WCE

Whipple Consulting Engineers

Spokane, WA

# TRAFFIC IMPACT ANALYSIS
# FOR

## 32nd and Conklin

Spokane, Washington
April, 2022
2021-2933

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# TRAFFIC IMPACT ANALYSIS

## 32nd and Conklin

Spokane County, Washington

April 25, 2022

W.O. No. 2021-2933

Prepared by:

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This report has been prepared by Ken Kim, P.E.(ID) of Whipple Consulting Engineers, Inc. under the direction of the undersigned professional engineer whose seal and signature appears hereon.


Todd R. Whipple, P.E.

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## EXECUTIVE SUMMARY

Supplemental to the SEPA Process for the proposed 32nd and Conklin residential development, the following Traffic Impact Analysis applies:

1. Spokane County and the City of Spokane Valley have established Level of Service D as the minimum acceptable level for signalized intersections and Level of Service E for unsignalized intersections.

2. The project proposes to develop approximately 19.33 acres +/- into 123 residential lots. With the county code change there is the potential that lots may be developed with a duplex. It is anticipated that the plat may include up to 18 duplex lots. With the development of the duplexes there would be 141 residential units (105 single family residential units and 36 duplex unites) onsite.

3. The project site is currently developed with a residential home and outbuildings, all structures are proposed to be removed during construction. The site is also covered with trees, field grass, & weeds. The project proposes that 30th Avenue extend west from Man O' War Court through Ridgemont Lane, Shamrock Road, Hollywood Road, and Galaway Road before transitioning into 30th Lane which continues through Sunnyvale Lane and terminates. The project proposes Galaway Road that extends south from 30th Avenue through 31st Avenue to 32nd Avenue. 31st Avenue is proposed to extend east from Galaway Road through Hollywood Road to Shamrock Road. Hollywood Road and Shamrock Road are proposed to extend south from 30th Avenue to 31st Avenue. Sunnyvale Lane is proposed to extend south from 30th Lane and terminates. Ridgemont Lane is also proposed to extend south form 30th Avenue and terminates with a hammerhead. The project site will be accessed via Man O' War Court and 32nd Avenue. The expected build out year is 2027. Please see Figure 2, Preliminary Site Plan.

4. The site is currently zoned as Low Density Residential (LDR). The subject property is located in a portion of SE ¼, Section 25, T25N., R44E., W.M. The parcel numbers for the project are 45254.9013 and 45254.9112. The surrounding areas are zoned as low density residential.

5. The project study area intersections were identified through a public traffic scoping meeting held on March 2022 and conversations with the City of Spokane Valley and Spokane County. The scope of the study includes the level of service analysis of the AM and PM peak hours of the following intersections:

    - Sullivan Road & 16th Avenue
    - Sullivan Road & 24th Avenue
    - Sullivan Road & Saltese Road
    - Galaway Road (South Access) & 32nd Avenue
    - Man O'War Court & 30th Avenue (East Access)
    - Man O'War Court & 32nd Avenue

    Additional analysis scope included sight distance at accesses and left turn warrants on 32nd

Avenue as well as a signal warrant analysis at Saltese & Sullivan.

6. The proposed land use is anticipated to generate 92 trips in the AM peak hour with 24 trips entering the site and 68 trips exiting the site. In the PM peak hour, the proposed land use is anticipated to generate 123 trips with 76 trips entering the site and 47 trips exiting the site. The proposed land use is anticipated to generate 1,280 average daily trips to/from the project site.

7. **Conclusions**
   This Traffic Impact Analysis (TIA) has reviewed and analyzed the study area per the scope established by the scoping meeting, Spokane County, and the City of Spokane Valley. Based upon the analysis, field observations, assumptions, methodologies and results which are provided in the body of this report, it is concluded that the development of the proposed project will generate new trips on the existing transportation system and that those trips will not have a significant impact on the level of service of the transportation system in the buildout year. This conclusion was reached and has been documented within the body of this report.

   - Under the **year 2022 existing** conditions, all intersections are currently operating at an acceptable level of service.

   - For the **year 2027 with background growth rate** scenario, all intersections are anticipated to operate at an acceptable level of service except the intersection of Saltese Road & Sullivan Road. With the signalized intersection at Saltese Road & Sullivan Road, the intersection is anticipated to operate at an acceptable level of service.

   - For the **year 2027 with background projects without the project** scenario, with the signalized intersection at Saltese Road & Sullivan Road, all intersections are anticipated to operate at acceptable levels of service.

   - For the **year 2027 with background projects with the project** scenario, with the signalized intersection at Saltese Road & Sullivan Road, all intersections are anticipated to operate at acceptable levels of service.

8. As shown in the additional analysis section, based upon the Sight Distance Analysis provided, for the left turn movement at the intersection of Galaway Road (South Access) & 32nd Avenue, there is an existing sight obstruction with a fence which is located within the Right of Way (ROW). We recommend that the fence within the ROW be removed to secure better sight distance for the left turn movement per the Spokane County standard.

9. For the right turn movement at the intersection of Man O' War Court & 30th Avenue (East Access), the recommend AASHTO sight distance of 290' is not available. There is currently 230' of sight distance available, which is more than the 200' of AASHTO stopping distance needed to avoid a collision. It is recommended that an appropriate advisory sign(s) (Ex. MUTCD W2-2 Sign with "Limited Sight Distance" Warning) be

installed to protect the safety of the traveling public.

10. As shown in the signal warrant analysis section, based upon a signal warrant analysis, a signal is warranted at the intersection of Saltese & Sullivan Roads. As noted previously, as the intersection meets 5 warrants of 8 warrants, a signal installation for the intersection is anticipated to raise the intersection level of service to an acceptable level.

    Based upon the analysis provided and the capacity analysis of the intersection at Saltese Road & Sullivan Road for Elk Meadow Estates Project (Included in the Appendix), it is recommended that the cost per trip for new proposed trips to the transportation system using the available capacity should be $267.37 per PM peak hour trip. The project is projecting 110 PM peak hour trips through the intersection. The improvement participation is anticipated to total $29,410.70 ($267.37 x 110 trips) or $208.59 per lot/unit ($29,410.70/141 units). As each lot goes through the permitting process the project specific trip generation will be determined and the fee applied to the PM peak hour trips or the specific lot and will be due at the time of building permit.

11. As shown in the Left Turn and Right Turn Lane Analysis section, based upon the left and right-turn lane warrants analysis provided, it is concluded that the intersections of South Access & 32nd Avenue and Man O' War Court & 32nd Avenue do not meet the WSDOT right and left turn lane warrants.

12. **Recommendations**
    Based upon the conclusions within this study, the proposed project is recommended to complete all required conditions of approval including frontage improvement and payment to the county mitigation fee for the Saltese & Sullivan signal at the time of building permit, and should be allowed to move forward without further traffic analysis, or offsite mitigation.

## INTRODUCTION

### *Introduction, Purpose of Report and Study Area*

This traffic impact analysis is required by Spokane County as part of the SEPA process for the proposed 32nd and Conklin development. The proposed development consists of 123 residential lots on 19.33 acres +/- site. Please see Figure 1 Vicinity Map and Figure 2 Preliminary Site Plan.

The purpose of this analysis is to review, assess, and identify the potential traffic related impacts that the proposed project may have on the transportation network and where possible minimize and/or mitigate any impact. This TIA will be completed in accordance with the current traffic guidelines from Spokane County, the City of Spokane Valley, and the Institute of Transportation Engineers (A Recommended Practice – Traffic Access and Impact Studies for Site Development, 2010) as well as their respective requirements.

### *Site Location and Development Description*

The subject property is located on a portion of the SE ¼ Section 25, T 25 N., R 44 E., W.M. within Spokane County, Washington. The project proposes to develop approximately 19.34 acres +/- into 123 residential lots. With the county code change there is the potential that lots may be developed with a duplex. It is anticipated that the plat may include up to 18 duplex lots. With the development of the duplexes there would be 141 residential units (105 single family residential units and 36 duplex unites) onsite.

The project site is currently developed with a residential home and outbuildings, all structures are proposed to be removed during construction. The site is also covered with trees, field grass, & weeds. The project proposes 30th Avenue that extends west from Man O War Court through Courtney Lane, Shamrock Road, Hollywood Road, and Galaway Road before transitioning into 30th Lane which continues through Sunnyvale Lane and terminates. The project proposes Galaway Road that extends south from 30th Avenue through 31st Avenue to 32nd Avenue. 31st Avenue is proposed to extend east from Galaway Road through Hollywood Road to Shamrock Road. Hollywood Road and Shamrock Road are proposed to extend south from 30th Avenue to 31st Avenue. Sunnyvale Lane is proposed to extend south from 30th Lane and terminates. Courtney Lane is also proposed to extend south form 30th Avenue and terminates. The project site will be accessed via Man O' War Court and 32nd Avenue. The expected build out year is 2023. Please see Figure 2, Preliminary Site Plan.


| | | |
|---|---|---|
| PROJ #: 21-2933<br>DATE: 04/06/22<br>DRAWN: KMK<br>APPROVED: TRW | TRAFFIC IMPACT ANALYSIS<br>**32ND AND CONKLIN**<br>16605 E 32ND AVENUE<br>SPOKANE COUNTY, WASHINGTON | WCE<br>WHIPPLE CONSULTING ENGINEERS<br>CIVIL AND TRANSPORTATION ENGINEERING<br>21 S. PINES ROAD<br>SPOKANE VALLEY, WASHINGTON 99206<br>PH: 509-893-2617 FAX: 509-926-0227 |
| FIGURE 1 | VICINITY MAP | |


| | | |
|---|---|---|
| PROJ #: 21-2933<br>DATE: 04/06/22<br>DRAWN: KMK<br>APPROVED: TRW | TRAFFIC IMPACT ANALYSIS<br>**32ND AND CONKLIN**<br>16605 E 32ND AVENUE<br>SPOKANE COUNTY, WASHINGTON | WCE<br>WHIPPLE CONSULTING ENGINEERS<br>CIVIL AND TRANSPORTATION ENGINEERING<br>21 S. PINES ROAD<br>SPOKANE VALLEY, WASHINGTON 99206<br>PH: 509-893-2617 FAX: 509-926-0227 |
| FIGURE 2 | PRELIMINARY SITE PLAN | |

***Existing and Proposed Conditions within the Study Area***

***Land Use & Zoning***

The site is currently zoned as Low Density Residential (LDR). The subject property is located in a portion of SE ¼, Section 25, T25N., R44E., W.M. The parcel numbers for the project are 45254.9013 and 45254.9112. The surrounding areas are zoned as low density residential.

***Existing Roadways***

The overall transportation network in this area consists of an urban principal arterial, minor arterials, major collector and local access roads. The project is proposed to be accessed via Man O' War Court and 32nd Avenue. The proposed project trips are anticipated to use the following roadways:

**Man O' War Court** is generally a north/south, two-way, 2-lane local access road that extends north from 32nd Avenue through Man O' War Lane before terminating at Secretariate Lane. Man O' War Court serves residential land uses. The speed limit on Man O' War Court is 25 MPH in the project area.

**32nd Avenue** within the study area is generally an east/west, two-way, 2-lane urban minor arterial road that extends east from Conklin Drive through Man O' War Court, Chapman Road, Linke Road, and Barker Road before transitioning into Saltese Lake Road generally terminating at Sullivan Road. 32nd Avenue serves residential and agricultural land uses. The speed limit on 32nd Avenue is 35 MPH in the project area.

**Saltese Road** is an east/west, two-way, 2-lane urban minor arterial road that extends east from Morboch Road alignment through Sullivan Road and Needham Drive before transitioning into 32nd Avenue at Conklin Drive. Saltese Road generally serves residential and rural land uses. The speed limit on Saltese Road is 35 MPH in the project area.

**Sullivan Road** is a north/south, two-way, 2-, 3- & 5-lane urban principal/minor arterial & urban collector that extends south from Wellesley Avenue as an urban minor arterial through Euclid Avenue, Indiana Avenue and continues as an urban principal arterial through I-90 interchange, Broadway Avenue, Sprague Avenue, 16th Avenue, and 32nd Avenue before becoming an urban collector and continuing through Belle Terre Avenue and Ball Road before terminating. Sullivan Road primarily serves residential, industrial, commercial, and institutional land uses. The posted speed limit on Sullivan Road is 35 MPH.

***Study Area Intersections***

The project study area intersections were identified through a public traffic scoping meeting held on March 01, 2022 and conversations with the Spokane County and the City of Spokane Valley. The scope of the study includes the level of service analysis of the AM and PM peak hours of the following intersections:

- Sullivan Road & 16th Avenue
- Sullivan Road & 24th Avenue
- Sullivan Road & Saltese Road
- South Access & 32nd Avenue
- Man O'War Court & East Access
- Man O'War Court & 32nd Avenue

Additional analysis scope included sight distance at accesses and left turn warrants on 32nd Avenue as well as a signal warrant analysis at Saltese & Sullivan.

***Traffic Control and Descriptions***

**Sullivan Road & 16th Avenue** is a signalized intersection with the following lane configuration: the west leg has one (1) receiving lane, a left turn lane, and a through-right lane. The east leg has one (1) receiving lane and a left-through-right lane. The south leg has two (2) receiving lanes, a left turn lane, a through lane, and a through-right lane. The north leg has two (2) receiving lanes, a left turn lane, a through lane, and a through-right lane.

**Sullivan Road & 24th Avenue** is a signalized intersection with the following lane configuration: the west leg has one (1) receiving lane and a left-through-right lane. The east leg has one (1) receiving lane and a left-through-right lane. The south leg has one (1) receiving lane, a left turn lane, and a through-right lane. The north leg has two (2) receiving lanes, a left turn lane, a through lane, and a right turn lane.

**Sullivan Road & Saltese Road** is an unsignalized intersection with the following lane configuration: the west leg has one (1) receiving lane. The east leg has one (1) receiving lane, a left-through lane, and a right turn lane. The south leg has one (1) receiving lane, a Two-Way-Left-Turn-Lane (TWLTL), and a left-through-right lane. The north leg has one (1) receiving lane, a Two-Way-Left-Turn-Lane (TWLTL), and a left-through-right lane.

**South Access (Proposed) & 32nd Avenue** is an unsignalized intersection with the following lane configuration: the west leg has one (1) receiving lane and a left-through lane. The east leg has one (1) receiving lane and a through-right lane. The north leg has one (1) receiving lane and a left-right turn lane.

**Man O'War Court & East Access (Proposed)** is an unsignalized intersection with the following lane configuration: the west leg has one (1) receiving lane and a left-right turn lane. The south leg has one (1) receiving lane and a left-through lane. The north leg has one (1) receiving lane and a through-right lane.

**Man O'War Court & 32nd Avenue** is an unsignalized intersection with the following lane configuration: the west leg has one (1) receiving lane and a left-through lane. The east leg has one (1) receiving lane and a through-right lane. The north leg has one (1) receiving lane and a left-right turn lane.

### *Existing Intermodal Transportation System*

The existing intermodal transportation system including public transit(bus), pedestrian sidewalks, bikeways, and on-street parking in this study area are described as follows.

**Public Transit (Bus)**

The existing bus routes nearest the project site are Route 97. The nearest bus stops from the project site to the route is 1.40 miles at Sullivan Road & 16th Avenue. Please see the attached route map.


**Source: Spokane Transit Authority**

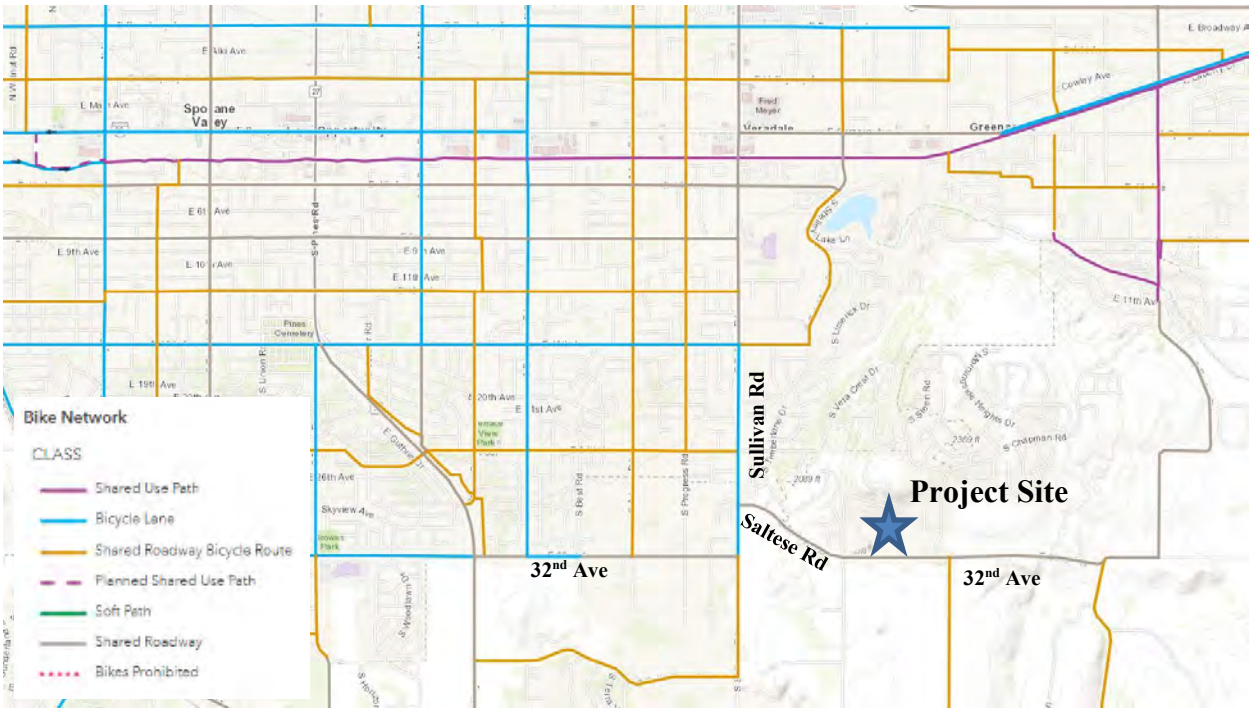
**Pedestrian Sidewalks**

There is an existing sidewalk on the west side of Conklin Road from 32nd Avenue to Vera Crest Drive. There is an existing sidewalk on north side of Saltese Road from Conklin Road to 700ft west. There is no sidewalk on Man O' War Court and 32nd Avenue within the project area.


**Source: Satellite Map**

## Bikeways

Within the study area, 32nd Avenue, Saltese Road, are assigned as shared roadways and there are bicycle lanes along Sullivan Road within the study area.




