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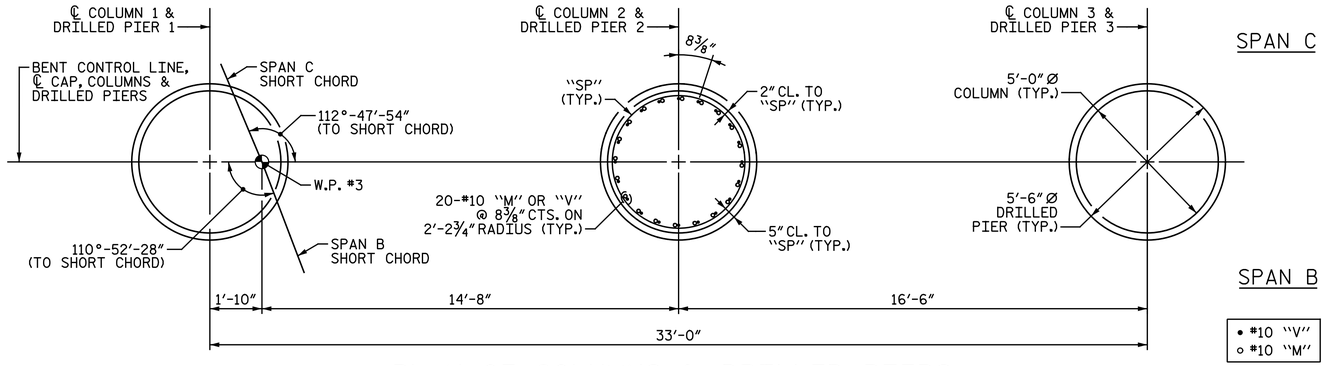
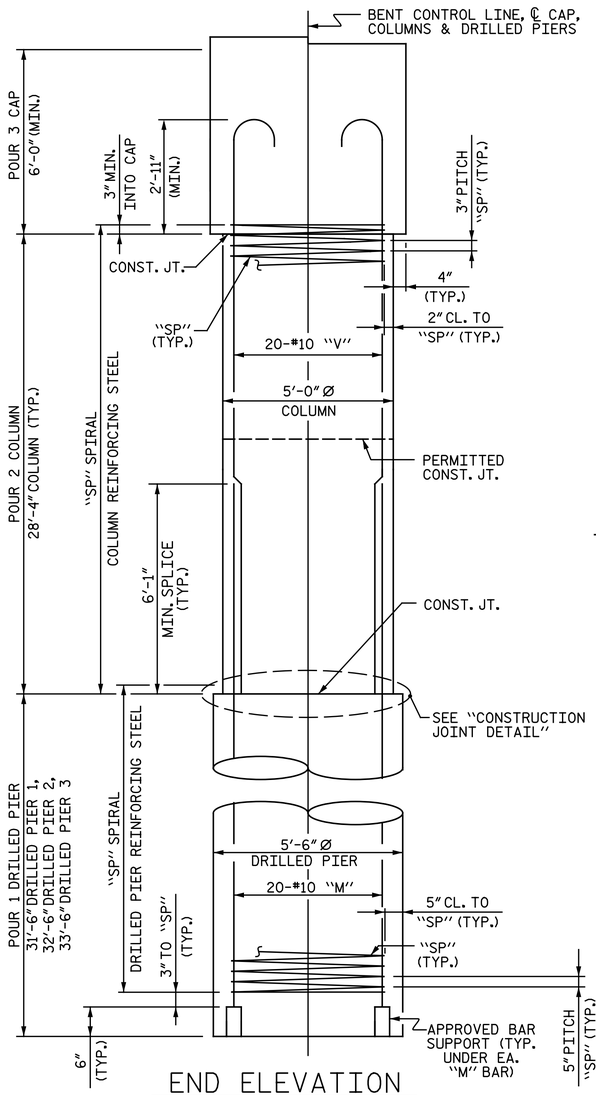
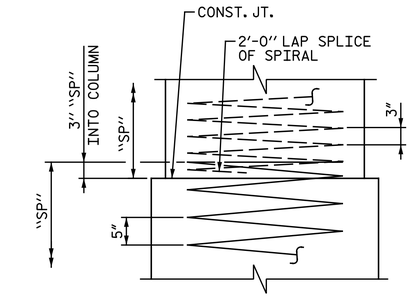


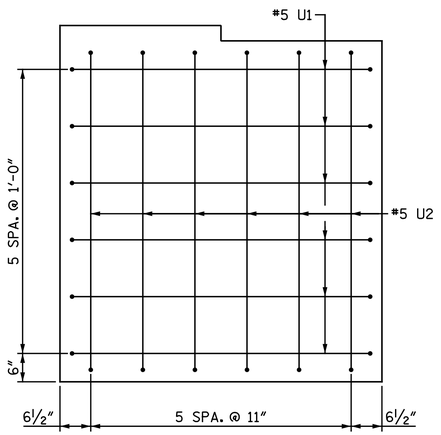
PLAN OF COLUMNS & DRILLED PIERS



END ELEVATION



CONSTRUCTION JOINT DETAIL



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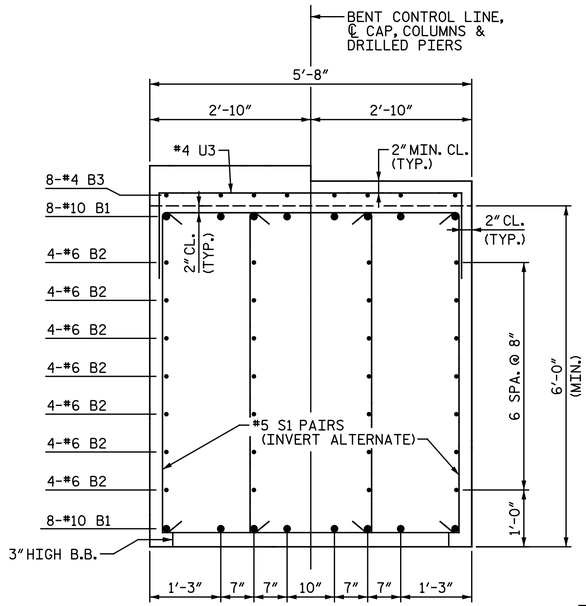
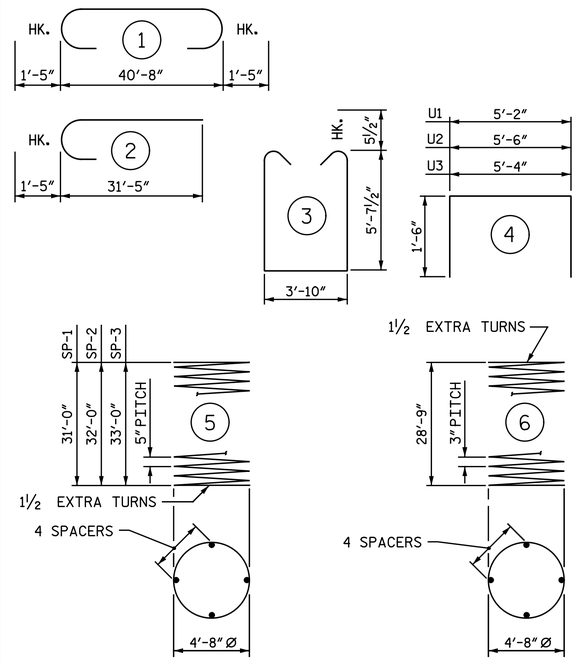


SECTION A-A

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

✳ THE SP-1 THRU SP-3 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.

✳✳ THE SP-4 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

BILL OF MATERIAL

BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	16	#10	1	43′ - 6″	2,995
B2	28	#6	STR.	40′ - 8″	1,710
B3	32	#4	STR.	5′ - 2″	110
M1	20	#10	STR.	40′ - 1″	3,450
M2	20	#10	STR.	41′ - 1″	3,536
M3	20	#10	STR.	42′ - 1″	3,622
S1	108	#5	3	16′ - 0″	1,802
U1	12	#5	4	8′ - 2″	102
U2	12	#5	4	8′ - 6″	106
U3	44	#4	4	8′ - 4″	245
V1	60	#10	2	32′ - 10″	8,477
REINFORCING STEEL				LBS.	26,155
SP-1	1	✳	5	1100′ - 9″	1,148
SP-2	1	✳	5	1135′ - 7″	1,184
SP-3	1	✳	5	1170′ - 5″	1,221
SP-4	3	✳✳	6	1693′ - 0″	3,393
SPIRAL COLUMN REINFORCING STEEL				LBS.	6,946

CLASS A CONCRETE		
POUR 2 - COLUMNS	C.Y.	61.8
POUR 3 - CAP	C.Y.	53.3
TOTAL CLASS A CONCRETE	C.Y.	115.1
DRILLED PIER CONCRETE		
POUR 1 - DRILLED PIERS	C.Y.	85.8
5′-6″ DIA. DRILLED PIERS IN SOIL	LIN. FT.	61.50
5′-6″ DIA. DRILLED PIERS NOT IN SOIL	LIN. FT.	36.00
SID INSPECTIONS	EA.	1
CSL TESTING	EA.	1
CSL TUBES	LIN. FT.	612.00

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/22/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

