (s)	17.7	11.1	11.8	12.5	65.2	7.8
Level of Service	B	B	B	B	E	A
Approach Delay (s)	16.8		12.4			17.7
Approach LOS	B		B			B

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	46.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: NE 43rd Ave & NE Everett St (SR 500)

8/18/2010

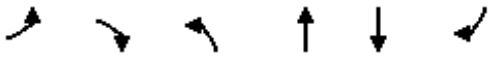
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	118	30	293	143	23	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-7%		5%			-6%
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1868	1672	1834	1559	1859	1919
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1868	1672	1834	1559	1859	1919
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	131	33	326	159	26	151
RTOR Reduction (vph)	0	27	0	80	0	0
Lane Group Flow (vph)	131	6	326	79	26	151
Heavy Vehicles (%)	0%	0%	1%	1%	0%	2%
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	7.3	7.3	21.8	21.8	0.6	27.4
Effective Green, g (s)	7.3	7.3	21.8	21.8	0.6	27.4
Actuated g/C Ratio	0.17	0.17	0.50	0.50	0.01	0.63
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.5	3.5	4.5	4.5	3.5	4.5
Lane Grp Cap (vph)	312	279	915	778	26	1203
v/s Ratio Prot	c0.07		c0.18		c0.01	0.08
v/s Ratio Perm		0.00		0.05		
v/c Ratio	0.42	0.02	0.36	0.10	1.00	0.13
Uniform Delay, d1	16.3	15.2	6.7	5.8	21.6	3.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.0	0.4	0.1	176.5	0.1
Delay (s)	17.4	15.2	7.1	5.9	198.1	3.4
Level of Service	B	B	A	A	F	A
Approach Delay (s)	17.0		6.7			32.0
Approach LOS	B		A			C

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	43.7	Sum of lost time (s)	14.0
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lake Rd & NE Everett St (SR 500)

8/17/2010



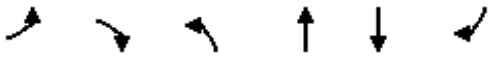
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	229	121	153	163	382	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1703	1538	1703	1712	1715	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1703	1538	1703	1712	1715	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	297	157	199	212	496	194
RTOR Reduction (vph)	0	87	0	0	11	0
Lane Group Flow (vph)	297	70	199	212	679	0
Heavy Vehicles (%)	6%	5%	6%	11%	8%	3%
Turn Type		custom	Prot			
Protected Phases	7	4	5	2	6	
Permitted Phases						
Actuated Green, G (s)	20.0	20.0	14.7	62.7	43.0	
Effective Green, g (s)	20.0	20.0	14.7	62.7	43.0	
Actuated g/C Ratio	0.22	0.22	0.16	0.68	0.47	
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.5	3.5	3.5	4.5	4.5	
Lane Grp Cap (vph)	371	335	273	1171	804	
v/s Ratio Prot	c0.17	0.05	c0.12	0.12	c0.40	
v/s Ratio Perm						
v/c Ratio	0.80	0.21	0.73	0.18	0.84	
Uniform Delay, d1	34.0	29.4	36.6	5.2	21.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	12.0	0.4	9.7	0.1	8.8	
Delay (s)	46.0	29.7	46.3	5.4	30.2	
Level of Service	D	C	D	A	C	
Approach Delay (s)	40.4			25.2	30.2	
Approach LOS	D			C	C	

Intersection Summary			
HCM Average Control Delay	31.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	91.7	Sum of lost time (s)	14.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lake Rd & NE Everett St (SR 500)

8/18/2010



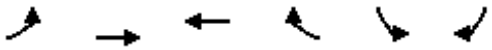
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	133	203	176	359	180	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1787	1599	1787	1881	1780	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1787	1599	1787	1881	1780	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	141	216	187	382	191	113
RTOR Reduction (vph)	0	173	0	0	21	0
Lane Group Flow (vph)	141	43	187	382	283	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	2%
Turn Type		custom	Prot			
Protected Phases	7	4	5	2	6	
Permitted Phases						
Actuated Green, G (s)	10.3	10.3	12.0	32.8	15.8	
Effective Green, g (s)	10.3	10.3	12.0	32.8	15.8	
Actuated g/C Ratio	0.20	0.20	0.23	0.63	0.30	
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.5	3.5	3.5	4.5	4.5	
Lane Grp Cap (vph)	353	316	412	1184	540	
v/s Ratio Prot	c0.08	0.03	c0.10	0.20	c0.16	
v/s Ratio Perm						
v/c Ratio	0.40	0.14	0.45	0.32	0.52	
Uniform Delay, d1	18.2	17.2	17.2	4.5	15.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.2	0.9	0.3	1.5	
Delay (s)	19.1	17.5	18.2	4.8	16.5	
Level of Service	B	B	B	A	B	
Approach Delay (s)	18.1			9.2	16.5	
Approach LOS	B			A	B	

Intersection Summary			
HCM Average Control Delay	13.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	52.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
1: NE Goodwin Rd & NE Ingle Rd

8/18/2010



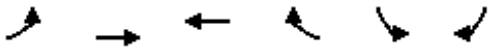
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	82	68	233	103	59	150
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	96	80	274	121	69	176
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	395				608	335
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	395				608	335
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	91				83	74
cM capacity (veh/h)	1111				410	689

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	176	395	246
Volume Left	96	0	69
Volume Right	0	121	176
cSH	1111	1700	960
Volume to Capacity	0.09	0.23	0.26
Queue Length 95th (ft)	7	0	26
Control Delay (s)	5.0	0.0	13.0
Lane LOS	A		B
Approach Delay (s)	5.0	0.0	13.0
Approach LOS			B

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: NE Goodwin Rd & NE Ingle Rd

8/18/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	116	294	179	84	127	90
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	123	313	190	89	135	96
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	280				795	235
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	280				795	235
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				58	88
cM capacity (veh/h)	1283				322	801

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	436	280	231
Volume Left	123	0	135
Volume Right	0	89	96
cSH	1283	1700	551
Volume to Capacity	0.10	0.16	0.42
Queue Length 95th (ft)	8	0	51
Control Delay (s)	3.0	0.0	18.2
Lane LOS	A		C
Approach Delay (s)	3.0	0.0	18.2
Approach LOS			C

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: NE 28th St & NE 232nd Ave

8/18/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	66	61	6	260	1	70	1	6	2	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	1	76	70	7	299	1	80	1	7	2	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	300			146			428	427	111	434	461	299
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	300			146			428	427	111	434	461	299
tC, single (s)	4.1			4.1			7.2	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			100			85	100	99	100	100	100
cM capacity (veh/h)	1273			1448			526	520	896	528	497	745

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	147	307	89	5
Volume Left	1	7	80	2
Volume Right	70	1	7	1
cSH	1273	1448	543	560
Volume to Capacity	0.00	0.00	0.16	0.01
Queue Length 95th (ft)	0	0	14	1
Control Delay (s)	0.1	0.2	12.9	11.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.2	12.9	11.5
Approach LOS			B	B

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	31.5%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
2: NE 28th St & NE 232nd Ave

8/18/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	333	77	7	199	1	61	2	16	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	2	343	79	7	205	1	63	2	16	1	1	1
Pedestrians					1						1	
Lane Width (ft)					12.0						8.0	
Walking Speed (ft/s)					4.0						4.0	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	207			423			609	609	384	627	648	207
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	207			423			609	609	384	627	648	207
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	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			99			84	99	98	100	100	100
cM capacity (veh/h)	1375			1147			403	409	667	385	389	838

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	425	213	81	3
Volume Left	2	7	63	1
Volume Right	79	1	16	1
cSH	1375	1147	439	471
Volume to Capacity	0.00	0.01	0.19	0.01
Queue Length 95th (ft)	0	0	17	0
Control Delay (s)	0.1	0.3	15.1	12.7
Lane LOS	A	A	C	B
Approach Delay (s)	0.1	0.3	15.1	12.7
Approach LOS			C	B

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Leadbetter Rd & Everett Rd (SR 500)

8/18/2010

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	1	105	61	143	292	3
Sign Control	Stop			Free	Free	
Grade	0%			6%	-7%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	1	124	72	168	344	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				360		
pX, platoon unblocked						
vC, conflicting volume	657	345	347			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	657	345	347			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	100	82	94			
cM capacity (veh/h)	407	700	1185			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	125	72	168	347
Volume Left	1	72	0	0
Volume Right	124	0	0	4
cSH	695	1185	1700	1700
Volume to Capacity	0.18	0.06	0.10	0.20
Queue Length 95th (ft)	16	5	0	0
Control Delay (s)	11.3	8.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.3	2.5		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	35.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Leadbetter Rd & Everett Rd (SR 500)

8/18/2010

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	82	88	298	201	6
Sign Control	Stop			Free	Free	
Grade	0%			6%	-7%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	5	87	94	317	214	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				360		
pX, platoon unblocked	0.95					
vC, conflicting volume	721	217	220			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	682	217	220			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	89	93			
cM capacity (veh/h)	371	828	1361			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	93	94	317	220
Volume Left	5	94	0	0
Volume Right	87	0	0	6
cSH	773	1361	1700	1700
Volume to Capacity	0.12	0.07	0.19	0.13
Queue Length 95th (ft)	10	6	0	0
Control Delay (s)	10.3	7.8	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.3	1.8		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	31.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
4: NE 43rd Ave & NE Everett St (SR 500)

8/18/2010

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	267	45	105	380	52	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-7%		5%			-6%
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1668	1639	1700	1485	1603	1900
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1668	1639	1700	1485	1603	1900
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	314	53	124	447	61	293
RTOR Reduction (vph)	0	37	0	298	0	0
Lane Group Flow (vph)	314	16	124	149	61	293
Heavy Vehicles (%)	12%	2%	9%	6%	16%	3%
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	13.6	13.6	15.3	15.3	3.1	23.4
Effective Green, g (s)	13.6	13.6	15.3	15.3	3.1	23.4
Actuated g/C Ratio	0.30	0.30	0.33	0.33	0.07	0.51
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.5	3.5	4.5	4.5	3.5	4.5
Lane Grp Cap (vph)	493	485	565	494	108	967
v/s Ratio Prot	c0.19		0.07		c0.04	c0.15
v/s Ratio Perm		0.01		0.10		
v/c Ratio	0.64	0.03	0.22	0.30	0.56	0.30
Uniform Delay, d1	14.1	11.5	11.1	11.4	20.8	6.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.8	0.0	0.3	0.6	7.2	0.3
Delay (s)	16.9	11.6	11.4	12.0	28.0	6.9
Level of Service	B	B	B	B	C	A
Approach Delay (s)	16.1		11.9			10.5
Approach LOS	B		B			B

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	46.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	35.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: NE 43rd Ave & NE Everett St (SR 500)

