Appendix J:
TRAFFIC ANALYSIS

Airport Master Plan Update

Aurora State Airport

Appendix J
TRAFFIC ANALYSIS

Contents

- Email memo from Don Crownover, ODOT, 11/15/10
- Transportation Development Division, TSM Unit, Aurora Airport Data Sheets
- Marion County, AADT data sheets
- Clackamas County, AADT data sheets
- Marion County, Rural road functional classification
- Marion County, Average daily traffic volume
- Marion County, Rural road functional classification characteristics
- Clackamas County, Functional classification guidelines
- Clackamas County, Access management plan, Appendix F
- Helicopter Transport Services, Transportation Impact Study excerpts, Mackenzie Group (2009)
- Fred Meyer, Transportation Impact Study excerpts, DKS associates (2008)

Anderson, Rainse

From: CROWNOVER Don R [Don.R.CROWNOVER@odot.state.or.us]
Sent: Wednesday, November 03, 2010 4:31 PM
To: Anderson, Rainse; CUMMINGS Christopher * ODA; WILSON John P * ODA
Subject: RE: Aurora airport counts [auto-ip][senderbase]

All; I applied factors to the counts to estimate a annual average daily traffic (AADT) at the sites. These should be taken with a great plus or minus. The AADT is derived by multiplying the count ADT by a seasonal factor by an axle factor. The count ADT is just the average from the seven days it was counted. The seasonal factor is just an adjustment based on our nearby Hubbard automatic traffic recorder (ATR) that is a ratio of that count week to the year (in this case a rolling year from Nov 2009 to Oct 2010, because 2010 is not yet complete. That factor was 0.97. The axle factor adjusts for the fact that the counter just sees every two axles as a vehicle. Since there were few trailers that we saw, I just applied an axle factor of 0.99. Since all that is such a long shot, I also rounded as much as I could get away with. The chart below presents the sites in clockwise order around the airport. If you have any questions, please let me know. Don

Site ID	Description	Count ADT	Estimated Annual ADT	Peak Hour
21127	Columbia North Exit	106	100	37
21165	Columbia North Entrance	142	140	50
21157	Columbia East Entrance	926	890	396
21187	Willamette Aviation	165	160	36
21122	Orange Entrance	75	70	15
21114	Blue Entrance	170	160	30
21160	Green Entrance	145	140	29
21159	Purple Entrance	137	130	33
21168	Yellow Entrance	306	290	39
21105	Van's Entrance	142	140	59
21119	Red Entrance	185	180	33
			2400	

Columbia (3) - 1130
Airport (8) - 1270
2400

HTS - keilrd 211
Peak 34 AM
36 PM

From: Anderson, Rainse [mailto:RAnderson@whpacific.com]
Sent: Friday, October 29, 2010 10:39 AM
To: CROWNOVER Don R; CUMMINGS Christopher * ODA; WILSON John P * ODA
Cc: Anderson, Rainse
Subject: RE: Aurora airport counts

Don,

Thanks for the data. Could you let me know what other reports you can provide....also I assume that these number are total axle counts so at a minimum they are one half of the total correct?

Thanks

Rainse
Rainse Anderson
Director of Aviation

Transportation Development Division - TSM Unit

Site Number:	21127			Site Name:	Columbia North Exit			Region:	2			Vehicle Type:	Vehicles			County:	Marion								
Street Number:	0			Mile Point:				Start Date:	10/18/2010			Lane / Direction / Flow:	Combined												
	ADT:	100		Avg Weekdays (Mon - Thu):	-			Avg Day:	106																
	Max Hour:	37		Day:	Wed			Date:	10/20/2010			Hour:	18												
	Max Day:	188		Day:	Tue			Date:	10/19/2010																

Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value
		10/18	-	10/19	188	10/20	157	10/21	140	10/22	151	10/23	00
10/24	01	10/25	-										
Avg:	1	Avg:	-	Avg:	188	Avg:	157	Avg:	140	Avg:	151	Avg:	0

Date	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
10/18	Mon	-	-	-	-	-	-	-	-	-	-	-	-	-	5	6	5	28	33	0	0	0	0	0	0	77
10/19	Tue	0	0	0	0	0	1	8	27	3	3	4	29	14	13	4	1	32	35	0	13	1	0	0	0	188
10/20	Wed	0	0	0	0	0	1	6	20	0	0	4	29	13	5	5	1	36	37	0	0	0	0	0	0	157
10/21	Thu	0	0	0	0	0	2	5	28	2	4	3	20	10	4	16	2	28	16	0	0	0	0	0	0	140
10/22	Fri	0	0	0	0	0	1	4	17	2	1	3	31	28	7	2	14	28	13	0	0	0	0	0	0	151
10/23	Sat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/24	Sun	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
10/25	Mon	0	0	0	0	0	1	7	24	3	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	35

Transportation Development Division - TSM Unit

Site Number:	21165		Site Name:	Columbia North Ent		Region:	2		Vehicle Type:	Vehicles		County:	Marion											
Street Number:	0		Mile Point:			Start Date:	10/18/2010		Lane / Direction / Flow:	Combined														
	ADT:	140	Avg Weekdays (Mon - Thu):	-		Avg Day:	142																	
	Max Hour:	50	Day:	Tue		Date:	10/19/2010		Hour:	8														
	Max Day:	242	Day:	Tue		Date:	10/19/2010																	

Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value
		10/18	-	10/19	242	10/20	215	10/21	230	10/22	163	10/23	01
10/24	00	10/25	-										
Avg:	0	Avg:	-	Avg:	242	Avg:	215	Avg:	230	Avg:	163	Avg:	1

Date	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
10/18	Mon	-	-	-	-	-	-	-	-	-	-	-	-	-	19	4	14	4	16	2	0	0	0	1	0	60
10/19	Tue	0	0	0	1	0	4	8	50	14	19	17	14	27	14	10	20	20	16	0	7	0	0	1	0	242
10/20	Wed	0	0	0	0	0	0	3	42	16	13	14	23	31	4	2	23	9	31	2	2	0	0	0	0	215
10/21	Thu	0	0	0	0	0	0	3	46	15	18	18	28	27	7	19	23	15	10	0	0	0	1	0	0	230
10/22	Fri	0	0	0	1	0	0	2	30	8	10	6	10	28	14	8	11	19	14	2	0	0	0	0	0	163
10/23	Sat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
10/24	Sun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/25	Mon	0	0	0	0	1	0	2	28	13	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-	58

Transportation Development Division - TSM Unit

Site Number:	21157			Site Name:	Columbia East Entrance			Region:	2			Vehicle Type:	Vehicles			County:	Marion								
Street Number:	0			Mile Point:				Start Date:	10/18/2010			Lane / Direction / Flow:	Combined												
	ADT:	890		Avg Weekdays (Mon - Thu):	-			Avg Day:	926																
	Max Hour:	396		Day:	Thu			Date:	10/21/2010			Hour:	17												
	Max Day:	1538		Day:	Tue			Date:	10/19/2010																

Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value
		10/18	-	10/19	1538	10/20	1502	10/21	1499	10/22	1016	10/23	00
10/24	01	10/25	-										
Avg:	1	Avg:	-	Avg:	1538	Avg:	1502	Avg:	1499	Avg:	1016	Avg:	0

Date	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
10/18	Mon	-	-	-	-	-	-	-	-	-	-	-	-	104	42	47	54	383	94	0	2	2	3	0	0	731
10/19	Tue	2	2	2	1	1	156	283	117	29	40	35	122	51	56	55	76	375	107	11	0	5	2	9	1	1538
10/20	Wed	0	3	0	1	0	152	260	104	68	45	42	72	92	66	58	63	367	94	3	2	5	3	0	2	1502
10/21	Thu	1	2	3	1	1	140	281	118	25	54	52	83	89	57	68	47	396	75	3	0	2	0	0	1	1499
10/22	Fri	0	2	0	2	0	130	216	101	53	49	54	59	29	23	31	115	125	27	0	0	0	0	0	0	1016
10/23	Sat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/24	Sun	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10/25	Mon	0	0	0	0	0	6	10	10	18	18	23	-	-	-	-	-	-	-	-	-	-	-	-	-	85

Transportation Development Division - TSM Unit

Site Number:	21187			Site Name:	Willimette Entrance			Region:	2			Vehicle Type:	Vehicles			County:	Marion								
Street Number:	0			Mile Point:				Start Date:	10/18/2010			Lane / Direction / Flow:	Combined												
	ADT:	160		Avg Weekdays (Mon - Thu):	-			Avg Day:	165																
	Max Hour:	36		Day:	Mon			Date:	10/18/2010			Hour:	13												
	Max Day:	244		Day:	Tue			Date:	10/19/2010																

Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value
		10/18	-	10/19	244	10/20	199	10/21	182	10/22	147	10/23	142
10/24	77	10/25	-										
Avg:	77	Avg:	-	Avg:	244	Avg:	199	Avg:	182	Avg:	147	Avg:	142

Date	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
10/18	Mon	-	-	-	-	-	-	-	-	-	-	-	-	36	16	20	7	18	15	6	3	2	6	1	0	130
10/19	Tue	0	0	0	0	0	0	0	2	16	18	19	23	17	17	17	20	8	22	17	9	15	24	0	0	244
10/20	Wed	0	0	0	0	0	0	0	6	24	15	12	15	20	15	22	9	11	16	17	0	2	15	0	0	199
10/21	Thu	0	0	0	0	0	0	1	4	10	3	18	20	21	32	13	19	16	14	10	0	1	0	0	0	182
10/22	Fri	0	0	0	0	0	0	0	7	9	16	13	22	18	21	14	6	8	2	9	2	0	0	0	0	147
10/23	Sat	0	0	0	0	0	3	11	1	3	14	14	16	14	11	5	10	6	4	4	0	1	3	22	0	142
10/24	Sun	0	0	0	0	0	0	0	0	4	2	5	6	6	10	11	9	9	3	1	0	4	7	0	0	77
10/25	Mon	0	0	0	0	0	0	2	4	8	12	24	-	-	-	-	-	-	-	-	-	-	-	-	-	50

Transportation Development Division - TSM Unit

Site Number:	21122		Site Name:	Orange Entrance		Region:	2		Vehicle Type:	Vehicles		County:	Marion											
Street Number:	0		Mile Point:			Start Date:	10/18/2010		Lane / Direction / Flow:	Combined														
	ADT:	70	Avg Weekdays (Mon - Thu):	-		Avg Day:	75																	
	Max Hour:	15	Day:	Tue		Date:	10/19/2010		Hour:	12														
	Max Day:	116	Day:	Wed		Date:	10/20/2010																	

Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value
		10/18	-	10/19	100	10/20	116	10/21	84	10/22	58	10/23	54
10/24	40	10/25	-										
Avg:	40	Avg:	-	Avg:	100	Avg:	116	Avg:	84	Avg:	58	Avg:	54

Date	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
10/18	Mon	-	-	-	-	-	-	-	-	-	-	-	-	13	6	4	3	5	8	8	1	0	0	0	0	48
10/19	Tue	0	0	0	0	0	0	5	0	2	7	4	15	5	11	8	3	15	6	9	3	0	2	3	2	100
10/20	Wed	0	0	0	0	0	0	0	2	8	8	3	15	12	4	15	13	5	15	13	0	0	0	2	1	116
10/21	Thu	0	0	0	0	0	3	0	0	6	13	2	6	9	7	6	3	9	4	2	0	1	1	0	12	84
10/22	Fri	0	0	0	0	0	0	0	0	7	6	3	2	7	12	13	2	2	2	2	0	0	0	0	0	58
10/23	Sat	0	0	0	1	0	0	0	0	3	0	5	2	3	10	8	6	8	5	2	1	0	0	0	0	54
10/24	Sun	0	0	0	0	0	1	6	0	0	0	1	4	7	4	1	6	3	5	2	0	0	0	0	0	40
10/25	Mon	0	0	0	0	0	0	0	0	4	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	9

Transportation Development Division - TSM Unit

Site Number:	21114	Site Name:	Blue Entrance	Region:	2	Vehicle Type:	Vehicles	County:	Marion		
Street Number:	0	Mile Point:		Start Date:	10/18/2010	Lane / Direction / Flow:	Combined				

ADT:	160	Avg Weekdays (Mon - Thu):	-	Avg Day:	170			
Max Hour:	30	Day:	Thu	Date:	10/21/2010	Hour:	16	
Max Day:	219	Day:	Wed	Date:	10/20/2010			

Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value
		10/18	-	10/19	213	10/20	219	10/21	215	10/22	173	10/23	112
10/24	91	10/25	-										
Avg:	91	Avg:	-	Avg:	213	Avg:	219	Avg:	215	Avg:	173	Avg:	112

Date	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
10/18	Mon	-	-	-	-	-	-	-	-	-	-	-	-	14	9	19	15	10	8	12	1	0	9	0	2	99
10/19	Tue	0	2	2	3	0	4	7	11	7	16	15	22	15	23	18	17	16	10	11	7	2	2	1	2	213
10/20	Wed	0	0	3	1	0	1	7	5	16	20	14	24	11	16	22	27	19	8	11	3	2	4	3	2	219
10/21	Thu	0	0	0	2	5	0	7	3	12	14	13	15	18	28	17	30	20	14	3	0	3	4	0	7	215
10/22	Fri	0	0	3	1	3	0	5	4	12	15	12	17	11	17	16	21	12	6	7	5	6	0	0	0	173
10/23	Sat	0	0	3	1	7	7	8	9	6	3	1	11	5	3	11	6	8	3	2	6	4	3	5	0	112
10/24	Sun	3	2	0	3	3	0	5	1	0	3	5	15	5	10	9	4	4	7	2	1	4	0	0	5	91
10/25	Mon	3	0	0	3	0	0	7	5	13	11	10	-	-	-	-	-	-	-	-	-	-	-	-	-	52

Transportation Development Division - TSM Unit

Site Number:	21160		Site Name:	Green Entrance		Region:	2		Vehicle Type:	Vehicles		County:	Marion											
Street Number:	0		Mile Point:			Start Date:	10/18/2010		Lane / Direction / Flow:	Combined														
	ADT:	140	Avg Weekdays (Mon - Thu):	-		Avg Day:	145																	
	Max Hour:	29	Day:	Wed		Date:	10/20/2010		Hour:	9														
	Max Day:	227	Day:	Wed		Date:	10/20/2010																	

Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value
		10/18	-	10/19	203	10/20	227	10/21	181	10/22	201	10/23	34
10/24	24	10/25	-										
Avg:	24	Avg:	-	Avg:	203	Avg:	227	Avg:	181	Avg:	201	Avg:	34

