



July 5, 2019

Carolina Bay, LLC.

Via: Ms. Patty Kennedy
PKennedy@ecovestcap.com

Re: Carolina Bay Canal
North Myrtle Beach, SC

Dear Ms. Kennedy:

Per your request on June 27, 2019 we have visited the Carolina Bay, LLC property and the canal crossing identified by you. We have collected field survey data on the canal and crossing pipes and have observed the local geography to determine drainage contributory areas. This canal drains an area of approximately +/- 1,100 acres including the nearby mining operation and various "Carolina Bays" to the north of Highway 31.

We modeled the various drainage contributory areas in order to create a drainage model of the canal prior to the instillation of the current crossing. Hydrographic information was estimated using publicly available land cover information, soil type data, and drainage paths. The existing canal appears to have a cross sectional area of approximately 165sf with a top of bank width of approximately 30ft as shown in Appendix A. Approximately 125 linear feet of the canal was surveyed roughly centered around the existing crossing, linear slope along this section of canal appears to be approximately 4%. Soils in the area appear to consist of sands and clayey sands which are highly erodible.

Our calculations focused on the 25 year and 100 year storms as they will be the driving factors in designing a new crossing apparatus. The total canal flow and flow depth are in Table 1 below. More detailed results are attached in Appendix B.

| | Channel Flow (cfs) | Flow Depth (ft) |
|----------|--------------------|-----------------|
| 25 Year | 1732.41 | 6.99 |
| 100 Year | 2601.30 | 8.32 |

Table 1: Hydraulic Analysis Results

During our visit to the site it appears that significant erosion of the channel has occurred in the recent past. It also appears that the existing canal crossing, utilizing 2-48"

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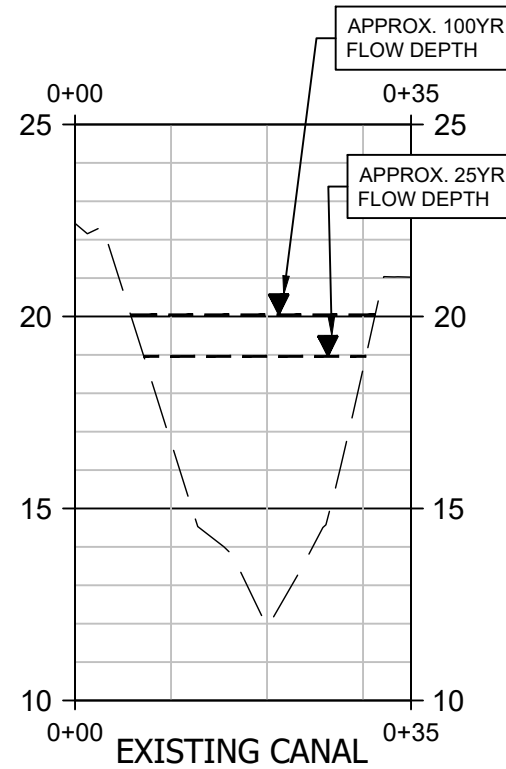
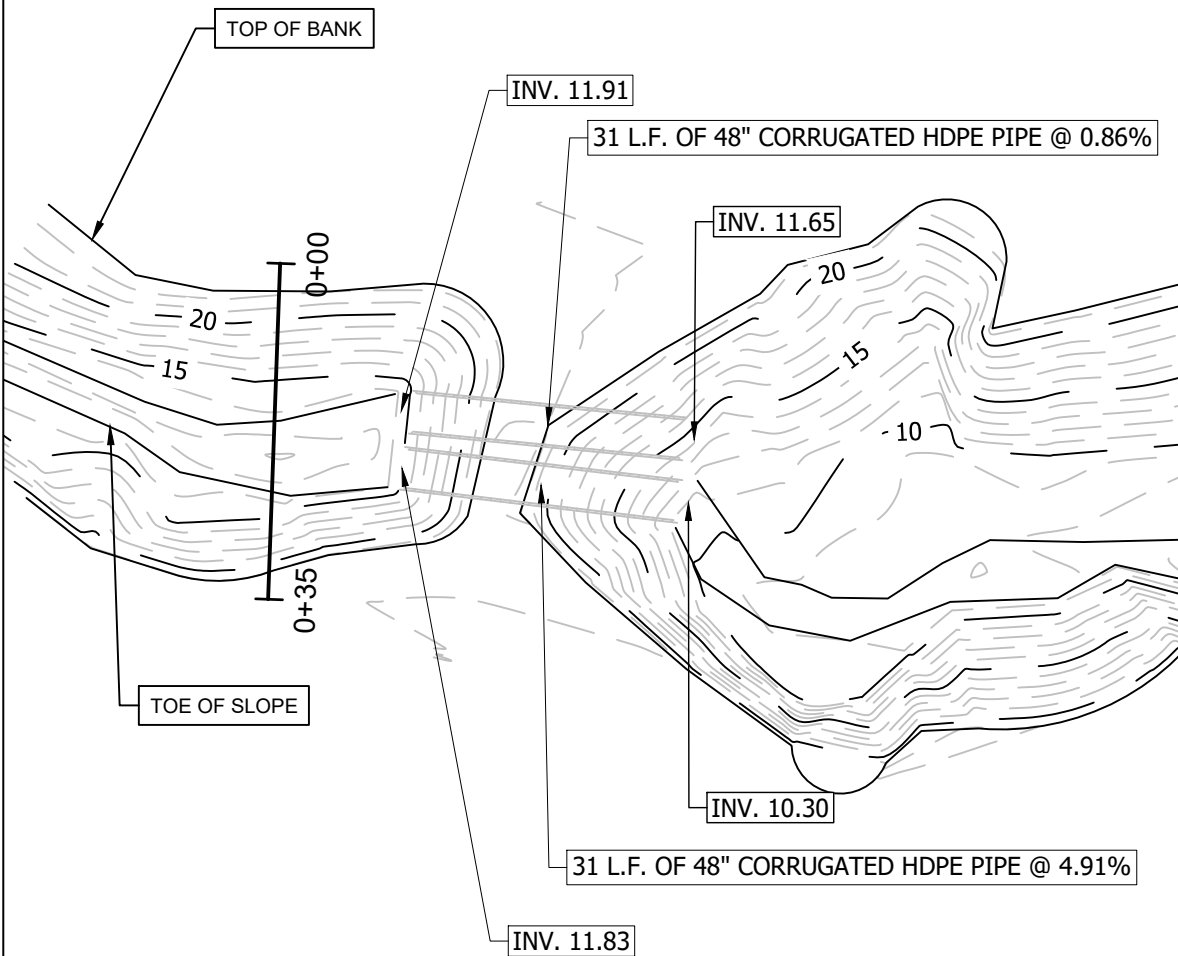
Corrugated Plastic Pipes was over topped at some point in the recent past, likely in the Hurricane Florence rain event of September 2018. The combined flow capacity of these two existing pipes is estimated to be approximately 533 cubic feet per second.

