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**TO:** Eric Larson, Beaufort County Director of Environmental Engineering

**CC:** Danny Polk, Beaufort County Project Manager/ Stormwater Inspections Superintendent

**FROM:** Michael Klink, P.E.

**DATE:** June 16, 2016

**RE:** Drainage Analysis for McTeer Drive Ditch at Avenue of Oaks and Waldon Property

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**Background:**

Four Waters Engineering, Inc. (4Waters) has been tasked by Beaufort County to conduct a drainage analysis of a ditch that generally flows from the southwest to northeast. The ditch is located on St. Helena Island, SC between Avenue of Oaks and McTeer Drive (see Appendix A for Aerial Vicinity Map with ditch location and Appendix B for USGS Map). The southwest ditch appears to flow via culvert under McTeer Drive to the northeast ditch, which then connects to a 24" pipe that discharges to the St. Helena Sound on the Waldon property. Property owners of parcels adjacent to the ditch have notified the County of the land's inability to drain, the effect of this poor drainage on proper function of several septic tank fields in the area, and continued static water. The County has asked 4Waters to conduct a drainage analysis of the ditch to determine the drainage basin of the ditch, calculate ditch and culvert flows, review survey data to evaluate the existing topography and ditch obstructions, and develop preliminary drainage design improvements.

**Existing Conditions and Watershed:**

The subject ditch is located between McTeer Drive and Coffin Point Road and flows from the southwest to the northeast towards the St Helena Sound. Appendix C shows the location of the ditch and other drainage features. The area consists of undeveloped and developed wooded and grassed residential lots and dirt roads with a drainage ditch system throughout the area. The lots adjacent to the ditch to the northwest range in size from approximately 1 to 7 acres and the lots adjacent to the ditch to the southeast range in size of 1 to 3 acres. The houses built on the lots to northwest of the ditch have approximately 1% to 7% impervious surfaces, which creates an insignificant amount of stormwater runoff from the impervious areas that do not directly connect to the drainage ditch. The lots to the southeast are undeveloped.

The delineated drainage basin is approximately 71 acres and located between Sea Pines Drive and McTeer Drive to the south and Coffin Point Road to the north and Janette Drive to the west and McTeer Drive to the east (see Appendix C for the delineated drainage basin). The drainage basin elevations range from approximately 4' to 15' (NAVD 88), with the lowest elevations located at the outfall to the St. Helena Sound. The watershed is located in the A9 flood zone with the majority of

the area having a flood elevation of 14' (NGVD 29), refer to Appendix D. The soils located in this drainage area consists of Wando (Wd), Seewee (Sw), Rosedhu (Ro), Bohicket (Bk), and Ridgeland (Rd) with associated Hydrologic Soils Groups (HSG) of "A", "B", "B/D", "D", and "B/D" respectively. See Appendix E for the Soils Map. HSG "A" soils have low runoff potential and high infiltration rates even when thoroughly wetted; HSG "B" soils have moderate infiltration rates when thoroughly wet; and HSG "B/D" soils have moderate infiltration rates until soils become thoroughly wet, which then have "D" soil characteristics of low infiltration rates. The tide ranges from Mean Higher-High Water of 3.90' and Mean Low Water of -2.58 (NGVD 29) based on the tide station located at Harbor River Bridge, St Helena Sound (see Appendix F for tide information).

### **Data Review, Field Reconnaissance, and Survey Data:**

4Waters conducted a site visit on May 19, 2016 to verify the survey, determine the drainage basin area, identify areas of concern, and determine a solution of the drainage issues occurring in the area. On May 17, 2016 a rain event occurred between 11:30AM to 7:00PM (36 hours prior to the site visit on May 19, 2016) in the amount of 2.4" per local recorded weather history data ([www.wunderground.com](http://www.wunderground.com)) for St. Helena Island, SC. According to property owners at Parcel 1H the drainage ditch was dry before the rain event occurred. The site visit conducted 36 hours after the rain event still showed flooding in some upstream areas of the drainage basin and areas where drainage was blocked. Appendix G includes figures of the surveyed ditch (NGVD 29) with photos of key areas of the ditch and estimated water elevations based on the ditch survey used during the site visit.

Based on the collected data, site visit, and review of the survey completed by Beaufort Surveying, Inc., 4Waters was able to identify the following drainage concerns. Refer to figures in Appendix G, starting downstream at Sheet 4 of 4 and going upstream to Sheet 1 of 4 in reference to the following observations:

- 24" CMP at the outfall is half buried and invert elevations indicate the pipe is too low and not effective for draining the ditch.
- Culvert under McTeer Drive that connects the upstream ditch to the southwest to the downstream ditch to the northeast was buried and located by Beaufort County. The culvert is an 18" RCP that is filled with debris and silt.
- The water elevation estimated at 7.2' just upstream of McTeer Drive indicates that the ditch is draining but considering standing water present and water marks from the rain event 36 hours ago the ditch is draining at a slow rate.
- Culvert under McTeer Drive appears to be draining the ditch at a slow rate by infiltration through sandy soils that exist closer to St. Helena Sound.
- Based on amount of debris and silt at the McTeer Drive culvert indicates this pipe has not been in full operation for several years.
- Estimated upstream elevations and standing water indicate that the ditch is draining to the northeast. It is evident from property owners and conducted site visits that the water flows in the northeast direction towards McTeer Drive and to the St. Helena Sound.
- The ditch appears to have dirt filled in at Parcel 222J. This debris location is indicated on the survey with an elevation of 9.8'. The estimated water level upstream of the blocked ditch is at elevation of 9.5'. The dirt appears to be a way to cross the ditch by foot or horse.

- Upstream of the blocked ditch at Parcel 222J water marks on trees and water level indicate limited infiltration or drainage. Water level decreased approximately 2" to 3" in the past 24 to 36 hours.
- Upstream estimated water elevation appears to be 9.5' at Parcels 222H, 579, and 222F.
- South portion of Parcel 222 floods heavily due to the low elevation of the yard, grade at ditch near the fence line, and water elevation of the ditch (estimated to be an elevation of 9.5').
- The 16" DIP is  $\frac{3}{4}$ th full of water, estimated water elevation is 9.25' based on survey DIP invert elevation.
- Approximately 800' to the southwest from the 16" DIP at Jannete Drive and Sea Pines Drive the road swales and ditches are flooded with no water movement indicated.
- The ditch and surrounding areas starting at the ditch blocked by dirt at Parcel 222 and upstream to Jannete Drive experienced flooding after the 2.4" rain event with little to no drainage in the past 36 hours.

Another site visit was conducted on June 2, 2016 after Tropical Storm Bonnie passed through Beaufort County on May 30, 2016. The site visit concluded that the roadway at McTeer Drive was overtopped by the water from the upstream ditch. It was evident that water was flowing through the culvert under McTeer Drive to the 24" CMP and outfalling to the St. Helena Sound. The culvert at McTeer Drive was still clogged; however, the amount of water upstream and pressure of the water stage allowed a small visible flow from the culvert. The site visit was conducted four days after the storm event and the area was still heavily flooded.

### **Drainage Calculations:**

The peak stormwater runoff was calculated for the delineated drainage basin by incorporating the land cover and HGS classification of the soils to determine the curve number (CN) of the drainage basin and time of concentration (Tc). Based on CNs for the identified soils and land cover of woods, grass, dirt roads, and impervious surfaces of 3,000 ft<sup>2</sup> per lot (assumes future build-out per lot) a composite CN of 58 was calculated for the drainage basin (see Appendix H for TR-55 input and results). The Tc was determined to be approximately 2.7 hours from the farthest location of the drainage basin to the end of the ditch at McTeer Drive. Using the TR-55 methodology, the drainage basin peak stormwater runoff for the 2-yr, 24-hr storm event is 13.0 cfs, 10-yr, 24-hr storm event is 37.2 cfs, and 25-yr, 24-hr storm event is 49.8 cfs.

The current condition of the ditch with all blocked areas of the ditch removed is calculated to handle peak flows of approximately 11.2 cfs using a ditch bottom width of 3', ditch top width of 15', ditch slope of 0.04%, 3' to 1' ditch side slopes, and a Manning's "n" of 0.100 (not maintained, dense brush, high stage). The 24" CMP outfall to the St. Helena Sound is ultimately the allowable discharge to the St. Helena Sound and controls the allowable peak flow of the drainage ditch. The 24" CMP at a full flowing pipe with a Manning's "n" of 0.022 can handle a flow amount of 11.7 cfs. The condition of the existing ditch and outfall indicate that the existing ditch and outfall are capable of handling peak flows for approximately a 2-yr, 24-hr storm event.

The Beaufort County design standards for drainage ditches are to be designed to handle peak flows up to the 25-yr, 24-hr design storm. In order to handle the 25-yr, 24-hr storm event peak flow of 49.8 cfs the ditch would have to be reconstructed with a ditch bottom width of 6', ditch top width of 24', ditch slope of 0.04%, ditch side slopes of 3' to 1', and a Manning's "n" of 0.040 (clean ditch bottom and sides). In order for Beaufort County to maintain either a 2-yr, 24-hr design storm ditch or

a 25-yr, 24-hr design storm ditch, a drainage easement with an access easement will be required to provide maintenance of the ditch. The table below shows the design criteria required for both types of ditches and outfalls to be constructed per design storm with associated County minimum required drainage easements. The two preliminary design improvement scenarios are shown in Appendix I including required easements for Beaufort County to provide ditch maintenance.

**Design and Easement Requirements for 2-yr and 25-yr, 24-hr Storm Events:**

Description	Design Criteria	
	2 yr, 24 hr	25 yr, 24 hr
Storm Event	2 yr, 24 hr	25 yr, 24 hr
Peak Flow	13.0 cfs	49.8 cfs
<b>Outfall (McTeer Drive to St Helena Sound)</b>		
Pipe Size	24"	2- 30"
Slope	0.30% & 0.15%	0.35% & 0.15%
County Required Minimum Easement	20'	20'
<b>Ditch (16" DIP to McTeer Drive)</b>		
Bottom Width	Existing (~3')	6'
Side Slope	Existing (~3':1')	3':1'
Top Width	Existing (~15')	24'
Depth	Existing (~3')	3'
Slope	Existing (~0.04%)	0.04%
Manning's n	0.100	0.040
County Required Minimum Easement including 15' Access	30'	39'

**Recommended Drainage Improvements:**

After analysis of the LiDAR, survey data, USGS maps, soils maps, FEMA Flood Map, field reconnaissance, drainage calculations, and local discussions, 4Waters recommends the following ditch drainage improvements.

- Improve drainage system to allow for a minimum of 2-yr, 24-hr, design storm peak flows.
- Remove all debris throughout the ditch, specifically the dirt filled in at the ditch at Parcel 222J.
- Replace and raise the culvert across McTeer Drive with design invert elevations that provide positive drainage of the ditch.
- Remove or abandon 24" CMP and replace with new HDPE outfall pipe(s) with higher invert elevations to allow drainage of the ditch, limit tidal tailwater influence, ease permitting, and to avoid extension of the outfall pipe to an existing grade that is more visible near the St. Helena Sound.
- Install rip-rap on filter fabric at the outfall pipe(s) with rip-rap check dams to dissipate stormwater flow energy for erosion control prior to the St. Helena Sound.




At a minimum, 4Waters recommends improvements to the ditch that will accommodate existing flow amounts which approximate a 2-yr, 24-hr storm event. It appears that the drainage ditch has allowed for satisfactory drainage results for the residents in the area until recent years when debris and silt has blocked the drainage flow. Due to the heavy vegetation along and around the ditch, it is also recommended that the ditch and outfall be regularly maintained at a minimum of once a year to avoid debris blockage in the ditch and stormwater pipe(s) outfall.

