

**Project: Belleair Country Club: West Golf Course Improvements**

**Drainage Calculations: Related to Unnamed Creek**

**(Additional to Drainage Report as Prepared by Applied Sciences dated January 2020)**

**Prepared by**

**McKim & Creed, Inc.**

**March 22, 2021**

**Description of Impacts:** It is estimated that 190.7 cubic yards of fill will be placed at the existing upstream terminus of the Unnamed Creek. As identified in **Section A-A of Figure F5.0**, the fill will be used to recreate the ditch section at a higher elevation to allow for a better ditch connection transition and will disturb 3,200 square feet within the existing banks. Within the last 30 years the club has modified the basin to the Unnamed Creek by regrading previous uplands and installing reclaimed and irrigation ponds as part of the water reuse development in the area. **Figure 3B of the revised Drainage Report dated March 2020** shows the overall drainage basin for the Unnamed Creek prior to the major pond installations. Because of the ponds the pre-construction drainage basin for the unnamed creek is estimated be 36.65 acres, as shown on attached **Existing Drainage Areas Drawing D1**, with the upper basins potentially popping off to the creek during major storm events. As part of the proposed improvements the site is to be modified to recreate the original course layout and drainage patterns which includes removal of the ponds and development of meandering, vegetated, shallow ditches to collect, convey and filter stormwater flows upstream of the current Unnamed Creek source, as shown on the attached **Proposed Drainage Area Drawing D2 and Ditch Drainage Plans Drawings D3, D4 and D5**.

**Calculations:** The Rational Method was utilized to calculate the pre and post construction peak runoff quantities for the 25-year event, as summarized in **Table 1**. There are two influencing factors: 1) removal of the upstream retention ponds increase the amount of flow during peak runoff conditions post-construction by increase the immediate drainage area and 2) the time of concentration will increase reflecting the additional flow distance along the proposed ditches for the unretained areas to the existing creek source. The increase in flow is anticipated to have minimal impacts to the established vegetation within the existing creek system.

The existing Unnamed Creek outfall system is shown in the **sketch on Figure 6**. The 29" x 48" reinforced concrete elliptical pipe (RCEP), as shown in **Photo 2 on Figure 6**, and the dual 24-inch diameter pipes connected downstream that outlet through the existing seawall, as shown in **Photo 1 on Figure 6**, will not be modified by the proposed improvements. Based on Manning's Equation this system has sufficient capacity to convey the post-construction discharge and therefore backwater increases will be minimal.

**Table 1: Peak Runoff Quantities for Unnamed Creek**

	Drainage Area (acres)	Time of Concentration (minutes)	Rainfall Intensity (25-year, Zone6) (in/hr)	Peak Discharge (Per Rational Method) (cfs)
Pre-Construction	36.65	19.2	6.6	51.40
Post-Construction	66.17	35.4	5.0	70.31

**Assumptions:**

1. Runoff Coefficient (C) assumed to be 0.21 for both pre and post conditions.
2. Post-construction peak will not be impacted by the 10.58 acres draining to Pond 2.
3. Existing outfall drainage system and downstream 1,200 feet of channel will not impacted by construction activities.

**On-site Drainage System:** The majority of the existing drainage system within the project limits will be removed and reconstructed with inlets and subdrains at new locations appropriate for the proposed grading plan. On-site storm sewer systems outlet directly to the existing creeks and then to the bay. Impacts to the creeks have been provided per the Drainage Report by Applied Science dated January 2020 and these supplemental calculations for the Unnamed Creek. The storm system is design to convey flow under normal storm conditions through and away from the site. Specific storm calculations are not provided for the on-site storm conveyance system related to this project. Surcharging and back-ups that may occur during larger storms will not adversely impacts adjacent properties or drainage systems.

### **Attachments**

Drainage Report prepared by Applied Sciences, Revised date March 2020 (by reference)

#### **Figures**

- Figure 1- Project Location Map
- Figure 2 – Wetlands and Surface Waters in Project Area
- Figure 3 – Disturbance Areas
- Figure 4 – (Not Included)
- Figure 5.0 – Unnamed Creek Connection: Pre & Post Conditions
- Figure 5.1 – Unnamed Creek Connection: Plan & Profiles
- Figure 5.2 – Unnamed Creek Connection: Cross Sections
- Figure 6 – Unnamed Creek Outfall Storm Sewer System Sketch & Photos

#### **Plan Sheets**

- D1 – Existing Drainage Areas
- D2 – Proposed Drainage Areas
- D3 – Drainage Plans Ditch: West Branch
- D4 – Drainage Plans Ditch: East Branch Sta. 0+00 to Sta. 11+00
- D5 – Drainage Plans Ditch: East Branch Sta. 11+00 to Sta. 22+00