At this time we recommend that a new canal crossing be designed as the current solution appears to be inadequate. This new crossing design should take into account the flows generated by the tributary drainage area and the likelihood of large debris within the flow. This new crossing design may take the form of a bridge, box culvert, pre-fab metal culvert, or other large stream crossing system.

Sincerely,
Development Resource Group, LLC

W. Austin Graham P.E.

W. Austin Graham, P.E.



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EXISTING CANAL CROSS SECTION

CAROLINA BAY, LLC

JOB NO: 19.157

SCALE: 1" = 20'

DRAWN BY: WAG

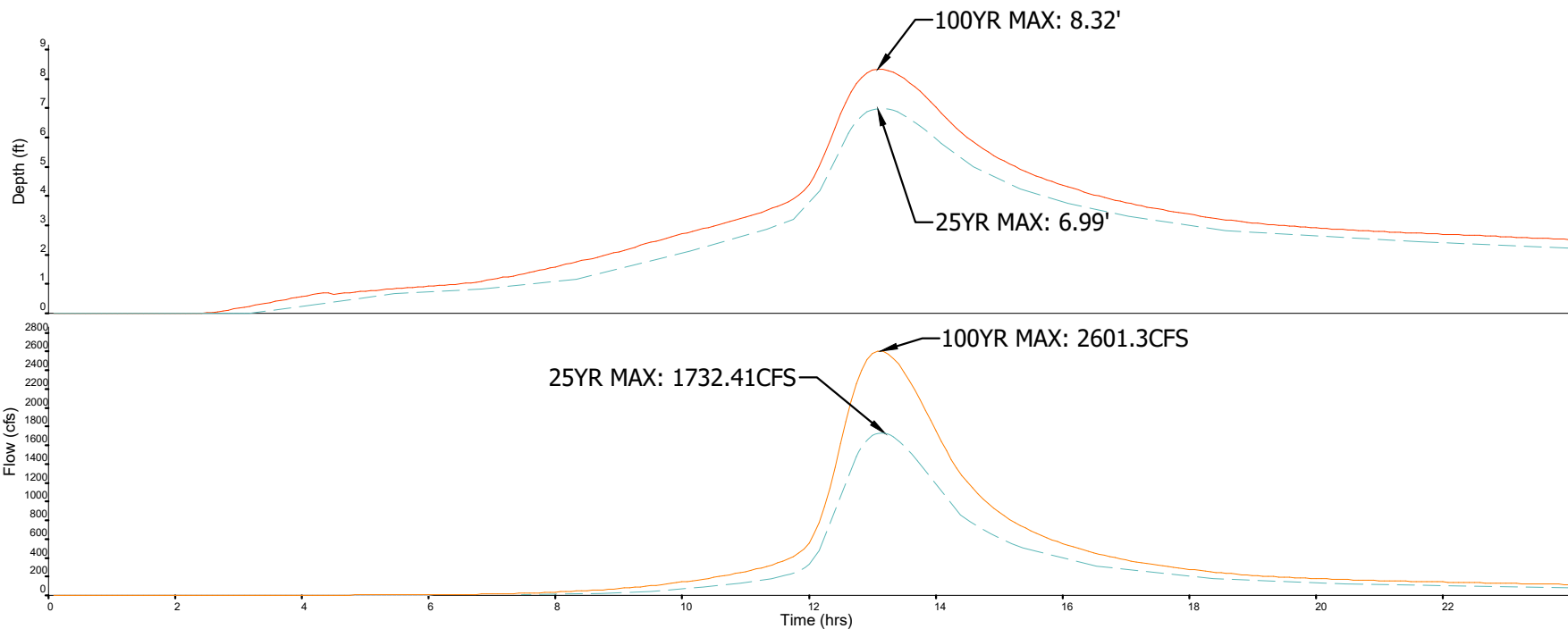
CHECKED BY: WAG

DATE: 7/5/19

EXHIBIT NUMBER:

A

P:\19157 - CAROLINA BAY CULVERT REHABILITATION\DESIGN\REPORTS\CALCULATIONS\DRAINAGE\CANAL GRAPH.DWG 7/5/2019 10:57 AM



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HYDRAULIC MODEL RESULTS

CAROLINA BAY, LLC

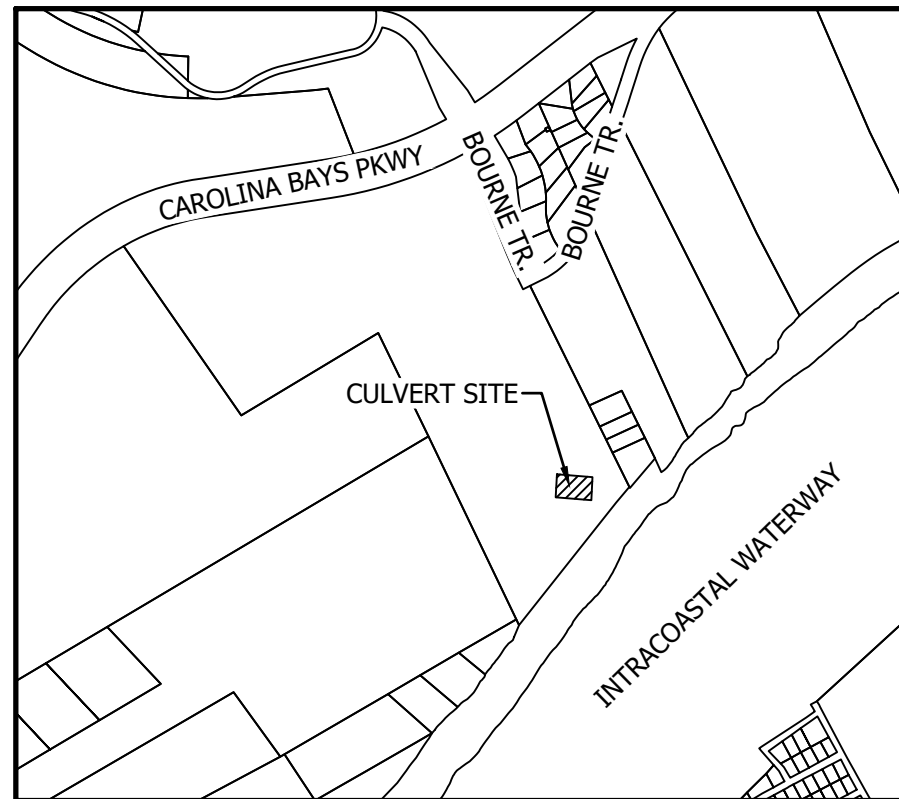
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| JOB NO: | 19.157 |
| SCALE: | N.T.S. |
| DRAWN BY: | WAG |
| CHECKED BY: | WAG |
| DATE: | 7/5/19 |
| EXHIBIT NUMBER: | |

B

P:\20153 - ECOVEST - SANDRIDGE\HARDWOOD SOUTH\CAROLINA BAY - CULVERT REHABILITATION\DESIGN\DRAWINGS\SHEET DRAWINGS\20153 HWS CULVERT COVER\20201016\$25FAM\1.S.DWG

HARDWOOD SOUTH CULVERT

SITE LOCATION
0.5 MILES SOUTHEAST FROM
INTERSECTION OF CAROLINA
BAYS PKWY & BOURNE TR.



LOCATION MAP / VICINITY MAP
SCALE N.T.S.

SHEET INDEX

| DESCRIPTION | SHEET |
|----------------------------|-------|
| COVER SHEET | A |
| SITE PLAN | B |
| GRADING & DRAINAGE PLAN | C |
| CULVERT PROFILES | D |
| ROADWAY CENTERLINE PROFILE | E |
| DETAILS | F-G |



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COVER

DRAINAGE CULVERT

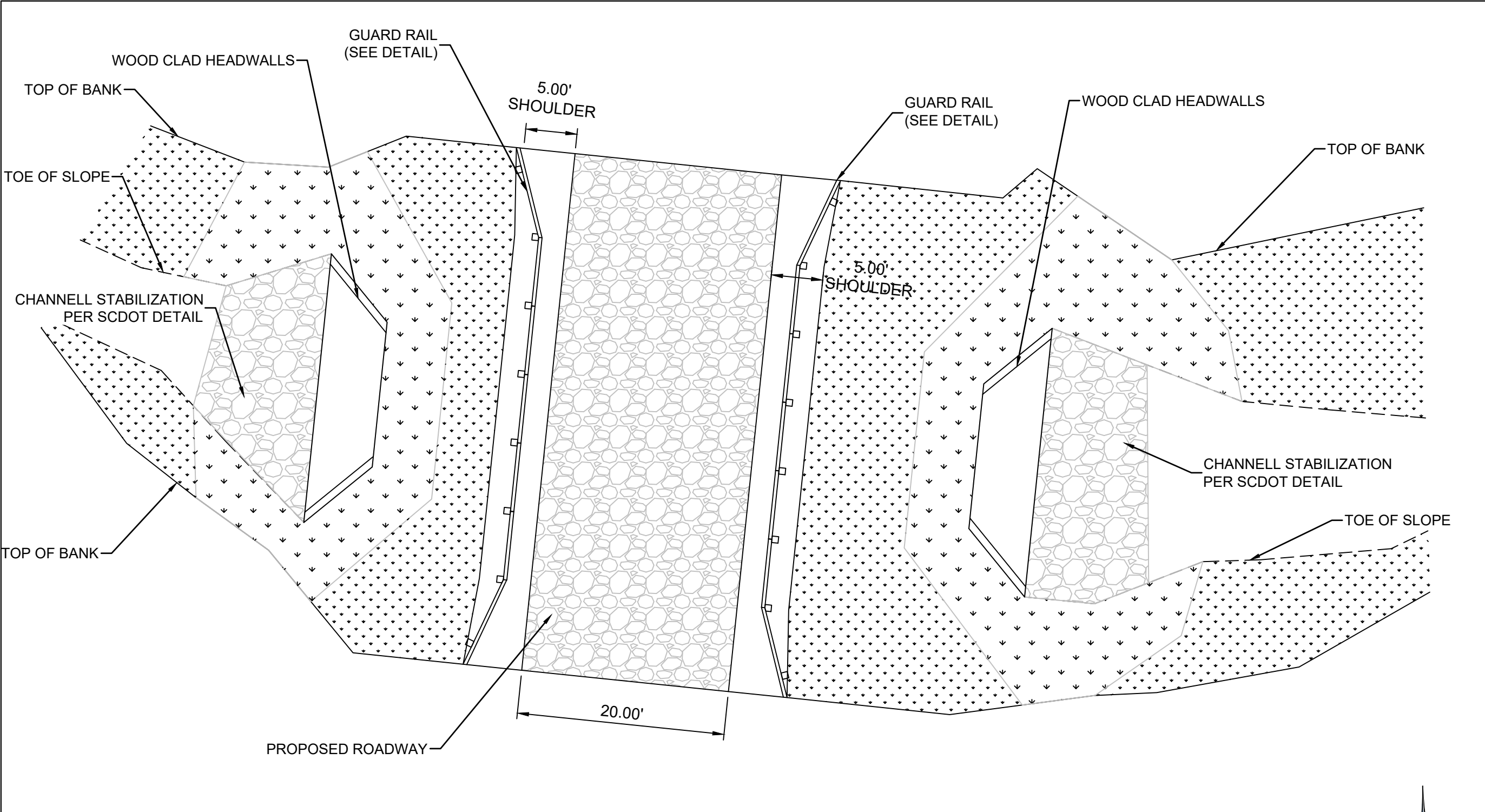
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| SCALE: | NTS |
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| CHECKED BY: | WAG |
| DATE: | 9/8/2020 |
| EXHIBIT NUMBER: | |

