
TRAFFIC ROUTING ASSIGNMENT ANALYSIS
for

Old Mill Point
in conjunction with
Weber's Ridge & Chrysalis Estates

Prepared for:

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Background

The subject study was prepared in response to King County Traffic Engineering's request of 10/23/98 for a traffic modeling effort to determine whether traffic volumes on the planned connection between Hidden Ridge and Timberline subdivisions will exceed 2000 ADT when the connection is completed and the projects are built-out (estimated buildout year 2003). The question has been raised as the previous EIS routing analysis assumed 1999 as the horizon year and a significant amount of additional pipeline growth proposals are indicated for the extended horizon.

The county's analysis request is generated by the Examiner's Condition 19.c. of the Old Mill Point, Weber's Ridge, Chrysalis Estates plat hearing which, in addressing traffic control plan mitigation in the Timberline neighborhood, states the following:

- 19.c. Understanding between the applicant, Save Timberline, and the Hidden Ridge Homeowners attached to Exhibit 84 and shall include, but not be limited to, traffic control devices such as reduced pavement widths, traffic circles, pavement markings, and stop signs. The final determination of the design requirements will be made by King County. The plans shall also provide for and fund the measurement of peak hour traffic and ADT for five years after plat completion along the neighborhood collector route through Hidden Ridge and Timberline and for implementation of further traffic control modifications if 2,000 ADT is exceeded at any point west of the intersection of NE 37th Way and 205th Place NE. Such further mitigations may include bonding to finance construction of turning and storage lanes or other interim improvements at the SR 202 and Sahalee Way intersection designed to decrease traffic delays.

Construction of improvements, as detailed by this condition (reader note -- refers to conditions a. and b. as well as c), are not required until either Chrysalis Estates is recorded or a public road connection is made between 192nd Avenue NE and NE 42nd Street. In the event Old Mill Point records before this occurs, the applicant for Old Mill Point may provide bonding which will assure the funding of an equitable share of the cost of the improvements, as determined by the Department of Public Works.

The applicant, John F. Buchan Homes, is attempting to comply with the interim improvements proviso and to have a backup plan if conditions cause traffic volume on the neighborhood collector route to exceed 2000 ADT.

Model Development

A computer simulation model was developed in order to manage the voluminous calculations necessary to estimate the potential traffic diversion on nine links through the several neighborhoods for various network and trip generation scenarios. A brief itemization of the model development process and inputs is discussed below:

- Existing AM and PM peak period travel time runs between Timberline and Redmond were conducted during the month of October 1998.

- Future PM peak hour link volumes were obtained from the county's latest concurrency model which include all pipeline development projects through July 1998. The future PM peak hour link volumes are considered representative of year 2003 conditions, since the pipeline projects are assumed to be built out in six years concurrent with the county's 6-year Transportation Improvement Program.
- Future AM and PM peak hour turning movement volumes at the critical signalized intersections were estimated from the concurrency model link volumes using a fratar growth factor process with existing turning movement counts. Analysis intersections include:
 1. SR 202/Sahalee Way NE
 2. SR 202/204th PI NE
 3. SR 202/192nd Dr NE
 4. Sahalee Way NE/NE 37th Way
- AM and PM peak hour level of service and delay (by movement) were estimated using Transyt-7f software at the four analysis intersections. The assumed intersection geometrics include existing 1998 configurations at SR 202/204th PI NE and Sahalee Way NE/NE 37th Way, a new signal at the SR 202/192nd Dr NE intersection, and an eastbound right turn lane at the SR 202/Sahalee Way NE intersection.
- A link-node type traffic assignment model was developed using TModel2 software. Six different sub-models were developed:
 1. PM peak hour model with the proposed connection between Hidden Ridge and Timberline
 2. PM peak hour model without the proposed connection between Hidden Ridge and Timberline
 3. AM peak hour model with the proposed connection between Hidden Ridge and Timberline
 4. AM peak hour model without the proposed connection between Hidden Ridge and Timberline
 5. Off-peak model with the proposed connection between Hidden Ridge and Timberline
 6. Off-peak model without the proposed connection between Hidden Ridge and Timberline

Note that the AM and PM peak hour model speeds and capacities are calibrated such that they yield the estimated delays determined from the Transyt-7f analyses. Free flow operating speeds and delay were assumed for the off-peak and reverse commute conditions.

Also, the loading of the trips onto the network utilizes a 10 increment capacity - restraint procedure such that the diversion potential increases as overall traffic increases.

- The land use assumptions include 1,143 single family dwelling units within 9 different neighborhoods. They are broken down as follows:
 - ✓ Old Mill Point, 76 lots
 - ✓ Chrysalis Estates, 16 lots
 - ✓ Weber's Ridge, 28 lots
 - ✓ Timberline Ridge, 240 lots
 - ✓ Hidden Ridge, 90 lots
 - ✓ Sterlingwood, 62 lots
 - ✓ Timberline, 532 lots
 - ✓ Shannonwood, 99 lots

Attachment 1A identifies the locations of each neighborhood.