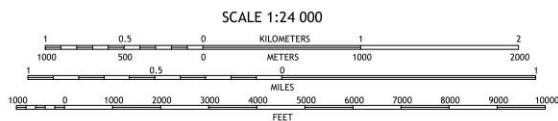
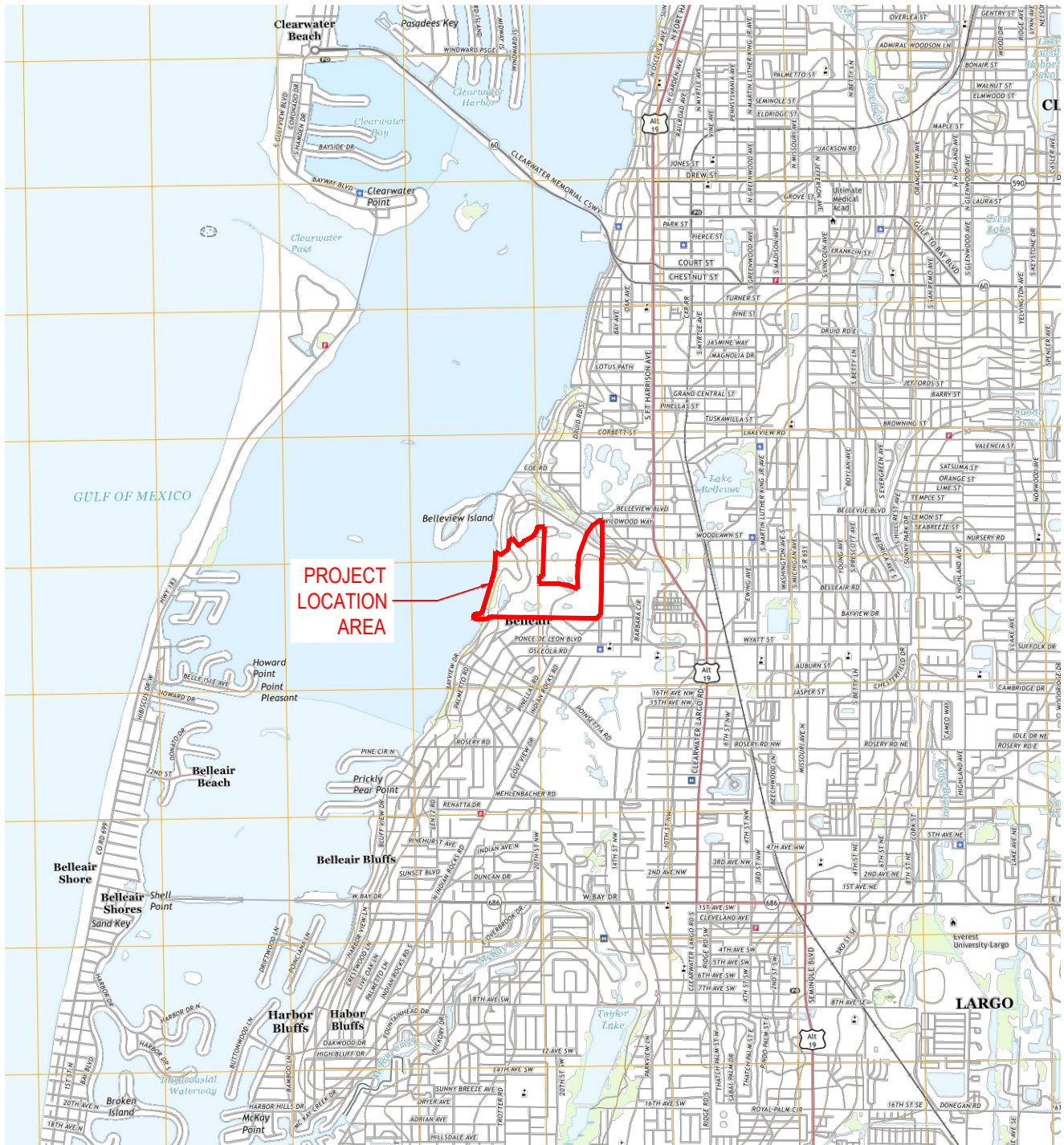
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CONTOUR INTERVAL 10 FEET  
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the  
National Geospatial Program US Topo Product Standard, 2011.  
A metadata file associated with this product is draft version 0.6.18



1	2
3	4
5	

ADJOINING QUADRANGLES

CLEARWATER QUADRANGLE  
FLORIDA - PINELLAS COUNTY  
7.5-MINUTE SERIES

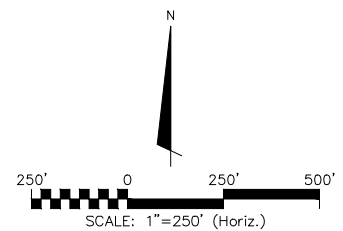


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## BELLEAIR COUNTRY CLUB WEST COURSE IMPROVEMENTS

FIGURE 1  
PROJECT LOCATION MAP





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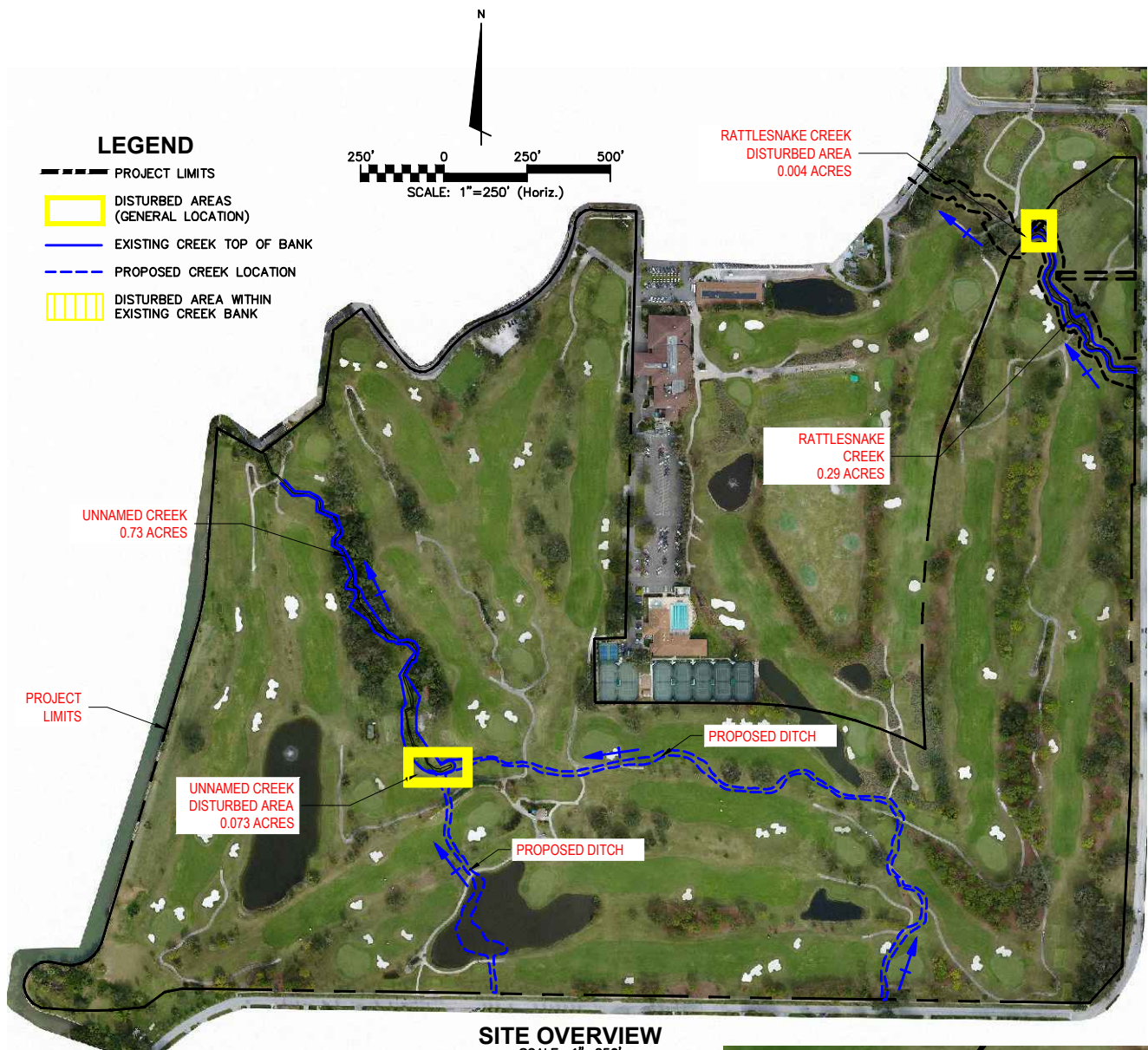
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AUGUST 31, 2020

