



Transportation Impact Analysis

EXHIBIT 2

Kittleson and Associates, Inc., August 2004

Transportation Impact Analysis

Sustainable Fairview Development Plan

Salem, Oregon

Prepared For:

Sustainable Fairview Associates

PO Box 144

Salem, Oregon 97308

(503) 510-6721

Prepared By:

Kittelson & Associates, Inc.

610 SW Alder, Suite 700

Portland, OR 97205

(503) 228-5230

Project Principal: Brian Ray, P.E.

Project Manager: Elizabeth Wemple, P.E.

Transportation Analyst: Chris Tiesler

Project No. 5622.00

August 2004



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Section 1

Executive Summary

Executive Summary

Sustainable Fairview Associates, LLC is proposing a mixed-use development at the Fairview Hospital site in Salem, Oregon. The proposed development includes a mix of residential housing, employment and commercial land uses. Sustainable Fairview Associates, LLC is planning to incorporate multimodal transportation facilities into the development, with extensive pedestrian paths, streets suitable for bicycle travel, and frequent transit to and from downtown Salem. Access to the overall site is proposed from the four bounding roadways: Battle Creek Road SE, Reed Road SE, Strong Road SE, and Pringle Road SE. Roadways will be built by Sustainable Fairview Associates, LLC to provide access to the site and site circulation as the development occurs.

Summary of Mitigation Recommendations

The project traffic impact analysis was conducted assuming that the development is constructed in three phases: 2008, 2012, and 2016. For existing conditions and each phase of development (before and after development), traffic operations were evaluated and compared to the appropriate City level of service standard (i.e. level of service E for unsignalized intersections and level of service D for signalized intersections). As necessary for each phase of development, roadway system changes were identified to improve traffic operations back to the City's level of service standard. The following table shows the identified mitigations by phase of development and by responsible party.

Phase	City of Salem Mitigation	Site Development Mitigation
2003 Existing Traffic Conditions	<ul style="list-style-type: none"> • 25th Street SE/Madrona Avenue SE - realign and signalized; • 27th Street SE/Kuebler Boulevard - signalize • Battle Creek Road SE/Kuebler Boulevard - add northbound and southbound right turn lanes. Protected/permitted signal heads should be added to all intersection approaches 	Not Applicable
2008 Background Traffic Conditions	<ul style="list-style-type: none"> • Commercial Street/Madrona Avenue SE - add eastbound right turn lane • 12th Street SE/Madrona Avenue SE - add northbound and southbound through lanes • 25th Street SE/Mission Street - add additional eastbound and westbound through lane 	Not Applicable
2008 Total Traffic Conditions	Not Applicable	<ul style="list-style-type: none"> • Commercial Street/Madrona Avenue SE - add westbound right turn lane. Although this is triggered with development of Sustainable Fairview, the improvement should be constructed concurrent with the eastbound right turn.

Phase	City of Salem Mitigation	Site Development Mitigation
2012 Background Traffic Conditions	<ul style="list-style-type: none"> • Commercial Street/Madrona Avenue SE – Add an additional eastbound and westbound through lane • McGilchrist St SE/Pringle Road SE – Add a westbound left turn lane • Battle Creek Road SE/Kuebler Road SE – meets city level of service standard though over capacity; add separate eastbound and westbound through lanes. • Madrona Avenue SE/Fairview Industrial Drive SE – add a second westbound left-turn lane 	Not Applicable
2012 Total Traffic Conditions	Not Applicable	<ul style="list-style-type: none"> • 12th Avenue SE/Madrona Avenue SE – add a separate right-turn lane at the eastbound and westbound intersection approaches; • Madrona Avenue SE/Fairview Industrial Road SE – convert to protected signal phasing at the northbound and southbound approach; convert eastbound approach lane configuration to one left-turn, one through-lane and one right-turn lane and add overlap phasing • Strong Road SE/Fairview Industrial Road SE – add a traffic signal • Battle Creek Road SE/Reed Road SE – add a traffic signal (consider a roundabout; though topography may make this difficult)
2016 Background Traffic Conditions	<ul style="list-style-type: none"> • Madrona Avenue SE/Pringle Road SE – add additional eastbound and westbound through lanes • Commercial Street SE/Hilfiker Lane SE – add an additional northbound and southbound through lane; add a separate left turn lane at the eastbound and westbound approaches. • Sunnyside Road SE/Hilfiker Lane SE – add a traffic signal • Commercial Street SE/Madrona Avenue SE – add an additional northbound and southbound through lane • 25th Street SE/Mission Street SE – add a northbound left turn lane • Pringle Road SE/Ewald Avenue SE – add a traffic signal • Pringle Road SE/Hilfiker Lane SE – add a traffic signal 	Not Applicable
2016 Total Traffic Conditions	Not Applicable	<ul style="list-style-type: none"> • 25th Street SE/Mission Street SE – add a southbound left turn lane • Reed Road SE/Fairview Industrial Drive SE – re-stripe the southbound approach to include add a separate right turn lane (consider a roundabout)

Based on the results of this study, with the street system improvements identified above, the proposed Sustainable Fairview Development Plan can be developed while maintaining acceptable traffic operations and safety at the study intersections within the site vicinity. Where the above table shows the required street improvements by phase, Figure 1 shows the final recommended transportation system improvements at all of the project study intersections.





Additional details of the study methodology, findings, and recommendations are provided within this report. The following table summarizes the results of the traffic operations analysis for all three phases of the project development assuming the improvements identified above.

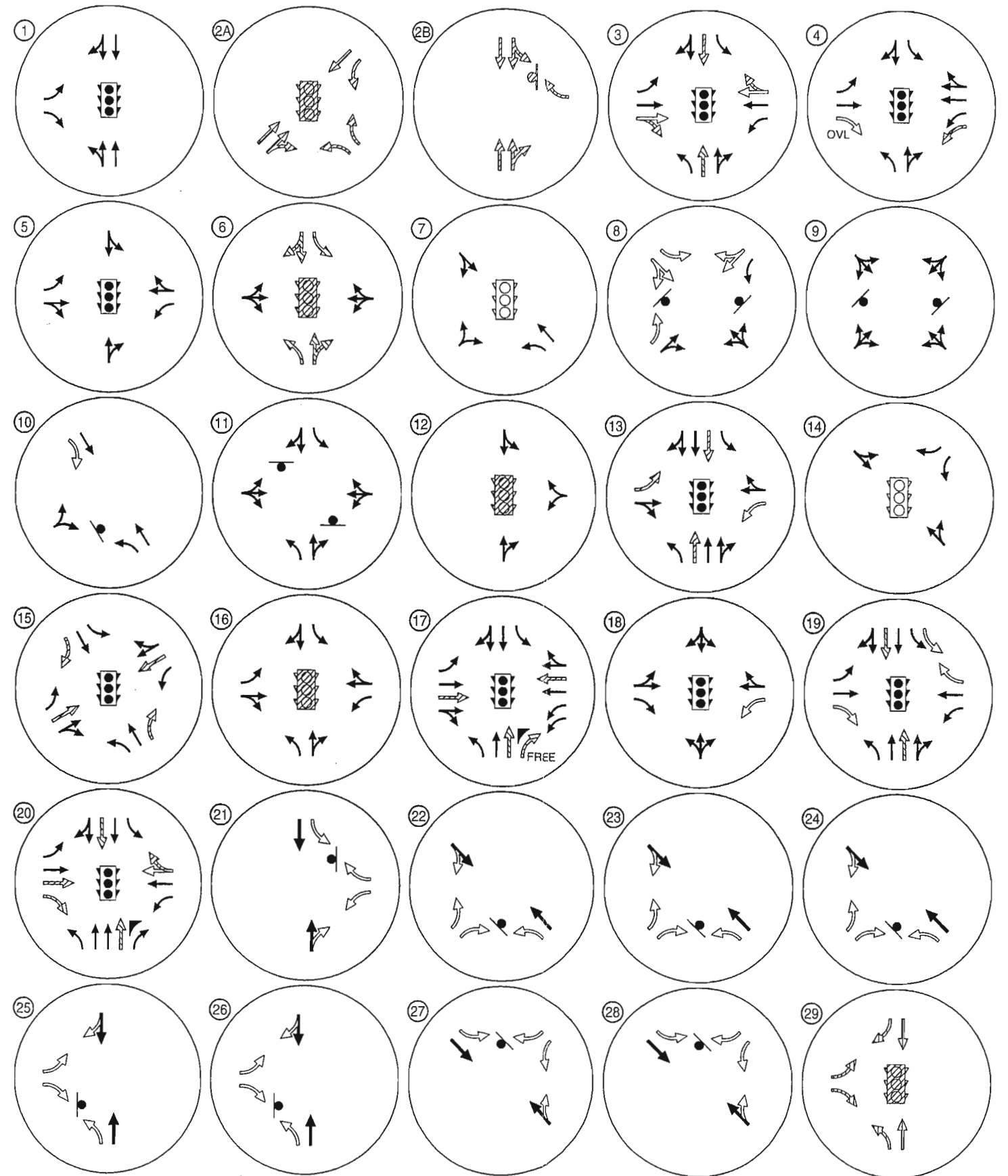


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LEGEND

-  - STOP SIGN
-  - TRAFFIC SIGNAL
-  - CITY OF SALEM MITIGATION REQUIREMENT
-  - SITE DEVELOPMENT RELATED MITIGATION REQUIREMENT



**RECOMMENDED TRANSPORTATION SYSTEM
IMPROVEMENTS SUMMARY
SALEM, OREGON**

**FIGURE
1**

Intersection	Year 2003 Existing Traffic			Phase 1 - 2008						Phase 2 - 2012						Phase 3 - 2016					
	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del
McGilchrist Street SE/ Pringle Road SE	B	0.64	15.2	B	0.73	17.8	B	0.77	19.4	B	0.74	18.9	C	0.80	21.3	B	0.79	19.4	C	0.84	21.4
27th Street SE/ Kuebler Boulevard	A	0.67	6.0	A	0.69	5.2	A	0.70	5.4	A	0.75	6.1	A	0.76	6.3	A	0.82	7.2	A	0.83	7.9
Unsignalized Intersections ¹																					
Ewald Avenue SE/ Pringle Road SE	C	0.19	22.8	D	0.22	25.8	D	0.23	27.0	C	0.09	18.0	C	0.10	19.6	B	0.85	17.9	C	0.89	20.6
Fairview Industrial Drive SE/ Strong Road SE	B	0.01	14.4	C	0.01	15.1	D	0.45	27.4	B	0.38	10.8	B	0.55	17.1	B	0.50	13.1	B	0.65	18.0
Reed Road SE/ Strong Road SE (East)	B	0.13	10.7	B	0.15	11.0	B	0.11	15.8	B	0.10	14.5	C	0.27	19.3	C	0.26	22.1	D	0.52	36.4
Reed Road SE/ Strong Road SE (West)	B	0.01	12.0	B	0.01	12.3	B	0.01	14.1	B	0.01	14.9	C	0.01	17.6	C	0.02	16.6	C	0.04	19.6
Fairview Industrial Drive SE/ Reed Road SE	C	0.50	15.9	C	0.56	17.5	C	0.71	23.7	C	0.41	20.4	D	0.67	31.8	C	0.75	27.6	E	0.89	42.4
27th Street SE/ Strong Road SE	B	0.12	11.6	B	0.13	11.9	B	0.14	12.0	C	0.11	23.6	C	0.11	23.6	B	0.18	13.0	B	0.18	13.1
Hilfiker Lane SE/ Sunnyside Road SE	B	0.10	11.0	B	0.11	11.4	B	0.11	11.4	C	0.23	15.3	C	0.23	15.3	A	0.67	6.9	A	0.68	7.3
Reed Road SE/ Battle Creek Road SE	B	0.06	13.1	B	0.07	14.3	C	0.19	15.9	B	0.49	12.3	B	0.53	13.1	A	0.53	5.8	A	0.58	7.3

LOS: Level of Service

V/C: Volume/Capacity Ratio

Del: Intersection control delay for signalized and all-way stop-controlled intersections, critical movement delay for unsignalized intersections.

¹ Note: Unsignalized two-way stop-controlled intersection LOS, V/C ratio, and Delay represent operations of critical movement only

Summary of Weekday PM Peak Hour Intersection Analysis Findings

Intersection	Year 2003 Existing Traffic			Phase 1 - 2008						Phase 2 - 2012						Phase 3 - 2016					
				2008 Background Traffic			2008 Total Traffic			2012 Background Traffic			2012 Total Traffic			2016 Background Traffic			2016 Total Traffic		
	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del
Signalized and All-Way Stop-Controlled Intersections																					
25 th Street SE/ McGilchrist St SE	C	0.68	26.2	C	0.73	27.8	C	0.75	28.4	C	0.81	32.6	C	0.86	33.8	C	0.92	33.5	D	0.98	38.7
25 th Street SE/ Madrona Avenue SE	A	0.57	8.9	A	0.61	9.3	A	0.66	9.3	A	0.70	9.9	B	0.76	10.4	B	0.79	11.8	B	0.85	13.5
Madrona Avenue SE/ Pringle Road SE	D	0.81	35.1	D	0.87	38.5	D	0.96	47.3	C	0.84	34.6	D	0.94	43.5	D	0.77	38.2	D	0.85	42.1
Madrona Avenue SE/ Fairview Industrial Drive SE	C	0.58	30.2	C	0.62	30.0	D	0.82	37.4	C	0.71	34.1	D	0.82	38.2	D	0.82	38.5	D	0.92	47.9
Ewald Avenue SE/ 12 th Street SE	A	0.55	4.4	A	0.59	4.7	A	0.59	4.8	A	0.63	5.6	A	0.64	6.3	A	0.66	6.3	A	0.67	6.6
Hilfiker Lane SE/ Commercial Street SE	C	0.57	23.0	C	0.61	23.9	C	0.61	23.9	C	0.65	25.0	C	0.65	25.0	C	0.74	34.8	D	0.77	36.2
Battle Creek Road SE/ Kuebler Boulevard	D	0.86	35.0	D	0.92	38.3	D	0.96	42.7	C	0.67	30.4	C	0.71	31.8	C	0.78	33.3	D	0.82	35.0
25 th Street SE/ Mission Street	D	0.92	48.3	D	0.82	41.7	D	0.85	44.2	D	0.91	48.2	D	0.95	53.2	D	0.93	49.1	D	0.97	54.3
12 th Street SE/ Madrona Avenue SE	D	0.97	51.9	D	0.79	45.5	D	0.83	48.9	D	0.85	40.8	D	0.89	44.8	D	0.87	48.3	D	0.91	52.5
Commercial Street SE/ Madrona Avenue SE	D	0.96	53.2	D	0.91	47.0	D	0.92	48.0	D	0.94	47.8	D	0.95	49.0	D	0.88	46.0	D	0.89	46.6

Intersection	Phase 1 - 2008						Phase 2 - 2012						Phase 3 - 2016																
	Year 2003 Existing Traffic			2008 Background Traffic			2008 Total Traffic			2012 Background Traffic			2012 Total Traffic			2016 Background Traffic			2016 Total Traffic										
	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del	LOS	V/C	Del								
McGilchrist Street SE/ Pringle Road SE	B	0.81	19.2	C	0.95	32.5				D	>1	43.5	C	0.88	22.7				C	0.95	29.6	C	0.87	21.7			C	0.92	25.8
27th Street SE/ Kuebler Boulevard	A	0.64	9.9	B	0.69	10.6				B	0.70	10.9	B	0.75	12.0				B	0.76	12.4	B	0.82	14.9			B	0.85	16.3
Unsignalized Intersections ¹																													
Ewald Avenue SE/ Pringle Road SE	B	0.06	14.9	C	0.08	15.8	C	0.08	16.5	C	0.10	18.6	C	0.11	21.2	B	0.84	15.5	B	0.90	19.2								
Fairview Industrial Drive SE/ Strong Road SE	B	0.10	14.4	C	0.12	15.2	E	0.66	40.1	B	0.54	13.0	C	0.81	23.4	B	0.69	16.5	C	0.92	30.9								
Reed Road SE/ Strong Road SE (East)	A	0.07	9.3	A	0.07	9.3	B	0.11	14.1	B	0.14	16.1	C	0.43	28.2	C	0.31	23.2	E	0.88	45.4								
Reed Road SE/ Strong Road SE (West)	A	0.02	9.7	A	0.03	9.9	B	0.01	14.2	B	0.01	14.4	C	0.01	18.8	C	0.03	17.8	D	0.40	25.7								
Fairview Industrial Drive SE/ Reed Road SE	B	0.21	13.8	B	0.23	14.6	C	0.48	21.1	C	0.48	23.1	E	0.84	47.6	C	0.61	25.0	E	0.88	48.8								
27th Street SE/ Strong Road SE	C	0.08	19.0	C	0.09	21.2	C	0.09	21.3	C	0.12	24.2	C	0.12	24.4	B	0.21	31.0	D	0.24	32.5								
Hilfiker Lane SE/ Sunnyside Road SE	B	0.18	13.5	B	0.20	14.4	B	0.20	14.4	C	0.23	15.4	C	0.23	15.4	B	0.75	16.1	B	0.76	16.3								
Reed Road SE/ Battle Creek Road SE	C	0.50	19.7	C	0.56	22.6	D	0.73	32.8	B	0.50	12.5	B	0.56	13.5	B	0.61	13.8	B	0.67	15.1								

LOS: Level of Service

V/C: Volume/Capacity Ratio

Del: Intersection control delay for signalized and all-way stop-controlled intersections, critical movement delay for unsignalized intersections.

¹ Note: Unsignalized two-way stop-controlled intersection LOS, V/C ratio, and Delay represent operations of critical movement only

Section 2

Introduction

Introduction

PROJECT DESCRIPTION

Sustainable Fairview Associates, LLC is proposing to develop approximately 275-acres of land located on the former Fairview Hospital site in Salem, Oregon. The site, shown in Figure 2, was previously used as a State Hospital providing practical training and care for resident patients. The facility closed in 1998 and since then a majority of the property has been vacant.

The proposed development includes a mix of residential housing, employment and commercial land uses. Sustainable Fairview Associates, LLC is planning to incorporate multimodal transportation into the development, with extensive pedestrian paths, streets suitable for bicycle travel and frequent transit from downtown Salem into the development. Figure 3 illustrates the current project site plan.

SCOPE OF THE REPORT

This analysis documents the transportation-related impacts associated with the proposed Development Plan and was prepared in accordance with the City of Salem transportation impact analysis requirements. The study intersections and overall study area for this project were selected based on a review of the local transportation system and direction provided by the City of Salem. Operational analyses were performed at the following intersections:

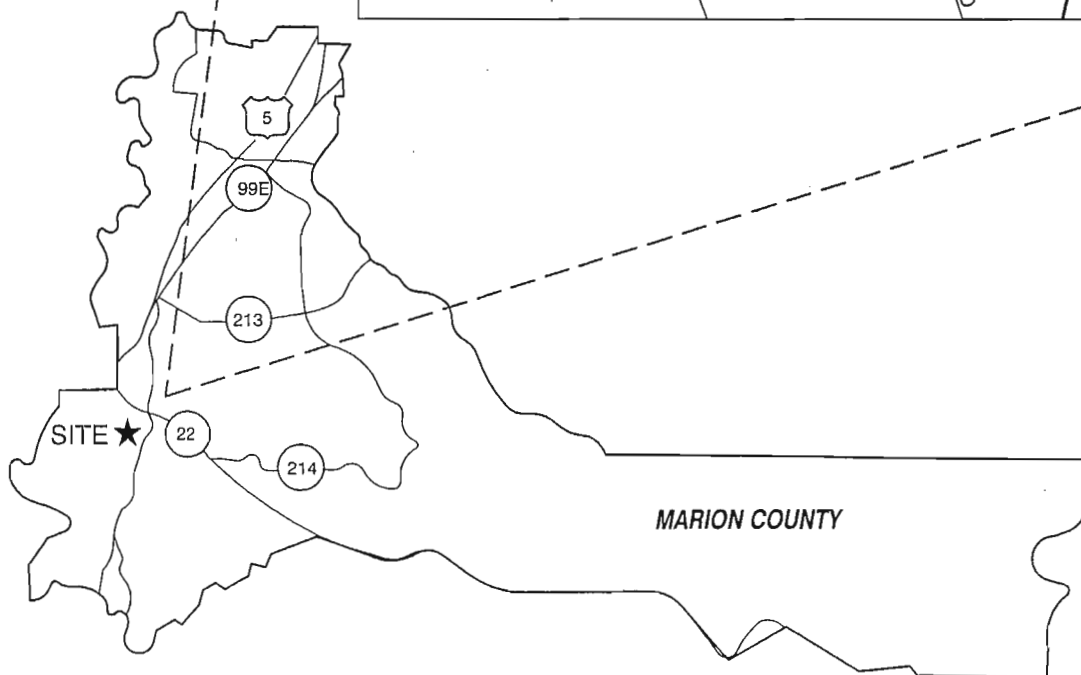
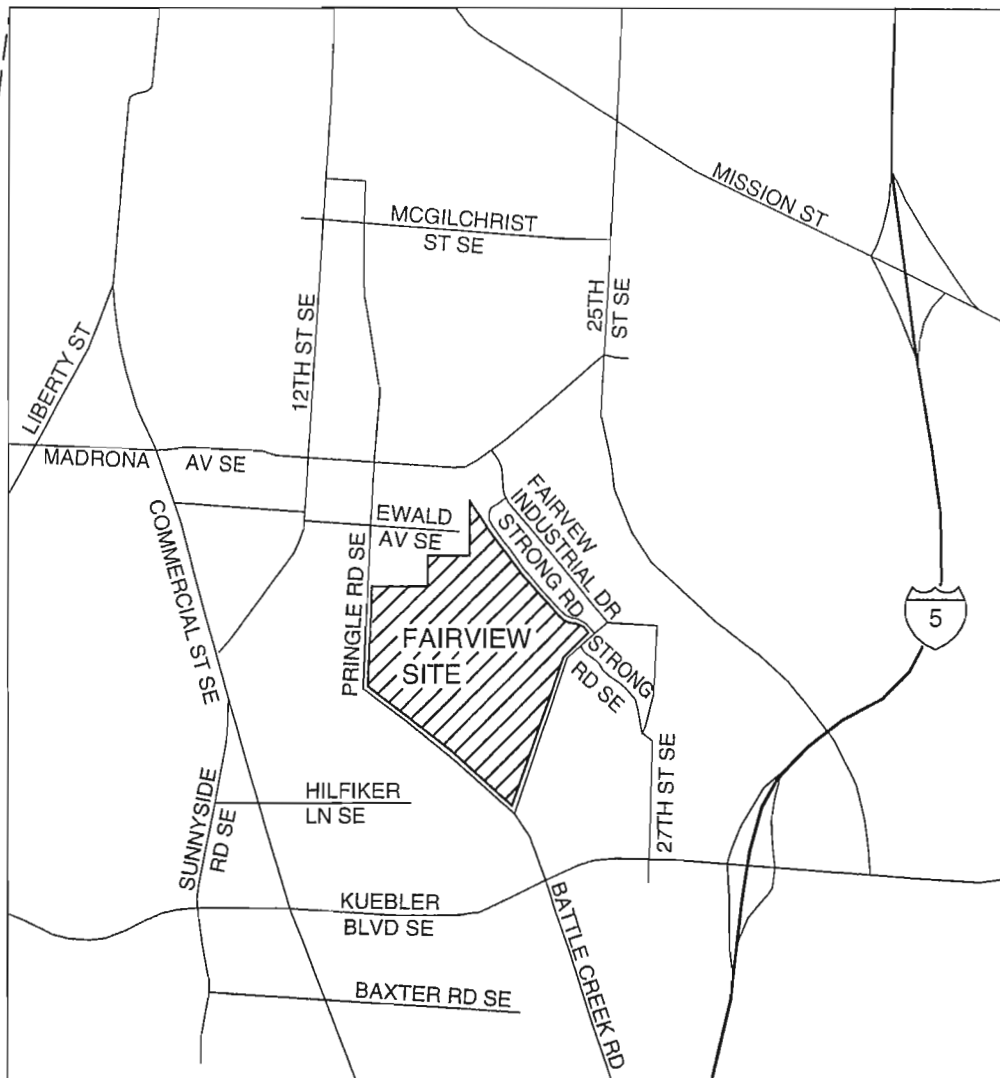
- 25th Street SE/McGilchrist St SE;
- 25th Street SE/Madrona Avenue SE;
- Madrona Avenue SE/Fairview Industrial Drive SE;
- Madrona Avenue SE/Pringle Road SE;
- Ewald Avenue SE/Pringle Road SE;
- Ewald Avenue SE/12th Street SE;
- Fairview Industrial Drive SE/Strong Road SE;
- 25th Street SE/Mission Street SE
- Commercial Street SE/Madrona Avenue SE
- Fairview Industrial Drive SE/Reed Road SE;
- Reed Road SE/Battle Creek Road SE;
- Reed Road SE/Strong Road SE;
- Hilfiker Lane SE/Commercial Street SE;
- Hilfiker Lane SE/Sunnyside Road SE;
- Battle Creek Road SE/Kuebler Boulevard;
- 27th Street SE/Strong Road SE; and
- 27th Street SE/Kuebler Boulevard.
- 12th Street SE/Madrona Avenue SE
- McGilchrist Street SE/Pringle Road SE

This report addresses the following transportation issues:

- Year 2003 existing land use and transportation system conditions within the site vicinity;
- Planned developments and transportation improvements in the study area;
- Forecast years (2008, 2012, and 2016) background traffic conditions during the weekday a.m. and p.m. peak periods;
- Trip generation and distribution estimates for the proposed development (Phases 1, 2 and 3);
- Forecast years (2008, 2012, and 2016) total traffic conditions with full build-out of the site during the weekday a.m. and p.m. peak periods; and
- Conclusions and recommendations.



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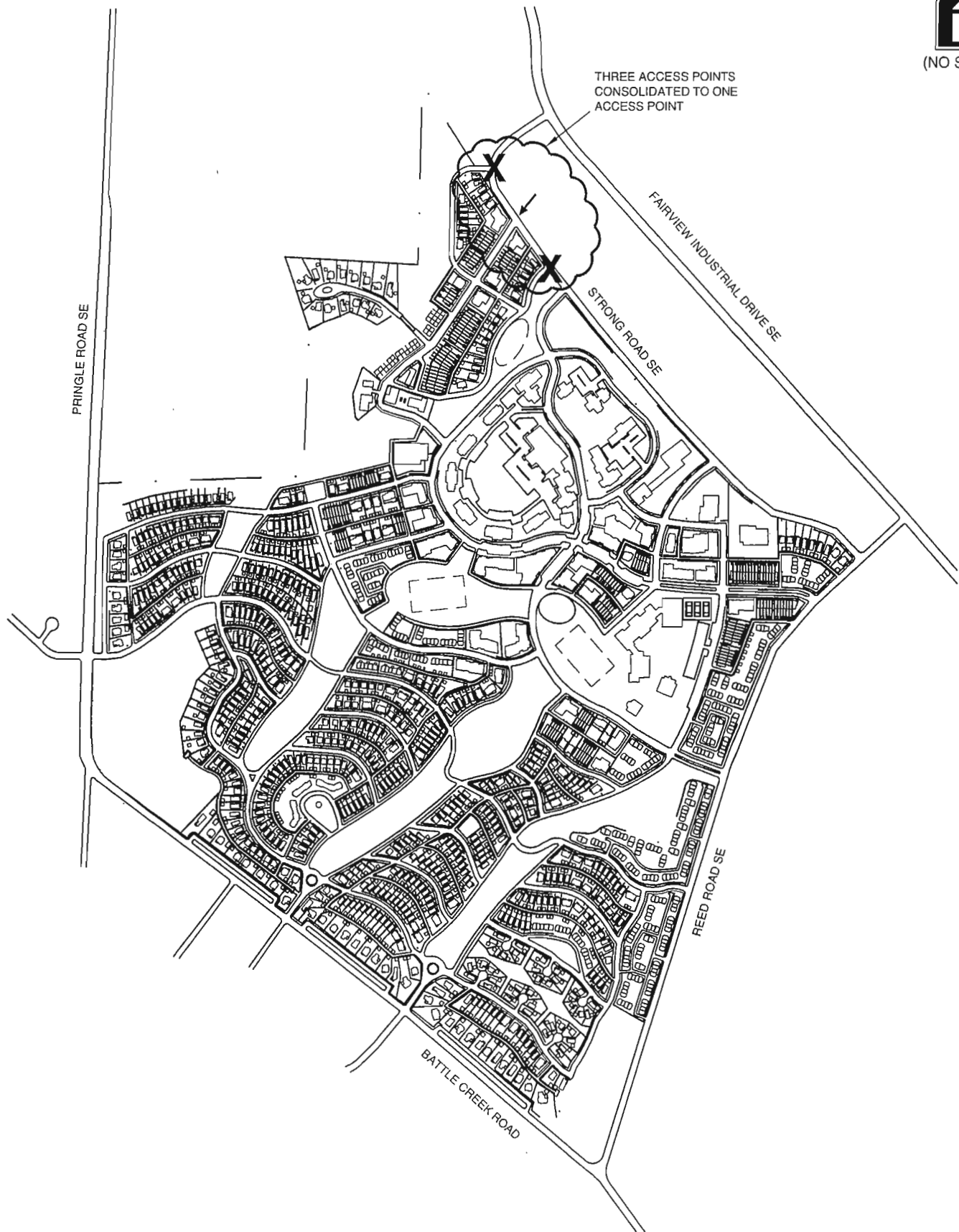
**SITE VICINITY
SALEM, OREGON**

**FIGURE
2**

5622FIGS



(NO SCALE)



PROPOSED SITE PLAN
SALEM, OREGON

FIGURE
3

5622FIGS

Section 3

Existing Conditions

Existing Conditions

The existing conditions analysis identifies site conditions and the current operational and geometric characteristics of roadways within the study area. The purpose of this section is to develop a basis of comparison to future conditions.

The site of the proposed Sustainable Fairview Development Plan was visited and inventoried in December, 2003. At that time, information was collected regarding site conditions, adjacent land uses, existing traffic operations, and transportation facilities in the study area.

SITE CONDITIONS AND ADJACENT LAND USES

The proposed Sustainable Fairview site is located on a parcel of land bordered by Battle Creek Road SE, Reed Road SE, Pringle Road SE and Strong Road SE. Residential housing bounds the site to the north and west; there are light industrial uses to the east of the site and undeveloped land borders the site to the south. The hospital that operated on the property was closed in 1998. Since then the property has been used for less intensive purposes, e.g. administration, storage, services, and maintenance.

TRANSPORTATION FACILITIES

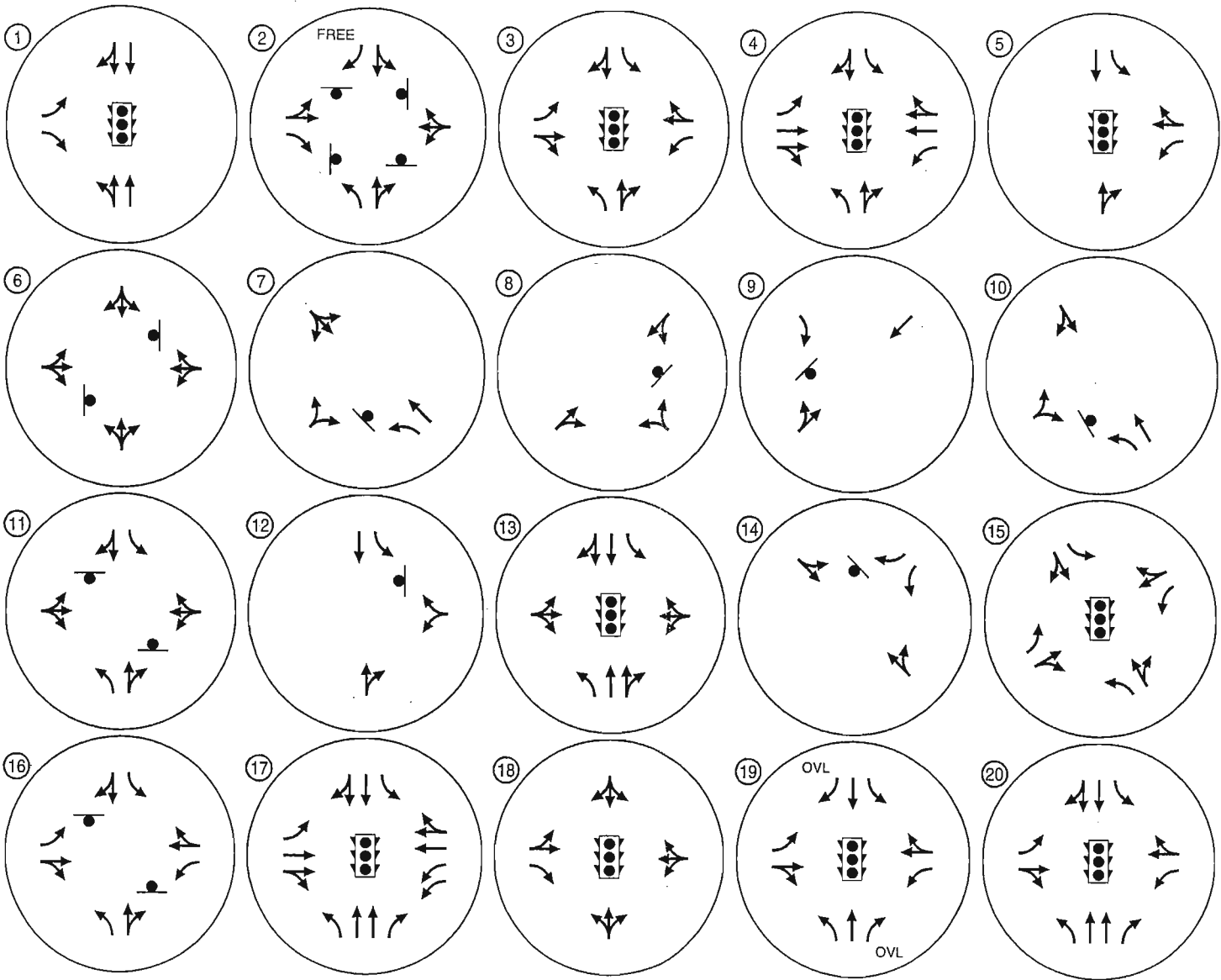
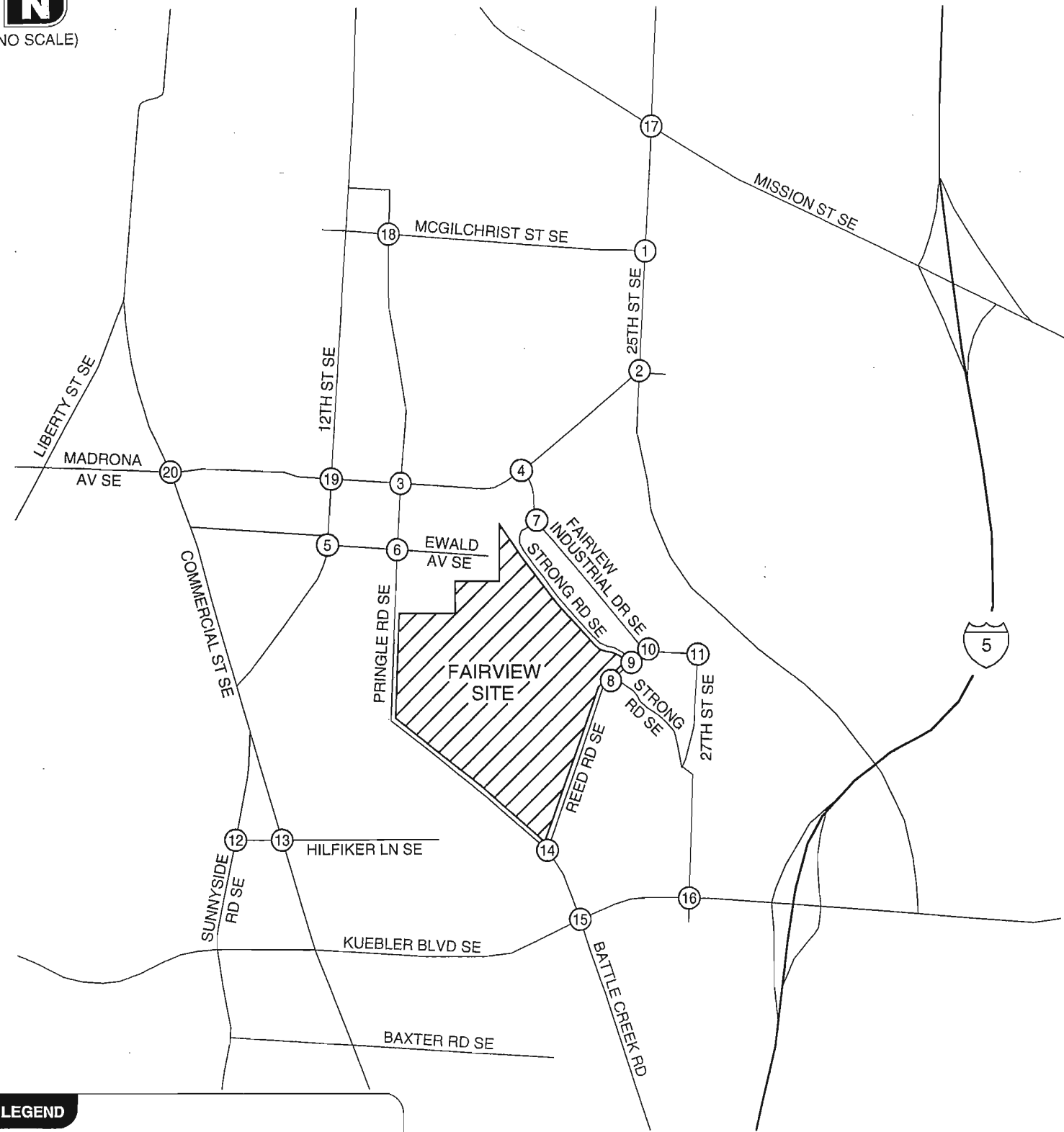
Roadway Facilities

Table 1 summarizes key roadway facilities in the general vicinity of the site that are included in the analysis. Figure 4 illustrates the location of the study intersections as well as the existing lane configurations and traffic control devices associated with each intersection.

