

HARRINGTON CREEK MODEL

- Surveyed stormwater infrastructure within City of Memphis limits.
- Survey data and City infrastructure data used to construct model.
- Collected rainfall and channel flow depth data from November 2019 through March 2020.
- Model calibrated to measured data and used to analyze existing infrastructure capacity and condition.



PIPE INFRASTRUCTURE



CHANNEL INFRASTRUCTURE



BRIDGE AND CULVERT ROAD CROSSINGS

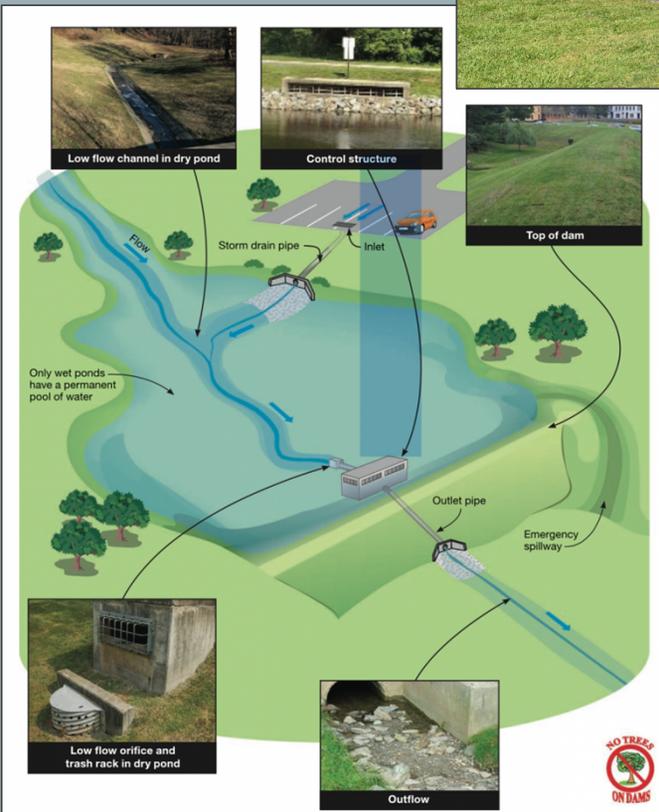


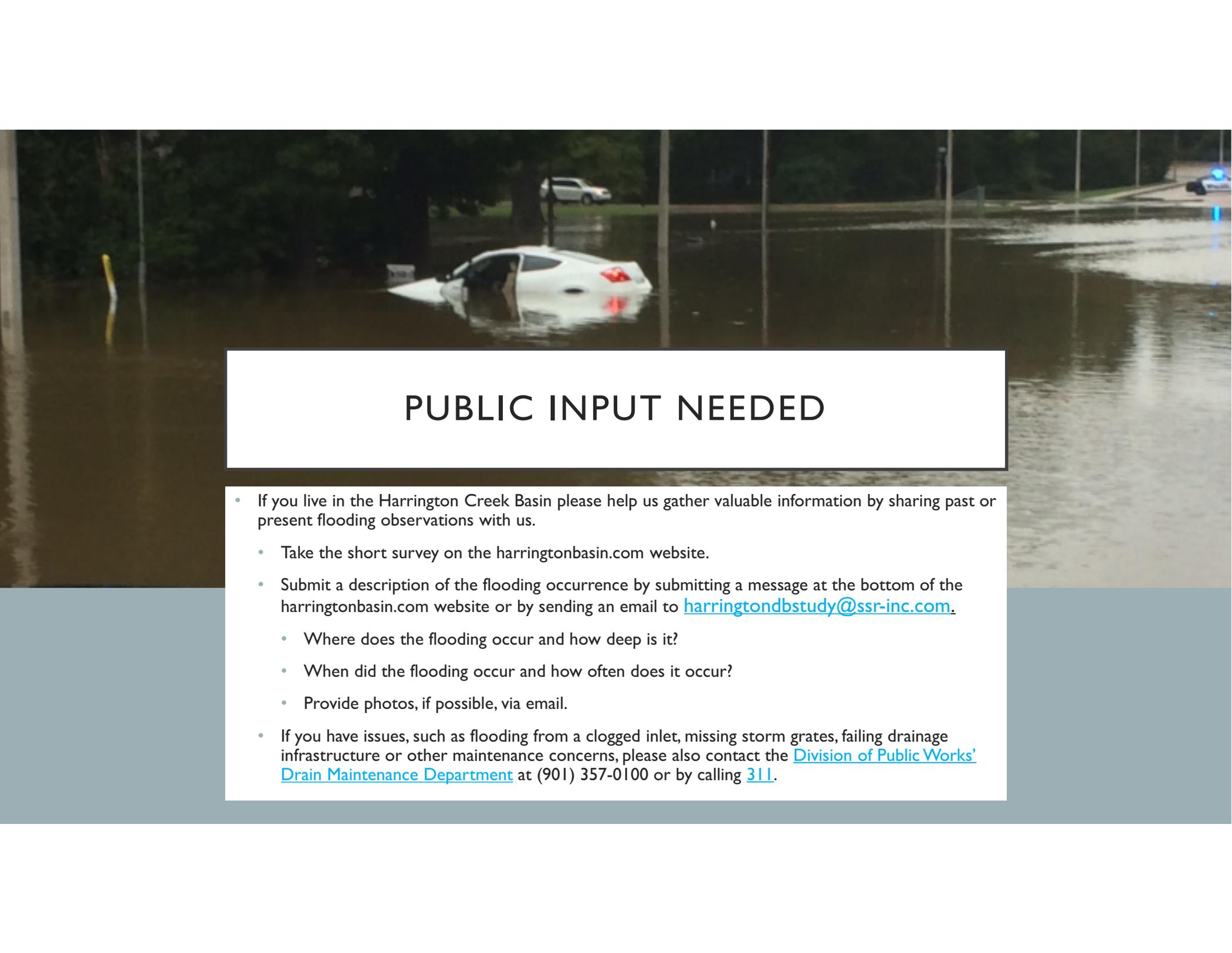
INFRASTRUCTURE FLOODING



NEXT STEPS

- City review of existing conditions model.
- Compare model results to observed and reported flooding complaints.
- Model improvement alternatives to mitigate modeled and reported flooding.
 - Additional detention or infrastructure replacement/alteration.
- Selection of improvements that will be constructed.
- Public notification of selected improvements.
- Construction of improvements.





PUBLIC INPUT NEEDED

- If you live in the Harrington Creek Basin please help us gather valuable information by sharing past or present flooding observations with us.
 - Take the short survey on the harringtonbasin.com website.
 - Submit a description of the flooding occurrence by submitting a message at the bottom of the harringtonbasin.com website or by sending an email to harringtondbstudy@ssr-inc.com.