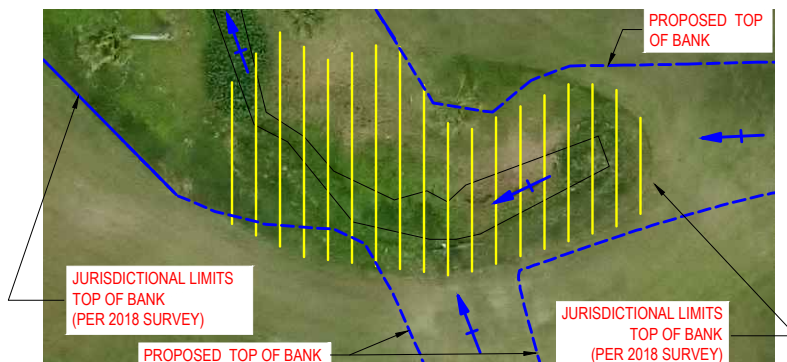
## BELLEAIR COUNTRY CLUB WEST COURSE IMPROVEMENTS

**FIGURE 2  
WETLANDS AND SURFACE WATERS  
IN PROJECT AREA**





**SITE OVERVIEW**  
SCALE: 1"=250'



**UNNAMED CREEK**

SCALE: 1"=20'

PURPOSE: GRADING FOR PROPOSED FEATURES & CONNECTION TO CREEK EXTENSIONS

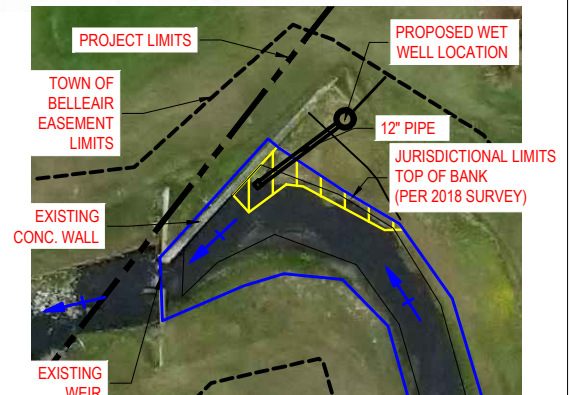
DISTURBANCE WITHIN JURISDICTIONAL LIMITS:

AREA: 3,200 SQ FT (0.073 ACRE)

FILL: 191 CU YD

CUT: 0 CU YD

(SEE FIGURES 5.0, 5.1 AND 5.2 FOR MORE DETAILS)



**RATTLESNAKE CREEK**

SCALE: 1"=20'

PURPOSE: INSTALLATION OF A WITHDRAWAL STRUCTURE FOR USE IN IRRIGATION

DISTURBANCE WITHIN JURISDICTIONAL LIMITS:

AREA: 170 SQ FT (0.004 ACRE)

FILL: 0.33 CU YD

CUT: 12.0 CU YD

(SEE FIGURES 4.0 AND 4.1 FOR MORE DETAILS)



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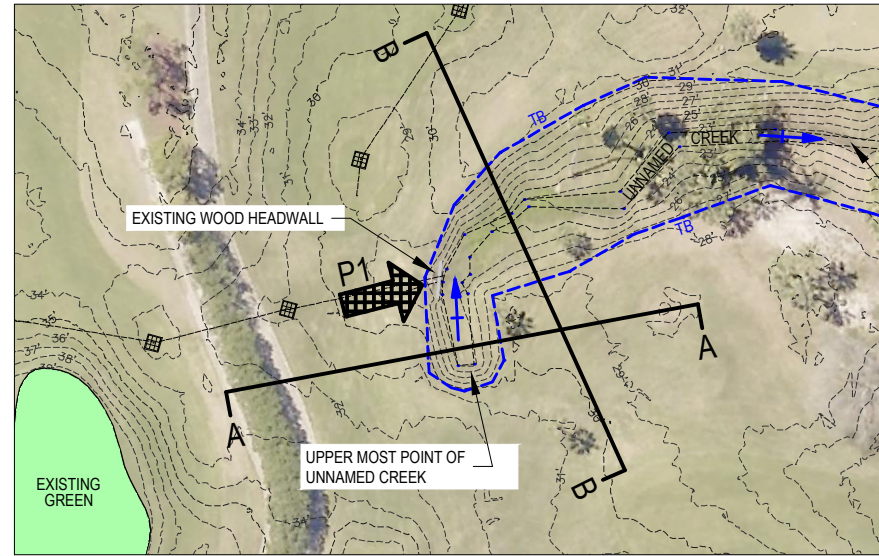
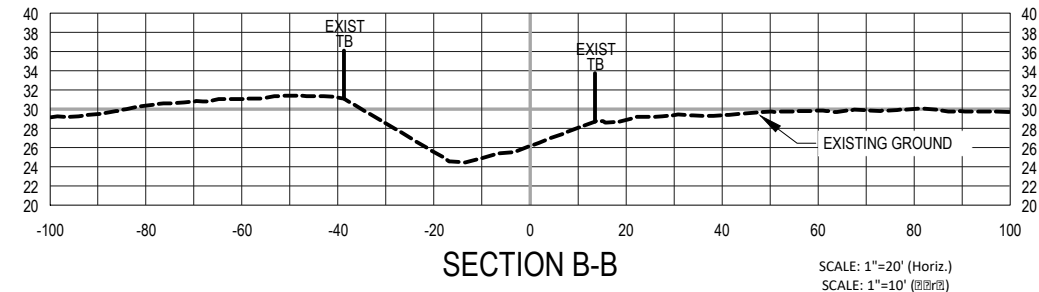
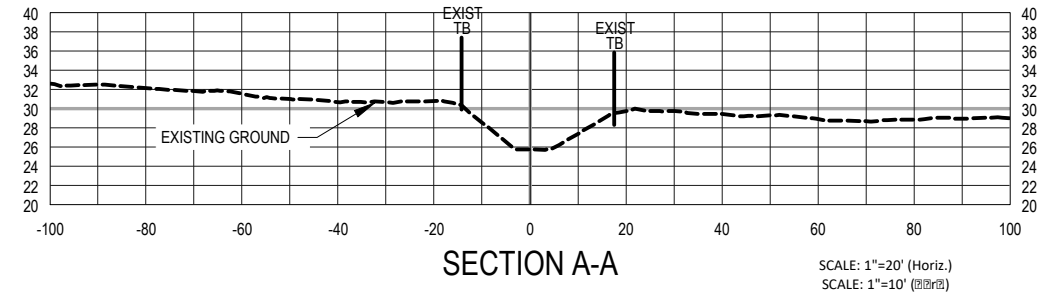
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SEPTEMBER 11, 2020

