

Chapter 6

Conclusions and Recommendations

6.1 Introduction

The goal of this project has been to aid the Virginia Department of Transportation in improving the post-hurricane recovery of highway signs, lights, and signals through the assessment of risks, costs and benefits of alternative plans.

6.2 Conclusions

6.2.1 Need for Recovery Management

VDOT's need for hurricane recovery of signs, signals, and lights stems from the 1997 workshop to which sessions were devoted to this topic. In this seminar concern was expressed about the state-of-readiness of Virginia, especially in areas such as the Suffolk district, where the economy and population have grown extensively in the last fifteen years. It was deemed that analysis must begin on the feasibility of different preparation techniques and recovery tactics.

6.2.2. Four Approaches

Four major issues associated with recovery were identified and determined to be beneficial to the overall analysis of hurricane preparedness. Figure 6.1 shows the four approaches taken in this study.

Recovery Management of Signs, Signals, and Lights

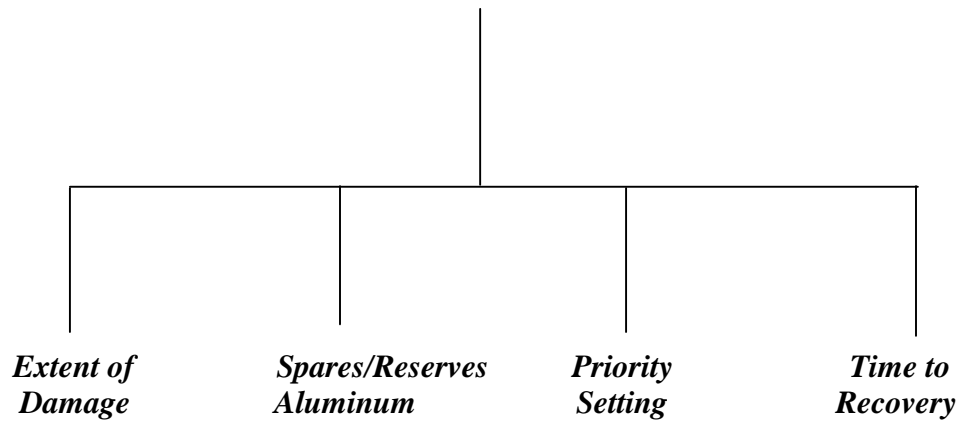


Figure 6.1: Project Overview and Integration.

6.2.3 Modeling and Evaluation Alternatives

This project developed an examination grounded in risk-cost benefit analysis, data sources from VDOT and other authorities, and systems modeling to demonstrate prototyping solutions for the above four issues.

6.2.4 Tradeoffs

Tradeoffs that were examined involve

- Assume definite costs now versus paying uncertain costs later
- Priorities for recovery
- Reconfiguration of activities based on different recovery schedules
- Sign strengthening versus uncertain damage potential

6.2.5 Applicability and National Interest

The Federal Emergency Management Agency provides funding to individual states when a natural disaster strikes. The analysis performed in this report can help VDOT plan efficiently and show if it is using a sound approach to solve the hurricane problem (Cogburn, 1998). The methodology will serve as an example to other states and countries and help them see how systematic recovery management can provide beneficial results in the wake of a natural disaster.

6.2.6 Applicability across VDOT

The overall approach of systems modeling in support of cost/risk-benefit analysis is transferable to other areas of VDOT for problem solving. It is applicable to all types of disaster planning including flooding, fires, and hazardous material cleanups.

6.3 Recommendations for Further Work

Recommendation for further study include expanding upon the four methodologies presented in this report by collecting data that will focus the approach analysis used. Doing so will reveal insights to the recovery process and will allow VDOT to improve the foundations of its recovery procedure. VDOT should therefore consider the foregoing effort as a feasibility study, outlining directions for in-depth analysis in any or all the four issues. A statement of work based on these preliminary analyses should be formulated to ensure the initiation of further study and improvement.

References

References

1. Bell, M. G. H., and Y. Iida “Transportation Network Analysis” Chichester, England: 1997.
2. Baker, E.J. “Empirical Studies of Public Response to Tornado and Hurricane Warnings in the United States” *Prediction and Perception of Natural Hazards*, Kluwer Academic Publishers, Dordrecht, The Netherlands, 65 - 73 (1991).
3. Baker, E.J. “Hurricane Evacuation Behavior” *International Journal of Mass Emergencies and Disasters*, (1991) Vol. 9: 287 - 310.
4. Commonwealth of Virginia “Emergency Operations Plan” Vol. 7 (1996).
5. Cogburn, Perry E. Oral Communication regarding the presence of recovery plans in the Suffolk District, March 2nd 1998.
6. Della-Giustina, D.E. “Needs of Victims after a Disaster” *Professional-Safety* 39 (July 1994): 29-32.
7. Decker, Steven. *Electronic Communication*. FDOT; December 3, 1997.
8. Department of the Army. “Shore Protection Manuel Volume 1”. Coastal Engineering Research Center, 1984.
9. Dilworth, James B. “Production and Operations Management” Random House , Inc. New York, New York, 1989.
10. Diaz, H.F., and R. S. Pulwarty “Hurricanes - Climates and Socioeconomic Impacts” Springer-Verlag Germany (1997).
11. Fabrycky, W. J., P.M. Ghare, and P.E. Torgersen. “Applied Operations Research and Management Science” Prentice Hall, Inc. Englewood Cliffs, New Jersey 1984.

