

2009-01-01

Asset Management Application Towards an Improved Right of Way Acquisition

Dora Oralia Francis

University of Texas at El Paso, dora_francis24@hotmail.com

Follow this and additional works at: https://digitalcommons.utep.edu/open_etd



Part of the [Civil Engineering Commons](#)

Recommended Citation

Francis, Dora Oralia, "Asset Management Application Towards an Improved Right of Way Acquisition" (2009). *Open Access Theses & Dissertations*. 2678.

https://digitalcommons.utep.edu/open_etd/2678

This is brought to you for free and open access by DigitalCommons@UTEP. It has been accepted for inclusion in Open Access Theses & Dissertations by an authorized administrator of DigitalCommons@UTEP. For more information, please contact lweber@utep.edu.

ASSET MANAGEMENT APPLICATION TOWARDS AN IMPROVED RIGHT OF WAY ACQUISITION

DORA O. FRANCIS

Department of Civil Engineering

APPROVED:

Carlos Chang-Albitres, Ph.D., Chair

Eric D. Smith, Ph.D.

Ruey Kelvin Cheu ,Ph.D.

Patricia D. Witherspoon, Ph.D.
Dean of the Graduate School

Copyright ©

by

Dora O. Francis

2009

Dedication

I would like to dedicate my Thesis to my mother, who has been a mother and a father for me. She has dedicated her whole life to take care of me when I was a child, and to guide me through the right path as an adult. She never had the chance to pursue a career and for this reason, she has worked really hard for me to be able to obtain a degree. Therefore, she has motivated me to continue my studies and someday become the person she always dreamed for me to be. Without her love and support nothing would be possible.

ASSET MANAGEMENT APPLICATION TOWARDS AN IMPROVED RIGHT
OF WAY ACQUISITION

by

DORA O. FRANCIS, B.S.C.E.

THESIS

Presented to the Faculty of the Graduate School of

The University of Texas at El Paso

in Partial Fulfillment

of the Requirements

for the Degree of

MASTER OF SCIENCE

Department of Civil Engineering

THE UNIVERSITY OF TEXAS AT EL PASO

December 2009

Acknowledgements

I would like to show my most sincere appreciation to Dr. Carlos Chang-Albitres, for all his support and for being there as my guide and mentor, without his help this research would not be possible. I would like to thank Dr. Ruey Kelvin Cheu, for his support during my undergraduate and graduate years. I would also like to thank Dr. Eric D. Smith for participating in my thesis committee. I would like to thank my professors for always being available to assist during difficult homework and projects. I would also like to thank the Texas Department of Transportation (TxDOT), the Federal Highway Administration (FHWA), the Texas Transportation Institute (TTI), and the Texas A&M University for their cooperation and support on this research. In addition, I would like to thank my family for the support I received during my studies, in particular to my husband for all his patience during the last two years.

Abstract

The purpose of this research is to discover a most suitable approach when the right of way acquisition process begins. As soon as it is known that the right of way acquisitions begin, speculations are made to parcels in order to increase the values of these parcel. Different types of speculations can be made, at a different phase of the right of way (ROW) acquisition process. The parcel cost can vary due to speculations according to the phase of the right of way acquisition process. To help assist the Texas Department of Transportation (TxDOT) on the right of way acquisition process, two computerized simulator tools were developed by the Texas A&M University and the Texas Transportation Institute (TTI) in order to assist in this research. TAMSIM is a right of way simulator that provides with the acquisition costs and savings based on data from the Right of Way Information Systems (ROWIS). EROW is an optimization tool that uses the outputs from TAMSIM in order to provide with a more optimized alternative for the ROW acquisitions. TAMSIM and EROW were run and tested to provide a method of how to use these tools to obtain the most suitable early acquisition for right of way.

Table of Contents

Acknowledgements	v
Abstract	vi
Table of Contents	vii
List of Tables	x
List of Figures	xv
Chapter 1: Introduction	1
1.1 Basis of Asset Management.....	1
1.2 Simulation Tools	2
1.3 Right of Way	2
1.4 Research Objective	3
1.5 Organization.....	3
Chapter 2: Data Compilation and Organization.....	5
2.1 Right of Way Information Systems	5
2.1.1 Activities for Right of Way Parcel Acquisition	7
2.2 Interviews with ROW Personnel Section	10
2.3 ROWIS Data Analysis	12
2.3.1 Acquisition Type.....	12
2.3.2 County Type Population	13
2.3.3 County Type Cost	15
2.3.4 Acquisition Method	16
2.3.5 Acquisition Timing	17
2.3.6 Types of Early Acquisitions.....	17
Chapter 3: Introduction to TAMSIM and EROW	19
3.1 TAMSIM Introduction.....	19
3.1.1 Input Data for TAMSIM.....	19
3.1.2 TAMSIM Outputs	24
3.2 EROW Introduction	26

Chapter 4: TAMSIM: ROW Simulator Tool	27
4.1 Right of Way Early Acquisition Sensitivity Analysis	27
4.2 TAMSIM Application.....	29
4.2.1 Costs and Savings	29
4.3 Findings from Sensitivity Analysis.....	32
4.3.1 Environmental Clearance Obtained Scenario	32
4.3.2 First Parcel Purchased (not early) Scenario	40
4.3.3 Schematics Available (time 0) Scenario	46
4.3.4 First Parcel Purchased (inc. early) Scenario	52
4.3.5 ROW Release Obtained Scenario	58
4.4 Summary of TAMSIM Finding	64
4.4.1 Environmental Clearance Obtained Scenario	65
4.4.2 First Parcel Purchased (not early) Scenario	67
4.4.3 First Parcel Purchased (inc. early) Scenario	68
4.4.4 Schematics Available (time 0) Scenario	69
4.4.5 ROW Release Obtained Scenario	70
4.5 Findings Summary of the Five Speculation Scenarios	71
Chapter 5: EROW: ROW Optimization Tool.....	78
5.1 EROW Application.....	78
5.2 Case Study One.....	80
5.2.1 First Option for Case Study One.....	80
5.2.2 Results for First Option for Case Study One	85
5.2.3 Second Option for Case Study One	88
5.2.4 Results for the Second Option for Case Study One.....	93
5.3 Case Study Two	95
5.3.1 First Option for Case Study Two	95
5.3.2 Results for the First Option for Case Study Two.....	99
5.3.3 Second Option for Case Study Two.....	102
5.3.4 Results for the Second Option for Case Study Two	104
5.4 EROW Result Summary	107
5.4.1 First Option of Case Study One Summary	107
5.4.2 Second Option of Case Study One Summary	108

5.4.3 First Option of Case Study Two Summary	109
5.4.4 Second Option of Case Study Two Summary	110
Chapter 6: Conclusion.....	112
6.1 Summary	112
6.2 EROW and TAMSIM	113
6.3 Duration	115
6.4 Conclusion	116
References	118
Appendix A: TAMSIM Outputs	120
Appendix B: EROW Case Study One Outputs	160
Appendix C: EROW Case Study Two Outputs	187
Vita.....	215

List of Tables

Table 2.1: ROWIS Key Attributes.....	5
Table 2.2: Data Sets of ROWIS from TxDOT	6
Table 2.3: Negotiation vs. Eminent Domain Time Duration ⁽¹⁾	12
Table 2.4: Costs by Acquisition Type ⁽¹⁾	13
Table 2.5: County Type Categorization by Population	14
Table 2.6: County Type Time Durations ⁽¹⁾	15
Table 2.7: Costs by County Type (Population) ⁽¹⁾	16
Table 2.8: Cost and Duration of Outsourcing and In-house ⁽¹⁾	16
Table 2.9: Costs and Durations of Early and Conventional Acquisition ⁽¹⁾	17
Table 2.10: Early Acquisition Type ⁽¹⁾	18
Table 4.1: Project Main Characteristics.....	28
Table 4.2: Results for the Metro Project under the Environmental Clearance Obtained Speculation Scenario.....	31
Table 4.3: Estimates for the Environmental Clearance Obtained Scenario.....	66
Table 4.4: Estimates for the First Parcel Purchased (not early) Scenario.....	67
Table 4.5: Estimates for the First Parcel Purchased (inc. early) Scenario.....	68
Table 4.6: Estimates for the Schematic Available Scenario	69
Table 4.7: Estimates for the ROW Release Obtained Scenario.....	71
Table 4.8: Summary of the Minimum Total Project Costs and Savings	72
Table 4.9: Summary of the Maximum Total Project Costs and Savings.....	74
Table 4.10: Summary of the Average Total Project Costs and Savings.....	75
Table 4.11: Time Durations to Complete Right-of-Way Acquisitions.....	77

Table 5.1: Data for EROW under the First Option for Case Study One	81
Table 5.2: EROW Input Data for the First Option of Case Study One	83
Table 5.3: Best and Worst Case Scenario of the Environmental Clearance Obtained for the First Option of Case Study One	88
Table 5.4: Data for EROW under the Second Option for Case Study One	89
Table 5.5: EROW Input Data for the Second Option of Case Study One	91
Table 5.6: Best and Worst Case Scenario of the Metro County for the Second Option of Case Study One.....	95
Table 5.7: Total Average Cost Values for the First Option of Case Study Two	97
Table 5.8: Total Standard Deviation values for the First Option of Case Study Two	98
Table 5.9: Best and Worst Case Scenario of the Environmental Clearance Obtained Scenario for the First Option of Case Study Two	102
Table 5.10: Best and Worst Case Scenario of the Metro County for the Second Option of Case Study Two	107
Table 5.11: EROW Results Recompilation for First Option of Case Study One	108
Table 5.12: EROW Results Recompilation for Second Option of Case Study One.....	109
Table 5.13: EROW Results Recompilation for First Option of Case Study Two	110
Table 5.14: EROW Results Recompilation for Second Option of Case Study Two	111
Table 6.1: Case Study One Results Recompilation	114
Table 6.2: Case Study Two Results Recompilation.....	115
Table 6.3: Parcel-Speculation Scenario Summary.....	117
Table A.1: Metro County under Environmental Clearance Obtained	120
Table A.2: Urban County under Environmental Clearance Obtained	121
Table A.3: Rural County under Environmental Clearance Obtained	122
Table A.4: Dallas County under Environmental Clearance Obtained.....	123

Table A.5: Harris County under Environmental Clearance Obtained	124
Table A.6: Tarrant County under Environmental Clearance Obtained	125
Table A.7: Metro County under First Parcel Purchased (inc. early)	128
Table A.8: Urban County under First Parcel Purchased (inc. early)	129
Table A.9: Rural County under First Parcel Purchased (inc. early)	130
Table A.10: Dallas County under First Parcel Purchased (inc. early)	131
Table A.11: Harris County under First Parcel Purchased (inc. early)	132
Table A.12: Tarrant County under First Parcel Purchased (inc. early)	133
Table A.13: Metro County under First Parcel Purchased (not early)	136
Table A.14: Urban County under First Parcel Purchased (not early)	137
Table A.15: Rural County under First Parcel Purchased (not early)	138
Table A.16: Dallas County under First Parcel Purchased (not early)	139
Table A.17: Harris County under First Parcel Purchased (not early)	140
Table A.18: Tarrant County under First Parcel Purchased (not early)	141
Table A.19: Metro County under ROW Release Obtained	144
Table A.20: Urban County under ROW Release Obtained	145
Table A.21: Rural County under ROW Release Obtained	146
Table A.22: Dallas County under ROW Release Obtained	147
Table A.23: Harris County under ROW Release Obtained	148
Table A.24: Tarrant County under ROW Release Obtained	149
Table A.25: Metro County under Schematics Available	152
Table A.26: Urban County under Schematics Available	153
Table A.27: Rural County under Schematics Available	154

Table A.28: Dallas County under Schematics Available.....	155
Table A.29: Harris County under Schematics Available.....	156
Table A.30: Tarrant County under Schematics Available	157
Table B.1: Best and Worst Case Scenario of the Environmental Clearance Obtained Scenario for the First Option of Case Study One	160
Table B.2: Best and Worst Case Scenario of the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study One	162
Table B.3: Best and Worst Case Scenario of the First Parcel Purchased (not early) Scenario for the First Option of Case Study One	165
Table B.4: Best and Worst Case Scenario of the ROW Release Obtained Scenario for the First Option of Case Study One	167
Table B.5: Best and Worst Case Scenario of the Schematics Available (time 0) Scenario for the First Option of Case Study One	170
Table B.6: Best and Worst Case Scenario of the Dallas County for the Second Option of Case Study One.....	172
Table B.7: Best and Worst Case Scenario of the Harris County for the Second Option of Case Study One.....	175
Table B.8: Best and Worst Case Scenario of the Metro County for the Second Option of Case Study One.....	177
Table B.9: Best and Worst Case Scenario of the Rural County for the Second Option of Case Study One.....	180
Table B.10: Best and Worst Case Scenario of the Tarrant County for the Second Option of Case Study One.....	182
Table B. 11: Best and Worst Case Scenario of the Urban County for the Second Option of Case Study One.....	184
Table C.1: Best and Worst Case Scenario of the Environmental Clearance Obtained Scenario for the First Option of Case Study Two	187
Table C.2: Best and Worst Case Scenario of the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study Two	189

Table C.3: Best and Worst Case Scenario of the First Parcel Purchased (not early) Scenario for the First Option of Case Study Two	192
Table C.4: Best and Worst Case Scenario of the ROW Release Obtained Scenario for the First Option of Case Study Two.....	194
Table C.5: Best and Worst Case Scenario of the Schematics Available (time 0) Scenario for the First Option of Case Study Two	197
Table C.6: Best and Worst Case Scenario of the Dallas County for the Second Option of Case Study Two.....	199
Table C.7: Best and Worst Case Scenario of the Harris County for the Second Option of Case Study Two.....	202
Table C.8: Best and Worst Case Scenario of the Metro County for the Second Option of Case Study Two.....	204
Table C.9: Best and Worst Case Scenario of the Rural County for the Second Option of Case Study Two.....	207
Table C.10: Best and Worst Case Scenario of the Tarrant County for the Second Option of Case Study Two.....	209
Table C.11: Best and Worst Case Scenario of the Urban County for the Second Option of Case Study Two.....	212

List of Figures

Figure 2.1: ROW Acquisition Process Key Dates.....	10
Figure 3.1: First Screen of TAMSIM.	19
Figure 3.2: TAMSIM Parcel Generator Screen.	20
Figure 3.3: TAMSIM Alignments Screen.	21
Figure 3.4: TAMSIM Basic Data Screen.....	22
Figure 3.5: TAMSIM Parcel Data Screen.....	23
Figure 3.6: TAMSIM Screen for Possession Time/Cost Data.....	24
Figure 3.7: TAMSIM Summary Statistics Screen.	25
Figure 3.8: TAMSIM Detailed Results.....	26
Figure 4.1: Costs and Savings for the Metro Project under the Environmental Clearance Obtained Scenario.....	33
Figure 4.2: Costs and Savings for the Urban Project under the Environmental Clearance Obtained Scenario.	34
Figure 4.3: Costs and Savings for the Rural Project under the Environmental Clearance Obtained Scenario.....	35
Figure 4.4: Costs and Savings for the Dallas Project under the Environmental Clearance Obtained Scenario.	36
Figure 4.5: Costs and Savings for the Harris Project under the Environmental Clearance Obtained Scenario.	38
Figure 4.6: Costs and Savings for the Tarrant Project under the Environmental Clearance Obtained Scenario.	39
Figure 4.7: Costs and Savings for the Metro Project under the First Parcel Purchased (not early) Scenario.....	41
Figure 4.8: Costs and Savings for the Urban Project under the First Parcel Purchased (not early) Scenario.....	42

Figure 4.9: Costs and Savings for the Rural Project under the First Parcel Purchased (not early) Scenario.....	43
Figure 4.10: Costs and Savings for the Dallas Project under the First Parcel Purchased (not early) Scenario.....	44
Figure 4.11: Costs and Savings for the Harris Project under the First Parcel Purchased (not early) Scenario.....	45
Figure 4.12: Costs and Savings for the Tarrant Project under the First Parcel Purchased (not early) Scenario.....	46
Figure 4.13: Costs and Savings for the Metro Project under the Schematics Available (time 0) Scenario.....	47
Figure 4.14: Costs and Savings for the Urban Project under the Schematics Available (time 0) Scenario.....	48
Figure 4.15: Costs and Savings for the Rural Project under the Schematics Available (time 0) Scenario.....	49
Figure 4.16: Costs and Savings for the Dallas Project under the Schematics Available (time 0) Scenario.....	50
Figure 4.17: Costs and Savings for the Harris Project under the Schematics Available (time 0) Scenario.....	51
Figure 4.18: Costs and Savings for the Tarrant Project under the Schematics Available (time 0) Scenario.....	52
Figure 4.19: Costs and Savings for the Metro Project under the First Parcel Purchased (inc. early) Scenario.....	53
Figure 4.20: Costs and Savings for the Urban Project under the First Parcel Purchased (inc. early) Scenario.....	54
Figure 4.21: Costs and Savings for the Rural Project under the First Parcel Purchased (inc. early) Scenario.....	55
Figure 4.22: Costs and Savings for the Dallas Project under the First Parcel Purchased (inc. early) Scenario.....	56
Figure 4.23: Costs and Savings for the Harris Project under the First Parcel Purchased (inc. early) Scenario.....	57

Figure 4.24: Costs and Savings for the Tarrant Project under the First Parcel Purchased (inc. early) Scenario.....	58
Figure 4.25: Costs and Savings for the Metro Project under the ROW Release Obtained Scenario.....	59
Figure 4.26: Costs and Savings for the Urban Project under the ROW Release Obtained Scenario.....	60
Figure 4.27: Costs and Savings for the Rural Project under the ROW Release Obtained Scenario.....	61
Figure 4.28: Costs and Savings for the Dallas Project under the ROW Release Obtained Scenario.....	62
Figure 4.29: Costs and Savings for the Harris Project under the ROW Release Obtained Scenario.....	63
Figure 4.30: Costs and Savings for the Tarrant Project under the ROW Release Obtained Scenario.....	64
Figure 5.1: EROW Input Data Format.....	79
Figure 5.2: Case Studies One and Two.....	79
Figure 5.3: Environmental Clearance Obtained Input Data Format for the First Option of Method One.....	81
Figure 5.4: EROW Input Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study One.	85
Figure 5.5: EROW Best Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study One.	86
Figure 5.6: Graph of Savings and RORs for Budget Options of the Environmental Clearance Obtained Scenario for the First Option of Case Study One.....	87
Figure 5.7: Metro County Type Input Data Format for the Second Option of Method One.....	90
Figure 5.8: EROW Input Screen for the Metro County for the Second Option of Case Study One.	92
Figure 5.9: EROW Best Case Scenario Output Screen for the Metro County for the Second Option of Case Study One.	93

Figure 5.10: Graph of Savings and RORs for Budget Options of the Metro County for the Second Option of Case Study One.....	94
Figure 5.11: Environmental Clearance Obtained Scenario Input Data Format for the First Option of Method Two	98
Figure 5.12: EROW Input Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.	99
Figure 5.13: EROW Best Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.	100
Figure 5.14: Graph of Savings and RORs for Budget Options of the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.	101
Figure 5.15: Metro County Input Data Format for the Second Option of Method Two	103
Figure 5.16: EROW Input Screen for the Metro County for the Second Option of Case Study Two.	104
Figure 5.17: EROW Best Case Scenario Output Screen for the Metro County for the Second Option of Case Study Two.....	105
Figure 5.18: Graph of Savings and RORs for Budget Options of the Metro County for the Second Option of Case Study Two.....	106
Figure B.1: Graph of Savings and RORs for Budget Options of the Environmental Clearance Obtained Scenario for the First Option of Case Study One.....	160
Figure B.2: EROW Input Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study One.	161
Figure B.3: EROW Best Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study One.	161
Figure B.4: EROW Worst Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study One.....	162
Figure B.5: Graph of Savings and RORs for Budget Options of the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study One.....	163
Figure B.6: EROW Input Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study One.	163
Figure B.7: EROW Best Case Scenario Output Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study One.	164

Figure B.8: EROW Worst Case Scenario Output Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study One.	164
Figure B.9: Graph of Savings and RORs for Budget Options of the First Parcel Purchased (not early) Scenario for the First Option of Case Study One.	165
Figure B.10: EROW Input Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study One.	166
Figure B.11: EROW Best Case Scenario Output Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study One.	166
Figure B.12: EROW Worst Case Scenario Output Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study One.	167
Figure B.13: Graph of Savings and RORs for Budget Options of the ROW Release Obtained Scenario for the First Option of Case Study One.	168
Figure B.14: EROW Input Screen for the ROW Release Obtained Scenario for the First Option of Case Study One.	168
Figure B.15: EROW Best Case Scenario Output Screen for the ROW Release Obtained Scenario for the First Option of Case Study One.	169
Figure B.16: EROW Worst Case Scenario Output Screen for the ROW Release Obtained Scenario for the First Option of Case Study One.	169
Figure B.17: Graph of Savings and RORs for Budget Options of the Schematics Available (time 0) Scenario for the First Option of Case Study One.	170
Figure B.18: EROW Input Screen for the Schematics Available (time 0) Scenario for the First Option of Case Study One.	171
Figure B.19: EROW Best Case Scenario Output Screen for the Schematics Available (time 0) Scenario for the First Option of Method One.	171
Figure B.20: EROW Worst Case Scenario Output Screen for the Schematics Available (time 0) Scenario for the First Option of Case Study One.	172
Figure B.21: Graph of Savings and RORs for Budget Options of the Dallas County for the Second Option of Case Study One.	173
Figure B.22: EROW Input Screen for the Dallas County for the Second Option of Case Study One.	173

Figure B.23: EROW Best Case Scenario Output Screen for the Dallas County for the Second Option of Case Study One.	174
Figure B.24: EROW Worst Case Scenario Output Screen for the Dallas County for the Second Option of Case Study One.	174
Figure B.25: Graph of Savings and RORs for Budget Options of the Harris County for the Second Option of Case Study One.....	175
Figure B.26: EROW Input Screen for the Harris County for the Second Option of Case Study One.....	176
Figure B.27: EROW Best Case Scenario Output Screen for the Harris County for the Second Option of Case Study One.	176
Figure B.28: EROW Worst Case Scenario Output Screen for the Harris County for the Second Option of Case Study One.	177
Figure B.29: Graph of Savings and RORs for Budget Options of the Metro County for the Second Option of Case Study One.....	178
Figure B.30: EROW Input Screen for the Metro County for the Second Option of Case Study One.....	178
Figure B.31: EROW Best Case Scenario Output Screen for the Metro County for the Second Option of Case Study One.	179
Figure B.32: EROW Worst Case Scenario Output Screen for the Metro County for the Second Option of Case Study One.	179
Figure B.33. Graph of Savings and RORs for Budget Options of the Rural County for the Second Option of Case Study One.	180
Figure B.34: EROW Input Screen for the Rural County for the Second Option of Case Study One.....	181
Figure B.35: EROW Best Case Scenario Output Screen for the Rural County for the Second Option of Case Study One.	181
Figure B.36: Graph of Savings and RORs for Budget Options of the Tarrant County for the Second Option of Case Study One.....	182
Figure B.37: EROW Input Screen for the Tarrant County for the Second Option of Case Study One.....	183

Figure B.38: EROW Best Case Scenario Output Screen for the Tarrant County for the Second Option of Case Study One.	183
Figure B.39: EROW Worst Case Scenario Output Screen for the Tarrant County for the First Option of Case Study One.	184
Figure B.40: Graph of Savings and RORs for Budget Options of the Urban County for the Second Option of Case Study One.....	185
Figure B.41: EROW Input Screen for the Urban County for the Second Option of Case Study One.....	185
Figure B.42: EROW Best Case Scenario Output Screen for the Urban County for the Second Option of Case Study One.	186
Figure B.43: EROW Worst Case Scenario Output Screen for the Urban County for the Second Option of Case Study One.	186
Figure C.1: Graph of Savings and RORs for Budget Options of the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.	187
Figure C.2: EROW Input Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.	188
Figure C.3: EROW Best Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.....	188
Figure C.4: EROW Worst Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.	189
Figure C.5: Graph of Savings and RORs for Budget Options of the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study Two.	190
Figure C.6: EROW Input Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study Two.....	190
Figure C.7: EROW Best Case Scenario Output Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study Two.....	191
Figure C.8: EROW Worst Case Scenario Output Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study Two.	191
Figure C.9: Graph of Savings and RORs for Budget Options of the First Parcel Purchased (not early) Scenario for the First Option of Case Study Two.	192

Figure C.10: EROW Input Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study Two.....	193
Figure C.11: EROW Best Case Scenario Output Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study Two.....	193
Figure C.12: EROW Worst Case Scenario Output Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study Two.	194
Figure C.13: Graph of Savings and RORs for Budget Options of the ROW Release Obtained Scenario for the First Option of Case Study Two.....	195
Figure C.14: EROW Input Screen for the ROW Release Obtained Scenario for the First Option of Case Study Two.....	195
Figure C.15: EROW Best Case Scenario Output Screen for the ROW Release Obtained Scenario for the First Option of Case Study Two.....	196
Figure C.16: EROW Worst Case Scenario Output Screen for the ROW Release Obtained Scenario for the First Option of Case Study Two.....	196
Figure C.17: Graph of Savings and RORs for Budget Options of the Schematics Available (time 0) Scenario for the First Option of Case Study Two.	197
Figure C.18: EROW Input Screen for the Schematics Available (time 0) Scenario for the First Option of Case Study Two.....	198
Figure C.19: EROW Best Case Scenario Output Screen for the Schematics Available (time 0) Scenario for the First Option of Case Study Two.....	198
Figure C.20: EROW Worst Case Scenario Output Screen for the Schematics Available (time 0) Scenario for the First Option of Case Study Two.....	199
Figure C.21: Graph of Savings and RORs for Budget Options of the Dallas County for the Second Option of Case Study Two.....	200
Figure C.22: EROW Input Screen for the Dallas County for the Second Option of Case Study Two.	200
Figure C.23: EROW Best Case Scenario Output Screen for the Dallas County for the Second Option of Case Study Two.....	201
Figure C.24: EROW Worst Case Scenario Output Screen for the Dallas County for the Second Option of Case Study Two.....	201

Figure C.25: Graph of Savings and RORs for Budget Options of the Harris County for the Second Option of Case Study Two.....	202
Figure C.26: EROW Input Screen for the Harris County for the Second Option of Case Study Two.	203
Figure C.27: EROW Best Case Scenario Output Screen for the Harris County for the Second Option of Case Study Two.....	203
Figure C.28: EROW Worst Case Scenario Output Screen for the Harris County for the Second Option of Case Study Two.....	204
Figure C.29: Graph of Savings and RORs for Budget Options of the Metro County for the Second Option of Case Study Two.....	205
Figure C.30: EROW Input Screen for the Metro County for the Second Option of Case Study Two.	205
Figure C.31: EROW Best Case Scenario Output Screen for the Metro County for the Second Option of Case Study Two.....	206
Figure C.32: EROW Worst Case Scenario Output Screen for the Metro County for the Second Option of Case Study Two.....	206
Figure C.33: Graph of Savings and RORs for Budget Options of the Rural County for the Second Option of Case Study Two.....	207
Figure C.34: EROW Input Screen for the Rural County for the Second Option of Case Study Two.	208
Figure C.35: EROW Best Case Scenario Output Screen for the Rural County for the Second Option of Case Study Two.....	208
Figure C.36: EROW Best Case Scenario Output Screen for the Rural County for the Second Option of Case Study Two.....	209
Figure C.37: Graph of Savings and RORs for Budget Options of the Tarrant County for the Second Option of Case Study Two.....	210
Figure C.38: EROW Input Screen for the Tarrant County for the Second Option of Case Study Two.	210
Figure C.39: EROW Best Case Scenario Output Screen for the Tarrant County for the Second Option of Case Study Two.....	211

Figure C.40: EROW Worst Case Scenario Output Screen for the Tarrant County for the First Option of Case Study Two.....	211
Figure C.41: Graph of Savings and RORs for Budget Options of the Urban County for the Second Option of Case Study Two.....	212
Figure C.42: EROW Input Screen for the Urban County for the Second Option of Case Study Two.	213
Figure C.43: EROW Best Case Scenario Output Screen for the Urban County for the Second Option of Case Study Two.....	213
Figure C.44: EROW Worst Case Scenario Output Screen for the Urban County for the Second Option of Case Study Two.....	214

Chapter 1: Introduction

In modern days, more constructions have been developed in order to help mobilize products and persons or improve the infrastructure of a section of a city or even the city as a whole. As time passes by, cities in Texas are getting more crowded and the population is growing rapidly. Therefore, the roads, highways and freeways are not sufficient to provide a good level of service to the community. For this reason, more infrastructures are required to be added to the current system. Most of the time the process of building a road, highway or freeway becomes more complicated when there is no space for the addition due to business, houses or any other building.

1.1 Basis of Asset Management

Asset management is well known as “a process of resource allocation and utilization” (AASHTO, 2002). One of the purposes of asset management is to assist different agencies in managing their asset costs in an effective manner by gathering engineering, finance, personnel, planning, and information management (AASHTO, 1997). The decision-making process is affected by the way asset management is applied. The function of asset management is for the agencies to invest in the option that will provide with the best rate of return. In order to achieve this objective, asset management should consist of tools, processes, and data required being able to manage the assets in a useful approach (Nemmers, 2004). In a more expansive definition, asset management is “a systematic process of maintaining, upgrading, and operating assets, combining engineering principles with sound business practice and economic rationale, and providing tools to facilitate a more organized and flexible approach to making the decisions necessary to achieve the public’s expectations” (OECD, 2001).

1.2 Simulation Tools

In order to improve the modern traffic management, transportation infrastructure construction (Turkiyyah et al.,2005) and traffic demand modeling (Antoniou, 1997) are applying simulators to assist in the process. For example, simulation methods in pavement management systems (PMS) and bridge management systems (BMS) are being utilized by a significant number of researchers as subsystems for the transportation asset management (Hudson et al., 1987; Amekudzi, 1999; Amekudzi and McNeil, 2000). Although these computerized tools are of great importance to assist the decision-making process, they are not exactly precise in guaranteeing the most suitable solutions. Therefore, sub-modules such as optimization techniques are used to assist in confirming the optimum alternative (Hegazy and Kassab, 2003; AbouRizk and Shi, 1994). Nevertheless, on other occasions the simulations are used as a supporting tool to verify if the outcome is the most suitable scenario, afterward optimization techniques are used to solve the remaining problems (Worzel et al., 1994; Consiglio and Zenios, 1999; Seshadri et al., 1999).

1.3 Right of Way

Right of way (ROW) acquisitions refers to the situation in which although a parcel of land has an owner, some other party has a legal right to take over that land. Planning, appraisal, negotiation, property management, and relocation are the five general phases for the ROW process (TxDOT, 2006c). In modern times, money has become an important issue. The economy is not significantly good, and nowadays it is of great importance to save money. Asset management strategies have been applied in order to assist the Texas Department of Transportation (TxDOT) to be able to acquire parcels in an improved and more efficient way. The computerized programs TAMSIM and EROW were developed in order to provide helpful

assistance when right of way has to be applied in order to improve our infrastructure. These simulator components will provide helpful information on when to obtain a certain parcel, and in what region to obtain it. Two previous reports were developed on regard of this analysis (Chang, Kang, Hicks, Pickett, Krugler, Feldman, Smith, Butenko, and Guikema, 2007; Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

1.4 Research Objective

The main purpose of this research is to provide the Texas Department of Transportation (TxDOT) with asset management tools to better estimate potential savings from advanced right of way acquisition, and it is also aimed to provide evidence that advanced right of way acquisitions grant the highest savings value. Currently there are restrictions towards obtaining advanced right of way acquisitions. Nonetheless, this research has the intention to provide enough information to justify advanced right of way acquisitions when considered as the most suitable alternative.

1.5 Organization

This study consists of analyzing and obtaining feasible outputs from the two right of way simulation assistance computerized programs, TAMSIM and EROW:

Chapter 2; consists of an overview of the data collection and the right of way process with its stages. Chapter 2 also includes historical data acquired and the organization and categorization of this data.

Chapter 3; includes the introduction to TAMSIM and EROW. TAMSIM is a component simulator for right of way acquisitions. EROW is an optimization tool aimed to support the results obtained from TAMSIM.

Chapter 4; presents the outputs from TAMSIM.

Chapter 5; includes the results from EROW.

Chapter 6; provides with a summary of the analysis and the conclusion of the application of TAMSIM and EROW on the right of way acquisition process.

Chapter 2: Data Compilation and Organization

2.1 Right of Way Information Systems

In order to compare the results with actual and accurate data, a historical data collection had been made. The principal resource for this data compilation was the Right of Way Information System (ROWIS) database, which is a database management program and it is used by district offices and the Right of Way Division (Gibson, 2006). Table 2.1 shows the key attributes of the information that can be found in ROWIS. In order to support data obtained from ROWIS, some interviews with TxDOT key personnel were conducted.

Table 2.1: ROWIS Key Attributes

Project Level Attributes	Parcel Level Attributes	Time Attributes	Cost Attributes
District, County, Highway, CSJ number, Parcel Number, etc.	Property Type, Taken Area, Remainder Area, Type of Damages, Type of Improvements, Type of Acquisition, etc.	Environmental Clearance Date, ROW Release Date, Appraisal Report Date, Value Approved Date, Possession Date, etc.	Land Value, Damage Value, Improvement Value, Total Appraised Value, Total Approved Value, Total Acquisition Cost, etc.

Historical acquisition records obtained from ROWIS were filtered out in order to obtain more recent and accurate data. Records from parcel acquisitions older than the year 2003 were discarded, while the more recent records were analyzed carefully in order to prevent TAMSIM input errors. Cost terms used for the program were appropriately adjusted to the House Price Index (HPI) to take into consideration the properties' inflation rates (OFHEO, 2008). Table 2.2 contains four ROWIS data sets received as of June 2008, thanks to the close partnership provided by the TxDOT Right of Way Division. The last column, which is the fourth data set, is up to date and is the basis for the simulation model (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Table 2.2: Data Sets of ROWIS from TxDOT

	1st ROWIS Data Set	2nd ROWIS Data Set	3rd ROWIS Data Set	4th ROWIS Data Set
Received Date	April, 2007	July, 2007	November, 2007	April, 2008
Geographical Locations	5 counties from 1 district (SAT)	67 counties from 9 districts (ABL, AUS, BRY, CRP, ELP, FTW, HOU, WAC, WFS)	18 counties from 3 districts (FTW, HOU, SAT)	141 counties from 25 districts
Time Periods (1)	1985 – 2007	1985 – 2007	2003 – 2007	2003 – April, 2008
Number of Projects (2)	27	323	128	579
Number of Parcels (2)	296	5,313	2,127	7,559

(1) Based on parcel possession dates

(2) The project and parcel numbers are those from the combined tables after the data filtering process

Although the information obtained from the tables of ROWIS is reliable, it can contain some errors (TxDOT, 2006). In order to clean the data and obtain more accurate information to be used for the simulation model and prevent for future error in the usage of the simulation model, an overall filtering process was made. The filtering process includes the following stages:

1. Eliminate records with old date values
2. Eliminate records with no Acquisition Type Code
3. Eliminate records with unusual cost
4. Eliminate Records with blank date fields:
 - blank Environmental Clearance Date
 - blank Appraisal Report Date
 - blank Possession Date
 - blank ROW Release Date
 - blank Value Approved Date
5. Eliminate records with precedence violations:
 - ROW Release Date is earlier than Environmental Clearance Date
 - Appraisal Report Date is earlier than ROW Release Date
 - Value Approved Date is earlier than Appraisal Report Date

2.1.1 Activities for Right of Way Parcel Acquisition

A construction project development could take approximately between 3 to 10 years to be completed. The processes of environmental clearance and ROW acquisition consume a considerable portion of the construction project development time before the construction phase begins. Generally, once environmental clearance is obtained, the process of ROW acquisition starts. Appraisal of the parcel, negotiation, possession, and relocation take place after the ROW

is released. The ROW acquisition process key dates are shown and summarized in Figure 2.1.

The durations are categorized as follows:

D1 : Time duration from Environmental Clearance to ROW Release, which is the same for all parcels within a project.

D2: Time duration from ROW release to possession, which could differ between individual parcels.

D3: Time duration from ROW Release to Appraisal Report.

D4: Time duration from Appraisal Report to Value Approved.

D5: Time Duration from Value Approved to Possession Date.

Therefore, the total time duration from environmental clearance to the possession date of a project depends on the parcel that takes the longest time duration during the whole ROW acquisition process. The definitions for the key dates presented in Figure 2.1 (Gibson, 2006) are the following:

Environmental Clearance Date: An environmental assessment must be completed while the Plan Authority phase takes place. During this environmental assessment, an environmental evaluation is made and must be approved by the Environmental Affair Division (ENV). The environmental clearance date takes place once the ENV has approved the environmental evaluation made. Generally, once the environmental clearance and the ROW release are approved, the ROW acquisition process can begin.

Guess Estimate Date: The guess estimate date takes place after the environmental clearance date and before the ROW release date. Typically, estimated values on the acquisition cost of the parcels are required prior to the start of the ROW acquisition process. The estimated cost values are prepared by the district ROW personnel. The guess estimate date is not included in the

simulation model TAMSIM due to significant inaccuracies related to the guess estimates and other factors from the data of ROWIS.

ROW Release Date: To start the authorizations for the ROW acquisition process, they have to be approved by the ROW division. This process takes place after the guess estimate date and before the appraisal report date. Usually the ROW acquisition process cannot start until the districts received the ROW acquisition approval from the ROW division (TxDOT, 2006). There are cases when parcel acquisitions are made before the ROW release date. These acquisitions are known as early acquisition. Protective buying, donations, and hardship acquisitions are considered as early acquisitions (TxDOT, 2006).

Appraisal Report Date: The appraisal report date follows after the district receives the ROW release by the ROW Division. Once the ROW release is obtained, an independent contract appraiser is designated by the district to obtain an evaluation of the parcels' current value. Once the value of the parcel is appraised, it is then submitted on a Form ROW-A-10, Tabulation of Value, to the district right of way section. This tabulation of values contains the values of the land, improvements and damages (TxDOT, 2006).

Value Approved Date: Before negotiations start, the district right of way section and the ROW Division have to revise the appraised value of the land. Once the ROW Division verifies that the parcel value is suitable is when the Value Approved Date takes place (TxDOT, 2006).

Possession Date: There are two approaches towards the Possession Date, negotiation or condemnation. After the approval of the appraised value, if the negotiations with the parcel owner are successful, the parcel possession date is defined as the completion date of ROW-N-72, Title Company's Closing Statement. On the other hand, if the parcel acquisition goes by

condemnation, the possession date is defined as the date of deposit, which is shown in ROW-END, Notice of Deposit (TxDOT, 2006).

Let Date: When the construction is ready to start after the parcels have being acquired, this date is defined as the let date. The simulation program does not include this date, since it is designed to provide users with the estimated right of way costs and times by the time that the right of way process will be concluded (TxDOT, 2003).

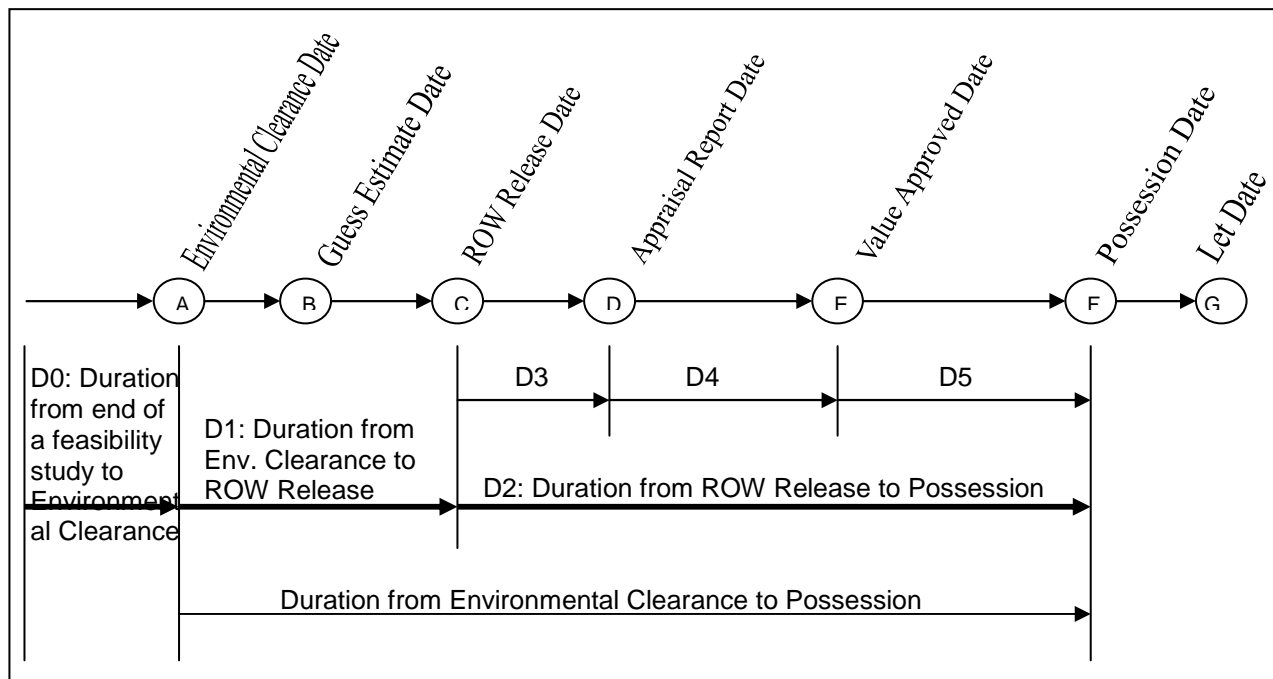


Figure 2.1: ROW Acquisition Process Key Dates.

2.2 Interviews with ROW Personnel Section

The interviews were aimed to understand the reason why TxDOT personnel with experience in the right of way acquisition area are in favor of early acquisition in some cases instead of the

process of conventional acquisition (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009). The personnel interviewed are the following:

- Frances Wilson; Director Right of Way, Houston District
- Scott B. Hall; District Right of Way Administrator, Fort Worth District
- Denise Baxter; Right of Way Agent, Fort Worth District
- Randall Redmond; Director of Transportation Planning and Development, Tyler District
- Thomas L. Doss; Right of Way Administrator, Tyler District
- Donald Toner; Texas Turnpike Authority (TTA) Division
- Jr., Keith Sliger; Texas Turnpike Authority (TTA) Division
- Kerry Fulton; Texas Turnpike Authority (TTA) Division

It was reported that the cost of right of way is affected by the speculator activities done on the parcel to be purchased. One of the speculation cases can consist of selling the property several times in a considerably short period of time. Every instance the parcel is sold, the price increases. Usually, these speculation activities begin once it is observed that the State of Texas has begun the purchase process of land. Another reason for the district personnel to prefer early acquisitions is that once landowners realize that the right of way acquisitions would take place, they subdivide the land in multiple smaller lands to be able to sell the property in separate smaller parcels, therefore causing cost increments to the state (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

2.3 ROWIS Data Analysis

2.3.1 Acquisition Type

There are two main types of ROW acquisitions: Negotiation, and Eminent Domain. Negotiation is when a private party negotiates with the property owner in order to use the property for public use. Eminent domain is when the state has the right to take away private property for public use. Table 2.3 includes the time durations for these two types of acquisition. Table 2.3, includes the median, maximum, average, and standard deviation duration times for the environmental clearance to possession and for the ROW release to possession (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Table 2.3: Negotiation vs. Eminent Domain Time Duration⁽¹⁾

Acquisition Type	Number of Parcels	Time Duration from Environmental Clearance to Possession (months)				Time Duration from ROW Release to Possession (months)			
		Median	Max.	Average	Std. Dev.	Median	Max.	Average	Std. Dev.
Negotiation	6,705	29.2	391.5	37.4	32.9	15.6	252.2	20.5	20.0
Eminent Domain	825	45.1	247.6	59.4	44.2	29.6	235.3	38.7	31.5
All Parcel Acquisitions	7,530	31.0	391.5	39.8	35.0	16.8	252.2	22.5	22.3

(1) From 4th ROWIS data set received in April 2008

The cost by acquisition type is shown in Table 2.4. By analyzing Table 2.4, it can be concluded that the number of parcels obtained by negotiation is significantly higher than the number of parcels obtained by eminent domain. However, the eminent domain average total

acquisition costs are considerably higher than the negotiation costs (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Table 2.4: Costs by Acquisition Type ⁽¹⁾

Acquisition Type	Number of Parcels	Land Cost (\$/square foot)				Total Acquisition Cost (\$, thousands)			
		Median	Max.	Average	Std. Dev.	Median	Max.	Average	Std. Dev.
Negotiation	6,705	0.38	96.14	3.29	6.92	14.7	20,095	105.7	552.2
Eminent Domain	825	1.83	69.14	6.66	9.80	56.9	11,417	350.3	965.7
All Parcel Acquisitions	7,530	0.45	96.14	3.66	7.36	16.8	20,095	132.5	616.0

(1) From 4th ROWIS data set received in April 2008

2.3.2 County Type Population

The data set from ROWIS that was gathered in April 2008 has the information of 141 counties of the state of Texas. These counties were categorized into different classifications; metropolitan, urban, and rural. The population for each of these county categories can be observed in Table 2.5. The metropolitan county type has a population greater than 400,000, while the rural county type has a population below 50,000. Nevertheless, the urban county type has a population between 50,000 and 400,000 (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Table 2.5: County Type Categorization by Population

County Type	Number of Counties with Parcel Acquisitions in ROWIS	Number of Parcels Acquisitions in ROWIS	County Name	Total Population (Census 2000)
Metropolitan (pop. > 400K)	9	2,191	Harris	3,400,578
			Dallas	2,218,899
			Tarrant	1,446,219
			Bexar	1,392,931
			Travis	812,280
			El Paso	679,622
			Hidalgo	569,463
			Collin	491,675
			Denton	432,976
Urban (50K < pop. < 400K)	37	2,423	Fort Bend	354,452
			Cameron	335,227
		
Rural (pop. < 50K)	95	2,475	Wise	48,793
			Lamar	48,499
		

The time durations according to the county types are shown in Table 2.6. The metropolitan county type takes more average time from environmental clearance to possession and from the ROW release to possession. Nonetheless, the rural county type takes less average time from environmental clearance to possession and from the ROW release to possession (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Table 2.6: County Type Time Durations ⁽¹⁾

County Type	Number of Parcels	Time Duration from Environmental Clearance to Possession (months)		Time Duration from ROW Release to Possession (months)	
		Average	Std. Dev.	Average	Std. Dev.
Metropolitan (pop. > 400K)	2,191	52	41	31	33
Urban (50K < pop. < 400K)	2,423	38	34	21	16
Rural (pop. < 50K)	2,475	30	26	17	11
All County Types	7,089	40	35	23	22

(1) From 4th ROWIS data set received in April 2008

2.3.3 County Type Cost

The dollars per square foot of land cost for the metropolitan county type is more than three times greater than the cost of the other two county types. The Rural county type has the least expensive land cost average, with a land cost of 0.64 \$/square foot. The average land cost for the urban county type is 2.53 \$/square foot. Furthermore, the average land cost for the metropolitan county is 9.04 \$/square foot. This observation is shown in Table 2.7 (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Table 2.7: Costs by County Type (Population)⁽¹⁾

County Type	Number of Parcels	Land Cost (\$/square foot)		Total Acquisition Cost (\$, thousands)	
		Average	Std. Dev.	Average	Std. Dev.
Metropolitan (pop. > 400K)	2,191	9.04	10.74	274.3	1,044.9
Urban (50K < pop. < 400K)	2,423	2.53	4.41	105.6	294.1
Rural (pop. < 50K)	2,475	0.64	2.29	32.0	87.5
All County Types	7,089	3.88	7.53	132.5	616.0

(1) From 4th ROWIS data set received in April 2008

2.3.4 Acquisition Method

The outsourcing method has been applied by TxDOT since 2003 in assisting during the parcel acquisition process. According to the data obtained from ROWIS, outsourcing has being used to acquire 58 percent of the total number of acquired parcels. Table 2.8 includes the durations from ROW release to possession by the acquisition methods of both, in-house and outsourced. In addition, Table 2.8 contains the total acquisition cost averages and standard deviation for the two methods (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Table 2.8: Cost and Duration of Outsourcing and In-house⁽¹⁾

Acquisition Method	Number of Parcels	Duration from ROW Release to Possession (months)		Total Acquisition Cost (\$, thousands)	
		Average	Std. Dev.	Average	Std. Dev.
In-House	3,116	25	29	136.5	676.1
Outsourced	4,414	21	15	129.7	569.7
All Acquisition Methods	7,530	23	22	132.5	616.0

(1) From 4th ROWIS data set received in April 2008

2.3.5 Acquisition Timing

The parcel records show only 1% of all the acquisitions as early acquisitions. Although there is little evidence of early acquisitions, a comparison can be observed in Table 2.9. A reduction in time from the right of way release to possession is noticeable. Data in Table 2.9 shows that the total average acquisition cost of parcels is significantly higher through early acquisition than the conventional acquisition method. It is believed that the value for the total average acquisition cost for early acquisition is higher than conventional acquisition, due to the fact that the acquisitions shown in Table 2.9 are located in metropolitan areas (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Table 2.9: Costs and Durations of Early and Conventional Acquisition ⁽¹⁾

Acquisition Timing	Number of Parcels	Duration from ROW Release to Possession (months)		Total Acquisition Cost (\$, thousands)	
		Average	Std. Dev.	Average	Std. Dev.
Early Acquisitions	66	11	15	468.8	1,161.2
Conventional Acquisitions	7,121	22	22	132.9	617.5
All Acquisitions	7,187	22	21	136.0	625.3

(1) From 4th ROWIS data set received in April 2008

2.3.6 Types of Early Acquisitions

There are two main categories for early acquisitions, hardship and protective buy. Table 2.10 shows the acquisition types of the early acquisition categories. It can be observed that the average time duration from ROW release to possession is greater for eminent domain than negotiation. It is also noticeable that the average total acquisition cost is significantly higher for

eminent domain than negotiation as well. From Table 2.10 can be concluded that landowners with higher value parcels lead the acquisitions through eminent domain (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Table 2.10: Early Acquisition Type ⁽¹⁾

Type of Early Acquisition	Acquisition Type	Number of Parcels	Average Time Duration from ROW Release to Possession (months)	Average Total Acquisition Cost (\$, thousands)
Hardship	Negotiation	12	9	187.0
	Eminent Domain	6	26	773.0
All Hardship Acquisitions		18	15	382.4
Protective Buy	Negotiation	46	10	375.4
	Eminent Domain	2	15	3,395.7
All Protective Buy Acquisitions		48	10	501.3
All Early Acquisitions		66	11	468.8

(1) From 4th ROWIS data set received in April 2008

Chapter 3: Introduction to TAMSIM and EROW

3.1 TAMSIM Introduction

The data obtained from ROWIS was the data basis for the development of TAMSIM. TAMSIM was programmed to run according to the data gather from ROWIS. The purpose of TAMSIM is to simulate the costs and savings from early acquisition according to the speculation scenario where the acquisition takes place and the number of parcels to be acquired early.

3.1.1 Input Data for TAMSIM

The first screen of TAMSIM is shown in Figure 3.1. In this window TAMSIM allows the user to start a new simulation or continue with a previous simulation. If the user decides to start a new simulation the window from Figure 3.2 will appear on the screen (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

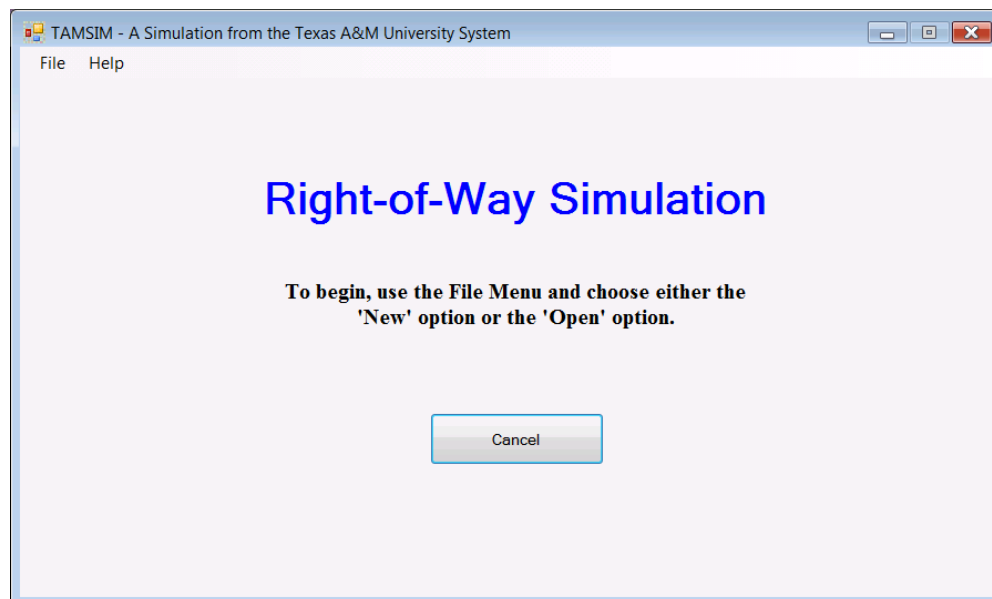


Figure 3.1: First Screen of TAMSIM.

When Figure 3.2 appears, the user has the option of choosing the county type where the parcel to be acquired is located. The option of the total number of parcels for the project is included, along with the number of parcels with future improvements likely and the number of parcels to be purchased early. The number of alignments is another option for the user to enter. It refers to the group of parcels to be included or rejected during the analysis. Since TAMSIM is intended to be used before the approval of the environmental clearance, there is a chance that some of the parcels will not be included in the approval. Therefore, this number of parcels not included, will be rejected during the analysis (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Generation of Random Parcels

File Run Help

Parcel Generator

Select a county or district

Generic County in Texas

Total Number of Parcels for the Project

49

Number Parcels with Future Improvements Likely

5

Number Parcels to Purchase Early

5

Number of Alignments

3

Continue Quit

Figure 3.2: TAMSIM Parcel Generator Screen.

When a number of alignments greater than one are chosen, the screen in Figure 3.3 will appear. In Figure 3.3 the user has the opportunity to choose the percentage of likelihood of inclusion and the permit cost for each of the alignments. The likelihood of inclusion is defined as the probability that the alignment will be approved during the environmental clearance. The cost permit refers to the cost or costs for permits associated with a certain alignment (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Num	ID	Start New Group	Likelihood of Inclusion	Permit Cost (x\$1000)
1	Alignment-1	<input checked="" type="checkbox"/>	1.0	\$0
2	Alignment-2	<input checked="" type="checkbox"/>	0.5	\$0
3	Alignment-3	<input type="checkbox"/>	0.5	\$0

Figure 3.3: TAMSIM Alignments Screen.

The project level data for TAMSIM is shown in Figure 3.4. The information included in this screen is generated from TAMSIM based on the data obtained from ROWIS. In addition, this information is generated according to the county type selected and the number of parcels to be obtained by early acquisition. Some of the information integrated in the basic data screen

includes the project time estimates in months from the schematics available until the environmental clearance, and the project time estimates in months from the environmental clearance to the ROW release (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

TAMSIM - Input of Project Level Data (C:\TxDOT\TAMSIM\bin\Debug_tmp.tmp)

File View Run Help

Basic Data

Project Description by

Project Time Estimates from Schematics Available Until Environmental Clearance, in months

Estimate of minimum	Estimate of most likely	Estimate of maximum
<input type="text" value="12"/>	<input type="text" value="18"/>	<input type="text" value="36"/>

Project Time Estimates from Environmental Clearance to ROW Release, in months

Estimate of minimum	Estimate of most likely	Estimate of maximum
<input type="text" value="2"/>	<input type="text" value="4"/>	<input type="text" value="12"/>

Number of replications	Nominal inflation per year (%)	Target completion date (months)	Penalty cost per day late (\$/day)	Cost reduction per day early (\$/day)
<input type="text" value="50"/>	<input type="text" value="6.00%"/>	<input type="text" value="50"/>	<input type="text" value="100"/>	<input type="text" value="100"/>

Sometimes benefit of early finish are estimated to be 30% of total project costs divided by 365

Additional cost increase due to speculation (%/yr)	Speculation begins	Offset for Speculation
<input type="text" value="20.00%"/>	<input type="text" value="First parcel purchased (not early)"/>	<input type="text" value="no offset"/>

Figure 3.4: TAMSIM Basic Data Screen.

The parcel specific data is shown in Figure 3.5. The information in Figure 3.5 is also generated by the county type chosen in Figure 3.2 and based on ROWIS gathered data. Some of the information included in the parcel data screen are the associated alignment, likelihood of outsourcing, likelihood of condemnation, begin time, minimum duration in months for improvement, early acquisition, and so forth. (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009). Several of these values are explained more in detailed in Chapter 4.

Num	ID	Associated Alignment	Likelihood of Outsourcing	Likelihood of Condemnation	Likelihood of Improvements Beginning after Feasibility Study	Begin Time (months) for Improvement	Min Duration (months) for Improvement	Mode Duration (months) for Improvement	Max Duration (months) for Improvement	Cost Multiplier for Improvements	Early Acquisition
1	Generic-1	1	0.7298	0.1003	1	0	12	36	72	5	<input checked="" type="checkbox"/>
2	Generic-2	1	0.7298	0.1003	1	0	12	36	72	5	<input checked="" type="checkbox"/>
3	Generic-3	1	0.7298	0.1003	1	0	12	36	72	5	<input checked="" type="checkbox"/>
4	Generic-4	2	0.7298	0.1003	1	0	12	36	72	5	<input checked="" type="checkbox"/>
5	Generic-5	2	0.7298	0.1003	1	0	12	36	72	5	<input checked="" type="checkbox"/>
6	Generic-6	2	0.7298	0.1003	0	0	0	0	0	1	<input type="checkbox"/>
7	Generic-7	3	0.7298	0.1003	0	0	0	0	0	1	<input type="checkbox"/>
8	Generic-8	3	0.7298	0.1003	0	0	0	0	0	1	<input type="checkbox"/>
9	Generic-9	3	0.7298	0.1003	0	0	0	0	0	1	<input type="checkbox"/>
10	Generic-10	1	0.7298	0.1003	0	0	0	0	0	1	<input type="checkbox"/>
11	Generic-11	1	0.7298	0.1003	0	0	0	0	0	1	<input type="checkbox"/>
12	Generic-12	1	0.7298	0.1003	0	0	0	0	0	1	<input type="checkbox"/>
13	Generic-13	1	0.7298	0.1003	0	0	0	0	0	1	<input type="checkbox"/>
14	Generic-14	1	0.7298	0.1003	0	0	0	0	0	1	<input type="checkbox"/>

Figure 3.5: TAMSIM Parcel Data Screen.

The TAMSIM parcel possession cost data is shown in Figure 3.6. The parcel possession/cost data screen is as well generated according to the county typed chosen by the user and it is as well generated based on the data gathered by ROWIS. Some of the values included in

Figure 3.6 are the min-5%, median, and mean duration in months. The multiplier for outsourcing and condemnation is included as well. More indices are included in the parcel possession/cost data as shown in Figure 3.6 (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

Parcel Num	Name	Min-5% Duration in months	Median Duration in months	Mean Duration in months	StDev Duration in months	Max-95% in months	Multiplier for outsource	Multiplier for condemn	MinCost (land, improve, damage x\$1000)	MedCost (land, improve, damage x\$1000)	MeanCost (land, improve, damage x\$1000)	StDevCost (land, improve, damage x\$1000)	Max-95% (land, improve, damage x\$1000)	Multiplier for condemn
0	Standard...	7.7	18.3	21.1	12.0	43.8	0.986	1.501	5.4	51.5	131.3	307.9	489.0	1.721
1	Generic-1	7.7	18.3	21.1	12.0	43.8	0.986	1.501	5.4	51.5	131.3	307.9	489.0	1.721
2	Generic-2	7.7	18.3	21.1	12.0	43.8	0.986	1.501	5.4	51.5	131.3	307.9	489.0	1.721
3	Generic-3	7.7	18.3	21.1	12.0	43.8	0.986	1.501	5.4	51.5	131.3	307.9	489.0	1.721
4	Generic-4	7.7	18.3	21.1	12.0	43.8	0.986	1.501	5.4	51.5	131.3	307.9	489.0	1.721
5	Generic-5	7.7	18.3	21.1	12.0	43.8	0.986	1.501	5.4	51.5	131.3	307.9	489.0	1.721

Figure 3.6: TAMSIM Screen for Possession Time/Cost Data.

3.1.2 TAMSIM Outputs

After the TAMSIM results are generated, the outputs will be shown in the summary statistics screen in Figure 3.7. The outputs will provide with the cost without acquisition and the savings from early acquisition according to the number of parcels to be obtained and the county type where the parcels are purchased. The chosen speculation scenario in Figure 3.4 plays an important role in the results as well. Another section of the outputs are shown in Figure 3.8 which includes the detailed results. The results from Figure 3.8 consist of the costs and durations

for early acquisition and non-early acquisition, for each of the individual parcel. It also contains these values for the average of all of the parcels included in the project (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009).

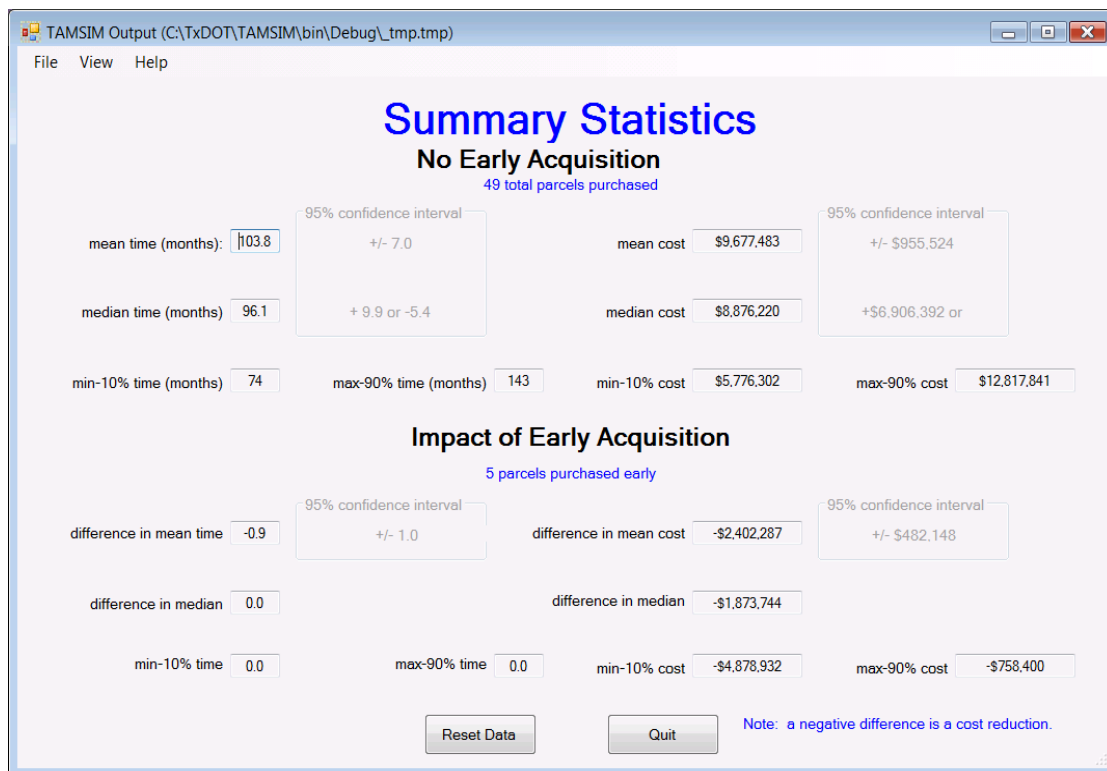


Figure 3.7: TAMSIM Summary Statistics Screen.

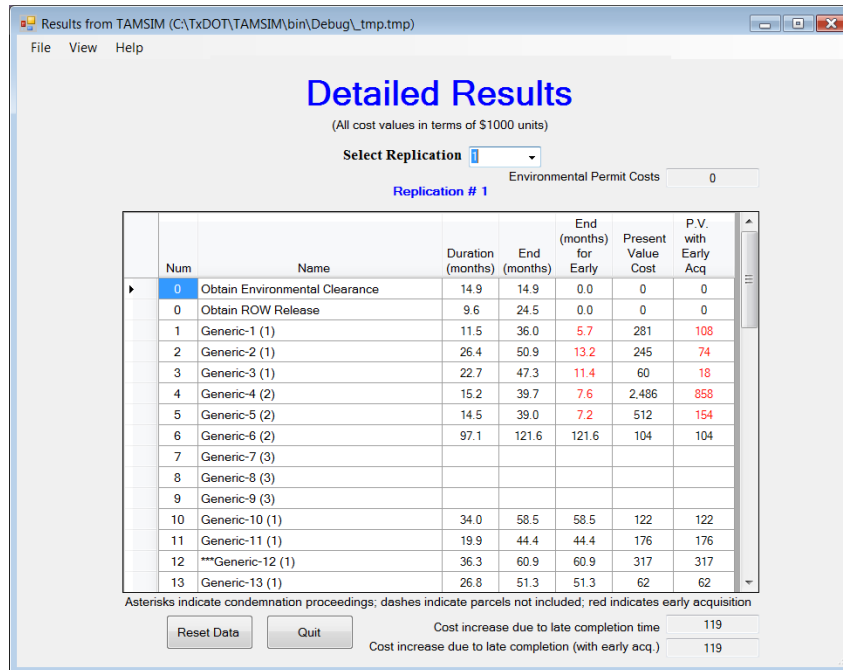


Figure 3.8: TAMSIM Detailed Results.

