

Section 5 Summary and Final Recommendations

5.1 Summary of Recommended Improvements Based on Modeling

Figure 97 provides locations and brief description of recommended Projects A-D (Based on modeling) and Projects 1 – 8 (Based on Public Works Flood Tickets – See Section 5.2).

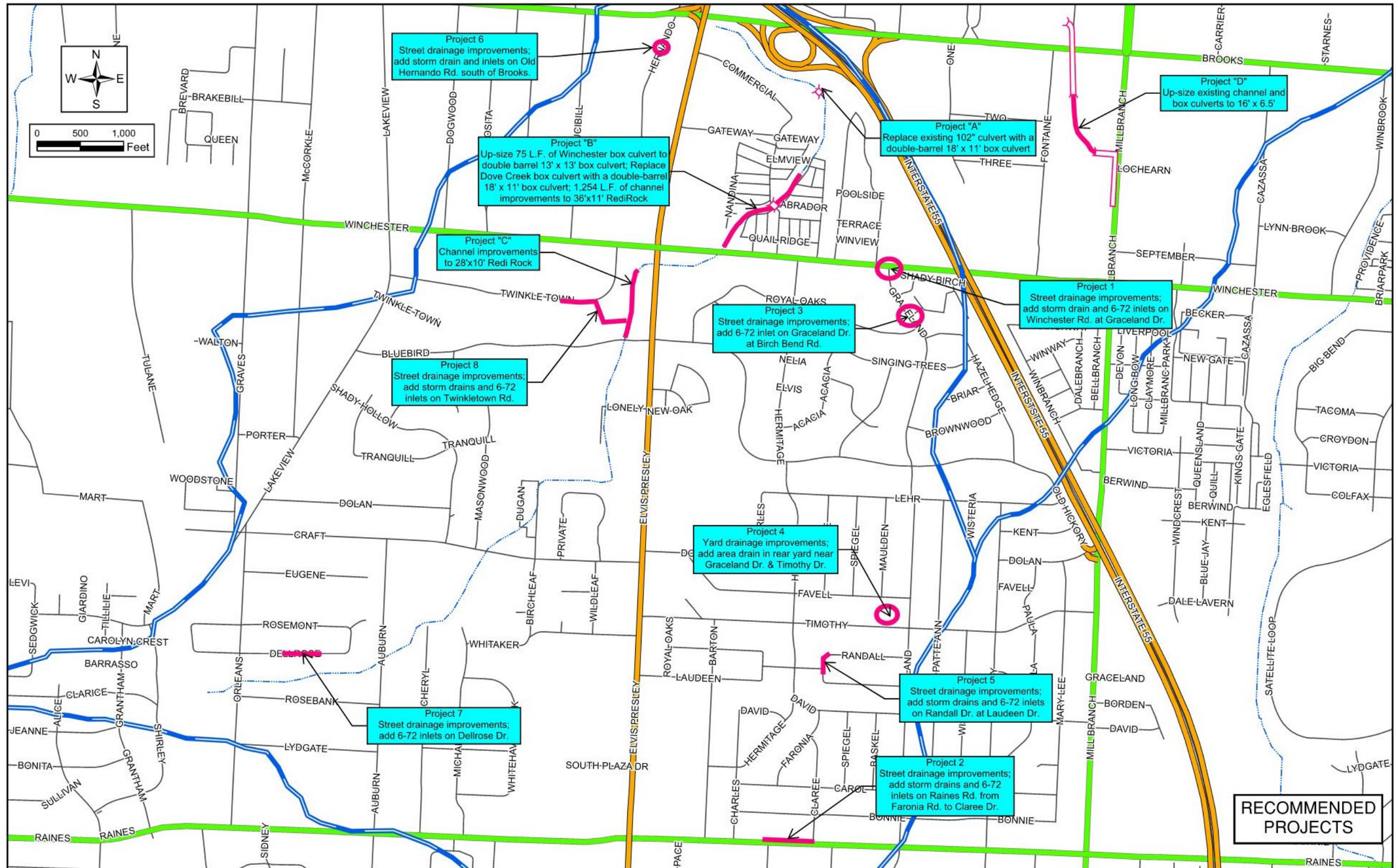


Figure 97. Recommended Projects

5.1.1 Project "A": Billboard Site Access Drive

One of the commercial properties on Commercial Parkway extends across the main drainage ditch for the Whitehaven Basin. An access drive was installed across this ditch using a 102" steel pipe for a culvert. Based on aerial photography of the area, it appears this work was done some time after 2010. The 102" pipe is greatly undersized, and is restricting flow, causing flooding in the Highland Creek Apartments.

It is recommended that this undersized pipe be removed from the ditch. Figure 96 illustrates the reduction in flooding that would result from removal of this restriction. If this pipe is removed, alternate access to the billboard site could be provided through properties east of the main drainage ditch. Alternately, if this driveway access is to be maintained, it would require the installation of a two-barrel box culvert, with each opening being 11' wide by 18' deep. Table 5 provides a cost estimate and Figure 98 shows typical details for this project.

PROJECT "A"					
BILLBOARD SITE DRIVE BOX CULVERT					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
1	MOBILIZATION	1	LS	\$ 12,000.00	\$ 12,000.00
2	CLEARING AND GRUBBING	1	LS	16,000.00	16,000.00
3	EXCAVATION - GRADING	1	LS	12,000.00	12,000.00
4	BORROW MATERIAL	200	CY	50.00	10,000.00
5	COMPACTED CRUSHED STONE	300	TON	50.00	15,000.00
6	GROUTED CLASS C RIP RAP	100	TON	140.00	14,000.00
7	SODDING	500	SY	10.00	5,000.00
8	4' CHAIN LINK FENCE	100	LF	40.00	4,000.00
9	EROSION CONTROL	1	LS	12,000.00	12,000.00
10	DEWATERING	1	LS	12,000.00	12,000.00
11	UTILITY RELOCATIONS	1	LS	65,000.00	65,000.00
12	UNDERCUT	250	CY	80.00	20,000.00
13	REMOVE EXISTING CULVERT	1	LS	25,000.00	25,000.00
14	2 @ 11'x18' BOX CULVERT	1	LS	375,000.00	375,000.00
15	STREET REPAIR	200	SY	65.00	13,000.00
				Subtotal:	\$ 610,000.00
				Surveying, Design & Permitting (16%):	98,000.00
				Easement Acquisitions:	20,000.00
				Bidding & CA (10%):	61,000.00
				Legal & Admin. (5%):	31,000.00
				Contingency (20%):	122,000.00
				Total Project Budget:	\$ 942,000.00