Table 1
Existing Transportation Facilities and Roadway Designations

Roadway	Classification	Cross Section	Speed Limit (mph)	Sidewalks?	Bicycle Lanes?	On-Street Parking?
Kuebler Boulevard	Parkway	2 lanes	40	No	Both sides	No
Mission Street SE	Parkway	4 lanes	40	Yes	Both sides	No
25 th Street SE	Major Arterial	4 lanes	45	Intermittent	No	No
McGilchrist SE	Major Arterial	2 lanes	40	No	No	No
12 th Street SE	Major Arterial	3 lanes	35	Both sides	No	No
Commercial Street SE	Major Arterial	5 lanes	45	Both sides	Both sides	No
Madrona Avenue SE	Major/Minor Arterial	2 - 3 lanes	25 - 40	Both sides	Both sides	No
Reed Road SE	Minor Arterial	2 lanes	45	No	No	No
Battle Creek Road SE	Minor Arterial	2 - 3 lanes	40	No	Both sides	No
Pringle Road SE	Minor Arterial	2 - 3 lanes	25 - 35	Intermittent	Both sides	No
Hilfiker Lane SE	Minor Arterial	2 lanes	25	Both sides	Both sides	No
Fairview Industrial Drive SE	Minor Arterial	3 lanes	45	Both sides	Both sides	No
27 th Street SE	Collector	2 lanes	NP	No	No	No
Sunnyside Road SE	Collector	3 lanes	35	Both sides	Both sides	No
Ewald Avenue SE	Local Street	2 lanes	25	Both sides	No	Yes
Strong Road SE	Local Street	2 lanes	NP	No	No	No

NP: Not Posted



- LEGEND**
- FREE - FREE RIGHT TURN
 - OVL - OVERLAP
 - CM = CRITICAL MOVEMENT (UNSIGNALIZED)
 - LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED) CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
 - Del = INTERSECTION AVERAGE DELAY (SIGNALIZED) CRITICAL MOVEMENT DELAY (UNSIGNALIZED)
 - V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

EXISTING LANE CONFIGURATIONS
AND TRAFFIC CONTROL DEVICES
SALEM, OREGON

Pedestrian and Bicycle Facilities

Field observations within the site vicinity identified moderate levels of pedestrian and bicycle activity along the study roadways during the weekday p.m. peak hour. Significant pedestrian volumes were observed near the intersection of Madrona Avenue SE/Pringle Road SE and in the vicinity of the school on 12th Avenue SE. Striped bicycle lanes are provided on approximately half of the streets in the vicinity of the site providing a network for cyclists. There are no bike lanes on Reed Road SE and Strong Road SE.

Transit Facilities

Cherriots operates three bus routes in the general site vicinity. A summary of each route and the service times is provided below.

- Route 6, *12th Street & Sunnyside*, provides service to downtown Salem, Salem Hospital, and Judson Middle School. Buses operate six days a week with headways of approximately 30 minutes each weekday and 60 minutes headways on Saturdays and holidays.
- Route 7, *State & Fairview*, provides service to downtown Salem, Salem Airport and the Salem Post Office. Buses operate six days a week with headways of approximately 30 minutes each weekday and 60 minutes headways on Saturdays and holidays.
- Route 21, *Turner Road*, provides service to downtown Salem, Salem Hospital, and the Marion County Correctional Facility. Buses operate six days a week with headways of approximately 60 minutes each weekday, Saturdays, and holidays.
- Route 22, *Battle Creek*, also provides service to downtown Salem, and to South Salem High School and Leslie Middle School. Buses operate six days a week with headways of approximately 60 minutes each day. (Reference 1)

TRAFFIC VOLUMES & PEAK HOUR OPERATIONS

Manual turning movement counts were obtained for the majority of the study intersections on mid-week days during the first week of December 2003. Generally, traffic counts are not conducted during December, as traffic volumes tend to be higher as a reflection of holiday shopping and other activities. To remain conservative, however, and with agreement from the City of Salem, the traffic volumes were not adjusted.

In June 2004, at the request of the City of Salem, additional traffic counts were conducted at the intersections of:

- Commercial Street SE/Madrona Avenue,
- 12th Street SE/Madrona Avenue SE,
- Pringle Road SE/McGilchrist Street SE and
- 25th Street SE/Mission St SE.

In all cases, the traffic counts were conducted during the weekday morning (7:00 a.m. - 9:00 a.m.) and evening (4:00 p.m. - 6:00 p.m.) peak hours. The weekday morning peak hour occurred between 7:15 and 8:15 a.m. while the evening peak hour occurred between 4:30 and 5:30 p.m. *Appendix "A" contains the traffic count sheets used in this study.*

Existing Peak Hour Traffic Operations

Level-of-service analyses described in this report were performed in accordance with the procedures stated in the *2000 Highway Capacity Manual* (Reference 2). *A description of level of service and the criteria by which they are determined is presented in Appendix "B."* Appendix "B" also indicates how level of service is measured and what is generally considered the acceptable range of level of service.

To ensure that this analysis was based on a reasonable worst-case scenario, the peak 15-minute flow rate during the weekday a.m. and p.m. peak hours was used in the evaluation of all intersection levels of service. For this reason, the analyses reflect conditions that are only likely to occur for 15 minutes out of each average peak hour. Traffic conditions during all other weekday hours will likely operate under better conditions than those described in this report.

Signalized Intersections

According to HCM Procedures, the level of service analyses for signalized intersections are based on the average control delay per vehicle entering the intersection. The City of Salem requires that a Level of Service "D" or better be maintained at signalized intersections.

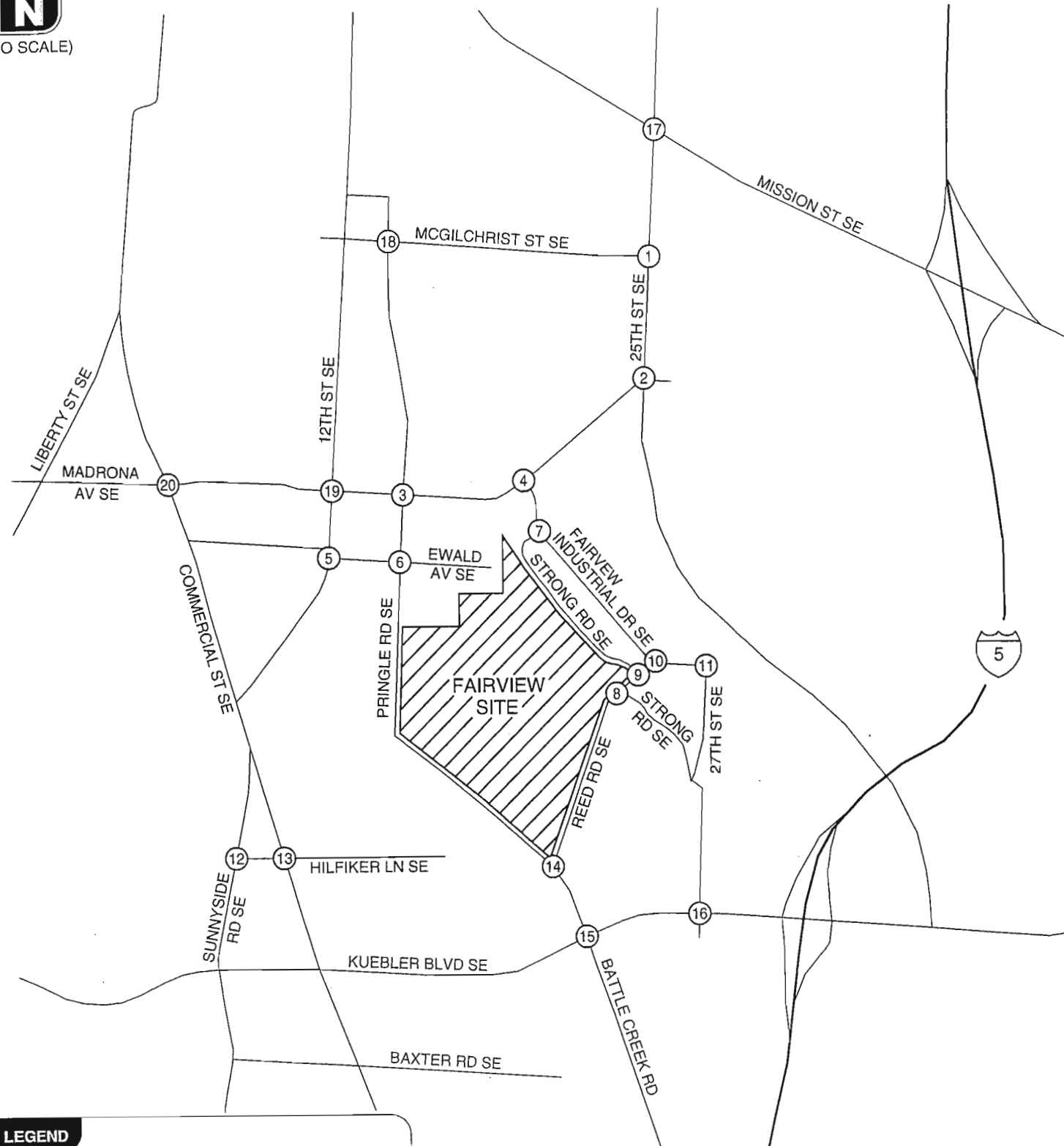
Using the weekday a.m. and p.m. peak hour traffic volumes, volume-to-capacity ratios and levels of service were calculated for the signalized study intersections as shown in Figures 5 and 6. With one exception, the signalized study intersections operate at acceptable levels of service during both the weekday a.m. and p.m. peak hours. The intersection of Battle Creek Road SE/Kuebler Boulevard SE intersection operates at Level of Service "E" during the weekday p.m. peak hour. The City of Salem has identified this intersection for improvement in 2004. Improvements involve changing the signal phasing from protected to protected/permitted on all approaches and adding right-turn lanes on the northbound and southbound approaches. This mitigation has been assumed for all of the future conditions.

Unsignalized Intersections

For unsignalized two-way stop controlled intersections, level of service is based on the average control delay on the minor street approach. Level of service at all-way stop controlled intersections is based on the average stopped delay per vehicle entering the intersection. The City of Salem operating standards require a Level of Service "E" or better be maintained for two-way stop controlled intersections. A Level of Service "D" or better with a volume to capacity ratio of less than 0.90 is required for all-way stop controlled intersections.



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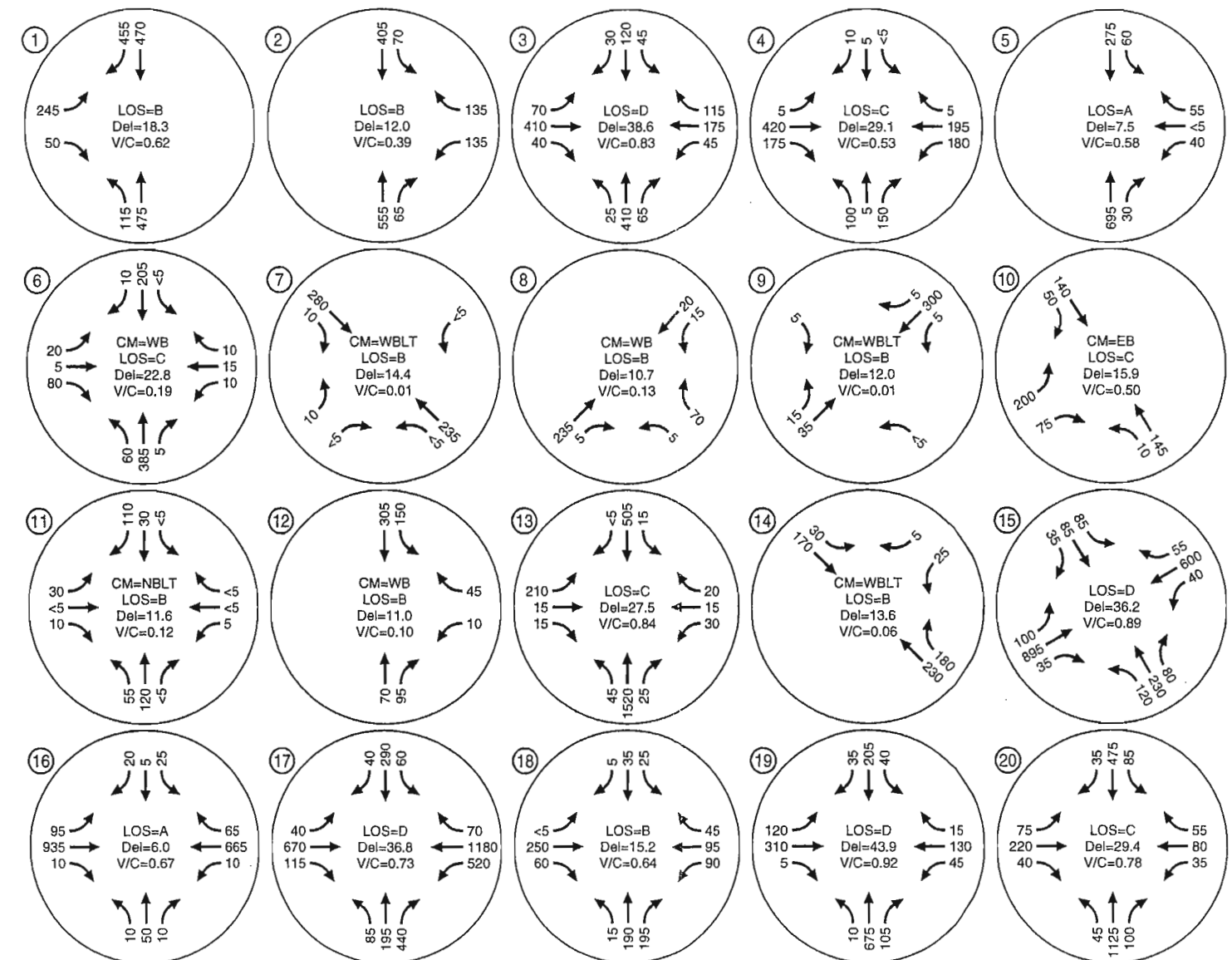
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PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE
(SIGNALIZED) CRITICAL MOVEMENT LEVEL
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V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

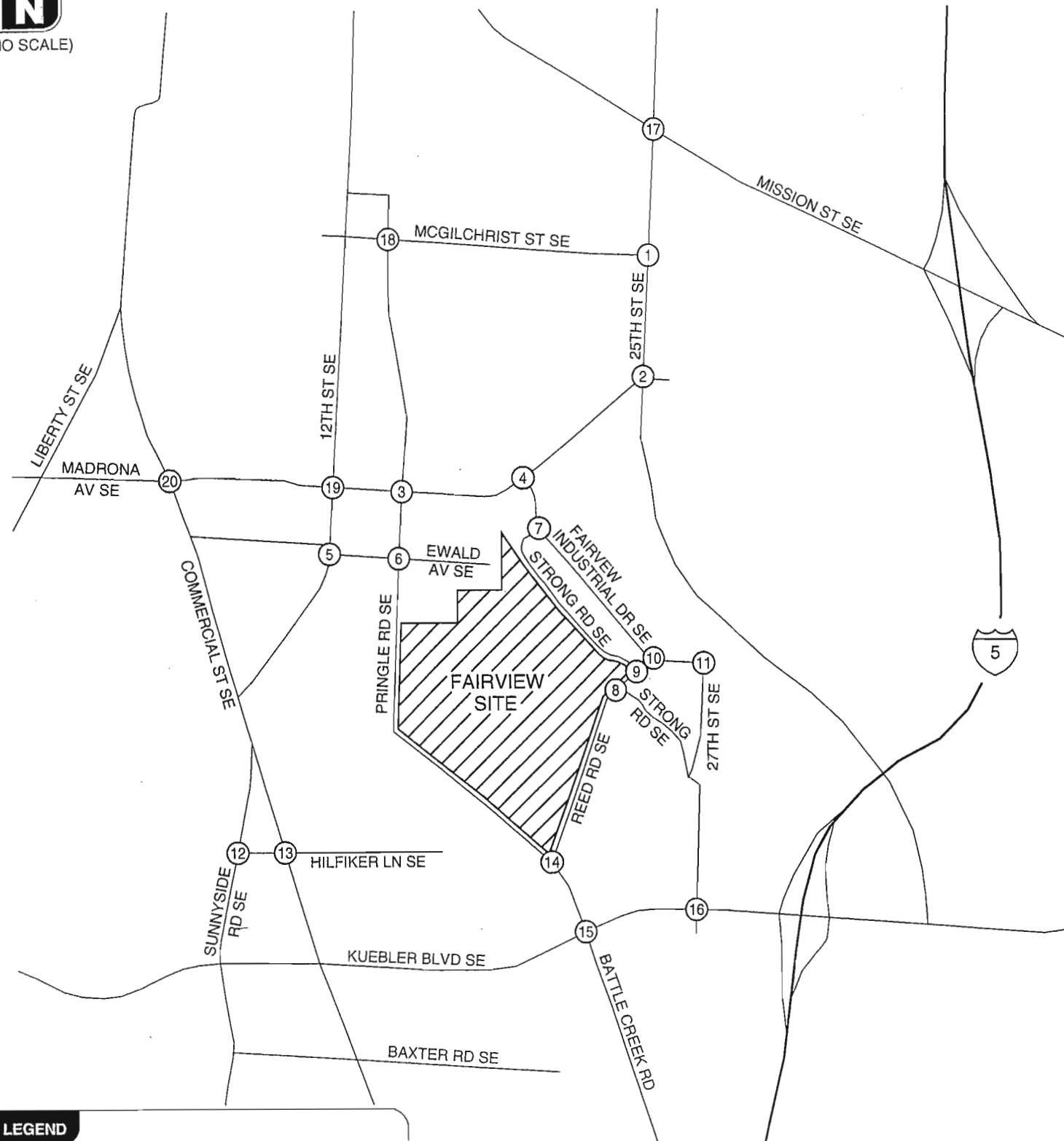


2003 EXISTING TRAFFIC CONDITIONS
WEEKDAY AM PEAK HOUR
SALEM, OREGON

FIGURE
5



(NO SCALE)

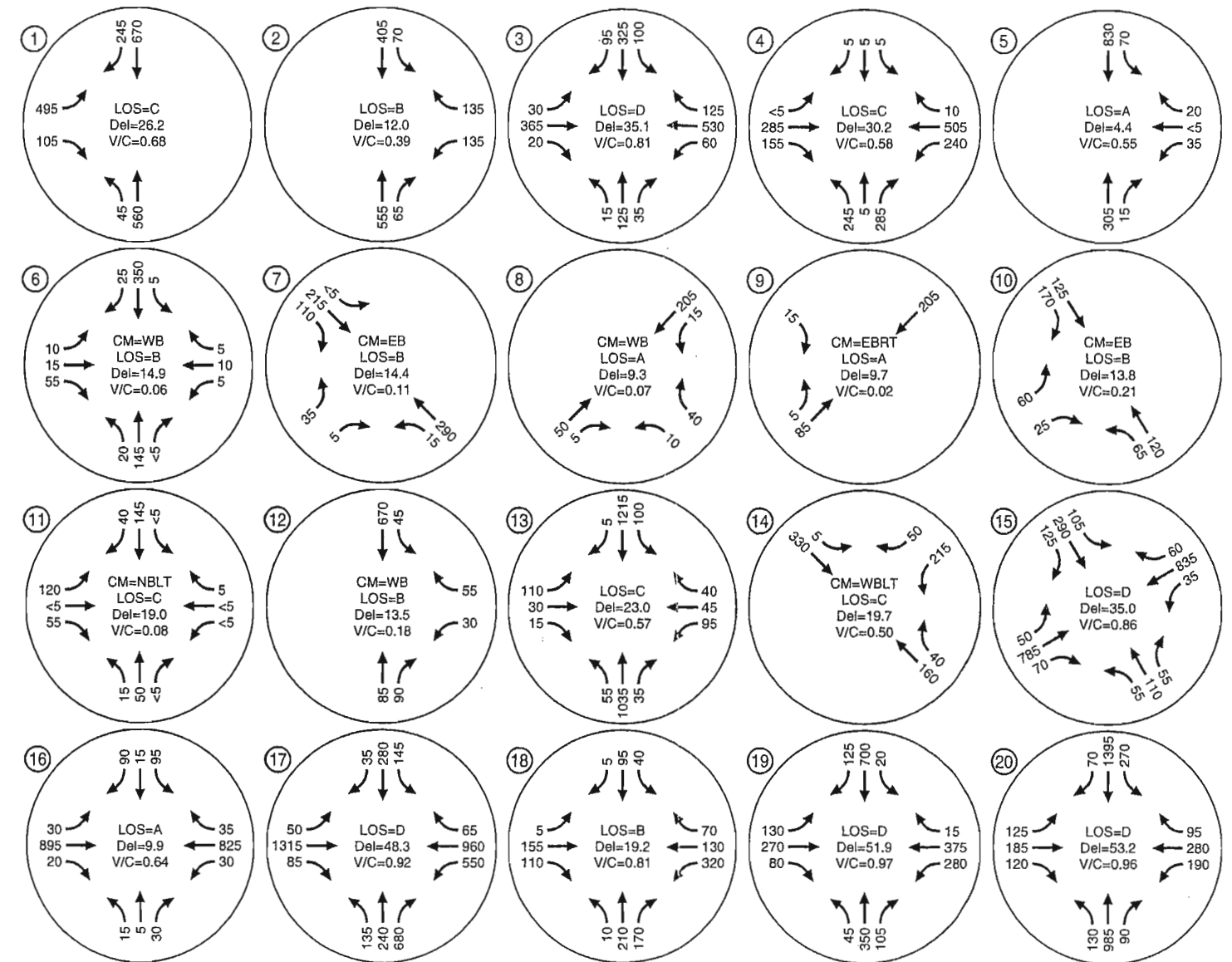
**LEGEND**

PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE
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V/C = CRITICAL VOLUME-TO-CAPACITY RATIO



2003 EXISTING TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
SALEM, OREGON

FIGURE
6

Figures 5 and 6 also summarize the level of service results for the unsignalized study intersections under the weekday a.m. and p.m. peak hours, respectively. A majority of the unsignalized study intersections are operating acceptably during the weekday a.m. and p.m. peak hours except the following intersections:

- The Madrona Avenue SE/25th Street SE intersection operates over capacity with a level of service “E” during the weekday a.m. and p.m. peak hours.
 - The City of Salem has previously identified the need for improvements at this intersection. They include: realigning 25th Street SE to intersect Madrona Avenue to a 90-degree angle converting Madrona Avenue SE to the continuous movement; relocating the airport access to intersect with the south section of 25th Street SE, and adding a traffic signal. With these improvements, the intersection will operate under capacity with a level of service “B” during the a.m. peak hour and level of service “A” during the p.m. peak hour. This improvement is included in the City’s CIP in the unfunded category. This mitigation has been assumed for all future conditions.
- The Kuebler Boulevard SE/27th Street SE intersection operates at or over capacity with a level of service “F” during both the weekday a.m. and p.m. peak hours.
 - The City of Salem’s Capital Improvement Program (CIP) identifies this intersection for future signalization in the funded category. MUTCD signal warrants are met under the existing conditions. When signalized it is anticipated that the intersection will operate at a level of service “A” during the weekday a.m. and p.m. peak hours. Signalization of this intersection has been assumed for all future conditions.

Appendix “C” includes the year 2003 existing conditions level-of-service worksheets, without any of the assumed mitigations and Appendix “D” includes the year 2004 analysis with the assumed mitigations in place.

Traffic Safety

The crash histories of the study intersections were reviewed to identify potential intersection safety deficiencies. Crash records were obtained from Oregon Department of Transportation for the four-year period from January 1999 through December 2002. *A summary of the crash data for recorded crashes, including the severity and type of crashes at study intersections are shown in Appendix “E”.* The majority of the study intersections have a relatively low incidence of crashes. The intersections that had a higher incidence of crashes are described below:

Battle Creek Road SE/Kuebler Boulevard SE

As shown in the table below, the majority of fifteen recorded crashes at Battle Creek Road SE/Kuebler Boulevard SE were rear-end collisions. The eleven rear-end collisions were relatively evenly distributed at all approaches. The number of crashes per year appears to fluctuate from one to seven incidents this reflects the random nature of crashes. In 2003 the average daily traffic at this location was 25,750 and the intersection is signalized. While the incidence of crashes is higher than other project study intersections there do not appear to be any trends that require mitigation.

Year	Collision Type (PDO, Injury)					Total Crashes
	Side-swipe	Rear-End	Angle	Turning	Other	
1999	0	4 (1,3)	0	1 (1,0)	0	5
2000	0	2 (0,2)	0	0	0	2
2001	0	5 (2,3)	1 (0,1)	1 (1,0)	0	7
2002	0	0	0	1 (0,1)	0	1
Total	0	11	1	3	0	15

Hilfiker Lane SE/Commercial Street SE

The reported crashes at the Hilfiker Lane SE/Commercial Street SE intersection were predominately turning movement collisions. Of the fifteen recorded crashes, nine were turning movement. Eight of the recorded turning movement collisions were left-turning movements Hilfiker Lane SE to Commercial Street SE. Approximately half of all the recorded crashes resulted in injuries. In 2003 the average daily traffic at this location was 27,800 vehicles and the intersection is signalized.

Year	Collision Type (PDO, Injury)					Total Crashes
	Side-swipe	Rear-End	Angle	Turning	Other	
1999	0	2 (2,0)	2 (1,1)	4 (0,4)	0	8
2000	0	1 (1,0)	0	0	0	1
2001	0	0	0	3 (3,0)	0	3
2002	0	1 (1,0)	0	2 (1,1)	0	3
Total	0	4	2	9	0	15

25th Street SE/McGilchrist St SE

As shown in the table below, there were eight recorded crashes at the 25th Street SE/McGilchrist Street SE intersection. In 2003 the average daily traffic at this location was 21,200 vehicles and the intersection is signalized. Both turning movement and rear-end collisions were represented. This may be attributed to the signal phasing with permitted/split phasing for the northbound left-turns. Possible mitigations are providing a northbound left-turn lane and changing the signal phasing to protected on the northbound approach. The City of Salem should consider this intersection along with all other city intersections, to obtain a prioritized list of safety mitigations.

Year	Collision Type (PDO, Injury)					Total Crashes
	Side-swipe	Rear-End	Angle	Turning	Other	
1999	0	0	0	0	0	0
2000	0	1 (1,0)	0	2 (0,2)	0	3
2001	0	1 (0,1)	0	1 (0,1)	0	2
2002	0	1 (0,1)	0	1 (1,1)	0	3
Total	0	3	0	5	0	8

25th Street SE/Mission Street SE

As shown in the table below, there were eight recorded crashes at the 25th Street SE/Mission Street SE intersection. In 2003 the average daily traffic at this location was 43,160 vehicles and the intersection is signalized. Both turning movement and rear-end collisions were represented, with rear-end collisions representing approximately 65% of recorded crashes. This may be attributed to the congestion experienced at the intersection during peak hours. Given the high number of rear-end collisions, it is likely drivers are following too closely in an effort to get through the intersection.

Year	Collision Type (PDO, Injury)					Total Crashes
	Side-swipe	Rear-End	Angle	Turning	Other	
1999	2 (1,1)	42 (21,21)	1 (0,1)	14 (7,7)	3 (2,1)	62
2000	3 (2,1)	37 (19,18)	2 (1,1)	11 (8,3)	4 (2,2)	57
2001	2 (0,2)	48 (27,21)	0	15 (11,4)	3 (2,1)	68
2002	3 (3,0)	31 (24,7)	4 (1,3)	12 (8,4)	4 (3,1)	54
Total	10	158	7	52	14	241

12th Street SE/Madrona Avenue SE

The reported crashes at the 12th Street SE/Madrona Avenue SE intersection were predominately rear-end collisions. Of the 67-recorded crashes, 39 were rear-end collisions, predominately in the north-south direction. Other than this, there is no apparent trend in the data to suggest a particular mitigation. Approximately half of all the recorded crashes resulted in injuries. In 2003 the average daily traffic at this location was 23,940 vehicles and the intersection is signalized.

Year	Collision Type (PDO, Injury)					Total Crashes
	Side-swipe	Rear-End	Angle	Turning	Other	
1999	1 (1,0)	12 (7,5)	2 (0,2)	2 (0,2)	3 (2,1)	20
2000	1 (0,1)	6 (4,2)	2 (0,2)	2 (2,0)	2 (1,1)	13
2001	0	8 (3,5)	1 (0,1)	4 (1,3)	1 (0,1)	14
2002	4 (3,1)	13 (6,7)	0	2 (0,2)	1 (1,0)	20
Total	6	39	5	10	7	67

Commercial Street SE/Madrona Avenue SE

As shown in the table below, the majority of 181-recorded crashes at Commercial Street SE/Madrona Avenue SE were turning movement collisions. These resulted primarily from people on the minor approaches turning onto Commercial Street. There were also a number of rear-end collisions, which were relatively evenly distributed at all approaches. The number of crashes per year appears to fluctuate, reflecting the random nature of crashes. In 2003 the average daily traffic at this location was 38,190 and the intersection is signalized. While the incidence of crashes is higher than some other project study intersections there do not appear to be any trends that require mitigation.

Year	Collision Type (PDO, Injury)					Total Crashes
	Side-swipe	Rear-End	Angle	Turning	Other	
1999	2 (1,1)	17 (9,8)	2 (1,1)	29 (19,10)	1 (0,1)	51
2000	1 (0,1)	19 (11,8)	3 (2,1)	17 (12,5)	2 (0,2)	42
2001	2 (1,1)	11 (6,5)	1 (1,0)	15 (9,6)	4 (4,0)	33
2002	5 (5,0)	20 (8,12)	4 (1,3)	23 (11,12)	3 (0,3)	55
Total	10	67	10	84	10	181

Pringle Road S/McGilchrist Street

As shown in the table below, there were 44-recorded crashes at the Pringle Road SE/McGilchrist Street SE intersection. In 2003 the average daily traffic at this location was 13,320 vehicles and the intersection is signalized. Rear-end collisions were most frequent, representing approximately 39% of recorded crashes. No observable trend is shown in the data that suggests a specific mitigation.

Year	Collision Type (PDO, Injury)					Total Crashes
	Side-swipe	Rear-End	Angle	Turning	Other	
1999	0	2 (2,0)	3 (2,1)	1 (1,0)	1 (1,0)	7
2000	1 (1,0)	7 (2,5)	1 (1,0)	2 (2,0)	6 (4,0)	17
2001	0	8 (3,5)	2 (2,0)	6 (1,5)	4 (2,2)	20
2002	0	0	0	0	0	0
Total	1	17	6	9	11	44

Section 4

Traffic Impact Analysis

Traffic Impact Analysis

The transportation impact analysis identifies how the study area's roadway network will operate in the development year with and without the proposed development. The following broadly summarizes the methodology followed to conduct the analysis:

- Planned developments and transportation improvements in the site vicinity were identified and reviewed;
- Background weekday a.m. and p.m. peak hour traffic volumes were estimated for the years 2008, 2102 and 2016 using a growth factor developed from the SKATS model;
- Background weekday a.m. and p.m. peak hour traffic conditions for the years 2008, 2012 and 2016 were analyzed;
- Future daily, a.m. and p.m. peak hour site-generated trips for each phase of development were estimated;
- A trip distribution pattern was derived through a review of local travel demand modeling data; and
- Predicted site-generated traffic for each phase of development (2008, 2012, 2016) was added to the background traffic volumes of the appropriate phase to evaluate traffic operations at the study area intersections during the weekday a.m. and p.m. peak hour.