**Source: Spokane Regional Bike Map – Spokane County**

## On-street Parking

On-street parking is designated on Conklin Road and Man O'War Court surrounding the project site.

### *Traffic Safety*

For the intersections within the study area accident report summaries were received from the City of Spokane Valley and WSDOT. Generally, accidents are documented by type of occurrence, such as property damage or injury. No fatalities were reported for the study intersections during the last five years.

## ITE MEV Method

$$Rate\ per\ MEV = \frac{number\ of\ accidents\ in\ five\ years\ X\ 1\ million}{ADT\ \ X\ 365\ X\ 5\ years}$$

Equation 4-2 of ITE manual of traffic engineering studies (fourth edition) (modified given the available data, for 5 years and utilizes PM peak hour volumes: 8.31% of ADT for 16th & Sullivan and 7.21% of ADT for 24th & Sullivan, Saltese & Sullivan, and 32nd Ave & Man O' War per ADT provided by COSV).

In this analysis accidents are measured based on frequency per million entering vehicles (MEV). This ratio is a function of the average daily traffic entering the intersection and the annual frequency of accidents. This method of analysis is also considered as an "exposure" analysis. This method of analysis is used to identify areas that need further review. A typical review threshold for accidents at an intersection is 1.00 accidents per MEV. The accident data for the intersections within the study area are shown in Table 4.

***Table 1 – Accident Data for Intersections within the Study Area***

| ACCIDENT DATA* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Intersection & Segment** | **2016** | | **2017** | | **2018** | | **2019** | | **2020** | | **Total** | **INTX ADT**** | **Per MEV** |
| | **P** | **I** | **P** | **I** | **P** | **I** | **P** | **I** | **P** | **I** | | | |
| 16th Ave & Sullivan Rd | 1 | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 9 | 19,795 | 0.249 |
| 24th Ave & Sullivan Rd | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 4 | 18,419 | 0.119 |
| Saltese Rd & Sullivan Rd | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 4 | 17,115 | 0.128 |
| 32nd Ave & Man O' War Ct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 6,047 | 0.091 |

***P: Property Damage Only, I: Injury**

As shown in Table 1, the intersections within the study area do not meet or exceed the threshold for further analysis.

### *Traffic Volumes and Peak Hours of Operation*

Traffic counts were collected in May 2019, November 2021, and March 2022 under the direction of Whipple Consulting Engineers (WCE) and All Traffic Data at the following intersection:

- 16th Avenue & Sullivan Road (November 2021 – WCE)
- 24th Avenue & Sullivan Road (November 2021 – WCE)
- Saltese Road & Sullivan Road (May 2019 – All Traffic Data)
- 32nd Avenue & Man O'War Court (March 2022 – WCE)

The AM & PM peak hours from these counts are shown on Figures 3 & 4. The raw data for these counts are located in the technical appendix.

## LEVEL OF SERVICE

Level of Service (LOS) is an empirical premise developed by the transportation profession to quantify driver perception for such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles afforded to drivers who utilize the transportation network. It has been defined by the Transportation Research Board in the *Highway Capacity Manual 6th Edition*. This document has quantified level of service into a range from "A" which indicates little, if any, vehicle delay, to "F" which indicates significant vehicle delay and traffic congestion that may lead to system breakdown due to volumes that may exceed capacity.

### *Signalized Intersections*

For signalized intersections, research has determined that average stopped delay per vehicle is the best available measure of Level of Service. The following tables identify the relationships between level of service and average stopped delay per vehicle. The City of Spokane Valley (Level of Service Table 4.3 of the City of Spokane Valley Comprehensive Plan) and Spokane County have adopted level of service D as the minimum acceptable level for all signalized intersections.

**Level of Service Criteria and Descriptions - Signalized**

| LOS | Delay Range (sec) | General Description |
|---|---|---|
| A | 10 | • Very low delay at intersection.<br>• All signal cycles clear.<br>• No vehicles wait through more than one signal cycle. |
| B | 10 to 20 | • Operating speeds beginning to be affected by other traffic.<br>• Short traffic delays at intersections.<br>• Higher average intersections delays resulting from more vehicles stopping. |
| C | 20 to 35 | • Operating speeds and maneuverability closely controlled by other traffic.<br>• Higher delays at intersections than for LOS B due to a significant number of vehicles stopping.<br>• Not all signal cycles clear the waiting vehicles. |
| D | 35 to 55 | • Tolerable operating speeds, but long traffic delays occur at intersections<br>• The influence of congestion is noticeable.<br>• Many vehicles stop and the proportion of vehicles not stopping declines.<br>• The number of signal cycle failures, for which vehicles must wait through more than one signal cycle are noticeable. |
| E | 55 to 80 | • Speeds are restricted, very long traffic delays are experienced and traffic volumes are near capacity.<br>• Traffic flow is unstable, any interruption, no matter how minor, will cause queues to form and service to deteriorate.<br>• Traffic signal cycle failures are frequent occurrences. |
| F | 80 | • Extreme delays resulting in long queues which may interfere with other traffic movements<br>• Stoppages of long duration and speeds may drop to zero.<br>• Vehicle arrival rates are greater than capacity.<br>• Considered unacceptable by most drivers. |

***Unsignalized Intersections***

The calculation of Level of Service (LOS) at an unsignalized one/two-way stop-controlled intersection is examined in the Transportation Research Board's *Highway Capacity Manual 6th Edition*. For unsignalized intersections, Level of Service is based on the delay experienced by each movement and approach within the intersection. The concept of delay as presented for unsignalized intersections in the Highway Capacity Manual is based on the amount of time a vehicle must spend at the intersection. Vehicles passing straight through the intersection on the major (uncontrolled) street experience no delay at the intersection. On the other hand, vehicles which are turning left from the minor street, because they must yield the right of way to all right turning vehicles, all left turning vehicles from the major street and all through vehicles on both the minor and major streets, must spend more time at the intersection. Levels of Service are assigned to individual movements within the intersection, and are based upon the delay experienced by each movement or approach.

The Transportation Research Board has determined what Levels of Service for unsignalized intersections should be, by designating Level of Service A through F, where Level of Service A represents a facility where no vehicle in any movement is delayed very long and Level of Service F which represents a facility where there is excessive delay for the average vehicle in at least one movement in the intersection. The City of Spokane Valley (Level of Service Table 4.3 of the City of Spokane Valley Comprehensive Plan) and Spokane County have adopted level of service E for all unsignalized intersections within the study area.

**Level of Service Criteria and Descriptions - Unsignalized**

| LOS | Delay Range (sec) | Expected Delay to Minor Street Traffic | General Description |
|---|---|---|---|
| A | 10 | Little to No Delay | • Nearly all drivers find freedom of operation.<br>• Very seldom is there more than one vehicle in the queue. |
| B | 10 to 15 | Short Traffic Delays | • Some drivers begin to consider the delay an inconvenience<br>• Occasionally there is more than one vehicle in the queue. |
| C | 15 to 25 | Average Traffic Delays | • Many times, there is more than one vehicle in the queue.<br>• Most drivers feel restricted, but not objectionably so. |
| D | 25 to 35 | Long Traffic Delays | • Often there is more than one vehicle in the queue.<br>• Drivers feel quite restricted. |
| E | 35 to 50 | Very Long Traffic Delays | • Represents conditions in which, demand is near or equal capacity.<br>• There is almost always more than one vehicle in the queue.<br>• Drivers find the delays approaching intolerable levels. |
| F | 50 | Stop-and-Go Condition Delays Generally Longer than Acceptable | • Forced flow.<br>• Represents an intersection failure condition that is caused by geometric and/or operational constraints external to the intersection |

All Level of Service analyses described in this report were performed in accordance with the procedures described above. As a final note, the Highway Capacity Manual (HCM) analysis and procedures are based upon worst case conditions. Therefore, most of each weekday and the weekends will experience traffic conditions better than those described within this document, which are only for the peak hours of operation

***Existing Level of Service and Traffic Analysis***

The existing Levels of Service at the scoped intersections were calculated using the methods from the *6th Edition Highway Capacity Manual* as implemented in Synchro*, version 10 - Build 122*. The existing Levels of Service for the intersection within the study area are summarized on the following tables. The existing traffic volumes used for this report are shown on Figures 3 & 4.

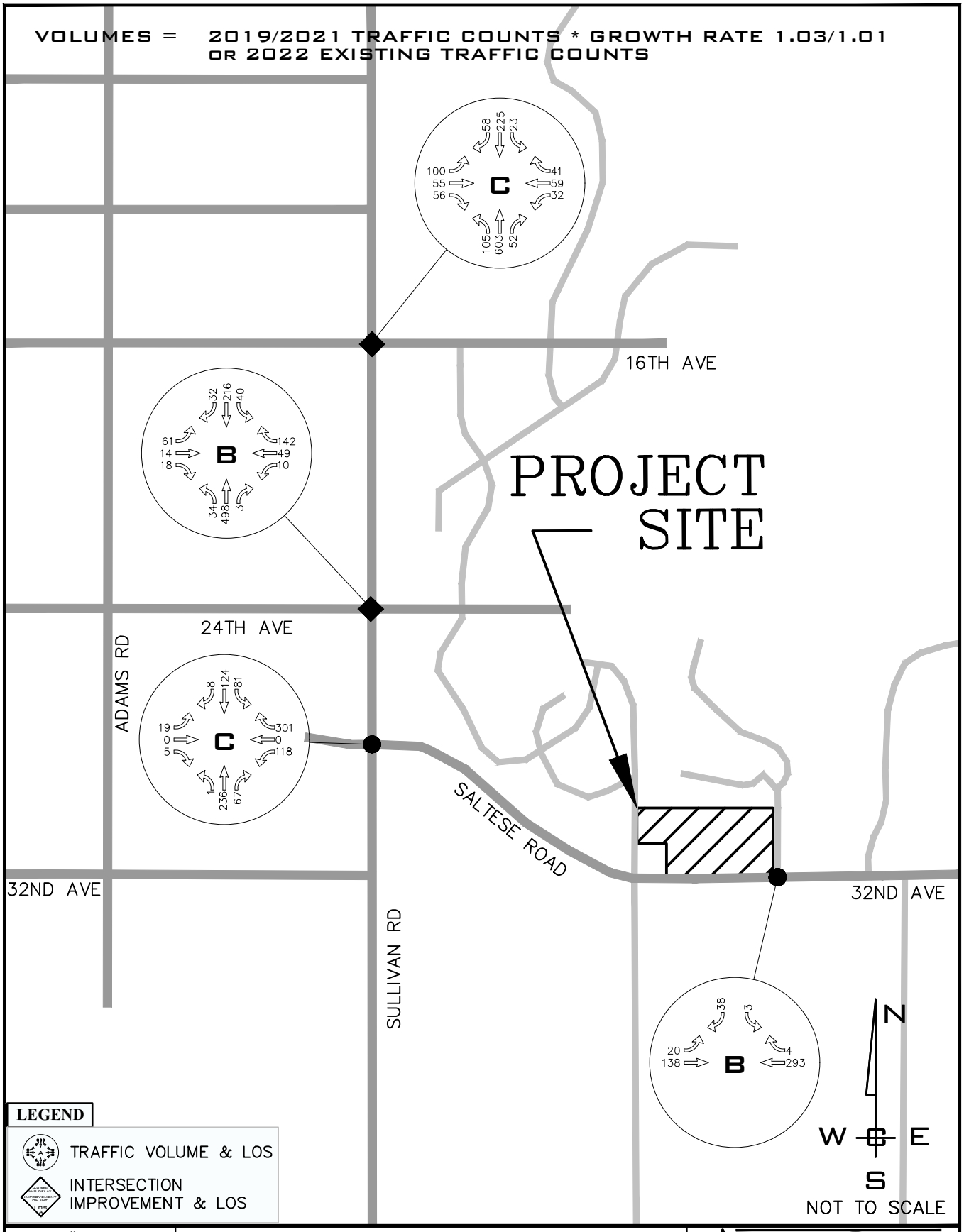
***Table 2 – 2022 Existing Intersections Levels of Service (Figure 3&4)***

| **INTERSECTION** **(S)ignalized (U)nsignalized** | | **AM Peak Hour** | | **PM Peak Hour** | |
|---|---|---|---|---|---|
| | | **Delay (sec)** | **LOS** | **Delay (sec)** | **LOS** |
| 16th Ave & Sullivan Rd | S | 21.5 | C | 22.8 | C |
| 24th Ave & Sullivan Rd | S | 11.1 | B | 9.8 | A |
| Saltese Rd & Sullivan Rd* | U | 22.2 | C | 42.1 | E |
| 32nd Avenue & Man O'War Court** | U | 10.6 | B | 9.7 | A |

***Delay and LOS based on critical movement – EB for AM and WB LT for PM**
****Delay and LOS based on critical movement – SB for AM and PM**

The Spokane County and the City of Spokane Valley have adopted level of service D as the minimum acceptable level for signalized intersections and level of service E as the minimum acceptable level for unsignalized intersections.

As shown in Table 2, the intersections are currently operating at an acceptable level of service.

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APPROVED: TRW

# TRAFFIC IMPACT ANALYSIS
# 32ND AND CONKLIN
## 16605 E 32ND AVENUE
## SPOKANE COUNTY, WASHINGTON

FIGURE 3

2022 AM EXISTING TRAFFIC VOL. & LOS

WCE
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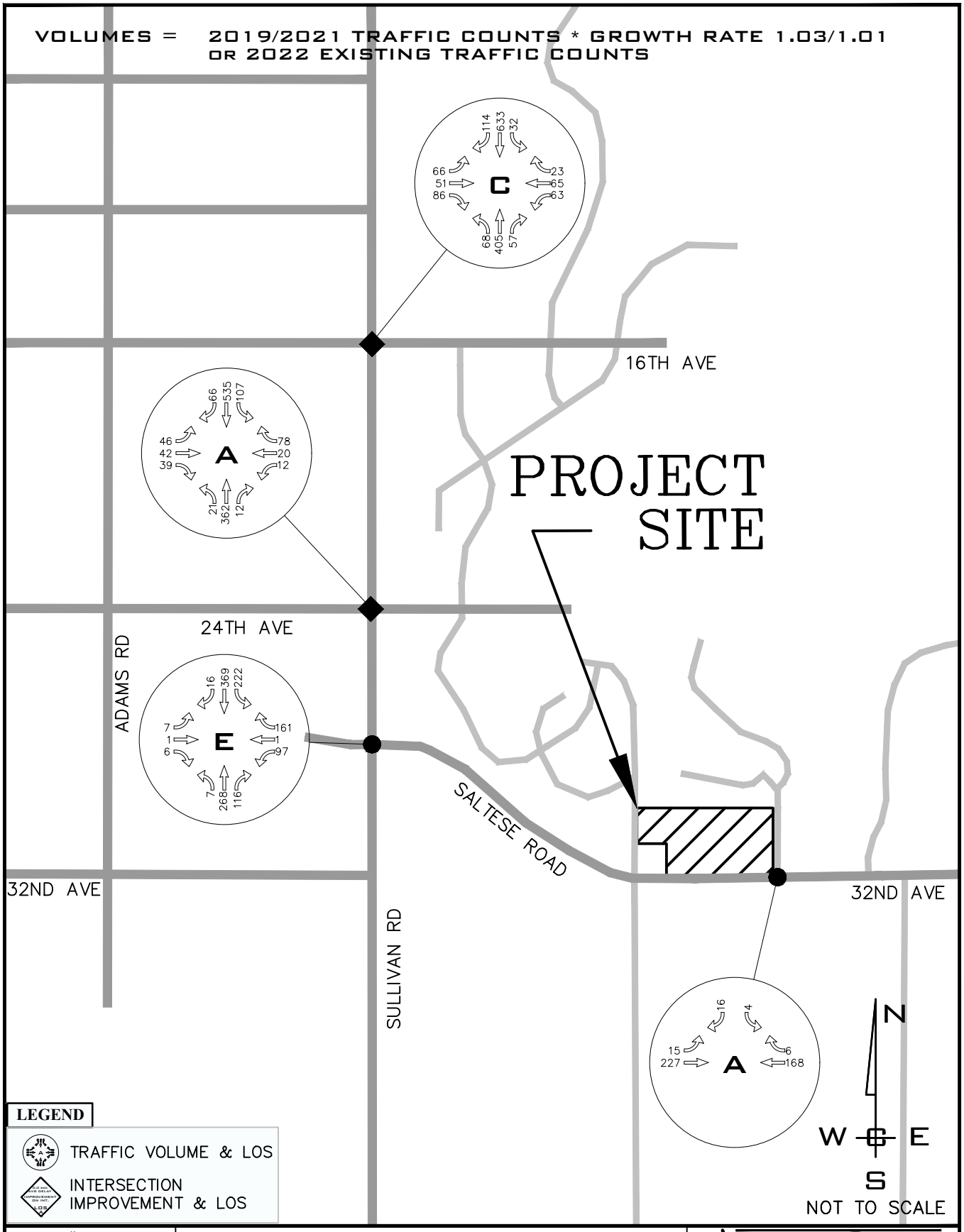


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| FIGURE 4 | 2022 PM EXISTING TRAFFIC VOL. & LOS | |

### *Future Year Traffic Impact Analysis*

The build out year analysis is required, per the scope of the TIA meeting. Three scenarios were examined for the build out year (2027) analysis. The first scenario assumes that the existing traffic volumes as shown on Figures 3 & 4 experience an increase above the existing volumes at the established background rate. The second scenario assumes that the development has not moved forward and analyzes the scoped intersections with the background growth rate and the background project trips as shown on Figures 7 & 8. The third scenario assumes that the development has moved forward and analyzes the scoped intersection with the background growth rate, the background projects, and the project trips as shown on Figures 11 & 12. These scenarios will allow a determination to be made as to what the future conditions may be both with/without the background project trips and with/without the project trips.

### *Background Traffic Growth*

Background traffic growth is an anticipated increase in traffic volume from year to year. As the existing land uses that surround a transportation facility mature, an increase in traffic results and may be due to either an increase in drivers per household, a household's purchase of an additional vehicle, unplatted lot development, etc. Many things can cause an increase in the traffic volumes of a facility. The objective of the background traffic growth rate is to anticipate what the traffic volumes may be in the future. The background traffic growth rate for an area or street is determined by means of physical counts collected by local governmental agencies. The counts are compared on a yearly basis and a rate of increase is calculated from the data.

The background growth rate was determined to be 1.0% per year. Based on a five-year build out, compounded annually, the total increase in traffic rate for the year 2027 is anticipated to be 1.051.