If the County desires to increase the level of service of the drainage ditch to meet current design standards, the ditch must be enlarged and regraded to handle greater flows, along with installation of a larger outfall. Creating a larger ditch and drainage easement will require existing trees to be removed and additional permitting required with Ocean & Coastal Resource Management (OCRM) and U.S. Army Corps of Engineers (USACE) for reconstruction of the existing ditch.

## Appendix A



### Legend

-  Drainage Ditch
-  Drainage Basin
-  Parcels



## Appendix A Aerial Image and Vicinity Map McTeer Drive Ditch at Avenue of Oaks and Waldon Property

DISCLAIMER: This map is for reference and discussion purposes only. Data provided are derived from multiple sources with varying levels of accuracy. The information shown hereon is not intended for site specific use or design.





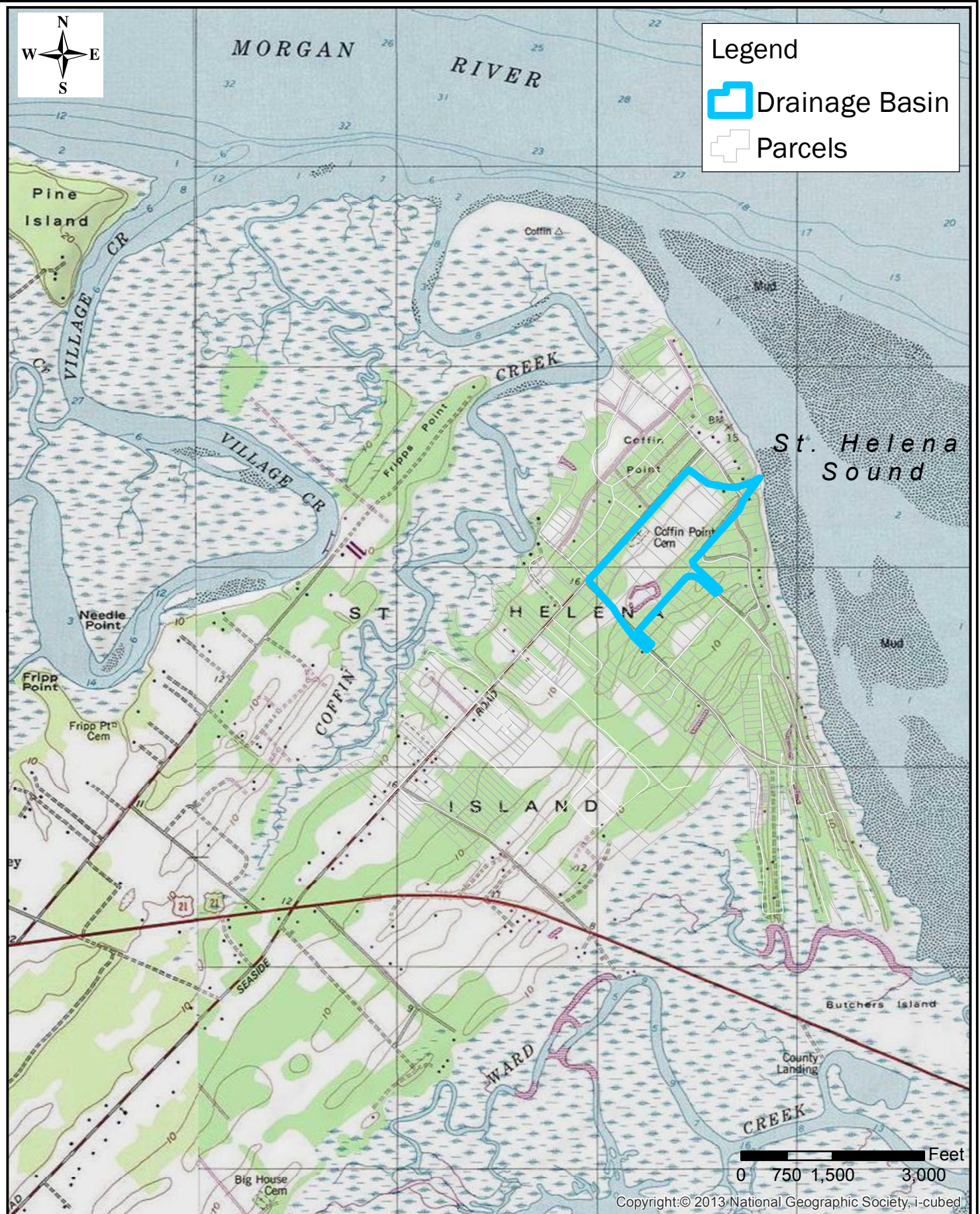
## Appendix B





Legend

-  Drainage Basin
-  Parcels



Appendix B  
USGS Map

McTeer Drive Ditch at Avenue of Oaks and Waldon Property



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## Appendix C












**Legend**

-  Drainage Basin
-  Parcels

**Drainage Feature**

-  Ditch
-  Pipe
-  Roadside Swale

**Elevation (NAVD 88)**

-  2 feet
-  4 feet
-  6 feet
-  8 feet
-  10 feet
-  12 feet
-  14 feet
-  16 feet
-  18 feet

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St. Helena Sound

## Appendix D



Zone A9  
(EL 14)

Zone A9  
(EL 15)

Zone V12  
(EL 16)

Zone V12  
(EL 17)

Zone A9  
(EL 16)

Zone V12  
(EL 18)

Zone V12  
(EL 16)

NATIONAL FLOOD INSURANCE PROGRAM

**FIRM**  
FLOOD INSURANCE RATE MAP

BEAUFORT  
COUNTY,  
SOUTH CAROLINA  
(UNINCORPORATED AREAS)

PANEL 135 OF 163  
(SEE MAP INDEX FOR PANELS NOT PRINTED)

NOTE:  
THIS MAP INCORPORATES APPROXIMATE  
BOUNDARIES OF COASTAL BARRIER RE-  
SOURCE SYSTEM UNIT AND/OR OTHER  
WIDE PROTECTED AREAS ESTABLISHED  
UNDER THE COASTAL BARRIER APPROVE-  
MENT ACT OF 1980 (PL 96-359).

COMMUNITY-PANEL NUMBER  
450025 0135 E

MAP REVISED:  
NOVEMBER 4, 1992



Federal Emergency Management Agency

KEY TO MAP

500-Year Flood Boundary	Zone B
100-Year Flood Boundary	Zone A1
Zone Designations*	Zone A5
100-Year Flood Boundary	Zone B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	EL 98/71
Base Flood Elevation In Feet Where Uniform Within Zone**	(EL 98/71)
Elevation Reference Mark	RM7X
Zone D Boundary	
River Mile	M1.5

\*\*Referenced to the National Geodetic Vertical Datum of 1979

UNDEVELOPED COASTAL BARRIERS

Identified 1980	Identified 1990	Otherwise Protected Areas
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\*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by Flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. No shading.
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and Flood Hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and Flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (Zones A and V) may be protected by flood control structures.

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all plainland features outside special flood hazard areas.

The coastal flooding elevations shown may include the effects of wave action and differ significantly from those determined by the National Weather Service for hurricane evacuation planning.

Coastal base flood elevations apply only landward of the shoreline shown on this map.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For adjoining map panels, see separately printed Map Index.

INITIAL IDENTIFICATION:  
SEPTEMBER 30, 1977

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:  
SEPTEMBER 30, 1977

FLOOD INSURANCE RATE MAP REVISIONS:

Map revised December 4, 1984  
to change zone designations and base flood elevations reflecting wave action effects.

Map revised September 29, 1986  
to change special flood hazard areas; base flood elevations and zone designations.

Map revised November 4, 1992  
to incorporate Coastal Barrier Resource System areas and/or otherwise protected areas.

Coffin

Creek

Project Area

Zone A9  
(EL 14)

APPROXIMATE SCALE

1000 0 1000 FEET

# Appendix D

## FEMA Flood Map

McTeer Drive Ditch at Avenue of Oaks and Waldon Property

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## Appendix E



# Appendix E Soils Map

McTeer Drive Ditch at Avenue of Oaks and Waldon Property

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## Appendix F



**Tidal Benchmark**

**Conversion from MLLW to Standard Data (NAVD88 and NGVD29)**

Station ID: **8668146**

Station Name: **Harbor River Bridge, St. Helena Sound, SC**

**Datum Station Information (Given):**

	Data (ft)	
Mean Higher-High Water	7.48	
Mean High Water	7.09	
Mean Tide Level	4.05	
Mean Sea Level	4.20	
Mean Low Water	1.00	
Mean Lower-Low Water	0.79	
North American Vertical Datum - 1988	4.51	
Highest Observed Water Level	9.13	date: 11/2/1975
Lowest Observed Water Level	-2.69	date: 11/13/1974
National Geodetic Vertical Datum 1929 (from Chart)	2.79	

**Tidal Datum - Above Mean Lower-Low Water:**

	Data (ft)	
	0.79	
Mean Higher-High Water	6.69	
Mean High Water	6.30	
Mean Tide Level	3.26	
Mean Sea Level	3.41	
Mean Low Water	0.21	
Mean Lower-Low Water	0.00	
North American Vertical Datum - 1988	3.72	
Highest Observed Water Level	8.34	date: 11/2/1975
Lowest Observed Water Level	-3.48	date: 11/13/1974

**Convert to NAVD88 and NGVD29:**

	Data (ft)		
	NAVD88	NGVD29	
<b>Mean Higher-High Water</b>	<b>2.97</b>	<b>3.90</b>	
Mean High Water	2.58	3.51	
Mean Tide Level	-0.46	0.47	
Mean Sea Level	-0.31	0.62	
<b>Mean Low Water</b>	<b>-3.51</b>	<b>-2.58</b>	
Mean Lower-Low Water	-3.72	-2.79	
North American Vertical Datum - 1988	0.00	0.93	
Highest Observed Water Level	4.62	5.55	date: 11/2/1975
Lowest Observed Water Level	-7.20	-6.27	date: 11/13/1974

# 8668146 HARBOR RIVER BRIDGE, ST. HELENA SOUND, SC



Home (/) / Stations (stations.html) / 8668146 HARBOR RIVER BRIDGE, ST. HELENA SOUND, SC

Station Info

Tides/Water Levels

Meteorological Obs.

Phys. Oceanography

## HARBOR RIVER BRIDGE, ST. HELENA SOUND, SC - Station ID: 8668146

Station Info

Today's Tides

Photos

Sensor Information

Observations

Directions and Map

Available Products

Established: Aug 20, 1974

Time Meridian: 75° W

Present Installation: Aug 20, 1974

Date Removed: 1976-02-19

Water Level Max (ref MHHW): 1.65 ft. Nov 02, 1975

Water Level Min (ref MLLW): -3.48 ft. Nov 13, 1974

Mean Range: 6.09 ft.

Diurnal Range: 6.69 ft.

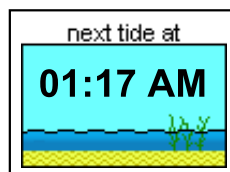
Latitude: 32° 24.2' N

Longitude: 80° 27.2' W

NOAA Chart#: 11517 (<http://www.charts.noaa.gov/OnLineViewer/11517.shtml>)

Met Site Elevation: ft. above

Today's Tides (LST/LDT)



12:20 AM	high	7.0 ft.
6:40 AM	low	-0.1 ft.
1:00 PM	high	6.0 ft.
6:54 PM	low	0.1 ft.

