Special Research Study

Comparison of Stormwater Pipe Installation Lengths and Costs in Texas: Frisco, Arlington, Austin, Victoria and Hidalgo County

Client: American Chemistry Council

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USA

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EXECUTIVE SUMMARY

The American Chemistry Council (ACC) retained BCC Research to investigate and compare stormwater (non-pressurized) pipe installation costs in five communities in Texas. These included Hidalgo County and Victoria, that permit open competition for pipe materials, and Arlington, Austin, and Frisco, that use a closed competition for pipe and pipeline projects. BCC Research collected pipe installation, pipe cost, and pipe material data in each of these communities to compare cost and cost differential among the communities.

BCC Research collected publicly available data from bid documentation, city data, council meeting minutes, contracts, and other data sources. Primary data collection methods, including phone and/or email interviews, were used as needed to fill gaps or to verify and benchmark available data.

Key project findings indicate that communities with open competition enjoy lower pipe cost, on average, for stormwater projects, reaching savings of up to 57% in comparison to municipalities employing closed competition practices. Based on these data, for a hypothetical one-mile installation of 24-inch stormwater pipe, a municipality using a closed competition pipe material selection process would pay approximately $391,746. In contrast, a municipality using an open competition pipe material selection process would pay approximately $235,621, for a cost savings of $156,125 per mile of 24-inch stormwater pipe purchased. Figure A visually summarizes the closed and open competition pipe cost results shown in Table A.