2008 BACKGROUND TRAFFIC CONDITIONS

The background traffic analysis identifies how the study area's roadway network will operate in 2008, the year the first phase of the proposed site development is expected to be fully completed.

Planned Transportation Improvements

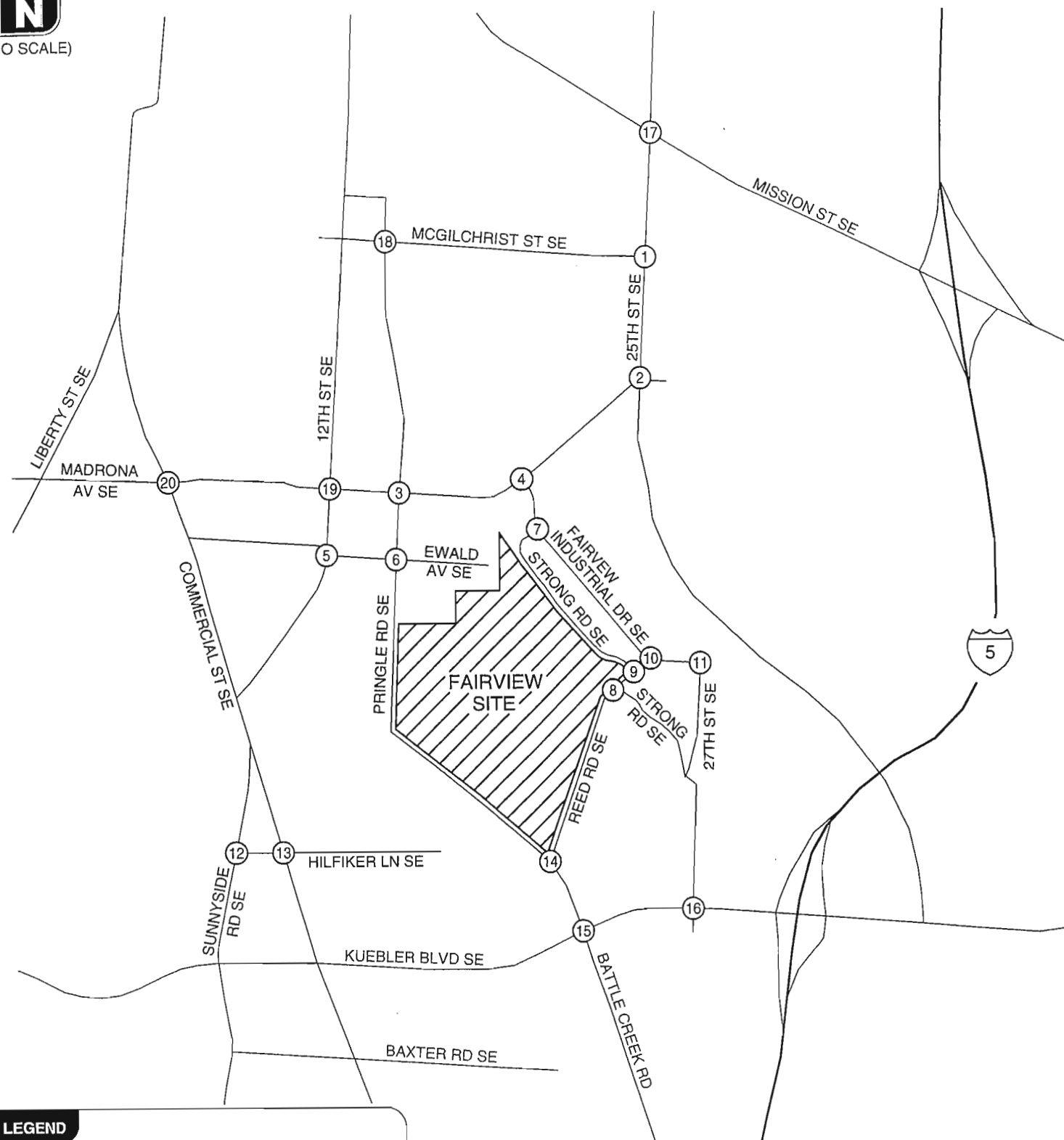
There are no planned transportation improvements in the site vicinity that will be constructed prior to 2008 scenarios.

Traffic Volumes

To estimate future year traffic volumes, SKATS year 2000 and 2025 forecast volumes were compared along key roadways in the study area. The comparison showed that the SKATS model is predicting an annual growth rate of 1.7 percent per year. This growth rate was applied to the 2003/2004 traffic volume data to estimate the background traffic volumes in 2008 and for each subsequent phase of the project. Figure 7 and 8 illustrate the resulting forecast year 2008 background traffic volumes for the weekday a.m. and p.m. peak hour, respectively.



(NO SCALE)



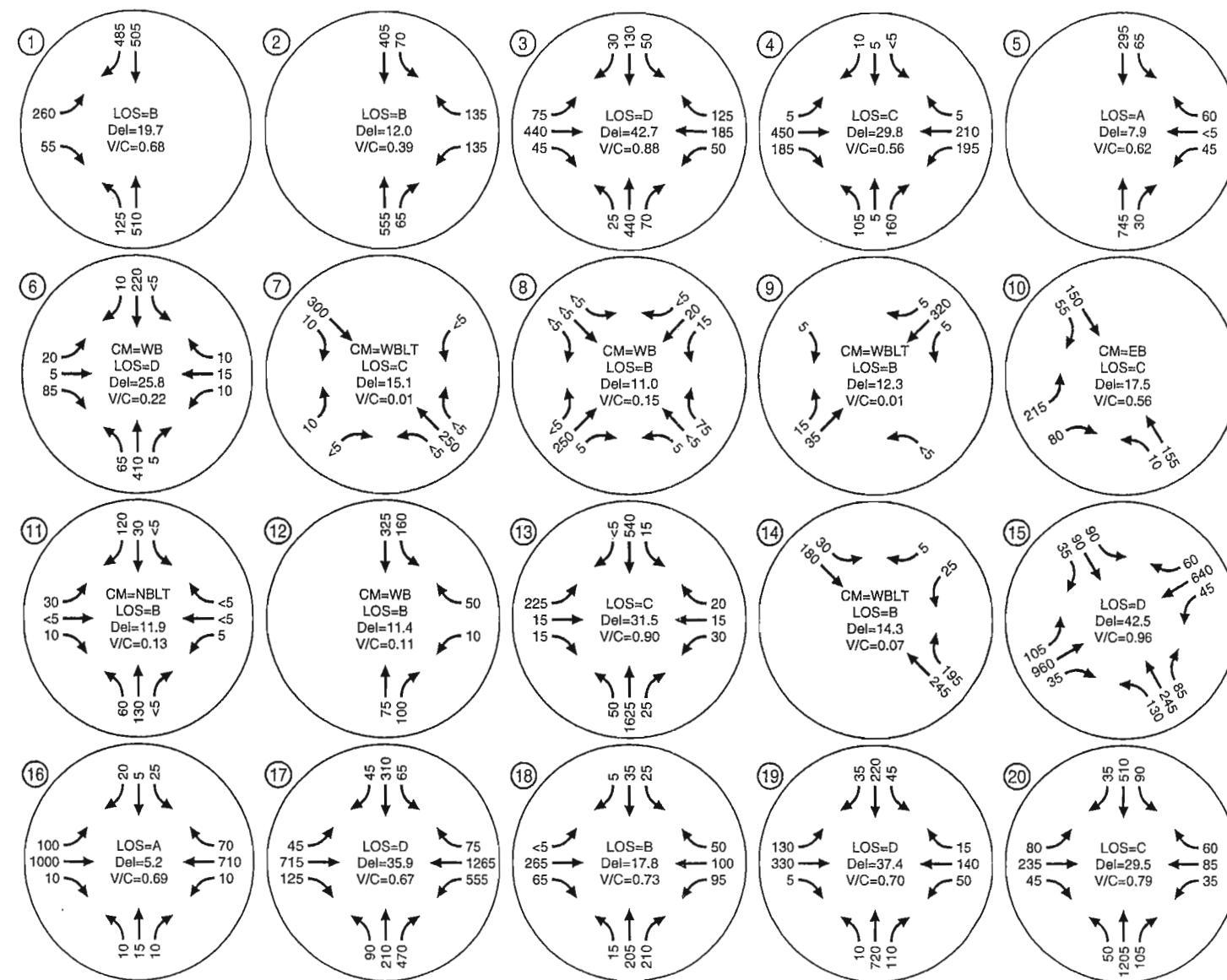
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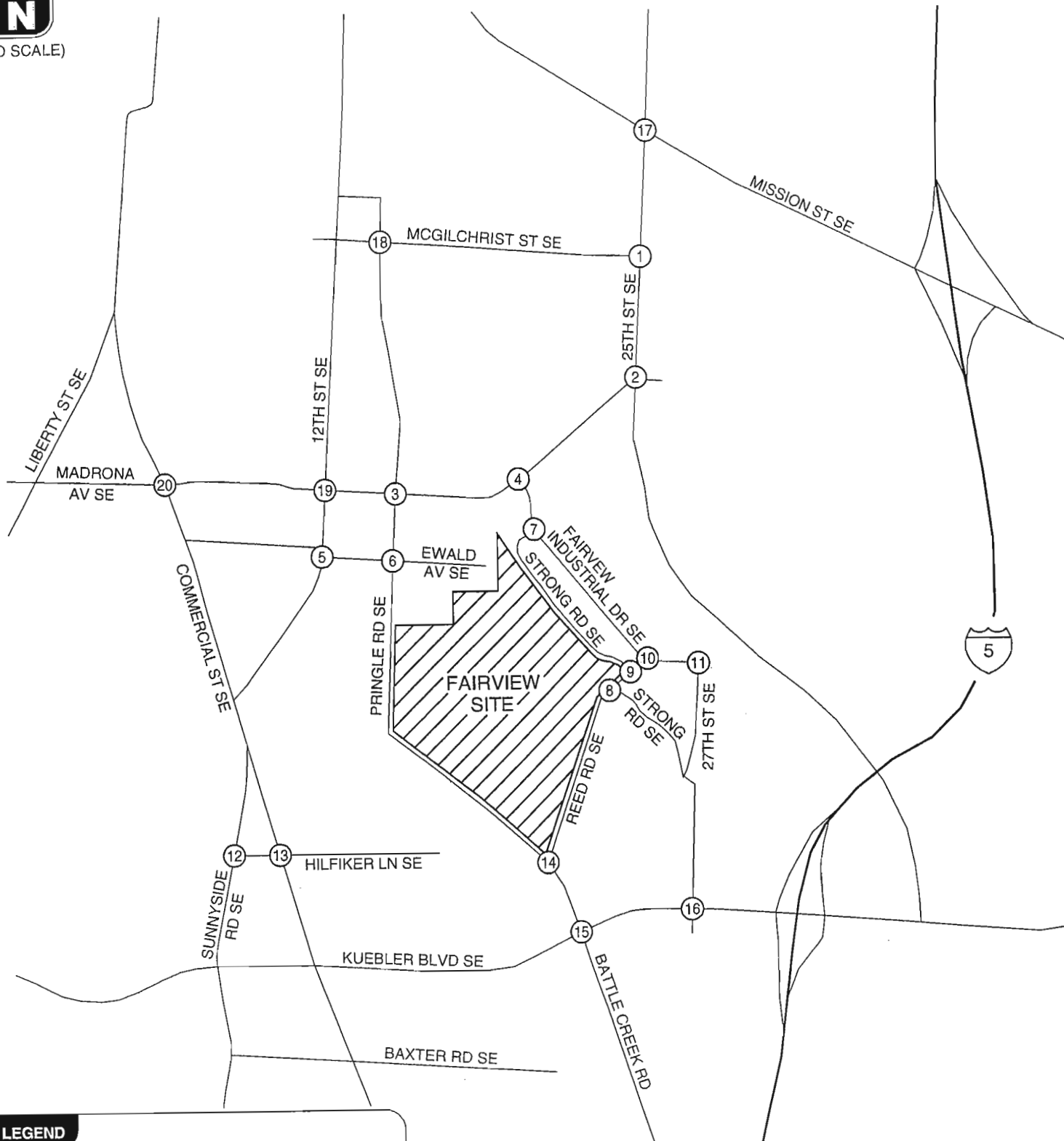
PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

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2008 BACKGROUND TRAFFIC CONDITIONS
WEEKDAY AM PEAK HOUR
SALEM, OREGONFIGURE
7



LEGEND

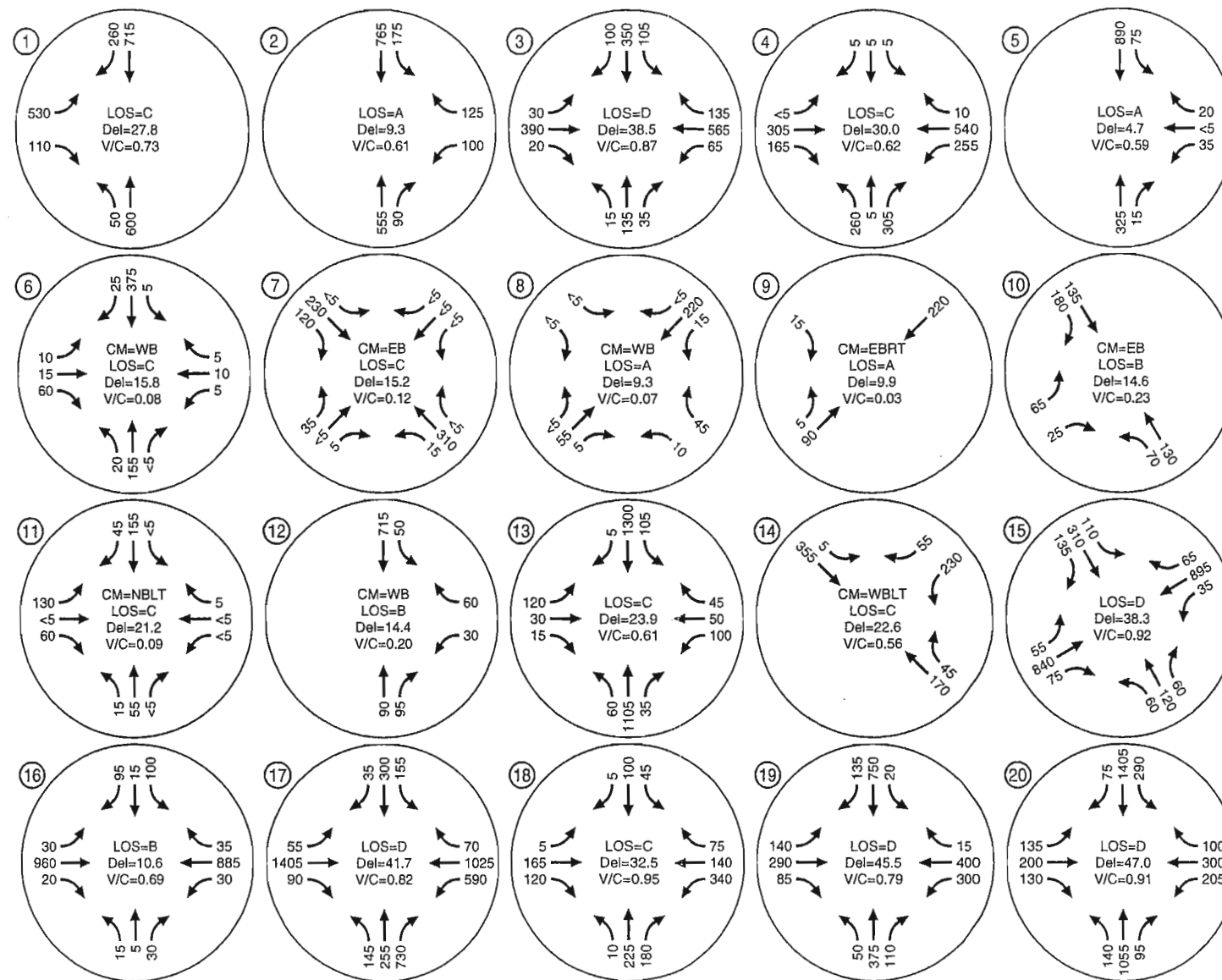
PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

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V/C = CRITICAL VOLUME-TO-CAPACITY RATIO



2008 BACKGROUND TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
SALEM, OREGON

Level of Service Analysis

Using the weekday a.m. and p.m. peak hour turning movement volumes shown in Figures 7 and 8, and assuming construction of all improvements identified in the existing conditions analysis, the results of the traffic operations analysis show that with the following exceptions all of the study intersections will continue to operate at acceptable levels of service. The exceptions are:

- Commercial Street SE/Madrona Avenue SE -
 - Acceptable traffic operations can be achieved at this intersection by adding an eastbound right turn lane on Madrona Avenue SE.
- 12th Street SE/Madrona Avenue SE -
 - Acceptable traffic operations can be achieved at this intersection by adding an additional northbound and southbound through lane on 12th Street.
- 25th Street SE/Mission Street SE -
 - Acceptable traffic operations can be achieved at this intersection by adding an additional eastbound and westbound through lane.

With these improvements all of the study intersections will operate at acceptable levels of service during the 2008 background a.m. and p.m. peak hour analysis scenario. *Appendix "F" includes the year 2008 background traffic conditions unmitigated level-of-service analysis worksheets; Appendix "G" contains the 2008 background conditions mitigated level of service analysis worksheets.*

PROPOSED DEVELOPMENT PLAN

A part of the development, Sustainable Fairview Associates, LLC is proposing to develop mixed-use development incorporating office, research-park, industrial park, and retail land uses as well as residential dwellings. This development is expected to be phased, with construction beginning in 2004. Phase 1 of the development should be fully occupied by 2008. Table 2 provides a summary of the development phases.

Table 2
Development Plan

Land Use	Phases			Total Development
	1	2	3	
Single Family Houses	172 Units	300 Units	358 Units	830 Units
Apartment Houses	220 Units	160 Units	50 Units	430 Units
Town Houses	136 Units	120 Units	170 Units	426 Units
Office	20,000 sq-ft	40,000 sq-ft	60,000 sq-ft	120,000 sq-ft
Research Park	10,000 sq-ft	30,000 sq-ft	40,000 sq-ft	80,000 sq-ft
Retail/Shopping center	10,000 sq-ft	10,000 sq-ft	20,000 sq-ft	40,000 sq-ft
Commercial/Industrial	10,000 sq-ft	20,000 sq-ft	20,000 sq-ft	50,000 sq-ft

TRIP GENERATION

This section presents the trip generation estimates for all three phases of the proposed development. The trip generation estimates for each phase of the development were determined through collaboration with the City of Salem.

As a starting point, estimates of daily, weekday a.m., and weekday p.m. peak hour vehicle trip ends for the proposed site development were prepared based on empirical observations at similar land uses. These observations are summarized in the standard reference *Trip Generation, 7th Edition*, published by the Institute of Transportation Engineers (Reference 3).

As the data represented in the ITE trip generation manual is primarily collected at suburban locations with little or no transit service and minimal pedestrian, or bicycle facilities it was recognized that these likely overestimated the trip generation of the proposed mixed used development. To adjust for this, trip generation estimates were reduced by 10 percent to represent this multi-modal development. The ten-percent reduction is consistent with the Transportation Planning Rule (TPR) policies and the City of Salem agreed to its application in this case.

Estimates for pass-by and internal trips were obtained from the *Trip Generation Handbook*, published by the Institute of Transportation Engineers (Reference 4). The internal trip reduction was based on the mixed-used nature of the proposed development; the internal trips were calculated for each land use under each different phase. The pass-by reduction is only applicable to the retail component of the development; as such, this was deducted from the total new trips. The ITE pass-by rate of 34 percent for a shopping center is calculated based on the p.m. peak hour, and was also applied to daily and a.m. peak hour trips in this analysis. Approximately 21-percent of the total site generated trips are related to retail uses. The product of these two percentages are then multiplied with the total site-generated trips less the internal and TPR reduction trips to calculate the final net new trips attributable to the site.

Tables 3 through 6 summarize the estimated site trip generation during a typical weekday as well as during the weekday a.m. and p.m. peak hours for all three phases of development. Trip generation estimates shown in the tables below are rounded to the nearest five trips.

Table 3
Weekday Trip Generation Estimates - Phase 1 (Full Build-out in 2008)

Land Use	ITE Code	Size	Daily Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
				Total	In	Out	Total	In	Out
Phase 1 – 2008									
Single Family Houses	210	172 units	1,705	130	35	100	175	110	65
- Internal Trips (5%)			(80)	(5)	(0)	(5)	(10)	(5)	(5)
Apartment Houses	220	220 units	1,475	110	20	90	135	90	45
- Internal Trips (5%)			(70)	(5)	(0)	(5)	(5)	(5)	(0)
Town Houses	230	136 units	835	60	10	50	70	45	25
- Internal Trips (5%)			(40)	(5)	(0)	(0)	(5)	(5)	(0)
Office	710	20,000 s.f.	385	50	45	5	100	15	85
- Internal Trips (4%)			(15)	(0)	(0)	(0)	(5)	(0)	(5)
Research Park	760	10,000 s.f.	80	10	10	0	10	0	10
- Internal Trips (4%)			(5)	(0)	(0)	(0)	(0)	(0)	(0)
Retail/Shopping center	820	10,000 s.f.	1,520	10	5	5	135	65	70
- Internal Trips (13%)			(200)	(0)	(0)	(0)	(20)	(10)	(10)
Commercial/Industrial	130	10,000 s.f.	70	10	10	0	10	0	10
- Internal Trips (4%)			(5)	(0)	(0)	(0)	(0)	(0)	(0)
Total Phase 1 Generated Trips			6,070	380	135	250	635	325	310
- Total Internal Trips			(415)	(15)	(5)	(10)	(45)	(25)	(20)
- 10% TPR reduction			(565)	(35)	(10)	(25)	(60)	(30)	(30)
Net New Trips Phase 1			5,090	330	125	215	530	270	260

Table 4
Weekday Trip Generation Estimates – Phase 2 (Full Build-out in 2012)

Land Use	ITE Code	Size	Daily Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
				Total	In	Out	Total	In	Out
Phase 2 – 2012									
Single Family Houses	210	300 units	2,850	220	55	165	290	185	105
- Internal Trips (5%)			(130)	(10)	(5)	(10)	(15)	(10)	(5)
Apartment Houses	220	160 units	1,110	80	15	65	100	65	35
- Internal Trips (5%)			(50)	(5)	(0)	(5)	(5)	(5)	(0)
Town Houses	230	120 units	750	55	10	45	60	40	20
- Internal Trips (5%)			(35)	(5)	(0)	(0)	(5)	(5)	(0)
Office	710	40,000 s.f.	660	90	80	10	125	20	105
- Internal Trips (4%)			(25)	(5)	(5)	(0)	(5)	(0)	(5)
Research Park	760	30,000 s.f.	245	35	30	5	30	5	25
- Internal Trips (4%)			(10)	(0)	(0)	(0)	(0)	(0)	(0)
Retail/Shopping center	820	10,000 s.f.	1,520	10	5	5	135	65	70
- Internal Trips (13%)			(200)	(0)	(0)	(0)	(20)	(10)	(10)
Commercial/Industrial	130	20,000 s.f.	140	15	10	5	15	5	10
- Internal Trips (4%)			(5)	(0)	(0)	(0)	(0)	(0)	(0)
Total Phase 2 Generated Trips			7,275	505	205	300	755	385	370
- Total Internal Trips			(455)	(25)	(10)	(15)	(50)	(30)	(20)
- 10% TPR reduction			(680)	(50)	(20)	(30)	(70)	(35)	(35)
Net New Trips Phase 2			6,140	430	175	255	635	320	315

Table 5
Weekday Trip Generation Estimates – Phase 3 (Full Build-out in 2016)

Land Use	ITE Code	Size	Daily Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
				Total	In	Out	Total	In	Out
Phase 3 – 2016									
Single Family Houses	210	358 units	3,350	260	65	195	340	215	125
- Internal Trips (5%)			(155)	(10)	(5)	(10)	(15)	(10)	(5)
Apartment Houses	220	50 units	450	30	5	25	30	20	10
- Internal Trips (5%)			(20)	(0)	(0)	(0)	(0)	(0)	(0)
Town Houses	230	170 units	1,010	75	15	60	90	60	30
- Internal Trips (5%)			(45)	(5)	(0)	(5)	(5)	(5)	(0)
Office	710	60,000 s.f.	900	125	110	15	145	25	120
- Internal Trips (4%)			(35)	(5)	(5)	(0)	(5)	(0)	(5)
Research Park	760	40,000 s.f.	325	50	40	10	45	5	40
- Internal Trips (4%)			(15)	(0)	(0)	(0)	(0)	(0)	(0)
Retail/Shopping center	820	20,000 s.f.	2,385	20	10	10	215	105	110
- Internal Trips (13%)			(310)	(5)	(0)	(0)	(30)	(15)	(15)
Commercial/Industrial	130	20,000 s.f.	140	15	10	5	15	5	10
- Internal Trips (4%)			(5)	(0)	(0)	(0)	(0)	(0)	(0)
Total Phase 3 Generated Trips			8,560	575	255	320	880	435	445
- Total Internal Trips			(585)	(30)	(15)	(15)	(55)	(30)	(25)
- 10% TPR reduction			(800)	(55)	(25)	(30)	(80)	(40)	(40)
Total Phase 3 Generated Trips			7,175	490	215	275	745	365	380

Table 6
Weekday Trip Generation Estimates – All Phases

Land Use	Daily Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
		Total	In	Out	Total	In	Out
Total Site-Generated Trips	21,905	1,460	595	870	2,270	1,145	1,125
- Total Internal Trips	(1,455)	(70)	(25)	(40)	(150)	(85)	(65)
- 10% TPR reduction	(2,045)	(140)	(55)	(85)	(210)	(105)	(105)
- 34% Pass-by reduction (Retail Component)	(1,335)	(90)	(35)	(55)	(140)	(70)	(70)
NET NEW TRIPS	17,070	1,160	480	690	1,770	885	885

As shown in Table 6, with development of all three phases, the proposed development is anticipated to generate approximately 17,070 net new daily trips. Of these trips, 1,160 (480 in and 690 out) are anticipated during the weekday a.m. peak hour and 1,770 (885 in and 885 out) are anticipated during the weekday p.m. peak hour.

TRIP DISTRIBUTION

For each phase of development, the net new trips were distributed to the system according to the trip distribution estimate shown in Figure 9. The trip distribution estimate was based on SKATS model data and in collaboration with the City of Salem.

2008 PHASE 1 TOTAL TRAFFIC CONDITIONS

The 2008 Phase 1 total traffic conditions analysis forecasts how the study area's roadway network will operate when Phase 1 of the proposed development has been built and is occupied.

Trip Generation and Distribution

As shown in Table 3, under the first phase of the development, the site will generate 330 a.m. peak hour trips, of which 125 and 215 are inbound and outbound, respectively, and 530 p.m. peak hour trips of which 270 and 260 are inbound and outbound, respectively. These site-generated trips were added to the roadway network according to the trip distribution shown in Figure 9. Figures 10 and 11 show the site-generated trips for the weekday a.m. and p.m. peak hours, respectively.

Traffic Volumes

The 2008 background traffic volumes for the weekday a.m. and p.m. peak hours shown in Figure 7 and 8 were added to the Phase 1 site-generated traffic shown in Figure 10 and 11 to arrive at the 2008 total traffic volumes shown in Figure 12 and 13.

Level of Service Analysis

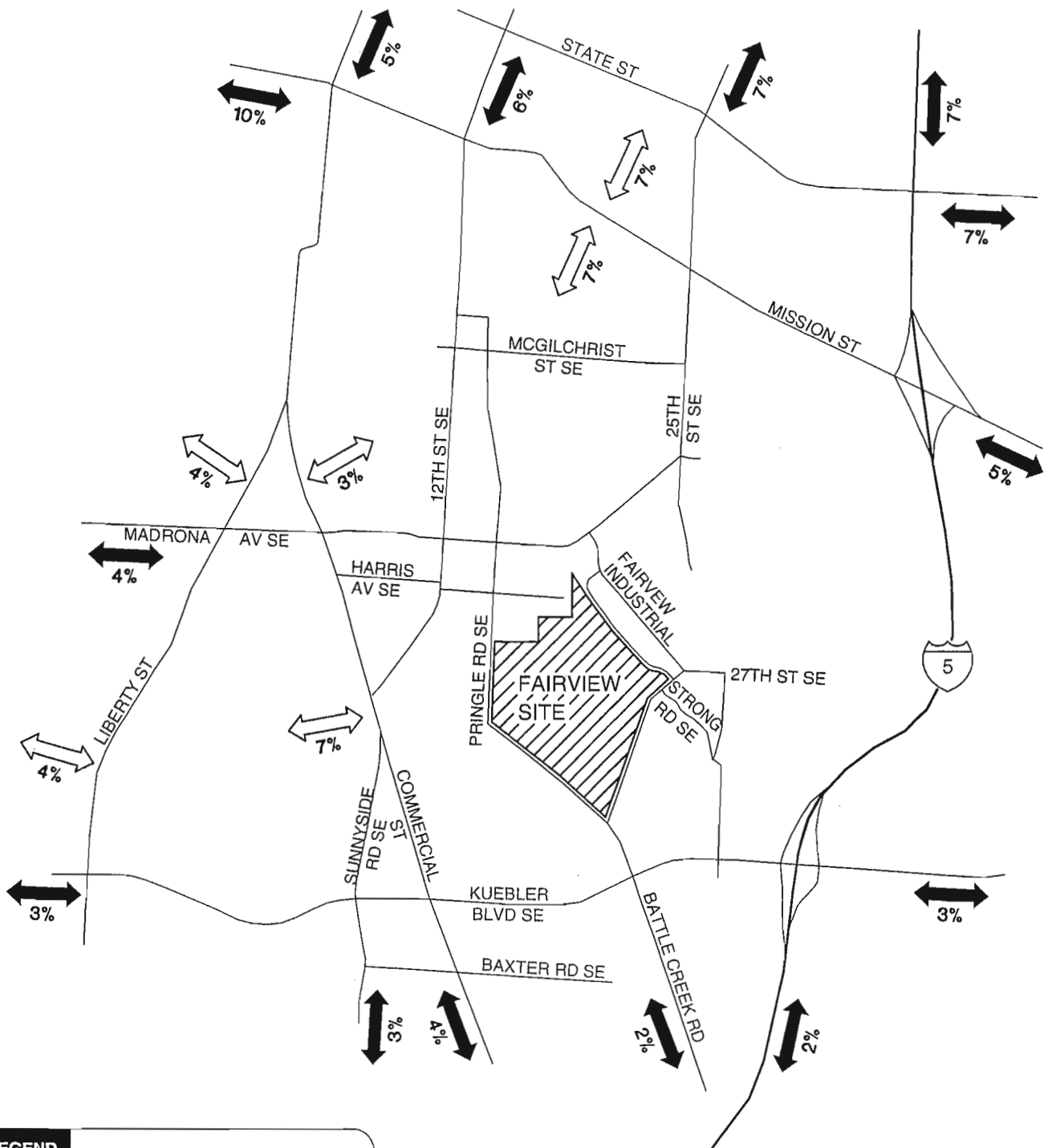
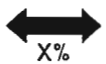
Figures 12 and 13 also summarize the forecast Phase 1 total traffic levels of service and volume-to-capacity ratios associated with build-out of the initial development. With the proposed development it is found that with one exception all of the intersections will operate at acceptable levels of service. The exception is:

- **Commercial Street SE/Madrona Avenue SE**
 - To achieve acceptable traffic operations with development of the site it is necessary to add a westbound right turn lane.