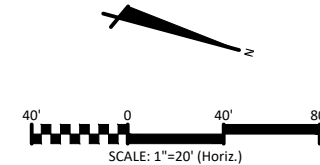
**BELLEAIR COUNTRY CLUB  
WEST COURSE IMPROVEMENTS**

**FIGURE 3  
DISTURBANCE AREAS**

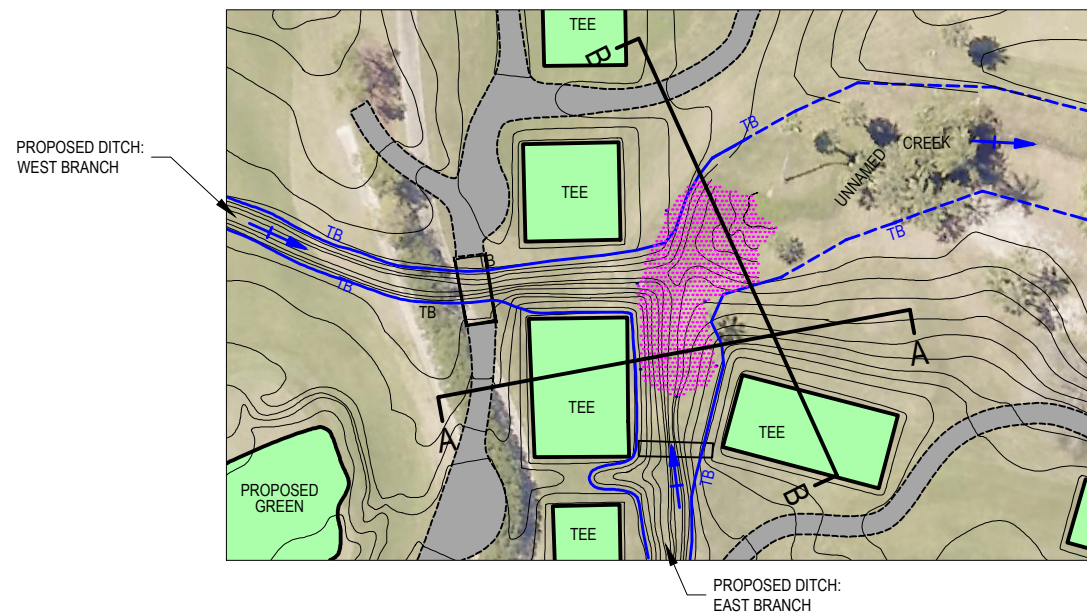
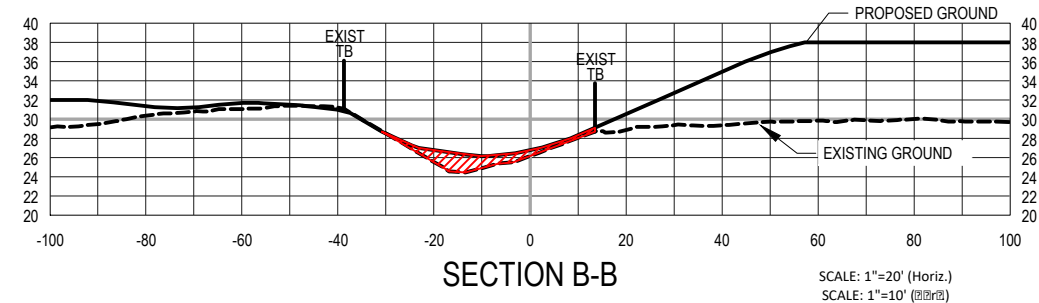
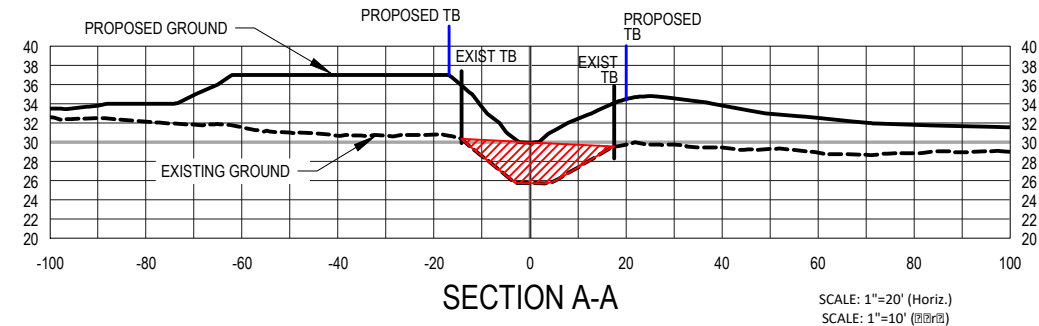




P1 - EXISTING PHOTO

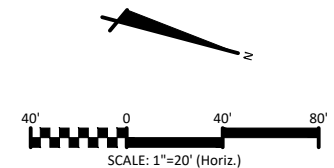


PRE-CONSTRUCTION CONDITION  
SCALE: 1" = 40'



LEGEND

- TB EXISTING CREEK TOP OF BANK: JURISDICTIONAL LIMITS
- PROPOSED DISTURBED AREA WITHIN JURISDICTIONAL LIMITS (PLAN)
- TB PROPOSED TOP OF BANK
- PROPOSED FILL: PERMANENT STRUCTURES WITHIN JURISDICTIONAL LIMITS (SECTION)



POST-CONSTRUCTION CONDITION  
SCALE: 1" = 40'

