



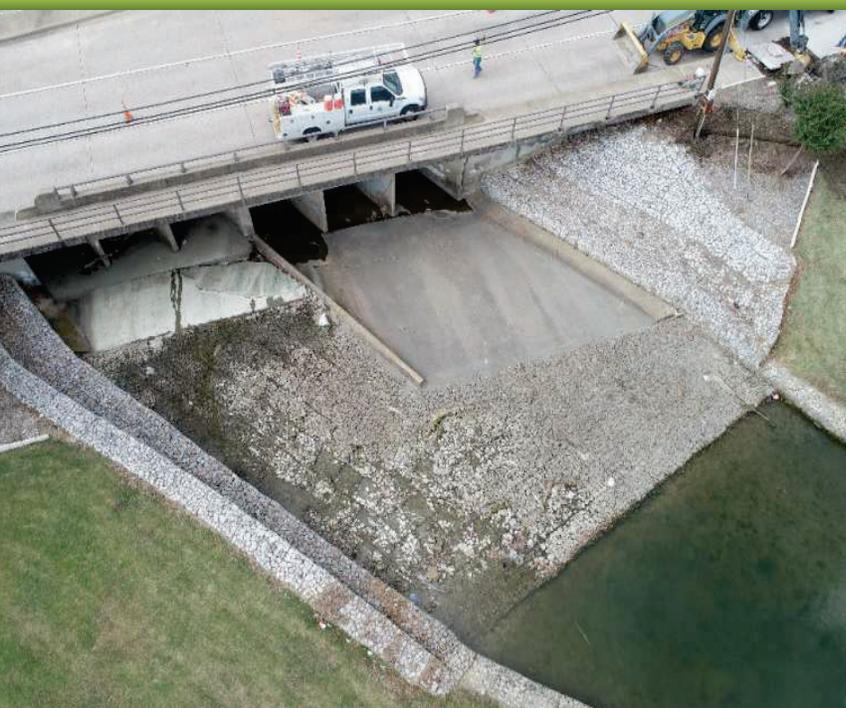
Rawhide Creek Infrastructure Assessment

Final Technical Memorandum

December 18, 2020



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FINAL MEMORANDUM



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TO: Marc Bentley, PE
FROM: David Rivera, PhD, PE, CFM
SUBJECT: Rawhide Creek Infrastructure Assessment
DATE: 12/18/2020
PROJECT: FBR20638 – Rawhide Infrastructure Assessment



Scope

Freese and Nichols, Inc. (FNI) performed a visual assessment of stormwater infrastructure along a 1.8-mile segment of Rawhide Creek. The assessment was conducted from Valley View Lane to the low head dam structure at Webb Chapel Road (see **Appendix C**, which also contains an overview of the project areas). The purpose of the assessment was to identify damaged infrastructure in need of repair or replacement. City staff noted that the roadway crossings are of particular importance. Channel and culvert capacity was not understood to be a focus of this study, and as a result, capacity improvements were not evaluated.

FNI identified 10 areas/structures in need of maintenance and/or replacement and developed a repair concept for each of the project locations. Three of those identified project areas pertain to improvements at culvert crossings. The remaining seven identified project areas primarily focus on erosion control improvements along and within the channel lining. Project information sheets were created to summarize the observed problems and describe the proposed improvements for each of the project areas. FNI also developed a conceptual Opinion of Probable Construction Cost (OPCC) for each of the project areas to estimate the potential costs of design and construction of each project. The project information sheets are included as **Appendix A** and the OPCCs are included as **Appendix B**.

Site Visits

FNI engineers conducted a total of four (4) site visits to visually assess and document the drainage infrastructure conditions with photographs, field measurements, drone imagery. Each of the site visits is outlined below:

- October 13, 2020 – Infrastructure assessment along the entire 1.8-mile segment.
- November 5, 2020 – Drone mission flyover from Webb Chapel Rd. to Josey Ln. Needed FAA approval to fly the drone downstream of Josey Ln. due to air traffic control guidelines/restrictions.
- November 5, 2020 – Visual structural assessment of the three road crossings: Webb Chapel Rd., Josey Ln., and Valley View Ln.
- November 12, 2020 – Drone mission flyover from Josey Ln. to Tom Field Rd. Technical difficulties with the drone occurred downstream of Tom Field Rd., which is why there is no drone imagery available within this area of the creek.

During the site visits, FNI observed some utility work being performed in the area. The result of the construction is a long trench running parallel to the creek. The line of demarcation is visible in the photos

and drone imagery captured during the site visits. Work to restore site conditions prior to the utility installation is not included as part of the projects developed for this study.

Drone Information

The drone mission was performed using DJI's Phantom 4 Pro Version 2.0. The drone was flown at an elevation of 100 feet above ground level (agl) in both cross hatched and corridor automated flights along the channel area. The drone was flown at an elevation of 15 feet agl at certain sections along the upstream portion of Webb Chapel Rd. to steer clear of surrounding trees. Drone imagery and data were then uploaded using Site Scan for ArcGIS. Site Scan is a cloud-based drone mapping software that enables imagery collection, processing, and analysis. It also serves as a drone inventory and displays each of the drone mission's flight history. High quality 2-D photos were taken at two second intervals, geotagged, and post-processed to create an orthomosaic map and a digital surface model (3-D) of the project area. Site Scan analysis tools aided in extracting quantity measurements that were used to develop the OPCCs. Digital data collected as part of this study has been provided as a digital appendix (**Appendix E**).

Limitations

FNI's stormwater and geotechnical engineers conducted a one-day site visit to perform a visual assessment of stormwater infrastructure along the creek. This visit focused primarily on evaluating the low head dams and the erosion control features along the creek. A second site visit was conducted by FNI's structural engineers to perform a visual assessment of the three culvert crossings. In addition, the structural team utilized 2019 bridge inspection reports prepared by the Texas Department of Transportation (TxDOT) to supplement the site visit observations. These reports are included as **Appendix D**. A follow-up structural condition survey for these culverts is recommended as part of the design and construction process, to verify that current observations have not changed significantly and validate the quantities used for the planning level cost estimates presented in this study.

A detailed risk analysis was not performed as part of this study. Instead, each project was assigned a risk rating of low, medium, or high based on factors such as the observable level of damage/failure and threat to public infrastructure and public safety. No hydraulic, channel/slope stability, or structural stability testing or modeling were conducted as part of this study.

Proposed Improvements

FNI developed a repair concept for each of the project locations based on field observations, comparison to as-built construction plans, evaluation of previous reports, and experience from similar design projects. Channel and culvert capacity improvements were not understood to be a focus of this study and were therefore not evaluated. Conceptual projects primarily focused on improving safety at roadway crossings and protecting park infrastructure with a secondary goal of improving aesthetics.

Generally, the roadway crossings were determined to be the most critical projects due to the potential life-safety and traffic mobility impacts associated with closure or failure. Recommendations for repairs to address issues identified in the TxDOT Bridge Inspection Reports were incorporated into the proposed improvements. Overall, it appears that damage at the culverts has progressed since the TxDOT inspection was performed. Additional evaluation will be required to determine the scope of repairs necessary for subgrade conditions or interior structural elements that were not observable during the site visit.

Overall, the bank stabilization appears to be working well with a few localized areas of erosion. For this reason, minor repairs to match in situ bank stabilization are recommended and are likely to be the lowest-cost alternative. Some additional rows of gabion baskets are proposed to mitigate sudden changes in

grade adjacent to current wall sections. In other areas where a likely cause of failing infrastructure could be determined, improvements to address the cause of the failure are recommended. For example, it is recommended that a turf reinforcement matting product be installed on the bank above the gabion section to provide erosion protection where the channel velocities are likely higher at the transition from a hard to soft section.

No hydraulic analyses were performed as part of this study. FNI recommends that any proposed improvements that result in a change of channel geometry or roughness values be evaluated prior to construction for potential hydraulic impacts, including increased water surface elevations, velocities, or peak discharges downstream.

Opinions of Probable Construction Cost

Once the project areas were identified, FNI utilized construction drawings, bid tabulations from similar projects within the City of Farmers Branch and the Dallas-Fort Worth area, and the TxDOT Average Low Bid Tabulation for Highway Construction Projects to identify likely bid items and estimated unit costs. The quantities were then determined using a combination of the record drawings, visual assessments, and measurements from Site Scan. Some of the quantities were estimated in areas where FNI could not conduct direct measurements (i.e., within the channel, assumed voids under culverts, etc.).

The proposed projects presented in this study are conceptual based on current, observable site conditions and are meant to be used for planning purposes only. Cost estimates should be refined and modified as part of the project development and design phase.

General Recommendations

The site conditions observed by FNI indicate that erosion is occurring primarily at the transition between the gabion wall sections and the natural bank. It also appears that the bank is mowed up to the top of wall. To improve the longevity of the proposed repairs, FNI recommends the City establish a “no-mow” zone at least five feet wide from the top of the wall. The no-mow zone, also known as a riparian buffer, allows for upgrowth of aquatic and semi-aquatic plants, which naturally prevents erosion and has a secondary benefit of improving water quality. While there is no additional cost to this alternative, it will change the aesthetics of the linear park and require education of City maintenance crews.

As it relates to project phasing, FNI recommends combining some of the project areas to reduce mobilization costs and reduce the unit costs for selected materials, thus recognizing cost-savings for the overall project. The recommended project areas to be combined are the following:

- Project Areas 3, 4, and 5 – located upstream and downstream of Longmeade Dr.
- Project Areas 7, 8, and 9 – located between the downstream side of Josey Ln. and the upstream side of Tom Field Rd.

Furthermore, FNI suggests that the City address the culvert crossing improvements first, since they are more likely to have life-safety or traffic mobility impacts. The remaining erosion control projects along the channel are not believed to have significant impacts to public safety or public infrastructure.

Projects Summary

Table 1 provides a summary of the projects identified in this assessment with their associated costs. The recommended areas to be combined are presented as a single total cost. Further details are provided in the Project Information Sheets and OPCCs.

Table 1: Projects Summary and Associated Costs

Project Description	Project Area	Construction Subtotal	Design & Permitting	Total Cost
Webb Chapel Road Culvert	1	\$429,000	\$86,000	\$515,000
Manske Library Retaining Wall	2	\$207,000	\$42,000	\$249,000
Erosion Control Improvements and Gabion Repairs - Webb Chapel Road to Josey Lane	3, 4, 5	\$308,000	\$63,000	\$371,000
Josey Lane Culvert	6	\$328,000	\$66,000	\$394,000
Erosion Control Improvements and Gabion Repairs - Josey Lane to Valley View Lane	7, 8, 9	\$694,000	\$140,000	\$834,000
Valley View Lane Culvert	10	\$541,000	\$109,000	\$650,000
Total Cost	All	\$2,507,000	\$506,000	\$3,013,000

Appendix A | Project Information Sheets

Reference Address:	13800 Block of Webb Chapel Road – Webb Chapel Road Bridge (upstream)
Project Area: 1	Priority: Medium Estimated Cost: \$515,000
Problem Description:	Upstream concrete apron is severely damaged (Image 1). This may cause seepage under the culvert. It is not known whether there are cut-off walls at the upstream end to prevent flow under the culvert. There is minor amount of debris lodged against culvert wall. Northeast wingwall is cracked at the connection with the culvert and has shifted outward at its top by approximately 3 inches (Image 3). A crack is developing on the southeast wingwall at the culvert (Image 4). Wingwall is shifting outward by about 0.5-0.75 inches (Image 5). The top slab of center barrel on east side has spalling and cracked concrete with exposed rusted reinforcing. There are small areas of wall concrete that have delaminated. There is surface erosion occurring along northeastern corner at a utility pole adjacent to the sidewalk (Image 2).
Proposed Improvement:	Replace wingwalls on the upstream side; repair spalled, cracked and delaminated patches of concrete. Install new concrete apron/riprap. Investigate potential of soil loss under the culvert. Fill voids with cementitious flowable fill. Perform a site visit to verify items in the last TXDOT inspection performed on 4/10/2019. Some conditions may have worsened.



Image 2. Erosion along sidewalk-adjacent utility pole.



Image 1. Damaged concrete apron upstream



Image 3. Elongated crack within concrete culvert.



Image 4. Continued damage/cracks along culvert.



Image 5. Ground-level view of cracks within culvert.

Reference Address:	13800 Block of Webb Chapel Road – Webb Chapel Road Bridge (downstream)	
Project Area: 1	Priority: Medium	Estimated Cost: (included in upstream cost)
Problem Description: (Continued)	Existing timber retaining wall at southwestern corner has failed (Images 6 and 7). The sidewalk has settled as a consequence of this failure (Image 8).	
Proposed Improvement:	Remove and replace the timber retaining wall with a concrete retaining wall. Perform site grading to reestablish slope and remove and replace damaged portion of sidewalk. Allow native vegetation to reestablish to further stabilize slope.	

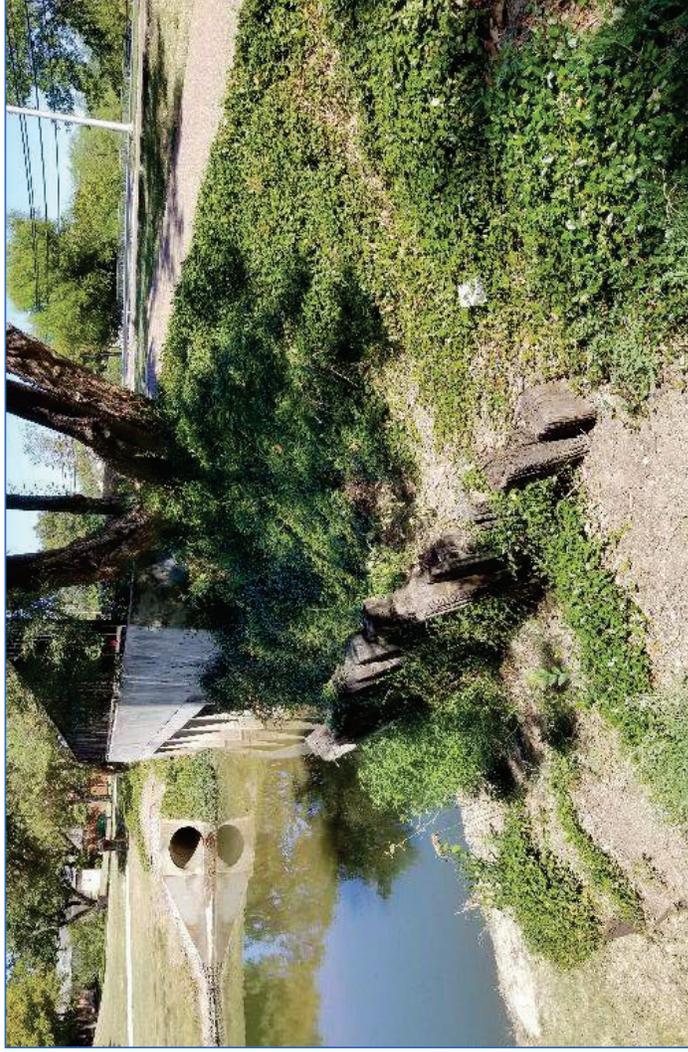


Image 6. Timber retaining wall at southwest corner.



Image 7 (right). Leaning retaining wall within culvert (on far, southeast side).

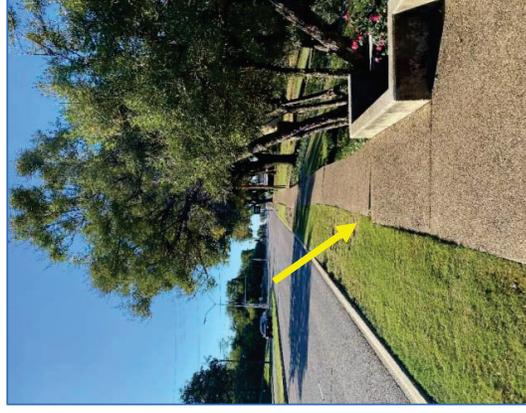


Image 8 (left). Webb Chapel Road sidewalk displacement.



Problem: Northeast wingwall cracked at connection with culvert.
Solution: Replace wingwall.



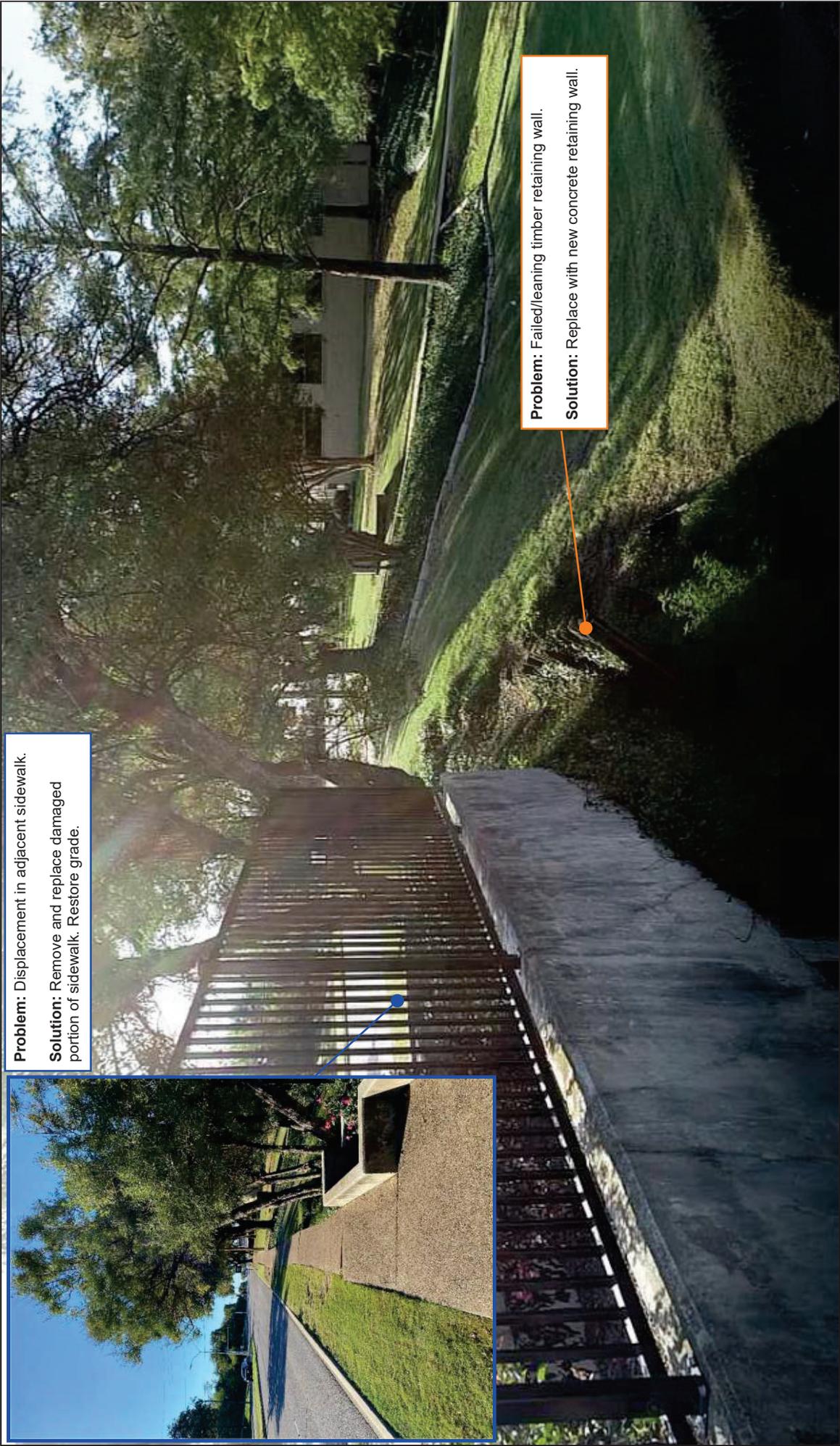
Problem: Crack developing on southeast wingwall at culvert.
Solution: Replace wingwall.



