100% Design Documentation

Lake Charlene Drainage Improvements

US 98 to Lake Joanne Drive

Escambia County, Florida

February 5, 2018

hdrinc.com 25 West Cedar Street, Suite 200, Pensacola, FL 32502-5945
(850) 432-6800

TABLE OF CONTENTS

HORIZONTAL & VERTICAL ALIGNMENT REPORTS

hdrinc.com 25 West Cedar Street, Suite 200, Pensacola, FL 32502-5945
(850) 432-6800

Alignment PI Station Report

Client:
Client
Escambia County - Public Works
3363 West Park Place
Date: 2/2/2018 1:33:02 PM

Prepared by:
Jennifer Clark
HDR Engineering, INC.
25 West Cedar St.

Alignment Name: BL1-South 61st Street
Description:
Station Range: Start: 30+00.00, End: 53+00.00

PI Station	Northing	Easting	Distance	Direction
30+00.00	518,726.1348'	1,085,420.6385'		
			2,300.00'	N3°19'34"E
53+00.00	521,022.2604'	1,085,554.0836'		

Alignment Name: BL2-Lake Joanne Dr.
Description:
Station Range: Start: 26+00.00, End: 30+00.00

PI Station	Northing	Easting	Distance	Direction
26+00.00	520,936.8135'	1,085,148.4436'		
			400.00'	S86°47'42"E
30+00.00	520,914.4493'	1,085,547.8179'		

HDR Engineering, INC.

25 West Cedar St.

Suite #200

Pensacola, FL 32502

PVI Stations Report
Project Name: C:\pwworking\tpa\d1032081\00C-001.dwg
Report Date: 2/2/2018 1:41:33 PM

Client: Escambia County - Public Works
Project Description:
Prepared by: Jennifer Clark

Horizontal Alignment Information

Name: BL1-South 61st Street
Station Range: 30+00.00 to 53+00.00

Vertical Alignment: PROPOSED

PVI	Station	Elevation (ft)	Grade Out (%)	Curve Length (ft)
1	32+00.00	27.27	0.0198 %	0.0000
2	32+70.25	27.29	0.8900 %	0.0000
3	35+78.82	30.03	0.4394 %	0.0000
4	37+00.29	30.57	-0.1596 %	0.0000
5	38+42.18	30.34	-0.4396 %	0.0000
6	39+11.90	30.03	-0.6125 %	0.0000
7	40+60.00	29.13	-0.4394 %	0.0000
8	42+52.28	28.28	0.0630 %	0.0000
9	44+13.96	28.38	0.2037 %	0.0000
10	51+47.13	29.88	0.0075 %	0.0000
11	52+26.11	29.88		

HDR Engineering, INC.

25 West Cedar St.

Suite #200

Pensacola, FL 32502

PVI Stations Report **Client:** Escambia County - Public Works
Project Name: C:\pwworking\tpa\d1032081\00C-001.dwg **Project Description:**
Report Date: 2/2/2018 1:43:25 PM **Prepared by:** Jennifer Clark

---

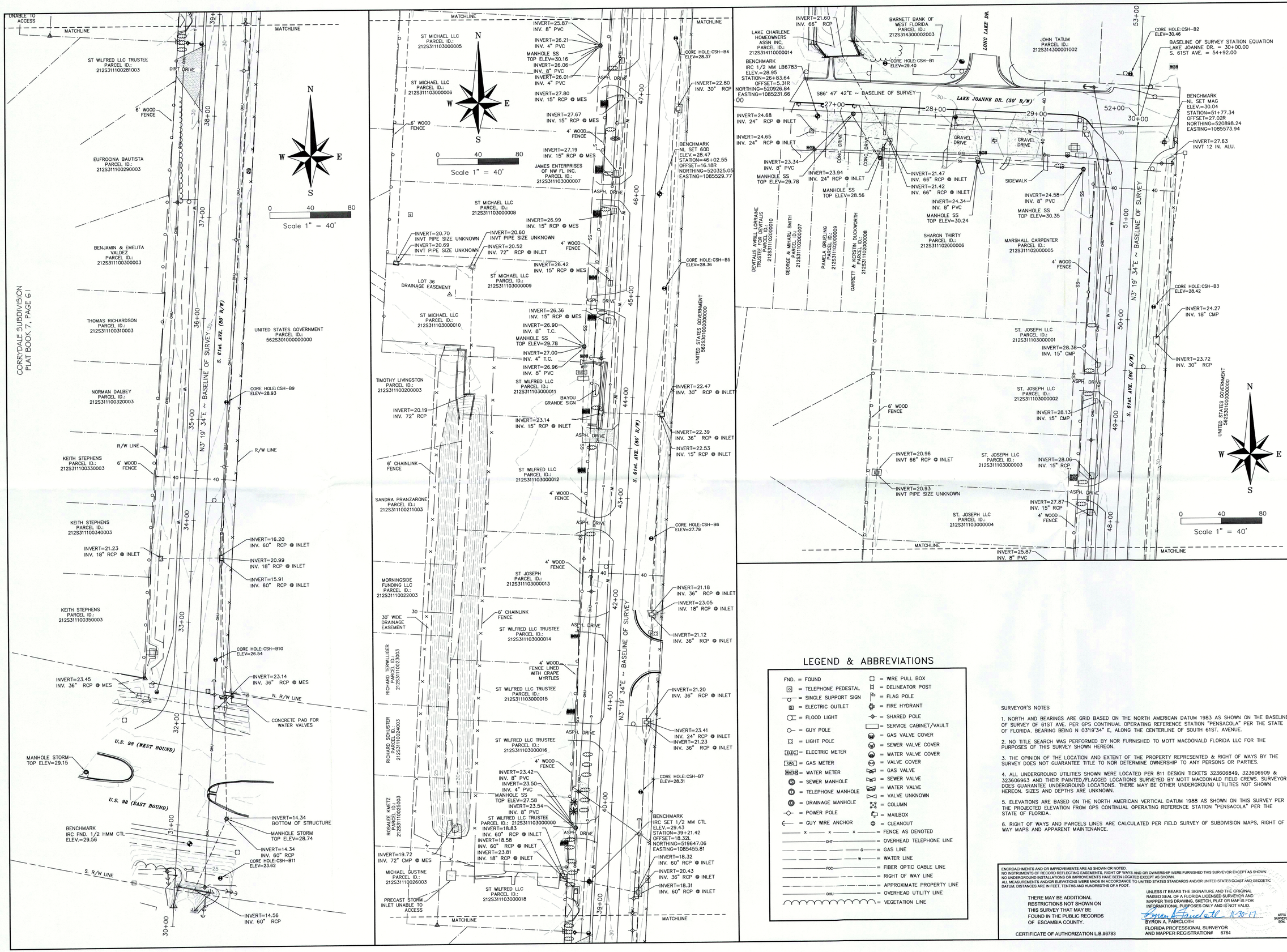
Horizontal Alignment Information
Name: BL2-Lake Joanne Dr.
Station Range: 26+00.00 to 30+00.00

Vertical Alignment: PROPOSEDLAKE JOANNE

PVI	Station	Elevation (ft)	Grade Out (%)	Curve Length (ft)
1	26+88.00	29.30	0.3516 %	0.0000
2	27+66.59	29.57	0.2411 %	0.0000
3	28+40.84	29.75	0.6428 %	0.0000
4	29+13.26	30.22	0.0927 %	0.0000
5	29+51.08	30.25	-0.4729 %	0.0000
6	30+00.00	30.02		

TOPOGRAPHIC SURVEY

hdrinc.com 25 West Cedar Street, Suite 200, Pensacola, FL 32502-5945
(850) 432-6800



LEGEND & ABBREVIATIONS

FND. = FOUND
⊡ = TELEPHONE PEDESTAL
= SINGLE SUPPORT SIGN
⊠ = ELECTRIC OUTLET
= FLOOD LIGHT
= GUY POLE
= LIGHT POLE
ELEC = ELECTRIC METER
GAS = GAS METER
WATER = WATER METER
Ⓢ = SEWER MANHOLE
Ⓣ = TELEPHONE MANHOLE
Ⓓ = DRAINAGE MANHOLE
= POWER POLE
= GUY WIRE ANCHOR
= WIRE PULL BOX
= DELINEATOR POST
= FLAG POLE
= FIRE HYDRANT
= SHARED POLE
= SERVICE CABINET/VAULT
= GAS VALVE COVER
= SEWER VALVE COVER
= WATER VALVE COVER
= VALVE COVER
= GAS VALVE
= SEWER VALVE
= WATER VALVE
= VALVE UNKNOWN
= COLUMN
= MAILBOX
= CLEANOUT
x x x = FENCE AS DENOTED
OHT = OVERHEAD TELEPHONE LINE
G = GAS LINE
W = WATER LINE
FOC = FIBER OPTIC CABLE LINE
= RIGHT OF WAY LINE
= APPROXIMATE PROPERTY LINE
OHU = OVERHEAD UTILITY LINE
= VEGETATION LINE

SURVEYOR'S NOTES

1. NORTH AND BEARINGS ARE GRID BASED ON THE NORTH AMERICAN DATUM 1983 AS SHOWN ON THE BASELINE OF SURVEY OF 61ST AVE. PER GPS CONTINUAL OPERATING REFERENCE STATION "PENSACOLA" PER THE STATE OF FLORIDA. BEARING BEING N 03°19'34" E, ALONG THE CENTERLINE OF SOUTH 61ST. AVENUE.

2. NO TITLE SEARCH WAS PERFORMED BY NOR FURNISHED TO MOTT MACDONALD FLORIDA LLC FOR THE PURPOSES OF THIS SURVEY SHOWN HEREON.

3. THE OPINION OF THE LOCATION AND EXTENT OF THE PROPERTY REPRESENTED & RIGHT OF WAYS BY THE SURVEY DOES NOT GUARANTEE TITLE TO NOR DETERMINE OWNERSHIP TO ANY PERSONS OR PARTIES.

4. ALL UNDERGROUND UTILITIES SHOWN WERE LOCATED PER 811 DESIGN TICKETS 323606849, 323606909 & 323606963 AND THEIR PAINTED/FLAGGED LOCATIONS SURVEYED BY MOTT MACDONALD FIELD CREWS. SURVEYOR DOES GUARANTEE UNDERGROUND LOCATIONS. THERE MAY BE OTHER UNDERGROUND UTILITIES NOT SHOWN HEREON. SIZES AND DEPTHS ARE UNKNOWN.

5. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM 1988 AS SHOWN ON THIS SURVEY PER THE PROJECTED ELEVATION FROM GPS CONTINUAL OPERATING REFERENCE STATION "PENSACOLA" PER THE STATE OF FLORIDA.

6. RIGHT OF WAYS AND PARCELS LINES ARE CALCULATED PER FIELD SURVEY OF SUBDIVISION MAPS, RIGHT OF WAY MAPS AND APPARENT MAINTENANCE.

ENCROACHMENTS AND OR IMPROVEMENTS ARE AS SHOWN OR NOTED.
NO INSTRUMENTS OF RECORD REFLECTING EASEMENTS, RIGHT OF WAYS AND OR OWNERSHIP WERE FURNISHED THIS SURVEYOR EXCEPT AS SHOWN.
NO UNDERGROUND INSTALLATIONS OR IMPROVEMENTS HAVE BEEN LOCATED EXCEPT AS SHOWN.
ALL MEASUREMENTS AND/OR ELEVATIONS WERE MADE IN ACCORDANCE TO UNITED STATES STANDARDS AND/OR UNITED STATES COAST AND GEODETIC DATUM. DISTANCES ARE IN FEET, TENTHS AND HUNDREDTHS OF A FOOT.

THERE MAY BE ADDITIONAL RESTRICTIONS NOT SHOWN ON THIS SURVEY THAT MAY BE FOUND IN THE PUBLIC RECORDS OF ESCAMBIA COUNTY.

UNLESS IT BEARS THE SIGNATURE AND THE ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER THIS DRAWING, SKETCH, PLAT OR MAP IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT VALID.

BYRON A. FAIRCLOTH
FLORIDA PROFESSIONAL SURVEYOR AND MAPPER REGISTRATION# 6764
11-30-17
AFFIX SURVEYOR SEAL

CERTIFICATE OF AUTHORIZATION L.B.#6783

MOTT MACDONALD FLORIDA, LLC
220 West Garden Street
Suite 700,
Pensacola, Florida 32502
Telephone: (850) 484-6011
Architects AA - C0000035
Engineers EB - 0000035
Surveyors LB - 0006783

MOTT MACDONALD

61ST AVE & LAKE JOANNE DR. SURVEY FOR LAKE CHARLENE DRAINAGE STUDY PENSACOLA, FLORIDA

DATE	REV.	REVISION DESCRIPTION

FIELD BOOK PAGES
FIELD BOOK
SECTION

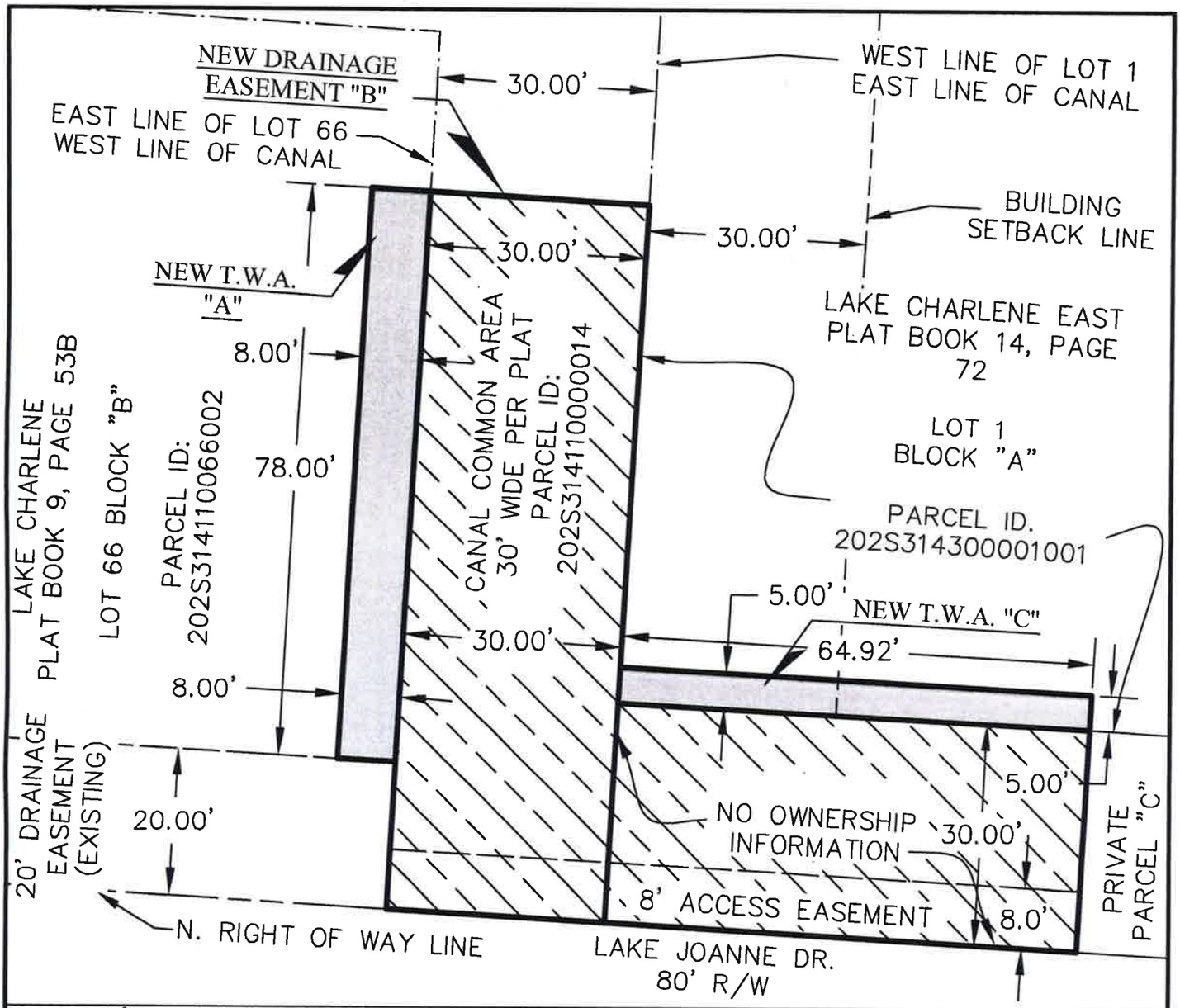
DATE ISSUED: 11-29-17
FIELD DATE: 12-12-16
DRAWN BY: D. HITCHCOCK
PROJECT SURVEYOR: B. FAIRCLOTH
M.M. PROJECT NUMBER: 350721

SHEET TITLE: TOPOGRAPHIC SURVEY

SHEET NUMBER: 1 of 1

EASEMENT LEGAL DESCRIPTIONS

hdrinc.com 25 West Cedar Street, Suite 200, Pensacola, FL 32502-5945
(850) 432-6800



SURVEYOR'S NOTES

1. NORTH AND BEARINGS ARE ASSUMED ALONG THE NORTH RIGHT OF WAY OF LAKE JOANNE DR. PER MOTT MACDONALD SURVEY, PROJECT #350271.

2. NO TITLE SEARCH WAS PERFORMED BY NOR FURNISHED TO MOTT MACDONALD FLORIDA, LLC FOR THE PURPOSES OF THE SKETCH & DESCRIPTION SHOWN HEREON.

3. THE OPINION OF THE LOCATION AND EXTENT OF THE PROPERTY REPRESENTED BY THE SURVEY DOES NOT GUARANTEE TITLE TO OR DETERMINE OWNERSHIP TO ANY PERSONS OR PARTIES.

4. NO EFFORT WAS GIVEN TO SHOW LOCATION OF UNDERGROUND IMPROVEMENTS.

LEGEND & ABBREVIATIONS

FND. = FOUND	CONC. = CONCRETE
C = CALCULATED MEASUREMENT	MON. = MONUMENT
D = DEED MEASUREMENT	ID. = IDENTIFICATION
F = FIELD MEASUREMENT	SQ. FT. = SQUARE FEET
SEC. = SECTION	AC. = ACRES
TWP. = TOWNSHIP	± = PLUS OR MINUS
RNG. = RANGE	O.R. = OFFICIAL RECORDS
P.O.C. = POINT OF COMMENCEMENT	BK. = BOOK
P.O.B. = POINT OF BEGINNING	= NOT TO SCALE
℄ = CENTERLINE	P.C. = POINT OF CURVATURE
R/W = RIGHT OF WAY	P.T. = POINT OF TANGENCY
Δ = DELTA	CL = CHORD LENGTH
CB = CHORD BEARING	R/W = RIGHT OF WAY
L.B. = LAND SURVEY BUSINESS REGISTRATION NUMBER	
T.W.A. = TEMPORARY WORK AGREEMENT	

= RIGHT OF WAY LINE
= PROPERTY LINE
= BOUNDARY LINE
= EASEMENT LINE

SKETCH & DESCRIPTION ~NOT A SURVEY~

THERE MAY BE ADDITIONAL RESTRICTIONS NOT SHOWN ON THIS SURVEY THAT MAY BE FOUND IN THE PUBLIC RECORDS OF ESCAMBIA COUNTY.

N W E S

DESCRIPTION:

NEW TEMPORARY WORK AGREEMENT "A"

THE EAST 8 FEET OF THE SOUTH 78 FEET OF THE NORTH 100 FEET OF LOT 66, BLOCK "B", OF THE PLAT OF LAKE CHARLENE AS RECORDED IN PLAT BOOK 9, PAGE 53B. CONTAINS 624 SQUARE FEET MORE OR LESS.

NEW DRAINAGE EASEMENT "B"

THE SOUTH 98 FEET A 30 FOOT WIDE "CANAL COMMON AREA" LYING EAST OF LOT 66, BLOCK "B" AS RECORDED IN PLAT BOOK 9, PAGE 53B AND THE LANDS LYING EAST OF SAID CANAL, NORTH OF LAKE JOANNE DR., SOUTH OF LOT 1, BLOCK "A" AND WEST OF PARCEL "C" OF LAKE CHARLENE EAST AS RECORDED IN PLAT BOOK 14, PAGE 72 AND PLAT BOOK 9, PAGE 53C. CONTAINS 4,888 SQUARE FEET OR 0.11 ACRES MORE OR LESS

TEMPORARY WORK AGREEMENT "C"

THE SOUTH 5 FEET OF THE WEST 64.92 FEET OF LOT 1, BLOCK "A" OF LAKE CHARLENE EAST AS RECORDED IN PLAT BOOK 14, PAGE 72. CONTAINS 285 SQUARE FEET MORE OR LESS.

MOTT MACDONALD

MOTT MACDONALD FLORIDA LLC
220 West Garden Street
Suite 700,
Pensacola, Florida 32502
Telephone: (850) 484-6011
Architects AA - C0000035
Engineers EB - 0000155
Surveyors LB - 0006783

ENCROACHMENTS AND OR IMPROVEMENTS ARE AS SHOWN OR NOTED.
NO INSTRUMENTS OF RECORD REFLECTING EASEMENTS, RIGHT OF WAYS AND OR OWNERSHIP WERE FURNISHED THIS SURVEYOR EXCEPT AS SHOWN.
NO UNDERGROUND INSTALLATIONS OR IMPROVEMENTS HAVE BEEN LOCATED EXCEPT AS SHOWN.
ALL MEASUREMENTS AND/OR ELEVATIONS WERE MADE IN ACCORDANCE TO UNITED STATES STANDARDS AND/OR UNITED STATES COAST AND GEODETIC DATUM, DISTANCES ARE IN FEET, TENTHS AND HUNDREDTHS OF A FOOT.

DESCRIPTION: LAKE CHARLENE

RECORDED IN NA BOOK NA PAGE NA
SEC. 20 TWP. 2 S RNG. 31 W
DATE 8/01/2017 DATE OF FIELD SURVEY NA
FB. NA PAGE NA SCALE 1" = 20'
PROJ.# 350271

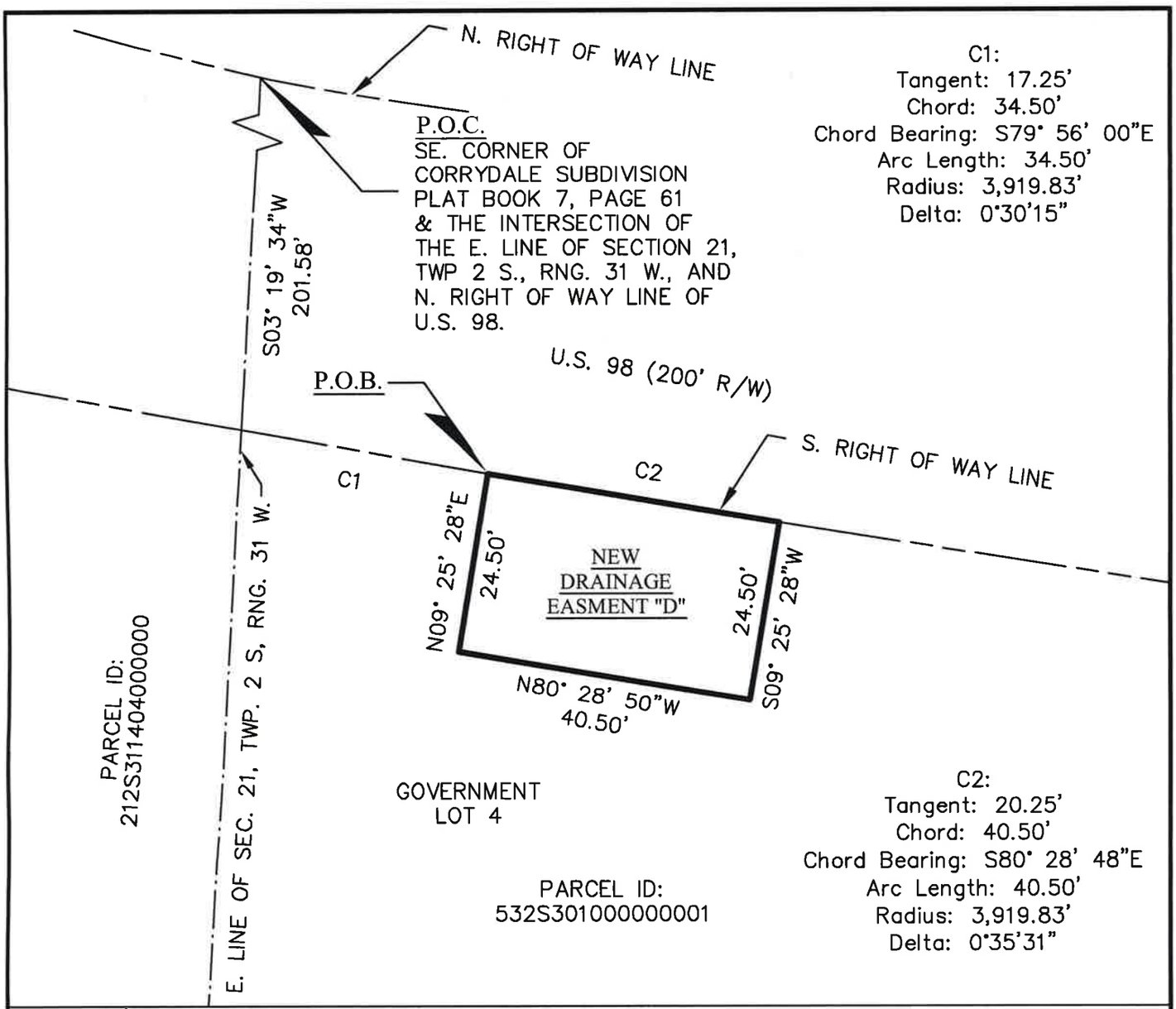
UNLESS IT BEARS THE SIGNATURE AND THE ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER THIS DRAWING, SKETCH, PLAT OR MAP IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT VALID.

Byron A. Faircloth 12-26-17

BYRON A. FAIRCLOTH
FLORIDA PROFESSIONAL SURVEYOR AND MAPPER NO. 6764

AFFIX SURVEYOR SEAL

FILE NO. _____



SURVEYOR'S NOTES

1. NORTH AND BEARINGS ARE ASSUMED ALONG THE EAST LINE OF SECTION 21, TOWNSHIP 2 SOUTH, RANGE 31 WEST PER MOTT MACDONALD SURVEY, PROJECT #350271.

2. NO TITLE SEARCH WAS PERFORMED BY NOR FURNISHED TO MOTT MACDONALD FLORIDA, LLC FOR THE PURPOSES OF THE SKETCH & DESCRIPTION SHOWN HEREON.

3. THE OPINION OF THE LOCATION AND EXTENT OF THE PROPERTY REPRESENTED BY THE SURVEY DOES NOT GUARANTEE TITLE TO OR DETERMINE OWNERSHIP TO ANY PERSONS OR PARTIES.

4. NO EFFORT WAS GIVEN TO SHOW LOCATION OF UNDERGROUND IMPROVEMENTS.

LEGEND & ABBREVIATIONS

FND. = FOUND	CONC. = CONCRETE
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R/W = RIGHT OF WAY	P.T. = POINT OF TANGENCY
Δ = DELTA	CL = CHORD LENGTH
CB = CHORD BEARING	
L.B. = LAND SURVEY BUSINESS REGISTRATION NUMBER	

= RIGHT OF WAY LINE
= PROPERTY LINE
= BOUNDARY LINE
= EASEMENT LINE

SKETCH & DESCRIPTION ~NOT A SURVEY~

THERE MAY BE ADDITIONAL RESTRICTIONS NOT SHOWN ON THIS SURVEY THAT MAY BE FOUND IN THE PUBLIC RECORDS OF ESCAMBIA COUNTY.

N W E S

DESCRIPTION:

NEW DRAINAGE EASEMENT "D"

COMMENCE AT THE SOUTHEAST CORNER OF CORRYDALE SUBDIVISION AS RECORDED IN PLAT BOOK 7, PAGE 61 OF ESCAMBIA COUNTY, FL PUBLIC RECORDS ALSO BEING THE INTERSECTION OF THE EAST LINE OF SECTION 21, TOWNSHIP 2 SOUTH, RANGE 31 WEST AND THE NORTH RIGHT OF WAY LINE OF U.S. 98; THENCE S 03°19'34" W, ALONG THE EAST LINE OF SAID SECTION 21 FOR A DISTANCE OF 201.58 FEET TO THE SOUTH RIGHT OF WAY LINE OF SAID U.S. 98 TO A POINT ON A CURVE CONCAVE TO THE NORTH HAVING A RADIUS OF 3,919.83 FEET; THENCE DEPARTING SAID EAST LINE ALONG SAID CURVE AND SAID SOUTH RIGHT OF WAY LINE FOR AN ARC LENGTH OF 34.50 FEET (HAVING A CHORD BEARING OF S 79°56'00" E AND HAVING A CHORD LENGTH OF 34.50 FEET) TO THE POINT OF BEGINNING; THENCE CONTINUE ALONG SAID SOUTH RIGHT OF WAY LINE AND SAID CURVE HAVING A RADIUS OF 3,919.83 FEET; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE 40.50 FEET (HAVING A CHORD BEARING OF S 80°28'48" E AND HAVING A CHORD LENGTH OF 40.50 FEET); THENCE DEPARTING SAID SOUTH RIGHT OF WAY LINE S 09°25'28" W, FOR A DISTANCE OF 24.50 FEET; THENCE N 80°28'50" W, FOR A DISTANCE OF 40.50 FEET; THENCE N 09°25'28" E, FOR A DISTANCE OF 24.50 FEET TO SAID NORTH RIGHT OF WAY LINE AND TO THE POINT OF BEGINNING.

CONTAINING 990.85 SQUARE FEET OR 0.02 ACRES MORE OR LESS.

MOTT MACDONALD
MOTT MACDONALD FLORIDA LLC
220 West Garden Street
Suite 700,
Pensacola, Florida 32502
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Architects AA - C0000035
Engineers EB - 0000155
Surveyors LB - 0006783

ENCROACHMENTS AND OR IMPROVEMENTS ARE AS SHOWN OR NOTED.
NO INSTRUMENTS OF RECORD REFLECTING EASEMENTS, RIGHT OF WAYS AND OR OWNERSHIP WERE FURNISHED THIS SURVEYOR EXCEPT AS SHOWN.
NO UNDERGROUND INSTALLATIONS OR IMPROVEMENTS HAVE BEEN LOCATED EXCEPT AS SHOWN.
ALL MEASUREMENTS AND/OR ELEVATIONS WERE MADE IN ACCORDANCE TO UNITED STATES STANDARDS AND/OR UNITED STATES COAST AND GEODETIC DATUM, DISTANCES ARE IN FEET, TENTHS AND HUNDREDTHS OF A FOOT.

DESCRIPTION: SEE ABOVE

RECORDED IN NA BOOK NA PAGE NA
SEC. 53 TWP. 2 S RNG. 30 W
DATE 8/01/2017 DATE OF FIELD SURVEY NA
FB. NA PAGE NA SCALE 1" = 20'
PROJ.# 350271

UNLESS IT BEARS THE SIGNATURE AND THE ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER THIS DRAWING, SKETCH, PLAT OR MAP IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT VALID.

Byron A. Faircloth 12-26-17
BYRON A. FAIRCLOTH
FLORIDA PROFESSIONAL SURVEYOR AND MAPPER NO. 6764

AFFIX SURVEYOR SEAL

FILE NO. _____

BATHYMETRIC SURVEY

hdrinc.com 25 West Cedar Street, Suite 200, Pensacola, FL 32502-5945
(850) 432-6800

HYDROGRAPHIC (BATHYMETRIC) SURVEY

Certified to: Escambia County, Florida Board of County Commissioners

Surveyor's Notes:

1) The purpose of this survey is to depict the general existing bottom elevations for Lake Charlene.
   a. No data was collected under any portion of an existing dock or structure due to safety concerns.
2) The information shown hereon reflects the general bottom conditions as they existed on the field survey date below, and can only be indicative of the general bottom conditions on that date.
   a. Bathymetric Field Survey Date: October 13, 2016.
3) The horizontal positions and tidal reductions were derived from the utilization of a Leica 1200 Feal Time Kinematic (RTK) Global Positioning System (GPS) dual frequency receiver in RTK mode utilizing the Florida Department of Transportation (FDOT) Florida Permanent Reference Network (FPRN) and the National Geodetic Survey (NGS) Geoid 12A model.
4) The subaqueous measurements were made using a 200kHz single beam echo sounder (Unabara's HydroBook).
5) The echo soulfder data was collected and processed using Hypack 2014.
6) The sound velocity was determined using a Unabara HydroBar in cast (profile) mode, and then verified using a bar plate/bar check.
   a. An average sound velocity was used.
7) Measurements were made in accordance with the United States Standard Foot.
8) This is not a boundary survey.
9) This survey does not reflect, determine, or guarantee ownership.
10) Underground utilities were not located, if any.
11) No attempt was made to locate any underground foundations or structures.
12) Additions or deletions to survey map(s) or report(s) by other than the signing party or parties is prohibited without written consent of the signing parties.
13) The bathymetric survey or copies thereof are not valid without the signature and the original raised seal of a Florida licensed Surveyor and Mapper.
14) No other person(s) and/or entity(ies) other than those certified to above may use this bathymetric survey or copies thereof, for any reason whatsoever, without the prior written consent of the undersigned.
15) All elevations are referenced to the North American Datum of 1988 (NAVD88).
16) Bearings and coordinates shown hereon have the following metadata:
   a. Projection Zone: Florida North
   b. Projection Type: Lambert Conformal Conic
   c. Datum: North American Datum of 1983 with a datum tag of 2011 (NAD83 (2011))
17) Spot elevations shown hereon are for graphical purposes only and were determined using the Hypack sub-program SORT.
18) Aerial photography was obtained from the Florida Department of Transportation and dated 2013.
19) The elevation of the water surface relative to the North American Vertical Datum of 1988 (NAVD88) at 1:45 pm on October 13, 2016 was 23.2 feet.
   a. The vertical elevation shown above is based on the following benchmark:
   i. Designation: K 111 and PID: BG1688
      1. North American Vertical Datum of 1988 (NAVD88) Elevation = 37.63 feet (11.471 meters)
20) The official record of this survey is the original signed and sealed paper version. Any electronic version(s) is not valid unless it is identical in all forms and respects to the original signed and sealed paper version. The onus of comparison is placed on the user of the electronic version.

LEGEND:

O.R. BOOK - OFFICIAL RECORD BOOK

X 15.6 - SPOT ELEVATION

10 - CONTOUR LINE

I hereby certify that the Hydrographic (Bathymetric) Survey shown hereon was made under my responsible charge and meets the Standards of Practice as set forth by the Florida Board of Professional Surveyors and Mappers in Chapter 5J-17.050, 5J-17.051, and 5J-17.052, pursuant to Section 472.027 Florida Statutes.

Date: 1/5/17

Darryl R. Swain, Professional Surveyor and Mapper No. 5942

State of Florida

REVISIONS:	DATE:

ESCAMBIA COUNTY FLORIDA

ENGINEERING DEPARTMENT
ESCAMBIA COUNTY, FLORIDA
3363 WEST PARK PLACE, PENSACOLA, FLORIDA 32505

FIELD DATE: October 13, 2016	SECTION, TOWNSHIP, RANGE: 20 & 5S-2S-31W
DRAWING DATE: Jan. 03, 2017	FIELD BOOK: 527 PAGE: 57-60
DRAWN BY: M. KIRKLAND	APPROVED BY:
DESIGNED BY:	REGISTERED FL ENGINEER NO.
CHECKED BY: D. SWAIN	PROFESSIONAL SURVEYOR AND MAPPER NO. 5942

MEASUREMENTS MADE IN ACCORDANCE WITH UNITED STATES STANDARD FOOT

DRAWING FILE LOCATION: L:\Drafting\LAKE CHARLENE\2016\0725\dwg\LAKE CHARLENE-20160725

PROJECT NO: 20160725

DISTRICT TWO

LAKE CHARLENE
(Bathymetric Survey)

DRAWING NUMBER: L-5078

SHEET 1

OF 1 SHEET/S

HYDROGRAPHIC (BATHYMETRIC) SURVEY

Certified to: Escambia County, Florida Board of County Commissioners

Surveyor's Notes:

1) The purpose of this survey is to depict the general existing bottom elevations for Lake Joanne.
   a. No data was collected under any portion of an existing dock or structure due to safety concerns.
2) The information shown hereon reflects the general bottom conditions as they existed on the field survey date below, and can only be indicative of the general bottom conditions on this date.
   a. Bathymetric Field Survey Date: December 20, 2016.
3) The horizontal positions and tidal reductions were derived from the utilization of a Leica 1200 Real Time Kinematic (RTK) Global Positioning System (GPS) dual frequency receiver in RTK mode utilizing the Florida Department of Transportation (FDOT) Florida Permanent Reference Network (FPRN) and the National Geodetic Survey (NGS) Geoid 12A model.
4) The subaqueous measurements were made using a 200kHz single beam echo sounder (Unabara's HydroBook).
5) The echo sounder data was collected and processed using Hypack 2014.
6) The sound velocity was determined using a Unabara HydroBar in cast (profile) mode, and then verified using a bar plate/bar check.
   a. An average sound velocity was used.
7) Measurements were made in accordance with the United States Standard Foot.
8) This is not a boundary survey.
9) This survey does not reflect, determine, or guarantee ownership.
10) Underground utilities were not located, if any.
11) No attempt was made to locate any underground foundations or structures.
12) Additions or deletions to survey map(s) or report(s) by other than the signing party or parties is prohibited without written consent of the signing parties.
13) The bathymetric survey or copies thereof are not valid without the signature and the original raised seal of a Florida licensed Surveyor and Mapper.
14) No other person(s) and/or entity(ies) other than those certified to above may use this bathymetric survey or copies thereof, for any reason whatsoever, without the prior written consent of the undersigned.
15) All elevations are referenced to the North American Datum of 1988 (NAVD88).
16) Bearings and coordinates shown hereon have the following metadata:
   a. Projection Zone: Florida North
   b. Projection Type: Lambert Conformal Conic
   c. Datum: North American Datum of 1983 with a datum tag of 2011 (NAD83 (2011))
17) Spot elevations shown hereon are for graphical purposes only and were determined using the Hypack sub-program SORT.
18) Aerial photography was obtained from the Florida Department of Transportation and dated 2013.
19) The elevation of the water surface relative to the North American Vertical Datum of 1988 (NAVD88) at 11:15 am on December 21, 2016 was 23.4 feet.
   a. The vertical elevation shown above is based on the following benchmark:
      i. Designation: K 111 and PID: BG1688
         1. North American Vertical Datum of 1988 (NAVD88) Elevation = 37.63 feet (11.471 meters)
20) The official record of this survey is the original signed and sealed paper version. Any electronic version(s) is not valid unless it is identical in all forms and respects to the original signed and sealed paper version. The onus of comparison is placed on the user of the electronic version.

LEGEND:

O.R. BOOK - OFFICIAL RECORD BOOK

X 15.6 - SPOT ELEVATION

10 - CONTOUR LINE

ESCAMBIA COUNTY FLORIDA

I hereby certify that the Hydrographic (Bathymetric) Survey shown hereon was made under my responsible charge and meets the Standards of Practice as set forth by the Florida Board of Professional Surveyors and Mappers in Chapter 5J-17.050, 5J-17.051, and 5J-17.052, pursuant to Section 472.027 Florida Statutes.

Date: 1/5/17

Danny R. Swain, Professional Surveyor and Mapper No. 5942 State of Florida

REVISIONS:

ENGINEERING DEPARTMENT
ESCAMBIA COUNTY, FLORIDA
3363 WEST PARK PLACE, PENSACOLA, FLORIDA 32505

FIELD DATE:	Dec. 20 & 21, 2016
DRAWING DATE:	Jan. 03, 2017
DRAWN BY:	M. KIRKLAND
DESIGNED BY:	
CHECKED BY:	D. SWAIN
SECTION - TOWNSHIP - RANGE:	20-2S-31W
APPROVED BY:	
DATE:	
FIELD BOOK	527
PAGE	57-60
REGISTERED FL ENGINEER NO.	
PROFESSIONAL SURVEYOR AND MAPPER NO.	5942

MEASUREMENTS MADE IN ACCORDANCE WITH UNITED STATES STANDARD FOOT

DRAWING FILE LOCATION: L:\Dwfg\LAKE CHARLENE\20160125\dwg\LAKE CHARLENE-20160125

PROJECT NO. 20160125

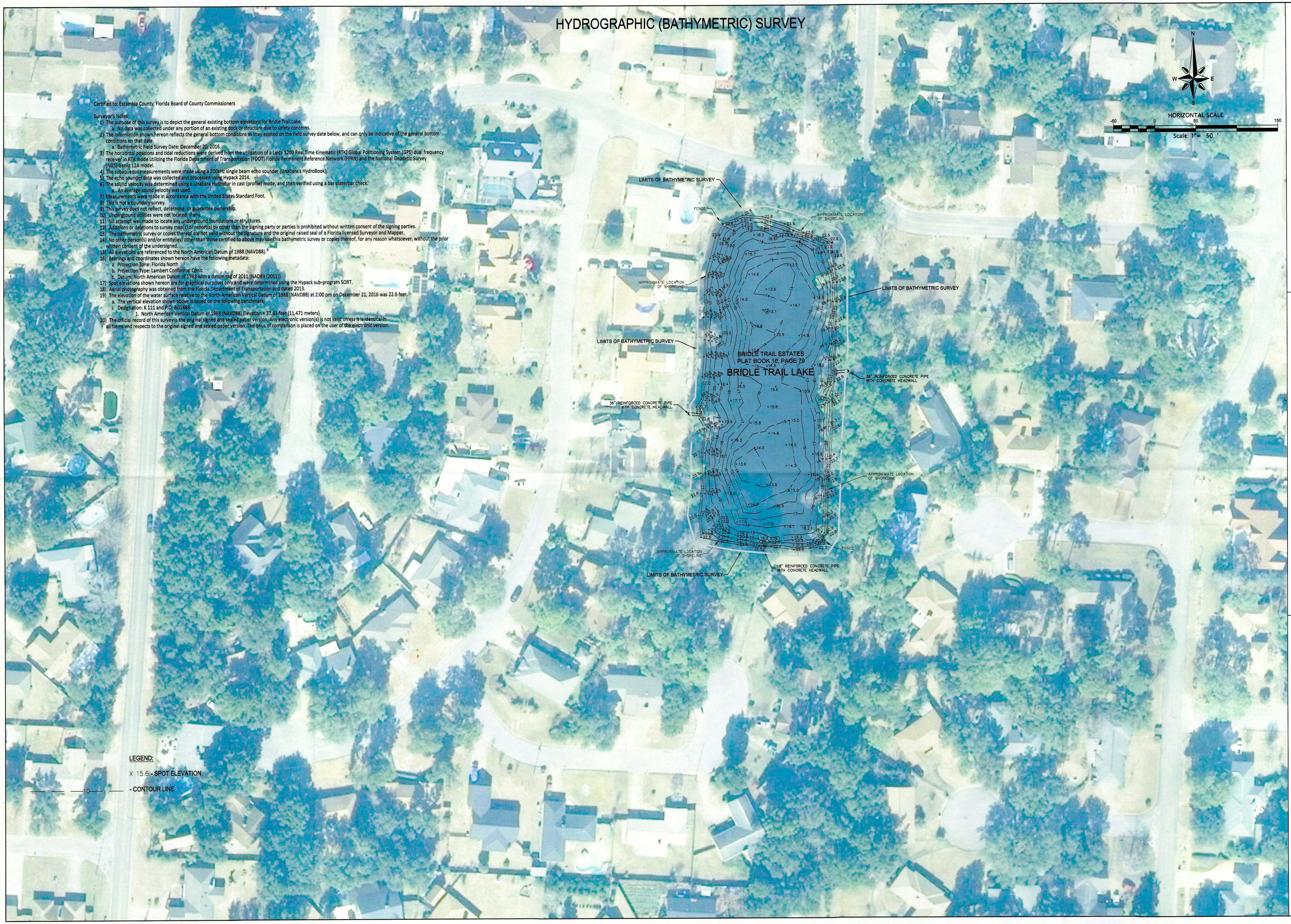
DISTRICT TWO

LAKE JOANNE
(Bathymetric Survey)

DRAWING NUMBER: L-5078

SHEET 1

OF 1 SHEET/S


HYDROGRAPHIC (BATHYMETRIC) SURVEY
Certified to: Escambia County, Florida Board of County Commissioners
Surveyor's Notes:
1) The purpose of this survey is to depict the general existing bottom elevations for Bridle Trail Lake.
a. No data was collected under any portion of an existing dock or structure due to safety concerns.
2) The information shown hereon reflects the general bottom conditions as they existed on the field survey date below, and can only be indicative of the general bottom conditions on that date.
a. Bathymetric Field Survey Date: December 20, 2016.
3) The horizontal positions and tidal reductions were derived from the utilization of a Leica 1200 Real Time Kinematic (RTK) Global Positioning System (GPS) dual frequency receiver in RTK mode utilizing the Florida Department of Transportation (FDOT) Florida Permanent Reference Network (FPRN) and the National Geodetic Survey (NGS) Geoid 12A model.
4) The subaqueous measurements were made using a 200kHz single beam echo sounder (Unabara's HydroBook).
5) The echo sounder data was collected and processed using Hypack 2014.
6) The sound velocity was determined using a Unabara HydroBar in cast (profile) mode, and then verified using a bar plate/bar check.
a. An average sound velocity was used.
7) Measurements were made in accordance with the United States Standard Foot.
8) This is not a boundary survey.
9) This survey does not reflect, determine, or guarantee ownership.
10) Underground utilities were not located, if any.
11) No attempt was made to locate any underground foundations or structures.
12) Additions or deletions to survey map(s) or report(s) by other than the signing party or parties is prohibited without written consent of the signing parties.
13) The bathymetric survey or copies thereof are not valid without the signature and the original raised seal of a Florida licensed Surveyor and Mapper.
14) No other person(s) and/or entity(ies) other than those certified to above may use this bathymetric survey or copies thereof, for any reason whatsoever, without the prior written consent of the undersigned.
15) All elevations are referenced to the North American Datum of 1988 (NAVD88).
16) Bearings and coordinates shown hereon have the following metadata:
a. Projection Zone: Florida North
b. Projection Type: Lambert Conformal Conic
c. Datum: North American Datum of 1983 with a datum tag of 2011 (NAD83 (2011))
17) Spot elevations shown hereon are for graphical purposes only and were determined using the Hypack sub-program SORT.
18) Aerial photography was obtained from the Florida Department of Transportation and dated 2013.
19) The elevation of the water surface relative to the North American Vertical Datum of 1988 (NAVD88) at 2:00 pm on December 21, 2016 was 22.6 feet.
a. The vertical elevation shown above is based on the following benchmark:
i. Designation: K 111 and PID: BG1688
1. North American Vertical Datum of 1988 (NAVD88) Elevation = 37.63 feet (11.471 meters)
20) The official record of this survey is the original signed and sealed paper version. Any electronic version(s) is not valid unless it is identical in all forms and respects to the original signed and sealed paper version. The onus of comparison is placed on the user of the electronic version.
LIMITS OF BATHYMETRIC SURVEY
APPROXIMATE LOCATION OF SHORELINE
FENCE
BRIDLE TRAIL ESTATES
PLAT BOOK 16, PAGE 79
BRIDLE TRAIL LAKE
36" REINFORCED CONCRETE PIPE WITH CONCRETE HEADWALL
HORIZONTAL SCALE
Scale: 1" = 50'
LEGEND:
X 15.6 - SPOT ELEVATION
- CONTOUR LINE

I hereby certify that the Hydrographic (Bathymetric) Survey shown hereon was made under my responsible charge and meets the Standards of Practice as set forth by the Florida Board of Professional Surveyors and Mappers in Chapter 5J-17.050, 5J-17.051, and 5J-17.052, pursuant to Section 472.027 Florida Statutes.

Date: 1/5/17

Danny R. Swain, Professional Surveyor and Mapper No. 5942 State of Florida

REVISIONS: DATE:

ENGINEERING DEPARTMENT
ESCAMBIA COUNTY, FLORIDA
3363 WEST PARK PLACE, PENSACOLA, FLORIDA 32505

DRAWN BY: M. KIRKLAND	FIELD DATE: Dec. 20 & 21, 2016	SECTION–TOWNSHIP–RANGE 20-2S-31W	APPROVED BY:	DATE:
DESIGNED BY:	DRAWING DATE: Jan. 3, 2017	FIELD BOOK 527 PAGE 57-60	REGISTERED FL ENGINEER NO.	PROFESSIONAL SURVEYOR AND MAPPER NO. 5942
CHECKED BY: D. SWAIN				

MEASUREMENTS MADE IN ACCORDANCE WITH UNITED STATES STANDARD FOOT
DRAWING FILE LOCATION: L:\Drafting\L\LAKE CHARLENE\20160125\dwg\LAKE CHARLENE-20160125
PROJECT NO. 20160125
DISTRICT TWO

BRIDLE TRAIL LAKE
(Bathymetric Survey)

DRAWING NUMBER: L-5078
SHEET 1 OF 1 SHEET/S

GEOTECHNICAL INVESTIGATION

hdrinc.com 25 West Cedar Street, Suite 200, Pensacola, FL 32502-5945
(850) 432-6800

January 13, 2017

Report of Geotechnical Exploration
Lake Charlene Drainage Improvements
LMJ File # 16-251

HDR Engineering, Inc.
25 West Cedar Street, Suite #200
Pensacola, Florida 32502-5945

Since 1976
Geotechnical Engineering
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Larry M. Jacobs & Associates
328 E Gadsden St
Pensacola, FL 32501
850.434.0846
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TABLE OF CONTENTS

1.0 INTRODUCTION

This report forwards the results of our geotechnical exploration for the proposed **Lake Charlene Drainage Improvements** project in Pensacola, Florida. The purpose of this geotechnical exploration was to determine the general subsurface conditions in the proposed concrete pipe areas and headwall location. This information would be used to provide recommendations for dewatering, earthwork, pipe bedding and backfilling. In addition, we installed piezometers around the Lake Charlene area to help evaluate groundwater levels and groundwater flow direction in the project vicinity. Our exploration included 17 Standard Penetration Test (SPT) borings, the installation of six piezometers, classification of the samples obtained in the field, laboratory testing of selected samples, and analysis by our engineering staff.

2.0 SITE AND PROJECT CONDITIONS

The proposed project will lower the water level of Lake Charlene 18 inches and provide larger outflow pipe(s). The purpose is to help control flooding in the area around Lake Charlene and the other lake connected to it (Lake Bridle). Reportedly, the current pipe outfall is set too high and is using only some the cross sectional area for water flow. Flow into the current pipe is controlled by a sluice gate structure, which we understand holds back 18 inches of water. We understand that a new sheet pile weir is planned to be placed at the invert of existing pipe, and a headwall is planned for the two new pipes.

Two new 60 inch diameter concrete pipes are planned to extend from the Lake Charlene outfall running east along Lake Joanne Drive to South 61st Avenue, then southwards down 61st Avenue to the drainage structure number 5. A single 66 inch diameter concrete pipe is planned to extend southwards along 61st Avenue (parallel to the existing 66 inch pipe) from structure 5 to structure 6, where a new 60 inch diameter concrete pipe (parallel to the existing 60 inch pipe) will extend to an outfall on the south side of US Highway 98. Reportedly, the total length of dual and single piping is roughly 2,558 feet, and the top of pipe is planned to be three feet below existing grades. We understand that cut and cover is the planned installation method for most of the pipe run, and the excavation will likely take out most of the existing roadways. The pipe under Highway 98 may be installed by cut and cover or jack and bore methods. Our client also needs to know the elevation of the groundwater surface around Lake Charlene, as well as approximate groundwater flow direction and rate. If this information changes or is incorrect, the geotechnical engineer should be notified, and changes to our recommendations may be needed.

3.0 SUBSURFACE EXPLORATION

Our exploration in the new concrete drainage pipe run consisted of 11 Standard Penetration Test (SPT) borings (B-1 to B-11) drilled to a depth of 16-31 feet below grade at the time of drilling. Our exploration in the vicinity of Lake Charlene consisted of 6 SPT borings drilled to a depth of 21 feet below existing grade. These borings were drilled in two groups, with B-12 to B-14 being drilled north of Lake Charlene and B-15 to B-17 drilled southwest of Lake Charlene. One inch diameter PVC piezometers were installed to an approximate depth of 20 feet below existing grade at the B-12 to B-17 boring locations in the county right of way. Each piezometer was finished with a flush mounted cast iron manhole along with a small concrete pad.

Due to utility concerns, the top 5-8 feet of the borings were advanced by manually turning a 3-inch diameter, 6-inch long sampler/auger into the soil until it was full. The auger borings were

probed using a steel probe rod to approximate the in place soil density. The procedure was generally repeated until the borehole collapsed due to groundwater. After the hand auger was stopped the SPT sampling began.

The SPT consists of driving a 2-inch diameter split spoon sampler into the ground using a 140-pound hammer dropped 30 inches. The number of blows required to drive the sampler one foot after seating it six inches is referred to as the blow count or "N" value and is considered a measure of the relative density of soils. "N" values can be found in **Figure #2** adjacent to the soil descriptions. The SPT borings were drilled in general accordance with ASTM D1586 using a truck mounted drill rig. The borings were advanced between SPT sampling with the "mud" jetting technique and a Bentonite drilling mud. Each sample was removed from the hand auger or SPT sampler, classified in the field by the driller, and packaged for visual classification by our engineering staff and for laboratory testing. Two Shelby tube or relatively undisturbed samples were taken for permeability testing in our laboratory.

4.0 SUBSURFACE CONDITIONS

Boring locations for the new concrete drainage pipes are shown in the attached **Figure #1A** and the soil boring locations in the vicinity of Lake Charlene are shown on the attached **Figure #1B.** These locations should be considered approximate. The borings were located in the field using a hand held GPS unit, the provided drawings, and Google Earth. Our client's surveyors determined the ground surface elevations at the boring locations and the top of metal casing at the six piezometer locations after drilling. The subsurface conditions encountered in the borings are shown in **Figure #2**, and descriptions of the soils encountered are accompanied by their Unified Classification symbol (SP, SM, etc.) based on a visual examination unless accompanied by laboratory results. Boundaries between soil layers and soil depths should be considered approximate, since the actual transition between soil layers may be gradual. Following is a generalized summary of the subsurface conditions encountered in the test borings. A detailed description of the subsurface conditions encountered in the borings can be found on **Figure #2**. Note that boring B-11 and associated recommendations will be forwarded under separate cover.

Boring B-1 at the northern concrete headwall generally encountered 24 inches of topsoil at the ground surface, underlain by dark brown to dark brown/gray loose to medium dense silty sand with roots to the 7 foot depth, over brown stained medium dense to dense sand to the 19 foot depth. Below the 19 foot depth, layers of dark brown, brown and gray stained dense, medium dense and loose silty sand and sand were encountered to the bottom of the boring at the 31 foot depth.

Borings B-2 to B-6 generally encountered 5-24 inches of topsoil at the ground surface, underlain by brown, gray, white and orange medium dense, loose and very loose slightly silty sand with occasional layers of sand and silty sand to depths of 2-4.5 feet, underlain by dark brown very loose, loose and medium dense stained slightly silty sand to sand to a depth of 7 feet. Boring B-4 encountered dark brown to black loose to medium dense silty sand with heavy organic stain at the 4-7 foot depth. Below the 7 foot depth, these borings encountered dark brown to brown dense and medium dense stained slightly silty sand and sand to the bottom of the borings to the 16 foot depth.

Borings B-7 to B-10 was similar to the B-2 to B-6, except that the soils from roughly 4-7 to 9.5-14 feet were loose to very loose in density. Note that seams of dark brown organic clayey silt

and/or silty sand with wood, roots and organic material were encountered in borings B-7, B-9 and B-10 between the 9-14, 7-9 and 7.5-8 foot depths respectively.

Borings B-12 to B-17 generally encountered 12-24 inches of topsoil at the ground surface, underlain by tan, brown, dark brown, gray, orange and white slightly silty sand with layers of sand or silty sand to the bottom of the borings at the 21 foot depth. Organic stain was common in the brown to dark brown soils. Lighter colored sand layers were more common at or near the bottom of borings B-12 to B-14. Soil density was generally loose and very loose with scattered medium dense layers in the upper 7-14 foot, over medium dense or medium dense to dense soils with scattered loose areas to the bottom of the borings.

4.1 Groundwater Data

Groundwater was encountered at the boring locations at the elevations noted on **Table #1** below. Water levels taken in the boreholes at the time of drilling should be considered approximate. Water levels were taken at the time of drilling at all boring locations, and twice after boring operations were complete in the six piezometers (B-12 to B-17). Groundwater levels will vary with the water levels in the nearby lakes, the amount of local rainfall, and changes in site drainage characteristics and may be different at other times. Ground surface elevations at our boring locations and top of casing elevations were provided by our client. The elevation data for B-8 was estimated from the two adjacent borings, as no survey data was provided.

Table #1: Groundwater Elevation Data

Boring/Piezometer	Ground Surface/Top Of Casing Elevation (ft)	Groundwater Elevation Time of Drilling (ft) 11.30.16 to 12.7.16	Groundwater Elevation (ft) 12.27.16	Groundwater Elevation (ft) 1.6.17
B-1	29.4	24.4	-	-
B-2	30.5	23.5	-	-
B-3	28.4	23.4	-	-
B-4	28.4	23.4	-	-
B-5	28.4	23.4	-	-
B-6	27.8	22.8	-	-
B-7	28.3	21.3	-	-
B-8	28.6*	20.6	-	-
B-9	28.9	20.9	-	-
B-10	26.5	19.0	-	-
B-11	23.6	-	-	-
B-12	29.6	21.6	22.9	25.3
B-13	27.1	20.6	22.9	24.0
B-14	27.8	20.8	22.8	24.5
B-15	31.8	21.8	23.5	25.4
B-16	29.4	25.9	26.8	28.4
B-17	28.9	22.9	24.3	27

*Ground surface elevation estimated from adjacent borings

5.0 LABORATORY TEST RESULTS

Laboratory testing for this project included two falling head permeability tests and grainsize analysis tests run on portions of the Shelby tube samples. Laboratory testing also included basic properties tests run on the split spoon samples including wash #200 sieve, grainsize and natural moisture content tests to document basic properties and assist in soil classification. The results of the moisture content tests, wash #200 sieve, and the wash #200 sieve portion of the grainsize tests are shown on the boring logs (**Figure #2**) adjacent to the samples tested. The results of the permeability tests are summarized in the following **Table #2**. Grainsize analysis tests were run on portions of the two Shelby tube samples and one split spoon sample, and the grainsize curves are attached as **Figure #3**. The sample marked in the table below with an asterisk appeared to be disturbed in the tube, and this sample was remolded in a Standard Proctor mold to a density similar to that of the in place soils based on the SPT data.

Table #2: Falling Head Permeability Test Results

Boring	Sample Depth (ft)	Sample Description	Dry Unit Weight (pcf)	Saturated Vertical Hydraulic Conductivity (K_{vs}) (ft/day)	Percent Fines
B-12	8.5-9.5	Light orange sand w/orange silty sand	99.4	3.0	3.3
B-17	8-9	Dark brown sand	103.2	29.4*	1.5

*Remolded Test Results

6.0 DISCUSSION AND RECOMMENDATIONS

6.1 Basis of Recommendations

Recommendations rendered herein are based on assumed and/or design information available at the time of this report, the subsurface conditions encountered in the test borings, commonly accepted Geotechnical Engineering principles and practices, and our experience with similar soil/groundwater conditions. Should the final project design information differ from the design information used in this report or should any soil conditions not discussed in this report be encountered during construction, our office should be notified and retained so that this report can be modified as needed.

Regardless of the care exercised in performing a Geotechnical Exploration, the possibility always exists that soil and/or groundwater conditions between the test borings will differ from those encountered at the specific boring locations. In addition, construction operations may alter the soil conditions. Therefore, it is recommended that a representative from Larry M. Jacobs & Associates, Inc. (LMJ) remain involved throughout construction to provide construction testing and quality assurance services and additional recommendations if needed due to unforeseen conditions.

6.2 Summary and General Comments

Soil conditions were good at the B-1 boring location for support of the headwall foundation and sheet piling at the north end of the project. In addition, the subsurface conditions encountered in the borings appear to be suitable for bedding the drainage pipes with some probable undercutting of poor soils on the southern half of the pipe run. Shallow groundwater is

anticipated to impact construction, and dewatering will be required to install the pipes and headwall foundation. Groundwater was between 5-8 feet below existing grade at the time of drilling which was during a dry period, and the bottoms of the pipes are reported to be 8-8.5 feet below existing grade. Groundwater levels were significantly higher when the water levels were rechecked in the piezometers on 1.6.17 after heavy rainfalls. The 1.6.17 readings in the piezometers indicate a 2.5-4.1 foot rise in water levels above the time of drilling. Consideration should be given to starting dewatering as far in advance of the work as possible and doing the work in a typically dry weather period, as this would help with the moisture sensitive soil problems noted below.

Compaction of the bottom of the pipe excavation will be needed in loose to very loose soil areas to provide proper pipe support. Loose to very loose soils were encountered at the bottom of the proposed excavation in borings B-7 to B-10. The other borings (B-1 to B-6) indicated medium dense to dense soils at that depth, and these medium dense to dense conditions are expected to be suitable to bed the pipes on firm undisturbed soils or with compaction if loose soils are encountered. Note that borings B-7, B-9 and B-10 encountered soils with organics, wood or soft organic clayey silt at or near the bottom of pipe depth. Soils with significant organic content, wood, or soft clayey silt are typically unsuitable to bed pipes. LMJ technicians should evaluate all questionable areas during construction, and undercutting and replacement with clean, coarse sand (less than 3% fines) or crushed stone may be needed. Based on the logs of boring at these three locations, undercutting depths would appear to be in the 1-2 foot range to remove the problem soils. We recommend the contract have a unit price and budget for removal and replacement of unsuitable soils.

The borings also encountered silty sand, slightly silty sand and sand soils with organic stain in the upper 8 feet and at deeper depths. These type soils, particularly the silty sand and slightly silty sand with more fines (SM/SP), are moisture sensitive and can be more difficult or impractical to compact in wet conditions. Wet silty sand soils will be slow to dry, will not dry in a stockpile and would need to be worked and spread out in dry weather to achieve moisture contents near optimum. Adequate space would be needed to dry these soils out, and it may not be practical to reuse the worse part of the native soils (heavily stained silty sand) due to space, time and weather constraints. The following sections provide our recommendations for site preparation and excavation, pipe bedding, backfilling, quality control testing, foundation design recommendations and our comments on groundwater flow around Lake Charlene.

6.3 Site Preparation and Excavation Recommendations

Site preparation should begin stripping topsoil and existing pavement systems and then dewatering as needed. Note topsoil was thick at some boring locations, and it should be stockpiled for reuse as needed in the landscaping areas. Existing pavement base types and thickness are unknown, and you may want to consider stockpiling the base material separately for reuse as top of subgrade material beneath the new road. We recommend that the contractor evaluate the groundwater levels at the time of construction, and we recommend lowering the groundwater table to a minimum depth of 2-3 feet below the bottom of the excavation. Well points are most suitable for dewatering in the native sand and slightly silty sand soils. Some difficulty dewatering may be experienced in the lower permeability silty sand soil layers, and the well points may need to be sanded in at those locations to improve performance. The water produced by the well points is likely to be brown in color, due to the organic stain in most of the

sands on site. Well points should be installed as far ahead of the construction as practical to facilitate lower moisture content in the native soils to be used as backfill.

A trench box is typically used for utility trenches and would be acceptable for this purpose. If no trench box is used (in areas with utilities), excavations should be made at a safe slope (1.5H:1V minimum) or the contractor will need to maintain shoring and/or bracing as applicable. Note that significant rainfall events and flowing water (seepage forces) through the sides of excavations can destabilize open cuts, and surface water runoff, erosion, and groundwater seepage should be controlled for all excavations. The contractor is solely responsible for designing and constructing safe excavations as required to maintain stability during construction. All excavations should be constructed in accordance with the latest local, state, and federal safety regulations.

6.4 Pipe Bedding Recommendations

All pipes and any manholes should be placed on firm undisturbed soils or well compacted soils. We recommend that a representative from our office evaluate the soils at the bottom of the trenches and at manholes by probing with a steel rod, and any loose areas encountered should be compacted to a minimum of 95% of the Modified Proctor Test (ASTM D1557) density for a minimum depth of 12 inches. Compaction of loose areas should be verified using in place nuclear density testing. As noted in **Section 6.2**, undercutting of soils with significant organic content or soft clayey silt should be expected at locations near B-7, B-9 and B-10, and potentially at other areas on the pipe run if these unsuitable soils are more widespread than indicated by the borings or where the loose native soils are too wet to compact if needed.

6.5 Backfill Recommendations

Excavated native soils, free of significant organic content, wood, debris or other deleterious materials can be used to backfill trenches or other excavations. Imported fill should be sand (SP) or slightly silty sand (SP/SM) with less than 9 percent fines, and sand soils with less than 3 percent fines or crushed stone would be advisable at the bottom of the excavation if wet conditions are present. Backfill materials under the roadway or structures should be placed at or near their optimum moisture content in lifts compacted to a minimum of 95% of the soil's maximum density as determined by the Modified Proctor Test (ASTM D1557). Backfill for trenches or excavations more than 5 feet outside of roadways or structures can be compacted to a minimum of 90% of the soil’s Modified Proctor Test (ASTM D1557) density. The sand and slightly silty sand soils encountered in the borings should be readily compactable in 12-inch lifts using traffic sized equipment or 6-8 inch lifts using hand equipment. The borings encountered moisture sensitive stained silty sand (SM) and stained slightly silty sand soils (SM/SP) and these soils are hard to work when wet. Moisture sensitive soils, particularly the silty sand, are more difficult to dry out and compact and may need to be placed in thinner lifts to achieve compaction. Wet soils may need to be spread out to dry. Native soils that cannot be practically dried out in the available time frame or space will need to be replaced with dried native soils or imported fill soils at or near its optimum moisture content.

6.6 Earthwork Quality Control Testing

We recommend running in place nuclear density tests to verify compaction on every 12-inch increment of trench backfill and compacted trench bottom at a maximum of 75-foot intervals along the trench alignment. Field monitoring and quality assurance testing are an extension of

the geotechnical design, and we recommend that LMJ be allowed to continue our involvement in the project through these phases of construction. All testing should be performed by a qualified engineering technician working under the direct supervision of a registered professional geotechnical engineer.

6.7 Pavement Repair Recommendations

6.7.1 Subgrade Recommendations

The native sand and slightly silty sand soils have moderate strength, with an estimated LBR of roughly 15-30 based on our experience. The top 12 inches of backfill beneath the pavement and shoulder areas should have a minimum LBR of 30. The contractor may need to stabilize lower strength soils by mixing the subgrade with graded aggregate base, reusable old base materials or imported suitable soils with an LBR of 30. We recommend compacting the top 12 inches of the subgrade to a minimum of 98% of the Modified Proctor Test (ASTM D1557) density.

6.7.2 Base Recommendations

Given the potential for shallow water conditions, we recommend providing a graded aggregate base for this project because it is the least effected by shallow groundwater. We recommend providing a minimum of 8 inches of base material for this project, unless a pavement design based on expected traffic loads is done. Graded aggregate base should have a minimum LBR value of 100. The base should be compacted to a minimum of 100% of the Modified Proctor Test (ASTM D1557) density.

6.7.3 Asphalt Recommendations

We recommend paving with at least 2 inches of asphalt for medium duty areas (depending upon traffic loads and other factors). All asphalt should consist of FDOT structural course Superpave Asphaltic Concrete (SP-9.5, SP-12.5, or SP-19.0) meeting the requirements of the FDOT Standard Specifications for Road and Bridge Construction Section 334. Superpave asphalt fine mixes should be compacted to a minimum density of 93% of the laboratory maximum specific gravity (G_{mm} or Rice Specific Gravity) as determined by FM 1-T 209. Superpave asphalt coarse mixes should be compacted to a minimum density of 94.5% of the laboratory maximum specific gravity as determined by FM 1-T 209.

6.7.4 Pavement Quality Control Testing

A sample of the proposed pavement base material should be submitted to our laboratory for LBR and grainsize testing to verify that it meets the project requirements prior to purchase. Proper compaction of the pavement subgrade and base is critical to the performance of the pavement. We recommend running in place density tests to verify compaction of the base and subgrade at a frequency of one test per 5,000 square feet of roadway. The temperature of asphalt at the time of placement is critical to achieving proper compaction, and we recommend documenting and verifying the asphalt temperature at the time of placement. After placement and compaction, the asphalt should be cored to determine the thickness that was placed and the compaction of the asphalt. The bulk specific gravity (G_{mb}) of the cores should be determined in accordance with FM 1-T 166.

6.8 Headwall Foundation and Sheet Piling Recommendations

The soil borings encountered dense sands at a depth of 10 feet below grade at the B-1 boring location and groundwater at 5 feet below existing grade at the time of drilling which was during a dry period. Dewatering will be needed to install a foundation roughly 10 feet below grade at this location. The boring data indicates the footing may be placed on firm undisturbed sand soils, and our te chnician should probe the bottom of the footing excavation prior to the placement of rebar. Any loose areas should be compacted to a depth of at least 12 inches to a minimum of 95% of the soil's maximum density as determined by the Modified Proctor Test (ASTM D1557) with a large mechanical plate tamper with a minimum dead weight of 300 pounds. We recommend that a representative from our staff run field density tests to verify compaction of the bottom of the footing excavation.

If the site is prepared in accordance with the preceding recommendations, and a representative from our company is able to verify these recommendations, footings for the proposed headwall may be designed for an allowable net soil bearing pressure of **2,500 pounds per square foot (psf)**. Settlements from the soils beneath the footings at this pressure are expected to be less than one inch, most of which should occur during construction and after the first loading. Sheet piling may be designed with the soil properties noted on the logs of boring for the B-1 boring. The angle of internal friction for sandy soils is provided, as well as moist/buoyant unit weights above the water table and buoyant unit weights below the water table.

6.9 Groundwater Flow Around Lake Charlene Discussion

Based on water levels taken on 1.6.17, the groundwater flow direction in the vicinity of borings B-12 to B-14 is south towards Lake Charlene and groundwater flow direction in the vicinity of borings B-15 to B-17 is north northeast towards Lake Charlene and Lake Bridle. Given an average of the permeability test results, a horizontal permeability rate of twice the vertical, and gradients taken from the piezometer readings, LMJ has estimated the groundwater flow velocity in these areas to be 0.3 to 0.4 feet per day. This value may vary in the field, as soil conditions can change and our permeability data is limited. This data indicates that Lakes Charlene and Bridle are acting as drains for the area, lowering groundwater levels in the vicinity. Lowering the lake level will increase this effect, reducing nearby shallow water events to help limit the negative effects on roadways and housing due to heavy rainfall and providing more in ground stormwater storage.

We hope that this report provides sufficient information for your current requirements. If you have any questions or comments, please do not hesitate to call.

Respectfully yours,

LARRY M. JACOBS & ASSOCIATES, INC.

Terry D. Niemann
Project Manager

Larry M. Jacobs, PE
Principal Geotechnical Engineer
Florida Reg. #19690

Attachments

Figure #1A

BORING LOCATION PLAN

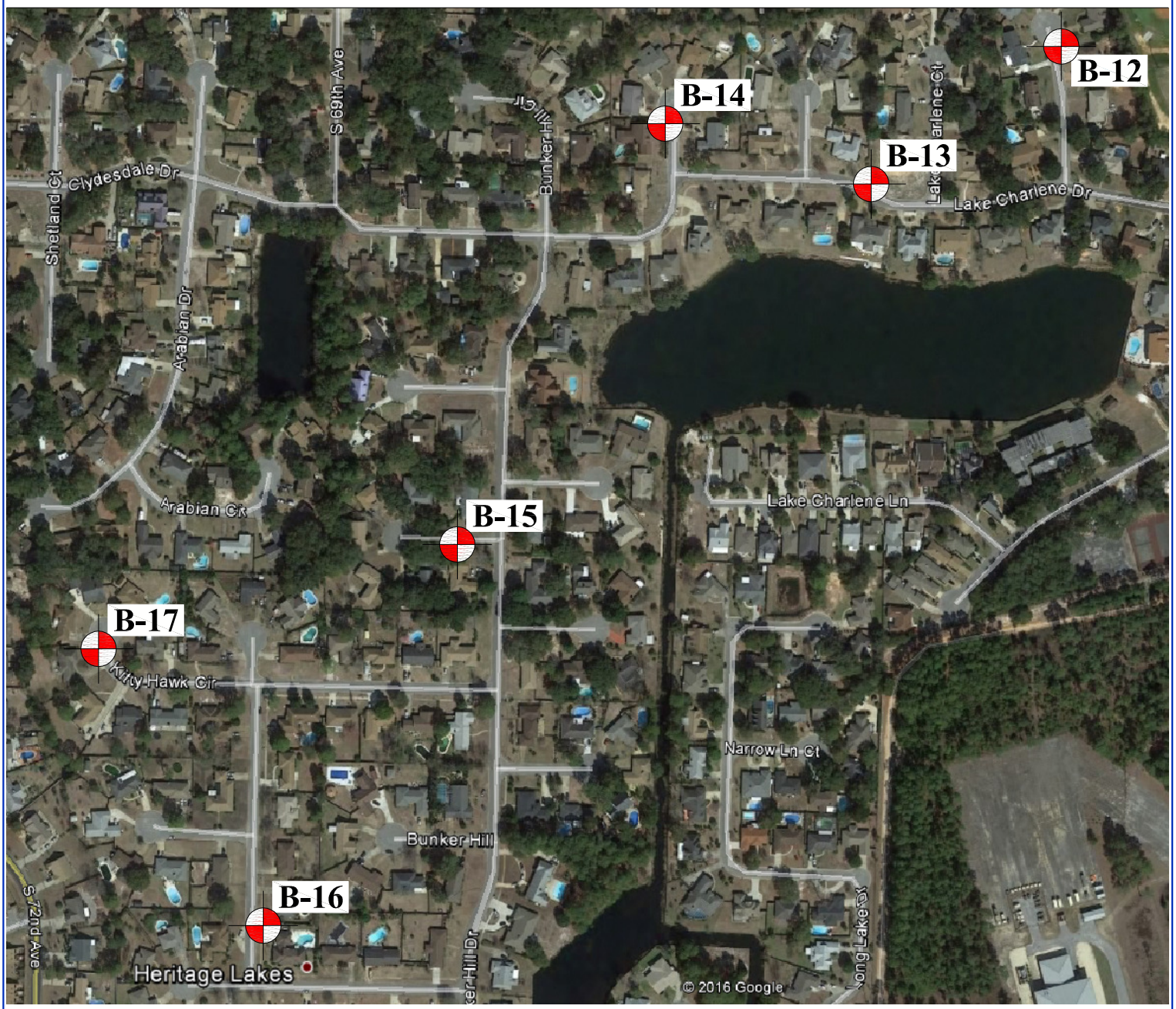
STANDARD PENETRATION TEST BORING
ALL BORING LOCATIONS ARE APPROXIMATE

Project #: 16-251	**Scale: NTS**
Date: 01/13/2017	**Checked By: TDN**
Project: Lake Charlene	
Location: Pensacola, Florida	

Geotechnical Engineering
Drilling Services
Materials Testing

Figure #1B

BORING LOCATION PLAN



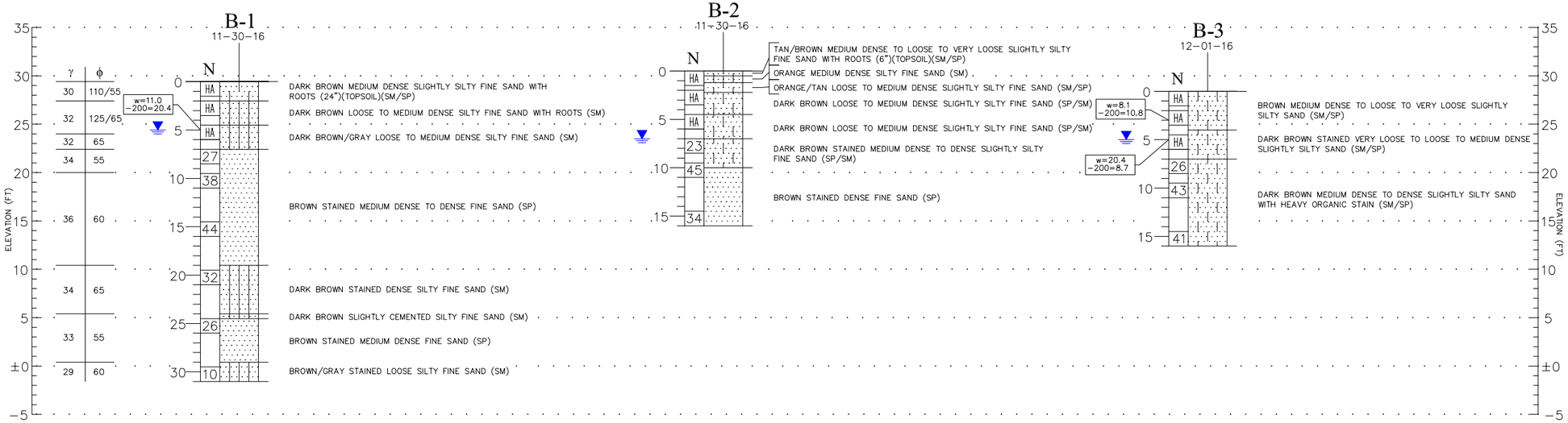
STANDARD PENETRATION TEST BORING
ALL BORING LOCATIONS ARE APPROXIMATE

Project #: 16-251	**Scale: NTS**
Date: 01/13/2017	**Checked By: TDN**
Project: Lake Charlene	
Location: Pensacola, Florida	

Geotechnical Engineering
Drilling Services
Materials Testing

Figure #2

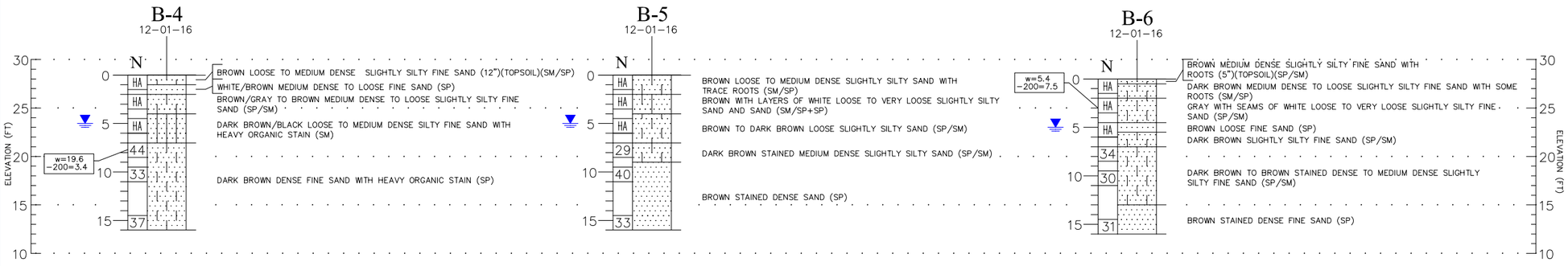
BORING LOGS



DEPTH (IN)	PROBE (IN)
0	2
6	0
12	0
18	0
24	1
30	1
36	1
42	1
48	1
54	1
60	1
66	1

DEPTH (IN)	PROBE (IN)
0	1
6	0
12	0
18	0
24	1
30	1
36	1
42	2
48	1
54	1
60	1
66	1

DEPTH (IN)	PROBE (IN)
0	2
6	0
12	1
18	2
24	6
30	12
42	12
54	2
60	1
66	1
72	1



DEPTH (IN)	PROBE (IN)
0	2
6	0
12	0
18	0
24	0
30	0
36	0
42	1
48	2
54	1
60	0
66	0

DEPTH (IN)	PROBE (IN)
0	2
6	1
12	0
18	1
24	1
30	2
36	2
42	6
48	5
54	2
60	1
66	1

DEPTH (IN)	PROBE (IN)
0	1
6	0
12	0
18	1
24	2
30	5
36	5
42	6
48	5
54	2
60	1
66	1

LEGEND

SAND | SLIGHTLY SILTY SAND
SILTY SAND | SILT
CLAY | CLAYEY SAND
PEAT | GRAVEL

GRANULAR MATERIALS

SPT BLOWS/FOOT (N)	RELATIVE DENSITY
0–4	VERY LOOSE
5–10	LOOSE
11–30	MEDIUM DENSE
31–50	DENSE
GREATER THAN 50	VERY DENSE

SILTS AND CLAY

SPT BLOWS/FOOT (N)	RELATIVE DENSITY
0–2	VERY SOFT
3–4	SOFT
5–8	MEDIUM STIFF
9–16	STIFF
17–32	VERY STIFF
GREATER THAN 32	HARD

SYMBOLS:

GNE= GROUNDWATER NOT ENCOUNTERED AT TIME OF DRILLING
N = STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
▼= ENCOUNTERED GROUNDWATER LEVEL
▽= ENCOUNTERED PERCHED WATER LEVEL
50/2"= NUMBER OF BLOWS REQUIRED (50) TO ADVANCE SPLIT SPOON SAMPLER A SPECIFIC DISTANCE (2) INCHES
HW= SPLIT SPOON SAMPLER ADVANCED UNDER WEIGHT OF ROD AND HAMMER
HA= HAND AUGER
▮= SHELBY TUBE SAMPLE
W= NATURAL MOISTURE CONTENT (%)
-200= FINES PASSING #200 SIEVE (%)
O.C.= ORGANIC CONTENT (%)
LL= ATTERBERG LIMITS (%)
LL=LIQUID LIMIT, PL=PLASTIC LIMIT
LI= LIQUIDITY INDEX
c≈ APPROXIMATE COHESION VALUE (PSF) BASED ON POCKET PENETROMETER READINGS
K_v = SATURATED VERTICAL HYDRAULIC CONDUCTIVITY (FT/DAY)
γ_d = DRY UNIT WEIGHT (PCF)
γ_m = ESTIMATED MOIST UNIT WEIGHT (PCF)
γ_b = ESTIMATED BOUYANT UNIT WEIGHT (PCF)
ϕ= ESTIMATED ANGLE OF INTERNAL FRICTION (DEGREES)

NOTES:

1) SPT BORINGS PERFORMED IN GENERAL ACCORDANCE WITH ASTM D1586
2) SUBSURFACE CONDITIONS ARE AT BORING LOCATIONS AND ACTUAL CONDITIONS BETWEEN BORINGS MAY VARY
3) ALL CLASSIFICATIONS ARE BASED ON VISUAL EXAMINATION UNLESS ACCOMPANIED BY LABORATORY TEST RESULTS
4) BOUNDARIES BETWEEN SOIL LAYERS SHOULD BE CONSIDERED APPROXIMATE AS THE ACTUAL TRANSITION MAY BE GRADUAL
5) DEPTH OF BORING IS BELOW EXISTING GRADE AT TIME OF DRILLING
6) ELEVATIONS ESTIMATED FROM PROVIDED TOPOGRAPHIC SURVEY

Project #: 16-251 **Scale: NTS**

Date: 01/13/2017 **Checked By: TDN**

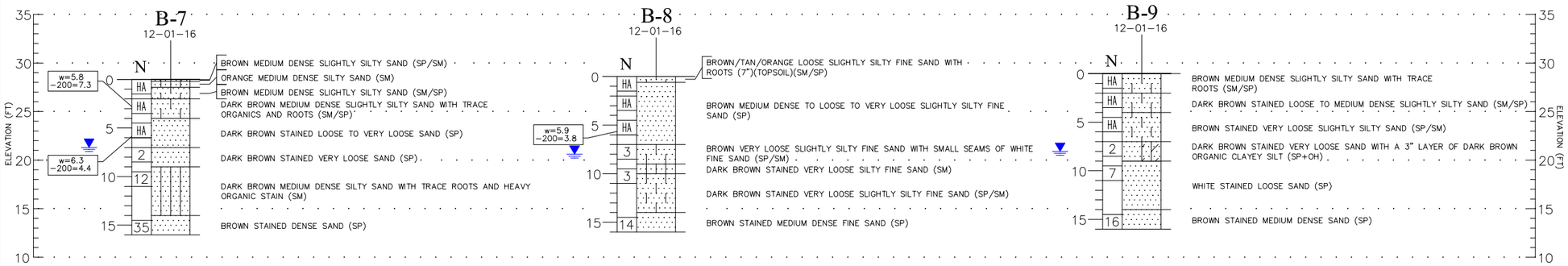
Project: Lake Charlene

Location: Pensacola, Florida

Geotechnical Engineering
Drilling Services
Materials Tested

Figure #2

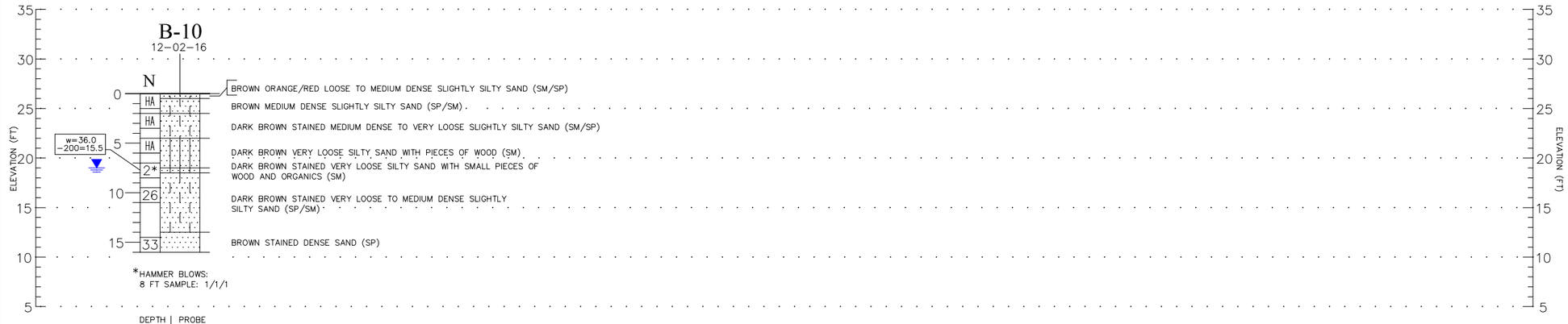
BORING LOGS



DEPTH (IN)	PROBE (IN)
0	1
6	0
12	0
18	0
24	0
30	0
36	0
42	0
48	1
54	3
60	5
66	6

DEPTH (IN)	PROBE (IN)
0	1
6	0
12	0
18	0
24	1
30	1
36	1
42	1
48	5
54	6
60	8
66	8

DEPTH (IN)	PROBE (IN)
0	1
6	0
12	0
18	1
24	1
30	1
36	1
42	2
48	2
54	2
60	6
66	8



*HAMMER BLOWS:
8 FT SAMPLE: 1/1/1

DEPTH (IN)	PROBE (IN)
0	1
6	0
12	0
18	0
24	0
30	1
36	1
42	2
48	6
54	8
60	12

LEGEND

SAND
SLIGHTLY SILTY SAND
SILTY SAND
SILT
CLAY
CLAYEY SAND
PEAT
GRAVEL

GRANULAR MATERIALS

SPT BLOWS/FOOT (N)	RELATIVE DENSITY
0–4	VERY LOOSE
5–10	LOOSE
11–30	MEDIUM DENSE
31–50	DENSE
GREATER THAN 50	VERY DENSE

SILTS AND CLAY

SPT BLOWS/FOOT (N)	RELATIVE DENSITY
0–2	VERY SOFT
3–4	SOFT
5–8	MEDIUM STIFF
9–16	STIFF
17–32	VERY STIFF
GREATER THAN 32	HARD

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HA= HAND AUGER
▮= SHELBY TUBE SAMPLE
W= NATURAL MOISTURE CONTENT (%)
-200= FINES PASSING #200 SIEVE (%)
O.C.= ORGANIC CONTENT (%)
LL= ATTERBERG LIMITS (%)
LL=LIQUID LIMIT, PL=PLASTIC LIMIT
LI= LIQUIDITY INDEX
c≈ APPROXIMATE COHESION VALUE (PSF) BASED ON POCKET PENETROMETER READINGS
K_v = SATURATED VERTICAL HYDRAULIC CONDUCTIVITY (FT/DAY)
γ_d = DRY UNIT WEIGHT (PCF)
γ_m = ESTIMATED MOIST UNIT WEIGHT (PCF)
γ_b = ESTIMATED BOUYANT UNIT WEIGHT (PCF)
ϕ = ESTIMATED ANGLE OF INTERNAL FRICTION (DEGREES)

NOTES:

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5) DEPTH OF BORING IS BELOW EXISTING GRADE AT TIME OF DRILLING
6) ELEVATIONS ESTIMATED FROM PROVIDED TOPOGRAPHIC SURVEY

Project #: 16-251 **Scale: NTS**

Date: 01/13/2017 **Checked By: TDN**

Project: Lake Charlene

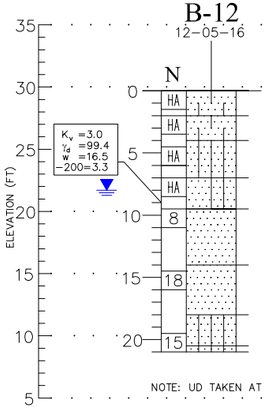
Location: Pensacola, Florida

Geotechnical Engineering
Drilling Services
Materials Tested

Figure #2

BORING LOGS

B-12
12-05-16

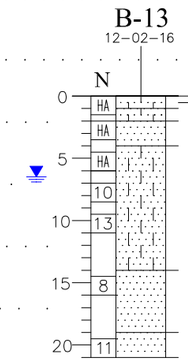


BROWN LOOSE SLIGHTLY SILTY FINE SAND WITH TRACE ROOTS (24")(TOPSOIL)(SM/SP)
TAN/BROWN LOOSE SLIGHTLY SILTY FINE SAND, TRACE PIECES OF GRAVEL (SM/SP)
ORANGE/TAN/RED LOOSE SILTY FINE SAND (SM)
TAN/ORANGE FINE SAND AND SILTY SAND (SP+SM)
ORANGE LOOSE FINE SAND (SP)
WHITE MEDIUM DENSE FINE SAND (SP)
LIGHT YELLOW MEDIUM DENSE SILTY FINE SAND (SM)
ORANGE MEDIUM DENSE SILTY FINE SAND (SM)

NOTE: UD TAKEN AT 7.5-9.5 IN OFFSET BORING.