No photos are available for this station. (stationphotos.html?id=8668146)

**How to reach:** To reach the tidal bench marks from the post office in Frogmore, proceed east on U.S. Highway 21 for 12.9 km (8.0 mi) to the steel swing bridge over the north entrance to Harbor River. The bench marks are on the bridge and along the highway north of the bridge. The tide gauge and staff were on the bridge fender.



Show nearby stations

## Products available at 8668146 HARBOR RIVER BRIDGE, ST. HELENA SOUND, SC

### TIDES/WATER LEVELS

Water Levels

NOAA Tide Predictions (/noaatidepredictions/NOAATidesFacade.jsp?Stationid=8668146)

Harmonic Constituents

Sea Level Trends

Datums (/datums.html?id=8668146)

Bench Mark Sheets (/benchmarks.html?id=8668146)

Extreme Water Levels

Reports (/reports.html?id=8668146)

# 8668146 HARBOR RIVER BRIDGE, ST. HELENA SOUND, SC



Home (/) / Products (products.html) / Datums (stations.html?type=Datums) /  
8668146 HARBOR RIVER BRIDGE, ST. HELENA SOUND, SC

Station Info

Tides/Water Levels

Meteorological Obs.

Phys. Oceanography

## Datums for 8668146, HARBOR RIVER BRIDGE, ST. HELENA SOUND SC

### Elevations on Station Datum

**Station:** 8668146, HARBOR RIVER BRIDGE, ST. HELENA SOUND, SC

**Status:** Accepted (Jun 3 2003)

**Units:** Feet

**T.M.:** 75

**Epoch:** (/datum\_options.html#NTDE) 1983-2001

**Datum:** STND

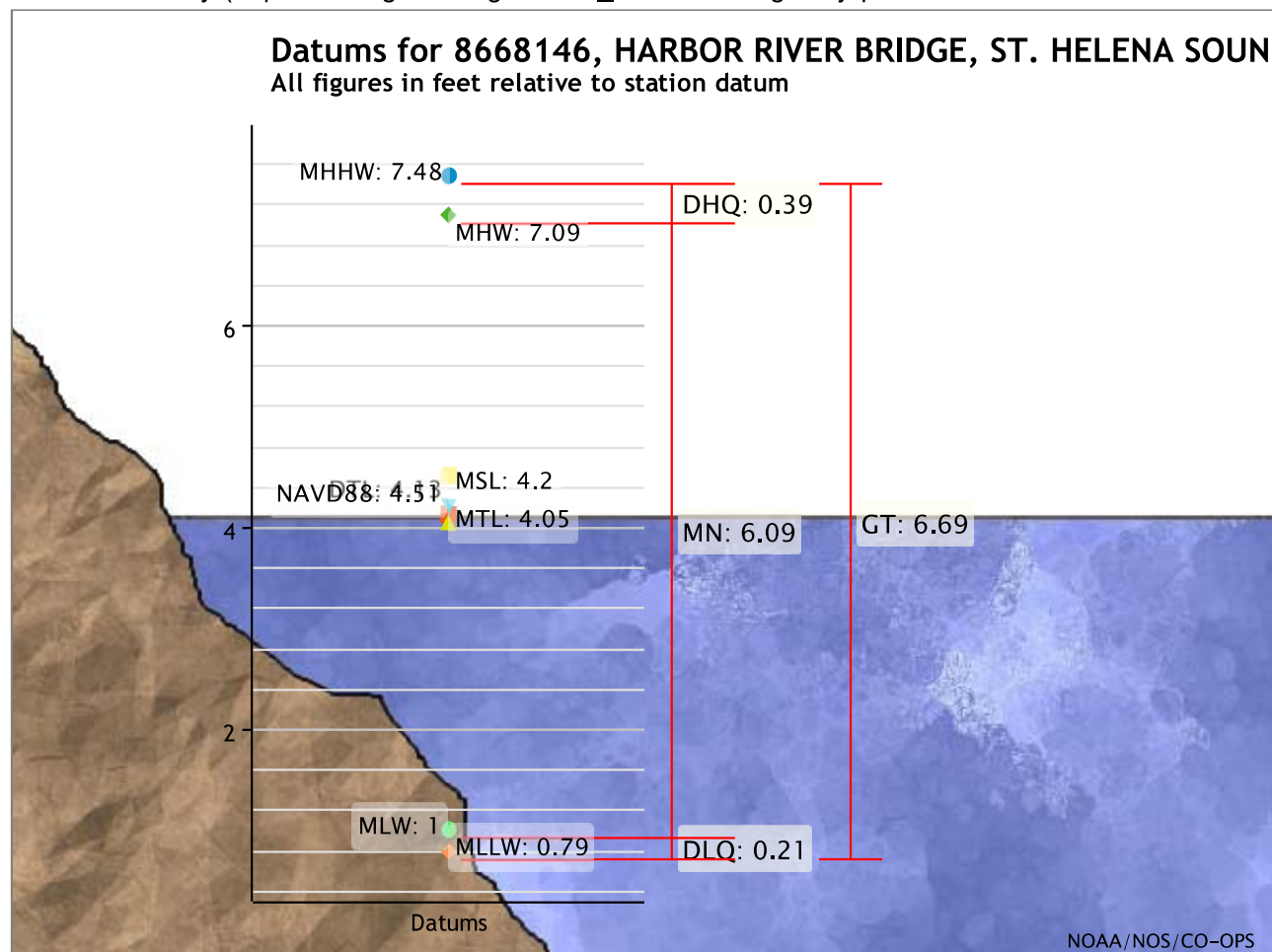
Datum	Value	Description
MHHW (/datum_options.html#MHHW)	7.48	Mean Higher-High Water
MHW (/datum_options.html#MHW)	7.09	Mean High Water
MTL (/datum_options.html#MTL)	4.05	Mean Tide Level
MSL (/datum_options.html#MSL)	4.20	Mean Sea Level
DTL (/datum_options.html#DTL)	4.13	Mean Diurnal Tide Level
MLW (/datum_options.html#MLW)	1.00	Mean Low Water
MLLW (/datum_options.html#MLLW)	0.79	Mean Lower-Low Water
NAVD88 (/datum_options.html)	4.51	North American Vertical Datum of 1988
STND (/datum_options.html#STND)	0.00	Station Datum
GT (/datum_options.html#GT)	6.69	Great Diurnal Range
MN (/datum_options.html#MN)	6.09	Mean Range of Tide
DHQ (/datum_options.html#DHQ)	0.39	Mean Diurnal High Water Inequality

DLQ (/datum_options.html#DLQ)	0.21	Mean Diurnal Low Water Inequality
HWI (/datum_options.html#HWI)	0.56	Greenwich High Water Interval (in hours)
LWI (/datum_options.html#LWI)	6.80	Greenwich Low Water Interval (in hours)
Maximum	9.13	Highest Observed Water Level
Max Date & Time	11/02/1975 06:36	Highest Observed Water Level Date and Time
Minimum	-2.69	Lowest Observed Water Level
Min Date & Time	11/13/1974 01:12	Lowest Observed Water Level Date and Time
HAT (/datum_options.html#HAT)		Highest Astronomical Tide
HAT Date & Time		HAT Date and Time
LAT (/datum_options.html#LAT)		Lowest Astronomical Tide
LAT Date & Time		LAT Date and Time

### Tidal Datum Analysis Periods

02/01/1975 - 01/31/1976

To refer water level heights to NAVD88 (North American Vertical Datum of 1988), apply the values located at National Geodetic Survey ([http://www.ngs.noaa.gov/Tidal\\_Elevation/diagram.jsp?PID=CK0845&EPOCH=1983-2001](http://www.ngs.noaa.gov/Tidal_Elevation/diagram.jsp?PID=CK0845&EPOCH=1983-2001)).



# Tidal Elevation

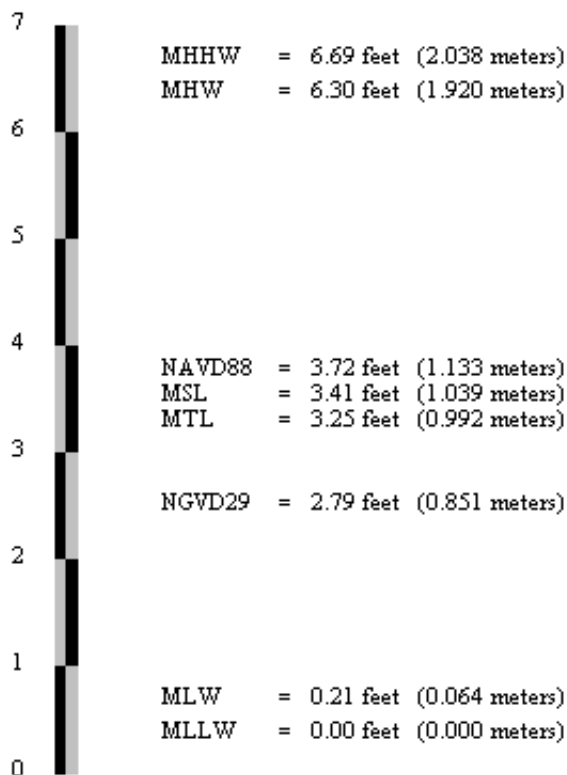
- [NGS Home](#)
- [About NGS](#)
- [Data & Imagery](#)
- [Tools](#)
- [Surveys](#)
- [Science & Education](#)

[Go Back to Main Page](#)

## ELEVATION INFORMATION

PID: CK0845  
 VM: 4461  
 STATION ID: 8668146  
 EPOCH: 1983-2001  
 DATE: Wednesday, May 11, 2016 11:25:29 AM EST



The NAVD 88 and the NGVD 29 elevations related to MLLW were computed from Bench Mark, 866 8146 TIDAL 1, at the station.

Displayed tidal datums are Mean Higher High Water(MHHW), Mean High Water (MHW), Mean Tide Level(MTL), Mean Sea Level (MSL), Mean Low Water(MLW), and Mean Lower Low Water(MLLW) referenced on 1983-2001 Epoch.

