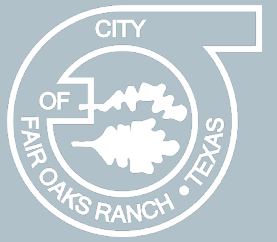




City Council Workshop Vestal Park Culvert Design Options

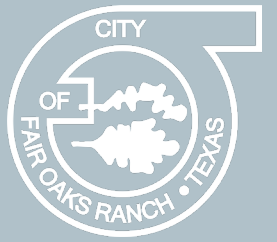


Lee Muñiz, P.E., CFM
Manager of Engineering Services

Project Summary



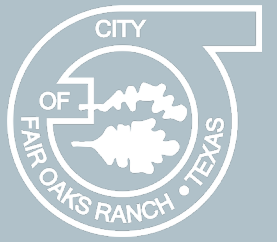
- Project location: west of the intersection of Pimlico Lane and Rocking Horse Lane
- Existing culvert: 48-inch corrugated metal pipe (CMP)
- Project was initiated due to significant degradation of the existing CMP
- Staff coordinated a preliminary project assessment under the City's General Engineering Consultant (GEC) contract
- Presentation outlines three potential solutions to address the culvert degradation



Hydrology and Hydraulics

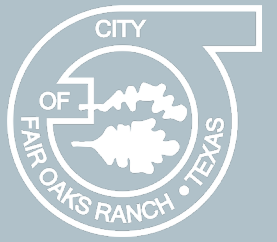
- Stream is part of the Salado Creek Watershed
- Drainage area is approximately 100 acres
- Approximately 330 cubic feet per second of storm water flows to the culvert
- Hydraulic modeling was created to show that approximately 1.22 feet (14.64 inches) of water would overtop the road during a 10-year event
- Hydrology and hydraulic data obtained from the SARA Atlas 14 models and updated with 2021 LiDAR terrain data

Option 1: Box Culvert Design



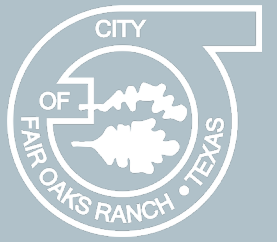
- Proposes to replace the existing culvert with two 6 ft. wide by 4 ft. high concrete box culverts
- Would reduce the amount of water overtopping the road to 0.4 feet (4.8 inches) during a 10-year event
- Estimated construction cost: \$548,000
- Benefit: increased capacity, longevity, and maintenance improvement

Option 2: Culvert Pipe Design

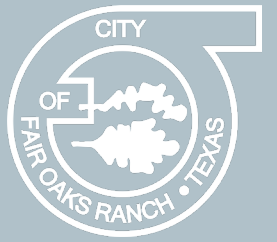


- Proposes to replace the existing culvert with a 48-inch reinforced concrete pipe
- Would not have a change in the water overtopping the road during a 10-year event
- Estimated construction cost: \$371,000
- Benefit: concrete pipe longevity, maintenance exceeds corrugated pipe, and lower cost

Option 3: Culvert patch repair



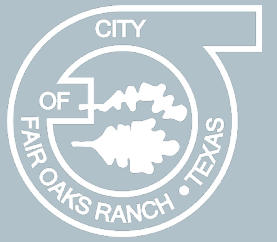
- Proposes to patch existing pipe erosion with bags of concrete
- Would not have a change in the water overtopping the road during a 10-year event
- Estimated construction cost: minimal as handled in-house by the maintenance department
- Benefit: cost is significantly less, and handled in-house to expedite completion of project



Staff Recommendation

- Options 1 and 2 present maintenance improvements with concrete base infrastructure
- Options 2 and 3 show a reduced cost but do not improve the amount of storm water overtopping the road during a 10-year event
- Option 3 provides the most cost-effective solution. Future upgrades may be necessary, and citizens will need to be redirected to Fair Oaks Parkway during rain events when road closure due to overtopping occurs.