## FUTURE ANALYSIS WITH BACKGROUND TRAFFIC GROWTH

***Year 2027 with Background Traffic Growth***

This scenario assumes that the existing traffic volumes experience an increase above the existing volumes at the established background rate. The traffic volumes for this condition include the existing traffic, as shown on Figures 3 & 4, multiplied by the background growth rate for year 2027(1.051). Please see Figures 5 & 6 for the traffic volumes used for this scenario. A summary of the Level of Service results is shown in the following table. This scenario creates a future year baseline that allows for a direct comparison of the with background project scenario.

***Table 3 – Year 2027 Level of Service, with Background Traffic Growth (Figure 5&6)***

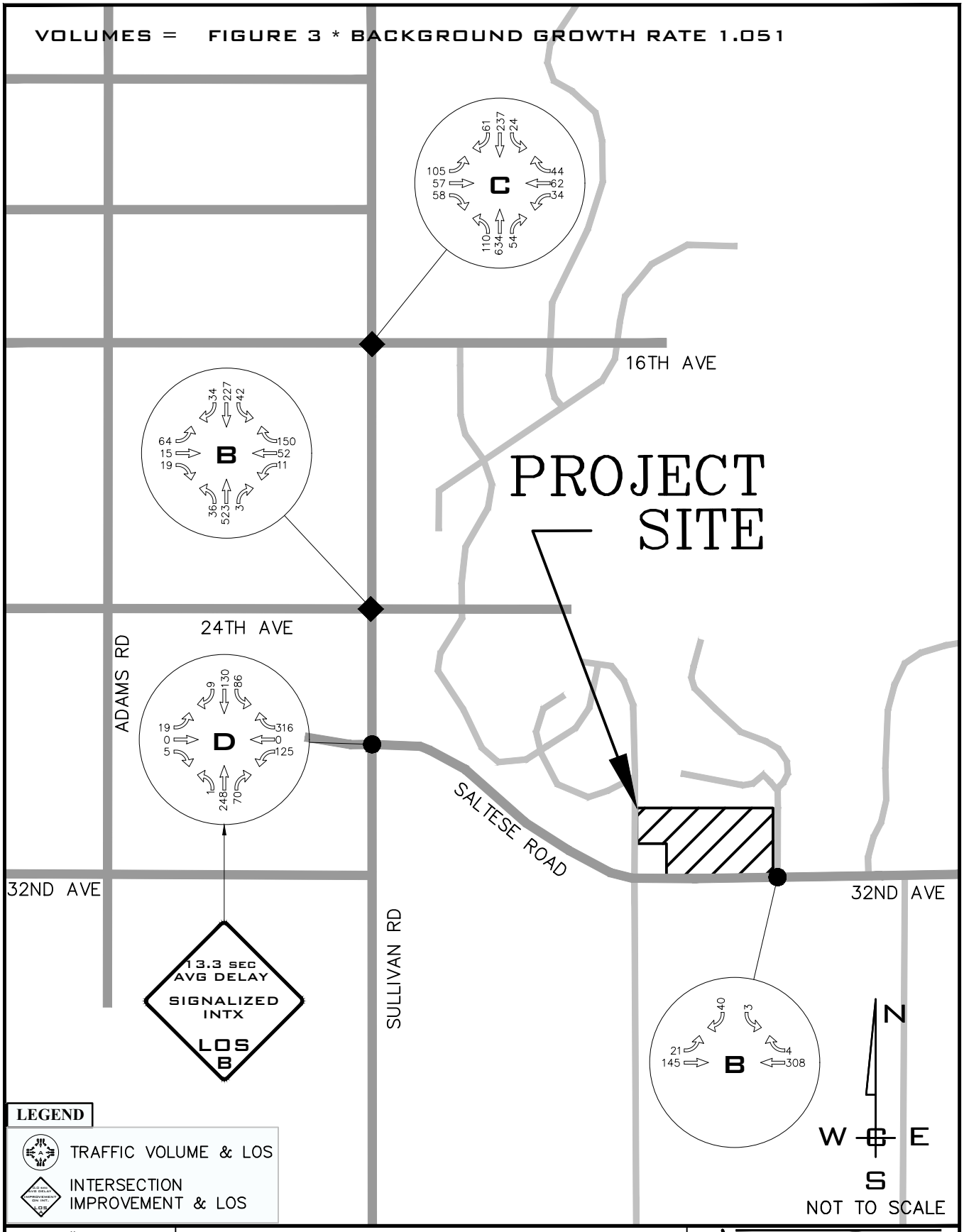
| **INTERSECTION** | **(S)ignalized (U)nsignalized** | **AM Peak Hour** | | **PM Peak Hour** | |
|---|---|---|---|---|---|
| | | **Delay (sec)** | **LOS** | **Delay (sec)** | **LOS** |
| 16th Ave & Sullivan Rd | S | 22.0 | C | 23.5 | C |
| 24th Ave & Sullivan Rd | S | 11.5 | B | 10.1 | B |
| Saltese Rd & Sullivan Rd | U | 25.2* | D* | 53.1* | **F*** |
| • Signalized Intersection | (S) | (13.3) | (B) | (11.7) | (B) |
| 32nd Avenue & Man O'War Court** | U | 10.8 | B | 9.8 | A |

***Delay and LOS based on critical movement – EB for AM and WB LT for PM**

****Delay and LOS based on critical movement – SB for AM and PM**

The Spokane County and the City of Spokane Valley have adopted level of service D as the minimum acceptable level for signalized intersections and level of service E as the minimum acceptable level for unsignalized intersections.

As shown in Table 3, all intersections are anticipated to operate at an acceptable level of service except the intersection of Saltese Road & Sullivan Road. With the signalized intersection at Saltese Road & Sullivan Road, the intersection is anticipated to operate at an acceptable level of service.

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# TRAFFIC IMPACT ANALYSIS
# 32ND AND CONKLIN
## 16605 E 32ND AVENUE
## SPOKANE COUNTY, WASHINGTON

FIGURE 5

2027 AM VOL. W GROWTH RATE & LOS

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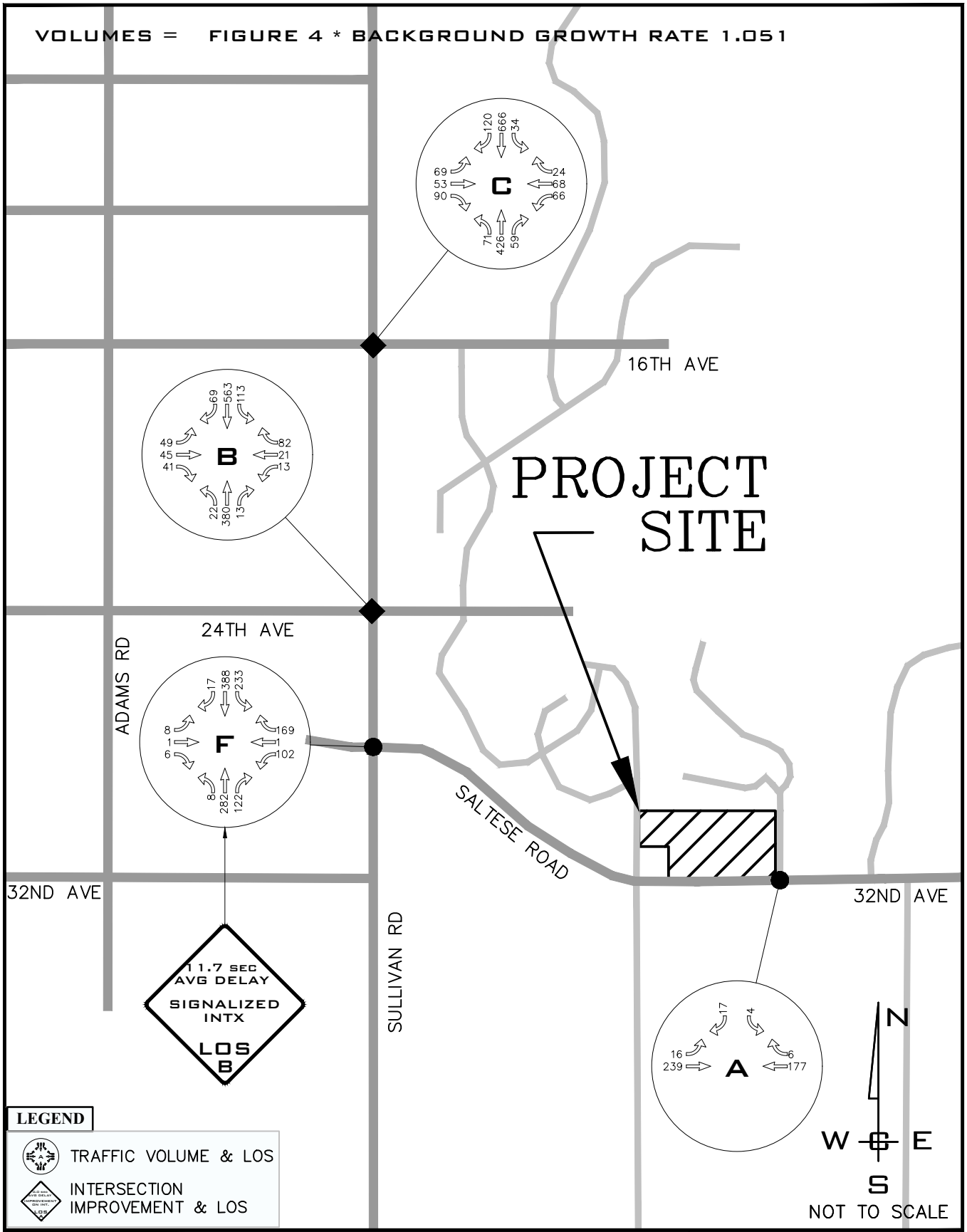
VOLUMES = FIGURE 4 * BACKGROUND GROWTH RATE 1.051

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|---|---|---|
| PROJ #: 21-2933<br>DATE: 04/06/22<br>DRAWN: KMK<br>APPROVED: TRW | TRAFFIC IMPACT ANALYSIS<br>**32ND AND CONKLIN**<br>16605 E 32ND AVENUE<br>SPOKANE COUNTY, WASHINGTON | WCE<br>WHIPPLE CONSULTING ENGINEERS<br>CIVIL AND TRANSPORTATION ENGINEERING<br>21 S. PINES ROAD<br>SPOKANE VALLEY, WASHINGTON 99206<br>PH: 509-893-2617 FAX: 509-926-0227 |
| FIGURE 6 | 2027 PM VOL. W GROWTH RATE & LOS | |

***Background Project Traffic***

In addition to the natural increase in background growth, background projects that have already been approved or have made application and have been vested before this project have been included. The summary of background project traffic volumes used for this report are shown on Table 5. Please see Figures 7 & 8 for a graphical representation of this distribution.

***Table 4 – Summary of the Background Project Trip Generation (Figure 7&8)*** *

| Background Projects | ITE LUC | Remaining/ Total | AM Peak Hour Trips | | | PM Peak Hour Trips | | |
|---|---|---|---|---|---|---|---|---|
| | | | Vol. / LUC | Directional Distribution | | Vol. / LUC | Directional Distribution | |
| | | | | In | Out | | In | Out |
| Painted Hills PRD | 230 | 52/52 Units | 23 | 4 | 19 | 28 | 19 | 9 |
| | 210 | 206/206 Units | 155 | 39 | 116 | 201 | 127 | 74 |
| | 210 | 42/42 Units | 32 | 8 | 24 | 42 | 26 | 16 |
| | 220 | 228/228 Units | 117 | 23 | 94 | 138 | 90 | 48 |
| | 220 | 52/52 Units | 27 | 5 | 22 | 32 | 20 | 12 |
| | 820 | 13.4/13.4 KSF | 13 | 8 | 5 | 40 | 20 | 20 |
| | 820 | 9.0/9.0 KSF | 9 | 6 | 3 | 34 | 16 | 18 |
| | 931 | 4.0/4.0 KSF | 4 | 2 | 2 | 30 | 20 | 10 |
| Elk Ridge Heights | 210 | 17/119 Units | 17 | 4 | 13 | 19 | 12 | 7 |
| Elk Meadow | 335 | 335/335 Units | 243 | 61 | 182 | 325 | 205 | 120 |
| Paxton Addition | 210 | 13/14 Units | 15 | 4 | 11 | 15 | 10 | 5 |
| 31st & Adams | 210 | 6/20 Units | 10 | 3 | 7 | 7 | 4 | 3 |
| Ponderosa Ridge | 210 | 135/135 Units | 101 | 25 | 76 | 136 | 86 | 50 |
| Total | | | **766** | **192** | **574** | **1,047** | **655** | **392** |

***The trip generations for the background projects are based upon the approved TIA and TGDL.**

**Background Project Description**

**Painted Hills PRD**: The project site is located on the northeast corner of Thorpe Road & Dishman-Mica Road. The proposed development includes 52 Cottage Style Single Family Lots, 206 Single Family Residential Lots, 42 Estate Type Single Family Lots, 228 Apartment Units, and a commercial development and a mixed use commercial/residential development (4.26 ± ac), with a total of 99.7 acres +/-. The project will be accessed via Dishman-Mica Road, Thorpe Road, and Madison Road. Based upon the Traffic Impact Analysis completed in 2015, the build out year for this project was 2020, therefore, for this analysis 100% of available generated trips are assumed on the system.

**Elk Ridge Heights**: The project site is located on the west side of 46th Avenue & SR 27. 119 single family lots were proposed, and 102 lots are currently occupied. The project is accessed via SR 27.

**Elk Meadow Estates**: The project site is located on the northwest corner of 40th Avenue & Highway 27. The project proposes to develop 50.00 acres +/- into a 335 single family lots with four (4) north/south and three (2) east/west public local access roads. The project is accessed via 40th Avenue, 35th Avenue, and the Clinton Road connection to 32nd Avenue. The expected build out year is 2025.

**Paxton Addition:** The project site is located on the east side of Thorpe Road & Madison Road. 14 single family lots were proposed and 1 lot is currently occupied. The project is accessed via Madison Road.

**31st & Adams:** The project site is located on the west side of 31st Street & Adams Road. The project proposes to develop 5.09 +/- acres into 21 single family residential lots with a public Street (31st Street). 20 single family lots were proposed, and 15 lots are currently occupied. The project is accessed via 31st Street and Adams Road.

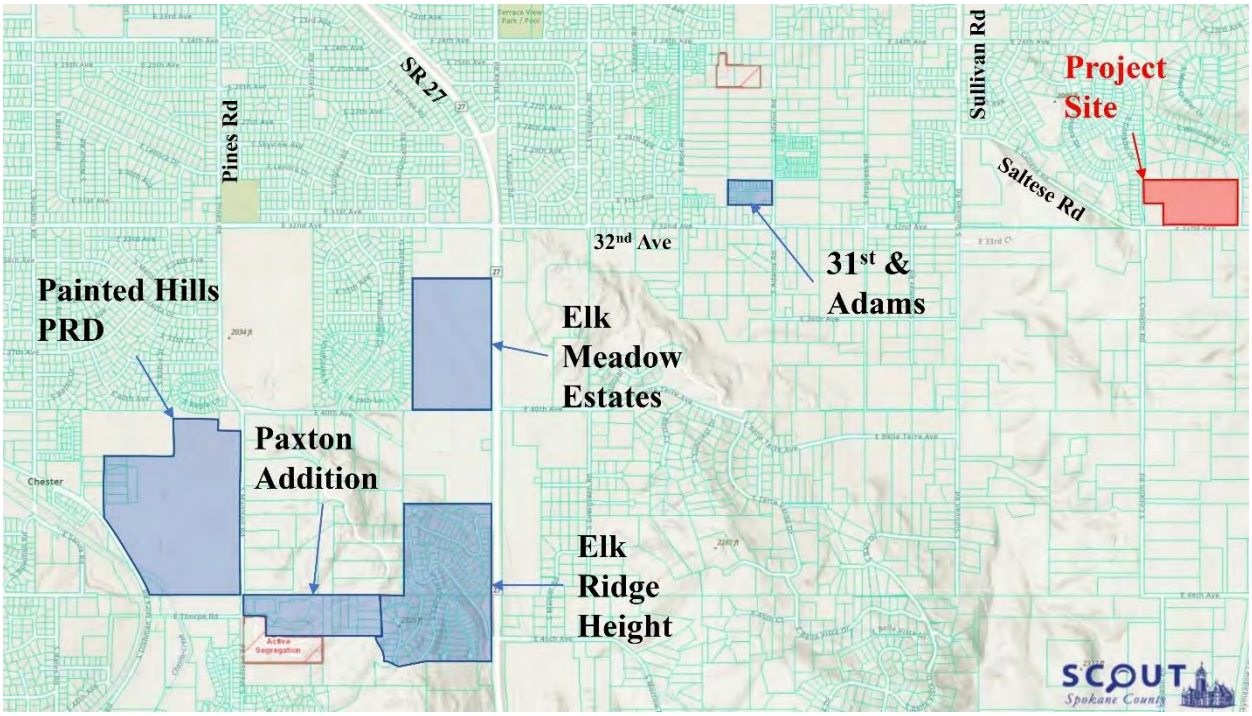
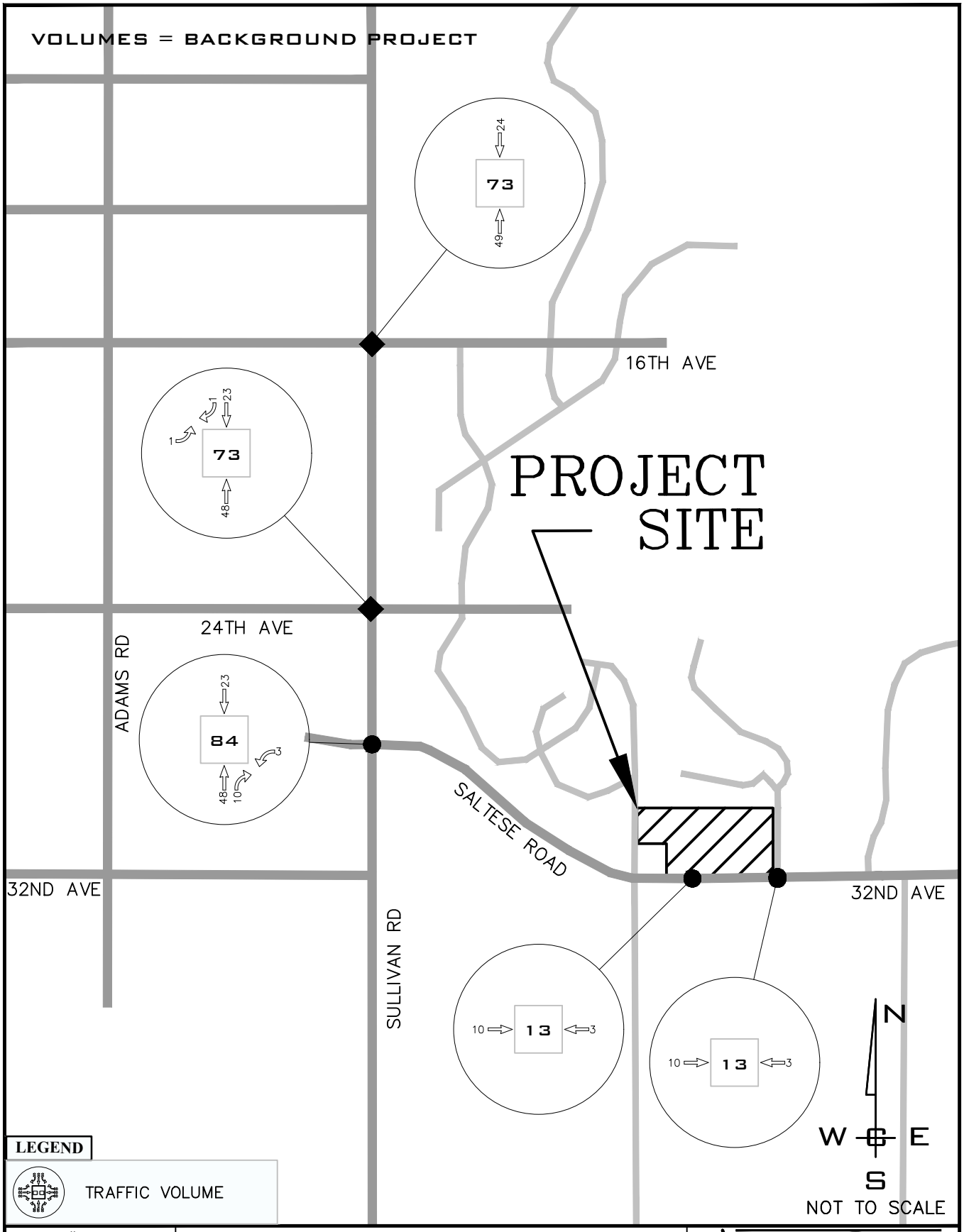



