

Transportation Impact Analysis

Nyberg Rivers

Tualatin, Oregon

April 2013



KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

Transportation Impact Analysis

Nyberg Rivers TIA

Tualatin, Oregon

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Section 1
Executive Summary

EXECUTIVE SUMMARY

CenterCal Properties, LLC is proposing to redevelop a portion of an existing Tualatin retail center located in the northwest quadrant of the I-5/Nyberg Road interchange. The redevelopment, known as Nyberg Rivers, will consist of a reconfiguration of portions of the larger existing shopping center site. The redevelopment plan includes demolition of existing buildings, construction of new retail pads, and the relocation of some existing uses. In addition, several access changes will be made to the site to better accommodate the estimated traffic volumes being generated by the redevelopment. When complete, the proposed redeveloped plan will consist of a maximum total of 307,000 square feet of retail space.

The transportation analysis demonstrates that the proposed Nyberg Rivers redevelopment project can be constructed while maintaining acceptable traffic operations and safety at the study intersections within the immediate site vicinity, assuming provision of the recommended mitigation measures.

FINDINGS

Year 2012 Existing Conditions

- All of the study intersections currently operate acceptably during the weekday p.m. and Saturday midday peak hours with the exception of the SW Martinazzi Avenue/SW Sagert Street and SW 65th Avenue/SW Sagert Road intersections.
 - At both the SW Martinazzi Avenue/SW Sagert Street and SW 65th Avenue/SW Sagert Street intersections, the southbound approach during the weekday p.m. peak hour operates at LOS F.

Year 2014 Background Traffic Conditions

- All of the study intersections are forecast to operate acceptably during the weekday p.m. and Saturday midday peak hours with the exception of SW Martinazzi Avenue/SW Sagert Road and SW 65th Avenue/SW Sagert Road intersections.
 - At both the SW Martinazzi Avenue/SW Sagert Street and SW 65th Avenue/SW Sagert Street intersections, the southbound approach during the weekday p.m. peak hour is forecast to continue to operate at LOS F. These findings are consistent with analysis conducted as part of the recent Tualatin Transportation System Plan (TSP) Update and future improvements are identified within the TSP for both of these intersections.

Proposed Redevelopment Plan

- Under the redevelopment plan, the existing SW 75th Avenue connection to SW Nyberg Road will be closed to improve access management along SW Nyberg Road and to better accommodate the redevelopment proposal.
- The existing signalized access on SW Nyberg Road that currently serves the shopping center and the adjacent Fred Meyer site will remain. However, the following changes are proposed in order to better accommodate the proposed redevelopment, provide additional capacity for future growth in traffic, and improve safety relative to the existing condition:
 - A westbound right-turn lane will be developed on SW Nyberg Road to enhance access to the site and minimize vehicle queuing on SW Nyberg Road.
 - The existing site driveway is proposed to be widened as shown in the proposed site plan. This widening will include dual southbound left-turn lanes, a shared through/right-turn lane, and dual in-bound receiving lanes. A raised median will be constructed in the driveway throat to reduce turning conflicts on-site turning maneuvers and manage vehicle queues on the approach to the signal.
 - The north and south approach signal phasing is proposed to be modified from permissive left-turn phasing to split phasing.
- With the anticipated mix of new retail uses, the proposed redevelopment is estimated to generate 405 net new trips during the weekday p.m. peak hour and 725 net new trips during the Saturday midday peak hour.

Year 2014 Total Traffic Conditions

- All of the study intersections within the immediate site vicinity, including the site access points and internal site intersections, are forecast to operate acceptably during the weekday p.m. and Saturday midday peak hours.
- The SW Martinazzi Avenue/SW Sagert Road and SW 65th Avenue/SW Sagert Road intersections are forecast to continue to operate at LOS F.
 - The proposed development will have an insignificant impact at either intersection, resulting in an estimated 1.6% and 0.6% increase, respectively, during the weekday p.m. peak hour.
 - The Tualatin TSP has identified mitigations for these two intersections that, when implemented, will address the long-term operations.
 - The Washington County Transportation Development Tax (TDT) in part funds an improvement project on SW Sagert Street that will add capacity and reduce delay to both intersections.
- Beyond the site's frontage along SW Tualatin Sherwood Road and SW Martinazzi Avenue, where significant transportation improvements are proposed (including implementing the

- intent of the City's Loop Road), the project will have an insignificant impact on the other study intersections (generally resulting in less than a two percent increase in traffic relative to 2014 background conditions).
- At all signalized intersections beyond the site frontage (with the exception of the I-5 interchange), the project will add on average one vehicle or less per signal cycle to any movement. This level of impact is less than significant by any traffic engineering standard and well below the level that would be perceived by motorists.
 - Anticipated vehicle queues can be accommodated at the I-5 ramp terminals and the SW Nyberg Road/Signalized site driveway.
 - The proposed Nyberg Rivers redevelopment project has proposed an on-site roadway network that will meet the intent of the loop road connection. The proposal includes the following:
 - A new roadway connection to SW Boones Ferry Road (shown as "Street A" in Figure 2) that includes sidewalks.
 - An enhanced site-access driveway to SW Nyberg Road that will better accommodate vehicular queuing and demand.
 - A potential future (assuming the City desires to move forward) new site-access connection to SW Martinazzi Avenue that aligns across from SW Seneca Street. This connection would be the Seneca Street extension envisioned in the Town Center Plan. Prior to the City making a decision on any new SW Street Seneca alignment, the redevelopment site plan preserves this connection opportunity in the present or future.
 - The preservation of east-west and north-south travel ways that will provide vehicular and pedestrian access between Street A, the Seneca Street alignment/extension, and enhanced access to SW Nyberg Road.
 - New sidewalks along the enhanced site-access driveway to SW Nyberg Road that provide pedestrian connections to the integrated site circulation network.
 - New bikeway connections along the perimeter of the site.

SW Martinazzi Avenue and SW Boones Ferry Road Site Access Alternatives

- An alternative site access scenario was evaluated that demonstrates the impact of potentially adding a fourth leg (in the form of a site-access driveway) to the existing SW Martinazzi Avenue/SW Seneca Street intersection and closing the existing SW Martinazzi Avenue site driveway adjacent to the library. This analysis produced the following results:
 - The east and west approaches to a modified SW Martinazzi Avenue/SW Seneca Street intersection would operate at Level of Service (LOS) F and over capacity during the

weekday p.m. peak hour with the addition of a fourth site-access leg. Signalizing the intersection would provide the following:

- Mitigation that results in LOS A or better (a significant improvement over existing conditions).
 - Additional excess intersection capacity beyond what is needed to serve the Nyberg Rivers project traffic.
 - Enhanced east-west pedestrian connectivity across SW Martinazzi Avenue.
 - A safety improvement relative to stop sign control.
- In addition to the modified SW Martinazzi Avenue/SW Seneca Street intersection, another site-access alternative was evaluated that demonstrates the impacts of adding a limited access site-driveway to SW Boones Ferry Road. The analysis shows that with a direct connection to SW Boones Ferry Road, there would be some shifting of site-generated traffic off of SW Martinazzi Avenue. This additional access would further improve connectivity, help implement the City's loop road concept, and provide additional capacity beyond what is needed to serve the Nyberg Rivers project.

RECOMMENDATIONS

- With the proposed Nyberg Rivers redevelopment:
 - The existing SW 75th Avenue site-access driveway to SW Nyberg Road should be closed in order to minimize turning movement conflicts, allow for the construction of a westbound right-turn lane at the SW Nyberg Road/signalized site driveway, and improve the interchange access spacing conditions along SW Nyberg Road.
 - To better accommodate the anticipated site-generated traffic at the SW Nyberg Road/Signalized site driveway:
 - A new westbound right-turn lane should be constructed on SW Nyberg Road.
 - The site driveway should be modified to include dual southbound left-turn lanes, a shared through/right-turn lane, and two inbound receiving lanes.
 - The existing north/south traffic signal phasing should be modified from permissive phasing to split phasing. Right-turn overlap phasing should be provided for the westbound right-turn movement into the Nyberg Rivers site.
- If site access to SW Martinazzi Avenue is provided via a new fourth leg to the SW Martinazzi Avenue/SW Seneca Street intersection, the intersection should be signalized.
- If a new site access driveway is provided to SW Boones Ferry Road, the driveway should be limited to right-in/right-out only access.

Section 2
Introduction

INTRODUCTION

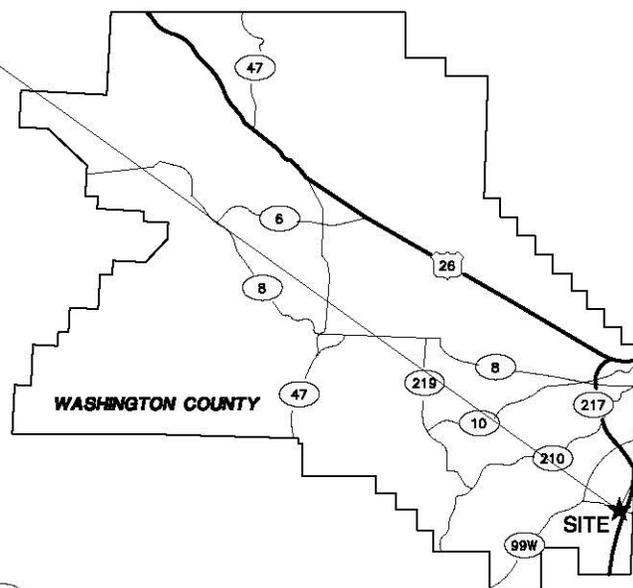
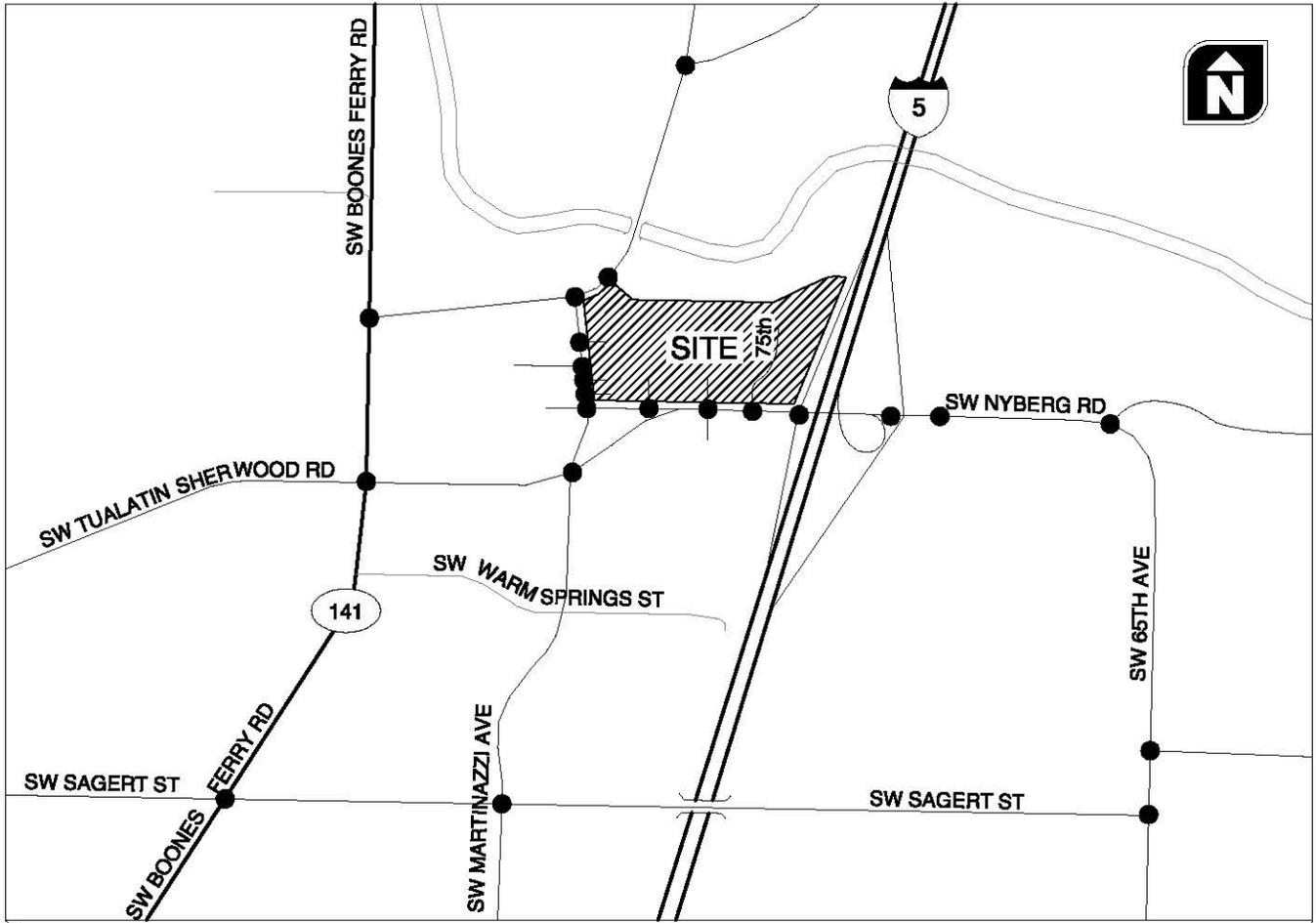
PROJECT DESCRIPTION

CenterCal Properties, LLC is proposing to redevelop a portion of the existing Tualatin shopping center located in the northwest quadrant of the I-5/Nyberg Road interchange. The existing shopping center has been anchored by K-Mart and includes an assortment of other supporting retail uses such as drive-thru banks, fast-food restaurants, and small to medium miscellaneous retailers. The Tualatin City Hall and Library is also located within the boundary of the shopping center site, but on its own legal lot of record and in separate ownership than the shopping center. Figure 1 illustrates the location of the site in relationship to the larger regional vicinity.

In an effort to enhance and reinvigorate the existing shopping center, CenterCal is proposing to redevelop the center as shown in Figure 2. Known as the Nyberg Rivers project, the full redevelopment vision will entail the following components:

- The existing 96,799 square foot former K-Mart building will be removed.
- The existing 3,500 square foot building currently occupied by a Wendy's will be relocated to a new pad within the shopping center site.
- All other existing buildings will remain and it has been assumed that the existing tenants will continue to operate as-is for the foreseeable future.
- While a specific tenant mix is still being developed by CenterCal, it is envisioned that the redevelopment will include a large retailer and an assortment of small and medium-sized retail/restaurant uses. For the purposes of this traffic study, it has been assumed that this mix of uses will total approximately 245,456 square feet of new leasable area bringing the total net leasable square footage for the entire shopping center to 307,000.
- The existing SW 75th Avenue access to SW Nyberg Road is proposed to be closed.
- The existing signalized access on SW Nyberg Road that currently serves the shopping center will remain and continue to serve as the main entrance.
- All other shopping center driveways located off of SW Nyberg Road and SW Martinazzi Avenue will remain.
- While not required under this proposal, in consultation and cooperation with the City of Tualatin, the existing SW Martinazzi Avenue driveway (adjacent to the library/city hall) could close and alternative access could be provided via a new driveway across from SW Seneca Street. This option would only be pursued if it was with the mutual agreement of the City and on a timeline acceptable to the City.

Redevelopment construction is expected to begin in 2013 and with completion and full occupancy anticipated in 2014.



LEGEND

● - STUDY INTERSECTIONS

**SITE VICINITY MAP
TUALATIN, OREGON**

**FIGURE
1**

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PROJECT SUMMARY

MASTER PLAN AREA:	38.72 ACRES
FUTURE DEVELOPMENT AREA:	4.81 ACRES
(By others)	
UNUSUAL DEVELOPMENT AREAS:	
CRUSS AREA:	31.91 ACRES
CONSERVATION AREA:	4.00 ACRES
HEIR AREA:	25.91 ACRES
REQUIRE'D LANDSCAPE AREA:	1.5% / 4.78 ACRES
LANDSCAPE AREA PROVIDED:	9.03 ACRES
FLOOR AREA RATIO:	0.2'4
TOTAL FPM IN B.F.	
BUILDING AREA:	307,000 SF
BUILDING AREA:	
BLDG 1005	30,000 SF
BLDG 1010	21,750 SF
BLDG 1030	2,900 SF
BLDG 1040	110,000 SF
BLDG A	12,500 SF
BLDG B	5,650 SF
BLDG C	3,950 SF
BLDG D	32,429 SF
BLDG E	2,280 SF
BLDG F	5,000 SF
BLDG G 102	4,620 SF
BLDG H 100	4,370 SF
BLDG J - DE	5,734 SF
BLDG W-100	8,660 SF
BLDG W-100	43,000 SF
TOTAL:	297,807 SF
ADDITIONAL POTENTIAL BUILDING AREA:	
	9,193 SF
TOTAL PROVIDED STALLS:	
PARKING A-L 125	4,367 STDS
PARKING S-A-L	STANDA-C 9-F X 19-F
COMPACT	7,741 X 15-F

Notes:

- 1) "Site Area" includes only the areas of Tualatin Riverwa Blocks that are subject of the development proposal. Other phases of the Master Plan may be developed by others.
- 2) Proposed Landscaping is based on Gross Site Area.
- 3) Building areas listed in table may differ from actual footprint size to allow for interior walls and architectural elements.



Nyberg Rivers DRAFT

Concept Plan - 19V1c - Dual Entry Lanes

Tualatin, Oregon

PROPOSED SITE PLAN
TUALATIN, OREGON

FIGURE
2

SCOPE OF THE REPORT

This analysis determines the transportation-related impacts associated with the proposed Nyberg Rivers redevelopment and was prepared in accordance with the City of Tualatin, Washington County, and Oregon Department of Transportation (ODOT) requirements for traffic impact studies. The study intersections and scope of this project were selected in consultation with City, County, and ODOT staff. Appendix A contains a copy of the traffic impact study scoping letter and feedback received from the agency staff. Based on this correspondence, this study contains the following elements:

- Year 2012 existing land-use and transportation-system conditions within the site vicinity during the weekday p.m. and Saturday midday peak periods;
- Forecast year 2014 background traffic conditions during the weekday p.m. and Saturday midday peak periods;
- Trip generation and distribution estimates for the proposed Nyberg Rivers redevelopment;
- Forecast year 2014 total traffic conditions during the weekday p.m. and Saturday midday peak periods with build-out of the site;
- Vehicle queuing operations at the Nyberg Road site access driveway and the I-5 off-ramps;
- On-site traffic operations and circulation; and
- Recommendations

Section 3
Existing Conditions

EXISTING CONDITIONS

The existing conditions analysis identifies the site conditions and current operational and geometric characteristics of the roadways within the study area. These conditions will be compared with future conditions later in this report.

Kittelson & Associates, Inc. (KAI) staff visited and inventoried the proposed Nyberg Rivers redevelopment site and surrounding study area. At that time, KAI collected information regarding site conditions, adjacent land uses, existing traffic operations, and transportation facilities in the study area.

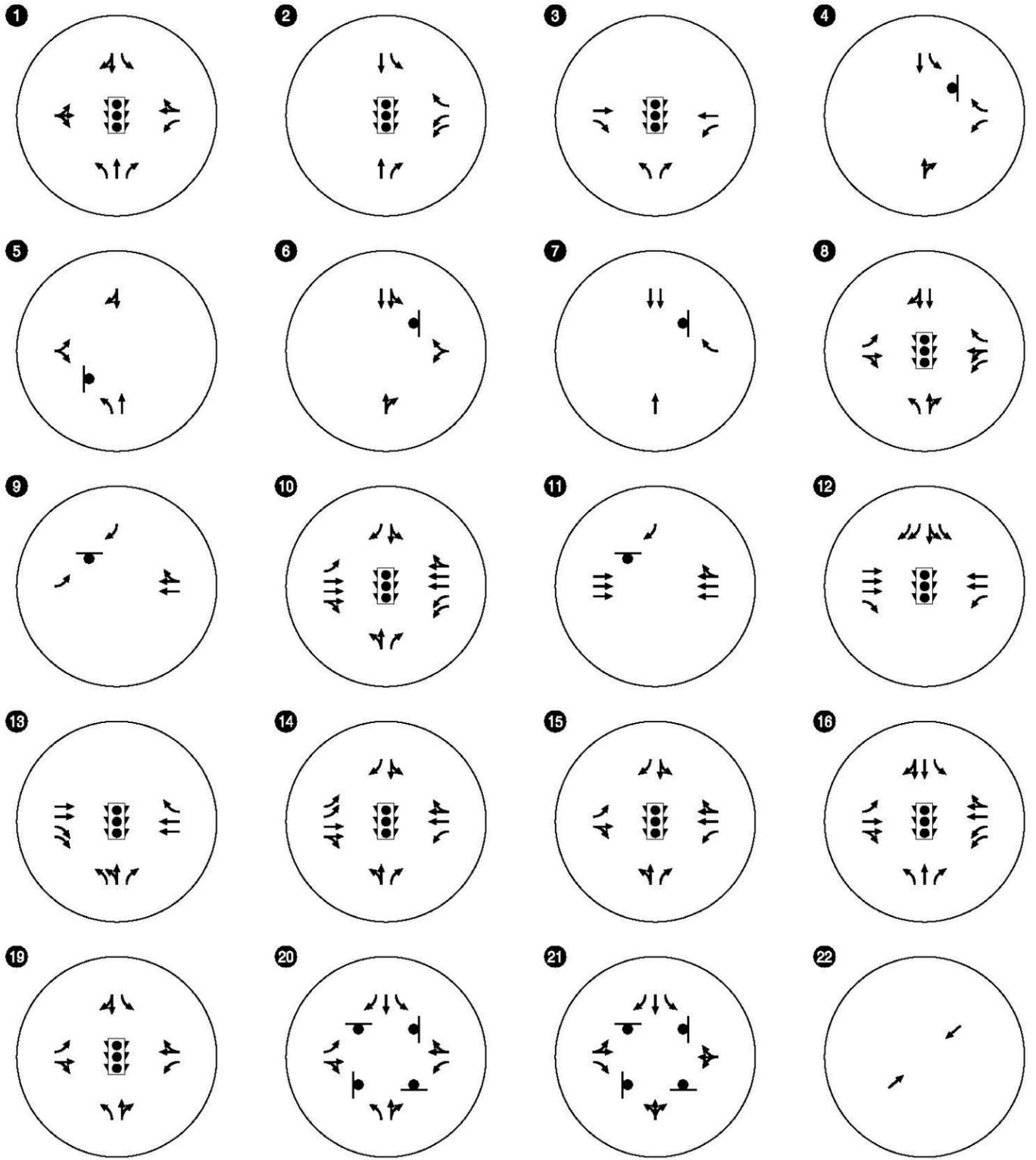
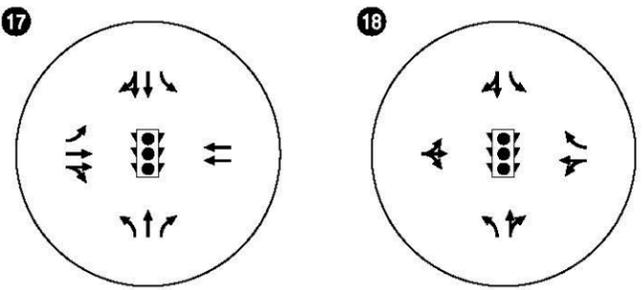
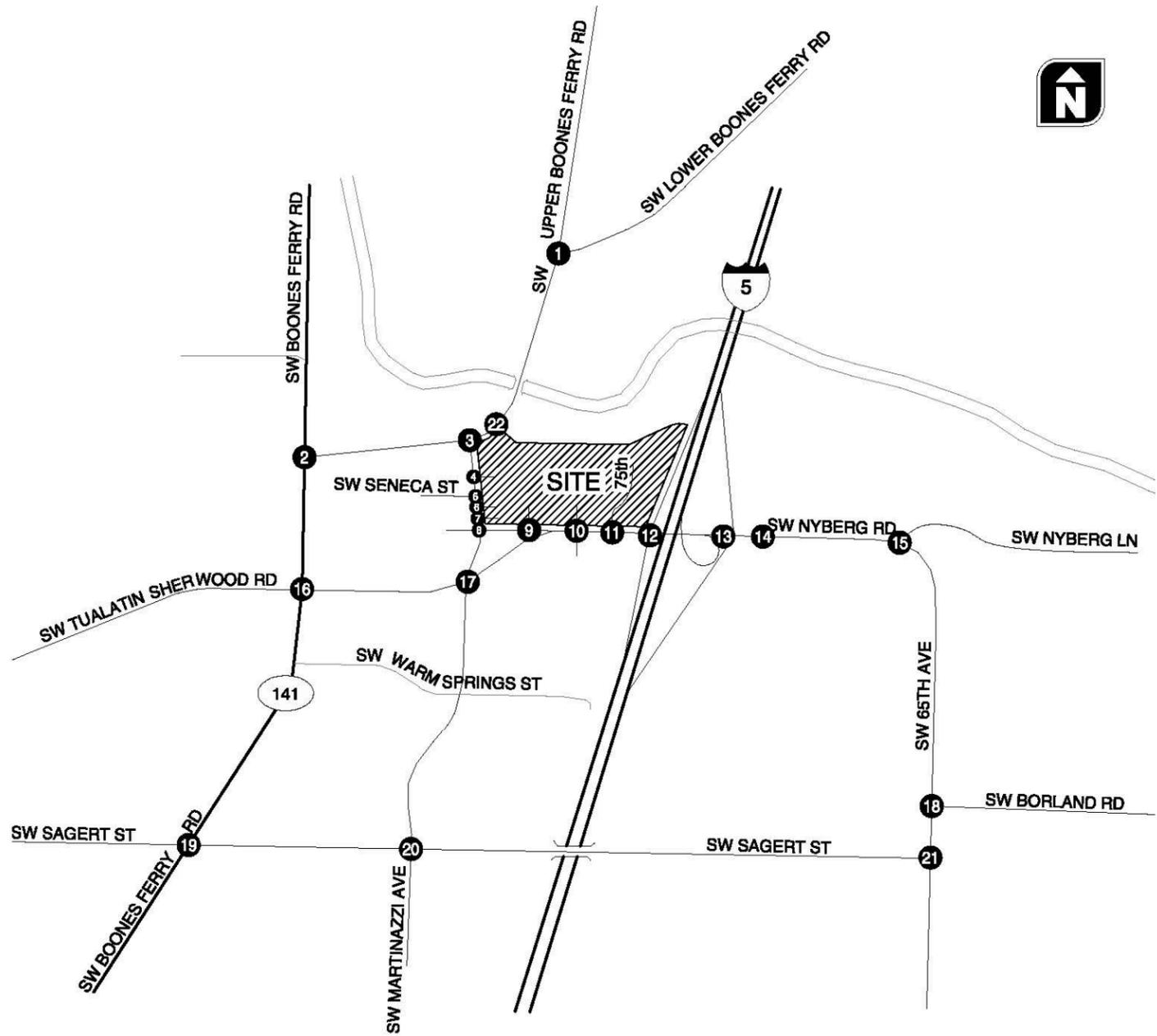
SITE CONDITIONS AND ADJACENT LAND USES

As shown in Figure 1, the existing shopping center is located in the northwest quadrant of the I-5/Nyberg Road interchange in Tualatin. The shopping center is bounded by Nyberg Road to the south, I-5 to the east, SW Martinazzi Avenue to the west, and Boones Ferry Road/Tualatin River to the north. The shopping center currently consists of an unoccupied former K-Mart, two drive-thru banks, a fast-food restaurant, and an assortment of retail uses. In addition, the Tualatin City Hall, city administrative offices, and public library are located in the northwest portion of the shopping center site on City-owned property and a separate legal lot of record.