- There are five external cordon locations defined by the model. At these locations the traffic origin-destinations during the Year 2003 PM peak hour were derived from the county's concurrency model. Future AM peak hour external origin-destinations were determined based on existing AM to PM peak hour relationships. The external locations include:
 - ✓ SR 202/East Lake Sammamish Parkway; west and south legs,
 - ✓ 204th Pl NE north of SR 202,
 - ✓ SR 202 east of Sahalee Way,
 - ✓ Sahalee Way south of NE 37th Way,
 - ✓ East Lake Sammamish Parkway north of Inglewood Hill Road.

Trip Generation Rates

Trip generation for seven of the eight neighborhoods were calculated using trip generation rates obtained from the *ITE Trip Generation Manual*, 6th Edition. Since local trip generation studies have been conducted for the existing Timberline neighborhood, it was presumed that these rates are appropriate for this neighborhood. As noted, the neighborhoods employ the more conservative ITE rates. Table 1 below identifies the national standard trip generation rates (per ITE) and the local area trip generation rates.

Table 1
Trip Generation Rates - Weekday/Dwelling Unit

Source	AWDT	AM Peak			PM Peak		
		Total	In	Out	Total	In	Out
<i>ITE Trip Generation Manual, 6th Edition</i>	9.57	0.75	31%	69%	1.01	64%	36%
<i>Local Trip Generation Rates</i>	7.16	0.56	20%	80%	0.67	66%	34%

^a AWDT: Average Weekday Daily Traffic
^b Trip Generation Rates determined from 2-day count (5/93) at the within Timberline neighborhood cordon location on NE 37th Way west of Sahalee Way NE

In general, the local rates are approximately 25% less than the ITE rate. For the modeling process, a comparison analysis was conducted employing the local rates for all of the eight neighborhoods.

Traffic Distribution

External area trip distribution patterns for the neighborhoods were determined from existing AM and PM peak hour traffic counts at the Sahalee Way NE/NE 37th Way intersection. Table 2 below identifies the trip distribution percentages for the three modeled time periods.

Table 2
Trip Distribution Percentages^a

Orientation	OFF-PEAK		AM PEAK HOUR		PM PEAK HOUR	
	Origin/ Outbound	Destination/ Inbound	Origin/ Outbound	Destination/ Inbound	Origin/ Outbound	Destination/ Inbound
North	65%	65%	35%	70%	62%	47%
South	35%	35%	65%	30%	38%	53%
Total	100%	100%	100%	100%	100%	100%

^a AM and PM peak hours percentages determined from turning movement counts (prior to construction of School)

^b Off-peak period includes all hours less the AM and PM peak hours

Traffic Assignment

The assignment of neighborhood trips (1,143 dwelling units) was accomplished with the model using a 10 increment capacity-restraint process. The off-peak conditions do not employ the capacity-restraint process since it is estimated that off-peak conditions will be under capacity.

Results

The results of the traffic assignment loadings for the three time periods were added together to yield an AWDT (Average Weekday Daily Traffic) value. Table 3 below indicates the AWDT at the 9 monitor stations (as determined by King County) for the with- and with-out-connection through the Old Mill Point/Weber's Ridge/Chrysalis Estates project; see Attachment 1. Note that the AWDT values presented in the table are based on ITE trip generation rates, except for the existing Timberline neighborhood.

Table 3
AWDT at Selected Locations^a

Monitor Station	Location	AWDT w/o Connection	AWDT w/Connection
1	37th Way w/o 206th Pl NE	4480	3850
2	208th Ave NE n/o NE 37th Way	1580	1230
3	206th Pl NE n/o NE 37th Way	820	760
4	NE 37th Way n/o 205th Pl NE	1170	1190
5	NE 39th St w/o 204th Ave NE	880	1970
6	203rd Ave NE n/o NE 39th St	720	2140
7	NE 42nd St w/o Chrysalis Estates	0	2310
8	192nd Dr NE n/o Old Mill Point	1180	2700
9	192nd Dr NE n/o NE 51st St	2160	3540

^a using ITE rates for all developments other than the Timberline subdivisions

As shown in Table 3, the 2000 AWDT is exceeded at Stations 1, 6, 7, 8, and 9 with the connection, whereas, it is only exceeded at Stations 1 and 9 without the connection; see Attachment 2 and 3.

However, applying the local rates determined from the Timberline neighborhood, the resultant AWDT values are more favorable. Also shown in Table 4 are the AWDT estimates with widening of SR 202.

Table 4
AWDT at Selected Locations^a

Monitor Station	Location	without connection	with connection	w/connection & SR 202 widen'g
1	NE 37th Way w/o 206th Pl NE	3800	3230	3170
2	208th Ave NE n/o NE 37th Way	1580	1230	1280
3	206th Pl NE n/o NE 37th Way	800	690	560
4	NE 37th Way n/o 205th Pl NE	1170	1140	550
5	NE 39th St w/o 204th Ave NE	890	1880	1090
6	203rd Ave NE n/o NE 39th St	700	2020	1230
7	NE 42nd St w/o Chrysalis Estates	0	2190	1420
8	192nd Dr NE n/o Old Mill Point	900	2430	1700
9	192nd Dr NE n/o NE 51st St	1640	3110	2390

^a using local rates for all developments, as determined from the Timberline neighborhood.