DEPTH (IN)	PROBE (IN)
0	2
6	1
12	2
18	2
24	1
30	2
36	2
42	2
48	2
54	2
60	2
66	1
72	2

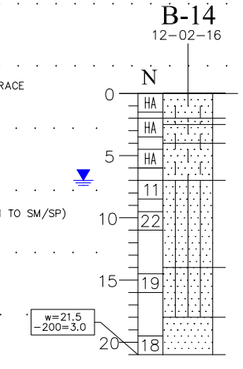
B-13
12-02-16



BROWN LOOSE TO MEDIUM DENSE SLIGHTLY SILTY FINE SAND WITH TRACE ROOTS (12")(TOPSOIL)(SP/SM)
GRAY MEDIUM DENSE SLIGHTLY SILTY FINE SAND (SM/SP)
LIGHT BROWN MEDIUM DENSE FINE SAND (SP)
BROWN LOOSE TO MEDIUM DENSE SLIGHTLY SILTY FINE SAND (SP/SM TO SM/SP)
LIGHT BROWN SLIGHTLY STAINED LOOSE FINE SAND (SP)
WHITE MEDIUM DENSE FINE SAND (SP)

DEPTH (IN)	PROBE (IN)
0	1
6	0
12	0
18	0
24	0
30	0
36	0
42	0
48	1
54	2
60	1
66	2

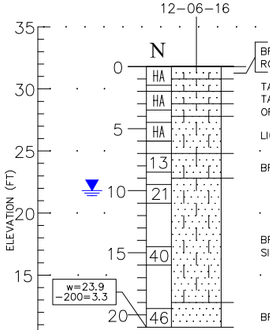
B-14
12-02-16



BROWN/ORANGE/LIGHT TAN LOOSE SLIGHTLY SILTY FINE SAND (SP/SM)
TAN/ORANGE LOOSE SLIGHTLY SILTY FINE SAND (SP/SM)
LIGHT TAN/ORANGE VERY LOOSE SLIGHTLY SILTY FINE SAND (SP/SM)
TAN/ORANGE VERY LOOSE SLIGHTLY SILTY FINE SAND (SP/SM)
LIGHT TAN MEDIUM DENSE SILTY FINE SAND (SM)
LIGHT TAN/WHITE SILTY FINE SAND (SM)
WHITE MEDIUM DENSE FINE SAND (SP)

DEPTH (IN)	PROBE (IN)
0	2
6	1
12	1
18	1
24	1
30	3
36	2
42	2
48	2
54	2
60	2
66	2

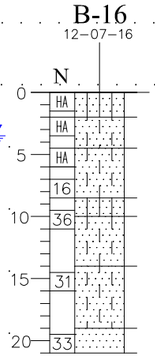
B-15
12-06-16



BROWN/RED LOOSE TO VERY LOOSE SLIGHTLY SILTY FINE SAND WITH ROOTS (SM/SP)
TAN/BROWN LOOSE TO VERY LOOSE SLIGHTLY SILTY FINE SAND (SP/SM).
TAN VERY LOOSE SLIGHTLY SILTY FINE SAND (SP/SM)
ORANGE/TAN VERY LOOSE SLIGHTLY SILTY FINE SAND (SP/SM)
LIGHT TAN LOOSE SLIGHTLY SILTY FINE SAND (SP/SM)
BROWN MEDIUM DENSE SLIGHTLY SILTY FINE SAND (SM/SP)
BROWN TO DARK BROWN STAINED MEDIUM DENSE TO DENSE SLIGHTLY SILTY FINE SAND (SP/SM)
BROWN STAINED DENSE FINE SAND (SP)

DEPTH (IN)	PROBE (IN)
0	2
6	1
12	2
18	1
24	2
30	2
36	2
42	2
48	2
54	1
60	2
66	2

B-16
12-07-16

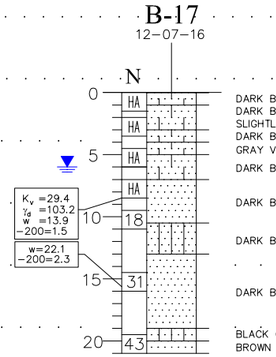


DARK BROWN LOOSE TO VERY LOOSE SILTY FINE SAND WITH ROOTS (24")(TOPSOIL)(SM)
GRAY LOOSE TO VERY LOOSE SLIGHTLY SILTY FINE SAND (SP/SM)
DARK BROWN STAINED LOOSE TO MEDIUM DENSE SLIGHTLY SILTY FINE SAND (SM/SP)
BLACK STAINED DENSE SILTY FINE SAND (SM)
DARK BROWN STAINED DENSE SLIGHTLY SILTY FINE SAND (SP/SM)
DARK BROWN STAINED DENSE SLIGHTLY SILTY FINE SAND (SP/SM)
DARK BROWN STAINED DENSE FINE SAND (SP)

NOTE: ATTEMPTED UD AT 7 FT NO RETURN.

DEPTH (IN)	PROBE (IN)
0	2
6	3
12	5
18	4
24	6
30	4
36	2
42	2
48	2
54	1
60	2
66	1

B-17
12-07-16



DARK BROWN VERY LOOSE SLIGHTLY SILTY FINE SAND (SP/SM)
DARK BROWN VERY LOOSE SLIGHTLY SILTY FINE SAND WITH LAYERS OF LIGHT TAN SLIGHTLY SILTY FINE SAND (SM/SP)
DARK BROWN VERY LOOSE SLIGHTLY SILTY FINE SAND (SP/SM).
GRAY VERY LOOSE SLIGHTLY SILTY FINE SAND (SP/SM)
DARK BROWN VERY LOOSE SLIGHTLY SILTY FINE SAND WITH ROOTS (SM/SP)
DARK BROWN STAINED LOOSE TO MEDIUM DENSE FINE SAND (SP)
DARK BROWN STAINED MEDIUM DENSE SILTY FINE SAND (SM)
DARK BROWN STAINED DENSE FINE SAND (SP)
BLACK CEMENTED DENSE SILTY FINE SAND (SM)
BROWN STAINED DENSE FINE SAND (SP)

NOTE: UD TAKEN AT 7-9 FT IN OFFSET BORING.

DEPTH (IN)	PROBE (IN)
0	6
6	5
12	4
18	2
24	5
30	4
36	6
42	3
48	9
54	6
60	4
66	3
72	3

LEGEND

SAND | SLIGHTLY SILTY SAND
SILTY SAND | SILT
CLAY | CLAYEY SAND
PEAT | GRAVEL

GRANULAR MATERIALS

SPT BLOWS/FOOT (N)	RELATIVE DENSITY
0-4	VERY LOOSE
5-10	LOOSE
11-30	MEDIUM DENSE
31-50	DENSE
GREATER THAN 50	VERY DENSE

SILTS AND CLAY

SPT BLOWS/FOOT (N)	RELATIVE DENSITY
0-2	VERY SOFT
3-4	SOFT
5-8	MEDIUM STIFF
9-16	STIFF
17-32	VERY STIFF
GREATER THAN 32	HARD

SYMBOLS:

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50/2"= NUMBER OF BLOWS REQUIRED (50) TO ADVANCE SPLIT SPOON SAMPLER A SPECIFIC DISTANCE (2) INCHES
HW= SPLIT SPOON SAMPLER ADVANCED UNDER WEIGHT OF ROD AND HAMMER
HA= HAND AUGER
▮= SHELBY TUBE SAMPLE
W= NATURAL MOISTURE CONTENT (%)
-200= FINES PASSING #200 SIEVE (%)
O.C.= ORGANIC CONTENT (%)
LL= ATTERBERG LIMITS (%)
LL=LIQUID LIMIT, PL=PLASTIC LIMIT
LI= LIQUIDITY INDEX
c≈ APPROXIMATE COHESION VALUE (PSF) BASED ON POCKET PENETROMETER READINGS
K_v= SATURATED VERTICAL HYDRAULIC CONDUCTIVITY (FT/DAY)
γ_d= DRY UNIT WEIGHT (PCF)
γ_m= ESTIMATED MOIST UNIT WEIGHT (PCF)
γ_b = ESTIMATED BOUYANT UNIT WEIGHT (PCF)
ϕ= ESTIMATED ANGLE OF INTERNAL FRICTION (DEGREES)

NOTES:

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5) DEPTH OF BORING IS BELOW EXISTING GRADE AT TIME OF DRILLING
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Project #: 16-251 **Scale: NTS**

Date: 01/13/2017 **Checked By: TDN**

Project: Lake Charlene

Location: Pensacola, Florida

Geotechnical Engineering
LMJ
Drilled Services
Materials Tested

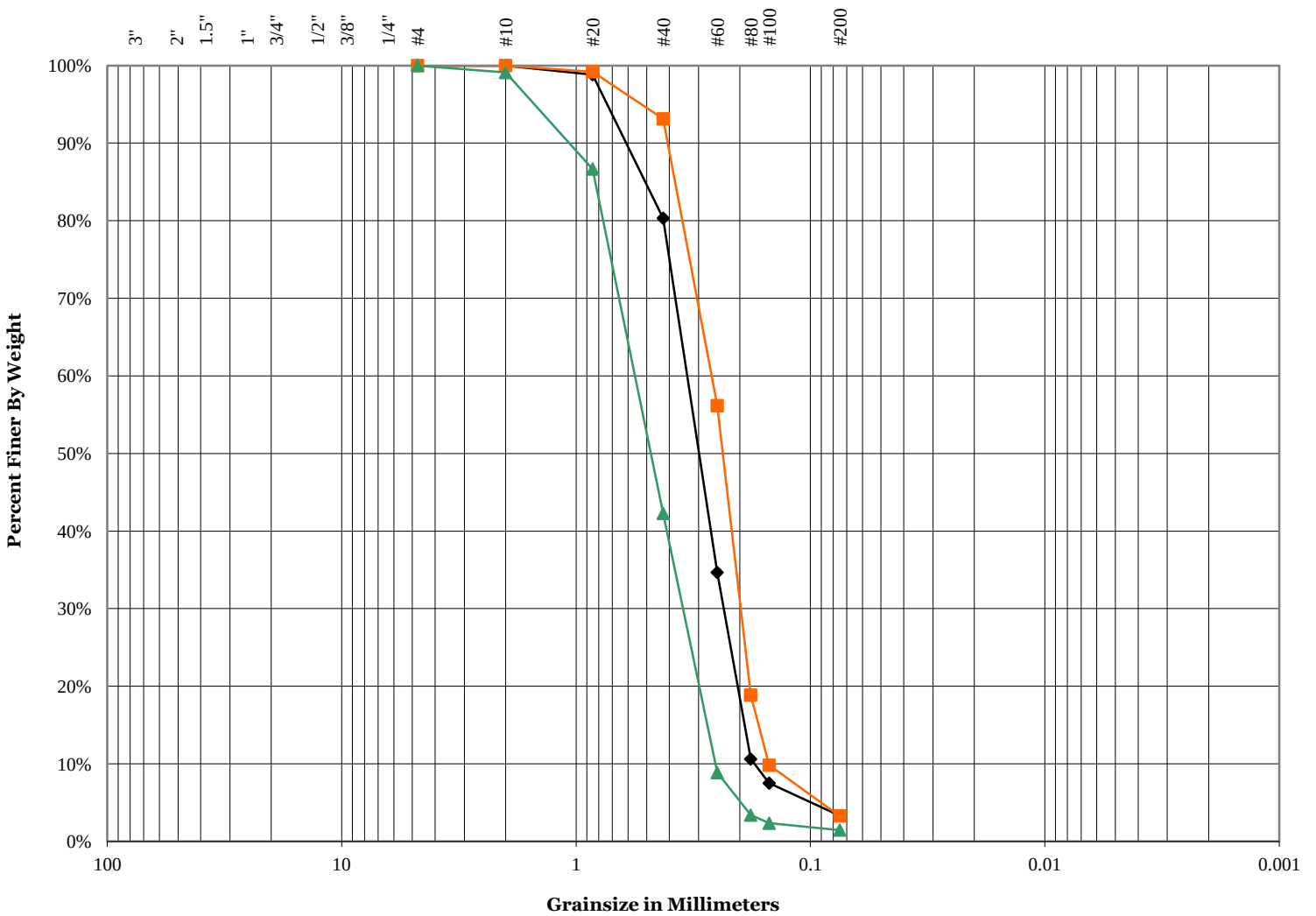
Geotechnical Engineering
Drilling Services
Materials Testing
Since 1976

Client: HDR
Project: Lake Charlene
Location: Escambia County, Florida

Grainsize Analysis - ASTM C136/AASHTO T27

Figure #: 3
Project #: 16-251
Date: 01/13/17
Engineer: TDN

Sample #	Depth (ft)	Soil Description
◆ B-12	7.5-9.5	Light Orange Sand with Some Orange Silty Sand
■ B-15	19.5-21.5	Brown Sand
▲ B-17	7-9	Dark Brown Sand



GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

328 E Gadsden St. ▼ Pensacola, Florida 32501 ▼ 850-434-0846 ▼ Fax 850-433-7027 ▼ www.lmj-a.com

January 26, 2017

Mr. Allen Vinson, PE
HDR
25 West Cedar Street, Suite #200
Pensacola, Florida 33602

SUBJECT: Addendum to Report of Geotechnical Exploration
Lake Charlene Drainage Improvements
Escambia County, Florida
LMJ File #: 16-251

Dear Mr. Vinson:

This letter is an addendum to our geotechnical report dated January 13, 2017 and forwards the log of boring for B-11 and associated additional recommendations. The boring location plan is attached as **Figure #1** and the log of boring is attached as **Figure #2**. Boring B-11 was drilled south of the intersection of US Highway 98 and 61st Avenue, and we understand that the project at this location consists of the installation of a new 60-inch diameter concrete pipe running parallel to an existing 60-inch diameter concrete pipe extending south across US Highway 98. We understand that the new pipe is planned to tie into the existing outfall structure, and the bottom of the pipe is planned roughly 8 feet below existing grades. Reportedly, cut and cover or jack and bore methods may be used to lay the new pipe across US Highway 98.

Boring B-11 generally encountered dark brown to brown loose to very loose slightly silty sand to 9.5 feet, over dark brown to black very loose peat with roots and trace wood to 14.5 feet, underlain by brown medium dense sand to 24.5 feet. The SPT blow count in the peat is likely affected by the presence of roots and wood in an otherwise very loose peat matrix. Below 24.5 feet, B-11 encountered gray very loose clayey sand and silty sand to the bottom of the boring at 31 feet.

Based on the planned bottom of pipe depth of roughly 8 feet below grade, the peat encountered in B-11 is a concern for pipe installation. Peat is an organic soil which can be very erratic in lateral extent, thickness and material properties. Peat soils are compressible, low to very low strength, and unsuitable for backfill. Compressible soils can cause settlement of overlying surfaces when subjected to new loads, and laboratory testing on the peat indicates high compressibility.

The increase in stress on the compressible peat from dewatering is a settlement concern for the excavation and surrounding area, potentially including the existing pipe and headwall. B-11 encountered a thin layer of very loose sand underlain by low strength peat at the planned pipe embedment depth and these conditions are unsuitable for bedding the pipe. In addition, there is the potential for the peat soils at the bottom of the excavation to heave upwards into the trench once the soils have been excavated. We recommend that the peat layer be completely removed from beneath the pipe if cut and cover methods are used and an LMJ technician should be onsite to direct and document the removal of the peat. Backfill should be placed and compacted in accordance with our report for this project.

The low to very low strength peat is a concern for jack and bore methods, and stability of the borehole may be concern. Undercutting the peat at and around the southern installation pit will be needed, and associated dewatering may cause a settlement concern for the ground surface around the pit and surrounding headwalls and pipes. Tunneling methods using drilling mud may not be suitable as peat soils can yield to drilling mud under pressure and cause significant loss of drilling fluid.

We hope that this letter provides sufficient information for your current requirements. If you have any questions or comments, please do not hesitate to call.

Sincerely,

LARRY M. JACOBS & ASSOCIATES, INC.

Terry Niemann
Project Manager

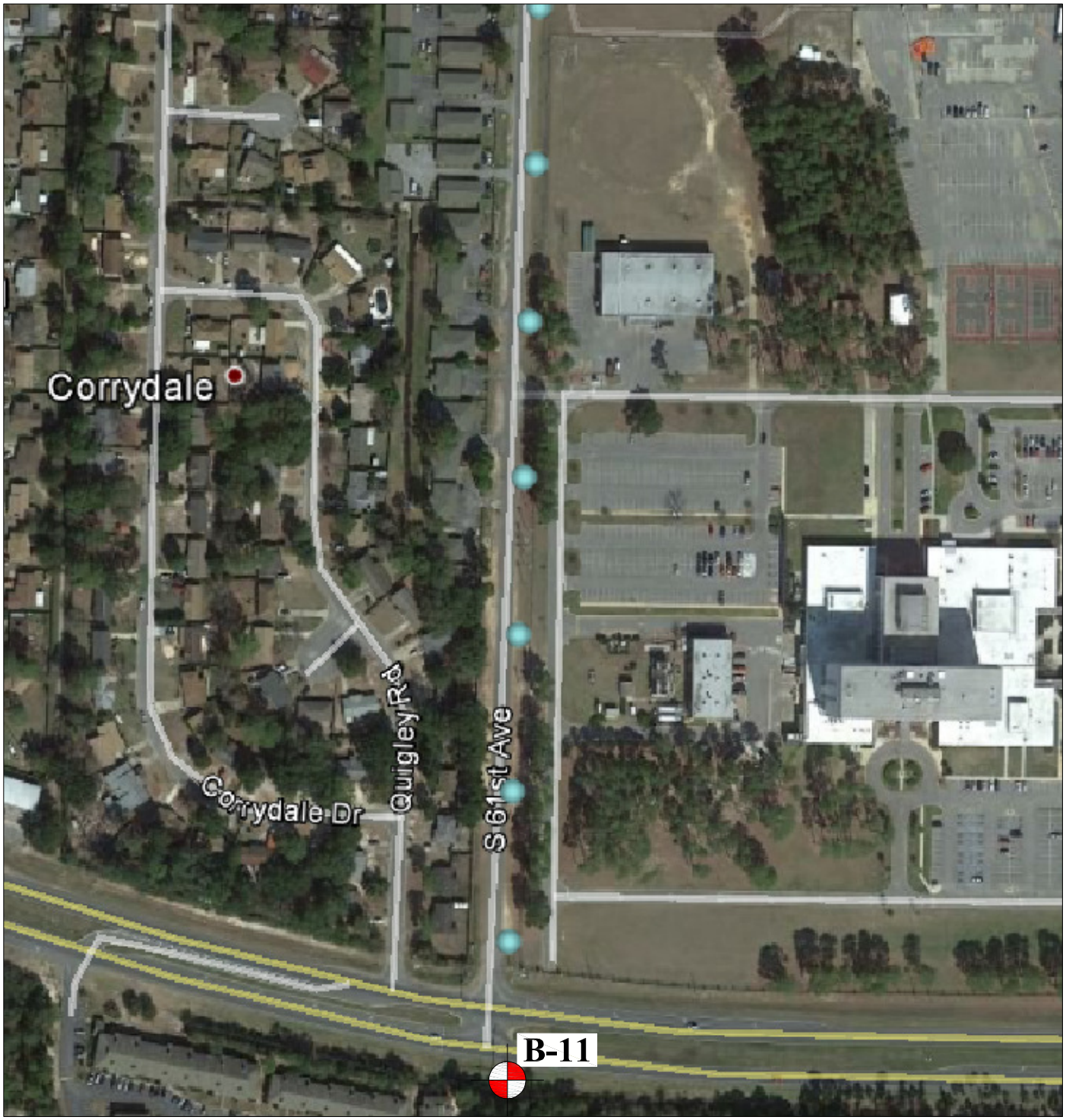
Keith V. Jacobs, PE
Project Engineer
Florida Reg. #66577

KEITH VICTOR JACOBS LICENSE No 66577 1/26/17 STATE OF FLORIDA PROFESSIONAL ENGINEER

Attachments

Figure #1A

BORING LOCATION PLAN

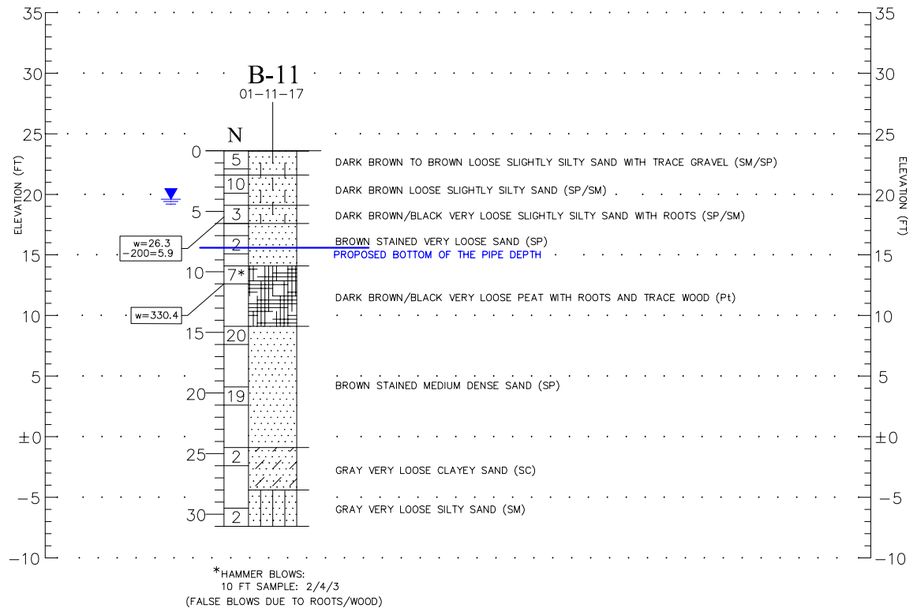


STANDARD PENETRATION TEST BORING
ALL BORING LOCATIONS ARE APPROXIMATE

Project #: 16-251	**Scale: NTS**
Date: 01/26/2017	**Checked By: TDN**
Project: Lake Charlene	
Location: Pensacola, Florida	

Geotechnical Engineering
Drilling Services
Materials Testing

BORING LOGS



*HAMMER BLOWS:
10 FT SAMPLE: 2/4/3
(FALSE BLOWS DUE TO ROOTS/WOOD)

LEGEND

SAND
SLIGHTLY SILTY SAND
SILTY SAND
SILT
CLAY
CLAYEY SAND
PEAT
GRAVEL

GRANULAR MATERIALS

SPT BLOWS/FOOT (N)	RELATIVE DENSITY
0–4	VERY LOOSE
5–10	LOOSE
11–30	MEDIUM DENSE
31–50	DENSE
GREATER THAN 50	VERY DENSE

SILTS AND CLAY

SPT BLOWS/FOOT (N)	RELATIVE DENSITY
0–2	VERY SOFT
3–4	SOFT
5–8	MEDIUM STIFF
9–16	STIFF
17–32	VERY STIFF
GREATER THAN 32	HARD

SYMBOLS:

GNE= GROUNDWATER NOT ENCOUNTERED AT TIME OF DRILLING
N = STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
▼= ENCOUNTERED GROUNDWATER LEVEL
▽= ENCOUNTERED PERCHED WATER LEVEL
50/2"= NUMBER OF BLOWS REQUIRED (50) TO ADVANCE SPLIT SPOON SAMPLER A SPECIFIC DISTANCE (2) INCHES
HW= SPLIT SPOON SAMPLER ADVANCED UNDER WEIGHT OF ROD AND HAMMER
HA= HAND AUGER
▮= SHELBY TUBE SAMPLE
W= NATURAL MOISTURE CONTENT (%)
-200= FINES PASSING #200 SIEVE (%)
O.C.= ORGANIC CONTENT (%)
LL= ATTERBERG LIMITS (%)
LL=LIQUID LIMIT, PL=PLASTIC LIMIT
LI= LIQUIDITY INDEX
c≈ APPROXIMATE COHESION VALUE (PSF) BASED ON POCKET PENETROMETER READINGS
K_v = SATURATED VERTICAL HYDRAULIC CONDUCTIVITY (FT/DAY)
γ_d = DRY UNIT WEIGHT (PCF)
γ_m = ESTIMATED MOIST UNIT WEIGHT (PCF)
γ_b = ESTIMATED BOUYANT UNIT WEIGHT (PCF)
ϕ = ESTIMATED ANGLE OF INTERNAL FRICTION (DEGREES)

NOTES:

1) SPT BORINGS PERFORMED IN GENERAL ACCORDANCE WITH ASTM D1586
2) SUBSURFACE CONDITIONS ARE AT BORING LOCATIONS AND ACTUAL CONDITIONS BETWEEN BORINGS MAY VARY
3) ALL CLASSIFICATIONS ARE BASED ON VISUAL EXAMINATION UNLESS ACCOMPANIED BY LABORATORY TEST RESULTS
4) BOUNDARIES BETWEEN SOIL LAYERS SHOULD BE CONSIDERED APPROXIMATE AS THE ACTUAL TRANSITION MAY BE GRADUAL
5) DEPTH OF BORING IS BELOW EXISTING GRADE AT TIME OF DRILLING
6) ELEVATIONS ESTIMATED FROM PROVIDED TOPOGRAPHIC SURVEY

Project #: 16-251 **Scale: NTS**

Date: 01/26/2017 **Checked By: TDN**

Project: Lake Charlene

Location: Pensacola, Florida

Geotechnical Engineering
Drilling Services
Materials Testing

STORMWATER MODELING RESULTS

hdrinc.com 25 West Cedar Street, Suite 200, Pensacola, FL 32502-5945
(850) 432-6800

MOTT MACDONALD

Lake Charlene Drainage Improvements

Stormwater Modeling Results

July 28, 2017

Mott MacDonald
220 West Garden Street
Suite 700
Pensacola FL 32502
United States of America

T +1 (850) 484 6011
F +1 (850) 484 8199
mottmac.com

Lake Charlene Drainage Improvements

Stormwater Modeling Results

July 28, 2017

STEVEN D. WHITE, PE
PE # 58809
EB0000155

Contents

1. Executive summary

1.0 Introduction

HDR contracted Mott Macdonald to prepare/modify existing hydrologic/hydraulic models to evaluate proposed improvements to alleviate flooding in Lake Charlene. Advanced Interconnected Channel and Pond Routing (ADICPR) Version 3.2 developed and marketed by Streamline Technologies, Inc. was used to analyze the performance of the proposed stormwater improvements, and asses the effects of the proposed improvements upon peak stages experienced upstream within the Lake Charlene system, as well as those experienced downstream within Jones Swamp.

1.1 Flooding Area Synopsis: Lake Charlene

The warning stages surrounding Lake Charlene range from 25’ to 27’, with the higher warning stages occurring along the more southerly nodes and decreasing in elevation as the nodes progress further north through the lake system. The normal water surface elevation of the lake system is controlled by the sluice gate at the outfall pipe located at Lake Joanne Drive. This sluice gate maintains a normal water surface elevation of approximately 23’. This elevation leaves available storage capacity within the lake system of only 2’ (25’-23’=2’) before warning stages at the northerly end of the pond are exceeded. This condition is further exacerbated by the fact that flow through the lake system occurs from north to south. Hence, stages at the north end of the system must be higher than those at the south end of the system in order for flow to occur, further reducing the available storage within the system prior to exceeding warning stages at the north end. The cause of flooding along the Lake Charlene system is a lack of sufficient storage capacity above the normal water surface of the lake and below the minimum warning stage elevation. As such, the control structure at Lake Joanne Drive consisting of the sluice gate and 66” RCP pipe is unable to discharge flows from the Lake as quickly as flows into the Lake are added. As long as this condition persists during a storm event, the water surface elevation within the lake system continues to rise and ultimately exceeds the warning stage elevation resulting in flooding conditions.

1.2 Stormwater Modeling:

Existing Lake Charlene Discharge Piping / Channel Model

ICPR models were updated with current channel and pipe invert elevations, sizes, and lengths to reflect the existing conditions of the Lake Charlene outfall piping and channel conveyance system from Lake Joanne Drive to the outfall located South of US Hwy. 98. These modifications were based on recent survey data obtained by Mott MacDonald in December 2016. Survey data was provided in NAVD 88, however ICPR model data is in terms of NGVD 29 (a translation of + 0.22 ft.).

Updates to Existing Conditions within Warrington Basin

Recent improvements within the Warrington Basin were added to the model to better reflect current conditions and drainage patters influencing the proposed project:

65th and La Rua

Drainage improvements to collect runoff from 65th Ave. and La Rua Street have altered the existing drainage pattern by conveying flows to NB360. Previously, runoff from this area was divided among basins BB520, BB530, and BB540. In the new configuration, these basin areas have decreased as reflected in the model, and a new basin, BB529, has been created and assigned to NB360 to represent the new drainage area contributing to this node.

CA080

Pipe PA080 and weir WA080 were removed from the model and replaced with channel CA080, which has a 153-foot-long irregular cross section. This represents the removal of the road that was previously there crossing East Jones Creek (north of Patton Dr./ South of Hwy. 98) which contained a piped connection from NA080 to NA070.

Glen Key

The Glen Key pond (NA260) stage/storage and drop structure data was updated based on survey information provided by HDR. A drop structure was added to account for the 36” pipe connection to NA030, East Jones Creek. The

weir link was also updated to be an irregular cross section, which also conveys water to NA030.

East Jones Creek Restoration

The East Jones Creek portion of the model was updated to reflect the recent restoration project, based on plans and survey information provided by HDR. Three culvert connections were added to convey water from NA050 to NA040, at the location where Navy Blvd. Crosses East Jones Creek. Additional nodes (NA025, NA026, NA028) and channel links were added to reflect the improvements to the creek, which included re-grading and the addition of a bypass channel within the creek.

Lexington Terrace

New nodes (NA006 and NA003) and drop structures were added to the model to represent a new stormwater collection and treatment system at Lexington Terrace, based on plans from Fabre Engineering. The plans included two interconnected stormwater management ponds which discharge to East Jones Creek.

1.3 Proposed Improvements at Lake Charlene

HDR provided Mott MacDonald with a proposed drainage improvement plan set which included placement of double 60” RCP pipes from approx. STA 27+40 (adjacent to Lake Joanne Dr.) to STA 39+20, where the system transitions to a singe 60” RCP pipe to the outfall at STA 30+40. The existing Lake Charlene pipe and channel conveyance system runs adjacent to the East and West of the proposed piping, and ties into the proposed drainage system at three locations: STA 43+85, STA 39+20, and STA 33+65.

The proposed improvements plan was added to the ICPR model with the invert elevation for the pipe run extending from the headwall at Lake Joanne Dr. (approx. STA 27+40) set at an elevation of 20.00 NAVD 88. Initially, it was thought that the system would convey water via pressure flow. However, after reviewing results from the 50 year-24 hour storm event, it was determined that the system was functioning through gravity flow. This was found by comparing the peak stages in the nodes of the proposed system to the elevation of the crown of the pipes entering and exiting each node, which did not appear to be submerged.

Multiple scenarios were analyzed in which the starting water surface elevation was adjusted from el. 21.60 ft. NAVD88 (the invert elevation of the existing discharge pipe) up to el. 23.1 ft. NAVD88, with varying weir lengths. It was ultimately decided That a 53 foot long weir at an elevation of 22.35 ft. NAVD88, would provide acceptable flood relief, while minimizing stage increases downstream, and maintaining a desired normal water level within Lake Charlene. The final results show a stage reduction of 2.72 ft. at Lake Charlene during the 50-year, 24-hour event, and a stage increase of 0.108 ft. downstream at Jones Creek (NA130). This is only a slight rise in comparison to the Grant Model (which has been updated since the initial submittal to include improvements within Warrington Basin), Which provided a maximum stage of 0.02 ft. (0.24 in.) less than the current proposed conditions model.

The results for the existing Conditions, Proposed Improvements, and Grant model are tabulated below for Lake Charlene and downstream at the discharge to Jones Creek.

Existing Conditions			
Node Name	Storm Event	Max Stage (ft.)	Warning Stage (ft.)
NB140	10 year-24 hour	26.785	25
NB140	50 year-24 hour	27.484	25
NB140	100 year-24 hour	27.659	25
NB140	500 year-24 hour	29.623	25
NA130	10 year-24 hour	14.98	16
NA130	50 year-24 hour	15.262	16
NA130	100 year-24 hour	15.351	16
NA130	500 year-24 hour	15.923	16

Grant Application Improvements with Double 60” RCP				
Node Name	Storm Event	Max Stage (ft.)	Warning Stage (ft.)	Stage Increase Above Existing Conditions (ft.)
NB140	10 year-24 hour	24.024	25	N
NB140	50 year-24 hour	25.211	25	N
NB140	100 year-24 hour	25.465	25	N
NB140	500 year-24 hour	29.017	25	N
NA130	10 year-24 hour	15.025	16	0.045
NA130	50 year-24 hour	15.35	16	0.088
NA130	100 year-24 hour	15.437	16	0.086
NA130	500 year-24 hour	16.043	16	0.12

Proposed Improvements with Double 60” RCP				
Node Name	Storm Event	Max Stage (ft.)	Warning Stage (ft.)	Stage Increase Above Existing Conditions (ft.)
NB140	10 year-24 hour	23.991	25	N
NB140	50 year-24 hour	24.764	25	N
NB140	100 year-24 hour	24.965	25	N
NB140	500 year-24 hour	27.245	25	N
NA130	10 year-24 hour	15.029	16	0.049
NA130	50 year-24 hour	15.37	16	0.108
NA130	100 year-24 hour	15.466	16	0.115
NA130	500 year-24 hour	16.063	16	0.14

Due to the nature of the project, there are some increases in peak stage downstream of the systems connection at Jones Creek, from NA130 to Bayou Chico. These increases are shown in the table below. A complete report of the ICPR results is attached hereto.

Peak Stage Increases Downstream of Discharge				
Node Name	Storm Event	Existing Max Stage (ft.)	Proposed Max Stage (ft.)	Stage Increase Above Existing Conditions (ft.)
NA130	10 year-24 hour	14.98	15.029	0.049
NA130	50 year-24 hour	15.262	15.37	0.108
NA130	100 year-24 hour	15.351	15.466	0.115
NA130	500 year-24 hour	15.923	16.063	0.14
NA120	10 year-24 hour	14.864	14.909	0.045
NA120	50 year-24 hour	15.13	15.231	0.101
NA120	100 year-24 hour	15.216	15.324	0.108
NA120	500 year-24 hour	15.802	15.944	0.142
NA110	10 year-24 hour	14.309	14.344	0.035
NA110	50 year-24 hour	14.419	14.458	0.039
NA110	100 year-24 hour	14.448	14.483	0.035
NA110	500 year-24 hour	15.124	15.325	0.201
NA100	10 year-24 hour	12.906	12.969	0.063
NA100	50 year-24 hour	13.293	13.409	0.116
NA100	100 year-24 hour	13.402	13.504	0.102
NA100	500 year-24 hour	14.789	15.052	0.263
NA090	10 year-24 hour	12.726	12.795	0.069
NA090	50 year-24 hour	13.131	13.249	0.118
NA090	100 year-24 hour	13.241	13.337	0.096
NA090	500 year-24 hour	14.72	14.991	0.271
NA080	10 year-24 hour	12.409	12.472	0.063
NA080	50 year-24 hour	12.765	12.872	0.107

NA080	100 year-24 hour	12.861	12.929	0.068
NA080	500 year-24 hour	14.564	14.853	0.289
NA070	10 year-24 hour	12.147	12.197	0.05
NA070	50 year-24 hour	12.441	12.528	0.087
NA070	100 year-24 hour	12.515	12.541	0.026
NA070	500 year-24 hour	14.504	14.805	0.301
NA060	10 year-24 hour	10.116	10.247	0.131
NA060	50 year-24 hour	10.846	11.117	0.271
NA060	100 year-24 hour	11.155	11.482	0.327
NA060	500 year-24 hour	14.415	14.73	0.315
NA050	10 year-24 hour	9.094	9.335	0.241
NA050	50 year-24 hour	10.105	10.508	0.403
NA050	100 year-24 hour	10.579	11.077	0.498
NA050	500 year-24 hour	14.363	14.684	0.321
NA040	10 year-24 hour	5.498	5.752	0.254
NA040	50 year-24 hour	7.162	7.549	0.387
NA040	100 year-24 hour	7.626	8.038	0.412
NA040	500 year-24 hour	10.779	11.082	0.303
NA030	10 year-24 hour	4.183	4.421	0.238
NA030	50 year-24 hour	5.977	6.393	0.416
NA030	100 year-24 hour	6.482	6.908	0.426
NA030	500 year-24 hour	9.652	9.954	0.302
NA028	10 year-24 hour	4.102	4.341	0.239
NA028	50 year-24 hour	5.935	6.358	0.423
NA028	100 year-24 hour	6.449	6.881	0.432
NA028	500 year-24 hour	9.645	9.92	0.275
NA026	10 year-24 hour	3.978	4.219	0.241
NA026	50 year-24 hour	5.859	6.289	0.43
NA026	100 year-24 hour	6.382	6.822	0.44

NA026	500 year-24 hour	9.607	9.884	0.277
NA025	10 year-24 hour	3.813	4.035	0.222
NA025	50 year-24 hour	5.638	6.071	0.433
NA025	100 year-24 hour	6.168	6.61	0.442
NA025	500 year-24 hour	9.396	9.659	0.263
NA020	10 year-24 hour	3.489	3.705	0.216
NA020	50 year-24 hour	5.437	5.882	0.445
NA020	100 year-24 hour	5.978	6.429	0.451
NA020	500 year-24 hour	9.3	9.566	0.266
NA010	10 year-24 hour	3.183	3.386	0.203
NA010	50 year-24 hour	4.294	4.511	0.217
NA010	100 year-24 hour	4.564	4.796	0.232
NA010	500 year-24 hour	6.496	6.703	0.207
N-BND-CHICO	10 year-24 hour	0	0	0
N-BND-CHICO	50 year-24 hour	0	0	0
N-BND-CHICO	100 year-24 hour	0	0	0
N-BND-CHICO	500 year-24 hour	0	0	0

2 ICPR Results

The compiled results from ICPR are attached hereto.

10YR-24HR

Existing Conditions						Proposed Improvements - 53 Ft. Weir @ El. 22.57 NGVD 29							Grant Improvements						
Name	Simulation	Max Stage (ft)	Warning Stage (ft)	Warning Stage Exceeded (Y/N)	Warning Stage Exceedance (ft)	Name	Simulation	Max Stage (ft)	Warning Stage (ft)	Warning Stage Exceeded (Y/N)	Peak Stage Increase Above Existing Conditions (Y/N)	Peak Stage Increase Above Existing Conditions (ft)	Stage Increase Results in New Warning Stage Exceedance (Y/N)	Name	Simulation	Max Stage (ft)	Warning Stage (ft)	Warning Stage Exceeded (Y/N)	Peak Stage Increase Above Existing Conditions (Y/N)	Peak Stage Increase Above Existing Conditions (ft)	Stage Increase Results in New Warning Stage Exceedance (Y/N)
N-BND-BAY	10yr-24hr	0.9	8	N		N-BND-BAY	10yr-24hr	0.9	8	N	N			N-BND-BAY	10yr-24hr	0.9	8	N	N		
N-BND-BELL	10yr-24hr	0	5	N		N-BND-BELL	10yr-24hr	0	5	N	N			N-BND-BELL	10yr-24hr	0	5	N	N		
N-BND-CHICO	10yr-24hr	0	5	N		N-BND-CHICO	10yr-24hr	0	5	N	N			N-BND-CHICO	10yr-24hr	0	5	N	N		
N-BNY-STAR	10yr-24hr	0	5	N		N-BNY-STAR	10yr-24hr	0	5	N	N			N-BNY-STAR	10yr-24hr	0	5	N	N		
N-GRND	10yr-24hr	0	0	N		N-GRND	10yr-24hr	0	0	N	N			N-GRND	10yr-24hr	0	0	N	N		
NA003	10yr-24hr	5.994	10	N		NA003	10yr-24hr	5.994	10	N	N			NA003	10yr-24hr	6.538	10	N	Y	0.544	N
NA006	10yr-24hr	8.881	10	N		NA006	10yr-24hr	8.881	10	N	N			NA006	10yr-24hr	8.881	10	N	N		
NA010	10yr-24hr	3.183	8	N		NA010	10yr-24hr	3.386	8	N	Y	0.203	N	NA010	10yr-24hr	3.349	8	N	Y	0.166	N
NA020	10yr-24hr	3.489	7	N		NA020	10yr-24hr	3.705	7	N	Y	0.216	N	NA020	10yr-24hr	3.666	7	N	Y	0.177	N
NA021	10yr-24hr	17.83	22.13	N		NA021	10yr-24hr	17.83	22.13	N	N			NA021	10yr-24hr	17.83	22.13	N	N		
NA022	10yr-24hr	17.861	21.21	N		NA022	10yr-24hr	17.861	21.21	N	N			NA022	10yr-24hr	17.861	21.21	N	N		
NA023	10yr-24hr	18.204	21.41	N		NA023	10yr-24hr	18.204	21.41	N	N			NA023	10yr-24hr	18.204	21.41	N	N		
NA024	10yr-24hr	19.46	21	N		NA024	10yr-24hr	19.46	21	N	N			NA024	10yr-24hr	19.46	21	N	N		
NA025	10yr-24hr	3.813	7	N		NA025	10yr-24hr	4.035	7	N	Y	0.222	N	NA025	10yr-24hr	3.995	7	N	Y	0.182	N
NA026	10yr-24hr	3.978	7	N		NA026	10yr-24hr	4.219	7	N	Y	0.241	N	NA026	10yr-24hr	4.175	7	N	Y	0.197	N
NA028	10yr-24hr	4.102	7	N		NA028	10yr-24hr	4.341	7	N	Y	0.239	N	NA028	10yr-24hr	4.298	7	N	Y	0.196	N
NA030	10yr-24hr	4.183	8	N		NA030	10yr-24hr	4.421	8	N	Y	0.238	N	NA030	10yr-24hr	4.378	8	N	Y	0.195	N
NA040	10yr-24hr	5.498	11.5	N		NA040	10yr-24hr	5.752	11.5	N	Y	0.254	N	NA040	10yr-24hr	5.706	11.5	N	Y	0.208	N
NA050	10yr-24hr	9.094	11	N		NA050	10yr-24hr	9.335	11	N	Y	0.241	N	NA050	10yr-24hr	9.293	11	N	Y	0.199	N
NA060	10yr-24hr	10.116	9	Y	1.116	NA060	10yr-24hr	10.247	9	Y	Y	0.131	N	NA060	10yr-24hr	10.224	9	Y	Y	0.108	N
NA070	10yr-24hr	12.147	11	Y	1.147	NA070	10yr-24hr	12.197	11	Y	Y	0.05	N	NA070	10yr-24hr	12.192	11	Y	Y	0.045	N
NA080	10yr-24hr	12.409	11	Y	1.409	NA080	10yr-24hr	12.472	11	Y	Y	0.063	N	NA080	10yr-24hr	12.465	11	Y	Y	0.056	N
NA090	10yr-24hr	12.726	15	N		NA090	10yr-24hr	12.795	15	N	Y	0.069	N	NA090	10yr-24hr	12.786	15	N	Y	0.06	N
NA100	10yr-24hr	12.906	16	N		NA100	10yr-24hr	12.969	16	N	Y	0.063	N	NA100	10yr-24hr	12.962	16	N	Y	0.056	N
NA110	10yr-24hr	14.309	20	N		NA110	10yr-24hr	14.344	20	N	Y	0.035	N	NA110	10yr-24hr	14.335	20	N	Y	0.026	N
NA120	10yr-24hr	14.864	21	N		NA120	10yr-24hr	14.909	21	N	Y	0.045	N	NA120	10yr-24hr	14.905	21	N	Y	0.041	N
NA130	10yr-24hr	14.98	16	N		NA130	10yr-24hr	15.029	16	N	Y	0.049	N	NA130	10yr-24hr	15.025	16	N	Y	0.045	N
NA140	10yr-24hr	15.286	16	N		NA140	10yr-24hr	15.307	16	N	Y	0.021	N	NA140	10yr-24hr	15.304	16	N	Y	0.018	N
NA150	10yr-24hr	16.903	16.5	Y	0.403	NA150	10yr-24hr	16.925	16.5	Y	Y	0.022	N	NA150	10yr-24hr	16.925	16.5	Y	Y	0.022	N
NA160	10yr-24hr	17.153	16.5	Y	0.653	NA160	10yr-24hr	17.164	16.5	Y	Y	0.011	N	NA160	10yr-24hr	17.164	16.5	Y	Y	0.011	N
NA170	10yr-24hr	17.867	22	N		NA170	10yr-24hr	17.873	22	N	Y	0.006	N	NA170	10yr-24hr	17.872	22	N	Y	0.005	N
NA180	10yr-24hr	17.889	23	N		NA180	10yr-24hr	17.894	23	N	Y	0.005	N	NA180	10yr-24hr	17.894	23	N	Y	0.005	N
NA190	10yr-24hr	17.907	23	N		NA190	10yr-24hr	17.912	23	N	Y	0.005	N	NA190	10yr-24hr	17.911	23	N	Y	0.004	N
NA200	10yr-24hr	18.73	22	N		NA200	10yr-24hr	18.732	22	N	Y	0.002	N	NA200	10yr-24hr	18.731	22	N	Y	0.001	N
NA210	10yr-24hr	19.012	22	N		NA210	10yr-24hr	19.014	22	N	Y	0.002	N	NA210	10yr-24hr	19.013	22	N	Y	0.001	N
NA220	10yr-24hr	19.154	24	N		NA220	10yr-24hr	19.156	24	N	Y	0.002	N	NA220	10yr-24hr	19.155	24	N	Y	0.001	N
NA230	10yr-24hr	20.037	27	N		NA230	10yr-24hr	20.038	27	N	Y	0.001	N	NA230	10yr-24hr	20.038	27	N	Y	0.001	N
NA240	10yr-24hr	23.929	27	N		NA240	10yr-24hr	23.929	27	N	N			NA240	10yr-24hr	23.929	27	N	N		
NA250	10yr-24hr	24.496	27	N		NA250	10yr-24hr	24.496	27	N	N			NA250	10yr-24hr	24.496	27	N	N		
NA260	10yr-24hr	10.452	11	N		NA260	10yr-24hr	10.452	11	N	N			NA260	10yr-24hr	10.452	11	N	N		
NA265	10yr-24hr	9.097	12.62	N		NA265	10yr-24hr	9.336	12.62	N	Y	0.239	N	NA265	10yr-24hr	9.291	12.62	N	Y	0.194	N
NA270	10yr-24hr	7.177	12	N		NA270	10yr-24hr	7.232	12	N	Y	0.055	N	NA270	10yr-24hr	7.218	12	N	Y	0.041	N
NA280	10yr-24hr	18.595	22	N		NA280	10yr-24hr	18.595	22	N	N			NA280	10yr-24hr	18.595	22	N	N		
NA290	10yr-24hr	19.984	22	N		NA290	10yr-24hr	19.984	22	N	N			NA290	10yr-24hr	19.984	22	N	N		
NA300	10yr-24hr	20.061	22	N		NA300	10yr-24hr	20.061	22	N	N			NA300	10yr-24hr	20.061	22	N	N		
NA310	10yr-24hr	20.117	22	N		NA310	10yr-24hr	20.117	22	N	N			NA310	10yr-24hr	20.117	22	N	N		
NA320	10yr-24hr	28.665	29	N		NA320	10yr-24hr	28.665	29	N	N			NA320	10yr-24hr	28.665	29	N	N		
NA330	10yr-24hr	28.702	28	Y	0.702	NA330	10yr-24hr	28.702	28	Y	N			NA330	10yr-24hr	28.702	28	Y	N		
NA340	10yr-24hr	9.197	14	N		NA340	10yr-24hr	9.464	14	N	Y	0.267	N	NA340	10yr-24hr	9.416	14	N	Y	0.219	N
NA350	10yr-24hr	15.13	22	N		NA350	10yr-24hr	15.13	22	N	N			NA350	10yr-24hr	15.13	22	N	N		
NA360	10yr-24hr	21.75	26	N		NA360	10yr-24hr	21.75	26	N	N			NA360	10yr-24hr	21.75	26	N	N		
NA370	10yr-24hr	22.173	27.5	N		NA370	10yr-24hr	22.173	27.5	N	N			NA370	10yr-24hr	22.173	27.5	N	N		
NA380	10yr-24hr	9.101	12	N		NA380	10yr-24hr	9.344	12	N	Y	0.243	N	NA380	10yr-24hr	9.302	12	N	Y	0.201	N
NA390	10yr-24hr	11.53	23	N		NA390	10yr-24hr	11.53	23	N	N			NA390	10yr-24hr	11.53	23	N	N		
NA400	10yr-24hr	20.119	27.5	N		NA400	10yr-24hr	20.119	27.5	N	N			NA400	10yr-24hr	20.119	27.5	N	N		
NA410	10yr-24hr	21.051	28	N		NA410	10yr-24hr	21.051	28	N	N			NA410	10yr-24hr	21.051	28	N	N		
NA420	10yr-24hr	21.979	28	N		NA420	10yr-24hr	21.979	28	N	N			NA420	10yr-24hr	21.979	28	N	N		
NA430	10yr-24hr	16.312	21	N		NA430	10yr-24hr	16.312	21	N	N			NA430	10yr-24hr	16.312	21	N	N		
NA440	10yr-24hr	20.67	27	N		NA440	10yr-24hr	20.67	27	N	N			NA440	10yr-24hr	20.67	27	N	N		
NA450	10yr-24hr	21.174	27	N		NA450	10yr-24hr	21.174	27	N	N			NA450	10yr-24hr	21.174	27	N	N		
NA460	10yr-24hr	21.746	28	N		NA460	10yr-24hr	21.746	28	N	N			NA460	10yr-24hr	21.746	28	N	N		
NA470	10yr-24hr	22.192	27	N		NA470	10yr-24hr	22.192	27	N	N			NA470	10yr-24hr	22.192	27	N	N		
NA480	10yr-24hr	22.654	27.5	N		NA480	10yr-24hr	22.654	27.5	N	N			NA480	10yr-24hr	22.654	27.5	N	N		
NA490	10yr-24hr	22.831	28	N		NA490	10yr-24hr	22.831	28	N	N			NA490	10yr-24hr	22.831	28	N	N		
NA500	10yr-24hr	11.275	15	N		NA500	10yr-24hr	11.275	15	N	N			NA500	10yr-24hr	11.275	15	N	N		
NA510	10yr-24hr	13.432	16	N		NA510	10yr-24hr	13.432	16	N	N			NA510	10yr-24hr	13.432	16	N	N		
NA520	10yr-24hr	14.742	17	N		NA520	10yr-24hr	14.742	17	N	N			NA520	10yr-24hr	14.742	17	N	N		
NA530	10yr-24hr	16.488	21.5	N		NA530	10yr-24hr	16.488	21.5	N	N			NA530	10yr-24hr	16.488	21.5	N	N		
NA540	10yr-24hr	19.322	28	N		NA540	10yr-24hr	19.322	28	N	N			NA540	10yr-24hr	19.322	28	N	N		
NA550	10yr-24hr	19.662	29	N		NA550	10yr-24hr	19.662	29	N	N			NA550	10yr-24hr	19.662	29	N	N		
NA560	10yr-24hr	19.899	28.5	N		NA560	10yr-24hr	19.899	28.5	N	N			NA560	10yr-24hr	19.899	28.5	N	N		
NA570	10yr-24hr	20.792	29	N		NA570	10yr-24hr	20.792	29	N	N			NA570	10yr-24hr	20.792	29	N	N		
NA580	10yr-24hr	21.229	26	N		NA580	10yr-24hr	21.229	26	N	N			NA580	10yr-24hr	21.229	26	N	N		
NA590	10yr-24hr	21.648	26.6	N		NA590	10yr-24hr	21.648	26.6	N	N			NA590	10yr-24hr	21.648	26.6	N	N		
NA600	10yr-24hr	22.128	25.5	N		NA600	10yr-24hr	22.128	25.5	N	N			NA600	10yr-24hr	22.128	25.5	N	N		
NA610	10yr-24hr	17.302	22	N		NA610	10yr-24hr	17.302	22	N	N			NA610	10yr-24hr	17.302	22	N	N		

10YR-24HR

NA620	10yr-24hr	17.302	21	N		NA620	10yr-24hr	17.302	21	N	N			NA620	10yr-24hr	17.302	21	N	N		
NA630	10yr-24hr	20.375	30	N		NA630	10yr-24hr	20.375	30	N	N			NA630	10yr-24hr	20.375	30	N	N		
NA640	10yr-24hr	20.732	29.75	N		NA640	10yr-24hr	20.732	29.75	N	N			NA640	10yr-24hr	20.732	29.75	N	N		
NA650	10yr-24hr	21.307	30	N		NA650	10yr-24hr	21.307	30	N	N			NA650	10yr-24hr	21.307	30	N	N		
NA660	10yr-24hr	21.905	28.5	N		NA660	10yr-24hr	21.905	28.5	N	N			NA660	10yr-24hr	21.905	28.5	N	N		
NA670	10yr-24hr	16.776	23	N		NA670	10yr-24hr	16.776	23	N	N			NA670	10yr-24hr	16.776	23	N	N		
NA690	10yr-24hr	16.841	20	N		NA690	10yr-24hr	16.841	20	N	N			NA690	10yr-24hr	16.841	20	N	N		
NA700	10yr-24hr	16.841	20	N		NA700	10yr-24hr	16.841	20	N	N			NA700	10yr-24hr	16.841	20	N	N		
NA710	10yr-24hr	11.407	22	N		NA710	10yr-24hr	11.407	22	N	N			NA710	10yr-24hr	11.407	22	N	N		
NA720	10yr-24hr	11.406	20	N		NA720	10yr-24hr	11.406	20	N	N			NA720	10yr-24hr	11.407	20	N	Y	0.001	N
NA730	10yr-24hr	11.407	22.61	N		NA730	10yr-24hr	11.407	22.61	N	N			NA730	10yr-24hr	11.406	22.61	N	N		
NA740	10yr-24hr	11.407	19.68	N		NA740	10yr-24hr	11.407	19.68	N	N			NA740	10yr-24hr	11.407	19.68	N	N		
NA750	10yr-24hr	11.407	22	N		NA750	10yr-24hr	11.407	22	N	N			NA750	10yr-24hr	11.407	22	N	N		
NA760	10yr-24hr	16.421	22	N		NA760	10yr-24hr	16.421	22	N	N			NA760	10yr-24hr	16.421	22	N	N		
NA770	10yr-24hr	17.421	26.75	N		NA770	10yr-24hr	17.421	26.75	N	N			NA770	10yr-24hr	17.421	26.75	N	N		
NA780	10yr-24hr	17.646	27.5	N		NA780	10yr-24hr	17.646	27.5	N	N			NA780	10yr-24hr	17.646	27.5	N	N		
NA790	10yr-24hr	17.977	27.5	N		NA790	10yr-24hr	17.977	27.5	N	N			NA790	10yr-24hr	17.977	27.5	N	N		
NA800	10yr-24hr	19.524	28.75	N		NA800	10yr-24hr	19.524	28.75	N	N			NA800	10yr-24hr	19.524	28.75	N	N		
NB010	10yr-24hr	20.701	26.36	N		NB010	10yr-24hr	19.837	26.36	N	N			NB010	10yr-24hr	19.762	26.36	N	N		
NB020	10yr-24hr	22.83	28.81	N		NB020	10yr-24hr	22.141	28.81	N	N			NB020	10yr-24hr	22.168	28.81	N	N		
NB030	10yr-24hr	23.995	26.75	N		NB030	10yr-24hr	23.904	26.75	N	N			NB030	10yr-24hr	23.995	26.75	N	N		
NB040	10yr-24hr	24.879	27.59	N		NB040	10yr-24hr	24.913	27.59	N	Y	0.034	N	NB040	10yr-24hr	24.879	27.59	N	N		
NB050	10yr-24hr	27.36	29.72	N		NB050	10yr-24hr	27.36	29.72	N	N			NB050	10yr-24hr	27.36	29.72	N	N		
NB055	10yr-24hr	23.359	26.27	N		NB055	10yr-24hr	22.522	26.27	N	N			NB055	10yr-24hr	23.015	26.27	N	N		
NB060	10yr-24hr	23.579	27.57	N		NB060	10yr-24hr	22.551	27.57	N	N			NB060	10yr-24hr	23.039	27.57	N	N		
NB063	10yr-24hr	23.737	28.22	N		NB063	10yr-24hr	22.583	28.22	N	N			NB063	10yr-24hr	23.059	28.22	N	N		
NB065	10yr-24hr	23.88	28.22	N		NB065	10yr-24hr	22.655	28.22	N	N			NB065	10yr-24hr	23.094	28.22	N	N		
NB070	10yr-24hr	24.687	30.49	N		NB070	10yr-24hr	22.923	30.49	N	N			NB070	10yr-24hr	23.261	30.49	N	N		
NB080	10yr-24hr	25.2	29.51	N		NB080	10yr-24hr	23.182	29.51	N	N			NB080	10yr-24hr	23.419	29.51	N	N		
NB090	10yr-24hr	25.907	28.85	N		NB090	10yr-24hr	23.627	28.85	N	N			NB090	10yr-24hr	23.745	28.85	N	N		
NB095	10yr-24hr	26.099	27	N		NB095	10yr-24hr	23.732	27	N	N			NB095	10yr-24hr	23.834	27.22	N	N		
NB100	10yr-24hr	26.776	27	N		NB100	10yr-24hr	23.905	27	N	N			NB100	10yr-24hr	23.937	27.22	N	N		
NB110	10yr-24hr	26.778	27	N		NB110	10yr-24hr	23.922	27	N	N			NB110	10yr-24hr	23.951	27	N	N		
NB120	10yr-24hr	26.78	27	N		NB120	10yr-24hr	23.931	27	N	N			NB120	10yr-24hr	23.958	27	N	N		
NB130	10yr-24hr	26.781	26	Y	0.781	NB130	10yr-24hr	23.94	26	N	N			NB130	10yr-24hr	23.966	26	N	N		
NB140	10yr-24hr	26.785	25	Y	1.785	NB140	10yr-24hr	23.991	25	N	N			NB140	10yr-24hr	24.024	25	N	N		
NB150	10yr-24hr	26.783	28	N		NB150	10yr-24hr	24.119	28	N	N			NB150	10yr-24hr	24.119	28	N	N		
NB160	10yr-24hr	26.822	26.5	Y	0.322	NB160	10yr-24hr	25.525	26.5	N	N			NB160	10yr-24hr	25.525	26.5	N	N		
NB170	10yr-24hr	26.94	27	N		NB170	10yr-24hr	24.187	27	N	N			NB170	10yr-24hr	24.183	27	N	N		
NB180	10yr-24hr	27.192	27.11	Y	0.082	NB180	10yr-24hr	24.824	27.11	N	N			NB180	10yr-24hr	24.811	27.11	N	N		
NB181	10yr-24hr	29.924	31	N		NB181	10yr-24hr	29.924	31	N	N			NB181	10yr-24hr	29.924	31	N	N		
NB182	10yr-24hr	30.107	30	Y	0.107	NB182	10yr-24hr	30.107	30	Y	N			NB182	10yr-24hr	30.107	30	Y	N		
NB183	10yr-24hr	30.113	30	Y	0.113	NB183	10yr-24hr	30.113	30	Y	N			NB183	10yr-24hr	30.113	30	Y	N		
NB190	10yr-24hr	26.793	28	N		NB190	10yr-24hr	24.328	28	N	N			NB190	10yr-24hr	24.328	28	N	N		
NB200	10yr-24hr	27.238	27.64	N		NB200	10yr-24hr	25.919	27.64	N	N			NB200	10yr-24hr	25.919	27.64	N	N		
NB210	10yr-24hr	28.443	29	N		NB210	10yr-24hr	27.91	29	N	N			NB210	10yr-24hr	27.91	29	N	N		
NB220	10yr-24hr	29.702	29	Y	0.702	NB220	10yr-24hr	29.547	29	Y	N			NB220	10yr-24hr	29.547	29	Y	N		
NB230	10yr-24hr	30.857	30.5	Y	0.357	NB230	10yr-24hr	30.769	30.5	Y	N			NB230	10yr-24hr	30.769	30.5	Y	N		
NB240	10yr-24hr	31.946	31.8	Y	0.146	NB240	10yr-24hr	31.939	31.8	Y	N			NB240	10yr-24hr	31.939	31.8	Y	N		
NB250	10yr-24hr	31.948	35	N		NB250	10yr-24hr	31.948	35	N	N			NB250	10yr-24hr	31.948	35	N	N		
NB260	10yr-24hr	42.367	42.5	N		NB260	10yr-24hr	42.367	42.5	N	N			NB260	10yr-24hr	42.367	42.5	N	N		
NB270	10yr-24hr	26.793	27.5	N		NB270	10yr-24hr	24.029	27.5	N	N			NB270	10yr-24hr	24.052	27.5	N	N		
NB280	10yr-24hr	26.814	26.81	Y	0.004	NB280	10yr-24hr	24.667	26.81	N	N			NB280	10yr-24hr	24.667	26.81	N	N		
NB290	10yr-24hr	26.817	25.69	Y	1.127	NB290	10yr-24hr	24.147	25.69	N	N			NB290	10yr-24hr	24.141	25.69	N	N		
NB295	10yr-24hr	26.836	25.76	Y	1.076	NB295	10yr-24hr	24.235	25.76	N	N			NB295	10yr-24hr	24.207	25.76	N	N		
NB300	10yr-24hr	26.85	26.04	Y	0.81	NB300	10yr-24hr	24.298	26.04	N	N			NB300	10yr-24hr	24.259	26.04	N	N		
NB305	10yr-24hr	26.864	28.2	N		NB305	10yr-24hr	24.346	28.2	N	N			NB305	10yr-24hr	24.3	28.2	N	N		
NB310	10yr-24hr	26.887	29	N		NB310	10yr-24hr	24.404	29	N	N			NB310	10yr-24hr	24.348	29	N	N		
NB313	10yr-24hr	26.978	31.5	N		NB313	10yr-24hr	26.511	31.5	N	N			NB313	10yr-24hr	26.511	31.5	N	N		
NB316	10yr-24hr	28.701	31.5	N		NB316	10yr-24hr	28.701	31.5	N	N			NB316	10yr-24hr	28.701	31.5	N	N		
NB319	10yr-24hr	29.336	32.9	N		NB319	10yr-24hr	29.336	32.9	N	N			NB319	10yr-24hr	29.336	32.9	N	N		
NB320	10yr-24hr	30.432	34.25	N		NB320	10yr-24hr	30.432	34.25	N	N			NB320	10yr-24hr	30.432	34.25	N	N		
NB325	10yr-24hr	30.534	34.8	N		NB325	10yr-24hr	30.534	34.8	N	N			NB325	10yr-24hr	30.534	34.8	N	N		
NB328	10yr-24hr	30.612	33.1	N		NB328	10yr-24hr	30.612	33.1	N	N			NB328	10yr-24hr	30.612	33.1	N	N		
NB330	10yr-24hr	30.645	31.6	N		NB330	10yr-24hr	30.645	31.6	N	N			NB330	10yr-24hr	30.645	31.6	N	N		
NB340	10yr-24hr	30.655	36.4	N		NB340	10yr-24hr	30.655	36.4	N	N			NB340	10yr-24hr	30.655	36.4	N	N		
NB350	10yr-24hr	30.655	35	N		NB350	10yr-24hr	30.655	35	N	N			NB350	10yr-24hr	30.655	35	N	N		
NB351	10yr-24hr	32.827	35	N		NB351	10yr-24hr	32.827	35	N	N			NB351	10yr-24hr	32.827	35	N	N		
NB352	10yr-24hr	32.836	35	N		NB352	10yr-24hr	32.836	35	N	N			NB352	10yr-24hr	32.836	35	N	N		
NB352A	10yr-24hr	32.837	34	N		NB352A	10yr-24hr	32.837	34	N	N			NB352A	10yr-24hr	32.837	34	N	N		
NB353	10yr-24hr	32.845	38.71	N		NB353	10yr-24hr	32.845	38.71	N	N			NB353	10yr-24hr	32.845	38.71	N	N		
NB353A	10yr-24hr	32.846	37.25	N		NB353A	10yr-24hr	32.846	37.25	N	N			NB353A	10yr-24hr	32.846	37.25	N	N		
NB354	10yr-24hr	32.851	37	N		NB354	10yr-24hr	32.851	37	N	N			NB354	10yr-24hr	32.851	37	N	N		
NB354A	10yr-24hr	32.859	36	N		NB354A	10yr-24hr	32.859	36	N	N			NB354A	10yr-24hr	32.859	36	N	N		
NB355	10yr-24hr	41.295	43.24	N		NB355	10yr-24hr	41.295	43.24	N	N			NB355	10yr-24hr	41.295	43.24	N	N		
NB355A	10yr-24hr	35.341	39.7	N		NB355A	10yr-24hr	35.341	39.7	N	N			NB355A	10yr-24hr	35.341	39.7	N	N		
NB356	10yr-24hr	41.297	43	N		NB356	10yr-24hr	41.297	43	N	N			NB356	10yr-24hr	41.297	43	N	N		
NB356A	10yr-24hr	41.298	43.5	N		NB356A	10yr-24hr	41.295	43.5	N	N			NB356A	10yr-24hr	41.298	43.5	N	N		
NB357	10yr-24hr	44.334	47.54	N		NB357	10yr-24hr	44.334	47.54	N	N			NB357	10yr-24hr	44.334	47.54	N	N		
NB357A	10yr-24hr	43.937	47.9	N		NB357A	10yr-24hr	43.937	47.9	N	N			NB357A	10yr-24hr	43.937	47.9	N	N		
NB357B	10yr-24hr	43.154	45.95	N		NB357B	10yr-24hr	43.154	45.95	N	N			NB357B	10yr-24hr	43.154	45.95	N	N		
NB360	10yr-24hr	38.893	48	N		NB360	10yr-24hr	38.893	48	N	N			NB360	10yr-24hr	38.893	48	N	N		
NB370	10yr-24hr	47.684	48	N		NB370	10yr-24hr	47.684	48	N	N			NB370	10yr-24hr	47.684	48	N	N		
NB380	10yr-24hr	48.356	48	Y	0.356	NB380	10yr-24hr	48.356	48	Y	N			NB380	10yr-24hr	48.356	48	Y	N		
NB400	10yr-24hr	27.081	27	Y	0.081	NB400	10yr-24hr	25.638	27	N	N			NB400	10yr-24hr	25.188	27	N	N		

10YR-24HR

NB410	10yr-24hr	27.26	26.98	Y	0.28
NB420	10yr-24hr	27.166	26.5	Y	0.666
NB430	10yr-24hr	27.636	26.51	Y	1.126
NB440	10yr-24hr	27.638	26	Y	1.638
NB450	10yr-24hr	27.622	29	N	
NB460	10yr-24hr	33.589	41	N	
NB470	10yr-24hr	35.819	38	N	
NB480	10yr-24hr	36.018	36	Y	0.018
NB490	10yr-24hr	37.71	37.5	Y	0.21
NB500	10yr-24hr	38.051	38	Y	0.051
NB510	10yr-24hr	38.163	38	Y	0.163
NB520	10yr-24hr	38.632	37.5	Y	1.132
NB530	10yr-24hr	45.288	47.5	N	
NB540	10yr-24hr	48.44	48	Y	0.44
NB550	10yr-24hr	50.551	50.5	Y	0.051
NB560	10yr-24hr	49.659	50	N	
NB570	10yr-24hr	50.427	51.5	N	
NB580	10yr-24hr	47.615	54.5	N	
NC010	10yr-24hr	23.931	26.5	N	
NC020	10yr-24hr	24.011	27	N	
NC030	10yr-24hr	25.277	32.2	N	
NC040	10yr-24hr	25.441	27	N	
NC050	10yr-24hr	19.466	21.5	N	
NC060	10yr-24hr	25.807	29	N	
NC070	10yr-24hr	26.549	30	N	
NC080	10yr-24hr	26.801	28	N	
NC090	10yr-24hr	26.909	28	N	
NC100	10yr-24hr	26.918	28.5	N	
NC110	10yr-24hr	27.244	29	N	
NC120	10yr-24hr	28.161	28	Y	0.161
NC130	10yr-24hr	28.467	29	N	
NC140	10yr-24hr	28.469	30	N	
NC150	10yr-24hr	28.4	30	N	
NC160	10yr-24hr	28.01	28.5	N	
NC161	10yr-24hr	29.44	29.5	N	
NC162	10yr-24hr	29.377	29.5	N	
NC170	10yr-24hr	27.247	27	Y	0.247
NC180	10yr-24hr	17.2	20	N	
NC190	10yr-24hr	17.276	21	N	
NC200	10yr-24hr	18.464	24	N	
NC210	10yr-24hr	20.895	28	N	
NC220	10yr-24hr	22.544	25	N	
NC230	10yr-24hr	22.906	26	N	
NC240	10yr-24hr	24.433	27	N	
NC250	10yr-24hr	25.148	27	N	
NC260	10yr-24hr	25.23	28	N	
NC270	10yr-24hr	25.314	27	N	
NC280	10yr-24hr	25.511	27	N	
NC290	10yr-24hr	26.701	28	N	
NC300	10yr-24hr	26.891	28	N	
NC310	10yr-24hr	19.536	24	N	
NC320	10yr-24hr	21.298	25	N	
NC330	10yr-24hr	21.932	26	N	
NC340	10yr-24hr	23.874	25	N	
NC350	10yr-24hr	24.279	27	N	
NC360	10yr-24hr	25.73	27	N	
NC370	10yr-24hr	26.423	28	N	
NC380	10yr-24hr	27.115	27	Y	0.115
NC390	10yr-24hr	27.263	27	Y	0.263
NC400	10yr-24hr	27.415	27	Y	0.415
NC410	10yr-24hr	27.913	27	Y	0.913
NC420	10yr-24hr	28.193	27	Y	1.193
NC430	10yr-24hr	28.235	27	Y	1.235
NC440	10yr-24hr	28.432	28	Y	0.432
NC450	10yr-24hr	28.436	29	N	
NC460	10yr-24hr	28.654	30	N	
NC470	10yr-24hr	27.318	28	N	
NC480	10yr-24hr	27.941	29	N	
NC490	10yr-24hr	27.967	28	N	
NC500	10yr-24hr	27.98	28	N	
NC510	10yr-24hr	27.828	28	N	

10YR-24HR

NB410	10yr-24hr	26.833	26.98	N	N		
NB420	10yr-24hr	24.671	26.5	N	N		
NB430	10yr-24hr	27.333	26.51	Y	N		
NB440	10yr-24hr	27.342	26	Y	N		
NB450	10yr-24hr	27.414	29	N	N		
NB460	10yr-24hr	33.588	41	N	N		
NB470	10yr-24hr	35.819	38	N	N		
NB480	10yr-24hr	36.019	36	Y	Y	0.001	N
NB490	10yr-24hr	37.711	37.5	Y	Y	0.001	N
NB500	10yr-24hr	38.051	38	Y	N		
NB510	10yr-24hr	38.163	38	Y	N		
NB520	10yr-24hr	38.632	37.5	Y	N		
NB530	10yr-24hr	45.288	47.5	N	N		
NB540	10yr-24hr	48.44	48	Y	N		
NB550	10yr-24hr	50.551	50.5	Y	N		
NB560	10yr-24hr	49.659	50	N	N		
NB570	10yr-24hr	50.427	51.5	N	N		
NB580	10yr-24hr	47.615	54.5	N	N		
NC010	10yr-24hr	23.931	26.5	N	N		
NC020	10yr-24hr	24.011	27	N	N		
NC030	10yr-24hr	25.277	32.2	N	N		
NC040	10yr-24hr	25.441	27	N	N		
NC050	10yr-24hr	19.466	21.5	N	N		
NC060	10yr-24hr	25.807	29	N	N		
NC070	10yr-24hr	26.549	30	N	N		
NC080	10yr-24hr	26.801	28	N	N		
NC090	10yr-24hr	26.909	28	N	N		
NC100	10yr-24hr	26.918	28.5	N	N		
NC110	10yr-24hr	27.244	29	N	N		
NC120	10yr-24hr	28.161	28	Y	N		
NC130	10yr-24hr	28.467	29	N	N		
NC140	10yr-24hr	28.469	30	N	N		
NC150	10yr-24hr	28.4	30	N	N		
NC160	10yr-24hr	28.01	28.5	N	N		
NC161	10yr-24hr	29.44	29.5	N	N		
NC162	10yr-24hr	29.377	29.5	N	N		
NC170	10yr-24hr	27.247	27	Y	N		
NC180	10yr-24hr	17.21	20	N	Y	0.01	N
NC190	10yr-24hr	17.284	21	N	Y	0.008	N
NC200	10yr-24hr	18.464	24	N	N		
NC210	10yr-24hr	20.895	28	N	N		
NC220	10yr-24hr	22.544	25	N	N		
NC230	10yr-24hr	22.906	26	N	N		
NC240	10yr-24hr	24.433	27	N	N		
NC250	10yr-24hr	25.148	27	N	N		
NC260	10yr-24hr	25.23	28	N	N		
NC270	10yr-24hr	25.314	27	N	N		
NC280	10yr-24hr	25.511	27	N	N		
NC290	10yr-24hr	26.701	28	N	N		
NC300	10yr-24hr	26.891	28	N	N		
NC310	10yr-24hr	19.536	24	N	N		
NC320	10yr-24hr	21.298	25	N	N		
NC330	10yr-24hr	21.932	26	N	N		
NC340	10yr-24hr	23.874	25	N	N		
NC350	10yr-24hr	24.279	27	N	N		
NC360	10yr-24hr	25.73	27	N	N		
NC370	10yr-24hr	26.423	28	N	N		
NC380	10yr-24hr	27.115	27	Y	N		
NC390	10yr-24hr	27.263	27	Y	N		
NC400	10yr-24hr	27.415	27	Y	N		
NC410	10yr-24hr	27.913	27	Y	N		
NC420	10yr-24hr	28.193	27	Y	N		
NC430	10yr-24hr	28.235	27	Y	N		
NC440	10yr-24hr	28.432	28	Y	N		
NC450	10yr-24hr	28.436	29	N	N		
NC460	10yr-24hr	28.654	30	N	N		
NC470	10yr-24hr	27.318	28	N	N		
NC480	10yr-24hr	27.941	29	N	N		
NC490	10yr-24hr	27.967	28	N	N		
NC500	10yr-24hr	27.98	28	N	N		
NC510	10yr-24hr	27.828	28	N	N		
NEW/ADDED GRANT CONDITIONS NODES							
Pond 1	10yr-24hr	10	15.9	N	N/A	N/A	
Pond 2	10yr-24hr	10	16	N	N/A	N/A	
Discharge 1	10yr-24hr	13.8	15	N	N/A	N/A	
GW1	10yr-24hr	10	11	N	N/A	N/A	
GW2	10yr-24hr	10	13	N	N/A	N/A	
NB056	10yr-24hr	23.24	30.22	N	N/A	N/A	
NB057	10yr-24hr	23.604	29.72	N	N/A	N/A	
NEW/ADDED PROPOSED CONDITIONS NODES							
NB010B	10yr-24hr	18.26	28.69	N	N/A	N/A	
NB056B	10yr-24hr	22.549	28.22	N	N/A	N/A	
NB056C	10yr-24hr	22.252	30.22	N	N/A	N/A	
NB056D	10yr-24hr	19.902	28.22	N	N/A	N/A	

10YR-24HR

NB410	10yr-24hr	26.38	26.98	N	N		
NB420	10yr-24hr	24.73	26.5	N	N		
NB430	10yr-24hr	27.336	26.51	Y	N		
NB440	10yr-24hr	27.345	26	Y	N		
NB450	10yr-24hr	27.414	29	N	N		
NB460	10yr-24hr	33.588	41	N	N		
NB470	10yr-24hr	35.819	38	N	N		
NB480	10yr-24hr	36.018	36	Y	N		
NB490	10yr-24hr	37.711	37.5	Y	Y	0.001	N
NB500	10yr-24hr	38.051	38	Y	N		
NB510	10yr-24hr	38.163	38	Y	N		
NB520	10yr-24hr	38.632	37.5	Y	N		
NB530	10yr-24hr	45.288	47.5	N	N		
NB540	10yr-24hr	48.44	48	Y	N		
NB550	10yr-24hr	50.551	50.5	Y	N		
NB560	10yr-24hr	49.659	50	N	N		
NB570	10yr-24hr	50.427	51.5	N	N		
NB580	10yr-24hr	47.615	54.5	N	N		
NC010	10yr-24hr	23.931	26.5	N	N		
NC020	10yr-24hr	24.011	27	N	N		
NC030	10yr-24hr	25.277	32.2	N	N		
NC040	10yr-24hr	25.441	27	N	N		
NC050	10yr-24hr	19.466	21.5	N	N		
NC060	10yr-24hr	25.807	29	N	N		
NC070	10yr-24hr	26.549	30	N	N		
NC080	10yr-24hr	26.801	28	N	N		
NC090	10yr-24hr	26.909	28	N	N		
NC100	10yr-24hr	26.918	28.5	N	N		
NC110	10yr-24hr	27.244	29	N	N		
NC120	10yr-24hr	28.161	28	Y	N		
NC130	10yr-24hr	28.467	29	N	N		
NC140	10yr-24hr	28.469	30	N	N		
NC150	10yr-24hr	28.4	30	N	N		
NC160	10yr-24hr	28.01	28.5	N	N		
NC161	10yr-24hr	29.44	29.5	N	N		
NC162	10yr-24hr	29.377	29.5	N	N		
NC170	10yr-24hr	27.247	27	Y	N		
NC180	10yr-24hr	17.21	20	N	Y	0.01	N
NC190	10yr-24hr	17.284	21	N	Y	0.008	N
NC200	10yr-24hr	18.464	24	N	N		
NC210	10yr-24hr	20.895	28	N	N		
NC220	10yr-24hr	22.544	25	N	N		
NC230	10yr-24hr	22.906	26	N	N		
NC240	10yr-24hr	24.433	27	N	N		
NC250	10yr-24hr	25.148	27	N	N		
NC260	10yr-24hr	25.23	28	N	N		
NC270	10yr-24hr	25.314	27	N	N		
NC280	10yr-24hr	25.511	27	N	N		
NC290	10yr-24hr	26.701	28	N	N		
NC300	10yr-24hr	26.891	28	N	N		
NC310	10yr-24hr	19.536	24	N	N		
NC320	10yr-24hr	21.298	25	N	N		
NC330	10yr-24hr	21.932	26	N	N		
NC340	10yr-24hr	23.874	25	N	N		
NC350	10yr-24hr	24.279	27	N	N		
NC360	10yr-24hr	25.73	27	N	N		
NC370	10yr-24hr	26.423	28	N	N		
NC380	10yr-24hr	27.115	27	Y	N		
NC390	10yr-24hr	27.263	27	Y	N		
NC400	10yr-24hr	27.415	27	Y	N		
NC410	10yr-24hr	27.913	27	Y	N		
NC420	10yr-24hr	28.193	27	Y	N		
NC430	10yr-24hr	28.235	27	Y	N		
NC440	10yr-24hr	28.432	28	Y	N		
NC450	10yr-24hr	28.436	29	N	N		
NC460	10yr-24hr	28.654	30	N	N		
NC470	10yr-24hr	27.318	28	N	N		
NC480	10yr-24hr	27.941	29	N	N		
NC490	10yr-24hr	27.967	28	N	N		
NC500	10yr-24hr	27.98	28	N	N		
NC510	10yr-24hr	27.828	28	N	N		
NEW/ADDED GRANT CONDITIONS NODES							
Pond 1	10yr-24hr	10	15.9	N	N/A	N/A	
Pond 2	10yr-24hr	10	16	N	N/A	N/A	
Discharge 1	10yr-24hr	13.8	15	N	N/A	N/A	
GW1	10yr-24hr	10	11	N	N/A	N/A	
GW2	10yr-24hr	10	13	N	N/A	N/A	
NB056	10yr-24hr	23.549	28.72	N	N/A	N/A	
NB057	10yr-24hr	23.74	27.97	N	N/A	N/A	

50YR-24HR

N-BND-BAY	50yr-24hr	0.9	8	N		N-BND-BAY	50yr-24hr	0.9	8	N	N			N-BND-BAY	50yr-24hr	0.9	8	N	N		
N-BND-BELL	50yr-24hr	0	5	N		N-BND-BELL	50yr-24hr	0	5	N	N			N-BND-BELL	50yr-24hr	0	5	N	N		
N-BND-CHICO	50yr-24hr	0	5	N		N-BND-CHICO	50yr-24hr	0	5	N	N			N-BND-CHICO	50yr-24hr	0	5	N	N		
N-BNY-STAR	50yr-24hr	0	5	N		N-BNY-STAR	50yr-24hr	0	5	N	N			N-BNY-STAR	50yr-24hr	0	5	N	N		
N-GRND	50yr-24hr	0	0	N		N-GRND	50yr-24hr	0	0	N	N			N-GRND	50yr-24hr	0	0	N	N		
NA003	50yr-24hr	6.537	10	N		NA003	50yr-24hr	6.537	10	N	N			NA003	50yr-24hr	6.737	10	N	Y	0.2	N
NA006	50yr-24hr	8.957	10	N		NA006	50yr-24hr	8.957	10	N	N			NA006	50yr-24hr	8.957	10	N	N		
NA010	50yr-24hr	4.294	8	N		NA010	50yr-24hr	4.511	8	N	Y	0.217	N	NA010	50yr-24hr	4.457	8	N	Y	0.163	N
NA020	50yr-24hr	5.437	7	N		NA020	50yr-24hr	5.882	7	N	Y	0.445	N	NA020	50yr-24hr	5.783	7	N	Y	0.346	N
NA021	50yr-24hr	18.104	22.13	N		NA021	50yr-24hr	18.104	22.13	N	N			NA021	50yr-24hr	18.104	22.13	N	N		
NA022	50yr-24hr	18.128	21.21	N		NA022	50yr-24hr	18.128	21.21	N	N			NA022	50yr-24hr	18.128	21.21	N	N		
NA023	50yr-24hr	18.411	21.41	N		NA023	50yr-24hr	18.411	21.41	N	N			NA023	50yr-24hr	18.411	21.41	N	N		
NA024	50yr-24hr	20.275	21	N		NA024	50yr-24hr	20.275	21	N	N			NA024	50yr-24hr	20.275	21	N	N		
NA025	50yr-24hr	5.638	7	N		NA025	50yr-24hr	6.071	7	N	Y	0.433	N	NA025	50yr-24hr	5.968	7	N	Y	0.33	N
NA026	50yr-24hr	5.859	7	N		NA026	50yr-24hr	6.289	7	N	Y	0.43	N	NA026	50yr-24hr	6.188	7	N	Y	0.329	N
NA028	50yr-24hr	5.935	7	N		NA028	50yr-24hr	6.358	7	N	Y	0.423	N	NA028	50yr-24hr	6.258	7	N	Y	0.323	N
NA030	50yr-24hr	5.977	8	N		NA030	50yr-24hr	6.393	8	N	Y	0.416	N	NA030	50yr-24hr	6.295	8	N	Y	0.318	N
NA040	50yr-24hr	7.162	11.5	N		NA040	50yr-24hr	7.549	11.5	N	Y	0.387	N	NA040	50yr-24hr	7.456	11.5	N	Y	0.294	N
NA050	50yr-24hr	10.105	11	N		NA050	50yr-24hr	10.508	11	N	Y	0.403	N	NA050	50yr-24hr	10.406	11	N	Y	0.301	N
NA060	50yr-24hr	10.846	9	Y	1.846	NA060	50yr-24hr	11.117	9	Y	Y	0.271	N	NA060	50yr-24hr	11.053	9	Y	Y	0.207	N
NA070	50yr-24hr	12.441	11	Y	1.441	NA070	50yr-24hr	12.528	11	Y	Y	0.087	N	NA070	50yr-24hr	12.523	11	Y	Y	0.082	N
NA080	50yr-24hr	12.765	11	Y	1.765	NA080	50yr-24hr	12.872	11	Y	Y	0.107	N	NA080	50yr-24hr	12.859	11	Y	Y	0.094	N
NA090	50yr-24hr	13.131	15	N		NA090	50yr-24hr	13.249	15	N	Y	0.118	N	NA090	50yr-24hr	13.23	15	N	Y	0.099	N
NA100	50yr-24hr	13.293	16	N		NA100	50yr-24hr	13.409	16	N	Y	0.116	N	NA100	50yr-24hr	13.39	16	N	Y	0.097	N
NA110	50yr-24hr	14.419	20	N		NA110	50yr-24hr	14.458	20	N	Y	0.039	N	NA110	50yr-24hr	14.445	20	N	Y	0.026	N
NA120	50yr-24hr	15.13	21	N		NA120	50yr-24hr	15.231	21	N	Y	0.101	N	NA120	50yr-24hr	15.211	21	N	Y	0.081	N
NA130	50yr-24hr	15.262	16	N		NA130	50yr-24hr	15.37	16	N	Y	0.108	N	NA130	50yr-24hr	15.35	16	N	Y	0.088	N
NA140	50yr-24hr	15.59	16	N		NA140	50yr-24hr	15.643	16	N	Y	0.053	N	NA140	50yr-24hr	15.632	16	N	Y	0.042	N
NA150	50yr-24hr	17.18	16.5	Y	0.68	NA150	50yr-24hr	17.179	16.5	Y	N			NA150	50yr-24hr	17.18	16.5	Y	N		
NA160	50yr-24hr	17.413	16.5	Y	0.913	NA160	50yr-24hr	17.412	16.5	Y	N			NA160	50yr-24hr	17.413	16.5	Y	N		
NA170	50yr-24hr	19.01	22	N		NA170	50yr-24hr	19.01	22	N	N			NA170	50yr-24hr	19.01	22	N	N		
NA180	50yr-24hr	19.019	23	N		NA180	50yr-24hr	19.02	23	N	Y	0.001	N	NA180	50yr-24hr	19.019	23	N	N		
NA190	50yr-24hr	19.677	23	N		NA190	50yr-24hr	19.666	23	N	N			NA190	50yr-24hr	19.687	23	N	Y	0.01	N
NA200	50yr-24hr	20.328	22	N		NA200	50yr-24hr	20.32	22	N	N			NA200	50yr-24hr	20.334	22	N	Y	0.006	N
NA210	50yr-24hr	20.606	22	N		NA210	50yr-24hr	20.6	22	N	N			NA210	50yr-24hr	20.611	22	N	Y	0.005	N
NA220	50yr-24hr	20.757	24	N		NA220	50yr-24hr	20.751	24	N	N			NA220	50yr-24hr	20.762	24	N	Y	0.005	N
NA230	50yr-24hr	20.894	27	N		NA230	50yr-24hr	20.888	27	N	N			NA230	50yr-24hr	20.898	27	N	Y	0.004	N
NA240	50yr-24hr	24.143	27	N		NA240	50yr-24hr	24.143	27	N	N			NA240	50yr-24hr	24.143	27	N	N		
NA250	50yr-24hr	24.771	27	N		NA250	50yr-24hr	24.771	27	N	N			NA250	50yr-24hr	24.771	27	N	N		
NA260	50yr-24hr	10.504	11	N		NA260	50yr-24hr	10.504	11	N	N			NA260	50yr-24hr	10.504	11	N	N		
NA265	50yr-24hr	10.098	12.62	N		NA265	50yr-24hr	10.502	12.62	N	Y	0.404	N	NA265	50yr-24hr	10.395	12.62	N	Y	0.297	N
NA270	50yr-24hr	9.697	12	N		NA270	50yr-24hr	10.453	12	N	Y	0.756	N	NA270	50yr-24hr	10.332	12	N	Y	0.635	N
NA280	50yr-24hr	18.839	22	N		NA280	50yr-24hr	18.839	22	N	N			NA280	50yr-24hr	18.839	22	N	N		
NA290	50yr-24hr	20.705	22	N		NA290	50yr-24hr	20.705	22	N	N			NA290	50yr-24hr	20.705	22	N	N		
NA300	50yr-24hr	20.762	22	N		NA300	50yr-24hr	20.762	22	N	N			NA300	50yr-24hr	20.762	22	N	N		
NA310	50yr-24hr	20.793	22	N		NA310	50yr-24hr	20.793	22	N	N			NA310	50yr-24hr	20.793	22	N	N		
NA320	50yr-24hr	28.753	29	N		NA320	50yr-24hr	28.753	29	N	N			NA320	50yr-24hr	28.753	29	N	N		
NA330	50yr-24hr	28.771	28	Y	0.771	NA330	50yr-24hr	28.771	28	Y	N			NA330	50yr-24hr	28.771	28	Y	N		
NA340	50yr-24hr	10.35	14	N		NA340	50yr-24hr	10.747	14	N	Y	0.397	N	NA340	50yr-24hr	10.642	14	N	Y	0.292	N
NA350	50yr-24hr	15.531	22	N		NA350	50yr-24hr	15.531	22	N	N			NA350	50yr-24hr	15.531	22	N	N		
NA360	50yr-24hr	22.187	26	N		NA360	50yr-24hr	22.187	26	N	N			NA360	50yr-24hr	22.187	26	N	N		
NA370	50yr-24hr	22.784	27.5	N		NA370	50yr-24hr	22.784	27.5	N	N			NA370	50yr-24hr	22.784	27.5	N	N		
NA380	50yr-24hr	10.136	12	N		NA380	50yr-24hr	10.549	12	N	Y	0.413	N	NA380	50yr-24hr	10.446	12	N	Y	0.31	N
NA390	50yr-24hr	13.691	23	N		NA390	50yr-24hr	13.691	23	N	N			NA390	50yr-24hr	13.691	23	N	N		
NA400	50yr-24hr	20.553	27.5	N		NA400	50yr-24hr	20.553	27.5	N	N			NA400	50yr-24hr	20.553	27.5	N	N		
NA410	50yr-24hr	21.426	28	N		NA410	50yr-24hr	21.426	28	N	N			NA410	50yr-24hr	21.426	28	N	N		
NA420	50yr-24hr	22.277	28	N		NA420	50yr-24hr	22.277	28	N	N			NA420	50yr-24hr	22.277	28	N	N		
NA430	50yr-24hr	16.467	21	N		NA430	50yr-24hr	16.467	21	N	N			NA430	50yr-24hr	16.467	21	N	N		
NA440	50yr-24hr	21.634	27	N		NA440	50yr-24hr	21.634	27	N	N			NA440	50yr-24hr	21.634	27	N	N		
NA450	50yr-24hr	22.189	27	N		NA450	50yr-24hr	22.189	27	N	N			NA450	50yr-24hr	22.189	27	N	N		
NA460	50yr-24hr	22.494	28	N		NA460	50yr-24hr	22.493	28	N	N			NA460	50yr-24hr	22.493	28	N	N		
NA470	50yr-24hr	22.906	27	N		NA470	50yr-24hr	22.906	27	N	N			NA470	50yr-24hr	22.906	27	N	N		
NA480	50yr-24hr	23.245	27.5	N		NA480	50yr-24hr	23.245	27.5	N	N			NA480	50yr-24hr	23.245	27.5	N	N		
NA490	50yr-24hr	23.431	28	N		NA490	50yr-24hr	23.431	28	N	N			NA490	50yr-24hr	23.431	28	N	N		
NA500	50yr-24hr	11.664	15	N		NA500	50yr-24hr	11.664	15	N	N			NA500	50yr-24hr	11.664	15	N	N		
NA510	50yr-24hr	13.618	16	N		NA510	50yr-24hr	13.618	16	N	N			NA510	50yr-24hr	13.618	16	N	N		
NA520	50yr-24hr	14.937	17	N		NA520	50yr-24hr	14.937	17	N	N			NA520	50yr-24hr	14.937	17	N	N		
NA530	50yr-24hr	16.807	21.5	N		NA530	50yr-24hr	16.807	21.5	N	N			NA530	50yr-24hr	16.807	21.5	N	N		
NA540	50yr-24hr	19.18	28	N		NA540	50yr-24hr	19.18	28	N	N			NA540	50yr-24hr	19.18	28	N	N		
NA550	50yr-24hr	19.779	29	N		NA550	50yr-24hr	19.779	29	N	N			NA550	50yr-24hr	19.779	29	N	N		
NA560	50yr-24hr	20.035	28.5	N		NA560	50yr-24hr	20.035	28.5	N	N			NA560	50yr-24hr	20.035	28.5	N	N		
NA570	50yr-24hr	21.018	29	N		NA570	50yr-24hr	21.018	29	N	N			NA570	50yr-24hr	21.018	29	N	N		
NA580	50yr-24hr	21.458	26	N		NA580	50yr-24hr	21.458	26	N	N			NA580	50yr-24hr	21.458	26	N	N		
NA590	50yr-24hr	22.064	26.6	N		NA590	50yr-24hr	22.064	26.6	N	N			NA590	50yr-24hr	22.064	26.6	N	N		
NA600	50yr-24hr	22.289	25.5	N		NA600	50yr-24hr	22.289	25.5	N	N			NA600	50yr-24hr	22.289	25.5	N	N		
NA610	50yr-24hr	17.806	22	N		NA610	50yr-24hr	17.806	22	N	N			NA610	50yr-24hr	17.806	22	N	N		
NA620	50yr-24hr	17.806	21	N		NA620	50yr-24hr	17.806	21	N	N			NA620	50yr-24hr	17.806	21	N	N		
NA630	50yr-24hr	20.838	30	N		NA630	50yr-24hr	20.838	30	N	N			NA630	50yr-24hr	20.838	30	N	N		
NA640	50yr-24hr	21.21	29.75	N		NA640	50yr-24hr	21.21	29.75	N	N			NA640	50yr-24hr	21.21	29.75	N	N		
NA650	50yr-24hr	21.429	30	N		NA650	50yr-24hr	21.429	30	N	N			NA650	50yr-24hr	21.429	30	N	N		
NA660	50yr-24hr	22.002	28.5	N		NA660	50yr-24hr	22.002	28.5	N	N			NA660	50yr-24hr	22.002	28.5	N	N		
NA670	50yr-24hr	17.016	23	N		NA670	50yr-24hr	17.016	23	N	N			NA670	50yr-24hr	17.016	23	N	N		
NA690	50yr-24hr	17.078	20	N		NA690	50yr-24hr	17.078	20	N	N			NA690	50yr-24hr	17.078	20	N	N		
NA700	50yr-24hr	17.078	20	N		NA700	50yr-24hr	17.078	20	N	N			NA700	50yr-24hr	17.078	20	N	N		
NA710	50yr-24hr	12.841	22	N		NA710	50yr-24hr	12.836	22	N	N			NA710	50yr-24hr	12.817	22	N	N		