Problem: Additional cracks developing within southeast wingwall.
Solution: Repair spalled, cracked, and delaminated patches of concrete.

Problem: Concrete apron/riprap severely damaged.
Solution: Install new concrete apron/riprap. Fill voids with flowable fill.

Figure I. Project Area 1 (Upstream)



Problem: Displacement in adjacent sidewalk.
Solution: Remove and replace damaged portion of sidewalk. Restore grade.

Problem: Failed/leaning timber retaining wall.
Solution: Replace with new concrete retaining wall.



Figure II. Project Area 1 (Downstream)

Reference Address:	Farmers Branch Manske Library (13613 Webb Chapel Road)
Project Area: 2	Priority: Low Estimated Cost: \$249,000
Problem Description:	Erosion of bank has caused damage to stone retaining wall and gabion baskets adjacent to library (Image 9). Minor erosion observed at transition from gabion wall to natural ground (Image 11).
Proposed Improvement:	Remove and replace 400 SF damaged stone retaining wall system. Remove and replace 190 LF of damaged gabion wall. Perform bank grading to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground.

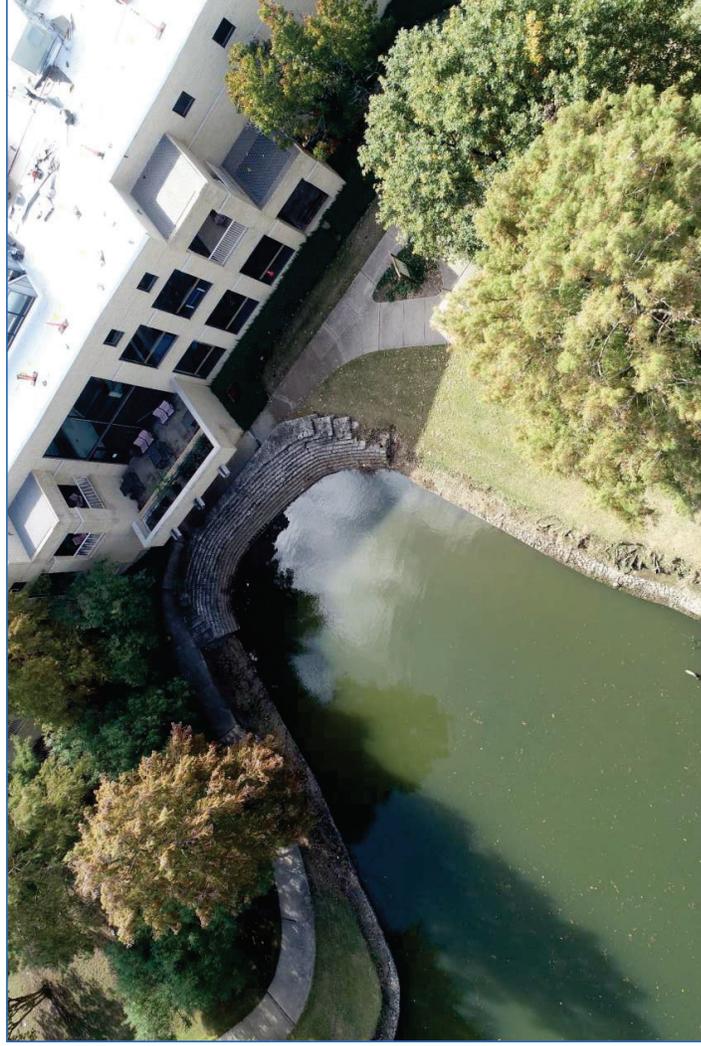


Figure 1. Aerial Drone Imagery of Project Area 2.
Shot on DJI Phantom 4 Pro Version 2.0 at 100' agl (above ground level).



Image 9. Manske Library eroded retaining wall.

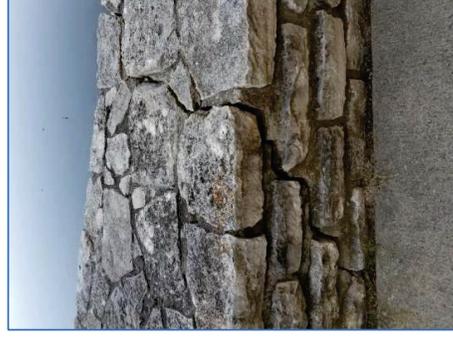
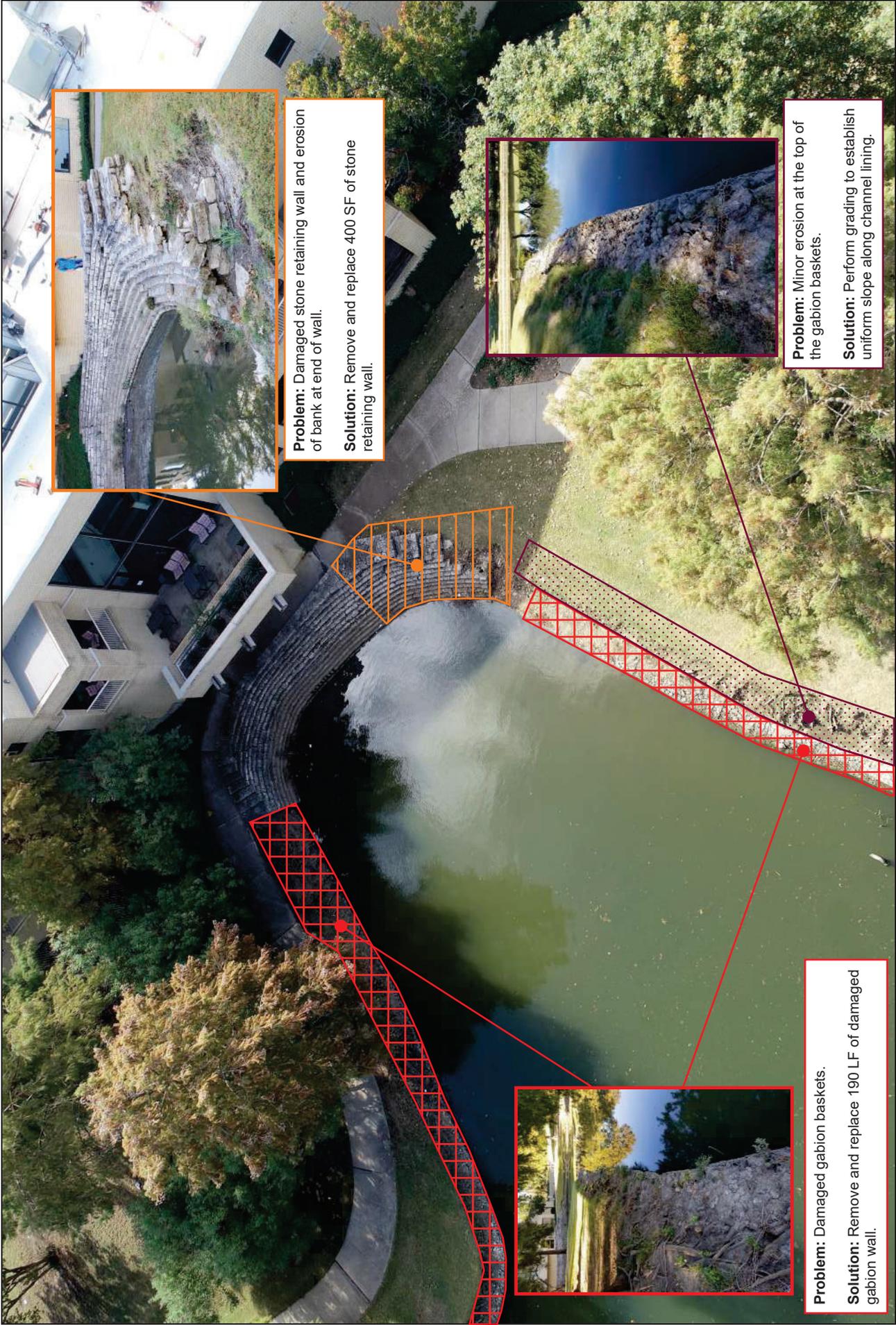


Image 10. Cracks within stone and grout of the retaining wall.



Image 11. Gabion bank erosion.



Problem: Damaged stone retaining wall and erosion of bank at end of wall.

Solution: Remove and replace 400 SF of stone retaining wall.



Problem: Minor erosion at the top of the gabion baskets.

Solution: Perform grading to establish uniform slope along channel lining.



Problem: Damaged gabion baskets.

Solution: Remove and replace 190 LF of damaged gabion wall.

Figure III. Project Area 2

Reference Address:	13800 Block of Lillard Lane	
Project Area: 3	Priority: Low	Estimated Cost: \$371,000 (Includes Project Areas 3, 4 & 5)
Problem Description:	Damage of gabion wall along the right bank of the channel (Images 12, 13, and 15). Localized erosion at transition from gabion wall to natural ground. Water seepage occurring behind the baskets, likely resulting in the gabion wall leaning inwards towards the creek.	
Proposed Improvement:	Remove 25 LF of gabion baskets. Reconstruct and install 20 CY of new gabion baskets around the channel bend to connect to existing gabion wall. Perform bank grading to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground. Install 110 SY of turf reinforcement matting (TRM) to armor bank from further erosion. Tie TRM to gabion wall to prevent seepage behind wall. A sample TRM detail has been included as part of this Appendix.	

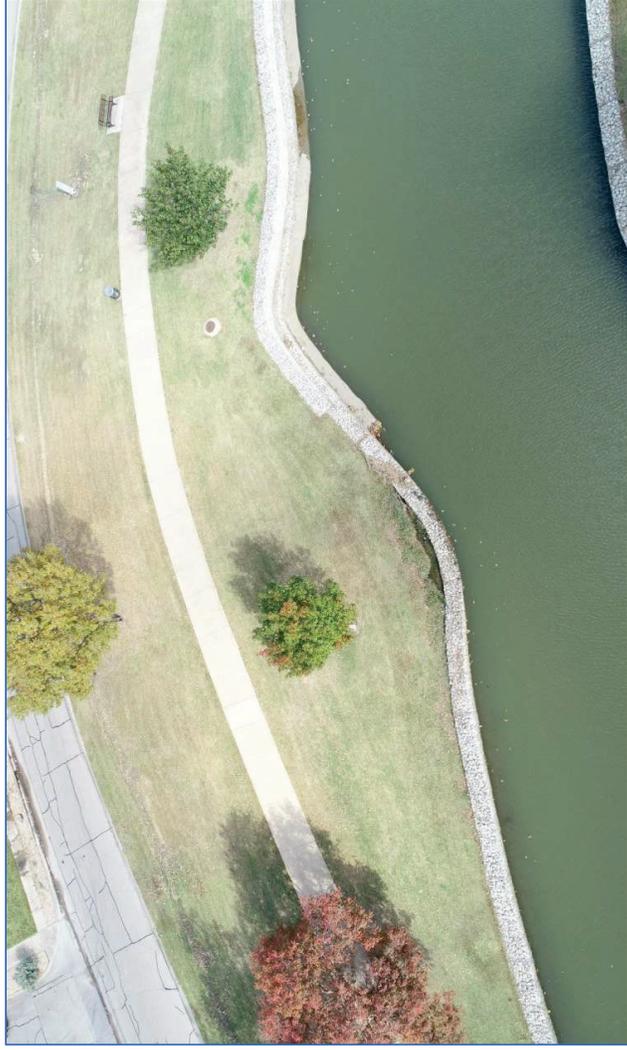


Figure II. Aerial Drone Imagery of Project Area 3. Shot on DJI Phantom 4 Pro Version 2.0 at 100' agl (above ground level).

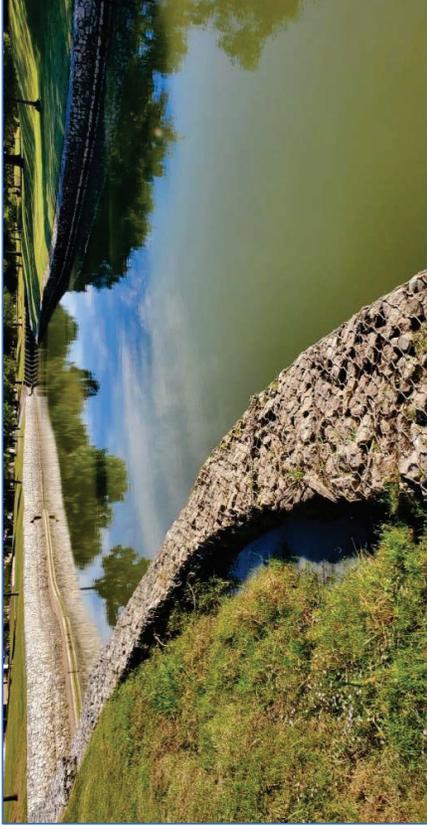


Image 12. Undetermined gabion wall (upstream view).



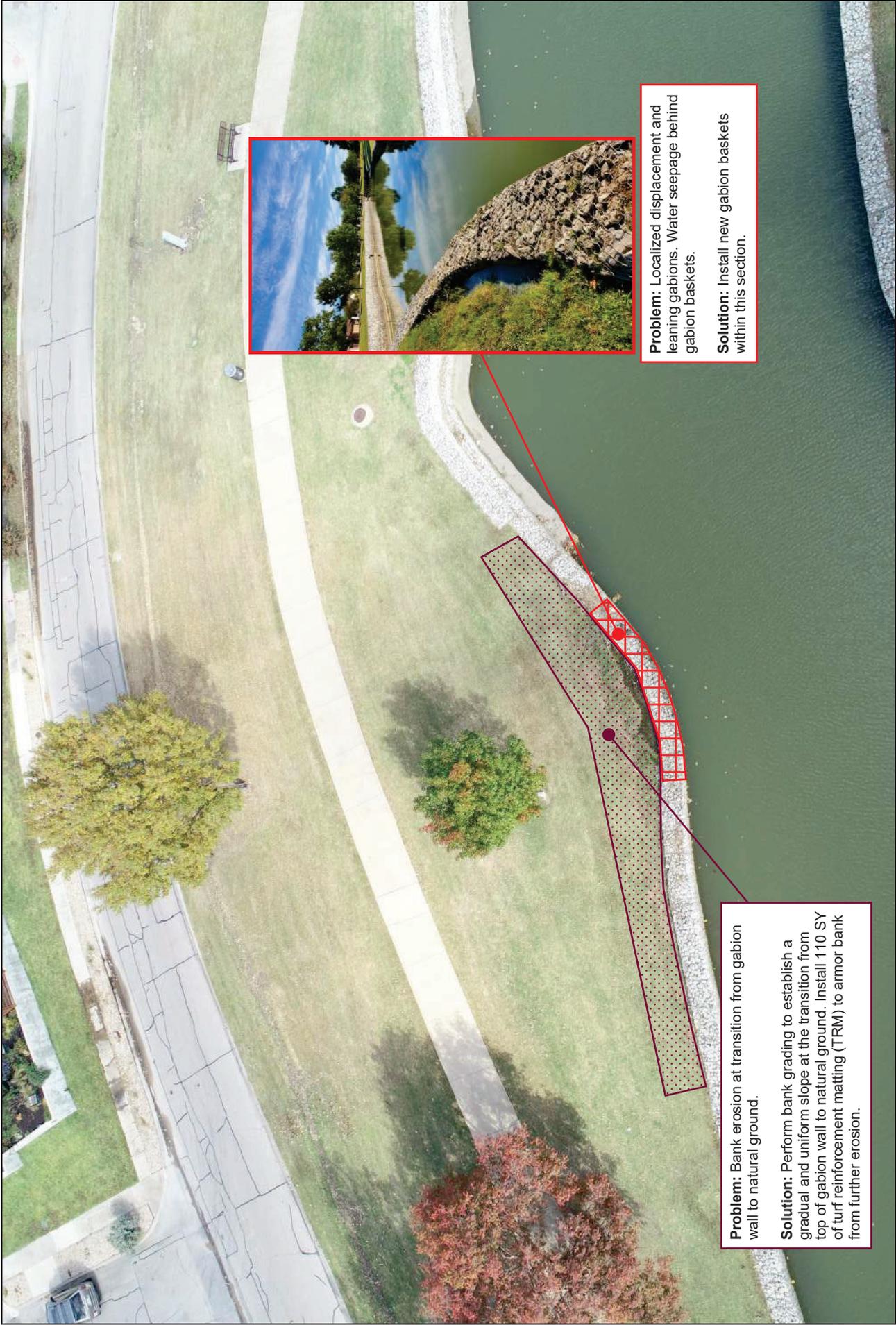
Image 14. Broken-up gabion wall within the channel lining.



Image 13. Leaning gabion wall (downstream view).



Image 15. Leaning gabion wall (upstream view).



Problem: Localized displacement and leaning gabions. Water seepage behind gabion baskets.

Solution: Install new gabion baskets within this section.

Problem: Bank erosion at transition from gabion wall to natural ground.

Solution: Perform bank grading to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground. Install 110 SY of turf reinforcement matting (TRM) to armor bank from further erosion.

Figure IV. Project Area 3 Proposed Improvement

Reference Address:	13750 Block of Rawhide Pkwy	
Project Area: 4	Priority: Low	Estimated Cost: \$371,000 (Includes Project Areas 3, 4 & 5)
Problem Description:	Gabion mattress downstream of check-dam damaged due to debris and litter caught within the wiring, which appears to have eventually caused breakage (Images 16 and 17). The adjacent gabion wall along the left bank is leaning in towards the gabion mattress. The upstream check dam does not appear to be undermined by the damaged gabion sections.	
Proposed Improvement:	Repair damaged portions of 12" gabion mattress, including replacing lost rock fill and replacing wire mesh. Remove and replace 20 LF of gabion baskets at connection with existing gabion wall. Remove and dispose of debris.	

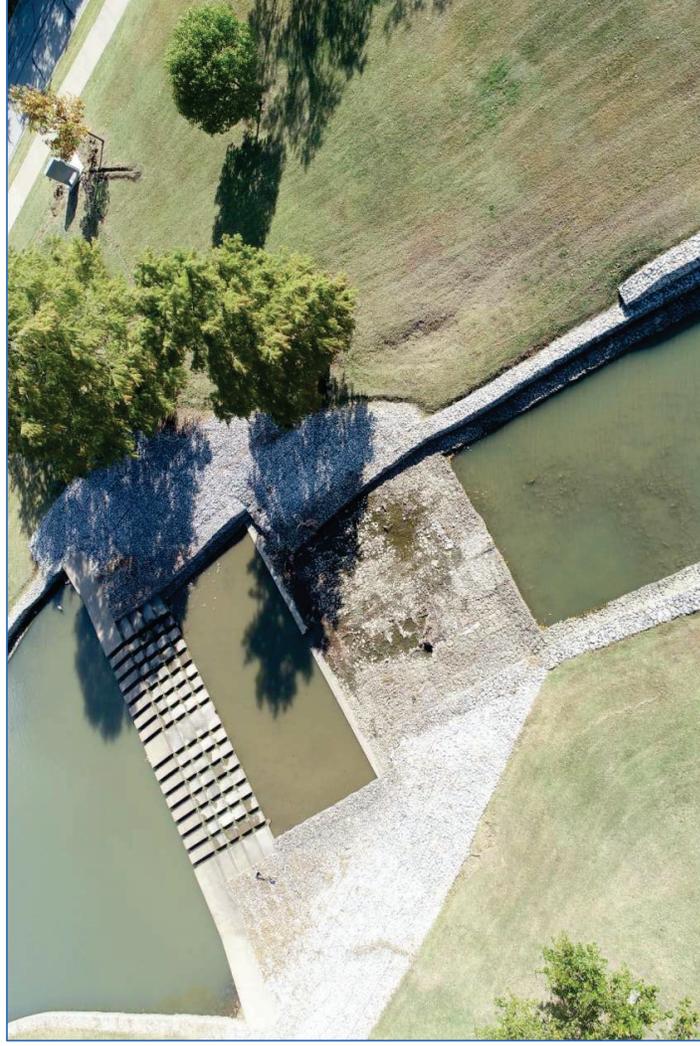


Figure III. Aerial Drone Imagery of Project Area 4.
Shot on DJI Phantom 4 Pro Version 2.0 at 100' agl (above ground level).

