

S-31 over Todd Swamp



S-154 over Murrells Inlet Creek

Bridge Package 18

Design-Build Project




Horry County, SC | Contract ID 2662300

October 3, 2024

Balfour Beatty | **RK&K**



4.1 Technical Proposal Narrative

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***HYPERLINK** and will take you to more detailed information.*
To return to your previous location,
simply type  + 



1.a Project Delivery and Approach



1.a.1 | Ability and Assurances to Complete the Project on Schedule and Within Budget

Since 1998, **Balfour Beatty** has been successfully delivering numerous high-profile complex bridge projects, including rural crossings, urban bridges, as well as landmark bridges that enhance connectivity and accessibility in the Carolinas. In summary, this includes 41 projects and 105 bridges, 31 of which are over water/wetlands. This includes various bridge types and foundations. Balfour Beatty can perform the bulk of work scope on any project other than specialty work, asphalt paving,

and work done by minority subcontractors. Balfour Beatty has no verified claims on Carolina projects within the last five years. Swift resolution of issues helps minimize or eliminate the potential for schedule delays and claims. Balfour Beatty will proactively resolve issues and manage claims. In the past, partnering, project controls, early notification, and adequate experienced staffing have been keys for our Team to successfully address claims, contract modifications,

and schedule recovery. Issue resolution will occur at the lowest authorized level to maintain open communication and respect between all Team members.

Avoiding Cost Overrun			
Project	Original Budget	Final Contract	Reason
SCDOT US 17 Bypass SC 707 Interchange	\$76,444,277	\$67,639,069 (-\$8,805,208)	Sourced a superior lightweight fill that allowed for significant savings in project value and complying to project specifications
SCDOT SC 917 Little Pee Dee River	\$13,041,541	\$12,800,724 (-\$240,817)	Resuse of waste material
NCDOT US 17 Maysville Bypass (R-2514B, C, D)	\$143,402,171	\$142,844,181 (-\$557,990)	Erosion control line items underrun despite having to work around 51 ESAs
GDOT Harry S. Truman Parkway Phase V	\$67,499,715	\$66,530,048 (-\$969,667)	Sophisticated bridge design
NCDOT SR 1404/Morganton Road Bridge and Widening	\$11,860,623	\$11,524,069 (-\$336,554)	Schedule reduction through phase changes
NCDOT I-140 Wilmington Bypass (R-2633B)	\$124,368,201	\$121,568,045 (-\$2,800,156)	Prompt cooperative resolution of issues



CHANGE MANAGEMENT AND PROCEDURES FOR AVOIDING COST OVERRUNS

Experience from previous Design-Build (D-B) projects allow our team to anticipate potential issues and communicate mitigation alternatives to deliver a claim-free project that meets the original completion date. Recent regional projects delivered under budget are shown in the table on the left.



As Lead Designer, **Rummel, Klepper & Kahl, LLP (RK&K)** will be responsible for the overall design of the project and will be supported by trusted local subconsultants that specialize in utility coordination and right-of-way services. Cathodic protection services will be provided by our dedicated subcontractor, **Corrpro**, who brings corrosion control, cathodic protection, and asset integrity management experience.

Providing Schedule Certainty | Additionally, our Team will practice claim avoidance by openly communicating at all management levels with SCDOT. We will similarly manage the Bridge Package 18 (BP 18) project as a partner with SCDOT, working to eliminate potential claims. If schedule recovery is necessary, we will accelerate the schedule, employing additional resources, extending work hours, or re-sequencing critical work. The following table illustrates several projects completed ahead of schedule.



Projects Completed Early			
Project Name	Scope	Early Delivery	Reason
NCDOT Harker's Island Bridge (B-4863)	Marine Bridge	360 days early	Deployment of additional trestle and substructure crews, double shift to work around in-water work moratoriums
NCDOT Surf City Bridge (B-4929)	Marine Bridge / Complex MOT	404 days early	Deployment of additional trestle and substructure crews, double shift to work around in-water work moratoriums
NCDOT US 17 Maysville Bypass (R-2514B, C, D)	Roadway and Bridges / Complex MOT	301 days early	Revised TMP, additional resources assigned that mitigated Hurricane Florence impacts
NCDOT I-140 Wilmington Bypass (R-2633B)	Marine Bridges and Roadway	60 days early	Mobilization of additional resources and a detailed plan for winter work yielded significant time savings
NCDOT MLK, Jr. Parkway (U-0092B)	Roadway and Bridges / Complex MOT	84 days early	Mobilization of multiple crews and progressing the project at multiple locations
NCDOT White Oak River Bridge (R-2938)	Marine Bridges	166 days early	Use of a temporary work trestle accelerated the project by over five months
NCDOT Rose Bay, Kitty, and Wallace Bridge Replacements	Roadway and Bridges	27 days early	Mobilization of multiple crews and progressing the project at multiple locations
NCDOT SR 1404/ Morganton Road Bridge and Widening (U-4756)	Roadway and Bridges / Complex MOT	40 days early	Double shifts, night work, and progressing the project at multiple locations



Cathodic Protection | Corrpro, our cathodic protection subcontractor for this project, is a leading provider of cathodic protection services. Designing and installing cathodic protection systems is a core activity for Corrpro. Corrosion can destroy the integrity of infrastructure. Patching the damaged area may seem the simplest and least expensive process of repair, but it may also be the least effective. Eventually, repairs may be required on a cyclical basis—each time growing more expensive. These repairs weaken the structure and may lead to the need for total replacement. Because Corrpro engineers understand the principles of corrosion, they will provide SCDOT with a cost-effective corrosion control system designed to protect your infrastructure. Corrpro can prevent corrosion in new structures and mitigate corrosion to existing structures to save you money. Corrpro employs hundreds of cathodic protection engineers and construction personnel. They offer comprehensive system analysis, upgrade designs and installation services using advanced cathodic protection design tools, materials and construction techniques.

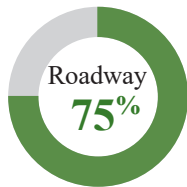
LifeJacket® Cathodic Protection System

Corrpro is a supplier of the Artazn cathodic protection systems for bridges. One of these systems, the **LifeJacket®** cathodic protection system, provides long-term remediation to corrosion degradation for both steel and steel-reinforced concrete structures subjected to premature failure from chloride induced corrosion. The patented system uses zinc mesh anodes inside stay-in-place fiberglass jackets, often with supplemental bulk zinc anodes below the water-line. This galvanic cathodic protection (GCP) system effectively prevents further corrosion damage and rehabilitates the structure in one step. LifeJackets® prevent corrosion degradation that can occur with conventional jackets. Compared to conventional jackets, LifeJackets® more than double the design life to 25 years, and a true life to 40+ years, but only cost 25-30% more to install.

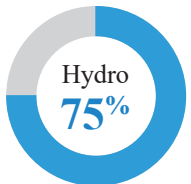




1.a.2 | Design Completed to Date – During our field inspections we noted items such as utility conflicts, hydraulic conditions, right-of-way issues, environmental concerns, roadway geometry, tie down locations, and constructability. These have been incorporated into the design tasks completed to date as detailed here.

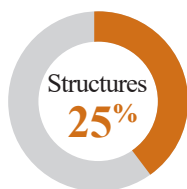


Roadway | Preliminary and ROW plan design submittals will be expedited for review and anticipated approval. This then initiate our public involvement, right-of-way, permitting, and utility coordination teams started much sooner with their outreach, negotiations, and impact studies.



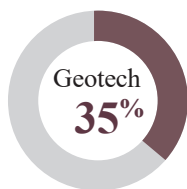
Hydrology | Per the RFP, S-154 over Murrells Inlet Creek is to be rehabilitated and not to be analyzed hydraulically. S-31 over Todd Swamp is located in a FEMA Flood Zone AE and is designed to achieve a “No-Rise” certificate. The discharges for the 25-year and 100-year events have been determined by StreamStats for South Carolina and compared to those provided by the FEMA Studies. The discharges have been incorporated in HEC-RAS with the predetermined cross sections along with additional cross sections needed to remove errors or warnings in the models, Corrected Effective Models (CEM) were used to analyze the natural, existing, proposed and sensitivity models. The preliminary designs for the proposed bridge have less than one foot of backwater as compared to the natural model and meets or reduces the backwater of the existing model.

Preliminary Hydraulic Design Assessment				
Bridge Site	FEMA Comment		Design Comment	
S-31 over Todd Swamp	Zone AE	Designed to achieve "No-Rise" Certificate	No pressure flow for 100-year event, conceptual bridge and span lengths reduced per approved ATC 1	Held Low Chord



Bridges | These tables illustrate the status and details of our team's proposed structures, including the use of approved [Formal ATCs](#).

Preliminary Bridge Details					
Bridge Site	Superstructure Type	Foundation Type	Length (ft.)	Width (ft.)	Span Arrangement
1 S-31 over Todd Swamp	Cored Slab	Prestressed Concrete Piles	70	42	Single
2 S-154 over Murrells Inlet Creek	Flat Slab	Rehab Existing	69	30.33	Multi (23-23-23)



Geotechnical | Initial geotechnical design tasks have been completed as noted in the table below. Foundation types, sizes and depths are preliminary and based on the limited subsurface information provided. SCDOT provided a minimum number of borings for the S-31 over Todd Swamp bridge location. Our Team proposes to perform additional borings before and after the S-31 over Todd Swamp bridge and also in proximity of the proposed bridge bents to meet the requirements presented in the Geotechnical Design Manual, and to supplement and verify the provided boring information. Thorough knowledge of the subsurface conditions will also minimize construction issues related to pile driving, which will help reduce schedule uncertainty. Geotechnical boring information was not provided for the S-154 over Murrells Inlet Creek bridge location.

Bridge Design Tasks	Completed
Layout bridges to meet RFP requirements	✓
Select superstructure type	✓
Design preliminary superstructure	✓
Design preliminary substructure	✓
Compute elevations	25%
Design final superstructure	---
Design final substructure	---
Final bill of materials	---
Produce AASHTOWare Load Rating	---

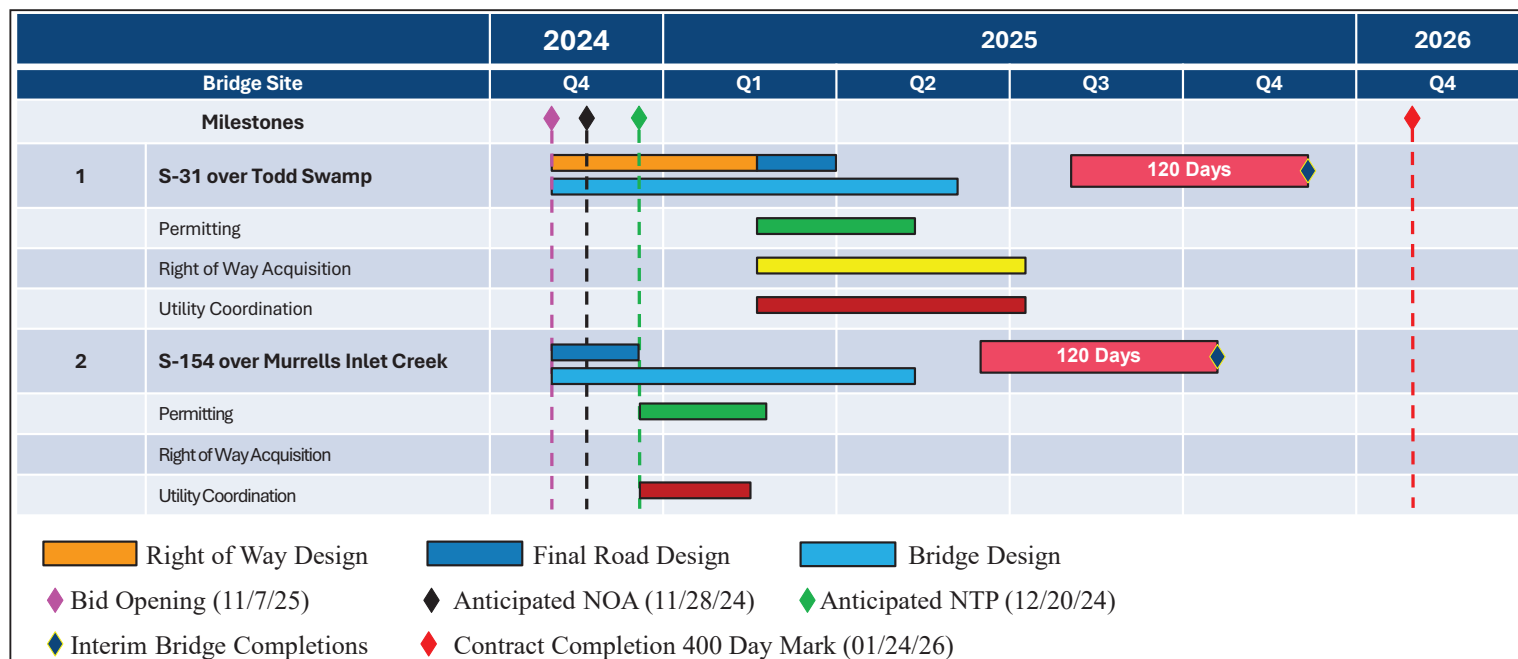
Geotechnical Design Tasks	Completed
Assess borings provided by SCDOT	✓
Liquefaction screening	✓
Select foundation types	✓
Preliminary pile depths	✓
Drill additional borings	---
Final pile depths	---
Preliminary and Final Bridge Geotechnical Reports	---
Preliminary and Final Roadway Geotechnical Reports	---





1.a.3 | Project Schedule — We have developed a proposed schedule for delivery of each bridge site within the contractual time frame as depicted by the schematic below. A more detailed CPM schedule is included in appendix A.3.

We are committed to overall substantial completion within 313 days of NTP, 87 days earlier than required, and final completion within 400 days. This is achievable due to FATC 1, and by working concurrently on both bridge sites with careful pre-construction planning.






Project Resources, Strategies, and Execution |

Strategies to implement Available Resources

- Self-perform major task items
- Work both bridge locations concurrently
- Use staff in SC/NC offices with relevant roadway and bridge experience and availability for a quick turnaround on design development and construction

Balfour Beatty has the resources available to successfully deliver this project, as demonstrated in the table on the right. Our people have experience constructing highway, interchange, and bridge projects in environmentally sensitive areas in the Carolinas. The team's primary advantages are its management personnel, local relationships, specialized equipment, labor crews, and other resources, which will be effectively leveraged on this project.

BP18 Resource Requirements vs. Resources Available	Available Locally (within 1 day)	Anticipated Quantity Req.
Equipment		
Crawler Cranes for Barge Use (50T-300T)	7	0
Truck Cranes (75T-100T)	2	1
Hydraulic Truck Cranes (22T-65T)	4	1
Work Boats	4	1
Crane Trestle (LF)	4,200 LF	120 LF
Pile Hammers-all Types and Sizes (Hydraulic, Diesel,Vibratory, Air and Steam	8	2
Bulldozers	10	2
Off-road trucks	16	0
Backhoes	12	2
Graders	4	1
Labour (Skilled and unskilled)	430	20
Bridge Site #1 - S-31 over Todd Swamp	-	10
Bridge Site #2 - S-154 over Murrells Inlet Creek	-	10
Staff (Contractor)	70	5
Key Preferred Subcontractors & Suppliers		
4-D Construction, LLC (DBE)	King Asphalt - asphalt paving	
Willoughby - Robinson - P6 CPM scheduling (DBE)		

Balfour Beatty Current Resource Commitments and Availability									
Project	Value	Location	Employees	2024	2025	2026	2027	2028	
BP18	\$10M	Horry County, SC	Peak 20	Procure / Design	Const.				
Ongoing Projects and Planned Onboarding of Resources to CCR3 Phase C						No other project commitments			
Havelock Bypass	\$167M	Havelock, NC	70	Const.					Const.
Harkers Island Bridge	\$60M	Harkers Island, NC	30	Const.					Complete
Military Cutoff	\$96M	Wilmington, NC	60	Const.					Complete
NC 87-11	\$36M	Wilmington, NC	30	Const.					Const.
Effingham Parkway	\$51M	Savannah, GA	35	Const.	Const.				
James City	\$220M	James City, NC	80	Const.	Const.				Const.
Thurman to Havelock	\$242M	Havelock, NC	80	Design	Const.				Const.
Fayetteville Outerloop	\$235M	Fayetteville, NC	80	Const.	Const.				



1.b Approach to Design and Minimizing Need for New Right-of-Way

1.b.1 | Key Design Decisions and Controlling Criteria – The key design decisions and controlling criteria that dictated our design approach are summarized in the table on the right.

1.b.2 | Minimized Right-of-Way Impacts

– While adhering to the RFP requirements, right-of-way (ROW) impacts have been minimized as follows. Our Team optimized the roadway geometry to minimize construction limits and avoid utility and environmental

impacts wherever possible. We also included compressed guardrail along bridge quadrants, resulting in a smaller overall footprint at S-31, and focused on obtaining the No-Rise Certificates necessary to eliminate drainage easements.

Key Design Decisions	Controlling Criteria
<ul style="list-style-type: none"> Best fit profile 	<ul style="list-style-type: none"> Retaining existing profile in conjunction with hydro structure requirements to minimize earthwork and construction limits
<ul style="list-style-type: none"> Minimize earthwork 	<ul style="list-style-type: none"> Profile and typical section with a hinged front slope beyond clear zone limits
<ul style="list-style-type: none"> Increase safety 	<ul style="list-style-type: none"> Upgrade to latest guardrail standards, relocate drives away from bridges, ensure adequate sight distance, and provide adequate clear zone
<ul style="list-style-type: none"> Bridge length, span configuration, superstructure type, and toe of fill 	<ul style="list-style-type: none"> Minimum setback from top of channel banks
<ul style="list-style-type: none"> Bridge foundation type and location 	<ul style="list-style-type: none"> Square prestressed concrete piles for enhanced seismic resistance
<ul style="list-style-type: none"> Bridge size 	<ul style="list-style-type: none"> Designated FEMA flood zone requirements cannot exceed 100-Year water surface elevations
<ul style="list-style-type: none"> Road and bridge profile 	<ul style="list-style-type: none"> Pass the 100-Year discharge to prevent pressure flow scour (which would produce additional scour) and to meet SCDOT Hydraulic Requirements



Bridge Site	Total Approach Length (feet)			ROW Needed (Acres)		
	SCDOT Concept	RK&K Design	Delta	SCDOT Concept	RK&K Design	Delta
S-31 over Todd Swamp	1,100	1,100	+10	2.109	0.892	1.217

Bridge Design Objectives	
<ul style="list-style-type: none"> Maximize use of precast, prestressed cored slabs and box beams 	<ul style="list-style-type: none"> Minimize hydraulic/hydrologic impacts
<ul style="list-style-type: none"> Minimize the bridge length, number of spans, interior bents/joints 	<ul style="list-style-type: none"> Meet toe of fill setback requirements and bank setback requirements
<ul style="list-style-type: none"> Minimize structure depth to limit roadway approach work 	<ul style="list-style-type: none"> Utilize standard details, where possible



1.c Proposed Design Submittal Process



Proposed Design Submittal Process – Our conceptual roadway plans are essentially at the ROW stage. We will finalize Preliminary Plans for submittal shortly after receiving NTP. The intent will be to turn around for approval with ROW plans to follow.

2 Innovation and Added Value

This chart illustrates the many innovations and added value provided to SCDOT and this project.

S = Schedule
R = ROW
U = Utilities

SF = Safety
O = Other

Risk Mitigation

Means and Methods

- Perform early clearing under flagging operations for utility relocations
- Make early contract commitments to material suppliers due to supply chain challenges
- Perform weekly updates of CPM schedule to provide timely feedback to suppliers and subcontractors
- Issue multiple purchase orders to ready mix concrete suppliers to ensure delivery as scheduled
- Issue purchase order to independent haulers for precast components in event of delivery delay
- Aggressively pursue and manage multiple active bridge sites to enable flexibility in project scheduling

S, U

S

S

S

S

S

Design Elements

Bridges

- Usage of reinforced concrete overlays on prestressed concrete cored slab superstructure for S-31 over Todd Swamp for increased durability against high traffic volumes
- Usage of Ultra High Performance Concrete in shear keys of cored slabs for S-31 over Todd Swamp to create a stiffer structure

S, O

S, O

Roadway

- Compressed shoulder for bridge quadrants to minimize earth shoulder for impacts
- 2:1 fill and back slopes beyond guardrail to minimize impacts
- Consistent vertical grade across structure to enhance constructibility

R, SF, O

R

O



S = Schedule R = ROW U = Utilities SF = Safety O = Other		Risk Mitigation
Hydraulics		
▪ Replace drive pipe where needed		O
▪ Match and improve roadside ditch conveyances		S
▪ Replace 15" drive pipes with 18" drive pipes within project limits		S, O
Geotech		
▪ Perform additional roadway/bridge borings to supplement and verify the provided borings information		S
▪ Geotextile fabric may be required for slope stability to address liquefaction concerns and/or the anticipated scour		O
Environmental		
▪ Our approach to the Cathodic Protection on interior piers and end bents will be to use divers for installation eliminating the need for coffer dams and dewatering.		O
▪ This will greatly reduce the footprint for impacted areas to a small walking path on one side of the bridge and a small diameter area around each pier and end bent.		O
▪ The LifeJacket® system allows us to seal the jacket around each pier before using built-in injection ports to add the fill material.		O
Approach		
▪ Both bridge sites achieve continuously, as shown on quality credit matrix.		S
▪ Reduced substantial completion from 400 to 313 days		S
▪ Significantly improved schedule certainty by allocating ample time for ROW acquisition and utility relocation		S, U
▪ Reduced traffic impacts by eliminating staged bridge construction at S-31		S, SF
▪ Enhanced quality by providing ultra high performance concrete in the box beam joints of S-31 as shown on quality credit matrix form		O
FATCs		
FATC 1 - Shorten the bridge length and use of cored slabs at S-31 over Todd Swamp:		
▪ Reduced structure depth minimizes impacts to right-of-way, utilities, and environmental due to lower roadway profile		R, U
▪ Reduction in construction schedule to due to elimination of form work for the deck and overhang		S
Location of Balfour Beatty Facilities		
▪ The Project Sites are conveniently located less than 90 minutes from Balfour Beatty office locations		O
▪ Established relationships in the region with subcontractors and suppliers		S
▪ Familiarity with the region and the ability to self-perform the majority of the work (more than 70%)		O

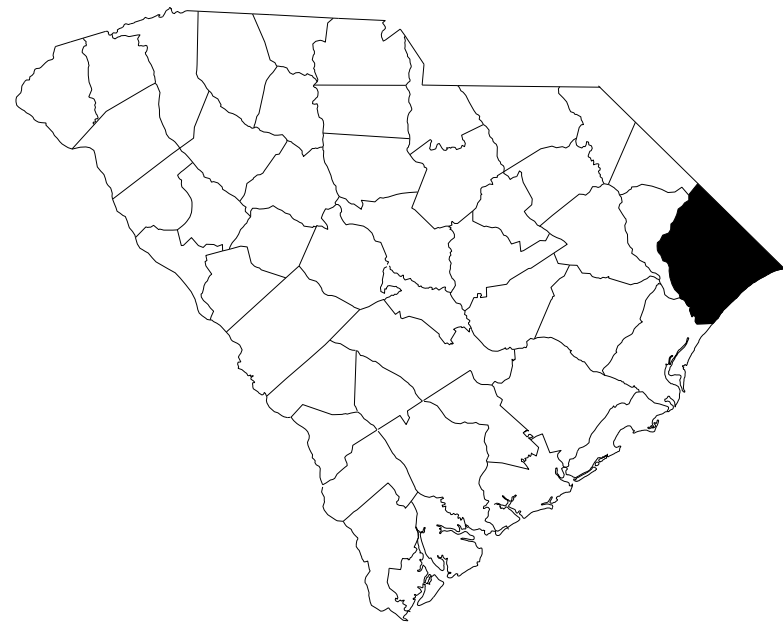
Appendix A.1 - Roadway Plans



NSC\SCDOT\p22-0112_SCDOT Bridge Package 18 DB\Preliminary Design\Roadway\01_S31\pS31_LTs.dgn
10/2/2024
mkeisler

INDEX OF SHEETS

SHEET NO.	DESCRIPTION	SHEET SUBTOTALS
1	TITLE SHEET	1
3	TYPICAL SECTION	1
6	PLAN AND PROFILE SHEET	1
X1-X7	CROSS SECTIONS	7
TOTAL SHEETS =		10



MAP SHOWING LOCATION OF
HORRY COUNTY IN SOUTH CAROLINA

ENVIRONMENTAL PERMIT INFORMATION				
USACE PERMIT	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO		
NEPA DOCUMENT	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO		
401 CERTIFICATION	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO		
OCRM CAP	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO		
NAVIGABLE WATERS	<input type="checkbox"/> SC	<input type="checkbox"/> USCG	<input type="checkbox"/> USACE	<input checked="" type="checkbox"/> N/A

3 DAYS BEFORE DIGGING IN
SOUTH CAROLINA

CALL 811

SOUTH CAROLINA 811 (SC811)
WWW.SC811.COM

ALL UTILITIES MAY NOT BE A MEMBER OF SC811

RAILROAD INVOLVEMENT?
YES / NO

TRAFFIC DATA

2024 ADT 6400

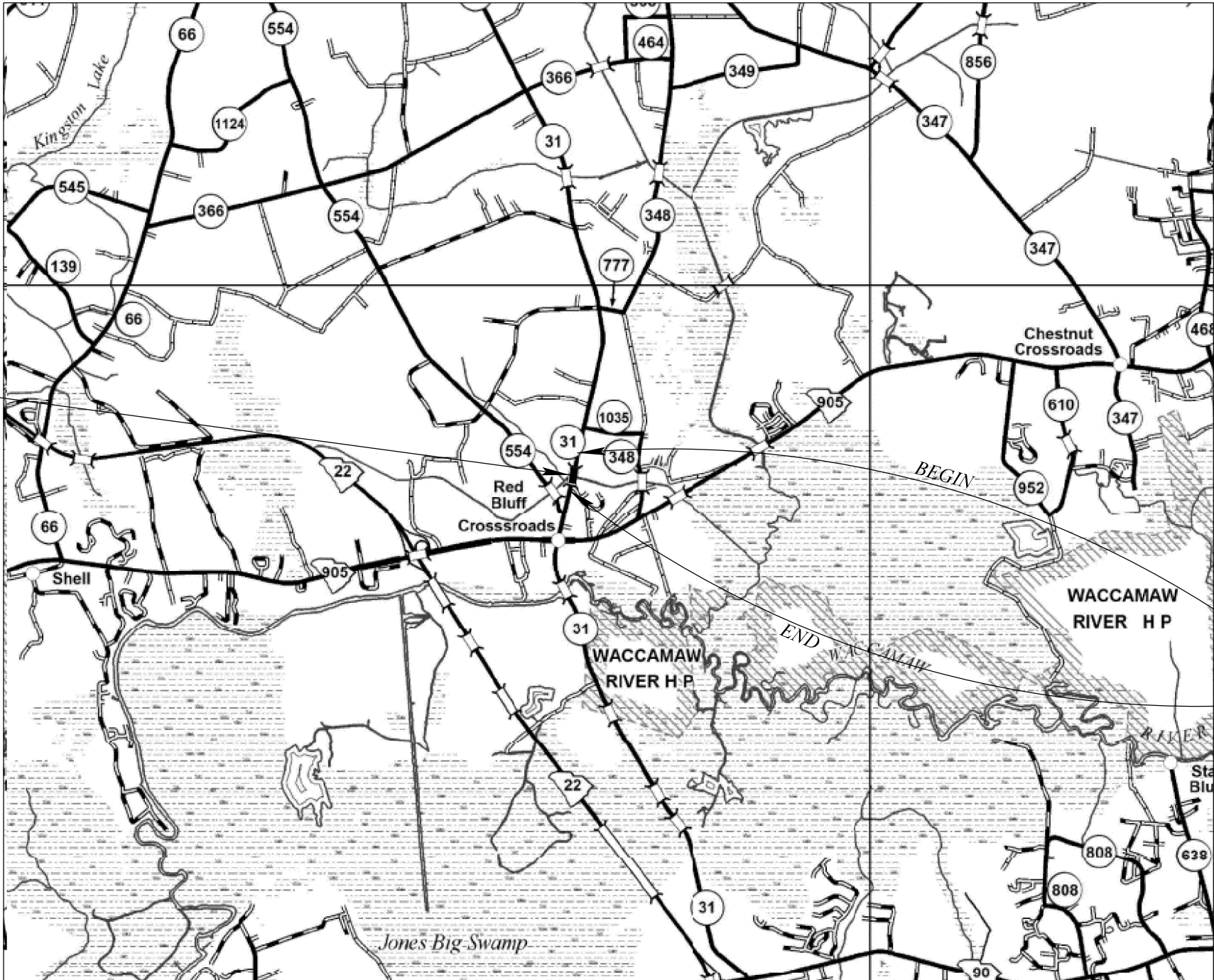
2044 ADT 12000

TRUCKS 4 %



CONCEPTUAL ROADWAY PLANS
FOR
HORRY COUNTY
PROJECT ID 041157

S-31 (RED BLUFF ROAD)
BRIDGE REPLACEMENT OVER TODD SWAMP



HORRY COUNTY MAP

LAYOUT

SCALE = N.T.S.

	S-31	TOTAL
NET LENGTH OF ROADWAY	0.224	0.224 MILES
NET LENGTH OF BRIDGES	0.013	0.013 MILES
NET LENGTH OF PROJECT	0.237	0.237 MILES
LENGTH OF EXCEPTIONS	0.000	0.000 MILES
GROSS LENGTH OF PROJECT	0.237	0.237 MILES

EQUALITIES IN STATIONING
NONE

NOTE: EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIALS AND WORKMANSHIP ON THIS PROJECT SHALL CONFORM TO THE SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (2007 EDITION) AND THE STANDARD DRAWINGS FOR ROAD CONSTRUCTION IN EFFECT AT THE TIME OF FINAL RFP.