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NA720	50yr-24hr	12.899	20	N		NA720	50yr-24hr	12.826	20	N	N			NA720	50yr-24hr	12.8	20	N	N		
NA730	50yr-24hr	12.816	22.61	N		NA730	50yr-24hr	12.857	22.61	N	Y	0.041	N	NA730	50yr-24hr	12.901	22.61	N	Y	0.085	N
NA740	50yr-24hr	12.852	19.68	N		NA740	50yr-24hr	12.84	19.68	N	N			NA740	50yr-24hr	12.834	19.68	N	N		
NA750	50yr-24hr	12.848	22	N		NA750	50yr-24hr	12.841	22	N	N			NA750	50yr-24hr	12.841	22	N	N		
NA760	50yr-24hr	16.732	22	N		NA760	50yr-24hr	16.732	22	N	N			NA760	50yr-24hr	16.732	22	N	N		
NA770	50yr-24hr	18.338	26.75	N		NA770	50yr-24hr	18.338	26.75	N	N			NA770	50yr-24hr	18.338	26.75	N	N		
NA780	50yr-24hr	18.665	27.5	N		NA780	50yr-24hr	18.665	27.5	N	N			NA780	50yr-24hr	18.665	27.5	N	N		
NA790	50yr-24hr	18.954	27.5	N		NA790	50yr-24hr	18.954	27.5	N	N			NA790	50yr-24hr	18.954	27.5	N	N		
NA800	50yr-24hr	20.053	28.75	N		NA800	50yr-24hr	20.053	28.75	N	N			NA800	50yr-24hr	20.053	28.75	N	N		
NB010	50yr-24hr	21.488	26.36	N		NB010	50yr-24hr	21.221	26.36	N	N			NB010	50yr-24hr	20.62	26.36	N	N		
NB020	50yr-24hr	23.162	28.81	N		NB020	50yr-24hr	22.537	28.81	N	N			NB020	50yr-24hr	22.693	28.81	N	N		
NB030	50yr-24hr	24.386	26.75	N		NB030	50yr-24hr	24.218	26.75	N	N			NB030	50yr-24hr	24.386	26.75	N	N		
NB040	50yr-24hr	25.269	27.59	N		NB040	50yr-24hr	25.278	27.59	N	Y	0.009	N	NB040	50yr-24hr	25.269	27.59	N	N		
NB050	50yr-24hr	27.707	29.72	N		NB050	50yr-24hr	27.707	29.72	N	N			NB050	50yr-24hr	27.707	29.72	N	N		
NB055	50yr-24hr	24.002	26.27	N		NB055	50yr-24hr	23.185	26.27	N	N			NB055	50yr-24hr	24.047	26.27	N	Y	0.045	N
NB060	50yr-24hr	24.351	27.57	N		NB060	50yr-24hr	23.247	27.57	N	N			NB060	50yr-24hr	24.133	27.57	N	N		
NB063	50yr-24hr	24.51	28.22	N		NB063	50yr-24hr	23.297	28.22	N	N			NB063	50yr-24hr	24.173	28.22	N	N		
NB065	50yr-24hr	24.609	28.22	N		NB065	50yr-24hr	23.367	28.22	N	N			NB065	50yr-24hr	24.208	28.22	N	N		
NB070	50yr-24hr	25.237	30.49	N		NB070	50yr-24hr	23.683	30.49	N	N			NB070	50yr-24hr	24.437	30.49	N	N		
NB080	50yr-24hr	25.805	29.51	N		NB080	50yr-24hr	23.974	29.51	N	N			NB080	50yr-24hr	24.641	29.51	N	N		
NB090	50yr-24hr	26.6	28.85	N		NB090	50yr-24hr	24.421	28.85	N	N			NB090	50yr-24hr	24.966	28.85	N	N		
NB095	50yr-24hr	26.823	27	N		NB095	50yr-24hr	24.542	27	N	N			NB095	50yr-24hr	25.061	27.22	N	N		
NB100	50yr-24hr	27.471	27	Y	0.471	NB100	50yr-24hr	24.696	27	N	N			NB100	50yr-24hr	25.16	27.22	N	N		
NB110	50yr-24hr	27.474	27	Y	0.474	NB110	50yr-24hr	24.718	27	N	N			NB110	50yr-24hr	25.175	27	N	N		
NB120	50yr-24hr	27.475	27	Y	0.475	NB120	50yr-24hr	24.73	27	N	N			NB120	50yr-24hr	25.184	27	N	N		
NB130	50yr-24hr	27.477	26	Y	1.477	NB130	50yr-24hr	24.744	26	N	N			NB130	50yr-24hr	25.193	26	N	N		
NB140	50yr-24hr	27.484	25	Y	2.484	NB140	50yr-24hr	24.764	25	N	N			NB140	50yr-24hr	25.211	25	Y	N		
NB150	50yr-24hr	27.474	28	N		NB150	50yr-24hr	24.729	28	N	N			NB150	50yr-24hr	25.196	28	N	N		
NB160	50yr-24hr	27.484	26.5	Y	0.984	NB160	50yr-24hr	26.486	26.5	N	N			NB160	50yr-24hr	26.486	26.5	N	N		
NB170	50yr-24hr	27.605	27	Y	0.605	NB170	50yr-24hr	25.095	27	N	N			NB170	50yr-24hr	25.544	27	N	N		
NB180	50yr-24hr	27.843	27.11	Y	0.733	NB180	50yr-24hr	25.666	27.11	N	N			NB180	50yr-24hr	25.949	27.11	N	N		
NB181	50yr-24hr	30.007	31	N		NB181	50yr-24hr	30.007	31	N	N			NB181	50yr-24hr	30.007	31	N	N		
NB182	50yr-24hr	30.241	30	Y	0.241	NB182	50yr-24hr	30.241	30	Y	N			NB182	50yr-24hr	30.241	30	Y	N		
NB183	50yr-24hr	30.247	30	Y	0.247	NB183	50yr-24hr	30.247	30	Y	N			NB183	50yr-24hr	30.247	30	Y	N		
NB190	50yr-24hr	27.481	28	N		NB190	50yr-24hr	24.791	28	N	N			NB190	50yr-24hr	25.23	28	N	N		
NB200	50yr-24hr	28.037	27.64	Y	0.397	NB200	50yr-24hr	26.177	27.64	N	N			NB200	50yr-24hr	26.178	27.64	N	N		
NB210	50yr-24hr	29.456	29	Y	0.456	NB210	50yr-24hr	28.691	29	N	N			NB210	50yr-24hr	28.683	29	N	N		
NB220	50yr-24hr	30.951	29	Y	1.951	NB220	50yr-24hr	30.703	29	Y	N			NB220	50yr-24hr	30.701	29	Y	N		
NB230	50yr-24hr	31.665	30.5	Y	1.165	NB230	50yr-24hr	31.508	30.5	Y	N			NB230	50yr-24hr	31.506	30.5	Y	N		
NB240	50yr-24hr	32.419	31.8	Y	0.619	NB240	50yr-24hr	32.369	31.8	Y	N			NB240	50yr-24hr	32.37	31.8	Y	N		
NB250	50yr-24hr	32.456	35	N		NB250	50yr-24hr	32.456	35	N	N			NB250	50yr-24hr	32.456	35	N	N		
NB260	50yr-24hr	42.558	42.5	Y	0.058	NB260	50yr-24hr	42.558	42.5	Y	N			NB260	50yr-24hr	42.558	42.5	Y	N		
NB270	50yr-24hr	27.486	27.5	N		NB270	50yr-24hr	24.824	27.5	N	N			NB270	50yr-24hr	25.259	27.5	N	N		
NB280	50yr-24hr	27.489	26.81	Y	0.679	NB280	50yr-24hr	24.946	26.81	N	N			NB280	50yr-24hr	25.337	26.81	N	N		
NB290	50yr-24hr	27.556	25.69	Y	1.866	NB290	50yr-24hr	25.215	25.69	N	N			NB290	50yr-24hr	25.643	25.69	N	N		
NB295	50yr-24hr	27.604	25.76	Y	1.844	NB295	50yr-24hr	25.451	25.76	N	N			NB295	50yr-24hr	25.856	25.76	Y	N		
NB300	50yr-24hr	27.684	26.04	Y	1.644	NB300	50yr-24hr	25.643	26.04	N	N			NB300	50yr-24hr	26.054	26.04	Y	N		
NB305	50yr-24hr	27.785	28.2	N		NB305	50yr-24hr	25.819	28.2	N	N			NB305	50yr-24hr	26.226	28.2	N	N		
NB310	50yr-24hr	27.982	29	N		NB310	50yr-24hr	26.074	29	N	N			NB310	50yr-24hr	26.429	29	N	N		
NB313	50yr-24hr	28.259	31.5	N		NB313	50yr-24hr	27.04	31.5	N	N			NB313	50yr-24hr	27.04	31.5	N	N		
NB316	50yr-24hr	29.303	31.5	N		NB316	50yr-24hr	29.303	31.5	N	N			NB316	50yr-24hr	29.303	31.5	N	N		
NB319	50yr-24hr	29.869	32.9	N		NB319	50yr-24hr	29.869	32.9	N	N			NB319	50yr-24hr	29.869	32.9	N	N		
NB320	50yr-24hr	31.028	34.25	N		NB320	50yr-24hr	31.028	34.25	N	N			NB320	50yr-24hr	31.028	34.25	N	N		
NB325	50yr-24hr	31.14	34.8	N		NB325	50yr-24hr	31.14	34.8	N	N			NB325	50yr-24hr	31.14	34.8	N	N		
NB328	50yr-24hr	31.267	33.1	N		NB328	50yr-24hr	31.267	33.1	N	N			NB328	50yr-24hr	31.267	33.1	N	N		
NB330	50yr-24hr	31.459	31.6	N		NB330	50yr-24hr	31.459	31.6	N	N			NB330	50yr-24hr	31.459	31.6	N	N		
NB340	50yr-24hr	31.522	36.4	N		NB340	50yr-24hr	31.526	36.4	N	Y	0.004	N	NB340	50yr-24hr	31.522	36.4	N	N		
NB350	50yr-24hr	31.593	35	N		NB350	50yr-24hr	31.596	35	N	Y	0.003	N	NB350	50yr-24hr	31.593	35	N	N		
NB351	50yr-24hr	33.042	35	N		NB351	50yr-24hr	33.043	35	N	Y	0.001	N	NB351	50yr-24hr	33.042	35	N	N		
NB352	50yr-24hr	33.1	35	N		NB352	50yr-24hr	33.101	35	N	Y	0.001	N	NB352	50yr-24hr	33.1	35	N	N		
NB352A	50yr-24hr	33.07	34	N		NB352A	50yr-24hr	33.071	34	N	Y	0.001	N	NB352A	50yr-24hr	33.07	34	N	N		
NB353	50yr-24hr	33.494	38.71	N		NB353	50yr-24hr	33.494	38.71	N	N			NB353	50yr-24hr	33.494	38.71	N	N		
NB353A	50yr-24hr	33.118	37.25	N		NB353A	50yr-24hr	33.123	37.25	N	Y	0.005	N	NB353A	50yr-24hr	33.118	37.25	N	N		
NB354	50yr-24hr	33.501	37	N		NB354	50yr-24hr	33.494	37	N	N			NB354	50yr-24hr	33.501	37	N	N		
NB354A	50yr-24hr	33.489	36	N		NB354A	50yr-24hr	33.496	36	N	Y	0.007	N	NB354A	50yr-24hr	33.489	36	N	N		
NB355	50yr-24hr	41.416	43.24	N		NB355	50yr-24hr	41.416	43.24	N	N			NB355	50yr-24hr	41.416	43.24	N	N		
NB355A	50yr-24hr	35.613	39.7	N		NB355A	50yr-24hr	35.614	39.7	N	Y	0.001	N	NB355A	50yr-24hr	35.613	39.7	N	N		
NB356	50yr-24hr	41.42	43	N		NB356	50yr-24hr	41.42	43	N	N			NB356	50yr-24hr	41.42	43	N	N		
NB356A	50yr-24hr	41.421	43.5	N		NB356A	50yr-24hr	41.419	43.5	N	N			NB356A	50yr-24hr	41.421	43.5	N	N		
NB357	50yr-24hr	44.408	47.54	N		NB357	50yr-24hr	44.408	47.54	N	N			NB357	50yr-24hr	44.408	47.54	N	N		
NB357A	50yr-24hr	44.032	47.9	N		NB357A	50yr-24hr	44.032	47.9	N	N			NB357A	50yr-24hr	44.032	47.9	N	N		
NB357B	50yr-24hr	43.367	45.95	N		NB357B	50yr-24hr	43.367	45.95	N	N			NB357B	50yr-24hr	43.367	45.95	N	N		
NB360	50yr-24hr	46.136	48	N		NB360	50yr-24hr	46.136	48	N	N			NB360	50yr-24hr	46.136	48	N	N		
NB370	50yr-24hr	47.787	48	N		NB370	50yr-24hr	47.787	48	N	N			NB370	50yr-24hr	47.787	48	N	N		
NB380	50yr-24hr	48.599	48	Y	0.599	NB380	50yr-24hr	48.599	48	Y	N			NB380	50yr-24hr	48.599	48	Y	N		
NB400	50yr-24hr	27.939	27	Y	0.939	NB400	50yr-24hr	26.43	27	N	N			NB400	50yr-24hr	26.529	27	N	N		
NB410	50yr-24hr	28.237	26.98	Y	1.257	NB410	50yr-24hr	27.422	26.98	Y	N			NB410	50yr-24hr	27.405	26.98	Y	N		
NB420	50yr-24hr	28.203	26.5	Y	1.703	NB420	50yr-24hr	26.131	26.5	N	N			NB420	50yr-24hr	26.442	26.5	N	N		
NB430	50yr-24hr	28.827	26.51	Y	2.317	NB430	50yr-24hr	27.651	26.51	Y	N			NB430	50yr-24hr	27.775	26.51	Y	N		
NB440	50yr-24hr	28.829	26	Y	2.829	NB440	50yr-24hr	27.656	26	Y	N			NB440	50yr-24hr	27.779	26	Y	N		
NB450	50yr-24hr	28.829	29	N		NB450	50yr-24hr	27.598	29	N	N			NB450	50yr-24hr	27.735	29	N	N		
NB460	50yr-24hr	33.959	41	N		NB460	50yr-24hr	34.14	41	N	Y	0.181	N	NB460	50yr-24hr	34.141	41	N	Y	0.182	N
NB470	50yr-24hr	36.244	38	N		NB470	50yr-24hr	36.244	38	N	N			NB470	50yr-24hr	36.244	38	N	N		
NB480	50yr-24hr	36.263	36	Y	0.263	NB480	50yr-24hr	36.299	36	Y	Y	0.036	N	NB480	50yr-24hr	36.297	36	Y	Y	0.034	N
NB490	50yr-24hr	38.706	37.5	Y	1.206	NB490	50yr-24hr	38.584	37.5	Y	N			NB490	50yr-24hr	38.588	37.5	Y	N		

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	NB500	50yr-24hr	38.831	38	Y	0.831	NB500	50yr-24hr	38.752	38	Y	N			NB500	50yr-24hr	38.756	38	Y	N		
	NB510	50yr-24hr	38.885	38	Y	0.885	NB510	50yr-24hr	38.816	38	Y	N			NB510	50yr-24hr	38.82	38	Y	N		
	NB520	50yr-24hr	40.536	37.5	Y	3.036	NB520	50yr-24hr	40.52	37.5	Y	N			NB520	50yr-24hr	40.521	37.5	Y	N		
	NB530	50yr-24hr	45.948	47.5	N		NB530	50yr-24hr	45.948	47.5	N	N			NB530	50yr-24hr	45.948	47.5	N	N		
	NB540	50yr-24hr	48.525	48	Y	0.525	NB540	50yr-24hr	48.525	48	Y	N			NB540	50yr-24hr	48.525	48	Y	N		
	NB550	50yr-24hr	50.574	50.5	Y	0.074	NB550	50yr-24hr	50.574	50.5	Y	N			NB550	50yr-24hr	50.574	50.5	Y	N		
	NB560	50yr-24hr	50.039	50	Y	0.039	NB560	50yr-24hr	50.039	50	Y	N			NB560	50yr-24hr	50.039	50	Y	N		
	NB570	50yr-24hr	50.614	51.5	N		NB570	50yr-24hr	50.614	51.5	N	N			NB570	50yr-24hr	50.614	51.5	N	N		
	NB580	50yr-24hr	50.356	54.5	N		NB580	50yr-24hr	50.356	54.5	N	N			NB580	50yr-24hr	50.356	54.5	N	N		
	NC010	50yr-24hr	24.36	26.5	N		NC010	50yr-24hr	24.36	26.5	N	N			NC010	50yr-24hr	24.36	26.5	N	N		
	NC020	50yr-24hr	24.46	27	N		NC020	50yr-24hr	24.46	27	N	N			NC020	50yr-24hr	24.46	27	N	N		
	NC030	50yr-24hr	25.725	32.2	N		NC030	50yr-24hr	25.725	32.2	N	N			NC030	50yr-24hr	25.725	32.2	N	N		
	NC040	50yr-24hr	25.931	27	N		NC040	50yr-24hr	25.931	27	N	N			NC040	50yr-24hr	25.931	27	N	N		
	NC050	50yr-24hr	19.864	21.5	N		NC050	50yr-24hr	19.864	21.5	N	N			NC050	50yr-24hr	19.864	21.5	N	N		
	NC060	50yr-24hr	25.977	29	N		NC060	50yr-24hr	25.977	29	N	N			NC060	50yr-24hr	25.977	29	N	N		
	NC070	50yr-24hr	26.809	30	N		NC070	50yr-24hr	26.809	30	N	N			NC070	50yr-24hr	26.809	30	N	N		
	NC080	50yr-24hr	27.067	28	N		NC080	50yr-24hr	27.067	28	N	N			NC080	50yr-24hr	27.067	28	N	N		
	NC090	50yr-24hr	27.197	28	N		NC090	50yr-24hr	27.197	28	N	N			NC090	50yr-24hr	27.197	28	N	N		
	NC100	50yr-24hr	27.205	28.5	N		NC100	50yr-24hr	27.205	28.5	N	N			NC100	50yr-24hr	27.205	28.5	N	N		
	NC110	50yr-24hr	27.513	29	N		NC110	50yr-24hr	27.513	29	N	N			NC110	50yr-24hr	27.513	29	N	N		
	NC120	50yr-24hr	28.322	28	Y	0.322	NC120	50yr-24hr	28.322	28	Y	N			NC120	50yr-24hr	28.322	28	Y	N		
	NC130	50yr-24hr	28.68	29	N		NC130	50yr-24hr	28.68	29	N	N			NC130	50yr-24hr	28.68	29	N	N		
	NC140	50yr-24hr	28.663	30	N		NC140	50yr-24hr	28.663	30	N	N			NC140	50yr-24hr	28.663	30	N	N		
	NC150	50yr-24hr	28.472	30	N		NC150	50yr-24hr	28.472	30	N	N			NC150	50yr-24hr	28.472	30	N	N		
	NC160	50yr-24hr	28.01	28.5	N		NC160	50yr-24hr	28.01	28.5	N	N			NC160	50yr-24hr	28.01	28.5	N	N		
	NC161	50yr-24hr	29.516	29.5	Y	0.016	NC161	50yr-24hr	29.516	29.5	Y	N			NC161	50yr-24hr	29.516	29.5	Y	N		
	NC162	50yr-24hr	29.44	29.5	N		NC162	50yr-24hr	29.44	29.5	N	N			NC162	50yr-24hr	29.44	29.5	N	N		
	NC170	50yr-24hr	27.517	27	Y	0.517	NC170	50yr-24hr	27.517	27	Y	N			NC170	50yr-24hr	27.517	27	Y	N		
	NC180	50yr-24hr	17.485	20	N		NC180	50yr-24hr	17.484	20	N	N			NC180	50yr-24hr	17.484	20	N	N		
	NC190	50yr-24hr	17.61	21	N		NC190	50yr-24hr	17.609	21	N	N			NC190	50yr-24hr	17.61	21	N	N		
	NC200	50yr-24hr	18.874	24	N		NC200	50yr-24hr	18.875	24	N	Y	0.001	N	NC200	50yr-24hr	18.875	24	N	Y	0.001	N
	NC210	50yr-24hr	21.063	28	N		NC210	50yr-24hr	21.063	28	N	N			NC210	50yr-24hr	21.063	28	N	N		
	NC220	50yr-24hr	23.091	25	N		NC220	50yr-24hr	23.091	25	N	N			NC220	50yr-24hr	23.091	25	N	N		
	NC230	50yr-24hr	23.395	26	N		NC230	50yr-24hr	23.395	26	N	N			NC230	50yr-24hr	23.395	26	N	N		
	NC240	50yr-24hr	24.967	27	N		NC240	50yr-24hr	24.967	27	N	N			NC240	50yr-24hr	24.967	27	N	N		
	NC250	50yr-24hr	25.669	27	N		NC250	50yr-24hr	25.669	27	N	N			NC250	50yr-24hr	25.669	27	N	N		
	NC260	50yr-24hr	25.771	28	N		NC260	50yr-24hr	25.771	28	N	N			NC260	50yr-24hr	25.771	28	N	N		
	NC270	50yr-24hr	25.871	27	N		NC270	50yr-24hr	25.871	27	N	N			NC270	50yr-24hr	25.871	27	N	N		
	NC280	50yr-24hr	26.146	27	N		NC280	50yr-24hr	26.146	27	N	N			NC280	50yr-24hr	26.146	27	N	N		
	NC290	50yr-24hr	27.021	28	N		NC290	50yr-24hr	27.021	28	N	N			NC290	50yr-24hr	27.021	28	N	N		
	NC300	50yr-24hr	27.226	28	N		NC300	50yr-24hr	27.226	28	N	N			NC300	50yr-24hr	27.226	28	N	N		
	NC310	50yr-24hr	19.726	24	N		NC310	50yr-24hr	19.726	24	N	N			NC310	50yr-24hr	19.726	24	N	N		
	NC320	50yr-24hr	21.523	25	N		NC320	50yr-24hr	21.523	25	N	N			NC320	50yr-24hr	21.523	25	N	N		
	NC330	50yr-24hr	22.156	26	N		NC330	50yr-24hr	22.156	26	N	N			NC330	50yr-24hr	22.156	26	N	N		
	NC340	50yr-24hr	24.443	25	N		NC340	50yr-24hr	24.443	25	N	N			NC340	50yr-24hr	24.443	25	N	N		
	NC350	50yr-24hr	25.062	27	N		NC350	50yr-24hr	25.062	27	N	N			NC350	50yr-24hr	25.062	27	N	N		
	NC360	50yr-24hr	25.826	27	N		NC360	50yr-24hr	25.783	27	N	N			NC360	50yr-24hr	25.825	27	N	N		
	NC370	50yr-24hr	26.58	28	N		NC370	50yr-24hr	26.513	28	N	N			NC370	50yr-24hr	26.58	28	N	N		
	NC380	50yr-24hr	27.335	27	Y	0.335	NC380	50yr-24hr	27.249	27	Y	N			NC380	50yr-24hr	27.335	27	Y	N		
	NC390	50yr-24hr	27.524	27	Y	0.524	NC390	50yr-24hr	27.447	27	Y	N			NC390	50yr-24hr	27.524	27	Y	N		
	NC400	50yr-24hr	27.713	27	Y	0.713	NC400	50yr-24hr	27.647	27	Y	N			NC400	50yr-24hr	27.713	27	Y	N		
	NC410	50yr-24hr	28.311	27	Y	1.311	NC410	50yr-24hr	28.284	27	Y	N			NC410	50yr-24hr	28.311	27	Y	N		
	NC420	50yr-24hr	28.775	27	Y	1.775	NC420	50yr-24hr	28.775	27	Y	N			NC420	50yr-24hr	28.775	27	Y	N		
	NC430	50yr-24hr	28.848	27	Y	1.848	NC430	50yr-24hr	28.848	27	Y	N			NC430	50yr-24hr	28.848	27	Y	N		
	NC440	50yr-24hr	29.181	28	Y	1.181	NC440	50yr-24hr	29.181	28	Y	N			NC440	50yr-24hr	29.181	28	Y	N		
	NC450	50yr-24hr	29.186	29	Y	0.186	NC450	50yr-24hr	29.186	29	Y	N			NC450	50yr-24hr	29.186	29	Y	N		
	NC460	50yr-24hr	29.248	30	N		NC460	50yr-24hr	29.248	30	N	N			NC460	50yr-24hr	29.248	30	N	N		
	NC470	50yr-24hr	27.355	28	N		NC470	50yr-24hr	27.355	28	N	N			NC470	50yr-24hr	27.355	28	N	N		
	NC480	50yr-24hr	28.328	29	N		NC480	50yr-24hr	28.301	29	N	N			NC480	50yr-24hr	28.328	29	N	N		
	NC490	50yr-24hr	28.345	28	Y	0.345	NC490	50yr-24hr	28.32	28	Y	N			NC490	50yr-24hr	28.345	28	Y	N		
	NC500	50yr-24hr	28.355	28	Y	0.355	NC500	50yr-24hr	28.332	28	Y	N			NC500	50yr-24hr	28.355	28	Y	N		
	NC510	50yr-24hr	28.355	28	Y	0.355	NC510	50yr-24hr	28.332	28	Y	N			NC510	50yr-24hr	28.355	28	Y	N		
							NEW/ADDED GRANT CONDITIONS NODES								**NEW/ADDED GRANT CONDITIONS NODES**							
							Pond 1	50yr-24hr	10	15.9	N	N/A	N/A		Pond 1	50yr-24hr	10	15.9	N	N/A	N/A	
							Pond 2	50yr-24hr	10	16	N	N/A	N/A		Pond 2	50yr-24hr	10	16	N	N/A	N/A	
							Discharge 1	50yr-24hr	13.8	15	N	N/A	N/A		Discharge 1	50yr-24hr	13.8	15	N	N/A	N/A	
							GW1	50yr-24hr	10	11	N	N/A	N/A		GW1	50yr-24hr	10	11	N	N/A	N/A	
							GW2	50yr-24hr	10	13	N	N/A	N/A		GW2	50yr-24hr	10	13	N	N/A	N/A	
							NB056	50yr-24hr	23.999	30.22	N	N/A	N/A		NB056	50yr-24hr	24.782	28.72	N	N/A	N/A	
							NB057	50yr-24hr	24.4	29.72	N	N/A	N/A		NB057	50yr-24hr	24.975	27.97	N	N/A	N/A	
							NEW/ADDED PROPOSED CONDITIONS NODES															
							NB010B	50yr-24hr	19.392	28.69	N	N/A	N/A									
							NB056B	50yr-24hr	23.199	28.22	N	N/A	N/A									
							NB056C	50yr-24hr	22.819	30.22	N	N/A	N/A									
							NB056D	50yr-24hr	20.457	28.22	N	N/A	N/A									
	N-BND-BAY	100Y024H	0.9	8	N		N-BND-BAY	100YR-24HR	0.9	8	N	N			N-BND-BAY	100YR-24HR	0.9	8	N	N		
	N-BND-BELL	100Y024H	0	5	N		N-BND-BELL	100YR-24HR	0	5	N	N			N-BND-BELL	100YR-24HR	0	5	N	N		
	N-BND-CHICO	100Y024H	0	5	N		N-BND-CHICO	100YR-24HR	0	5	N	N			N-BND-CHICO	100YR-24HR	0	5	N	N		
	N-BNY-STAR	100Y024H	0	5	N		N-BNY-STAR	100YR-24HR	0	5	N	N			N-BNY-STAR	100YR-24HR	0	5	N	N		
	N-GRND	100Y024H	0	0	N		N-GRND	100YR-24HR	0	0	N	N			N-GRND	100YR-24HR	0	0	N	N		
	NA003	100Y024H	6.763	10	N		NA003	100YR-24HR	6.763	10	N	N			NA003	100YR-24HR	6.905	10	N	Y	0.142	N
	NA006	100Y024H	8.978	10	N		NA006	100YR-24HR	8.978	10	N	N			NA006	100YR-24HR	8.978	10	N	N		
	NA010	100Y024H	4.564	8	N		NA010	100YR-24HR	4.796	8	N	Y	0.232	N	NA010	100YR-24HR	4.739	8	N	Y	0.175	N
	NA020	100Y024H	5.978	7	N		NA020	100YR-24HR	6.429	7	N	Y	0.451	N	NA020	100YR-24HR	6.317	7	N	Y	0.339	N

50YR-24HR

50YR-24HR

24HR

100YR-24HR

NA021	100Y024H	18.182	22.13	N		NA021	100YR-24HR	18.182	22.13	N	N			NA021	100YR-24HR	18.182	22.13	N	N		
NA022	100Y024H	18.203	21.21	N		NA022	100YR-24HR	18.203	21.21	N	N			NA022	100YR-24HR	18.203	21.21	N	N		
NA023	100Y024H	18.462	21.41	N		NA023	100YR-24HR	18.462	21.41	N	N			NA023	100YR-24HR	18.462	21.41	N	N		
NA024	100Y024H	20.585	21	N		NA024	100YR-24HR	20.585	21	N	N			NA024	100YR-24HR	20.585	21	N	N		
NA025	100Y024H	6.168	7	N		NA025	100YR-24HR	6.61	7	N	Y	0.442	N	NA025	100YR-24HR	6.503	7	N	Y	0.335	N
NA026	100Y024H	6.382	7	N		NA026	100YR-24HR	6.822	7	N	Y	0.44	N	NA026	100YR-24HR	6.715	7	N	Y	0.333	N
NA028	100Y024H	6.449	7	N		NA028	100YR-24HR	6.881	7	N	Y	0.432	N	NA028	100YR-24HR	6.776	7	N	Y	0.327	N
NA030	100Y024H	6.482	8	N		NA030	100YR-24HR	6.908	8	N	Y	0.426	N	NA030	100YR-24HR	6.804	8	N	Y	0.322	N
NA040	100Y024H	7.626	11.5	N		NA040	100YR-24HR	8.038	11.5	N	Y	0.412	N	NA040	100YR-24HR	7.937	11.5	N	Y	0.311	N
NA050	100Y024H	10.579	11	N		NA050	100YR-24HR	11.077	11	Y	Y	0.498	Y	NA050	100YR-24HR	10.951	11	N	Y	0.372	N
NA060	100Y024H	11.155	9	Y	2.155	NA060	100YR-24HR	11.482	9	Y	Y	0.327	N	NA060	100YR-24HR	11.396	9	Y	Y	0.241	N
NA070	100Y024H	12.515	11	Y	1.515	NA070	100YR-24HR	12.541	11	Y	Y	0.026	N	NA070	100YR-24HR	12.536	11	Y	Y	0.021	N
NA080	100Y024H	12.861	11	Y	1.861	NA080	100YR-24HR	12.929	11	Y	Y	0.068	N	NA080	100YR-24HR	12.91	11	Y	Y	0.049	N
NA090	100Y024H	13.241	15	N		NA090	100YR-24HR	13.337	15	N	Y	0.096	N	NA090	100YR-24HR	13.312	15	N	Y	0.071	N
NA100	100Y024H	13.402	16	N		NA100	100YR-24HR	13.504	16	N	Y	0.102	N	NA100	100YR-24HR	13.477	16	N	Y	0.075	N
NA110	100Y024H	14.448	20	N		NA110	100YR-24HR	14.483	20	N	Y	0.035	N	NA110	100YR-24HR	14.472	20	N	Y	0.024	N
NA120	100Y024H	15.216	21	N		NA120	100YR-24HR	15.324	21	N	Y	0.108	N	NA120	100YR-24HR	15.297	21	N	Y	0.081	N
NA130	100Y024H	15.351	16	N		NA130	100YR-24HR	15.466	16	N	Y	0.115	N	NA130	100YR-24HR	15.437	16	N	Y	0.086	N
NA140	100Y024H	15.679	16	N		NA140	100YR-24HR	15.731	16	N	Y	0.052	N	NA140	100YR-24HR	15.717	16	N	Y	0.038	N
NA150	100Y024H	17.235	16.5	Y	0.735	NA150	100YR-24HR	17.222	16.5	Y	N			NA150	100YR-24HR	17.222	16.5	Y	N		
NA160	100Y024H	17.467	16.5	Y	0.967	NA160	100YR-24HR	17.461	16.5	Y	N			NA160	100YR-24HR	17.461	16.5	Y	N		
NA170	100Y024H	19.433	22	N		NA170	100YR-24HR	19.426	22	N	N			NA170	100YR-24HR	19.423	22	N	N		
NA180	100Y024H	19.44	23	N		NA180	100YR-24HR	19.434	23	N	N			NA180	100YR-24HR	19.43	23	N	N		
NA190	100Y024H	21.186	23	N		NA190	100YR-24HR	21.164	23	N	N			NA190	100YR-24HR	21.165	23	N	N		
NA200	100Y024H	21.588	22	N		NA200	100YR-24HR	21.571	22	N	N			NA200	100YR-24HR	21.571	22	N	N		
NA210	100Y024H	21.784	22	N		NA210	100YR-24HR	21.769	22	N	N			NA210	100YR-24HR	21.768	22	N	N		
NA220	100Y024H	21.893	24	N		NA220	100YR-24HR	21.879	24	N	N			NA220	100YR-24HR	21.879	24	N	N		
NA230	100Y024H	22.002	27	N		NA230	100YR-24HR	21.989	27	N	N			NA230	100YR-24HR	21.988	27	N	N		
NA240	100Y024H	24.163	27	N		NA240	100YR-24HR	24.163	27	N	N			NA240	100YR-24HR	24.165	27	N	Y	0.002	N
NA250	100Y024H	24.846	27	N		NA250	100YR-24HR	24.846	27	N	N			NA250	100YR-24HR	24.846	27	N	N		
NA260	100Y024H	10.511	11	N		NA260	100YR-24HR	10.511	11	N	N			NA260	100YR-24HR	10.511	11	N	N		
NA265	100Y024H	10.576	12.62	N		NA265	100YR-24HR	11.072	12.62	N	Y	0.496	N	NA265	100YR-24HR	10.946	12.62	N	Y	0.37	N
NA270	100Y024H	10.552	12	N		NA270	100YR-24HR	11.041	12	N	Y	0.489	N	NA270	100YR-24HR	10.918	12	N	Y	0.366	N
NA280	100Y024H	18.907	22	N		NA280	100YR-24HR	18.907	22	N	N			NA280	100YR-24HR	18.907	22	N	N		
NA290	100Y024H	20.951	22	N		NA290	100YR-24HR	20.951	22	N	N			NA290	100YR-24HR	20.951	22	N	N		
NA300	100Y024H	21.001	22	N		NA300	100YR-24HR	21.001	22	N	N			NA300	100YR-24HR	21.001	22	N	N		
NA310	100Y024H	21.027	22	N		NA310	100YR-24HR	21.027	22	N	N			NA310	100YR-24HR	21.027	22	N	N		
NA320	100Y024H	28.775	29	N		NA320	100YR-24HR	28.775	29	N	N			NA320	100YR-24HR	28.775	29	N	N		
NA330	100Y024H	28.791	28	Y	0.791	NA330	100YR-24HR	28.791	28	Y	N			NA330	100YR-24HR	28.791	28	Y	N		
NA340	100Y024H	10.868	14	N		NA340	100YR-24HR	11.365	14	N	Y	0.497	N	NA340	100YR-24HR	11.24	14	N	Y	0.372	N
NA350	100Y024H	16.123	22	N		NA350	100YR-24HR	16.123	22	N	N			NA350	100YR-24HR	16.117	22	N	N		
NA360	100Y024H	22.227	26	N		NA360	100YR-24HR	22.227	26	N	N			NA360	100YR-24HR	22.227	26	N	N		
NA370	100Y024H	22.792	27.5	N		NA370	100YR-24HR	22.792	27.5	N	N			NA370	100YR-24HR	22.792	27.5	N	N		

100YR-24HR

NA380	100Y024H	10.63	12	N		NA380	100YR-24HR	11.128	12	N	Y	0.498	N	NA380	100YR-24HR	11.002	12	N	Y	0.372	N
NA390	100Y024H	14.359	23	N		NA390	100YR-24HR	14.423	23	N	Y	0.064	N	NA390	100YR-24HR	14.36	23	N	Y	0.001	N
NA400	100Y024H	20.69	27.5	N		NA400	100YR-24HR	20.69	27.5	N	N			NA400	100YR-24HR	20.69	27.5	N	N		
NA410	100Y024H	21.552	28	N		NA410	100YR-24HR	21.552	28	N	N			NA410	100YR-24HR	21.552	28	N	N		
NA420	100Y024H	22.371	28	N		NA420	100YR-24HR	22.371	28	N	N			NA420	100YR-24HR	22.371	28	N	N		
NA430	100Y024H	16.511	21	N		NA430	100YR-24HR	16.511	21	N	N			NA430	100YR-24HR	16.511	21	N	N		
NA440	100Y024H	22.08	27	N		NA440	100YR-24HR	22.08	27	N	N			NA440	100YR-24HR	22.081	27	N	Y	0.001	N
NA450	100Y024H	22.752	27	N		NA450	100YR-24HR	22.754	27	N	Y	0.002	N	NA450	100YR-24HR	22.755	27	N	Y	0.003	N
NA460	100Y024H	23.02	28	N		NA460	100YR-24HR	23.022	28	N	Y	0.002	N	NA460	100YR-24HR	23.023	28	N	Y	0.003	N
NA470	100Y024H	23.328	27	N		NA470	100YR-24HR	23.33	27	N	Y	0.002	N	NA470	100YR-24HR	23.331	27	N	Y	0.003	N
NA480	100Y024H	23.479	27.5	N		NA480	100YR-24HR	23.481	27.5	N	Y	0.002	N	NA480	100YR-24HR	23.478	27.5	N	N		
NA490	100Y024H	23.659	28	N		NA490	100YR-24HR	23.661	28	N	Y	0.002	N	NA490	100YR-24HR	23.658	28	N	N		
NA500	100Y024H	11.792	15	N		NA500	100YR-24HR	11.792	15	N	N			NA500	100YR-24HR	11.792	15	N	N		
NA510	100Y024H	13.683	16	N		NA510	100YR-24HR	13.683	16	N	N			NA510	100YR-24HR	13.683	16	N	N		
NA520	100Y024H	15.021	17	N		NA520	100YR-24HR	15.021	17	N	N			NA520	100YR-24HR	15.021	17	N	N		
NA530	100Y024H	16.974	21.5	N		NA530	100YR-24HR	16.974	21.5	N	N			NA530	100YR-24HR	16.974	21.5	N	N		
NA540	100Y024H	19.186	28	N		NA540	100YR-24HR	19.186	28	N	N			NA540	100YR-24HR	19.186	28	N	N		
NA550	100Y024H	19.929	29	N		NA550	100YR-24HR	19.929	29	N	N			NA550	100YR-24HR	19.929	29	N	N		
NA560	100Y024H	20.185	28.5	N		NA560	100YR-24HR	20.185	28.5	N	N			NA560	100YR-24HR	20.185	28.5	N	N		
NA570	100Y024H	21.154	29	N		NA570	100YR-24HR	21.154	29	N	N			NA570	100YR-24HR	21.154	29	N	N		
NA580	100Y024H	21.603	26	N		NA580	100YR-24HR	21.603	26	N	N			NA580	100YR-24HR	21.603	26	N	N		
NA590	100Y024H	22.21	26.6	N		NA590	100YR-24HR	22.21	26.6	N	N			NA590	100YR-24HR	22.21	26.6	N	N		
NA600	100Y024H	22.455	25.5	N		NA600	100YR-24HR	22.455	25.5	N	N			NA600	100YR-24HR	22.455	25.5	N	N		
NA610	100Y024H	17.962	22	N		NA610	100YR-24HR	17.962	22	N	N			NA610	100YR-24HR	17.962	22	N	N		
NA620	100Y024H	17.962	21	N		NA620	100YR-24HR	17.962	21	N	N			NA620	100YR-24HR	17.962	21	N	N		
NA630	100Y024H	20.97	30	N		NA630	100YR-24HR	20.97	30	N	N			NA630	100YR-24HR	20.97	30	N	N		
NA640	100Y024H	21.355	29.75	N		NA640	100YR-24HR	21.355	29.75	N	N			NA640	100YR-24HR	21.355	29.75	N	N		
NA650	100Y024H	21.56	30	N		NA650	100YR-24HR	21.559	30	N	N			NA650	100YR-24HR	21.56	30	N	N		
NA660	100Y024H	22.098	28.5	N		NA660	100YR-24HR	22.096	28.5	N	N			NA660	100YR-24HR	22.097	28.5	N	N		
NA670	100Y024H	17.1	23	N		NA670	100YR-24HR	17.1	23	N	N			NA670	100YR-24HR	17.1	23	N	N		
NA690	100Y024H	17.159	20	N		NA690	100YR-24HR	17.159	20	N	N			NA690	100YR-24HR	17.159	20	N	N		
NA700	100Y024H	17.159	20	N		NA700	100YR-24HR	17.159	20	N	N			NA700	100YR-24HR	17.159	20	N	N		
NA710	100Y024H	13.27	22	N		NA710	100YR-24HR	13.264	22	N	N			NA710	100YR-24HR	13.265	22	N	N		
NA720	100Y024H	13.261	20	N		NA720	100YR-24HR	13.256	20	N	N			NA720	100YR-24HR	13.228	20	N	N		
NA730	100Y024H	13.284	22.61	N		NA730	100YR-24HR	13.28	22.61	N	N			NA730	100YR-24HR	13.324	22.61	N	Y	0.04	N
NA740	100Y024H	13.274	19.68	N		NA740	100YR-24HR	13.27	19.68	N	N			NA740	100YR-24HR	13.279	19.68	N	Y	0.005	N
NA750	100Y024H	13.276	22	N		NA750	100YR-24HR	13.273	22	N	N			NA750	100YR-24HR	13.287	22	N	Y	0.011	N
NA760	100Y024H	16.821	22	N		NA760	100YR-24HR	16.821	22	N	N			NA760	100YR-24HR	16.821	22	N	N		
NA770	100Y024H	18.717	26.75	N		NA770	100YR-24HR	18.717	26.75	N	N			NA770	100YR-24HR	18.717	26.75	N	N		
NA780	100Y024H	19.101	27.5	N		NA780	100YR-24HR	19.101	27.5	N	N			NA780	100YR-24HR	19.101	27.5	N	N		
NA790	100Y024H	19.367	27.5	N		NA790	100YR-24HR	19.367	27.5	N	N			NA790	100YR-24HR	19.367	27.5	N	N		
NA800	100Y024H	20.323	28.75	N		NA800	100YR-24HR	20.323	28.75	N	N			NA800	100YR-24HR	20.323	28.75	N	N		

100YR-24HR

NB010	100Y024H	21.705	26.36	N		NB010	100YR-24HR	21.366	26.36	N	N			NB010	100YR-24HR	20.761	26.36	N	N		
NB020	100Y024H	23.385	28.81	N		NB020	100YR-24HR	22.725	28.81	N	N			NB020	100YR-24HR	22.706	28.81	N	N		
NB030	100Y024H	24.511	26.75	N		NB030	100YR-24HR	24.315	26.75	N	N			NB030	100YR-24HR	24.511	26.75	N	N		
NB040	100Y024H	25.387	27.59	N		NB040	100YR-24HR	25.386	27.59	N	N			NB040	100YR-24HR	25.387	27.59	N	N		
NB050	100Y024H	27.817	29.72	N		NB050	100YR-24HR	27.817	29.72	N	N			NB050	100YR-24HR	27.817	29.72	N	N		
NB055	100Y024H	24.155	26.27	N		NB055	100YR-24HR	23.28	26.27	N	N			NB055	100YR-24HR	24.112	26.27	N	N		
NB060	100Y024H	24.543	27.57	N		NB060	100YR-24HR	23.336	27.57	N	N			NB060	100YR-24HR	24.212	27.57	N	N		
NB063	100Y024H	24.702	28.22	N		NB063	100YR-24HR	23.383	28.22	N	N			NB063	100YR-24HR	24.256	28.22	N	N		
NB065	100Y024H	24.792	28.22	N		NB065	100YR-24HR	23.455	28.22	N	N			NB065	100YR-24HR	24.292	28.22	N	N		
NB070	100Y024H	25.415	30.49	N		NB070	100YR-24HR	23.81	30.49	N	N			NB070	100YR-24HR	24.584	30.49	N	N		
NB080	100Y024H	25.969	29.51	N		NB080	100YR-24HR	24.137	29.51	N	N			NB080	100YR-24HR	24.831	29.51	N	N		
NB090	100Y024H	26.785	28.85	N		NB090	100YR-24HR	24.614	28.85	N	N			NB090	100YR-24HR	25.186	28.85	N	N		
NB095	100Y024H	27.014	27	Y	0.014	NB095	100YR-24HR	24.741	27	N	N			NB095	100YR-24HR	25.459	27.22	N	N		
NB100	100Y024H	27.646	27	Y	0.646	NB100	100YR-24HR	24.894	27	N	N			NB100	100YR-24HR	25.417	27.22	N	N		
NB110	100Y024H	27.648	27	Y	0.648	NB110	100YR-24HR	24.916	27	N	N			NB110	100YR-24HR	25.431	27	N	N		
NB120	100Y024H	27.65	27	Y	0.65	NB120	100YR-24HR	24.929	27	N	N			NB120	100YR-24HR	25.439	27	N	N		
NB130	100Y024H	27.651	26	Y	1.651	NB130	100YR-24HR	24.943	26	N	N			NB130	100YR-24HR	25.447	26	N	N		
NB140	100Y024H	27.659	25	Y	2.659	NB140	100YR-24HR	24.965	25	N	N			NB140	100YR-24HR	25.465	25	Y	N		
NB150	100Y024H	27.649	28	N		NB150	100YR-24HR	24.949	28	N	N			NB150	100YR-24HR	25.464	28	N	N		
NB160	100Y024H	27.657	26.5	Y	1.157	NB160	100YR-24HR	26.605	26.5	Y	N			NB160	100YR-24HR	26.609	26.5	Y	N		
NB170	100Y024H	27.776	27	Y	0.776	NB170	100YR-24HR	25.486	27	N	N			NB170	100YR-24HR	25.851	27	N	N		
NB180	100Y024H	28.005	27.11	Y	0.895	NB180	100YR-24HR	26.11	27.11	N	N			NB180	100YR-24HR	26.313	27.11	N	N		
NB181	100Y024H	30.027	31	N		NB181	100YR-24HR	30.027	31	N	N			NB181	100YR-24HR	30.027	31	N	N		
NB182	100Y024H	30.276	30	Y	0.276	NB182	100YR-24HR	30.276	30	Y	N			NB182	100YR-24HR	30.276	30	Y	N		
NB183	100Y024H	30.283	30	Y	0.283	NB183	100YR-24HR	30.283	30	Y	N			NB183	100YR-24HR	30.283	30	Y	N		
NB190	100Y024H	27.656	28	N		NB190	100YR-24HR	25.002	28	N	N			NB190	100YR-24HR	25.513	28	N	N		
NB200	100Y024H	28.232	27.64	Y	0.592	NB200	100YR-24HR	26.224	27.64	N	N			NB200	100YR-24HR	26.312	27.64	N	N		
NB210	100Y024H	29.686	29	Y	0.686	NB210	100YR-24HR	28.92	29	N	N			NB210	100YR-24HR	28.924	29	N	N		
NB220	100Y024H	31.243	29	Y	2.243	NB220	100YR-24HR	31.023	29	Y	N			NB220	100YR-24HR	31.024	29	Y	N		
NB230	100Y024H	31.892	30.5	Y	1.392	NB230	100YR-24HR	31.724	30.5	Y	N			NB230	100YR-24HR	31.725	30.5	Y	N		
NB240	100Y024H	32.589	31.8	Y	0.789	NB240	100YR-24HR	32.536	31.8	Y	N			NB240	100YR-24HR	32.539	31.8	Y	N		
NB250	100Y024H	32.663	35	N		NB250	100YR-24HR	32.663	35	N	N			NB250	100YR-24HR	32.663	35	N	N		
NB260	100Y024H	42.566	42.5	Y	0.066	NB260	100YR-24HR	42.566	42.5	Y	N			NB260	100YR-24HR	42.566	42.5	Y	N		
NB270	100Y024H	27.661	27.5	Y	0.161	NB270	100YR-24HR	25.04	27.5	N	N			NB270	100YR-24HR	25.532	27.5	N	N		
NB280	100Y024H	27.664	26.81	Y	0.854	NB280	100YR-24HR	25.186	26.81	N	N			NB280	100YR-24HR	25.618	26.81	N	N		
NB290	100Y024H	27.748	25.69	Y	2.058	NB290	100YR-24HR	25.625	25.69	N	N			NB290	100YR-24HR	25.969	25.69	Y	N		
NB295	100Y024H	27.809	25.76	Y	2.049	NB295	100YR-24HR	25.95	25.76	Y	N			NB295	100YR-24HR	26.216	25.76	Y	N		
NB300	100Y024H	27.915	26.04	Y	1.875	NB300	100YR-24HR	26.25	26.04	Y	N			NB300	100YR-24HR	26.462	26.04	Y	N		
NB305	100Y024H	28.073	28.2	N		NB305	100YR-24HR	26.512	28.2	N	N			NB305	100YR-24HR	26.723	28.2	N	N		
NB310	100Y024H	28.323	29	N		NB310	100YR-24HR	26.82	29	N	N			NB310	100YR-24HR	27.044	29	N	N		
NB313	100Y024H	28.668	31.5	N		NB313	100YR-24HR	27.398	31.5	N	N			NB313	100YR-24HR	27.438	31.5	N	N		
NB316	100Y024H	29.462	31.5	N		NB316	100YR-24HR	29.463	31.5	N	Y	0.001	N	NB316	100YR-24HR	29.462	31.5	N	N		
NB319	100Y024H	30.001	32.9	N		NB319	100YR-24HR	30.001	32.9	N	N			NB319	100YR-24HR	30.001	32.9	N	N		
NB320	100Y024H	31.206	34.25	N		NB320	100YR-24HR	31.207	34.25	N	Y	0.001	N	NB320	100YR-24HR	31.205	34.25	N	N		
NB325	100Y024H	31.35	34.8	N		NB325	100YR-24HR	31.35	34.8	N	N			NB325	100YR-24HR	31.349	34.8	N	N		
NB328	100Y024H	31.665	33.1	N		NB328	100YR-24HR	31.666	33.1	N	Y	0.001	N	NB328	100YR-24HR	31.664	33.1	N	N		
NB330	100Y024H	31.965	31.6	Y	0.365	NB330	100YR-24HR	31.967	31.6	Y	Y	0.002	N	NB330	100YR-24HR	31.964	31.6	Y	N		
NB340	100Y024H	32.261	36.4	N		NB340	100YR-24HR	32.263	36.4	N	Y	0.002	N	NB340	100YR-24HR	32.26	36.4	N	N		
NB350	100Y024H	32.376	35	N		NB350	100YR-24HR	32.378	35	N	Y	0.002	N	NB350	100YR-24HR	32.374	35	N	N		
NB351	100Y024H	33.104	35	N		NB351	100YR-24HR	33.104	35	N	N			NB351	100YR-24HR	33.104	35	N	N		
NB352	100Y024H	33.198	35	N		NB352	100YR-24HR	33.197	35	N	N			NB352	100YR-24HR	33.197	35	N	N		
NB352A	100Y024H	33.149	34	N		NB352A	100YR-24HR	33.149	34	N	N			NB352A	100YR-24HR	33.148	34	N	N		
NB353	100Y024H	33.587	38.71	N		NB353	100YR-24HR	33.583	38.71	N	N			NB353	100YR-24HR	33.58	38.71	N	N		
NB353A	100Y024H	33.235	37.25	N		NB353A	100YR-24HR	33.23	37.25	N	N			NB353A	100YR-24HR	33.231	37.25	N	N		
NB354	100Y024H	33.588	37	N		NB354	100YR-24HR	33.585	37	N	N			NB354	100YR-24HR	33.593	37	N	Y	0.005	N
NB354A	100Y024H	33.594	36	N		NB354A	100YR-24HR	33.584	36	N	N			NB354A	100YR-24HR	33.595	36	N	Y	0.001	N
NB355	100Y024H	41.452	43.24	N		NB355	100YR-24HR	41.452	43.24	N	N			NB355	100YR-24HR	41.452	43.24	N	N		
NB355A	100Y024H	35.694	39.7	N		NB355A	100YR-24HR	35.694	39.7	N	N			NB355A	100YR-24HR	35.694	39.7	N	N		
NB356	100Y024H	41.458	43	N		NB356	100YR-24HR	41.457	43	N	N			NB356	100YR-24HR	41.457	43	N	N		
NB356A	100Y024H	41.458	43.5	N		NB356A	100YR-24HR	41.457	43.5	N	N			NB356A	100YR-24HR	41.458	43.5	N	N		
NB357	100Y024H	44.43	47.54	N		NB357	100YR-24HR	44.43	47.54	N	N			NB357	100YR-24HR	44.43	47.54	N	N		
NB357A	100Y024H	44.06	47.9	N		NB357A	100YR-24HR	44.06	47.9	N	N			NB357A	100YR-24HR	44.06	47.9	N	N		
NB357B	100Y024H	43.43	45.95	N		NB357B	100YR-24HR	43.43	45.95	N	N			NB357B	100YR-24HR	43.43	45.95	N	N		
NB360	100Y024H	47.689	48	N		NB360	100YR-24HR	47.689	48	N	N			NB360	100YR-24HR	47.689	48	N	N		
NB370	100Y024H	47.831	48	N		NB370	100YR-24HR	47.831	48	N	N			NB370	100YR-24HR	47.831	48	N	N		
NB380	100Y024H	48.633	48	Y	0.633	NB380	100YR-24HR	48.633	48	Y	N			NB380	100YR-24HR	48.633	48	Y	N		
NB400	100Y024H	28.168	27	Y	1.168	NB400	100YR-24HR	26.686	27	N	N			NB400	100YR-24HR	26.849	27	N	N		
NB410	100Y024H	28.499	26.98	Y	1.519	NB410	100YR-24HR	27.688	26.98	Y	N			NB410	100YR-24HR	27.69	26.98	Y	N		
NB420	100Y024H	28.435	26.5	Y	1.935	NB420	100YR-24HR	26.372	26.5	N	N			NB420	100YR-24HR	26.733	26.5	Y	N		
NB430	100Y024H	29.088	26.51	Y	2.578	NB430	100YR-24HR	27.877	26.51	Y	N			NB430	100YR-24HR	28.038	26.51	Y	N		
NB440	100Y024H	29.09	26	Y	3.09	NB440	100YR-24HR	27.881	26	Y	N			NB440	100YR-24HR	28.042	26	Y	N		
NB450	100Y024H	29.091	29	Y	0.091	NB450	100YR-24HR	27.828	29	N	N			NB450	100YR-24HR	27.994	29	N	N		
NB460	100Y024H	34.053	41	N		NB460	100YR-24HR	34.243	41	N	Y	0.19	N	NB460	100YR-24HR	34.234	41	N	Y	0.181	N
NB470	100Y024H	36.414	38	N		NB470	100YR-24HR	36.414	38	N	N			NB470	100YR-24HR	36.414	38	N	N		
NB480	100Y024H	36.37	36	Y	0.37	NB480	100YR-24HR	36.419	36	Y	Y	0.049	N	NB480	100YR-24HR	36.415	36	Y	Y	0.045	N
NB490	100Y024H	38.985	37.5	Y	1.485	NB490	100YR-24HR	38.844	37.5	Y	N			NB490	100YR-24HR	38.852	37.5	Y	N		
NB500	100Y024H	39.074	38	Y	1.074	NB500	100YR-24HR	38.97	38	Y	N			NB500	100YR-24HR	38.98	38	Y	N		
NB510	100Y024H	39.112	38	Y	1.112	NB510	100YR-24HR	39.025	38	Y	N			NB510	100YR-24HR	39.032	38	Y	N		
NB520	100Y024H	41.118	37.5	Y	3.618	NB520	100YR-24HR	41.098	37.5	Y	N			NB520	100YR-24HR	41.099	37.5	Y	N		
NB530	100Y024H	46.144	47.5	N		NB530	100YR-24HR	46.144	47.5	N	N			NB530	100YR-24HR	46.144	47.5	N	N		
NB540	100Y024H	48.549	48	Y	0.549	NB540	100YR-24HR	48.549	48	Y	N			NB540	100YR-24HR	48.549	48	Y	N		
NB550	100Y024H	50.582	50.5	Y	0.082	NB550	100YR-24HR	50.582	50.5	Y	N			NB550	100YR-24HR	50.582	50.5	Y	N		
NB560	100Y024H	50.102	50	Y	0.102	NB560	100YR-24HR	50.102	50	Y	N			NB560	100YR-24HR	50.102	50	Y	N		
NB570	100Y024H	50.67	51.5	N		NB570	100YR-24HR	50.67	51.5	N	N			NB570	100YR-24HR	50.67	51.5	N	N		
NB580	100Y024H	50.946	54.5	N		NB580	100YR-24HR	50.946	54.5	N	N			NB580	100YR-24HR	50.946	54.5	N	N		

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NC010	100Y024H	24.476	26.5	N		NC010	100YR-24HR	24.476	26.5	N	N			NC010	100YR-24HR	24.476	26.5	N	N		
NC020	100Y024H	24.584	27	N		NC020	100YR-24HR	24.584	27	N	N			NC020	100YR-24HR	24.584	27	N	N		
NC030	100Y024H	25.805	32.2	N		NC030	100YR-24HR	25.805	32.2	N	N			NC030	100YR-24HR	25.805	32.2	N	N		
NC040	100Y024H	26.036	27	N		NC040	100YR-24HR	26.036	27	N	N			NC040	100YR-24HR	26.036	27	N	N		
NC050	100Y024H	19.982	21.5	N		NC050	100YR-24HR	19.982	21.5	N	N			NC050	100YR-24HR	19.982	21.5	N	N		
NC060	100Y024H	26.028	29	N		NC060	100YR-24HR	26.028	29	N	N			NC060	100YR-24HR	26.028	29	N	N		
NC070	100Y024H	26.888	30	N		NC070	100YR-24HR	26.888	30	N	N			NC070	100YR-24HR	26.888	30	N	N		
NC080	100Y024H	27.144	28	N		NC080	100YR-24HR	27.144	28	N	N			NC080	100YR-24HR	27.144	28	N	N		
NC090	100Y024H	27.281	28	N		NC090	100YR-24HR	27.281	28	N	N			NC090	100YR-24HR	27.281	28	N	N		
NC100	100Y024H	27.289	28.5	N		NC100	100YR-24HR	27.289	28.5	N	N			NC100	100YR-24HR	27.289	28.5	N	N		
NC110	100Y024H	27.596	29	N		NC110	100YR-24HR	27.596	29	N	N			NC110	100YR-24HR	27.596	29	N	N		
NC120	100Y024H	28.371	28	Y	0.371	NC120	100YR-24HR	28.371	28	Y	N			NC120	100YR-24HR	28.371	28	Y	N		
NC130	100Y024H	28.746	29	N		NC130	100YR-24HR	28.746	29	N	N			NC130	100YR-24HR	28.746	29	N	N		
NC140	100Y024H	28.722	30	N		NC140	100YR-24HR	28.722	30	N	N			NC140	100YR-24HR	28.722	30	N	N		
NC150	100Y024H	28.491	30	N		NC150	100YR-24HR	28.491	30	N	N			NC150	100YR-24HR	28.491	30	N	N		
NC160	100Y024H	28.01	28.5	N		NC160	100YR-24HR	28.01	28.5	N	N			NC160	100YR-24HR	28.01	28.5	N	N		
NC161	100Y024H	29.537	29.5	Y	0.037	NC161	100YR-24HR	29.537	29.5	Y	N			NC161	100YR-24HR	29.537	29.5	Y	N		
NC162	100Y024H	29.458	29.5	N		NC162	100YR-24HR	29.458	29.5	N	N			NC162	100YR-24HR	29.458	29.5	N	N		
NC170	100Y024H	27.6	27	Y	0.6	NC170	100YR-24HR	27.6	27	Y	N			NC170	100YR-24HR	27.6	27	Y	N		
NC180	100Y024H	17.548	20	N		NC180	100YR-24HR	17.539	20	N	N			NC180	100YR-24HR	17.54	20	N	N		
NC190	100Y024H	17.695	21	N		NC190	100YR-24HR	17.685	21	N	N			NC190	100YR-24HR	17.688	21	N	N		
NC200	100Y024H	18.974	24	N		NC200	100YR-24HR	18.972	24	N	N			NC200	100YR-24HR	18.972	24	N	N		
NC210	100Y024H	21.103	28	N		NC210	100YR-24HR	21.102	28	N	N			NC210	100YR-24HR	21.103	28	N	N		
NC220	100Y024H	23.219	25	N		NC220	100YR-24HR	23.219	25	N	N			NC220	100YR-24HR	23.219	25	N	N		
NC230	100Y024H	23.506	26	N		NC230	100YR-24HR	23.506	26	N	N			NC230	100YR-24HR	23.506	26	N	N		
NC240	100Y024H	25.082	27	N		NC240	100YR-24HR	25.082	27	N	N			NC240	100YR-24HR	25.082	27	N	N		
NC250	100Y024H	25.779	27	N		NC250	100YR-24HR	25.779	27	N	N			NC250	100YR-24HR	25.779	27	N	N		
NC260	100Y024H	25.888	28	N		NC260	100YR-24HR	25.888	28	N	N			NC260	100YR-24HR	25.888	28	N	N		
NC270	100Y024H	25.996	27	N		NC270	100YR-24HR	25.996	27	N	N			NC270	100YR-24HR	25.996	27	N	N		
NC280	100Y024H	26.327	27	N		NC280	100YR-24HR	26.327	27	N	N			NC280	100YR-24HR	26.327	27	N	N		
NC290	100Y024H	27.133	28	N		NC290	100YR-24HR	27.133	28	N	N			NC290	100YR-24HR	27.133	28	N	N		
NC300	100Y024H	27.337	28	N		NC300	100YR-24HR	27.337	28	N	N			NC300	100YR-24HR	27.337	28	N	N		
NC310	100Y024H	19.994	24	N		NC310	100YR-24HR	19.865	24	N	N			NC310	100YR-24HR	19.864	24	N	N		
NC320	100Y024H	21.533	25	N		NC320	100YR-24HR	21.533	25	N	N			NC320	100YR-24HR	21.533	25	N	N		
NC330	100Y024H	22.166	26	N		NC330	100YR-24HR	22.166	26	N	N			NC330	100YR-24HR	22.166	26	N	N		
NC340	100Y024H	24.472	25	N		NC340	100YR-24HR	24.472	25	N	N			NC340	100YR-24HR	24.472	25	N	N		
NC350	100Y024H	25.113	27	N		NC350	100YR-24HR	25.113	27	N	N			NC350	100YR-24HR	25.113	27	N	N		
NC360	100Y024H	25.862	27	N		NC360	100YR-24HR	25.667	27	N	N			NC360	100YR-24HR	25.855	27	N	N		
NC370	100Y024H	26.64	28	N		NC370	100YR-24HR	26.468	28	N	N			NC370	100YR-24HR	26.63	28	N	N		
NC380	100Y024H	27.418	27	Y	0.418	NC380	100YR-24HR	27.389	27	Y	N			NC380	100YR-24HR	27.405	27	Y	N		
NC390	100Y024H	27.613	27	Y	0.613	NC390	100YR-24HR	27.557	27	Y	N			NC390	100YR-24HR	27.604	27	Y	N		
NC400	100Y024H	27.809	27	Y	0.809	NC400	100YR-24HR	27.733	27	Y	N			NC400	100YR-24HR	27.804	27	Y	N		
NC410	100Y024H	28.435	27	Y	1.435	NC410	100YR-24HR	28.401	27	Y	N			NC410	100YR-24HR	28.435	27	Y	N		
NC420	100Y024H	28.926	27	Y	1.926	NC420	100YR-24HR	28.926	27	Y	N			NC420	100YR-24HR	28.926	27	Y	N		
NC430	100Y024H	29.002	27	Y	2.002	NC430	100YR-24HR	29.002	27	Y	N			NC430	100YR-24HR	29.002	27	Y	N		
NC440	100Y024H	29.348	28	Y	1.348	NC440	100YR-24HR	29.348	28	Y	N			NC440	100YR-24HR	29.348	28	Y	N		
NC450	100Y024H	29.353	29	Y	0.353	NC450	100YR-24HR	29.353	29	Y	N			NC450	100YR-24HR	29.353	29	Y	N		
NC460	100Y024H	29.417	30	N		NC460	100YR-24HR	29.417	30	N	N			NC460	100YR-24HR	29.417	30	N	N		
NC470	100Y024H	27.366	28	N		NC470	100YR-24HR	27.366	28	N	N			NC470	100YR-24HR	27.366	28	N	N		
NC480	100Y024H	28.451	29	N		NC480	100YR-24HR	28.419	29	N	N			NC480	100YR-24HR	28.451	29	N	N		
NC490	100Y024H	28.466	28	Y	0.466	NC490	100YR-24HR	28.439	28	Y	N			NC490	100YR-24HR	28.466	28	Y	N		
NC500	100Y024H	28.476	28	Y	0.476	NC500	100YR-24HR	28.451	28	Y	N			NC500	100YR-24HR	28.476	28	Y	N		
NC510	100Y024H	28.476	28	Y	0.476	NC510	100YR-24HR	28.45	28	Y	N			NC510	100YR-24HR	28.476	28	Y	N		
						NEW/ADDED GRANT CONDITIONS NODES								**NEW/ADDED GRANT CONDITIONS NODES**							
						Pond 1	100YR-24HR	10	15.9	N	N/A	N/A		Pond 1	100YR-24HR	10	15.9	N	N/A	N/A	
						Pond 2	100YR-24HR	10	16	N	N/A	N/A		Pond 2	100YR-24HR	10	16	N	N/A	N/A	
						Discharge 1	100YR-24HR	13.8	15	N	N/A	N/A		Discharge 1	100YR-24HR	13.8	15	N	N/A	N/A	
						GW1	100YR-24HR	10	11	N	N/A	N/A		GW1	100YR-24HR	10	11	N	N/A	N/A	
						GW2	100YR-24HR	10	13	N	N/A	N/A		GW2	100YR-24HR	10	13	N	N/A	N/A	
						NB056	100YR-24HR	24.184	30.22	N	N/A	N/A		NB056	100YR-24HR	24.973	28.72	N	N/A	N/A	
						NB057	100YR-24HR	24.596	29.72	N	N/A	N/A		NB057	100YR-24HR	25.19	27.97	N	N/A	N/A	
						NEW/ADDED PROPOSED CONDITIONS NODES															
						NB010B	100YR-24HR	19.511	28.69	N	N/A	N/A									
						NB056B	100YR-24HR	23.375	28.22	N	N/A	N/A									
						NB056C	100YR-24HR	22.979	30.22	N	N/A	N/A									
						NB056D	100YR-24HR	20.628	28.22	N	N/A	N/A									

500YR-24HR

N-BND-BAY	500yr-24hr	0.9	8	N		N-BND-BAY	500yr-24hr	0.9	8	N	N			N-BND-BAY	500yr-24hr	0.9	8	N	N		
N-BND-BELL	500yr-24hr	0	5	N		N-BND-BELL	500yr-24hr	0	5	N	N			N-BND-BELL	500yr-24hr	0	5	N	N		
N-BND-CHICO	500yr-24hr	0	5	N		N-BND-CHICO	500yr-24hr	0	5	N	N			N-BND-CHICO	500yr-24hr	0	5	N	N		
N-BNY-STAR	500yr-24hr	0	5	N		N-BNY-STAR	500yr-24hr	0	5	N	N			N-BNY-STAR	500yr-24hr	0	5	N	N		
N-GRND	500yr-24hr	0	0	N		N-GRND	500yr-24hr	0	0	N	N			N-GRND	500yr-24hr	0	0	N	N		
NA003	500yr-24hr	9.101	10	N		NA003	500yr-24hr	9.101	10	N	N			NA003	500yr-24hr	9.115	10	N	Y	0.014	N
NA006	500yr-24hr	9.765	10	N		NA006	500yr-24hr	9.765	10	N	N			NA006	500yr-24hr	9.783	10	N	Y	0.018	N
NA010	500yr-24hr	6.496	8	N		NA010	500yr-24hr	6.703	8	N	Y	0.207	N	NA010	500yr-24hr	6.677	8	N	Y	0.181	N
NA020	500yr-24hr	9.3	7	Y	2.3	NA020	500yr-24hr	9.566	7	Y	Y	0.266	N	NA020	500yr-24hr	9.532	7	Y	Y	0.232	N
NA021	500yr-24hr	18.678	22.13	N		NA021	500yr-24hr	18.678	22.13	N	N			NA021	500yr-24hr	18.678	22.13	N	N		
NA022	500yr-24hr	18.7	21.21	N		NA022	500yr-24hr	18.7	21.21	N	N			NA022	500yr-24hr	18.7	21.21	N	N		
NA023	500yr-24hr	18.95	21.41	N		NA023	500yr-24hr	18.95	21.41	N	N			NA023	500yr-24hr	18.95	21.41	N	N		
NA024	500yr-24hr	23.988	21	Y	2.988	NA024	500yr-24hr	23.988	21	Y	N			NA024	500yr-24hr	23.988	21	Y	N		
NA025	500yr-24hr	9.396	7	Y	2.396	NA025	500yr-24hr	9.659	7	Y	Y	0.263	N	NA025	500yr-24hr	9.626	7	Y	Y	0.23	N
NA026	500yr-24hr	9.607	7	Y	2.607	NA026	500yr-24hr	9.884	7	Y	Y	0.277	N	NA026	500yr-24hr	9.848	7	Y	Y	0.241	N
NA028	500yr-24hr	9.645	7	Y	2.645	NA028	500yr-24hr	9.92	7	Y	Y	0.275	N	NA028	500yr-24hr	9.884	7	Y	Y	0.239	N
NA030	500yr-24hr	9.652	8	Y	1.652	NA030	500yr-24hr	9.954	8	Y	Y	0.302	N	NA030	500yr-24hr	9.916	8	Y	Y	0.264	N
NA040	500yr-24hr	10.779	11.5	N		NA040	500yr-24hr	11.082	11.5	N	Y	0.303	N	NA040	500yr-24hr	11.043	11.5	N	Y	0.264	N

500YR-24HR

NA050	500yr-24hr	14.363	11	Y	3.363	NA050	500yr-24hr	14.684	11	Y	Y	0.321	N	NA050	500yr-24hr	14.643	11	Y	Y	0.28	N
NA060	500yr-24hr	14.415	9	Y	5.415	NA060	500yr-24hr	14.73	9	Y	Y	0.315	N	NA060	500yr-24hr	14.69	9	Y	Y	0.275	N
NA070	500yr-24hr	14.504	11	Y	3.504	NA070	500yr-24hr	14.805	11	Y	Y	0.301	N	NA070	500yr-24hr	14.767	11	Y	Y	0.263	N
NA080	500yr-24hr	14.564	11	Y	3.564	NA080	500yr-24hr	14.853	11	Y	Y	0.289	N	NA080	500yr-24hr	14.816	11	Y	Y	0.252	N
NA090	500yr-24hr	14.72	15	N		NA090	500yr-24hr	14.991	15	N	Y	0.271	N	NA090	500yr-24hr	14.956	15	N	Y	0.236	N
NA100	500yr-24hr	14.789	16	N		NA100	500yr-24hr	15.052	16	N	Y	0.263	N	NA100	500yr-24hr	15.018	16	N	Y	0.229	N
NA110	500yr-24hr	15.124	20	N		NA110	500yr-24hr	15.325	20	N	Y	0.201	N	NA110	500yr-24hr	15.298	20	N	Y	0.174	N
NA120	500yr-24hr	15.802	21	N		NA120	500yr-24hr	15.944	21	N	Y	0.142	N	NA120	500yr-24hr	15.924	21	N	Y	0.122	N
NA130	500yr-24hr	15.923	16	N		NA130	500yr-24hr	16.063	16	Y	Y	0.14	Y	NA130	500yr-24hr	16.043	16	Y	Y	0.12	Y
NA140	500yr-24hr	16.184	16	Y	0.184	NA140	500yr-24hr	16.272	16	Y	Y	0.088	N	NA140	500yr-24hr	16.259	16	Y	Y	0.075	N
NA150	500yr-24hr	17.418	16.5	Y	0.918	NA150	500yr-24hr	17.39	16.5	Y	N			NA150	500yr-24hr	17.395	16.5	Y	N		
NA160	500yr-24hr	17.688	16.5	Y	1.188	NA160	500yr-24hr	17.673	16.5	Y	N			NA160	500yr-24hr	17.676	16.5	Y	N		
NA170	500yr-24hr	21.926	22	N		NA170	500yr-24hr	21.921	22	N	N			NA170	500yr-24hr	21.921	22	N	N		
NA180	500yr-24hr	21.928	23	N		NA180	500yr-24hr	21.923	23	N	N			NA180	500yr-24hr	21.923	23	N	N		
NA190	500yr-24hr	25.3	23	Y	2.3	NA190	500yr-24hr	25.292	23	Y	N			NA190	500yr-24hr	25.293	23	Y	N		
NA200	500yr-24hr	25.38	22	Y	3.38	NA200	500yr-24hr	25.372	22	Y	N			NA200	500yr-24hr	25.373	22	Y	N		
NA210	500yr-24hr	25.419	22	Y	3.419	NA210	500yr-24hr	25.412	22	Y	N			NA210	500yr-24hr	25.412	22	Y	N		
NA220	500yr-24hr	25.441	24	Y	1.441	NA220	500yr-24hr	25.434	24	Y	N			NA220	500yr-24hr	25.435	24	Y	N		
NA230	500yr-24hr	25.45	27	N		NA230	500yr-24hr	25.443	27	N	N			NA230	500yr-24hr	25.443	27	N	N		
NA240	500yr-24hr	25.468	27	N		NA240	500yr-24hr	25.462	27	N	N			NA240	500yr-24hr	25.462	27	N	N		
NA250	500yr-24hr	25.576	27	N		NA250	500yr-24hr	25.571	27	N	N			NA250	500yr-24hr	25.572	27	N	N		
NA260	500yr-24hr	10.627	11	N		NA260	500yr-24hr	10.627	11	N	N			NA260	500yr-24hr	10.627	11	N	N		
NA265	500yr-24hr	14.283	12.62	Y	1.663	NA265	500yr-24hr	14.598	12.62	Y	Y	0.315	N	NA265	500yr-24hr	14.557	12.62	Y	Y	0.274	N
NA270	500yr-24hr	14.215	12	Y	2.215	NA270	500yr-24hr	14.53	12	Y	Y	0.315	N	NA270	500yr-24hr	14.489	12	Y	Y	0.274	N
NA280	500yr-24hr	19.523	22	N		NA280	500yr-24hr	19.523	22	N	N			NA280	500yr-24hr	19.523	22	N	N		
NA290	500yr-24hr	22.315	22	Y	0.315	NA290	500yr-24hr	22.315	22	Y	N			NA290	500yr-24hr	22.315	22	Y	N		
NA300	500yr-24hr	22.362	22	Y	0.362	NA300	500yr-24hr	22.362	22	Y	N			NA300	500yr-24hr	22.362	22	Y	N		
NA310	500yr-24hr	22.381	22	Y	0.381	NA310	500yr-24hr	22.381	22	Y	N			NA310	500yr-24hr	22.381	22	Y	N		
NA320	500yr-24hr	28.974	29	N		NA320	500yr-24hr	28.974	29	N	N			NA320	500yr-24hr	28.974	29	N	N		
NA330	500yr-24hr	28.975	28	Y	0.975	NA330	500yr-24hr	28.975	28	Y	N			NA330	500yr-24hr	28.975	28	Y	N		
NA340	500yr-24hr	15.364	14	Y	1.364	NA340	500yr-24hr	15.609	14	Y	Y	0.245	N	NA340	500yr-24hr	15.573	14	Y	Y	0.209	N
NA350	500yr-24hr	17.009	22	N		NA350	500yr-24hr	17.237	22	N	Y	0.228	N	NA350	500yr-24hr	17.2	22	N	Y	0.191	N
NA360	500yr-24hr	22.895	26	N		NA360	500yr-24hr	22.972	26	N	Y	0.077	N	NA360	500yr-24hr	22.951	26	N	Y	0.056	N
NA370	500yr-24hr	24.618	27.5	N		NA370	500yr-24hr	24.686	27.5	N	Y	0.068	N	NA370	500yr-24hr	24.667	27.5	N	Y	0.049	N
NA380	500yr-24hr	14.368	12	Y	2.368	NA380	500yr-24hr	14.689	12	Y	Y	0.321	N	NA380	500yr-24hr	14.648	12	Y	Y	0.28	N
NA390	500yr-24hr	23.657	23	Y	0.657	NA390	500yr-24hr	23.768	23	Y	Y	0.111	N	NA390	500yr-24hr	23.753	23	Y	Y	0.096	N
NA400	500yr-24hr	26.144	27.5	N		NA400	500yr-24hr	26.206	27.5	N	Y	0.062	N	NA400	500yr-24hr	26.196	27.5	N	Y	0.052	N
NA410	500yr-24hr	27.527	28	N		NA410	500yr-24hr	27.564	28	N	Y	0.037	N	NA410	500yr-24hr	27.557	28	N	Y	0.03	N
NA420	500yr-24hr	28.549	28	Y	0.549	NA420	500yr-24hr	28.566	28	Y	Y	0.017	N	NA420	500yr-24hr	28.562	28	Y	Y	0.013	N
NA430	500yr-24hr	16.883	21	N		NA430	500yr-24hr	16.883	21	N	N			NA430	500yr-24hr	16.883	21	N	N		
NA440	500yr-24hr	26.789	27	N		NA440	500yr-24hr	26.841	27	N	Y	0.052	N	NA440	500yr-24hr	26.832	27	N	Y	0.043	N
NA450	500yr-24hr	27.788	27	Y	0.788	NA450	500yr-24hr	27.829	27	Y	Y	0.041	N	NA450	500yr-24hr	27.821	27	Y	Y	0.033	N
NA460	500yr-24hr	28.374	28	Y	0.374	NA460	500yr-24hr	28.406	28	Y	Y	0.032	N	NA460	500yr-24hr	28.4	28	Y	Y	0.026	N
NA470	500yr-24hr	28.986	27	Y	1.986	NA470	500yr-24hr	29.01	27	Y	Y	0.024	N	NA470	500yr-24hr	29.005	27	Y	Y	0.019	N
NA480	500yr-24hr	29.176	27.5	Y	1.676	NA480	500yr-24hr	29.195	27.5	Y	Y	0.019	N	NA480	500yr-24hr	29.191	27.5	Y	Y	0.015	N
NA490	500yr-24hr	29.431	28	Y	1.431	NA490	500yr-24hr	29.448	28	Y	Y	0.017	N	NA490	500yr-24hr	29.444	28	Y	Y	0.013	N
NA500	500yr-24hr	14.466	15	N		NA500	500yr-24hr	14.771	15	N	Y	0.305	N	NA500	500yr-24hr	14.732	15	N	Y	0.266	N
NA510	500yr-24hr	15.085	16	N		NA510	500yr-24hr	15.232	16	N	Y	0.147	N	NA510	500yr-24hr	15.212	16	N	Y	0.127	N
NA520	500yr-24hr	15.848	17	N		NA520	500yr-24hr	15.874	17	N	Y	0.026	N	NA520	500yr-24hr	15.869	17	N	Y	0.021	N
NA530	500yr-24hr	18.426	21.5	N		NA530	500yr-24hr	18.426	21.5	N	N			NA530	500yr-24hr	18.426	21.5	N	N		
NA540	500yr-24hr	21.102	28	N		NA540	500yr-24hr	21.102	28	N	N			NA540	500yr-24hr	21.102	28	N	N		
NA550	500yr-24hr	21.79	29	N		NA550	500yr-24hr	21.79	29	N	N			NA550	500yr-24hr	21.79	29	N	N		
NA560	500yr-24hr	22.546	28.5	N		NA560	500yr-24hr	22.546	28.5	N	N			NA560	500yr-24hr	22.546	28.5	N	N		
NA570	500yr-24hr	23.502	29	N		NA570	500yr-24hr	23.502	29	N	N			NA570	500yr-24hr	23.502	29	N	N		
NA580	500yr-24hr	24.086	26	N		NA580	500yr-24hr	24.086	26	N	N			NA580	500yr-24hr	24.086	26	N	N		
NA590	500yr-24hr	25.315	26.6	N		NA590	500yr-24hr	25.315	26.6	N	N			NA590	500yr-24hr	25.315	26.6	N	N		
NA600	500yr-24hr	26.35	25.5	Y	0.85	NA600	500yr-24hr	26.35	25.5	Y	N			NA600	500yr-24hr	26.35	25.5	Y	N		
NA610	500yr-24hr	19.54	22	N		NA610	500yr-24hr	19.54	22	N	N			NA610	500yr-24hr	19.54	22	N	N		
NA620	500yr-24hr	19.539	21	N		NA620	500yr-24hr	19.539	21	N	N			NA620	500yr-24hr	19.539	21	N	N		
NA630	500yr-24hr	22.951	30	N		NA630	500yr-24hr	22.951	30	N	N			NA630	500yr-24hr	22.951	30	N	N		
NA640	500yr-24hr	24.363	29.75	N		NA640	500yr-24hr	24.363	29.75	N	N			NA640	500yr-24hr	24.363	29.75	N	N		
NA650	500yr-24hr	24.804	30	N		NA650	500yr-24hr	24.804	30	N	N			NA650	500yr-24hr	24.804	30	N	N		
NA660	500yr-24hr	25.17	28.5	N		NA660	500yr-24hr	25.17	28.5	N	N			NA660	500yr-24hr	25.17	28.5	N	N		
NA670	500yr-24hr	17.893	23	N		NA670	500yr-24hr	17.893	23	N	N			NA670	500yr-24hr	17.893	23	N	N		
NA690	500yr-24hr	17.932	20	N		NA690	500yr-24hr	17.932	20	N	N			NA690	500yr-24hr	17.932	20	N	N		
NA700	500yr-24hr	17.932	20	N		NA700	500yr-24hr	17.932	20	N	N			NA700	500yr-24hr	17.932	20	N	N		
NA710	500yr-24hr	17.293	22	N		NA710	500yr-24hr	17.293	22	N	N			NA710	500yr-24hr	17.293	22	N	N		
NA720	500yr-24hr	17.258	20	N		NA720	500yr-24hr	17.258	20	N	N			NA720	500yr-24hr	17.258	20	N	N		
NA730	500yr-24hr	17.34	22.61	N		NA730	500yr-24hr	17.34	22.61	N	N			NA730	500yr-24hr	17.34	22.61	N	N		
NA740	500yr-24hr	17.272	19.68	N		NA740	500yr-24hr	17.272	19.68	N	N			NA740	500yr-24hr	17.272	19.68	N	N		
NA750	500yr-24hr	17.308	22	N		NA750	500yr-24hr	17.308	22	N	N			NA750	500yr-24hr	17.308	22	N	N		
NA760	500yr-24hr	17.633	22	N		NA760	500yr-24hr	17.633	22	N	N			NA760	500yr-24hr	17.633	22	N	N		
NA770	500yr-24hr	21.814	26.75	N		NA770	500yr-24hr	21.814	26.75	N	N			NA770	500yr-24hr	21.814	26.75	N	N		
NA780	500yr-24hr	24.2	27.5	N		NA780	500yr-24hr	24.2	27.5	N	N			NA780	500yr-24hr	24.2	27.5	N	N		
NA790	500yr-24hr	25.213	27.5	N		NA790	500yr-24hr	25.213	27.5	N	N			NA790	500yr-24hr	25.213	27.5	N	N		
NA800	500yr-24hr	29.035	28.75	Y	0.285	NA800	500yr-24hr	29.035	28.75	Y	N			NA800	500yr-24hr	29.035	28.75	Y	N		
NB010	500yr-24hr	22.72	26.36	N		NB010	500yr-24hr	22.053	26.36	N	N			NB010	500yr-24hr	21.837	26.36	N	N		
NB020	500yr-24hr	25.278	28.81	N		NB020	500yr-24hr	24.004	28.81	N	N			NB020	500yr-24hr	23.842	28.81	N	N		
NB030	500yr-24hr	26.538	26.75	N		NB030	500yr-24hr	24.982	26.75	N	N			NB030	500yr-24hr	25.239	26.75	N	N		
NB040	500yr-24hr	28.308	27.59	Y	0.718	NB040	500yr-24hr	27.311	27.59	N	N			NB040	500yr-24hr	27.315	27.59	N	N		
NB050	500yr-24hr	30.141	29.72	Y	0.421	NB050	500yr-24hr	29.943	29.72	Y	N			NB050	500yr-24hr	29.942	29.72	Y	N		
NB055	500yr-24hr	25.918	26.27	N		NB055	500yr-24hr	25.049	26.27	N	N			NB055	500yr-24hr	26.067	26.27	N	Y	0.149	N
NB060	500yr-24hr	26.599	27.57	N		NB060	500yr-24hr	25.628	27.57	N	N			NB060	500yr-24hr	26.361	27.57	N	N		
NB063	500yr-24hr	26.879	28.22	N		NB063	500yr-24hr	25.71	28.22	N	N			NB063	500yr-24hr	26.566	28.22	N	N		
NB065	500yr-24hr	26.894	28.22	N		NB065	500yr-24hr	25.735	28.22	N	N			NB065	500yr-24hr	26.58	28.22	N	N		

