

Submitted By: Maddy Barbian, PE

Date: 6/5/24

To: Michael Pitts, PE, Assoc. DBIA
Program/Project Manager

BASIS OF DESIGN EXCEPTION

- Request for Approval of Design Exceptions to AASHTO Guidelines
- Request for Approval of Design Exceptions from Standard SCDOT Procedures

PROJECT CHARACTERISTICS

County: Horry RD/Route: S-26-154 Const. Pin: P041158

From: Milepoint 0.64 To: Milepoint 0.69

Length: 275 feet MPO/COG: GSATS

Work Type: Bridge Rehabilitation including superstructure replacement

Functional Classification: Urban Major Collector

Group Description: (1 / 2 / 3 / 4) (if applicable)

Type of Terrain: (Level / Rolling / Mountainous)

Design Speed: 35 (mph)

2025 ADT 2,200

2045 ADT 3,200

TRUCKS 2 %

IS THIS A "PROJECT OF DIVISIONAL INTEREST", SUBJECT TO FHWA/SCDOT STEWARDSHIP AND OVERSIGHT PLAN?

Yes No

CRASH ANALYSIS

(Attach additional sheets with accident history data)

TOTAL PROJECT ESTIMATE (\$) 2.5 Million

CHECK APPROPRIATE BOX(ES) FOR DESIGN EXCEPTION(S)

- | | | |
|--|--|---|
| <input type="checkbox"/> Design Speed | <input type="checkbox"/> Maximum Grade | <input checked="" type="checkbox"/> Travel Lane Width |
| <input type="checkbox"/> Minimum Radii | <input type="checkbox"/> Vertical Clearance | <input checked="" type="checkbox"/> Shoulder Width |
| <input type="checkbox"/> Stopping Sight Distance | <input type="checkbox"/> Bridge Width | <input type="checkbox"/> Horizontal Clearance |
| <input type="checkbox"/> Vertical | <input type="checkbox"/> Structural Capacity | <input type="checkbox"/> Cross Slope |
| <input type="checkbox"/> Horizontal | <input type="checkbox"/> Superelevation Rate | <input type="checkbox"/> Travel Lanes |
| | | <input type="checkbox"/> Shoulders |

Recommended by _____ Alternative Delivery Design Manager

Reviewed by:

Alternative Delivery Preconstruction Engineer

Engineering Support Discipline Lead

Approved by:

Director of Alternative Delivery

Director of Engineering Support

Concur

Signature Field

FHWA (As needed per FHWA/SCDOT Stewardship and Oversight Plan)

cc:

FHWA

District Engineering Administrator

Director of Traffic Engineering

Chief Engineer for Project Delivery

ATTACHMENT A

DESCRIBE ELEMENTS FOR DESIGN EXCEPTION

The existing bridge on S-26-154 over Murrels Inlet Creek consists of two ten (10) foot lanes with four (4) foot shoulders, two (2) foot paved, for twenty-eight (28) feet in total width. This project proposes to rehabilitate the existing structurally deficient bridge by replacing the superstructure and rehabilitating the substructure. The existing lane and shoulder widths are proposed to remain.

AASHTO's A Policy on Geometric Design of Highways and Streets 2018 (2018 Green Book) Section 6.2.2.1, Table 6-5, Minimum Width of Traveled Way and Shoulders, shows that the minimum width of traveled way for over 2000 veh/day and a design speed of 35 mph is twenty-two (22) feet equating to eleven (11) foot lanes. 2018 Green Book Table 6-5 shows that the minimum width of shoulder on each side of road is six (6) feet.

SCDOT's Roadway Design Manual 2021, Section 15.2.6, states that the lane width should be twelve (12) feet with shoulder widths of eight (8) feet, two (2) paved.

The existing roadway approaches and bridge lane widths of ten (10) feet and shoulders of four (4) feet do not meet AASHTO guidelines or SCDOT roadway design criteria.

JUSTIFICATION FOR DESIGN EXCEPTIONS

The purpose of the project is to remove the current load restriction and rehabilitate the bridge so that it is no longer structurally deficient. Rehabilitation and replacement alternatives were analyzed for this project and it was determined that rehabilitating the existing bridge would minimize impacts to this environmentally sensitive area and be cost-effective while extending service life of the bridge up to 25 years. The conditions including 2% truck volumes and a low posted speed of 35 MPH support retaining the ten (10) foot lanes. Sight distance is not impacted by the shoulder widths because the project bridge and roadway is in the middle of a long tangent with greater than 1,000 feet on each approach. The Design Exceptions reduce the cost of construction, cost of future maintenance and impacts to the environmentally sensitive tidal streams and marsh.