Date	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
10/18	Mon	-	-	-	-	-	-	-	-	-	-	-	-	13	14	12	9	19	19	5	2	1	1	0	0	95
10/19	Tue	0	0	0	0	0	3	11	17	18	14	18	20	16	15	14	12	20	20	3	0	2	0	0	0	203
10/20	Wed	0	0	0	0	0	2	9	15	29	22	12	14	13	14	17	23	23	21	6	3	4	0	0	0	227
10/21	Thu	0	0	0	0	2	2	7	14	22	16	10	12	9	18	7	22	16	22	0	1	1	0	0	0	181
10/22	Fri	0	0	0	0	0	2	9	10	22	8	11	24	22	28	10	22	15	16	1	0	0	0	1	0	201
10/23	Sat	0	0	0	0	0	0	0	0	9	0	5	8	6	1	0	0	2	0	1	2	0	0	0	0	34
10/24	Sun	0	0	0	0	0	1	2	2	3	0	1	0	3	0	5	0	1	2	1	1	0	2	0	0	24
10/25	Mon	0	0	0	0	0	2	6	12	17	12	9	-	-	-	-	-	-	-	-	-	-	-	-	-	58

Transportation Development Division - TSM Unit

Site Number:	21159	Site Name:	Purple Entrance	Region:	2	Vehicle Type:	Vehicles	County:	Marion		
Street Number:	0	Mile Point:		Start Date:	10/18/2010	Lane / Direction / Flow:	Combined				

ADT:	130	Avg Weekdays (Mon - Thu):	-	Avg Day:	137			
Max Hour:	33	Day:	Thu	Date:	10/21/2010	Hour:	21	
Max Day:	222	Day:	Thu	Date:	10/21/2010			

Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value
		10/18	-	10/19	170	10/20	187	10/21	222	10/22	152	10/23	54
10/24	37	10/25	-										
Avg:	37	Avg:	-	Avg:	170	Avg:	187	Avg:	222	Avg:	152	Avg:	54

Date	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
10/18	Mon	-	-	-	-	-	-	-	-	-	-	-	-	12	21	4	9	9	17	12	0	1	4	0	0	89
10/19	Tue	0	1	1	0	0	5	8	7	16	15	9	15	14	15	10	14	15	8	10	4	1	2	0	0	170
10/20	Wed	0	0	2	0	0	3	4	7	12	24	13	19	12	5	11	11	23	14	10	15	1	1	0	0	187
10/21	Thu	0	0	2	0	0	3	6	6	7	13	11	14	19	12	11	14	17	25	21	4	33	3	0	1	222
10/22	Fri	0	0	2	0	1	2	4	10	10	14	17	17	25	10	6	13	9	6	4	1	0	1	0	0	152
10/23	Sat	0	0	0	0	0	0	2	1	3	2	3	8	1	6	6	10	8	1	0	0	0	0	3	0	54
10/24	Sun	0	0	0	0	0	0	0	0	0	5	4	1	2	8	4	4	0	4	3	1	0	0	0	1	37
10/25	Mon	0	0	0	0	0	0	5	4	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17

Transportation Development Division - TSM Unit

Site Number:	21168	Site Name:	Yellow Entrance	Region:	2	Vehicle Type:	Vehicles	County:	Marion		
Street Number:	0	Mile Point:		Start Date:	10/18/2010	Lane / Direction / Flow:	Combined				

ADT:	290	Avg Weekdays (Mon - Thu):	-	Avg Day:	306			
Max Hour:	59	Day:	Tue	Date:	10/19/2010	Hour:	12	
Max Day:	504	Day:	Tue	Date:	10/19/2010			

Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value
		10/18	-	10/19	504	10/20	399	10/21	419	10/22	379	10/23	72
10/24	63	10/25	-										
Avg:	63	Avg:	-	Avg:	504	Avg:	399	Avg:	419	Avg:	379	Avg:	72

Date	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
10/18	Mon	-	-	-	-	-	-	-	-	-	-	-	-	39	20	23	26	49	17	10	5	4	4	0	0	197
10/19	Tue	0	0	2	3	4	7	34	52	32	34	35	59	29	36	52	41	43	21	13	3	2	2	0	0	504
10/20	Wed	0	0	1	2	4	2	31	43	32	24	20	43	35	17	21	27	35	29	13	6	8	6	0	0	399
10/21	Thu	0	1	2	1	9	5	27	53	28	29	21	45	45	19	28	31	36	15	4	3	6	2	9	0	419
10/22	Fri	2	0	1	4	6	0	30	47	29	26	22	39	38	40	20	18	33	11	6	0	3	4	0	0	379
10/23	Sat	0	0	0	0	0	2	5	0	10	1	5	5	7	4	3	7	11	3	3	2	1	1	0	2	72
10/24	Sun	1	0	0	0	0	2	7	2	3	3	5	1	2	0	2	6	3	2	11	3	7	0	0	3	63
10/25	Mon	1	0	0	0	2	8	24	57	33	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	171

Transportation Development Division - TSM Unit

Site Number:	21105			Site Name:	Vans Entrance				Region:	2			Vehicle Type:	Vehicles			County:	Marion							
Street Number:	0			Mile Point:					Start Date:	10/18/2010			Lane / Direction / Flow:	Combined											
	ADT:	140		Avg Weekdays (Mon - Thu):	-				Avg Day:	142															
	Max Hour:	39		Day:	Tue				Date:	10/19/2010			Hour:	12											
	Max Day:	239		Day:	Tue				Date:	10/19/2010															

Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value
		10/18	-	10/19	239	10/20	201	10/21	208	10/22	174	10/23	30
10/24	00	10/25	-										
Avg:	0	Avg:	-	Avg:	239	Avg:	201	Avg:	208	Avg:	174	Avg:	30

Date	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
10/18	Mon	-	-	-	-	-	-	-	-	-	-	-	-	8	6	13	36	16	1	0	0	0	0	0	0	80
10/19	Tue	0	0	0	1	19	23	13	7	10	9	20	39	21	7	11	37	18	4	0	0	0	0	0	0	239
10/20	Wed	0	0	0	0	16	24	15	9	3	6	27	20	15	8	12	32	10	2	0	0	2	0	0	0	201
10/21	Thu	0	0	0	0	10	29	9	12	17	14	19	21	14	12	18	20	12	1	0	0	0	0	0	0	208
10/22	Fri	4	0	0	0	5	16	19	15	5	10	19	22	15	17	11	10	6	0	0	0	0	0	0	0	174
10/23	Sat	0	0	0	0	0	0	0	0	10	3	0	0	1	3	10	0	3	0	0	0	0	0	0	0	30
10/24	Sun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/25	Mon	0	0	0	0	3	4	3	1	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15

Transportation Development Division - TSM Unit

Site Number:	21119		Site Name:	Red Entrance		Region:	2		Vehicle Type:	Vehicles		County:	Marion											
Street Number:	0		Mile Point:			Start Date:	10/18/2010		Lane / Direction / Flow:	Combined														
	ADT:	180	Avg Weekdays (Mon - Thu):	-		Avg Day:	185																	
	Max Hour:	33	Day:	Tue		Date:	10/19/2010		Hour:	12														
	Max Day:	290	Day:	Thu		Date:	10/21/2010																	

Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value
		10/18	-	10/19	201	10/20	198	10/21	290	10/22	230	10/23	105
10/24	87	10/25	-										
Avg:	87	Avg:	-	Avg:	201	Avg:	198	Avg:	290	Avg:	230	Avg:	105

Date	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Total
10/18	Mon	-	-	-	-	-	-	-	-	-	-	-	-	27	6	19	2	13	14	9	1	2	0	0	0	93
10/19	Tue	0	4	0	4	2	2	11	3	6	5	20	33	19	22	6	15	16	6	10	6	5	4	2	0	201
10/20	Wed	0	0	4	6	2	2	20	18	9	14	14	11	2	12	8	2	17	25	3	9	13	7	0	0	198
10/21	Thu	0	4	0	7	2	5	6	8	9	8	16	27	19	33	18	24	24	29	12	10	10	5	14	0	290
10/22	Fri	0	0	4	0	4	12	22	8	6	17	13	20	25	5	22	28	14	7	8	0	0	2	9	4	230
10/23	Sat	0	0	2	3	5	0	7	2	0	5	17	4	16	11	12	3	2	5	3	4	0	4	0	0	105
10/24	Sun	0	0	0	0	5	0	2	3	5	2	11	3	4	3	13	6	2	18	0	0	0	6	0	4	87
10/25	Mon	0	0	3	4	2	7	13	7	25	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80

Print This Page

ADT For: AIRPORT RD NE
Rd#: 59
Date: 9/18/2007
From: EHLEN RD
To: ARNDT RD

Milepost	ADT	Date	Source	Comments
0.03	2632	6/11/2007	Hose Count	N OF EHLEN RD (CR 96)
0.58	2610	9/18/2007	Estimated Volume	S OF KEIL RD (CR 429)
0.6	2600	9/18/2007	Estimated Volume	N OF KEIL RD (CR 429)
1.86	2521	6/4/2007	Classifier	S OF ARNDT RD (CR 428)

Print This Page

ADT For: KEIL RD NE
Rd#: 429
Date: 9/18/2007
From: WILSONVILLE-HUBBARD CUT OFF(PAVED)
To: BOONES FERRY ROAD

Milepost	ADT	Date	Source	Comments
0.05	1010	6/6/2007	Classifier	W OF WILSONVILLE-HUBBARD CUT OFF
0.07	735	6/11/2007	Hose Count	E OF WILSONVILLE-HUBBARD CUT OFF
0.89	720	9/18/2007	Estimated Volume	W OF AIRPORT RD (CR 59)

Print This Page

ADT For: ARNDT RD NE
Rd#: 428
Date: 9/18/2007
From: AIRPORT RD
To: BOONES FERRY RD

Milepost	ADT	Date	Source	Comments
0.010	10062	6/4/2007	Classifier	W OF AIRPORT RD (CR 59)
0.24	9500	9/18/2007	Estimated Volume	E OF WILSONVILLE-HUBBARD CUT OFF
0.26	2500	9/18/2007	Estimated Volume	W OF WILSONVILLE-HUBBARD CUT OFF
0.74	2128	6/4/2007	Classifier	E OF BOONES FERRY RD (CR 11)

Print This Page

ADT For: EHLEN RD NE
Rd#: 96
Date: 9/18/2007
From: DONALD RD
To: AURORA CITY LIMITS

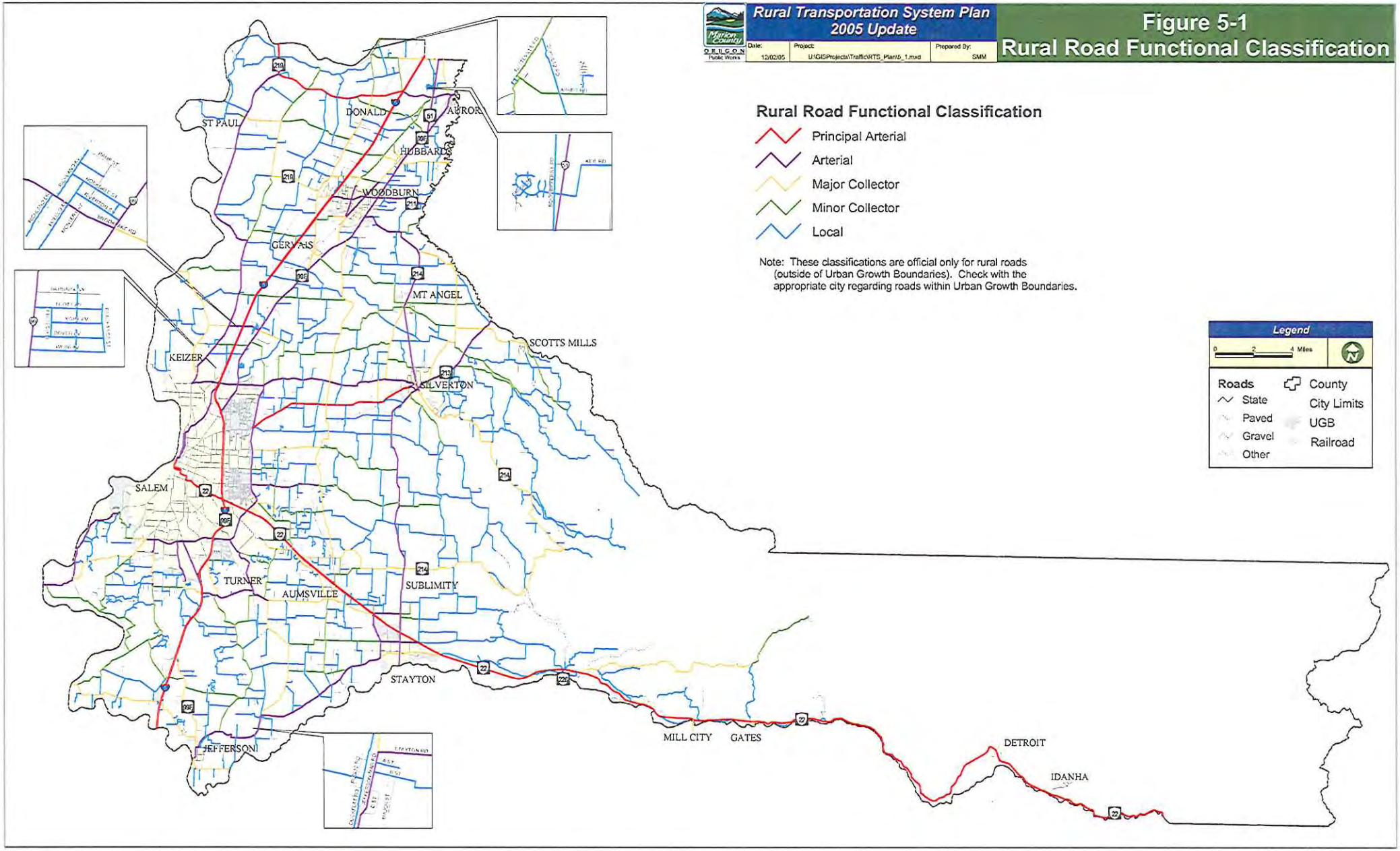
Milepost	ADT	Date	Source	Comments
2.77	6200	9/18/2007	Estimated Volume	NE OF DONALD RD (CR 61)
3.54	6454	7/12/2007	Classifier	W OF BUTTEVILLE RD (CR 65)
3.56	7866	6/11/2007	Classifier	E OF BUTTEVILLE RD (CR 65)
5.17	9670	6/6/2007	Classifier	W OF BENTS RD (CR 425)
5.22	9994	7/16/2003	Classifier	UNDER I - 5
5.28	8488	6/6/2007	Classifier	SE OF I-5 INTERCHANGE
6.85	7258	6/20/2007	Classifier	W OF BOONES FERRY RD (CR 10)
6.9	10945	6/22/2007	Hose Count	W OF WILSONVILLE-HUBBARD CUT OFF
6.92	5158	6/20/2007	Classifier	E OF WILSONVILLE-HUBBARD CUT OFF
7.44	8300	9/18/2007	Estimated Volume	W OF COLE LN (CR 430)
7.65	8408	6/6/2007	Classifier	W OF AIRPORT RD (CR 59)
7.7	9500	9/18/2007	Estimated Volume	E OF AIRPORT RD (CR 59)
7.81	9664	6/20/2007	Classifier	@ AURORA CITY LIMITS

