TRAFFIC IMPACT STUDY REPORT
George Butler Associates, Inc.
July 27, 2001

Project: Proposed Eagle Creek Development

Location: The proposed 275-acre development tract is located along the west side of Pryor Road approximately 3/4 mile south of Scherer Road, in Lee's Summit, Missouri.

Description: The purpose of this traffic study is to determine if additional improvements are necessary due to the expansion of the Eagle Creek Development compared to the original TranSystems traffic study dated September, 1997. The original traffic study looked at Pryor Road from Scherer Road to Missouri Route 150. At the request of City staff, the traffic study was expanded to include Pryor Road from Longview Road to Scherer Road and Longview Road at Sampson Road

EXISTING CONDITIONS

Existing Land Use: Currently, 62 single-family units of the approved 480 dwellings units for the Eagle Creek subdivision are occupied. The land for the additional 160 acres is currently is vacant - agriculture land.

Existing Street System: Pryor Road currently is mostly a two-lane rural roadway from Longview Road to Missouri Route150. The pavement between Longview Road and Scherer Road currently is about 16 feet wide with no shoulders and includes a narrow culvert crossing that is 13 feet wide. Pryor Road south of Scherer Road is 20 feet wide except for the frontage of the Eagle Creek property which has been improved to provide 12 foot lanes with exclusive turn lanes into the site.

Existing Traffic Volumes: ***Figures 1 and 2*** summarize the existing A.M. and P.M. commuter peak hour traffic volumes that were recorded on July 17 and 18, 2001. ***Figures 3 and 4*** summarize the existing levels of service and lane configurations.

Existing Traffic Controls: Currently, the intersection of Longview Road and Pryor Road has stop sign control on Pryor Road. The intersection of Pryor Road and Scherer Road currently operates as an All-way stop sign controlled intersection. The intersection of Pryor Road and Hook Road is also currently an All-way stop sign controlled intersection.

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9/11

PROPOSED CONDITIONS

Proposed Land Use: The proposed Eagle Creek Development is planned as a residential development with 744 single family homes and 400 Townhome/Patio Homes. 480 of the single family units have already been approved, of which 62 of the homes have been completed at the time of the traffic count. Two access intersections exist today with a southbound exclusive right-turn lane on Pryor Road at the north drive and an exclusive northbound left-turn lane on Pryor Road at the south drive. A third access road is planned to be about 930 feet north of the existing north Eagle Creek Entrance.

Trip Generation: The proposed traffic that would be expected to be generated from the proposed Eagle Creek Development is detailed in the attached ***Table 1.*** The expected site-generated traffic was based on the proposed land uses on the site plan dated June 29, 2001. The table summarizes the site-generated traffic that would be generated for the Approved Eagle Creek Development, 480 single-family homes as reported in the original traffic study; Expanded Eagle Creek which includes additional homes and the townhomes; and the expected partial development of Eagle Creek within the five-year period based on the dates of completion listed on the site plans.

Traffic Assignment: The proposed site traffic from ***Table 1*** was assigned to the existing street system using the following trip distributions.

To/From the North on Pryor Road	**35%**
To/From the South on Pryor Road	**15%**
To/From the East on Longview Road	**5%**
To/From the West on Longview Road	**10%**
To/From the East on Scherer Road	**10%**
To/From the West on Scherer Road	**10%**
To/From the East on Hook Road	**10%**
To/From the West on Hook Road	**5%**

Five-Year Traffic Volumes: Five-Year projected background traffic volumes were provided by City staff. These Five-Year background traffic volumes include full development and operation of the Summit Woods Crossing Shopping Center located at I-470 and Highway 50, the Stoney Creek Residential Development located south of Missouri Route 150, the Monarch View Residential Development located west of Pryor Road on Hook Road, the Pryor Meadows Residential Development located south of Hook Road on Pryor Road, and the developments located along Longview Road (Bridlewood Residential Development, Winterset Park Residential Development, Winterset Garden Residential Development, Glen at Meadows of Winterset Residential Development, and the Meadows of Winterset Residential Development). The city staff assumed that all of the above mentioned developments would be fully developed within the five-year time frame.

Based on the developers absorption rate for Eagle Creek, the development will not be completed within the five-year period that City has indicated. This can also be said for other developments located within the area such as Monarch View and Pryor Meadows.

ANALYSES

The traffic operations during the design peak hours were evaluated by computing the respective service capacities, amounts of vehicle delay, Levels of Service (LOS), and vehicle stacking requirements for each vehicular movement at the following intersections.

1. **Longview Road and Sampson Road**
2. **Longview Road and Pryor Road**
3. **Pryor Road and Scherer Road**
4. **Pryor Road and the North Eagle Creek Entrance**
5. **Pryor Road and the Middle Eagle Creek Entrance**
6. **Pryor Road and the South Eagle Creek Entrance**
7. **Pryor Road and Hook Road**

The analyses were based on three traffic volumes scenarios. **Traffic Volume Scenario 1** consists of the City's five-year background traffic volumes, supplied by the City, as described previously, with the addition of the currently approved 480 single-family units for the Eagle Creek Development, as detailed in the original traffic study dated September, 1997. Both A.M. and P.M. peak periods were developed and are summarized in ***Figures 5 and 6***.

Traffic Volume Scenario 2 consists of the projected five-year background traffic volumes, as described above, with the addition of the traffic from the expanded Eagle Creek Development as if it were fully developed within the five-year period. **Scenario 1** volumes were estimated for both A.M. and P.M. peak periods and are shown in ***Figures 9 and 10***.

It should be noted that the five-year design traffic volumes on Pryor Road based on data provided by the City exceed 50 percent of the twenty-year projection from the cities traffic model. Based on the existing traffic volumes, as shown in ***Figures 1 and 2,*** the traffic volumes on Pryor Road have been growing at a significantly lower rate than what was expected in the original traffic study. Therefore, the City's five-year background traffic volumes are unrealistic.

Traffic Volume Scenario 3 consists once again of the City's five-year background traffic volumes and the addition of traffic from the Eagle Creek Development that is anticipated to be completed within the five-year period based on realistic development absorption rates. The expected development rate for Eagle Creek is shown on the submitted site plan and is estimated by the developer to average 85 new residential units per year. Field investigations show that this planned rate is 3 times larger than the development history of the area. Over the past 2 years, the Eagle Creek Development has only constructed 62 new homes. Similarly, Monarch View has built only 52 new homes, while Pryor Meadows has only 5 homes occupied. Please note that the Eagle Creek traffic projections requested by the City for this report, as detailed in **Scenarios 1** and **2,** would require the construction of new residences within Eagle Creek at a rate of almost 230 units per year, or at a rate almost 3 times faster than the developer is expecting or planning to construct. The expected traffic volumes for **Scenario 3** on area streets during the A.M. and P.M. peak periods are shown in ***Figures 13 and 14***.

The quality of traffic flow, or Level of Service (LOS), is rated from Level A to Level F as described in ***Exhibit A***. LOS "A" represents the best condition, when little or no vehicle delay occurs. LOS "F" represents the worst condition when traffic demand exceeds capacity and resulting vehicle queuing interferes with the operation of other traffic movements at or adjacent to the intersection. Acceptable design levels of service are generally either LOS "C" or LOS "D."

Figures 7, 8, 11, 12, 15, and 16 detail the recommended lane arrangements and summarizes the level of service for each movement and overall intersection for their respective traffic volume scenarios.

Study Intersection #1 - Longview Road and Sampson

Intersection capacity analyses were performed at the intersection of Longview Road and Sampson to determine the expected levels of service for the intersection with existing traffic control and approach lane configuration. Based on the capacity analyses, the northbound and southbound approaches would be expected to operate with a Level of Service "B" or better under all traffic volume scenarios.

Study Intersection #2 - Longview Road and Pryor Road

Intersection capacity analyses were performed at the intersection of Longview Road and Pryor Road to determine the expected levels of service for the intersection with various traffic control and approach lane configuration assumptions.

Scenario 1... Based on the unsignalized intersection capacity analyses, the overall intersection would be expected to operate with a Level of Service "C"and "E" during the A.M. and P.M. peak periods as shown in ***Figures 7 and 8***. These levels of service occur even with the addition of separate left turn lanes on both Pryor Road approaches to the intersection.

Due to the poor level of service for the overall intersection during the afternoon peak period, signal warrant analyses were conducted on the projected Five-Year traffic volumes with the addition of the approved site-generated traffic to determine if a traffic signal is warranted. The analyses revealed that the Peak Hour Warrant (Warrant 11) would be expected to be met by the Year 2006. The signalized intersection capacity analyses revealed that the overall intersection would be expected to operate with a Level of Service "B" and "C" during the A.M. and P.M. peak periods, respectively.

Scenario 2... Based on the unsignalized intersection capacity analyses, the overall intersection would be expected to operate with a Level of Service "C"and "F" during the A.M. and P.M. peak periods as shown in ***Figures 11 and 12***. Again, separate northbound and southbound left turn lanes on Pryor Road were again found to be required.

Due to the poor level of service for the overall intersection, signal warrant analyses were conducted on the projected Five-Year traffic volumes with the addition of the full Eagle Creek development

traffic to determine if a traffic signal is warranted. The analyses revealed that the Peak Hour Warrant (Warrant 11) would be expected to be met by the Year 2006. The signalized intersection capacity analyses revealed that the overall intersection would be expected to operate with a Level of Service "B" and "C" during the A.M. and P.M. peak periods, respectively.

Scenario 3... Based on the unsignalized intersection capacity analyses, the overall intersection would be expected to operate with a Level of Service "B"and "D" during the A.M. and P.M. peak periods, respectively, as depicted in ***Figures 15 and 16***. Under unsignalized operations, all approaches to the Pryor Road and Longview road intersection would require separate left turn lanes to adequately handle the projected traffic volumes.

Study Intersection #3 - Pryor Road and Scherer Road

Intersection capacity analyses were performed at the intersection of Pryor Road and Scherer Road to determine the expected levels of service for the intersection and approach lane configuration assumptions. The intersection currently operates with all-way stop sign control. With the connection of Pryor Road to the north to I-470, the traffic patterns would be expected to shift and make Pryor Road the major through roadway. Therefore, the intersection was analyzed with two-way stop signed control on Scherer Road for all future conditions.