3.2 EROW Introduction

EROW is a computerized optimization tool that can assist TAMSIM to obtain the optimum number of parcels to be acquired early and the speculation scenario during the time these parcels should be acquired. Budget ranges can be entered in EROW along with the text files obtained from TAMSIM outputs. In this manner, EROW will provide with a specific optimum project and number of parcels based on the best rate of return. EROW also provides with the budget required, savings obtained and the resulting expenditure. More projects and parcels options can be obtained from EROW besides the optimum option. However, these additional options have a lower rate of return compared to the assigned best rate of return suggested by EROW (Chang, Kang, Krugler, Seyedshohadaie, Feldman, and Butenko, 2009). A more detailed explanation on EROW can be found in Chapter 5.

Chapter 4: TAMSIM: ROW Simulator Tool

4.1 Right of Way Early Acquisition Sensitivity Analysis

A sensitivity analysis was conducted for six typical projects located in different geographic areas. The projects are Metro, Urban, Rural, Dallas, Harris, and Tarrant. The number of total parcels for each project and characteristics are shown in Table 4.1. The indices shown in Table 4.1 are default, and estimated from statistics obtained from the Right of Way Information Systems (ROWIS). The projects' main characteristics are:

1. Project Name: The project name represents the county type of which the parcels to be obtained are located.
2. Total Number of Parcels: The number of parcels is the possible number of parcels under a project.
3. Number of Parcel for Possible Improvement: The number of parcels for possible improvement represents the possible number of parcels within a project that district personnel suspect are likely to receive improvements.
4. Cost Multiplier for Improvement: TAMSIM will generate a random value representing the cost for each parcel. The cost multiplier for improvement refers to any number greater than one to be multiplied by this random value generated by TAMSIM in case of any improvement made to the parcel.
5. Additional Cost Increase due to Speculation (%/yr): The additional cost increase due to speculation refers to the percentage of cost addition per year in case improvements are made to the parcel.

6. Likelihood of Outsourcing: If it is known that the parcel will be acquired through an outside contractor, then the value for likelihood of outsourcing (column 6) should be 1.0. On the other hand, if it is known with no doubt that district employees are going to be used to obtain the parcel, then this value should be 0, or else, a value between 0.0 and 1.0 should be inputted.
7. Likelihood of Condemnation: The likelihood of condemnation should contain a value between 0.0 and 1.0 depending on how probable it is to use condemnation in order to acquire a parcel.

The rest of the TAMSIM input field are left as default. It can be observed in Table 4.1 that the cost multiplier for improvement (column 4) is entered for each of the number of parcels for possible improvement (column 3). In other words, the cost multiplier for improvement value of five is entered for the seven parcels of possible improvement for the Metro county. This procedure is followed for the rest of the six projects.

Table 4.1: Project Main Characteristics

Project Name (1)	Total Number of Parcels (2)	Number of Parcels for Possible Improvement (3)	Cost Multiplier for Improvement (4)	Additional Cost Increase due to Speculation (%/yr) (5)	Likelihood of Outsourcing (6)	Likelihood of Condemnation (7)
Metro	42	7	5	40	0.7384	0.1879
Urban	42	5	4	15	0.6901	0.0888
Rural	43	2	3	10	0.7052	0.0863
Dallas	28	5	5	40	0.5848	0.1579
Harris	24	5	6	40	0.6679	0.3547
Tarrant	40	6	5	40	0.8143	0.0286

The sensitivity analysis consisted in running simulations for each project under five speculation scenarios:

- a. Environmental Clearance Obtained
- b. First Parcel Purchased (not early)
- c. Schematics Available (time 0)
- d. First Parcel Purchased (inc. early)
- e. ROW Release Obtained

For each speculation scenario the number of parcels acquired early was also varied from 1 to the total number of parcels. TAMSIM was used to run the simulations and to obtain costs and savings for each of the projects under each of the speculation scenarios. These results were used to run EROW in order to find the most attractive projects under certain budgets.

4.2 TAMSIM Application

TAMSIM was run for each case of number of parcels acquired early within a speculation scenario. Therefore, TAMSIM was run 42 times for the Metro project, 42 times for the Urban project, 43 times for the Rural project, 28 times for the Dallas project, 24 times for the Harris project, and 40 times for the Tarrant project under each of the five speculation scenarios. Data used in the simulation for a specific project is the same for the five speculation scenarios.

4.2.1 Costs and Savings

Costs and savings with early acquisition and without early acquisition for each project were obtained from TAMSIM. Graphs were created for each project under each speculation scenario showing savings from early acquisitions, total project cost with early acquisition, total project cost without early acquisition, and total cost of parcel acquired early. A table was manually

created with the results for the 42 case scenarios of the Metro Project under the environmental clearance obtained scenario as a model for this example and shown in Table 4.2. A description of each of the parameters reported in Table 4.2 follows:

1. Case Number: The case number is the number of parcels to be obtained by early acquisition.
2. Project Cost without Early Acquisition: The project cost without early acquisition is the cost of the project if there are no parcels obtained by early acquisition.
3. Project Cost with Early Acquisition: The project cost with early acquisition is calculated by subtracting the value of expected savings from early acquisition from project cost without early acquisition of its corresponding case, given as a result the cost of the project if it is obtained by early acquisition.
4. Present Value with Early Acquisition: It is the parcel individual value if obtained by early acquisition.
5. Total Cost of Parcel Acquired Early (from text file): It is the cumulative value of the present value with early acquisition. For example, for case 5 the total cost parcel acquired early is the summation of the values of present value with early acquisition from case 0 to case 5. In other words for case 5, the total cost of parcel acquired early is the summation of the 5 parcels individual value if they are obtained by early acquisition. After each run TAMSIM records this value in the costs text file (cost.txt).
6. Expected Savings from Early Acquisition (from text file): The expected savings from early acquisition are obtained if certain number of parcels is acquired early. After each run TAMSIM records this value in the savings text file (savings.txt).

Table 4.2: Results for the Metro Project under the Environmental Clearance Obtained
Speculation Scenario

Case #	Project Total Cost without Early Acquisition (\$1,000)	Project Total Cost with Early Acquisition (\$1,000)	Present Value with Early Acquisition (\$1,000)	Total Cost of Parcels Acquired Early (\$1,000)	Expected Savings from Early Acquisition (\$1,000)
0	\$147,320	\$147,320	\$0	\$0	\$0
1	\$147,320	\$96,939	\$1,614	\$1,614	\$50,381
2	\$147,320	\$83,713	\$318	\$1,932	\$63,607
3	\$147,320	\$77,887	\$200	\$2,132	\$69,433
4	\$147,320	\$56,335	\$627	\$2,759	\$90,985
5	\$147,320	\$41,896	\$413	\$3,172	\$105,424
6	\$147,320	\$35,298	\$165	\$3,337	\$112,022
7	\$147,320	\$23,578	\$401	\$3,738	\$123,742
8	\$147,320	\$23,263	\$120	\$3,859	\$124,057
9	\$147,320	\$22,972	\$107	\$3,966	\$124,348
10	\$147,320	\$22,733	\$106	\$4,072	\$124,587
11	\$147,320	\$22,393	\$156	\$4,228	\$124,927
12	\$147,320	\$22,104	\$173	\$4,401	\$125,216
13	\$147,320	\$21,591	\$83	\$4,484	\$125,729
14	\$147,320	\$21,385	\$76	\$4,561	\$125,935
15	\$147,320	\$20,602	\$371	\$4,932	\$126,718
16	\$147,320	\$20,323	\$118	\$5,050	\$126,997
17	\$147,320	\$19,970	\$229	\$5,279	\$127,350
18	\$147,320	\$19,792	\$60	\$5,339	\$127,528
19	\$147,320	\$19,479	\$101	\$5,440	\$127,841
20	\$147,320	\$19,256	\$71	\$5,511	\$128,064
21	\$147,320	\$18,776	\$168	\$5,679	\$128,544
22	\$147,320	\$18,018	\$267	\$5,945	\$129,302
23	\$147,320	\$17,601	\$137	\$6,082	\$129,719
24	\$147,320	\$17,020	\$184	\$6,266	\$130,300
25	\$147,320	\$16,732	\$247	\$6,513	\$130,588
26	\$147,320	\$16,567	\$106	\$6,619	\$130,753
27	\$147,320	\$16,239	\$105	\$6,724	\$131,081
28	\$147,320	\$15,574	\$477	\$7,201	\$131,746
29	\$147,320	\$15,385	\$82	\$7,282	\$131,935
30	\$147,320	\$15,071	\$83	\$7,366	\$132,249
31	\$147,320	\$14,823	\$116	\$7,481	\$132,497
32	\$147,320	\$14,351	\$225	\$7,707	\$132,969
33	\$147,320	\$13,735	\$166	\$7,873	\$133,585
34	\$147,320	\$13,506	\$84	\$7,957	\$133,814
35	\$147,320	\$12,626	\$378	\$8,335	\$134,694
36	\$147,320	\$12,477	\$48	\$8,383	\$134,843
37	\$147,320	\$12,205	\$124	\$8,507	\$135,115
38	\$147,320	\$11,753	\$134	\$8,640	\$135,567
39	\$147,320	\$11,142	\$167	\$8,807	\$136,178
40	\$147,320	\$10,912	\$129	\$8,936	\$136,408
41	\$147,320	\$9,963	\$578	\$9,515	\$137,357
42	\$147,320	\$9,591	\$115	\$9,630	\$137,729

4.3 Findings from Sensitivity Analysis

4.3.1 Environmental Clearance Obtained Scenario

Metro Project

The costs and savings for the Metro project under the environmental clearance obtained scenario are shown in Figure 4.1. It is observed that the slope of the output values is constant throughout the graph; therefore, there are more savings as the number of parcels obtained by early acquisition increase. The savings start at \$50,381,000, if obtaining parcel 1 by early acquisition. The maximum savings that can be obtained are \$137,729,000, when the 42 parcels are obtained by early acquisition. By analyzing the slope of the line for the total project cost with early acquisition, it can be observed that there is a significance difference in cost from parcel 3 to parcel 4. This is due to a \$21,552,000 difference in savings from early acquisition. The slope for savings from early acquisition is rapidly increasing from parcel 1 through parcel 7. For parcel 7, the savings from early acquisition reach \$123,742,000, where it starts increasing at a slower rate. The lines for the total project cost with early acquisition and for cost of early acquisition almost meet in parcel 42 at \$9,629,000 with a difference of \$38,000.

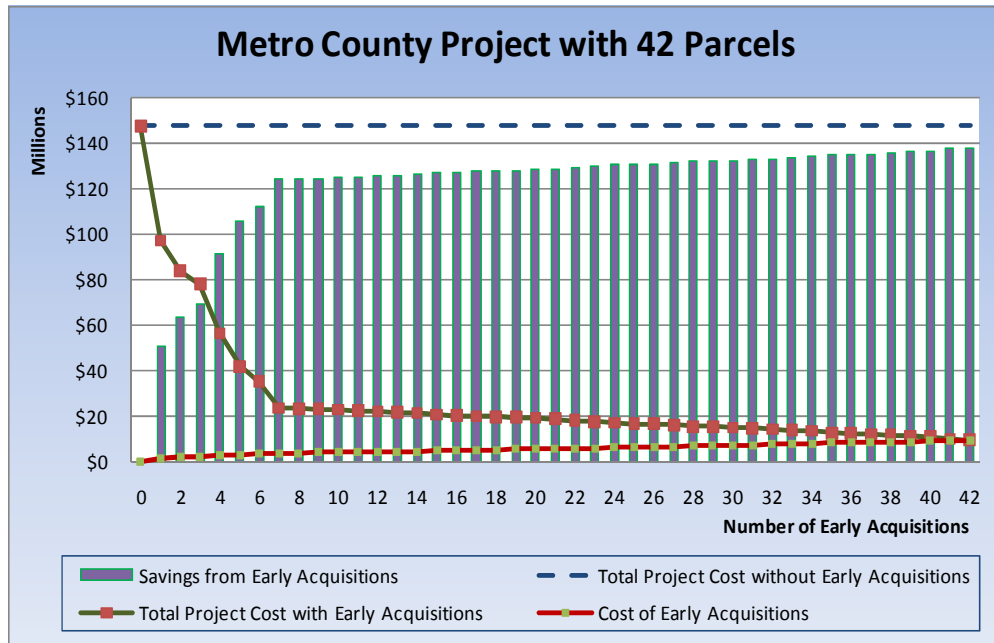


Figure 4.1: Costs and Savings for the Metro Project under the Environmental Clearance Obtained Scenario.

Urban Project

The costs and savings for the Urban project under the environmental clearance obtained scenario are shown in Figure 4.2. From this graph, it is observed that the value from savings from early acquisition increases rapidly from parcel 0 to parcel 5. After parcel 5, the slope for the savings from early acquisition fairly stabilizes from parcel 5 to parcel 42, with small increments on each parcel. For the urban county, if one parcel is obtained early, the savings are \$2,790,000. In parcel 5 the savings reach \$7,003,000. It is in parcel 5 where the slope for the savings from early acquisition fair stabilizes. It can be observed that the line of the total project cost with early acquisition has a difference on the slope of \$263,000 between parcel 23 and parcel 24. The line for the cost of early acquisition reaches \$3,475,000. Meanwhile, the line for the total project cost

with early acquisition reaches \$3,414,000, resulting in a difference of \$61,000 between the early acquisition cost and the total project cost with early acquisition.

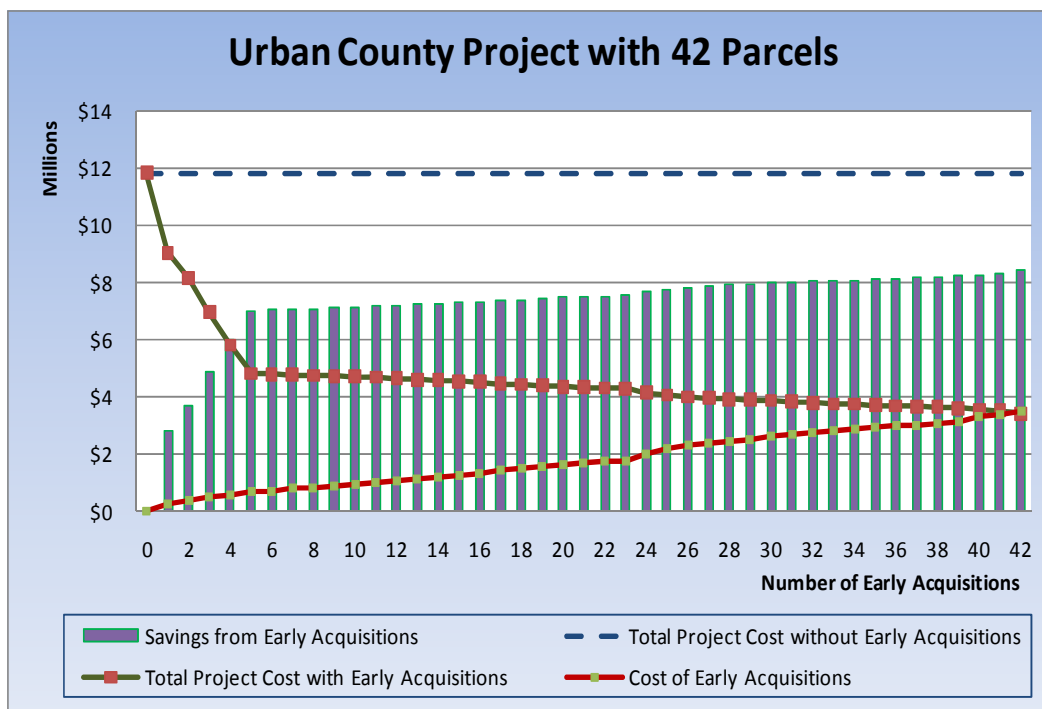


Figure 4.2: Costs and Savings for the Urban Project under the Environmental Clearance Obtained Scenario.

Rural Project

For almost all of the graphs, the slope of the values for the savings from early acquisitions follows a very similar behavior, but with different values. Rural is the only project that does not provide significant savings in comparison to the rest of the projects, as shown in Figure 4.3. Rural was run for 43 early acquisitions, one run for each early acquisition. In Figure 4.3 the savings start at \$136,000, this is by obtaining one parcel by early acquisition. The line for total project cost with early acquisition and the line of cost of early acquisition almost meet at

\$1,331,000 with a difference of \$76,000. The maximum amount for saving from early acquisition is \$712,000 if 43 parcels are acquired early. In the slope for the savings from early acquisition, there is a non-constant point in parcel 33 where the savings drop \$7,000 instead of increasing or staying about the same value. For parcel 39, the cost of early acquisitions significantly increases \$97,000.

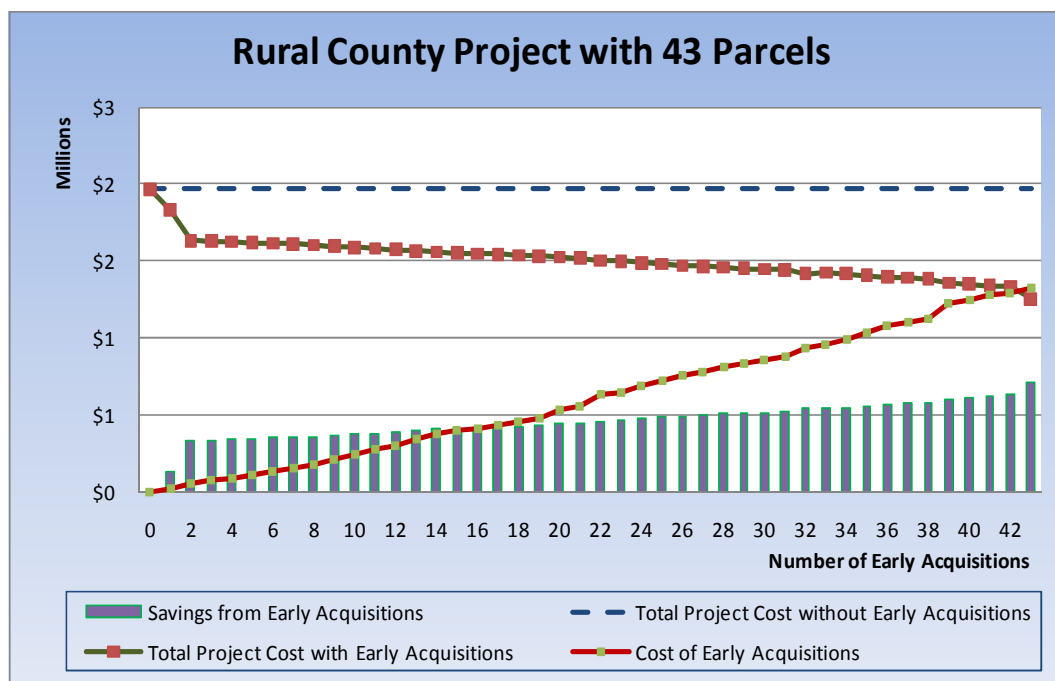


Figure 4.3: Costs and Savings for the Rural Project under the Environmental Clearance Obtained Scenario.

Dallas Project

The results for the Dallas project under the first parcel purchased (inc. early) scenario are shown in Figure 4.4. The total project cost without early acquisition starts at parcel 0 with a value of \$88,764,000, and remains constant through parcel 28. For parcel 1 the savings from

early acquisition has a value of \$52,619,000. The slope for the savings from early acquisition continuously increases rapidly from parcel 1 through parcel 5 reaching a savings of \$76,553,000. At parcel 5, the slope for the savings from early acquisition remain increasing but at a significantly slow rate, reaching a maximum savings of \$83,406,000 for parcel 28. A change in the slope of the line can be observed for the total project cost with early acquisition between parcel 17 and parcel 18. This change in slope is due to a difference of \$895,000 for the value of the total project cost with early acquisition. The total project cost with early acquisition line almost meets in parcel 28 with the line of the cost of early acquisition at \$5,410,000 with a difference of \$52,000.

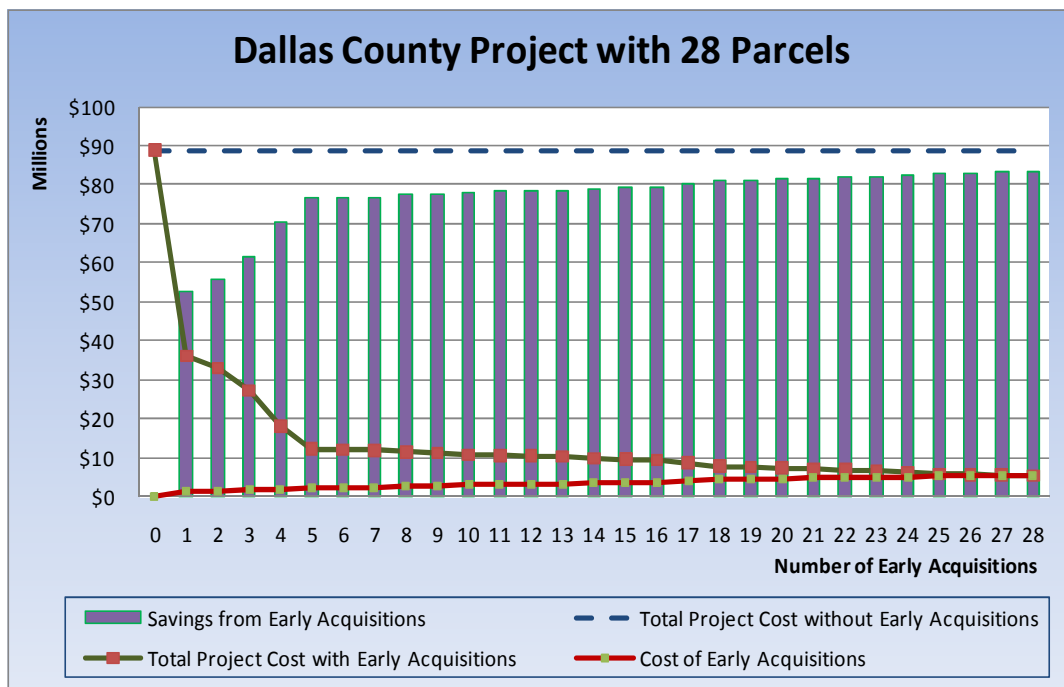


Figure 4.4: Costs and Savings for the Dallas Project under the Environmental Clearance Obtained Scenario.

Harris Project

The total project cost without early acquisition for the Harris county project under the first parcel purchased remains constant for the 24 parcels that are obtained by early acquisition. The consistent value for the total project cost without early acquisition is \$381,424,000. If one parcel out of the 24 parcels in the project is obtained by early acquisition, the savings from early acquisition would be \$75,572,000. Therefore, the total project cost with early acquisition will consist of \$305,852,000. The savings from early acquisition are significantly increasing from parcel 0 through parcel 5, where the savings reach \$313,216,000. After parcel 5 the savings from early acquisition continuously increase but not at a rapid rate. The slope for the savings from early acquisition follows the same pattern as the previous county projects. There is a drastic change in the slope of the total project cost with early acquisition line among parcel 21 and parcel 22. This change in slope is due to a significant difference in the amount of savings obtained by the two parcels. The difference in savings from early acquisition of parcel 21 and parcel 22 is \$17,660,000. The line for the total project cost with early acquisition and the line for the cost of early acquisition must more or less meet at parcel 24 with a value of \$28,771,000 for the cost of early acquisition and \$28,714,000 for the total project cost with early acquisition, resulting in a difference of \$57,000. This analysis can be observed in Figure 4.5.

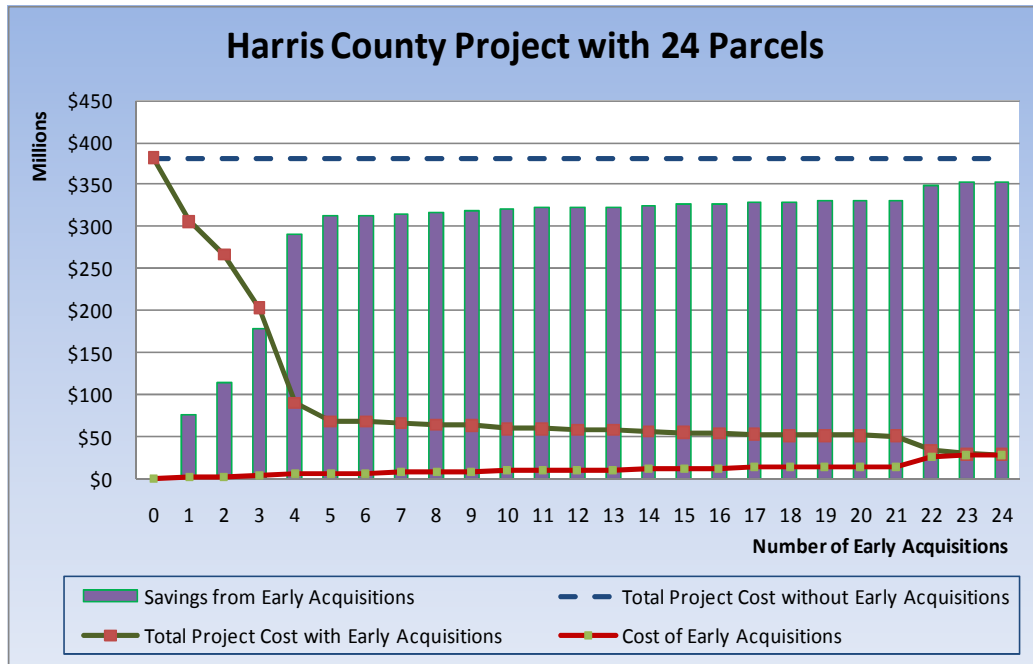


Figure 4.5: Costs and Savings for the Harris Project under the Environmental Clearance Obtained Scenario.

Tarrant Project

The savings from the early acquisition slope for the Tarrant project under the environmental clearance obtained scenario is not as constant as the previous projects shown. A slope change can be observed in different points on the graph in Figure 4.6. The total project cost without early acquisition throughout the entire analysis of the Tarrant project under the environmental clearance obtained scenario is \$138,718,000. The savings from early acquisitions has a value of \$5,169,000, if one parcel is obtained by early acquisition. There is a notorious difference in the savings from early acquisition among the 1st and the 2nd parcels obtained by early acquisition. Parcel 2 has savings from early acquisition of \$35,330,000, and the difference of savings from early acquisition between parcel 1 and parcel 2 is \$30,161,000. Parcel 6 marks the first slope change for the savings from early acquisition towards a group of parcels with a

more or less constant slope. Parcel 6 has a value of \$71,258,000 for savings from early acquisition. Parcel 21 shows another significant change in slope for the savings from early acquisition. There is another mark post in parcel 26 with a value of \$90,597,000 for a slope change for savings from early acquisition. The last mark post is shown in parcel 36 with a value of \$104,478 for savings from early acquisition. If 40 parcels are obtained by early acquisition, the total amount of savings to be gathered would be \$107,583,000. In this same case of obtaining 40 parcels by early acquisition, the values for the total project cost with early acquisition would be \$31,135,000, while the cost of early acquisition would be \$31,135,000, having a difference of \$83,000.

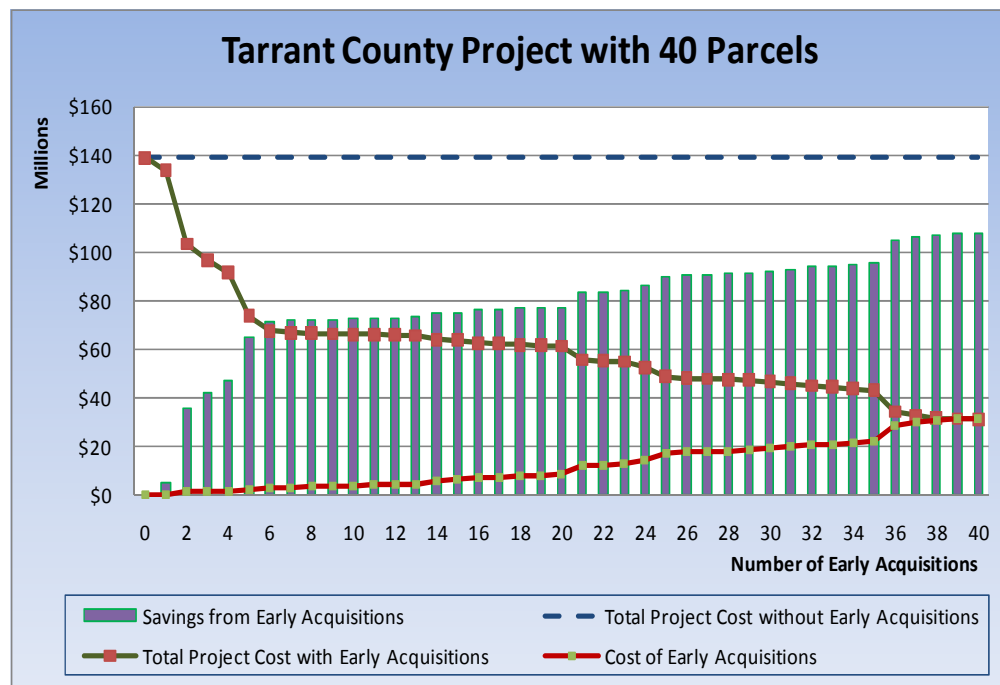


Figure 4.6: Costs and Savings for the Tarrant Project under the Environmental Clearance Obtained Scenario.

4.3.2 First Parcel Purchased (not early) Scenario

Metro Project

When the first parcel is purchased by early acquisition in the Metro project under the first parcel purchased (not early) scenario, the savings from early acquisition are \$48,452,000. The savings from early acquisition increases rapidly from parcel 1 to parcel 7, when the savings reach a value of \$119,597,000. After parcel 7 the savings from early acquisition followed a reasonably constant slope. Yet, the slope for the cost of early acquisitions has a discrepancy of \$992,000 between parcel 34 and parcel 35. When 42 parcels are obtained by early acquisition, the cost with early acquisition is \$20,027,000, while the total project cost without early acquisitions remains on \$147,320,000 throughout the 42 parcels. The maximum savings from early acquisition when the 42 parcels are acquired early are \$127,293,000. These estimates are graphed in Figure 4.7.

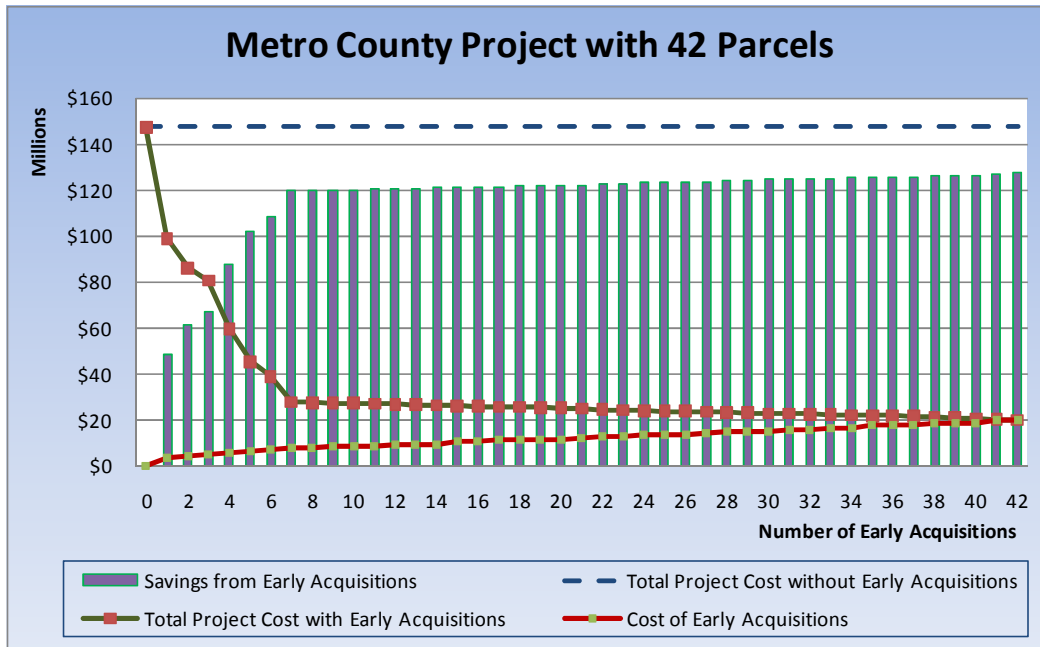


Figure 4.7: Costs and Savings for the Metro Project under the First Parcel Purchased (not early) Scenario.

Urban Project

The project cost without early acquisition for the Urban project under the first parcel purchased (not early) is \$11,817,000. The maximum savings from early acquisition when 42 parcels are obtained under the Urban project is \$7,545,000. From Figure 4.8 it can be observed that the slope for the savings from early acquisitions fairly stabilizes at parcel 5 with a value of \$6,813,000. There is a difference in the slope of the cost of early acquisition of \$321,000 between parcel 23 and parcel 24. The total project cost with early acquisition is \$42,272,000, if 42 parcels are acquired early. These estimates are shown in Figure 4.8.

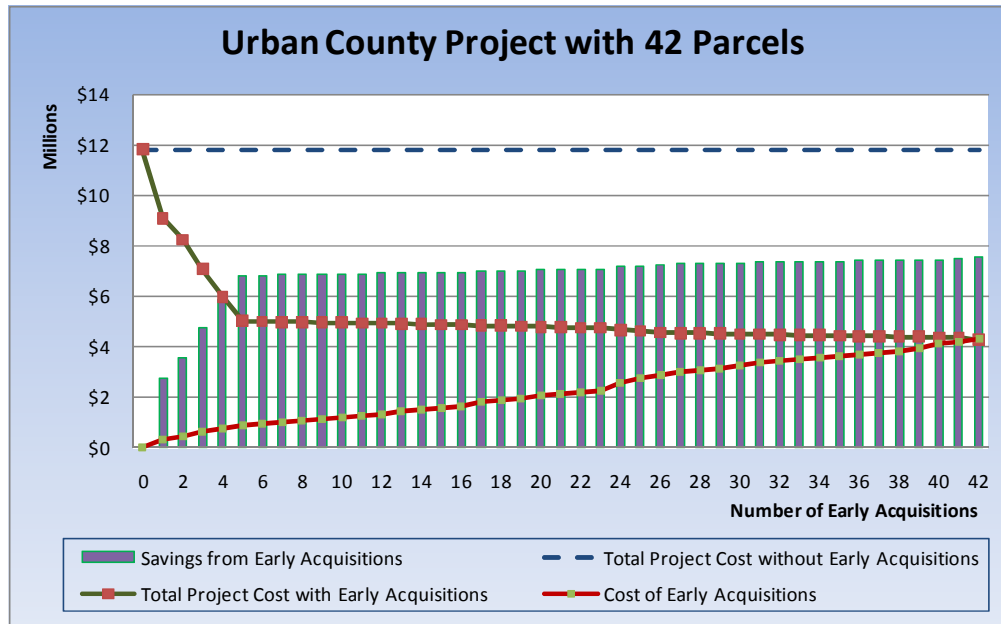


Figure 4.8: Costs and Savings for the Urban Project under the First Parcel Purchased (not early) Scenario.

Rural Project

The estimates obtained for the Rural project under the first parcel purchased (not early) scenario can be observed in Figure 4.9. The savings from early acquisitions start when the first parcel is purchased. When one parcel is purchased, the savings from early acquisitions are \$133,000. When two parcels are purchased, the savings from early acquisitions have a significant change to \$326,000. The slope for the savings from early acquisitions stays fairly constant throughout the 43 parcels. However, there is another significant change of \$71,000 from parcel 42 to parcel 43. The total project cost without early acquisition for the whole project is \$1,967,000. Nevertheless, the total project cost with early acquisition when the 43 parcels are acquired is \$1,434,000, which provides a savings from early acquisition of \$533,000.

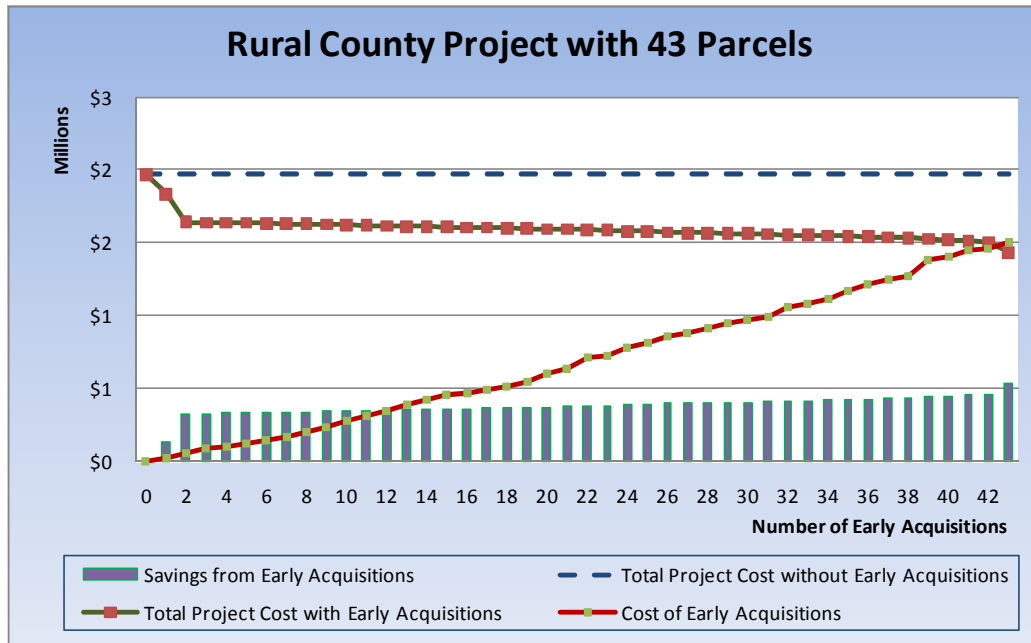


Figure 4.9: Costs and Savings for the Rural Project under the First Parcel Purchased (not early) Scenario.

Dallas Project

The Dallas project estimates are shown in Figure 4.10. There is a considerable savings from early acquisitions of \$51,342 when the first parcel is purchased in this project. The savings from early acquisitions increment drastically until parcel 5, where it maintains a fairly consistent slope through the rest of the parcels. The savings from early acquisitions in parcel 5 are \$74,559,000. The total project cost without early acquisitions for the Dallas project is \$88,764,000. However, the total project cost with early acquisitions when the 28 parcels are acquired by early acquisitions is \$10,223,000; therefore, the savings from early acquisition for the 28 parcels are \$78,541,000.

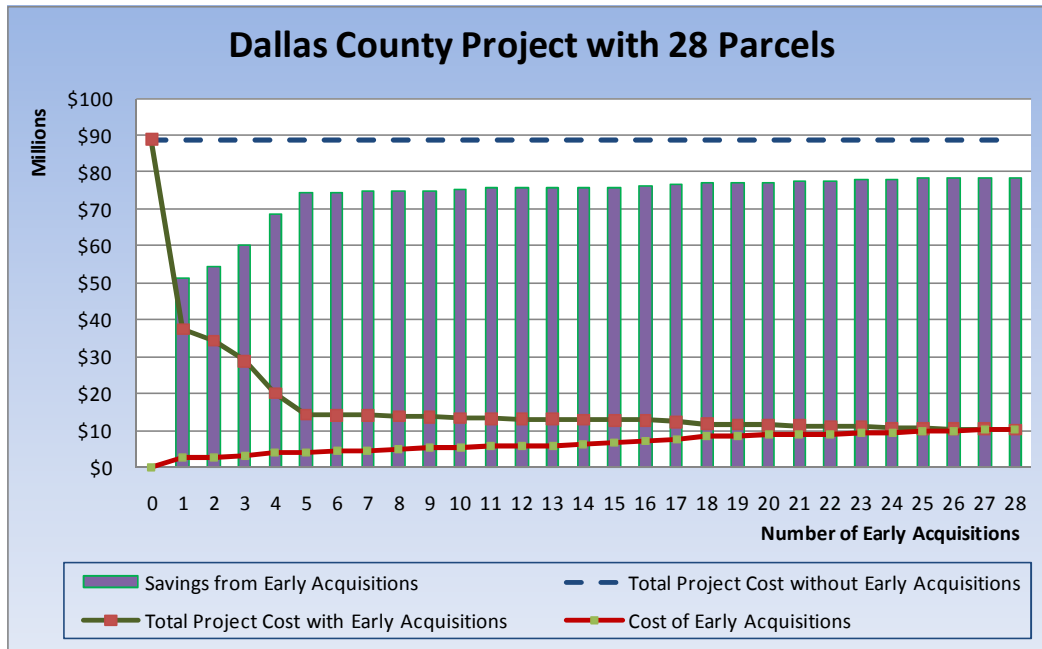


Figure 4.10: Costs and Savings for the Dallas Project under the First Parcel Purchased (not early) Scenario.

Harris Project

The total project cost without early acquisitions for the Harris project under the first parcel purchased (not early) is \$381,424,000. On the other hand, if 24 parcels are obtained by early acquisitions, the total project cost with early acquisition is \$58,096,000. This means that the savings from early acquisitions, if the 24 parcels are obtained by early acquisition, is \$323,328,000. In the case that only one parcel is acquired early, the savings from early acquisitions are \$74,181,000. These estimates are shown in the graph of Figure 4.11.

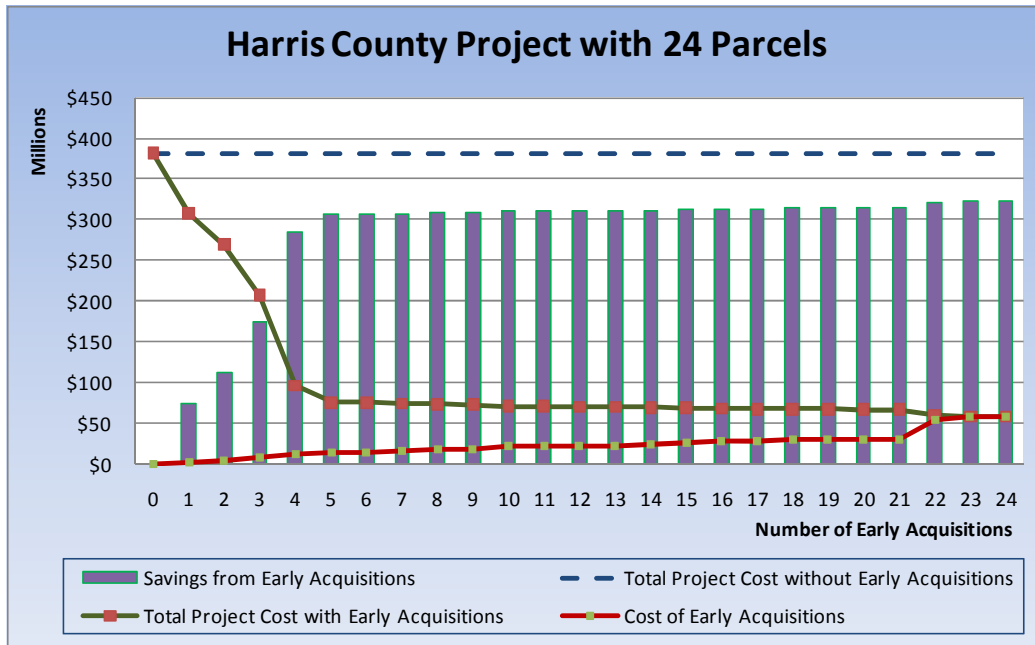


Figure 4.11: Costs and Savings for the Harris Project under the First Parcel Purchased (not early) Scenario.

Tarrant Project

If the 40 parcels included in the Tarrant project are obtained by early acquisition, the savings from early acquisitions are \$83,912,000. This is because the total project cost without early acquisitions is \$138,718,000, and the total project cost with early acquisitions is \$54,806,000. The savings from early acquisitions start at \$5,025,000, when the first parcel is obtained by early acquisition. These estimates can be observed in Figure 4.12.

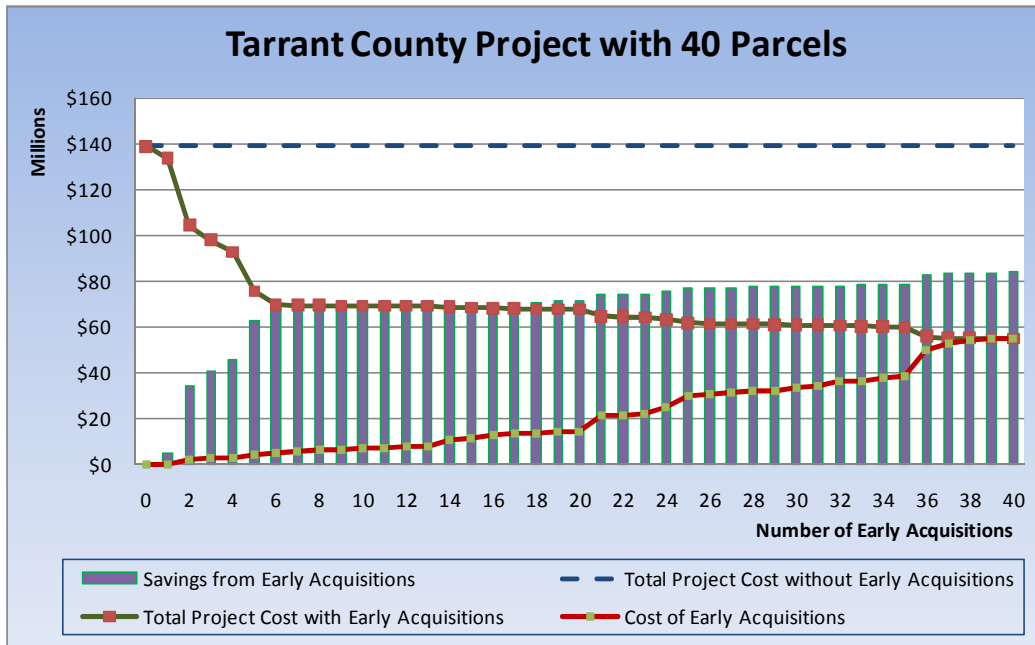


Figure 4.12: Costs and Savings for the Tarrant Project under the First Parcel Purchased (not early) Scenario.

4.3.3 Schematics Available (time 0) Scenario

Metro Project

The total project cost with early acquisitions of the Metro project under the schematics Available (time 0) scenario, if the 42 parcels in the project are obtained by early acquisitions, is \$7,083,000. However, the total project cost without early acquisitions is \$147,320,000. The maximum savings from early acquisitions when the 42 parcels are acquired early are \$140,237,000. On the other hand, if just one parcel is obtained by early acquisition, the savings are \$50,708,000. In parcel 7 the slope for the savings from early acquisitions somewhat stabilizes with a savings from early acquisitions of \$124,593,000. The estimates for this project can be observed in the graph of Figure 4.13.

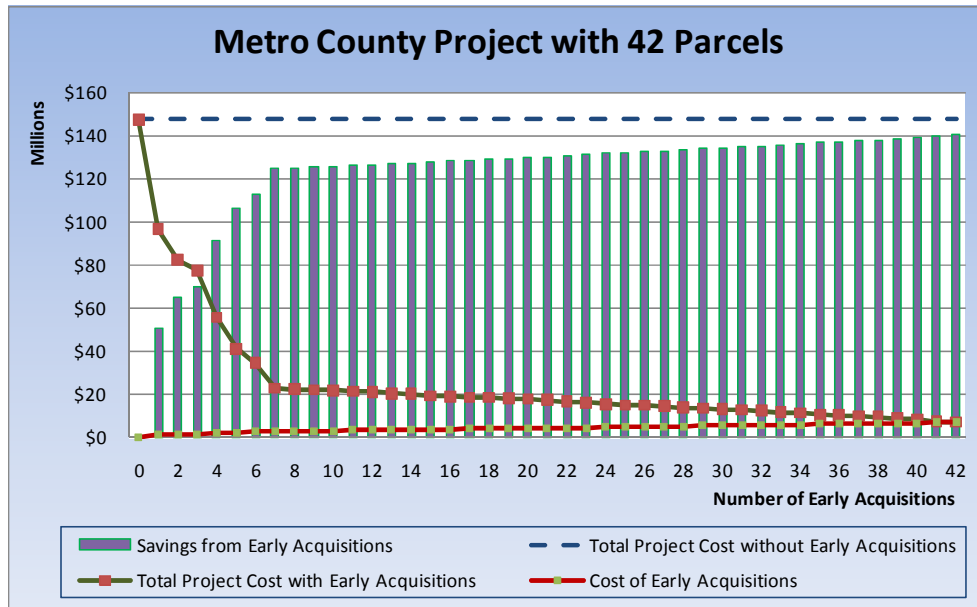


Figure 4.13: Costs and Savings for the Metro Project under the Schematics Available (time 0) Scenario.

Urban Project

The estimates for the costs and savings of the Urban project under the schematics available (time 0) scenario can be observed in Figure 4.14. The total project cost without early acquisitions is \$11,817,000, while the total project cost with early acquisition is \$2,966,000. The difference between these previous values provides with the savings from early acquisitions if the 42 parcels are acquired early. The savings from early acquisitions for the 42 parcels are \$8,851,000. The savings from early acquisitions if only one parcel is obtained early is \$2,805,000. The slope change for the savings from early acquisitions can be observed in parcel 5 with a value of \$7,067,000.

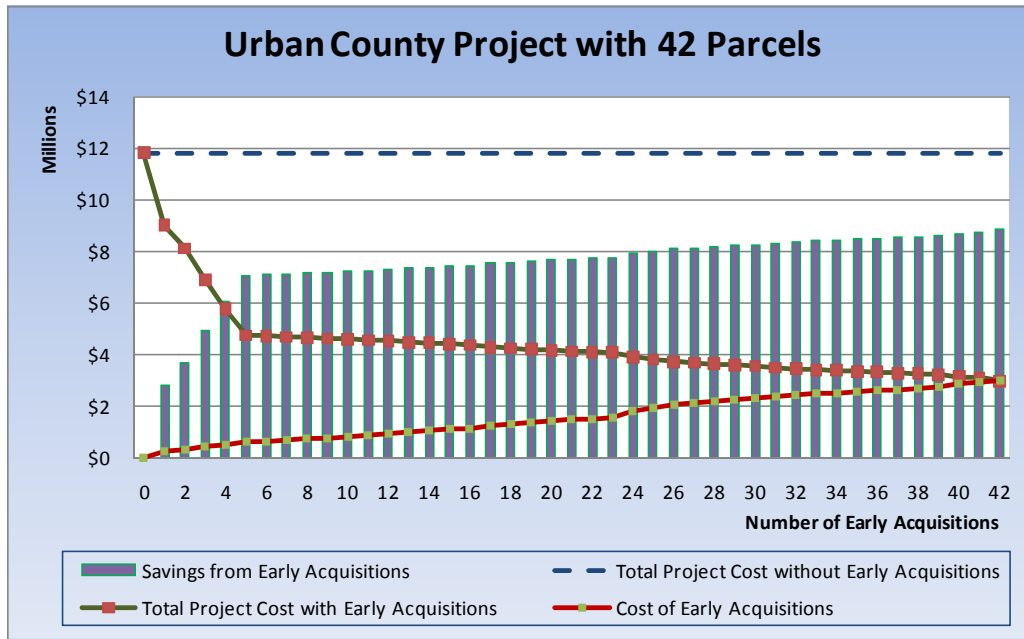


Figure 4.14: Costs and Savings for the Urban Project under the Schematics Available (time 0) Scenario.

Rural Project

It can be observed in Figure 4.15 that the slope for the savings from early acquisitions has multiple changes throughout the whole graph. In other words, the savings from early acquisitions slope is not significantly constant. The savings from early acquisitions if one parcel is acquired early are \$138,000. The savings from early acquisitions if the 43 parcels in the Rural project are obtained by early acquisition are \$884,000. However, the total project cost with early acquisitions is \$1,083,000, and the total project cost without early acquisitions is \$1,967,000.

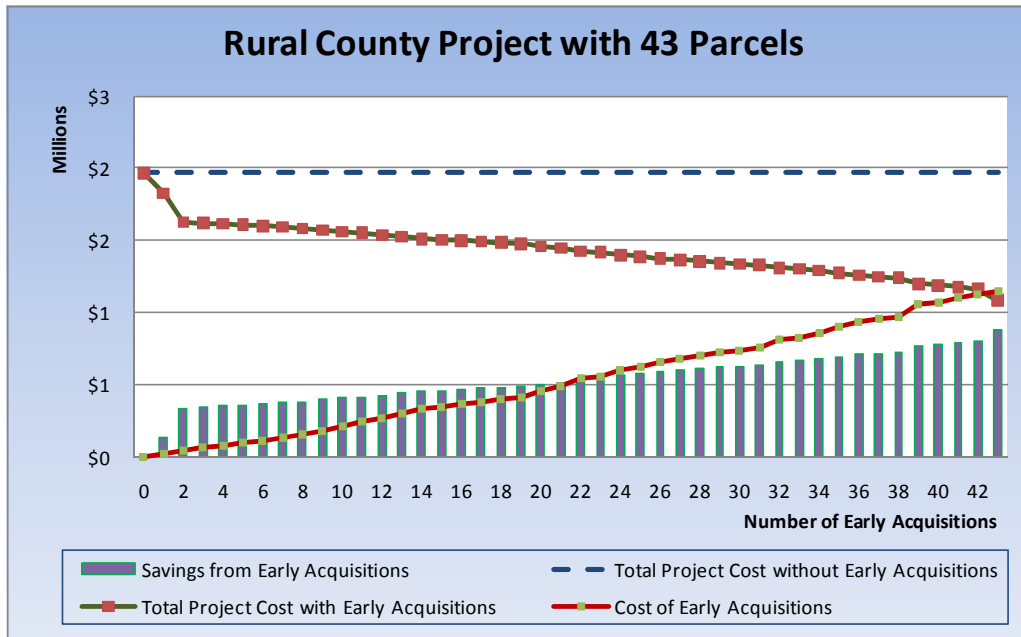


Figure 4.15: Costs and Savings for the Rural Project under the Schematics Available (time 0) Scenario.

Dallas Project

The costs and savings for the Dallas project under the schematics available (time 0) scenario are shown in Figure 4.16. The savings from early acquisitions if one parcel of the Dallas project is acquired is \$52,660,000. There is a change in the savings from early acquisitions slope rate in parcel 5, where the slope starts stabilizing at a value of \$76,869,000. In addition, the savings from early acquisitions if the 28 parcels included in the Dallas project are obtained by early acquisitions are \$84,809,000. The total project cost with early acquisitions if the 28 parcels are acquired early is \$3,955,000. Nevertheless, the total project cost without early acquisitions for the whole project is \$88,764,000.

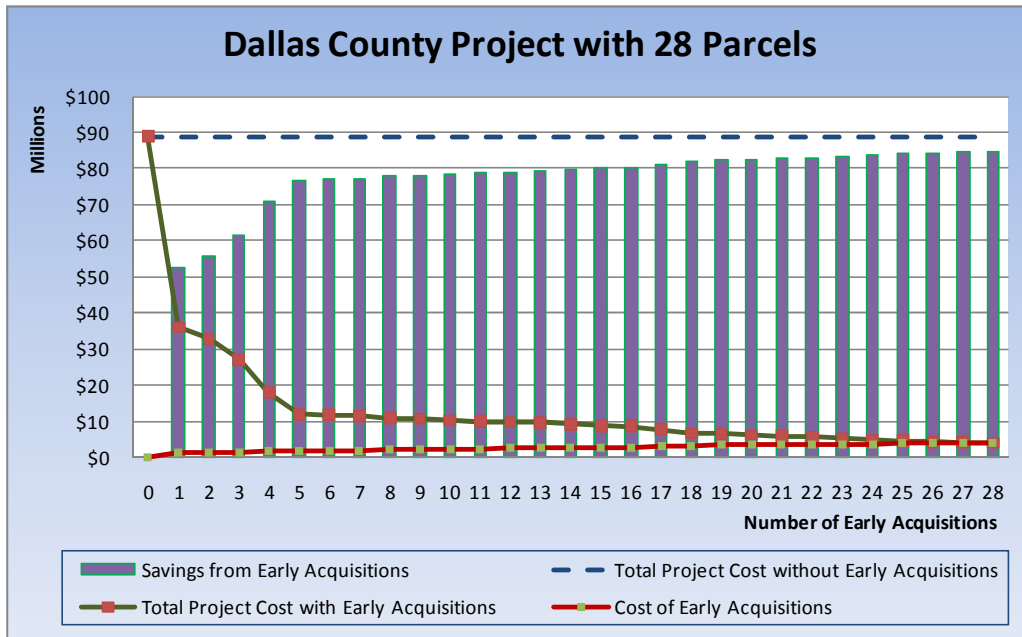


Figure 4.16: Costs and Savings for the Dallas Project under the Schematics Available (time 0) Scenario.

Harris Project

The total project cost with early acquisitions if 24 parcels are acquired early in the Harris project under the schematics available (time 0) scenario is \$18,232,000. However, the total project cost without early acquisitions is \$381,424,000. The difference between the total project cost without early acquisitions and the total project cost with early acquisitions provides the savings from early acquisition of \$363,192,000, if the 24 parcels are early acquisitions. If one parcel is obtained by early acquisition, the savings from early acquisitions are \$75,731,000. The slope for the savings from early acquisitions fairly stabilizes in parcel 5 with a value of \$314,642,000. Yet, there is a significant difference in the savings from early acquisition slope between parcel 21 and parcel 22. These costs and savings for the Harris project can be observed in Figure 4.17.

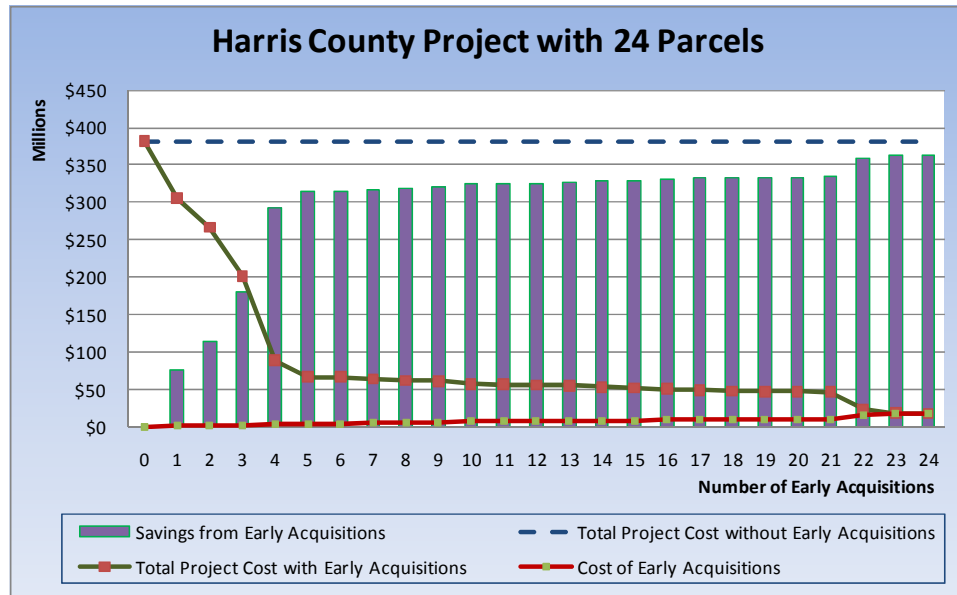


Figure 4.17: Costs and Savings for the Harris Project under the Schematics Available (time 0) Scenario.

Tarrant Project

As it is observed on the previous graphs of the Tarrant projects of the different speculation scenarios, the slopes for the savings and costs with early acquisitions have multiple discrepancies along the whole graph. However, the savings from early acquisitions if one parcel is acquired early are \$5,251,000. If the 40 parcels within the Tarrant project are obtained by early acquisition, the savings are \$120,337,000. The total project cost with early acquisition if the 40 parcels are acquired early is \$18,381,000. Nevertheless, the total project cost without early acquisitions is \$138,718,000. The cost and savings for the Tarrant Project under the Schematics Available (time 0) scenario are shown in Figure 4.18.

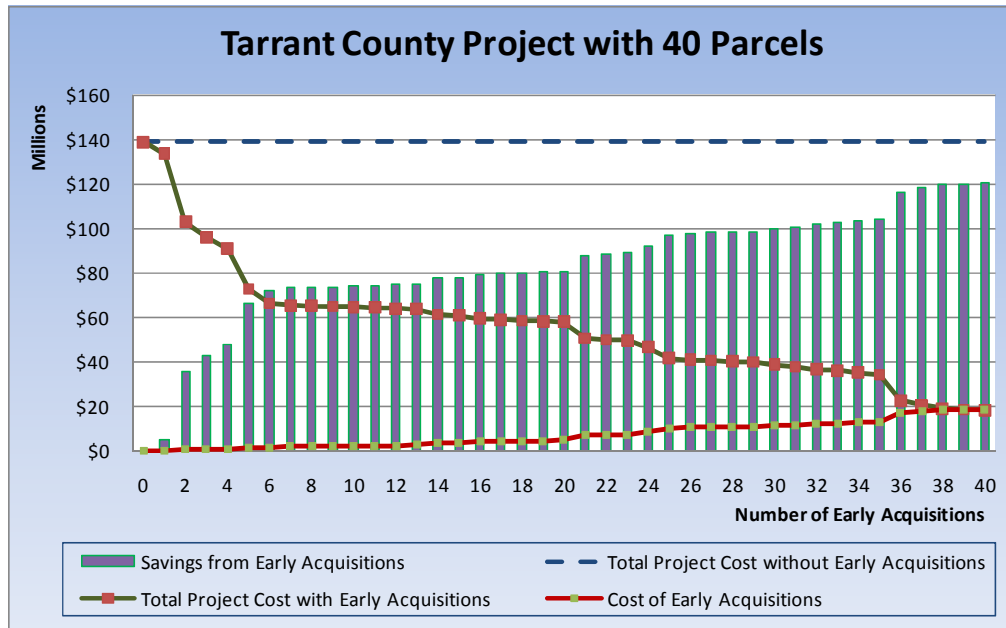


Figure 4.18: Costs and Savings for the Tarrant Project under the Schematics Available (time 0) Scenario.

4.3.4 First Parcel Purchased (inc. early) Scenario

Metro Project

The costs and savings for the Metro project under the first parcel purchased (inc. early) scenario can be observed in Figure 4.19. The total project cost without early acquisitions throughout the 42 parcels is \$147,320,000. However, the total project cost with early acquisitions if the 42 parcels are acquired early is \$24,977,000. This difference between the total cost with early acquisitions and the total cost without early acquisitions provides the savings from early acquisitions of \$122,343,000, if the 42 parcels were obtained by early acquisitions. In the condition, that only one parcel is obtained by early acquisition; the savings from early acquisitions are \$48,452,000. There is an important change in the slope rate of the savings from early acquisition in parcel 7, where the savings are \$118,176,000.

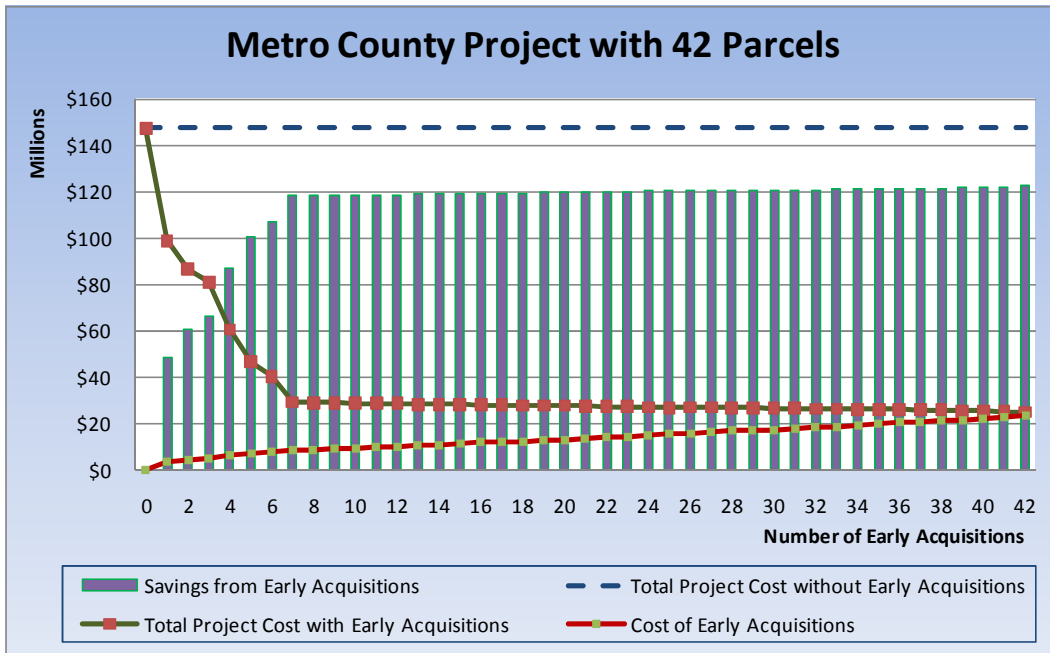


Figure 4.19: Costs and Savings for the Metro Project under the First Parcel Purchased (inc. early) Scenario.