12. FWA, VDOT, VDEM, VTTTC “1997 Post Hurricane Highway Recovery Workshop; Virginia Beach, Va.” April 8-10, 1997.
13. Getter, L. “Inspections: A Breakdown in the System. Lessons from Hurricane Andrew” 15th Annual National Hurricane Conference, FEMA, Washington, D.C. (April 1993): 33-36.
14. Grimco Inc., Signs and Related Material. Catalog 98A effective March 1, 1998.
15. Haimes, Y.Y., J.H. Lambert, L. Schiff, H. Frohwein, P. Hashemi. “A Tool to Aid the Comparison of Improvement Projects of the Virginia Department of Transportation” Center for Risk Management of Engineering Systems, University of Virginia, September 19, 1997.
16. Henley, E. and H. Kumamoto. “Probabilistic Risk Assessment and Management for Engineers and Scientists”, second edition, IEEE Press: 1995.
17. Hillier, F. and G. Lieberman. “Introduction to Operations Research” sixth edition, McGraw-Hill Inc.: 1995.
18. “The Hurricane History of Coastal Virginia” Available at:
<http://www.state.va.us/~des/hurhist.html> 1996.
19. “Jacksonville Comprehensive Emergency Management Plan” Available at:
<http://www.itd.ci.jax.fl.us/pub/hurricane/basicpln.html> 1992.
20. Krajewski, Lee J. and Ritzman, Larry P. “Operations Management” Addison-Wesley Publishing Company: 1987.
21. Lambert, J. “Memorandum - VDOT Hurricane Capstone” September 10, 1997.
22. Landvater, Darryl H. “World Class Production and Inventory Management” Oliver Wright Publications Inc. Essex Junction, Vermont: 1993.

23. Malgorzata, R. “Methodology to Review Cost Effective Highway Sign Retroflective Sheeting Policy”. Journal of Transportation Engineering, pp. 176-181. American Society of Civil Engineers, New York, NY: March 1995.
24. “MapQuest! Maps” Available at <http://www.mapquest.com> Maintained by Geosystems Global Corporation: 1997.
25. Miller, J., Oral Communication (conference call), Oct. 6, 1997.
26. Mesterton-Gibbons, M. “A Concrete Approach to Mathematical Modelling” John Wiley & Sons, Inc. New York (1995).
27. Metropolitan Dade County Florida, Public Works Dept. “Specifications and Contract Documents for Furnishing and Delivery of Traffic Control and Street Name Signs”, October, 1992.
28. Mondul, S., VDOT Emergency Operations Center, Oral Communication (conference call), Oct. 6, 1997.
29. Moore, Franklin, and Hendrick, Thomas. “Production/Operations Management 7th Edition” Richard D. Irwin Inc. Homewood Illinois: 1977.
30. Murthy, A. S., and Mohle, H. R. “Transportation Engineering Basics” New York: 1993.
31. Post-Hurricane Recovery Workshop (PHHRW) held at Virginia Beach, VA, April 8 – 10, 1997.
32. Scotti, R.S.; S. F. Al-Hajj; S.S. Gambhir; Kanecki “Improving the Effectiveness of Initial Disaster Relief Systems” *Journal of Simulation for Emergency Management* (1994): 9 – 18.
33. Shedum, Bert. Telephone conversation March 2, 1998.

34. Simpson, R. and Reihl, H. "The Hurricane and Its Impact" Louisiana State University Press, Baton Rouge and London: 1981.
35. Tersine, Richard J. "Production Operations Management" New York: 1985.
36. USDOT, FHWA(1). *Emergency Relief Manual* : FHWA, January 1994.
37. USDOT, FHWA(2). *Manual on Uniform Traffic Control Devices*: FHWA, 1988
38. VDOT, "Comprehensive Emergency Management Plan" 1996.
39. VDOT, FWA "Emergency Relief Manual" January 1994.
40. VDOT, "Hampton Roads Hurricane Evacuation Routes" Available at
http://www.state.va.us/traf/hur_phase1.html 1996.
41. VDOT, "Hurricane Evacuation Traffic Control Plan" Hampton Roads Region 1995.
42. VDOT, "'Purchasing, Inventory and Management System", Output given on 15-Jan-1998, 11:42am EST.
43. VDOT, *Suffolk Meeting*. November 14, 1997.
44. VDOT, "Suffolk District Tunnels" Hurricane Assessment. July 16, 1997
45. VDOT "Transportation Emergency Operations Center Hurricane Checklist: 1996" 1996
46. VDOT, "Virginia Hurricane Evacuation Routes" 1997.
47. VDOT, "VOIS Action Report" October 1996, Volume 1, Number 1.
48. Wong, B.; J. Monaco, C. Sellaro. "Disaster Recovery Planning: Suggestions to Top Management & Information Systems Managers" *Journal of Systems Managers* 45 (May 1994): 28.
49. Yamada, Y. and S. Noda. "Optimum Post-Earthquake Recovery of Lifeline Systems by Importance Analysis" *Proceedings of the Eighth World Conference on Earthquake Engineering* VII (1984): 585-592.