With this improvement all of the study intersections will operate at acceptable levels of service through Phase 1 of the proposed development. *Appendix "H" contains the 2008 Phase 1 total conditions unmitigated traffic level-of-service analysis worksheets. Appendix "I" contains the 2008 Phase 1 total conditions mitigated traffic level of service analysis worksheets.*

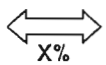


(NO SCALE)

**LEGEND**

MAJOR STREET DISTRIBUTION

X%

MINOR (NEIGHBORHOOD)
STREET DISTRIBUTION

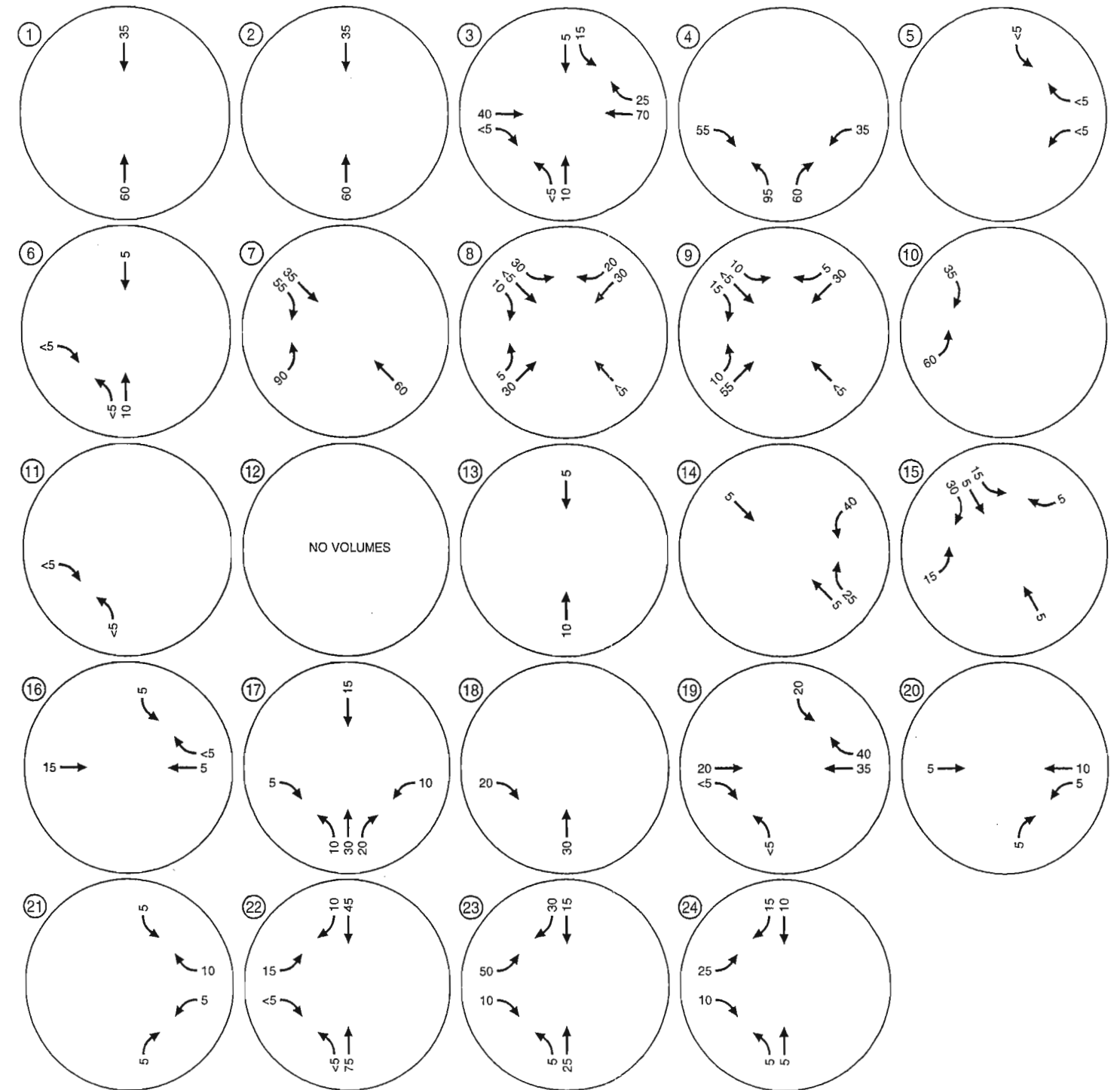
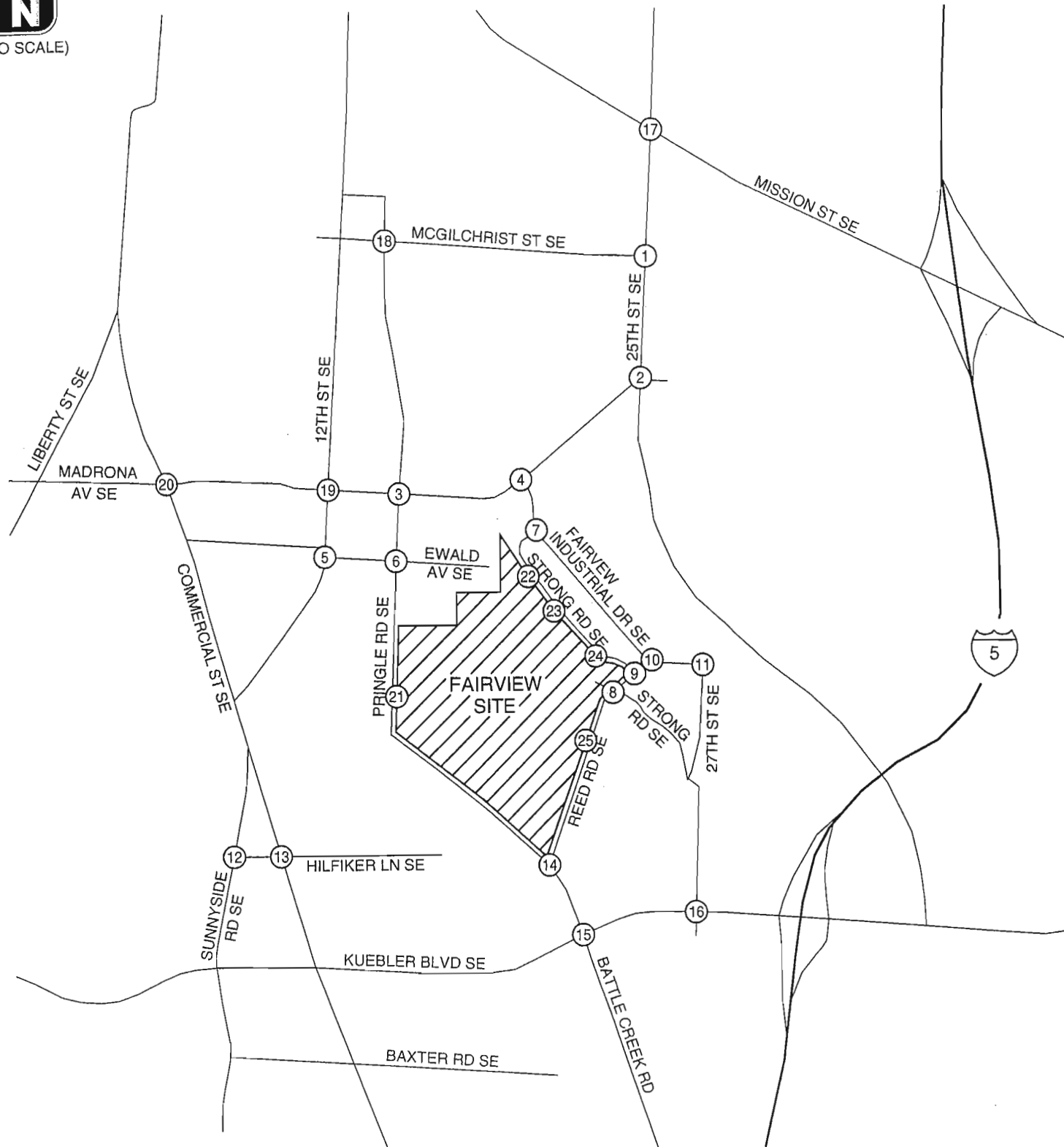
X%

**ESTIMATED TRIP DISTRIBUTION PATTERN
SALEM, OREGON**

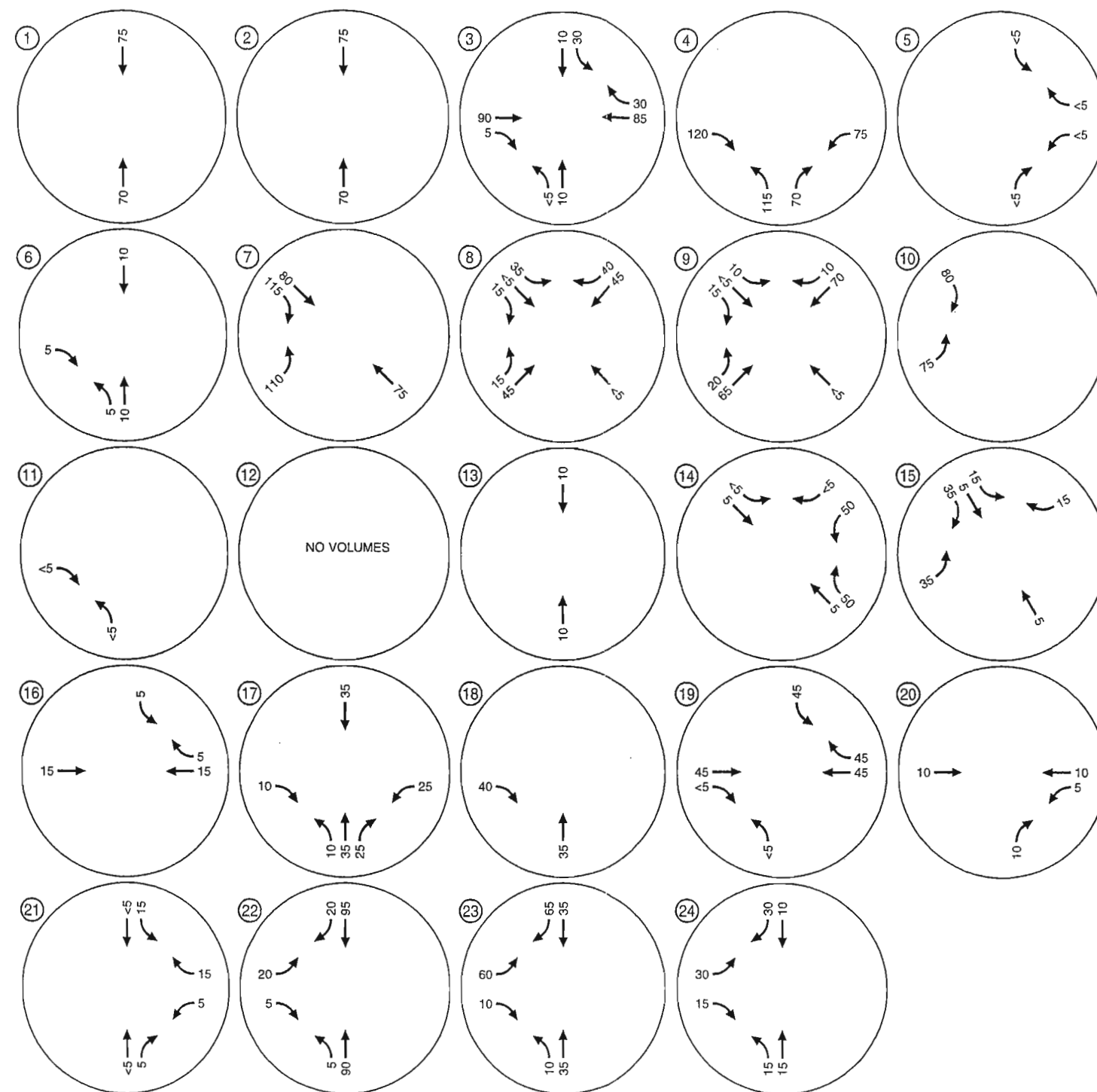
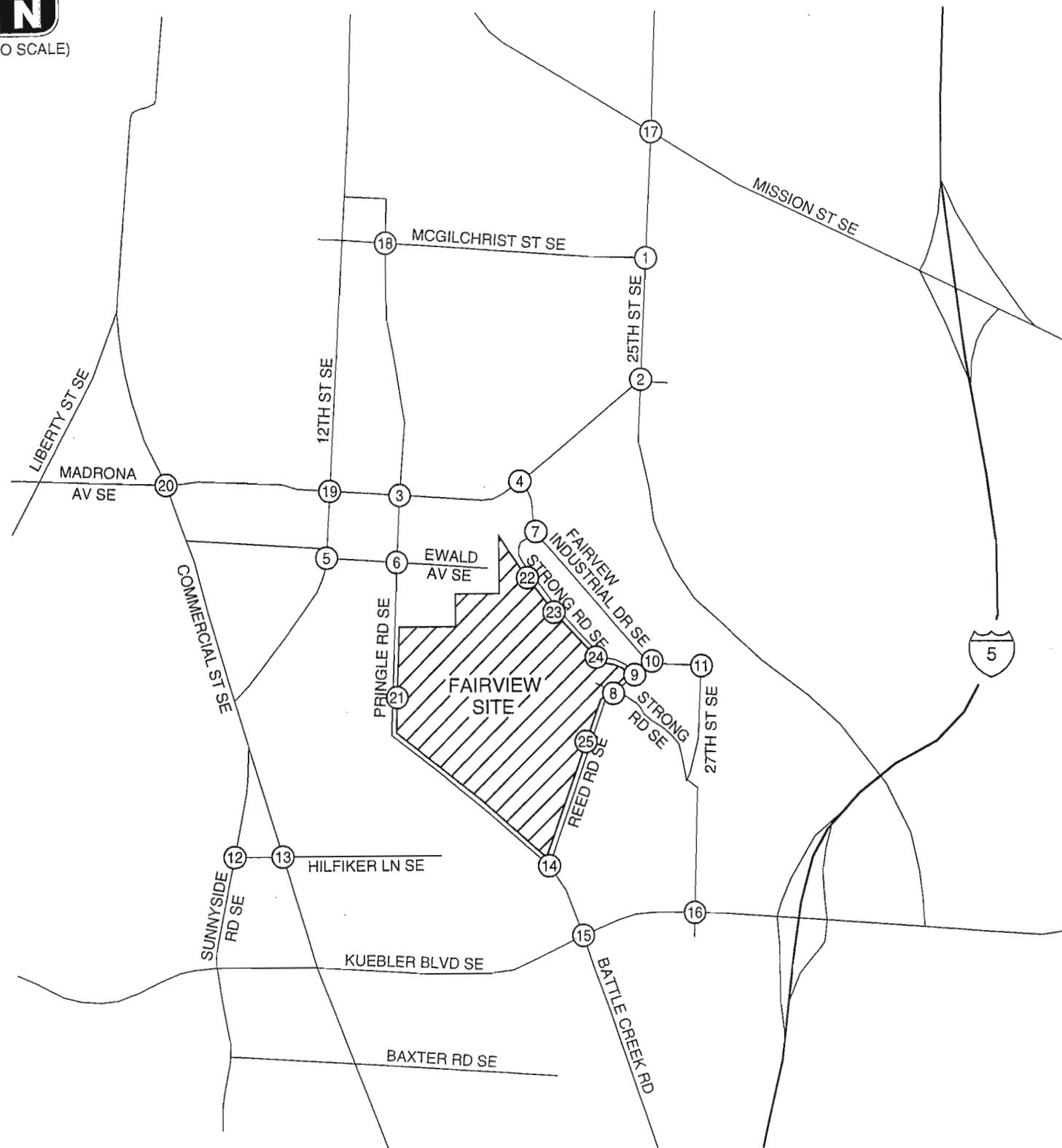
FIGURE

9

5622FIGS



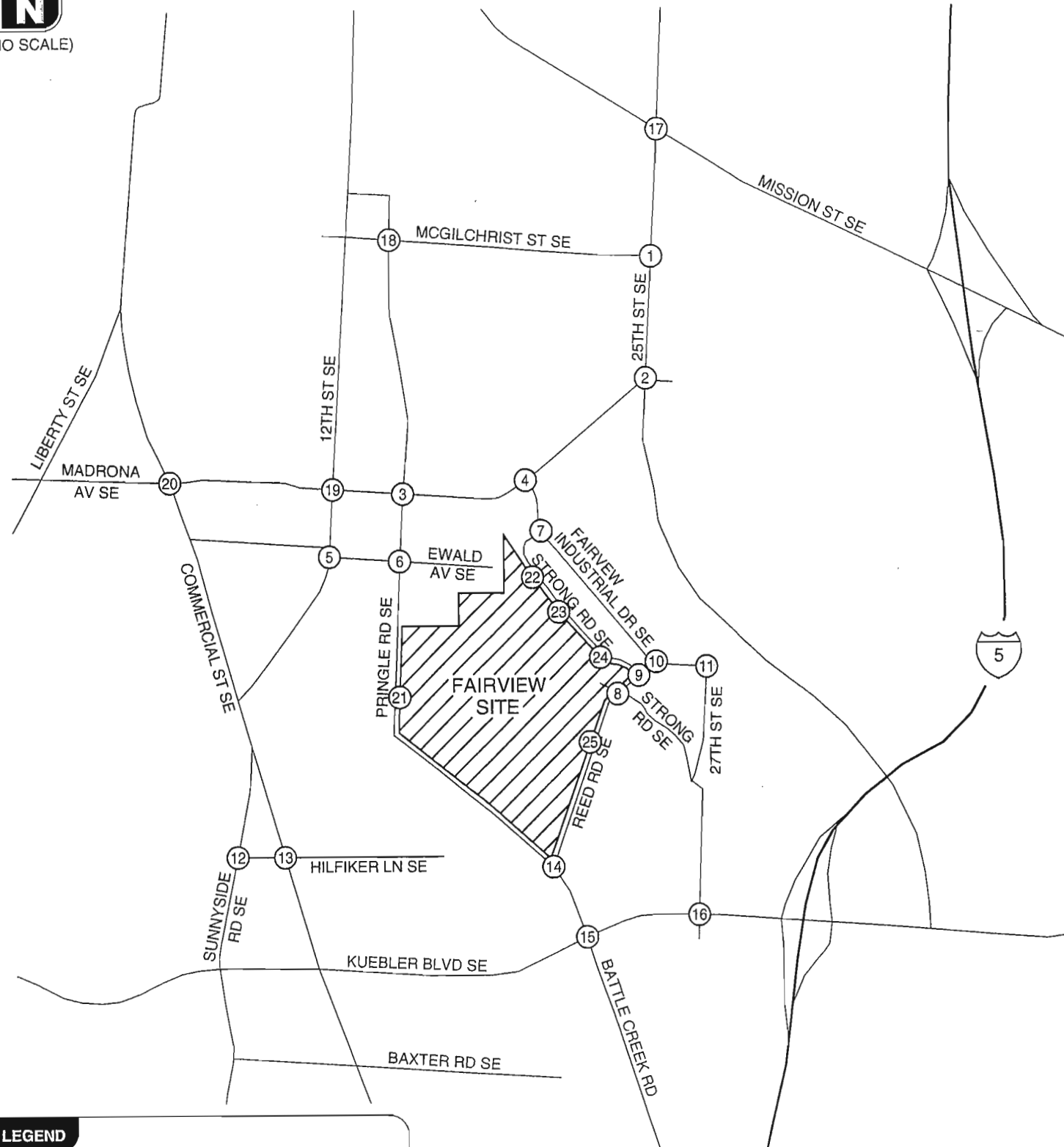
PHASE 1 SITE-GENERATED TRAFFIC VOLUMES
WEEKDAY AM PEAK HOUR
SALEM, OREGON



PHASE 1 SITE-GENERATED TRAFFIC VOLUMES
WEEKDAY PM PEAK HOUR
SALEM, OREGON



(NO SCALE)



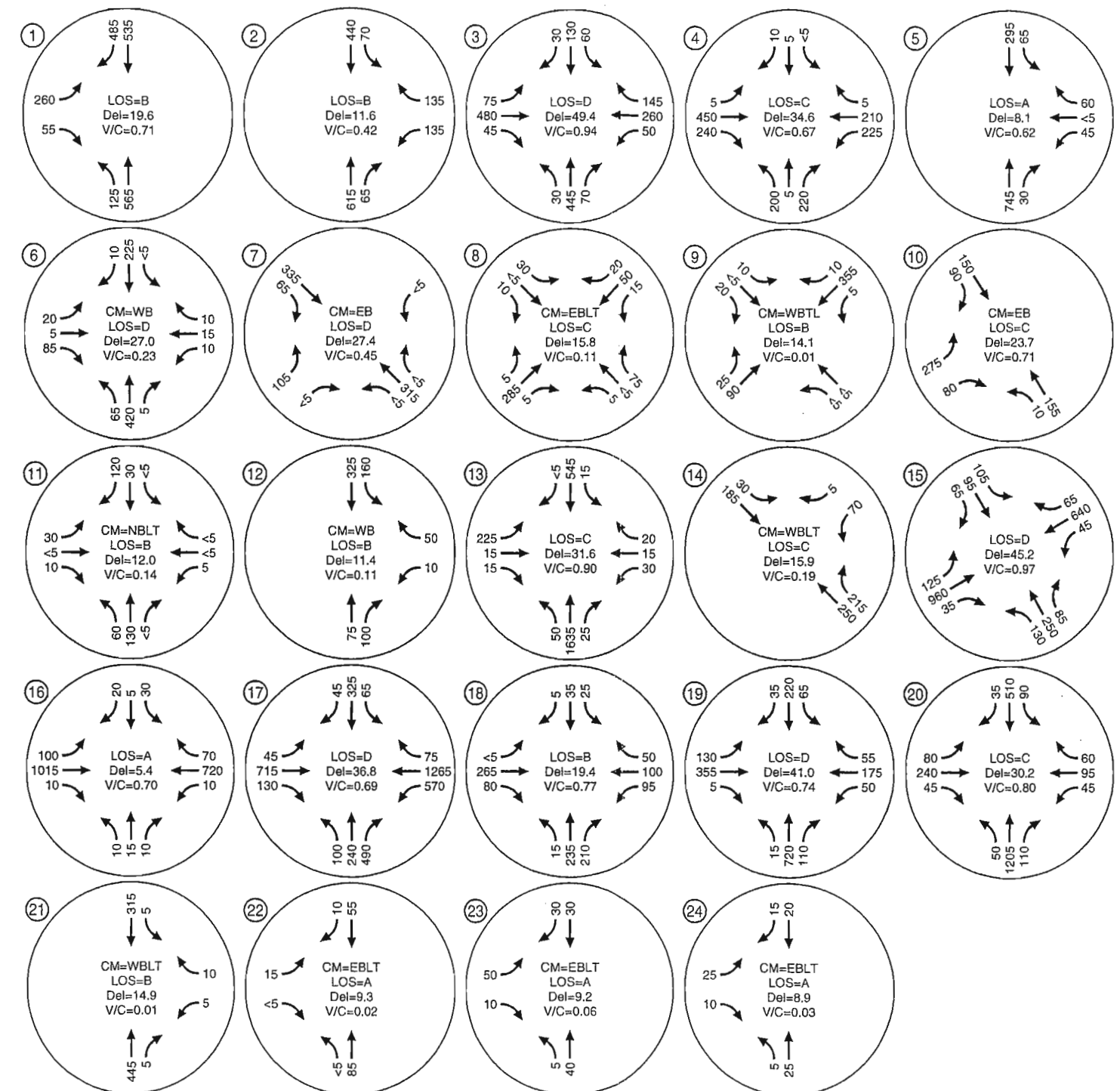
LEGEND

PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

CM = CRITICAL MOVEMENT (UNSIGNALIZED)

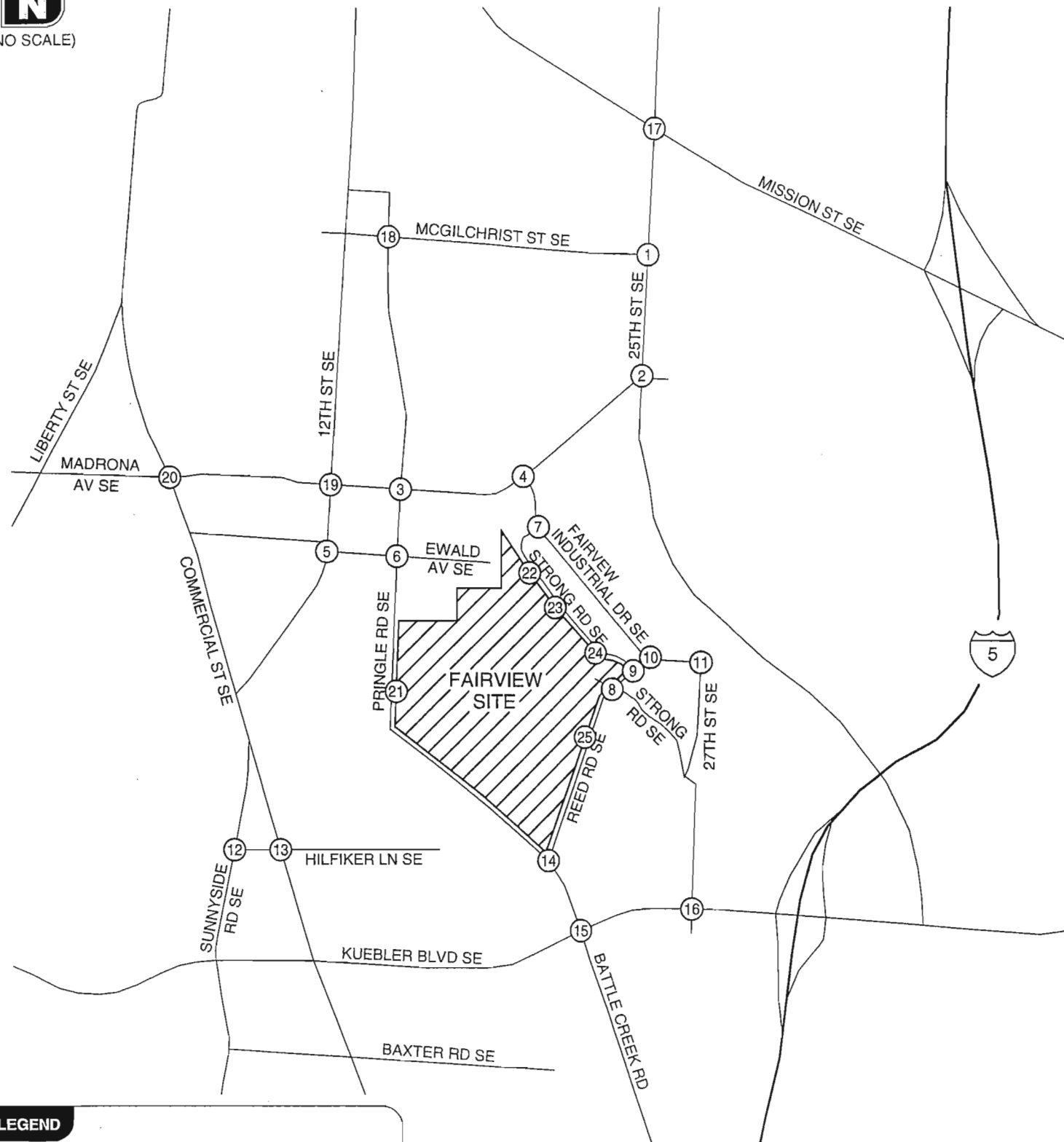
LOS = INTERSECTION LEVEL OF SERVICE
(SIGNALIZED) CRITICAL MOVEMENT LEVEL
OF SERVICE (UNSIGNALIZED)Del = INTERSECTION AVERAGE DELAY (SIGNALIZED)/
CRITICAL MOVEMENT DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2008 TOTAL TRAFFIC CONDITIONS
WEEKDAY AM PEAK HOUR
SALEM, OREGONFIGURE
12



(NO SCALE)

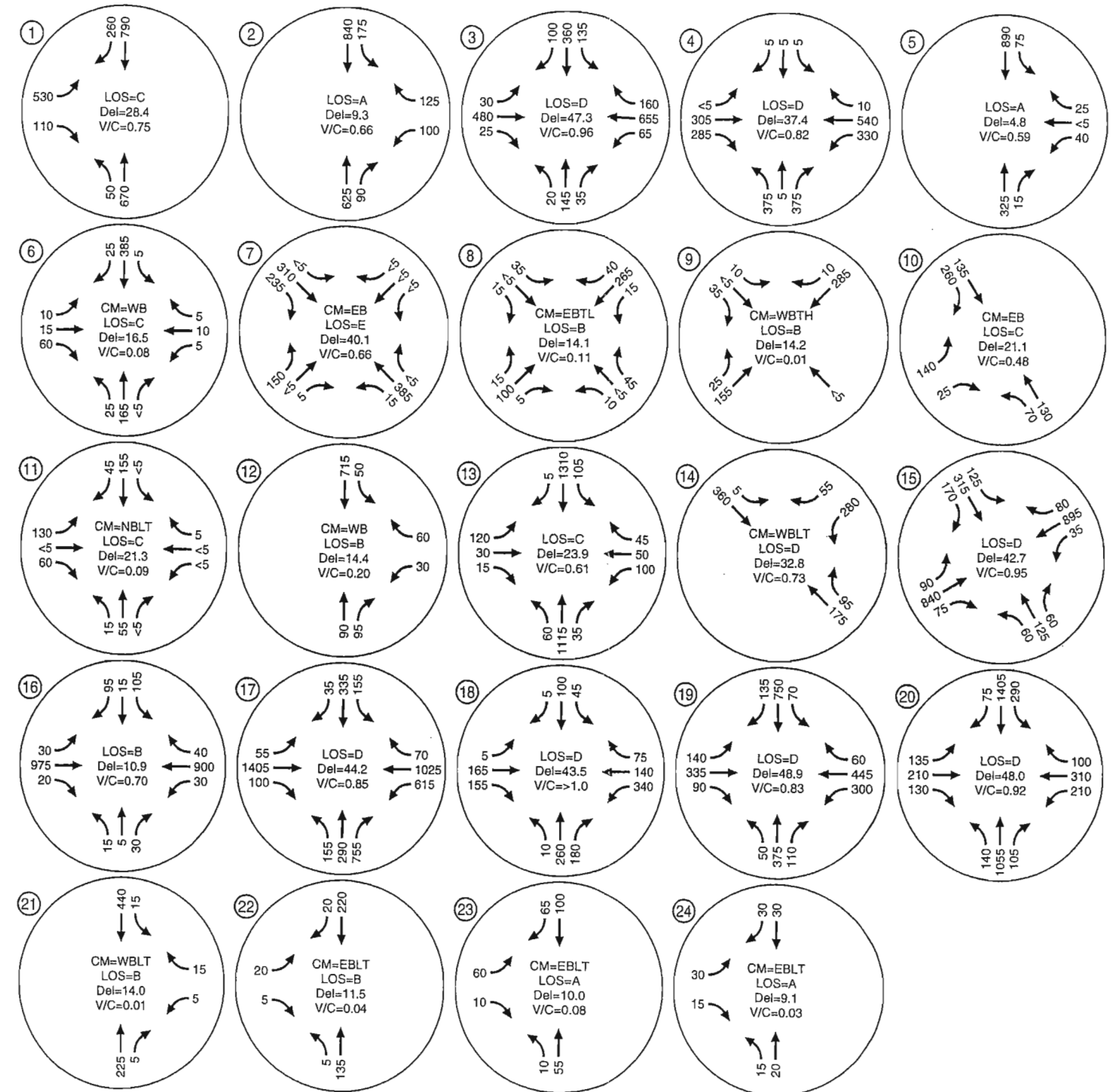
**LEGEND**

PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE
(SIGNALIZED) CRITICAL MOVEMENT LEVEL
OF SERVICE (UNSIGNALIZED)Del = INTERSECTION AVERAGE DELAY (SIGNALIZED)/
CRITICAL MOVEMENT DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO



2008 TOTAL TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
SALEM, OREGON

FIGURE
13

2012 BACKGROUND TRAFFIC CONDITIONS

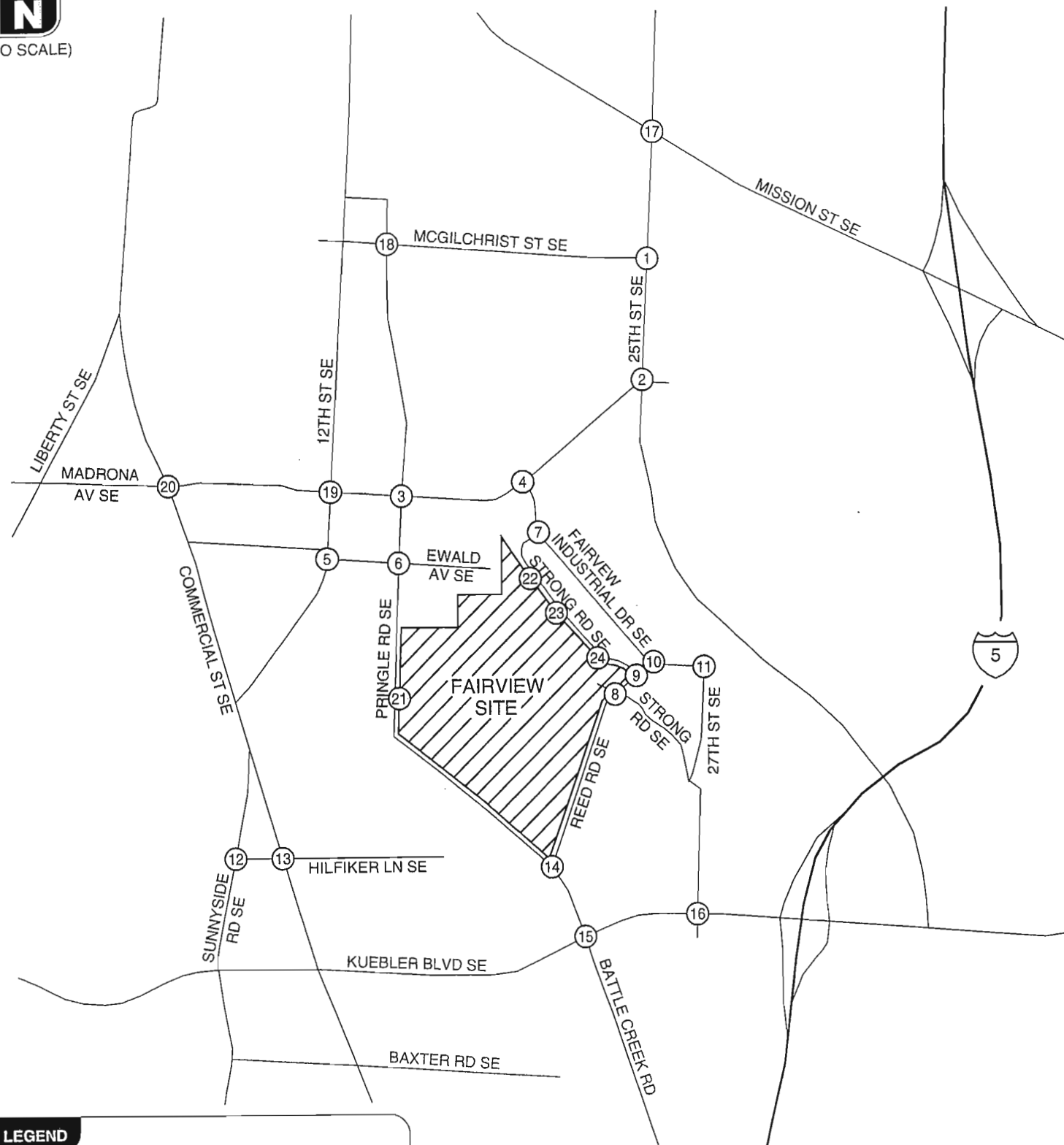
The 2012 background conditions traffic operations analysis estimates 2012 traffic operations assuming Phase 1 of the development is fully occupied and that since 2008, there has been four years of growth in regional traffic volumes. The traffic volumes are shown in Figures 14 and 15.

Level of Service Analysis

Figures 14 and 15 also show the results of the 2012 background conditions a.m. and p.m. peak hour level of service analyses. As shown in these figures, with the following exceptions the project study intersections will operate at acceptable levels of service during both the weekday a.m. and p.m. peak hour conditions. The exceptions are:

- **Commercial Street SE/Madrona Avenue SE -**
 - Acceptable traffic operations can be achieved at this intersection by adding an additional eastbound and westbound through lane in addition to the mitigations identified in the 2008 development scenario.
- **McGilchrist Street SE/Pringle Road SE –**
 - Acceptable traffic operations can be achieved at this intersection by adding a westbound left turn lane.
- **Battle Creek Road SE/Kuebler Road SE**
 - This intersection does meet the City's level of service standard for unsignalized intersections; however in the 2012 background scenario it would be operating over capacity. This condition can be mitigated by adding separate eastbound and westbound through lanes.

Appendix "J" includes the year 2012 background traffic conditions unmitigated level-of-service analysis worksheets. Appendix "K" includes the 2012 background traffic conditions mitigated level of serviced analysis worksheets.