As shown in Table 4, and similar to Table 3, the 2000 AWDT is exceeded at Stations 1, 6, 7, 8, and 9 with the connection, whereas, it is only exceeded at Station 1 without the connection; see Attachment 4 and 5.

With the WSDOT planned improvements on SR 202, specifically widening to 4-5 lanes from East Lake Sammamish Parkway to Sahalee Way, the AWDT estimates from Station 4 to 9 decrease approximately 600 to 800 vehicles.

Other Conditions

SR 202/Sahalee Way NE

Any improvements slated directly for this intersection will not address the larger problem which is deficient corridor capacity. The proposed eastbound right turn lane, currently complete through the design stage, is estimated to alleviate some delay during the PM peak hour.

SR 202 WSDOT Planned Improvements

Per WSDOT (Robert Josephson) improvements include widening of SR 202 to 4-5 lanes from East Lake Sammamish Parkway to Sahalee Way NE with an ad date of March 2001. The WSDOT has budgeted \$8.5 million for design and ROW acquisition and estimated \$27.5 million for construction. With approval of Referendum 49, the design and EIS process is back under way. The SR 202 project was on the project list submitted to the legislature when it was deliberating Referendum 49. This list will go back to the legislature for review prior to approving the sale of bonds so the project is not guaranteed, however, it is a high priority project for WSDOT and is believed to be the same with the legislature -- certainly the eastside delegation.

Neighborhood Route Friction

The model may overestimate traffic on the connector route as stream friction and other qualitative elements are not incorporated. The route would be challenging to the uninitiated as it is a very tortuous route. Furthermore, there will be numerous residential driveways entering the street; there will be multiple stop signs (two-way and all-way) and several low speed curves; there are steep grades along 192nd Dr NE and through Weber's Ridge, greater than 15%, and there will be school buses during the AM peak hour. All these conditions are likely to increase driver discomfort and route choice (actual stop sign delays are incorporated in model, however)

Seven Day ADT vs. AWDT

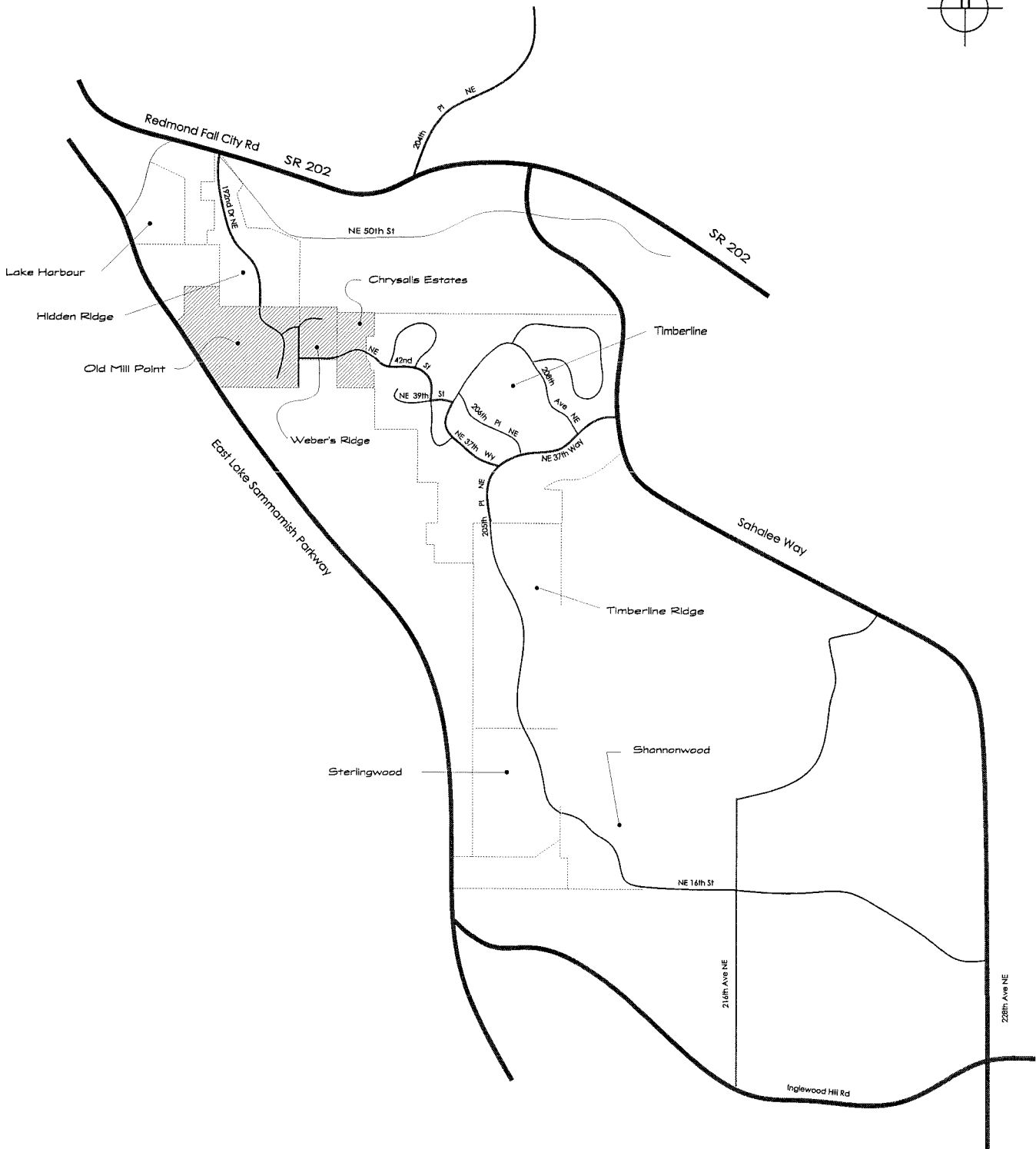
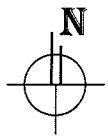
Condition 19c calls for an ADT (average daily traffic) condition. This implies an average condition over a seven day period, including Saturday and Sunday. The analysis and resultant daily numbers presented in this study represent an AWDT (average weekday daily traffic) condition. It should be noted that even though the Saturday and Sunday daily rates are similar to the weekday daily rate, it is expected that the level of congestion on the arterial route will be significantly less than the weekday AM or PM peak condition, and thus, the arterial route would be the preferred route at all times on Saturdays and Sundays. Based on this, it is estimated that the ADT at the selected locations will be less than the AWDT numbers; in general, approximately 10% less.