Recommendation - Option 3



Way Forward

- Feedback from City Council on preferred option
- Budget for this project is \$113,844
- Options 1 or 2 require a budget amendment. Staff will move forward with developing plan sets to bid the project
- Option 3 requires no budget amendment. Staff will begin mobilization and commence patchwork construction

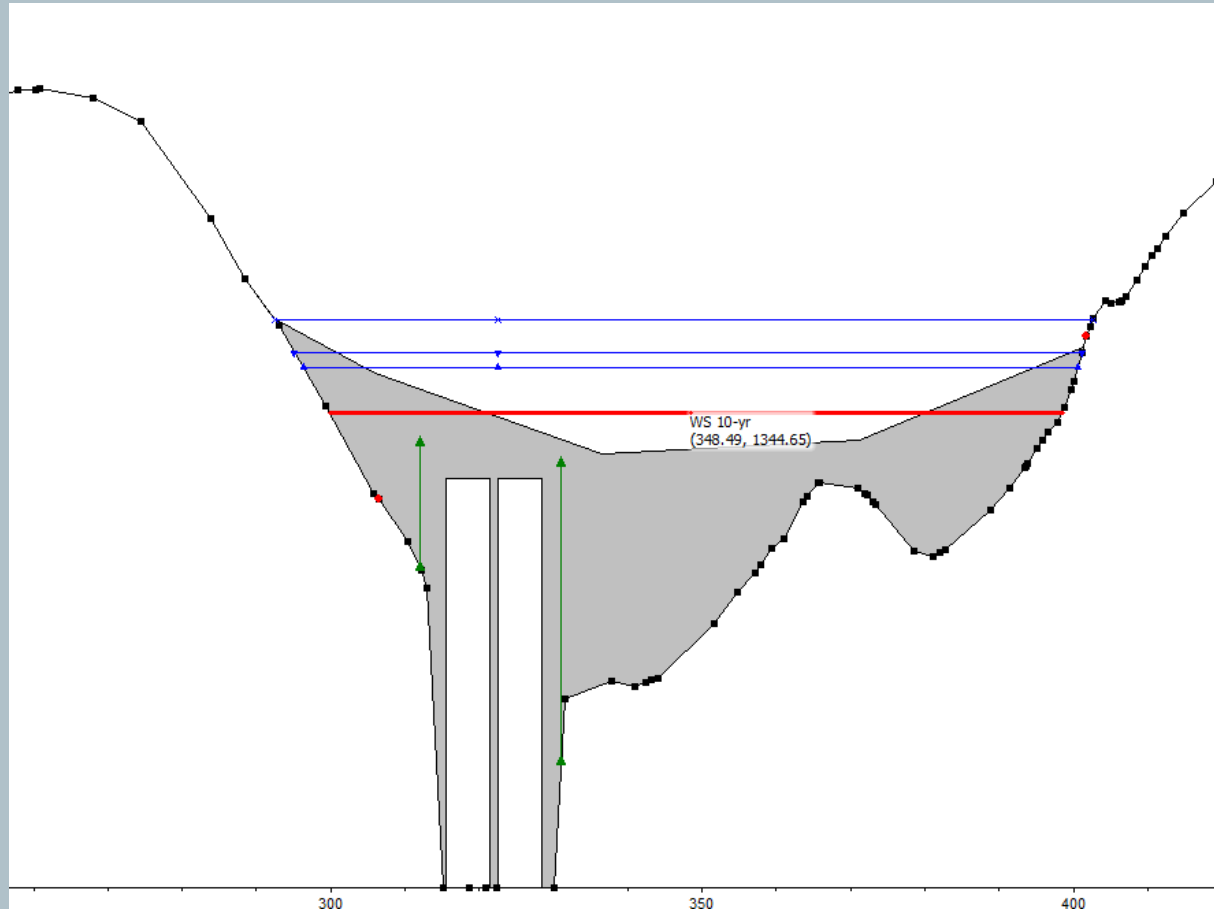


Questions?