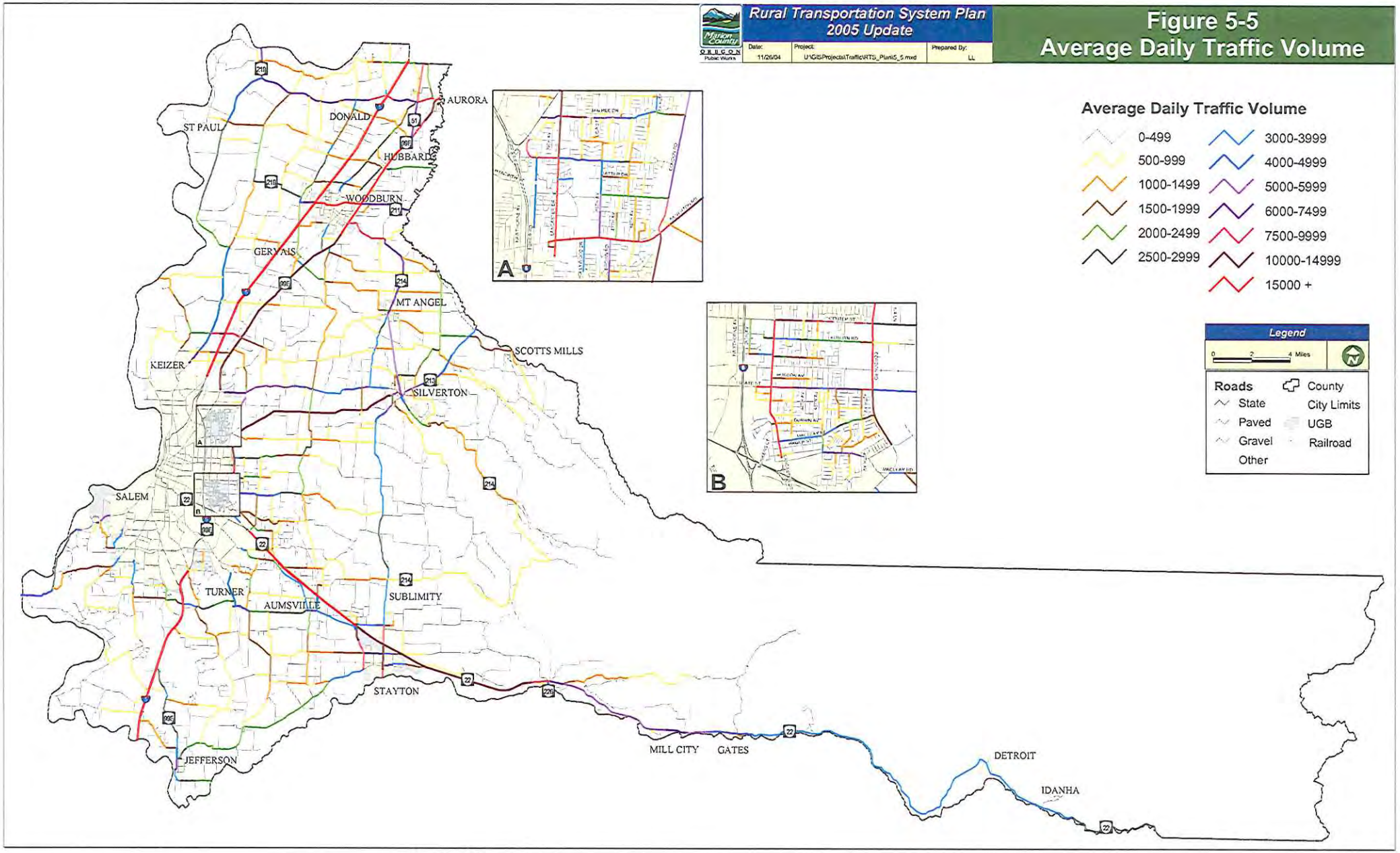
A

STREET	CROSS STREET	2008 ADT	2005 ADT	2002 ADT	2000 ADT
ABERNETHY RD	WEST OF HOLCOMB	5050	-	-	-
ADVANCE RD	WEST OF MOUNTAIN	600	930	830	950
ADVANCE RD	EAST OF STAFFORD	1450	1950	2150	2150
AIRPORT RD	SOUTH OF MILEY	4500	6450	5300	6600
ALBERTA AVE	WEST OF BELL	860	860	1050	870
ALDERCREST RD	NORTH OF RUSK	1300	1450	1200	1200
ALDERCREST RD	NORTH OF THIESSEN	3100	2850	3000	2800
AMISIGGER RD	NORTH OF HWY 224	2850	2900	2700	2950
ARNDT RD	EAST OF AIRPORT RD	11450	11600	10950	11950
ARNDT RD	EAST OF KNIGHTS BRIDGE RD	7500	6400	6700	6650
ARRAH WANNA BLVD	SOUTH OF HWY 26	500	470	520	580

#-A-B-C-D-E-F-G-H-I-J-K-L-M-N-O-P-R-S-T-U-V-W-Z

MERIDIAN RD	NORTH OF BARLOW	670	650	850	620
MERIDIAN WAY	EAST OF 65TH	640	780	690	580
MILEY RD	EAST OF I-5	9200	12000	9900	8550
MILEY RD	EAST OF AIRPORT	7400	7400	7000	7100
MOLALLA AVE	EAST OF HWY 213	3900	3350	3700	5450
MOLALLA AVE	SOUTH OF VICK	6650	3950	4700	4950
MOLALLA AVE	SOUTH OF WARRICK	1800	1900	2300	2150
MONROE ST	WEST OF LINWOOD	2350	2350	2450	2500
MONROE ST	EAST OF LINWOOD	2250	2200	2100	2300
MONTE CRISTO RD	WEST OF HWY 213	480	530	450	440
MONTEREY AVE	EAST OF 82ND	6400	5700	6000	4200
MORGAN RD	EAST OF BAKER	620	680	670	400
MOUNTAIN RD	EAST OF STAFFORD	2750	3250	2450	2600
MOUNTAIN RD	NORTH OF ADVANCE	930	1050	880	1050
MOUNTAIN RD	SOUTH OF ADVANCE	1550	1550	1450	1650
MOUNTAIN RD	SOUTH OF HOFFMAN	400	300	320	450
MULINO RD	SOUTH OF HAINES	1350	1750	1600	1300
MULINO RD	SOUTH OF TOWNSHIP	1700	2000	1750	1550
MULINO RD	WEST OF CENTRAL POINT	1200	1400	1250	1350
MULINO RD	SOUTH OF CENTRAL POINT	1100	1300	1200	1300
MULINO RD	WEST OF AIRPORT	1200	1300	1250	1550
MULINO RD	WEST OF HWY213	1250	1350	1250	1550
MUSIC CAMP RD	EAST OF FIRWOOD	210	550	210	230


Rural Transportation System Plan
2005 Update
Figure 5-1
Rural Road Functional Classification
Date: 12/02/05
Project: U:\GIS\Projects\Traffic\RTS_Plan\5_1.mxd
Prepared By: SMM
Rural Road Functional Classification
Principal Arterial
Arterial
Major Collector
Minor Collector
Local
Note: These classifications are official only for rural roads (outside of Urban Growth Boundaries). Check with the appropriate city regarding roads within Urban Growth Boundaries.
Legend
0 2 4 Miles
Roads
State
Paved
Gravel
Other
County
City Limits
UGB
Railroad
ST PAUL
DONALD
AURORA
HUBBARD
WOODBURN
GERVAIS
MT ANGEL
SCOTTS MILLS
KEIZER
SILVERTON
SALEM
TURNER
AUMSVILLE
SUBLIMITY
STAYTON
JEFFERSON
MILL CITY
GATES
DETROIT
IDANHA


Rural Transportation System Plan
2005 Update
Date: 11/26/04
Project: U:\GIS\Projects\Traffic\RTS_Plan\5_5.mxd
Prepared By: LL
Figure 5-5
Average Daily Traffic Volume
Average Daily Traffic Volume
0-499
500-999
1000-1499
1500-1999
2000-2499
2500-2999
3000-3999
4000-4999
5000-5999
6000-7499
7500-9999
10000-14999
15000 +
Legend
0 2 4 Miles
Roads
State
Paved
Gravel
Other
County
City Limits
UGB
Railroad
AURORA
DONALD
ST PAUL
HUBBARD
WOODBURN
GERVAIS
MT ANGEL
SCOTTS MILLS
KEIZER
SILVERTON
SALEM
TURNER
AUMSVILLE
SUBLIMITY
STAYTON
JEFFERSON
MILL CITY
GATES
DETROIT
IDANHA
A
B

Rural Road Functional Classification Characteristics

Principal Arterial
- Continuous segments with trip length and travel density indicative of statewide or interstate travel; and
- Serve all of the large urban areas and most of the moderate sized cities.

Arterial
- Link cities, larger towns, and other major traffic generators; and provide interstate and inter-county service: and
- Spaced such that all developed areas of the region are within reasonable distance of an arterial; and
- Serve a higher travel density, trip length, and overall travel speed than collector and local systems.

Major Collector
- Provide service to larger towns not directly served by higher classed roads and to other traffic generators of equivalent intra-county importance (including parks, tourist attractions, significant resource areas, etc.); and
- Link these places with nearby towns and cities, or routes of higher classification; and
- Serve the more important intra-county travel corridors.

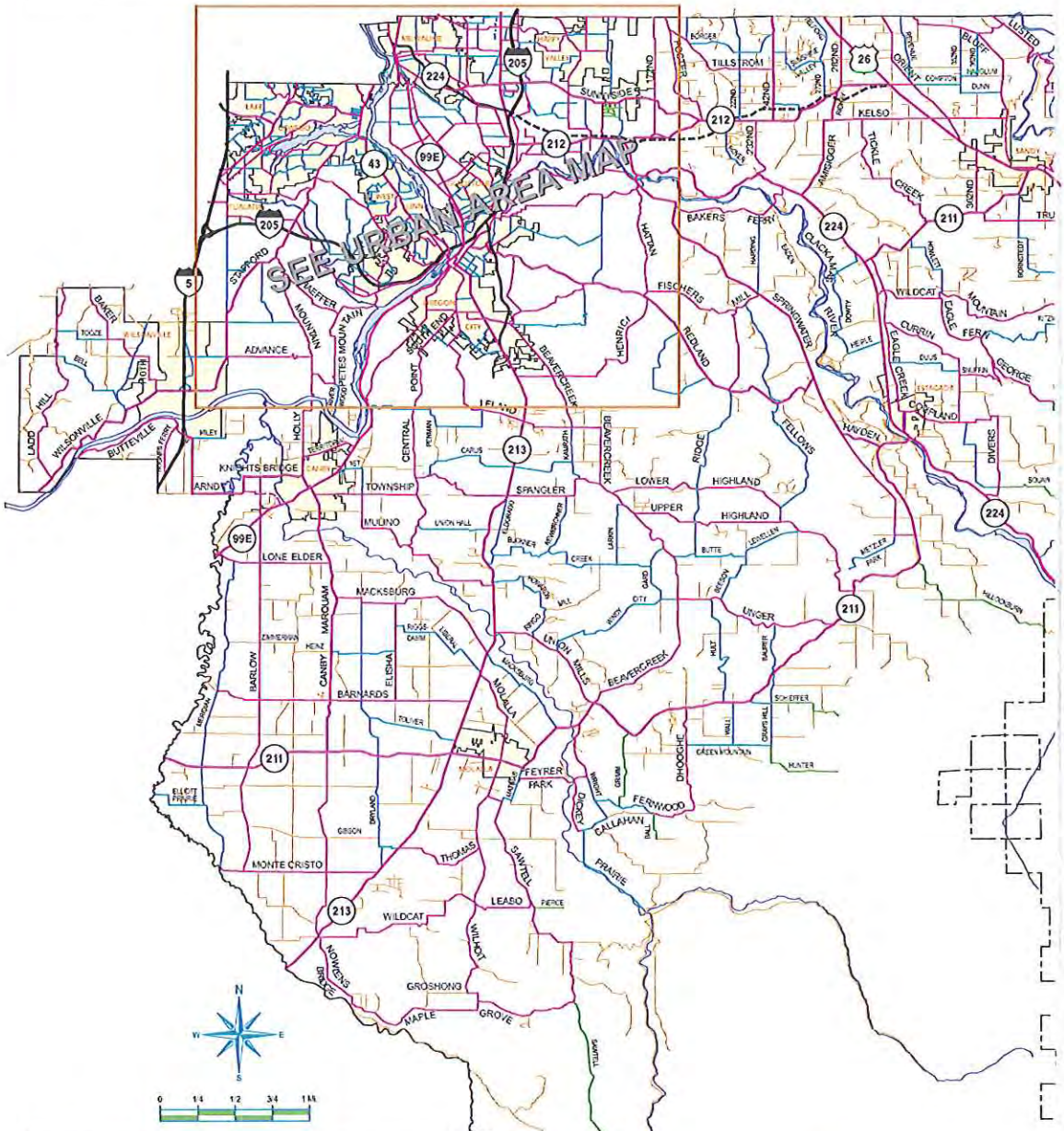
Minor Collector
- Spaced at intervals to collect traffic from local roads and bring all developed areas within a reasonable distance of a collector road; and
- Provide service to any remaining smaller communities and traffic generators; and
- Link locally important traffic generators with their local constituents.

Local
- Primarily provide access to adjacent lands; and
- Provide relatively short travel distances compared to higher classed facilities.

The original (1998) RTSP included a list of roadways and their functional classification. As part of this 2005 Update, some changes are being made as shown in **Table 5-2**, which better reflect the current and future function of each roadway.