Scenario 1... Based on the unsignalized intersection capacity analyses, the eastbound and westbound approaches on Scherer Road would be expected to operate with a Level of Service "C" during the A.M. peak period. During the P.M. peak period the eastbound and westbound approaches would be expected to operate with a Level of Service "D" and "E," respectively, with single lane approaches. The northbound and southbound approaches would require the addition of exclusive left-turn lanes due to the increase in the background traffic on Pryor Road. Signal warrant review of this intersection under **Scenario 1** volumes show that signal warrants are not expected to be met.

Scenario 2... Based on the unsignalized intersection capacity analyses, the eastbound and westbound approaches on Scherer Road would be expected to operate with a Level of Service "C" and "D" during the A.M. peak period, respectively. During the P.M. peak period the eastbound and westbound approaches would be expected to operate with a Level of Service "E" and "F" with single lane approaches. Again, signal warrant review determined that signal warrant cannot be expected to be met at this location under the assumed design traffic volumes. It should be noted that poor levels of service for side streets are not out of the ordinary due to the high volumes on the major road during peak hours. The northbound and southbound approaches would be expected to need exclusive left-turn lanes due to the increase in the background traffic on Pryor Road.

Scenario 3... Based on the unsignalized intersection capacity analyses, the eastbound and westbound approaches on Scherer Road would be expected to operate with a Level of Service "B" and "C" during the A.M. peak period, respectively. Again, no signal warrant is expected at this location. During the P.M. peak period the eastbound and westbound approaches would be expected to operate with a Level of Service "C" and "D," respectively, with single lane approaches. The northbound and southbound

approaches would still expected to need exclusive left-turn lanes to adequately serve the traffic volumes, primarily due to the large volume of background traffic on Pryor Road.

Study Intersection #4 - Pryor Road and North Eagle Creek Entrance

Intersection capacity analyses were performed at the proposed intersection of Pryor Road and North Eagle Creek Entrance to determine the expected levels of service for this intersection. The intersection was analyzed as a two-way stop sign control with an exclusive southbound right-turn lane and an exclusive left-turn lane. Based on national and local criteria, an exclusive southbound right-turn lane and an exclusive left-turn lane would be warranted by the time the development is completed. The intersection was analyzed with the proposed lane arrangements. Based on the unsignalized intersection capacity analyses, all of the turn movements operate with a Level of Service "C" or better under all traffic volume scenarios.

Study Intersection #5 - Pryor Road and Middle Eagle Creek Entrance

The existing intersection of Pryor Road and Middle Eagle Creek Entrance currently operates with stop sign control for the side street and has an exclusive southbound right-turn lane. Intersection capacity analyses were performed to determine the expected levels of service for the intersection. Based on the unsignalized intersection capacity analyses, all of the turn movements operate with a Level of Service "C" or better under all traffic volume scenarios.

Study Intersection #6 - Pryor Road and South Eagle Creek Entrance

The existing intersection of Pryor Road and South Eagle Creek Entrance currently operates with stop sign control for the side street and has an exclusive northbound left-turn lane. Intersection capacity analyses were performed to determine the expected levels of service for the intersection. Based on the unsignalized intersection capacity analyses, all of the turn movements operate with a Level of Service "C" or better under all traffic volume scenarios.

Study Intersection #7 - Pryor Road and Hook Road

The existing intersection of Pryor Road and Hook Road currently operates with all-way stop sign control. Intersection capacity analyses were performed to determine the expected levels of service for the intersection. Based on the unsignalized intersection capacity analyses, the overall intersection would be expected to operate with a Level of Service "B" or better under all traffic volume scenarios.

SUMMARY / RECOMMENDATIONS

Based on the capacity analyses, the new intersection of North Eagle Creek Entrance with Pryor Road should be constructed to have an exclusive southbound right-turn lane and a separate northbound left-turn lane based on national and local criteria that determine when such improvements should be considered.

The existing Eagle Creek Entrances would not be expected to require any additional improvements beyond the ones that were completed at the beginning of the development.

The improvements determined at the remainder of the study intersections detailed in this report are not a result of the traffic volumes associated with the additional 160 acres of development to Eagle Creek. **These needed improvements are due to the connection of Pryor Road to the north from Longview Road to I-470, which causes a significant increase in the background traffic volumes on Pryor Road.**

At the intersection of Longview Road with Pryor Road, capacity analyses of the **Scenarios 1 and 2** traffic volumes indicate that a traffic signal would be expected to be warranted along with the addition of exclusive northbound and southbound left-turn lanes by the Year 2006, due to the increase in background traffic volumes caused by the Pryor Road extension as projected by the City. Under **Scenario 3** traffic conditions (i.e. expected volumes from Eagle Creek development), the intersection of Pryor Road and Longview Road can be expected to be maintained as an all-way stop controlled intersection with the only the addition of separate left turn lane on all approaches.

Similarly, the intersection of Pryor Road and Scherer Road should be changed to two-way stop sign control on Scherer Road based on the City's traffic projections. The traffic volumes at the intersection become significantly unbalanced with the majority of traffic being on Pryor Road due to the increase in background through traffic. Due to this imbalance, all-way stop sign control can no longer be warranted and can not be considered as the best traffic control option available. Warrant analyses conducted determined that no signal warrants for this intersection would be expected to be met. Based on the results of the capacity analyses, the westbound approach would be expected to operate with a Level of Service "E" and "F" under **Scenario 1** and **2** conditions, respectively, during the P.M. peak period. The eastbound approach would be expected to operate with a Level of Service "D" and "E" under **Scenario 1** and **2**, respectively, during the P.M. peak period. The poor level of service can be attributed to the increase in the background traffic volume on Pryor Road due to the connection to the north and is not a result to the expansion of the Eagle Creek Development.

While it is agreed that a significant increase in the background traffic volumes can be expected due to the connection of Pryor Road to I-470 and area-wide development, the timing of this connection and the rate of the area development assumed for this study is debatable. The portion of Pryor Road between Longview Road and Scherer Road should be improved to meet current design standards prior to completing the Pryor Road connection to the north from Longview Road to I-470. **Again, these improvements are not required due to increase in size of the Eagle Creek Development, but are primarily due to the expected change in traffic patterns with the new connection of Pryor Road to I-470.**

Please fell free to contact us if you have any questions or need any additional information.

Respectfully submitted,

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EXHIBIT A

Level of Service Definitions

Level of service criteria are outlined in the 2000 edition of the *"Highway Capacity Manual"* (HCM) for both signalized and unsignalized intersections. The HCM defines the level of service as a measure of the quality of traffic flow. There are six different levels of service for each facility type, each representing a range of operating conditions. Each level of service is designated by a letter from "A" to "F," with "A" being the most desirable condition and "F" being the least desirable condition. The level of service criteria, as reported by the 2000 HCM, for both signalized and unsignalized intersections, are listed below:

Unsignalized Intersections		**Signalized Intersections**	
Level of Service	**Average Total Delay (sec/veh)**	**Level of Service**	**Stopped Delay per Vehicle (sec)**
A	≤ 10	A	≤ 10
B	> 10 and ≤ 15	B	> 10 and ≤ 20
C	> 15 and ≤ 25	C	> 20 and ≤ 35
D	> 25 and ≤ 35	D	> 35 and ≤ 55
E	> 35 and ≤ 50	E	> 55 and ≤ 80
F	> 50	F	> 80

Table 1

Approved Eagle Creek Development (Scenario 1)

LAND USE	FLOOR AREA Sq. Ft.	MISC. Quantity	MISC. Unit	ADT (VPD)	A.M. PEAK HOUR (VPH) IN	A.M. PEAK HOUR (VPH) OUT	P.M. PEAK HOUR (VPH) IN	P.M. PEAK HOUR (VPH) OUT	Comments
Single Family Dwelling Unit		480	Home	4,389	86	259	282	159	Single Family Homes
				4,389	**86**	**259**	**282**	**159**	

Expanded Eagle Creek Development (Scenario 2)

LAND USE	FLOOR AREA Sq. Ft.	MISC. Quantity	MISC. Unit	ADT (VPD)	A.M. PEAK HOUR (VPH) IN	A.M. PEAK HOUR (VPH) OUT	P.M. PEAK HOUR (VPH) IN	P.M. PEAK HOUR (VPH) OUT	Comments
Single Family Dwelling Unit		744	Home	6,569	133	398	419	236	Single Family Homes
Condominium / Townhouses		400	Unit	2,115	26	127	129	64	Townhomes
				8,684	**159**	**525**	**548**	**300**	

Expected Five-Year Eagle Creek Development (Scenario 3)

LAND USE	FLOOR AREA Sq. Ft.	MISC. Quantity	MISC. Unit	ADT (VPD)	A.M. PEAK HOUR (VPH) IN	A.M. PEAK HOUR (VPH) OUT	P.M. PEAK HOUR (VPH) IN	P.M. PEAK HOUR (VPH) OUT	Comments
Single Family Dwelling Unit		277	Home	2,647	51	153	172	97	Single Family Homes
Condominium / Townhouses		180	Unit	1,073	14	68	67	33	Townhomes
				3,720	**65**	**221**	**239**	**130**	