 - Where does the flooding occur and how deep is it?
 - When did the flooding occur and how often does it occur?
 - Provide photos, if possible, via email.
 - If you have issues, such as flooding from a clogged inlet, missing storm grates, failing drainage infrastructure or other maintenance concerns, please also contact the [Division of Public Works' Drain Maintenance Department](#) at (901) 357-0100 or by calling [311](#).

APPENDIX C

COST ESTIMATE FIGURES

FIGURE 1: IA1A Planning Level Cost Estimate

Smith Seckman Reid, Inc		City of Memphis		
Harrington Creek Drainage Study				
Improvement Alternative 1: IA1A				
DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
Mobilization	L.S.	1	\$20,000.00	\$20,000.00
Earthwork and Pond Excavation	C.Y.	37500	\$10.00	\$375,000.00
Waste Material Haul-Off	C.Y.	37500	\$20.00	\$750,000.00
Removal and Disposal of Brush and Trees	L.S.	1	\$150,000.00	\$150,000.00
Erosion Control	L.S.	1	\$75,000.00	\$75,000.00
Custom Outlet Structure	EACH	1	\$30,000.00	\$30,000.00
36" RCP Pipe	L.F.	50	\$200.00	\$10,000.00
			SUB-TOTAL =	\$1,410,000.00
Construction Contingencies			30%	\$423,000.00
Design, Survey, CA Services			20%	\$282,000.00
			TOTAL =	\$2,115,000.00