Table 5. Project "A" Cost Estimate

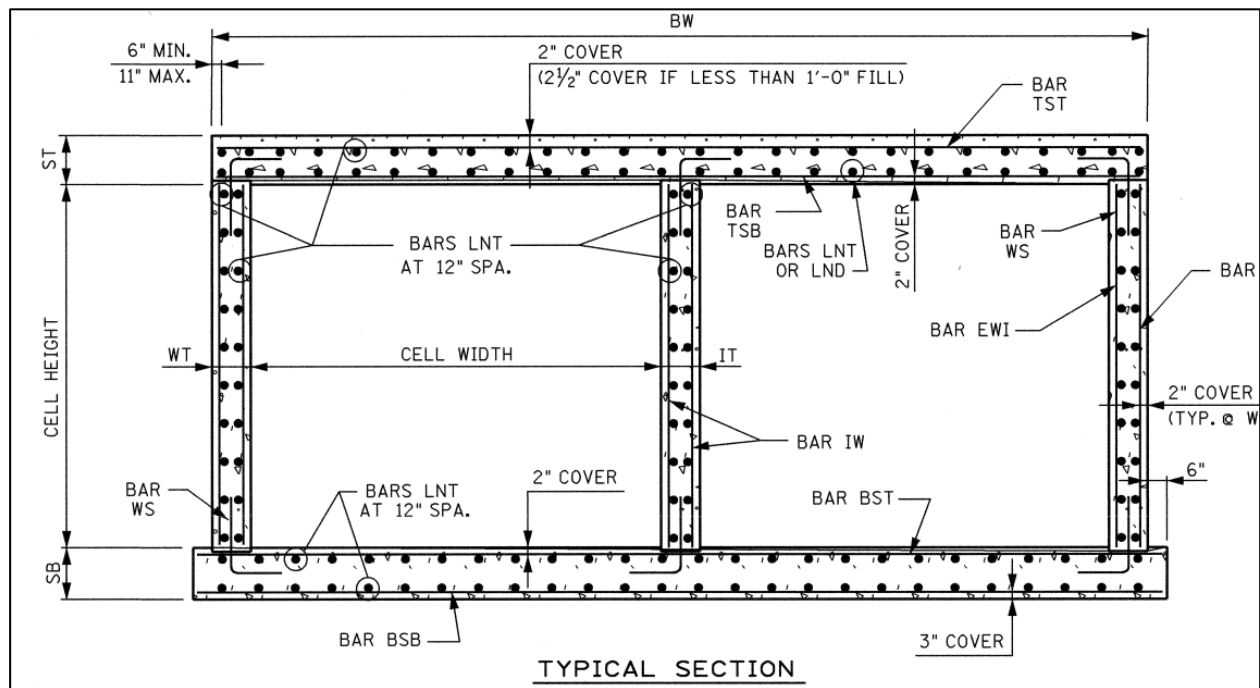


Figure 98. Project "A" Details

5.1.2 Project "B": Winchester Grove Apartments Channelization

The main drainage ditch for the Whitehaven Basin crosses Winchester Road and bisects the Winchester Grove Apartment site downstream of Winchester for a distance of approximately 1,250 feet. The downstream 75' of the box culvert that crosses Winchester is a double barrel 10.5' x 9.5' box, while the remainder of the box culvert upstream of this location is a double barrel 14' x 13' box. Within the ditch section downstream of Winchester, there is one street crossing (Dove Creek Drive). The downstream end of the Winchester box culvert, the existing natural channel and the box culvert under Dove Creek Drive are all undersized and inadequate to carry the flow from the 100-year storm event. In addition, the upstream channel improvements recommended for the Bluebird Road area (Project "C") would increase the peak flows in this channel segment, further exacerbating existing flooding issues. In order to make the needed improvements upstream, this segment must be improved.

It is recommended that the undersized section of box culvert under Winchester and at Dove Creek Drive be enlarged and the existing natural channel be widened and straightened using RediRock segmented block walls to stabilize the channel walls. The existing flow channel would remain natural as required by TDEC, but a stable channel 36' wide by 11' deep would be created. In addition, the existing section of Winchester box culvert would be enlarged from a double barrel 10.5' x 9.5' to a double barrel 14' x 13' box culvert. Finally, the existing box culvert at Dove Creek Drive would be enlarged from a double barrel 10'x12' box to a double barrel 11'x18' box. Table 6 provides a cost estimate and Figure 99 shows typical details for this project.

PROJECT "B"					
WINCHESTER GROVE APARTMENTS DITCH CHANNELIZATION					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
1	MOBILIZATION	1	LS	\$ 140,000.00	\$ 140,000.00
2	CLEARING AND GRUBBING	1	LS	150,000.00	150,000.00
3	EXCAVATION - GRADING	1	LS	200,000.00	200,000.00
4	BORROW MATERIAL	1,100	CY	50.00	55,000.00
5	GRAVITY RETAINING WALL	30,000	SF	75.00	2,250,000.00
6	COMPACTED CRUSHED STONE	7,000	TON	50.00	350,000.00
7	GROUTED CLASS C RIP RAP	600	TON	140.00	84,000.00
8	GROUTED CLASS A-1 RIP RAP	250	TON	150.00	37,500.00
9	SODDING	5,000	SY	10.00	50,000.00
10	4' CHAIN LINK FENCE	3,400	LF	40.00	136,000.00
11	EROSION CONTROL	1	LS	95,000.00	95,000.00
12	DEWATERING	1	LS	100,000.00	100,000.00
13	UTILITY RELOCATIONS	1	LS	625,000.00	625,000.00
14	UNDERCUT	1,500	CY	75.00	112,500.00
15	REMOVE EXISTING BOX CULVERT	1	LS	125,000.00	125,000.00
16	2 @ 13'x14' BOX CULVERT	1	LS	750,000.00	750,000.00
17	2 @ 11'x18' BOX CULVERT	1	LS	450,000.00	450,000.00
18	STREET REPAIR	1,000	SY	65.00	65,000.00
				Subtotal:	\$ 5,775,000.00
				Surveying, Design & Permitting (16%):	924,000.00
				Easement Acquisitions:	349,000.00
				Bidding & CA (10%):	578,000.00
				Legal & Admin. (5%):	289,000.00
				Contingency (20%):	1,155,000.00
				Total Project Budget:	\$ 9,070,000.00

