

175th Street – Quivira to Antioch (TH-1343)
Preliminary Engineering Study
Overland Park, KS



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EXECUTIVE SUMMARY

This preliminary engineering study presents the results of the preliminary analysis to establish a horizontal and vertical alignment for 175th Street from Quivira Road to Antioch Road. The purpose of this study was to perform a preliminary design to minimize impacts to existing development and to serve as a planning tool for future development.

More specifically, the major objectives of this study were as follows:

- Establish design guidelines, typical roadway sections and right-of-way widths for 175th Street, Quivira Road to Antioch Road.
- Develop preliminary horizontal and vertical alignments for 175th Street, Quivira Road to Antioch Road.
- Size facilities for major drainage crossings (bridges and culverts).
- Identify impacts to existing developments and infrastructure.
- Provide opinion of probable total project cost including construction, utility relocation, right-of-way, administration, legal and engineering costs based upon 2010 costs.

The comprehensive solution to meet the objectives set forth is summarized in subsequent pages in this report.

175th Street is classified as a super-collector in the 2009 Master Plan and is designed to meet the City's super-collector standards consisting of a four-lane undivided roadway with two through lanes in each direction. The roadway section also includes a single left turn lane at designated locations, curb and gutter, enclosed drainage systems, sidewalks, bike/hike trails as designated by the Greenway Linkages Master Plan and street lighting.

INTRODUCTION

The study presented herein was conducted by City staff and was required to include the preparation of a preliminary engineering study and report together with preliminary scaled plans and drawings.

The study establishes a recommended horizontal and vertical alignment for 175th Street from Quivira Road to Antioch Road. Specifically, the study includes the following:

- Recommended typical sections.
- Required right-of-way widths.
- Proposed horizontal and vertical roadway alignments.
- Plan sheets showing existing right-of-way, ownership, utilities, and topographic features, locations for retaining walls, construction limits and locations of major drainage structures.
- Drainage structure analyses including type, size, and location.
- Roadway cross sections.
- Opinion of probable project costs.

Each of these items is discussed in the following sections. In addition, plan and profile drawings are part of the report appendix to illustrate the recommended roadway improvements.

This Preliminary Engineer Study has been prepared by City of Overland Park engineering staff at the direction of the Director of Public Works and represents the best information available to the City Engineer.

BASIC INFORMATION AND PROCEDURES

In the development of the preliminary design study, the following information and procedures were utilized.

- Topographic information along the 175th Street corridor was obtained from 2006 Johnson County LIDAR data and incorporated into Plan and Profile sheets. Johnson County provided the LIDAR data.
- City ownership and plat maps were utilized to determine property owners and to plot existing R/W and property lines.
- Utility information was obtained through the Collaborative Utility Exchange (CUE) and by contacting the utility companies. The utility information shown on the plan sheets was taken from the CUE, and additional maps supplied to City staff, and does not represent field-verified locations.
- The existing surface was modeled from Bare Earth files in the 2006 LIDAR data set. The created surface model has a tolerance of +/- 1 ft. at any given point.
- The December 2009 Future Development Plan was obtained from the City of Overland Park Planning and Development Services Department.
- The City of Overland Park Planning and Development Services Department provided turn bay locations and storage length requirements.
- Design Criteria is in accordance with current ordinances for the City of Overland Park, the Kansas Department of Transportation, and the American Association of State Highway and Transportation Officials publication, *A Policy on Geometric Design of Highways and Streets*.
- Opinions of probable construction costs were based on 2010 dollar values. Recent bid tabs and other historical cost information were utilized to establish 2010 unit prices.
- “175th Street – 179th Street to Quivira Road” prepared by BHC Rhodes, submitted February 2008.
- “Antioch Road from 167th Street to 179th Street” prepared by Olsson Associates, submitted August 2006.

EXISTING CONDITIONS

Roadways

175th Street is an east/west super-collector corridor serving Overland Park residents. It is a two lane paved roadway with no shoulders and open ditches.

There are three intersecting thoroughfares – Quivira Road, Switzer Road, and Antioch Road. Quivira Road and Switzer Road are currently two-lane undivided roadways with no shoulders and open ditches. Antioch Road is currently a two-lane undivided roadway with no shoulders and open ditches that ties into 175th Street from the south in an L intersection.