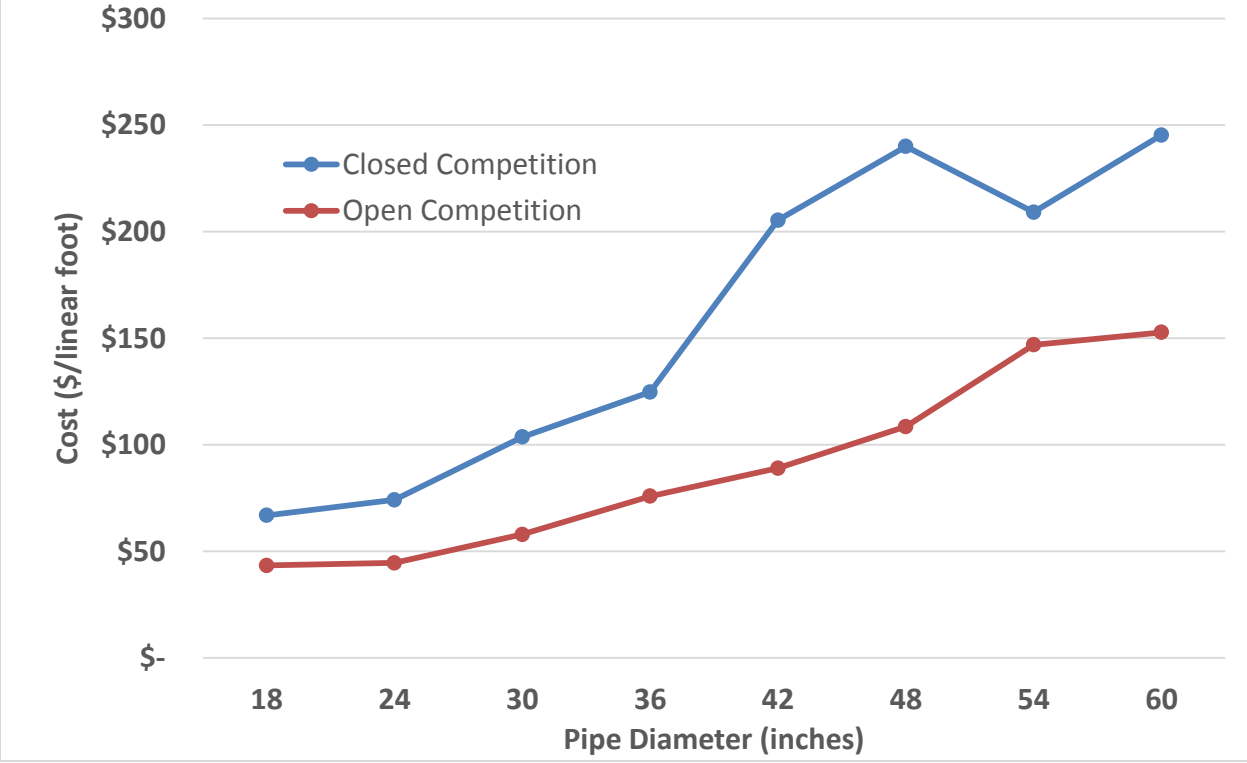

Figure A: Average Pipe Capital Costs by Pipe Diameter, for Closed Competition (Frisco, Arlington, and Austin) and Open Competition (Victoria, Hidalgo County) Municipalities.

Table A: Average Cost ($/Foot) for Closed and Open Competition, and Percent Savings Identified for Open Over Closed Competition, On Average

Pipe diameter (inches)	Closed Competition	Open Competition	Percent Savings from Open Competition
18	$67.75	$43.44	36%
24	$74.19	$44.63	40%
30	$103.66	$58.01	44%
36	$124.76	$75.93	39%
42	$205.41	$89.04	57%
48	$239.99	$108.60	55%
54	$209.11	$146.95	30%
60	$245.35	$152.80	38%

Source: BCC Research.

INTRODUCTION

PURPOSE

The primary objective of this study was to provide a comparison of stormwater (non-pressurized) pipe installation and costs in five communities in Texas. Two permit open competition for pipe materials (Victoria, Hidalgo County). Three use a closed competition process for pipe and pipeline projects (Frisco, Arlington, and Austin). Data gathered will make it possible to see differences between types of bidding options:

- How much pipe is installed each year
- Pipe sizing
- Pipe material, where data are available
- Compare cost and cost differential in the selected communities that permit different options for bidding

METHODOLOGY

Information collected in support of this study was collected through a combination of primary and secondary research methods. For these cities, secondary research methods, include city data, bid documentation, council meeting minutes, contracts, planning documents, stormwater master plans, and other available data which have proved effective as reliable data sources. Primary data sources (phone and/or email based interviews with City staff) are used to fill gaps or verify/benchmark pipe data.

Public data was collected that included pipe lengths, materials, diameter and published costs. However, some data sources also included extraneous information and costs, beyond simple pipe cost. For example, some pipeline projects are bid out as a cost for construction and completion of the entire project, including pipe as well as appurtenances (vaults, manholes, etc.) and sometimes roadwork and earthwork (pavement, fill, sidewalks, etc.). Data collected for these cities were of especially high quality. Pipe cost, length, and diameter data were available for at least 90% of the data points collected. In total, 368 individual pipe installations were considered, from 2013 through 2015, in support of the project. Pipe sizes considered here were limited to stormwater pipe sized 18 inches and greater in even diameters (i.e., 18, 24, 30, 36, 42, 48, 54, and 60-inch diameter pipe) – consistent with the primary sizes of stormwater pipe installed in most cities for typical urban storm sewers.

CITY OF VICTORIA (OPEN COMPETITION) PIPELINE INSTALLATION AND COST DATA

Victoria, Texas allows open competition for stormwater pipeline projects. The vast majority of the city's in-ground stormwater pipeline infrastructure is reinforced concrete pipe (RCP). While Victoria has installed an increasing proportion of small diameter (i.e., less than 18 inches) plastic pipe for stormwater management, the City has installed primarily RCP for pipe sized 18 inches and up. For example, in 2013, only 3% of its total pipe installation was plastic, with no plastic installed in 2014, and no stormwater pipes installed at 18 inches and larger during 2015.

Data for the City were collected primarily based on filed bid responses and awarded contracts for City pipeline projects, which were publicly available through City Council meeting documentation, contract documentation, and as data made available to BCC Research. Data collected were benchmarked against city stormwater planning documentation. Pipeline diameter, length and cost data were readily available for Victoria for all identified projects.