500YR-24HR

NB070	500yr-24hr	27.386	30.49	N		NB070	500yr-24hr	25.972	30.49	N	N			NB070	500yr-24hr	27.196	30.49	N	N		
NB080	500yr-24hr	27.956	29.51	N		NB080	500yr-24hr	26.24	29.51	N	N			NB080	500yr-24hr	27.696	29.51	N	N		
NB090	500yr-24hr	28.819	28.85	N		NB090	500yr-24hr	26.781	28.85	N	N			NB090	500yr-24hr	28.496	28.85	N	N		
NB095	500yr-24hr	29.262	27	Y	2.262	NB095	500yr-24hr	26.812	27	N	N			NB095	500yr-24hr	30.018	27.22	Y	Y	0.756	N
NB100	500yr-24hr	29.61	27	Y	2.61	NB100	500yr-24hr	27.199	27	Y	N			NB100	500yr-24hr	29.048	27.22	Y	N		
NB110	500yr-24hr	29.611	27	Y	2.611	NB110	500yr-24hr	27.205	27	Y	N			NB110	500yr-24hr	29.033	27	Y	N		
NB120	500yr-24hr	29.612	27	Y	2.612	NB120	500yr-24hr	27.212	27	Y	N			NB120	500yr-24hr	29.03	27	Y	N		
NB130	500yr-24hr	29.613	26	Y	3.613	NB130	500yr-24hr	27.219	26	Y	N			NB130	500yr-24hr	29.028	26	Y	N		
NB140	500yr-24hr	29.623	25	Y	4.623	NB140	500yr-24hr	27.245	25	Y	N			NB140	500yr-24hr	29.017	25	Y	N		
NB150	500yr-24hr	29.615	28	Y	1.615	NB150	500yr-24hr	27.293	28	N	N			NB150	500yr-24hr	28.939	28	Y	N		
NB160	500yr-24hr	29.499	26.5	Y	2.999	NB160	500yr-24hr	27.783	26.5	Y	N			NB160	500yr-24hr	28.108	26.5	Y	N		
NB170	500yr-24hr	29.621	27	Y	2.621	NB170	500yr-24hr	27.832	27	Y	N			NB170	500yr-24hr	28.682	27	Y	N		
NB180	500yr-24hr	29.648	27.11	Y	2.538	NB180	500yr-24hr	28.5	27.11	Y	N			NB180	500yr-24hr	28.625	27.11	Y	N		
NB181	500yr-24hr	30.157	31	N		NB181	500yr-24hr	30.157	31	N	N			NB181	500yr-24hr	30.157	31	N	N		
NB182	500yr-24hr	30.518	30	Y	0.518	NB182	500yr-24hr	30.518	30	Y	N			NB182	500yr-24hr	30.518	30	Y	N		
NB183	500yr-24hr	30.524	30	Y	0.524	NB183	500yr-24hr	30.524	30	Y	N			NB183	500yr-24hr	30.524	30	Y	N		
NB190	500yr-24hr	29.625	28	Y	1.625	NB190	500yr-24hr	27.384	28	N	N			NB190	500yr-24hr	28.897	28	Y	N		
NB200	500yr-24hr	30.16	27.64	Y	2.52	NB200	500yr-24hr	28.373	27.64	Y	N			NB200	500yr-24hr	29.262	27.64	Y	N		
NB210	500yr-24hr	31.506	29	Y	2.506	NB210	500yr-24hr	30.965	29	Y	N			NB210	500yr-24hr	31.039	29	Y	N		
NB220	500yr-24hr	33.558	29	Y	4.558	NB220	500yr-24hr	33.452	29	Y	N			NB220	500yr-24hr	33.459	29	Y	N		
NB230	500yr-24hr	33.892	30.5	Y	3.392	NB230	500yr-24hr	33.806	30.5	Y	N			NB230	500yr-24hr	33.814	30.5	Y	N		
NB240	500yr-24hr	34.324	31.8	Y	2.524	NB240	500yr-24hr	34.298	31.8	Y	N			NB240	500yr-24hr	34.299	31.8	Y	N		
NB250	500yr-24hr	34.658	35	N		NB250	500yr-24hr	34.628	35	N	N			NB250	500yr-24hr	34.628	35	N	N		
NB260	500yr-24hr	42.627	42.5	Y	0.127	NB260	500yr-24hr	42.627	42.5	Y	N			NB260	500yr-24hr	42.627	42.5	Y	N		
NB270	500yr-24hr	29.623	27.5	Y	2.123	NB270	500yr-24hr	27.371	27.5	N	N			NB270	500yr-24hr	28.693	27.5	Y	N		
NB280	500yr-24hr	29.624	26.81	Y	2.814	NB280	500yr-24hr	27.56	26.81	Y	N			NB280	500yr-24hr	28.19	26.81	Y	N		
NB290	500yr-24hr	30.051	25.69	Y	4.361	NB290	500yr-24hr	28.694	25.69	Y	N			NB290	500yr-24hr	28.981	25.69	Y	N		
NB295	500yr-24hr	30.201	25.76	Y	4.441	NB295	500yr-24hr	28.972	25.76	Y	N			NB295	500yr-24hr	29.147	25.76	Y	N		
NB300	500yr-24hr	30.495	26.04	Y	4.455	NB300	500yr-24hr	29.402	26.04	Y	N			NB300	500yr-24hr	29.544	26.04	Y	N		
NB305	500yr-24hr	30.82	28.2	Y	2.62	NB305	500yr-24hr	29.863	28.2	Y	N			NB305	500yr-24hr	29.975	28.2	Y	N		
NB310	500yr-24hr	31.301	29	Y	2.301	NB310	500yr-24hr	30.449	29	Y	N			NB310	500yr-24hr	30.536	29	Y	N		
NB313	500yr-24hr	32.025	31.5	Y	0.525	NB313	500yr-24hr	31.271	31.5	N	N			NB313	500yr-24hr	31.348	31.5	N	N		
NB316	500yr-24hr	33.126	31.5	Y	1.626	NB316	500yr-24hr	32.528	31.5	Y	N			NB316	500yr-24hr	32.58	31.5	Y	N		
NB319	500yr-24hr	34.087	32.9	Y	1.187	NB319	500yr-24hr	33.664	32.9	Y	N			NB319	500yr-24hr	33.692	32.9	Y	N		
NB320	500yr-24hr	34.853	34.25	Y	0.603	NB320	500yr-24hr	34.521	34.25	Y	N			NB320	500yr-24hr	34.542	34.25	Y	N		
NB325	500yr-24hr	35.418	34.8	Y	0.618	NB325	500yr-24hr	35.153	34.8	Y	N			NB325	500yr-24hr	35.17	34.8	Y	N		
NB328	500yr-24hr	36.112	33.1	Y	3.012	NB328	500yr-24hr	35.929	33.1	Y	N			NB328	500yr-24hr	35.94	33.1	Y	N		
NB330	500yr-24hr	36.659	31.6	Y	5.059	NB330	500yr-24hr	36.542	31.6	Y	N			NB330	500yr-24hr	36.548	31.6	Y	N		
NB340	500yr-24hr	36.007	36.4	N		NB340	500yr-24hr	35.952	36.4	N	N			NB340	500yr-24hr	35.955	36.4	N	N		
NB350	500yr-24hr	35.399	35	Y	0.399	NB350	500yr-24hr	35.394	35	Y	N			NB350	500yr-24hr	35.394	35	Y	N		
NB351	500yr-24hr	36.746	35	Y	1.746	NB351	500yr-24hr	36.737	35	Y	N			NB351	500yr-24hr	36.737	35	Y	N		
NB352	500yr-24hr	37.12	35	Y	2.12	NB352	500yr-24hr	37.11	35	Y	N			NB352	500yr-24hr	37.11	35	Y	N		
NB352A	500yr-24hr	36.924	34	Y	2.924	NB352A	500yr-24hr	36.914	34	Y	N			NB352A	500yr-24hr	36.914	34	Y	N		
NB353	500yr-24hr	37.432	38.71	N		NB353	500yr-24hr	37.42	38.71	N	N			NB353	500yr-24hr	37.421	38.71	N	N		
NB353A	500yr-24hr	37.257	37.25	Y	0.007	NB353A	500yr-24hr	37.247	37.25	N	N			NB353A	500yr-24hr	37.247	37.25	N	N		
NB354	500yr-24hr	37.408	37	Y	0.408	NB354	500yr-24hr	37.397	37	Y	N			NB354	500yr-24hr	37.397	37	Y	N		
NB354A	500yr-24hr	37.41	36	Y	1.41	NB354A	500yr-24hr	37.4	36	Y	N			NB354A	500yr-24hr	37.399	36	Y	N		
NB355	500yr-24hr	41.82	43.24	N		NB355	500yr-24hr	41.82	43.24	N	N			NB355	500yr-24hr	41.82	43.24	N	N		
NB355A	500yr-24hr	37.476	39.7	N		NB355A	500yr-24hr	37.465	39.7	N	N			NB355A	500yr-24hr	37.465	39.7	N	N		
NB356	500yr-24hr	41.846	43	N		NB356	500yr-24hr	41.846	43	N	N			NB356	500yr-24hr	41.846	43	N	N		
NB356A	500yr-24hr	41.846	43.5	N		NB356A	500yr-24hr	41.846	43.5	N	N			NB356A	500yr-24hr	41.846	43.5	N	N		
NB357	500yr-24hr	44.659	47.54	N		NB357	500yr-24hr	44.659	47.54	N	N			NB357	500yr-24hr	44.659	47.54	N	N		
NB357A	500yr-24hr	44.326	47.9	N		NB357A	500yr-24hr	44.326	47.9	N	N			NB357A	500yr-24hr	44.326	47.9	N	N		
NB357B	500yr-24hr	44.05	45.95	N		NB357B	500yr-24hr	44.05	45.95	N	N			NB357B	500yr-24hr	44.05	45.95	N	N		
NB360	500yr-24hr	48.395	48	Y	0.395	NB360	500yr-24hr	48.395	48	Y	N			NB360	500yr-24hr	48.395	48	Y	N		
NB370	500yr-24hr	48.461	48	Y	0.461	NB370	500yr-24hr	48.461	48	Y	N			NB370	500yr-24hr	48.461	48	Y	N		
NB380	500yr-24hr	48.9	48	Y	0.9	NB380	500yr-24hr	48.9	48	Y	N			NB380	500yr-24hr	48.9	48	Y	N		
NB400	500yr-24hr	30.389	27	Y	3.389	NB400	500yr-24hr	29.159	27	Y	N			NB400	500yr-24hr	29.587	27	Y	N		
NB410	500yr-24hr	30.872	26.98	Y	3.892	NB410	500yr-24hr	30.261	26.98	Y	N			NB410	500yr-24hr	30.318	26.98	Y	N		
NB420	500yr-24hr	30.593	26.5	Y	4.093	NB420	500yr-24hr	28.827	26.5	Y	N			NB420	500yr-24hr	29.912	26.5	Y	N		
NB430	500yr-24hr	31.594	26.51	Y	5.084	NB430	500yr-24hr	30.46	26.51	Y	N			NB430	500yr-24hr	30.716	26.51	Y	N		
NB440	500yr-24hr	31.596	26	Y	5.596	NB440	500yr-24hr	30.463	26	Y	N			NB440	500yr-24hr	30.718	26	Y	N		
NB450	500yr-24hr	31.628	29	Y	2.628	NB450	500yr-24hr	30.463	29	Y	N			NB450	500yr-24hr	30.849	29	Y	N		
NB460	500yr-24hr	35.919	41	N		NB460	500yr-24hr	35.451	41	N	N			NB460	500yr-24hr	35.508	41	N	N		
NB470	500yr-24hr	38.848	38	Y	0.848	NB470	500yr-24hr	38.712	38	Y	N			NB470	500yr-24hr	38.718	38	Y	N		
NB480	500yr-24hr	37.905	36	Y	1.905	NB480	500yr-24hr	37.854	36	Y	N			NB480	500yr-24hr	37.86	36	Y	N		
NB490	500yr-24hr	41.283	37.5	Y	3.783	NB490	500yr-24hr	41.087	37.5	Y	N			NB490	500yr-24hr	41.112	37.5	Y	N		
NB500	500yr-24hr	40.881	38	Y	2.881	NB500	500yr-24hr	40.79	38	Y	N			NB500	500yr-24hr	40.8	38	Y	N		
NB510	500yr-24hr	40.633	38	Y	2.633	NB510	500yr-24hr	40.573	38	Y	N			NB510	500yr-24hr	40.582	38	Y	N		
NB520	500yr-24hr	45.977	37.5	Y	8.477	NB520	500yr-24hr	45.957	37.5	Y	N			NB520	500yr-24hr	45.958	37.5	Y	N		
NB530	500yr-24hr	48.346	47.5	Y	0.846	NB530	500yr-24hr	48.346	47.5	Y	N			NB530	500yr-24hr	48.346	47.5	Y	N		
NB540	500yr-24hr	48.778	48	Y	0.778	NB540	500yr-24hr	48.778	48	Y	N			NB540	500yr-24hr	48.778	48	Y	N		
NB550	500yr-24hr	50.65	50.5	Y	0.15	NB550	500yr-24hr	50.65	50.5	Y	N			NB550	500yr-24hr	50.65	50.5	Y	N		
NB560	500yr-24hr	50.626	50	Y	0.626	NB560	500yr-24hr	50.626	50	Y	N			NB560	500yr-24hr	50.626	50	Y	N		
NB570	500yr-24hr	51.187	51.5	N		NB570	500yr-24hr	51.187	51.5	N	N			NB570	500yr-24hr	51.187	51.5	N	N		
NB580	500yr-24hr	54.246	54.5	N		NB580	500yr-24hr	54.246	54.5	N	N			NB580	500yr-24hr	54.246	54.5	N	N		
NC010	500yr-24hr	25.459	26.5	N		NC010	500yr-24hr	25.459	26.5	N	N			NC010	500yr-24hr	25.459	26.5	N	N		
NC020	500yr-24hr	25.675	27	N		NC020	500yr-24hr	25.675	27	N	N			NC020	500yr-24hr	25.675	27	N	N		
NC030	500yr-24hr	26.699	32.2	N		NC030	500yr-24hr	26.699	32.2	N	N			NC030	500yr-24hr	26.699	32.2	N	N		
NC040	500yr-24hr	27.293	27	Y	0.293	NC040	500yr-24hr	27.293	27	Y	N			NC040	500yr-24hr	27.293	27	Y	N		
NC050	500yr-24hr	21.329	21.5	N		NC050	500yr-24hr	21.328	21.5	N	N			NC050	500yr-24hr	21.328	21.5	N	N		
NC060	500yr-24hr	26.609	29	N		NC060	500yr-24hr	26.609	29	N	N			NC060	500yr-24hr	26.609	29	N	N		
NC070	500yr-24hr	27.626	30	N		NC070	500yr-24hr	27.626	30	N	N			NC070	500yr-24hr	27.626	30	N	N		
NC080	500yr-24hr	27.877	28	N		NC080	500yr-24hr	27.877	28	N	N			NC080	500yr-24hr	27.877	28	N	N		
NC090	500yr-24hr	28.061	28	Y	0.061	NC090	500yr-24hr	28.061	28	Y	N			NC090	500yr-24hr	28.061	28	Y	N		

500YR-24HR

NC100	500yr-24hr	28.067	28.5	N	
NC110	500yr-24hr	28.403	29	N	
NC120	500yr-24hr	28.84	28	Y	0.84
NC130	500yr-24hr	29.399	29	Y	0.399
NC140	500yr-24hr	29.304	30	N	
NC150	500yr-24hr	28.681	30	N	
NC160	500yr-24hr	28.507	28.5	Y	0.007
NC161	500yr-24hr	29.719	29.5	Y	0.219
NC162	500yr-24hr	29.608	29.5	Y	0.108
NC170	500yr-24hr	28.409	27	Y	1.409
NC180	500yr-24hr	17.834	20	N	
NC190	500yr-24hr	18.105	21	N	
NC200	500yr-24hr	19.538	24	N	
NC210	500yr-24hr	21.327	28	N	
NC220	500yr-24hr	23.872	25	N	
NC230	500yr-24hr	24.102	26	N	
NC240	500yr-24hr	25.714	27	N	
NC250	500yr-24hr	26.376	27	N	
NC260	500yr-24hr	26.543	28	N	
NC270	500yr-24hr	26.742	27	N	
NC280	500yr-24hr	27.905	27	Y	0.905
NC290	500yr-24hr	28.243	28	Y	0.243
NC300	500yr-24hr	28.382	28	Y	0.382
NC310	500yr-24hr	21.936	24	N	
NC320	500yr-24hr	22.383	25	N	
NC330	500yr-24hr	22.548	26	N	
NC340	500yr-24hr	25.189	25	Y	0.189
NC350	500yr-24hr	26.293	27	N	
NC360	500yr-24hr	26.864	27	N	
NC370	500yr-24hr	27.539	28	N	
NC380	500yr-24hr	28.46	27	Y	1.46
NC390	500yr-24hr	28.621	27	Y	1.621
NC400	500yr-24hr	28.796	27	Y	1.796
NC410	500yr-24hr	29.483	27	Y	2.483
NC420	500yr-24hr	30.038	27	Y	3.038
NC430	500yr-24hr	30.12	27	Y	3.12
NC440	500yr-24hr	30.501	28	Y	2.501
NC450	500yr-24hr	30.504	29	Y	1.504
NC460	500yr-24hr	30.593	30	Y	0.593
NC470	500yr-24hr	27.459	28	N	
NC480	500yr-24hr	29.494	29	Y	0.494
NC490	500yr-24hr	29.507	28	Y	1.507
NC500	500yr-24hr	29.516	28	Y	1.516
NC510	500yr-24hr	29.516	28	Y	1.516

500YR-24HR

NC100	500yr-24hr	28.067	28.5	N	N		
NC110	500yr-24hr	28.403	29	N	N		
NC120	500yr-24hr	28.84	28	Y	N		
NC130	500yr-24hr	29.399	29	Y	N		
NC140	500yr-24hr	29.304	30	N	N		
NC150	500yr-24hr	28.681	30	N	N		
NC160	500yr-24hr	28.507	28.5	Y	N		
NC161	500yr-24hr	29.719	29.5	Y	N		
NC162	500yr-24hr	29.608	29.5	Y	N		
NC170	500yr-24hr	28.409	27	Y	N		
NC180	500yr-24hr	17.82	20	N	N		
NC190	500yr-24hr	18.095	21	N	N		
NC200	500yr-24hr	19.535	24	N	N		
NC210	500yr-24hr	21.325	28	N	N		
NC220	500yr-24hr	23.872	25	N	N		
NC230	500yr-24hr	24.102	26	N	N		
NC240	500yr-24hr	25.714	27	N	N		
NC250	500yr-24hr	26.376	27	N	N		
NC260	500yr-24hr	26.543	28	N	N		
NC270	500yr-24hr	26.742	27	N	N		
NC280	500yr-24hr	27.905	27	Y	N		
NC290	500yr-24hr	28.243	28	Y	N		
NC300	500yr-24hr	28.382	28	Y	N		
NC310	500yr-24hr	21.931	24	N	N		
NC320	500yr-24hr	22.378	25	N	N		
NC330	500yr-24hr	22.543	26	N	N		
NC340	500yr-24hr	25.189	25	Y	N		
NC350	500yr-24hr	26.293	27	N	N		
NC360	500yr-24hr	26.864	27	N	N		
NC370	500yr-24hr	27.539	28	N	N		
NC380	500yr-24hr	28.46	27	Y	N		
NC390	500yr-24hr	28.621	27	Y	N		
NC400	500yr-24hr	28.796	27	Y	N		
NC410	500yr-24hr	29.482	27	Y	N		
NC420	500yr-24hr	30.038	27	Y	N		
NC430	500yr-24hr	30.12	27	Y	N		
NC440	500yr-24hr	30.501	28	Y	N		
NC450	500yr-24hr	30.504	29	Y	N		
NC460	500yr-24hr	30.593	30	Y	N		
NC470	500yr-24hr	27.459	28	N	N		
NC480	500yr-24hr	29.493	29	Y	N		
NC490	500yr-24hr	29.507	28	Y	N		
NC500	500yr-24hr	29.516	28	Y	N		
NC510	500yr-24hr	29.516	28	Y	N		
NEW/ADDED GRANT CONDITIONS NODES							
Pond 1	500yr-24hr	10	15.9	N	N/A	N/A	
Pond 2	500yr-24hr	10	16	N	N/A	N/A	
Discharge 1	500yr-24hr	13.8	15	N	N/A	N/A	
GW1	500yr-24hr	10	11	N	N/A	N/A	
GW2	500yr-24hr	10	13	N	N/A	N/A	
NB056	500yr-24hr	25.936	30.22	N	N/A	N/A	
NB057	500yr-24hr	26.73	29.72	N	N/A	N/A	
NEW/ADDED PROPOSED CONDITIONS NODES							
NB010B	500yr-24hr	20.042	28.69	N	N/A	N/A	
NB056B	500yr-24hr	24.894	28.22	N	N/A	N/A	
NB056C	500yr-24hr	24.351	30.22	N	N/A	N/A	
NB056D	500yr-24hr	21.699	28.22	N	N/A	N/A	

500YR-24HR

NC100	500yr-24hr	28.067	28.5	N	N		
NC110	500yr-24hr	28.403	29	N	N		
NC120	500yr-24hr	28.84	28	Y	N		
NC130	500yr-24hr	29.399	29	Y	N		
NC140	500yr-24hr	29.304	30	N	N		
NC150	500yr-24hr	28.681	30	N	N		
NC160	500yr-24hr	28.507	28.5	Y	N		
NC161	500yr-24hr	29.719	29.5	Y	N		
NC162	500yr-24hr	29.608	29.5	Y	N		
NC170	500yr-24hr	28.409	27	Y	N		
NC180	500yr-24hr	17.822	20	N	N		
NC190	500yr-24hr	18.096	21	N	N		
NC200	500yr-24hr	19.535	24	N	N		
NC210	500yr-24hr	21.325	28	N	N		
NC220	500yr-24hr	23.872	25	N	N		
NC230	500yr-24hr	24.102	26	N	N		
NC240	500yr-24hr	25.714	27	N	N		
NC250	500yr-24hr	26.376	27	N	N		
NC260	500yr-24hr	26.543	28	N	N		
NC270	500yr-24hr	26.742	27	N	N		
NC280	500yr-24hr	27.905	27	Y	N		
NC290	500yr-24hr	28.243	28	Y	N		
NC300	500yr-24hr	28.382	28	Y	N		
NC310	500yr-24hr	21.931	24	N	N		
NC320	500yr-24hr	22.378	25	N	N		
NC330	500yr-24hr	22.543	26	N	N		
NC340	500yr-24hr	25.189	25	Y	N		
NC350	500yr-24hr	26.293	27	N	N		
NC360	500yr-24hr	26.864	27	N	N		
NC370	500yr-24hr	27.539	28	N	N		
NC380	500yr-24hr	28.46	27	Y	N		
NC390	500yr-24hr	28.621	27	Y	N		
NC400	500yr-24hr	28.796	27	Y	N		
NC410	500yr-24hr	29.482	27	Y	N		
NC420	500yr-24hr	30.038	27	Y	N		
NC430	500yr-24hr	30.12	27	Y	N		
NC440	500yr-24hr	30.501	28	Y	N		
NC450	500yr-24hr	30.504	29	Y	N		
NC460	500yr-24hr	30.593	30	Y	N		
NC470	500yr-24hr	27.459	28	N	N		
NC480	500yr-24hr	29.493	29	Y	N		
NC490	500yr-24hr	29.507	28	Y	N		
NC500	500yr-24hr	29.516	28	Y	N		
NC510	500yr-24hr	29.516	28	Y	N		
NEW/ADDED GRANT CONDITIONS NODES							
Pond 1	500yr-24hr	10	15.9	N	N/A	N/A	
Pond 2	500yr-24hr	10	16	N	N/A	N/A	
Discharge 1	500yr-24hr	13.8	15	N	N/A	N/A	
GW1	500yr-24hr	10	11	N	N/A	N/A	
GW2	500yr-24hr	10	13	N	N/A	N/A	
NB056	500yr-24hr	27.887	28.72	N	N/A	N/A	
NB057	500yr-24hr	28.651	27.97	Y	N/A	N/A	

Appendix A

Figures

LEGEND

- OVERALL BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- 2007 MODEL UPDATE REACHES
- 2007 MODEL UPDATE NODES
- SUB-BASIN BOUNDARY
- ADDED REACHES
- ADDED NODES

Scale: 1" = 200'

200 0 200

KEY MAP

1	2	3	4	
5	6	7	8	
9	10	11	12	
13	14			

SHEET NUMBER: 6

ATTACHMENT – A
DRAINAGE MAP ADICPR MODEL NETWORK

LAKE CHARLENE DRAINAGE IMPROVEMENTS

MOTT MACDONALD
MOTT MACDONALD FLORIDA LLC
220 West Garden Street
Suite 700,
Pensacola, Florida 32502
Telephone: (850) 484-6011
Architects AA – C000035
Engineers EB – 0000155
Surveyors LB – 0006783

MOTT MACDONALD

LAKE CHARLENE DRAINAGE IMPROVEMENTS

ATTACHMENT – A
DRAINAGE MAP ADICPR MODEL NETWORK

LEGEND

- OVERALL BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- 2007 MODEL UPDATE REACHES
- 2007 MODEL UPDATE NODES
- SUB-BASIN BOUNDARY
- ADDED REACHES
- ADDED NODES

N
W E
S

200 0 200

Scale: 1"= 200'

KEY MAP

13 14
9 10 11 12
5 6 7 8
1 2 3 4

SHEET NUMBER:
2

MOTT MACDONALD

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FLORIDA LLC
220 West Garden Street
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Pensacola, Florida 32502
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ATTACHMENT – A
DRAINAGE MAP ADICPR MODEL NETWORK

LEGEND

- ▀▀▀ OVERALL BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- 2007 MODEL UPDATE REACHES
- ● 2007 MODEL UPDATE NODES
- SUB-BASIN BOUNDARY
- ADDED REACHES
- ● ADDED NODES

Scale: 1"= 200'

KEY MAP

SHEET NUMBER:
7

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STRUCTURES DESIGN (ENDWALLS AND SIGNAL)

hdrinc.com 25 West Cedar Street, Suite 200, Pensacola, FL 32502-5945
(850) 432-6800

MOTT MACDONALD

Lake Charlene Drainage Study

Structures Design

February 02, 2018

Mott MacDonald
220 West Garden Street
Suite 700
Pensacola FL 32502
United States of America

T +1 (850) 484 6011
F +1 (850) 484 8199
mottmac.com

Lake Charlene Drainage Study

Structures Design

February 02, 2018

Bart F. Hendricks, P.E.

P.E. Number 51391

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
0	10/19/2017	YSS	RHB	BFH	Structures Design

Document reference: 350271 | 1 | 0

Information class: Standard

Element:		Prepared by:	Date:	Discipline:
CV - Civil		YSS	10/17/2017	BR
Description:		Checked by:	Date:	
Headwall, Weir, Sheet Pile, Mast Arms		BFH	(insert)	
Calculation No:	Rev. No.	Reviewed by:	Date:	Sheet No.:
350271	0	(insert)	(insert)	

Lake Charlene Drainage Study
Structures Design

Subject:		Prepared by:	Date:	Discipline:
CV - Civil		YSS	10/17/2017	BR
Component:		Checked by:	Date:	
Headwall, Weir, Sheet Pile, Mast Arms		BFH	(insert)	
Calculation No:	Rev. No.	Reviewed by:	Date:	Sheet No.:
350271	0	(insert)	(insert)	

TABLE OF CONTENTS

Subject:		Prepared by:	Date:	Discipline:
CV - Civil		YSS	10/17/2017	BR
Component:		Checked by:	Date:	
Headwall, Weir, Sheet Pile, Mast Arms		BFH	(insert)	
Calculation No:	Rev. No.	Reviewed by:	Date:	Sheet No.:
350271	0	(insert)	(insert)	

1 Calculation Scope

1. Headwall, Weir and Sheet Pile Design at Lake Joanne Drive

2. Headwall Design at S. 61st Street and US Hwy 98

3. Mast Arm Design at S. 61st Street and US Hwy 98

3 Criteria, Codes, and Standards

Florida Department of Transportation Standard Specification for Roads and Bridge Construction, January 2018

FDOT Structures Manual Dated January 2017

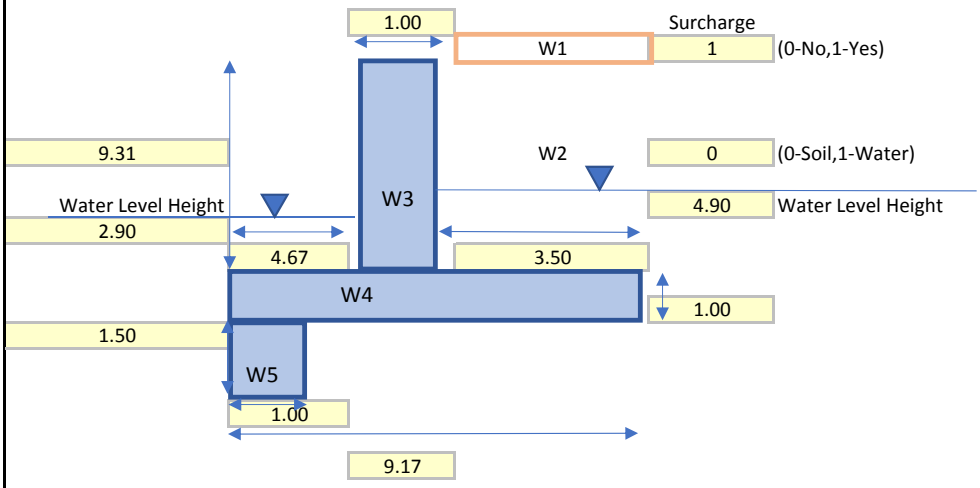
American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor (LRFD), Bridge Design Specifications, (7th), Edition and all subsequent interims

3 Lake Joanne Drive (North Headwall)

North Headwall Design

Dimensions

ALL DIMENSIONS ARE IN FEET



Design Summary

Design Summary

F.O.S (Sliding)	=	**OK**	
F.O.S (Overturning)	=	**OK**	
e	=	**0.47**	ft
q(max)	=	**OK**	ksf
q(min)	=	**OK**	ksf

Material and Soil Properties

f'_c	3.4	ksi
f_y	60	ksi
$\varphi_{flexure}$	0.9	
φ_{shear}	0.75	
γ_{soil}	117.5	pcf
γ_{conc}	150	pcf
γ_{water}	62.4	pcf
$\gamma_{waterbuyonat}$	60	pcf
φ_{soil}	32.8	deg
$w_{surcharge}$	25	psf
K_a	0.30	
K_p	3.36	
NABC	2500	psf
Groundwater EL	24.4	ft
Top of Foundation EL	19.5	ft
$LF_{earthpressure}$	1.6	

Cover

Wall Active Side	2	in
Wall Passive Side	1.5	in
Base Bottom	4	in

Design

Psoil	1119.2	psf	Soil+Surcharge
Fsoil	2371.6	lb	
Mu	11.8	k-ft	

$M_u = \varphi M_n$

$M_n = Asfy\,(d - \frac{a}{2})$

$a = \frac{A_s f_y}{0.85 f'_c b}$

Stem Design

Calculate d

			Goal Seek		
Mu	141.3	k-in	0.0		
PhiMu	141.3	k-in			
d_{min}	8.7	in	Assume	#5	Bars for Main Reinforcement
Min t_{stem}	**11.6**	**in**			
t_{stem}	12.0	in			
d	9.7	in			
Check Thickness of Stem			**OK**		

Flexure

			Goal Seek	
Mu	141.3	k-in	0.0	
PhiMu	141.3	k-in		
As req	**0.28**	**in^2**		
As of one	#5			
As	0.31	in^2/ft		
Use	**#5**	@	**12**	
As prov	**0.310**	in/ft	**OK**	
Max Spacing	13.43	in/bar		

Shear

Vu	3.8	k			
d	9.125	in	Assume	#4	Horizontal Bars
φVc	302.9	k			
No shear reinf. Req'd					

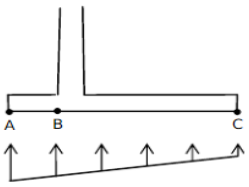
Stem Horizontal Reinf.

0.002	ratio for #5 bars and smaller				
0.0025	ratio for bars larger than #5				
Use	#4	@	12	in	

Toe Design

Earth Pressure at Tip of Toe

Wu	7986	lbs
Mu	6286	lb-ft
σva	1320	psf
σvc	422	psf
σvb	863	psf



d for flexure

			Goal Seek		
Mu	123.0	k-in	0.0		
PhiMu	123.0	k-in			
d_{min}	7.62	in	Assume	#5	Bars for Main Reinforcement
Min t_{toe}	**11.93**	**in**			

d for shear

Assume t_{toe}	12	in			d	7.69	in
Critical section for shear occurs at "d" from face of stem							
d_{min}	7.69	in	Assume	#5	Bars		
σvcritical	926	psf					
Vu	4521	lb					
ϕVc	8069	lb					
ϕVc	>	Vu	**OK**				
d for shear controls							

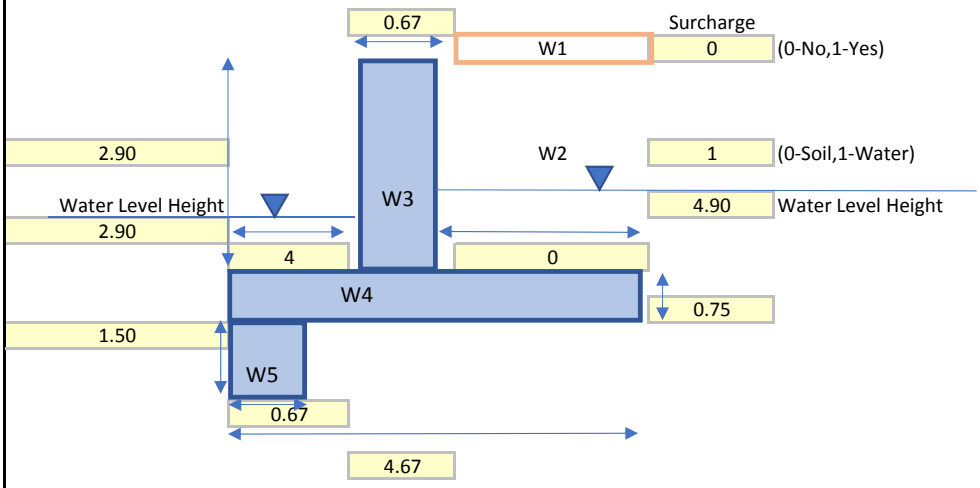
Reinforcement in toe

			Goal Seek				
Mu	123.0	k-in	0.0				
PhiMu	123.0	k-in					
As req	**0.31**	**in^2**					
Max Spacing	12.1	in		Try	#5	Bars	
As prov	0.37	in^2		Use	#5	@	10

Weir Design

Dimensions

ALL DIMENSIONS ARE IN FEET



Design Summary

Design Summary			
F.O.S (Sliding)	=	**OK**	
F.O.S (Overturning)	=	**OK**	
e	=	**0.10**	ft
q(max)	=	**OK**	ksf
q(min)	=	**OK**	ksf

Material and Soil Properties

f'_c	3.4	ksi
f_y	60	ksi
$\varphi_{flexure}$	0.9	
φ_{shear}	0.75	
γ_{soil}	120	pcf
γ_{conc}	150	pcf
γ_{water}	62.4	pcf
$\gamma_{waterbuyonat}$	60	pcf
φ_{soil}	32.8	deg
$w_{surcharge}$	25	psf
K_a	0.30	
K_p	3.36	
NABC	2500	psf
Groundwater EL	24.4	ft
Top of Foundation EL	19.5	ft
$LF_{earthpressure}$	1.6	

Cover

Wall Active Side	2	in
Wall Passive Side	1.5	in
Base Bottom	4	in

Design

Psoil	181.0	psf	Soil+Surcharge
Fsoil	262.4	lb	
Mu	0.41	k-ft	

$M_u = \varphi M_n$

$M_n = Asfy\,(d - \frac{a}{2})$

$a = \frac{A_s f_y}{0.85 f'_c b}$

Stem Design

Calculate d

			Goal Seek		
Mu	4.9	k-in	0.0		
PhiMu	4.9	k-in			
d_{min}	0.6	in	Assume	#4	Bars for Main Reinforcement
Min t_{stem}	**3.4**	**in**			
t_{stem}	8.0	in			
d	5.8	in			
Check Thickness of Stem			**OK**		

Flexure

			Goal Seek	
Mu	4.9	k-in	0.0	
PhiMu	4.9	k-in		
As req	**0.02**	**in^2**		
As of one	#4			
As	0.20	in^2/ft		
Use	**#4**	@	**12**	
As prov	**0.20**	in/ft	**OK**	
Max Spacing	152.7	in/bar		

Shear

Vu	0.4	k			
d	5.25	in	Assume	#4	Horizontal Bars
φVc	174.2	k			
No shear reinf. Req'd					

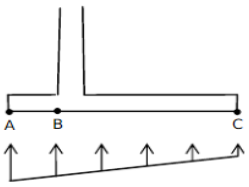
Stem Horizontal Reinf.

0.002	ratio for #5 bars and smaller				
0.0025	ratio for bars larger than #5				
Use	#4	@	12	in	

Toe Design

Earth Pressure at Tip of Toe

Wu	1158	lbs
Mu	1079	lb-ft
σva	545	psf
σvc	-49	psf
σvb	36	psf



d for flexure

Goal Seek

Mu	11.1	k-in	0.0		
PhiMu	11.1	k-in			
d_{min}	1.20	in	Assume	#4	Bars for Main Reinforcement
Min t_{toe}	**5.45**	**in**			

d for shear

Assume t_{toe}	9	in		d	4.75	in
Critical section for shear occurs at "d" from face of stem						
d_{min}	4.75	in	Assume	#4	Bars	
σvcritical	86	psf				
Vu	1138	lb				
ϕVc	4985	lb				
ϕVc	>	Vu	**OK**			

d for shear controls

Reinforcement in toe

Goal Seek

Mu	11.1	k-in	0.0				
PhiMu	11.1	k-in					North Headwall Controls Toe Reinf.
As req	**0.04**	**in^2**					
Max Spacing	54.9	in		Try	#4	Bars	
As prov	0.24	in^2		Use	#4	@ 10	

Stability Analysis

Overturning

Resisting Forces			
Component	Force (lb)	Arm (ft)	Moment (lb-ft)
W1	0	4.67	0
W2	0	4.67	0
W3	290	4.33	1257
W4	525	2.33	1225
W5	150	0.33	50
Total	965		2532
Overturning Forces			
Component	Force (lb)	Arm (ft)	Moment (lb-ft)
O1-Active	707		674
Total	707		674

F.O.S (overturning) = Resist. Moment / Over. Moment = 3.76 > 2 **OK**

Sliding

Sliding Force, Fo	707	lb
Frictional Resistance, Fr	965	lb

F.O.S (sliding) = Resist. Force / Sliding Force = 1.37 > 1.5 **NG**

Note: Weir is connected to headwall, Sliding OK

Bearing

Eccentricity

e	0.10	ft				
L/6 =	0.78	ft				
q(min)	275	psf	>	0	psf	**OK**
q(max)	276.4	psf	<	2500	psf	**OK**

Heel Design

Maximum load on heel is due to the weight of heel + fill +surcharge as the wall tries to tip over

Flexure

W_T	1493	plf	Goal Seek		
Mu	110	k-in	0.0		
PhiMu	110		Assume	#5	Bars for Main Reinforcement
d_{min}	6.82	in	for flexure		
Min t_{heel}	**11.14**	**in**			

Shear

Vu	5226	lb	
ϕVc	0.75*2*sqrt(f'c)*b*d		
d_{min}	4.98	in	for shear
Min t_{heel}	9.29	in	
d for flexure controls			

Reinforcement in heel

			Goal Seek		
Mu	110	k-in	0.0		
PhiMu	110	k-in			
As req	**0.27**	**in^2**	Assume	#5	Bars
Max Spacing	13.6	in			
Use	#5	@	12"		

Stability Analysis

Overturning

Resisting Forces			
Component	Force (lb)	Arm (ft)	Moment (lb-ft)
W1	815	7.42	6043
W2	2844	7.42	21090
W3	1397	5.17	7217
W4	1375	4.58	6302
W5	225	0.50	113
Total	6655		40766
Overturning Forces			
Component	Force (lb)	Arm (ft)	Moment (lb-ft)
O1-Active	2128		3929
Total	2128		3929

F.O.S (overturning) = Resist. Moment / Over. Moment = 10.38 > 2 **OK**

Sliding

Sliding Force, Fo	2128	lb
Frictional Resistance, Fr	6655	lb

F.O.S (sliding) = Resist. Force / Sliding Force = 3.13 > 1.5 **OK**

Bearing

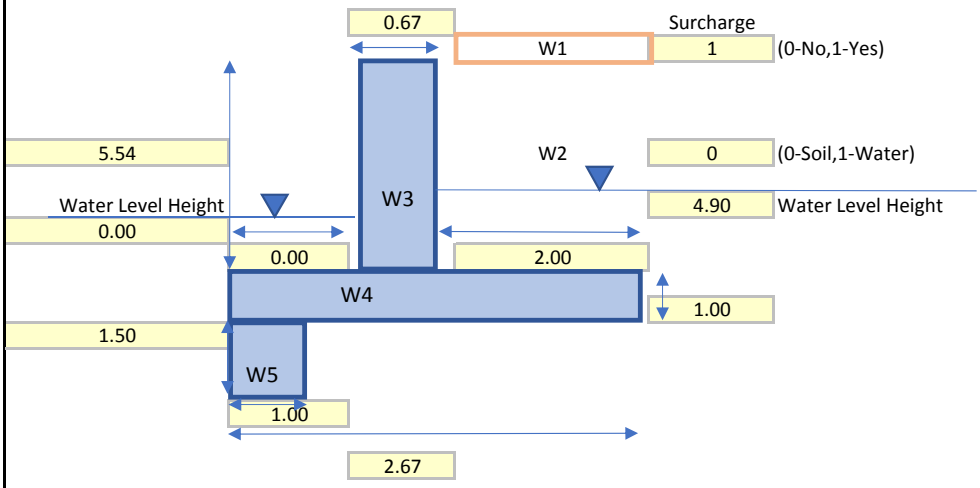
Eccentricity

e	0.47	ft				
L/6 =	1.53	ft				
q(min)	720	psf	>	0	psf	**OK**
q(max)	732.2	psf	<	2500	psf	**OK**

Weir Sidewall Design

Dimensions

ALL DIMENSIONS ARE IN FEET



Material and Soil Properties

f'_c	3.4	ksi
f_y	60	ksi
$\varphi_{flexure}$	0.9	
φ_{shear}	0.75	
γ_{soil}	117.5	pcf
γ_{conc}	150	pcf
γ_{water}	62.4	pcf
$\gamma_{waterbuyonat}$	60	pcf
φ_{soil}	32.8	deg
$w_{surcharge}$	25	psf
K_a	0.30	
K_p	3.36	
NABC	2500	psf
Groundwater EL	24.4	ft
Top of Foundation EL	19.5	ft
$LF_{earthpressure}$	1.6	

Cover

Wall Active Side	2	in
Wall Passive Side	1.5	in
Base Bottom	4	in

Design

Psoil	650.4	psf	Soil+Surcharge
Fsoil	1005	lb	
Mu	2.97	k-ft	

$M_u = \varphi M_n$

$M_n = Asfy\,(d - \frac{a}{2})$

$a = \frac{A_s f_y}{0.85 f'_c b}$

Stem Design

Calculate d

			Goal Seek		
Mu	35.6	k-in	0.0		
PhiMu	35.6	k-in			
d_{min}	3.5	in	Assume	#4	Bars for Main Reinforcement
Min t_{stem}	**6.2**	**in**			
t_{stem}	8.0	in			
d	5.8	in			
Check Thickness of Stem			**OK**		

Flexure

			Goal Seek	
Mu	35.6	k-in	0.0	
PhiMu	35.6	k-in		
As req	**0.12**	**in^2**		
As of one	#4			
As	0.20	in^2/ft		
Use	**#4**	@	**12**	
As prov	**0.200**	in/ft	**OK**	
Max Spacing	20.56	in/bar		

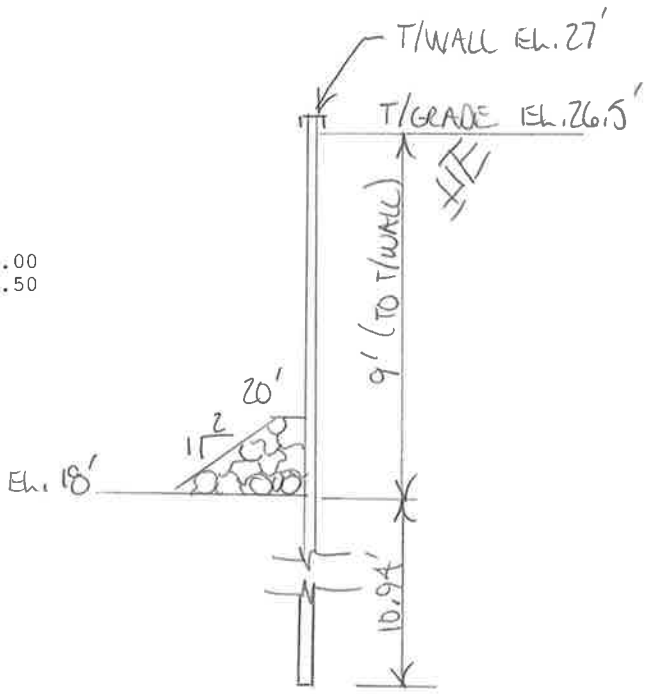
Shear

Vu	1.6	k			
d	5.25	in	Assume	#4	Horizontal Bars
φVc	174.2	k			
No shear reinf. Req'd					

Stem Horizontal Reinf.

0.002	ratio for #5 bars and smaller				
0.0025	ratio for bars larger than #5				
Use	#4	@	12	in	

```
PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
                        BY CLASSICAL METHODS
DATE: 9-AUGUST-2017                                        TIME: 10:43:56

                              ****************
                              *  INPUT DATA  *
                              ****************

      I.--HEADING
     'LAKE CHARLENE
     'CANTILEVERED FRP SHEET PILE WINGWALL
     '25 psf Surcharge, EL 26.5

     II.--CONTROL
        CANTILEVER WALL DESIGN
        FACTOR OF SAFETY FOR ACTIVE PRESSURES  = 1.00
        FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.50

    III.--WALL DATA
        ELEVATION AT TOP OF WALL    = 26.50 FT.

     IV.--SURFACE POINT DATA

          IV.A.--RIGHTSIDE
             DIST. FROM     ELEVATION
             WALL (FT)         (FT)
                  0.00         26.50
                 25.00         26.50

          IV.B.--LEFTSIDE
             DIST. FROM     ELEVATION
             WALL (FT)         (FT)
                 25.00         18.00

      V.--SOIL LAYER DATA

          V.A.--RIGHTSIDE
              LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE  = DEFAULT
              LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

                ANGLE OF          ANGLE OF                          <-SAFETY->
  SAT.   MOIST  INTERNAL  COH-      WALL     ADH-    <--BOTTOM-->  <-FACTOR->
 WGHT.   WGHT.  FRICTION  ESION   FRICTION  ESION    ELEV.  SLOPE  ACT. PASS.
 (PCF)   (PCF)    (DEG)   (PSF)     (DEG)   (PSF)    (FT)  (FT/FT)
117.50  117.50    32.80    0.00     28.00    0.00                   DEF  DEF

          V.B.--LEFTSIDE
              LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE  = DEFAULT
              LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

                ANGLE OF          ANGLE OF                          <-SAFETY->
  SAT.   MOIST  INTERNAL  COH-      WALL     ADH-    <--BOTTOM-->  <-FACTOR->
 WGHT.   WGHT.  FRICTION  ESION   FRICTION  ESION    ELEV.  SLOPE  ACT. PASS.
 (PCF)   (PCF)    (DEG)   (PSF)     (DEG)   (PSF)    (FT)  (FT/FT)
117.50  117.50    32.80    0.00     28.00    0.00                   DEF  DEF

      VI.--WATER DATA
         UNIT WEIGHT          = 62.40 (PCF)
         RIGHTSIDE ELEVATION = 20.00 (FT)
         LEFTSIDE ELEVATION  = 20.00 (FT)
         NO SEEPAGE

     VII.--VERTICAL SURCHARGE LOADS

         VII.A.--VERTICAL LINE LOADS
              NONE

         VII.B.--VERTICAL UNIFORM LOADS
                   LEFTSIDE     RIGHTSIDE
                     (PSF)        (PSF)
                      0.00         25.00

         VII.C.--VERTICAL STRIP LOADS
              NONE

         VII.D.--VERTICAL RAMP LOADS
              NONE
```



USE 20'-0"

VII.E.--VERTICAL TRIANGULAR LOADS
NONE

VII.F.--VERTICAL VARIABLE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 9-AUGUST-2017 TIME: 10:44:16

****
* SOIL PRESSURES FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'LAKE CHARLENE
'CANTILEVERED FRP SHEET PILE WINGWALL
'25 psf Surcharge, EL 26.5

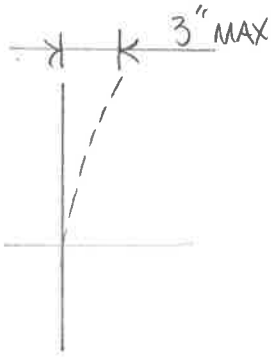
II.--SOIL PRESSURES

RIGHTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY COULOMB COEFFICIENTS
AND THEORY OF ELASTICITY EQUATIONS FOR SURCHARGE LOADS.

				<------NET------>			
	NET	<---LEFTSIDE--->		(SOIL + WATER)		<--RIGHTSIDE--->	
ELEV.	WATER	PASSIVE	ACTIVE	ACTIVE	PASSIVE	ACTIVE	PASSIVE
(FT)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)
26.5	0.0	0.0	0.0	6.7	142.5	6.7	142.5
25.5	0.0	0.0	0.0	32.8	710.9	32.8	710.9
24.5	0.0	0.0	0.0	59.9	1297.1	59.9	1297.1
23.5	0.0	0.0	0.0	87.0	1883.3	87.0	1883.3
22.5	0.0	0.0	0.0	114.1	2469.5	114.1	2469.5
21.5	0.0	0.0	0.0	141.2	3056.2	141.2	3056.2
20.5	0.0	0.0	0.0	168.2	3641.0	168.2	3641.0
20.0	0.0	0.0	0.0	179.9	3894.2	179.9	3894.2
19.5	0.0	0.0	0.0	188.1	4071.5	188.1	4071.5
18.5	0.0	0.0	0.0	200.8	4347.7	200.8	4347.7
18.0	0.0	0.0	0.0	207.2	4484.8	207.2	4484.8
17.5	0.0	94.4	6.5	119.1	4615.8	213.5	4622.3
17.0	0.0	188.9	13.0	31.0	4746.7	219.9	4759.7
16.8	0.0	222.1	15.3	0.0	4792.8	222.1	4808.1
16.5	0.0	283.3	19.5	-57.1	4877.7	226.2	4897.2
15.5	0.0	472.2	32.5	-233.3	5139.6	238.9	5172.0
14.5	0.0	661.0	45.4	-409.4	5401.5	251.6	5446.9
13.5	0.0	849.9	58.4	-585.6	5663.4	264.3	5721.8
12.5	0.0	1038.8	71.4	-761.8	5925.3	277.0	5996.7
11.5	0.0	1227.7	84.4	-937.9	6187.2	289.7	6271.6
10.5	0.0	1416.5	97.4	-1114.1	6449.1	302.4	6546.5
9.5	0.0	1605.4	110.3	-1290.3	6711.1	315.1	6821.4
8.5	0.0	1794.3	123.3	-1466.5	6973.0	327.8	7096.3
7.5	0.0	1983.1	136.3	-1642.6	7234.9	340.5	7371.2
6.5	0.0	2172.0	149.3	-1818.8	7496.8	353.2	7646.1
5.5	0.0	2360.9	162.3	-1995.0	7758.7	365.9	7921.0
4.5	0.0	2549.7	175.2	-2171.1	8020.6	378.6	8195.8
3.5	0.0	2738.6	188.2	-2347.3	8282.5	391.3	8470.7
2.5	0.0	2927.5	201.2	-2523.5	8544.4	404.0	8745.6
1.5	0.0	3116.3	214.2	-2699.7	8806.3	416.7	9020.5
0.5	0.0	3305.2	227.2	-2875.8	9068.2	429.4	9295.4
-0.5	0.0	3494.1	240.1	-3052.0	9330.2	442.1	9570.3
-1.5	0.0	3683.0	253.1	-3228.2	9592.1	454.8	9845.2
-2.5	0.0	3871.8	266.1	-3404.3	9854.0	467.5	10120.1
-3.5	0.0	4060.7	279.1	-3580.5	10115.9	480.2	10395.0

-4.5	0.0	4249.6	292.1	-3756.7	10377.8	492.9	10669.9
-5.5	0.0	4438.4	305.0	-3932.9	10639.7	505.6	10944.8
-6.5	0.0	4627.3	318.0	-4109.0	10901.6	518.3	11219.6
-7.5	0.0	4816.2	331.0	-4285.2	11163.5	531.0	11494.5
-8.5	0.0	5005.0	344.0	-4461.4	11425.4	543.7	11769.4
-9.5	0.0	5193.9	357.0	-4637.5	11687.4	556.4	12044.3
-10.5	0.0	5382.8	369.9	-4813.7	11949.3	569.1	12319.2
-11.5	0.0	5571.7	382.9	-4989.9	12211.2	581.8	12594.1
-12.5	0.0	5760.5	395.9	-5166.1	12473.1	594.5	12869.0



PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 9-AUGUST-2017 TIME: 10:44:18

****
* SUMMARY OF RESULTS FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'LAKE CHARLENE
'CANTILEVERED FRP SHEET PILE WINGWALL
'25 psf Surcharge, EL 26.5

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY COULOMB COEFFICIENTS
AND THEORY OF ELASTICITY EQUATIONS FOR SURCHARGE LOADS.

WALL BOTTOM ELEV. (FT) : 8.88
PENETRATION (FT) : 9.12 — USE PENETRATION = (1.2)(9.12) = 10.94'

MAX. BEND. MOMENT (LB-FT) : 6.8927E+03
AT ELEVATION (FT) : 13.26

FOR 3" MAX Δ:

MAX. SCALED DEFL. (LB-IN^3): 1.0520E+09
AT ELEVATION (FT) : 26.50

EI REQ'D = 1.0520E9/3 = 350.7 E6 LB·IN²

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF
ELASTICITY IN PSI TIMES PILE MOMENT
OF INERTIA IN IN^4 TO OBTAIN DEFLECTION
IN INCHES.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHOREDOR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 9-AUGUST-2017 TIME: 10:44:18

****
* COMPLETE OF RESULTS FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'LAKE CHARLENE
'CANTILEVERED FRP SHEET PILE WINGWALL
'25 psf Surcharge, EL 26.5

II.--RESULTS672. (LB))

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN^3)	NET PRESSURE (PSF)
26.50	0.0000E+00	0.	1.0520E+09	6.67

25.50	7.6967E+00	20.	9.6413E+08	32.84
24.50	4.8385E+01	66.	8.7630E+08	59.92
23.50	1.4899E+02	140.	7.8857E+08	87.00
22.50	3.3659E+02	240.	7.0110E+08	114.07
21.50	6.3827E+02	368.	6.1424E+08	141.18
20.50	1.0811E+03	522.	5.2849E+08	168.19
20.00	1.3638E+03	609.	4.8627E+08	179.88
19.50	1.6914E+03	701.	4.4464E+08	188.07
18.50	2.4890E+03	896.	3.6374E+08	200.83
18.00	2.9623E+03	998.	3.2481E+08	207.17
17.50	3.4835E+03	1079.	2.8717E+08	119.08
17.00	4.0344E+03	1117.	2.5103E+08	31.00
16.82	4.2313E+03	1120.	2.3872E+08	0.00
16.50	4.5931E+03	1110.	2.1663E+08	-57.09
15.50	5.6457E+03	965.	1.5403E+08	-233.26
14.50	6.4649E+03	644.	1.0114E+08	-409.43
13.50	6.8748E+03	146.	5.9371E+07	-585.60
12.50	6.6990E+03	-527.	2.9395E+07	-761.78
11.50	5.7615E+03	-1377.	1.0885E+07	-937.95
10.50	3.8860E+03	-2403.	2.1952E+06	-1114.12
9.95	2.4042E+03	-3037.	5.0112E+05	-1210.24
9.50	1.0170E+03	-2809.	6.2527E+04	2213.61
8.88	0.0000E+00	0.	0.0000E+00	6873.01

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF ELASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN^4 TO OBTAIN DEFLECTION IN INCHES.

III.--WATER AND SOIL PRESSURES

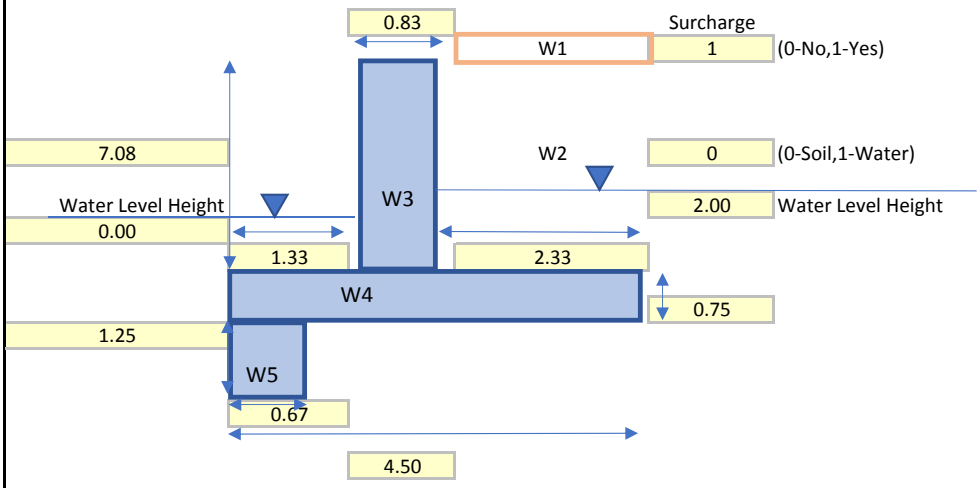
		<----------SOIL PRESSURES---------->			
	WATER	<----LEFTSIDE----->		<---RIGHTSIDE---->	
ELEVATION (FT)	PRESSURE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
26.50	0.	0.	0.	7.	143.
25.50	0.	0.	0.	33.	711.
24.50	0.	0.	0.	60.	1297.
23.50	0.	0.	0.	87.	1883.
22.50	0.	0.	0.	114.	2470.
21.50	0.	0.	0.	141.	3056.
20.50	0.	0.	0.	168.	3641.
20.00	0.	0.	0.	180.	3894.
19.50	0.	0.	0.	188.	4072.
18.50	0.	0.	0.	201.	4348.
18.00	0.	0.	0.	207.	4485.
17.50	0.	94.	6.	214.	4622.
17.00	0.	189.	13.	220.	4760.
16.82	0.	222.	15.	222.	4808.
16.50	0.	283.	19.	226.	4897.
15.50	0.	472.	32.	239.	5172.
14.50	0.	661.	45.	252.	5447.
13.50	0.	850.	58.	264.	5722.
12.50	0.	1039.	71.	277.	5997.
11.50	0.	1228.	84.	290.	6272.
10.50	0.	1417.	97.	302.	6546.
9.95	0.	1520.	104.	309.	6696.
9.50	0.	1605.	110.	315.	6821.
8.88	0.	1794.	123.	328.	7096.
7.50	0.	1983.	136.	340.	7371.

4 S. 61st Street and US Hwy 98 (South Headwall)

South Headwall Design

Dimensions

ALL DIMENSIONS ARE IN FEET



Design Summary

Design Summary

F.O.S (Sliding)	=	**OK**	
F.O.S (Overturning)	=	**OK**	
e	=	**0.54**	ft
q(max)	=	**OK**	ksf
q(min)	=	**OK**	ksf

Material and Soil Properties

f'_c	3.4	ksi
f_y	60	ksi
$\varphi_{flexure}$	0.9	
φ_{shear}	0.75	
γ_{soil}	105	pcf
γ_{conc}	150	pcf
γ_{water}	62.4	pcf
$\gamma_{waterbuyonat}$	45	pcf
φ_{soil}	27	deg
$w_{surcharge}$	25	psf
K_a	0.38	
K_p	2.66	
NABC	1500	psf
Groundwater EL	19.5	ft
Top of Foundation EL	14.06	ft
$LF_{earthpressure}$	1.6	

Cover

Wall Active Side	2	in
Wall Passive Side	1.5	in
Base Bottom	4	in

Design

Psoil	768.4	psf	Soil+Surcharge
Fsoil	1511.5	lb	
Mu	5.7	k-ft	

$M_u = \varphi M_n$

$M_n = Asfy\,(d - \frac{a}{2})$

$a = \frac{A_s f_y}{0.85 f'_c b}$

Stem Design

Calculate d

			Goal Seek		
Mu	68.5	k-in	0.0		
PhiMu	68.5	k-in			
d_{min}	6.5	in	Assume	#4	Bars for Main Reinforcement
Min t_{stem}	**9.3**	**in**			
t_{stem}	10.0	in			
d	7.8	in			
Check Thickness of Stem			**OK**		

Flexure

			Goal Seek	
Mu	68.5	k-in	0.0	
PhiMu	68.5	k-in		
As req	**0.17**	**in^2**		
As of one	#4			
As	0.20	in^2/ft		
Use	**#4**	@	**12**	
As prov	**0.20**	in/ft	**OK**	
Max Spacing	14.39	in/bar		

Shear

Vu	2.4	k			
d	7.25	in	Assume	#4	Horizontal Bars
φVc	240.6	k			
No shear reinf. Req'd					

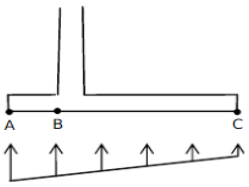
Stem Horizontal Reinf.

0.002	ratio for #5 bars and smaller				
0.0025	ratio for bars larger than #5				
Use	#4	@	12	in	

Toe Design

Earth Pressure at Tip of Toe

Wu	4061	lbs
Mu	2192	lb-ft
σva	1552	psf
σvc	253	psf
σvb	1167	psf



d for flexure

Goal Seek

Mu	13.2	k-in	0.0		
PhiMu	13.1	k-in			
d_{min}	1.05	in	Assume	#5	Bars for Main Reinforcement
Min t_{toe}	**5.37**	**in**			

d for shear

Assume t_{toe}	9	in		d	4.69	in
Critical section for shear occurs at "d" from face of stem						
d_{min}	4.75	in	Assume	#4	Bars	
σvcritical	1281	psf				
Vu	1328	lb				
ϕVc	4985	lb				
ϕVc	>	Vu	**OK**			
d for shear controls						

Reinforcement in toe

Goal Seek

Mu	13.2	k-in	0.0				
PhiMu	13.1	k-in					
As req	**0.05**	**in^2**					
Max Spacing	45.8	in		Try	#4	Bars	
As prov	0.20	in^2		Use	#4	@	12

Heel Design

Maximum load on heel is due to the weight of heel + fill +surcharge as the wall tries to tip over

Flexure

W_T	1027	plf	Goal Seek		
Mu	34	k-in	0.0		
PhiMu	34		Assume	#4	Bars for Main Reinforcement
d_{min}	3.28	in	for flexure		
Min t_{heel}	**7.53**	**in**			

Shear

Vu	2397	lb	
ϕVc	0.75*2*sqrt(f'c)*b*d		
d_{min}	2.28	in	for shear
Min t_{heel}	6.53	in	
d for flexure controls			

Reinforcement in heel

			Goal Seek		
Mu	34	k-in	0.0		
PhiMu	34	k-in			
As req	**0.14**	**in^2**	Assume	#4	Bars
Max Spacing	17.7	in			
Use	#4	@	12"		

Stability Analysis

Overturning

Resisting Forces			
Component	Force (lb)	Arm (ft)	Moment (lb-ft)
W1	413	3.33	1377
W2	1455	3.33	4849
W3	885	1.75	1549
W4	506	2.25	1139
W5	125	0.33	42
Total	3384		8955
Overturning Forces			
Component	Force (lb)	Arm (ft)	Moment (lb-ft)
O1-Active	1134		1370
Total	1134		1370

F.O.S (overturning) = Resist. Moment / Over. Moment = 6.54 > 2 **OK**

Sliding

Sliding Force, Fo	1134	lb
Frictional Resistance, Fr	3384	lb

F.O.S (sliding) = Resist. Force / Sliding Force = 2.98 > 1.5 **OK**

Bearing

Eccentricity

e	0.54	ft				
L/6 =	0.75	ft				
q(min)	988	psf	>	0	psf	**OK**
q(max)	1017.5	psf	<	1500	psf	**OK**

5 Quantities

North Headwall Reinforcing Quantities								
Size	Desig.	Total No. Req	Total Length	Location	Total Weight (lbs)	A	B	C
3	A1	2	43'-4"	Endwall	33	43'-4"		
3	A2	2	54'-0"	Endwall	41	54'-0"		
3	A3	2	33'-6 5/8"	Endwall	25	33'-6 5/8"		
3	A4	2	32'-8 3/4"	Endwall	25	32'-8 3/4"		
3	A5	2	13'-1 1/2"	Endwall	10	13'-1 1/2"		
3	A6	2	12'-3 3/8"	Endwall	9	12'-3 3/8"		
3	A7	2	11'-11 1/2"	Endwall	9	11'-11 1/2"		
3	A8	2	12'-0 3/8"	Endwall	9	12'-0 3/8"		
3	A9	2	12'-6 1/8"	Endwall	9	12'-6 1/8"		
3	A10	2	13'-8 3/8"	Endwall	10	13'-8 3/8"		
3	A11	4	4'-11 7/8"	Endwall	8	4'-11 7/8"		
3	A12	4	3'-3 5/8"	Endwall	5	3'-3 5/8"		
3	A13	4	3'-3 3/4"	Endwall	5	3'-3 3/4"		
3	A14	4	4'-3 1/8"	Endwall	6	4'-3 1/8"		
3	A15	2	3'-9 1/4"	Endwall	3	3'-9 1/4"		
3	A16	2	6'-1 5/8"	Endwall	5	6'-1 5/8"		
3	A17	2	3'-8"	Endwall	3	3'-8"		
3	A18	2	7'-0"	Endwall	5	7'-0"		
3	A19	2	14'-8 7/8"	Endwall	11	14'-8 7/8"		
3	A20	2	13'-10 7/8"	Endwall	10	13'-10 7/8"		
3	A21	2	13'-6 5/8"	Endwall	10	13'-6 5/8"		
3	A22	2	13'-6 3/4"	Endwall	10	13'-6 3/4"		
3	A23	2	13'-11 1/4"	Endwall	10	13'-11 1/4"		
3	A24	2	14'-9 5/8"	Endwall	11	14'-9 5/8"		
3	A25	2	25'-1 1/4"	Endwall	19	25'-1 1/4"		
3	A26	2	26'-3 3/8"	Endwall	20	26'-3 3/8"		
3	B1	65	2'-10"	Footing/Weir	69		0'-10"	2'-0"
4	A1	53	9'-1 1/4"	Endwall	322	9'-1 1/4"		
4	A2	24	54'-0"	Footing/Key	866	54'-0"		
4	A3	4	54'-0"	Weir	144	54'-0"		
4	A4	55	4'-8 1/4"	Weir	172	4'-8 1/4"		
4	A5	2	9'-5 3/8"	Weir	13	9'-5 3/8"		
4	A6	2	9'-8 7/8"	Footing/Weir Endwall	13	9'-8 7/8"		
4	A7	2	10'-0 3/4"	Footing/Weir Endwall	13	10'-0 3/4"		
4	A8	2	10'-4 5/8"	Footing/Weir Endwall	14	10'-4 5/8"		
4	A9	2	10'-8 1/2"	Footing/Weir Endwall	14	10'-8 1/2"		
4	A10	2	11'-0 3/8"	Footing/Weir Endwall	15	11'-0 3/8"		
4	A11	24	4'-4"	Footing/Weir Endwall	69	4'-4"		
4	A12	2	2'-1 3/8"	Weir Endwall	3	2'-1 3/8"		
4	A13	2	4'-8 1/2"		6			
5	A1	53	9'-1 1/4"	Endwall	503	9'-1 1/4"		
5	A2	73	8'-10"	Footing	673	8'-10"		
5	A3	8	5'-0"		42			
5	A4	8	7'-0"		58			
5	A5	8	10'-0"		83			
5	B1	37	7'-2"	Footing	277		3'-0"	4'-2"
5	B2	43	8'-4"	Footing	374		3'-0"	5'-4"
					4066			

North Headwall Concrete Quantities

Weir				
L (ft)	D (ft)	W (ft)	V (ft^3)	CY
53.0	2.9	0.7	100.7	4
4.7	10.9	0.7	33.9	1
4.7	10.9	0.7	33.9	1
Headwall				
L (ft)	D (ft)	W (ft)	V (ft^3)	CY
54.3	9.3	1	506.0	19
Footing				
L (ft)	D (ft)	W (ft)	V (ft^3)	CY
54.3	1.0	4.50	244.5	9
53.0	1.0	4.67	247.3	9
Key				
L (ft)	D (ft)	W (ft)	V (ft^3)	CY
53.0	1.5	1.00	79.5	2.94
Under 5'-6" Pipe				
L (ft)	D (ft)	W (ft)	V (ft^3)	CY
2	1.7	3.5	12.0	0.4
Pipes				
	A (ft^2)	W (ft)	V (ft^3)	CY
	23.8	1	23.8	0.9
	19.6	1	19.6	0.7
	19.6	1	19.6	0.7
Notch				
	A (ft^2)	W (ft)	V (ft^3)	CY
	0.3	1	0.3	0.01
			Total	**44**

North Headwall Riprap Quantities			
Rubble Riprap (SG 2.2)			
	L (ft)	Area (ft^2)	Weight (TN)
	54.33	10.75	40
	20.00	12	16
	6.67	12	5
	28.33	12	23
		Total	**85**
Sand Cement			
L (ft)	D (ft)	W (ft)	Volume (CY)
54.33	3.5	1.5	11
		Total	**11**

South Headwall Concrete Quantities				
Headwall				
L (ft)	D (ft)	W (ft)	V (ft^3)	CY
20.3	7.1	0.83	119.5	4
Footing				
L (ft)	D (ft)	W (ft)	V (ft^3)	CY
20.3	0.8	4.50	68.3	3
Key				
L (ft)	D (ft)	W (ft)	V (ft^3)	CY
20.3	1.25	0.67	16.9	0.63
Pipes				
	A (ft^2)	W (ft)	V (ft^3)	CY
	19.6	0.83	16.4	0.6
			Total	**7**

South Headwall Reinforcing Quantities								
Size	Desig.	Total No. Req	Total Length (ft)	A	B	C	Location	Total Weight (lbs)
3	A1	4	19'-11"	19'-11"			Endwall	30
3	A2	2	3'-2"	3'-2"			Endwall	2
3	A3	16	2'-0"	2'-0"			Endwall	12
3	A4	2	2'-10 3/8"	2'-10 3/8"			Endwall	2
3	A5	2	14'-5 5/8"	14'-5 5/8"			Endwall	11
3	A6	2	13'-1 3/4"	13'-1 3/4"			Endwall	10
3	A7	2	12'-7 1/4"	12'-7 1/4"			Endwall	9
3	A8	2	12'-5 1/4"	12'-5 1/4"			Endwall	9
3	A9	2	12'-6 7/8"	12'-6 7/8"			Endwall	9
3	A10	2	13'-0 5/8"	13'-0 5/8"			Endwall	10
3	A11	2	14'-2 3/8"	14'-2 3/8"			Endwall	11
3	B1	21	2'-5"	2'-5"	10"	1'-7"	Key	19
4	A1	32	6'-11"	6'-11"			Endwall	148
4	A2	27	4'-2"	4'-2"			Footing	75
4	A3	12	19'-11"	19'-11"			Footing	160
4	B1	15	4'-10"		2'-0"	2'-10"	Endwall/Footing	48
4	B2	15	3'-10"		1'-10"	2'-0"	Endwall/Footing	38
5	A1	4	5'-3"	5'-3"				22
5	A2	4	3'-9"	3'-9"				16
								642

6 S. 61st Street and US Hwy 98 (Mast Arm)

Revised on
02/02/2018

FDOT Mast Arm Analysis Program

Custom File Name (optional) Lake Charlene Mast Ar

The new custom file will be a copy of the last file called from the program. A '.dat' extension will be added to the file name.

Add file to file list Refresh File List

Select Data File (required)

- Lake Charlene Mast Arm
- A30D-A30DH-P1DL-DS1245
- A30D-A30D-P1DL-DS124
- A30DH-A30DH-P1DL-DS1245
- A30SH-P1SL-DS124
- A30S-P1SL-DS124
- A40D-A30DH-P2DL-DS1445

All data files are in the same directory as the MastArm.xmcd fi

Path = "P:\350271 - HDR Lake Charlene Drainage Study\Struc

DataFile = "Lake Charlene Mast Arm.dat"

Reference

This program works in conjunction with Mastarm Design Standards 17743 and 17745.

References:
AASHTO LRFD Specifications for Signs, Luminaires and Traffic Signals, 1st Edition (LRFDLTS).
FDOT Structures Manual Vol. 3 (SM V3).

For more information see Reference.xmcd and Changes.xmcd.

Reference:P:\350271 - HDR Lake Charlene Drainage Study\Struct\MastArm-LRFDv1.0\REV_121317\REV_013118\LRFD Equation Module.xmcd

Read In Data

General Information

DataFile = "Lake Charlene Mast Arm.dat"

Current Values	New Values
Subject = "A70D-A40D-P5DL-DS165"	Revised Sign/Signal Locations
ProjectNo = 3.503×10^5	350271
PoleLocation = "U.S 98 and S 61st. Ave"	U.S 98 and S 61st. Ave
Date = "08/01/2017"	02/02/2018
DesignedBy = "YSS"	YSS
CheckedBy = "BFH"	BFH

Use Control+F9 to recalculate the worksheet, once to write out data, twice to read in data

Wind Speed

DataFile = "Lake Charlene Mast Arm.dat"

Current Value	New Value		
WindSpeed = 150·mph	150	*mph*	***SM V3 3.8.2***

$K_d := 0.85$

$V_{Service} := 90mph$

Arm 1 Analysis

DataFile = "Lake Charlene Mast Arm.dat" WindSpeed = 150·mph

$$SignalData_{arm1} = \begin{pmatrix} \text{"SignalNumber"} & \text{"DistanceToSignal(ft)"} & \text{"NumberOfSignalHeads"} & \text{"BackPlate"} \\ 1 & 45 & 3 & \text{"yes"} \\ 2 & 57 & 5 & \text{"yes"} \\ 3 & 0 & 0 & \text{"yes"} \\ 4 & 0 & 0 & \text{"yes"} \\ 5 & 0 & 0 & \text{"yes"} \\ 6 & 0 & 0 & \text{"yes"} \\ 7 & 0 & 0 & \text{"yes"} \\ 8 & 0 & 0 & \text{"yes"} \\ 9 & 0 & 0 & \text{"yes"} \\ 10 & 0 & 0 & \text{"yes"} \end{pmatrix}$$

use X to zero out data
use 0 to keep current values

" Yes" or "No"

New Values

"SignalNumber"	"DistToSignal(ft)"	"#SignalHeads"	"BackPlate"
1	45	3	"yes"
2	57	5	"yes"
3	"X"	"X"	"yes"
4	"X"	"X"	"yes"
5	0	0	"yes"
6	0	0	"yes"
7	0	0	"yes"
8	0	0	"yes"
9	0	0	"yes"
10	0	0	"yes"

$$SignData_{arm1} = \begin{pmatrix} \text{"PanelNumber"} & \text{"DistanceToPanelCentroid(ft)"} & \text{"PanelArea(sf)"} \\ 1 & 50 & 7.5 \\ 2 & 0 & 0 \\ 3 & 0 & 0 \\ 4 & 0 & 0 \\ 5 & 0 & 0 \end{pmatrix}$$

New Values

"Panel#"	"DistToCentroid(ft)"	"PanelArea(sf)"
1	50	7.5
2	0	0
3	0	0
4	0	0
5	0	0

use X to zero out data
use 0 to keep current values

Arm 1 Loads

Arm 1 Properties

Current Values

New Values

$L_{total.arm1} = 63\,ft$ — 63 — *feet, 40 ft. max. for 1 piece arms*

$Diameter_{base.arm1} = 17 \cdot in$ — 17 — *inches, measured flat to flat (FG)*

$Dist_{splice.from.base.arm1} = 35\,ft$ — 35 — *feet, splice distance, for 2 piece arms, length of piece closest to pole, use X to zero out (FE)*

set $Dist_{splice.from.base.arm1} = 0\,ft$ *for NO SPLICE*

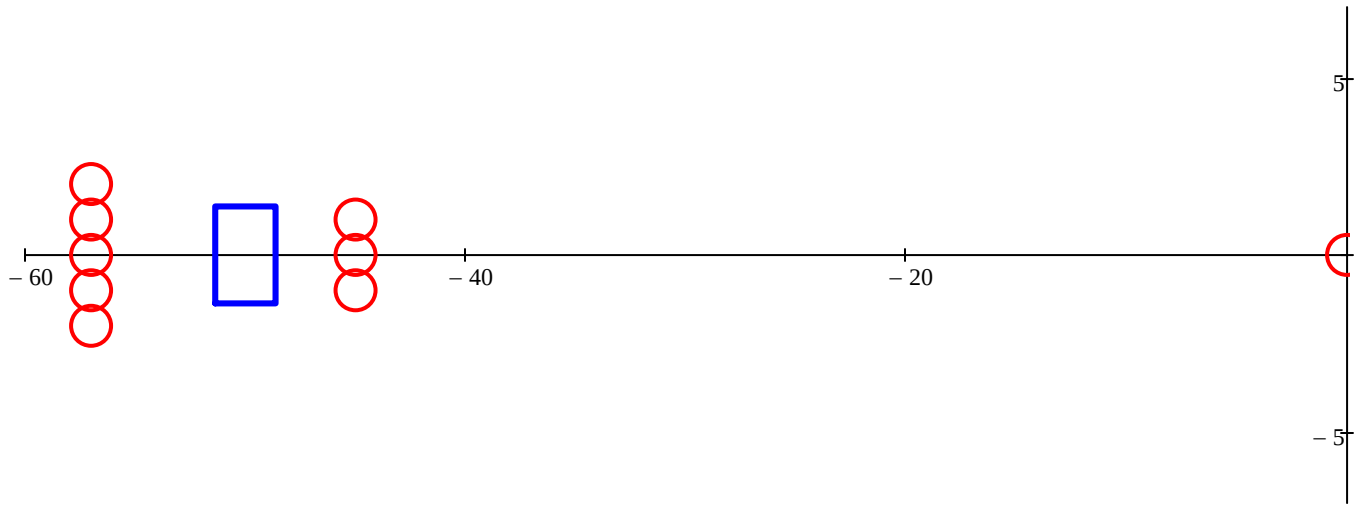
$t_{wall.arm1} = \begin{pmatrix} 0.25 \\ 0.375 \end{pmatrix} \cdot in$ — 0.25 — *inches, this value is used for one piece arms (FD)*

0.375 — *inches, for 2 piece arms, wall thickness of piece closest to the pole, use X to zero out (FH)*

Arm 1 Properties

Analyze Arm 1

Summary - Arm 1 Geometry and Loading



Location of Signs and Signals

$WindSpeed = 150 \cdot mph$ $L_{total.arm1} = 63\,ft$

$Diameter_{tip.arm1} = \begin{pmatrix} 8.71 \\ 12.13 \end{pmatrix} \cdot in$ $Diameter_{base.arm1} = \begin{pmatrix} 12.915 \\ 17 \end{pmatrix} \cdot in$ $L_{arm1} = \begin{pmatrix} 30 \\ 35 \end{pmatrix} ft$ $t_{wall.arm1} = \begin{pmatrix} 0.25 \\ 0.375 \end{pmatrix} \cdot in$

$X_{signal.arm1_{i1}} =$

45 ft
57

$Sections_{signal.arm1_{i1}} =$

3
5

$X_{panel.arm1_{j1}} =$

50 ft

$Area_{panel.arm1_{j1}} =$

7.5 ft^2

Arm 1 Combined Stress Ratio and Deflection

$\max(CFI_{arm1}) = 0.545$ $\max(\Delta_{arm1}) = 10.67 \cdot in$ $2 \cdot deg \cdot \sum (L_{arm1} - L_{splice.provided}) = 25.55 \cdot in$

Arm 2 Analysis

DataFile = "Lake Charlene Mast Arm.dat" WindSpeed = 150·mph

Arm 2 Loads

$$\text{SignalData}_{arm2} = \begin{pmatrix} \text{"SignalNumber"} & \text{"DistanceToSignal(ft)"} & \text{"NumberOfSignalHeads"} & \text{"BackPlate"} \\ 1 & 8 & 3 & \text{"yes"} \\ 2 & 16 & 3 & \text{"yes"} \\ 3 & 0 & 0 & \text{"yes"} \\ 4 & 0 & 0 & \text{"yes"} \\ 5 & 0 & 0 & \text{"yes"} \\ 6 & 0 & 0 & \text{"yes"} \\ 7 & 0 & 0 & \text{"yes"} \\ 8 & 0 & 0 & \text{"yes"} \\ 9 & 0 & 0 & \text{"yes"} \\ 10 & 0 & 0 & \text{"yes"} \end{pmatrix}$$

use X to zero out data
use 0 to keep current values *"yes" or "no"*

New Values

"SignalNumber"	"DistToSignal(ft)"	"#SignalHeads"	"BackPlate"
1	8	3	"yes"
2	16	3	"yes"
3	"X"	"X"	"yes"
4	0	0	"yes"
5	0	0	"yes"
6	0	0	"yes"
7	0	0	"yes"
8	0	0	"yes"
9	0	0	"yes"
10	0	0	"yes"

$$\text{SignData}_{arm2} = \begin{pmatrix} \text{"PanelNumber"} & \text{"DistanceToPanelCentroid(ft)"} & \text{"PanelArea(sf)"} \\ 1 & 25 & 8.25 \\ 2 & 0 & 0 \\ 3 & 0 & 0 \\ 4 & 0 & 0 \\ 5 & 0 & 0 \end{pmatrix}$$

New Values

"Panel#"	"DistToCentroid(ft)"	"PanelArea(sf)"
1	25	8.25
2	"X"	"X"
3	0	0
4	0	0
5	0	0

use X to zero out
use 0 to keep current values

Arm 2 Loads

Arm 2 Properties

Current Values

New Values

$L_{total.arm2} = 34\,ft$ — 34 — *feet, 40 ft. max. for 1 piece arms, use X to zero out* *set* $L_{total.arm2} = 0\,ft$ *for NO ARM2*

$Diameter_{base.arm2} = 13 \cdot in$ — 13 — *inches, measured flat to flat, use X to zero out (SG)*

$Dist_{splice.from.base.arm2} = 0 \cdot ft$ — X — *feet, splice distance, for 2 piece arms, length of piece closest to pole, use X to zero out (SE)* *set* $Dist_{splice.from.base.arm2} = 0\,ft$ *for NO SPLICE*

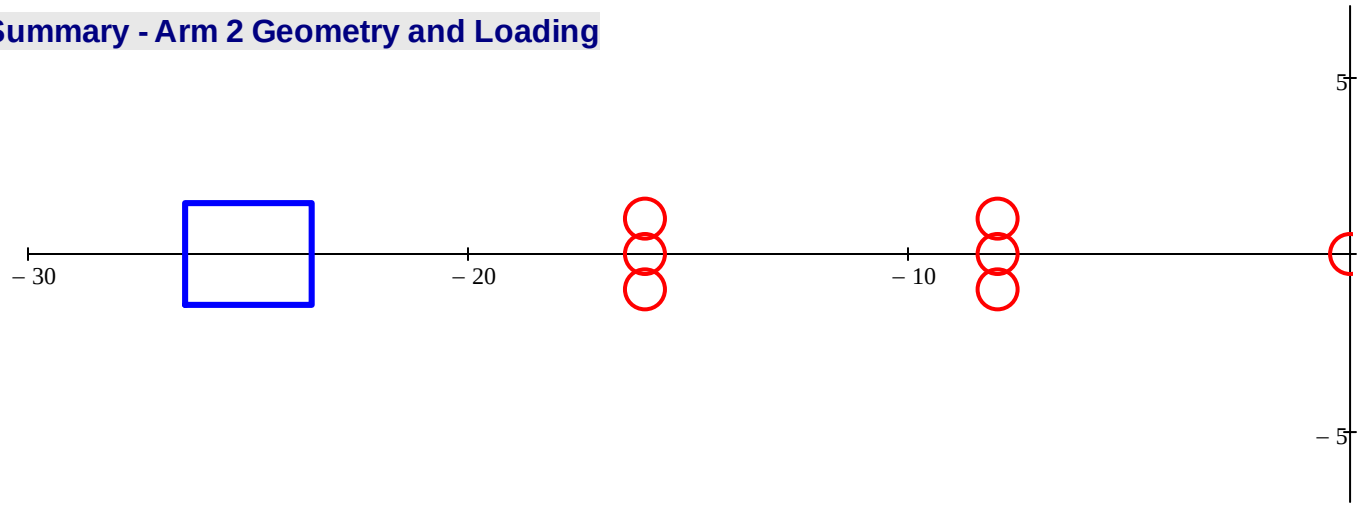
$t_{wall.arm2} = \begin{pmatrix} 0.25 \\ 0 \end{pmatrix} \cdot in$ — 0.25 — *inches, use X to zero out (SD)*

X — *inches, for 2 piece arms, wall thickness of piece closest to the pole, use X to zero out (SH)*

Arm 2 Properties

Analyze Arm 2

Summary - Arm 2 Geometry and Loading



Location of Signs and Signals

$WindSpeed = 150 \cdot mph$ $L_{total.arm2} = 34\,ft$

$Diameter_{tip.arm2} = \begin{pmatrix} 8.275 \\ 0 \end{pmatrix} \cdot in$ $Diameter_{base.arm2} = \begin{pmatrix} 13 \\ 0 \end{pmatrix} \cdot in$ $L_{arm2} = \begin{pmatrix} 34 \\ 0 \end{pmatrix} ft$ $t_{wall.arm2} = \begin{pmatrix} 0.25 \\ 0 \end{pmatrix} \cdot in$

$X_{signal.arm2_{i2}} =$

8	ft
16	

$Sections_{signal.arm2_{i2}} =$

3
3

$X_{panel.arm2_{j2}} =$ 25 ft

$Area_{panel.arm2_{j2}} =$ 8.25 ft^2

Arm 2 Combined Stress Ratio and Deflection

$\max(CFI_{arm2}) = 0.352$ $\max(\Delta_{arm2}) = 1.87 \cdot in$ $2 \cdot deg \cdot \sum (L_{arm2} - L_{splice.provided}) = 12.57 \cdot in$

Luminaire Arm Analysis DataFile = "Lake Charlene Mast Arm.dat" WindSpeed = 150·mph

Luminaire Properties

See Design Standards 17743 and 17745 for input values.