***Exhibit 1 – Background Projects***




| | | |
|---|---|---|
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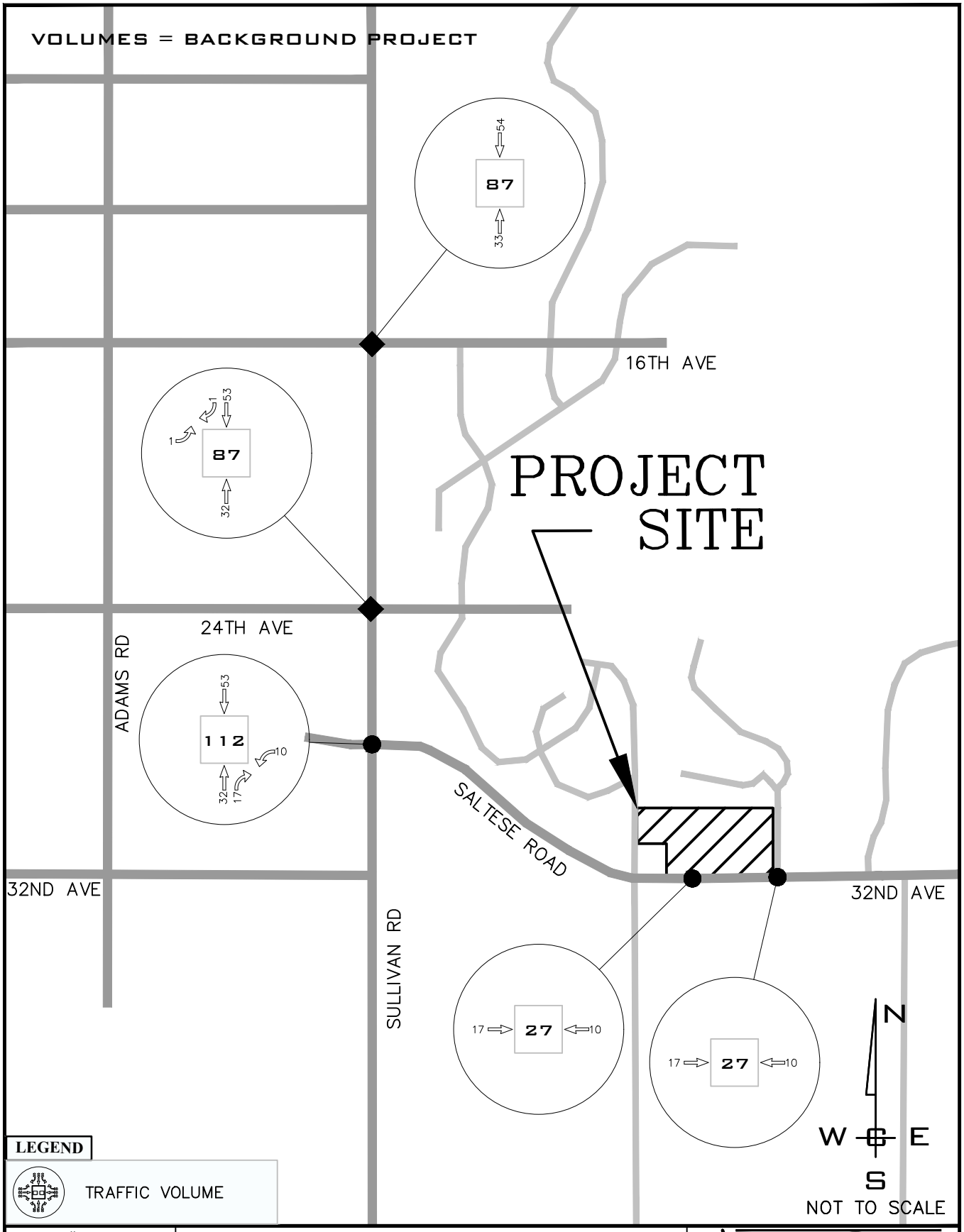
| FIGURE 7 | AM BACKGROUND TRIPS | |




| | | |
|---|---|---|
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| FIGURE 8 | PM BACKGROUND TRIPS | |

***Year 2027 with the Background Projects and without the Project***

This scenario assumes that the development has not moved forward. The traffic volumes for this condition include the traffic volumes shown on Figures 5 & 6 and adds the traffic from the background projects as shown on Figures 7 & 8. Please see Figures 9 & 10 for the traffic volumes used for this scenario. A summary of the Level of Service results is shown in the following table.

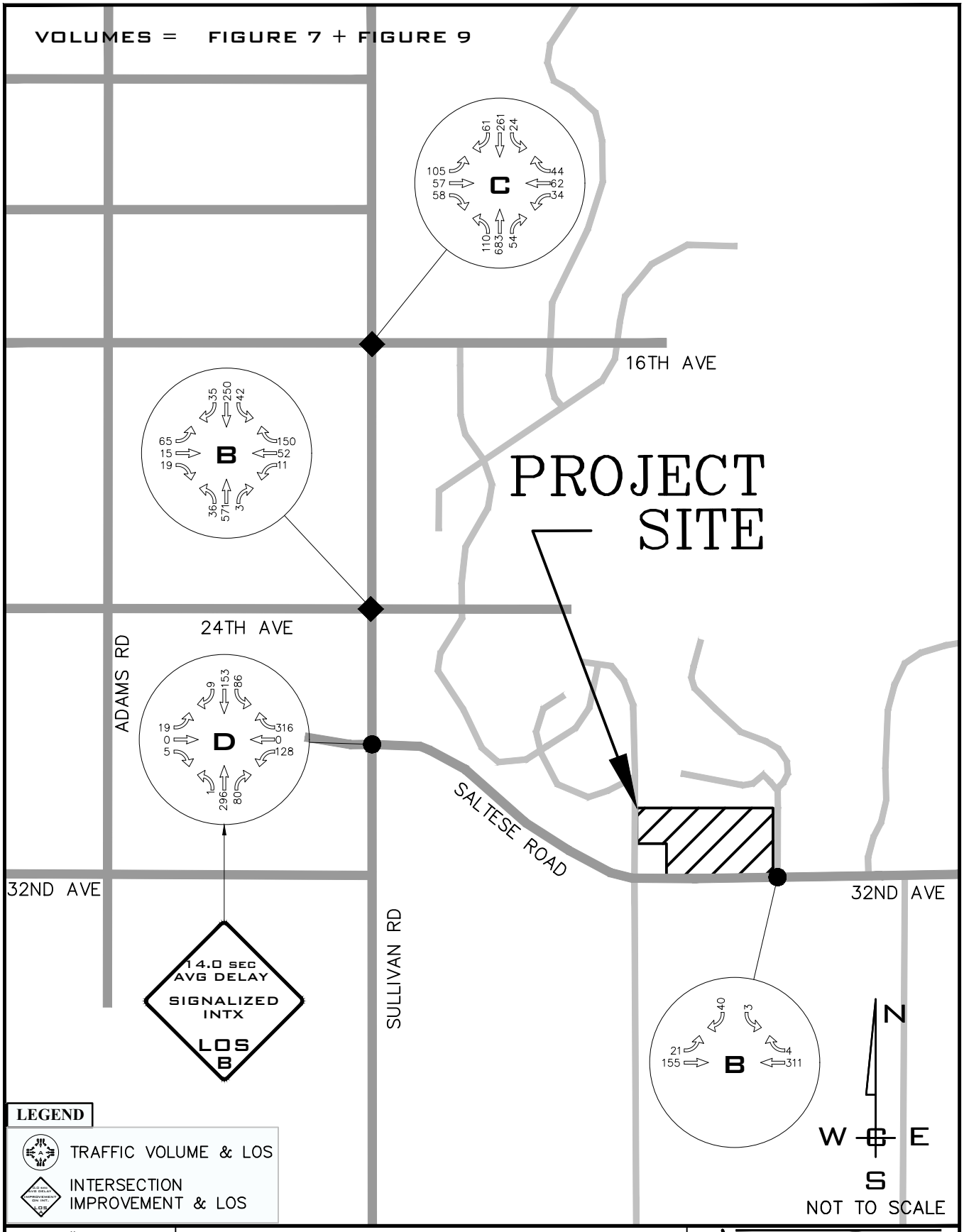
***Table 5 – Year 2027 LOS, with the Background Projects and without the Project (Fig. 9&10)***

| **INTERSECTION** | **(S)ignalized (U)nsignalized** | **AM Peak Hour** | | **PM Peak Hour** | |
|---|---|---|---|---|---|
| | | **Delay (sec)** | **LOS** | **Delay (sec)** | **LOS** |
| 16th Ave & Sullivan Rd | S | 22.2 | C | 24.0 | C |
| 24th Ave & Sullivan Rd | S | 11.8 | B | 10.3 | B |
| Saltese Rd & Sullivan Rd* | U | 31.0 | D | 77.4 | **F** |
| • Signalized Intersection | (S) | (14.0) | (B) | (12.1) | (B) |
| 32nd Avenue & Man O'War Court** | U | 10.8 | B | 9.9 | A |

***Delay and LOS based on critical movement – EB for AM and WB LT for PM**
****Delay and LOS based on critical movement – SB for AM and PM**

The Spokane County and the City of Spokane Valley have adopted level of service D as the minimum acceptable level for signalized intersections and level of service E as the minimum acceptable level for unsignalized intersections.

As shown in Table 5, with the signalized intersection at Saltese Road & Sullivan Road, all intersections are anticipated to operate at acceptable levels of service.

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# TRAFFIC IMPACT ANALYSIS
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FIGURE 9

2027 AM VOL. W- BK PROJECT
W-O PROJECT & LOS

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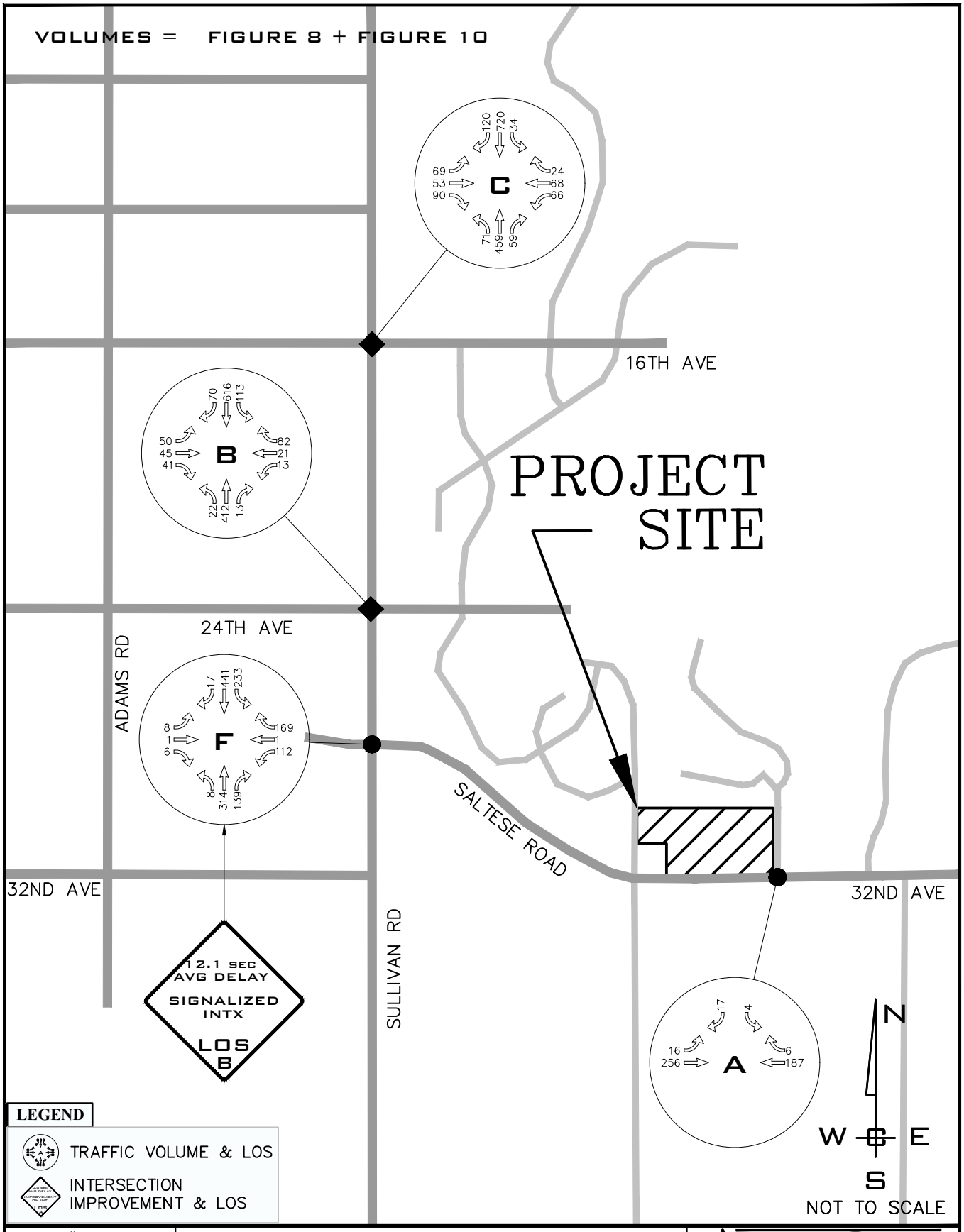


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**TRAFFIC IMPACT ANALYSIS**
# 32ND AND CONKLIN
**16605 E 32ND AVENUE**
**SPOKANE COUNTY, WASHINGTON**

**FIGURE 10**

**2027 PM VOL. W- BK PROJECT**
**W-O PROJECT & LOS**

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***Trip Generation and Distribution***

As noted earlier, trip generation rates for the AM and PM peak hours are determined by the use of the *Trip Generation Manual, 11th Edition* published by the Institute of Transportation Engineers (ITE). The purpose of the *Trip Generation Manual* is to compile and quantify empirical data into trip generation rates for specific land uses within the US, UK and Canada.

**Proposed Land Uses**

For the proposed 105 single family residential units, Land Use Code LUC#210, Single-Family Detached Housing was used to establish the number of potential trips generated by the proposed land use. Based upon Section 4.4 in Trip Generation Handbook, the fitted curve equation was used to calculate new project trips. The fitted curve equation and the anticipated number of AM & PM peak hour trips for the proposed land use are shown on Table 6.

***Table 6 - Trip Generation Rates for LUC # 210 – Single-Family Detached Housing***

| Dwelling Units | AM Peak Hour Trips | | | PM Peak Hour Trips | | |
|---|---|---|---|---|---|---|
| | Vol. @ Fitted Curve Equation / Unit | Directional Distribution | | Vol. @ Fitted Curve Equation / Unit | Directional Distribution | |
| | | 26% In | 74% Out | | 63% In | 37% Out |
| 105 | 78 | 20 | 58 | 105 | 66 | 39 |
| Average Daily Trip Ends (ADT) | | | | Fitted Curve Equation<br>AM – Ln(T) = 0.91 Ln(x) + 0.12<br>PM - Ln(T) = 0.94 Ln(x) + 0.27<br>ADT – Ln(T) = 0.92 Ln(x) + 2.68<br>T = Trips/units, x = Dwelling Units | | |
| Units | Fitted Curve Equation | | ADT | | | |
| 105 | - | | 1,056 | | | |

For the proposed 36 duplex residential units, Land Use Code LUC#215, Single-Family Attached Housing was used to establish the number of potential trips generated by the proposed land use. Based upon Section 4.4 in Trip Generation Handbook, the fitted curve equation was used to calculate new project trips. The fitted curve equation and the anticipated number of AM & PM peak hour trips for the proposed land use are shown on Table 7.