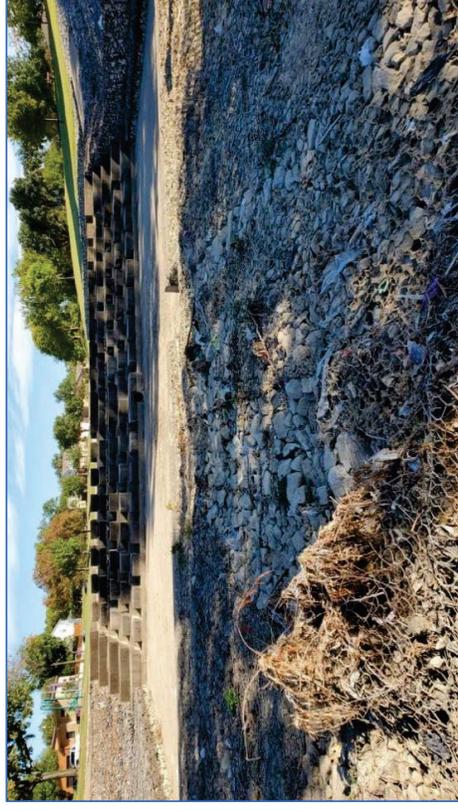


Image 16. Close-up of wire damage within gabion mattress.

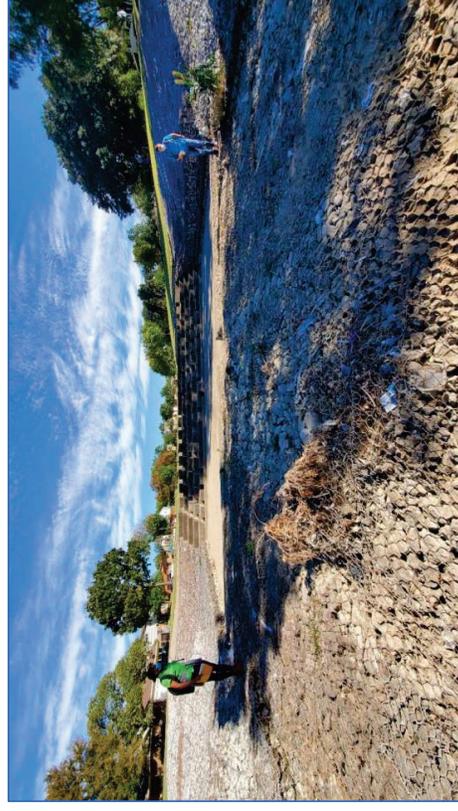


Image 17. Overview of gabion mattress within channel.



Problem: Damaged/eroded gabion mattress due to debris and litter. Leaning gabion baskets adjacent to gabion mattress.

Solution: Repair damaged portions of 12" gabion mattress, including replacing lost rock fill and replacing wire mesh. Remove and replace 20 LF of gabion baskets at connection with existing gabion wall. Remove and dispose of debris.

Figure V. Project Area 4

Reference Address:	2970 Block of Golfing Green Drive	
Project Area: 5	Priority: Low	Estimated Cost: \$371,000 (Includes Project Areas 3, 4 & 5)
Problem Description:	High erosion along the left bank behind the gabion wall directly downstream of the Tom Field Road intersection (Image 19). Gabion baskets are leaning inwards towards the creek (Image 18). Gabion mattress in creek does not have significant damage.	
Proposed Improvement:	Remove and replace 50 LF of gabion wall. Perform bank grading to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground. Install 890 SY of TRM to armor bank from further erosion. Tie TRM to gabion wall to prevent seepage behind wall.	



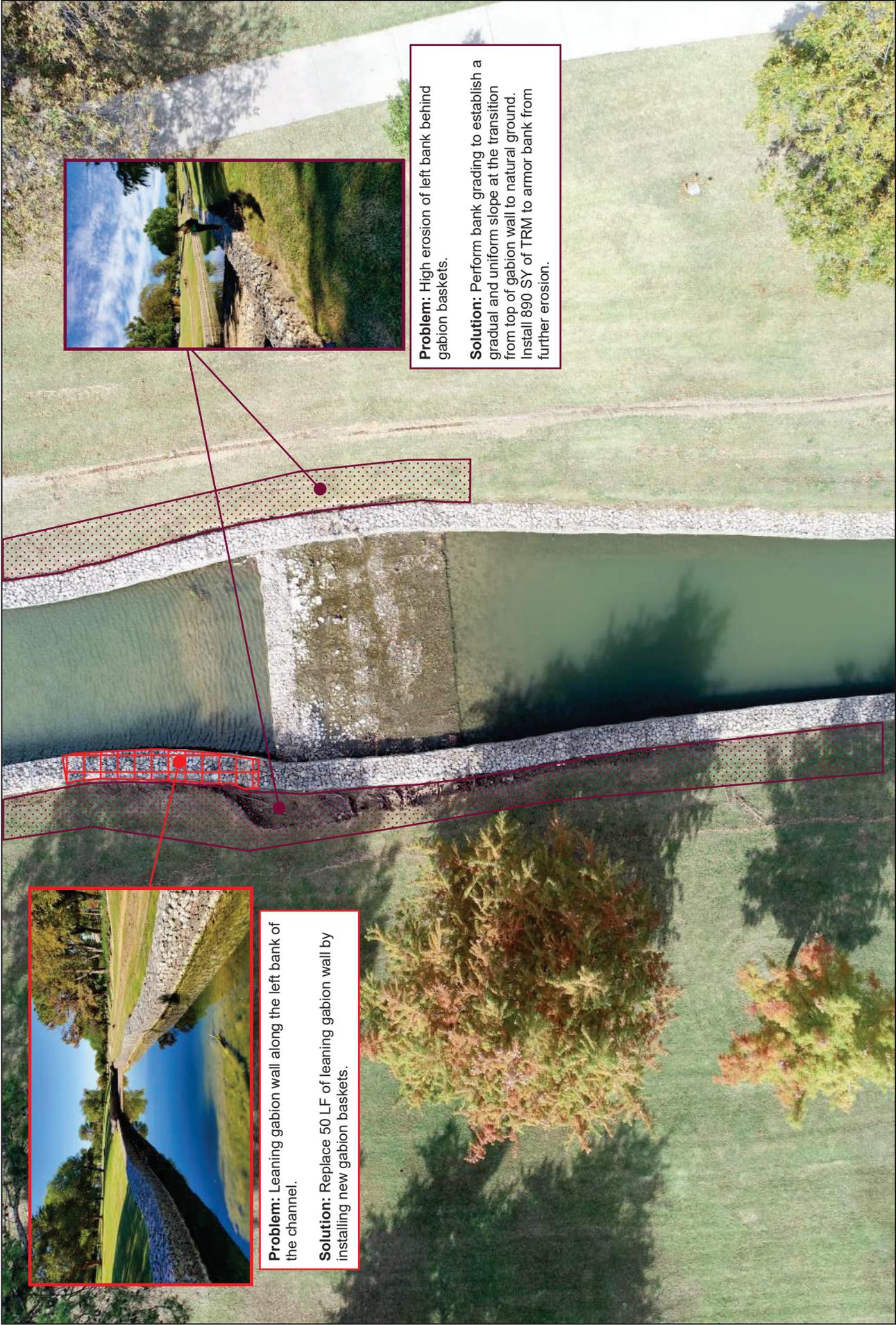
Figure IV. Aerial Drone Imagery of Project Area 5. Shot on DJI Phantom 4 Pro Version 2.0 at 100' agl (above ground level).



Image 18. Looking downstream at leaning gabion wall due to erosion along the left bank.



Image 19. Side profile of erosion along bank easement.



Problem: High erosion of left bank behind gabion baskets.

Solution: Perform bank grading to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground. Install 890 SY of TRM to armor bank from further erosion.



Problem: Leaning gabion wall along the left bank of the channel.

Solution: Replace 50 LF of leaning gabion wall by installing new gabion baskets.

Figure VI. Project Area 5

Reference Address:	13450 Josey Lane	
Project Area:	Priority:	Estimated Cost:
Problem Description:	High	\$394,000
Proposed Improvement:	<p>Upstream apron is damaged (Figure V). Upstream concrete riprap is severely damaged (Image 20). There is water flowing under the concrete riprap from the high side to the entrance of the culvert. Possibility of water flowing under the culvert and forming cavities should be investigated. There is no way to confirm whether there is a cut off wall at the upstream side of culvert without excavation and no record drawings are available.</p> <p>There are concrete spalls and rusted reinforcing at both ends at wingwall and culvert connection (Image 21). A corner reinforcing bar is exposed and bent out at upstream end (Image 22)</p> <p>Clean corroded exposed reinforcing and repair spalls. Seal joints at wingwalls and culvert. Replace damaged concrete riprap and apron. Investigate possible soil loss under the culvert. Fill voids by pumping fill material (flowable fill). Perform a site visit to verify whether the items noted in TXDOT inspection, conducted on 5/22/2019, have expanded.</p>	



Image 20. Josey Lane damaged concrete riprap.



Image 21. Exposed reinforced steel at wingwall connection.



Image 22. Exposed rebar within culvert.



Image 23. Water percolation within concrete riprap.

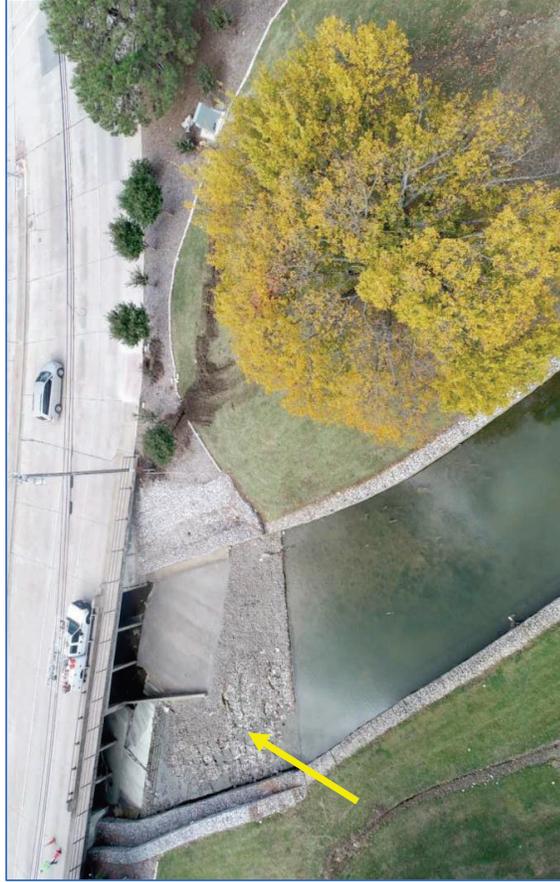
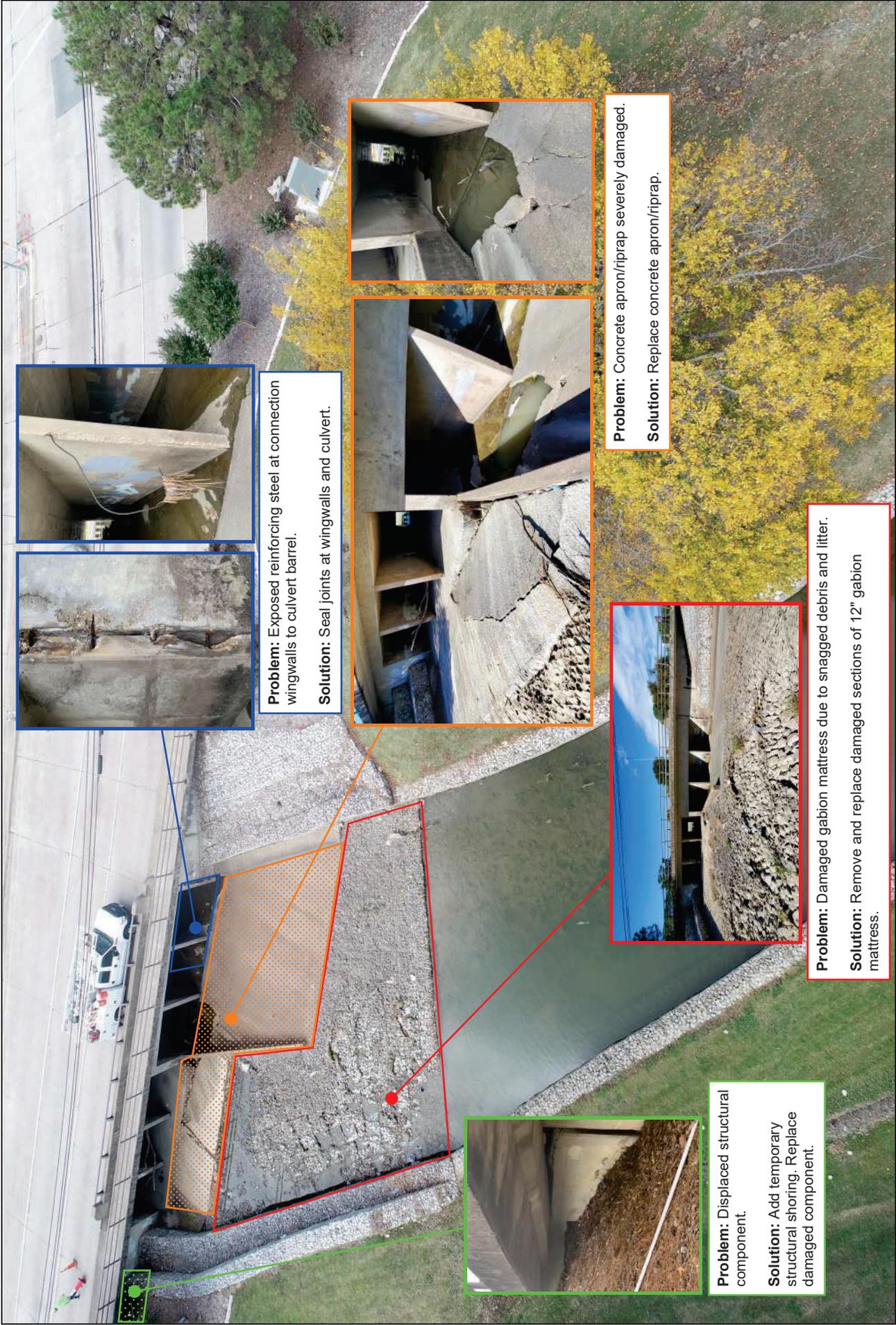


Figure V. Aerial Drone Imagery of Project Area 6. Shot on DJI Phantom 4 Pro Version 2.0 at 100' agl (above ground level).



Problem: Exposed reinforcing steel at connection wingwalls to culvert barrel.
Solution: Seal joints at wingwalls and culvert.

Problem: Displaced structural component.
Solution: Add temporary structural shoring. Replace damaged component.

Problem: Damaged gabion mattress due to snagged debris and litter.
Solution: Remove and replace damaged sections of 12" gabion mattress.

Problem: Concrete apron/riprap severely damaged.
Solution: Replace concrete apron/riprap.

Figure VII. Project Area 6

Reference Address:	2850 Golfing Green Drive
Project Area: 7	Priority: Low
Problem Description:	High erosion of left and right banks behind gabion wall. Exposed concrete outfall pipe within the gabion baskets along the left bank (Figure VI and Image 24).
Proposed Improvement:	Backfill and grade behind gabion wall to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground. Install 880 SY of TRM to armor bank from further erosion. Tie TRM to gabion wall to prevent seepage behind wall. Stabilize stormwater outfall during bank repairs.

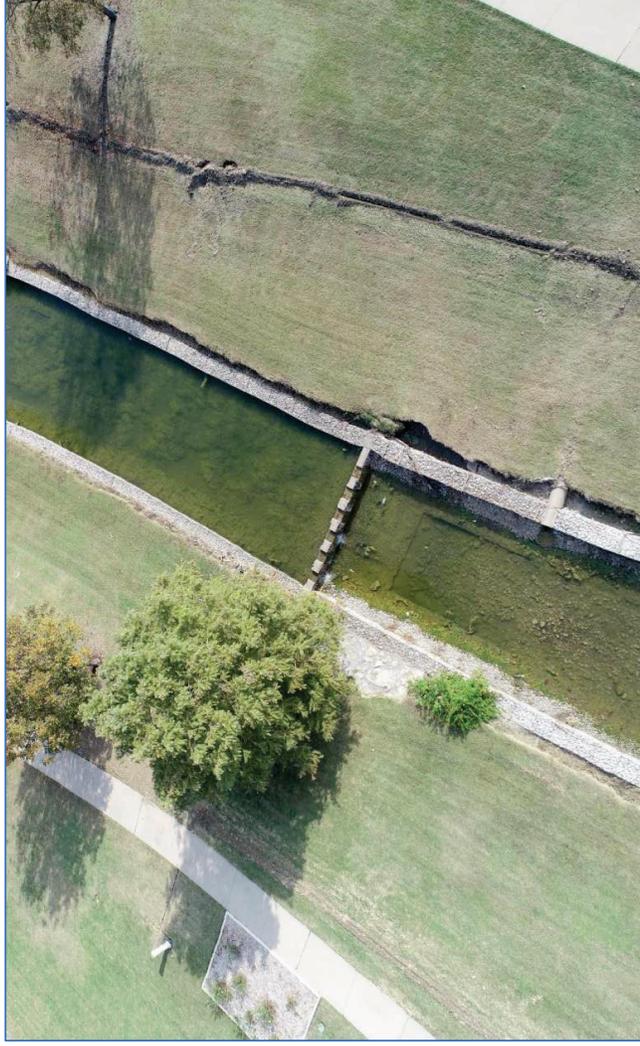


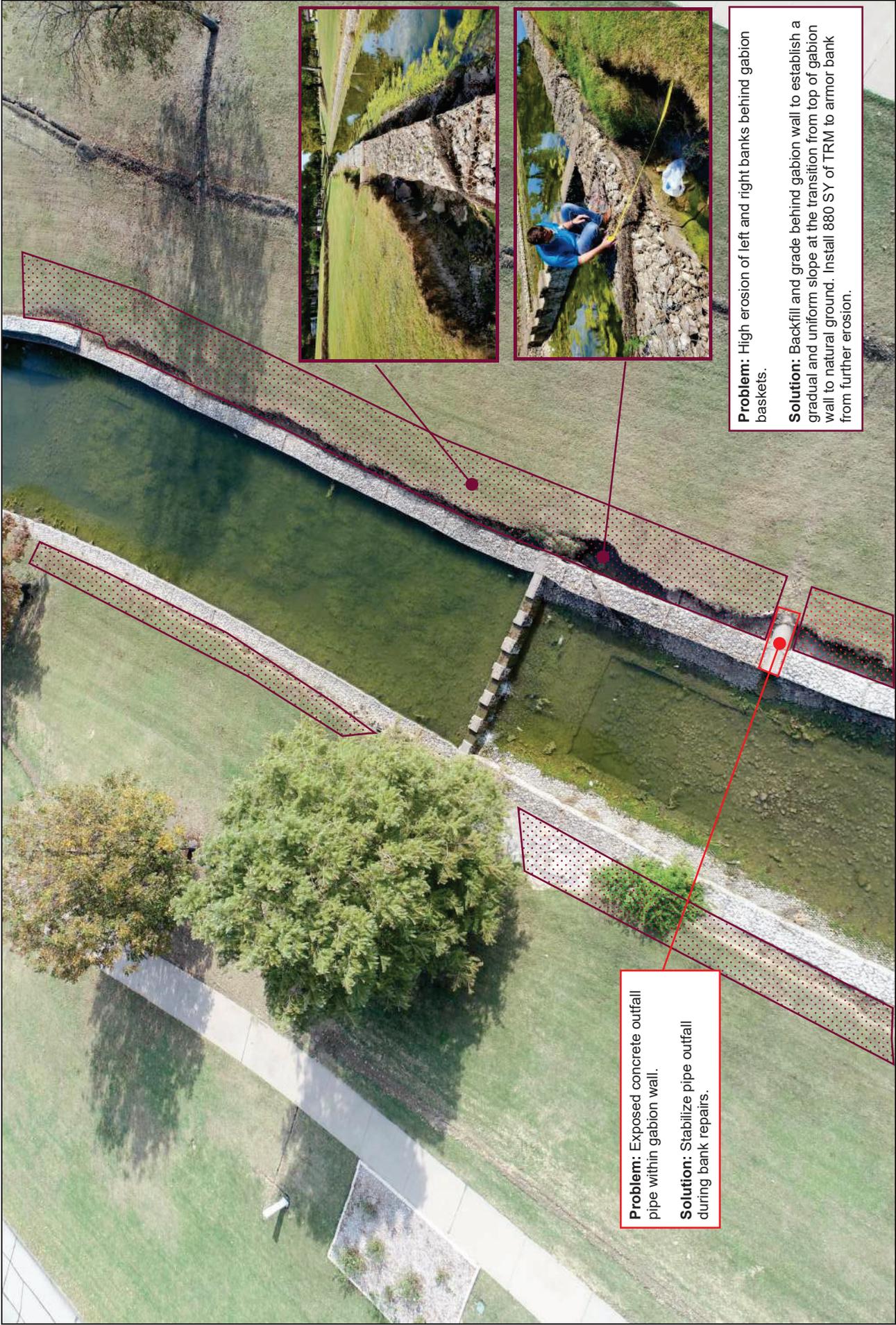
Figure VI. Aerial Drone Imagery of Project Area 7.
Shot on DJI Phantom 4 Pro Version 2.0 at 100' agl (above ground level).