NOTE: BRIDGE PLANS BOUND UNDER SEPARATE COVER

Design Reference for these plans is the:

2021

SCDOT Roadway Design Manual

Hydraulic Design Reference for these plans is the:

2009

Edition of SCDOT's "Requirements for
Hydraulic Design Studies"

NPDES PERMIT INFORMATION

Disturbed Area = 2.06 Acre(s)

Project Area = 4.06 Acre(s)

Approximate Location of Roadway is

Begin

Latitude 34°33'05.5"N

Longitude 81°36'21.0"W

End

Latitude 34°32'34.5"N

Longitude 81°36'11.2"W

Hydraulic and NPDES Design
provided by:

RK&K

Designs may be obtained from the
SCDOT Regional Production Group

PROJECT ID. 041157
ROAD S-31 (RED BLUFF ROAD)
STA. 550+35.00 TO STA. 562+15.00
SEE SHEET 6

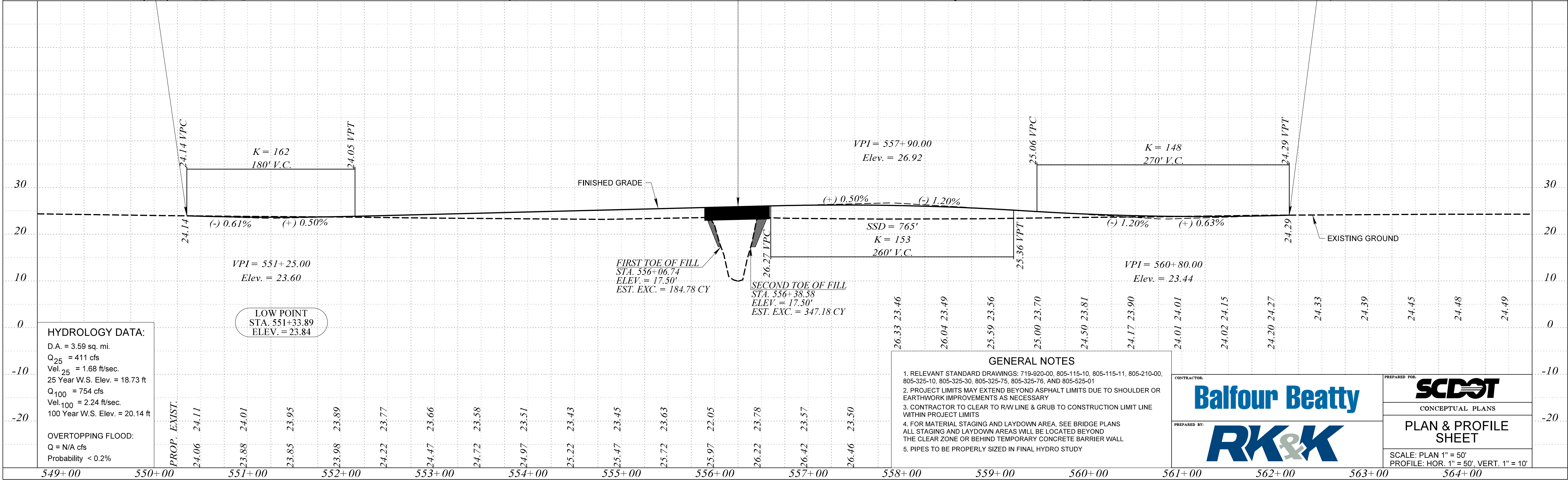
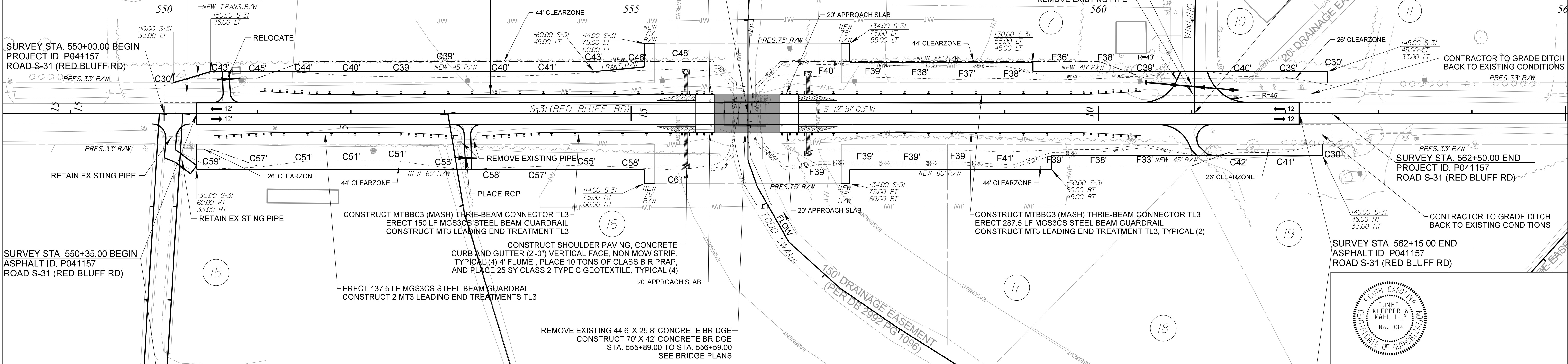
Balfour Beatty

RK&K

SHEET NO.	TOTAL SHEETS
1	10

FED. ROAD DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	HORRY	P041157	S-31	6

TIE EQUALITY:
STA. 556+25.00 S-31 (RED BLUFF RD)
STA. 10+00.00 WINDING PATH DR

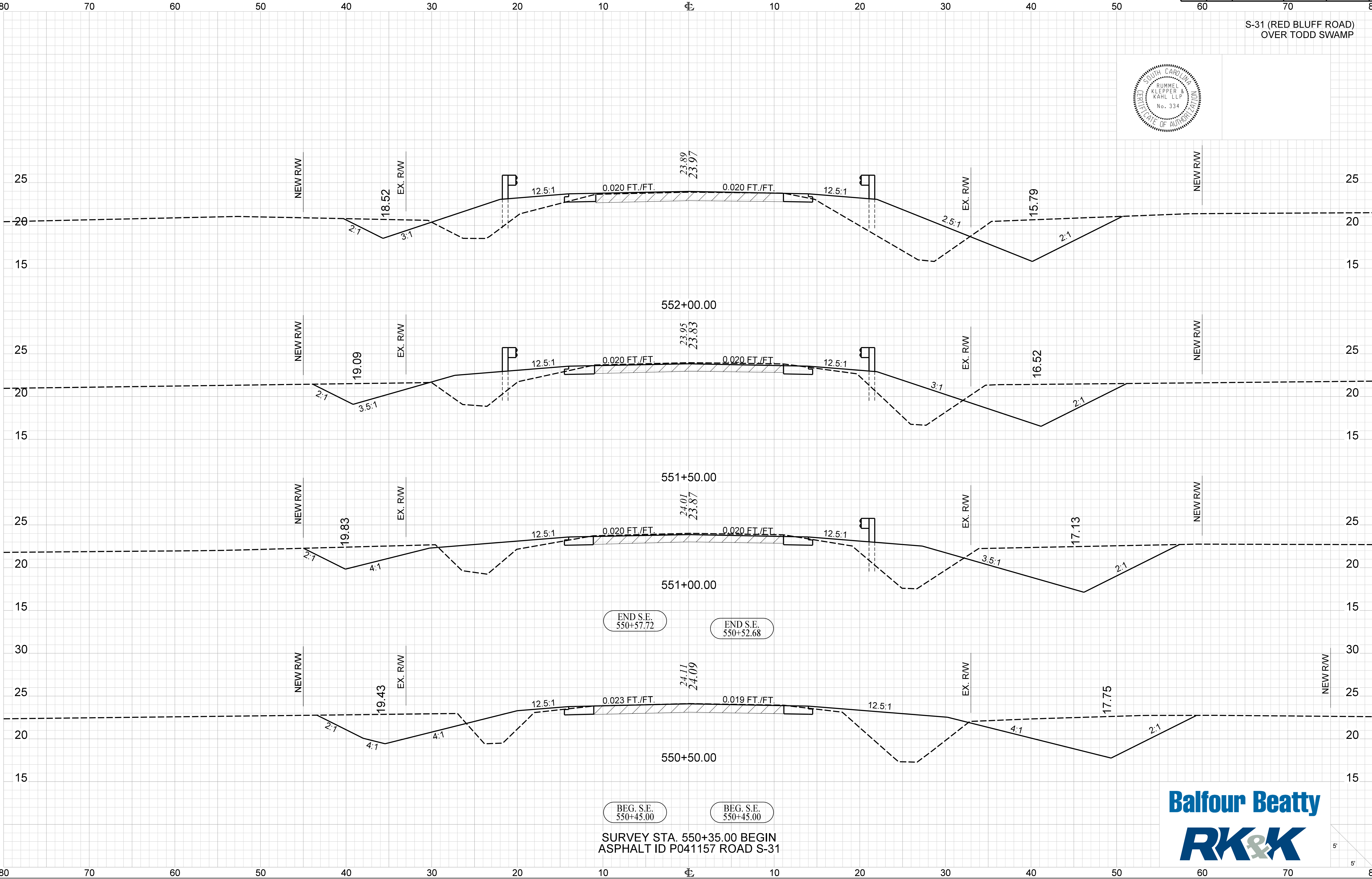
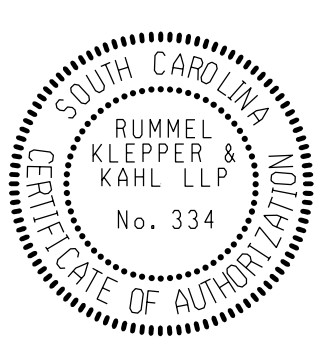


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10/2/2024

engpro.dan

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	HORRY	P041157	S-31	X1

S-31 (RED BLUFF ROAD)
OVER TODD SWAMP

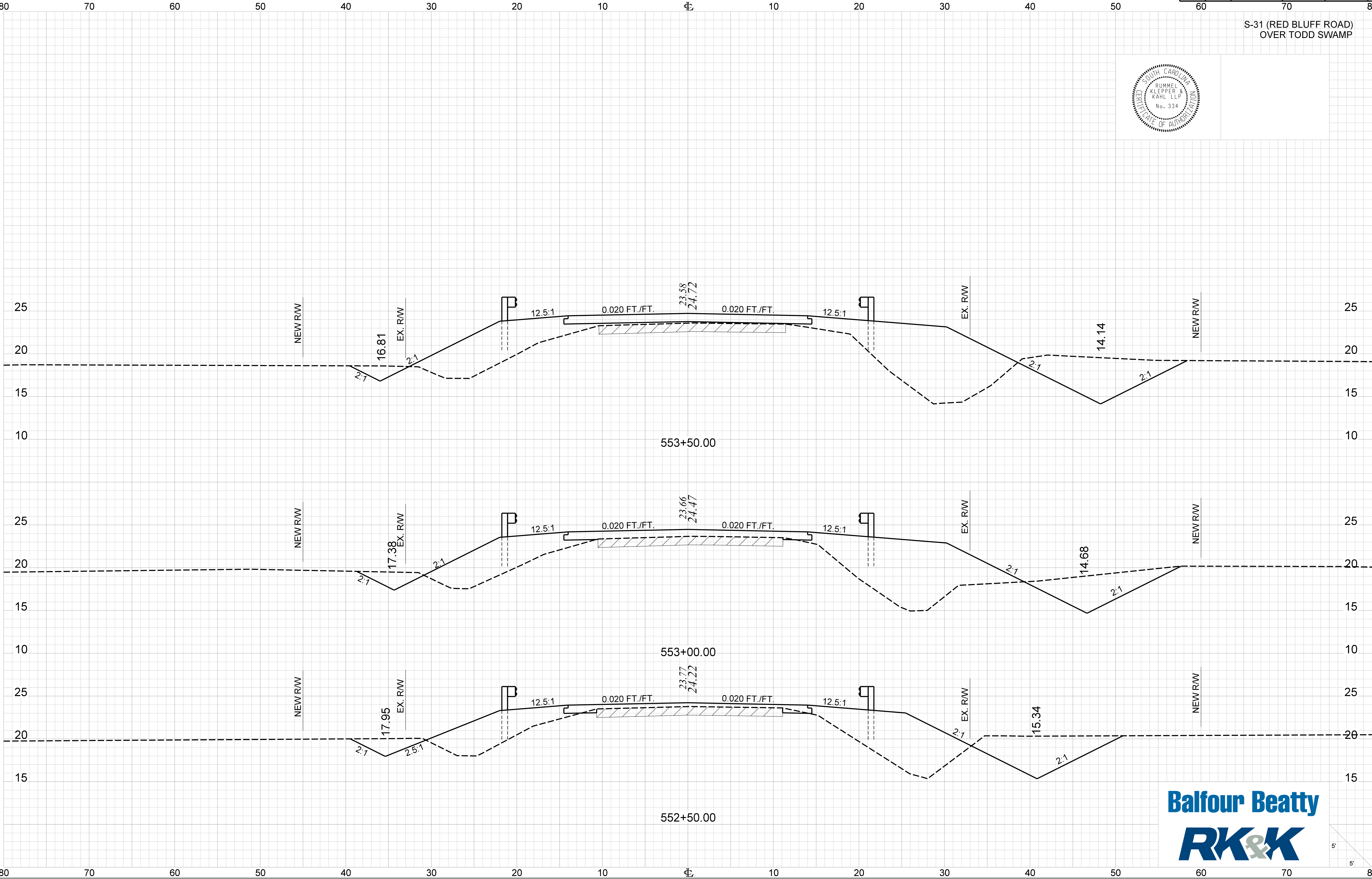


SURVEY STA. 550+35.00 BEGIN
ASPHALT ID P041157 ROAD S-31



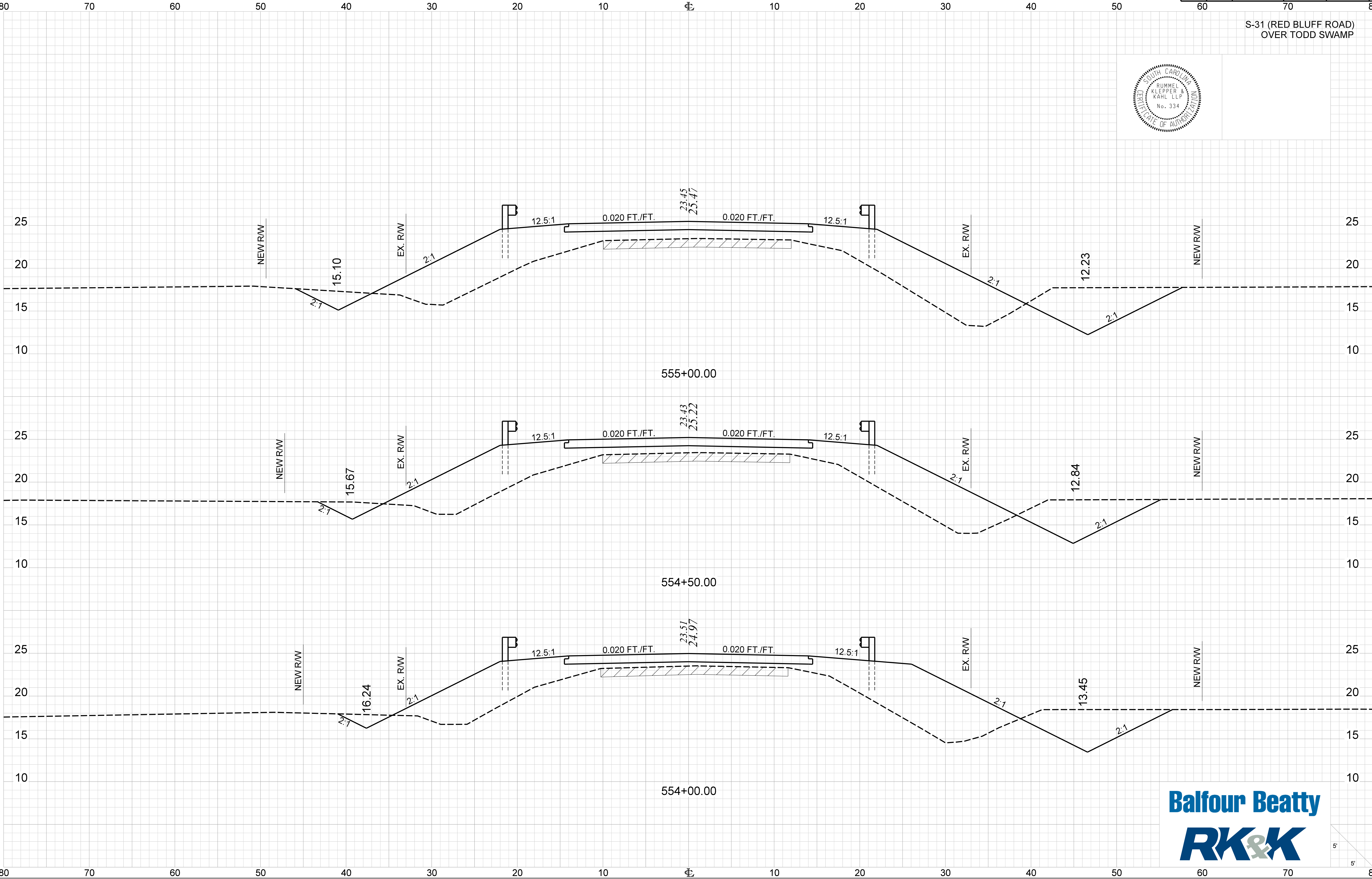
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S-31 (RED BLUFF ROAD)
OVER TODD SWAMP



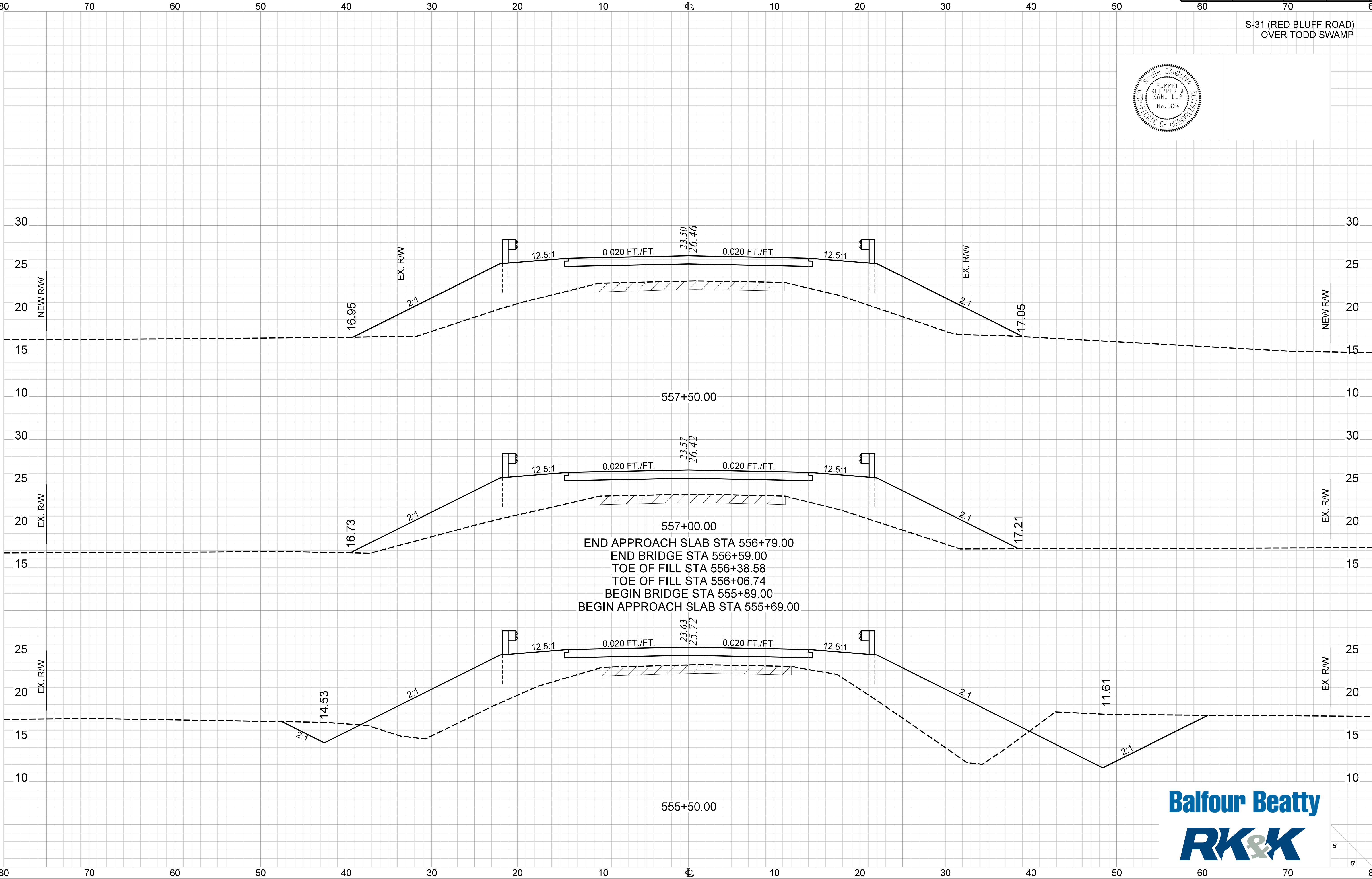
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S-31 (RED BLUFF ROAD)
OVER TODD SWAMP



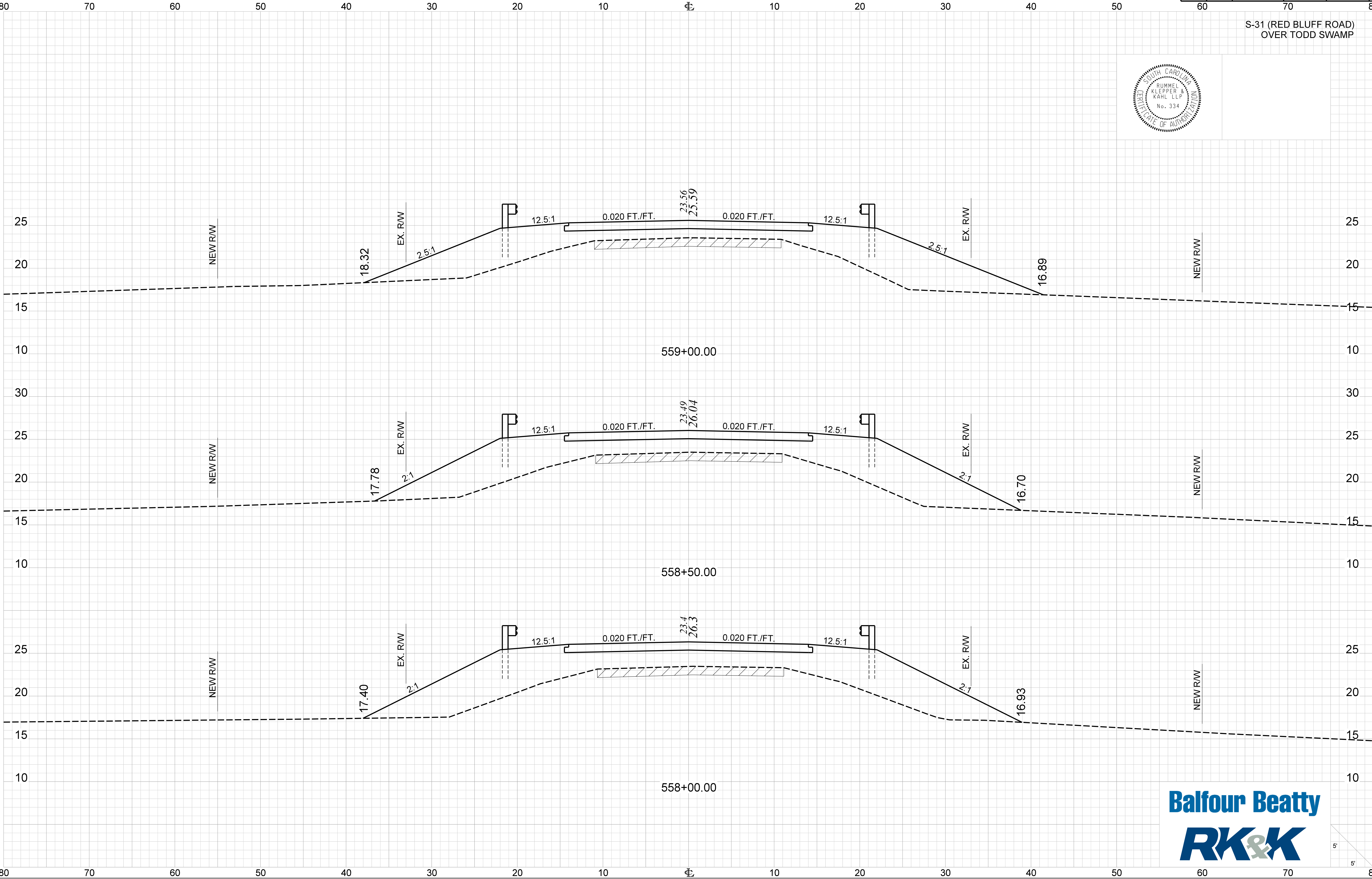
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S-31 (RED BLUFF ROAD)
OVER TODD SWAMP



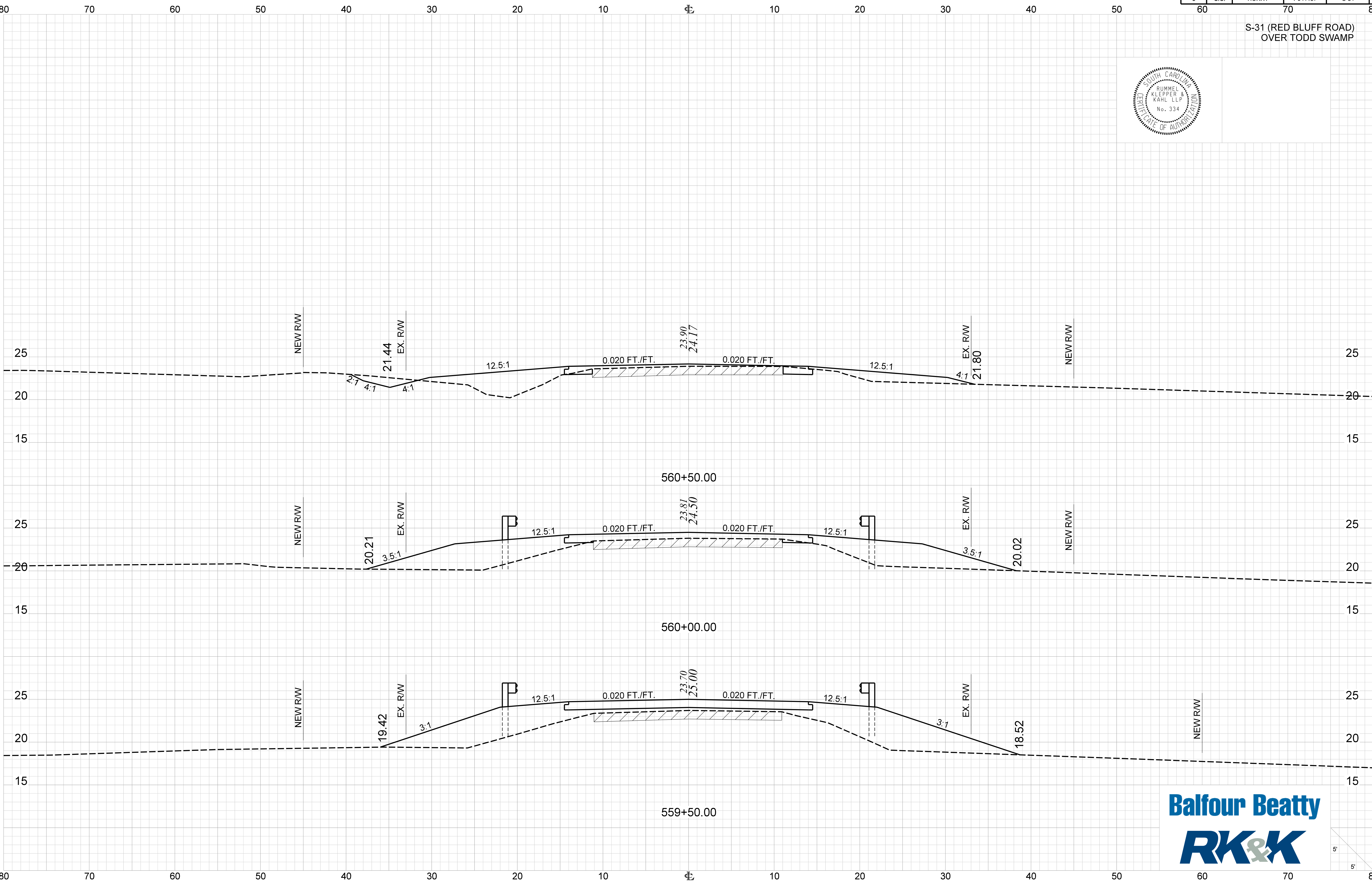
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S-31 (RED BLUFF ROAD)
OVER TODD SWAMP



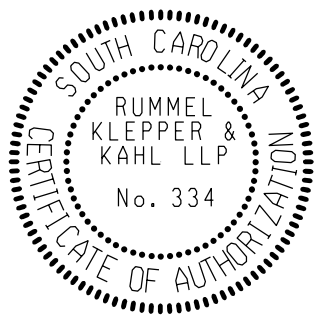
FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	HORRY	P041157	S-31	X6

S-31 (RED BLUFF ROAD)
OVER TODD SWAMP



FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	HORRY	P041157	S-31	X7

S-31 (RED BLUFF ROAD)
OVER TODD SWAMP



SURVEY STA. 562+15.00 END
ASPHALT ID P041157 ROAD S-31

END S.E.
562+15.00
BEG. S.E.
562+10.44

END S.E.
562+15.00

BEG. S.E.
561+76.12



Appendix A.2 - Bridge Plans

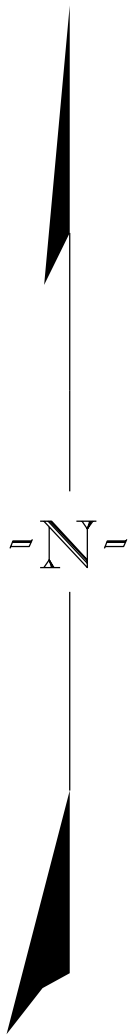
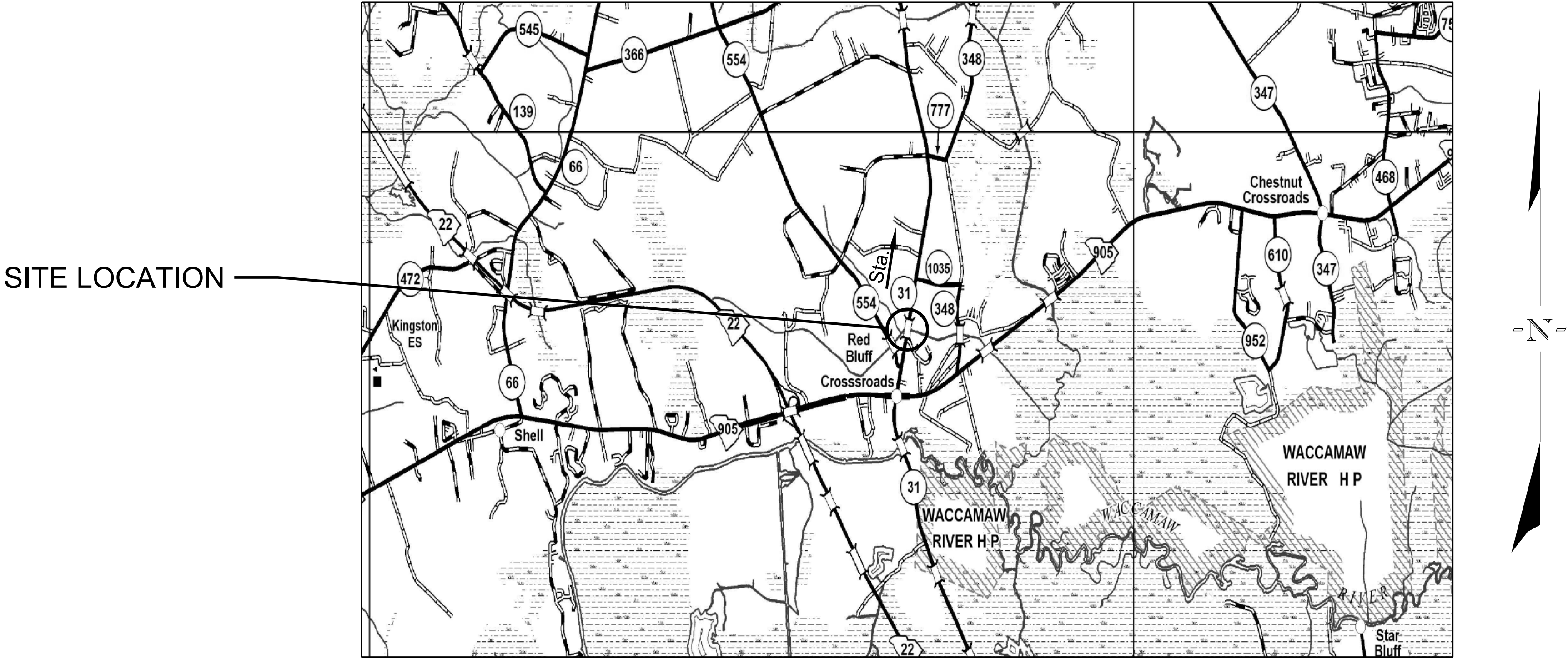


INDEX OF SHEETS

- 1. Title Sheet
- 2. Bridge Plan and Profile
- 3. End Bents 1 & 2
- 4. Superstructure Typical Section
- 5. Bridge Construction Access Plan



CONCEPTUAL BRIDGE PLANS
FOR
HORRY COUNTY
PROJECT ID P041157
STATE ROUTE S-26-31 (RED BLUFF ROAD)
REPLACE BRIDGE OVER TODD SWAMP



Approximate Location of Bridge is:
Latitude 33° - 54' - 44" N
Longitude 78° - 50' - 18" W

LAYOUT

NET LENGTH OF ROADWAY	0.000	MILES
NET LENGTH OF BRIDGES	0.013	MILES
NET LENGTH OF PROJECT	0.013	MILES
LENGTH OF EXCEPTIONS	0.000	MILES
GROSS LENGTH OF PROJECT	0.013	MILES

NOTE: EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIALS AND WORKMANSHIP ON THIS PROJECT SHALL CONFORM TO THE SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (2007 EDITION) AND THE STANDARD DRAWINGS FOR ROAD CONSTRUCTION IN EFFECT AT THE TIME OF FINAL RFP.



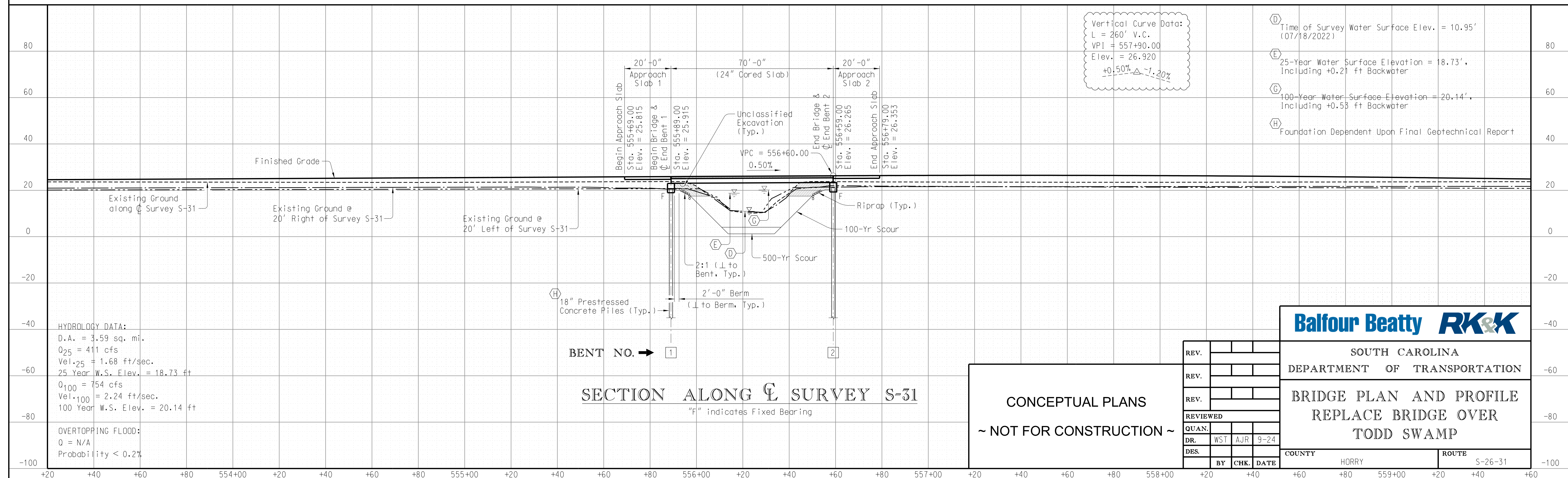
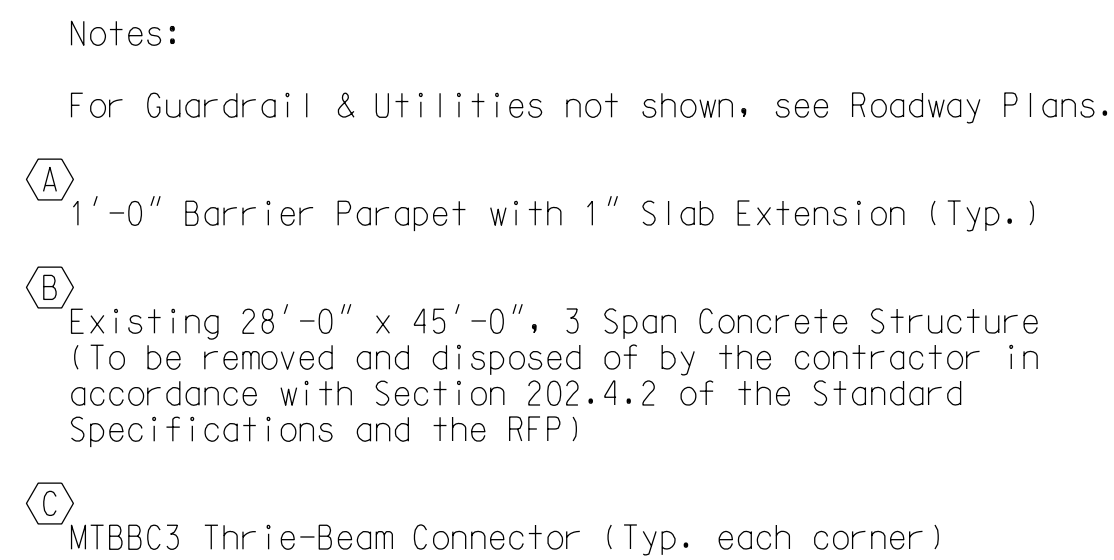
REVIEWED	9-24	WST	BY	CHK	DATE
DR.					