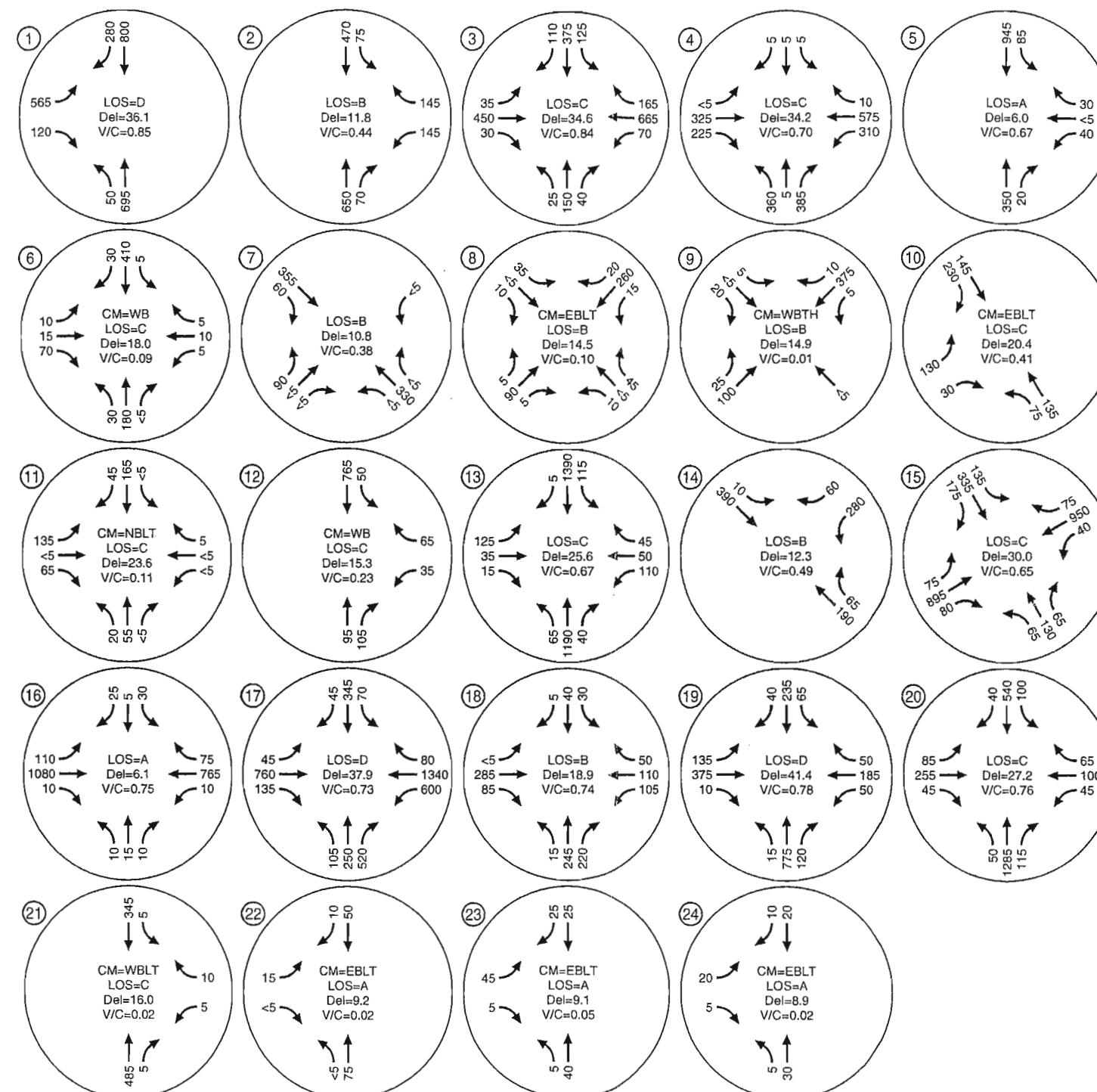
LEGEND

PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

CM = CRITICAL MOVEMENT (UNSIGNALIZED)

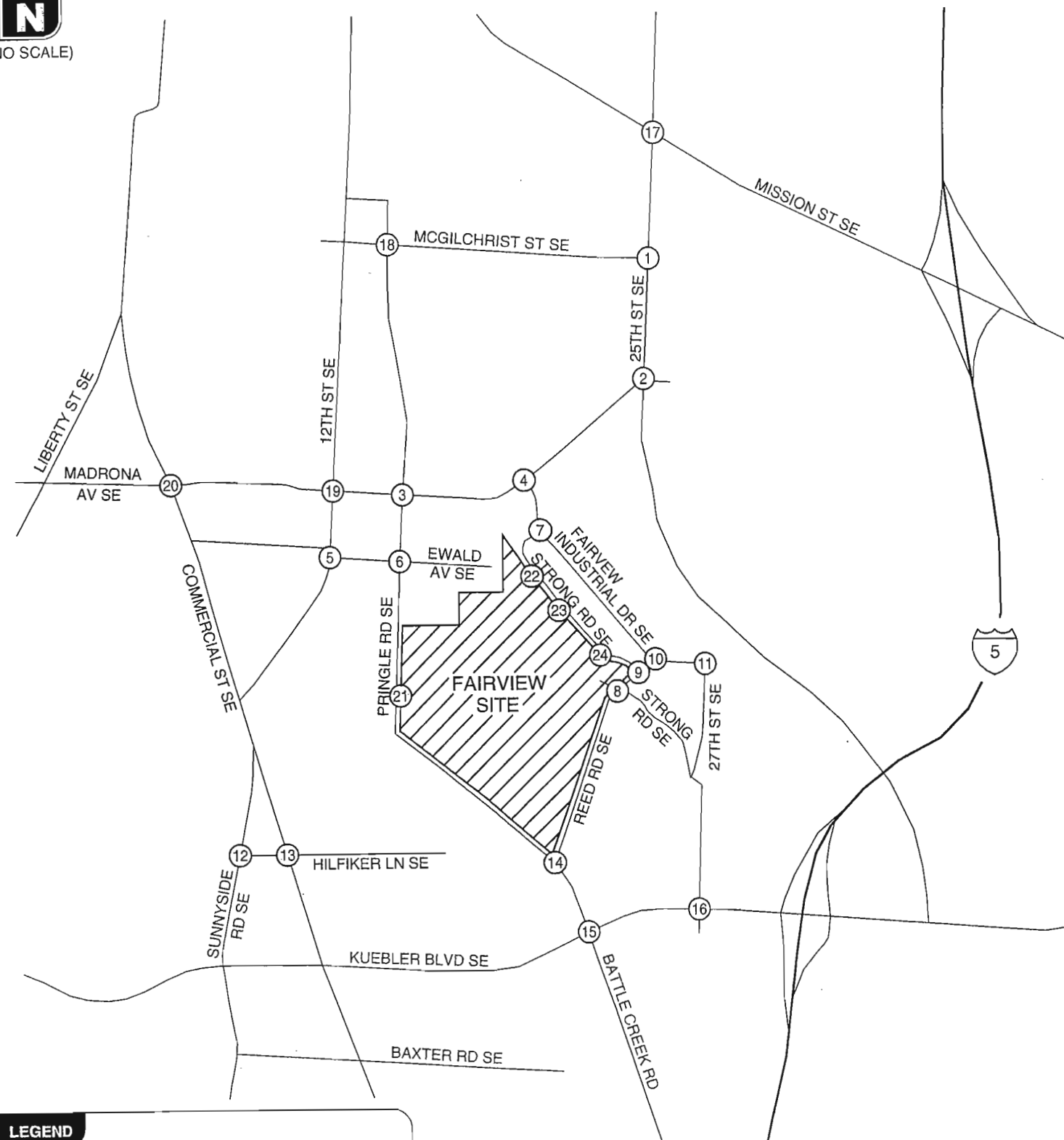
LOS = INTERSECTION LEVEL OF SERVICE
(SIGNALIZED) CRITICAL MOVEMENT LEVEL
OF SERVICE (UNSIGNALIZED)Del = INTERSECTION AVERAGE DELAY (SIGNALIZED)/
CRITICAL MOVEMENT DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2012 BACKGROUND TRAFFIC CONDITIONS
WEEKDAY AM PEAK HOUR
SALEM, OREGONFIGURE
14



(NO SCALE)



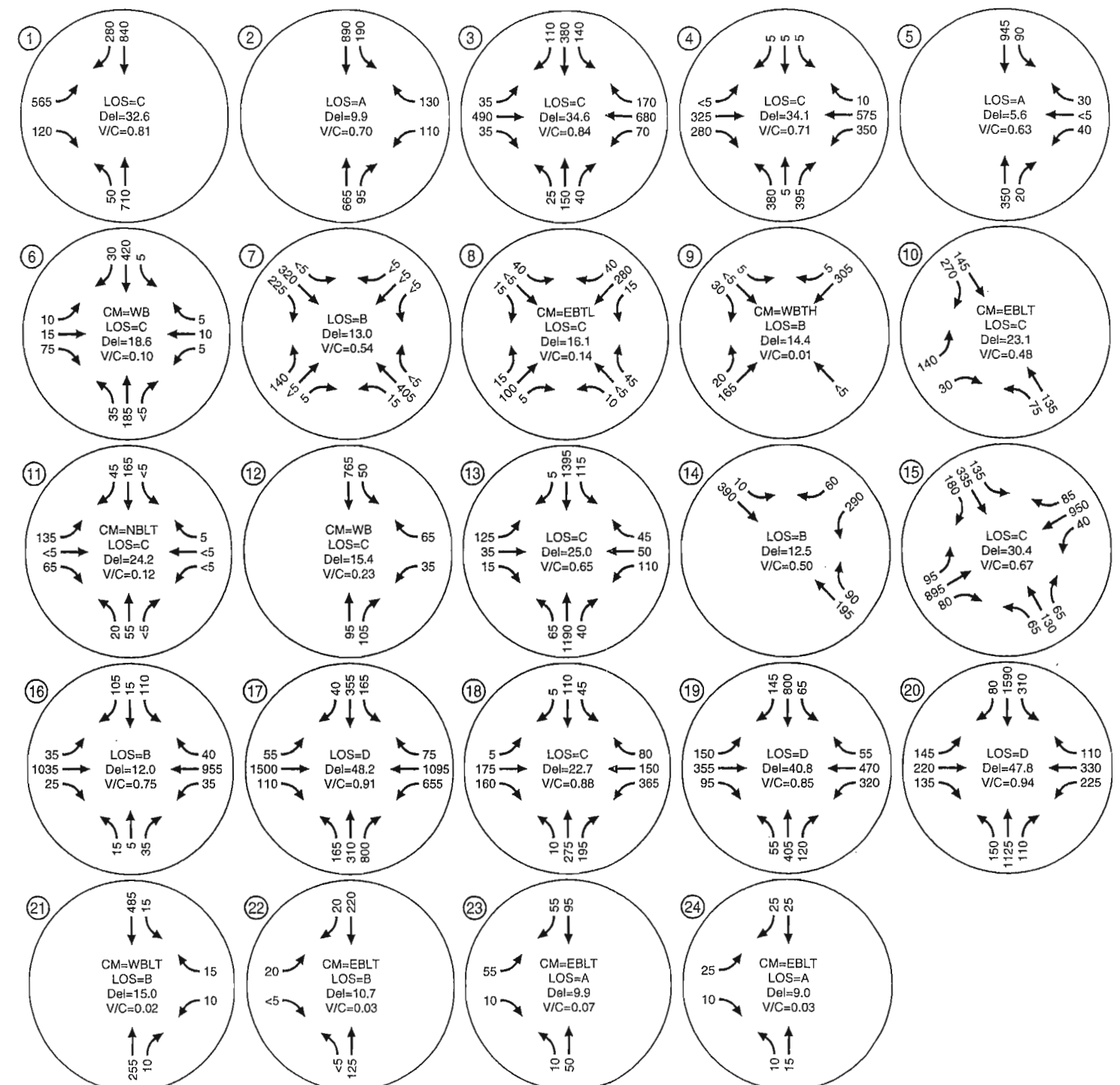
LEGEND

PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE
(SIGNALIZED) CRITICAL MOVEMENT LEVEL
OF SERVICE (UNSIGNALIZED)Del = INTERSECTION AVERAGE DELAY (SIGNALIZED)/
CRITICAL MOVEMENT DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO



2012 BACKGROUND TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
SALEM, OREGON

FIGURE
15

2012 PHASE 2 TOTAL TRAFFIC CONDITIONS

The 2012 total traffic represents the full build-out of Phase 2 of the proposed development. Table 4 shows that under the second phase of the development, the site will generate an additional 430 a.m. peak hour trips, of which 175 and 255 are inbound and outbound, respectively, and 635 p.m. peak hour trips of which 320 and 315 are inbound and outbound respectively. Figures 16 and 17 show the site-generated volumes for Phase 2 of the development. Total traffic volumes for the 2012 Phase 2 development scenario are shown in Figures 18 and 19.

Level of Service Analysis

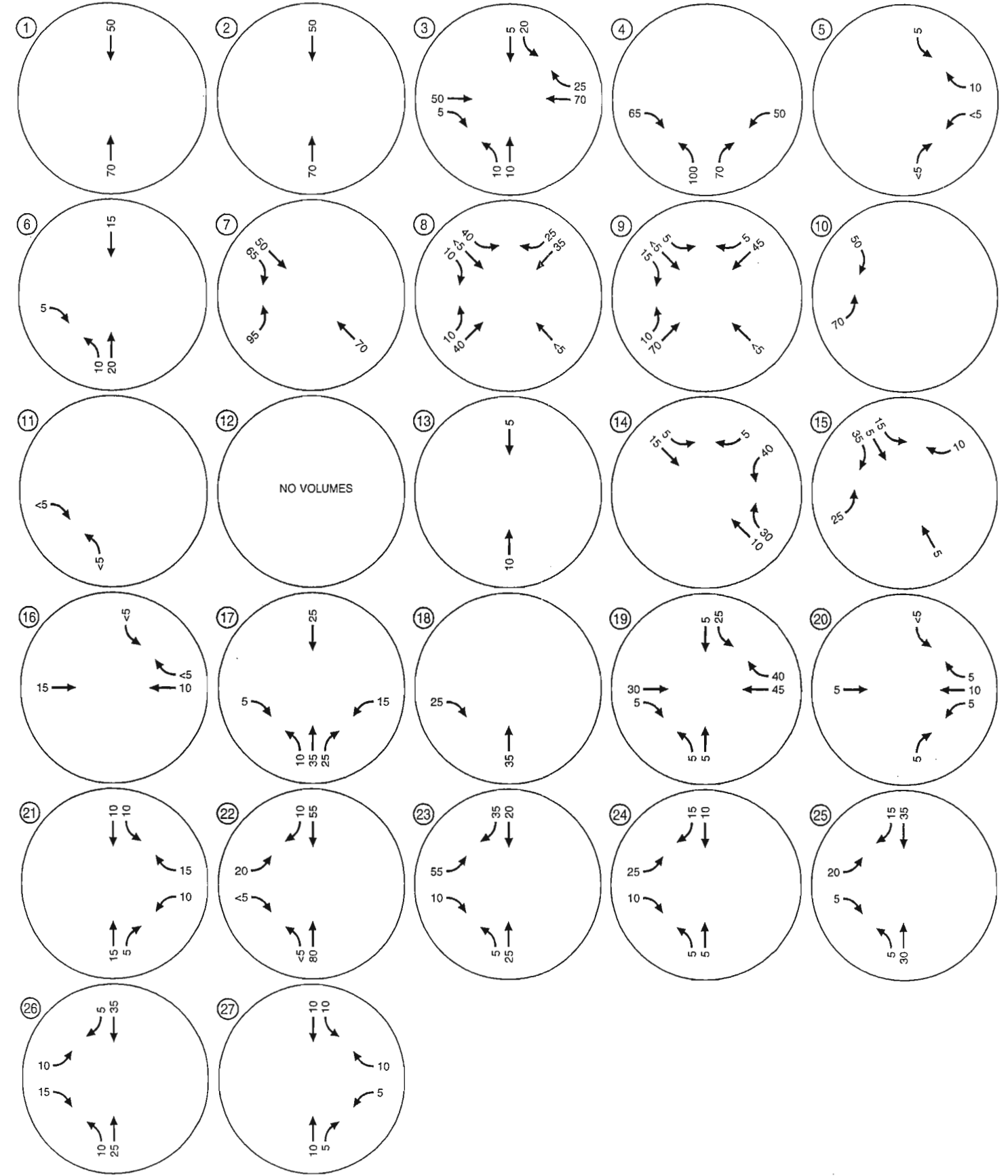
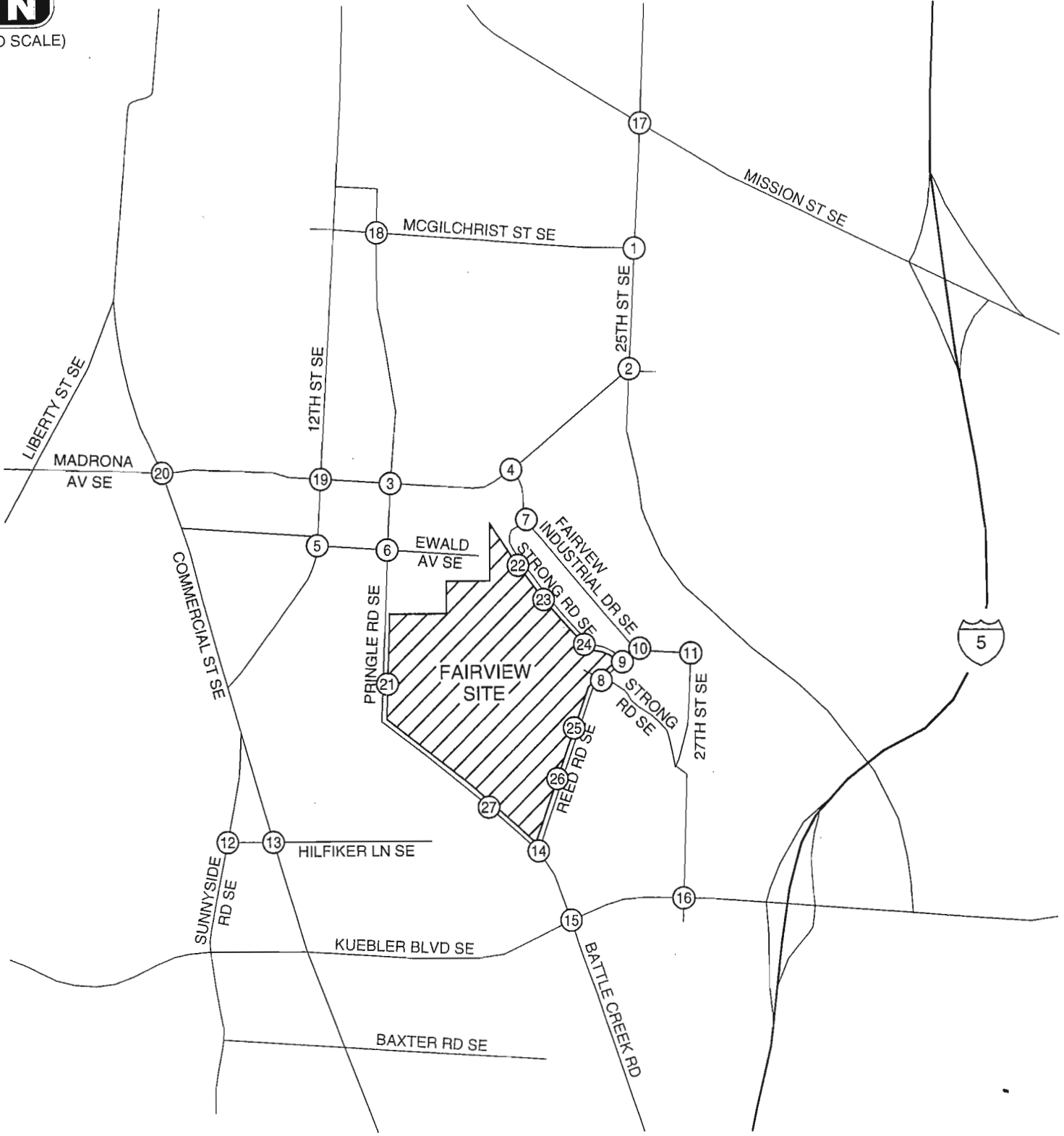
As shown in Figures 18 and 19 with development of Phase 2 of the site, most of the project study intersections continue to operate at acceptable levels of service. However, additional mitigations are required at:

- **12th Avenue SE/Madrona Avenue SE –**
 - In addition to the mitigations identified in the 2008 background conditions, to achieve acceptable traffic operations through Phase 2 of the development, it will be necessary to also add separate eastbound and westbound right-turn lanes
- **Madrona Avenue SE/Fairview Industrial Strong Road SE –**
 - Convert the northbound and southbound approaches to the intersection to protected signal phasing; add a second westbound left-turn lane; convert the eastbound approach lane configuration to one left-turn, one through-lane and one right-turn lane and add overlap phasing for the right-turn.
- **Strong Road SE/Fairview Industrial Road SE –**
 - Add a traffic signal (*Appendix “L” contains all of the signal warrant analysis worksheets*).
- **Battle Creek Road SE/Reed Road SE –**
 - Add a traffic signal. A preliminary analysis indicates that from an operational perspective a roundabout may work at this location. Subject to level of interest, additional analyses should be conducted to assess the physical feasibility of installing a roundabout at this location.

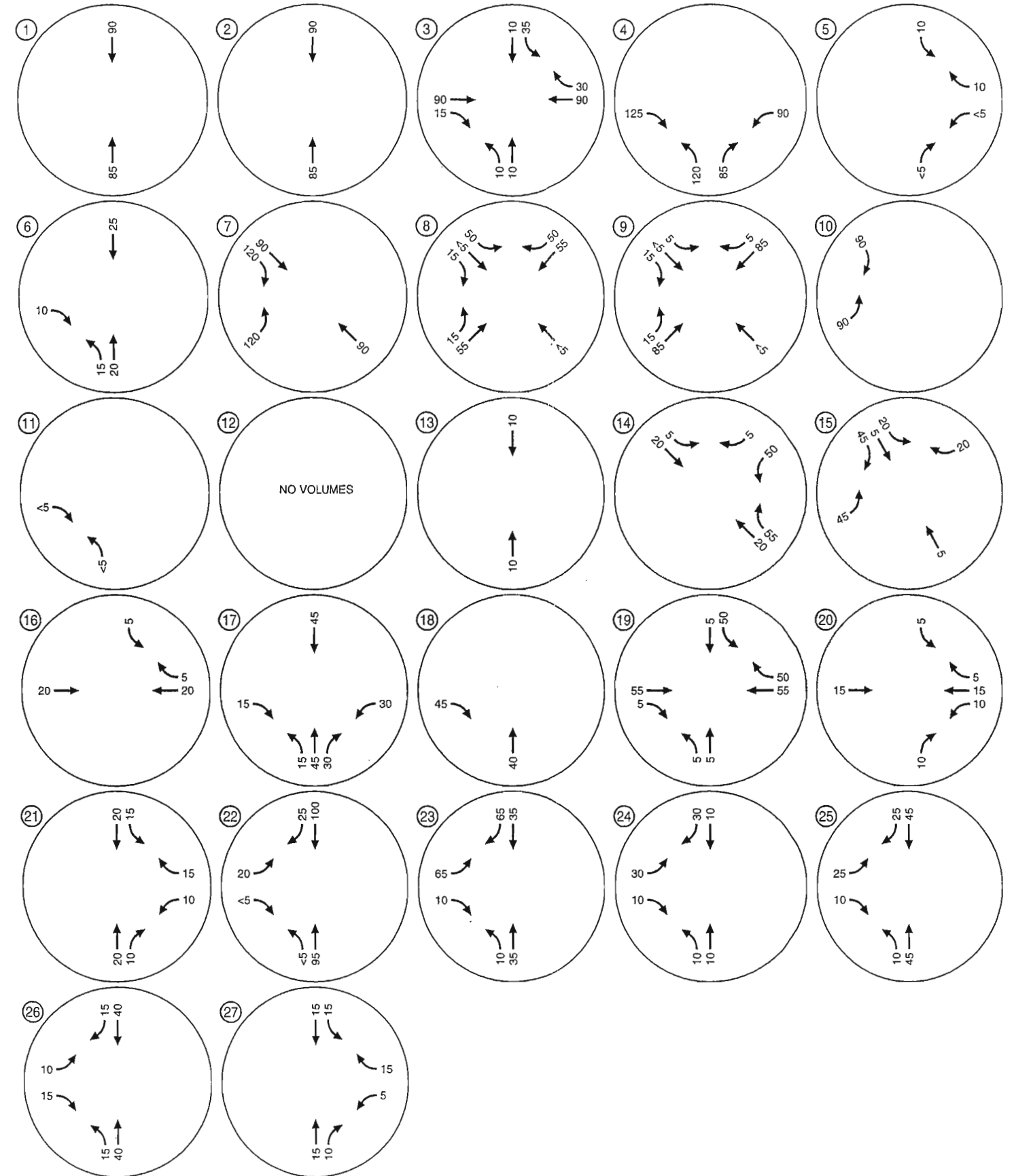
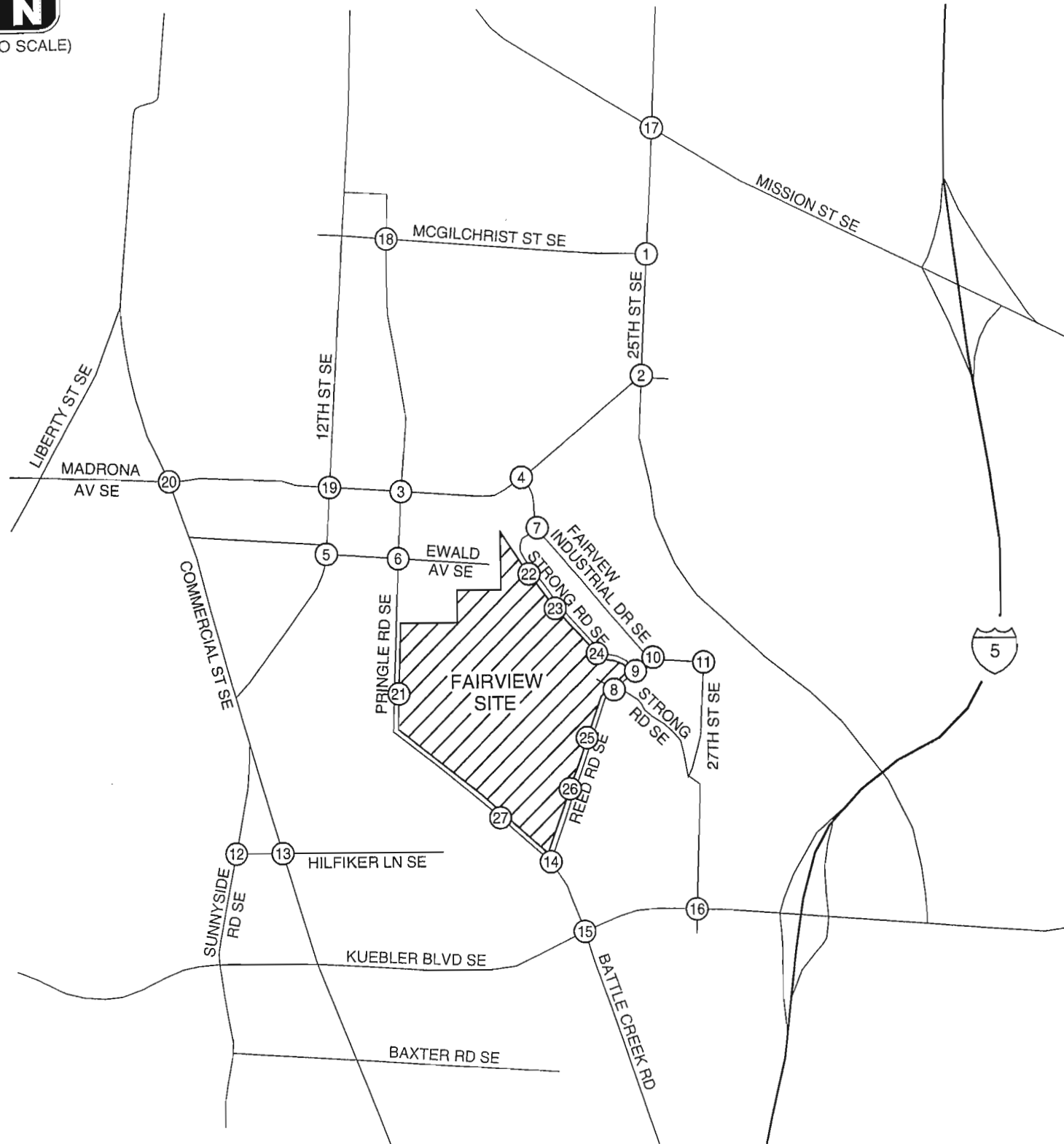
Appendix “M” contains the traffic operations analysis for the unmitigated 2012 total conditions analysis scenario. Appendix “N” contains the traffic operations analysis worksheets for the 2012 total conditions mitigated analysis scenario.



(NO SCALE)



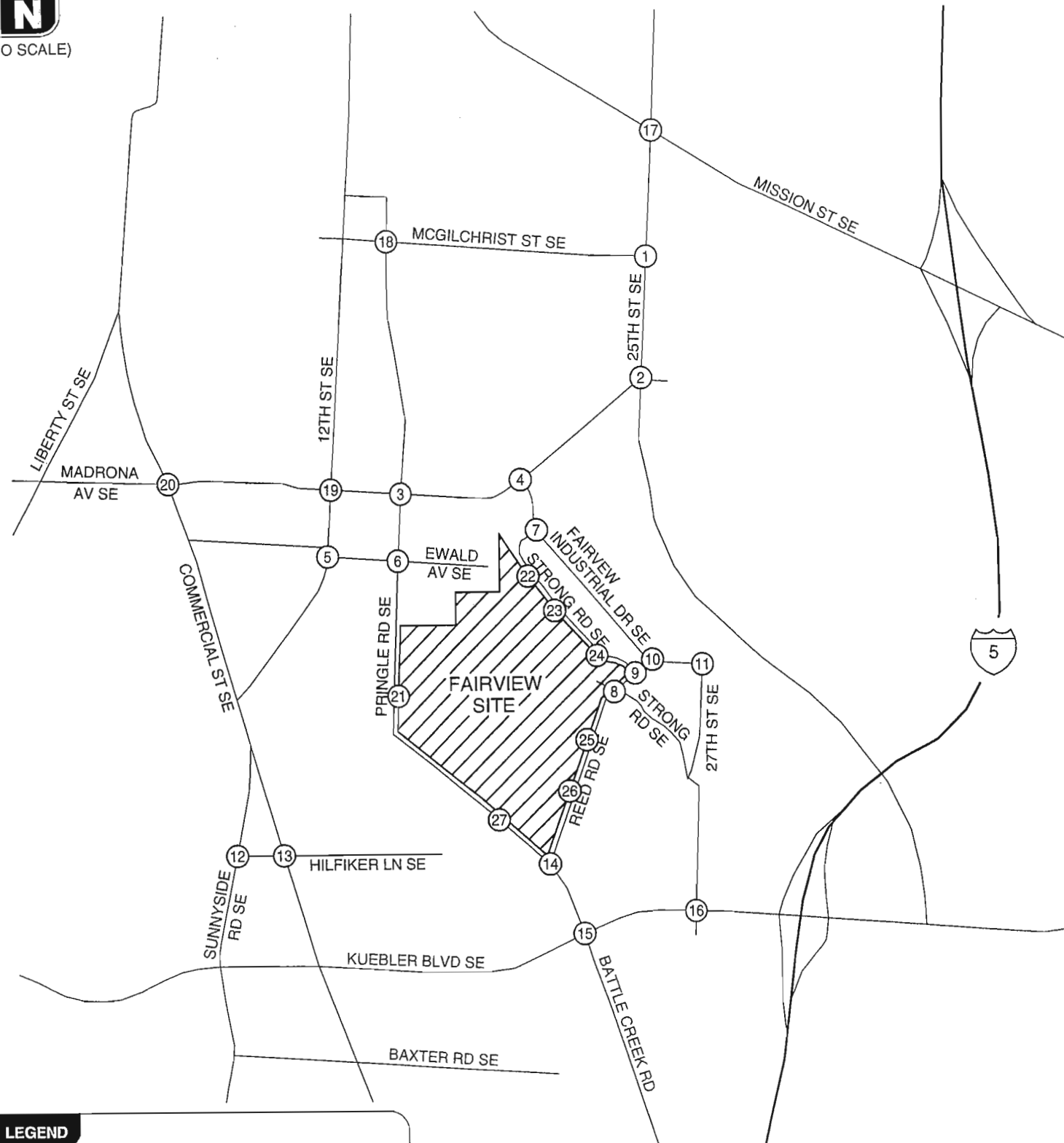
PHASE 2 SITE-GENERATED TRAFFIC VOLUMES
WEEKDAY AM PEAK HOUR
SALEM, OREGON



PHASE 2 SITE-GENERATED TRAFFIC VOLUMES
WEEKDAY PM PEAK HOUR
SALEM, OREGON



(NO SCALE)

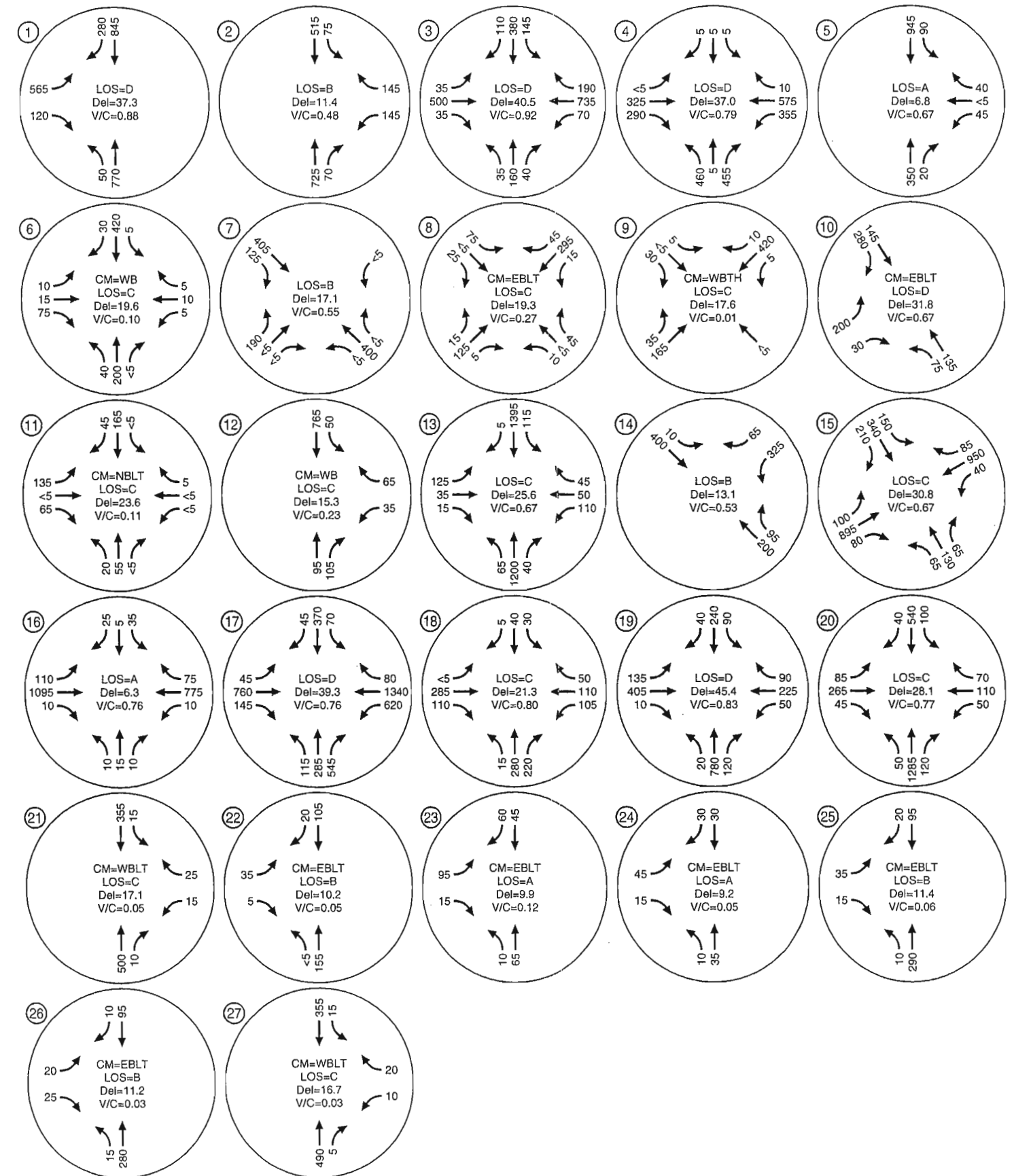
**LEGEND**

PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE
(SIGNALIZED) CRITICAL MOVEMENT LEVEL
OF SERVICE (UNSIGNALIZED)Del = INTERSECTION AVERAGE DELAY (SIGNALIZED)/
CRITICAL MOVEMENT DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO