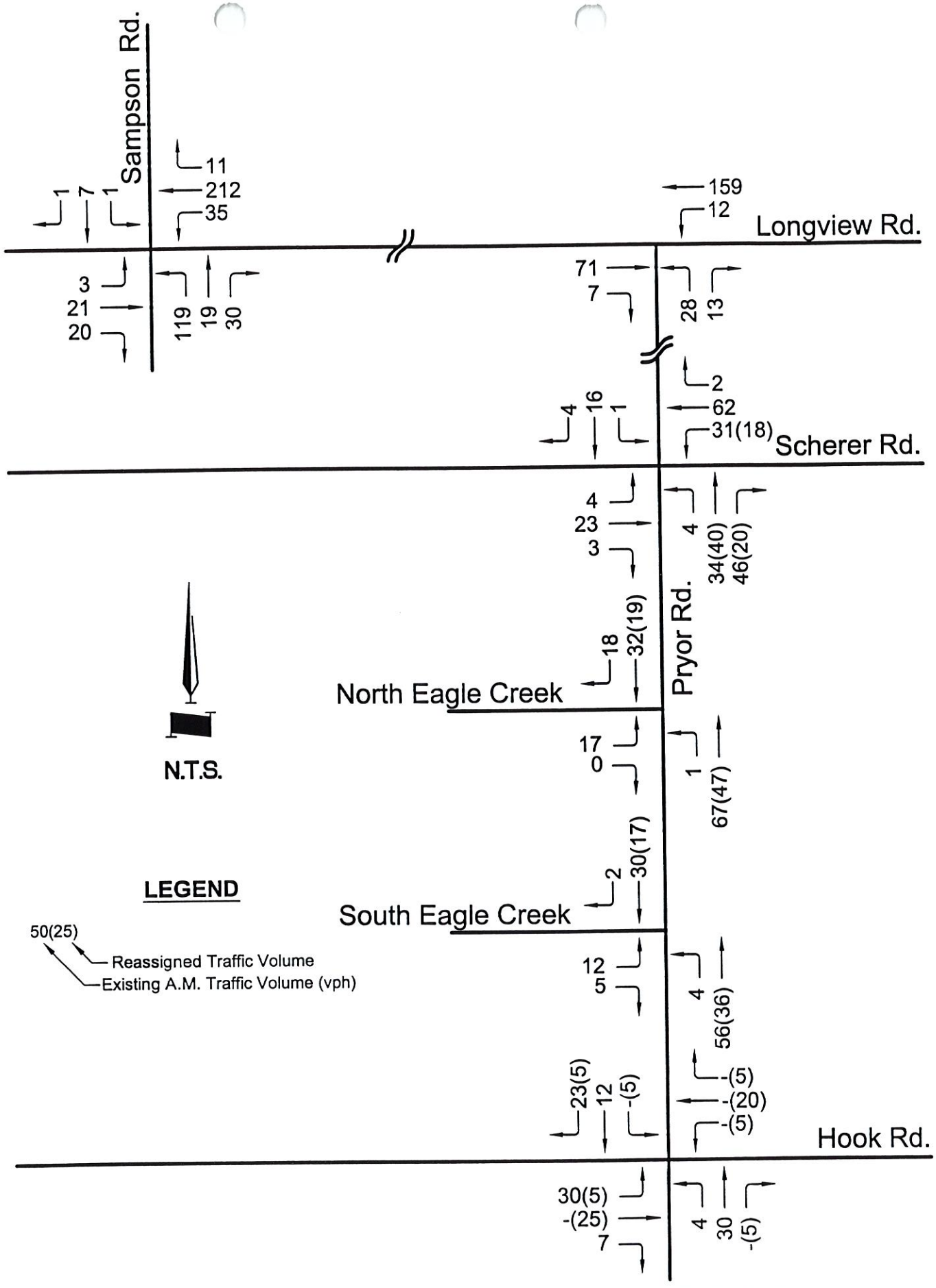

FIGURE 1
Existing Volumes
AM Peak Hour (7:00-8:00)

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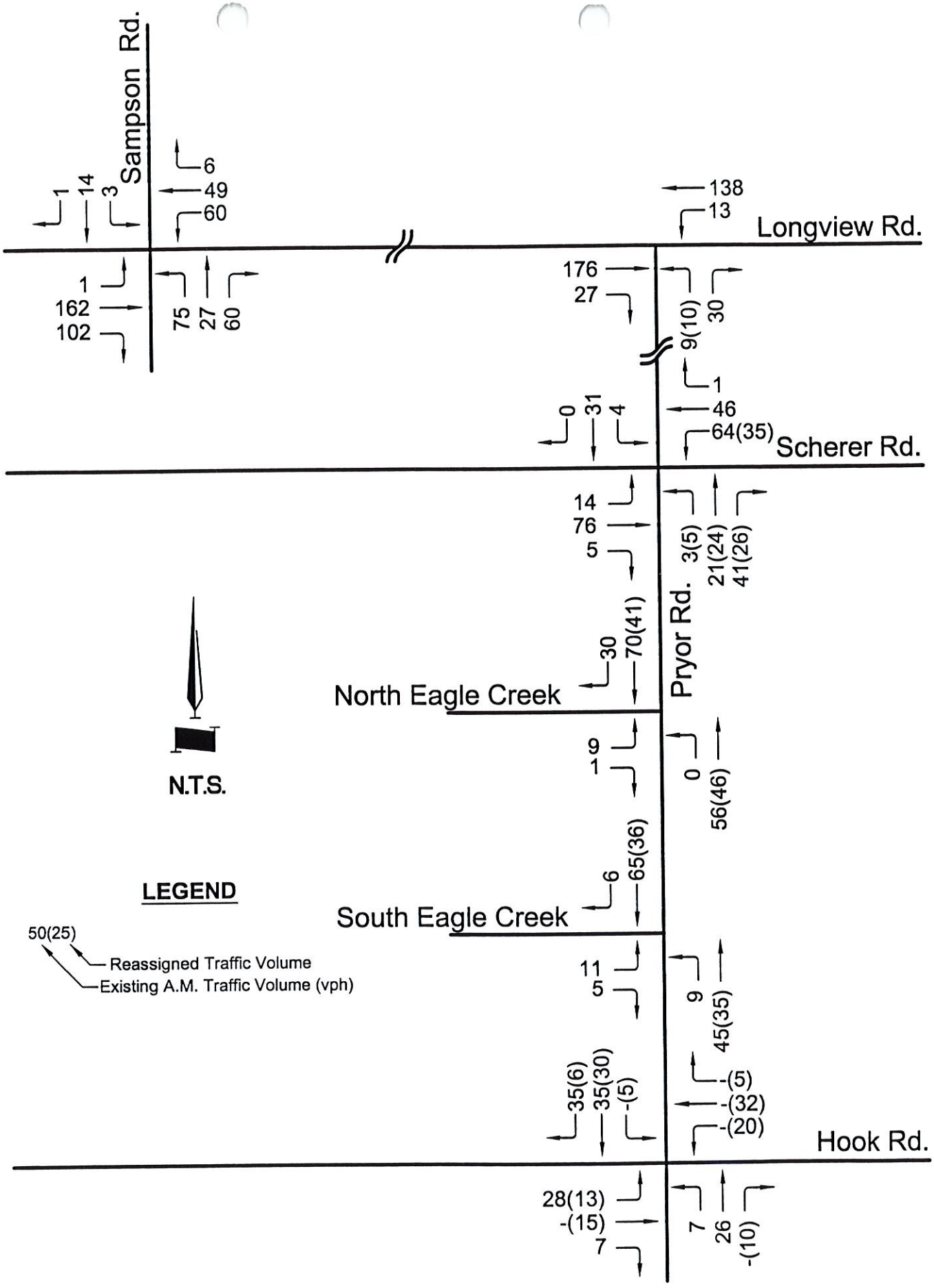

FIGURE 2
Existing Volumes
PM Peak Hour (4:45-5:45)

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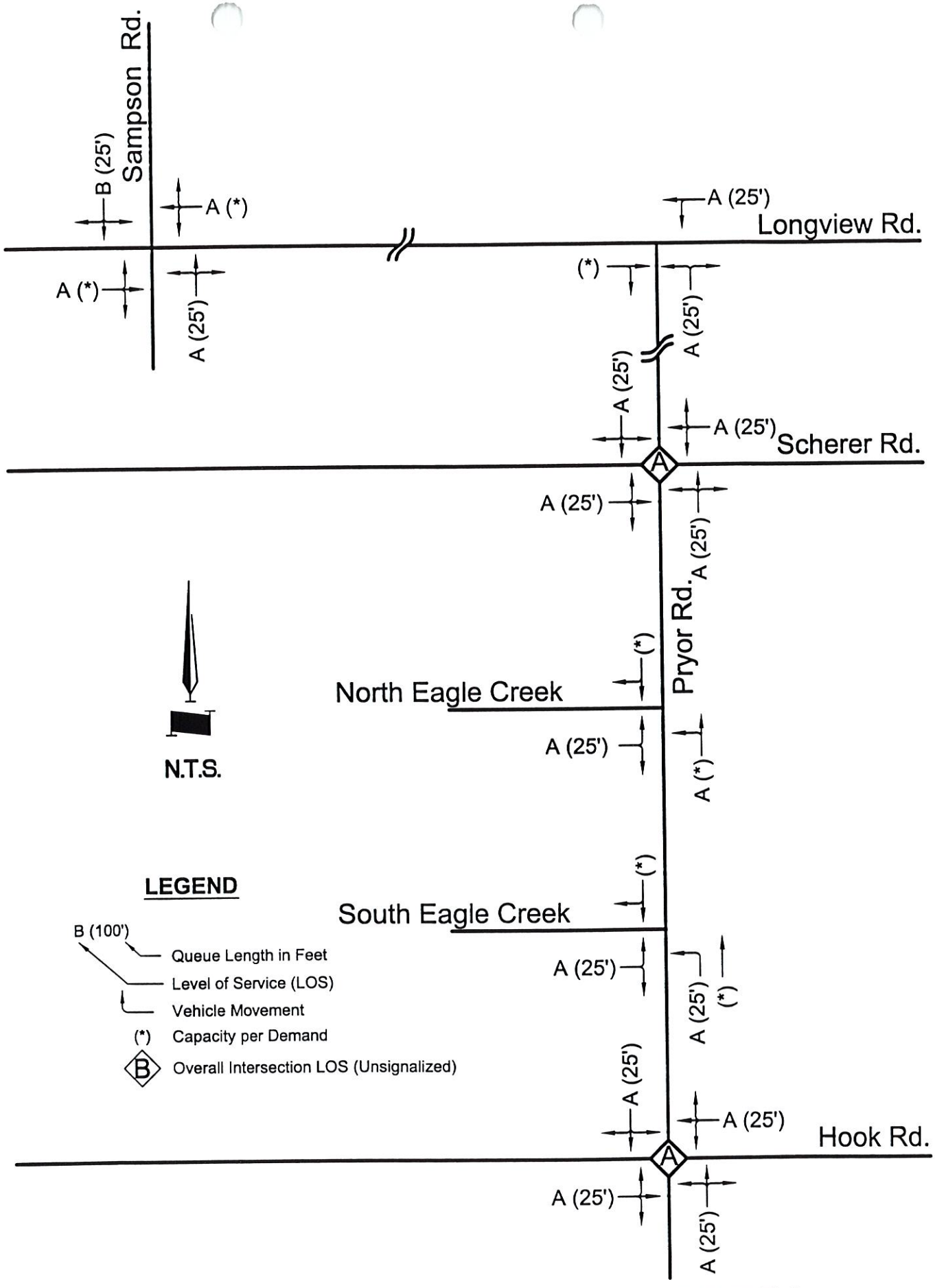