Image 24. Erosion of earthen material adjacent to gabion wall and exposed outfall pipe.



Image 25. Side profile of erosion along bank easement.



Problem: Exposed concrete outfall pipe within gabion wall.
Solution: Stabilize pipe outfall during bank repairs.

Problem: High erosion of left and right banks behind gabion baskets.
Solution: Backfill and grade behind gabion wall to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground. Install 880 SY of TRM to armor bank from further erosion.

Figure VIII. Project Area 7

Reference Address:	2800 Golfing Green Drive
Project Area: 8	Priority: Low
Problem Description:	Estimated Cost: \$834,000 (Includes Project Areas 7, 8, & 9) Erosion behind gabion walls along both the left and right banks of the channel. Steep drops in the terrain elevations adjacent to the gabion channel lining.
Proposed Improvement:	Backfill and grade behind gabion wall to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground. Install 720 SY of TRM to armor bank from further erosion. The TRM to gabion wall to prevent seepage behind wall. Remove and replace damaged gabion baskets. Install an additional row of gabion baskets, approximately 775 LF, to help meet grade in areas with drastic changes of elevation between natural ground and top of wall.

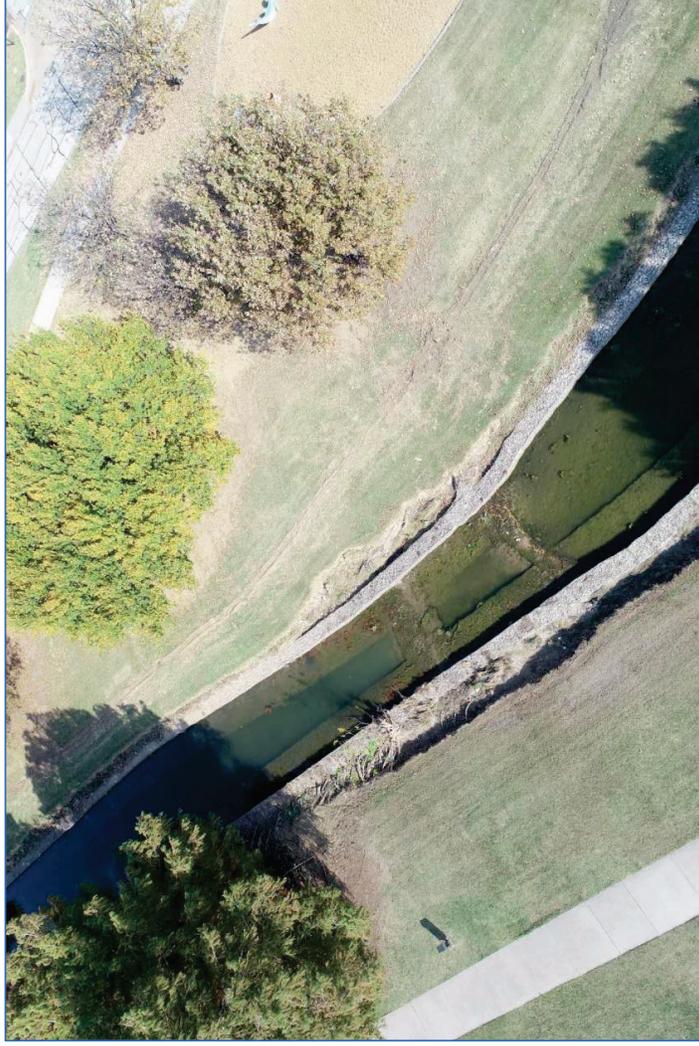


Figure VII. Aerial Drone Imagery of Project Area 8.
Shot on DJI Phantom 4 Pro Version 2.0 at 100' agl (above ground level).



Image 26. Upstream view of Golfing Green Drive erosion along the right bank.

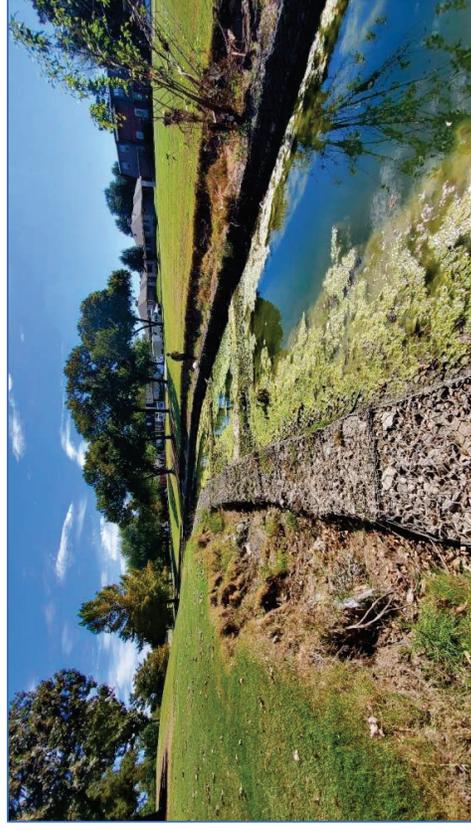
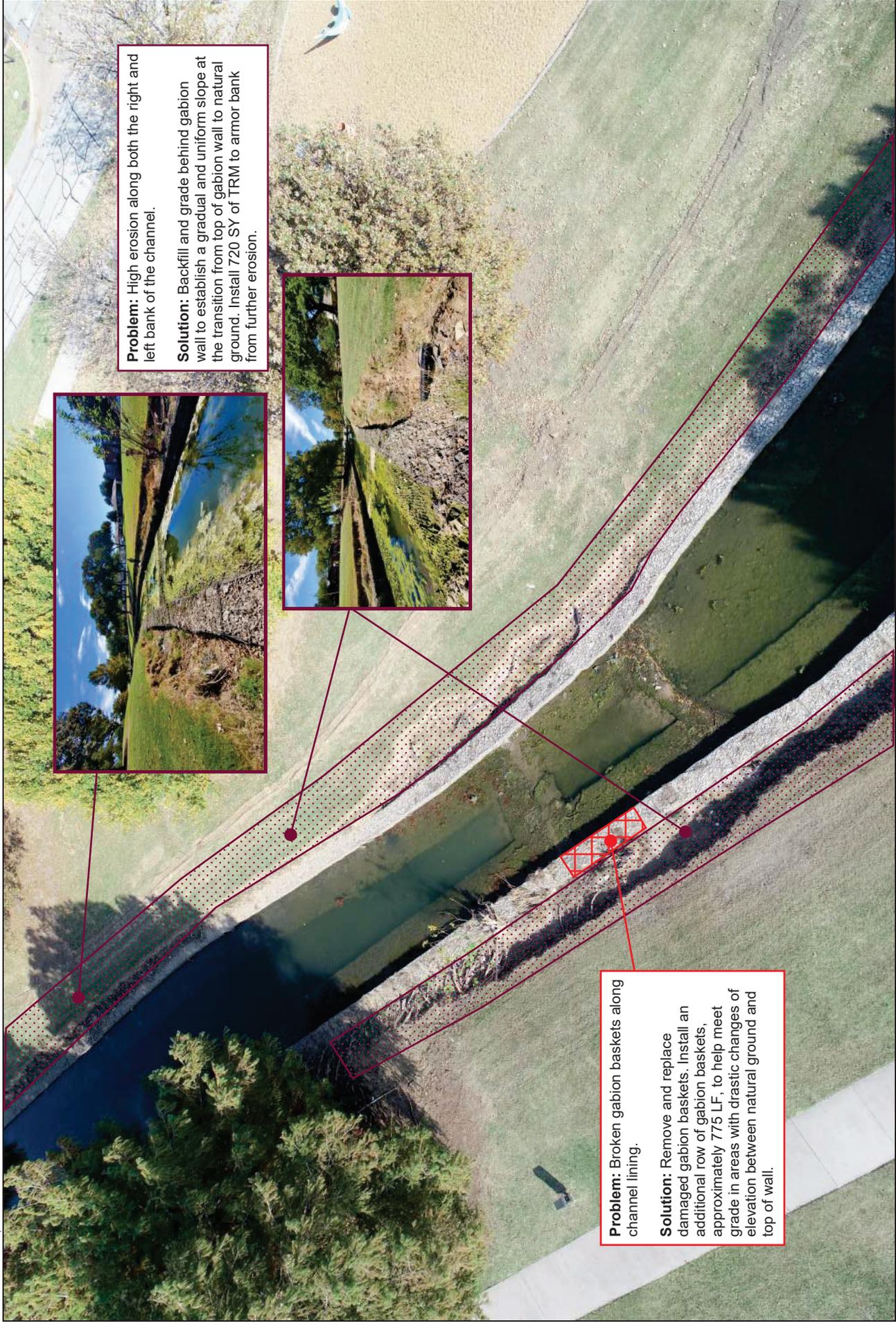


Image 27. Downstream view of Golfing Green Drive erosion along the right bank.



Problem: High erosion along both the right and left bank of the channel.

Solution: Backfill and grade behind gabion wall to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground. Install 720 SY of TRM to armor bank from further erosion.

Problem: Broken gabion baskets along channel lining.

Solution: Remove and replace damaged gabion baskets. Install an additional row of gabion baskets, approximately 775 LF, to help meet grade in areas with drastic changes of elevation between natural ground and top of wall.

Figure IX. Project Area 8



Rawhide Creek Infrastructure Assessment
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Reference Address:	13500 Heartside Place
Project Area: 9	Priority: Low
Problem Description:	Estimated Cost: \$834,000 (Includes Project Areas 7, 8, & 9) Sharp drops in terrain elevations – potential pedestrian safety hazard, specifically along the right side of the channel adjacent to the jogging trail (Image 28). Erosion behind gabion wall/baskets (Image 29). Exposed concrete outfall pipe within the gabion baskets along the right bank (Image 29).
Proposed Improvement:	Backfill and grade behind gabion wall to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground. Install 610 SY of TRM to armor bank from further erosion. Tie TRM to gabion wall to prevent seepage behind wall. Remove and replace damaged gabion baskets. Install an additional layer of gabion wall, 275 LF, to help meet grade in areas with drastic changes of elevation between natural ground and top of wall. Stabilize stormwater outfall during bank repairs.



Image 28. Sharp drops in terrain elevation adjacent to pedestrian walkway.



Image 29. Elevation changes along right bank (upstream view).



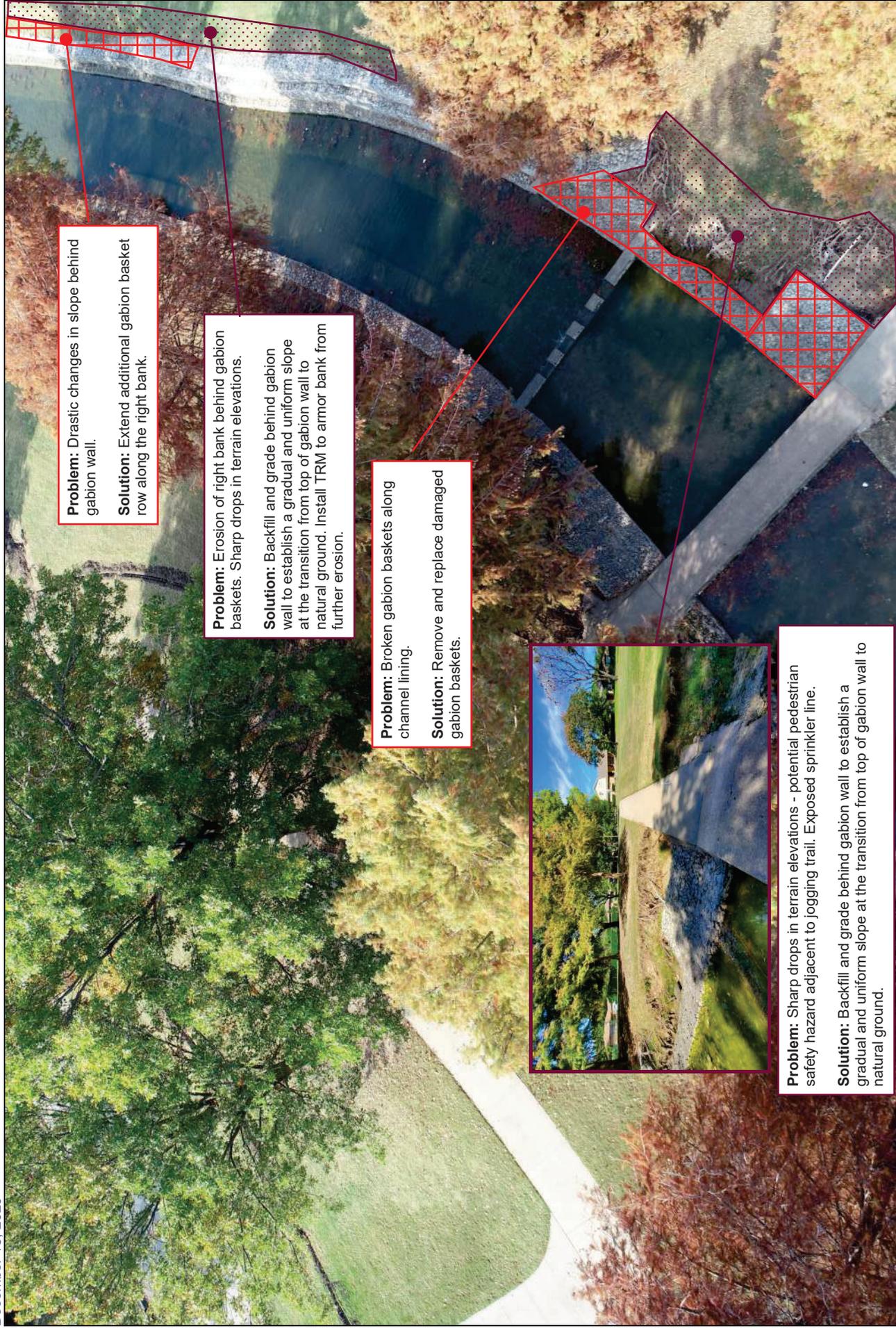
Image 30. Exposed storm sewer line.



Image 31. Elevation changes along right bank (downstream view).



Figure VIII. Aerial Drone Imagery of Project Area 9. Shot on DJI Phantom 4 Pro Version 2.0 at 100' agl (above ground level).



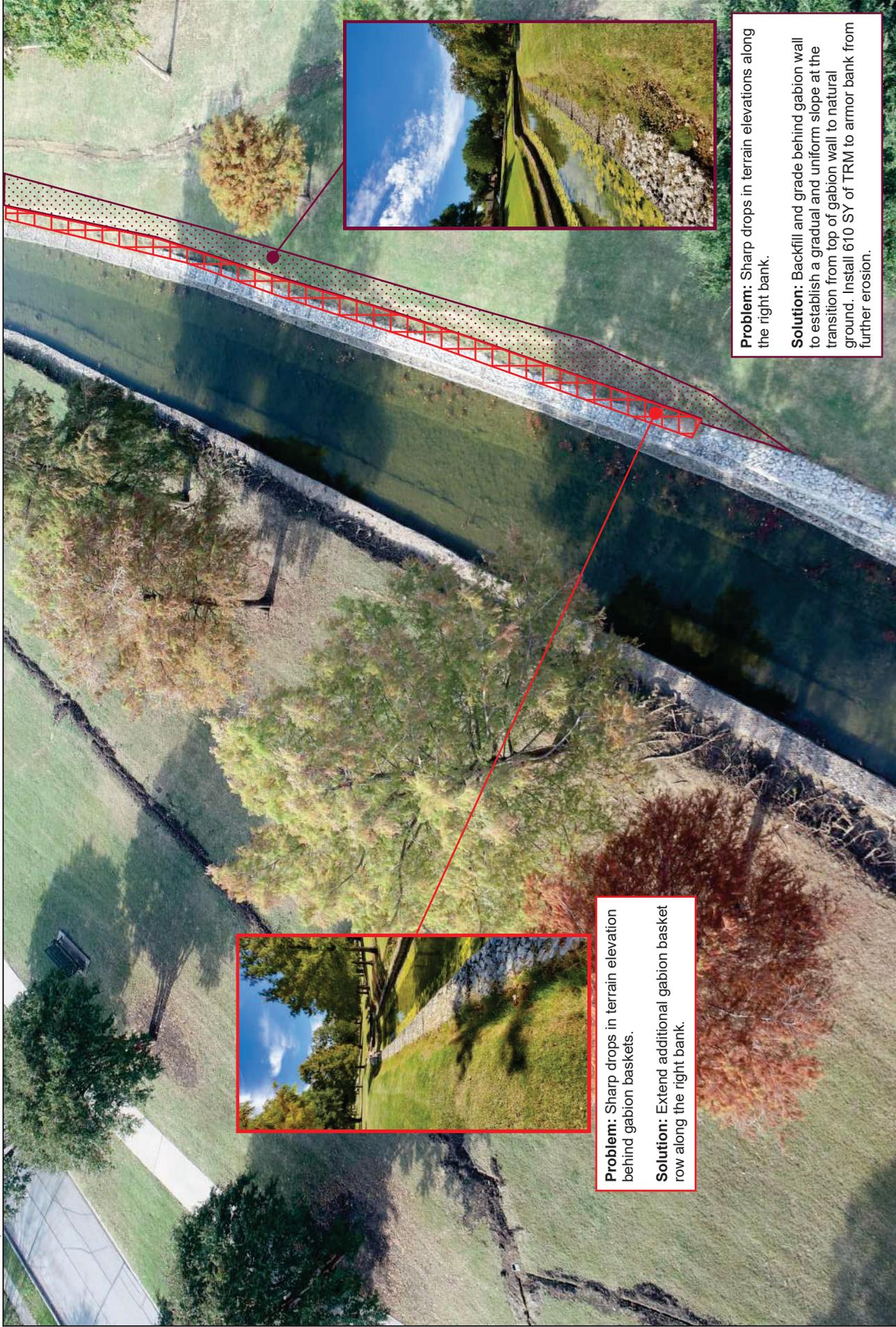
Problem: Drastic changes in slope behind gabion wall.
Solution: Extend additional gabion basket row along the right bank.