TRANSPORTATION FACILITIES

Table 1 identifies the characteristics of key roadways located within the vicinity of the redevelopment site. Figure 3a identifies the existing lane configurations and traffic control devices at all of the study intersections while Figure 3b identifies the study area roadway ownership.

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LEGEND

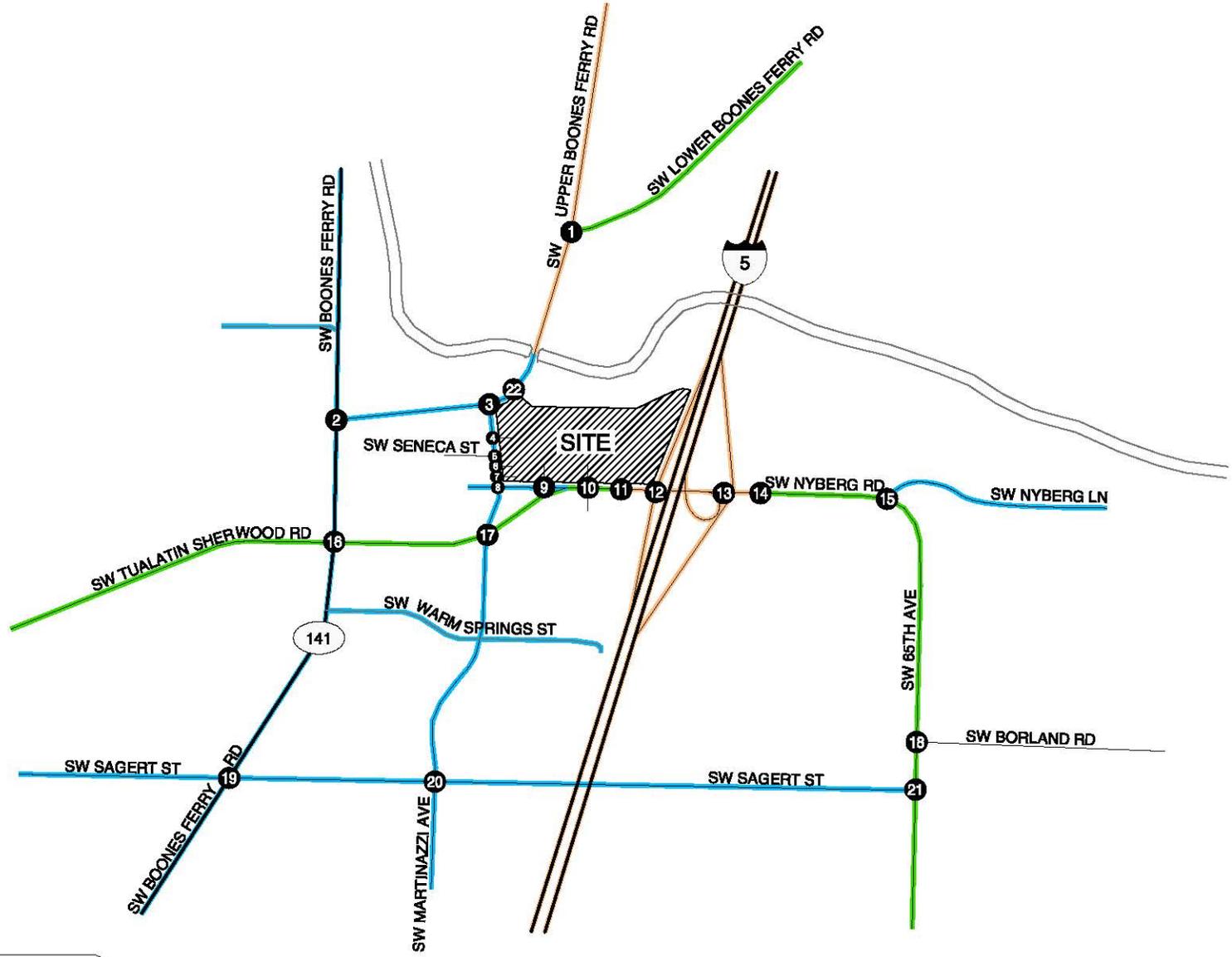
- STOP SIGN
- TRAFFIC SIGNAL

EXISTING LANE CONFIGURATIONS AND TRAFFIC CONTROL DEVICES TUALATIN, OREGON

FIGURE 3A



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LEGEND

- ODOT
- Washington County
- City of Tualatin

ROADWAY OWNERSHIP MAP
TUALATIN, OREGON

FIGURE
3B

Table 1: Existing Transportation Facilities

Roadway	Functional Classification (By Jurisdiction)	Number of Lanes	Posted Speed (mph)	Sidewalks	Bicycle Lanes	On-Street Parking
I-5	Interstate Highway - (ODOT)	7-8 lanes	55	No	No	No
SW Nyberg Road	Arterial (east of T-S Road) - (Washington County) ¹	6 lanes	30	Yes	Yes	No
	Minor Collector (west of T-S Road) – (Tualatin)	2 lanes	30	Yes	No	No
Tualatin-Sherwood Road	Arterial – (Washington County)	5 lanes	35	Yes	No	No
SW Martinazzi Avenue	Minor Arterial (north of T-S Road) – (Tualatin)	3 lanes	NP	Yes	No	No
	Major Arterial (south of T-S Road) – (Tualatin)	5 lanes	35	Yes	No	No
Boones Ferry Road	Major Arterial (east of Martinazzi) – (Tualatin)	3 lanes	35	Yes	Yes	No
	Minor Arterial (west of Martinazzi) – (Tualatin)	3 lanes	30	Yes	Yes	No
	Major Arterial (south of Tualatin Road) – (Tualatin)	2-4 lanes	30-35	Yes	Yes	No
Lower Boones Ferry Road	Minor Arterial – (Tualatin)	3 lanes	35	Yes	Yes	No
Upper Boones Ferry Road	District Highway – (ODOT)	3 lanes	35	Yes	Yes	No
SW Seneca Street	Local Commercial – (Tualatin)	2 lanes	NP	Yes	No	No
SW 65 th Avenue	Major Arterial – (Tualatin)	3 lanes	35	Yes	No	No
SW Sagert Street	Major Arterial – (Tualatin) (east of SW Martinazzi Ave)	2-3 lanes	35 ²	Yes	Yes	No
	Major Collector – (Tualatin) (west of SW Martinazzi Ave)					
	Minor Arterial – (Tualatin) (west of SW Boones Ferry Rd)					
SW Borland Rd	Major Arterial – (Tualatin)	2-3 lanes	35	Yes	Yes ³	No
	Minor Arterial (Clackamas County)					

Notes:

¹ ODOT has jurisdictional control over SW Nyberg Road within the vicinity of the northbound and southbound I-5 ramp terminals² 30 mph west of SW Martinazzi Avenue³ There are no bicycle lanes within the vicinity of the SW 65th Avenue intersection

NP = Not Posted

T-S Road = Tualatin-Sherwood Road

TRAFFIC VOLUMES AND PEAK HOUR OPERATIONS

In late May 2012 (while local schools were still in session), manual turning-movement counts were obtained for the all the study intersections and site driveways located within the immediate vicinity of the shopping center. In addition, traffic count data collected as part of the on-going Tualatin Transportation System Plan Update were utilized for all of the other study intersections¹. Figures 4a and 4b provide a summary of the existing turning-movement counts, which are rounded to the nearest five vehicles per hour for the weekday p.m. and Saturday midday peak hours. *Appendix “B” contains the traffic count worksheets used in this study.*

¹ Saturday midday counts were only collected at the site-access driveways and adjacent study area intersections.

Operational Standards

Level of service (LOS) and volume-to-capacity (V/C) ratio are the two performance measures utilized by the affected review agencies for determining intersection operations. A description of each is outlined below.

Level of Service

All level-of-service analyses described in this report were performed in accordance with the procedures stated in the 2000 *Highway Capacity Manual*. A description of level of service and the criteria by which they are determined is presented in Appendix "C". Appendix "C" also indicates how level of service is measured and what is generally considered the acceptable range of level of service. The City of Tualatin has adopted level-of-service standards for signalized and unsignalized intersections. LOS "D" is considered acceptable at signalized intersections and LOS "E" is considered acceptable at an unsignalized intersections.

V/C Ratio

The V/C ratio is a measure of an intersection's theoretical capacity. As the V/C ratio approaches 1.0, vehicle congestion worsens and the intersection becomes less capable of accommodating the vehicular demand. For all of the Washington County study intersections, the maximum acceptable V/C ratio is 0.99 during the first hour and 0.90 during second hour. For the ODOT study intersections, the minimum acceptable V/C ratio is 0.99.

All intersection level-of-service evaluations used the peak 15-minute flow rate during the weekday p.m. and Saturday midday peak hours. Using the peak 15-minute flow rate ensures that this analysis is based on a reasonable worst-case scenario. For this reason, the analysis reflects conditions that are only likely to occur for 15 minutes out of each average peak hour. The transportation system will likely operate under conditions better than those described in this report during all other time periods.

Figures 4a, 4b, and Table 2 summarize the operational performance for the study intersections under the existing peak hour conditions. As shown, all of the study intersections currently operate at acceptable levels of service and V/C ratios during the peak hours with the exception of the SW Martinazzi Avenue/SW Sagert Road and SW 65th Avenue/SW Sagert Road intersections. *Appendix "D" includes the operational worksheets under year 2012 existing traffic conditions.*

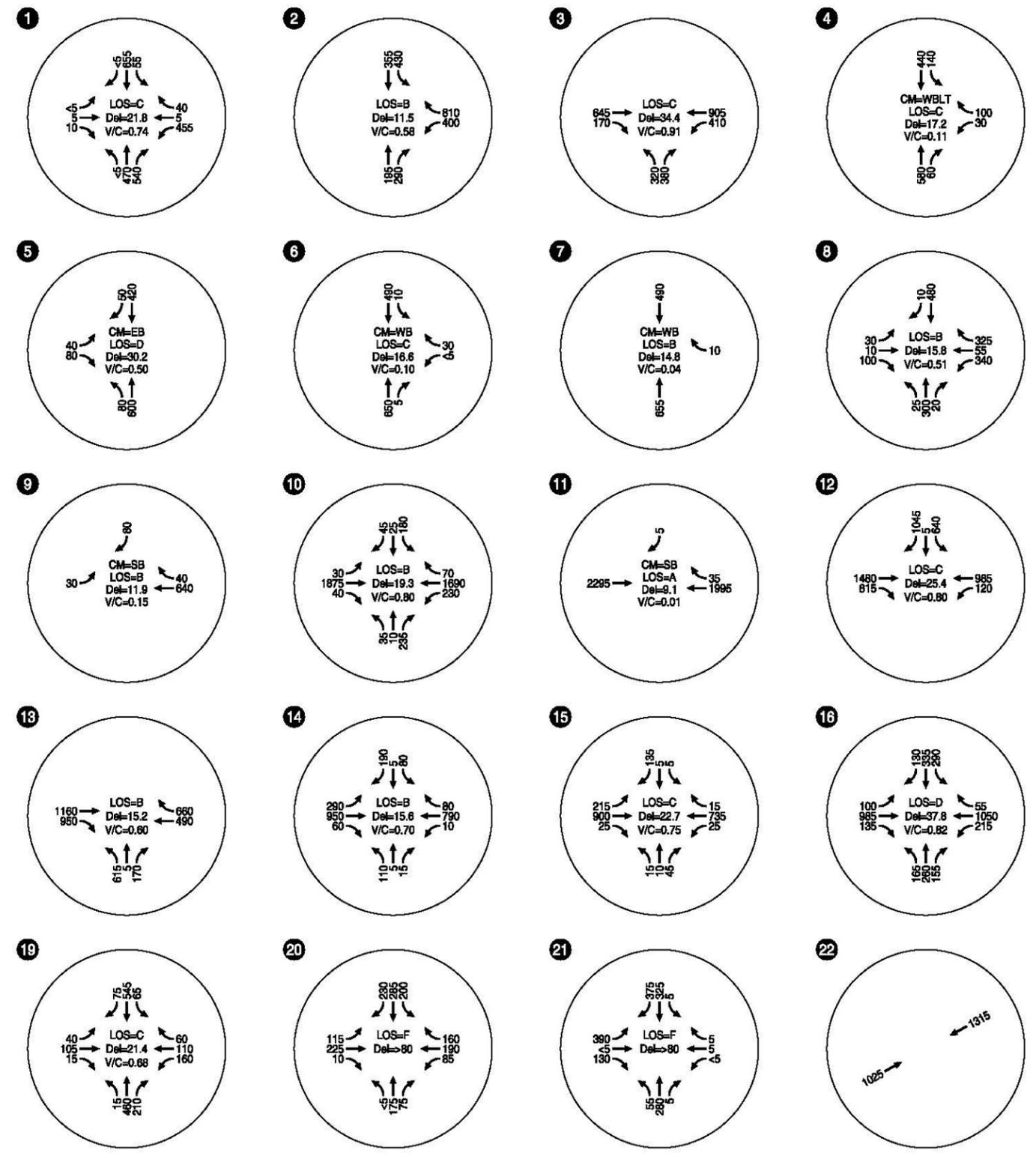
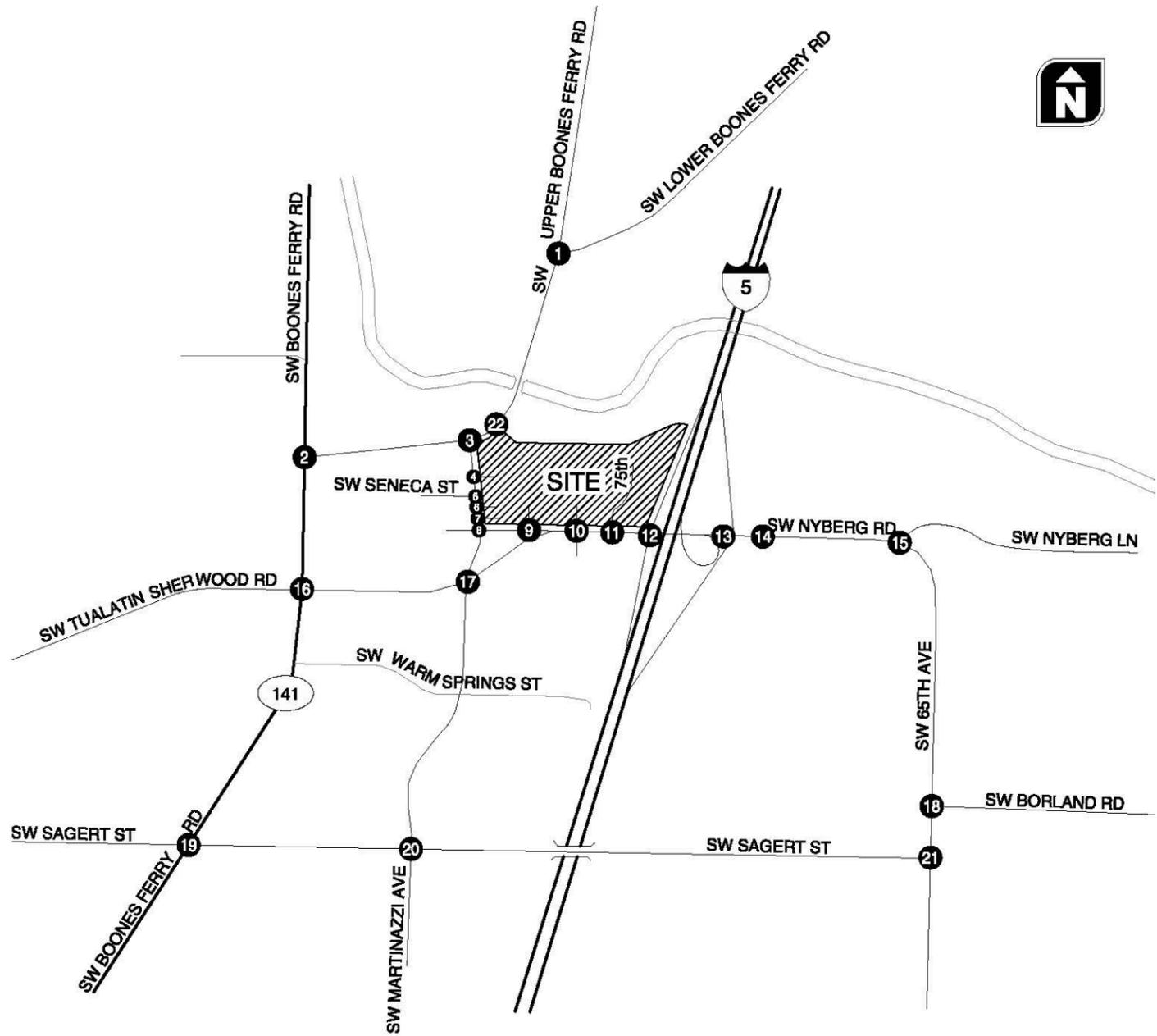
Table 2: 2012 Existing Conditions Operations Summary

Number	Intersection	Maximum Operating Standard	Weekday PM Peak Hour		Saturday Midday Peak Hour	
			LOS	V/C	LOS	V/C
Signalized Intersections						
1	SW Upper Boones Ferry Road/ SW Lower Boones Ferry Road/ SW Boones Ferry Road	0.99	C	0.74	Not Analyzed	Not Analyzed
2	SW Boones Ferry Road/ SW Tualatin Road	0.99	B	0.58	Not Analyzed	Not Analyzed
3	SW Boones Ferry Road/ SW Martinazzi Avenue	0.99	C	0.91	B	0.64
8	SW Nyberg Road/ SW Martinazzi Avenue	0.99	B	0.51	B	0.39
10	SW Nyberg Road/ SW Tualatin-Sherwood Road/ Fred Meyer/Site Access	0.99	B	0.80	B	0.66
12	I-5 SB Ramp Terminal/ SW Nyberg Road	0.85	C	0.80	C	0.77
13	I-5 NB Ramp Terminal/ SW Nyberg Road	0.85	B	0.60	C	0.55
14	SW Nyberg Road/ Nyberg Woods Driveway	0.99	B	0.70	B	0.64
15	SW Nyberg Road/ SW 65 th Avenue	0.99	C	0.75	Not Analyzed	Not Analyzed
16	SW Tualatin-Sherwood Road/ SW Boones Ferry Road	0.99	D	0.82	Not Analyzed	Not Analyzed
17	SW Tualatin-Sherwood Road/ SW Martinazzi Avenue	0.99	D	0.85	C	0.76
18	SW 65 th Avenue/ SW Borland Road	0.99	D	0.88	Not Analyzed	Not Analyzed
19	SW Boones Ferry Road/ SW Sagert Street	0.99	C	0.68	Not Analyzed	Not Analyzed
Unsignalized Intersections¹						
4	SW Martinazzi Avenue/ North Site Driveway	E	C	0.11	B	0.11
5	SW Martinazzi Avenue/ SW Seneca Street	E	D	0.50	C	0.22
6	SW Martinazzi Avenue/ Site Driveway	E	C	0.10	B	0.07
7	SW Martinazzi Avenue/ Right-Out Only Site Driveway	E	B	0.04	B	0.02
9	SW Nyberg Road/ Site Driveway	E	B	0.15	B	0.08
11	SW Nyberg Road/ Right-in Right-Out Site Driveway	0.99	A	0.01	A	0.02
All-Way Stop controlled Intersections						
20	SW Sagert Street/ SW Martinazzi Avenue	D	F	N/A	Not Analyzed	Not Analyzed
21	SW Sagert Street/ SW 65 th Avenue	D	F	N/A	Not Analyzed	Not Analyzed

Notes:

¹ LOS and V/C reported for the highest delay or critical movement

For intersections #4, #5, #6, and #7, it is recognized that the operational results shown may differ slightly due to the presence of vehicle queuing along SW Martinazzi Avenue during peak time periods.