FUNCTIONAL CLASSIFICATION GUIDELINES

Classification	Number of Traffic Lanes	Purpose	Access Impacts	Examples
Freeway Expressway	4-8	Serves Interregional and Intrareginal Trips. Carries heavy volume at high speed.	Freeways and expressways are intended to move traffic and not provide direct access to land use activities. Access to these facilities will be from other arterials.	I-205 Milwaukie Expressway
Major Arterial	3-7 Urban 2-4 Rural	Carries local and through traffic to and from destinations outside local community, connects cities and rural centers. Moderate to heavy volume, moderate to high speed.	Direct Access to major arterials will be limited. Access should be restricted to major generators.	Sunnyside Road Boones Ferry Road Highway 26
Minor Arterial	2-5	Connects collectors to higher order roadways. Carries moderate volume at moderate speed.	Direct access will be limited, however to a lesser degree than major arterials. The number and location of driveways should be controlled.	Oatfield Road Beavercreek Road Borland Road



Classification	Number of Traffic Lanes	Purpose	Access Impacts	Examples
Collector	2	Principle carrier within neighborhoods or single land use areas. Links neighbor-hoods with major activity centers and arterials. Generally not for through traffic. Low to moderate volume; low to moderate speed. New collectors should intersect minor arterials rather than major arterials.	Collectors provide access to abutting land and to the arterial system. Access to individual parcels is usually allowed.	Roethe Road Welches Road Pilkington Road
Connector	2	Collects traffic from and distribute traffic to local streets within neighborhoods or industrial districts. Usually longer than local streets. Low traffic volumes and speeds. Primarily serves access and local circulation functions. Not for through traffic	Connectors provide direct access to abutting properties	Risley Ave Harold Ave Pleasant Ct
Local	2	Provides access to abutting property and connects to higher order roads. New local roads should intersect collectors or, if necessary, minor arterials.	Local streets provide direct access to abutting properties. Adjacent land is normally residential.	Blanton Street Windy City Road La Bonita Way

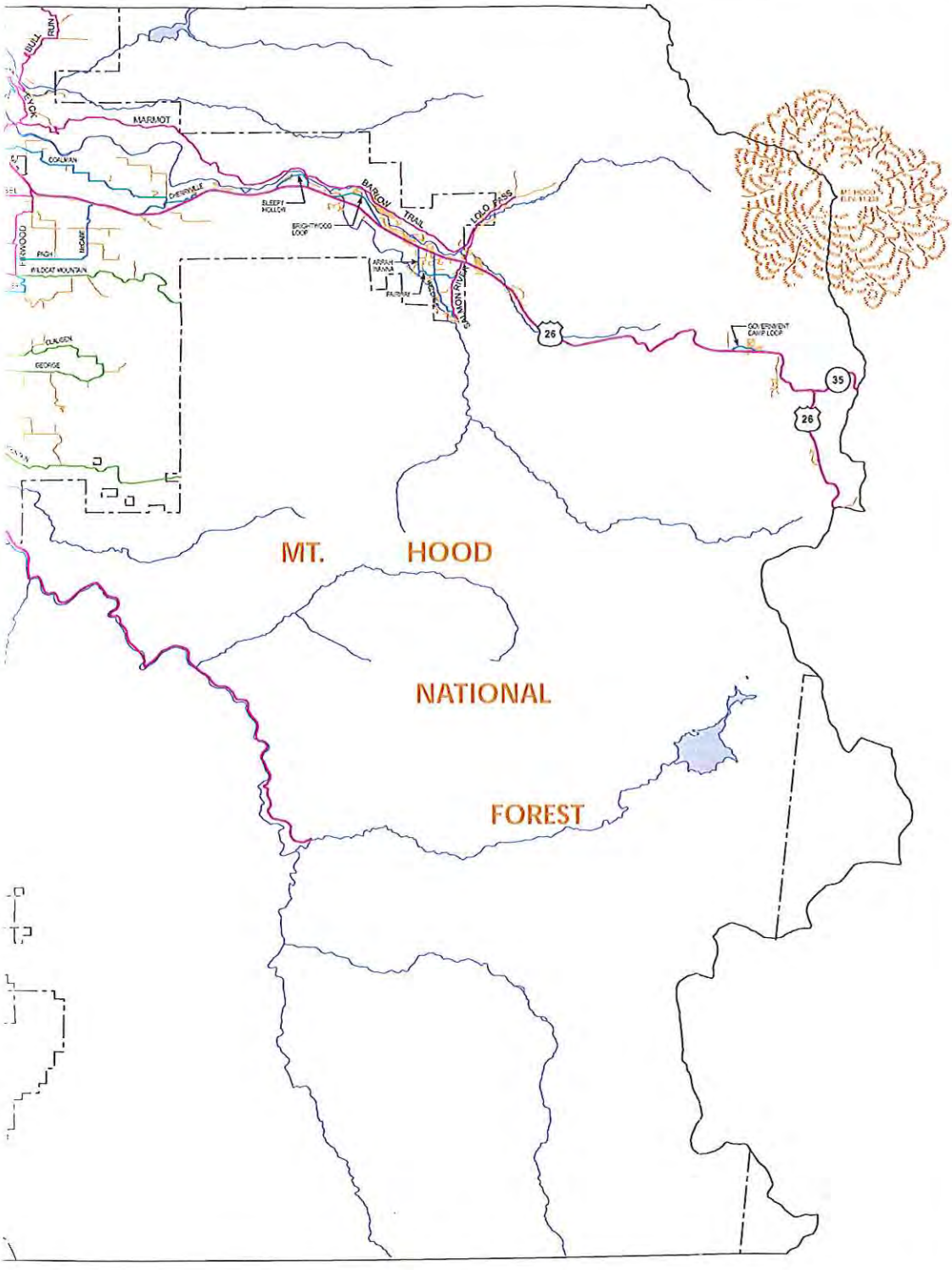


Table V-3
Clackamas County
Roadway Classifications and Guidelines (Continued)

Roadway Classifications and Guidelines (continued)						
FUNCTIONAL CLASSIFICATION	NUMBER OF TRAFFIC LANES	MINIMUM RIGHT-OF-WAY WIDTH*	PAVED WIDTH	SIDEWALK/ PATHWAY (1/17/08)	BIKWAYS	LANDSCAPE STRIP**
Freeway/ Expressway	4 to 8	Defer to Federal and State Standards	Defer to Federal and State	No	No	Defer to Federal and State
Major Arterial	3 to 7 Urban 2 to 4 Rural	60'-125' More if needed for terrain, turn lanes or heavy volume	36'-98'	Yes In urban areas only	Yes	Yes In urban areas
Minor Arterial	2 to 5	60' – 115'	36' – 90'	Yes In urban areas only	Yes	Yes In urban areas
Collector	2 to 3	60' – 85' Less if volume and land use density are low and terrain allows	32' – 61'	Yes In urban areas only	Yes	Yes In urban areas
Connector	2	55'	28' – 34' Residential 28' – 40' Industrial	Yes In urban areas only	If ROW allows	Yes In urban areas
Local	2	40' – 50'	28'	Yes***	No	Yes In urban areas
Alley	2	16'	16'	No	No	No

* - Preferred dimensions are not adjusted for adjacent land uses; additional right-of-way may be required for slope, sign, sidewalk and utility easements.

** - Required unless acquiring right-of-way is impractical due to wetlands, topographic conditions, resource protection, or preexisting development patterns.

*** - Sidewalks are required on all new streets within the Urban Growth Boundary and when development or redevelopment occurs on existing streets. (1/17/08)

Milepoint	2009 AADT All Vehicles		Location Description
			PACIFIC HIGHWAY NO. 1 (Continued)
258.10	*88900*		0.40 mile south of Hayesville Interchange
259.50	*81800*		0.70 mile south of Chemawa Road Interchange
263.09	*87400*		0.40 mile south of Brooks Interchange
271.55	*81900*		0.30 mile south of Hillsboro-Silverton Highway (OR214)
278.27	*83600*		0.40 mile south of Aurora-Donald Interchange (Ehlen Road)
281.20	*85700*	*	Wilsonville Automatic Traffic Recorder, Sta. 03-011, 1.38 miles south of Wilsonville-Hubbard Highway No. 51 (OR551)
283.58	*115700*		0.30 mile south of Wilsonville Interchange
285.88	*117700*		0.30 mile south of Stafford Road
287.91	*129800*		0.60 mile south of East Portland Freeway (I-205)
289.20	*134300*		0.30 mile south of Nyberg Road Interchange
290.14	*153600*	*	Tigard Automatic Traffic Recorder, Sta. 34-008, 0.34 mile south of Boones Ferry Road Interchange
290.99	*153700*		0.30 mile south of Upper Boones Ferry Road Interchange
291.80	*154300*		0.40 mile south of Beaverton-Tigard Highway (OR217)
293.00	*107300*		0.30 mile south of Haines Road
293.51	*104900*		0.30 mile south of Pacific Highway West (OR99W), at Tigard Jct.
294.74	*118800*		0.30 mile south of Capitol Highway
295.43	*119000*		0.10 mile south of Taylors Ferry Road Connection
296.24	*116600*		0.10 mile south of Spring Garden Road Undercrossing
296.45	*120800*		0.10 mile south of Multnomah Boulevard Undercrossing
297.08	*126100*		0.10 mile south of Terwilliger Boulevard Undercrossing
298.24	*140900*	*	Iowa Automatic Traffic Recorder, Sta. 26-016, 1.07 miles north of S.W. Terwilliger Boulevard, in Portland
299.13	*137700*		0.10 mile south of Macadam and Hood Avenue connections
299.87	*123000*		0.10 mile south of Stadium Freeway (I-405)
300.37	*138600*	*	Marquam Bridge Automatic Traffic Recorder, Sta. 26-026, 0.34 mile northeast of Stadium Freeway No. 61 (I-405)
301.09	*89200*		Undercrossing, S.E. Morrison Street Bridge
301.50	*66700*		Undercrossing, Burnside Bridge
301.70	*78600*		Undercrossing, eastbound connection to Columbia River Highway (I-84)
301.99	*122500*		Overcrossing, N.E. Holladay Street
302.70	*121000*		0.40 mile south of Stadium Freeway (I-405)
303.68	*136500*		0.30 mile south of N. Going Street Interchange
304.23	*119000*		0.20 mile south of N. Killingsworth Street Overcrossing
304.66	*130000*	*	Minnesota Freeway Automatic Traffic Recorder, Sta. 26-019, 0.03 mile south of N. Ainsworth Street undercrossing
305.14	*123700*		0.30 mile south of Northeast Portland Highway (US30 Bypass)
305.64	*109100*		0.20 mile north of Northeast Portland Highway (US30 Bypass)
306.36	*93900*		0.50 mile south of Overcrossing Pacific Highway West (OR99W)
307.08	*98500*		0.38 mile south of Pacific Highway East (OR99E)
307.66	*126800*		0.20 mile north of Pacific Highway East (OR99E)
307.97	*121100*	*	Interstate Bridge Automatic Traffic Recorder, Sta. 26-004, 0.41 mile south of Oregon-Washington State Line
			COLUMBIA RIVER HIGHWAY NO. 2
			Milepoint indicates distance from Pacific Highway (I-5), in Portland
0.49	*142100*	*	West Banfield Automatic Traffic Recorder, Sta. 26-015, 0.49 mile east of Pacific Highway No. 1 (I-5)
0.76	*150200*		0.24 mile east of Pacific Highway East (OR99E, Grand Avenue) undercrossing
1.43	*168700*		0.57 mile west of N.E. 33rd Avenue
2.27	*147900*		0.27 mile east of N.E. 33rd Avenue

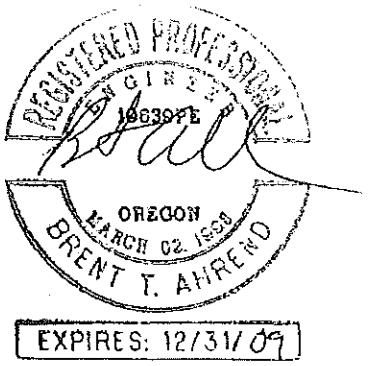
Milepoint	2009 AADT All Vehicles		Location Description
			KLAMATH FALLS-MALIN HIGHWAY NO. 50 (Continued)
27.08	*170*		0.02 mile north of Oregon-California State Line (Loveness Road)
			ESPLANADE STREET SPUR HIGHWAY NO. 50
			Milepoint indicates distance from Klamath Falls-Lakeview Highway (OR39/OR140), in Klamath Falls
Y 4.98	*7200*		0.01 mile southwest of Klamath Falls-Malin Highway (OR39), on Esplanade Street
			WILSONVILLE-HUBBARD HIGHWAY NO. 51
			Milepoint indicates distance Pacific Highway (I-5), south of Wilsonville
0.50	*19900*		0.50 mile south of Pacific Highway (I-5)
1.48	*10800*		0.01 mile south of Arndt Road, Clackamas-Marion County Line
3.47	*11000*		0.01 mile north of Ehlen Road
3.70	*7700*	*	Hubbard Automatic Traffic Recorder, Sta. 24-016, 0.22 mile south of Ehlen Road
5.43	*7400*		0.20 mile north of Pacific Highway East (OR99E)
			HEPPNER HIGHWAY NO. 52
			Milepoint indicates distance from Columbia River Highway (I-84), at Heppner Jct.
0.30	*150*		0.30 mile south of Columbia River Highway (I-84)
3.93	*140*		On Willow Creek Bridge
8.44	*120*		Gilliam-Morrow County Line
13.88	*120*		0.10 mile north of Fairview Road at Cecil
14.12	*120*		0.02 mile south of Immigrant Road
19.29	*110*		0.10 mile north of E. Morgan Road
19.60	*120*		0.21 mile south of E. Morgan Road
20.42	*150*		0.01 mile south of Ely Canyon Road
24.58	*170*		0.05 mile northwest of McNab West Road
24.73	*280*		0.10 mile east of McNab West Road
27.16	*260*		0.25 mile west of Johnson Grade Road
27.50	*320*		0.01 mile west of Main Street
27.61	*240*		West city limits of Ione
27.89	*600*		0.01 mile east of Green Street
28.33	*610*		0.01 mile west of Ella Road
28.72	*780*		0.03 mile west of Emert Road
29.09	*730*		0.34 mile east of Emert Road
30.36	*640*		0.01 mile west of Jordan Grade Road
30.86	*600*		0.01 mile west of Rhea Creek Road
30.88	*620*		0.01 mile east of Rhea Creek Road
36.11	*640*		North city limits of Lexington
36.41	*950*		0.01 mile northwest of Lexington-Echo Highway (OR207)
36.46	*1700*		0.01 mile southeast of Lexington-Echo Highway (OR207)
36.59	*1700*		0.01 mile northwest of "C" Street
36.61	*1600*		0.01 mile southeast of "C" Street
36.77	*1500*		South city limits of Lexington, 0.01 mile south of "A" Street
37.83	*1400*	*	Lexington Automatic Traffic Recorder, Sta. 25-007, 1.38 miles southeast of Lexington-Echo Highway No. 320 (OR207)