There are three intersecting side streets – Cody Street, Bond Avenue, and Bluejacket (Private). All three are currently T intersections, and the study assumes that all three will remain the same.

There are 24 intersecting private drive entrances and one intersecting field entrance within the study limits.

Existing Right-of-Way

The existing right-of-way ranges between 20 feet and 55 feet on either side of the section lines through undeveloped tracts of land and between 40 feet and 60 feet on either side of the section lines where subdivisions have been platted. The existing right-of-way is shown on the plan drawings in the Appendix.

Traffic Counts

Traffic data from the City of Overland Park indicate 500 Average Daily Traffic (ADT) along 175th Street from the year 2010. A projected count of 9,000 ADT from 175th Street is anticipated for the year 2030. 175th Street is currently signed for 35 mph.

Land Use

The properties adjacent to the roadways in this study include small subdivisions as well as a mix of small and large tracts of land. The current planned zoning for the majority of the study corridor is low-density and very-low-density residential with parks, recreation, and open space on the east end near Coffee Creek. Blue Valley Southwest High School is located on the southwest corner of 175th Street and Quivira.

Existing Vertical Alignments

According to AASHTO design criteria, adequate stopping sight distance and/or intersection sight distance is not currently available at several locations along 175th Street at the proposed design speeds, particularly between Switzer Road and Antioch Road. Currently, the posted speed limit along 175th Street is 35 mph. Because the proposed design speed for 175th Street is 40 mph, existing high spots in the profiles will need to be cut down and low spots will need to be filled in to meet the new criteria.

Existing Drainage

There are currently open ditches adjacent to 175th Street. Eight (8) existing drainage structures cross 175th Street. A 2' x 3' arched concrete culvert with a drop inlet structure crosses 175th Street approximately 435' east of Bond Avenue. A double 36" corrugated metal pipe crosses 175th Street approximately 415' west of Switzer Road. A 24" corrugated metal pipe crosses 175th Street approximately 0.3 miles east of Switzer Road. A 24" corrugated metal pipe crosses 175th Street approximately 0.47 miles east of Switzer Road. A 18" HDPE pipe crosses 175th Street approximately 0.47 miles west of Antioch Road. A 36" corrugated metal pipe crosses 175th Street approximately 0.25 miles west of Antioch Road. A 21" corrugated metal pipe crosses 175th Street approximately 740 feet west of Antioch Road. A 21" corrugated metal pipe crosses 175th Street approximately 150 feet west of Antioch Road. None of these structures are sized to pass the 100-year event. None of the structures are long enough to accommodate the proposed typical section with adequate clear zone.

EXISTING UTILITIES

The major utilities in the study area are telephone, water, power, gas, sanitary sewers and fiber optic. These utility lines and their respective sizes are shown on the plan drawings located in the Appendix and are described in the following paragraphs. Note that all utility line locations are approximate and are not guaranteed to be correct.

AT&T

AT&T has buried fiber optic facilities along the west side of Quivira Road north of 175th Street. There are underground facilities along the south side of 175th Street from Quivira Road to Cody Street, from Bond Avenue east 540', and from Bluejacket Street east to Switzer Road. There are underground facilities along the west side of Switzer Road north and south of 175th Street and along the north side of 175th Street from Switzer Road to Antioch Road.

Water District No. 1 of Johnson County

WaterOne has a 36" transmission main along the north side of 175th Street from 179th Street to just east of Quivira Road and on the east side of Quivira Road from 175th extending to the north. There is a 24" transmission main along the east side of Quivira Road south of 175th Street. There is a 4" line along the south side of 175th Street beginning at Quivira Road, crossing to the north side 0.5 miles west of Switzer Road, then crossing back to the south side at Switzer Road. A 2" PVC line extends to a point 1,475' west of Antioch Road. All of the lines appear to be in existing waterline easement and would be a project cost.

Atmos Energy

Atmos Energy has a 4" plastic gas line along the west side of Switzer Road.