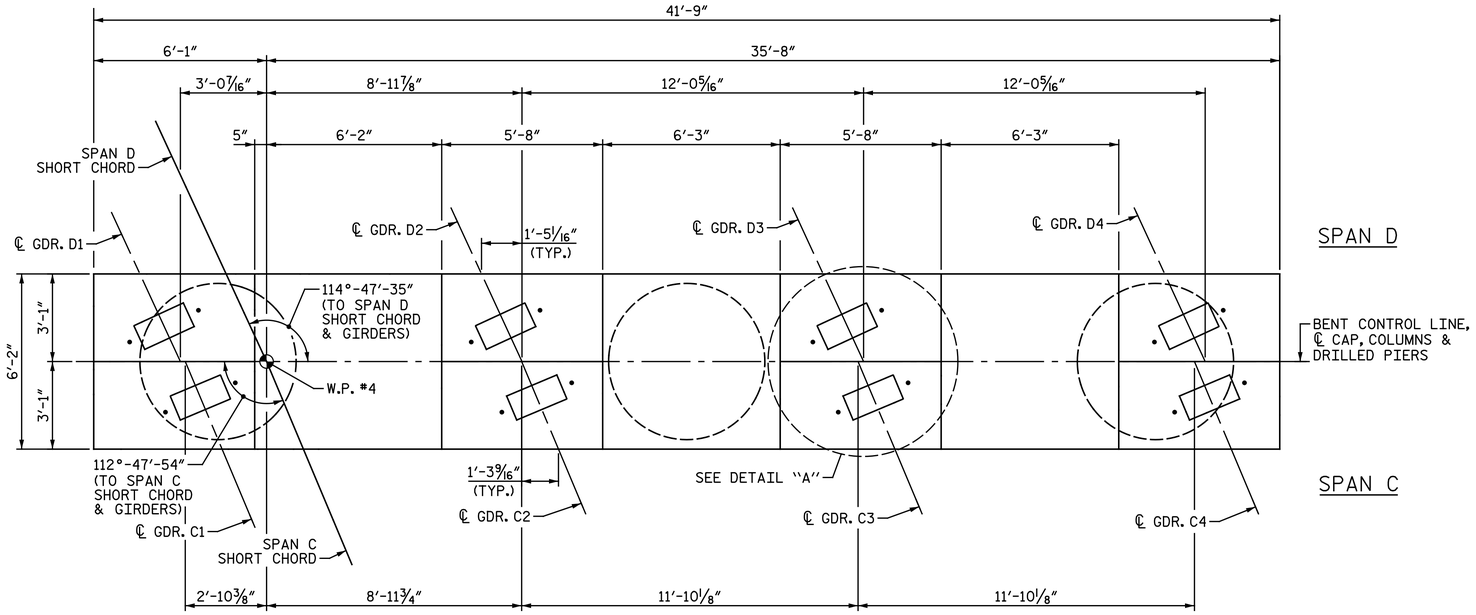
BENT 2 DETAILS

RIGHT LANE

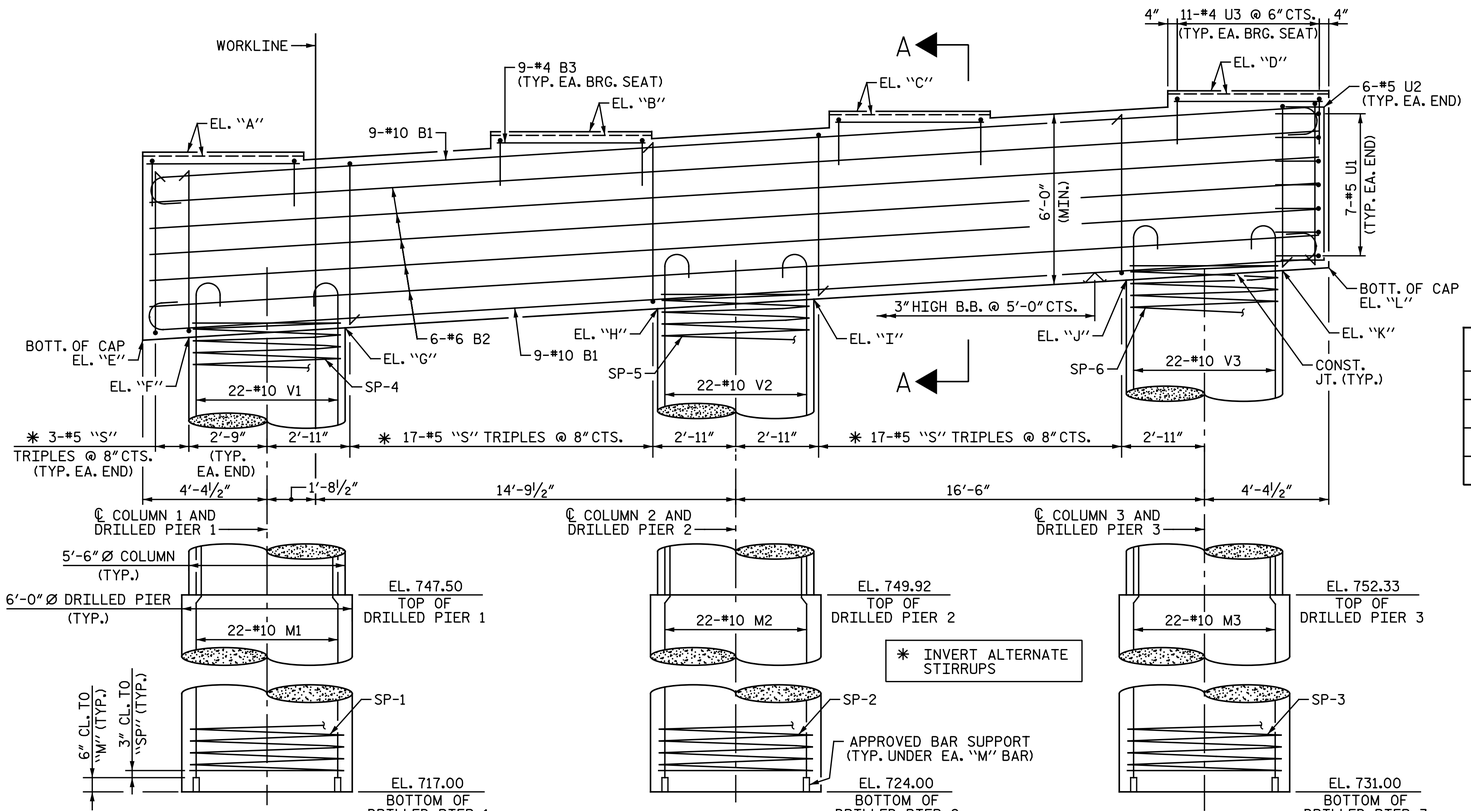
DRAWN BY : C.E.M./N.B.S. DATE : 5-21-18
CHECKED BY : T. M. GARRISON DATE : 5-21-18

Michael Baker INTERNATIONAL
Michael Baker Engineering
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518
NC License No. : F-1084

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-48
1			3			TOTAL SHEETS
2			4			63



PLAN



ELEVATION

LOCATION	ELEVATION SPAN C	ELEVATION SPAN D
A	791.20	791.08
B	791.93	791.82
C	792.65	792.56
D	793.38	793.29

LOCATION	ELEVATION
E	784.59
F	784.69
G	785.03
H	785.71
I	786.05
J	786.73
K	787.07
L	787.17

NOTES:

STIRRUPS AND ″U″ BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR SECTION A-A, SEE ″BENT 3 DETAILS″ SHEET.

HOOKS ON ″V″ BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

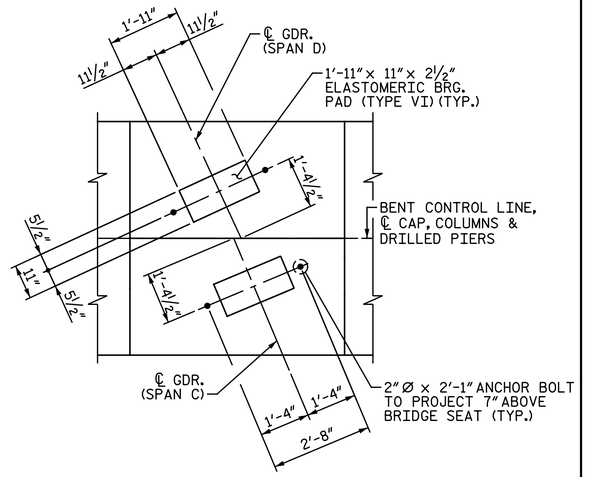
THE TOP SURFACE AREAS OF THE BENT 3 CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR ″REINFORCING STEEL″ AND ″SPIRAL COLUMN REINFORCING STEEL″.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FT. BELOW THE GROUND LINE.

FOR MASS CONCRETE, SEE SPECIAL PROVISIONS.



DETAIL ″A″

(TYP. EA. BRIDGE SEAT)

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

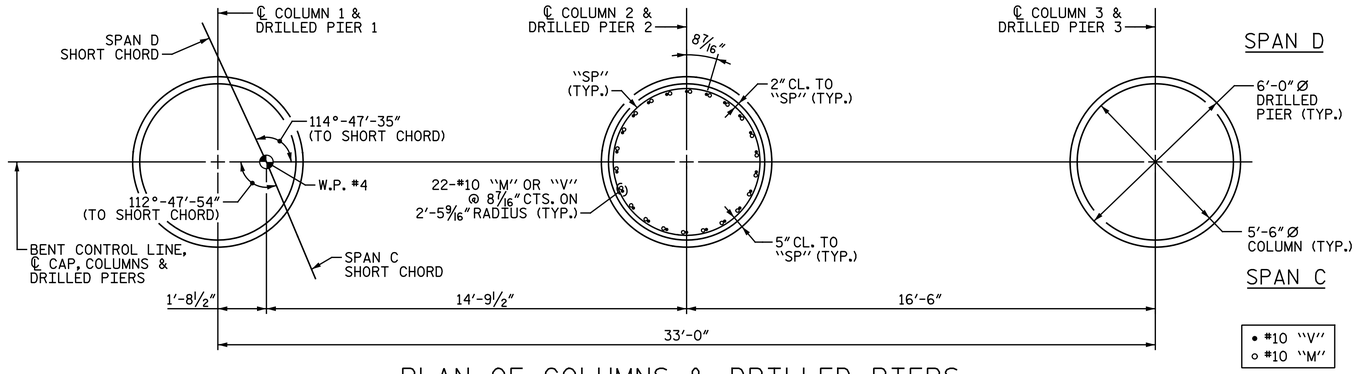
BENT 3

RIGHT LANE

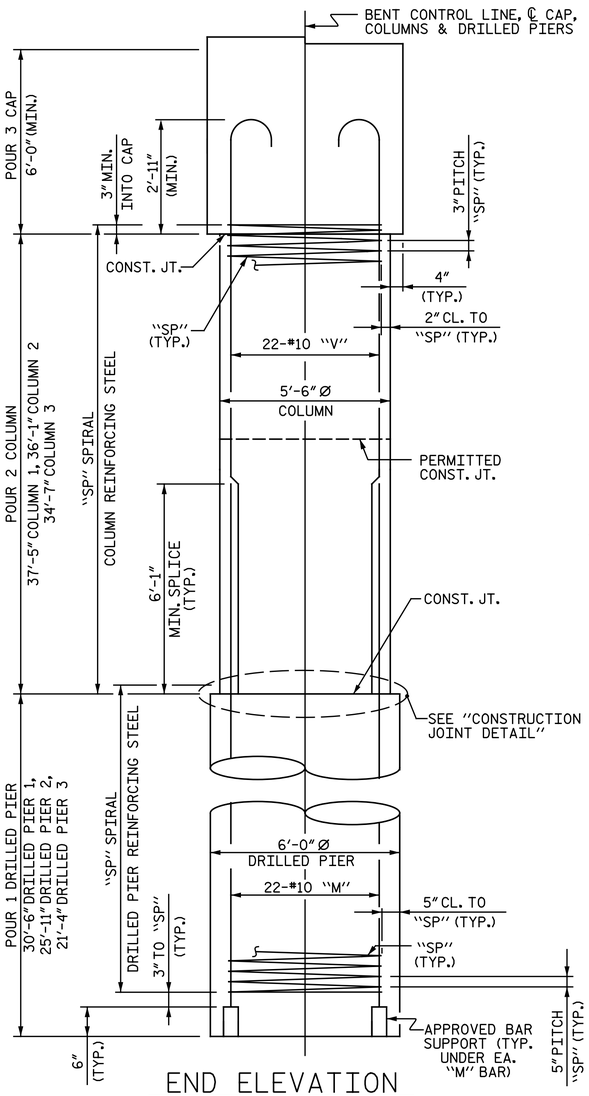
DRAWN BY : C. E. MAYHEW DATE : 5-21-18
CHECKED BY : A. H. SHARPE DATE : 5-21-18

Michael Baker INTERNATIONAL
Michael Baker Engineering
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518
NC License No. : F-1084

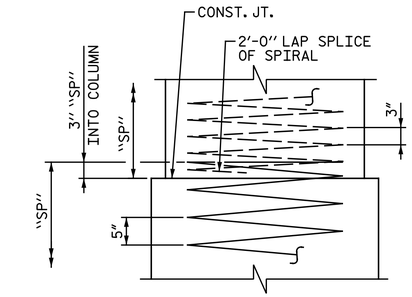
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-49
1			3			TOTAL SHEETS
2			4			63