Summary of Findings and Conclusions

1. Extending the analysis horizon year from 1999 to 2003 brings significant additional plateau pipeline development proposals which create a substantial increase in projected delay on the external arterial system (in the absence of SR202 widening).
2. In the absence of the WSDOT planned SR 202 widening, traffic volumes on portions of the connector route will probably exceed 2000 ADT with full development of Old Mill Point, Weber's Ridge, Chrysalis Estates, Timberline Ridge and Sterlingwood.
3. Interim improvements of the SR 202/Sahalee Way intersection will do little to alleviate the projected extended AM peak hour delay scenario on SR 202 as westbound downstream delays on SR 202 currently cause queues to extend through the subject intersection in the AM peak hour.
4. With the passage of Referendum 49 the SR 202 widening by WSDOT is likely to occur. Plans are currently scheduled for an Ad date of March 2001. The project could theoretically be in place by the 2003 horizon year used in this analysis.

Possible Alternative Courses of Action

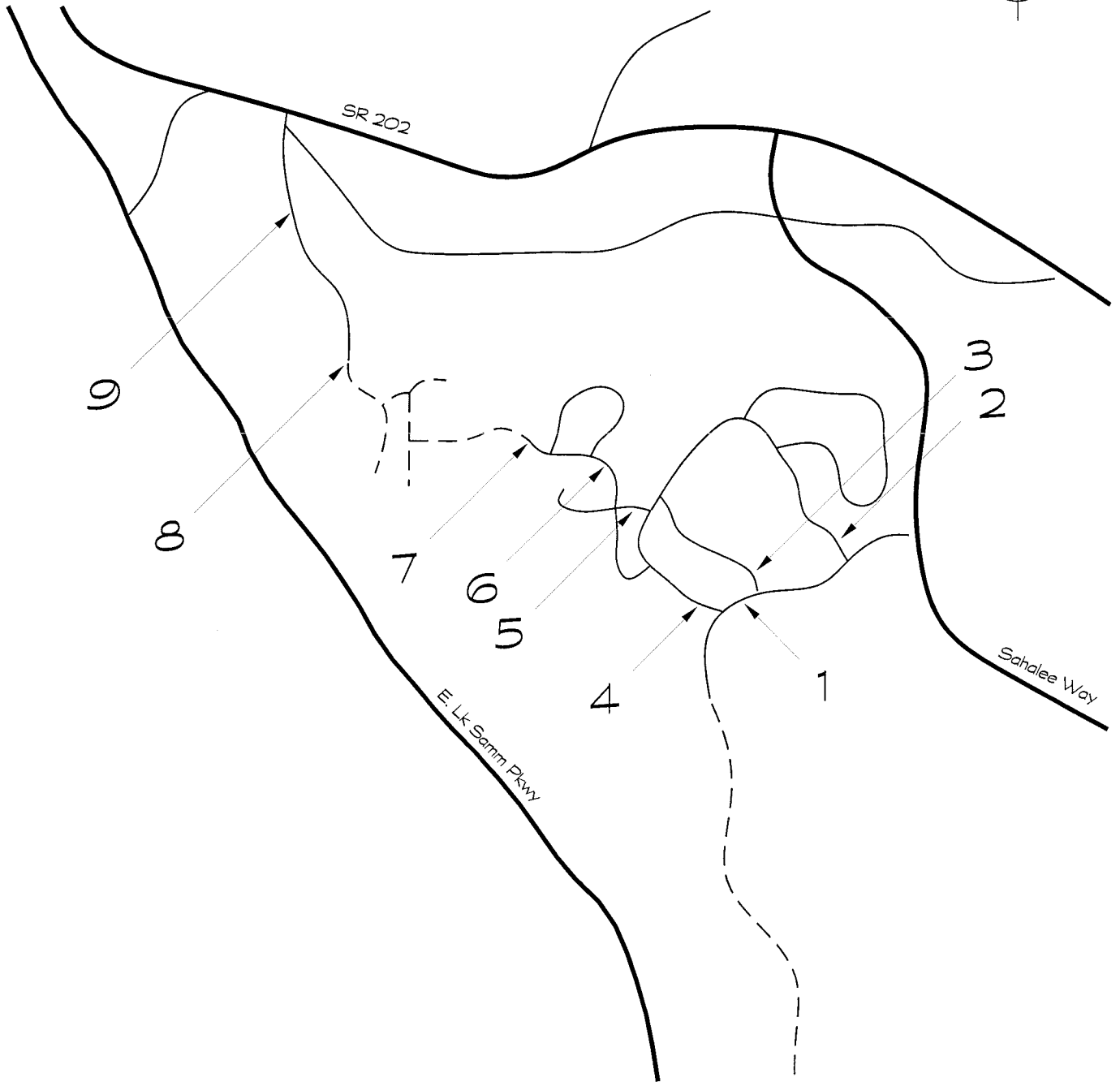
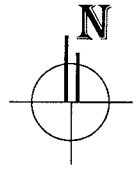
1. Continue with Old Mill Point design approvals while awaiting the outcome of funding and scheduling commitments for the SR 202 widening. The status should be known by early spring at the latest. A go ahead status would preclude the conditioned bonding for interim improvements at the SR 202/Sahalee Way intersection.