Kansas City Power & Light

KCP&L has overhead facilities along the north side of 175th Street beginning west of Quivira Road. The line crosses to the south side of 175th Street approximately 1,000' east of Quivira Road and extends along the south side to a point approximately 1,350' west of Antioch Road. There are overhead facilities along the west side of Quivira Road north of 175th Street and along the east side of Switzer Road south of 175th Street. There are overhead facilities along the west side of Switzer Road north of 175th Street and along the east side of Switzer Road south of 175th Street. There are several underground crossings of 175th Street along the alignment.

Time Warner Cable

Time Warner Cable has overhead facilities attached to KCP&L's poles along 175th Street from Quivira Road east to a point 400' east of Switzer Road; along Quivira Road south of 175th Street; and along Switzer Road north and south of 175th Street. There are underground facilities on the south side of 175th Street west of Quivira Road and at several crossings along 175th Street.

Blue Valley School District

Blue Valley School District has a buried fiber optic line along the west side of Quivira Road beginning at 179th Street. The line crosses to the east side approximately 300' north of 175th Street.

TURN LANE STORAGE REQUIREMENTS

City staff provided the following recommendations for proposed full-width turn lane storage requirements (excluding tapers):

<u>Location</u>	<u>Northbound</u>	<u>Southbound</u>	<u>Eastbound</u>	<u>Westbound</u>
Quivira*	250' left	250' left	---	250' left
Switzer	250' left	250' left	250' left	250' left
Antioch	200' left**	150' left**	250' left	---

* From 2007 Preliminary Engineering Study (BHC Rhodes)

** From 2005 Preliminary Engineering Study (Olsson)

PRELIMINARY DESIGN

Design Criteria

	<u>175th Street</u>	<u>Switzer Road</u>
TYPICAL SECTIONS		
Classification	Super Collector	Thoroughfare
Lane Width	12'-0" – inside lane 12'-0" – outside lane 12'-2" – left turn bay	12'-2" – inside lane 13'-0" – outside lane 12'-2" – left turn bay
Median Width	N/A	24'
Shoulder		
Inside	N/A	Curb (Type D)
Outside	Curb (Type B)	Curb (Type B)
Normal Crown	2.08% (1/4"/ft)	2.08% (1/4"/ft)
 SIDE SLOPES		
Maximum	4:1	4:1
 GEOMETRICS		
Design Speed	40 mph	50 mph
Posted Speed	35 mph	45 mph
Min. Horizontal Radii	600'	1200'
Vertical Alignment		
Maximum Grade	8%	6%
Minimum Grade	1%	1%
Stopping Sight Distance	305'	425'
Min. K value	64 (Sag) 44 (Crest)	96 (Sag) 84 (Crest)
Superelevation Runoff	1:200	1:200
 DRAINAGE		
Hydrology	Rational Method	
Drainage Structures (Culverts)	100-year Design	

Proposed Typical Sections

The typical sections for the proposed roadways are shown in the Appendix. All thoroughfare and super collector sections consist of a 10" thick asphaltic concrete pavement over a 6" aggregate base course and a 8" fly ash treated subgrade.

Page 3 of the plans in the Appendix shows the four-lane super collector section recommended for 175th Street (Quivira Road to Antioch Road). The roadway width consists of a 12' outside lane and a 12' inside lane. The roadway widens as it approaches the intersections of Quivira Road, Switzer Road and Antioch Road to include a 12'-2" left turn lane and 4' raised median. Five-foot sidewalks are located 1' inside the proposed right-of-way line. An 8' hike/bike trail will be utilized in locations designated by the Greenway Linkages Master Plan and will be located 1' inside the proposed right-of-way line. The trail locations are shown in the plans.

Page 4 of the plans in the Appendix shows the standard four-lane thoroughfare section recommended for Switzer Road. The roadway width consists of a 13' outside lane and a 12'-2" inside lane. This section includes a 24' raised median which can be narrowed to 13' or 4' to accommodate single or dual left turn lanes, respectively. Five-foot sidewalks are located 1' inside the proposed right-of-way line. A 10' hike/bike trail will be utilized in locations designated by the Greenway Linkages Master Plan and will be located 1' inside the proposed right-of-way line. The trail locations are shown in the plans.