Appendix B

Table B1 -- Complete Table of Costs and Sizes

Size of sign:		Costs	
h(feet)	w(feet)	area(ft ²) /ft ²	Complete Sign
3.50	4.50	15.75	2 \$31.50
0.75	4.00	3.00	\$6.00
0.75	8.50	6.38	\$12.75
0.83	12.00	10.00	\$20.00
0.75	6.67	5.00	\$10.00
0.75	1.00	0.75	\$1.50
1.00	1.00	1.00	\$2.00
1.00	1.50	1.50	\$3.00
1.00	2.00	2.00	\$4.00
1.00	3.00	3.00	\$6.00
1.00	3.50	3.50	\$7.00
1.00	4.00	4.00	\$8.00
1.00	5.00	5.00	\$10.00
1.50	2.00	3.00	\$6.00
1.50	3.50	5.25	\$10.50
1.50	5.00	7.50	\$15.00
1.50	5.50	8.25	\$16.50
1.50	8.00	12.00	\$24.00
1.50	9.00	13.50	\$27.00
1.50	12.00	18.00	\$36.00
2.00	2.00	4.00	\$8.00
2.00	2.50	5.00	\$10.00
2.00	3.00	6.00	\$12.00
2.00	3.50	7.00	\$14.00
2.00	4.00	8.00	\$16.00
2.00	5.00	10.00	\$20.00
2.00	6.50	13.00	\$26.00
2.00	12.00	24.00	\$48.00
2.50	2.50	6.25	\$12.50
2.50	3.50	8.75	\$17.50
2.50	4.00	10.00	\$20.00
2.50	5.00	12.50	\$25.00
2.50	5.50	13.75	\$27.50
2.50	6.50	16.25	\$32.50
2.50	7.00	17.50	\$35.00
2.50	12.00	30.00	\$60.00
3.00	3.00	9.00	\$18.00
3.00	4.00	12.00	\$24.00
3.00	7.00	21.00	\$42.00
3.00	9.00	27.00	\$54.00
3.00	12.00	36.00	\$72.00
3.50	5.50	19.25	\$38.50
3.50	12.00	42.00	\$84.00
4.00	4.00	16.00	\$32.00
4.00	5.00	20.00	\$40.00
4.00	5.50	22.00	\$44.00
4.00	8.00	32.00	\$64.00
4.00	12.00	48.00	\$96.00

Table B1(Cont.) -- Complete Table of Costs and Sizes

Size of sign:		Costs	
h(feet)	w(feet)	area(ft ²) /ft ²	Complete Sign
5.00	5.50	27.50	\$55.00
5.00	6.00	30.00	\$60.00
5.00	6.50	32.50	\$65.00
5.00	10.00	50.00	\$100.00
5.00	12.00	60.00	\$120.00
5.00	5.00	25.00	\$50.00

Table B2 -- Cost of Storage of Signs for VDOT

Amount Stored (ft^2)	Cost to store	Amount Stored (ft^2)	Cost to store
10000	\$5,000.00	270000	\$15,000.00
20000	\$5,000.00	280000	\$15,000.00
30000	\$5,000.00	290000	\$15,000.00
40000	\$5,000.00	300000	\$15,000.00
50000	\$5,000.00	310000	\$20,000.00
60000	\$5,000.00	320000	\$20,000.00
70000	\$5,000.00	330000	\$20,000.00
80000	\$5,000.00	340000	\$20,000.00
90000	\$5,000.00	350000	\$20,000.00
100000	\$5,000.00	360000	\$20,000.00
110000	\$10,000.00	370000	\$20,000.00
120000	\$10,000.00	380000	\$20,000.00
130000	\$10,000.00	390000	\$20,000.00
140000	\$10,000.00	400000	\$20,000.00
150000	\$10,000.00	410000	\$25,000.00
160000	\$10,000.00	420000	\$25,000.00
170000	\$10,000.00	430000	\$25,000.00
180000	\$10,000.00	440000	\$25,000.00
190000	\$10,000.00	450000	\$25,000.00
200000	\$10,000.00	460000	\$25,000.00
210000	\$15,000.00	470000	\$25,000.00
220000	\$15,000.00	480000	\$25,000.00
230000	\$15,000.00	490000	\$25,000.00
240000	\$15,000.00	500000	\$25,000.00
250000	\$15,000.00	510000	\$30,000.00