2012 TOTAL TRAFFIC CONDITIONS
WEEKDAY AM PEAK HOUR
SALEM, OREGON

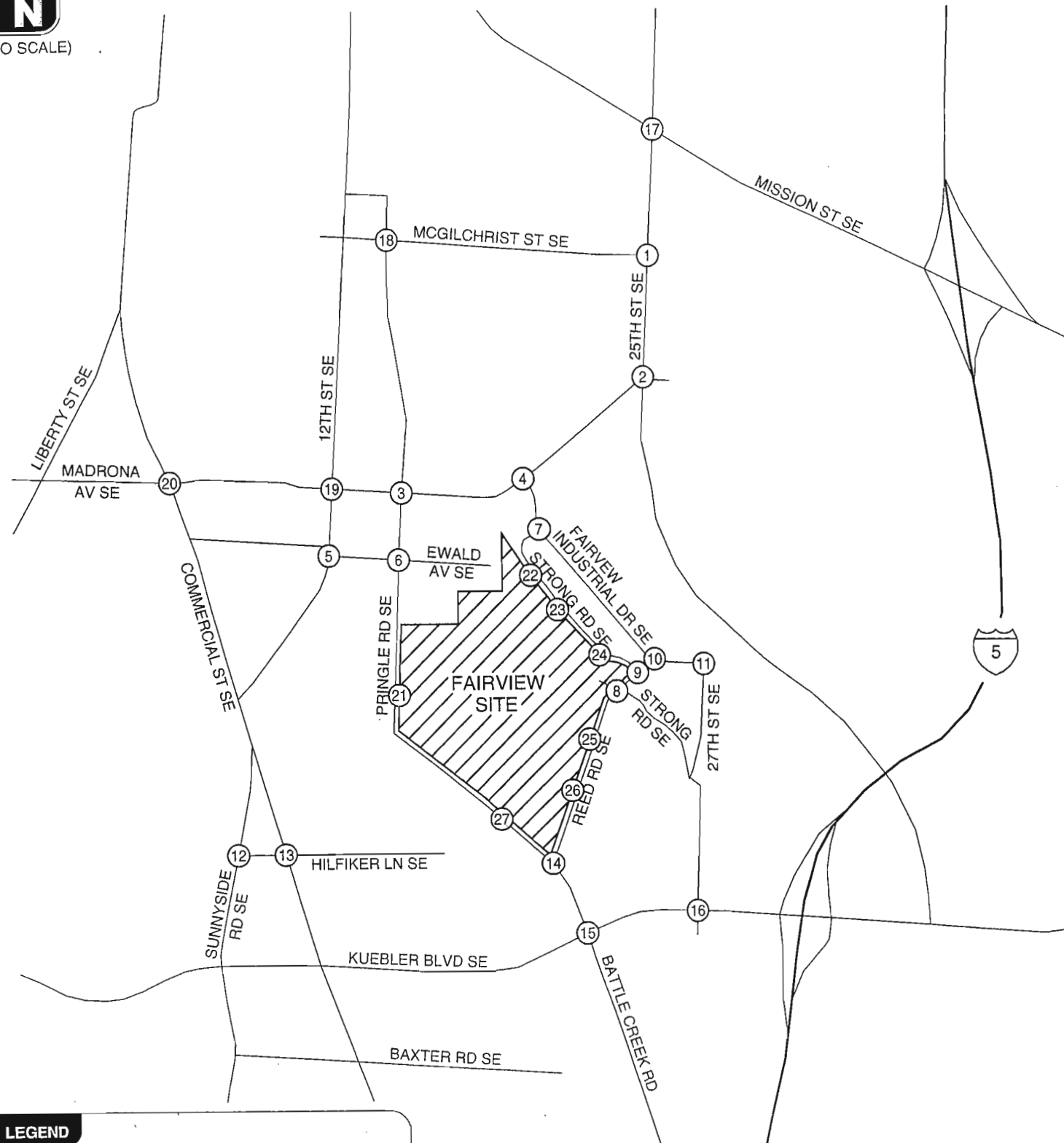
FIGURE

18

5622F/OS



(NO SCALE)

**LEGEND**

PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

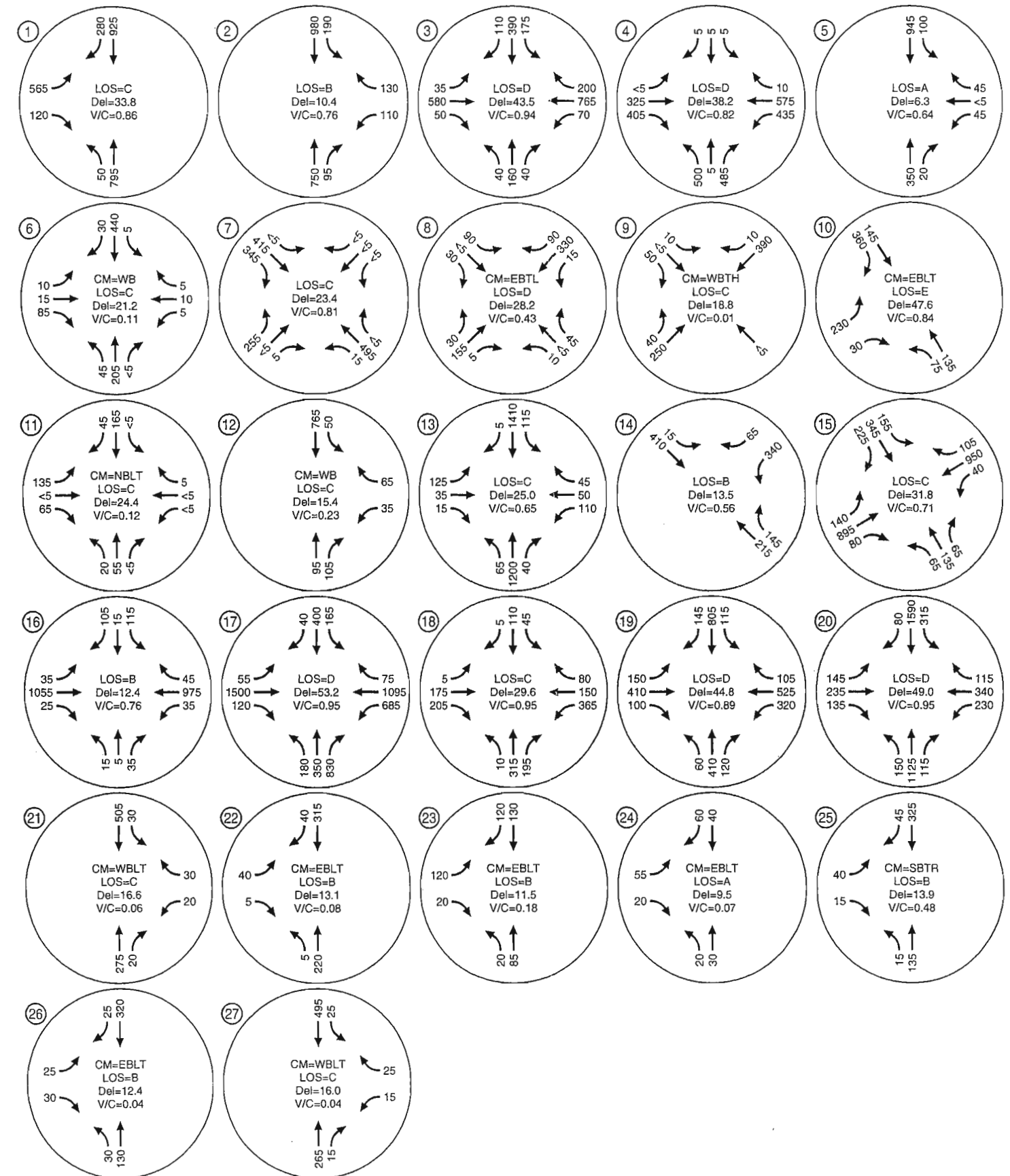
CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE
(SIGNALIZED) CRITICAL MOVEMENT LEVEL
OF SERVICE (UNSIGNALIZED)

Del = INTERSECTION AVERAGE DELAY (SIGNALIZED)/

CRITICAL MOVEMENT DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO



2012 TOTAL TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
SALEM, OREGON

FIGURE

19

5622FGS

2016 NO-BUILD TRAFFIC CONDITIONS

The City of Salem requested that in addition to a typical 2016 background analysis (e.g. Phases 1 and 2 development, but prior to Phase 3), an analysis of 2016 conditions assuming *no development on the SFA site* also be conducted. This analysis is called the 2016 No-Build analysis. The weekday a.m. and p.m. peak hour traffic volumes for the 2016 No-Build Traffic conditions are shown in Figures 20 and 21.

The 2016 No-Build, Background and Total traffic conditions analyses include a Hilfiker Street SE connection between Commercial Street SE and Pringle Road SE in the vicinity of the elbow between Pringle Road SE and Battle Creek Road SE. The 2016 volumes on this roadway network were estimated using SKATS model data, and re-assigning forecast 2016 traffic volumes in a manner consistent with the results of the 2025 model select link analysis on Hilfiker Street SE.

With the Hilfiker Street connections, the results of the 2016 No-Build traffic analysis are shown in Figure 20 and 21. The No-Build analysis assumes no new development on the SFA property and the existing traffic volumes are increased by 1.7 percent per year to 2016 to reflect regional growth. To achieve acceptable operating conditions in the 2016 No-Build scenario it would be necessary to:

- **Pringle Road SE/Madrona Avenue SE**
 - To achieve acceptable traffic operations at this intersection it is necessary to add a northbound and southbound through lane.
- **Pringle Road SE/Ewald Avenue SE**
 - To achieve acceptable traffic operations this intersection must be signalized.
- **Commercial Street SE/Hilfiker Lane SE**
 - To achieve acceptable traffic operations at this intersection, an additional through lane is required in the northbound and southbound direction.
- **Sunnyside Road SE/Hilfiker Lane SE**
 - This intersection must be signalized in order to achieve acceptable traffic operations.
- **Commercial Street SE/Madrona Avenue SE**
 - To achieve acceptable traffic operations at this intersections it is necessary to add a northbound and southbound through lane.
- **Battle Creek Road SE/Kuebler Road SE**
 - An additional through lane is required in the eastbound and westbound directions in order to achieve acceptable traffic operations at this intersection.

Appendix "O" contains the results of the unmitigated 2016 No-Build traffic analysis; and Appendix "P" contains the results of the mitigated 2016 No-Build traffic operations analysis.

2016 BACKGROUND TRAFFIC CONDITIONS

The 2016 background conditions traffic operations analysis estimates 2016 traffic operations assuming Phase 1 and 2 of the development are fully occupied, that since 2012, there has been four years of growth in regional traffic volumes, and that the Hilfiker Street connection has been constructed. The forecast traffic volumes are shown in Figures 22 and 23.

Level of Service Analysis

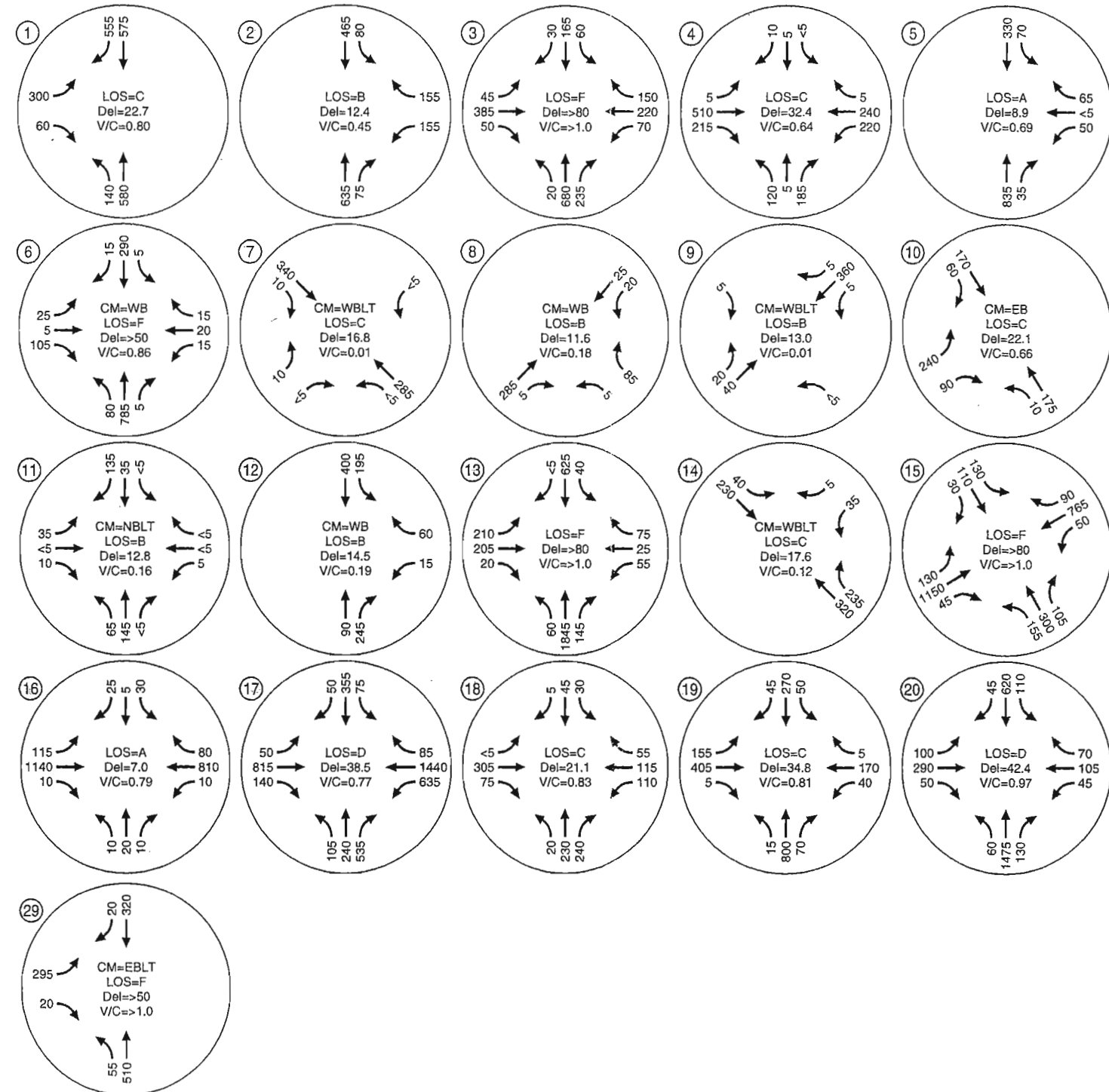
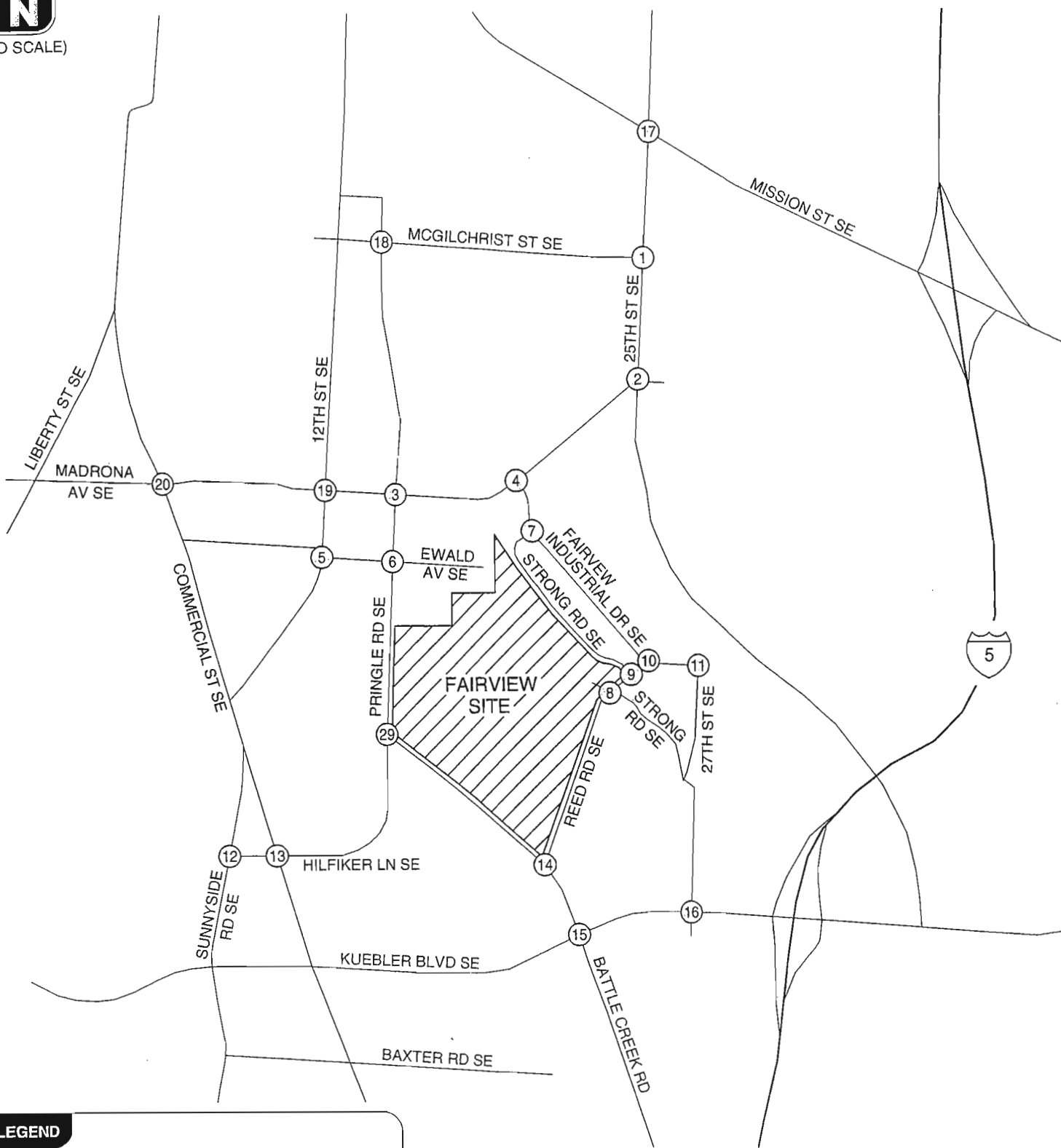
Figures 22 and 23 also show the results of the 2016 background conditions a.m. and p.m. peak hour level of service analyses. As shown in these figures, with the following exceptions the project study intersections will operate at acceptable levels of service during both the weekday a.m. and p.m. peak hour conditions. The exceptions are:

- **Madrona Avenue SE/Pringle Road SE-**
 - Acceptable traffic operations can be achieved at this intersection by adding additional eastbound and westbound through lanes.
- **Commercial Street SE/Hilfiker Lane SE –**
 - Acceptable traffic operations can be achieved at this intersection by adding an additional through lane in the northbound and southbound direction and by adding separate left turn lanes at the eastbound and westbound approach to the intersection.
- **Sunnyside Road SE/Hilfiker Lane SE –**
 - To meet the City's level of service standard a traffic signal would be required at this intersection.
- **Commercial Street SE/Madrona Avenue SE –**
 - In addition to the modifications identified in the 2012 background scenario, it will also be necessary to add an additional northbound and southbound through lane on Commercial Street.
- **25th Street SE/Mission Street SE -**
 - A northbound left turn lane is required to achieve acceptable traffic operating conditions in this scenario.
- **Pringle Road SE/Ewald Avenue SE –**
 - A traffic signal is required to improve traffic operations to the City's level of service standard.
- **Pringle Road SE/Hilfiker Lane SE -**
 - A traffic signal is required to improve traffic operations to the City's level of service standard.

With these improvements in place, the City's level of service standard would be achieved at all of the study intersections. *Appendix "Q" provides the traffic operations analysis worksheets for the 2016 background unmitigated condition level of service analyses, and Appendix "R" contains the traffic operations analysis worksheets for the 2016 background mitigated conditions analysis.*



(NO SCALE)



LEGEND

PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED) CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)

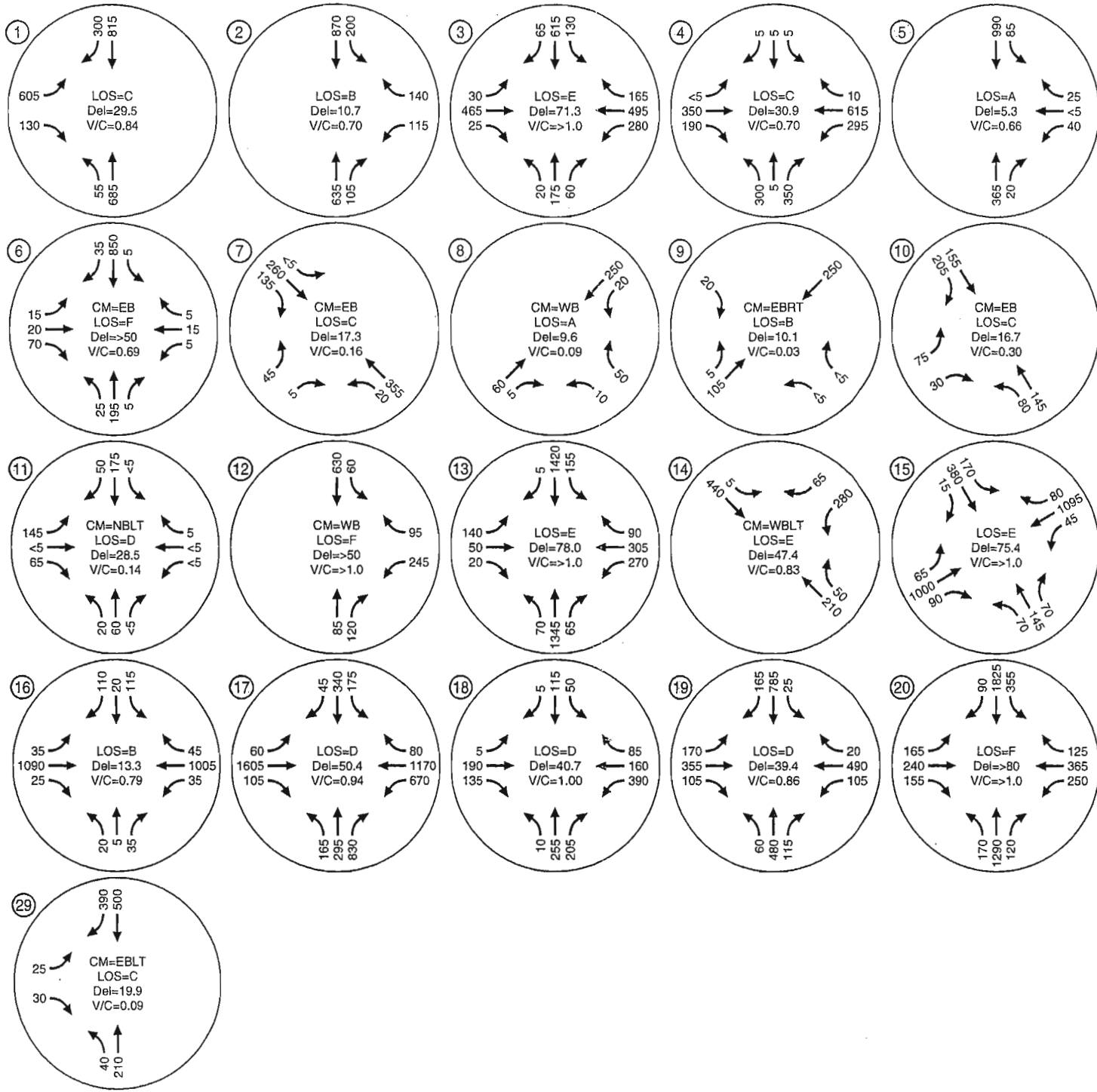
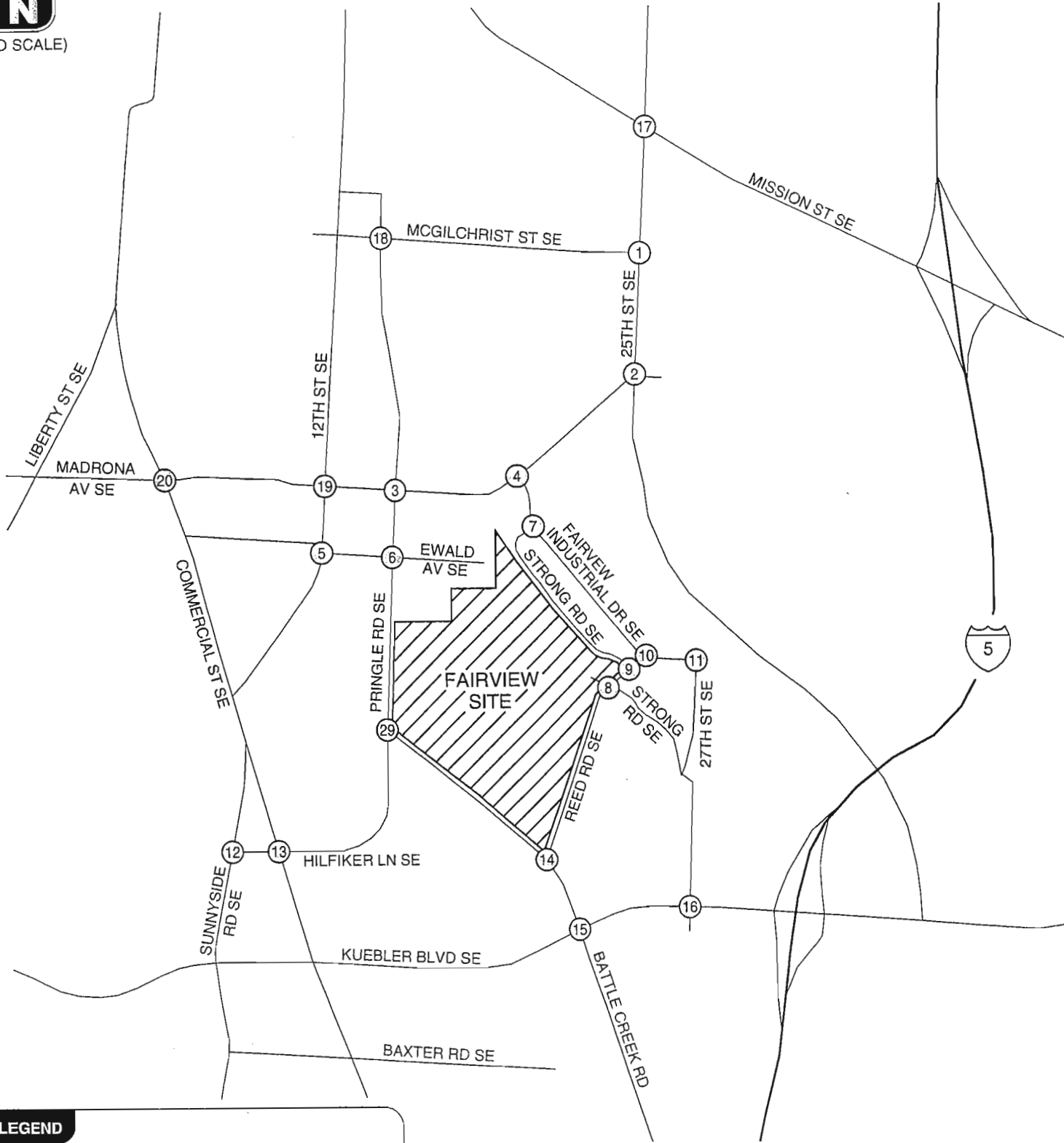
Del = INTERSECTION AVERAGE DELAY (SIGNALIZED) CRITICAL MOVEMENT DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2016 BACKGROUND TRAFFIC CONDITIONS (NO SITE)
WEEKDAY AM PEAK HOUR
SALEM, OREGON



(NO SCALE)



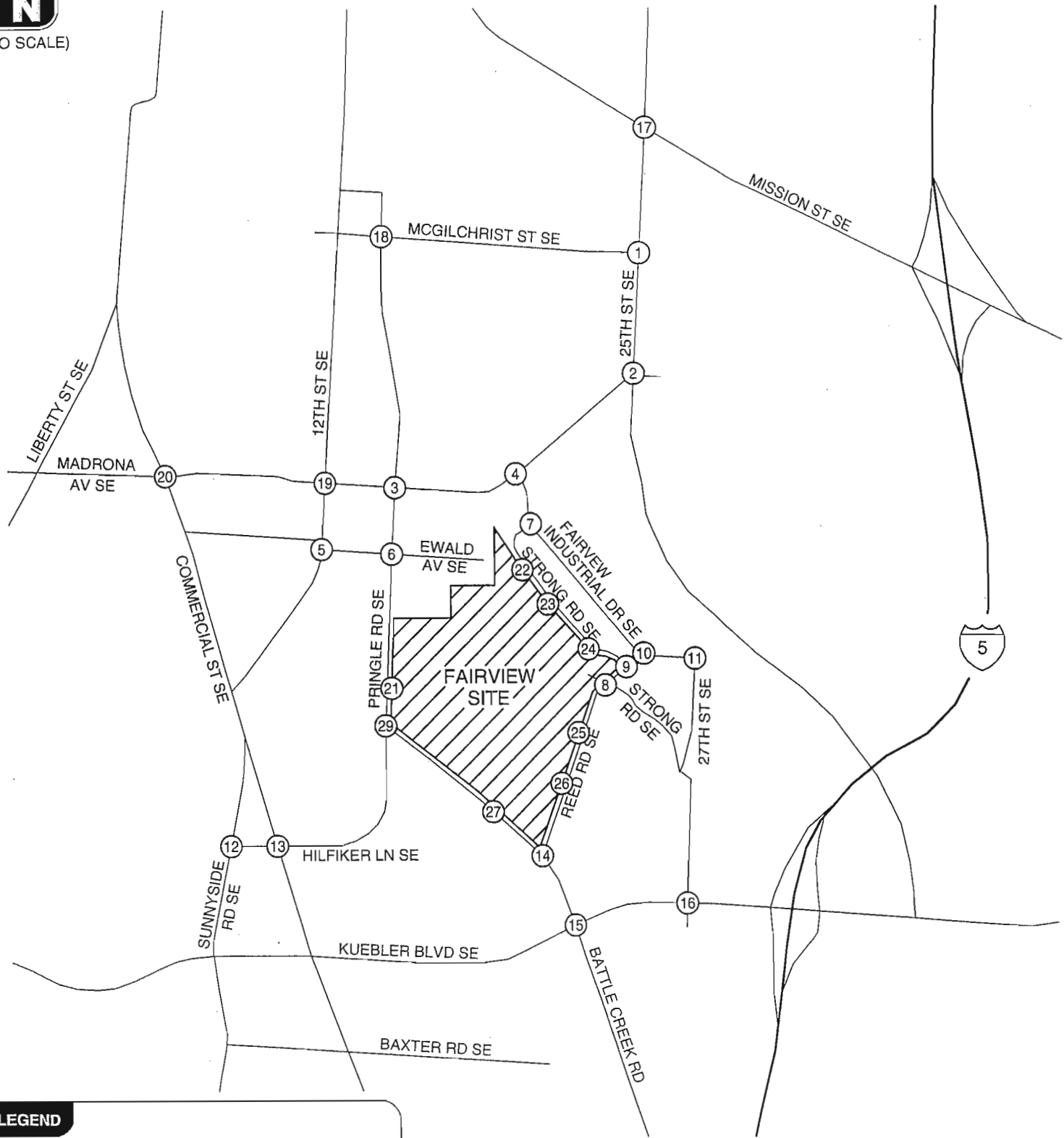
LEGEND

- # PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED
- CM = CRITICAL MOVEMENT (UNSIGNALIZED)
- LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED) CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
- Del = INTERSECTION AVERAGE DELAY (SIGNALIZED)/ CRITICAL MOVEMENT DELAY (UNSIGNALIZED)
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2016 BACKGROUND TRAFFIC CONDITIONS (NO SITE)
WEEKDAY PM PEAK HOUR
SALEM, OREGON