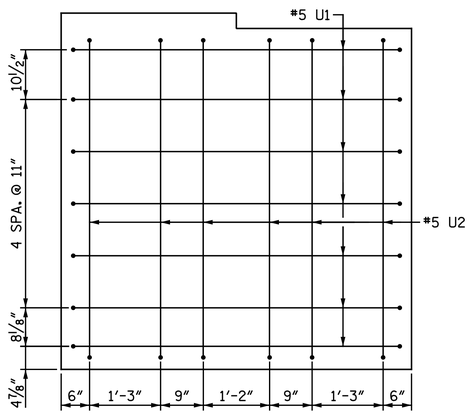
PLAN OF COLUMNS & DRILLED PIERS



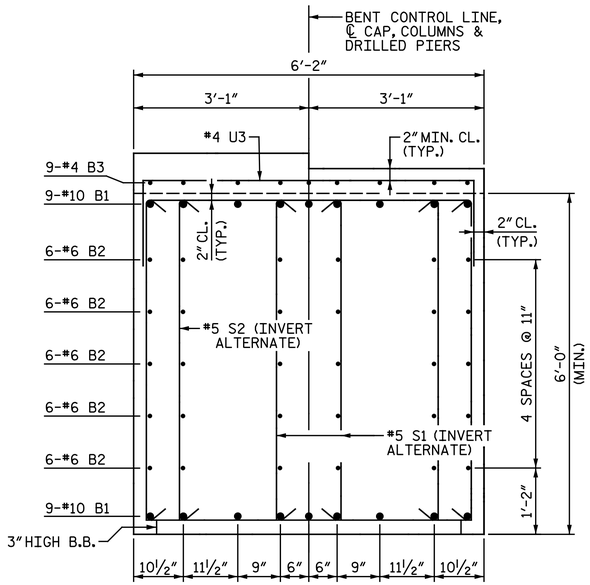
END ELEVATION



CONSTRUCTION JOINT DETAIL

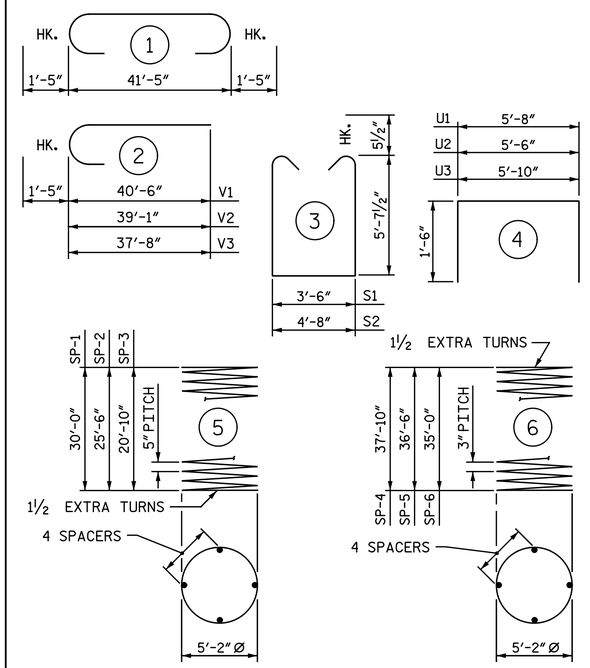


END VIEW



SECTION A-A

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

✱ THE SP-1 THRU SP-3 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.

✱✱ THE SP-4 THRU SP-6 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

BILL OF MATERIAL

BENT 3

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	18	#10	1	44′ - 3″	3,427
B2	30	#6	STR.	41′ - 5″	1,866
B3	36	#4	STR.	5′ - 4″	128
M1	22	#10	STR.	39′ - 1″	3,700
M2	22	#10	STR.	34′ - 7″	3,274
M3	22	#10	STR.	29′ - 11″	2,832
S1	80	#5	3	15′ - 8″	1,307
S2	40	#5	3	16′ - 10″	702
U1	14	#5	4	8′ - 8″	127
U2	12	#5	4	8′ - 6″	106
U3	44	#4	4	8′ - 10″	260
V1	22	#10	2	41′ - 11″	3,968
V2	22	#10	2	40′ - 6″	3,834
V3	22	#10	2	39′ - 1″	3,700
REINFORCING STEEL				LBS.	29,231
SP-1	1	✱	5	1181′ - 5″	1,232
SP-2	1	✱	5	1007′ - 10″	1,051
SP-3	1	✱	5	827′ - 9″	863
SP-4	1	✱✱	6	2461′ - 0″	1,644
SP-5	1	✱✱	6	2369′ - 9″	1,583
SP-6	1	✱✱	6	2278′ - 6″	1,522
SPIRAL COLUMN REINFORCING STEEL				LBS.	7,895

CLASS A CONCRETE		
POUR 2 - COLUMNS	C.Y.	95.0
POUR 3 - CAP	C.Y.	59.1
TOTAL CLASS A CONCRETE	C.Y.	154.1
DRILLED PIER CONCRETE		
POUR 1 - DRILLED PIERS	C.Y.	81.5
6′-0″ DIA. DRILLED PIERS IN SOIL	LIN. FT.	38.75
6′-0″ DIA. DRILLED PIERS NOT IN SOIL	LIN. FT.	39.00
SID INSPECTIONS	EA.	1
CSL TESTING	EA.	1
CSL TUBES	LIN. FT.	493.50

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/22/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

BENT 3 DETAILS

RIGHT LANE

DRAWN BY : C.E.M./N.B.S. DATE : 5-21-18
CHECKED BY : A. H. SHARPE DATE : 5-21-18

Michael Baker INTERNATIONAL
Michael Baker Engineering
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518
NC License No. : F-1084

REVISIONS						SHEET NO.
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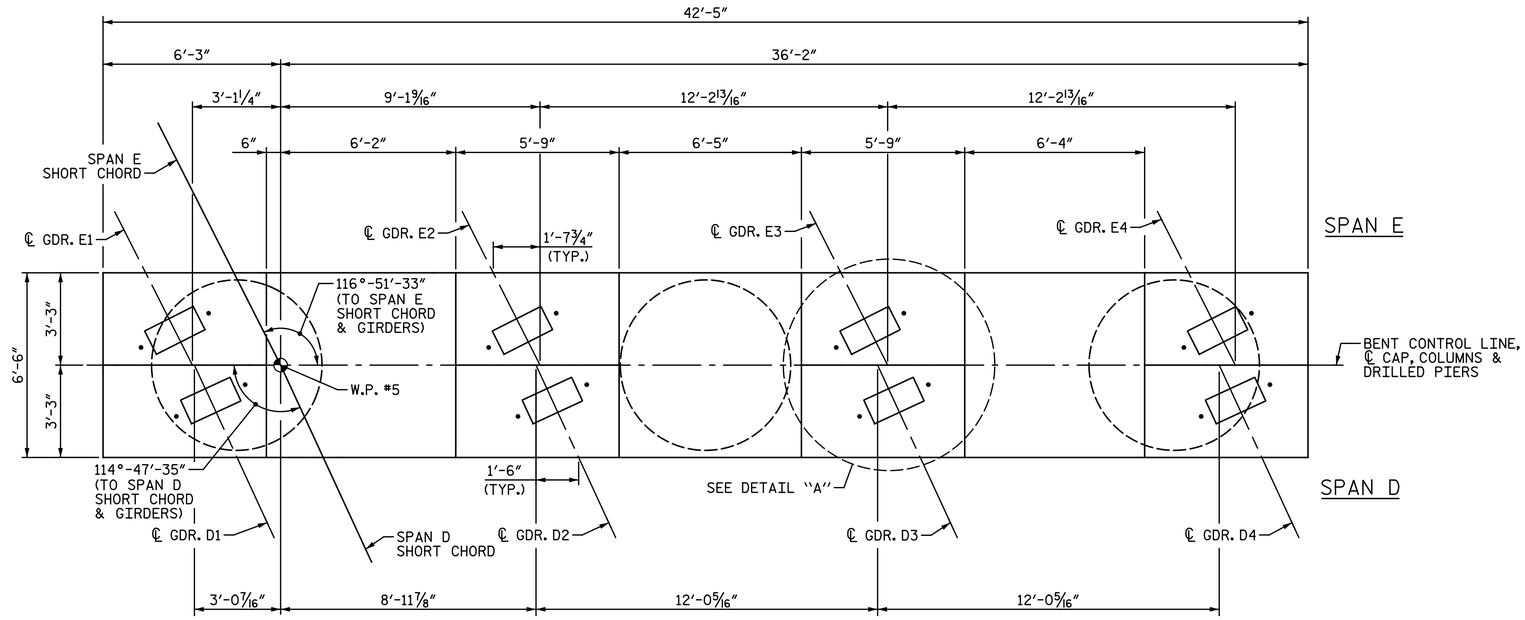
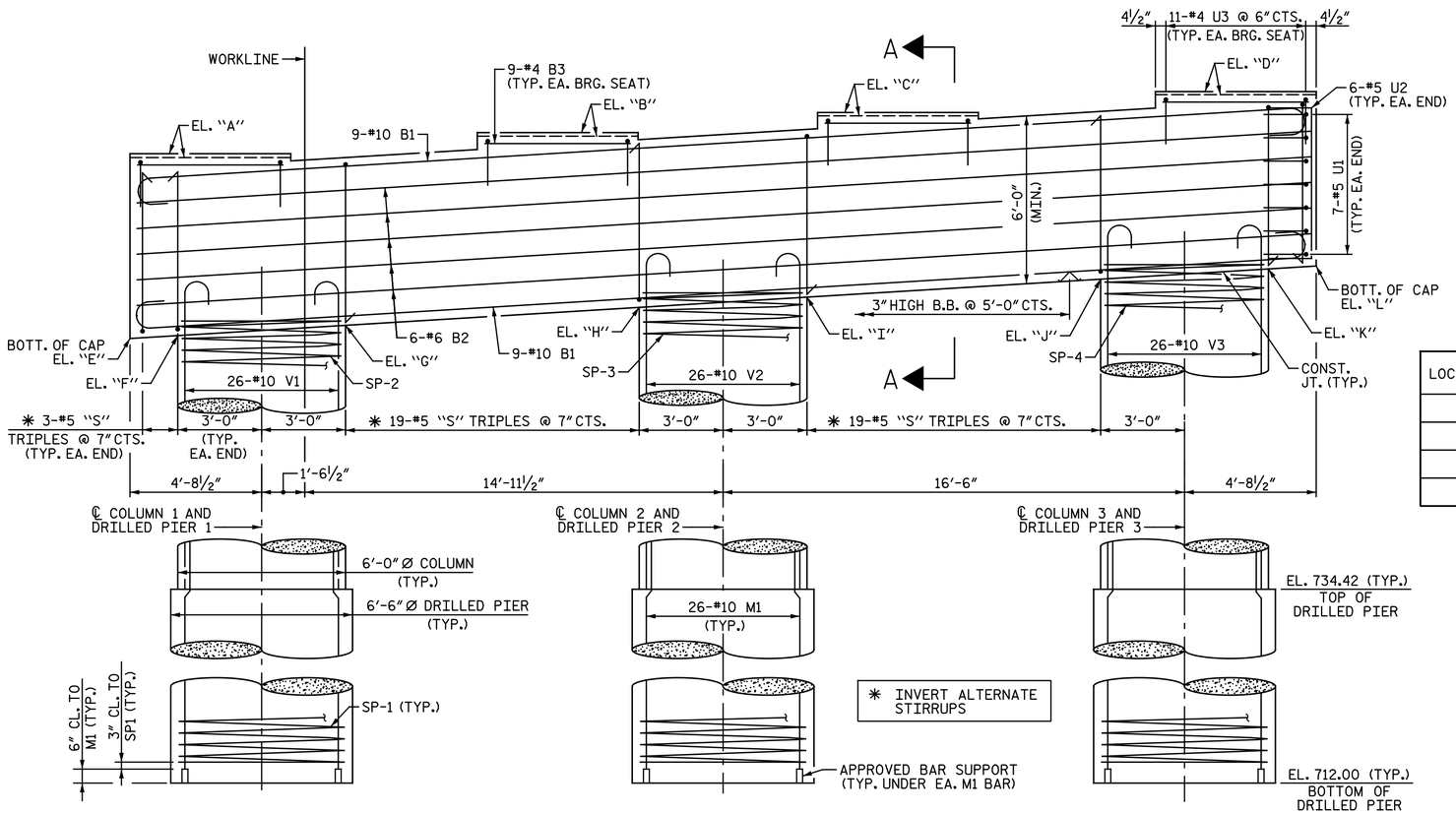
1			3			TOTAL SHEETS
2			4			63