8/18/2010

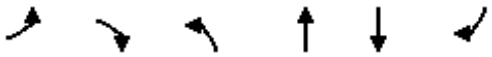
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	125	32	311	152	24	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-7%		5%			-6%
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1868	1672	1834	1559	1859	1919
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1868	1672	1834	1559	1859	1919
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	139	36	346	169	27	160
RTOR Reduction (vph)	0	30	0	85	0	0
Lane Group Flow (vph)	139	6	346	84	27	160
Heavy Vehicles (%)	0%	0%	1%	1%	0%	2%
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	7.5	7.5	21.9	21.9	0.6	27.5
Effective Green, g (s)	7.5	7.5	21.9	21.9	0.6	27.5
Actuated g/C Ratio	0.17	0.17	0.50	0.50	0.01	0.62
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.5	3.5	4.5	4.5	3.5	4.5
Lane Grp Cap (vph)	318	285	913	776	25	1199
v/s Ratio Prot	c0.07		c0.19		c0.01	0.08
v/s Ratio Perm		0.00		0.05		
v/c Ratio	0.44	0.02	0.38	0.11	1.08	0.13
Uniform Delay, d1	16.4	15.2	6.8	5.9	21.7	3.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.0	0.5	0.1	205.9	0.1
Delay (s)	17.5	15.2	7.3	6.0	227.6	3.5
Level of Service	B	B	A	A	F	A
Approach Delay (s)	17.0		6.9			35.8
Approach LOS	B		A			D

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	44.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lake Rd & NE Everett St (SR 500)

8/18/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	243	128	162	173	405	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1703	1538	1703	1712	1715	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1703	1538	1703	1712	1715	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	286	151	191	204	476	186
RTOR Reduction (vph)	0	97	0	0	11	0
Lane Group Flow (vph)	286	54	191	204	651	0
Heavy Vehicles (%)	6%	5%	6%	11%	8%	3%
Turn Type		custom	Prot			
Protected Phases	7	4	5	2	6	
Permitted Phases						
Actuated Green, G (s)	17.0	17.0	13.8	54.8	36.0	
Effective Green, g (s)	17.0	17.0	13.8	54.8	36.0	
Actuated g/C Ratio	0.21	0.21	0.17	0.68	0.45	
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.5	3.5	3.5	4.5	4.5	
Lane Grp Cap (vph)	358	324	291	1161	764	
v/s Ratio Prot	c0.17	0.04	c0.11	0.12	c0.38	
v/s Ratio Perm						
v/c Ratio	0.80	0.17	0.66	0.18	0.85	
Uniform Delay, d1	30.3	26.1	31.3	4.7	20.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	12.1	0.3	5.5	0.1	9.7	
Delay (s)	42.4	26.4	36.8	4.9	29.7	
Level of Service	D	C	D	A	C	
Approach Delay (s)	36.8			20.3	29.7	
Approach LOS	D			C	C	

Intersection Summary			
HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	80.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lake Rd & NE Everett St (SR 500)

8/18/2010

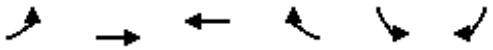
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	141	215	187	381	191	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1787	1599	1787	1881	1781	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1787	1599	1787	1881	1781	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	150	229	199	405	203	119
RTOR Reduction (vph)	0	184	0	0	21	0
Lane Group Flow (vph)	150	45	199	405	301	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	2%
Turn Type		custom	Prot			
Protected Phases	7	4	5	2	6	
Permitted Phases						
Actuated Green, G (s)	10.6	10.6	12.4	33.9	16.5	
Effective Green, g (s)	10.6	10.6	12.4	33.9	16.5	
Actuated g/C Ratio	0.20	0.20	0.23	0.63	0.31	
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.5	3.5	3.5	4.5	4.5	
Lane Grp Cap (vph)	354	317	414	1192	549	
v/s Ratio Prot	c0.08	0.03	c0.11	0.22	c0.17	
v/s Ratio Perm						
v/c Ratio	0.42	0.14	0.48	0.34	0.55	
Uniform Delay, d1	18.8	17.7	17.8	4.6	15.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	0.2	1.0	0.3	1.7	
Delay (s)	19.7	17.9	18.8	4.9	17.1	
Level of Service	B	B	B	A	B	
Approach Delay (s)	18.7			9.5	17.1	
Approach LOS	B			A	B	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	53.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
9: Leadbetter Rd & NE Adams St

8/18/2010



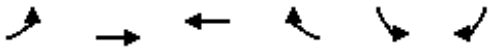
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	1	94	77	5	13	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	1	108	89	6	15	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	94				202	91
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	94				202	91
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1506				790	969

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	109	94	16
Volume Left	1	0	15
Volume Right	0	6	1
cSH	1506	1700	800
Volume to Capacity	0.00	0.06	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.1	0.0	9.6
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	9.6
Approach LOS			A

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	15.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
9: Leadbetter Rd & NE Adams St

8/18/2010



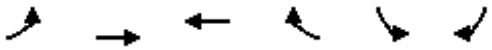
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	1	100	96	14	9	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	105	101	15	9	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	116				216	108
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	116				216	108
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1479				775	948

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	106	116	11
Volume Left	1	0	9
Volume Right	0	15	1
cSH	1479	1700	790
Volume to Capacity	0.00	0.07	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.1	0.0	9.6
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	9.6
Approach LOS			A

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		16.1%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
1: NE Goodwin Rd & NE Ingle Rd

8/18/2010



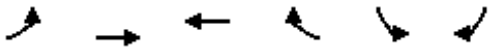
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	82	79	266	119	64	150
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	96	93	313	140	75	176
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	453				669	383
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	453				669	383
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	91				80	73
cM capacity (veh/h)	1057				376	647

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	189	453	252
Volume Left	96	0	75
Volume Right	0	140	176
cSH	1057	1700	923
Volume to Capacity	0.09	0.27	0.27
Queue Length 95th (ft)	8	0	28
Control Delay (s)	4.9	0.0	13.9
Lane LOS	A		B
Approach Delay (s)	4.9	0.0	13.9
Approach LOS			B

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: NE Goodwin Rd & NE Ingle Rd

8/18/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	116	329	200	94	145	90
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	123	350	213	100	154	96
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	313				860	263
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	313				860	263
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				48	88
cM capacity (veh/h)	1248				294	773

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	473	313	250
Volume Left	123	0	154
Volume Right	0	100	96
cSH	1248	1700	477
Volume to Capacity	0.10	0.18	0.52
Queue Length 95th (ft)	8	0	75
Control Delay (s)	2.9	0.0	22.4
Lane LOS	A		C
Approach Delay (s)	2.9	0.0	22.4
Approach LOS			C

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: NE 28th St & NE 232nd Ave

8/18/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	66	77	9	260	1	119	1	14	2	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	1	76	89	10	299	1	137	1	16	2	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	300			164			444	443	120	459	487	299
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	300			164			444	443	120	459	487	299
tC, single (s)	4.1			4.1			7.2	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			99			73	100	98	100	100	100
cM capacity (veh/h)	1273			1426			512	508	885	502	480	745

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	166	310	154	5
Volume Left	1	10	137	2
Volume Right	89	1	16	1
cSH	1273	1426	536	540
Volume to Capacity	0.00	0.01	0.29	0.01
Queue Length 95th (ft)	0	1	30	1
Control Delay (s)	0.1	0.3	14.4	11.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.3	14.4	11.7
Approach LOS			B	B

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: NE 28th St & NE 232nd Ave

8/18/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	333	130	15	199	1	92	2	22	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	2	343	134	15	205	1	95	2	23	1	1	1
Pedestrians					1						1	
Lane Width (ft)					12.0						8.0	
Walking Speed (ft/s)					4.0						4.0	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	207			477			653	653	411	677	719	207
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	207			477			653	653	411	677	719	207
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	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			99			75	99	96	100	100	100
cM capacity (veh/h)	1375			1095			375	383	644	350	351	838

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	479	222	120	3
Volume Left	2	15	95	1
Volume Right	134	1	23	1
cSH	1375	1095	407	435
Volume to Capacity	0.00	0.01	0.29	0.01
Queue Length 95th (ft)	0	1	30	1
Control Delay (s)	0.0	0.7	17.5	13.3
Lane LOS	A	A	C	B
Approach Delay (s)	0.0	0.7	17.5	13.3
Approach LOS			C	B

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Leadbetter Rd & Everett Rd (SR 500)

8/18/2010

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	9	204	93	143	292	6
Sign Control	Stop			Free	Free	
Grade	0%			6%	-7%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	11	240	109	168	344	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				360		
pX, platoon unblocked						
vC, conflicting volume	734	347	351			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	734	347	351			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	97	66	91			
cM capacity (veh/h)	353	698	1181			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	251	109	168	351
Volume Left	11	109	0	0
Volume Right	240	0	0	7
cSH	671	1181	1700	1700
Volume to Capacity	0.37	0.09	0.10	0.21
Queue Length 95th (ft)	43	8	0	0
Control Delay (s)	13.5	8.4	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.5	3.3		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Leadbetter Rd & Everett Rd (SR 500)

8/18/2010

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	10	144	194	298	201	15
Sign Control	Stop			Free	Free	
Grade	0%			6%	-7%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	153	206	317	214	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				360		
pX, platoon unblocked	0.99					
vC, conflicting volume	952	222	230			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	945	222	230			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	81	85			
cM capacity (veh/h)	244	820	1344			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	164	206	317	230
Volume Left	11	206	0	0
Volume Right	153	0	0	16
cSH	711	1344	1700	1700
Volume to Capacity	0.23	0.15	0.19	0.14
Queue Length 95th (ft)	22	14	0	0
Control Delay (s)	11.6	8.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.6	3.2		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
4: NE 43rd Ave & NE Everett St (SR 500)

8/18/2010

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	267	50	132	380	69	331
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-7%		5%			-6%
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1668	1639	1700	1485	1603	1900
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1668	1639	1700	1485	1603	1900
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	314	59	155	447	81	389
RTOR Reduction (vph)	0	42	0	294	0	0
Lane Group Flow (vph)	314	17	155	153	81	389
Heavy Vehicles (%)	12%	2%	9%	6%	16%	3%
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	14.0	14.0	16.5	16.5	3.6	25.1
Effective Green, g (s)	14.0	14.0	16.5	16.5	3.6	25.1
Actuated g/C Ratio	0.29	0.29	0.34	0.34	0.07	0.52
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.5	3.5	4.5	4.5	3.5	4.5
Lane Grp Cap (vph)	485	477	583	509	120	991
v/s Ratio Prot	c0.19		0.09		c0.05	c0.20
v/s Ratio Perm		0.01		0.10		
v/c Ratio	0.65	0.04	0.27	0.30	0.68	0.39
Uniform Delay, d1	14.9	12.2	11.4	11.6	21.7	6.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	0.0	0.4	0.6	14.5	0.4
Delay (s)	18.0	12.3	11.8	12.2	36.2	7.4
Level of Service	B	B	B	B	D	A
Approach Delay (s)	17.1		12.1			12.3
Approach LOS	B		B			B

Intersection Summary			
HCM Average Control Delay	13.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	48.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: NE 43rd Ave & NE Everett St (SR 500)