Urban Project

The costs and savings for the Urban project under the first parcel purchased (inc. early) scenario are shown in Figure 4.20. The savings from early acquisitions if only one parcel is acquired early are \$2,719,000. If the 42 parcels are obtained by early acquisitions, the savings from early acquisitions are \$7,165,000. However, the total project cost with early acquisitions is \$4,652,000, if the 42 parcels are acquired early. The total project cost without early acquisitions is \$11,817,000. In addition, there is a change in the slope of the cost of early acquisition between parcel 23 and parcel 24.

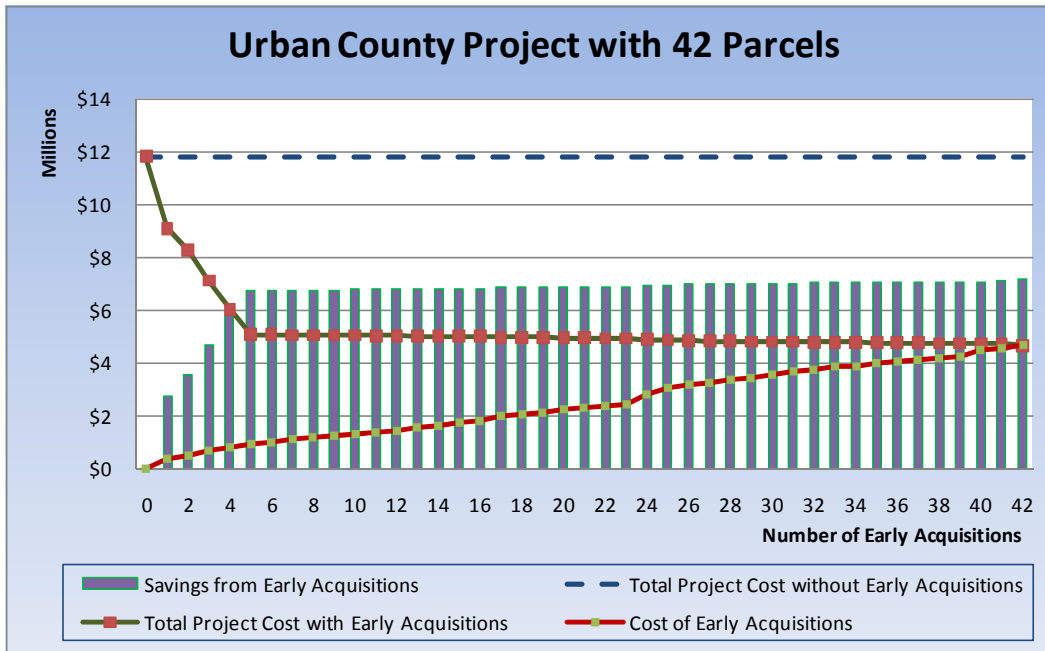


Figure 4.20: Costs and Savings for the Urban Project under the First Parcel Purchased (inc. early) Scenario.

Rural Project

The total project cost without early acquisitions for the Rural project under the first parcel purchased (inc. early) is \$1,967,000. Nevertheless, the total project cost with early acquisitions is \$1,487,000, if the 43 parcels within the Rural project are obtained by early acquisition. In the case of only one parcel being acquired by early acquisition the savings from early acquisitions are \$133,000. However, if the 43 parcels are acquired early, the savings from early acquisitions are \$480,000. The costs and savings for the Rural project under the first parcel purchased (inc. early) scenario can be found in Figure 4.21.

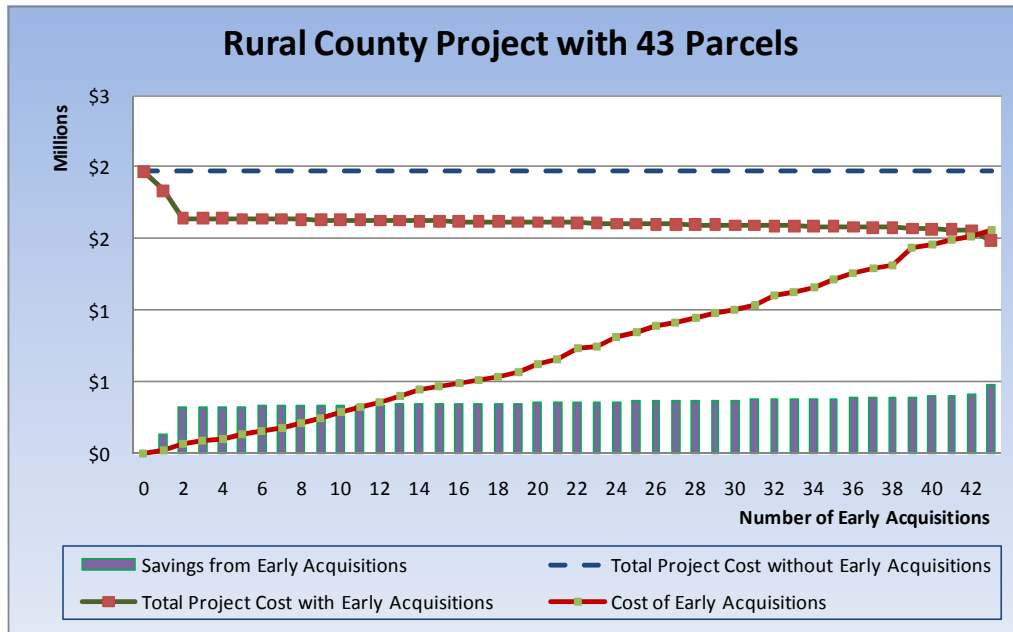


Figure 4.21: Costs and Savings for the Rural Project under the First Parcel Purchased (inc. early) Scenario.

Dallas Project

The costs and savings for the Dallas project under the first parcel purchased (inc. early) scenario can be observed in Figure 4.22. The savings from early acquisitions are \$51,342,000 if only one parcel is acquired early. Nevertheless, if five parcels are obtained by early acquisition, the savings from early acquisitions are \$72,632,000. There is a change in the slope of the savings from early acquisitions at parcel 5, where the slope fairly stabilizes. The total project cost without early acquisitions throughout the whole project is \$88,764,000. However, the total project cost with early acquisitions if the 28 parcels are acquired early is \$14,563,000, which yields savings from early acquisitions of \$74,201,000.

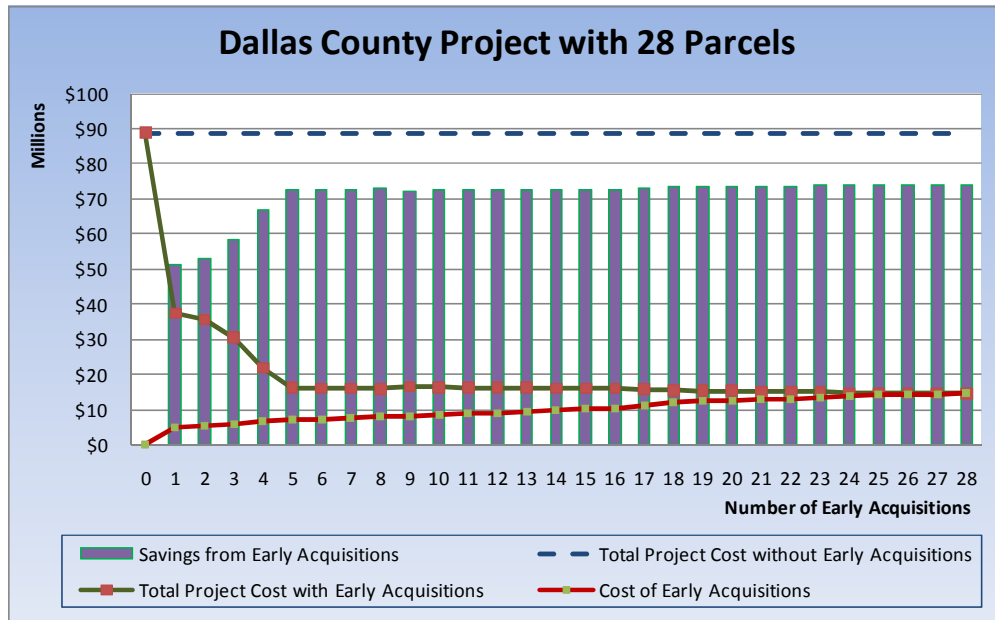


Figure 4.22: Costs and Savings for the Dallas Project under the First Parcel Purchased (inc. early) Scenario.

Harris Project

The total project cost with early acquisitions is \$70,070,000, if the 24 parcels of Harris project under the first parcel purchased (inc. early) scenario are obtained by early acquisition. Conversely, the total project cost without early acquisitions is \$381,424,000. In the case of only one parcel being obtained by early acquisition, the savings from early acquisitions is \$74,181,000. In addition, the slope rate for the savings from early acquisitions quite stabilizes in parcel 5, where the value for the savings is \$302,901,000. The savings from early acquisitions for the 24 parcels within the Harris project are \$311,354,000. The cost and savings for the Harris project under the first parcel purchased (inc. early) scenario are shown in Figure 4.23.

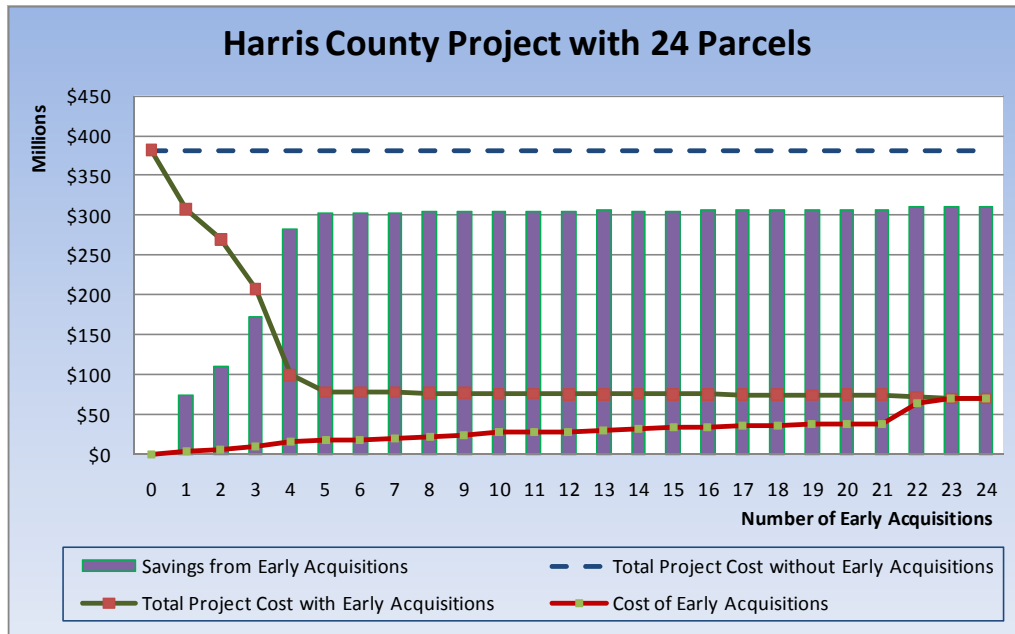


Figure 4 23: Costs and Savings for the Harris Project under the First Parcel Purchased (inc. early) Scenario.

Tarrant Project

The costs and savings for the Tarrant project under the first parcel purchased (inc. early) scenario can be found in Figure 4.24. The savings from early acquisitions if one parcel is acquired early is \$5,025,000. The total project cost without early acquisitions for all of the parcels is \$138,718,000. On the other hand, the total project cost with early acquisition if the 40 parcels within the Tarrant project are acquired early is \$62,172,000. From Figure 4.24, it can also be observed that the slope for the savings from early acquisitions is fairly constant when it reaches a value of \$68,768,000 for parcel 6.

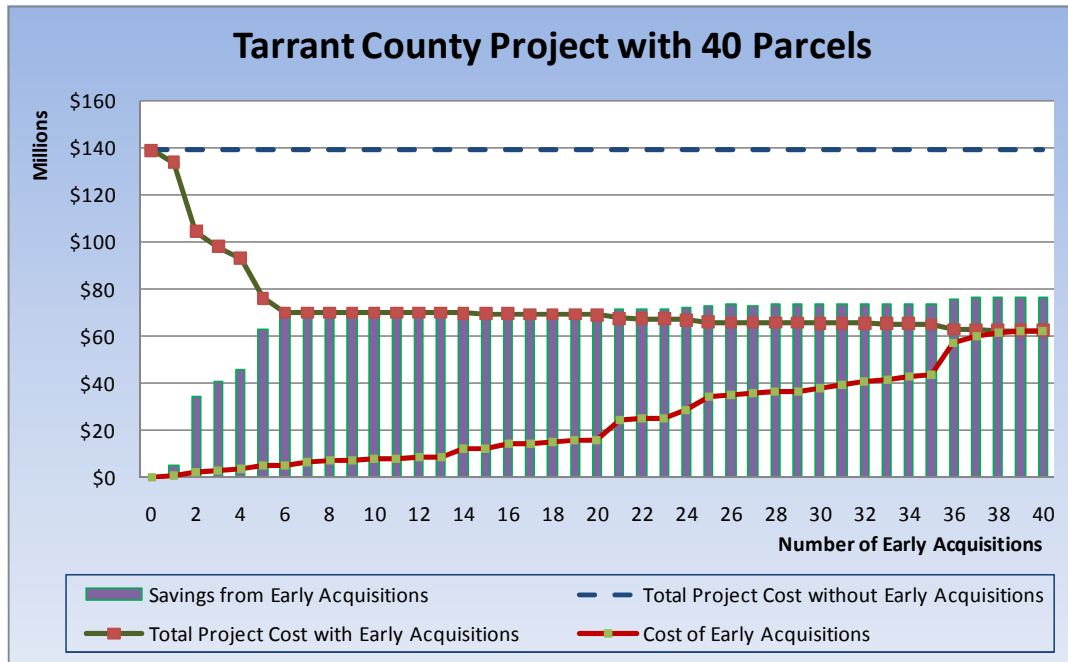


Figure 4.24: Costs and Savings for the Tarrant Project under the First Parcel Purchased (inc. early) Scenario.

4.3.5 ROW Release Obtained Scenario

Metro Project

The costs and savings for the Metro project under the ROW release obtained scenario are shown in Figure 4.25. The total project cost without early acquisitions for this project is \$147,320,000. Nevertheless, the total project cost with early acquisitions if the 42 parcels within the Metro project are obtained by early acquisition is \$11,678,000. The difference between the costs with and without early acquisitions shows a total savings from early acquisitions of \$135,642,000. In the case of only one parcel being obtained by early acquisition, the savings from early acquisitions are \$50,104,000. Besides, there is a change in the slope rate of the savings from early acquisitions for parcel 7, where the savings are \$122,927,000.

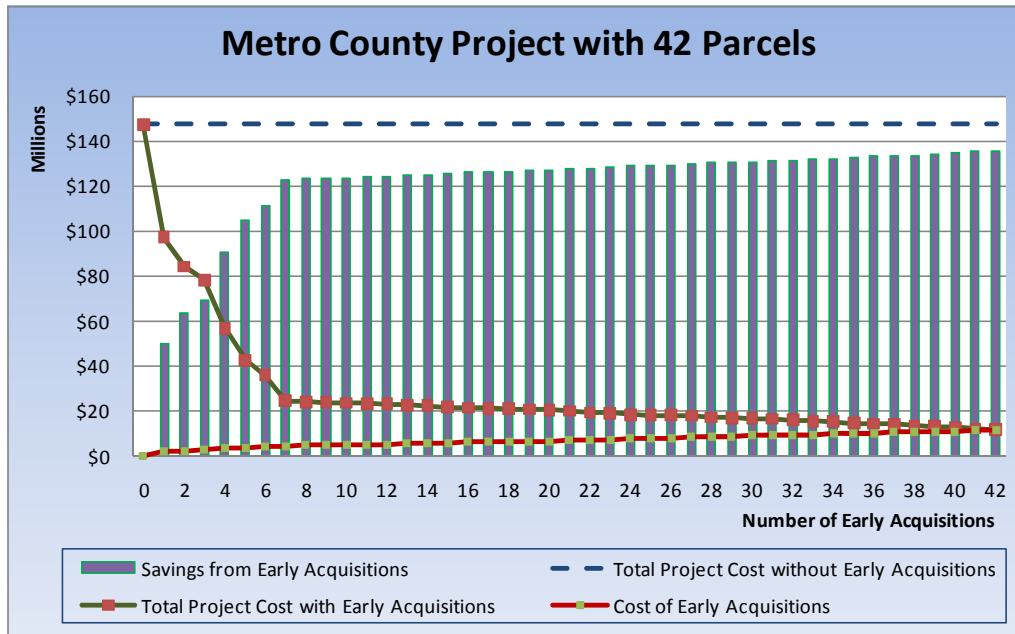


Figure 4.25: Costs and Savings for the Metro Project under the ROW Release Obtained Scenario.

Urban Project

The total project cost without early acquisitions for the Urban project under the ROW release obtained scenario is \$11,817,000. On the other hand, the total project cost with early acquisitions for the 42 parcels is \$3,714,000. By analyzing the difference between the costs with and without early acquisition, it is concluded that the savings from early acquisitions if the 42 parcels within this project are obtained by early acquisition are \$8,103,000. However, if only one parcel is obtained by early acquisitions, the savings from early acquisitions are \$2,768,000. Figure 4.26 includes the costs and savings for the Urban project under the ROW release obtained scenario. It can be observed a lower slope rate for the savings from early acquisitions from parcel 5.

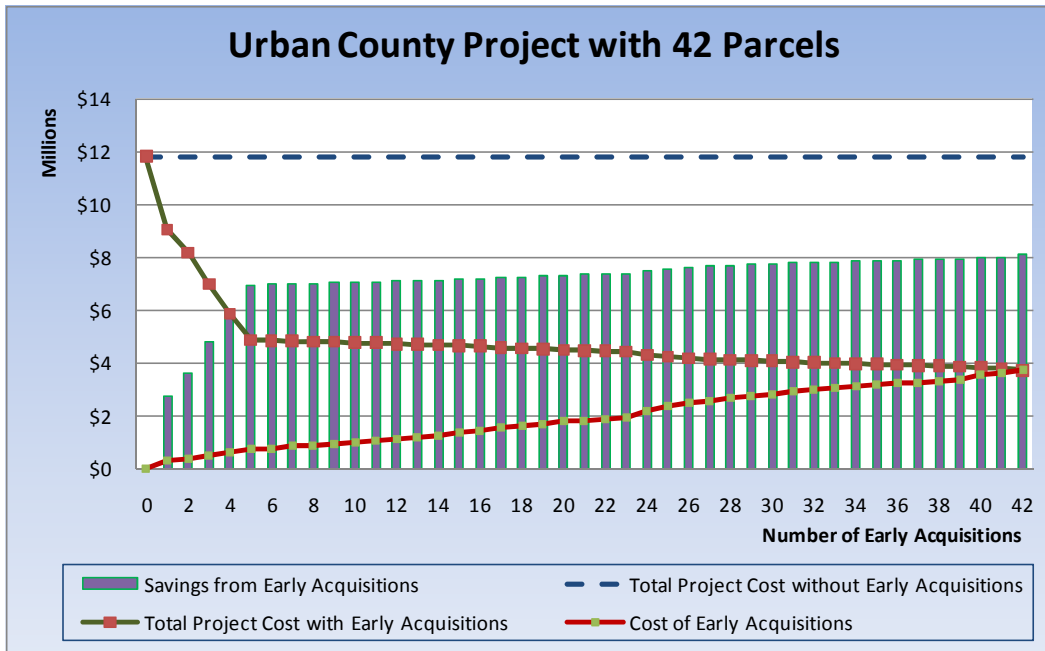


Figure 4.26: Costs and Savings for the Urban Project under the ROW Release Obtained Scenario.

Rural Project

The costs and savings for the Rural project under the ROW release obtained scenario are shown in the graph of Figure 4.27. The costs and savings with early acquisition have multiple discrepancies throughout the graph. The savings from early acquisitions are \$135,000, if only one parcel is acquired early. However, the savings from early acquisitions are \$631,000, if 43 parcels were obtained by early acquisition. The total project cost without early acquisitions for all of the parcels within the Rural project is \$1,967,000. Yet, the total project cost with early acquisitions is \$1,336,000, if the 43 parcels were acquired early. Therefore, the total savings from early acquisitions for the 43 parcels are \$631,000.

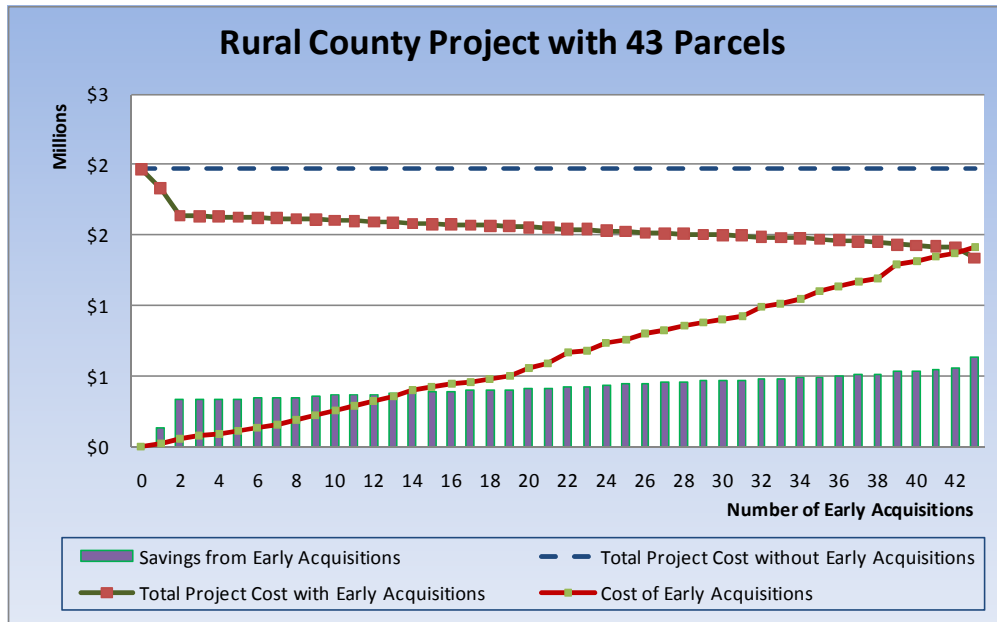


Figure 4.27: Costs and Savings for the Rural Project under the ROW Release Obtained Scenario.

Dallas Project

The costs and savings for the Dallas project under the ROW release obtained scenario can be observed in Figure 4.28. The total project cost without early acquisitions for all of the parcels within the Dallas project is \$88,764,000. The savings from early acquisitions are \$82,162,000, if the 28 parcels within the Dallas project are obtained by early acquisition. Therefore, the total project cost with early acquisitions for the 28 parcels within this project is \$6,602,000. In the instance of only one parcel being acquired early, the savings from early acquisitions is \$52,507,000. By observing Figure 4.28, it can be discovered that the slope for the savings from early acquisitions rapidly increases from parcel 0 to parcel 5, where the slope fairly stabilizes. The savings from early acquisitions for parcel 5 are \$76,217,000.

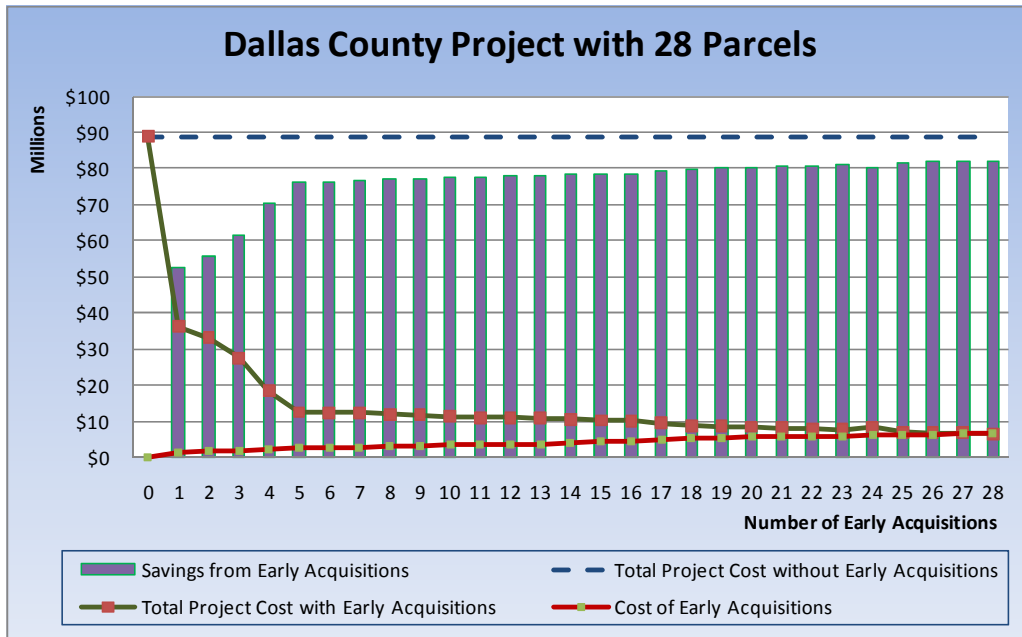


Figure 4.28: Costs and Savings for the Dallas Project under the ROW Release Obtained Scenario.

Harris Project

The costs and savings for the Harris project under the ROW release obtained scenario are included in Figure 4.29. The total project costs with early acquisitions for the 24 parcels within the Harris project is \$35,141,000. Conversely, the total project cost without early acquisitions is \$381,424,000. The difference between the costs with and without early acquisitions provides a savings from early acquisitions of \$346,283,000, if 24 parcels are obtained by early acquisition. From Figure 4.29 it can be found that the slope for the savings from early acquisitions fairly stabilized in parcel 5 with a savings of \$311,863,000. In the instance of obtaining only one parcel by early acquisition, the savings from early acquisitions are \$75,306,000.

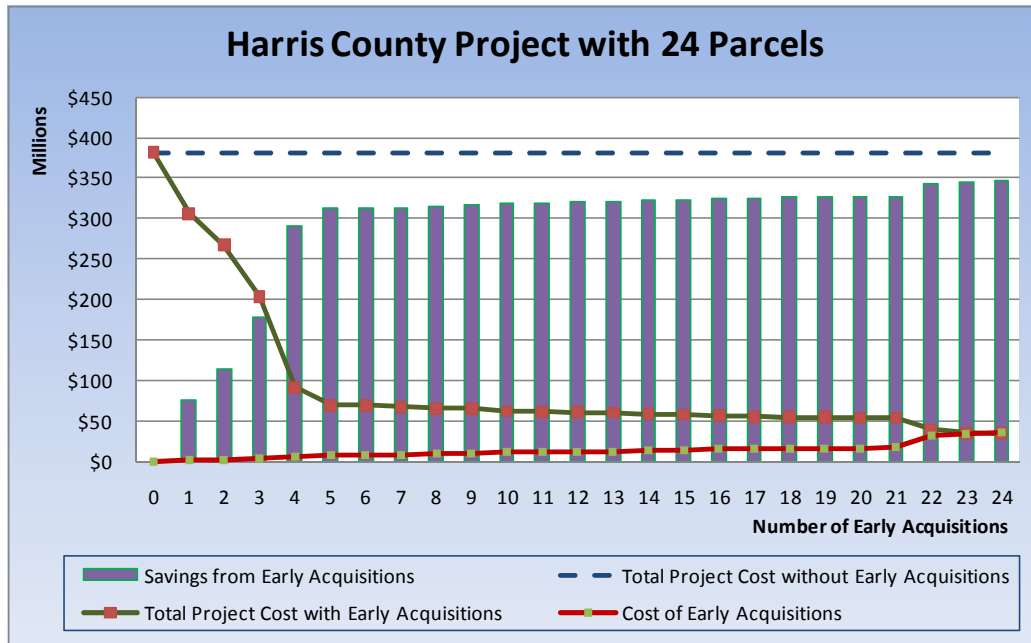


Figure 4.29: Costs and Savings for the Harris Project under the ROW Release Obtained Scenario.

Tarrant Project

By observing Figure 4.30, which consists of the costs and savings for the Tarrant project under the ROW release obtained, it can be found that slope for the savings from early acquisitions has multiple discrepancies throughout the whole graph. In the instance of obtaining only one parcel by early acquisition, the savings from early acquisitions are \$5,113,000. The total project cost without early acquisitions for all of the parcels in the Tarrant project is \$138,718,000. Inversely, the total project cost with early acquisition for parcel 40 is \$40,222,000. By analyzing the difference in the costs with and without early acquisitions, it can be concluded that the total savings from early acquisitions is \$98,496,000, if the 40 parcels within this project are obtained by early acquisition, as shown in Figure 4.30.

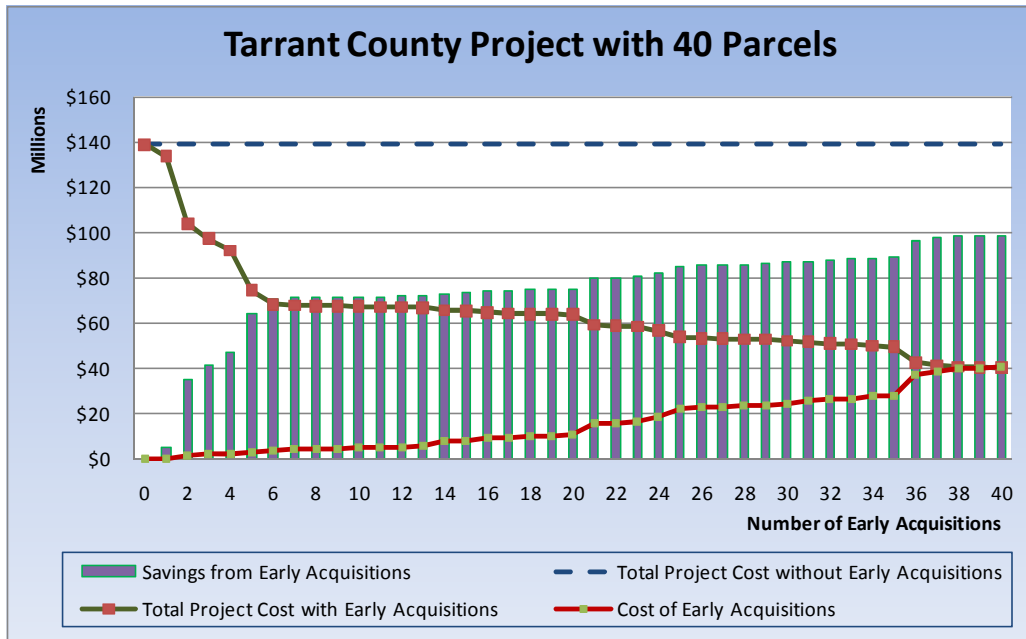


Figure 4.30: Costs and Savings for the Tarrant Project under the ROW Release Obtained Scenario.

4.4 Summary of TAMSIM Finding

The completed outputs from TAMSIM for this study are shown in Appendix A. After the TAMSIM runs were completed, a comparison table for each of the five speculation scenarios was prepared including all the possible parcels to be acquired by early acquisition. For example, 42 parcels for the Metro and Urban projects, 43 parcels for the Rural project, 28 parcels for the Dallas project, 24 parcels for the Harris project, and finally 40 parcels for the Tarrant project, as shown in Table 4.3. The following five comparison tables include:

1. County Type: The county type includes the counties within a speculation scenario (Metro, Urban, Rural, Dallas, Harris, and Tarrant).
2. Type of Estimates: The estimates made for these counties include maximum, minimum, average, and standard deviation values.

3. Project Cost without Early Acquisition: The project cost without early acquisition includes the cost values for their respective project if no parcels are obtained by early acquisition.
4. Project Cost with Early Acquisition: The project cost with early acquisition includes the cost values for their respective project if all of the parcels within the project are obtained by early acquisition.
5. Present Value with Early Acquisition: The present value with early acquisition is the parcel individual cost value for their respective project if all of the parcels are obtained by early acquisition.
6. Early Acquisition Cost: The early acquisition cost is the cumulative value of the parcel individual cost value for its respective project if all of the parcels within the project are obtained by early acquisition
7. Expected Savings from Early Acquisition: The expected savings from early acquisition includes the savings from early acquisition of its respective project if all the parcels within the project are acquired by early acquisition.

4.4.1 Environmental Clearance Obtained Scenario

For example, in Table 4.3 the value for the project cost without early acquisition (column 3) for the metro project under the environmental clearance obtained scenario was obtained by calculating the average project cost without early acquisition of the 42 parcels under this project. In this way, the rest of the values were obtained by calculating the minimum, maximum, average and standard deviation value of the total parcels under each project. It can be observed that the maximum expected savings from early acquisition for the Metro project is \$9,629,000. While, the maximum expected savings from early acquisition for the Urban project is \$3,475,000, although the total project cost without early acquisition is significantly less expensive for the

Urban project than the Metro project. The Rural project is considerably less expensive than the rest of the projects, with a total project cost without early acquisition of \$1,967,000.

Table 4.3: Estimates for the Environmental Clearance Obtained Scenario

County Type (1)	Type of Estimates (2)	Total Project Cost without Early Acquisition (\$1,000) (3)	Total Project Cost with Early Acquisition (\$1,000) (4)	Total PV with Early Acquisition (\$1,000) (5)	Total Early Acquisition Cost (\$1,000) (6)	Total Expected Savings from Early Acquisition (\$1,000) (7)
Metro	Minimum	\$147,320	\$9,591	\$48	\$1,614	\$50,381
	Maximum	\$147,320	\$96,939	\$1,614	\$9,630	\$137,729
	Average	\$147,320	\$26,812	\$224	\$5,750	\$120,508
	Standard Deviation	\$0	\$26,951	\$259	\$2,320	\$26,951
Urban	Minimum	\$11,817	\$3,414	\$27	\$262	\$2,790
	Maximum	\$11,817	\$9,027	\$263	\$3,473	\$8,403
	Average	\$11,817	\$4,652	\$81	\$1,800	\$7,165
	Standard Deviation	\$0	\$1,583	\$54	\$992	\$1,583
Rural	Minimum	\$1,967	\$1,255	\$12	\$23	\$136
	Maximum	\$1,967	\$1,831	\$97	\$1,329	\$712
	Average	\$1,967	\$1,513	\$30	\$615	\$454
	Standard Deviation	\$0	\$128	\$16	\$405	\$128
Dallas	Minimum	\$88,764	\$5,358	\$65	\$1,382	\$52,619
	Maximum	\$88,764	\$36,145	\$1,382	\$5,409	\$83,406
	Average	\$88,764	\$14,254	\$187	\$3,441	\$74,510
	Standard Deviation	\$0	\$16,269	\$247	\$1,418	\$16,269
Harris	Minimum	\$381,424	\$28,714	\$77	\$1,337	\$75,572
	Maximum	\$381,424	\$305,852	\$12,737	\$28,769	\$352,710
	Average	\$381,424	\$93,099	\$1,151	\$11,174	\$288,325
	Standard Deviation	\$0	\$92,142	\$2,480	\$7,513	\$92,142
Tarrant	Minimum	\$138,718	\$31,135	\$90	\$202	\$5,169
	Maximum	\$138,718	\$133,549	\$6,765	\$31,216	\$107,583
	Average	\$138,718	\$60,801	\$761	\$12,255	\$77,917
	Standard Deviation	\$0	\$23,714	\$1,227	\$9,645	\$9,646

4.4.2 First Parcel Purchased (not early) Scenario

The estimates for the speculation scenario of First Parcel Purchased (not early) are shown in Table 4.4. It can be observed that there are additional expected savings from early acquisition from the first parcel purchased (not early) scenario than from the speculation scenario of environmental clearance obtained. The maximum expected savings from early acquisition for the Metro project, if 42 parcels are obtained by early acquisition are \$20,067,000.

Table 4.4: Estimates for the First Parcel Purchased (not early) Scenario

County Type (1)	Type of Estimates (2)	Total Project Cost without Early Acquisition (\$1,000) (3)	Total Project Cost with Early Acquisition (\$1,000) (4)	Total PV with Early Acquisition (\$1,000) (5)	Total Early Acquisition Cost (\$1,000) (6)	Total Expected Savings from Early Acquisition (\$1,000) (7)
Metro	Minimum	\$147,320	\$20,027	\$92	\$3,543	\$48,452
	Maximum	\$147,320	\$98,868	\$3,543	\$20,066	\$127,293
	Average	\$147,320	\$33,145	\$467	\$12,084	\$114,175
	Standard Deviation	\$0	\$25,079	\$554	\$4,799	\$25,079
Urban	Minimum	\$11,817	\$4,272	\$34	\$333	\$2,719
	Maximum	\$11,817	\$9,098	\$333	\$4,332	\$7,545
	Average	\$11,817	\$5,109	\$101	\$2,258	\$6,708
	Standard Deviation	\$0	\$1,418	\$67	\$1,229	\$1,418
Rural	Minimum	\$1,967	\$1,434	\$14	\$26	\$133
	Maximum	\$1,967	\$1,834	\$112	\$1,507	\$533
	Average	\$1,967	\$1,595	\$34	\$695	\$372
	Standard Deviation	\$0	\$82	\$18	\$457	\$82
Dallas	Minimum	\$88,764	\$10,223	\$116	\$2,659	\$51,342
	Maximum	\$88,764	\$37,422	\$2,659	\$10,273	\$78,541
	Average	\$88,764	\$17,352	\$354	\$6,539	\$71,412
	Standard Deviation	\$0	\$15,345	\$475	\$2,691	\$15,345
Harris	Minimum	\$381,424	\$58,096	\$177	\$2,728	\$74,181
	Maximum	\$381,424	\$307,243	\$23,689	\$58,151	\$323,328
	Average	\$381,424	\$105,486	\$2,326	\$23,561	\$275,938
	Standard Deviation	\$0	\$86,985	\$4,612	\$15,171	\$86,985
Tarrant	Minimum	\$138,718	\$54,806	\$156	\$346	\$5,025
	Maximum	\$138,718	\$133,693	\$11,656	\$54,888	\$83,912
	Average	\$138,718	\$70,145	\$1,339	\$21,599	\$68,573
	Standard Deviation	\$0	\$18,349	\$2,116	\$16,939	\$18,349

4.4.3 First Parcel Purchased (inc. early) Scenario

As it can be observed, the estimates for the project cost without early acquisition is the same for all the speculation scenarios according to their project county. The expected savings from early acquisition are higher for the first parcel purchased (inc. early) scenario than the scenarios explained previously, as it can be observed in Table 4.5. The value for the expected savings from early acquisition is higher in this scenario for the reason that advanced acquisition starts in an early stage, preventing speculations from start and develop cost additions to the project.

Table 4.5: Estimates for the First Parcel Purchased (inc. early) Scenario

County Type (1)	Type of Estimates (2)	Total Project Cost without Early Acquisition (\$1,000) (3)	Total Project Cost with Early Acquisition (\$1,000) (4)	Total PV with Early Acquisition (\$1,000) (5)	Total Early Acquisition Cost (\$1,000) (6)	Total Expected Savings from Early Acquisition (\$1,000) (7)
Metro	Minimum	\$147,320	\$24,977	\$129	\$3,543	\$48,452
	Maximum	\$147,320	\$98,868	\$3,543	\$25,016	\$122,343
	Average	\$147,320	\$35,830	\$542	\$14,769	\$111,490
	Standard Deviation	\$0	\$24,141	\$564	\$6,189	\$24,141
Urban	Minimum	\$11,817	\$4,652	\$37	\$333	\$2,719
	Maximum	\$11,817	\$9,098	\$380	\$4,712	\$7,165
	Average	\$11,817	\$5,311	\$110	\$2,460	\$6,506
	Standard Deviation	\$0	\$1,347	\$75	\$1,348	\$1,347
Rural	Minimum	\$1,967	\$1,487	\$15	\$26	\$133
	Maximum	\$1,967	\$1,834	\$116	\$1,560	\$480
	Average	\$1,967	\$1,618	\$36	\$718	\$349
	Standard Deviation	\$0	\$70	\$19	\$473	\$70
Dallas	Minimum	\$88,764	\$14,563	\$139	\$2,659	\$51,342
	Maximum	\$88,764	\$37,422	\$5,046	\$14,614	\$74,201
	Average	\$88,764	\$20,283	\$504	\$9,470	\$68,481
	Standard Deviation	\$0	\$14,468	\$901	\$3,855	\$14,468
Harris	Minimum	\$381,424	\$70,070	\$209	\$2,728	\$74,181
	Maximum	\$381,424	\$307,243	\$26,828	\$70,125	\$311,354
	Average	\$381,424	\$110,906	\$2,805	\$28,994	\$270,518
	Standard Deviation	\$0	\$84,697	\$5,258	\$18,456	\$84,697
Tarrant	Minimum	\$138,718	\$62,172	\$170	\$346	\$5,025
	Maximum	\$138,718	\$133,693	\$13,516	\$62,254	\$76,546
	Average	\$138,718	\$72,865	\$1,518	\$24,319	\$65,853
	Standard Deviation	\$0	\$16,970	\$2,467	\$19,355	\$16,970

4.4.4 Schematics Available (time 0) Scenario

The estimates prepared for the speculation scenario of schematics available are included in Table 4.6. The maximum expected savings from early acquisition for the metro project is smaller than the previous scenarios. This change in the value of expected savings from early acquisition might be due to the stage where the early acquisition took place and the speculations made on the parcel.

Table 4.6: Estimates for the Schematic Available Scenario

County Type (1)	Type of Estimates (2)	Total Project Cost without Early Acquisition (\$1,000) (3)	Total Project Cost with Early Acquisition (\$1,000) (4)	Total PV with Early Acquisition (\$1,000) (5)	Total Early Acquisition Cost (\$1,000) (6)	Total Expected Savings from Early Acquisition (\$1,000) (7)
Metro	Minimum	\$147,320	\$7,083	\$37	\$1,287	\$50,708
	Maximum	\$147,320	\$96,612	\$1,287	\$7,122	\$140,237
	Average	\$147,320	\$25,355	\$166	\$4,317	\$121,965
	Standard Deviation	\$0	\$27,383	\$200	\$1,684	\$27,383
Urban	Minimum	\$11,817	\$2,966	\$24	\$247	\$2,805
	Maximum	\$11,817	\$9,012	\$253	\$3,026	\$8,851
	Average	\$11,817	\$4,440	\$70	\$1,588	\$7,377
	Standard Deviation	\$0	\$1,674	\$50	\$866	\$1,674
Rural	Minimum	\$1,967	\$1,083	\$11	\$21	\$138
	Maximum	\$1,967	\$1,829	\$82	\$1,157	\$884
	Average	\$1,967	\$1,435	\$26	\$535	\$532
	Standard Deviation	\$0	\$177	\$14	\$351	\$177
Dallas	Minimum	\$88,764	\$3,955	\$40	\$1,341	\$52,660
	Maximum	\$88,764	\$36,104	\$1,341	\$4,006	\$84,809
	Average	\$88,764	\$13,498	\$138	\$2,685	\$75,266
	Standard Deviation	\$0	\$16,562	\$238	\$974	\$16,562
Harris	Minimum	\$381,424	\$18,232	\$55	\$1,178	\$75,731
	Maximum	\$381,424	\$305,693	\$6,565	\$18,288	\$363,192
	Average	\$381,424	\$89,884	\$732	\$7,959	\$291,540
	Standard Deviation	\$0	\$93,727	\$1,297	\$4,684	\$93,727
Tarrant	Minimum	\$138,718	\$18,381	\$55	\$119	\$5,251
	Maximum	\$138,718	\$133,467	\$4,033	\$18,463	\$120,337
	Average	\$138,718	\$55,774	\$450	\$7,228	\$82,944
	Standard Deviation	\$0	\$26,957	\$736	\$5,744	\$26,957

4.4.5 ROW Release Obtained Scenario

It can be observed in Table 4.7 that the maximum expected savings from early acquisition under the speculation scenario of ROW release obtained is \$11,719,000. The amount for the maximum expected savings from early acquisition for the metro project under this scenario is more than the maximum expected savings from early acquisitions for the metro project under the scenarios of schematics available and environmental clearance obtained. However, the maximum expected savings from early acquisition for the metro project under the scenarios of parcel purchased (inc. early) and parcel purchased (not early) are more than the maximum expected savings from early acquisition under the ROW released scenario.

Table 4.7: Estimates for the ROW Release Obtained Scenario

County Type (1)	Type of Estimates (2)	Total Project Cost without Early Acquisition (\$1,000) (3)	Total Project Cost with Early Acquisition (\$1,000) (4)	Total PV with Early Acquisition (\$1,000) (5)	Total Early Acquisition Cost (\$1,000) (6)	Total Expected Savings from Early Acquisition (\$1,000) (7)
Metro	Minimum	\$147,320	\$11,678	\$58	\$1,891	\$50,104
	Maximum	\$147,320	\$97,216	\$1,891	\$11,717	\$135,642
	Average	\$147,320	\$28,065	\$273	\$7,004	\$119,255
	Standard Deviation	\$0	\$26,544	\$306	\$2,842	\$26,544
Urban	Minimum	\$11,817	\$3,714	\$30	\$284	\$2,768
	Maximum	\$11,817	\$9,049	\$284	\$3,773	\$8,103
	Average	\$11,817	\$4,806	\$88	\$1,954	\$7,011
	Standard Deviation	\$0	\$1,524	\$58	\$1,076	\$1,524
Rural	Minimum	\$1,967	\$1,336	\$13	\$24	\$135
	Maximum	\$1,967	\$1,832	\$104	\$1,410	\$631
	Average	\$1,967	\$1,550	\$32	\$651	\$417
	Standard Deviation	\$0	\$106	\$17	\$428	\$106
Dallas	Minimum	\$88,764	\$6,602	\$81	\$1,494	\$52,507
	Maximum	\$88,764	\$36,257	\$1,494	\$6,652	\$82,162
	Average	\$88,764	\$14,997	\$229	\$4,127	\$73,767
	Standard Deviation	\$0	\$15,999	\$271	\$1,783	\$15,999
Harris	Minimum	\$381,424	\$35,141	\$97	\$1,603	\$75,306
	Maximum	\$381,424	\$306,118	\$15,457	\$35,196	\$346,283
	Average	\$381,424	\$95,635	\$1,408	\$13,711	\$285,789
	Standard Deviation	\$0	\$91,033	\$3,007	\$9,216	\$91,033
Tarrant	Minimum	\$138,718	\$40,222	\$112	\$258	\$5,113
	Maximum	\$138,718	\$133,605	\$8,786	\$40,303	\$98,496
	Average	\$138,718	\$64,354	\$983	\$15,808	\$74,364
	Standard Deviation	\$0	\$21,521	\$1,594	\$12,464	\$21,521

4.5 Findings Summary of the Five Speculation Scenarios

Minimum Total Project Costs and Savings

The minimum values for the total project cost without early acquisitions, total project cost with early acquisitions, and total expected savings from early acquisition are shown in Table 4.8.

Table 4.8 also displays the increase cost ratio for each of the speculation scenarios according to

the county type. The increase cost ratio is the total project cost without early acquisitions value over the total project cost with early acquisition value. By observing the increase cost ratio, it can be concluded that the speculation scenario of schematics available for the six county types has the highest values for the increase cost ratio. Yet, the county type with the highest increase cost ratio is Harris under the speculation scenario of schematics available.

Table 4.8: Summary of the Minimum Total Project Costs and Savings

Project	Speculation Scenario	Total Project Cost without Early Acquisitions (\$1,000)	Total Project Cost with Early Acquisitions (\$1,000)	Total Expected Savings from Early Acquisitions (\$1,000)	Increase Cost Ratio
Metro	Environmental Clearance Obtained	\$147,320	\$9,591	\$50,381	15.36
	First Parcel Purchased (not early)	\$147,320	\$20,027	\$48,452	7.36
	Schematics Available (time 0)	\$147,320	\$7,083	\$50,708	20.80
	First Parcel Purchased (inc. early)	\$147,320	\$24,977	\$48,452	5.90
	ROW Release Obtained	\$147,320	\$11,678	\$50,104	12.62
Urban	Environmental Clearance Obtained	\$11,817	\$3,414	\$2,790	3.46
	First Parcel Purchased (not early)	\$11,817	\$4,272	\$2,719	2.77
	Schematics Available (time 0)	\$11,817	\$2,966	\$2,805	3.98
	First Parcel Purchased (inc. early)	\$11,817	\$4,652	\$2,719	2.54
	ROW Release Obtained	\$11,817	\$3,714	\$2,768	3.18
Rural	Environmental Clearance Obtained	\$1,967	\$1,255	\$136	1.57
	First Parcel Purchased (not early)	\$1,967	\$1,434	\$133	1.37
	Schematics Available (time 0)	\$1,967	\$1,083	\$138	1.82
	First Parcel Purchased (inc. early)	\$1,967	\$1,487	\$133	1.32
	ROW Release Obtained	\$1,967	\$1,336	\$135	1.47
Dallas	Environmental Clearance Obtained	\$88,764	\$5,358	\$52,619	16.57
	First Parcel Purchased (not early)	\$88,764	\$10,223	\$51,342	8.68
	Schematics Available (time 0)	\$88,764	\$3,955	\$52,660	22.44
	First Parcel Purchased (inc. early)	\$88,764	\$14,563	\$51,342	6.10
	ROW Release Obtained	\$88,764	\$6,602	\$52,507	13.45
Harris	Environmental Clearance Obtained	\$381,424	\$28,714	\$75,572	13.28
	First Parcel Purchased (not early)	\$381,424	\$58,096	\$74,181	6.57
	Schematics Available (time 0)	\$381,424	\$18,232	\$75,731	20.92
	First Parcel Purchased (inc. early)	\$381,424	\$70,070	\$74,181	5.44
	ROW Release Obtained	\$381,424	\$35,141	\$75,306	10.85
Tarrant	Environmental Clearance Obtained	\$138,718	\$31,135	\$5,169	4.46
	First Parcel Purchased (not early)	\$138,718	\$54,806	\$5,025	2.53
	Schematics Available (time 0)	\$138,718	\$18,381	\$5,251	7.55
	First Parcel Purchased (inc. early)	\$138,718	\$62,172	\$5,025	2.23
	ROW Release Obtained	\$138,718	\$40,222	\$5,113	3.45

Maximum Total Project Costs and Savings

The summary of the maximum total project costs, savings, and increase cost ratio for the six county types under the five speculation scenarios is displayed in Table 4.9. For the Metro project, the speculation scenarios with highest increase cost ratio are environmental clearance obtained as well as schematics available. For the Urban project, the most suitable speculation scenarios for advanced right of way acquisitions are the environmental clearance, schematics available and ROW release obtained. The rest of the counties also have two or three speculation scenarios for the most suitable. However, Dallas has the highest increase cost ratio under the speculation scenarios of environmental clearance obtained and schematics available.

Table 4.9: Summary of the Maximum Total Project Costs and Savings

Project	Speculation Scenario	Total Project Cost without Early Acquisitions (\$1,000)	Total Project Cost with Early Acquisitions (\$1,000)	Total Expected Savings from Early Acquisitions (\$1,000)	Increase Cost Ratio
Metro	Environmental Clearance Obtained	\$147,320	\$96,939	\$137,729	1.52
	First Parcel Purchased (not early)	\$147,320	\$98,868	\$127,293	1.49
	Schematics Available (time 0)	\$147,320	\$96,612	\$140,237	1.52
	First Parcel Purchased (inc. early)	\$147,320	\$98,868	\$122,343	1.49
	ROW Release Obtained	\$147,320	\$97,216	\$135,642	1.52
Urban	Environmental Clearance Obtained	\$11,817	\$9,027	\$8,403	1.31
	First Parcel Purchased (not early)	\$11,817	\$9,098	\$7,545	1.30
	Schematics Available (time 0)	\$11,817	\$9,012	\$8,851	1.31
	First Parcel Purchased (inc. early)	\$11,817	\$9,098	\$7,165	1.30
	ROW Release Obtained	\$11,817	\$9,049	\$8,103	1.31
Rural	Environmental Clearance Obtained	\$1,967	\$1,831	\$712	1.07
	First Parcel Purchased (not early)	\$1,967	\$1,834	\$533	1.07
	Schematics Available (time 0)	\$1,967	\$1,829	\$884	1.08
	First Parcel Purchased (inc. early)	\$1,967	\$1,834	\$480	1.07
	ROW Release Obtained	\$1,967	\$1,832	\$631	1.07
Dallas	Environmental Clearance Obtained	\$88,764	\$36,145	\$83,406	2.46
	First Parcel Purchased (not early)	\$88,764	\$37,422	\$78,541	2.37
	Schematics Available (time 0)	\$88,764	\$36,104	\$84,809	2.46
	First Parcel Purchased (inc. early)	\$88,764	\$37,422	\$74,201	2.37
	ROW Release Obtained	\$88,764	\$36,257	\$82,162	2.45
Harris	Environmental Clearance Obtained	\$381,424	\$305,852	\$352,710	1.25
	First Parcel Purchased (not early)	\$381,424	\$307,243	\$323,328	1.24
	Schematics Available (time 0)	\$381,424	\$305,693	\$363,192	1.25
	First Parcel Purchased (inc. early)	\$381,424	\$307,243	\$311,354	1.24
	ROW Release Obtained	\$381,424	\$306,118	\$346,283	1.25
Tarrant	Environmental Clearance Obtained	\$138,718	\$133,549	\$107,583	1.04
	First Parcel Purchased (not early)	\$138,718	\$133,693	\$83,912	1.04
	Schematics Available (time 0)	\$138,718	\$133,467	\$120,337	1.04
	First Parcel Purchased (inc. early)	\$138,718	\$133,693	\$76,546	1.04
	ROW Release Obtained	\$138,718	\$133,605	\$98,496	1.04

Average Total Project Costs and Savings

The summary of the average total project costs and savings as well as the increase cost ratio is shown in Table 4.10. From this table it can be observed that the six county types have the highest increase cost ratio when early acquisitions take place under the schematics available scenario.

However, the county type with the highest increase cost ratio under the schematics available scenario is Dallas.

Table 4.10: Summary of the Average Total Project Costs and Savings

Project	Speculation Scenario	Total Project Cost without Early Acquisitions (\$1,000)	Total Project Cost with Early Acquisitions (\$1,000)	Total Expected Savings from Early Acquisitions (\$1,000)	Increase Cost Ratio
Metro	Environmental Clearance Obtained	\$147,320	\$26,812	\$120,508	5.49
	First Parcel Purchased (not early)	\$147,320	\$33,145	\$114,175	4.44
	Schematics Available (time 0)	\$147,320	\$25,355	\$121,965	5.81
	First Parcel Purchased (inc. early)	\$147,320	\$35,830	\$111,490	4.11
	ROW Release Obtained	\$147,320	\$28,065	\$119,255	5.25
Urban	Environmental Clearance Obtained	\$11,817	\$4,652	\$7,165	2.54
	First Parcel Purchased (not early)	\$11,817	\$5,109	\$6,708	2.31
	Schematics Available (time 0)	\$11,817	\$4,440	\$7,377	2.66
	First Parcel Purchased (inc. early)	\$11,817	\$5,311	\$6,506	2.23
	ROW Release Obtained	\$11,817	\$4,806	\$7,011	2.46
Rural	Environmental Clearance Obtained	\$1,967	\$1,513	\$454	1.30
	First Parcel Purchased (not early)	\$1,967	\$1,595	\$372	1.23
	Schematics Available (time 0)	\$1,967	\$1,435	\$532	1.37
	First Parcel Purchased (inc. early)	\$1,967	\$1,618	\$349	1.22
	ROW Release Obtained	\$1,967	\$1,550	\$417	1.27
Dallas	Environmental Clearance Obtained	\$88,764	\$14,254	\$74,510	6.23
	First Parcel Purchased (not early)	\$88,764	\$17,352	\$71,412	5.12
	Schematics Available (time 0)	\$88,764	\$13,498	\$75,266	6.58
	First Parcel Purchased (inc. early)	\$88,764	\$20,283	\$68,481	4.38
	ROW Release Obtained	\$88,764	\$14,997	\$73,767	5.92
Harris	Environmental Clearance Obtained	\$381,424	\$93,099	\$288,325	4.10
	First Parcel Purchased (not early)	\$381,424	\$105,486	\$275,938	3.62
	Schematics Available (time 0)	\$381,424	\$89,884	\$291,540	4.24
	First Parcel Purchased (inc. early)	\$381,424	\$110,906	\$270,518	3.44
	ROW Release Obtained	\$381,424	\$95,635	\$285,789	3.99
Tarrant	Environmental Clearance Obtained	\$138,718	\$60,801	\$77,917	2.28
	First Parcel Purchased (not early)	\$138,718	\$70,145	\$68,573	1.98
	Schematics Available (time 0)	\$138,718	\$55,774	\$82,944	2.49
	First Parcel Purchased (inc. early)	\$138,718	\$72,865	\$65,853	1.90
	ROW Release Obtained	\$138,718	\$64,354	\$74,364	2.16

Time Duration

The costs and savings value obtained from TAMSIM played an important role in this analysis. Nonetheless, time durations gathered from TAMSIM are essential during the decision making process, in order to have a better idea what county will be the most time efficient. The second column in Table 4.11 represents the mean time duration in months without early acquisition. The third column shows three set of parcels for each county type. The first section is always one since it is when savings begin. The second section was chosen according to the expected savings from early acquisitions rate. For example, the expected savings from early acquisition for the Metro county increases at a significant rapid rate from parcel 1 to 7, and it fairly stabilizes after parcel seven. Therefore, parcel 7 was chosen as a mark point and it was important to know the mean duration time for this mark point. The same was applied for the rest of the county types. The fourth column of Table 4.11 represents the difference in mean time if parcels are obtained by early acquisitions. The second to last column is the mean time duration if the parcels in column 3 are obtained by early acquisitions.

In order to have a better understanding of the differences in time duration between these counties, a time reduction factor was calculated. There are no time duration differences between speculation scenarios. The only difference on time durations observed was between county types. As shown in Table 4.11 Tarrant has the lowest time reduction value out of all of the county types when one parcel is obtained by early acquisition. However, Tarrant has the highest time reduction value out of all of the counties when the 42 parcels within this project are acquired early.

Table 4.11: Time Durations to Complete Right-of-Way Acquisitions

County Type	Duration without Early Acquisition (months)	Parcels Obtained by Early Acquisition	Savings in Time (months)	Duration with Early Acquisition (months)	Time Reduction Factor
Metro	102.6	1	-0.4	102.2	0.004
		7	-2.3	100.3	0.023
		42	-66.5	36.1	1.842
Urban	76.8	1	-0.2	76.6	0.003
		5	-0.5	76.3	0.007
		42	-54	22.8	2.368
Rural	65.1	1	-0.2	64.9	0.003
		2	-0.3	64.8	0.005
		43	-47.7	17.4	2.741
Dallas	83.1	1	-0.4	82.7	0.005
		5	-1.5	81.6	0.018
		28	-57	26.1	2.184
Harris	78.5	1	-0.2	78.3	0.003
		5	-1.3	77.2	0.017
		24	-55	23.5	2.340
Tarrant	60.3	1	0	60.3	0
		6	-0.2	60.1	0.003
		40	-45.8	14.5	3.159

Chapter 5: EROW: ROW Optimization Tool

5.1 EROW Application

The results obtained from TAMSIM are sufficient for an analyst to make a decision on which projects are the most appropriate to buy. Nonetheless, EROW can be used as a verifying tool to confirm whether the chosen projects are the most appropriate projects. Costs and savings obtained from TAMSIM are used for EROW. Two methods were used to group the projects and case scenarios for further analysis. The first method is treating the county types as projects, and the second method is by dividing the county types into case scenario groups and treating the groups as sub-projects, still counting parcels acquired early as individual cases. After the projects to be used are chosen, it is necessary to determine the needed budget based on the results from TAMSIM.

In order to run EROW and obtain different alternatives of appropriate projects to buy according to the budget, it is recommended to change the minimum and maximum budgets along with the increments in the EROW input field. The output data from the Save.txt and Cost.txt files of TAMSIM is used as input data from EROW. The data in the text files should be accumulated and display in a column form. While the input data for EROW should be displayed in a row form, one row per project. Below is an example of how a costs/savings input file for EROW should be built. Each row represents a project and each column a case. In this example there are three projects and nine cases per project. Each project should start with “0”, since the option of doing nothing is an alternative as well as shown in Figure 5.1.

0	5154	13146	9268	21007	24429	21361	25020	22025
0	436	548	770	1231	1254	1296	1489	1384
0	54	112	107	110	122	142	96	156

Figure 5.1: EROW Input Data Format

In the following study there will be two case studies with two different options for running EROW. Figure 5.2 shows an illustration of how these studies are managed. Case study one has non-constant values for the budges and increments, and has two options for running EROW. Case study two has constant values for the budges and increments, and as well has two options for running EROW. Option one takes each county as projects, while option two takes each speculation scenarios as projects. Farther explanation can be found later in this chapter.

Options	Non-Constant Budges and Increments	Constant Budges and Increments
	Case Study 1	Case Study 2
Option 1	Projects: Metro Urban Rural Dallas Harris Tarrant	Projects: Metro Urban Rural Dallas Harris Tarrant
Option 2	Projects: Environmental Clearance Obtained First Parcel Purchased (not early) Schematics Available (time 0) First Parcel Purchased (inc. early) ROW Release Obtained	Projects: Environmental Clearance Obtained First Parcel Purchased (not early) Schematics Available (time 0) First Parcel Purchased (inc. early) ROW Release Obtained

Figure 5.2: Case Studies One and Two

5.2 Case Study One

5.2.1 First Option for Case Study One

For this method we treat the county types, Metro, Urban, Rural, Dallas, Harris, and Tarrant, as projects and the parcels within them as individual cases. Table 5.1 shows the projects and cases to be used in EROW. Table 5.1 contains:

1. Speculation Scenarios: There will be one run of EROW for each speculation scenario.
2. Project 1: Project 1 includes the Metro project with its respective 42 parcels under each of the speculation scenarios.
3. Project 2: Project 2 includes the 42 parcels of the Urban project under each of the speculation scenarios.
4. Project 3: Project 3 corresponds to the Rural project and its 43 parcels per speculation scenario.
5. Project 4: Project 4 includes the Dallas project and its respective 28 parcels under each of the speculation scenarios.
6. Project 5: Project 5 includes the 24 parcels of the Harris project per each speculation scenario.
7. Project 6: Project 6 corresponds to the Tarrant project and its respective 40 parcels under each of the speculation scenarios.

Table 5.1: Data for EROW under the First Option for Case Study One

Speculation Scenario (1)	Project 1 (Metro) Case (2)	Project 2 (Urban) Case (3)	Project 3 (Rural) Case (4)	Project 4 (Dallas) Case (5)	Project 5 (Harris) Case (6)	Project 6 (Tarrant) Case (7)
Environmental Clearance Obtained	0-42	0-42	0-43	0-28	0-24	0-40
First Parcel Purchased (Not Early)	0-42	0-42	0-43	0-28	0-24	0-40
Schematics Available (Time 0)	0-42	0-42	0-43	0-28	0-24	0-40
First Parcel Purchased (inc. early)	0-42	0-42	0-43	0-28	0-24	0-40
ROW Release Obtained	0-42	0-42	0-43	0-28	0-24	0-40

As an example for the environmental clearance obtained scenario, the projects and cases explained in Table 5.1, are entered in EROW for savings and costs, in the format shown in Figure 5.3.

Project	SAVINGS								
1 Metro	0	50381	63607	69433	90985	105424	112022	123742	...
2 Urban	0	2790	3678	4874	6009	7003	7028	7062	...
3 Rural	0	136	333	338	341	346	352	356	...
4 Dallas	0	52619	55826	61546	70559	76553	76716	76858	...
5 Harris	0	75572	114599	178474	291291	313216	313389	315227	...
6 Tarrant	0	5169	35330	41928	47268	65019	71258	71911	...
	COSTS								
1 Metro	0	1614	1932	2132	2759	3172	3337	3738	...
2 Urban	0	262	346	471	568	664	714	788	...
3 Rural	0	23	53	77	90	111	131	151	...
4 Dallas	0	1382	1484	1701	2007	2197	2300	2392	...
5 Harris	0	1337	2228	3915	5755	6352	6429	7328	...
6 Tarrant	0	202	1309	1517	1719	2332	2587	3209	...

Figure 5.3: Environmental Clearance Obtained Input Data Format for the First Option of Method One.

The values from the first row for the savings and costs correspond to the Metro project, while the second row corresponds to the Urban project. In this way, the following rows correspond to its respective county project. The numerical section is the input for EROW as explained previously. In order to start running EROW, the values from Table 5.2 were calculated:

1. Scenarios: The speculation scenarios to be used for each of the runs of EROW
2. Project: The five projects (Metro, Urban, Rural, Dallas, Harris, and Tarrant) considered for running EROW for each of the speculation scenarios.
3. Total Average Cost: The project costs with early acquisition of each of the parcels for the five projects under each of the speculation scenarios were grouped, then the average of the project cost with early acquisition for all of the parcels under the same project was calculated
4. Maximum Cost: The project with the highest average cost with early acquisition was used as a base for the maximum budget to be inputted into EROW.
5. Minimum Cost: The project with the minimum average cost with early acquisition was used as a base for the minimum budget to be inputted into EROW.
6. Standard Deviation: The standard deviation was calculated after obtaining the minimum value. For example, for the environmental clearance obtained scenario, the average minimum value corresponds to the Rural project. The increment was obtained by calculating the standard deviation of the Rural project parcels under the environmental clearance obtained scenario.

