

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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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 the 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. Due to the potentially sensitive nature of the requested data, the secondary sources were used to initiate the study.

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.). Fortunately, data collected for these cities were of especially high quality, avoiding need to estimate pipe costs based on total project costs. Pipe cost, length, and diameter data were available for at least 90% of the data points collected. In total, 374 individual pipe installations were considered, from 2013 through 2015, in support of the project.

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). 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, 20% of Victoria's installed stormwater pipe (based on pipe length) was plastic, with 80% RCP. By 2015, 83% of Victoria's installed stormwater pipe was plastic, with only 17% 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 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
12	2,000	900	1,950
15	862	-	700
18	4,389	3,100	-
21	-	-	-
24	2,272	-	-
27	-	-	-
30	802	-	-
33	-	-	-
36	1,069	-	-
39	-	-	-
42	-	-	-
48	-	-	-
54	-	-	-
60	-	-	-
TOTAL	**11,394**	**4,000**	**2,650**

Source: BCC Research.

Table 2: Victoria: Pipeline Cost, 2013-2015

Pipe Diameter (inches)	Pipe Cost ($/Year)		
	2013	2014	2015
12	$9,298	$4,608	$11,612
15	$47,385	$-	$8,853
18	$210,759	$176,700	$-
21	$-	$-	$-
24	$133,265	$-	$-
27	$-	$-	$-
30	$56,140	$-	$-
33	$-	$-	$-
36	$99,135	$-	$-
39	$-	$-	$-
42	$-	$-	$-
48	$-	$-	$-
54	$-	$-	$-
60	$-	$-	$-
TOTAL	**$555,982**	**$181,308**	**$20,465**

Source: BCC Research.

Table 3: Victoria: Pipe Cost per Foot

Pipe Diameter (inches)	Pipe Cost ($/Foot)		
	2013	2014	2015
12	$5	$5	$6
15	$55	$-	$13
18	$48	$57	$-
21	$-	$-	$-
24	$59	$-	$-
27	$-	$-	$-
30	$70	$-	$-
33	$-	$-	$-
36	$93	$-	$-
39	$-	$-	$-
42	$-	$-	$-
48	$-	$-	$-
54	$-	$-	$-
60	$-	$-	$-

Source: BCC Research.

Table 4: Victoria: Pipe Materials

Pipe Materials	Pipe Length Installed		
	2013	2014	2015
RCP	9,161	3,100	450
Plastics	2,233	900	2,200
Ductile Iron	-	-	-
Total	11,394	4,000	2,650

Source: BCC Research.

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

Pipe Diameter (inches)	Average Pipe Cost ($/ft), 2013-2015
12	$5.26
15	$36.00
18	$51.74
21	N/A
24	$58.66
27	N/A
30	$70.00
33	N/A
36	$92.74
39	N/A
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, 44% of Hidalgo County's installed stormwater pipe was plastic, with only 66% 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
12	-	800	-
15	-	64	5,031
18	2,360	2,119	3,402
21	-	-	-
24	12,342	1,316	5,861
27	-	-	-
30	2,099	911	9,643
33	-	-	-
36	5,314	858	2,891
39	-	-	-
42	550	827	5,760
48	1,480	675	8,151
54	1,351	-	2,949
60	1,070	160	-
TOTAL	**26,566**	**7,730**	**43,688**

Source: BCC Research.

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

Pipe Diameter (inches)	Pipe Cost ($/Year)		
	2013	2014	2015
12	$-	$25,112	$-
15	$-	$4,096	$74,122
18	$78,832	$72,849	$128,503
21	$-	$-	$-
24	$530,318	$59,168	$249,677
27	$-	$-	$-
30	$118,604	$60,625	$545,137
33	$-	$-	$-
36	$383,560	$57,108	$229,470
39	$-	$-	$-
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**	**$497,012**	**$3,059,096**

Source: BCC Research.