Table 6. Project "B" Cost Estimate

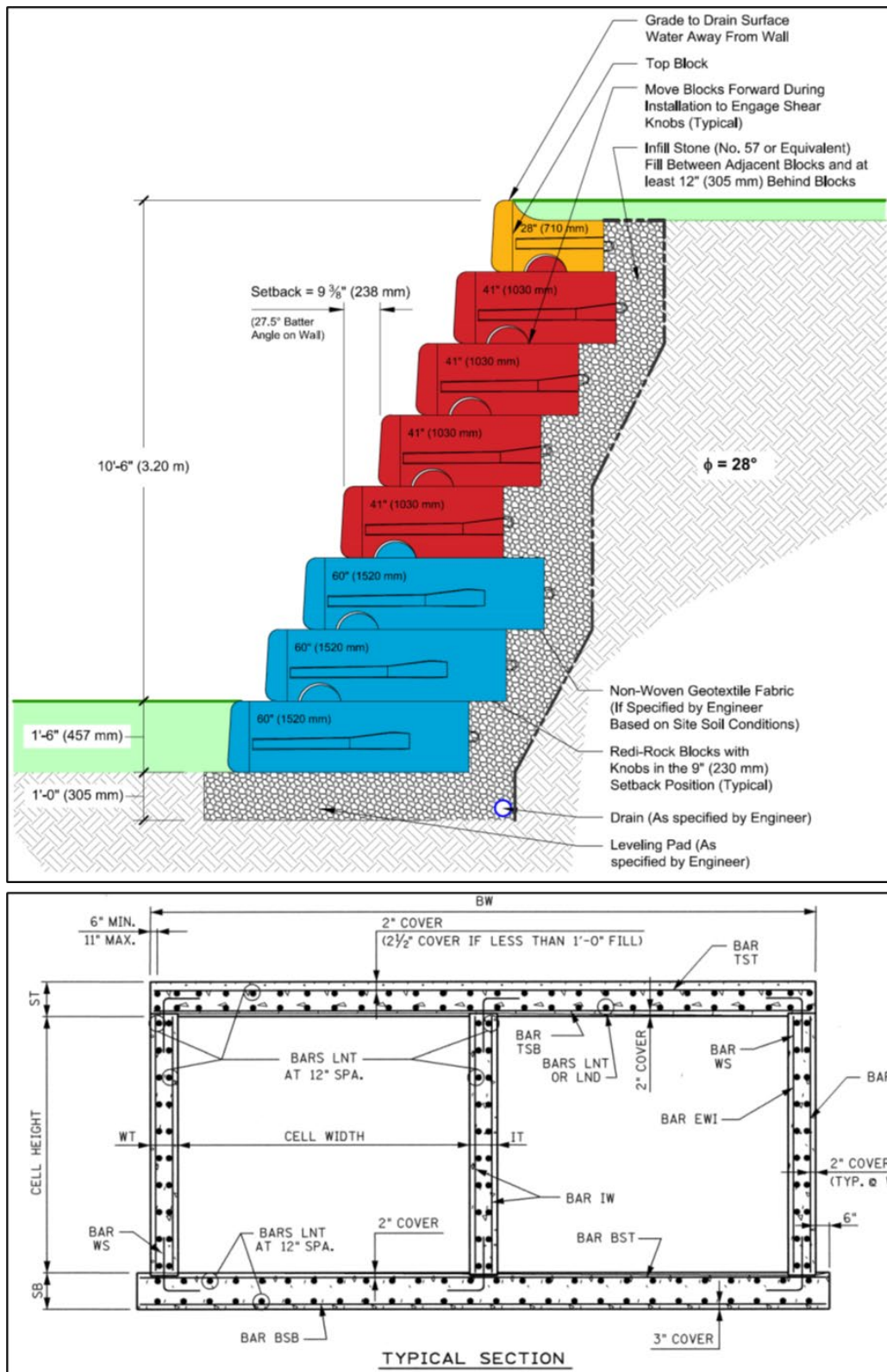


Figure 99. Project "B" Details

5.1.3 Project "C": Bluebird Road Channelization

Residences along Bluebird Road located southwest of the intersection of Winchester and Elvis Presley have experienced flooding for several years. Modelling indicates that the natural channel between the Heartbreak Hotel entrance drive and the box culvert just south of Winchester is inadequate to convey the flow it receives. This segment is overgrown with trees, and the channel is irregular and hydraulically inefficient.

It is recommended that this natural channel be widened and straightened using RediRock segmented block walls to stabilize the channel walls. As with the Highland Creek Apartment project, the existing flow channel would remain natural as required by TDEC, but a stable channel of adequate size would be created. For the Bluebird ditch segment, the required channel size is 28' wide by 10' deep. The existing bridge at Bluebird Road is adequate in size and will remain as-is. Table 7 provides a cost estimate and Figure 100 shows typical details for this project.