2. If SR 202 improvements appear to be delayed past 2003, the developer could contribute (or bond) a proportionate share of the currently planned eastbound right turn lane improvement at the SR 202/Sahalee Way intersection. This project is estimated to provide delay reduction in the PM peak hour. The contribution would be appropriately credited to the \$221,000 in SR 202 improvements included in the plat conditions.
3. If after implementation of the internal traffic control plan the counts exceed 2000 ADT, signage could be installed at the Hidden Ridge entrance from SR 202 and at the Chrysalis Estates border with Timberline prohibiting cut-through traffic. This action may require periodic enforcement and/or message board displays using vehicle identification observations. A bond amount could be established to cover this eventuality for a specified period of time.



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Nighborhood Locations

Old Mill Point
Diversion Analysis



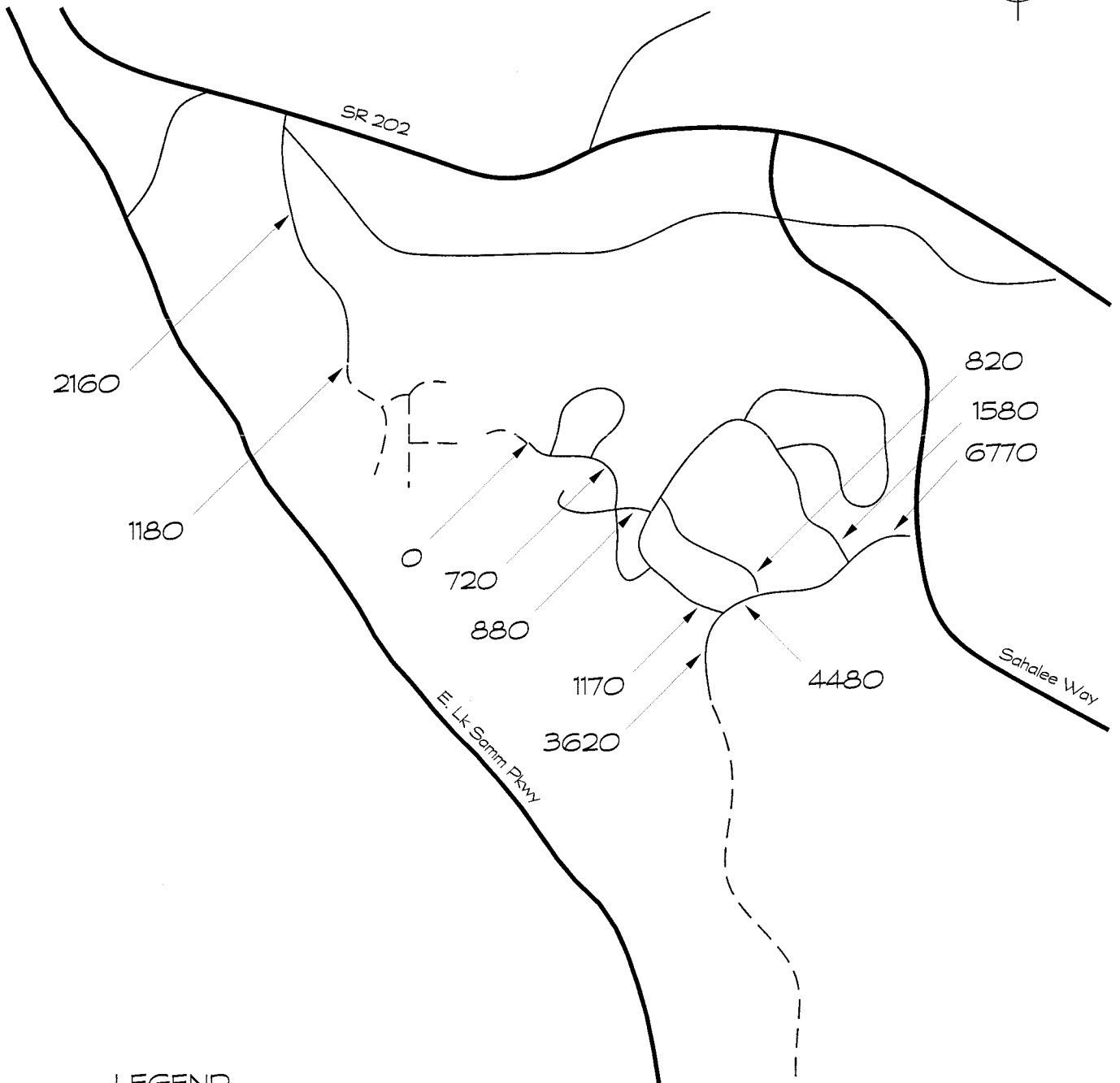
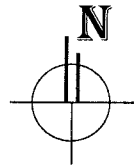
xx - Location for required traffic counts for measurement of annual peak hours and ADT for five years