Problem: Erosion of right bank behind gabion baskets. Sharp drops in terrain elevations.
Solution: Backfill and grade behind gabion wall to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground. Install TRM to armor bank from further erosion.

Problem: Broken gabion baskets along channel lining.
Solution: Remove and replace damaged gabion baskets.

Problem: Sharp drops in terrain elevations - potential pedestrian safety hazard adjacent to jogging trail. Exposed sprinkler line.
Solution: Backfill and grade behind gabion wall to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground.

Figure X. Project Area 9 (US)



Problem: Sharp drops in terrain elevation behind gabion baskets.
Solution: Extend additional gabion basket row along the right bank.

Problem: Sharp drops in terrain elevations along the right bank.
Solution: Backfill and grade behind gabion wall to establish a gradual and uniform slope at the transition from top of gabion wall to natural ground. Install 610 SY of TRM to armor bank from further erosion.

Figure XI. Project Area 9 (DS)

Reference Address:	2800 Rawhide Drive (Valley View Lane)
Project Area: 10	Priority: High Estimated Cost: \$650,000
Problem Description:	Gabion mattress downstream of check-dam damaged due to debris and litter caught within the wiring, which caused breakage (Image 32). Gabion mattress under the concrete apron is undermined (Image 33). Cracks within siding rock (localized) at grout seams. There are efflorescence and lime residue build-ups on the inside surfaces of the culvert concrete, indication of moisture seepage through the concrete hairline cracks (Image 33). Headwall concrete has spalled off at majority of the sidewalk handrail.
Proposed Improvement:	Remove failing concrete apron and gabion toe on downstream side. Replace concrete apron and fill voids beneath apron with select backfill and flowable fill as needed. Install concrete toe wall at edge of apron for protection. Remove and replace damaged gabion mattress upstream. Connect to existing gabion wall. Repair spalled concrete and handrail support concrete at top of the culvert at bottom of posts. Repair concrete spalls on wall 4 from east and soffit of barrel 2 at east end and east end of barrel 5. Monitor interior hair cracks. Perform a site visit to verify whether items identified in TXDOT inspection report of 05/14/2019 have expanded.

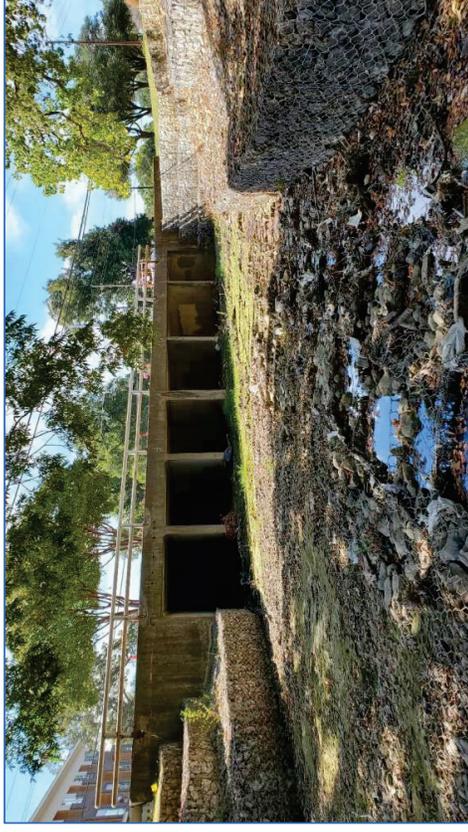


Image 32. Close-up of wire damage within gabion mattress at Valley View (upstream).



Figure IX. Aerial imagery of Project Area 10.

Source: Nearmap, a high-quality aerial imagery provider via aircraft.

Date of Capture: May 6, 2020



Image 33. Undermined concrete apron at Valley View (downstream).

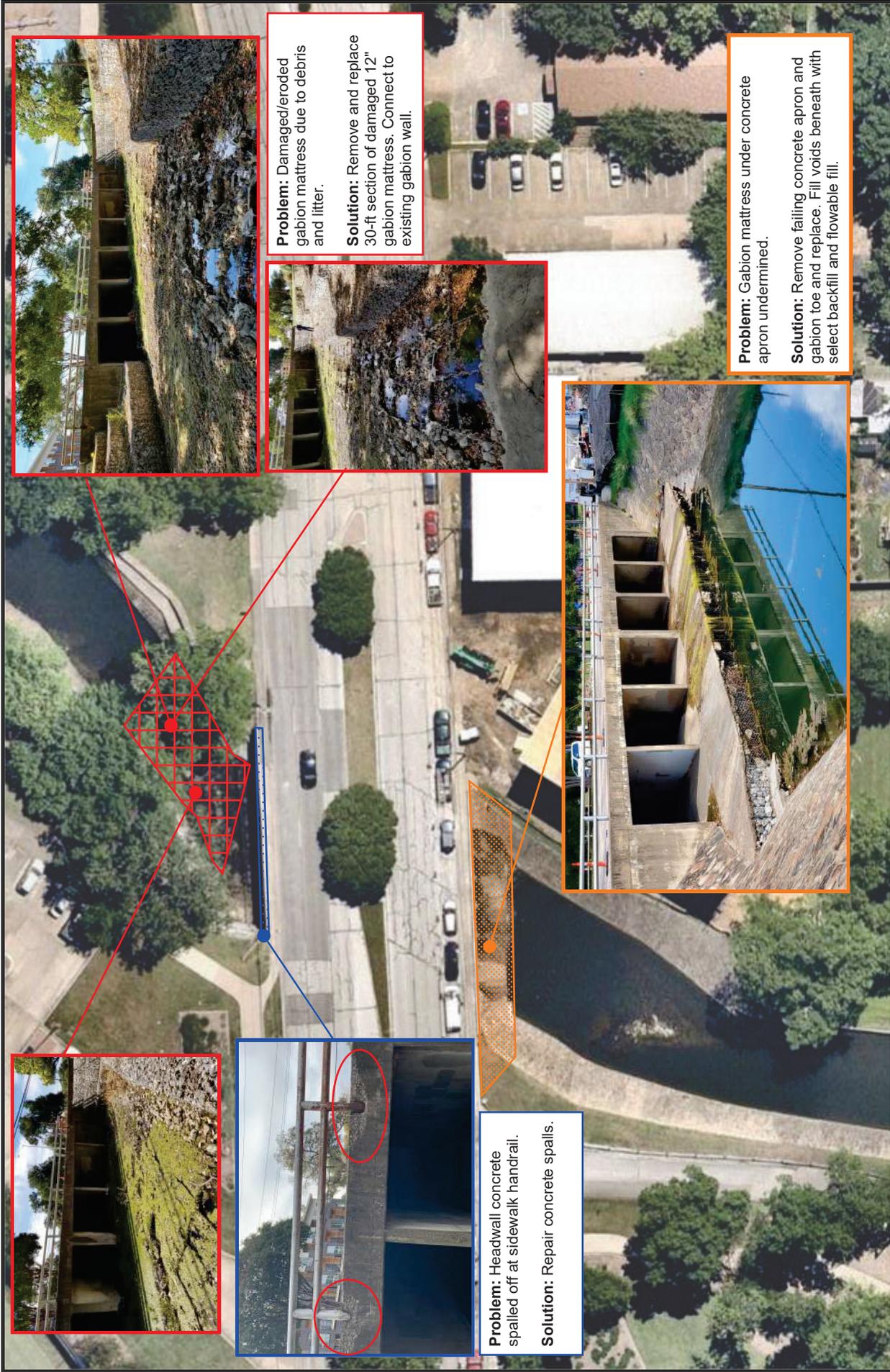


Figure XII. Project Area 10

Appendix B | Opinion of Probable Construction Costs



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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NAME	Rawhide Creek Infrastructure Assessment	DATE	12/11/2020
CLIENT	City of Farmers Branch	GROUP	1156
PROJECT AREA	Area 1 (Webb Chapel Road)	PM	David Rivera

ESTIMATED BY	QC CHECKED BY	FNI PROJECT NUMBER
Shena Providence	Scott Hubley	FBR20638

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
MOBILIZATION & SWPPP					
1	Traffic Control Plan	1	LS	\$ 20,000.00	\$ 20,000
2	Storm Water Pollution Prevention Plan (SWPPP) (1%)	1	LS	\$ 3,000.00	\$ 3,000
3	Site Preparation (Includes Temporary Construction Access and Demolition)	1	LS	\$ 27,000.00	\$ 27,000
4	Restore Pre-Construction Conditions	1	LS	\$ 5,000.00	\$ 5,000
PROPOSED IMPROVEMENTS					
5	Replace Parallel Wingwall at Box Culvert	2	EA	\$ 64,000.00	\$ 128,000
6	Concrete Repair	10	SF	\$ 210.00	\$ 2,100
7	Concrete Riprap (4")	20	CY	\$ 450.00	\$ 9,000
8	Remove Concrete Riprap	140	SY	\$ 10.00	\$ 1,400
10	Care of Water During Construction	1	LS	\$ 15,000.00	\$ 15,000
11	Remove & Replace Sidewalk	40	SY	\$ 75.00	\$ 3,000
12	Flowable Fill	60	CY	\$ 1,000.00	\$ 60,000
13	Temporary Structural Shoring	1	LS	\$ 15,000.00	\$ 15,000
14	Remove Wooden Retaining Wall	50	LF	\$ 10.00	\$ 500
15	Class C Concrete (Retaining Wall)	10	CY	\$ 850.00	\$ 8,500
16	Fill & Revegetate Area of Localized Erosion	20	SY	\$ 100.00	\$ 2,000

SUBTOTAL	\$	299,500
CONTINGENCY	30%	\$ 90,000
SUBTOTAL	\$	390,000
MOBILIZATION	10%	\$ 39,000
SUBTOTAL	\$	429,000
ENGINEERING & PERMITTING	\$	86,000

PROJECT TOTAL (2020 COSTS)	\$	515,000
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NOTES:

- 1 FNI OPCC classified as an ACEE Class 4 Estimate with accuracy range or -20 to + 30.
- 2 OPCC assumes concrete box culverts will not need to be replaced.



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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NAME	Rawhide Creek Infrastructure Assessment	DATE	12/11/2020
CLIENT	City of Farmers Branch	GROUP	1156
PROJECT AREA	Area 2 (Farmers Branch Manske Library)	PM	David Rivera

ESTIMATED BY	QC CHECKED BY	FNI PROJECT NUMBER
Shena Providence	Scott Hubley	FBR20638

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
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MOBILIZATION & SWPPP					
1	Storm Water Pollution Prevention Plan (SWPPP) (1%)	1	LS	\$ 2,000.00	\$ 2,000
2	Site Preparation (Includes Temporary Construction Access and Demolition)	1	LS	\$ 13,000.00	\$ 13,000
3	Restore Pre-Construction Conditions	1	LS	\$ 3,000.00	\$ 3,000

PROPOSED IMPROVEMENTS					
4	Gabion Baskets (3' x 3')	70	CY	\$ 350.00	\$ 24,500
5	Turf Reinforcement Matting	140	SY	\$ 6.00	\$ 840
6	Care of Water During Construction	1	LS	\$ 10,000.00	\$ 10,000
7	Removal of Retaining Wall (Stone)	10	CY	\$ 850.00	\$ 8,500
8	Grout	1	LS	\$ 2,000.00	\$ 2,000
9	Sodding & Seeding	150	SY	\$ 8.00	\$ 1,200
10	Tree Protection per Plans	3	EA	\$ 500.00	\$ 1,500
11	Embankment (Fill) & Earthwork (Grading)	1	LS	\$ 5,000.00	\$ 5,000
12	Retaining Wall (Stone)	400	SF	\$ 75.00	\$ 30,000
13	Gabion Mattress (12")	50	CY	\$ 275.00	\$ 13,750
14	Gabion Basket Removal	190	LF	\$ 150.00	\$ 28,500

SUBTOTAL	\$	143,790
CONTINGENCY	30%	\$ 44,000
SUBTOTAL	\$	188,000
MOBILIZATION	10%	\$ 19,000
SUBTOTAL	\$	207,000
ENGINEERING & PERMITTING	\$	42,000

PROJECT TOTAL (2020 COSTS)	\$	249,000
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NOTES:

- 1 FNI OPCC classified as an AACE Class 4 Estimate with accuracy range or -20 to + 30.



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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NAME	Rawhide Creek Infrastructure Assessment	DATE	12/11/2020
CLIENT	City of Farmers Branch	GROUP	1156
PROJECT AREA	Area 3 (13800 Block of Lillard Lane)	PM	David Rivera

ESTIMATED BY	QC CHECKED BY	FNI PROJECT NUMBER
Shena Providence	Scott Hubley	FBR20638

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
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MOBILIZATION & SWPPP					
1	Storm Water Pollution Prevention Plan (SWPPP) (1%)	1	LS	\$ 1,000.00	\$ 1,000
2	Site Preparation (Includes Temporary Construction Access and Demolition)	1	LS	\$ 5,000.00	\$ 5,000
3	Restore Pre-Construction Conditions	1	LS	\$ 3,000.00	\$ 3,000

PROPOSED IMPROVEMENTS					
4	Care of Water During Construction	1	LS	\$ 10,000.00	\$ 10,000
5	Turf Reinforcement Matting	110	SY	\$ 6.00	\$ 660
6	Gabion Baskets (3' x 3')	20	CY	\$ 350.00	\$ 7,000
7	Gabion Basket Removal	25	LF	\$ 150.00	\$ 3,750
8	Sodding & Seeding	110	SY	\$ 10.00	\$ 1,100
9	Embankment (Fill) & Earthwork (Grading)	1	LS	\$ 5,000.00	\$ 5,000
10	Tree Protection per Plans	2	EA	\$ 500.00	\$ 1,000
11	Gabion Mattress (12")	40	CY	\$ 275.00	\$ 11,000

SUBTOTAL	\$	48,510
CONTINGENCY	30%	\$ 15,000
SUBTOTAL	\$	64,000
MOBILIZATION	10%	\$ 7,000
SUBTOTAL	\$	71,000
ENGINEERING & PERMITTING	\$	15,000

PROJECT TOTAL (2020 COSTS)	\$	86,000
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NOTES:

- 1 FNI OPCC classified as an AACE Class 4 Estimate with accuracy range or -20 to + 30.



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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NAME	Rawhide Creek Infrastructure Assessment	DATE	12/11/2020
CLIENT	City of Farmers Branch	GROUP	1156
PROJECT AREA	Area 4 (13750 Block of Rawhide Pkwy)	PM	David Rivera

ESTIMATED BY	QC CHECKED BY	FNI PROJECT NUMBER
Shena Providence	Scott Hubley	FBR20638

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
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MOBILIZATION & SWPPP					
1	Storm Water Pollution Prevention Plan (SWPPP) (1%)	1	LS	\$ 1,000.00	\$ 1,000
2	Site Preparation (Includes Temporary Construction Access and Demolition)	1	LS	\$ 7,000.00	\$ 7,000
3	Restore Pre-Construction Conditions	1	LS	\$ 5,000.00	\$ 5,000

PROPOSED IMPROVEMENTS					
4	Gabion Baskets (3' x 3')	30	CY	\$ 350.00	\$ 10,500
5	Gabion Basket Removal	20	LF	\$ 150.00	\$ 3,000
6	Care of Water During Construction	1	LS	\$ 12,000.00	\$ 12,000
8	Gabion Mattress (12")	150	SF	\$ 250.00	\$ 37,500
9	Tree Protection per Plans	3	EA	\$ 500.00	\$ 1,500

SUBTOTAL		\$	77,500
CONTINGENCY	30%	\$	24,000
SUBTOTAL		\$	102,000
MOBILIZATION	10%	\$	11,000
SUBTOTAL		\$	113,000
ENGINEERING & PERMITTING		\$	23,000

PROJECT TOTAL (2020 COSTS)	\$ 136,000
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NOTES:

- 1 FNI OPCC classified as an AACE Class 4 Estimate with accuracy range or -20 to + 30.



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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NAME	Rawhide Creek Infrastructure Assessment	DATE	12/11/2020
CLIENT	City of Farmers Branch	GROUP	1156
PROJECT AREA	Area 5 (2970 Block of Golfing Green Dr)	PM	David Rivera

ESTIMATED BY	QC CHECKED BY	FNI PROJECT NUMBER
Shena Providence	Scott Hubley	FBR20638

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
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MOBILIZATION & SWPPP					
1	Storm Water Pollution Prevention Plan (SWPPP) (1%)	1	LS	\$ 1,000.00	\$ 1,000
2	Site Preparation (Includes Temporary Construction Access and Demolition)	1	LS	\$ 8,000.00	\$ 8,000
3	Restore Pre-Construction Conditions	1	LS	\$ 5,000.00	\$ 5,000

PROPOSED IMPROVEMENTS					
4	Turf Reinforcement Matting	890	SY	\$ 5.00	\$ 4,450
5	Gabion Baskets (3' x 3')	70	CY	\$ 350.00	\$ 24,500
6	Gabion Basket Removal	50	LF	\$ 150.00	\$ 7,500
7	Care of Water During Construction	1	LS	\$ 15,000.00	\$ 15,000
8	Sodding & Seeding	980	SY	\$ 8.00	\$ 7,840
9	Embankment (Fill) & Earthwork (Grading)	1	LS	\$ 10,000.00	\$ 10,000
10	Tree Protection per Plans	5	EA	\$ 500.00	\$ 2,500

SUBTOTAL	\$	85,790
CONTINGENCY	30%	\$ 26,000
SUBTOTAL	\$	112,000
MOBILIZATION	10%	\$ 12,000
SUBTOTAL	\$	124,000
ENGINEERING & PERMITTING	\$	25,000

PROJECT TOTAL (2020 COSTS)	\$	149,000
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NOTES:

- 1 FNI OPCC classified as an AACE Class 4 Estimate with accuracy range or -20 to + 30.



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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NAME	Rawhide Creek Infrastructure Assessment	DATE	12/11/2020
CLIENT	City of Farmers Branch	GROUP	1156
PROJECT AREA	Area 6 (Josey Lane)	PM	David Rivera

ESTIMATED BY	QC CHECKED BY	FNI PROJECT NUMBER
Shena Providence	Scott Hubley	FBR20638

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
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MOBILIZATION & SWPPP					
1	Traffic Control Plan	1	LS	\$ 20,000.00	\$ 20,000
2	Storm Water Pollution Prevention Plan (SWPPP) (1%)	1	LS	\$ 3,000.00	\$ 3,000
3	Site Preparation (Includes Temporary Construction Access and Demolition)	1	LS	\$ 21,000.00	\$ 21,000
4	Restore Pre-Construction Conditions	1	LS	\$ 5,000.00	\$ 5,000

PROPOSED IMPROVEMENTS					
5	Remove Grouted Gabion Mattress	60	CY	\$ 200.00	\$ 12,000
6	Install Grouted Gabion Mattress	60	CY	\$ 400.00	\$ 24,000
7	Concrete Riprap (4") Apron	20	CY	\$ 450.00	\$ 9,000
8	Remove Concrete Riprap	180	SY	\$ 10.00	\$ 1,800
9	Remove and Replace Damaged Reinforced Concrete (Wingwalls)	1	LS	\$ 50,000.00	\$ 50,000
10	Care of Water During Construction	1	LS	\$ 15,000.00	\$ 15,000
11	Flowable Fill	50	CY	\$ 1,000.00	\$ 50,000
12	Seal Joints	40	LF	\$ 16.00	\$ 640
13	Concrete Repair	8	SF	\$ 210.00	\$ 1,680
14	Temporary Structural Shoring	1	LS	\$ 15,000.00	\$ 15,000

SUBTOTAL	\$	228,120
CONTINGENCY	30%	\$ 69,000
SUBTOTAL	\$	298,000
MOBILIZATION	10%	\$ 30,000
SUBTOTAL	\$	328,000
ENGINEERING & PERMITTING	\$	66,000

PROJECT TOTAL (2020 COSTS)	\$	394,000
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- NOTES:
- 1 FNI OPCC classified as an AACE Class 4 Estimate with accuracy range or -20 to + 30.
 - 2 OPCC assumes concrete box culverts will not need to be replaced.