***Table 7 - Trip Generation Rates for LUC # 215 – Single-Family Attached Housing***

| Dwelling Units | AM Peak Hour Trips | | | PM Peak Hour Trips | | |
|---|---|---|---|---|---|---|
| | Vol. @ Fitted Curve Equation / Unit | Directional Distribution | | Vol. @ Fitted Curve Equation / Unit | Directional Distribution | |
| | | 31% In | 69% Out | | 57% In | 43% Out |
| 36 | 14 | 4 | 10 | 18 | 10 | 8 |
| Average Daily Trip Ends (ADT) | | | | Fitted Curve Equation<br>AM – T = 0.52(x) - 5.70<br>PM - T = 0.60(x) – 3.93<br>ADT – T = 7.62(x) – 50.48<br>T = Trips/units, x = Dwelling Units | | |
| Units | Fitted Curve Equation | | ADT | | | |
| 36 | - | | 224 | | | |

A trip generation summary of the proposed residential development is shown in Table

***Table 8 – Trip Generation Summary (Figures 11&12)***

| Land Use Code (LUC) | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|
| | Vol. per LUC | Directional Distribution | | Vol. per LUC | Directional Distribution | |
| | | In | Out | | In | Out |
| LUC 210 Single-Family Detached Housing | 78 | 20 | 58 | 105 | 66 | 39 |
| LUC 215 Single Family Attached Housing | 14 | 4 | 10 | 18 | 10 | 8 |
| Total | 92 | 24 | 68 | 123 | 76 | 47 |

| Average Daily Trip Ends (ADT) | | |
|---|---|---|
| **Land Use Code (LUC)** | **Rate** | **ADT** |
| LUC 210 Single-Family Detached Housing | | 1,056 |
| LUC 215 Single Family Attached Housing | | 224 |
| Total | | 1,280 |

As shown on Table 8, the proposed development is anticipated to generate a total of 92 trips in the AM peak hour with 24 trips entering the site and 68 trips exiting the site. In the PM peak hour, the proposed development is anticipated to generate a total of 123 trips, with 76 trips entering the site and 47 trips exiting the site. The proposed development is anticipated to generate a total of 1,280 average daily trip ends to/from the site.

***Trip Distribution Characteristics of the Proposed Project***

Considering many factors such as the surrounding transportation facilities, typical commuting patterns, existing development in the area, and Average Daily Traffic counts as well as coordination with the City Traffic Engineer, traffic for the proposed development is anticipated as follows: 90% of the trips are anticipated to go to/from the west via Saltese Road with 60% of the trips traveling to/from the north via Sullivan Road and 30% of the trips traveling to/from the west via 32nd Avenue, and 10% of the trips are anticipated to go to/from the east via 32nd Avenue. Of the 60% trips on Sullivan Road to/from the north, 30% of the trips are anticipated to go to/from the north via Sullivan Road, 10% of the trips are anticipated to go to/from the west via 16th Avenue, 5% of the trips are anticipated to go to/from the west via 24th Avenue, 5% of the trips are anticipated to go to/from the east via 24th Avenue, and 10% of the trips are anticipated to go to/from the east via 16th Avenue. Please see Figures 11 & 12, Project Trip Distribution.

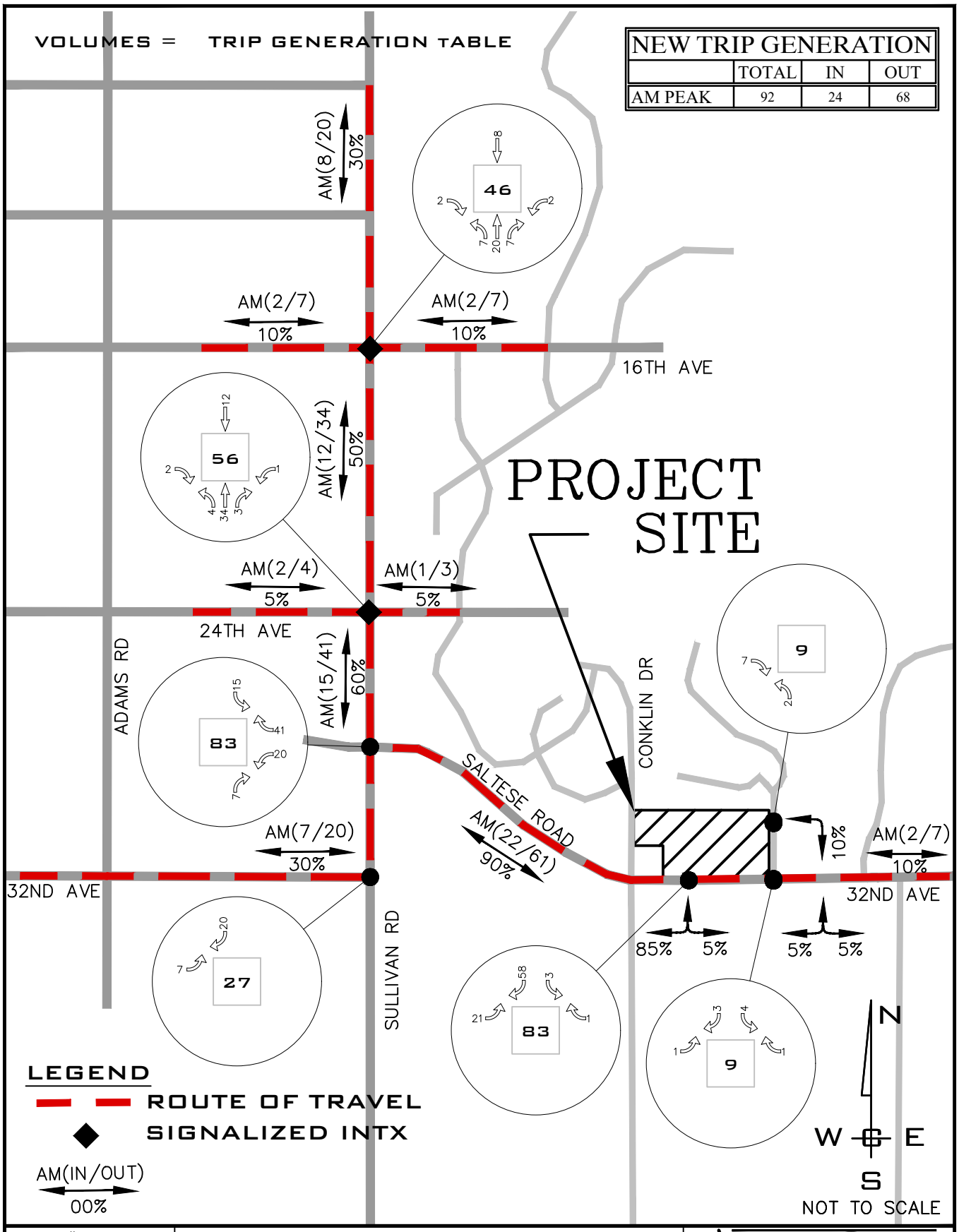


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FIGURE 11

## AM NEW TRIP DISTRIBUTION

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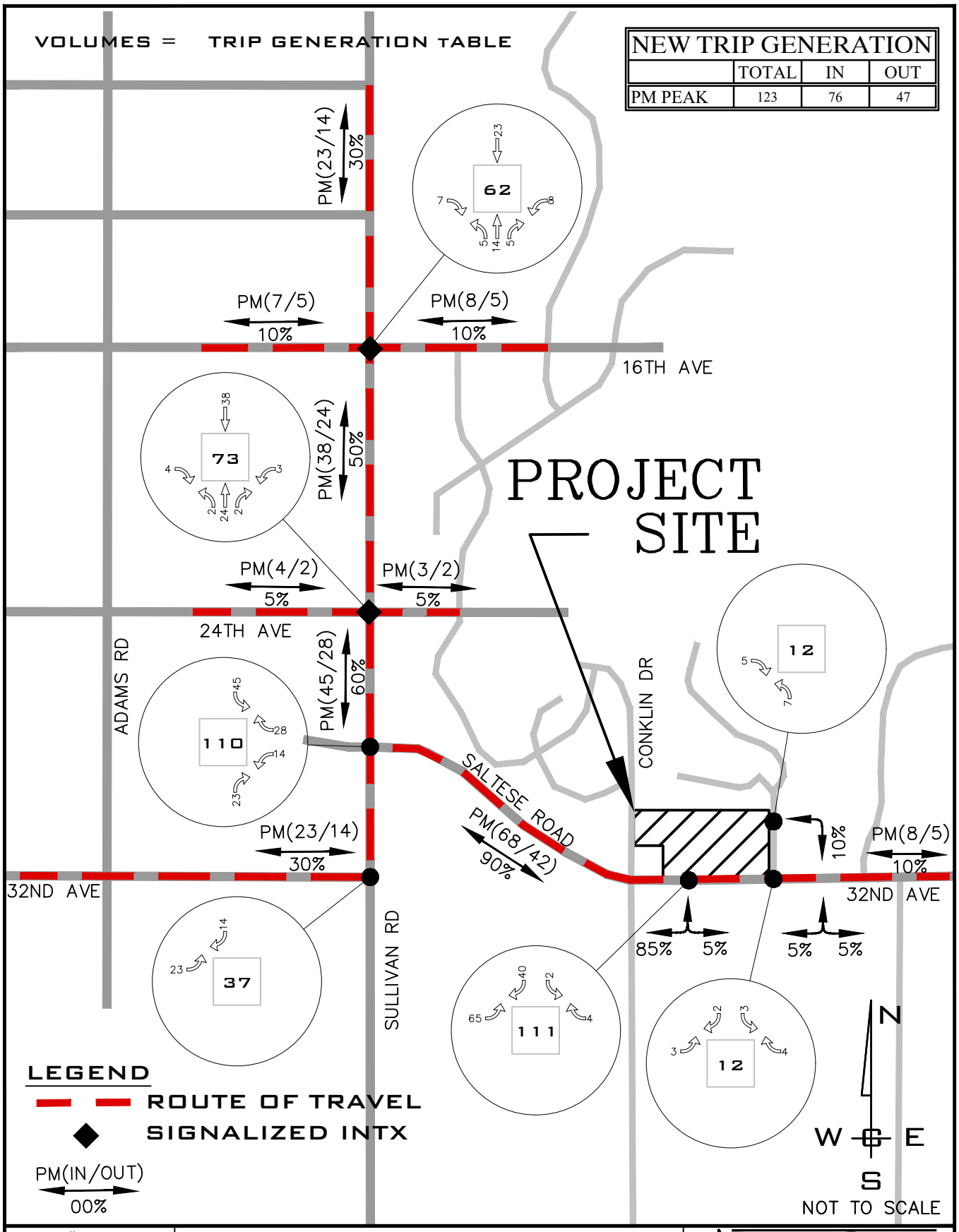


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FIGURE 12

## PM NEW TRIP DISTRIBUTION

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***Year 2027 with the Background Projects and the Project***
This scenario assumes that the project have moved forward and is added to the previously established baseline. The traffic volume for this condition includes the traffic volumes shown on Figures 9 & 10 and adds the project trips as shown on Figures 11 & 12. Please see Figures 13 & 14 for the traffic volumes used for this scenario. A summary of the Level of Service results is shown in the following table.

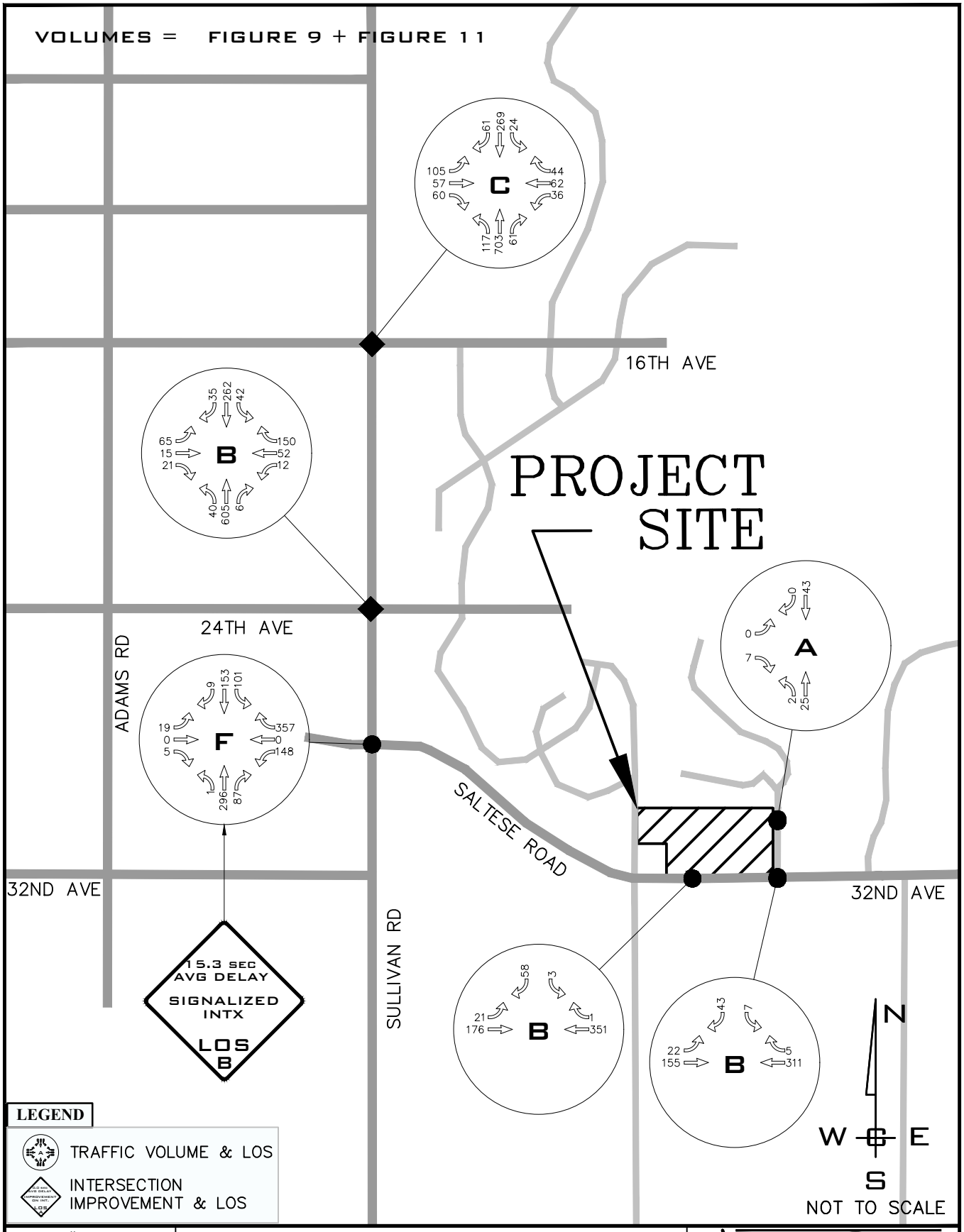
***Table 9 – Year 2027 LOS, with the Background Projects & the Project (Figure 13&14)***

| **INTERSECTION** | **(S)ignalized (U)nsignalized** | **AM Peak Hour** | | **PM Peak Hour** | |
|---|---|---|---|---|---|
| | | **Delay (sec)** | **LOS** | **Delay (sec)** | **LOS** |
| 16th Ave & Sullivan Rd | S | 22.5 | C | 24.9 | C |
| 24th Ave & Sullivan Rd | S | 12.1 | B | 10.6 | B |
| Saltese Rd & Sullivan Rd* | U | 51.7 | **F** | 168.4 | **F** |
| • Signalized Intersection | (S) | (15.3) | (B) | (13.5) | (B) |
| South Access & 32nd Avenue** | U | 11.2 | B | 9.9 | A |
| Man O'War Court & East Access*** | U | 8.5 | A | 8.4 | A |
| 32nd Avenue & Man O'War Court** | U | 11.1 | B | 10.2 | B |

***Delay and LOS based on critical movement – EB for AM and WB LT for PM**
****Delay and LOS based on critical movement – SB for AM and PM**
*****Delay and LOS based on critical movement – EB for AM and PM**

The Spokane County and the City of Spokane Valley have adopted level of service D as the minimum acceptable level for signalized intersections and level of service E as the minimum acceptable level for unsignalized intersections.

As shown in Table 9, with the signalized intersection at Saltese Road & Sullivan Road, all intersections are anticipated to operate at acceptable levels of service.

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# TRAFFIC IMPACT ANALYSIS
# 32ND AND CONKLIN
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## SPOKANE COUNTY, WASHINGTON

FIGURE 13

2027 AM VOL. W- BK PROJECT
W- PROJECT & LOS

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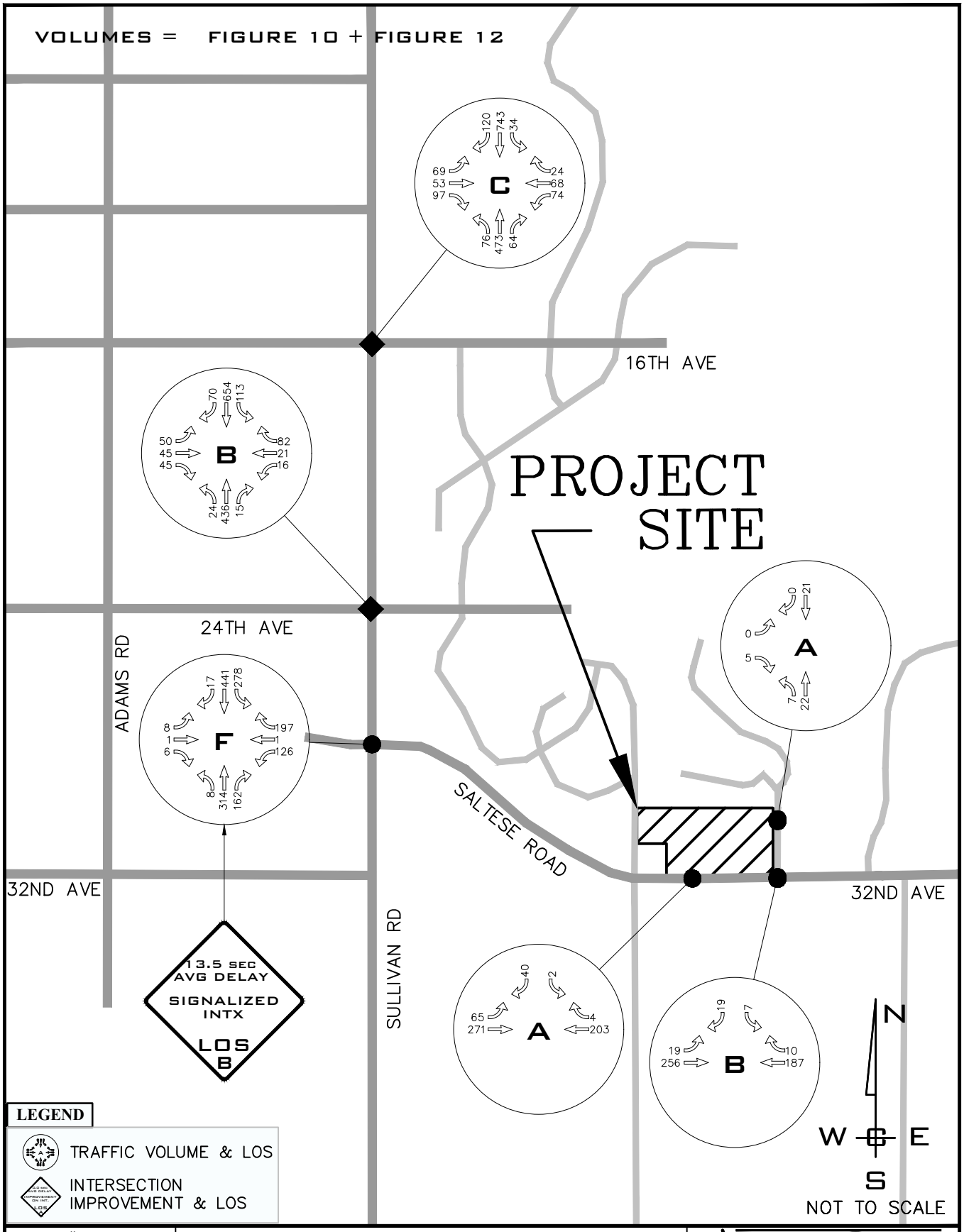


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# TRAFFIC IMPACT ANALYSIS
# 32ND AND CONKLIN
## 16605 E 32ND AVENUE
## SPOKANE COUNTY, WASHINGTON

FIGURE 14

2027 PM VOL. W- BK PROJECT
W- PROJECT & LOS

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## ADDITIONAL ANALYSIS

Based upon the TIA scoping, the additional analysis includes Horizontal/Decision Sight Distance, Signal Warrant, and Left-Turn & Right-Turn Lane Analysis as shown in the following lists.