Table 8: Hidalgo County: Pipe Cost per Foot

Pipe Diameter (inches)	Pipe Cost ($/Foot)		
	2013	2014	2015
12	$-	$31	$-
15	$-	$64	$15
18	$33	$34	$38
21	$-	$-	$-
24	$43	$45	$43
27	$-	$-	$-
30	$57	$67	$57
33	$-	$-	$-
36	$72	$67	$79
39	$-	$-	$-
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	6,387	24,667
Plastics	-	1,343	19,021
Ductile Iron	-	-	-
Total	26,566	7,730	43,688

Source: BCC Research.

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

Pipe Diameter (inches)	Average Pipe Cost ($/ft), 2013-2015
12	$31.39
15	$15.35
18	$35.55
21	N/A
24	$42.99
27	N/A
30	$57.25
33	N/A
36	$73.94
39	N/A
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
12	-	-	-
15	-	-	-
18	-	132	951
21	-	110	-
24	-	271	543
27	-	-	-
30	-	32	323
33	-	-	-
36	-	-	95
39	-	-	-
42	-	-	67
48	-	-	505
54	-	-	-
60	-	-	317
TOTAL	**0**	**545**	**2801**

Source: BCC Research.

Table 12: Frisco: Pipeline Cost, 2013-2015

Pipe Diameter (inches)	Pipe Cost ($/Year)		
	2013	2014	2015
12	$-	$-	$-
15	$-	$-	$-
18	$-	$6,240	$58,805
21	$-	$7,150	$-
24	$-	$12,195	$30,122
27	$-	$-	$-
30	$-	$1,760	$26,145
33	$-	$-	$-
36	$-	$-	$10,350
39	$-	$-	$-
42	$-	$-	$12,395
48	$-	$-	$78,780
54	$-	$-	$-
60	$-	$-	$69,423
TOTAL	$-	$27,345	$286,020

Source: BCC Research.

Table 13: Frisco: Pipe Cost per Foot

Pipe Diameter (inches)	Pipe Cost ($/Foot)		
	2013	2014	2015
12	$-	$-	$-
15	$-	$-	$-
18	$-	$47	$62
21	$-	$65	$-
24	$-	$45	$55
27	$-	$-	$-
30	$-	$55	$81
33	$-	$-	$-
36	$-	$-	$109
39	$-	$-	$-
42	$-	$-	$185
48	$-	$-	$156
54	$-	$-	$-
60	$-	$-	$219

Source: BCC Research.

Table 14: Frisco: Pipe Materials

Pipe Materials	Pipe Length Installed

	2013	2014	2015
RCP	-	545	2,801
Plastics	-	-	-
Ductile Iron	-	-	-
Total	**-**	**545**	**2,801**

Source: BCC Research.

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

Pipe Diameter (inches)	Average Pipe Cost ($/ft), 2013-2015
12	N/A
15	N/A
18	$60.06
21	$65.00
24	$51.99
27	N/A
30	$78.61
33	N/A
36	$108.95
39	N/A
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
12	-	-	-
15	-	-	-
18	270	3,348	1,519
21	309	1,032	817
24	1,014	2,949	539
27	-	14	312
30	84	1,626	352
33	-	-	741
36	224	4,442	436
39	20	-	164
42	58	1,385	1,392
48	147	355	1,105
54	-	322	-
60	1,242	1,034	-
TOTAL	**3,368**	**16,507**	**7,377**

Source: BCC Research.

Table 17: Arlington: Pipeline Cost, 2013-2015

Pipe Diameter (inches)	Pipe Cost ($/Year)		
	2013	2014	2015
12	$-	$-	$-
15	$-	$-	$-
18	$22,892	$202,359	$154,286
21	$19,483	$78,643	$91,290
24	$80,877	$239,215	$65,525
27	$-	$994	$54,958
30	$7,323	$169,780	$58,146
33	$-	$-	$117,389
36	$22,516	$500,617	$79,046
39	$3,600	$-	$34,440
42	$9,838	$228,536	$380,366
48	$25,220	$82,145	$360,402
54	$-	$101,430	$-
60	$313,380	$263,670	$-
TOTAL	**$505,128**	**$1,867,389**	**$1,395,848**

Source: BCC Research.