8/18/2010

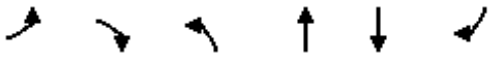
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	125	50	399	152	34	196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-7%		5%			-6%
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1868	1672	1834	1559	1859	1919
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1868	1672	1834	1559	1859	1919
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	139	56	443	169	38	218
RTOR Reduction (vph)	0	47	0	84	0	0
Lane Group Flow (vph)	139	9	443	85	38	218
Heavy Vehicles (%)	0%	0%	1%	1%	0%	2%
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	7.5	7.5	23.0	23.0	1.3	29.3
Effective Green, g (s)	7.5	7.5	23.0	23.0	1.3	29.3
Actuated g/C Ratio	0.16	0.16	0.50	0.50	0.03	0.64
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.5	3.5	4.5	4.5	3.5	4.5
Lane Grp Cap (vph)	306	274	921	783	53	1228
v/s Ratio Prot	c0.07		c0.24		c0.02	0.11
v/s Ratio Perm		0.01		0.05		
v/c Ratio	0.45	0.03	0.48	0.11	0.72	0.18
Uniform Delay, d1	17.3	16.1	7.5	6.0	22.1	3.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.1	0.7	0.1	38.0	0.1
Delay (s)	18.6	16.2	8.2	6.1	60.1	3.5
Level of Service	B	B	A	A	E	A
Approach Delay (s)	17.9		7.6			11.9
Approach LOS	B		A			B

Intersection Summary			
HCM Average Control Delay	10.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	45.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lake Rd & NE Everett St (SR 500)

8/18/2010



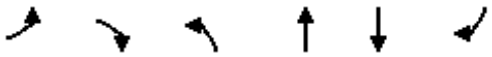
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	248	128	162	195	471	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1703	1538	1703	1712	1717	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1703	1538	1703	1712	1717	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	292	151	191	229	554	205
RTOR Reduction (vph)	0	77	0	0	9	0
Lane Group Flow (vph)	292	74	191	229	750	0
Heavy Vehicles (%)	6%	5%	6%	11%	8%	3%
Turn Type		custom	Prot			
Protected Phases	7	4	5	2	6	
Permitted Phases						
Actuated Green, G (s)	21.0	21.0	15.0	72.0	52.0	
Effective Green, g (s)	21.0	21.0	15.0	72.0	52.0	
Actuated g/C Ratio	0.21	0.21	0.15	0.71	0.51	
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.5	3.5	3.5	4.5	4.5	
Lane Grp Cap (vph)	351	317	250	1208	875	
v/s Ratio Prot	c0.17	0.05	c0.11	0.13	c0.44	
v/s Ratio Perm						
v/c Ratio	0.83	0.23	0.76	0.19	0.86	
Uniform Delay, d1	38.8	33.8	41.8	5.1	21.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	15.7	0.4	13.3	0.1	8.9	
Delay (s)	54.5	34.2	55.1	5.2	30.7	
Level of Service	D	C	E	A	C	
Approach Delay (s)	47.6			27.9	30.7	
Approach LOS	D			C	C	

Intersection Summary			
HCM Average Control Delay	34.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	102.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lake Rd & NE Everett St (SR 500)

8/18/2010



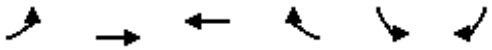
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	159	215	187	451	233	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1787	1599	1787	1881	1788	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1787	1599	1787	1881	1788	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	169	229	199	480	248	130
RTOR Reduction (vph)	0	182	0	0	18	0
Lane Group Flow (vph)	169	47	199	480	360	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	2%
Turn Type		custom	Prot			
Protected Phases	7	4	5	2	6	
Permitted Phases						
Actuated Green, G (s)	11.7	11.7	12.6	36.6	19.0	
Effective Green, g (s)	11.7	11.7	12.6	36.6	19.0	
Actuated g/C Ratio	0.20	0.20	0.22	0.64	0.33	
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.5	3.5	3.5	4.5	4.5	
Lane Grp Cap (vph)	365	326	393	1201	593	
v/s Ratio Prot	c0.09	0.03	c0.11	0.26	c0.20	
v/s Ratio Perm						
v/c Ratio	0.46	0.14	0.51	0.40	0.61	
Uniform Delay, d1	20.0	18.7	19.6	5.0	16.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	0.2	1.2	0.4	2.3	
Delay (s)	21.1	18.9	20.8	5.4	18.3	
Level of Service	C	B	C	A	B	
Approach Delay (s)	19.9			9.9	18.3	
Approach LOS	B			A	B	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	14.0
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Leadbetter Road & Fargo St

8/18/2010



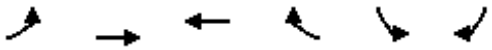
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	6	106	115	12	35	19
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	7	122	132	14	40	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	146				275	139
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	146				275	139
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				94	98
cM capacity (veh/h)	1436				713	910

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	129	146	62
Volume Left	7	0	40
Volume Right	0	14	22
cSH	1436	1700	771
Volume to Capacity	0.00	0.09	0.08
Queue Length 95th (ft)	0	0	7
Control Delay (s)	0.4	0.0	10.1
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	10.1
Approach LOS			B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	21.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
6: Leadbetter Road & Fargo St

8/18/2010



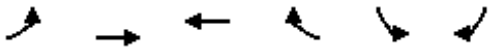
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	20	141	121	38	22	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	21	148	127	40	23	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	167				338	147
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	167				338	147
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				96	99
cM capacity (veh/h)	1410				649	900

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	169	167	36
Volume Left	21	0	23
Volume Right	0	40	13
cSH	1410	1700	720
Volume to Capacity	0.01	0.10	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	1.1	0.0	10.3
Lane LOS	A		B
Approach Delay (s)	1.1	0.0	10.3
Approach LOS			B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	30.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Leadbetter Rd & Benton St

8/18/2010



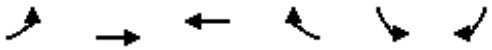
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	139	119	5	17	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	3	160	137	6	20	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	143				306	140
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	143				306	140
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	99
cM capacity (veh/h)	1440				685	909

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	163	143	30
Volume Left	3	0	20
Volume Right	0	6	10
cSH	1440	1700	749
Volume to Capacity	0.00	0.08	0.04
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.2	0.0	10.0
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	10.0
Approach LOS			B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Leadbetter Rd & Benton St

8/18/2010



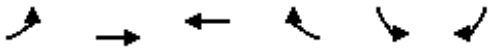
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	10	154	154	18	11	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	162	162	19	12	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	181				355	172
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	181				355	172
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	99
cM capacity (veh/h)	1394				640	873

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	173	181	18
Volume Left	11	0	12
Volume Right	0	19	6
cSH	1394	1700	706
Volume to Capacity	0.01	0.11	0.03
Queue Length 95th (ft)	1	0	2
Control Delay (s)	0.5	0.0	10.2
Lane LOS	A		B
Approach Delay (s)	0.5	0.0	10.2
Approach LOS			B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
8: Leadbetter Rd & Division St

8/18/2010



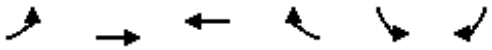
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	151	110	9	27	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	6	174	126	10	31	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	137				317	132
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	137				317	132
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				95	98
cM capacity (veh/h)	1447				675	918

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	179	137	47
Volume Left	6	0	31
Volume Right	0	10	16
cSH	1447	1700	742
Volume to Capacity	0.00	0.08	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.3	0.0	10.2
Lane LOS	A		B
Approach Delay (s)	0.3	0.0	10.2
Approach LOS			B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	22.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
8: Leadbetter Rd & Division St

8/18/2010



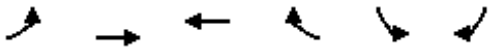
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	15	150	163	29	17	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	16	158	172	31	18	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	202				376	187
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	202				376	187
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	99
cM capacity (veh/h)	1370				619	856

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	174	202	27
Volume Left	16	0	18
Volume Right	0	31	9
cSH	1370	1700	685
Volume to Capacity	0.01	0.12	0.04
Queue Length 95th (ft)	1	0	3
Control Delay (s)	0.8	0.0	10.5
Lane LOS	A		B
Approach Delay (s)	0.8	0.0	10.5
Approach LOS			B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
9: Leadbetter Rd & NE Adams St

8/18/2010



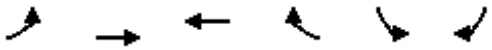
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	173	103	14	41	16
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	6	199	118	16	47	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	134				337	126
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	134				337	126
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				93	98
cM capacity (veh/h)	1450				658	924

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	205	134	66
Volume Left	6	0	47
Volume Right	0	16	18
cSH	1450	1700	716
Volume to Capacity	0.00	0.08	0.09
Queue Length 95th (ft)	0	0	8
Control Delay (s)	0.2	0.0	10.5
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	10.5
Approach LOS			B

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
9: Leadbetter Rd & NE Adams St

8/18/2010



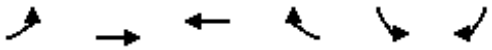
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	17	150	181	44	26	11
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	18	158	191	46	27	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	237				407	214
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	237				407	214
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				95	99
cM capacity (veh/h)	1330				593	827

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	176	237	39
Volume Left	18	0	27
Volume Right	0	46	12
cSH	1330	1700	648
Volume to Capacity	0.01	0.14	0.06
Queue Length 95th (ft)	1	0	5
Control Delay (s)	0.9	0.0	10.9
Lane LOS	A		B
Approach Delay (s)	0.9	0.0	10.9
Approach LOS			B

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: NE Goodwin Rd & NE Ingle Rd

8/18/2010



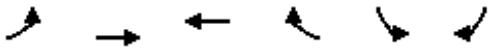
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	101	96	326	146	79	189
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	112	107	362	162	88	210
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	524				774	443
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	524				774	443
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	89				72	65
cM capacity (veh/h)	993				318	598

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	219	524	298
Volume Left	112	0	88
Volume Right	0	162	210
cSH	993	1700	848
Volume to Capacity	0.11	0.31	0.35
Queue Length 95th (ft)	10	0	40
Control Delay (s)	5.2	0.0	16.1
Lane LOS	A		C
Approach Delay (s)	5.2	0.0	16.1
Approach LOS			C

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: NE Goodwin Rd & NE Ingle Rd

8/18/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	145	406	246	116	178	111
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	154	432	262	123	189	118
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	385				1064	323
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	385				1064	323
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	87				12	83
cM capacity (veh/h)	1173				214	715

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	586	385	307
Volume Left	154	0	189
Volume Right	0	123	118
cSH	1173	1700	315
Volume to Capacity	0.13	0.23	0.98
Queue Length 95th (ft)	11	0	257
Control Delay (s)	3.4	0.0	81.9
Lane LOS	A		F
Approach Delay (s)	3.4	0.0	81.9
Approach LOS			F

Intersection Summary			
Average Delay	21.2		
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: NE 28th St & NE 232nd Ave

8/18/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	83	92	11	329	1	135	1	16	3	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	92	102	12	366	1	150	1	18	3	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	367			194			538	537	143	554	587	366
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	367			194			538	537	143	554	587	366
tC, single (s)	4.1			4.1			7.2	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.5	3.5	4.0	3.3
p0 queue free %	100			99			66	100	98	99	100	100
cM capacity (veh/h)	1203			1391			443	449	859	433	420	684

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	196	379	169	6
Volume Left	1	12	150	3
Volume Right	102	1	18	1
cSH	1203	1391	467	464
Volume to Capacity	0.00	0.01	0.36	0.01
Queue Length 95th (ft)	0	1	41	1
Control Delay (s)	0.1	0.3	17.0	12.9
Lane LOS	A	A	C	B
Approach Delay (s)	0.1	0.3	17.0	12.9
Approach LOS			C	B