Historical crash data for the most recent 3.75-year period (1/1/2019 through 9/30/2023) was reviewed within the limits of the design exception to determine if any crashes could be attributed to the existing ten (10) foot lanes and four (4) foot shoulders. See Attachment B for the crash summary. The review indicated that there were four (4) crashes within the study area. However, two (2) crashes were at adjacent intersections, outside of the construction limits. Of the other two (2) crashes, one (1) involved an under the influence driver or pedestrian. The final crash indicates collision with the guard rail approaching the bridge and an improper lane use/change indicating the driver likely crossed into the opposing lane before striking the guardrail. It is not clear that this crash can be attributed to the lane or shoulder width.

DESCRIBE STEPS TO ELIMINATE DESIGN EXCEPTIONS, INCLUDE COST

Eliminating the design exceptions would require replacement of the bridge substructure and roadway approaches. The hydraulic requirements for a full replacement require raising the bridge approximately ten (10) feet and lengthening the bridge from the proposed 69 feet for the rehabilitation to 760 feet for the full replacement. See Attachment C for the plans and elevations for both options. The project costs are estimated at \$14.1 million for replacement versus \$2.5 million for rehabilitation. Additionally, major environmental impacts are associated with the full replacement.

To mitigate the design exceptions, the existing graded shoulder slopes on the roadway approaches to the bridge are being flattened to meet the 8% requirement and compressed shoulder guardrail is proposed to minimize wetland impacts. Also, the clear roadway width on the bridge is proposed to be widened from 27'6" to 28'2" to improve the existing shoulders on the bridge from 3'9" to a full 4'1". With this improvement the bridge width will match the approach roadway width (traveled way plus shoulders).

HOW WILL FUTURE CONSTRUCTION IMPACT DESIGN EXCEPTIONS?

There are no planned projects on S-26-154. The design exceptions will not impact future construction.

Query Crash List

HORRY

S- 154 (CYPRESS AVE)

MP 0.4 to 0.9 (Length = 0.5 miles)

AADT: 1750

Functional Class: Urban - Major Collector

01/01/2019 through 09/30/2022

Crashes by Injury Class

Fatal Crashes:	0
Serious Injury Crashes:	0
Other Injury Crashes:	3
PDO Crashes:	1

Total: 4

Crashes by Manner of Collision

Rear End:	0
Angle:	1
Sideswipe:	0
Head On:	0
Run off Road:	2
Animal:	0
Bicycle:	0
Pedestrian:	1
Other:	0

Total: 4

Special Contributing Factors

Night:	1
Day:	3
Not Reported:	0
Wet:	1
Dry:	3
Not Reported:	0

Query Crash List

HORRY

S- 154 (CYPRESS AVE)

MP 0.4 to 0.9 (Length = 0.5 miles)

AADT: 1750

Functional Class: Urban - Major Collector

01/01/2019 through 09/30/2022

Statistics

Fatal Crashes:	0
Fatal Injuries:	0
Serious Crashes:	0
Serious Injuries:	0
Other Injury Crashes:	3
Other Injuries:	3
Property Damage Crashes:	1
Total Crashes:	4

Crash Location

Intersections:	2
Midblock Crashes:	2
Urban Crashes:	4
Rural Crashes:	0
MPO Crashes:	4
COG Crashes:	0

Manner of Collision

Angle:	1
Backed Into:	0
Head On:	0
Non Collision:	3
Rear End:	0
Rear To Rear:	0
Sideswipe, Opposite Direction:	0
Sideswipe, Same Direction:	0
Unknown:	0

Junction Type

Crossover:	0
Driveway:	1
Five Or More Points:	0
Four Way Intersection:	0
Non-Junction:	2
Railway Grade Crossing:	0
Shared Use Path Or Trails:	0
T-Intersection:	1
Traffic Circle:	0
Not Reported:	0
Unknown:	0
Y-Intersection:	0

Number of Units

1:	2
2:	2
3:	0
4+:	0

Crashes Involving

Pedestrians:	1
Bicycles:	0
Motorcycles:	0
Truck Tractors:	0
Fixed Objects:	2
Workzones:	0

Road Conditions

Dry:	3
Wet:	1
Snow:	0
Slush:	0
Ice:	0
Contaminate:	0
Water (standing):	0
Other:	0
Not Reported:	0

Light Conditions

Day:	3
Dawn:	0
Dusk:	0
Dark (Unspecified Lighting):	0
Dark (Street Lamp):	0
Dark (Street Lamp Not Lit):	0
Dark (No Lights):	1
Not Reported:	0

Weather Conditions

Blowing Sand, Oil, Dirt, Or Snow:	0
Clear:	3
Cloudy:	0
Fog, Smoke, Smog:	0
Rain:	1
Severe Crosswinds:	0
Sleet/Hail:	0
Snow:	0
Not Reported:	0
Unknown:	0