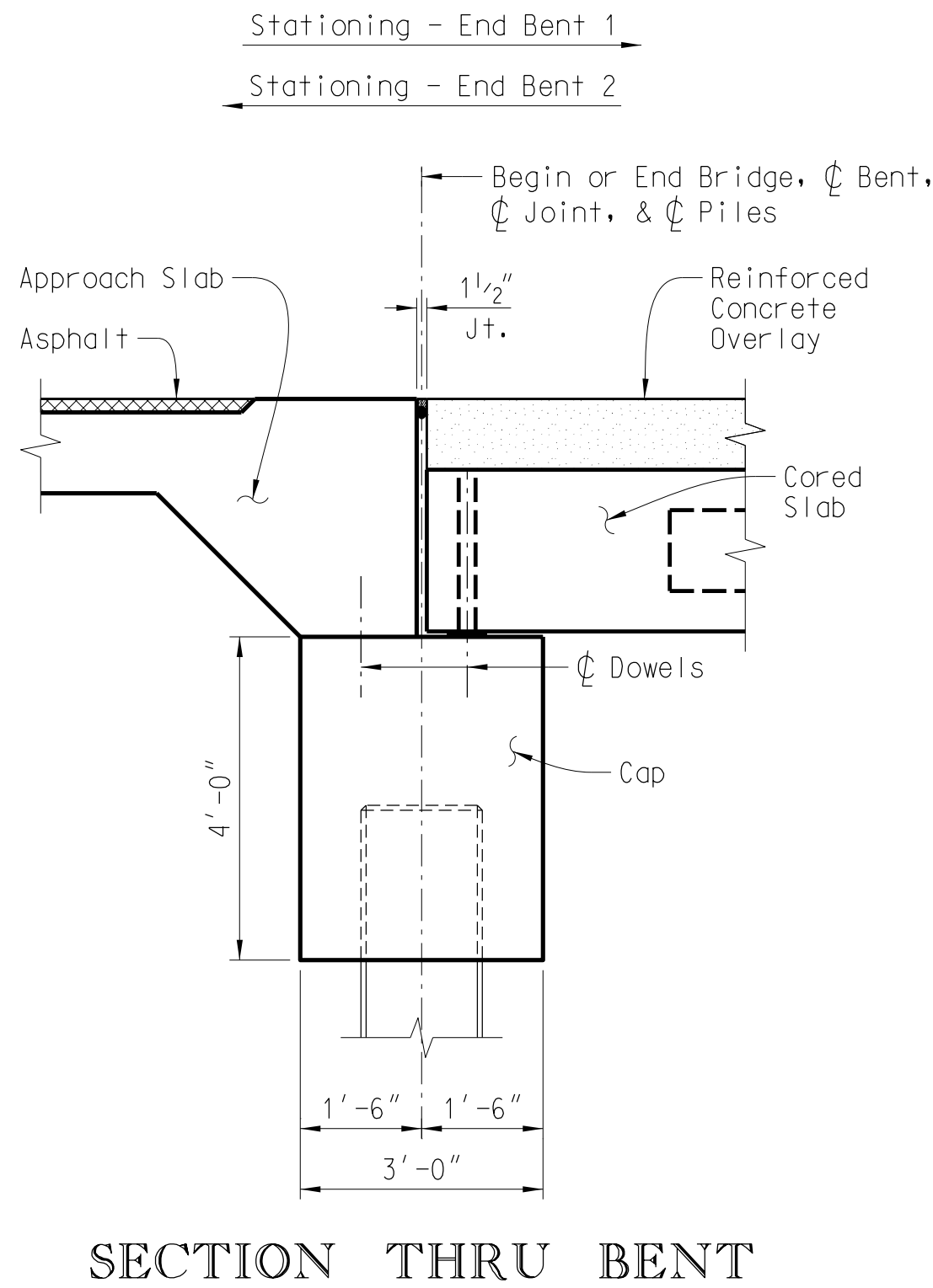
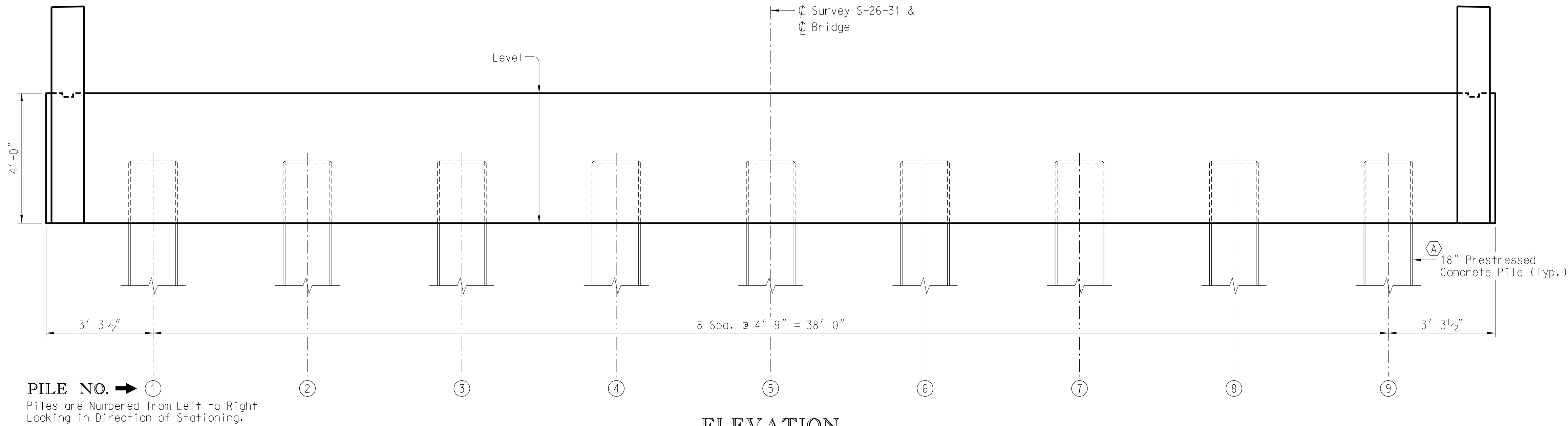
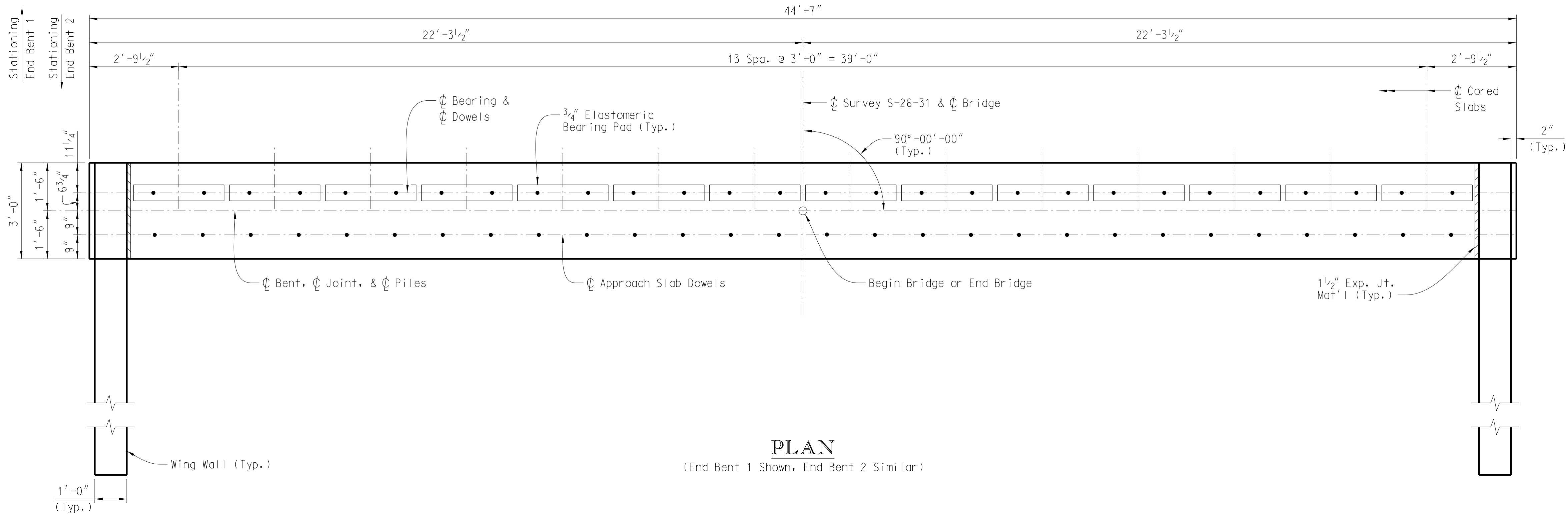
10/12/2024 1:31:08 PM

3 DAYS BEFORE DIGGING IN
SOUTH CAROLINA
CALL 811
SOUTH CAROLINA 811 (SC811)
WWW.SC811.COM
ALL UTILITIES MAY NOT BE A MEMBER OF SC811

ASSET ID NOT ASSIGNED

TRAFFIC DATA			
2024	ADT	6,400	V.P.D.
2044	ADT	12,000	V.P.D.
TRUCKS 4 %			





PILE NO. → ①
Piles are Numbered from Left to Right
Looking in Direction of Stationing.

(A) Foundation Size Dependent Upon
Final Geotechnical Report

CONCEPTUAL PLANS
~ NOT FOR CONSTRUCTION ~

REV.			
REV.			
REV.			
REVIEWED			
QUAN.			
DR.	WST	AJR	9-24
DES.			
BY	CHK.	DATE	

Balfour Beatty **RK&K**

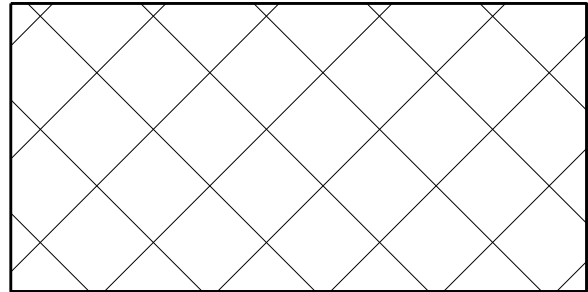
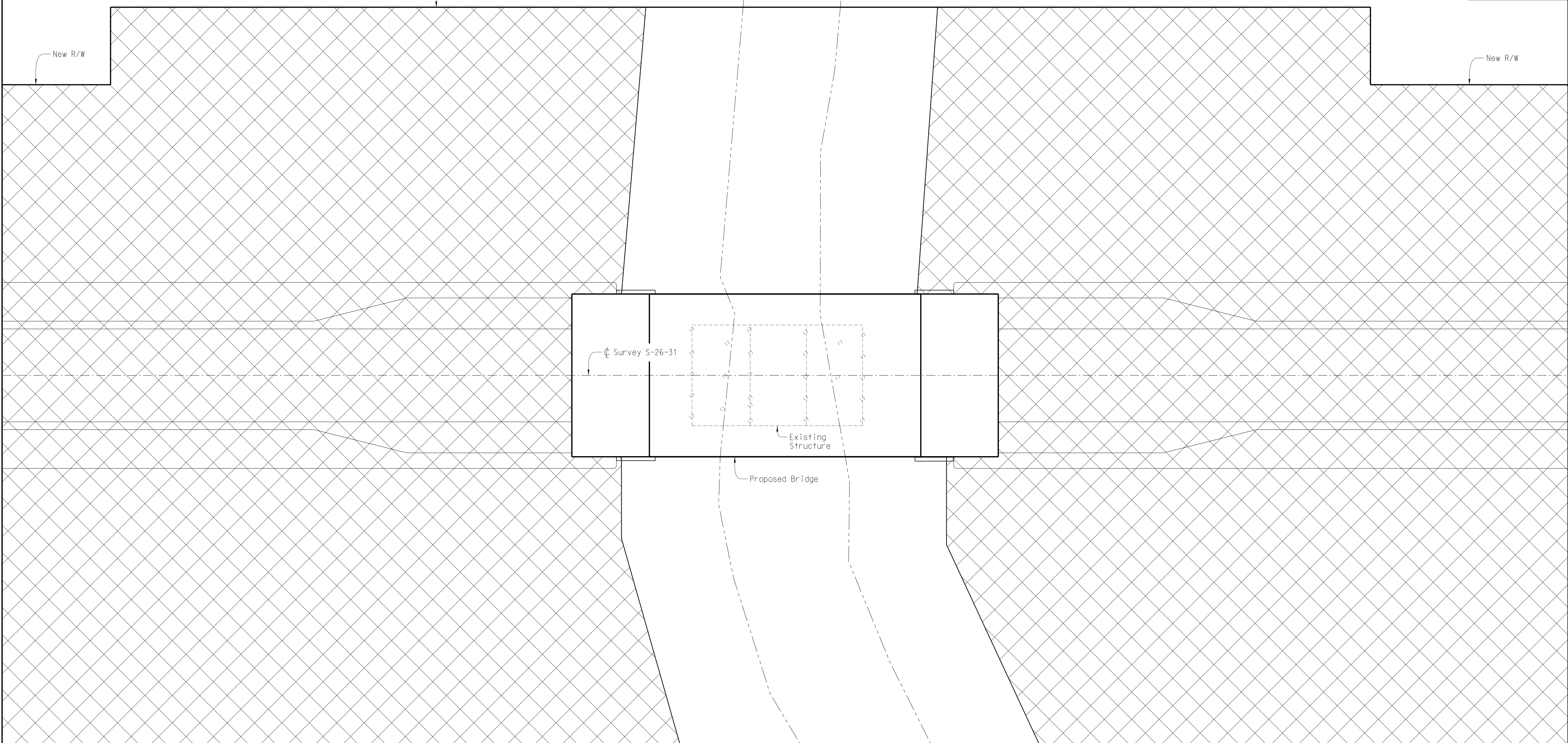
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

END BENTS
1 & 2

COUNTY	HORRY	ROUTE	S-26-31
--------	-------	-------	---------



REV.			
REV.			
REV.			
REVIEWED			
QUAN.			
DR.	WST	AJR	9-24
DES.			
	BY	CHK.	DATE



Material Staging and Laydown Area

BRIDGE CONSTRUCTION
ACCESS PLAN

CONCEPTUAL PLANS
~ NOT FOR CONSTRUCTION ~

REV.			
REV.			
REV.			
REVIEWED			
QUAN.			
DR.	WST	AJR	9-24
DES.			
	BY	CHK.	DATE

Balfour Beatty **RK&K**

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BRIDGE CONSTRUCTION
ACCESS PLAN

COUNTY
HORRY

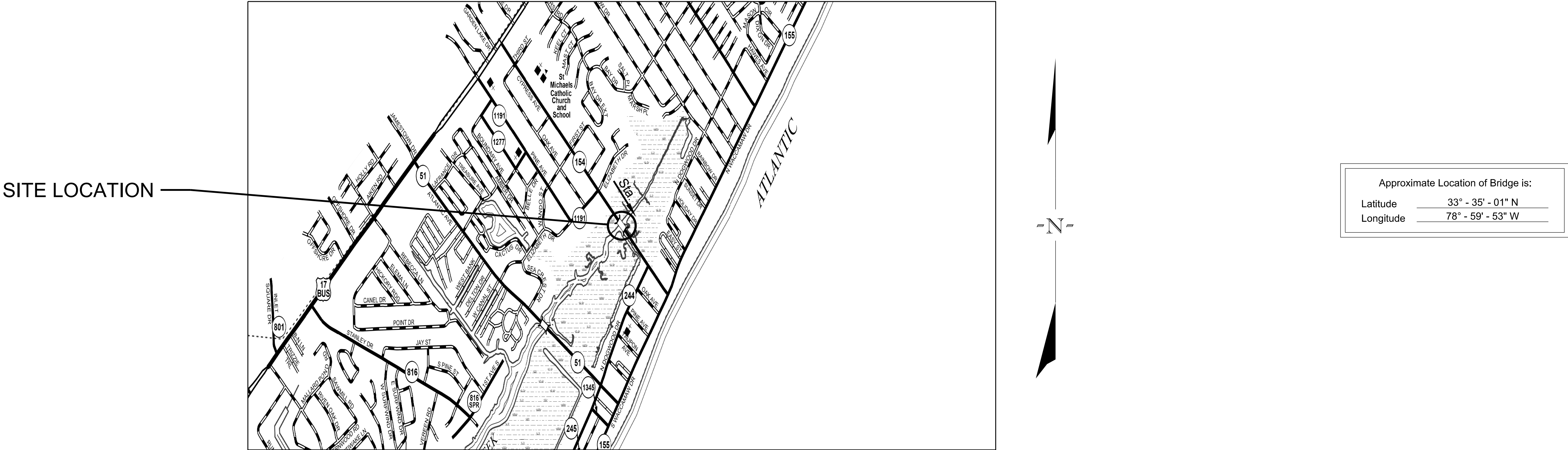
ROUTE
S-26-31

INDEX OF SHEETS

- 1. Title Sheet
- 2. Bridge Plan and Profile
- 3. Superstructure Typical Section
- 4. Bridge Construction Access Plan



CONCEPTUAL BRIDGE PLANS
FOR
HORRY COUNTY
PROJECT ID P041158
STATE ROUTE S-26-154 (CYPRESS AVENUE)
REHABILITATE BRIDGE OVER MURRELLS INLET CREEK



SITE LOCATION

LAYOUT

3 DAYS BEFORE DIGGING IN
SOUTH CAROLINA
CALL 811
SOUTH CAROLINA 811 (SC811)
WWW.SC811.COM
ALL UTILITIES MAY NOT BE A MEMBER OF SC811

ASSET ID 9211

TRAFFIC DATA				
2025	ADT	2,200	V.P.D.	
2045 *	ADT	3,200 *	V.P.D.	
TRUCKS 2 %				
* DESIGN TRAFFIC DATA				

NET LENGTH OF ROADWAY	0.000	MILES
NET LENGTH OF BRIDGES	0.013	MILES
NET LENGTH OF PROJECT	0.013	MILES
LENGTH OF EXCEPTIONS	0.000	MILES
GROSS LENGTH OF PROJECT	0.013	MILES

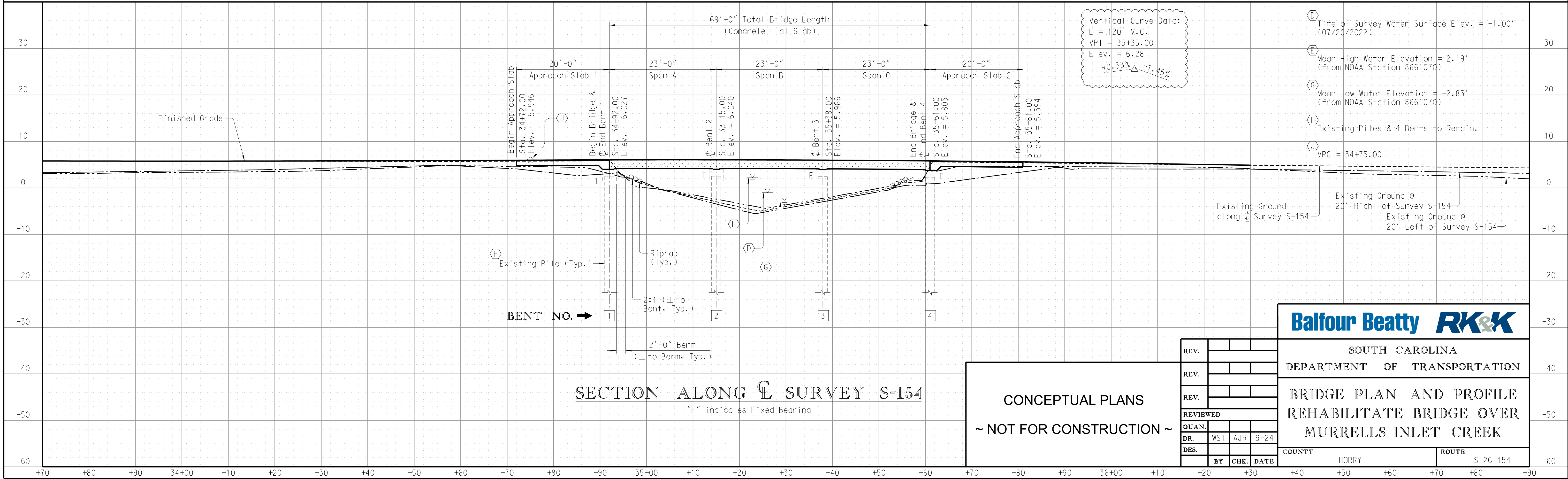
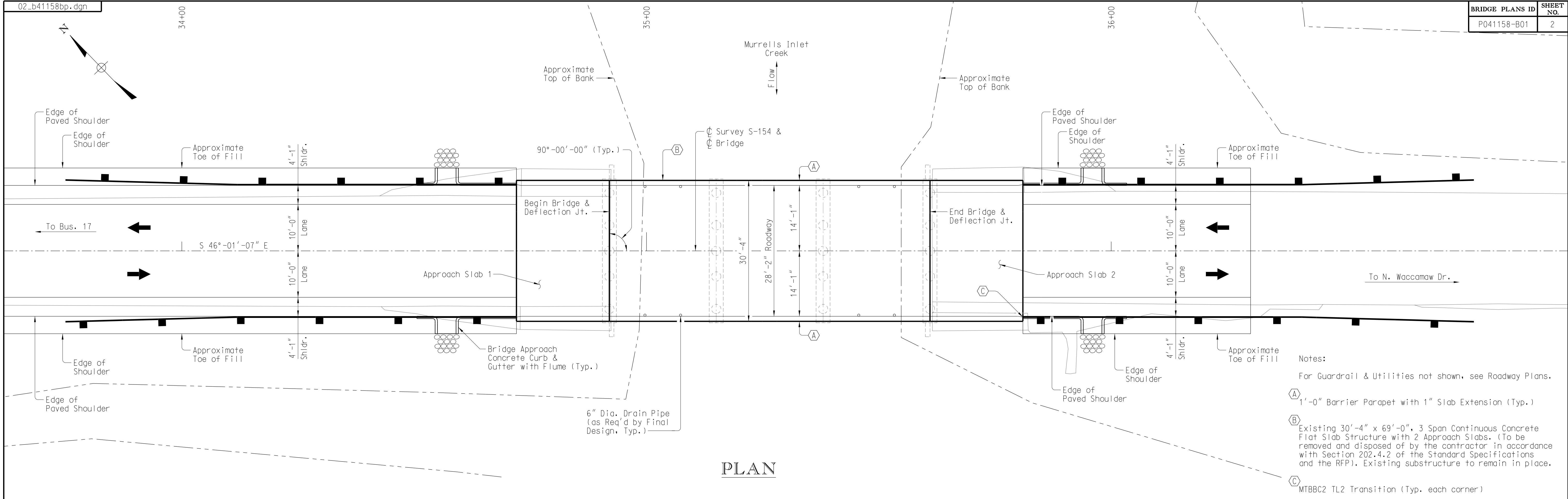
NOTE: EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIALS AND WORKMANSHIP ON THIS PROJECT SHALL CONFORM TO THE SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (2007 EDITION) AND THE STANDARD DRAWINGS FOR ROAD CONSTRUCTION IN EFFECT AT THE TIME OF FINAL RFP.

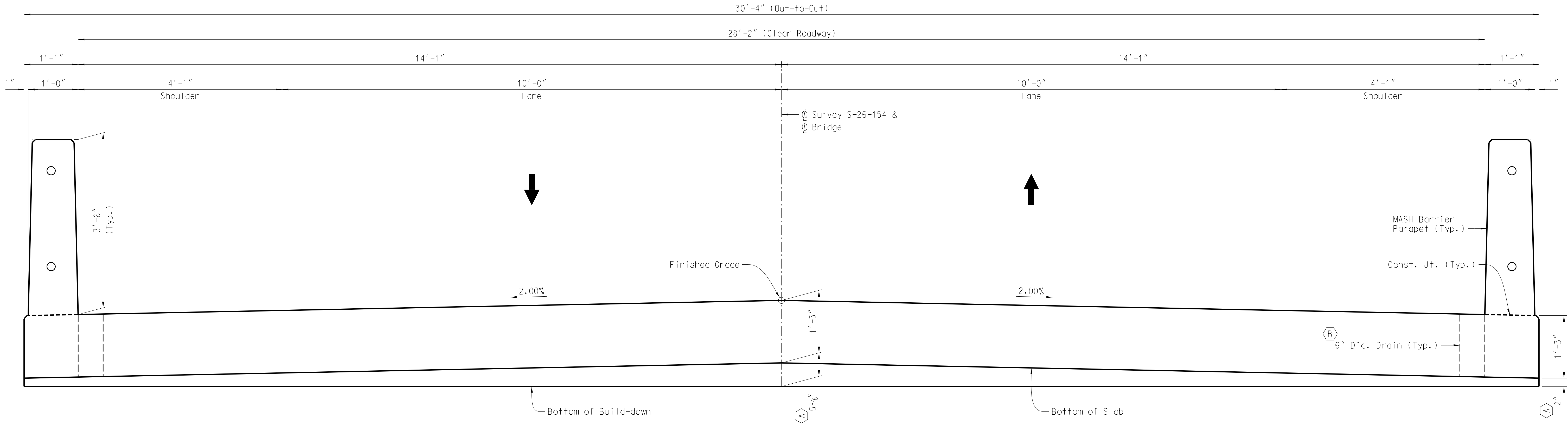


REVIEWED	9-24	WST	BY	DATE
	DR.	CHK		

9/29/2024 8:39:40 AM

10/2/2024 2:35:20 PM





SUPERSTRUCTURE TYPICAL SECTION
(Looking in Direction of Stationing)

Notes:

A Includes 1/2" Elastomeric Bearing Pad

B As Required by Final Design (Typ.)

Flat Slabs shall be reinforced with Glass Fiber Reinforced Polymer (GFRP) Reinforcement Bars.

GFRP Reinforcement Bars shall meet the requirements of SCDOT Supplemental Technical Specification SC-M-703.

Flat Slab top reinforcement shall have a minimum clear cover of 2 1/2" and bottom reinforcement shall have a minimum clear cover of 2".

Balfour Beatty **RK&K**

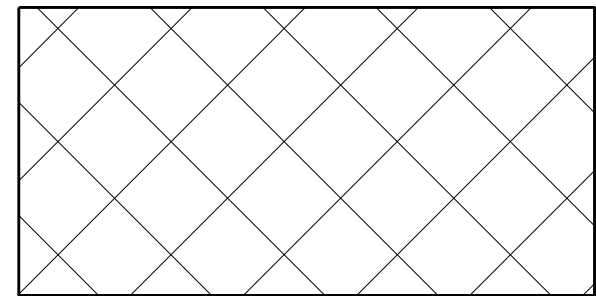
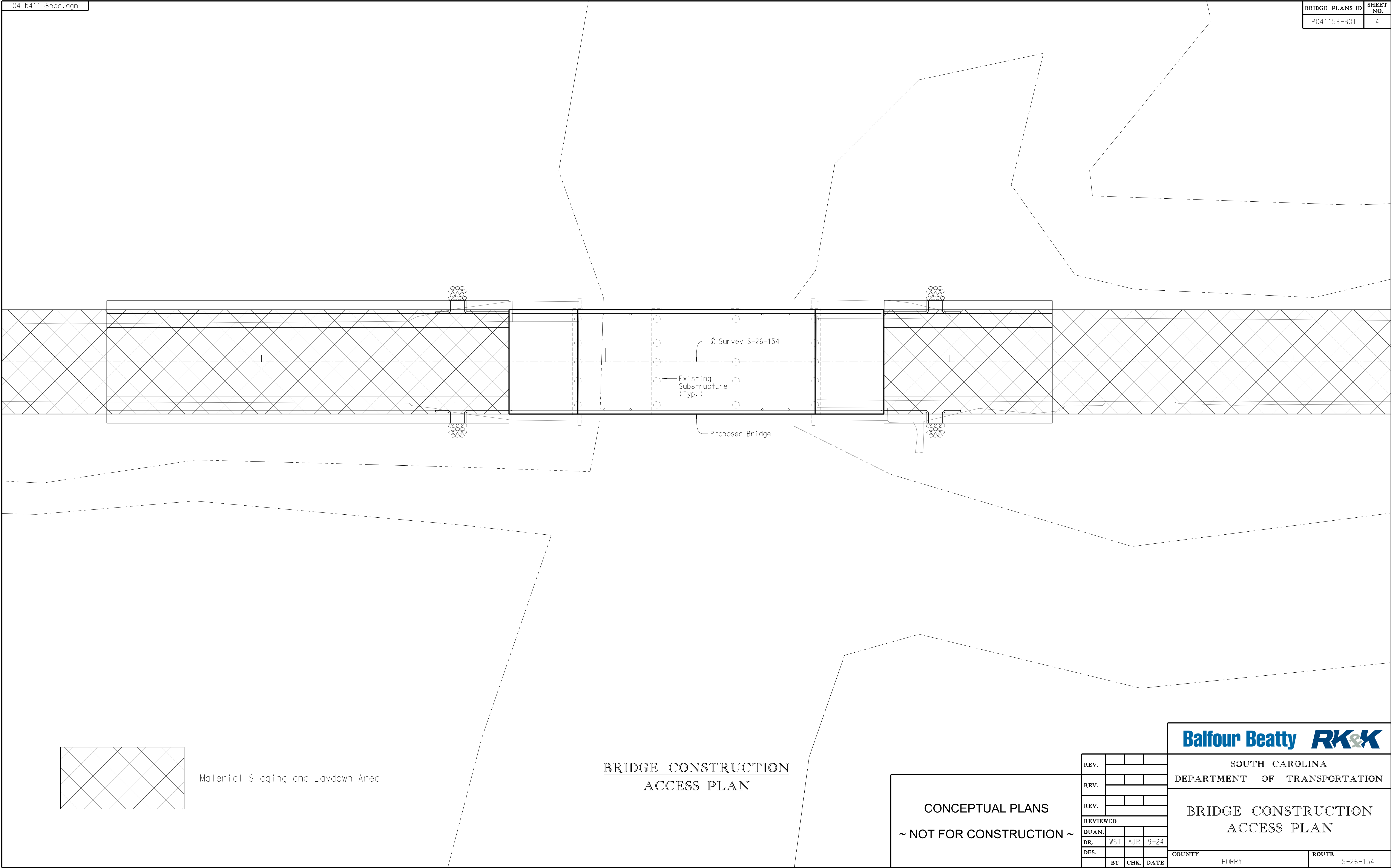
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

SUPERSTRUCTURE
TYPICAL SECTION

COUNTY HORRY ROUTE S-26-154

CONCEPTUAL PLANS
~ NOT FOR CONSTRUCTION ~

REV.			
REV.			
REV.			
REVIEWED			
QUAN.			
DR.	WST	AJR	9-24
DES.			
BY	CHK.	DATE	



Material Staging and Laydown Area

BRIDGE CONSTRUCTION
ACCESS PLAN

CONCEPTUAL PLANS
~ NOT FOR CONSTRUCTION ~

REV.			
REV.			
REV.			
REVIEWED			
QUAN.			
DR.	WST	AJR	9-24
DES.			
	BY	CHK.	DATE

Balfour Beatty **RK&K**

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BRIDGE CONSTRUCTION
ACCESS PLAN