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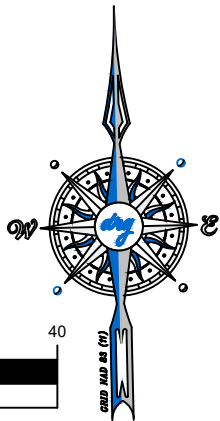
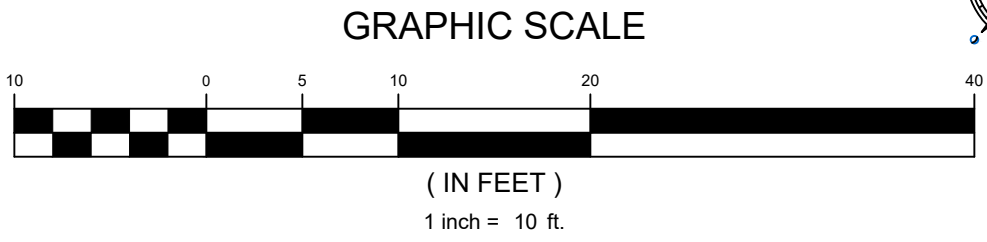


**Know what's below.
Call before you dig.**

P:\20153 - ECOVEST - SANDRIDGE\HARDWOOD SOUTH\CAROLINA BAY - CULVERT REHABILITATION\DESIGN\DRAWINGS\153 HWS CULVERT SITE PLAN.dwg 9/8/2020 10:25 AM



| PLAN LEGEND | |
|-------------|---------------------|
| | CLASS B RIP-RAP |
| | GRAVEL ROADWAY |
| | GRASS STABILIZATION |



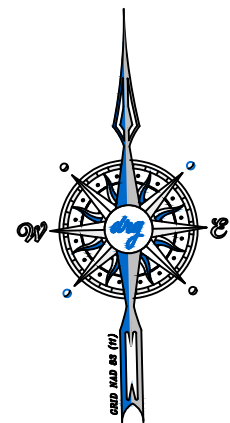
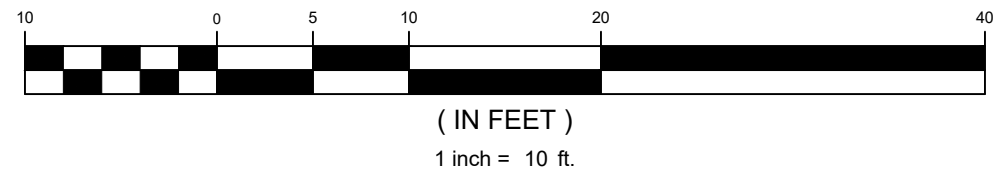
DEVELOPMENT RESOURCE GROUP, LLC
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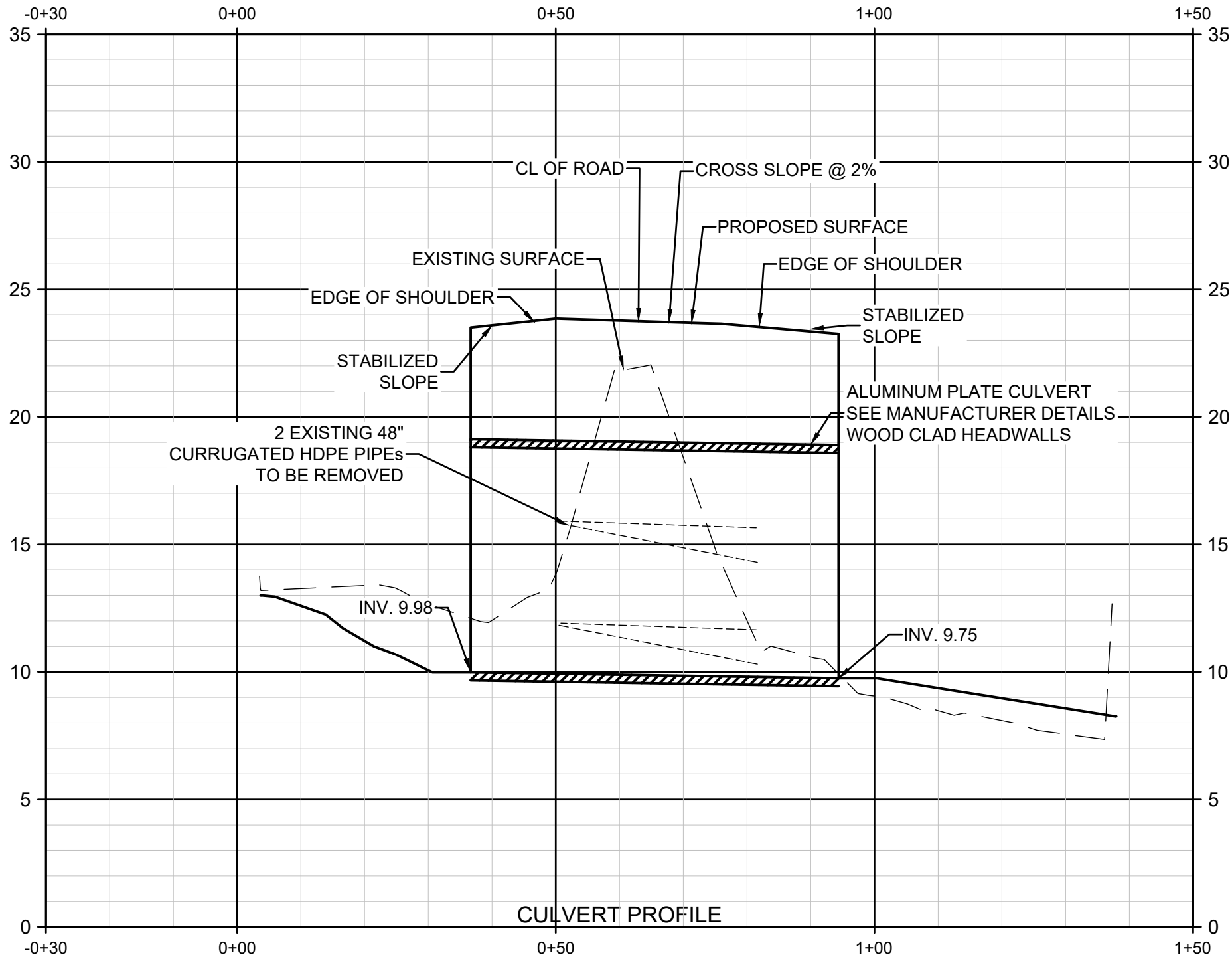
SITE PLAN