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	43.7%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
2: NE 28th St & NE 232nd Ave

8/18/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	422	148	17	252	1	106	3	26	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	3	435	153	18	260	1	109	3	27	1	1	1
Pedestrians					1						1	
Lane Width (ft)					12.0						8.0	
Walking Speed (ft/s)					4.0						4.0	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	262			588			814	814	512	843	890	261
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	262			588			814	814	512	843	890	261
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	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			98			62	99	95	100	100	100
cM capacity (veh/h)	1313			997			291	308	565	265	278	782

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	591	278	139	3
Volume Left	3	18	109	1
Volume Right	153	1	27	1
cSH	1313	997	321	347
Volume to Capacity	0.00	0.02	0.43	0.01
Queue Length 95th (ft)	0	1	53	1
Control Delay (s)	0.1	0.7	24.5	15.5
Lane LOS	A	A	C	C
Approach Delay (s)	0.1	0.7	24.5	15.5
Approach LOS			C	C

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Leadbetter Rd & Everett Rd (SR 500)

8/18/2010

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	9	227	106	173	365	7
Sign Control	Stop			Free	Free	
Grade	0%			6%	-7%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	252	118	192	406	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				360		
pX, platoon unblocked						
vC, conflicting volume	837	409	413			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	837	409	413			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	97	61	89			
cM capacity (veh/h)	302	644	1119			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	262	118	192	413
Volume Left	10	118	0	0
Volume Right	252	0	0	8
cSH	618	1119	1700	1700
Volume to Capacity	0.42	0.11	0.11	0.24
Queue Length 95th (ft)	53	9	0	0
Control Delay (s)	15.1	8.6	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	15.1	3.3		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Leadbetter Rd & Everett Rd (SR 500)

8/18/2010

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	11	161	213	373	247	16
Sign Control	Stop			Free	Free	
Grade	0%			6%	-7%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	12	171	227	397	263	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				360		
pX, platoon unblocked	0.92					
vC, conflicting volume	1121	271	280			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1087	271	280			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	78	82			
cM capacity (veh/h)	181	770	1289			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	183	227	397	280
Volume Left	12	227	0	0
Volume Right	171	0	0	17
cSH	638	1289	1700	1700
Volume to Capacity	0.29	0.18	0.23	0.16
Queue Length 95th (ft)	30	16	0	0
Control Delay (s)	12.9	8.4	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.9	3.0		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
4: NE 43rd Ave & NE Everett St (SR 500)

8/18/2010

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	346	63	163	493	84	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-7%		5%			-6%
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1668	1639	1700	1485	1603	1900
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1668	1639	1700	1485	1603	1900
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	384	70	181	548	93	450
RTOR Reduction (vph)	0	46	0	371	0	0
Lane Group Flow (vph)	384	24	181	177	93	450
Heavy Vehicles (%)	12%	2%	9%	6%	16%	3%
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	15.9	15.9	16.4	16.4	4.5	25.9
Effective Green, g (s)	15.9	15.9	16.4	16.4	4.5	25.9
Actuated g/C Ratio	0.31	0.31	0.32	0.32	0.09	0.51
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.5	3.5	4.5	4.5	3.5	4.5
Lane Grp Cap (vph)	522	513	549	479	142	969
v/s Ratio Prot	c0.23		0.11		0.06	c0.24
v/s Ratio Perm		0.01		0.12		
v/c Ratio	0.74	0.05	0.33	0.37	0.65	0.46
Uniform Delay, d1	15.6	12.2	13.0	13.2	22.4	8.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	0.0	0.6	0.8	10.8	0.6
Delay (s)	21.1	12.2	13.6	14.1	33.2	8.6
Level of Service	C	B	B	B	C	A
Approach Delay (s)	19.7		14.0			12.8
Approach LOS	B		B			B

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	50.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: NE 43rd Ave & NE Everett St (SR 500)

8/18/2010

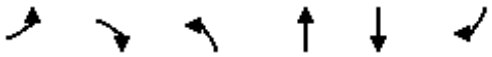
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	162	59	491	197	41	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-7%		5%			-6%
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1868	1672	1834	1559	1859	1919
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1868	1672	1834	1559	1859	1919
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	171	62	517	207	43	252
RTOR Reduction (vph)	0	51	0	104	0	0
Lane Group Flow (vph)	171	11	517	103	43	252
Heavy Vehicles (%)	0%	0%	1%	1%	0%	2%
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	8.2	8.2	23.4	23.4	1.3	29.7
Effective Green, g (s)	8.2	8.2	23.4	23.4	1.3	29.7
Actuated g/C Ratio	0.17	0.17	0.50	0.50	0.03	0.63
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.5	3.5	4.5	4.5	3.5	4.5
Lane Grp Cap (vph)	327	292	915	778	52	1215
v/s Ratio Prot	c0.09		c0.28		c0.02	0.13
v/s Ratio Perm		0.01		0.07		
v/c Ratio	0.52	0.04	0.57	0.13	0.83	0.21
Uniform Delay, d1	17.6	16.1	8.2	6.3	22.7	3.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	0.1	1.1	0.1	65.7	0.1
Delay (s)	19.3	16.1	9.3	6.4	88.4	3.8
Level of Service	B	B	A	A	F	A
Approach Delay (s)	18.5		8.5			16.1
Approach LOS	B		A			B

Intersection Summary			
HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	46.9	Sum of lost time (s)	14.0
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lake Rd & NE Everett St (SR 500)

8/18/2010



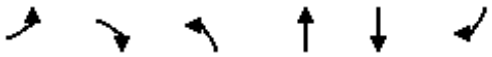
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	320	166	210	246	591	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1703	1538	1703	1712	1716	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1703	1538	1703	1712	1716	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	356	184	233	273	657	246
RTOR Reduction (vph)	0	64	0	0	8	0
Lane Group Flow (vph)	356	120	233	273	895	0
Heavy Vehicles (%)	6%	5%	6%	11%	8%	3%
Turn Type		custom	Prot			
Protected Phases	7	4	5	2	6	
Permitted Phases						
Actuated Green, G (s)	26.0	26.0	17.0	87.0	65.0	
Effective Green, g (s)	26.0	26.0	17.0	87.0	65.0	
Actuated g/C Ratio	0.21	0.21	0.14	0.71	0.53	
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.5	3.5	3.5	4.5	4.5	
Lane Grp Cap (vph)	363	328	237	1221	914	
v/s Ratio Prot	c0.21	0.08	c0.14	0.16	c0.52	
v/s Ratio Perm						
v/c Ratio	0.98	0.37	0.98	0.22	0.98	
Uniform Delay, d1	47.8	41.0	52.4	6.0	27.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	42.0	0.8	53.5	0.2	24.6	
Delay (s)	89.7	41.8	105.8	6.1	52.5	
Level of Service	F	D	F	A	D	
Approach Delay (s)	73.4			52.0	52.5	
Approach LOS	E			D	D	

Intersection Summary			
HCM Average Control Delay	58.2	HCM Level of Service	E
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	122.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lake Rd & NE Everett St (SR 500)

8/18/2010



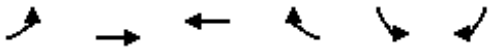
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	201	279	242	564	290	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1787	1599	1787	1881	1787	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1787	1599	1787	1881	1787	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	212	294	255	594	305	163
RTOR Reduction (vph)	0	234	0	0	18	0
Lane Group Flow (vph)	212	60	255	594	450	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	2%
Turn Type		custom	Prot			
Protected Phases	7	4	5	2	6	
Permitted Phases						
Actuated Green, G (s)	13.5	13.5	14.9	44.1	24.2	
Effective Green, g (s)	13.5	13.5	14.9	44.1	24.2	
Actuated g/C Ratio	0.20	0.20	0.22	0.66	0.36	
Clearance Time (s)	4.0	4.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.5	3.5	3.5	4.5	4.5	
Lane Grp Cap (vph)	362	324	400	1246	649	
v/s Ratio Prot	c0.12	0.04	c0.14	0.32	c0.25	
v/s Ratio Perm						
v/c Ratio	0.59	0.18	0.64	0.48	0.69	
Uniform Delay, d1	24.0	22.0	23.4	5.6	18.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.6	0.3	3.5	0.5	3.7	
Delay (s)	26.6	22.3	26.9	6.1	21.8	
Level of Service	C	C	C	A	C	
Approach Delay (s)	24.1			12.3	21.8	
Approach LOS	C			B	C	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	66.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Leadbetter Road & Fargo St

8/18/2010



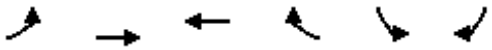
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	6	129	133	12	35	19
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	7	143	148	13	39	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	161				311	154
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	161				311	154
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				94	98
cM capacity (veh/h)	1418				680	892

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	150	161	60
Volume Left	7	0	39
Volume Right	0	13	21
cSH	1418	1700	742
Volume to Capacity	0.00	0.09	0.08
Queue Length 95th (ft)	0	0	7
Control Delay (s)	0.4	0.0	10.3
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	10.3
Approach LOS			B

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	22.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
6: Leadbetter Road & Fargo St

8/18/2010



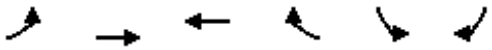
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	20	165	145	38	22	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	21	174	153	40	23	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	193				388	173
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	193				388	173
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				96	99
cM capacity (veh/h)	1381				607	871

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	195	193	36
Volume Left	21	0	23
Volume Right	0	40	13
cSH	1381	1700	680
Volume to Capacity	0.02	0.11	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.9	0.0	10.6
Lane LOS	A		B
Approach Delay (s)	0.9	0.0	10.6
Approach LOS			B

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Leadbetter Rd & Benton St

8/18/2010



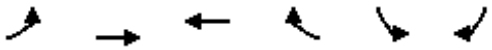
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	162	137	5	17	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	180	152	6	19	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	158				342	155
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	158				342	155
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	99
cM capacity (veh/h)	1422				654	891

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	183	158	29
Volume Left	3	0	19
Volume Right	0	6	10
cSH	1422	1700	721
Volume to Capacity	0.00	0.09	0.04
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.2	0.0	10.2
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	10.2
Approach LOS			B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	21.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Leadbetter Rd & Benton St

8/18/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	10	179	178	18	11	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	188	187	19	12	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	206				406	197
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	206				406	197
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	99
cM capacity (veh/h)	1365				598	845

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	199	206	18
Volume Left	11	0	12
Volume Right	0	19	6
cSH	1365	1700	667
Volume to Capacity	0.01	0.12	0.03
Queue Length 95th (ft)	1	0	2
Control Delay (s)	0.5	0.0	10.5
Lane LOS	A		B
Approach Delay (s)	0.5	0.0	10.5
Approach LOS			B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	27.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
8: Leadbetter Rd & Division St

8/18/2010

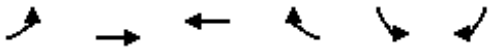
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	174	128	9	27	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	193	142	10	30	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	152				352	147
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	152				352	147
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				95	98
cM capacity (veh/h)	1429				645	900