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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NAME	Rawhide Creek Infrastructure Assessment	DATE	12/11/2020
CLIENT	City of Farmers Branch	GROUP	1156
PROJECT AREA	Area 7 (2850 Golfing Green Dr)	PM	David Rivera

ESTIMATED BY	QC CHECKED BY	FNI PROJECT NUMBER
Shena Providence	Scott Hubley	FBR20638

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
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MOBILIZATION & SWPPP					
1	Storm Water Pollution Prevention Plan (SWPPP) (1%)	1	LS	\$ 1,000.00	\$ 1,000
2	Site Preparation (Includes Temporary Construction Access and Demolition)	1	LS	\$ 7,000.00	\$ 7,000
3	Restore Pre-Construction Conditions	1	LS	\$ 5,000.00	\$ 5,000

PROPOSED IMPROVEMENTS					
4	Turf Reinforcement Matting	880	SY	\$ 6.00	\$ 5,280
5	Gabion Baskets (3' x 3')	40	CY	\$ 350.00	\$ 14,000
6	Gabion Basket Removal	25	LF	\$ 150.00	\$ 3,750
7	Care of Water During Construction	1	LS	\$ 15,000.00	\$ 15,000
8	Sodding & Seeding	970	SY	\$ 8.00	\$ 7,760
9	Embankment (Fill) & Earthwork (Grading)	1	LS	\$ 10,000.00	\$ 10,000
10	Tree Protection per Plans	1	EA	\$ 500.00	\$ 500

SUBTOTAL	\$	69,290
CONTINGENCY	30%	\$ 21,000
SUBTOTAL	\$	91,000
MOBILIZATION	10%	\$ 10,000
SUBTOTAL	\$	101,000
ENGINEERING & PERMITTING	\$	21,000

PROJECT TOTAL (2020 COSTS)	\$	122,000
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NOTES:

- 1 FNI OPCC classified as an AACE Class 4 Estimate with accuracy range of -20 to + 30.
- 2 Assuming that the exposed outfall pipe does not need to be encased and/or replaced.



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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NAME	Rawhide Creek Infrastructure Assessment	DATE	12/11/2020
CLIENT	City of Farmers Branch	GROUP	1156
PROJECT AREA	Area 8 (2800 Golfing Green Dr)	PM	David Rivera

ESTIMATED BY	QC CHECKED BY	FNI PROJECT NUMBER
Shena Providence	Scott Hubley	FBR20638

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
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MOBILIZATION & SWPPP					
1	Storm Water Pollution Prevention Plan (SWPPP) (1%)	1	LS	\$ 3,000.00	\$ 3,000
2	Site Preparation (Includes Temporary Construction Access and Demolition)	1	LS	\$ 25,000.00	\$ 25,000
3	Restore Pre-Construction Conditions	1	LS	\$ 5,000.00	\$ 5,000

PROPOSED IMPROVEMENTS					
5	Turf Reinforcement Matting	720	SY	\$ 6.00	\$ 4,320
6	Gabion Baskets (3' x 3')	420	CY	\$ 350.00	\$ 147,000
7	Gabion Basket Removal	100	LF	\$ 150.00	\$ 15,000
8	Care of Water During Construction	1	LS	\$ 15,000.00	\$ 15,000
9	Embankment (Fill) & Earthwork (Grading)	310	CY	\$ 150.00	\$ 46,500
10	Sodding & Seeding	790	SY	\$ 8.00	\$ 6,320
11	Tree Protection per Plans	8	EA	\$ 500.00	\$ 4,000

SUBTOTAL	\$	271,140
CONTINGENCY	30%	\$ 82,000
SUBTOTAL	\$	354,000
MOBILIZATION	10%	\$ 36,000
SUBTOTAL	\$	390,000
ENGINEERING & PERMITTING	\$	78,000

PROJECT TOTAL (2020 COSTS)	\$	468,000
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NOTES:

- 1 FNI OPCC classified as an AACE Class 4 Estimate with accuracy range or -20 to + 30.



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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NAME	Rawhide Creek Infrastructure Assessment	DATE	12/11/2020
CLIENT	City of Farmers Branch	GROUP	1156
PROJECT AREA	Area 9 (13500 Heartside Place)	PM	David Rivera

ESTIMATED BY	QC CHECKED BY	FNI PROJECT NUMBER
Shena Providence	Scott Hubley	FBR20638

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
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MOBILIZATION & SWPPP					
1	Storm Water Pollution Prevention Plan (SWPPP) (1%)	1	LS	\$ 2,000.00	\$ 2,000
2	Site Preparation (Includes Temporary Construction Access and Demolition)	1	LS	\$ 13,000.00	\$ 13,000
3	Restore Pre-Construction Conditions	1	LS	\$ 5,000.00	\$ 5,000

PROPOSED IMPROVEMENTS					
4	Turf Reinforcement Matting	610	SY	\$ 6.00	\$ 3,660
5	Gabion Baskets (3' x 3')	130	CY	\$ 350.00	\$ 45,500
6	Gabion Baskets (3' x 3') Removal	15	LF	\$ 150.00	\$ 2,250
7	Care of Water During Construction	1	LS	\$ 15,000.00	\$ 15,000
8	Embankment (Fill) & Earthwork (Grading)	270	CY	\$ 150.00	\$ 40,500
9	Sodding & Seeding	670	SY	\$ 8.00	\$ 5,360
10	Tree Protection per Plans	6	EA	\$ 500.00	\$ 3,000
11	Furnish and Install 6" Top Soil (including labor, equipment, materials etc.)	670	SY	\$ 8.00	\$ 5,360

SUBTOTAL	\$	140,630
CONTINGENCY	30%	\$ 43,000
SUBTOTAL	\$	184,000
MOBILIZATION	10%	\$ 19,000
SUBTOTAL	\$	203,000
ENGINEERING & PERMITTING	\$	41,000

PROJECT TOTAL (2020 COSTS)	\$	244,000
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NOTES:

- 1 FNI OPCC classified as an AACE Class 4 Estimate with accuracy range of -20 to + 30.
- 2 Assuming that the exposed outfall pipe does not need to be encased and/or replaced.



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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NAME	Rawhide Creek Infrastructure Assessment	DATE	12/11/2020
CLIENT	City of Farmers Branch	GROUP	1156
PROJECT AREA	Area 10 (Valley View Lane)	PM	David Rivera

ESTIMATED BY	QC CHECKED BY	FNI PROJECT NUMBER
Shena Providence	Scott Hubley	FBR20638

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
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MOBILIZATION & SWPPP					
1	Traffic Control Plan	1	LS	\$ 20,000.00	\$ 20,000
2	Storm Water Pollution Prevention Plan (SWPPP) (1%)	1	LS	\$ 4,000.00	\$ 4,000
3	Site Preparation (Includes Temporary Construction Access and Demolition)	1	LS	\$ 34,000.00	\$ 34,000
4	Restore Pre-Construction Conditions	1	LS	\$ 5,000.00	\$ 5,000

PROPOSED IMPROVEMENTS					
5	Remove Gabion Mattress	150	CY	\$ 150.00	\$ 22,500
6	Install Gabion Mattress	150	CY	\$ 350.00	\$ 52,500
7	Concrete Riprap (4")	40	CY	\$ 450.00	\$ 18,000
8	Remove Concrete Riprap	340	SY	\$ 10.00	\$ 3,400
9	Care of Water During Construction	1	LS	\$ 15,000.00	\$ 15,000
10	Flowable Fill	100	CY	\$ 1,000.00	\$ 100,000
11	Temporary Structural Shoring	1	LS	\$ 15,000.00	\$ 15,000
12	Cast-in-Place Concrete Wall for Toe Protection	50	CY	\$ 1,000.00	\$ 50,000
13	Concrete Repair	7	SF	\$ 210.00	\$ 1,470
14	Repair Rail	25	LF	\$ 85.00	\$ 2,125
15	Select Backfill	450	CY	\$ 75.00	\$ 33,750

SUBTOTAL		\$	376,745
CONTINGENCY	30%	\$	114,000
SUBTOTAL		\$	491,000
MOBILIZATION	10%	\$	50,000
SUBTOTAL		\$	541,000
ENGINEERING & PERMITTING		\$	109,000

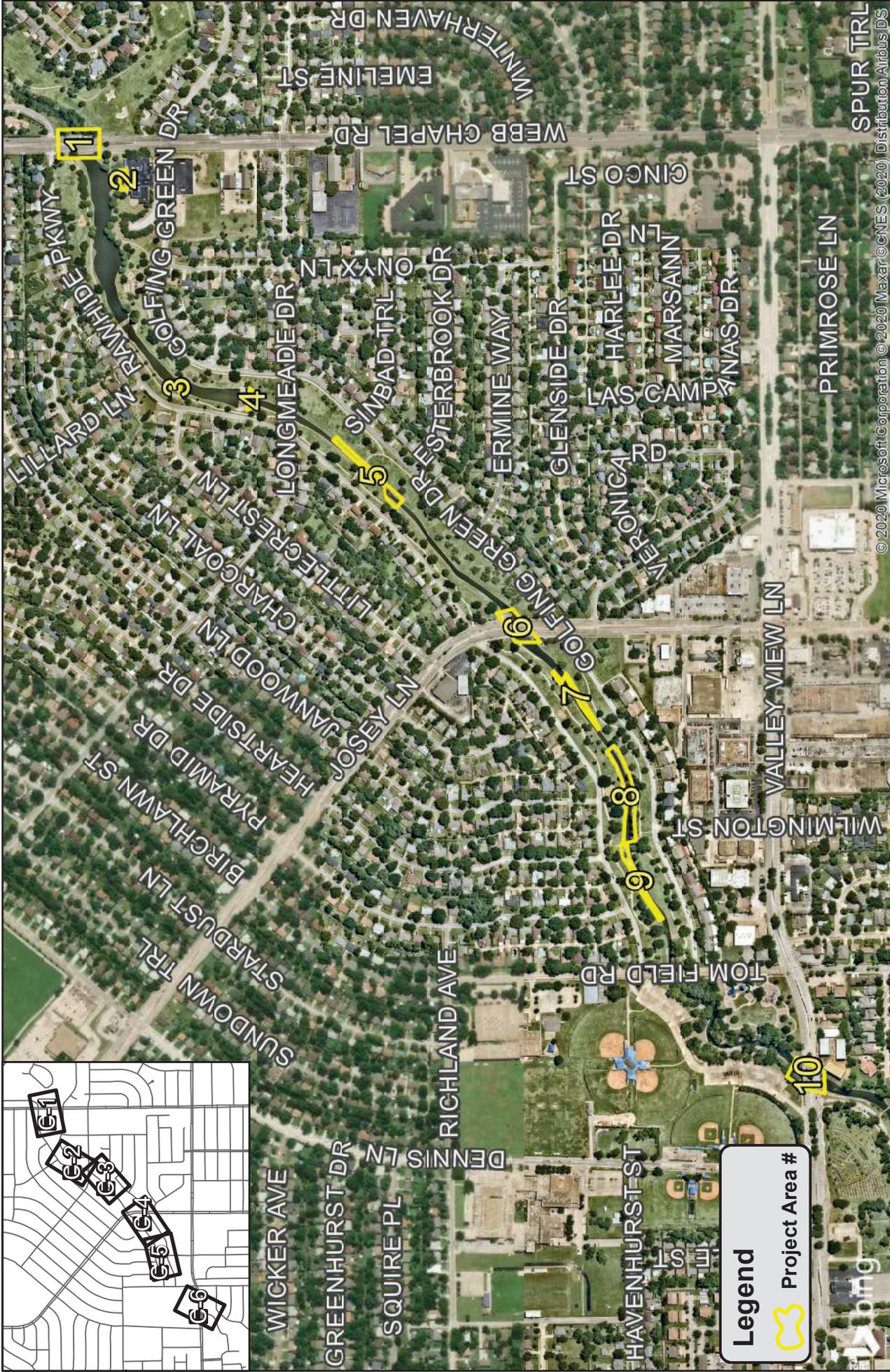
PROJECT TOTAL (2020 COSTS)		\$	650,000
-----------------------------------	--	-----------	----------------

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

NOTES:

- 1 FNI OPCC classified as an AACE Class 4 Estimate with accuracy range of -20 to + 30.
- 2 OPCC assumes concrete box culverts will not need to be replaced.

Appendix C | Project Area Overview Maps



Legend

Project Area #



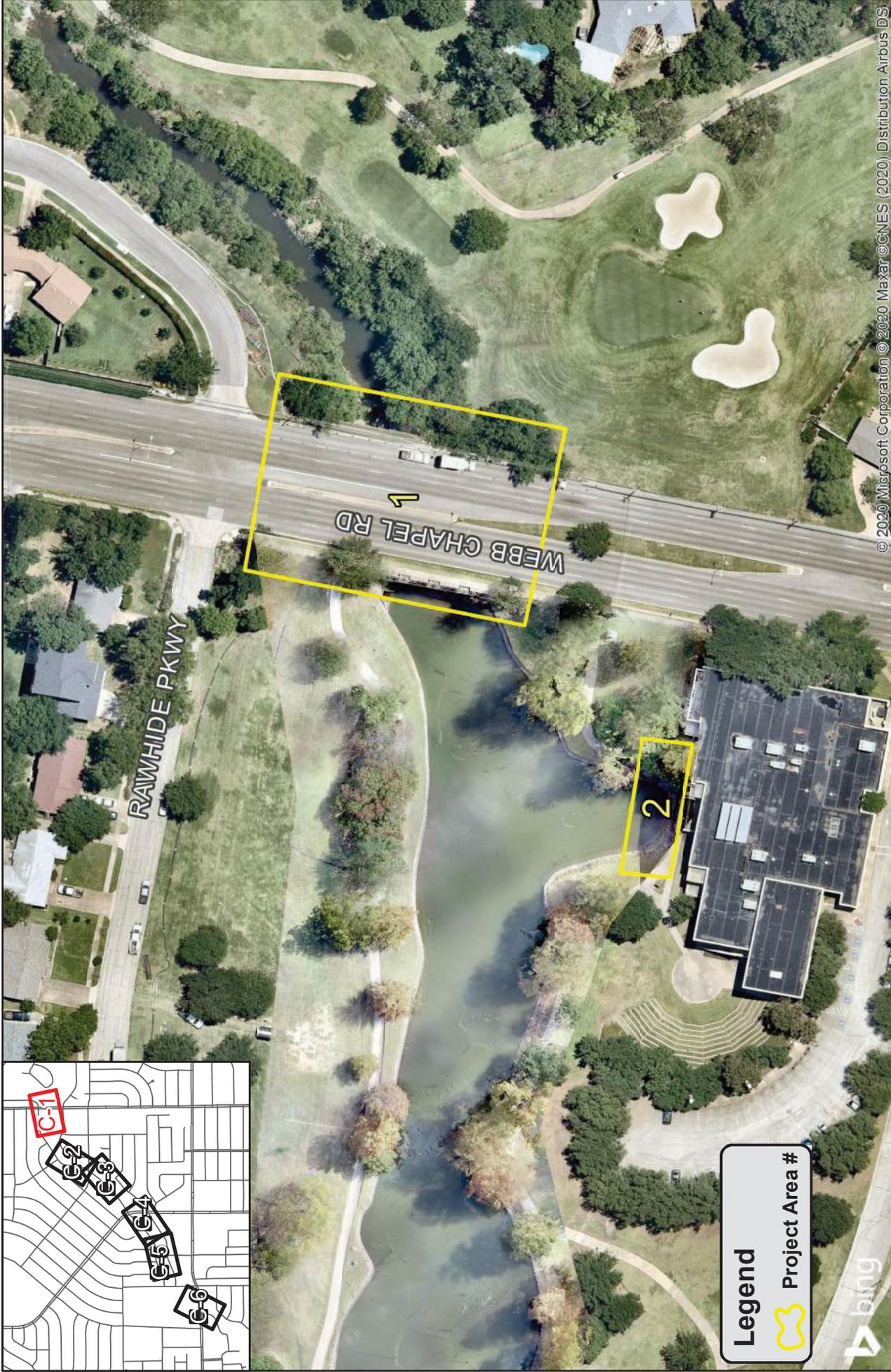
FREES & NICHOLS
 2711 North Haskell Ave.
 Suite 3300
 Dallas, Texas 75204
 P: 214-217-2200

City of Farmers Branch

Rawhide Creek Infrastructure Assessment
 Project Areas

FN JOB NO	FBR20638	EXHIBIT	C-0
FILE NAME	Project Area Exhibits.mxd		
DATE	12/18/2020	DESIGNED	BH
SCALE	1:39,147	DRAFTED	02540

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Legend

Project Area #

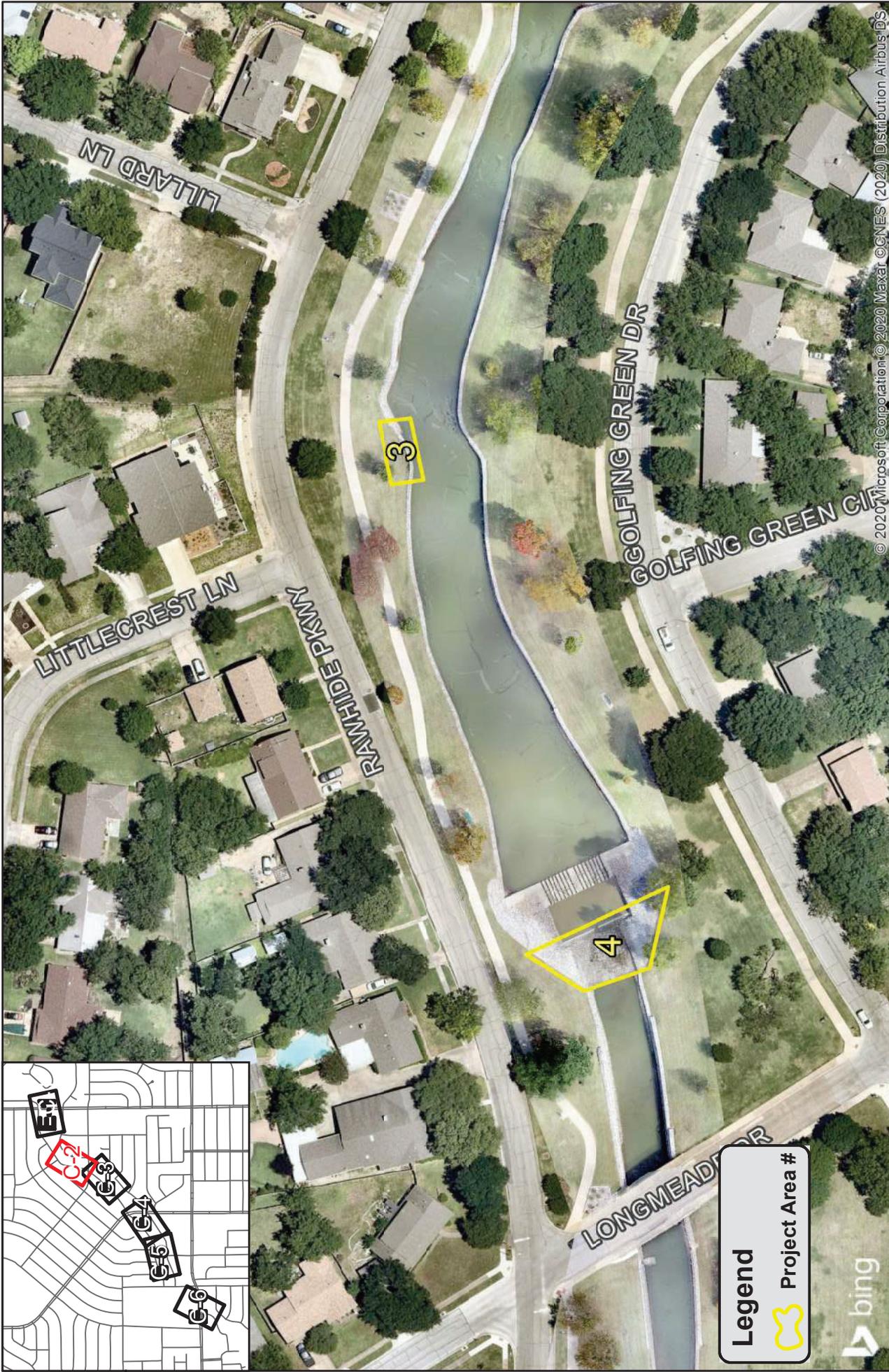


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 2711 North Haskell Ave.
 Suite 3300
 Dallas, Texas 75204
 P: 214-217-2220