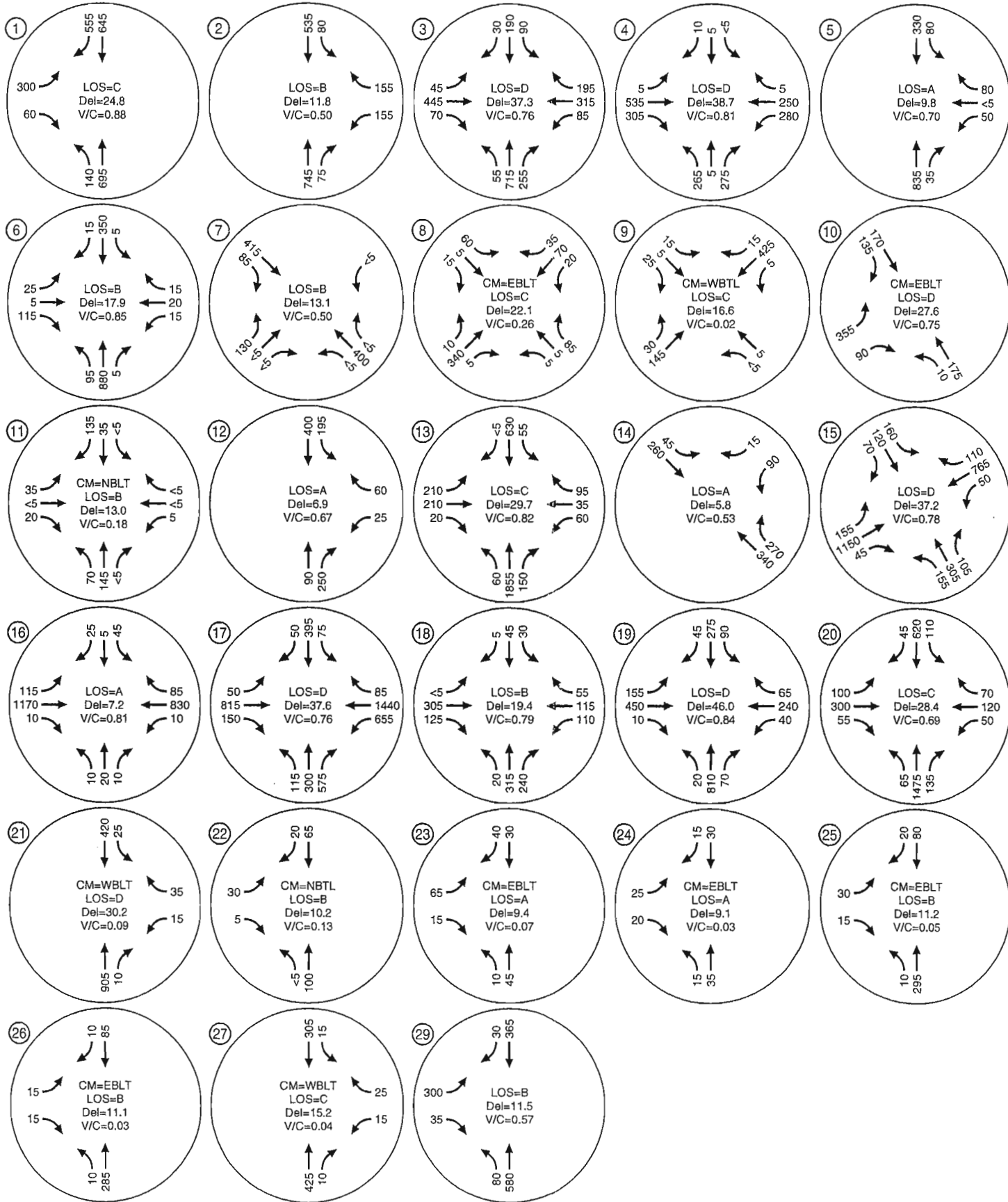


(NO SCALE)

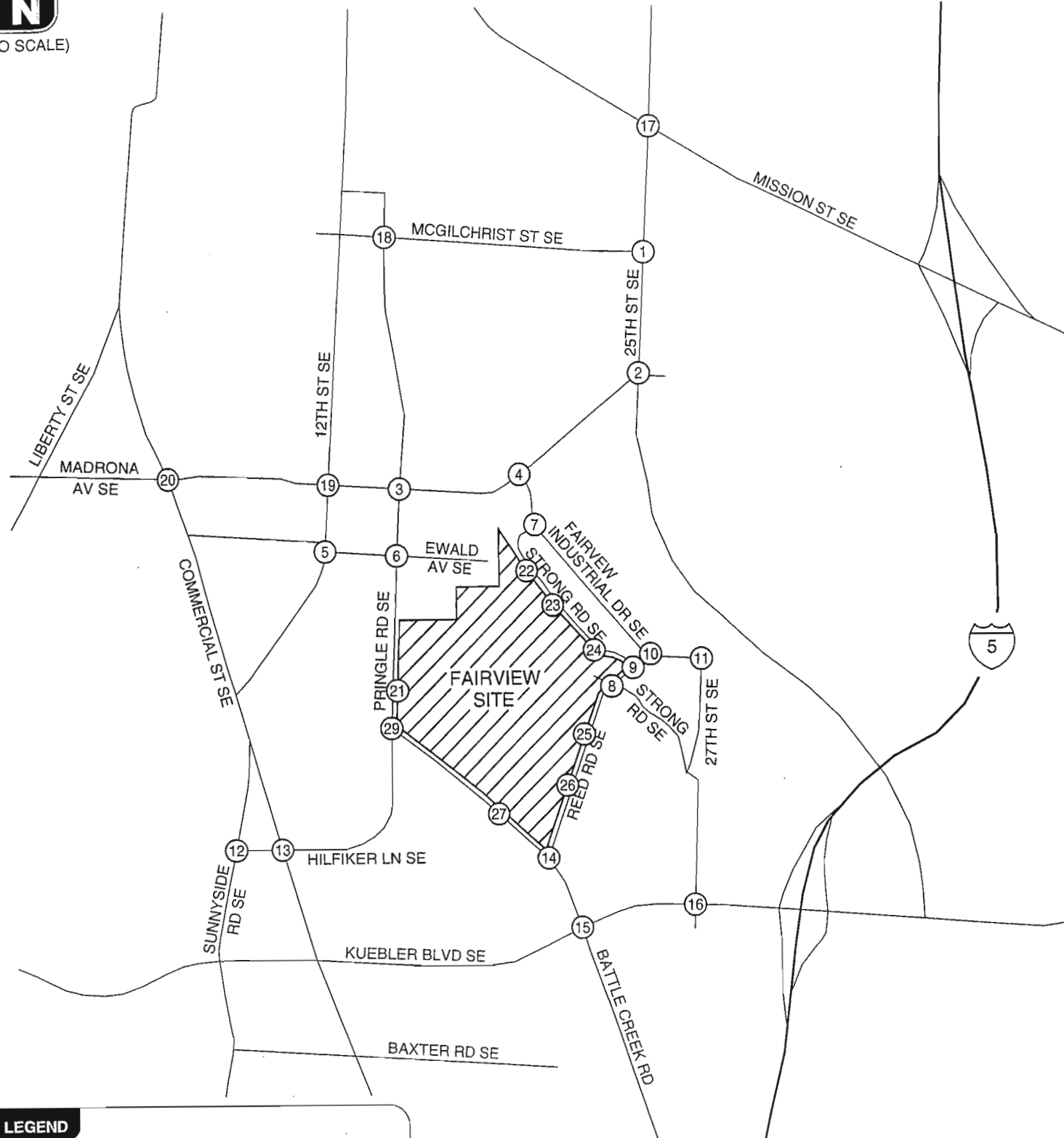


LEGEND

- # PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED
- CM = CRITICAL MOVEMENT (UNSIGNALIZED)
- LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED) CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
- Del = INTERSECTION AVERAGE DELAY (SIGNALIZED)/ CRITICAL MOVEMENT DELAY (UNSIGNALIZED)
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

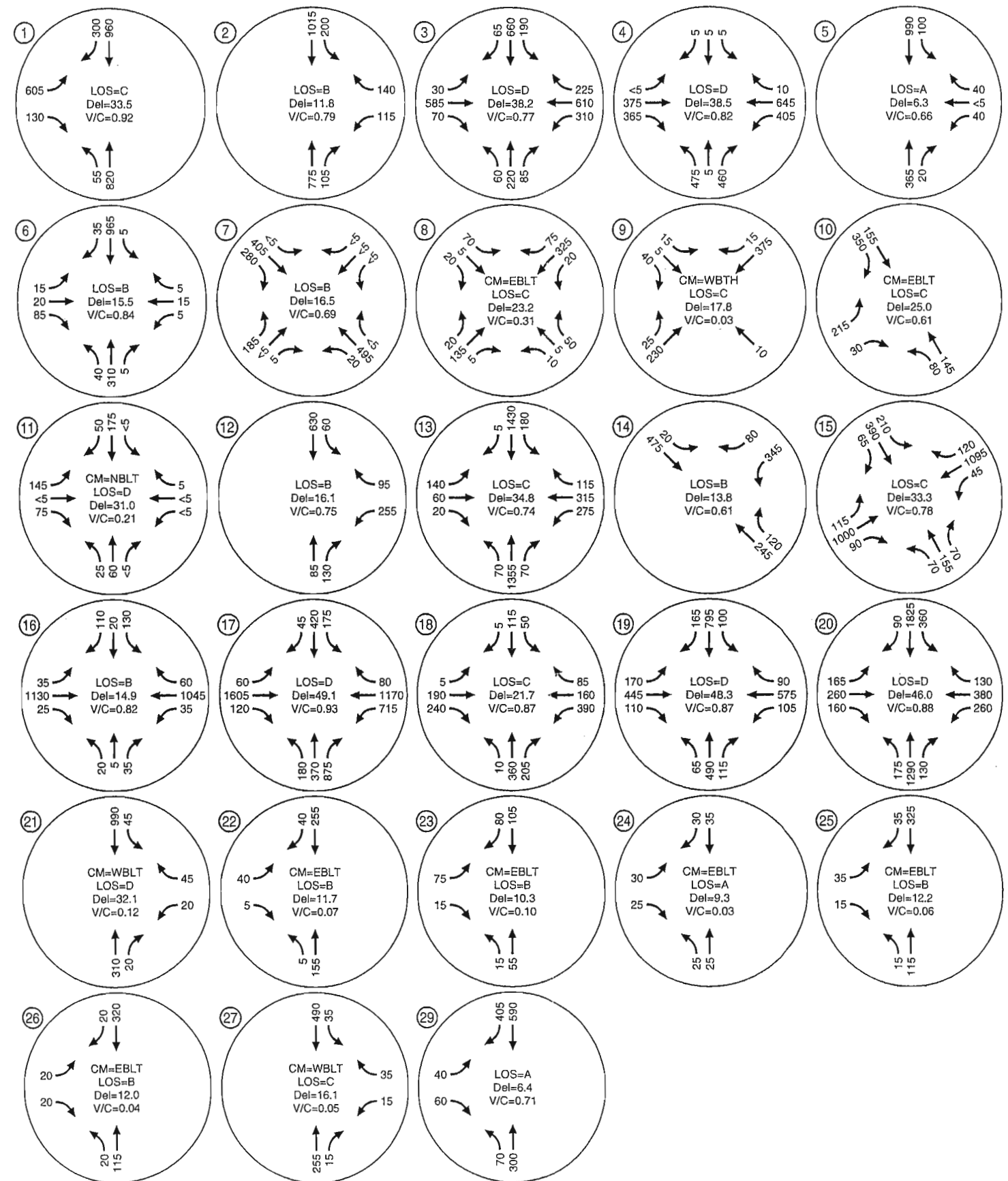


2016 BACKGROUND TRAFFIC CONDITIONS
WEEKDAY AM PEAK HOUR
SALEM, OREGON



LEGEND

- # PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED
- CM = CRITICAL MOVEMENT (UNSIGNALIZED)
- LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED) CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
- Del = INTERSECTION AVERAGE DELAY (SIGNALIZED)/ CRITICAL MOVEMENT DELAY (UNSIGNALIZED)
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO



2016 BACKGROUND TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
SALEM, OREGON

2016 PHASE 3 TOTAL TRAFFIC CONDITIONS

As shown in Table 5 under the third phase of the development, the site will generate 490 a.m. peak hour trips, of which 215 and 275 are inbound and outbound, respectively, and 745 p.m. peak hour trips of which 365 and 380 are inbound and outbound respectively. Figures 24 and 25 show the a.m. and p.m. peak hour site-generated traffic volumes for Phase 3 of the development. For reference only, Figure 26 and 27 show the a.m. and p.m. peak hour *total* (i.e. all three phases of development) site generated traffic volumes.

Level of Service Analysis

Figures 28 and 29 show the 2016 total development conditions a.m. and p.m. peak hour traffic volumes and the resulting level of service analyses. As shown in these figures, with the future Hilfiker Street SE extension, construction of previously identified improvements, and full development of Phase 3 all study intersections will operate acceptably, with the following exceptions:

- **25th Street SE/Mission Street SE -**
 - In addition to the other improvements previously identified, a southbound left-turn lane is required to achieve acceptable traffic operations.
- **Reed Road SE/Fairview Industrial Drive SE –**
 - Re-stripe the southbound approach to the intersection to include a separate right turn lane. Preliminary results of a traffic operations analysis indicate that a one lane roundabout would address traffic operating conditions at this location. Further review is required to assess whether there are any physical constraints to installing a roundabout at this location.

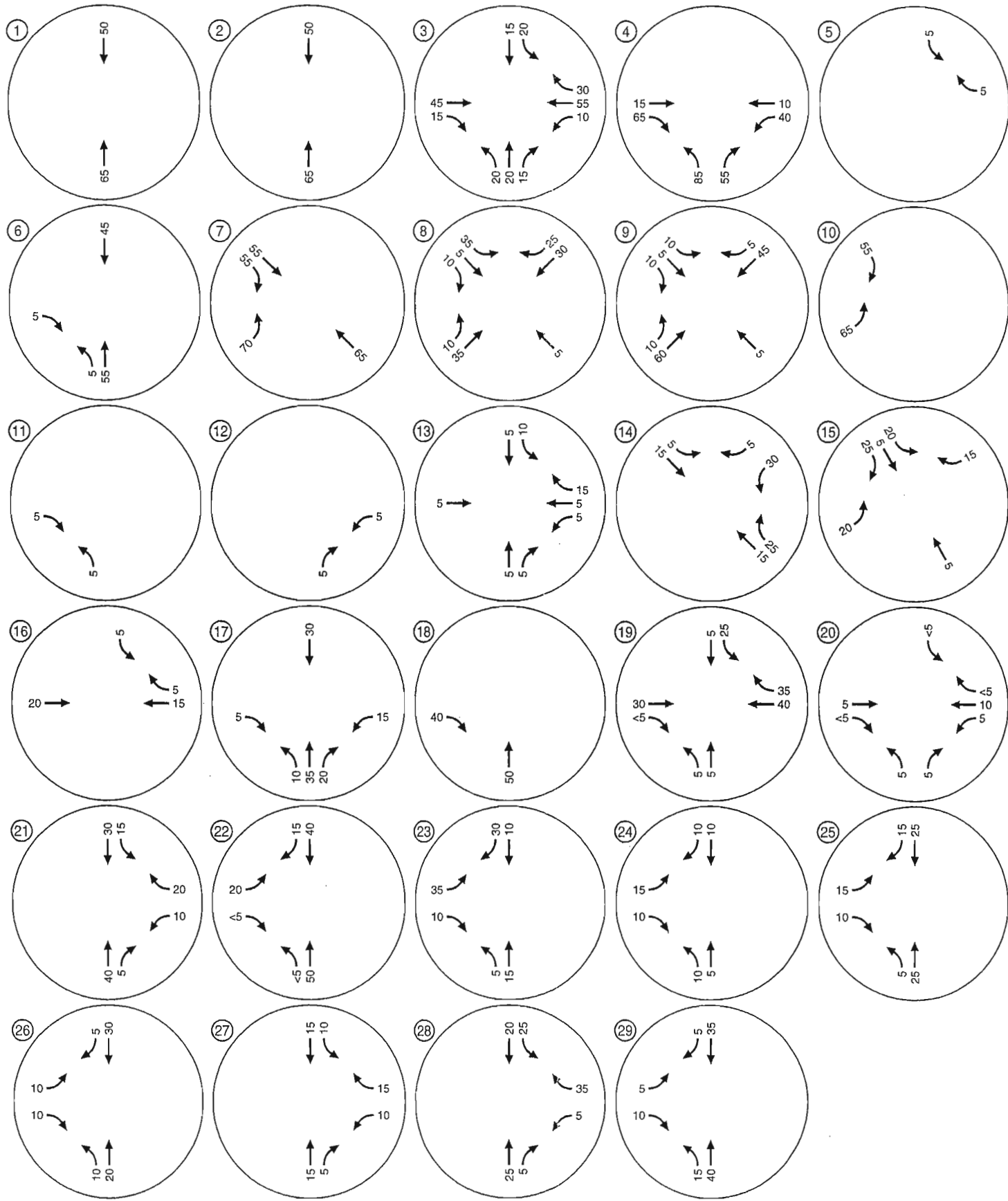
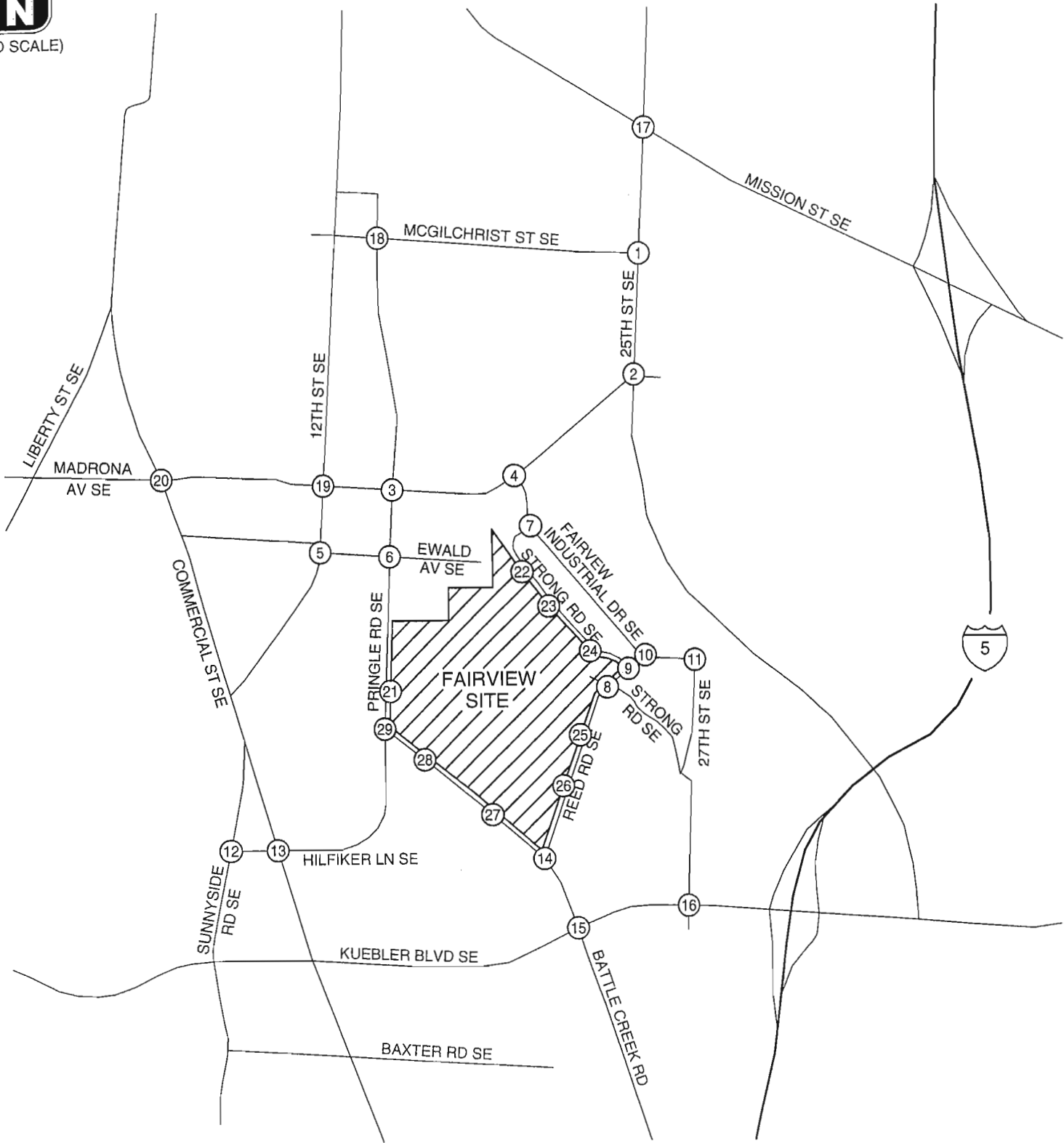
Appendix “S” and “T” respectively, include the unmitigated and mitigated traffic operations analysis worksheets for the 2016 total conditions.

SUMMARY OF IMPROVEMENTS

The improvements documented above have been presented by phase of development. Figure 30 shows, under the full build out condition, the improvements necessary to maintain acceptable traffic operating conditions at all of the study intersections; providing a system-wide view of the improvements necessary to allow development of the Sustainable Fairview Property and maintain the city’s level of service standard.



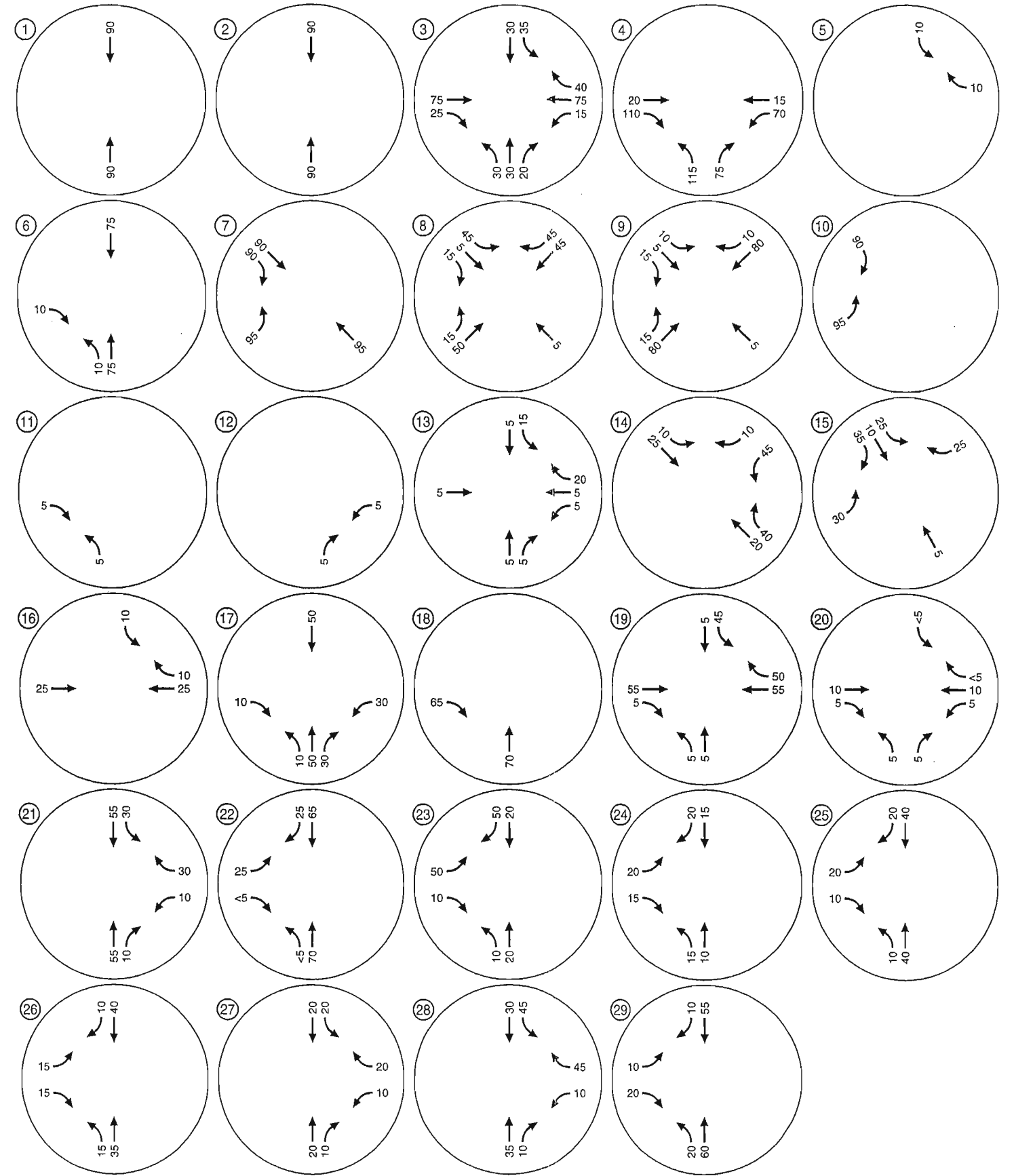
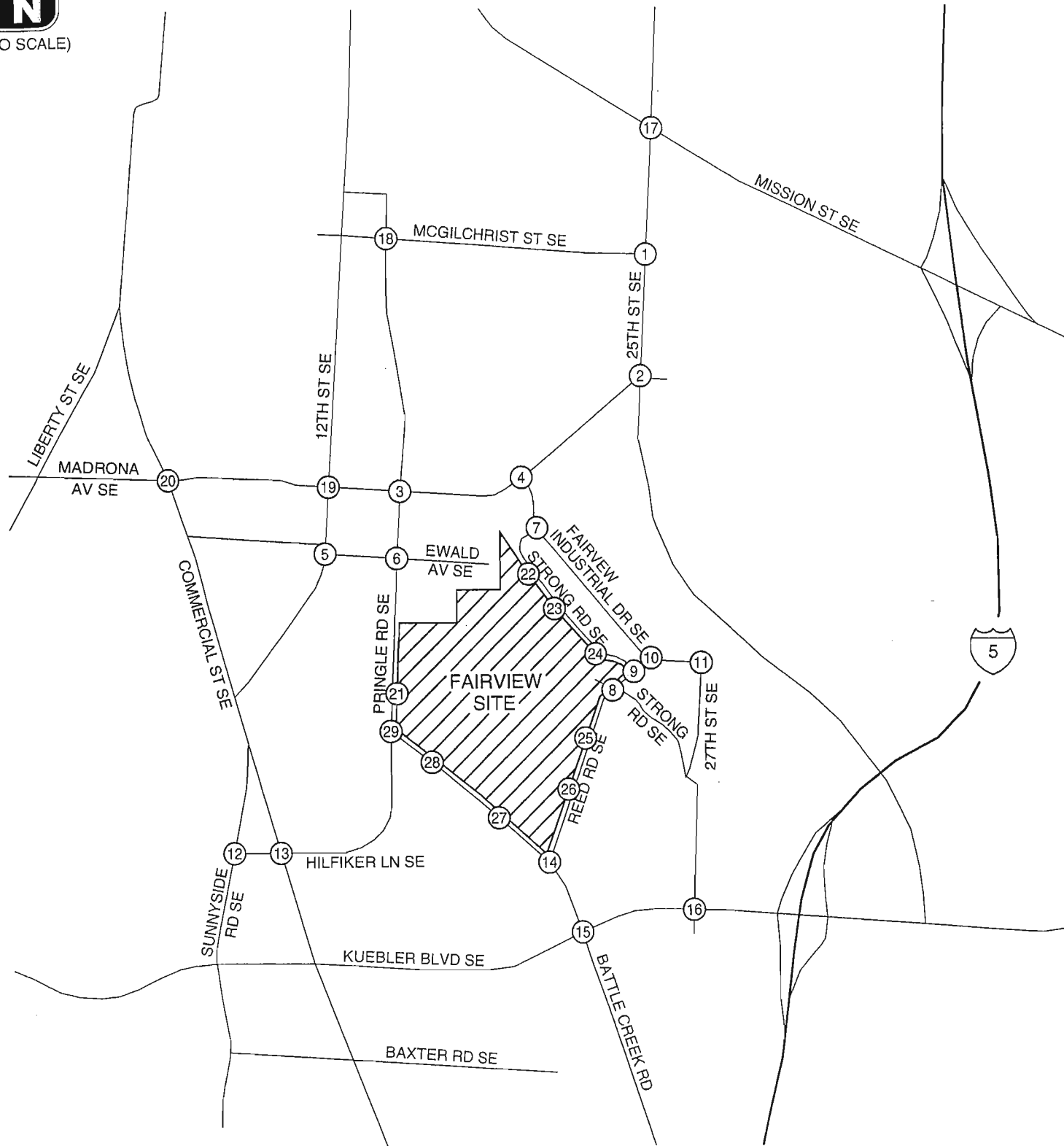
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PHASE 3 SITE-GENERATED TRAFFIC VOLUMES
WEEKDAY AM PEAK HOUR
SALEM, OREGON



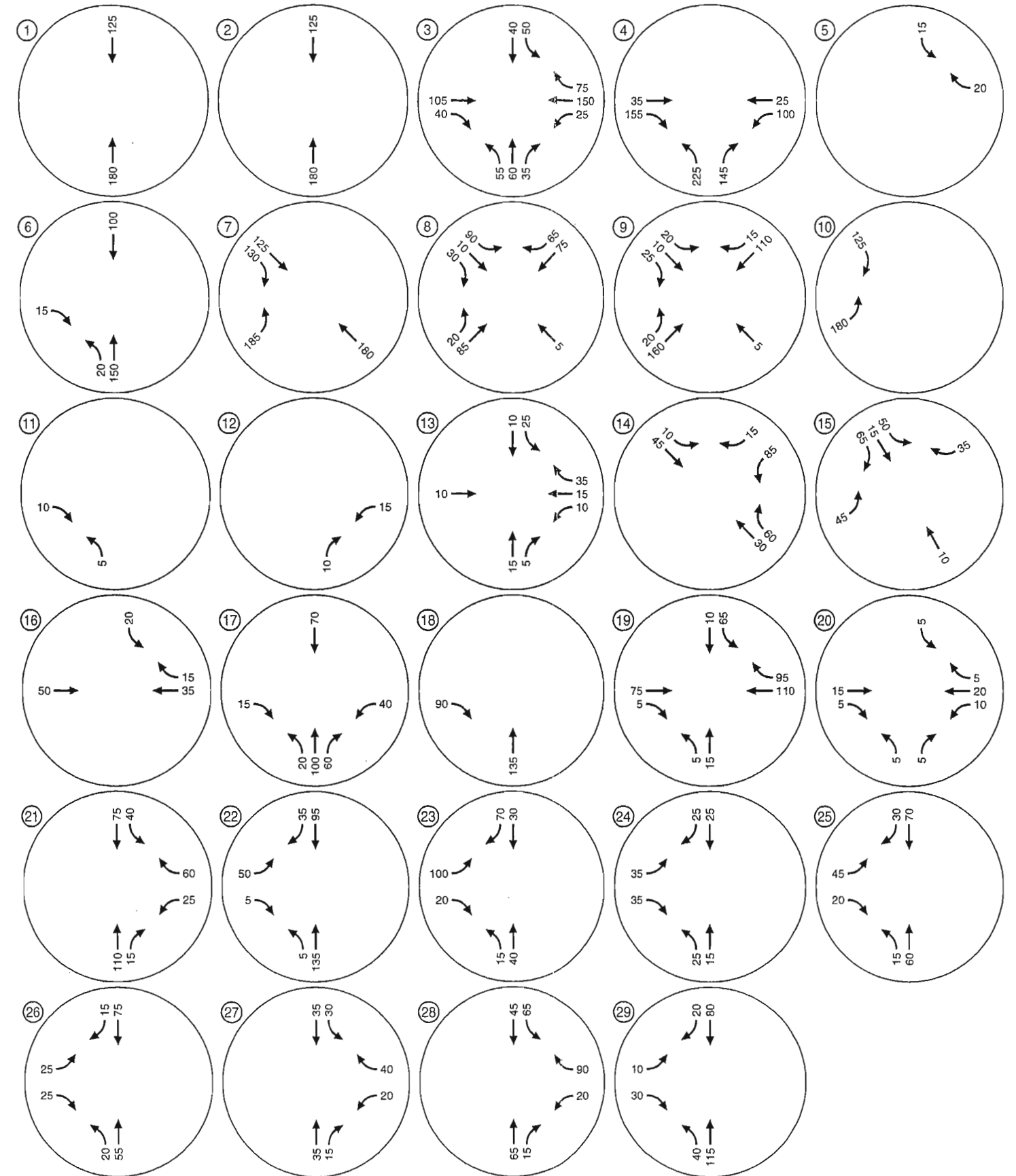
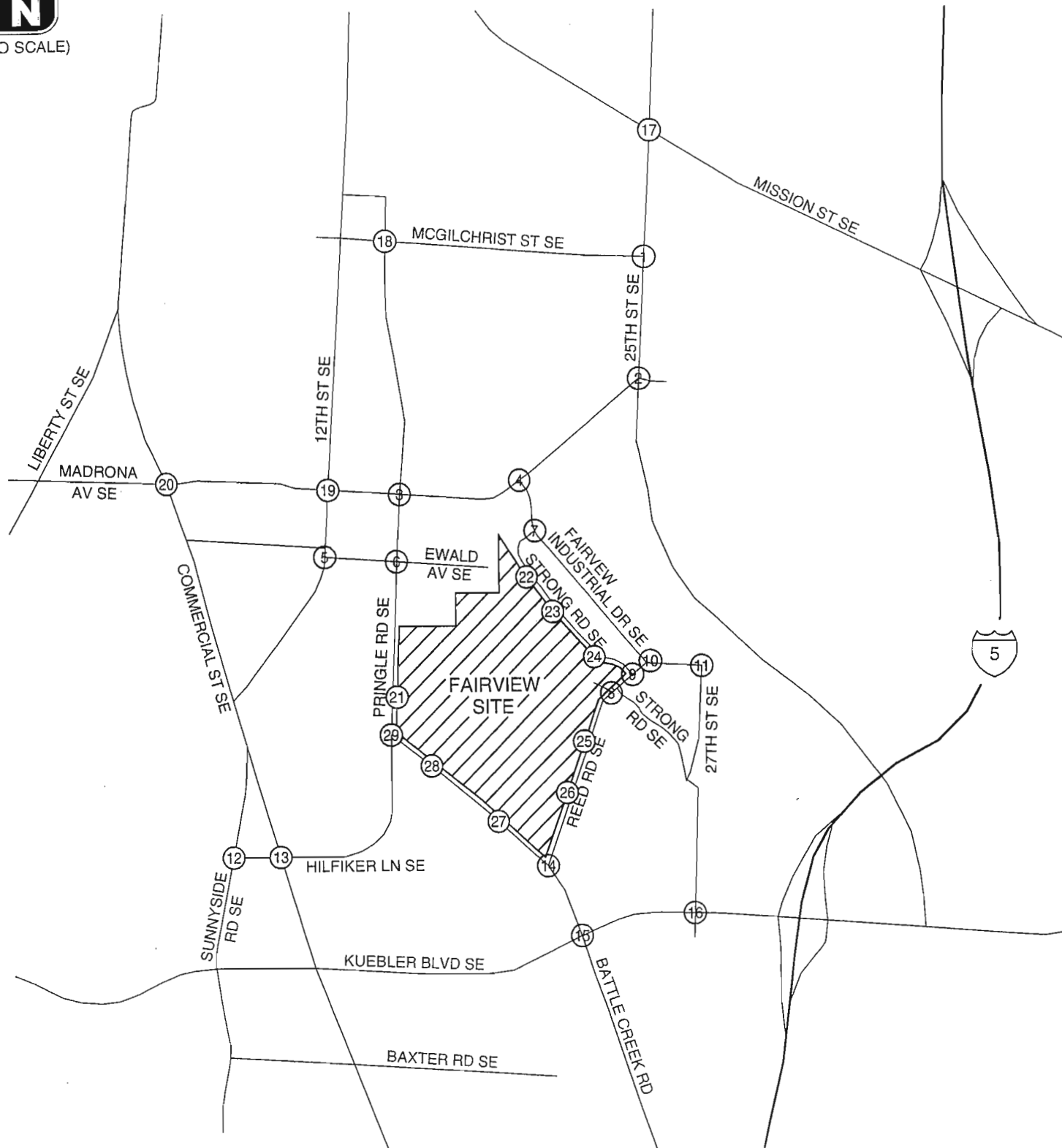
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PHASE 3 SITE-GENERATED TRAFFIC VOLUMES
WEEKDAY PM PEAK HOUR
SALEM, OREGON



