

Technical Memorandum

To: Bob Schunicht, P.E., Landform
From: Mike Spack, P.E., P.T.O.E.
Date: September 2, 2011
Re: The COR Traffic Generation in Ramsey, MN

Per your request, this technical memorandum provides traffic generation forecasts for Development Plan 5.03 of The COR along with traffic forecasts necessary to design the proposed roundabout at Ramsey Parkway and Sunwood Drive.

Traffic Forecast Results

Build out of The COR is forecast to generate approximately 3,700 vehicles in the a.m. peak hour, 5,600 vehicles in the p.m. peak hour, and 57,700 vehicles per day. The build out (2030) forecasts needed to design the roundabout at the Ramsey Parkway/Sunwood Drive intersection are shown in Figure 1 (a.m. peak hour turning movement volumes), Figure 2 (p.m. peak hour turning movement volumes), and Figure 3 (daily traffic volumes). The traffic forecasts are based on the methodology discussed in the next section.

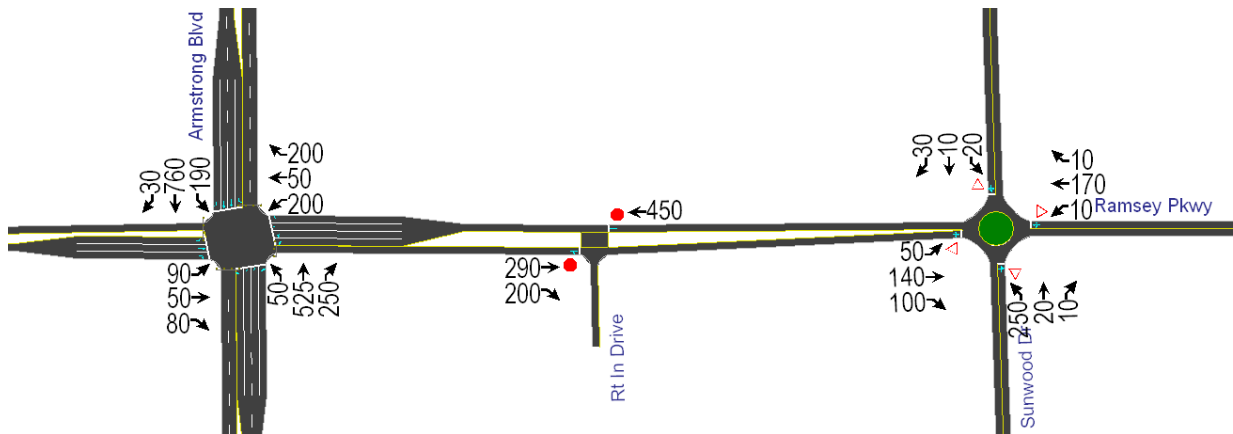


Figure 1 – Build Out A.M. Peak Hour Turning Movement Volumes

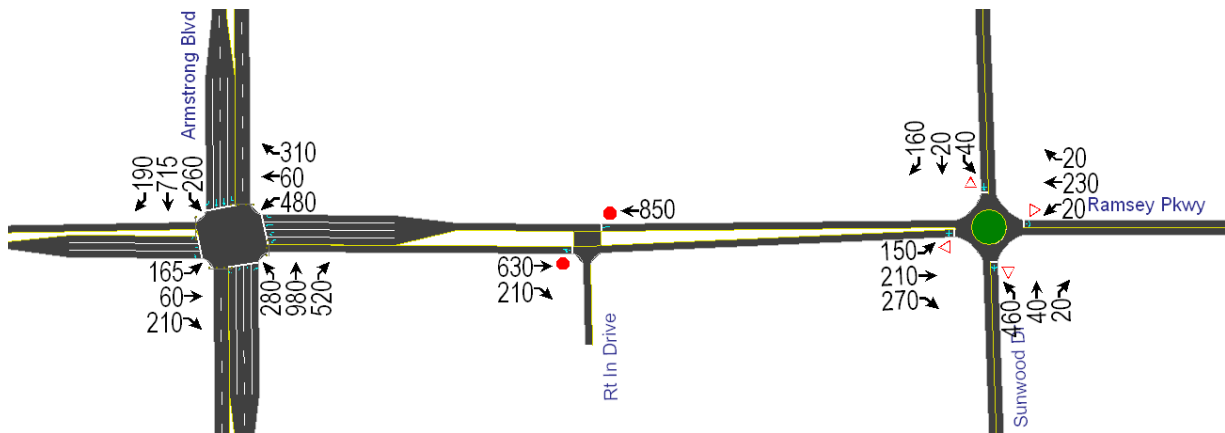


Figure 2 – Build Out P.M. Peak Hour Turning Movement Volumes**Figure 3 – Build Out Daily Traffic Volumes**