## Appendix G

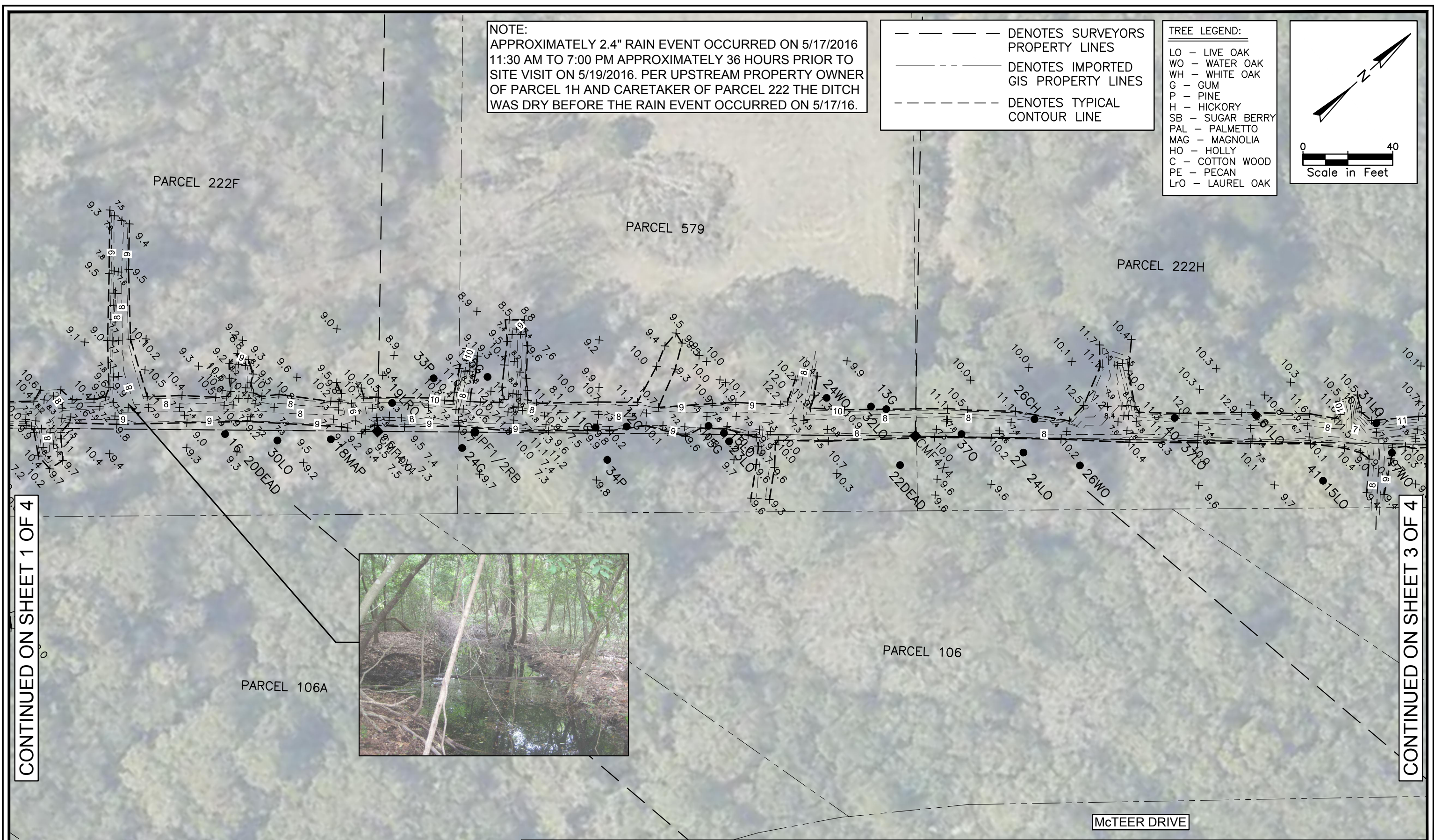
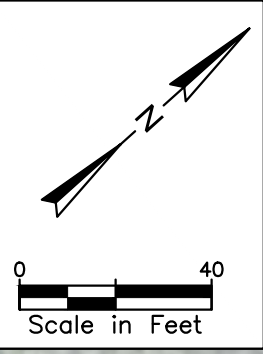




**NOTE:**  
 APPROXIMATELY 2.4" RAIN EVENT OCCURRED ON 5/17/2016  
 11:30 AM TO 7:00 PM APPROXIMATELY 36 HOURS PRIOR TO  
 SITE VISIT ON 5/19/2016. PER UPSTREAM PROPERTY OWNER  
 OF PARCEL 1H AND CARETAKER OF PARCEL 222 THE DITCH  
 WAS DRY BEFORE THE RAIN EVENT OCCURRED ON 5/17/16.

— — — — — DENOTES SURVEYORS  
 PROPERTY LINES  
 - - - - - DENOTES IMPORTED  
 GIS PROPERTY LINES  
 - - - - - DENOTES TYPICAL  
 CONTOUR LINE

**TREE LEGEND:**  
 LO - LIVE OAK  
 WO - WATER OAK  
 WH - WHITE OAK  
 G - GUM  
 P - PINE  
 H - HICKORY  
 SB - SUGAR BERRY  
 PAL - PALMETTO  
 MAG - MAGNOLIA  
 HO - HOLLY  
 C - COTTON WOOD  
 PE - PECAN  
 LrO - LAUREL OAK



CONTINUED ON SHEET 1 OF 4

CONTINUED ON SHEET 3 OF 4

McTEER DRIVE



SURVEY WITH SITE VISIT 5/19/2016 PHOTOS  
 McTEER DRIVE DITCH AT AVENUE OF OAKS AND WALDON PROPERTY  
 ST HELENA ISLAND, SOUTH CAROLINA  
 BEAUFORT COUNTY, SOUTH CAROLINA

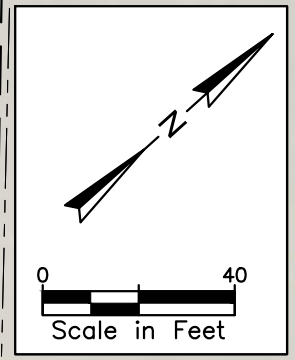
DESIGN MRK	DRAWN SLD	DRAWING NUMBER <b>2 of 4</b>
JOB NUMBER	16-1001	
ISSUE DATE	MAY-2016	
ISSUE	PRELIM	

WATER MARK FROM RAIN EVENT  
~2" TO WATER LEVEL



- DENOTES SURVEYORS PROPERTY LINES
- DENOTES IMPORTED GIS PROPERTY LINES
- DENOTES TYPICAL CONTOUR LINE

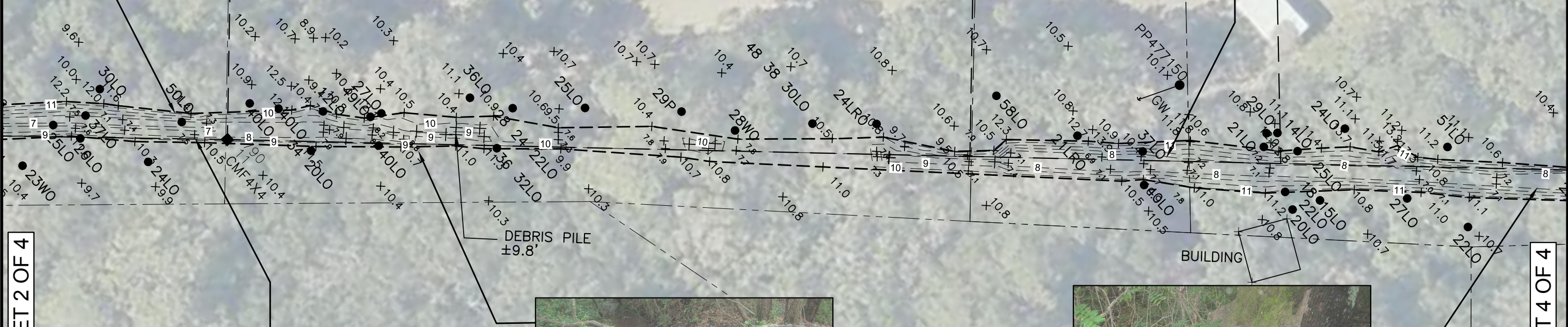
- TREE LEGEND:
- LO - LIVE OAK
  - WO - WATER OAK
  - WH - WHITE OAK
  - G - GUM
  - P - PINE
  - H - HICKORY
  - SB - SUGAR BERRY
  - PAL - PALMETTO
  - MAG - MAGNOLIA
  - HO - HOLLY
  - C - COTTON WOOD
  - PE - PECAN
  - LrO - LAUREL OAK



WATER LEVEL 3" FROM DITCH BOTTOM  
ESTIMATED WATER ELEV. =7.5'



NOTE:  
APPROXIMATELY 2.4" RAIN EVENT OCCURRED ON 5/17/2016 11:30 AM TO 7:00 PM APPROXIMATELY 36 HOURS PRIOR TO SITE VISIT ON 5/19/2016. PER UPSTREAM PROPERTY OWNER OF PARCEL 1H AND CARETAKER OF PARCEL 222 THE DITCH WAS DRY BEFORE THE RAIN EVENT OCCURRED ON 5/17/16.



CONTINUED ON SHEET 2 OF 4

CONTINUED ON SHEET 4 OF 4



UPSTREAM FROM DITCH AREA FILLED WITH DIRT. WATER ELEV ~2.5' FROM DITCH BOTTOM, ESTIMATED WATER ELEV.=9.5'



DITCH FILLED WITH DIRT FOR CROSSING BY FOOT AND/OR HORSE. SURVEY ELEV. =9.8'

McTEER DRIVE



WATER MARK ~ 12" ABOVE WATER LEVEL AND WATER LEVEL 6" FROM DITCH BOTTOM. ESTIMATED WATER ELEV. =7.5'



SURVEY WITH SITE VISIT 5/19/2016 PHOTOS  
McTEER DRIVE DITCH AT AVENUE OF OAKS AND WALDON PROPERTY  
ST HELENA ISLAND, SOUTH CAROLINA  
BEAUFORT COUNTY, SOUTH CAROLINA

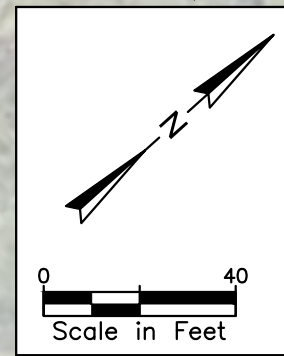
DESIGN MRK	DRAWN SLD	DRAWING NUMBER <b>3 of 4</b>
JOB NUMBER	16-1001	
ISSUE DATE	MAY-2016	
ISSUE	PRELIM	

DITCH WITH MINOR STANDING WATER.  
ESTIMATED WATER ELEV. =7.2'



- — — — — DENOTES SURVEYORS PROPERTY LINES
- — — — — DENOTES IMPORTED GIS PROPERTY LINES
- - - - - DENOTES TYPICAL CONTOUR LINE

- TREE LEGEND:
- LO - LIVE OAK
  - WO - WATER OAK
  - WH - WHITE OAK
  - G - GUM
  - P - PINE
  - H - HICKORY
  - SB - SUGAR BERRY
  - PAL - PALMETTO
  - MAG - MAGNOLIA
  - HO - HOLLY
  - C - COTTON WOOD
  - PE - PECAN
  - LrO - LAUREL OAK



OUTFALL TO ST HELENS SOUND



NOTE:  
APPROXIMATELY 2.4" RAIN EVENT OCCURRED ON 5/17/2016 11:30 AM TO 7:00 PM APPROXIMATELY 36 HOURS PRIOR TO SITE VISIT ON 5/19/2016. PER UPSTREAM PROPERTY OWNER OF PARCEL 1H AND CARETAKER OF PARCEL 222 THE DITCH WAS DRY BEFORE THE RAIN EVENT OCCURRED ON 5/17/16.

