



**BLEYL ENGINEERING**  
**PLANNING • DESIGN • MANAGEMENT**

100 Nugent Street  
Conroe, TX 77301  
**(936) 441-7833**

March 30, 2021

Mrs. Jennifer Skinner  
IMC Property Management  
3500 West Davis, Suite 190  
Conroe, Texas 77301

Re: Drainage Evaluation on Common Area  
Bleyl Project No. 12735

Dear Mrs. Skinner:

Below is a summary of our evaluation of the drainage issues with the common areas located near 3915 Knollcrest Drive, Montgomery, Texas and 3842 Lakewood Drive, Montgomery, Texas, in Section 7 of the Walden on Lake Conroe (Walden) residential subdivision. It is our professional opinion that there are multiple causes to the drainage issues at these properties. Our findings are summarized at the end of this letter.

**Sources of Information**

In addition to the information and pictures that we gathered from our site visit on March 3, 2021; we also obtained the following information that was made available by various online resources:

- **Attachment A** – LiDAR data captured in 2018 (LiDAR, Light Detection and Ranging, is a surveying technology that uses pulses of light to measure distances. This technology is widely used in the Civil Engineering field to gather topographic surveys.)
- **Attachment B** – Federal Emergency Management Agency (FEMA) floodplain mapping
- Historic aerial imagery from Google Earth and Nearmap
- Plat for Walden on Lake Conroe Section 7 (Engineered construction drawings were not available)

**Background**

Both the common area near the Knollcrest property (GBR M) and the common area near the Lakewood property (GBR L) are in Walden Section 7 (Section 7), on the north side of the Walden residential subdivision. Walden is a master planned community located in west Montgomery County, Texas that is subject to the Declaration of Covenants, Conditions, and Restrictions (CCRs) for Section 7 and are governed by the Walden on Lake Conroe Community Improvement Association Inc. Per the plat, both common areas are platted as Green Belt Reserves (GBR) with no plat reference that the common areas are reserved for any drainage use. Section 7 was platted in May of 1973. Engineered construction drawings associated with the plat were not available.

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Tex Reg. No. F-678

**Existing Drainage Patterns**

The natural topography of the land within GBR M generally slopes from a high southern point then to the east, west, and north. From our site visit, it is evident that storm water in GBR M will generally flow overland, until it reaches a street where it is captured and conveyed through storm sewer (located within road right-of-ways and easements) to Lake Conroe located along the northern properties in Section 7. We do not have detailed data on the size of the storm sewer within Section 7. Small area drains were found along the backyards of the properties that reported drainage issues in GBR M. These area drains appear to be connected to each other by 6-inch HDPE pipes and then most likely outfall in the street gutters/curb inlets, but this could not be confirmed.

Without construction plans or survey of Section 7, we are unable to determine if there were any other improvements to help with the drainage in GBR M or if the area was constructed to plan. It was evident that the area drains were partially full with silt and leaves due to storm runoff over time. This is common with smaller drains. It is recommended to have the area drains cleaned out and inspected. During our site visit, we found standing water in some of the area drains which could result from the debris build up or possible lower flow lines than designed. Without construction plans, it is not possible to determine if these drains were constructed to the correct flow lines or if they have settled over the years.

The natural topography of the land within GBR L generally slopes from the east to the west. From our site visit, it is evident that storm water will flow overland, until it reaches a street where it is captured and conveyed through storm sewer (located within road right-of-ways and easements) to Lake Conroe located along the northern properties in Section 7. A small berm runs parallel with the properties of interest, about 15 feet off the property line, and the land in between the berm and property line appeared to be relatively flat, but LiDAR shows that storm water should flow towards Glenview Drive.

Without the Section 7 construction plans, we are unable to determine if there were any other measures to convey storm water to the existing storm sewer or if the small berm was constructed to help with drainage in the common area. There is generally standing water in between the berm and the property lines.