Proposed Right-of-Way

Right-of-way requirements are indicated on the plan drawings as well as the typical sections on pages 3-4 of the Appendix. The super collector roadway section will require an 80' right-of-way corridor with an additional 20' of right-of-way required to accommodate a left turn lanes at Quivira Road, Switzer Road, and Antioch Road. The thoroughfare roadway section will require a 120' right-of-way corridor.

Permanent drainage easements will be necessary for any stormwater treatment facilities and at the ends of the crossroad drainage structures. Temporary construction easements will be necessary along most properties adjacent to construction. There are also locations where utility easements will be required for utility relocations. The exact locations of proposed utility easements should be determined during the project design phase when more accurate utility information is available.

Proposed Horizontal Alignments

A super collector section, centered on section line, is recommended for 175th Street as shown in the Appendix. A thoroughfare section, centered on section line, is recommended for Switzer Road as shown in the Appendix.

Proposed Vertical Alignments

The minimum design criteria for super collector and thoroughfare roadways are established by *Volume 1 of the Overland Park Design and Construction Standards* and the 2004 edition of "A Policy on Geometric Design of Highways and Streets" published by the American Association of State Highway and Transportation Officials. In order to provide the required Stopping Sight Distance (S.S.D.) for crest vertical curves on a super collector section, a minimum "K" value of 44 is required. The minimum "K" for sag curves on a super collector section based on headlight sight distance is 64. In order to provide the required Stopping Sight Distance (S.S.D.) for crest

vertical curves on a thoroughfare section, a minimum “K” value of 84 is required. The minimum “K” for sag curves on a super collector section based on headlight sight distance is 96.

Proposed Drainage

New drainage structures crossing 175th Street and Switzer Road will be reinforced concrete boxes and pipes. The crossings were sized for a 100-yr storm with a 1’ minimum freeboard elevation. There are steep slopes on the south side of 175th Street from Switzer to Antioch, requiring the use of interceptor ditches to keep off-site drainage from entering the roadway. These ditches would only be implemented where development has not yet occurred.

There are ten drainage structure crossing for this study area (nine along 175th Street and one on Switzer Road). The details for each structure are shown in the below table.

Structure Location	Size	Drainage Area (acres)	Rational C	Q100 (cfs)
Sta 104+60 (Switzer)	2 – 8’ x 5’ RCB	93.8	0.51	439
Sta 73+33	48” RCP	17.7	0.51	90
Sta 98+42	2 – 6’ x 5’ RCB	70.4	0.51	340
Sta 119+60	9’ x 5’ RCB	66.0	0.51	338
Sta 128+17	48” RCP	29.0	0.51	143
Sta 131+10	24” RCP	4.4	0.51	24
Sta 141+80	36” RCP	18.1	0.51	97
Sta 143+00	36” RCP	13.4	0.51	71
Sta 148+90	36” RCP	4.8	0.51	30
Sta 155+00	30” RCP	4.4	0.51	25

Stormwater Treatment Facilities

Stormwater treatment facilities will be installed at each low point along the road. This study assumes two treatment facilities for each low point, at a cost of \$70,000 per unit. There are seven low points resulting in an estimated cost of **\$980,000**.

Historical Considerations

Based on a cursory review of the Kansas State Historical Society (KSHS) website, it appears that there are no known archeological sites or historic structures within the project limits, thus the improvements should have no effect on properties listed on the National Register of Historic Places. However, during the project design phase it is recommended that further investigation be undertaken.

Retaining Walls

The east mile of the proposed 175th Street alignment has several locations where the cut and fill sections will adversely impact the adjacent landowners. While this study did not utilize retaining walls in these locations, it is recommended that the practicality of using retaining walls be investigated during the project design phase.

Existing Lakes and Ponds

There are several private ponds that are adjacent to 175th Street that are outside of the proposed right-of-way and grading limits. It is assumed that these ponds will be removed as the land is developed. However, it is recommended that the stability of each pond be investigated during the

project design phase to determine what impact, if any, they might have on the roadway during construction if the land remains undeveloped.