Traffic Control Type

Crash Harmful Event

Tree:	1
Utility Pole:	0
Other (Post, Pole, Support, ..):	0
Light/Luminance Support:	0
Overhead Sign Support:	0
Culvert:	0
Ditch:	0
Equipment:	0
Curb:	0
Embankment:	0
Guardrail End:	1
Fence:	0
Mail Box:	0
Highway Traffic Sign Post:	0
Guardrail Face:	0
Bridge Overhead Structure:	0
Bridge Parapet End:	0
Bridge Pier or Abutment:	0
Bridge Rail:	0
Impact Attenuator/Crash Cushion:	0
Median Barrier:	0
Other (Wall, Building, Tunnel, etc.):	0
Work Zone Maintenance Equip:	0
Other (fixed):	0
Unknown (fixed):	0
Animal (Deer Only):	0
Animal (all other):	0
Motor Unit (Stopped):	0
Motor Unit (Other Roadway):	0
Motor Unit (Parked):	0
Railway Unit:	0
Work Zone Maintenance Equip:	0
Other Movable Object:	0
Unknown Movable Object:	0
Cross Median/Center:	0
Spill (2-wheeled Units):	0
Ran off Road Left:	0
Ran off Road Right:	0
Overturn/Rollover:	0
Immersion:	0
Cargo/Equipment Loss or Shift:	0
Downhill Runaway:	0
Equipment Failure:	0
Fire/Explosion:	0
Jackknife:	0
Separation of Units:	0
Other - non Collision:	0
Unknown - non Collision:	0
Motor Unit (In Transport):	1
Undetermined:	0

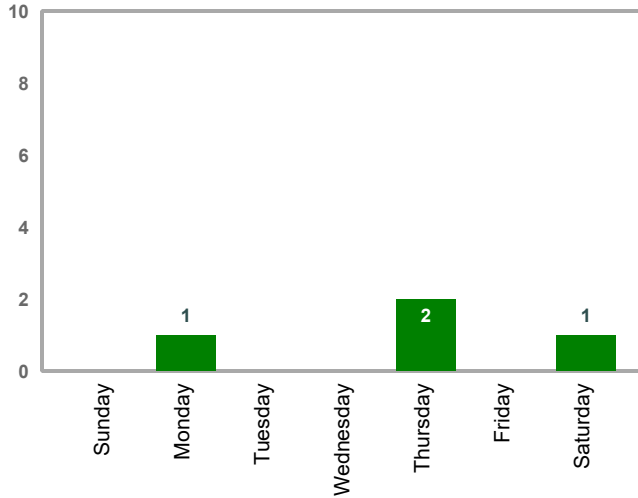
Query Crash List
 Horry
 S- 154 (CYPRESS AVE)
 MP 0.4 to 0.9 (Length = 0.5 miles)

AADT: 1750
 Functional Class: Urban - Major Collector
 01/01/2019 through 09/30/2022

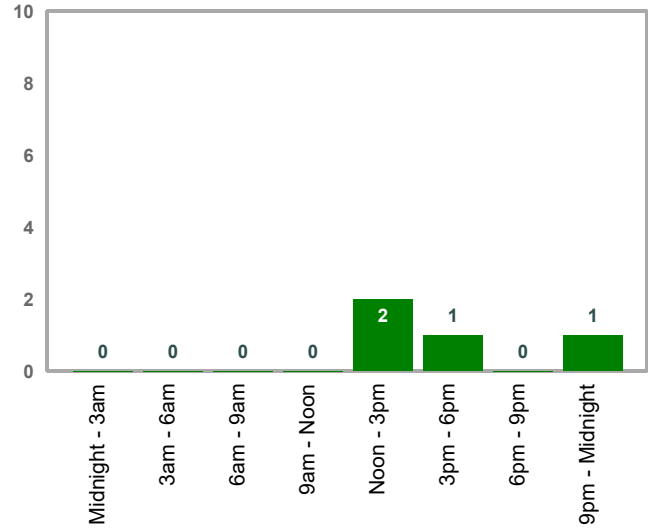
Yearly Comparison

Year	2019	2020	2021	2022	Total
Rear End	0	0	0	0	0
Angle	0	1	0	0	1
Sideswipe	0	0	0	0	0
Head On	0	0	0	0	0
Run Off Road	1	0	0	1	2
Animal	0	0	0	0	0
Bicycle	0	0	0	0	0
Pedestrian	0	0	0	1	1
Other	0	0	0	0	0
	1	1	0	2	4