PROJECT "C"					
BLUEBIRD ROAD DITCH CHANNELIZATION					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
1	MOBILIZATION	1	LS	\$ 125,000.00	\$ 125,000.00
2	CLEARING AND GRUBBING	1	LS	125,000.00	125,000.00
3	EXCAVATION - GRADING	1	LS	150,000.00	150,000.00
4	BORROW MATERIAL	1,500	CY	50.00	75,000.00
5	GRAVITY RETAINING WALL	39,000	SF	75.00	2,925,000.00
6	COMPACTED CRUSHED STONE	6,000	TON	50.00	300,000.00
7	GROUTED CLASS C RIP RAP	500	TON	140.00	70,000.00
8	GROUTED CLASS A-1 RIP RAP	250	TON	150.00	37,500.00
9	SODDING	5,000	SY	10.00	50,000.00
10	4' CHAIN LINK FENCE	3,300	LF	40.00	132,000.00
11	EROSION CONTROL	1	LS	90,000.00	90,000.00
12	DEWATERING	1	LS	65,000.00	65,000.00
13	UTILITY RELOCATIONS	1	LS	250,000.00	250,000.00
14	UNDERCUT	1,000	CY	75.00	75,000.00
15	STREET REPAIR	500	SY	65.00	32,500.00
				Subtotal:	\$ 4,502,000.00
				Surveying, Design & Permitting (16%):	720,000.00
				Easement Acquisitions:	400,000.00
				Bidding & CA (10%):	450,000.00
				Legal & Admin. (5%):	225,000.00
				Contingency (20%):	900,000.00
				Total Project Budget:	\$ 7,197,000.00

Table 7. Project "C" Cost Estimate

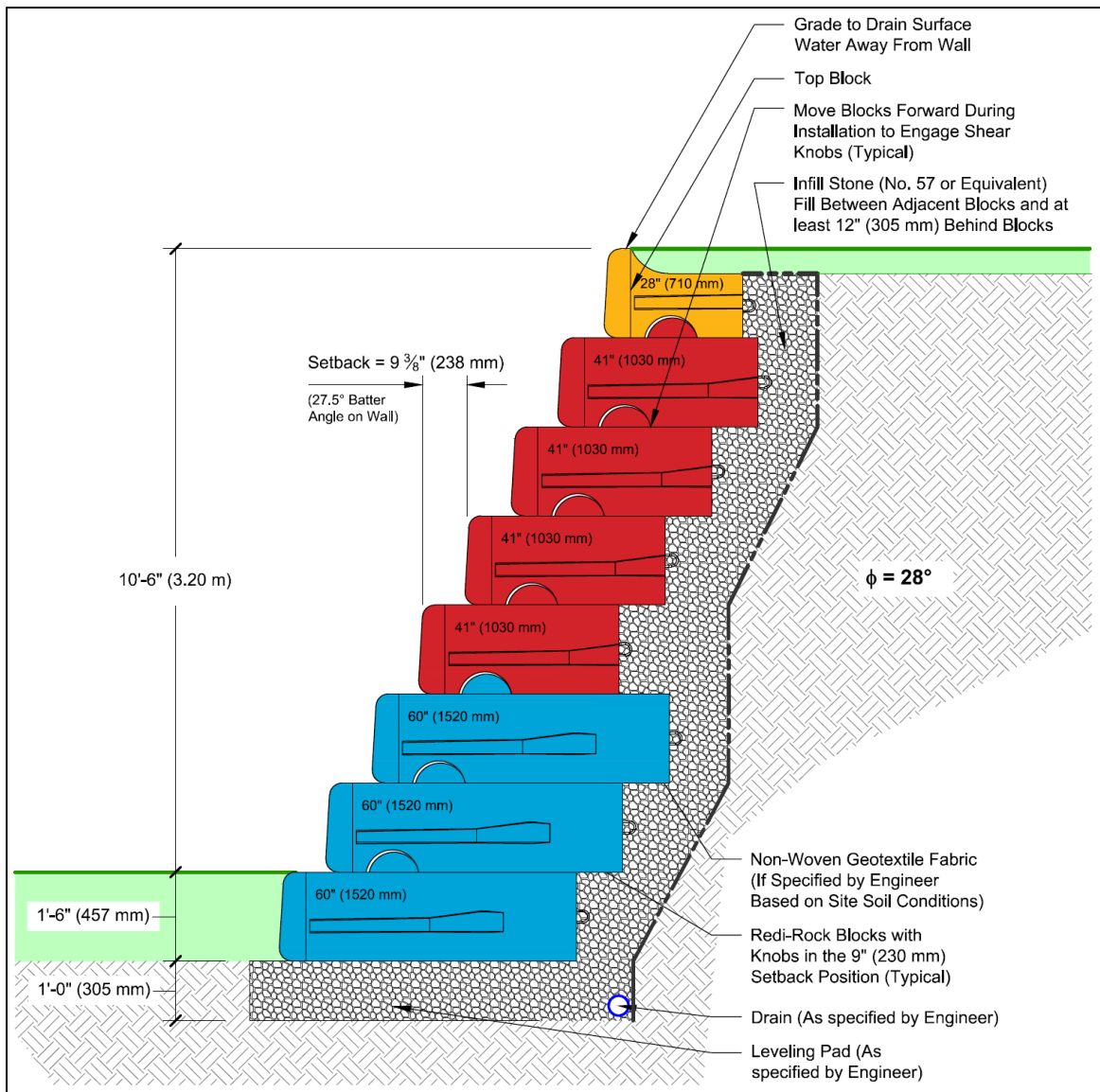


Figure 100. Project "C" Details

5.1.4 Project "D": Millbranch to Brooks Drainage Improvements

Project "D" is located in the Fontaine Basin, and extends from Millbranch Road just south of Lochearn, north across Brooks Road at Fontaine Road. This area includes box culverts under Millbranch and Brooks, sections of unimproved natural channel and a segment of concrete-lined channel. One segment of box culvert is located under an existing building on Millbranch and will need to be re-located around the building.

SSR's modeling recommends up-sizing the box culverts and channel segments throughout the entire 2,200' length of this area. The recommended section is 16' wide by 6' deep. Open channel sections will consist of RediRock walls with natural channel bottom. Box culvert sections will be 16' x 6' sections. Table 8 provides a cost estimate and Figure 101 shows typical details for this project.