Permitting

Permits will be required before beginning construction activities on this project. Due to the continually changing nature of permitting requirements, it is recommended that the engineer analyze permitting requirements during the project’s preliminary phase. The following permits may be required and should be investigated:

- USACE 404 Permit
- Kansas DWR Permit
- National Pollution Discharge Elimination System (NPDES) Permit
- Federal Aviation Administration Form 7460-1
- City Land Disturbance Permit
- City Flood Plain Permit
- Other

Construction

This report has been formatted to show three (3) separate sections of roadway. The quantities and estimate of cost have been calculated separately for each section. The quantities and costs can be found beginning on page 20 of this report. These opinions of probable costs and previous area studies will assist in phasing of the roadway construction.

Temporary surfacing will be necessary to maintain access to residences throughout the study area. Recommendations for construction phasing and maintenance of traffic during construction will need to be evaluated during each preliminary project design. The cost of earthwork should also be considered during the sequencing of construction. As shown from the table below, various sections of roadway construction will have excess waste material while other sections will require borrow.

Estimated Earthwork Volumes

Segment	Unclassified Excavation	Compaction	Waste/Borrow
175 th Street (Quivira to Switzer)	8,371	25,889	17,518 Borrow
175 th Street/Switzer Road Intersection	6,966	26,476	19,510 Borrow
175 th Street (Switzer to Antioch)	43,816	42,110	1,706 Waste
Total	59,153	94,475	35,322 Borrow

Note: All volumes shown are unadjusted volumes. No shrinkage factor has been applied.

OPINIONS OF PROBABLE COST

Total Project Cost Summary

	175th (Quivira to Switzer)	175th/Switzer Intersection	175th (Switzer to Antioch)
1 Construction Cost* General Contract	\$3,984,670	\$3,282,791	\$5,155,941
2 Estimated Change Orders (5%)	\$199,234	\$164,140	\$257,797
3 Engineering			
Final Design (8%)	\$318,774	\$262,623	\$412,475
Consultant Inspection (5%)	\$199,234	\$164,140	\$257,797
Consultant EDC (1%)	\$39,847	\$32,828	\$51,559
4 Material Testing (1%)	\$39,847	\$32,828	\$51,559
5 Legal Publications, Blueprinting, Miscellaneous (1%)	\$39,847	\$32,828	\$51,559
6 Project Administration (3%)	\$119,540	\$98,484	\$154,678
7 Ownership Certificates (0.5%)	\$19,923	\$16,414	\$25,780
8 Utility Relocations**	\$141,000	\$139,000	\$72,000
9 R/W & Easement Acquisition***	\$504,582	\$316,182	\$577,085
Total Project Cost	\$5,606,496	\$4,542,257	\$7,068,231

* *Based on 2010 costs*

** *See Utility Relocations costs*

*** *See Right-of-Way costs*

Right-of-Way Costs

Additional right-of-way and easements will be required for these projects as summarized on the following pages. All right-of-way costs are based on information from recent widening projects. Costs include right-of-way, permanent drainage and temporary construction easements.

The following unit costs were used to develop the proposed right-of-way costs for the different sections:

Platted

Right-of-way	\$4.00 per square foot
Sidewalk/Utility Easement	\$4.00 per square foot
Permanent Drainage Easement.....	\$2.00 per square foot
Temporary Construction Easement	\$1.00 per square foot

Unplatted

Right-of-way	\$2.00 per square foot
Sidewalk/Utility Easement	\$2.00 per square foot
Permanent Drainage Easement.....	\$1.00 per square foot
Temporary Construction Easement	\$0.50 per square foot

175th Street (Quivira to Switzer)