REV. NO.	DESCRIPTION	DATE
1	ISSUED FOR PERMITTING	9/11/20

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BELLEAIR COUNTRY CLUB  
WEST COURSE IMPROVEMENT

FIGURE 5.0  
UNNAMED CREEK CONNECTION  
PRE POST CONDITIONS

DATE:	9/11/2020
MCE PROJ. #	07334-0001
DRAWN	TLW
DESIGNED	TLW
CHECKED	PJL
PROJ. MGR.	TLW

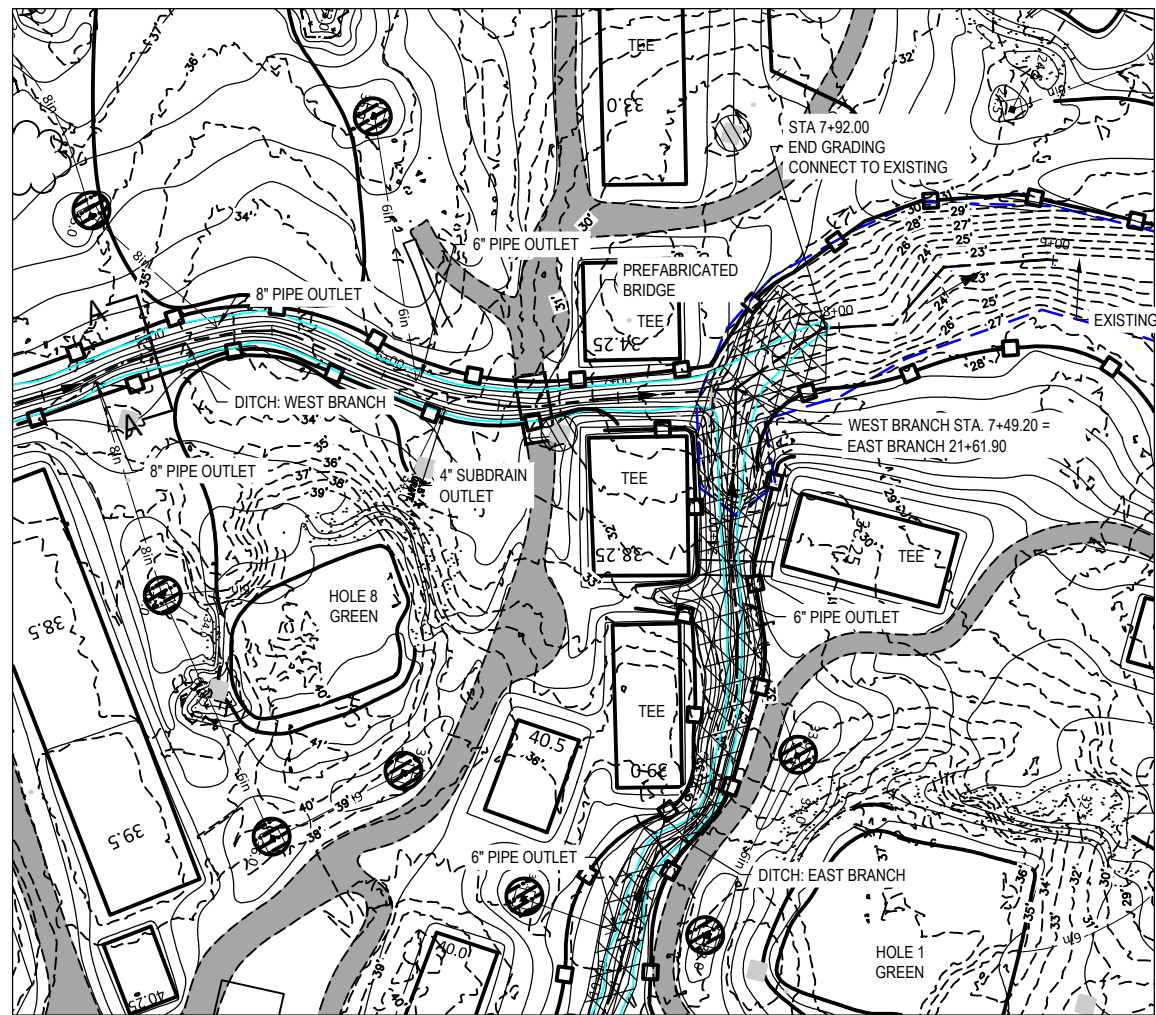
SCALE	
HORIZONTAL:	AS NOTED
VERTICAL:	N/A

F5.0

DRAWING NUMBER

01  
REVISION

STATUS: ISSUED FOR PERMITTING



40' 0 40' 80'

SCALE: 1"=40' (Horiz.)