**Engineering Evaluations**

No hydraulics and hydrology calculations were completed to size the proposed swales in GBR M and GBR L. This evaluation focused on the natural flow of storm water and how to redirect it away from the previously flooded structures.

Based on our findings, the properties located by GBR M have drainage issues because the general terrain slopes towards the buildings. If the properties in GRB M haven't experienced drainage issues in the past, then it is possible that the area drains located near the property lines have been rendered ineffective over time due to the buildup of debris or settlement of the flow lines. Bleyl believes that these properties would benefit from two swales that are graded to direct the flow of stormwater north and south along the property lines as shown in **Attachment C**. This will allow for stormwater to flow over the ground and away from the homes. The two swales will daylight on either side of the properties to allow for stormwater to flow overland to Knollcrest Drive.

In the attached exhibit for GBR M, we show both swales starting at an elevation of 212.00 and are graded at an approximate 1.00% slope away from each other. We also propose 3:1 side slopes for both swales, the width will vary depending on the depth throughout the swale. There are existing trees and utilities that may be in conflict. The shown alignment of the swales may be adjusted to avoid existing trees and utilities.

The properties located by GBR L have drainage issues due to the common area primarily draining to the west to a small berm with a swale that is relatively flat. Bleyl believes that these properties would benefit from a swale that is graded to direct stormwater to the north as shown in **Attachment D**. The proposed swale would daylight as it reached the natural ground on the north side of the properties and allow for the stormwater to flow overland until it reaches Lakewood Drive where it will flow to the nearest inlet.

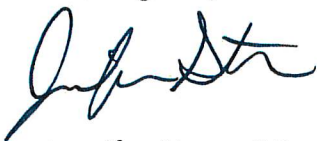
In the attached exhibit for GBR L, we show the swale starting at an elevation of 212.00 and is graded at an approximate 1.00% slope where it will eventually daylight at 211.00. We also propose 3:1 side slopes for the swale, the width will also vary depending on the depth throughout the swale. There does not appear to be any conflicts regarding utilities or trees in this common area. The proposed swale will direct the flow from the northern portion of the common area and should help the minor swale between the berm and the property lines by intercepting this flow.

#### **Conclusion**

Based on LiDAR topography and our site visit, it is evident that stormwater will generally flow overland to the properties that have expressed concerns for drainage issues or that have flooded during heavy rain events. It is also evident that the existing storm drains/berm do not prevent these issues. In our professional opinion, both common areas GBR L and GRB M would benefit from the installation of swales to help redirect the flow of stormwater away from the properties as described earlier.

Should you have any further questions or need additional assistance, do not hesitate to contact me by email at [jsteen@bleylengineering.com](mailto:jsteen@bleylengineering.com) or by phone at (936) 441-7833.

Best regards,



Jennifer Steen, P.E.  
Public Works Department Manager

Enclosed:

**Attachment A** – LiDAR/Contour Map

**Attachment B** – FEMA FIRMette Map

**Attachment C** – Walden on Lake Conroe Section 7 Green Belt Reserve M Exhibit

**Attachment D** – Walden on Lake Conroe Section 7 Green Belt Reserve L Exhibit

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# Attachment A

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## Legend

— Contours\_1ft

□ Parcels

## LiDAR/Contour Map

Drainage Evaluation on Common Area



0 20 40 80 120 160  
1 in = 96 ft

Date: 3/30/2021

Author: KS

Job No.12735



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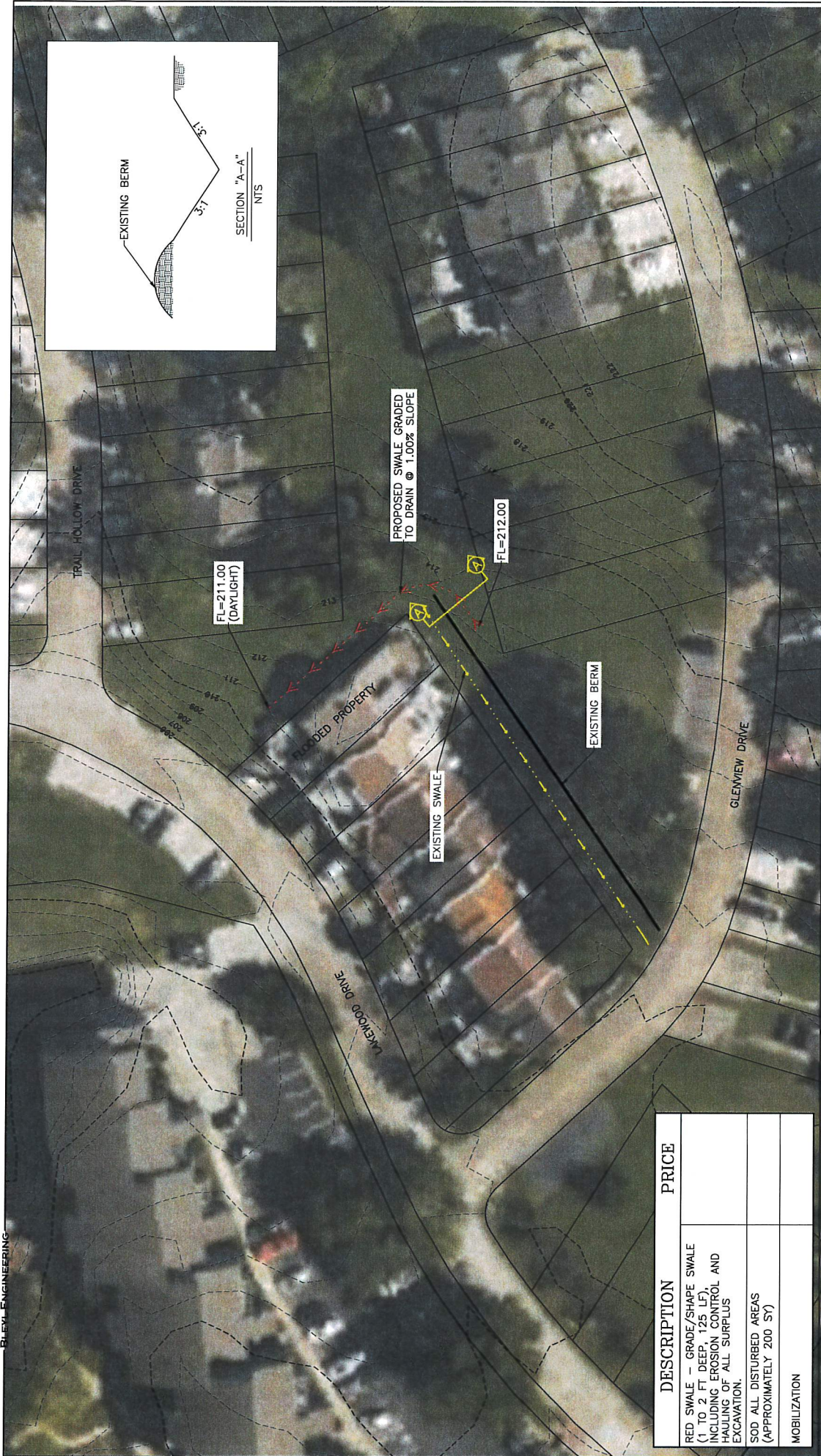
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# Attachment B

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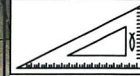
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ORIGINAL LAYOUT SIZE - 11x17



DESCRIPTION	PRICE
RED SWALE - GRADE/SHAPE SWALE (1 TO 2 FT DEEP - 125 LF), INCLUDING EROSION CONTROL AND HAULING OF ALL SURPLUS EXCAVATION.	
SOD ALL DISTURBED AREAS (APPROXIMATELY 200 SY)	
MOBILIZATION	