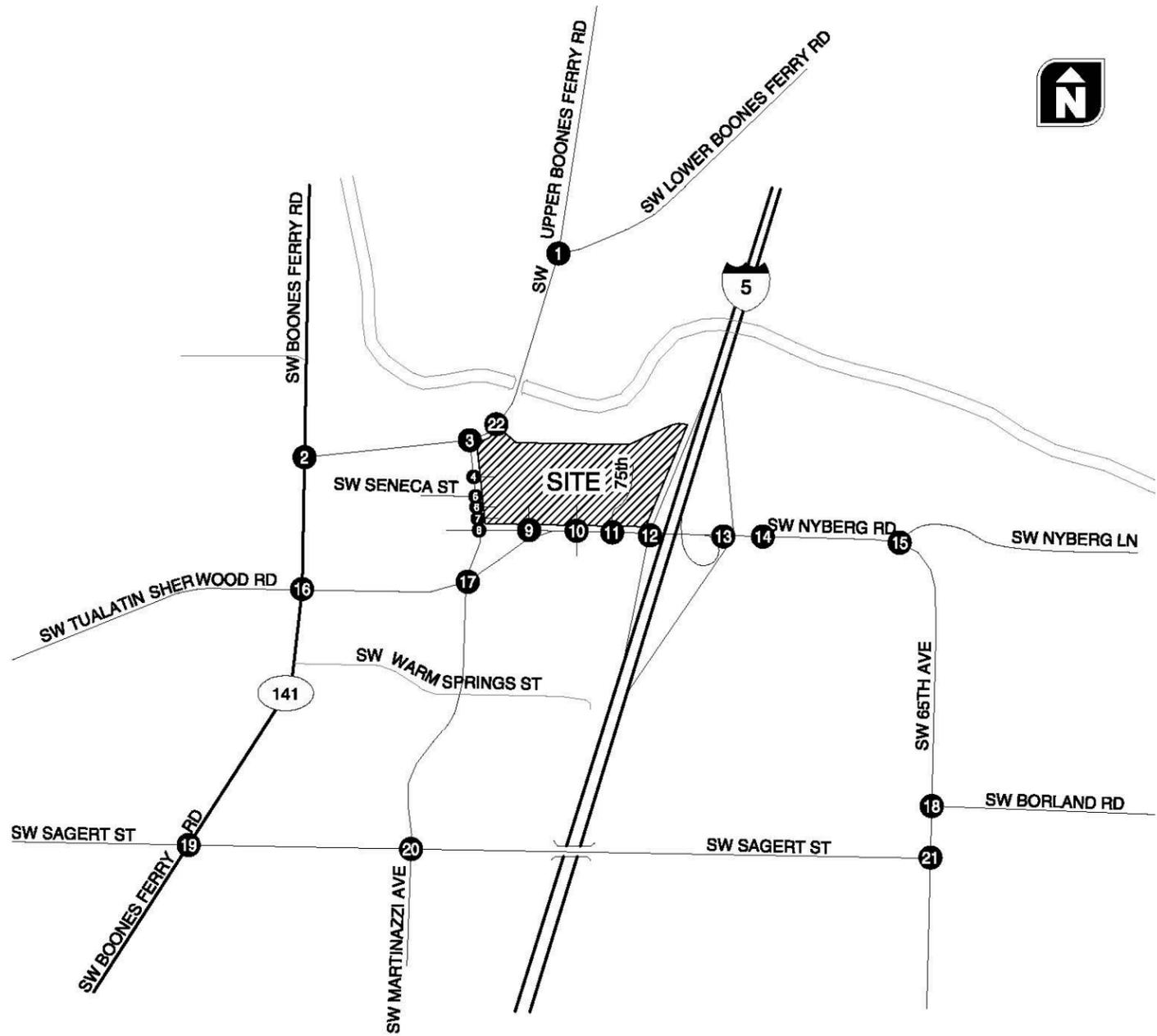
LEGEND

- CM = CRITICAL MOVEMENT (TWSC)
- LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC)/CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
- Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
- TWSC = TWO-WAY STOP CONTROL
- AWSC = ALL-WAY STOP CONTROL

EXISTING TRAFFIC CONDITIONS, WEEKDAY PM PEAK HOUR TUALATIN, OREGON

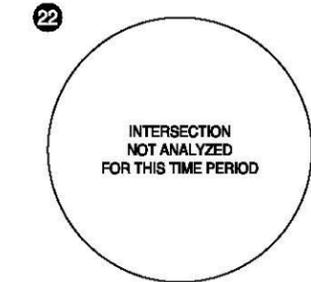
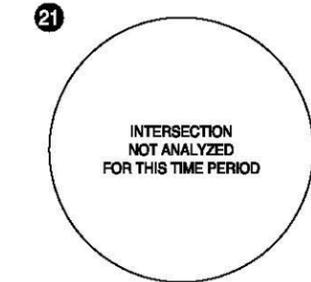
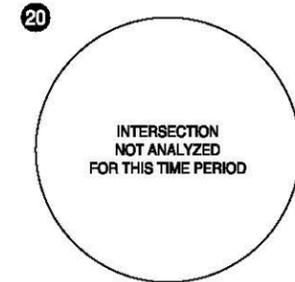
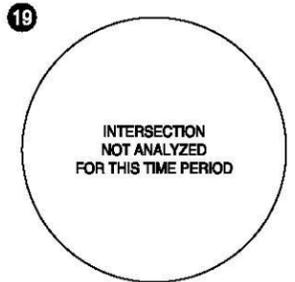
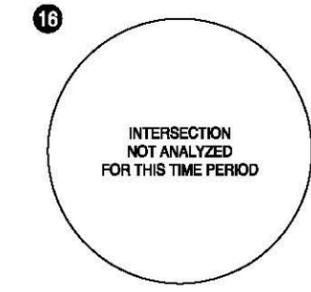
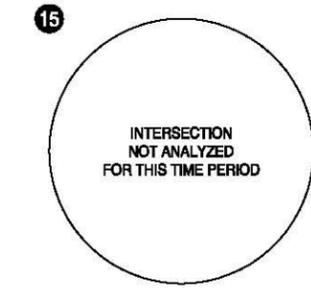
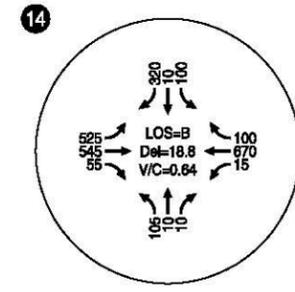
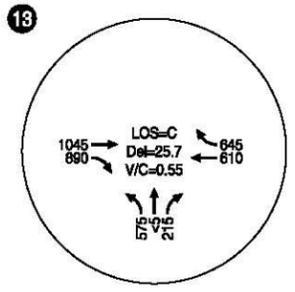
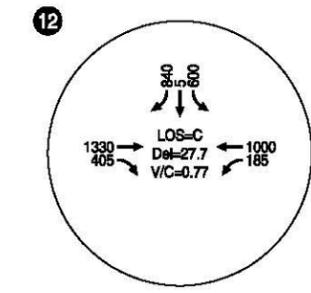
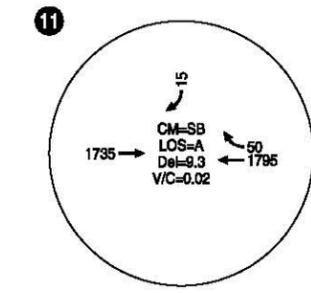
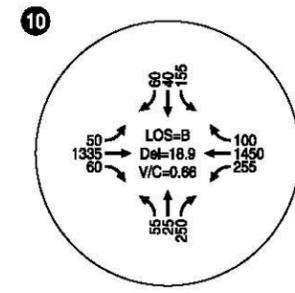
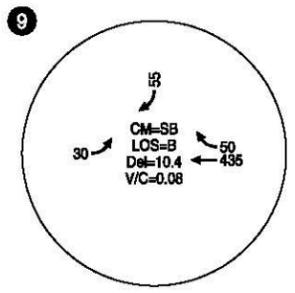
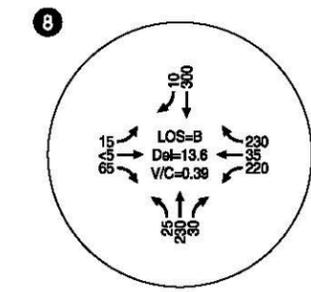
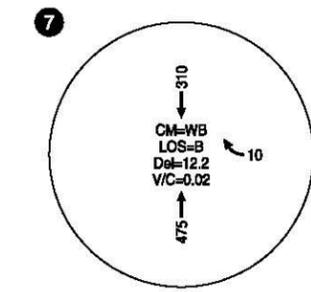
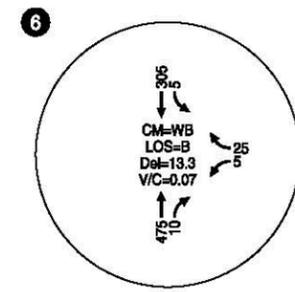
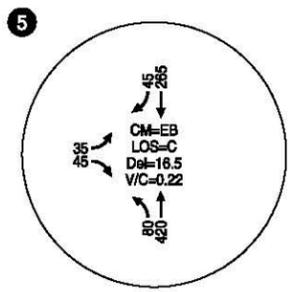
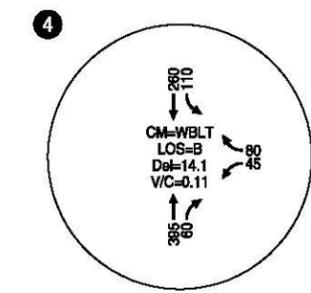
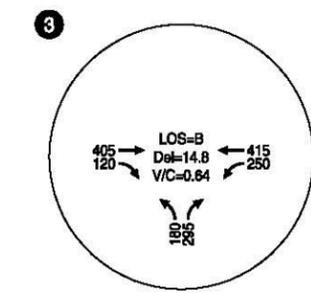
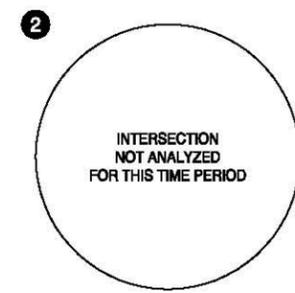
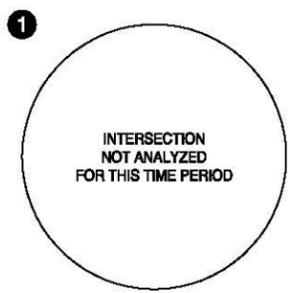
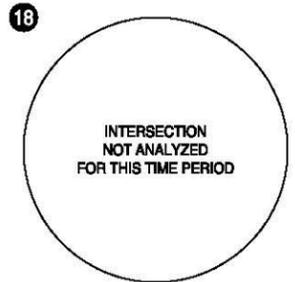
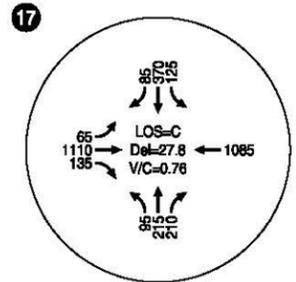
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LEGEND

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- AWSC = ALL-WAY STOP CONTROL



EXISTING SATURDAY MIDDAY PEAK TRAFFIC VOLUMES TUALATIN, OREGON **FIGURE 4B**

SW 65th Avenue/SW Sagert Street

The SW 65th Avenue/SW Sagert Street intersection is an all-way stop-controlled intersection. Based on the existing traffic demand, the intersection currently operates at LOS F conditions during the weekday p.m. peak hour. These findings are consistent with the existing conditions analysis prepared as part of the recent update to the Tualatin Transportation System Plan (TSP).

SW Martinazzi Avenue/SW Sagert Road

The SW Martinazzi Avenue/SW Sagert Street intersection is an all-way stop-controlled intersection. Based on the existing traffic demand, the intersection currently operates at LOS F conditions during the weekday p.m. peak hour. These findings are consistent with existing conditions analysis prepared as part of the recent update to the Tualatin TSP.

Existing Daily Traffic Profile

A summation of daily traffic volumes was prepared at the request of the City of Tualatin. Using available daily traffic volume counts collected by Washington County and those daily counts collected as part of the on-going Tualatin Transportation System Plan Update, it was generally determined that the weekday p.m. peak hour traffic volumes are approximately 8% of the daily traffic profile. Applying this factor to the weekday p.m. peak hour turning movement volumes collected at the study area intersections, daily traffic volume estimates were derived and summarized in Table 3.

Table 3: Existing Daily Traffic Volumes on Select Roadway Segments

Roadway	Segment	Estimated Daily Volume
SW Lower Boones Ferry Road	East of SW Upper Boones Ferry Road	13,200
SW Boones Ferry Road	East of SW Martinazzi Avenue	28,100
SW Boones Ferry Road	West of SW Martinazzi Avenue	24,400
SW Martinazzi Avenue	South of SW Boones Ferry Road and north of SW Nyberg Road	13,700
SW Martinazzi Avenue	South of SW Tualatin-Sherwood Road	17,100
SW Boones Ferry Road	North of SW Tualatin-Sherwood Road	14,000
SW Boones Ferry Road	South of SW Tualatin-Sherwood Road	15,200
SW Tualatin-Sherwood Road	West of SW Boones Ferry Road	30,800
SW Tualatin-Sherwood Road	East of SW Boones Ferry Road and west of SW Martinazzi Avenue	34,000
SW Tualatin-Sherwood Road	East of SW Martinazzi Avenue and west of SW Nyberg Road	44,600
SW Nyberg Lane	West of SW Tualatin-Sherwood Road and east of SW Martinazzi Avenue	9,000
SW Nyberg Road	East of SW Tualatin-Sherwood Road and west of I-5 SB Ramp Terminal	51,900
SW Nyberg Road	West of I-5 SB Ramp Terminal and east of I-5 NB Ramp Terminal	38,600
SW Nyberg Road	East of I-5 NB Ramp Terminal and west of SW 65 th Avenue	23,100
SW 65 th Avenue	South of SW Nyberg Road	17,500
SW Borland Road	East of SW 65 th Avenue	14,900
SW 65 th Avenue	South of SW Sagert Street	9,600
SW Sagert Street	West of SW 65 th Avenue	11,500
SW Sagert Street	East of SW Martinazzi Avenue	11,200

SAFETY ANALYSIS

This section provides analysis of roadway safety information within the site vicinity. Three sources of crash data were considered: the ODOT Safety Priority Index System, the Washington County Safety Priority Indexing System (SPIS), and review of crash data provided by ODOT. The ODOT crash data includes all reported crashes that occurred at the study intersections for the three-year period from January 1, 2009 to December 31, 2011 (matching the Tualatin TSP Update review period).

ODOT Statewide Priority Index System

The Statewide Priority Index System (ODOT SPIS) is a method developed by ODOT for identifying hazardous locations on state highways through consideration of crash frequency, crash rate, and crash severity. The ODOT SPIS designates a roadway segment as a SPIS site if a location experiences three or more crashes or one or more fatal crashes over a three-year period. Under this method, all state highways are analyzed in 0.10 mile segments to identify SPIS sites. Statewide, there are approximately 6,000 SPIS sites. SPIS sites are typically intersections, but can also be roadway segments.

Within the study area, none of the ODOT controlled intersections or roadway segments are included in ODOT's SPIS ranking program for 2009-2011.

Washington County Safety Priority Index System (SPIS)

Washington County ranks their high accident SPIS locations based on a formula that identifies potentially hazardous locations. The formula takes into consideration the frequency, rate, and severity of crashes.

Within the study area, there are two intersections that rank within the top 50 SPIS locations. These include SW Tualatin-Sherwood Road/SW Boones Ferry Road and SW Tualatin-Sherwood Road/SW Martinazzi Avenue.

Intersection Crash Data Analysis

The individual crash history of the study intersections was reviewed in an effort to identify potential intersection safety issues. The crash types and crash rates from the analysis are presented in Table 4. Typically, crash rates that meet or exceed 1.0 crashes per million entering vehicles are reviewed for additional geometric and operational investigation. As shown in the table, all of the reported intersections have crash rates less than 1.0. These findings are generally consistent with the crash assessment provided in the Tualatin TSP Update.

Table 4: Intersection Crash History (January 1, 2009 through December 31, 2011)

Intersection	Collision Type						Total Crashes	Estimated Annual Average Daily Traffic	Crash Rate (crashes per million entering vehicles)
	Angle	Turning	Rear End	Fixed Object	Ped / Bike	Other			
SW Upper Boones Ferry Road/ SW Lower Boones Ferry Road/ SW Boones Ferry Road	-	1	-	1	-	-	2	22,300	0.08
SW Boones Ferry Road/ SW Tualatin Road	-	-	4	-	2	-	6	24,800	0.22
SW Boones Ferry Road/ SW Martinazzi Avenue	-	-	4	-	-	-	4	28,300	0.13
SW Nyberg Road/ SW Martinazzi Avenue	-	4	4	-	-	-	8	16,950	0.43
SW Nyberg Road/ SW Tualatin-Sherwood Road	-	8	7	1	-	-	16	44,650	0.33
I-5 SB Ramp Terminal/ SW Nyberg Road	1	20	24	-	2	1	48	50,900	0.86
I-5 NB Ramp Terminal/ SW Nyberg Road	-	6	9	-	-	-	15	40,500	0.34
SW Nyberg Road/ SW 65 th Avenue	-	1	2	-	-	-	3	21,300	0.13
SW Tualatin-Sherwood Road/ SW Boones Ferry Road	3	11	21	-	-	4	39	38,750	0.92
SW Tualatin-Sherwood Road/ SW Martinazzi Avenue	6	2	8	1	-	-	17	42,800	0.36
SW 65 th Avenue/ SW Borland Road	-	1	1	-	-	-	2	20,750	0.09
SW Boones Ferry Road/ SW Sagert Street	-	3	2	-	-	-	5	18,600	0.25
SW Sagert Street/ SW Martinazzi Avenue	4	-	-	-	-	-	4	17,500	0.21
SW Sagert Street/ SW 65 th Avenue	-	-	-	-	-	-	0	15,750	0.00

Section 4
Transportation Impact Analysis

TRANSPORTATION IMPACT ANALYSIS

The transportation impact analysis identifies how the study area's transportation system will operate in the year the proposed redevelopment is expected to be fully built and occupied (2014). The impact of traffic generated by the proposed Nyberg Rivers development during the typical weekday p.m. and Saturday midday peak hours was examined as follows:

- Background weekday p.m. and Saturday midday peak hour traffic conditions for the 2014 (build-out year of the Nyberg Rivers redevelopment) was analyzed at each of the study intersections.
- Background conditions were developed by applying a 1.5-percent annual growth rate to the existing traffic volumes to account for regional growth in the site vicinity between years 2012 and 2014.
- Site-generated trips were estimated for build-out of the site.
- Site trip-distribution patterns were derived from a review of existing traffic patterns and regional planning model outputs.
- Year 2014 (build-out year of the Nyberg Rivers redevelopment) total traffic conditions were analyzed at each of the study intersections and site-access points during the weekday p.m. and Saturday midday peak hours.
- On-site circulation issues and site-access alternatives were evaluated.

YEAR 2014 BACKGROUND TRAFFIC CONDITIONS

The year 2014 background traffic analysis identifies how the study area's transportation system will operate without the proposed Nyberg Rivers redevelopment. This analysis includes traffic attributed to general growth in the region, but does not include traffic from the proposed redevelopment.

Traffic Volumes

In order to develop a near-term traffic growth rate, the last five years of annual Washington County daily traffic counts were reviewed along SW Tualatin-Sherwood Road (just east of SW Boones Ferry Road) and SW Nyberg Road (west of SW 65th Avenue). A summary of these counts is provided in Table 5 below.

Table 5: Historical Traffic Counts

Count Location	2008	2009	2010	2011	2012
SW Nyberg Road (west of SW 65 th Avenue)	21,837	20,764	21,733	21,506	21,351
SW Tualatin-Sherwood Road (east of SW Boones Ferry Road)	40,469	38,813	39,671	41,137	40,591

As shown in the table, traffic growth within the general site vicinity between 2008 and 2012 has been minimal to negative, in part reflecting the economic slowdown that occurred after 2008. City staff recommended a 1.5% annual growth rate be applied to reflect a reasonable, yet conservative approximation of traffic growth at each of the study intersections. This growth rate is consistent with other traffic studies that have been submitted in the past within the project vicinity. Figures 5a and 5b illustrate the resulting forecast year 2014 background traffic volumes during the weekday p.m. and Saturday midday peak hours.

2014 Background Operations Analysis

The weekday p.m. and Saturday midday peak-hour turning-movement volumes shown in Figure 5a and 5b were used to conduct an operational analysis at each study intersection to determine the year 2014 background traffic levels of service. As indicated by the respective figures and Table 6, the background traffic analysis determined that all of but two of the study intersections are forecast to operate at acceptable standards during both the weekday p.m. and Saturday midday peak hours. *Appendix "E" contains the year 2014 background traffic level-of-service worksheets.*

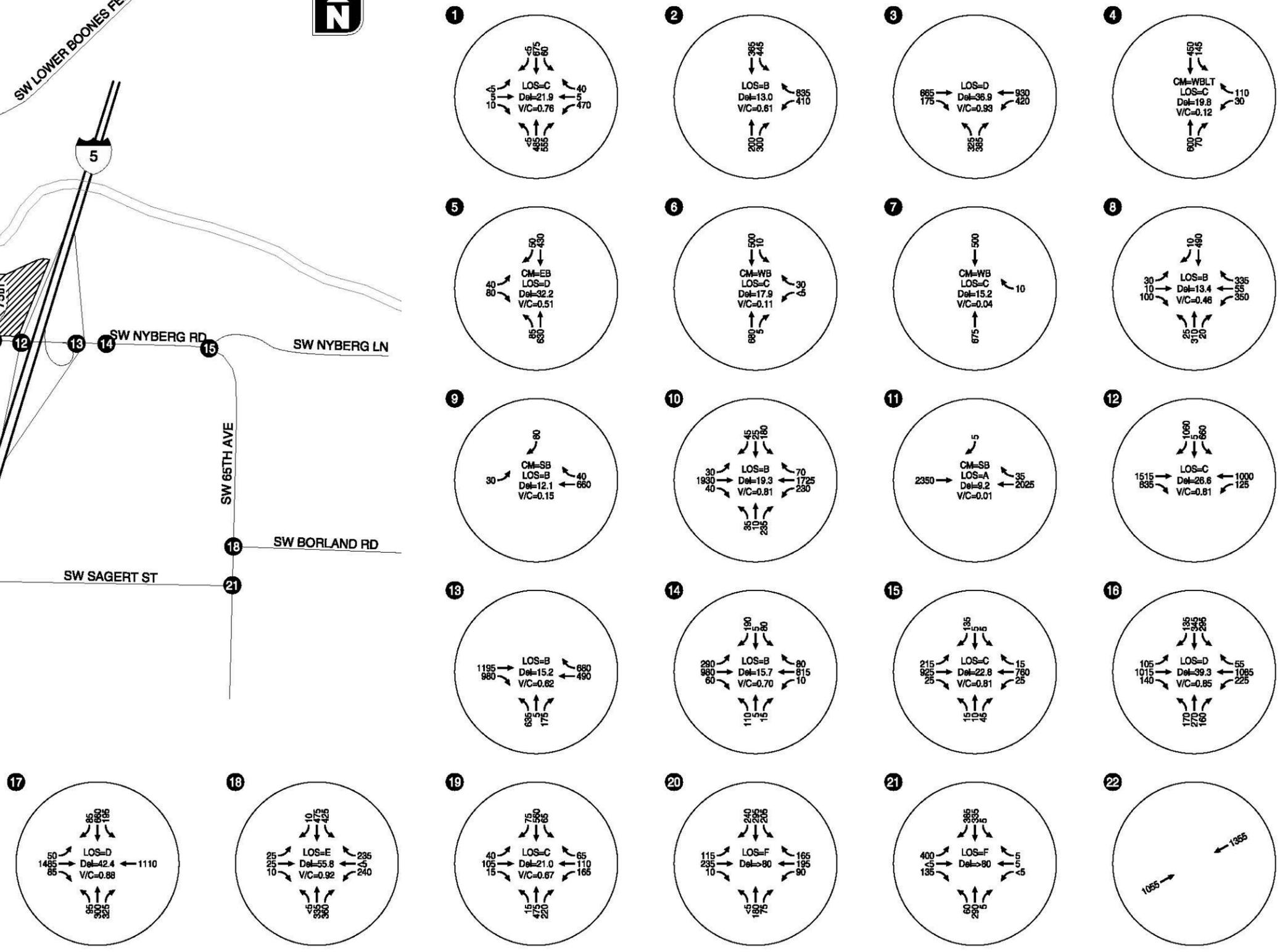
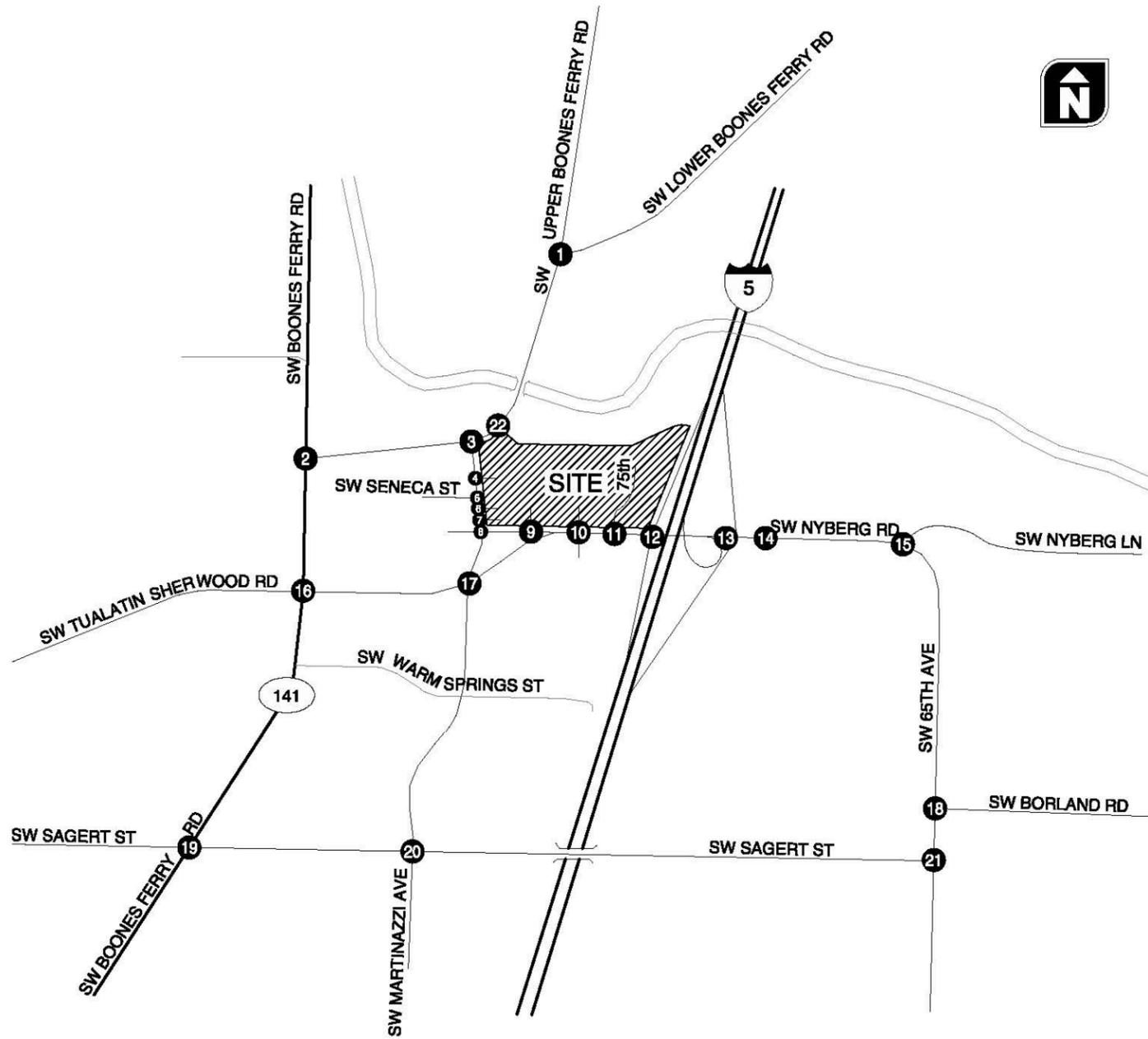
SW 65th Avenue/SW Sagert Street

Based on the estimated future traffic demand, the intersection is forecast to continue to operate at LOS F conditions during the weekday p.m. peak hour.

SW Martinazzi Avenue/SW Sagert Road

Based on the existing traffic demand, the intersection is forecast to continue to operate at LOS F conditions during the weekday p.m. peak hour.