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Monitor Stations

Old Mill Point
Diversion Analysis

Attachment 1B



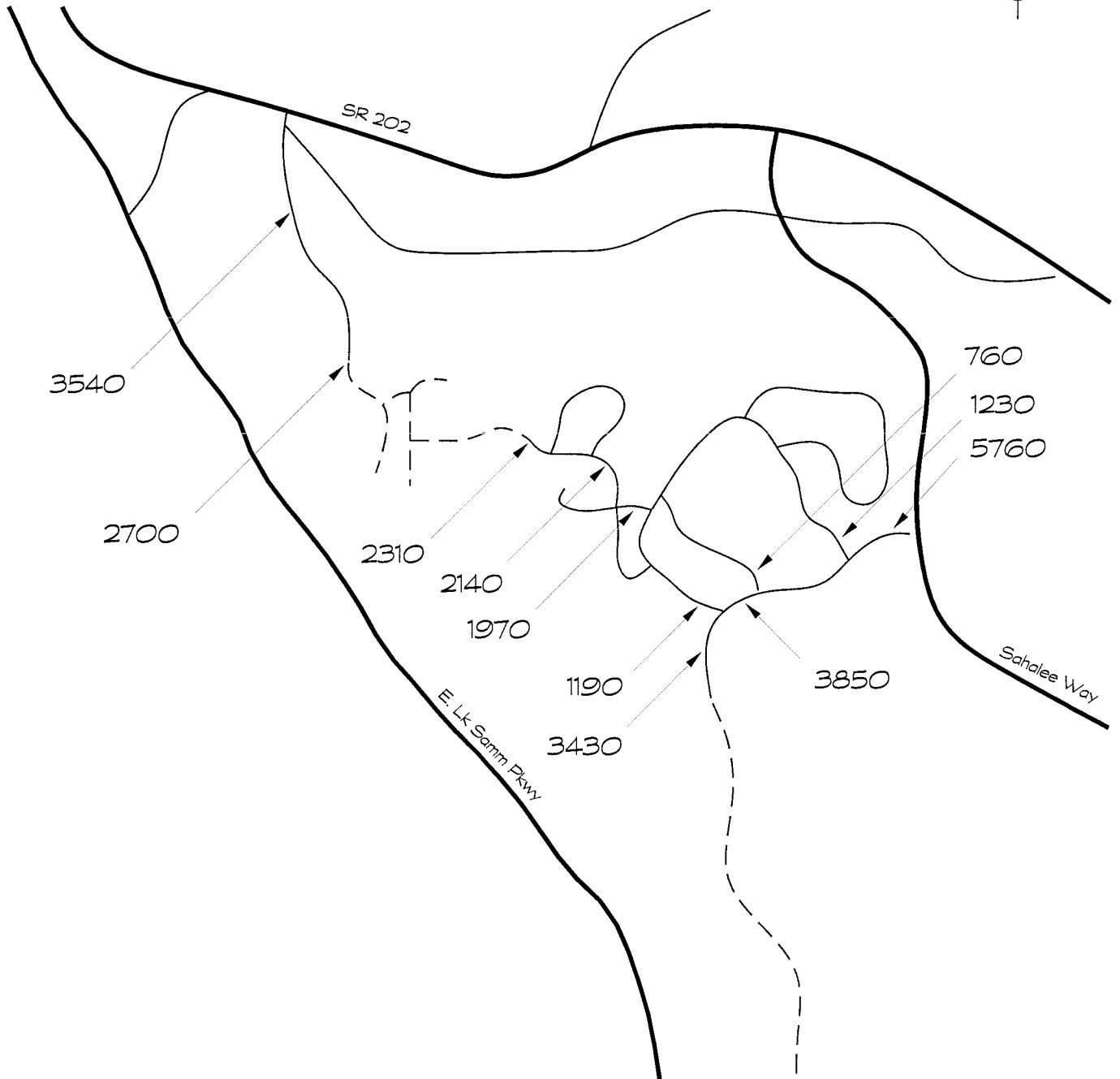
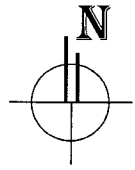
LEGEND