GROUP MACKENZIE

TRANSPORTATION IMPACT ANALYSIS

HELICOPTER TRANSPORT SERVICES

Aurora, Oregon



Prepared For
Helicopter Transport Services LLC

Completed On
May 27, 2009

Submittal To
Marion County

Project Number
2090040.00

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GROUP MACKENZIE

TRANSPORTATION IMPACT ANALYSIS

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Aurora, Oregon

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TABLE OF CONTENTS PAGE

I. Executive summary 2
II. Introduction 4
III. Existing Conditions 6
IV. Pre-Development Conditions 8
V. Site Development 9
VI. Intersection and Roadway Analysis 10
VII. Mitigation 14
VIII. Summary 15
IX. Appendix 18

LIST OF TABLES

Table 1 – Roadway Characteristics 6
Table 2 – Crash Data 7
Table 3 – Trip Generation 9
Table 4 – Intersection Operations 11
Table 5 – Queue Lengths (feet) 12

LIST OF FIGURES

1. Vicinity Map
2. Site Plan
3. Existing Lane Configuration & Intersection Control
4A. 2009 Existing Intersection Volumes – AM Peak Hour
4B. 2009 Existing Intersection Volumes – PM Peak Hour
5A. Background Growth: 1 Year at 2.5% - AM Peak Hour
5B. Background Growth: 1 Year at 2.5% - PM Peak Hour 2010
6A. 2010 Pre-Development Intersection Volumes - AM Peak Hour
6B. 2010 Pre-Development Intersection Volumes - PM Peak Hour
7A. Site Trip Distribution and Assignment - AM Peak Hour
7B. Site Trip Distribution and Assignment – PM Peak Hour
8A. 2010 Post-Development Intersection Volumes - AM Peak Hour
8B. 2010 Post-Development Intersection Volumes - PM Peak Hour

I. EXECUTIVE SUMMARY

DEVELOPMENT DESCRIPTION

A zone change and conditions use application are required for development of the proposed Helicopter Transport Services facility. The site is currently zoned Exclusive Farm Use (EFU) and the proposed zone is Public (P). An airport use is a conditional use in the Public zone. It has been determined the zone change from EFU to P does not result in an increase in trip potential, so only the condition use application is addressed for conditions at buildout of the site.

The Helicopter Transport Services facility is a repair station for the company's helicopters. The company's helicopters are located around the world at different sites, and generally are brought back to this maintenance facility once a year in the late fall for major overhaul and repair during the winter months. After a several month overhaul and repair, the helicopters, pilot crews, mechanics, and fuel tank drivers, then return to service in the spring to specific locations based on contract needs for firefighting services with the company's clients. Thus, the activities within the facility are all related to helicopter maintenance. In addition, there is supporting administrative and management activities for the helicopter maintenance operation.

During the fire season, which runs from May through October/November, only support staff remain in the building, with an estimate of up to 30 employees working an 8:00 am - 5:00 pm shift. During the off-season, running from November through April, employment at the building will increase to up to 70 employees.

The site plan and access locations are still in development. Access will be provided to Keil Road, and will comply with Marion County access and spacing standards.

MAJOR FINDINGS

Trip generation estimates for the Helicopter Transport Services facility were prepared using the Institute of Transportation Engineers *Trip Generation*, Land Use – 110 (General Light Industrial) based on the anticipated peak seasonal 70 employees. A total of 211 daily, 34 AM peak hour and 36 PM peak hour trips are anticipated. Truck trips are expected to be less than 30 per day.

The intersection of OR 551 with Ehlen Road does not currently meet ODOT standards of v/c 0.70. The addition of site trips does not decrease the v/c in the critical PM peak hour. Improvements are planned, as noted in the Draft 2010-2013 STIP (key number 16121), to include building left turn lanes on Ehlen Road and a traffic separator to limit Boones Ferry to right turns. The Marion County 2005 Rural Transportation Plan, Table 8-5 also identifies improvements that are needed at the OR intersection.

- The Airport Road/Ehlen Road intersection is expected to operate at a level of service "F" in 2010 PM peak hour conditions regardless of site development, which is below Marion County standards. AM peak hour operation would remain at level of service "C". The City of Aurora is considering adding a traffic signal at this intersection in their TSP.

Queuing calculations were prepared for the OR 551 intersections in accordance with ODOT standards using SimTraffic software. The addition of trips from the proposed Helicopter Transport Services facility has little impact on the anticipated queue lengths at the study intersections. Long queues are currently experienced on the Ehlen Road eastbound approach to OR 551, cansed by the lack of a dedicated left turn lane. Both ODOT and Marion County have identified the need for dedicated left turn lanes, which would address the long queues currently occurring.

- Traffic signal warrants presented in the Manual on Uniform Traffic Control Devises were reviewed for the intersection of Ehlen Road with Airport Road, specifically Warrants 1 – Eight Hour Vehicular Volume, 2 – Four Hour Vehicular Volume, and 3 – Peak Hour. ODOT's sixteen hour volumes were used as a basis for review of the eight and four hour warrants. With the addition of site trips, Warrants 1 and 2 not met, and Warrant 3 is just met. Based on this analysis, a traffic signal is not recommended at this time.

The need for right and left turn lanes at the study area intersections was reviewed using ODOT's turn-lane criterion. Right turn volumes on OR 551 at Keil Road will not meet ODOT's Right Turn Lane Criterion for either AM or PM peak hours.

No left turn lanes are provided on OR 551 at the intersection with Keil Road. Given the high through volume on the highway, the left turn lane criterion is met with only 10 left turns in an hour. The criterion is met with existing AM peak hour volumes, but not with the PM peak hour volumes for the southbound left turn movement.

- The need for a left tnrn lane was also reviewed on Ehlen Road at the intersection with Airport Road, where no turn lanes are currently provided. The ODOT left turn criterion is met for both the Pre-Development AM and PM peak hour conditions.

MITIGATION MEASURES PROPOSED

With improvements already identified for the intersections of Ehlen Road with OR 551 and Airport Road, and costs that would exceed the proportionate impacts of the Helicopter Transport Services facility, it is recommended the project contribute a proportionate share of planned improvements.

II. INTRODUCTION

This transportation impact analysis has been prepared to support the proposed zone change and Conditional Use Permit for the 126,000 square foot Helicopter Transport Services facility in Aurora, Oregon. The site is currently zoned Exclusive Farm Use (EFU) and the proposed zone is Public (P). An airport use is a conditional use in the Public zone. The subject area is bound by the Aurora Airport to the west, vacant land to the north, Keil Road to the south, and Airport Road to the east. Figure 1 is a vicinity map indicating the property location.

PROJECT DESCRIPTION

The site is approximately 27.48 acres and is identified by Assessor's Map Township 4 Range 1W Section 11 Tax Lot 100 and Township 4 Range 1W Section 12b Tax Lot 400. There are currently two dwelling units on the property.

The Helicopter Transport Services facility is a repair station for the company's helicopters. The company's helicopters are located around the world at different sites, and generally are brought back to this maintenance facility once a year in the late fall (November) for major overhaul and repair during the winter months. After a several month overhaul and repair, the helicopters, pilot crews, mechanics, and fuel tank drivers, then return to service in the spring (April/May) to specific locations based on contract needs for firefighting services with the company's clients. Thus, the activities within the facility are all related to helicopter maintenance. Such use generally includes airframe, rotor, engine, electronics, and radio repair items. In addition, there is supporting administrative and management activities for the helicopter maintenance operation.

During the fire season, which runs from May through October/November, only support staff remain in the building, with an estimate of up to 30 employees working an 8:00 am - 5:00 pm shift. During the off-season, running from November through April, employment at the building will increase to up to 70 employees.

Site access is proposed to Keil Road at several locations. The number and location of access points will be refined based on site conditions and will comply with Marion County access and spacing standards. Figure 2 attached is the preliminary site plan.

SCOPE OF REPORT

As identified in our March 17, 2009 scope letter to Marion County, the zone change from EFU to P does not result in an increase in trip potential. For this reason, only the condition use application is addressed for conditions at buildout of the site.

Due to the project location, both the Marion County and the Oregon Department of Transportation (ODOT) have jurisdiction over certain study area intersections. Based on the March 17, 2009 scope letter, May 14, 2009 trip generation letter and conversations with County staff, the analysis study area includes the following intersections as well as the site access to Keil Road:

ODOT
- OR 551/Keil Road
- OR 551/Ehlen Road

Marion County
- Airport Road/Keil Road
- Airport Road/Ehlen Road

Analysis was conducted for the AM and PM peak hour for the following scenarios:

- 2009 Existing
- 2010 Pre-Development
- 2010 Post-Development

All correspondence is included in the appendix.

III. EXISTING CONDITIONS

TRANSPORTATION FACILITIES

The following summarizes the study area roadway classifications and descriptions:

TABLE 1 - ROADWAY CHARACTERISTICS						
Roadway	ODOT/City Classification	Posted Speed	Travel Lanes	Bike Lanes	On-Street Parking	Sidewalks
OR 551	Rural Arterial – Regional Hwy	50	2	No	No	No
Ehlen Road	Arterial	35/55	2	No	No	No
Airport Road	Major Collector	35/55	2	No	No	No
Keil Road	Local Road	25	2	No	No	No

Currently, the OR 551/Ehlen Road intersection is signalized. The other intersections are stop controlled for the minor street approach.

Figure 3 illustrates study area intersection existing lane configurations and traffic controls.

EXISTING TRAFFIC COUNTS

Traffic volume data was either collected at the study intersections between 7 AM – 9 AM and 4 AM – 6 PM in April, 2009 or agency supplied. Sixteen hour counts for the intersection of Ehlen Road/Airport Road were conducted by ODOT in 2008 and were used in review of signal warrants for that intersection.

Turning movement counts for OR 551 were not conducted in the peak month (August); therefore, a 3.2% seasonal volume adjustment was made using the 2008 Seasonal Trend Table, in accordance with ODOT standards. Calculations and raw count data are included in the appendix.

Figures 4A and 4B present 2009 intersection traffic volumes including the seasonally adjusted volumes on OR 551.

PLANNED PUBLIC IMPROVEMENTS

ODOT

The Draft 2010-2013 STIP (key number 16121) indicates improvements are scheduled to begin in 2012 at the OR 551/Ehlen Road intersection. Identified improvements include building left turn lanes on Ehlen Road and a traffic separator to limit Boones Ferry to right turns.

Marion County

The Marion County 2005 Rural Transportation Plan, Table 8-5 also identifies improvements are needed at the OR 551/Ehlen Road intersection. Potential improvements may include "*Left Turn Lane on Ehlen; possible realignment; possible traffic signal at Boones Ferry coordinated with State Highway signal*".

City of Aurora
The City of Aurora is currently in the process of a TSP update with public hearings scheduled for July 2009. According to City and County staff, a recommendation for a signal at the Ehlen Road/Airport Road intersection is expected to be included in the TSP.

CRASH ANALYSIS

When evaluating relative intersection safety, consideration is given to the total number and types of crashes occurring and the number of vehicles entering the intersection. This leads to the concept known as "crash rate", usually expressed in terms of the number of crashes occurring per one million vehicles entering the intersection (mev). Intersections having a crash rate less than 1.0/mev are generally considered relatively safe and with crash rates higher than 1.0/mev, consideration may be given to correcting operational problems.

Crash data for the study area intersections were provided by the ODOT Crash Analysis and Reporting Unit (CARU) for January 2003 through December 2007. The following table represents calculated crash rates at the study intersections for the five-year data period. Annual traffic entering the intersections was estimated by multiplying the average daily traffic (ADT) entering the intersection by 365. ADT was estimated by multiplying the intersection PM peak hour volumes by a factor of 10, which coincides with volumes found in the 2007 Oregon State Flow Map.

TABLE 2 – CRASH DATA

Intersection	2004	2005	2006	2007	2008	Total	Crash Rate
OR 551/Keil Road	2	5	1	4	1	13	0.72
OR 551/Ehlen Road	4	2	10	8	7	31	1.09
Airport Road/Keil Road	0	0	0	0	0	0	0.00
Airport Road/Ehlen Road	1	0	0	2	0	3	0.14

All study intersections have crash rates below the 1.0 mev threshold with the exception of the OR 551/Ehlen Road intersection, with a crash rate of 1.09/MEV.

The OR 551/Ehlen Road intersection is currently listed in the ODOT Highway Safety Improvement Program (HSIP) Top 5% Report. The report describes the problem as 43% of crashes turning related, with angle and rear-end type crashes also. It noted the Boones Ferry Road intersection approximately 260 feet to the west causing issues with back to back left turns and traffic backing up through the highway. It lists potential remedies as designated left turn lanes on Ehlen Road and a traffic separator restricting turn movements to and from Boones Ferry Road. The Draft 2010-2013 STIP (key number 16121) indicates improvements are scheduled to begin in 2012. A copy of the HSIP page is located in the appendix.

IV. PRE-DEVELOPMENT CONDITIONS

IN-PROCESS TRAFFIC VOLUMES

In-process traffic volumes are generated by approved projects not yet complete at the time of this analysis. County Staff has stated there are no significant in-process projects to be included in the analysis.

BACKGROUND TRAFFIC GROWTH

Background growth is general traffic growth not related to specific projects. These volumes represent anticipated growth in the project area over the planning period. Individual neighborhoods and streets may have higher growth rates in the short term, but the overall growth rate is averaged over the planning period.

The background traffic growth rate was based on the Marion County Rural Transportation Systems Plan (RTSP) and Automatic Traffic Recorder (ATR) 24-016 data. The RTSP, Table 6-2, included in appendix, presents anticipated 2025 daily traffic volumes. Growth rates for the study area roadways range from 1.8% to 2.5%.

ATR 24-016 is located 0.22 miles south of Ehlen Road on OR 551. Being near the study area and on the major study area roadway, this ATR is a fair representation of traffic growth in the area. The ATR data presents daily traffic volumes for years 1998-2007. The 10 year growth rate is 2.0% and the 5 year growth rate is 1.0%.

For the purposes of this study a conservative 2.5% growth rate was used for all future year analyses. Figures 5A and 5B illustrates one year of background traffic growth volumes for the AM and PM peak hour.