Tract No.	Easement Type	Approximate Area (sq. ft.)	Approximate Cost
1	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	4,849	\$4,849
	<i>Drainage</i>	0	\$0
2	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	3,825	\$3,825
	<i>Drainage</i>	0	\$0
3	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	6,212	\$6,212
	<i>Drainage</i>	0	\$0
4	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	12,300	\$12,300
	<i>Drainage</i>	0	\$0
5	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	11,057	\$11,057
	<i>Drainage</i>	0	\$0
6	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	5,697	\$5,697
	<i>Drainage</i>	0	\$0
7	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	15,576	\$15,576
	<i>Drainage</i>	1,812	\$3,625
8	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	2,830	\$2,830
	<i>Drainage</i>	0	\$0
9	<i>Right-of-Way</i>	6,000	\$12,000
	<i>Temporary Construction</i>	9,754	\$4,877
	<i>Sidewalk/Utility</i>	3,000	\$6,000
	<i>Drainage</i>	0	\$0
10	<i>Right-of-Way</i>	5,504	\$11,008
	<i>Temporary Construction</i>	9,244	\$4,622
	<i>Sidewalk/Utility</i>	2,751	\$5,501
	<i>Drainage</i>	0	\$0
11	<i>Right-of-Way</i>	12,663	\$25,325
	<i>Temporary Construction</i>	14,513	\$7,257
	<i>Sidewalk/Utility</i>	6,331	\$12,663
	<i>Drainage</i>	0	\$0
12	<i>Right-of-Way</i>	2,424	\$4,849
	<i>Temporary Construction</i>	4,256	\$2,128
	<i>Sidewalk/Utility</i>	1,214	\$2,429
	<i>Drainage</i>	0	\$0

175th Street (Quivira to Switzer), Cont'd			
13	<i>Right-of-Way</i>	5,255	\$10,510
	<i>Temporary Construction</i>	38,059	\$19,029
	<i>Sidewalk/Utility</i>	2,627	\$5,254
	<i>Drainage</i>	0	\$0
14	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	5,706	\$5,706
	<i>Drainage</i>	0	\$0
32*	<i>Right-of-Way</i>	30,022	\$60,044
	<i>Temporary Construction</i>	35,782	\$17,891
	<i>Drainage</i>	6,418	\$6,418
33	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	5,300	\$5,300
	<i>Drainage</i>	0	\$0
34	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	0	\$0
	<i>Drainage</i>	0	\$0
35	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	1,800	\$1,800
	<i>Drainage</i>	0	\$0
36	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	9,733	\$9,733
	<i>Drainage</i>	0	\$0
37	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	7,681	\$7,681
	<i>Drainage</i>	0	\$0
38	<i>Right-of-Way</i>	8,883	\$17,765
	<i>Temporary Construction</i>	13,326	\$6,663
	<i>Drainage</i>	0	\$0
39	<i>Right-of-Way</i>	12,761	\$25,521
	<i>Temporary Construction</i>	46,367	\$23,184
	<i>Drainage</i>	1,330	\$1,330
40	<i>Right-of-Way</i>	7,641	\$15,282
	<i>Temporary Construction</i>	36,254	\$18,127
	<i>Drainage</i>	0	\$0
41	<i>Right-of-Way</i>	7,804	\$15,607
	<i>Temporary Construction</i>	25,806	\$12,903
	<i>Drainage</i>	0	\$0
42	<i>Right-of-Way</i>	10,780	\$21,560
	<i>Temporary Construction</i>	10,780	\$5,390
	<i>Drainage</i>	0	\$0
43	<i>Right-of-Way</i>	9,903	\$19,805
	<i>Temporary Construction</i>	14,900	\$7,450
	<i>Drainage</i>	0	\$0
Subtotal Right-of-Way Costs			\$504,582

175th Street/Switzer Road Intersection

Tract No.	Easement Type	Approximate Area (SF)	Approximate Cost
15	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	8,377	\$8,377
	<i>Drainage</i>	3,223	\$6,446
16	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	13,623	\$13,623
	<i>Drainage</i>	0	\$0
16a	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	3,277	\$3,277
	<i>Drainage</i>	0	\$0
16b	<i>Right-of-Way</i>	5,632	\$22,527
	<i>Temporary Construction</i>	0	\$0
	<i>Drainage</i>	0	\$0
17*	<i>Right-of-Way</i>	13,352	\$26,705
	<i>Temporary Construction</i>	14,098	\$7,049
	<i>Sidewalk/Utility</i>	3,020	\$6,041
	<i>Drainage</i>	912	\$912
31	<i>Right-of-Way</i>	49,373	\$98,746
	<i>Temporary Construction</i>	59,143	\$29,572
	<i>Drainage</i>	8,554	\$8,554
32**	<i>Right-of-Way</i>	30,022	\$60,044
	<i>Temporary Construction</i>	35,782	\$17,891
	<i>Drainage</i>	6,418	\$6,418

Subtotal Right-of-Way Costs		\$316,182	
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175th Street (Switzer to Antioch)