PROJECT "D"					
MILLBRANCH TO BROOKS DRAINAGE IMPROVEMENTS					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
Item	Description	Quantity	Unit	Unit Price	Amount
1	MOBILIZATION	1	LS	\$ 300,000.00	\$ 300,000.00
2	CLEARING AND GRUBBING	1	LS	125,000.00	125,000.00
3	EXCAVATION - GRADING	1	LS	200,000.00	200,000.00
4	BORROW MATERIAL	1,500	CY	50.00	75,000.00
5	GRAVITY RETAINING WALL	18,000	SF	75.00	1,350,000.00
6	COMPACTED CRUSHED STONE	2,000	TON	50.00	100,000.00
7	GROUTED CLASS C RIP RAP	700	TON	140.00	98,000.00
8	GROUTED CLASS A-1 RIP RAP	500	TON	150.00	75,000.00
9	SODDING	1,500	SY	10.00	15,000.00
10	4' CHAIN LINK FENCE	2,500	LF	40.00	100,000.00
11	EROSION CONTROL	1	LS	200,000.00	200,000.00
12	DEWATERING	1	LS	100,000.00	100,000.00
13	UTILITY RELOCATIONS	1	LS	1,250,000.00	1,250,000.00
14	UNDERCUT	4,000	CY	75.00	300,000.00
15	REMOVE EXISTING BOX CULVERT	1	LS	380,000.00	380,000.00
16	16' X 6' BOX CULVERT	1,160	LF	4,400.00	5,104,000.00
17	STREET REPAIR	4,000	SY	65.00	260,000.00
				Subtotal:	\$ 10,032,000.00
				Surveying, Design & Permitting (16%):	1,605,000.00
				Easement Acquisitions:	500,000.00
				Bidding & CA (10%):	1,003,000.00
				Legal & Admin. (5%):	502,000.00
				Contingency (20%):	2,006,000.00
				Total Project Budget:	\$ 15,648,000.00

Table 8. Project "D" Cost Estimate

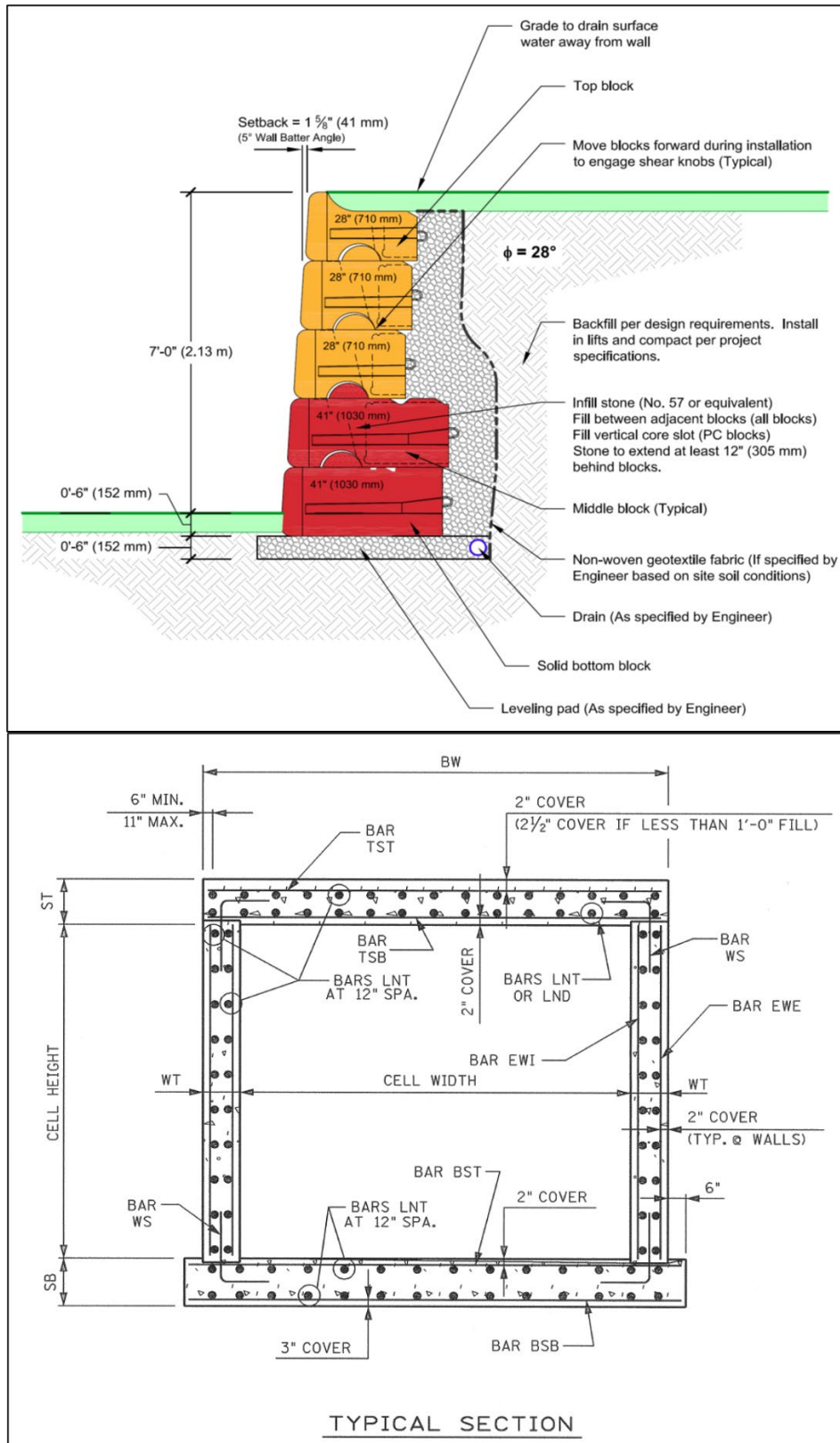


Figure 101. Project "D" Details

5.2 Recommended Improvements Based on Public Works Flood Tickets

The Memphis Public Works Department provided historical data on flood tickets documenting complaints received from citizens in the Whitehaven-Fontaine area. These complaints were classified and analyzed to determine if the issues raised could be addressed by drainage improvements.

For the Whitehaven basin, a total of 147 tickets were analyzed and were classified by the nature of the complaint. Many tickets were duplicates of the same issue at a given location. Based on an analysis of the issues and locations, a total of 8 projects were identified to address specific drainage issues. This information is summarized in Table 9.

Classification	# of Tickets	# of Locations	# of Projects
Minor St., Yard or Bldg. Flooding	69	27	8
Maintenance Issues	21	9	--
TDOT Issues	2	1	--
Outside of Basin	16	9	--
Non-Drainage Issue	15	10	--
Private Drainage Issue	11	8	--

Table 9. Summary of Public Works Flood Tickets

5.2.1 Project 1: Winchester & Graceland Drainage Improvements

The intersection of Winchester Road and Graceland Drive needs additional inlets on both sides of Winchester just east of Graceland Dr. to catch drainage flowing west along Winchester. Proposed improvements include the addition of an 18" storm drain along the south side of Winchester Road east across Graceland Drive, the north across Winchester, and the installation of two 6-72 drain inlets on Winchester.