FIGURE 3
Existing Level of Service
AM Peak Hour (7:00-8:00)

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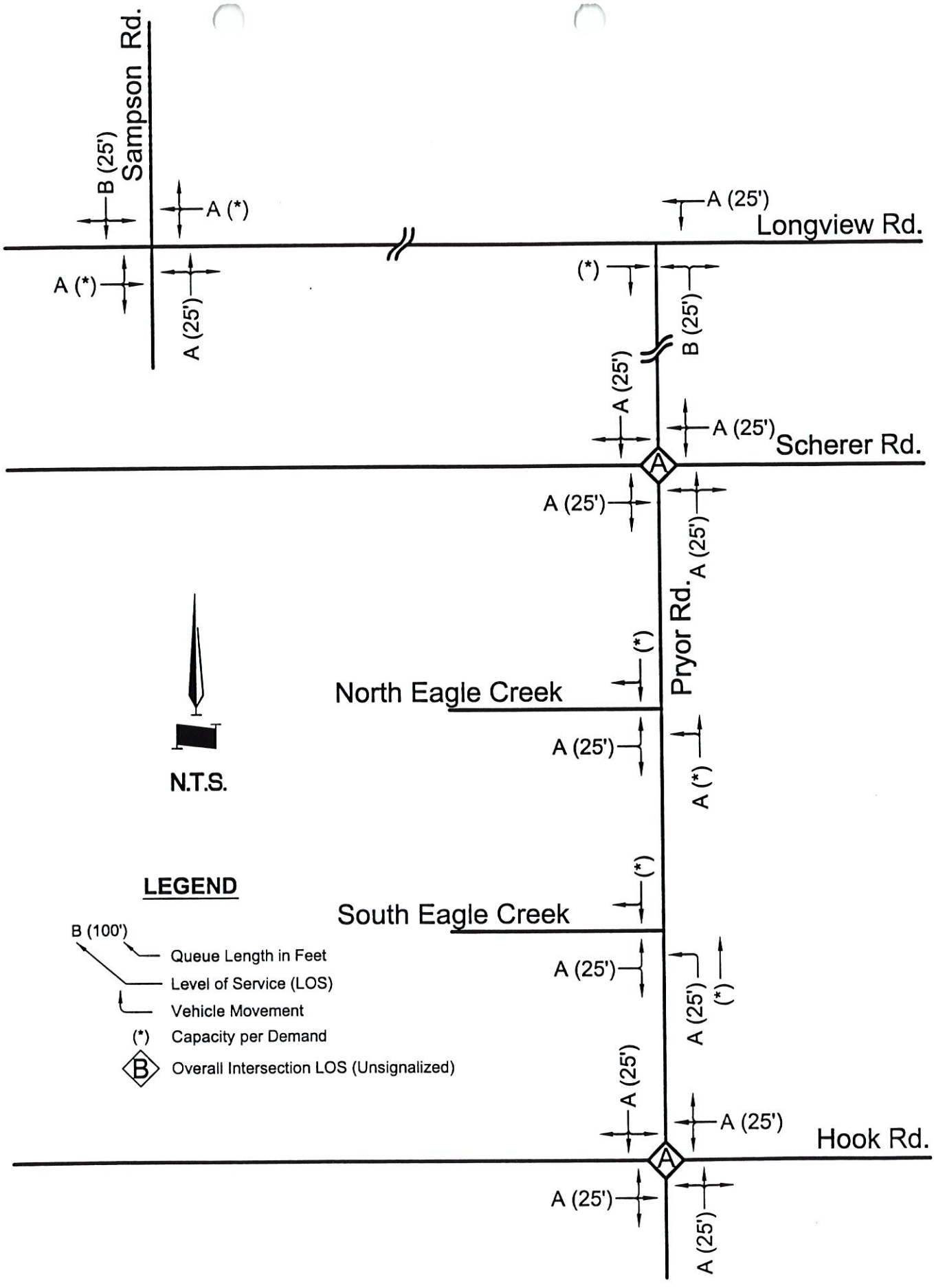

FIGURE 4
Existing Level of Service
PM Peak Hour (4:45-5:45)

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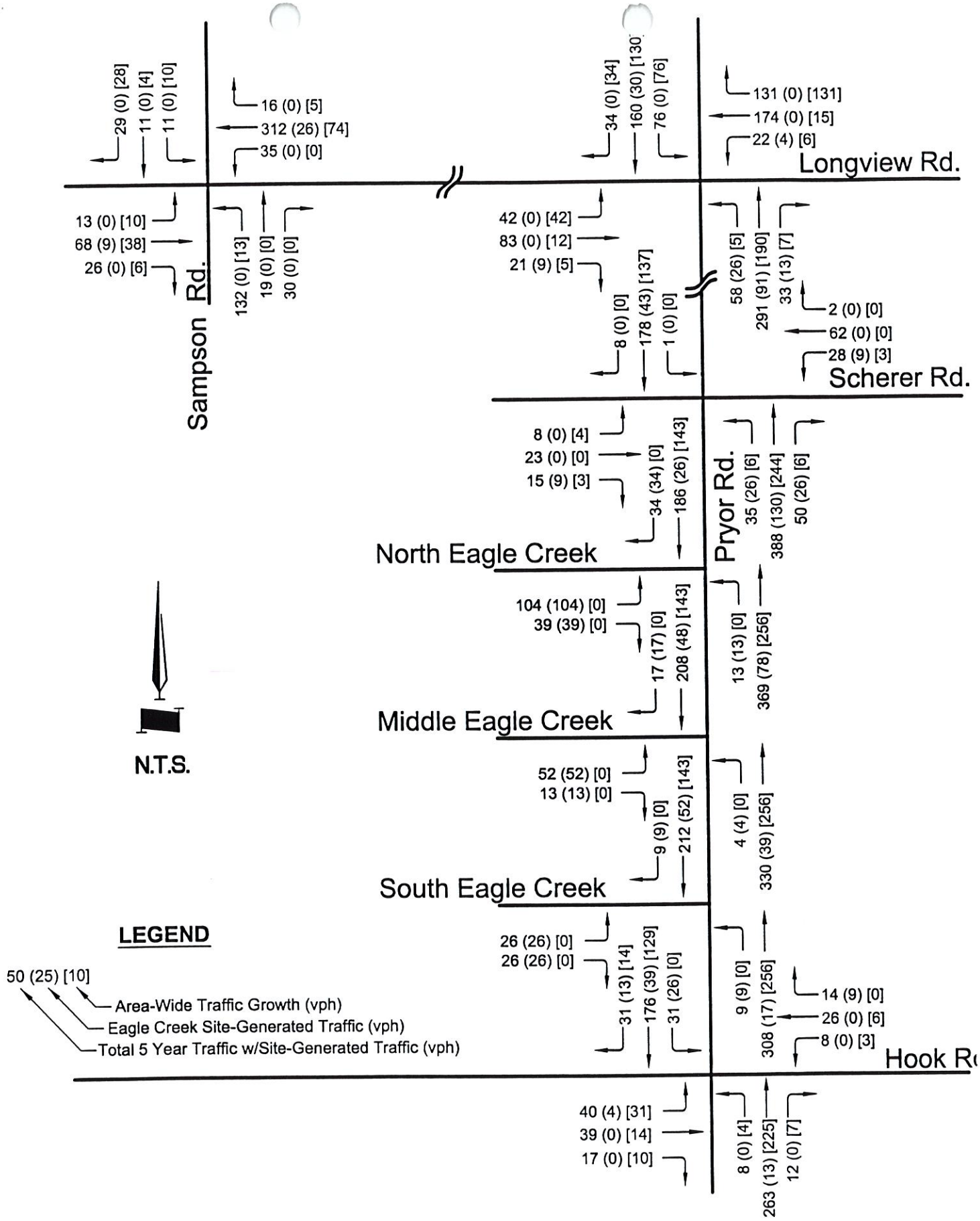

FIGURE 5
Scenario 1
Traffic Volumes
AM Peak Hour (7:00-8:00)

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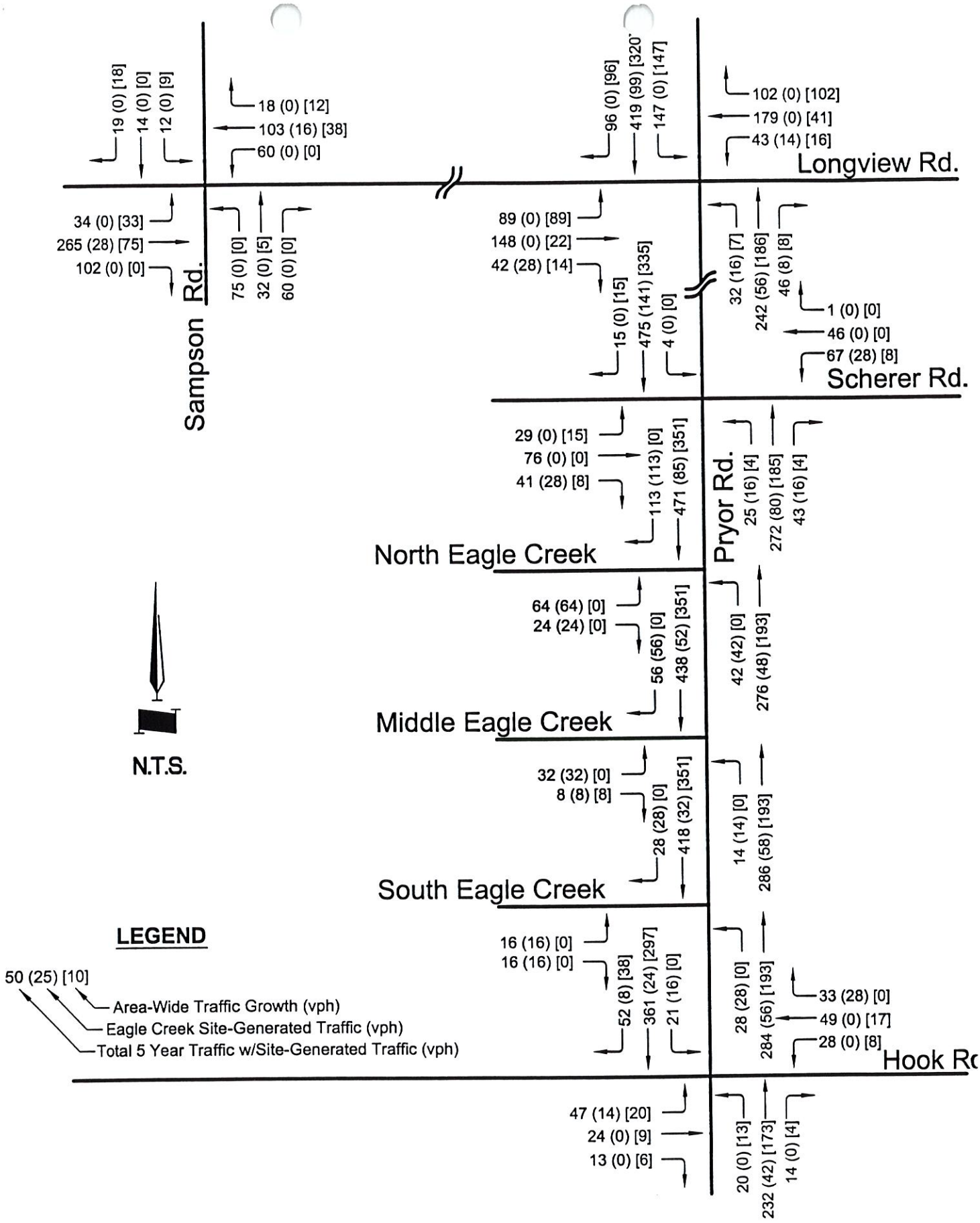