Table 5.2: EROW Input Data for the First Option of Case Study One

Scenario (1)	Project (2)	Total Average Cost (\$1,000) (3)	Total Maximum Cost (\$1,000) (4)	Total Minimum Cost (\$1,000) (5)	Total Standard Deviation (\$1,000) (6)
Environmental Clearance Obtained	Metro	\$5,750	\$12,255 (Tarrant)	\$615 (Rural)	\$405 (Rural)
	Urban	\$1,800			
	Rural	\$615			
	Dallas	\$3,441			
	Harris	\$11,174			
	Tarrant	\$12,255			
First Parcel Purchased (inc. early)	Metro	\$14,769	\$28,994 (Harris)	\$718 (Rural)	\$473 (Rural)
	Urban	\$2,460			
	Rural	\$718			
	Dallas	\$9,470			
	Harris	\$28,994			
	Tarrant	\$24,319			
First Parcel Purchased (not early)	Metro	\$12,084	\$23,561 (Harris)	\$695 (Rural)	\$457 (Rural)
	Urban	\$2,258			
	Rural	\$695			
	Dallas	\$6,539			
	Harris	\$23,561			
	Tarrant	\$21,599			
ROW Release Obtained	Metro	\$7,004	\$15,808 (Tarrant)	\$651 (Rural)	\$425 (Rural)
	Urban	\$1,954			
	Rural	\$651			
	Dallas	\$4,127			
	Harris	\$13,711			
	Tarrant	\$15,808			
Schematics Available	Metro	\$4,317	\$7,959 (Harris)	\$535 (Rural)	\$351 (Rural)
	Urban	\$1,588			
	Rural	\$535			
	Dallas	\$2,685			
	Harris	\$7,959			
	Tarrant	\$7,228			

Figure 5.4 shows the input screen for EROW, under the environmental clearance obtained scenario. In Figure 5.4 it can be observed how the maximum cost, minimum cost, and standard deviation from Table 5.2 were used as input for the maximum budget, minimum

budget, and the increment. On the left side of Figure 5.4, under the Project Input section, the maximum cost of the environmental clearance obtained from Table 5.2 was entered as the maximum budget in EROW. In same manner, the minimum budget is the minimum cost calculated for the environmental clearance obtained scenario. Finally the standard deviation of the environmental clearance obtained was entered as the increment value in EROW. On the left side of the EROW input screen, the cost and savings are entered. For the cost section, it can be observed that scenario 1 is “0” for the six projects, which is the act of not buying any parcel. The value for the scenarios 2 are the values for purchasing 1 parcel. The rest of the scenarios followed the same pattern, until reaching scenario 44, since the Urban project has 43 parcels within it. Project 1 represents Metro, Project 2 Urban, and so forth. Since each project has different number of parcels and all the cells need to be filled in, for the projects that have less than 43 parcels, the rest of the cells that do not have a value, are filled in with a “0.”

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 12255

Minimum Budget: 615

Increment: 405

(Enter any integer > 0 and =< 11640)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %

(Minimum Attractive Rate of Return)

STATUS

Data Processed.

RESULTS

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1614	1932	2132	275
Project 2	0	262	346	471	568
Project 3	0	23	53	77	90
Project 4	0	1382	1484	1701	200

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	50381	63607	69433	909
Project 2	0	2790	3678	4874	600
Project 3	0	136	333	338	341
Project 4	0	52619	55826	61546	709

SOLVE

Figure 5.4: EROW Input Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study One.

5.2.2 Results for First Option for Case Study One

Once the input data is ready to start running EROW as shown in Table 5.2, we start by inputting data from the environmental clearance obtained scenario, which are Project 1, 2, 3, 4, 5, and 6. EROW would suggest a suitable project to obtain by early acquisition from this speculation scenario, and the number of cases or parcels that are appropriate to buy as well. Next, we follow the same procedure for the rest of the speculation scenarios. Figure 5.5 shows the EROW output data screen for the first option of case study one under the environmental clearance obtained scenario. On the bottom left part of the output screen the best rate of return, budget required, and the savings obtained are located. To the right of the best rate of return, the maximum savings can be found. The maximum savings data is the maximum savings that can be obtained out of all the cases and their projects, but it is not necessarily the best option. For this

reason, the best rate of return should be used in order to conclude which scenarios and under what projects are the most suitable parcels to buy. In Figure 5.5 the best rate of return is highlighted for better visual purposes. EROW is suggesting that the most suitable option for early acquisition would be Project 5, Scenario 7. Project 5 in this analysis refers to the Harris project, and scenario 7 refers to 6 parcels to be obtained by early acquisition, since the option of doing nothing or 0 parcels is being considered.

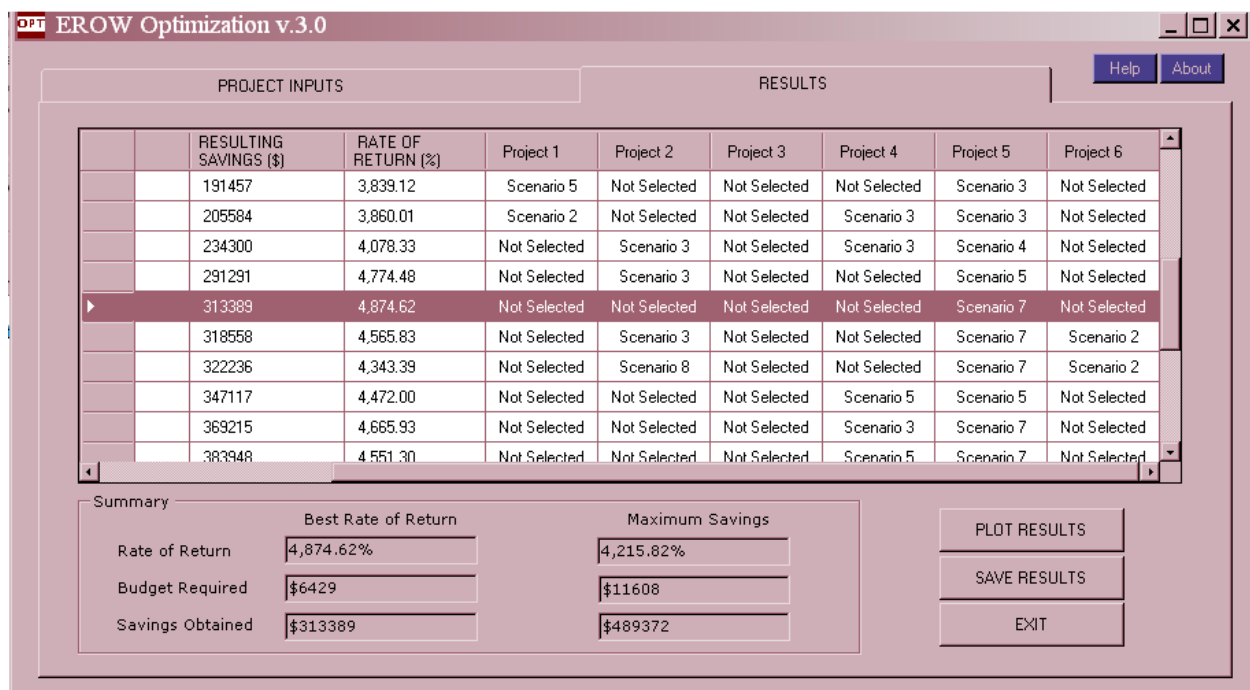


Figure 5.5: EROW Best Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study One.

Once EROW provides with the output data, it also provides with a plot of the results. This icon can be clicked on the output data screen as it can be seen in Figure 5.5. Figure 5.6 is the plot of results for the environmental clearance obtained scenario. The slope of the savings

line is fairly constant in the sense that the more savings the more rate of return (ROR) and the higher the early acquisition budget option. However, the line for the ROR has significant slope changes. The ROR line is constant until almost reaching an early acquisition cost of \$2,000,000 which is where the slope starts changing drastically and the savings, ROR and early acquisition values depend on each other.

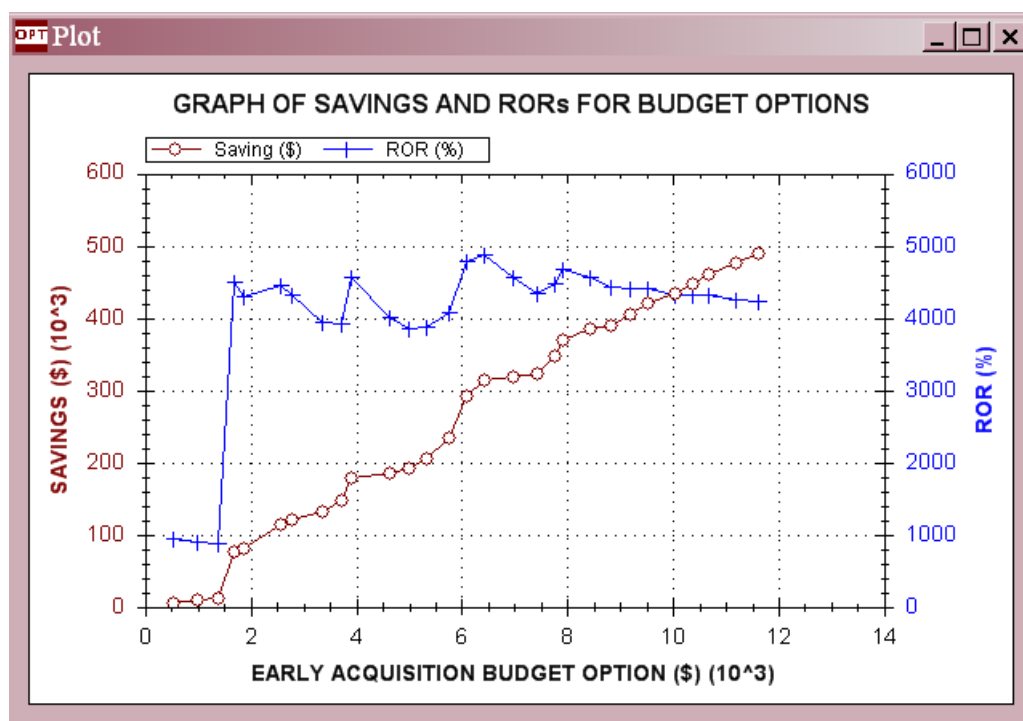


Figure 5.6: Graph of Savings and RORs for Budget Options of the Environmental Clearance Obtained Scenario for the First Option of Case Study One.

Table 5.3 shows the summary of the results suggested by EROW. For the speculation scenario of environmental clearance obtained, EROW recommended as the most suitable option to buy six parcels in the Harris county. These six parcels will require a budget of \$6,690,000. The total expenditure for the six parcels to be obtained by early acquisition in the Harris county

is \$6,429,000. The resulting savings from these six parcels will be \$313,389,000, with a rate of return of 4,874.62%. The worst case scenario in Table 5.3 is not necessary the worst case scenario out of all of the alternatives, but it described by EROW as the lowest rate of return.

Table 5.3: Best and Worst Case Scenario of the Environmental Clearance Obtained for the First Option of Case Study One

Best case Scenario	
County Type and Parcels	Harris (6 parcel)
Budget Option (\$1,000)	6,690
Best Rate of Return (%)	4,874.62
Resulting Expenditure (\$1,000)	6,429
Resulting Savings (\$1,000)	313,389
Worst Case Scenario	
County Types and Parcels	Urban (7 parcels), Rural (15 parcels), and Tarrant (1 parcel)
Budget Option (\$1,000)	1,425
Worst Rate of Return (%)	880.56
Resulting Expenditure (\$1,000)	1,389
Resulting Savings (\$1,000)	12,231

In order to obtain the results from EROW, this same procedure should be done for the rest of the speculation scenarios (first parcel purchased not early, schematics available, first parcel purchased inc. early, and ROW release obtained).

5.2.3 Second Option for Case Study One

On the other hand, data for Project 1 from each of the five speculation scenarios can be entered, and discover which speculations scenario is the most suitable for this project, and how many parcels are suggested to be obtained by early acquisition. In other worlds, this occasion the speculation scenarios can be treated as projects, and there can be one EROW run for each of the

county types. We can follow this same procedure for the six of the county types, and determine which speculation scenario is the more attractive according to the county type. Table 5.4, practically follows the same format as Table 5.2, but this time it is inverted.

Table 5.4: Data for EROW under the Second Option for Case Study One

County Type (1)	Project 1 (Environmental Clearance Obtained) (2)	Project 2 (First Parcel Purchased not early) (3)	Project 3 (Schematics Available) (4)	Project 4 (First Parcel Purchased inc. early) (5)	Project 5 (ROW Release Obtained) (6)
Metro	0-42	0-42	0-42	0-42	0-42
Urban	0-42	0-42	0-42	0-42	0-42
Rural	0-43	0-43	0-43	0-43	0-43
Dallas	0-28	0-28	0-28	0-28	0-28
Harris	0-24	0-24	0-24	0-24	0-24
Tarrant	0-40	0-40	0-40	0-40	0-40

Using the Metro county type as the example, all values of the project costs with early acquisitions and savings from early acquisitions of the metro county from the five speculation scenarios were gathered and entered in EROW as shown in Figure 5.7.

Project	SAVINGS							
1 Environmental Clearance Obtained	0	50381	63607	69433	90985	105424	112022	...
2 First Parcel Purchased (not early)	0	48452	61191	66763	87717	101819	108207	...
3 Schematics Available	0	50708	63994	69849	91594	106152	112782	...
4 First Parcel Purchased (inc. early)	0	48452	60880	66269	86807	100772	106984	...
5 ROW Release Obtained	0	50104	63242	69028	90462	104762	111333	...
	COSTS							
1 Environmental Clearance Obtained	0	1614	1932	2132	2759	3172	3337	...
2 First Parcel Purchased (not early)	0	3543	4348	4802	6027	6776	7152	...
3 Schematics Available	0	1287	1545	1716	2150	2444	2577	...
4 First Parcel Purchased (inc. early)	0	3543	4659	5296	6937	7824	8375	...
5 ROW Release Obtained	0	1891	2296	2536	3282	3833	4026	...

Figure 5.7: Metro County Type Input Data Format for the Second Option of Method One.

The first row of the savings and the first row of the costs corresponds to the values obtained from TAMSIM for the Metro county under the environmental clearance obtained scenario. The second row of the savings and costs corresponds to the values of Metro county under the first parcel purchased (not early). In the same way, the rest of the rows corresponds to the speculation scenarios of schematics available, first parcel purchased (inc. early), and ROW release obtained, respectively. The values from Table 5.5 were calculated following the same technique as the values from Table 5.2. Nevertheless, this occasion the average cost for each of the speculation scenarios were grouped for each of the county types, and the maximum cost, minimum cost, and standard deviation were obtained for each of the county type groups.

Table 5.5: EROW Input Data for the Second Option of Case Study One

Scenario (1)	Project (2)	Total Average Cost (\$1,000) (3)	Maximum Total Cost (\$1,000) (4)	Minimum Total Cost (\$1,000) (5)	Total Standard Deviation (\$1,000) (6)
Metro	Environmental Clearance Obtained	\$5,750	\$14,769 (First Parcel Purchased (inc. early))	\$4,317 (Schematics Available)	\$1,684 (Schematic s Available)
	First Parcel Purchased (not early)	\$12,084			
	Schematics Available	\$4,317			
	First Parcel Purchased (inc. early)	\$14,769			
	ROW Release Obtained	\$7,004			
Urban	Environmental Clearance Obtained	\$1,800	\$2,460 (First Parcel Purchased (inc. early))	\$1,588 (Schematics Available)	\$866 (Schematic s Available)
	First Parcel Purchased (not early)	\$2,258			
	Schematics Available	\$1,588			
	First Parcel Purchased (inc. early)	\$2,460			
	ROW Release Obtained	\$1,954			
Rural	Environmental Clearance Obtained	\$615	\$718 (First Parcel Purchased (inc. early))	\$535 (Schematics Available)	\$351 (Schematic s Available)
	First Parcel Purchased (not early)	\$695			
	Schematics Available	\$535			
	First Parcel Purchased (inc. early)	\$718			
	ROW Release Obtained	\$651			
Dallas	Environmental Clearance Obtained	\$3,441	\$9,470 (First Parcel Purchased (inc. early))	\$2,685 (Schematics Available)	\$974 (Schematic s Available)
	First Parcel Purchased (not early)	\$6,539			
	Schematics Available	\$2,685			
	First Parcel Purchased (inc. early)	\$9,470			
	ROW Release Obtained	\$4,127			
Harris	Environmental Clearance Obtained	\$11,174	\$28,994 (First Parcel Purchased (inc. early))	\$7,959 (Schematics Available)	\$4,684 (Schematic s Available)
	First Parcel Purchased (not early)	\$23,561			
	Schematics Available	\$7,959			
	First Parcel Purchased (inc. early)	\$28,994			
	ROW Release Obtained	\$13,711			
Tarrant	Environmental Clearance Obtained	\$12,255	\$24,319 (First Parcel Purchased (inc. early))	\$7,228 (Schematics Available)	\$5,744 (Schematic s Available)
	First Parcel Purchased (not early)	\$21,599			
	Schematics Available	\$7,228			
	First Parcel Purchased (inc. early)	\$24,319			
	ROW Release Obtained	\$15,808			

From Table 5.5 the maximum budget, the minimum budget, and the increment were obtained from each of the county types to be run in EROW. Figure 5.8 shows the EROW input data screen for the Metro county type, which includes all Metro costs by early acquisition of each of the speculation scenarios. It can be observed that under the early acquisition budget inputs that the values from Table 5.5, calculated for the Metro county were entered. These values are \$14,769,000 for the maximum budget, \$4,317,000 for the minimum budget, and \$1,684,000 for the increment. The left side of the screen includes the costs and savings of each speculation scenario. The values for Project 1 intended for costs and savings corresponds to the Metro cost under the environmental clearance obtained scenario. Project 2 for both, costs and savings corresponds to the Metro costs under first parcel purchased (not early) scenario, and the rest of the projects follow the same pattern.

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 14769

Minimum Budget: 4317

Increment: 1684

(Enter any integer > 0 and =< 10452)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %

(Minimum Attractive Rate of Return)

STATUS

Data Processed.

RESULTS

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1614	1932	2132	275
Project 2	0	3543	4348	4802	602
Project 3	0	1287	1545	1716	215
Project 4	0	3543	4659	5296	693

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	50381	63607	69433	905
Project 2	0	48452	61191	66763	877
Project 3	0	50708	63994	69849	915
Project 4	0	48452	60880	66269	866

SOLVE

Figure 5.8: EROW Input Screen for the Metro County for the Second Option of Case Study One.

5.2.4 Results for the Second Option for Case Study One

The results obtained from EROW are shown in Figure 5.9. By observing the results in Figure 5.9, it can be noticed that EROW is suggesting that the best rate of return out of all the options presented is 3,768.01%, which corresponds to the highlighted row in the results screen. The most suitable speculation scenario for early acquisition is Project 3, which is the schematics available scenario. Furthermore, EROW is suggesting that scenario 13 is the best option, which means that 12 parcels are feasible to be obtained by early acquisition, since the number of scenarios is the number of parcels to be acquired, and the option of zero parcels is taken into consideration as well. Once more, the best rate of return can be found on the lower left side of the EROW screen with the recommended budget required and the savings to be obtained.

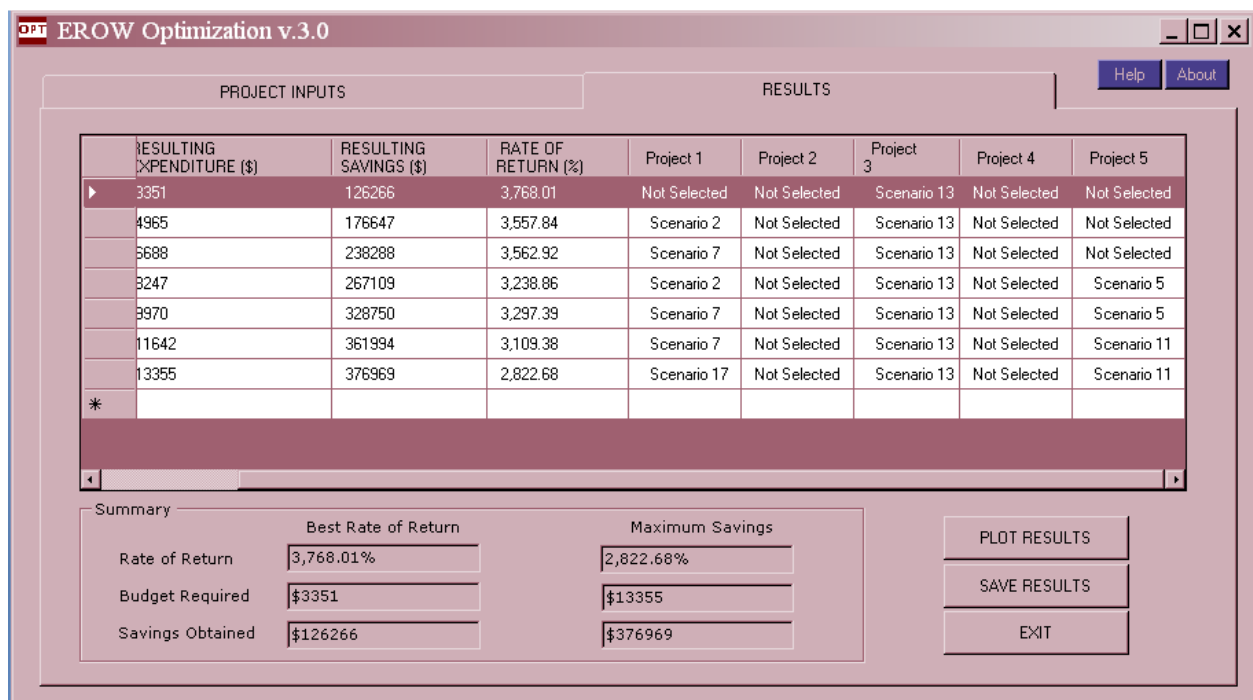


Figure 5.9: EROW Best Case Scenario Output Screen for the Metro County for the Second Option of Case Study One.

The plot for the results from Figure 5.9 can be observed in Figure 5.10. The graph contains savings, early acquisition budget option and ROR. It can be observed by the savings line that there are more savings as the early acquisition budget and ROR increase. Nonetheless, the savings are low when the early acquisition budget option is low as well as the rate of return. On the other hand, by observing the ROR lane, it can be seen that the ROR is higher when there are more savings and less early acquisition budget option. However, the ROR line is indicating that as the early acquisition budget option increases there are fewer savings and less ROR.

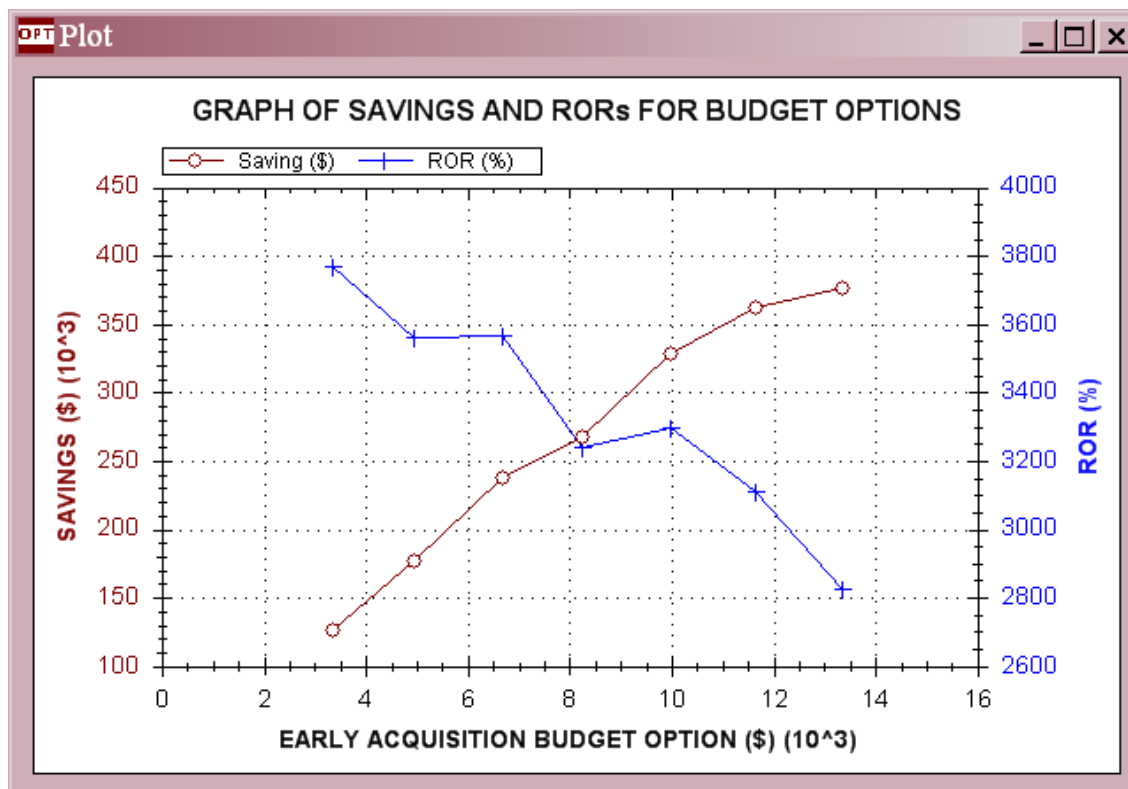


Figure 5.10: Graph of Savings and RORs for Budget Options of the Metro County for the Second Option of Case Study One.

Table 5.6 shows the outputs from EROW for the Metro county of each speculations scenario. As it was observed in Figure 5.8, EROW suggested that there most suitable option was to purchase 12 parcels under the schematics available scenario. The best rate of return for this option is 3,351%, while the expenses are \$3,351,000 and the savings would be \$126,266,000. However, the recommended budget option is \$4,317,000. The rest of the outputs from EROW for case study one are shown in Appendix B.

Table 5.6: Best and Worst Case Scenario of the Metro County for the Second Option of Case Study One

Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (12 parcels)
Budget Option (\$1,000)	4,317
Best Rate of Return (%)	3,768.01
Resulting Expenditure (\$1,000)	3,351
Resulting Savings (\$1,000)	126,266
Worst Case Scenario	
Speculation Scenarios and Parcels	Environmental Clearance Obtained (16 parcels), Schematics Available (12 parcels), and ROW Release (10 parcels)
Budget Option (\$1,000)	14,421
Worst Rate of Return (%)	2,822.68
Resulting Expenditure (\$1,000)	13,355
Resulting Savings (\$1,000)	376,969

5.3 Case Study Two

5.3.1 First Option for Case Study Two

The first option for case study two practically follows the same procedure as the first option for case study one. However, for the first option of case study two the values for

maximum budget, minimum budget and the increment are constant throughout the whole running EROW process for more precise comparison purposes. The county types (Metro, Urban, Rural, Dallas, Harris, and Tarrant) were taken as projects. Each of the parcels within the projects or county types are considered scenarios or cases, as shown in Table 5.1.

In order to estimate the maximum and minimum budget to be used for EROW, the average cost with early acquisition for the total number of parcels of each county under each speculation scenario were estimated from the values obtained from TAMSIM. Table 5.7, shows the averages of each county under each speculation scenario. In addition, the averages of each county under the same speculation scenario were analyzed and the highest average cost with early acquisition was chosen as the maximum cost. Once the maximum costs were obtained for the five speculation scenario, the average of the maximum costs were obtained and chosen as the maximum budget to be used in EROW. On the other hand, the minimum average cost with early acquisition from each of the five speculation scenarios was selected, once the minimum cost for each of the five speculation scenarios were obtained, the average of the five minimum costs was estimated, and assigned as the minimum budget to be used for EROW.

Table 5.7: Total Average Cost Values for the First Option of Case Study Two

Speculation Scenario	Metro (\$1,000)	Urban (\$1,000)	Rural (\$1,000)	Dallas (\$1,000)	Harris (\$1,000)	Tarrant (\$1,000)	Maximum (\$1,000)	Minimum (\$1,000)
Environmental Clearance Obtained	\$5,750	\$1,800	\$615	\$3,441	\$11,174	\$12,255	\$12,255 (Tarrant)	\$615 (Rural)
First Parcel Purchased (not early)	\$12,084	\$2,258	\$695	\$6,539	\$23,561	\$21,599	\$23,561 (Harris)	\$695 (Rural)
Schematics Available (time 0)	\$4,317	\$1,588	\$535	\$2,685	\$79,959	\$7,228	\$79,959 (Harris)	\$535 (Rural)
First Parcel Purchased (inc. early)	\$14,769	\$2,460	\$718	\$9,470	\$28,994	\$24,319	\$28,994 (Harris)	\$718 (Rural)
ROW Release Obtained	\$7,004	\$1,954	\$651	\$4,127	\$13,711	\$15,808	\$15,808 (Tarrant)	\$651 (Rural)
Average							\$32,115	\$643

The applied technique to find the increment that will be used for EROW is significantly similar to the process used to find the maximum and minimum budget. The standard deviation of all of the parcels for each of the county types under each of the five speculation scenarios was estimated. After all of the standard deviations were calculated as shown in Table 5.8, the average of all of the standard deviations was estimated, and used as the increment to be entered in EROW.

Table 5.8: Total Standard Deviation values for the First Option of Case Study Two

Speculation Scenario	Metro (\$1,000)	Urban (\$1,000)	Rural (\$1,000)	Dallas (\$1,000)	Harris (\$1,000)	Tarrant (\$1,000)
Environmental Clearance Obtained	\$2,320	\$992	\$405	\$1,418	\$7,513	\$9,645
First Parcel Purchased (not early)	\$4,799	\$1,229	\$457	\$2,691	\$15,171	\$16,939
Schematics Available (time 0)	\$1,684	\$866	\$351	\$974	\$4,684	\$5,744
First Parcel Purchased (inc. early)	\$6,189	\$1,348	\$473	\$3,855	\$18,456	\$19,355
ROW Release Obtained	\$2,842	\$1,076	\$428	\$1,783	\$9,216	\$12,464
Average	\$5,179					

The speculation scenario of environmental clearance obtained was used as an example for the EROW input data. The savings and costs with early acquisition of all of the parcels of each of the county types were grouped and entered in EROW in the following mode shown in Figure 5.11.

Project	SAVINGS								
1 Metro	0	50381	63607	69433	90985	105424	112022	123742	...
2 Urban	0	2790	3678	4874	6009	7003	7028	7062	...
3 Rural	0	136	333	338	341	346	352	356	...
4 Dallas	0	52619	55826	61546	70559	76553	76716	76858	...
5 Harris	0	75572	114599	178474	291291	313216	313389	315227	...
6 Tarrant	0	5169	35330	41928	47268	65019	71258	71911	...
	COSTS								
1 Metro	0	1614	1932	2132	2759	3172	3337	3738	...
2 Urban	0	262	346	471	568	664	714	788	...
3 Rural	0	23	53	77	90	111	131	151	...
4 Dallas	0	1382	1484	1701	2007	2197	2300	2392	...
5 Harris	0	1337	2228	3915	5755	6352	6429	7328	...
6 Tarrant	0	202	1309	1517	1719	2332	2587	3209	...

Figure 5.11: Environmental Clearance Obtained Scenario Input Data Format for the First Option of Method Two.

Figure 5.12 represents the input data screen for EROW. It can be observed that under the early acquisition budget section, the maximum budget \$32,115,000 and the minimum budget \$643,000 were entered. These values were obtained from Table 5.7. The increment of \$5,179 was entered as well. The increment value was estimated in Table 5.8. On the left side of the screen, the text files from TAMSIM were inserted in the format previously explained.

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179
(Enter any integer > 0 and =< 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

RESULTS

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1614	1932	2132	275
Project 2	0	262	346	471	568
Project 3	0	23	53	77	90
Project 4	0	1382	1484	1701	200

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	50381	63607	69433	905
Project 2	0	2790	3678	4874	600
Project 3	0	136	333	338	341
Project 4	0	52619	55826	61546	705

SOLVE

Figure 5.12: EROW Input Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.

5.3.2 Results for the First Option for Case Study Two

Once EROW was run for the environmental clearance obtained scenario, it is suggested that the best rate of return is 4,558.72%, therefore the row corresponding to this rate of return was highlighted as shown in Figure 5.13. EROW suggested that the most suitable option for

early acquisition was Scenario 4 under Project 5. Project 5, refers to the Harris county as it can be observed in the explanation above on the savings and costs input data section. Scenario 4 refers to 3 parcels, since the option of zero parcels exists and it is taken into consideration on the analysis.

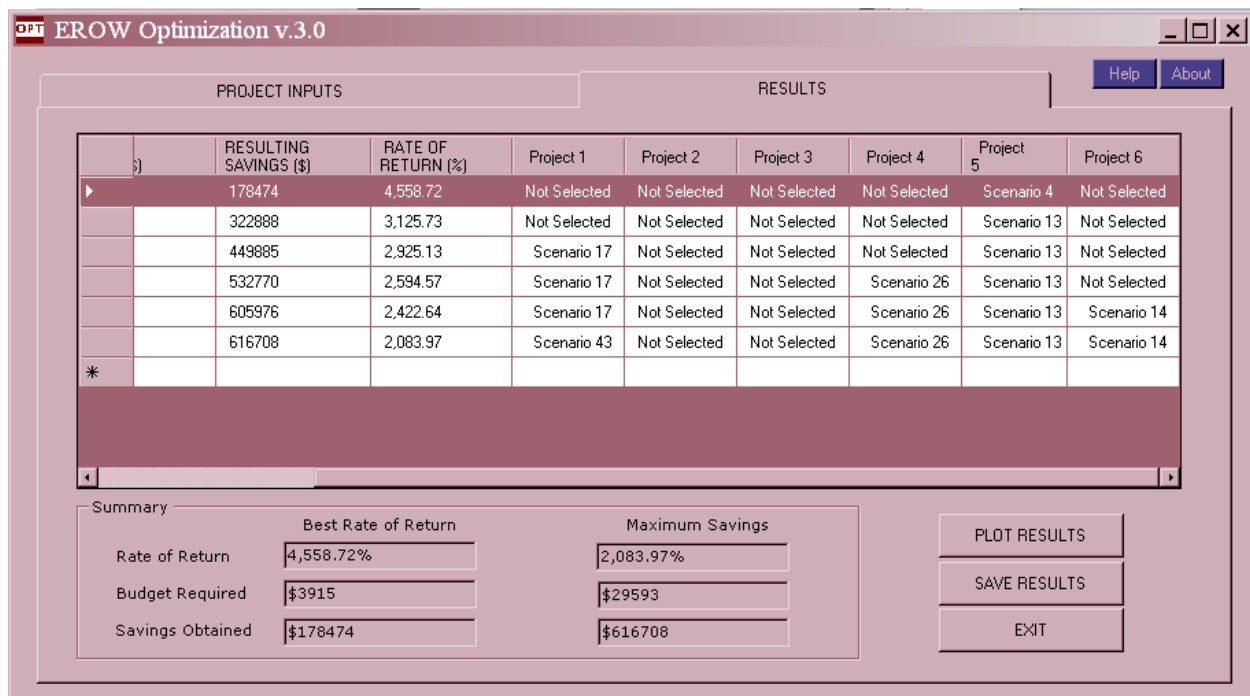


Figure 5.13: EROW Best Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.

The plot of the results for the environmental clearance obtained is shown in Figure 5.14. Figure 5.14, includes the savings, ROR and early acquisition budget option for the environmental clearance obtained analysis. The savings line shows a fairly constant positive slope until almost reaching an early acquisition budget option of \$25,000,000, where it is continuously increasing but at a noticeable slower rate. The ROR line has a steep negative slope before fairly reaching an

early acquisition budget option of \$10,000,000, when the slope increases at a slower rate as well. The ROR lines shows that the higher the value for the ROR the more savings and the less early acquisition budget option. While the saving line demonstrates that the higher the ROR, the more savings and the higher the early acquisition budget option is.

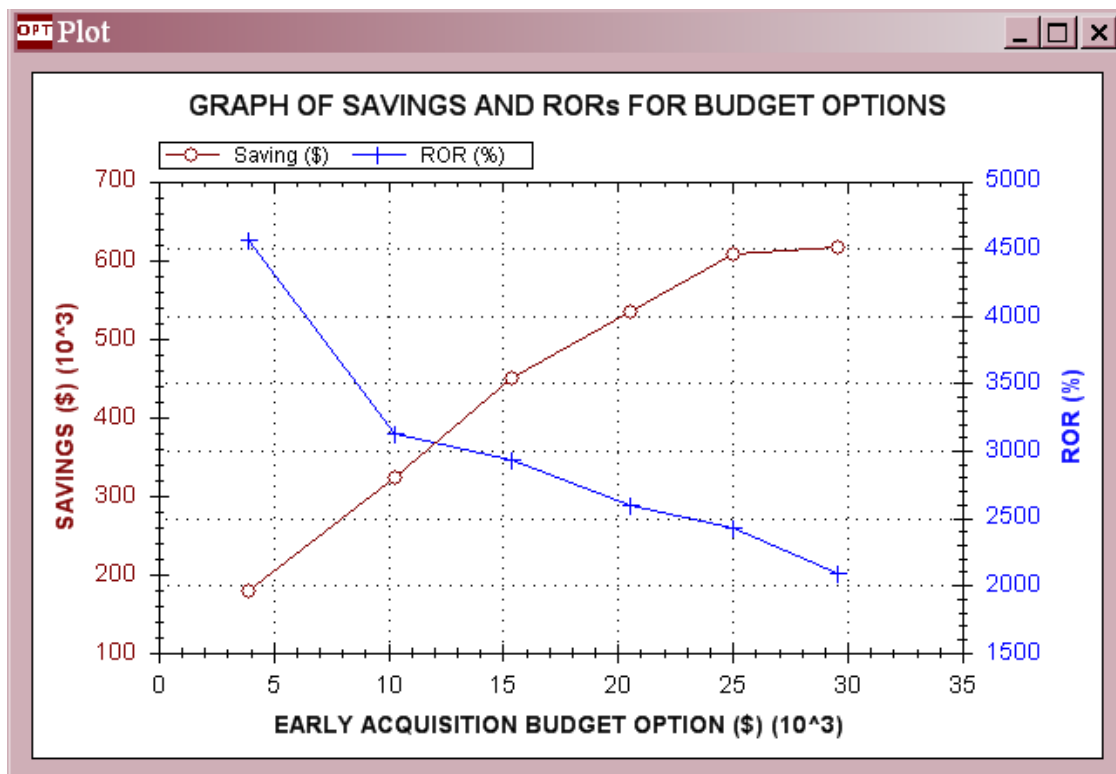


Figure 5.14: Graph of Savings and RORs for Budget Options of the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.

Table 5.9 contains a summary of the most important results provided by EROW, which would be helpful in deciding how many parcels to obtain by early acquisition and where to purchase them. As it can be observed in Figure 5.13, EROW suggested that the most suitable alternative was to obtain 3 parcels by early acquisition in the Harris county. These acquisitions

would require a budget of \$5,822,000, from which is suggested that \$3,915,000 would be actually spent. The savings that would be obtained are \$178,474,000. These acquisitions will provided with a rate of return of 4,558.72%.

Table 5.9: Best and Worst Case Scenario of the Environmental Clearance Obtained Scenario for the First Option of Case Study Two

Best Case Scenario	
County Type and Parcels	Harris (3 parcels)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	4,558.72
Resulting Expenditure (\$1,000)	3,915
Resulting Savings (\$1,000)	178,474
Worst Case Scenario	
County Types and Parcels	Metro (42 parcels), Dallas (25 parcels), Harris (12 parcels), and Tarrant (13 parcels)
Budget Option (\$1,000)	31,717
Best Rate of Return (%)	2,083.97
Resulting Expenditure (\$1,000)	29,593
Resulting Savings (\$1,000)	616,708

The procedure applied previously should be applied for the rest of the speculation scenarios. By following these steps, the optimum county for early acquisition and the number of parcels to be acquired would be provided depending on the speculation scenario.

5.3.3 Second Option for Case Study Two

For the second option of case study two, the same process from the second option of case study one is applied. Nevertheless, the maximum budget, minimum budget, and the increment are fixed for all of the EROW runs. The format to be followed can be observed in Table 5.4, where the speculation scenarios are taken as projects. There would be one EROW run for each of

the county types. For example, each Metro parcel group from each speculation scenarios were grouped to be the input data for EROW, and it would provide with the most suitable speculation scenario for the Metro county. In this way, the rest of the county types were grouped, and there was one EROW run for each county in order to find the most appropriate speculation scenario for each county. The format to input the data obtained from TAMSIM to EROW for this particular example is shown below in Figure 5.15. The following is a fragment of the input data for the Metro county to be entered in EROW.

Project	SAVINGS							
1 Environmental Clearance Obtained	0	50381	63607	69433	90985	105424	112022	...
2 First Parcel Purchased (not early)	0	48452	61191	66763	87717	101819	108207	...
3 Schematics Available	0	50708	63994	69849	91594	106152	112782	...
4 First Parcel Purchased (inc. early)	0	48452	60880	66269	86807	100772	106984	...
5 ROW Release Obtained	0	50104	63242	69028	90462	104762	111333	...
	COSTS							
1 Environmental Clearance Obtained	0	1614	1932	2132	2759	3172	3337	...
2 First Parcel Purchased (not early)	0	3543	4348	4802	6027	6776	7152	...
3 Schematics Available	0	1287	1545	1716	2150	2444	2577	...
4 First Parcel Purchased (inc. early)	0	3543	4659	5296	6937	7824	8375	...
5 ROW Release Obtained	0	1891	2296	2536	3282	3833	4026	...

Figure 5.15: Metro County Input Data Format for the Second Option of Method Two.

Only the numerical component is used as the input data for EROW. However, the speculation scenarios to the left of the values represent the speculation scenarios and the project number that each of them correspond to. The maximum budget, minimum budget and the

increment (standard deviation) are estimated in Tables 5.7 and 5.8 for this method as well. Figure 5.16 shows the EROW input data screen for the second option of case study two. It can be observed that the maximum budget, minimum budget and the increments values are the same values as first option of case study two.

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179

(Enter any integer > 0 and <= 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %

(Minimum Attractive Rate of Return)

STATUS

Data Processed.

RESULTS

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1614	1932	2132	275
Project 2	0	3543	4348	4802	602
Project 3	0	1287	1545	1716	215
Project 4	0	3543	4659	5296	693

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	50381	63607	69433	909
Project 2	0	48452	61191	66763	877
Project 3	0	50708	63994	69849	915
Project 4	0	48452	60880	66269	868

SOLVE

Figure 5.16: EROW Input Screen for the Metro County for the Second Option of Case Study Two.

5.3.4 Results for the Second Option for Case Study Two

The results provided by EROW for the Metro county can be observed in Figure 5.17. EROW is suggesting that out of all of the possible alternatives for the Metro county, the most feasible is Project 3, which is schematics available scenario. In addition, EROW is suggesting

that is recommendable to obtain 27 parcels by early acquisition in the Metro county under the schematics available scenario.

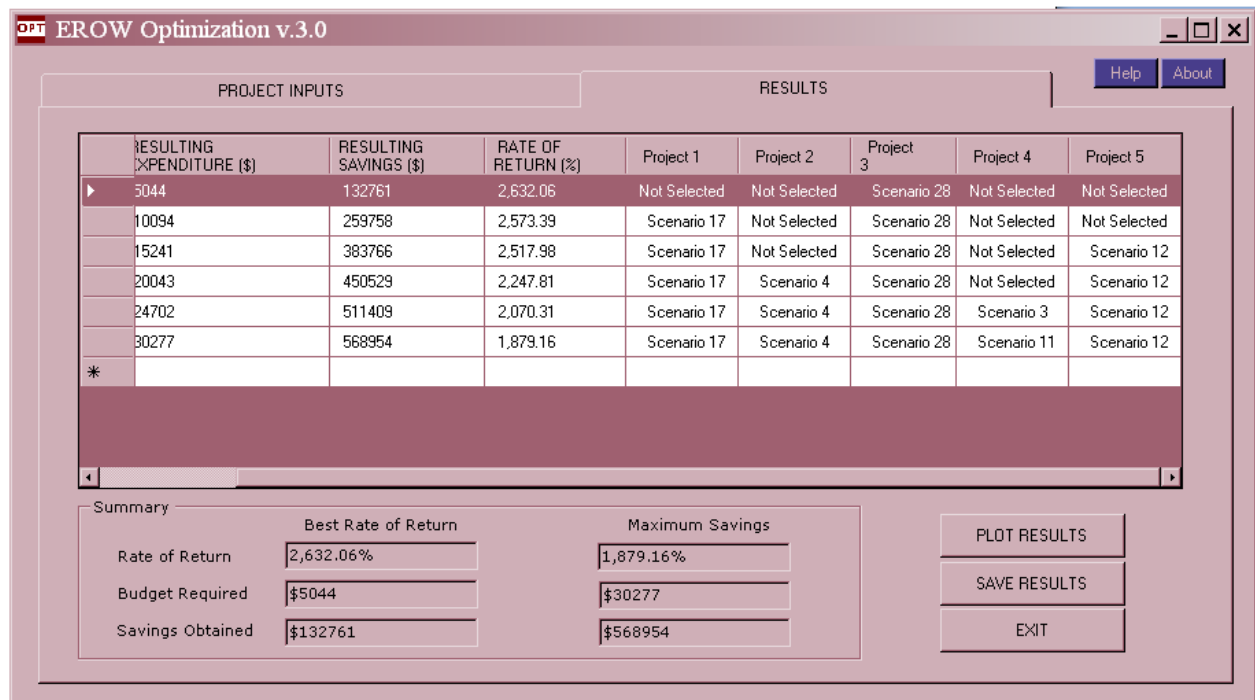


Figure 5.17: EROW Best Case Scenario Output Screen for the Metro County for the Second Option of Case Study Two.

The graph containing the ROR savings and early acquisition budget option for the previous simulation is shown in Figure 5.18. The ROR line is suggesting the lower the ROR, there are less savings and more early acquisition budget option. On the other hand, the savings line is suggesting that the higher the ROR, the more savings and the higher the early acquisition budget. The intersection of both lines is among an early acquisition budget option of \$18,000,000, a savings of \$400,000,000, and a rate of return of 2,400 %.

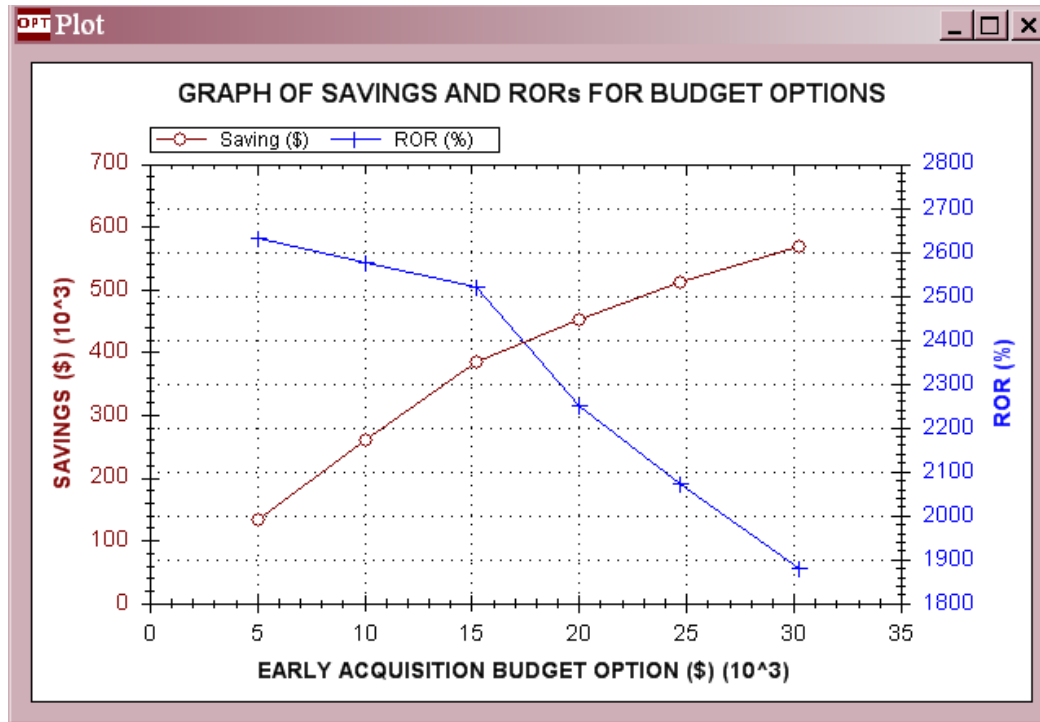


Figure 5.18: Graph of Savings and RORs for Budget Options of the Metro County for the Second Option of Case Study Two.

The results obtained from EROW are summarized in Table 5.10. It can be observed from Table 5.10 that the most suitable option is to buy 27 parcels in a Metro county under the schematics available speculation scenario. The budget option for this acquisition is \$5,822,000, while the savings are \$132,761,000. The rate of return provided by EROW is 2,632.06%, whereas the resulting expenditure is \$5,044,000. The rest of the outputs from EROW for case study two are shown in Appendix C.

Table 5.10: Best and Worst Case Scenario of the Metro County for the Second Option of Case Study Two

Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (27 Parcels)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	2,632.06
Resulting Expenditure (\$1,000)	5,044
Resulting Savings (\$1,000)	132,761
Worst Case Scenario	
Speculation Scenario and Parcels	Environmental Clearance Obtained (16 parcels), First Parcel Purchased (not early) (3 parcels), Schematics Available (27 parcels), First Parcel Purchased (inc. early) (10 parcels), and ROW Release Obtained (11 Parcels)
Budget Option (\$1,000)	31,717
Worst Rate of Return (%)	1,879.16
Resulting Expenditure (\$1,000)	30,277
Resulting Savings (\$1,000)	568,954

5.4 EROW Result Summary

5.4.1 First Option of Case Study One Summary

Table 5.11 includes a recompilation of the EROW runs for each of the speculation scenarios, using the county types as projects. In addition, the input value for minimum budget, maximum budget and increment differed by speculation scenario. For each of the speculation scenarios, the optimum county type to obtain by early acquisition is Harris county. The optimum number of parcels to be acquired early under each county type is as well shown in the table below. The alternative that provides with the higher resulting savings is buying six parcels during the environmental clearance obtained scenario. However, this option provides with the highest budget option. It can be observed that buying three parcels during the schematics available scenario results in significant savings and not as high budget option. In the other hand,

if one parcel is obtained during the ROW release obtained scenario, provides with the fewest budget option and the highest savings, comparing it against the speculation scenarios of first parcel purchased (inc. early) and first parcel purchased (not early). In addition, the speculation scenarios of first parcel purchased (inc. early) and first parcel purchased (not early) have the lowest rate of return.

Table 5.11: EROW Results Recompile for First Option of Case Study One

Speculation Scenario	County Type and Parcels	Budget Option (\$1,000)	Best Rate of Return (%)	Resulting Expenditure (\$1,000)	Resulting Savings (\$1,000)
Environmental Clearance Obtained	Harris (6 Parcels)	\$6,690	4,875	\$6,429	\$313,389
First Parcel Purchased (inc. early)	Harris (1 Parcels)	\$2,844	2,719	\$2,728	\$74,181
First Parcel Purchased (not early)	Harris (1 Parcels)	\$2,980	2,719	\$2,728	\$74,181
ROW Release Obtained	Harris (1 Parcels)	\$1,980	4,698	\$1,603	\$75,306
Schematics Available	Harris (3 Parcels)	\$2,992	6,442	\$2,788	\$179,602

5.4.2 Second Option of Case Study One Summary

The second option of case study one consisted of taking the speculation scenarios as projects. There was one EROW run for every county type. The input values for the budgets and the increment varied according to the county type. Each county type includes all of the speculation scenarios. From Table 5.12 can be observed that the best speculation scenario for the

six county types was the schematics available scenario. The alternative that provides with the highest saving suggests to purchase 4 parcels in the Harris county, with resulting savings of \$292,488,000 and a budget option of \$7,959,000. It can also be observed that the maximum number of parcels that can be obtained is 20 and they are located in the Tarrant county. The lowest rate of return corresponds to the Rural county type.

Table 5.12: EROW Results Recompile for Second Option of Case Study One

County Type	Speculation Scenario and Parcels	Budget Option (\$1,000)	Best Rate of Return (%)	Resulting Expenditure (\$1,000)	Resulting Savings (\$1,000)
Metro	Schematics Available (12 Parcels)	4, 317	3,768	\$3,351	\$126,266
Urban	Schematics Available (10 Parcels)	\$1,588	880	\$821	\$7,224
Rural	Schematics Available (15 Parcels)	\$535	132	\$351	\$462
Dallas	Schematics Available (5 Parcels)	\$2,685	4,087	\$1,881	\$76,869
Harris	Schematics Available (4 Parcels)	\$7,959	6,417	\$4,558	\$292,488
Tarrant	Schematics Available (20 Parcels)	\$7,228	1,708	\$4,732	\$80,822

5.4.3 First Option of Case Study Two Summary

For the first option of case study two, the same result was obtained as for the first option of case study one. However, the maximum budget, minimum budget, and increment value was

fixed for all of the speculation scenarios. The optimum county type for all of the speculations scenarios is Harris county. Table 5.13, shows the results obtained, when EROW was run for all of the speculation scenarios. It can be concluded that the highest savings correspond to the schematics available speculation scenario if six parcels are obtained by early acquisition. In addition, the highest rate of return corresponds to the schematics available scenario as well. The lowest rate of return corresponds to the speculation scenario of first parcel purchased (not early).

Table 5.13: EROW Results Recompilation for First Option of Case Study Two

Speculation Scenario	County Type and Parcels	Budget Option (\$1,000)	Best Rate of Return (%)	Resulting Expenditure (\$1,000)	Resulting Savings (\$1,000)
Environmental Clearance Obtained	Harris (3 Parcels)	\$5,822	4,559	\$3,915	\$178,474
First Parcel Purchased (inc. early)	Harris (1 Parcels)	\$5,822	2,719	\$2,728	\$74,181
First Parcel Purchased (not early)	Harris (2 Parcels)	\$5,822	2,309	\$4,849	\$111,978
ROW Release Obtained	Harris (3 Parcels)	\$5,822	3,721	\$4,773	\$177,616
Schematics Available	Harris (6 Parcels)	\$5,822	6,319	\$4,982	\$314,836

5.4.4 Second Option of Case Study Two Summary

From Table 5.14, it can be observed that the results for the second option of case study two follow the same pattern as the results from the second option of case study one. The

schematics available scenario is the most suitable speculation scenario to obtain the early acquisitions. For case study two the values for the minimum budget, maximum budget and increment remain fixed, this applies to the first and second option. By observing Table 5.14, it can be concluded that the highest rate of return corresponds to the alternative of purchasing 6 parcels in the Harris county under the schematics available speculation scenario. The lowest rate of return corresponds to the Rural county.

Table 5.14: EROW Results Recompilation for Second Option of Case Study Two

County Type	Speculation Scenario and Parcels	Budget Option (\$1,000)	Best Rate of Return (%)	Resulting Expenditure (\$1,000)	Resulting Savings (\$1,000)
Metro	Schematics Available (27 Parcels)	\$5,822	2,632	\$5,044	\$132,761
Urban	Schematics Available (42 Parcels)	\$5,822	293	\$3,026	\$8,851
Rural	Schematics Available (43 Parcels)	\$5,822	76	\$1,157	\$884
Dallas	Schematics Available (28 Parcels)	\$5,822	2,117	\$4,006	\$84,809
Harris	Schematics Available (6 Parcels)	\$5,822	6,319	\$4,982	\$314,836
Tarrant	Schematics Available (20 Parcels)	\$5,822	1,708	\$4,732	\$80,822

Chapter 6: Conclusion

6.1 Summary

The infrastructure of the transportation system is being affected by the amount of people that are now driving vehicles in order to reach their destinations. Therefore, the transportation infrastructure has to be improved by adding more lanes, overpasses, roads, and other components of the infrastructure. to our current transportation system. Most of the times, in order to acquire the optimum transportation system, properties have to be bought to use the land for improvement to our infrastructure. In an effort to support the Texas Department of Transportation (TxDOT) with the right of way (ROW) acquisition process, two simulator components were created.

TAMSIM is a computerized tool that simulates the right of way advanced acquisition process. Once data is entered on how many parcels are planning to be obtained by early acquisition, in addition with the type of county and speculation scenario in which this parcels are to be acquired, TAMSIM will provide with cost and savings results. TAMSIM can provide for the cost without early acquisition, the savings from early acquisition and text files (Save.txt and Cost.txt). These text files contain the value for the savings and cost of each of the parcels simulated in TAMSIM. In addition, the Save.txt and Cost.txt files are used as part of the input data for EROW.

EROW is like TAMSIM a computerized tool. However, EROW is an optimization simulator that would help to provide with the most suitable alternative in the ROW acquisition process. Projects with their respective parcels are entered in EROW, and this will provide with the optimum project and the scenario or number of parcels to be purchased. Additionally, EROW will supply with the best rate of return, which is the value that defines the most suitable project

and scenario. The budget option for the best alternative, resulting expenditure, and resulting savings are provided by EROW as well.

TAMSIM and EROW were run for each of the parcel cases for the county types of Metro, Urban, Rural, Dallas, Harris, and Tarrant, under each of the speculation scenarios; environmental clearance obtained, first parcel purchased (inc. early), first parcel purchased (not early), ROW release obtained, and schematics available.

6.2 EROW and TAMSIM

Once the most suitable county type and speculation scenario are obtained for the first and second options of methods one and two, two tables were created. The first table corresponds to case study one. It includes the results from the first and second option of this method. It is observed that for all of the county types the best speculations scenario is schematics available, while the most suitable county type for all of the speculation scenarios is Harris county. Both of the results intersect in Project 5 (Harris) and the speculation scenario of schematics available. If it is assumed that the optimum and most suitable alternative is where the results intersect. Therefore, the optimum alternative for this analysis will be to obtain early acquisitions in the Harris county under the schematics available scenario. The number of parcels to be obtained under this scenario and in this county, vary due to the different budget and increments input values for each run. Table 6.1 shows the results, intersection, and the optimum alternative for case study one. In addition, the total average project costs with early acquisitions under the schematics available scenario for each of the county types shown in Table 6.3 are the following;

- a. Metro: \$25,355,000
- b. Urban: \$4,440,000
- c. Rural: \$1,435,000

- d. Dallas: \$13,498,000
- e. Harris: \$89,884,000
- f. Tarrant: \$55,774,000

Table 6.5: Case Study One Results ReCompilation

Speculation Scenario	Project 1 (Metro) Case	Project 2 (Urban) Case	Project 3 (Rural) Case	Project 4 (Dallas) Case	Project 5 (Harris) Case	Project 6 (Tarrant) Case
Environmental Clearance Obtained					6	
First Parcel Purchased (Not Early)					1	
Schematics Available (Time 0)	12	10	15	5	4(3)	20
First Parcel Purchased (inc. early)					1	
ROW Release Obtained					1	

A recompilation of the results from case study two can be found in Table 6.2. The results follow the same pattern as the results from case study one, which are shown in Table 6.1. The best speculation scenario for the six counties is schematics available, while the best county for the five speculation scenarios is Harris county. From Table 6.2 it can be observed that where the results are intersecting, they have the same number of parcels. This might be because the values for the budgets and increment were the same throughout all of the simulations. Six parcels in Harris county under the speculation scenario of schematics available is the optimum alternative.

Table 6.6: Case Study Two Results Recompile

Speculation Scenario	Project 1 (Metro) Case	Project 2 (Urban) Case	Project 3 (Rural) Case	Project 4 (Dallas) Case	Project 5 (Harris) Case	Project 6 (Tarrant) Case
Environmental Clearance Obtained					3	
First Parcel Purchased (Not Early)					2	
Schematics Available (Time 0)	27	42	43	28	6 (6)	20
First Parcel Purchased (inc. early)					1	
ROW Release Obtained					3	

6.3 Duration

It can be observed from Table 4.11 that Tarrant county has zero for the value of time reduction factor when one parcel is acquired early. This means that there are no time duration differences when one parcel is obtained by early acquisition in this county type. However, Tarrant also has the highest time duration factor when all of the parcels in this county are obtained by early acquisition in comparison with the rest of the counties. If the time duration without early acquisition is taken into consideration, Metro county has the highest value for duration without early acquisition (102.6 months). Meanwhile, Tarrant county has the lowest time duration without early acquisition value with 60.3 months. From Table 4.11 it was concluded that the time reduction factor increases as the number of parcels obtained by early acquisition increases.

6.4 Conclusion

The following table summarizes the most suitable speculation scenario for advanced right of way acquisitions according to the county type where these acquisitions will take place. Table 6.3 also includes the total project cost without early acquisitions, total project cost with early acquisitions, total expected savings from early acquisitions, and increase cost ratio. In addition, the following table contains the mean time duration without early acquisitions and mean time duration with early acquisition in months. The mean time duration with early acquisitions value assumes that all of the parcels within the county are early acquisitions. By observing the increase cost ratio, it can be concluded that the Metro county under the scenario of schematics available is the most suitable option, when considering cost. However, when time is the key factor in the decision making process, the most suitable alternative is Tarrant county under the schematics available scenario with the highest time reduction factor. It can be concluded that right of way early acquisitions are related to the savings gathered and time reduction. In other words, the more early acquisitions are obtained, the more savings are gathered and there is a larger time reduction.

Table 6.7: Parcel-Speculation Scenario Summary

County Type	Most Suitable Speculation Scenario	Total Average Project Cost without Early Acquisitions (\$1,000)	Total Average Project Cost with Early Acquisitions (\$1,000)	Total Average Expected Savings from Early Acquisitions (\$1,000)	Increase Cost Ratio	Mean Time Duration without Early Acquisition (months)	Mean Time Duration with Early Acquisition (months)	Time Reduction Factor
Metro	Schematics Available (time 0)	\$147,320	\$25,355	\$121,965	5.81	102.6	36.1	1.842
Urban	Schematics Available (time 0)	\$11,817	\$4,440	\$7,377	2.66	76.8	22.8	2.368
Rural	Schematics Available (time 0)	\$1,967	\$1,435	\$532	1.37	65.1	17.4	2.741
Dallas	Schematics Available (time 0)	\$88,764	\$13,498	\$75,266	6.58	83.1	26.1	2.184
Harris	Schematics Available (time 0)	\$381,424	\$89,884	\$291,540	4.24	78.5	23.5	2.340
Tarrant	Schematics Available (time 0)	\$138,718	\$55,774	\$82,944	2.49	60.3	14.5	3.159

There are simulation and optimization methods used as decision-support tools for advanced right of way acquisitions financial planning. TAMSIM and EROW are interacting tools that estimate the right of way acquisition costs and savings. In addition, they suggest a number of parcels to be acquired early and the location along with the speculation scenario where these acquisitions could take place.

There are current limitations that do not allow full potential of the advanced right of way acquisition implementation. TAMSIM and EROW are useful decision support tools to evaluate the advanced right of way acquisition. This research study has provided enough evidence that advanced right of way acquisition is an option to consider since it can result in significant savings in time and money. Information provided by these decision tools will also be helpful in supporting legislative changes to overcome current right of way acquisition limitations.

References

- AASHTO. 21st Century Asset Management. American Association of State Highway and Transportation Officials, Washington, D.C., 1997.
- AASHTO. Transportation Asset Management Guide. American Association of State Highway and Transportation Officials, Washington, D.C., 2002.
- AbouRizk, S., and J. Shi. "Automated Construction-Simulation Optimization." *Journal of Construction Engineering and Management*, Vol. 120, No. 2, 1994, pp. 374-385.
- Amekudzi, A. *Uncertainty Analysis of National Highway Performance Measures in the Context of Evolving Analysis Models and Data*. Doctoral Dissertation, Carnegie Mellon University, Pittsburgh, PA, 1999.
- Amekudzi, A., and S. McNeil. "Capturing Data and Model Uncertainties in Highway Performance Estimation." *Journal of Transportation Engineering*, Vol. 126, No. 6, 2000, pp. 455-463.
- Antoniou, C. *Demand Simulation for Dynamic Traffic Assignment*. Master's thesis, Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, MA, 1997.
- C. Chang-Albitres, D. Kang, I. Hicks, K. Pickett, P. Krugler, R. Feldman, R. Smith, S. Butenko, and S. Guikema. "Asset Management Literature Review and Potential Applications of Simulation, Optimization and Decision Analysis Techniques for Right-of-Way and Transportation Planning and Programming." Report 0-5534-1. College Station, TX, 2007.
- C. Chang-Albitres, D. Kang, P. Krugler, R. Seyedshohadaie, R. Feldman, and S. Butenko. "Development of Decision-Making Support Tools for Early Right of Way Acquisitions." Report 0-5534-2. College Station, TX, 2009.
- Consiglio, A., and S. A. Zenios. "Designing Portfolios of Financial Products via Integrated Simulation and Optimization Models." *Operations Research*, Vol. 47, No. 2, 1999, pp. 195-208.
- Gibson, G.E, J. O'Connor, R. Chang, S. Hedemann, and W. Chong. "Durations for Acquiring Roadway Right of Way and Assorted Expediting Strategies." Technical Report 0-4617-1, The University of Texas at Austin. 2005.
- Hegazy, T., and Kassab. "Resource Optimization Using Combined Simulation and Genetic Algorithms." *Journal of Construction Engineering and Management*, Vol. 129, No. 6, 2003, pp. 698-705.
- Hudson, S. W., R. F. Carmichael, L. O. Moser, W. R. Hudson, and W. J. Wilkes. "Bridge Management Systems." NCHRP Report 300, Project 12-28(2), Transportation Research Board, National Research Council, Washington, D.C., December 1987.
- Nemmers, C. "Transportation Asset Management." Public Roads Magazine. Data accessed at www.tfhr.gov/pubrds/july97/tam.htm.
- OECD. Asset Management for the Road Sector. Organization for Economic Co-Operation and Development, Paris, 2001.
- OFHEO, 2008. "Latest House Price Index." URL: <http://www.ofheo.gov/hpi.aspx> (Accessed on May 27, 2008).
- Seshadri, S., A. Khanna, F. Harche, and R. Wyle. "A Method for Strategic Asset-Liability Management with an Application to the Federal Home Loan Bank of New York." *Operations Research*, Vol. 47, No. 3, 1999, pp. 345-360.