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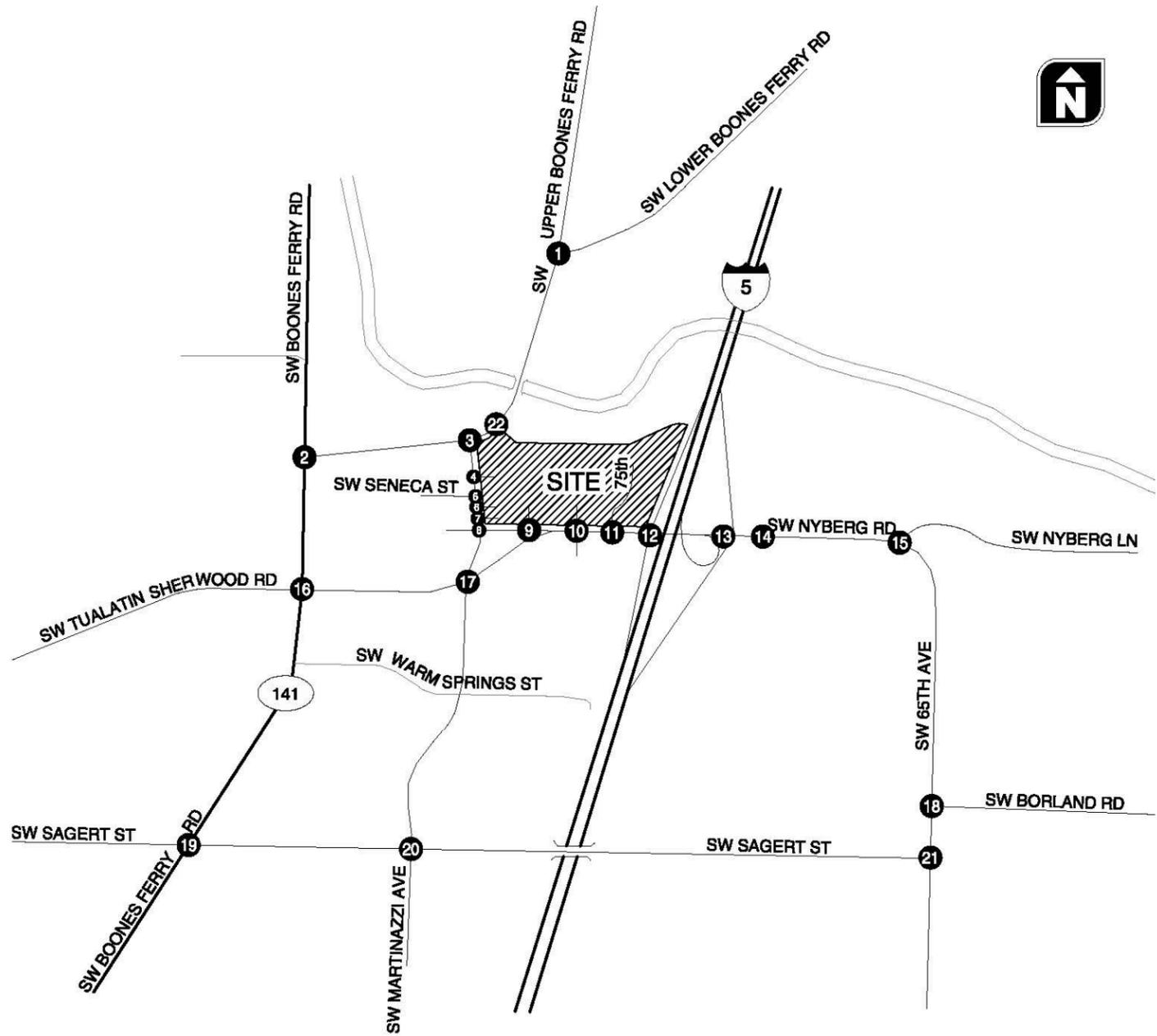


LEGEND

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- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
- TWSC = TWO-WAY STOP CONTROL
- AWSC = ALL-WAY STOP CONTROL

2014 BACKGROUND TRAFFIC CONDITIONS, WEEKDAY PM PEAK HOUR TUALATIN, OREGON

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LEGEND

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- AWSC = ALL-WAY STOP CONTROL



2014 BACKGROUND TRAFFIC CONDITIONS, SATURDAY MIDDAY PEAK HOUR TUALATIN, OREGON

Table 6: 2014 Background Traffic Conditions

Number	Intersection	Maximum Operating Standard	Weekday PM Peak Hour		Saturday Midday Peak Hour	
			LOS	V/C	LOS	V/C
Signalized Intersections						
1	SW Upper Boones Ferry Road/ SW Lower Boones Ferry Road/ SW Boones Ferry Road	0.99	C	0.76	Not Analyzed	Not Analyzed
2	SW Boones Ferry Road/ SW Tualatin Road	0.99	B	0.61	Not Analyzed	Not Analyzed
3	SW Boones Ferry Road/ SW Martinazzi Avenue	0.99	D	0.93	B	0.66
8	SW Nyberg Road/ SW Martinazzi Avenue	0.99	B	0.46	B	0.40
10	SW Nyberg Road/ SW Tualatin-Sherwood Road/ Fred Meyer/Site Driveway	0.99	B	0.81	B	0.67
12	I-5 SB Ramp Terminal/ SW Nyberg Road	0.85	C	0.81	C	0.81
13	I-5 NB Ramp Terminal/ SW Nyberg Road	0.85	B	0.62	C	0.56
14	SW Nyberg Road/ Nyberg Woods Driveway	0.99	B	0.70	B	0.65
15	SW Nyberg Road/ SW 65 th Avenue	0.99	C	0.81	Not Analyzed	Not Analyzed
16	SW Tualatin-Sherwood Road/ SW Boones Ferry Road	0.99	D	0.85	Not Analyzed	Not Analyzed
17	SW Tualatin-Sherwood Road/ SW Martinazzi Avenue	0.99	D	0.88	C	0.78
18	SW 65 th Avenue/ SW Borland Road	0.99	E	0.92	Not Analyzed	Not Analyzed
19	SW Boones Ferry Road/ SW Sagert Street	0.99	C	0.67	Not Analyzed	Not Analyzed
Unsignalized Intersections¹						
4	SW Martinazzi Avenue/ North Site Driveway	E	C	0.12	B	0.11
5	SW Martinazzi Avenue/ SW Seneca Street	E	D	0.51	C	0.23
6	SW Martinazzi Avenue/ Site Driveway	E	C	0.11	B	0.07
7	SW Martinazzi Avenue/ Right-Out Only Site Driveway	E	C	0.04	B	0.02
9	SW Nyberg Road/ Site Driveway	E	B	0.15	B	0.08
11	SW Nyberg Road/ Right-in Right-Out Site Driveway	0.99	A	0.01	A	0.02
All-Way Stop-Controlled Intersections						
20	SW Sagert Street/ SW Martinazzi Avenue	D	F	N/A	Not Analyzed	Not Analyzed
21	SW Sagert Street/ SW 65 th Avenue	D	F	N/A	Not Analyzed	Not Analyzed

Notes:

¹ LOS and V/C reported for the highest delay or critical movement

For intersections #4, #5, #6, and #7, it is recognized that the operational results shown may differ slightly due to the presence of vehicle queuing along SW Martinazzi Avenue during peak time periods.

Background Daily Traffic Profile

A summation of the 2014 Background daily traffic volumes and their comparison to 2012 existing conditions is summarized in Table 7 below (the growth shown in Table 7 reflects the assumed 1.5% annual growth).

Table 7: 2014 Background Daily Traffic Profile

Roadway	Segment	Estimated Daily Volume	
		2012 Existing	2014 Background
SW Lower Boones Ferry Road	East of SW Upper Boones Ferry Road	13,200	13,600
SW Boones Ferry Road	East of SW Martinazzi Avenue	28,100	28,800
SW Boones Ferry Road	West of SW Martinazzi Avenue	24,400	25,100
SW Martinazzi Avenue	South of SW Boones Ferry Road and north of SW Nyberg Road	13,700	14,100
SW Martinazzi Avenue	South of SW Tualatin-Sherwood Road	17,100	17,600
SW Boones Ferry Road	North of SW Tualatin-Sherwood Road	14,000	14,500
SW Boones Ferry Road	South of SW Tualatin-Sherwood Road	15,200	15,700
SW Tualatin-Sherwood Road	West of SW Boones Ferry Road	30,800	31,800
SW Tualatin-Sherwood Road	East of SW Boones Ferry Road and west of SW Martinazzi Avenue	34,000	34,900
SW Tualatin-Sherwood Road	East of SW Martinazzi Avenue and west of SW Nyberg Road	36,400	37,400
SW Nyberg Lane	West of SW Tualatin-Sherwood Road and east of SW Martinazzi Avenue	9,000	9,200
SW Nyberg Road	East of SW Tualatin-Sherwood Road and west of I-5 SB Ramp Terminal	51,900	52,900
SW Nyberg Road	West of I-5 SB Ramp Terminal and east of I-5 NB Ramp Terminal	38,600	39,600
SW Nyberg Road	East of I-5 NB Ramp Terminal and west of SW 65 th Avenue	23,100	23,800
SW 65 th Avenue	South of SW Nyberg Road	17,500	18,100
SW Borland Road	East of SW 65 th Avenue	14,900	15,400
SW 65 th Avenue	South of SW Sagert Street	9,600	9,900
SW Sagert Street	West of SW 65 th Avenue	11,500	11,900
SW Sagert Street	East of SW Martinazzi Avenue	11,200	11,600

PROPOSED REDEVELOPMENT PLAN

In an effort to enhance and reinvigorate the existing shopping center, CenterCal is proposing to redevelop a portion of the existing center. The redevelopment is envisioned to entail the following:

- The 96,799 square foot former K-Mart building will be removed.
- The existing 3,500 square foot building currently occupied by a Wendy's will be relocated to a new pad within the shopping center site.
- All other existing buildings (and associated access driveways) will remain as it has been assumed that the existing tenants will continue to operate as-is for the foreseeable future.
- While a specific tenant mix is still being developed by CenterCal, it is envisioned that the redeveloped portion of the center will include large and medium sized retailers and an assortment of smaller retail/restaurant uses. For the purposes of this traffic study, it has

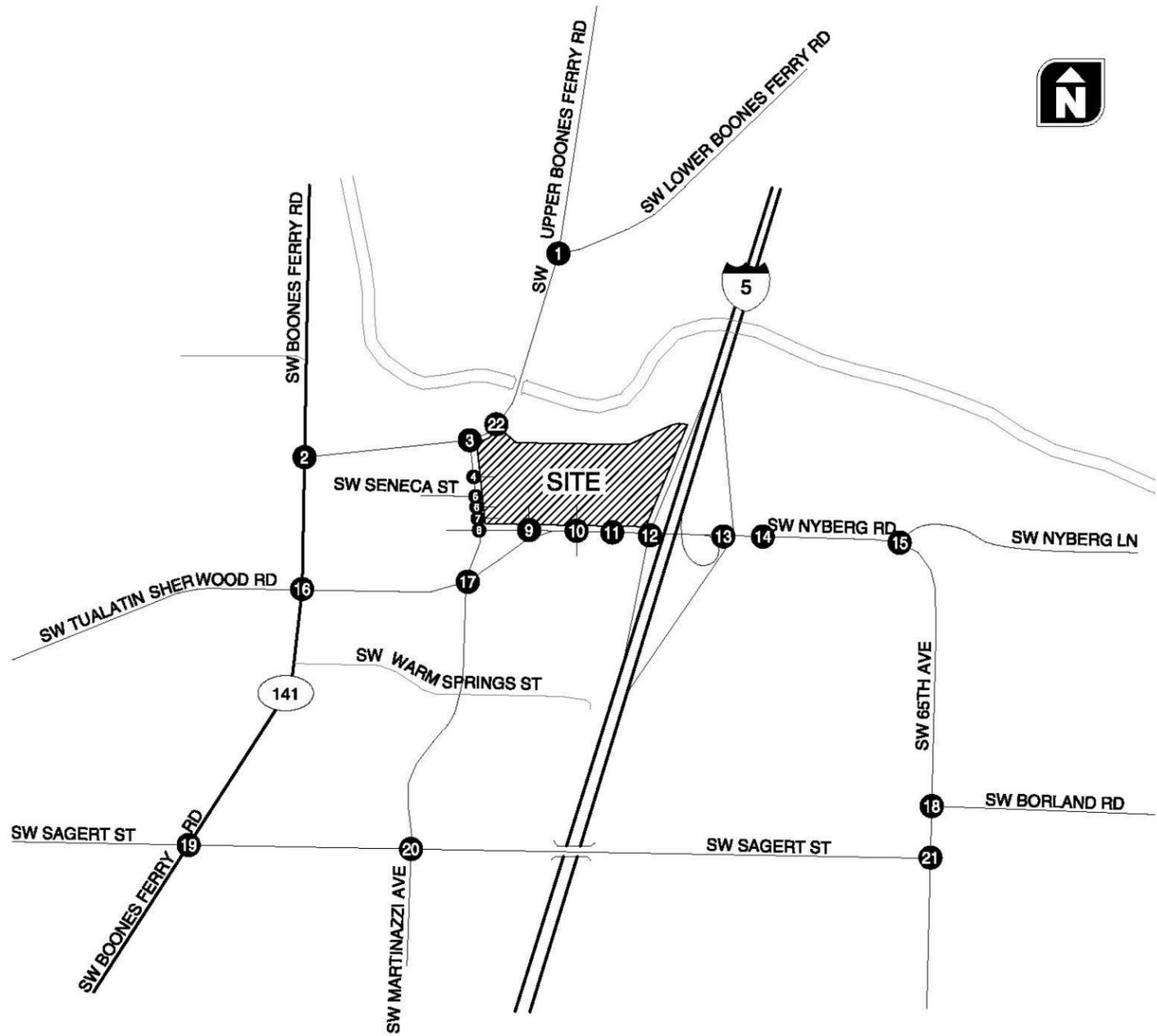
been assumed that this mix of uses will total approximately 245,456 square feet of new leasable area bringing the total net leasable area for the entire shopping center to 307,000 square feet.

In order to enhance access to the redeveloped shopping center, several modifications to the existing shopping center driveways are proposed. These include the following:

- The existing SW 75th Avenue connection to SW Nyberg Road is proposed to be closed under the redevelopment plan. This closure will minimize turning movement conflicts along a busy segment of SW Nyberg Road and it will improve the interchange access spacing conditions within the I-5/Nyberg Interchange influence area.
- The existing signalized access on SW Nyberg Road that serves the shopping center and the adjacent Fred Meyer site will remain at its current location; however, the following changes are proposed to increase intersection capacity:
 - A westbound right-turn lane is proposed on SW Nyberg Street to enhance access to the site and minimize vehicle queuing on SW Nyberg Street.
 - The existing site driveway is proposed to be widened as shown in the site plan to accommodate increased site traffic. This widening will include dual southbound left-turn lanes, a shared through/right-turn lane, and dual in-bound receiving lanes (See the *"Impacts of the Nyberg Rivers Development on Identified Transportation Planning Projects"* section for further discussion on these improvements).
 - The north and south approach signal phasing is proposed to be modified from permissive left-turn phasing to split phasing. Westbound right-turn overlap phasing is proposed for the westbound right-turn lane into the Nyberg Rivers site.
 - No modifications are proposed to the existing Fred Meyer driveway at this intersection.

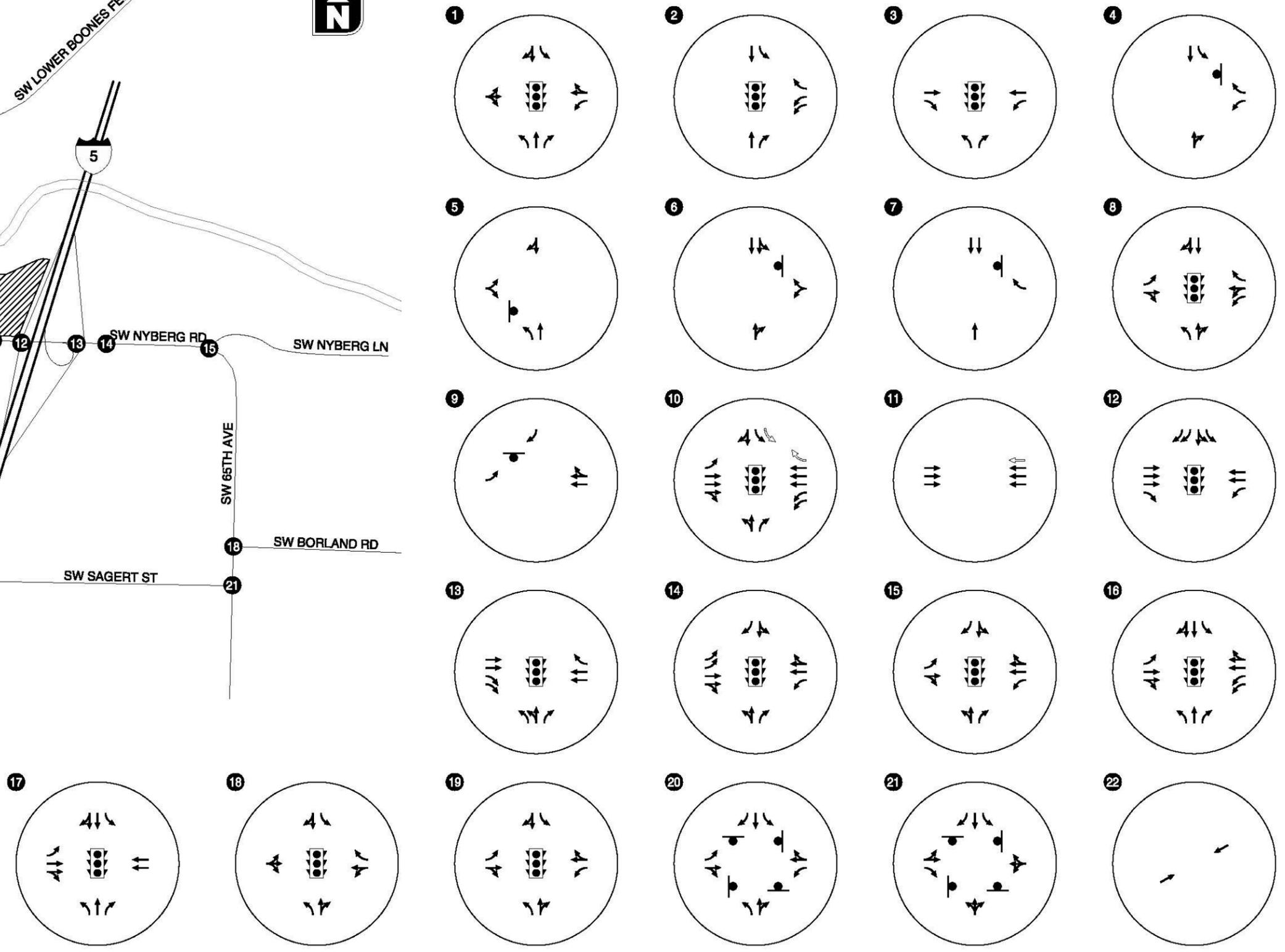
Figure 6 shows the proposed site-access configurations and traffic control devices that will be assumed as part of the total traffic analysis. Construction of this development is expected to begin in 2013 with the build-out projected to occur in year 2014.

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LEGEND

- NEW TRAVEL LANE
- STOP SIGN
- TRAFFIC SIGNAL



ASSUMED SITE ACCESS CONFIGURATION AND TRAFFIC CONTROL DEVICES TUALATIN, OREGON

FIGURE 6

Redevelopment Plan Trip Generation

Given that the proposed project is only a partial redevelopment of the larger shopping center; a trip generation methodology was developed to reflect the characteristics of a unified and vibrant shopping center. The following outline describes the trip generation methodology that was used:

- Traffic counts were conducted at all of the site driveways to quantify the trip generation profile of the existing retail and civic uses currently operating on the site.
- Recognizing that the City offices/library are not retail uses and the layout of the site/parking fields prevents an accurate quantification of trips being generated by these uses, estimates were developed using the standard reference manual, *Trip Generation*, published by the Institute of Transportation Engineers (ITE). The Library and Single Tenant Office Building land uses were used in the estimate process. The resulting estimates were then subtracted from the existing site driveway counts to produce a trip profile estimate for the existing 158,343 square feet of retail building space at the site.
- A trip generation rate was calculated using the Shopping Center land use in ITE *Trip Generation* for the 245,456² square feet of new retail use plus the 61,544 square feet of remaining retail uses³.
- The existing site retail traffic estimate was then subtracted from the total shopping center and office trip generation estimate to arrive at a total trip estimate for the net increase in shopping center and office square footage. A pass-by rate reduction of 34%⁴ was assumed for the shopping center component to generate the net new trip estimate for the site. This pass-by estimate is consistent with ITE *Trip Generation* for similar shopping center uses. Furthermore, given the mix of existing uses (fast-food restaurants, drive-thru banks, and shopping center commercial uses) that will remain on the site and proposed mix of uses (large and medium sized general retailers and assortment of general retail/restaurant uses), this pass-by reduction rate is considered to be reasonable and conservatively appropriate.

² New Retail Uses = Total Proposed Area – Existing Uses that Remain = 307,000 sq. ft. – 61,544 sq. ft. = 245,456 sq. ft.

³ Remaining uses = Existing building area – Existing Kmart = 158,343 sq. ft. - 96,799 sq. ft. = 61,544 sq. ft.)

⁴ There are approximately 55,000-60,000 vehicles per day passing by the site frontage on SW Tualatin-Sherwood Road and SW Martinazzi Avenue. This volume is considered sufficient to justify the standard 34 percent pass-by assumption for the shopping center (the average 34 percent was obtained directly from the Institute of Transportation Engineers (ITE) *Trip Generation*, 9th Edition). It is also expected that some trips will re-route from I-5, which would be considered “diverted trips”. All trips coming from I-5 were considered “primary” trips in an effort to present a conservative and reasonable worst-case condition. ITE *Trip Generation* Shopping Center trip rates indicate that an average 26 percent of shopping center trips are diverted, in addition to the 34 percent pass-by. By not accounting for diverted trips, the current study is inherently conservative and likely overstates impacts between the main site driveway and the I-5 interchange ramps.

Table 8 below illustrates the trip generation calculation process (all trip ends shown in Table 8 have been rounded to the nearest five trips).

Table 8: Estimated Nyberg Rivers Trip Generation

	ITE Code	Size (sq. ft.)	Weekday PM Peak Hour			Saturday Midday Peak Hour		
			Total	In	Out	Total	In	Out
Existing Site								
Existing Site Driveways ¹	-	-	945	435	510	970	490	480
Less Existing Library ²	590	22,123	(160)	(75)	(85)	(150)	(80)	(70)
Less Existing Civic Uses ³	715	~10,000	(50)	(10)	(40)	-	-	-
Total Existing Retail			735	350	385	820	410	410
Future Site								
Shopping Center	820	307,000 ⁴	1,350	660	690	1,775	925	850
<i>Less Existing Retail Driveway Counts</i>			(735)	(350)	(385)	(820)	(410)	(410)
Sub Total			615	310	305	955	515	440
<i>Pass-by Trips (Weekday 34%, Saturday 26%)</i>			(210)	(105)	(105)	(230)	(115)	(115)
Net New Trips			405	205	200	725	400	325

¹Represents the total site driveway counts during the weekday p.m. peak hour of 4:35-5:35 p.m. and Saturday midday peak hour of 12:10-1:10 p.m. This is the traffic volume being generated by the existing 158,343 square feet of shopping center currently residing on the site prior to Kmart's closure.

²The library traffic counts were estimated using the *Library* land use in *ITE Trip Generation*.

³The City Hall traffic counts were estimated using the *Single Tenant Office Building* land use in *ITE Trip Generation*. The existing City Hall square footage was estimated to be approximately 10,000 square feet in size.

⁴Includes the 158,343 square feet of existing shopping center (minus the 96,799 square foot former K-Mart) plus the 245,456 square feet of proposed shopping center uses.