FN JOB NO	FBR20638	EXHIBIT
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DATE	12/18/2020	
SCALE	1:39,147	
DESIGNED	BH	
DRAFTED	02540	

City of Farmers Branch

Rawhide Creek Infrastructure Assessment Project Areas



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EXHIBIT	C-2
FILE NAME	FBR2\0638
Project Area	Exhibits.mxd
DATE	12/18/2020
SCALE	1:39,147
DESIGNED	BH
DRAFTED	02540
FN JOB NO	NA0_1883 StatePlane Texas North Central FIPS 4202 Feet

City of Farmers Branch

Rawhide Creek Infrastructure Assessment

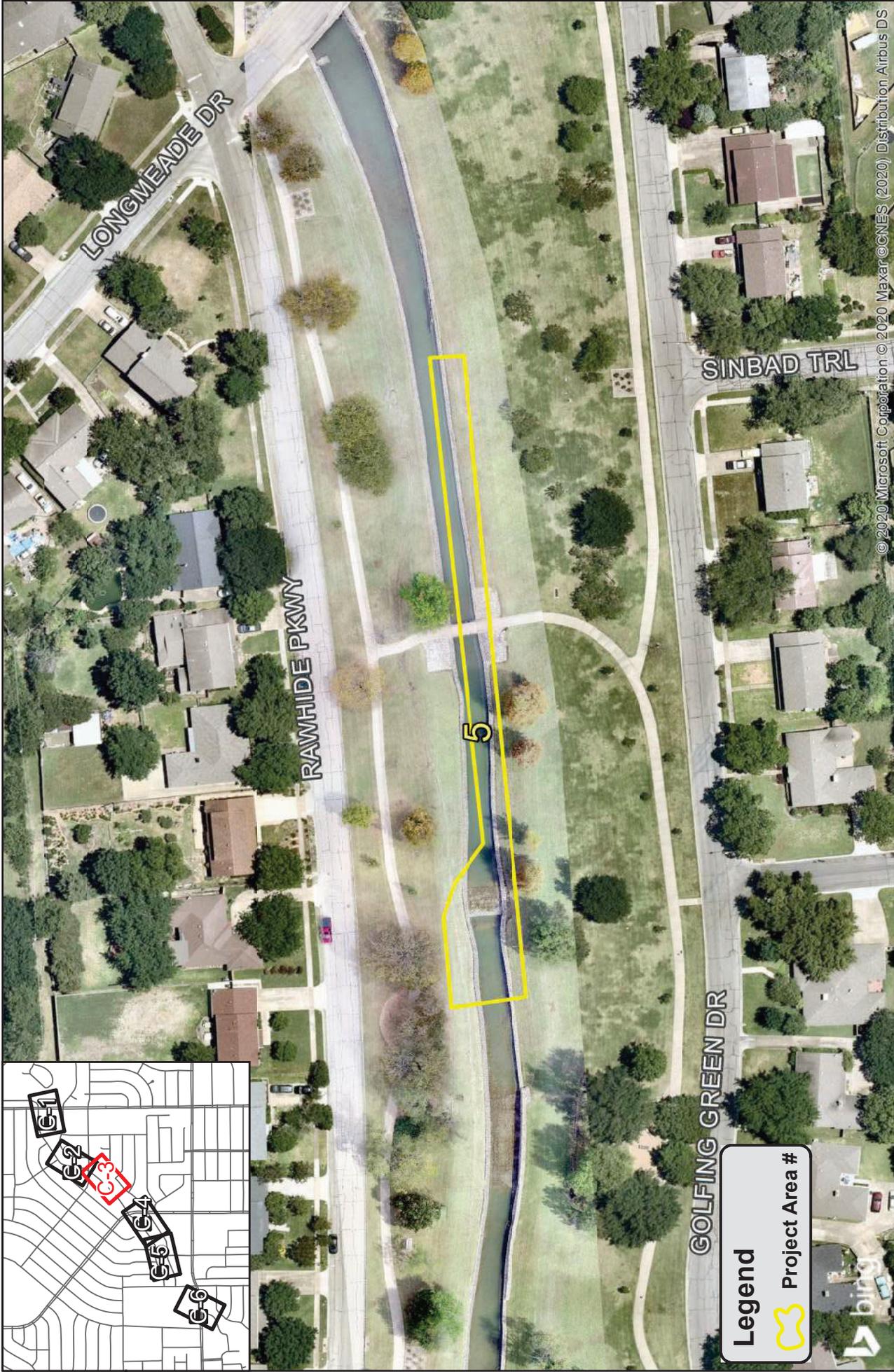
Project Areas



Legend

 Project Area #

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 2711 North Haskell Ave.
 Suite 3300
 Dallas, Texas 75204
 P: 214-217-2200



Legend

Project Area #

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 Suite 3300
 Dallas, Texas 75204
 P: 214-217-2200



City of Farmers Branch

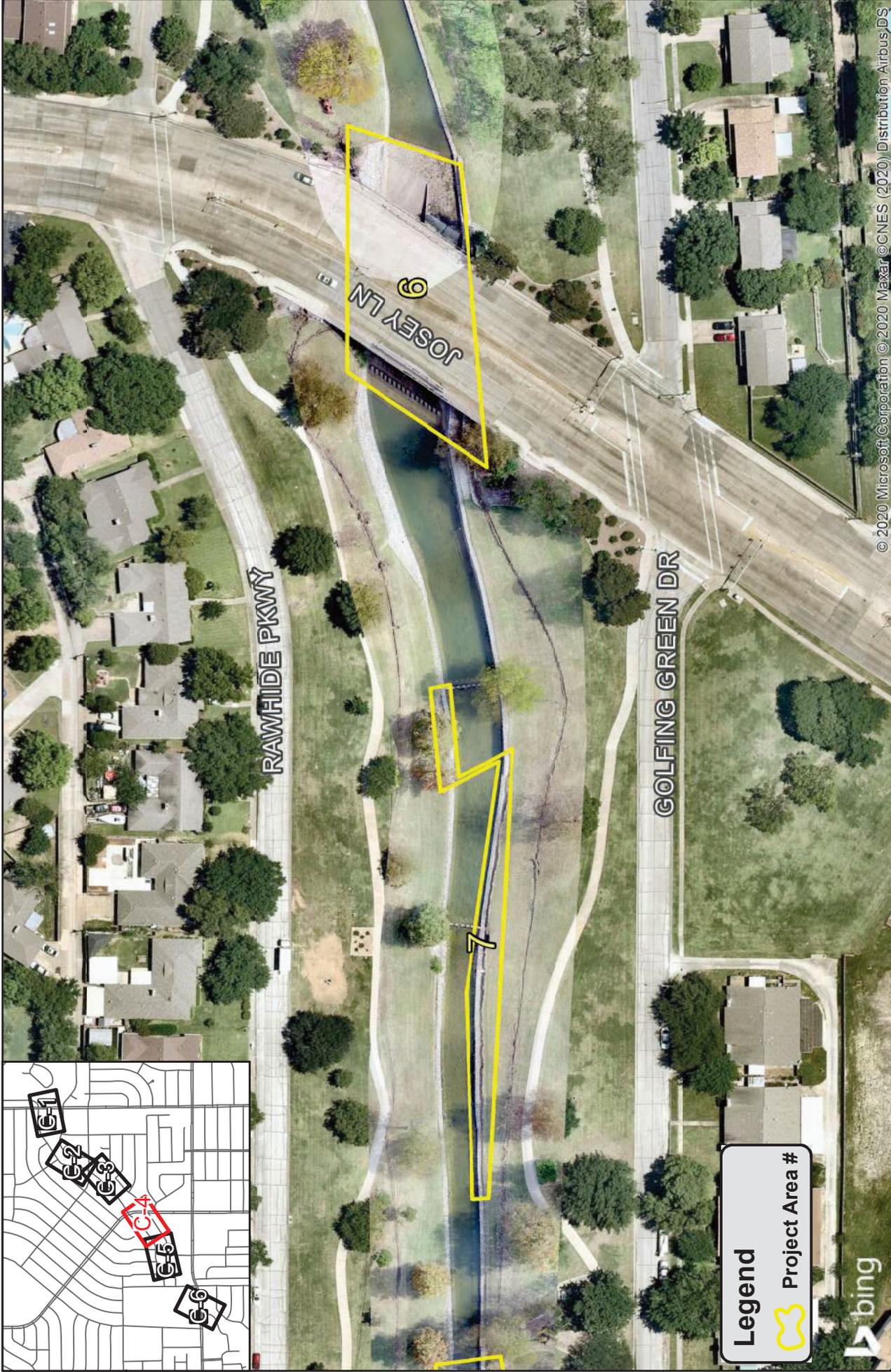
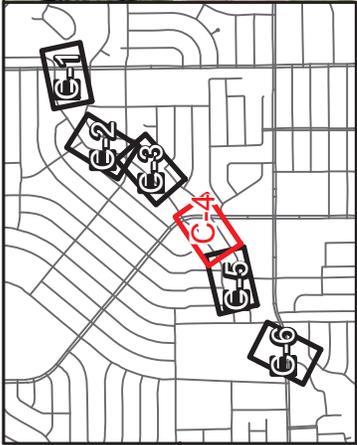
Rawhide Creek Infrastructure Assessment
 Project Areas

FN JOB NO	FBR2/0638
FILE NAME	Project Area Exhibits.mxd
DATE	12/18/2020
SCALE	1:39,147
DESIGNED	BH
DRAFTED	02540

EXHIBIT

C-3

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FN JOB NO	FBR2/0638	EXHIBIT
FILE NAME	Project Area Exhibits.mxd	C-4
DATE	12/18/2020	
SCALE	1:39,147	
DESIGNED	BH	
DRAFTED	02540	

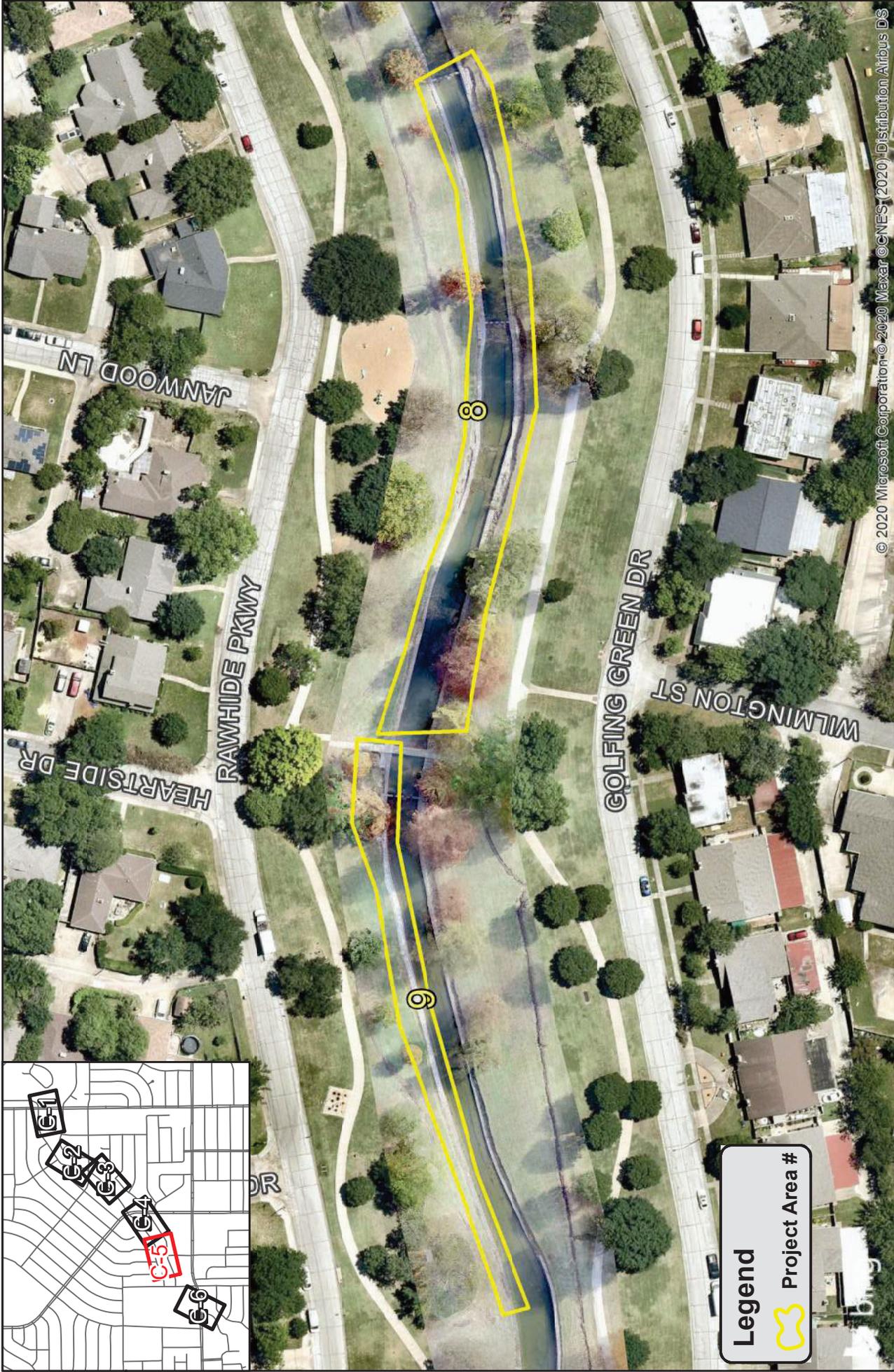
City of Farmers Branch

Rawhide Creek Infrastructure Assessment Project Areas



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Legend
 Project Area #



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Legend



Project Area #



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City of Farmers Branch

Rawhide Creek Infrastructure Assessment
 Project Areas

PN JOB NO	FBR20638	EXHIBIT
FILE NAME	Project Area Exhibits.mxd	C-5
DATE	12/18/2020	
SCALE	1:39,147	
DESIGNED	BH	
DRAFTED	02540	



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FN JOB NO	FBR20638
FILE NAME	Project Area Exhibits.mxd
DATE	12/18/2020
SCALE	1:39,147
DESIGNED	BH
DRAFTED	02540

City of Farmers Branch

Rawhide Creek Infrastructure Assessment Project Areas



**FREESE
BY NICHOLS**

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Suite 3300
Dallas, Texas 75204
P: 214-217-2200

Legend



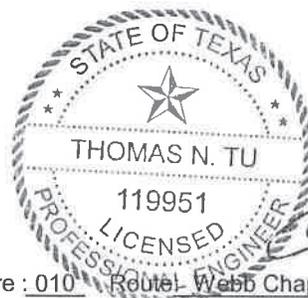
Project Area #

EXHIBIT
C-6

Appendix D | TxDOT Bridge Inspection Reports



BRIDGE SUMMARY SHEET



Form 2602
(03/16)
Page 1 of 1

District: 18 County: 057 Control-Section: G012 - 15 Structure : 010 Route: Webb Chapel Road
 Feature Crossed: Rawhide Creek Inspector's Signature: Thomas N. Tu, P.E. Date: April 10, 2019
 Company Name and Company Number: Barnhart Constructors, Inc. F-669

Selected Component Description and Rating:	Inspection Rating (1085)	Inventory Rating		Operating Rating	
		H	HS	H	HS
Concrete Culvert: Top & Bottom Slabs, Abutment & Intermediate Walls	6	15.0	15.0	20.0	20.0
<i>Load Rating</i>		15.0	15.0	20.0	20.0

Comments and/or Upgrade Recommendations (if applicable):

Culvert top slab has total 4 square foot moderate honeycombed spalls with exposed rebar in soffit of barrels 2 and 3 from south near east end. See photo

Recommendation: Remove loose concrete and rust, then patch spalls with epoxy modified grout.

Northeast and southeast wingwalls have moderate vertical cracks at junctions with abutment walls; see photo.

Recommendation: Seal cracks at junctions.

Load Posting Limits for Present Condition (if applicable):

Inventory	Operating					
_____ lbs Gross	_____ lbs Gross	1	2	3	4	5
_____ lbs Tandem Axle	_____ lbs Tandem Axle	OTHER	WEIGHT LIMIT AXLE OR TANDEM LBS R12-2bT	WEIGHT LIMIT TANDEM AXLE LBS R12-2cT	WEIGHT LIMITS GROSS LBS AXLE OR TANDEM LBS R12-4Tb	WEIGHT LIMITS GROSS LBS TANDEM AXLE LBS R12-4Tc
_____ lbs Axle or Tandem	_____ lbs Axle or Tandem					
_____ Sign Code	_____ Sign Code					6 LOAD ZONED BRIDGE W12-5T

Posting Recommendation: Load Posting Not Required At This Time.