Current Values	New Values	
$Y_{luminaire} = 0\,ft$	X	*feet, use X to zero out (Standard LA = 40 feet)*
$X_{luminaire} = 10 \cdot ft$		*feet, use X to zero out (Standard LB = 10 feet)*
$Diameter_{base.lumarm} = 3 \cdot in$		*inches, use X to zero out (Standard LC = 3 inches)*
$t_{wall.lumarm} = 0.125 \cdot in$		*inches, use X to zero out (Standard LD = 0.125 inches)*
$Slope_{lumarm} = 0.5$		*rise/run, use X to zero out (Standard LE = 0.5)*
$r_{lumarm} = 8 \cdot ft$		*feet, use X to zero out (Standard LF = 8 feet)*
$d_{bolt.lum} = 0.5 \cdot in$		*inches, use X to zero out (Standard LG = 0.5 inches)*
$t_{baseplate.lum} = 0.75 \cdot in$		*inches, use X to zero out (Standard LH = 0.75 inches)*

set $Y_{luminaire} = 0\,ft$ *for NO LUMINAIRE*

Luminaire Properties

Analyze Luminaire

Summary - Luminaire Arm Geometry

$Y_{luminaire} = 0\,ft$	$X_{luminaire} = 0 \cdot ft$	$Diameter_{base.lumarm} = 0 \cdot in$	$t_{wall.lumarm} = 0 \cdot in$
$Slope_{lumarm} = 0$	$r_{lumarm} = 0 \cdot ft$	$d_{bolt.lum} = 0 \cdot in$	$t_{baseplate.lum} = 0 \cdot in$
$w_{base.lum} = 0 \cdot in$	$w_{channel.lum} = 0 \cdot in$		

Luminaire Arm Ratios

$CFI_{base.lumarm} = 0$	$CheckBolt_{LumBolt} = "OK"$	$PR_{baseplate.lum} = 0$	$PR_{conn.plate.lum} = 0$

Upright Analysis DataFile = "Lake Charlene Mast Arm.dat" WindSpeed = 150·mph

Pole Properties

Current Values	New Values	
$Y_{pole} = 27\,ft$	27	*feet (UA)*
$Y_{arm.conn} = 24\,ft$	24	*feet (UB)*
$Diameter_{base.pole} = 24 \cdot in$	24	*inches, measured flat to flat (UD)*
$t_{wall.pole} = 0.375 \cdot in$	0.375	*inches (UE)*
$Gap = \begin{pmatrix} 15.5 \\ 15.5 \end{pmatrix} \cdot in$	15.5	*inches, clear distance between connection plate and upright*
	15.5	*inches, use X to zero out*

Common wall thicknesses:
0.1793 in.
0.2391 in.
0.25 in.
0.313 in.
0.375 in.
0.5 in.

Pole Properties

Summary - Upright Geometry

$$Gap = \begin{pmatrix} 15.5 \\ 15.5 \end{pmatrix} \cdot in$$

$Y_{pole} = 27\,ft$ $Y_{arm.conn} = 24\,ft$ $\alpha = 90 \cdot deg$

$Diameter_{base.pole} = 24 \cdot in$ $t_{wall.pole} = 0.375 \cdot in$

Upright Combined Stress Ratio and Deflections

$\max(CFI_{pole}) = 0.371$ $\max(\Delta_{x.dl}) = 1 \cdot in$ $\max(\Delta_{z.dl}) = -0.21 \cdot in$

$Chk_{10.4.2.1} = "OK"$ $CheckDeflec_{10.4.2.1}(\Delta tip, Y_{arm.conn}) = "OK"$ $CheckSlope_{10.4.2.1}(Slope) = "OK"$

Mast Arm Connection(s) Analysis

DataFile = "Lake Charlene Mast Arm.dat" WindSpeed = 150·mph

Connection Properties

Current Values	New Values	
$h_{conn.plate} = 30 \cdot in$		*inches, for two arm Mast Arms both connection plate heights must be equal (HT)*
$t_{vertical.plate} = \begin{pmatrix} 0.75 \\ 0.75 \end{pmatrix} \cdot in$		*inches (FL)*
		inches, use X to zero out (SL)
$d_{bolt.conn} = \begin{pmatrix} 1.25 \\ 1.25 \end{pmatrix} \cdot in$	1.25	*inches (FP)*
	1.25	*inches, use X to zero out (SP)*
$t_{baseplate.arm} = \begin{pmatrix} 3 \\ 3 \end{pmatrix} \cdot in$		*inches (FK)*
		inches, use X to zero out (SK)
$b_{conn.plate.pv} = \begin{pmatrix} 36 \\ 36 \end{pmatrix} \cdot in$		*inches (FJ)*
		inches, use X to zero out (SJ)

Connection Properties

Analyze Connection

Summary - Connection Geometry

$h_{conn.plate} = 30 \cdot in$

$Gap = \begin{pmatrix} 15.5 \\ 15.5 \end{pmatrix} \cdot in$

$Offset_{conn} = \begin{pmatrix} 25.8346 \\ 25.8346 \end{pmatrix} \cdot in$

$d_{bolt.conn} = \begin{pmatrix} 1.25 \\ 1.25 \end{pmatrix} \cdot in$

$\#ConnBolts = \begin{pmatrix} 6 \\ 6 \end{pmatrix}$

$Spacing_{bolts.conn} = \begin{pmatrix} 12.5 \\ 12.5 \end{pmatrix} \cdot in$

$t_{conn.plate} = \begin{pmatrix} 2 \\ 2 \end{pmatrix} \cdot in$

$b_{conn.plate.pv} = \begin{pmatrix} 36 \\ 36 \end{pmatrix} \cdot in$

$t_{vertical.plate} = \begin{pmatrix} 0.75 \\ 0.75 \end{pmatrix} \cdot in$

$t_{baseplate.arm} = \begin{pmatrix} 3 \\ 3 \end{pmatrix} \cdot in$

$w_{conn.plate} = \begin{pmatrix} 0.3125 \\ 0.3125 \end{pmatrix} \cdot in$

$w_{vertical.plate} = \begin{pmatrix} 0.25 \\ 0.25 \end{pmatrix} \cdot in$

Connection Ratios

$CheckBolt_{ConnBolt} = \begin{pmatrix} "OK" \\ "OK" \end{pmatrix}$

$CFI_{t.vert.plate} = \begin{pmatrix} 0.449 \\ 0.076 \end{pmatrix}$

$PR_{t.baseplate.arm} = \begin{pmatrix} 0.833 \\ 0.833 \end{pmatrix}$

$PR_{t.connplate.arm} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$

Base Plate Analysis

DataFile = "Lake Charlene Mast Arm.dat" WindSpeed = 150·mph

Base Plate Properties

Current Values	New Values	
#AnchorRods = 6		*use 6 bolts minimum*
$d_{bolt.pole} = 2 \cdot in$	2	*inches (BC)*

Base Plate Properties

Summary - Upright Base Plate Geometry

#AnchorRods = 6

$d_{bolt.pole} = 2 \cdot in$

$t_{baseplate.pole} = 2.5 \cdot in$

$Diameter_{baseplate.pole} = 40 \cdot in$

Upright Base Plate Performance Ratios

$Check_{Anchor.Bolt.Capacity} = "OK"$

$PR_{plate.pole} = 1$

$check_{conn.plate.width} = \begin{pmatrix} "OK" \\ "OK" \end{pmatrix}$

Foundation Analysis Cohesionless or Cohesive Soil

DataFile = "Lake Charlene Mast Arm.dat"

Soil Properties

Current Values	New Values	
SoilType = 1	○ Clay ◉ Sand	*0 - clay 1 - sand*

$\phi_{soil} = 23 \cdot deg$ | 23 | *degrees, soil friction angle (sand)*

$c_{soil} = 2000 \cdot psf$ | | *psf, soil shear strength (clay)*

$\gamma_{soil} = 49 \cdot pcf$ | 49 | *pcf, soil density (typical design value = 45-50 pcf)*

Offset = 0 ft | | *vertical distance between top of foundation and groundline*

$N_{blows} = 9$ | 9 | *Number of blows per foot. If N< 5, contact the district geotech Engineer* ***SM V3 13.6***

Soil Properties

Analyze Foundation

Summary - Soil Properties and Drilled Shaft Geometry

SoilType = 1 *0 - clay 1 - sand* | $\phi_{soil} = 23 \cdot deg$ | $c_{soil} = 2000 \cdot psf$ | $\gamma_{soil} = 49 \cdot pcf$ | Offset = 0 ft

$Diameter_{shaft} = 5$ ft | $L_{shaft} = 17$ ft | $L_{anchor.rod} = 48 \cdot in$

#BarsProvided = 19 | $d_{bar} = 1.41 \cdot in$ | 'BF'= $L_{embedment.rod} = 40 \cdot in$

Foundation Performance Ratios

$DCRatio_{foundation} = 0.906$ | CheckReinfClearSpacing = "OK" | CheckShearTorsion = "OK"

$CheckLongReinf_{shr.tor}$ = "OK" | CheckMaxSpacingTransvReinf = "OK"

OverlapTest = "No Overlap of Failure Cones" | OverlapDesign = "Based on No Overlap of Failure Cones"

BreakoutTest = "OK"

Fatigue Analysis

DataFile = "Lake Charlene Mast Arm.dat" | WindSpeed = 150·mph

Use the member cross section adjacent to the weld toe to compute the nominal stress range. ***LTS 11.9***

FatigueCategory := 2 ***SM V3 11.6***

Analyze Structure for Fatigue

Arm and Pole Welds

$f_{galloping.arm1} = 2.747 \cdot ksi$ | $CAFT_{fullpengroove.weld.arm1} = 4.5 \cdot ksi$ | $Check_{galloping.arm1}$ = "OK"

$f_{galloping.arm2} = 1.858 \cdot ksi$ | $CAFT_{fullpengroove.weld.arm2} = 7 \cdot ksi$ | $Check_{galloping.arm2}$ = "OK"

$f_{galloping.pole} = 1.36 \cdot ksi$ | $CAFT_{fullpengroove.weld.pole} = 4.5 \cdot ksi$ | $Check_{galloping.pole}$ = "OK"

$f_{nwg.arm1} = 2.175 \cdot ksi$ | $Check_{nwg.arm1}$ = "OK"

$f_{nwg.arm2} = 1.4 \cdot ksi$ $Check_{nwg.arm2} = "OK"$

$f_{nwg.pole} = 2.217 \cdot ksi$ $Check_{nwg.pole} = "OK"$

A325 Connection Bolts

$f_{t.g.bolt} = \begin{pmatrix} 3.6 \\ 0.9 \end{pmatrix} \cdot ksi$ $CAFT_{conn.bolt} = 16 \cdot ksi$ $Check_{g.conn.bolt} = \begin{pmatrix} "OK" \\ "OK" \end{pmatrix}$

$f_{t.nwg.bolt} = \begin{pmatrix} 2.8 \\ 0.7 \end{pmatrix} \cdot ksi$ $Check_{nwg.conn.bolt} = \begin{pmatrix} "OK" \\ "OK" \end{pmatrix}$

Anchor Bolts

$f_{t.g.rod} = 1.953 \cdot ksi$ $CAFT_{anchor.rods} = 7 \cdot ksi$ $Check_{g.rod} = "OK"$

$f_{t.nwg.rod} = 3.182 \cdot ksi$ $Check_{nwg.rod} = "OK"$

Summary

Mast Arm Design and Analysis Summary

DataFile = "Lake Charlene Mast Arm.dat"

WindSpeed = 150·mph

Subject = "Revised Sign/Signal Locations" **DesignedBy** = "YSS" **PoleLocation** = "U.S 98 and S 61st. Ave"

ProjectNo = 3.503×10^5 **CheckedBy** = "BFH" **Date** = "02/02/2018"

1st Mast Arm

$\#Signals_{arm1} = 2$ $\#Panels_{arm1} = 1$

$X_{signal.arm1} = \begin{pmatrix} 45 \\ 57 \end{pmatrix} ft$ $Sections_{signal.arm1} = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$ $Backplate_{signal.arm1} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$

$X_{panel.arm1} = (50)\,ft$ $Area_{panel.arm1} = (7.5)\,ft^2$

$L_{total.arm1} = 63\,ft$ $L_{splice.provided.arm1} = 24 \cdot in$

'FA'= 'FE'= $L_{arm1} = \begin{pmatrix} 30 \\ 35 \end{pmatrix} \cdot ft$

'FB'= 'FF'= $Diameter_{tip.arm1} = \begin{pmatrix} 8.715 \\ 12.135 \end{pmatrix} \cdot in$

'FC'= 'FG'= $Diameter_{base.arm1} = \begin{pmatrix} 12.915 \\ 17 \end{pmatrix} \cdot in$

'FD'= 'FH'= $t_{wall.arm1} = \begin{pmatrix} 0.25 \\ 0.375 \end{pmatrix} \cdot in$

$\max(\Delta_{arm1}) = 10.67 \cdot in$

$\max(CFI_{arm1}) = 0.545$

2nd Mast Arm

$\#Signals_{arm2} = 2$

$\#Panels_{arm2} = 1$

$X_{signal.arm2} = \begin{pmatrix} 8 \\ 16 \end{pmatrix} ft$

$Sections_{signal.arm2} = \begin{pmatrix} 3 \\ 3 \end{pmatrix}$

$Backplate_{signal.arm2} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$

$X_{panel.arm2} = (25)\, ft$

$Area_{panel.arm2} = (8.25)\, ft^2$

$L_{total.arm2} = 34\, ft$

$L_{splice.provided.arm2} = 24 \cdot in$

'UF'= $\alpha = 90 \cdot deg$ **(Angle Between Arms)**

'SA'= 'SE'= $L_{arm2} = \begin{pmatrix} 34 \\ 0 \end{pmatrix} \cdot ft$

'SB'= 'SF'= $Diameter_{tip.arm2} = \begin{pmatrix} 8.275 \\ 0 \end{pmatrix} \cdot in$

'SC'= 'SG'= $Diameter_{base.arm2} = \begin{pmatrix} 13 \\ 0 \end{pmatrix} \cdot in$

'SD'= 'SH'= $t_{wall.arm2} = \begin{pmatrix} 0.25 \\ 0 \end{pmatrix} \cdot in$

$\max(\Delta_{arm2}) = 1.87 \cdot in$

$\max(CFI_{arm2}) = 0.352$

Luminaire Arm and Connection

DataFile = "Lake Charlene Mast A WindSpeed = 150·mph

(use MC10x33.6 channel for connection)

'LA'= $Y_{luminaire} = 0\, ft$

'LB'= $X_{luminaire} = 0\, ft$

'LC'= $Diameter_{base.lumarm} = 0 \cdot in$

'LD'= $t_{wall.lumarm} = 0 \cdot in$

'LE'= $Slope_{lumarm} = 0$

'LF'= $r_{lumarm} = 0\, ft$

'LG'= $d_{bolt.lum} = 0 \cdot in$

'LH'= $t_{baseplate.lum} = 0 \cdot in$

'LJ'= $w_{base.lum} = 0 \cdot in$

'LK'= $w_{channel.lum} = 0 \cdot in$

$CFI_{base.lumarm} = 0$

$CheckBolt_{LumBolt} = "OK"$

$PR_{baseplate.lum} = 0$

$PR_{conn.plate.lum} = 0$

Upright

'UA'= $Y_{pole} = 27 \cdot ft$

'UB'= $Y_{arm.conn} = 24 \cdot ft$

'UC'= $Diameter_{tip.pole} = 20.2492 \cdot in$

'UD'= $Diameter_{base.pole} = 24 \cdot in$

'UE'= $t_{wall.pole} = 0.375 \cdot in$

'UF'= $\alpha = 90 \cdot deg$

'UG'= $Y_{lum.conn} = 0\, ft$

$\Delta_{x.dl} = 1 \cdot in$

$Slope_x = 0.43 \cdot deg$

$\Delta_{z.dl} = -0.21 \cdot in$ $\quad Slope_z = 0.09 \cdot deg$ $\quad B = 1.028$

$\max(CFI_{pole}) = 0.371$

1st Arm/Upright Connection

$\#ConnBolts_0 = 6$ $\quad$ 'HT'= $h_{conn.plate} = 30 \cdot in$ $\quad$ 'FJ'= $b_{conn.plate.pv_0} = 36 \cdot in$

'FK'= $t_{baseplate.arm_0} = 3 \cdot in$ $\quad$ 'FL'= $t_{vertical.plate_0} = 0.75 \cdot in$

'FN'= $w_{vertical.plate_0} = 0.25 \cdot in$ $\quad$ 'FO'= $Offset_{conn_0} = 25.8346 \cdot in$

'FP'= $d_{bolt.conn_0} = 1.25 \cdot in$ $\quad$ 'FR'= $t_{min.bpl.LTS} = 2 \cdot in$

'FS'= $Spacing_{bolts.conn_0} = 12.5 \cdot in$ $\quad$ 'FT'= $w_{conn.plate_0} = 0.3125 \cdot in$

$$\begin{pmatrix} PR_{t.baseplate.arm_0} \\ PR_{t.connplate.arm_0} \\ CFI_{t.vert.plate_0} \end{pmatrix} = \begin{pmatrix} 0.833 \\ 1 \\ 0.449 \end{pmatrix}$$

2nd Arm/Upright Connection

$\#ConnBolts_1 = 6$ $\quad$ 'HT'= $h_{conn.plate} = 30 \cdot in$ $\quad$ 'SJ'= $b_{conn.plate.pv_1} = 36 \cdot in$

'SK'= $t_{baseplate.arm_1} = 3 \cdot in$ $\quad$ 'SL'= $t_{vertical.plate_1} = 0.75 \cdot in$

'SN'= $w_{vertical.plate_1} = 0.25 \cdot in$ $\quad$ 'SO'= $Offset_{conn_1} = 25.8346 \cdot in$

'SP'= $d_{bolt.conn_1} = 1.25 \cdot in$ $\quad$ 'SR'= $t_{min.bpl.LTS} = 2 \cdot in$

'SS'= $Spacing_{bolts.conn_1} = 12.5 \cdot in$ $\quad$ 'ST'= $w_{conn.plate_1} = 0.3125 \cdot in$

$$\begin{pmatrix} PR_{t.baseplate.arm_1} \\ PR_{t.connplate.arm_1} \\ CFI_{t.vert.plate_1} \end{pmatrix} = \begin{pmatrix} 0.833 \\ 1 \\ 0.076 \end{pmatrix}$$

$$CheckBolt_{ConnBolt} = \begin{pmatrix} "OK" \\ "OK" \end{pmatrix}$$

Pole Baseplate

DataFile = "Lake Charlene Mast A WindSpeed = 150·mph

$\#AnchorRods = 6$ $\quad$ 'BA'= $Diameter_{baseplate.pole} = 40 \cdot in$ $\quad$ 'BB'= $t_{baseplate.pole} = 2.5 \cdot in$

'BC'= $d_{bolt.pole} = 2 \cdot in$ $\quad$ 'BF'= $L_{embedment.rod} = 40 \cdot in$

$Diameter_{boltcircle.pole} = 32 \cdot in$

$Check_{Anchor.Bolt.Capacity} = "OK"$ $\quad$ $CheckAnchor_{Alter} = "OK"$ $\quad$ $PR_{plate.pole} = 1$

Foundation

'DA'= $L_{shaft} = 17 \cdot ft$ $\quad$ 'DB'= $Diameter_{shaft} = 5 \cdot ft$ $\quad$ $d_{bar} = 1.41 \cdot in$ $\quad$ $Offset = 0\ ft$

'RA'= $round\left(\frac{d_{bar}}{0.125 in}\right) = 11$ $\quad$ 'RB'= $\#BarsProvided = 19$ $\quad$ $Diameter_{rebar.circle} = 3.7783\ ft$

'RC'= $NumSpaces_{v.bar} = 12$ $\quad$ 'RD'= $s_{v2} = 8 \cdot in$ $\quad$ $DCRatio_{foundation} = 0.906$

WRITEPRN to Line 1-2-3

Mast Arm Tip Deflection

Compare Mast Arm deflection of each arm to a proposed camber

$Camber_{arm1} := 2 \cdot deg$ $Camber_{arm2} := 2 \cdot deg$

$L_{arm1} := \sum L_{arm1} - if\left[\left(L_{arm1_1} = 0 \cdot ft\right), 0 \cdot ft, 2 \cdot ft\right]$ $L_{arm2} := \sum L_{arm2} - if\left[\left(L_{arm2_1} = 0 \cdot ft\right), 0 \cdot ft, 2 \cdot ft\right]$

$Deflection_{arm1} := Slope_x \cdot L_{arm1} + \max\left(\Delta_{arm1}\right)$ $Deflection_{arm1} = 16.36 \cdot in$

$CamberArm1_{upward} := \sin\left(Camber_{arm1}\right) \cdot L_{arm1}$ $CamberArm1_{upward} = 26.38 \cdot in$

$Deflection_{arm2} := \left[Slope_z \cdot L_{arm2} \cdot (\sin(\alpha))\right] + Slope_x \cdot L_{arm2} \cdot \cos(\alpha) + \max\left(\Delta_{arm2}\right)$ $Deflection_{arm2} = 2.53 \cdot in$

$CamberArm2_{upward} := \sin\left(Camber_{arm2}\right) \cdot L_{arm2}$ $CamberArm2_{upward} = 14.24 \cdot in$

Check Clearance Between Connection Plates *(for Two Arm Structures only)*

$\alpha = 90 \cdot deg$ $\alpha := if\left[(\alpha > 180 \cdot deg), (360 \cdot deg - \alpha), \alpha\right]$

$Offset_{conn_0} = 25.835 \cdot in$ $b_{conn.plate.pv_0} = 36 \cdot in$ $h_{conn.plate} = 30 \cdot in$ $\alpha = 90 \cdot deg$

$Offset_{conn_1} = 25.835 \cdot in$ $b_{conn.plate.pv_1} = 36 \cdot in$

$x_1 := Offset_{conn_0} - t_{conn.plate_0} - h_{conn.plate} \cdot \frac{\sin\left(Camber_{arm1}\right)}{2}$ $y_1 := \frac{b_{conn.plate.pv_0}}{2}$ $x_1 = 23.31 \cdot in$ $y_1 = 18 \cdot in$

$x_2 := \left(Offset_{conn_1} - t_{conn.plate_1} - h_{conn.plate} \cdot \frac{\sin\left(Camber_{arm2}\right)}{2}\right) \cdot \cos(\alpha) + \frac{b_{conn.plate.pv_1}}{2} \cdot \sin(\alpha)$

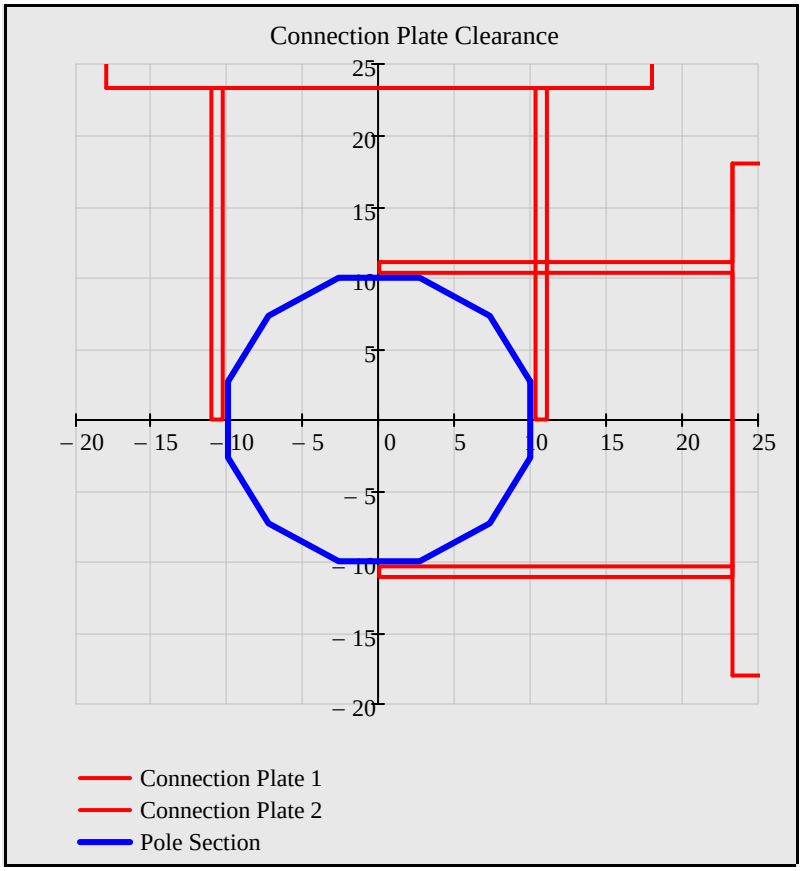
$y_2 := \left(Offset_{conn_1} - t_{conn.plate_1} - h_{conn.plate} \cdot \frac{\sin\left(Camber_{arm2}\right)}{2}\right) \cdot \sin(\alpha) - \frac{b_{conn.plate.pv_1}}{2} \cdot \cos(\alpha)$ $x_2 = 18 \cdot in$ $y_2 = 23.31 \cdot in$

$Clearance := \sqrt{\left(x_1 - x_2\right)^2 + \left(y_1 - y_2\right)^2}$ $Clearance := if\left[\left(y_2 \le y_1\right), if\left[\left(x_1 > x_2\right), Clearance, 0 \cdot in\right], Clearance\right]$ $Clearance = 7.51 \cdot in$

(if Clearance equals 0, then Connection Plates intersect and redesign is required.

Plan View - Connection Plate Clearance for Two Arm Connections

Coordinates for Drawings



Clearance = 7.51·in

$Diameter_{conn.pole} = 20.6692 \cdot in$

$t_{conn.plate_0} = 2 \cdot in$

$b_{conn.plate.pv_0} = 36 \cdot in$

$t_{vertical.plate_0} = 0.75 \cdot in$

$Offset_{conn_0} = 25.8346 \cdot in$

$Gap_0 = 15.5 \cdot in$

$t_{conn.plate_1} = 2 \cdot in$

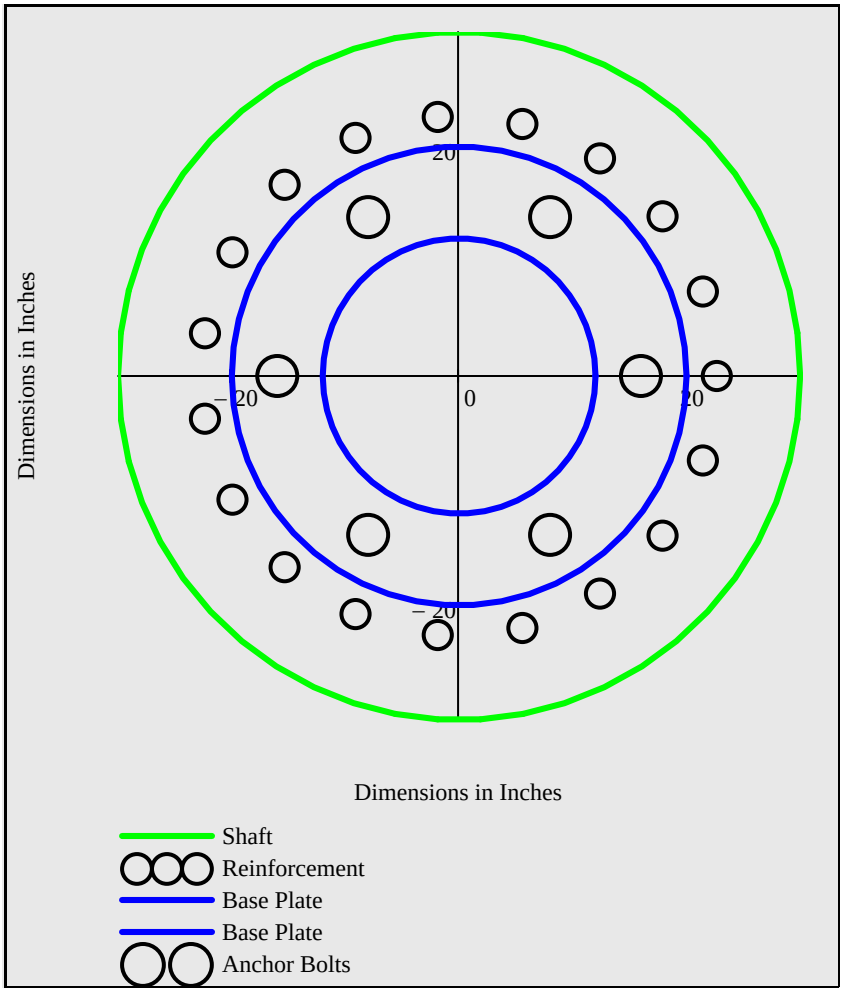
$b_{conn.plate.pv_1} = 36 \cdot in$

$t_{vertical.plate_1} = 0.75 \cdot in$

$Offset_{conn_1} = 25.8346 \cdot in$

$Gap_1 = 15.5 \cdot in$

Plan View - Drilled Shaft, Base Plate, Anchor Bolts, & Reinforcing Steel



$Diameter_{base.pole} = 24 \cdot in$

$Diameter_{baseplate.pole} = 40 \cdot in$

$Diameter_{shaft} = 60 \cdot in$

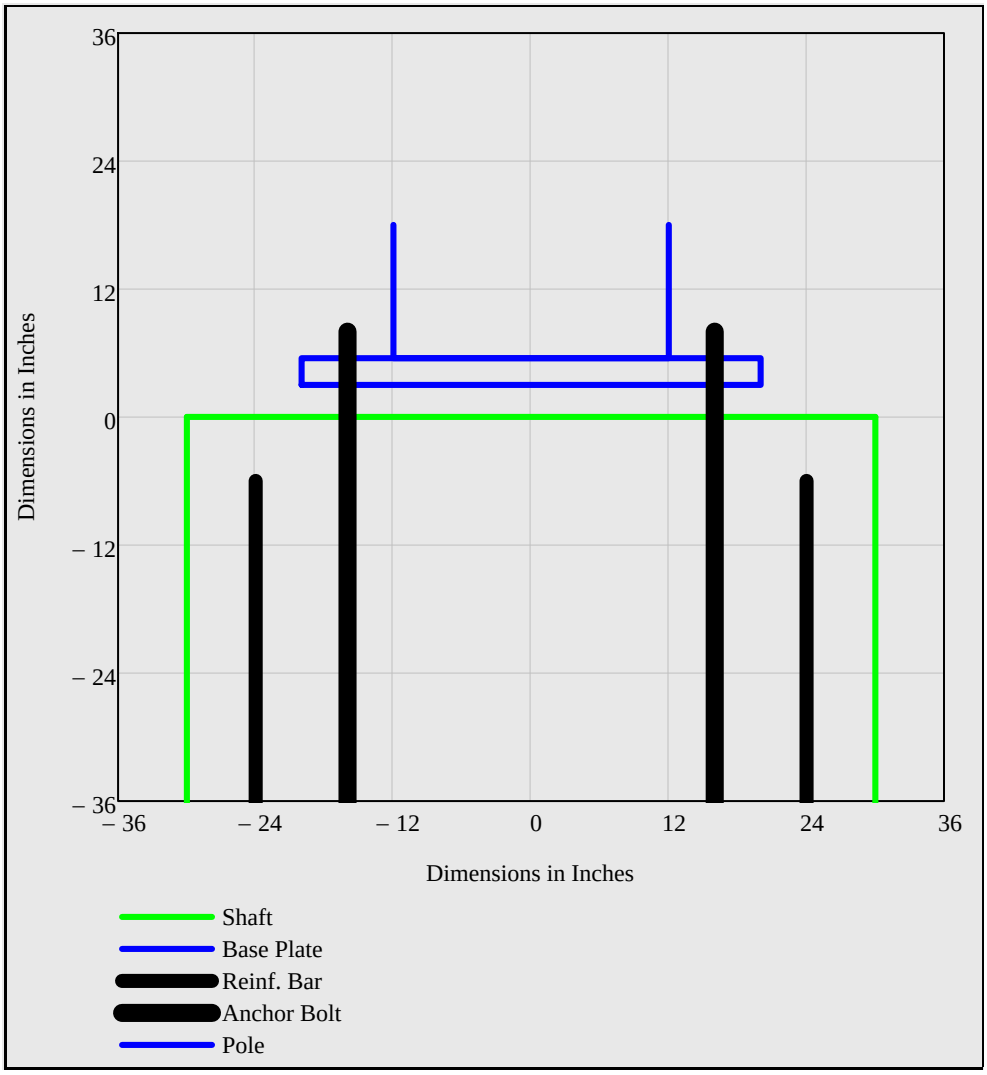
$Diameter_{boltcircle.pole} = 32 \cdot in$

$Diameter_{rebar.circle} = 45.34 \cdot in$

#AnchorRods = 6

#BarsProvided = 19

Elevation View - Drilled Shaft, Base Plate, Anchor Bolts, & Reinforcing Steel



$Diameter_{base.pole} = 24 \cdot in$

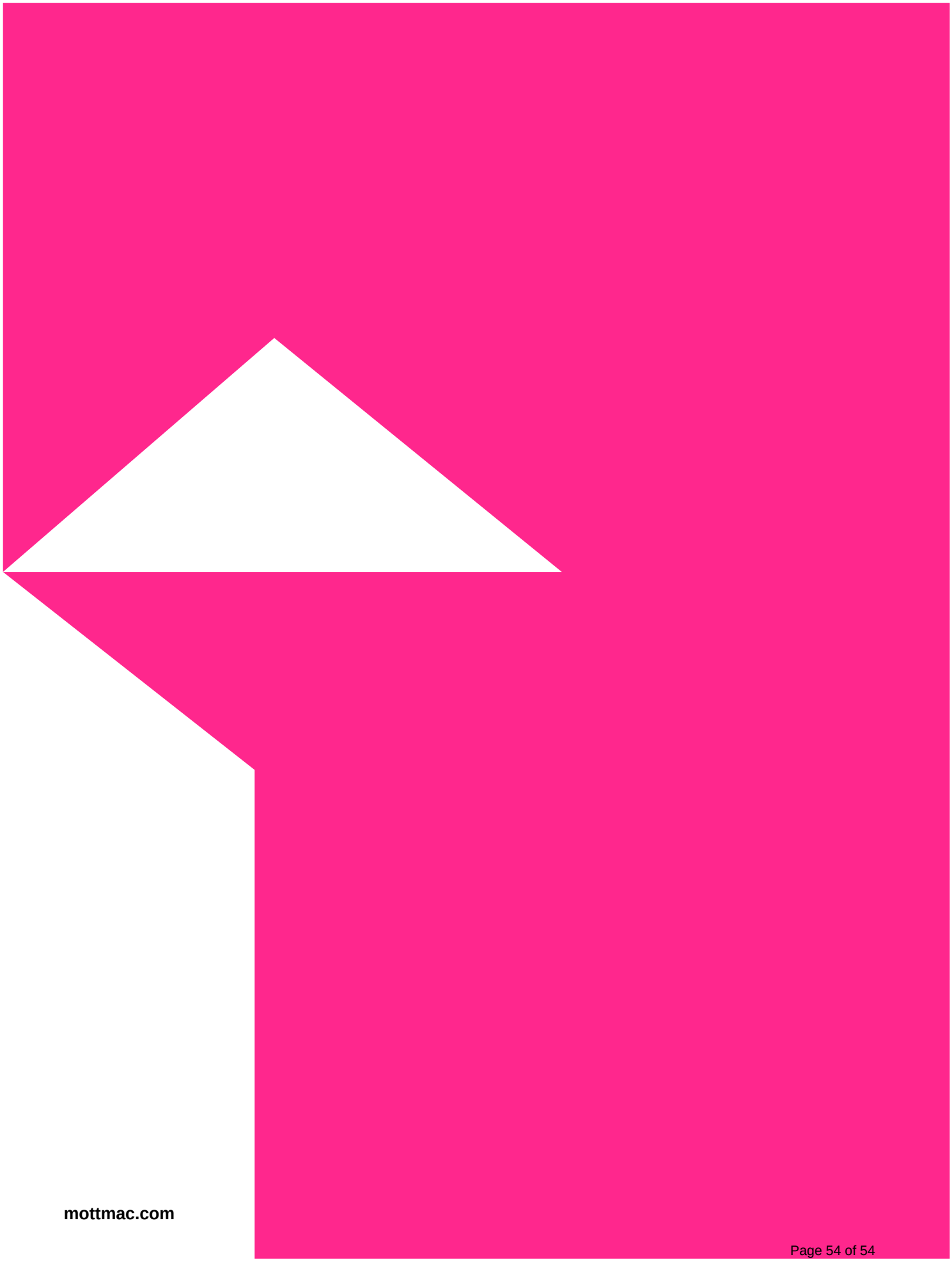
$Diameter_{baseplate.pole} = 40 \cdot in$

$t_{baseplate.pole} = 2.5 \cdot in$

$Diameter_{shaft} = 5 \cdot ft$

$Diameter_{boltcircle.pole} = 32 \cdot in$

$Diameter_{rebar.circle} = 45.3 \cdot in$



PERMITS

FDOT PERMIT STILL PENDING AS OF 02/05/2018

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
PENSACOLA REGULATORY OFFICE
41 NORTH JEFFERSON STREET, SUITE 301
PENSACOLA, FLORIDA 32502

REPLY TO ATTENTION OF

December 27, 2017

Regulatory Division
North Permits Branch
Pensacola Permits Section
SAJ-2017-02504 (NW-HMM)

Escambia County Board of County Commissioners
c/o Joy Jones, County Engineer
3363 West Park Place
Pensacola, FL 32502

Dear Ms. Jones:

Your application for a Department of the Army permit has been assigned number SAJ-2017-02504 (NW-HMM). A review of the information and drawings provided shows the proposed work is to impact 0.069 acres of wetlands associated with stormwater drainage improvements. The work consists of impacts to 2479 square feet of wetlands for the replacement of the headwall and removal of 105 cubic yards of accumulated sediments (on the north side of Lake Joanne Drive) and 419 square feet of wetlands for the extension of the existing endwall and replacement/rehabilitation of riprap (on the south side of the 61st Avenue and Highway 98 intersection). The project is located at Lake Joanne Drive and South 61st Avenue, Latitude 30.400726° North, Longitude 87.301116° West, in Lake Charlene, Sections 20, 21 and 53, Township 2 South, Range 30 and 31 West, in Escambia County, Florida.

Your project, as depicted on the enclosed drawings, is authorized by Nationwide Permit (NWP) Number 3. In addition, project specific conditions have been enclosed. This verification is valid until **March 18, 2022**. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permit is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this nationwide permit. Please access the U.S. Army Corps of Engineers' (Corps) Jacksonville District's Regulatory Internet page to access Internet links to view the Final Nationwide Permits, Federal Register Vol. 82, dated January 6, 2017, specifically pages 1983 to 2008, and the table of Regional Conditions. The Internet page address is:

http://www.saj.usace.army.mil/Missions/Regulatory.aspx

Please be aware this internet address is case sensitive and should be entered as it appears above. Once there you will need to click on “Source Book”; and, then click on “Nationwide Permits.” These files contain the description of the Nationwide Permit authorization, the Nationwide Permit general conditions, and the regional conditions, which apply specifically to this verification for this NWP. Enclosed is a list of the six General Conditions, which apply to all Department of the Army authorizations. You must comply

with all of the special and general conditions and any project specific condition of this authorization or you may be subject to enforcement action. In the event you have not completed construction of your project within the specified time limit, a separate application or re-verification may be required.
The following special conditions are included with this verification:

1. **Reporting Address:** The Permittee shall submit all reports, notifications, documentation and correspondence required by the general and special conditions of this permit to the following address:

   a. For standard mail: U.S. Army Corps of Engineers, Regulatory Division, Enforcement Section, 41 North Jefferson St., Suite 301, Pensacola, FL 32502.

   b. For electronic mail: SAJ-RD-Enforcement@usace.army.mil (not to exceed 10 MB). The Permittee shall reference this permit number, SAJ-2017-02504 (NW-HMM), on all submittals.

2. **Self-Certification:** Within 60 days of completion of the work authorized by this permit, the Permittee shall complete the attached "Self-Certification Statement of Compliance" form and submit it to the Corps. In the event that the completed work deviates in any manner from the authorized work, the Permittee shall describe the deviations between the work authorized by this permit and the work as constructed on the "Self-Certification Statement of Compliance" form. The description of any deviations on the "Self-Certification Statement of Compliance" form does not constitute approval of any deviations by the Corps.

3. **Erosion Control:** Prior to the initiation of any work authorized by this permit, the Permittee shall install erosion control measures along the perimeter of all work areas to prevent the displacement of fill material outside the work area. Immediately after completion of the final grading of the land surface, all slopes, land surfaces, and filled areas shall be stabilized using sod, degradable mats, barriers, or a combination of similar stabilizing materials to prevent erosion. The erosion control measures shall remain in place and be maintained until all authorized work has been completed and the site has been stabilized.

4. **Turbidity Barriers:** Prior to the initiation of any of the work authorized by this permit, the Permittee shall install floating turbidity barriers with weighted skirts that extend to within 1 foot of the bottom around all work areas that are in, or adjacent to, surface waters. The turbidity barriers shall remain in place and be maintained until the authorized work has been completed and all suspended and erodible materials have been stabilized. Turbidity barriers shall be removed upon stabilization of the work area.

5. **Eastern Indigo Snake Protection Measures and Inspection:** Permittee shall comply with U.S. Fish and Wildlife Service's "Standard Protection Measures for the Eastern Indigo Snake" dated August 12, 2013, which can be found at https://www.fws.gov/northflorida/IndigoSnakes/20130812_Eastern_indigo_snake_Standard_Protection_Measures.htm. All gopher tortoise burrows, active or inactive, shall be evacuated prior to site manipulation in the vicinity of the burrow. If excavating potentially occupied burrows, active or inactive, individuals must first obtain state authorization via a Florida Fish and Wildlife Conservation Commission (FWC)

Authorized Gopher Tortoise Agent permit. The excavation method selected shall minimize the potential for injury of an indigo snake. The Permittee shall follow the excavation guidance provided in the most current FWC Gopher Tortoise Permitting Guidelines found at http://myfwc.com/gophertortoise. If an indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Holes, cavities, and snake refugia other than gopher tortoise burrows shall be inspected each morning before planned site manipulation of a particular area, and if occupied by an indigo snake, no work shall commence until the snake has vacated the vicinity of the proposed work.

6. No building or fill materials, tools or other equipment shall be stockpiled within the waters of the United States.

7. All contractors involved in this permitted activity shall be provided copies of this permit in its entirety. A copy shall remain on site at all times during construction.

8. **Agency Changes/Approvals:** Should any other agency require and/or approve changes to the work authorized or obligated by this permit, the Permittee is advised a modification to this permit instrument is required prior to initiation of those changes. It is the Permittee's responsibility to request a modification of this permit from the Pensacola Permits Section. The Corps reserves the right to fully evaluate, amend, and approve or deny the request for modification of this permit.

9. **Cultural Resources/Historic Properties:**

   a. No structure or work shall adversely affect impact or disturb properties listed in the *National Register of Historic Places* (NRHP) or those eligible for inclusion in the NRHP.

   b. If during the ground disturbing activities and construction work within the permit area, there are archaeological/cultural materials encountered which were not the subject of a previous cultural resources assessment survey (and which shall include, but not be limited to: pottery, modified shell, flora, fauna, human remains, ceramics, stone tools or metal implements, dugout canoes, evidence of structures or any other physical remains that could be associated with Native American cultures or early colonial or American settlement), the Permittee shall immediately stop all work and ground-disturbing activities within a 100-meter diameter of the discovery and notify the Corps within the same business day (8 hours). The Corps shall then notify the Florida State Historic Preservation Officer (SHPO) and the appropriate Tribal Historic Preservation Officer(s) (THPO(s)) to assess the significance of the discovery and devise appropriate actions.

   c. Additional cultural resources assessments may be required of the permit area in the case of unanticipated discoveries as referenced in accordance with the above Special Condition ; and if deemed necessary by the SHPO, THPO(s), or Corps, in accordance with 36 CFR 800 or 33 CFR 325, Appendix C (5). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume on non-federal lands without written authorization from the SHPO for finds under his or her jurisdiction, and from the Corps.

d. In the unlikely event that unmarked human remains are identified on non-federal lands, they will be treated in accordance with Section 872.05 Florida Statutes. All work and ground disturbing activities within a 100-meter diameter of the unmarked human remains shall immediately cease and the Permittee shall immediately notify the medical examiner, Corps, and State Archeologist within the same business day (8-hours). The Corps shall then notify the appropriate SHPO and THPO(s). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume without written authorization from the State Archeologist and from the Corps.

This letter of authorization does not give absolute Federal authority to perform the work as specified on your application. The proposed work may be subject to local building restrictions mandated by the National Flood Insurance Program. You should contact your local office that issues building permits to determine if your site is located in a flood-prone area, and if you must comply with the local building requirements mandated by the National Flood Insurance Program.

If you are unable to access the internet or require a hardcopy of any of the conditions, limitations, or expiration date for the above referenced NWP, please contact me by the letterhead address, by email at Holly.M.Millsap@usace.army.mil or by telephone at 850-470-9823.

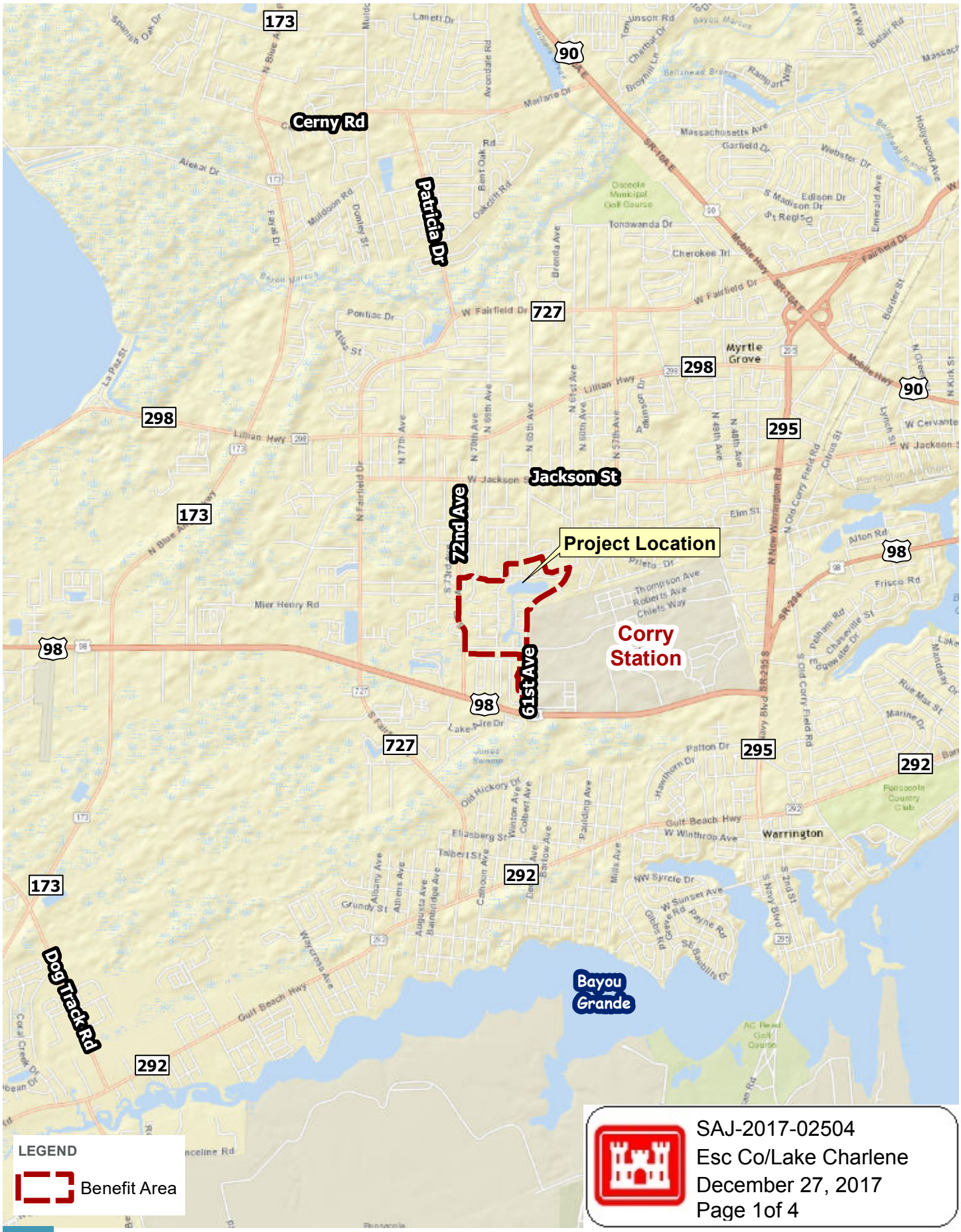
Thank you for your cooperation with our permit program. The Corps Jacksonville District Regulatory Division is committed to improving service to our customers. We strive to perform our duty in a friendly and timely manner while working to preserve our environment. We invite you to complete our automated Customer Service Survey at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey. Please be aware this Internet address is case sensitive; and, you will need to enter it exactly as it appears above. Your input is appreciated – favorable or otherwise.

Sincerely,

Holly Millsap
Project Manager

Enclosures:
Permit Drawings
General Conditions
Self-Certification Statement of Compliance
Department of the Army Permit Transfer Request

Copy/ies Furnished:
HDR Engineering, Inc., Agent
CESAJ-RD-SE



LEGEND

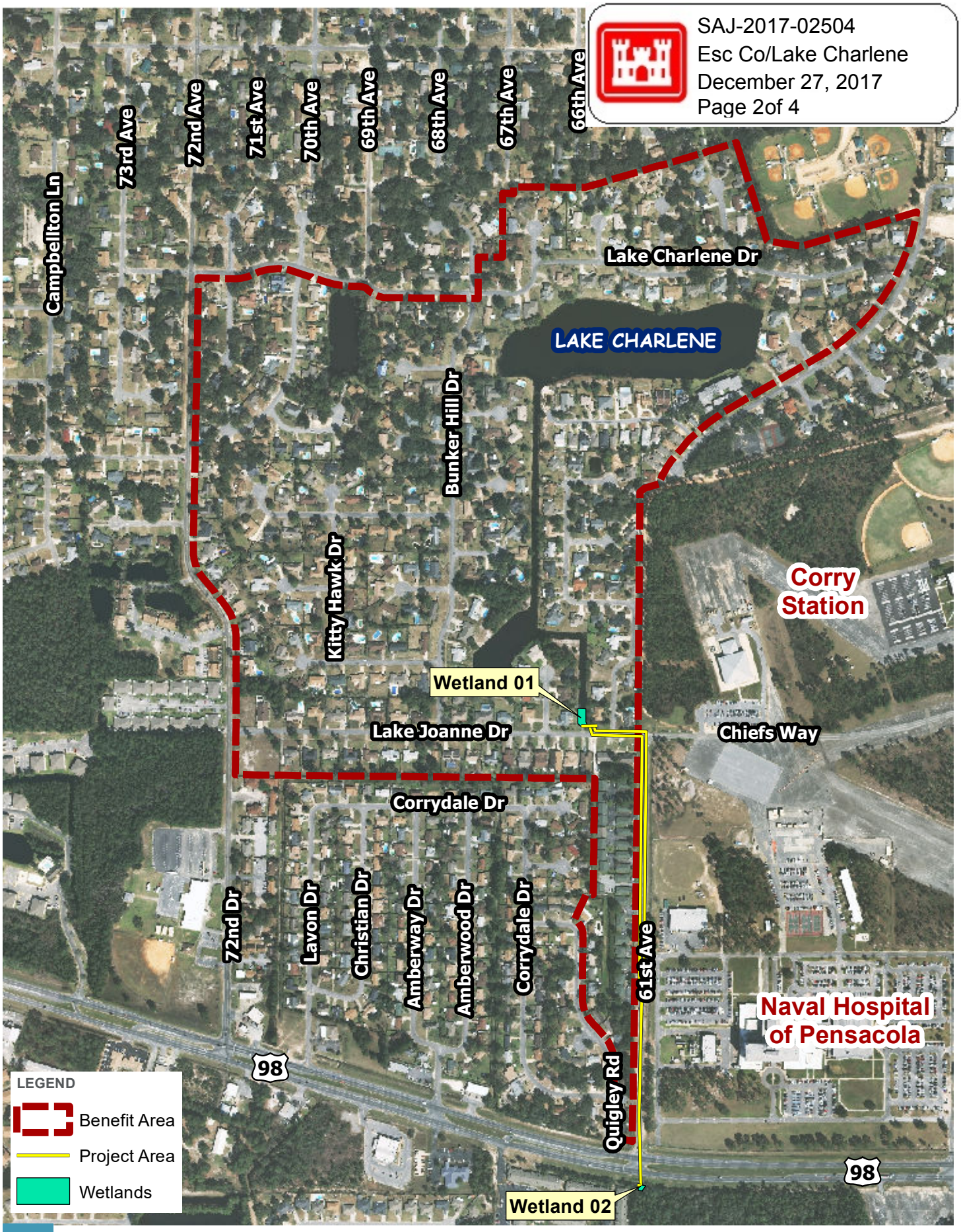
Benefit Area

SAJ-2017-02504
Esc Co/Lake Charlene
December 27, 2017
Page 1of 4

0 Miles 0.5

LAKE CHARLENE
LOCATION MAP
(FIGURE 1)

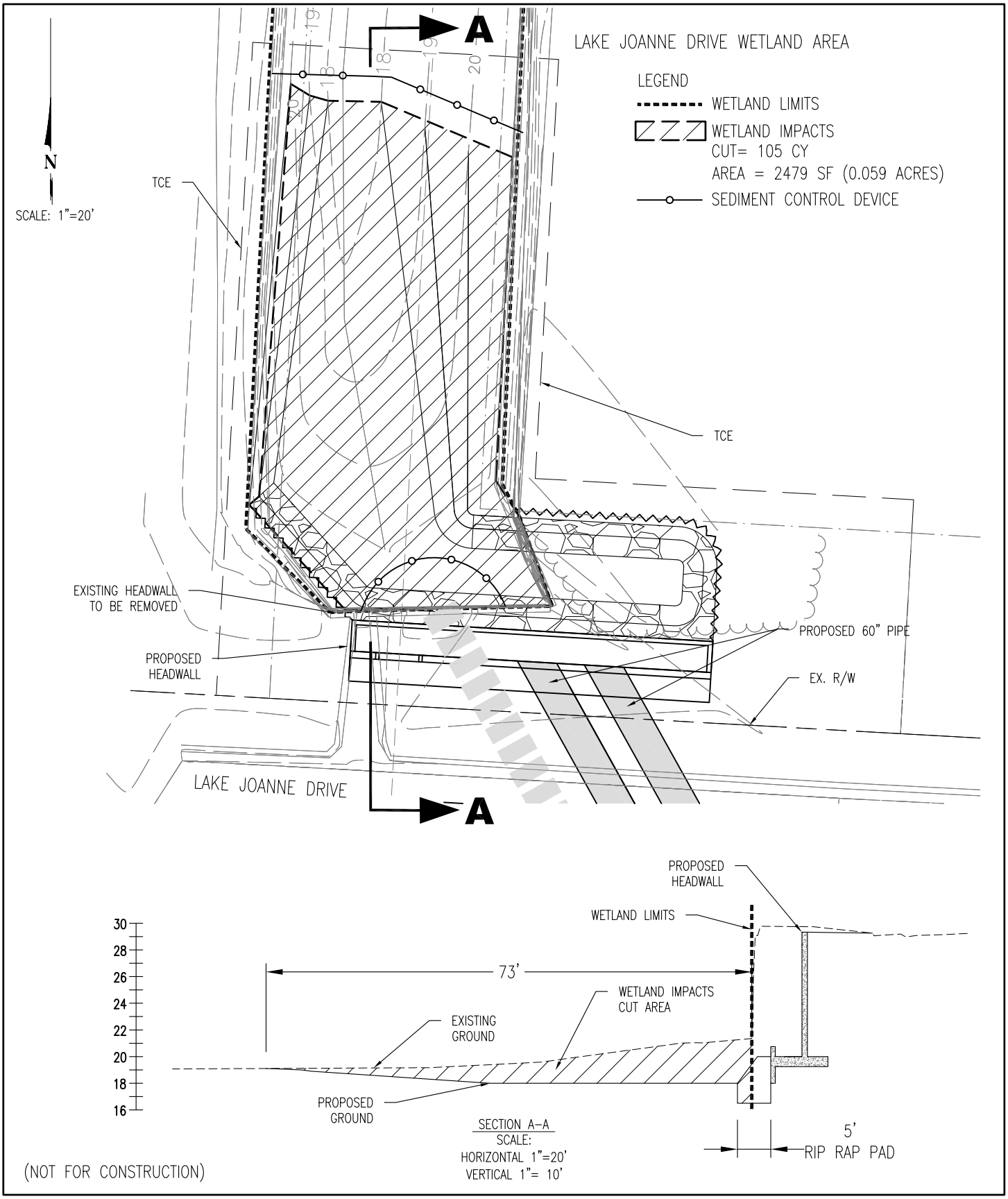
PATH: W:\000204\0000000000243622\LAKE CHARLENE WATERSHED EVAL\GIS\MAP_DOCS\MXD\MEETING_5-2017\LOCATION_MAP.MXD - USER: TELLIS - DATE: 5/18/2017



0 Feet 500

LAKE CHARLENE
OVERVIEW MAP
(FIGURE 2)

PATH: W:\000204\000000000243622\LAKE CHARLENE WATERSHED EVAL\GIS\MAP_DOCS\MXD\MEETING_5-2017\OVERVIEW_MAP.MXD - USER: TELLIS - DATE: 5/18/2017



PROJECT TITLE
LAKE CHARLENE
DRAINAGE IMPROVEMENTS

SHEET TITLE
WETLAND SURFACE WATER IMPACT AREAS

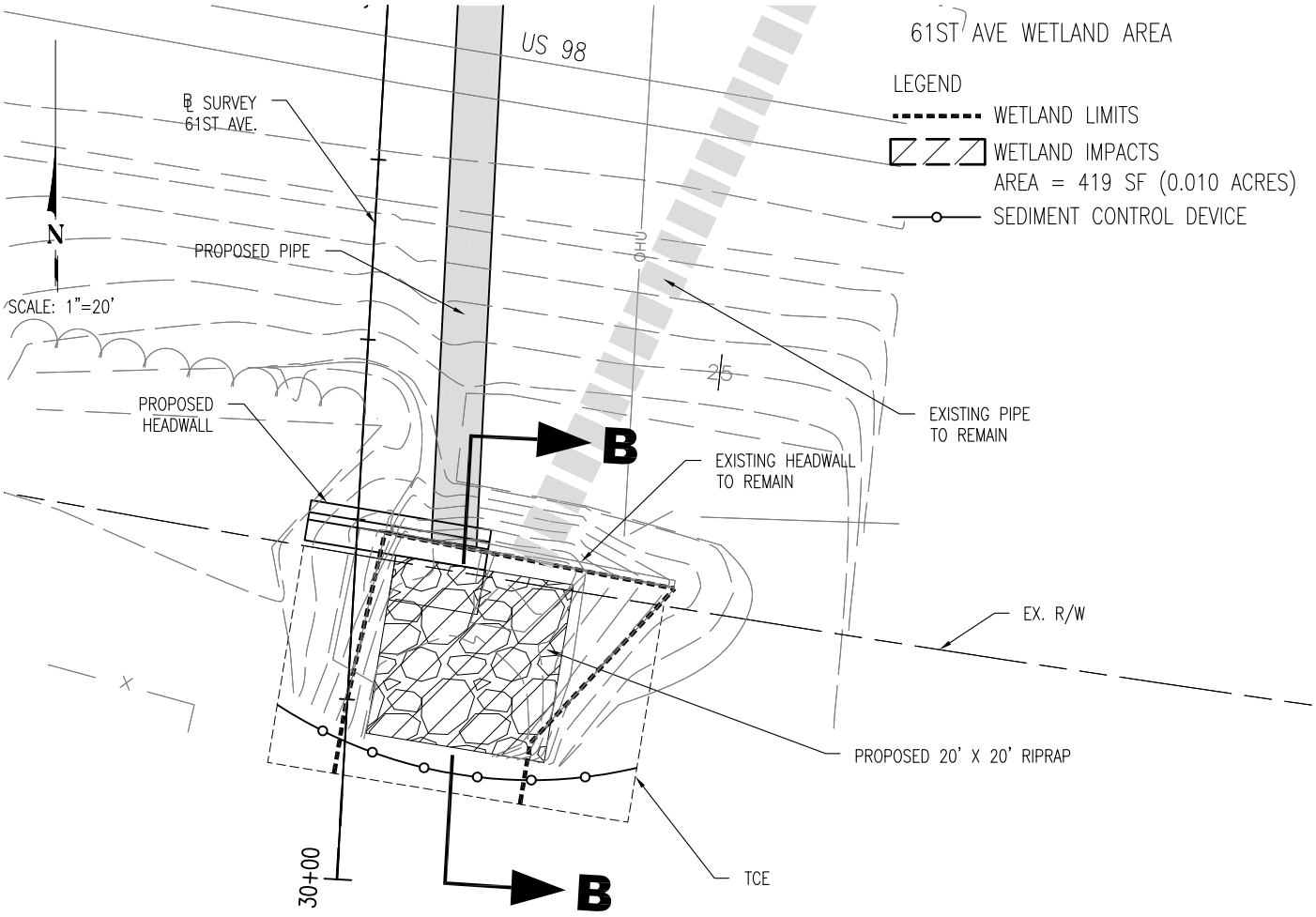
PROJECT NUMBER

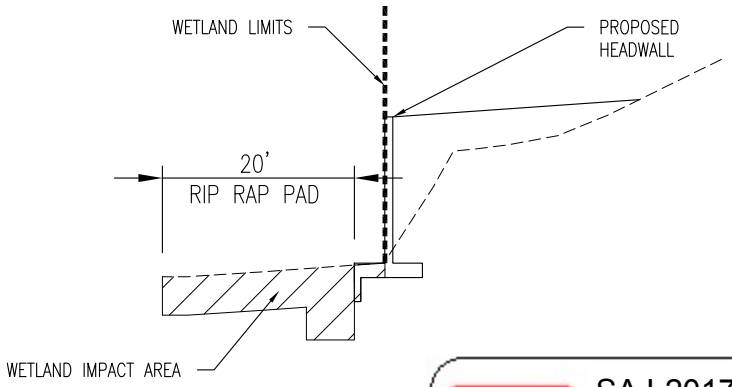
REFERENCE SHEET

PROJE
ALLE

DATE
AUG

SAJ-2017-02504
Esc Co/Lake Charlene
December 27, 2017





SECTION B–B
SCALE:
HORIZONTAL 1"=20'
VERTICAL 1"= 10'

(NOT FOR CONSTRUCTION)

SAJ-2017-02504
Esc Co/Lake Charlene
December 27, 2017
Page 4of 4

PROJECT TITLE: LAKE CHARLENE DRAINAGE IMPROVEMENTS		PROJECT NUMBER	REFERENCE SHEET
SHEET TITLE: **WETLAND SURFACE WATER IMPACT AREAS**		PROJECT MANAGER: ALLEN VINSON	REFERENCE DOCUMENT
		DATE: AUG. 2017	EXHIBIT NUMBER: 2 OF 2

GENERAL CONDITIONS
33 CFR PART 320-330

1. The time limit for completing the work authorized ends on **March 18, 2022.**

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort of if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow a representative from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

SELF-CERTIFICATION STATEMENT OF COMPLIANCE

Permit Number: SAJ-2017-02504 (NW-HMM)

Permittee's Name & Address (please print or type): _____

_____

_____

Telephone Number: _____

Location of the Work: _____

_____

Date Work Started: _____ Date Work Completed: _____

PROPERTY IS INACCESSIBLE WITHOUT PRIOR NOTIFICATION: YES _____ NO_____

TO SCHEDULE AN INSPECTION PLEASE CONTACT _____ AT _____

Description of the Work (e.g. bank stabilization, residential or commercial filling, docks, dredging, etc.):

_____

_____

_____

Acreage or Square Feet of Impacts to Waters of the United States: _____

Describe Mitigation completed (if applicable): _____

_____

Describe any Deviations from Permit (attach drawing(s) depicting the deviations):

_____

_____

****

I certify that all work, and mitigation (if applicable) was done in accordance with the limitations and conditions as described in the permit. Any deviations as described above are depicted on the attached drawing(s).

_____
Signature of Permittee

_____
Date

DEPARTMENT OF THE ARMY PERMIT TRANSFER REQUEST

Permit Number: SAJ-2017-02504 (NW-HMM)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. Although the construction period for works authorized by Department of the Army permits is finite, the permit itself, with its limitations, does not expire.

To validate the transfer of this permit and the associated responsibilities associated with compliance with its terms and conditions, have the transferee sign and date below and mail to the U.S. Army Corps of Engineers, Enforcement Section, Post Office Box 4970, Jacksonville, FL 32232-0019.

_____ _____

(TRANSFEREE-SIGNATURE) **(SUBDIVISION)**

_____ _____ _____

(DATE) **(LOT)** **(BLOCK)**

_____ _____

(NAME-PRINTED) **(STREET ADDRESS)**

_____

(MAILING ADDRESS)

_____

_____

(CITY, STATE, ZIP CODE)

Florida Department of Environmental Protection

Northwest District Office
160 W. Government Street, Suite 308
Pensacola, Florida 32502-5740

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

December 8, 2017

Escambia County BOCC
Joy Jones
3363 W Park Place
Pensacola, FL 32505
DJJones@myescambia.com

File No. 0358869-001-EG/17, Escambia County

Dear Ms. Jones:

On November 14, 2017, we received your notice of intent to use a General Permit (GP) pursuant to Rule 62-330.451, Florida Administrative Code (F.A.C.) to upgrade an existing drainage structure within unnamed wetlands, Class III Florida Waters. The project is located within the Lake Charlene subdivision, along Lake Joanne Drive and S 61st Street in Pensacola, Florida 32506, in Section 20, Township 02 South, Range 31 West of Escambia County; Latitude 30°24′2.60″ North / Longitude 87°18′4.02″ West.

Your intent to use a general permit has been reviewed by Department staff for three types of authorization: (1) regulatory authorization, (2) proprietary authorization (related to state-owned submerged lands), and (3) federal authorization. The authority for review and the outcomes of the reviews are listed below. Please read each section carefully.

Your project did not qualify for the federal authorization; therefore, additional authorization must be obtained prior to commencement of the proposed activity. This letter does not relieve you from the responsibility of obtaining other federal, state, or local authorizations that may be required for the activity. Please refer to the specific section dealing with that portion of the review below for advice on how to proceed.

If you change the project from what you submitted, the authorizations granted may no longer be valid at the time of commencement of the project. Please contact us prior to beginning your project if you wish to make any changes.

If you have any questions regarding this matter, please contact Chuck Harrell at the letterhead address, at (850)595-0581, or at Charles.Harrell@dep.state.fl.us.

1. Regulatory Review – Approved

Based on the forms, drawings, and documents submitted with your notice, it appears that the project meets the requirements for the General Permit under Rule 62-330.451, F.A.C. Any activities performed under a general permit are subject to general conditions required in Rule 62-330.405, F.A.C. (attached) and the specific conditions of Rule 62-330.451, F.A.C. (attached). Any deviations from these conditions may subject the permittee to enforcement action and possible penalties.

Please be advised that the construction phase of the GP must be completed within five years from the date the notice to use the GP was received by the Department. If you wish to continue this GP beyond the expiration date, you must notify the Department at least 30 days before its expiration.

Authority for review – Part IV of Chapter 373, Florida Statutes (F.S.), Title 62, F.A.C., and in accordance with the operating agreements executed between the Department and the water management districts, as referenced in Chapter 62-113, F.A.C.

2. Proprietary Review – Not Required

The activity does not appear to be located on sovereign submerged lands and does not require further authorization under Chapters 253 or 258, F.S. or Chapters 18-20 or 18-21, F.A.C.

3. Federal Review – SPGP Not Approved

Your proposed activity as outlined on your application and attached drawings **does not qualify** for federal authorization pursuant to the State Programmatic General Permit and a **SEPARATE permit** or authorization **shall be required** from the U.S. Army Corps of Engineers (Corps). You must apply separately to the Corps using the federal application form (ENG 4345). More information about Corps permitting may be found online in the Jacksonville District Regulatory Division Sourcebook. **Failure to obtain Corps authorization prior to construction could subject you to federal enforcement action by that agency.**

Authority for review – an agreement with the Corps entitled "Coordination Agreement Between the U.S. Army Corps of Engineers (Jacksonville District) and the Florida Department of Environmental Protection, or Duly Authorized Designee, State Programmatic General Permit," Section 10 of the Rivers and Harbor Act of 1899, and Section 404 of the Clean Water Act.

Additional Information

Please retain this general permit. The activities may be inspected by authorized state personnel in the future to ensure compliance with appropriate statutes and administrative codes. If the activities are not in compliance, you may be subject to penalties under Chapter 373, F.S. and Chapter 18-14, F.A.C.

NOTICE OF RIGHTS

This action is final and effective on the date filed with the Clerk of the Department unless a petition for an administrative hearing is timely filed under Sections 120.569 and 120.57, F.S. before the deadline for filing a petition. On the filing of a timely and sufficient petition, this action will not be final and effective until further order of the Department. Because the administrative hearing process is designed to formulate final agency action, the hearing process may result in a modification of the agency action or even denial of the application.

Petition for Administrative Hearing

A person whose substantial interests are affected by the Department's action may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, F.S. Pursuant to Rules 28-106.201 and 28-106.301, F.A.C., a petition for an administrative hearing must contain the following information:

(a) The name and address of each agency affected and each agency's file or identification number, if known;
(b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests are or will be affected by the agency determination;
(c) A statement of when and how the petitioner received notice of the agency decision;
(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
(e) A concise statement of the ultimate facts alleged, including the specific facts that the petitioner contends warrant reversal or modification of the agency's proposed action;
(f) A statement of the specific rules or statutes that the petitioner contends require reversal or modification of the agency's proposed action, including an explanation of how the alleged facts relate to the specific rules or statutes; and
(g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wishes the agency to take with respect to the agency's proposed action.

The petition must be filed (received by the Clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, or via electronic correspondence at Agency_Clerk@dep.state.fl.us. Also, a copy of the petition shall be mailed to the applicant at the address indicated above at the time of filing.

Time Period for Filing a Petition

In accordance with Rule 62-110.106(3), F.A.C., petitions for an administrative hearing by the applicant and persons entitled to written notice under Section 120.60(3), F.S., must be filed within 21 days of receipt of this written notice. Petitions filed by any persons other than the applicant, and other than those entitled to written notice under Section 120.60(3), F.S., must be filed within 21 days of publication of the notice or within 21 days of receipt of the written notice, whichever occurs first. The failure to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S. or to intervene in this proceeding and participate as a party to it. Any subsequent intervention (in a proceeding initiated by another party) will be only

at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, F.A.C.

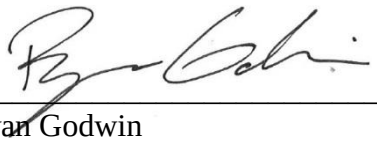
Extension of Time
Under Rule 62-110.106(4), F.A.C., a person whose substantial interests are affected by the Department's action may also request an extension of time to file a petition for an administrative hearing. The Department may, for good cause shown, grant the request for an extension of time. Requests for extension of time must be filed with the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, or via electronic correspondence at Agency_Clerk@dep.state.fl.us, before the deadline for filing a petition for an administrative hearing. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

Mediation
Mediation is not available in this proceeding.

FLAWAC Review
The applicant, or any party within the meaning of Section 373.114(1)(a) or 373.4275, F.S., may also seek appellate review of this order before the Land and Water Adjudicatory Commission under Section 373.114(1) or 373.4275, F.S. Requests for review before the Land and Water Adjudicatory Commission must be filed with the Secretary of the Commission and served on the Department within 20 days from the date when this order is filed with the Clerk of the Department.

Judicial Review
Once this decision becomes final, any party to this action has the right to seek judicial review pursuant to Section 120.68, F.S. by filing a Notice of Appeal pursuant to Florida Rules of Appellate Procedure 9.110 and 9.190 with the Clerk of the Department in the Office of General Counsel (Station #35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000) and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice must be filed within 30 days from the date this action is filed with the Clerk of the Department.

EXECUTION AND CLERKING
Executed in Orlando, Florida.
STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION



Ryan Godwin
Environmental Specialist
Submerged Lands and Environmental Resources Program

Attachment(s):

1. Rule 62-330.451, F.A.C., 2 pages
2. General Conditions for All General Permits, Rule 62-330.405, F.A.C., 3 pages
3. Project Drawings, 51 pages

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this document and all attachments were sent on the filing date below to the following listed persons:

D. Allen Vinson, HDR, Inc., Allen.Vinson@hdrinc.com
Escambia County, jtkirsche@myescambia.com; BDBANE@myescambia.com; bdschneider@myescambia.com; TRDAY@myescambia.com

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to Section 120.52, F.S., with the designated Department Clerk, receipt of which is hereby acknowledged.

Barbara Browning

Clerk

December 8, 2017

Date

62-330.451 General Permit to Counties, Municipalities, and other Agencies to Conduct Stormwater Retrofit Activities.

(1) A general permit is granted to counties, municipalities, state agencies and water management districts to construct, operate and maintain stormwater retrofit activities as authorized below for improving existing surface water and stormwater systems. This general permit may be used in conjunction with exempt activities.

(2) Types of stormwater retrofit activities authorized under this general permit are:

(a) Construction or alteration that will add additional treatment or attenuation capacity and capability to an existing stormwater management system;

(b) The modification, reconstruction, or relocation of an existing stormwater management system or stormwater discharge facility;

(c) Stabilization of eroding banks, and installation of structures such as gabions to limit sidebank erosion; or

(d) Excavation or dredging to remove sediments or other pollutants that have accumulated in existing surface waters as a result of stormwater runoff and stormwater discharges, provided the material removed is not deposited in existing wetlands or other surface waters.

(3) Stormwater retrofit activities shall not:

(a) Be proposed or implemented for the purpose of providing the water quality treatment or flood control needed to serve new development or redevelopment; or

(b) Include a dam that has more than 50 acre-feet of storage capacity if the dam is more than five feet high, nor a dam having a height of ten or more feet, regardless of storage capacity. Height is measured from the top of the dam to the natural bed of the stream or watercourse at the downward toe of the dam, or from the lowest elevation of the outside limit of the dam to the maximum elevation of the dam.

(4) There is no limit to the acreage of stormwater retrofit activities in artificial waters. Work in wetlands and non-artificial surface waters shall be limited to no more than 0.5 acre.

(5) A stormwater quality retrofit activity must result in at least one of the following:

(a) Addition of treatment capacity to an existing stormwater management system such that it reduces stormwater pollutant loadings to receiving waters;

(b) Addition of treatment or attenuation capability to an existing developed area when either the existing stormwater management system or the developed area has substandard stormwater treatment or attenuation capabilities, compared to what would be required for a new system requiring a permit under Part IV of Chapter 373, F.S.; or

(c) Removal of pollutants generated by, or resulting from, previous stormwater discharges.

(6) A water quantity retrofit project proposed to reduce existing flooding problems must be designed in such a way that the project does not:

(a) Result in a net reduction in water quality treatment provided by the existing stormwater management system;

(b) Increase discharges of untreated stormwater entering receiving waters;

(7) The project must be designed, constructed, and implemented so that it will be implemented as a complete, stand-alone project within the construction phase duration of a general permit, and such that it will not at any time during its construction or operation:

(a) Cause or contribute to any water quality violations;

(b) Contribute to any existing violation if it discharges pollutants into waters where existing ambient water quality does not meet water quality standards for those pollutants. In such a case,

the project must include measures that will cause a net improvement in the receiving waters for those pollutants in accordance with Section 373.414(1)(b)3., F.S.;

(c) Adversely affect the value of functions provided to fish and wildlife by wetlands or other surface waters;

(d) Adversely affect the hydroperiod of wetlands on adjacent lands or the hydroperiod of other wetlands upstream, downstream, or adjoining to the work area under subsection (4), above;

(e) Cause or contribute to increased flooding of adjacent lands or cause new adverse water quantity impacts to receiving waters;

(f) Add or increase any chemical treatment;

(g) Be operated by pumps or other mechanical or adjustable features;

(h) Adversely impact the maintenance of surface or ground water levels or surface water flows established pursuant to Section 373.042, F.S.

(8) The entity conducting this general permit must conduct at least one pre-notice meeting with Agency staff having responsibility for the review of the proposed activities. The notice required in Rule 62-330.402, F.A.C., shall include materials reflecting the recommendations of the Agency discussed during that meeting, and demonstrating compliance with the above, including a certification by a registered professional that the proposed activity will meet the criteria specified above. Such certification shall include appropriate design analyses, pollutant loading analyses, modeling and other engineering calculations, drawings, specifications and other information to support, describe, verify, and document the registered professional's certification.

(9) Nothing in this general permit will preclude a county or municipality from obtaining and implementing a Basin Management Action Plan with water quality credits for activities performed under this authorization.

(10) Within 30 days after completion of construction, a registered professional shall submit certification that construction was completed in substantial conformance with the plans and calculations that were submitted in the notice to use this general permit.

Rulemaking Authority 373.026(7), 373.043, 373.118(1), 373.118(6), 373.406(5), 373.4131, 373.414(9), 373.418, 403.805(1) FS. Law Implemented 373.118(1), (6), 373.406(5), 373.413, 373.4131, 373.414(9), 373.416, 373.418 FS. History–New 10-1-13.

62-330.405 General Conditions for All General Permits

The following general permit condiitons are binding upon the permittee and are enforceable under Chapter 373, F.S. These conditions do not apply to the general permit in Section 403.814(12), F.S.

(1) The general permit is valid only for the specific activity indicated. Any deviation from the specified activity and the conditions for undertaking that activity shall constitute a violation of the permit and may subject the permittee to enforcement action and revocation of the permit under Chapter 373, F.S.

(2) This general permit does not eliminate the necessity to obtain any required federal, state, local and special district authorizations prior to the start of any construction, alteration, operation, maintenance, removal or abandonment authorized by this permit.

(3) This general permit does not convey to the permittee or create in the permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the permittee, or convey any rights or privileges other than those specified in the general permit.

(4) The general permit does not relieve the permittee from liability and penalties when the permitted activity causes harm or injury to: human health or welfare; animal, plant or aquatic life; or property. It does not allow the permittee to cause pollution that violates state water quality standards.

(5) Section 253.77, F.S., provides that a person may not commence any excavation, construction, or other activity involving the use of state-owned or other lands of the state, the title to which is vested in the Board of Trustees of the Internal Improvement Trust Fund without obtaining the required consent, lease, easement, or other form of authorization authorizing the proposed use. Therefore, the permittee is responsible for obtaining any necessary authorizations from the Board of Trustees prior to commencing activity on state-owned lands.

(6) The authorization to conduct activities under a general permit may be modified, suspended or revoked in accordance with Chapter 120, F.S., and Section 373.429, F.S.

(7) This permit shall not be transferred to a third party except pursuant to Rule 62-330.340, F.A.C. The permittee transferring the general permit shall remain liable for any corrective actions that may be required as a result of any permit violations prior to sale, conveyance, or other transfer of ownership or control of the permitted project, activity, or the real property at which the permitted project or activity is located.

(8) Upon reasonable notice to the permittee, Agency staff with proper identification shall have permission to enter, inspect, sample and test the permitted system to ensure conformity with the plans and specifications approved by the permit.

(9) The permittee shall maintain any permitted project or activity in accordance with the plans submitted to the Agency and authorized in this general permit.

(10) A permitee’s right to conduct a specific activity under this general permit is authorized for a duration of five years.

(11) Activities shall be conducted in a manner that does not cause or contribute to violations of state water quality standards. Performance-based erosion and sediment control best management practices shall be implemented and maintained immediately prior to, during, and after construction as needed to stabilize all disturbed areas, including other measures specified in the permit to prevent adverse impacts to the water resources and adjacent lands. Erosion and sediment control measures shall be installed and maintained in accordance with the *State of*

Florida Erosion and Sediment Control Designer and Reviewer Manual (Florida Department of Environmental Protection and Florida Department of Transportation June 2007), available at www.dep.state.fl.us/water/wetlands/docs/erp/FLErosionSedimentManual_6_07.pdf, and the *Florida Stormwater Erosion and Sedimentation Control Inspector's Manual* (Florida Department of Environmental Protection, Nonpoint Source Management Section, Tallahassee, Florida, July 2008), available at www.dep.state.fl.us/water/nonpoint/docs/erosion/erosion-inspectors-manual.pdf.

(12) Unless otherwise specified in the general permit, temporary vehicular access within wetlands during construction shall be performed using vehicles generating minimum ground pressure to minimize rutting and other environmental impacts. Within forested wetlands, the permittee shall choose alignments that minimize the destruction of mature wetland trees to the greatest extent practicable. When needed to prevent rutting or soil compaction, access vehicles shall be operated on wooden, composite, metal, or other non-earthen construction mats. In all cases, access in wetlands shall comply with the following:

(a) Access within forested wetlands shall not include the cutting or clearing of any native wetland tree having a diameter 4 inches or greater at breast height;

(b) The maximum width of the construction access area shall be limited to 15 feet;

(c) All mats shall be removed within 72 hours after the work commences; and

(d) Areas disturbed for access shall be restored to natural grades immediately after the maintenance or repair is completed.

(13) Barges or other work vessels used to conduct in-water activities shall be operated in a manner that prevents unauthorized dredging, water quality violations, and damage to submerged aquatic communities.

(14) The construction, alteration, or use of the authorized project shall not adversely impede navigation or create a navigational hazard in the water body.

(15) Except where specifically authorized in a general permit, activities must not:

(a) Impound or obstruct existing water flow, cause adverse impacts to existing surface water storage and conveyance capabilities, or otherwise cause adverse water quantity or flooding impacts to receiving water and adjacent lands;

(b) Cause an adverse impact to the maintenance of surface or ground water levels or surface water flows established pursuant to Section 373.042, F.S., or a Works of the District established pursuant to Section 373.086, F.S.; or

(16) If any prehistoric or historic artifacts, such as pottery or ceramics, stone tools or metal implements, dugout canoes, or any other physical remains that could be associated with Native American cultures, or early colonial or American settlement are encountered at any time within the project site area, work involving subsurface disturbance in the immediate vicinity of such discoveries shall cease. The permittee or other designee shall contact the Florida Department of State, Division of Historical Resources, Compliance and Review Section, at (850) 245-6333 or (800) 847-7278, as well as the appropriate permitting agency office. Such subsurface work shall not resume without verbal or written authorization from the Division of Historical Resources. If unmarked human remains are encountered, all work shall stop immediately and notification shall be provided in accordance with Section 872.05, F.S.

(17) The activity must be capable, based on generally accepted engineering and scientific principles, of being performed and of functioning as proposed, and must comply with any applicable District special basin and geographic area criteria.

(18) The permittee shall comply with the following when performing work within waters accessible to federally- or state-listed aquatic species, such as manatees, marine turtles, smalltooth sawfish, and Gulf sturgeon:

(a) All vessels associated with the project shall operate at "Idle Speed/No Wake" at all times while in the work area and where the draft of the vessels provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

(b) All deployed siltation or turbidity barriers shall be properly secured, monitored, and maintained to prevent entanglement or entrapment of listed species.

(c) All in-water activities, including vessel operation, must be shut down if a listed species comes within 50 feet of the work area. Activities shall not resume until the animal(s) has moved beyond a 50-foot radius of the in-water work, or until 30 minutes elapses since the last sighting within 50 feet. Animals must not be herded away or harassed into leaving. All on-site project personnel are responsible for observing water-related activities for the presence of listed species.

(d) Any listed species that is killed or injured by work associated with activities performed shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1 (888) 404-3922 and ImperiledSpecies@myFWC.com.

(e) Whenever there is a spill or frac-out of drilling fluid into waters accessible to the above species during a directional drilling operation, the FWC shall be notified at imperiledspecies@myfwc.com with details of the event within 24 hours following detection of the spill or frac-out.

(19) The permittee shall hold and save the Agency harmless from any and all damages, claims, or liabilities which may arise by reason of the construction, alteration, operation, maintenance, removal, abandonment or use of any activity authorized by the general permit.

(20) The permittee shall immediately notify the Agency in writing of any submitted information that is discovered to be inaccurate.

Rulemaking Authority 373.026(7), 373.043, 373.118(1), 373.406(5), 373.4131, 373.414(9), 373.4145, 373.418, 403.805(1) FS. Law Implemented 373.044, 373.118(1), 373.129, 373.136, 373.406(5), 373.413, 373.4131, 373.414(9), 373.4145, 373.416, 373.422, 373.423, 373.429, 403.814(1) FS. History–New 10-3-95, Amended 10-1-07, Formerly 62-341.215, Amended 10-1-13.

BOARD OF COUNTY COMMISSIONERS
ESCAMBIA COUNTY, FLORIDA
PUBLIC WORKS BUREAU
ENGINEERING DIVISION

INDEX OF ROADWAY PLANS

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4	TYPICAL SECTIONS
5	TYPICAL SECTION DETAILS
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S-009	REINFORCING BAR LIST

PROJECT NO.
PD 13-14.081

THESE PLANS HAVE BEEN PREPARED IN ACCORDANCE WITH THE LATEST ESCAMBIA COUNTY TECHNICAL SPECIFICATIONS.

ANY REFERENCE TO FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION, DIVISION 1, GENERAL REQUIREMENTS AND COVENANTS, SHALL BE EXCLUDED AND NOT APPLICAPABLE TO ANY SPECIFICATION REFERED HEREIN OR OTHERWISE LISTED IN THESE PLANS OR RELATED DOCUMENTS OR THE ESCAMBIA COUNTY TECHNICAL SPECIFICATIONS.

PLANS PROPOSED FOR

LAKE CHARLENE DRAINAGE IMPROVEMENTS

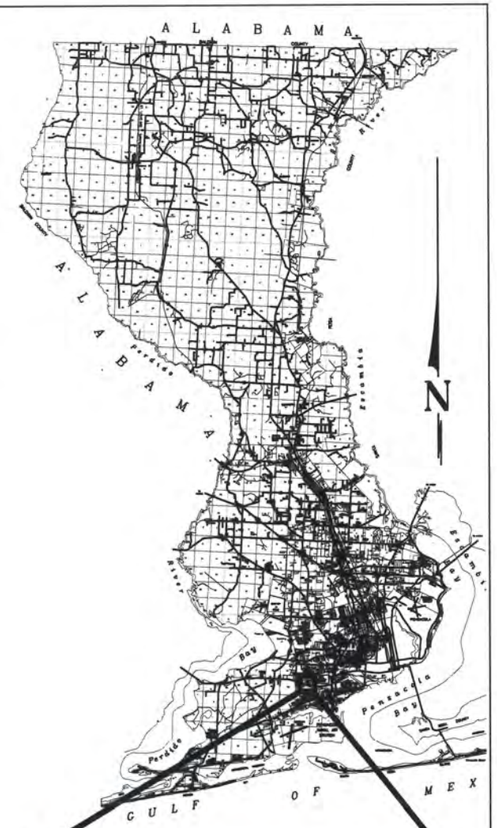
100% PLANS
OCTOBER 2017

D. ALLEN VINSON, II
LICENSE
No. 72543
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
10/20/2017

COMMISSIONERS

DISTRICT ONE	JEFF BERGOSH (VICE CHAIRMAN)
DISTRICT TWO	DOUG UNDERHILL (CHAIRMAN)
DISTRICT THREE	LUMON MAY
DISTRICT FOUR	GROVER C. ROBINSON, IV
DISTRICT FIVE	STEVEN BARRY

DEPARTMENT OF ENVIRONMENTAL PROTECTION
PERMIT
RG
STATE OF FLORIDA
1/51
0358869-001-EG/17



VICINITY MAP

PROJECT MANAGER: D. Allen Vinson	
SECTION / TOWNSHIP / RANGE: S20, 21, 53 / T2S / R30,31W	DISTRICT: 2
PROJECT ENGINEER: D. Allen Vinson	REG FLA ENG NO: 72543
SIGNATURE: See EOR Seal	DATE: See EOR Seal

SUMMARY OF PAY ITEMS

PAY ITEM	DESCRIPTION	QUANTITY	UNITS
1	Mobilization / Demobilization	1	EA
2	Clearing and Grubbing, per County Spec 2230	4.32	ACRE
3	Earthwork	1	LS
4	Earthwork Establishing Grade, County Specs 2300	12438	SY
5	Dewatering - Bypass pumping at weir	1	LS
6	Dewatering -Trench	2500	LF
7	2" County Spec 2500 Type SP 12.5 Asphalt, over 1500sy	6613	SY
8	Type SP 12.5 Asphalt Leveling (110lbs. per SY), less than 1500sy	102	SY
9	1 1/4" County Spec 2500 Type SP 12.5 Asphalt (Driveways) in place, includes compacted subgrade	778	SY
10	Mill Existing Asphalt, 0"-1.5" Thickness, less than 1500sy	102	SY
11	Lateral pavement patch as per FDOT Index 307 (Full depth Asphalt)	138	SY
12	Saw cut Existing Asphalt	81	LF
13	12" Stabilized Subgrade, County Spec 2300, over 1000sy	10375	SY
14	6" Graded aggregate Base "Min. LBR 100 at 100% Modified Proctor", County Spec 2400, over 1000sy	6764	SY
15	Relocate Traffic Signs	4	EA
16	FDOT Type E Curb And Gutter, FDOT Index 300, less than 500lf	386	LF
17	County Type B Curb, Per County Detail, over 500lf	632	LF
18	Valley Gutter Section, 6" thick, Per County Detail	78	LF
19	4" Fiber Reinforced Concrete Driveway, over 100sy	249	SY
20	Storm Manhole, 6-12ft depth	5	EA
21	Tie to Existing Inlets, Pipe, Manhole	6	EA
22	36" RCP Pipe, 0'-6' depth	81	LF
23	60" RCP Pipe, 7'-12' depth	3973	LF
24	36" RCP Side Drain MES, FDOT Index 273, 280	2	EA
25	Class II Concrete for Endwalls	51	CY
26	Reinforcing Steel for Endwalls	4708	LB
27	Pipe Removal, 30" and larger	81	LF
28	Remove MES for 30" and larger (or equivalent) pipe	2	EA
29	Centipede Sod, Staked, over 1000sy	12438	SY
30	18" Depth Rip Rap Rubble w/ 4" Bedding Stone and Geotextile	45	SY
31	Establish and Provide Sediment & Erosion Control Plan including all items for implementation	1	LS
32	Fiber Reinforced Plastic (FRP) Sheet Pile Retaining Wall	1334	SF
33	Thermoplastic 6" White Solid Stripe	50	LF
34	Thermoplastic 24" White Solid Stripe	42	LF
35	Thermoplastic 6" Double Yellow Solid Stripe	150	LF
36	RPM's (Y/Y)	8	EA
37	Maintenance of Traffic Safety Plan (develop and provide including all items for implementation)	1	LS
38	State Road - Maintenance of Traffic	1	LS

SUMMARY OF PAY ITEMS

PAY ITEM	DESCRIPTION	QUANTITY	UNITS
39	Riprap for Sheet Pile and Weir	1	LS
40	Final Pavement Markings (US 98 Only)	1	LS
630-2-12	Conduit, F&I, Directional Bore	204	LF
632-7-1	Signal Cable-New or Reconstructed Intersection, F&I	1	PI
635-2-11	Pull & Splice Box, 13"x24" Cover Size	3	EA
649-26-5	Steel Mast Arm Assembly, Remove, Deep Foundation-Bolt On Attachment	1	EA
649-21-17	Steel Mast Arm Assembly, F&I, Double Arm 70'-40'	1	EA
650-1-14	Traffic Signal, F&I, Alum., 3 Section, 1 Way	3	AS
650-1-18	Traffic Signal, F&I, Alum., 5 Section Straight, 1 Way	1	AS
660-2-101	Loop Assembly, F&I, Type A	1	AS
700-3-501	Sign Panel, Relocate, Up To 12 SF	2	EA

IITEM 1:
IT IS THE CONTRACTOR'S RESPONSIBILITY TO SELECT AND GAIN PERMISSION TO USE SITES/PARCELS WHICH ARE LOCATED OUTSIDE THE COUNTY'S RIGHT-OF-WAY OR MAINTENANCE CLAIM AREAS FOR LAYDOWN OR TEMPORARY EARTHWORK DISPOSAL (INCLUDING SEDIMENT CONTROL). THE CONTRACTOR SHALL RETURN ALL SITES USED FOR THESE PURPOSES TO ORIGINAL CONDITION OR BETTER. ANY COSTS ASSOCIATED WITH THE ABOVE SHALL BE INCLUDED IN THE COST OF MOBILIZATION/DEMOBILIZATION.