UNNAMED CREEK

SECTION A-A  
TYPICAL DITCH SECTION

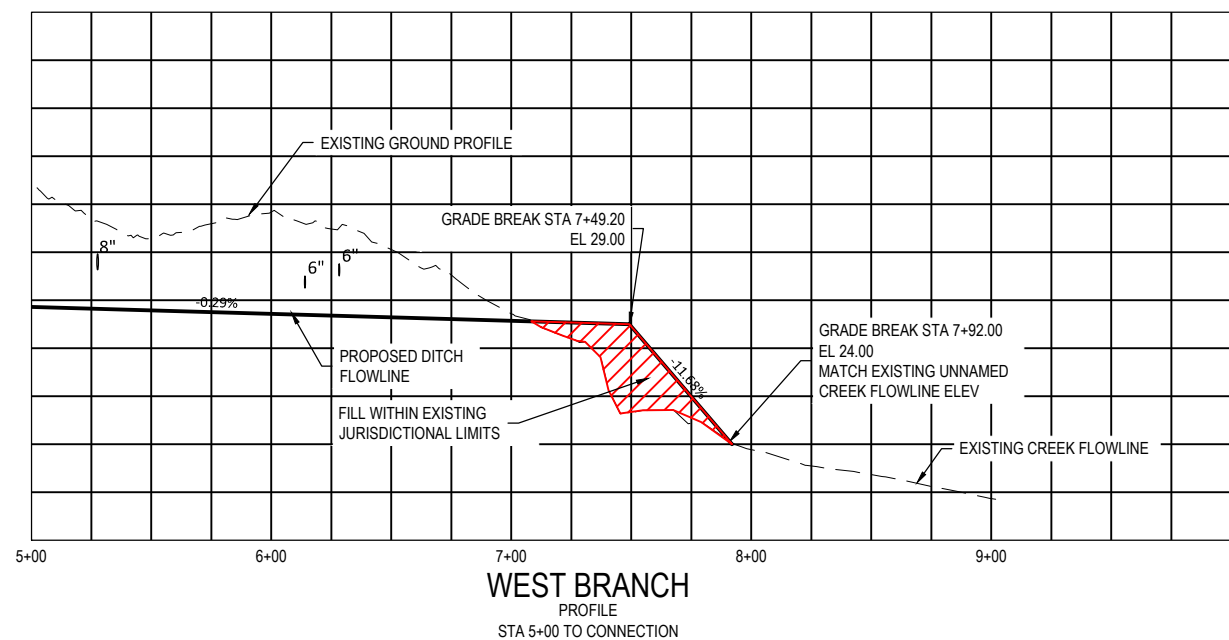
EXISTING GROUND PROFILE

VARIES SEE PROPOSED GRADING PLAN

3'H:1'V

3'H:1'V

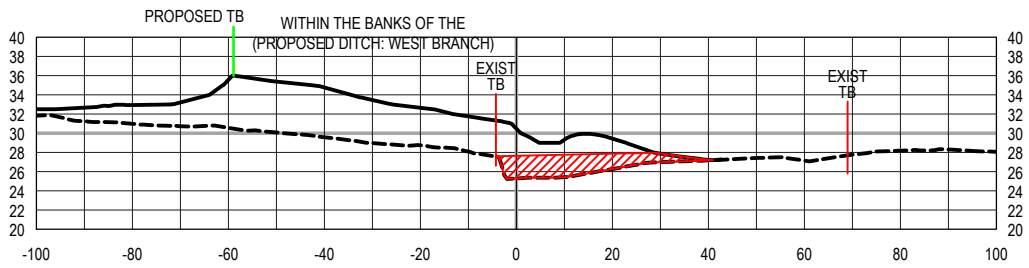
2.0' FT BOTTOM (MIN)



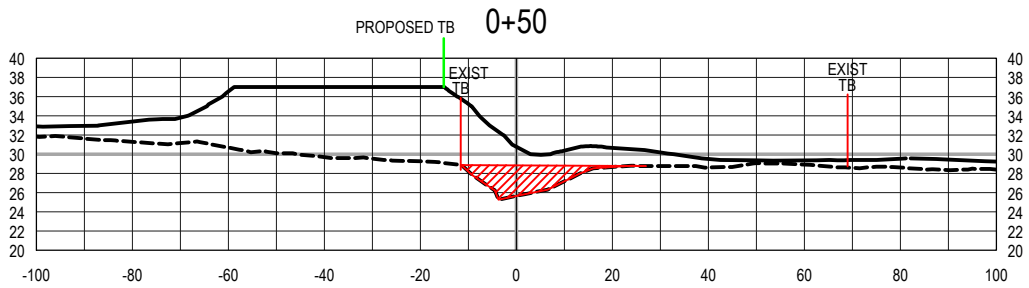
STATUS: **ISSUED FOR PERMITTING**



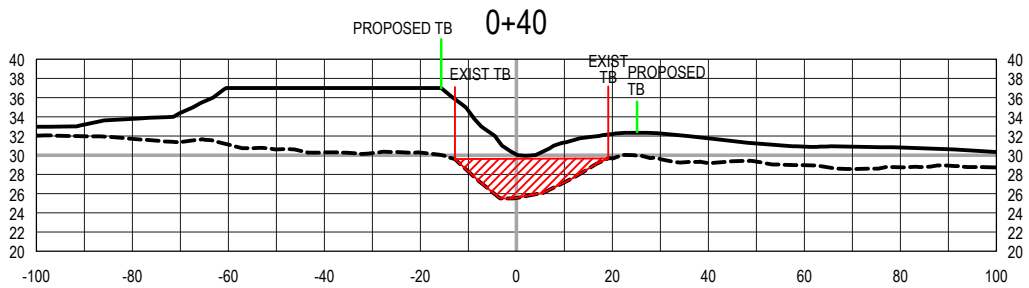
AREA FILL: 66.8 SQ FT  
VOLUME FILL: 28.9 CU YD



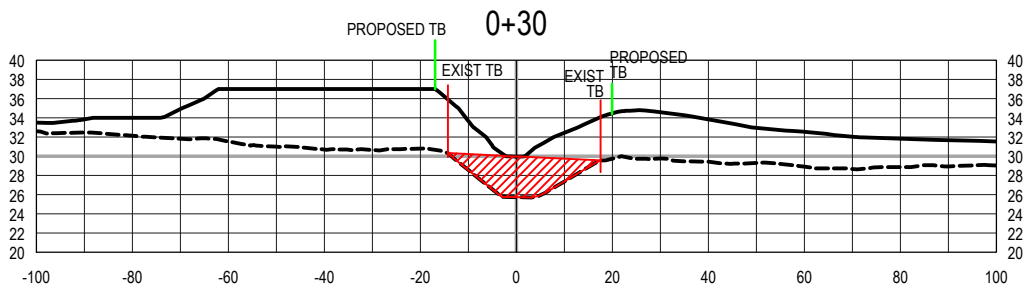
AREA FILL: 57.2 SQ FT  
VOLUME FILL: 25.3 CU YD



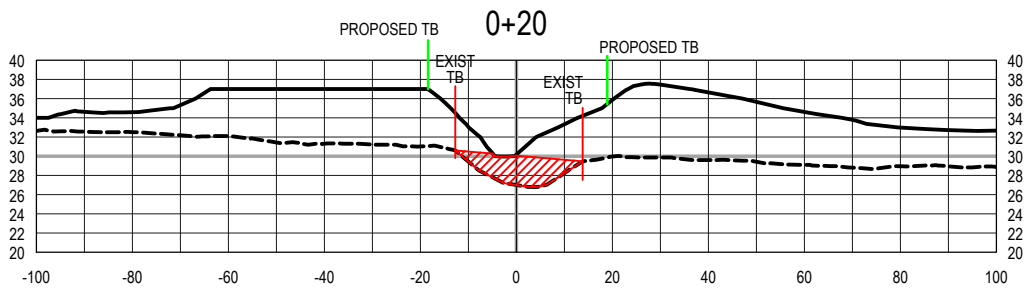
AREA FILL: 79.4 SQ FT  
VOLUME FILL: 30.0 CU YD