Table 18: Arlington: Pipe Cost per Foot

Pipe Diameter (inches)	Pipe Cost ($/Foot)		
	2013	2014	2015
12	$-	$-	$-
15	$-	$-	$-
18	$85	$60	$102
21	$63	$76	$112
24	$80	$81	$122
27	$-	$71	$176
30	$87	$104	$165
33	$-	$-	$158
36	$101	$113	$181
39	$180	$-	$210
42	$170	$165	$273
48	$172	$231	$326
54	$-	$315	$-
60	$252	$255	$-

Source: BCC Research.

Table 19: Arlington: Pipe Materials

Pipe Materials	Pipe Length Installed		
	2013	2014	2015
RCP	3,368	16,477	7,377
Plastics	-	30	-
Ductile Iron	-	-	-
Total	**3,368**	**16,507**	**7,377**

Source: BCC Research.

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

Pipe Diameter (inches)	Average Pipe Cost ($/ft), 2013-2015
12	N/A
15	N/A
18	$73.88
21	$87.77
24	$85.65
27	$171.63
30	$114.09
33	$158.42
36	$118.03
39	$206.74
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, 9% of installed pipe (length basis) was plastic, with the remaining 91% RCP. The 9% was primarily PVC material used for a specialized project that was also designed to manage pressurized flows.

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
12	500	458	400
15	200	205	200
18	1,434	595	840
21	645	600	600
24	1,907	600	855
27	100	100	100
30	1,189	256	200
33	-	-	-
36	794	814	1,140
39	-	-	-
42	100	100	100
48	148	100	100
54	1,302	100	100
60	220	40	40
TOTAL	**8,539**	**3,968**	**4,675**

Source: BCC Research.

Table 22: Austin: Pipeline Cost, 2013-2015

Pipe Diameter (inches)	Pipe Cost ($/Year)		
	2013	2014	2015
12	$11,920	$11,720	$5,920
15	$3,532	$4,962	$3,532
18	$82,017	$27,643	$54,144
21	$19,963	$15,598	$15,598
24	$140,550	$18,945	$56,430
27	$3,851	$3,851	$3,851
30	$128,432	$20,724	$8,740
33	$-	$-	$-
36	$81,038	$109,452	$188,236
39	$-	$-	$-
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	$795,221	$257,801	$381,357

Source: BCC Research.

Table 23: Austin: Pipe Cost per Foot

Pipe Diameter (inches)	Pipe Cost ($/Foot)		
	2013	2014	2015
12	$24	$26	$15
15	$18	$24	$18
18	$57	$46	$64
21	$31	$26	$26
24	$74	$32	$66
27	$39	$39	$39
30	$108	$81	$44
33	$-	$-	$-
36	$102	$134	$165
39	$-	$-	$-
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	8,619	3,503	4,675
Plastics	-	356	-
Ductile Iron	-	109	-
Total	**8,619**	**3,968**	**4,675**

Source: BCC Research.

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

Pipe Diameter (inches)	Average Pipe Cost ($/ft), 2013-2015
12	$21.77
15	$19.88
18	$57.09
21	$27.73
24	$64.23
27	$38.51
30	$95.99
33	N/A
36	$137.82
39	N/A
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 25, Open competition resulted in a pipe cost savings for all pipe diameters except for 15-inch, with average savings reaching up to 59%. 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
12	$21.77	$8.96	59%
15	$19.88	$20.20	-2%*
18	$66.94	$43.44	35%
21	$60.23	N/A	N/A
24	$74.19	$44.63	40%
27	$107.83	N/A	N/A
30	$103.66	$58.01	44%
33	$158.42	N/A	N/A
36	$124.76	$75.93	39%
39	$206.74	N/A	N/A
42	$205.41	$89.04	57%
48	$239.99	$108.60	55%
54	$209.11	$146.95	30%
60	$245.35	$152.80	38%

* indicates (minor) price increase for 15” pipe; 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; dots without lines reflect lack of 21-inch, 27-inch, 33-inch, and 39-inch pipe in Victoria and Hidalgo County.