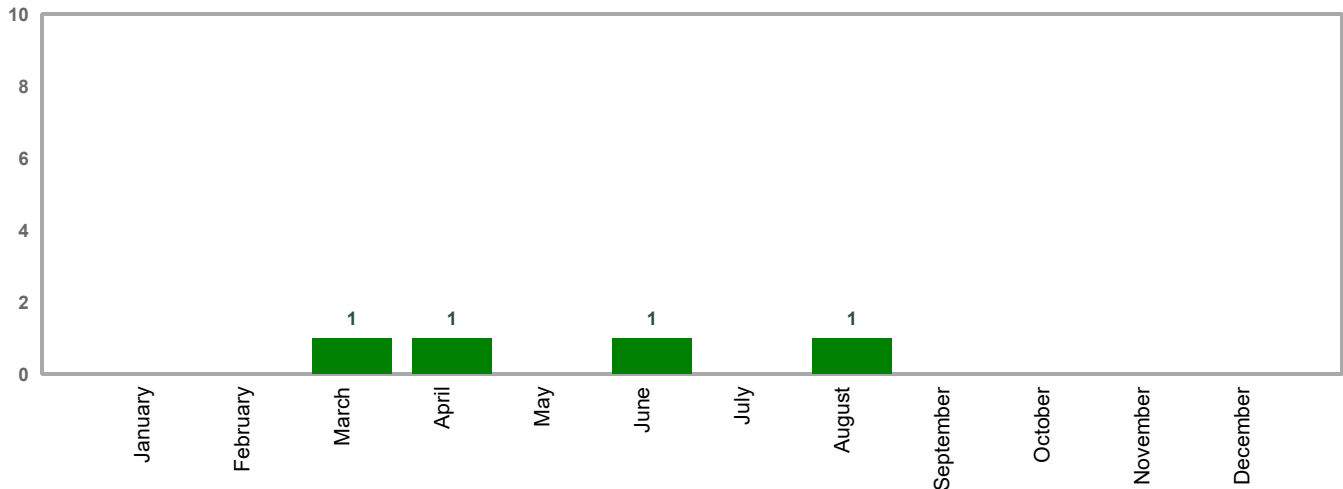
Day of the Week



Time of Day



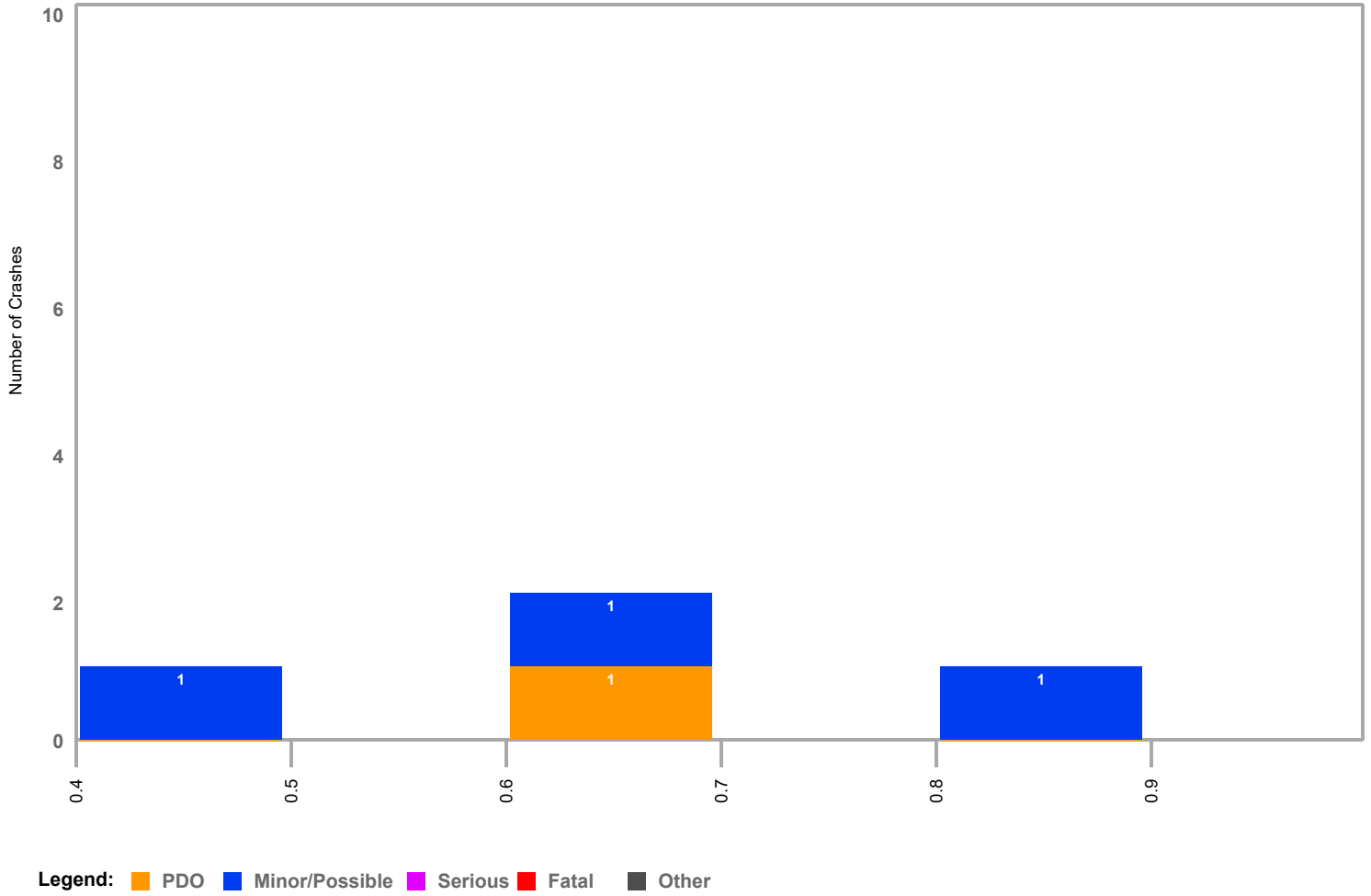
Month of Year



Query Crash List
 HORRY
 S- 154 (CYPRESS AVE)
 MP 0.4 to 0.9 (Length = 0.5 miles)

AADT: 1750
 Functional Class: Urban - Major Collector
 01/01/2019 through 09/30/2022

Interval Crashes by Interval



Section Crashes

ATTACHMENT B

MPT 0.4 to 0.5 (Stack #1)

Total Crashes: 1 Light: 1 Dark: 0 Dry: 1 Wet: 0 Fatalities: 0 Injuries: 1 PDO: 0

OBS	Crash #	Date	Main	MP	Base	Second	BDO	Max Inj	Light	SFC	MAC	Probable Cause	Harmful Event
1	22223506	03/28/22	S- 154	0.48	L- 9134	L- 7630	7	2	day	dry	none	Driving too Fast for Con	Tree

MPT 0.6 to 0.7 (Stack #3)

Total Crashes: 2 Light: 1 Dark: 1 Dry: 1 Wet: 1 Fatalities: 0 Injuries: 1 PDO: 1

OBS	Crash #	Date	Main	MP	Base	Second	BDO	Max Inj	Light	SFC	MAC	Probable Cause	Harmful Event
2	19555448	04/20/19	S- 154	0.65	S- 1191	S- 244	11	1	day	dry	none	Improper Lane use/change	Guardrail End