PROJECT NAME:	DRAINAGE EVALUATION ON COMMON AREA
PROJECT NUMBER:	12735
PREPARED FOR:	MC PROPERTY MANAGEMENT
DATE:	APRIL 12, 2021



## WALDEN ON LAKE CONROE - SECTION 7 GREEN BELT RESERVE "L"

**BLEYL ENGINEERING**  
TEXAS FIRM REGISTRATION NO. F-678  
100 NUGENT STREET, CONROE TEXAS 77301  
PHONE 936-441-7833 FAX 936-760-3833  
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# Attachment C

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WALDEN ON LAKE CONROE - SECTION 7  
GREEN BELT RESERVE "M"

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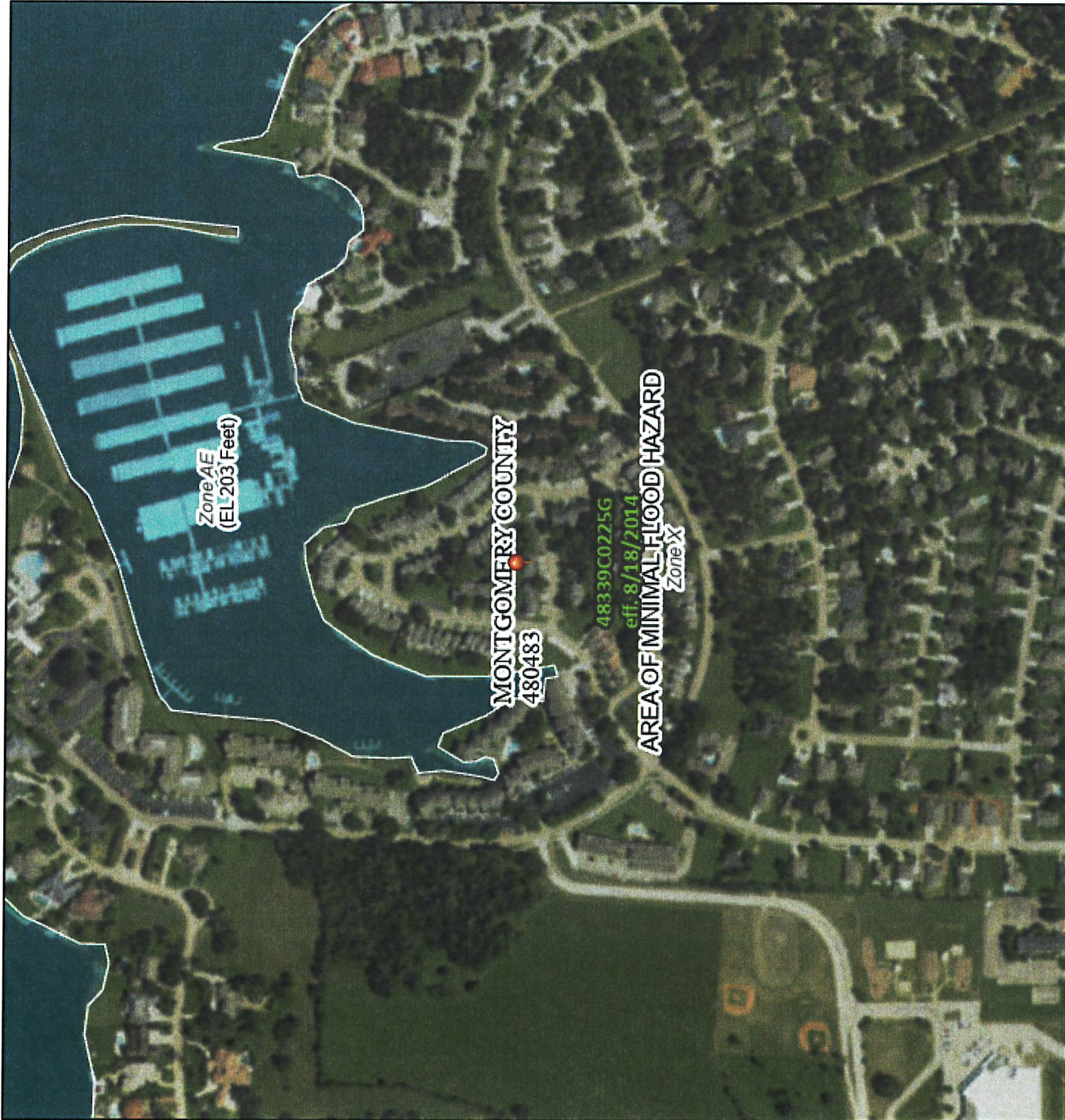
# Attachment D