COUNTY
HORRY

ROUTE
S-26-154

Appendix A.3 - CPM Schedule



SCDOT Bridge Package 18 Proposal Schedule Data Date: 07-Nov-24		Balfour Beatty						Schedule Consultant: Willoughby Robinson Associates LLC														
Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Total Float	Activity % Complete	2025												2026		
								Sep	Oct	Nov	Dec	Jan	F	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
SCDOT Bridge Package 18 Proposal Schedule		261	261	07-Nov-24	07-Nov-25	56		07-Nov-25, SCDOT Bridge Package 18 Proposal Schedule														
Milestones		365	365	07-Nov-24	07-Nov-25	78		07-Nov-25, Milestones														
A1000	Bid Opening	0	0	07-Nov-24*		82	0%	◆ Bid Opening, 07-Nov-24*														
A1990	Notice of Award	0	0	28-Nov-24*		145	0%	◆ Notice of Award, 28-Nov-24*														
A1010	Notice to Proceed (NTP)	0	0	20-Dec-24*		159	0%	◆ Notice to Proceed (NTP), 20-Dec-24*														
A1180	Start Construction	0	0	26-Jun-25		76	0%	◆ Start Construction, 26-Jun-25														
A1020	Substantial Completion	0	0		29-Oct-25	80	0%	◆ Substantial Completion, 29-Oct-25														
A1030	Final Completion	0	0		07-Nov-25	78	0%	◆ Final Completion, 07-Nov-25														
Level of Effort		125	125	28-Jun-25	30-Oct-25	78		30-Oct-25, Level of Effort														
LOE1010	S-154 Over Murrells Inlet Creek Full Bridge Closure	116	116	28-Jun-25	21-Oct-25	87	0%	S-154 Over Murrells Inlet Creek Full Bridge Closure														
LOE1000	S-31 Over Todd Swamp Full Bridge Closure	115	115	08-Jul-25	30-Oct-25	78	0%	S-31 Over Todd Swamp Full Bridge Closure														
Design		165	165	07-Nov-24	25-Jun-25	101		25-Jun-25, Design														
Submittals		130	130	07-Nov-24	13-May-25	82		13-May-25, Submittals														
A1920	Preliminary Road Plan Submittal for S-31	48	48	07-Nov-24	17-Jan-25	54	0%	Preliminary Road Plan Submittal for S-31														
A1930	Preliminary Bridge Rehab Plan Submittal for S-154	54	54	07-Nov-24	27-Jan-25	158	0%	Preliminary Bridge Rehab Plan Submittal for S-154														
A1950	Preliminary Bridge Plan Submittal for S-31	80	80	07-Nov-24	04-Mar-25	82	0%	Preliminary Bridge Plan Submittal for S-31														
A1900	Project Info Submittal	11	11	14-Nov-24	03-Dec-24	85	0%	Project Info Submittal														
A1910	Geotechnical Borings for S-31	40	40	03-Dec-24	30-Jan-25	99	0%	Geotechnical Borings for S-31														
A1940	Right of Way Package Submittal for S-31	54	54	10-Dec-24	25-Feb-25	54	0%	Right of Way Package Submittal for S-31														
A1980	Final Bridge Rehab Plan Submittal for S-154	81	81	21-Jan-25	13-May-25	82	0%	Final Bridge Rehab Plan Submittal for S-154														
A1960	Final Roadway Plan Submittal for S-31	46	46	21-Jan-25	26-Mar-25	116	0%	Final Roadway Plan Submittal for S-31														
A1970	Final Bridge Plan Submittal for S-31	71	71	28-Jan-25	06-May-25	82	0%	Final Bridge Plan Submittal for S-31														
ROW Aquisition		120	120	26-Feb-25	25-Jun-25	83		25-Jun-25, ROW Aquisition														
A1790	ROW Acquisition	120	120	26-Feb-25	25-Jun-25	83	0%	ROW Acquisition														
Utility Relocates		188	188	20-Dec-24	25-Jun-25	76		25-Jun-25, Utility Relocates														
A1890	S-154 Utility Coordination	60	60	20-Dec-24	17-Feb-25	204	0%	S-154 Utility Coordination														
A1880	S-31 Utility Coordination	120	120	26-Feb-25	25-Jun-25	76	0%	S-31 Utility Coordination														
Permits		126	126	20-Dec-24	18-Jun-25	64		18-Jun-25, Permits														
S-31		80	80	26-Feb-25	18-Jun-25	57		18-Jun-25, S-31														
A1840	408 Permit	60	60	26-Feb-25	20-May-25	57	0%	408 Permit														
A1850	404 Permit	20	20	21-May-25	18-Jun-25	57	0%	404 Permit														
S-154		80	80	20-Dec-24	14-Apr-25	110		14-Apr-25, S-154														
A1860	404 Permit	60	60	20-Dec-24	17-Mar-25	130	0%	404 Permit														
A1870	EFH Critical Area Permit	80	80	20-Dec-24	14-Apr-25	110	0%	EFH Critical Area Permit														
Procurement		42	42	14-May-25	24-Jun-25	142		24-Jun-25, Procurement														
A1780	Procure Precast Bridge Girders	42	42	14-May-25	24-Jun-25	142	0%	Procure Precast Bridge Girders														
A1820	Procure Bridge Pile Materials	30	30	14-May-25	12-Jun-25	120	0%	Procure Bridge Pile Materials														
A1830	Procure Cathodic Protection Retrofit Materials	42	42	14-May-25	24-Jun-25	120	0%	Procure Cathodic Protection Retrofit Materials														
Construction		89	89	25-Jun-25	30-Oct-25	52		30-Oct-25, Construction														
A1040	Mobilization	5	5	26-Jun-25	02-Jul-25	52	0%	Mobilization														
S-31 Over Tod Swamp(Demo/Replace)		84	84	03-Jul-25	30-Oct-25	52		30-Oct-25, S-31 Over Tod Swamp(Demo/Replace)														
A1050	Install Erosion Control Measures	2	2	03-Jul-25	07-Jul-25	52	0%	Install Erosion Control Measures														
Actual Level of Effort																						
Actual Work																						
Remaining Work																						
Critical Remaining Work																						
Milestone																						
summary																						

Page 1 of 3

TASK filter: All Activities

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SCDOT Bridge Package 18 Proposal Schedule Data Date: 07-Nov-24		Balfour Beatty							Schedule Consultant: Willoughby Robinson Associates LLC																										
Activity ID		Activity Name		Original Duration	Remaining Duration	Start	Finish	Total Float	Activity % Complete					2025												2026									
										Sep	Oct	Nov	Dec	Jan	F	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	F	Mar							
	<div></div> A1070	Install Maintenance and Protection Measures (Detour Traffic)		2	2	08-Jul-25	09-Jul-25	52	0%																										
	<div></div> A1760	Remove Maintenance and Protection Measures (Open Road)		2	2	29-Oct-25	30-Oct-25	52	0%																										
	<div></div> Bridge Construction			63	63	10-Jul-25	07-Oct-25	52		07-Oct-25, Bridge Construction																									
	<div></div> Demolition			11	11	10-Jul-25	24-Jul-25	52		24-Jul-25, Demolition																									
	<div></div> A1100	Conduct Lead Abatement		2	2	10-Jul-25	11-Jul-25	52	0%																										
	<div></div> A1400	Demo/Remove Existing Guardrail		1	1	14-Jul-25	14-Jul-25	52	0%																										
	<div></div> A1110	Demo/Remove Existing Bridge Deck		5	5	15-Jul-25	21-Jul-25	52	0%																										
	<div></div> A1120	Demo/Remove Existing Bridge Abutments		2	2	22-Jul-25	23-Jul-25	52	0%																										
	<div></div> A1240	Demo/Remove Existing Approach Slabs		1	1	24-Jul-25	24-Jul-25	52	0%																										
	<div></div> Substructure			26	26	25-Jul-25	29-Aug-25	52		29-Aug-25, Substructure																									
	<div></div> A1130	Excavate/Muck Stream and Bent Locations		3	3	25-Jul-25	29-Jul-25	52	0%																										
	<div></div> A1140	Drive Piles for End Bent 1		2	2	30-Jul-25	31-Jul-25	52	0%																										
	<div></div> A1150	Drive Piles for End Bent 2		2	2	01-Aug-25	04-Aug-25	52	0%																										
	<div></div> A1160	Form/Rebar/Pour End Bent 1		4	4	05-Aug-25	08-Aug-25	52	0%																										
	<div></div> A1250	Form/Rebar/Pour End Bent 1 Wing Walls		3	3	11-Aug-25	13-Aug-25	52	0%																										
	<div></div> A1170	Form/Rebar/Pour End Bent 2		4	4	14-Aug-25	19-Aug-25	52	0%																										
	<div></div> A1260	Form/Rebar/Pour End Bent 2 Wing Walls		3	3	20-Aug-25	22-Aug-25	52	0%																										
	<div></div> A1270	Place Fill at End Bents		3	3	25-Aug-25	27-Aug-25	52	0%																										
	<div></div> A1300	Place Rip Rap Slope Protection		2	2	28-Aug-25	29-Aug-25	52	0%																										
	<div></div> Superstructure			26	26	02-Sep-25	07-Oct-25	52		07-Oct-25, Superstructure																									
	<div></div> A1280	Setup Crane		1	1	02-Sep-25	02-Sep-25	52	0%																										
	<div></div> A1290	Place Precast Concrete Girders		2	2	03-Sep-25	04-Sep-25	52	0%																										
	<div></div> A1310	Install SIP Decking		3	3	05-Sep-25	09-Sep-25	52	0%																										
	<div></div> A1320	Form Overhangs		2	2	10-Sep-25	11-Sep-25	52	0%																										
	<div></div> A1330	Install Rebar		3	3	12-Sep-25	16-Sep-25	52	0%																										
	<div></div> A1340	Place Concrete		1	1	17-Sep-25	17-Sep-25	52	0%																										
	<div></div> A1350	Cure Period		5	5	18-Sep-25	24-Sep-25	52	0%																										
	<div></div> A1360	Install Barrier		3	3	25-Sep-25	29-Sep-25	52	0%																										
	<div></div> A1370	Form/Rebar/Pour Approach Slab End Bent 1		3	3	30-Sep-25	02-Oct-25	52	0%																										
	<div></div> A1380	Form/Rebar/Pour Approach Slab End Bent 2		3	3	03-Oct-25	07-Oct-25	52	0%																										
	<div></div> Roadway Construction			15	15	08-Oct-25	28-Oct-25	52		28-Oct-25, Roadway Construction																									
	<div></div> A1390	Mill Existing Road Surface		1	1	08-Oct-25	08-Oct-25	52	0%																										
	<div></div> A1410	Clear and Grub in Existing SCDOT ROW		1	1	09-Oct-25	09-Oct-25	52	0%																										
	<div></div> A1420	Cut/Fill Roadway Shoulders		3	3	10-Oct-25	14-Oct-25	52	0%																										
	<div></div> A1430	Install Subbase		3	3	15-Oct-25	17-Oct-25	52	0%																										
	<div></div> A1440	Pour Curb		2	2	20-Oct-25	21-Oct-25	52	0%																										
	<div></div> A1450	Pave Road		2	2	22-Oct-25	23-Oct-25	52	0%																										
	<div></div> A1490	Install Concrete Ditches		2	2	22-Oct-25	23-Oct-25	54	0%																										
	<div></div> A1460	Install Guardrail		1	1	24-Oct-25	24-Oct-25	52	0%																										
	<div></div> A1470	Install Striping		1	1	27-Oct-25	27-Oct-25	52	0%																										
	<div></div> A1480	Seed and Matt Slopes		1	1	28-Oct-25	28-Oct-25	52	0%																										
	<div></div> S-154 Over Murrells Inlet Creek (Rehabilitation)			82	82	25-Jun-25	21-Oct-25	59		21-Oct-25, S-154 Over Murrells Inlet Creek (Rehabilitation)																									
	<div></div> A1060	Install Erosion Control Measures		2	2	25-Jun-25	27-Jun-25	59	0%																										

Actual Level of Effort

Actual Work

Remaining Work

Critical Remaining Work

◆ Milestone

summary

Page 2 of 3

TASK filter: All Activities

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[illegible]

Appendix B - Required Forms, Confidential and Proprietary Information Page List



10. NON-COLLUSION CERTIFICATION

NON-COLLUSION CERTIFICATION

Project ID: 2662300

IN ACCORDANCE WITH THE PROVISIONS OF S.C. CODE ANN. §§ 39-3-10 ET. SEQ., 39-5-10 ET. SEQ., 15 U.S.C. §45; 23 C.F.R. §635.112(F); AND 28 U.S.C. §1746, I HEREBY ACKNOWLEDGE THAT I AM AN OFFICER OF THE PROPOSER FIRM AND, UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE UNITED STATES AND SOUTH CAROLINA, DECLARE, BY MY CERTIFICATION BELOW, THAT THE FOLLOWING IS TRUE AND CORRECT, AND FURTHER, THAT THIS JOINT-VENTURE, FIRM, PARTNERSHIP, ASSOCIATION OR CORPORATION, OR ANY OTHER LEGAL ENTITY HAS NOT, EITHER DIRECTLY OR INDIRECTLY, ENTERED INTO ANY AGREEMENT, PARTICIPATED IN ANY COLLUSION, OR OTHERWISE TAKEN ANY ACTION IN RESTRAINT OF FREE COMPETITIVE BIDDING IN CONNECTION WITH THE SUBMISSION OF A BID PROPOSAL ON THE ABOVE REFERENCED PROJECT.

BY CHECKING THIS BOX ☒ , I CERTIFY THAT I HAVE READ, UNDERSTAND, ACCEPT, AND ACKNOWLEDGE ALL OF THE ABOVE STATEMENTS.

Executed on 9/16/2024
(Date)

Signed: 
(Officer/Proposer)

SVP & CHIEF OPERATING OFFICER
(Title)

3314 JAECKLE DRIVE
(Address)

WILMINGTON, NC 28403

11. EQUAL EMPLOYMENT OPPORTUNITY CERTIFICATION

(COMPLETE THIS SECTION FOR FEDERAL PROJECTS ONLY) EQUAL EMPLOYMENT OPPORTUNITY PERFORMANCE

Select the Certification that applies to the PROPOSER:

Certification (1) ☒ or Certification (2) ☐

Select the appropriate responses in the applicable Certification:

Certification (1): Pursuant to 41 C.F.R. §60-1.7(b)(1), Previous Equal Employment Opportunity Performance Certification, as the Prospective Prime Contractor, I HEREBY CERTIFY THAT I:

(a) (~~HAVE~~ / ~~HAVE NOT~~) developed and filed an Affirmative Action Program pursuant to 41C.F.R. §60-2 and/or 60-4;

(b) (~~HAVE~~ / ~~HAVE NOT~~) participated in a previous contract or subcontract subject to the equal opportunity clause;

(c) (~~HAVE~~ / ~~HAVE NOT~~) filed with the Joint Reporting Committee, the Director of Office of Federal Contract Compliance, or the Equal Employment Opportunity Commission, all reports due under the applicable filing requirements,

OR

Certification (2): I, HEREBY CERTIFY that as the Prospective Prime Contractor submitting this Proposal, (**CLAIM / DO NOT CLAIM**) exemption from the submission of the Standard Form 100 (EEO-1) due to the fact that it employs a total of less than fifty (50) employees under C.F.R. §60-1.7, or qualifies for an exempted status under 41 C.F.R. §60-1.5.

I FURTHER CERTIFY that the above Certification will be made part of any Subcontract Agreement, or other agreement involved with this project.

Executed on 9/16, 20 24.

Signed: [Signature]
(Officer/PROPOSER)

Title: SVP & CHIEF OPERATING OFFICER

Company: BALFOUR BEATTY

Address: 3314 JAECKLE DRIVE, WILMINGTON
NC 28403

Note: The above certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7(b)(1)), and must be submitted by PROPOSERS only in connection with contracts which are subject to the equal opportunity clause. Contracts that are exempt from the equal opportunity clause are set forth in 41 CFR 60-1.5. (Generally, only contracts of \$10,000 or under are exempt.)

Currently, Standard Form 100 (EEO-1) is the only report required by Executive Orders or their implementing regulations.

Proposers, Primary Members, or proposed Subcontractors (any tier) and Consultants who have participated in a previous contract subject to the Executive Orders and have not filed the required reports shall note that 41 CFR 60-1.7(b)(1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.

12. STIPEND ACKNOWLEDGEMENT FORM

Stipend Acknowledgement Form

Bridge Package 18 Horry County

Proposer: BALFOUR BEATTY

ADDRESS: 3314 JAECKLE DRIVE, WILMINGTON, NC 28403

The undersigned Proposer, hereby:

☐

Waives the stipend for this Project.

☒

Accepts the stipend for this Project.

By accepting the stipend for this Project, Proposer agrees:

- 1) to execute and include the Stipend Agreement in Article XIII of the RFP with its RFP response;
- 2) to submit an invoice with FEIN number for the stipend amount to the SCDOT POC after SCDOT's posting of the Notice of Award on SCDOT's Design-Build Website.;
- 3) to transfer all rights to its Work Product used to develop the Proposal as of the date of this acknowledgement. "Work Product" means all submittals, including ATCs, ideas, innovations, solutions, methods, processes, design concepts, materials, electronic files, marked up drawings, cross sections, quantity lists and intellectual property, made by Proposer during the RFP process, including the Proposal, exchange of information during the pre-Proposal and post-Proposal period.

SCDOT will pay the stipend to each eligible unsuccessful Proposer, who has signed a Stipend Agreement, within ninety (90) days after execution of the Contract or the decision to not award a contract.

9/16/24
Date

BALFOUR BEATTY
Proposer

MARK JOHNNIE
Print Name

13. STIPEND AGREEMENT

STIPEND AGREEMENT

Project ID: 2662300

Bridge Package 18

Horry County

THIS STIPEND AGREEMENT (the "Agreement") is made and entered into as of the ____ day of _____, 20__, by and between the SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION (hereinafter "SCDOT"), and _____ ("Proposer"), with reference to the following facts:

SCDOT issued a Request for Proposal ("RFP") for design and construction of the above-referenced Design-Build Project ("Project"), pursuant to procurement authority granted in Section 57-5-1625 of the S.C. Code of Laws, 1976, as amended. The RFP provided for payment of stipends as provided herein. Capitalized terms used, but not defined, have the meanings ascribed in the RFP.

NOW, THEREFORE, Proposer hereby agrees as follows:

1. Work Product.

1.1 Proposer shall prepare and submit a responsible and responsive Technical Proposal and Cost Proposal that conforms in all material respects to the requirements and provisions of the RFP, as determined by SCDOT, and are timely received by SCDOT in accordance with the RFP Milestone Schedule.

1.2 By signing this Stipend Agreement, Proposer agrees to transfer full and complete ownership to SCDOT of all Work Product. The Work Product (as defined below) shall become the property of SCDOT without restriction or limitation on its use, without further compensation or consideration, and can be used in connection with this Project or any future projects by SCDOT. Neither Proposer nor any of its team members shall copyright any of the material developed under this Agreement.

1.3 The term "Work Product" shall mean the Proposal and all material, electronic files, marked up drawings, cross sections, quantity lists, submittals, alternative technical concepts (ATC), ideas, innovations, solutions, methods, processes, design concepts, Trade Secrets or confidential information, and intellectual property, made by or produced for Proposer in the development and submission of the Technical and Cost Proposal, including exchanges of information during the pre-Proposal and post-Proposal period.

2. Compensation and Payment.

2.1 A stipend to Proposer for the Work Product described herein shall be \$20,000.00 and is payable to Proposer that was determined to be responsible and (1) submitted a responsive Technical Proposal and responsive Cost Proposal to the RFP which is not selected for award of this Project, or (2) was awarded the Contract but the Contract was terminated by SCDOT for convenience after the Submittal of Proposal Due Date (See Final RFP Milestone schedule) but prior to the Notice to Proceed #1. Responsibility of Proposers and responsiveness of the Technical Proposal and Cost Proposal will be determined by SCDOT as a condition of payment.

2.2 SCDOT will pay the stipend to Proposer as follows, subject (as applicable) to the following conditions:

- (a) Proposer has submitted this signed Stipend Agreement, unchanged with its response to the RFP.
- (b) After posting of the Notice of Award on SCDOT's Design-Build Website, Proposer has submitted to SCDOT an invoice, with FEIN Number, for the Stipend amount.
- (c) After execution of the Contract or the decision not to award a contract, SCDOT will pay the invoice for the stipend amount to the unsuccessful Proposer meeting the criteria of Section 2.1 within 90 calendar days of receipt of the invoice from Proposer.
- (d) If the procurement is suspended or cancelled prior to the Proposal Due Date (see FINAL RFP Milestone schedule), no stipend will be paid to Proposer.
- (e) After the submittal of Proposals, but prior to award, if the procurement is cancelled, all Proposers that provide a responsive Technical Proposal and Cost Proposal to the final RFP and submitted a signed Stipend Agreement with their RFP shall receive the stipend.
- (f) In the event of a Best and Final Offer, only one stipend will be paid to each Proposer that executed a Stipend Agreement and met the other criteria and conditions herein.
- (g) No stipends will be paid for submitting RFQ responses.
- (h) No stipends will be paid to a Proposer who withdraws at any time from this procurement.

2.3 Acceptance by the Proposer of payment of the stipend amount from SCDOT shall constitute a waiver by Proposer of any and all right, equitable or otherwise, to bring any claim in connection with this procurement, procurement process, award of the Contract, or cancellation of this procurement.

2.4 The Proposer awarded the contract shall be not eligible to receive a stipend.

2.5 If Proposer elects to waive payment of the stipend, SCDOT will not use the ideas or information contained in that Proposer's Proposal for this Project. However, the Proposer's Proposal will be subject to the South Carolina Freedom of Information Act.

3. Indemnities.

3.1 Subject to the limitations contained in Section 3.2, Proposer shall indemnify, protect and hold harmless SCDOT and its directors, officers, employees and contractors from, and Proposer shall defend at its own expense, all claims, costs, expenses, liabilities, demands, or suits at law or equity arising, in whole or in part, from the negligence or willful misconduct of Proposer or any of its agents, officers, employees, representatives or subcontractors or breach of any of Proposer's obligations under this Agreement.

3.2 This indemnity shall not apply with respect to any claims, demands or suits arising from use of the Work Product by SCDOT.

4. Compliance With Laws.

4.1 Proposer shall comply with all federal, state, and local laws, ordinances, rules, and regulations applicable to the work performed or paid for under this Agreement and covenants and agrees that it and its employees shall be bound by the standards of conduct provided in applicable laws, ordinances, rules, and regulations as they relate to work performed under this Agreement. Proposer agrees to incorporate the provisions of this paragraph in any subcontract into which it might enter with reference to the work performed pursuant to this Agreement.

4.2 The Proposer agrees (a) not to discriminate in any manner against an employee or applicant for employment because of race, color, religion, creed, age, sex, marital status, national origin, ancestry or disability of a qualified individual with a disability; (b) to include a provision similar to that contained in subsection (a) in any subcontract; and (c) to post and to cause subcontractors to post in conspicuous places available to employees and applicants for employment, notices setting forth the substance of this clause.

5. Assignment.

Proposer shall not assign this Agreement without SCDOT's prior written consent. Any assignment of this Agreement without such consent shall be null and void.

6. Miscellaneous.

6.1 Proposer and SCDOT agree that Proposer, its team members, and their respective employees are not agents of SCDOT as a result of this Agreement.

6.2 This Agreement, together with the RFP, as amended from time to time, the provisions of which are incorporated herein by reference, embodies the entire agreement of the parties. There are no promises, terms, conditions, or obligations other than those contained herein or in the RFP, and this Agreement shall supersede all previous communications, representation, or agreements, either oral or written, between the parties hereto.

6.3 It is understood and agreed by the parties hereto that if any part, term, or provision of this Agreement is by the courts held to be illegal or in conflict with any law of the State of South Carolina, the validity of the remaining portions or provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Agreement did not contain the particular part, term, or provisions to be invalid.

6.4 This Agreement shall be governed by and construed in accordance with the laws of the State of South Carolina.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first written above.

Witness:

Recommended:

Michael Pitts

**SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION**

By: _____
Jae Mattox
Alternative Delivery Engineer

Proposer

g. Confidential and Proprietary Information Page List

Balfour Beatty, PLC (Contractor) and Rummel, Klepper & Kahl, LLP (RK&K) (Lead Designer) do not hold any of the information in this submittal as confidential or proprietary. However, we have included a "redacted copy" per 4.4 of the RFP.



South Carolina Department of Transportation

Columbia, South Carolina

South Carolina Department

Of

Transportation

Prime Contractor

Prequalification Certificate

This Certifies that your company has complied with the rules and regulations of the Department and the State of South Carolina, and subject to the rules and regulations for a prime contractor, is declared eligible to submit a bid and be awarded any construction contract issued by the Department, subject to obtaining proper bonds and insurance acceptable to the Department and complying with all other statutory and contract requirements.

ALL BIDS SUBMITTED TO THE DEPARTMENT MUST BE IN THE NAME AS SHOWN BELOW.

VENDOR NAME

BALFOUR BEATTY INFRASTRUCTURE, INC.

Vendor ID:

1BA013

Date Issued:

March 27, 2024

Expiration Date:

March 31, 2025

Approved By:

A handwritten signature in black ink, appearing to read "B. J. [unclear]", is written over a horizontal line. Below the line, the text "Prequalification and Contracts Coordinator" is printed in a bold, black, sans-serif font.

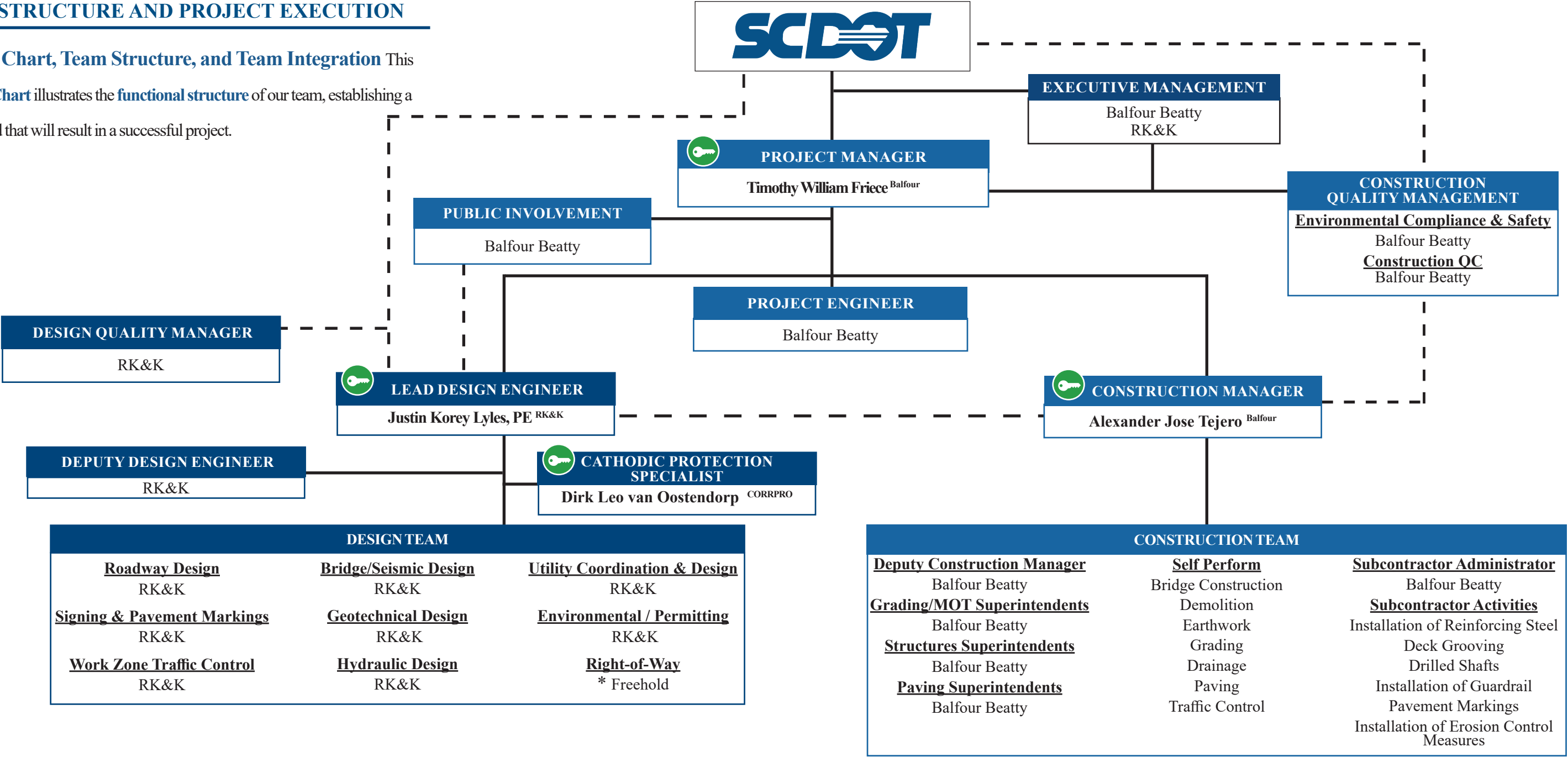
Prequalification and Contracts Coordinator



TEAM STRUCTURE AND PROJECT EXECUTION

Organization Chart, Team Structure, and Team Integration

This Organizational Chart illustrates the functional structure of our team, establishing a chain of command that will result in a successful project.



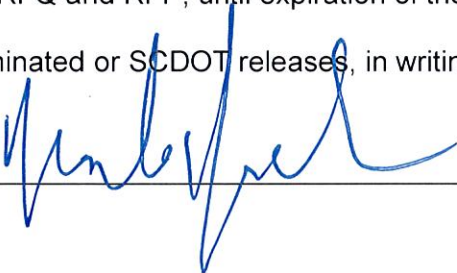
Team Members			
Balfour	Balfour Beatty, PLC	CORRPRO	Corrpro Companies, Inc.
RK&K	Rummel, Klepper & Kahl, LLP	Freehold	Freehold Focus *
	RFQ Key Individuals	*	Disadvantaged Business Enterprise (DBE)
—	Direct Report	----	Communication

Quality Credit Matrix				
Number	Description	Added Value/Benefits	Cost/Schedule Impacts	Self-Imposed Assurance
1	Two separate operation for each bridge location - BB has the ability to, and will commit to two independent operations supported by resources located locally in Brunswick County, NC, and Horry County, SC.	Build float contingency into overall schedule.	Reduction in project indirect costs/ overhead, reflected in price proposal.	N/A.
2	S-31 duration of road closure / construction duration is reduced by 4 days.	Schedule certainty.	We believe there is potential to reduce the bridge closure duration further by working 10 hour shifts 5 day working week. We decided not to be aggressive and instead focus on schedule certainty.	\$10,500 per day self-imposed Liquidated Damages if S-31 bridge closure exceeds 120 calendars. An increase of \$500 per day over D.1
3	S-154 duration of road closure / construction duration is reduced by 5 days.	Schedule certainty.	We believe there is potential to reduce the bridge closure duration further by working 10 hour shifts 5 day working week. We decided not to be aggressive and instead focus on schedule certainty.	\$4,000 per day self-imposed Liquidated Damages if S-154 bridge closure exceeds 120 calendars. An increase of \$500 per day over D.1
4	Project will be substantially complete in 313 days from the Notice to Proceed, 87 days earlier than required by Article IV.A.1 of the agreement.	Schedule betterment	Reduction in project indirect costs/overhead, reflected in price proposal.	\$1,500 per day Liquidated Damages if substantial completion is not achieved within 313 days. An increase of \$500 per day over D.2.
5	Balfour Beatty commits to achieve final completion in 400 days from the Notice to Proceed. 90 days betterment than required by Article IV.A.5.	Schedule betterment	Reduction in project indirect costs/overhead, reflected in price proposal.	N/A.
6	Early procurment and storage of major bridge components such as girders and deck panels, etc.	Cost certainty, eliminate potential escalation.	Reduce potential for claims	N/A.
7	The Design Builder proposes to utilize a higher psi concrete / fly ash for cast-in-place superstructure items.	The increased concrete durability will help to minimize long-term maintenance costs for SCDOT. Potentially lengthen design life of structure	No cost saving	N/A.

3314 Jaeckle Drive, Unit 140
Wilmington NC 28403
910-452-1145

COMMITMENT OF KEY INDIVIDUALS

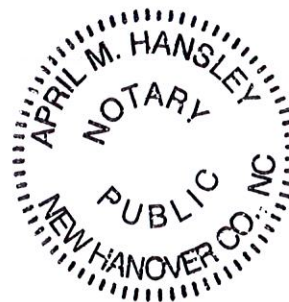
This serves as a written statement that Balfour Beatty's Key Individuals represented on the Project Organization Chart in our SOQ will be available to construct the Bridge Package 18 Design-Build Project, barring any unforeseen circumstances, at the earliest of the times and durations identified in the RFQ and RFP, until expiration of the Warranty Period, or such earlier date as the Contract is terminated or SCDOT releases, in writing, such Key Individual from this requirement.


_____ 6/17/2024

Subscribed and witnessed before me this 17th day of June 2024


Notary Public

My Commission Expires June 11, 2027



September 12, 2024

RE: Bridge Package 18 - Design-Build Project - Contract ID 2662300

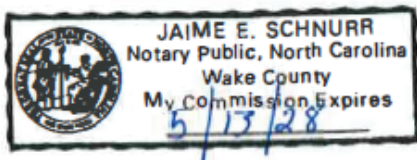
This serves as a written statement that RK&K's Key Individuals presented on the organizational chart submitted with the SOQ will be available, barring any unforeseen circumstances, at the earliest of the times and durations identified in the RFQ and RFP, until expiration of the Warranty Period, or such earlier date as the Contract is terminated or SCDOT releases, in writing, such Key Individual from this requirement.

B. Keith Skinner

B. Keith Skinner, PE
Partner
Rummel, Klepper & Kahl, LLP

Jaime E. Schnurr
Notary Signature

Expiration 5/13/28



Appendix C - Approved Formal ATCs being incorporated into the Proposer's Cost Proposal



Formal Alternative Technical Concepts Submittal Form

Project: BRIDGE PACKAGE 18

Project ID: 2662300

ATC No.: 1

Priority: High

Team: BalfourBeatty-RK&K

Date: 9/10/24

Description (required):

This ATC proposes a shorter bridge length of 70-ft and seeks the use of prestressed concrete cored slabs with a concrete overlay as an approved bridge type at S-31 over Tod Swamp. The RFP currently has a minimum bridge length of 80-ft at this site, however our preliminary design shows that our team could utilize a 70-ft bridge at this location.

Usage:

Our team is proposing to use a single span 70-ft long bridge with 2-ft deep x 3-ft wide prestressed concrete cored slabs. Due to durability concerns of the joints for bridges with a current ADT equal or exceeding 3000 vpd, our team proposes to use a concrete overlay for the riding surface providing additional rigidity and durability of the structure, utilizing #3 bars spaced at 6" centers in both the longitudinal and transverse directions. In addition to normal weight concrete overlay, our team proposes to use Ultra High Performance Concrete (UHPC) in the shear keys to provide an overall stiffer structure. The slabs will have a raked finish to be used with the concrete overlay in lieu of a waterproofing membrane. A grooved surface finish will be provided on the concrete overlay and SCDOT rideability specifications will be met. A saw cut opening will be used at the joint for the usage of a compression seal between the concrete of the approach slab and concrete overlay. The concrete overlay will be used in conjunction with applicable notes and details released with DM0524.

Deviations (required):

The reduced bridge length at this site will deviate from Section 2.1.7 of Exhibit 4b in the RFP, "Provide a single span bridge over Tod Swamp, centered on the existing channel, with a minimum bridge length of 80 feet." The use of cored slabs at this site will deviate from Section 2.1.8 of the Exhibit 4b in the RFP, "For this bridge, use prestressed concrete girder structure type, outlined in Section 12.3.2.1 of the BDM." Prestressed concrete cored slabs are an allowable superstructure type in SC as detailed in Section 12.3.2.5 of the SCDOT Bridge Design Manual. The use of 3-ft wide cored slabs with 1-ft wide MASH Barriers offset 1-in from the exterior edge of the slab will deviate from Section 2.5 of Exhibit 4a in the RFP which states the shoulder width at S-31 shall be 8-ft, and will instead result in 7-ft 11-in wide shoulders.

Justification:

Upon an in-depth review of the site and the model, our team determined that a 70-ft span over the channel would be achievable at this site. The allowance of cored slabs at S-31 over Tod Swamp would provide cost and time savings due to the elimination of form work for the deck and overhang. Cored slabs also provide a reduced structure depth of up to 23 inches over an I-girder design with a concrete deck and haunch. This savings in structure depth will result in a much lower roadway profile, reducing approach lengths, and reducing construction limits.

Formal Alternative Technical Concepts Submittal Form

Project: BRIDGE PACKAGE 18

Project ID: 2662300

ATC No.: 1

Priority: High

Team: BalfourBeatty-RK&K

Date: 9/10/24

Schedule:

The use of cored slabs will allow a schedule savings of approximately 3 weeks.

Impacts:

No negative impacts with the use of cored slabs. Reduced impacts to right of way, utilities, and environmental with lower roadway profile.