PROJECT 1					
WINCHESTER & GRACELAND DRAINAGE IMPROVEMENTS					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
1	MOBILIZATION	1	LS	\$ 3,000.00	\$ 3,000.00
2	DEMOLITION	1	LS	2,000.00	2,000.00
3	18" RCP	250	LF	100.00	25,000.00
4	6-72 INLETS	2	EA	5,000.00	10,000.00
5	STONE BACKFILL	150	TON	50.00	7,500.00
6	CURB REPAIR	100	LF	50.00	5,000.00
7	SIDEWALK REPAIR	400	SF	20.00	8,000.00
8	ASPHALT REPAIR	60	SY	100.00	6,000.00
9	EROSION CONTROL	1	LS	2,000.00	2,000.00
10	UTILITY ADJUSTMENTS	1	LS	5,000.00	5,000.00
11	SODDING	10	SY	50.00	500.00
				Subtotal:	\$ 74,000.00
				Surveying, Design & Permitting (16%):	12,000.00
				Easement Acquisitions:	-
				Bidding & CA (10%):	7,000.00
				Legal & Admin. (5%):	4,000.00
				Contingency (20%):	15,000.00
				Total Project Budget:	\$ 112,000.00

Table 10. Project 1 Cost Estimate

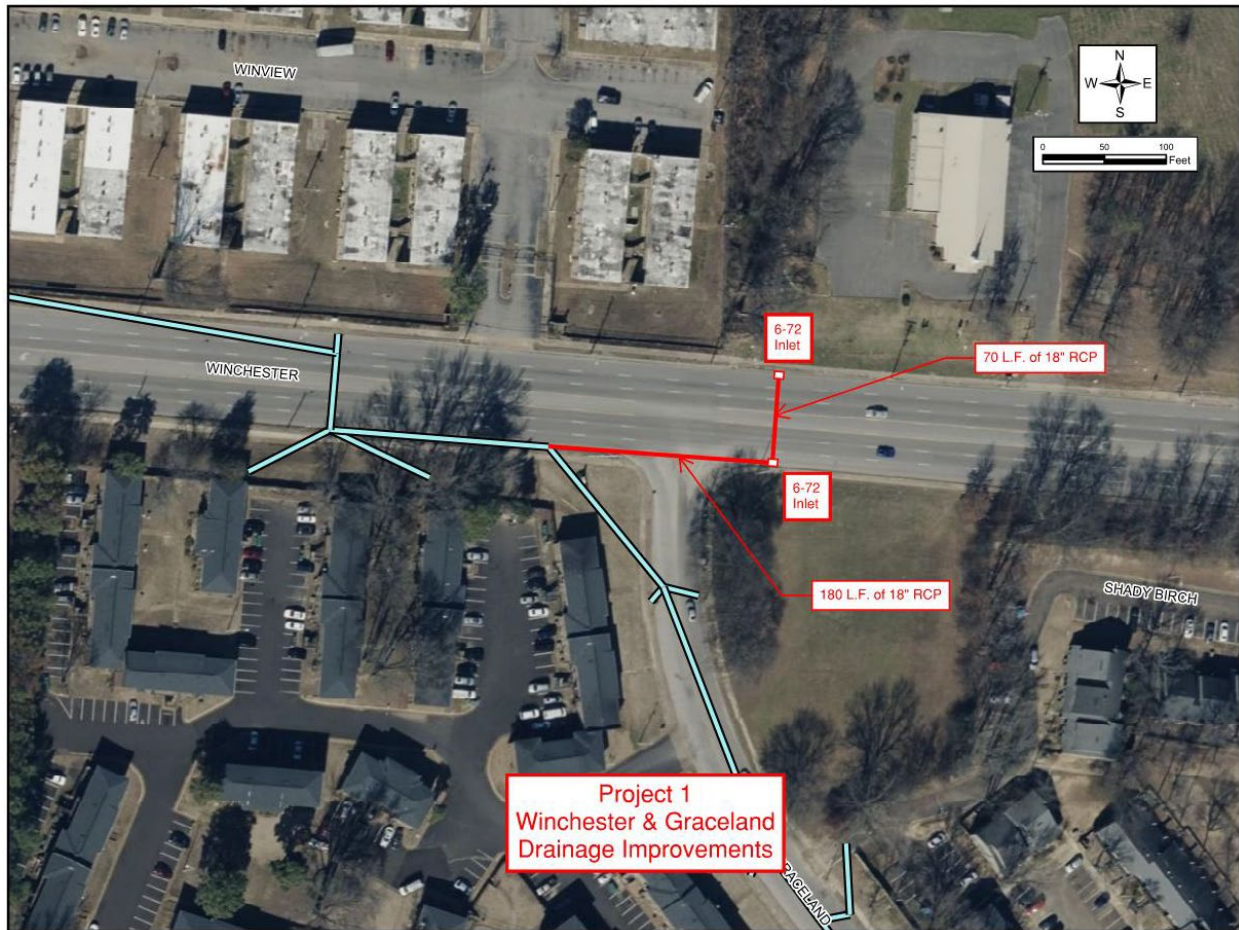


Figure 102. Project 1 Details

5.2.2 Project 2: Raines & Faronia Drainage Improvements

The intersection of Raines Road and Faronia Drive experiences street flooding due to the large drainage area draining west on Raines, with no drain inlets along Raines until the water reaches Faronia. Raines Road needs additional drain inlets on both sides of the road east of Faronia Drive to capture this drainage before it floods the intersection. Improvements will include the installation of 24" and 18" storm drains along the north side of Raines Road from just west of Faronia to the east side of Claree Street, and the installation of two 18" storm drains crossing Raines to the south side. A total of six 6-72 drain inlets will be installed on Raines Road (four on the north side and two on the south side).