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# National Flood Hazard Layer FIRMette



95°36'50"W 30°24'17"N



95°36'13"W 30°23'46"N

Feet 0 250 500 1,000 1,500 2,000 1:6,000

Basemap: USGS National Map. Orthoimagery: Data refreshed October, 2020

## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

Without Base Flood Elevation (BFE)  
*Zone A, V, A99*

With BFE or Depth *Zone AE, AO, AH, VE, AR*

Regulatory Floodway

SPECIAL FLOOD HAZARD AREAS

0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*

Future Conditions 1% Annual Chance Flood Hazard *Zone X*

Area with Reduced Flood Risk due to Levee, See Notes, *Zone X*

Area with Flood Risk due to Levee *Zone D*

OTHER AREAS OF FLOOD HAZARD

NO SCREEN

Area of Minimal Flood Hazard *Zone X*

Effective LOMRs

Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

Channel, Culvert, or Storm Sewer

Levee, Dike, or Floodwall

Cross Sections with 1% Annual Chance

Water Surface Elevation

Coastal Transect

Base Flood Elevation Line (BFE)

Limit of Study

Jurisdiction Boundary

Coastal Transect Baseline

Profile Baseline

Hydrographic Feature

OTHER FEATURES

Digital Data Available

No Digital Data Available

Unmapped

MAP PANELS

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/24/2021 at 9:17 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

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**Engineer's Preliminary Opinion of Cost**  
**Drainage Evaluation on Common Area**  
**Bleyl Project No. 12735**  
**April 12, 2021**

**GBR L**

No.	DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
1.	Mobilization	LS	1	\$ 1,000.00	\$ 1,000.00
2.	Grade/Shape Swale	LS	1	\$ 6,500.00	\$ 6,500.00
3.	Sod all disturbed areas	SY	200	\$ 5.00	\$ 1,000.00
<b>GBR L SUBTOTAL</b>					<b>\$ 8,500</b>

**GBR M**

No.	DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
1.	Mobilization	LS	1	\$ 1,000.00	\$ 1,000.00
2.	Grade/Shape Yellow Swale	LS	1	\$ 6,500.00	\$ 6,500.00
3.	Grade/Shape Red Swale	LS	1	\$ 6,500.00	\$ 6,500.00
4.	Sod all disturbed areas	SY	400	\$ 5.00	\$ 2,000.00
<b>GBR M SUBTOTAL:</b>					<b>\$16,000.00</b>
<b>TOTAL CONSTRUCTION COST</b>					<b>\$24,500.00</b>
<b>CONTINGENCIES (15%)</b>					<b>\$4,000.00</b>

**TOTAL PROJECT COSTS****TOTAL COST: \$28,500.00**

## Notes:

1. This estimate was completed without the benefit of detailed design or studies and is subject to change based on final design considerations.
2. This estimate represents my best judgment as a design professional familiar with the construction industry. Bleyl Engineering has no control over the cost of labor, materials, or equipment; over the Contractor's methods of determining bid prices; or over competitive bidding or market conditions. Therefore, we cannot and do not guarantee that bids will not vary from this cost estimate.

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