STORMWATER CULVERT PER BEAUFORT COUNTY GIS STORMWATER LAYER, INVENTORY CONDUCTED IN ~2004. SURVEYOR UNABLE TO LOCATE PIPE

NO STANDING WATER AT DITCH ON SITE VISIT 5/19/2016

PARCEL 206

PARCEL 100

PARCEL 104A

PARCEL 101



EDGE OF McTEER DRIVE WITH SILT AND DEBRIS



OUTFALL 24" CMP HALF FULL OF DEBRIS

CONTINUED ON SHEET 3 OF 4



SURVEY WITH SITE VISIT 5/19/2016 PHOTOS  
McTEER DRIVE DITCH AT AVENUE OF OAKS AND WALDON PROPERTY  
ST HELENA ISLAND, SOUTH CAROLINA  
BEAUFORT COUNTY, SOUTH CAROLINA

DESIGN MRK	DRAWN SLD	DRAWING NUMBER <b>4 of 4</b>
JOB NUMBER	16-1001	
ISSUE DATE	MAY-2016	
ISSUE	PRELIM	

## Appendix H

Klink

McTeer Drive

Beaufort County, South Carolina

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
4.5	5.9	6.8	7.8	8.8	10.0	3.7

Storm Data Source: Beaufort County, SC (NRCS)  
Rainfall Distribution Type: Type III  
Dimensionless Unit Hydrograph: <standard>

**CN Calculations**

McTeer Drive  
 Beaufort County, SC

  = Insert Value

**Entire Site**

Total Site 71.21 acres

Site Soils	HSG	Percent of Total Site	Area (acres)
Wd	A	27.56	19.62
Sw	B	11.90	8.47
Rd and Ro	B/D	60.51	43.09
BK	D	0.04	0.03

Cover Description	Percent of Total Site	Area (acres)
Woods (Good)	72.89	51.90
Grass (Good)	21.92	15.61
Dirt Road	2.77	1.97
Impervious (Homes)	2.42	1.72

Site Soils	HSG	Woods Area (acres)	Woods CN	Grass Area (acres)	Grass CN	Dirt Roads (acres)	Dirt Roads CN	Impervious Area (acres)	Impervious Area CN
Wd	A	14.302	30	4.301	39	0.544	72	0.474	98
Sw	B	6.174	55	1.857	61	0.235	82	0.205	98
Rd and Ro	B/D*	31.405	66	9.445	70.5	1.194	85.5	1.041	98
BK	D	0.019	77	0.006	80	0.001	89	0.001	98

*B/D\* - Average of HSG CN for B and D*

Total Area = 71.20 acres

**Composite CN** 58



Klink

McTeer Drive

Beaufort County, South Carolina

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period		
	2-Yr (cfs) (hr)	10-Yr (cfs) (hr)	25-Yr (cfs) (hr)

-----  
SUBAREAS

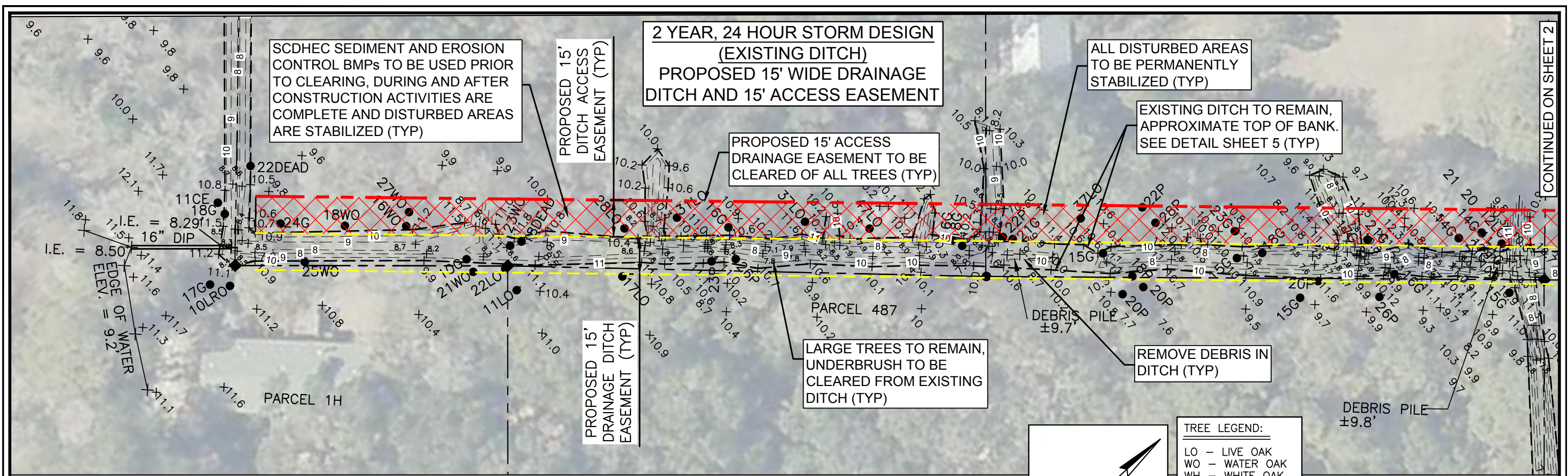
McTeer Dr	13.03	37.24	49.83
	14.20	13.86	13.87

REACHES

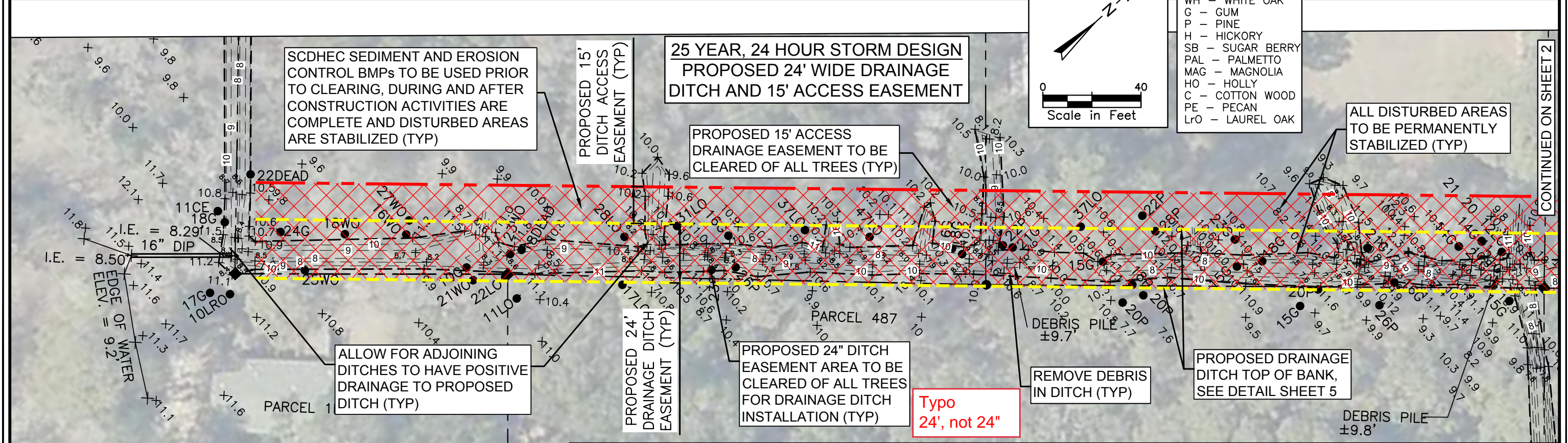
OUTLET	13.03	37.24	49.83
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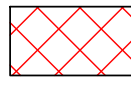
## Appendix I



CONTINUED ON SHEET 2



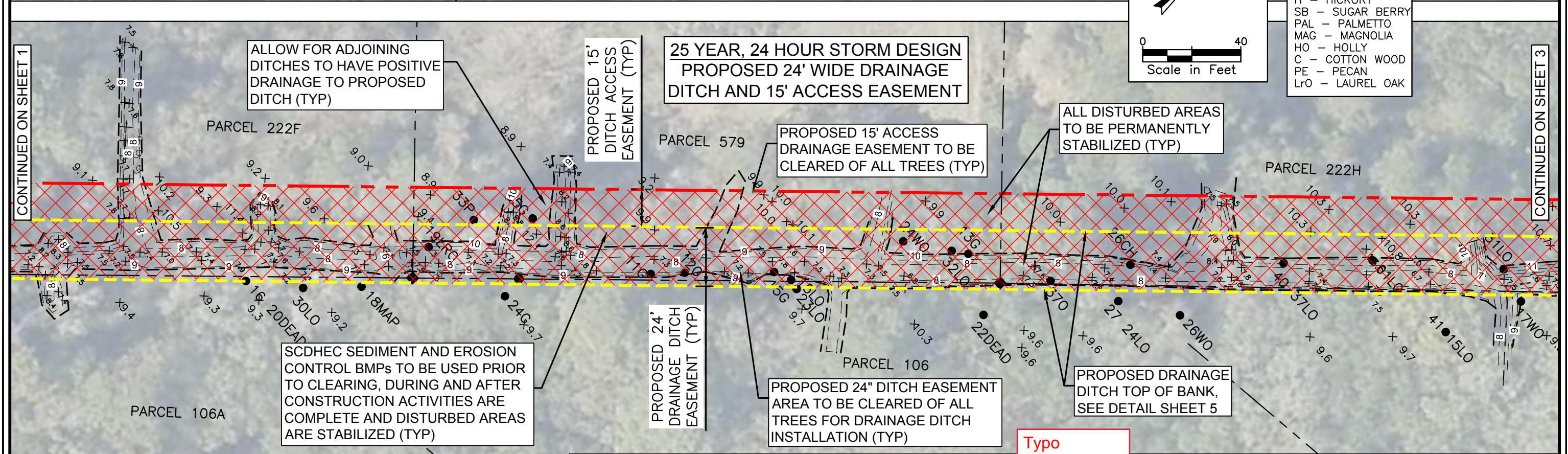
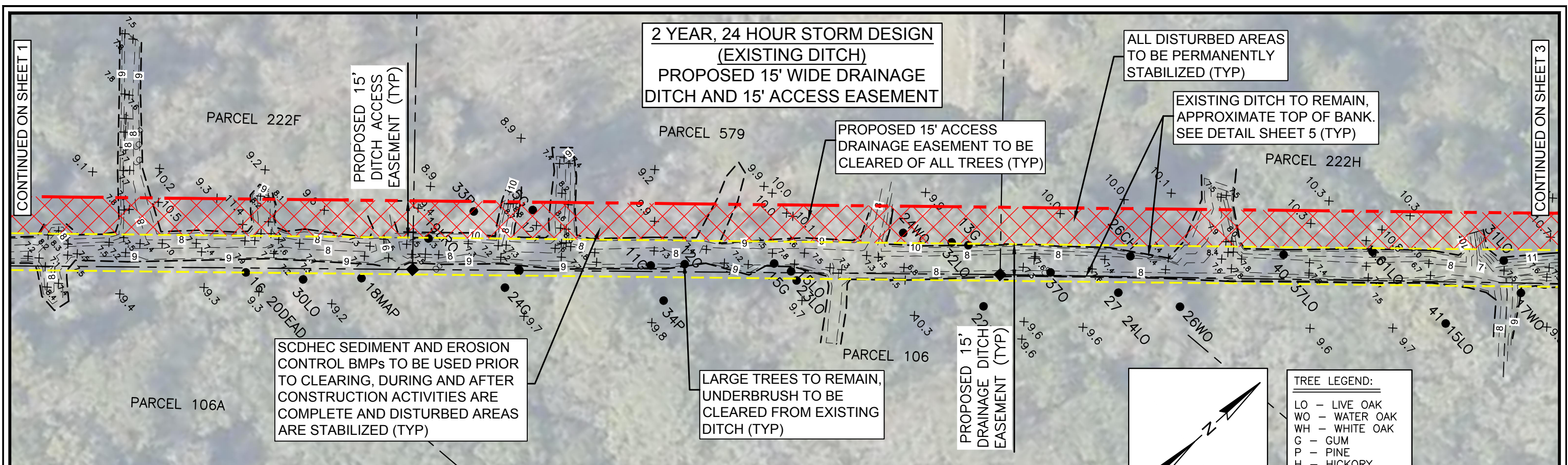
CONTINUED ON SHEET 2

 DENOTES AREA OF TREES TO BE REMOVED  
 - - - - - DENOTES SURVEYORS PROPERTY LINES  
 - - - - - DENOTES TYPICAL CONTOUR LINE