Table B3 – Total Cost to VDOT as a function of aluminum lost

Amount of Aluminum Lost	Storage	Production	Labor	Material	Total	Total for Contractor
0	\$0	\$0	\$0	\$0	\$0	\$0
5000	\$5,000	\$85,000	\$4,250	\$10,000	\$104,250	\$115,000
10000	\$5,000	\$170,000	\$8,500	\$20,000	\$203,500	\$225,000
15000	\$5,000	\$255,000	\$12,750	\$30,000	\$302,750	\$335,000
20000	\$5,000	\$340,000	\$17,000	\$40,000	\$402,000	\$445,000
25000	\$5,000	\$425,000	\$21,250	\$50,000	\$501,250	\$555,000
30000	\$5,000	\$510,000	\$25,500	\$60,000	\$600,500	\$665,000
35000	\$5,000	\$595,000	\$29,750	\$70,000	\$699,750	\$775,000
40000	\$5,000	\$680,000	\$34,000	\$80,000	\$799,000	\$885,000
45000	\$5,000	\$765,000	\$38,250	\$90,000	\$898,250	\$995,000
50000	\$5,000	\$850,000	\$42,500	\$100,000	\$997,500	\$1,105,000
55000	\$5,000	\$935,000	\$46,750	\$110,000	\$1,096,750	\$1,215,000
60000	\$5,000	\$1,020,000	\$51,000	\$120,000	\$1,196,000	\$1,325,000
65000	\$5,000	\$1,105,000	\$55,250	\$130,000	\$1,295,250	\$1,435,000
70000	\$5,000	\$1,190,000	\$59,500	\$140,000	\$1,394,500	\$1,545,000
75000	\$5,000	\$1,275,000	\$63,750	\$150,000	\$1,493,750	\$1,655,000
80000	\$5,000	\$1,360,000	\$68,000	\$160,000	\$1,593,000	\$1,765,000
85000	\$5,000	\$1,445,000	\$72,250	\$170,000	\$1,692,250	\$1,875,000
90000	\$5,000	\$1,530,000	\$76,500	\$180,000	\$1,791,500	\$1,985,000
95000	\$5,000	\$1,615,000	\$80,750	\$190,000	\$1,890,750	\$2,095,000
100000	\$5,000	\$1,700,000	\$85,000	\$200,000	\$1,990,000	\$2,205,000
105000	\$10,000	\$1,785,000	\$89,250	\$210,000	\$2,094,250	\$2,320,000
110000	\$10,000	\$1,870,000	\$93,500	\$220,000	\$2,193,500	\$2,430,000
115000	\$10,000	\$1,955,000	\$97,750	\$230,000	\$2,292,750	\$2,540,000
120000	\$10,000	\$2,040,000	\$102,000	\$240,000	\$2,392,000	\$2,650,000
125000	\$10,000	\$2,125,000	\$106,250	\$250,000	\$2,491,250	\$2,760,000
130000	\$10,000	\$2,210,000	\$110,500	\$260,000	\$2,590,500	\$2,870,000
135000	\$10,000	\$2,295,000	\$114,750	\$270,000	\$2,689,750	\$2,980,000
140000	\$10,000	\$2,380,000	\$119,000	\$280,000	\$2,789,000	\$3,090,000
145000	\$10,000	\$2,465,000	\$123,250	\$290,000	\$2,888,250	\$3,200,000
150000	\$10,000	\$2,550,000	\$127,500	\$300,000	\$2,987,500	\$3,310,000
155000	\$10,000	\$2,635,000	\$131,750	\$310,000	\$3,086,750	\$3,420,000
160000	\$10,000	\$2,720,000	\$136,000	\$320,000	\$3,186,000	\$3,530,000
165000	\$10,000	\$2,805,000	\$140,250	\$330,000	\$3,285,250	\$3,640,000
170000	\$10,000	\$2,890,000	\$144,500	\$340,000	\$3,384,500	\$3,750,000
175000	\$10,000	\$2,975,000	\$148,750	\$350,000	\$3,483,750	\$3,860,000
180000	\$10,000	\$3,060,000	\$153,000	\$360,000	\$3,583,000	\$3,970,000
185000	\$10,000	\$3,145,000	\$157,250	\$370,000	\$3,682,250	\$4,080,000
190000	\$10,000	\$3,230,000	\$161,500	\$380,000	\$3,781,500	\$4,190,000
195000	\$10,000	\$3,315,000	\$165,750	\$390,000	\$3,880,750	\$4,300,000
200000	\$10,000	\$3,400,000	\$170,000	\$400,000	\$3,980,000	\$4,410,000
205000	\$15,000	\$3,485,000	\$174,250	\$410,000	\$4,084,250	\$4,525,000
210000	\$15,000	\$3,570,000	\$178,500	\$420,000	\$4,183,500	\$4,635,000
215000	\$15,000	\$3,655,000	\$182,750	\$430,000	\$4,282,750	\$4,745,000
220000	\$15,000	\$3,740,000	\$187,000	\$440,000	\$4,382,000	\$4,855,000
225000	\$15,000	\$3,825,000	\$191,250	\$450,000	\$4,481,250	\$4,965,000
230000	\$15,000	\$3,910,000	\$195,500	\$460,000	\$4,580,500	\$5,075,000
235000	\$15,000	\$3,995,000	\$199,750	\$470,000	\$4,679,750	\$5,185,000
240000	\$15,000	\$4,080,000	\$204,000	\$480,000	\$4,779,000	\$5,295,000

Table B3(Cont.) – Total Cost to VDOT as a function of aluminum lost

Amount of Aluminum Lost	Storage	Production	Labor	Material	Total	Total for Contractor
245000	\$15,000	\$4,165,000	\$208,250	\$490,000	\$4,878,250	\$5,405,000
250000	\$15,000	\$4,250,000	\$212,500	\$500,000	\$4,977,500	\$5,515,000
255000	\$15,000	\$4,335,000	\$216,750	\$510,000	\$5,076,750	\$5,625,000
260000	\$15,000	\$4,420,000	\$221,000	\$520,000	\$5,176,000	\$5,735,000
265000	\$15,000	\$4,505,000	\$225,250	\$530,000	\$5,275,250	\$5,845,000
270000	\$15,000	\$4,590,000	\$229,500	\$540,000	\$5,374,500	\$5,955,000
275000	\$15,000	\$4,675,000	\$233,750	\$550,000	\$5,473,750	\$6,065,000
280000	\$15,000	\$4,760,000	\$238,000	\$560,000	\$5,573,000	\$6,175,000
285000	\$15,000	\$4,845,000	\$242,250	\$570,000	\$5,672,250	\$6,285,000
290000	\$15,000	\$4,930,000	\$246,500	\$580,000	\$5,771,500	\$6,395,000
295000	\$15,000	\$5,015,000	\$250,750	\$590,000	\$5,870,750	\$6,505,000
300000	\$15,000	\$5,100,000	\$255,000	\$600,000	\$5,970,000	\$6,615,000

