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Appendix A. Sample Program Summary Report of *Satellite Viewsheds*

```
Satellite Visibility Program Summary Report
-------------------------------------------

Test Date:  April 14, 2005  GMT -4
Horizon mask angle: 10 deg
Number of test times:  2
Two-Line Element Set file:  gps_4_14.txt

Working directory:  C:\Thesis\Final\
Surface model grid:  "campus_3"
Center of grid:  37.230 deg N, 80.420 deg W
Spatial reference of grid:  NAD_1983_StatePlane_Virginia_South_FIPS_4502_Feet
Z-units of grid:  Feet
Z-Factor:  1

Location of output grids:  C:\Thesis\Final\TimeRangeGrids\
Output grids:  MaxVisSats, BestTime


Test time:  10:33:00 AM, GMT -4

Satellite       Az (deg)        El (deg)        Coverage (%)
---------       --------        --------        ------------
PRN 15             216.2           -70.0                   0
PRN 24              53.6            26.7               84.07
PRN 25               2.9           -15.2                   0
PRN 26             213.4           -26.5                   0
PRN 27             129.3           -27.8                   0
PRN 01             355.5           -15.6                   0
PRN 29             199.0           -21.2                   0
PRN 31             109.8            25.4               79.74
PRN 07             103.6            44.4               89.43
PRN 09             257.6             7.5                   0
PRN 05             301.7            36.2               87.85
PRN 04              19.3            67.9               95.99


Test time:  10:35:00 AM, GMT -4

Satellite       Az (deg)        El (deg)        Coverage (%)
---------       --------        --------        ------------
PRN 15             217.0           -69.5                   0
PRN 24              54.1            25.9               83.57
PRN 25               2.3           -14.9                   0
PRN 26             212.6           -26.4                   0
PRN 27             128.5           -27.7                   0
PRN 01             354.9           -16.0                   0
PRN 29             198.4           -20.9                   0
PRN 31             110.5            24.7               79.17
PRN 07             104.6            43.7               89.23
PRN 09             256.9             7.0                   0
PRN 05             300.9            36.7               87.99
PRN 04              20.8            67.2               95.85


BestTime grid key:

'Value'         Best Time
-------         ---------

-1              Never
0               10:33:00 AM
1               10:35:00 AM
999             Any time
```

Appendix B. Field Test Data: Observed and Predicted Number of Visible Satellites

				Number of Visible Satellites		
Date	**Point No.**	**Time**	**PDOP**	**Observed**	**Predicted**	**Discrepancy**
11-Apr	1	14:05	5.97	6	6	0
11-Apr	2	14:10	5.73	5	5	0
11-Apr	3	14:12	8.94	4	4	0
11-Apr	4	14:23	2.95	6	7	1
11-Apr	5	14:29	2.97	6	6	0
11-Apr	6	14:35	8.57	4	4	0
11-Apr	7	14:43	2.95	6	6	0
11-Apr	8	14:47	9.16	4	4	0
11-Apr	9	14:51	5.91	5	5	0
11-Apr	10	14:59	2.05	7	7	0
11-Apr	11	15:05	2.04	7	6	-1
11-Apr	12	15:11	4.25	6	6	0
11-Apr	13	15:17	2	7	7	0
11-Apr	14	15:23	1.99	7	7	0
11-Apr	15	15:28	1.97	7	7	0
11-Apr	16	15:35	1.97	7	6	-1
11-Apr	17	15:41	2.31	7	6	-1
11-Apr	18	15:47	3.02	5	5	0
11-Apr	19	15:55	2.97	6	6	0
11-Apr	20	15:59	2.49	6	6	0
14-Apr	1	10:33	3.66	5	5	0
14-Apr	2	10:35	4.38	4	4	0
14-Apr	3	10:40	2.77	5	5	0
14-Apr	4	10:43	8.61	3	4	1
14-Apr	5	10:46	6.33	4	4	0
14-Apr	6	10:49	3.31	7	7	0
14-Apr	7	10:52	6.61	4	4	0
14-Apr	8	10:58	2.06	5	5	0
14-Apr	9	11:02	1.97	8	8	0
14-Apr	11	11:11	3.15	6	6	0
14-Apr	12	11:15	3.21	5	5	0
14-Apr	13	11:18	3.24	5	5	0
14-Apr	14	11:22	2.32	7	7	0
14-Apr	15	11:25	3.74	6	6	0
14-Apr	16	11:29	2.55	6	7	1
14-Apr	17	11:37	4.38	5	5	0
14-Apr	18	11:39	2.77	5	5	0
14-Apr	19	11:42	3.8	5	4	-1
14-Apr	20	11:48	7.43	4	4	0
14-Apr	21	11:53	2.8	6	6	0
14-Apr	22	11:58	6.83	4	4	0
14-Apr	23	12:01	3.43	5	5	0
14-Apr	25	12:17	2.4	7	7	0
14-Apr	26	12:22	5.78	4	4	0