Table 1 summarizes the length and diameter of pipe installed in Victoria during 2013, 2014, and 2015. Similarly, Table 2 summarizes total pipe costs by diameter and year, while Table 3 summarizes pipeline cost per foot, and Table 4 summarizes pipe *materials* by length of pipe installed. Finally, we summarized average pipe costs for Victoria over the study period by diameter. These are shown in Table 5.

Table 1: Victoria: Linear Feet of Pipe Installed, 2013-2015

Pipe Diameter (inches)	Pipe Length (feet)		
	2013	2014	2015
18	4,389	3,100	-
24	2,272	-	-
30	802	-	-
36	1,069	-	-
42	-	-	-
48	-	-	-
54	-	-	-
60	-	-	-
TOTAL	**8,532**	**3,100**	**-**

Source: BCC Research.

Table 2: Victoria: Pipeline Cost, 2013-2015

Pipe Diameter (inches)	Pipe Cost ($/Year)		
	2013	2014	2015
18	$210,759	$176,700	$-
24	$133,265	$-	$-
30	$56,140	$-	$-
36	$99,135	$-	$-
42	$-	$-	$-
48	$-	$-	$-
54	$-	$-	$-
60	$-	$-	$-
TOTAL	**$499,299**	**$176,700**	**$-**

Source: BCC Research.

Table 3: Victoria: Pipe Cost per Foot

Pipe Diameter (inches)	Pipe Cost ($/Foot)		
	2013	2014	2015
18	$48	$57	$-
24	$59	$-	$-
30	$70	$-	$-
36	$93	$-	$-
42	$-	$-	$-
48	$-	$-	$-
54	$-	$-	$-
60	$-	$-	$-

Source: BCC Research.

Table 4: Victoria: Pipe Materials

Pipe Materials	Pipe Length Installed		
	2013	2014	2015
RCP	8,299	3,100	-
Plastics	233	-	-
Total	**8,532**	**3,100**	**-**

Source: BCC Research.

Table 5: Victoria: Average Pipe Cost, by Pipe Diameter

Pipe Diameter (inches)	Average Pipe Cost ($/ft), 2013-2015
18	$51.74
24	$58.66
30	$70.00
36	$92.74
42	N/A
48	N/A
54	N/A
60	N/A

Source: BCC Research.

HIDALGO COUNTY (OPEN COMPETITION) PIPELINE INSTALLATION AND COST DATA

Hidalgo County, Texas allows open competition for stormwater pipeline projects. The vast majority of the county's in-ground stormwater pipeline infrastructure is reinforced concrete pipe (RCP). However, based on data collected in support of this project, the city over the last several years has been increasingly deploying plastic pipe for stormwater management within its service area. For example, in 2013, 0% of Hidalgo County's installed stormwater pipe (based on pipe length) was plastic, with 100% RCP. However, by 2015, 38% of Hidalgo County's installed stormwater pipe was plastic, with only 62% RCP.

Data for the County were collected primarily based on filed bid responses and awarded contracts for County pipeline projects, which were publicly available through County meeting documentation, contract documentation, and as data made available to BCC research. Data collected were benchmarked against available stormwater planning documentation and stormwater installed base information. Pipeline diameter, length and cost data were readily available for the county, for all identified projects.

The tables below summarize the length and diameter of pipe installed in Hidalgo County during 2013, 2014, and 2015, total pipe costs by diameter and year, pipe cost per foot by year, pipe materials by length of pipe installed, and average pipe costs for the County over the study period, by diameter.

Table 6: Hidalgo County: Linear Feet of Pipe Installed, 2013-2015

Pipe Diameter (inches)	Pipe Length (feet)		
	2013	**2014**	**2015**
18	2,360	2,119	3,402
24	12,342	1,316	5,861
30	2,099	911	9,643
36	5,314	858	2,891
42	550	827	5,760
48	1,480	675	8,151
54	1,351	-	2,949
60	1,070	160	-
TOTAL	**26,566**	**6,866**	**38,657**

Source: BCC Research.