**DRAINAGE IMPROVEMENTS**  
 McTEER DRIVE DITCH AT AVENUE OF OAKS AND WALDON PROPERTY  
 ST HELENA ISLAND, SOUTH CAROLINA  
 BEAUFORT COUNTY, SOUTH CAROLINA

DESIGN MRK	DRAWN SLD	DRAWING NUMBER
JOB NUMBER	16-1001	1 of 5
ISSUE DATE	JUNE-2016	
ISSUE	PRELIM	



2 YEAR, 24 HOUR STORM DESIGN  
(EXISTING DITCH)  
PROPOSED 15' WIDE DRAINAGE  
DITCH AND 15' ACCESS EASEMENT

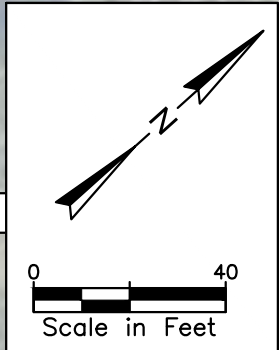
ALL DISTURBED AREAS  
TO BE PERMANENTLY  
STABILIZED (TYP)

EXISTING DITCH TO REMAIN,  
APPROXIMATE TOP OF BANK.  
SEE DETAIL SHEET 5 (TYP)

PROPOSED 15' ACCESS  
DRAINAGE EASEMENT TO BE  
CLEARED OF ALL TREES (TYP)

SCDHEC SEDIMENT AND EROSION  
CONTROL BMPs TO BE USED PRIOR  
TO CLEARING, DURING AND AFTER  
CONSTRUCTION ACTIVITIES ARE  
COMPLETE AND DISTURBED AREAS  
ARE STABILIZED (TYP)

LARGE TREES TO REMAIN,  
UNDERBRUSH TO BE  
CLEARED FROM EXISTING  
DITCH (TYP)



- TREE LEGEND:
- LO - LIVE OAK
  - WO - WATER OAK
  - WH - WHITE OAK
  - G - GUM
  - P - PINE
  - H - HICKORY
  - SB - SUGAR BERRY
  - PAL - PALMETTO
  - MAG - MAGNOLIA
  - HO - HOLLY
  - C - COTTON WOOD
  - PE - PECAN
  - LrO - LAUREL OAK

25 YEAR, 24 HOUR STORM DESIGN  
PROPOSED 24' WIDE DRAINAGE  
DITCH AND 15' ACCESS EASEMENT

ALL DISTURBED AREAS  
TO BE PERMANENTLY  
STABILIZED (TYP)

PROPOSED 15' ACCESS  
DRAINAGE EASEMENT TO BE  
CLEARED OF ALL TREES (TYP)

ALLOW FOR ADJOINING  
DITCHES TO HAVE POSITIVE  
DRAINAGE TO PROPOSED  
DITCH (TYP)

SCDHEC SEDIMENT AND EROSION  
CONTROL BMPs TO BE USED PRIOR  
TO CLEARING, DURING AND AFTER  
CONSTRUCTION ACTIVITIES ARE  
COMPLETE AND DISTURBED AREAS  
ARE STABILIZED (TYP)

PROPOSED 24" DITCH EASEMENT  
AREA TO BE CLEARED OF ALL  
TREES FOR DRAINAGE DITCH  
INSTALLATION (TYP)

PROPOSED DRAINAGE  
DITCH TOP OF BANK,  
SEE DETAIL SHEET 5

Typo  
24', not 24"

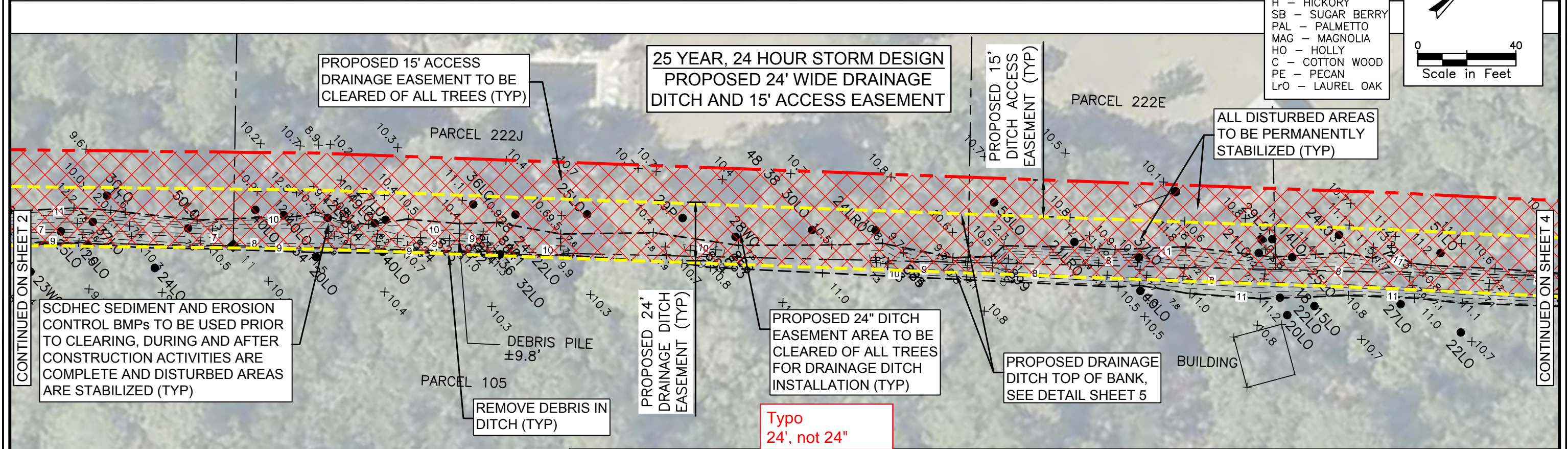
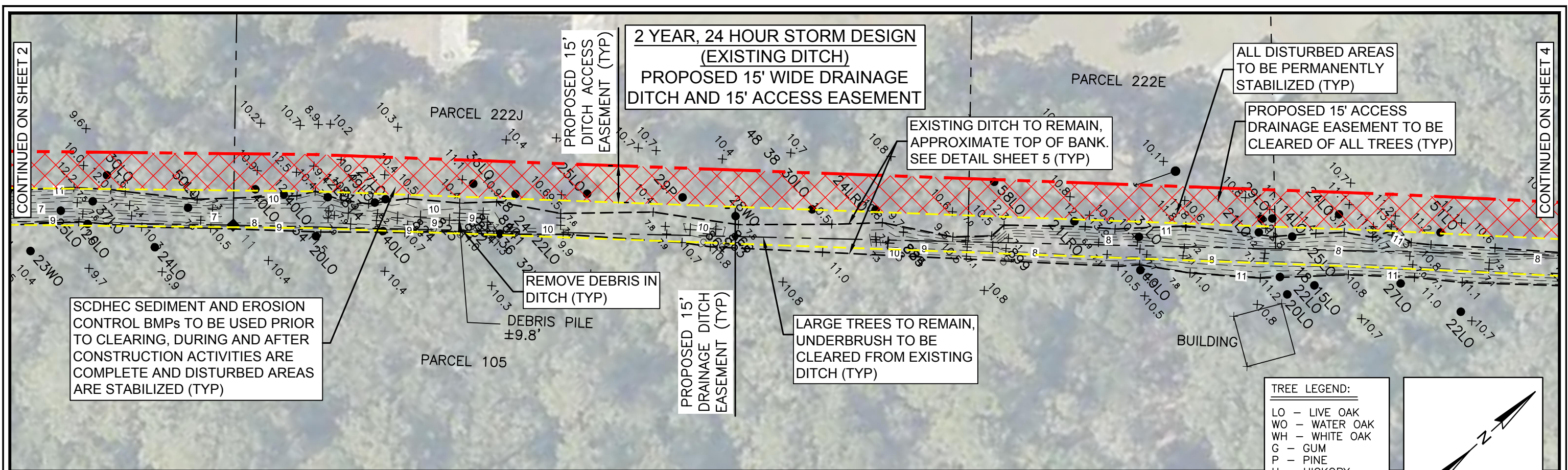
DENOTES AREA OF  
TREES TO BE REMOVED

--- DENOTES SURVEYORS  
PROPERTY LINES  
- - - - DENOTES TYPICAL  
CONTOUR LINE

**FOUR WATERS  
ENGINEERING**  
843-298-2369 C.O.A.# 5166 WWW.4WENG.COM

DRAINAGE IMPROVEMENTS  
McTEER DRIVE DITCH AT AVENUE OF OAKS AND WALDON PROPERTY  
ST HELENA ISLAND, SOUTH CAROLINA  
BEAUFORT COUNTY, SOUTH CAROLINA

DESIGN MRK	DRAWN SLD	DRAWING NUMBER <b>2 of 5</b>
JOB NUMBER	16-1001	
ISSUE DATE	JUNE-2016	
ISSUE	PRELIM	



2 YEAR, 24 HOUR STORM DESIGN  
(EXISTING DITCH)  
PROPOSED 15' WIDE DRAINAGE  
DITCH AND 15' ACCESS EASEMENT

EXISTING DITCH TO REMAIN,  
APPROXIMATE TOP OF BANK.  
SEE DETAIL SHEET 5 (TYP)

ALL DISTURBED AREAS  
TO BE PERMANENTLY  
STABILIZED (TYP)

PROPOSED 15' ACCESS  
DRAINAGE EASEMENT TO BE  
CLEARED OF ALL TREES (TYP)

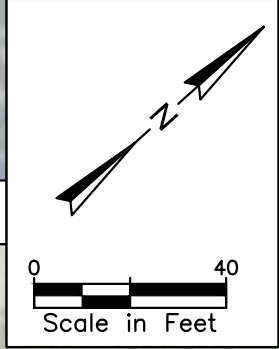
SCDHEC SEDIMENT AND EROSION  
CONTROL BMPs TO BE USED PRIOR  
TO CLEARING, DURING AND AFTER  
CONSTRUCTION ACTIVITIES ARE  
COMPLETE AND DISTURBED AREAS  
ARE STABILIZED (TYP)

REMOVE DEBRIS IN  
DITCH (TYP)

DEBRIS PILE  
±9.8'

LARGE TREES TO REMAIN,  
UNDERBRUSH TO BE  
CLEARED FROM EXISTING  
DITCH (TYP)

- TREE LEGEND:
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25 YEAR, 24 HOUR STORM DESIGN  
PROPOSED 24' WIDE DRAINAGE  
DITCH AND 15' ACCESS EASEMENT

PROPOSED 15'  
DITCH ACCESS  
EASEMENT (TYP)

ALL DISTURBED AREAS  
TO BE PERMANENTLY  
STABILIZED (TYP)

SCDHEC SEDIMENT AND EROSION  
CONTROL BMPs TO BE USED PRIOR  
TO CLEARING, DURING AND AFTER  
CONSTRUCTION ACTIVITIES ARE  
COMPLETE AND DISTURBED AREAS  
ARE STABILIZED (TYP)

REMOVE DEBRIS IN  
DITCH (TYP)

DEBRIS PILE  
±9.8'

PROPOSED 24" DITCH  
EASEMENT AREA TO BE  
CLEARED OF ALL TREES  
FOR DRAINAGE DITCH  
INSTALLATION (TYP)

PROPOSED DRAINAGE  
DITCH TOP OF BANK,  
SEE DETAIL SHEET 5

Typo  
24', not 24"