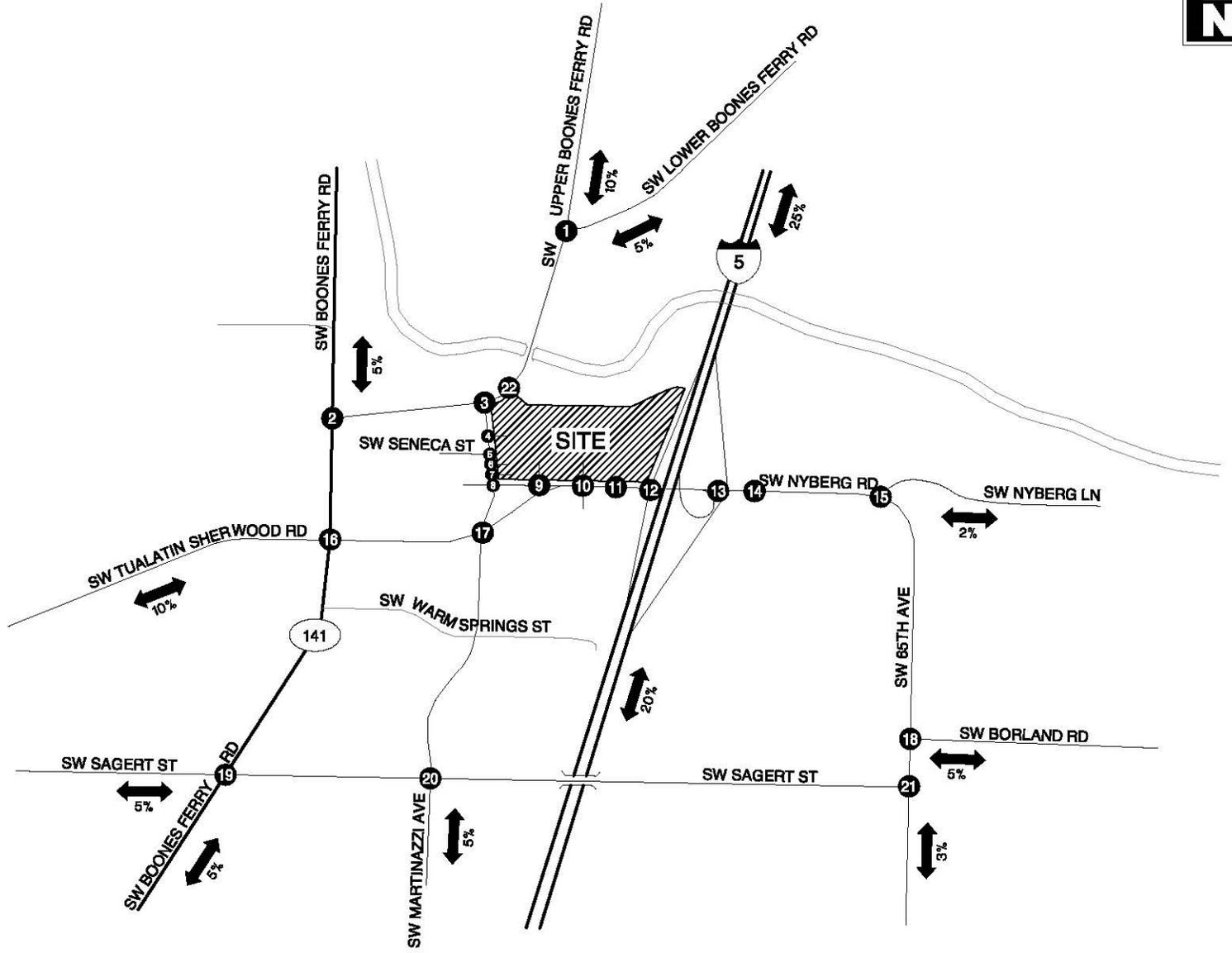
As shown in Table 8, the proposed redevelopment project is anticipated to generate approximately 405 net new weekday p.m. peak hour trips and 725 net new Saturday midday peak hour trips.

Site Trip Distribution/Trip Assignment

The trip distribution pattern for the proposed redevelopment project was estimated based on a review of existing traffic patterns and a select zone assignment obtained from Washington County's travel demand model. A *summary output sheet from the travel demand model and the distribution calculations derived from it is provided in the first part of Appendix F*. The trip distribution pattern used in the analysis is shown in Figure 7.



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ESTIMATED TRIP DISTRIBUTION PATTERN
TUALATIN, OREGON

FIGURE
7

The estimated site-generated trips were assigned to the network by distributing the trips shown in Table 8 according to the trip distribution pattern shown in Figure 7. Figures 8aA/8aPB and 8bA/8bBP illustrate the site-generated/pass-by trips that are expected to use the roadway system during the weekday p.m. and Saturday midday peak hours.

YEAR 2014 TOTAL TRAFFIC CONDITIONS

The total traffic conditions analysis forecasts how the study area's transportation system will operate with the traffic generated by the Nyberg Rivers redevelopment plan. The year 2014 background traffic volumes for the weekday p.m. and Saturday midday peak hours (shown in Figure 5a and 5b) were added to the site-generated traffic (shown in Figures 8aA/8aPB and 8bA/8bPB) to arrive at the total traffic volumes that are shown in Figures 9a and 9b.

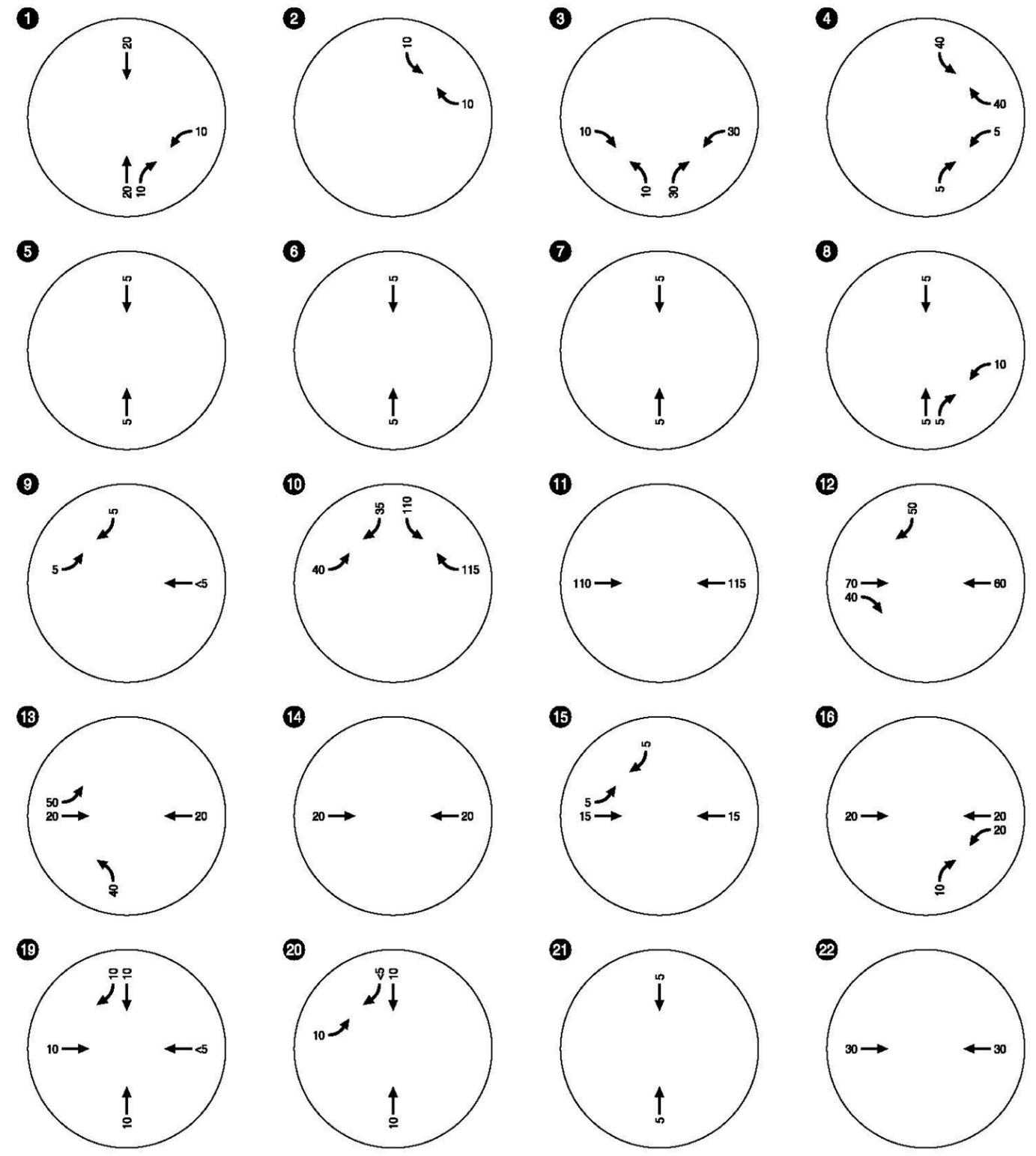
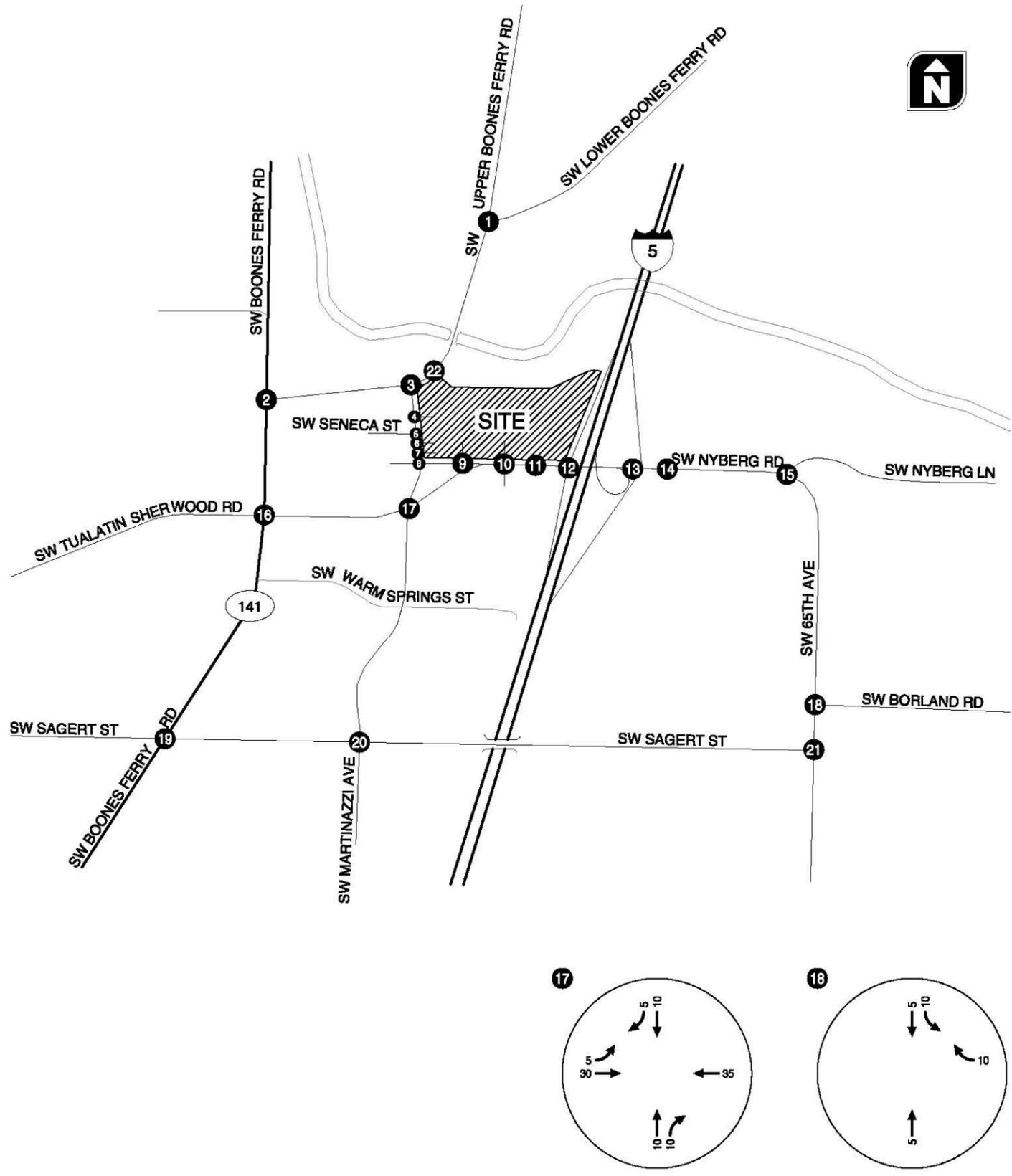
2014 Total Traffic Operations

The weekday p.m. and Saturday midday peak hour turning-movement volumes shown in Figures 9a and 9b were used to conduct an operational analysis at each study intersection and site driveway to determine the year 2014 total traffic operations. The results of the total traffic analysis shown in Figures 9a, 9b, and Table 9 indicate that all of the study intersections and site access points, except for the SW 65th Avenue/SW Sager Road and SW Martinazzi Avenue/SW Sagert Road intersections, are forecast to operate at acceptable operations during the weekday p.m. and Saturday midday peak hours. *Appendix "F" contains the year 2014 total traffic level-of-service worksheets.*

The SW Martinazzi Avenue/SW Sagert Road and SW 65th Avenue/SW Sagert Road intersections are forecast to continue to operate at LOS F. The proposed development is estimated to contribute an additional 1.6% and 0.6%, respectively, during the weekday p.m. peak hour. Given this small increase, no development-driven traffic mitigation is recommended for the following reasons:

- The Tualatin TSP has identified mitigations for these two intersections that, when implemented, will address the long-term operations.
- The Washington County Transportation Development Tax (TDT) in part funds an improvement project on SW Sagert Street that will add capacity and reduce delay to both intersections.

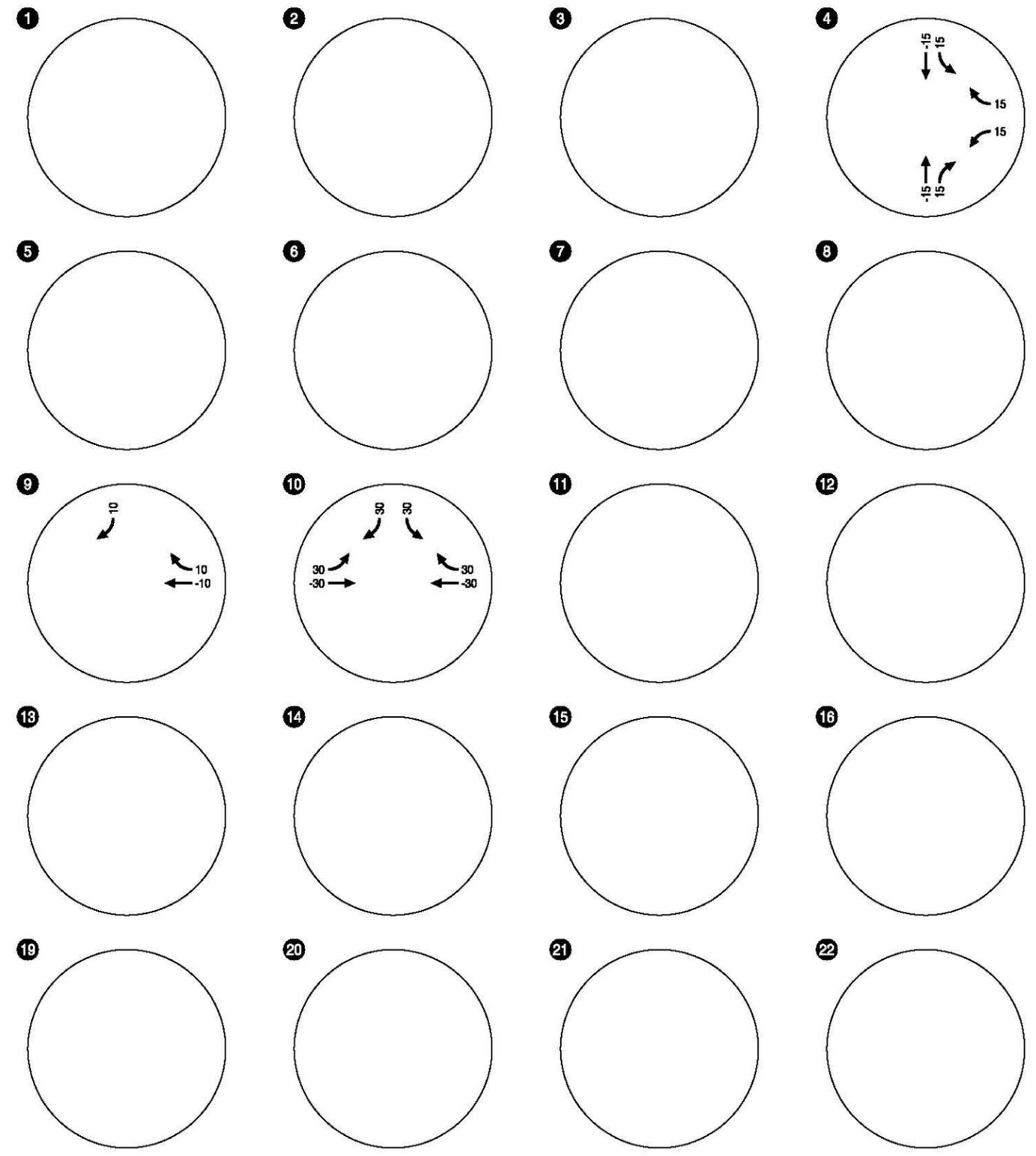
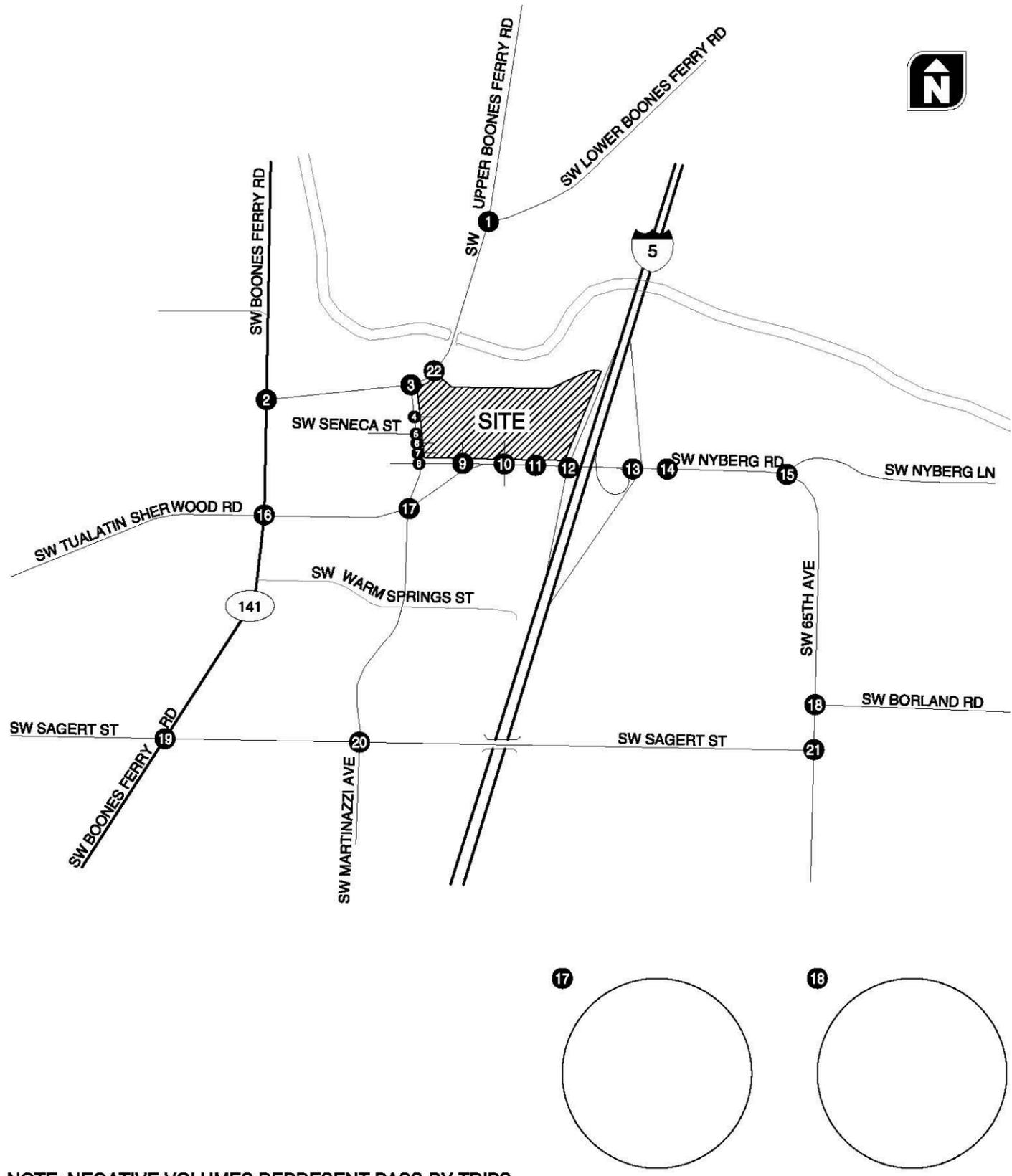
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SITE-GENERATED TRIPS (ADDED TRIPS), WEEKDAY PM PEAK HOUR
ASSUMED SITE ACCESS CONFIGURATION
TUALATIN, OREGON

FIGURE
8aA

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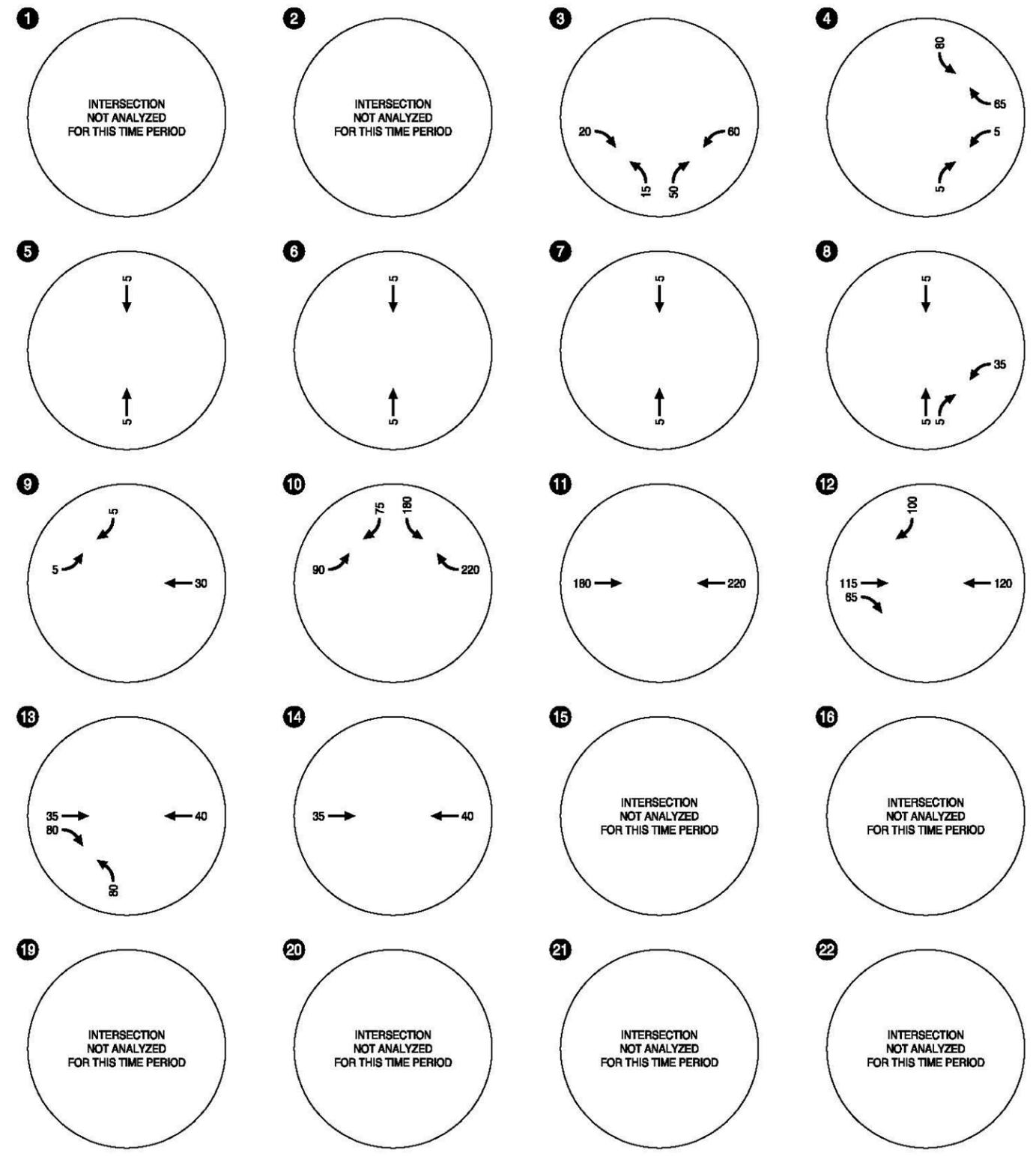
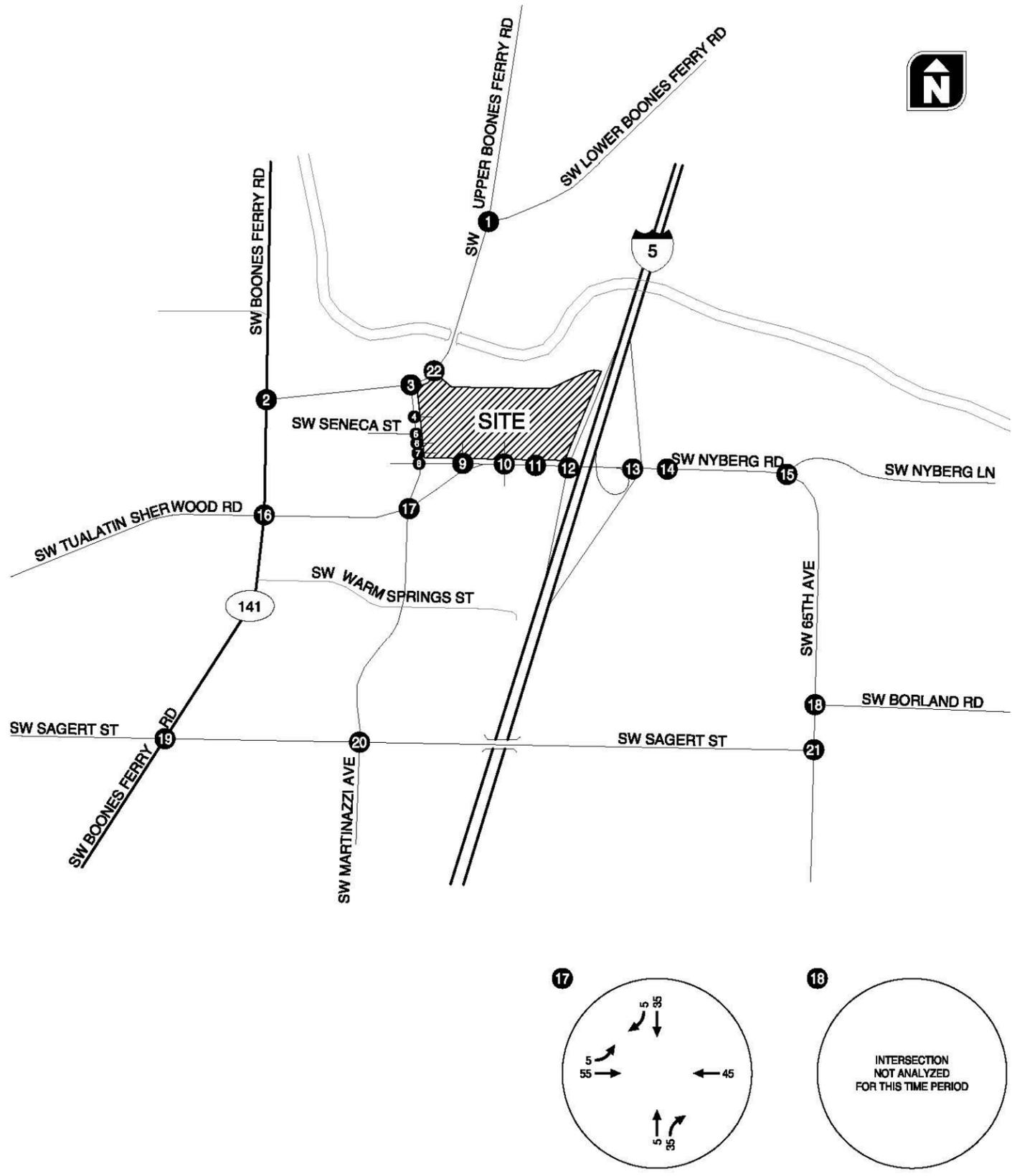