3	22240542	06/30/22	S- 154	0.68	S- 244	S- 1191	10	0	night	wet	none	Under the Influence (non	Pedestrian

MPT 0.8 to 0.9 (Stack #5)

Total Crashes: 1 Light: 1 Dark: 0 Dry: 1 Wet: 0 Fatalities: 0 Injuries: 1 PDO: 0

OBS	Crash #	Date	Main	MP	Base	Second	BDO	Max Inj	Light	SFC	MAC	Probable Cause	Harmful Event
4	20261595	08/27/20	S- 154	0.82	S- 244	S- 1191	0	1	day	dry	Angle	Failure to Yield RoW	Motor Unit (In Transpo

ATTACHMENT C

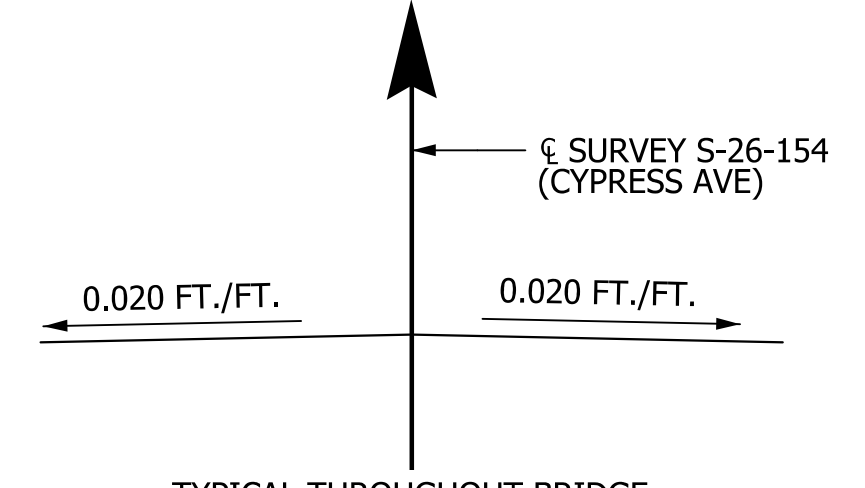
- NOTES:
- (A) A GALVANIC (OR PASSIVE) CATHODIC PROTECTION SYSTEM SHALL BE INSTALLED ON ALL FACES OF BENT CAPS AND ON INTERIOR BENT PILES DOWN TO THE MUDLINE.
 - (B) INCLUDES 1'-0" MASH BARRIER PARAPET AND 1" SLAB EXTENSION.
 - (C) REMOVE AND DISPOSE OF EXISTING 30'-4" X 69' | 3-SPAN CONTINUOUS CONCRETE FLAT SLAB SUPERSTRUCTURE, APPROACH SLABS AND APPURTENANCES IN ACCORDANCE WITH SECTION 202.4.2 OF THE STANDARD SPECIFICATIONS. EXISTING SUBSTRUCTURE TO REMAIN.
 - (D) MHW AND MLW FROM NOAA STATION 8661070