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	199	152	46
Volume Left	6	0	30
Volume Right	0	10	16
cSH	1429	1700	714
Volume to Capacity	0.00	0.09	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.2	0.0	10.4
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	10.4
Approach LOS			B

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
8: Leadbetter Rd & Division St

8/18/2010



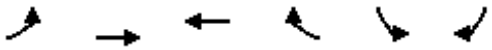
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	15	175	187	29	17	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	16	184	197	31	18	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	227				428	212
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	227				428	212
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	99
cM capacity (veh/h)	1341				579	829

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	200	227	27
Volume Left	16	0	18
Volume Right	0	31	9
cSH	1341	1700	646
Volume to Capacity	0.01	0.13	0.04
Queue Length 95th (ft)	1	0	3
Control Delay (s)	0.7	0.0	10.8
Lane LOS	A		B
Approach Delay (s)	0.7	0.0	10.8
Approach LOS			B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
9: Leadbetter Rd & NE Adams St

8/18/2010



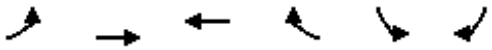
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	196	121	14	41	16
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	218	134	16	46	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	150				371	142
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	150				371	142
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				93	98
cM capacity (veh/h)	1431				629	906

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	223	150	63
Volume Left	6	0	46
Volume Right	0	16	18
cSH	1431	1700	688
Volume to Capacity	0.00	0.09	0.09
Queue Length 95th (ft)	0	0	8
Control Delay (s)	0.2	0.0	10.8
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	10.8
Approach LOS			B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
9: Leadbetter Rd & NE Adams St

8/18/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	17	175	205	44	26	11
Sign Control		Free	Free		Stop	
Grade		0%	0%		-12%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	18	184	216	46	27	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	262				459	239
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	262				459	239
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				95	99
cM capacity (veh/h)	1302				554	801

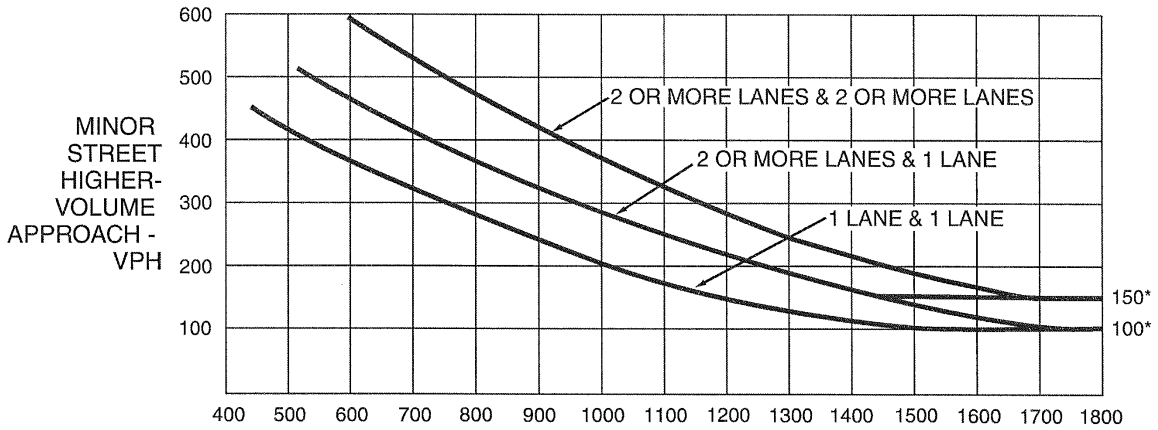
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	202	262	39
Volume Left	18	0	27
Volume Right	0	46	12
cSH	1302	1700	610
Volume to Capacity	0.01	0.15	0.06
Queue Length 95th (ft)	1	0	5
Control Delay (s)	0.8	0.0	11.3
Lane LOS	A		B
Approach Delay (s)	0.8	0.0	11.3
Approach LOS			B

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX H

Warrant Analysis

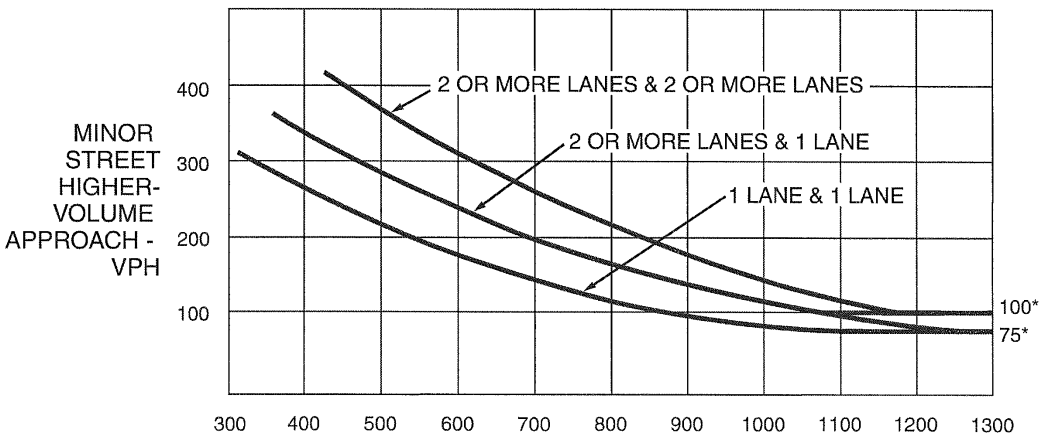
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

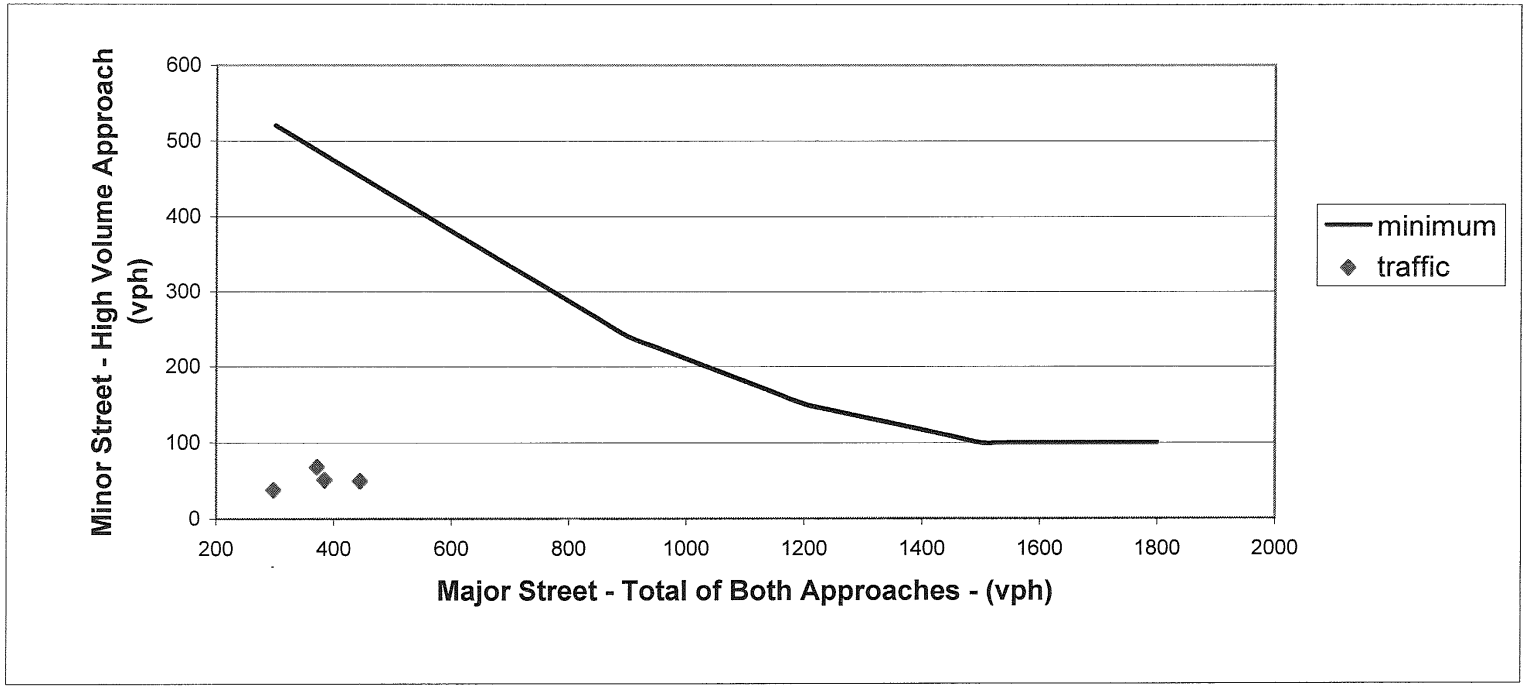
Everett Street / Leadbetter Road - 2010 Existing Scenario

Warrant 3, Peak Hour

Major Street:	**Everett St (SR 500)**
Minor Street:	**Leadbetter Road**
Mile Post:	**17.26**
Warrant Called:	**NO**
Condition:	

Time	Major Street (2X - vph)	Minor Street (1X - vph)	100% Factor (1X - vph)	70% Factor (1X - vph)	Meets Criteria
7:00	371	68	497		
17:00	384	51	497		
16:00	444	50	473		
8:00	297	38	#N/A		#N/A
23:00	0	0	#N/A		#N/A

*Needs to meet Criteria a Minimum of 1 time.
**Criteria Minor St. VPH > Factor VPH or Condition A on Delay.
***If Minor St. VPH > Factor VPH, but criteria is blank, Minor St. VPH is just below the Factor VPH.