NOTE: NEGATIVE VOLUMES REPRESENT PASS-BY TRIPS

SITE-GENERATED TRIPS (PASS BY TRIPS), WEEKDAY PM PEAK HOUR
ASSUMED SITE ACCESS CONFIGURATION
TUALATIN, OREGON

FIGURE
8aPB

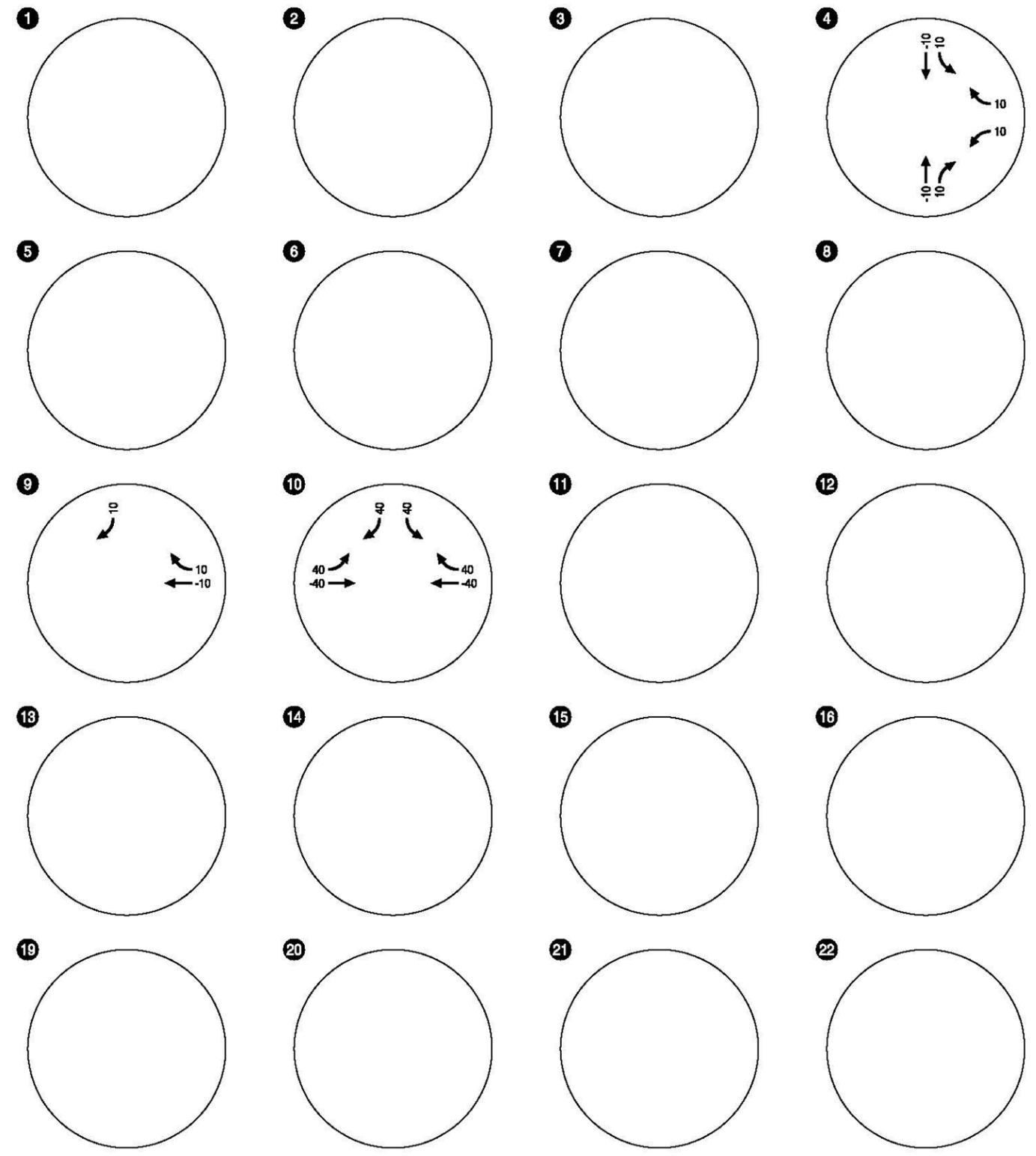
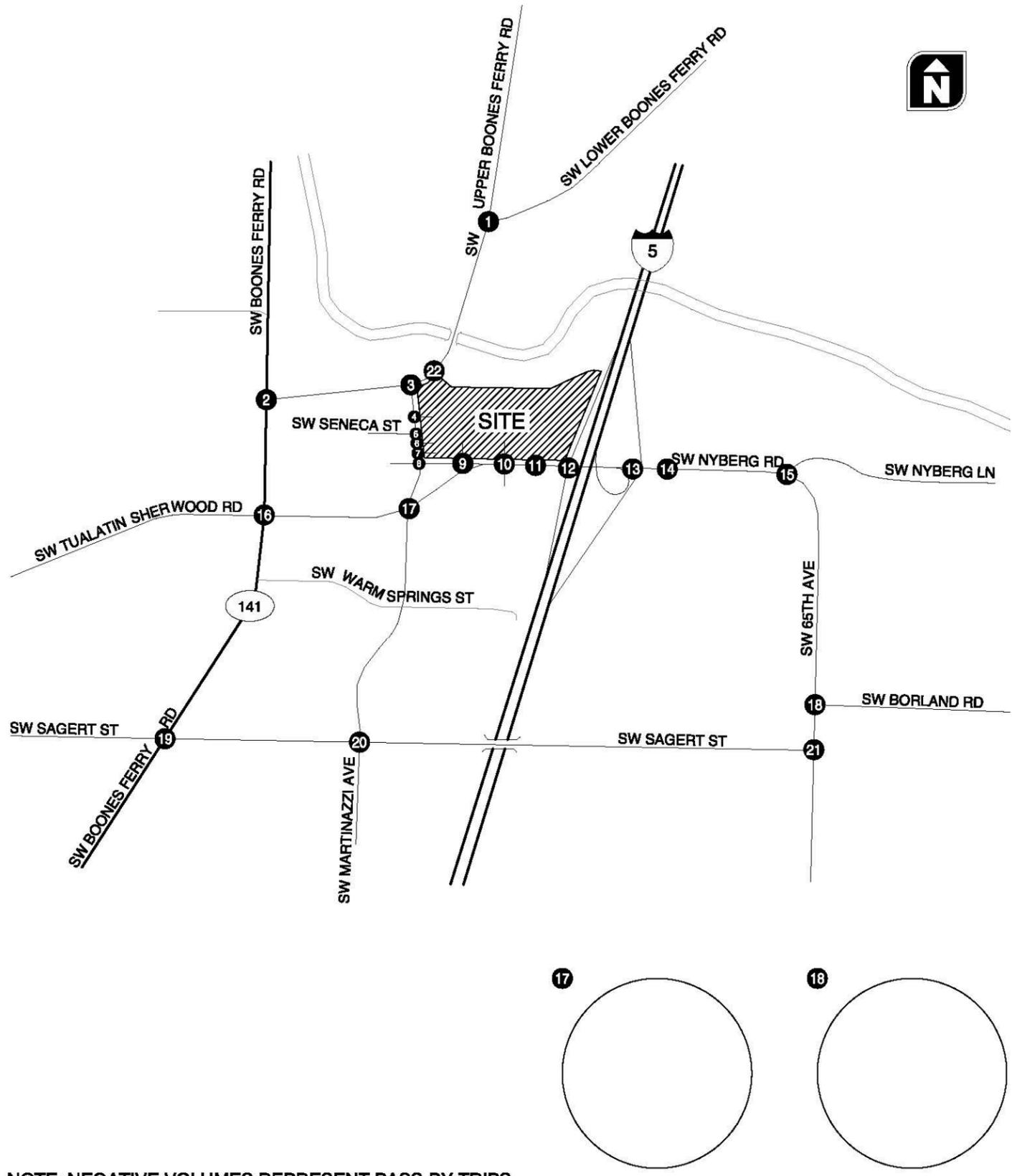
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SITE-GENERATED TRIPS (ADDED TRIPS), SATURDAY MIDDAY PEAK HOUR
ASSUMED SITE ACCESS CONFIGURATION
TUALATIN, OREGON

FIGURE
8bA

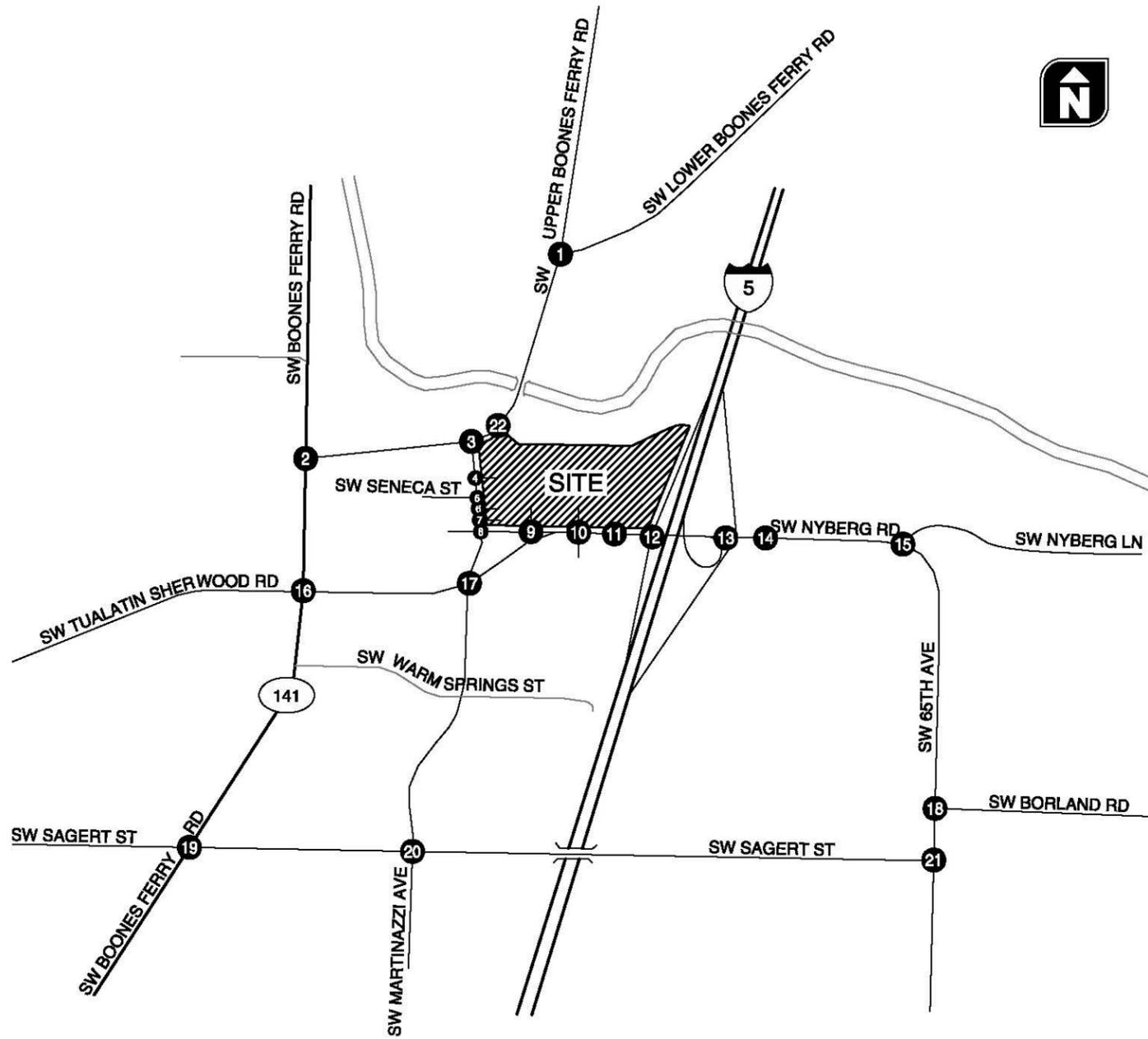
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NOTE: NEGATIVE VOLUMES REPRESENT PASS-BY TRIPS

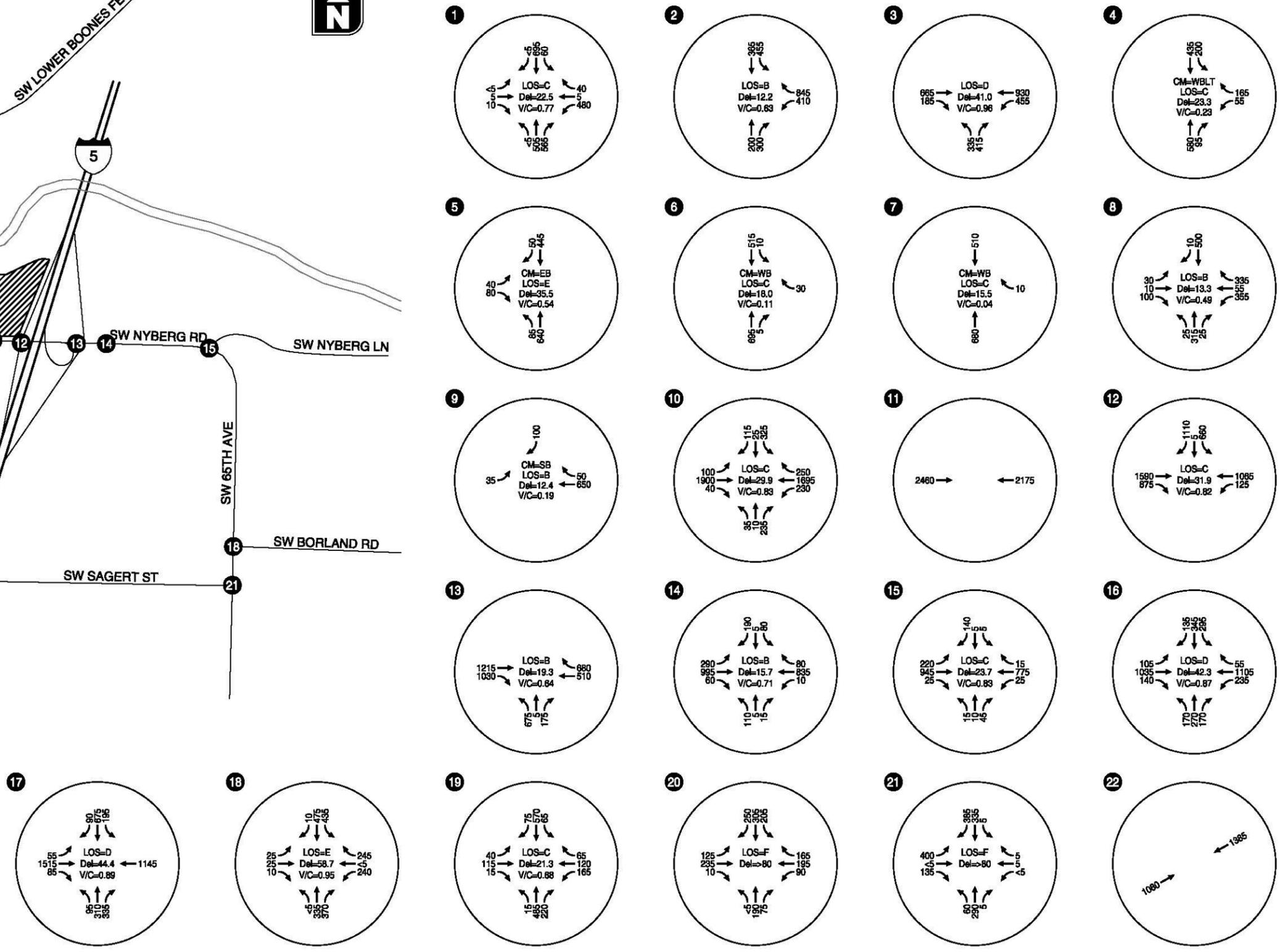
SITE-GENERATED TRIPS (PASS BY TRIPS), SATURDAY MIDDAY PEAK HOUR ASSUMED SITE ACCESS CONFIGURATION TUALATIN, OREGON **FIGURE 8bPB**

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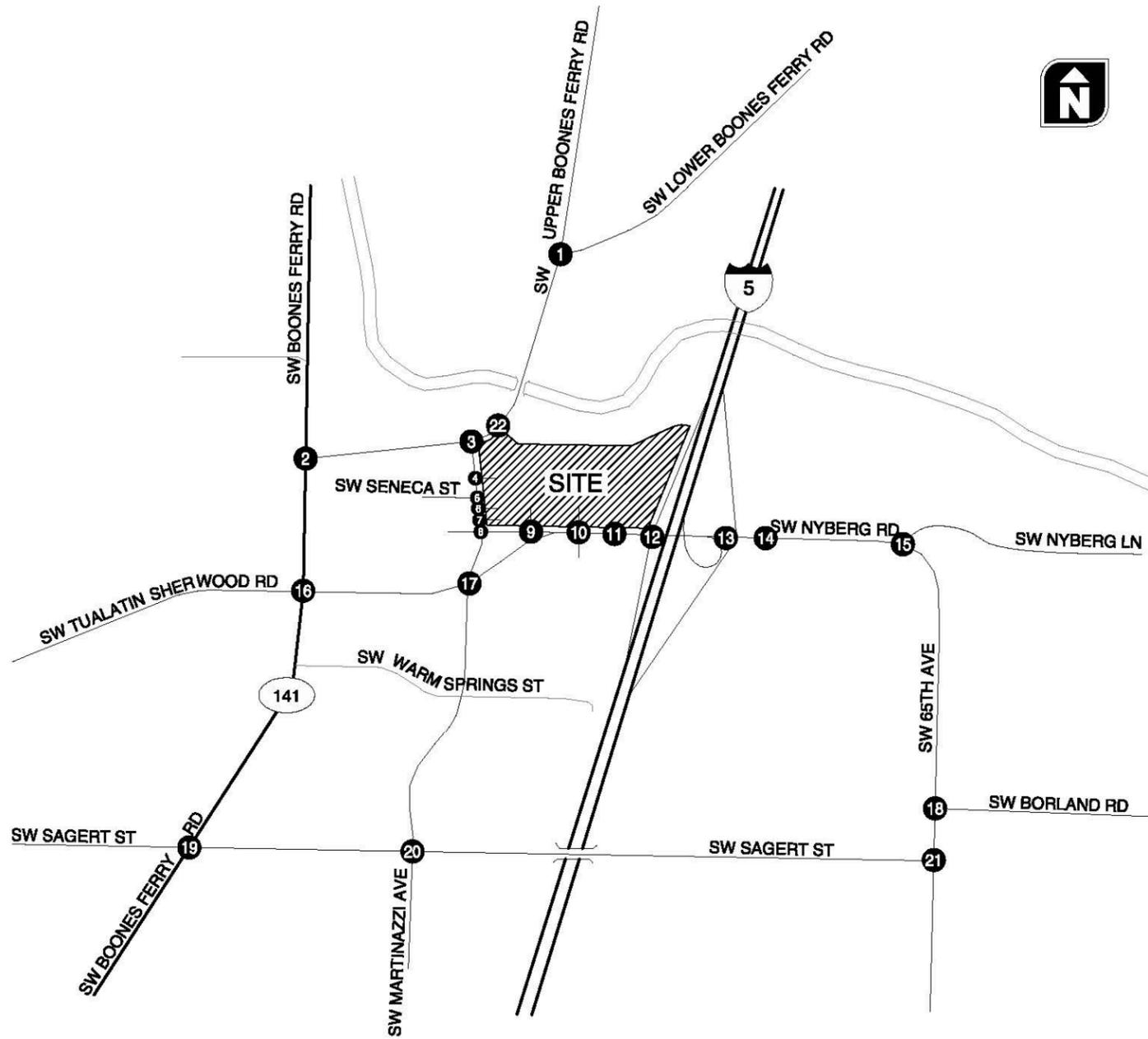
LEGEND

- CM = CRITICAL MOVEMENT (TWSC)
- LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC)/CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
- Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
- TWSC = TWO-WAY STOP CONTROL
- AWSC = ALL-WAY STOP CONTROL



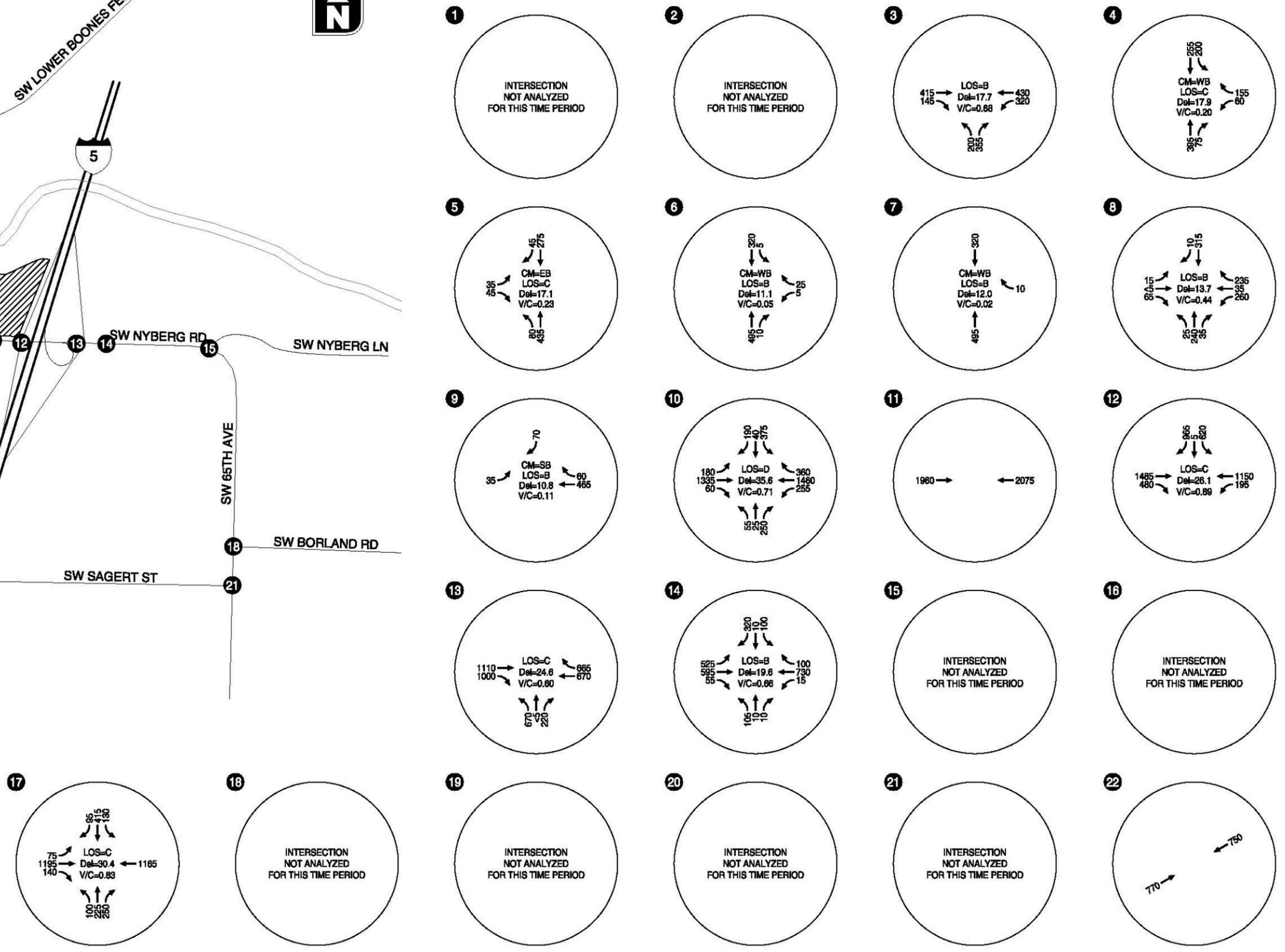
2014 TOTAL TRAFFIC CONDITIONS, WEEKDAY PM PEAK HOUR
ASSUMED SITE ACCESS CONFIGURATION
TUALATIN, OREGON