Appendix C. Field Test Data: Observed and Predicted Satellite Look Angles

				Observation		*Prediction*		*Discrepancy*	
Date	**Time**	**Pt. No.**	**Satellite**	**Azimuth**	**Elevation**	**Azimuth**	**Elevation**	**Azimuth**	**Elevation**
15-Apr	10:33	1	PRN 10	195	19	195	20	0	1
15-Apr	10:33	1	PRN 2	270	52	271	54	1	2
15-Apr	10:33	1	PRN 31	110	23	110	25	0	2
15-Apr	10:33	1	PRN 4	21	67	19	68	-2	1
15-Apr	10:33	1	PRN 5	301	36	301	36	0	0
15-Apr	10:35	2	PRN 2	272	53	273	54	1	1
15-Apr	10:35	2	PRN 31	111	23	111	25	0	2
15-Apr	10:35	2	PRN 4	23	66	21	67	-2	1
15-Apr	10:35	2	PRN 5	300	37	301	37	1	0
15-Apr	10:40	3	PRN 10	195	22	195	23	0	1
15-Apr	10:40	3	PRN 2	274	54	276	56	2	2
15-Apr	10:40	3	PRN 31	112	22	112	23	0	1
15-Apr	10:40	3	PRN 4	25	65	25	65	0	0
15-Apr	10:40	3	PRN 5	298	38	299	39	1	1
15-Apr	10:43	4	PRN 10	195	24	195	25	0	1
15-Apr	10:43	4	PRN 31	113	20	112	22	-1	2
15-Apr	10:43	4	PRN 4	28	63	27	64	-1	1
15-Apr	10:46	5	PRN 10	195	25	196	26	1	1
15-Apr	10:46	5	PRN 2	279	56	280	57	1	1
15-Apr	10:46	5	PRN 4	30	62	28	63	-2	1
15-Apr	10:46	5	PRN 5	294	39	296	39	2	0
15-Apr	10:49	6	PRN 10	195	27	196	27	1	0
15-Apr	10:49	6	PRN 13	88	14	88	15	0	1
15-Apr	10:49	6	PRN 2	281	57	283	58	2	1
15-Apr	10:49	6	PRN 24	57	21	58	21	1	0
15-Apr	10:49	6	PRN 31	115	18	115	20	0	2
15-Apr	10:49	6	PRN 4	31	61	30	62	-1	1
15-Apr	10:49	6	PRN 5	293	40	293	40	0	0
15-Apr	10:52	7	PRN 2	284	58	285	59	1	1
15-Apr	10:52	7	PRN 31	116	17	116	18	0	1
15-Apr	10:52	7	PRN 4	34	59	32	61	-2	2
15-Apr	10:52	7	PRN 5	291	41	293	40	2	-1
15-Apr	10:58	8	PRN 2	289	60	290	61	1	1
15-Apr	10:58	8	PRN 30	317	14	318	14	1	0
15-Apr	10:58	8	PRN 31	118	15	118	16	0	1
15-Apr	10:58	8	PRN 4	37	57	36	58	-1	1
15-Apr	10:58	8	PRN 5	287	41	288	41	1	0
15-Apr	11:02	9	PRN 10	197	33	197	33	0	0
15-Apr	11:02	9	PRN 13	81	17	82	17	1	0
15-Apr	11:02	9	PRN 2	293	60	293	62	0	2
15-Apr	11:02	9	PRN 24	61	16	61	17	0	1
15-Apr	11:02	9	PRN 30	316	16	317	16	1	0
15-Apr	11:02	9	PRN 31	119	14	119	15	0	1
15-Apr	11:02	9	PRN 4	39	56	39	57	0	1
15-Apr	11:02	9	PRN 5	285	42	286	42	1	0
15-Apr	11:11	11	PRN 10	197	37	198	38	1	1
15-Apr	11:11	11	PRN 13	78	18	79	18	1	0
15-Apr	11:11	11	PRN 2	300	62	301	63	1	1
15-Apr	11:11	11	PRN 24	63	14	63	14	0	0
15-Apr	11:11	11	PRN 4	43	53	42	54	-1	1
15-Apr	11:11	11	PRN 5	279	43	281	43	2	0