FIGURE 2: IA1B Planning Level Cost Estimate

Smith Seckman Reid, Inc	City of Memphis
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Harrington Creek Drainage Study

Improvement Alternative 1: IA1B

DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
Mobilization	L.S.	1	\$20,000.00	\$20,000.00
Removal of 24" RCP Pipe and Replace with 2 parallel (42" RCP Eq.) 51" x 31" RCAP Pipes	L.F.	163	\$550.00	\$89,650.00
Removal of 30" RCP Pipe and Replace with 42" RCP Pipe	L.F.	274	\$220.00	\$60,280.00
Removal of 36" RCP Pipe and Replace with 48" RCP Pipe	L.F.	43	\$260.00	\$11,180.00
Removal of 30" RCP Pipe and Replace with 48" RCP Pipe	L.F.	278	\$230.00	\$63,940.00
Removal of 15" RCP Pipe and Replace with 2 parallel 48" RCP Pipes	L.F.	141	\$460.00	\$64,860.00
2 parallel 42" RCP Pipes	L.F.	474	\$440.00	\$208,560.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	435	\$100.00	\$43,500.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	1260	\$200.00	\$252,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	725	\$100.00	\$72,500.00
Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	4	\$20,000.00	\$80,000.00
New or Removal and Replacement of Special Drainage Structure, 4' - 8' Depth	EACH	6	\$40,000.00	\$240,000.00
Waste Material Haul-Off	C.Y.	1100	\$30.00	\$33,000.00
Existing Channel Connection Modifications	L.S.	1	\$30,000.00	\$30,000.00
Removal and Disposal of Brush and Trees	L.S.	1	\$20,000.00	\$20,000.00
Traffic Control	L.S.	1	\$30,000.00	\$30,000.00
Erosion Control	L.S.	1	\$25,000.00	\$25,000.00

Additional Recommendations Outside of Modeling Scope

Removal of 15" RCP Pipe and Replace with 24" RCP Pipe	L.F.	46	\$125.00	\$5,750.00
Removal of 18" RCP Pipe and Replace with 24" RCP Pipe	L.F.	32	\$125.00	\$4,000.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	40	\$100.00	\$4,000.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	90	\$200.00	\$18,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	60	\$100.00	\$6,000.00
Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	3	\$20,000.00	\$60,000.00
Waste Material Haul-Off	C.Y.	20	\$30.00	\$600.00

	SUB-TOTAL =	\$1,442,820.00
Construction Contingencies	30%	\$432,846.00
Design, Survey, CA Services	20%	\$288,564.00
	TOTAL =	\$2,164,230.00

FIGURE 3: IA2A Planning Level Cost Estimate

Smith Seckman Reid, Inc		City of Memphis		
Harrington Creek Drainage Study				
Improvement Alternative 2: IA2A				
DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
Mobilization	L.S.	1	\$20,000.00	\$20,000.00
Removal of 24" RCP Pipe and Replace with 36" RCP Pipe	L.F.	336	\$150.00	\$50,400.00
Removal of 27" RCP Pipe and Replace with 42" RCP Pipe	L.F.	38	\$250.00	\$9,500.00
24" RCP Pipe	L.F.	300	\$75.00	\$22,500.00
48" RCP Pipe	L.F.	674	\$200.00	\$134,800.00
54" RCP Pipe	L.F.	268	\$355.00	\$95,140.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	600	\$100.00	\$60,000.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	1800	\$200.00	\$360,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	910	\$100.00	\$91,000.00
New or Removal and Replacement of Drainage Structure, 0' - 4' Depth	EACH	2	\$15,000.00	\$30,000.00
New or Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	7	\$20,000.00	\$140,000.00
Waste Material Haul-Off	C.Y.	1000	\$30.00	\$30,000.00
Existing Box Culvert and Channel Connection Modifications	L.S.	1	\$30,000.00	\$30,000.00
Removal and Disposal of Brush and Trees	L.S.	1	\$20,000.00	\$20,000.00
Traffic Control	L.S.	1	\$30,000.00	\$30,000.00
Erosion Control	L.S.	1	\$25,000.00	\$25,000.00
Additional Recommendations Outside of Modeling Scope				
Removal of 15" RCP Pipe and Replace with 24" RCP Pipe	L.F.	21	\$125.00	\$2,625.00
Removal of 18" RCP Pipe and Replace with 24" RCP Pipe	L.F.	115	\$125.00	\$14,375.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	60	\$100.00	\$6,000.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	220	\$200.00	\$44,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	100	\$100.00	\$10,000.00
Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	4	\$20,000.00	\$80,000.00
Waste Material Haul-Off	C.Y.	30	\$30.00	\$900.00
			SUB-TOTAL =	\$1,306,240.00
Construction Contingencies			30%	\$391,872.00
Design, Survey, CA Services			20%	\$261,248.00
			TOTAL =	\$1,959,360.00