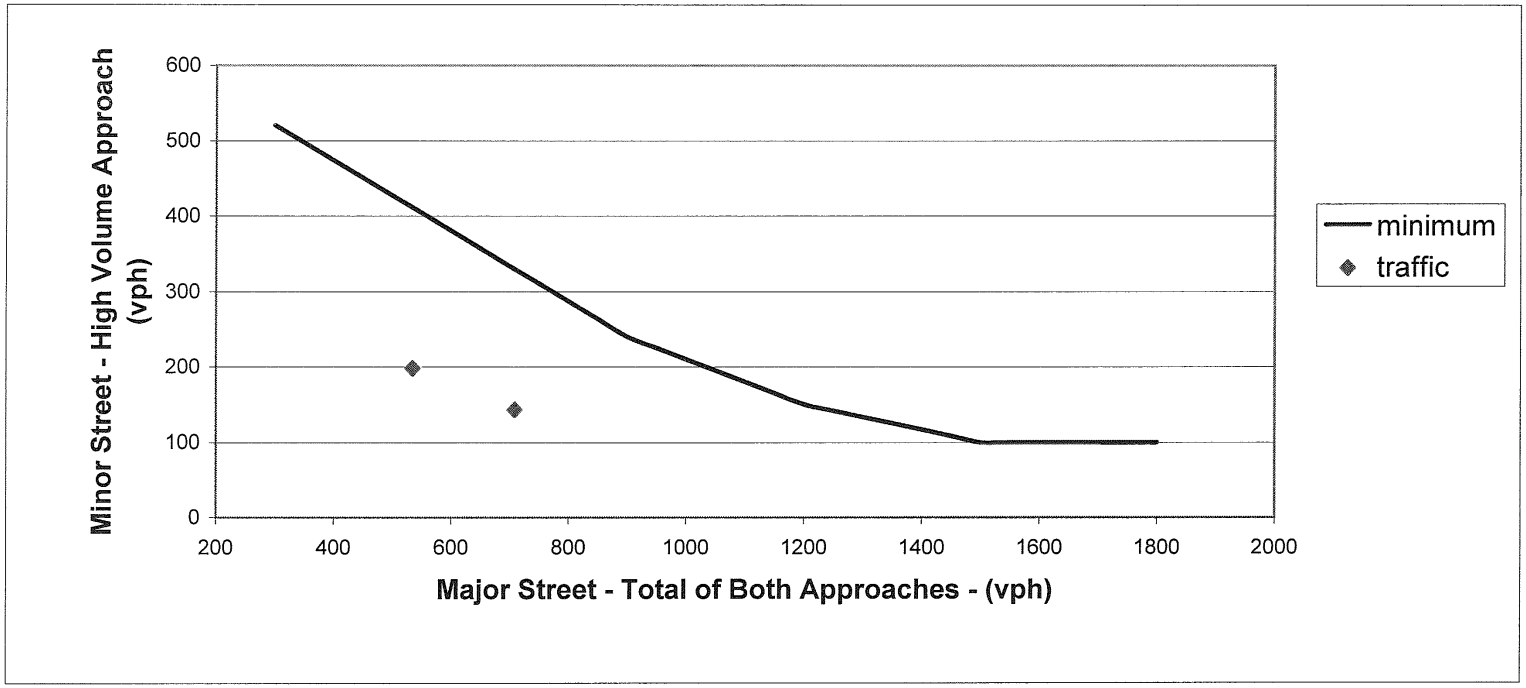
Everett Street / Leadbetter Road - 2018 Post-Development Scenario

Warrant 3, Peak Hour

Major Street:	**Everett St (SR 500)**
Minor Street:	**Leadbetter Road**
Mile Post:	**17.26**
Warrant Called:	**NO**
Condition:	

Time	Major Street (2X - vph)	Minor Street (1X - vph)	100% Factor (1X - vph)	70% Factor (1X - vph)	Meets Criteria
7:00	534	198	427		
16:00	708	143	333		
23:00	0	0	#N/A		#N/A
22:00	0	0	#N/A		#N/A
21:00	0	0	#N/A		#N/A

*Needs to meet Criteria a Minimum of 1 time.
**Criteria Minor St. VPH > Factor VPH or Condition A on Delay.
***If Minor St. VPH > Factor VPH, but criteria is blank, Minor St. VPH is just below the Factor VPH.



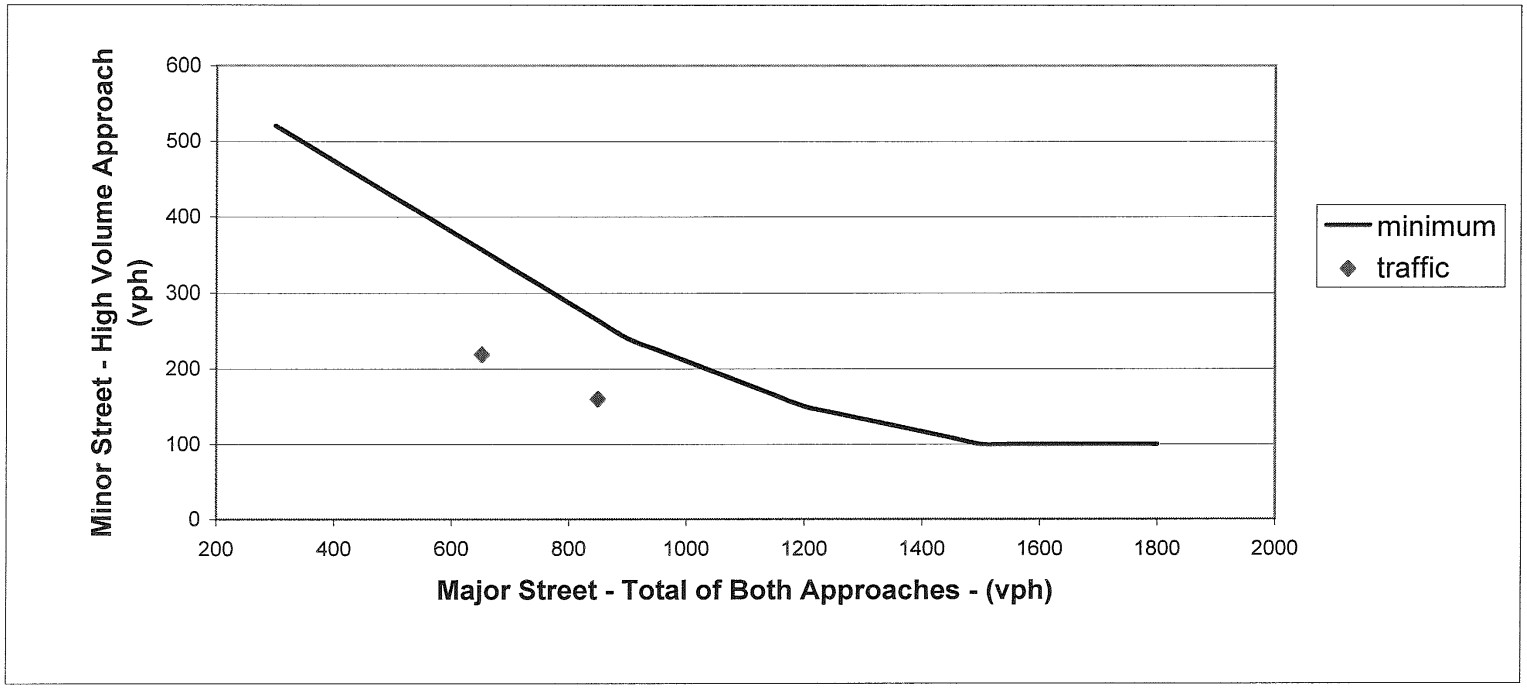
Everett Street / Leadbetter Road - 2030 Future Year Scenario

Warrant 3, Peak Hour

Major Street:	**Everett St (SR 500)**
Minor Street:	**Leadbetter Road**
Mile Post:	**17.26**
Warrant Called:	**NO**
Condition:	

Time	Major Street (2X - vph)	Minor Street (1X - vph)	100% Factor (1X - vph)	70% Factor (1X - vph)	Meets Criteria
7:00	651	219	357		
16:00	849	160	287		
23:00	0	0	#N/A		#N/A
22:00	0	0	#N/A		#N/A
21:00	0	0	#N/A		#N/A

*Needs to meet Criteria a Minimum of 1 time.
**Criteria Minor St. VPH > Factor VPH or Condition A on Delay.
***If Minor St. VPH > Factor VPH, but criteria is blank, Minor St. VPH is just below the Factor VPH.



APPENDIX I

Scoping

David Holt

From: Curleigh Carothers [jcarothers@ci.camas.wa.us]
Sent: Friday, July 16, 2010 11:14 AM
To: Brent Ahrend
Cc: Wes Heigh; David Holt; Todd Johnson; carl@lawsoninvestment.com
Subject: RE: CJ Dens TIA Scope

Brent,
If there is not a great delay in the timing of the application submittal, your proposal appears to be fine based on the information provided in your email.

"Curleigh"
James E. Carothers, P.E.
Engineering Manager/City Engineer
City of Camas
616 NE 4th Avenue
PO Box 1055
Camas, WA 98607
360-817-7230
360-834-1535 FAX
jcarothers@ci.camas.wa.us

>>> "Brent Ahrend" <BAhrend@grpmack.com> 7/15/2010 3:59 PM >>>
Curleigh,

During our review of the in-process projects provided to us by Wes Heigh, we found that the recent proposal to expand Camas High School analyzed two intersections in common with our analysis scope:

- NE Everett Street (SR 500) / NE 43rd Avenue
- NE Everett Street (SR 500) / NE Lake Road

The analysis of these intersections was based on turning movement counts collected in January 2010, and the study was completed in February. As it was provided to us as an in-process project, we understand the CHS project to be approved, adding capacity for 330 more students at the existing campus on SE 15th Street (NE 43rd Avenue) for a buildout year of 2015.

Because the counts were collected within the last 12 months and the analysis was recently completed, we propose to use the CHS study data as the basis for analyzing these two intersections. This will reduce our need for data collection and additional analysis. The volume calculations would be adjusted to these formulae:

- 2010 Existing scenario = CHS study 2010 Existing scenario
- 2018 Pre-Development scenario = [CHS study 2015 Total scenario volumes] + [2% annual growth for 3 years]
- 2018 Post-Development scenario = [2018 Pre-Development] + [CJ Dens Subdivision Site Trips]
- 2030 Future Year scenario = [2018 Post-Development] + [2% annual growth for 12 years]

For all other study area intersections the previously proposed conditions (2% annual growth for 8 years, plus inclusion of all provided in-process trips, to yield 2018 buildout year conditions) would still be applied without change.

Please confirm that this approach is an acceptable alternative to that proposed and agreed upon in our prior correspondence. Thank you for your time and consideration.

From: Curleigh Carothers [mailto:jcarothers@ci.camas.wa.us]
Sent: Friday, May 14, 2010 4:17 PM
To: Brent Ahrend; David Holt

Cc: Wes Heigh; Todd Johnson; carl@lawsoninvestment.com
Subject: Re: CJ Dens TIA Scope

Brent,
Thanks for the clarification. I have verified that the PM peak number for 302 vehicles is "spot on."

David,
To answer your question on timing...I plan of going over the study with Wes next week. We will supply comments once we have had time to review and discuss. Thank you.

Curleigh

>>> <bahrend@grpmack.com> 5/14/2010 1:43 PM >>>
We used the equation instead of the average. ITE guidelines suggest use of the equation.

Brent

Sent from my Verizon Wireless BlackBerry

From: "Curleigh Carothers" <jcarothers@ci.camas.wa.us>
Date: Fri, 14 May 2010 12:26:36 -0700
To: Brent Ahrend<BAhrend@grpmack.com>
Cc: Wes Heigh<wheigh@ci.camas.wa.us>; David Holt<DHolt@grpmack.com>; Todd Johnson<TJohnson@grpmack.com>; <carl@lawsoninvestment.com>
Subject: CJ Dens TIA Scope

Brent,
I have just scanned the document so far. I noticed, however, that the PM peak hour total seems low for 302 SF detached. Can you please check this number? I come up with 305 to 308 (for 1.01 to 1.02 trips per SFD).

Thank you.

"Curleigh"
James E. Carothers, P.E.
Engineering Manager/City Engineer
City of Camas
616 NE 4th Avenue
PO Box 1055
Camas, WA 98607
360-817-7230
360-834-1535 FAX
jcarothers@ci.camas.wa.us

>>> "Brent Ahrend" <BAhrend@grpmack.com> 5/13/2010 3:15 PM >>>
Curleigh,

Please see the attached TIA scoping letter.

Contact David Holt or me if you have any questions.