PLAN



ELEVATION

LOCATION	ELEVATION SPAN D	ELEVATION SPAN E
A	786.95	786.84
B	787.69	787.59
C	788.44	788.35
D	789.18	789.11

LOCATION	ELEVATION
E	780.33
F	780.44
G	780.82
H	781.47
I	781.85
J	782.50
K	782.87
L	782.98

NOTES:

STIRRUPS AND ″U″ BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR SECTION A-A, SEE ″BENT 4 DETAILS″ SHEET.

HOOKS ON ″V″ BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR ″REINFORCING STEEL″ AND ″SPIRAL COLUMN REINFORCING STEEL″.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

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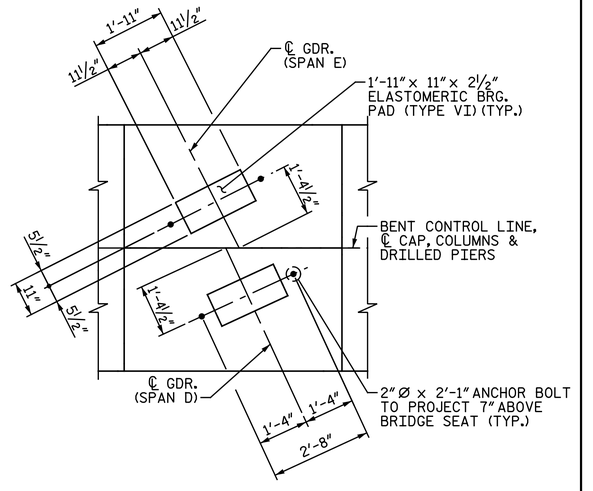
FOR MASS CONCRETE, SEE SPECIAL PROVISIONS.



DETAIL ″A″
(TYP. EA. BRIDGE SEAT)

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

DRAWN BY : C. E. MAYHEW DATE : 5-21-18

CHECKED BY : A. H. SHARPE DATE : 5-21-18

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/22/2018

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Michael Baker INTERNATIONAL

Michael Baker Engineering
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518
NC License No. : F-1084

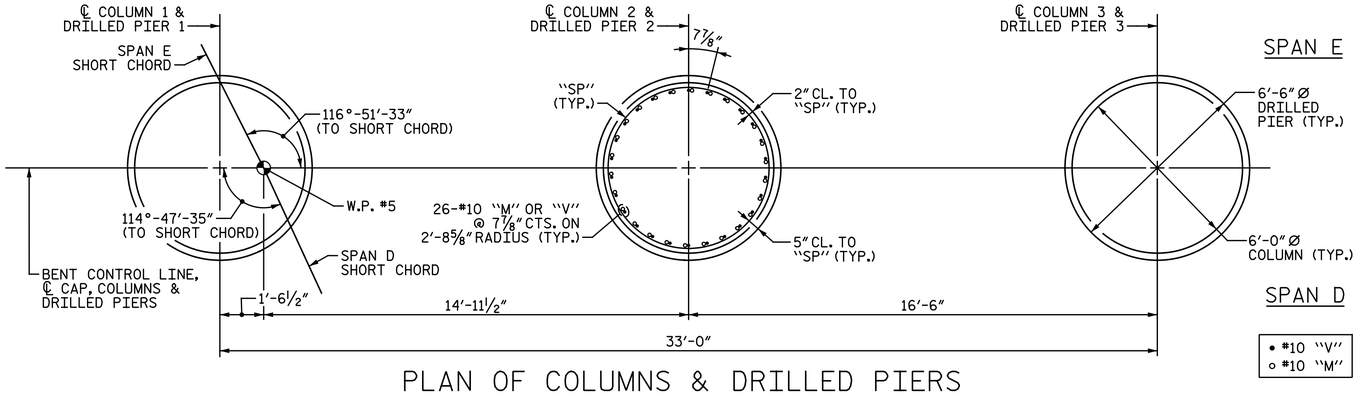
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

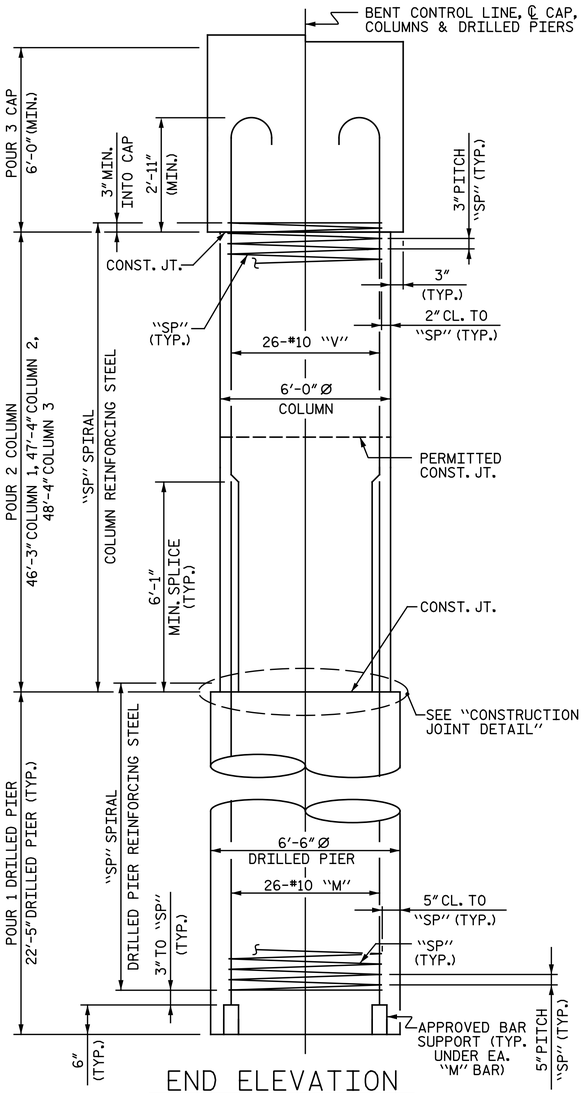
BENT 4

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-51
1			3			TOTAL SHEETS
2			4			63



PLAN OF COLUMNS & DRILLED PIERS



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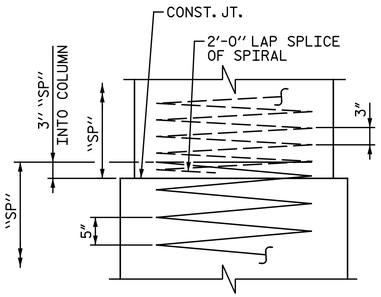
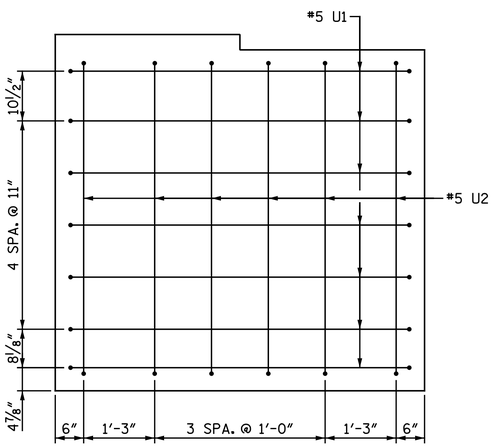
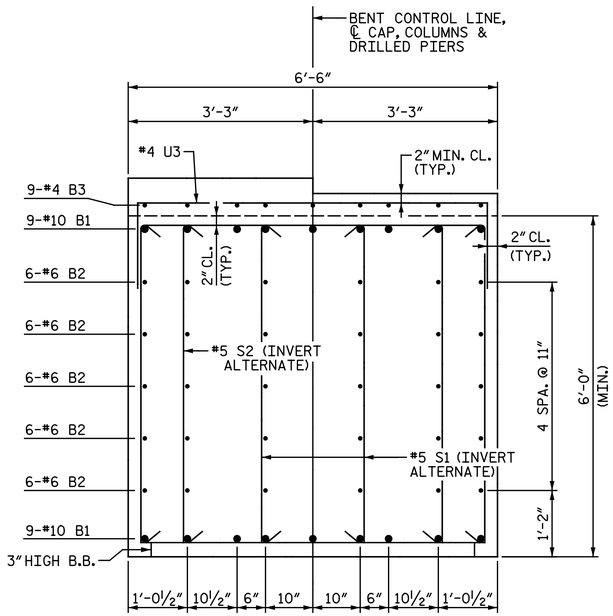


CONSTRUCTION JOINT DETAIL

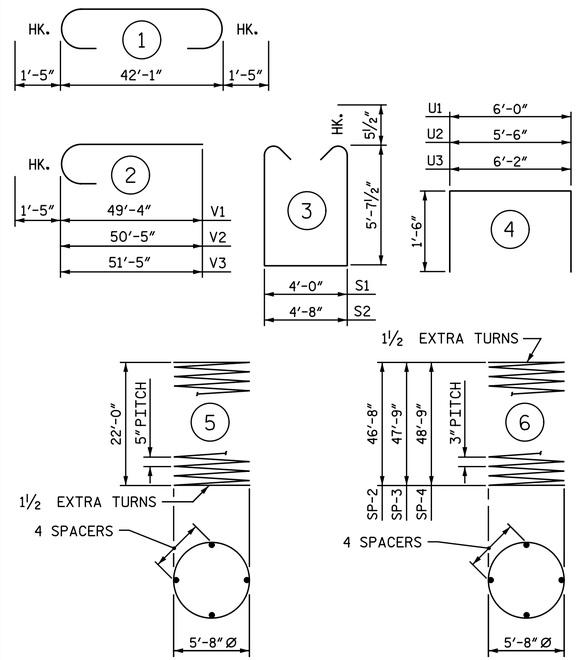


END VIEW



SECTION A-A

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

✱ THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.