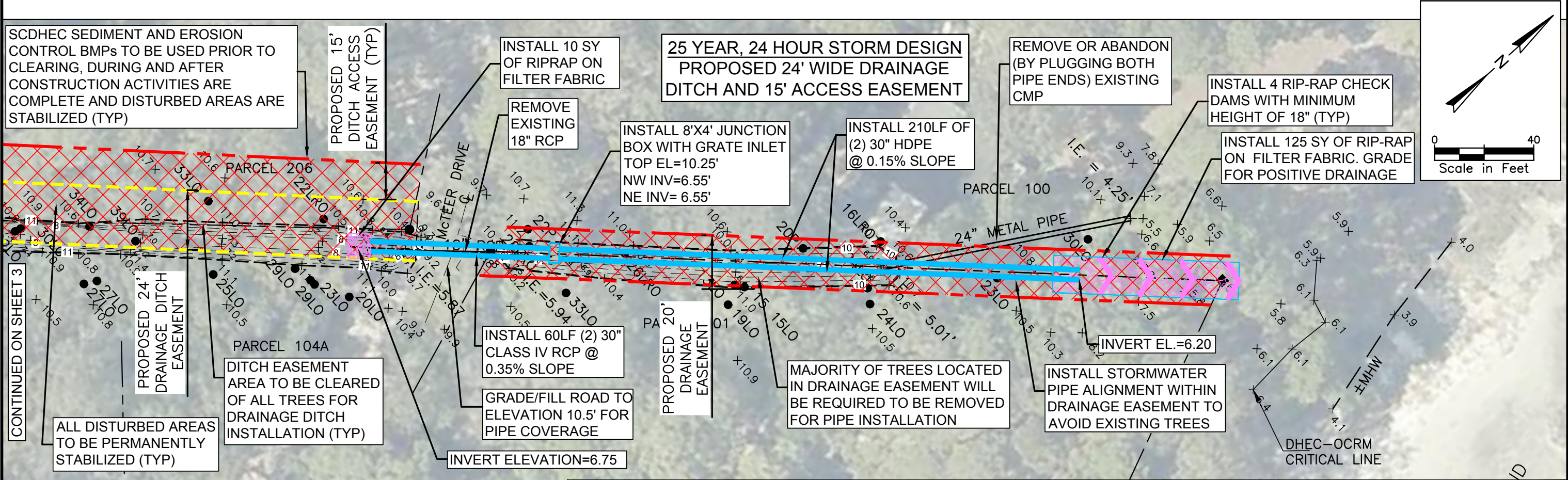
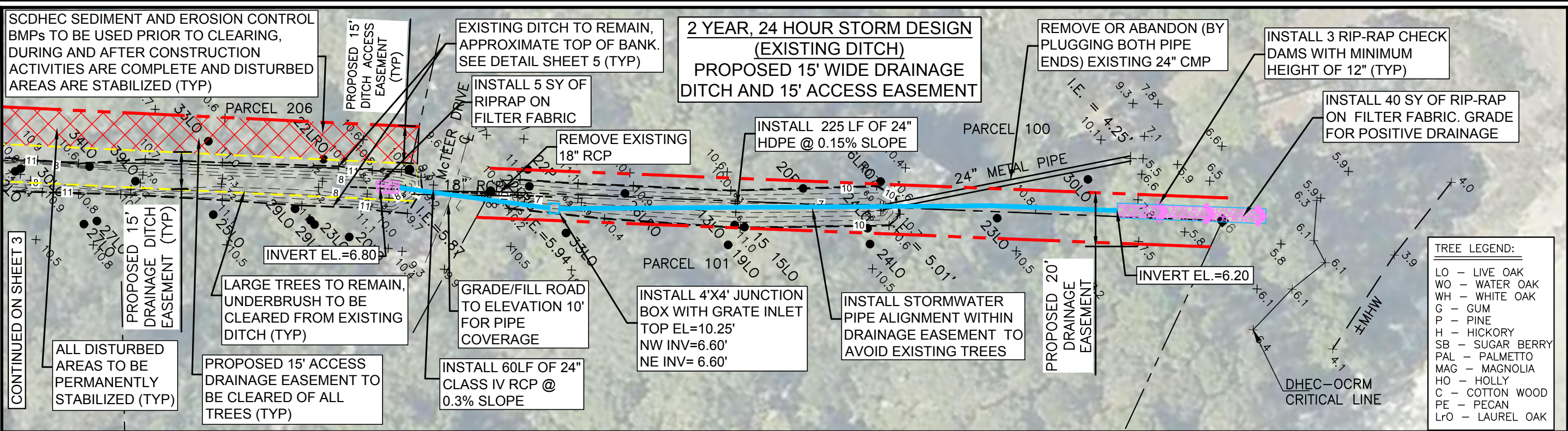
DENOTES AREA OF  
TREES TO BE REMOVED

--- DENOTES SURVEYORS  
PROPERTY LINES  
- - - DENOTES TYPICAL  
CONTOUR LINE



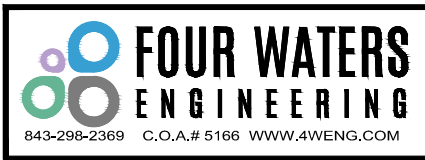
DRAINAGE IMPROVEMENTS  
McTEER DRIVE DITCH AT AVENUE OF OAKS AND WALDON PROPERTY  
ST HELENA ISLAND, SOUTH CAROLINA  
BEAUFORT COUNTY, SOUTH CAROLINA

DESIGN MRK	DRAWN SLD	DRAWING NUMBER  <b>3 of 5</b>
JOB NUMBER	16-1001	
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ISSUE	PRELIM	



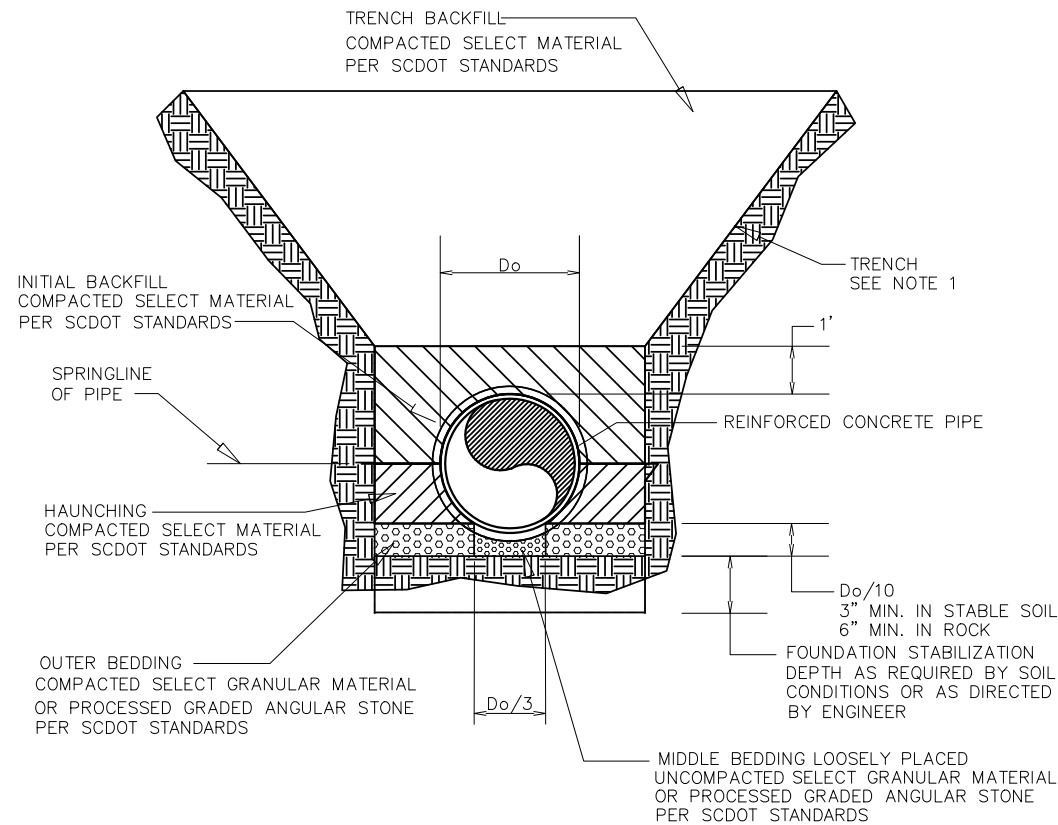
DENOTES AREA OF TREES TO BE REMOVED  
 DENOTES SURVEYORS PROPERTY LINES  
 DENOTES TYPICAL CONTOUR LINE

DENOTES SURVEYORS PROPERTY LINES  
 DENOTES TYPICAL CONTOUR LINE



**DRAINAGE IMPROVEMENTS**  
 McTEER DRIVE DITCH AT AVENUE OF OAKS AND WALDON PROPERTY  
 ST HELENA ISLAND, SOUTH CAROLINA  
 BEAUFORT COUNTY, SOUTH CAROLINA

DESIGN MRK	DRAWN SLD	DRAWING NUMBER <b>4 of 5</b>
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ISSUE	PRELIM	

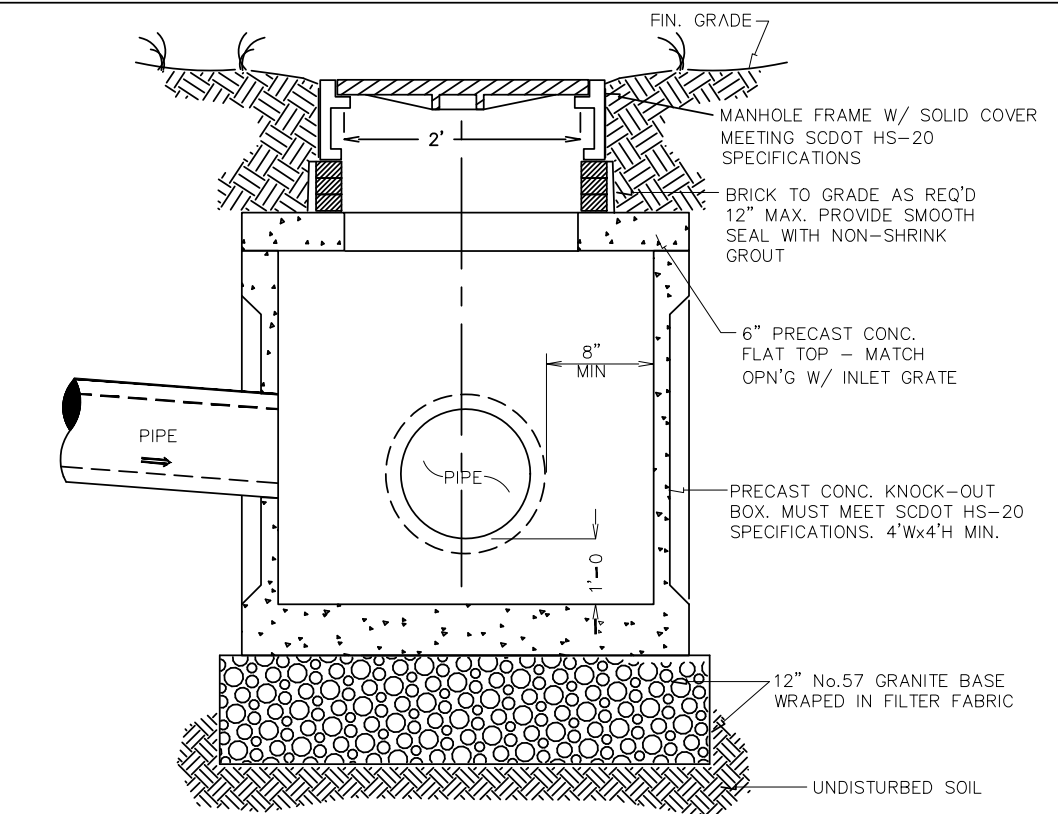


NOTES:

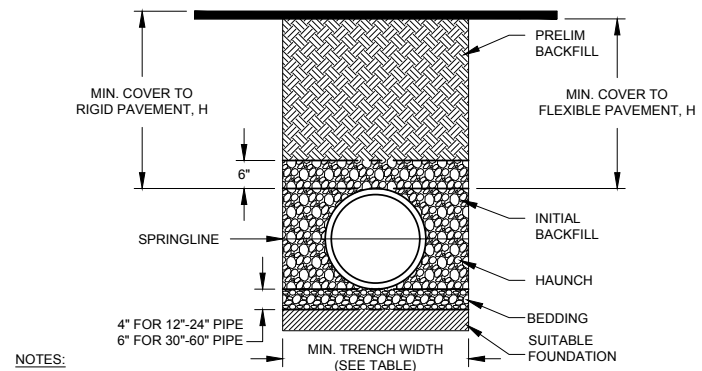
1. DEPTH OF VERTICAL TRENCH AND SIDE SLOPES OF TRENCH MAY VARY DEPENDING ON DEPTH OF EXCAVATION AND TRENCH PROTECTION SYSTEM USED. COMPLY WITH OSHA REGULATIONS (STANDARDS - 29 CFR) PART 1956 SUBPART P, EXCAVATIONS.