- Turkiyyah, G. M., J. P. Mahoney, and D. Batchelor. *Virtual Training Tools for Transportation Infrastructure Construction*. Technical Report, University of Washington, Seattle, WA, 2005.
- TxDOT. "Right of Way Manual, Volume 2: Right of Way Acquisition." Texas Department of Transportation, Austin, Texas, 2006.
- TxDOT. *Right of Way Manual, Volume 2: Right of Way Acquisition*. Texas Department of Transportation, Austin, Texas, 2006c.
- Worzel, K. J., C. Vassiadou-Seniou, and S. A. Zenois. "Integrated Simulation Models for Tracking of Fixed-Income Securities." *Operations Research*, Vol. 42, No. 2, 1994, pp. 223-233.

Appendix A: TAMSIM Outputs

Environmental Clearance Obtained Scenario:

Table A.1: Metro County under Environmental Clearance Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
MetroROW01	0	\$147,320	\$147,320	\$0	\$0	\$0
	1	\$147,320	\$96,939	\$50,381	\$1,614	\$1,614
	2	\$147,320	\$83,713	\$63,607	\$318	\$1,932
	3	\$147,320	\$77,887	\$69,433	\$200	\$2,132
	4	\$147,320	\$56,335	\$90,985	\$627	\$2,759
	5	\$147,320	\$41,896	\$105,424	\$413	\$3,172
	6	\$147,320	\$35,298	\$112,022	\$165	\$3,337
	7	\$147,320	\$23,578	\$123,742	\$401	\$3,738
	8	\$147,320	\$23,263	\$124,057	\$120	\$3,858
	9	\$147,320	\$22,972	\$124,348	\$107	\$3,965
	10	\$147,320	\$22,733	\$124,587	\$106	\$4,071
	11	\$147,320	\$22,393	\$124,927	\$156	\$4,227
	12	\$147,320	\$22,104	\$125,216	\$173	\$4,400
	13	\$147,320	\$21,591	\$125,729	\$83	\$4,483
	14	\$147,320	\$21,385	\$125,935	\$76	\$4,559
	15	\$147,320	\$20,602	\$126,718	\$371	\$4,930
	16	\$147,320	\$20,323	\$126,997	\$118	\$5,048
	17	\$147,320	\$19,970	\$127,350	\$229	\$5,277
	18	\$147,320	\$19,792	\$127,528	\$60	\$5,337
	19	\$147,320	\$19,479	\$127,841	\$101	\$5,438
	20	\$147,320	\$19,256	\$128,064	\$71	\$5,509
	21	\$147,320	\$18,776	\$128,544	\$168	\$5,677
	22	\$147,320	\$18,018	\$129,302	\$267	\$5,944
	23	\$147,320	\$17,601	\$129,719	\$137	\$6,081
	24	\$147,320	\$17,020	\$130,300	\$184	\$6,265
	25	\$147,320	\$16,732	\$130,588	\$247	\$6,512
	26	\$147,320	\$16,567	\$130,753	\$106	\$6,618
	27	\$147,320	\$16,239	\$131,081	\$105	\$6,723
	28	\$147,320	\$15,574	\$131,746	\$477	\$7,200
	29	\$147,320	\$15,385	\$131,935	\$82	\$7,282
	30	\$147,320	\$15,071	\$132,249	\$83	\$7,365
	31	\$147,320	\$14,823	\$132,497	\$116	\$7,481
	32	\$147,320	\$14,351	\$132,969	\$225	\$7,706
	33	\$147,320	\$13,735	\$133,585	\$166	\$7,872
	34	\$147,320	\$13,506	\$133,814	\$84	\$7,956
	35	\$147,320	\$12,626	\$134,694	\$378	\$8,334
	36	\$147,320	\$12,477	\$134,843	\$48	\$8,382
	37	\$147,320	\$12,205	\$135,115	\$124	\$8,506
	38	\$147,320	\$11,753	\$135,567	\$134	\$8,640
	39	\$147,320	\$11,142	\$136,178	\$167	\$8,807
	40	\$147,320	\$10,912	\$136,408	\$129	\$8,936
	41	\$147,320	\$9,963	\$137,357	\$578	\$9,514
	42	\$147,320	\$9,591	\$137,729	\$115	\$9,629

Table A.2: Urban County under Environmental Clearance Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
UrbanROW01	0	\$11,817	\$11,817	\$0	\$0	\$0
	1	\$11,817	\$9,027	\$2,790	\$262	\$262
	2	\$11,817	\$8,139	\$3,678	\$85	\$347
	3	\$11,817	\$6,943	\$4,874	\$125	\$472
	4	\$11,817	\$5,808	\$6,009	\$97	\$569
	5	\$11,817	\$4,814	\$7,003	\$96	\$665
	6	\$11,817	\$4,789	\$7,028	\$51	\$716
	7	\$11,817	\$4,755	\$7,062	\$74	\$790
	8	\$11,817	\$4,739	\$7,078	\$42	\$832
	9	\$11,817	\$4,720	\$7,097	\$38	\$870
	10	\$11,817	\$4,694	\$7,123	\$54	\$924
	11	\$11,817	\$4,671	\$7,146	\$56	\$980
	12	\$11,817	\$4,640	\$7,177	\$57	\$1,037
	13	\$11,817	\$4,605	\$7,212	\$73	\$1,110
	14	\$11,817	\$4,579	\$7,238	\$57	\$1,167
	15	\$11,817	\$4,542	\$7,275	\$75	\$1,242
	16	\$11,817	\$4,523	\$7,294	\$57	\$1,299
	17	\$11,817	\$4,450	\$7,367	\$135	\$1,434
	18	\$11,817	\$4,425	\$7,392	\$58	\$1,492
	19	\$11,817	\$4,397	\$7,420	\$64	\$1,556
	20	\$11,817	\$4,348	\$7,469	\$92	\$1,648
	21	\$11,817	\$4,332	\$7,485	\$39	\$1,687
	22	\$11,817	\$4,299	\$7,518	\$50	\$1,737
	23	\$11,817	\$4,285	\$7,532	\$27	\$1,764
	24	\$11,817	\$4,139	\$7,678	\$263	\$2,027
	25	\$11,817	\$4,062	\$7,755	\$184	\$2,211
	26	\$11,817	\$3,990	\$7,827	\$97	\$2,308
	27	\$11,817	\$3,949	\$7,868	\$74	\$2,382
	28	\$11,817	\$3,919	\$7,898	\$81	\$2,463
	29	\$11,817	\$3,888	\$7,929	\$64	\$2,527
	30	\$11,817	\$3,861	\$7,956	\$86	\$2,613
	31	\$11,817	\$3,819	\$7,998	\$90	\$2,703
	32	\$11,817	\$3,792	\$8,025	\$55	\$2,758
	33	\$11,817	\$3,755	\$8,062	\$57	\$2,815
	34	\$11,817	\$3,739	\$8,078	\$44	\$2,859
	35	\$11,817	\$3,707	\$8,110	\$60	\$2,919
	36	\$11,817	\$3,684	\$8,133	\$50	\$2,969
	37	\$11,817	\$3,661	\$8,156	\$48	\$3,017
	38	\$11,817	\$3,634	\$8,183	\$54	\$3,071
	39	\$11,817	\$3,608	\$8,209	\$62	\$3,133
	40	\$11,817	\$3,553	\$8,264	\$172	\$3,305
	41	\$11,817	\$3,522	\$8,295	\$40	\$3,345
	42	\$11,817	\$3,414	\$8,403	\$130	\$3,475

Table A.3: Rural County under Environmental Clearance Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
RuralROW01	0	\$1,967	\$1,967	\$0	\$0	\$0
	1	\$1,967	\$1,831	\$136	\$23	\$23
	2	\$1,967	\$1,634	\$333	\$30	\$53
	3	\$1,967	\$1,629	\$338	\$24	\$77
	4	\$1,967	\$1,626	\$341	\$14	\$91
	5	\$1,967	\$1,621	\$346	\$21	\$112
	6	\$1,967	\$1,615	\$352	\$20	\$132
	7	\$1,967	\$1,611	\$356	\$21	\$153
	8	\$1,967	\$1,605	\$362	\$26	\$179
	9	\$1,967	\$1,597	\$370	\$33	\$212
	10	\$1,967	\$1,590	\$377	\$33	\$245
	11	\$1,967	\$1,584	\$383	\$31	\$276
	12	\$1,967	\$1,576	\$391	\$28	\$304
	13	\$1,967	\$1,567	\$400	\$40	\$344
	14	\$1,967	\$1,559	\$408	\$35	\$379
	15	\$1,967	\$1,553	\$414	\$22	\$401
	16	\$1,967	\$1,549	\$418	\$17	\$418
	17	\$1,967	\$1,544	\$423	\$19	\$437
	18	\$1,967	\$1,539	\$428	\$20	\$457
	19	\$1,967	\$1,534	\$433	\$22	\$479
	20	\$1,967	\$1,525	\$442	\$51	\$530
	21	\$1,967	\$1,519	\$448	\$32	\$562
	22	\$1,967	\$1,505	\$462	\$68	\$630
	23	\$1,967	\$1,501	\$466	\$12	\$642
	24	\$1,967	\$1,489	\$478	\$53	\$695
	25	\$1,967	\$1,482	\$485	\$27	\$722
	26	\$1,967	\$1,471	\$496	\$38	\$760
	27	\$1,967	\$1,466	\$501	\$22	\$782
	28	\$1,967	\$1,459	\$508	\$28	\$810
	29	\$1,967	\$1,454	\$513	\$26	\$836
	30	\$1,967	\$1,449	\$518	\$22	\$858
	31	\$1,967	\$1,444	\$523	\$23	\$881
	32	\$1,967	\$1,418	\$549	\$58	\$939
	33	\$1,967	\$1,426	\$541	\$19	\$958
	34	\$1,967	\$1,418	\$549	\$34	\$992
	35	\$1,967	\$1,409	\$558	\$49	\$1,041
	36	\$1,967	\$1,398	\$569	\$37	\$1,078
	37	\$1,967	\$1,392	\$575	\$28	\$1,106
	38	\$1,967	\$1,386	\$581	\$19	\$1,125
	39	\$1,967	\$1,361	\$606	\$97	\$1,222
	40	\$1,967	\$1,352	\$615	\$22	\$1,244
	41	\$1,967	\$1,341	\$626	\$34	\$1,278
	42	\$1,967	\$1,332	\$635	\$18	\$1,296
	43	\$1,967	\$1,255	\$712	\$35	\$1,331

Table A.4: Dallas County under Environmental Clearance Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
DallasROW01	0	\$88,764	\$88,764	\$0	\$0	\$0
	1	\$88,764	\$36,145	\$52,619	\$1,382	\$1,382
	2	\$88,764	\$32,938	\$55,826	\$102	\$1,484
	3	\$88,764	\$27,218	\$61,546	\$216	\$1,700
	4	\$88,764	\$18,205	\$70,559	\$306	\$2,006
	5	\$88,764	\$12,211	\$76,553	\$191	\$2,197
	6	\$88,764	\$12,048	\$76,716	\$103	\$2,300
	7	\$88,764	\$11,906	\$76,858	\$92	\$2,392
	8	\$88,764	\$11,383	\$77,381	\$260	\$2,652
	9	\$88,764	\$11,224	\$77,540	\$104	\$2,756
	10	\$88,764	\$10,765	\$77,999	\$158	\$2,914
	11	\$88,764	\$10,513	\$78,251	\$87	\$3,001
	12	\$88,764	\$10,359	\$78,405	\$81	\$3,082
	13	\$88,764	\$10,223	\$78,541	\$69	\$3,151
	14	\$88,764	\$9,848	\$78,916	\$214	\$3,365
	15	\$88,764	\$9,559	\$79,205	\$224	\$3,589
	16	\$88,764	\$9,407	\$79,357	\$101	\$3,690
	17	\$88,764	\$8,676	\$80,088	\$362	\$4,052
	18	\$88,764	\$7,781	\$80,983	\$371	\$4,423
	19	\$88,764	\$7,640	\$81,124	\$76	\$4,499
	20	\$88,764	\$7,359	\$81,405	\$114	\$4,613
	21	\$88,764	\$7,117	\$81,647	\$81	\$4,694
	22	\$88,764	\$6,913	\$81,851	\$74	\$4,768
	23	\$88,764	\$6,556	\$82,208	\$135	\$4,903
	24	\$88,764	\$6,121	\$82,643	\$129	\$5,032
	25	\$88,764	\$5,879	\$82,885	\$124	\$5,156
	26	\$88,764	\$5,689	\$83,075	\$112	\$5,268
	27	\$88,764	\$5,564	\$83,200	\$65	\$5,333
	28	\$88,764	\$5,358	\$83,406	\$77	\$5,410

Table A.5: Harris County under Environmental Clearance Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
HarrisROW01	0	\$381,424	\$381,424	\$0	\$0	\$0
	1	\$381,424	\$305,852	\$75,572	\$1,337	\$1,337
	2	\$381,424	\$266,825	\$114,599	\$891	\$2,228
	3	\$381,424	\$202,950	\$178,474	\$1,688	\$3,916
	4	\$381,424	\$90,133	\$291,291	\$1,840	\$5,756
	5	\$381,424	\$68,208	\$313,216	\$597	\$6,353
	6	\$381,424	\$68,035	\$313,389	\$77	\$6,430
	7	\$381,424	\$66,197	\$315,227	\$899	\$7,329
	8	\$381,424	\$64,050	\$317,374	\$791	\$8,120
	9	\$381,424	\$63,449	\$317,975	\$269	\$8,389
	10	\$381,424	\$59,803	\$321,621	\$1,409	\$9,798
	11	\$381,424	\$59,324	\$322,100	\$258	\$10,056
	12	\$381,424	\$58,536	\$322,888	\$275	\$10,331
	13	\$381,424	\$58,017	\$323,407	\$155	\$10,486
	14	\$381,424	\$56,307	\$325,117	\$1,191	\$11,677
	15	\$381,424	\$55,191	\$326,233	\$516	\$12,193
	16	\$381,424	\$53,987	\$327,437	\$486	\$12,679
	17	\$381,424	\$52,802	\$328,622	\$441	\$13,120
	18	\$381,424	\$51,706	\$329,718	\$458	\$13,578
	19	\$381,424	\$51,461	\$329,963	\$129	\$13,707
	20	\$381,424	\$51,261	\$330,163	\$89	\$13,796
	21	\$381,424	\$50,854	\$330,570	\$229	\$14,025
	22	\$381,424	\$33,194	\$348,230	\$12,737	\$26,762
	23	\$381,424	\$29,193	\$352,231	\$1,791	\$28,553
	24	\$381,424	\$28,714	\$352,710	\$218	\$28,771

Table A.6: Tarrant County under Environmental Clearance Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
TarrantROW01	0	\$138,718	\$138,718	\$0	\$0	\$0
	1	\$138,718	\$133,549	\$5,169	\$202	\$202
	2	\$138,718	\$103,388	\$35,330	\$1,107	\$1,309
	3	\$138,718	\$96,790	\$41,928	\$209	\$1,518
	4	\$138,718	\$91,450	\$47,268	\$202	\$1,720
	5	\$138,718	\$73,699	\$65,019	\$612	\$2,332
	6	\$138,718	\$67,460	\$71,258	\$255	\$2,587
	7	\$138,718	\$66,807	\$71,911	\$622	\$3,209
	8	\$138,718	\$66,523	\$72,195	\$247	\$3,456
	9	\$138,718	\$66,437	\$72,281	\$100	\$3,556
	10	\$138,718	\$66,199	\$72,519	\$279	\$3,835
	11	\$138,718	\$66,007	\$72,711	\$176	\$4,011
	12	\$138,718	\$65,767	\$72,951	\$160	\$4,171
	13	\$138,718	\$65,512	\$73,206	\$308	\$4,479
	14	\$138,718	\$63,921	\$74,797	\$1,566	\$6,045
	15	\$138,718	\$63,631	\$75,087	\$232	\$6,277
	16	\$138,718	\$62,620	\$76,098	\$940	\$7,217
	17	\$138,718	\$62,175	\$76,543	\$247	\$7,464
	18	\$138,718	\$61,825	\$76,893	\$358	\$7,822
	19	\$138,718	\$61,633	\$77,085	\$168	\$7,990
	20	\$138,718	\$61,391	\$77,327	\$237	\$8,227
	21	\$138,718	\$55,617	\$83,101	\$3,842	\$12,069
	22	\$138,718	\$55,116	\$83,602	\$353	\$12,422
	23	\$138,718	\$54,812	\$83,906	\$202	\$12,624
	24	\$138,718	\$52,487	\$86,231	\$1,696	\$14,320
	25	\$138,718	\$48,693	\$90,025	\$2,986	\$17,306
	26	\$138,718	\$48,121	\$90,597	\$272	\$17,578
	27	\$138,718	\$47,902	\$90,816	\$230	\$17,808
	28	\$138,718	\$47,558	\$91,160	\$318	\$18,126
	29	\$138,718	\$47,412	\$91,306	\$116	\$18,242
	30	\$138,718	\$46,521	\$92,197	\$805	\$19,047
	31	\$138,718	\$45,919	\$92,799	\$588	\$19,635
	32	\$138,718	\$44,891	\$93,827	\$724	\$20,359
	33	\$138,718	\$44,541	\$94,177	\$226	\$20,585
	34	\$138,718	\$43,775	\$94,943	\$784	\$21,369
	35	\$138,718	\$43,152	\$95,566	\$463	\$21,832
	36	\$138,718	\$34,240	\$104,478	\$6,765	\$28,597
	37	\$138,718	\$32,517	\$106,201	\$1,336	\$29,933
	38	\$138,718	\$31,618	\$107,100	\$943	\$30,876
	39	\$138,718	\$31,330	\$107,388	\$252	\$31,128
	40	\$138,718	\$31,135	\$107,583	\$90	\$31,218

Environmental Clearance Obtained Scenario Savings from the Text File:

	Metro		Urban		Rural		Dallas		Harris		Tarrant
0	0	0	0	0	0	0	0	0	0	0	0
1	50381	1	2790	1	136	1	52619	1	75572	1	5169
2	63607	2	3678	2	333	2	55826	2	114599	2	35330
3	69433	3	4874	3	338	3	61546	3	178474	3	41928
4	90985	4	6009	4	341	4	70559	4	291291	4	47268
5	105424	5	7003	5	346	5	76553	5	313216	5	65019
6	112022	6	7028	6	352	6	76716	6	313389	6	71258
7	123742	7	7062	7	356	7	76858	7	315227	7	71911
8	124057	8	7078	8	362	8	77381	8	317374	8	72195
9	124348	9	7097	9	370	9	77540	9	317975	9	72281
10	124587	10	7123	10	377	10	77999	10	321621	10	72519
11	124927	11	7146	11	383	11	78251	11	322100	11	72711
12	125216	12	7177	12	391	12	78405	12	322888	12	72951
13	125729	13	7212	13	400	13	78541	13	323407	13	73206
14	125935	14	7238	14	408	14	78916	14	325117	14	74797
15	126718	15	7275	15	414	15	79205	15	326233	15	75087
16	126997	16	7294	16	418	16	79357	16	327437	16	76098
17	127350	17	7367	17	423	17	80088	17	328622	17	76543
18	127528	18	7392	18	428	18	80983	18	329718	18	76893
19	127841	19	7420	19	433	19	81124	19	329963	19	77085
20	128064	20	7469	20	442	20	81405	20	330163	20	77327
21	128544	21	7485	21	448	21	81647	21	330570	21	83101
22	129302	22	7518	22	462	22	81851	22	348230	22	83602
23	129719	23	7532	23	466	23	82208	23	352231	23	83906
24	130300	24	7678	24	478	24	82643	24	352710	24	86231
25	130588	25	7755	25	485	25	82885			25	90025
26	130753	26	7827	26	496	26	83075			26	90597
27	131081	27	7868	27	501	27	83200			27	90816
28	131746	28	7898	28	508	28	83406			28	91160
29	131935	29	7929	29	513					29	91306
30	132249	30	7956	30	518					30	92197
31	132497	31	7998	31	523					31	92799
32	132969	32	8025	32	549					32	93827
33	133585	33	8062	33	541					33	94177
34	133814	34	8078	34	549					34	94943
35	134694	35	8110	35	558					35	95566
36	134843	36	8133	36	569					36	104478
37	135115	37	8156	37	575					37	106201
38	135567	38	8183	38	581					38	107100
39	136178	39	8209	39	606					39	107388
40	136408	40	8264	40	615					40	107583
41	137357	41	8295	41	626						
42	137729	42	8403	42	635						
				43	712						

Environmental Clearance Obtained Scenario Costs from the Text File:

	Metro		Urban		Rural		Dallas		Harris		Tarrant
0	0	0	0	0	0	0	0	0	0	0	0
1	1614	1	262	1	23	1	1382	1	1337	1	202
2	1932	2	346	2	53	2	1484	2	2228	2	1309
3	2132	3	471	3	77	3	1701	3	3915	3	1517
4	2759	4	568	4	90	4	2007	4	5755	4	1719
5	3172	5	664	5	111	5	2197	5	6352	5	2332
6	3337	6	714	6	131	6	2300	6	6429	6	2587
7	3738	7	788	7	151	7	2392	7	7328	7	3209
8	3859	8	830	8	177	8	2652	8	8119	8	3456
9	3966	9	867	9	210	9	2755	9	8388	9	3556
10	4072	10	921	10	243	10	2913	10	9797	10	3835
11	4228	11	977	11	274	11	3000	11	10055	11	4011
12	4401	12	1034	12	302	12	3082	12	10330	12	4171
13	4484	13	1107	13	342	13	3151	13	10485	13	4479
14	4561	14	1164	14	377	14	3364	14	11676	14	6045
15	4932	15	1239	15	399	15	3588	15	12192	15	6277
16	5050	16	1295	16	416	16	3689	16	12677	16	7217
17	5279	17	1431	17	436	17	4051	17	13118	17	7464
18	5339	18	1489	18	455	18	4422	18	13577	18	7822
19	5440	19	1553	19	478	19	4498	19	13705	19	7989
20	5511	20	1645	20	528	20	4611	20	13794	20	8226
21	5679	21	1684	21	560	21	4692	21	14023	21	12068
22	5945	22	1734	22	628	22	4766	22	26760	22	12422
23	6082	23	1761	23	640	23	4901	23	28551	23	12623
24	6266	24	2025	24	693	24	5030	24	28769	24	14319
25	6513	25	2209	25	719	25	5154			25	17305
26	6619	26	2306	26	758	26	5267			26	17577
27	6724	27	2380	27	780	27	5331			27	17807
28	7201	28	2461	28	808	28	5409			28	18124
29	7282	29	2525	29	833					29	18241
30	7366	30	2611	30	855					30	19046
31	7481	31	2701	31	879					31	19634
32	7707	32	2756	32	989					32	20357
33	7873	33	2813	33	955					33	20583
34	7957	34	2857	34	989					34	21367
35	8335	35	2917	35	1038					35	21830
36	8383	36	2967	36	1075					36	28595
37	8507	37	3015	37	1103					37	29931
38	8640	38	3070	38	1122					38	30875
39	8807	39	3131	39	1219					39	31126
40	8936	40	3303	40	1241					40	31216
41	9515	41	3343	41	1275						
42	9630	42	3473	42	1293						
				43	1329						

First Parcel Purchased (inc. early) Scenario:

Table A.7: Metro County under First Parcel Purchased (inc. early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
MetroROW01	0	\$147,320	\$147,320	\$0	\$0	\$0
	1	\$147,320	\$98,868	\$48,452	\$4,339	\$4,339
	2	\$147,320	\$86,440	\$60,880	\$1,057	\$5,396
	3	\$147,320	\$81,051	\$66,269	\$609	\$6,005
	4	\$147,320	\$60,513	\$86,807	\$1,616	\$7,621
	5	\$147,320	\$46,548	\$100,772	\$848	\$8,469
	6	\$147,320	\$40,336	\$106,984	\$566	\$9,035
	7	\$147,320	\$29,144	\$118,176	\$954	\$9,989
	8	\$147,320	\$29,069	\$118,251	\$330	\$10,319
	9	\$147,320	\$28,970	\$118,350	\$305	\$10,624
	10	\$147,320	\$28,895	\$118,425	\$263	\$10,887
	11	\$147,320	\$28,755	\$118,565	\$367	\$11,254
	12	\$147,320	\$28,660	\$118,660	\$379	\$11,633
	13	\$147,320	\$28,361	\$118,959	\$294	\$11,927
	14	\$147,320	\$28,297	\$119,023	\$197	\$12,124
	15	\$147,320	\$28,198	\$119,122	\$977	\$13,101
	16	\$147,320	\$28,103	\$119,217	\$304	\$13,405
	17	\$147,320	\$27,993	\$119,327	\$484	\$13,889
	18	\$147,320	\$27,935	\$119,385	\$148	\$14,037
	19	\$147,320	\$27,861	\$119,459	\$311	\$14,348
	20	\$147,320	\$27,762	\$119,558	\$198	\$14,546
	21	\$147,320	\$27,594	\$119,726	\$488	\$15,034
	22	\$147,320	\$27,405	\$119,915	\$739	\$15,773
	23	\$147,320	\$27,264	\$120,056	\$413	\$16,186
	24	\$147,320	\$27,022	\$120,298	\$525	\$16,711
	25	\$147,320	\$26,970	\$120,350	\$460	\$17,171
	26	\$147,320	\$27,135	\$120,185	\$237	\$17,408
	27	\$147,320	\$27,016	\$120,304	\$309	\$17,717
	28	\$147,320	\$26,921	\$120,399	\$890	\$18,607
	29	\$147,320	\$26,854	\$120,466	\$205	\$18,812
	30	\$147,320	\$26,694	\$120,626	\$237	\$19,049
	31	\$147,320	\$26,623	\$120,697	\$295	\$19,344
	32	\$147,320	\$26,478	\$120,842	\$542	\$19,886
	33	\$147,320	\$26,359	\$120,961	\$663	\$20,549
	34	\$147,320	\$26,269	\$121,051	\$223	\$20,772
	35	\$147,320	\$26,120	\$121,200	\$1,113	\$21,885
	36	\$147,320	\$26,054	\$121,266	\$130	\$22,015
	37	\$147,320	\$25,957	\$121,363	\$300	\$22,315
	38	\$147,320	\$25,807	\$121,513	\$436	\$22,751
	39	\$147,320	\$25,507	\$121,813	\$482	\$23,233
	40	\$147,320	\$25,434	\$121,886	\$290	\$23,523
	41	\$147,320	\$25,161	\$122,159	\$1,229	\$24,752
	42	\$147,320	\$24,977	\$122,343	\$264	\$25,016

Table A.8: Urban County under First Parcel Purchased (inc. early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
UrbanROW01	0	\$11,817	\$11,817	\$0	\$0	\$0
	1	\$11,817	\$9,098	\$2,719	\$380	\$380
	2	\$11,817	\$8,258	\$3,559	\$115	\$495
	3	\$11,817	\$7,113	\$4,704	\$180	\$675
	4	\$11,817	\$6,026	\$5,791	\$136	\$811
	5	\$11,817	\$5,077	\$6,740	\$135	\$946
	6	\$11,817	\$5,070	\$6,747	\$68	\$1,014
	7	\$11,817	\$5,061	\$6,756	\$100	\$1,114
	8	\$11,817	\$5,057	\$6,760	\$54	\$1,168
	9	\$11,817	\$5,053	\$6,764	\$52	\$1,220
	10	\$11,817	\$5,045	\$6,772	\$73	\$1,293
	11	\$11,817	\$5,041	\$6,776	\$74	\$1,367
	12	\$11,817	\$5,031	\$6,786	\$77	\$1,444
	13	\$11,817	\$5,022	\$6,795	\$100	\$1,544
	14	\$11,817	\$5,016	\$6,801	\$77	\$1,621
	15	\$11,817	\$5,007	\$6,810	\$101	\$1,722
	16	\$11,817	\$5,004	\$6,813	\$71	\$1,793
	17	\$11,817	\$4,980	\$6,837	\$186	\$1,979
	18	\$11,817	\$4,974	\$6,843	\$77	\$2,056
	19	\$11,817	\$4,965	\$6,852	\$83	\$2,139
	20	\$11,817	\$4,951	\$6,866	\$127	\$2,266
	21	\$11,817	\$4,947	\$6,870	\$50	\$2,316
	22	\$11,817	\$4,940	\$6,877	\$73	\$2,389
	23	\$11,817	\$4,937	\$6,880	\$37	\$2,426
	24	\$11,817	\$4,890	\$6,927	\$362	\$2,788
	25	\$11,817	\$4,873	\$6,944	\$243	\$3,031
	26	\$11,817	\$4,840	\$6,977	\$134	\$3,165
	27	\$11,817	\$4,827	\$6,990	\$102	\$3,267
	28	\$11,817	\$4,820	\$6,997	\$104	\$3,371
	29	\$11,817	\$4,812	\$7,005	\$85	\$3,456
	30	\$11,817	\$4,809	\$7,008	\$109	\$3,565
	31	\$11,817	\$4,798	\$7,019	\$122	\$3,687
	32	\$11,817	\$4,792	\$7,025	\$75	\$3,762
	33	\$11,817	\$4,779	\$7,038	\$80	\$3,842
	34	\$11,817	\$4,775	\$7,042	\$56	\$3,898
	35	\$11,817	\$4,767	\$7,050	\$84	\$3,982
	36	\$11,817	\$4,761	\$7,056	\$67	\$4,049
	37	\$11,817	\$4,757	\$7,060	\$64	\$4,113
	38	\$11,817	\$4,751	\$7,066	\$74	\$4,187
	39	\$11,817	\$4,745	\$7,072	\$80	\$4,267
	40	\$11,817	\$4,735	\$7,082	\$217	\$4,484
	41	\$11,817	\$4,719	\$7,098	\$56	\$4,540
	42	\$11,817	\$4,652	\$7,165	\$169	\$4,709

Table A.9: Rural County under First Parcel Purchased (inc. early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
RuralROW01	0	\$1,967	\$1,967	\$0	\$0	\$0
	1	\$1,967	\$1,834	\$133	\$28	\$28
	2	\$1,967	\$1,642	\$325	\$34	\$62
	3	\$1,967	\$1,641	\$326	\$28	\$90
	4	\$1,967	\$1,640	\$327	\$16	\$106
	5	\$1,967	\$1,639	\$328	\$25	\$131
	6	\$1,967	\$1,637	\$330	\$23	\$154
	7	\$1,967	\$1,636	\$331	\$24	\$178
	8	\$1,967	\$1,635	\$332	\$31	\$209
	9	\$1,967	\$1,632	\$335	\$39	\$248
	10	\$1,967	\$1,630	\$337	\$38	\$286
	11	\$1,967	\$1,630	\$337	\$36	\$322
	12	\$1,967	\$1,627	\$340	\$33	\$355
	13	\$1,967	\$1,625	\$342	\$47	\$402
	14	\$1,967	\$1,624	\$343	\$42	\$444
	15	\$1,967	\$1,622	\$345	\$27	\$471
	16	\$1,967	\$1,621	\$346	\$20	\$491
	17	\$1,967	\$1,620	\$347	\$23	\$514
	18	\$1,967	\$1,618	\$349	\$23	\$537
	19	\$1,967	\$1,616	\$351	\$26	\$563
	20	\$1,967	\$1,615	\$352	\$58	\$621
	21	\$1,967	\$1,614	\$353	\$37	\$658
	22	\$1,967	\$1,611	\$356	\$78	\$736
	23	\$1,967	\$1,609	\$358	\$15	\$751
	24	\$1,967	\$1,605	\$362	\$62	\$813
	25	\$1,967	\$1,604	\$363	\$32	\$845
	26	\$1,967	\$1,600	\$367	\$45	\$890
	27	\$1,967	\$1,599	\$368	\$26	\$916
	28	\$1,967	\$1,597	\$370	\$33	\$949
	29	\$1,967	\$1,596	\$371	\$30	\$979
	30	\$1,967	\$1,594	\$373	\$26	\$1,005
	31	\$1,967	\$1,593	\$374	\$27	\$1,032
	32	\$1,967	\$1,590	\$377	\$67	\$1,099
	33	\$1,967	\$1,588	\$379	\$22	\$1,121
	34	\$1,967	\$1,586	\$381	\$39	\$1,160
	35	\$1,967	\$1,585	\$382	\$57	\$1,217
	36	\$1,967	\$1,581	\$386	\$44	\$1,261
	37	\$1,967	\$1,580	\$387	\$33	\$1,294
	38	\$1,967	\$1,577	\$390	\$22	\$1,316
	39	\$1,967	\$1,572	\$395	\$116	\$1,432
	40	\$1,967	\$1,567	\$400	\$26	\$1,458
	41	\$1,967	\$1,562	\$405	\$40	\$1,498
	42	\$1,967	\$1,556	\$411	\$22	\$1,520
	43	\$1,967	\$1,487	\$480	\$42	\$1,562

Table A.10: Dallas County under First Parcel Purchased (inc. early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
DallasROW01	0	\$88,764	\$88,764	\$0	\$0	\$0
	1	\$88,764	\$37,422	\$51,342	\$5,046	\$5,046
	2	\$88,764	\$35,587	\$53,177	\$233	\$5,279
	3	\$88,764	\$30,467	\$58,297	\$440	\$5,719
	4	\$88,764	\$21,823	\$66,941	\$779	\$6,498
	5	\$88,764	\$16,132	\$72,632	\$474	\$6,972
	6	\$88,764	\$16,107	\$72,657	\$222	\$7,194
	7	\$88,764	\$16,067	\$72,697	\$197	\$7,391
	8	\$88,764	\$15,879	\$72,885	\$610	\$8,001
	9	\$88,764	\$16,541	\$72,223	\$220	\$8,221
	10	\$88,764	\$16,331	\$72,433	\$424	\$8,645
	11	\$88,764	\$16,203	\$72,561	\$216	\$8,861
	12	\$88,764	\$16,180	\$72,584	\$182	\$9,043
	13	\$88,764	\$16,145	\$72,619	\$154	\$9,197
	14	\$88,764	\$16,089	\$72,675	\$518	\$9,715
	15	\$88,764	\$16,028	\$72,736	\$454	\$10,169
	16	\$88,764	\$15,987	\$72,777	\$214	\$10,383
	17	\$88,764	\$15,732	\$73,032	\$847	\$11,230
	18	\$88,764	\$15,431	\$73,333	\$944	\$12,174
	19	\$88,764	\$15,381	\$73,383	\$164	\$12,338
	20	\$88,764	\$15,272	\$73,492	\$288	\$12,626
	21	\$88,764	\$15,182	\$73,582	\$230	\$12,856
	22	\$88,764	\$15,110	\$73,654	\$201	\$13,057
	23	\$88,764	\$14,964	\$73,800	\$347	\$13,404
	24	\$88,764	\$14,769	\$73,995	\$365	\$13,769
	25	\$88,764	\$14,721	\$74,043	\$292	\$14,061
	26	\$88,764	\$14,667	\$74,097	\$249	\$14,310
	27	\$88,764	\$14,677	\$74,087	\$139	\$14,449
	28	\$88,764	\$14,563	\$74,201	\$168	\$14,617

Table A.11: Harris County under First Parcel Purchased (inc. early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
HarrisROW01	0	\$381,424	\$381,424	\$0	\$0	\$0
	1	\$381,424	\$307,243	\$74,181	\$3,973	\$3,973
	2	\$381,424	\$270,236	\$111,188	\$2,613	\$6,586
	3	\$381,424	\$208,166	\$173,258	\$3,601	\$10,187
	4	\$381,424	\$99,627	\$281,797	\$6,250	\$16,437
	5	\$381,424	\$78,523	\$302,901	\$1,450	\$17,887
	6	\$381,424	\$78,489	\$302,935	\$209	\$18,096
	7	\$381,424	\$77,927	\$303,497	\$2,230	\$20,326
	8	\$381,424	\$77,202	\$304,222	\$2,329	\$22,655
	9	\$381,424	\$77,033	\$304,391	\$725	\$23,380
	10	\$381,424	\$76,099	\$305,325	\$3,975	\$27,355
	11	\$381,424	\$76,015	\$305,409	\$630	\$27,985
	12	\$381,424	\$75,726	\$305,698	\$785	\$28,770
	13	\$381,424	\$75,511	\$305,913	\$459	\$29,229
	14	\$381,424	\$76,235	\$305,189	\$2,659	\$31,888
	15	\$381,424	\$75,866	\$305,558	\$1,289	\$33,177
	16	\$381,424	\$75,579	\$305,845	\$1,349	\$34,526
	17	\$381,424	\$75,164	\$306,260	\$1,212	\$35,738
	18	\$381,424	\$74,877	\$306,547	\$1,272	\$37,010
	19	\$381,424	\$74,531	\$306,893	\$311	\$37,321
	20	\$381,424	\$74,778	\$306,646	\$232	\$37,553
	21	\$381,424	\$74,828	\$306,596	\$565	\$38,118
	22	\$381,424	\$71,290	\$310,134	\$26,828	\$64,946
	23	\$381,424	\$70,218	\$311,206	\$4,632	\$69,578
	24	\$381,424	\$70,070	\$311,354	\$548	\$70,126

Table A.12: Tarrant County under First Parcel Purchased (inc. early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
TarrantROW01	0	\$138,718	\$138,718	\$0	\$0	\$0
	1	\$138,718	\$133,693	\$5,025	\$393	\$393
	2	\$138,718	\$104,340	\$34,378	\$2,094	\$2,487
	3	\$138,718	\$97,982	\$40,736	\$439	\$2,926
	4	\$138,718	\$92,856	\$45,862	\$412	\$3,338
	5	\$138,718	\$75,977	\$62,741	\$1,541	\$4,879
	6	\$138,718	\$69,950	\$68,768	\$478	\$5,357
	7	\$138,718	\$69,825	\$68,893	\$1,165	\$6,522
	8	\$138,718	\$69,829	\$68,889	\$471	\$6,993
	9	\$138,718	\$69,813	\$68,905	\$170	\$7,163
	10	\$138,718	\$69,864	\$68,854	\$495	\$7,658
	11	\$138,718	\$69,832	\$68,886	\$333	\$7,991
	12	\$138,718	\$69,805	\$68,913	\$375	\$8,366
	13	\$138,718	\$69,817	\$68,901	\$536	\$8,902
	14	\$138,718	\$69,575	\$69,143	\$2,907	\$11,809
	15	\$138,718	\$69,497	\$69,221	\$452	\$12,261
	16	\$138,718	\$69,324	\$69,394	\$1,781	\$14,042
	17	\$138,718	\$69,198	\$69,520	\$570	\$14,612
	18	\$138,718	\$69,132	\$69,586	\$643	\$15,255
	19	\$138,718	\$69,106	\$69,612	\$321	\$15,576
	20	\$138,718	\$69,055	\$69,663	\$434	\$16,010
	21	\$138,718	\$67,402	\$71,316	\$7,966	\$23,976
	22	\$138,718	\$67,270	\$71,448	\$723	\$24,699
	23	\$138,718	\$67,182	\$71,536	\$419	\$25,118
	24	\$138,718	\$66,691	\$72,027	\$3,537	\$28,655
	25	\$138,718	\$65,780	\$72,938	\$5,892	\$34,547
	26	\$138,718	\$65,611	\$73,107	\$681	\$35,228
	27	\$138,718	\$65,669	\$73,049	\$422	\$35,650
	28	\$138,718	\$65,621	\$73,097	\$600	\$36,250
	29	\$138,718	\$65,591	\$73,127	\$232	\$36,482
	30	\$138,718	\$65,420	\$73,298	\$1,522	\$38,004
	31	\$138,718	\$65,368	\$73,350	\$1,133	\$39,137
	32	\$138,718	\$65,346	\$73,372	\$1,690	\$40,827
	33	\$138,718	\$65,250	\$73,468	\$479	\$41,306
	34	\$138,718	\$65,092	\$73,626	\$1,389	\$42,695
	35	\$138,718	\$64,955	\$73,763	\$944	\$43,639
	36	\$138,718	\$62,794	\$75,924	\$13,516	\$57,155
	37	\$138,718	\$62,419	\$76,299	\$2,683	\$59,838
	38	\$138,718	\$62,353	\$76,365	\$1,776	\$61,614
	39	\$138,718	\$62,277	\$76,441	\$463	\$62,077
	40	\$138,718	\$62,172	\$76,546	\$180	\$62,257

First Parcel Purchased (inc. early) Scenario Savings from the Text File:

	Metro		Urban		Rural		Dallas		Harris		Tarrant
0	0	0	0	0	0	0	0	0	0	0	0
1	48452	1	2719	1	133	1	51342	1	74181	1	5025
2	60880	2	3559	2	325	2	53177	2	111188	2	34378
3	66269	3	4704	3	326	3	58297	3	173258	3	40736
4	86807	4	5791	4	327	4	66941	4	281797	4	45862
5	100772	5	6740	5	328	5	72632	5	302901	5	62741
6	106984	6	6747	6	330	6	72657	6	302935	6	68768
7	118176	7	6756	7	331	7	72697	7	303497	7	68893
8	118251	8	6760	8	332	8	72885	8	304222	8	68889
9	118350	9	6764	9	335	9	72223	9	304391	9	68905
10	118425	10	6772	10	337	10	72433	10	305325	10	68854
11	118565	11	6776	11	337	11	72561	11	305409	11	68886
12	118660	12	6786	12	340	12	72584	12	305698	12	68913
13	118959	13	6795	13	342	13	72619	13	305913	13	68901
14	119023	14	6801	14	343	14	72675	14	305189	14	69143
15	119122	15	6810	15	345	15	72736	15	305558	15	69221
16	119217	16	6813	16	346	16	72777	16	305845	16	69394
17	119327	17	6837	17	347	17	73032	17	306260	17	69520
18	119385	18	6843	18	349	18	73333	18	306547	18	69586
19	119459	19	6852	19	351	19	73383	19	306593	19	69612
20	119558	20	6866	20	352	20	73492	20	306646	20	69663
21	119726	21	6870	21	353	21	73582	21	306596	21	71316
22	119915	22	6877	22	356	22	73654	22	310134	22	71448
23	120056	23	6880	23	358	23	73800	23	311206	23	71536
24	120298	24	6927	24	362	24	73995	24	311354	24	72027
25	120350	25	6944	25	363	25	74043			25	72938
26	120185	26	6977	26	367	26	74097			26	73107
27	120304	27	6990	27	368	27	74087			27	73049
28	120399	28	6997	28	370	28	74201			28	73097
29	120466	29	7005	29	371					29	73127
30	120626	30	7008	30	373					30	73298
31	120697	31	7019	31	374					31	73350
32	120842	32	7025	32	377					32	73372
33	120961	33	7038	33	379					33	73468
34	121051	34	7042	34	381					34	73626
35	121200	35	7050	35	382					35	73763
36	121266	36	7056	36	386					36	75924
37	121363	37	7060	37	387					37	76299
38	121513	38	7066	38	390					38	76365
39	121813	39	7072	39	395					39	76441
40	121886	40	7082	40	400					40	76546
41	122159	41	7098	41	405						
42	122342.5	42	7165	42	411						
				43	480						

First Parcel Purchased (inc. early) Scenario Costs from the Text File:

	Metro		Urban		Rural		Dallas		Harris		Tarrant
0	0	0	0	0	0	0	0	0	0	0	0
1	3543	1	333	1	26	1	2659	1	2728	1	346
2	4659	2	466	2	60	2	4133	2	5639	2	2260
3	5296	3	641	3	88	3	4949	3	9132	3	2708
4	6937	4	786	4	104	4	5625	4	15249	4	3126
5	7824	5	927	5	129	5	6118	5	16667	5	4610
6	8375	6	996	6	152	6	6359	6	16883	6	5077
7	9303	7	1094	7	176	7	6553	7	19058	7	6226
8	9665	8	1148	8	207	8	7147	8	21271	8	6762
9	9964	9	1200	9	246	9	8073	9	21973	9	6931
10	10234	10	1272	10	284	10	8479	10	26093	10	7499
11	10590	11	1348	11	320	11	8691	11	26745	11	7836
12	10957	12	1425	12	353	12	8903	12	27519	12	8209
13	11254	13	1524	13	400	13	9073	13	27979	13	8785
14	11473	14	1601	14	442	14	9606	14	31603	14	11700
15	12527	15	1703	15	468	15	10058	15	32867	15	12143
16	12830	16	1776	16	488	16	10269	16	34269	16	13921
17	13303	17	1961	17	511	17	11107	17	35480	17	14487
18	13482	18	2037	18	534	18	12072	18	36747	18	15129
19	13823	19	2120	19	560	19	12239	19	37075	19	15462
20	14018	20	2248	20	618	20	12525	20	37311	20	15890
21	14497	21	2298	21	655	21	12757	21	37998	21	23854
22	15332	22	2375	22	733	22	12963	22	64855	22	24575
23	15744	23	2414	23	748	23	13309	23	69577	23	24993
24	16269	24	2776	24	809	24	13678	24	70125	24	28523
25	16750	25	3020	25	841	25	13997			25	34392
26	17187	26	3156	26	886	26	14245			26	35067
27	17501	27	3257	27	913	27	14444			27	35574
28	18547	28	3362	28	945	28	14614			28	36188
29	18752	29	3449	29	975					29	36420
30	18989	30	3559	30	1001					30	37945
31	19282	31	3681	31	1028					31	39082
32	19834	32	3757	32	1095					32	40813
33	20497	33	3837	33	1118					33	41292
34	20720	34	3893	34	1157					34	42684
35	21829	35	3976	35	1214					35	43633
36	21960	36	4044	36	1258					36	57150
37	22259	37	4111	37	1292					37	59833
38	22695	38	4187	38	1313					38	61609
39	23172	39	4268	39	1429					39	62073
40	23458	40	4485	40	1456					40	62254
41	24713	41	4541	41	1496						
42	25016	42	4712	42	1518						
				43	1560						

First Parcel Purchased (not early) Scenario:

Table A.13: Metro County under First Parcel Purchased (not early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
MetroROW01	0	\$147,320	\$147,320	\$0	\$0	\$0
	1	\$147,320	\$98,868	\$48,452	\$3,543	\$3,543
	2	\$147,320	\$86,129	\$61,191	\$805	\$4,348
	3	\$147,320	\$80,557	\$66,763	\$454	\$4,802
	4	\$147,320	\$59,603	\$87,717	\$1,225	\$6,027
	5	\$147,320	\$45,501	\$101,819	\$749	\$6,776
	6	\$147,320	\$39,113	\$108,207	\$376	\$7,152
	7	\$147,320	\$27,723	\$119,597	\$731	\$7,883
	8	\$147,320	\$27,553	\$119,767	\$267	\$8,150
	9	\$147,320	\$27,400	\$119,920	\$244	\$8,394
	10	\$147,320	\$27,262	\$120,058	\$208	\$8,602
	11	\$147,320	\$27,073	\$120,247	\$307	\$8,909
	12	\$147,320	\$26,935	\$120,385	\$324	\$9,233
	13	\$147,320	\$26,551	\$120,769	\$212	\$9,445
	14	\$147,320	\$26,416	\$120,904	\$147	\$9,592
	15	\$147,320	\$26,102	\$121,218	\$840	\$10,432
	16	\$147,320	\$25,945	\$121,375	\$241	\$10,673
	17	\$147,320	\$25,770	\$121,550	\$407	\$11,080
	18	\$147,320	\$25,647	\$121,673	\$115	\$11,195
	19	\$147,320	\$25,472	\$121,848	\$239	\$11,434
	20	\$147,320	\$25,320	\$122,000	\$143	\$11,577
	21	\$147,320	\$25,055	\$122,265	\$382	\$11,959
	22	\$147,320	\$24,589	\$122,731	\$558	\$12,517
	23	\$147,320	\$24,353	\$122,967	\$318	\$12,835
	24	\$147,320	\$24,002	\$123,318	\$414	\$13,249
	25	\$147,320	\$23,873	\$123,447	\$405	\$13,654
	26	\$147,320	\$23,813	\$123,507	\$212	\$13,866
	27	\$147,320	\$23,615	\$123,705	\$234	\$14,100
	28	\$147,320	\$23,217	\$124,103	\$744	\$14,844
	29	\$147,320	\$23,111	\$124,209	\$164	\$15,008
	30	\$147,320	\$22,877	\$124,443	\$164	\$15,172
	31	\$147,320	\$22,759	\$124,561	\$246	\$15,418
	32	\$147,320	\$22,501	\$124,819	\$440	\$15,858
	33	\$147,320	\$22,291	\$125,029	\$572	\$16,430
	34	\$147,320	\$22,159	\$125,161	\$180	\$16,610
	35	\$147,320	\$21,892	\$125,428	\$992	\$17,602
	36	\$147,320	\$21,787	\$125,533	\$92	\$17,694
	37	\$147,320	\$21,631	\$125,689	\$240	\$17,934
	38	\$147,320	\$21,382	\$125,938	\$336	\$18,270
	39	\$147,320	\$20,925	\$126,395	\$321	\$18,591
	40	\$147,320	\$20,812	\$126,508	\$247	\$18,838
	41	\$147,320	\$20,314	\$127,006	\$1,029	\$19,867
	42	\$147,320	\$20,027	\$127,293	\$200	\$20,067

Table A.14: Urban County under First Parcel Purchased (not early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
UrbanROW01	0	\$11,817	\$11,817	\$0	\$0	\$0
	1	\$11,817	\$9,098	\$2,719	\$333	\$333
	2	\$11,817	\$8,231	\$3,586	\$106	\$439
	3	\$11,817	\$7,074	\$4,743	\$163	\$602
	4	\$11,817	\$5,970	\$5,847	\$128	\$730
	5	\$11,817	\$5,004	\$6,813	\$124	\$854
	6	\$11,817	\$4,990	\$6,827	\$62	\$916
	7	\$11,817	\$4,975	\$6,842	\$92	\$1,008
	8	\$11,817	\$4,968	\$6,849	\$51	\$1,059
	9	\$11,817	\$4,961	\$6,856	\$49	\$1,108
	10	\$11,817	\$4,947	\$6,870	\$67	\$1,175
	11	\$11,817	\$4,938	\$6,879	\$70	\$1,245
	12	\$11,817	\$4,920	\$6,897	\$70	\$1,315
	13	\$11,817	\$4,904	\$6,913	\$93	\$1,408
	14	\$11,817	\$4,893	\$6,924	\$72	\$1,480
	15	\$11,817	\$4,875	\$6,942	\$93	\$1,573
	16	\$11,817	\$4,868	\$6,949	\$68	\$1,641
	17	\$11,817	\$4,827	\$6,990	\$168	\$1,809
	18	\$11,817	\$4,816	\$7,001	\$72	\$1,881
	19	\$11,817	\$4,802	\$7,015	\$78	\$1,959
	20	\$11,817	\$4,776	\$7,041	\$116	\$2,075
	21	\$11,817	\$4,769	\$7,048	\$47	\$2,122
	22	\$11,817	\$4,752	\$7,065	\$66	\$2,188
	23	\$11,817	\$4,743	\$7,074	\$34	\$2,222
	24	\$11,817	\$4,655	\$7,162	\$321	\$2,543
	25	\$11,817	\$4,621	\$7,196	\$227	\$2,770
	26	\$11,817	\$4,562	\$7,255	\$110	\$2,880
	27	\$11,817	\$4,539	\$7,278	\$91	\$2,971
	28	\$11,817	\$4,526	\$7,291	\$99	\$3,070
	29	\$11,817	\$4,510	\$7,307	\$79	\$3,149
	30	\$11,817	\$4,503	\$7,314	\$106	\$3,255
	31	\$11,817	\$4,484	\$7,333	\$113	\$3,368
	32	\$11,817	\$4,472	\$7,345	\$70	\$3,438
	33	\$11,817	\$4,449	\$7,368	\$71	\$3,509
	34	\$11,817	\$4,443	\$7,374	\$54	\$3,563
	35	\$11,817	\$4,429	\$7,388	\$78	\$3,641
	36	\$11,817	\$4,419	\$7,398	\$63	\$3,704
	37	\$11,817	\$4,408	\$7,409	\$60	\$3,764
	38	\$11,817	\$4,395	\$7,422	\$69	\$3,833
	39	\$11,817	\$4,384	\$7,433	\$77	\$3,910
	40	\$11,817	\$4,369	\$7,448	\$212	\$4,122
	41	\$11,817	\$4,348	\$7,469	\$50	\$4,172
	42	\$11,817	\$4,272	\$7,545	\$162	\$4,334

Table A.15: Rural County under First Parcel Purchased (not early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
RuralROW01	0	\$1,967	\$1,967	\$0	\$0	\$0
	1	\$1,967	\$1,834	\$133	\$26	\$26
	2	\$1,967	\$1,641	\$326	\$33	\$59
	3	\$1,967	\$1,639	\$328	\$27	\$86
	4	\$1,967	\$1,638	\$329	\$16	\$102
	5	\$1,967	\$1,636	\$331	\$24	\$126
	6	\$1,967	\$1,633	\$334	\$22	\$148
	7	\$1,967	\$1,631	\$336	\$23	\$171
	8	\$1,967	\$1,629	\$338	\$30	\$201
	9	\$1,967	\$1,625	\$342	\$37	\$238
	10	\$1,967	\$1,622	\$345	\$37	\$275
	11	\$1,967	\$1,620	\$347	\$35	\$310
	12	\$1,967	\$1,616	\$351	\$32	\$342
	13	\$1,967	\$1,612	\$355	\$45	\$387
	14	\$1,967	\$1,610	\$357	\$40	\$427
	15	\$1,967	\$1,607	\$360	\$26	\$453
	16	\$1,967	\$1,605	\$362	\$20	\$473
	17	\$1,967	\$1,603	\$364	\$22	\$495
	18	\$1,967	\$1,601	\$366	\$22	\$517
	19	\$1,967	\$1,598	\$369	\$25	\$542
	20	\$1,967	\$1,595	\$372	\$57	\$599
	21	\$1,967	\$1,593	\$374	\$36	\$635
	22	\$1,967	\$1,588	\$379	\$76	\$711
	23	\$1,967	\$1,586	\$381	\$14	\$725
	24	\$1,967	\$1,580	\$387	\$59	\$784
	25	\$1,967	\$1,577	\$390	\$30	\$814
	26	\$1,967	\$1,571	\$396	\$44	\$858
	27	\$1,967	\$1,569	\$398	\$25	\$883
	28	\$1,967	\$1,566	\$401	\$32	\$915
	29	\$1,967	\$1,564	\$403	\$29	\$944
	30	\$1,967	\$1,562	\$405	\$25	\$969
	31	\$1,967	\$1,560	\$407	\$26	\$995
	32	\$1,967	\$1,554	\$413	\$65	\$1,060
	33	\$1,967	\$1,551	\$416	\$21	\$1,081
	34	\$1,967	\$1,548	\$419	\$38	\$1,119
	35	\$1,967	\$1,545	\$422	\$55	\$1,174
	36	\$1,967	\$1,540	\$427	\$42	\$1,216
	37	\$1,967	\$1,537	\$430	\$32	\$1,248
	38	\$1,967	\$1,534	\$433	\$21	\$1,269
	39	\$1,967	\$1,525	\$442	\$112	\$1,381
	40	\$1,967	\$1,518	\$449	\$25	\$1,406
	41	\$1,967	\$1,512	\$455	\$38	\$1,444
	42	\$1,967	\$1,505	\$462	\$21	\$1,465
	43	\$1,967	\$1,434	\$533	\$40	\$1,505

Table A.16: Dallas County under First Parcel Purchased (not early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
DallasROW01	0	\$88,764	\$88,764	\$0	\$0	\$0
	1	\$88,764	\$37,422	\$51,342	\$2,659	\$2,659
	2	\$88,764	\$34,305	\$54,459	\$191	\$2,850
	3	\$88,764	\$28,762	\$60,002	\$394	\$3,244
	4	\$88,764	\$20,022	\$68,742	\$579	\$3,823
	5	\$88,764	\$14,205	\$74,559	\$368	\$4,191
	6	\$88,764	\$14,132	\$74,632	\$193	\$4,384
	7	\$88,764	\$14,066	\$74,698	\$168	\$4,552
	8	\$88,764	\$13,767	\$74,997	\$483	\$5,035
	9	\$88,764	\$13,692	\$75,072	\$188	\$5,223
	10	\$88,764	\$13,377	\$75,387	\$301	\$5,524
	11	\$88,764	\$13,196	\$75,568	\$159	\$5,683
	12	\$88,764	\$13,109	\$75,655	\$148	\$5,831
	13	\$88,764	\$13,024	\$75,740	\$120	\$5,951
	14	\$88,764	\$12,902	\$75,862	\$468	\$6,419
	15	\$88,764	\$12,795	\$75,969	\$406	\$6,825
	16	\$88,764	\$12,727	\$76,037	\$184	\$7,009
	17	\$88,764	\$12,299	\$76,465	\$665	\$7,674
	18	\$88,764	\$11,746	\$77,018	\$713	\$8,387
	19	\$88,764	\$11,665	\$77,099	\$136	\$8,523
	20	\$88,764	\$11,489	\$77,275	\$219	\$8,742
	21	\$88,764	\$11,337	\$77,427	\$170	\$8,912
	22	\$88,764	\$11,208	\$77,556	\$150	\$9,062
	23	\$88,764	\$10,973	\$77,791	\$257	\$9,319
	24	\$88,764	\$10,659	\$78,105	\$250	\$9,569
	25	\$88,764	\$10,534	\$78,230	\$242	\$9,811
	26	\$88,764	\$10,446	\$78,318	\$214	\$10,025
	27	\$88,764	\$10,373	\$78,391	\$116	\$10,141
	28	\$88,764	\$10,223	\$78,541	\$134	\$10,275

Table A.17: Harris County under First Parcel Purchased (not early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
HarrisROW01	0	\$381,424	\$381,424	\$0	\$0	\$0
	1	\$381,424	\$307,243	\$74,181	\$2,728	\$2,728
	2	\$381,424	\$269,446	\$111,978	\$2,120	\$4,848
	3	\$381,424	\$207,147	\$174,277	\$3,264	\$8,112
	4	\$381,424	\$96,627	\$284,797	\$4,136	\$12,248
	5	\$381,424	\$75,359	\$306,065	\$1,253	\$13,501
	6	\$381,424	\$75,286	\$306,138	\$177	\$13,678
	7	\$381,424	\$74,398	\$307,026	\$1,849	\$15,527
	8	\$381,424	\$73,319	\$308,105	\$1,858	\$17,385
	9	\$381,424	\$73,056	\$308,368	\$608	\$17,993
	10	\$381,424	\$71,180	\$310,244	\$3,179	\$21,172
	11	\$381,424	\$70,986	\$310,438	\$542	\$21,714
	12	\$381,424	\$70,521	\$310,903	\$598	\$22,312
	13	\$381,424	\$70,182	\$311,242	\$335	\$22,647
	14	\$381,424	\$69,758	\$311,666	\$2,477	\$25,124
	15	\$381,424	\$69,169	\$312,255	\$1,043	\$26,167
	16	\$381,424	\$68,567	\$312,857	\$1,088	\$27,255
	17	\$381,424	\$67,874	\$313,550	\$933	\$28,188
	18	\$381,424	\$67,377	\$314,047	\$1,057	\$29,245
	19	\$381,424	\$67,270	\$314,154	\$267	\$29,512
	20	\$381,424	\$67,171	\$314,253	\$190	\$29,702
	21	\$381,424	\$67,045	\$314,379	\$511	\$30,213
	22	\$381,424	\$60,338	\$321,086	\$23,689	\$53,902
	23	\$381,424	\$58,305	\$323,119	\$3,760	\$57,662
	24	\$381,424	\$58,096	\$323,328	\$487	\$58,149

Table A.18: Tarrant County under First Parcel Purchased (not early)

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
TarrantROW01	0	\$138,718	\$138,718	\$0	\$0	\$0
	1	\$138,718	\$133,693	\$5,025	\$346	\$346
	2	\$138,718	\$104,329	\$34,389	\$1,904	\$2,250
	3	\$138,718	\$97,899	\$40,819	\$376	\$2,626
	4	\$138,718	\$92,715	\$46,003	\$359	\$2,985
	5	\$138,718	\$75,700	\$63,018	\$1,349	\$4,334
	6	\$138,718	\$69,629	\$69,089	\$422	\$4,756
	7	\$138,718	\$69,422	\$69,296	\$1,068	\$5,824
	8	\$138,718	\$69,310	\$69,408	\$419	\$6,243
	9	\$138,718	\$69,281	\$69,437	\$157	\$6,400
	10	\$138,718	\$69,241	\$69,477	\$476	\$6,876
	11	\$138,718	\$69,174	\$69,544	\$302	\$7,178
	12	\$138,718	\$69,128	\$69,590	\$354	\$7,532
	13	\$138,718	\$69,076	\$69,642	\$512	\$8,044
	14	\$138,718	\$68,597	\$70,121	\$2,678	\$10,722
	15	\$138,718	\$68,469	\$70,249	\$393	\$11,115
	16	\$138,718	\$68,144	\$70,574	\$1,627	\$12,742
	17	\$138,718	\$67,929	\$70,789	\$477	\$13,219
	18	\$138,718	\$67,809	\$70,909	\$587	\$13,806
	19	\$138,718	\$67,736	\$70,982	\$287	\$14,093
	20	\$138,718	\$67,651	\$71,067	\$394	\$14,487
	21	\$138,718	\$64,637	\$74,081	\$6,602	\$21,089
	22	\$138,718	\$64,404	\$74,314	\$620	\$21,709
	23	\$138,718	\$64,248	\$74,470	\$351	\$22,060
	24	\$138,718	\$63,342	\$75,376	\$3,114	\$25,174
	25	\$138,718	\$61,700	\$77,018	\$5,138	\$30,312
	26	\$138,718	\$61,412	\$77,306	\$555	\$30,867
	27	\$138,718	\$61,361	\$77,357	\$399	\$31,266
	28	\$138,718	\$61,244	\$77,474	\$545	\$31,811
	29	\$138,718	\$61,189	\$77,529	\$207	\$32,018
	30	\$138,718	\$60,865	\$77,853	\$1,371	\$33,389
	31	\$138,718	\$60,757	\$77,961	\$1,082	\$34,471
	32	\$138,718	\$60,645	\$78,073	\$1,640	\$36,111
	33	\$138,718	\$60,471	\$78,247	\$402	\$36,513
	34	\$138,718	\$60,181	\$78,537	\$1,260	\$37,773
	35	\$138,718	\$59,921	\$78,797	\$826	\$38,599
	36	\$138,718	\$55,900	\$82,818	\$11,656	\$50,255
	37	\$138,718	\$55,197	\$83,521	\$2,356	\$52,611
	38	\$138,718	\$55,071	\$83,647	\$1,716	\$54,327
	39	\$138,718	\$54,936	\$83,782	\$404	\$54,731
	40	\$138,718	\$54,806	\$83,912	\$156	\$54,887

First Parcel Purchased (not early) Scenario Savings from the Text File:

	Metro		Urban		Rural		Dallas		Harris		Tarrant	
0	0	0	0	0	0	0	0	0	0	0	0	0
1	48452	1	2719	1	133	1	51342	1	74181	1	5025	
2	61191	2	3586	2	326	2	54459	2	111978	2	34389	
3	66763	3	4743	3	328	3	60002	3	174277	3	40819	
4	87717	4	5847	4	329	4	68742	4	284797	4	46003	
5	101819	5	6813	5	331	5	74559	5	306065	5	63018	
6	108207	6	6827	6	334	6	74632	6	306138	6	69089	
7	119597	7	6842	7	336	7	74698	7	307026	7	69296	
8	119767	8	6849	8	338	8	74997	8	308105	8	69408	
9	119920	9	6856	9	342	9	75072	9	308368	9	69437	
10	120058	10	6870	10	345	10	75387	10	310244	10	69477	
11	120247	11	6879	11	347	11	75568	11	310438	11	69544	
12	120385	12	6897	12	351	12	75655	12	310903	12	69590	
13	120769	13	6913	13	355	13	75740	13	311242	13	69642	
14	120904	14	6924	14	357	14	75862	14	311666	14	70121	
15	121218	15	6942	15	360	15	75969	15	312255	15	70249	
16	121375	16	6949	16	362	16	76037	16	312857	16	70574	
17	121550	17	6990	17	364	17	76465	17	313550	17	70789	
18	121673	18	7001	18	366	18	77018	18	314047	18	70909	
19	121848	19	7015	19	369	19	77099	19	314154	19	70982	
20	122000	20	7041	20	372	20	77275	20	314253	20	71067	
21	122265	21	7048	21	374	21	77427	21	314379	21	74081	
22	122731	22	7065	22	379	22	77556	22	321086	22	74314	
23	122967	23	7074	23	381	23	77791	23	323119	23	74470	
24	123318	24	7162	24	387	24	78105	24	323328	24	75376	
25	123447	25	7196	25	390	25	78230			25	77018	
26	123507	26	7255	26	396	26	78318			26	77306	
27	123705	27	7278	27	398	27	78391			27	77357	
28	124103	28	7291	28	401	28	78541			28	77474	
29	124209	29	7307	29	403					29	77529	
30	124443	30	7314	30	405					30	77853	
31	124561	31	7333	31	407					31	77961	
32	124819	32	7345	32	413					32	78073	
33	125029	33	7368	33	416					33	78247	
34	125161	34	7374	34	419					34	78537	
35	125428	35	7388	35	422					35	78797	
36	125533	36	7398	36	427					36	82818	
37	125689	37	7409	37	430					37	83521	
38	125938	38	7422	38	433					38	83647	
39	126395	39	7433	39	442					39	83782	
40	126508	40	7448	40	449					40	83912	
41	127006	41	7469	41	455							
42	127293	42	7545	42	462							
				43	533							