1. Horizontal/Decision Sight Distance
   a. Galaway Road (South Access) & 32nd Avenue
   b. 30th Avenue (East Access) & Man O' War Court

2. Signal Warrant Analysis
   a. Saltese Road & Sullivan Road

3. Left-Turn & Right-Turn Lane Analysis
   a. Galaway Road (South Access) & 32nd Avenue
   b. Man O' War Court & 32nd Avenue


***Horizontal / Decision Sight Distance***

The decision sight distance or horizontal sight distance of an intersection is essential in the safe operation of an unsignalized intersection. For a vehicle stopped at an intersection on a minor road, the decision to enter the intersection is dependent on the sight distance of the minor street driver's eye. Any obstructions within the sight distance triangles such as; trees, bushes, fences, or existing vertical curves would impair the driver's ability to make a safe decision to enter the intersection. Therefore, an analysis of the sight distance triangles was done to determine if there are any objects within the sight triangles that may block the view of the driver. This analysis will follow sight distance guidelines which are listed in AASHTO's publication *A Policy on Geometric Design of Highways and Streets 2018 7th Edition.* For this analysis, Chapter 9 - intersection Sight Distance (pg. 9-28 to pg. 9-59) was used as a guideline for calculating the sight distance triangles, that includes Cases A through G.

**Decision Point**

The decision point as described by AASHTO is the vertex of the Sight Distance triangles and is the location of the driver in a stopped vehicle. The vertex of the sight triangle should be located 14.5 feet from the edge of the major road traveled way, six feet from the minor road center line, and 3.5 feet above the road surface. Per AASHTO 3.2 Sight Distance, the driver's eye within the passenger car, design vehicle is set at a height of 3.5' above the pavement surface, the target of the driver's eye is typically an object that measures 2' from the pavement surface and represents the height of a vehicle's headlights.

**Intersection Sight Distance**

The posted speed limit on 32nd Avenue at the intersection with the south access is 35 MPH with a design speed of 40 MPH. The posted speed limit on Man O' War Court at the intersection with the east access is 25 MPH with a design speed of 30 MPH. In order to determine the length needed for the base of the triangles, Tables 9-7 & 9-9 were used.

**Table 9-7**
**Left turn from stop**

| Design speed (mph) | Stopping Sight Distance (ft) | Intersection sight distance for passenger cars: Calculated (ft) | Intersection sight distance for passenger cars: Design (ft) |
|---|---|---|---|
| 15 | 80 | 165.4 | 170 |
| 20 | 115 | 220.5 | 225 |
| 25 | 155 | 275.6 | 280 |
| **30** | 200 | 330.8 | **335** |
| 35 | 250 | 385.9 | 390 |
| **40** | 305 | 441.0 | **445** |
| 45 | 360 | 496.1 | 500 |
| 50 | 425 | 551.3 | 555 |
| 55 | 495 | 606.4 | 610 |
| 60 | 570 | 661.5 | 665 |
| 65 | 645 | 716.6 | 720 |
| 70 | 730 | 771.8 | 775 |
| 75 | 820 | 826.9 | 830 |
| 80 | 910 | 882.0 | 885 |

**Table 9-9**
**Right turn and crossing from stop**

| Design speed (mph) | Stopping Sight Distance (ft) | Intersection sight distance for passenger cars: Calculated (ft) | Intersection sight distance for passenger cars: Design (ft) |
|---|---|---|---|
| 15 | 80 | 143.3 | 145 |
| 20 | 115 | 191.1 | 195 |
| 25 | 155 | 238.9 | 240 |
| **30** | 200 | 286.7 | **290** |
| 35 | 250 | 334.4 | 335 |
| **40** | 305 | 382.2 | **385** |
| 45 | 360 | 430.0 | 430 |
| 50 | 425 | 477.8 | 480 |
| 55 | 495 | 525.5 | 530 |
| 60 | 570 | 573.3 | 575 |
| 65 | 645 | 621.1 | 625 |
| 70 | 730 | 668.9 | 670 |
| 75 | 820 | 716.6 | 720 |
| 80 | 910 | 764.4 | 765 |

Per page 9-46 & 9-48 of AASHTO "No adjustment of the recommended sight distance values for the minor-road grade is needed as the measured slope of the approach is less than 3% ±.

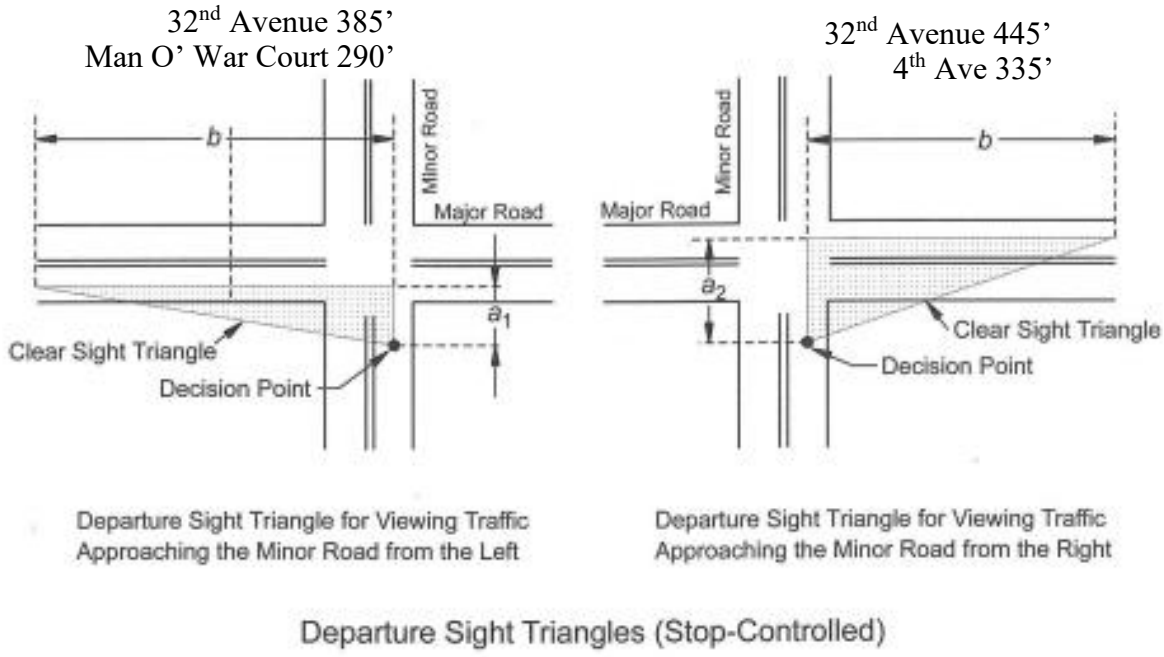
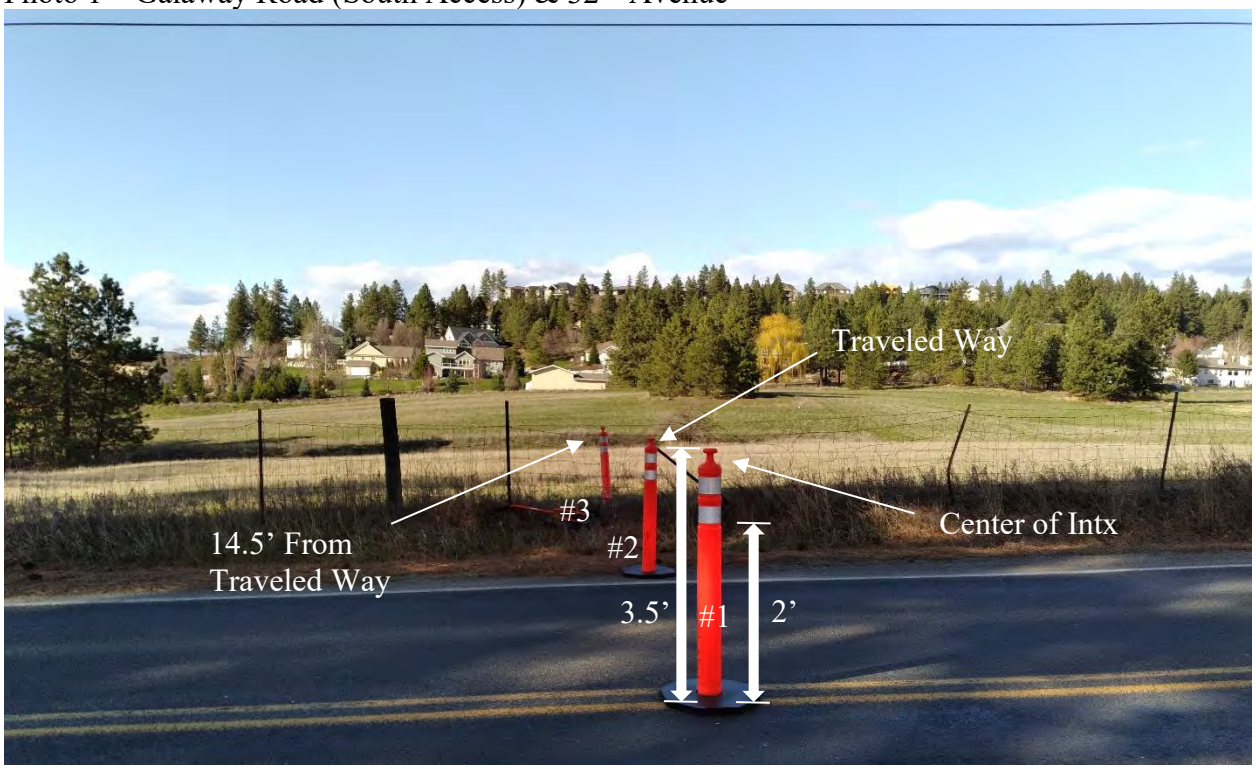



Figure 9-17. Departure Sight Triangles for Intersections

**Galaway Road (South Access) & 32nd Avenue**

Photo 1 – Galaway Road (South Access) & 32nd Avenue



**Right Turn Movement (SB to WB)**

Photo 2 – From 14.5' Decision Point looking east for right turn movement

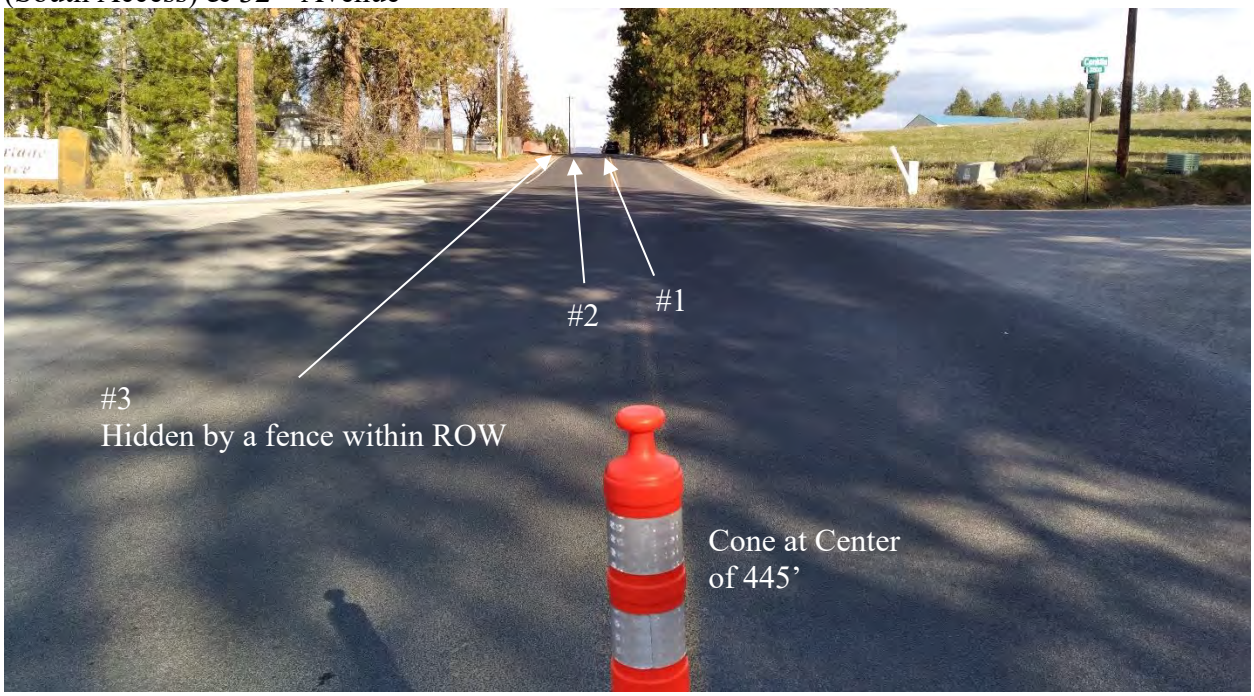

Photo 3 – Looking west from Cone at 385' to the intersection of Galaway Road (South Access) & 32nd Avenue

**Left Turn Movement (SB to EB)**

Photo 4 – From 14.5’ Decision Point looking west for left turn movement


Photo 5 – From 8.0’ Decision Point looking west for left turn movement

Photo 6 – Looking east from Cone at Center of 445’ to the intersection of Galaway Road (South Access) & 32nd Avenue

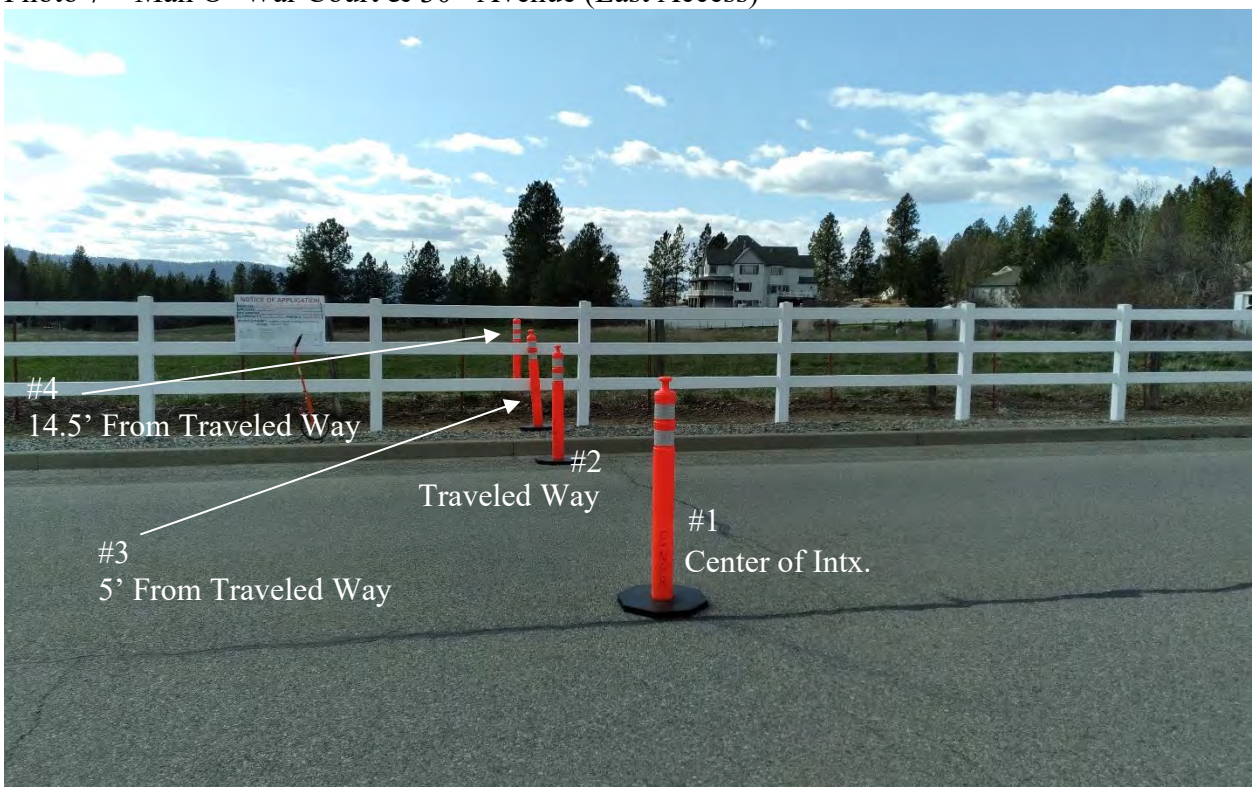



**Galaway Road (South Access) & 32nd Avenue Conclusion**

For the right and left turn movements, there is a sight obstruction with two fences. One of them is located along the property line on the project site and will be removed during construction. The remaining one is located within the Right of Way (ROW). We recommend that the fence within the ROW be removed to secure better sight distance for the left turn movement per the Spokane County standard.