ITEM 2:
ITEM INCLUDES ALL ITEMS TO BE REMOVED FOR THE CONSTRUCTION OF THE PROJECT INCLUDING TREES, ROADWAYS, DRIVEWAYS, CURB AND GUTTER, FLUMES AND ALL OTHER ITEMS NOT LISTED AS A REMOVAL PAY ITEM. THE CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE AMOUNT, LOCATION, AND SIZE OF TREES TO BE REMOVED BEFORE BIDDING.

ITEM 3:
EARTHWORK IS A LUMP SUM PAY ITEM AND IS LIMITED TO AREAS ADJACENT TO THE TWO ENDWALL LOCATIONS. DREDGING OF A PORTION OF THE CANAL, AS SHOWN IN THE PLANS, IS INCLUDED IN THIS PAY ITEM. THIS PAY ITEM DOES NOT INCLUDE EARTHWORK ASSOCIATED WITH PIPE INSTALLATION OR ROADWAY RECONSTRUCTION.

ITEM 4:
EARTHWORK ESTABLISHING GRADE INCLUDES ALL GRADING FROM THE EDGE OF PROPOSED PAVEMENT TO THE LIMITS OF CONSTRUCTION. THIS INCLUDES RE-ESTABLISHING ALL SHOULDER AND DITCH GRADES AS SHOWN IN THE PLANS AND CROSS SECTIONS.

ITEM 5:
THIS ITEM IS INTENDED TO COVER THE CONTRACTOR'S MEANS AND METHODS FOR CONSTRUCTION OF THE WEIR/ENDWALL/SHEET PILING AT THE END OF THE CANAL. THIS MAY INCLUDE BUT IS NOT LIMITED TO DEWATERING OF THE AREA, TEMPORARILY PUMPING DOWN THE WATER SURFACE ELEVATION, OR BYPASS PUMPING IN WORK AREAS.

ITEM 6:
THIS ITEM INCLUDES ALL ITEMS AND PHASES NECESSARY TO DEWATER THE TRENCHES FOR STORMWATER SYSTEM INSTALLATION.

ITEM 8:
ITEM INTENDED FOR THE RESURFACING OF MILLED AREAS.

ITEM 11:
ITEM IS INTENDED FOR WORK CROSSING US 98. THE PAVEMENT DESIGN FOR THE LATERAL PAVEMENT PATCH MATCHES THE EXISTING PAVEMENT DESIGN FOR US 98. SEE PLAN DETAIL.

ITEM 12:
SAW CUT QUANTITY IS INTENDED FOR LOCATIONS WERE RECONSTRUCTION LIMITS END. SAW CUTTING FOR US 98 IS INCLUDED IN THE COST OF LATERAL PAVEMENT PATCH.

ITEM 17:
QUANTITY INCLUDES COST TO CONSTRUCT FLUME THAT FLOWS OVER HEADWALL LOCATED OFF LAKE JOANNE DR. FLUME AREA IS 14SY.

ITEM 20:
INCLUDES THE TOP AND BOTTOM OF DRAINAGE STRUCTURES. MANHOLE ACCESS LOCATIONS SHALL AVOID THE WHEEL PATH OF ROADWAYS BY LOCATING ALONG THE CENTERLINE OF THE ROADWAY OR CENTER OF THE TRAVEL LANE.

ITEM 21:
ITEM IS FOR CONNECTION OF EXISTING PIPE TO PROPOSED DRAINAGE STRUCTURES.

ITEMS 22-26:
ALL SHORING REQUIRED FOR PIPE INSTALLATION IS INCLUDED IN THE COST OF PIPE. DEWATERING IS INCLUDED IN OTHER ITEMS. THE COST OF REMOVAL AND REPLACEMENT OF UNSUITABLE MATERIAL IS INCLUDED IN THE COST OF PIPE. SEE GEOTECHNICAL REPORT FOR LIMITS OF UNSUITABLE MATERIAL. AT A MINIMUM, UNSUITABLE MATERIAL IS LIKELY TO BE ENCOUNTERED AT PIPE ELEVATIONS ALONG THE SOUTHERN 1300 FEET OF THE PROJECT.

ITEM 29:
SOD ALL AREAS OF DISTURBANCE FROM R/W TO R/W. SOD THICKNESS SHOULD BE CONSIDERED WHEN PLACING ON FINAL GRADES SO THAT STORMWATER RUNOFF IS NOT IMPEDED SUCH AS AT THE EDGE OF PAVEMENT OR DRIVEWAYS. SODDING OR SEEDING OF DISTURBANCE OUTSIDE THE R/W SHALL BE INCLUDED IN THE COST OF MOBILIZATION/DEMOBILIZATION.

ITEM 31:
CONTRACTOR SHALL SUBMIT A PLAN FOR COUNTY APPROVAL. ITEM INCLUDES NPDES PERMITTING.

ITEMS 33-36:
INCLUDES LAYOUT, PAINT, AND THERMOPLASTIC APPLICATION WITHIN COUNTY RIGHT-OF-WAY. INCLUDES TEMPORARY AND PERMANENT RPMS. ALL PAVEMENT MARKINGS ASSOCIATED WITH MOT SHALL BE INCLUDED IN THE COST OF MOT.

ITEM 37:
CONTRACTOR SHALL SUBMIT A PLAN FOR COUNTY APPROVAL. ITEM INCLUDES BUT IS NOT LIMITED TO DETOUR SIGNAGE, WORK ZONE SIGNAGE, DRUMS, PCMS'S, PAVEMENT MARKINGS, AND INSTALLATION AND REMOVAL OF COMMERCIAL MATERIAL FOR LOCAL DRIVEWAY/ROADWAY ACCESS AS REQUIRED.

ITEM 38:
CONTRACTOR SHALL SUBMIT A PLAN FOR FDOT APPROVAL. ITEM INCLUDES BUT IS NOT LIMITED TO TEMPORARY ASPHALT, EARTHWORK, BARRIER WALL, WORK ZONE & DETOUR SIGNAGE, DRUMS, PCMS'S, PAVEMENT MARKINGS AND ITEMS TO BE TEMPORARILY RELOCATED FOR MULTIPLE PHASES. PLAN MAY REQUIRE MULTIPLE SUBMITTALS TO FDOT.

ITEM 39:
ITEM COVERS ALL RIPRAP CEMENT SAND AND RIPRAP RUBBLE QUANTITIES SHOWN ON SHEET S007.

ITEM 40:
ITEM COVERS FINAL PLACEMENT OF PERMANENT MARKINGS, INCLUDING RPM'S IN FDOT R/W. MARKINGS TO MATCH EXISTING MARKINGS AND SHALL COVER THE LIMITS OF CONTRACTOR'S MOT PLAN.

PAY ITEMS 632-2-12 THRU 700-3-501:
THESE PAYITEMS ARE DIRECTLY FROM THE MOST CURRENT VERSION OF THE FLORIDA DEPARTMENT BASIS OF ESTIMATES MANUAL.

D. ALLEN VINSON, II
LICENSE
No. 72543
STATE OF
PROFESSIONAL ENGINEER
FLORIDA

DEPARTMENT OF ENVIRONMENTAL PROTECTION
0358869-001-EG/17
PERMIT
STATE OF FLORIDA

HDR Engineering, Inc.
25 West Cedar Street, Suite 200
Pensacola, FL 32502-5945
(850) 432-6800
www.hdrinc.com
Certificate of Authorization No. 4213

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER	A. VINSON
DESIGNED BY	J. CLARK
DRAWN BY	J. CLARK
CHECKED BY	J. BURCHFIELD
PROJECT NUMBER	PD 13-14.081

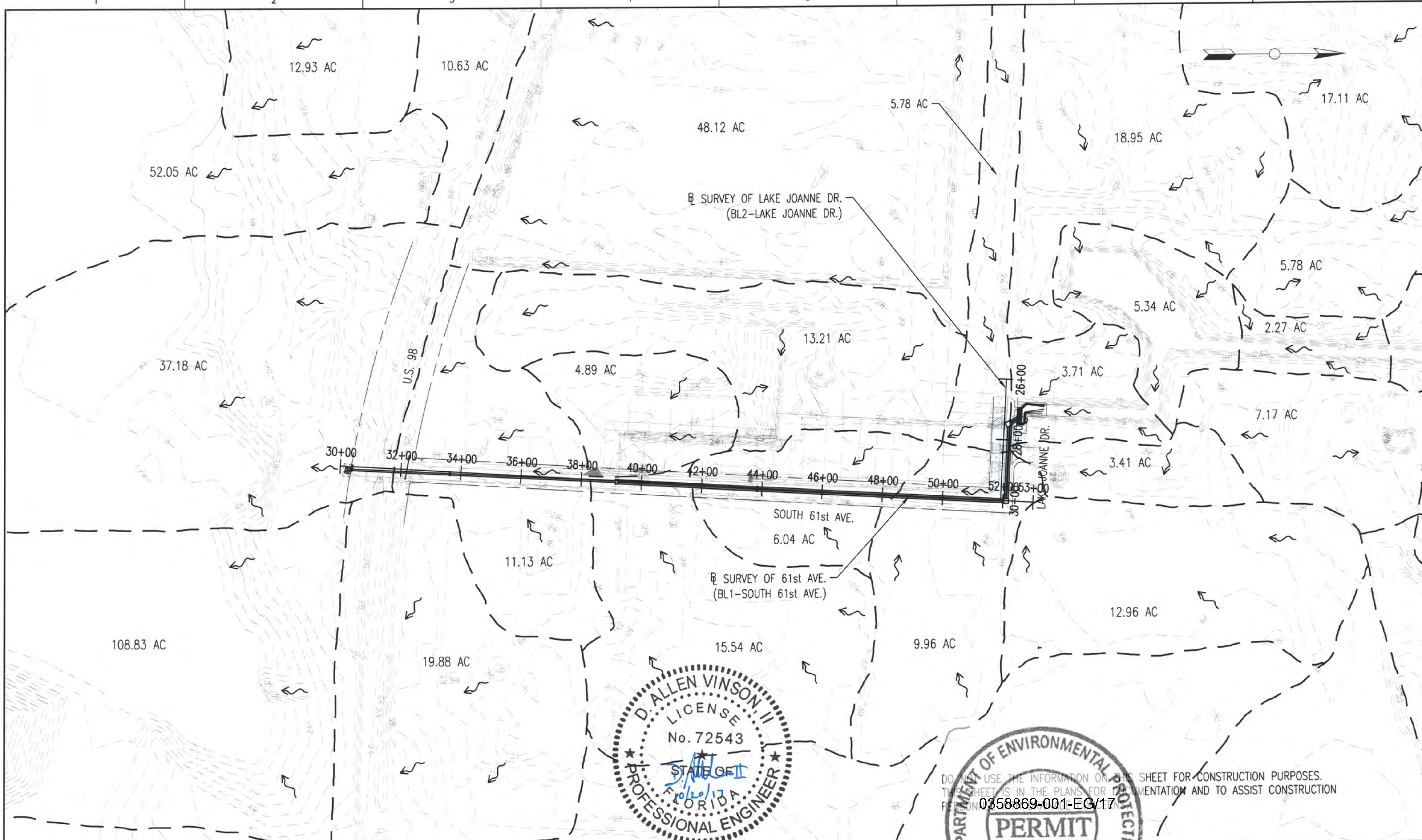
D. Allen Vinson, P.E.
License No. 72543

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE AREA
DRAINAGE IMPROVEMENTS

SUMMARY OF PAY ITEMS

11 X 17 SCALE: NOT TO SCALE

SHEET 2



HDR

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D. Allen Vinson, P.E.

License No. 72543

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT

LAKE CHARLENE DR.
DRAINAGE IMPROVEMENTS

DRAINAGE MAP

0 150 300

11 X 17 SCALE: 1" = 300'

SHEET 3

TRAFFIC DATA

DESIGN SPEED = 25 MPH
POSTED SPEED = 25 MPH
NO COUNTS AVAILABLE

RECONSTRUCTION

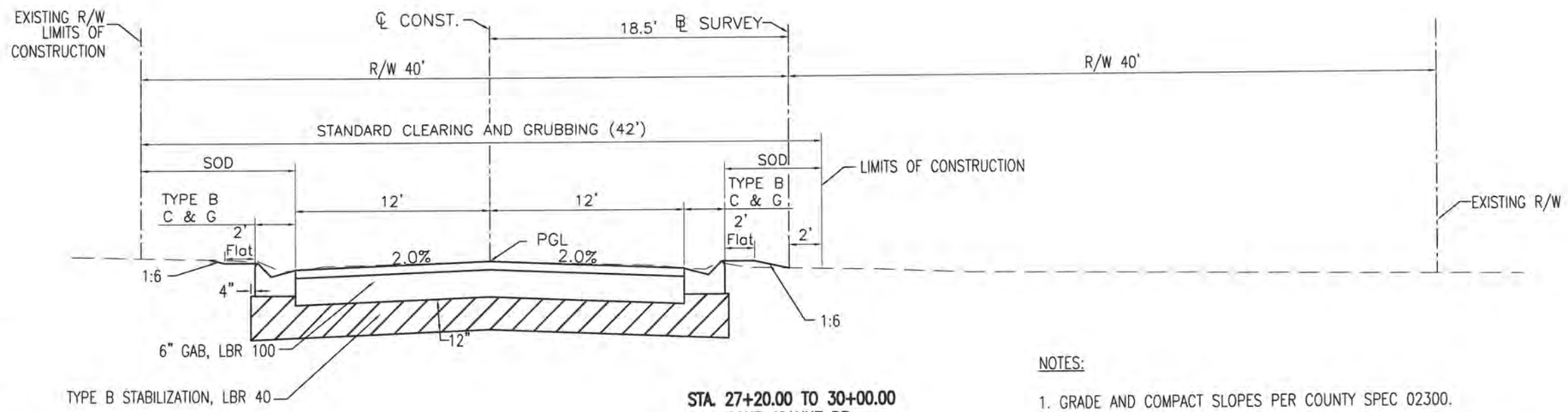
2.0" SP-12.5 ASPHALT

6" GRADED AGGREGATE BASE (98% MODIFIED PROCTOR, LBR 100)

12" TYPE B STABILIZATION (98% MODIFIED PROCTOR, LBR 40)

NOTES

1. LIMITS OF CONSTRUCTION SHALL BE AT THE R/W FOR THE LEFT SIDE AND FOR THE RIGHT SIDE IT SHALL BE 2 FT TO THE RIGHT OF SURVEY OF BASELINE.



STA. 27+20.00 TO 30+00.00
LAKE JOANNE DR.
TYPICAL SECTION
(NTS)

NOTES:

1. GRADE AND COMPACT SLOPES PER COUNTY SPEC 02300.
2. ALL PROPOSED SLOPES 1:3 OR STEEPER SHALL BE COVERED IN VEGETATED ROLLED EROSION CONTROL PRODUCTS (RECP) RATED TYPE 4 PER THE STATE OF FLORIDA E&SC DESIGNER AND REVIEWER MANUAL. DATED JULY 2013.
3. SODDED SLOPES SHALL BE STAKED PER COUNTY SPEC 02900.

TRAFFIC DATA

DESIGN SPEED = 30 MPH
POSTED SPEED = 30 MPH
NO COUNTS AVAILABLE

RECONSTRUCTION

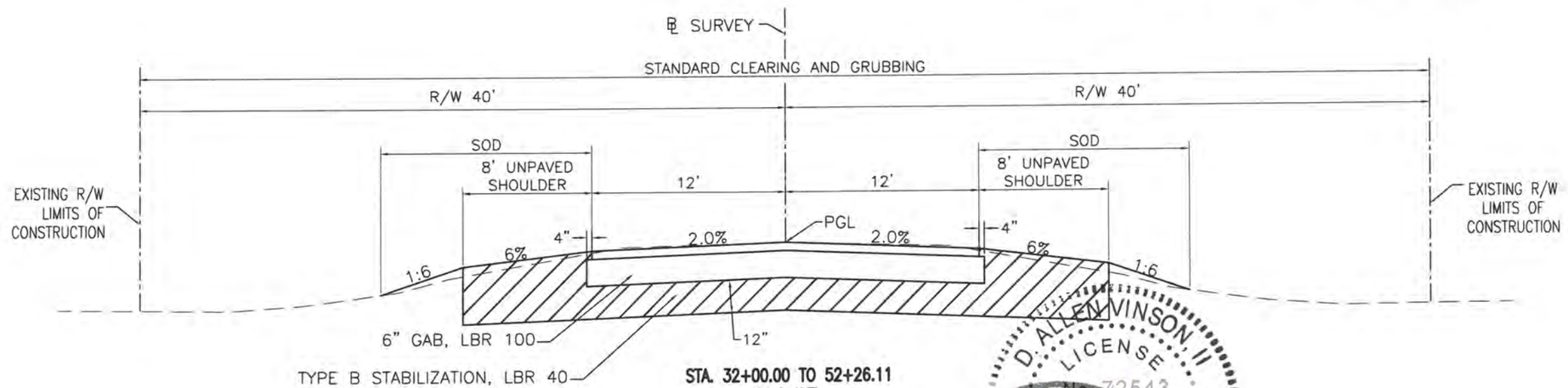
2.0" SP-12.5 ASPHALT

6" GRADED AGGREGATE BASE (98% MODIFIED PROCTOR, LBR 100)

12" TYPE B STABILIZATION (98% MODIFIED PROCTOR, LBR 40)

NOTES

1. LIMITS OF CONSTRUCTION SHALL BE AT THE R/W.



STA. 32+00.00 TO 52+26.11
61st AVE.
TYPICAL SECTION
(NTS)

D. ALLEN VINSON, II
LICENSE
No. 72543
STATE OF FLORIDA
10/10/17
DEPARTMENT OF ENVIRONMENTAL PROTECTION
0358869-001-EG/17
PERMIT

HDR Engineering, Inc.
25 West Cedar Street, Suite 200
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CHECKED BY	J. BURCHFIELD
PROJECT NUMBER	PD 13-14.081

D. Allen Vinson, P.E.
License No. 72543

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE AREA
DRAINAGE IMPROVEMENTS

TYPICAL SECTIONS

11 X 17 SCALE: NOT TO SCALE

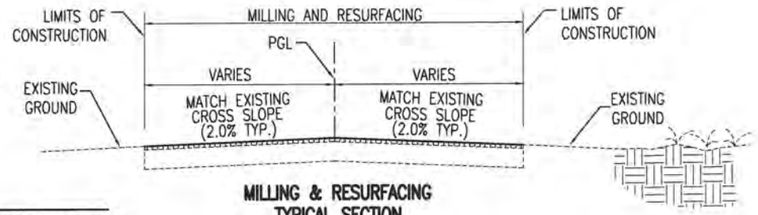
SHEET 4

TRAFFIC DATA

DESIGN SPEED = 25 MPH
POSTED SPEED = 25 MPH
NO COUNTS AVAILABLE

MILLING & RESURFACING

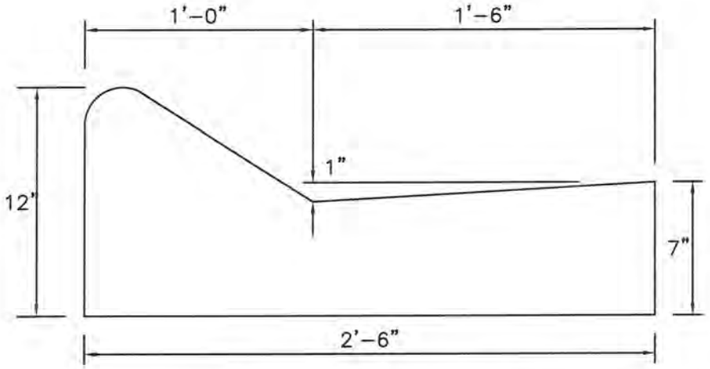
MILL 1" DEPTH RESURFACE
W/ 1" SP-12.5 ASPHALT



MILLING & RESURFACING TYPICAL SECTION (NTS) LAKE JOANNE DR.

NOTES

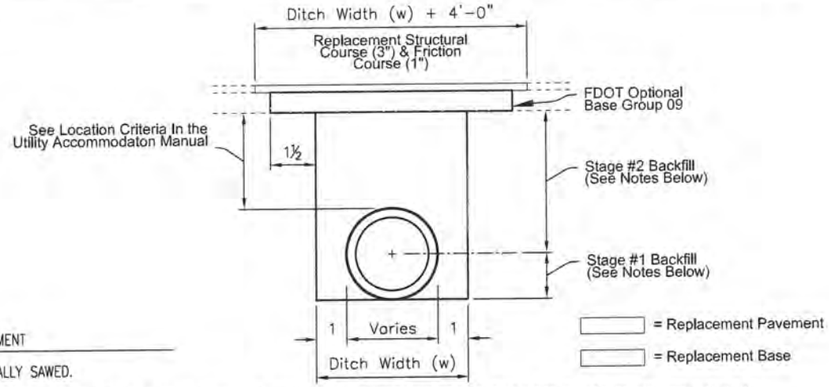
1. LIMITS OF CONSTRUCTION SHALL BE FROM EDGE OF PAVEMENT TO EDGE OF PAVEMENT UNLESS OTHERWISE DIRECTED.



TYPE 'B' CURB & GUTTER
FOR CURB MACHINE
NOT TO SCALE

NOTE:

1. ALL CURB TO HAVE DUMMY JOINT AT 10' ON CENTER. MIN. DEPTH OF JOINT TO BE 2".
2. EXPANSION JOINTS ARE TO BE 60' ON CENTER. TYPICAL FOR ALL CURB.
3. CONCRETE TO BE 3000 PSI.



NOTES:

PAVEMENT REMOVAL AND REPLACEMENT

1. PAVEMENT SHALL BE MECHANICALLY SAWED.
2. THE REPLACEMENT ASPHALT SHALL MATCH THE EXISTING STRUCTURAL AND FRICTION COURSES FOR TYPE AND THICKNESS IN ACCORDANCE WITH CURRENT FDOT ASPHALT MIX SPECIFICATIONS.
3. THE NEW BASE MATERIALS SHALL BE EITHER OF THE SAME TYPE AND COMPOSITION AS THE MATERIALS REMOVED OR OF EQUAL OR GREATER STRUCTURAL ADEQUACY (SEE FDOT PAVEMENT DESIGN MANUAL).

BACKFILL OPTION

1. COMPACTED AND STABILIZED FILL
   A. BACKFILL MATERIAL SHALL BE PLACED IN ACCORDANCE WITH SECTION 125 OF THE STANDARD SPECIFICATIONS.
   B. IN STAGE #1, CONSTRUCT COMPACTED FILL BENEATH THE HAUNCHES OF THE PIPE, USING MECHANICAL TAMPS SUITABLE FOR THIS PURPOSE. THIS COMPACTION APPLIES TO THE MATERIAL PLACED BENEATH THE HAUNCHES OF THE PIPE AND ABOVE ANY BEDDING.
   C. IN STAGE #2, CONSTRUCT COMPACTED FILL ALONG THE SIDES OF THE PIPE AND UP TO THE BOTTOM OF THE BASE, WITH THE UPPER 12" RECEIVING TYPE B STABILIZATION. IN LIEU OF TYPE B STABILIZATION, THE CONTRACTOR MAY CONSTRUCT USING OPTIONAL BASE GROUP 3.
2. FLOWABLE FILL
   A. IF COMPACTION CAN NOT BE ACHIEVED THROUGH NORMAL MECHANICAL METHODS THEN FLOWABLE FILL MAY BE USED.
   B. FLOWABLE FILL IS TO BE PLACED IN ACCORDANCE WITH SECTION 121 OF THE SPECIFICATIONS, AS APPROVED BY THE ENGINEER.
   C. DO NOT ALLOW THE UTILITY BEING INSTALLED TO FLOAT. IF A METHOD IS PROVIDED TO PREVENT FLOTATION FROM OCCURRING, STAGES #1 AND #2 CAN BE COMBINED, IF APPROVED BY THE ENGINEER.
   D. IN STAGE #1, PLACE FLOWABLE FILL MIDWAY UP ON BOTH SIDES OF THE UTILITY. ALLOW TO HARDEN BEFORE PLACING STAGE #2.
   E. IN STAGE #2, PLACE FLOWABLE FILL TO THE BOTTOM OF THE EXISTING BASE COURSE.

GENERAL NOTES

1. THE DETAILS PROVIDED IN THIS STANDARD INDEX APPLY TO CASES IN WHICH JACK AND BORE OR DIRECTIONAL BORING METHODS ARE NOT REQUIRED BY THE ENGINEER.
2. FLOWABLE FILL SHALL NOT BE PLACED DIRECTLY OVER LOOSE, OR HIGH PLASTIC, OR MUCK MATERIAL (SEE INDEX 505) WHICH WILL CAUSE SETTLEMENT DUE TO FILL WEIGHT. WHERE HIGHLY COMPRESSIBLE MATERIAL EXISTS, THE AMOUNT, SHAPE AND DEPTH OF FLOWABLE FILL MUST BE ENGINEERED TO PREVENT PAVEMENT SETTLEMENT.
3. THESE DETAILS DO NOT APPLY TO UTILITY CUTS LONGITUDINAL TO THE CENTERLINE OF THE ROADWAY WHICH MAY REQUIRE THE ADDITIONAL USE OF GEOTEXTILES, SPECIAL BEDDING AND BACKFILL, OR OTHER SPECIAL REQUIREMENTS.
4. METHOD OF CONSTRUCTION MUST BE APPROVED BY THE ENGINEER.
5. SOME PIPE MAY REQUIRE SPECIAL GRANULAR BACKFILL UP TO 6" ABOVE TOP OF PIPE. GEOTEXTILES MAY BE REQUIRED TO ENCAPSULATE THE SPECIAL GRANULAR MATERIAL.
6. WHERE ASPHALT CONCRETE OVERLAYS EXIST OVER FULL SLAB CONCRETE PAVEMENT, THE REPLACEMENT PAVEMENT SHALL HAVE AN OVERLAY CONSTRUCTED OVER THE REPLACEMENT SLAB. THE OVERLAY SHALL MATCH THE EXISTING ASPHALT PAVEMENT THICKNESS. THE REPLACEMENT FRICTION COURSE SHALL MATCH THE EXISTING FRICTION COURSE, EXCEPT STRUCTURAL COURSE MAY BE USED IN LIEU OF DENSE GRADED FRICTION COURSE.
7. ALL SHOULDER PAVEMENT, CURB, CURB AND GUTTER, AND THEIR SUPPORTING BASE DISTURBED BY UTILITY TRENCH CUT CONSTRUCTION SHALL BE RESTORED IN KIND.
8. THE USE OF FLOWABLE FILL TO REDUCE THE TIME TRAFFIC IS TAKEN OFF A FACILITY IS ENCOURAGED BUT MUST HAVE PRIOR APPROVAL BY THE ENGINEER. FLOWABLE FILL USE IS ALLOWED ONLY WHEN PROPERLY ENGINEERED FOR PAVEMENT CROSS SECTION, WHETHER STRAIGHT OR DIAGONAL, AND SHALL NOT BE INSTALLED FOR SIGNIFICANT DEPTHS OR LENGTHS. THE MINIMUM LENGTH SHALL BE FIFTY (50) FEET AND A MAXIMUM DEPTH OF SIX (6) FEET UNLESS SUPPORTED BY AN ENGINEERING DOCUMENT PREPARED BY A REGISTERED PROFESSIONAL ENGINEER THAT SPECIALIZES IN SOILS ENGINEERING. THE ENGINEERING DOCUMENT SHALL ADDRESS THE EVALUATION OF THE GROUNDWATER FLOW INTERACTION AND SETTLEMENT POTENTIAL.
9. EXCAVATABLE FLOWABLE FILL IS TO BE USED WHEN [illegible] FLOWABLE BACKFILL IS SPECIFIED.

TRENCH [illegible] ACROSS ROADWAYS PER FDOT INDEX 307

D. ALLEN VINSON, II LICENSE No. 72543 STATE OF FLORIDA PROFESSIONAL ENGINEER
10/20/2017

DEPARTMENT OF ENVIRONMENTAL PROTECTION PERMIT STATE OF FLORIDA
0358869-001-EG/17

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25 West Cedar Street, Suite 200
Pensacola, FL 32502-5945
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PROJECT MANAGER	A. VINSON
DESIGNED BY	J. CLARK
DRAWN BY	J. CLARK
CHECKED BY	J. BURCHFIELD
PROJECT NUMBER	PD 13–14.081

D. Allen Vinson, P.E.
License No. 72543

ESCAMBIA COUNTY FLORIDA
ESCAMBIA COUNTY ENGINEERING DEPARTMENT
LAKE CHARLOTTE AREA DRAINAGE IMPROVEMENTS

TYPICAL SECTION DETAILS

0

11 X 17 SCALE: NOT TO SCALE

SHEET 5

X = SHEET NUMBERS

BENCHMARK #1
SET NAIL IN POLE
Alignment=BL1-South 61st Street
Station=30+82.04
Offset=12.55 RT
ELEV.= 29.56

BENCHMARK #2
SET NAIL IN POLE
Alignment=BL1-South 61st Street
Station=39+21.42
Offset=18.32 LT
ELEV.= 29.43

BENCHMARK #5
SET NAIL IN POLE
Alignment=BL1-South 61st Street
Station=51+86.03
Offset=316.35 LT
ELEV.= 28.95

BEGIN ALIGNMENT=BL2-Lake Joanne Dr.
STATION=26+00.00
OFFSET=0.000
NORTHING=520936.8135
EASTING=1085148.4436

S86° 47' 41.60"E
400.00'

N3° 19' 34.13"E
2300.00'

℄ SURVEY OF LAKE JOANNE DR.
(BL2-LAKE JOANNE DR.)

END ALIGNMENT=BL2-Lake Joanne Dr.
STATION=30+00.00
OFFSET=0.000
NORTHING=520914.4493
EASTING=1085547.8179

U.S. 98

SOUTH 61st AVE.

LAKE JOANNE DR.

BEGIN ALIGNMENT=BL1=SOUTH 61st AVE
STATION=30+00.00
OFFSET=0.000
NORTHING=518726.1348
EASTING=1085420.6385

℄ SURVEY OF 61st AVE.
(BL1-SOUTH 61st AVE.)

BENCHMARK #3
SET NAIL IN POLE
Alignment=BL1-South 61st Street
Station=46+02.55
Offset=16.18 RT
ELEV.= 28.47

BENCHMARK #4
SET NAIL IN POLE
Alignment=BL1-South 61st Street
Station=51+77.34
Offset=27.02 RT
ELEV.= 30.04

END ALIGNMENT=BL1-SOUTH 61st AVE
STATION=53+00.00
OFFSET=0.000
NORTHING=521022.2604
EASTING=1085554.0836

D. ALLEN VINSON, II
LICENSE
No. 72543
STATE OF FLORIDA
PROFESSIONAL ENGINEER
10/20/2017

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STATE OF FLORIDA
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PROJECT NUMBER	PD 13-14.081

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License No. 72543

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE AREA
DRAINAGE IMPROVEMENTS

PROJECT LAYOUT

0 75 150
11 X 17 SCALE: 1" = 150'

SHEET 6

GENERAL NOTES:

1. THE CONTRACTORS SHALL NOTIFY THE COUNTY DESIGN ENGINEER OR DESIGNEE 48 HOURS PRIOR TO CONSTRUCTION.
2. ALL CONDITIONS AND STIPULATIONS OF THE CONSTRUCTION PERMITS AND THE APPROVALS ISSUED BY THE ESCAMBIA COUNTY ENGINEER SHALL BE COMPLIED WITH IN EVERY DETAIL.
3. ANY DAMAGE TO ROADWAYS OR ADJACENT PRIVATE PROPERTIES CAUSED BY THE CONTRACTORS OPERATIONS SHALL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S SOLE EXPENSE.
4. THE CONTRACTOR SHALL TAKE STEPS NECESSARY TO PREVENT EROSION AND ANY OFF SITE SEDIMENT TRANSPORT RESULTING FROM INCREASED RUNOFF DURING CONSTRUCTION BY PROVIDING SILT FENCE AND/OR STAKED HAY BALES AS REQUIRED BY FDOT EROSION AND SEDIMENT CONTROL INSPECTOR'S MANUAL, 2012 EDITION, OR AS INDICATED ON THE PLANS. ALL EROSION CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL ASSOCIATED DISTURBED AREAS ARE STABILIZED AS TO REDUCE SEDIMENT RUNOFF, UNLESS OTHERWISE DIRECTED BY THE ENGINEER OR DESIGNEE.
5. ANY NECESSARY PERMITS WILL BE THE RESPONSIBILITY OF THE CONTRACTOR. ESCAMBIA COUNTY OR ITS DESIGNEE WILL ASSIST CONTRACTOR WITH REQUIRED PERMITS.
6. THE CONTRACTOR IS CAUTIONED TO VISIT THE SITE AND FAMILIARIZE HIMSELF WITH THE PROJECT PRIOR TO BIDDING AND/OR CONSTRUCTION.
7. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO PRESERVE OR RELOCATE ALL BENCHMARKS (VERTICAL CONTROL) AS NEEDED DURING CONSTRUCTION. ALL PUBLIC OR PRIVATE CORNER MONUMENTATION SHALL BE PROTECTED. IF A PUBLIC OR PRIVATE CORNER MONUMENTATION IS IN DANGER OF BEING DESTROYED AND HAS NOT BEEN PROPERLY REFERENCED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER OR DESIGNEE IMMEDIATELY. ANY ESCAMBIA COUNTY HARN/GPS NETWORK MONUMENTS OR BUREAU OF SURVEY AND MAPPING GPS NETWORK MONUMENTS WITHIN THE LIMITS OF CONSTRUCTION SHALL BE PROTECTED. IF A HARN/GPS NETWORK MONUMENTS OR BUREAU OF SURVEY AND MAPPING GPS NETWORK MONUMENTS ARE DISTURBED OR DESTROYED THE CONTRACTOR SHALL BE RESPONSIBLE FOR RELACEMENT OF THE MONUMENTS AND HAVE THE MONUMENTS POSITION DETERMINED BY A FLORIDA LICENSED PROFESSIONAL SURVEYOR AND MAPPER USING GUIDELINES AS ESTABLISHED BY NATIONAL GEODETIC SURVEY FOR BLUE BOOKING AND APPROVAL.
8. EXISTING DRAINAGE FEATURES WITHIN CONSTRUCTION LIMITS SHALL REMAIN UNLESS OTHERWISE NOTED.
9. THE CONTRACTOR SHALL MATCH EXISTING CONDITIONS AT THE BEGINNING AND END OF CONSTRUCTION AS DIRECTED BY THE COUNTY ENGINEER OR DESIGNEE.
10. EXISTING STREETS AND DRIVES SHALL BE MAINTAINED TO LOCAL TRAFFIC AND PROPERTY OWNERS.
11. ALL ROADWAY CONSTRUCTION SHALL COMPLY WITH THE ESCAMBIA COUNTY TECHNICAL SPECIFICATIONS, LATEST EDITION.
12. ALL MATERIALS, TESTING AND CONSTRUCTION METHODS SHALL CONFORM TO THE ESCAMBIA COUNTY TECHNICAL SPECIFICATIONS, LATEST EDITION.
13. ANY REFERENCE TO FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION, DIVISION 1, GENERAL REQUIREMENTS AND COVENANTS, SHALL BE EXCLUDED AND NOT APPLICABLE TO ANY SPECIFICATION REFERRED HEREIN OR OTHERWISE LISTED IN THESE PLANS OR RELATED DOCUMENTS OR THE ESCAMBIA COUNTY TECHNICAL SPECIFICATIONS.
14. EXISTING STREET AND ROAD NAME SIGNS ON THE PROJECT SHALL BE KEPT VISIBLE AT ALL TIMES FOR THE FACILITATION OF ACCESS BY EMERGENCY VEHICLES. ALL OTHER EXISTING SIGNS THAT CONFLICT WITH CONSTRUCTION OPERATIONS SHALL BE TAKEN DOWN AND STOCKPILED WITHIN THE R/W LIMITS BY THE CONTRACTOR AS DIRECTED BY THE COUNTY ENGINEER OR DESIGNEE. ANY EXISTING SIGNS THAT ARE TO BE RELOCATED AND ARE DAMAGED BEYOND USE BY THE CONTRACTOR SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE.
15. CONTRACTOR SHALL COMPLY WITH ALL F.D.E.P. AND ARMY CORP. OF ENGINEERS REQUIREMENTS.
16. ONLY ACCESS TO THE ROAD R/W AS SHOWN IS GUARANTEED BY THE COUNTY. PRIVATE R/W REQUIRED BY THE CONTRACTOR TO FACILITATE CONSTRUCTION SHALL BE ACQUIRED BY THE CONTRACTOR WITH NO ADDITIONAL COMPENSATION OR ASSISTANCE FROM THE COUNTY.
17. IN THE EVENT THAT SURVEY MONUMENTATION OR REFERENCE POINTS ARE MISSING OR HAVE BEEN DESTROYED, PLEASE CONTACT:

DANNY SWAIN
3363 WEST PARK PLACE
PENSACOLA, FLORIDA 32505 PH (850) 595-3427

ERIC STUART, PMS
NOBLES CONSULTING GROUP
600 UNIVERSITY OFFICE BLVD., SUITE 17-B
PENSACOLA, FL. 32504, (850) 857-7723

18. VEGETATION ON R/W AND EASEMENTS SHALL BE RESTORED TO ORIGINAL CONDITION UNLESS OTHERWISE NOTED ON THE PLAN SHEETS. COST OF SAID RESTORATION SHALL BE CONSIDERED INCIDENTAL TO OTHER PAY ITEMS.
19. ALL TREES WITHIN LIMITS OF CONSTRUCTION SHALL BE REMOVED UNLESS OTHERWISE NOTED IN PLANS.
20. ALL COMPACTED FILL SHALL BE PLACED IN 4" LIFTS FOR HAND POWERED TAMPERS AND 8" LIFTS FOR HEAVY EQUIPMENT OPERATED TAMPERS.
21. IF ARCHAEOLOGICAL MATERIAL/PREHISTORIC ARTIFACTS SUCH AS POTTERY OR CERAMICS, STONE TOOLS OR METAL IMPLEMENTS, OR ANY OTHER PHYSICAL REMAINS THAT COULD BE ASSOCIATED WITH NATIVE AMERICAN CULTURES, OR EARLY COLONIAL OR AMERICAN SETTLEMENT ARE ENCOUNTERED AT ANY TIME, THE PROJECT SHOULD CEASE ALL ACTIVITIES INVOLVING SUBSURFACE DISTURBANCE IN THE IMMEDIATE VICINITY OF SUCH DISCOVERIES. THE APPLICANT/RECIPIENT, OR OTHER DESIGNEE, SHOULD CONTACT THE FLORIDA DEPARTMENT OF STATE, DIVISION OF HISTORICAL RESOURCES, THE STATE HISTORIC PRESERVATION OFFICER (SHPO) AND THE DSH/FEMA REGION IV ENVIRONMENTAL OFFICER AND FDEM STATE ENVIRONMENTAL LIAISON OFFICER FOR FURTHER GUIDANCE. PROJECT ACTIVITIES SHOULD NOT RESUME WITHOUT WERBAL AND/OR WRITTEN AUTHORIZATION FROM THE DIVISION OF HISTORICAL RESOURCES.
22. IN THE EVENT THAT UNMARKED HUMAN REMAINS ARE ENCOUNTERED DURING PERMITTED ACTIVITIES, ALL WORK MUST STOP IMMEDIATELY AND THE PROPER AUTHORITIES NOTIFIED IN ACCORDANCE WITH F.S. 872.05.
23. GROUNDWATER ELEVATIONS SHOWN IN THE PLANS REFLECT GROUNDWATER ELEVATIONS DURING TIME OF GEOTECHNICAL BORINGS ONLY. GROUNDWATER ELEVATIONS CAN FLUCTUATE UP OR DOWN.

UTILITY NOTES:

1. THE LOCATION SHOWN FOR EXISTING UNDERGROUND UTILITIES IS APPROXIMATE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK IN EACH AREA. THE CONTRACTOR AGREES TO BE COMPLETELY RESPONSIBLE FOR ALL DAMAGES WHICH MIGHT OCCUR BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ALL UTILITIES.
2. UTILITY OWNERS SHALL BE NOTIFIED AT LEAST 48 HOURS PRIOR TO ANY CONSTRUCTION SO THAT THE UTILITY OWNER CAN SPOT VERIFY AND/OR EXPOSE THEIR UTILITIES. KNOWN UTILITIES OWNERS INCLUDE:

SEWER/WATER - EMERALD COAST UTILITY AUTHORITY
MR. MIKE HAMLIN
P.O. BOX 15311
PENSACOLA, FL. 32514 PH: (850) 969-3310

NATURAL GAS - ENERGY SERVICES OF PENSACOLA
MR. CLINT SHEVAT
1625 ATWOOD DRIVE
PENSACOLA, FL. 32514 PH: (850) 791-5285

TELEPHONE - AT&T FLORIDA
MR. STEVE KENNINGTON
MILTON, FL. 32571
PH: (850) 623-3811

TRAFFIC DEPARTMENT - ESCAMBIA COUNTY PUBLIC WORKS
MRS. JOHNNY COX
3363 WEST PARK PLACE
PENSACOLA, FL. 32505 PH:(850) 595-3404

ELECTRIC - GULF POWER
MR. CHAD SWAILS
5120 DOGWOOD DRIVE
MILTON, FL. 32570 PH: (850) 429-2446

CABLE - COX CABLE
MR. TROY YOUNG
2421 EXECUTIVE PLAZA
PENSACOLA, FL. 32504 PH: (850) 857-4564

SUNSHINE STATE ONE-CALL
7200 LAKE ELLENOR DRIVE, SUITE 200
ORLANDO, FL. 32809 PH: (800) 432-4770

3. AT&T FLORIDA WILL COMPLETE ALL WORK DURING THE HOURS OF 7:30 AM - 4:30 PM, MONDAY THRU FRIDAY. NO NIGHT OR WEEKEND WORK.
4. ALL CABLE DAMAGE MUST BE REPORTED TO THE ATT FLORIDA REPAIR SERVICE DEPARTMENT AT 611 FROM A LAND LINE OR 877-737-2478 IF USING A CELL PHONE.
5. CONTRACTOR IS TO USE CAUTION WHEN WORKING IN OR AROUND AREAS OF OVERHEAD TRANSMISSION LINES AND UNDERGROUND UTILITIES.
6. UTILITIES TO REMAIN AND BE PROTECTED DURING CONSTRUCTION. NECESSARY REPAIRS SHALL BE CONSIDERED INCIDENTAL TO OTHER PAY ITEMS AND SHALL BE TO THE SATISFACTION OF UTILITY OWNERS.

D. ALLEN VINSON, II
LICENSE
No. 72543
STATE OF
10/20/2017
FLORIDA
PROFESSIONAL ENGINEER

SURVEYOR NOTES

1. NORTH AND BEARINGS ARE GRID BASED ON THE NORTH AMERICAN DATUN 1983 AS SHOWN ON THE BASELINE OF SURVEY OF 61ST AVE. PER GPS CONTINUAL OPERATING REFERENCE STATION "PENSACOLA" PER THE STATE OF FLORIDA.
2. NO TITLE SEARCH WAS PERFORMED BY NOR FURNISHED TO MOTT MACDONALD FLORIDA LLC FOR THE PURPOSES OF THIS SURVEY SHOWN HEREON.
3. THE OPINION OF THE LOCATION AND EXTENT OF THE PROPERTY REPRESENTED & RIGHT OF WAYS BY THE SURVEY DOES NOT GUARANTEE TITLE TO NOR DETERMINE OWNERSHIP TO ANY PERSONS OR PARTY.
4. ALL UNDERGROUND UTILITIES SHOWN WERE LOCATED PER 811 DESIGN TICKETS 323606849, 323606909 & 323606963 AND THEIR PAINTED/FLAGGED LOCATIONS SURVEYED BY MOTT MACDONALD FIELD CREWS. SURVEYOR DOES GUARANTEE UNDERGROUND LOCATIONS. THERE MAY BE OTHER UNDERGROUND UTILITIES NOT SHOWN HEREON. SIZES AND DEPTHS ARE UNKNOWN.
5. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM 1988 AS SHOWN ON THIS SURVEY PER THE PROJECTED ELEVATION FROM GPS CONTINUAL REFERENCE STATION "PENSACOLA" PER THE STATE OF FLORIDA.
6. RIGHT OF WAYS AND PARCELS LINES ARE CALCULATED PER FIELD SURVEY OF SUBDIVISION MAPS, RIGHT OF WAY MAPS AND APPARENT MAINTENANCE.

LEGEND & ABBREVIATIONS

LEGEND & ABBREVIATIONS (CONT'D)

DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OF FLORIDA
0358869-001-EG/17
PERMIT
EG

HDR Engineering, Inc.
25 West Cedar Street, Suite 200
Pensacola, FL 32502-5945
(850) 432-6800
www.hdrinc.com
Certificate of Authorization No. 4213

ISSUE	DATE	DESCRIPTION
–	–	–

PROJECT MANAGER	A. VINSON
DESIGNED BY	J. CLARK
DRAWN BY	J. CLARK
CHECKED BY	J. BURCHFIELD
PROJECT NUMBER	PD 13-14.081

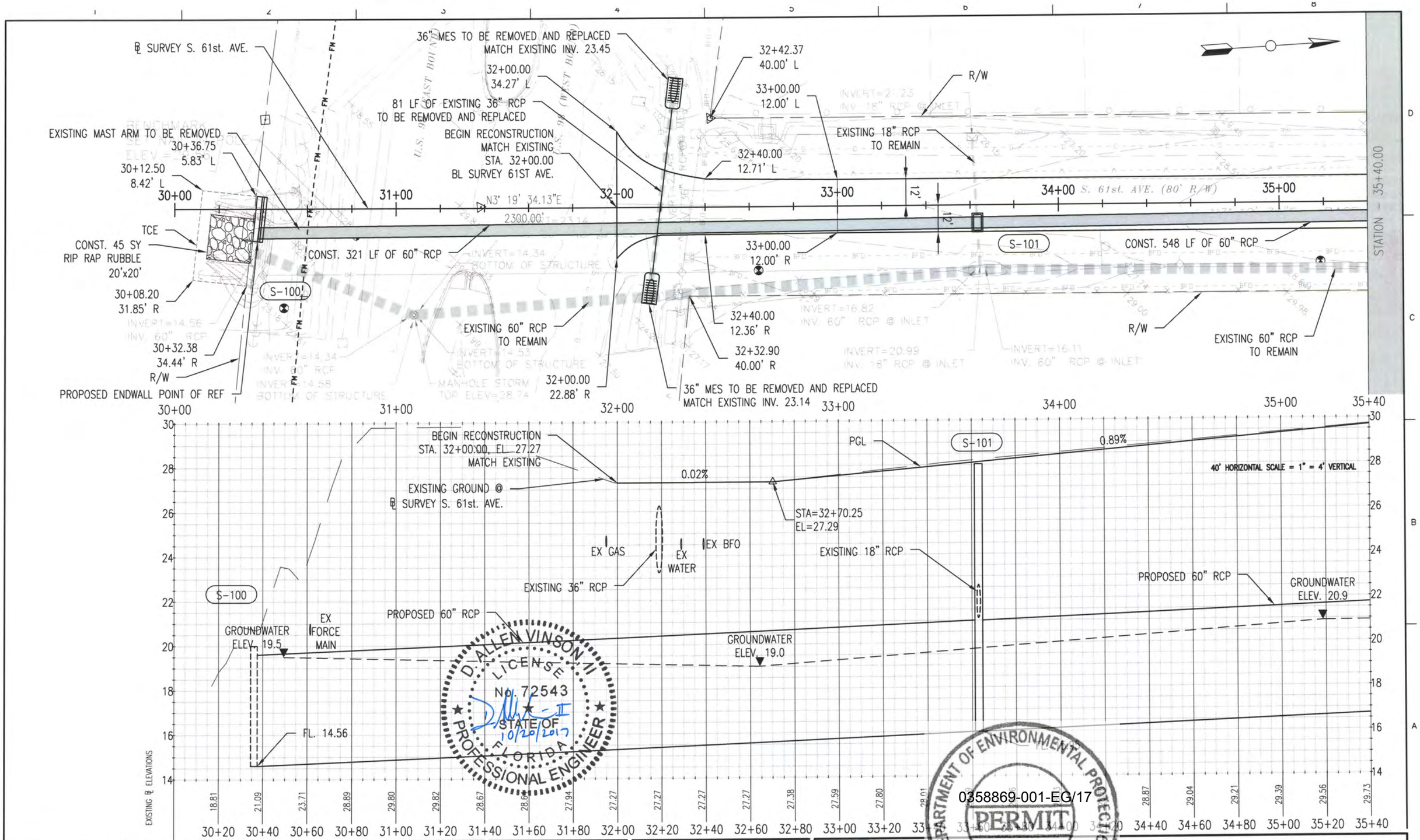
D. Allen Vinson, P.E.
License No. 72543

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE DRIVE
DRAINAGE IMPROVEMENTS

PROJECT NOTES

0 | 11 X 17 SCALE: | NOT TO SCALE

SHEET 7



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PROJECT NUMBER	13-14.081

D. Allen Vinson, P.E.
License No. 72543

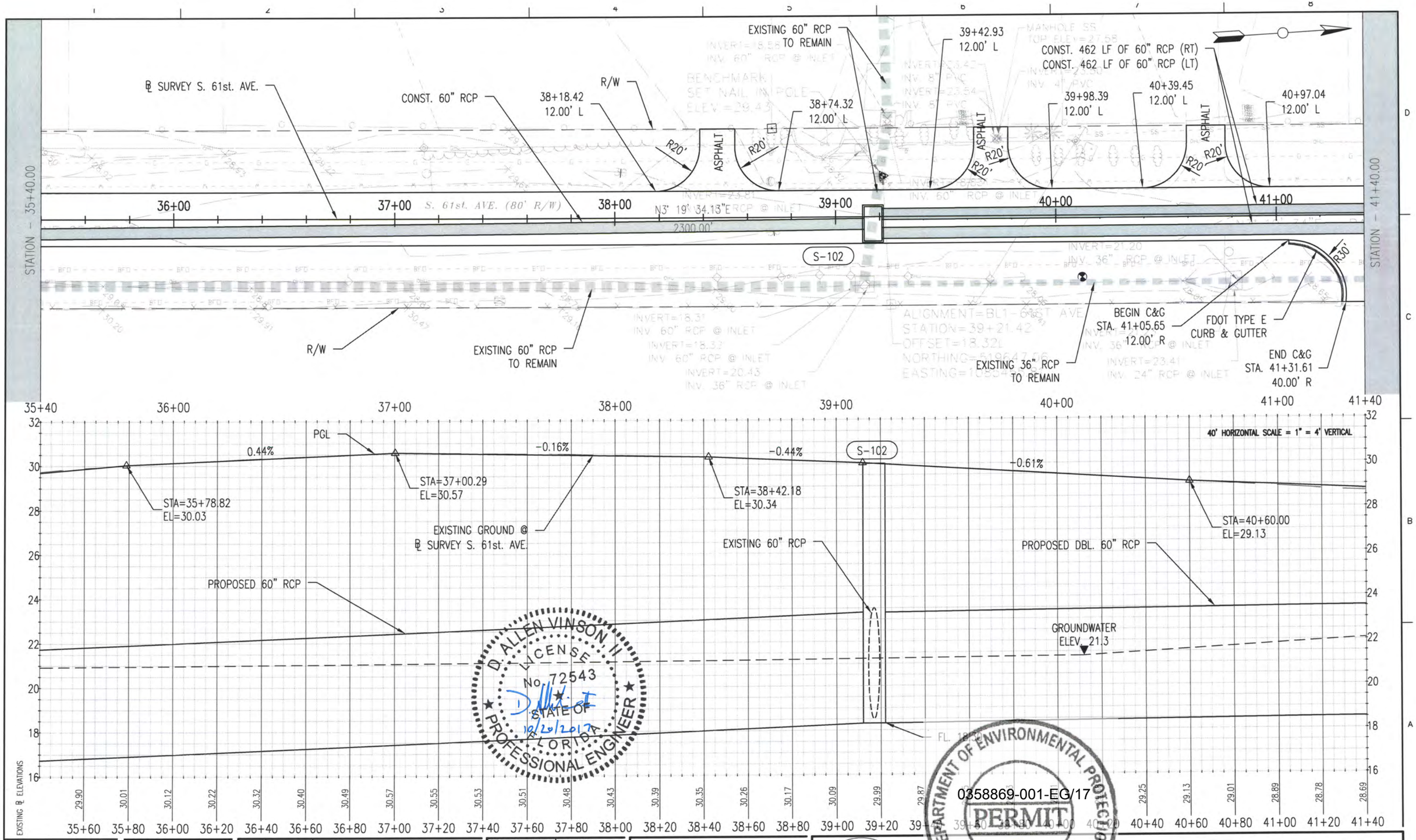
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLES
DRAINAGE IMPROVEMENTS

PLAN & PROFILE
S. 61 st. AVE.
STA. 30+00.00 - 35+40.00

0 20 40

11 X 17 SCALE:	1" = 40'

SHEET 8



D. ALLEN VINSON, II
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10/20/2017

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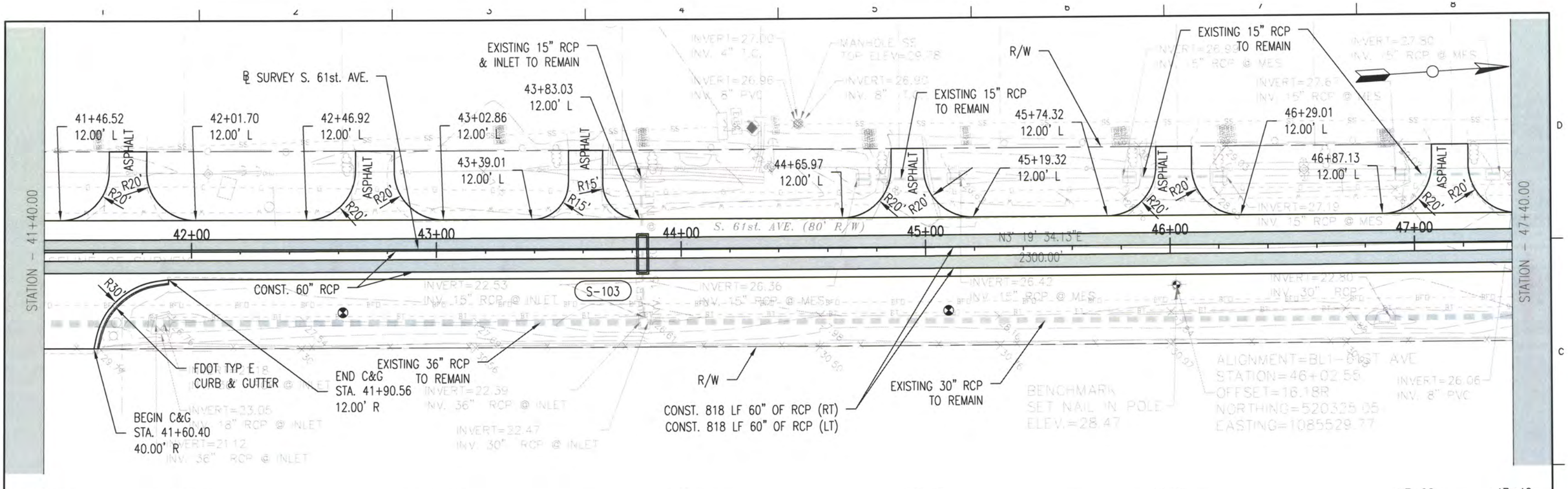
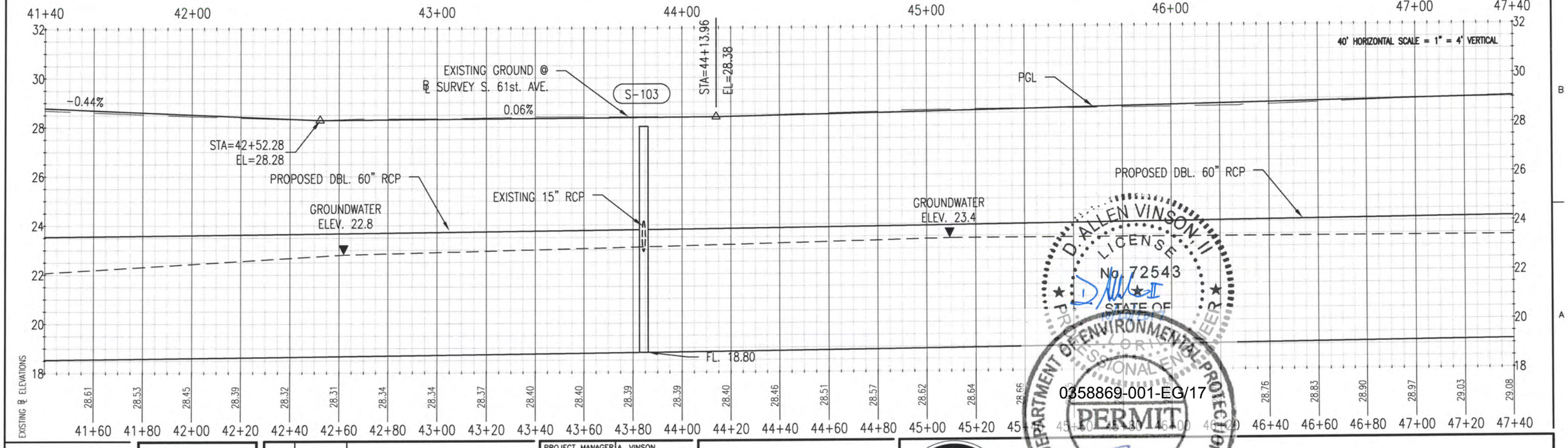
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE
DRAINAGE IMPROVEMENTS

PLAN & PROFILE
S. 61 st. AVE.
STA. 35+40.00 - 41+40.00

0 20 40
11 X 17 SCALE: 1" = 40'

SHEET 9





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D. ALLEN VINSON, II LICENSE No. 72543 STATE OF FLORIDA PROFESSIONAL ENGINEER

DEPARTMENT OF ENVIRONMENTAL PROTECTION
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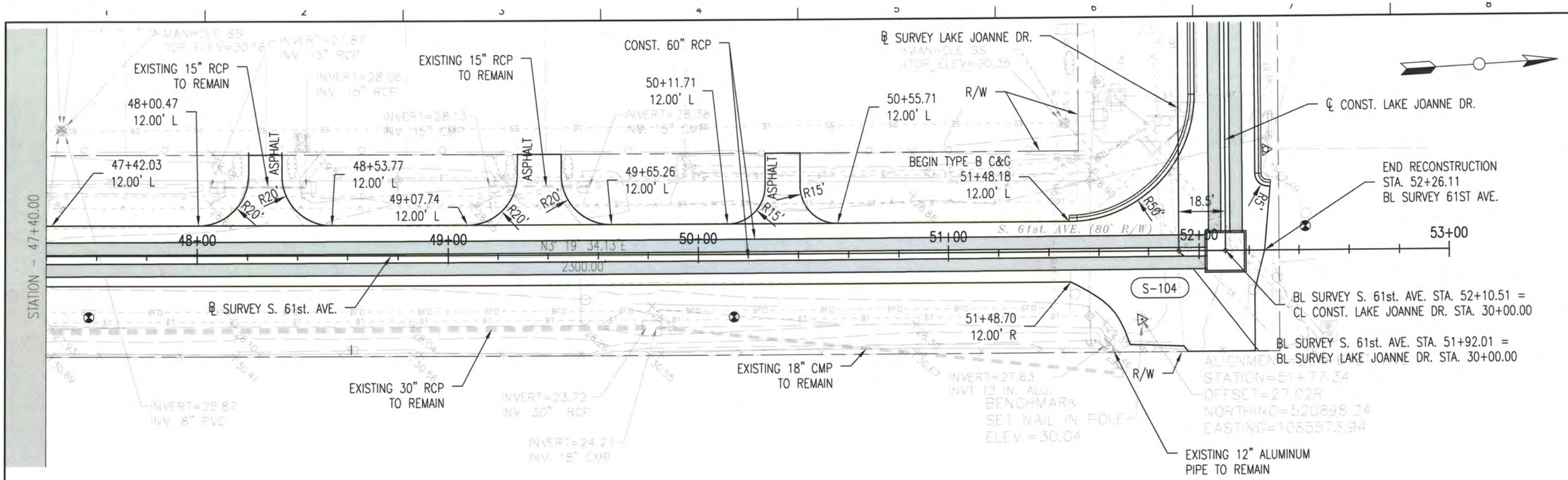
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE DRAINAGE IMPROVEMENTS

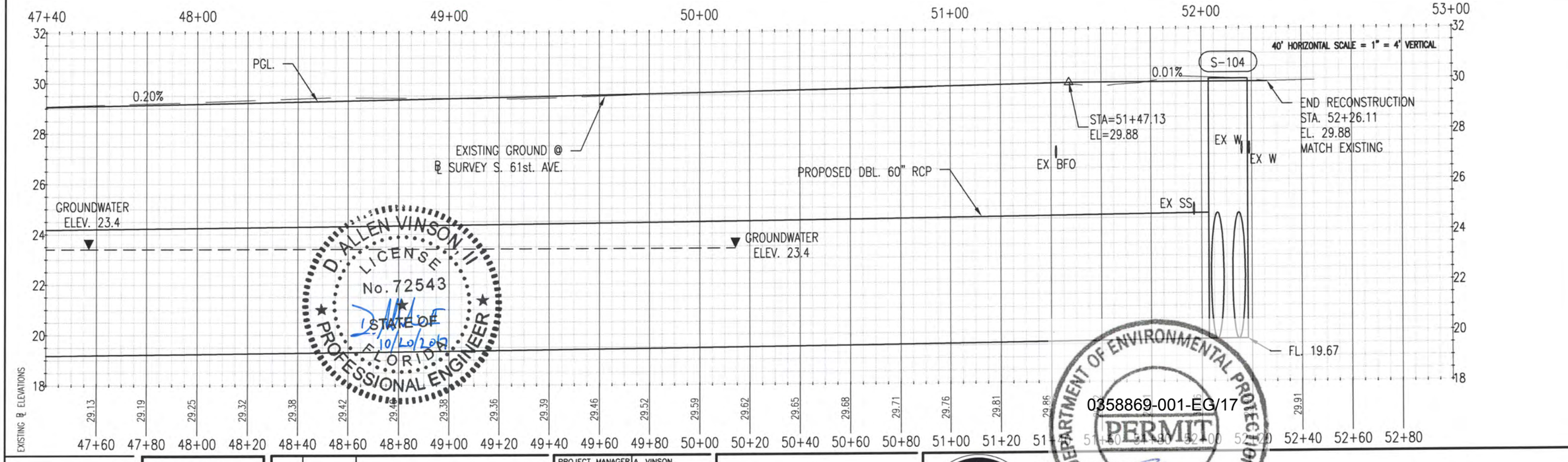
PLAN & PROFILE
S. 61 st. AVE.
STA. 41+40.00 - 47+40.00

0 20 40

11 X 17 SCALE: 1" = 40'

SHEET 10





D. ALLEN VINSON, II LICENSE No. 72543 STATE OF FLORIDA PROFESSIONAL ENGINEER
10/20/2017

DEPARTMENT OF ENVIRONMENTAL PROTECTION STATE OF FLORIDA
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ISSUE	DATE	DESCRIPTION
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PROJECT MANAGER	A. VINSON
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CHECKED BY	A. VINSON
PROJECT NUMBER	13-14.081

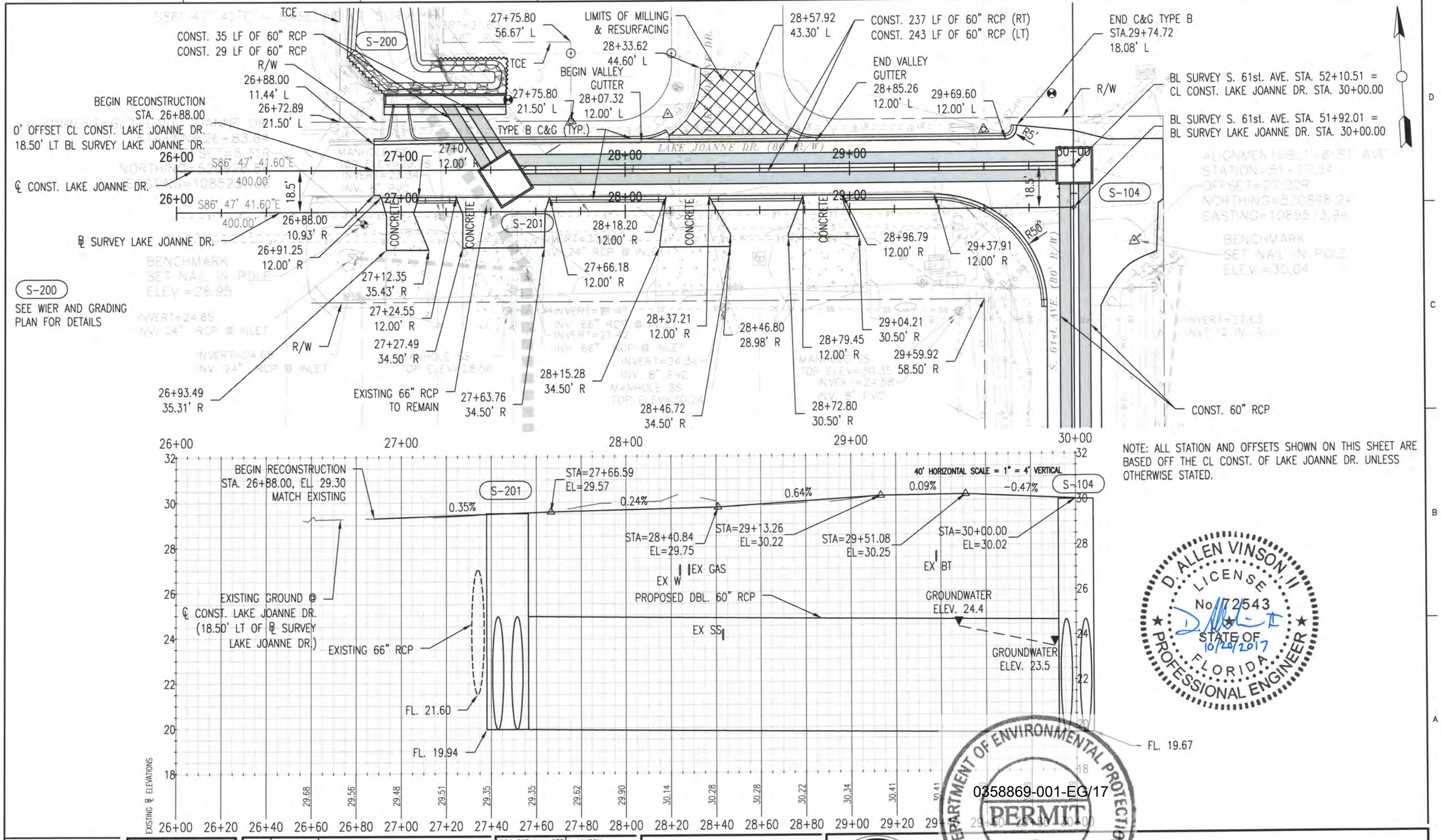
D. Allen Vinson, P.E.
License No. 72543

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE
DRAINAGE IMPROVEMENTS

PLAN & PROFILE
S. 61 st. AVE.
STA. 47+40.00 - 53+00.00

0 20 40
11 X 17 SCALE: 1" = 40'

SHEET 11



NOTE: ALL STATION AND OFFSETS SHOWN ON THIS SHEET ARE BASED OFF THE CL CONST. OF LAKE JOANNE DR. UNLESS OTHERWISE STATED.

D. ALLEN VINSON, II
LICENSE
No. 72543
STATE OF
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DRAWN BY	J. CLARK
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PROJECT NUMBER	13-14.081

D. Allen Vinson, P.E.
License No. 72543

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE
DRAINAGE IMPROVEMENTS

PLAN & PROFILE
LAKE JOANNE DR.
STA. 26+00.00 - 30+00.00

0 20 40
11 X 17 SCALE: 1" = 40'

SHEET 12

NOTE: ALL STATION AND OFFSETS ARE BASED OFF
℄ CONST. LAKE JOANNE DR. UNLESS NOTED.

S-200
STA. 27+19.77, 28.33' LT
CONST. STRAIGHT ENDWALL
WITH WEIR
(1) EXISTING 66", (2) 60"
FDOT INDEX NO. 251, 252
FL. 21.60 (EXISTING 66" RCP)
FL. 20.75 (PROPOSED WEIR)
FL. 20.00 (PROPOSED DBL. 60")

D. ALLEN VINSON, II
LICENSE
No. 72543
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
10/26/2017

26+72.88
119.67' L

27+18.88
119.67' L

TCE

TCE

BEGIN SHEET PILE
TIE INTO EXISTING WALL
STA. 26+76.24
50.24' L

20 19 18

18 19 20

27+10.09
49.67' L

27+18.88
56.67' L

BEGIN SHEET PILE
TIE INTO EXISTING WALL
STA. 27+17.14
49.54' L

TCE

27+75.80
56.67' L

SEE SHEET S006 FOR
SHEET PILE WALL PLANS

SEE SHEET S006 FOR
SHEET PILE WALL PLANS

END SHEET PILE
TIE TO PROPOSED
HEADWALL
STA. 26+92.64
33.93' L

R6'
R3'
R1'

R1' R4' R6'

27+40.89
42.67' L

END SHEET PILE
TIE TO PROPOSED
HEADWALL
STA. 27+46.89
33.74' L

SEE SHEET S002
FOR HEADWALL DETAILS

R/W

TCE

S-200

26+72.88
21.67' L

27+75.80
21.50' L

R4'

27+08.44
13.30' L

BEGIN TYPE B
C&G MATCH EXISTING
26+88.00
11.44' L

PROPOSED DBL. 60" RCP

R4'

27+20.00
12.00' L

26+00

S86° 47' 41.60"E
400.00'

27+00

℄ CONST. LAKE JOANNE DR.

18.5'

BEGIN RECONSTRUCTION
STA. 26+88.00
18.50' L

26+91.40
13.00' L

26+00

S86° 47' 41.60"E
400.00'

27+00

28+00

29+00

℄ SURVEY LAKE JOANNE DR.

EXISTING 66" RCP TO
REMAIN AND TO BE
CONNECTED TO S-200

PROPOSED DBL. 60" RCP

R/W

END TYPE B
C&G MATCH EXISTING
28+18.27
17.41' L

LAKE JOANNE DR. (80' R/W)

BENCHMARK

DEPARTMENT OF ENVIRONMENTAL PROTECTION
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STATE OF FLORIDA

HDR
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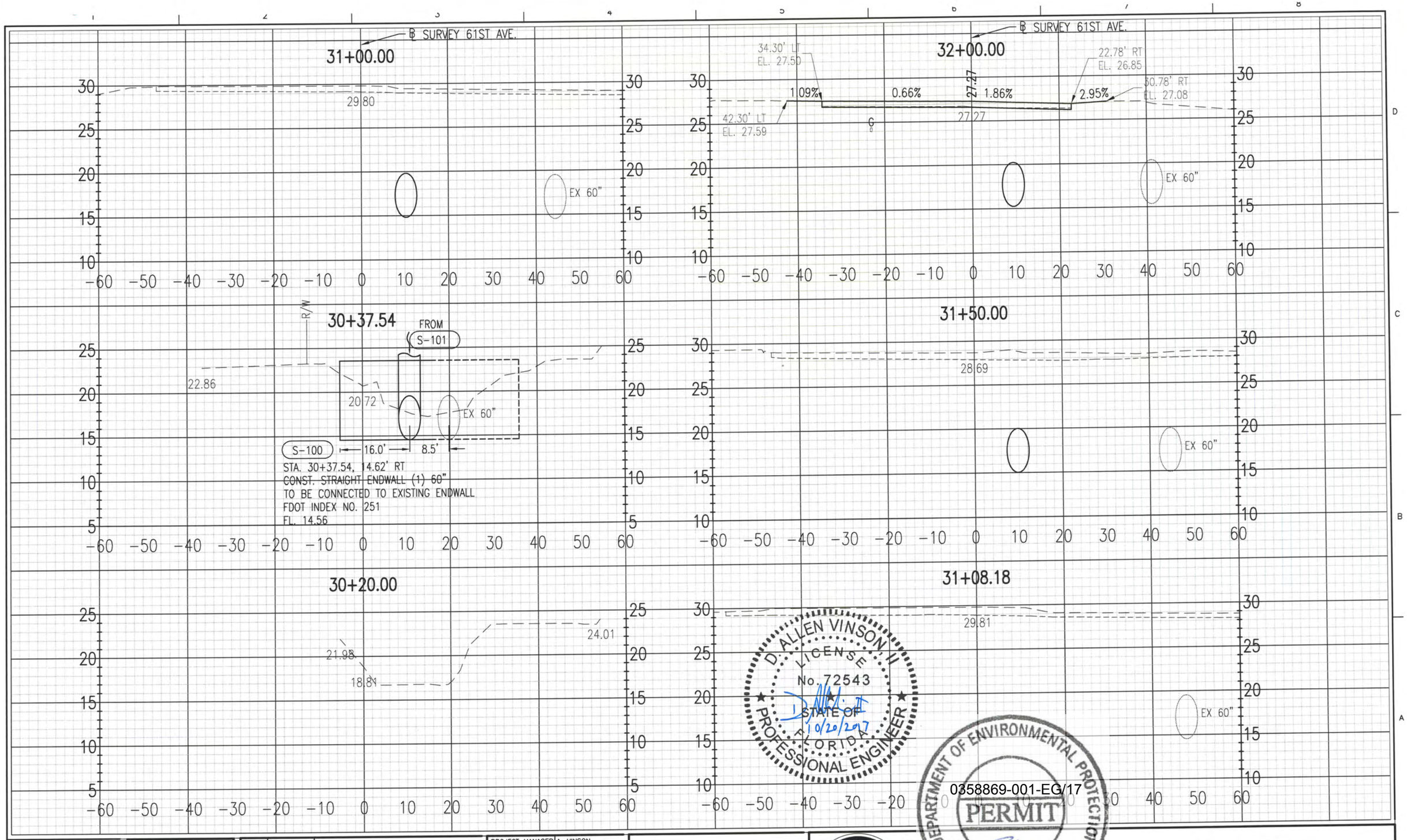
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE
DRAINAGE IMPROVEMENTS

WEIR AND GRADING PLAN
LAKE JOANNE DR.

0 10 20
11 X 17 SCALE: 1" = 20'

SHEET 13



D. ALLEN VINSON, II
LICENSE
No. 72543
STATE OF FLORIDA
PROFESSIONAL ENGINEER
10/20/2017

DEPARTMENT OF ENVIRONMENTAL PROTECTION
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25 West Cedar Street, Suite 200
Pensacola, FL 32502-5945
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ISSUE	DATE	DESCRIPTION
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PROJECT MANAGER	A. VINSON
DESIGNED BY	J. CLARK
DRAWN BY	J. CLARK
CHECKED BY	J. BURCHFIELD
PROJECT NUMBER	PD 13-14.081

D. Allen Vinson, P.E.
License No. 72543

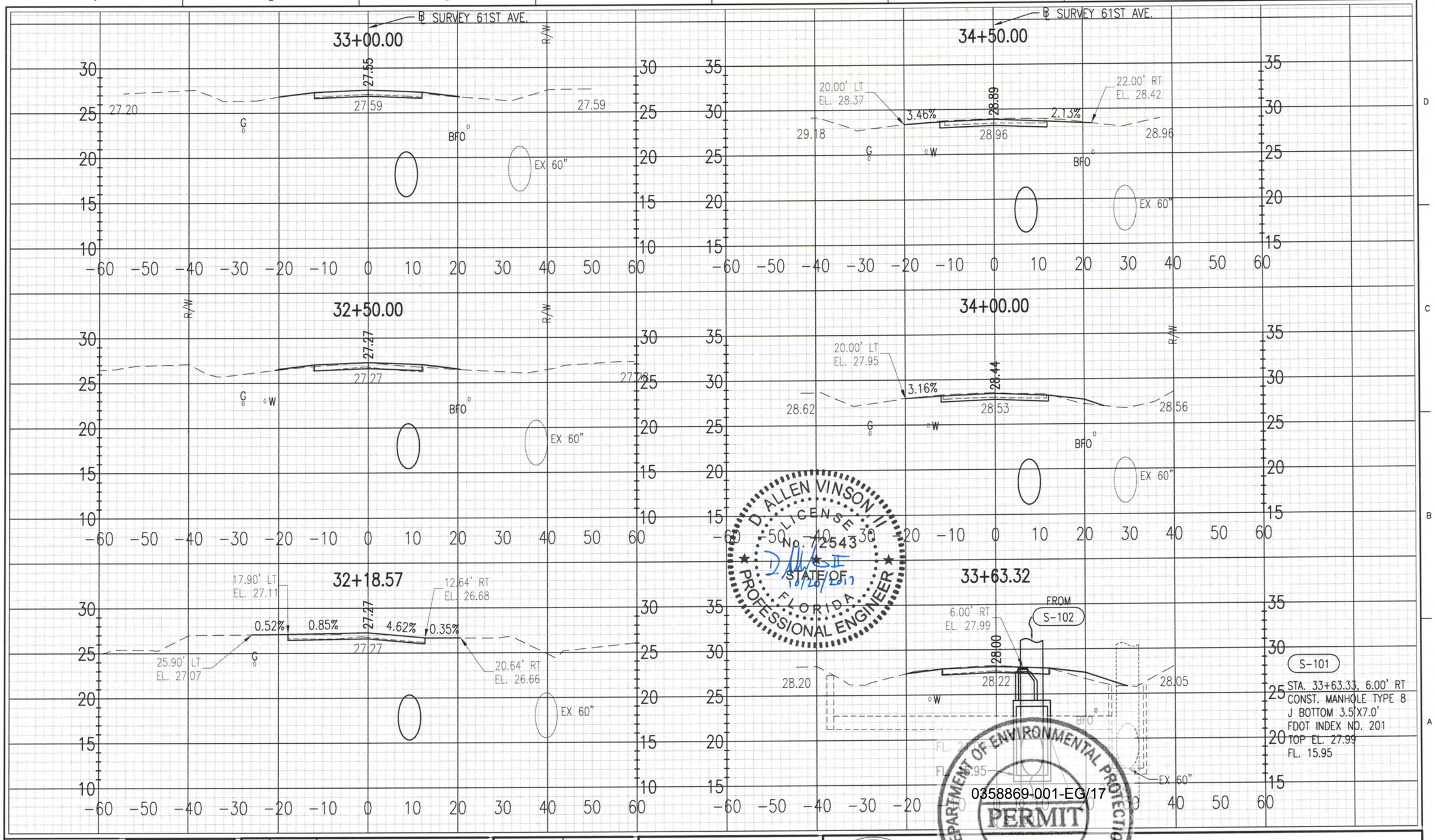
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE DRIVE
DRAINAGE IMPROVEMENTS

CROSS SECTIONS 61ST AVE.

0 10 20

11 X 17 SCALE:	HORZ: 1" = 20'
	VERT: 1" = 10'

SHEET 14



D. ALLEN VINSON II
LICENSE
No. 72543
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
10/26/2017

0358869-001-EG/17
PERMIT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OF FLORIDA

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25 West Cedar Street, Suite 200
Pensacola, FL 32502-5945
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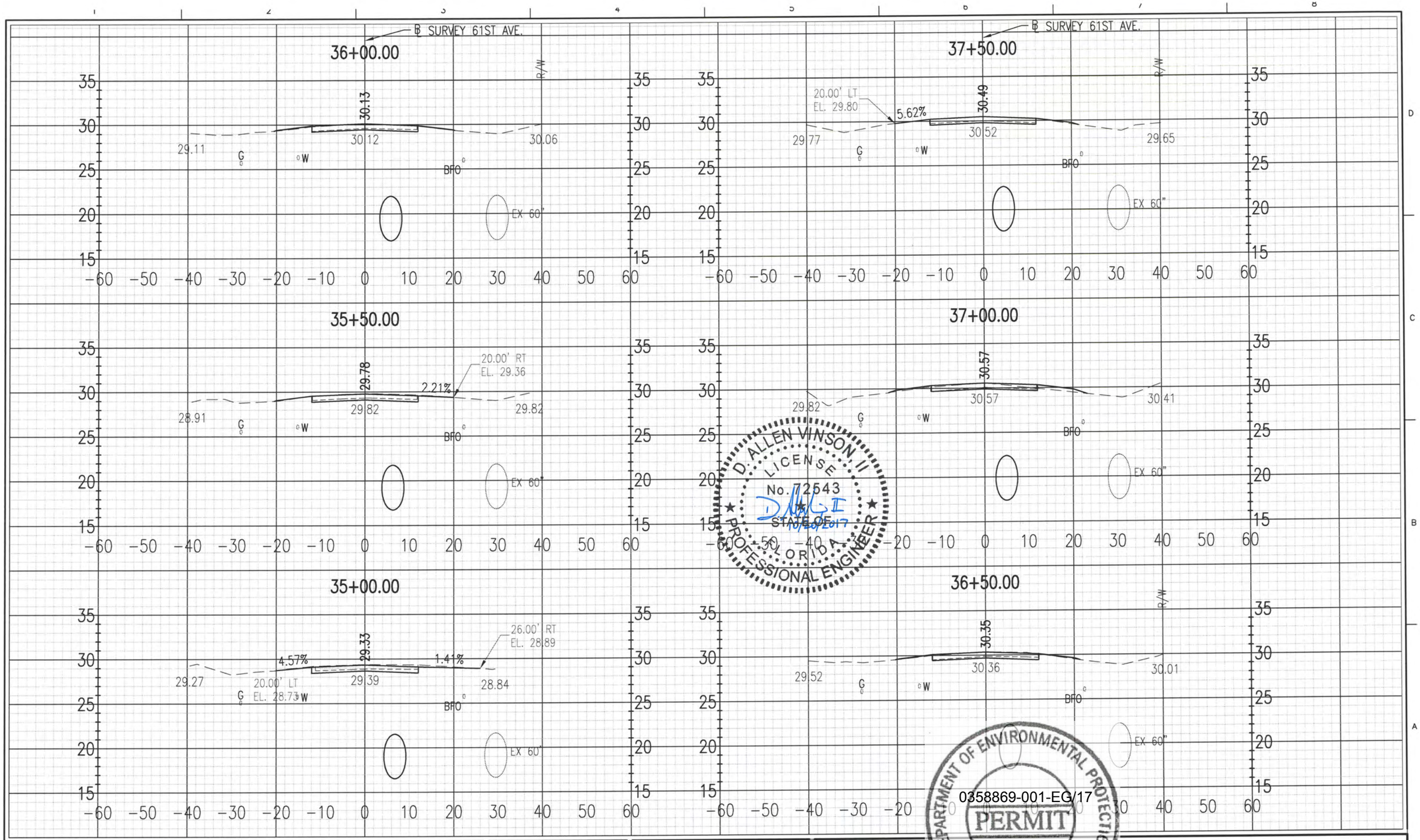
D. Allen Vinson, P.E.
License No. 72543

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE DRIVE
DRAINAGE IMPROVEMENTS

CROSS SECTIONS
61ST AVE.

0 10 20
11 X 17 SCALE:
HORZ: 1" = 20'
VERT: 1" = 10'

SHEET
15



D. ALLEN VINSON, II
LICENSE
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PROFESSIONAL ENGINEER
10/20/2017

DEPARTMENT OF ENVIRONMENTAL PROTECTION
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PROJECT NUMBER	PD 13-14.081

D. Allen Vinson, P.E.
License No. 72543

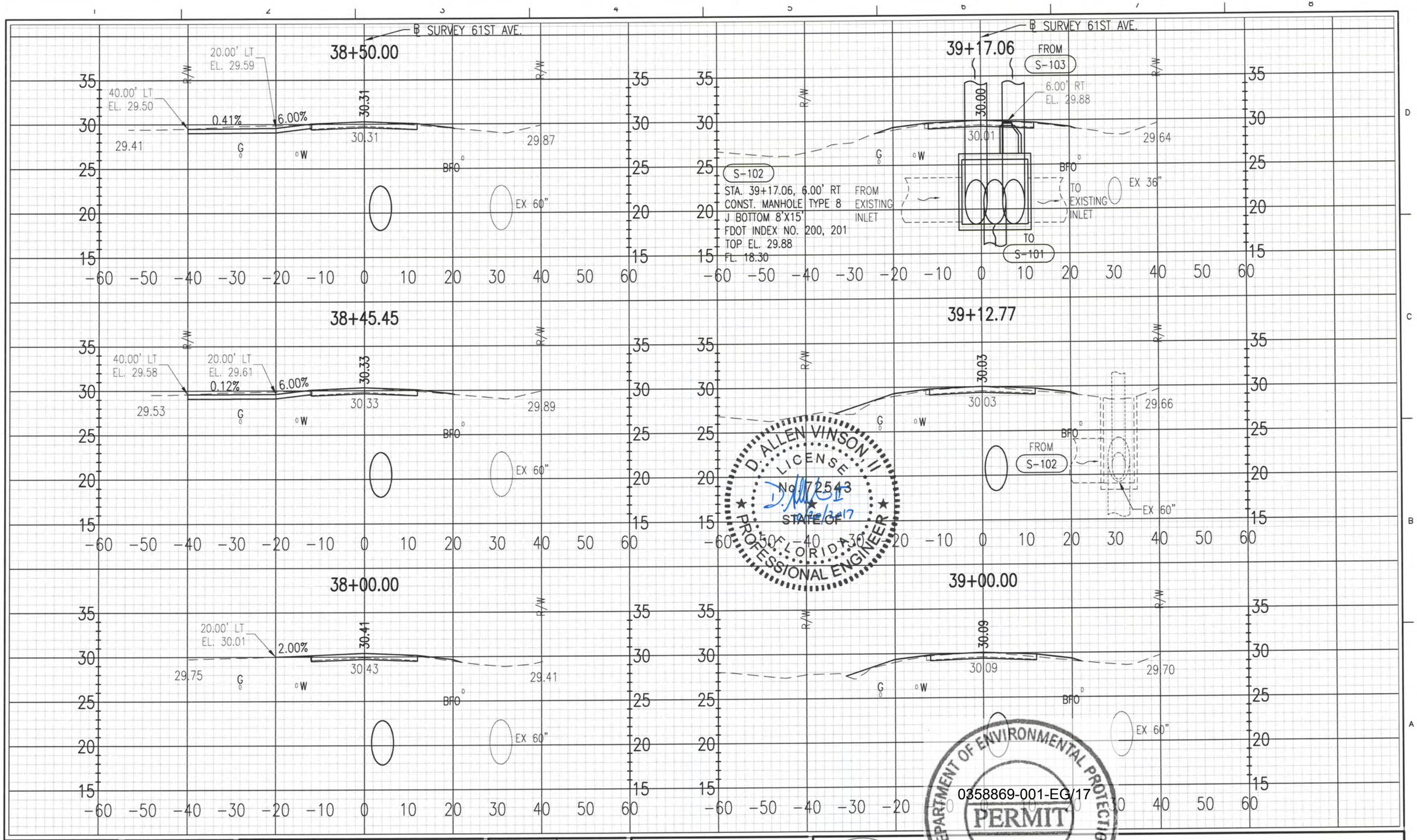
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLES DRIVE
DRAINAGE IMPROVEMENTS

CROSS SECTIONS 61ST AVE.