First Parcel Purchased (not early) Scenario Costs from the Text File:

Metro		Urban		Rural		Dallas		Harris		Tarrant	
0	0	0	0	0	0	0	0	0	0	0	0
1	3543.106	1	332.641	1	26.163	1	2658.743	1	2728.298	1	345.637
2	4347.81	2	438.831	2	59.562	2	2850.211	2	4848.659	2	2249.338
3	4801.919	3	601.423	3	86.599	3	3244.266	3	8112.871	3	2625.523
4	6026.644	4	729.703	4	102.319	4	3823.293	4	12249.34	4	2984.556
5	6776.078	5	853.618	5	125.929	5	4191.127	5	13502.65	5	4333.559
6	7151.606	6	915.676	6	148.022	6	4384.048	6	13679.37	6	4755.624
7	7882.437	7	1008.165	7	171.441	7	4552.335	7	15528.71	7	5823.815
8	8149.096	8	1059.144	8	200.966	8	5035.189	8	17387.04	8	6243.061
9	8393.515	9	1107.85	9	238.303	9	5223.405	9	17995.11	9	6399.791
10	8601.587	10	1174.559	10	275.232	10	5524.448	10	21174.32	10	6875.934
11	8908.361	11	1244.538	11	310.503	11	5683.39	11	21716.66	11	7177.962
12	9232.092	12	1314.076	12	342.241	12	5831.523	12	22314.43	12	7531.924
13	9444.178	13	1406.657	13	387.379	13	5951.186	13	22649.85	13	8043.532
14	9591.287	14	1478.575	14	427.696	14	6418.686	14	25126.75	14	10721.52
15	10431.37	15	1571.542	15	453.337	15	6824.927	15	26170.03	15	11114.39
16	10672.23	16	1639.643	16	472.85	16	7009.304	16	27257.76	16	12741.2
17	11079.18	17	1807.919	17	494.507	17	7674.22	17	28190.31	17	13218.12
18	11194.48	18	1879.45	18	516.814	18	8387.473	18	29247.23	18	13805.01
19	11433.2	19	1957.185	19	541.818	19	8523.181	19	29514.07	19	14092.28
20	11575.75	20	2072.866	20	598.448	20	8742.095	20	29703.72	20	14486.45
21	11957.8	21	2120.067	21	634.391	21	8911.781	21	30214.46	21	21088.89
22	12515.84	22	2186.088	22	710.474	22	9061.311	22	53903.63	22	21709.06
23	12833.92	23	2219.694	23	724.609	23	9318.065	23	57663.69	23	22059.74
24	13248.22	24	2540.66	24	783.653	24	9568.262	24	58151.02	24	25174.12
25	13653.58	25	2767.875	25	814.036	25	9809.813			25	30312
26	13865.52	26	2877.706	26	857.566	26	10023.543			26	30867.48
27	14099.73	27	2969.206	27	882.934	27	10139.573			27	31266.05
28	14843.46	28	3068.098	28	914.458	28	10273.357			28	31810.6
29	15007.95	29	3147.245	29	943.339					29	32018.02
30	15171.66	30	3252.997	30	968.316					30	33389.43
31	15417.63	31	3366.475	31	994.494					31	34471.75
32	15857.21	32	3436.199	32	1059.39					32	36111.73
33	16428.77	33	3507.05	33	1080.644					33	36513.35
34	16608.91	34	3560.694	34	1118.826					34	37773.08
35	17600.78	35	3638.574	35	1174.302					35	38599.56
36	17692.83	36	3702.04	36	1216.636					36	50255.13
37	17933.1	37	3762.199	37	1248.67					37	52611.32
38	18268.8	38	3830.856	38	1269.731					38	54327.6
39	18590.13	39	3907.359	39	1382.212					39	54732
40	18836.64	40	4118.949	40	1407.451					40	54887.51
41	19866.14	41	4169.161	41	1445.686						
42	20065.91	42	4331.501	42	1466.615						
				43	1507.069						

ROW Release Obtained Scenario:

Table A.19: Metro County under ROW Release Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
MetroROW01	0	\$147,320	\$147,320	\$0	\$0	\$0
	1	\$147,320	\$97,216	\$50,104	\$1,891	\$1,891
	2	\$147,320	\$84,078	\$63,242	\$405	\$2,296
	3	\$147,320	\$78,292	\$69,028	\$240	\$2,536
	4	\$147,320	\$56,858	\$90,462	\$746	\$3,282
	5	\$147,320	\$42,558	\$104,762	\$552	\$3,834
	6	\$147,320	\$35,987	\$111,333	\$193	\$4,027
	7	\$147,320	\$24,393	\$122,927	\$527	\$4,554
	8	\$147,320	\$24,097	\$123,223	\$139	\$4,693
	9	\$147,320	\$23,830	\$123,490	\$131	\$4,824
	10	\$147,320	\$23,614	\$123,706	\$131	\$4,955
	11	\$147,320	\$23,312	\$124,008	\$193	\$5,148
	12	\$147,320	\$23,055	\$124,265	\$205	\$5,353
	13	\$147,320	\$22,564	\$124,756	\$105	\$5,458
	14	\$147,320	\$22,375	\$124,945	\$94	\$5,552
	15	\$147,320	\$21,689	\$125,631	\$467	\$6,019
	16	\$147,320	\$21,431	\$125,889	\$140	\$6,159
	17	\$147,320	\$21,124	\$126,196	\$276	\$6,435
	18	\$147,320	\$20,961	\$126,359	\$74	\$6,509
	19	\$147,320	\$20,669	\$126,651	\$122	\$6,631
	20	\$147,320	\$20,460	\$126,860	\$85	\$6,716
	21	\$147,320	\$20,025	\$127,295	\$212	\$6,928
	22	\$147,320	\$19,336	\$127,984	\$335	\$7,263
	23	\$147,320	\$18,954	\$128,366	\$173	\$7,436
	24	\$147,320	\$18,411	\$128,909	\$223	\$7,659
	25	\$147,320	\$18,181	\$129,139	\$304	\$7,963
	26	\$147,320	\$18,042	\$129,278	\$133	\$8,096
	27	\$147,320	\$17,736	\$129,584	\$126	\$8,222
	28	\$147,320	\$17,154	\$130,166	\$560	\$8,782
	29	\$147,320	\$16,983	\$130,337	\$100	\$8,882
	30	\$147,320	\$16,689	\$130,631	\$103	\$8,985
	31	\$147,320	\$16,471	\$130,849	\$146	\$9,131
	32	\$147,320	\$16,047	\$131,273	\$274	\$9,405
	33	\$147,320	\$15,471	\$131,849	\$205	\$9,610
	34	\$147,320	\$15,260	\$132,060	\$102	\$9,712
	35	\$147,320	\$14,465	\$132,855	\$463	\$10,175
	36	\$147,320	\$14,326	\$132,994	\$58	\$10,233
	37	\$147,320	\$14,077	\$133,243	\$147	\$10,380
	38	\$147,320	\$13,655	\$133,665	\$164	\$10,544
	39	\$147,320	\$13,065	\$134,255	\$188	\$10,732
	40	\$147,320	\$12,862	\$134,458	\$156	\$10,888
	41	\$147,320	\$12,025	\$135,295	\$691	\$11,579
	42	\$147,320	\$11,678	\$135,642	\$140	\$11,719

Table A.20: Urban County under ROW Release Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
UrbanROW01	0	\$11,817	\$11,817	\$0	\$0	\$0
	1	\$11,817	\$9,049	\$2,768	\$284	\$284
	2	\$11,817	\$8,168	\$3,649	\$92	\$376
	3	\$11,817	\$6,981	\$4,836	\$133	\$509
	4	\$11,817	\$5,857	\$5,960	\$107	\$616
	5	\$11,817	\$4,871	\$6,946	\$104	\$720
	6	\$11,817	\$4,850	\$6,967	\$55	\$775
	7	\$11,817	\$4,823	\$6,994	\$81	\$856
	8	\$11,817	\$4,810	\$7,007	\$45	\$901
	9	\$11,817	\$4,795	\$7,022	\$41	\$942
	10	\$11,817	\$4,773	\$7,044	\$58	\$1,000
	11	\$11,817	\$4,754	\$7,063	\$61	\$1,061
	12	\$11,817	\$4,728	\$7,089	\$61	\$1,122
	13	\$11,817	\$4,701	\$7,116	\$81	\$1,203
	14	\$11,817	\$4,680	\$7,137	\$62	\$1,265
	15	\$11,817	\$4,650	\$7,167	\$81	\$1,346
	16	\$11,817	\$4,636	\$7,181	\$61	\$1,407
	17	\$11,817	\$4,576	\$7,241	\$150	\$1,557
	18	\$11,817	\$4,557	\$7,260	\$63	\$1,620
	19	\$11,817	\$4,535	\$7,282	\$69	\$1,689
	20	\$11,817	\$4,493	\$7,324	\$99	\$1,788
	21	\$11,817	\$4,480	\$7,337	\$42	\$1,830
	22	\$11,817	\$4,453	\$7,364	\$55	\$1,885
	23	\$11,817	\$4,440	\$7,377	\$30	\$1,915
	24	\$11,817	\$4,311	\$7,506	\$280	\$2,195
	25	\$11,817	\$4,250	\$7,567	\$200	\$2,395
	26	\$11,817	\$4,181	\$7,636	\$100	\$2,495
	27	\$11,817	\$4,148	\$7,669	\$81	\$2,576
	28	\$11,817	\$4,123	\$7,694	\$87	\$2,663
	29	\$11,817	\$4,098	\$7,719	\$70	\$2,733
	30	\$11,817	\$4,080	\$7,737	\$94	\$2,827
	31	\$11,817	\$4,046	\$7,771	\$99	\$2,926
	32	\$11,817	\$4,024	\$7,793	\$59	\$2,985
	33	\$11,817	\$3,991	\$7,826	\$61	\$3,046
	34	\$11,817	\$3,980	\$7,837	\$48	\$3,094
	35	\$11,817	\$3,953	\$7,864	\$66	\$3,160
	36	\$11,817	\$3,935	\$7,882	\$55	\$3,215
	37	\$11,817	\$3,917	\$7,900	\$53	\$3,268
	38	\$11,817	\$3,894	\$7,923	\$59	\$3,327
	39	\$11,817	\$3,874	\$7,943	\$67	\$3,394
	40	\$11,817	\$3,837	\$7,980	\$190	\$3,584
	41	\$11,817	\$3,809	\$8,008	\$43	\$3,627
	42	\$11,817	\$3,714	\$8,103	\$143	\$3,770

Table A.21: Rural County under ROW Release Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
RuralROW01	0	\$1,967	\$1,967	\$0	\$0	\$0
	1	\$1,967	\$1,832	\$135	\$24	\$24
	2	\$1,967	\$1,637	\$330	\$31	\$55
	3	\$1,967	\$1,634	\$333	\$25	\$80
	4	\$1,967	\$1,632	\$335	\$15	\$95
	5	\$1,967	\$1,628	\$339	\$22	\$117
	6	\$1,967	\$1,623	\$344	\$21	\$138
	7	\$1,967	\$1,620	\$347	\$22	\$160
	8	\$1,967	\$1,616	\$351	\$28	\$188
	9	\$1,967	\$1,610	\$357	\$35	\$223
	10	\$1,967	\$1,604	\$363	\$34	\$257
	11	\$1,967	\$1,600	\$367	\$33	\$290
	12	\$1,967	\$1,594	\$373	\$30	\$320
	13	\$1,967	\$1,588	\$379	\$42	\$362
	14	\$1,967	\$1,582	\$385	\$37	\$399
	15	\$1,967	\$1,577	\$390	\$24	\$423
	16	\$1,967	\$1,574	\$393	\$18	\$441
	17	\$1,967	\$1,571	\$396	\$20	\$461
	18	\$1,967	\$1,566	\$401	\$21	\$482
	19	\$1,967	\$1,562	\$405	\$23	\$505
	20	\$1,967	\$1,556	\$411	\$54	\$559
	21	\$1,967	\$1,553	\$414	\$34	\$593
	22	\$1,967	\$1,543	\$424	\$72	\$665
	23	\$1,967	\$1,540	\$427	\$13	\$678
	24	\$1,967	\$1,530	\$437	\$55	\$733
	25	\$1,967	\$1,525	\$442	\$28	\$761
	26	\$1,967	\$1,516	\$451	\$41	\$802
	27	\$1,967	\$1,512	\$455	\$24	\$826
	28	\$1,967	\$1,507	\$460	\$29	\$855
	29	\$1,967	\$1,503	\$464	\$27	\$882
	30	\$1,967	\$1,500	\$467	\$23	\$905
	31	\$1,967	\$1,496	\$471	\$25	\$930
	32	\$1,967	\$1,487	\$480	\$61	\$991
	33	\$1,967	\$1,483	\$484	\$20	\$1,011
	34	\$1,967	\$1,477	\$490	\$36	\$1,047
	35	\$1,967	\$1,471	\$496	\$52	\$1,099
	36	\$1,967	\$1,463	\$504	\$40	\$1,139
	37	\$1,967	\$1,457	\$510	\$30	\$1,169
	38	\$1,967	\$1,453	\$514	\$20	\$1,189
	39	\$1,967	\$1,435	\$532	\$104	\$1,293
	40	\$1,967	\$1,427	\$540	\$24	\$1,317
	41	\$1,967	\$1,418	\$549	\$36	\$1,353
	42	\$1,967	\$1,410	\$557	\$19	\$1,372
	43	\$1,967	\$1,336	\$631	\$38	\$1,410

Table A.22: Dallas County under ROW Release Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
DallasROW01	0	\$88,764	\$88,764	\$0	\$0	\$0
	1	\$88,764	\$36,257	\$52,507	\$1,494	\$1,494
	2	\$88,764	\$33,080	\$55,684	\$132	\$1,626
	3	\$88,764	\$27,417	\$61,347	\$274	\$1,900
	4	\$88,764	\$18,486	\$70,278	\$388	\$2,288
	5	\$88,764	\$12,547	\$76,217	\$245	\$2,533
	6	\$88,764	\$12,411	\$76,353	\$130	\$2,663
	7	\$88,764	\$12,296	\$76,468	\$119	\$2,782
	8	\$88,764	\$11,841	\$76,923	\$328	\$3,110
	9	\$88,764	\$11,710	\$77,054	\$132	\$3,242
	10	\$88,764	\$11,300	\$77,464	\$207	\$3,449
	11	\$88,764	\$11,070	\$77,694	\$109	\$3,558
	12	\$88,764	\$10,937	\$77,827	\$102	\$3,660
	13	\$88,764	\$10,815	\$77,949	\$83	\$3,743
	14	\$88,764	\$10,505	\$78,259	\$280	\$4,023
	15	\$88,764	\$10,290	\$78,474	\$298	\$4,321
	16	\$88,764	\$10,163	\$78,601	\$126	\$4,447
	17	\$88,764	\$9,551	\$79,213	\$480	\$4,927
	18	\$88,764	\$8,778	\$79,986	\$493	\$5,420
	19	\$88,764	\$8,658	\$80,106	\$97	\$5,517
	20	\$88,764	\$8,408	\$80,356	\$145	\$5,662
	21	\$88,764	\$8,190	\$80,574	\$104	\$5,766
	22	\$88,764	\$8,004	\$80,760	\$92	\$5,858
	23	\$88,764	\$7,677	\$81,087	\$165	\$6,023
	24	\$88,764	\$8,408	\$80,356	\$155	\$6,178
	25	\$88,764	\$7,057	\$81,707	\$154	\$6,332
	26	\$88,764	\$6,895	\$81,869	\$141	\$6,473
	27	\$88,764	\$6,788	\$81,976	\$81	\$6,554
	28	\$88,764	\$6,602	\$82,162	\$98	\$6,652

Table A.23: Harris County under ROW Release Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
HarrisROW01	0	\$381,424	\$381,424	\$0	\$0	\$0
	1	\$381,424	\$306,118	\$75,306	\$1,603	\$1,603
	2	\$381,424	\$267,309	\$114,115	\$1,109	\$2,712
	3	\$381,424	\$203,808	\$177,616	\$2,061	\$4,773
	4	\$381,424	\$91,327	\$290,097	\$2,176	\$6,949
	5	\$381,424	\$69,561	\$311,863	\$756	\$7,705
	6	\$381,424	\$69,408	\$312,016	\$97	\$7,802
	7	\$381,424	\$67,754	\$313,670	\$1,083	\$8,885
	8	\$381,424	\$65,795	\$315,629	\$979	\$9,864
	9	\$381,424	\$65,276	\$316,148	\$352	\$10,216
	10	\$381,424	\$62,090	\$319,334	\$1,869	\$12,085
	11	\$381,424	\$61,667	\$319,757	\$313	\$12,398
	12	\$381,424	\$60,956	\$320,468	\$353	\$12,751
	13	\$381,424	\$60,475	\$320,949	\$193	\$12,944
	14	\$381,424	\$59,010	\$322,414	\$1,436	\$14,380
	15	\$381,424	\$58,017	\$323,407	\$639	\$15,019
	16	\$381,424	\$56,939	\$324,485	\$612	\$15,631
	17	\$381,424	\$55,850	\$325,574	\$537	\$16,168
	18	\$381,424	\$54,886	\$326,538	\$590	\$16,758
	19	\$381,424	\$54,670	\$326,754	\$157	\$16,915
	20	\$381,424	\$54,495	\$326,929	\$113	\$17,028
	21	\$381,424	\$54,140	\$327,284	\$282	\$17,310
	22	\$381,424	\$39,200	\$342,224	\$15,457	\$32,767
	23	\$381,424	\$35,566	\$345,858	\$2,159	\$34,926
	24	\$381,424	\$35,141	\$346,283	\$271	\$35,197

Table A.24: Tarrant County under ROW Release Obtained

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
TarrantROW01	0	\$138,718	\$138,718	\$0	\$0	\$0
	1	\$138,718	\$133,605	\$5,113	\$258	\$258
	2	\$138,718	\$103,759	\$34,959	\$1,421	\$1,679
	3	\$138,718	\$97,218	\$41,500	\$266	\$1,945
	4	\$138,718	\$91,942	\$46,776	\$267	\$2,212
	5	\$138,718	\$74,398	\$64,320	\$819	\$3,031
	6	\$138,718	\$68,221	\$70,497	\$317	\$3,348
	7	\$138,718	\$67,743	\$70,975	\$797	\$4,145
	8	\$138,718	\$67,522	\$71,196	\$311	\$4,456
	9	\$138,718	\$67,457	\$71,261	\$121	\$4,577
	10	\$138,718	\$67,295	\$71,423	\$355	\$4,932
	11	\$138,718	\$67,148	\$71,570	\$222	\$5,154
	12	\$138,718	\$66,960	\$71,758	\$212	\$5,366
	13	\$138,718	\$66,774	\$71,944	\$378	\$5,744
	14	\$138,718	\$65,638	\$73,080	\$2,020	\$7,764
	15	\$138,718	\$65,407	\$73,311	\$291	\$8,055
	16	\$138,718	\$64,675	\$74,043	\$1,219	\$9,274
	17	\$138,718	\$64,302	\$74,416	\$319	\$9,593
	18	\$138,718	\$64,044	\$74,674	\$449	\$10,042
	19	\$138,718	\$63,896	\$74,822	\$212	\$10,254
	20	\$138,718	\$63,718	\$75,000	\$302	\$10,556
	21	\$138,718	\$59,087	\$79,631	\$4,985	\$15,541
	22	\$138,718	\$58,687	\$80,031	\$454	\$15,995
	23	\$138,718	\$58,438	\$80,280	\$257	\$16,252
	24	\$138,718	\$56,645	\$82,073	\$2,228	\$18,480
	25	\$138,718	\$53,722	\$84,996	\$3,856	\$22,336
	26	\$138,718	\$53,234	\$85,484	\$356	\$22,692
	27	\$138,718	\$53,077	\$85,641	\$292	\$22,984
	28	\$138,718	\$52,825	\$85,893	\$410	\$23,394
	29	\$138,718	\$52,710	\$86,008	\$147	\$23,541
	30	\$138,718	\$52,050	\$86,668	\$1,036	\$24,577
	31	\$138,718	\$51,618	\$87,100	\$758	\$25,335
	32	\$138,718	\$50,841	\$87,877	\$975	\$26,310
	33	\$138,718	\$50,554	\$88,164	\$288	\$26,598
	34	\$138,718	\$49,988	\$88,730	\$984	\$27,582
	35	\$138,718	\$49,497	\$89,221	\$595	\$28,177
	36	\$138,718	\$42,606	\$96,112	\$8,786	\$36,963
	37	\$138,718	\$41,252	\$97,466	\$1,704	\$38,667
	38	\$138,718	\$40,621	\$98,097	\$1,211	\$39,878
	39	\$138,718	\$40,394	\$98,324	\$314	\$40,192
	40	\$138,718	\$40,222	\$98,496	\$112	\$40,304

ROW Release Obtained Scenario Savings from the Text File:

	Metro		Urban		Rural		Dallas		Harris		Tarrant
0	0	0	0	0	0	0	0	0	0	0	0
1	50104	1	2768	1	135	1	52507	1	75306	1	5113
2	63242	2	3649	2	330	2	55684	2	114115	2	34959
3	69028	3	4836	3	333	3	61347	3	177616	3	41500
4	90462	4	5960	4	335	4	70278	4	290097	4	46776
5	104762	5	6946	5	339	5	76217	5	311863	5	64320
6	111333	6	6967	6	344	6	76353	6	312016	6	70497
7	122927	7	6994	7	347	7	76468	7	313670	7	70975
8	123223	8	7007	8	351	8	76923	8	315629	8	71196
9	123490	9	7022	9	357	9	77054	9	316148	9	71261
10	123706	10	7044	10	363	10	77464	10	319334	10	71423
11	124008	11	7063	11	367	11	77694	11	319757	11	71570
12	124265	12	7089	12	373	12	77827	12	320468	12	71758
13	124756	13	7116	13	379	13	77949	13	320949	13	71944
14	124945	14	7137	14	385	14	78259	14	322414	14	73080
15	125631	15	7167	15	390	15	78474	15	323407	15	73311
16	125889	16	7181	16	393	16	78601	16	324485	16	74043
17	126196	17	7241	17	396	17	79213	17	325574	17	74416
18	126359	18	7260	18	401	18	79986	18	326538	18	74674
19	126651	19	7282	19	405	19	80106	19	326754	19	74822
20	126860	20	7324	20	411	20	80356	20	326929	20	75000
21	127295	21	7337	21	414	21	80574	21	327284	21	79631
22	127984	22	7364	22	424	22	80760	22	342224	22	80031
23	128366	23	7377	23	427	23	81087	23	345858	23	80280
24	128909	24	7506	24	437	24	80356	24	346283	24	82073
25	129139	25	7567	25	442	25	81707			25	84996
26	129278	26	7636	26	451	26	81869			26	85484
27	129584	27	7669	27	455	27	81976			27	85641
28	130166	28	7694	28	460	28	82162			28	85893
29	130337	29	7719	29	464					29	86008
30	130631	30	7737	30	467					30	86668
31	130849	31	7771	31	471					31	87100
32	131273	32	7793	32	480					32	87877
33	131849	33	7826	33	484					33	88164
34	132060	34	7837	34	490					34	88730
35	132855	35	7864	35	496					35	89221
36	132994	36	7882	36	504					36	96112
37	133243	37	7900	37	509					37	97466
38	133665	38	7923	38	514					38	98097
39	134255	39	7943	39	532					39	98324
40	134458	40	7980	40	540					40	98496
41	135295	41	8008	41	549						
42	135642	42	8103	42	557						
				43	631						

ROW Release Obtained Scenario Costs from the Text File:

	Metro		Urban		Rural		Dallas		Harris		Tarrant
0	0	0	0	0	0	0	0	0	0	0	0
1	1891	1	284	1	24	1	1494	1	1603	1	258
2	2296	2	376	2	56	2	1626	2	2712	2	1679
3	2536	3	509	3	81	3	1900	3	4773	3	1945
4	3282	4	616	4	96	4	2288	4	6949	4	2212
5	3833	5	720	5	118	5	2533	5	7705	5	3031
6	4026	6	775	6	138	6	2663	6	7802	6	3348
7	4553	7	856	7	161	7	2782	7	8885	7	4144
8	4692	8	901	8	188	8	3110	8	9864	8	4455
9	4823	9	942	9	223	9	3242	9	10215	9	4576
10	4954	10	1000	10	258	10	3448	10	12084	10	4931
11	5147	11	1061	11	291	11	3557	11	12397	11	5152
12	5353	12	1122	12	321	12	3659	12	12750	12	5364
13	5457	13	1203	13	363	13	3742	13	12943	13	5742
14	5551	14	1265	14	400	14	4021	14	14379	14	7762
15	6018	15	1347	15	423	15	4320	15	15018	15	8053
16	6158	16	1408	16	442	16	4446	16	15629	16	9272
17	6434	17	1557	17	462	17	4926	17	16166	17	9591
18	6508	18	1621	18	483	18	5419	18	16757	18	10040
19	6630	19	1690	19	506	19	5516	19	16914	19	10252
20	6715	20	1789	20	560	20	5661	20	17027	20	10554
21	6928	21	1832	21	594	21	5765	21	17310	21	15539
22	7262	22	1887	22	665	22	5857	22	32766	22	15992
23	7435	23	1916	23	679	23	6022	23	34925	23	16249
24	7658	24	2197	24	734	24	5661	24	35196	24	18477
25	7962	25	2397	25	762	25	6332			25	22333
26	8094	26	2497	26	803	26	6473			26	22689
27	8221	27	2578	27	826	27	6554			27	22981
28	8781	28	2666	28	856	28	6652			28	23391
29	8881	29	2735	29	883					29	23539
30	8984	30	2830	30	906					30	24574
31	9129	31	2929	31	931					31	25333
32	9403	32	2988	32	992					32	26308
33	9608	33	3049	33	1012					33	26596
34	9711	34	3097	34	1048					34	27580
35	10174	35	3163	35	1100					35	28175
36	10232	36	3218	36	1139					36	36962
37	10379	37	3271	37	1170					37	38666
38	10542	38	3330	38	1189					38	39877
39	10730	39	3397	39	1293					39	40191
40	10886	40	3587	40	1316					40	40303
41	11577	41	3630	41	1352						
42	11717	42	3773	42	1372						
				43	1410						

Schematics Available Scenario:

Table A.25: Metro County under Schematics Available

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
MetroROW01	0	\$147,320	\$147,320	\$0	\$0	\$0
	1	\$147,320	\$96,612	\$50,708	\$1,287	\$1,287
	2	\$147,320	\$82,326	\$64,994	\$257	\$1,544
	3	\$147,320	\$77,471	\$69,849	\$171	\$1,715
	4	\$147,320	\$55,726	\$91,594	\$434	\$2,149
	5	\$147,320	\$41,168	\$106,152	\$293	\$2,442
	6	\$147,320	\$34,538	\$112,782	\$133	\$2,575
	7	\$147,320	\$22,727	\$124,593	\$310	\$2,885
	8	\$147,320	\$22,389	\$124,931	\$98	\$2,983
	9	\$147,320	\$22,074	\$125,246	\$83	\$3,066
	10	\$147,320	\$21,804	\$125,516	\$76	\$3,142
	11	\$147,320	\$21,410	\$125,910	\$101	\$3,243
	12	\$147,320	\$21,054	\$126,266	\$105	\$3,348
	13	\$147,320	\$20,526	\$126,794	\$69	\$3,417
	14	\$147,320	\$20,302	\$127,018	\$58	\$3,475
	15	\$147,320	\$19,387	\$127,933	\$238	\$3,713
	16	\$147,320	\$19,083	\$128,237	\$94	\$3,807
	17	\$147,320	\$18,648	\$128,672	\$148	\$3,955
	18	\$147,320	\$18,457	\$128,863	\$46	\$4,001
	19	\$147,320	\$18,128	\$129,192	\$86	\$4,087
	20	\$147,320	\$17,888	\$129,432	\$53	\$4,140
	21	\$147,320	\$17,371	\$129,949	\$131	\$4,271
	22	\$147,320	\$16,563	\$130,757	\$216	\$4,487
	23	\$147,320	\$16,123	\$131,197	\$114	\$4,601
	24	\$147,320	\$15,497	\$131,823	\$139	\$4,740
	25	\$147,320	\$15,110	\$132,210	\$147	\$4,887
	26	\$147,320	\$14,910	\$132,410	\$71	\$4,958
	27	\$147,320	\$14,559	\$132,761	\$82	\$5,040
	28	\$147,320	\$13,706	\$133,614	\$289	\$5,329
	29	\$147,320	\$13,491	\$133,829	\$56	\$5,385
	30	\$147,320	\$13,160	\$134,160	\$66	\$5,451
	31	\$147,320	\$12,876	\$134,444	\$80	\$5,531
	32	\$147,320	\$12,337	\$134,983	\$158	\$5,689
	33	\$147,320	\$11,693	\$135,627	\$138	\$5,827
	34	\$147,320	\$11,440	\$135,880	\$60	\$5,887
	35	\$147,320	\$10,466	\$136,854	\$284	\$6,171
	36	\$147,320	\$10,306	\$137,014	\$37	\$6,208
	37	\$147,320	\$10,004	\$137,316	\$93	\$6,301
	38	\$147,320	\$9,526	\$137,794	\$108	\$6,409
	39	\$147,320	\$8,892	\$138,428	\$143	\$6,552
	40	\$147,320	\$8,621	\$138,699	\$88	\$6,640
	41	\$147,320	\$7,492	\$139,828	\$399	\$7,039
	42	\$147,320	\$7,083	\$140,237	\$78	\$7,117

Table A.26: Urban County under Schematics Available

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
UrbanROW01	0	\$11,817	\$11,817	\$0	\$0	\$0
	1	\$11,817	\$9,012	\$2,805	\$247	\$247
	2	\$11,817	\$8,113	\$3,704	\$74	\$321
	3	\$11,817	\$6,906	\$4,911	\$113	\$434
	4	\$11,817	\$5,757	\$6,060	\$83	\$517
	5	\$11,817	\$4,750	\$7,067	\$83	\$600
	6	\$11,817	\$4,718	\$7,099	\$44	\$644
	7	\$11,817	\$4,674	\$7,143	\$64	\$708
	8	\$11,817	\$4,651	\$7,166	\$35	\$743
	9	\$11,817	\$4,628	\$7,189	\$33	\$776
	10	\$11,817	\$4,593	\$7,224	\$46	\$822
	11	\$11,817	\$4,563	\$7,254	\$49	\$871
	12	\$11,817	\$4,526	\$7,291	\$50	\$921
	13	\$11,817	\$4,482	\$7,335	\$65	\$986
	14	\$11,817	\$4,447	\$7,370	\$48	\$1,034
	15	\$11,817	\$4,400	\$7,417	\$64	\$1,098
	16	\$11,817	\$4,372	\$7,445	\$47	\$1,145
	17	\$11,817	\$4,280	\$7,537	\$116	\$1,261
	18	\$11,817	\$4,247	\$7,570	\$50	\$1,311
	19	\$11,817	\$4,210	\$7,607	\$55	\$1,366
	20	\$11,817	\$4,151	\$7,666	\$82	\$1,448
	21	\$11,817	\$4,128	\$7,689	\$32	\$1,480
	22	\$11,817	\$4,089	\$7,728	\$44	\$1,524
	23	\$11,817	\$4,071	\$7,746	\$24	\$1,548
	24	\$11,817	\$3,915	\$7,902	\$253	\$1,801
	25	\$11,817	\$3,812	\$8,005	\$159	\$1,960
	26	\$11,817	\$3,734	\$8,083	\$91	\$2,051
	27	\$11,817	\$3,684	\$8,133	\$65	\$2,116
	28	\$11,817	\$3,637	\$8,180	\$65	\$2,181
	29	\$11,817	\$3,597	\$8,220	\$54	\$2,235
	30	\$11,817	\$3,553	\$8,264	\$68	\$2,303
	31	\$11,817	\$3,496	\$8,321	\$76	\$2,379
	32	\$11,817	\$3,461	\$8,356	\$47	\$2,426
	33	\$11,817	\$3,417	\$8,400	\$50	\$2,476
	34	\$11,817	\$3,393	\$8,424	\$35	\$2,511
	35	\$11,817	\$3,353	\$8,464	\$52	\$2,563
	36	\$11,817	\$3,321	\$8,496	\$42	\$2,605
	37	\$11,817	\$3,293	\$8,524	\$42	\$2,647
	38	\$11,817	\$3,259	\$8,558	\$48	\$2,695
	39	\$11,817	\$3,222	\$8,595	\$51	\$2,746
	40	\$11,817	\$3,132	\$8,685	\$137	\$2,883
	41	\$11,817	\$3,097	\$8,720	\$36	\$2,919
	42	\$11,817	\$2,966	\$8,851	\$107	\$3,026

Table A.27: Rural County under Schematics Available

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
RuralROW01	0	\$1,967	\$1,967	\$0	\$0	\$0
	1	\$1,967	\$1,829	\$138	\$21	\$21
	2	\$1,967	\$1,627	\$340	\$25	\$46
	3	\$1,967	\$1,620	\$347	\$21	\$67
	4	\$1,967	\$1,615	\$352	\$12	\$79
	5	\$1,967	\$1,608	\$359	\$18	\$97
	6	\$1,967	\$1,600	\$367	\$17	\$114
	7	\$1,967	\$1,593	\$374	\$18	\$132
	8	\$1,967	\$1,584	\$383	\$23	\$155
	9	\$1,967	\$1,571	\$396	\$29	\$184
	10	\$1,967	\$1,560	\$407	\$29	\$213
	11	\$1,967	\$1,551	\$416	\$27	\$240
	12	\$1,967	\$1,539	\$428	\$24	\$264
	13	\$1,967	\$1,525	\$442	\$35	\$299
	14	\$1,967	\$1,513	\$454	\$31	\$330
	15	\$1,967	\$1,505	\$462	\$20	\$350
	16	\$1,967	\$1,499	\$468	\$15	\$365
	17	\$1,967	\$1,492	\$475	\$17	\$382
	18	\$1,967	\$1,485	\$482	\$17	\$399
	19	\$1,967	\$1,477	\$490	\$19	\$418
	20	\$1,967	\$1,460	\$507	\$43	\$461
	21	\$1,967	\$1,449	\$518	\$27	\$488
	22	\$1,967	\$1,425	\$542	\$57	\$545
	23	\$1,967	\$1,419	\$548	\$11	\$556
	24	\$1,967	\$1,399	\$568	\$45	\$601
	25	\$1,967	\$1,389	\$578	\$23	\$624
	26	\$1,967	\$1,373	\$594	\$33	\$657
	27	\$1,967	\$1,365	\$602	\$19	\$676
	28	\$1,967	\$1,355	\$612	\$24	\$700
	29	\$1,967	\$1,346	\$621	\$22	\$722
	30	\$1,967	\$1,338	\$629	\$19	\$741
	31	\$1,967	\$1,330	\$637	\$21	\$762
	32	\$1,967	\$1,311	\$656	\$50	\$812
	33	\$1,967	\$1,303	\$664	\$16	\$828
	34	\$1,967	\$1,291	\$676	\$30	\$858
	35	\$1,967	\$1,274	\$693	\$41	\$899
	36	\$1,967	\$1,259	\$708	\$33	\$932
	37	\$1,967	\$1,249	\$718	\$24	\$956
	38	\$1,967	\$1,241	\$726	\$16	\$972
	39	\$1,967	\$1,201	\$766	\$82	\$1,054
	40	\$1,967	\$1,190	\$777	\$20	\$1,074
	41	\$1,967	\$1,176	\$791	\$31	\$1,105
	42	\$1,967	\$1,164	\$803	\$16	\$1,121
	43	\$1,967	\$1,083	\$884	\$31	\$1,152

Table A.28: Dallas County under Schematics Available

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
DallasROW01	0	\$88,764	\$88,764	\$0	\$0	\$0
	1	\$88,764	\$36,104	\$52,660	\$1,341	\$1,341
	2	\$88,764	\$32,862	\$55,902	\$66	\$1,407
	3	\$88,764	\$27,058	\$61,706	\$133	\$1,540
	4	\$88,764	\$17,951	\$70,813	\$212	\$1,752
	5	\$88,764	\$11,895	\$76,869	\$129	\$1,881
	6	\$88,764	\$11,697	\$77,067	\$68	\$1,949
	7	\$88,764	\$11,524	\$77,240	\$61	\$2,010
	8	\$88,764	\$10,914	\$77,850	\$173	\$2,183
	9	\$88,764	\$10,714	\$78,050	\$63	\$2,246
	10	\$88,764	\$10,210	\$78,554	\$112	\$2,358
	11	\$88,764	\$9,934	\$78,830	\$64	\$2,422
	12	\$88,764	\$9,755	\$79,009	\$56	\$2,478
	13	\$88,764	\$9,600	\$79,164	\$50	\$2,528
	14	\$88,764	\$9,157	\$79,607	\$147	\$2,675
	15	\$88,764	\$8,765	\$79,999	\$121	\$2,796
	16	\$88,764	\$8,577	\$80,187	\$65	\$2,861
	17	\$88,764	\$7,712	\$81,052	\$228	\$3,089
	18	\$88,764	\$6,676	\$82,088	\$230	\$3,319
	19	\$88,764	\$6,509	\$82,255	\$49	\$3,368
	20	\$88,764	\$6,190	\$82,574	\$76	\$3,444
	21	\$88,764	\$5,932	\$82,832	\$64	\$3,508
	22	\$88,764	\$5,713	\$83,051	\$59	\$3,567
	23	\$88,764	\$5,315	\$83,449	\$94	\$3,661
	24	\$88,764	\$4,853	\$83,911	\$102	\$3,763
	25	\$88,764	\$4,572	\$84,192	\$85	\$3,848
	26	\$88,764	\$4,336	\$84,428	\$67	\$3,915
	27	\$88,764	\$4,187	\$84,577	\$40	\$3,955
	28	\$88,764	\$3,955	\$84,809	\$52	\$4,007

Table A.29: Harris County under Schematics Available

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
HarrisROW01	0	\$381,424	\$381,424	\$0	\$0	\$0
	1	\$381,424	\$305,693	\$75,731	\$1,178	\$1,178
	2	\$381,424	\$266,487	\$114,937	\$712	\$1,890
	3	\$381,424	\$201,822	\$179,602	\$898	\$2,788
	4	\$381,424	\$88,936	\$292,488	\$1,770	\$4,558
	5	\$381,424	\$66,782	\$314,642	\$368	\$4,926
	6	\$381,424	\$66,588	\$314,836	\$55	\$4,981
	7	\$381,424	\$64,496	\$316,928	\$645	\$5,626
	8	\$381,424	\$62,142	\$319,282	\$583	\$6,209
	9	\$381,424	\$61,467	\$319,957	\$196	\$6,405
	10	\$381,424	\$57,362	\$324,062	\$950	\$7,355
	11	\$381,424	\$56,803	\$324,621	\$177	\$7,532
	12	\$381,424	\$55,926	\$325,498	\$187	\$7,719
	13	\$381,424	\$55,368	\$326,056	\$116	\$7,835
	14	\$381,424	\$53,217	\$328,207	\$750	\$8,585
	15	\$381,424	\$51,928	\$329,496	\$343	\$8,928
	16	\$381,424	\$50,602	\$330,822	\$364	\$9,292
	17	\$381,424	\$49,301	\$332,123	\$325	\$9,617
	18	\$381,424	\$48,078	\$333,346	\$331	\$9,948
	19	\$381,424	\$47,785	\$333,639	\$80	\$10,028
	20	\$381,424	\$47,557	\$333,867	\$61	\$10,089
	21	\$381,424	\$47,073	\$334,351	\$153	\$10,242
	22	\$381,424	\$23,241	\$358,183	\$6,565	\$16,807
	23	\$381,424	\$18,786	\$362,638	\$1,338	\$18,145
	24	\$381,424	\$18,232	\$363,192	\$143	\$18,288

Table A.30: Tarrant County under Schematics Available

Project Identification Number (ROW CSJ Number)	Case #	Project Cost without Early Acquisition (\$1,000)	Project Cost with Early Acquisition (\$1,000)	Expected Savings from Early Acquisition (\$1,000)	PV with Early Acquisition (\$1,000)	Early Acquisition Cost (Cost of all parcels purchased early) (\$1,000)
TarrantROW01	0	\$138,718	\$138,718	\$0	\$0	\$0
	1	\$138,718	\$133,467	\$5,251	\$119	\$119
	2	\$138,718	\$102,806	\$35,912	\$607	\$726
	3	\$138,718	\$96,111	\$42,607	\$111	\$837
	4	\$138,718	\$90,687	\$48,031	\$119	\$956
	5	\$138,718	\$72,738	\$65,980	\$414	\$1,370
	6	\$138,718	\$66,387	\$72,331	\$144	\$1,514
	7	\$138,718	\$65,466	\$73,252	\$353	\$1,867
	8	\$138,718	\$65,082	\$73,636	\$148	\$2,015
	9	\$138,718	\$64,951	\$73,767	\$55	\$2,070
	10	\$138,718	\$64,588	\$74,130	\$154	\$2,224
	11	\$138,718	\$64,319	\$74,399	\$100	\$2,324
	12	\$138,718	\$64,005	\$74,713	\$85	\$2,409
	13	\$138,718	\$63,607	\$75,111	\$166	\$2,575
	14	\$138,718	\$61,337	\$77,381	\$887	\$3,462
	15	\$138,718	\$60,953	\$77,765	\$137	\$3,599
	16	\$138,718	\$59,534	\$79,184	\$532	\$4,131
	17	\$138,718	\$59,005	\$79,713	\$163	\$4,294
	18	\$138,718	\$58,510	\$80,208	\$212	\$4,506
	19	\$138,718	\$58,251	\$80,467	\$101	\$4,607
	20	\$138,718	\$57,896	\$80,822	\$125	\$4,732
	21	\$138,718	\$50,663	\$88,055	\$2,383	\$7,115
	22	\$138,718	\$50,017	\$88,701	\$208	\$7,323
	23	\$138,718	\$49,638	\$89,080	\$127	\$7,450
	24	\$138,718	\$46,661	\$92,057	\$1,043	\$8,493
	25	\$138,718	\$41,615	\$97,103	\$1,734	\$10,227
	26	\$138,718	\$40,968	\$97,750	\$198	\$10,425
	27	\$138,718	\$40,650	\$98,068	\$131	\$10,556
	28	\$138,718	\$40,170	\$98,548	\$182	\$10,738
	29	\$138,718	\$39,979	\$98,739	\$71	\$10,809
	30	\$138,718	\$38,773	\$99,945	\$489	\$11,298
	31	\$138,718	\$37,907	\$100,811	\$324	\$11,622
	32	\$138,718	\$36,640	\$102,078	\$485	\$12,107
	33	\$138,718	\$36,211	\$102,507	\$147	\$12,254
	34	\$138,718	\$35,116	\$103,602	\$455	\$12,709
	35	\$138,718	\$34,268	\$104,450	\$238	\$12,947
	36	\$138,718	\$22,625	\$116,093	\$4,033	\$16,980
	37	\$138,718	\$20,421	\$118,297	\$855	\$17,835
	38	\$138,718	\$19,002	\$119,716	\$423	\$18,258
	39	\$138,718	\$18,610	\$120,108	\$149	\$18,407
	40	\$138,718	\$18,381	\$120,337	\$56	\$18,463

Schematics Available Scenario Savings from the Text File:

	Metro		Urban		Rural		Dallas		Harris		Tarrant
0	0	0	0	0	0	0	0	0	0	0	0
1	50708	1	2805	1	138	1	52660	1	75731	1	5252
2	63994	2	3704	2	340	2	55902	2	114937	2	35912
3	69849	3	4911	3	347	3	61706	3	179602	3	42607
4	91594	4	6060	4	352	4	70813	4	292488	4	48031
5	106152	5	7067	5	359	5	76869	5	314642	5	65980
6	112782	6	7099	6	367	6	77067	6	314836	6	72331
7	124593	7	7143	7	374	7	77240	7	316928	7	73252
8	124931	8	7166	8	383	8	77850	8	319282	8	73636
9	125246	9	7189	9	396	9	78050	9	319957	9	73767
10	125516	10	7224	10	407	10	78554	10	324062	10	74130
11	125910	11	7254	11	416	11	78830	11	324621	11	74399
12	126266	12	7291	12	428	12	79009	12	325498	12	74713
13	126794	13	7335	13	442	13	79164	13	326056	13	75111
14	127018	14	7370	14	454	14	79607	14	328207	14	77381
15	127933	15	7417	15	462	15	79999	15	329496	15	77765
16	128237	16	7445	16	468	16	80187	16	330822	16	79184
17	128672	17	7537	17	475	17	81052	17	332123	17	79713
18	128863	18	7570	18	482	18	82088	18	333346	18	80208
19	129192	19	7607	19	490	19	82255	19	333639	19	80467
20	129432	20	7666	20	507	20	82574	20	333867	20	80822
21	129949	21	7689	21	518	21	82832	21	334351	21	88055
22	130757	22	7728	22	542	22	83051	22	358183	22	88701
23	131197	23	7746	23	548	23	83449	23	362638	23	89080
24	131823	24	7902	24	568	24	83911	24	363192	24	92057
25	132210	25	8005	25	578	25	84192			25	97103
26	132410	26	8083	26	594	26	84428			26	97750
27	132761	27	8133	27	602	27	84577			27	98068
28	133614	28	8180	28	612	28	84809			28	98548
29	133829	29	8220	29	621					29	98739
30	134160	30	8264	30	629					30	99945
31	134444	31	8321	31	637					31	100811
32	134983	32	8356	32	656					32	102078
33	135627	33	8400	33	664					33	102507
34	135880	34	8424	34	676					34	103602
35	136854	35	8464	35	693					35	104450
36	137014	36	8496	36	708					36	116093
37	137316	37	8524	37	718					37	118297
38	137794	38	8558	38	726					38	119716
39	138428	39	8595	39	766					39	120108
40	138699	40	8685	40	777					40	120337
41	139828	41	8720	41	791						
42	140237	42	8851	42	803						
				43	884						

Schematics Available Scenario Costs from the Text File:

	Metro		Urban		Rural		Dallas		Harris		Tarrant
0	0	0	0	0	0	0	0	0	0	0	0
1	1287	1	247	1	21	1	1341	1	1178	1	119
2	1545	2	321	2	46	2	1408	2	1890	2	726
3	1716	3	434	3	67	3	1540	3	2788	3	837
4	2150	4	517	4	79	4	1752	4	4558	4	956
5	2444	5	599	5	98	5	1881	5	4926	5	1371
6	2577	6	643	6	115	6	1949	6	4982	6	1514
7	2887	7	707	7	133	7	2010	7	5627	7	1868
8	2984	8	742	8	156	8	2183	8	6210	8	2015
9	3068	9	775	9	185	9	2246	9	6406	9	2070
10	3144	10	821	10	214	10	2358	10	7356	10	2224
11	3245	11	870	11	241	11	2422	11	7533	11	2323
12	3351	12	920	12	265	12	2478	12	7720	12	2409
13	3419	13	985	13	300	13	2528	13	7836	13	2575
14	3478	14	1033	14	331	14	2674	14	8586	14	3462
15	3716	15	1097	15	351	15	2795	15	8928	15	3599
16	3810	16	1144	16	366	16	2860	16	9293	16	4131
17	3958	17	1261	17	383	17	3087	17	9617	17	4294
18	4004	18	1310	18	401	18	3317	18	9949	18	4507
19	4090	19	1365	19	420	19	3367	19	10029	19	4607
20	4143	20	1447	20	463	20	3442	20	10089	20	4732
21	4274	21	1479	21	490	21	3507	21	10242	21	7114
22	4490	22	1524	22	547	22	3566	22	16807	22	7322
23	4604	23	1547	23	558	23	3660	23	18145	23	7450
24	4743	24	1800	24	603	24	3762	24	18288	24	8493
25	4891	25	1959	25	626	25	3847			25	10226
26	4962	26	2050	26	660	26	3914			26	10424
27	5044	27	2115	27	679	27	3954			27	10555
28	5333	28	2180	28	703	28	4006			28	10737
29	5389	29	2234	29	725					29	10808
30	5455	30	2302	30	745					30	11297
31	5535	31	2378	31	765					31	11622
32	5693	32	2426	32	816					32	12106
33	5830	33	2475	33	832					33	12254
34	5890	34	2511	34	862					34	12708
35	6175	35	2563	35	903					35	12947
36	6212	36	2605	36	936					36	16980
37	6305	37	2647	37	960					37	17835
38	6414	38	2695	38	977					38	18258
39	6556	39	2746	39	1059					39	18407
40	6645	40	2882	40	1079					40	18463
41	7044	41	2919	41	1110						
42	7122	42	3026	42	1125						
				43	1157						

Appendix B: EROW Case Study One Outputs

First Option:

Table B.1: Best and Worst Case Scenario of the Environmental Clearance Obtained Scenario for the First Option of Case Study One

Environmental Clearance Obtained	
Best case Scenario	
County Type and Parcels	Harris (6 parcel)
Budget Option (\$1,000)	6,690
Best Rate of Return (%)	4,874.62
Resulting Expenditure (\$1,000)	6,429
Resulting Savings (\$1,000)	313,389
Worst Case Scenario	
County Types and Parcels	Urban (7 parcels), Rural (15 parcels), and Tarrant (1 parcel)
Budget Option (\$1,000)	1,425
Worst Rate of Return (%)	880.56
Resulting Expenditure (\$1,000)	1,389
Resulting Savings (\$1,000)	12,231

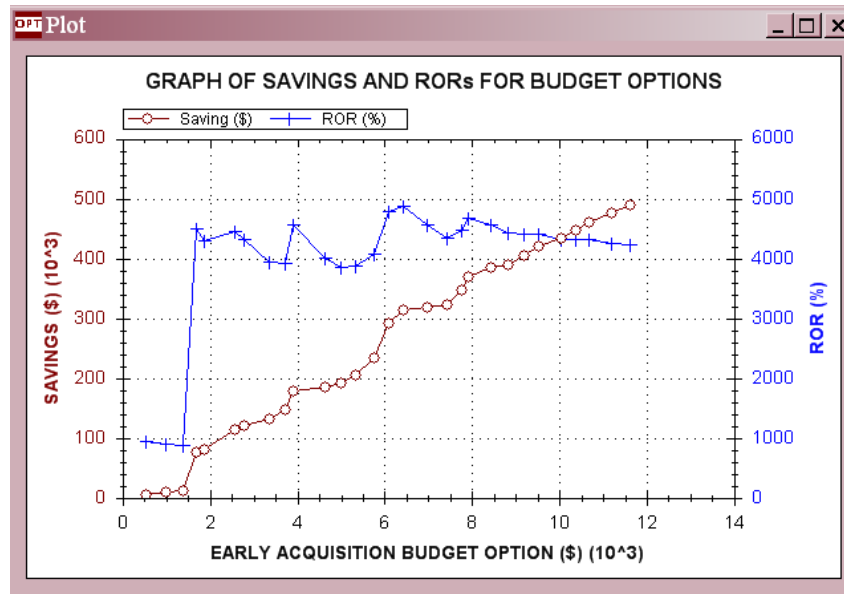


Figure B.1: Graph of Savings and RORs for Budget Options of the Environmental Clearance Obtained Scenario for the First Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 12255

Minimum Budget: 615

Increment: 405
(Enter any integer > 0 and =< 11640)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1614	1932	2132	275
Project 2	0	262	346	471	568
Project 3	0	23	53	77	90
Project 4	0	1382	1484	1701	200

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	50381	63607	69433	905
Project 2	0	2790	3678	4874	600
Project 3	0	136	333	338	341
Project 4	0	52619	55826	61546	705

SOLVE

Figure B.2: EROW Input Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS

RESULTS

	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5	Project 6
	191457	3.839.12	Scenario 5	Not Selected	Not Selected	Not Selected	Scenario 3	Not Selected
	205584	3.860.01	Scenario 2	Not Selected	Not Selected	Scenario 3	Scenario 3	Not Selected
	234300	4.078.33	Not Selected	Scenario 3	Not Selected	Scenario 3	Scenario 4	Not Selected
	291291	4.774.48	Not Selected	Scenario 3	Not Selected	Not Selected	Scenario 5	Not Selected
	313389	4.874.62	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 7	Not Selected
	318558	4.565.83	Not Selected	Scenario 3	Not Selected	Not Selected	Scenario 7	Scenario 2
	322236	4.343.39	Not Selected	Scenario 8	Not Selected	Not Selected	Scenario 7	Scenario 2
	347117	4.472.00	Not Selected	Not Selected	Not Selected	Scenario 5	Scenario 5	Not Selected
	369215	4.665.93	Not Selected	Not Selected	Not Selected	Scenario 3	Scenario 7	Not Selected
	383948	4.551.30	Not Selected	Not Selected	Not Selected	Scenario 5	Scenario 7	Not Selected

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	4,874.62%	4,215.82%
Budget Required	\$6429	\$11608
Savings Obtained	\$313389	\$489372

PLOT RESULTS

SAVE RESULTS

EXIT

Figure B.3: EROW Best Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study One.

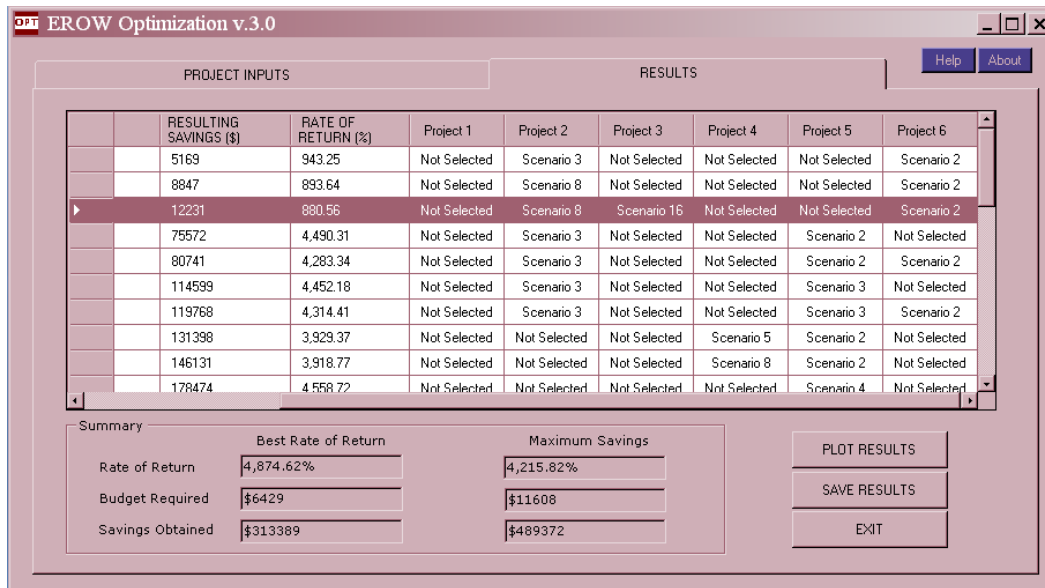


Figure B.4: EROW Worst Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study One.

Table B.2: Best and Worst Case Scenario of the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study One

First Parcel Purchased (inc. early)	
Best Case Scenario	
County Type and Parcels	Harris (1 parcel)
Budget Option (\$1,000)	3,083
Best Rate of Return (%)	2,719.24
Resulting Expenditure (\$1,000)	2,728
Resulting Savings (\$1,000)	74,181
Worst Case Scenario	
County Types and Parcels	Urban (5 parcels), Rural (15 parcels), And Tarrant (1 parcel)
Budget Option (\$1,000)	2,137
Worst Rate of Return (%)	695.58
Resulting Expenditure (\$1,000)	1,741
Resulting Savings (\$1,000)	12,110

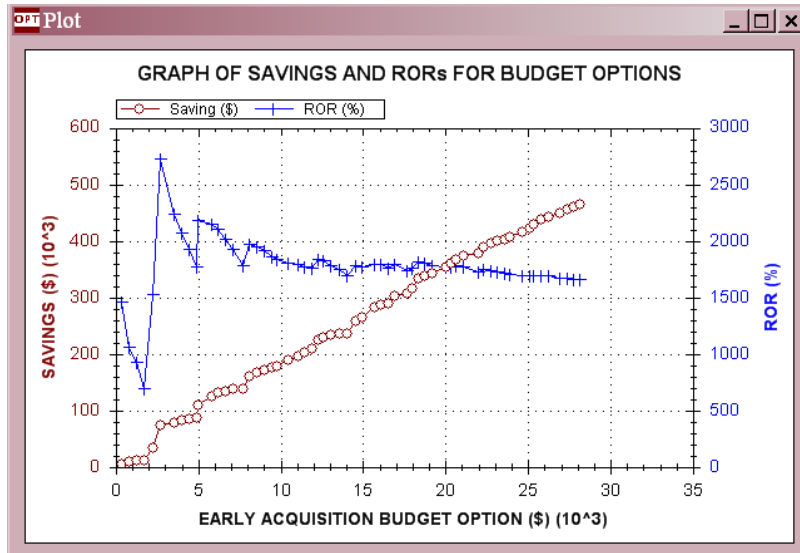


Figure B.5: Graph of Savings and RORs for Budget Options of the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 28994

Minimum Budget: 718

Increment: 473

(Enter any integer > 0 and <= 28276)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %

(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	So
Project 1	0	3543	4659	5296	693
Project 2	0	333	466	641	786
Project 3	0	26	60	88	104
Project 4	0	2659	4133	4949	562

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	So
Project 1	0	48452	60880	66269	866
Project 2	0	2719	3559	4704	579
Project 3	0	133	325	326	327
Project 4	0	51342	53177	58297	669

SOLVE

Figure B.6: EROW Input Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study One.

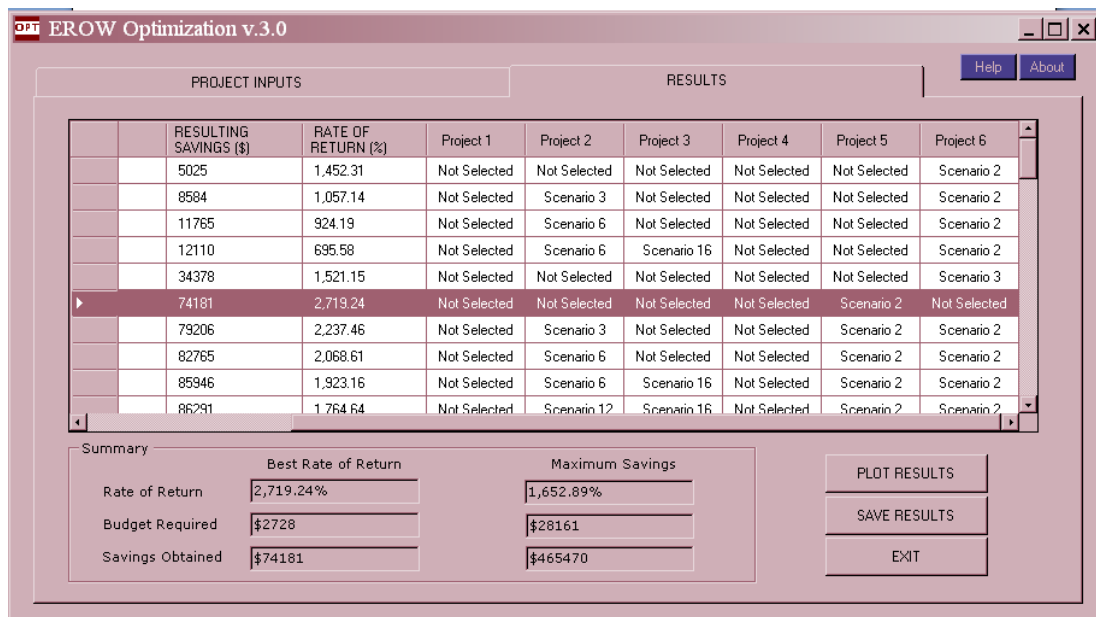


Figure B.7: EROW Best Case Scenario Output Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study One.

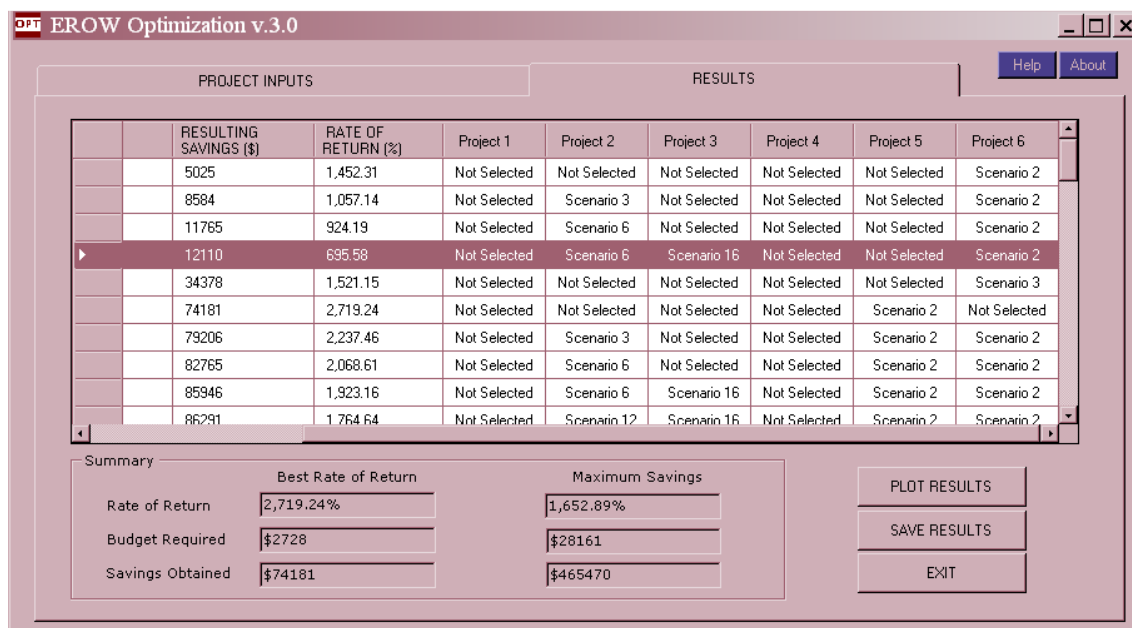


Figure B.8: EROW Worst Case Scenario Output Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study One.

Table B.3: Best and Worst Case Scenario of the First Parcel Purchased (not early) Scenario for the First Option of Case Study One

First Parcel Purchased (not early)	
Best Case Scenario	
County Type and Parcels	Harris (1 parcel)
Budget Option (\$1,000)	2980
Best Rate of Return (%)	2,719.24
Resulting Expenditure (\$1,000)	2,728
Resulting Savings (\$1,000)	74,181
Worst Case Scenario	
County Types and Parcels	Urban (5 parcels), Rural (15 parcels), and Tarrant (1 parcel)
Budget Option (\$1,000)	2,066
Worst Rate of Return (%)	737.93
Resulting Expenditure (\$1,000)	1,653
Resulting Savings (\$1,000)	12,198

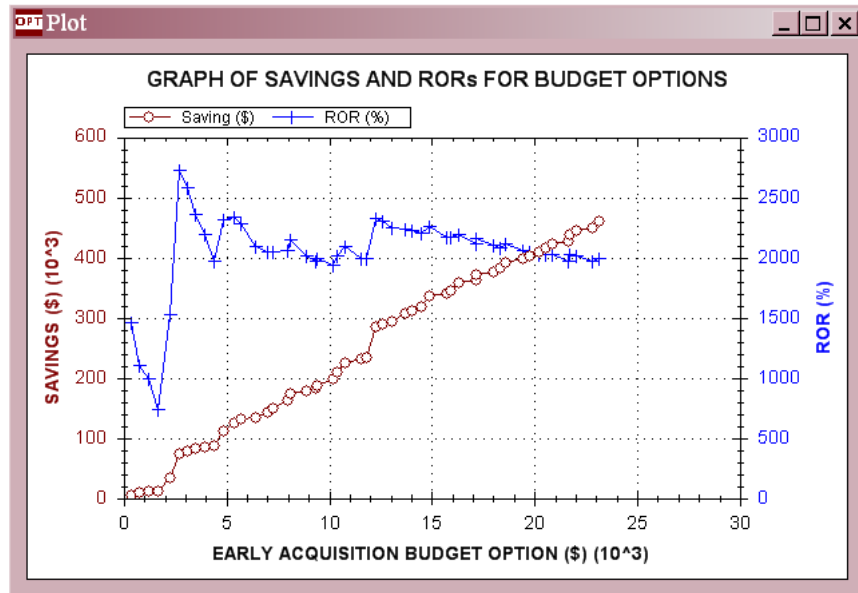


Figure B.9: Graph of Savings and RORs for Budget Options of the First Parcel Purchased (not early) Scenario for the First Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 23561

Minimum Budget: 695

Increment: 457
(Enter any integer > 0 and =< 22866)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

RESULTS

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	So
Project 1	0	3543	4348	4802	602
Project 2	0	333	439	601	730
Project 3	0	26	60	87	102
Project 4	0	2659	2850	3244	382

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	So
Project 1	0	48452	61191	66763	877
Project 2	0	2719	3586	4743	584
Project 3	0	133	326	328	325
Project 4	0	51342	54459	60002	687

SOLVE

Figure B.10: EROW Input Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS

RESULTS

	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5	Project 6
	12198	737.93	Not Selected	Scenario 6	Scenario 16	Not Selected	Not Selected	Scenario 2
	34389	1,529.08	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 3
	74181	2,719.24	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 2	Not Selected
	79206	2,576.64	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 2	Scenario 2
	82792	2,356.73	Not Selected	Scenario 3	Not Selected	Not Selected	Scenario 2	Scenario 2
	86019	2,189.89	Not Selected	Scenario 6	Not Selected	Not Selected	Scenario 2	Scenario 2
	86379	1,971.67	Not Selected	Scenario 6	Scenario 16	Not Selected	Scenario 2	Scenario 2
	111978	2,309.30	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 3	Not Selected
	125523	2,330.11	Not Selected	Not Selected	Not Selected	Scenario 2	Scenario 2	Not Selected
	130548	2,277.13	Not Selected	Not Selected	Not Selected	Scenario 2	Scenario 2	Scenario 2

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	2,719.24%	1,987.10%
Budget Required	\$2728	\$23114
Savings Obtained	\$74181	\$459299

PLOT RESULTS

SAVE RESULTS

EXIT

Figure B.11: EROW Best Case Scenario Output Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study One.