✱✱ THE SP-2 THRU SP-4 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

BILL OF MATERIAL

BENT 4

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	18	#10	1	44′ - 11″	3,479
B2	30	#6	STR.	42′ - 1″	1,896
B3	36	#4	STR.	5′ - 5″	130
M1	78	#10	STR.	31′ - 1″	10,433
S1	88	#5	3	16′ - 2″	1,484
S2	44	#5	3	16′ - 10″	773
U1	14	#5	4	9′ - 0″	131
U2	12	#5	4	8′ - 6″	106
U3	44	#4	4	9′ - 2″	269
V1	26	#10	2	50′ - 9″	5,678
V2	26	#10	2	51′ - 10″	5,799
V3	26	#10	2	52′ - 10″	5,911
REINFORCING STEEL				LBS.	36,089
SP-1	3	✱	5	958′ - 1″	2,997
SP-2	1	✱✱	6	3325′ - 6″	2,221
SP-3	1	✱✱	6	3402′ - 1″	2,273
SP-4	1	✱✱	6	3472′ - 9″	2,320
SPIRAL COLUMN REINFORCING STEEL				LBS.	9,811

CLASS A CONCRETE		
POUR 2 - COLUMNS	C.Y.	148.5
POUR 3 - CAP	C.Y.	63.3
TOTAL CLASS A CONCRETE	C.Y.	211.8
DRILLED PIER CONCRETE		
POUR 1 - DRILLED PIERS	C.Y.	82.7
6′-6″ DIA. DRILLED PIERS IN SOIL	LIN. FT.	22.25
6′-6″ DIA. DRILLED PIERS NOT IN SOIL	LIN. FT.	45.00
PERMANENT STEEL CASING FOR 6′-6″ DIA. DRILLED PIER	LIN. FT.	27.26
SID INSPECTIONS	EA.	1
CSL TESTING	EA.	1
CSL TUBES	LIN. FT.	502.25

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/22/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

BENT 4 DETAILS

RIGHT LANE

DRAWN BY : C. E. MAYHEW DATE : 5-21-18
CHECKED BY : A. H. SHARPE DATE : 5-21-18

Michael Baker INTERNATIONAL
Michael Baker Engineering
8000 Regency Parkway, Suite 600
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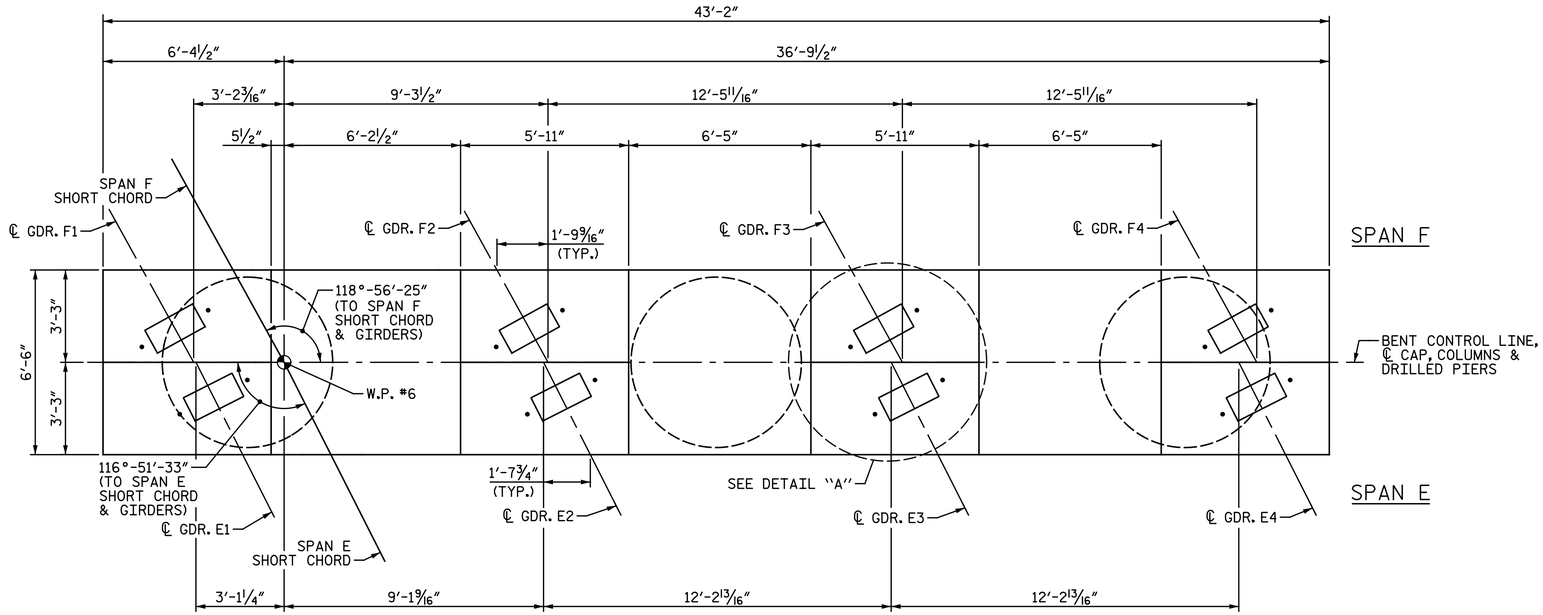
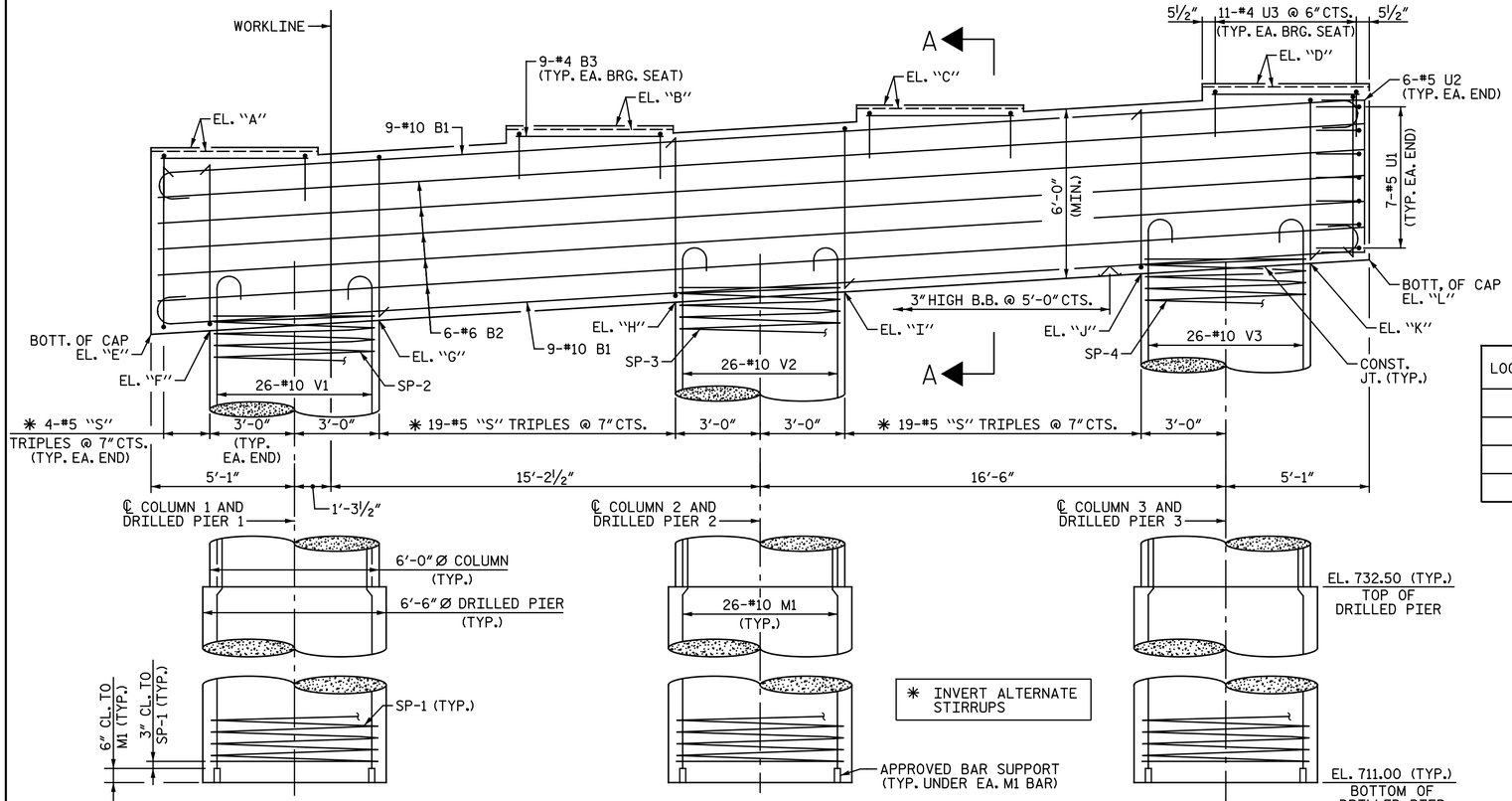
NC License No. : F-1084

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-52
1			3			TOTAL SHEETS
2			4			63



PLAN



ELEVATION

LOCATION	ELEVATION SPAN E	ELEVATION SPAN F
A	782.70	782.59
B	783.47	783.37
C	784.23	784.15
D	784.99	784.92

LOCATION	ELEVATION
E	776.08
F	776.21
G	776.59
H	777.25
I	777.63
J	778.29
K	778.66
L	778.79

NOTES:

STIRRUPS AND ″U″ BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR SECTION A-A, SEE ″BENT 5 DETAILS″ SHEET.

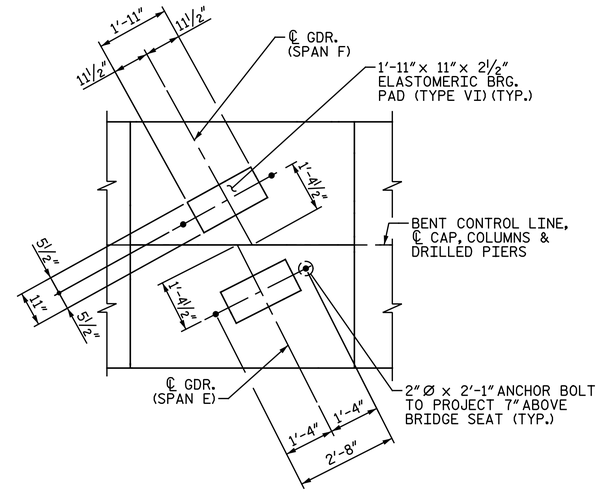
HOOKS ON ″V″ BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR ″REINFORCING STEEL″ AND ″SPIRAL COLUMN REINFORCING STEEL″.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FT. BELOW THE GROUND LINE.

FOR MASS CONCRETE, SEE SPECIAL PROVISIONS.