2. WHEN PROCESSED ANGULAR STONE IS USED FOR MIDDLE AND OUTER BEDDING, THE STONE SHALL BE COMPLETELY WRAPPED IN FILTER FABRIC TO PREVENT MIGRATION OF SURROUNDING SOILS.

**EMBEDMENT DETAIL FOR REINFORCED CONCRETE PIPE**



**JUNCTION BOX WITH FRAME AND COVER (SECTION)**



NOTES:

1. ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST ADDITION

2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.

3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER, AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.

4. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER, UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm), 6" (150mm) FOR 30"-60" (750mm-1500mm).

5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.

6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOTATION. FOR TRAFFIC APPLICATIONS: MINIMUM COVER, H, IS 12" UP TO 48" DIAMETER PIPE AND 24" OF COVER FOR 60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT. FOR TRAFFIC APPLICATIONS WITH LESS THAN FOUR FEET OF COVER, EMBEDMENT OF THE PIPE SHALL BE USING ONLY A CLASS I OR CLASS II BACKFILL.

RECOMMENDED MINIMUM TRENCH WIDTHS

PIPE DIAM.	MIN. TRENCH WIDTH
4"	21"
(100mm)	(533mm)
6"	23"
(150mm)	(584mm)
8"	26"
(200mm)	(660mm)
10"	28"
(250mm)	(711mm)
12"	30"
(300mm)	(762mm)
15"	34"
(375mm)	(864mm)
18"	39"
(450mm)	(991mm)
24"	48"
(600mm)	(1219mm)
30"	56"
(750mm)	(1422mm)
36"	64"
(900mm)	(1626mm)
42"	72"
(1050mm)	(1829mm)
48"	80"
(1200mm)	(2032mm)
60"	96"
(1500mm)	(2438mm)

MINIMUM RECOMMENDED COVER BASED ON VEHICLE LOADING CONDITIONS\*\*

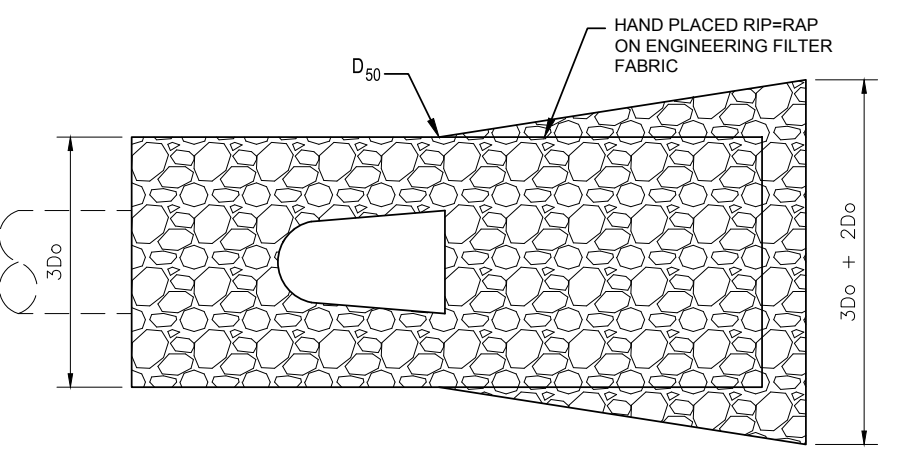
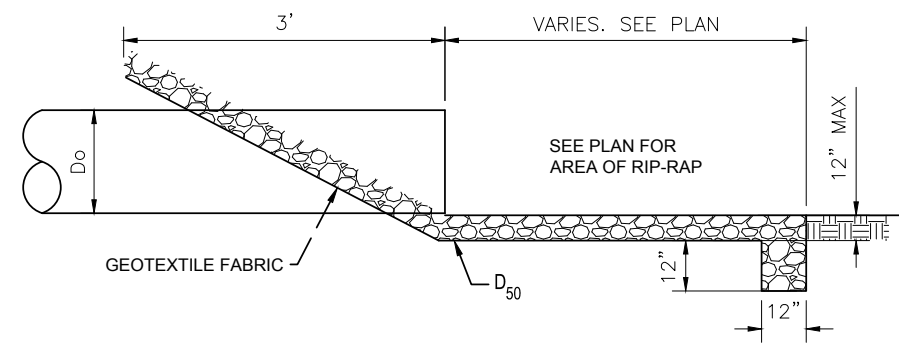
PIPE DIAM.	SURFACE LIVE LOADING CONDITION	
	H-25	HEAVY CONSTRUCTION (75T AXLE LOAD) *
12" - 48"	12"	48"
(300mm - 1200mm)	(305mm)	(1219mm)
60"	24"	60"
(1500mm)	(610mm)	(1524mm)

\* VEHICLES IN EXCESS OF 75T MAY REQUIRE ADDITIONAL COVER  
\*\*SEE BACKFILL REQUIREMENTS IN NOTE 6  
MAXIMUM RECOMMENDED COVER BASED ON VEHICLE LOADING CONDITIONS

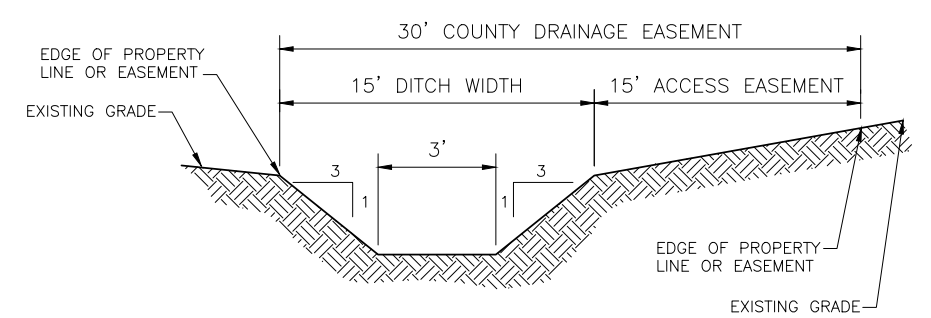
PIPE DIAM.	CLASS I		CLASS II	
	COMPACTED	DUMPED	95%	90%
4"	34	16	23	16
(100mm)	(10.4m)	(4.9m)	(7.0m)	(4.9m)
6"	40	19	27	19
(150mm)	(12.2m)	(5.8m)	(8.2m)	(5.8m)
8"	30	14	21	14
(200mm)	(9.1m)	(4.3m)	(6.4m)	(4.3m)
10"	34	16	23	16
(250mm)	(10.4m)	(4.9m)	(7.0m)	(4.9m)
12"	35	17	24	17
(300mm)	(10.7m)	(5.2m)	(7.3m)	(5.2m)
15"	37	18	25	18
(375mm)	(11.3m)	(5.5m)	(7.6m)	(5.5m)
18"	32	15	22	15
(450mm)	(9.8m)	(4.6m)	(6.7m)	(4.6m)
24"	27	13	19	13
(600mm)	(8.2m)	(4.0m)	(5.8m)	(4.0m)
30"	22	11	16	11
(750mm)	(6.7m)	(3.4m)	(4.9m)	(3.4m)
36"	26	12	18	12
(900mm)	(7.9m)	(3.7m)	(5.5m)	(3.7m)
42"	24	11	17	11
(1050mm)	(7.3m)	(3.4m)	(5.2m)	(3.4m)
48"	23	11	16	11
(1200mm)	(7.0m)	(3.4m)	(4.9m)	(3.4m)
60"	26	12	18	12
(1500mm)	(7.9m)	(3.7m)	(5.5m)	(3.7m)

FILL HEIGHT TABLE GENERATED USING AASHTO SECTION 12, LOAD RESISTANCE FACTOR DESIGN (LRFD) PROCEDURE WITH THE FOLLOWING ASSUMPTIONS:  
NO HYDROSTATIC PRESSURE.

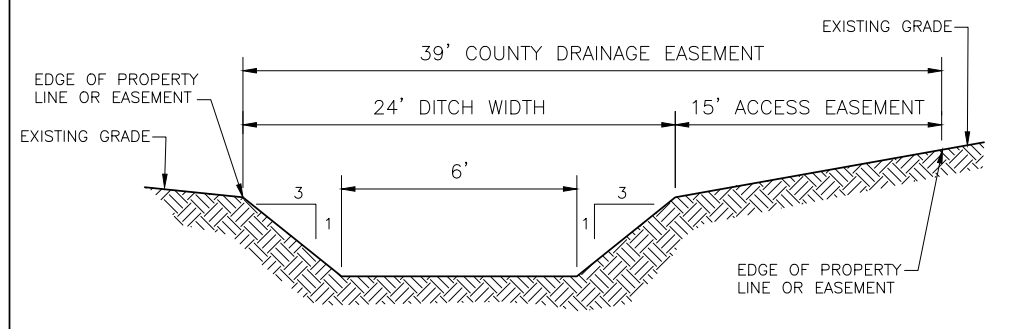
**HDPE TRENCH INSTALLATION DETAIL (ASTM F2648)**



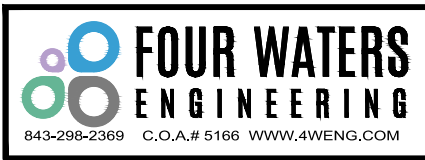
**RIP-RAP OUTFALL PROTECTION**



**2 YEAR, 2 HOUR STORM DESIGN (EXISTING CONDITIONS) DITCH CROSS-SECTION**



**25 YEAR, 24 HOUR STORM DESIGN (COUNTY STANDARD) DITCH CROSS-SECTION**



**DRAINAGE IMPROVEMENTS**  
McTEER DRIVE DITCH AT AVENUE OF OAKS AND WALDON PROPERTY  
ST HELENA ISLAND, SOUTH CAROLINA  
BEAUFORT COUNTY, SOUTH CAROLINA

DESIGN MRK	DRAWN SLD	DRAWING NUMBER <b>5 of 5</b>
JOB NUMBER	16-1001	
ISSUE DATE	JUNE-2016	
ISSUE	PRELIM	