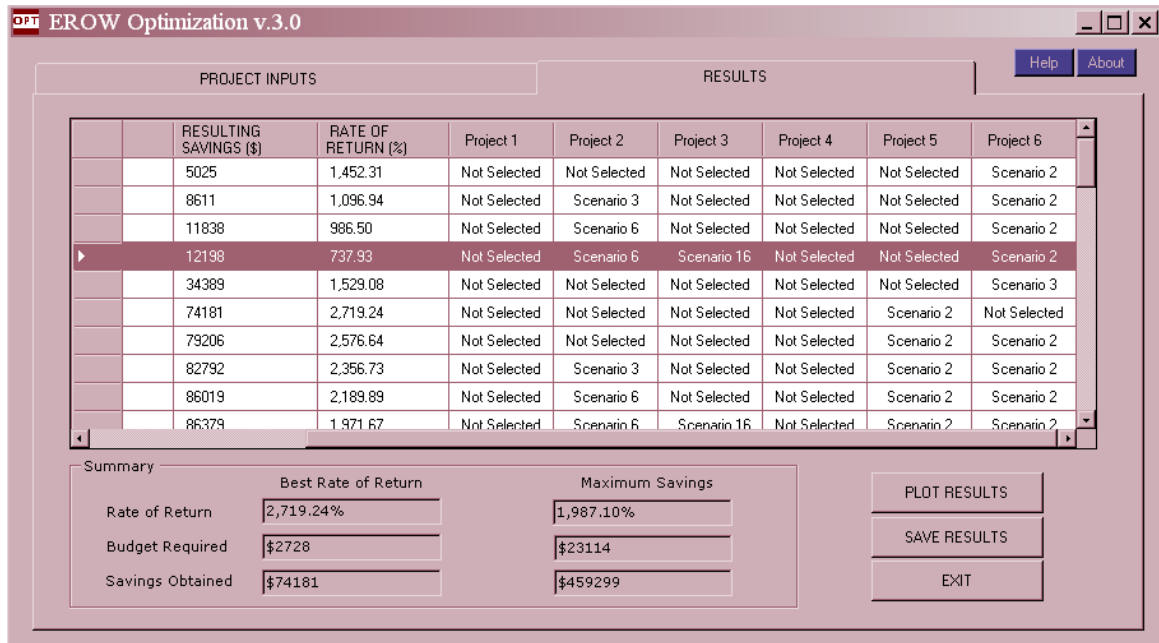


Figure B.12: EROW Worst Case Scenario Output Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study One.

Table B.4: Best and Worst Case Scenario of the ROW Release Obtained Scenario for the First Option of Case Study One

ROW Release Obtained	
Best Case Scenario	
County Type and Parcels	Harris (1 parcel)
Budget Option (\$1,000)	1,935
Best Rate of Return (%)	4,697.82
Resulting Expenditure (\$1,000)	1,603
Resulting Savings (\$1,000)	75,306
Worst Case Scenario	
County Types and Parcels	Urban (7 parcels), and Tarrant (1 parcel)
Budget Option (\$1,000)	1,507
Worst Rate of Return (%)	1,086.80
Resulting Expenditure (\$1,000)	1,114
Resulting Savings (\$1,000)	12,107

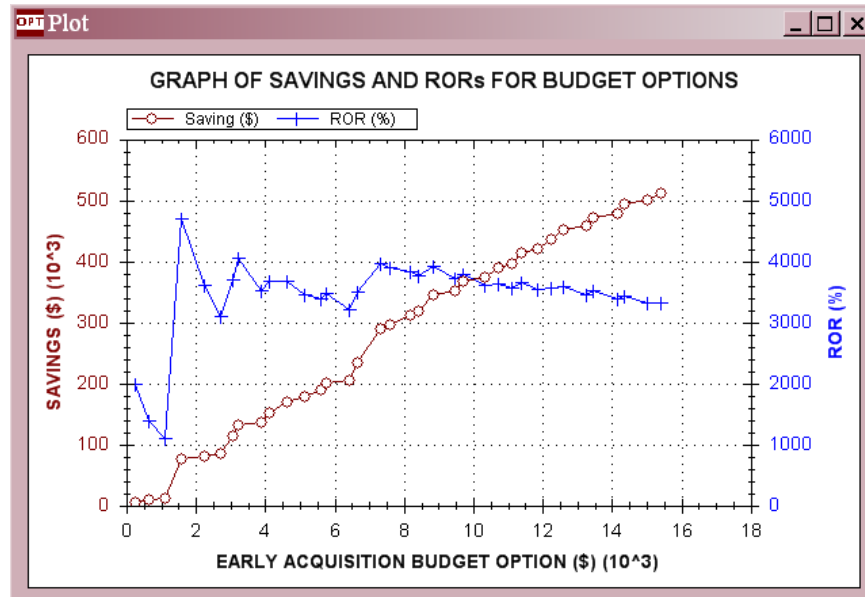


Figure B.13: Graph of Savings and RORs for Budget Options of the ROW Release Obtained Scenario for the First Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 15808

Minimum Budget: 651

Increment: 428

(Enter any integer > 0 and <= 15157)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %

(Minimum Attractive Rate of Return)

STATUS

Data Processed.

RESULTS

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1891	2296	2536	326
Project 2	0	284	376	509	616
Project 3	0	24	56	81	96
Project 4	0	1494	1626	1900	226

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	50104	63242	69028	904
Project 2	0	2768	3649	4836	596
Project 3	0	135	330	333	335
Project 4	0	52507	55684	61347	702

SOLVE

Figure B.14: EROW Input Screen for the ROW Release Obtained Scenario for the First Option of Case Study One.

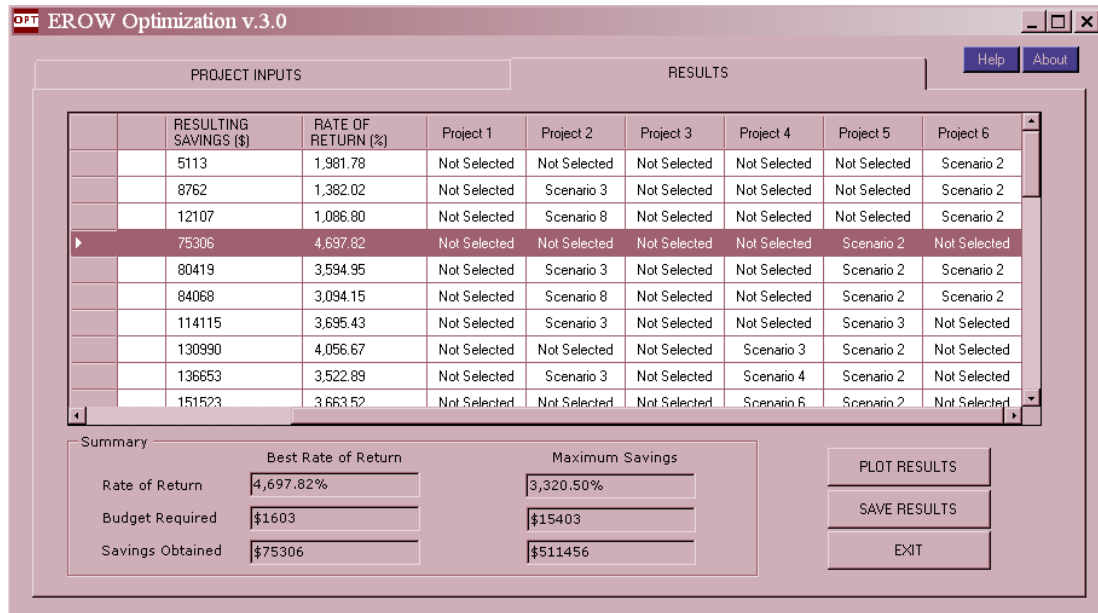


Figure B.15: EROW Best Case Scenario Output Screen for the ROW Release Obtained Scenario for the First Option of Case Study One.

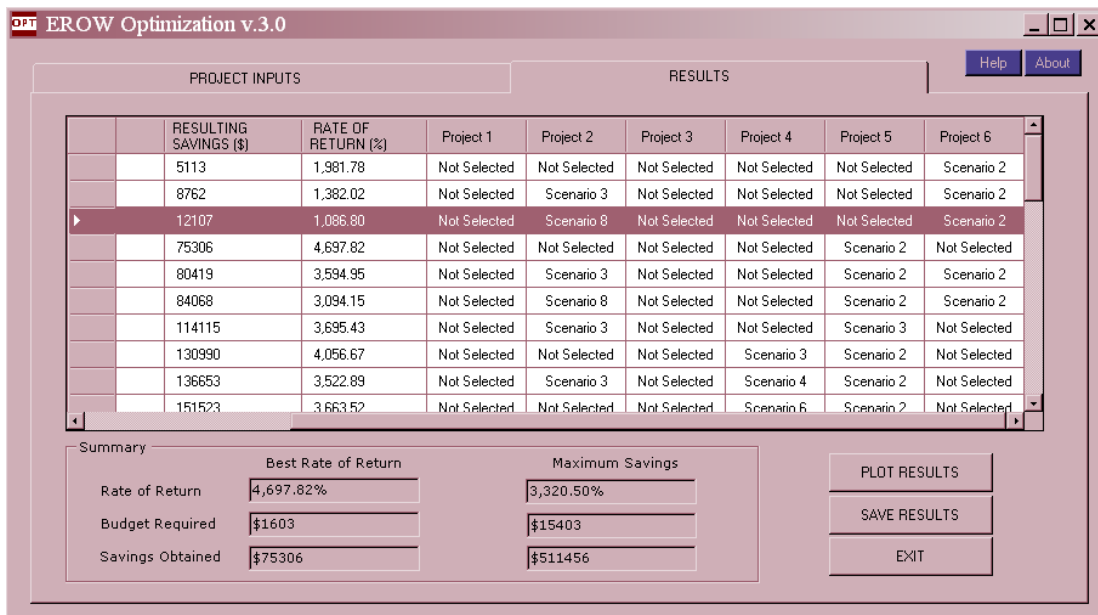


Figure B.16: EROW Worst Case Scenario Output Screen for the ROW Release Obtained Scenario for the First Option of Case Study One.

Table B.5: Best and Worst Case Scenario of the Schematics Available (time 0) Scenario for the First Option of Case Study One

Schematics Available	
Best Case Scenario	
County Type and Parcels	Harris (3 parcels)
Budget Option (\$1,000)	2,992
Best Rate of Return (%)	6,441.97
Resulting Expenditure (\$1,000)	2,788
Resulting Savings (\$1,000)	179,602
Worst Case Scenario	
County Types and Parcels	Urban (6 parcels), and Tarrant (1 parcel)
Budget Option (\$1,000)	886
Worst Rate of Return (%)	1,175.33
Resulting Expenditure (\$1,000)	762
Resulting Savings (\$1,000)	8,956

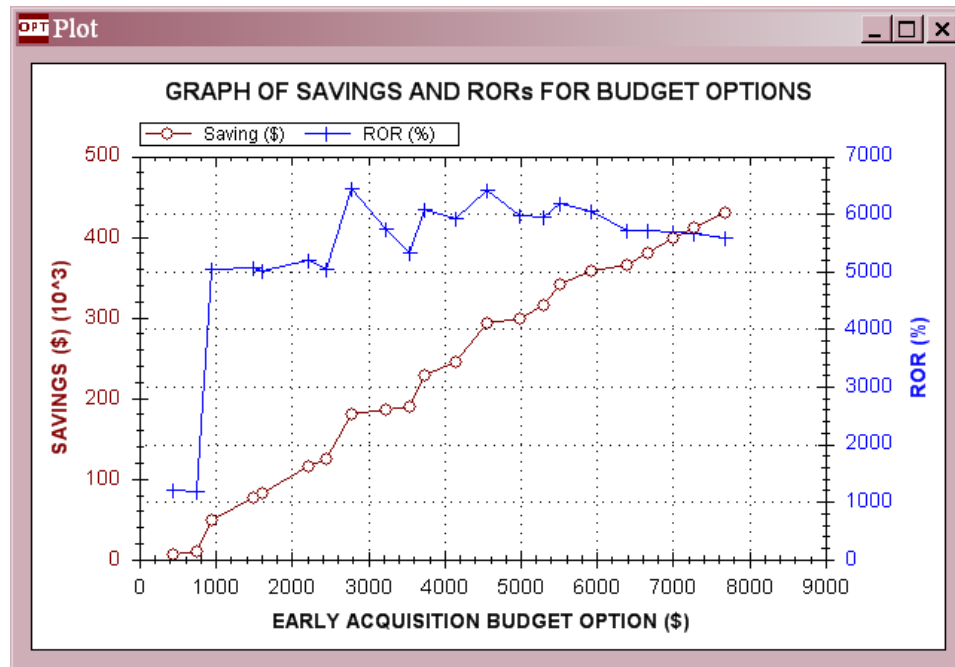


Figure B.17: Graph of Savings and RORs for Budget Options of the Schematics Available (time 0) Scenario for the First Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 7959

Minimum Budget: 535

Increment: 351
(Enter any integer > 0 and <= 7424)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

RESULTS

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1287	1545	1716	215
Project 2	0	247	321	434	517
Project 3	0	21	46	67	79
Project 4	0	1341	1408	1540	175

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	50708	63994	69849	915
Project 2	0	2805	3704	4911	606
Project 3	0	138	340	347	352
Project 4	0	52660	55902	61706	706

SOLVE

Figure B.18: EROW Input Screen for the Schematics Available (time 0) Scenario for the First Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS

RESULTS

	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5	Project 6
	48031	5,024.16	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 5
	75731	5,052.10	Not Selected	Scenario 3	Not Selected	Not Selected	Scenario 2	Not Selected
	80983	5,005.13	Not Selected	Scenario 3	Not Selected	Not Selected	Scenario 2	Scenario 2
	114937	5,198.42	Not Selected	Scenario 3	Not Selected	Not Selected	Scenario 3	Not Selected
	123762	5,041.22	Not Selected	Scenario 3	Not Selected	Not Selected	Scenario 2	Scenario 5
	179602	6,441.97	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 4	Not Selected
	184854	5,726.58	Not Selected	Scenario 3	Not Selected	Not Selected	Scenario 4	Scenario 2
	188558	5,311.49	Not Selected	Scenario 7	Not Selected	Not Selected	Scenario 4	Scenario 2
	227633	6,079.94	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 4	Scenario 5
	245582	5,904.83	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 4	Scenario 6

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	6,441.97%	5,588.87%
Budget Required	\$2788	\$7681
Savings Obtained	\$179602	\$429281

PLOT RESULTS

SAVE RESULTS

EXIT

Figure B.19: EROW Best Case Scenario Output Screen for the Schematics Available (time 0) Scenario for the First Option of Method One.

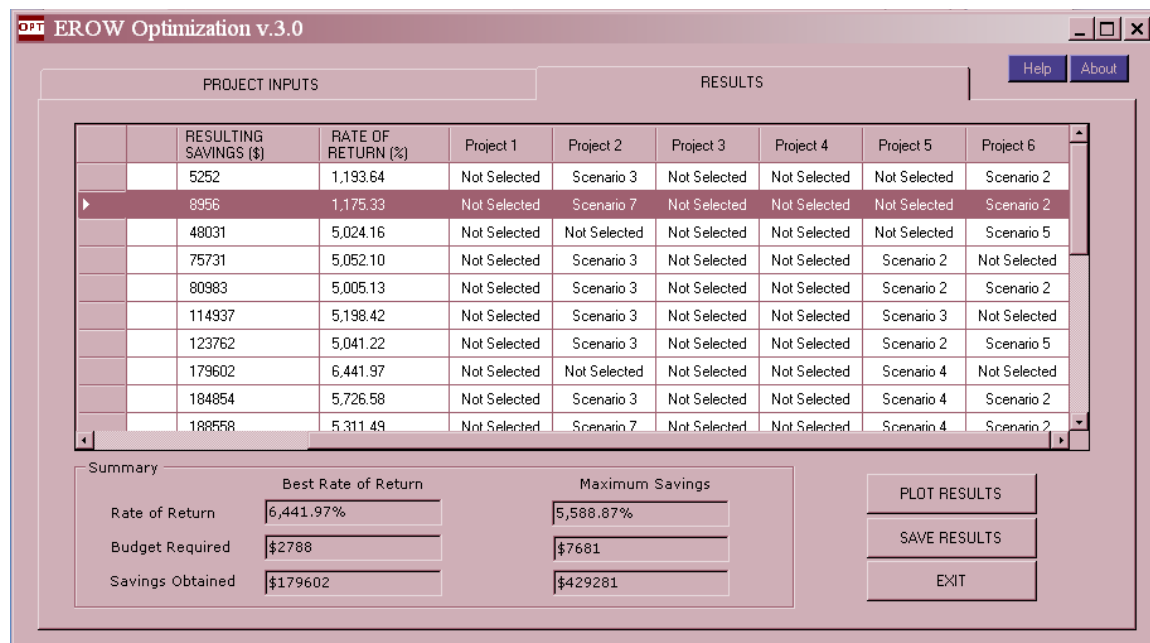


Figure B.20: EROW Worst Case Scenario Output Screen for the Schematics Available (time 0) Scenario for the First Option of Case Study One.

Second Option:

Table B.6: Best and Worst Case Scenario of the Dallas County for the Second Option of Case Study One

Dallas	
Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (5 parcels)
Budget Option (\$1,000)	2,685
Best Rate of Return (%)	4,086.60
Resulting Expenditure (\$1,000)	1881
Resulting Savings (\$1,000)	76,869
Worst Case Scenario	
Speculation Scenario and Parcels	Schematics Available (16 parcels)
Budget Option (\$1,000)	3,659
Worst Rate of Return (%)	2,803.74
Resulting Expenditure (\$1,000)	2,860
Resulting Savings (\$1,000)	80,187

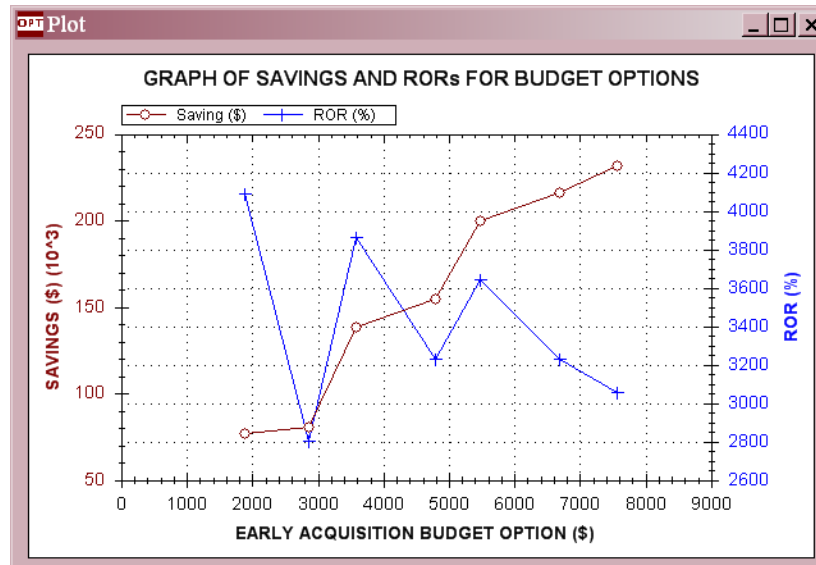


Figure B.21: Graph of Savings and RORs for Budget Options of the Dallas County for the Second Option of Case Study One.

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 9470

Minimum Budget: 2685

Increment: 974
(Enter any integer > 0 and <= 6785)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1382	1484	1701	2000
Project 2	0	2659	2850	3244	3820
Project 3	0	1341	1408	1540	1750
Project 4	0	2659	4133	4949	5620

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	52619	55826	61546	70500
Project 2	0	51342	54459	60002	68700
Project 3	0	52660	55902	61706	70600
Project 4	0	51342	53177	58297	66500

SOLVE

Figure B.22: EROW Input Screen for the Dallas County for the Second Option of Case Study One.

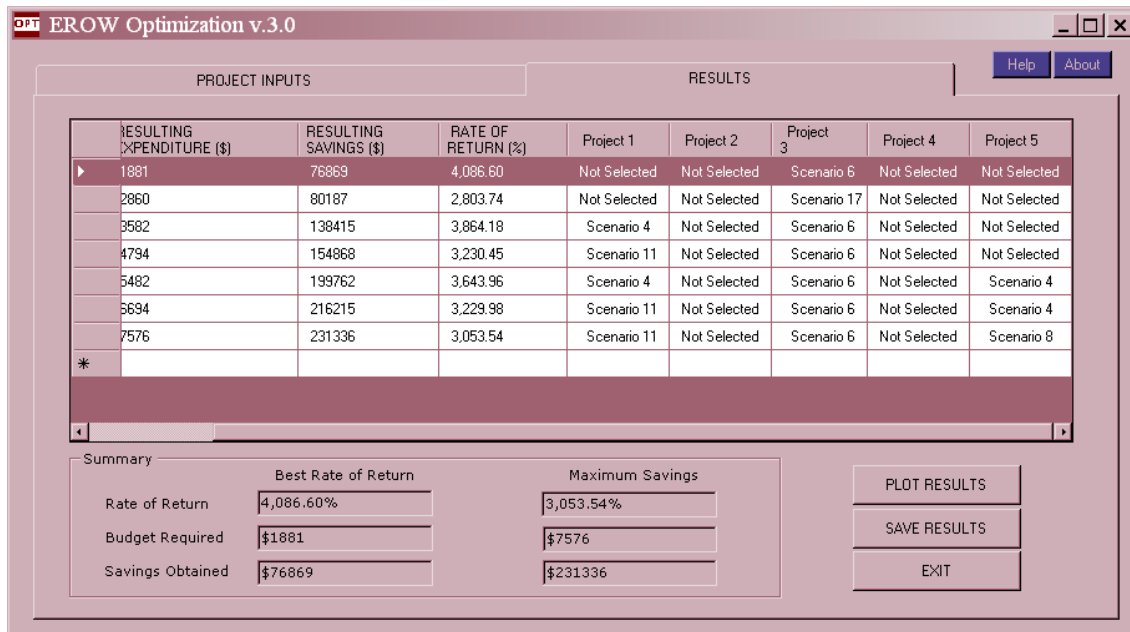


Figure B.23: EROW Best Case Scenario Output Screen for the Dallas County for the Second Option of Case Study One.

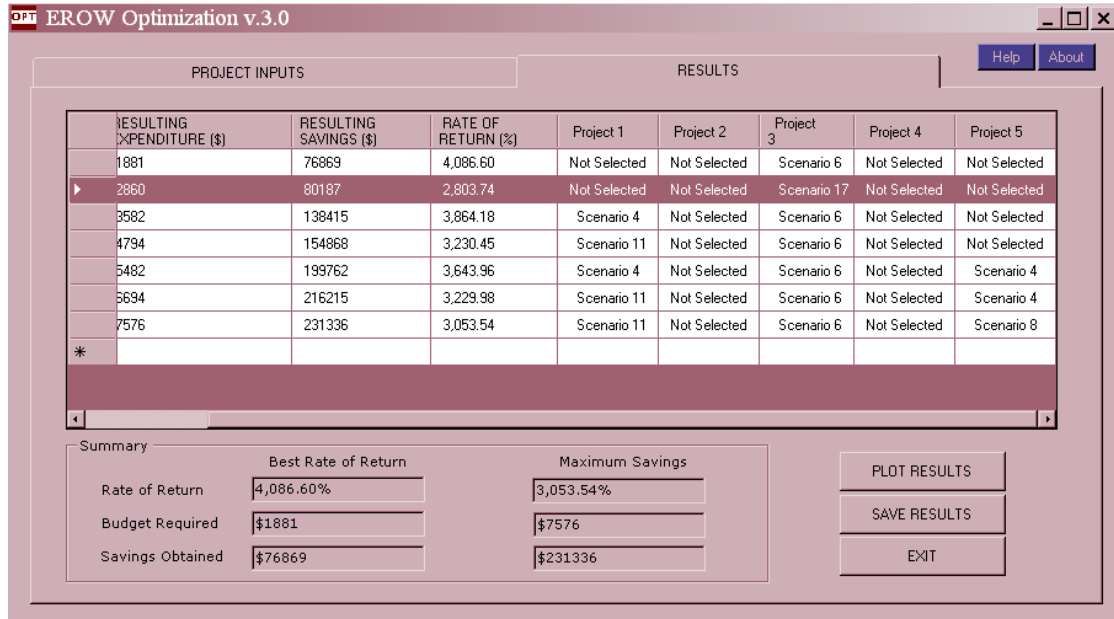


Figure B.24: EROW Worst Case Scenario Output Screen for the Dallas County for the Second Option of Case Study One.

Table B.7: Best and Worst Case Scenario of the Harris County for the Second Option of Case Study One

Harris	
Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (4 Parcels)
Budget Option (\$1,000)	7,959
Best Rate of Return (%)	6,417.03
Resulting Expenditure (\$1,000)	4,558
Resulting Savings (\$1,000)	292,488
Worst Case Scenario	
Speculation Scenarios and Parcels	Environmental Clearance Obtained (9 parcels) Schematics Available (4 parcels) and ROW Release Obtained (7 parcels)
Budget Option (\$1,000)	26,695
Worst Rate of Return (%)	4,233.12
Resulting Expenditure (\$1,000)	21,831
Resulting Savings (\$1,000)	924,133

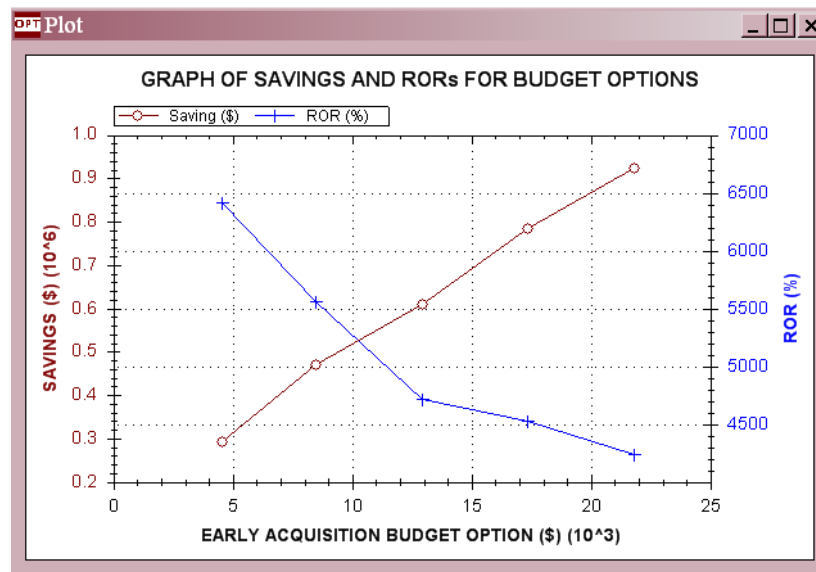


Figure B.25: Graph of Savings and RORs for Budget Options of the Harris County for the Second Option of Case Study One.

OPT EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 28994

Minimum Budget: 7959

Increment: 4684
(Enter any integer > 0 and =< 21035)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

Project inputs	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1337	2228	3915	575
Project 2	0	2728	4849	8113	122
Project 3	0	1178	1890	2788	458
Project 4	0	2728	5639	9132	152

Savings

Project inputs	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	75572	114599	178474	291
Project 2	0	74181	111978	174277	284
Project 3	0	75731	114937	179602	292
Project 4	0	74181	111188	173258	281

SOLVE

Figure B.26: EROW Input Screen for the Harris County for the Second Option of Case Study One.

OPT EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

RESULTING EXPENDITURE (\$)	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5
4558	292488	6,417.03	Not Selected	Not Selected	Scenario 5	Not Selected	Not Selected
8473	470962	5,558.39	Scenario 4	Not Selected	Scenario 5	Not Selected	Not Selected
12946	610463	4,715.46	Scenario 10	Not Selected	Scenario 5	Not Selected	Not Selected
17358	784632	4,520.29	Scenario 4	Not Selected	Scenario 5	Not Selected	Scenario 8
21831	924133	4,233.12	Scenario 10	Not Selected	Scenario 5	Not Selected	Scenario 8
*							

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	6,417.03%	4,233.12%
Budget Required	\$4558	\$21831
Savings Obtained	\$292488	\$924133

PLOT RESULTS

SAVE RESULTS

EXIT

Figure B.27: EROW Best Case Scenario Output Screen for the Harris County for the Second Option of Case Study One.

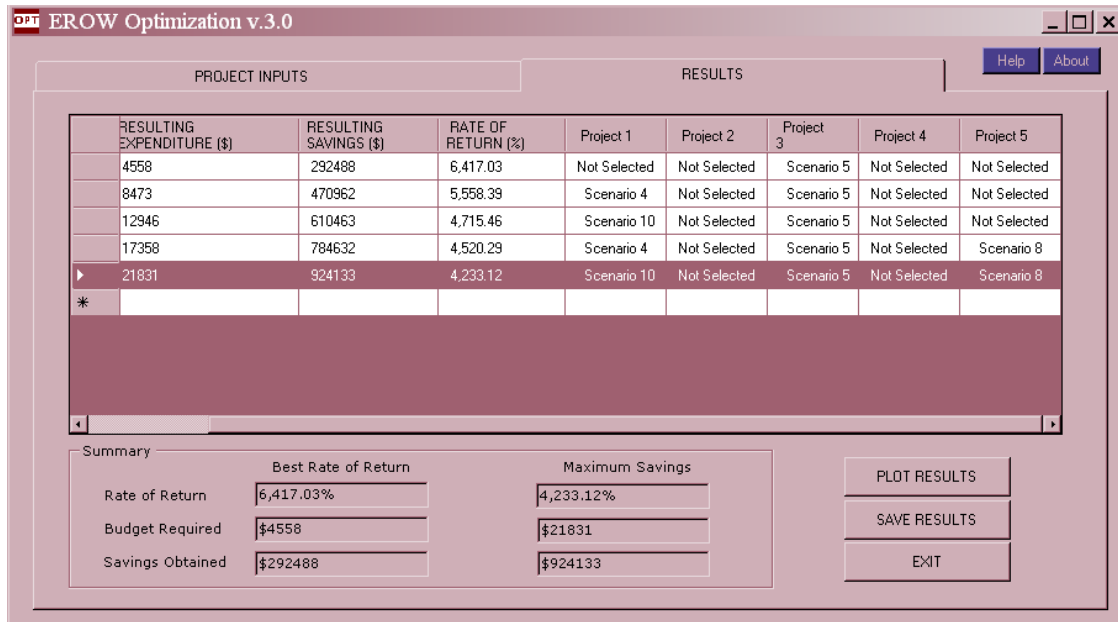


Figure B.28: EROW Worst Case Scenario Output Screen for the Harris County for the Second Option of Case Study One.

Table B.8: Best and Worst Case Scenario of the Metro County for the Second Option of Case Study One

Metro	
Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (12 parcels)
Budget Option (\$1,000)	4,317
Best Rate of Return (%)	3,768.01
Resulting Expenditure (\$1,000)	3,351
Resulting Savings (\$1,000)	126,266
Worst Case Scenario	
Speculation Scenarios and Parcels	Environmental Clearance Obtained (16 parcels), Schematics Available (12 parcels), and ROW Release (10 parcels)
Budget Option (\$1,000)	14,421
Worst Rate of Return (%)	2,822.68
Resulting Expenditure (\$1,000)	13,355
Resulting Savings (\$1,000)	376,969

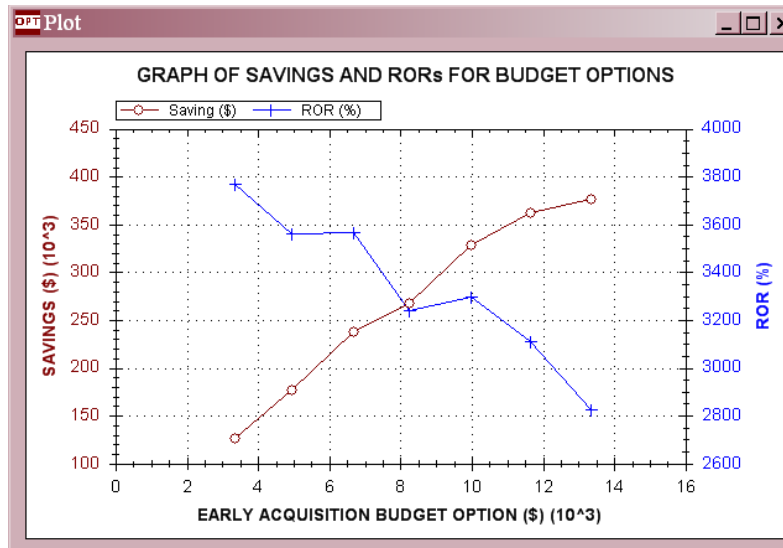


Figure B.29: Graph of Savings and RORs for Budget Options of the Metro County for the Second Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 14769

Minimum Budget: 4317

Increment: 1684
(Enter any integer > 0 and =< 10452)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

RESULTS

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1614	1932	2132	275
Project 2	0	3543	4348	4802	602
Project 3	0	1287	1545	1716	215
Project 4	0	3543	4659	5296	693

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	50381	63607	69433	909
Project 2	0	48452	61191	66763	877
Project 3	0	50708	63994	69849	915
Project 4	0	48452	60880	66269	866

SOLVE

Figure B.30: EROW Input Screen for the Metro County for the Second Option of Case Study One.

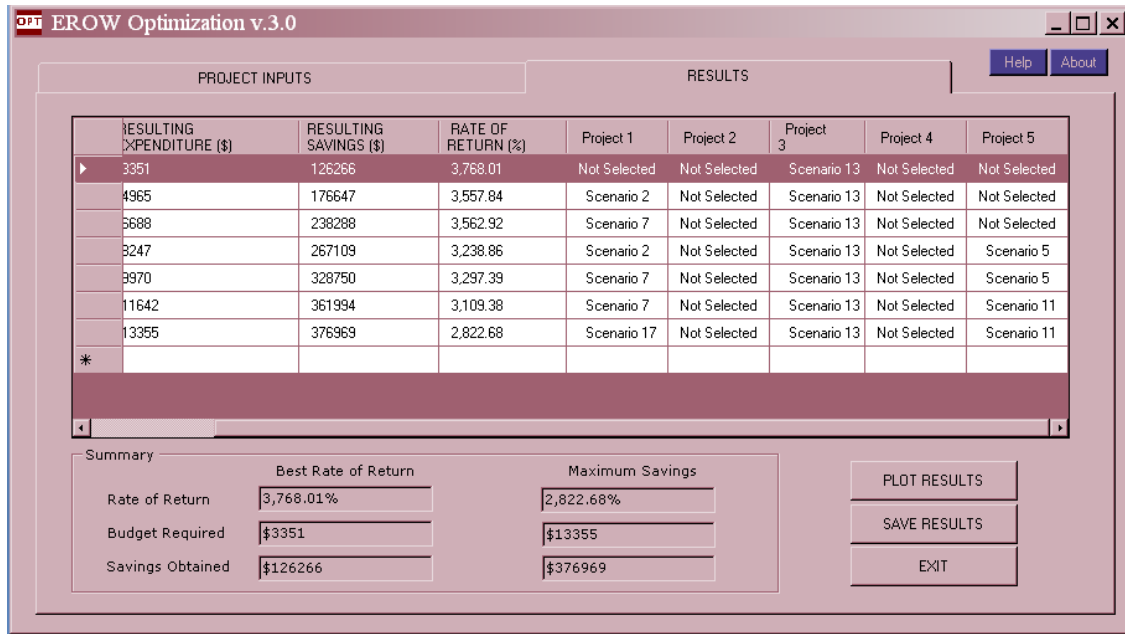


Figure B.31: EROW Best Case Scenario Output Screen for the Metro County for the Second Option of Case Study One.

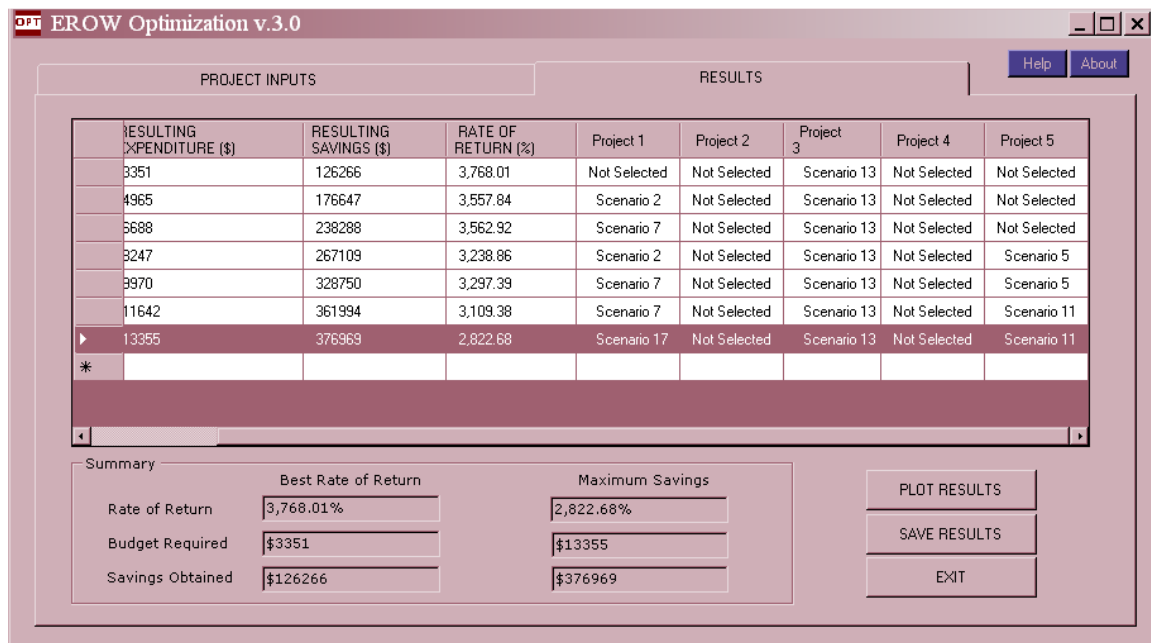


Figure B.32: EROW Worst Case Scenario Output Screen for the Metro County for the Second Option of Case Study One.

Table B.9: Best and Worst Case Scenario of the Rural County for the Second Option of Case Study One

Rural	
Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (15 parcels)
Budget Option (\$1,000)	535
Best Rate of Return (%)	131.62
Resulting Expenditure (\$1,000)	351
Resulting Savings (\$1,000)	462

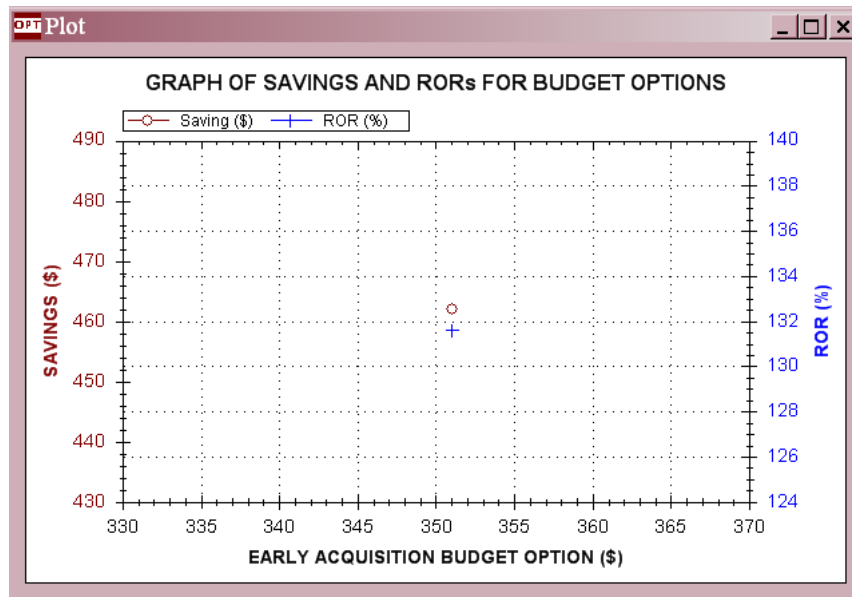


Figure B.33. Graph of Savings and RORs for Budget Options of the Rural County for the Second Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 718

Minimum Budget: 535

Increment: 351
(Enter any integer > 0 and <= 183)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs Browse

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	23	53	77	90
Project 2	0	26	60	87	102
Project 3	0	21	46	67	79
Project 4	0	26	60	88	104

Savings Browse

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	136	333	338	341
Project 2	0	133	326	328	329
Project 3	0	138	340	347	352
Project 4	0	133	325	326	327

SOLVE

Figure B.34: EROW Input Screen for the Rural County for the Second Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

	RESULTING EXPENDITURE (\$)	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5
*	351	462	131.62	Not Selected	Not Selected	Scenario 16	Not Selected	Not Selected

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	131.62%	131.62%
Budget Required	\$351	\$351
Savings Obtained	\$462	\$462

PLOT RESULTS

SAVE RESULTS

EXIT

Figure B.35: EROW Best Case Scenario Output Screen for the Rural County for the Second Option of Case Study One.

Table B.10: Best and Worst Case Scenario of the Tarrant County for the Second Option of Case Study One

Tarrant	
Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (20 parcels)
Budget Option (\$1,000)	7,228
Best Rate of Return (%)	1,707.99
Resulting Expenditure (\$1,000)	4,732
Resulting Savings (\$1,000)	80,822
Worst Case Scenario	
Speculation Scenarios and Parcels	Environmental Clearance Obtained (13 parcels), Schematics Available (20 parcels), and ROW Release Obtained (13 parcels)
Budget Option (\$1,000)	18,716
Worst Rate of Return (%)	1,511.22
Resulting Expenditure (\$1,000)	14,953
Resulting Savings (\$1,000)	225,972

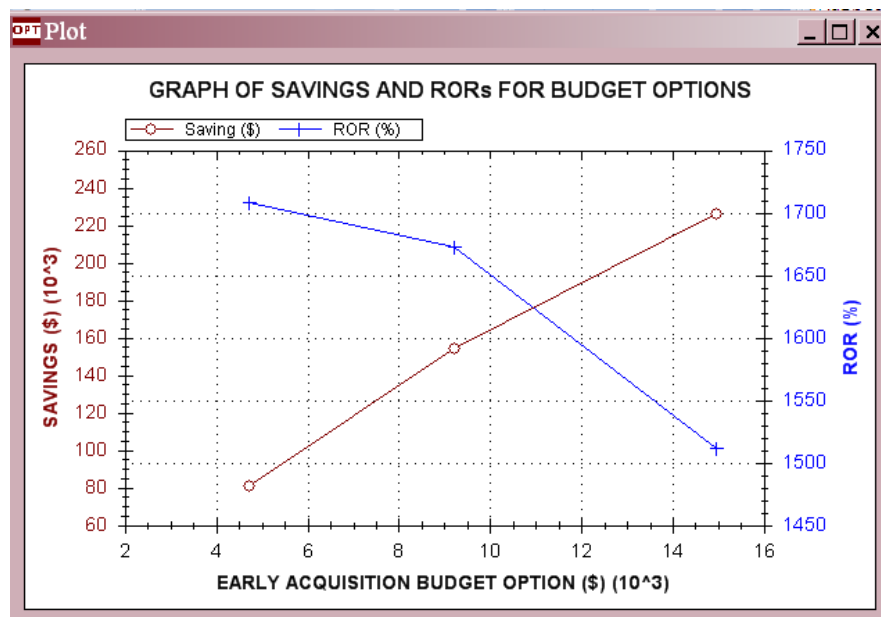


Figure B.36: Graph of Savings and RORs for Budget Options of the Tarrant County for the Second Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 24319
 Minimum Budget: 7228
 Increment: 5744
 (Enter any integer > 0 and =< 17091)

RESULTS OPTIONS

☒ Display Selected Project Scenarios
☒ Apply Incremental Analysis with MARR
 MARR: 25 %
 (Minimum Attractive Rate of Return)

STATUS
 Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	202	1309	1517	171
Project 2	0	346	2249	2626	298
Project 3	0	119	726	837	956
Project 4	0	346	2260	2708	312

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	5169	35330	41928	472
Project 2	0	5025	34389	40819	460
Project 3	0	5252	35912	42607	480
Project 4	0	5025	34378	40736	458

SOLVE

Figure B.37: EROW Input Screen for the Tarrant County for the Second Option of Case Study One.

EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

RESULTING EXPENDITURE (\$)	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5
4732	80822	1,707.99	Not Selected	Not Selected	Scenario 21	Not Selected	Not Selected
3211	154028	1,672.22	Scenario 14	Not Selected	Scenario 21	Not Selected	Not Selected
14953	225972	1,511.22	Scenario 14	Not Selected	Scenario 21	Not Selected	Scenario 14
*							

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	1,707.99%	1,511.22%
Budget Required	\$4732	\$14953
Savings Obtained	\$80822	\$225972

PLOT RESULTS
 SAVE RESULTS
 EXIT

Figure B.38: EROW Best Case Scenario Output Screen for the Tarrant County for the Second Option of Case Study One.

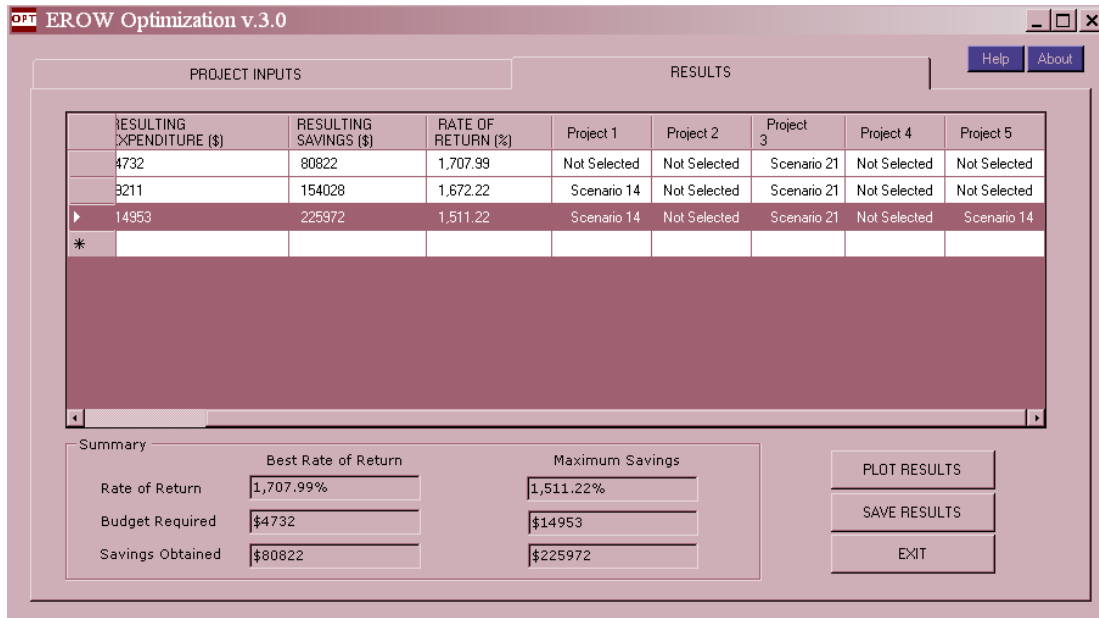


Figure B.39: EROW Worst Case Scenario Output Screen for the Tarrant County for the First Option of Case Study One.

Table B.11: Best and Worst Case Scenario of the Urban County for the Second Option of Case Study One

Urban	
Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (10 parcels)
Budget Option (\$1,000)	1,588
Best Rate of Return (%)	879.90
Resulting Expenditure (\$1,000)	821
Resulting Savings (\$1,000)	7,224
Worst Case Scenario	
Speculation Scenario and Parcels	Environmental Clearance Obtained (8 parcels), and Schematics Available (10 parcels)
Budget Option (\$1,000)	2,454
Worst Rate of Return (%)	866.26
Resulting Expenditure (\$1,000)	1,651
Resulting Savings (\$1,000)	14,302

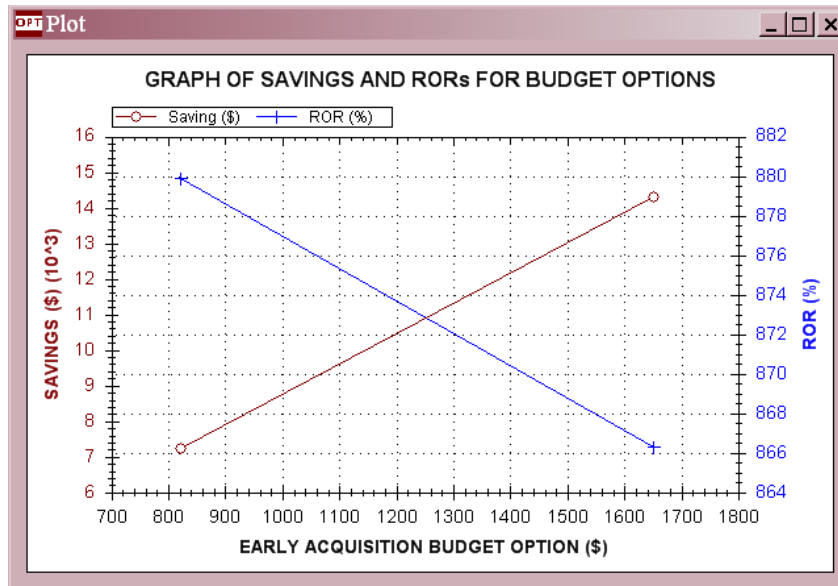


Figure B.40: Graph of Savings and RORs for Budget Options of the Urban County for the Second Option of Case Study One.

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 2460

Minimum Budget: 1588

Increment: 866
(Enter any integer > 0 and <= 872)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	262	346	471	566
Project 2	0	333	439	601	730
Project 3	0	247	321	434	517
Project 4	0	333	466	641	786

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	2790	3678	4874	6000
Project 2	0	2719	3586	4743	5840
Project 3	0	2805	3704	4911	6060
Project 4	0	2719	3559	4704	5790

SOLVE

Figure B.41: EROW Input Screen for the Urban County for the Second Option of Case Study One.

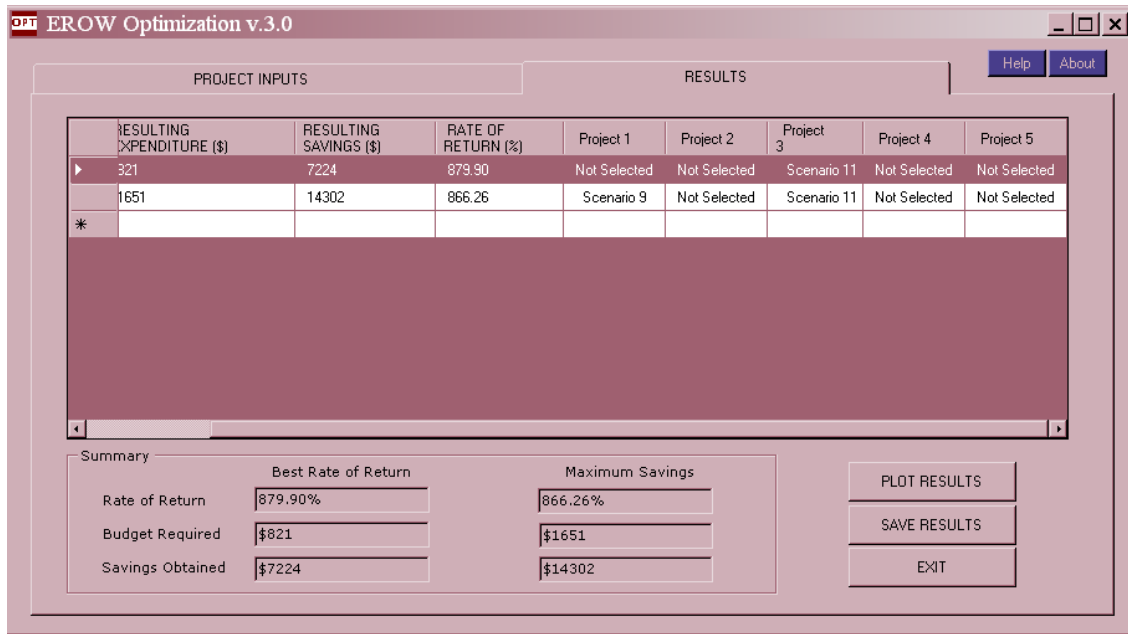


Figure B.42: EROW Best Case Scenario Output Screen for the Urban County for the Second Option of Case Study One.

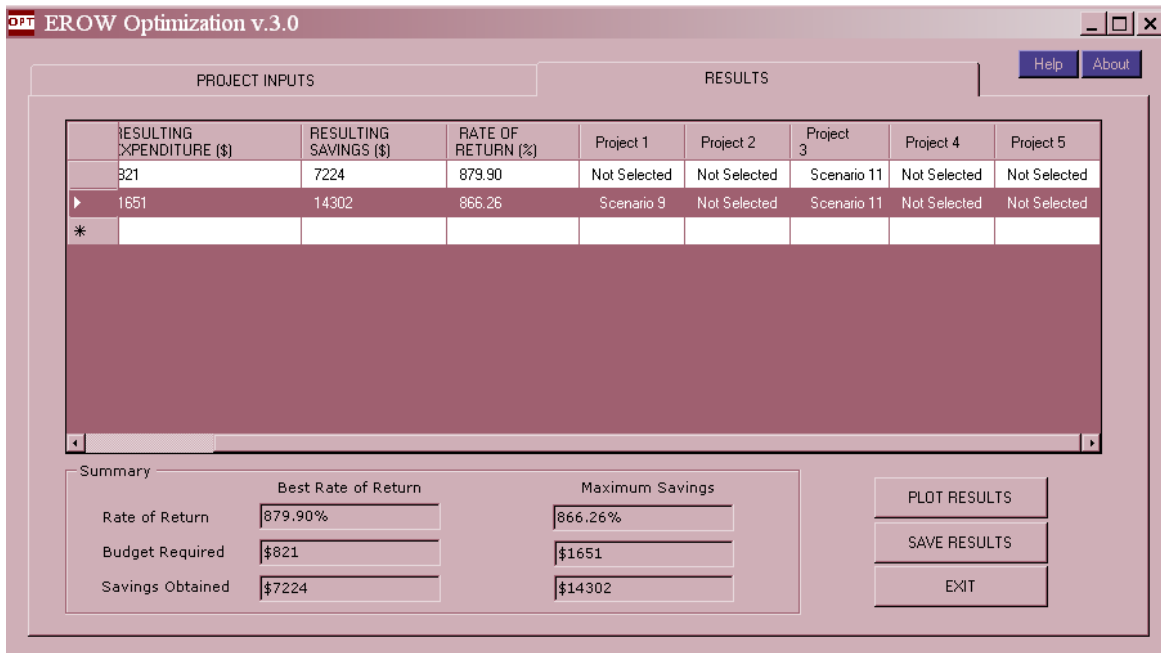


Figure B.43: EROW Worst Case Scenario Output Screen for the Urban County for the Second Option of Case Study One.

Appendix C: EROW Case Study Two Outputs

First Option:

Table C.1: Best and Worst Case Scenario of the Environmental Clearance Obtained Scenario for the First Option of Case Study Two

Environmental Clearance Obtained	
Best Case Scenario	
County Type and Parcels	Harris (3 parcels)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	4,558.72
Resulting Expenditure (\$1,000)	3,915
Resulting Savings (\$1,000)	178,474
Worst Case Scenario	
County Types and Parcels	Metro (42 parcels), Dallas (25 parcels), Harris (12 parcels), and Tarrant (13 parcels)
Budget Option (\$1,000)	31,717
Best Rate of Return (%)	2,083.97
Resulting Expenditure (\$1,000)	29,593
Resulting Savings (\$1,000)	616,708

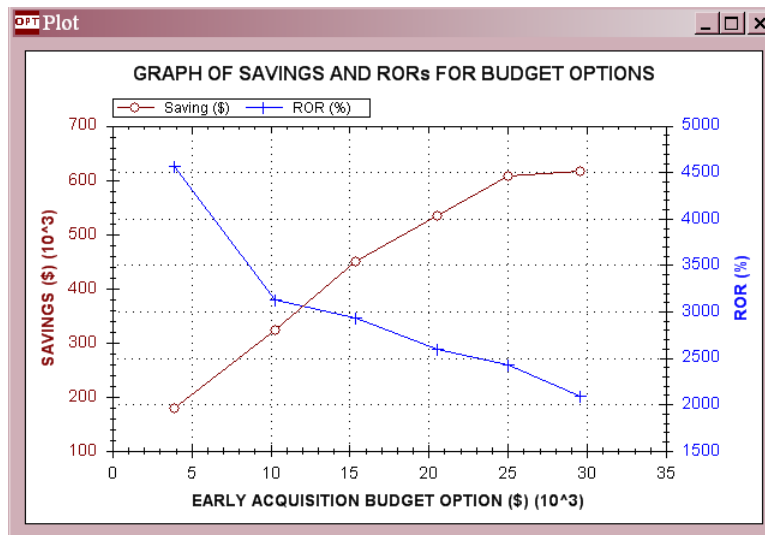


Figure C.1: Graph of Savings and RORs for Budget Options of the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179
(Enter any integer > 0 and =< 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1614	1932	2132	275
Project 2	0	262	346	471	566
Project 3	0	23	53	77	90
Project 4	0	1382	1484	1701	200

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	50381	63607	69433	909
Project 2	0	2790	3678	4874	600
Project 3	0	136	333	338	341
Project 4	0	52619	55826	61546	705

SOLVE

Figure C.2: EROW Input Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5	Project 6
▶	178474	4,558.72	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 4	Not Selected
	322888	3,125.73	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 13	Not Selected
	449885	2,925.13	Scenario 17	Not Selected	Not Selected	Not Selected	Scenario 13	Not Selected
	532770	2,594.57	Scenario 17	Not Selected	Not Selected	Scenario 26	Scenario 13	Not Selected
	605976	2,422.64	Scenario 17	Not Selected	Not Selected	Scenario 26	Scenario 13	Scenario 14
	616708	2,083.97	Scenario 43	Not Selected	Not Selected	Scenario 26	Scenario 13	Scenario 14
*								

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	4,558.72%	2,083.97%
Budget Required	\$3915	\$29593
Savings Obtained	\$178474	\$616708

PLOT RESULTS

SAVE RESULTS

EXIT

Figure C.3: EROW Best Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.

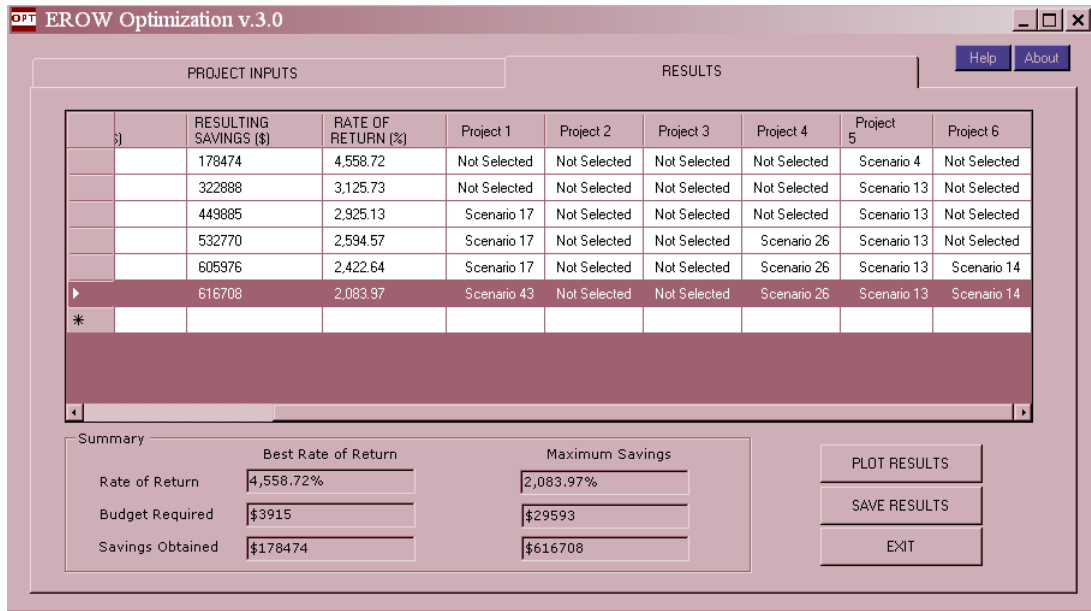


Figure C.4: EROW Worst Case Scenario Output Screen for the Environmental Clearance Obtained Scenario for the First Option of Case Study Two.

Table C.2: Best and Worst Case Scenario of the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study Two

First Parcel Purchased (inc. early)	
Best Case Scenario	
County Type and Parcels	Harris (1 Parcel)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	2,719.24
Resulting Expenditure (\$1,000)	2,728
Resulting Savings (\$1,000)	74,181
Worst Case Scenario	
County Types and Parcels	Metro (2 parcels), Dallas (3 parcels), Harris (4 parcels), and Tarrant (6 parcels)
Budget Option (\$1,000)	31,717
Worst Rate of Return (%)	1,569.26
Resulting Expenditure (\$1,000)	29,934
Resulting Savings (\$1,000)	469,742

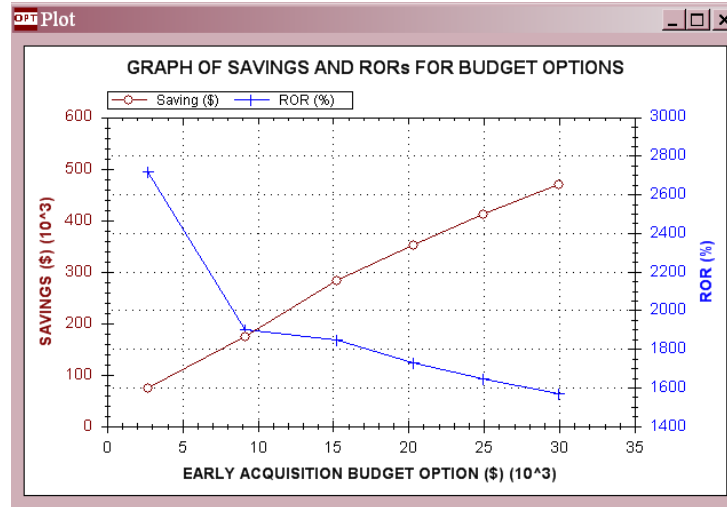


Figure C.5: Graph of Savings and RORs for Budget Options of the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study Two.

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115
 Minimum Budget: 643
 Increment: 5179
 (Enter any integer > 0 and <= 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios
☒ Apply Incremental Analysis with MARR
 MARR: 25 %
 (Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	3543	4659	5296	693
Project 2	0	333	466	641	786
Project 3	0	26	60	88	104
Project 4	0	2659	4133	4949	562

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	48452	60880	66269	866
Project 2	0	2719	3559	4704	575
Project 3	0	133	325	326	327
Project 4	0	51342	53177	58297	669

SOLVE

Figure C.6: EROW Input Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study Two.