FIGURE 6
Scenario 1
Traffic Volumes
PM Peak Hour (4:45-5:45)

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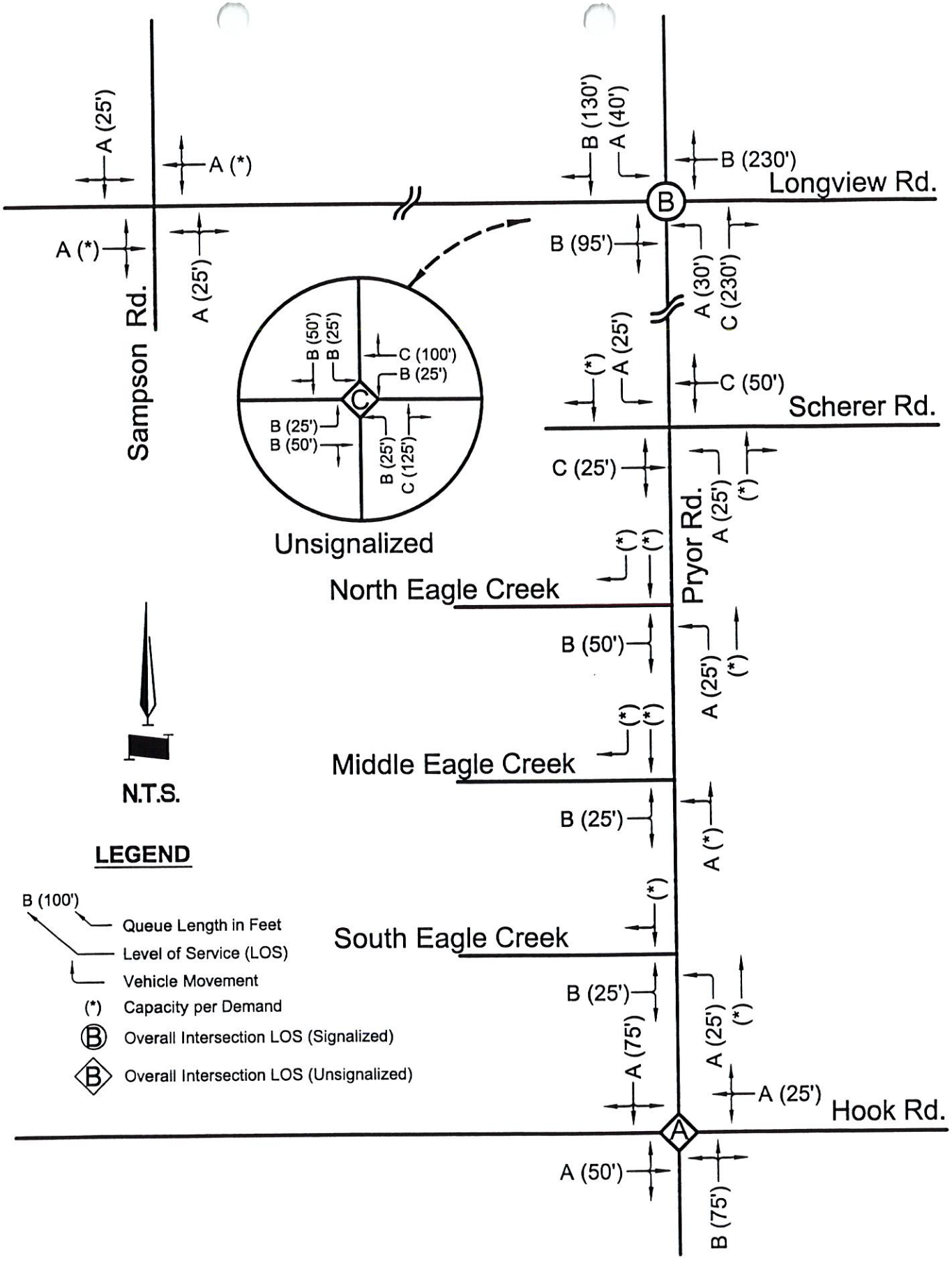

FIGURE 7
Scenario 1
Level of Service
AM Peak Hour (7:00-8:00)

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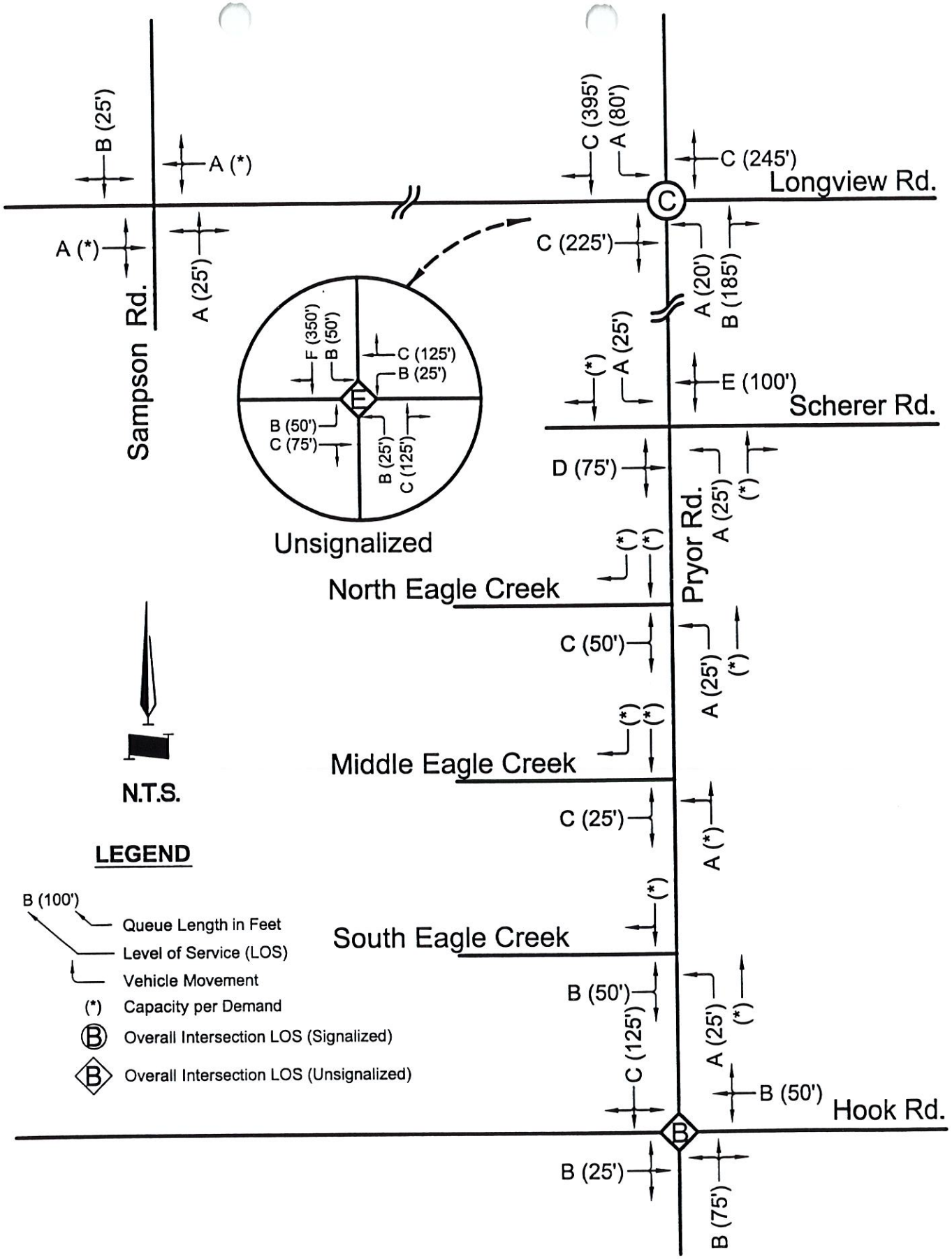

FIGURE 8
Scenario 1
Level of Service
PM Peak Hour (4:45-5:45)