**Man O' War Court & 30th Avenue (East Access)**

Photo 7 – Man O' War Court & 30th Avenue (East Access)




**Right Turn Movement (EB to SB)**

Photo 8 – From 14.5' Decision Point looking north for right turn movement

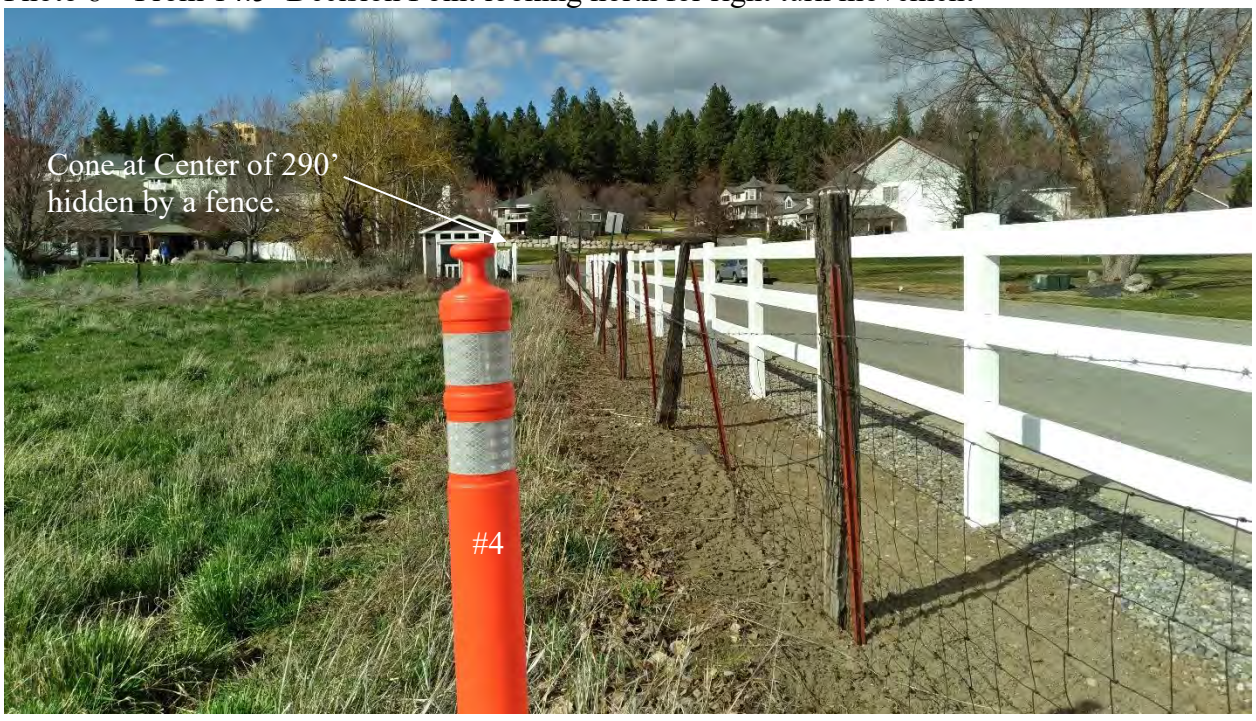


Photo 9 – From 5.0’ Decision Point looking north for right turn movement


Photo 10 – Looking south from Cone at 290’ to the intersection of Man O’ War Court & 30th Avenue (East Access)

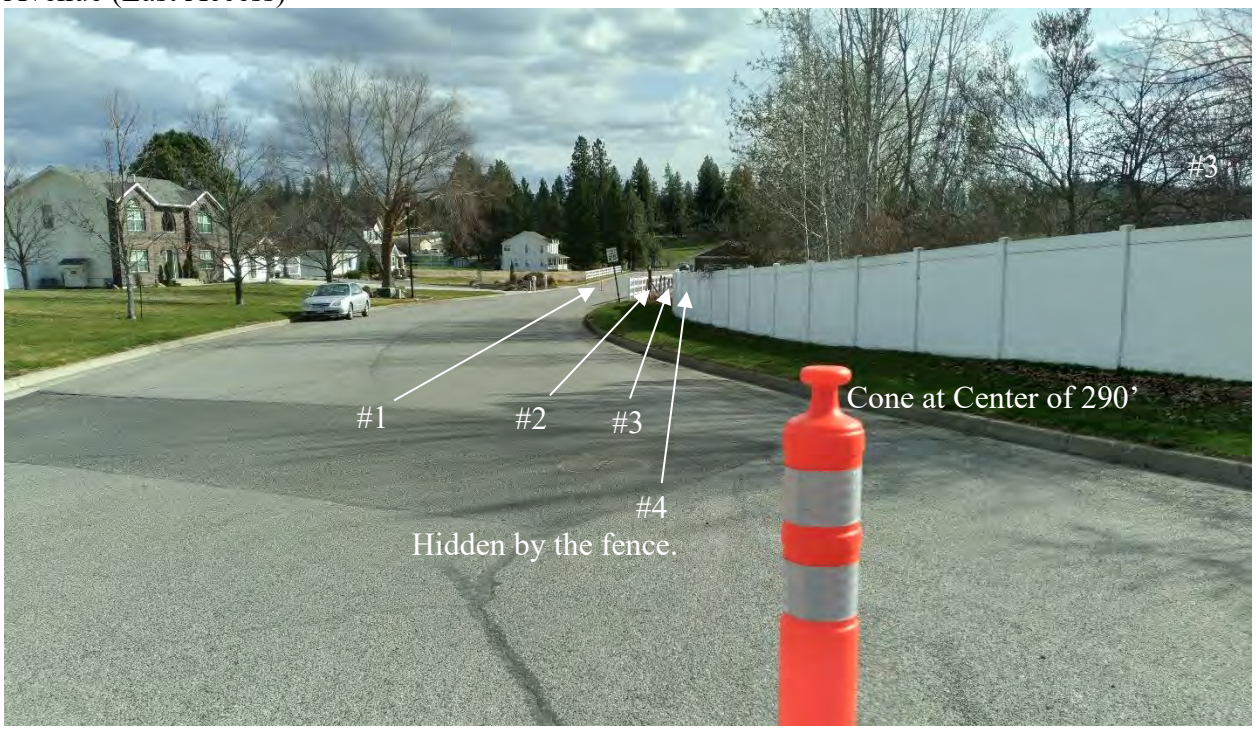


Photo 11 – From 14.5’ Decision Point looking north for right turn movement (230’ Sight Distance Available)


**Left Turn Movement (EB to NB)**

Photo 12 – From 14.5’ Decision Point looking south for left turn movement

Photo 13 – Looking north from Cone at Center of 335' to the intersection of Man O' War Court & 30th Avenue (East Access)


**Man O' War Court & 30th Avenue (East Access) Conclusion**

For the left turn movement, there is adequate sight distance available. For the right turn movement, the recommend AASHTO sight distance of 290' is not available. There is currently 230' of sight distance available, which is more than the 200' of AASHTO stopping distance needed to avoid a collision. It is recommended that an appropriate advisory sign(s) (Ex. MUTCD W2-2 Sign with "Limited Sight Distance" Warning) be installed to protect the safety of the traveling public.

***Signal Warrant Analysis***

Spokane County Six Year Transportation Plan includes the installation of a signal at the intersection of Saltese Road and Sullivan Road. The improvement is anticipated to raise the intersection level of service. Please see the appendix for the Warrant Analysis for the intersection. The results are summarized in Table 10.

***Table 10 – Signal Warrant for the Intersection of Saltese & Sullivan Roads***

| Warrant | 2020 Counts W/O Covid Factor | 2020 Counts W/ Covid Factor |
|---|---|---|
| Warrant 1 – Eight Hour Warrant | **Satisfied** | **Satisfied** |
| Warrant 2 – Four Hour Warrant | **Satisfied** | **Satisfied** |
| Warrant 3 – PM Peak Hour | Not Satisfied | **Satisfied** |
| Warrant 4 – Pedestrian Volume | Not Satisfied | Not Satisfied |
| Warrant 5 – School Crossing | Not Satisfied | Not Satisfied |
| Warrant 6 – Coordinated Signal System | Not Satisfied | Not Satisfied |
| Warrant 7 – Crash Experience | **Satisfied** | **Satisfied** |
| Warrant 8 – Roadway Network | **Satisfied** | **Satisfied** |
| Warrant 9 – Intersection Near A Grade Crossing | Not Satisfied | Not Satisfied |

As shown in Table 10, based upon signal warrant analysis, a signal is warranted at the intersection of Saltese & Sullivan Roads. A signal installation for the intersection is anticipated to raise the intersection level of service to an acceptable level.

Based upon the analysis provided and the capacity analysis of the intersection at Saltese Road & Sullivan Road for Elk Meadow Estates Project (Included in the Appendix), it is recommended that the cost per trip for new proposed trips to the transportation system using the available capacity should be $267.37 per PM peak hour trip. The project is projecting 110 PM peak hour trips through the intersection. The improvement participation is anticipated to total $29,410.70 ($267.37 x 110 trips) or $208.59 per lot/unit ($29,410.70/141 units). As each lot goes through the permitting process the project specific trip generation will be determined and the fee applied to the PM peak hour trips or the specific lot and will be due at the time of building permit.

***Left-Turn & Right-Turn Lane Analysis at South Access & Man O' War Court on 32nd Avenue***

Per the request of Spokane County, we have analyzed the proposed accesses to determine if a left turn and a right turn are warranted based upon the WSDOT design manual Exhibit 1310-7a and Exhibit 1310-11. The results are summarized in Table 11 and the left and right turn storage warrant analysis are shown in following exhibits:

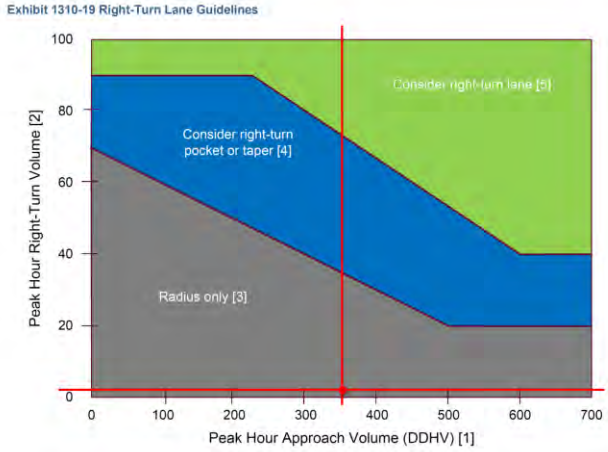
*Table 11 – Summary of Right-Turn & Left-Turn Lanes Warrant Analysis*

| Intersection | Turn Lane | | Traffic Volume | | Left/Right Turn Warrant Justification |
|---|---|---|---|---|---|
| | | | DHV/DDHV | Turn Volume (%) | |
| S. Access & 32nd Ave | WB RT Lane | AM | 352 | 1 | Not Satisfied |
| | | PM | 207 | 4 | |
| | EB LT Lane | AM | 548 | 21 (3.83%) | Not Satisfied |
| | | PM | 543 | 65 (11.97%) | |
| Man O' War Ct & 32nd Ave | WB RT Lane | AM | 316 | 5 | Not Satisfied |
| | | PM | 197 | 10 | |
| | EB LT Lane | AM | 492 | 22 (4.47%) | Not Satisfied |
| | | PM | 472 | 19 (4.03%) | |

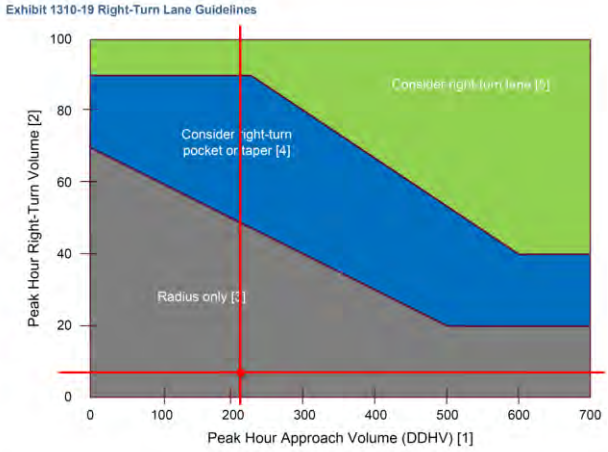
## South Access & 32nd Avenue

**South Access & 32nd Ave - Westbound Right Turn Storage Analysis**

**AM (DDHV: 352, Right Turn Volume: 1)**




**PM (DHV: 207, Right Turn Volume: 4)**

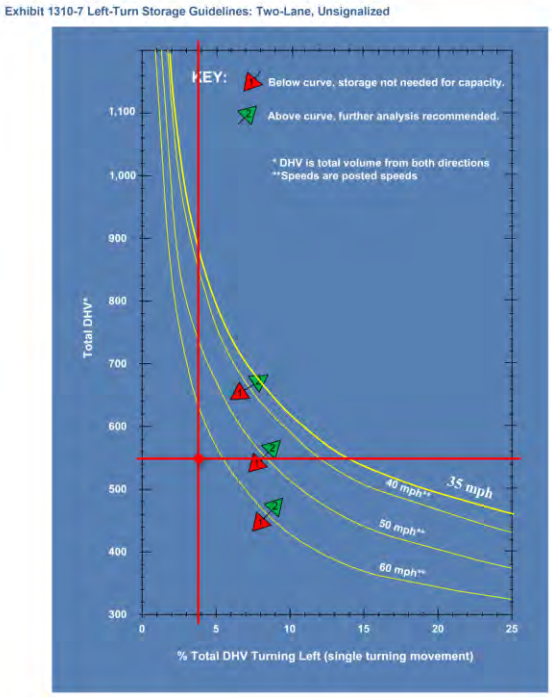



**Source: WSDOT Design Manual**

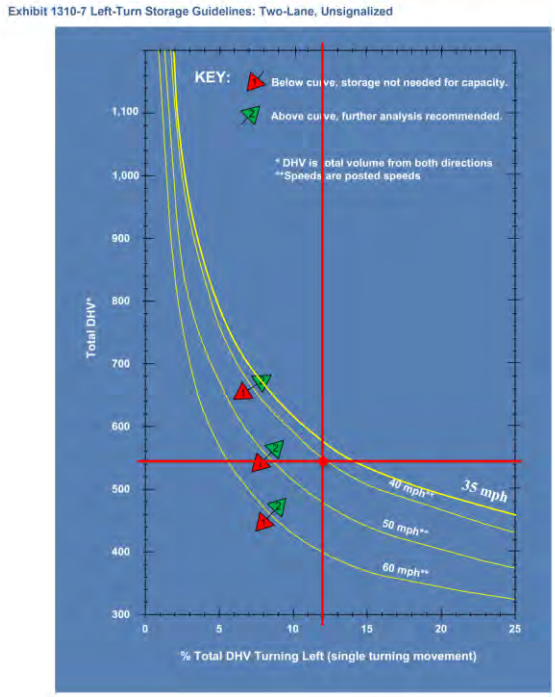
***Exhibit 2 – Westbound Right Turn Storage Analysis at South Access & 32nd Avenue***

**South Access & 32nd Ave – Eastbound Left Turn Storage Analysis**

**AM (DHV: 548, Left Turn Volume: 21 (3.83%))**




**PM (DHV: 543, Left Turn Volume: 65 (11.97%))**



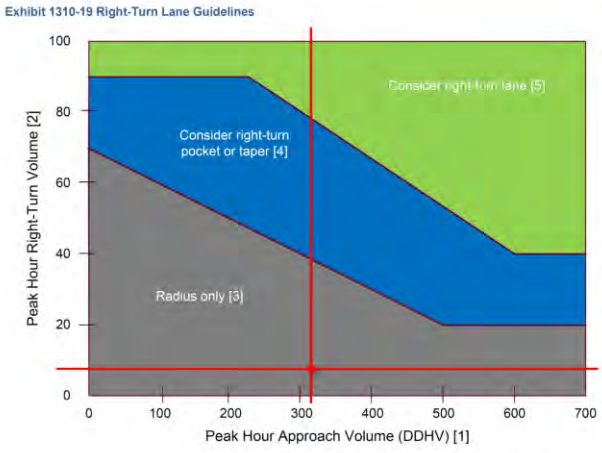

**Source: WSDOT Design Manual**

***Exhibit 3 – Eastbound Left Turn Storage Analysis at South Access & 32nd Avenue***

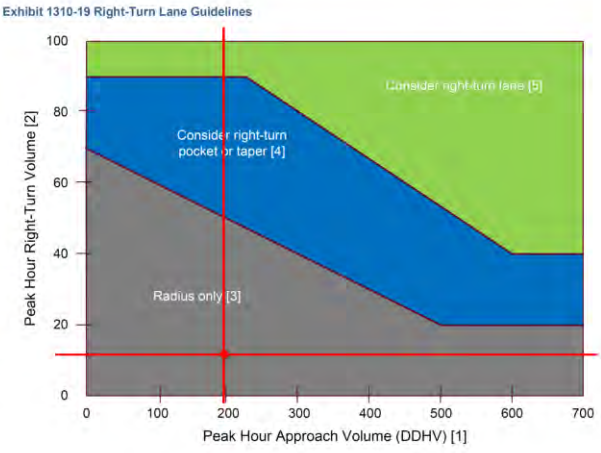
## Man O' War Court & 32nd Avenue

**Man O' War Ct & 32nd Ave - Westbound Right Turn Storage Analysis**

**AM (DDHV: 316, Right Turn Volume: 5)**




**PM (DHV: 197, Right Turn Volume: 10)**

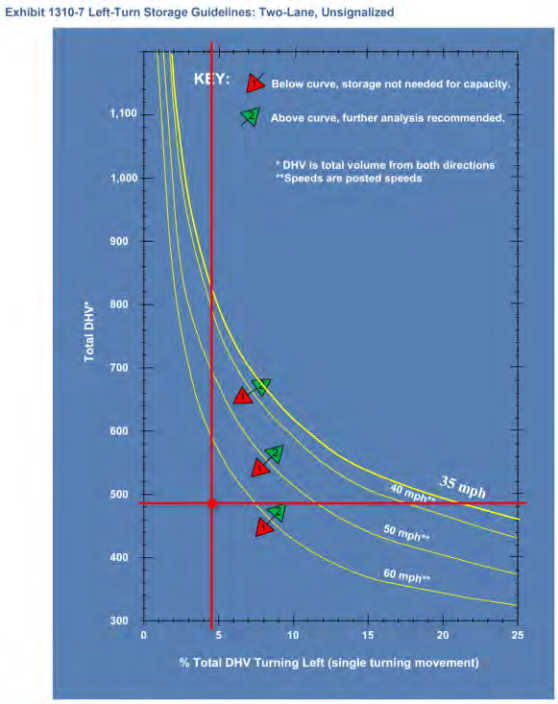



**Source: WSDOT Design Manual**

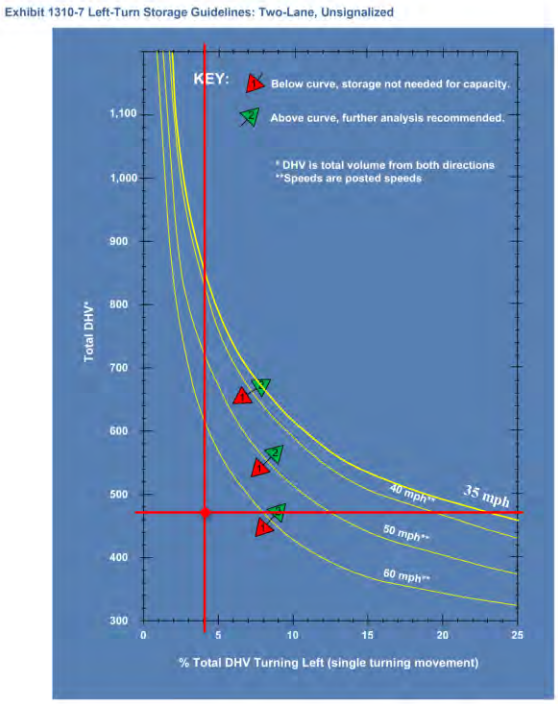
***Exhibit 4 – Westbound Right Turn Storage Analysis at Man O' War Court & 32nd Avenue***

**Man O' War Ct & 32nd Ave - Eastbound Left Turn Storage Analysis**

**AM (DHV: 492, Left Turn Volume: 22 (4.47%))**




**PM (DHV: 472, Left Turn Volume: 19 (4.03%))**




**Source: WSDOT Design Manual**

***Exhibit 5 – Eastbound Left Turn Storage Analysis at Man O' War Court & 32nd Avenue***

## Conclusion

Based upon the left and right-turn lane warrants analysis provided, it is concluded that the intersections of South Access & 32nd Avenue and Man O' War Court & 32nd Avenue do not meet the WSDOT right and left turn lane warrants.