Drainage Area Map

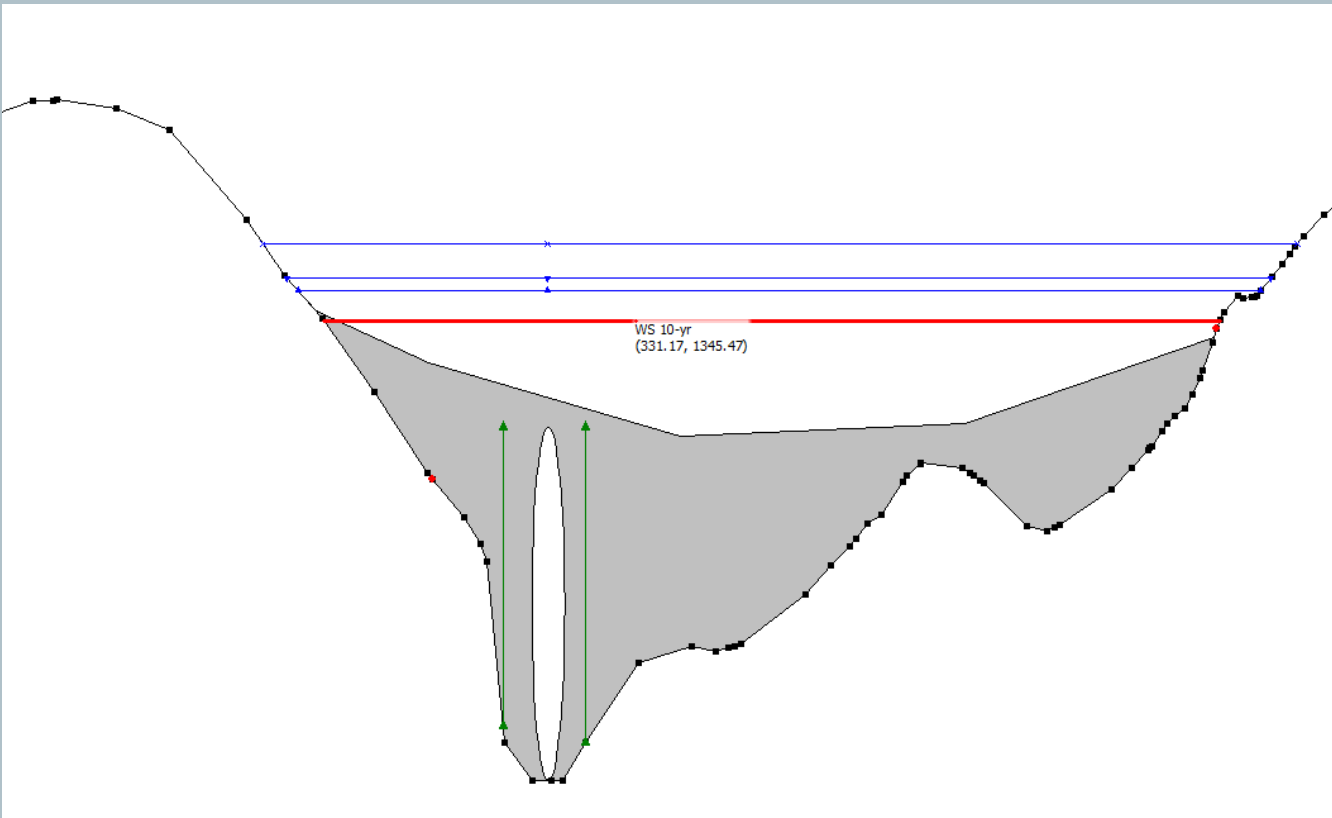


Option 1: Two 6 ft. x 4 ft. Concrete Box Culverts



Vestal Park Culvert Replacement					
Item Number	Item Description	Item Unit	Item Price	Quantity	Price
100.1	MOBILIZATION	LS	11%	1	\$34,655.72
100.2	INSURANCE AND BOND	LS	3%	1	\$9,451.56
101.1	PREPARATION ROW	LS	4%	1	\$12,986.08
540	SWPPP	LS	2%	1	\$6,301.04
530.1	BARRICADES, SIGNS, AND TRAFFIC HANDLING	MO	1000	9	\$9,000.00
531	SIGNAGE	EA	300	2	\$600.00
105.1	CHANNEL EXCAVATION (150 CY < X < 5,000 CY)	ALW	15000	1	\$15,000.00
104.1	STREET EXCAVATION (< 1,000 CY)	CY	74	100	\$7,400.00
	BOX CULVERT EXCAVATION AND BACKFILL (< 600 CY)	CY	\$40.00	80	\$3,200.00
1000.3	WOOD FENCE (INSTALL)(6' HIGH)	LF	74	200	\$14,800.00
9001.1	SMALL TREES (30 GAL.)	EA	606	4	\$2,424.00
205.2	HOT MIX ASPHALTIC PAVEMENT TYPE B (8" COMP DEPTH)(20% MAX RAP)(NO RAS)(PG 64-22)	SY	120	220	\$26,400.00
205.4	HOT MIX ASPHALTIC PAVEMENT TYPE D (2" COMP DEPTH) (< 1,000 SY)	SY	60	220	\$13,200.00
202.1	PRIME COAT	GAL	5	44	\$220.00
203.1	TACK COAT	GAL	7	22	\$154.00
413.2	FLOWABLE FILL (HIGH STRENGTH)	CY	220	30	\$6,600.00
505.1	CONCRETE RIPRAP (5" THICK)(APRON)	SY	177	40	\$7,080.00
505.1	CONCRETE RIPRAP (5" THICK)(FLUME)	SY	177	30	\$5,310.00
307.1	CONCRETE STRUCTURE (WINGWALL PARALLEL WINGS)	EA	20000	2	\$40,000.00
309.1	PRECAST REINFORCED CONCRETE CULVERT (6' X 4')	LF	1200	100	\$120,000.00
550.1	TRENCH EXCAVATION SAFETY PROTECTION	LF	16	50	\$800.00
515.1	TOPSOIL (> 500 CY)	CY	44	11	\$484.00
516.1	BERMUDA SODDING (< 2,000 SY)	SY	11	180	\$1,980.00
SP1	WATERLINE PROTECTION (FLOWABLE FILL)	ALW	25000	1	\$25,000.00
SP2	CONTROL OF WATER	SY	25000	1	\$25,000.00
				Sub-total	\$427,967.96
				Inflation	\$34,237.44
				Contingency	\$85,593.59
				Grand Total	\$547,798.99