Table 7: Hidalgo County: Pipeline Cost, 2013-2015

Pipe Diameter (inches)	Pipe Cost ($/Year)		
	2013	2014	2015
18	$78,832	$72,849	$128,503
24	$530,318	$59,168	$249,677
30	$118,604	$60,625	$545,137
36	$383,560	$57,108	$229,470
42	$51,700	$101,959	$481,852
48	$148,600	$83,295	$887,342
54	$168,875	$-	$462,993
60	$155,150	$32,800	$-
TOTAL	**$1,635,639**	**$467,804**	**$2,984,974**

Source: BCC Research.

Table 8: Hidalgo County: Pipe Cost per Foot

Pipe Diameter (inches)	Pipe Cost ($/Foot)		
	2013	2014	2015
18	$33	$34	$38
24	$43	$45	$43
30	$57	$67	$57
36	$72	$67	$79
42	$94	$123	$84
48	$100	$123	$109
54	$125	$-	$157
60	$145	$205	$-

Source: BCC Research.

Table 9: Hidalgo County: Pipe Materials

Pipe Materials	Pipe Length Installed		
	2013	2014	2015
RCP	26,566	6,057	23,942
Plastics	-	809	14,715
Total	**26,566**	**6,866**	**38,657**

Source: BCC Research.

Table 10: Hidalgo County: Average Pipe Cost, by Pipe Diameter

Pipe Diameter (inches)	Average Pipe Cost ($/ft), 2013-2015
18	$35.55
24	$42.99
30	$57.25
36	$73.94
42	$89.04
48	$108.60
54	$146.95
60	$152.80

Source: BCC Research.

CITY OF FRISCO (CLOSED COMPETITION) PIPELINE INSTALLATION AND COST DATA

The City of Frisco, Texas maintains a closed material competition process for pipeline projects, strongly focusing on RCP as the main stormwater pipe material. All pipeline project data collected for Frisco stormwater projects indicated that RCP was used. No moderate to major stormwater projects that used plastic pipelines were identified within the City (although PVC and other plastics were used for non-stormwater uses, including sewer line projects (data not shown here).

Data for the City were collected primarily based on filed bid responses and awarded contracts for City pipeline projects, which were publicly available through City meeting documentation, contract documentation, and as data made available to BCC research. Data collected were benchmarked against available stormwater planning documentation and/or stormwater installed base information. Pipeline diameter, length and cost data were readily available for the county, for all identified projects.

The tables below summarize the length and diameter of pipe installed in the City during 2013, 2014, and 2015, total pipe costs by diameter and year, pipe cost per foot by year, pipe materials by length of pipe installed, and average pipe costs for the City over the study period, by diameter.

Table 11: Frisco: Linear Feet of Pipe Installed, 2013-2015

Pipe Diameter (inches)	Pipe Length (feet)		
	2013	2014	2015
18	-	132	951
24	-	271	543
30	-	32	323
36	-	-	95
42	-	-	67
48	-	-	505
54	-	-	-
60	-	-	317
TOTAL	**0**	**435**	**2801**

Source: BCC Research.

Table 12: Frisco: Pipeline Cost, 2013-2015

Pipe Diameter (inches)	Pipe Cost ($/Year)		
	2013	2014	2015
18	$-	$6,240	$58,805
24	$-	$12,195	$30,122
30	$-	$1,760	$26,145
36	$-	$-	$10,350
42	$-	$-	$12,395
48	$-	$-	$78,780
54	$-	$-	$-
60	$-	$-	$69,423
TOTAL	**$-**	**$20,195**	**$286,020**

Source: BCC Research.

Table 13: Frisco: Pipe Cost per Foot

Pipe Diameter (inches)	Pipe Cost ($/Foot)		
	2013	2014	2015
18	$-	$47	$62
24	$-	$45	$55
30	$-	$55	$81
36	$-	$-	$109
42	$-	$-	$185
48	$-	$-	$156
54	$-	$-	$-
60	$-	$-	$219

Source: BCC Research.