DRAINAGE CULVERT

| | |
|-----------------|----------|
| JOB NO: | 20.153 |
| SCALE: | 1" = 10' |
| DRAWN BY: | IPO |
| CHECKED BY: | WAG |
| DATE: | 9/8/2020 |
| EXHIBIT NUMBER: | |

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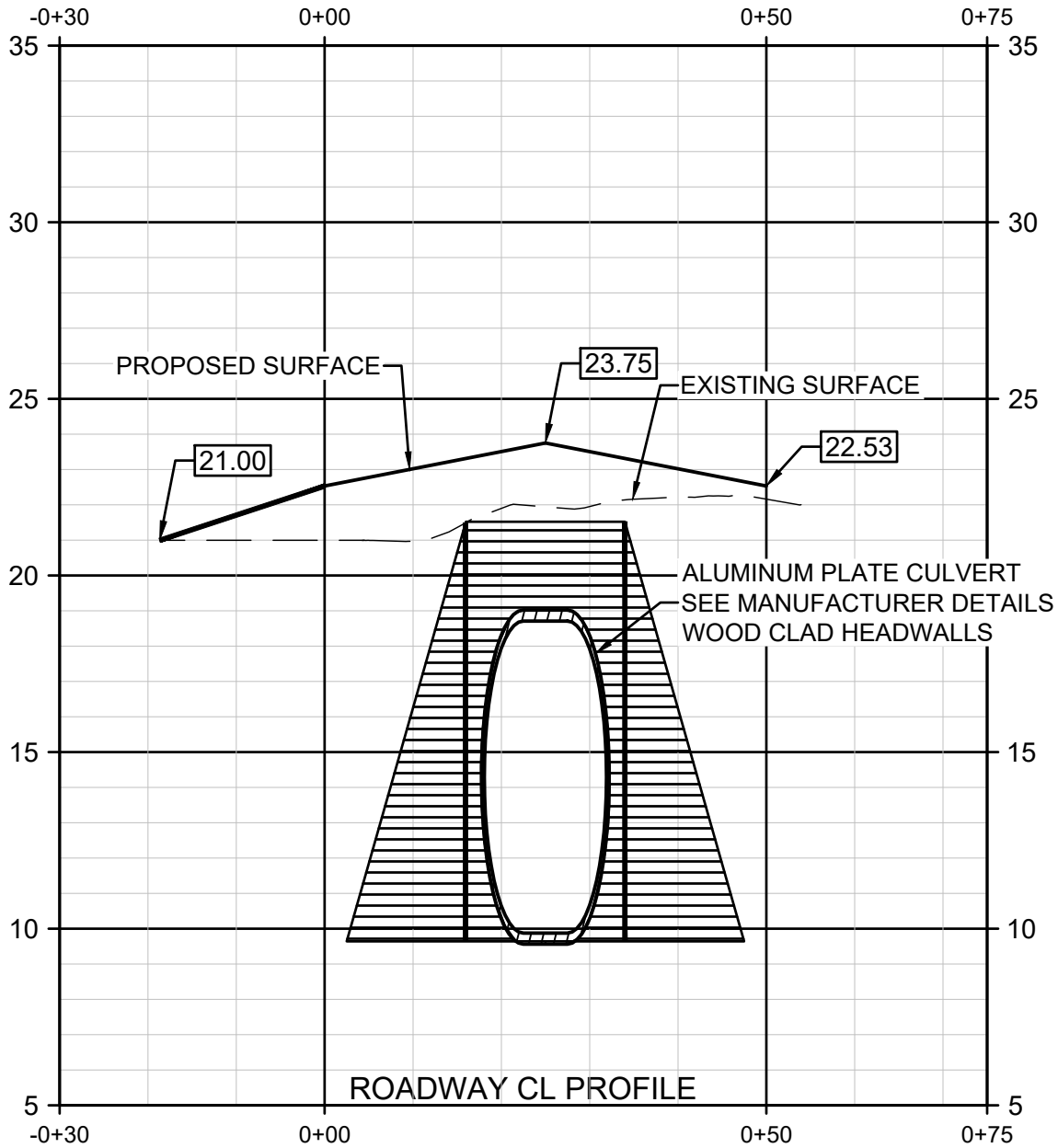
CULVERT PROFILE

DRAINAGE CULVERT

| | |
|-------------|----------|
| JOB NO: | 20.153 |
| SCALE: | 1" = 20' |
| DRAWN BY: | IPO |
| CHECKED BY: | WAG |
| DATE: | 9/8/2020 |

EXHIBIT NUMBER:

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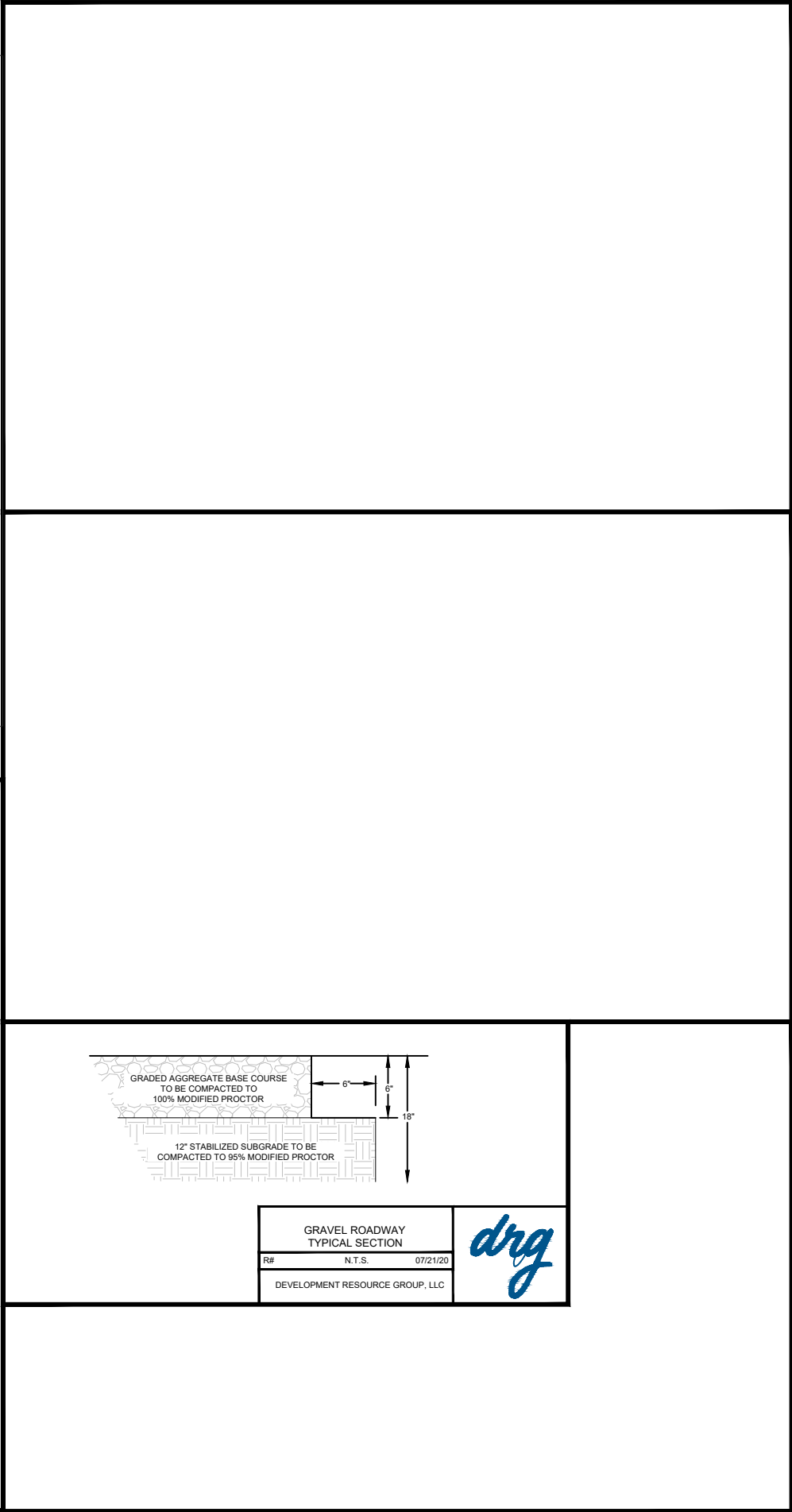