Table B4 – Cost of Production vs. percent held by VDOT

% held by VDOT	I	II	III	IV	Cost to Produce
20	0.045468	0.018687	0.014132	0.011694	\$397
40	0.090935	0.037374	0.028264	0.023388	\$794
60	0.136403	0.056062	0.042395	0.035083	\$1,191
80	0.181871	0.074749	0.056527	0.046777	\$1,588
100	0.227338	0.093436	0.070659	0.058471	\$1,985
120	0.272806	0.112123	0.084791	0.070165	\$2,382
140	0.318274	0.130811	0.098922	0.081859	\$2,779
160	0.363742	0.149498	0.113054	0.093554	\$3,176
180	0.409209	0.168185	0.127186	0.105248	\$3,573
200	0.454677	0.186872	0.141318	0.116942	\$3,970
220	0.500145	0.205559	0.15545	0.128636	\$4,367
240	0.545612	0.224247	0.169581	0.14033	\$4,764
260	0.59108	0.242934	0.183713	0.152025	\$5,161
280	0.636548	0.261621	0.197845	0.163719	\$5,558
300	0.682015	0.280308	0.211977	0.175413	\$5,955
320	0.727483	0.298996	0.226108	0.187107	\$6,352
340	0.772951	0.317683	0.24024	0.198801	\$6,749
360	0.818419	0.33637	0.254372	0.210496	\$7,146
380	0.863886	0.355057	0.268504	0.22219	\$7,543
400	0.909354	0.373744	0.282636	0.233884	\$7,940
420	0.954822	0.392432	0.296767	0.245578	\$8,337
440	1.000289	0.411119	0.310899	0.257272	\$8,734
460	1.045757	0.429806	0.325031	0.268967	\$9,131
480	1.091225	0.448493	0.339163	0.280661	\$9,528
500	1.136692	0.467181	0.353294	0.292355	\$9,925
520	1.18216	0.485868	0.367426	0.304049	\$10,322
540		0.504555	0.381558	0.315743	\$10,719
560		0.523242	0.39569	0.327438	\$11,116
580		0.541929	0.409822	0.339132	\$11,513
600		0.560617	0.423953	0.350826	\$11,910
620		0.579304	0.438085	0.36252	\$12,307
640		0.597991	0.452217	0.374214	\$12,704
660		0.616678	0.466349	0.385908	\$13,101
680		0.635366	0.48048	0.397603	\$13,498
700		0.654053	0.494612	0.409297	\$13,895
720		0.67274	0.508744	0.420991	\$14,292
740		0.691427	0.522876	0.432685	\$14,689
760		0.710114	0.537008	0.444379	\$15,086
780		0.728802	0.551139	0.456074	\$15,483
800		0.747489	0.565271	0.467768	\$15,880
820		0.766176	0.579403	0.479462	\$16,277
840		0.784863	0.593535	0.491156	\$16,674
860		0.803551	0.607666	0.50285	\$17,071
880		0.822238	0.621798	0.514545	\$17,468
900		0.840925	0.63593	0.526239	\$17,865
920		0.859612	0.650062	0.537933	\$18,262
940		0.878299	0.664194	0.549627	\$18,659
960		0.896987	0.678325	0.561321	\$19,056
980		0.915674	0.692457	0.573016	\$19,453

Table A4(Cont.) – Cost of Production vs. percent held by VDOT

% held by VDOT	I	II	III	IV	Cost to Produce
1000		0.934361	0.706589	0.58471	\$19,850
1020		0.953048	0.720721	0.596404	\$20,247
1040		0.971736	0.734852	0.608098	\$20,644
1060		0.990423	0.748984	0.619792	\$21,041
1080		1.00911	0.763116	0.631487	\$21,438
1100			0.777248	0.643181	\$21,835
1120			0.79138	0.654875	\$22,232
1140			0.805511	0.666569	\$22,629
1160			0.819643	0.678263	\$23,026
1180			0.833775	0.689958	\$23,423
1200			0.847907	0.701652	\$23,820
1220			0.862039	0.713346	\$24,217
1240			0.87617	0.72504	\$24,614
1260			0.890302	0.736734	\$25,011
1280			0.904434	0.748429	\$25,408
1300			0.918566	0.760123	\$25,805
1320			0.932697	0.771817	\$26,202
1340			0.946829	0.783511	\$26,599
1360			0.960961	0.795205	\$26,996
1380			0.975093	0.8069	\$27,393
1400			0.989225	0.818594	\$27,790
1420			1.003356	0.830288	\$28,187
1440				0.841982	\$28,584
1460				0.853676	\$28,981
1480				0.865371	\$29,378
1500				0.877065	\$29,775
1520				0.888759	\$30,172
1540				0.900453	\$30,569
1560				0.912147	\$30,966
1580				0.923842	\$31,363
1600				0.935536	\$31,760
1620				0.94723	\$32,157
1640				0.958924	\$32,554
1660				0.970618	\$32,951
1680				0.982313	\$33,348
1700				0.994007	\$33,745
1720				1.005701	\$34,142
1740				1.017395	\$34,539

Appendix C

Table C.1: Nodes and their respective weight.