Appendix C. Field Test Data: Observed and Predicted Satellite Look Angles (continued)

				Observation		*Prediction*		*Discrepancy*	
Date	**Time**	**Pt. No.**	**Satellite**	**Azimuth**	**Elevation**	**Azimuth**	**Elevation**	**Azimuth**	**Elevation**
15-Apr	11:15	12	PRN 10	198	39	198	40	0	1
15-Apr	11:15	12	PRN 2	304	63	305	64	1	1
15-Apr	11:15	12	PRN 30	313	19	313	19	0	0
15-Apr	11:15	12	PRN 4	44	51	44	52	0	1
15-Apr	11:15	12	PRN 5	277	43	278	43	1	0
15-Apr	11:18	13	PRN 2	307	64	308	65	1	1
15-Apr	11:18	13	PRN 24	65	11	65	11	0	0
15-Apr	11:18	13	PRN 30	312	20	313	20	1	0
15-Apr	11:18	13	PRN 4	46	50	46	50	0	0
15-Apr	11:18	13	PRN 5	275	43	276	43	1	0
15-Apr	11:22	14	PRN 10	199	42	199	43	0	1
15-Apr	11:22	14	PRN 13	73	19	73	19	0	0
15-Apr	11:22	14	PRN 2	310	64	312	65	2	1
15-Apr	11:22	14	PRN 24	66	10	66	10	0	0
15-Apr	11:22	14	PRN 30	311	21	312	21	1	0
15-Apr	11:22	14	PRN 4	47	49	47	50	0	1
15-Apr	11:22	14	PRN 5	273	43	273	43	0	0
15-Apr	11:25	15	PRN 10	199	44	199	45	0	1
15-Apr	11:25	15	PRN 13	71	19	72	20	1	1
15-Apr	11:25	15	PRN 2	314	65	315	65	1	0
15-Apr	11:25	15	PRN 30	310	22	311	22	1	0
15-Apr	11:25	15	PRN 4	49	48	49	49	0	1
15-Apr	11:25	15	PRN 5	271	43	272	43	1	0
15-Apr	11:29	16	PRN 10	200	46	200	47	0	1
15-Apr	11:29	16	PRN 13	70	19	70	20	0	1
15-Apr	11:29	16	PRN 2	318	65	320	66	2	1
15-Apr	11:29	16	PRN 30	308	23	309	23	1	0
15-Apr	11:29	16	PRN 4	50	47	50	48	0	1
15-Apr	11:29	16	PRN 5	268	42	270	43	2	1
15-Apr	11:37	17	PRN 10	201	50	201	51	0	1
15-Apr	11:37	17	PRN 2	328	66	329	67	1	1
15-Apr	11:37	17	PRN 30	305	25	306	25	1	0
15-Apr	11:37	17	PRN 4	58	44	56	45	-2	1
15-Apr	11:37	17	PRN 5	263	42	265	42	2	0
15-Apr	11:39	18	PRN 10	201	51	201	51	0	0
15-Apr	11:39	18	PRN 13	65	20	66	20	1	0
15-Apr	11:39	18	PRN 2	331	66	332	67	1	1
15-Apr	11:39	18	PRN 30	304	25	306	25	2	0
15-Apr	11:39	18	PRN 4	54	43	54	44	0	1
15-Apr	11:42	19	PRN 10	202	53	202	53	0	0
15-Apr	11:42	19	PRN 2	335	67	335	67	0	0
15-Apr	11:42	19	PRN 30	303	26	304	26	1	0
15-Apr	11:42	19	PRN 4	56	42	55	44	-1	2
15-Apr	11:42	19	PRN 5	260	41	260	41	0	0
15-Apr	11:48	20	PRN 13	60	20	61	20	1	0
15-Apr	11:48	20	PRN 2	342	67	343	67	1	0
15-Apr	11:48	20	PRN 4	58	40	58	41	0	1
15-Apr	11:48	20	PRN 7	129	18	129	17	0	-1
15-Apr	11:53	21	PRN 10	204	59	204	59	0	0
15-Apr	11:53	21	PRN 13	58	19	59	19	1	0
15-Apr	11:53	21	PRN 2	348	67	349	68	1	1