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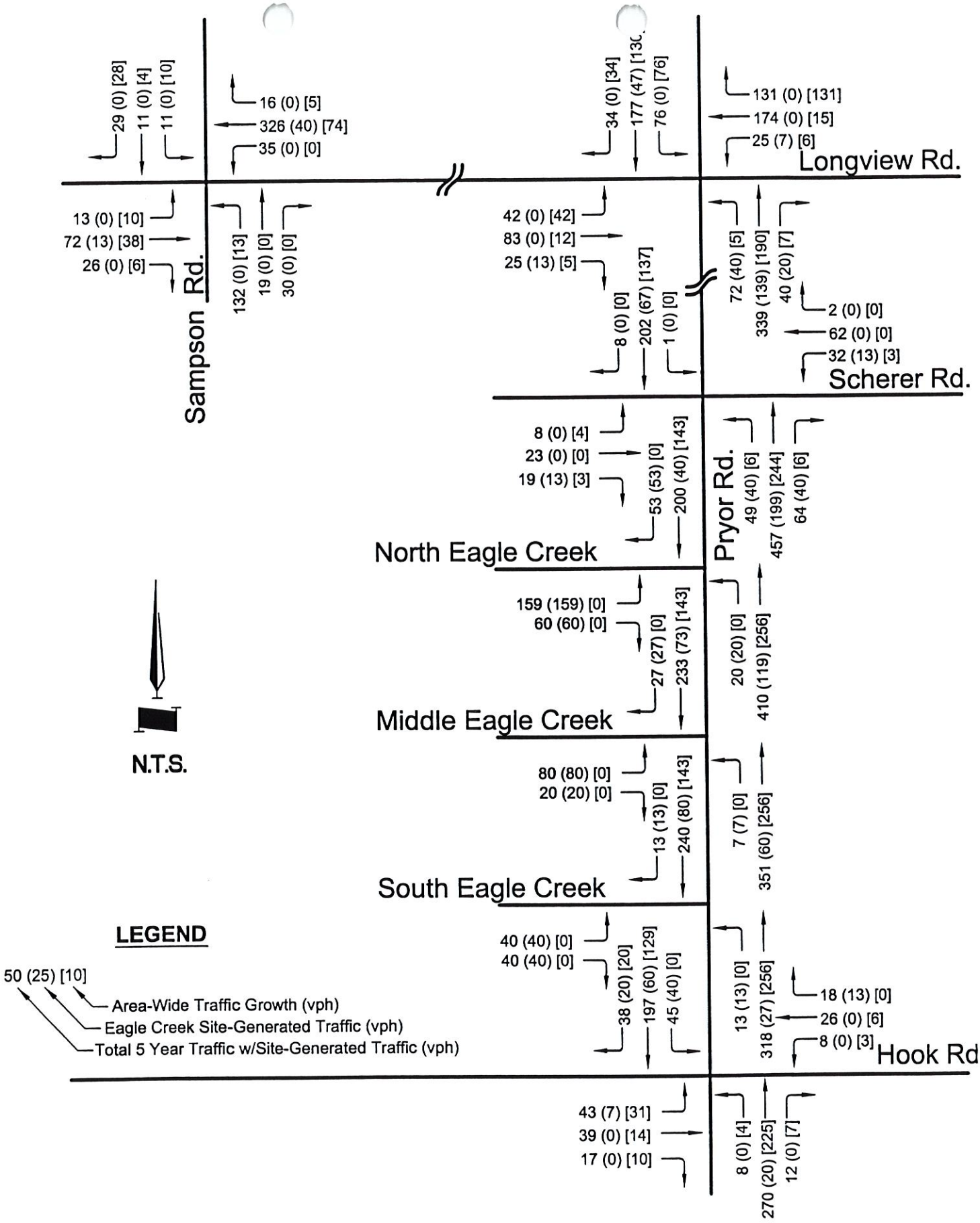

FIGURE 9
Scenario 2
Traffic Volumes
AM Peak Hour (7:00-8:00)

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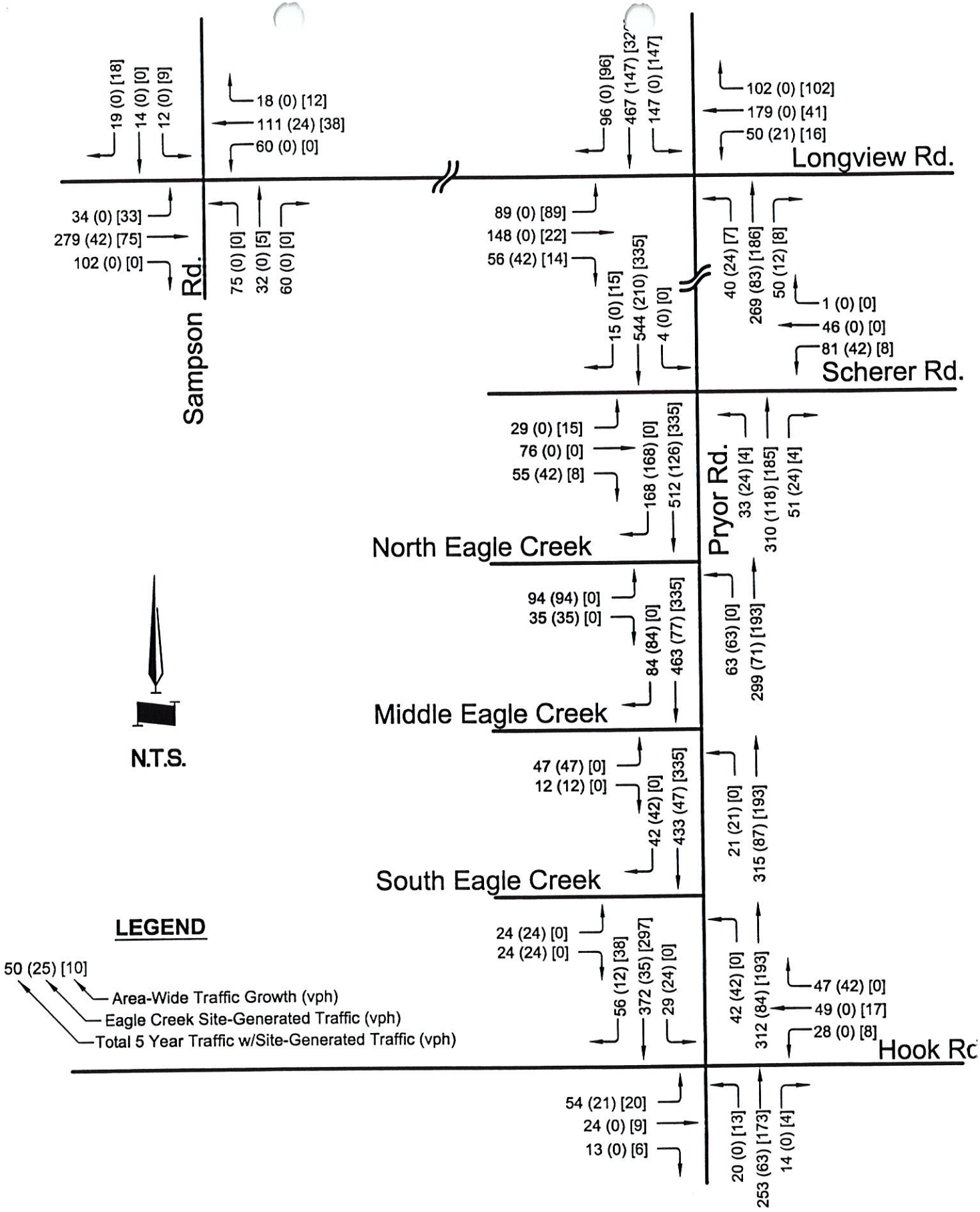

FIGURE 10
Scenario 2
Traffic Volumes
PM Peak Hour (4:45-5:45)

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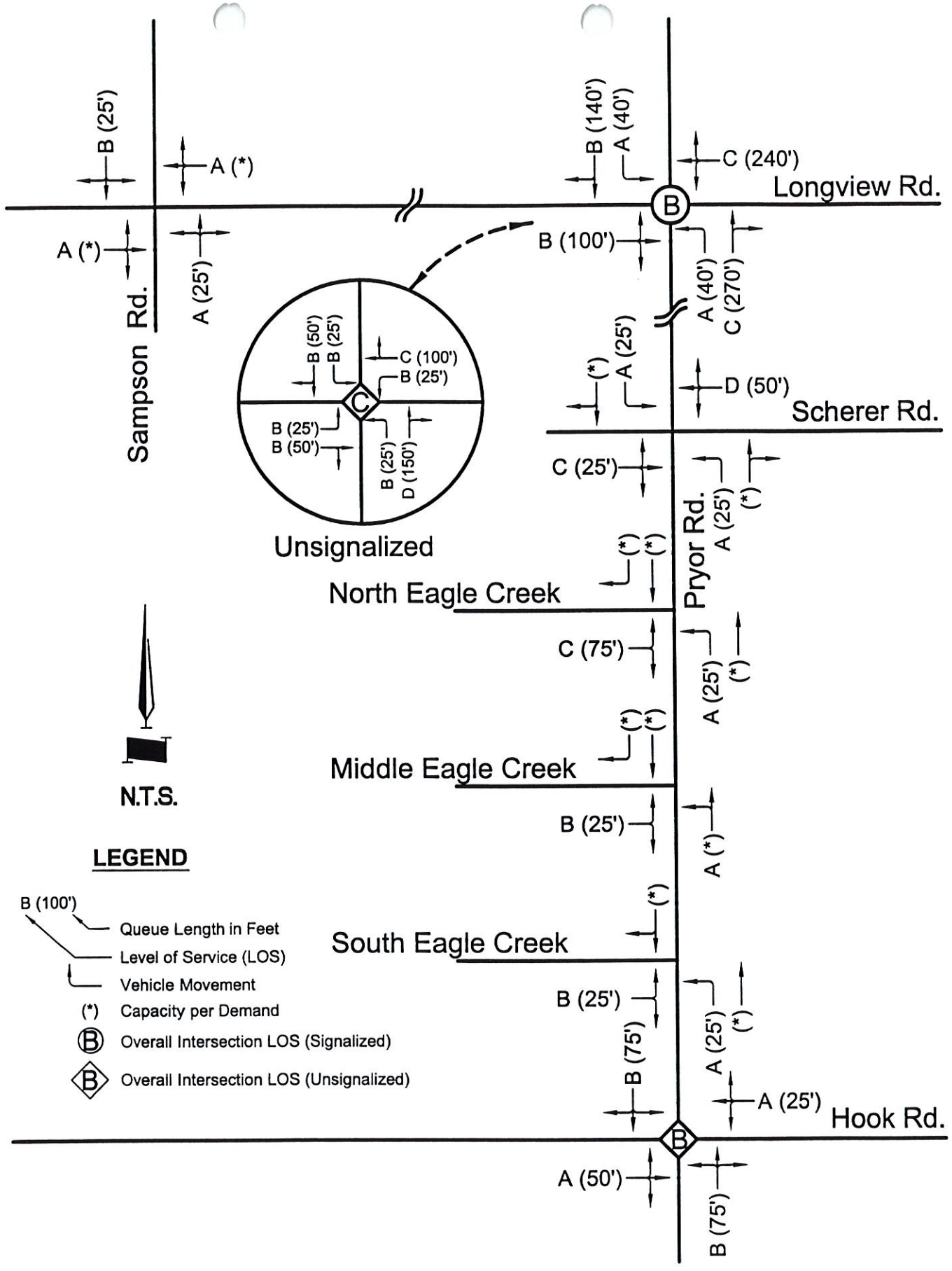