PRE-DEVELOPMENT TRAFFIC VOLUMES

Pre-Development traffic volumes are the sum of existing traffic volumes and background traffic growth. Figures 6A and 6B presents the 2010 Pre-Development volumes in the AM and PM peak hours.

V. SITE DEVELOPMENT

TRIP GENERATION

The Helicopter Transport use is best categorized using Institute of Transportation Engineers *Trip Generation,* Land Use – 110 (General Light Industrial). Based on the anticipated operation for Helicopter Transport, it is more appropriate to estimate trips based on employees than on building size. For purposes of this analysis, the higher winter employee estimate has been used to provide a "worst case" scenario. Based on discussions with County staff, average trip rates for the peak hour of the generator will be used in the trip generation estimates.

The anticipated trip generation is presented in the following table based on the number of employees.

TABLE 3 – TRIP GENERATION

Land Use (Code)	Employees	ADT	AM Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit
Light Industrial (110)	70	211	34	28	6	36	8	28

The proposed facility is anticipated to generate an additional 211 ADT, 34 AM and 36 PM peak hour trips. Truck trips are expected to be less than 30 per day.

TRIP DISTRIBUTION AND TRAFFIC ASSIGNMENT

Trip distribution and traffic assignment were based on a review study area traffic patterns and engineering judgment. In general, 30% of site trips are anticipated to travel north on OR 551, 10% south on OR 551, 20% both west and east on Ehlen Road, and 10% east on Arndt Road. Figures 7A and 7B illustrate trip distribution and traffic assignment for the AM and PM peak hours, respectively.

POST-DEVELOPMENT TRAFFIC VOLUMES

Post-Development traffic volumes are the sum of Pre-Development and proposed development traffic volumes. Figures 8A and 8B illustrate the 2010 Post-Development traffic volumes for the AM and PM peak hour, respectively.

VI. INTERSECTION AND ROADWAY ANALYSIS

OPERATION ANALYSIS DESCRIPTION

Intersection operation characteristics are generally defined by two measurements: volume-to-capacity (v/c) ratio and level-of-service (LOS). ODOT uses v/c ratio and the County uses LOS and delay to determine intersection performance. Since both agencies have roadways within the project impact area, both measurements are included in the analysis.

V/c ratio is a measurement of capacity used by a given traffic movement for an entire intersection. It is defined by the rate of traffic flow or traffic demand divided by the theoretical capacity. Based on the 1999 Oregon Highway Plan (OHP), OR 551 is a Regional Highway. The OHP requires a maximum v/c ratio of 0.70 be maintained on OR 551 at the study area intersections.

LOS is a measure of the average control delay (in seconds) experienced by drivers at an intersection and is described by a letter on the scale from 'A' to 'F'. LOS 'A' represents optimum operating conditions and minimum delay. LOS 'F' indicates over capacity conditions causing unacceptable delay. LOS 'D' is considered the acceptable minimum by Marion County (Marion County Department of Public Works Transportation Impact Analysis (TIA) Requirements).

PEAK HOUR FACTOR

The peak hour factor (PHF) is used to determine the design hour flow rate and is defined as the ratio of total hourly flow to the peak flow rate within the hour. For analyses contained in this report, 15-minute time increments are used to measure intersection approach volumes; therefore, the PHF is the total hourly volume of all approaches divided by 4 times the peak 15-minute total approach volume. As roads approach capacity, their peak hour factors approach 1.0.

PHFs were calculated for all study area intersections. For the 2010 analysis year, PHFs were assumed to remain consistent with existing 2009 PHFs. PHF calculations are included on the volume summary sheet.

OPERATION ANALYSIS

Operation analysis was conducted for the AM and PM peak hours using Synchro software and the Highway Capacity Manual Methodologies, and following ODOT's Analysis Procedures Manual. The following scenarios were analyzed:

- 2009 Existing
- 2010 Pre-Development
- 2010 Post-Development

In accordance with ODOT standards for areas outside the Portland MPO a saturation flow rate of 1,750 passenger cars per hour of green per lane was used in the analysis. This is consistent with Marion County's standard of 1,800 unless justified by a measurement at that location.

Calculation results are summarized in the following tables. Calculation sheets from the Synchro analysis are included in the appendix.

TABLE 4 – INTERSECTION OPERATIONS										
Intersection	Time Period	2009 Existing			2010 Pre-Development			2010 Post-Development		
OR 551/Keil Road	AM	22.7	0.26	C	23.7	0.27	C	24.9	0.30	C
	PM	31.8	0.28	D	33.7	0.30	D	35.6	0.36	E
OR 551/Ehlen Road	AM	30.0	0.74	C	32.0	0.76	C	32.6	0.77	C
	PM	32.5	0.81	C	35.1	0.83	D	35.6	0.83	D
Airport Road/Keil Road	AM	10.6	0.02	A	10.7	0.02	A	10.7	0.03	A
	PM	10.7	0.09	A	10.8	0.09	B	11.1	0.13	A
Airport Road/Ehlen Road	AM	17.0	0.14	C	17.5	0.15	C	17.9	0.15	C
	PM	46.7	0.75	E	53.6	0.80	F	59.0	0.84	F
Keil Road/Site Access	AM	-	-	-	-	-	-	8.7	0.01	A
	PM	-	-	-	-	-	-	8.8	0.03	A

Signalized/Unsignalized Criteria: Delay-v/c-LOS (unsignalized v/c reported for the critical movement)

The Keil Road approach to OR 551 is anticipated to operate at a 0.36 v/c and a level of service "E" with the addition of site trips. This is consistent with ODOT and Marion County standards for an unsignalized intersection.

The OR 551/Ehlen Road intersection does not meet ODOT's mobility standard of a 0.70 v/c, with an anticipated 0.83 in the PM peak hour pre-development scenario. The addition of site trips does not change the v/c, so no mitigation is required with the project. Both ODOT and Marion County have identified that dedicated left turn lanes are needed at this intersection to improve safety and capacity; identified on ODOT's Draft 2010-2013 STIP .

The Airport Road/Keil Road intersection will continue to operate at a level of service "A" with the addition of site trips.

The Airport Road/Ehlen Road intersection is expected to operate at a level of service "F" in 2010 PM peak hour conditions regardless of site development. AM peak hour operation would remain at level of service "C". The City of Aurora is considering adding a traffic signal at this intersection in their TSP. The project is expected to add 15 PM peak hour trips or a 1.3% increase over existing volumes.

For purposes of this analysis, one access was assumed to Keil Road. The number and locations of site accesses has yet to be determined.

QUEUING ANALYSIS

Queuing calculations were prepared for the OR 551 intersections in accordance with ODOT standards using SimTraffic software. The following table presents the queuing results at each of the study intersections.

TABLE 5 – QUEUE LENGTHS (FEET)								
Intersection	Approach	Movement	2009		2010			
			Existing		Pre-Development		Post-Development	
			AM	PM	AM	PM	AM	PM
OR 551/ Keil Road	EB	Lt, Th, Rt	75	50	50	50	75	75
	WB	Lt, Th, Rt	25	75	50	75	50	75
	NB	Lt, Th, Rt	25	25	25	25	50	25
	SB	Lt	50	25	50	25	75	25
OR 551/ Ehlen Road	EB	Lt, Th, Rt	975	2100	1500	2025	1300	2150
	WB	Lt, Th, Rt	375	300	550	300	300	275
	NB	Lt	125	100	125	75	125	75
		Th	350	275	375	575	425	275
		Rt	50	25	75	25	50	25
	SB	Lt	100	325	75	325	75	300
		Th	175	675	175	750	175	625
		Rt	100	200	100	200	100	200
Airport Road/ Keil Road	EB	Lt, Rt	25	50	25	50	50	50
	NB	Lt	25	0	0	0	0	0
Airport Road/ Ehlen Road	EB	Th, Rt	75	75	75	50	100	75
	SB	Lt, Rt	50	175	75	175	75	175

The addition of trips from the proposed Helicopter Transport Services facility has little impact on the anticipated queue lengths at the study intersections. Long queues are currently experienced on the Ehlen Road eastbound approach to OR 551, caused by the lack of a dedicated left turn lane. Both ODOT and Marion County have identified the need for dedicated left turn lanes, which would address the long queues currently occurring.

SIGNAL WARRANT ANALYSIS

The City of Aurora is currently considering including a traffic signal at the intersection of Ehlen Road with Airport Road in their TSP. Traffic signal warrants presented in the Manual on Uniform Traffic Control Devises were reviewed for this intersection with the post-development traffic volumes. Specifically, Warrants 1 – Eight Hour Vehicular Volume, 2 – Four-Hour Vehicular Volume, and 3 – Peak Hour were reviewed.

For Warrant 1 – Eight Hour Vehicular Volume, ODOT's 16 hour counts were used in the review. The count was conducted in 2008, so two years of background growth were added to the hourly volumes to estimate conditions in 2010, and 10 trips were added to both the minor and major streets (this is a worst case estimate as only 15 PM peak hour trips are added). The volume threshold is only met for three hours for both conditions A and B of the warrant. This warrant is not met, as eight hours must meet the volume thresholds.

Warrant 2 - Four-Hour Vehicular Volume was also reviewed using ODOT's 16 hour counts and the addition of background growth and site traffic. As shown on the warrant figure in the appendix, only three of the hours meet the volume standards. This warrant is not met.

The peak hour warrant was reviewed using PM peak hour volumes for the post-development scenario. The warrant is just met as shown in the attached figure.

With Warrants 1 and 2 not met with development of the site trips, and Warrant 3 just met, a signal is not recommended at this time.

Copies of the warrant worksheets and volume summaries are included in the appendix.

TURN LANE WARRANT ANALYSIS

The need for right and left turn lanes at the study area intersections was reviewed using ODOT's turn-lane criterion.

No right turn lane is currently provided on OR 551 at Keil Road northbound. With development of the site, volumes will not meet ODOT's Right Turn Lane Criterion for either AM or PM peak hours. ODOT's right turn figure is included in the appendix.

No left turn lanes are provided on OR 551 at the intersection with Keil Road. Given the high through volume on the highway (over 900 AM and 1200 PM vehicles per hour in both directions), the left turn lane criterion is met with only 10 left turns in an hour. Pre-development conditions include 23 AM peak hour. The addition of site trips increases the AM left turn volume to 29 trips. The PM volumes are only 6 left turns in the pre-development scenario, and 8 left turns with the addition of site trips. Only the AM peak hour volume meets the Left Turn Lane Criterion.

The need for a left turn lane was also reviewed on Ehlen Road at the intersection with Airport Road, where no turn lanes are currently provided. The ODOT left turn criterion is met for both the pre-development AM and PM peak hour conditions.

PEDESTRIAN AND BICYCLE

None of the roadways within the study area have striped bike lanes or sidewalks. A paved shoulder is currently provided on Ehlen Road.

VII. MITIGATION

The intersections of Ehlen Road with OR 551 and Airport Road currently do not meet operating standards even without the proposed Helicopter Transport Services facility. The project will add less than 2% to these intersections and have little impact above the pre-development conditions. Both intersections have improvements identified, including a traffic signal at Airport Road and dedicated left turn lanes at Ehlen Road. A warrant analysis indicates a traffic signal is not needed with the addition of site trips.

Existing traffic volumes at the intersection of OR 551 meet ODOT's left turn criterion for the AM peak hour. The site will add to the southbound left turn movement, increasing from the existing 22 to 29 left turns.

Costs for all of the identified future improvements would likely exceed the proportionate impacts of the Helicopter Transport Services facility. Therefore, it is recommended that the project contribute a proportionate share of planned improvements.

VIII. SUMMARY

This transportation impact analysis has been prepared to support the proposed zone change and Conditional Use Permit for the 126,000 square foot Helicopter Transport Services facility in Aurora, Oregon. The site is currently zoned Exclusive Farm Use (EFU) and the proposed zone is Public (P). An airport use is a conditional use in the Public zone. The 27.48 acre site is bound by the Aurora Airport to the west, vacant land to the north, Keil Road to the south, and Airport Road to the east. There are currently two dwelling units on the property.

As identified in our March 17, 2009 scope letter to Marion County, the zone change from EFU to P does not result in an increase in trip potential. For this reason, only the condition use application is addressed for conditions at buildout of the site. Both Marion County and the Oregon Department of Transportation (ODOT) have jurisdiction over study area intersections. This analysis addresses requirements of both jurisdictions. Analysis was conducted for the AM and PM peak hour for the 2009 Existing, 2010 Pre-Development and 2010 Post-Development.

The Helicopter Transport Services facility is a repair station for the company's helicopters. The company's helicopters are located around the world at different sites, and generally are brought back to this maintenance facility once a year in the late fall for major overhaul and repair during the winter months. After a several month overhaul and repair, the helicopters, pilot crews, mechanics, and fuel tank drivers, then return to service in the spring to specific locations based on contract needs for firefighting services with the company's clients. Thus, the activities within the facility are all related to helicopter maintenance. In addition, there is supporting administrative and management activities for the helicopter maintenance operation.

During the fire season which runs from May through October/November, only support staff remain in the building, with an estimate of up to 30 employees working an 8:00 AM -5:00 PM shift. During the off-season, running from November through April, employment at the building will increase to up to 70 employees.

The site plan and access locations are still in development. Access will be provided to Keil Road, and will comply with Marion County access and spacing standards.

Traffic volume data was either collected at the study intersections between 7 AM – 9 AM and 4 AM – 6 PM in April 2009, and sixteen hour counts for the intersection of Ehlen Road/Airport Road were conducted by ODOT in 2008. A seasonal volume adjustment was made to OR 551 volumes using the 2008 Seasonal Trend Table, in accordance with ODOT standards.

Improvements are planned at the OR 551/Ehlen Road intersection, as noted in the Draft 2010-2013 STIP (key number 16121), to include building left turn lanes on Ehlen Road and a traffic separator to limit Boones Ferry to right turns. The Marion County 2005 Rural Transportation Plan, Table 8-5 also identifies improvements are needed at the OR 551/Ehlen Road intersection. Potential improvements may include "*Left Turn Lane on Ehlen; possible realignment; possible traffic signal at Boones Ferry coordinated with State Highway signal*".

The City of Aurora is currently in the process of a TSP update with public hearings scheduled for July 2009. According to City and County staff, a recommendation for a signal at the Ehlen Road/Airport Road intersection is expected to be included in the TSP.

Crash data for the study area intersections were reviewed to determine crash rates. Only the intersection of OR 551 with Ehlen Road has a crash rate above 1.0 crashes per million entering vehicles, as has been noted in the ODOT Highway Safety Improvement Program (HSIP) Top 5% Report. The planned left turn improvements are expected to address the high crash rate.