CONTROL POINTS

CP 1
ELEVATION = 9.77'
N 643362.90 E 2608804.76
PSC 1

CP 2
ELEVATION = 5.22'
N 642724.45 E 2609514.86
PSC 2

CP 3
ELEVATION = 4.16'
N 641966.02 E 2610253.95
PSC 3



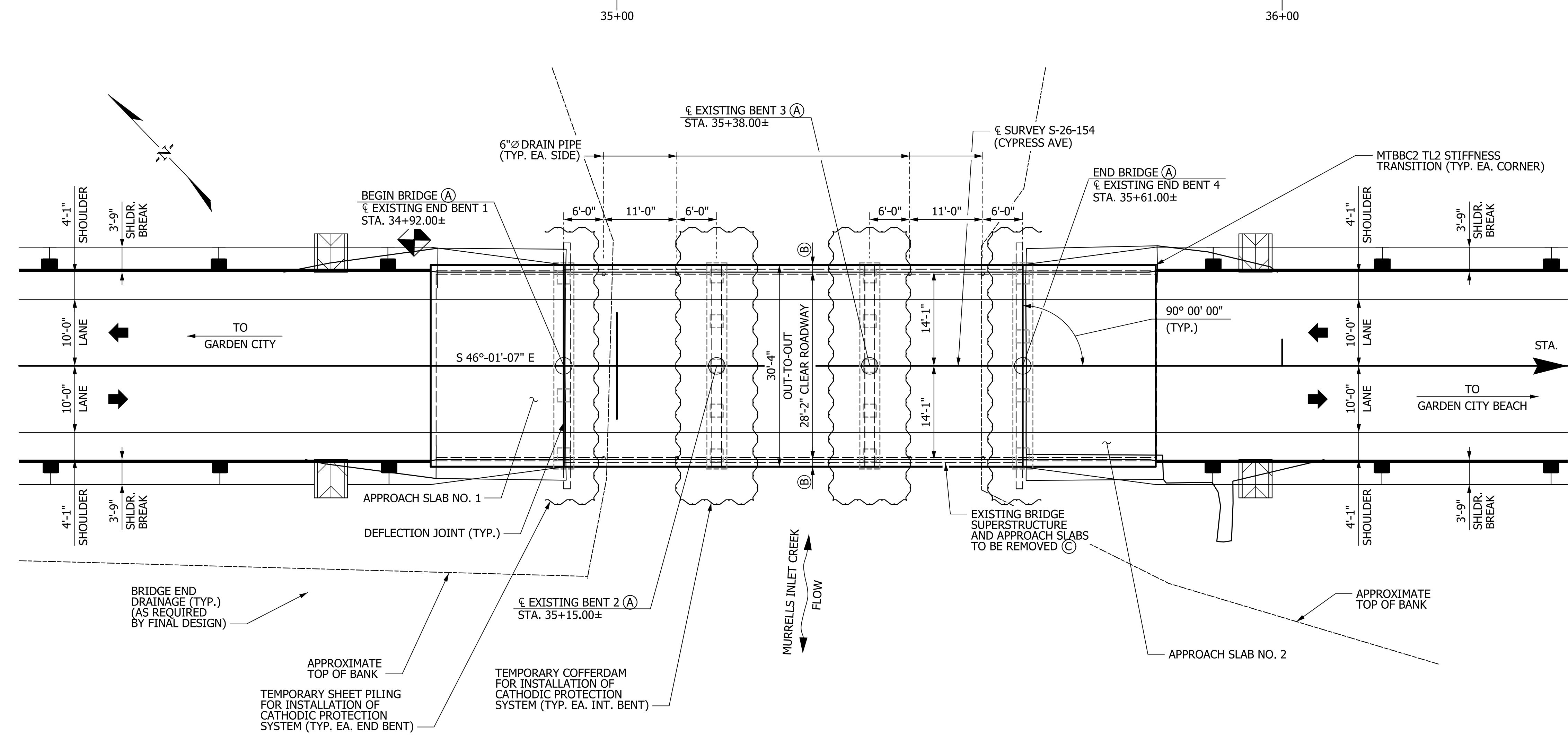
TYPICAL THROUGHOUT BRIDGE
SUPERELEVATION SKETCH