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LEGEND

- CM = CRITICAL MOVEMENT (TWSC)
- LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC)/CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
- Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
- TWSC = TWO-WAY STOP CONTROL
- AWSC = ALL-WAY STOP CONTROL



2014 TOTAL TRAFFIC CONDITIONS, SATURDAY MIDDAY PEAK HOUR
ASSUMED SITE ACCESS CONFIGURATION
TUALATIN, OREGON

Table 9: 2014 Total Traffic Operations

Number	Intersection	Maximum Operating Standard	Weekday PM Peak Hour		Saturday Midday Peak Hour	
			LOS	V/C	LOS	V/C
Signalized Intersections						
1	SW Upper Boones Ferry Road/ SW Lower Boones Ferry Road/ SW Boones Ferry Road	0.99	C	0.77	Not Analyzed	Not Analyzed
2	SW Boones Ferry Road/ SW Tualatin Road	0.99	B	0.63	Not Analyzed	Not Analyzed
3	SW Boones Ferry Road/ SW Martinazzi Avenue	0.99	D	0.96	B	0.68
8	SW Nyberg Road/ SW Martinazzi Avenue	0.99	B	0.49	B	0.44
10	SW Nyberg Road/ SW Tualatin-Sherwood Road/ Fred Meyer/Site Access	0.99	C	0.83	D	0.71
12	I-5 SB Ramp Terminal/ SW Nyberg Road	0.85	C	0.82	C	0.89
13	I-5 NB Ramp Terminal/ SW Nyberg Road	0.85	B	0.64	C	0.60
14	SW Nyberg Road/ Nyberg Woods Driveway	0.99	B	0.71	B	0.66
15	SW Nyberg Road/ SW 65 th Avenue	0.99	C	0.83	Not Analyzed	Not Analyzed
16	SW Tualatin-Sherwood Road/ SW Boones Ferry Road	0.99	D	0.87	Not Analyzed	Not Analyzed
17	SW Tualatin-Sherwood Road/ SW Martinazzi Avenue	0.99	D	0.89	C	0.83
18	SW 65 th Avenue/ SW Borland Road	0.99	E	0.95	Not Analyzed	Not Analyzed
19	SW Boones Ferry Road/ SW Sagert Street	0.99	C	0.68	Not Analyzed	Not Analyzed
Unsignalized Intersections¹						
4	SW Martinazzi Avenue/ North Site Driveway	E	C	0.23	C	0.20
5	SW Martinazzi Avenue/ SW Seneca Street	E	E	0.54	C	0.23
7	SW Martinazzi Avenue/ Right-Out Only Site Driveway	E	C	0.04	B	0.02
9	SW Nyberg Road/ Site Driveway	E	B	0.19	B	0.11
22*	SW Boones Ferry Road/ Right-in/Right-Out Site Driveway	0.99	D	0.23	C	0.16
All-Way Stop-Controlled Intersections						
20	SW Sagert Street/ SW Martinazzi Avenue	D	F	N/A	Not Analyzed	Not Analyzed
21	SW Sagert Street/ SW 65 th Avenue	D	F	N/A	Not Analyzed	Not Analyzed

Notes:

¹ LOS and V/C reported for the highest delay or critical movement

* Results reported reflect SW Martinazzi Avenue and SW Boones Ferry Road Site Access Alternatives discussed beginning on page 45.

For intersections #4, #5, #6, and #7, it is recognized that the operational results shown may differ slightly due to the presence of vehicle queuing along SW Martinazzi Avenue during peak time periods.

Existing and background conditions along the Tualatin-Sherwood corridor between the I-5 ramp terminals and Boones Ferry Road reflect consistent timing parameters due to the limited change in traffic volumes. Under the total conditions, with the new site traffic, timing parameters have been optimized in a more focused effort to approximate the SCATS adaptive system's response to the new traffic. The difference in timing optimization levels contributes to the variation in performance between background and total conditions.

Total Daily Traffic Profile

A summation of the 2014 Total Traffic daily traffic volumes is summarized in Table 10 below.

Table 10: 2014 Total Daily Traffic Profile

Roadway	Segment	Estimated Daily Volume		
		2012 Existing	2014 Background	2014 Total
SW Lower Boones Ferry Road	East of SW Upper Boones Ferry Road	13,200	13,600	13,900
SW Boones Ferry Road	East of SW Martinazzi Avenue	28,100	28,800	29,600
SW Boones Ferry Road	West of SW Martinazzi Avenue	24,400	25,100	25,400
SW Martinazzi Avenue	South of SW Boones Ferry Road and north of SW Nyberg Road	13,700	14,100	14,400
SW Martinazzi Avenue	South of SW Tualatin-Sherwood Road	17,100	17,600	18,100
SW Boones Ferry Road	North of SW Tualatin-Sherwood Road	14,000	14,500	14,500
SW Boones Ferry Road	South of SW Tualatin-Sherwood Road	15,200	15,700	16,100
SW Tualatin-Sherwood Road	West of SW Boones Ferry Road	30,800	31,800	32,300
SW Tualatin-Sherwood Road	East of SW Boones Ferry Road and west of SW Martinazzi Avenue	34,000	34,900	35,900
SW Tualatin-Sherwood Road	East of SW Martinazzi Avenue and west of SW Nyberg Road	36,400	37,400	38,300
SW Nyberg Lane	West of SW Tualatin-Sherwood Road and east of SW Martinazzi Ave	9,000	9,200	9,500
SW Nyberg Road	East of SW Tualatin-Sherwood Road and west of I-5 SB Ramp Terminal	51,900	52,900	55,900
SW Nyberg Road	West of I-5 SB Ramp Terminal and east of I-5 NB Ramp Terminal	38,600	39,600	41,300
SW Nyberg Road	East of I-5 NB Ramp Terminal and west of SW 65 th Avenue	23,100	23,800	24,300
SW 65 th Avenue	South of SW Nyberg Road	17,500	18,100	18,400
SW Borland Road	East of SW 65 th Avenue	14,900	15,400	15,700
SW 65 th Avenue	South of SW Sagert Street	9,600	9,900	10,000
SW Sagert Street	West of SW 65 th Avenue	11,500	11,900	11,900
SW Sagert Street	East of SW Martinazzi Avenue	11,200	11,600	11,700

Queuing Analysis

A 95th percentile vehicle queuing analysis was performed at the I-5 off-ramps and the SW Nyberg Road/Signalized site driveway. Per ODOT requirements, the ramp terminal queuing was assessed using SimTraffic software⁵. The queuing analysis was completed in accordance with the assumptions stipulated in the ODOT *Analysis Procedures Manual (APM)*.

Each vehicle was assumed to occupy 25 feet. Table 11 summarizes the queuing analysis at the study intersections for the 2014 total traffic conditions (critical weekday p.m. peak hour). All queues reported

⁵ Tualatin-Sherwood Road between the I-5 ramp terminals and Teton Avenue currently operates with an adaptive signal system (TransCore SCATSTM), which adjusts cycle length, green splits and offsets to match capacity to traffic demands. This traffic analysis approximated the SCATS system using an upper-end cycle length based on the existing logs from the SCATS system, provided by Washington County. The Synchro/SimTraffic analysis is still a static representation of the adaptive system, thus better than reported results for delay and queue lengths are expected due to the adaptive system capabilities.

are rounded up to the nearest vehicle length. Appendix “F” contains the year 2014 total traffic queuing analysis worksheets.

Table 11: Estimated 95th Percentile Queuing Analysis

Intersection	Movement	Estimated 95 th Percentile Queue (ft)				Storage Length
		Weekday PM Peak Hour		Saturday Midday Peak Hour		
		Background Traffic	Total Traffic	Background Traffic	Total Traffic	
I-5 SB Ramp Terminal/ SW Nyberg Road	SB LT/TH	675	700	550	650	700 ¹
	SB RT	550	450	400	475	700 ¹
I-5 NB Ramp Terminal/ SW Nyberg Road	NB TH/LT	400	625	375	675	1,270
	NB RT	225	275	250	300	1,270
SW Nyberg Road/ Signalized Site Driveway	WB LT	150	150	150	150	225
	SB LT	225	200	100	200	250
	EB LT	75	150	100	225	225
	NB RT	250	275	250	250	275

NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound

LT = Left-Turn; TH = Through; RT = Right-Turn

¹Storage length is framed by the portion of the freeway off-ramp needed to bring a vehicle to a full stop from the posted freeway speed (55 mph) at a deceleration rate of 6.5 feet/second². Ramp length is approximately 1,200 feet long with a deceleration distance of approximately 500 feet.

Table 11 shows that adequate storage exists for the forecast 95th percentile queues at the identified intersections and main sight-access driveway under total traffic conditions.

SW Martinazzi Avenue and SW Boones Ferry Road Site Access Alternatives

As part of this study, a separate site access alternative was evaluated that includes the following options:

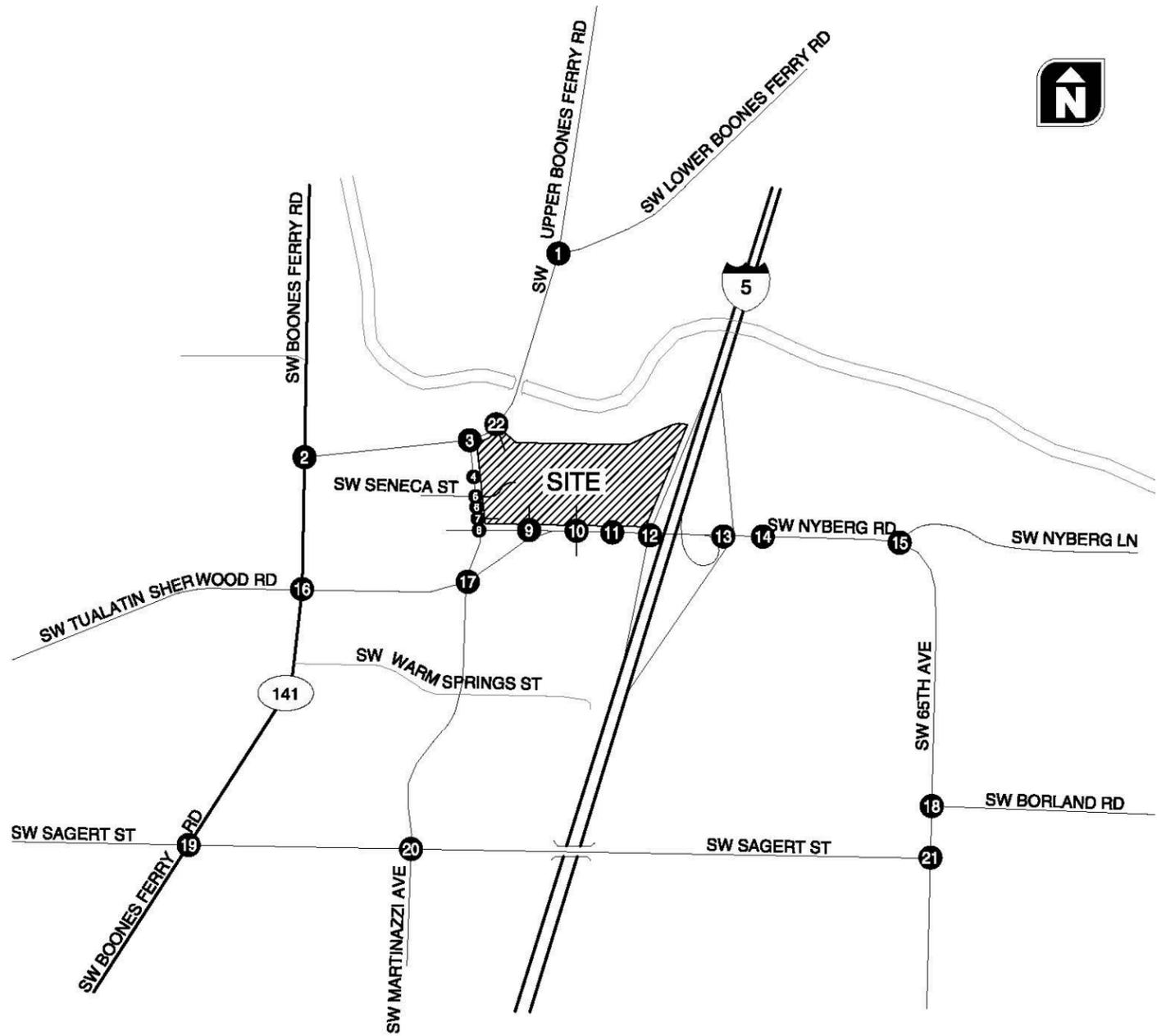
- Adding a fourth leg (in the form of a site-access driveway) to the existing SW Martinazzi Avenue/SW Seneca Street intersection and closing the existing SW Martinazzi Avenue site driveway adjacent to the library⁶. For initial evaluation purposes, it was assumed that the modified intersection would be stop-controlled on the east-west Seneca Street approaches

⁶ It should be noted that this site-access is not required to mitigate for any impacts from the proposed development. Rather, it was evaluated in the event the City determined that it had a desire to reconfigure its property and therefore realign the access. Such realignment is not immediately required and can await the City’s preferred timeline for redevelopment of its site. For the purposes of analyzing this scenario, it was assumed that the City buildings would be relocated somewhere within the existing shopping center site to ensure that this transportation impact analysis accounted for the trips associated with those uses.

- and the new westbound approach would have a separate left- and shared through-right lane.
- Adding a new site driveway that would connect to SW Boones Ferry Road (identified as the Street “A” connection in Figure 2). Given the limited site frontage along SW Boones Ferry Road, the nearby SW Martinazzi Avenue/SW Boones Ferry Road intersection, and the nearby Tualatin River Bridge, it was assumed that this driveway connection would be limited to right-in/right-out access.

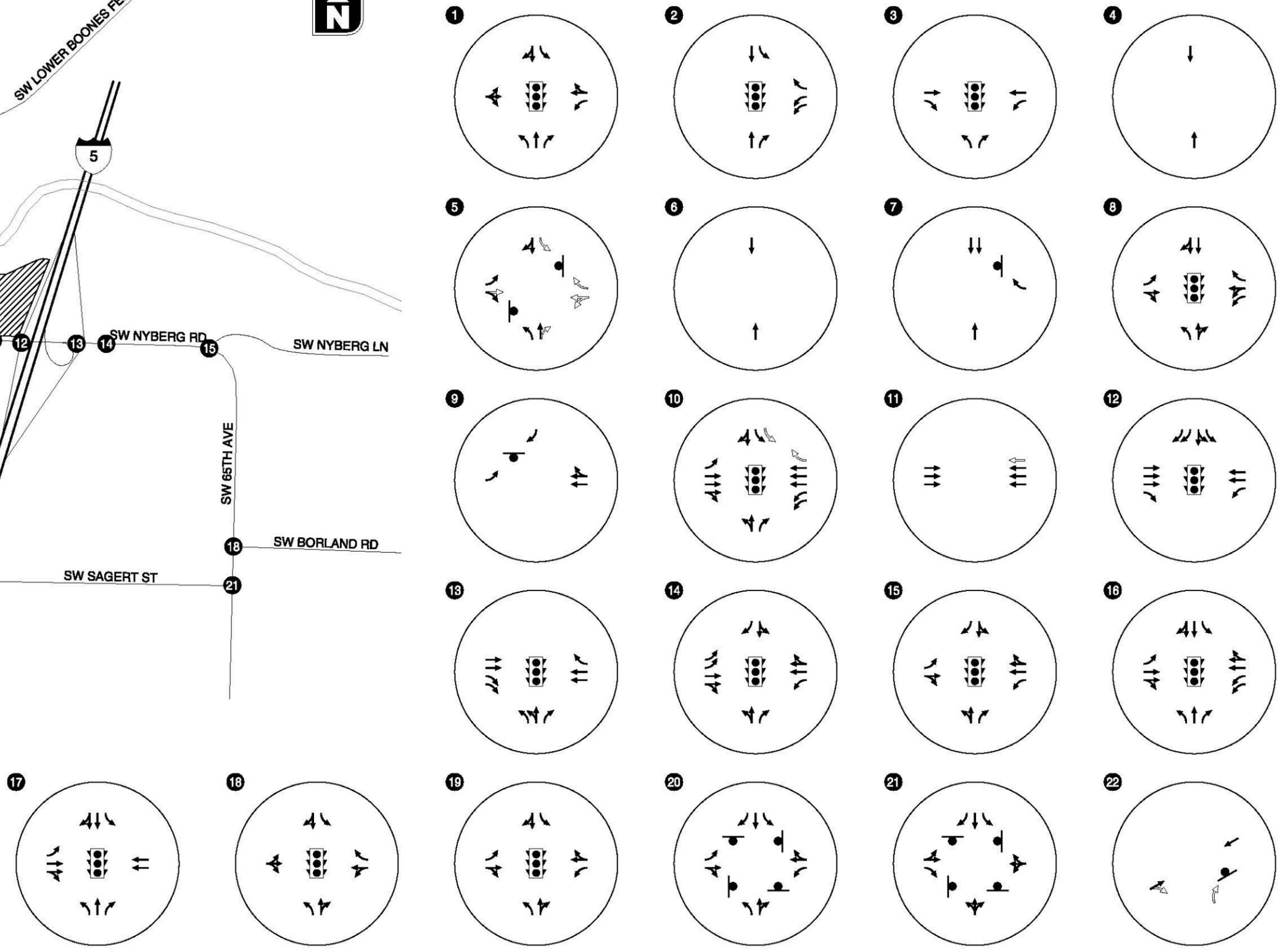
Figure 10 shows the assumed site-access configurations and traffic control devices associated with these site-access alternatives. Figures 11a and 11b summarize the resulting intersection operations for the weekday p.m. and Saturday midday peak hours.

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LEGEND

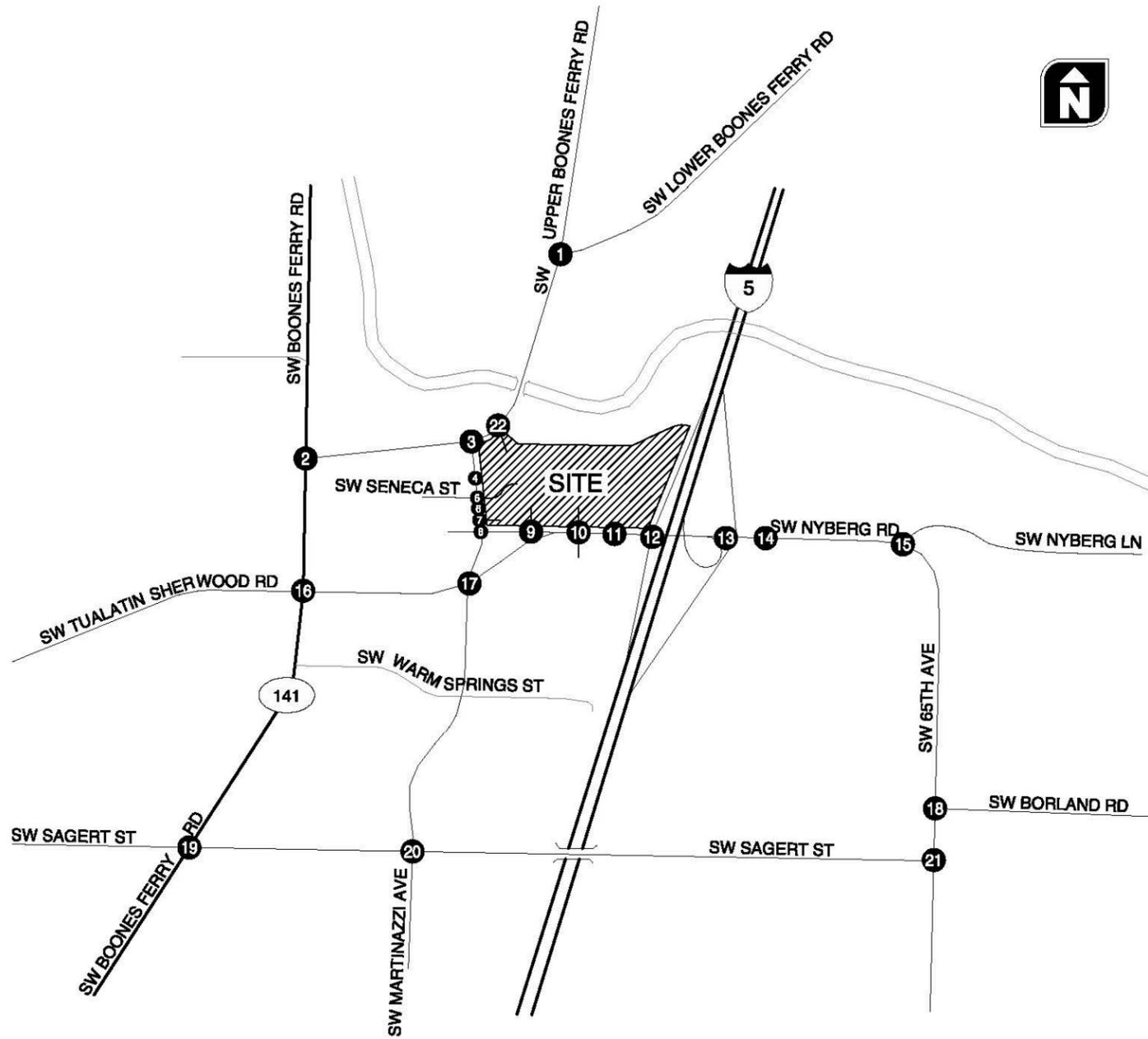
- NEW TRAVEL LANE
- STOP SIGN
- TRAFFIC SIGNAL