DETAIL ″A″
(TYP. EA. BRIDGE SEAT)

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 93+23.34 -L-

DRAWN BY : C. E. MAYHEW DATE : 5-21-18
CHECKED BY : A. H. SHARPE DATE : 5-21-18

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/22/2018

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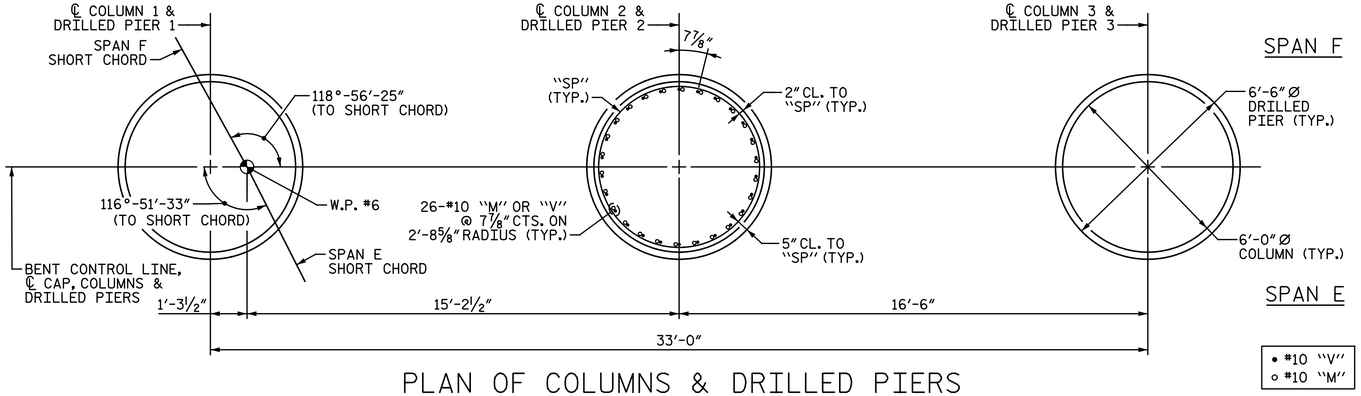
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

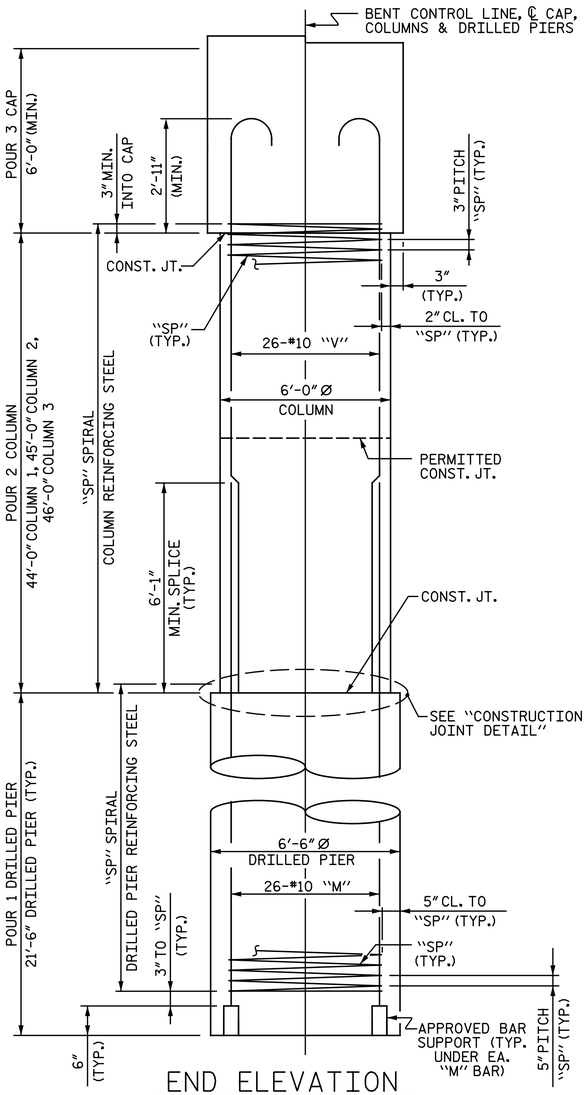
BENT 5

RIGHT LANE

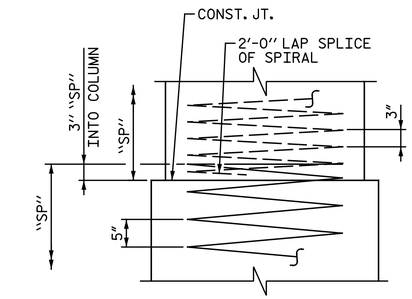
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-53
1			3			TOTAL SHEETS
2			4			63



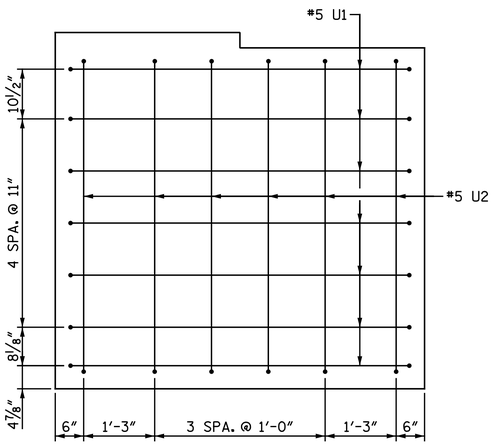
PLAN OF COLUMNS & DRILLED PIERS



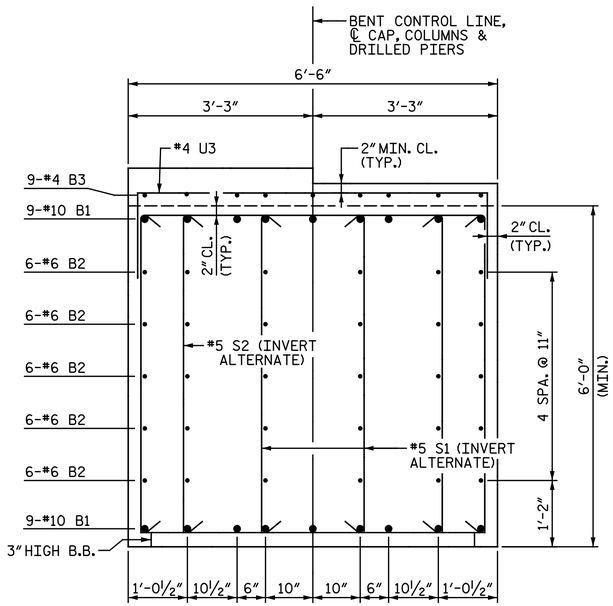
END ELEVATION



CONSTRUCTION JOINT DETAIL

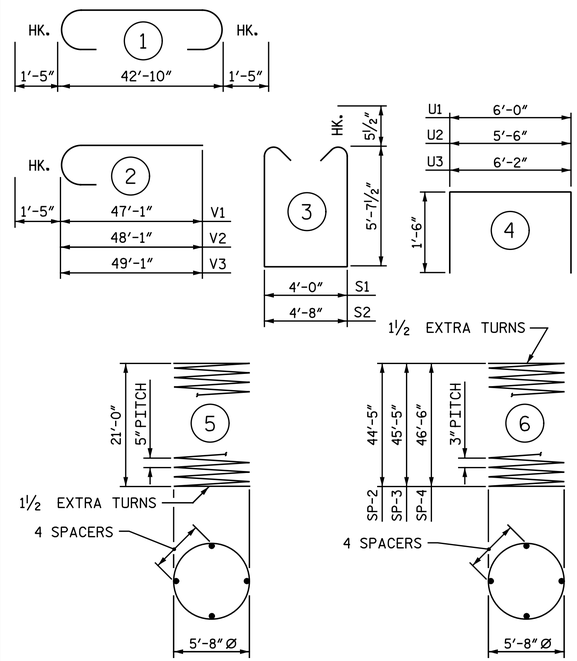


END VIEW



SECTION A-A

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

✳ THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.

✳✳ THE SP-2 THRU SP-4 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

BILL OF MATERIAL

BENT 5

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	18	#10	1	45′ - 8″	3,537
B2	30	#6	STR.	42′ - 10″	1,930
B3	36	#4	STR.	5′ - 7″	134
M1	78	#10	STR.	30′ - 1″	10,097
S1	92	#5	3	16′ - 2″	1,551
S2	46	#5	3	16′ - 10″	808
U1	14	#5	4	9′ - 0″	131
U2	12	#5	4	8′ - 6″	106
U3	44	#4	4	9′ - 2″	269
V1	26	#10	2	48′ - 6″	5,426
V2	26	#10	2	49′ - 6″	5,538
V3	26	#10	2	50′ - 6″	5,650
REINFORCING STEEL				LBS.	35,177
SP-1	3	✳	5	915′ - 8″	2,865
SP-2	1	✳✳	6	3166′ - 5″	2,115
SP-3	1	✳✳	6	3237′ - 2″	2,162
SP-4	1	✳✳	6	3307′ - 10″	2,210
SPIRAL COLUMN REINFORCING STEEL				LBS.	9,352

CLASS A CONCRETE		
POUR 2 - COLUMNS	C.Y.	141.2
POUR 3 - CAP	C.Y.	64.5
TOTAL CLASS A CONCRETE	C.Y.	205.7
DRILLED PIER CONCRETE		
POUR 1 - DRILLED PIERS	C.Y.	79.3
6′-6″DIA. DRILLED PIERS IN SOIL	LIN. FT.	14.50
6′-6″DIA. DRILLED PIERS NOT IN SOIL	LIN. FT.	50.00
PERMANENT STEEL CASING FOR 6′-6″DIA. DRILLED PIER	LIN. FT.	22.50
SID INSPECTIONS	EA.	1
CSL TESTING	EA.	1
CSL TUBES	LIN. FT.	483.00

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 93+23.34 -L-

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/22/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

BENT 5 DETAILS

RIGHT LANE

DRAWN BY : C. E. MAYHEW DATE : 5-21-18
CHECKED BY : A. H. SHARPE DATE : 5-21-18

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Cary, North Carolina 27518
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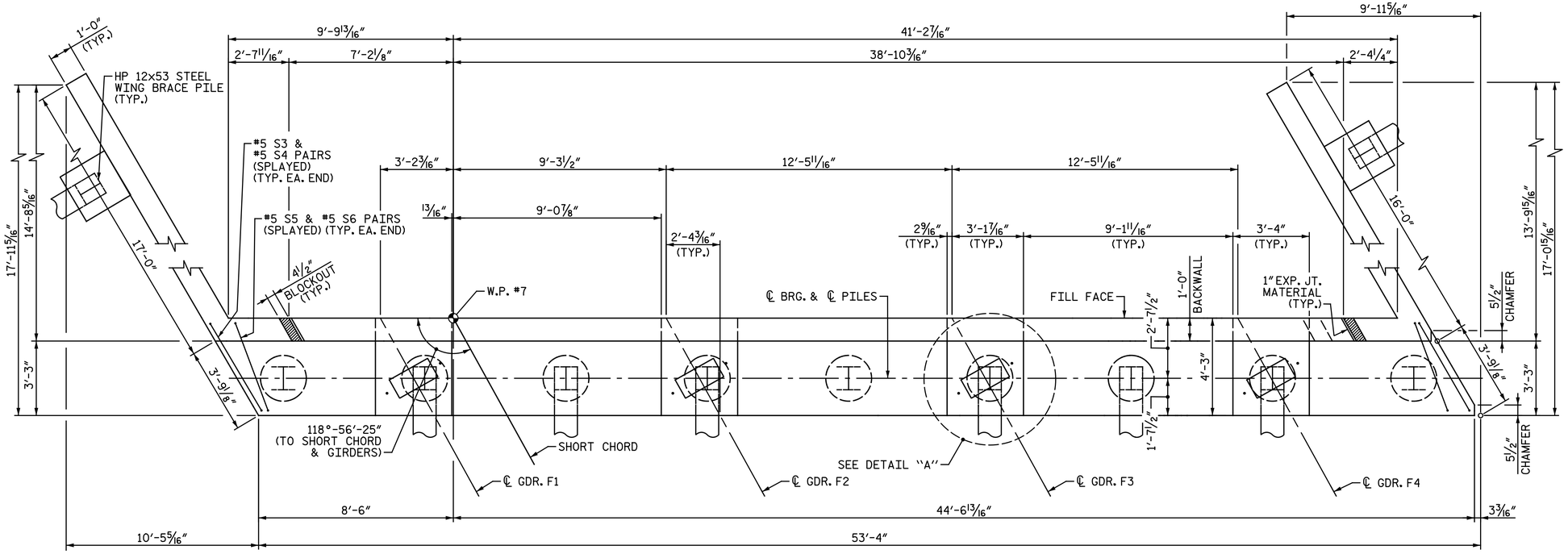
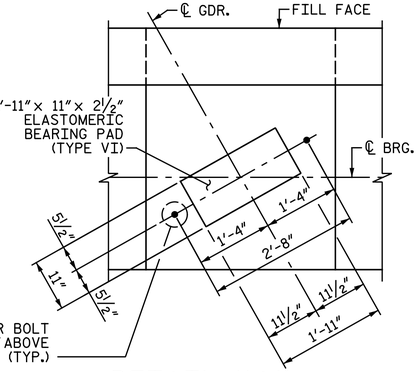
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-54
1			3			TOTAL SHEETS
2			4			63