NODE	Road 1	Road 2	Number of facilities (weight)
1	64	105	1
2	258	167	1
3	Exit	Suffolk	0
4	13	60	1
5	17	64	0
6	Cedar Ln.	164	1
7	64	664	0
8	44	Bus 58	1
9	13	Bridge	0
10	408	44	1
11	460	60	0
12	152	17	1
13	460	168	0
14	134	64	3
15	64	168	0
16	170	168	1
17	337	564	1
18	225	58	3
19	64	564	0
20	44	225	2
21	564	460	0
22	411	44	2
23	Exit	Suffolk	0
24	407	64	3
25	258	10	2
26	168	165	1
27	258	10	0
28	Bus 168	165	1
29	258	10	0
30	239	264	1
31	258	17	0
32	337	58	1
33	17	164	0
34	611	258	1
35	664	164	0
36	Bus 58	258	4
38	125	10	1
39	64	13	0
40	Along	258	2

NODE	Road 1	Road 2	Number of facilities (weight)
41	17	58	0
42	Along	17	1
43	460	58	0
44	Along	17	1
45	168	58	1
46	Along	258	2
47	13	58	0
48	Along	17	2
49	58	60	0
50	Along	58	1
51	264	17	0
52	Along	58	3
53	264	464	0
54	Along	58	0
55	264	460	0
56	Along	58	1
57	264	168	0
58	Along	13	1
59	264	13	0
60	Along	168	1
61	264	44	0
62	Along	168	1
63	44	60	3
64	Along	17	1
65	Exit	Suffolk	0
67	460	258	0
68	Along	17	1
69	Bus 460	58	0
70	Along	58	1
71	10	Bus 460	0
72	Along	460	2
73	58	10	0
74	alt 460	264	1
75	58	Bus 58	0
77	64	664	0
79	264	64	0
81	64	13	0
83	17	13	0
85	13	460	0
87	464	460	0
89	168	13	0

NODE	Road 1	Road 2	Number of facilities (weight)
93	64	464	0
95	64	168	0
97	Exit	Suffolk	0
99	58	258	0
103	58	Bus 58	0
105	13	32	3
109	32	58	0
111	168	Bus 168	0
113	Exit	Suffolk	0
115	Exit	Suffolk	0
117	Exit	Suffolk	0
119	Bus 168	168	0
121	Exit	Suffolk	0
123	17	258	0
125	64	258	0
127	258	169	1

Table C.2 - Method 1 (One step+)

Segments 34,36 25,46 10,63 20,22 18,7 50,52 8,10 22,8 43,5
0 2

re-established

NODE #	W	Combo(N,2)	W	C	W	C	W	C	W	C	W	C	W	C	W	C		
1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
2	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
4	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
6	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
8	1	0	1	0	1	0	1	0	1	0	1	0 V						
10	1	0	1	0	1	0 V												
12	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
14	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
16	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
17	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
18	3	3	3	3	3	3	3	3	3	3 V								
20	2	1	2	1	2	1	2	1 V										
22	2	1	2	1	2	1	2	1 X	4	6	4	6	4	6	4	6 V		
24	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
25	2	1	2	1 V														
26	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
28	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
30	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
32	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
34	1	0 V																
36	4	6 X	5	10	5	10	5	10	5	10	5	10	5	10	5	10		
38	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
40	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1		
42	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
44	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
45	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
46	2	1	2	1 X	4	6	4	6	4	6	4	6	4	6	4	6		
48	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1		
50	1	0	1	0	1	0	1	0	1	0	1	0 V						
52	3	3	3	3	3	3	3	3	3	3 X	4	6	4	6	4	6 V		
56	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
58	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
60	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
62	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
63	3	3	3	3	3	3 X	4	6	4	6	4	6 X	5	10 X	9	36		
64	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
68	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0 X		
70	1	0	1	0	1	0	1	0	1	0 X	4	6	4	6	4	6		
72	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1		
74	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
105	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
127	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0		
Total Connectivity		31		35		39		42		46		49		52		56		76
Steps		1		1		1		1		1		1		1		1		1
Step #		1		2		3		4		5		6		7		8		9

Table C.2 - Method 1 (One step+)

64,68 2,40 40,127 42,44 60,62 61,20 24,95 25,67 62,111
 24,61 95,60 67,34 111,28

NODE #	W		C		W		C		W		C		W		C		W		C		W		C	
	W	C	W	C	W	C	W	C	W	C	W	C	W	C	W	C	W	C	W	C	W	C	W	C
1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
2	1	0	1	0 V																				
4	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
6	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
8																								
10																								
12	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
14	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
16	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
17	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
18																								
20																								
22																								
24	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
25																								
26	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
28	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0 V
30	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
32	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
34																								
36	5	10	5	10	5	10	5	10	5	10	5	10	5	10	5	10	5	10	5	10	5	10	5	10 V
38	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
40	2	1	2	1 X	3	3 V																		
42	1	0	1	0	1	0	1	0 V																
44	1	0	1	0	1	0	1	0 X	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
45	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
46	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6 X
48	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
50																								
52																								
56	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
58	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
60	1	0	1	0	1	0	1	0	1	0	1	0 V												
62	1	0	1	0	1	0	1	0	1	0 X	2	1	2	1 V										
63	9	36	9	36	9	36	9	36	9	36	9	36 X	12	66 X	14	91	14	91	14	91 X				
64	1	0 V																						
68	5	10 X	6	15	6	15	6	15	6	15	6	15	6	15	6	15	6	15	6	15	6	15	6	15
70	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6
72	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1
74	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
105	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
127	1	0	1	0	1	0 X	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6	4	6
Total Connectivity	80		85		87		90		91		92		92		119		119		143		143		163	
Steps	1		1		1		1		1		2		2		2		2		2		2		2	
Step #	10		11		12		13		14		16		18		20		20		22		22		22	

Table C.2 - Method 1 (One step+)