On March 01, 2022, a virtual public traffic scoping meeting was held at 5:00 pm, the meeting was proctored by Ben Goodmansen. The issues related to traffic impacts were brought up and were either addressed at the meeting or are addressed here. The comments by public are listed below with our response in *italic*.

1. The intersection at Sullivan & Saltese is only part of the problem. Saltese hill is very dangerous and cannot handle that much more traffic especially in the Winter! – Sherry Corigliano

*Based upon the historical accident record (2016-2020) provided by WSDOT, a summary of accident data and geographical representation on Saltese Road and 32nd between Sullivan and Man O' War Court is shown in Exhibit 6 & Table 12.*


***Exhibit 6 - Accident Data Map on Saltese Road and 32nd***

***Table 12 – Summary of Accident Data on Saltese Road and 32nd (2016 – 2020)***

| Location (Exhibit 6) | Report Number | Date | Time | Damage* | | Weather | Road Surface Condition | Collision Type | Drive Contributing |
|---|---|---|---|---|---|---|---|---|---|
| | | | | I | P | | | | |
| 1 | EA87751 | 12/01/20 | 06:22 | 0 | 1 | Clear | Wet | Vehicle Strikes Deer | None |
| 2 | E926373 | 05/29/19 | 19:08 | 0 | 1 | Clear/Partly Cloudy | Dry | Guardrail – Face | Inattention |
| 3** | E938858 | 07/10/19 | 17:12 | 1 | 1 | Clear/Partly Cloudy | Dry | Vehicle Overturned | None |
| 4 | E568763 | 07/28/16 | 23:13 | 1 | 1 | Clear/Partly Cloudy | Dry | Tree or Stump (Stationary) | Under Influence of Alcohol |
| 5 | E610632 | 10/04/16 | 14:47 | 1 | 1 | Raining | Wet | Roadway Ditch | Exceeding Reas. Safe Speed |
| 6 | 3731185 | 02/08/19 | 14:23 | 1 | 1 | Snowing | Snow/Slush | Fence | Exceeding Reas. Safe Speed |

***P: Property Damage Only, I: Injury**
****Motorcycle**

*As shown in Table 12, 6 accidents have been reported on Saltese Road and 32nd Avenue between Sullivan Road and Man O' War Court with 1 snow/slush road condition, 2 wet road conditions, and 3 dry road conditions.*

2. Conklin Rd is very poorly maintained in the winter time. Many cars slide into the intersection of Conklin/32nd (approaching from the south) due to icy conditions. If traffic is increased to the numbers you are indicating, this could create more accidents and dangerous conditions. – Suzanne Beringer

*Based upon Snow Plow Priority Map provided by Spokane County, a summary of Snow Plow Priority Routes within the study area is shown in Exhibit 7.*

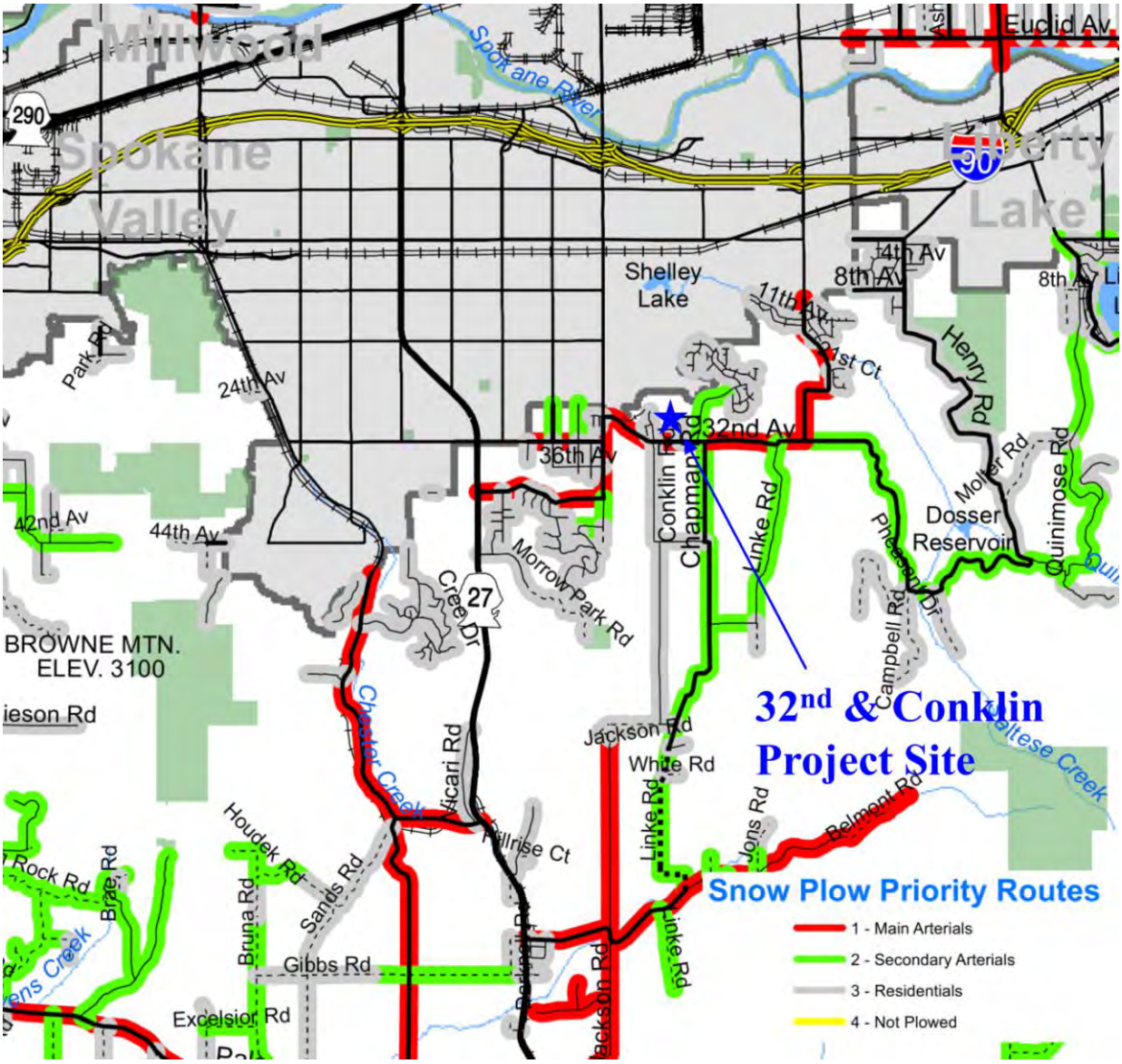



***Exhibit 7 – Snow Plow Priority Map (Spokane County)***

*As shown in Exhibit 7, Saltese Road & 32nd Avenue are assigned as 1-Main Arterials and Conklin Road & Man O' War Court are assigned as 3-Residentials.*

3. We've lived out here for over 40 years and have seen a major impact to Saltese especially the hill leading to Sullivan. In the winter this is very dangerous and not immediately maintained when winter weather arrives. Are there any plans to improve this portion of Saltese before construction on this development starts? – Sherry Corigliano

*There are no known improvement projects on Saltese Road.*

4. Given the current high risk of accidents on 32nd between Man O War and Sullivan, what are short and long term plans to improve the safety of this section of the Road? Should this new Plat of proposed home help pay for these improvements? – Jim D Allen

*The installation of a traffic signal should help reduce the risk to drivers.*

5. *(a)*There is already excessive traffic on 32nd Avenue. By excessive I mean that it is not uncommon for us to wait three to five minutes to cross the road to retrieve our mail. *(b)*We can safely assume that this development will add 200 and more vehicles to add to the existing load. There is not existing capacity to bear more traffic from Chapman, Saltese Flats, Fox Ridge and Morningside. Whipple has quoted data from national traffic studies stating at peak periods, the additional load will be about 76. I would judge this to be minimalization of added traffic.

   (c)We will not agree to another egress onto 32nd. With the existing excessive traffic, you will bring traffic to a standstill. In the winter, we can wait up to 15 minutes at the bottom of the hill at Sullivan. Putting a stop signal at the top of the hill at the intersection of Conklin will create another problem with stopped traffic on 32nd traveling uphill to have a problem resuming forward motion or even backsliding. The hill crests right at the proposed egress which creates a blind spot. No intersection should be allowed on the approach or at the crest.

   (d)Any improvement costs, anticipated or unanticipated, are to be levied on the project, not existing homes whose residents have already paid for infra-structure. Proportionate share is not relevant because the need for those improvements is brought on by the addition of the proposed addition. I should not be taxed to pay for upgrades that this development requires. This should be required for five years from the beginning of the project. – Dave Ewers

*(a) Traffic counts on 32nd Avenue & Man O' War Court were collected in March 15 (Tuesday), 2022 under direction of Whipple Consulting Engineers (WCE). A summary of traffic counts on 32nd and the anticipated trips generated by this project are shown in Table 13.*

***Table 13 – Summary of Traffic Counts on 32nd Avenue and the Trip Generation by the Project***

| | 2022 Traffic Counts | | Project Trips | | Total | |
|---|---|---|---|---|---|---|
| | Eastbound | Westbound | Eastbound | Westbound | Eastbound | Westbound |
| AM | 158 | 331 | 22 | 61 | 13.9% | 18.4% |
| PM | 242 | 184 | 68 | 42 | 28.1% | 22.8% |
| Expected Increasing Rate by the Project | | | | | 13.9% - 28.1% | |

*As shown in Table 13, it is anticipated that the project will increase the trips on 32nd Avenue by 13.9% - 28.1%.*

*(b) Since Man O' War Court is the only access for 69 existing single family residential units to the north of the intersection at 32nd Avenue & Man O' War Court, the localized trip generation data can be calculated within the study area based on the traffic counts on 32nd Avenue & Man O' War Court. The trip generation based on the ITE Trip Generation Manual and 69 single family residential units is shown in Table 14.*

***Table 14 - Trip Generation Rates for LUC # 210 – Single-Family Detached Housing***

| Dwelling Units | AM Peak Hour Trips | | | PM Peak Hour Trips | | |
|---|---|---|---|---|---|---|
| | Vol. @ Fitted Curve Equation / Unit | Directional Distribution | | Vol. @ Fitted Curve Equation / Unit | Directional Distribution | |
| | | 26% In | 74% Out | | 63% In | 37% Out |
| 69 | 54 | 14 | 40 | 71 | 45 | 26 |

| Average Daily Trip Ends (ADT) | | | Fitted Curve Equation<br>AM – Ln(T) = 0.91 Ln(x) + 0.12<br>PM - Ln(T) = 0.94 Ln(x) + 0.27<br>ADT – Ln(T) = 0.92 Ln(x) + 2.68<br>T = Trips/units, x = Dwelling Units |
|---|---|---|---|
| Units | Fitted Curve Equation | ADT | |
| 69 | - | 718 | |

*The trip generation based on the WCE traffic counts is shown in Table 15.*

***Table 15 - Trip Counts for LUC # 210 – Single-Family Detached Housing***

| Dwelling Units | AM Peak Hour Trips | | | PM Peak Hour Trips | | |
|---|---|---|---|---|---|---|
| | Traffic Counts | Directional Distribution | | Traffic Counts | Directional Distribution | |
| | | In | Out | | In | Out |
| 69 | 65 | 24 | 41 | 60 | 39 | 21 |

| Average Daily Trip Ends (ADT) | | |
|---|---|---|
| Units | Traffic Counts | ADT |
| 69 | - | - |

*A comparison of ITE Trip Generation and WCE Traffic Counts are summarized in Table 16.*

***Table 16 – Trip Generation Summary***

| Land Use Code (LUC) | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|
| | Vol. per LUC | Directional Distribution | | Vol. per LUC | Directional Distribution | |
| | | In | Out | | In | Out |
| ITE Trip Generation | 54 | 14 | 40 | 71 | 45 | 26 |
| WCE Traffic Counts | <65> | <24> | <41> | <60> | <39> | <21> |
| Difference | <11> | <10> | <1> | 11 | 6 | 5 |
| Difference in %(Difference/WCE Counts) | <17%> | <42%> | <2%> | 18% | 15% | 24% |

| Average Daily Trip Ends (ADT) | | | < > Indicates Reduction of Trips or % |
|---|---|---|---|
| **Land Use Code (LUC)** | **Rate** | **ADT** | |
| ITE Trip Generation | - | 718 | |
| WCE Traffic Counts | - | - | |
| Difference | | - | |

*As shown on Table 16, the trips based upon ITE Trip Generation Manual, a single-family residential land use is anticipated to generate a total of 17% less trips in the AM peak hour with 42% less trips entering the site and 2% less trips exiting the site. In the PM peak hour, the single-family land use is anticipated to generate a total of 18% additional trips, with 15% additional trips entering the site and 24% additional trips exiting the site.*

*(c) Thank you for your opinion. The signal is proposed at Saltese Road & Sullivan Road.*

*(d) Thank you for your opinion.*

## *Conclusions*

This Traffic Impact Analysis (TIA) has reviewed and analyzed the study area per the scope established by the scoping meeting, the Spokane County, and the City of Spokane Valley. Based upon the analysis, field observations, assumptions, methodologies and results which are provided in the body of this report, it is concluded that the development of the proposed project will generate new trips on the existing transportation system in the buildout year and that those trips will not have a significant impact on the level of service of the transportation system. This conclusion was reached and has been documented within the body of this report.

- Under the **year 2022 existing** conditions, all intersections are currently operating at an acceptable level of service.

- For the **year 2027 with background growth rate** scenario, all intersections are anticipated to operate at an acceptable level of service except the intersection of Saltese Road & Sullivan Road. With the signalized intersection at Saltese Road & Sullivan Road, the intersection is anticipated to operate at an acceptable level of service.

- For the **year 2027 with background projects without the project** scenario, with the signalized intersection at Saltese Road & Sullivan Road, all intersections are anticipated to operate at acceptable levels of service.

- For the **year 2027 with background projects with the project** scenario, with the signalized intersection at Saltese Road & Sullivan Road, all intersections are anticipated to operate at acceptable levels of service.

As shown in the additional analysis section, based upon the Sight Distance Analysis provided, for the left turn movement at the intersection of Galaway Road (South Access) & 32nd Avenue, there is an existing sight obstruction with a fence which is located within the Right of Way (ROW). We recommend that the fence within the ROW be removed to secure better sight distance for the left turn movement per the Spokane County standard.

For the right turn movement at the intersection of Man O' War Court & 30$^{th}$ Avenue (East Access), the recommend AASHTO sight distance of 290' is not available. There is currently 230' of sight distance available, which is more than the 200' of AASHTO stopping distance needed to avoid a collision. It is recommended that an appropriate advisory sign(s) (Ex. MUTCD W2-2 Sign with "Limited Sight Distance" Warning) be installed to protect the safety of the traveling public.

As shown in the signal warrant analysis section, based upon a signal warrant analysis, a signal is warranted at the intersection of Saltese & Sullivan Roads. As noted previously, as the intersection meets 5 warrants of 8 warrants, a signal installation for the intersection is anticipated to raise the intersection level of service to an acceptable level.

Based upon the analysis provided and the capacity analysis of the intersection at Saltese Road & Sullivan Road for Elk Meadow Estates Project (Included in the Appendix), it is recommended that the cost per trip for new proposed trips to the transportation system using the available capacity should be $267.37 per PM peak hour trip. The project is projecting 110 PM peak hour trips through the intersection. The improvement participation is anticipated to total $29,410.70 ($267.37 x 110 trips) or $208.59 per lot/unit ($29,410.70/141 units). As each lot goes through the permitting process the project specific trip generation will be determined and the fee applied to the PM peak hour trips or the specific lot and will be due at the time of building permit.

As shown in the Left Turn and Right Turn Lane Analysis section, based upon the left and right-turn lane warrants analysis provided, it is concluded that the intersections of South Access & 32nd Avenue and Man O' War Court & 32nd Avenue do not meet the WSDOT right and left turn lane warrants.

***Recommendations***

Based upon the conclusions within this study, the proposed project is recommended to complete all required conditions of approval including frontage improvement and payment to the county mitigation fee for the Saltese & Sullivan signal at the time of building permit and should be allowed to move forward without further traffic analysis, or offsite mitigation.