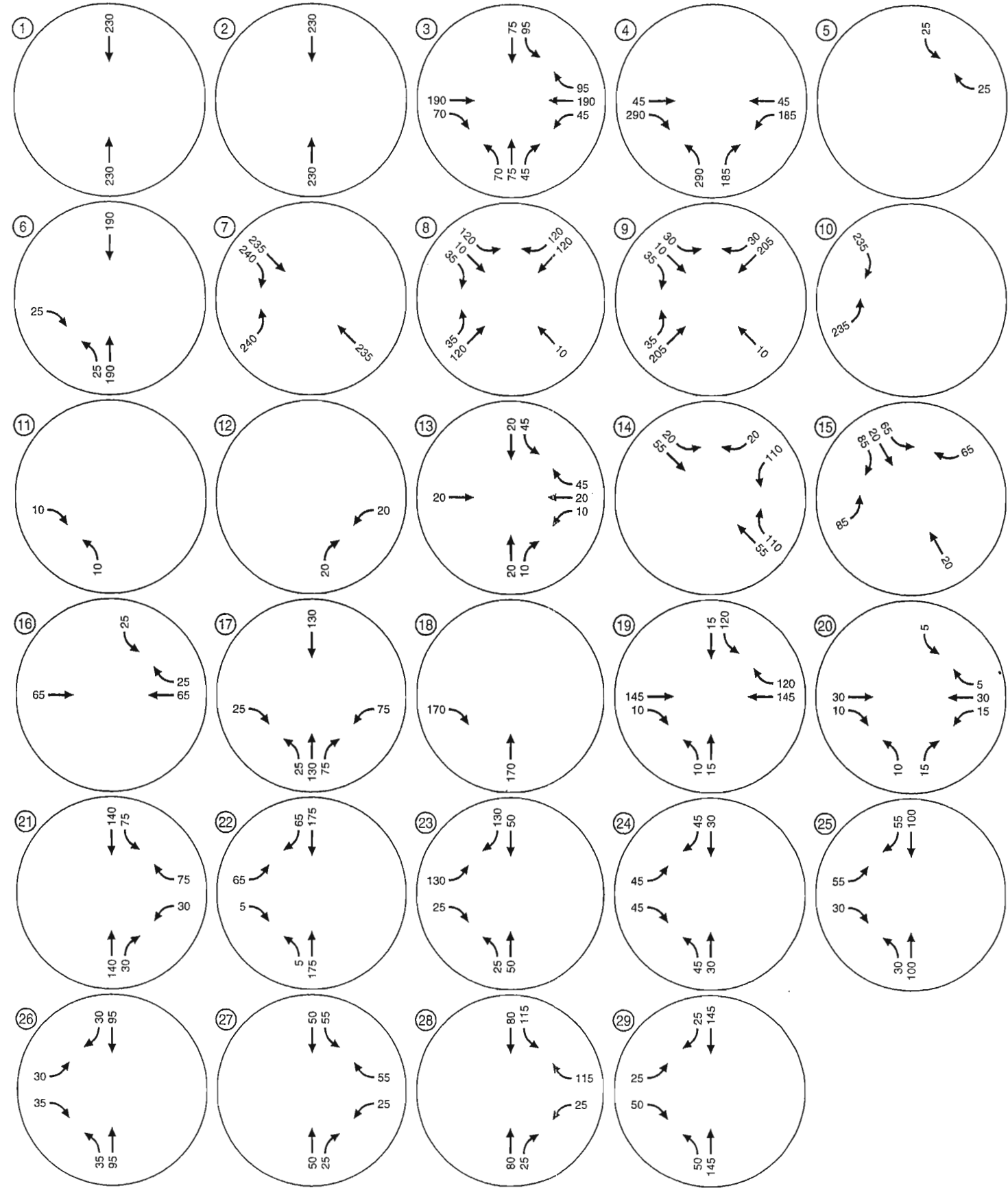
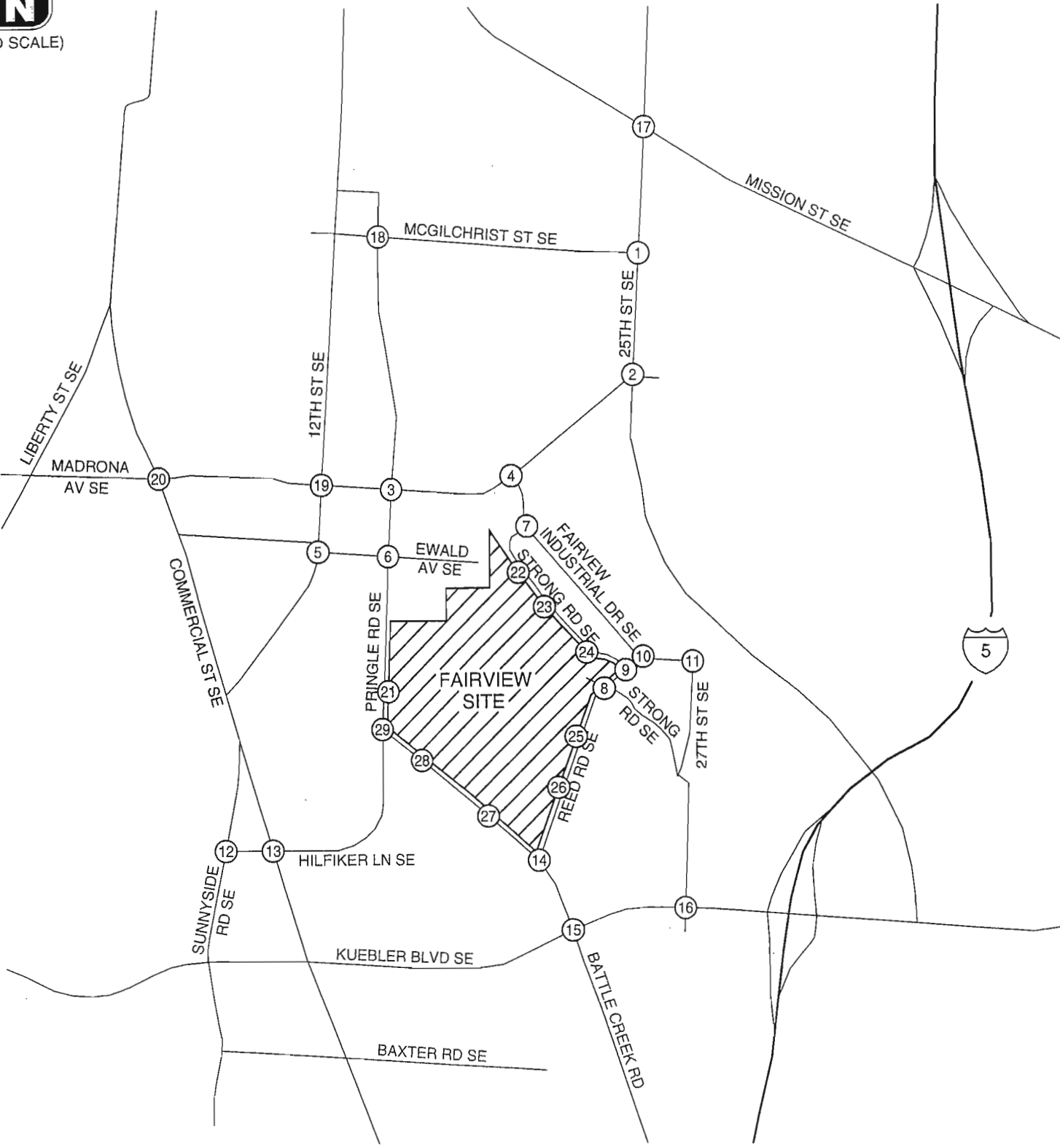
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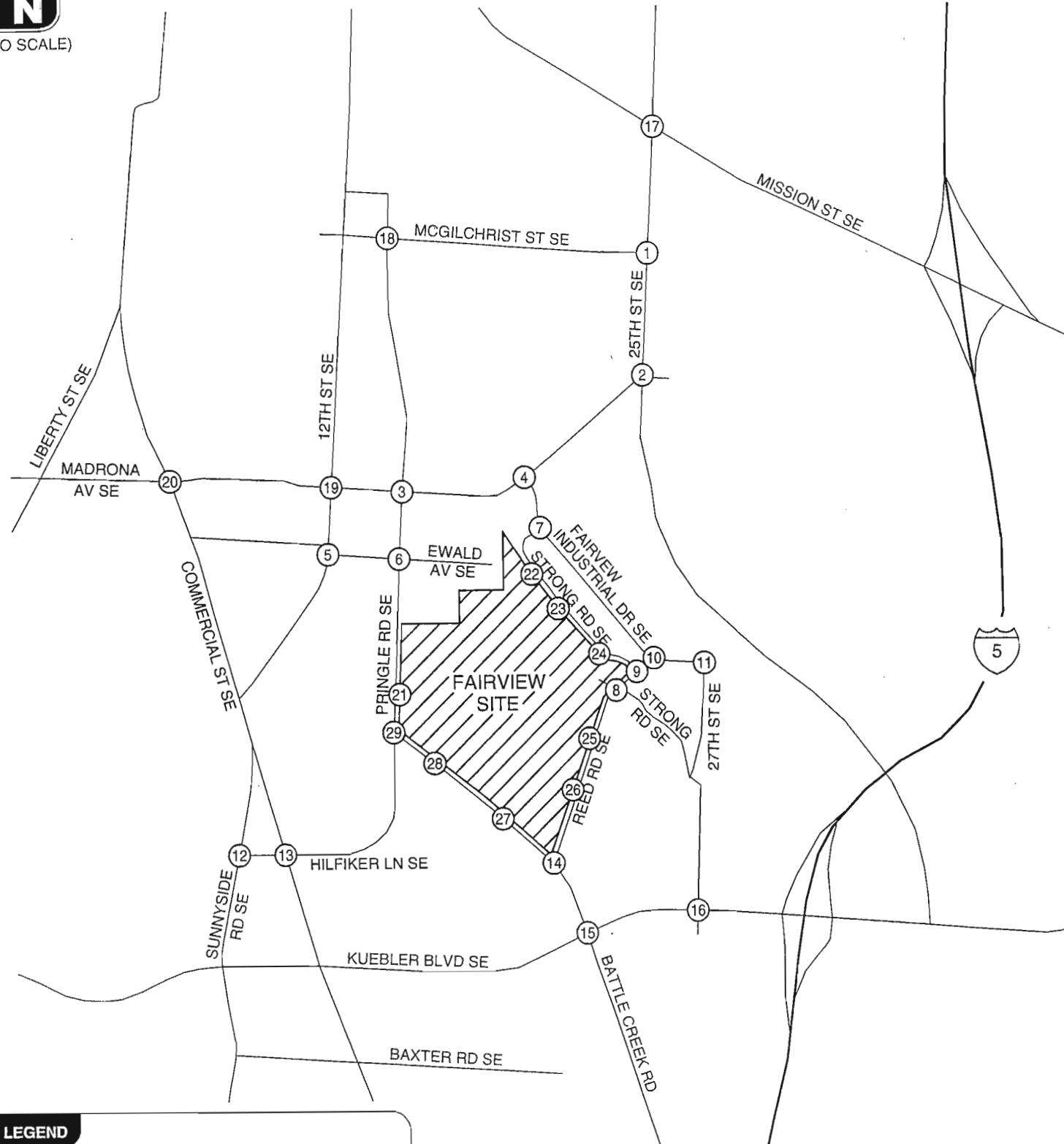
CUMULATIVE SITE-GENERATED TRAFFIC VOLUMES
WEEKDAY AM PEAK HOUR
SALEM, OREGON



(NO SCALE)



CUMULATIVE SITE-GENERATED TRAFFIC VOLUMES
WEEKDAY PM PEAK HOUR
SALEM, OREGON

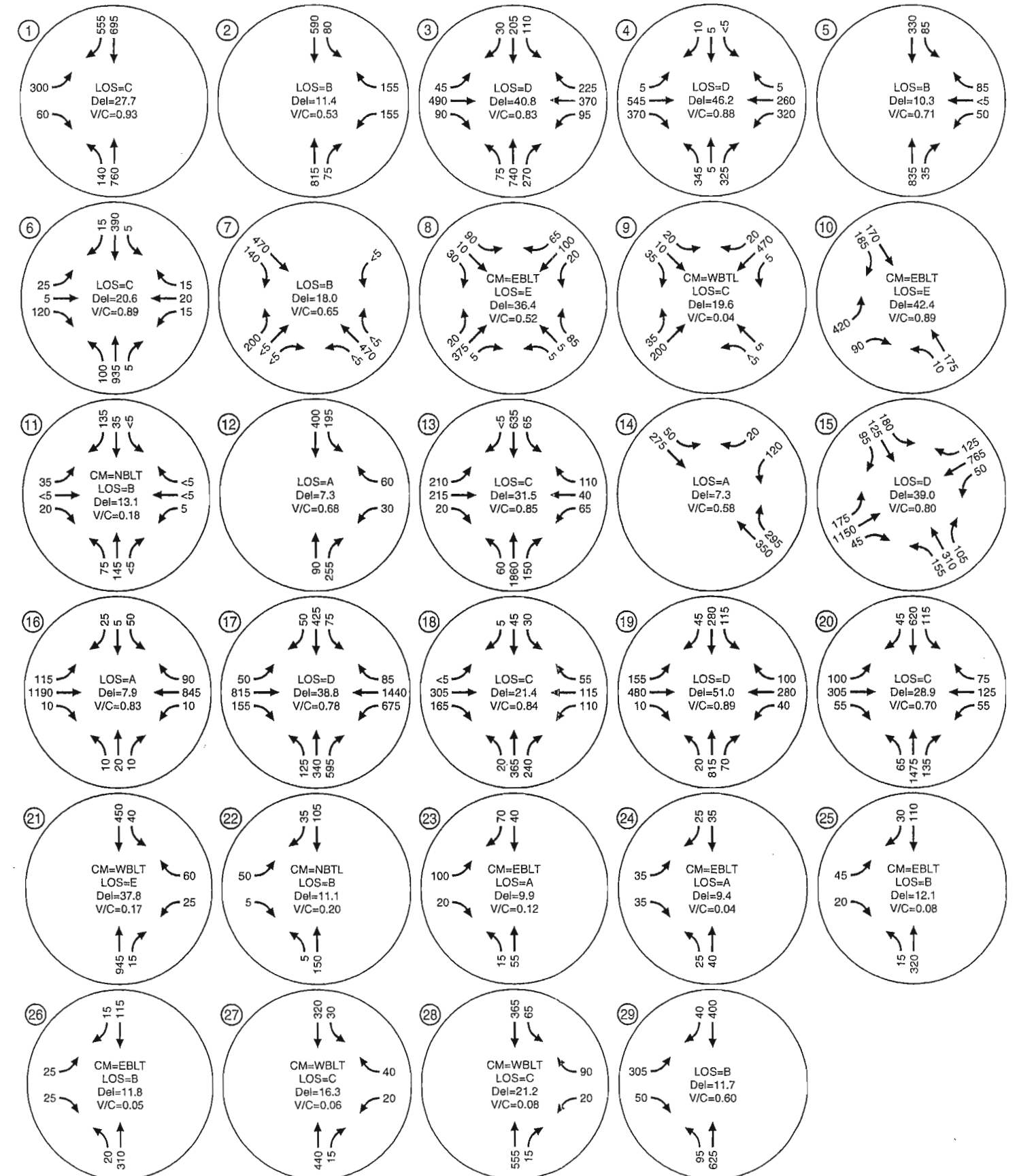
**LEGEND**

PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED

CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE
(SIGNALIZED) CRITICAL MOVEMENT LEVEL
OF SERVICE (UNSIGNALIZED)Del = INTERSECTION AVERAGE DELAY (SIGNALIZED)/
CRITICAL MOVEMENT DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO



2016 TOTAL TRAFFIC CONDITIONS
WEEKDAY AM PEAK HOUR
SALEM, OREGON

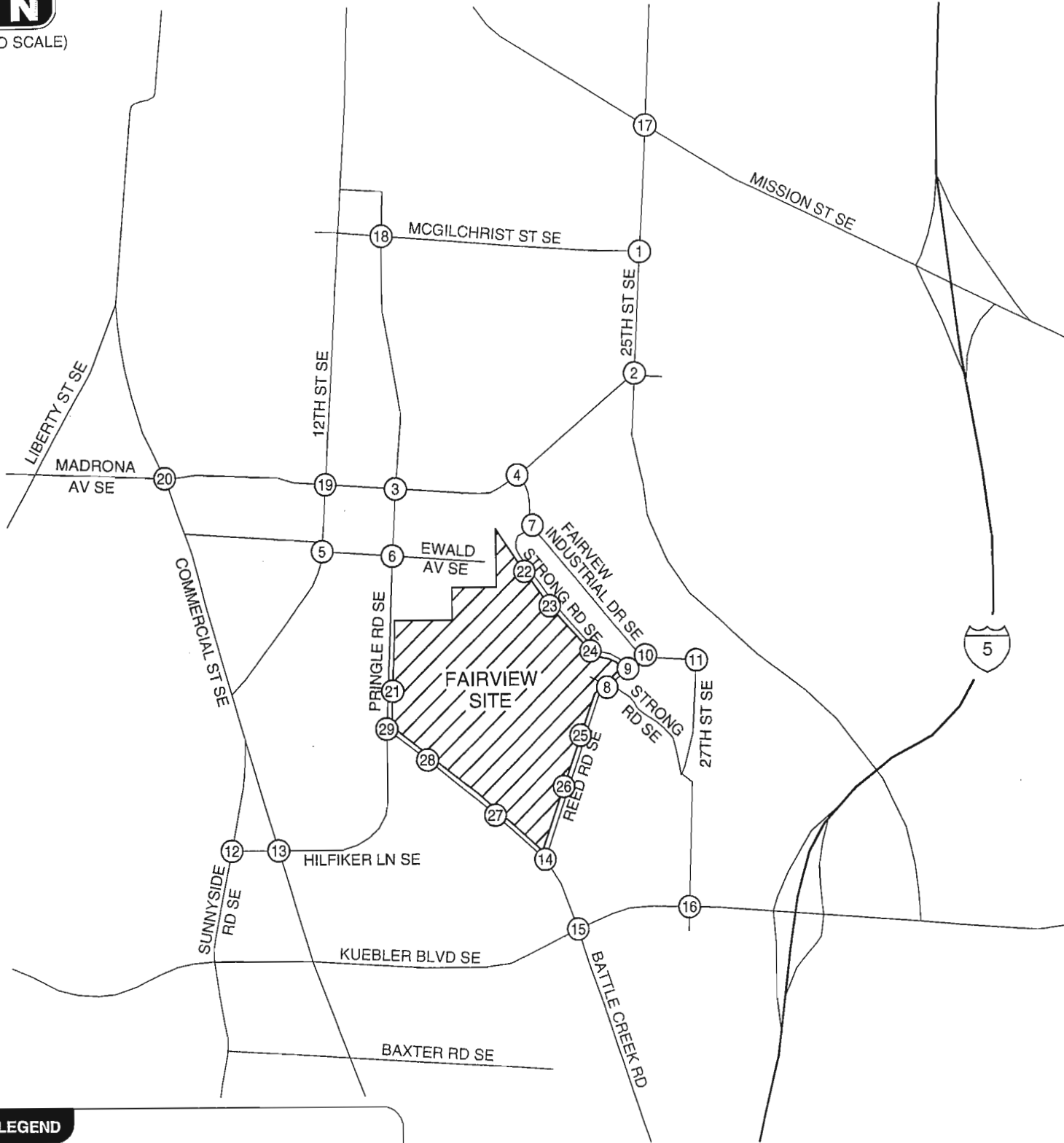
FIGURE

28

5622FIGS

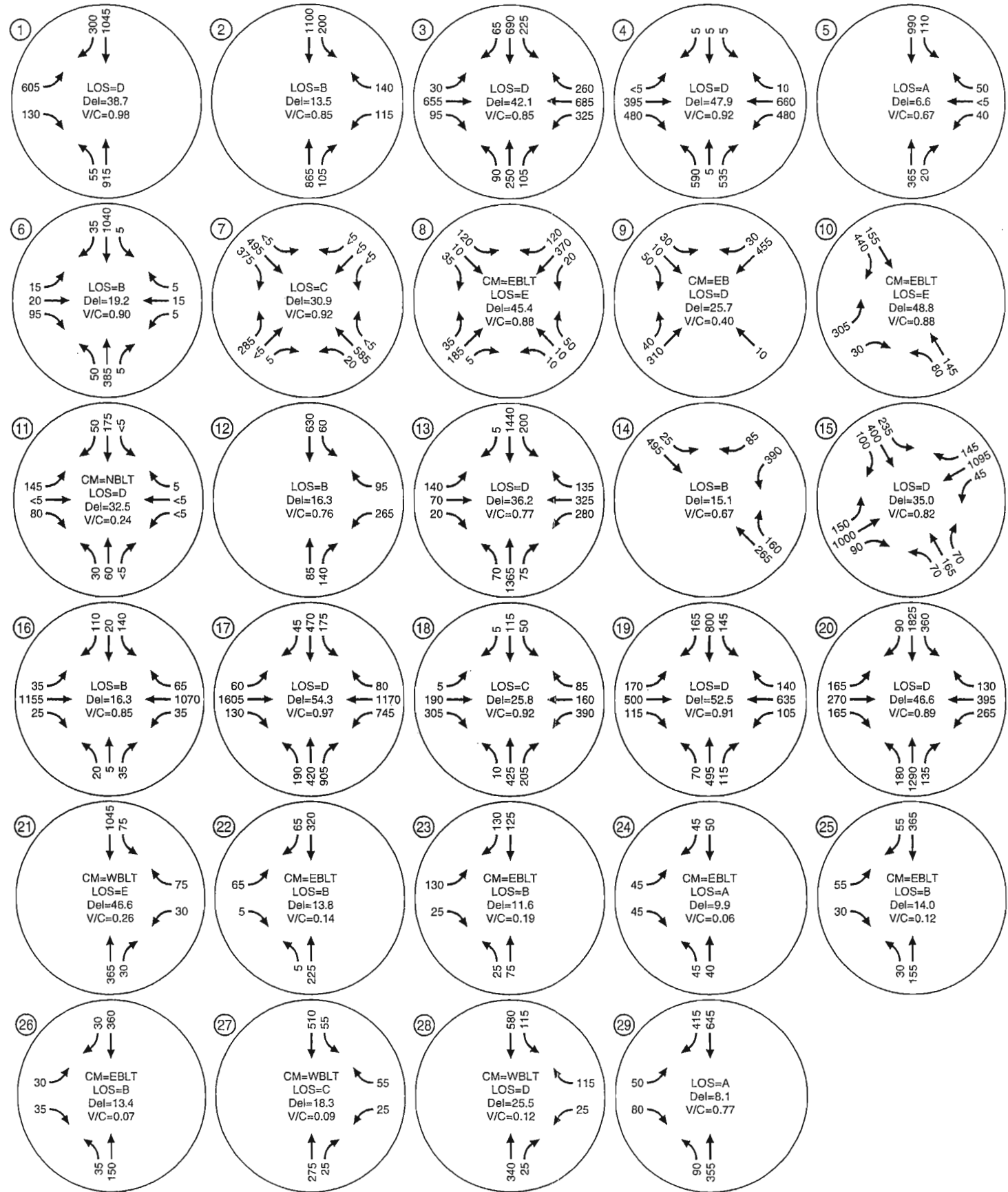


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LEGEND

- # PREVIOUS MITIGATION RECOMMENDATIONS INCLUDED
- CM = CRITICAL MOVEMENT (UNSIGNALIZED)
- LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED) CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
- Del = INTERSECTION AVERAGE DELAY (SIGNALIZED)/ CRITICAL MOVEMENT DELAY (UNSIGNALIZED)
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO



2016 TOTAL TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
SALEM, OREGON

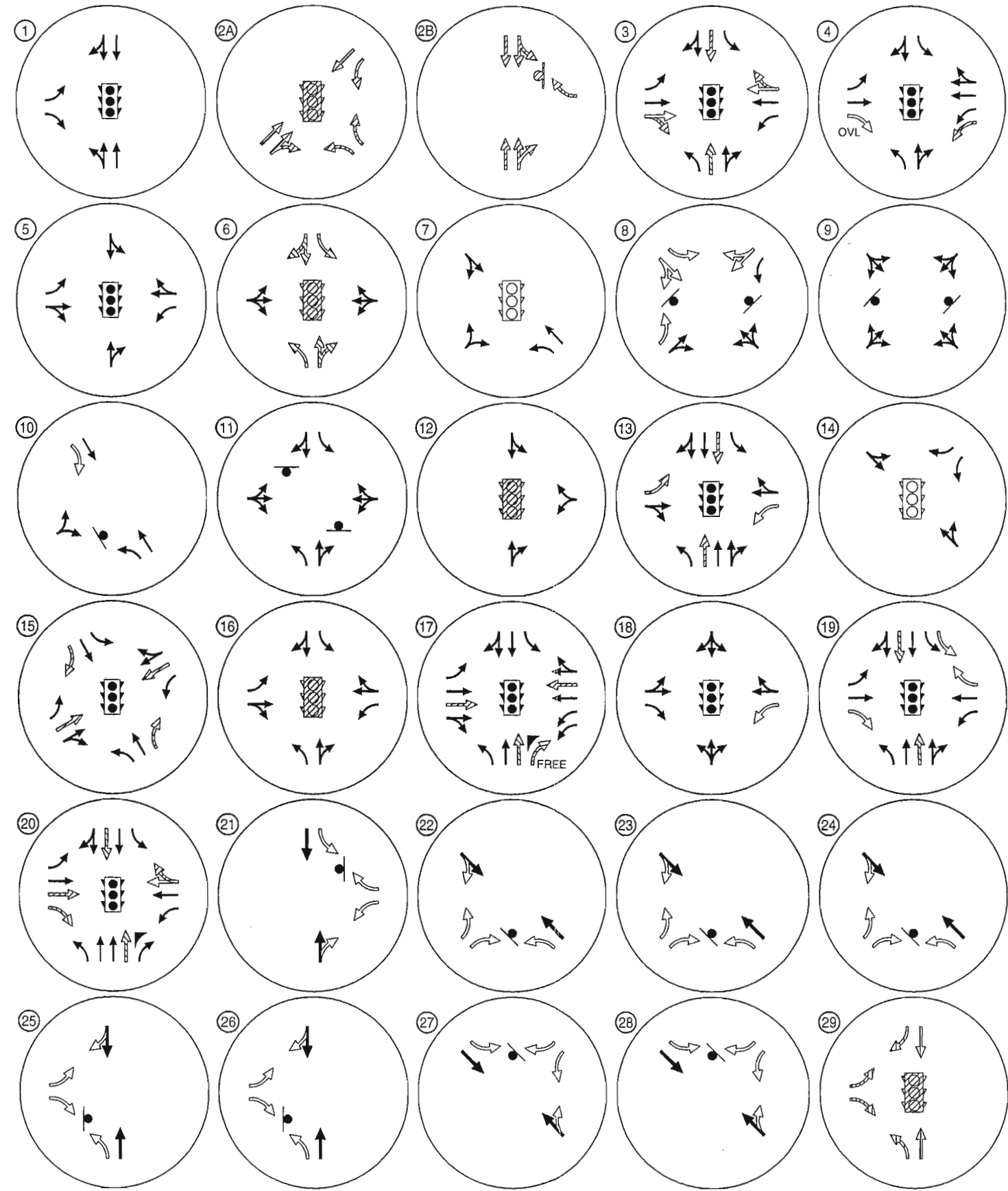
FIGURE

29



LEGEND

- STOP SIGN
- TRAFFIC SIGNAL
- CITY OF SALEM MITIGATION REQUIREMENT
- SITE DEVELOPMENT RELATED MITIGATION REQUIREMENT



RECOMMENDED TRANSPORTATION SYSTEM
IMPROVEMENTS SUMMARY
SALEM, OREGON

Section 5

Conclusions and Recommendations

Conclusions and Recommendations

With the roadway capacity improvements identified in Figure 30, the proposed Sustainable Fairview Development Plan can be achieved while maintaining acceptable levels of service and safety on the surrounding roadway network. The following findings and recommendations were determined through the operational analysis presented in this report.

EXISTING CONDITIONS

- The 25th Street SE/Madrona Avenue SE intersection should be realigned according to the CIP and signalized;
- The 27th Street SE/Kuebler Boulevard intersection should be signalized; and according to the CIP
- The Battle Creek Road SE/Kuebler Boulevard intersection should have southbound and northbound right-turn lanes added under existing conditions. In addition, protected/permitted signal heads should be added to all intersection approaches, consistent with the CIP.

PROPOSED DEVELOPMENT

- At full build-out the proposed Sustainable Fairview Development will generate approximately 17,070 net new daily trip ends, of which approximately 1,160 trip ends will occur during the weekday a.m. peak hour and 1,770 trip ends will occur during the p.m. peak hour.
- The development will be conducted in three phases as follows:
 - 2008 Phase 1 will generate approximately 5,090 net new daily trip ends, of which approximately 330 trip ends will occur during the weekday a.m. peak hour and 530 trip ends will occur during the p.m. peak hour.
 - 2012 Phase 2 will generate approximately 6,140 net new daily trip ends, of which approximately 430 trip ends will occur during the weekday a.m. peak hour and 635 trip ends will occur during the p.m. peak hour.
 - 2016 Phase 3 will generate approximately 7,175 net new daily trip ends, of which approximately 490 trip ends will occur during the weekday a.m. peak hour and 745 trip ends will occur during the p.m. peak hour.
- Access to the overall site is proposed from the four bounding roadways; Battle Creek Road SE, Reed Road SE, Strong Road SE, and Pringle Road SE.

BACKGROUND CONDITIONS

By Phase, the following transportation system improvements are required as part of the background conditions analysis:

2008 Phase 1 Background Conditions

- **Commercial Street SE/Madrona Avenue SE –**
 - Acceptable traffic operations can be achieved at this intersection by adding an eastbound right turn lane on Madrona Avenue SE.

- **12th Street SE/Madrona Avenue SE -**
 - Acceptable traffic operations can be achieved at this intersection by adding an additional northbound and southbound through lane on 12th Street.
- **25th Street SE/Mission Street SE –**
 - Acceptable traffic operations can be achieved at this intersection by adding an additional eastbound and westbound through lane.

2012 Phase 1 Background Conditions

- **Commercial Street SE/Madrona Avenue SE -**
 - Acceptable traffic operations can be achieved at this intersection by adding an additional eastbound and westbound through lane in addition to the mitigations identified in the 2008 development scenario.
- **McGilchrist Street SE/Pringle Road SE –**
 - Acceptable traffic operations can be achieved at this intersection by adding a westbound left turn lane.
- **Battle Creek Road SE/Kuebler Road SE –**
 - This intersection does meet the City's level of service standard for unsignalized intersections; however in the 2012 background scenario it would be operating over capacity. This condition can be mitigated by adding separate eastbound and westbound through lanes.
- **Madrona Avenue SE/Fairview Industrial Drive SE –**
 - Acceptable traffic operations can be achieved at this intersection by adding a second westbound left-turn lane.

2016 Phase 1 Background Conditions

- **Madrona Avenue SE/Pringle Road SE-**
 - Acceptable traffic operations can be achieved at this intersection by adding additional eastbound and westbound through lanes.
- **Commercial Street SE/Hilfiker Lane SE –**
 - Acceptable traffic operations can be achieved at this intersection by adding an additional through lane in the northbound and southbound direction and by adding separate left turn lanes at the eastbound and westbound approach to the intersection.
- **Sunnyside Road SE/Hilfiker Lane SE –**
 - To meet the City's level of service standard a traffic signal would be required at this intersection.
- **Commercial Street SE/Madrona Avenue SE –**
 - In addition to the modifications identified in the 2012 background scenario, it will also be necessary to add an additional northbound and southbound through lane on Commercial Street.

- **25th Street SE/Mission Street SE -**
 - A northbound left turn lane is required to achieve acceptable traffic operating conditions in this scenario.
- **Pringle Road SE/Ewald Avenue SE –**
 - A traffic signal is required to improve traffic operations to the City's level of service standard.
- **Pringle Road SE/Hilfiker Lane SE -**
 - A traffic signal is required to improve traffic operations to the City's level of service standard.

DEVELOPMENT IMPACTS

The following impacts are required with each phase of development:

2008 Phase 1 Total Conditions

- **Commercial Street SE/Madrona Avenue SE**
 - To achieve acceptable traffic operations with development of the site it is necessary to add a westbound right turn lane.

2012 Phase 1 Total Conditions

- **12th Avenue SE/Madrona Avenue SE –**
 - In addition to the mitigations identified in the 2008 background conditions, to achieve acceptable traffic operations through Phase 2 of the development, it will be necessary to also add separate eastbound and westbound right-turn lanes
- **Madrona Avenue SE/Fairview Industrial Drive SE -**
 - Convert the northbound and southbound approaches to the intersection to protected signal phasing; convert the eastbound approach lane configuration to one left-turn, one through-lane and one right-turn lane and add overlap phasing for the right-turn.
- **Strong Road SE/Fairview Industrial Road SE –**
 - Add a traffic signal.
- **Battle Creek Road SE/Reed Road SE –**
 - Add a traffic signal. A preliminary analysis indicates that from an operational perspective a roundabout may work at this location. Subject to level of interest, additional analyses should be conducted to assess the physical feasibility of installing a roundabout at this location.

2016 Phase 1 Total Conditions

- **25th Street SE/Mission Street SE -**
 - In addition to the other improvements previously identified, a southbound left-turn lane is required to achieve acceptable traffic operations.
- **Reed Road SE/Fairview Industrial Drive SE –**

- Re-stripe the southbound approach to the intersection to include a separate right turn lane. Preliminary results of a traffic operations analysis indicate that a one lane roundabout would address traffic operating conditions at this location. Further review is required to assess whether there are any physical constraints to installing a roundabout at this location.

All of these improvements have been identified and summarized by phase of development. In many cases the same intersection requires different improvements as part of different phases of the development or growth in background traffic. In reality, in order to maximize construction spending and minimize public disruption, the improvements would likely be built all at once and at the earliest phase they are required.

Section 6

References

References

1. Cherriots Salem Area Transit, <http://www.cherriots.org>.
2. Transportation Research Board, *Highway Capacity Manual*, 2000.
3. Institute of Transportation Engineers. *ITE Trip Generation Manual, Seventh Edition*. 2003.
4. Institute of Transportation Engineers. *Trip Generation Handbook*. 1998