FIGURE 11
Scenario 2
Level of Service
AM Peak Hour (7:00-8:00)

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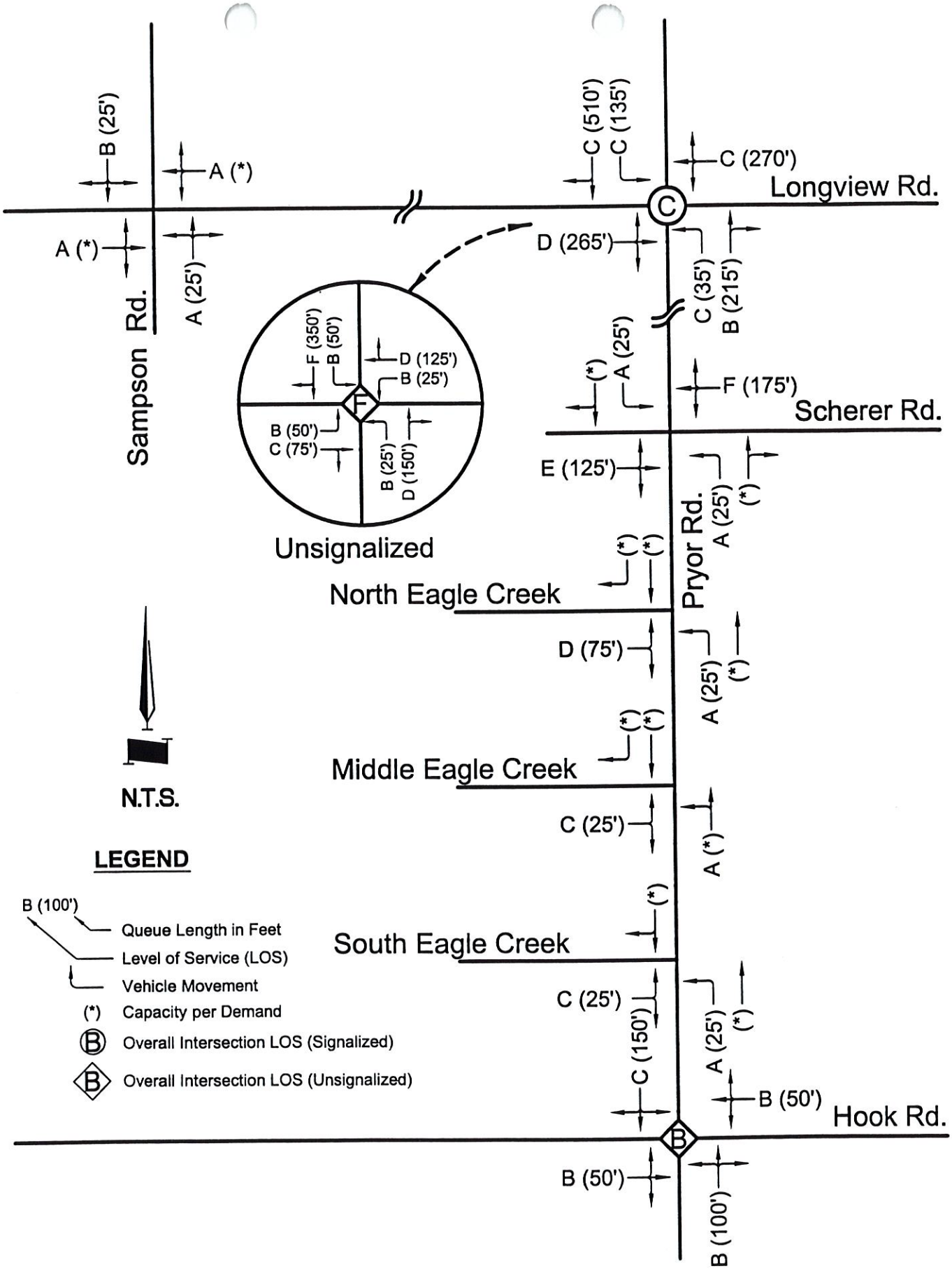

FIGURE 12
Scenario 2
Level of Service
PM Peak Hour (4:45-5:45)

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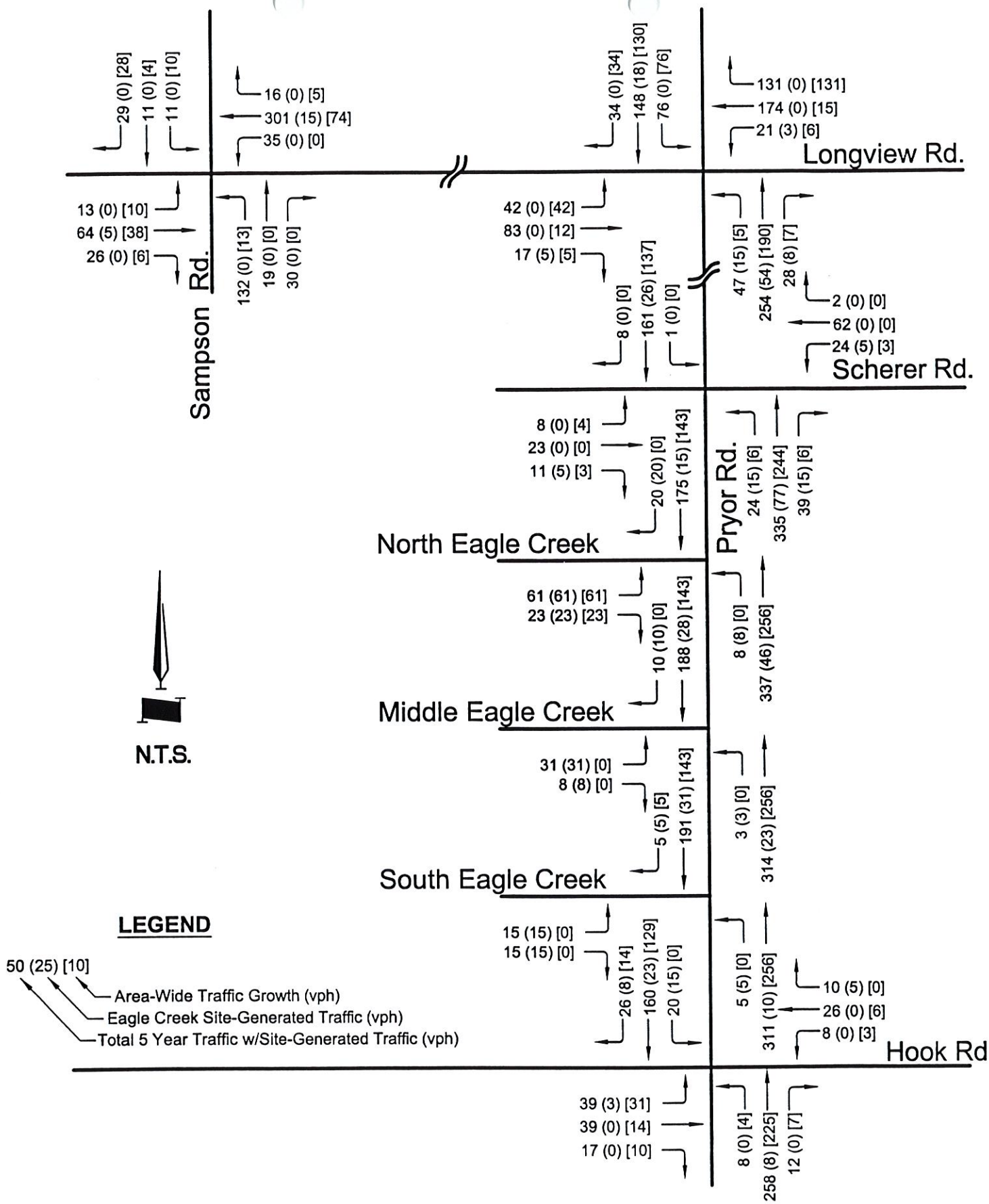

FIGURE 13
Scenario 3
Traffic Volumes
AM Peak Hour (7:00-8:00)