Traffic Forecast Methodology

Landform provided details for The COR, including the Traffic Analysis Zones (TAZs) shown in Figure 4 and individual land uses/square footages per TAZ as shown in Table 1. A trip generation analysis was performed for The COR based on the methods and average rates published in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 8th Edition*. Based on data in the Institute of Transportation Engineers (ITE) *Trip Generation Handbook, 2nd Edition*, a 20% reduction was applied to the trips generated by the development to account for internal, multi-purpose trips. The resultant trip generation per TAZ as well as totals for the whole development is shown in Table 1.

WSB & Associates prepared 2030 turning movement volume forecasts for the Armstrong Boulevard/Ramsey Parkway intersection in the *US 10 at Armstrong Boulevard Traffic Operations Memo*. The volumes entering/exiting The COR at the intersection were based on the March 24, 2003 *Ramsey Town Center Traffic Analysis* (The COR's previously proposed development plan). The *Ramsey Town Center Traffic Analysis* calculated the development will generate 51,186 vehicles per day whereas The COR is forecast to generate 57,739 vehicles per day. Since The COR is forecast to generate 12.8% more traffic than the Ramsey Town Center, the 2030 turning movement volumes entering/exiting The COR in the *US 10 at Armstrong Boulevard Traffic Operations Memo* were factored up by 12.8%. The resultant turning movement volumes for the Armstrong Boulevard/Ramsey Parkway intersection are shown in Figures 1 and 2.

The turning movement volume forecasts in Figures 1 and 2 for the Ramsey Parkway/Right-In Access intersection and the Ramsey Parkway/Sunwood Drive intersection were prepared by distributing the peak hour traffic volumes from Table 1 per the trip distribution percentages contained in the March 24, 2003 *Ramsey Town Center Traffic Analysis*.

According to Table 41 from *NCHRP Report 365 – Travel Estimation Techniques for Urban Planning*, 8.95% of the daily traffic volumes would be expected to use the roadway network through The COR in the p.m. peak hour. The p.m. peak hour volumes from Figure 2 were factored by this ratio (11.17 x p.m. peak hour volume = daily traffic volume) to develop the daily traffic volumes shown in Figure 3.