xxx - 2003 AWDT
without connection between Chrysalis Estates and Timberline Park
(using ITE rates for all developments except for Timberline (where local rates were used))

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**AWDT w/o Connection
without SR 202 widening**

**Old Mill Point
Diversion Analysis**



LEGEND

xxx - 2003 AWDT

with connection between Chrysalis Estates and Timberline Park

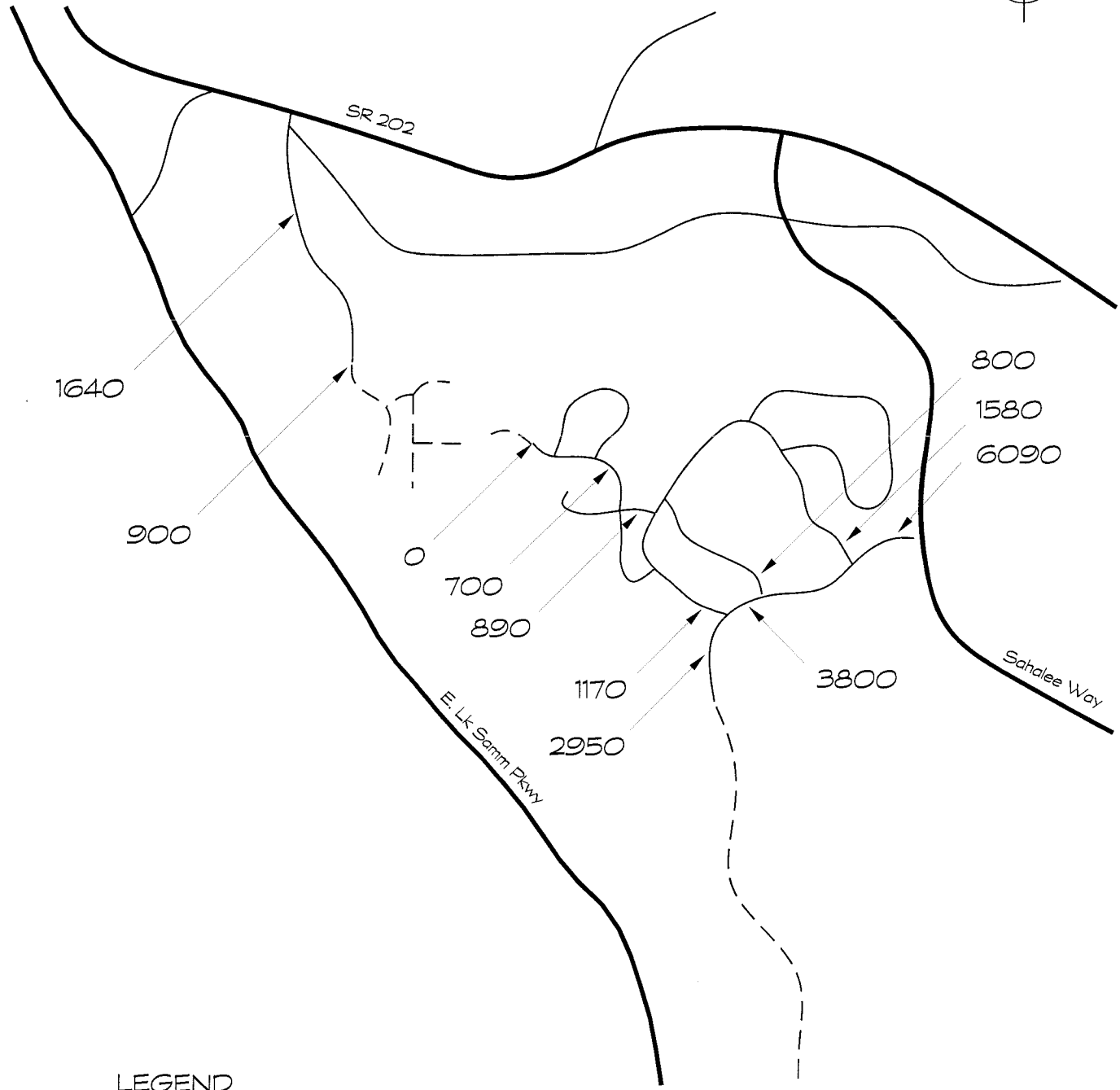
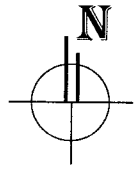
(using ITE rates for all developments except for Timberline (where local rates were used))