History:

NCDOT uses a limit of 5,000 vpd for the usage of cored slab or box beam bridges. For higher truck traffic they successfully use a concrete overlay on the adjacent box beams. In South Carolina, RK&K has successfully designed prestressed cored slab bridges as part of CLRB 2020-1, including Newberry S-272 over Second Creek, Saluda S-211 over Richland Creek, as well as Laurens S-34 over Millers Fork Creek, which utilized a concrete overlay. Balfour Beatty has successfully constructed cored slabs on numerous bridges in the southeast.

Risks:

No risks to SCDOT or others.

Costs (required):

Cored slab bridges are less expensive than girder type bridges. Cost savings could be experienced due to the reduced roadway grade and reduce construction duration. The use of cored slabs at S-31 over Tod Swamp will allow a cost savings of approximately \$250,000.

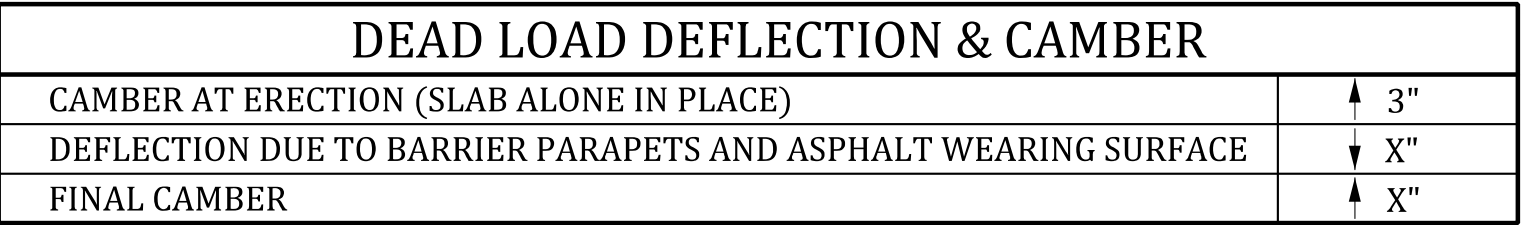
Quality:

No negative impact on quality or performance.

Operations & Maintenance:

Operations and maintenance will be similar to that for prestressed concrete girder bridges.

REVIEWED				
QUAN.	CTM	GCM		05-23
DR.	CTM	MWB		05-23
DES.	SJA	BWB		10-23
	BY	CHK.		DATE



FOR INFORMATION ONLY - PAID FOR AS CORED SLAB	BILL OF MATERIAL ONE 70' CORED SLAB							
	MARK	NO. REQ'D	DIMENSION					LENGTH
			"a"	"b"	"c"	"d"	"e"	
	A0501	4	35'-10"	—	—	—	—	35'-10"
	J0401	8	1'-9½"	1'-7"	—	—	—	5'-0"
	J0402	160	2'-8"	1'-7"	—	—	—	5'-10"
	J0403	4	1'-8½"	2'-8"	—	—	—	7'-1"
	J0501	8	2'-7"	6"	—	—	—	3'-7"
	LA0501	① 86	5½"	—	—	—	—	7'-7"
	QUANTITIES							
	ITEM		UNIT	INTERIOR	EXTERIOR			
	REINFORCING STEEL		LB	848	1,528			
CONCRETE, f'c 8,000		CY	11.7	11.8				
0.6" Ø L.R. STRANDS		LF	1,887	1,887				

① LA0501 BARS REQUIRED FOR EXTERIOR SLABS ONLY.

BILL OF MATERIAL ONE 70' BARRIER PARAPET							
MARK	NO. REQ'D	DIMENSION					LENGTH
		"a"	"b"	"c"	"d"	"e"	
A0502	20	36'-1"	—	—	—	—	36'-1"
A0503	16	5'-0"	—	—	—	—	5'-0"
J0502	86	5½"	3'-3"	—	—	—	7'-0"
QUANTITIES							
ITEM				UNIT	TOTAL		
2.0" SCHEDULE 80 PVC CONDUIT				LF	140.0		
REINFORCING STEEL				LB	1,464		
MASH CONCRETE BARRIER PARAPET				LF	70.0		

ESTIMATED QUANTITIES - ONE 70' SPAN		
ITEM	UNIT	TOTAL
2.0" SCHEDULE 80 PVC CONDUIT	LF	280.0
REINFORCING STEEL FOR STRUCTURES (BRIDGE)	LB	2,928
3'-0" X 2'-0" CORED SLABS	LF	978.3
MASH CONCRETE BARRIER PARAPET	LF	140.0
ELASTOMERIC BEARING	EA	28
BRIDGE DECK WATERPROOFING	SY	309.8



THIS DRAWING IS FURNISHED FOR INFORMATION ONLY. ALL DIMENSIONS SHOWN ARE SHEET SPECIFIC. ANY USE OF THIS DESIGN AND DRAWING, INCLUDING DIMENSIONS, MUST BE CHECKED BY THE USER'S ENGINEER TO ENSURE DESIGN IS ADEQUATE FOR THE INTENDED USE. ALL DRAWINGS MUST BE SIGNED AND SEALED BY A SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER WHEN USED.

CONSULTANT NAME/LOGO	
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
PRESTRESSED CONCRETE CORED SLAB 70' SPAN 39'-10" ROADWAY (0° SKEW)	
COUNTY: #####	ROUTE: #####

REVIEWED			
QUAN.	CTM	GCM	05-23
DR.	CTM	MWB	05-23
DES.	S/A	BB/DP	05-23
BY	CHK.	DATE	
	BY	CHK.	DATE
REV.			
REV.			
REV.			
REV.			



THE 2½" Ø DOWEL HOLES MAY BE FORMED USING PLASTIC CORRUGATED DUCT THAT IS LEFT IN PLACE.

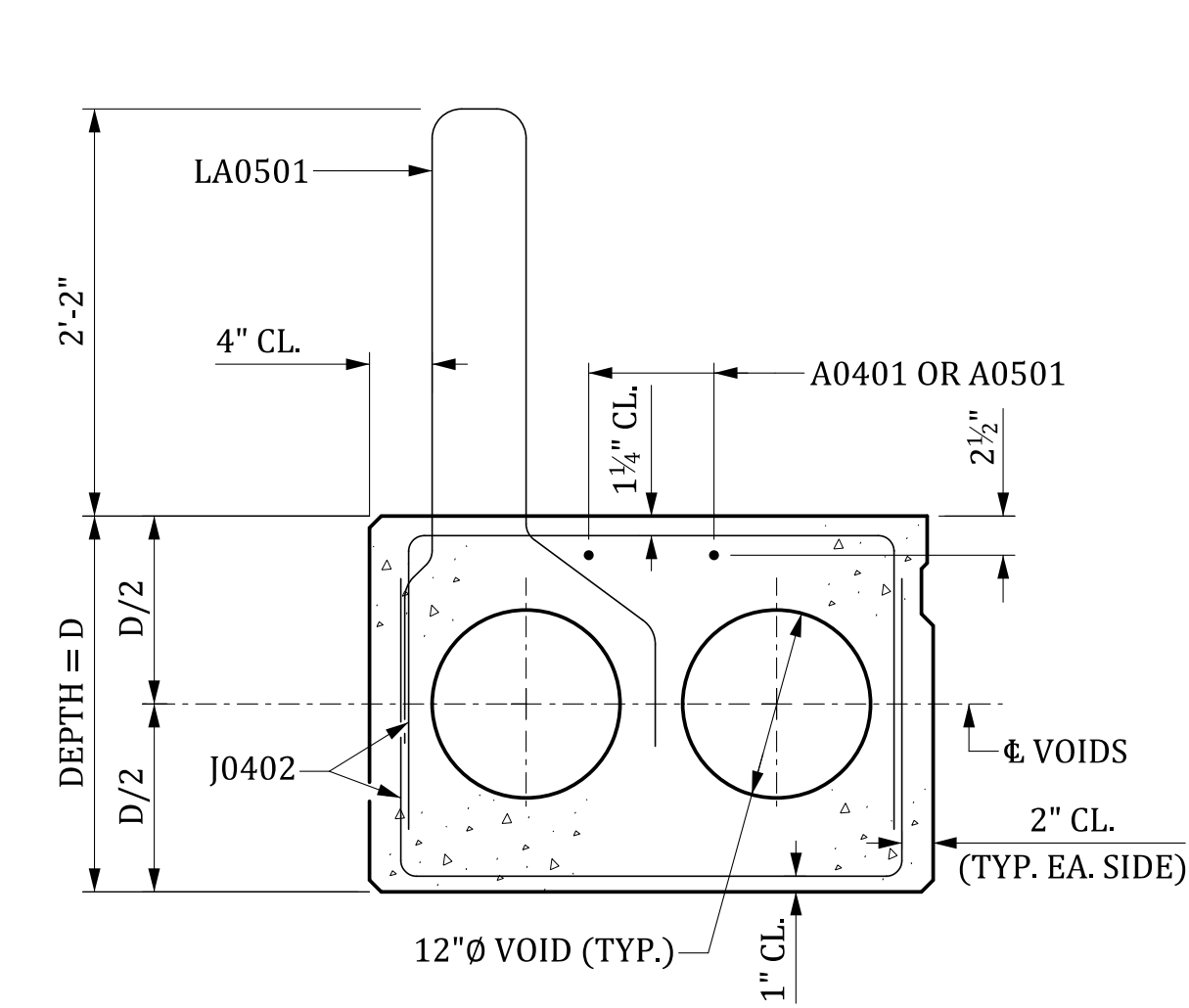
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CONSULTANT NAME/LOGO	
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
PRESTRESSED CONCRETE CORED SLAB TYPICAL SUPERSTRUCTURE SECTION 39'-10" ROADWAY	
COUNTY: ####	ROUTE: ####

DRAWING NUMBER: 704-ACS.TYP.R40

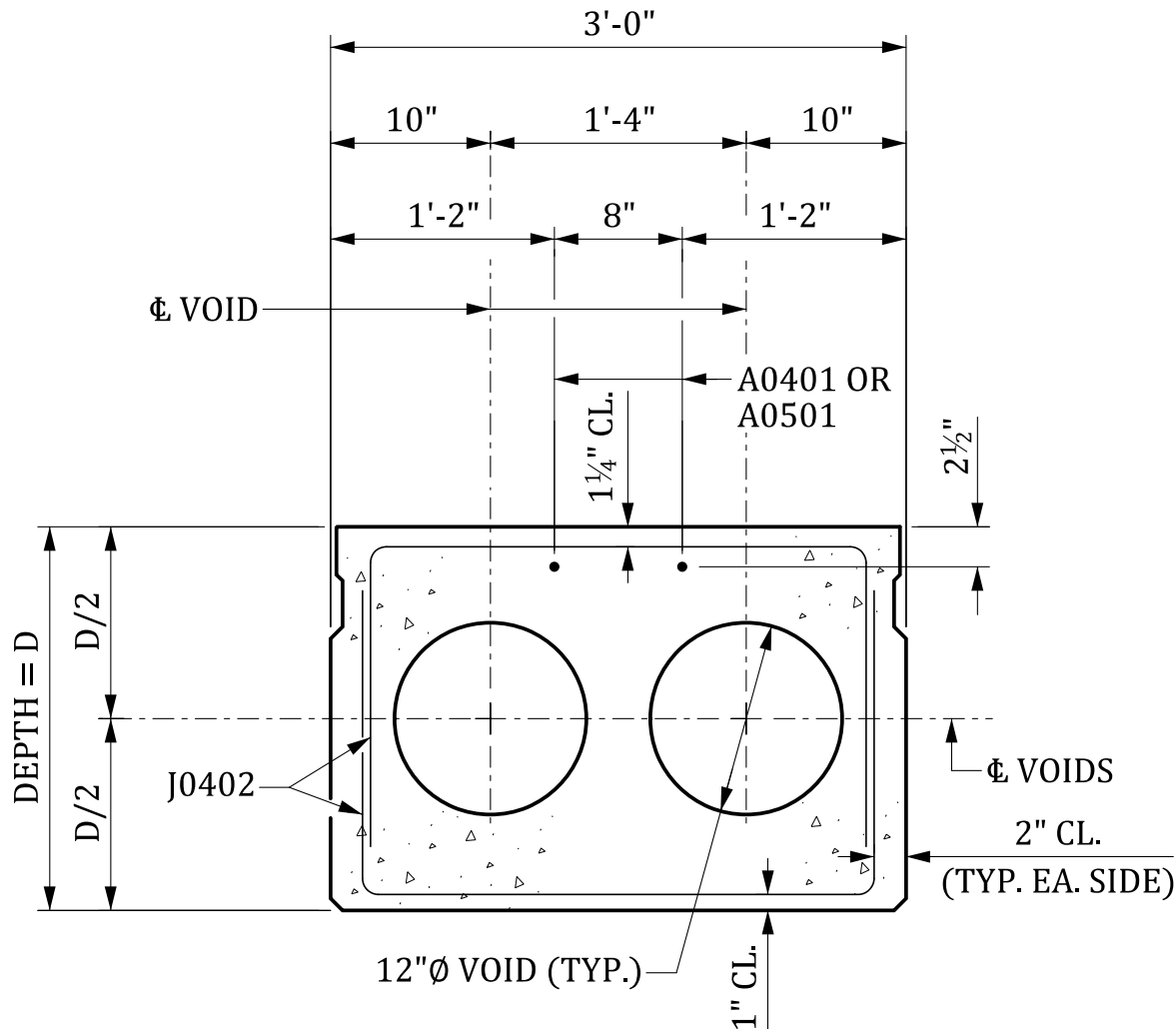
MBreeland 6/25/2024 5:22:44 PM 704_ACS_GENDET.dgn									
REVIEWED	QUAN.	CTM	GCM	05-23	BY	CHK.	DATE	REV.	DESCRIPTION OF REVISION
	DR.	CTM	MWB	05-23					
	DES.	SJA	BB/DT	05-23					

BRIDGE PLANS ID	SHEET
####-####	####



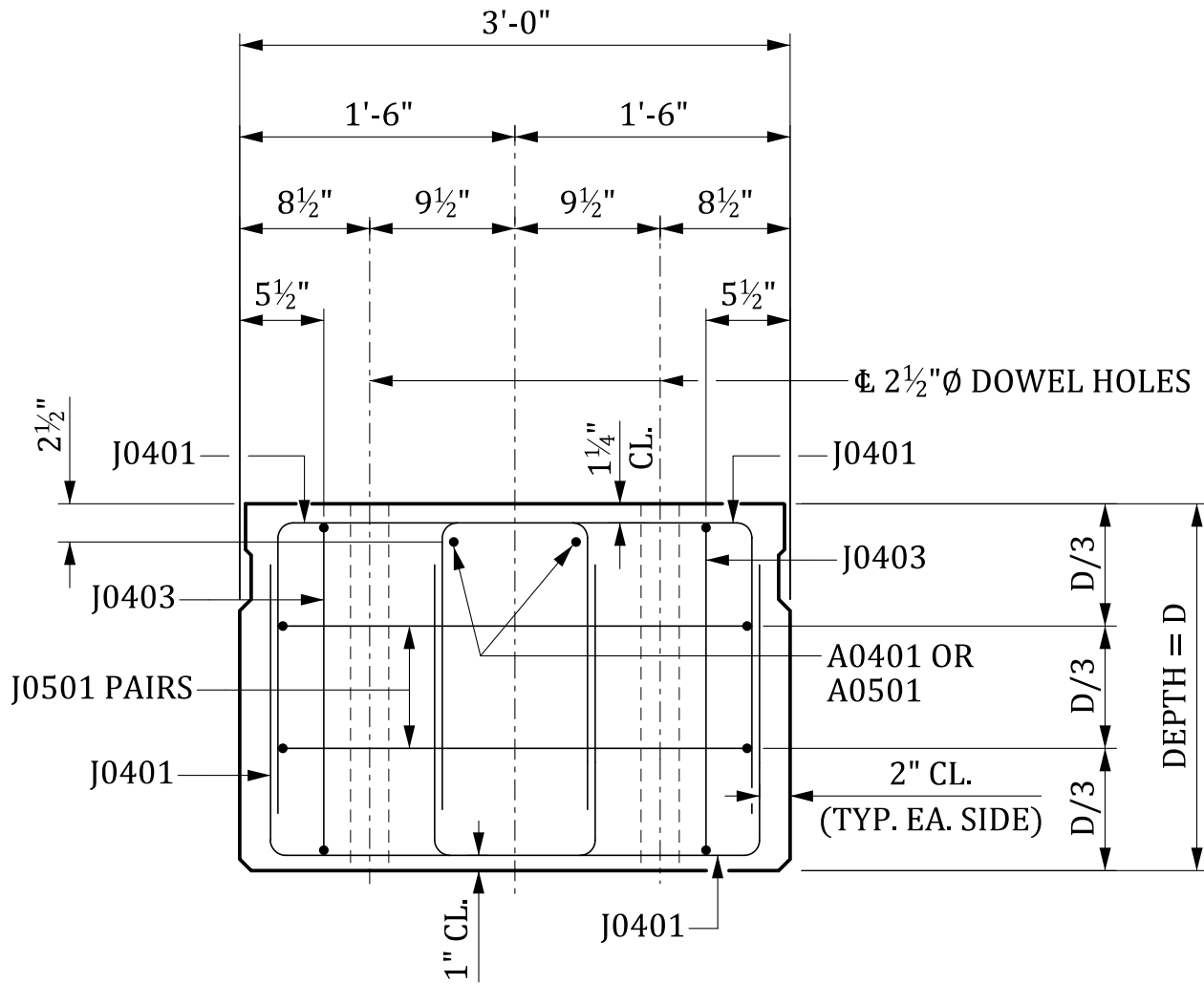
EXTERIOR SLAB

STRANDS NOT SHOWN.
FOR DETAILS NOT SHOWN, SEE "INTERIOR SLAB."



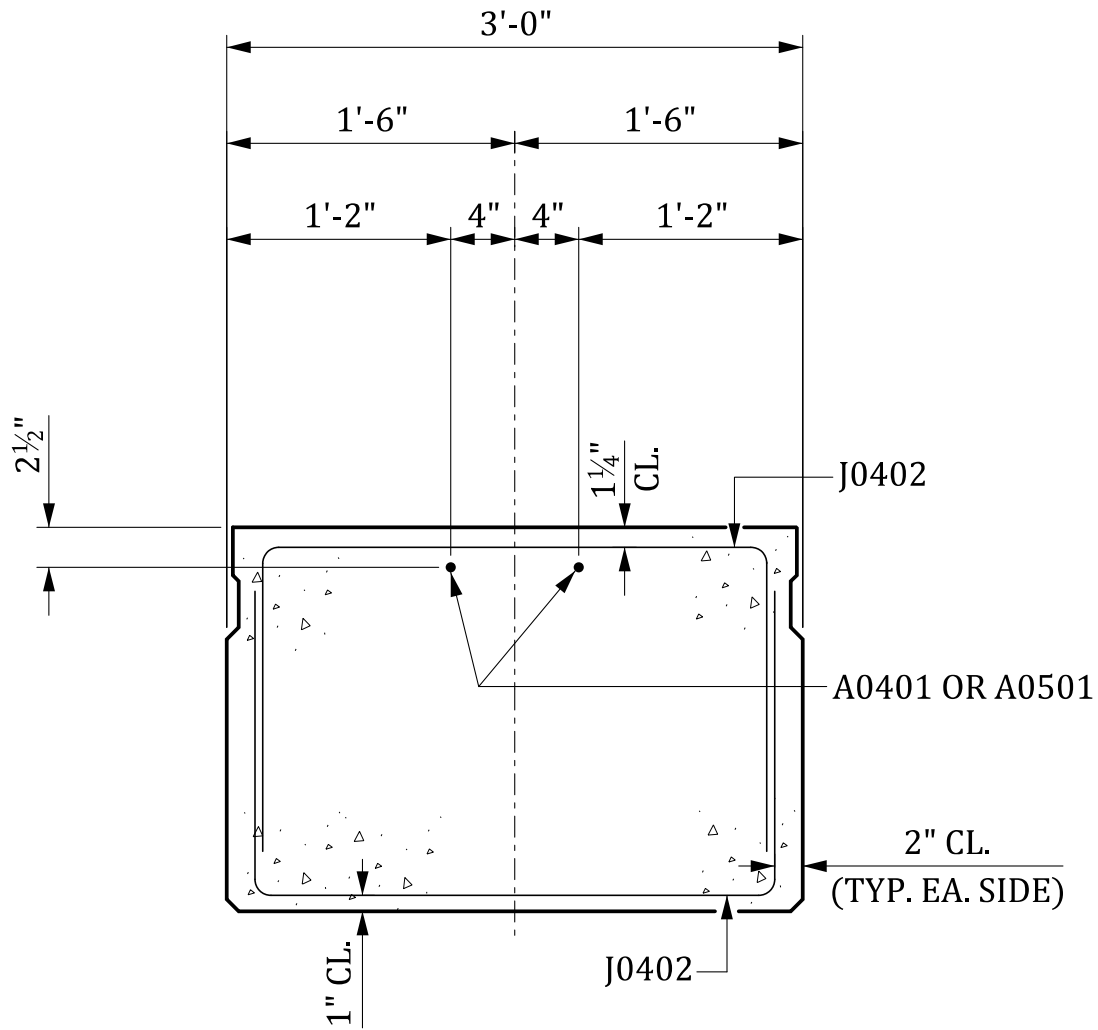
INTERIOR SLAB

STRANDS NOT SHOWN.



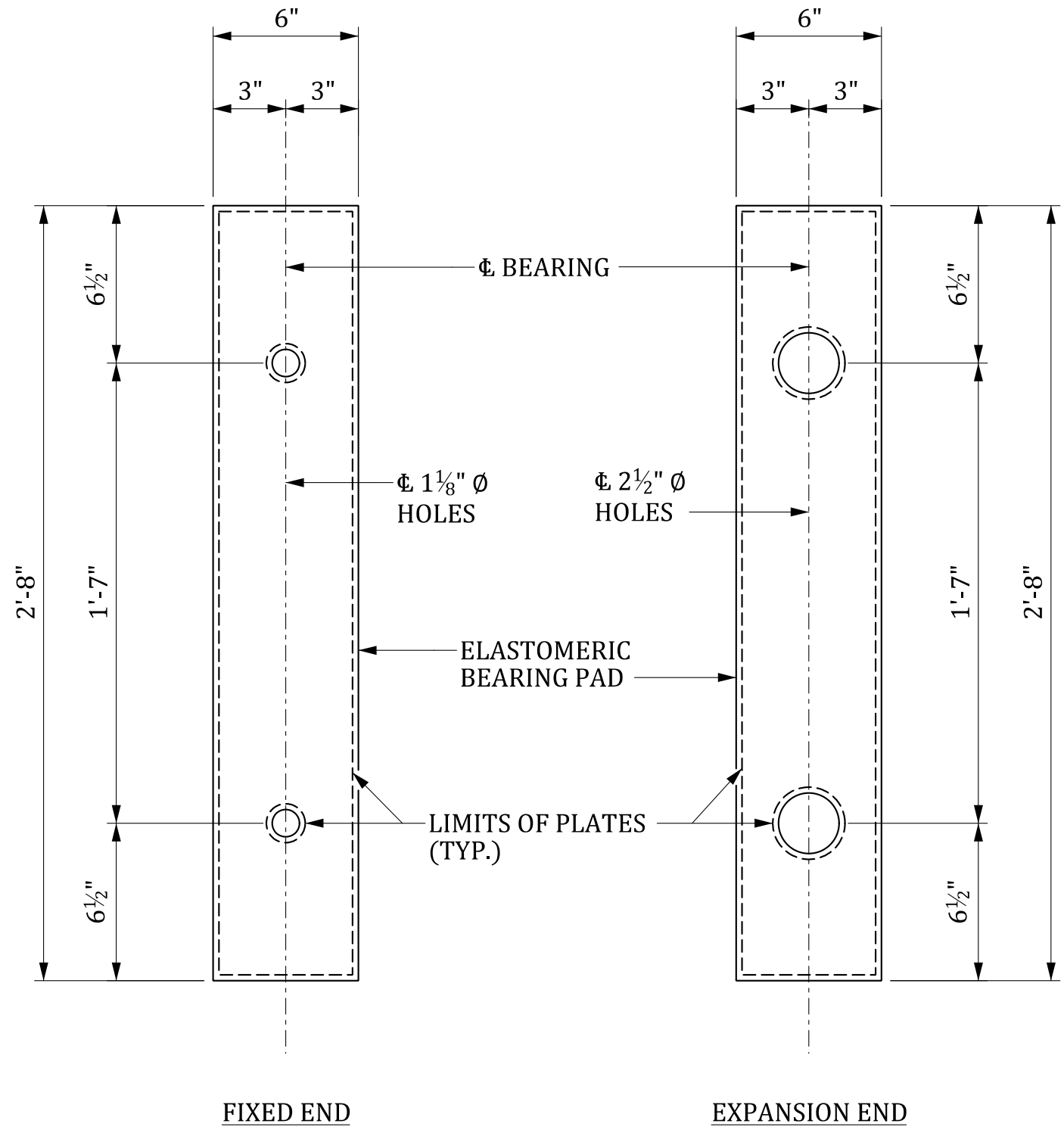
END ELEVATION

STRANDS NOT SHOWN.
INTERIOR SLAB SHOWN - EXTERIOR SLAB SIMILAR EXCEPT SHEAR KEY LOCATION

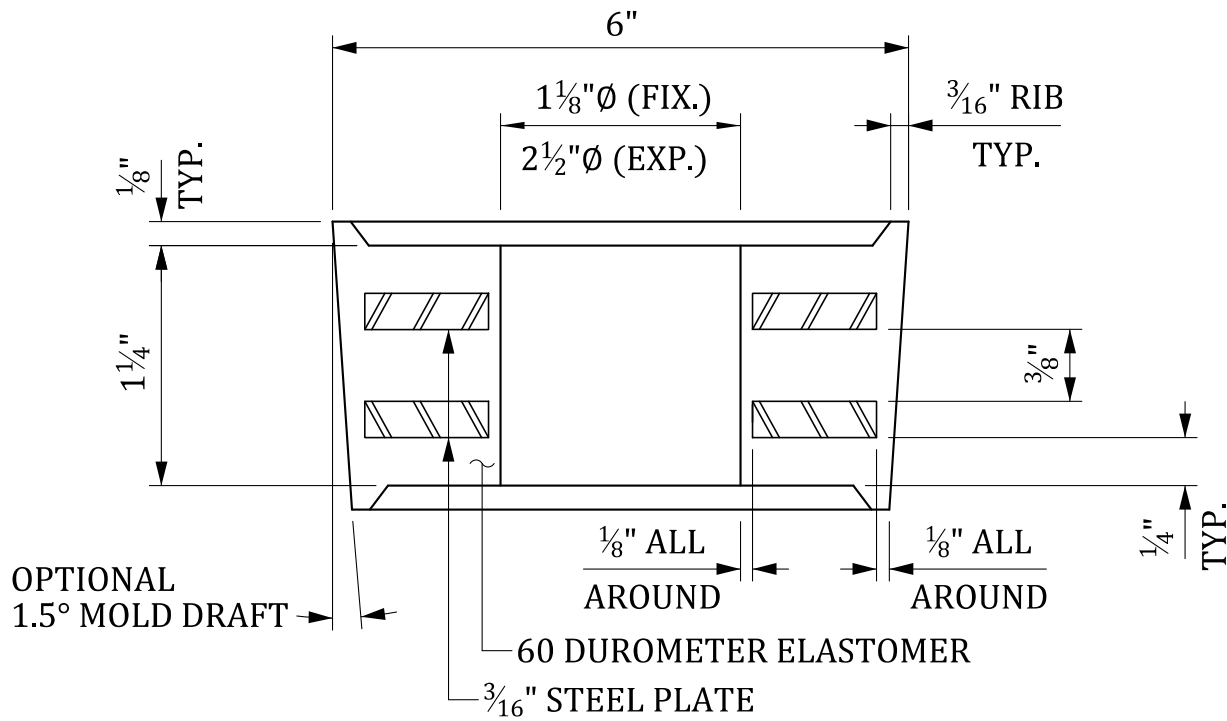


END REGION REINFORCING NEAR BEARING

STRANDS NOT SHOWN.
INTERIOR SLAB SHOWN - EXTERIOR SLAB SIMILAR EXCEPT SHEAR KEY LOCATION



PLAN



SECTION AT HOLE

ELASTOMERIC BEARING PAD DETAILS

NOTES:

PADS WERE DESIGNED USING AASHTO METHOD A. PAD MATERIAL SHALL BE ELASTOMER GRADE 2.
FOR ELASTOMERIC BEARING SPECIFICATIONS, SEE SCDOT STANDARD SPECIFICATIONS.

BEARING DESIGN LOAD

MAX. DL + LL = XX KIPS

THIS DRAWING IS FURNISHED FOR INFORMATION ONLY. ALL DIMENSIONS SHOWN ARE SHEET SPECIFIC. ANY USE OF THIS DESIGN AND DRAWING, INCLUDING DIMENSIONS, MUST BE CHECKED BY THE USER'S ENGINEER TO ENSURE DESIGN IS ADEQUATE FOR THE INTENDED USE. ALL DRAWINGS MUST BE SIGNED AND SEALED BY A SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER WHEN USED.