FIGURE 4: IA2B Planning Level Cost Estimate

Smith Seckman Reid, Inc		City of Memphis		
Harrington Creek Drainage Study				
Improvement Alternative 2: IA2B				
DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
Mobilization	L.S.	1	\$20,000.00	\$20,000.00
Removal of 42" RCP Culvert and Replace with (60" RCP Eq.) 76" x 48" HERCP Culvert	L.F.	50	\$650.00	\$32,500.00
Removal of 48" RCP Pipe and Replace with 60" RCP Pipe	L.F.	293	\$500.00	\$146,500.00
Removal of 4.5' x 15.5' to 9.7' x 12.2' box culvert and Replace with 7' x 15.5' box culvert	L.F.	107	\$5,000.00	\$535,000.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	225	\$100.00	\$22,500.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	1200	\$200.00	\$240,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	260	\$100.00	\$26,000.00
Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	4	\$20,000.00	\$80,000.00
Waste Material Haul-Off	C.Y.	1800	\$30.00	\$54,000.00
Channel and Box Culvert Regrading	C.Y.	1400	\$40.00	\$56,000.00
Reinforced Concrete Channel Reconstruction and Box Culvert Headwalls	C.Y.	300	\$1,300.00	\$390,000.00
Box Culvert Connection Modifications	L.S.	1	\$10,000.00	\$10,000.00
Removal and Disposal of Brush and Trees	L.S.	1	\$50,000.00	\$50,000.00
Traffic Control	L.S.	1	\$40,000.00	\$40,000.00
Erosion Control	L.S.	1	\$55,000.00	\$55,000.00
			SUB-TOTAL =	\$1,757,500.00
Construction Contingencies			30%	\$527,250.00
Design, Survey, CA Services			20%	\$351,500.00
			TOTAL =	\$2,636,250.00

FIGURE 5: IA4A Planning Level Cost Estimate

Smith Seckman Reid, Inc		City of Memphis		
Harrington Creek Drainage Study				
Improvement Alternative 4: IA4A				
DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
Mobilization	L.S.	1	\$20,000.00	\$20,000.00
Removal of 36" RCP	L.F.	35	\$40.00	\$1,400.00
Removal of Drainage Structure	EACH	2	\$2,500.00	\$5,000.00
(48" RCP Eq.) 60" x 38" HERCP Pipe	L.F.	29	\$450.00	\$13,050.00
48" RCP Pipe	L.F.	198	\$230.00	\$45,540.00
Earthwork and Pond Excavation	C.Y.	34300	\$10.00	\$343,000.00
Machined Rip Rap (Class A-1)	TON	3900	\$50.00	\$195,000.00
Geotextile Fabric (Type III)	S.Y.	4500	\$5.00	\$22,500.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	25	\$100.00	\$2,500.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	40	\$200.00	\$8,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	35	\$100.00	\$3,500.00
New or Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	3	\$20,000.00	\$60,000.00
New or Removal and Replacement of Drainage Structure, 12' - 16' Depth	EACH	1	\$30,000.00	\$30,000.00
Custom Outlet Structure	EACH	1	\$30,000.00	\$30,000.00
Waste Material Haul-Off	C.Y.	36000	\$20.00	\$720,000.00
Removal and Disposal of Brush and Trees	L.S.	1	\$40,000.00	\$40,000.00
Traffic Control	L.S.	1	\$15,000.00	\$15,000.00
Erosion Control	L.S.	1	\$50,000.00	\$50,000.00
Additional Recommendations Outside of Modeling Scope				
24" RCP Pipe	L.F.	97	\$125.00	\$12,125.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	13	\$100.00	\$1,300.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	90	\$200.00	\$18,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	28	\$100.00	\$2,800.00
New or Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	2	\$20,000.00	\$40,000.00
Waste Material Haul-Off	C.Y.	15	\$30.00	\$450.00
			SUB-TOTAL =	\$1,679,165.00
Construction Contingencies			30%	\$503,749.50
Design, Survey, CA Services			20%	\$335,833.00
			TOTAL =	\$2,518,747.50