PLAN



DETAIL "A"
(TYP. EA. BRIDGE SEAT)

NOTES:

SEE "GENERAL DRAWING" SHEET 4 OF 6 FOR LOCATIONS OF BRACE PILES IN WINGS.

FOR "SECTION A-A" AND "SECTION B-B", SEE "END BENT 2 DETAILS" SHEET.

STIRRUPS & U2 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

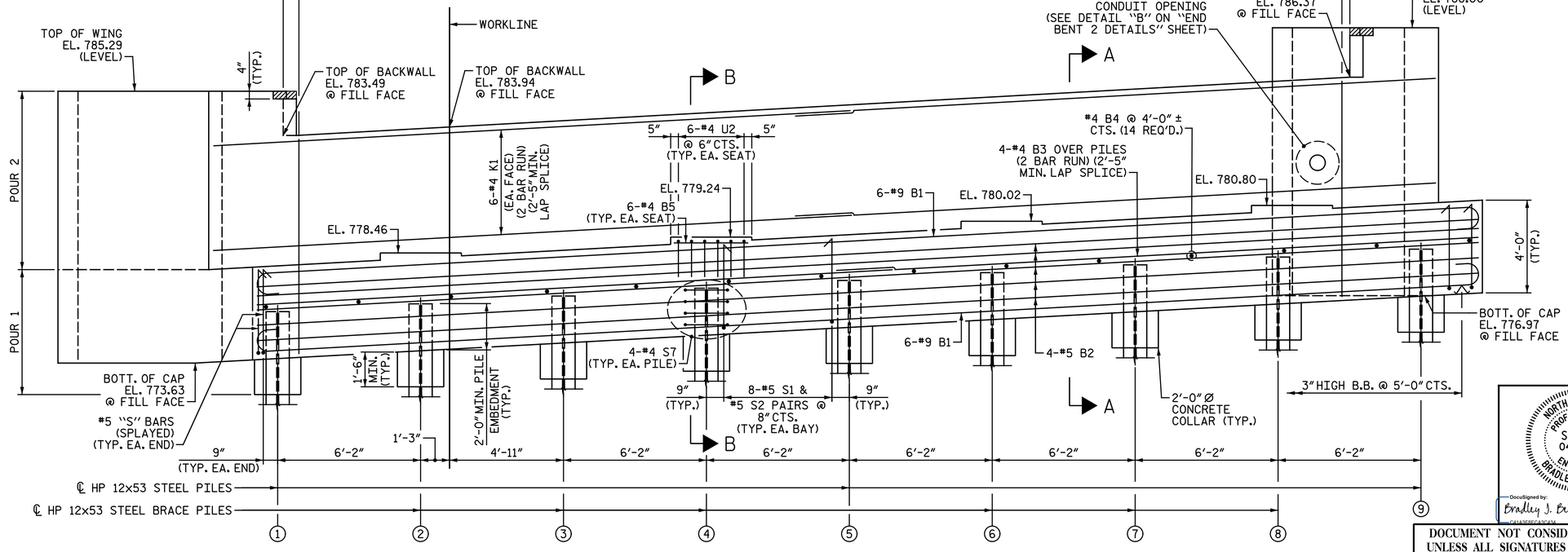
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE FRONT FACE AT A RATE OF 2%.

THE CONCRETE IN THE HATCHED AREA OF THE WING SHALL BE POURED AFTER THE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

V1 & K1 BARS IN BACKWALL MAY BE SHIFTED AS NECESSARY TO CLEAR CONDUIT OPENING.



ELEVATION
(BRACE PILES AND PILE CAPS IN WINGS NOT SHOWN FOR CLARITY)

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
1	775.88
2	776.27
3	776.65
4	777.04
5	777.42
6	777.81
7	778.20
8	778.58
9	778.97

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

SHEET 1 OF 2

DRAWN BY : C. E. MAYHEW DATE : 5-21-18
CHECKED BY : T. M. GARRISON DATE : 5-21-18

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

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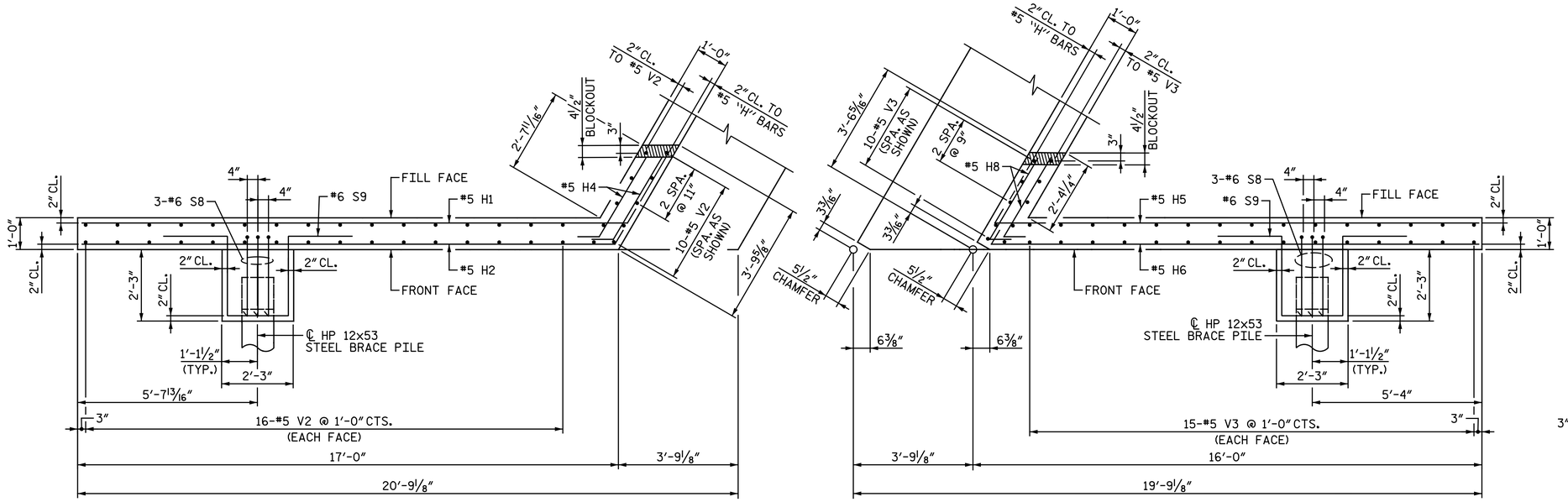
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-55
1			3			TOTAL SHEETS
2			4			63

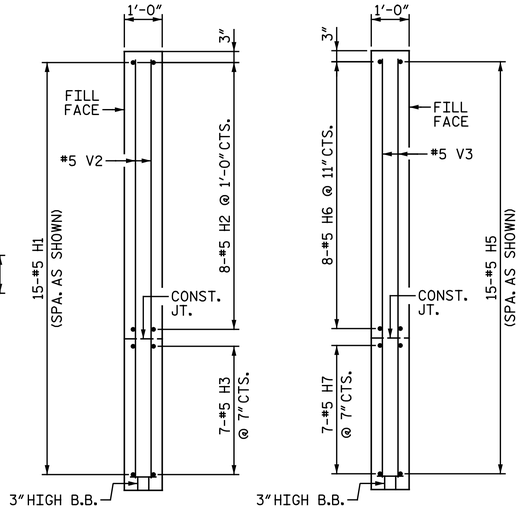


PLAN OF LEFT WING

(H3 & V4 BARS NOT SHOWN FOR CLARITY)

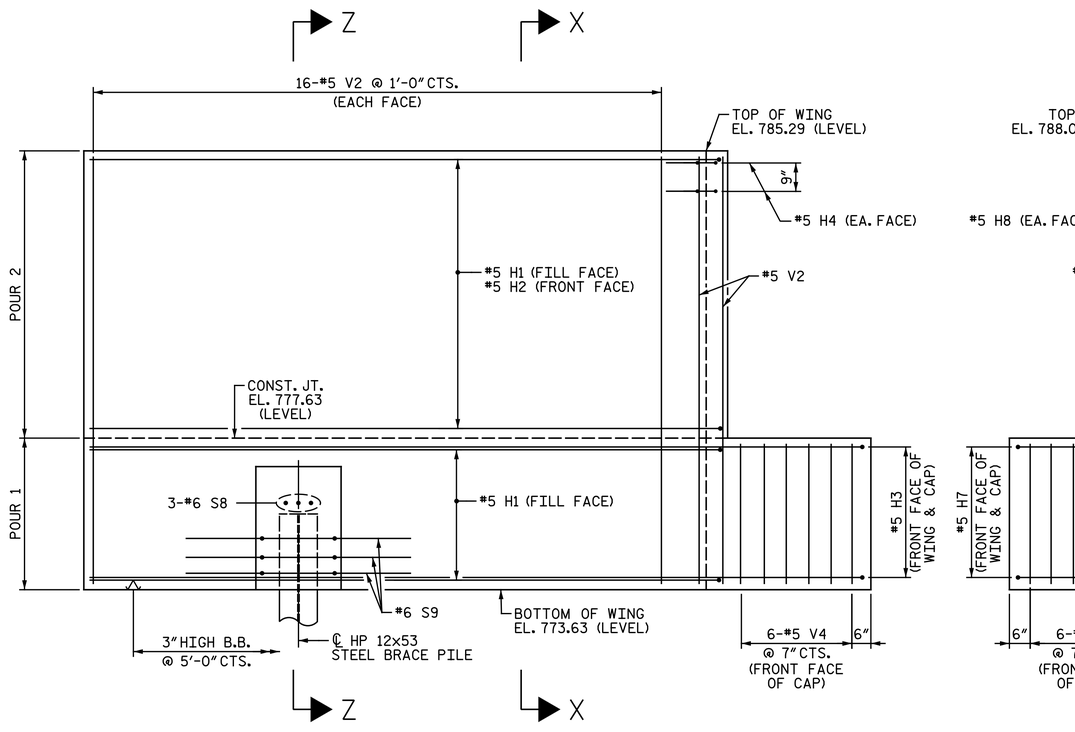
PLAN OF RIGHT WING

(H7 & V4 BARS NOT SHOWN FOR CLARITY)