Thanks,

Brent Ahrend, PE

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Please consider the environment before printing this email. Thank you.

David Holt

From: Curleigh Carothers [jcarothers@ci.camas.wa.us]
Sent: Friday, May 21, 2010 11:34 AM
To: Brent Ahrend; David Holt
Cc: Phil Bourquin; Wes Heigh; Todd Johnson; carl@lawsoninvestment.com
Subject: RE: CJ Dens TIA Scope

Brent,
My thoughts on your proposed scope are as follows:

Apparently, you and I interpret the Camas TIS Guidelines a bit differently. Since a TIF study has not been conducted for the north urban growth area, off-site impacts for this subdivision have not been conducted. The amount of traffic that is being added to the city's system may have an impact on number and length of "gaps" on some of the streets that you have proposed to leave out of your study.

Your Traffic Study Scope reads, *"The Guidelines indicate a TIS should analyze impacted intersections of streets that are both classified as a Collector or higher classification...Several intersections proposed for this study do not meet the Collector/Collector criterion..."* and you suggest paring down the list of intersections based on your interpretation.

The Camas TIS guidelines actually state, *"The preparer of the transportation impact study shall contact the Public Works Director to discuss study area limits (including the number of intersections to be analyzed and key project issues) for their specific project prior to beginning the study."* You have done this task.

The sentence that I believe that you are referring to out of the guidelines is, *"Intersections of arterials or collectors should be considered in determining study intersections..."* I do not find reference in the guidelines that determine that collectors, arterials, or state routes that intersect with non-collectors, non-arterials, or non-state routes should not be considered. You may have a solid argument on some of the lesser traveled side streets (e.g. NE 35th), but some of the intersections that you have eliminated from the list have school traffic or are neighborhood routes or "cut-through" streets (NE 22nd, NE 19th, Lacamas Lane, Leadbetter Drive (construction to be completed this year.))

You have proposed to eliminate at least one state-county intersection from your list of intersections. I has suggested that you might want to include the County and the State in the discussion for intersections to be analyzed. I do not know if you have made contact with them, but the City will, at some point in time, provide the study to these agencies for their comments.

As I have stated before, when a north urban growth area or citywide TIF study is conducted, you will likely be instructed that changes to the study will be required.

Ultimately, your study is for your client to provide adequate information to present for staff comments and to ultimately provide a solid application to take through the public process. I am merely trying to do the best at guiding you upon your request.

"Curleigh"
James E. Carothers, P.E.
Engineering Manager/City Engineer
City of Camas
616 NE 4th Avenue
PO Box 1055
Camas, WA 98607
360-817-7230
360-834-1535 FAX
jcarothers@ci.camas.wa.us

>>> "Brent Ahrend" <BAhrend@grpmack.com> 5/20/2010 1:00 PM >>>
Curleigh,

I am following up on my voice mail message regarding the traffic study scope. I am happy to answer any questions you may have or am available to discuss the scope with you and Wes.

Thanks,

Brent

From: Curleigh Carothers [mailto:jcarothers@ci.camas.wa.us]
Sent: Friday, May 14, 2010 4:17 PM
To: Brent Ahrend; David Holt
Cc: Wes Heigh; Todd Johnson; carl@lawsoninvestment.com
Subject: Re: CJ Dens TIA Scope

Brent,
Thanks for the clarification. I have verified that the PM peak number for 302 vehicles is "spot on."

David,
To answer your question on timing...I plan of going over the study with Wes next week. We will supply comments once we have had time to review and discuss. Thank you.

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We used the equation instead of the average. ITE guidelines suggest use of the equation.

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Sent from my Verizon Wireless BlackBerry

From: "Curleigh Carothers" <jcarothers@ci.camas.wa.us>
Date: Fri, 14 May 2010 12:26:36 -0700
To: Brent Ahrend<BAhrend@grpmack.com>
Cc: Wes Heigh<wheigh@ci.camas.wa.us>; David Holt<DHolt@grpmack.com>; Todd Johnson<TJohnson@grpmack.com>; <carl@lawsoninvestment.com>
Subject: CJ Dens TIA Scope

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Thank you.

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>>> "Brent Ahrend" <BAhrend@grpmack.com> 5/13/2010 3:15 PM >>>
Curleigh,

Please see the attached TIA scoping letter.

Contact David Holt or me if you have any questions.

Thanks,

Brent Ahrend, PE

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Please consider the environment before printing this email. Thank you.

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May 12, 2010

City of Camas
Attention: James "Curleigh" Carothers
616 NE 4th Avenue
PO Box 1055
Camas, WA 98607

Re: **CJ Dens Camas Subdivision**
Transportation Impact Study – Scope Definition
Project Number 2050186.01

Dear Mr. Carothers:

Group Mackenzie has prepared this letter to confirm the Transportation Impact Study (TIS) area limits for the above project as required by the City's *Transportation Impact Study and Neighborhood Traffic Management Guidelines* (*Guidelines*, dated 10/28/02, and revised 9/18/07). This letter responds to your April 9, 2010 e-mail, which discussed preliminary scope considerations. This letter also presents the anticipated trip generation and describes the proposed study scope.

Our client, CJ Dens Land Company, proposes to develop a 302-lot single-family residential subdivision within Camas city limits with accesses onto Leadbetter Road. The subdivision is anticipated to include development of all required public infrastructure, including streets, sidewalks, and utilities. Four parcels together comprise the currently undeveloped 82.5-acre site bounded by Leadbetter Road to the south and west, by undeveloped light industrial/business park properties to the north, and by partially-developed residential properties to the east. The site is zoned Residential-7,500 (R-7.5), in which the proposed single-family residential subdivision is an allowed use. A pre-application conference was held with city staff on March 18, 2010.

TRIP GENERATION

Trip generation estimates will be prepared using trip rates in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 8th Edition. Trip generation is anticipated to be as follows:

TABLE 1 – SITE TRIP GENERATION

Land Use (ITE Code)	Variable	Variable Value	ADT	AM Peak Hour		PM Peak Hour	
				Enter	Exit	Enter	Exit
Single-Family Detached Housing (210)	Dwelling Units	302	2,874	55	166	179	105

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Tel: 360.695.7879 Web: www.grpmack.com Fax: 360.693.6637

Group Mackenzie, Incorporated
Architecture
Interiors
Structural Engineering
Civil Engineering
Land Use Planning
Transportation Planning
Landscape Architecture

Locations:
Portland, Oregon
Seattle, Washington
Vancouver, Washington

With more than 200 daily trips, the project meets the City's requirement for preparing a TIS.

TRIP DISTRIBUTION

Distribution of site trips will be based on existing EMME/2 model data provided by the Southwest Washington Regional Transportation Council (RTC). Specifically, the trip assignment patterns from the model's Transportation Analysis Zone (TAZ) 483 are used. TAZ 483 includes all four subject parcels comprising the subdivision site.

From the site accesses on Leadbetter Road, it is estimated 35% of trips will travel to and from the north/west and 65% to and from the south/east. Approximately 10% of the site trips will travel along NE 43rd Avenue, primarily to and from the schools, and 40% of the site trips will travel along Everett Street farther south, between the subdivision and downtown Camas. The attached figure presents the proposed trip distribution.

TRAFFIC STUDY SCOPE

The *Guidelines* indicate a TIS should analyze impacted intersections of streets that are both classified as a Collector or higher classification. Applying this logic to the list of study intersections proposed in your April 9, 2010 e-mail, the following intersections meet this criterion. The intersections are shown in table format along with the number of site trips anticipated to travel through each intersection during the PM peak hour.

TABLE 2 – STUDY AREA PUBLIC STREET INTERSECTIONS AND PM PEAK HOUR SITE TRIPS

Street 1	Street 2	Approximate Added PM Peak Hour Site Trips
NE Goodwin Road	NE Ingle Road	85
NE 28th Street	NE 232nd Avenue	99
NE Everett Street (SR 500)	SE Leadbetter Road	185
NE Everett Street (SR 500)	NE 43rd Avenue	170
NE Everett Street (SR 500)	NE Lake Road	142
NW Sierra Street	NW Lake Road	28*
NW Leadbetter Drive	NW Lake Road	14*

* These intersections are proposed to be excluded from the TIS analysis. See note below.

Several intersections proposed for study in your April 9, 2010 e-mail do not meet the Collector/Collector criterion, and only through trips related to the subdivision site are anticipated to travel through them. Therefore we propose to exclude from the TIS the following intersections:

- NE 232nd Avenue/NE 9th Street
- NE Everett Street (SR 500)/NE 3rd Street
- NE Everett Street (SR 500)/NE 38th Avenue
- NE Everett Street (SR 500)/NE 35th Avenue
- NE Everett Street (SR 500)/NE 22nd Avenue
- NE Everett Street (SR 500)/NE 19th Avenue
- NE Everett Street (SR 500)/NE 15th Avenue
- NE Everett Street (SR 500)/NE 14th Avenue
- NW Lake Road/NW Lacamas Lane

We request these intersections not be included in the study area as they do not meet the standard of being a collector classification, nor are site trips likely to be added on the intersecting local streets.

Because the anticipated number of site trips at the NW Sierra Street/NW Lake Road and NW Leadbetter Drive/NW Lake Road intersections is small, we also propose to exclude these intersections from the TIS analysis. Only 10% of site trips are anticipated to travel this section of NW Lake Road.

In addition to the intersections identified in Table 2 above, analysis will be provided at the four locations where site trips will access Leadbetter Road, including the NE Adams Street/SE Leadbetter Road intersection identified in the April 9, 2010 e-mail and constructed with the Deerhaven Subdivision. The attached preliminary site plan depicts the approximate locations of the proposed access points.

In summary, the following intersections are proposed to be included in the analysis:

- NE Ingle Road/NE Goodwin Road
- NE 28th Street/NE 232nd Avenue
- NE Everett Street (SR 500)/NE Leadbetter Road
- NE Everett Street (SR 500)/NE 43rd Avenue
- NE Everett Street (SR 500)/NE Lake Road
- NE Leadbetter Road/NE Adams Street
- Site Accesses on Leadbetter Road (3)

ANALYSIS PERIODS

In conformance with the *Guidelines*, the study will analyze traffic operations during weekday AM and PM peak hour periods at intersections identified above for the following scenarios:

- 2010 Existing
- 2018 Pre-Development
- 2018 Post-Development (with project trips)
- 2030 Future Year

The analysis years are proposed to include build-out of the subdivision in 2018, which reflects an anticipated project approval in 2011 and a maximum seven-year phased development.

Existing vehicle turning movement counts will be collected at the intersections identified above for inclusion in the study area to form the basis of the operations analysis.

Roadway 24-hour volume and speed surveys will be conducted at two points along Leadbetter Road. One point will be near the proposed west public street access from the subdivision onto Leadbetter; the other point will be approximately halfway between the two new proposed east public street access points onto Leadbetter. These surveys will allow us to provide estimates of daily traffic volumes (ADT) and 85th percentile speeds in the TIS, as required in the *Guidelines*.

The TIS will conform to City standards and will include sight distance review, crash history assessment, pedestrian and bicycle facilities review, transit service review, turn lane warrant analysis, and signal warrant analysis.