FIGURE 6: IA5 Planning Level Cost Estimate

Smith Seckman Reid, Inc		City of Memphis		
Harrington Creek Drainage Study				
Improvement Alternative 5: IA5				
DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
Mobilization	L.S.	1	\$20,000.00	\$20,000.00
30" RCP Pipe	L.F.	301	\$125.00	\$37,625.00
36" RCP Pipe	L.F.	146	\$175.00	\$25,550.00
42" RCP Pipe	L.F.	725	\$190.00	\$137,750.00
Removal of 48" RCP Pipe and Replace with 2 parallel 42" RCP Pipes	L.F.	713	\$380.00	\$270,940.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	500	\$100.00	\$50,000.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	1800	\$200.00	\$360,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	1260	\$100.00	\$126,000.00
New or Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	4	\$20,000.00	\$80,000.00
New or Removal and Replacement of Drainage Structure, 8' - 12' Depth	EACH	2	\$25,000.00	\$50,000.00
New or Removal and Replacement of Special Drainage Structure, 4' - 8' Depth	EACH	6	\$40,000.00	\$240,000.00
Waste Material Haul-Off	C.Y.	1200	\$30.00	\$36,000.00
Removal and Disposal of Brush and Trees	L.S.	1	\$20,000.00	\$20,000.00
Traffic Control	L.S.	1	\$40,000.00	\$40,000.00
Erosion Control	L.S.	1	\$25,000.00	\$25,000.00
Additional Recommendations Outside of Modeling Scope				
Removal of 15" RCP Pipe and Replace with 24" RCP Pipe	L.F.	109	\$125.00	\$13,625.00
Removal of 18" RCP Pipe and Replace with 24" RCP Pipe	L.F.	56	\$125.00	\$7,000.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	35	\$100.00	\$3,500.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	280	\$200.00	\$56,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	120	\$100.00	\$12,000.00
Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	4	\$20,000.00	\$80,000.00
Waste Material Haul-Off	C.Y.	40	\$30.00	\$1,200.00
			SUB-TOTAL =	\$1,692,190.00
Construction Contingencies			30%	\$507,657.00
Design, Survey, CA Services			20%	\$338,438.00
			TOTAL =	\$2,538,285.00