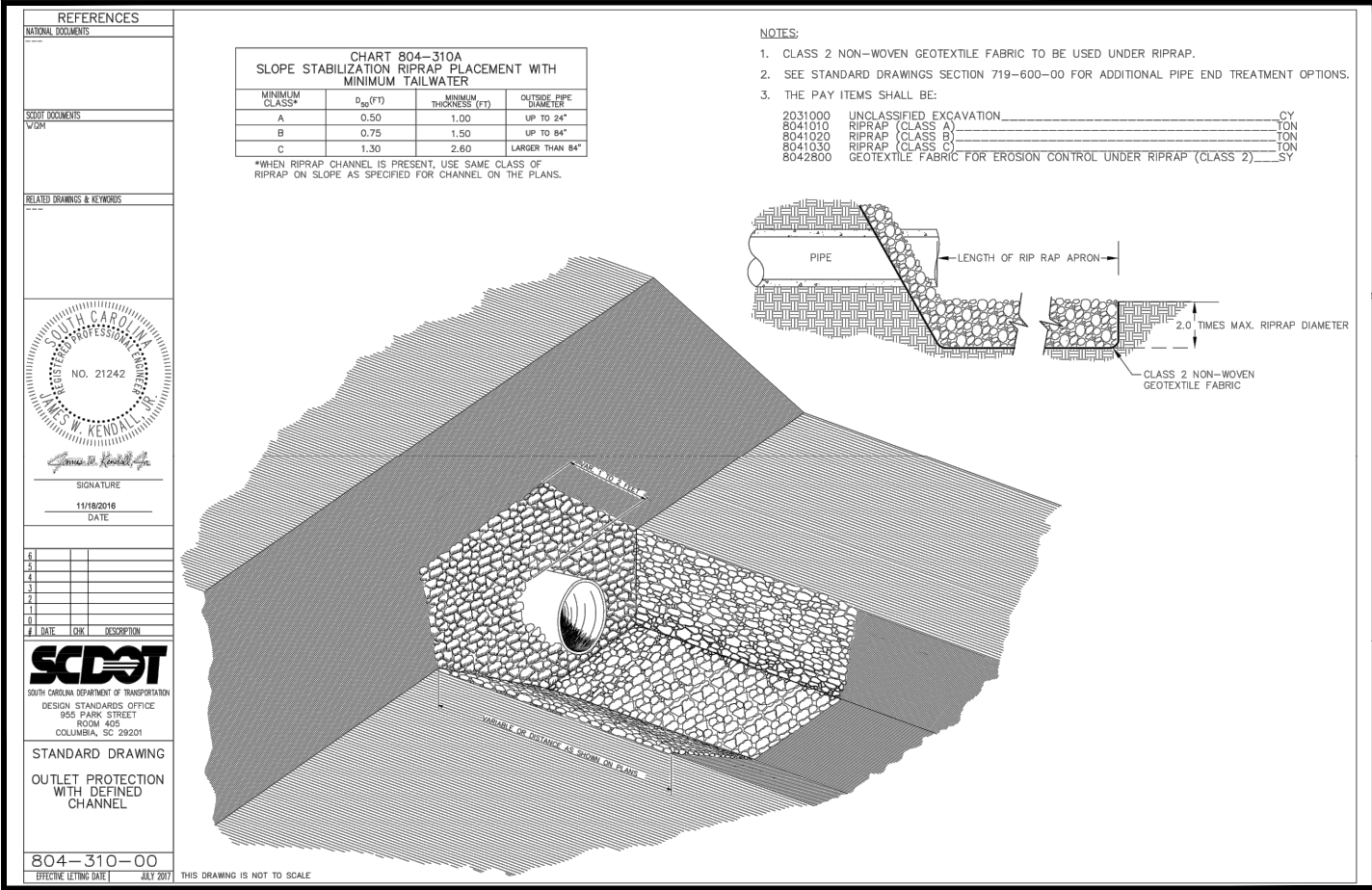
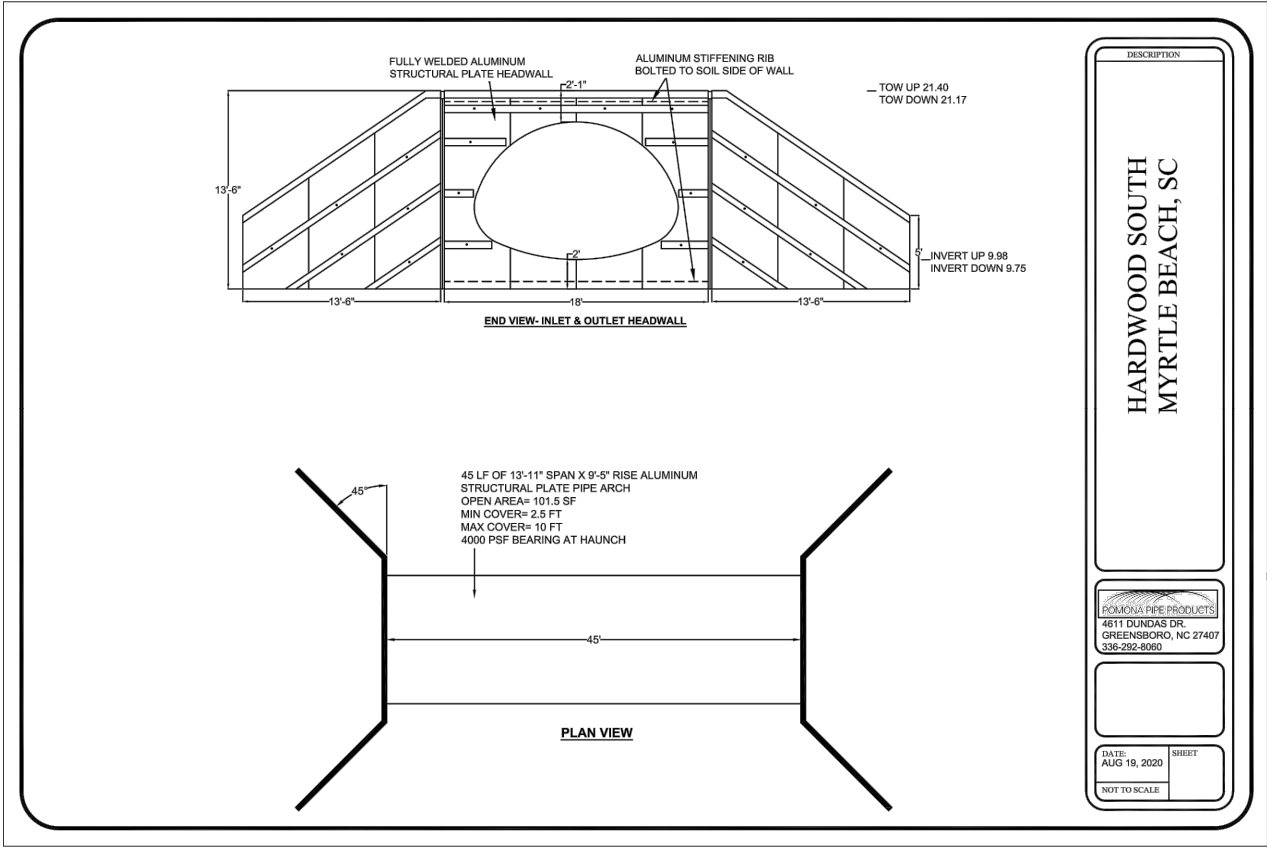
ROADWAY CL PROFILE