Table 14: Frisco: Pipe Materials

Pipe Materials	Pipe Length Installed		
	2013	2014	2015
RCP	0	435	2801
Plastics	0	0	0
Total	0	435	2801

Source: BCC Research.

Table 15: Frisco: Average Pipe Cost, by Pipe Diameter

Pipe Diameter (inches)	Average Pipe Cost ($/ft), 2013-2015
18	$60.06
24	$51.99
30	$78.61
36	$108.95
42	$185.00
48	$156.00
54	N/A
60	$219.00

Source: BCC Research.

CITY OF ARLINGTON (CLOSED COMPETITION) PIPELINE INSTALLATION AND COST DATA

The City of Arlington, Texas maintains a closed material competition process for pipeline projects, strongly focusing on RCP as the main stormwater pipe material. With the exception of a single project, all other pipeline project data collected for Arlington stormwater projects indicated that RCP was used.

Data for the City were collected primarily based on filed bid responses and awarded contracts for City pipeline projects, which were publicly available through City meeting documentation, contract documentation, and as data made available to BCC research. Data collected were benchmarked against available stormwater planning documentation and/or stormwater installed base information. Pipeline diameter, length, and cost data were readily available for the City, for all identified projects.

The tables below summarize the length and diameter of pipe installed in the City during 2013, 2014, and 2015, total pipe costs by diameter and year, pipe cost per foot by year, pipe materials by length of pipe installed, and average pipe costs for the City over the study period, by diameter.

Table 16: Arlington: Linear Feet of Pipe Installed, 2013-2015

Pipe Diameter (inches)	Pipe Length (feet)		
	2013	2014	2015
18	270	3,348	1,519
24	1,014	2,949	539
30	84	1,626	352
36	224	4,442	436
42	58	1,385	1,392
48	147	355	1,105
54	-	322	-
60	1,242	1,034	-
TOTAL	**3,039**	**15,461**	**5,343**

Source: BCC Research.

Table 17: Arlington: Pipeline Cost, 2013-2015

Pipe Diameter (inches)	Pipe Cost ($/Year)		
	2013	2014	2015
18	$22,892	$202,359	$154,286
24	$80,877	$239,215	$65,525
30	$7,323	$169,780	$58,146
36	$22,516	$500,617	$79,046
42	$9,838	$228,536	$380,366
48	$25,220	$82,145	$360,402
54	$-	$101,430	$-
60	$313,380	$263,670	$-
TOTAL	**$482,046**	**$1,787,752**	**$1,097,771**

Source: BCC Research.

Table 18: Arlington: Pipe Cost per Foot

Pipe Diameter (inches)	Pipe Cost ($/Foot)		
	2013	2014	2015
18	$85	$60	$102
21	$80	$81	$122
24	$87	$104	$165
30	$101	$113	$181
36	$170	$165	$273
42	$172	$231	$326
48	$-	$315	$-
54	$252	$255	$-
60	$85	$60	$102

Source: BCC Research.

Table 19: Arlington: Pipe Materials

Pipe Materials	Pipe Length Installed		
	2013	2014	2015
RCP	3,039	15,431	5,343
Plastics	-	30	-
Total	3,039	15,461	5,343

Source: BCC Research.

Table 20: Arlington: Average Pipe Cost, by Pipe Diameter

Pipe Diameter (inches)	Average Pipe Cost ($/ft), 2013-2015
18	$73.88
24	$85.65
30	$114.09
36	$118.03
42	$218.25
48	$291.08
54	$315.00
60	$253.54

Source: BCC Research.

CITY OF AUSTIN (CLOSED COMPETITION) PIPELINE INSTALLATION AND COST DATA

The City of Austin, Texas maintains a closed material competition process for pipeline projects, strongly focusing on RCP as the main stormwater pipe material. During 2013 and 2015, all stormwater pipe material for identified projects was RCP. During 2014, 11% of installed pipe (length basis) was plastic, with the remaining 89% RCP.