PROJECT 2					
RAINES & FARONIA DRAINAGE IMPROVEMENTS					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
Item	Description	Quantity	Unit	Unit Price	Amount
1	MOBILIZATION	1	LS	\$ 5,000.00	\$ 5,000.00
2	DEMOLITION	1	LS	10,000.00	10,000.00
3	18" RCP	220	LF	100.00	22,000.00
4	24" RCP	570	LF	120.00	68,400.00
5	6-72 INLETS	6	EA	5,000.00	30,000.00
6	STONE BACKFILL	660	TON	50.00	33,000.00
7	CURB REPAIR	600	LF	50.00	30,000.00
8	SIDEWALK REPAIR	300	SF	20.00	6,000.00
9	ASPHALT REPAIR	250	SY	100.00	25,000.00
10	EROSION CONTROL	1	LS	10,000.00	10,000.00
11	UTILITY ADJUSTMENTS	1	LS	10,000.00	10,000.00
12	SODDING	260	SY	50.00	13,000.00
				Subtotal:	\$ 262,400.00
				Surveying, Design & Permitting (16%):	42,000.00
				Easement Acquisitions:	-
				Bidding & CA (10%):	26,000.00
				Legal & Admin. (5%):	13,000.00
				Contingency (20%):	52,000.00
				Total Project Budget:	\$ 395,400.00

Table 11. Project 2 Cost Estimate



Figure 103. Project 2 Details

5.2.3 Project 3: Graceland & Birch Bend Drainage Improvements

There is a section of Graceland Drive between Acacia Street and Shady Birch Road with no drain inlets on the west side of the street. Citizen complaints are that the west side of Graceland Drive in this area floods. The addition of a 6-72 inlet near the intersection of Graceland Drive and Birch Bend Road is recommended. The project includes the installation of one 6-72 inlet on the west side of Graceland near Birch Bend Road and one 18" storm drain connecting to an existing drain manhole.

PROJECT 3					
GRACELAND & BIRCH BEND DRAINAGE IMPROVEMENTS					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
1	MOBILIZATION	1	LS	\$ 2,000.00	\$ 2,000.00
2	DEMOLITION	1	LS	1,000.00	1,000.00
3	18" RCP	20	LF	100.00	2,000.00
4	6-72 INLETS	1	EA	5,000.00	5,000.00
5	STONE BACKFILL	20	TON	50.00	1,000.00
6	CURB REPAIR	20	LF	50.00	1,000.00
7	SIDEWALK REPAIR	35	SF	20.00	700.00
8	ASPHALT REPAIR	10	SY	100.00	1,000.00
9	EROSION CONTROL	1	LS	1,000.00	1,000.00
10	UTILITY ADJUSTMENTS	1	LS	2,000.00	2,000.00
11	SODDING	6	SY	50.00	300.00
				Subtotal:	\$ 17,000.00
				Surveying, Design & Permitting (16%):	3,000.00
				Easement Acquisitions:	-
				Bidding & CA (10%):	2,000.00
				Legal & Admin. (5%):	1,000.00
				Contingency (20%):	3,000.00
				Total Project Budget:	\$ 26,000.00

Table 12. Project 3 Cost Estimate



Figure 104. Project 3 Details

5.2.4 Project 4: Graceland & Timothy Drainage Improvements

The property owner at 1448 Timothy Drive has repeatedly reported flooding in his rear yard. There is an existing 30" storm drain flowing west through this rear yard, but the nearest inlet is 2 lots away. The addition of a 3 x 3 inlet on this existing storm drain will alleviate this flooding problem. The improvements will include excavation to the existing 30" storm drain and construction of a new 3 x 3 drain inlet on top of the 30" storm drain.

PROJECT 4					
GRACELAND & TIMOTHY DRAINAGE IMPROVEMENTS					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
1	MOBILIZATION	1	LS	\$ 2,000.00	\$ 2,000.00
2	DEMOLITION	1	LS	1,000.00	1,000.00
3	3 X 3 INLET	1	EA	10,000.00	10,000.00
4	STONE BACKFILL	10	TON	50.00	500.00
5	EROSION CONTROL	1	LS	1,000.00	1,000.00
6	SODDING	50	SY	50.00	2,500.00
				Subtotal:	\$ 17,000.00
				Surveying, Design & Permitting (16%):	3,000.00
				Easement Acquisitions:	2,000.00
				Bidding & CA (10%):	2,000.00
				Legal & Admin. (5%):	1,000.00
				Contingency (20%):	3,000.00
				Total Project Budget:	\$ 28,000.00

Table 13. Project 4 Cost Estimate



Figure 105. Project 4 Details

5.2.5 Project 5: Randall & Laudeen Drainage Improvements

The property owner at 1360 Laudeen Drive has repeatedly reported flooding in his yard from the street just east of his property. The section of Randall Drive from Laudeen Drive to Graceland Drive (~900' of street) drains west to a corner, then south ~200' to the first available drain inlet. In a heavy rain event, this drainage runs across the street and into the property at 1360 Laudeen. This project would extend the existing storm drain system on Laudeen up to Randall Dr. to intercept this drainage. The improvements include 340 L.F. of 18" storm drain, one drain manhole and two 6-72 inlets on the north and south sides of Randall Drive.

PROJECT 5					
RANDALL & LAUDEEN DRAINAGE IMPROVEMENTS					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
1	MOBILIZATION	1	LS	\$ 5,000.00	\$ 5,000.00
2	DEMOLITION	1	LS	3,000.00	3,000.00
3	18" RCP	340	LF	100.00	34,000.00
4	6-72 INLETS	2	EA	5,000.00	10,000.00
5	DRAIN MANHOLE	1	EA	5,000.00	5,000.00
6	STONE BACKFILL	280	TON	50.00	14,000.00
7	CURB REPAIR	220	LF	50.00	11,000.00
8	SIDEWALK REPAIR	50	SF	20.00	1,000.00
9	ASPHALT REPAIR	150	SY	100.00	15,000.00
10	EROSION CONTROL	1	LS	5,000.00	5,000.00
11	UTILITY ADJUSTMENTS	1	LS	5,000.00	5,000.00
12	SODDING	100	SY	50.00	5,000.00
				Subtotal:	\$ 113,000.00
				Surveying, Design & Permitting (16%):	18,000.00
				Easement Acquisitions:	-
				Bidding & CA (10%):	11,000.00
				Legal & Admin. (5%):	6,000.00
				Contingency (20%):	23,000.00
				Total Project Budget:	\$ 171,000.00

Table 14. Project 5 Cost Estimate



Figure 106. Project 5 Details

5.2.6 Project 6: Hernando Road Drainage Improvements

The property owner at 3210 Hernando Road reports flooding of his building from the ditch south of his property. The ditch along the east side of Hernando Road intercepts drainage from ~8 acres of commercial property, with no drainage pipe to route this water into the drainage system. There is an existing 3' x 2' box culvert that crosses Hernando Road north of the ditch. This project would install a drainage pipe from the open ditch to the box culvert. The project would include 110 L.F. of 18" storm drain, a new No. 11 drain inlet on top of the existing box culvert, and a new headwall at the south end of the new 18" storm drain.