Appendix C. Field Test Data: Observed and Predicted Satellite Look Angles (continued)

				Observation		*Prediction*		*Discrepancy*	
Date	**Time**	**Pt. No.**	**Satellite**	**Azimuth**	**Elevation**	**Azimuth**	**Elevation**	**Azimuth**	**Elevation**
15-Apr	11:53	21	PRN 30	298	28	299	28	1	0
15-Apr	11:53	21	PRN 4	60	39	60	40	0	1
15-Apr	11:53	21	PRN 5	253	39	255	40	2	1
15-Apr	11:58	22	PRN 13	56	19	56	19	0	0
15-Apr	11:58	22	PRN 2	354	67	353	67	-1	0
15-Apr	11:58	22	PRN 4	62	37	61	38	-1	1
15-Apr	11:58	22	PRN 7	131	14	131	14	0	0
15-Apr	12:01	23	PRN 10	207	64	207	65	0	1
15-Apr	12:01	23	PRN 13	54	19	53	20	-1	1
15-Apr	12:01	23	PRN 2	0	67	1	66	1	-1
15-Apr	12:01	23	PRN 4	64	36	65	36	1	0
15-Apr	12:01	23	PRN 5	248	37	248	37	0	0
15-Apr	12:17	25	PRN 10	212	71	212	72	0	1
15-Apr	12:17	25	PRN 13	48	17	49	17	1	0
15-Apr	12:17	25	PRN 2	17	65	16	66	-1	1
15-Apr	12:17	25	PRN 30	286	30	287	31	1	1
15-Apr	12:17	25	PRN 4	69	31	71	31	2	0
15-Apr	12:17	25	PRN 5	241	33	241	33	0	0
15-Apr	12:17	25	PRN 6	312	16	311	16	-1	0
15-Apr	12:22	26	PRN 10	214	73	214	73	0	0
15-Apr	12:22	26	PRN 13	46	16	46	17	0	1
15-Apr	12:22	26	PRN 2	21	65	20	65	-1	0
15-Apr	12:22	26	PRN 4	70	30	70	30	0	0

Vita

Matthew Ryan Germroth

Matt Germroth was born on August 11, 1981 in Henrico County, Virginia, to Rick and Bonnie Germroth. He graduated from Oakton High School in Vienna, Virginia, in 1999 and attended Virginia Tech in Blacksburg, Virginia, where he received a Bachelor of Science degree in Aerospace Engineering and a minor in Mathematics in 2003. While an undergraduate, Matt interned for two summers at The Aerospace Corporation and also served as Vice President of the Virginia Tech Chapter of Sigma Gamma Tau, a national honor society in Aerospace Engineering.

Matt became a graduate student at Virginia Tech in 2003 and graduated with a Masters of Science in Geography in the spring of 2005, with a concentration on GIS. During his time as a graduate student, Matt served as both a Research Assistant and a Teaching Assistant. As a Teaching Assistant, he graded assignments and taught labs for Dr. Carstensen's Introduction to GIS course. As a Research Assistant, Matt maintained the website of the Virginia Geographic Alliance and assisted with the VirginiaView Remote Sensing Consortium's application for membership with AmericaView. Matt also worked for the Center for Geospatial Information Technology, where he created hazard risk assessment maps for several Virginia Planning District Commissions and designed a facility inventory system in ArcGIS for the College of Engineering at Virginia Tech. During the summer of 2004, Matt worked for BAE Systems in McLean, Virginia, assisting with the creation of a terrain modeling facility. He began working for BAE full-time in June of 2005.