Data for the City were collected primarily based on filed bid responses and awarded contracts for City pipeline projects, which were publicly available through City meeting documentation, contract documentation, and as data made available to BCC research. Data collected were benchmarked against available stormwater planning documentation and/or stormwater installed base information. Pipeline diameter, length and cost data were readily available for the City, for all identified projects.

The tables below summarize the length and diameter of pipe installed in the City during 2013, 2014, and 2015, total pipe costs by diameter and year, pipe cost per foot by year, pipe materials by length of pipe installed, and average pipe costs for the City over the study period, by diameter.

Table 21: Austin: Linear Feet of Pipe Installed, 2013-2015

Pipe Diameter (inches)	Pipe Length (feet)		
	2013	2014	2015
18	1,434	486	840
24	1,907	600	855
30	1,189	256	200
36	794	814	1,140
42	100	100	100
48	148	100	100
54	1,302	100	100
60	220	40	40
TOTAL	**7,094**	**2,496**	**3,375**

Source: BCC Research.

Table 22: Austin: Pipeline Cost, 2013-2015

Pipe Diameter (inches)	Pipe Cost ($/Year)		
	2013	2014	2015
18	$82,017	$17,724	$54,144
24	$140,550	$18,945	$56,430
30	$128,432	$20,724	$8,740
36	$81,038	$109,452	$188,236
42	$8,861	$8,861	$8,861
48	$19,765	$12,037	$12,037
54	$247,186	$16,402	$16,402
60	$48,107	$7,607	$7,607
TOTAL	$755,955	$211,751	$352,456

Source: BCC Research.

Table 23: Austin: Pipe Cost per Foot

Pipe Diameter (inches)	Pipe Cost ($/Foot)		
	2013	2014	2015
18	$57	$36	$64
24	$74	$32	$66
30	$108	$81	$44
36	$102	$134	$165
42	$89	$89	$89
48	$134	$120	$120
54	$190	$164	$164
60	$219	$190	$190

Source: BCC Research.

Table 24: Austin: Pipe Materials

Pipe Materials	Pipe Length Installed		
	2013	2014	2015
RCP	7,094	2,198	3,375
Plastics	-	298	-
Total	7,094	2,496	3,375

Source: BCC Research.

Table 25: Austin: Average Pipe Cost, by Pipe Diameter

Pipe Diameter (inches)	Average Pipe Cost ($/ft), 2013-2015
18	$55.76
24	$64.23
30	$95.99
36	$137.82
42	$88.61
48	$125.97
54	$186.41
60	$211.07

Source: BCC Research.

SUMMARY FINDINGS AND CONCLUSIONS

Key findings of this project indicate that municipalities employing open competition practices for the selection of stormwater pipe materials enjoy lower pipe cost on average for stormwater projects. As shown in Table 26, Open competition resulted in a pipe cost savings for all pipe diameters considered in the study, with average savings by diameter reaching up to 57%. Based on these data, for a hypothetical one-mile installation of 24-inch stormwater pipe, a municipality utilizing a closed competition pipe material selection process would pay approximately $391,746. In contrast, a municipality utilizing an open competition pipe material selection process would pay approximately $235,621, for a cost savings of $156,125 per mile of 24-inch stormwater pipe purchased. Figure 1 visually summarizes the closed and open competition pipe cost results shown in Table 25.

Table 26: Average Cost ($/Foot) for Closed and Open Competition, and Percent Savings Identified for Open Over Closed Competition, On Average

Pipe diameter (inches)	Closed Competition	Open Competition	Percent Savings from Open Competition
18	$66.64	$43.44	35%
24	$74.19	$44.63	40%
30	$103.66	$58.01	44%
36	$124.76	$75.93	39%
42	$205.41	$89.04	57%
48	$239.99	$108.60	55%
54	$209.11	$146.95	30%
60	$245.35	$152.80	38%

Source: BCC Research.