		59,58		58,47		47,56		47,39		56,54			
		111,26		61,59		47,18		39,4		54,45			
NODE #	W	C	W	C	W	C	W	C	W	C	W	C	
1	1	0	1	0	1	0	1	0	1	0	1	0	
2													
4	1	0	1	0	1	0	1	0	1	0 V			
6	1	0	1	0	1	0	1	0	1	0	1	0	
8													
10													
12	1	0	1	0	1	0	1	0	1	0	1	0	
14	3	3	3	3	3	3	3	3	3	3	3	3	
16	1	0	1	0	1	0	1	0	1	0	1	0	
17	1	0	1	0	1	0	1	0	1	0	1	0	
18													
20													
22													
24													
25													
26	1	0 V											
28													
30	1	0	1	0	1	0	1	0	1	0	1	0	
32	1	0	1	0	1	0	1	0	1	0	1	0	
34													
36													
38	1	0	1	0	1	0	1	0	1	0	1	0	
40													
42													
44	2	1	2	1	2	1	2	1	2	1	2	1	
45	1	0	1	0	1	0	1	0	1	0	1	0 V	
46	9	36	9	36	9	36	9	36	9	36	9	36	
48	2	1	2	1	2	1	2	1	2	1	2	1	
50													
52													
56	1	0	1	0	1	0	1	0 V					
58	1	0	1	0 V									
60													
62													
63	15	105 X	16	120 X	17	136 V							
64													
68	6	15	6	15	6	15	6	15	6	15	6	15	
70	4	6	4	6	4	6 X	21	210 X	22	231 X	23	253 X	
72	2	1	2	1	2	1	2	1	2	1	2	1	
74	1	0	1	0	1	0	1	0	1	0	1	0	
105	3	3	3	3	3	3	3	3	3	3	3	3	
127	4	6	4	6	4	6	4	6	4	6	4	6	
Total Connectivity	177		192	192	208	208	276		297	297	319	319	342
Steps		1		2		2		1		2		2	
Step #		23		25		27		28		30		32	

Table C.2 - Method 1 (One step+)

39,1 5	125,40	123,125	42,31	29,38	29,27	5,1	51,53
15,1 6	125,14	123,1 2	123,3 1	31,2 9	27,46	12,5	53,74

NODE #	W	C	W	C	W	C	W	C	W	C	W	C	W	C	
1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
2															
4															
6															
8															
10															
12	1	0	1	0											
14	3	3 V													
16	V														
17															
18															
20															
22															
24															
25															
26															
28															
30															
32															
34															
36															
38	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
40															
42															
44															
45															
46	9	36	9	36	9	36	9	36	9	36	9	36	9	36	
48															
50															
52															
56															
58															
60															
62															
63															
64															
68															
70															
72	X	41 820	41 820	41 820	41 820	41 820	41 820	41 820	41 820	41 820	41 820	41 820	41 820	41 820	
74		1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	
105		3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3	
127		4 6 X	7 21 X	8 28 X	49 1176 X	50 1225 X	59 1711 X	60 1770 X							
Total Connectivity	828	868	##	880	880	887	887	1215	1215	1264	1264	1714	1714	1773	1773
Steps	2	2		2	2	2	2	2	2	2	2	2	2	2	2
Step #	49	51		53	55	57	59	61	63						

Table C.2 - Method 1 (One step+)

38,73

73,71
71,10
5

NODE #	W	C	W	C
1				
2				
4				
6				
8				
10				
12				
14				
16				
17				
18				
20				
22				
24				
25				
26				
28				
30				
32				
34				
36				
38				
40				
42				
44				
45				
46				
48				
50				
52				
56				
58				
60				
62				
63				
64				
68				
70				
72				
74				
105	3	3	V	
127	61	1830	X	64
Total Connectivity	1883	1833	1833	1883

2016
2016

Steps
Step #

3
66

C(65) = 2016

Total Connectivity =

Table C.3: Method
2 (2 STEP+)

Segment recoveries->		20,22		8,10		20,61		61,59		58,47		18,70		24,95	
		22,8		10,63		61,24		59,58		47,18		47,56		95,60	
NODE #	W	Combo(N,2)	W	C	W	C	W	C	W	C	W	C	W	C	
1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
2	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
4	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
6	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
8	1	0 V													
10	1	0	1	0 V											
12	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
14	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
16	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
17	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
18	3	3	3	3	3	3	3	3	3	3 V					
20	2	1 V													
22	2	1 X	5	10 V											
24	3	3	3	3	3	3 V									
25	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
26	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
28	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
30	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
32	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
34	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
36	4	6	4	6	4	6	4	6	4	6	4	6	4	6	
38	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
40	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
42	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
44	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
45	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
46	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
48	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
50	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
52	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
56	1	0	1	0	1	0	1	0	1	0	1	0 V			
58	1	0	1	0	1	0	1	0 V							
60	1	0	1	0	1	0	1	0	1	0	1	0	1	0 V	
62	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
63	3	3	3	3 X	9	36 X	12	66 X	16	120 X	16	120 V			
64	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
68	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
70	1	0	1	0	1	0	1	0	1	0	1	0 X	18	153 X	
72	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
74	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
105	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
127	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
Total Connectivity		<u>31</u>	<u>39</u>	<u>62</u>	<u>89</u>	<u>143</u>	<u>140</u>	<u>173</u>							
Steps		2	2	2	2	2	2	2	2	2	2	2	2	2	
Step #		2	4	6	8	10	12	14							

Table C.3:
Method 2 (2
STEP+)