DRAINAGE CULVERT

| | |
|-------------|----------|
| JOB NO: | 20.153 |
| SCALE: | 1" = 20' |
| DRAWN BY: | IPO |
| CHECKED BY: | WAG |
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EXHIBIT NUMBER:

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DETAILS 1

DRAINAGE CULVERT

JOB NO: 20.153

SCALE: 1:2_XREF

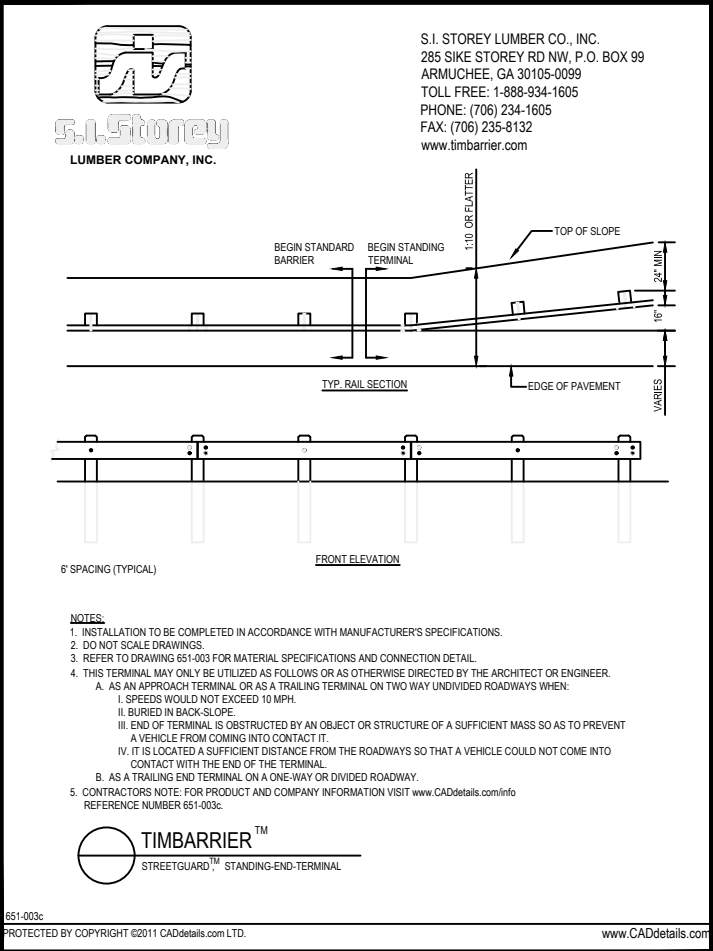
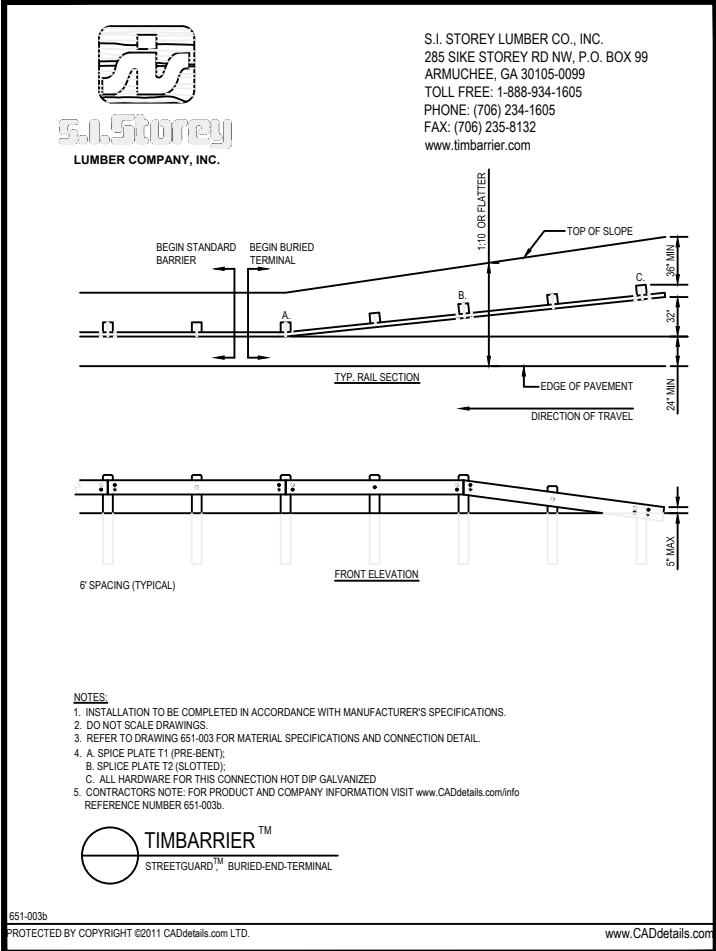
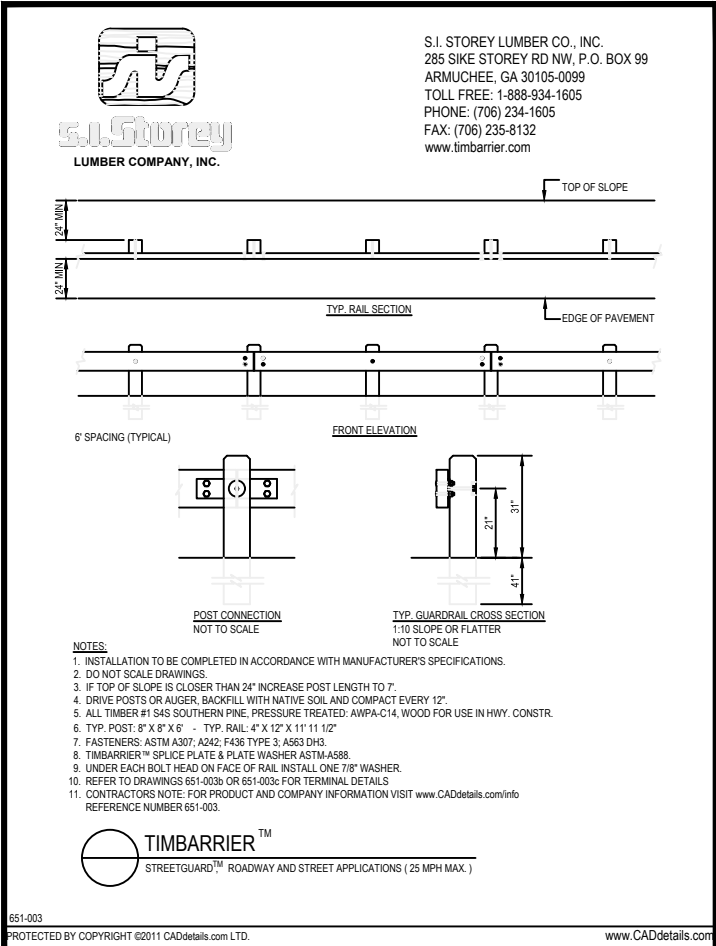
DRAWN BY: IPO

CHECKED BY: WAG

DATE: 9/8/2020

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DETAILS 2

DRAINAGE CULVERT

JOB NO: 20.153
SCALE: 1:2_XREF
DRAWN BY: IPO
CHECKED BY: WAG
DATE: 9/8/2020

EXHIBIT NUMBER:

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