FIGURE 7: IA6B Planning Level Cost Estimate

Smith Seckman Reid, Inc		City of Memphis		
Harrington Creek Drainage Study				
Improvement Alternative 6: IA6B				
DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
Mobilization	L.S.	1	\$20,000.00	\$20,000.00
60" RCP Pipe	L.F.	979	\$450.00	\$440,550.00
Removal of 24" RCP Pipe and Replace with 36" RCP Pipe	L.F.	124	\$200.00	\$24,800.00
Channel Excavation and Grading	C.Y.	1600	\$40.00	\$64,000.00
Machined Rip Rap (Class A-1)	TON	140	\$60.00	\$8,400.00
Geotextile Fabric (Type III)	S.Y.	160	\$10.00	\$1,600.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	800	\$100.00	\$80,000.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	1000	\$200.00	\$200,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	990	\$100.00	\$99,000.00
New or Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	4	\$20,000.00	\$80,000.00
New or Removal and Replacement of Drainage Structure, 8' - 12' Depth	EACH	2	\$25,000.00	\$50,000.00
New or Removal and Replacement of Drainage Structure, 12' - 16' Depth	EACH	1	\$30,000.00	\$30,000.00
Waste Material Haul-Off	C.Y.	2500	\$30.00	\$75,000.00
Box Culvert Connection Modifications	L.S.	1	\$10,000.00	\$10,000.00
Removal and Disposal of Brush and Trees	L.S.	1	\$50,000.00	\$50,000.00
Traffic Control	L.S.	1	\$40,000.00	\$40,000.00
Erosion Control	L.S.	1	\$40,000.00	\$40,000.00
Additional Recommendations Outside of Modeling Scope				
Removal of 18" RCP Pipe and Replace with 36" RCP Pipe	L.F.	28	\$200.00	\$5,600.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	10	\$100.00	\$1,000.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	60	\$200.00	\$12,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	30	\$100.00	\$3,000.00
New or Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	1	\$20,000.00	\$20,000.00
Waste Material Haul-Off	C.Y.	10	\$30.00	\$300.00
			SUB-TOTAL =	\$1,355,250.00
Construction Contingencies			30%	\$406,575.00
Design, Survey, CA Services			20%	\$271,050.00
			TOTAL =	\$2,032,875.00

FIGURE 8: IA7A Planning Level Cost Estimate

Smith Seckman Reid, Inc

City of Memphis

Harrington Creek Drainage Study

Improvement Alternative 7: IA7A

DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
Mobilization	L.S.	1	\$20,000.00	\$20,000.00
Removal of 27" RCP Pipe and Replace with 2 parallel 30" RCP Pipes	L.F.	765	\$200.00	\$153,000.00
Removal of 48" RCP Pipe and Replace with 2 parallel 48" RCP Pipes	L.F.	613	\$400.00	\$245,200.00
Removal of 60" RCP Pipe	L.F.	355	\$60.00	\$21,300.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	50	\$100.00	\$5,000.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	1900	\$200.00	\$380,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	620	\$100.00	\$62,000.00
New or Removal and Replacement of Special Drainage Structure, 4' - 8' Depth	EACH	5	\$40,000.00	\$200,000.00
New or Removal and Replacement of Special Drainage Structure, 8' - 12' Depth	EACH	1	\$50,000.00	\$50,000.00
Waste Material Haul-Off	C.Y.	1800	\$30.00	\$54,000.00
Channel Regrading	C.Y.	1400	\$40.00	\$56,000.00
Reinforced Concrete Channel Construction	C.Y.	200	\$1,300.00	\$260,000.00
Removal and Disposal of Brush and Trees	L.S.	1	\$50,000.00	\$50,000.00
Traffic Control	L.S.	1	\$20,000.00	\$20,000.00
Erosion Control	L.S.	1	\$45,000.00	\$45,000.00
			SUB-TOTAL =	\$1,621,500.00
Construction Contingencies			30%	\$486,450.00
Design, Survey, CA Services			20%	\$324,300.00
			TOTAL =	\$2,432,250.00