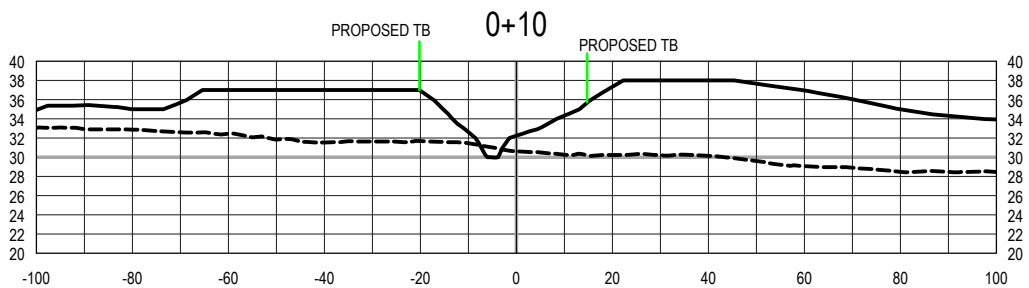
AREA FILL: 82.5 SQ FT  
VOLUME FILL: 25.3 CU YD



AREA FILL: 54.0 SQ FT  
VOLUME FILL: 7.0 CU YD\*

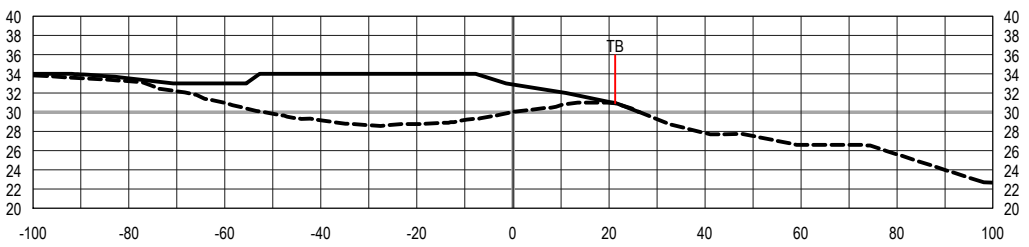


\* NOTE: DITCH BEGINS STA 0+03,  
ASSUMED AREA 0.0 SQ FT

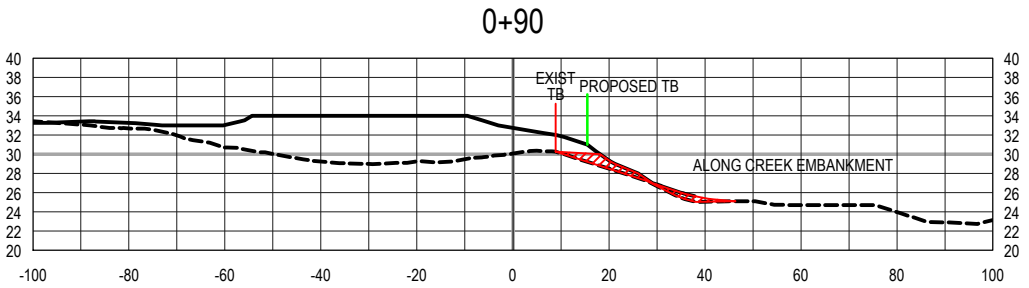


0+00  
(JUST SOUTH OF START OF EXISTING CREEK)

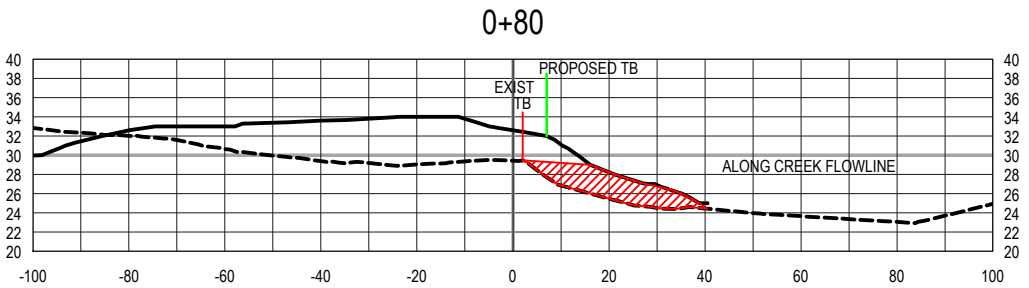
AREA FILL: 0.0 SQ FT  
VOLUME FILL: 0.0 CU YD



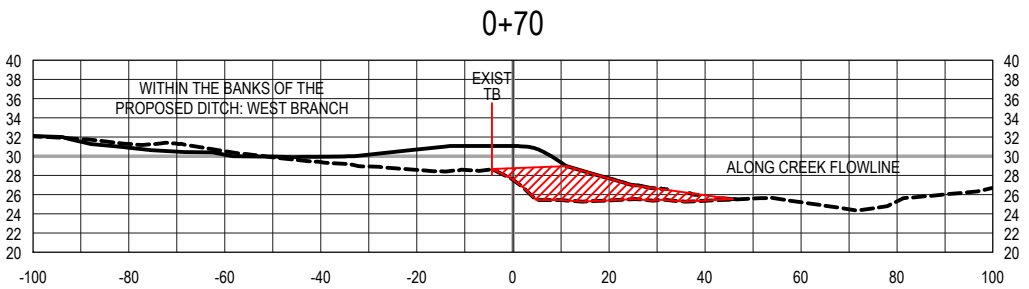
AREA FILL: 17.6 SQ FT  
VOLUME FILL: 3.3 CU YD