Previous Load Posting Recommendations:

_____ R12-2bT	X	None
_____ R12-2cT	_____	lbs Gross
_____ R12-4Tb	_____	lbs Tandem Axle
_____ R12-4Tc	_____	lbs Axle or Tandem

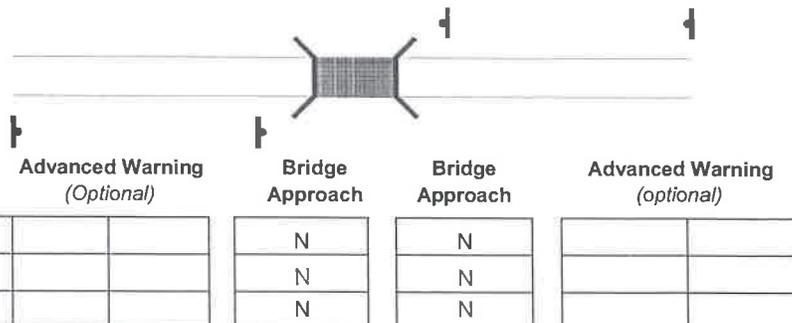
Observed Load Posting at Bridge:

_____ R12-2bT	X	None
_____ R12-2cT	_____	lbs Gross
_____ R12-4Tb	_____	lbs Tandem Axle
_____ R12-4Tc	_____	lbs Axle or Tandem

Other (desc): _____

Material Needed

- _____ - R12-2bT
- _____ - R12-2cT
- _____ - R12-4Tb
- _____ - R12-4Tc
- _____ - W12-5
- _____ - Posts
- _____ - Hardware Sets
- _____ - Decals



- | | | | | |
|---------------------------|--------------------------|------------------------|---------------------------|------------------------|
| A. Visible & Legible | D. Improper Position | G. Sign Missing | K. Clean Sign | N. None |
| B. Obscured by Vegetation | E. Damaged Beyond Repair | H. Sign & Post Missing | L. Reposition Sign | P. Replace Sign |
| C. Sign Needs Cleaning | F. Sign Down | J. Clear Vegetation | M. Reposition Sign & Post | S. Replace Sign & Post |



BRIDGE INSPECTION RECORD

Structure Number	180570G01215010	Inspector	Tu, Thomas
Facility Carried	WEBB CHAPEL ROAD	Inspection Date	04/10/2019
Feature Intersected	RAWHIDE CREEK	Maint. Section	02

Condition Rating	Description*
N	Not Applicable
9	Excellent Condition
8	Very Good Condition - no problems noted
7	Good Condition - some minor problems
6	Satisfactory Condition - minor deterioration of structural elements (limited)
5	Fair Condition - minor deterioration of structural elements (extensive)
4	Poor Condition - deterioration significantly affects structural capacity
3	Serious Condition - deterioration seriously affects structural capacity, local failures possible
2	Critical Condition - advance deterioration of primary elements, bridge should be closed until repaired
1	Failing Condition - bridge closed but repairable
0	Failed Condition - bridge closed and beyond repair

*These descriptions are for items 58, 59, 60 and 65. Code items 61 and 62 according to the TxDOT Coding Guide.

Bridge Description:

3 Barrel 10' X 8' & 3 Barrel 8' X 8' Reinforced Concrete Box Culvert With Cast In Place Concrete Wingwalls

General Comments:

3 - 10' x 8' & 3 - 8' x 8' MBC at 30 deg. RFS; S to N

Seal:

Signature & Date: *Thomas N. Tu*
07/18/2019

Prime Firm Name & Number:
Barnhart Constructors, Inc. F-669

Sub Firm Name & Number:

**DECK
(ITEM 58)**

Structure ID: 180570G01215010 Inspection Date: 04/10/2019
DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

Component	Description	Min.	Rating	Comment
Deck - Component Rating				
		1	N	
Wearing Surface	Asphalt	6	7	Asphalt overlay culvert has minor wear and cracks.
Joints, Expansion, Open		6	N	
Joints, Expansion, Sealed		6	N	
Joints, Other		6	N	
Drainage System		6	8	
Curbs, Sidewalk & Parapets		6	7	Roadway curbs and sidewalks over culvert have minor cracks.
Median Barrier		6	7	Median curbs have minor cracks.
Railings	MBGF	6	8	
Railing Protective Coating		7	8	
Delineation		7	N	
Other		-	N	

**SUPERSTRUCTURE
(ITEM 59)**

Structure ID: 180570G01215010 Inspection Date: 04/10/2019
DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

Component	Description	Min.	Rating	Comment
Main Members - Steel		0	N	
Main Members - Concrete		0	N	
Main Members - Timber		0	N	
Main Members - Connections		0	N	
Floor System Members		1	N	
Floor System Connections		1	N	
Secondary Members		5	N	
Secondary Mem. Connections		5	N	

Component	Description	Min.	Rating	Comment
Embankments		0	7	Northeast embankment has minor to moderate erosion at northeast corner of culvert.
Embankment Retaining Walls		4	N	
Slope Protection		5	7	Northeast embankment has minor to moderate erosion at northeast corner of culvert.
Roadway	Asphalt	5	7	Asphalt approach pavements have minor wear and minor cracks.
Relief Joints		6	N	
Drainage		6	8	
Guardfence		6	8	MBGF on east side of culvert only.
Delineation		7	8	
Sight Distance		7	8	
Other		-	N	
Overall Component Rating			7	

MISCELLANEOUS

Structure ID: 180570G01215010 Inspection Date: 04/10/2019
DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

Component	Description	Min.	Rating	Comment
Signs		N	N	
Illumination		N	N	
Warning Devices		N	N	
Utility Lines		7	N	
Other		N	N	

APPRAISAL RATINGS

Structure ID: 180570G01215010 Inspection Date: 04/10/2019
DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

TRAFFIC SAFETY FEATURES (ITEM 36)

	Description	Rating	Comment
0 - Does not meet current standards	Bridge Rails:	0	MBGF & Ped. Bridge rails, 2'-3" tall on east side
1 - Meets current standards	Transitions:	0	MBGF on east side of culvert only
N - Not applicable	Appr. Rails:	0	MBGF on east side of culvert only, 2'-5" tall
	Appr. Rail Ends:	0	MBGF on east side of culvert only

WATERWAY ADEQUACY (ITEM 71)

6 Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with insignificant traffic delays.

APPROACH ROADWAY ALIGNMENT (ITEM 72)

8 Approach alignments are good. No Speed Reduction



ROADWAY VIEW - LOOKING NORTH

VIEW 8301



SIDE ELEVATION - LOOKING SOUTHWEST

VIEW 8305



UPSTREAM CHANNEL - LOOKING NORTHEAST

VIEW 8304



DOWNSTREAM CHANNEL - LOOKING SOUTHWEST

VIEW 8302



NORTHEAST WINGWALL - LOOKING NORTH

VIEW 8307

NOTE: MODERATE VERTICAL CRACK AT JUNCTION BETWEEN NORTH ABUTMENT WALL AND NORTHEAST WINGWALL.



VIEW 8308

BARREL 3 FROM NORTH - LOOKING SOUTHWEST

NOTE: SOFFIT OF TOP SLAB HAS HONEYCOMB SPALLS WITH EXPOSED CORRODED REBAR AT EAST END.



SIDE ELEVATION - LOOKING EAST

VIEW 8303



VIEW THROUGH BRIDGE - LOOKING SOUTHWEST

VIEW 8306

STRUCTURE NO.:G012-15-010
DISTRICT - COUNTY (18-057)

DO NOT DISCLOSE – INFORMATION CONFIDENTIAL
UNDER THE TEXAS HOMELAND SECURITY ACT AND
23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

Inspection Date: April 10, 2019





BRIDGE INSPECTION RECORD

Structure Number	180570G00650008	Inspector	Tu, Thomas
Facility Carried	JOSEY LANE	Inspection Date	05/22/2019
Feature Intersected	RAWHIDE CREEK	Maint. Section	02

Condition Rating	Description*
N	Not Applicable
9	Excellent Condition
8	Very Good Condition - no problems noted
7	Good Condition - some minor problems
6	Satisfactory Condition - minor deterioration of structural elements (limited)
5	Fair Condition - minor deterioration of structural elements (extensive)
4	Poor Condition - deterioration significantly affects structural capacity
3	Serious Condition - deterioration seriously affects structural capacity, local failures possible
2	Critical Condition - advance deterioration of primary elements, bridge should be closed until repaired
1	Failing Condition - bridge closed but repairable
0	Failed Condition - bridge closed and beyond repair

Seal:

Signature & Date: *Thomas N. Tu*
07/23/2019

Prime Firm Name & Number:
Barnhart Constructors, Inc. F-669

Sub Firm Name & Number:

*These descriptions are for items 58, 59, 60 and 65. Code Items 61 and 62 according to the TxDOT Coding Guide.

Bridge Description:

3 Barrel 8' X 8' & 3 Barrel 9' X 8' Reinforced Concrete Box Culvert With Cast In Place Concrete Wingwalls @ 30 deg RFS

General Comments:

6 - (3 - 8' x 8' & 3 - 9' x 8') x 94' MBC at 30 Deg. RFS; N to S

**DECK
(ITEM 58)**

Structure ID: 180570G00650008 Inspection Date: 05/22/2019

DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

Component	Description	Min.	Rating	Comment
Deck - Component Rating				
Wearing Surface	Concrete	6	7	Concrete pavement over culvert has minor cracks and scaling in surface.
Joints, Expansion, Open		6	N	
Joints, Expansion, Sealed		6	N	
Joints, Other		6	N	
Drainage System		6	8	
Curbs, Sidewalk & Parapets		6	7	Roadway curbs and sidewalks over culvert have minor cracks.
Median Barrier		6	7	Median curbs have minor cracks.
Railings	Non-standard & Ped	6	7	Culvert rails have minor cracks in concrete portions. There are moderate spalls at base of pedestrian rail posts.
Railing Protective Coating		7	7	Pedestrian rails have slight rust on surface.
Delineation		7	N	
Other		-	N	

**SUPERSTRUCTURE
(ITEM 59)**

Structure ID: 180570G00650008 Inspection Date: 05/22/2019

DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

Component	Description	Min.	Rating	Comment
Main Members - Steel		0	N	
Main Members - Concrete		0	N	
Main Members - Timber		0	N	
Main Members - Connections		0	N	
Floor System Members		1	N	
Floor System Connections		1	N	
Secondary Members		5	N	

**APPROACHES
(ITEM 65)**

DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

Component	Description	Min.	Rating	Comment
Embankments		0	6	There is moderate undermining 3' back under south approach pavement at southwest corner of culvert; see photo. Embankment has minor erosion at northeast corner of culvert
Embankment Retaining Walls		4	N	
Slope Protection		5	6	There is moderate undermining 3' back under south approach pavement at southwest corner of culvert; see photo. Embankment has minor erosion at northeast corner of culvert
Roadway	Concrete	5	6	Concrete approach pavements have moderate cracks, spalls and patches.
Relief Joints		6	N	
Drainage		6	8	
Guardfence		6	N	
Delineation		7	N	
Sight Distance		7	8	
Other		-	N	
Overall Component Rating			6	

MISCELLANEOUS

Structure ID: 180570G00650008 Inspection Date: 05/22/2019
DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

Component	Description	Min.	Rating	Comment
Signs		N	N	
Illumination		N	8	
Warning Devices		N	N	
Utility Lines		7	N	
Other		N	N	

APPRAISAL RATINGS

Structure ID: 180570G00650008 Inspection Date: 05/22/2019
DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

TRAFFIC SAFETY FEATURES (ITEM 36)

	Description	Rating	Comment
0 - Does not meet current standards 1 - Meets current standards N - Not applicable	Bridge Rails:	0	Non-standard & Ped Bridge rails, 3'-10" tall & 3'-11' tall
	Transitions:	0	No approach guardfence
	Appr. Rails:	0	No approach guardfence
	Appr. Rail Ends:	0	No approach guardfence

WATERWAY ADEQUACY (ITEM 71)

6 Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with insignificant traffic delays.

APPROACH ROADWAY ALIGNMENT (ITEM 72)

8 Approach alignments are good. No Speed Reduction



ROADWAY VIEW - LOOKING NORTH

VIEW 8105



SIDE ELEVATION - LOOKING NORTHEAST

VIEW 8106



UPSTREAM CHANNEL - LOOKING NORTHEAST

VIEW 8104



DOWNSTREAM CHANNEL - LOOKING SOUTHWEST

VIEW 8112



SOUTHWEST CORNER OF CULVERT - LOOKING EAST

VIEW 8110

NOTE: UNDERMINING GOES 3' BACK UNDER SOUTH APPROACH AT SOUTHWEST CORNER OF CULVERT.



EAST END OF NORTH ABUTMENT - LOOKING NORTH

VIEW 8115

NOTE: MODERATE SPALLS WITH EXPOSED REBAR IN EAST EDGE OF NORTH ABUTMENT WALL.



SOUTHWEST WINGWALL JOINT - LOOKING EAST

VIEW 8107

NOTE: MODERATE SPALLS WITH EXPOSED CORRODED DOWELS.

STRUCTURE NO.:G006-50-008
DISTRICT - COUNTY (18-057)

DO NOT DISCLOSE – INFORMATION CONFIDENTIAL
UNDER THE TEXAS HOMELAND SECURITY ACT AND
23 USC SECTION 409, SAFETY SENSITIVE INFORMATION

Inspection Date: May 22, 2019





BARREL 4 FROM SOUTH - LOOKING SOUTHWEST

VIEW 8113

NOTE: CONCRETE LINING ON UPSTREAM SIDE HAS ADVANCED CRACKS AND IS BROKEN 10' X 5' X 1' DEEP WITH EXPOSED REBAR.



UPSTREAM APRON - LOOKING WEST

VIEW 8114

NOTE: PIPING HOLE IS 4' DEEP, 4' LONG, 3' WIDE AT UPSTREAM END OF BARREL 3.



SOUTH APPROACH - LOOKING NORTH

VIEW 8111

NOTE: Moderate Cracks And Spalls In South Approach Pavement.



NORTHEAST RAIL POSTS - LOOKING WEST

VIEW 8116

NOTE: MINOR TO MODERATE SPALLS AT BASE OF RAIL POST AT NORTHEAST CORNER.



SIDE ELEVATION - LOOKING SOUTHWEST

VIEW 8287



VIEW THROUGH BRIDGE - LOOKING EAST

VIEW 8108



BRIDGE INSPECTION RECORD

Structure Number 180570G01155007 Inspector *R. Rodriguez-C.* Roberto
 Facility Carried VALLEY VIEW LANE Inspection Date 05/14/2019
 Feature Intersected RAWHIDE CREEK Maint. Section 02

Condition Rating	Description*
N	Not Applicable
9	Excellent Condition
8	Very Good Condition - no problems noted
7	Good Condition - some minor problems
6	Satisfactory Condition - minor deterioration of structural elements (limited)
5	Fair Condition - minor deterioration of structural elements (extensive)
4	Poor Condition - deterioration significantly affects structural capacity
3	Serious Condition - deterioration seriously affects structural capacity, local failures possible
2	Critical Condition - advance deterioration of primary elements, bridge should be closed until repaired
1	Failing Condition - bridge closed but repairable
0	Failed Condition - bridge closed and beyond repair

*These descriptions are for items 58, 59, 60 and 65. Code items 61 and 62 according to the TxDOT Coding Guide.

Bridge Description:

6 Barrel 9' X 8' Reinforced Concrete Box Culvert With Cast In Place Concrete Wingwalls

Seal:

Signature & Date: *Joseph E. Garner 22 July 2019*

Prime Firm Name & Number: *BCI F-669*

Sub Firm Name & Number:

General Comments:

6 - 9' x 8' x 91.3' MBC at Variable Skew; E to W

**DECK
(ITEM 58)**

Structure ID: 180570G01155007 Inspection Date: 05/14/2019
DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

Component	Description	Min.	Rating	Comment
Deck - Component Rating				
Wearing Surface	Asphalt	6	7	Asphalt wearing surface has been replaced in 2 westbound lanes since last inspection. Remaining asphalt wearing surface has minor to moderate wear and cracks, some have been sealed.
Joints, Expansion, Open		6	N	
Joints, Expansion, Sealed		6	N	
Joints, Other		6	N	
Drainage System		6	8	
Curbs, Sidewalk & Parapets		6	7	Concrete curbs have minor cracks and scaling. East end of north sidewalk has been repaired since last inspection.
Median Barrier		6	N	
Railings	Non-standard steel	6	6	Moderate spalls at rail post connections in north headwall. See photo.
Railing Protective Coating		7	7	Widespread paint failure and surface rust.
Delineation		7	N	
Other		-	N	

**SUPERSTRUCTURE
(ITEM 59)**

Structure ID: 180570G01155007 Inspection Date: 05/14/2019
DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

Component	Description	Min.	Rating	Comment
Main Members - Steel		0	N	
Main Members - Concrete		0	N	
Main Members - Timber		0	N	
Main Members - Connections		0	N	
Floor System Members		1	N	
Floor System Connections		1	N	

(ITEM 65)**SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.**

Component	Description	Min.	Rating	Comment
Embankments		0	6	Southeast embankment has moderate runoff erosion along edge of riprap and sidewalk. Sidewalk is undermined up to 2' deep and 2' back. See photo. Erosion at northeast bridge corner has been repaired since last inspection.
Embankment Retaining Walls		4	N	
Slope Protection		5	6	Southeast embankment has moderate runoff erosion along edge of riprap and sidewalk. Sidewalk is undermined up to 2' deep and 2' back. See photo. Erosion at northeast bridge corner has been repaired since last inspection.
Roadway	Asphalt	5	7	Asphalt approach roadways have minor to moderate wear and cracks, some have been sealed. New asphalt overlay in two northern westbound lanes.
Relief Joints		6	N	
Drainage		6	8	
Guardfence		6	N	
Delineation		7	7	Delineators missing at northwest and southeast bridge corners.
Sight Distance		7	8	
Other		-	N	
Overall Component Rating			6	

MISCELLANEOUS

Structure ID: 180570G01155007 Inspection Date: 05/14/2019
DO NOT DISCLOSE. THIS INFORMATION IS CONFIDENTIAL UNDER THE TEXAS HOMELAND SECURITY ACT & 23 U.S.C SECTION 409, SAFETY SENSITIVE INFORMATION.

Component	Description	Min.	Rating	Comment
Signs		N	N	
Illumination		N	8	
Warning Devices		N	N	
Utility Lines		7	N	
Other		N	N	

APPRAISAL RATINGS

Structure ID: 180570G01155007 Inspection Date: 05/14/2019
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TRAFFIC SAFETY FEATURES (ITEM 36)	Rating	Comment
0 - Does not meet current standards	0	Non-standard steel Bridge rails, 2'-9" tall
1 - Meets current standards	0	No approach guardfence provided
N - Not applicable	0	
	0	None
WATERWAY ADEQUACY (ITEM 71)	6	Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with insignificant traffic delays.
APPROACH ROADWAY ALIGNMENT (ITEM 72)	8	Approach alignments are good. No Speed Reduction



ROADWAY VIEW - LOOKING WEST

VIEW 8124



SIDE ELEVATION - LOOKING SOUTHWEST

VIEW 8125



UPSTREAM CHANNEL - LOOKING NORTHEAST

VIEW 8126



DOWNSTREAM CHANNEL - LOOKING SOUTHWEST

VIEW 8135



WALL 4 FROM EAST - LOOKING SOUTHWEST

VIEW 8130

NOTE: WALL 4 FROM EAST HAS MODERATE SPALL WITH EXPOSED REBAR IN EAST FACE.



BARREL 2 FROM EAST - LOOKING SOUTHEAST

VIEW 8131

NOTE: SOFFIT OF BARREL 2 FROM EAST HAS MODERATE SPALL WITH EXPOSED REBAR.



NORTH HEADWALL - LOOKING SOUTHWEST

VIEW 8132

NOTE: MODERATE SPALLS WITH EXPOSED REBAR IN HEADWALL AT RAIL POST LOCATIONS.



SOUTHEAST CORNER - LOOKING WEST

VIEW 8133

NOTE: MODERATE RUNOFF EROSION AT SOUTHEAST CORNER HAS CAUSED UNDERMINING OF SOUTHEAST SIDEWALK, UP TO 2' DEEP X 2' BACK.

STRUCTURE NO.:G011-55-007
DISTRICT - COUNTY (18-057)

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DOWNSTREAM APRON TOEWALL - LOOKING EAST

VIEW 8128

NOTE: DOWNSTREAM APRON TOEWALL IS EXPOSED 7' DEEP.



BARREL 5 FROM EAST - LOOKING NORTHEAST

VIEW 8129

NOTE: MODERATE SPALL WITH EXPOSED REBAR IN SOFFIT OF BARREL 5 FROM EAST AT SOUTH END.



SIDE ELEVATION - LOOKING NORTHWEST

VIEW 8134



VIEW THROUGH BRIDGE - LOOKING SOUTH

VIEW 8127

STRUCTURE NO.:G011-55-007
DISTRICT - COUNTY (18-057)

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Appendix E | Digital Data