Pre-development traffic conditions were estimated by adding one year of 2.5% background growth to existing volumes. County staff has stated there are no significant in-process projects to be included in the analysis.

Trip generation estimates for the Helicopter Transport Services facility were prepared using Institute of Transportation Engineers *Trip Generation,* Land Use – 110 (General Light Industrial) based on the anticipated peak seasonal 70 employees.

Based on discussions with County staff, average trip rates for the peak hour of the generator will be used. A total of 211 daily, 34 AM peak hour and 36 PM peak hour trips are anticipated. Truck trips are expected to be less than 30 per day.

Capacity calculations were prepared in accordance with ODOT standards using Synchro software, which follows the Highway Capacity Manual methodologies.

The intersection of OR 551 with Ehlen Road does not currently meet ODOT standards of v/c 0.70, and the addition of site trips does not decrease the v/c in the critical PM peak hour. Improvements have been identified for this intersection to include left turn lanes on Ehlen Road.

The Airport Road/Ehlen Road intersection is expected to operate at a level of service "F" in 2010 PM peak hour conditions regardless of site development, which is below Marion County standards. AM peak hour operation would remain at level of service "C". The City of Aurora is considering adding a traffic signal at this intersection in their TSP.

Queuing calculations were prepared for the OR 551 intersections in accordance with ODOT standards using SimTraffic software. The addition of trips from the proposed Helicopter Transport Services facility has little impact on the anticipated queue lengths at the study intersections. Long queues are currently experienced on the Ehlen Road eastbound approach to OR 551, caused by the lack of a dedicated left turn lane. Both ODOT and Marion County have identified the need for dedicated left turn lanes, which would address the long queues currently occurring.

Traffic signal warrants presented in the Manual on Uniform Traffic Control Devises were reviewed for the intersection of Ehlen Road with Airport Road, specifically Warrants 1 – Eight Hour Vehicular Volume, 2 – Four-Hour Vehicular Volume, and 3 – Peak Hour. ODOT's sixteen hour volumes were used as a basis for review of the eight and four hour warrants. With the addition of site trips, Warrants 1 and 2 not met, and Warrant 3 is just met. Based on this analysis, a traffic signal is not recommended at this time.

The need for right and left turn lanes at the study area intersections was reviewed using ODOT's turn-lane criterion. Right turn volumes on OR 551 at Keil Road will not meet ODOT's Right Turn Lane Criterion for either AM or PM peak hours.

No left turn lanes are provided on OR 551 at the intersection with Keil Road. Given the high through volume on the highway, the left turn lane criterion is met with only 10 left turns in an hour. The criterion is met with existing AM peak hour volumes, but not with the PM peak hour volumes for the southbound left turn movement.

The need for a left turn lane was also reviewed on Ehlen Road at the intersection with Airport Road, where no turn lanes are currently provided. The ODOT left turn criterion is met for both the pre-development AM and PM peak hour conditions.

With improvements already identified for the intersections of Ehlen Road with OR 551 and Airport Road, and costs that would exceed the proportionate impacts of the Helicopter Transport Services facility, it is recommended the project contribute a proportionate share of planned improvements.

IX. APPENDIX

A. Figures
B. Traffic Count Summaries
C. Crash Data
D. Background Growth
E. Capacity Calculations
F. Queuing Calculations
G. Warrant Analysis
H. Marion County and ODOT Scoping

CHAPTER 1: INTRODUCTION AND SUMMARY

This study evaluates the transportation impacts for the proposed Fred Meyer development located on the northeast corner of Boones Ferry Road and Bailey Street in the City of Wilsonville, Oregon. It also recommends mitigation measures to offset the impacts.

The currently proposed development includes a 155,881 square-foot Fred Meyer building (which includes the Fred Meyer store as well as 10,100 square feet of additional tenant space[1]), six other buildings (which include 50,879 square feet of retail/office use and a 3,316 square-foot restaurant), and 60 residential apartment units.[2] The site has four access points to the public street system: two on SW Boones Ferry Road and two on SW Bailey Street.

The study area for the project is shown in Figure 1 and was determined based on discussions with City staff. Within the study area, there are seven study intersections where traffic operations are analyzed:

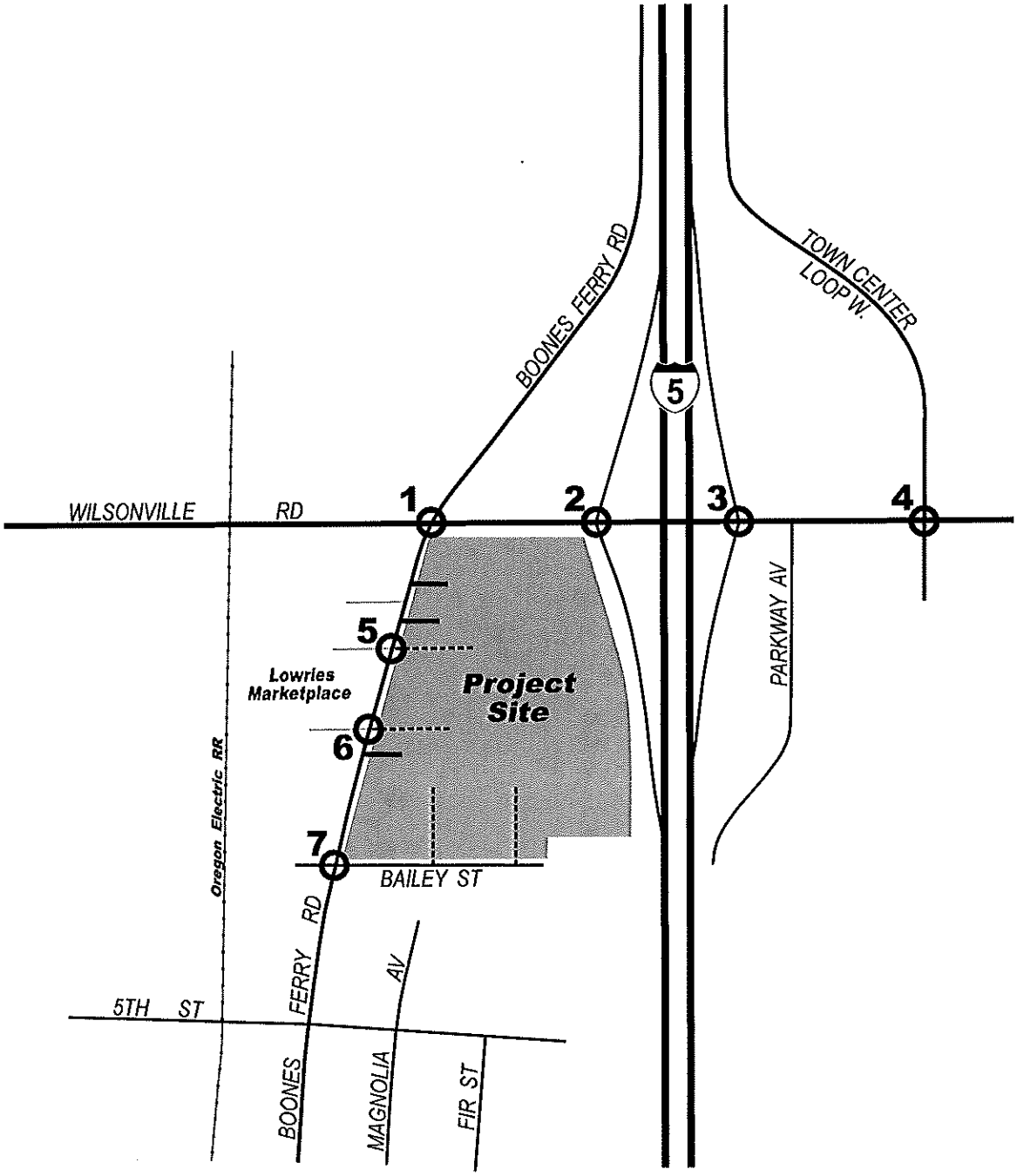
- Boones Ferry Road/Wilsonville Road
- I-5 Southbound Ramps/Wilsonville Road
- I-5 Northbound Ramps/Wilsonville Road
- Town Center Loop West/Wilsonville Road
- Boones Ferry Road/Fred Meyer north access
- Boones Ferry Road/Fred Meyer south access
- Boones Ferry Road/Bailey Street

Project traffic impacts were evaluated at the study intersections for the weekday PM peak hour. The impact analysis includes trip generation, trip distribution, PM peak hour project trips through the two City of Wilsonville I-5 interchange areas, and future traffic operating conditions. The analysis also accounts for developments in the area that have Stage II approval, including those under construction but not yet occupied. Recommended mitigations are then described and analyzed. Included in the mitigations section of Chapter 3 is a conceptual cross-section layout for Boones Ferry Road between Bailey Road and Wilsonville Road (see Figure 5).

Other issues addressed in this report include Saturday peak hour safety analysis and a project site evaluation (which addresses access location and spacing), sight distance, project frontage adjustments, traffic signal warrants, internal circulation, and parking. At the end of the report, a summary is presented of the recommended transportation mitigation measures that are expected to offset the negative transportation impacts of future traffic growth.

Table 1 lists important characteristics of the study area and proposed project.

[1] Tenant space within a Fred Meyer building is typically occupied by businesses providing additional goods or services, such as coffee shops or banks.
[2] Email from Christine McKelvey, Group Mackenzie, July 2, 2008.



LEGEND

1 - Study Intersection & Number

- - - - - - - - Proposed Fred Meyer Driveway

———— Existing Lowries Driveway

———— Existing Driveway to be Removed

DKS Associates
TRANSPORTATION SOLUTIONS

NO SCALE

Figure 1

STUDY AREA

TABLE 1: Study Area and Proposed Project Characteristics

Study Area	
Number of Study Intersections	7
Analysis Periods	Weekday PM Peak (4:00 p.m. to 6:00 p.m.) Saturday Midday Peak (11:00 a.m. to 1:00 p.m.)
Proposed Development	
Total Weekday PM Peak Hour Project Trips	1,255 (627 in, 628 out)
Non Pass-by[a] Weekday PM Peak Hour Project Trips	937 (468 in, 469 out)
Net New Weekday PM Peak Hour Project Trips	488 (244 in, 244 out)
Estimated Weekday PM Peak Hour Project Trips Through I-5/Wilsonville Road Interchange[b]	612 (768 new trips – 156 grandfathered trips)
Estimated Weekday PM Peak Hour Project Trips Through I-5/Elligsen Road Interchange	2
Vehicle Access Points	Four full access points: two on SW Boones Ferry Road and two on SW Bailey Street.
Project Vicinity	
Pedestrian Facilities	Sidewalks to be constructed along project frontage of Boones Ferry and Bailey Street with connection to Wilsonville Road.
Bicycle Facilities	Sidewalks and bike lanes on Boones Ferry Road and Wilsonville Road
Nearest Transit Stop	Boones Ferry Road (SMART Routes 1X and 203)

[a] Non-Pass-by project trips account for pass-by and internal trip reductions.
[b] The Wilsonville Road interchange area includes the Boones Ferry Road/Wilsonville Road intersection. Some of the new project trips that pass through this intersection are diverted trips.

Project Traffic Impact

To determine project impact at the study intersections, traffic operating conditions were analyzed at the study intersections during the weekday PM peak hour for the following four scenarios:

- Existing Conditions
- Existing plus Project
- Existing plus Stage II
- Existing plus Project plus Stage II

The study intersection operating conditions (assuming the existing roadway network) for the "Existing," "Existing plus Stage II," and "Existing plus Project plus Stage II" scenarios are listed in Table 2. Under existing conditions, all study intersections meet the City of Wilsonville LOS "D" standard and the Oregon Department of Transportation (ODOT) 0.99 volume-to-capacity (V/C) standard during the PM peak hour. With the addition of stage II traffic, both northbound and southbound ramps exceed operating standards. When project traffic is also added, all four study intersections on Wilsonville Road exceed operating standards. In addition, the two Fred Meyer development accesses on Boones Ferry Road operate below desired levels.

TABLE 2: Study Intersection Operating Conditions (PM Peak Hour)

Intersection	Operating Standard	Existing Conditions			Existing + Stage II			Existing + Stage II + Project		
		Delay	*LOS*	*V/C*	*Delay*	*LOS*	*V/C*	*Delay*	*LOS*	*V/C*
Signalized										
Boones Ferry Rd / Wilsonville Rd	LOS D	36.0	D	0.77	44.5	D	0.89	>80	**F**	>1.0
I-5 SB Ramps / Wilsonville Rd	LOS D, 0.99 V/C	36.1	D	0.90	79.1	**E**	**>1.0**	>80	**F**	**>1.0**
I-5 NB Ramps / Wilsonville Rd	LOS D, 0.99 V/C	37.2	D	0.91	70.9	**E**	**>1.0**	>80	**F**	**>1.0**
Town Center Loop W / Wilsonville Rd	LOS D	37.7	D	0.80	51.2	D	0.94	56.2	**E**	0.97
Unsignalized										
Boones Ferry Rd / North Project Access	-	12.7	A/B	0.13	13.9	A/B	0.18	>50	A/F	>1.0
Boones Ferry Rd / South Project Access	-	11.9	A/B	0.14	12.4	A/B	0.15	>50	A/F	0.71
Boones Ferry Rd / Bailey St	LOS D	10.9	A/B	0.06	11.6	A/B	0.06	13.8	A/B	0.12

Signalized intersections:
Delay = Average Stopped Delay per Vehicle (sec) for All Movements
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
Bold Underlined values do not meet standards.

Unsignalized intersections:
Delay = Average Stopped Delay per Vehicle (sec) at Worst Movement
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement
Bold Underlined values do not meet standards.

Planned Wilsonville Road Improvements

Due to capacity constraints at the I-5/Wilsonville Road interchange, improvements are planned that will provide additional capacity along Wilsonville Road between Boones Ferry Road and Town Center Loop West. Recently, the City has signed an intergovernmental agreement to construct the first phase of improvements, which will consist of a Wilsonville Road 6-lane enhanced alternative that focuses on ramp improvements and on adjustments to intersection lane configurations.

For the four study intersections on the Wilsonville Road corridor, a Synchro™ model of the improved Wilsonville Road cross-section was used to analyze intersection operating conditions for each of the three

future PM peak hour traffic scenarios (i.e., "Existing plus Project", "Existing plus Stage 2", and "Existing plus Project plus Stage 2"). The results of the analysis are listed in Table 3. As shown in the table, all four study intersections on Wilsonville Road comply with the City of Wilsonville LOS D operating standard for each of the three scenarios. The two I-5 ramps also meet the Oregon Department of Transportation (ODOT) 0.99 volume-to-capacity (V/C) standard.