FIGURE 9: IA8 Planning Level Cost Estimate

Smith Seckman Reid, Inc		City of Memphis		
Harrington Creek Drainage Study				
Improvement Alternative 8: IA8				
DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
Mobilization	L.S.	1	\$20,000.00	\$20,000.00
Removal of 48" RCP Pipe and Replace with 2 parallel 48" RCP Pipes	L.F.	200	\$460.00	\$92,000.00
Removal of 2 parallel 48" CMP Pipes and Jack and bore replacement with 2 parallel 48" DI Pipes	L.F.	37	\$4,000.00	\$148,000.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	60	\$100.00	\$6,000.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	150	\$200.00	\$30,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	75	\$100.00	\$7,500.00
New or Removal and Replacement of Special Drainage Structure, 4' - 8' Depth	EACH	2	\$40,000.00	\$80,000.00
New or Removal and Replacement of Special Drainage Structure, 12' - 16' Depth	EACH	2	\$60,000.00	\$120,000.00
Waste Material Haul-Off	C.Y.	1000	\$30.00	\$30,000.00
Channel Regrading	C.Y.	1000	\$40.00	\$40,000.00
Removal and Disposal of Brush and Trees	L.S.	1	\$50,000.00	\$50,000.00
Traffic Control	L.S.	1	\$10,000.00	\$10,000.00
Erosion Control	L.S.	1	\$40,000.00	\$40,000.00
Additional Recommendations Outside of Modeling Scope				
Removal of 15" RCP Pipe and Replace with 48" RCP Pipe	L.F.	28	\$260.00	\$7,280.00
Sidewalk Saw Cut, Removal, and Replacement	S.Y.	20	\$100.00	\$2,000.00
Asphalt Saw Cut, Removal, and Replacement	S.Y.	60	\$200.00	\$12,000.00
Curb and Gutter Saw Cut, Removal, and Replacement	L.F.	16	\$100.00	\$1,600.00
New or Removal and Replacement of Drainage Structure, 4' - 8' Depth	EACH	1	\$20,000.00	\$20,000.00
Waste Material Haul-Off	C.Y.	20	\$30.00	\$600.00
			SUB-TOTAL =	\$716,980.00
Construction Contingencies			30%	\$215,094.00
Design, Survey, CA Services			20%	\$143,396.00
			TOTAL =	\$1,075,470.00

FIGURE 10: 10-Year Storm Planning Level Cost Benefit Estimate

10-Year Storm Flood Mitigation: Recommended Construction Sequence	Improvement ID	Cost	Number of City of Memphis Structures Removed from the 10-Year Flooding Footprint ≥ 1' Depth		Cost per Structure Removed
			Stand-Alone	In-Series with IA2 and IA1 Improvements (Incremental Reduction)	
1	IA2B	\$2,636,250.00	6		\$439,375.00
2	IA4A	\$2,518,747.50	3		\$839,582.50
3	IA1B	\$2,164,230.00	-	1	\$2,164,230.00
4	IA2A	\$1,959,360.00	-	1	\$1,959,360.00
5	IA1A	\$2,115,000.00	1	0	\$2,115,000.00
6	IA6B	\$2,032,875.00	0		-
7	*IA7A	\$2,432,250.00	11		\$221,113.64
8	*IA8	\$1,075,470.00	8		\$134,433.75
9	**IA5	\$2,538,285.00	5		\$507,657.00
***Total of All 9 Improvements		\$19,472,467.50	45		\$432,721.50
<p>* Requires modifications to CSX Transportation infrastructure.</p> <p>** Ties into unknown City of Bartlett underground storm sewer infrastructure.</p> <p>*** Indicates modeling results after all improvements have been constructed. The values are not additive based on the individual improvement results listed above. See Model Scenario ID Map 17 on Figure 12.</p>					

FIGURE 11: 100-Year Storm Planning Level Cost Benefit Estimate

100-Year Storm Flood Mitigation: Recommended Construction Sequence	Improvement ID	Cost	Number of City of Memphis Structures Removed from the 100-Year Flooding Footprint ≥ 1' Depth		Cost per Structure Removed
			Stand-Alone	In-Series with IA2 and IA1 Improvements (Incremental Reduction)	
1	IA2B	\$2,636,250.00	41		\$64,298.78
2	IA4A	\$2,518,747.50	48		\$52,473.91
3	IA1B	\$2,164,230.00	-	19	\$113,906.84
4	IA1A	\$2,115,000.00	-	9	\$235,000.00
5	IA2A	\$1,959,360.00	-	6	\$326,560.00
6	IA6B	\$2,032,875.00	16		\$127,054.69
7	*IA8	\$1,075,470.00	20		\$53,773.50
8	*IA7A	\$2,432,250.00	19		\$128,013.16
9	**IA5	\$2,538,285.00	12		\$211,523.75
***Total of All 9 Improvements		\$19,472,467.50	192		\$101,419.10
<p>*Requires modifications to CSX Transportation infrastructure.</p> <p>**Ties into unknown City of Bartlett underground storm sewer infrastructure.</p> <p>*** Indicates modeling results after all improvements have been constructed. The values are not additive based on the individual improvement results listed above. See Model Scenario ID Map 17 on Figure 12.</p>					