0 10 20

11 X 17 SCALE: HORZ: 1" = 20'
VERT: 1" = 10'

SHEET 16



D. ALLEN VINSON II
LICENSE
No. 72543
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

D. Allen Vinson II
12/6/17

DEPARTMENT OF ENVIRONMENTAL PROTECTION
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HDR

HDR Engineering, Inc.
25 West Cedar Street, Suite 200
Pensacola, FL 32502-5945
(850) 432-6800
www.hdrinc.com
Certificate of Authorization No. 4213

ISSUE	DATE	DESCRIPTION
–	–	–

PROJECT MANAGER	A. VINSON
DESIGNED BY	J. CLARK
DRAWN BY	J. CLARK
CHECKED BY	J. BURCHFIELD
PROJECT NUMBER	PD 13-14.081

D. Allen Vinson, P.E.

License No. 72543

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT

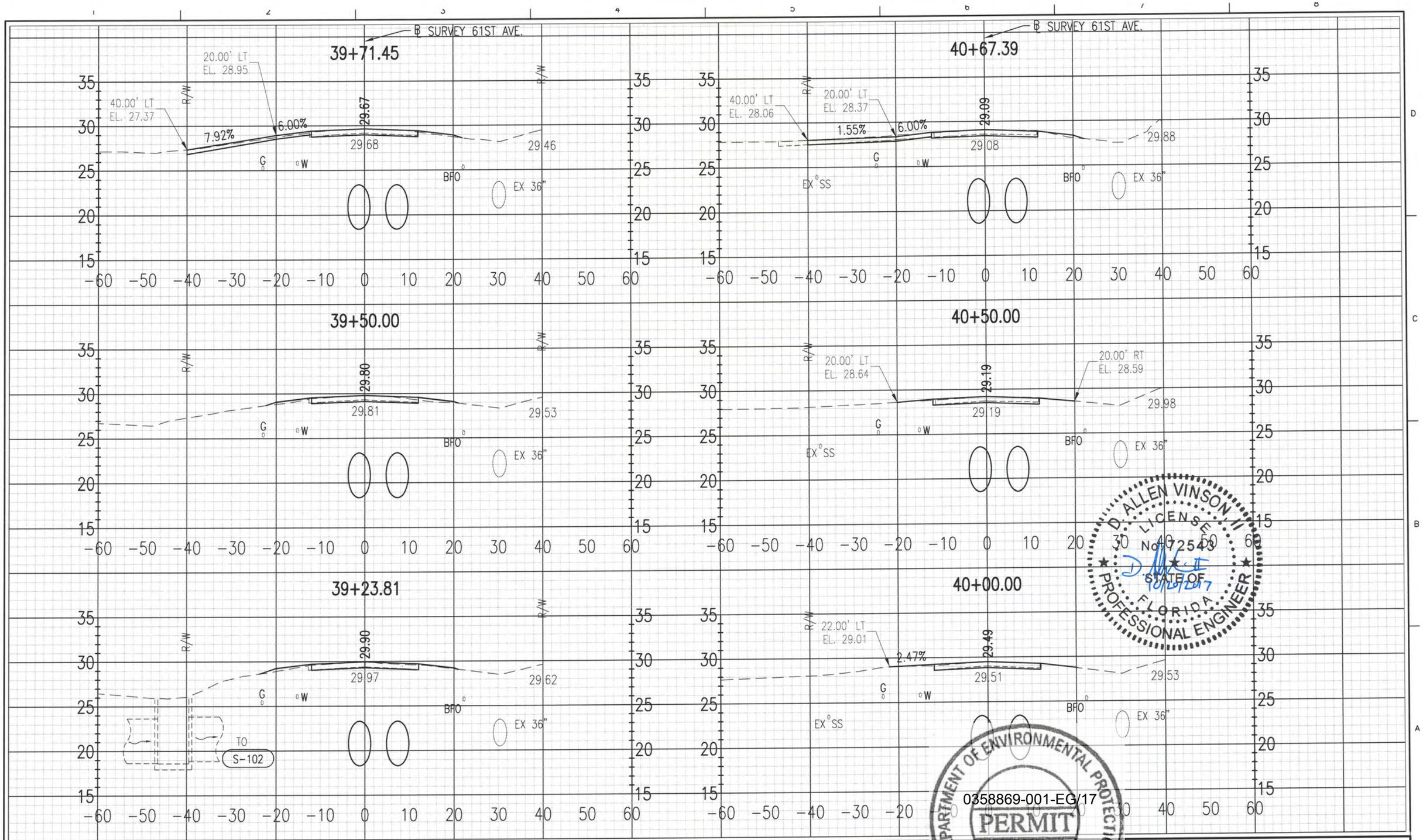
LAKE CHARLENE DR.
DRAINAGE IMPROVEMENTS

CROSS SECTIONS 61ST AVE.

0 10 20

11 X 17 SCALE: HORZ: 1" = 20'
VERT: 1" = 10'

SHEET 17



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10/27/2017

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CROSS SECTIONS
61ST AVE.

0 10 20

11 X 17 SCALE: HORZ: 1" = 20'
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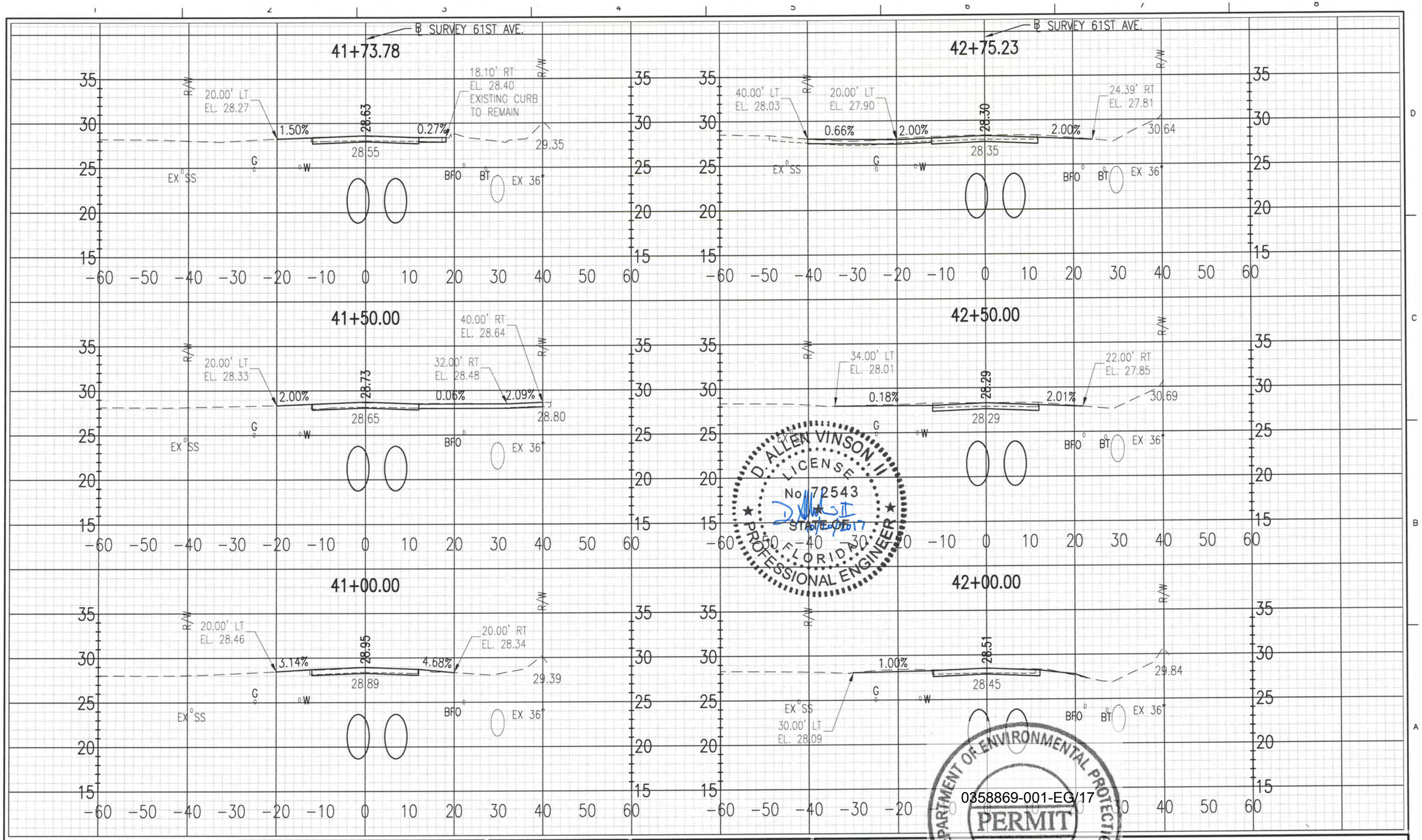
SHEET 18



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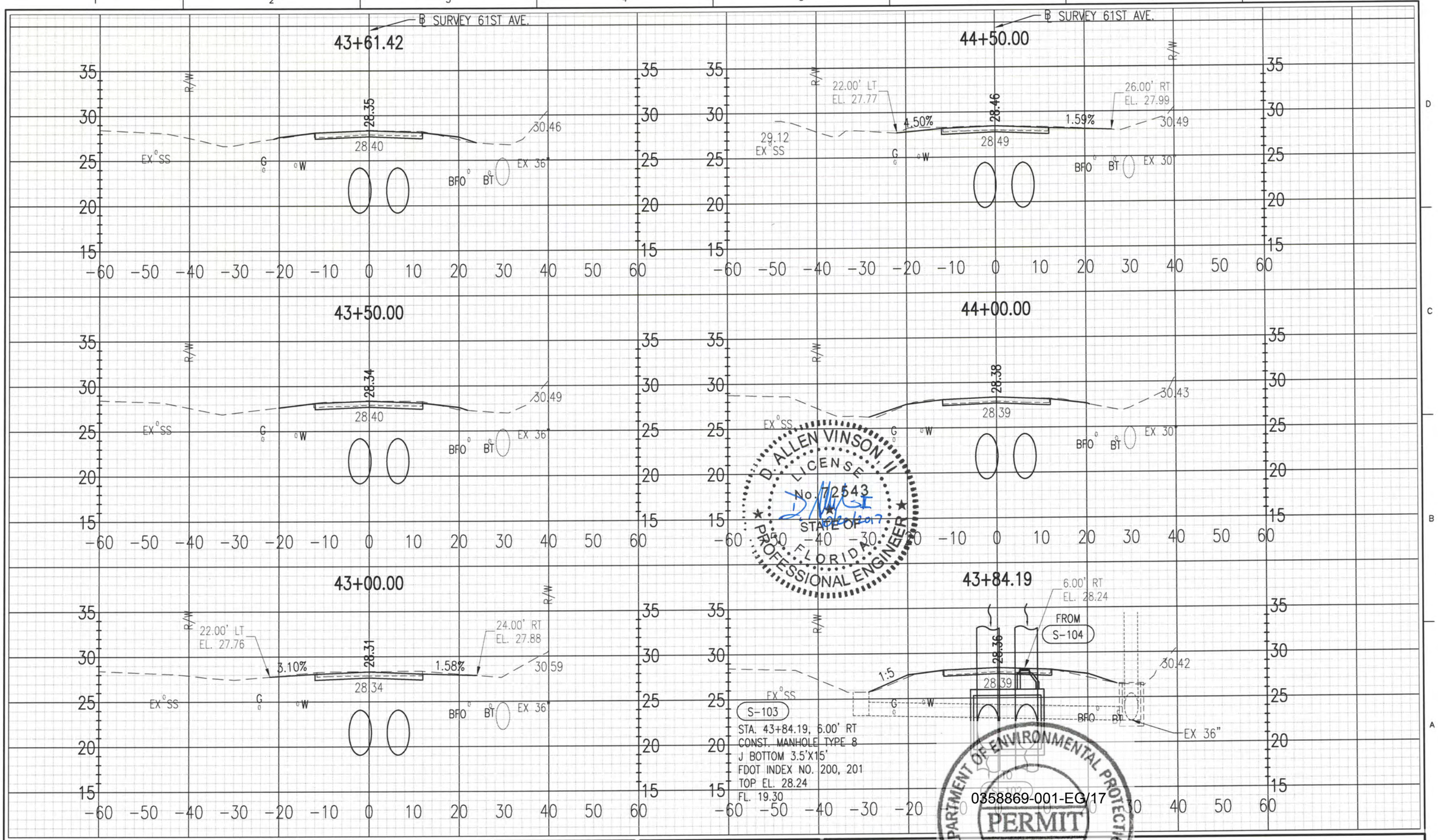
ENGINEERING DEPARTMENT
LAKE CHARLENE AREA
DRAINAGE IMPROVEMENTS

CROSS SECTIONS 61ST AVE.

0 10 20
11 X 17 SCALE: HORZ: 1" = 20'
VERT: 1" = 10'

SHEET 19



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DRAINAGE IMPROVEMENTS

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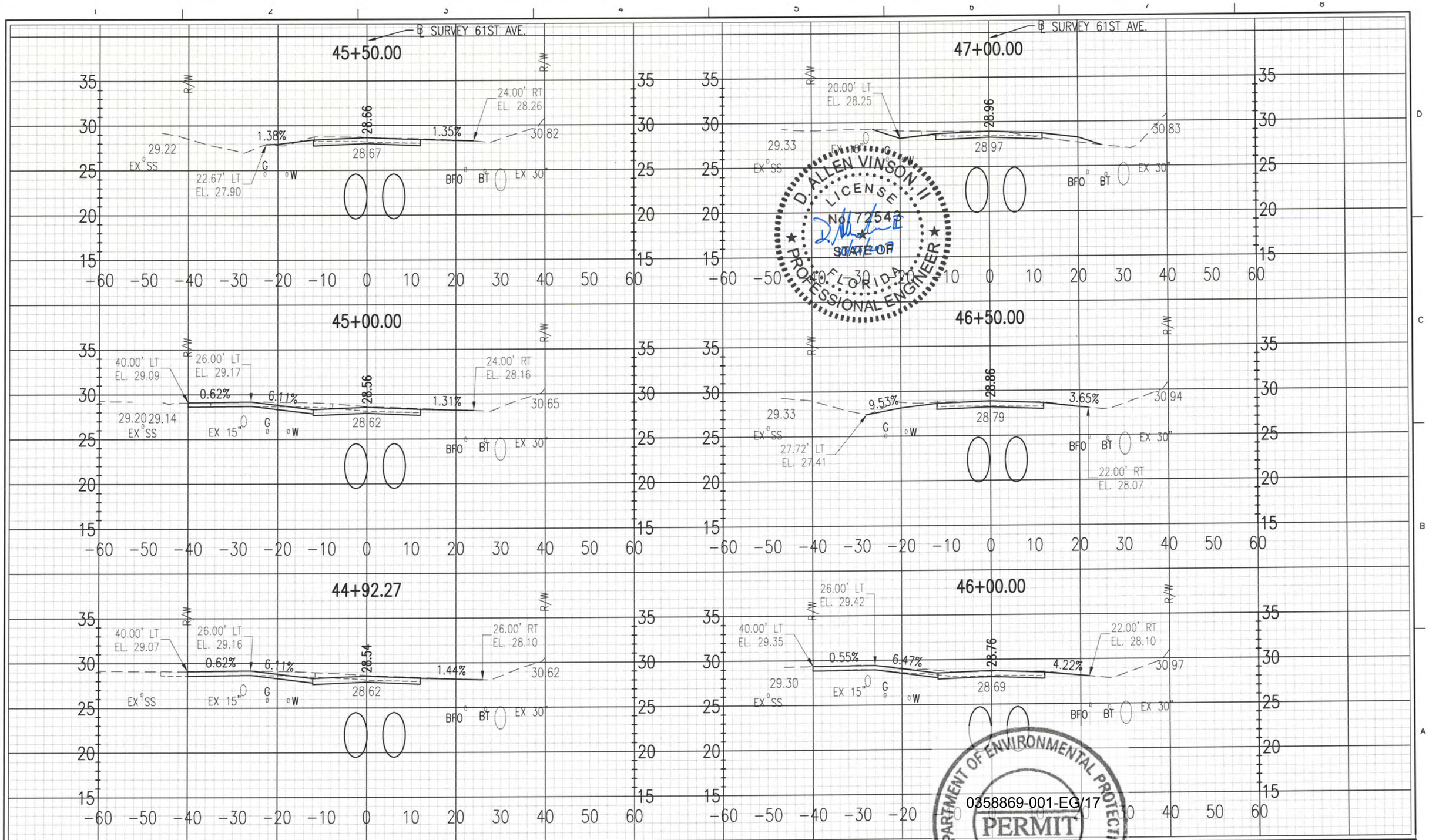
SHEET 20



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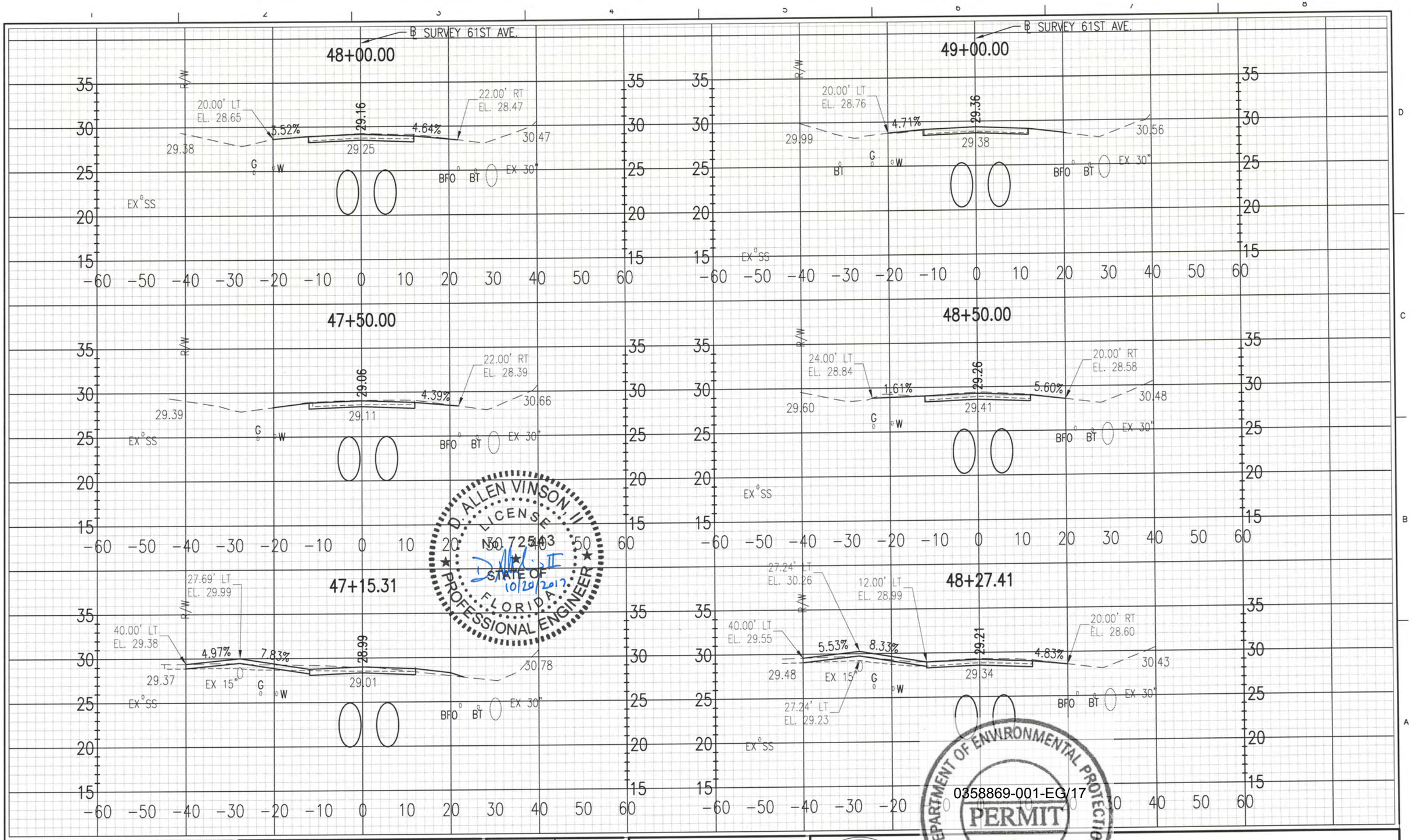
LAKE CHARLENE AREA
DRAINAGE IMPROVEMENTS

CROSS SECTIONS 61ST AVE.

0 10 20

11 X 17 SCALE: HORZ: 1" = 20'
VERT: 1" = 10'

SHEET 21



D. ALLEN VINSON, II
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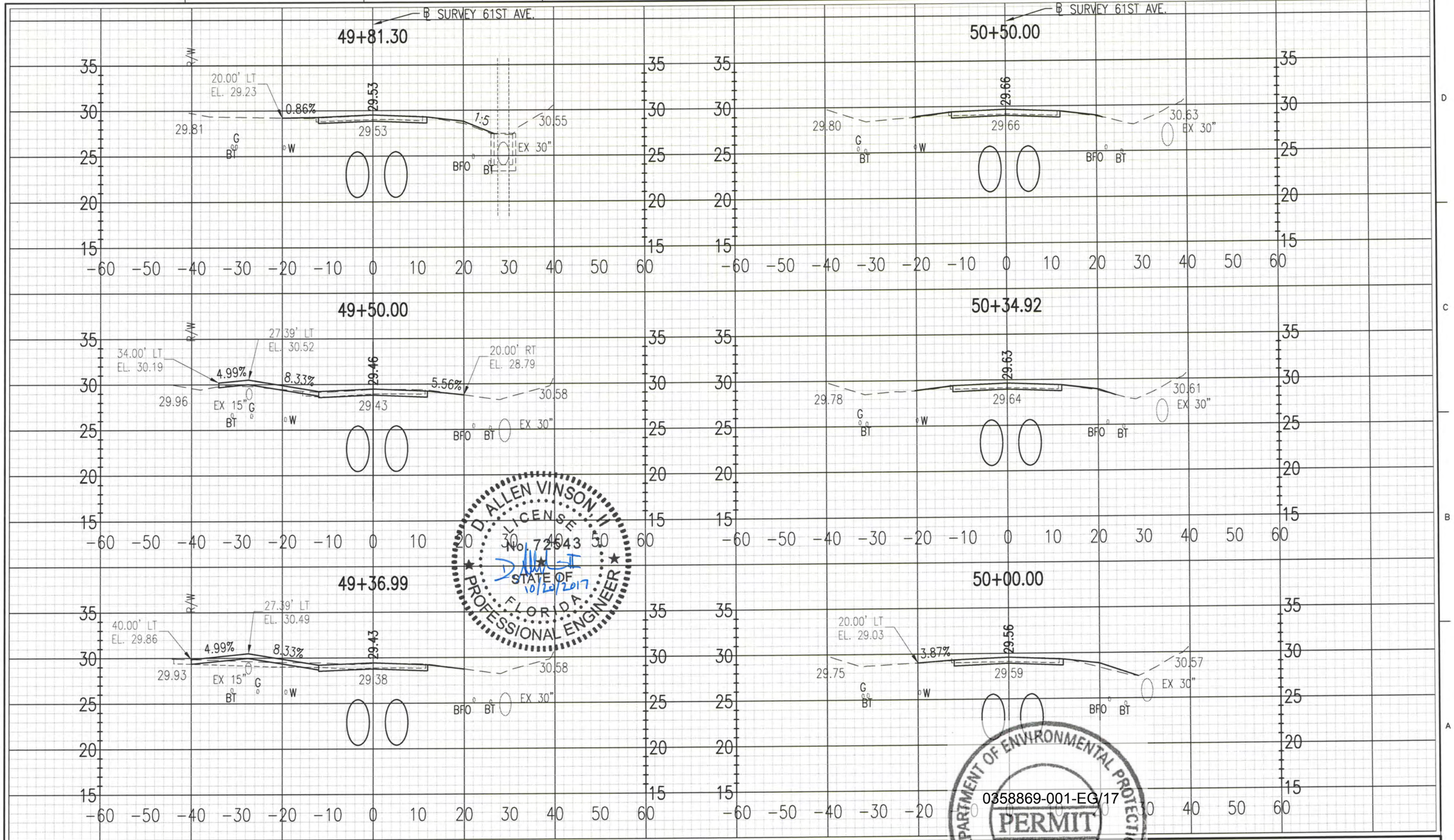
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLES DRIVE
DRAINAGE IMPROVEMENTS

CROSS SECTIONS 61ST AVE.

0 10 20

11 X 17 SCALE: HORZ: 1" = 20'
VERT: 1" = 10'

SHEET 22



D. ALLEN VINSON II
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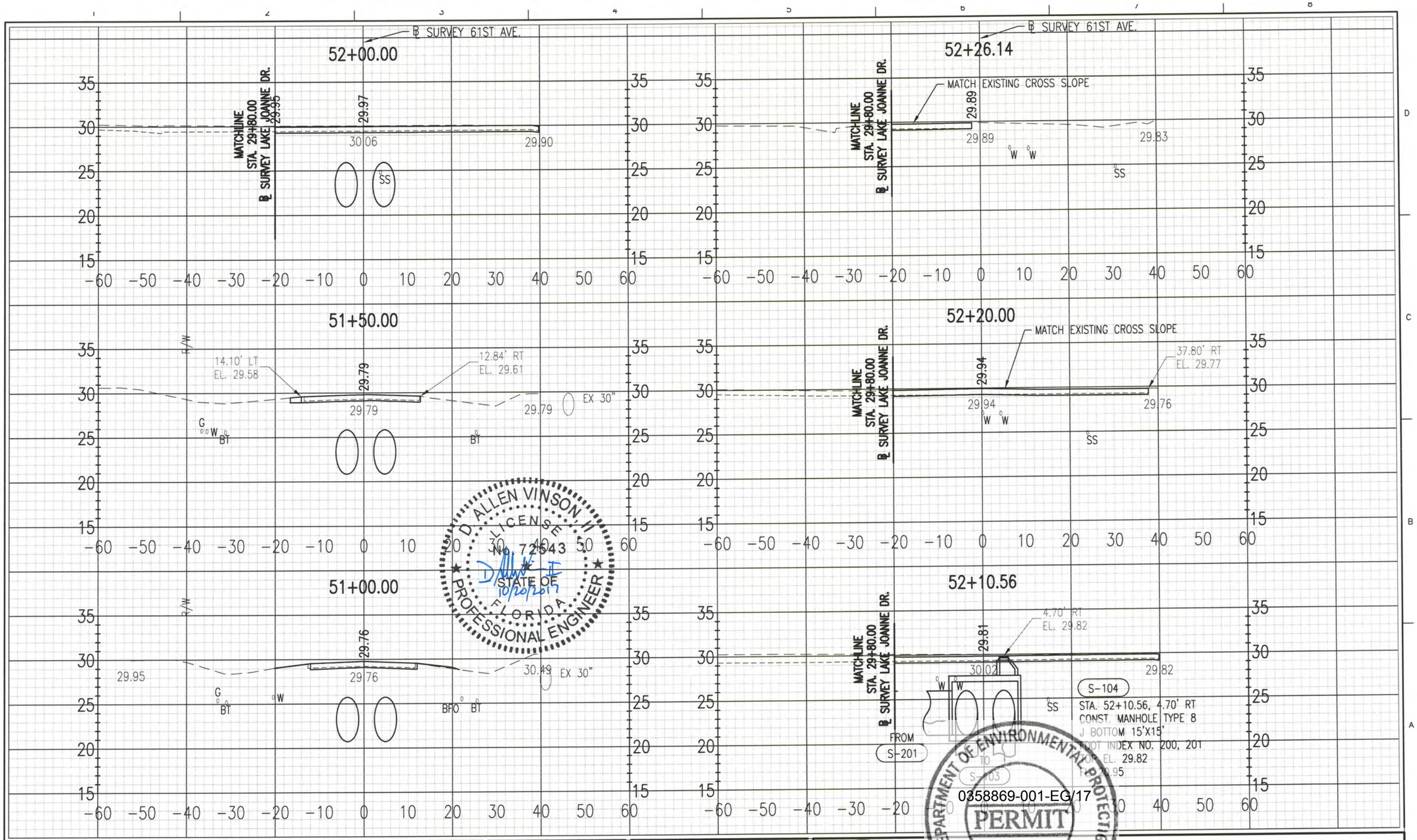
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE DRIVE
DRAINAGE IMPROVEMENTS

CROSS SECTIONS 61ST AVE.

0 10 20

11 X 17 SCALE: HORZ: 1" = 20'
VERT: 1" = 10'

SHEET 23



D. ALLEN VINSON, II
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STATE OF FLORIDA
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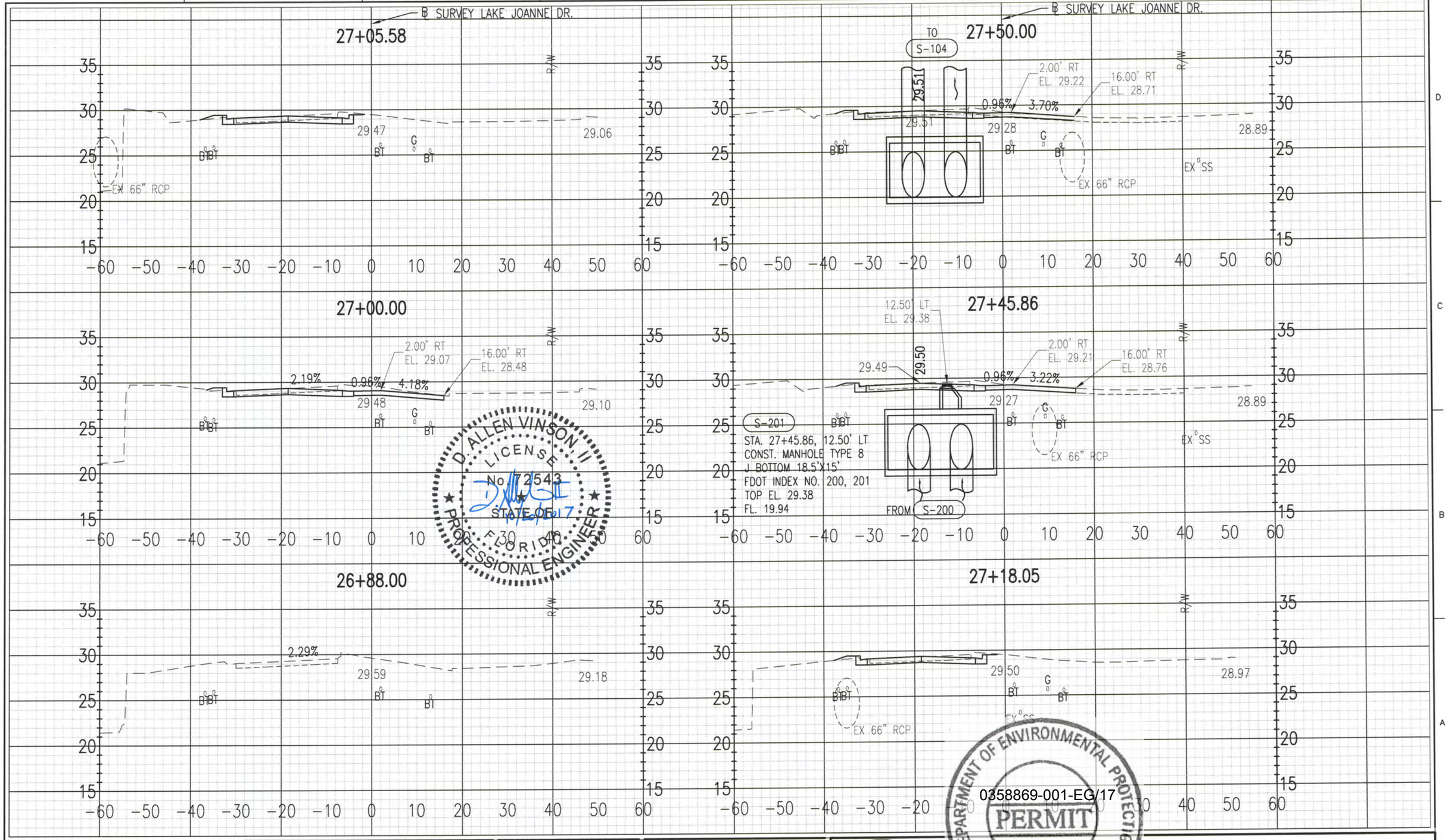
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE DRIVE
DRAINAGE IMPROVEMENTS

CROSS SECTIONS 61ST AVE.

0 10 20

11 X 17 SCALE: HORZ: 1" = 20'
VERT: 1" = 10'

SHEET 24



D. ALLEN VINSON II
LICENSED
No. 72543
STATE OF FLORIDA
PROFESSIONAL ENGINEER
12/6/2017

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D. Allen Vinson, P.E.
License No. 72543

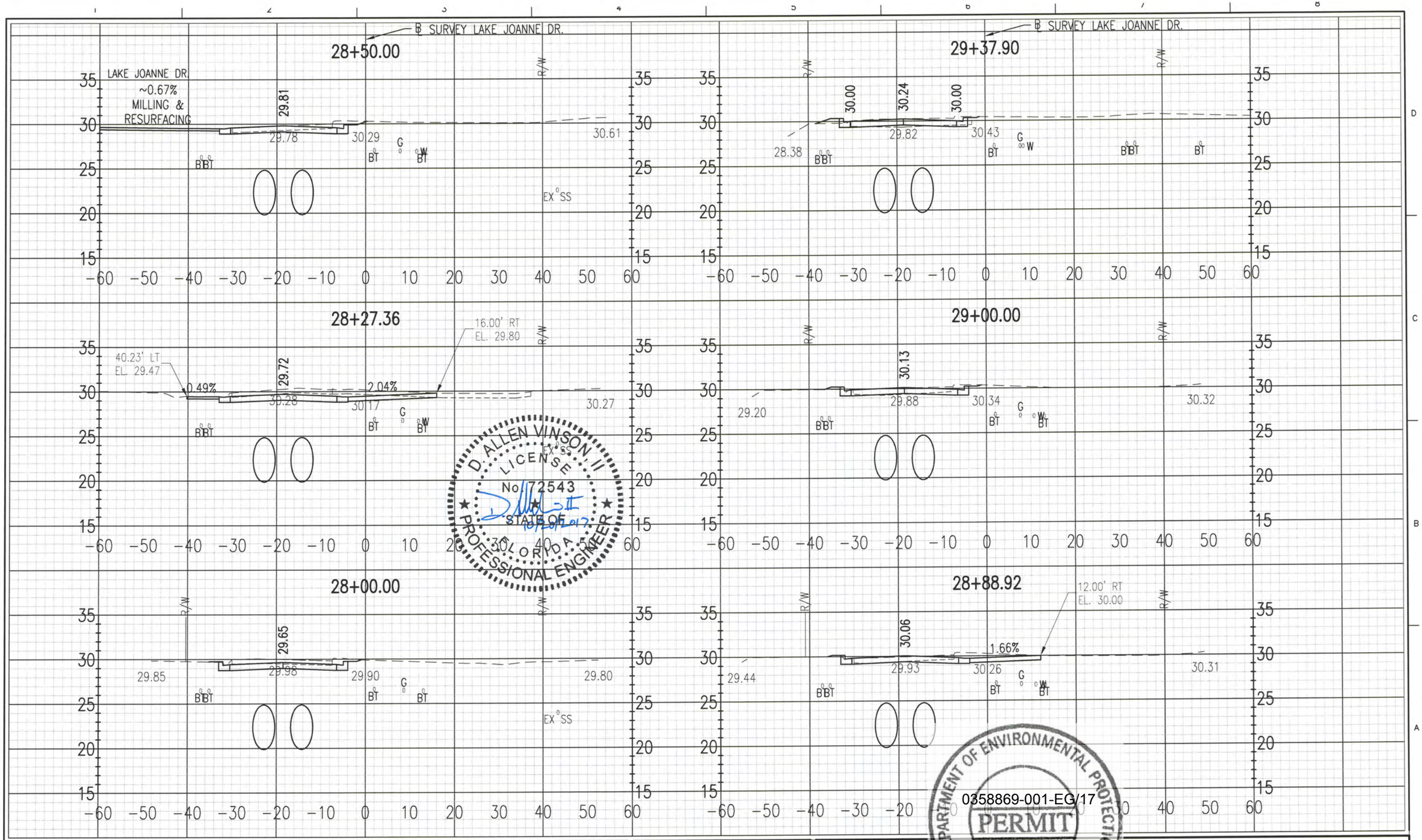
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE
DRAINAGE IMPROVEMENTS

CROSS SECTIONS LAKE JOANNE DR.

0 10 20

11 X 17 SCALE: HORZ: 1" = 20'
VERT: 1" = 10'

SHEET 25



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ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLOTTE AREA
DRAINAGE IMPROVEMENTS

CROSS SECTIONS
LAKE JOANNE DR.

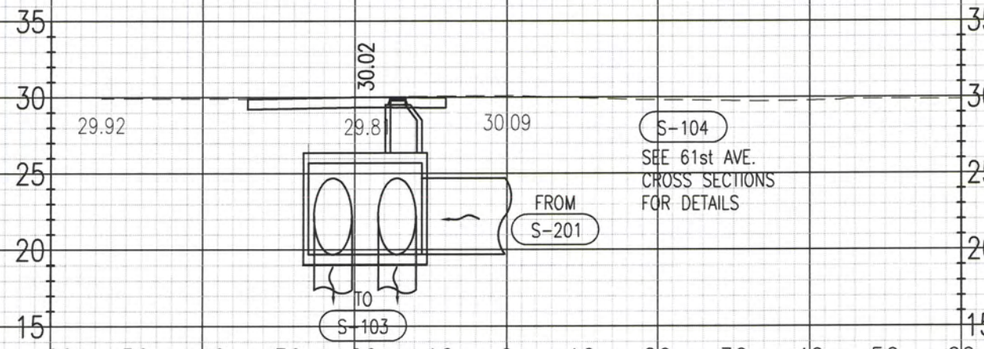
0 10 20

11 X 17 SCALE: HORZ: 1" = 20'
VERT: 1" = 10'

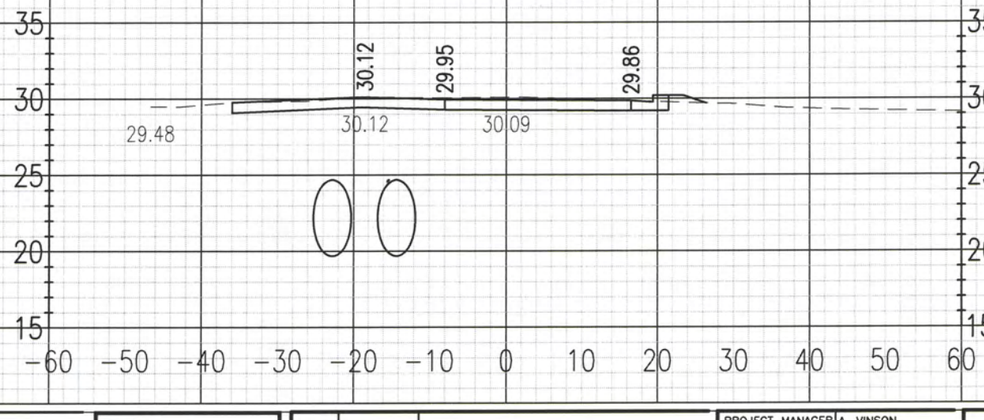
SHEET 26

℄ SURVEY LAKE JOANNE DR.

30+00.00



29+80.00



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10/25/2017

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STATE OF FLORIDA

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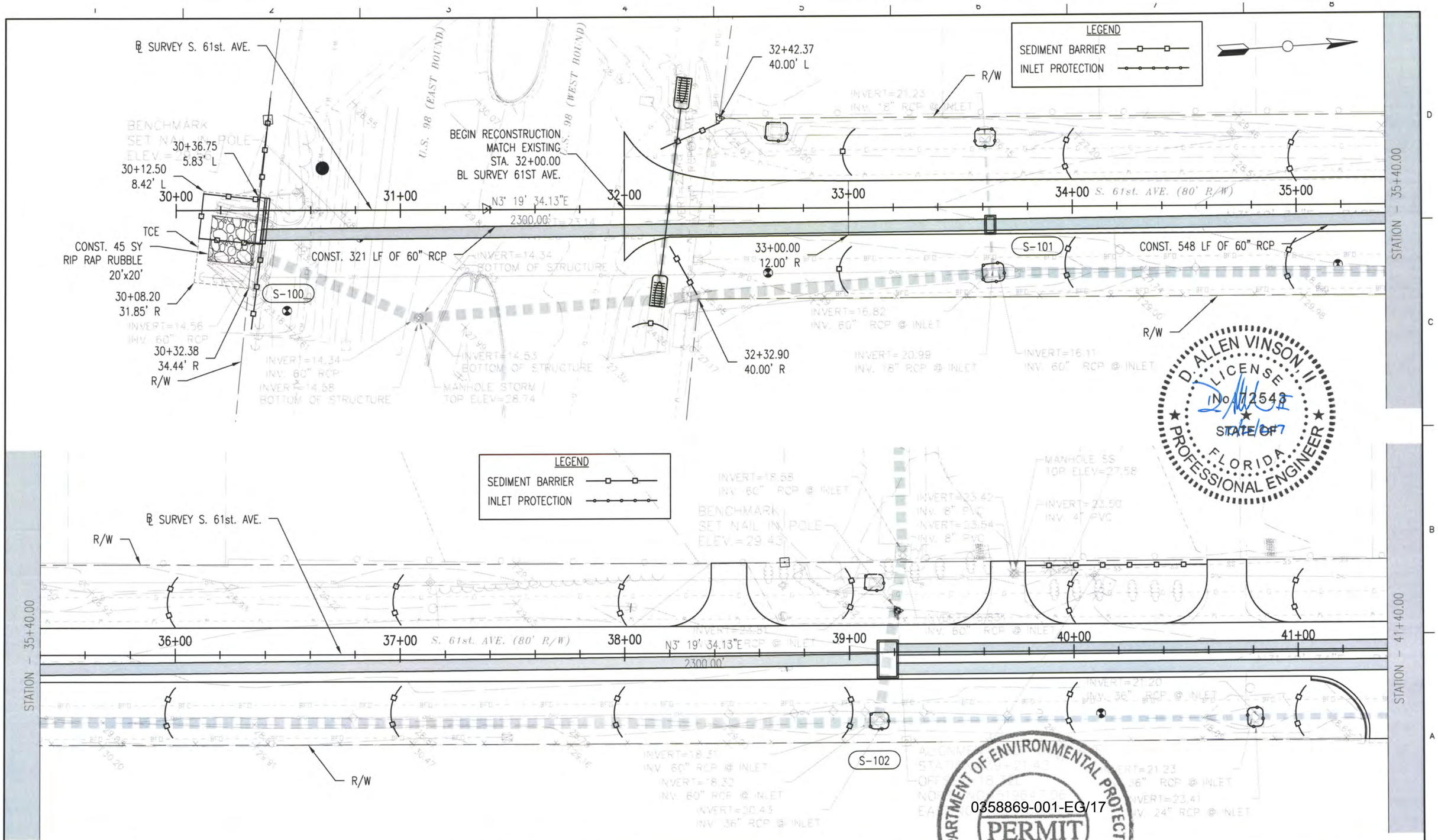
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE AREA
DRAINAGE IMPROVEMENTS

CROSS SECTIONS LAKE JOANNE DR.

0 10 20
11 X 17 SCALE:
HORZ: 1" = 20'
VERT: 1" = 10'

SHEET 27



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ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLES DRAINAGE IMPROVEMENTS

EROSION CONTROL PLAN
S. 61 st. AVE.
STA. 30+00.00 - 41+40.00

0 20 40
11 X 17 SCALE: 1" = 40'

SHEET 28

LEGEND
SEDIMENT BARRIER
INLET PROTECTION

℄ SURVEY S. 61st. AVE.

STATION - 41+40.00

42+00 43+00 44+00 45+00 46+00 47+00

S. 61st. AVE. (80' R/W)

N3° 19' 34.13"E
2300.00'

S-103

R/W

INVERT=21.18
INV. 36" RCP @ INLET

INVERT=23.05
INV. 18" RCP @ INLET

INVERT=21.12
INV. 36" RCP @ INLET

INVERT=22.53
INV. 15" RCP @ INLET

INVERT=22.39
INV. 36" RCP @ INLET

INVERT=22.47
INV. 30" RCP @ INLET

INVERT=26.36
INV. 15" RCP @ MES

INVERT=26.42
INV. 15" RCP @ MES

BENCHMARK
SET NAIL IN POLE
ELEV.=28.47

ALIGNMENT=BL1-61ST AVE
STATION=46+02.55
OFFSET=16.18R
NORTHING=520335.05
EASTING=1085529.77

INVERT=22.80
INV. 30" RCP

INVERT=26.06
INV. 8" PVC

D. ALLEN VINSON, II
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LEGEND
SEDIMENT BARRIER
INLET PROTECTION

STATION - 47+40.00

℄ SURVEY LAKE JOANNE DR.

R/W

29+59.92
58.50' R

℄ CONST. LAKE JOANNE DR.

END RECONSTRUCTION
STA. 52+26.11
BL SURVEY 61ST AVE.

48+00 49+00 50+00 51+00 52+00 53+00

S. 61st. AVE. (80' R/W)

N3° 19' 34.13"E
2300.00'

N3° 19' 34.13"E
2300.00'

S-104

℄ SURVEY S. 61st. AVE.

R/W

BL SURVEY S. 61st. AVE. STA. 52+10.51 =
CL CONST. LAKE JOANNE DR. STA. 30+00.00

BL SURVEY S. 61st. AVE. STA. 51+92.01 =
BL SURVEY LAKE JOANNE DR. STA. 30+00.00

INVERT=35.87
INV. 8" PVC

INVERT=23.73
INV. 30" RCP

INVERT=24.27
INV. 18" CMP

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ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE
DRAINAGE IMPROVEMENTS

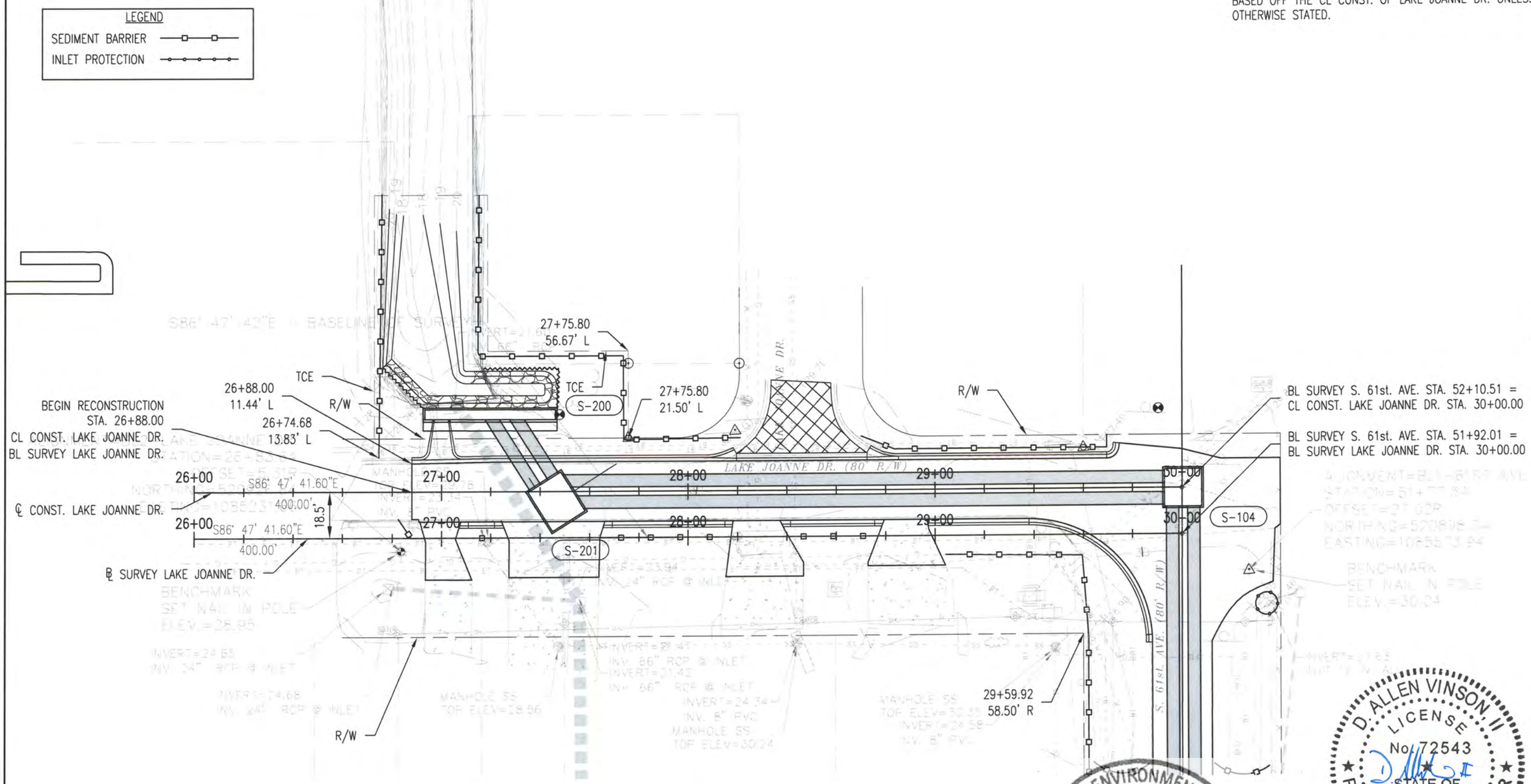
EROSION CONTROL PLAN
S. 61 st. AVE.
STA. 41+40.00 - 53+00.00

0 20 40
11 X 17 SCALE: 1" = 40'

SHEET 29

NOTE: ALL STATION AND OFFSETS SHOWN ON THIS SHEET ARE BASED OFF THE CL CONST. OF LAKE JOANNE DR. UNLESS OTHERWISE STATED.

LEGEND
SEDIMENT BARRIER
INLET PROTECTION



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ENGINEERING DEPARTMENT
LAKE CHARLENE
DRAINAGE IMPROVEMENTS

EROSION CONTROL PLAN
LAKE JOANNE DR.
STA. 26+00.00 - 30+00.00

0 20 40
11 X 17 SCALE: 1" = 40'

SHEET 30

TEMPORARY TRAFFIC CONTROL NOTES:

1. THE CONTRACTOR SHALL PROVIDE AN APPROVED TRAFFIC CONTROL PLAN THAT ADHERES TO THE REQUIREMENTS OF THE FY 2017-18 FLORIDA DEPARTMENT OF TRANSPORTATION DESIGN STANDARDS INDEX SERIES 600.

2. THE TRAFFIC SHALL BE MAINTAINED IN ACCORDANCE WITH THE CURRENT FDOT "DESIGN STANDARDS" INDEX SERIES 600, SPECIFICALLY INDEX 600, 602, 603, 604, 605, 612, 613 AND 615 AND THE CURRENT MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

3. THE CONTRACTOR SHALL INSTALL ADVANCE CONSTRUCTION SIGNING PRIOR TO COMMENCEMENT OF ALL CONSTRUCTION OPERATIONS AND MAINTAIN SIGNING THROUGHOUT THE DURATION OF CONSTRUCTION.

4. ARROWS DENOTE DIRECTION OF TRAFFIC ONLY AND DO NOT REFLECT PAVEMENT MARKINGS, UNLESS OTHERWISE NOTED.

5. LANE CLOSURES WILL NOT BE PERMITTED DURING SPECIAL EVENTS, AND NO WORK WILL BE PERMITTED DURING HOLIDAYS AS CALLED FOR IN THE SPECIFICATIONS.
SPECIAL EVENT: BLUE ANGEL AIR SHOW AT NAVAL AIR STATION HELD DURING NOVEMBER OF EACH YEAR.

6. ALL LANES ON 61st AVE., LAKE JOANNE DR. & US 98 MUST BE REOPENED TO NORMAL TRAFFIC WITHIN 12 HOURS DURING AN EVACUATION NOTICE OF A HURRICANE OR ANY OTHER CATASTROPHIC EVENT AND SHALL REMAIN OPEN FOR THE DURATION OF THE EVACUATION OR EVENT AS DIRECTED BY THE PROJECT ENGINEER/ADMINISTRATOR.

7. EXISTING STREET AND ROAD NAME SIGNS ON THE PROJECT ARE TO BE TEMPORARILY RELOCATED DURING CONSTRUCTION AND KEPT VISIBLE AT ALL TIMES FOR THE FACILITATION OF ACCESS BY EMERGENCY VEHICLE TRAFFIC.

8. WORK ZONE SPEED LIMITS SHALL BE POSTED 20 MPH ON COUNTY ROADWAYS AND 35 MPH ON US 98.

9. THE CONTRACTOR SHALL NOT EXCAVATE ANY AREA LARGER THAN HE CAN BACKFILL OR RECONSTRUCT BY THE END OF THE SAME WORK PERIOD. NO DROPOFF REQUIRING THE USE OF A BARRIER WALL WILL BE ALLOWED TO REMAIN IN AN INACTIVE WORK ZONE. THE CONTRACTOR SHALL RESTORE DROPOFFS TO AN ACCEPTABLE GRADE USING AN APPROVED METHOD FROM INDEX 600.

10. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) ARE TO BE PLACED AND RUNNING AT LEAST 7 DAYS PRIOR TO LANE AND/OR INTERSECTION CLOSURE.

11. THE CONTRACTOR SHALL MAINTAIN ACCESS TO LOCAL PROPERTIES DURING ROAD CLOSURE.

CONSTRUCTION SEQUENCE:

1. CLOSE S. 61ST AVE.

2. RELOCATE TRAFFIC SIGNAL ON US 98.

3. INSTALL PIPE ACROSS US 98 W/MOT.

4. INSTALL PIPE ON 61ST AVE.

5. RECONSTRUCT 61ST AVE.

6. INSTALL PIPE ON LAKE JOANNE DR.

7. RECONSTRUCT LAKE JOANNE DR.

8. OPEN S. 61ST AVE. TO TRAFFIC.

9. CONSTRUCT WEIR AND HEADWALL AT LAKE JOANNE CANAL.

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Certificate of Authorization No. 4213

ISSUE	DATE	DESCRIPTION
–	–	–

PROJECT MANAGER	A. VINSON
DESIGNED BY	J. CLARK
DRAWN BY	J. CLARK
CHECKED BY	J. BURCHFIELD
PROJECT NUMBER	PD 13-14.081

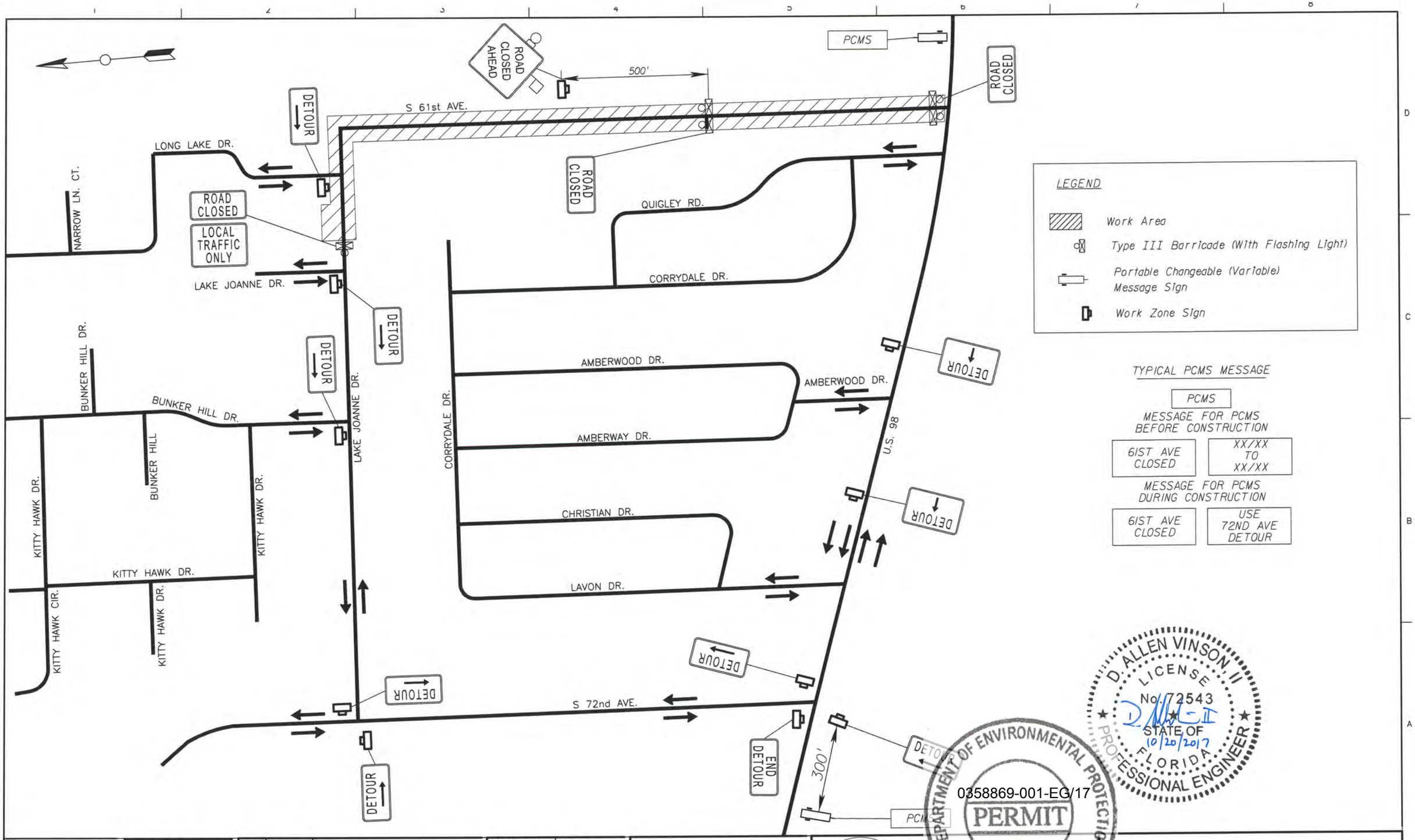
D. Allen Vinson, P.E.
License No. 72543

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE DR.
DRAINAGE IMPROVEMENTS

TEMPORARY TRAFFIC CONTROL PLAN

11 X 17 SCALE: NOT TO SCALE

SHEET 31



D. ALLEN VINSON, II
LICENSE
No. 72543
STATE OF FLORIDA
PROFESSIONAL ENGINEER
10/20/2017

DEPARTMENT OF ENVIRONMENTAL PROTECTION
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STATE OF FLORIDA
0358869-001-EG/17

HDR Engineering, Inc.
25 West Cedar Street, Suite 200
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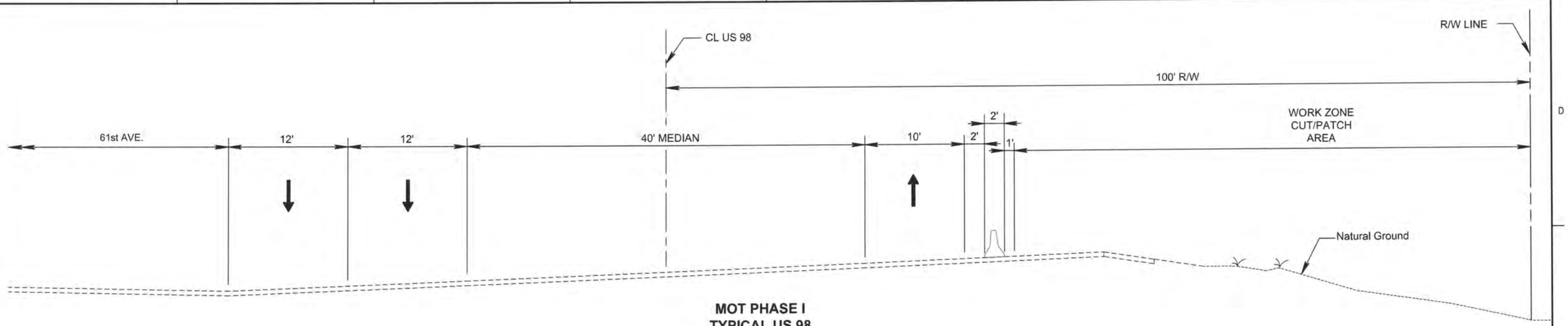
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE DRIVE
DRAINAGE IMPROVEMENTS

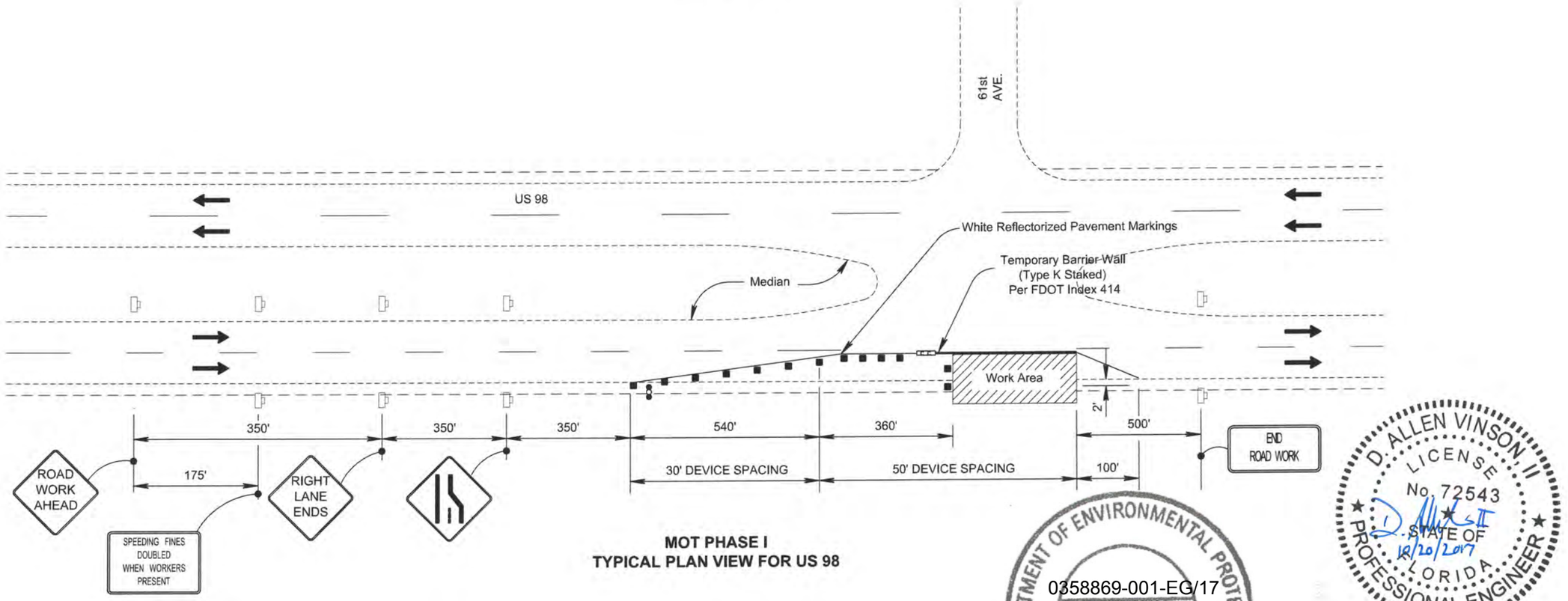
TEMPORARY TRAFFIC CONTROL PLAN

0 150 300
11 X 17 SCALE: 1" = 300'

SHEET 32



MOT PHASE I
TYPICAL US 98



MOT PHASE I
TYPICAL PLAN VIEW FOR US 98

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10/20/2017

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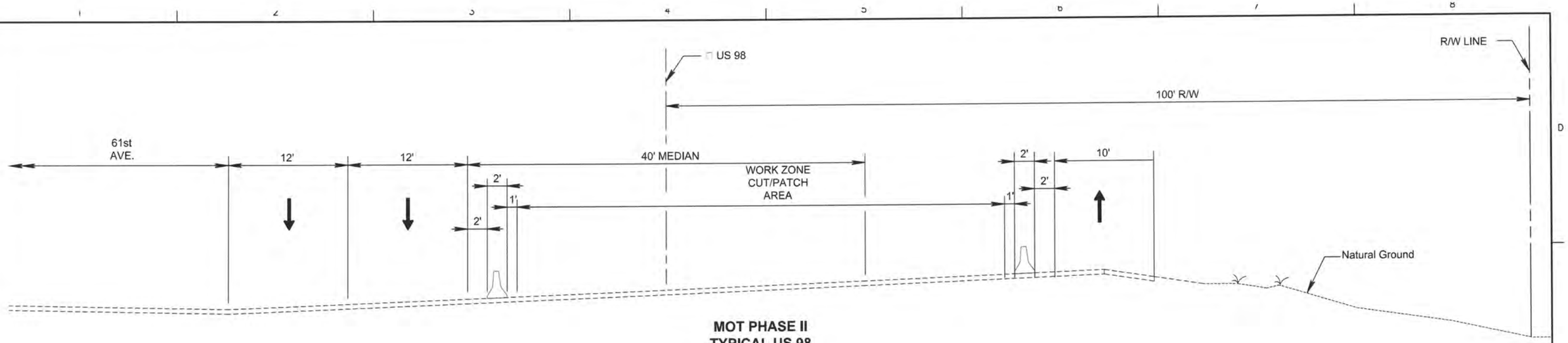
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE AREA
DRAINAGE IMPROVEMENTS

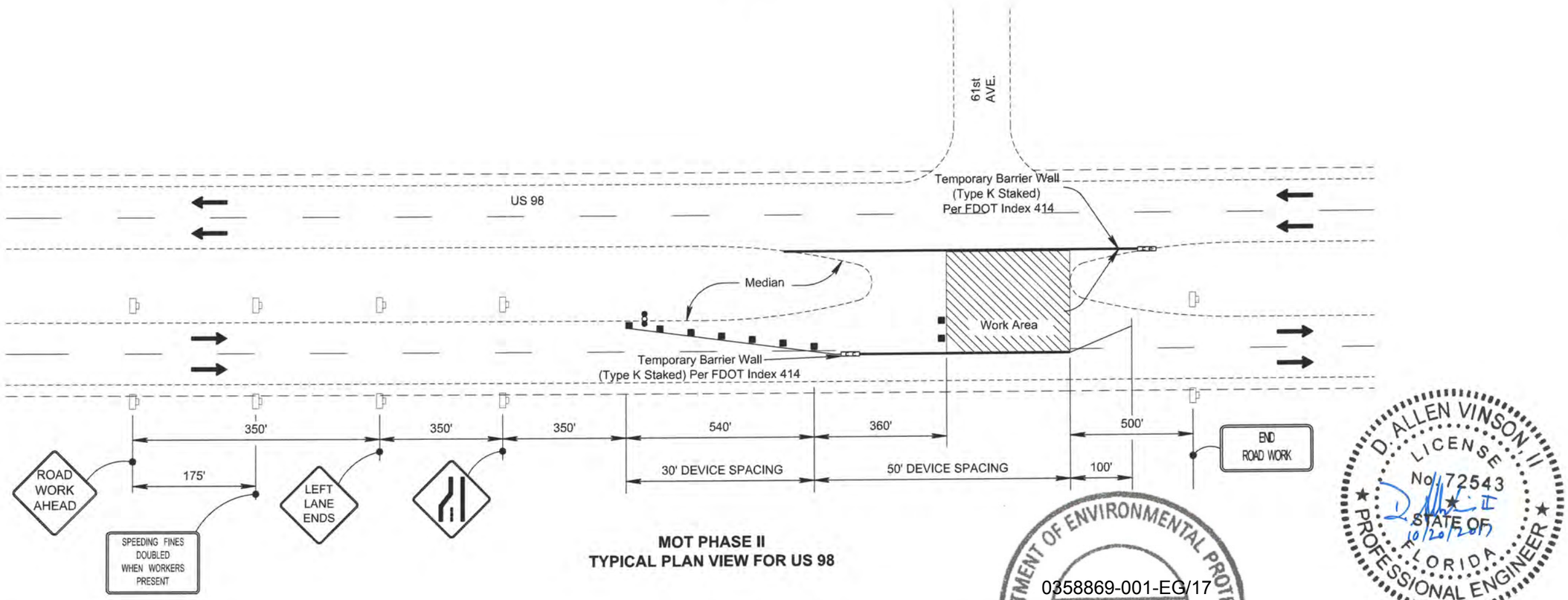
TEMPORARY TRAFFIC CONTROL PLAN

11 X 17 SCALE: NOT TO SCALE

SHEET 33



MOT PHASE II
TYPICAL US 98



MOT PHASE II
TYPICAL PLAN VIEW FOR US 98

D. ALLEN VINSON, II
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STATE OF
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10/20/2017

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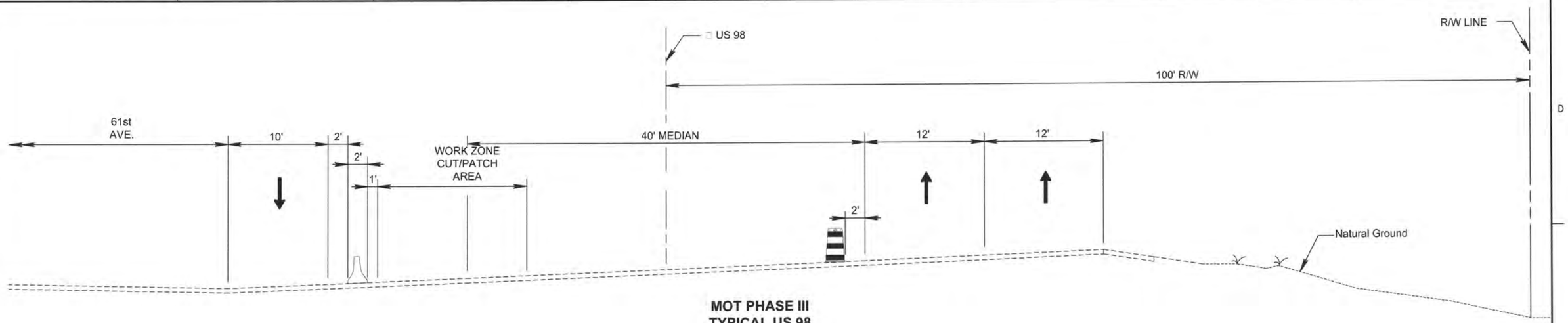
LAKE CHARLENE DRIVE
DRAINAGE IMPROVEMENTS

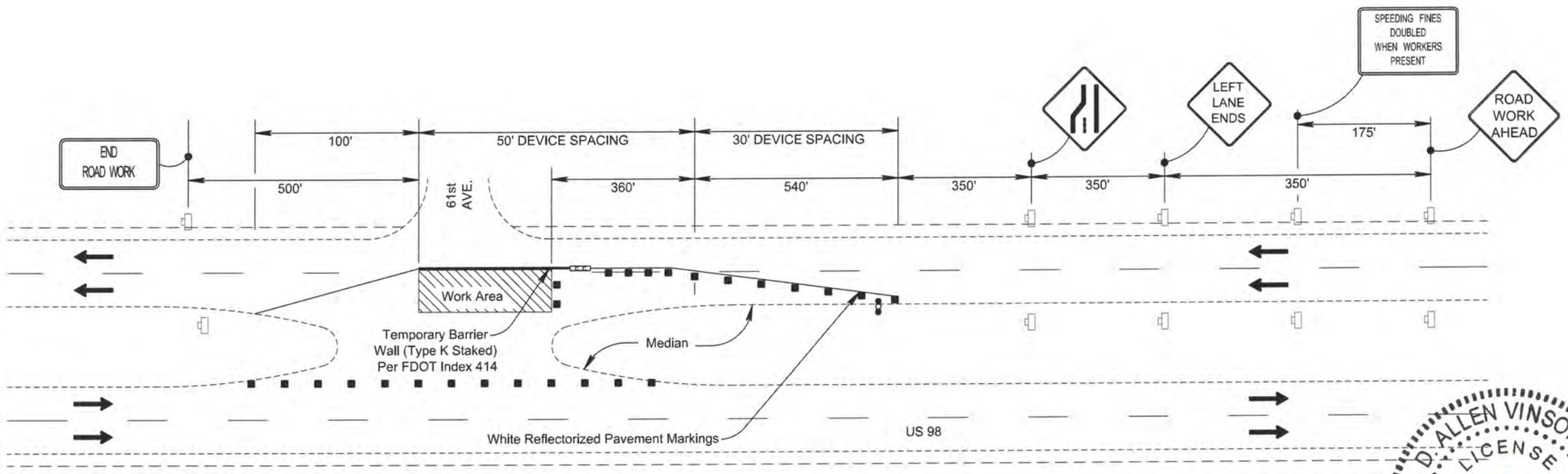
TEMPORARY TRAFFIC CONTROL PLAN

11 X 17 SCALE: NOT TO SCALE

SHEET 34



MOT PHASE III
TYPICAL US 98



MOT PHASE III
TYPICAL PLAN VIEW FOR US 98

D. ALLEN VINSON, II
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10/20/2017

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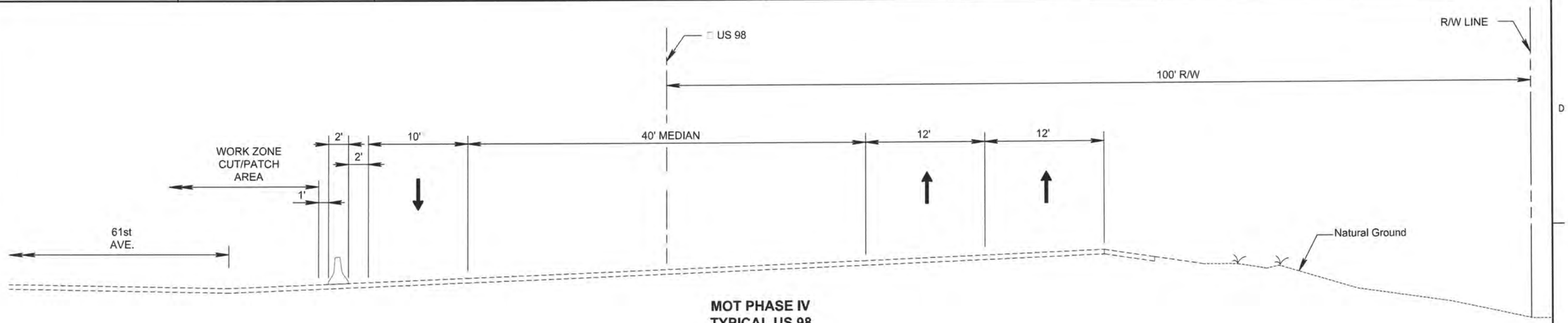
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE DRIVE
DRAINAGE IMPROVEMENTS

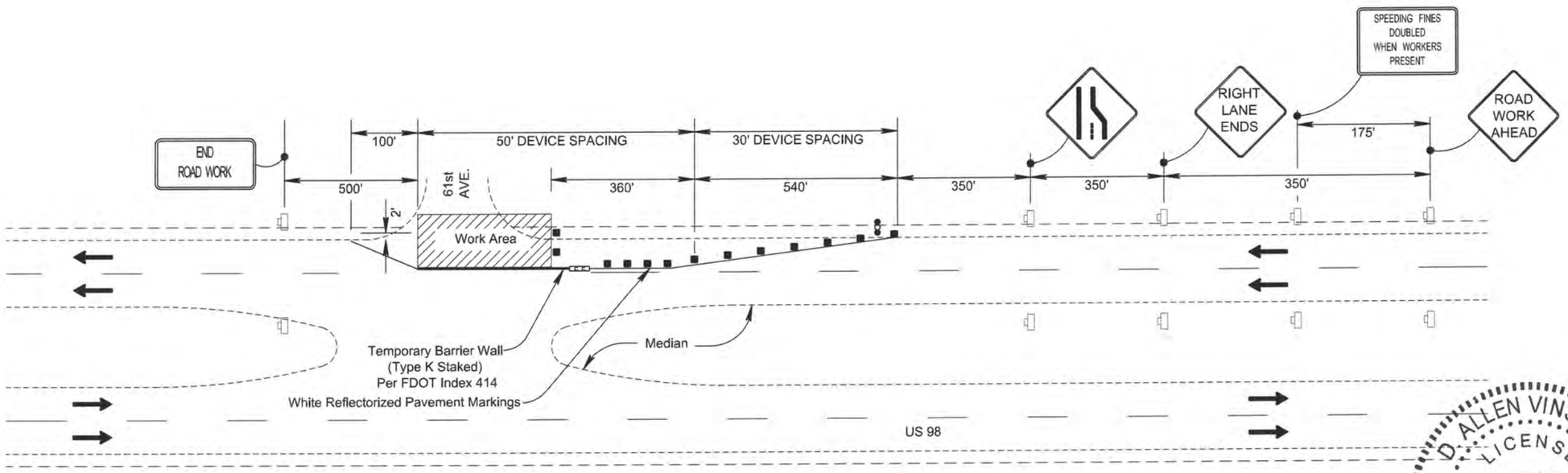
TEMPORARY TRAFFIC CONTROL PLAN

11 X 17 SCALE: NOT TO SCALE

SHEET 35



MOT PHASE IV
TYPICAL US 98



MOT PHASE IV
TYPICAL PLAN VIEW FOR US 98

D. ALLEN VINSON, II
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STATE OF
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PROFESSIONAL ENGINEER
10/20/2017

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ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE AREA
DRAINAGE IMPROVEMENTS

TEMPORARY TRAFFIC CONTROL PLAN

11 X 17 SCALE: NOT TO SCALE

SHEET 36

℄ SURVEY S. 61st. AVE.
12" FM (PVC & DI) / ECUA / TO REMAIN
36" MES TO BE REMOVED AND REPLACED MATCH EXISTING INV. 23.45
8" GAS (CS) / ESP / TO REMAIN
8" GAS (CS) / ESP / LOCATE & PROTECT
BEGIN RECONSTRUCTION MATCH EXISTING STA. 32+00.00 BL SURVEY 61ST AVE. N3° 19' 34.13"E 2300.00'
30+36.75 5.83' L
30+12.50 8.42' L
30+00
31+00
32+00
33+00
34+00
35+00
S. 61st. AVE. (80' R/W)
POLE / GULF POWER / TO REMAIN
TCE
CONST. 45 SY RIP RAP RUBBLE 20'x20'
30+08.20 31.85' R
S-100
30+32.38 44.14' R
R/W
CONST. 321 LF OF 60" RCP
81 LF OF EXISTING 36" RCP TO BE REMOVED AND REPLACED
EXISTING 60" RCP TO REMAIN
6" WATER (CS) / ESP / TO REMAIN
12" WATER (PVC) / ECUA / TO REMAIN
32+42.37 40.00' L
POLE / GULF POWER / TO REMAIN
6" WATER (PVC) / ECUA / TO REMAIN
R/W
EXISTING 18" RCP TO REMAIN
OE (12.47KV) / GULF POWER / TO REMAIN
2" GAS (PE) / ESP / TO REMAIN
POLE / GULF POWER / TO REMAIN
33+00.00 12.00' R
S-101
CONST. 548 LF OF 60" RCP
HANDHOLE / AT&T / TO REMAIN
32+32.90 40.00' R
36" MES TO BE REMOVED AND REPLACED MATCH EXISTING INV. 23.14
BFOC / AT&T / TO REMAIN
BFOC / AT&T / TO REMAIN
R/W
EXISTING 60" RCP TO REMAIN
OE (12.47KV) / GULF POWER / TO REMAIN
STATION - 35+40.00

POLE / GULF POWER / TO REMAIN
6" WATER (PVC) / ECUA / TO REMAIN
OE (12.47KV) / GULF POWER / TO REMAIN
2" GAS (PE) / ESP / TO REMAIN
CONST. 60" RCP
EXISTING 60" RCP TO REMAIN
SANITARY SEWER / ECUA / TO REMAIN
CONST. 462 LF OF 60" RCP (RT)
CONST. 462 LF OF 60" PIPE (LT)
℄ SURVEY S. 61st. AVE.
R/W
36+00
37+00
S. 61st. AVE. (80' R/W)
38+00
39+00
40+00
41+00
N3° 19' 34.13"E 2300.00'
S-102
BFOC / AT&T / TO REMAIN
R/W
BFOC / AT&T / TO REMAIN
HANDHOLE / AT&T / TO REMAIN
EXISTING 60" RCP TO REMAIN
POLES / GULF POWER / TO REMAIN
FDOT TYPE E CURB & GUTTER
OE (12.47KV) / GULF POWER / TO REMAIN
STATION - 35+40.00
STATION - 41+40.00

D. ALLEN VINSON LICENSE No. 72543 STATE OF FLORIDA PROFESSIONAL ENGINEER
10/10/2017

DEPARTMENT OF ENVIRONMENTAL PROTECTION
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STATE OF FLORIDA

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25 West Cedar Street, Suite 200
Pensacola, FL 32502-5945
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PROJECT MANAGER	A. VINSON
DESIGNED BY	A. VINSON
DRAWN BY	J. CLARK
CHECKED BY	A. VINSON
PROJECT NUMBER	13-14.081

D. Allen Vinson, P.E.
License No. 72543

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLES
DRAINAGE IMPROVEMENTS

UTILITY ADJUSTMENT PLAN
S. 61 St. AVE.
STA. 30+00.00 - 41+40.00

0 20 40
11 X 17 SCALE: 1" = 40'

SHEET 37

SANITARY SEWER / ECUA / TO REMAIN
2" GAS (PE) / ESP / TO REMAIN
EXISTING 15" RCP & INLET TO REMAIN
POLE & OE (12.47KV) / GULF POWER / TO REMAIN
6" WATER (PVC) / ECUA / TO REMAIN
EXISTING 15" RCP TO REMAIN
R/W
EXISTING 15" RCP TO REMAIN
POLE & OE (12.47KV) / GULF POWER / TO REMAIN
℄ SURVEY S. 61st. AVE.
STATION - 41+40.00
42+00
43+00
44+00
45+00
46+00
47+00
S. 61st. AVE. (80' R/W)
N3° 19' 34.13"E
2300.00'
STATION - 47+40.00
CONST. 60" RCP
S-103
FDOT TYP E CURB & GUTTER
BFOC / AT&T / TO REMAIN
EXISTING 36" RCP TO REMAIN
BT / AT&T / TO REMAIN
R/W
CONST. 818 LF 60" OF RCP (RT)
CONST. 818 LF 60" OF RCP (LT)
EXISTING 30" RCP TO REMAIN
D. ALLEN VINSON II LICENSE No. 72543 STATE OF FLORIDA PROFESSIONAL ENGINEER
10/20/2017

POLE & OE (12.47KV) / GULF POWER / TO REMAIN
BT / AT&T / TO REMAIN
EXISTING 15" RCP TO REMAIN
6" WATER (PVC) / ECUA / TO REMAIN
EXISTING 15" RCP TO REMAIN
SANITARY SEWER / ECUA / TO REMAIN
2" GAS (PE) / ESP / TO REMAIN
CONST. 60" RCP
R/W
℄ SURVEY LAKE JOANNE DR.
29+59.92
58.50' R
HANDHOLE / AT&T / TO REMAIN
℄ CONST. LAKE JOANNE DR.
POLE & OE (12.47KV) / GULF POWER / TO REMAIN
SANITARY SEWER / COREY STATION / ADJUST AS NEEDED
END RECONSTRUCTION STA. 52+26.11 BL SURVEY 61ST AVE.
48+00
49+00
50+00
51+00
52+00
53+00
S. 61st. AVE. (80' R/W)
N3° 19' 34.13"E
2300.00'
℄ SURVEY S. 61st. AVE.
S-104
WATER / COREY STATION / ADJUST AS NEEDED
BL SURVEY S. 61st. AVE. STA. 52+10.51 = CL CONST. LAKE JOANNE DR. STA. 30+00.00
BL SURVEY S. 61st. AVE. STA. 51+92.01 = BL SURVEY LAKE JOANNE DR. STA. 30+00.00
BFOC / AT&T / TO REMAIN
EXISTING 30" RCP TO REMAIN
BT / AT&T / TO REMAIN
R/W
EXISTING 18" CMP TO REMAIN
POLE & OE (12.47KV) / GULF POWER / TO REMAIN
ALUMINUM

DEPARTMENT OF ENVIRONMENTAL PROTECTION STATE OF FLORIDA PERMIT 0358869-001-EG/17 EG

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ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE
DRAINAGE IMPROVEMENTS

UTILITY ADJUSTMENT PLAN
S. 61 St. AVE.
STA. 41+40.00 - 53+00.00

0 20 40
11 X 17 SCALE: 1" = 40'

SHEET 38

NOTE: ALL STATION AND OFFSETS SHOWN ON THIS SHEET ARE BASED OFF THE ℄ CONST. OF LAKE JOANNE DR. UNLESS OTHERWISE STATED.

D. ALLEN VINSON, II
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10/20/2017

LIMITS OF MILLING & RESURFACING

2" GAS (PE) / ESP / TO REMAIN

6" WATER (PVC) / ECUA / TO REMAIN

BT / AT&T / LOCATE & PROTECT

CONST. 35 LF OF 60" RCP
CONST. 29 LF OF 60" PIPE
TCE

27+75.80
56.67' L
TCE
S-200
27+75.80
21.50' L

R/W
26+66.47
21.50' L

BEGIN RECONSTRUCTION
STA. 26+88.00
0' OFFSET CL CONST. LAKE JOANNE DR.
18.50' LT BL SURVEY LAKE JOANNE DR.

℄ CONST. LAKE JOANNE DR.
℄ SURVEY LAKE JOANNE DR.
S86° 47' 41.60"E
400.00'
18.5'

2" GAS (PE) / ESP / LOCATE & PROTECT

SANITARY SEWER / ECUA / ADJUST AS NEEDED

CONST. 237 LF OF 60" RCP (RT)
CONST. 243 LF OF 60" RCP (LT)

BT / AT&T / LOCATE & PROTECT

BT / AT&T / TO REMAIN

HANDHOLE / AT&T / TO REMAIN

WATER / COREY STATION / ADJUST AS NEEDED

BL SURVEY S. 61st. AVE. STA. 52+10.51 =
CL CONST. LAKE JOANNE DR. STA. 30+00.00

SANITARY SEWER / COREY STATION / ADJUST AS NEEDED

R/W

LAKE JOANNE DR. (80' R/W)

26+00 27+00 28+00 29+00 30+00

S-104

S-201

BL SURVEY S. 61st. AVE. STA. 51+92.01 =
BL SURVEY LAKE JOANNE DR. STA. 30+00.00

BFOC / AT&T / LOCATE & PROTECT

29+59.92
58.50' R

CONST. 60" RCP

6" WATER (PVC) / ECUA / TO REMAIN

POLE & OE (12.47KV) / GULF POWER / TO REMAIN

R/W

FORCE MAIN / ECUA / TO REMAIN

EXISTING 66" RCP TO REMAIN

6" WATER (PVC) / ECUA / LOCATE & PROTECT

2" GAS (PE) / ESP / TO REMAIN

SANITARY SEWER / ECUA / TO REMAIN

BT / AT&T / TO REMAIN

EQUIPMENT BOX / AT&T / TO REMAIN

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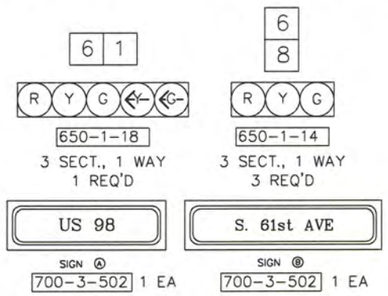
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE
DRAINAGE IMPROVEMENTS

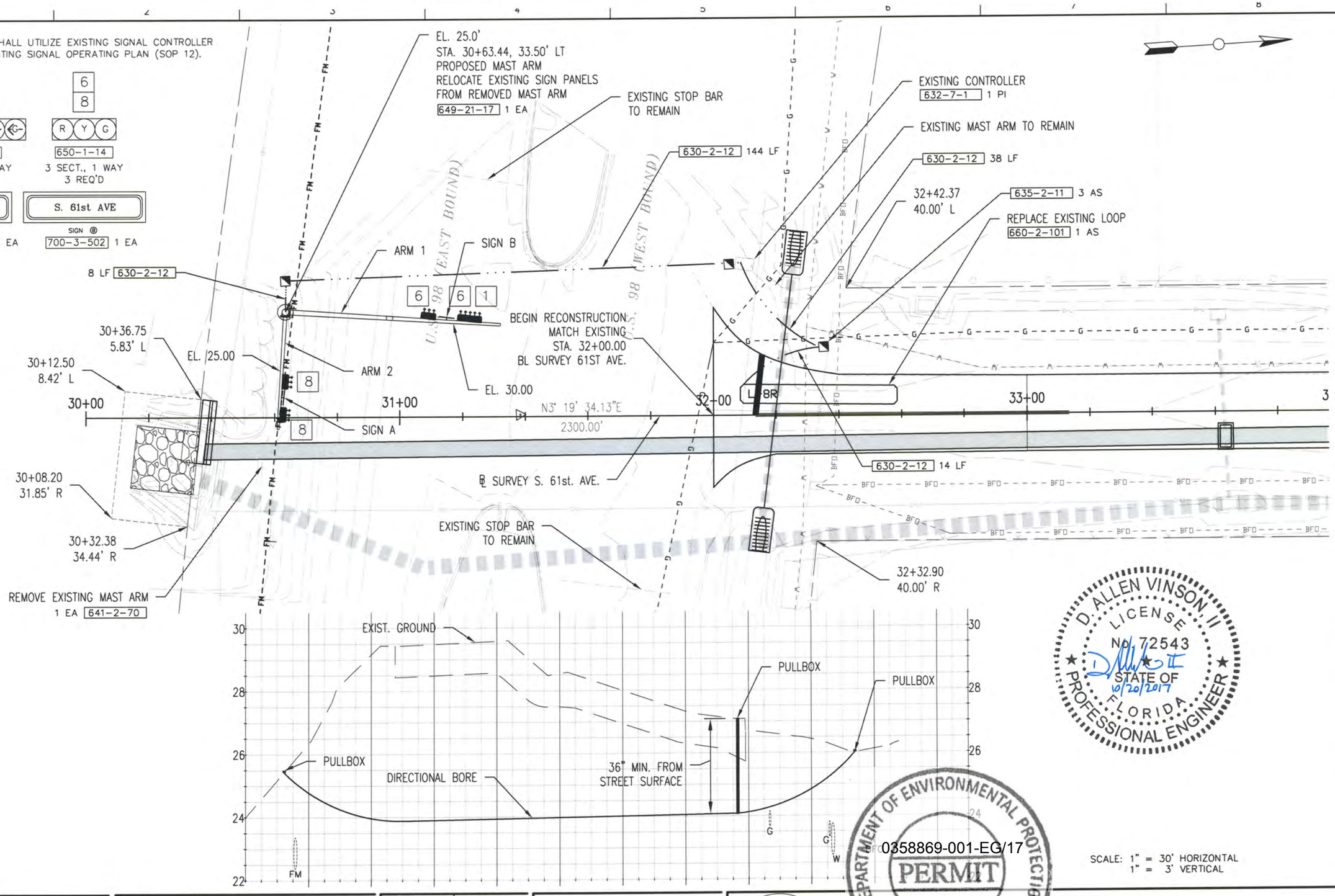
UTILITY ADJUSTMENT PLAN
LAKE JOANNE DR.
STA. 26+00.00 - 30+00.00

0 20 40
11 X 17 SCALE: 1" = 40'

SHEET 39

NOTE: CONTRACTOR SHALL UTILIZE EXISTING SIGNAL CONTROLLER TIMINGS AND THE EXISTING SIGNAL OPERATING PLAN (SOP 12).