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**AWDT w/Connection
without SR 202 widening**

Attachment 3

**Old Mill Point
Diversion Analysis**



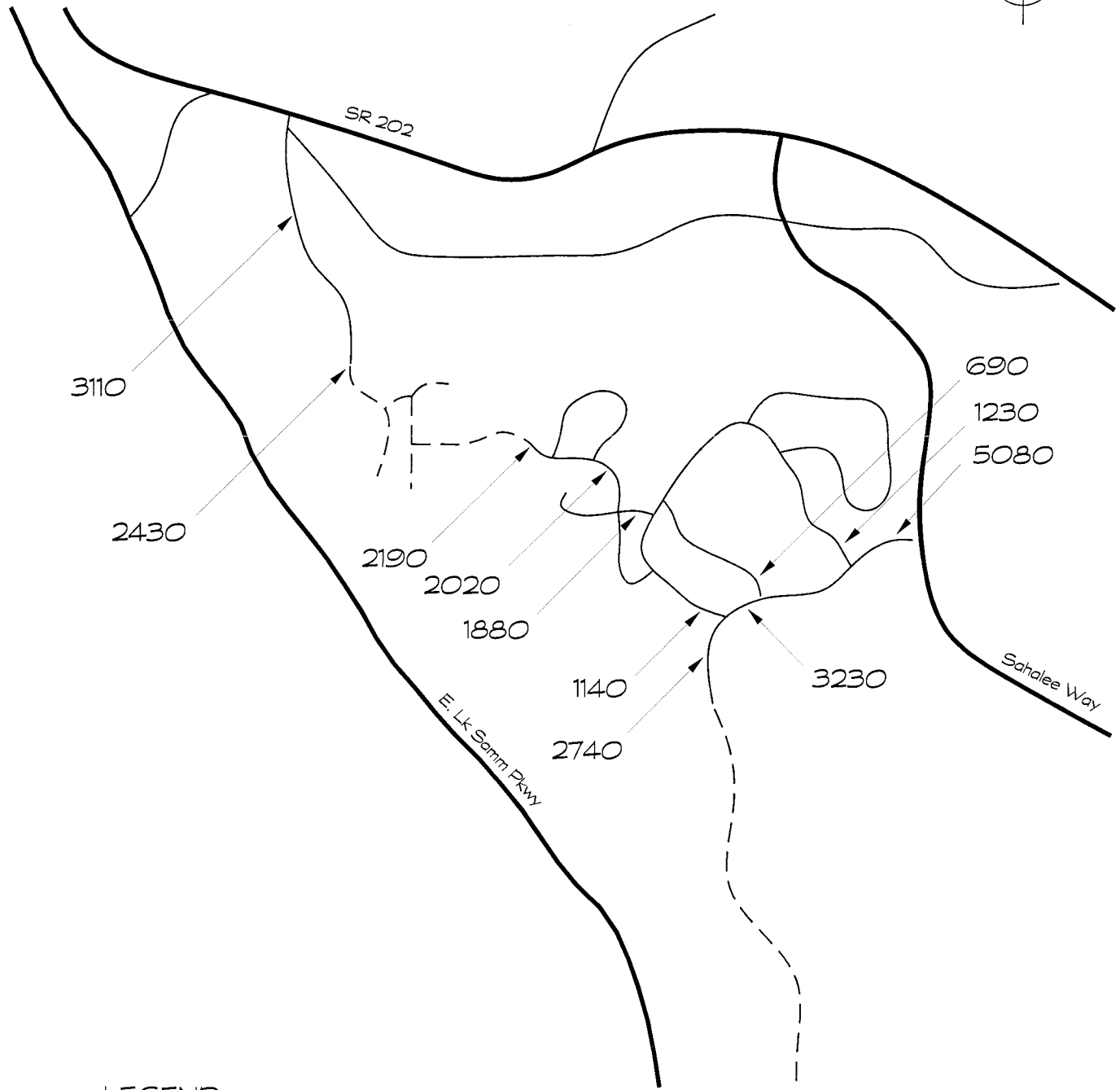
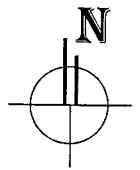
LEGEND

xxx - 2003 AWDT
without connection between Chrysalis Estates and Timberline Park
using local trip generation rates for all developments

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**AWDT w/o Connection
without SR 202 widening**

Old Mill Point
Diversion Analysis



LEGEND

xxx - 2003 AWDT
with connection between Chrysalis Estates and Timberline Park
using local trip generation rates for all developments

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**AWDT w/Connection
without SR 202 widening**

**Old Mill Point
Diversion Analysis**

TECHNICAL APPENDIX

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