		60,62		47,39		62,111		111,2 6 25,46		56,45		54,43		43,52	
		34,36		39,4		111,28				45,54		43,72		52,43	
NODE #	W	C	W	C	W	C	W	C	W	C	W	C	W	C	
1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
2	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
4	1	0	1	0 V											
6	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
8															
10															
12	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
14	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
16	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
17	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
18															
20															
22															
24															
25	2	1	2	1	2	1	2	1 V(46)							
26	1	0	1	0	1	0	1	0 V(70)							
28	1	0	1	0	1	0 V									
30	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
32	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
34	1	0 V(36)													
36	4	6 X	5	10	5	10	5	10	5	10	5	10	5	10	
38	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
40	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
42	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
44	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
45	1	0	1	0	1	0	1	0	1	0 V					
46	2	1	2	1	2	1	2	1 X	4	6	4	6	4	6	
48	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
50	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
52	3	3	3	3	3	3	3	3	3	3	3	3	3	3 V	
56															
58															
60															
62	1	0 V(70)													
63															
64	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
68	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
70	19	171 X	20	190 X	21	210 X	22	231 X	23	253 X	24	276 V			
72	2	1	2	1	2	1	2	1	2	1	2	1 X	26	325 X	
74	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
105	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
127	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
Total Connectivity		<u>191</u>		<u>214</u>		<u>234</u>		<u>255</u>		<u>281</u>		<u>304</u>		<u>352</u>	
Steps		2		2		2		2		2		2		2	
Step #		16		18		20		22		24		26		28	

Table C.3:
Method 2 (2

STEP+)

		52,50		50,51		68,64		39,15		72,21		64,33		33,35	
		50,68		51,48		51,30		15,16		21,17		33,44		35,6	
NODE #	W	C	W	C	W	C	W	C	W	C	W	C	W	C	
1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
2	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
4															
6	1	0	1	0	1	0	1	0	1	0	1	0	1	0 V	
8															
10															
12	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
14	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
16	1	0	1	0	1	0	1	0 V							
17	1	0	1	0	1	0	1	0	1	0 V					
18															
20															
22															
24															
25															
26															
28															
30	1	0	1	0	1	0 V									
32	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
34															
36	5	10	5	10	5	10	5	10	5	10	5	10	5	10	
38	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
40	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
42	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
44	1	0	1	0	1	0	1	0	1	0	1	0 V			
45															
46	4	6	4	6	4	6	4	6	4	6	4	6	4	6	
48	2	1	2	1 V											
50	1	0 V													
52															
56															
58															
60															
62															
63															
64	1	0	1	0	1	0 V									
68	1	0 V													
70															
72	29	406 X	31	465 X	33	528 X	35	595 X	36	630 X	37	666 X	38	703 X	
74	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
105	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
127	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
Total Connectivity		<u>430</u>		<u>489</u>		<u>551</u>		<u>618</u>		<u>653</u>		<u>689</u>		<u>726</u>	
Steps			2		2		2		2		2		2		2
Step #			30		32		34		36		38		40		42

Table C.3: Method 2 (2 STEP+)

35,7	14,25	40,2	44,42	50,41	43,55	40,123
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	7,14		125,4 0		2,127		42,31		41,32		55,74		123,12		
NODE #	W	C	W	C	W	C	W	C	<>	W	C	W	C	W	C
1	1	0	1	0	1	0	1	0		1	0	1	0	1	0
2	1	0	1	0	1	0 V									
4															
6															
8															
10															
12	1	0	1	0	1	0	1	0		1	0	1	0	1	0 V
14	3	3 V													
16															
17															
18															
20															
22															
24															
25															
26															
28															
30															
32	1	0	1	0	1	0	1	0		1	0 V				
34															
36	5	10	5	10	5	10	5	10		5	10	5	10	5	10
38	1	0	1	0	1	0	1	0		1	0	1	0	1	0
40	2	1	2	1 V											
42	1	0	1	0	1	0	1	0 V							
44															
45															
46	4	6	4	6	4	6	4	6		4	6	4	6	4	6
48															
50															
52															
56															
58															
60															
62															
63															
64															
68															
70															
72	39	741 X	42	861 X	44	946 V									
74	1	0	1	0	1	0	1	0		1	0	1	0 V		
105	3	3	3	3	3	3	3	3		3	3	3	3	3	3
127	1	0	1	0	1	0 X	46	1035 X		47	1081 X	48	1128 X	49	1176 X
Total Connectivity	<u>764</u>		<u>881</u>		<u>965</u>		<u>1054</u>			<u>1100</u>		<u>1147</u>		<u>1195</u>	
Steps			2		2		2			2		2		2	
Step #			44		46		48			50		52		54	

Table C.3: Method 2 (2 STEP+)

		12,5		31,29		29,27		25,67		Three step		73,71	
		5,1		29,38		27,46		67,43		38,73		71,105	
NODE #	W	C	W	C	W	C	W	C	W	C	W	C	
1	1	0 V											
2													
4													
6													
8													
10													
12													
14													
16													
17													
18													
20													
22													
24													
25													
26													
28													
30													
32													
34													
36	5	10	5	10	5	10	5	10 V					
38	1	0	1	0 V									
40													
42													
44													
45													
46	4	6	4	6	4	6 V							
48													
50													
52													
56													
58													
60													
62													
63													
64													
68													
70													
72													
74													
105	3	3	3	3	3	3	3	3 V	3	3 V			
127	50	1225 X	51	1275 X	52	1326 X	56	1540 X	61	1830 X	64	2016	
Total Connectivity		<u>1244</u>		<u>1294</u>		<u>1345</u>		<u>1553</u>		<u>1833</u>		<u>2016</u>	
Steps			2		2		2		2		3		
Step #			58		60		62		64		67		