PLANNED IMPROVEMENTS

The subject site is within an area recently annexed by the City of Camas, and the City has yet to adopt a new Transportation Impact Fee (TIF) Study or a Capital Facilities Plan (CFP) for the area. As such, no public transportation improvements are identified for the study area at this time.

Although a future east-west arterial roadway has been identified north of the site in the City's Transportation Comprehensive Plan, as an arterial replacement for the existing Leadbetter Road alignment, the timing for construction of such a new roadway is uncertain. For this reason, our analysis will assume Leadbetter Road remains in its current location and provides access to the site. At the time the new arterial roadway is constructed, site access would then be provided to the north and Leadbetter would be closed. Analysis of this condition would be prepared by the City in conjunction with the TIF/CFP update.

BACKGROUND GROWTH

We propose a background growth rate of 2% per year. A review of RTC model data in the site vicinity indicates growth rates from 2000 to 2009 varying between 1.5% and 8%; much of the significant growth since 2000 has been related to the new Camas High School campus on NE 43rd Avenue. Actual roadway volumes have decreased in the last two years and do not provide a reliable basis for estimating future growth. Thus an annual growth rate of 2% seems a logical value.

IN-PROCESS PROJECTS

City staff provided trip assignment information for several in-process projects in the area including the following. We will include trips from these projects in the future volumes for the study area intersections.

- Deerhaven
- The Hills at Round Lake
- Millshore Downs
- Camas High School Expansion
- Lacamas Pointe
- North Hills
- Vintage View/The Village at Round Lake
- Lakeridge North
- Two Creeks at Camas Meadows
- LaCamas Meadows PRD
- Hidden Meadows Subdivision

CONCLUSION

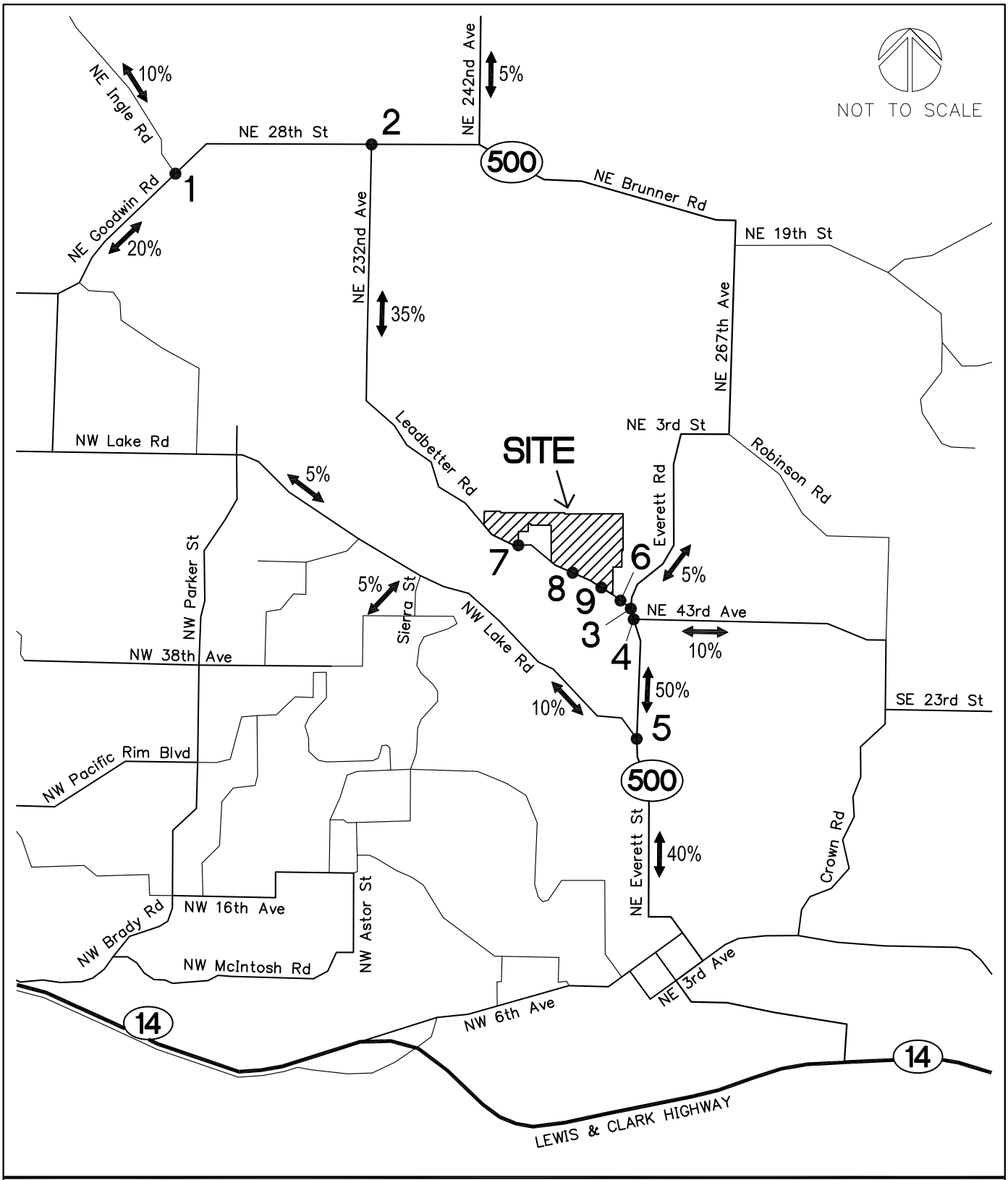
Please provide written confirmation of the traffic study scope and assumptions. Please contact David Holt or me if you need any additional information or have any questions.

Sincerely,

Brent Ahrend, P.E.
Senior Associate

Enclosures: Proposed Trip Distribution, Proposed Site Plan

c: Carl Lawson – CJ Dens Land Company
David Holt, Todd Johnson – Group Mackenzie



GROUP MACKENZIE

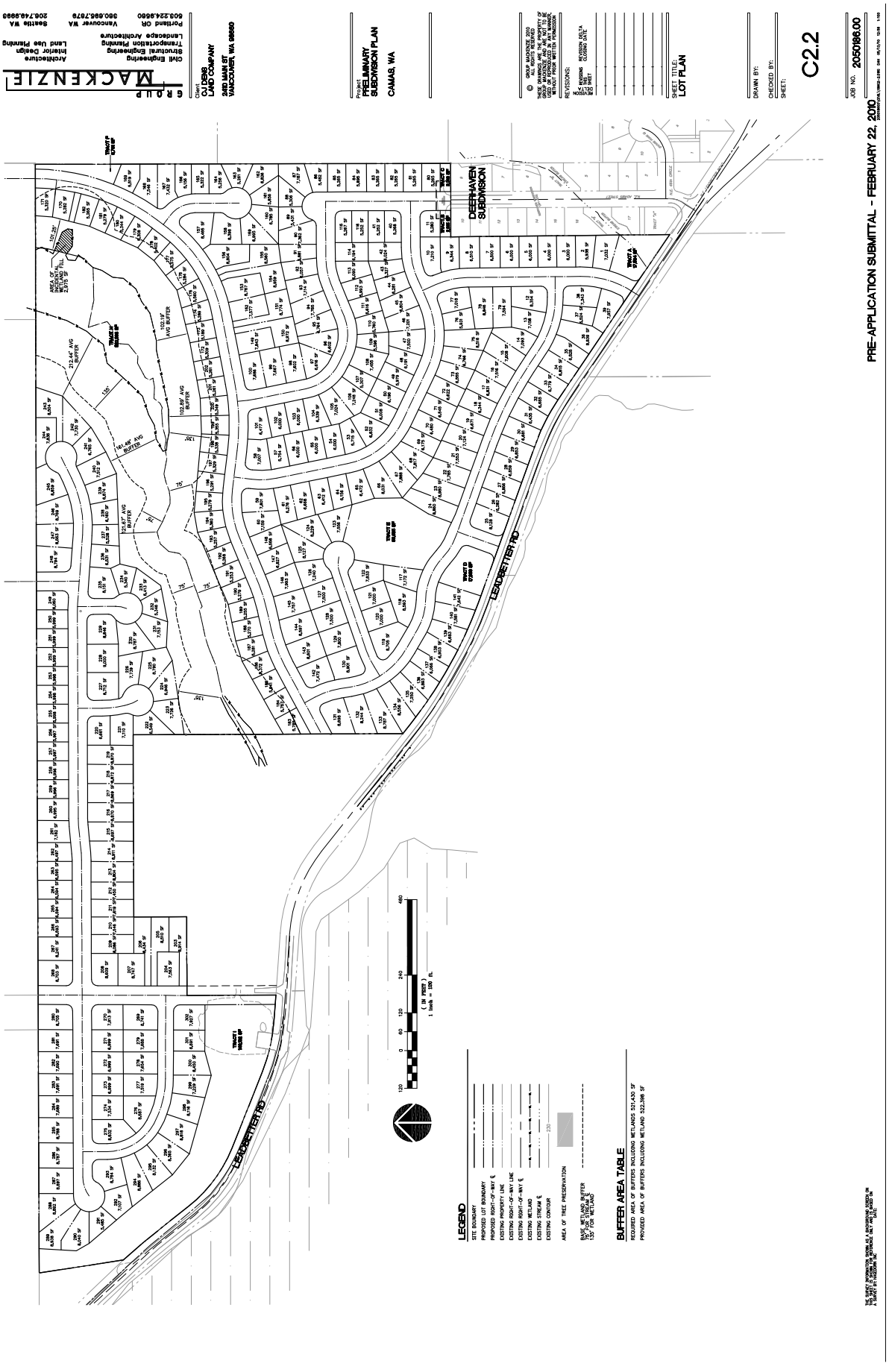
Portland OR 503.224.9560 Vancouver WA 360.695.7879 Seattle WA 206.749.9993

DATE: 05.13.10
DRAWN BY: DAH
CHECKED BY: BTA
JOB NO: 2050186.01

SITE TRIP DISTRIBUTION AND STUDY AREA INTERSECTIONS

CJ DENS RESIDENTIAL SUBDIVISION
CAMAS, WASHINGTON

FIGURE
A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Client
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Project
PRELIMINARY SUBDIVISION PLAN
CAMAS, WA
GROUP MACKENZIE 2020
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SHEET TITLE:
LOT PLAN
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SHEET:
C2.2
JOB NO. 2050186.00
PRE-APPLICATION SUBMITTAL - FEBRUARY 22, 2010
DEERHAVEN SUBDIVISION
LEADBETTER RD
LEGEND
SITE BOUNDARY
PROPOSED LOT BOUNDARY
PROPOSED RIGHT-OF-WAY ℄
EXISTING PROPERTY LINE
EXISTING RIGHT-OF-WAY LINE
EXISTING WETLAND
EXISTING STREAM ℄
EXISTING CONTOUR
AREA OF TREE PRESERVATION
BASIC WETLAND BUFFER 150' FOR WETLAND
BUFFER AREA TABLE
REQUIRED AREA OF BUFFERS INCLUDING WETLANDS 521,430 SF
PROVIDED AREA OF BUFFERS INCLUDING WETLAND 522,398 SF
(IN FEET)
1 inch = 120 ft.
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