CONSULTANT NAME/LOGO

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

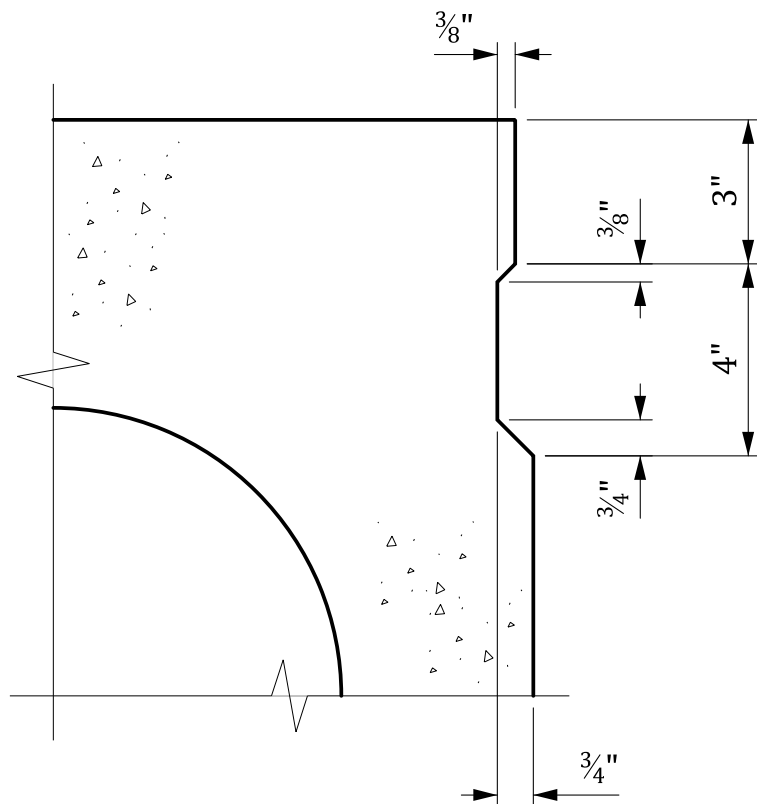
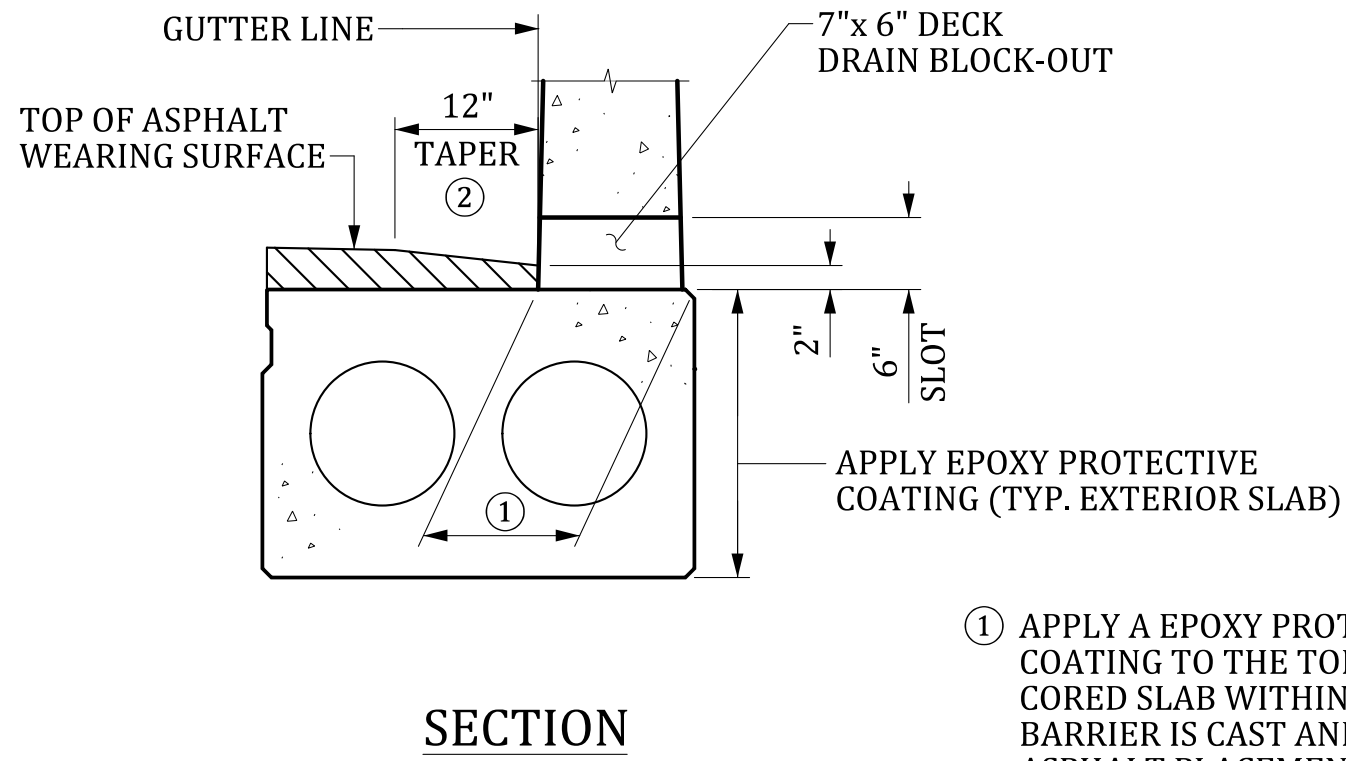
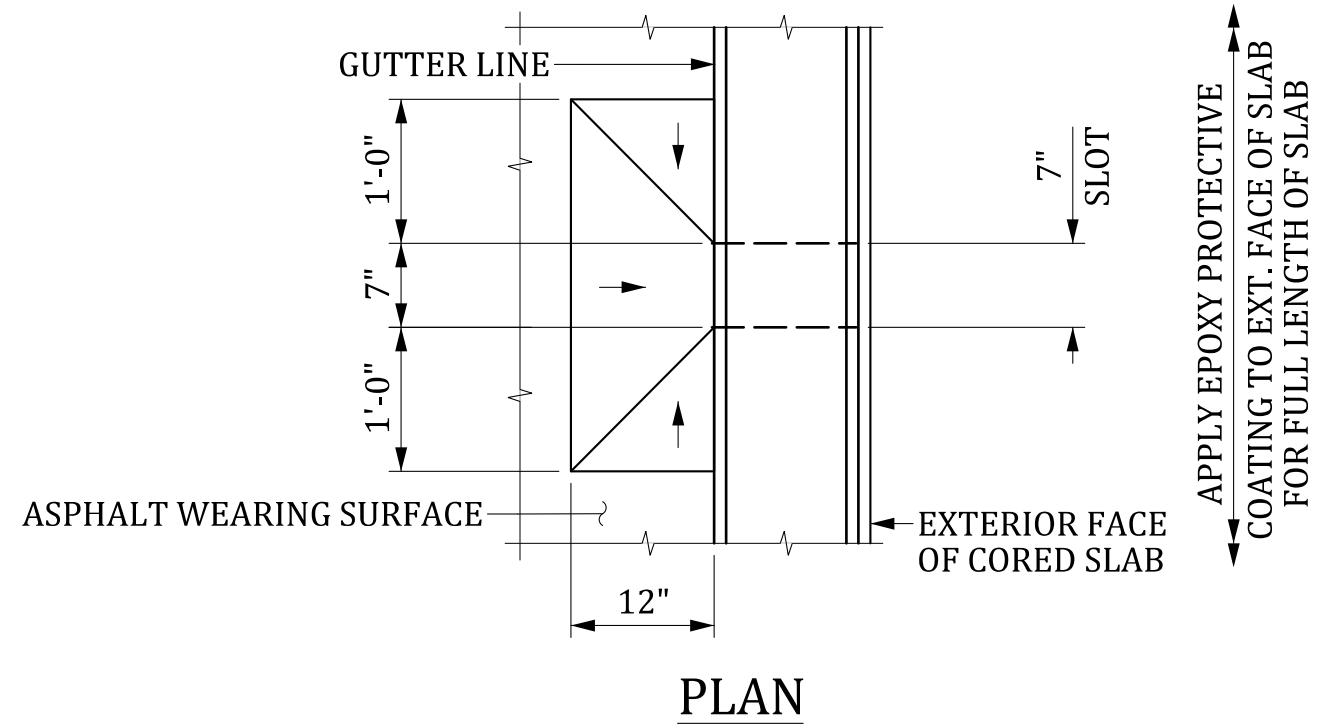
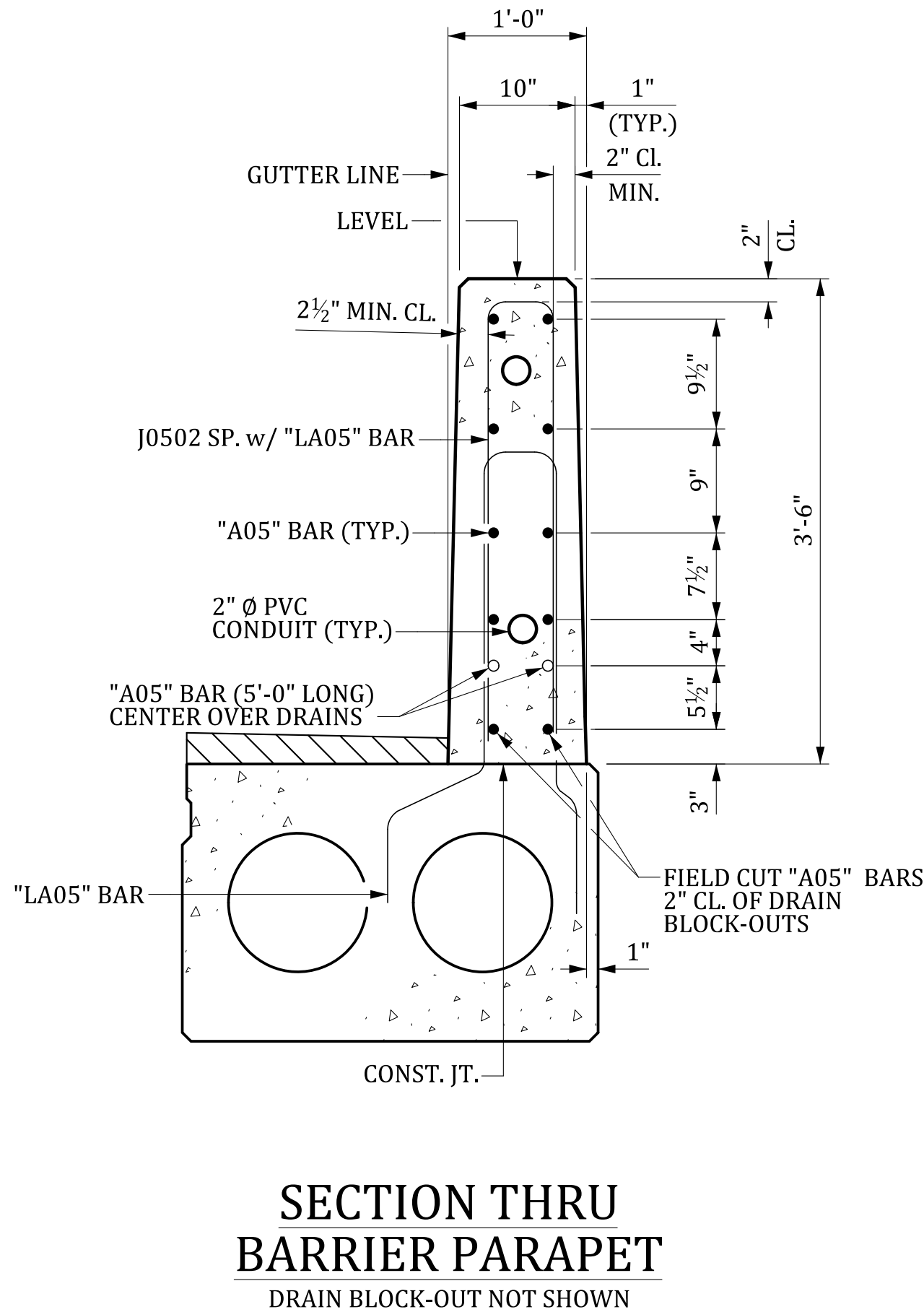
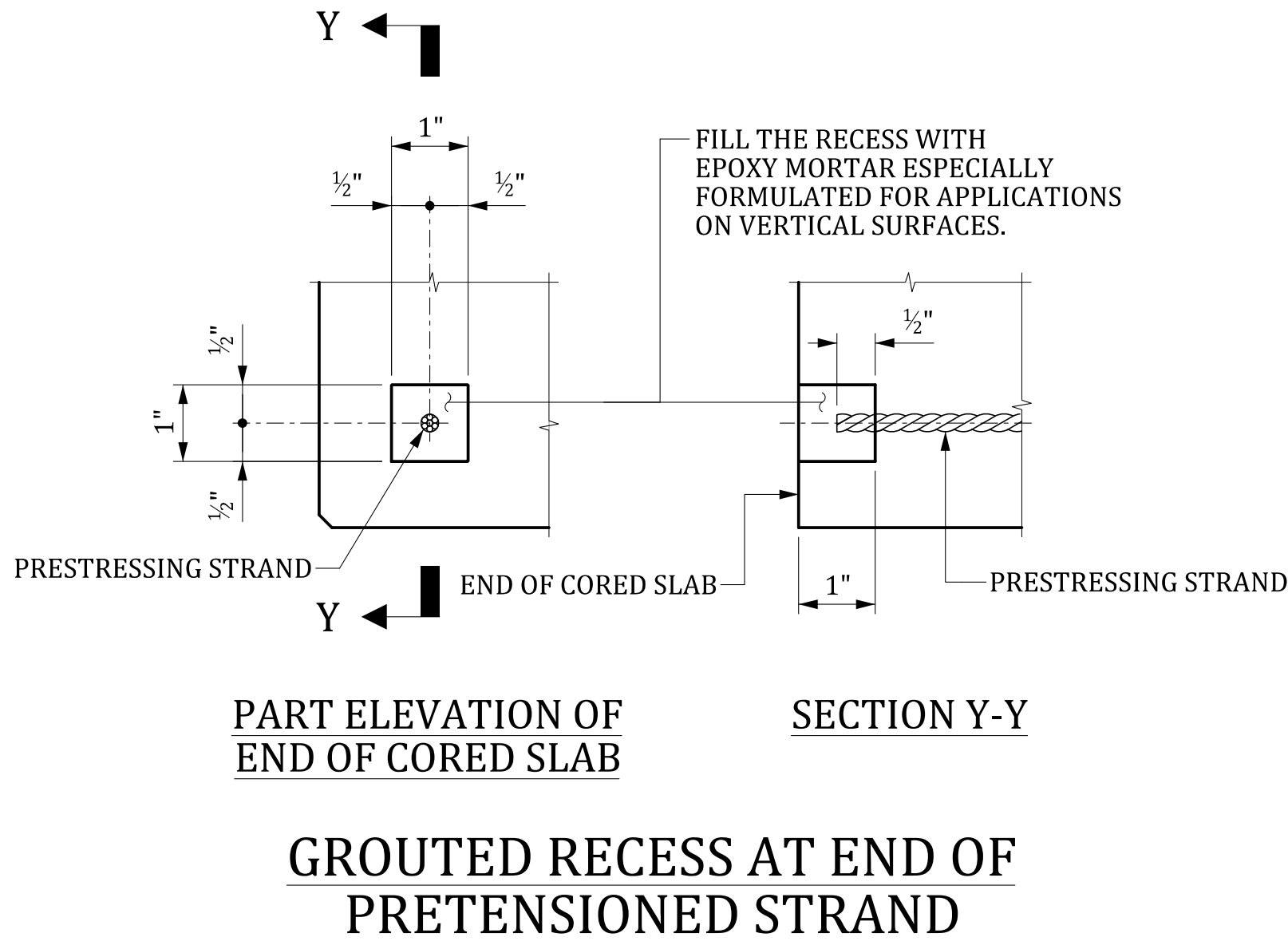
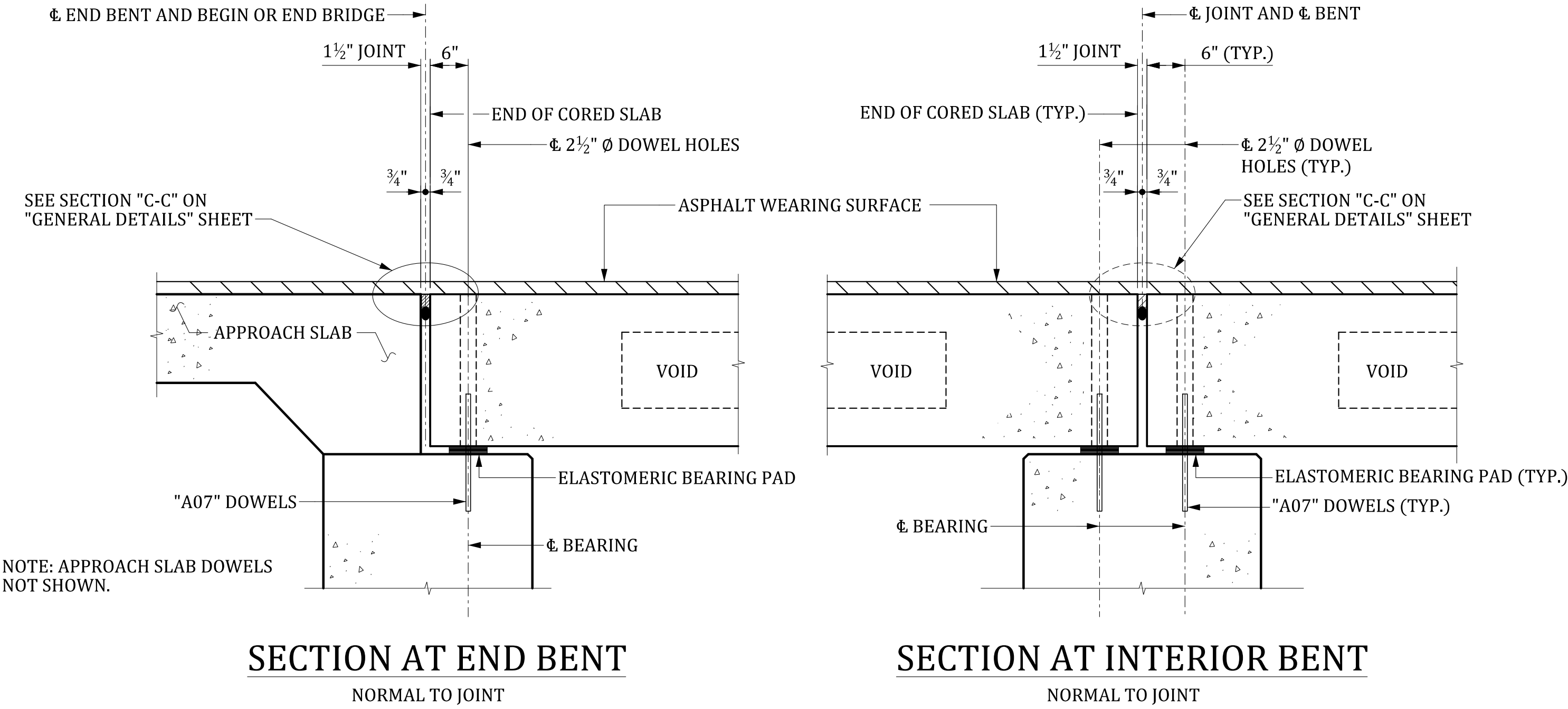
PRESTRESSED CONCRETE CORED SLAB
GENERAL DETAILS 1 OF 2
(0° SKEW)

COUNTY: ####

ROUTE: ####

DRAWING NUMBER: 704-ACS.GD01.AH00

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REVIEWED	QUAN	CTM	GCM	05-23	BY	CHK	DATE	DESCRIPTION OF REVISION	
	DR.	CTM	MWB	05-23					
	DES.	SJA	BB/DT	05-23					

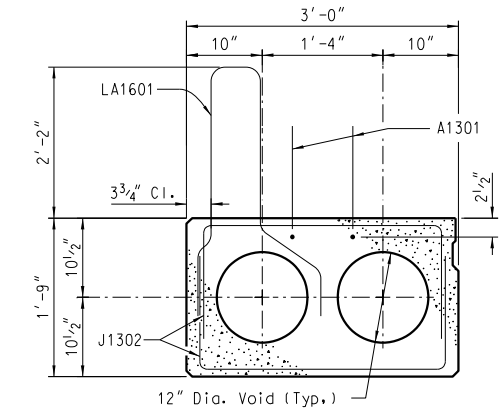
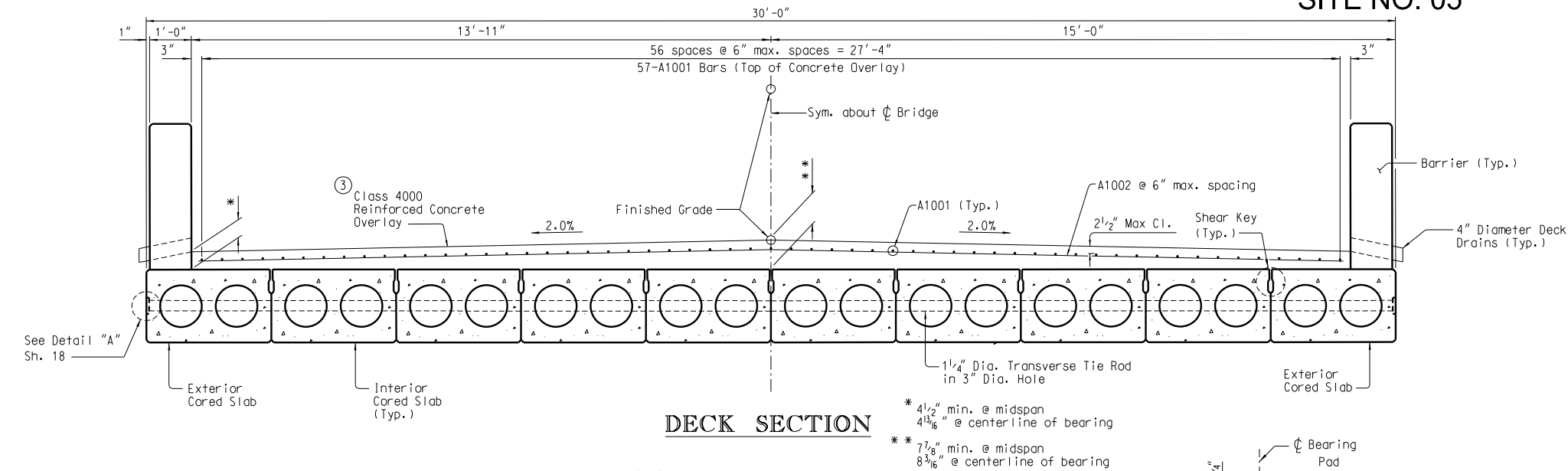


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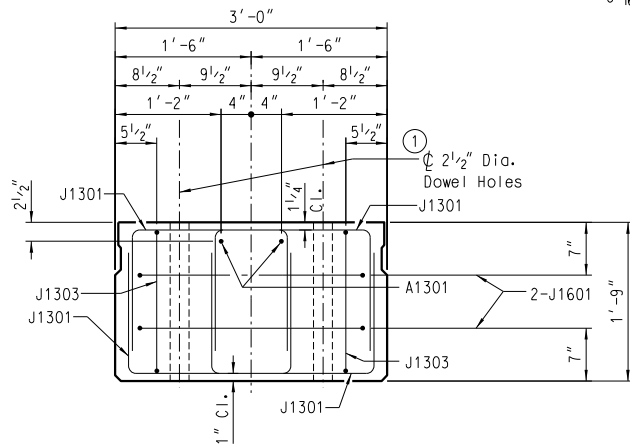
CONSULTANT NAME/LOGO	
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
PRESTRESSED CONCRETE CORED SLAB GENERAL DETAILS 2 OF 2	
COUNTY: #####	ROUTE: #####

GOLDEN ACRES RD.
SITE NO. 05

BRIDGE PLANS ID	SHEET NO.
P038301-B01	17

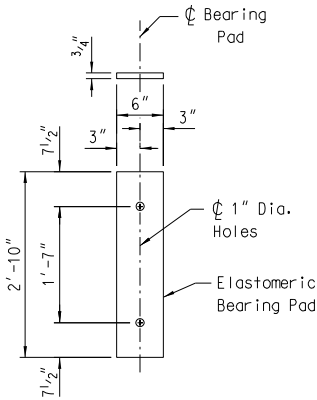


EXTERIOR SLAB SECTION ②



END ELEVATION ②

Interior Slab Section shown (Exterior Slab Section similar except Shear Key location.)



ELASTOMERIC BEARING DETAILS

(60 Durometer)

- ① Remove all pipes prior to grouting.
- ② For prestressed strand layout, see Sheet 16.

NOTES:

See Section 704 of the Standard Specifications and the Special Provisions for additional requirements and information regarding prestressed concrete cored slab units. Submit shop drawings in accordance with the Standard Specifications.

Include all costs associated with furnishing, fabricating, and placing concrete, prestressing strands, and reinforcing steel cast into the cored slab units in the unit price bid for 3'-0" x 1'-9" Cored Slab as appropriate for this project.

Use prestressing strands that conform to the latest AASHTO M 203 for grade 270 (low relaxation).

Use reinforcing steel that conforms to AASHTO M 31, Type W Grade 60.

The tensioning load in all 1/2" Dia. low relaxation strands is 31.0 kips. Do not release the strands until the compressive strength of the concrete has reached the value shown for f'ci.

When casting the cored slabs, use a positive hold-down system to prevent the voids from rising or moving sideways. Use a non-corrosive hold-down system that is designed to remain in place until the concrete attains the specified release strength. At least three weeks prior to casting the cored slab units, submit to the RCE, detailed drawings of the proposed hold-down system. Include structural details, locations, and spacing for the proposed hold-down system in the submittal.

Always maintain cored slab units in an upright position. Use lifting devices located within 2'-6" of the ends to lift or handle the cored slab units. Provide a 1" deep recess at the lifting devices. Grout the recesses prior to waterproofing the top surface of the cored slab units. Do not permit the cored slab units to be placed or stored on interior supports causing negative moments.

Tie rod assemblies include a 1/4" Dia. rod, two heavy hex nuts, two lockwashers, and two 5" x 5" x 5/8" plate washers. Thread 8" on each end of the tie rods. Provide tie rods and plate washers meeting the requirements of AASHTO M 270, Grade 36. Provide nuts meeting the requirements of ASTM A 563, Grade A. Galvanize tie rods and all hardware in accordance with ASTM A 123, ASTM A 153, or ASTM F 2329 as applicable. Tie rods are to be installed for test fit during fit up of span in casting yard. Include all costs associated with furnishing and installing tie rod assemblies in the unit price bid for 3'-0" x 1'-9" Cored Slab as appropriate for this project.

Place cored slab units so that the maximum transverse joint width at any location along the bent does not exceed 1 7/8".

Grout all shear keys, dowel holes, and recesses for transverse tie rods after tightening the transverse tie rods. After the grout has cured for a minimum of three days, and has attained the required strength, place the barrier parapet.

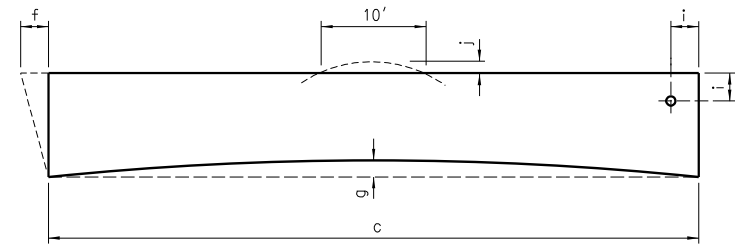
Provide deck drains made of 4" nominal diameter fiberglass pipe meeting the requirements of ASTM D 2996. Include all costs associated with furnishing and installing deck drains in the unit price bid for MASH Concrete Barrier Parapet/Railing Wall.

Include all costs associated with furnishing and installing joint, shear key, recess, and dowel hole filler materials including grout, backer rod, and cold applied elastic filler in the unit price bid for 3'-0" x 1'-9" Cored Slab as appropriate for this project.

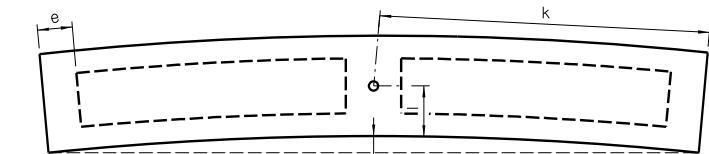
For locations of deck drains, see Sheet 8.

Example of Cored Slab with Concrete Overlay
CLRB 2020-1
Laurens County
S-34 over Millers Fork Creek

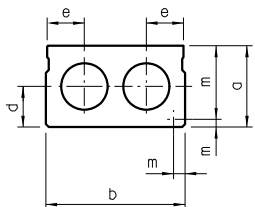
TOLERANCES



PLAN



ELEVATION



CROSS SECTION

a	Depth	+3/8" to -1/8"
b	Width	± 1/4"
c	Length (Length of adjacent cored slab units must be within ± 1/4".)	± 1/8" per 10'
d	Position of Voids: Vertical	± 3/8"
e	Position of Voids: Horizontal	± 3/8"
f	Position of Void Ends: Longitudinal	± 1"
g	Square Ends: Deviation from square (horizontal or vertical) or designated skew	± 1/4"
h	Horizontal Alignment: Deviation from a straight line parallel to the center line of member	± 3/8"
i	Camber: Differential between adjacent units	1/4" in 10', 3/4" max.
j	Camber: Differential between high and low members of the same span	3/4" max.
k	Position of Dowel Holes: Deviation from plan position	± 1/4"
l	Width: Differential of adjacent spans in the same structure	± 3/4"
m	Bearing Area: Deviation from plan surface	± 1/16"
n	Local Smoothness	1/4" in 10'
o	Horizontal Position of holes for Transverse Tie Rods	± 1/2"
p	Vertical Position of holes for Transverse Tie Rods	± 3/8"
q	Position of Strands	± 1/4"



REV.	TKB	KSH	12-21
	P038301-B01		
REV.	PCW	HL	10-20
	LA1601 Lap Len		
REV.	PCW	HL	10-20
	AASHTO M 31		
REVIEWED			
QUAN.			
DR.	PNP	SAN	5-08
DES.	KSH	DMR	11-21
	BY	CHK.	DATE

SOUTH CAROLINA	
DEPARTMENT OF TRANSPORTATION	
PRESTRESSED CONCRETE CORED SLAB DETAILS (1 of 2)	
COUNTY	ROUTE
LAURENS	S-34

Bridge Hydraulics Analysis for Alternative Technical Concept (ATC)

The analysis presented in this document covers evaluation and comparison of bridge hydraulic performance of the original SCDOT proposed design and the ATC design option under consideration for the Horry County S-31 bridge replacement over Tod Swamp.

I. INTRODUCTION

The Request for Proposal (RFP) includes a preliminary bridge hydraulic analysis for the existing bridge over Tod Swamp on S-31 in Horry County, SC in the Project Information Package (PIP). The RFP Exhibit 4b Section 2.1.7 calls for an 80-ft single span bridge centered over the existing channel. Our Team has performed an independent preliminary bridge hydraulic analysis for the S-31 bridge and proposes an Alternative Technical Concept (ATC), reducing the minimum bridge and span length to 70-ft from the required 80-ft minimum. All pertinent data and supporting documentation are provided below.

II. DESIGN CRITERIA

- Design Storm Event: 25-Year
- Overtopping: The 4% AEP (25 year event) shall be conveyed with no road overtopping and maintain the required freeboard. The 1% AEP (100 year event) shall be conveyed with no road overtopping and maintain free surface flow.
- Freeboard: Shall not be less than 2 feet above the proposed 4% AEP (25 year event). Free surface flow shall be maintained through the Bridge for frequencies up to and including the 1% AEP (100 year event) which on occasion may require a freeboard greater than the minimum 2 feet of freeboard above the design event.
- Backwater: All bridges shall be designed so that backwater for the 1% AEP flood is one foot or less when compared to the unrestricted or natural conditions and shall not create more backwater than the existing bridge.
- Low Chord: The design high-water elevation for evaluating freeboard and determining the minimum low chord elevation shall represent the highest water-surface elevation upstream of the bridge before it begins to drawdown through the bridge. The low chord of a replacement bridge shall not be below the low chord of the existing bridge. See HDB 2019-4 section 1.1.5.3 for details.
- Abutments: Provide a minimum 10 foot abutment setback from the top of the channel bank and at a point where the projection of the spill through slope will not intersect the channel not including the thickness of the riprap of abutment slope. To achieve setback criteria, a bench may be cut lower than the surveyed top-of-bank elevation, provided that the bench is cut higher than the ordinary-high-water elevation used for the environmental jurisdictional stream delineation.

III. MODEL UPDATES

The preliminary model provided in the PIP was updated using the guidance of the HEC-RAS Hydraulic Reference Manual Version 5.0 dated February 2016. Below is a list of updates that were completed by RK&K during the hydraulic design process. All models and subsequent updates were run in HEC-RAS version 6.3.3.

- Cross sections were added upstream and downstream of the bridge to model the channel characteristics more accurately. Within the project location (between HECRAS cross section 10088 and 6354) there are 13 cross sections upstream and 30 cross sections downstream of the bridge.

- Typical channel geometry was input into all cross sections based on the existing project survey.
- Manning's n values were updated to account for channel maintenance (mowing) approximately 30-ft on each side of the channel.
- Due to Tod Swamp's location to the Waccamaw river, the project was evaluated for the tidal and backwater conditions at the downstream boundary. It was determined that tidal impacts are not seen in this location however, per the Simpson Creek FIS flood profile, the Waccamaw River backwater impacts the downstream boundary condition for Tod Swamp (see FIS attached). The downstream boundary condition was updated to reflect this.
- In existing and proposed conditions, ineffective flow locations and elevations were adjusted using the ratios provided in the HEC-RAS Hydraulic Reference Manual. The ineffective elevations were set to match the low point of the roadway on the left and right respectively.
- The proposed bridge was modified to have spill through abutments set at a 2:1 slope. The sloped abutments have a 2-ft riprap bench located 2-ft below the low chord on both the left and right sides.
- The existing 1' bridge rail was added to the model.
- The proposed bridge model was edited for the updated structure depth and rail height determined from RK&K's structures department. The structure depth was revised to a total depth of 2.58' and the bridge rail height was revised to 3.5'.
- The proposed bridge length was reduced from an 80-ft single-span bridge to a 70-ft single-span bridge.
- The proposed roadway grade was added to the deck cross section.

IV. CONCLUSION AND RESULTS

The results from the HEC-RAS analysis demonstrate that a 70-ft single span bridge will meet the RFP requirements. RK&K's proposed bridge model shows a reduction in 100-year backwater from 0.95' to 0.81' from existing to proposed conditions. Table 1 shows a summary of the design criteria for the Horry County bridge along S-31.

Table 1: Summary of Results

<u>CRITERIA</u>	<u>RK&K Existing Model</u>	<u>RK&K Revised Model</u>
25-Year WSEL	19.24	19.15
100-Year WSEL	20.62	20.48
100-Year Backwater (ft)	0.95	0.81
25-Year Freeboard (ft)	3.85	3.94
500-Year Freeboard (ft)	1.64	1.94
Low Chord Elevation	23.09	23.09
Bridge Length (ft)	45	70
Span Arrangement	Single Span	Single Span

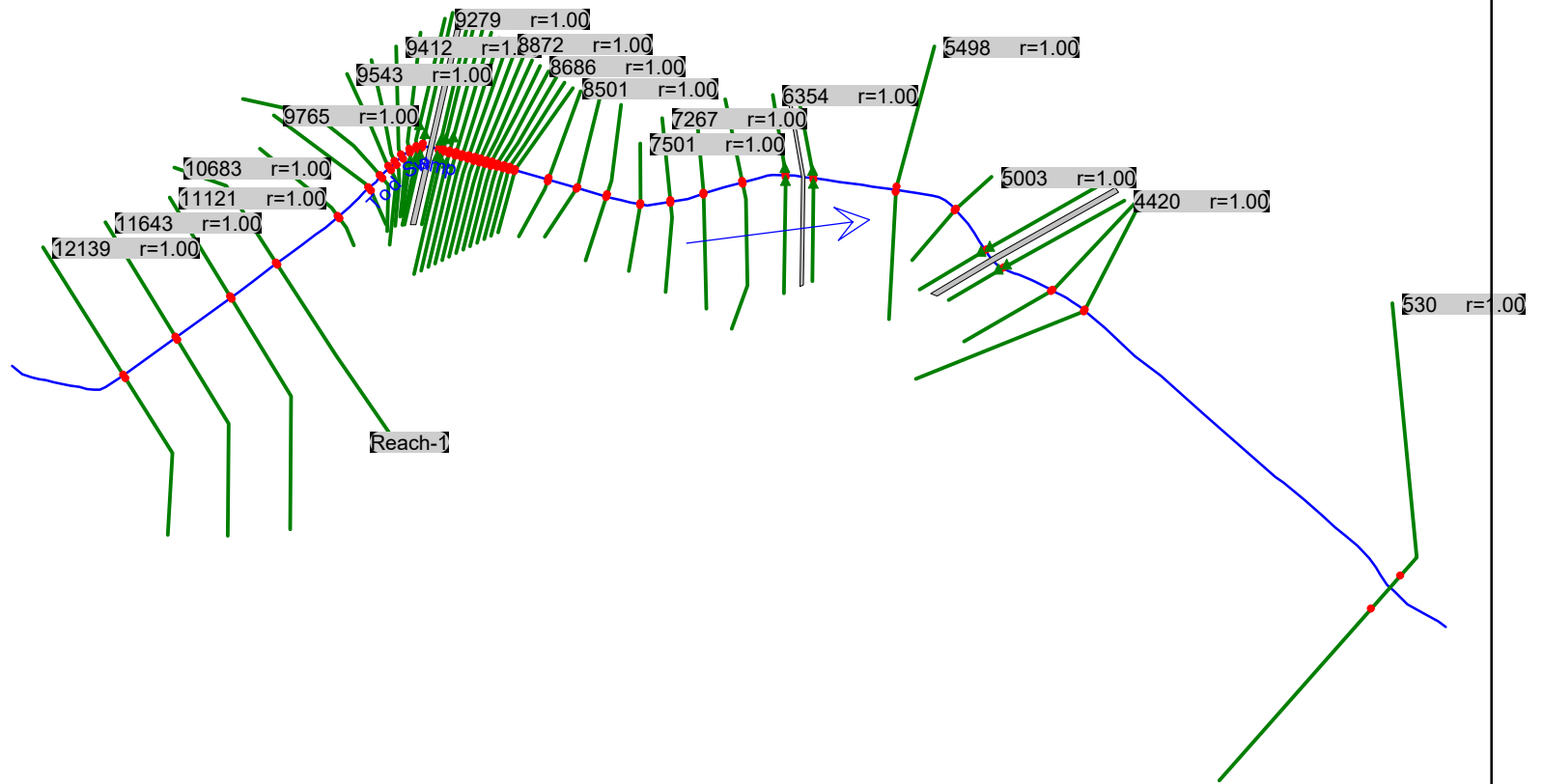
See Appendix B for bridge plan and profile showing that all setback requirements are met. Water surface elevations and freeboard are based on the approach cross section.