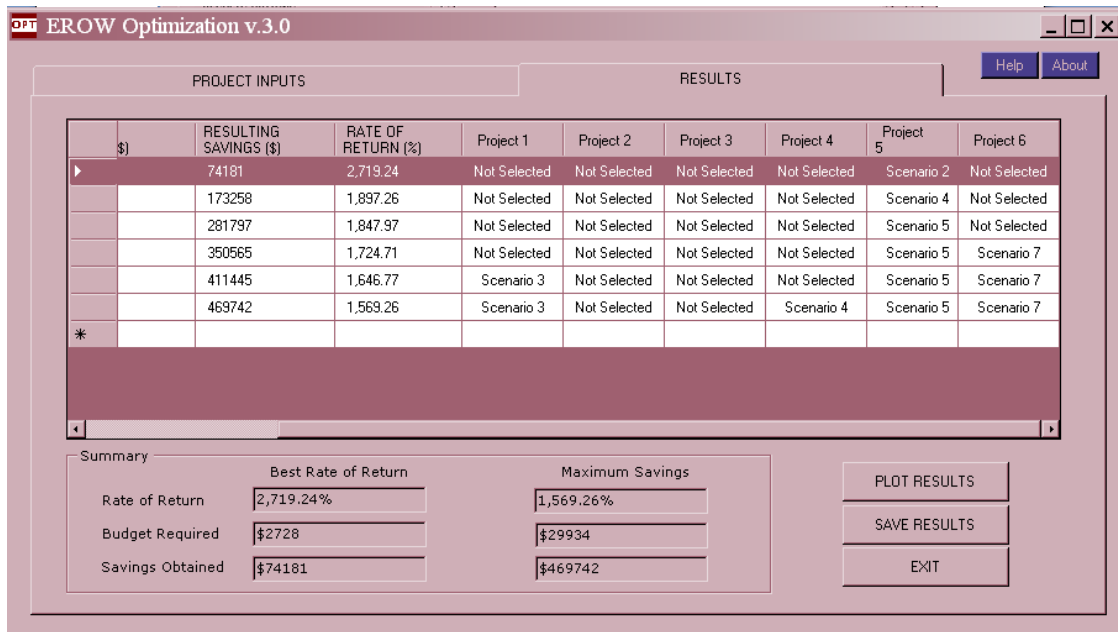


Figure C.7: EROW Best Case Scenario Output Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study Two.

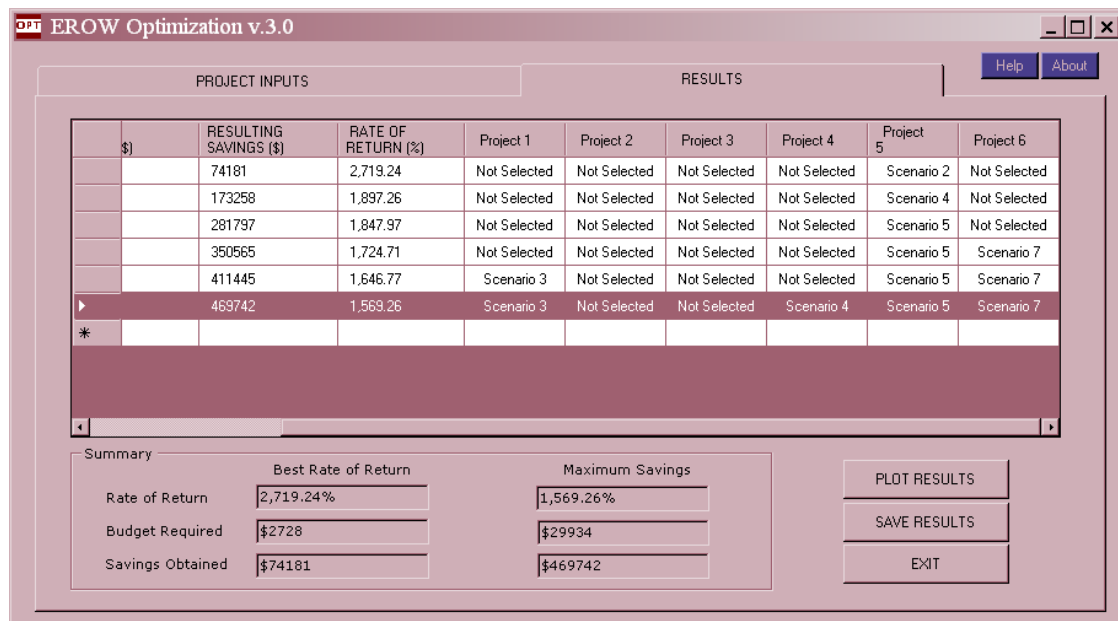


Figure C.8: EROW Worst Case Scenario Output Screen for the First Parcel Purchased (inc. early) Scenario for the First Option of Case Study Two.

Table C.3: Best and Worst Case Scenario of the First Parcel Purchased (not early) Scenario for the First Option of Case Study Two

First Parcel Purchased (Not early)	
Best Case Scenario	
County Type and Parcels	Harris (2 Parcels)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	2,309.30
Resulting Expenditure (\$1,000)	4,849
Resulting Savings (\$1,000)	111,978
Worst Case Scenario	
County Type and Parcels	Metro (3 parcels), Dallas (8 parcels), Harris (7 parcels), and Tarrant (6 parcels)
Budget Option (\$1,000)	31,717
Worst Rate of Return (%)	1,719.26
Resulting Expenditure (\$1,000)	30,122
Resulting Savings (\$1,000)	517,875

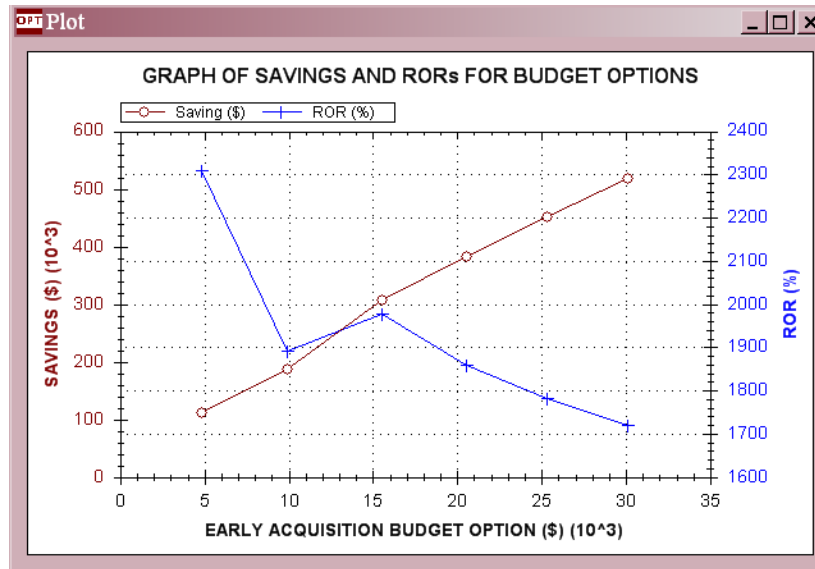


Figure C.9: Graph of Savings and RORs for Budget Options of the First Parcel Purchased (not early) Scenario for the First Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179
(Enter any integer > 0 and ≤ 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	3543	4348	4802	602
Project 2	0	333	439	601	730
Project 3	0	26	60	87	102
Project 4	0	2659	2850	3244	382

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	48452	61191	66763	877
Project 2	0	2719	3586	4743	584
Project 3	0	133	326	328	329
Project 4	0	51342	54459	60002	687

SOLVE

Figure C.10: EROW Input Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5	Project 6
▶	111978	2,309.30	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 3	Not Selected
	186975	1,891.69	Not Selected	Not Selected	Not Selected	Scenario 9	Scenario 3	Not Selected
	307026	1,977.11	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 8	Not Selected
	382023	1,857.73	Not Selected	Not Selected	Not Selected	Scenario 9	Scenario 8	Not Selected
	451112	1,781.64	Not Selected	Not Selected	Not Selected	Scenario 9	Scenario 8	Scenario 7
	517875	1,719.26	Scenario 4	Not Selected	Not Selected	Scenario 9	Scenario 8	Scenario 7
*								

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	2,309.30%	1,719.26%
Budget Required	\$4849	\$30122
Savings Obtained	\$111978	\$517875

PLOT RESULTS

SAVE RESULTS

EXIT

Figure C.11: EROW Best Case Scenario Output Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study Two.

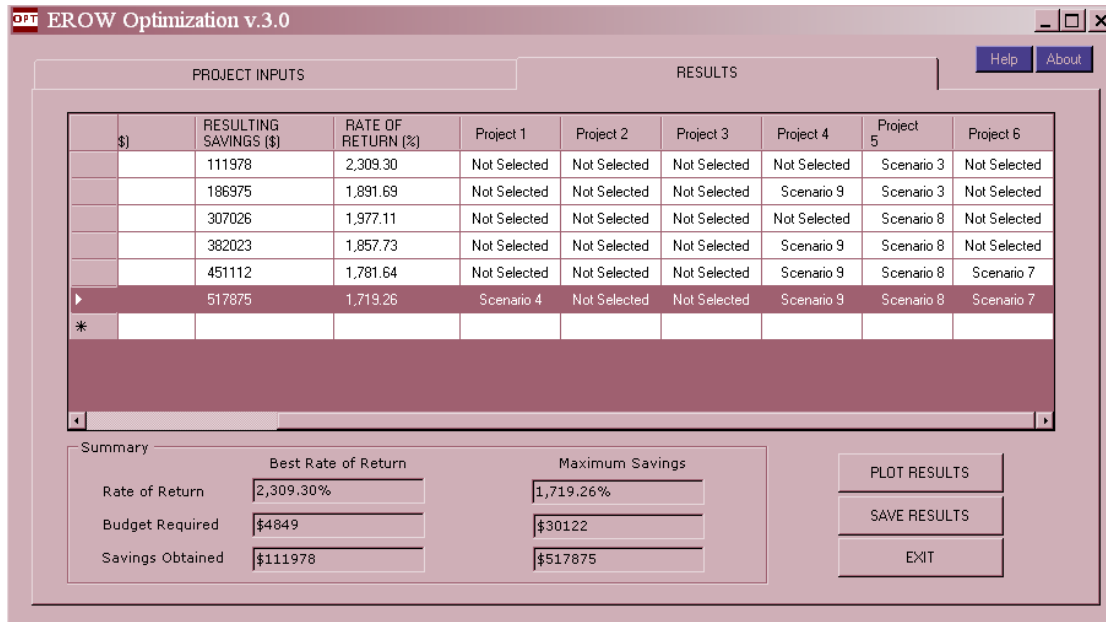


Figure C.12: EROW Worst Case Scenario Output Screen for the First Parcel Purchased (not early) Scenario for the First Option of Case Study Two.

Table C.4: Best and Worst Case Scenario of the ROW Release Obtained Scenario for the First Option of Case Study Two

ROW Release Obtained	
Best Case Scenario	
County Type and Parcels	Harris (3 Parcels)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	3,721.27
Resulting Expenditure (\$1,000)	4,773
Resulting Savings (\$1,000)	177,616
Worst Case Scenario	
County Type and Parcels	Metro (36 parcels), Dallas (17 parcels), Harris (9 parcels), and Tarrant (11 parcels)
Budget Option (\$1,000)	31,717
Worst Rate of Return (%)	1,965.36
Resulting Expenditure (\$1,000)	30,525
Resulting Savings (\$1,000)	599,925

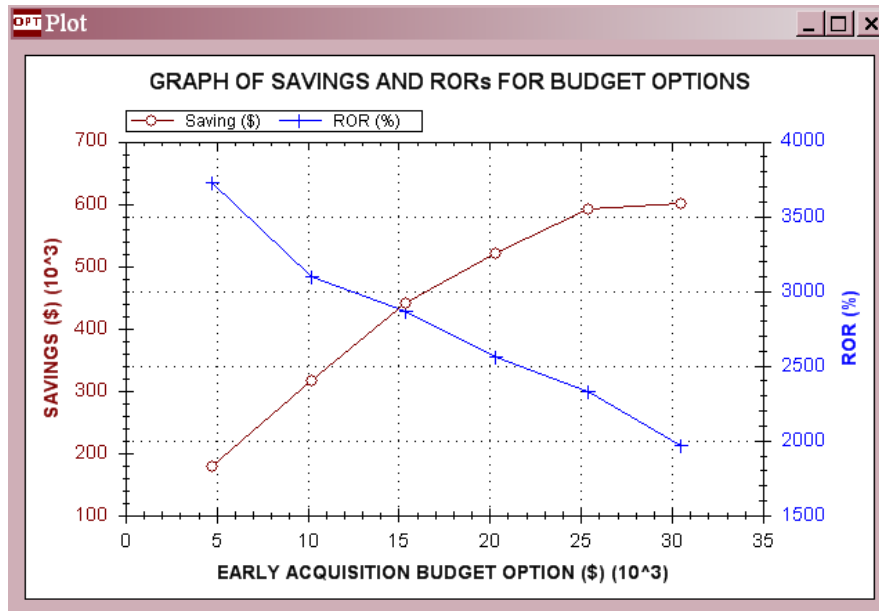


Figure C.13: Graph of Savings and RORs for Budget Options of the ROW Release Obtained Scenario for the First Option of Case Study Two.

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179
(Enter any integer > 0 and <= 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1891	2296	2536	328
Project 2	0	284	376	509	616
Project 3	0	24	56	81	96
Project 4	0	1494	1626	1900	228

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	50104	63242	69028	904
Project 2	0	2768	3649	4836	596
Project 3	0	135	330	333	335
Project 4	0	52507	55684	61347	702

SOLVE

Figure C.14: EROW Input Screen for the ROW Release Obtained Scenario for the First Option of Case Study Two.

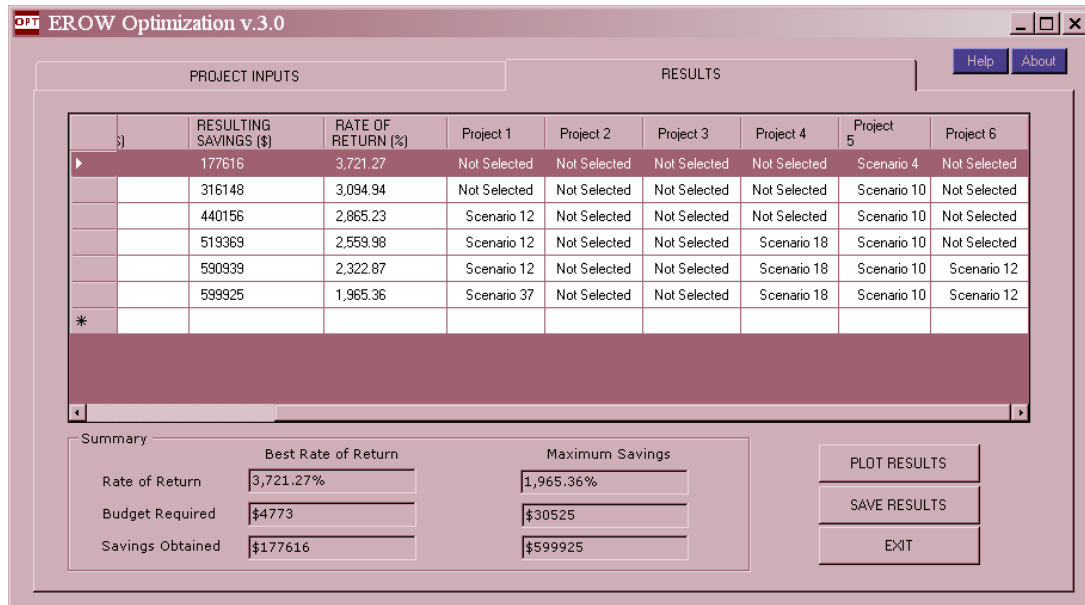


Figure C.15: EROW Best Case Scenario Output Screen for the ROW Release Obtained Scenario for the First Option of Case Study Two.

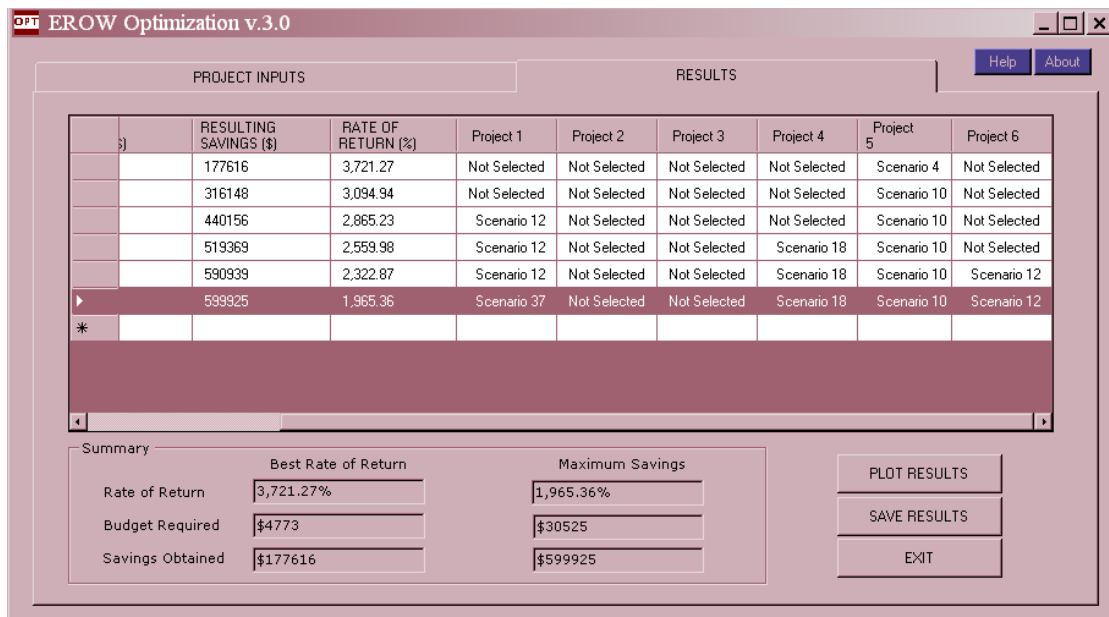


Figure C.16: EROW Worst Case Scenario Output Screen for the ROW Release Obtained Scenario for the First Option of Case Study Two.

Table C.5: Best and Worst Case Scenario of the Schematics Available (time 0) Scenario for the First Option of Case Study Two

Schematics Available	
Best Case Scenario	
County Type and Parcels	Harris (6 Parcels)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	6,319.47
Resulting Expenditure (\$1,000)	4,982
Resulting Savings (\$1,000)	314,836
Worst Case Scenario	
County Type and Parcels	Metro (27 parcels), Dallas (28 parcels), Harris (21 parcels), and Tarrant (25 parcels)
Budget Option (\$1,000)	31,717
Worst Rate of Return (%)	2,198.74
Resulting Expenditure (\$1,000)	29,518
Resulting Savings (\$1,000)	649,024

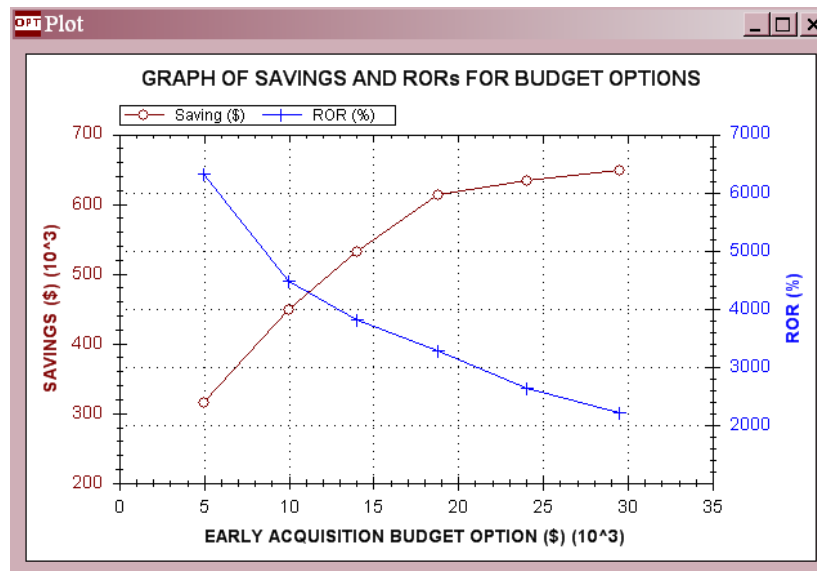


Figure C.17: Graph of Savings and RORs for Budget Options of the Schematics Available (time 0) Scenario for the First Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179
(Enter any integer > 0 and <= 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	So
Project 1	0	1287	1545	1716	215
Project 2	0	247	321	434	517
Project 3	0	21	46	67	79
Project 4	0	1341	1408	1540	175

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	So
Project 1	0	50708	63994	69849	915
Project 2	0	2805	3704	4911	606
Project 3	0	138	340	347	352
Project 4	0	52660	55902	61706	706

SOLVE

Figure C.18: EROW Input Screen for the Schematics Available (time 0) Scenario for the First Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS

RESULTS

	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5	Project 6
►	314836	6,319.47	Not Selected	Not Selected	Not Selected	Not Selected	Scenario 7	Not Selected
	447597	4,464.36	Scenario 28	Not Selected	Not Selected	Not Selected	Scenario 7	Not Selected
	532406	3,794.23	Scenario 28	Not Selected	Not Selected	Scenario 29	Scenario 7	Not Selected
	613228	3,268.11	Scenario 28	Not Selected	Not Selected	Scenario 29	Scenario 7	Scenario 21
	632743	2,633.80	Scenario 28	Not Selected	Not Selected	Scenario 29	Scenario 22	Scenario 21
	649024	2,198.74	Scenario 28	Not Selected	Not Selected	Scenario 29	Scenario 22	Scenario 26
*								

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	6,319.47%	2,198.74%
Budget Required	\$4982	\$29518
Savings Obtained	\$314836	\$649024

PLOT RESULTS

SAVE RESULTS

EXIT

Figure C.19: EROW Best Case Scenario Output Screen for the Schematics Available (time 0) Scenario for the First Option of Case Study Two.

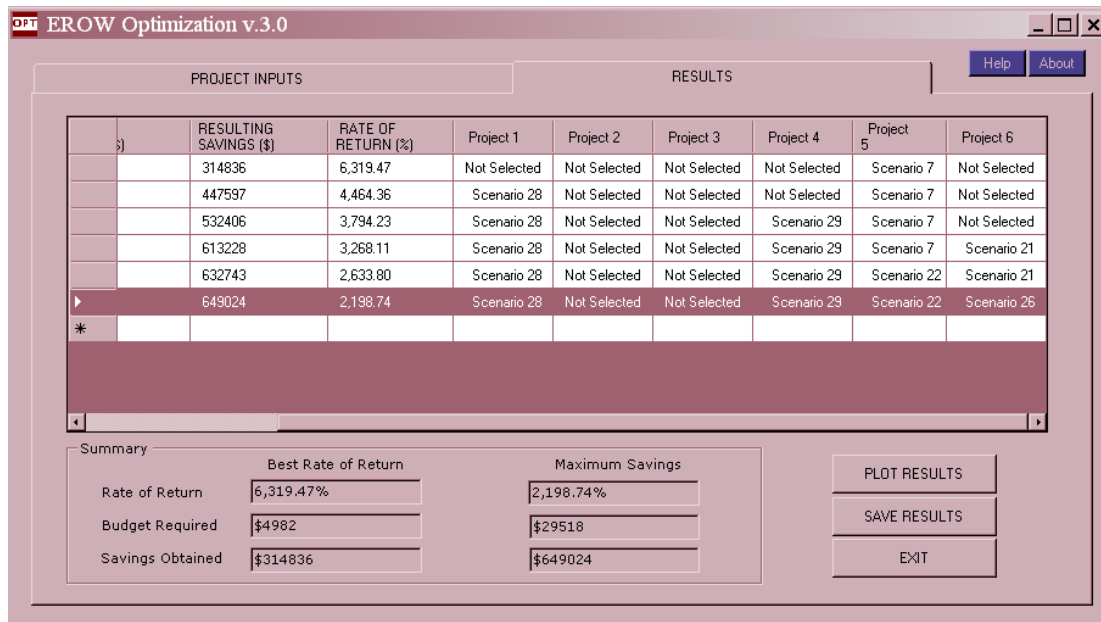


Figure C.20: EROW Worst Case Scenario Output Screen for the Schematics Available (time 0) Scenario for the First Option of Case Study Two.

Second Option:

Table C.6: Best and Worst Case Scenario of the Dallas County for the Second Option of Case Study Two

Dallas	
Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (28 Parcels)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	2,117.05
Resulting Expenditure (\$1,000)	4,006
Resulting Savings (\$1,000)	84,809
Worst Case Scenario	
Speculation Scenario and Parcels	Environmental Clearance Obtained (25 parcels), First Parcel Purchased (not early) (28 parcels), Schematics Available (28 parcels), First Parcel Purchased (inc. early) (8 parcels), and ROW Release Obtained (17 parcels)
Budget Option (\$1,000)	31,717
Worst Rate of Return (%)	1,253.06
Resulting Expenditure (\$1,000)	31,506
Resulting Savings (\$1,000)	394,789

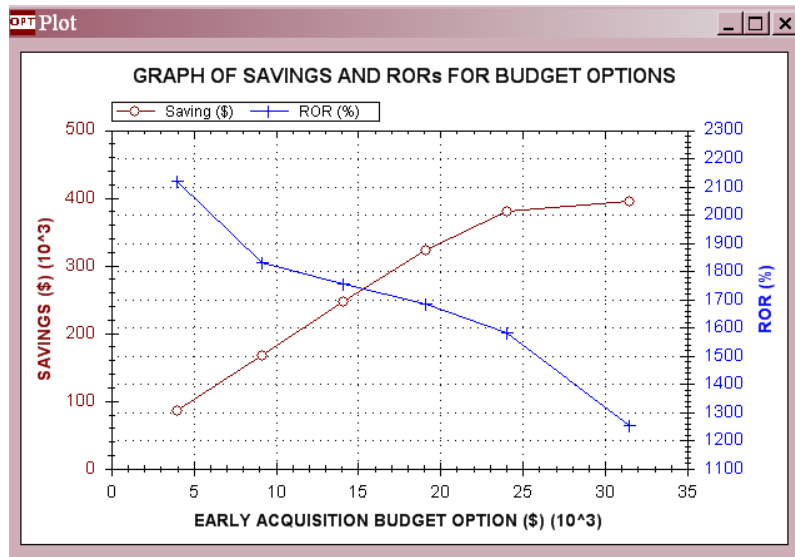


Figure C.21: Graph of Savings and RORs for Budget Options of the Dallas County for the Second Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179

(Enter any integer > 0 and <= 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %

(Minimum Attractive Rate of Return)

STATUS

Data Processed.

RESULTS

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Sol
Project 1	0	1382	1484	1701	200
Project 2	0	2659	2850	3244	382
Project 3	0	1341	1408	1540	175
Project 4	0	2659	4133	4949	562

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Sol
Project 1	0	52619	55826	61546	705
Project 2	0	51342	54459	60002	687
Project 3	0	52660	55902	61706	708
Project 4	0	51342	53177	58297	665

SOLVE

Figure C.22: EROW Input Screen for the Dallas County for the Second Option of Case Study Two.

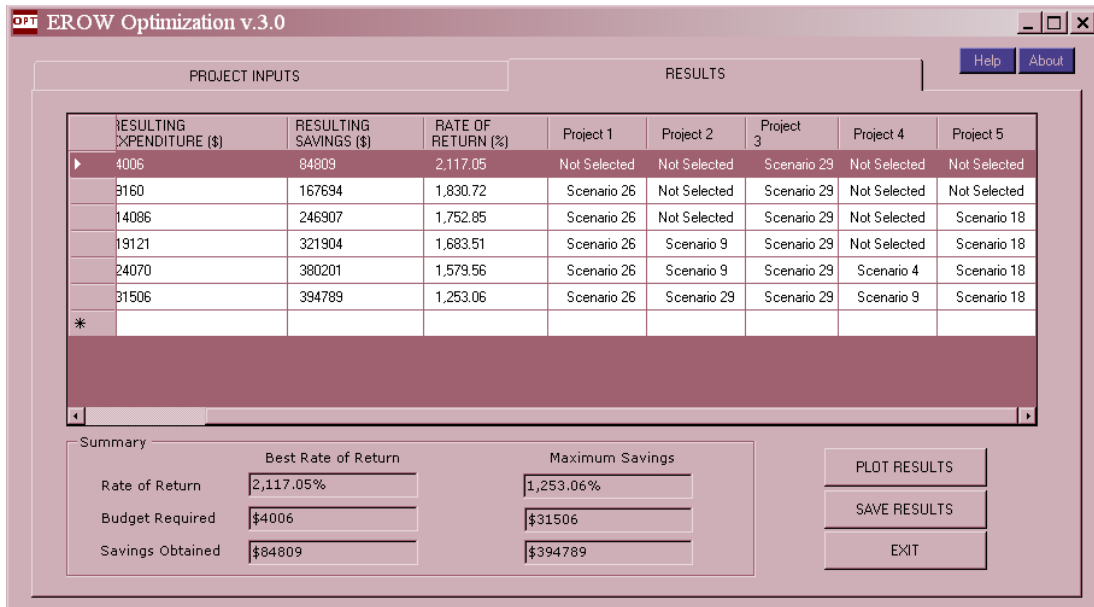


Figure C.23: EROW Best Case Scenario Output Screen for the Dallas County for the Second Option of Case Study Two.

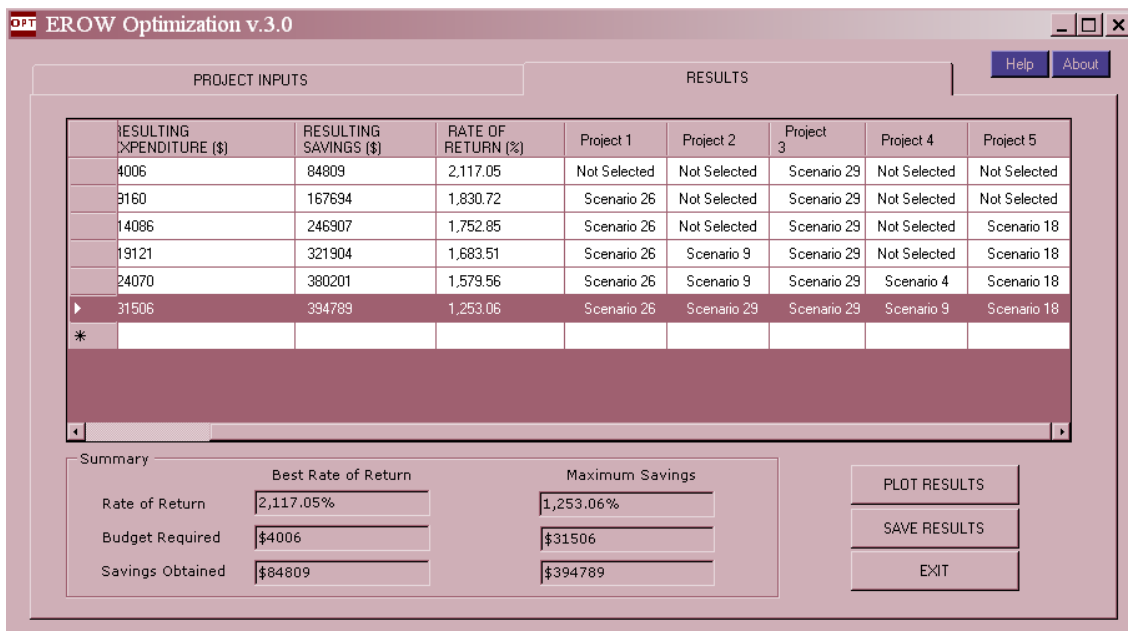


Figure C.24: EROW Worst Case Scenario Output Screen for the Dallas County for the Second Option of Case Study Two.

Table C.7: Best and Worst Case Scenario of the Harris County for the Second Option of Case Study Two

Harris	
Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (6 Parcel)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	6,319.47
Resulting Expenditure (\$1,000)	4,982
Resulting Savings (\$1,000)	314,836
Worst Case Scenario	
Speculation Scenario and Parcels	Environmental Clearance Obtained (12 parcels), First Parcel Purchased (not early) (2 parcels), Schematics Available (6 parcels), and ROW Release Obtained (9 parcels)
Budget Option (\$1,000)	31,717
Worst Rate of Return (%)	3,508.86
Resulting Expenditure (\$1,000)	30,376
Resulting Savings (\$1,000)	1,065,850

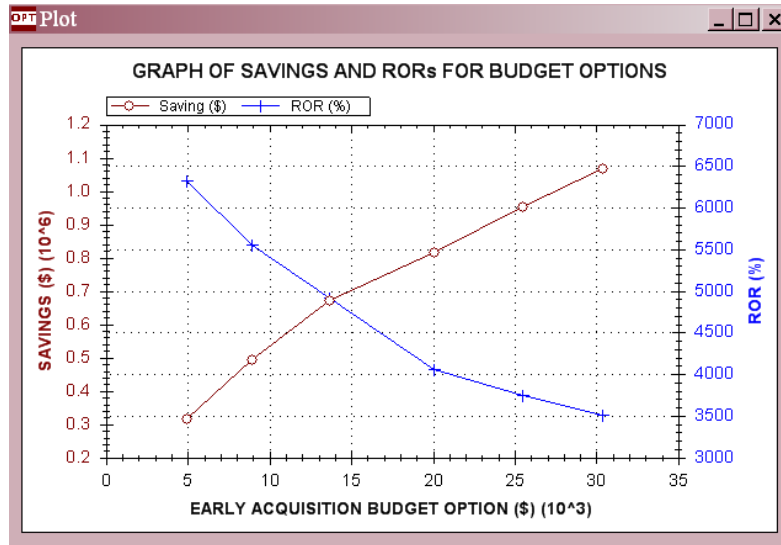


Figure C.25: Graph of Savings and RORs for Budget Options of the Harris County for the Second Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179
(Enter any integer > 0 and =< 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1337	2228	3915	575
Project 2	0	2728	4849	8113	122
Project 3	0	1178	1890	2788	455
Project 4	0	2728	5639	9132	152

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	75572	114599	178474	291
Project 2	0	74181	111978	174277	284
Project 3	0	75731	114937	179602	292
Project 4	0	74181	111188	173258	281

SOLVE

Figure C.26: EROW Input Screen for the Harris County for the Second Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS RESULTS Help About

	RESULTING EXPENDITURE (\$)	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5
▶	4982	314836	6,319.47	Not Selected	Not Selected	Scenario 7	Not Selected	Not Selected
	8897	493310	5,544.68	Scenario 4	Not Selected	Scenario 7	Not Selected	Not Selected
	13670	670926	4,908.02	Scenario 4	Not Selected	Scenario 7	Not Selected	Scenario 4
	20085	815340	4,059.45	Scenario 13	Not Selected	Scenario 7	Not Selected	Scenario 4
	25527	953872	3,736.72	Scenario 13	Not Selected	Scenario 7	Not Selected	Scenario 10
	30376	1065850	3,508.86	Scenario 13	Scenario 3	Scenario 7	Not Selected	Scenario 10
*								

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	6,319.47%	3,508.86%
Budget Required	\$4982	\$30376
Savings Obtained	\$314836	\$1065850

PLOT RESULTS

SAVE RESULTS

EXIT

Figure C.27: EROW Best Case Scenario Output Screen for the Harris County for the Second Option of Case Study Two.

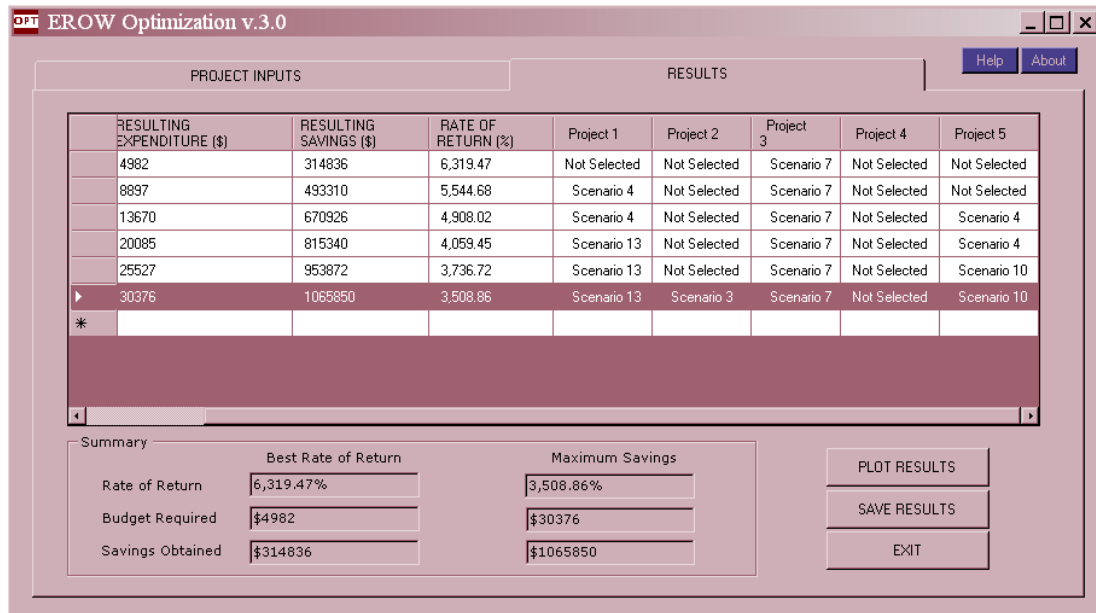


Figure C.28: EROW Worst Case Scenario Output Screen for the Harris County for the Second Option of Case Study Two.

Table C.8: Best and Worst Case Scenario of the Metro County for the Second Option of Case Study Two

Metro	
Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (27 Parcels)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	2,632.06
Resulting Expenditure (\$1,000)	5,044
Resulting Savings (\$1,000)	132,761
Worst Case Scenario	
Speculation Scenario and Parcels	Environmental Clearance Obtained (16 parcels), First Parcel Purchased (not early) (3 parcels), Schematics Available (27 parcels), First Parcel Purchased (inc. early) (10 parcels), and ROW Release Obtained (11 Parcels)
Budget Option (\$1,000)	31,717
Worst Rate of Return (%)	1,879.16
Resulting Expenditure (\$1,000)	30,277
Resulting Savings (\$1,000)	568,954

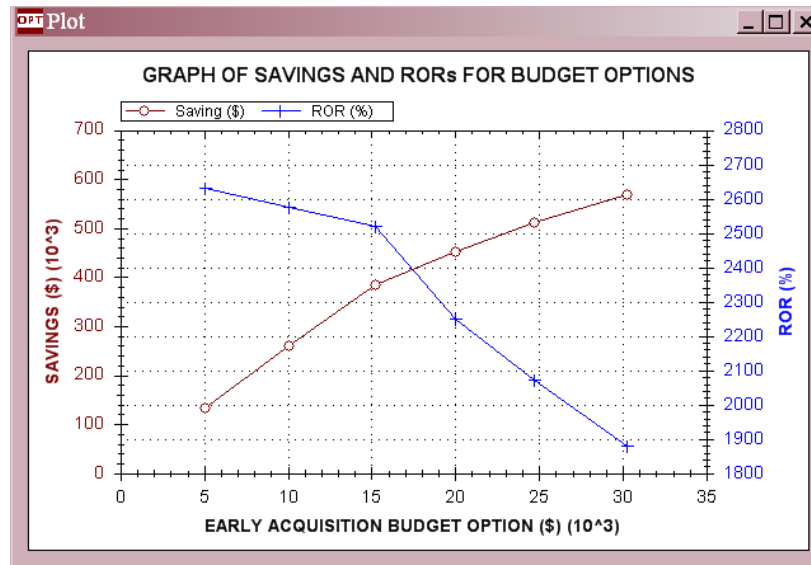


Figure C.29: Graph of Savings and RORs for Budget Options of the Metro County for the Second Option of Case Study Two.

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179
(Enter any integer > 0 and =< 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	1614	1932	2132	2750
Project 2	0	3543	4348	4802	6020
Project 3	0	1287	1545	1716	2150
Project 4	0	3543	4659	5296	6930

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	50381	63607	69433	90500
Project 2	0	48452	61191	66763	87700
Project 3	0	50708	63994	69849	91500
Project 4	0	48452	60880	66269	86500

SOLVE

Figure C.30: EROW Input Screen for the Metro County for the Second Option of Case Study Two.

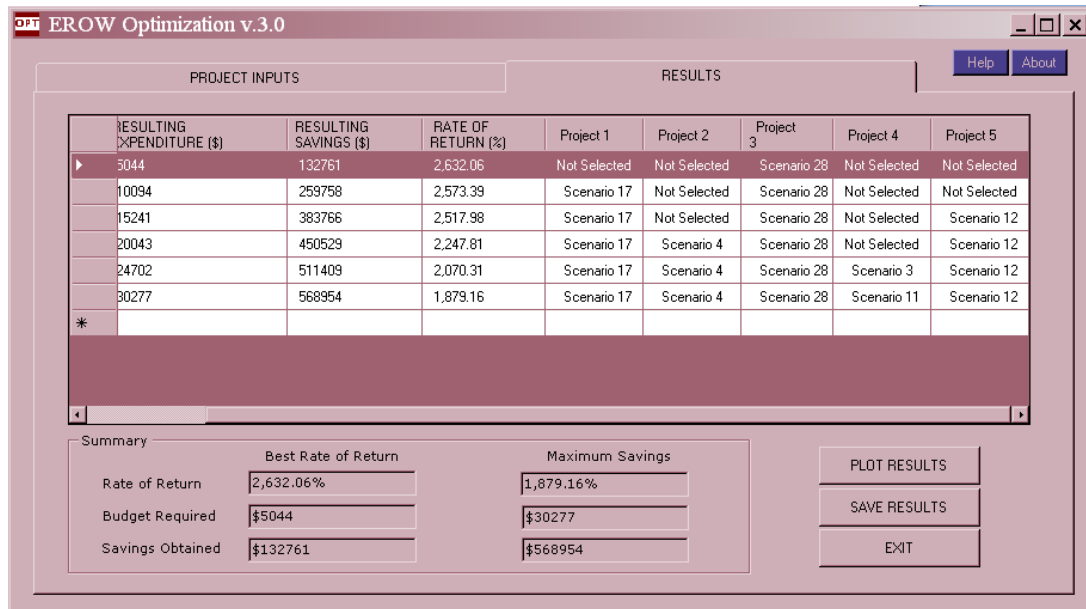


Figure C.31: EROW Best Case Scenario Output Screen for the Metro County for the Second Option of Case Study Two.

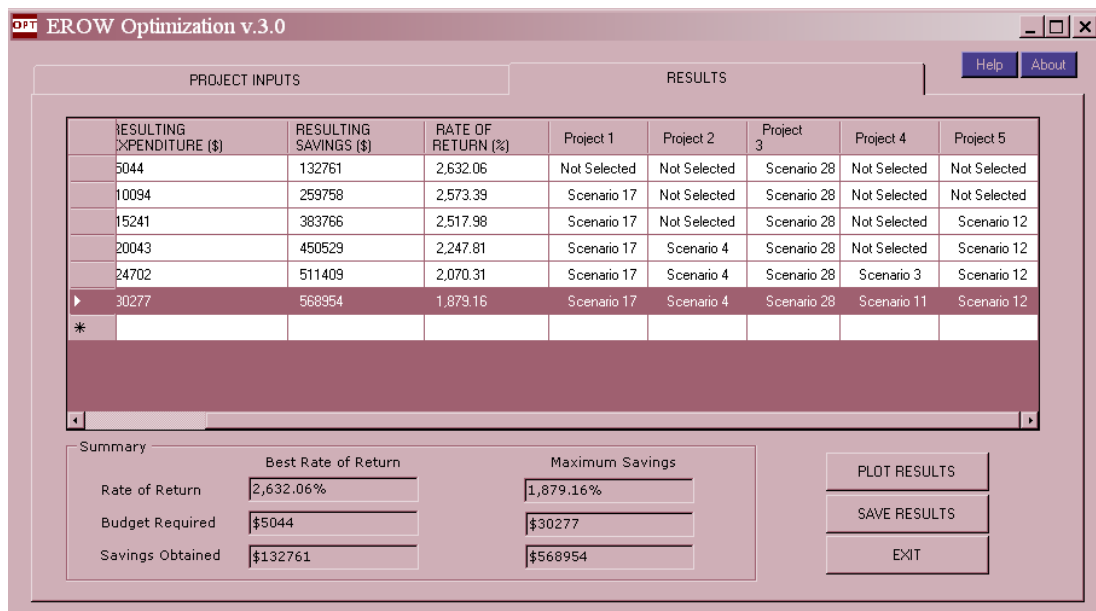


Figure C.32: EROW Worst Case Scenario Output Screen for the Metro County for the Second Option of Case Study Two.

Table C.9: Best and Worst Case Scenario of the Rural County for the Second Option of Case Study Two

Rural	
Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (43 Parcels)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	76.40
Resulting Expenditure (\$1,000)	1,157
Resulting Savings (\$1,000)	884
Worst Case Scenario	
Speculation Scenario and Parcels	Environmental Clearance Obtained (42 parcels), First Parcel Purchased (not early) (42 parcels), Schematics Available (42 parcels), First Parcel Purchased (inc. early) (42 parcels), and ROW Release Obtained (42 parcels)
Budget Option (\$1,000)	26,538
Worst Rate of Return (%)	46.53
Resulting Expenditure (\$1,000)	6,963
Resulting Savings (\$1,000)	3,240

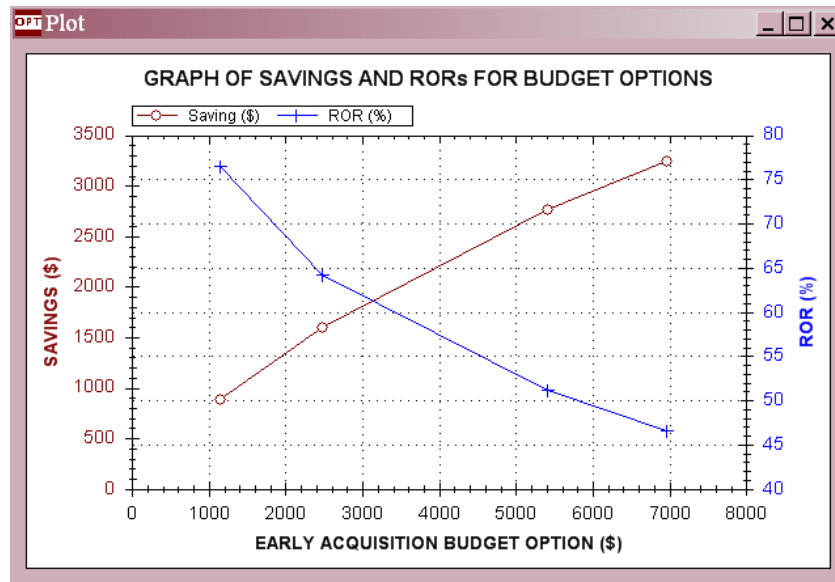


Figure C.33: Graph of Savings and RORs for Budget Options of the Rural County for the Second Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179
(Enter any integer > 0 and =< 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

RESULTS

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	23	53	77	90
Project 2	0	26	60	87	102
Project 3	0	21	46	67	79
Project 4	0	26	60	88	104

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	136	333	338	341
Project 2	0	133	326	328	329
Project 3	0	138	340	347	352
Project 4	0	133	325	326	327

SOLVE

Figure C.34: EROW Input Screen for the Rural County for the Second Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS

RESULTS

	RESULTING EXPENDITURE (\$)	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5
►	1157	884	76.40	Not Selected	Not Selected	Scenario 44	Not Selected	Not Selected
	2486	1596	64.20	Scenario 44	Not Selected	Scenario 44	Not Selected	Not Selected
	5403	2760	51.08	Scenario 44	Scenario 44	Scenario 44	Not Selected	Scenario 44
	5963	3240	46.53	Scenario 44	Scenario 44	Scenario 44	Scenario 44	Scenario 44
*								

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	76.40%	46.53%
Budget Required	\$1157	\$6963
Savings Obtained	\$884	\$3240

PLOT RESULTS

SAVE RESULTS

EXIT

Figure C.35: EROW Best Case Scenario Output Screen for the Rural County for the Second Option of Case Study Two.

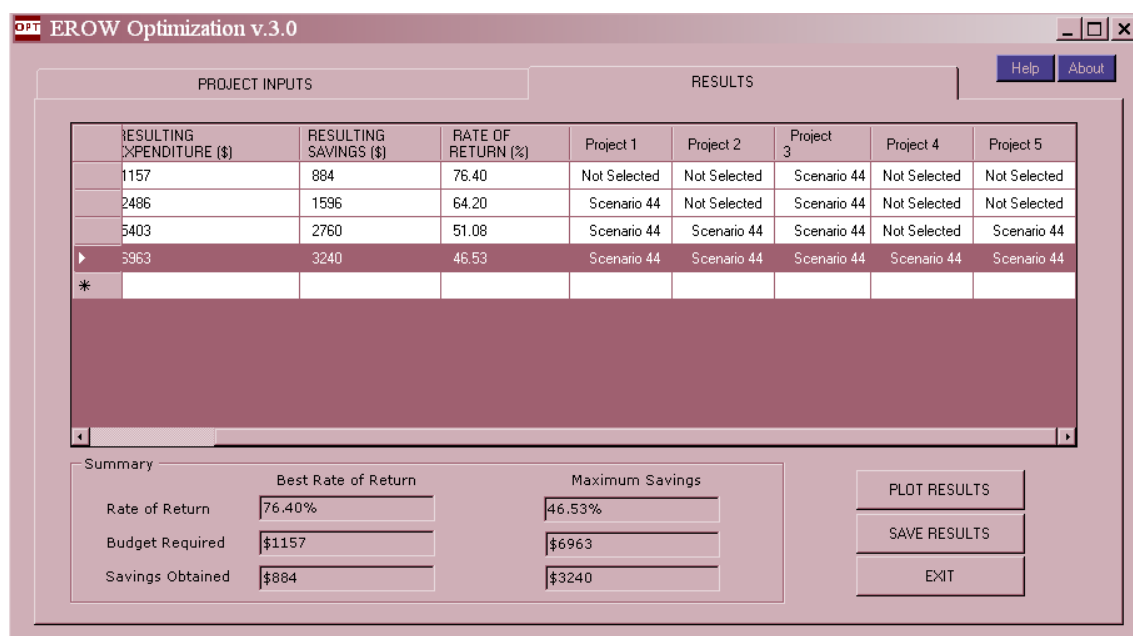


Figure C.36: EROW Best Case Scenario Output Screen for the Rural County for the Second Option of Case Study Two.

Table C.10: Best and Worst Case Scenario of the Tarrant County for the Second Option of Case Study Two

Tarrant	
Best Case Scenario	
County Type and Parcels	Schematics Available (20 Parcels)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	1,707.99
Resulting Expenditure (\$1,000)	4,732
Resulting Savings (\$1,000)	80,822
Worst Case Scenario	
County Type and Parcels	Environmental Clearance Obtained (13 parcels), First Parcel Purchased (not early) (6 parcels), Schematics Available (25 parcels), First Parcel Purchased (inc. early) (6 parcels), and ROW Release Obtained (11 parcels)
Budget Option (\$1,000)	31,717
Worst Rate of Return (%)	1,279
Resulting Expenditure (\$1,000)	29,690
Resulting Savings (\$1,000)	379,736

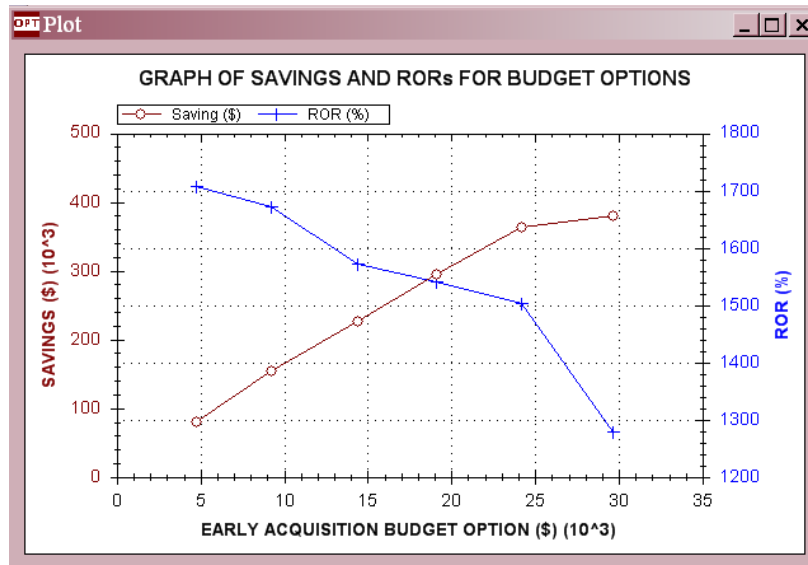


Figure C.37: Graph of Savings and RORs for Budget Options of the Tarrant County for the Second Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179
(Enter any integer > 0 and <= 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	So
Project 1	0	202	1309	1517	171
Project 2	0	346	2249	2626	296
Project 3	0	119	726	837	956
Project 4	0	346	2260	2708	312

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	So
Project 1	0	5169	35330	41928	472
Project 2	0	5025	34389	40819	460
Project 3	0	5252	35912	42607	480
Project 4	0	5025	34378	40736	456

SOLVE

Figure C.38: EROW Input Screen for the Tarrant County for the Second Option of Case Study Two.

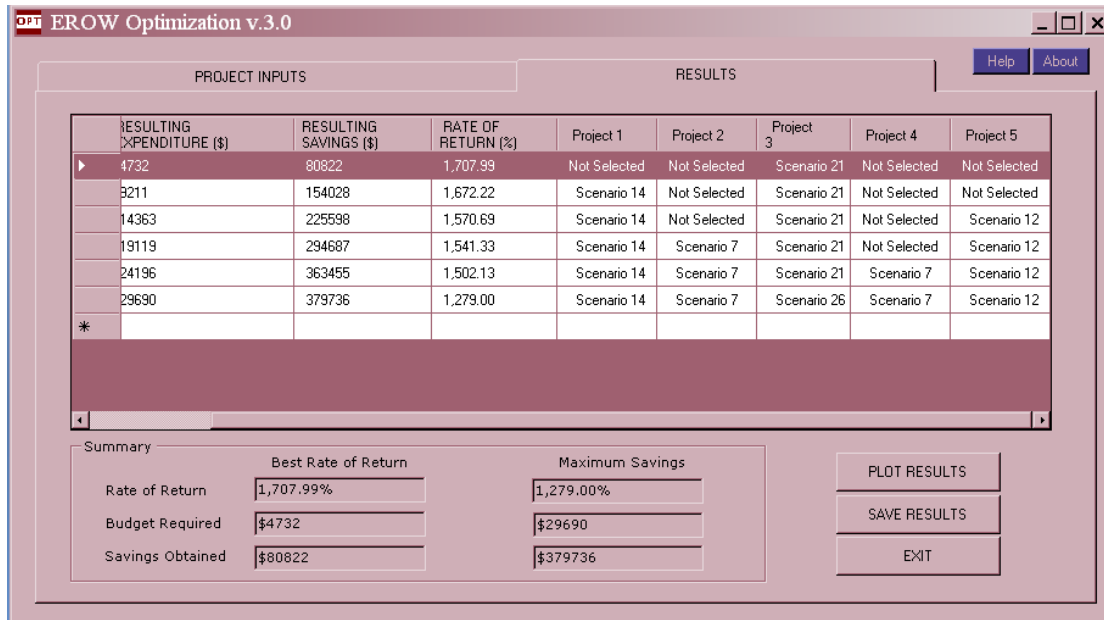


Figure C.39: EROW Best Case Scenario Output Screen for the Tarrant County for the Second Option of Case Study Two.

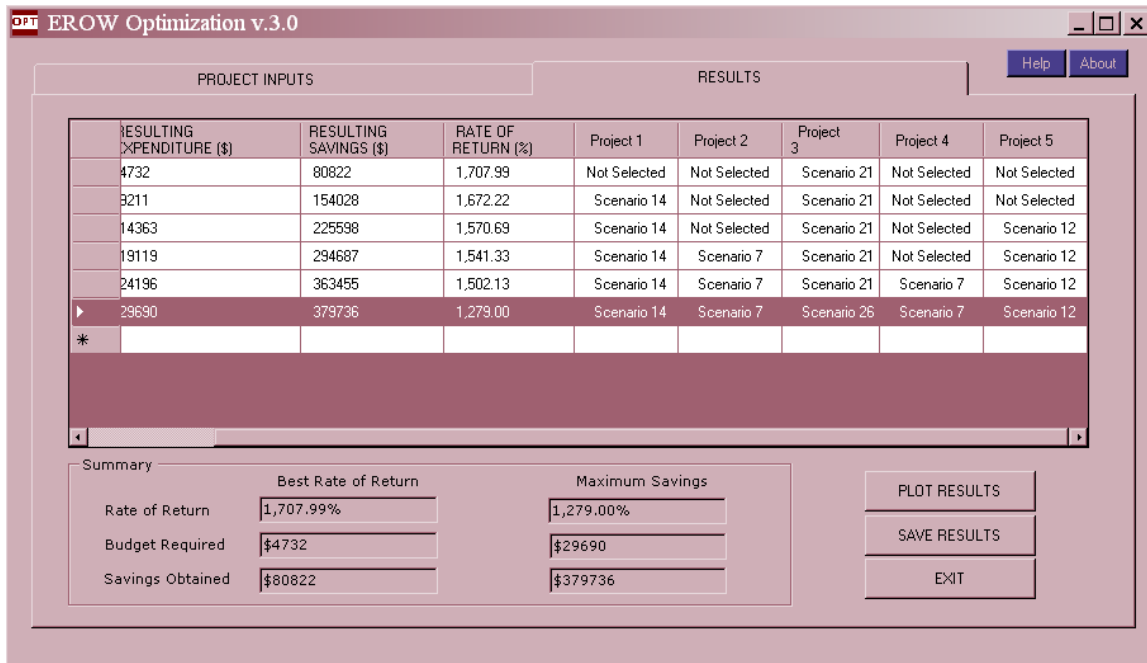


Figure C.40: EROW Worst Case Scenario Output Screen for the Tarrant County for the First Option of Case Study Two.

Table C.11: Best and Worst Case Scenario of the Urban County for the Second Option of Case Study Two

Urban	
Best Case Scenario	
Speculation Scenario and Parcels	Schematics Available (42 Parcels)
Budget Option (\$1,000)	5,822
Best Rate of Return (%)	292.50
Resulting Expenditure (\$1,000)	3,026
Resulting Savings (\$1,000)	8,851
Worst Case Scenario	
Speculation Scenario and Parcels	Environmental Clearance Obtained (42 parcels), First Parcel Purchased (not early) (42 parcels), Schematics Available (42 parcels), First Parcel Purchased (inc. early) (42 parcels), and ROW Release Obtained (42 parcels)
Budget Option (\$1,000)	26,538
Worst Rate of Return (%)	207.43
Resulting Expenditure (\$1,000)	19,316
Resulting Savings (\$1,000)	40,067

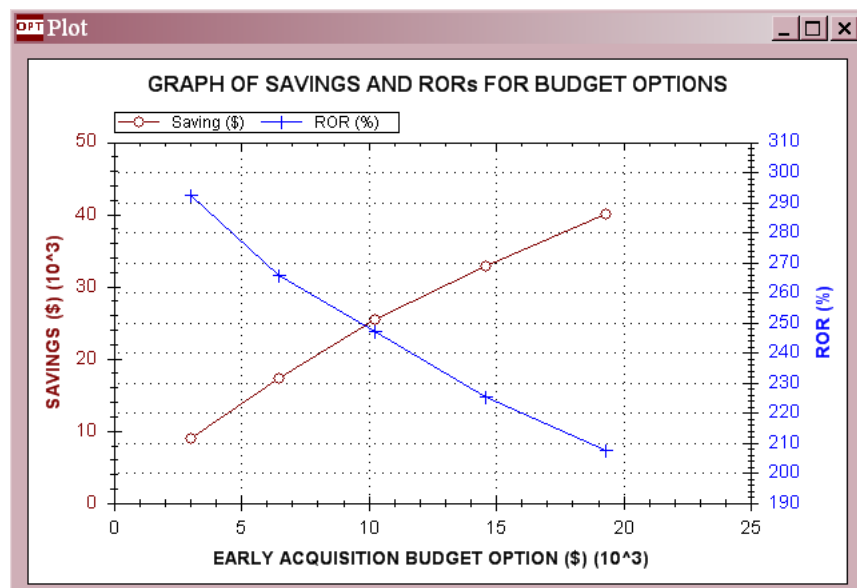


Figure C.41: Graph of Savings and RORs for Budget Options of the Urban County for the Second Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS

EARLY ACQUISITION BUDGET (\$)

Maximum Budget: 32115

Minimum Budget: 643

Increment: 5179
(Enter any integer > 0 and =< 31472)

RESULTS OPTIONS

☒ Display Selected Project Scenarios

☒ Apply Incremental Analysis with MARR

MARR: 25 %
(Minimum Attractive Rate of Return)

STATUS

Data Processed.

RESULTS

DATA (\$)

Costs

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	262	346	471	568
Project 2	0	333	439	601	730
Project 3	0	247	321	434	517
Project 4	0	333	466	641	786

Savings

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Project 1	0	2790	3678	4874	6000
Project 2	0	2719	3586	4743	5840
Project 3	0	2805	3704	4911	6000
Project 4	0	2719	3559	4704	5750

SOLVE

Figure C.42: EROW Input Screen for the Urban County for the Second Option of Case Study Two.

EROW Optimization v.3.0

PROJECT INPUTS

RESULTS

	RESULTING EXPENDITURE (\$)	RESULTING SAVINGS (\$)	RATE OF RETURN (%)	Project 1	Project 2	Project 3	Project 4	Project 5
▶	3026	8851	292.50	Not Selected	Not Selected	Scenario 43	Not Selected	Not Selected
	5499	17254	265.49	Scenario 43	Not Selected	Scenario 43	Not Selected	Not Selected
	10272	25357	246.86	Scenario 43	Not Selected	Scenario 43	Not Selected	Scenario 43
	14604	32902	225.29	Scenario 43	Scenario 43	Scenario 43	Not Selected	Scenario 43
	19316	40067	207.43	Scenario 43	Scenario 43	Scenario 43	Scenario 43	Scenario 43
*								

Summary

	Best Rate of Return	Maximum Savings
Rate of Return	292.50%	207.43%
Budget Required	\$3026	\$19316
Savings Obtained	\$8851	\$40067

PLOT RESULTS

SAVE RESULTS

EXIT

Figure C.43: EROW Best Case Scenario Output Screen for the Urban County for the Second Option of Case Study Two.

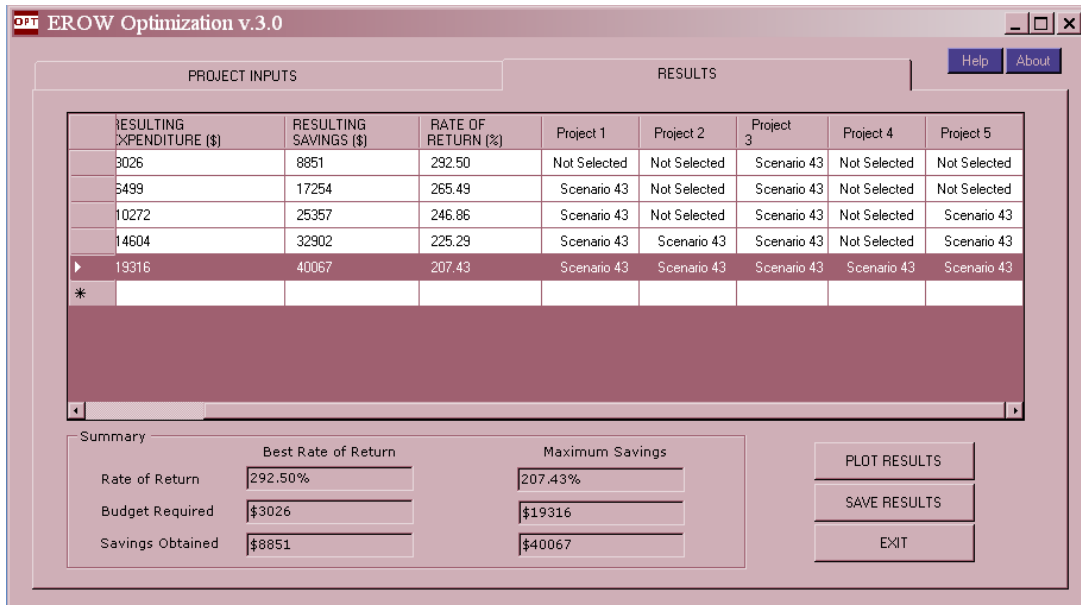


Figure C.44: EROW Worst Case Scenario Output Screen for the Urban County for the Second Option of Case Study Two.

Vita

Dora Oralia Francis was born in on October 24 1984 as the only child to Dora Oralia Arratia and Cesar Fernandez. She was born in Hermosillo, Sonora, Mexico. When she was two years old, her family moved to Cd. Juarez, Chihuahua, Mexico, where she spent her childhood. In October 1996, her family moved to El Paso, Texas. She graduated from Austin High School in May 2002 and began her higher education in Civil Engineering at the University of Texas at El Paso (UTEP) in August 2002. In October 2006, she married U.S. Army Sergeant Andrew J. Francis. Dora Francis earned her Bachelor of Science in Civil Engineering from UTEP in December 2007, and was a member of the group that received the Best Senior Design Award of her class. In the same year, she joined the National Civil Engineering Honor Society, Chi Epsilon. As an under graduate student she worked in UTEP as a research assistant for the project “Evaluation of Design Alternatives for US82/SH20 Intersection” sponsored by the Texas Department of Transportation (TxDOT) under the supervision of Dr. Ruey (Kelvin) Cheu. In December 2009, she received her Master of Science in Civil Engineering from UTEP. During her graduate studies, she worked as a research assistant for the project “Asset Management Texas-Style” under the supervision of Dr. Carlos Chang-Albitres. She also worked as a teaching assisting for the Transportation Engineering Class and the Infrastructure Management Class.

Permanent address: 7378 Mesquite Sun Ln.
El Paso, Texas, 79934

This thesis/dissertation was typed by Dora O. Francis