FIGURE 12: Improvement Alternatives Flooded Buildings and Area Reduction Analysis

Model Scenario ID	Storm Event	Active Improvements (Recommended in Blue)	Overall Basin Inundation Area ≥ 1ft Depth (ac)	Inundation Area Change Compared to Existing (ac)	Number of Buildings in City of Memphis with ≥ 1ft Depth of Flooding	Change in Number of Buildings in City of Memphis with ≥ 1ft Depth of Flooding Compared to Existing	Number of Buildings in City of Bartlett with ≥ 1ft Depth of Flooding	Change in Number of Buildings in City of Bartlett with ≥ 1ft Depth of Flooding Compared to Existing
Existing	10yr	-	242	-	92	-	30	-
Map 1	10yr	IA2B	241	-1	86	-6	30	0
Map 2	10yr	IA1A	240	-2	91	-1	30	0
Map 3	10yr	IA2B, IA1A	241	-1	86	-6	30	0
Map 4	10yr	IA2B, IA1A, IA2A	240	-2	85	-7	30	0
Map 5	10yr	IA2B, IA1A, IA1B	241	-1	84	-8	30	0
Map 6	10yr	IA2B, IA1A, IA1B, IA2A	241	-1	84	-8	30	0
Map 7	10yr	IA2B, IA1A, IA1B, IA2A, IA3	237	-5	77	-15	29	-1
Map 8	10yr	IA4A	241	-1	89	-3	29	-1
Map 9	10yr	IA4B	241	-1	92	0	29	-1
Map 10	10yr	IA4A, IA4B	238	-4	90	-2	29	-1
Map 11	10yr	IA5	241	-1	87	-5	29	-1
Map 12	10yr	IA6	237	-5	92	0	30	0
Map 12B	10yr	IA6B	237	-5	92	0	30	0
Map 13	10yr	IA7A	228	-14	81	-11	29	-1
Map 14	10yr	IA7B	238	-4	87	-5	29	-1
Map 15	10yr	IA7A, IA7B	228	-14	77	-15	30	0
Map 16	10yr	IA8	231	-11	84	-8	30	0
Map 17	10yr	IA2B, IA1A, IA1B, IA2A IA4A, IA5, IA6B, IA7A, IA8	196	-46	47	-45	28	-2
Existing	100yr	-	508	-	428	-	117	-
Map 1	100yr	IA2B	506	-2	387	-41	115	-2
Map 2	100yr	IA1A	502	-6	416	-12	114	-3
Map 3	100yr	IA2B, IA1A	496	-12	378	-50	111	-6
Map 4	100yr	IA2B, IA1A, IA2A	504	-4	374	-54	111	-6
Map 5	100yr	IA2B, IA1A, IA1B	497	-11	359	-69	98	-19
Map 6	100yr	IA2B, IA1A, IA1B, IA2A	490	-18	353	-75	99	-18
Map 7	100yr	IA2B, IA1A, IA1B, IA2A, IA3	481	-27	344	-84	99	-18
Map 8	100yr	IA4A	496	-12	380	-48	116	-1
Map 9	100yr	IA4B	503	-5	399	-29	117	0
Map 10	100yr	IA4A, IA4B	499	-9	376	-52	116	-1
Map 11	100yr	IA5	511	3	416	-12	117	0
Map 12	100yr	IA6	500	-8	417	-11	117	0
Map 12B	100yr	IA6B	491	-17	412	-16	117	0
Map 13	100yr	IA7A	483	-25	409	-19	117	0
Map 14	100yr	IA7B	506	-2	422	-6	117	0
Map 15	100yr	IA7A, IA7B	476	-32	405	-23	117	0
Map 16	100yr	IA8	500	-8	408	-20	117	0
Map 17	100yr	IA2B, IA1A, IA1B, IA2A IA4A, IA5, IA6B, IA7A, IA8	427	-81	236	-192	99	-18
Recommended Improvements								