V. ATTACHMENTS

- Attachment A: RK&K Proposed Model HEC-RAS Outputs
- Attachment C: Sampson Creek FIS Report

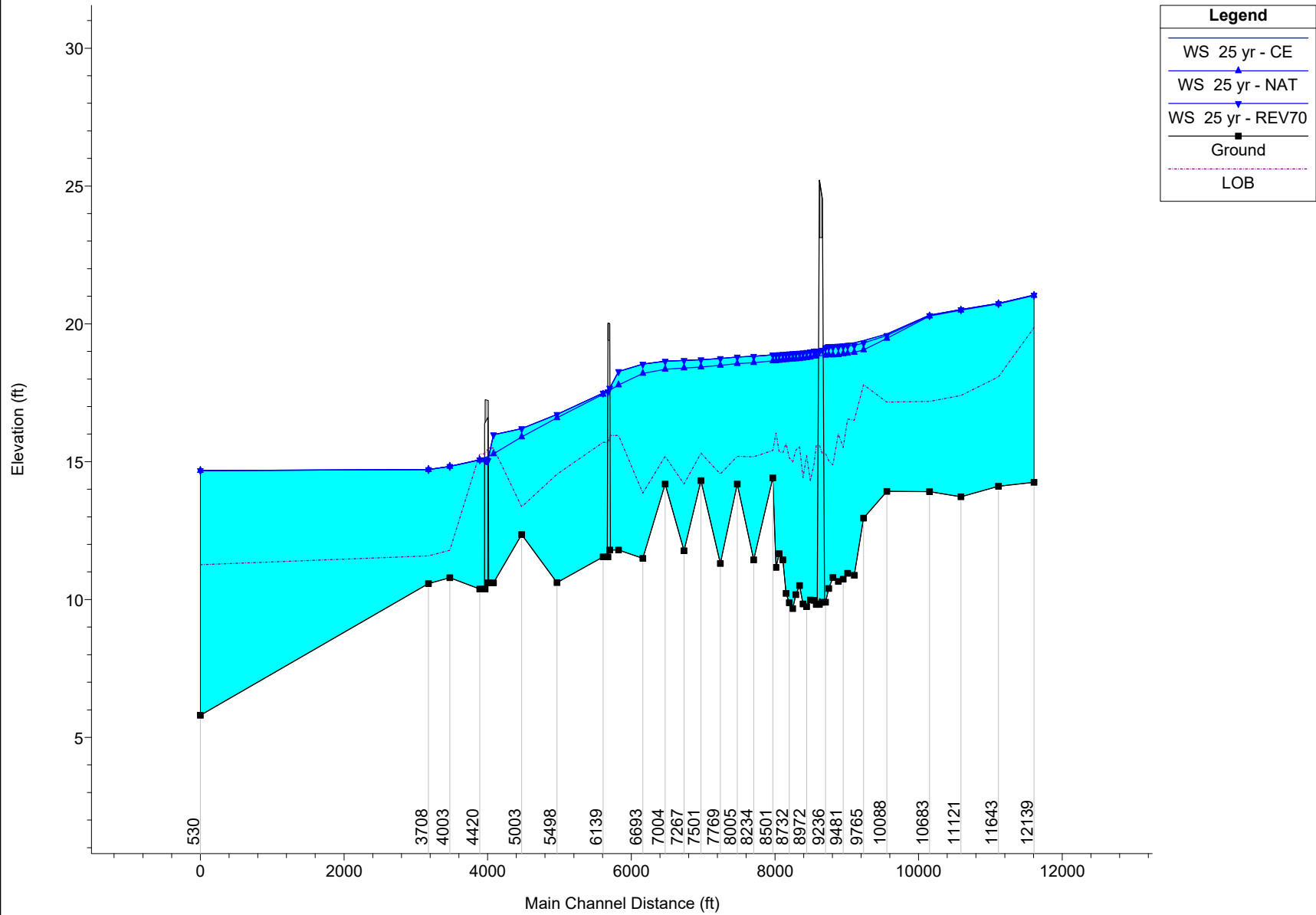
Appendix A: RK&K Proposed Model HEC-RAS Outputs

Horry County S-31 HECRAS Schematic



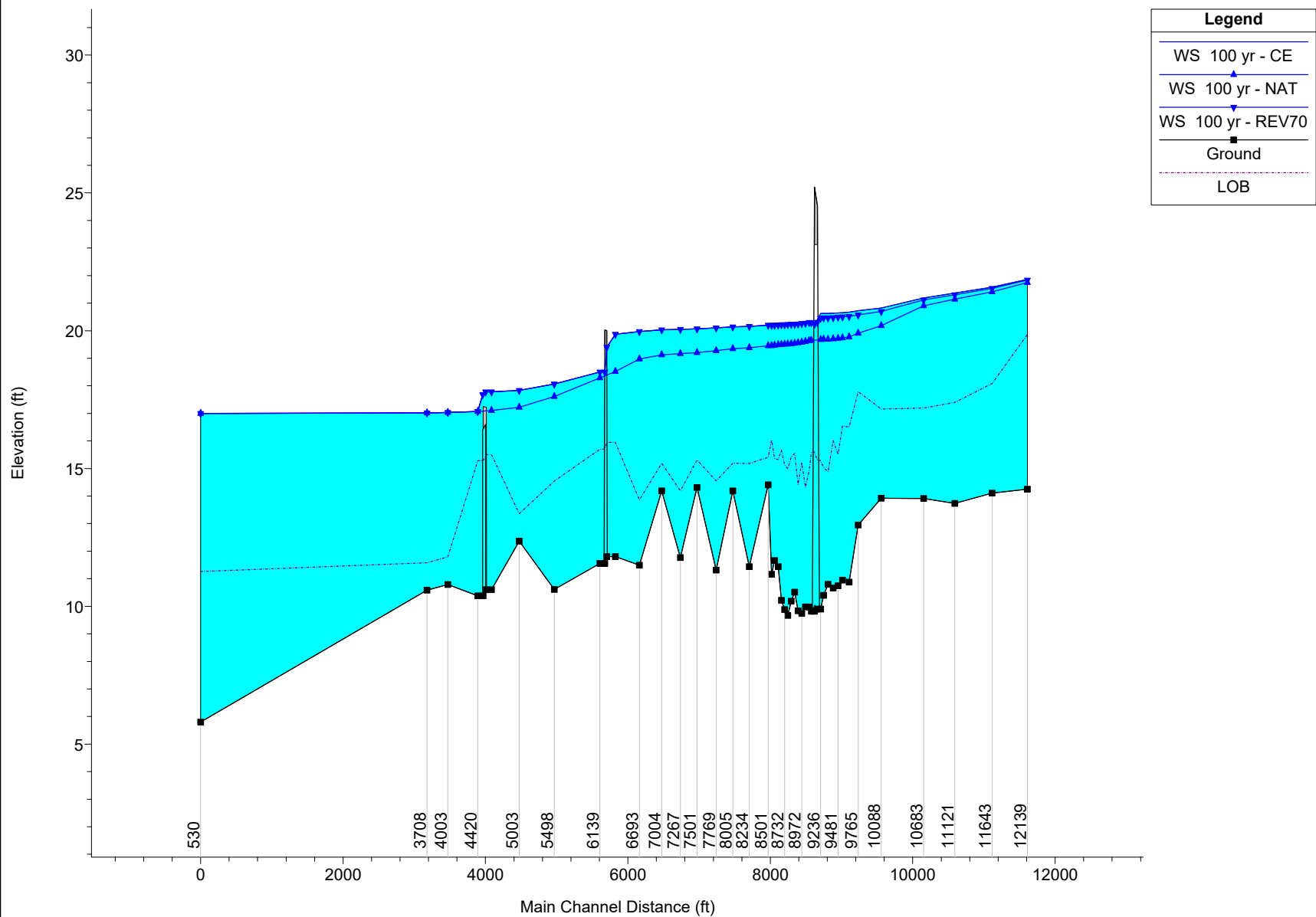
Horry County S-31 25-Year Profile

S31_HECRAS Plan: 1) CE 8/22/2024 2) NAT 8/22/2024 3) REV70 8/23/2024

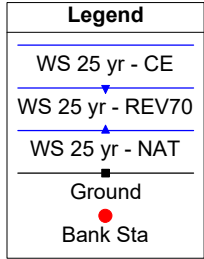


Horry County S-31 100-Year Profile

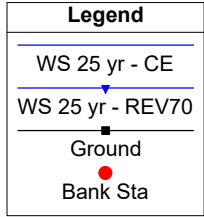
S31_HECRAS Plan: 1) CE 8/22/2024 2) NAT 8/22/2024 3) REV70 8/23/2024



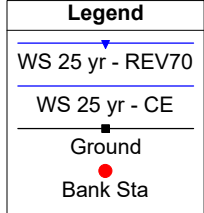
Horry County S-31 HEC-RAS 25-Year Cross Sections



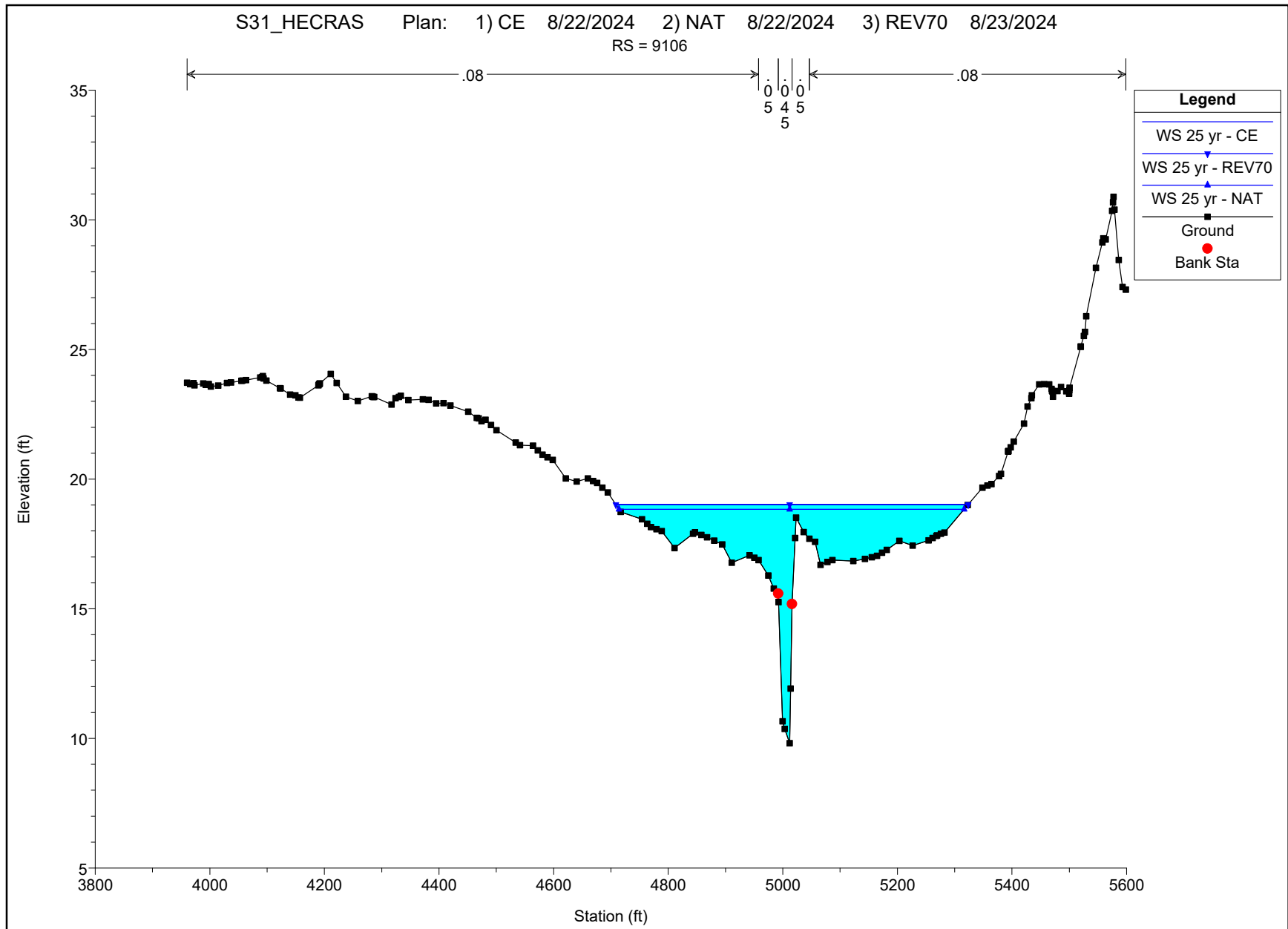
Horry County S-31 HEC-RAS 25-Year Cross Sections
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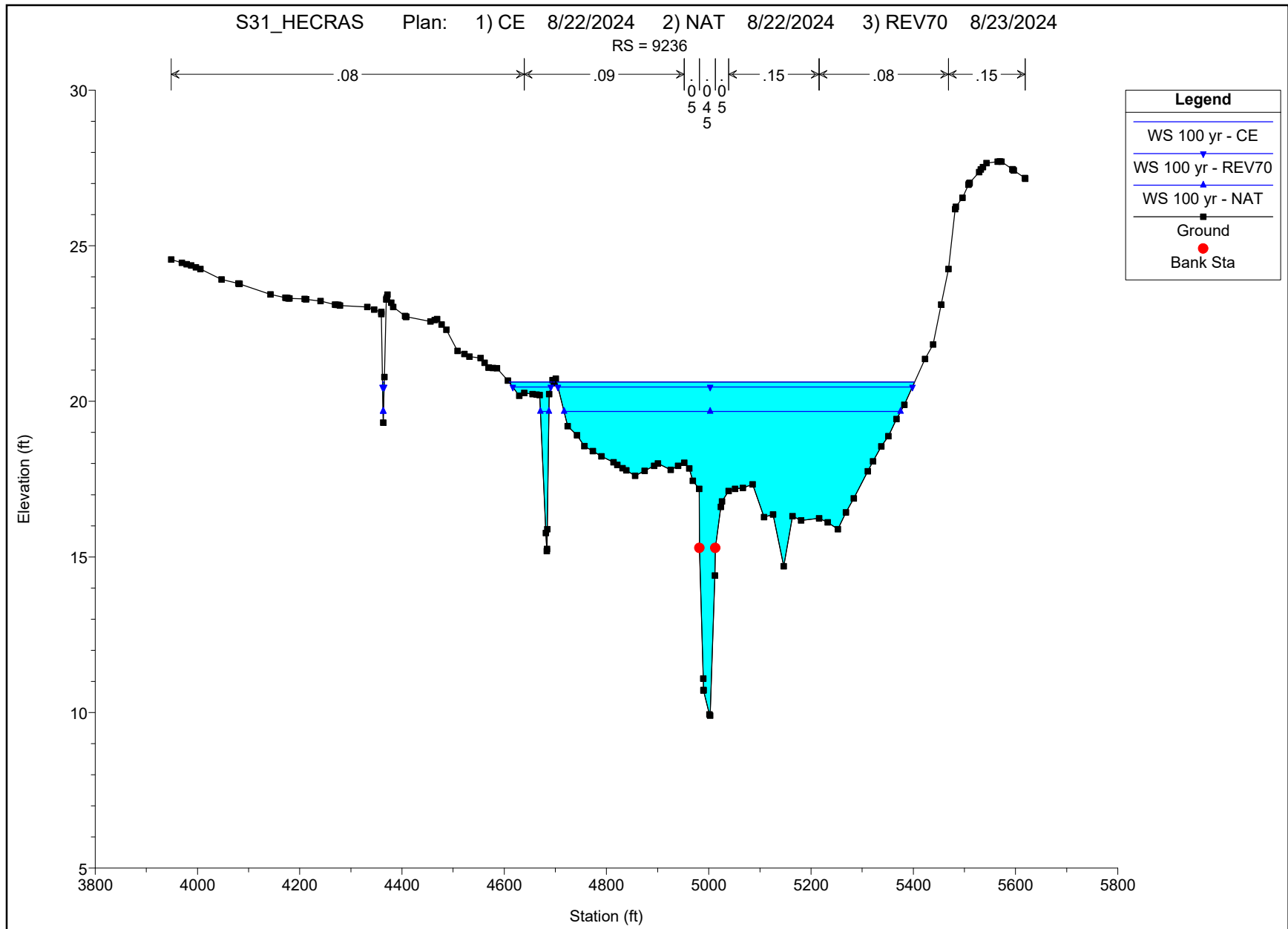
Horry County S-31 HEC-RAS 25-Year Cross Sections
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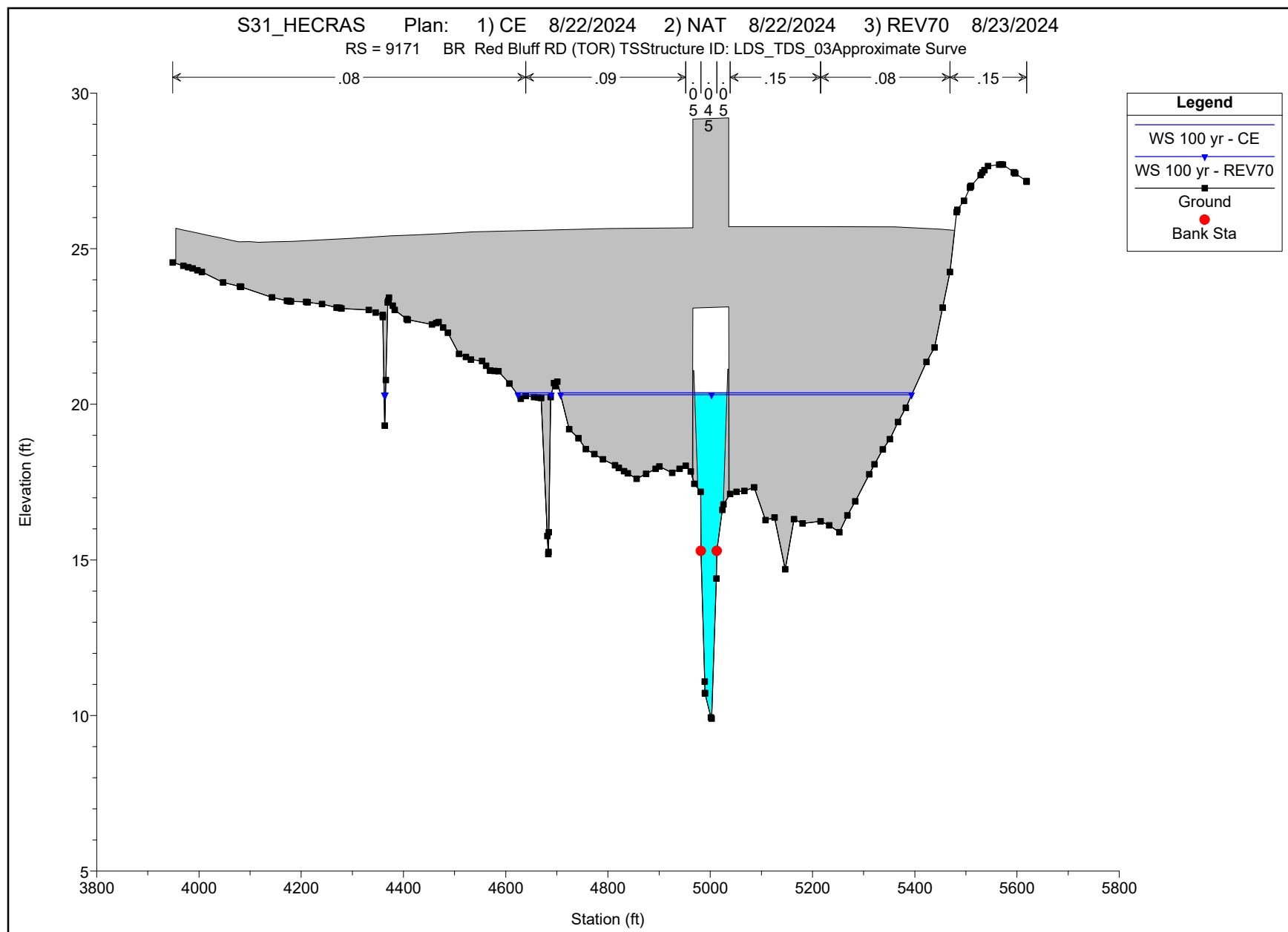
Horry County S-31 HEC-RAS 25-Year Cross Sections



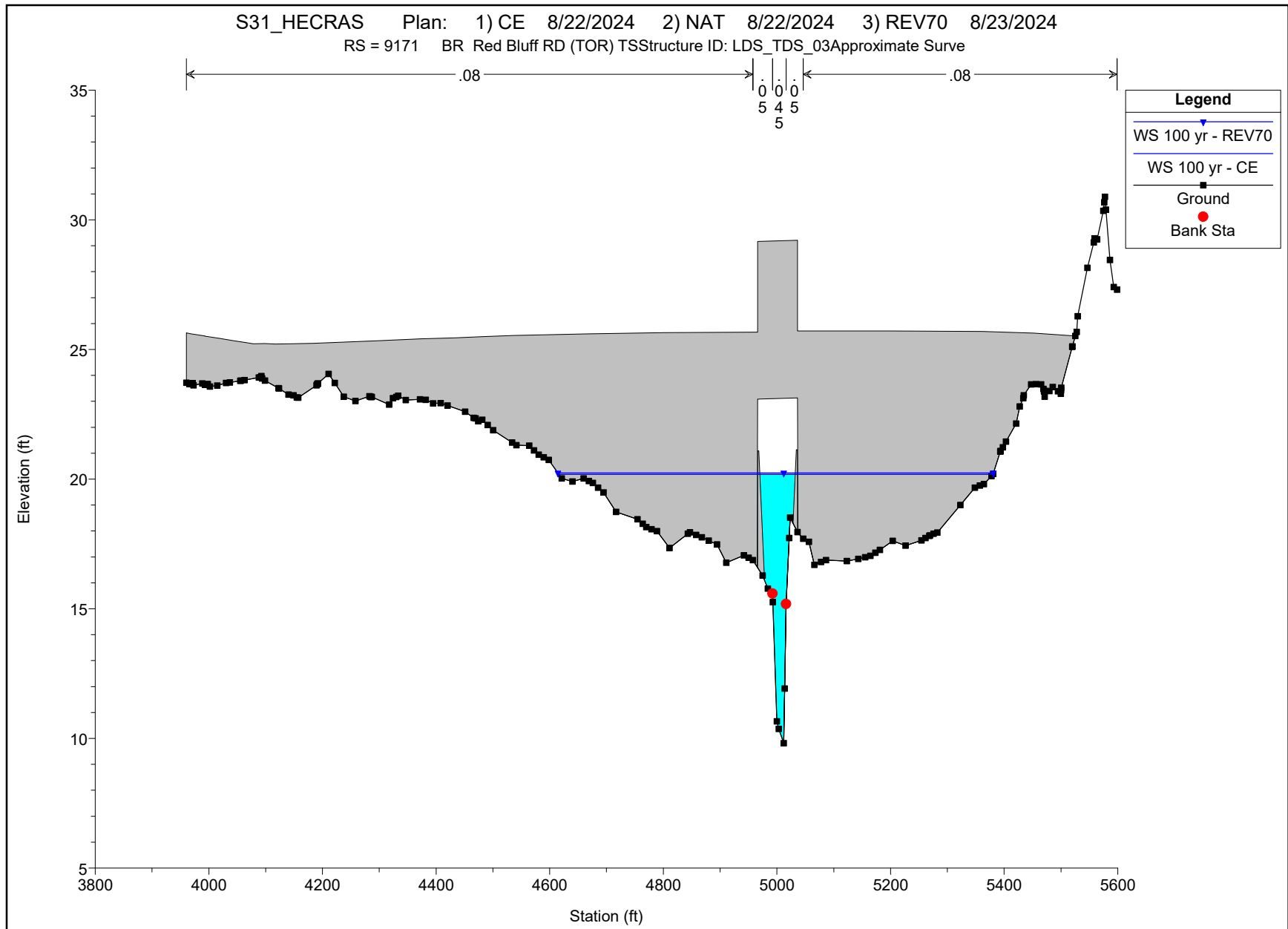
Horry County S-31 100-Year HECRAS Cross Sections



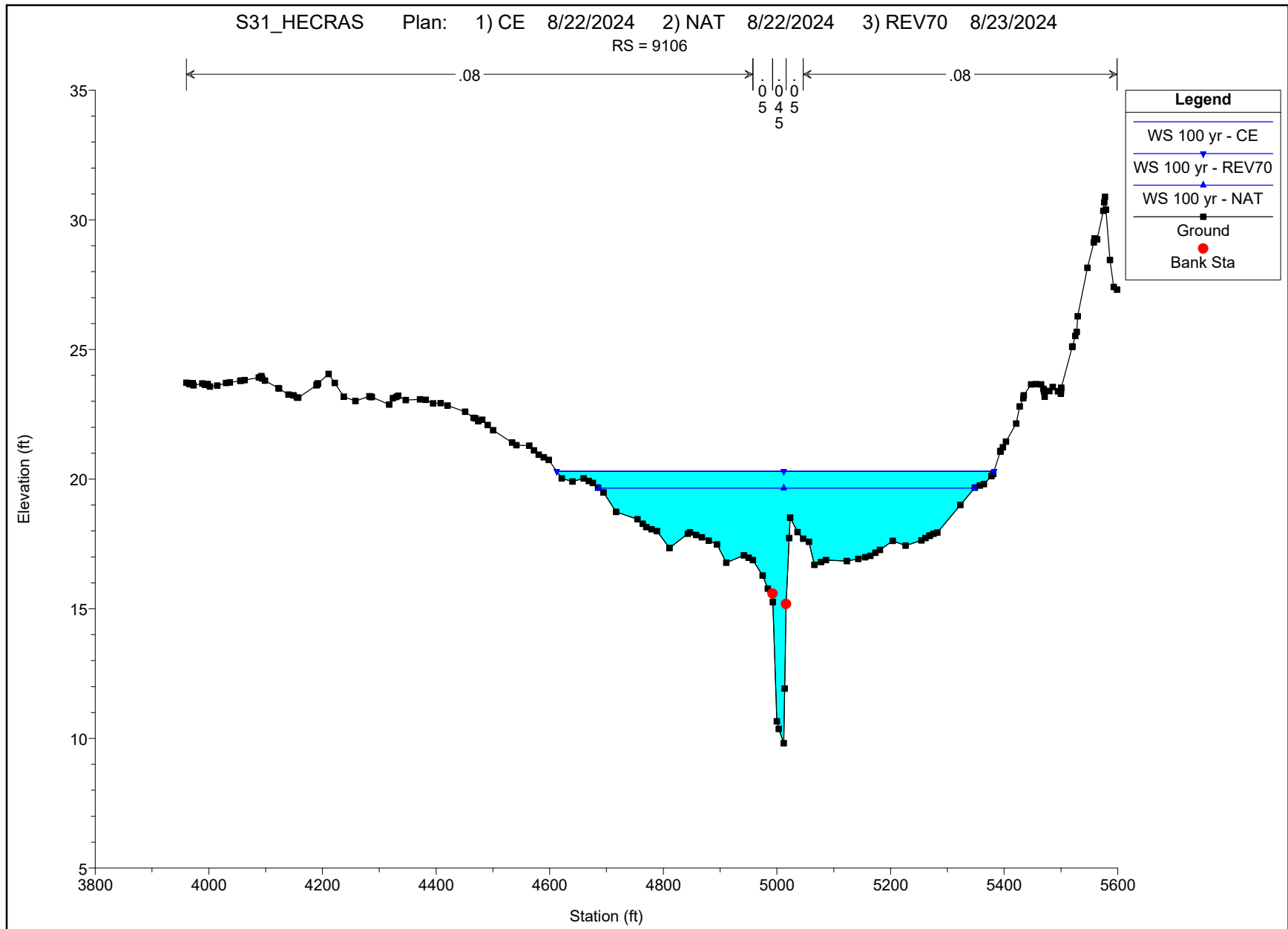
Horry County S-31 100-Year HECRAS Cross Sections



Horry County S-31 100-Year HECRAS Cross Sections



Horry County S-31 100-Year HECRAS Cross Sections



Horry County S-31 HEC-RAS 25-Year Output Table

HEC-RAS River: Tod Swamp Reach: Reach-1 Profile: 25 yr

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	12139	25 yr	CE	589.00	14.25	21.05	18.29	21.20	0.001559	3.43	412.08	339.08	0.28
Reach-1	12139	25 yr	NAT	589.00	14.25	21.03	18.29	21.19	0.001580	3.45	407.97	336.17	0.28
Reach-1	12139	25 yr	REV70	589.00	14.25	21.04		21.19	0.001568	3.44	410.36	337.87	0.28
Reach-1	11643	25 yr	CE	589.00	14.11	20.75	17.83	20.78	0.000459	2.07	992.51	542.43	0.16
Reach-1	11643	25 yr	NAT	589.00	14.11	20.73	17.83	20.76	0.000470	2.09	981.98	541.08	0.16
Reach-1	11643	25 yr	REV70	589.00	14.11	20.74		20.77	0.000463	2.08	988.14	541.87	0.16
Reach-1	11121	25 yr	CE	589.00	13.73	20.52	18.38	20.55	0.000421	1.98	933.90	481.68	0.15
Reach-1	11121	25 yr	NAT	589.00	13.73	20.50	18.38	20.52	0.000434	2.00	921.49	477.86	0.15
Reach-1	11121	25 yr	REV70	589.00	13.73	20.51		20.54	0.000426	1.99	928.75	480.10	0.15
Reach-1	10683	25 yr	CE	589.00	13.91	20.31	18.86	20.34	0.000525	2.15	1087.28	677.55	0.17
Reach-1	10683	25 yr	NAT	589.00	13.91	20.28	18.86	20.31	0.000556	2.20	1063.02	676.52	0.17
Reach-1	10683	25 yr	REV70	589.00	13.91	20.30		20.33	0.000538	2.17	1077.30	677.10	0.17
Reach-1	10088	25 yr	CE	589.00	13.92	19.63	17.98	19.80	0.001904	3.83	487.62	549.78	0.32
Reach-1	10088	25 yr	NAT	589.00	13.92	19.48	17.98	19.69	0.002437	4.23	404.51	500.65	0.36
Reach-1	10088	25 yr	REV70	589.00	13.92	19.58		19.76	0.002055	3.95	459.17	532.06	0.33
Reach-1	9765	25 yr	CE	589.00	12.95	19.39	16.85	19.43	0.000623	2.20	1042.20	837.06	0.18
Reach-1	9765	25 yr	NAT	589.00	12.95	19.06	16.85	19.14	0.001106	2.79	767.36	803.45	0.24
Reach-1	9765	25 yr	REV70	589.00	12.95	19.30		19.35	0.000725	2.34	966.09	828.84	0.20
Reach-1	9636	25 yr	CE	589.00	10.88	19.31	15.00	19.37	0.000423	2.17	725.46	488.94	0.15
Reach-1	9636	25 yr	NAT	589.00	10.88	18.96	15.00	19.03	0.000578	2.43	574.94	383.52	0.18
Reach-1	9636	25 yr	REV70	589.00	10.88	19.22		19.28	0.000458	2.23	680.64	451.30	0.16
Reach-1	9543	25 yr	CE	589.00	10.95	19.29	14.40	19.33	0.000272	1.78	961.11	674.71	0.13
Reach-1	9543	25 yr	NAT	589.00	10.95	18.93	14.40	18.98	0.000380	2.02	734.86	577.11	0.15
Reach-1	9543	25 yr	REV70	589.00	10.95	19.20		19.24	0.000298	1.84	896.44	651.23	0.13
Reach-1	9481	25 yr	CE	589.00	10.74	19.28	14.57	19.31	0.000254	1.80	980.40	696.60	0.12
Reach-1	9481	25 yr	NAT	589.00	10.74	18.91	14.57	18.96	0.000365	2.08	733.91	628.32	0.15
Reach-1	9481	25 yr	REV70	589.00	10.74	19.18		19.22	0.000280	1.87	911.94	682.10	0.13
Reach-1	9412	25 yr	CE	589.00	10.66	19.26	14.93	19.29	0.000274	1.76	949.75	670.68	0.13
Reach-1	9412	25 yr	NAT	589.00	10.66	18.88	14.93	18.93	0.000451	2.17	695.98	642.61	0.16
Reach-1	9412	25 yr	REV70	589.00	10.66	19.16		19.20	0.000311	1.86	881.46	667.01	0.13
Reach-1	9339	25 yr	CE	589.00	10.80	19.25	14.70	19.27	0.000183	1.55	1087.32	642.86	0.11
Reach-1	9339	25 yr	NAT	589.00	10.80	18.87	14.70	18.90	0.000280	1.85	844.18	620.95	0.13
Reach-1	9339	25 yr	REV70	589.00	10.80	19.15		19.17	0.000205	1.63	1021.36	637.15	0.11
Reach-1	9279	25 yr	CE	589.00	10.40	19.25	14.54	19.26	0.000067	0.96	1750.08	717.45	0.06
Reach-1	9279	25 yr	NAT	589.00	10.40	18.88	14.52	18.88	0.000099	1.13	1482.88	688.68	0.08
Reach-1	9279	25 yr	REV70	589.00	10.40	19.15		19.16	0.000074	1.00	1676.54	714.10	0.07
Reach-1	9236	25 yr	CE	589.00	9.90	19.24	13.65	19.25	0.000102	1.21	1440.74	653.36	0.08
Reach-1	9236	25 yr	NAT	589.00	9.91	18.86	13.65	18.88	0.000151	1.43	1197.63	620.53	0.09
Reach-1	9236	25 yr	REV70	589.00	9.90	19.14	13.65	19.15	0.000113	1.27	1373.07	645.64	0.08
Reach-1	9171		Bridge										
Reach-1	9106	25 yr	CE	589.00	9.82	19.02	13.96	19.04	0.000168	1.48	1070.82	615.14	0.10
Reach-1	9106	25 yr	NAT	589.00	9.82	18.83	13.96	18.85	0.000215	1.64	956.13	602.33	0.11
Reach-1	9106	25 yr	REV70	589.00	9.82	19.02		19.04	0.000168	1.48	1070.82	615.14	0.10
Reach-1	9073	25 yr	CE	589.00	9.97	19.01	15.13	19.03	0.000211	1.56	1340.84	654.65	0.11
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Reach-1	9073	25 yr	REV70	589.00	9.97	19.01		19.03	0.000211	1.56	1340.84	654.65	0.11
Reach-1	9022	25 yr	CE	589.00	9.98	18.98	14.79	19.01	0.000299	1.99	913.65	560.73	0.13
Reach-1	9022	25 yr	NAT	589.00	9.98	18.79	14.79	18.83	0.000364	2.16	809.99	524.55	0.15
Reach-1	9022	25 yr	REV70	589.00	9.98	18.98		19.01	0.000299	1.99	913.65	560.73	0.13
Reach-1	8972	25 yr	CE	589.00	9.74	18.96	14.16	19.00	0.000266	1.89	936.44	560.34	0.13
Reach-1	8972	25 yr	NAT	589.00	9.74	18.77	14.16	18.81	0.000327	2.05	830.27	533.81	0.14
Reach-1	8972	25 yr	REV70	589.00	9.74	18.96		19.00	0.000266	1.89	936.44	560.34	0.13
Reach-1	8921	25 yr	CE	589.00	9.84	18.95	13.99	18.98	0.000254	1.90	948.82	515.39	0.12
Reach-1	8921	25 yr	NAT	589.00	9.84	18.75	13.99	18.79	0.000310	2.06	848.71	495.41	0.14
Reach-1	8921	25 yr	REV70	589.00	9.84	18.95		18.98	0.000254	1.90	948.82	515.39	0.12
Reach-1	8872	25 yr	CE	589.00	10.51	18.94	14.14	18.97	0.000264	1.87	1068.07	584.73	0.12
Reach-1	8872	25 yr	NAT	589.00	10.51	18.74	14.14	18.78	0.000318	2.02	956.81	531.90	0.14
Reach-1	8872	25 yr	REV70	589.00	10.51	18.94		18.97	0.000264	1.87	1068.07	584.73	0.12
Reach-1	8823	25 yr	CE	589.00	10.18	18.93	14.15	18.96	0.000233	1.72	1112.74	584.51	0.12
Reach-1	8823	25 yr	NAT	589.00	10.18	18.73	14.15	18.76	0.000285	1.87	998.40	546.88	0.13
Reach-1	8823	25 yr	REV70	589.00	10.18	18.93		18.96	0.000233	1.72	1112.74	584.51	0.12
Reach-1	8777	25 yr	CE	589.00	9.67	18.92	14.00	18.95	0.000196	1.61	1238.40	627.17	0.11