Option 2: 48-inch Reinforced Concrete Pipe



Vestal Park Culvert Replacement					
Item Number	Item Description	Item Unit	Item Price	Quantity	Price
100.1	MOBILIZATION	LS	11%	1	\$21,927.40
100.2	INSURANCE AND BOND	LS	3%	1	\$5,980.20
101.1	PREPARATION ROW	LS	4%	1	\$8,357.60
540	SWPPP	LS	2%	1	\$3,986.80
530.1	BARRICADES, SIGNS, AND TRAFFIC HANDLING	MO	1000	9	\$9,000.00
531	SIGNAGE	EA	300	2	\$600.00
105.1	CHANNEL EXCAVATION (150 CY < X < 5,000 CY)	ALW	15000	1	\$15,000.00
104.1	STREET EXCAVATION (< 1,000 CY)	CY	74	60	\$4,440.00
	BOX CULVERT EXCAVATION AND BACKFILL (< 600 CY)	CY	\$40.00	80	\$3,200.00
1000.3	WOOD FENCE (INSTALL)(6' HIGH)	LF	74	200	\$14,800.00
9001.1	SMALL TREES (30 GAL.)	EA	606	4	\$2,424.00
205.2	HOT MIX ASPHALTIC PAVEMENT TYPE B (8" COMP DEPTH)(20% MAX RAP)(NO RAS)(PG 64-22)	SY	120	160	\$19,200.00
205.4	HOT MIX ASPHALTIC PAVEMENT TYPE D (2" COMP DEPTH) (< 1,000 SY)	SY	60	160	\$9,600.00
202.1	PRIME COAT	GAL	5	32	\$160.00
203.1	TACK COAT	GAL	7	16	\$112.00
413.2	FLOWABLE FILL (HIGH STRENGTH)	CY	220	30	\$6,600.00
505.1	CONCRETE RIPRAP (5" THICK)(APRON)	SY	177	40	\$7,080.00
505.1	CONCRETE RIPRAP (5" THICK)(FLUME)	SY	177	30	\$5,310.00
307.1	CONCRETE STRUCTURE (WINGWALL/RAPARALLEL WINGS)	EA	20000	2	\$40,000.00
401.1	REINFORCED CONCRETE PIPE (CLASS III)(48" DIA)	LF	363	50	\$18,150.00
550.1	TRENCH EXCAVATION SAFETY PROTECTION	LF	16	50	\$800.00
515.1	TOPSOIL (> 500 CY)	CY	44	11	\$484.00
516.1	BERMUDA SODDING (< 2,000 SY)	SY	11	180	\$1,980.00
SP1	WATERLINE PROTECTION (FLOWABLE FILL)	ALW	25000	1	\$25,000.00
SP2	CONTROL OF WATER	SY	25000	1	\$25,000.00
				Sub-total	\$289,113.56
				Inflation	\$23,129.08
				Contingency	\$57,822.71
				Grand Total	\$370,065.36