ALTERNATIVE SITE ACCESS CONFIGURATION AND TRAFFIC CONTROL DEVICES TUALATIN, OREGON

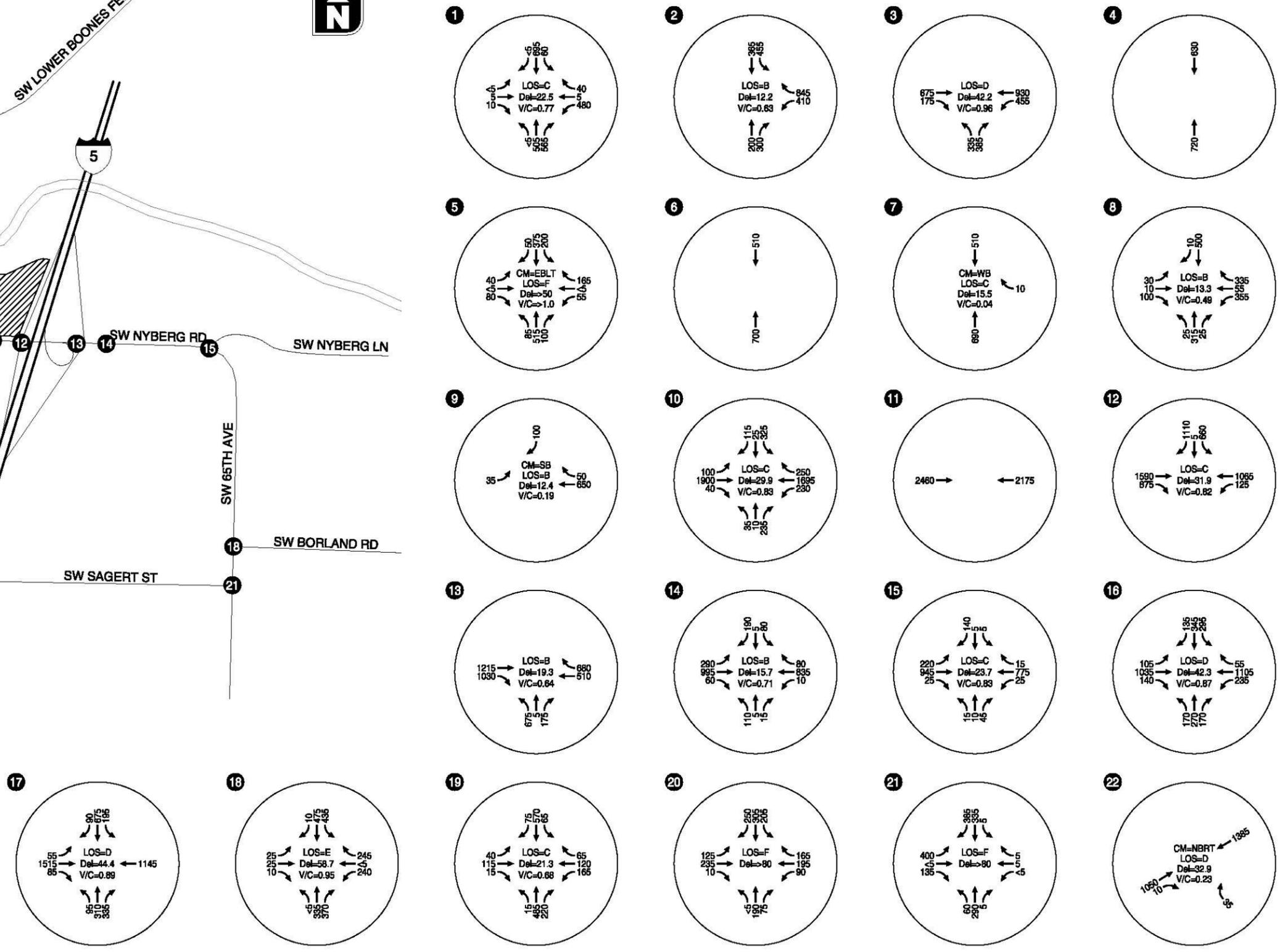
FIGURE 10

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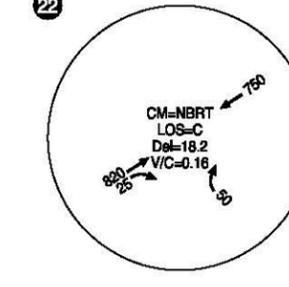
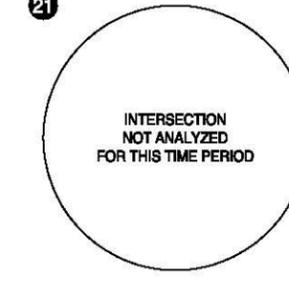
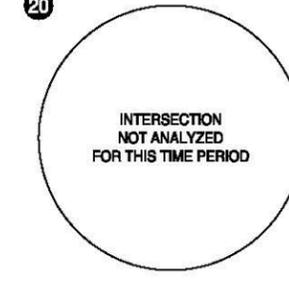
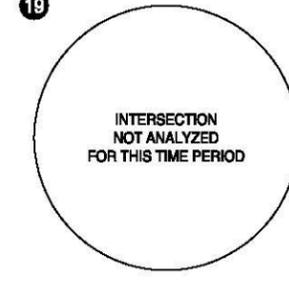
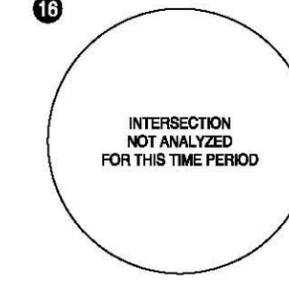
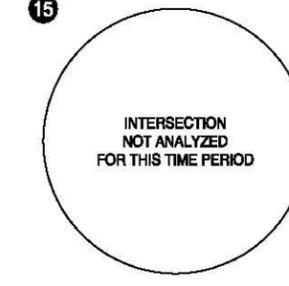
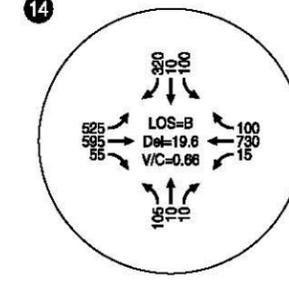
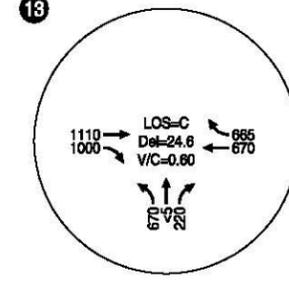
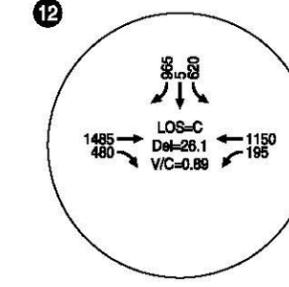
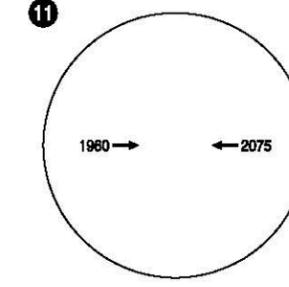
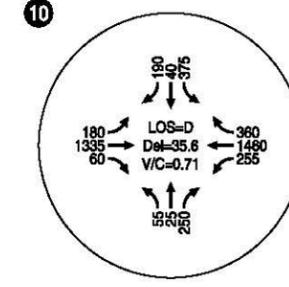
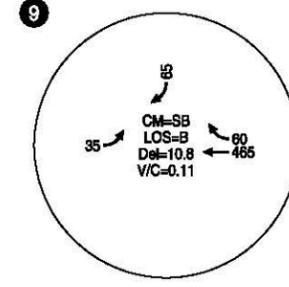
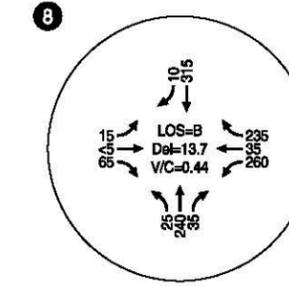
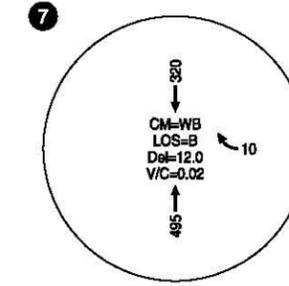
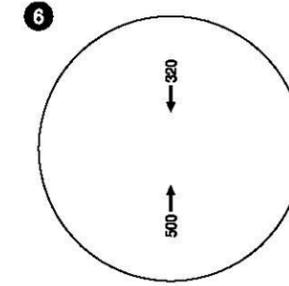
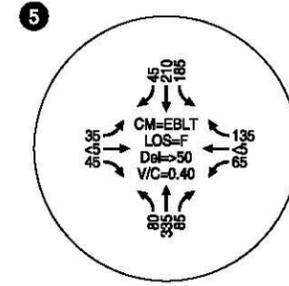
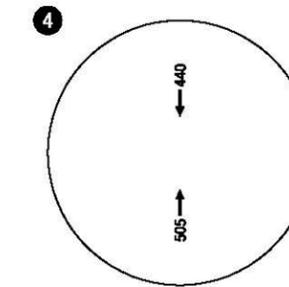
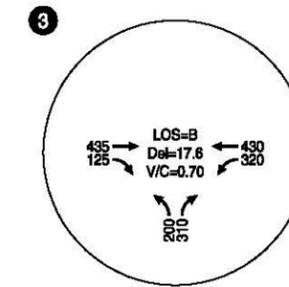
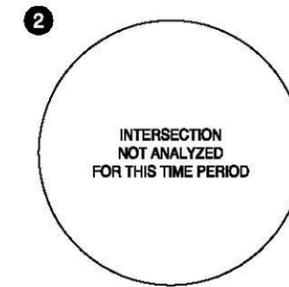
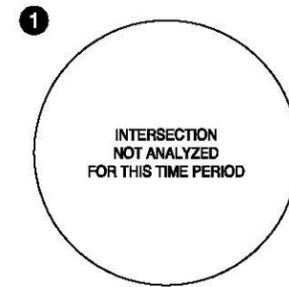
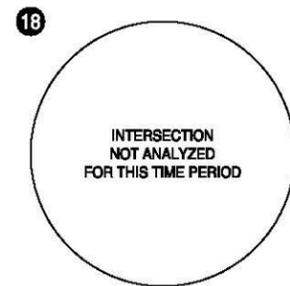
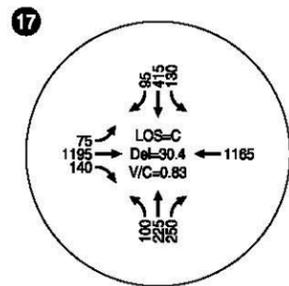
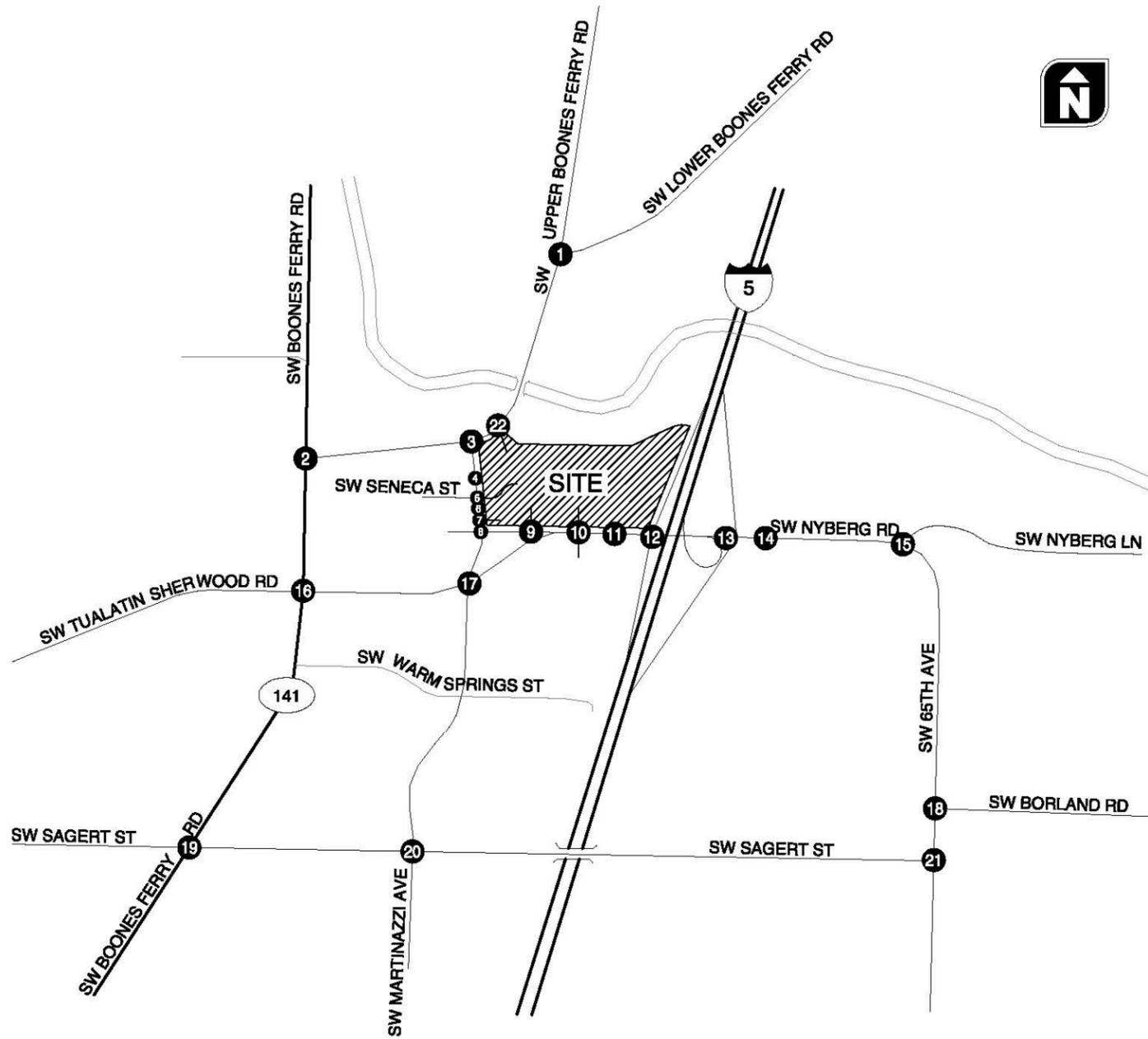
LEGEND

- CM = CRITICAL MOVEMENT (TWSC)
- LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC)/CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
- Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
- TWSC = TWO-WAY STOP CONTROL
- AWSC = ALL-WAY STOP CONTROL



2014 TOTAL TRAFFIC CONDITIONS, WEEKDAY PM PEAK HOUR
ALTERNATIVE SITE ACCESS CONFIGURATION
TUALATIN, OREGON **FIGURE 11A**

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LEGEND

- CM = CRITICAL MOVEMENT (TWSC)
- LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC)/CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
- Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
- TWSC = TWO-WAY STOP CONTROL
- AWSC = ALL-WAY STOP CONTROL

2014 TOTAL TRAFFIC CONDITIONS, SATURDAY MIDDAY PEAK HOUR
ALTERNATIVE SITE ACCESS CONFIGURATION
TUALATIN, OREGON

As shown in the Figure 11a, both the eastbound and westbound left-turn volumes at the modified SW Martinazzi Avenue/SW Seneca Street intersection are forecast to operate at LOS F and over capacity during the weekday p.m. peak hour conditions under this alternative. Based on these conditions, a traffic signal with permissive left-turn phasing was evaluated as a potential mitigation measure. Table 12 summarizes the resulting operations for the weekday p.m. and Saturday midday peak hours.

Table 12: SW Martinazzi Avenue/SW Seneca Street Intersection Mitigation (2014 Total Traffic Conditions)

Mitigation	Weekday PM Peak Hour			Saturday Midday Peak Hour		
	Delay	LOS	V/C	Delay	LOS	V/C
Traffic Signal ¹	10.6	B	0.68	5.5	A	0.37
¹ Permissive left-turn phasing was assumed on all approaches.						

Table 12 indicates that signalization of the intersection will mitigate the LOS F conditions under the previously assumed two-way stop-controlled approach on SW Seneca Street. *Appendix “G” contains the year 2014 total traffic operations worksheets for the alternative access scenario at SW Martinazzi Avenue/SW Seneca Street intersection.* As indicated in Table 12, a traffic signal at the SW Martinazzi Avenue/SW Seneca Street intersection provides a significant capacity and safety benefit. In particular, signalization would:

- Provide additional excess capacity compared to an unsignalized east-west stop-controlled intersection.
- Enhance east-west pedestrian movements by providing a signalized crossing where one does not exist today.

From a signal operations standpoint, progression along SW Martinazzi Avenue is constrained by the endpoints of SW Tualatin-Sherwood Road and SW Boones Ferry. Operational analysis indicates a new signal at Seneca and the existing signal at SW Martinazzi Avenue/SW Boones Ferry Road could operate well during the peak period as a fully actuated, uncoordinated signal. Queuing should be monitored, particularly for other time periods to determine if including one or both of these signals into the adaptive signal system would be advantageous. Note, the new signal at Seneca provides much needed queue management on SW Martinazzi (as seen in SimTraffic modeling) to facilitate traffic flows and represents a large improvement over the no-build conditions for the assumed 2014 traffic demand.

In addition to the modified SW Martinazzi Avenue/SW Seneca Street intersection, Figures 11a and 11b demonstrate the impacts of adding a limited access site-driveway to SW Boones Ferry Road (Street “A” connection). The analysis shows that the driveway would provide a direct connection to SW Boones Ferry Road, but that it would not provide an operational benefit to any other study intersection of site driveway beyond the base site layout analysis.

IMPACTS OF THE NYBERG RIVERS DEVELOPMENT ON IDENTIFIED TRANSPORTATION PLANNING PROJECTS

Figure 1 of the current Tualatin Transportation System Plan (TSP) has identified a future minor collector (Cb) roadway through the proposed Nyberg Rivers development area that would connect SW Nyberg Road to SW Boones Ferry Road. The TSP does not identify a specific alignment for this roadway. The *Tualatin Town Center Plan* subsequently identifies this connection as a “loop road” that would conceptually extend from SW Boones Ferry Road around the Kmart building and internally connect with a future Seneca Street extension from the west. The TSP and Town Center Plan do not specifically address how or where the loop road would make the final connection to SW Nyberg Road.

The Nyberg Rivers redevelopment project has proposed an on-site roadway network that will meet the intent of the loop road connection and completes the connection to SW Nyberg Road. While not meeting all the specific design requirements called for in the City’s proposed collector roadway designation, offers the functionality and connectivity that would be provided by a fully developed collector street system. The proposal includes the following:

- A new roadway connection to SW Boones Ferry Road (shown as "Street A" in Figure 2) that includes sidewalks.
- An enhanced site-access driveway to SW Nyberg Road that will better accommodate vehicular queuing and demand.
- A potential future (assuming the City desires to move forward) new site-access connection to SW Martinazzi Avenue that aligns across from SW Seneca Street. This connection would be the Seneca Street extension envisioned in the Town Center Plan. Prior to the City making a decision on any new SW Street Seneca alignment, the redevelopment site plan preserves this connection opportunity in the present or future.
- The preservation of east-west and north-south travel ways that will provide vehicular and pedestrian access between Street A, the Seneca Street alignment/extension, and enhanced access to SW Nyberg Road.
- New sidewalks along the enhanced site-access driveway to SW Nyberg Road that provide pedestrian connections to the integrated site circulation network.
- New bikeway connections along the perimeter of the site.

While all of these elements contribute towards the desired connectivity identified in the Tualatin TSP, development to full city standards is difficult for the following reasons:

- The TSP and Town Center Plan do not specifically address how or where the loop road would connect to SW Nyberg Road, however the graphics suggest the connection would occur somewhere within the vicinity of the existing SW 75th Avenue connection to SW Nyberg Road. Based on current ODOT access management policies, it is recognized that ODOT would not allow such a connection to be made given that it would be within 200-300 feet of the I-5 Southbound ramp terminal. Instead, it has been assumed that the existing SW

- Nyberg Road/signalized site driveway would represent the only access connection that ODOT would continue to support within the influence area of the interchange.
- The proposed Nyberg Rivers project is not a complete redevelopment of the existing shopping center site. A large number of existing uses (Michaels, US Bank, Banner Bank, Tualatin City Library and administrative offices, and other retail space) will remain on the site. As a result, much of the site layout (including buildings and parking areas) will remain substantially unchanged.
 - For example, the "loop road" concept in the Tualatin Town Center Plan suggested that the conceptual connection occur around and behind the existing Kmart building. As noted in the proposed development plan, this area of the site will be redeveloped with retail pads. A limited site configuration for the placement of new buildings and a need to maintain a sizable number of existing buildings/parking areas does not accommodate a "loop road" alignment.

Section 5
Conclusions and Recommendations

CONCLUSIONS AND RECOMMENDATIONS

The results of this study indicate that the proposed Nyberg Rivers redevelopment project can be constructed while maintaining acceptable traffic operations and safety at the study intersections, assuming provision of the recommended mitigation measures.

FINDINGS

Year 2012 Existing Conditions

- All of the study intersections currently operate acceptably during the weekday p.m. and Saturday midday peak hours with the exception of the SW Martinazzi Avenue/SW Sagert Street and SW 65th Avenue/SW Sagert Road intersections.
 - At both the SW Martinazzi Avenue/SW Sagert Street and SW 65th Avenue/SW Sagert Street intersections, the southbound approach during the weekday p.m. peak hour operates at LOS F.

Year 2014 Background Traffic Conditions

- All of the study intersections are forecast to operate acceptably during the weekday p.m. and Saturday midday peak hours with the exception of SW Martinazzi Avenue/SW Sagert Road and SW 65th Avenue/SW Sagert Road intersections.
 - At both the SW Martinazzi Avenue/SW Sagert Street and SW 65th Avenue/SW Sagert Street intersections, the southbound approach during the weekday p.m. peak hour is forecast to continue to operate at LOS F. These findings are consistent with analysis conducted as part of the recent Tualatin Transportation System Plan (TSP) Update and future improvements are identified within the TSP for both of these intersections.

Proposed Redevelopment Plan

- Under the redevelopment plan, the existing SW 75th Avenue connection to SW Nyberg Road will be closed to improve access management along SW Nyberg Road and to better accommodate the redevelopment proposal.
- The existing signalized access on SW Nyberg Road that currently serves the shopping center and the adjacent Fred Meyer site will remain. However, the following changes are proposed in order to better accommodate the proposed redevelopment, provide additional capacity for future growth in traffic, and improve safety relative to the existing condition:
 - A westbound right-turn lane will be developed on SW Nyberg Road to enhance access to the site and minimize vehicle queuing on SW Nyberg Road.

- The existing site driveway is proposed to be widened as shown in the proposed site plan. This widening will include dual southbound left-turn lanes, a shared through/right-turn lane, and dual in-bound receiving lanes. A raised median will be constructed in the driveway throat to reduce turning conflicts on-site turning maneuvers and manage vehicle queues on the approach to the signal.
- The north and south approach signal phasing is proposed to be modified from permissive left-turn phasing to split phasing.
- With the anticipated mix of new retail uses, the proposed redevelopment is estimated to generate 405 net new trips during the weekday p.m. peak hour and 725 net new trips during the Saturday midday peak hour.

Year 2014 Total Traffic Conditions

- All of the study intersections within the immediate site vicinity, including the site access points and internal site intersections, are forecast to operate acceptably during the weekday p.m. and Saturday midday peak hours.
- The SW Martinazzi Avenue/SW Sagert Road and SW 65th Avenue/SW Sagert Road intersections are forecast to continue to operate at LOS F.
 - The proposed development will have an insignificant impact at either intersection, resulting in an estimated 1.6% and 0.6% increase, respectively, during the weekday p.m. peak hour.
 - The Tualatin TSP has identified mitigations for these two intersections that, when implemented, will address the long-term operations.
 - The Washington County Transportation Development Tax (TDT) in part funds an improvement project on SW Sagert Street that will add capacity and reduce delay to both intersections.
- Beyond the site's frontage along SW Tualatin Sherwood Road and SW Martinazzi Avenue, where significant transportation improvements are proposed (including implementing the intent of the City's Loop Road), the project will have an insignificant impact on the other study intersections (generally resulting in less than a two percent increase in traffic relative to 2014 background conditions).
- At all signalized intersections beyond the site frontage (with the exception of the I-5 interchange), the project will add on average one vehicle or less per signal cycle to any movement. This level of impact is less than significant by any traffic engineering standard and well below the level that would be perceived by motorists.
- Anticipated vehicle queues can be accommodated at the I-5 ramp terminals and the SW Nyberg Road/Signalized site driveway.

- The proposed Nyberg Rivers redevelopment project has proposed an on-site roadway network that will meet the intent of the loop road connection. The proposal includes the following:
 - A new roadway connection to SW Boones Ferry Road (shown as "Street A" in Figure 2) that includes sidewalks.
 - An enhanced site-access driveway to SW Nyberg Road that will better accommodate vehicular queuing and demand.
 - A potential future (assuming the City desires to move forward) new site-access connection to SW Martinazzi Avenue that aligns across from SW Seneca Street. This connection would be the Seneca Street extension envisioned in the Town Center Plan. Prior to the City making a decision on any new SW Street Seneca alignment, the redevelopment site plan preserves this connection opportunity in the present or future.
 - The preservation of east-west and north-south travel ways that will provide vehicular and pedestrian access between Street A, the Seneca Street alignment/extension, and enhanced access to SW Nyberg Road.
 - New sidewalks along the enhanced site-access driveway to SW Nyberg Road that provide pedestrian connections to the integrated site circulation network.
 - New bikeway connections along the perimeter of the site.

SW Martinazzi Avenue and SW Boones Ferry Road Site Access Alternatives

- An alternative site access scenario was evaluated that demonstrates the impact of potentially adding a fourth leg (in the form of a site-access driveway) to the existing SW Martinazzi Avenue/SW Seneca Street intersection and closing the existing SW Martinazzi Avenue site driveway adjacent to the library. This analysis produced the following results:
 - The east and west approaches to a modified SW Martinazzi Avenue/SW Seneca Street intersection would operate at Level of Service (LOS) F and over capacity during the weekday p.m. peak hour with the addition of a fourth site-access leg. Signalizing the intersection would provide the following:
 - Mitigation that results in LOS A or better (a significant improvement over existing conditions).
 - Additional excess intersection capacity beyond what is needed to serve the Nyberg Rivers project traffic.
 - Enhanced east-west pedestrian connectivity across SW Martinazzi Avenue.
 - A safety improvement relative to stop sign control.

- In addition to the modified SW Martinazzi Avenue/SW Seneca Street intersection, another site-access alternative was evaluated that demonstrates the impacts of adding a limited access site-driveway to SW Boones Ferry Road. The analysis shows that with a direct connection to SW Boones Ferry Road, there would be some shifting of site-generated traffic off of SW Martinazzi Avenue. This additional access would further improve connectivity, help implement the City's loop road concept, and provide additional capacity beyond what is needed to serve the Nyberg Rivers project.

RECOMMENDATIONS

- With the proposed Nyberg Rivers redevelopment:
 - The existing SW 75th Avenue site-access driveway to SW Nyberg Road should be closed in order to minimize turning movement conflicts, allow for the construction of a westbound right-turn lane at the SW Nyberg Road/signalized site driveway, and improve the interchange access spacing conditions along SW Nyberg Road.
 - To better accommodate the anticipated site-generated traffic at the SW Nyberg Road/Signalized site driveway:
 - A new westbound right-turn lane should be constructed on SW Nyberg Road.
 - The site driveway should be modified to include dual southbound left-turn lanes, a shared through/right-turn lane, and two inbound receiving lanes.
 - The existing north/south traffic signal phasing should be modified from permissive phasing to split phasing. Right-turn overlap phasing should be provided for the westbound right-turn movement into the Nyberg Rivers site.
- If site access to SW Martinazzi Avenue is provided via a new fourth leg to the SW Martinazzi Avenue/SW Seneca Street intersection, the intersection should be signalized.
- If a new site access driveway is provided to SW Boones Ferry Road, the driveway should be limited to right-in/right-out only access.