Figure 4 - Traffic Analysis Zones

Table 1 - Land Uses and Traffic Generation

Zone/Block	Code	Land Use	Dwelling Units	Sq. ft.	Park Area ¹ (sq. ft.)	ITE Code ²	AM Peak			PM Peak			Daily
							Total	In	Out	Total	In	Out	Total
1a	3	Retail		11,882		820	10	6	4	35	17	18	408
1b	3	Retail		9,022		820	7	4	3	27	13	14	310
1c	3	Supermarket		62,396		850	179	109	70	524	267	257	5103
1d	3	Retail		13,283		820	11	6	4	40	19	20	456
1e	3	Retail		7,300		820	6	4	2	22	11	11	251
2a	3	Retail		5,248		820	4	3	2	16	8	8	180
2b	3	Retail		39,000		820	31	19	12	116	57	59	1340
2c	2	Daycare Center		10,320		565	101	54	48	103	48	55	654
2d	1	Senior Housing - Assisted Living	84			254	9	6	3	15	7	8	179
3a	1	Luxury Apartments / Townhomes	230			220	94	19	75	114	74	40	1224
3a	3	Retail		67,085		820	54	33	21	200	98	102	2305
3b	2	Government Office Building		49,107		730	231	194	37	48	15	33	2708
3c	0	Park & Ride (Northstar) ³											
4a	2	Clinic		50,092		720	92	73	19	139	37	101	1448
4b	3	Sit Down Restaurant		9,037		931	6	3	3	54	36	18	650
4c	3	Hotel ⁴		24,900		310	14	9	6	15	8	7	209
4d	3	Convention Center ⁵		110,000		310	34	20	13	35	19	17	490
5a	2	Office		17,598		710	22	19	3	21	4	17	155
5b	2	Business Park		93,871		770	107	90	17	97	22	75	958
6a	2	School		44,827		520	186	104	82	43	20	24	553
6b	3	Retail		13,070		820	10	6	4	39	19	20	449
6c	3	Retail		17,987		820	14	9	6	54	26	27	618
6d	3	Retail		17,987		820	14	9	6	54	26	27	618
7a	2	Charter School ⁶		50,511		534	468	258	211	264	129	135	1405
7b	2	Medical Office		33,374		720	61	49	13	92	25	67	965
7c	3	Retail		24,780		820	20	12	8	74	36	38	851
8a	0	City Park w/ Lake			430,000								
8b	2	General Office		43,584		710	54	48	6	52	9	43	384
8c	2	General Office		43,584		710	54	48	6	52	9	43	384
9a	0	City Park w/ Lake			171,445								
9b	1	Apartments	95			220	39	8	31	47	31	16	505
9c	2	Recreational Community Center		107,556		495	139	85	54	125	46	79	1969
9d	2	General Office		59,696		710	74	65	9	71	12	59	526
9e	2	General Office		42,765		710	53	47	6	51	9	42	377
9f	2	General Office		59,208		710	73	65	9	71	12	59	522
10a	0	City Park			3,500								
10b	2	General Office		8,400		710	10	9	1	10	2	8	74
10b	3	Specialty Retail		4,200		820	3	2	1	13	6	6	144
10c	2	General Office		40,800		710	51	45	6	49	8	40	359
10c	1	Apartments	120			220	49	10	39	60	39	21	638
10d	2	General Office		11,500		710	14	13	2	14	2	11	101
10d	3	Specialty Retail		11,500		820	9	6	4	34	17	18	395
10e	2	General Office		8,500		710	11	9	1	10	2	8	75
10e	3	Specialty Retail		4,250		820	3	2	1	13	6	6	146
10f	2	General Office		11,900		710	15	13	2	14	2	12	105
10f	3	Specialty Retail		8,500		820	7	4	3	25	12	13	292
10f	1	Apartments	14			220	6	1	5	7	5	2	74
10g	3	Specialty Retail		7,600		820	6	4	2	23	11	12	261
10g	2	General Office		7,600		710	9	8	1	9	2	8	67
10g	1	Apartments	18			220	7	1	6	9	6	3	96
10h	3	Specialty Retail		6,300		820	5	3	2	19	9	10	216
10i	3	Specialty Retail		6,100		820	5	3	2	18	9	9	210
10i	2	General Office		6,100		710	8	7	1	7	1	6	54
10i	1	Apartments	26			220	11	2	8	13	8	5	138
11a	3	Specialty Retail		17,000		820	14	8	5	51	25	26	584
11a	1	Apartments	89			220	36	7	29	44	29	15	473
11b	2	General Office		11,000		710	14	12	2	13	2	11	97
11b	1	Apartments	13			220	5	1	4	6	4	2	69
11c	2	General Office		20,700		710	26	23	3	25	4	20	182
11d	2	General Office		10,700		710	13	12	2	13	2	11	94
11d	3	Specialty Retail		10,700		820	9	5	3	32	16	16	368
11e	2	General Office		5,900		710	7	6	1	7	1	6	52
11e	3	Specialty Retail		11,800		820	9	6	4	35	17	18	405
11e	1	Apartments	14			220	6	1	5	7	5	2	74
11f	3	Specialty Retail		11,800		820	9	6	4	35	17	18	405
11f	2	General Office		5,900		710	7	6	1	7	1	6	52
11f	1	Apartments	14			220	6	1	5	7	5	2	74
11g	0	City Park			82,804								
12a	3	Sit Down Restaurant		23,355		931	15	8	8	140	94	46	1681
12b	3	Sit Down Restaurant		8,805		931	6	3	3	53	35	17	634
12c	3	Movie Theater ⁷		74,071		444	0	0	0	225	144	81	1733
13a	3	Retail		19,200		820	15	9	6	57	28	29	660
13b	3	Retail		16,664		820	13	8	5	50	24	25	572
14a	3	Gas Station w/Convenience Store ⁸		5,000		945	317	162	155	388	194	194	1563
14b	3	Retail		10,628		820	9	5	3	32	16	16	365
14c	3	Fast Food Restaurant w/Drive-Through		4,800		934	190	97	93	129	67	62	1905
15	3	Shopping Center		135,986		820	109	66	42	406	199	207	4671
16	3	Retail		94,960		820	76	46	30	283	139	145	3262