VERTICAL CURVE DATA

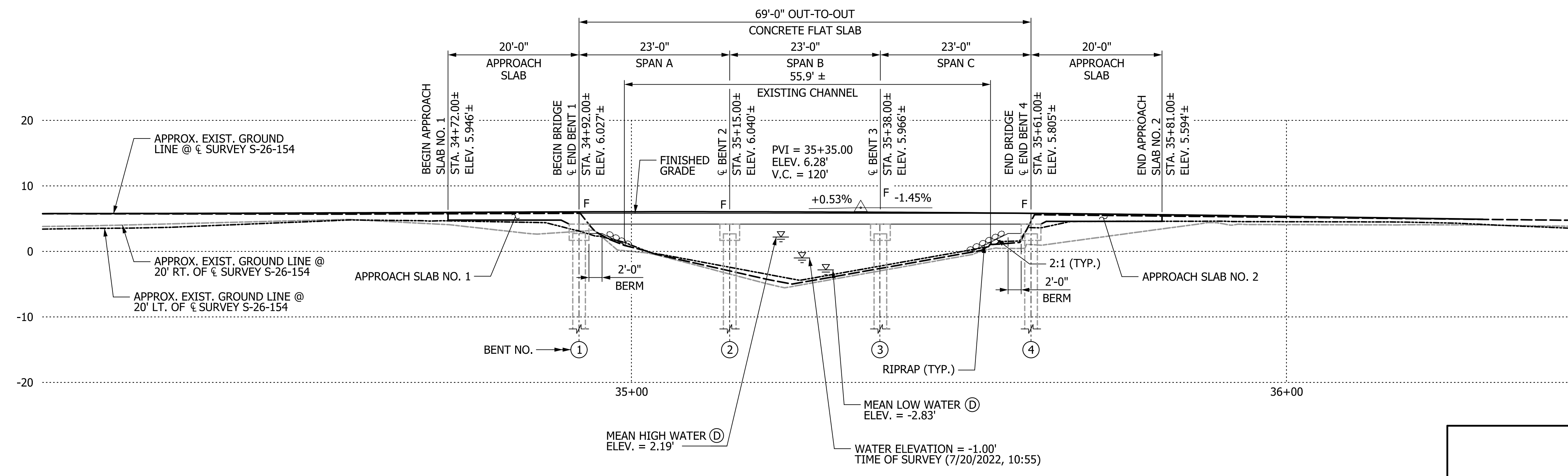
PVI = 34+15.00 ELEV. 5.65'
V.C. = 120'

PVI = 35+35.00 ELEV. 6.28'
V.C. = 120'

-0.30% +0.53% -1.45%



PLAN



SECTION ALONG SURVEY ζ S-26-154

NOT FOR CONSTRUCTION

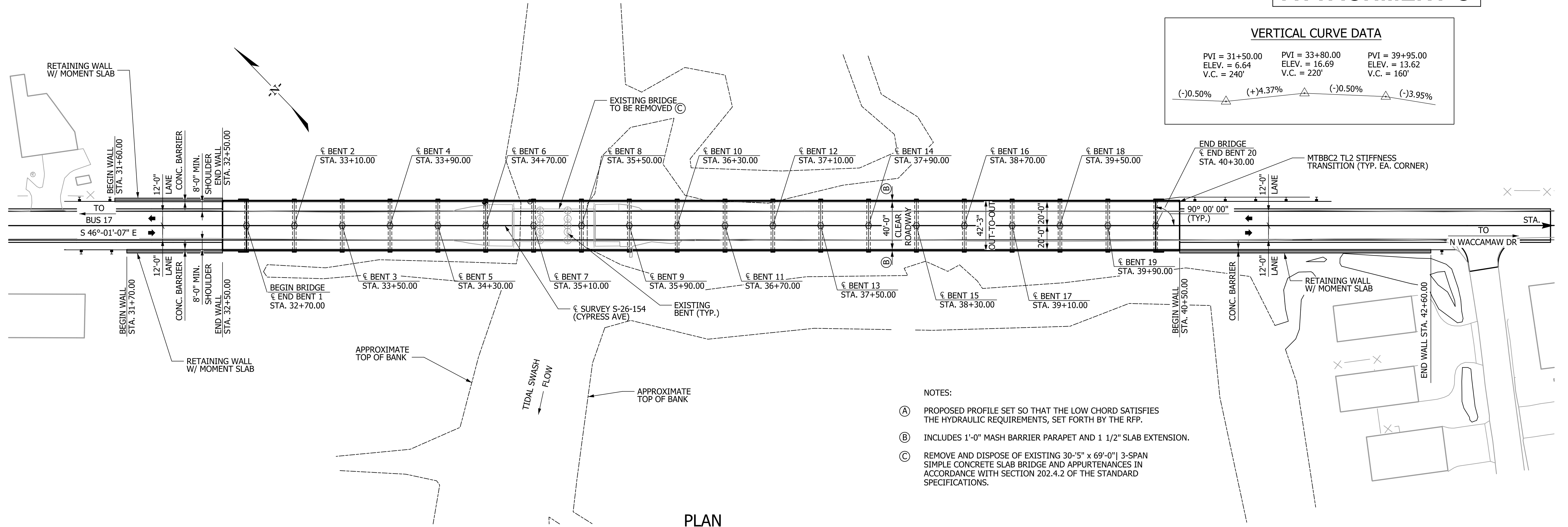
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	SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
	BRIDGE PLAN AND PROFILE	
	S-26-154 (CYPRESS AVE) BRIDGE SUPERSTRUCTURE REPLACEMENT OVER MURRELLS INLET CREEK	
REV.		
REV.		
REV.		
REV.		
QUAN.		
DR.	MEW	BJA 2/24
DES.		
BY	CHK.	DATE
COUNTY Horry		ROUTE S-26-154