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SCALE: 1" = 30' HORIZONTAL
1" = 3' VERTICAL

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ENGINEERING DEPARTMENT
LAKE CHARLENE
DRAINAGE IMPROVEMENTS

SIGNALIZATION PLAN
U.S. 90 AND S. 61 st. AVE.

0 15 30
11 X 17 SCALE: 1" = 30'

SHEET T-001

SPECIAL INSTRUCTIONS					
ID NO.	PED. BUTTON		PED. SIGNALS		HANDHOLE LOCATION

D. ALLEN VINSON II
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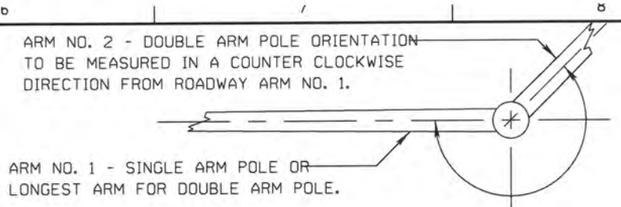

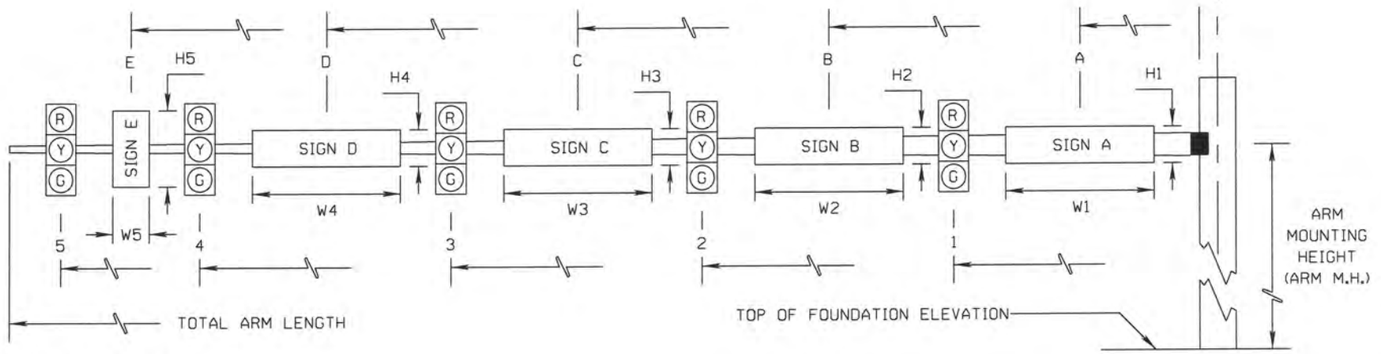

• DENOTES NUMBER OF SECTIONS IN SIGNAL HEAD ASSEMBLY

ID NO.	SHEET NO.	LOCATION BY STA.	TOP OF FOUNDATION ELEVATION	RDWY ARM NO.	CROWN ELEV.	SIGNAL DATA																	TOTAL ARM LENGTH	ARM M.H.	∠ BETWEEN DUAL ARMS 90/270	SIGN DATA															PAINT COLOR
						SIGNAL V/H	BACK PLATES Y/N	PED. SIGNAL Y/N	DISTANCE FROM POLE																		DISTANCE FROM POLE / HEIGHT AND WIDTH OF SIGN																
									1	•	2	•	3	•	4	•	5	•	6	•	7	•				A	H1	W1	B	H2	W2	C	H3	W3	D	H4	W4	E	H5	W5	
1	17	30+63.44	25.00	1	30.00	H	Y	N	45	3	57	5											63.0	24.0	270	50.00	1.5	5													
				2	25.00	H	Y	N	21	3	31	3											34.0	24.0		26.00	1.5	5.5													

* FUTURE CONFIGURATION - NOT TO BE CONSTRUCTED AT THIS TIME

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LAKE CHARLES
DRAINAGE IMPROVEMENTS

DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OF FLORIDA
0358869-001-EG/17
PERMIT
EG

MAST ARM TABULATION
U.S. 90 AND S. 61st. AVE.

11 X 17 SCALE: NOT TO SCALE

SHEET T-002

SPECIAL MAST ARM ASSEMBLIES DATA TABLE

NUMBER OF LOCATIONS	STRUCTURE NUMBER	FIRST ARM				FIRST ARM EXTENSION				SECOND ARM				SECOND ARM EXTENSION				POLE						
		FA(ft)	FB(in)	FC(in)	FD(in)	FE(ft)	FF(in)	FG(in)	FH(in)	SA(ft)	SB(in)	SC(in)	SD(in)	SE(ft)	SF(in)	SG(in)	SH(in)	UA(ft)	UB(ft)	UC(in)	UD(in)	UE(in)	UF(deg)	UG(ft)
1	1	30	8 71	12 9	0 25	35	12 1	17	0 375	34	8 28	13	0 25	0	C	0	0	27	24	20 2	24	0 3 75	270	0

SPECIAL MAST ARM ASSEMBLIES DATA TABLE (CONT.)

STRUCTURE NUMBER	FIRST ARM CONNECTION (in) FIRST ARM CAMBER ANGLE = 2 DEGREES											SECOND ARM CONNECTION (in) SECOND ARM CAMBER ANGLE = 2 DEGREES										
	# BOLTS	HT	FJ	FK	FL	FN	FO	FP	FR	FS	FT	# BOLTS	HT	SJ	SK	SL	SN	SO	SP	SR	SS	ST
1	6	30	36	3	0 75	0 25	25 8	1 25	2	12 5	0 313	6	30	36	3	0 75	0 25	25 8	1 25	2	12 5	0 313

SPECIAL MAST ARM ASSEMBLIES DATA TABLE (CONT.)

STRUCTURE NUMBER	POLE BASE CONNECTION (in)					SHAFT AND REINFORCING								LUMINAIRE AND LUMINAIRE CONNECTION										
	# BOLTS	BA	BB	BC	BF	DA(ft)	DB(ft)	RA	RB	RC	RD(in)	RE	RF(in)	LA(ft)	LB(ft)	LC(in)	LD(in)	LE	LF(ft)	LG(in)	LH(in)	LJ(in)	LK(in)	LL(deg)
1	6	40	2 5	2	40	19	5	11	19	12	8	0	0	0	0	0	0	0	0	0	0			

NOTES:

1 WORK WITH INDEX 17745

2 DESIGN WIND SPEED = 150 MPH

3 MOUNTING ARM HEIGHT, REFER TO MAST ARM TABULATIONS SHEET FOR ACTUAL ARM MOUNTING HEIGHT FOR EACH ARM

FOUNDATION NOTES:

1. DESIGN BASED ON BORING B-11 SHOWN IN ADDENDUM DATED 01/26/2017, SIGNED AND SEALED BY TERRY NEIMAN LMJ & ASSOCIATES, INC

2 ASSUMPTIONS AND VALUES USED IN DESIGN:

SOIL TYPE = COHESIONLESS
SOIL LAYER THICKNESS = 10 FT
SOIL FRICTION ANGLE = 27 DEG
SOIL WEIGHT = 42 6 PCF
N = 8
DESIGN WATER TABLE IS 4 FT BELOW SURFACE

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HDR Engineering, Inc.
25 West Cedar Street, Suite 200
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ISSUE	DATE	DESCRIPTION
A	10/20/17	ISSUED FOR PERMIT

PROJECT MANAGER	B. HENDRICKS
DESIGNED BY	YSS
DRAWN BY	KWD
CHECKED BY	BFH
PROJECT NUMBER	13-14.081

Bart F. Hendricks
License No. 51391

ESCAMBIA COUNTY ENGINEERING DEPARTMENT

LAKE CHARLENE
Warrington Basin Study

MAST ARM TABLE OF VARIABLES

SCALE AS SHOWN

SHEET T003

350271 LakeCharlene T003 - MAST ARM TABLE OF VARIABLES 10/19/2017 4:14 PM

GENERAL NOTES

GOVERNING STANDARDS AND CONSTRUCTION SPECIFICATIONS:
1. FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROADS AND BRIDGE CONSTRUCTION, AS AMENDED BY CONTRACT DOCUMENTS (LATEST EDITION)
2. FDOT STRUCTURES MANUAL DATED JANUARY 2017
3. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) LOAD AND RESISTANCE FACTOR (LRFD) BRIDGE DESIGN SPECIFICATIONS, [7TH], EDITION AND ALL SUBSEQUENT INTERIMS.

MATERIALS
1. ALL CONCRETE SHALL CONFORM WITH SECTION 346
2. UNIT WEIGHT OF CONCRETE (INCLUDING REINFORCING) = 150 LB/FT^3
3. CONCRETE SHALL BE CLASS II, CAST IN PLACE AND HAVE A MIN. 28-DAY COMPRESSIVE STRENGTH OF 3,400 PSI
4. PROVIDE ¾" CHAMFERS ON ALL EXPOSED EDGES EXCEPT AS OTHERWISE NOTED.
5. ALL REINFORCING STEEL SHALL BE ASTM A615, GRADE 60
6. MINIMUM CONCRETE COVER SHALL BE AS FOLLOWS UNLESS OTHERWISE SHOWN IN PLANS:
   WALL: 2"
   FOOTING: 2", EXCEPT CAST AGAINST EARTH: 3"

PLAN DIMENSIONS
1. ALL DIMENSIONS IN THESE PLANS ARE MEASURED IN FEET EITHER HORIZONTALLY OR VERTICALLY UNLESS OTHERWISE NOTED.
2. ENDWALL DIMENSIONS, LOCATIONS AND POSITIONS ARE FOR ROUND AND ELLIPTICAL CONCRETE PIPE. ROUND CONCRETE PIPE SHOWN.

UTILITIES
1. FOR LOCATIONS OF EXISTING UTILITIES, SEE CIVIL DRAWINGS AND UTILITY PLANS
   THE UTILITIES SHOWN IN THESE PLANS ARE AT APPROXIMATE LOCATIONS

SITE CONDITIONS
1. REVIEW ALL CONTRACT DOCUMENTS, DIMENSIONS AND SITE CONDITIONS AND COORDINATE WITH FIELD DIMENSIONS. REPORT ANY DISCREPANCIES IN WRITING TO THE ENGINEER OF RECORD. DO NOT CHANGE SIZE OR DIMENSIONS OF STRUCTURAL MEMBERS WITHOUT WRITTEN INSTRUCTIONS FROM THE ENGINEER OF RECORD.
2. ALL PORTIONS OF TREES AND MISCELLANEOUS DEBRIS WITHIN THE CHANNEL WITHIN THE R/W LIMITS SHALL BE REMOVED AND DISPOSED PROPERLY
3. FRONT SLOPE AND DITCH TRANSITIONS SHALL BE IN ACCORDANCE WITH INDEX NO. 280
4. ON OUTFALL DITCHES WITH SIDE SLOPES FLATTER THAN 1:1½ PROVIDE 20' TRANSITIONS FROM THE ENDWALL TO THE FLATTER SIDE SLOPES, RIGHT OF WAY PERMITTING
5. DEWATERING WILL BE NEEDED TO INSTALL THE FOUNDATIONS. REFER TO GEOTECHNICAL REPORT FROM LARRY M JACOBS, FILE # 16-251, DATED JANUARY 13, 2017 FOR HEADWALL FOUNDATION AND SHEET PILE RECOMMENDATIONS.
6. IF DEWATERING IS NOT PAID FOR IN A PAY ITEM, DEWATERING COST SHALL BE INCIDENTAL TO THE COST OF THE ITEM TO BE INSTALLED.

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Bart F. Hendricks
License No. 51391

BART FLETCHER HENDRICKS LICENSE No. 51391 STATE OF FLORIDA PROFESSIONAL ENGINEER
10/19/17

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ESCAMBIA COUNTY
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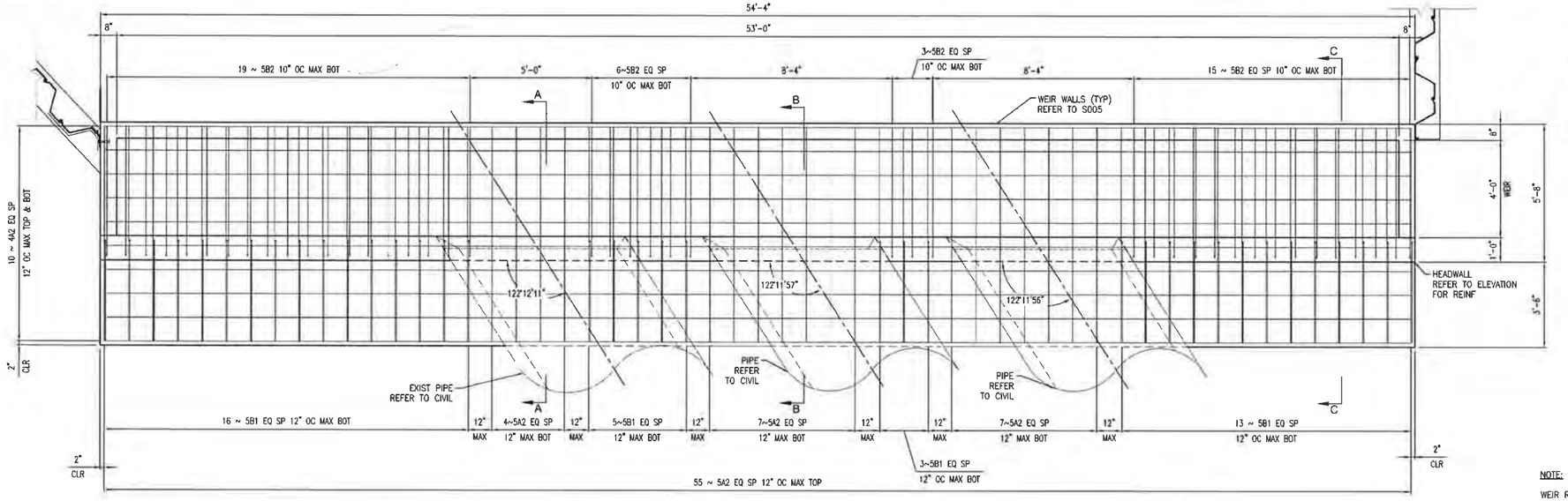
LAKE CHARLENE Area of Warrington Basin Study

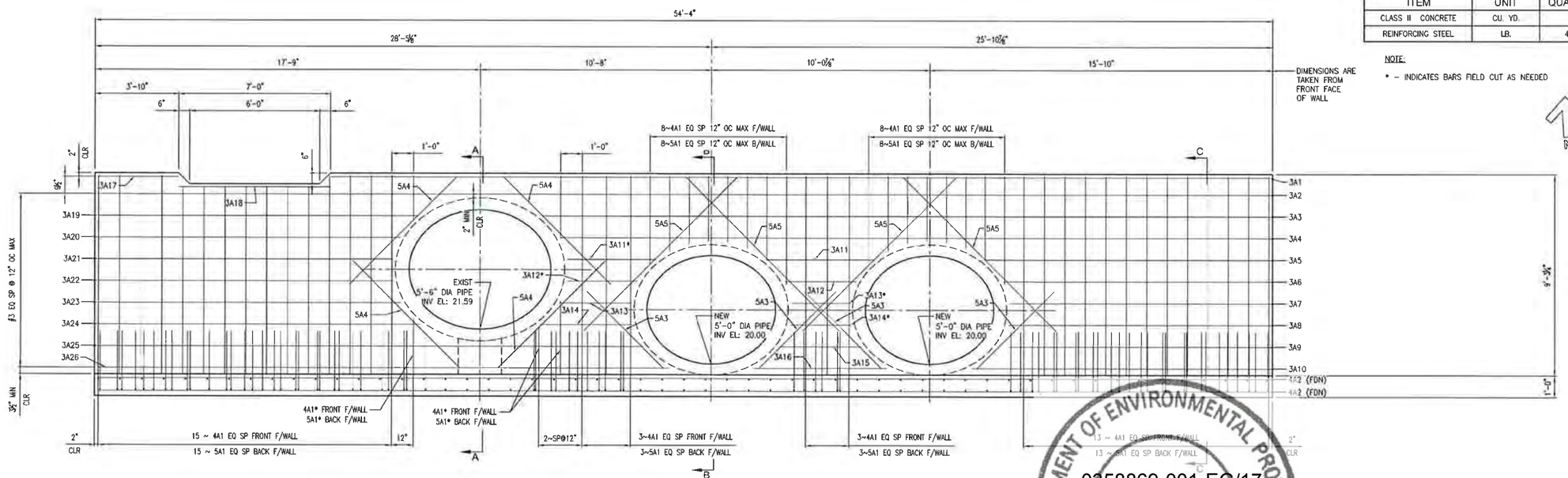
STRUCTURAL GENERAL NOTES

SCALE: AS SHOWN
SHEET: S001

350271 LakeCharlene S001 - STRUCTURAL GENERAL NOTES 10/19/2017 3:59 PM



FOUNDATION PLAN
(WALL REINFORCING NOT SHOWN)
SCALE: 3/8" = 1'-0"



ELEVATION
(TURNDOWN NOT SHOWN)
SCALE: 3/8" = 1'-0"

NOTE:

WEIR REINFORCING NOT SHOWN
REFER TO S005 FOR WEIR PLAN
AND DETAILS

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
CLASS II CONCRETE	CU. YD.	44
REINFORCING STEEL	LB.	4066

NOTE:

* – INDICATES BARS FIELD CUT AS NEEDED

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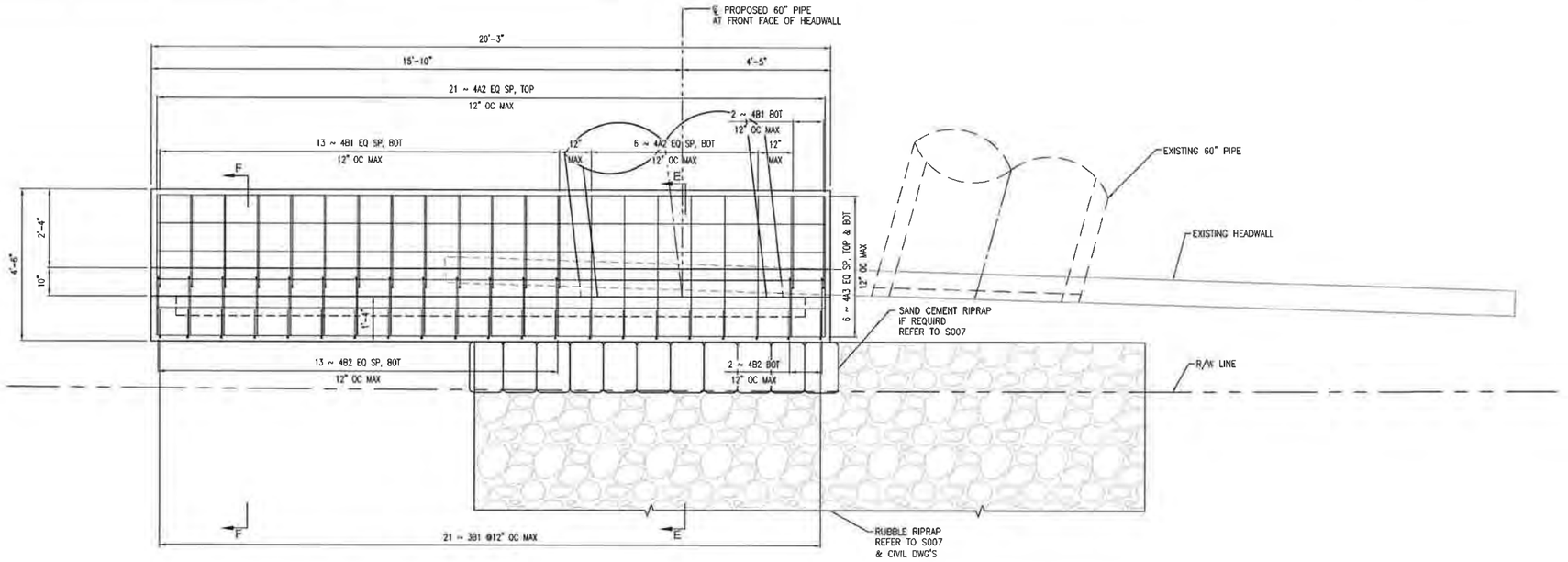
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE Area of
Warrington Basin Study

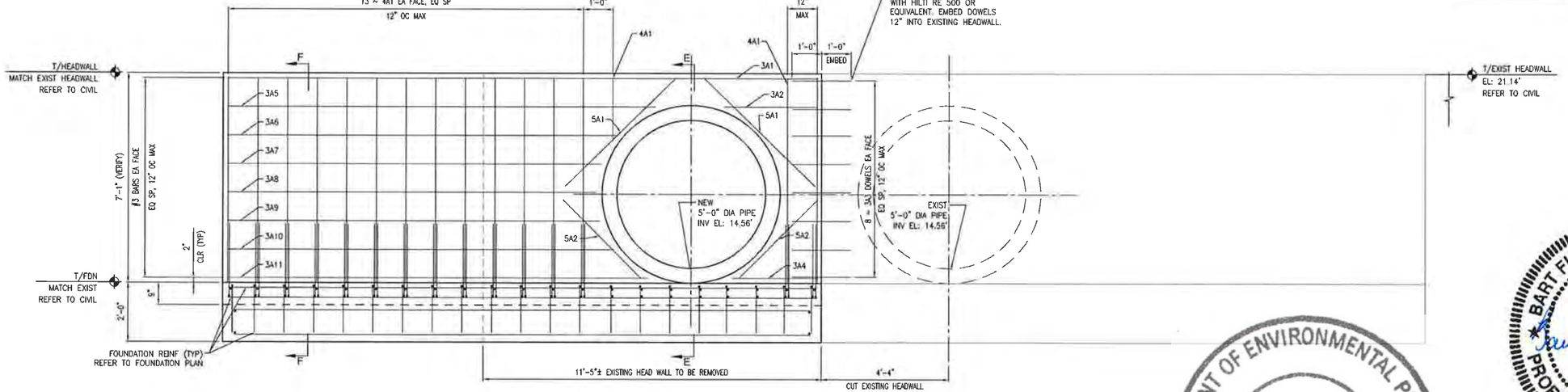
HEADWALL PLAN AND ELEVATION
LAKE JOANNE DRIVE

SCALE: AS SHOWN
SHEET: S002

350271 LakeCharlene S002 – HEADWALL PLAN AND ELEVATION 10/19/2017 4:00 PM



FOUNDATION PLAN
SCALE: ½" = 1'=0"



ELEVATION
SCALE: ½" = 1'=0"

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
CLASS II CONCRETE	CU. YD.	7
REINFORCING STEEL	LB.	642

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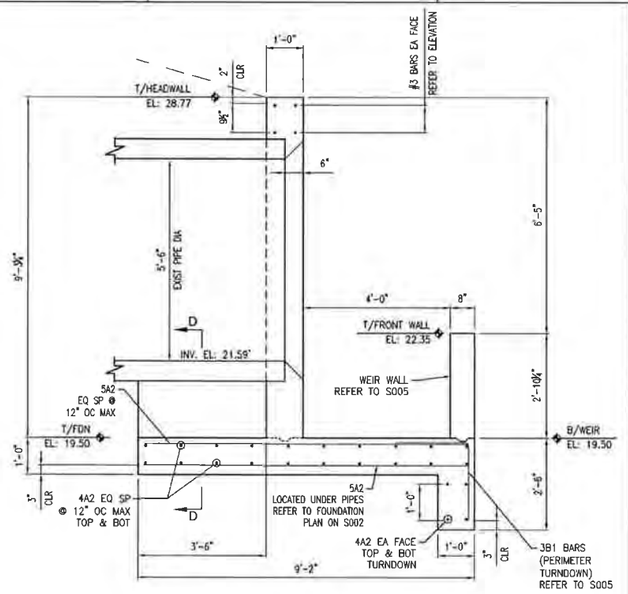
LAKE CHARLENE Area of
Warrington Basin Study

HEADWALL PLAN AND ELEVATION
S 61ST STREET AND US HWY 98

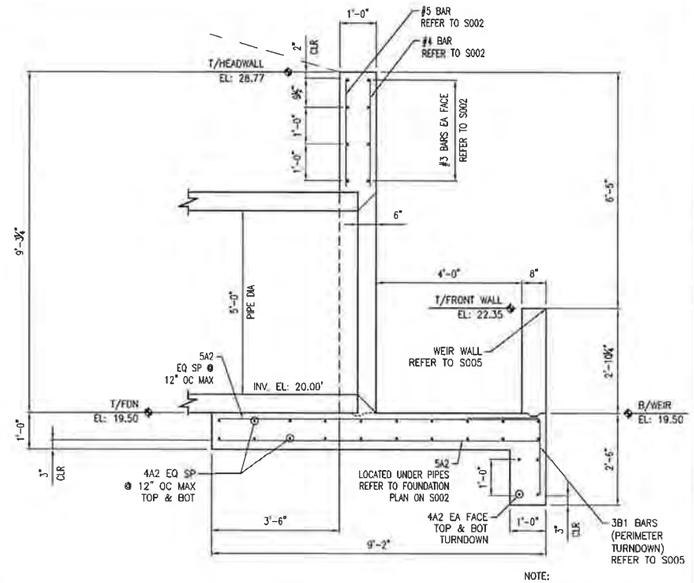
SCALE: AS SHOWN
SHEET: S003

350271 LakeCharlene S003 - HEADWALL PLAN AND ELEVATION 10/19/2017 4:02 PM



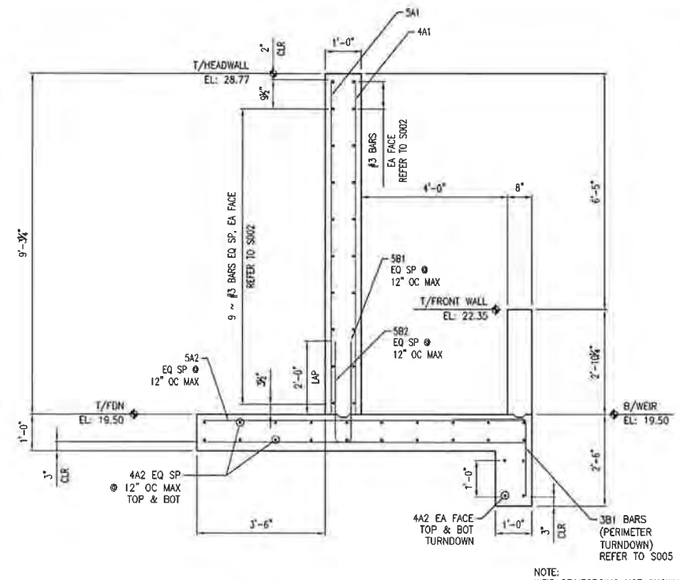
SECTION A-A
(5'-6" DIA PIPE)
SCALE: ½" = 1'-0"

NOTE:
WEIR REINFORCING NOT SHOWN
REFER TO WEIR PLAN AND DETAILS
USE WITH SHEET S002



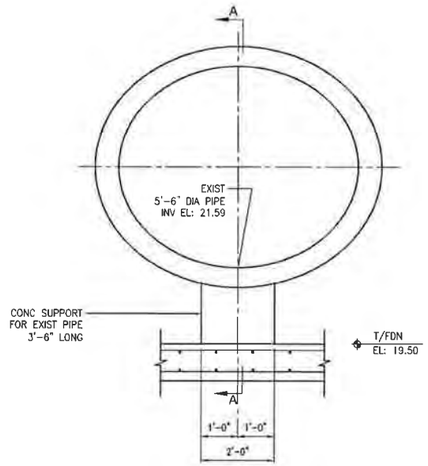
SECTION B-B
(5'-0" DIA PIPE)
SCALE: ½" = 1'-0"

NOTE:
WEIR REINFORCING NOT SHOWN
REFER TO WEIR PLAN AND DETAILS
USE WITH SHEET S002

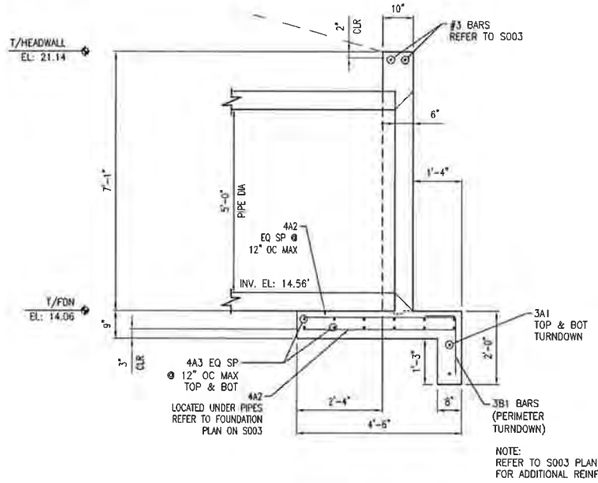


SECTION C-C
(TYPICAL ENDWALL SECTION)
SCALE: ½" = 1'-0"

NOTE:
WEIR REINFORCING NOT SHOWN
REFER TO WEIR PLAN AND DETAILS
USE WITH SHEET S002

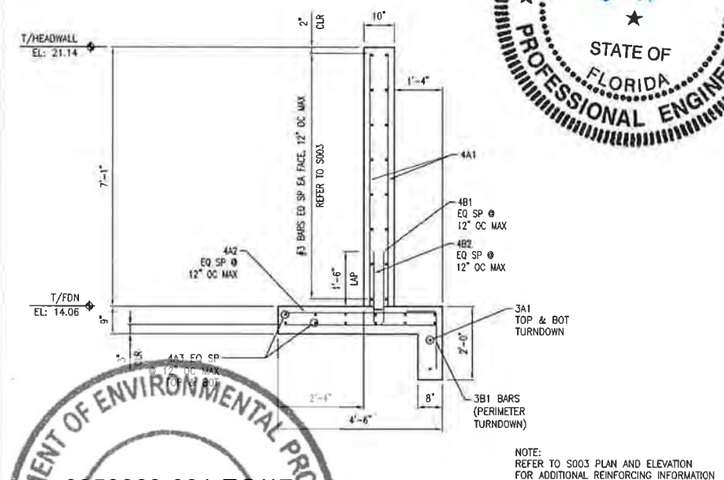


SECTION D-D
(CONCRETE SUPPORT FOR EXISTING PIPE)
SCALE: ½" = 1'-0"



SECTION E-E
(5'-0" DIA PIPE SOUTH HEAD WALL)
SCALE: ½" = 1'-0"

NOTE:
REFER TO S003 PLAN AND ELEVATION
FOR ADDITIONAL REINFORCING INFORMATION



SECTION F-F
(TYPICAL ENDWALL SECTION SOUTH HEADWALL)
SCALE: ½" = 1'-0"

NOTE:
REFER TO S003 PLAN AND ELEVATION
FOR ADDITIONAL REINFORCING INFORMATION

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LICENSE
No. 51391
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

Paul J. Heard
10-19-17

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Bart F. Hendricks
License No. 51391

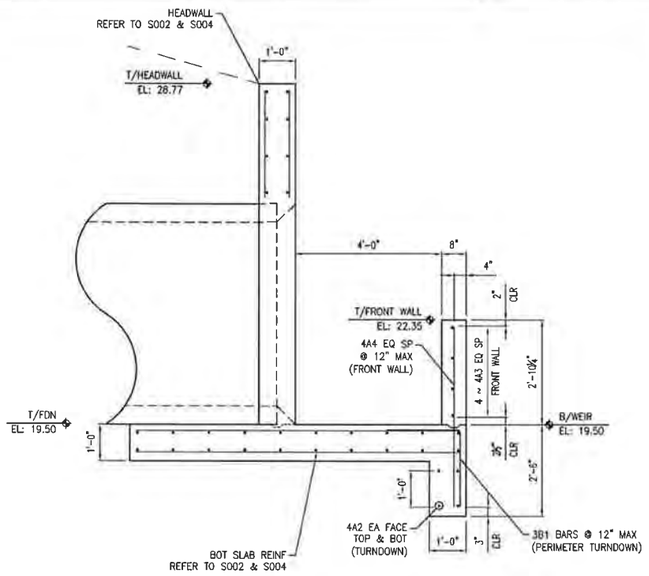
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE Area of
Warrington Basin Study

HEADWALL DETAILS

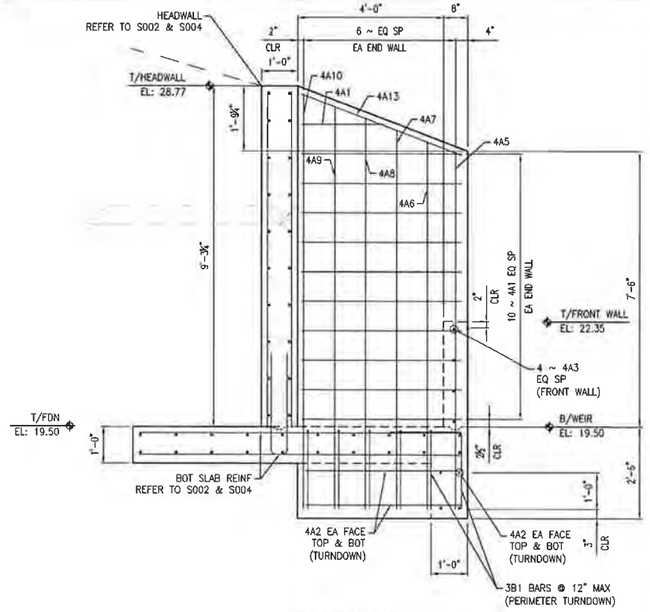
SCALE: AS SHOWN

SHEET S004

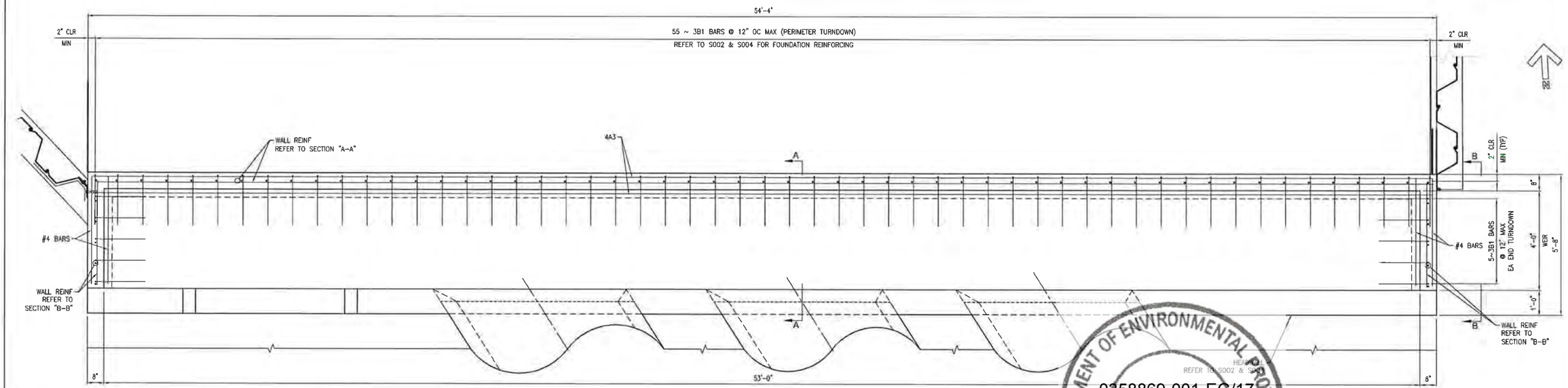
350271 LakeCharlene S004 - HEADWALL DETAILS 10/19/2017 4:03 PM



SECTION A-A
AT 5'-0" DIA PIPE (5'-6" DIA PIPE SIMILAR)
SCALE: ½" = 1'-0"



SECTION B-B
(WEIR SIDE WALL)
SCALE: ½" = 1'-0"



WEIR PLAN
(HEADWALL & FOOTING REINFORCING NOT SHOWN)
SCALE: ½" = 1'-0"

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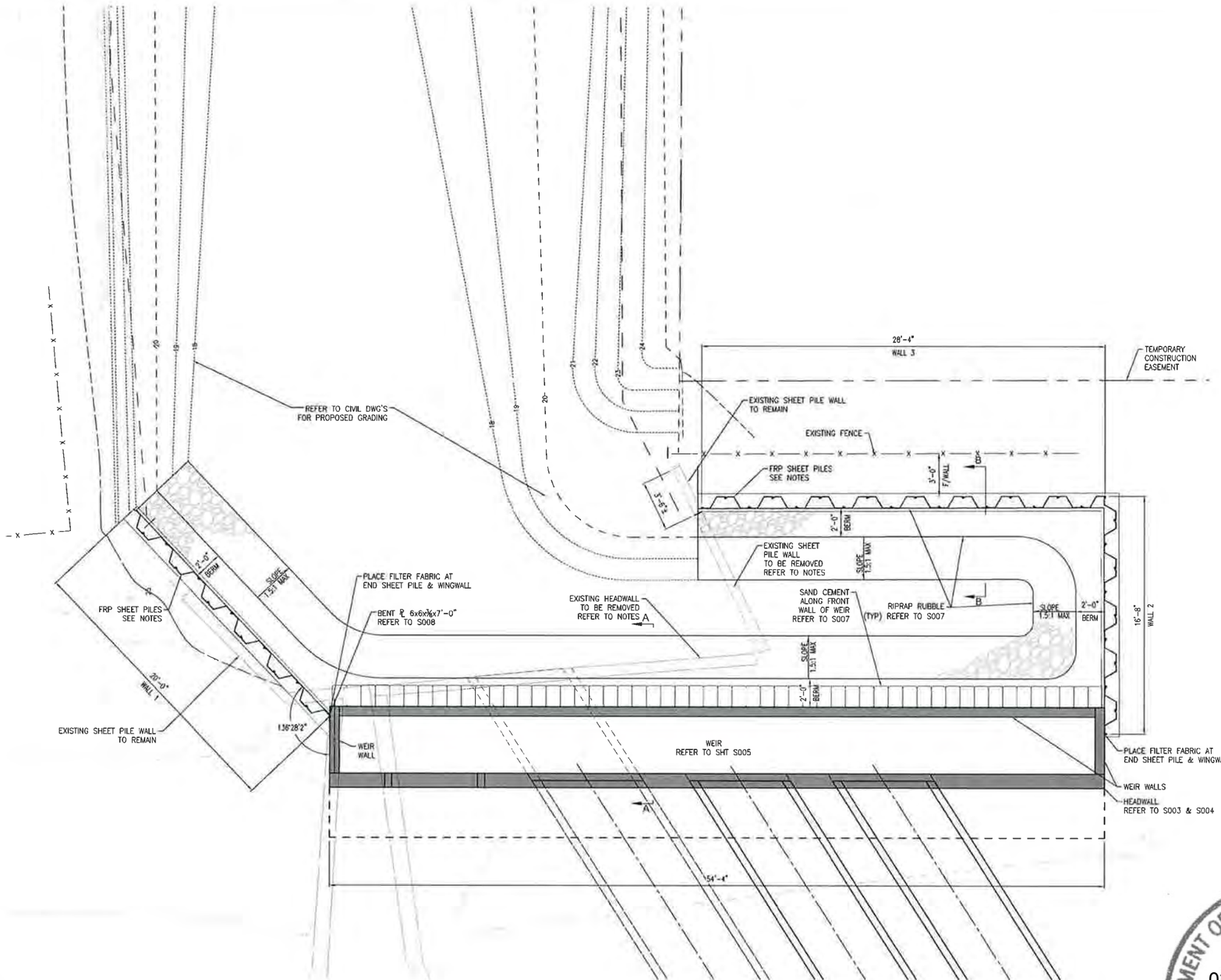
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE - Lot of
Warrington Basin Study

WEIR PLAN AND DETAILS
LAKE JOANNE DRIVE

SCALE: AS SHOWN
SHEET: S005

350271 LakeCharlene S005 - WEIR PLAN AND DETAILS 10/19/2017 4:04 PM



SHEET PILE WALL AND RIPRAP PLAN

SCALE : 1/4" = 1'

NOTES:

1. WARNING: WORK FOR THIS SITE IS BEING PERFORMED NEAR A GAS LINE
2. WORK THIS SHEET WITH S007 AND S008.
3. SHEET PILES SHALL BE FIBER REINFORCED PLASTIC (FRP). REFER TO SHEET S008 FOR REQUIRED FRP SHEET PILE PROPERTIES AND SECTIONS.
4. EXISTING WALL PLANKS/WALES THAT ARE NO LONGER REQUIRED SHALL BE REMOVED.
5. ADJUST ELEVATIONS AS REQUIRED TO MATCH SITE CONDITIONS. DO NOT EXCEED EXPOSED WALL HEIGHTS SHOWN
6. PLACE RIPRAP AND BEDDING STONE CAREFULLY ADJACENT TO SHEET PILES TO PREVENT DAMAGE.
7. BACKFILL SHALL BE A COHESIONLESS MATERIAL MEETING SPECIFICATIONS AND SHALL BE PLACED IN 12" MAX LIFTS AND COMPACTED TO 90 MODIFIED PROCTOR OR BETTER.
8. COMPACTION WITHIN 3'-0" OF THE SHEET PILE WALL FACE SHOULD BE ACHIEVED USING A PLATE TAMPER WITH A MINIMUM WEIGHT OF 300 LBS.
9. CONTRACTOR SHALL COORDINATE COMPONENTS FOR A COMPLETE SHEET PILE SYSTEM INCLUDING CAPS, WALES, ANCHORS, CORNERS, AND MISCELLANEOUS CONNECTIONS TO MATCH THE MINIMUM SHEET PILE SIZE INDICATED IN THE PLANS. ALL ITEMS NECESSARY TO PROVIDE A COMPLETE WALL SYSTEM ARE INCIDENTAL TO THE COST OF THE SHEET PILES.
10. WALL CAPS SHALL BE A FRP SHAPE DESIGNED BY THE MANUFACTURER FOR USE ON THE SELECTED PILE SHAPE. INSTALL ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.
11. INSTALL SHEETS ALONG STRAIGHT LINES WITH AN ALLOWABLE HORIZONTAL TOLERANCE OF 1" WITHIN 10'
12. WALES AND TIE-BACKS ARE NOT REQUIRED FOR THESE WALLS FOR STRENGTH OR DEFLECTION, BUT MAY BE REQUIRED TO MEET HORIZONTAL INSTALLATION TOLERANCE. IF USED, WALES SHALL BE A FRP MATERIAL DESIGNED BY THE MANUFACTURER FOR USE ON THE SELECTED PILE SHAPE
13. BENT PLATE SHALL BE ASTM A36 GALVANIZED.
14. EXPANSION BOLTS SHALL BE 3/4" DIA STAINLESS STEEL SUCH AS HILTI KWIK BOLT 3 SS 304.
15. CUT EXISTING SHEET PILE WALLS AT THE INTERFACE WITH NEW WALLS AND ATTACH TO THE NEW WALLS USING MATERIALS MATCHING EITHER THE EXISTING OR NEW WALLS. USE FILTER FABRIC ALONG THE INTERFACE. DETAILS OF THE ATTACHMENT TO BE SUBMITTED FOR REVIEW PRIOR TO IMPLEMENTATION. COSTS OF THE CONNECT ARE INCIDENTAL TO THE SHEET PILES.
16. CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS AND ANGLES SHOWN FOR EXISTING ITEMS THAT AFFECT CONSTRUCTION PRIOR TO STARTING CONSTRUCTION.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING BURIED AND OVERHEAD UTILITIES PRIOR TO SHEET PILE INSTALLATION AND SHALL COORDINATE WITH UTILITY COMPANIES TO SUPPORT UTILITIES AS REQUIRED
18. FOR LOCATIONS OF EXISTING UTILITIES, REFER TO CIVIL PLANS.
19. THE UTILITIES SHOWN IN THE WALL PLANS ARE AT APPROXIMATE LOCATIONS.
20. REFER TO SHEET S008 FOR SECTION B-B AND SHEET PILE ELEVATIONS AND DETAILS.
21. REFER TO SHEET S007 FOR SECTIONS A-A AND B-B FOR RIPRAP INFORMATION.
22. SHEET PILE INSTALLATION IS NOT ALLOWED FROM 7:00 P.M. TO 7:00 A.M.

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Bart F. Hendricks 10-18-17

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CHECKED BY	BFH
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License No. 51391

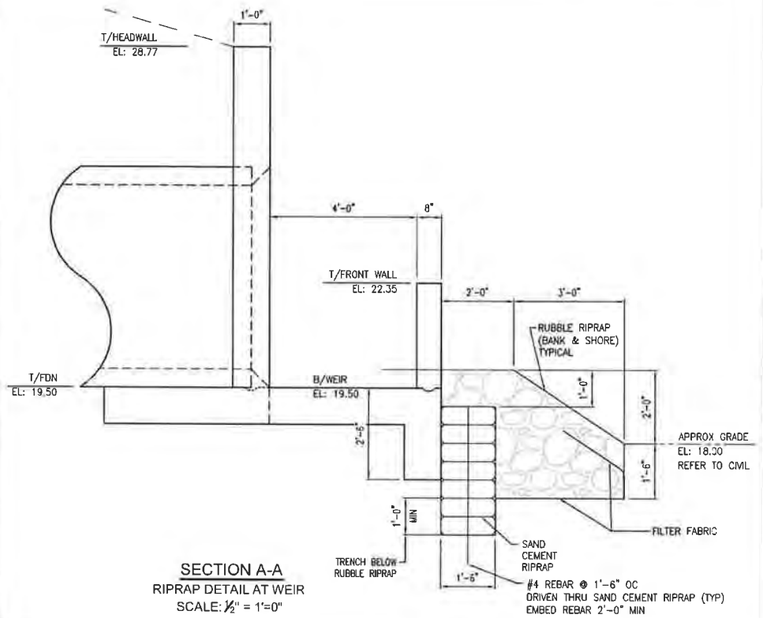
ESCAMBIA COUNTY ENGINEERING DEPARTMENT
LAKE CHARLENE Area of Warrington Basin Study

SHEET PILE WALL PLAN
LAKE JOANNE DRIVE

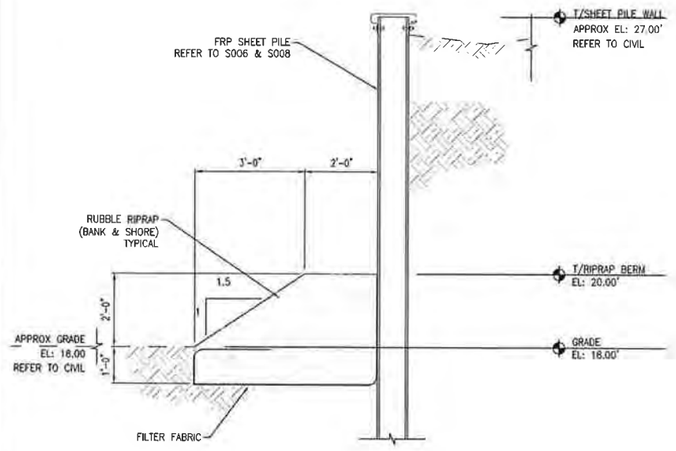
SCALE: AS SHOWN

SHEET S006

350271 LakeCharlene S006 - SHEET PILE WALL PLAN 10/19/2017 4:06 PM



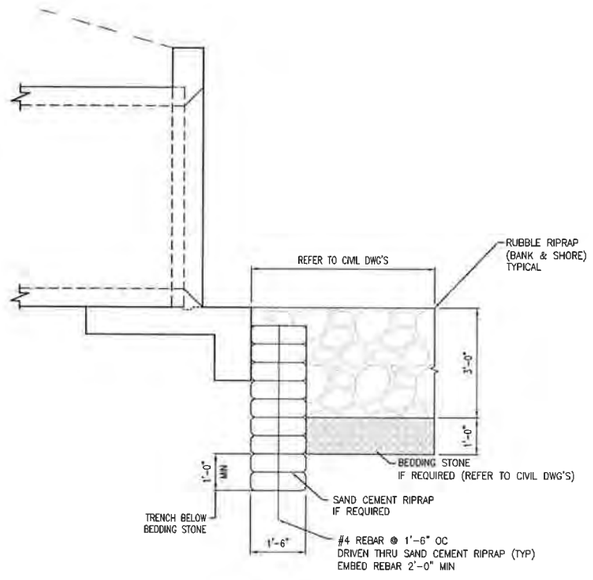
SECTION A-A
RIPRAP DETAIL AT WEIR
SCALE: ½" = 1'=0"



SECTION B-B
RIPRAP DETAIL AT SHEET PILE WALL
SCALE: ½" = 1'=0"

ESTIMATED QUANTITIES				
ITEM	UNIT	QUANTITY		
		LOCATION		
		WEIR	SHEET PILE WALL	SOUTH HEADWALL
RIPRAP (SAND CEMENT)	CY	11	0	REFER TO CIVIL DWG'S
RIPRAP (RUBBLE)	TN	40	45	REFER TO CIVIL DWG'S
BEDDING STONE	TN	0	0	REFER TO CIVIL DWG'S

NOTES:
1. PLACE SAND CEMENT RIPRAP TO A MINIMUM DEPTH OF 1'-0" BELOW BEDDING STONE, AS SHOWN IN RIPRAP DETAILS.
2. PLACE RIPRAP IN ACCORDANCE WITH SECTION 530 OF THE STANDARD SPECIFICATIONS OF ROAD AND BRIDGE CONSTRUCTION.
3. FILTER FABRIC SHALL BE TYPE D-2, SEE DESIGN STANDARD INDEX 199. SPLICE LENGTH SHALL BE 2'-0" MINIMUM.
4. DEWATERING AND COMPACTION SHALL BE PER SECTION 125 OF THE SPECIFICATIONS AND THE REPORT OF GEOTECHNICAL EXPLORATION, BY LARRY M. JACOBS & ASSOCIATES, FILE NO. 16-251 DATED JANUARY 13, 2017.



SECTION E-E
RIPRAP DETAIL AT SOUTH HEADWALL
SCALE: ½" = 1'=0"

MOTT MACDONALD FLORIDA LLC
MOTT MACDONALD

HDR Employee-owned
HDR Engineering, Inc.
25 West Cedar Street, Suite 200
Pensacola, FL 32502-5945
(850) 432-6800
www.hdrinc.com
Certificate of Authorization No. 4213

ISSUE	DATE	DESCRIPTION
A	10/20/17	ISSUED FOR PERMIT

PROJECT MANAGER	B. HENDRICKS
DESIGNED BY	YSS
DRAWN BY	KWD
CHECKED BY	BFH
PROJECT NUMBER	13-14.081

Bart F. Hendricks
License No. 51391

BART FLETCHER HENDRICKS LICENSE No. 51391 STATE OF FLORIDA PROFESSIONAL ENGINEER
10-19-17

DEPARTMENT OF ENVIRONMENTAL PROTECTION STATE OF FLORIDA
0358869-001-EG/17
PERMIT

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT
LAKE CHARLENE OR
Warrington Basin Study

TYPICAL RIPRAP DETAILS

SCALE: AS SHOWN
SHEET: S007

352271 LakeCharlene S007 - TYPICAL RIPRAP DETAILS 10/19/2017 4:07 PM

PERMANENT FRP SHEET PILE NOTES

DESIGN SPECIFICATIONS:
1. FDOT STRUCTURES MANUAL DATED JANUARY 2017, VOLUME 1 AND 2.
2. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) LRFD BRIDGE DESIGN SPECIFICATIONS (7TH EDITION) AND APPROVED INTERIMS AS SPECIFIED IN THE STRUCTURES DESIGN GUIDELINES.

GOVERNING STANDARDS AND CONSTRUCTION SPECIFICATIONS:
FLORIDA DEPARTMENT OF TRANSPORTATION, 2017 DESIGN STANDARDS AND JULY 2017 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AS AMENDED BY CONTRACT DOCUMENTS.

DESIGN METHOD:
LOAD AND RESISTANCE FACTOR DESIGN METHOD (LRFD).

VERTICAL DATUM:
VERTICAL DATUM USED IS NAVD 88.

ENVIRONMENT:
MODERATELY AGGRESSIVE

DESIGN LOADING:
1. WALL DESIGN LOADS INCLUDE THE LATERAL EARTH PRESSURE AND SURCHARGE LOADS.
2. SEE FRP SHEET PILE WALL DATA TABLE, THIS SHEET
3. THE DESIGN PARAMETERS INDICATED IN THIS TABLE WERE USED IN THE SHEET PILE WALL ANALYSIS IF THE CONTRACTOR PLANS OPERATIONS, WHICH EXCEED THE DESIGN PARAMETERS SHOWN, THE CONTRACTOR'S SPECIALTY ENGINEER WILL REDESIGN THE WALL TO RESIST CONSTRUCTION LOADS AT A MAXIMUM DEFLECTION OF 3 INCHES.
4. DESIGN PASSIVE RESISTANCE FACTOR = 0.65

INSTALLATION:
1. THE CONTRACTOR IS RESPONSIBLE FOR MEANS AND METHODS OF CONSTRUCTION.

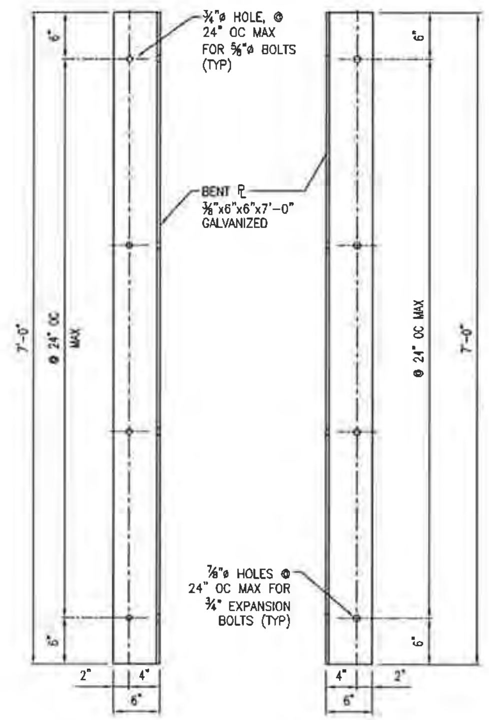
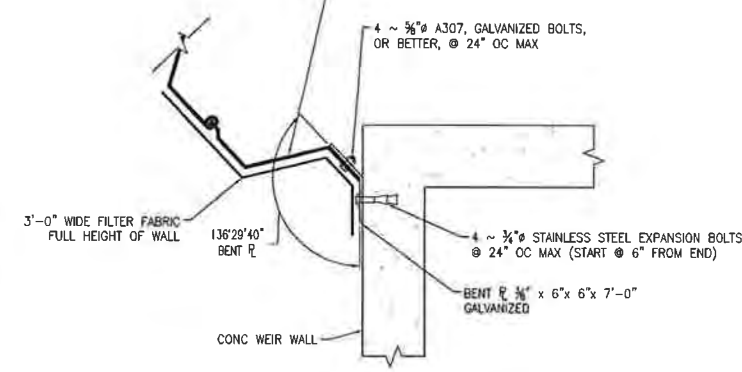
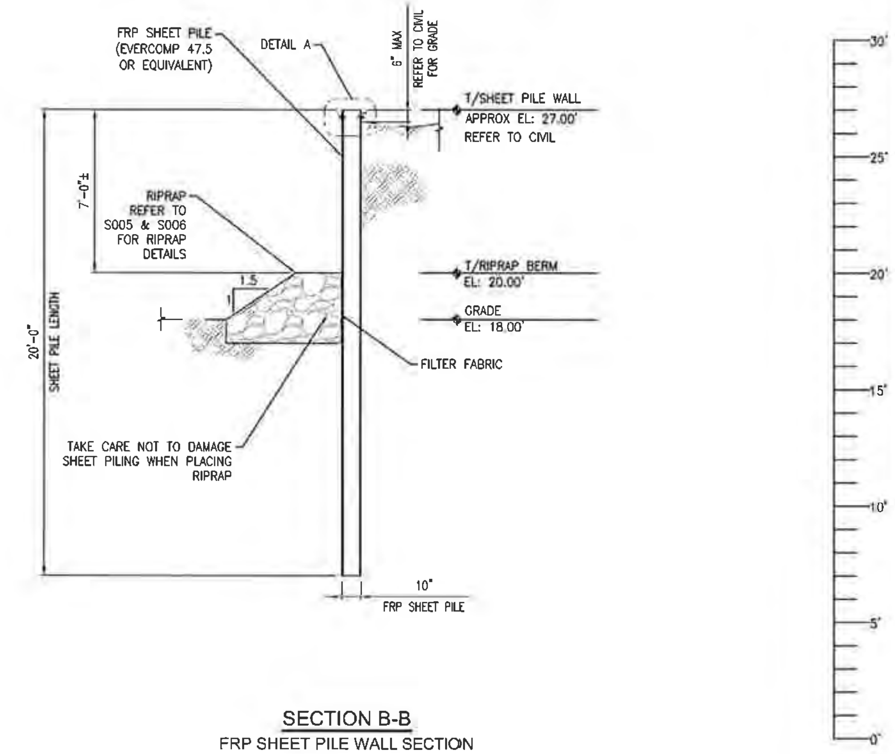
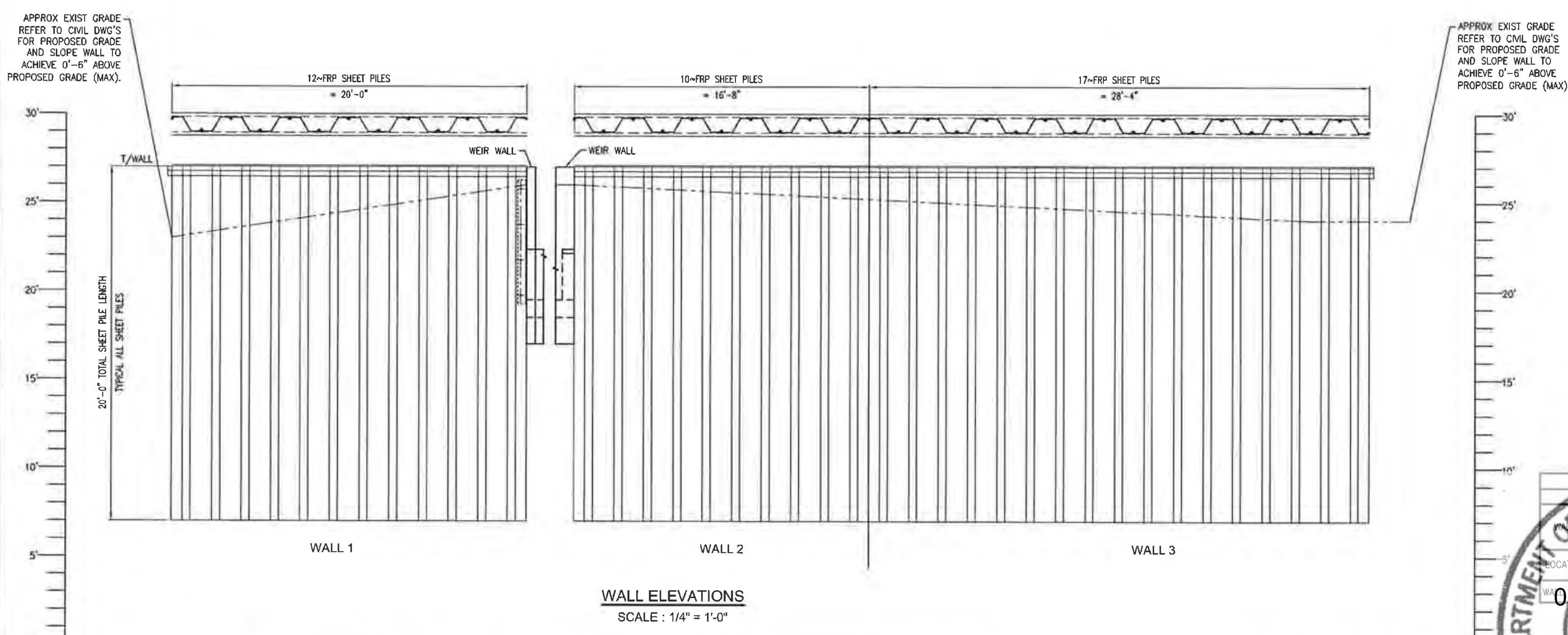


PLATE DETAILS
SCALE: 1" = 1'-0"

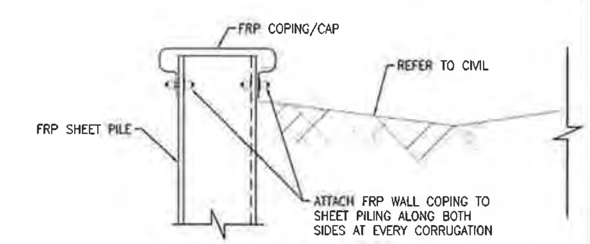




SECTION B-B
FRP SHEET PILE WALL SECTION
SCALE: 1/4" = 1'-0"



WALL ELEVATIONS
SCALE : 1/4" = 1'-0"



DETAIL A
SCALE: 1" = [illegible]

BART FLETCHER HENDRICKS LICENSE No. 51391 STATE OF FLORIDA PROFESSIONAL ENGINEER
10-19-17

FRP SHEET PILE WALL, DATA TABLE

CONSTRUCTION INFORMATION							*** DESIGN PARAMETERS					
WALL DESCRIPTION		MOMENT CAPACITY	MIN.(*) EI/FT X10^6	EXAMPLE SHAPES	MAXIMUM WALL TIP ELEVATION (FT)	WALL TOP ELEVATION (FT) **	SOIL ELEVATION		WATER ELEVATION		(10) DESIGN LIVE LOADS	
LOCATION	WALL LENGTH (FT)	(LB-FT)	(LB-IN^2)				WALL FRONT (FT)	WALL BACK (FT)	WALL FRONT (FT)	WALL BACK (FT)	VERTICAL LIVE LOAD (PSF)	HORIZONTAL LIVE LOAD (PSF)
WAL[illegible]	20'-0"	8,200	151	CMI UC-50	7.0	27.00	18.00	26.50	20	20	25	1058

(*) VALUES ARE BASED UPON AN ALLOWABLE 3" DEFLECTION
** MAXIMUM WALL TOP ELEVATION
*** CONTROLLING DESIGN PARAMETERS

DEPARTMENT OF ENVIRONMENTAL PROTECTION PERMIT STATE OF FLORIDA
0358869-001-EG/17
RG

PROJECT MANAGER	B. HENDRICKS
DESIGNED BY	YSS
DRAWN BY	KWD
CHECKED BY	BFH
PROJECT NUMBER	13-14.081

ISSUE	DATE	DESCRIPTION
A	10/20/17	ISSUED FOR PERMIT

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ESCAMBIA COUNTY FLORIDA
ESCAMBIA COUNTY
ENGINEERING DEPARTMENT

LAKE CHARLENE Area of Warrington Basin Study

SHEETPILE DETAILS
LAKE JOANNE DRIVE

SCALE: AS SHOWN
SHEET S008

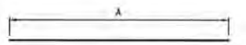
350271 LakeCharlene S008 - SHEETPILE DETAILS 10/19/2017 4:10 PM

REINFORCING BAR LIST
HEADWALL (LAKE JOANNE DRIVE)

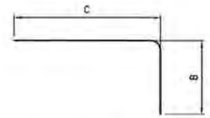
SIZE	DESIGNATION	TOTAL NO. REQUIRED	TOTAL LENGTH	A	B	C
3	A1	2	43'-4"	43'-4"		
3	A2	2	54'-0"	54'-0"		
3	A3	2	33'-6 5/8"	33'-6 5/8"		
3	A4	2	32'-8 3/4"	32'-8 3/4"		
3	A5	2	13'-1 1/2"	13'-1 1/2"		
3	A6	2	12'-3 3/8"	12'-3 3/8"		
3	A7	2	11'-11 1/2"	11'-11 1/2"		
3	A8	2	12'-0 3/8"	12'-0 3/8"		
3	A9	2	12'-6 1/8"	12'-6 1/8"		
3	A10	2	13'-8 3/8"	13'-8 3/8"		
3	A11	4	4'-11 7/8"	4'-11 7/8"		
3	A12	4	3'-3 5/8"	3'-3 5/8"		
3	A13	4	3'-3 3/4"	3'-3 3/4"		
3	A14	4	4'-3 1/8"	4'-3 1/8"		
3	A15	2	3'-9 1/4"	3'-9 1/4"		
3	A16	2	6'-1 5/8"	6'-1 5/8"		
3	A17	2	3'-8"	3'-8"		
3	A18	2	7'-0"	7'-0"		
3	A19	2	14'-8 7/8"	14'-8 7/8"		
3	A20	2	13'-10 7/8"	13'-10 7/8"		
3	A21	2	13'-6 5/8"	13'-6 5/8"		
3	A22	2	13'-6 3/4"	13'-6 3/4"		
3	A23	2	13'-11 1/4"	13'-11 1/4"		
3	A24	2	14'-9 5/8"	14'-9 5/8"		
3	A25	2	25'-1 1/4"	25'-1 1/4"		
3	A26	2	26'-3 3/8"	26'-3 3/8"		
3	B1	65	2'-10"		0'-10"	2'-0"
4	A1	53	9'-1 1/4"	9'-1 1/4"		
4	A2	24	54'-0"	54'-0"		
4	A3	4	54'-0"	54'-0"		
4	A4	55	4'-8 1/4"	4'-8 1/4"		
4	A5	2	9'-5 3/8"	9'-5 3/8"		
4	A6	2	9'-8 7/8"	9'-8 7/8"		
4	A7	2	10'-0 3/4"	10'-0 3/4"		
4	A8	2	10'-4 5/8"	10'-4 5/8"		
4	A9	2	10'-8 1/2"	10'-8 1/2"		
4	A10	2	11'-0 3/8"	11'-0 3/8"		
4	A11	24	4'-4"	4'-4"		
4	A12	2	2'-1 3/8"	2'-1 3/8"		
4	A13	2	4'-8 1/2"	4'-8 1/2"		
5	A1	53	9'-1 1/4"	9'-1 1/4"		
5	A2	73	8'-10"	8'-10"		
5	A3	8	5'-0"	5'-0"		
5	A4	8	7'-0"	7'-0"		
5	A5	8	10'-0"	10'-0"		
5	B1	37	7'-2"		3'-0"	4'-2"
5	B2	43	8'-4"		3'-0"	5'-4"

REINFORCING BAR LIST
HEADWALL (US 98 AND SOUTH 61st AVENUE)

SIZE	DESIGNATION	TOTAL NO. REQUIRED	TOTAL LENGTH	A	B	C
3	A1	4	19'-11"	19'-11"		
3	A2	2	3'-2"	3'-2"		
3	A3	16	2'-0"	2'-0"		
3	A4	2	2'-10 3/8"	2'-10 3/8"		
3	A5	2	14'-5 5/8"	14'-5 5/8"		
3	A6	2	13'-1 3/4"	13'-1 3/4"		
3	A7	2	12'-7 1/4"	12'-7 1/4"		
3	A8	2	12'-5 1/4"	12'-5 1/4"		
3	A9	2	12'-6 7/8"	12'-6 7/8"		
3	A10	2	13'-0 5/8"	13'-0 5/8"		
3	A11	2	14'-2 3/8"	14'-2 3/8"		
3	B1	21	2'-5"	2'-5"	10"	1'-7"
4	A1	32	6'-11"	6'-11"		
4	A2	27	4'-2"	4'-2"		
4	A3	12	19'-11"	19'-11"		
4	B1	15	4'-10"		2'-0"	2'-10"
4	B2	15	3'-10"		1'-10"	2'-0"
5	A1	4	5'-3"	5'-3"		
5	A2	4	3'-9"	3'-9"		



"A" BARS



"B" BARS

NOTE:
ALL BAR DIMENSIONS ARE OUT TO OUT

BENDING DIAGRAM
NOT TO SCALE

0358869-001-EG/17

PERMIT

DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OF FLORIDA

BART FLETCHER HENDRICKS
LICENSE
No. 51391
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
10-19-17

MOTT MACDONALD
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PROJECT NUMBER	13-14.081

Bart F. Hendricks
License No. 51391

ESCAMBIA COUNTY
ENGINEERING DEPARTMENT

LAKE CHARLENE DRIVE
Warrington Basin Study

REINFORCING BAR LIST

SCALE AS SHOWN

SHEET S009

350271 LakeCharlene S009 - REINFORCING BAR LIST 10/19/2017 4:17 PM

60% COUNTY COMMENT/RESPONSE

hdrinc.com 25 West Cedar Street, Suite 200, Pensacola, FL 32502-5945
(850) 432-6800

REVIEW COMMENTS

HDR ENGINEERING, INC.
25 W. Cedar Street
Suite 200
Pensacola, FL 32502

Submittal: 60% Plans
Discipline: Multiple
Reviewer: Multiple (see below)
Date of Review: March 2017
Response By: Allen Vinson
Date of Response: March 2017

FPN: N/A – Escambia County
Description : Lake Charlene Drainage Improvements

Comment No.	Sheet No.	Comment	Response	Designer Will Incorporate		
				YES	NO	Other
Terri Berry Comments dated March 16, 2017						
1		Verify scales on all design sheets. Some do not appear to be correct.	Agree. Designer will incorporate. It appears that the scales on cross section sheet 26 and traffic control sheet 28 are incorrect.	X		
2		Round up quantities on summary of pay items.	Designer will incorporate where this makes sense. Some quantities will need to be exact. We suggest taking a look at the final quantities before bidding to make this determination.			Discuss
3		Show lateral patch on drawings	Lateral patch detail is shown on Sheet 5 “Trench Cuts and Restorations across Roadways Per FDOT Index 307”.			N/A
4		Verify pipe depth. My measurements indicate 13-14ft depth.	Verified. Note that the pipe depth varies as shown in the Plan & Profile sheets. The deepest location is crossing US 98 at approximately 15’ deep.			N/A
5		Show details for pay item 26 Special concrete weir structure for triple end wall.	Designer will incorporate. These details were intended to be shown in the next submittal with the structural design.	X		
6		Couldn’t find well point or unsuitable in pay items. Geotechnical report calls out both. Please add to bid tab.	Well point is a dewatering mean/method which is dictated by the Contractor per pay item notes 5 & 6. We can add this method to the pay item note as “including but not limited to well point” if that is the preference. Unsuitable material is covered in pipe pay item notes.			Discuss
7		Add remove/replace label for each driveway with quantity.	Agree. Designer will incorporate. Removal quantity is included in clearing and grubbing per pay item note.	X		
8		Add county specification for driveways.	Driveway grades are shown in the cross sections. County Standard construction notes were added to Typical Section Sheet.	X		
9		Will there be any night work? If so add a pay item.	Based on the lane closure analysis we performed, there should be no restrictions which require night work.			N/A
10		If variable message boards will be needed, add pay item.	PCMS “portable changeable message sign” is included in the lump sum MOT pay item per pay item notes.			N/A
11		Have you applied for environmental permits? If not, please apply and let me know the date.	Environmental permits will be applied for once the design details and stormwater modeling report are finalized. – Update: Environmental permits received from FDEP & USACE.	X		
12		Have you sent drawings to utilities? Please copy me on the email you send to utilities. I will be scheduling a utility walk-thru.	Drawings sent to all utility owners. Utility walkthrough scheduled for 3/30.	X		
13		Any adverse affects to Jones Creek with new design?	Minor stage increases in Jones Creek are expected at specific locations. Stormwater Modeling Report by Mott MacDonald will describe these locations.			N/A

Reviewer’s Concurrence to Responses _____
Date: _____

REVIEW COMMENTS

HDR ENGINEERING, INC.
25 W. Cedar Street
Suite 200
Pensacola, FL 32502

Submittal: 60% Plans
Discipline: Multiple
Reviewer: Multiple (see below)
Date of Review: March 2017
Response By: Allen Vinson
Date of Response: March 2017

FPN: N/A – Escambia County
Description : Lake Charlene Drainage Improvements

Comment No.	Sheet No.	Comment	Response	Designer Will Incorporate		
				YES	NO	Other
14		Sheet 4 has note about vegetated rolled erosion control products. Add line item to bid tab.	Agree. Designer will incorporate. The notes were incorrect and will be removed.	X		
15		Please submit electronic copy of survey.	Electronic copy of survey was submitted to Danny Swain on 1/14/17.			N/A
16		Do you have any demolition sheets?	No. Demolition sheets are typically not included for infrastructure projects. Items to be removed or reconstructed are called out as such.			N/A
17		Sheet 9 has pipe instead or RCP for 60” pipe	Agree. Designer will incorporate correction.	X		
18		Sheet 11 has note to begin type B curb & gutter on south side but not on the north side.	North side callout is included on Sheet 12.			N/A
19		Some of your notes for Const 60” pipe have lengths and locations others do not.	To avoid contractor confusion, it is standard that the pipe length callout is only included in one callout location if a pipe breaks across to another plan sheet. The secondary sheet would only call out to construct pipe with no length callout.			N/A
20		Sheet 12 – has pipe instead of RCP on one of the Const 60” pipe notes.	Agree. Designer will incorporate correction.	X		
21		Sheet 12 – what are you doing with the driveways? If replacing add note with quantity.	Agree. Designer will incorporate.	X		
22		Add detail drawings showing sheet pile.	Agree. Designer will incorporate in next submittal as part of the structural plans.	X		
23		Sheet 13 – is it possible to move headwall into ROW? Or just the portion with the new 60” pipes into ROW.	This is possible but would move a dropoff hazard close to the travel way. Areas outside the right of way would still need to be accessed and graded to construct a connection to the existing channel.			N/A
24		Do you plan on leaving the sluice gate?	No. The sluice gate restricts flow and causes the starting water surface elevation in the lake to be too high in our stormwater models. Manual control is not recommended.			N/A
25		Add drawing showing how existing pipe will be connected to S-200.	Agree. Designer will incorporate in next submittal as part of the structural plans.	X		
26		Where is S-200 detail?	Designer will incorporate S-200 detail in next submittal as part of the structural plans.	X		
27		Sheet 13 – Add label for S-201 for clarity.	Agree. Designer will incorporate.	X		

Reviewer’s Concurrence to Responses_____
Date:_____

REVIEW COMMENTS

HDR ENGINEERING, INC.
25 W. Cedar Street
Suite 200
Pensacola, FL 32502

Submittal: 60% Plans
Discipline: Multiple
Reviewer: Multiple (see below)
Date of Review: March 2017
Response By: Allen Vinson
Date of Response: March 2017

FPN: N/A – Escambia County
Description : Lake Charlene Drainage Improvements

Comment No.	Sheet No.	Comment	Response	Designer Will Incorporate		
				YES	NO	Other
28		Sheet 13 – is there a way to design in an access ramp for maintenance?	Maintenance will have to be performed from the edges of the channel since the channel will be surrounded by sheet pile walls or concrete endwalls. The width of the weir structure was set at 30" to provide a maintainable space in the structure.		X	
29		Add misc. concrete in pay items.	If misc. concrete is required for some reason, it is suggested to added additional quantity to the concrete driveway pay item to cover. Otherwise there is no documented use.			Discuss
30		Add note due to water table collars will need to be poured for all connections.	This would be a tremendous expense for 60" concrete pipe. Please clarify.			Discuss
31		Consider adding water valve adjustments to bid tab.	Valve adjustments in the project limits are not expected.			N/A
32		Is there a way to identify HWY 98 better on the drawings?	Agree. Designer will incorporate.	X		
33		Sheet 8 add invert information for inlet at station 33+60 west side.	Existing Invert is shown as gray survey label.			N/A
34		Sheet 8 do you need to label inlet at 32+60 west side?	This is an AT&T remote terminal box/pad.			N/A
35		Showing flow lines on inlets would be helpful.	Please clarify "on inlets". Flow arrows are shown for proposed pipe in cross sections.			Discuss
36		S-101 Do you need the pipe connection on the East side or can we remove the connection by vacating the pipe or removing the pipe and sealing the existing east structure?	H&H modeling leaves all connections to existing structures in place in order to evenly spread the flow into the outfall system. Design intent also seeks to avoid work on shoulders where utilities are located where possible.			N/A
37		S-102 is the existing pipe the same elevation? What is the plan to handle the water? Does the east pipe need to flow into the existing pipe and the western pipes flow into the new one?	H&H modeling leaves all connections to existing structures in place in order to evenly spread the flow into the outfall system.			N/A
38		S-103 existing 15" should be replaced with 18". Do you need the pipe connection on the East side or can we remove the connection by vacating the pipe or removing the pipe and sealing the existing east structure?	H&H modeling leaves all connections to existing structures in place in order to evenly spread the flow into the outfall system. Design intent also seeks to avoid work on shoulders where utilities are located where possible.		X	
39		Sta 52+00 – Can you add quantities to resurface entire area up to the fence.	Reconstruction assumes entire pavement boundaries up to the fence.			N/A
40		Sta 52+00 – found 12" pipe going under the road that isn't shown on drawings. Please add pipe and plans to handle it.	Agree. Designer will incorporate.	X		
41		If a crane is needed to set structures there are some power lines we may have to deal with.	Agree. The site was reviewed with Gulf Power who believes that there should be enough clearance.			N/A

Reviewer's Concurrence to Responses
Date:

REVIEW COMMENTS

HDR ENGINEERING, INC.
25 W. Cedar Street
Suite 200
Pensacola, FL 32502

Submittal: 60% Plans
Discipline: Multiple
Reviewer: Multiple (see below)
Date of Review: March 2017
Response By: Allen Vinson
Date of Response: March 2017

FPN: N/A – Escambia County
Description : Lake Charlene Drainage Improvements

Comment No.	Sheet No.	Comment	Response	Designer Will Incorporate		
				YES	NO	Other
42		AT&T has flags for fiber cable at sta 28+88 -30+00. Please shown on drawings.	Agree. Designer will incorporate.	X		
43		S-201 Verify all angles will work. We may be pushing the maximum.	Angles work. This is the reason for the skewed structure.	X		
44		Will forward traffic comments when received.	Noted. Traffic Comments will be added to the comment/response sheet.			N/A
Robert Peterson Comments dated March 15, 2017						
		Signalization plans not included for review, only vague pay items that are not usable for constructability. Please provide full signalization plans at next revision submittal.	Agree. Designer will incorporate signal details in to next deliverable, including structure design.	X		
Mike Embich Comments dated March 15, 2017						
		Consider adding a note to coordinate with the Navy Hospital to keep the back gate to the hospital closed during the construction.	Agree. 61st Avenue will have limited access during construction which will require contractor coordination during construction.	X		
Tim Day / Brent Wipf Comments dated March 24, 2017						
1		The project is expected to lower the lake level and surrounding water table by approximately 18 inches. Has the likely extent of the associated cone of depression been determined? If so, will the project affect the hydrology of any existing jurisdictional wetland areas? Can the project be modified to mitigate any expected impacts to jurisdictional wetlands?	The geotech report indicates slow horizontal movement of groundwater toward Lake Charlene, which is already acting as a drain to the vicinity. Groundwater elevations in the vicinity are not expected to lower to the same level as the lake. Lowering the lake level is expected to have minor impacts, if any, to the nearest wetlands to the west. It should be noted that the existing sluice gate keeps water artificially high. Update: The lake level will only be lowered 9 inches after further coordination and modeling.			N/A
2		What is the expected change in peek discharge (for a given design storm such as 25-year or 100-year, 24 hour event) from the Highway 98 outfall? If an increase in peek discharge is expected, has the impact on stream bank stability downstream been evaluated? If so, how was it evaluated, and what were the findings? Can the project be modified to mitigate any expected increase in energy?	Minor peak stage increases in Jones Creek are expected at specific locations. Stormwater Modeling Report by Mott MacDonald will describe these locations. Impact on stream bank stability was not specifically evaluated but is expected to be minor on stream banks considering the minimal peak stage increase.			Discuss

Reviewer's Concurrence to Responses
Date:

REVIEW COMMENTS

HDR ENGINEERING, INC.
25 W. Cedar Street
Suite 200
Pensacola, FL 32502

Submittal: 60% Plans
Discipline: Multiple
Reviewer: Multiple (see below)
Date of Review: March 2017
Response By: Allen Vinson
Date of Response: March 2017

FPN: N/A – Escambia County
Description : Lake Charlene Drainage Improvements

Comment No.	Sheet No.	Comment	Response	Designer Will Incorporate		
				YES	NO	Other
6		What is the source of runoff captured by the existing stormwater collection system on the east side of 61st Avenue north of station 39+00? Does a significant amount of stormwater from Corry Station enter this system? If so, would the construction of additional stormwater facilities, or the removal of certain existing impervious surfaces on Corry Station significantly benefit the project? If so, has the county attempted to coordinate these improvements with the Navy?	The source is the areas immediately east of 61st Avenue. Studies were performed for the project in the past which recommended stormwater management pond options in this area to help reduce the stages in Lake Charlene. We ran similar modeling options during the iterations for this project. There are a couple of issues: 1) Using Navy property as a stormwater management option does not provide a significant benefit because the land is a few feet higher than the Lake Charlene. Additionally, the water table in this area is very near the water surface elevation of Lake Charlene. What this would mean is constructing a pond several feet deep over a very large area that would only hold less than a foot of stormwater above the water table. The option was not feasible. 2) Better managing stormwater to the east of 61st Avenue on Navy property would not substantially benefit the flooding in the Lake Charlene area because it does not contribute runoff to the Lake Charlene area.			N/A
No comments from Alan Thedford, Shomari Rawls, Don Christian, Jason Walters, Clara Long, Michael Rhodes or Jim Hagon						

Reviewer's Concurrence to Responses
Date:

CONSTRUCTION COST ESTIMATE

hdrinc.com 25 West Cedar Street, Suite 200, Pensacola, FL 32502-5945
(850) 432-6800

LAKE CHARLENE AREA DRAINAGE IMPROVEMENTS
100% CONSTRUCTION COST ESTIMATE

PAY ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT COST	EXTENDED COST
1	Mobilization / Demobilization	1	EA	$ 55,657.11	$ 55,657.11
2	Clearing and Grubbing, per County Spec 2230	4.32	ACRE	$ 6,000.00	$ 25,920.00
3	Earthwork	1	LS	$ 10,000.00	$ 10,000.00
4	Earthwork Establishing Grade, County Specs 2300	12438	SY	$ 3.00	$ 37,314.00
5	Dewatering - Bypass pumping at weir	1	LS	$ 30,000.00	$ 30,000.00
6	Dewatering -Trench	2500	LF	$ 30.00	$ 75,000.00
7	2" County Spec 2500 Type SP 12.5 Asphalt	6613	SY	$ 10.00	$ 66,130.00
8	Type SP 12.5 Asphalt Leveling (110lbs. per SY)	102	SY	$ 8.00	$ 816.00
9	1 1/4" County Spec 2500 Type SP 12.5 Asphalt (Driveways) in place, includes compacted subgrade	778	SY	$ 11.00	$ 8,558.00
10	Mill Existing Asphalt, 0"-1.5" Thickness	102	SY	$ 5.00	$ 510.00
11	Lateral pavement patch as per FDOT Index 307 (Full depth Asphalt)	138	SY	$ 120.00	$ 16,560.00
12	Saw cut Existing Asphalt	81	LF	$ 5.00	$ 405.00
13	12" Stabilized Subgrade, County Spec 2300	10375	SY	$ 3.00	$ 31,125.00
14	6" Graded aggregate Base "Min. LBR 100 at 100% Modified Proctor", County Spec 2400	6764	SY	$ 13.00	$ 87,932.00
15	Relocate Traffic Signs	4	EA	$ 50.00	$ 200.00
16	FDOT Type E Curb And Gutter, FDOT Index 300	386	LF	$ 16.00	$ 6,176.00
17	County Type B Curb, Per County Detail	632	LF	$ 17.00	$ 10,744.00
18	Valley Gutter Section, 6" thick, Per County Detail	78	LF	$ 49.00	$ 3,822.00
19	4" Fiber Reinforced Concrete Driveway	249	SY	$ 40.00	$ 9,960.00
20	Storm Manhole	5	EA	$ 20,000.00	$ 100,000.00
21	Tie to Existing Inlets, Pipe, Manhole	6	EA	$ 1,200.00	$ 7,200.00
22	36" RCP Pipe	81	LF	$ 90.00	$ 7,290.00
23	60" RCP Pipe	3973	LF	$ 220.00	$ 874,060.00
24	36" RCP Side Drain MES, FDOT Index 273, 280	2	EA	$ 3,033.00	$ 6,066.00
25	Class II Concrete for Endwalls	51	CY	$ 1,500.00	$ 76,500.00
26	Reinforcing Steel for Endwalls	4708	LB	$ 3.00	$ 14,124.00
27	Pipe Removal	81	LF	$ 25.00	$ 2,025.00
28	Remove MES	2	EA	$ 400.00	$ 800.00
29	Centipede Sod, Staked	12438	SY	$ 3.00	$ 37,314.00
30	Rip Rap Rubble w/ 4" Bedding Stone and Geotextile	45	SY	$ 240.00	$ 10,800.00
31	Establish and Provide Sediment & Erosion Control Plan including all items for implementation	1	LS	$ 14,000.00	$ 14,000.00
32	Fiber Reinforced Plastic (FRP) Sheet Pile Retaining Wall	1334	SF	$ 41.26	$ 55,040.84
33	Thermoplastic 6" White Solid Stripe	50	LF	$ 2.00	$ 100.00
34	Thermoplastic 24” White Solid Stripe	42	LF	$ 8.00	$ 336.00
35	Thermoplastic 6" Double Yellow Solid Stripe	150	LF	$ 3.50	$ 525.00
36	RPM's (Y/Y)	8	EA	$ 7.00	$ 56.00
37	Maintenance of Traffic Safety Plan (develop and provide including all items for implementation)	1	LS	$ 54,036.03	$ 54,036.03
38	State Road - Maintenance of Traffic	1	LS	$ 28,172.94	$ 28,172.94
39	Riprap Rubble for Sheet Pile and Weir	1	LS	$ 21,117.67	$ 21,117.67
40	Final Pavement Markings (US 98 Only)	1	LS	$ 11,130.00	$ 11,130.00
41	UTILITY ADJUSTMENT CONFLICT STRUCTURES-SEWER	2	EA	$ 7,850.00	$ 15,700.00
42	UTILITY ADJUSTMENT-WATER LINES 6" PVC	450	LF	$ 34.50	$ 15,525.00
630-2-12	Conduit, F&I, Directional Bore	234	LF	$ 20.88	$ 4,885.92
632-7-1	Signal Cable-New or Reconstructed Intersection, F&I	1	PI	$ 4,313.10	$ 4,313.10
635-2-11	Pull & Splice Box, 13"x24" Cover Size	3	EA	$ 631.34	$ 1,894.02
649-26-5	Steel Mast Arm Assembly, Remove, Deep Foundation-Bolt On Attachment	1	EA	$ 3,672.43	$ 3,672.43
649-21-17	Steel Mast Arm Assembly, F&I, Double Arm 70'-40'	1	EA	$ 62,060.98	$ 62,060.98
650-1-14	Traffic Signal, F&I, Alum., 3 Section, 1 Way	3	AS	$ 958.78	$ 2,876.34
650-1-18	Traffic Signal, F&I, Alum., 5 Section Straight, 1 Way	1	AS	$ 1,238.92	$ 1,238.92
660-2-101	Loop Assembly, F&I, Type A	1	AS	$ 879.39	$ 879.39
700-3-501	Sign Panel, Relocate, Up To 12 SF	2	EA	$ 162.69	$ 325.38
	Subtotal				$ 1,910,894.07
	10% Contingency (100% Design)				$ 191,089.41
	TOTAL CONSTRUCTION ESTIMATE				**$ 2,101,983.47**