Table 1 - Land Uses and Traffic Generation

Zone/Block	Code	Land Use	Dwelling Units	Sq. ft.	Park Area ¹ (sq. ft.)	ITE Code ²	AM Peak			PM Peak			Daily
							Total	In	Out	Total	In	Out	Total
17a	3	Sit Down Restaurant		6,000		931	4	2	2	36	24	12	432
17b	3	Sit Down Restaurant		5,470		931	4	2	2	33	22	11	394
17c	3	Sit Down Restaurant		5,470		931	4	2	2	33	22	11	394
17d	0	City Park w/ Lake			480,000								
18a	1	Condos	80			230	28	5	23	33	22	11	372
18b	1	Condos	69			230	24	4	20	29	19	9	321
18c	1	Condos	48			230	17	3	14	20	13	7	223
18d	1	Townhomes	32			230	11	2	9	13	9	4	149
19a	1	Townhomes	52			230	18	3	15	22	14	7	242
19b	1	Single Family - Detached	14			210	8	2	6	11	7	4	107
19c	1	Townhomes	31			230	11	2	9	13	9	4	144
20a	1	Townhomes	42			230	15	3	12	17	12	6	195
20b	1	Single Family - Detached	14			210	8	2	6	11	7	4	107
20c	1	Townhomes	28			230	10	2	8	12	8	4	130
21a	1	Townhomes	77			230	27	5	22	32	21	11	358
21b	1	Townhomes	90			230	32	5	26	37	25	12	418
22a	1	Single Family - Detached	23			210	14	3	10	19	12	7	176
22b	1	Townhomes	72			230	25	4	21	30	20	10	335
23a	1	Single Family - Detached	44			210	26	7	20	36	22	13	337
23b	1	Single Family - Detached	19			210	11	3	9	15	10	6	145
24a	1	Single Family - Detached	7			210	4	1	3	6	4	2	54
24b	0	City Park w/ Lake & Amphitheater			320,000								
24c	1	Single Family - Detached	17			210	10	3	8	14	9	5	130
Total			1,476	1,798,229	1,487,749		3,726	2,186	1,540	5,571	2,696	2,875	57,739
Residential Total (Code 1)			1,476	0			569	116	453	699	454	245	7,489
Office Total (Code 2)			0	855,093			1,903	1,360	543	1,406	427	979	14,319
Retail Total (Code 3)			0	943,136			1,255	710	544	3,467	1,815	1,651	35,930
			1,476	1,798,229			3,726	2,186	1,540	5,571	2,696	2,875	57,739

Notes:

¹ Due to the minimal amount of traffic generated by parks, they were not considered traffic generators in the original study. Likewise, parks are not considered traffic generators in this forecast.

² The trip generation was based on the methods and average rates published in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 8th Edition*.

³ The traffic generated by the park and ride was included in the analysis of the original study, however the unspecified volumes were added directly to the intersection traffic assignment instead of being listed with the other trip generation numbers. Accordingly, the traffic volumes generated by the park and ride facility are not considered with the rest of the generated traffic in this forecast.

⁴ The number of dwelling units (DU) for the hotel was obtained by proportioning the proposed hotel to the hotel in the original study via their respective footprints. The hotel was modeled as having 32 rooms.

⁵ Currently, there is no data for traffic volumes generated by Convention Centers. The Convention Center was modeled as a 75-unit Hotel (310).

⁶ Currently, there is no data for daily traffic volumes generated by 534 - Private School (K-8). For public elementary, junior high, and high schools, the ratio of the total daily traffic to the A.M. peak hour traffic is approximately 3.0. The total daily traffic generated by the charter school was calculated by multiplying the A.M. peak hour traffic by a factor of 3.0.

⁷ Due to the lack of data for the proposed theater type (445 - Multiplex Movie Theater), the daily and P.M. peak hour trips generated by the theater were obtained by scaling up the figures found in the original study using the theaters' respective footprints.

⁸ Due to the lack of data for total weekday trips generated by 945 - Gas Station w/Convenience Store using square footage, the total weekday trips were calculated using the number of fueling positions. Based on the typical size of gas stations currently being constructed, it was assumed that new gas station will have 12 fueling positions.

The forecasts reflect a 20% reduction for internal, multi-purpose trips.