CADD FILE INFORMATION 8:55:27 AM
 PLOTTED DATE: 5/8/2024
 FILE NAME: ...S-26-154 over Murrells Inlet Creek.bp_Microstation-Rehdb.dgn

ATTACHMENT C

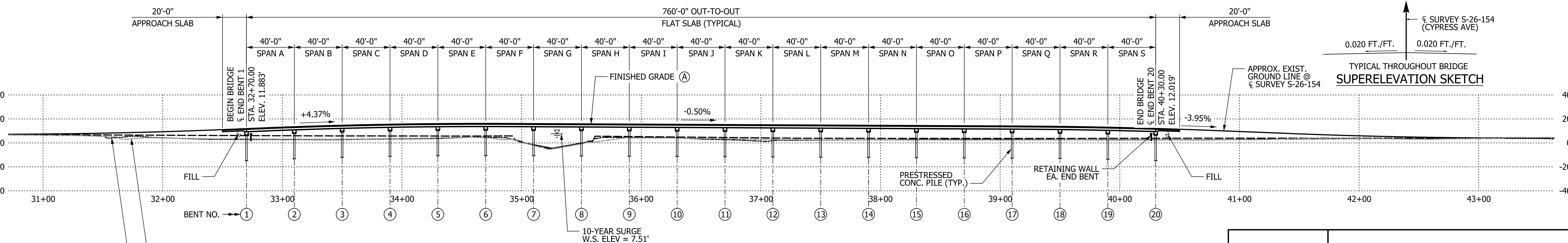
BRIDGE PLANS ID: P041158
SHEET NO.: 2

VERTICAL CURVE DATA		
PVI = 31+50.00 ELEV. = 6.64 V.C. = 240'	PVI = 33+80.00 ELEV. = 16.69 V.C. = 220'	PVI = 39+95.00 ELEV. = 13.62 V.C. = 160'
(-)0.50%	(+)4.37%	(-)3.95%



- NOTES:
- (A) PROPOSED PROFILE SET SO THAT THE LOW CHORD SATISFIES THE HYDRAULIC REQUIREMENTS, SET FORTH BY THE RFP.
 - (B) INCLUDES 1'-0" MASH BARRIER PARAPET AND 1 1/2" SLAB EXTENSION.
 - (C) REMOVE AND DISPOSE OF EXISTING 30'-5" x 69'-0" 3-SPAN SIMPLE CONCRETE SLAB BRIDGE AND APPURTENANCES IN ACCORDANCE WITH SECTION 202.4.2 OF THE STANDARD SPECIFICATIONS.

PLAN



SECTION ALONG SURVEY § S-26-154

NOT FOR CONSTRUCTION

CONCEPTUAL PLANS	HNTB HNTB CORPORATION SC License No. 265 343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609	
	SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
BRIDGE PLAN AND PROFILE		
S-26-154 (CYPRESS AVE) BRIDGE REPLACEMENT OVER TIDAL SWASH		
REV.	BY	DATE
REV.	BY	DATE
REV.	BY	DATE
REV.	BY	DATE
QUAN.	MEW	DWH
DES.	1/24	
BY	CHK.	DATE
COUNTY	ROUTE	
HORRY	S-26-154	

CADD FILE: INFORMATION@AM
 PLOTTED DATE: 2/20/24
 FILE NAME: ...S-26-154 over Swash Creek.bp_Microstation-Replacement.dgn