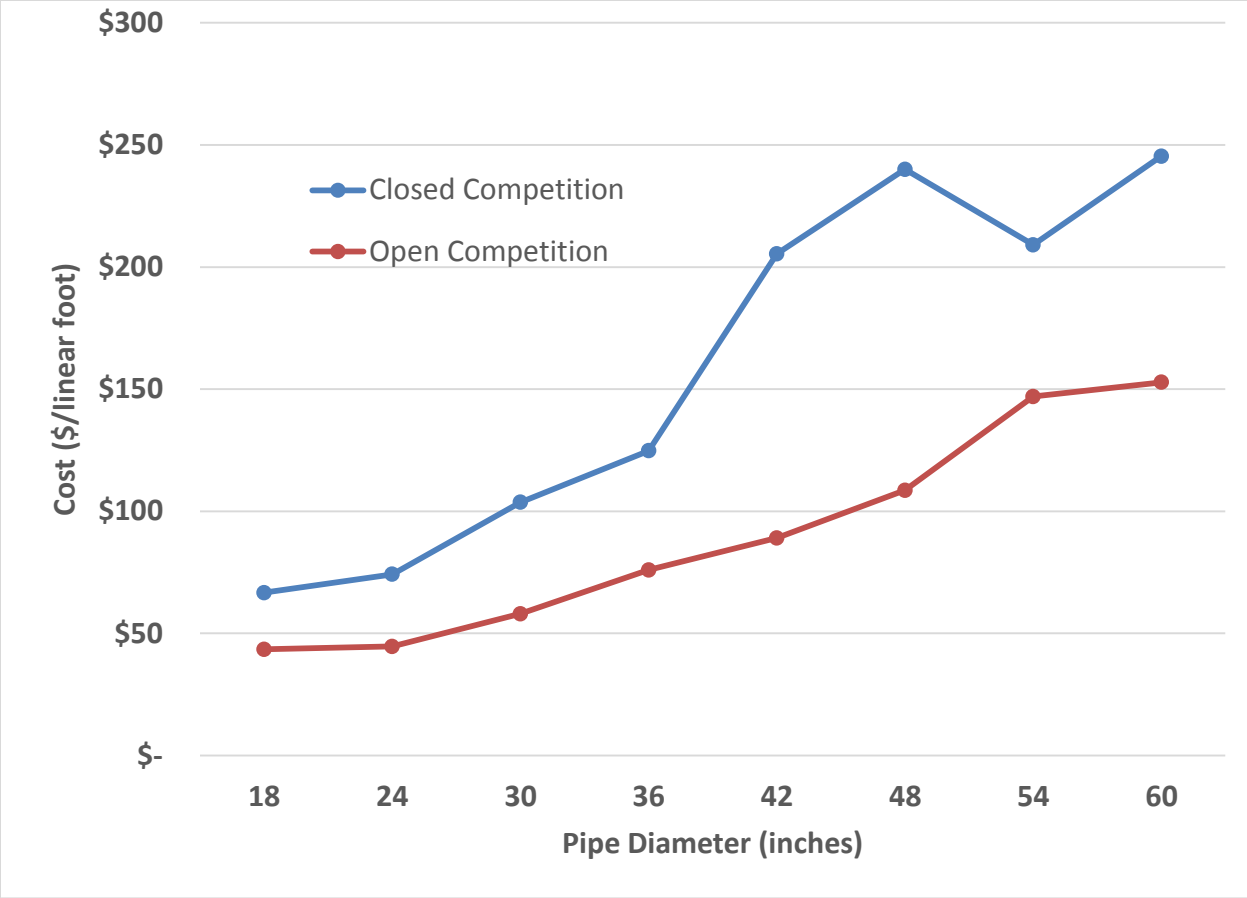

Figure 1: Average Pipe Capital Costs by Pipe Diameter, for Closed Competition (Frisco, Arlington, and Austin) and Open Competition (Victoria, Hidalgo County) Municipalities.