Horry County S-31 HEC-RAS 25-Year Output Table

HEC-RAS River: Tod Swamp Reach: Reach-1 Profile: 25 yr (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	8777	25 yr	NAT	589.00	9.67	18.72	14.00	18.75	0.000238	1.74	1116.93	585.08	0.12
Reach-1	8777	25 yr	REV70	589.00	9.67	18.92		18.95	0.000196	1.61	1238.40	627.17	0.11
Reach-1	8732	25 yr	CE	589.00	9.88	18.91	14.40	18.94	0.000218	1.64	1286.01	667.59	0.11
Reach-1	8732	25 yr	NAT	589.00	9.88	18.71	14.40	18.74	0.000262	1.76	1154.52	615.39	0.12
Reach-1	8732	25 yr	REV70	589.00	9.88	18.91		18.94	0.000218	1.64	1286.01	667.59	0.11
Reach-1	8686	25 yr	CE	589.00	10.22	18.91	14.79	18.93	0.000214	1.55	1370.55	715.00	0.11
Reach-1	8686	25 yr	NAT	589.00	10.22	18.70	14.79	18.72	0.000273	1.71	1225.22	688.89	0.12
Reach-1	8686	25 yr	REV70	589.00	10.22	18.91		18.93	0.000214	1.55	1370.55	715.00	0.11
Reach-1	8640	25 yr	CE	589.00	11.44	18.90	15.57	18.91	0.000235	1.60	1401.53	712.87	0.12
Reach-1	8640	25 yr	NAT	589.00	11.44	18.69	15.57	18.71	0.000302	1.77	1262.67	632.76	0.13
Reach-1	8640	25 yr	REV70	589.00	11.44	18.90		18.91	0.000235	1.60	1401.53	712.87	0.12
Reach-1	8591	25 yr	CE	589.00	11.66	18.88	15.51	18.90	0.000254	1.66	1427.37	790.34	0.12
Reach-1	8591	25 yr	NAT	589.00	11.66	18.67	15.51	18.69	0.000324	1.83	1269.94	690.07	0.13
Reach-1	8591	25 yr	REV70	589.00	11.66	18.88		18.90	0.000254	1.66	1427.37	790.34	0.12
Reach-1	8547	25 yr	CE	589.00	11.16	18.87	16.64	18.89	0.000269	1.58	1465.08	719.09	0.12
Reach-1	8547	25 yr	NAT	589.00	11.16	18.66	16.64	18.68	0.000358	1.77	1310.56	703.41	0.14
Reach-1	8547	25 yr	REV70	589.00	11.16	18.87		18.89	0.000269	1.58	1465.08	719.09	0.12
Reach-1	8501	25 yr	CE	589.00	14.41	18.87	16.40	18.88	0.000121	0.93	1627.69	704.78	0.08
Reach-1	8501	25 yr	NAT	589.00	14.41	18.66	16.40	18.66	0.000158	1.02	1475.65	696.69	0.09
Reach-1	8501	25 yr	REV70	589.00	14.41	18.87		18.88	0.000121	0.93	1627.69	704.78	0.08
Reach-1	8234	25 yr	CE	589.00	11.44	18.82	15.20	18.84	0.000197	1.50	1354.98	564.67	0.11
Reach-1	8234	25 yr	NAT	589.00	11.44	18.59	15.20	18.61	0.000256	1.66	1224.17	556.60	0.12
Reach-1	8234	25 yr	REV70	589.00	11.44	18.82		18.84	0.000197	1.50	1354.98	564.67	0.11
Reach-1	8005	25 yr	CE	589.00	14.19	18.79	16.19	18.80	0.000125	0.96	1327.65	494.01	0.08
Reach-1	8005	25 yr	NAT	589.00	14.19	18.55	16.19	18.56	0.000159	1.05	1212.62	469.52	0.09
Reach-1	8005	25 yr	REV70	589.00	14.19	18.79		18.80	0.000125	0.96	1327.65	494.01	0.08
Reach-1	7769	25 yr	CE	589.00	11.31	18.74	16.24	18.76	0.000216	1.54	1161.99	440.43	0.11
Reach-1	7769	25 yr	NAT	589.00	11.31	18.49	16.24	18.51	0.000279	1.69	1051.25	429.22	0.13
Reach-1	7769	25 yr	REV70	589.00	11.31	18.74		18.76	0.000216	1.54	1161.99	440.43	0.11
Reach-1	7501	25 yr	CE	589.00	14.31	18.70	16.28	18.70	0.000167	1.08	1782.69	665.93	0.09
Reach-1	7501	25 yr	NAT	589.00	14.31	18.43	16.28	18.44	0.000228	1.21	1604.56	654.76	0.11
Reach-1	7501	25 yr	REV70	589.00	14.31	18.70		18.70	0.000167	1.08	1782.69	665.93	0.09
Reach-1	7267	25 yr	CE	589.00	11.77	18.68	16.08	18.68	0.000081	0.93	2424.76	892.67	0.07
Reach-1	7267	25 yr	NAT	589.00	11.77	18.40	16.08	18.40	0.000110	1.05	2176.60	880.10	0.08
Reach-1	7267	25 yr	REV70	589.00	11.77	18.68		18.68	0.000081	0.93	2424.76	892.67	0.07
Reach-1	7004	25 yr	CE	589.00	14.19	18.65	16.22	18.65	0.000168	1.09	1976.15	982.92	0.09
Reach-1	7004	25 yr	NAT	589.00	14.19	18.35	16.22	18.36	0.000249	1.27	1699.21	923.24	0.11
Reach-1	7004	25 yr	REV70	589.00	14.19	18.65		18.65	0.000168	1.09	1976.15	982.92	0.09
Reach-1	6693	25 yr	CE	589.00	11.49	18.54	15.32	18.57	0.000355	2.04	940.87	586.01	0.15
Reach-1	6693	25 yr	NAT	589.00	11.49	18.20	15.32	18.25	0.000526	2.39	750.54	521.57	0.17
Reach-1	6693	25 yr	REV70	589.00	11.49	18.54		18.57	0.000355	2.04	940.87	586.01	0.15
Reach-1	6354	25 yr	CE	589.00	11.80	18.27	15.47	18.37	0.000969	2.93	466.97	339.99	0.23
Reach-1	6354	25 yr	NAT	589.00	11.80	17.78	15.47	17.94	0.001677	3.61	330.01	232.02	0.29
Reach-1	6354	25 yr	REV70	589.00	11.80	18.27	15.49	18.37	0.000969	2.93	466.97	339.99	0.23
Reach-1	6218			Bridge									
Reach-1	6139	25 yr	CE	589.00	11.55	17.49	15.23	17.62	0.001496	3.39	402.45	421.51	0.28
Reach-1	6139	25 yr	NAT	589.00	11.55	17.44	15.23	17.58	0.001591	3.47	385.49	412.74	0.29
Reach-1	6139	25 yr	REV70	589.00	11.55	17.49		17.62	0.001496	3.39	402.45	421.51	0.28
Reach-1	5498	25 yr	CE	589.00	10.61	16.71	13.93	16.82	0.001025	2.79	395.36	354.95	0.23
Reach-1	5498	25 yr	NAT	589.00	10.61	16.59	13.93	16.70	0.001176	2.94	352.37	323.78	0.25
Reach-1	5498	25 yr	REV70	589.00	10.61	16.71		16.82	0.001025	2.79	395.36	354.95	0.23
Reach-1	5003	25 yr	CE	589.00	12.36	16.20	14.50	16.24	0.001249	2.70	645.05	397.72	0.24
Reach-1	5003	25 yr	NAT	589.00	12.36	15.90	14.50	15.96	0.001924	3.17	528.18	354.26	0.30
Reach-1	5003	25 yr	REV70	589.00	12.36	16.20		16.24	0.001249	2.70	645.05	397.72	0.24
Reach-1	4613	25 yr	CE	589.00	10.60	15.98	14.11	15.99	0.000356	1.58	1670.34	1122.94	0.13
Reach-1	4613	25 yr	NAT	589.00	10.60	15.28	14.11	15.34	0.001309	2.74	935.02	949.19	0.24
Reach-1	4613	25 yr	REV70	589.00	10.60	15.98	14.10	15.99	0.000356	1.58	1670.34	1122.94	0.13
Reach-1	4511			Culvert									
Reach-1	4420	25 yr	CE	589.00	10.38	15.07	13.50	15.10	0.001115	2.28	1068.17	924.08	0.20
Reach-1	4420	25 yr	NAT	589.00	10.38	15.06	13.50	15.10	0.001127	2.29	1063.32	923.83	0.20
Reach-1	4420	25 yr	REV70	589.00	10.38	15.07		15.10	0.001115	2.28	1068.17	924.08	0.20

Horry County S-31 HEC-RAS 25-Year Output Table

HEC-RAS River: Tod Swamp Reach: Reach-1 Profile: 25 yr (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	4003	25 yr	CE	589.00	10.79	14.83	13.35	14.83	0.000392	1.41	1478.98	898.43	0.12
Reach-1	4003	25 yr	NAT	589.00	10.79	14.83	13.35	14.83	0.000392	1.41	1478.98	898.43	0.12
Reach-1	4003	25 yr	REV70	589.00	10.79	14.83		14.83	0.000392	1.41	1478.98	898.43	0.12
Reach-1	3708	25 yr	CE	589.00	10.58	14.71	13.06	14.72	0.000379	1.41	1595.85	1151.84	0.12
Reach-1	3708	25 yr	NAT	589.00	10.58	14.71	13.06	14.72	0.000379	1.41	1595.85	1151.84	0.12
Reach-1	3708	25 yr	REV70	589.00	10.58	14.71		14.72	0.000379	1.41	1595.85	1151.84	0.12
Reach-1	530	25 yr	CE	589.00	5.80	14.68	8.06	14.68	0.000003	0.20	9360.28	3831.85	0.01
Reach-1	530	25 yr	NAT	589.00	5.80	14.68	8.06	14.68	0.000003	0.20	9360.28	3831.85	0.01
Reach-1	530	25 yr	REV70	589.00	5.80	14.68	8.06	14.68	0.000003	0.20	9360.28	3831.85	0.01

Horry County S-31 HEC-RAS 100-Year Output Table

HEC-RAS River: Tod Swamp Reach: Reach-1 Profile: 100 yr

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	12139	100 yr	CE	922.00	14.25	21.87	19.30	22.02	0.001494	3.74	746.06	465.54	0.28
Reach-1	12139	100 yr	NAT	922.00	14.25	21.75	19.30	21.92	0.001689	3.92	692.96	438.31	0.30
Reach-1	12139	100 yr	REV70	922.00	14.25	21.84		21.99	0.001530	3.77	731.32	456.69	0.29
Reach-1	11643	100 yr	CE	922.00	14.11	21.58	19.44	21.61	0.000441	2.24	1473.97	608.11	0.16
Reach-1	11643	100 yr	NAT	922.00	14.11	21.41	19.44	21.45	0.000525	2.39	1371.16	593.58	0.17
Reach-1	11643	100 yr	REV70	922.00	14.11	21.54		21.57	0.000462	2.28	1446.56	604.20	0.16
Reach-1	11121	100 yr	CE	922.00	13.73	21.36	18.98	21.39	0.000414	2.17	1421.72	641.76	0.15
Reach-1	11121	100 yr	NAT	922.00	13.73	21.14	18.98	21.17	0.000522	2.37	1280.37	627.50	0.17
Reach-1	11121	100 yr	REV70	922.00	13.73	21.30		21.33	0.000439	2.22	1384.91	639.62	0.16
Reach-1	10683	100 yr	CE	922.00	13.91	21.19	19.29	21.21	0.000415	2.13	1745.57	917.57	0.15
Reach-1	10683	100 yr	NAT	922.00	13.91	20.90	19.29	20.93	0.000580	2.43	1502.48	778.06	0.18
Reach-1	10683	100 yr	REV70	922.00	13.91	21.11		21.14	0.000453	2.20	1680.73	894.82	0.16
Reach-1	10088	100 yr	CE	922.00	13.92	20.82	19.02	20.88	0.000754	2.82	1292.02	748.91	0.21
Reach-1	10088	100 yr	NAT	922.00	13.92	20.19	19.02	20.34	0.001970	4.21	825.93	677.43	0.33
Reach-1	10088	100 yr	REV70	922.00	13.92	20.70		20.76	0.000909	3.05	1196.73	744.84	0.23
Reach-1	9765	100 yr	CE	922.00	12.95	20.72	17.95	20.74	0.000249	1.65	2235.71	942.13	0.12
Reach-1	9765	100 yr	NAT	922.00	12.95	19.91	17.95	19.95	0.000705	2.51	1486.62	890.52	0.20
Reach-1	9765	100 yr	REV70	922.00	12.95	20.57		20.59	0.000296	1.77	2098.30	937.28	0.13
Reach-1	9636	100 yr	CE	922.00	10.88	20.67	15.97	20.70	0.000249	1.90	1897.26	1060.89	0.12
Reach-1	9636	100 yr	NAT	922.00	10.88	19.77	15.97	19.86	0.000662	2.84	1021.55	811.45	0.20
Reach-1	9636	100 yr	REV70	922.00	10.88	20.52		20.55	0.000294	2.04	1734.25	1034.95	0.13
Reach-1	9543	100 yr	CE	922.00	10.95	20.66	15.36	20.68	0.000190	1.70	2013.40	827.96	0.11
Reach-1	9543	100 yr	NAT	922.00	10.95	19.74	15.36	19.80	0.000442	2.37	1283.55	759.99	0.16
Reach-1	9543	100 yr	REV70	922.00	10.95	20.50		20.53	0.000218	1.79	1884.70	812.57	0.12
Reach-1	9481	100 yr	CE	922.00	10.74	20.65	15.46	20.67	0.000165	1.65	2024.91	804.59	0.10
Reach-1	9481	100 yr	NAT	922.00	10.74	19.72	15.46	19.77	0.000410	2.39	1304.45	763.84	0.16
Reach-1	9481	100 yr	REV70	922.00	10.74	20.49		20.51	0.000191	1.75	1899.33	781.35	0.11
Reach-1	9412	100 yr	CE	922.00	10.66	20.64	15.86	20.66	0.000158	1.53	1921.41	781.20	0.10
Reach-1	9412	100 yr	NAT	922.00	10.66	19.70	15.86	19.74	0.000397	2.22	1245.37	684.75	0.15
Reach-1	9412	100 yr	REV70	922.00	10.66	20.48		20.50	0.000181	1.62	1798.66	753.05	0.11
Reach-1	9339	100 yr	CE	922.00	10.80	20.63	15.61	20.64	0.000121	1.43	1997.26	685.52	0.09
Reach-1	9339	100 yr	NAT	922.00	10.80	19.68	15.61	19.72	0.000285	2.02	1365.64	649.12	0.13
Reach-1	9339	100 yr	REV70	922.00	10.80	20.47		20.49	0.000139	1.51	1887.39	679.32	0.09
Reach-1	9279	100 yr	CE	922.00	10.40	20.63	15.45	20.64	0.000047	0.91	2790.67	807.07	0.05
Reach-1	9279	100 yr	NAT	922.00	10.40	19.69	15.45	19.70	0.000107	1.26	2065.81	731.35	0.08
Reach-1	9279	100 yr	REV70	922.00	10.40	20.47		20.48	0.000054	0.96	2662.19	791.65	0.06
Reach-1	9236	100 yr	CE	922.00	9.90	20.62	14.62	20.63	0.000073	1.15	2413.38	790.05	0.07
Reach-1	9236	100 yr	NAT	922.00	9.91	19.67	14.62	19.69	0.000163	1.59	1727.71	675.68	0.10
Reach-1	9236	100 yr	REV70	922.00	9.90	20.46	14.62	20.47	0.000083	1.21	2287.09	770.68	0.07
Reach-1	9171		Bridge										
Reach-1	9106	100 yr	CE	922.00	9.82	20.30	15.06	20.31	0.000106	1.30	1942.68	769.60	0.08
Reach-1	9106	100 yr	NAT	922.00	9.82	19.65	15.06	19.67	0.000197	1.69	1471.69	661.46	0.10
Reach-1	9106	100 yr	REV70	922.00	9.82	20.30		20.31	0.000106	1.30	1942.68	769.60	0.08
Reach-1	9073	100 yr	CE	922.00	9.97	20.29	17.05	20.31	0.000153	1.50	2274.40	805.25	0.10
Reach-1	9073	100 yr	NAT	922.00	9.97	19.64	17.05	19.66	0.000278	1.91	1769.70	731.10	0.13
Reach-1	9073	100 yr	REV70	922.00	9.97	20.29		20.31	0.000153	1.50	2274.40	805.25	0.10
Reach-1	9022	100 yr	CE	922.00	9.98	20.27	16.25	20.29	0.000204	1.84	1789.15	819.69	0.11
Reach-1	9022	100 yr	NAT	922.00	9.98	19.60	16.25	19.64	0.000390	2.41	1301.43	670.36	0.15
Reach-1	9022	100 yr	REV70	922.00	9.98	20.27		20.29	0.000204	1.84	1789.15	819.69	0.11
Reach-1	8972	100 yr	CE	922.00	9.74	20.26	15.12	20.28	0.000196	1.81	1760.89	718.73	0.11
Reach-1	8972	100 yr	NAT	922.00	9.74	19.58	15.12	19.62	0.000357	2.31	1303.03	632.63	0.15
Reach-1	8972	100 yr	REV70	922.00	9.74	20.26		20.28	0.000196	1.81	1760.89	718.73	0.11
Reach-1	8921	100 yr	CE	922.00	9.84	20.25	14.98	20.27	0.000202	1.89	1768.34	751.94	0.11
Reach-1	8921	100 yr	NAT	922.00	9.84	19.56	14.98	19.60	0.000362	2.39	1286.30	607.29	0.15
Reach-1	8921	100 yr	REV70	922.00	9.84	20.25		20.27	0.000202	1.89	1768.34	751.94	0.11
Reach-1	8872	100 yr	CE	922.00	10.51	20.24	15.11	20.26	0.000191	1.79	2016.55	882.16	0.11
Reach-1	8872	100 yr	NAT	922.00	10.51	19.54	15.11	19.59	0.000360	2.32	1456.98	707.78	0.15
Reach-1	8872	100 yr	REV70	922.00	10.51	20.24		20.26	0.000191	1.79	2016.55	882.16	0.11
Reach-1	8823	100 yr	CE	922.00	10.18	20.23	15.13	20.25	0.000165	1.63	2140.79	940.03	0.10
Reach-1	8823	100 yr	NAT	922.00	10.18	19.53	15.13	19.57	0.000320	2.14	1518.46	794.69	0.14
Reach-1	8823	100 yr	REV70	922.00	10.18	20.23		20.25	0.000165	1.63	2140.79	940.03	0.10
Reach-1	8777	100 yr	CE	922.00	9.67	20.23	14.96	20.24	0.000143	1.55	2324.17	960.53	0.09

Horry County S-31 HEC-RAS 100-Year Output Table

HEC-RAS River: Tod Swamp Reach: Reach-1 Profile: 100 yr (Continued)

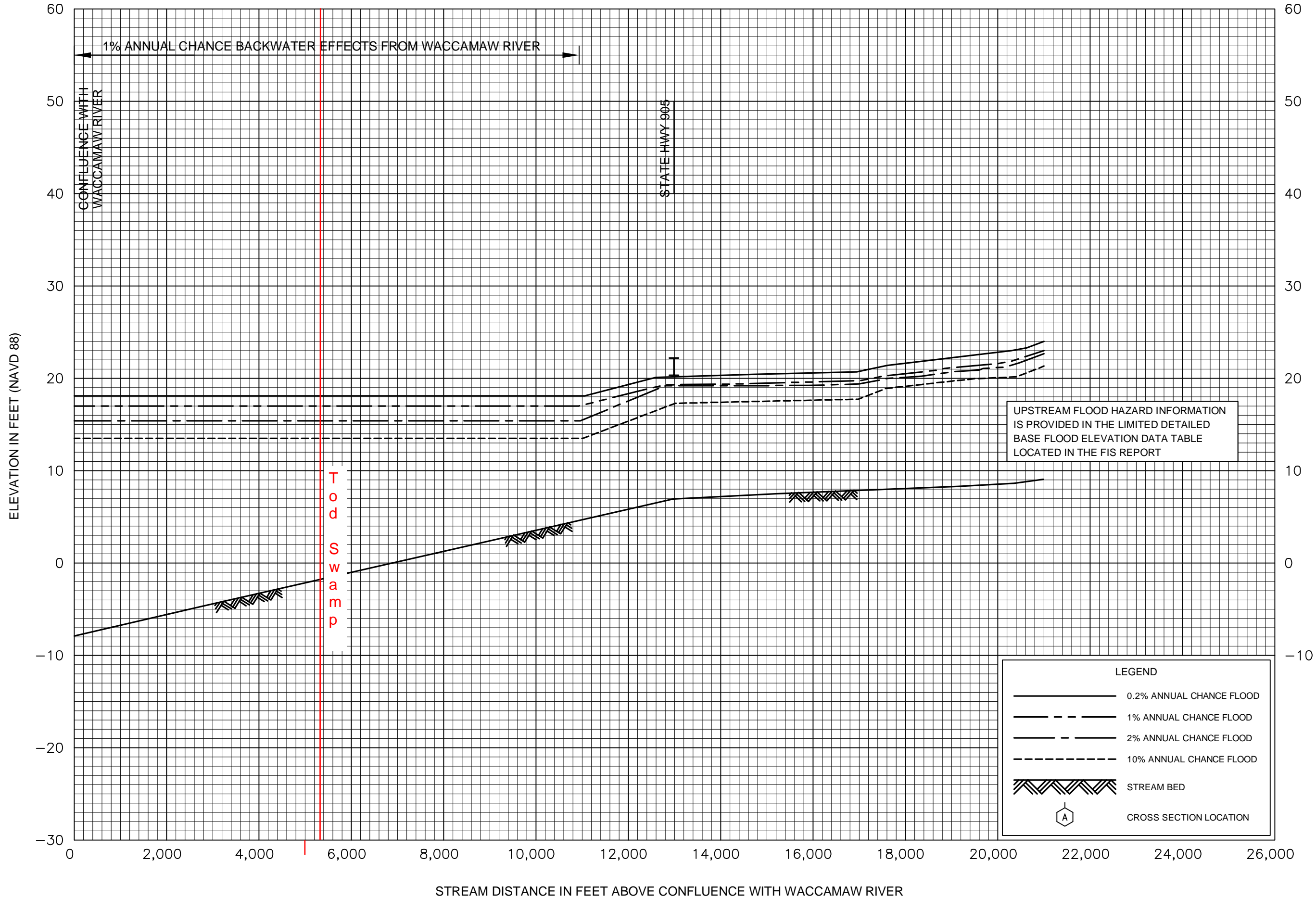
Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	8777	100 yr	NAT	922.00	9.67	19.52	14.96	19.55	0.000281	2.04	1672.70	832.95	0.13
Reach-1	8777	100 yr	REV70	922.00	9.67	20.23		20.24	0.000143	1.55	2324.17	960.53	0.09
Reach-1	8732	100 yr	CE	922.00	9.88	20.22	15.36	20.24	0.000147	1.52	2414.66	971.47	0.10
Reach-1	8732	100 yr	NAT	922.00	9.88	19.51	15.36	19.54	0.000297	2.03	1734.58	903.62	0.13
Reach-1	8732	100 yr	REV70	922.00	9.88	20.22		20.24	0.000147	1.52	2414.66	971.47	0.10
Reach-1	8686	100 yr	CE	922.00	10.22	20.22	15.69	20.23	0.000140	1.43	2553.73	1029.61	0.09
Reach-1	8686	100 yr	NAT	922.00	10.22	19.50	15.69	19.52	0.000290	1.92	1847.94	922.98	0.13
Reach-1	8686	100 yr	REV70	922.00	10.22	20.22		20.23	0.000140	1.43	2553.73	1029.61	0.09
Reach-1	8640	100 yr	CE	922.00	11.44	20.21	17.10	20.22	0.000157	1.49	2541.24	968.96	0.10
Reach-1	8640	100 yr	NAT	922.00	11.44	19.48	17.10	19.51	0.000333	2.02	1867.32	884.44	0.14
Reach-1	8640	100 yr	REV70	922.00	11.44	20.21		20.22	0.000157	1.49	2541.24	968.96	0.10
Reach-1	8591	100 yr	CE	922.00	11.66	20.20	17.17	20.22	0.000154	1.48	2600.46	967.72	0.10
Reach-1	8591	100 yr	NAT	922.00	11.66	19.47	17.17	19.49	0.000324	2.00	1913.96	874.67	0.14
Reach-1	8591	100 yr	REV70	922.00	11.66	20.20		20.22	0.000154	1.48	2600.46	967.72	0.10
Reach-1	8547	100 yr	CE	922.00	11.16	20.20	17.13	20.21	0.000158	1.40	2533.58	912.30	0.10
Reach-1	8547	100 yr	NAT	922.00	11.16	19.46	17.13	19.48	0.000334	1.89	1906.42	797.60	0.14
Reach-1	8547	100 yr	REV70	922.00	11.16	20.20		20.21	0.000158	1.40	2533.58	912.30	0.10
Reach-1	8501	100 yr	CE	922.00	14.41	20.20	16.59	20.20	0.000084	0.92	2611.69	841.94	0.07
Reach-1	8501	100 yr	NAT	922.00	14.41	19.46	16.59	19.46	0.000157	1.15	2044.06	727.03	0.09
Reach-1	8501	100 yr	REV70	922.00	14.41	20.20		20.20	0.000084	0.92	2611.69	841.94	0.07
Reach-1	8234	100 yr	CE	922.00	11.44	20.16	16.61	20.17	0.000147	1.47	2154.40	643.60	0.09
Reach-1	8234	100 yr	NAT	922.00	11.44	19.38	16.61	19.40	0.000276	1.88	1679.65	589.07	0.13
Reach-1	8234	100 yr	REV70	922.00	11.44	20.16		20.17	0.000147	1.47	2154.40	643.60	0.09
Reach-1	8005	100 yr	CE	922.00	14.19	20.14	16.40	20.14	0.000095	0.99	2039.44	580.90	0.07
Reach-1	8005	100 yr	NAT	922.00	14.19	19.34	16.40	19.35	0.000180	1.25	1607.62	524.70	0.10
Reach-1	8005	100 yr	REV70	922.00	14.19	20.14		20.14	0.000095	0.99	2039.44	580.90	0.07
Reach-1	7769	100 yr	CE	922.00	11.31	20.10	16.61	20.11	0.000172	1.57	1855.53	569.05	0.10
Reach-1	7769	100 yr	NAT	922.00	11.31	19.27	16.61	19.29	0.000328	2.00	1408.63	499.11	0.14
Reach-1	7769	100 yr	REV70	922.00	11.31	20.10		20.11	0.000172	1.57	1855.53	569.05	0.10
Reach-1	7501	100 yr	CE	922.00	14.31	20.07	16.48	20.07	0.000116	1.08	2727.89	719.58	0.08
Reach-1	7501	100 yr	NAT	922.00	14.31	19.21	16.48	19.21	0.000243	1.40	2124.29	684.43	0.11
Reach-1	7501	100 yr	REV70	922.00	14.31	20.07		20.07	0.000116	1.08	2727.89	719.58	0.08
Reach-1	7267	100 yr	CE	922.00	11.77	20.05	16.39	20.05	0.000061	0.93	3746.01	1041.61	0.06
Reach-1	7267	100 yr	NAT	922.00	11.77	19.17	16.39	19.17	0.000122	1.21	2869.55	913.31	0.09
Reach-1	7267	100 yr	REV70	922.00	11.77	20.05		20.05	0.000061	0.93	3746.01	1041.61	0.06
Reach-1	7004	100 yr	CE	922.00	14.19	20.03	16.56	20.03	0.000095	0.98	3481.34	1161.71	0.07
Reach-1	7004	100 yr	NAT	922.00	14.19	19.13	16.56	19.13	0.000230	1.37	2463.09	1062.04	0.11
Reach-1	7004	100 yr	REV70	922.00	14.19	20.03		20.03	0.000095	0.98	3481.34	1161.71	0.07
Reach-1	6693	100 yr	CE	922.00	11.49	19.97	16.64	19.99	0.000203	1.77	2160.32	1145.69	0.11
Reach-1	6693	100 yr	NAT	922.00	11.49	18.98	16.64	19.02	0.000541	2.63	1213.78	709.40	0.18
Reach-1	6693	100 yr	REV70	922.00	11.49	19.97		19.99	0.000203	1.77	2160.32	1145.69	0.11
Reach-1	6354	100 yr	CE	922.00	11.80	19.87	16.98	19.90	0.000331	2.05	1818.82	1101.25	0.14
Reach-1	6354	100 yr	NAT	922.00	11.80	18.52	16.98	18.70	0.001812	4.14	572.96	529.34	0.31
Reach-1	6354	100 yr	REV70	922.00	11.80	19.87	16.98	19.90	0.000331	2.05	1818.82	1101.25	0.14
Reach-1	6218			Bridge									
Reach-1	6139	100 yr	CE	922.00	11.55	18.50	16.74	18.56	0.000813	2.85	958.29	702.14	0.21
Reach-1	6139	100 yr	NAT	922.00	11.55	18.29	16.74	18.38	0.001098	3.23	820.59	601.32	0.24
Reach-1	6139	100 yr	REV70	922.00	11.55	18.50		18.56	0.000813	2.85	958.29	702.14	0.21
Reach-1	5498	100 yr	CE	922.00	10.61	18.06	14.81	18.13	0.000578	2.51	1203.83	856.11	0.18
Reach-1	5498	100 yr	NAT	922.00	10.61	17.62	14.81	17.72	0.000947	3.04	861.33	680.93	0.23
Reach-1	5498	100 yr	REV70	922.00	10.61	18.06		18.13	0.000578	2.51	1203.83	856.11	0.18
Reach-1	5003	100 yr	CE	922.00	12.36	17.84	14.88	17.85	0.000475	2.11	1379.13	521.82	0.16
Reach-1	5003	100 yr	NAT	922.00	12.36	17.22	14.87	17.25	0.000874	2.64	1075.81	467.89	0.21
Reach-1	5003	100 yr	REV70	922.00	12.36	17.84		17.85	0.000475	2.11	1379.13	521.82	0.16
Reach-1	4613	100 yr	CE	922.00	10.60	17.78	14.65	17.78	0.000085	0.96	3887.18	1304.69	0.07
Reach-1	4613	100 yr	NAT	922.00	10.60	17.10	14.65	17.11	0.000179	1.29	3014.16	1263.34	0.10
Reach-1	4613	100 yr	REV70	922.00	10.60	17.78	14.62	17.78	0.000085	0.96	3887.18	1304.69	0.07
Reach-1	4511			Culvert									
Reach-1	4420	100 yr	CE	922.00	10.38	17.07	14.34	17.08	0.000149	1.08	3160.50	1179.76	0.08
Reach-1	4420	100 yr	NAT	922.00	10.38	17.07	14.34	17.08	0.000149	1.08	3159.83	1179.49	0.08
Reach-1	4420	100 yr	REV70	922.00	10.38	17.07		17.08	0.000149	1.08	3160.50	1179.76	0.08

Horry County S-31 HEC-RAS 100-Year Output Table

HEC-RAS River: Tod Swamp Reach: Reach-1 Profile: 100 yr (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	4003	100 yr	CE	922.00	10.79	17.03	13.59	17.03	0.000074	0.82	3871.26	1401.28	0.06
Reach-1	4003	100 yr	NAT	922.00	10.79	17.03	13.59	17.03	0.000074	0.82	3871.26	1401.28	0.06
Reach-1	4003	100 yr	REV70	922.00	10.79	17.03		17.03	0.000074	0.82	3871.26	1401.28	0.06
Reach-1	3708	100 yr	CE	922.00	10.58	17.01	13.34	17.01	0.000056	0.73	4611.01	1496.61	0.05
Reach-1	3708	100 yr	NAT	922.00	10.58	17.01	13.34	17.01	0.000056	0.73	4611.01	1496.61	0.05
Reach-1	3708	100 yr	REV70	922.00	10.58	17.01		17.01	0.000056	0.73	4611.01	1496.61	0.05
Reach-1	530	100 yr	CE	922.00	5.80	17.00	8.52	17.00	0.000001	0.16	19565.19	4932.17	0.01
Reach-1	530	100 yr	NAT	922.00	5.80	17.00	8.52	17.00	0.000001	0.16	19565.19	4932.17	0.01
Reach-1	530	100 yr	REV70	922.00	5.80	17.00	8.52	17.00	0.000001	0.16	19565.19	4932.17	0.01

Appendix B: Sampson Creek FIS Profiles



FLOOD PROFILES

SIMPSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HORRY COUNTY, SC

AND INCORPORATED AREAS



Technical Proposal



3314 Jaeckle Drive

Wilmington, NC 28403



910.452.1145



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