TABLE 3: Future Operating Conditions of Wilsonville Road Intersections with Six-Lane Enhanced Alternative Improvements (PM Peak Hour)

Intersection	Operating Standard	Existing + Project + Improvements			Existing + Stage II + Improvements			Existing + Project + Stage II + Imps.		
		Delay	*LOS*	*V/C*	*Delay*	*LOS*	*V/C*	*Delay*	*LOS*	*V/C*
Signalized										
Boones Ferry Rd / Wilsonville Rd	LOS D	37.7	D	0.66	31.1	C	0.67	39.3	D	0.75
I-5 SB Ramps / Wilsonville Rd	LOS D	20.6	C	0.64	22.0	C	0.72	22.7	C	0.76
I-5 NB Ramps / Wilsonville Rd	LOS D	22.9	C	0.64	23.6	C	0.74	24.7	C	0.78
Town Center Loop W / Wilsonville Rd	LOS D	35.7	D	0.66	40.3	D	0.75	43.2	D	0.78

Delay = Average Stopped Delay per Vehicle (sec)
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
Bold Underlined values do not meet standards.

Project Impact Mitigations

To mitigate impacts at the north and south project accesses onto Boones Ferry Road, three Boones Ferry Road site frontage improvements are needed (these are in addition to the planned improvements to Boones Ferry Road that are shown on the Fred Meyer site plan):

- At the north Fred Meyer access, install a median along Boones Ferry Road to restrict movements to right-in/right-out for both the Lowries Marketplace and Fred Meyer developments; this will increase safety by removing turn lane needs at this access and will provide for better traffic flow (i.e. queuing spillback that impact Wilsonville Road). It will also accommodate turn lane placement and storage needs for the Boones Ferry Road/Wilsonville Road intersection's northbound approach traffic. Also, if desired, the north Fred Meyer access may be converted to a right-out only driveway and narrowed to one lane, which would allow additional space on the project site that could be used to increase a building pad size, the number of parking stalls, etc.
- Between the north and south Fred Meyer accesses, extend the second northbound through lane (which becomes a right turn lane at the Wilsonville Road intersection) to ensure approximately 600 feet of storage is provided for the northbound right turn lane at Wilsonville Road. This distance meets the short-term Fred Meyer needs and the long-term 20-year Wilsonville Road Interchange design needs.
- At the south Fred Meyer access, install a traffic signal to facilitate egress movements from the Lowries and Fred Meyer developments. There should also be two egress lanes (i.e., a right turn lane and a through-left lane). It is expected that warrants will be met in the near future due to the

addition of nearby developments. Installing the traffic signal with the Boones Ferry Road improvements will assure continuity between the improvements and the traffic signal construction. The signal should be coordinated with the Boones Ferry Road/Wilsonville Road signal. To enable the coordination, interconnect conduit and cable will need to be installed between the signals.

A conceptual layout of Boones Ferry Road that shows all improvements and mitigations is presented in Figure 5, which can be found in Chapter 3: Impact Analysis. The mitigated analysis results are listed in Table 4 for the north Fred Meyer access and the Boones Ferry Road/Bailey Street intersection and in Table 5 for both traffic control options at the south access (i.e., a traffic signal and four-way stop control). As shown in the tables, the three intersections have good operation levels and the two traffic control options for the south access are comparable to one another. The main benefits from the installation of the traffic signal are the ability to service platoon flow from the Boones Ferry Road/Wilsonville Road intersection and increased future capacity that will be available.

TABLE 4: Boones Ferry Road Mitigated Future Operating Conditions (PM Peak Hour)

Intersection	Operating Standard	Existing + Project + Stage II + Mitigated		
		Delay	*LOS*	*V/C*
Unsignalized – Two-way Stop Control				
Boones Ferry Rd / North Project Access	-	13.8	A/B	0.41
Boones Ferry Rd / Bailey St	LOS D	17.0	A/C	0.15

Delay = Average Stopped Delay per Vehicle (sec) at Worst Movement
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement
Bold Underlined values do not meet standards.

TABLE 5: South Project Access Mitigated Future Operating Conditions (PM Peak Hour)

Traffic Control at South Project Access	Existing + Project + Mitigated		
	Delay	*LOS*	*V/C*
Signalized (Option 1)	22.0	C	0.49
Four-way Stop Control (Option 2)	20.1	C	0.75

Delay = Average Stopped Delay per Vehicle (sec) for All Movements
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
Bold Underlined values do not meet standards.

Additional Project Oriented Transportation Mitigations

In addition to the Boones Ferry Road mitigations, the following project related measures would typically be required as conditions of approval if the project were approved:

Site Accesses

- The south Fred Meyer access on Boones Ferry Road should be aligned with the south Lowries Marketplace driveway (i.e., near Albertsons). In addition, regarding the Fred Meyer accesses on Bailey Street, the east access should be aligned with the driveway on the south side of the street and the west access should be located in a manner that it does not create conflicting turn movements with any nearby driveways on the south side of the street.
- The radius for the right-out movement at the north access on Boones Ferry Road should be designed to allow trucks to perform a right turn without encroaching on neighboring lanes.

Intersection Alignment

- Improvements to the Boones Ferry Road/Bailey Street intersection should be constructed to ensure that the east and west legs of Bailey Street are properly aligned (these legs currently are offset).

Sight Distance

- All proposed site driveways should meet American Association of State Highway and Transportation Officials (AASHTO) sight distance requirements[3], and prior to occupancy, sight distance at the access points will need to be verified, documented, and stamped by a registered professional Civil or Traffic Engineer licensed in the State of Oregon.
- The sight triangle at each driveway should be clear of objects (large signs, landscaping, parked cars, etc.) that could potentially limit vehicle sight distance.

Boones Ferry Road Adjustments

- The Fred Meyer development site frontage will require adjustments to accommodate the increased cross-section on Boones Ferry Road (as shown in Figure 5, which is found in Chapter 3: Impact Analysis). Adjustments at the southwest corner of the site may also be needed to ensure that the east and west legs of the Boones Ferry Road/Bailey Street intersection are properly aligned (currently, these legs are offset). Because the site plan does not show the curb locations on the west side of Boones Ferry Road or south side of Bailey Street, it is not clear what exact adjustments are needed.

Internal Circulation

- Site plan changes are recommended to convert the south access into the main access. One optional method for making the conversion is presented in Figure 8 (found in Chapter 5: Site Evaluation), which shows two conceptual changes: (1) realigning the internal roadways so that priority is given to vehicles coming and going to the south access and (2) installing four-way stop-control at the internal intersection near the south access.
- The site plan is not clear in the vicinity of the buildings, but it appears that the site would provide adequate pedestrian circulation. It should be ensured that the site indeed provides pedestrian access to the buildings and to the nearby crosswalks and paths (in particular, to the paths on the north side of the site that connect to Wilsonville Road).
- All sidewalks within the site should conform to ADA requirements.[4]

[3] *Geometric Design of Highways and Streets,* AASHTO, 2004; Case B1, p. 661.
[4] *ADA Accessibility Guidelines for Buildings and Facilities,* Department of Justice, January 1998.

Traffic Signal Warrants

- Though signal warrants are not met at any unsignalized study intersection for the "Existing plus Project plus Stage II" scenario, it was determined that the peak hour warrant will be met in the near future at the south Fred Meyer access; therefore, a traffic signal should be installed in conjunction with the Fred Meyer development. This will assure continuity between the Boones Ferry Road improvements and the traffic signal construction. The signal should be coordinated with the Boones Ferry Road/Wilsonville Road signal. To enable the coordination, interconnect conduit and cable will need to be installed between the signals.

Parking

- The proposed site provides only 885 parking stalls. This is not sufficient to meet City of Wilsonville code requirements, which specifies that a minimum of 962 stalls should be provided (based on the types of uses and the total building square footage of each use). During peak parking periods (such as holiday shopping periods), not meeting code requirements may cause parking demand to exceed the number of available stalls and oblige vehicles to park in adjacent commercial and/or residential areas; therefore, either 962 parking stalls should be provided to reduce potential off site parking impacts or a parking management plan should be prepared outlining how peak parking demand needs shall be met.
- The 138 bicycle parking spaces meet City code requirements and should be distributed throughout the development and should be located near building entrances in order to provide convenient access to each building.

PFB15.	Sidewalks and pedestrian linkages shall be in compliance with the ADA Accessibility Guidelines (ADAAG), as amended in 2004, and the 2005 Draft Public Rights-of-Way Accessibility Guidelines.
PFB16.	Prior to the City issuing a construction permit, the applicant shall submit the sanitary sewer construction plans to the Department of Environmental Quality for review and approval.
PFB17.	No surcharging of sanitary or storm water manholes is allowed.
PFB18.	The project shall connect to an existing manhole or install a manhole at each connection point to the public storm system and sanitary sewer system.
PFB19.	A City approved energy dissipation device shall be installed at all proposed storm system outfalls. Storm outfall facilities shall be designed and constructed in conformance with the Public Works Standards.
PFB20.	The applicant shall provide a 'stamped' engineering plan and supporting information that shows the proposed street light locations meet the appropriate AASHTO lighting standards for all proposed streets and pedestrian alleyways.
PFB21.	All required pavement markings, in conformance with the Transportation Systems Plan and the Bike and Pedestrian Master Plan, shall be completed in conjunction with any conditioned street improvements.
PFB22.	The proposed site plan and landscape plan shall depict adequate sight distance at all project driveways. The applicant shall maintain all landscaping to ensure that it does not interfere with adequate sight distance requirements at any project driveway.
PFB23.	Access requirements, including sight distance, shall conform to the City's Transportation Systems Plan (TSP) and be approved by the City Engineer.
PFB24.	Applicant shall design interior streets and aisles to meet specifications of Tualatin Valley Fire & Rescue, Allied Waste Management (United Disposal) and South Metro Area Regional Transit (SMART) for access and use of their vehicles.
Specific Comments:	
PFB25.	At the request of Staff, DKS Associates completed a Transportation Impact Study (TIS) dated November 22, 2004. This study looked at a 166,887 s.f. Fred Meyer store with additional 9,000 s.f. of retail pads and a 6,000 s.f. restaurant; total proposed development of 182,000 s.f.. At the request of staff, a new TIS was completed by DKS dated August 19, 2008. This new study looked at a 165,981 s.f. Fred Meyer building with an additional 51,879 s.f. of retail/office pads, a 3,316 s.f. restaurant and 60 residential apartment units; total proposed development of 221,176 s.f. plus 60 residential apartments. The applicant's traffic consultant has suggested a different methodology for calculating trips. Pursuant to the DKS study, the project is estimated to generate the following traffic impacts. Estimated Weekday PM Peak Hour Trips 1,255 Estimated Weekday PM Peak Hour Trips 768 Through Wilsonville Road Interchange Area Allowing for grandfathered trips from U.S. Bank and the demolished gas station, as well as accounting for pass-by trips and internal trips, the project is hereby limited to no more than the following impacts. Estimated Net New Weekday PM Peak Hour Trips 728 Estimated Weekday Net New PM Peak Hour Trips 612 Through Wilsonville Road Interchange Area
PFB26.	Applicant shall dedicate to the City sufficient rights-of-way along frontage on Boones Ferry Road to allow construction of the roadway sections as shown in Figure 5 of the DKS TIS

	report and from material submitted by the Old Town Square development team, specifically: From Wilsonville Road to north access driveway: 5-lane section (12-ft travel lanes and 14-ft northbound left turn lane with minimum 5-ft landscape median/pedestrian refuge) with two 5-ft bike lanes and on east side from back of rainwater flow-through planter a minimum 10-ft sidewalk/landscape area. From north access driveway to south access driveway: 4-lane section (12-ft travel lanes and 14-ft southbound left turn lane with minimum 5-ft landscape median/pedestrian refuge), with two 5-ft bike lanes, and on east side from back of rainwater flow-through planter a minimum 10-ft sidewalk/landscape area. From south access driveway to Bailey Street: 3-lane section (12-foot travel lanes with 14-ft northbound and southbound left turn lanes with minimum 5-ft landscape median/ pedestrian refuge), with two 5-ft bike lanes, and on east side from back of curb a 10-ft sidewalk/landscape area.
PFB27.	Applicant shall dedicate to ODOT/City of Wilsonville sufficient rights-of-way along frontage on Wilsonville Road to allow construction of a second westbound 14-ft left turn lane and a third eastbound 12-ft travel lane, and from back of curb a 12-ft wide sidewalk/landscape area.
PFB28.	Applicant shall dedicate to the City sufficient rights-of-way along frontage on Bailey Street to allow construction of the roadway section as shown in material submitted by the Old Town Square development team and from back of curb a 5-ft wide sidewalk area.
PFB29.	On Bailey Street, left turn pockets shall meet recommended lengths as determined by DKS Associates and approved by the City. Center lane areas not required for queue lengths shall be constructed as landscape medians.
PFB30.	Applicant shall provide sufficient PUE to allow the franchise utilities to construct necessary improvements, including installation of vaults, peds, conduit, and/or other facilities needed. Applicant shall coordinate on-site landscaping and pedestrian areas to incorporate the franchise utility improvements. The City will allow PGE to have conduit and cable in the easternmost 4 feet of the proposed Boones Ferry Road right-of-way.
PFB31.	Access to public rights-of-way shall be limited to the two proposed driveways on Boones Ferry Road and the two proposed driveways on Bailey Street. Proposed southern access driveway to Boones Ferry Road shall align centerlines with driveway on opposite side of roadway. Proposed eastern driveway to Bailey Street shall align centerlines with driveway on opposite side of the roadway.
PFB32.	The northern access driveway to Boones Ferry Road shall be limited to right-in / right out traffic movement only. The other three proposed driveways are allowed to have full turning access.
PFB33.	Applicant shall place adequate signage at the north and south access driveways on Boones Ferry Road to indicate the truck turning movements and prohibited movements as shown on submitted material.
PFB34.	The northern access driveway to Boones Ferry Road shall be designed with a sufficient radius to allow egress by WB65 trucks with limited impact on the middle travel lane and no impact on adjacent pedestrian sidewalks.
PFB35.	At the eastern access driveway to Bailey Street, material submitted indicates ingress turning movements for WB-65 trucks and buses are made from the through travel lane and not the left turn lane, and even so the movements are shown to conflict with the egress left turn lane. Applicant shall redesign this entrance so as to eliminate these conflicts and turning movements are made in a legal manner consistent with the Oregon Vehicular Code.