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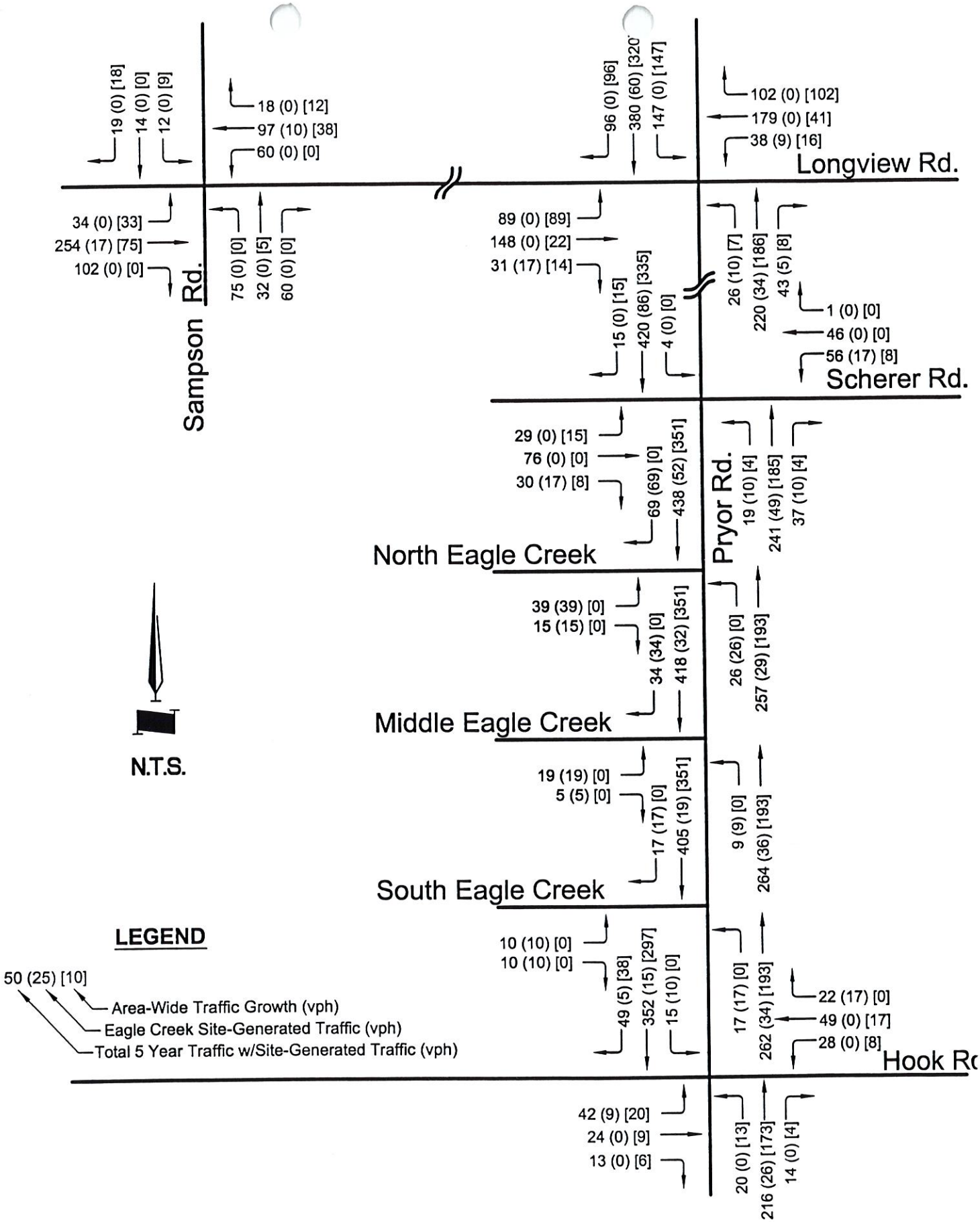

FIGURE 14
Scenario 3
Traffic Volumes
PM Peak Hour (4:45-5:45)

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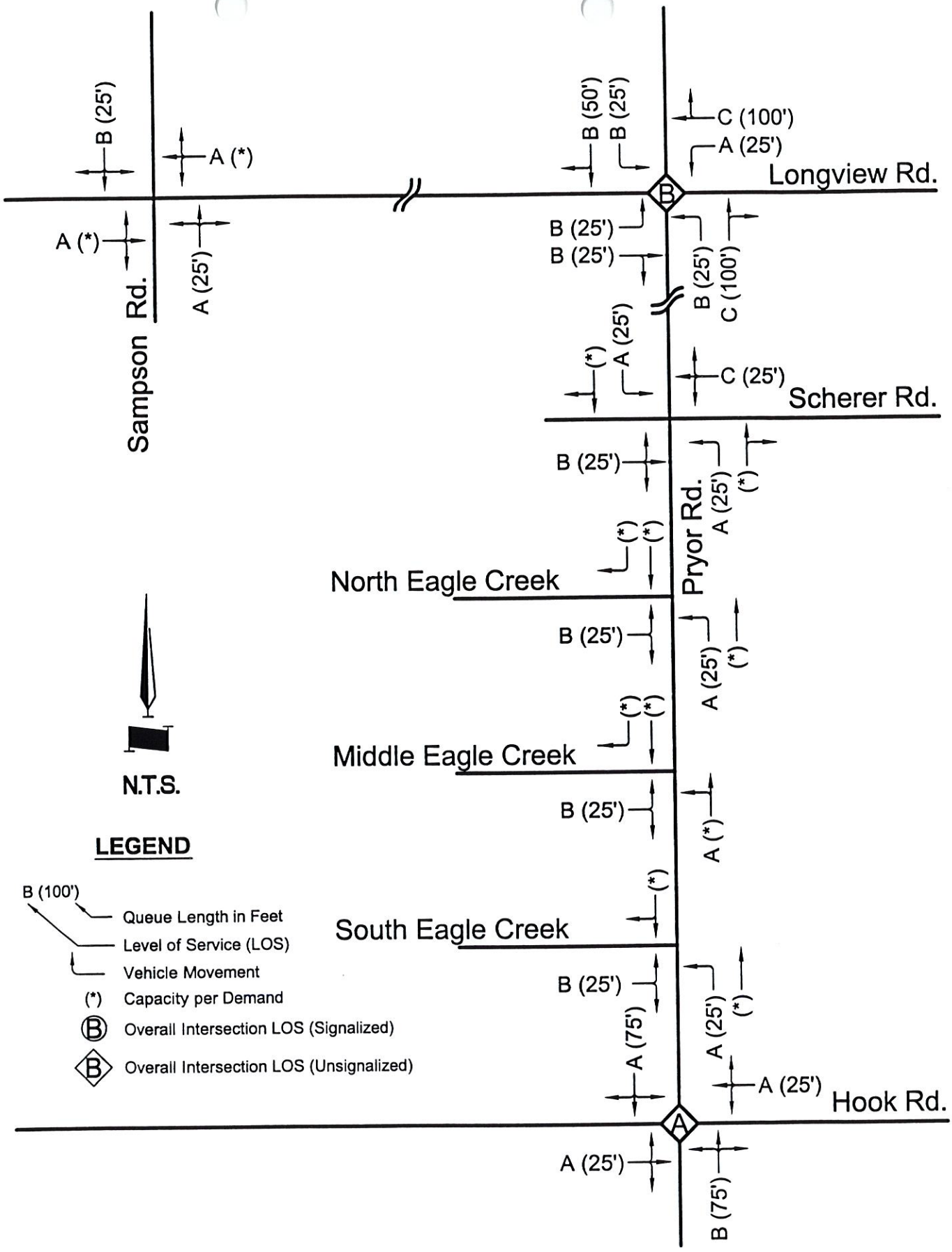

FIGURE 15
Scenario 3
Level of Service
AM Peak Hour (7:00-8:00)

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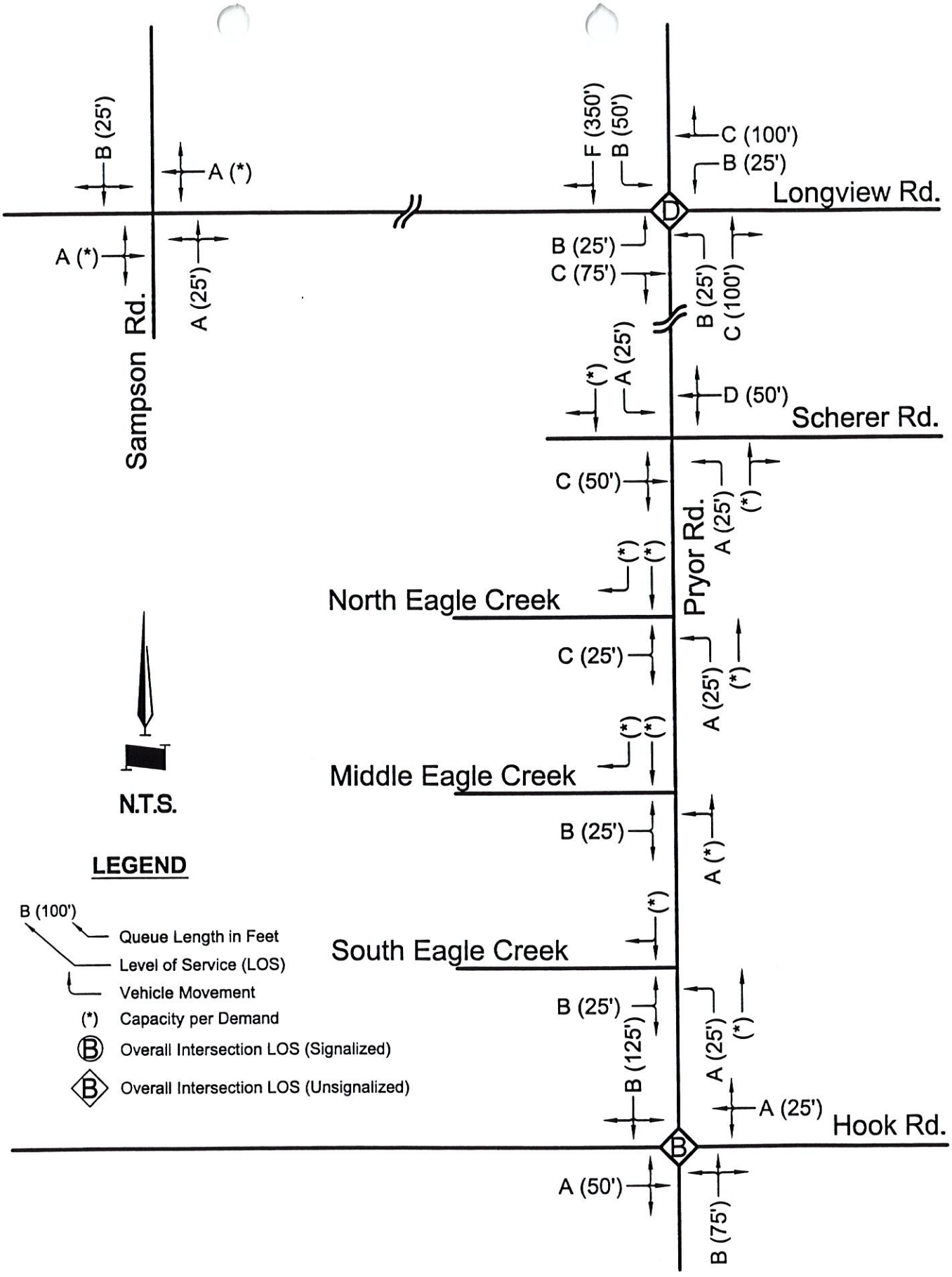

FIGURE 16
Scenario 3
Level of Service
PM Peak Hour (4:45-5:45)

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