PROJECT 6					
HERNANDO ROAD DRAINAGE IMPROVEMENTS					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
1	MOBILIZATION	1	LS	\$ 3,000.00	\$ 3,000.00
2	DEMOLITION	1	LS	2,000.00	2,000.00
3	18" RCP	110	LF	100.00	11,000.00
4	NO. 11 INLET	1	EA	5,000.00	5,000.00
5	HEADWALL	1	EA	5,000.00	5,000.00
6	STONE BACKFILL	60	TON	50.00	3,000.00
7	ASPHALT REPAIR	30	SY	100.00	3,000.00
8	EROSION CONTROL	1	LS	2,000.00	2,000.00
9	UTILITY ADJUSTMENTS	1	LS	2,000.00	2,000.00
10	SODDING	40	SY	50.00	2,000.00
				Subtotal:	\$ 38,000.00
				Surveying, Design & Permitting (16%):	6,000.00
				Easement Acquisitions:	-
				Bidding & CA (10%):	4,000.00
				Legal & Admin. (5%):	2,000.00
				Contingency (20%):	8,000.00
				Total Project Budget:	\$ 58,000.00

Table 15. Project 6 Cost Estimate



Figure 107. Project 6 Details

5.2.7 Project 7: Dellrose Drive Drainage Improvements

Approximately 6 acres of residential subdivision drains into Dellrose Drive, with only two drain inlets at the low end of the street to intercept this drainage. There is a 36" storm drain that runs down the center of Dellrose Drive for approximately 600', but there are no drain inlets along this section. This project would install three 6-72 drain inlets along Dellrose Drive to intercept the drainage along the street. The project would include the installation of three 6-72 drain inlets (two on the north side of Dellrose and one on the south side), and three sections of 18" storm drain to connect the three new inlets to existing storm drain manholes in Dellrose.

PROJECT 7					
DELLROSE DRIVE DRAINAGE IMPROVEMENTS					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
1	MOBILIZATION	1	LS	\$ 2,000.00	\$ 2,000.00
2	DEMOLITION	1	LS	2,500.00	2,500.00
3	18" RCP	45	LF	100.00	4,500.00
4	6-72 INLETS	3	EA	5,000.00	15,000.00
5	STONE BACKFILL	40	TON	50.00	2,000.00
6	CURB REPAIR	30	LF	50.00	1,500.00
7	ASPHALT REPAIR	25	SY	100.00	2,500.00
8	EROSION CONTROL	1	LS	2,000.00	2,000.00
9	UTILITY ADJUSTMENTS	1	LS	2,000.00	2,000.00
10	SODDING	20	SY	50.00	1,000.00
				Subtotal:	\$ 35,000.00
				Surveying, Design & Permitting (16%):	6,000.00
				Easement Acquisitions:	-
				Bidding & CA (10%):	4,000.00
				Legal & Admin. (5%):	2,000.00
				Contingency (20%):	7,000.00
				Total Project Budget:	\$ 54,000.00

Table 16. Project 7 Cost Estimate



Figure 108. Project 7 Details

5.2.8 Project 8: Twinkletown Road Drainage Improvements

Approximately 20 acres of residential subdivision along Twinkletown Road drains along the street through inadequate side ditches and undersized driveway culverts, eventually flooding the rear yards of residences fronting on Twinkletown Road and Bluebird Road. This project would install a new drainage system from the main drainage channel just west of Elvis Presley Blvd., up to and along Twinkletown Road to intercept this drainage and route it into the main drainageway. The project includes 30", 24" and 18" storm drains from the main drainage channel up to and along Twinkletown Road. Since Twinkletown Road is a rural street section, drainage will have to be intercepted using No. 11 inlets along the roadway. In addition, one 3 x 3 inlet will be installed in the rear yards, and headwalls at the upstream and downstream ends of the new drainage system.

PROJECT 8					
TWINKLETOWN ROAD DRAINAGE IMPROVEMENTS					
CONSTRUCTION COST ESTIMATE					
WHITEHAVEN STORMWATER STUDY					
<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
1	MOBILIZATION	1	LS	\$ 20,000.00	\$ 20,000.00
2	DEMOLITION	1	LS	15,000.00	15,000.00
3	18" RCP	40	LF	100.00	4,000.00
4	24" RCP	300	LF	120.00	36,000.00
5	30" RCP	650	LF	160.00	104,000.00
6	NO. 11 INLET	6	EA	5,000.00	30,000.00
7	3 X 3 INLET	1	EA	10,000.00	10,000.00
8	HEADWALLS	2	EA	10,000.00	20,000.00
9	STONE BACKFILL	100	TON	50.00	5,000.00
10	DRIVEWAY REPAIR	600	SF	40.00	24,000.00
11	ASPHALT REPAIR	20	SY	100.00	2,000.00
12	EROSION CONTROL	1	LS	20,000.00	20,000.00
13	UTILITY ADJUSTMENTS	1	LS	20,000.00	20,000.00
14	SODDING	600	SY	50.00	30,000.00
				Subtotal:	\$ 340,000.00
				Surveying, Design & Permitting (16%):	54,000.00
				Easement Acquisitions:	80,000.00
				Bidding & CA (10%):	34,000.00
				Legal & Admin. (5%):	17,000.00
				Contingency (20%):	68,000.00
				Total Project Budget:	\$ 593,000.00

Table 17. Project 8 Cost Estimate



Figure 109. Project 8 Details