Tract No.	Easement Type	Approximate Area (SF)	Approximate Cost
*17	<i>Right-of-Way</i>	75,663	\$151,327
	<i>Temporary Construction</i>	79,890	\$39,945
	<i>Sidewalk/Utility</i>	17,116	\$34,232
	<i>Drainage</i>	5,170	\$5,170
18	<i>Right-of-Way</i>	0	\$0
	<i>Temporary Construction</i>	30,061	\$30,061
	<i>Drainage</i>	910	\$1,820

	<i>Right-of-Way</i>	0	\$0
19	<i>Temporary Construction</i>	25,514	\$25,514
	<i>Drainage</i>	3,488	\$6,975
	<i>Right-of-Way</i>	0	\$0
20	<i>Temporary Construction</i>	46,800	\$46,800
	<i>Drainage</i>	2,490	\$4,979
	<i>Right-of-Way</i>	0	\$0
21	<i>Temporary Construction</i>	9,141	\$9,141
	<i>Drainage</i>	1,260	\$2,520
	<i>Right-of-Way</i>	0	\$0
22	<i>Temporary Construction</i>	8,329	\$8,329
	<i>Drainage</i>	0	\$0
	<i>Right-of-Way</i>	0	\$0
23	<i>Temporary Construction</i>	14,489	\$14,489
	<i>Drainage</i>	3,150	\$6,300
	<i>Right-of-Way</i>	0	\$0
24	<i>Temporary Construction</i>	3,830	\$3,830
	<i>Drainage</i>	234	\$468
	<i>Right-of-Way</i>	13,569	\$27,138
25	<i>Temporary Construction</i>	26,333	\$13,166
	<i>Drainage</i>	6,091	\$6,091
	<i>Right-of-Way</i>	3,300	\$6,600
26	<i>Temporary Construction</i>	4,950	\$2,475
	<i>Drainage</i>	0	\$0
	<i>Right-of-Way</i>	8,400	\$16,800
27	<i>Temporary Construction</i>	12,535	\$6,267
	<i>Drainage</i>	2,100	\$2,100
	<i>Right-of-Way</i>	0	\$0
28	<i>Temporary Construction</i>	18,929	\$9,465
	<i>Drainage</i>	2,861	\$2,861
	<i>Right-of-Way</i>	24,711	\$49,422
29	<i>Temporary Construction</i>	43,372	\$21,686
	<i>Drainage</i>	4,744	\$4,744
	<i>Right-of-Way</i>	6,556	\$13,112
30	<i>Temporary Construction</i>	6,517	\$3,258
	<i>Drainage</i>	0	\$0
Subtotal Right-of-Way Costs			\$577,085

Utility Relocation Costs

Based on preliminary information, it appears several of the existing utilities will need to be relocated. No subsurface investigations of existing facilities were performed during this study. During final design, additional information should be obtained to evaluate more accurately the possibility of avoiding some of the facilities that have been assumed to need relocation in this study. The following tables provide a summary of potential utility relocations and opinions of relocation costs for those utilities located in private easement.

175th Street (Quivira to Switzer)

Utility Company	Description	Approximate Length (LF)	Cost/LF	Approximate Cost
WaterOne	4" PVC Waterline	4,700	\$30	\$141,000
			Subtotal	\$141,000

175th Street & Switzer Intersection

Utility Company	Description	Approximate Length (LF)	Cost/LF	Approximate Cost
WaterOne	2" PVC Waterline	500	\$20	\$10,000
WaterOne	4" PVC Waterline	700	\$30	\$21,000
WaterOne	12" PVC Waterline	1,200	\$90	\$108,000
			Subtotal	\$139,000

175th Street (Switzer to Antioch)

Utility Company	Description	Approximate Length (LF)	Cost/LF	Approximate Cost
WaterOne	2" PVC Waterline	3,600	\$20	\$72,000
			Subtotal	\$72,000

Construction Costs

Detailed preliminary opinions of cost are shown on the following pages. Separate quantities and construction costs have been figured for each of the following sites:

- 175th Street (Quivira to Switzer)
- 175th Street & Switzer Road Intersection
- 175th Street (Switzer to Antioch)

APPENDIX