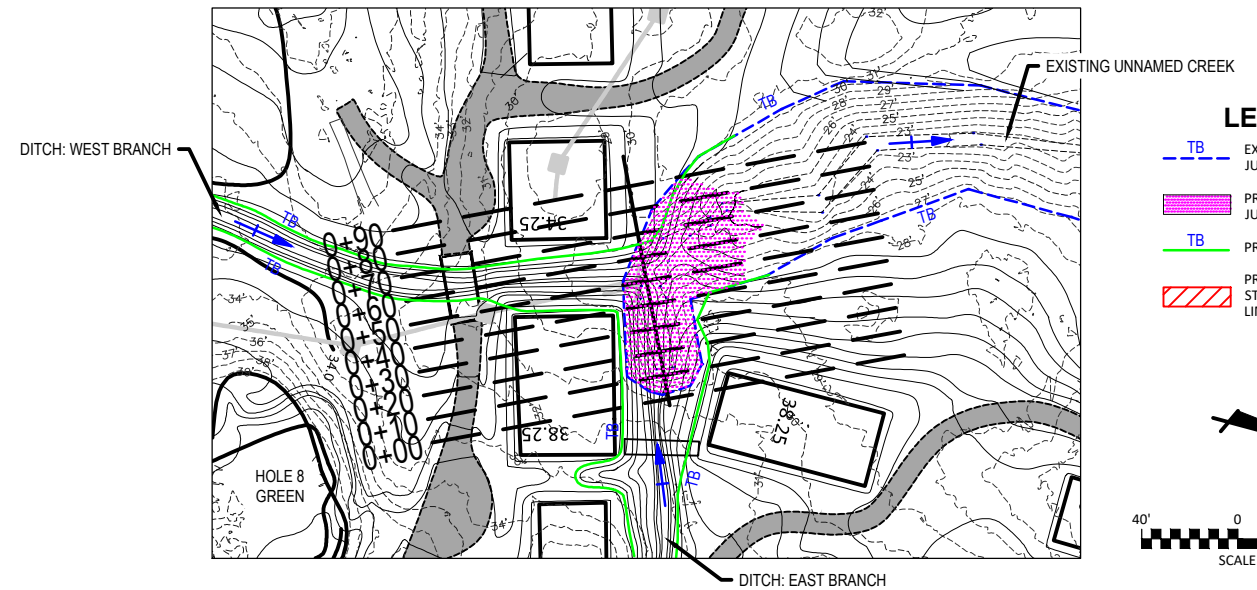
AREA FILL: 76.6 SQ FT  
VOLUME FILL: 17.4 CU YD



AREA FILL: 89.0 SQ FT  
VOLUME FILL: 30.7 CU YD



TOTAL FILL:  
190.7 CU. YD



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**BELLEAIR COUNTRY CLUB  
WEST COURSE IMPROVEMENT**

**FIGURE 5.2  
UNNAMED CREEK CONNECTION  
CROSS SECTIONS**

DATE: 9/11/20  
MCE PROJ. # 07334-0001  
DRAWN: TLW  
DESIGNED: TLW  
CHECKED: P.J.L.  
PROJ. MGR: TLW

STATUS:

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SCALE  
HORIZONTAL: AS NOTED  
VERTICAL: N/A  
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PREPARED BY MCKIM & CREED  
JULY 10, 2020

FIGURE 6

SKETCH OF STORM SEWER SYSTEM  
AT OUTFALL OF UNNAMED CREEK  
NOT TO SCALE

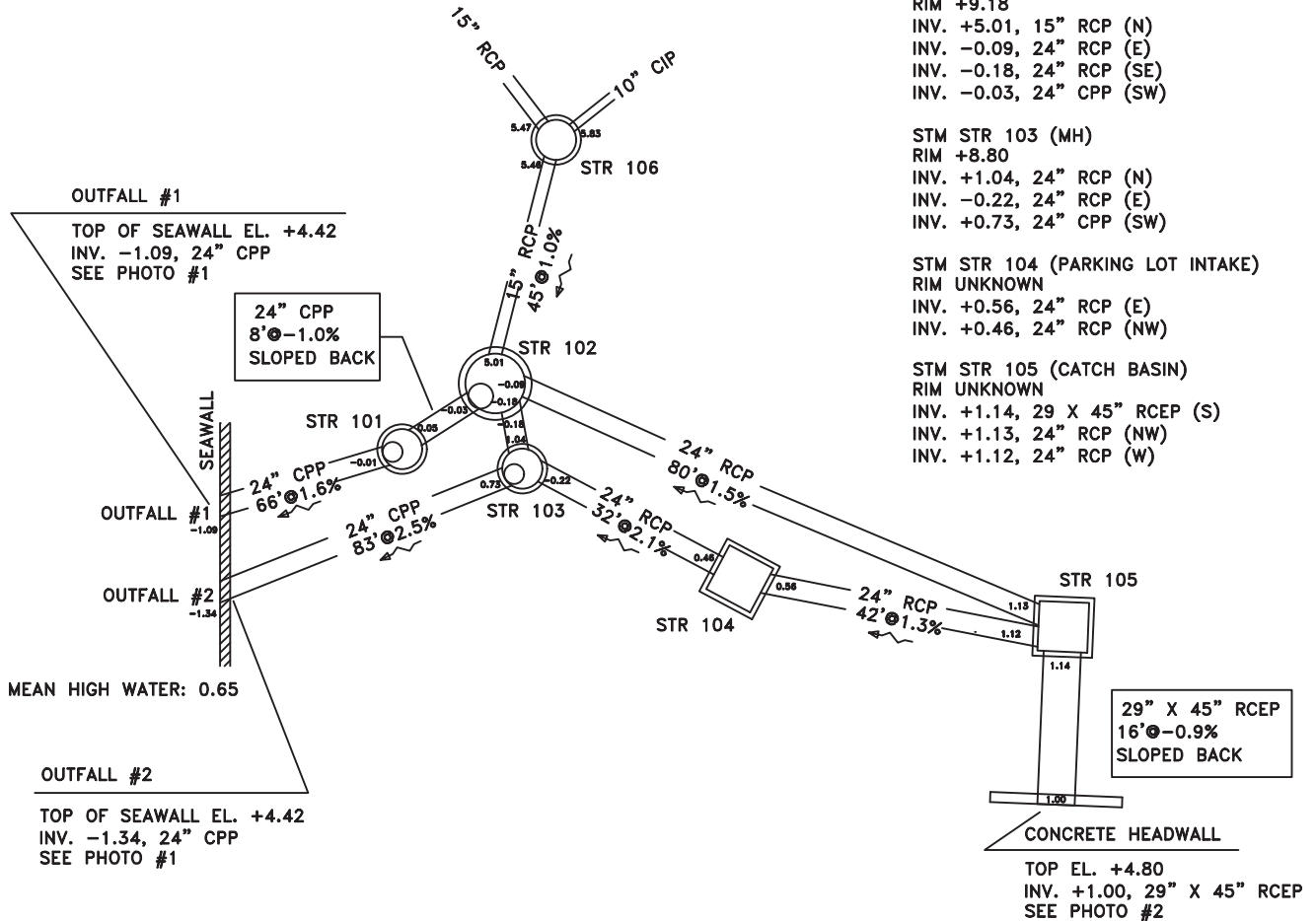


PHOTO 1:  
OUTFALL OF UNNAMED CREEK TO  
CLEARWATER HARBOR  
PHOTOGRAPH BY ANDY NEISWENDER ON JUNE 26, 2020



PHOTO 2:  
UNNAMED CREEK CULVERT CONNECTION  
PHOTOGRAPH BY ROB TOTH ON JUNE 9, 2020