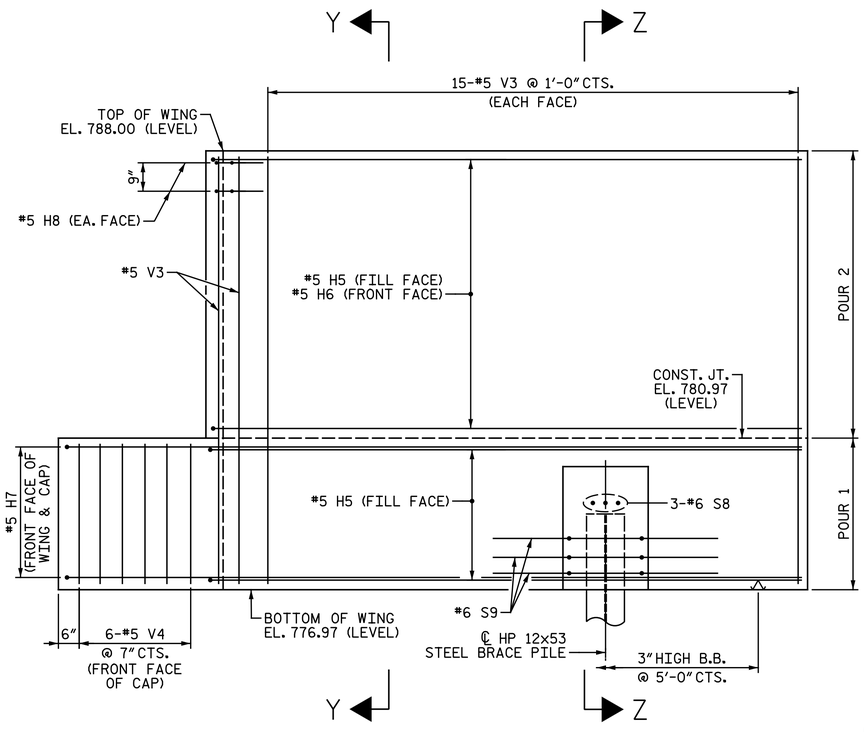


SECTION X-X

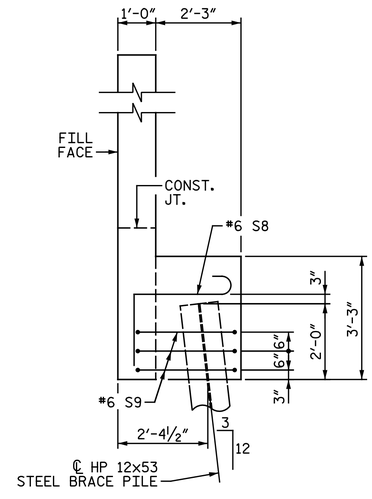
SECTION Y-Y



ELEVATION OF LEFT WING



ELEVATION OF RIGHT WING



SECTION Z-Z

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

SHEET 2 OF 2

DRAWN BY : C. E. MAYHEW DATE : 5-21-18

CHECKED BY : T. M. GARRISON DATE : 5-21-18

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 6/4/2018

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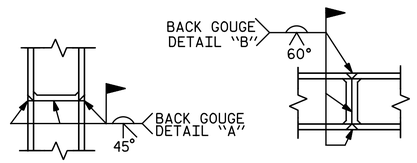
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

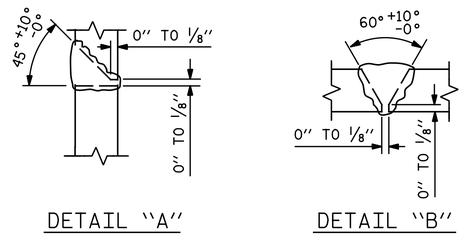
SUBSTRUCTURE

END BENT 2

RIGHT LANE

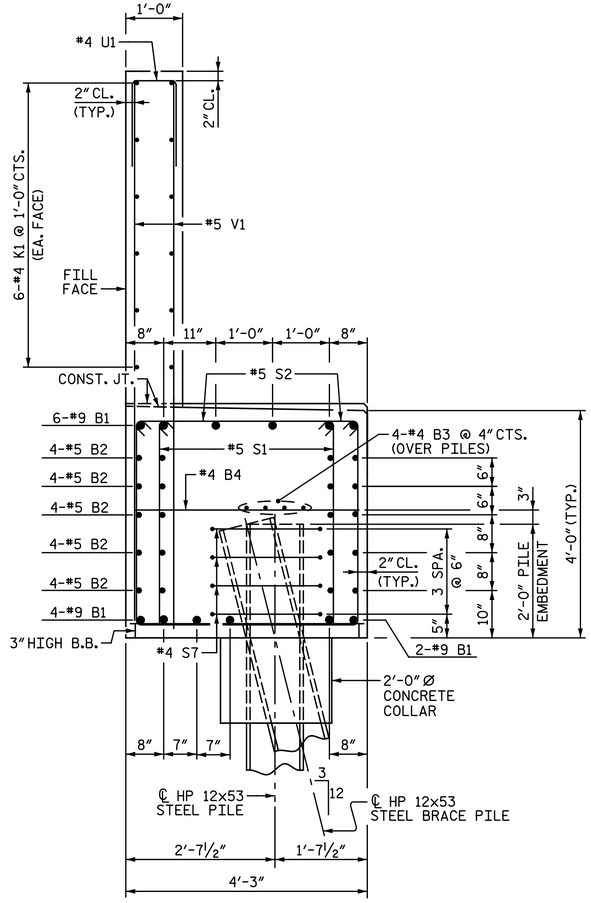
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-56
1			3			TOTAL SHEETS
2			4			63





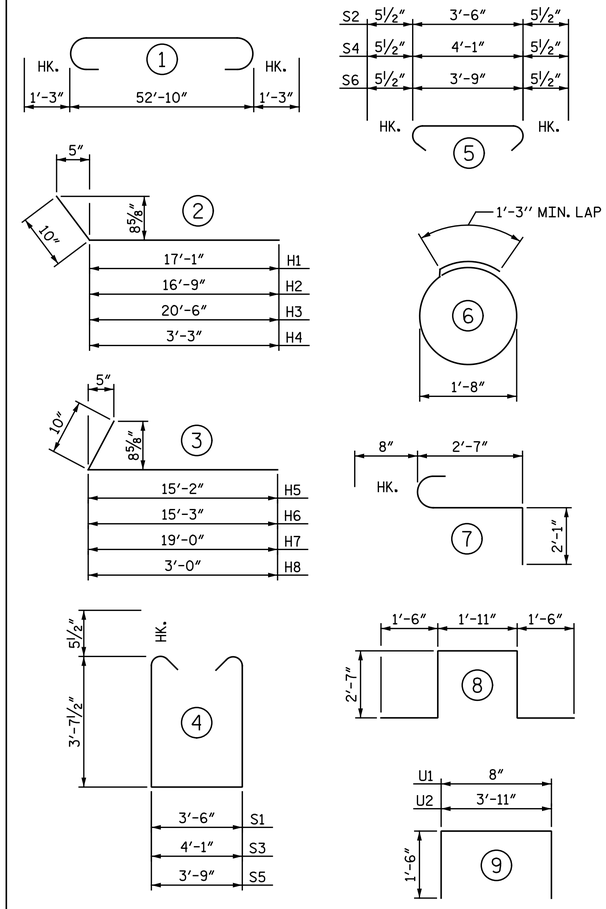
PILE SPLICE DETAILS

*POSITION OF PILE DURING WELDING



SECTION A-A

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

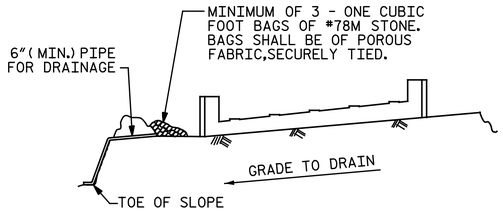
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9	1	55' - 4"	2,258
B2	20	#5	STR.	52' - 10"	1,102
B3	8	#4	STR.	27' - 9"	148
B4	14	#4	STR.	3' - 11"	37
B5	24	#4	STR.	3' - 0"	48
H1	15	#5	2	17' - 11"	280
H2	8	#5	2	17' - 7"	147
H3	7	#5	2	21' - 4"	156
H4	4	#5	2	4' - 1"	17
H5	15	#5	3	16' - 0"	250
H6	8	#5	3	16' - 1"	134
H7	7	#5	3	19' - 10"	145
H8	4	#5	3	3' - 10"	16
K1	24	#4	STR.	27' - 9"	445
K2	8	#4	STR.	3' - 8"	20
S1	128	#5	4	11' - 8"	1,558
S2	128	#5	5	4' - 5"	590
S3	4	#5	4	12' - 2"	51
S4	4	#5	5	4' - 11"	21
S5	4	#5	4	11' - 11"	50
S6	4	#5	5	4' - 8"	19
S7	36	#4	6	6' - 6"	156
S8	6	#6	7	5' - 4"	48
S9	6	#6	8	10' - 1"	91
U1	46	#4	9	3' - 8"	113
U2	24	#4	9	6' - 11"	111
V1	92	#5	STR.	9' - 3"	888
V2	42	#5	STR.	11' - 3"	493
V3	40	#5	STR.	10' - 8"	445
V4	12	#5	STR.	3' - 8"	46

REINFORCING STEEL LBS. 9,883

CLASS A CONCRETE
POUR 1 - CAP, COLLARS, LOWER PART OF WINGS, & PILE CAPS IN WINGS C.Y. 41.5
POUR 2 - BACKWALL & UPPER PART OF WINGS C.Y. 19.9
TOTAL C.Y. 61.4

PILE DRIVING EQUIPMENT SETUP FOR HP 12x53 STEEL PILES EA. 11

HP 12x53 STEEL PILES NO. 11 LIN. FT. 475

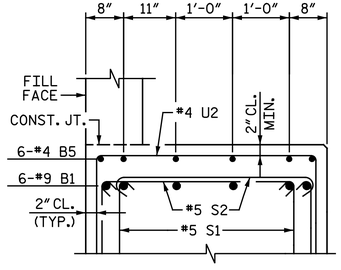


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

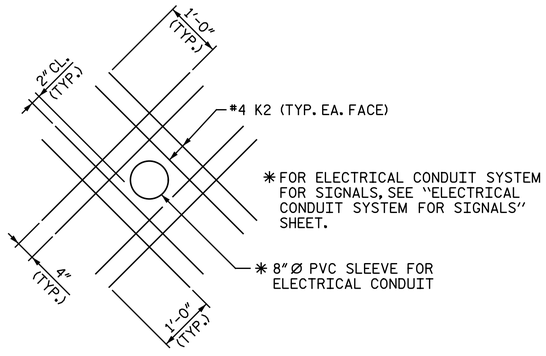
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



PARTIAL SECTION B-B



DETAIL "B"

THE PVC SLEEVE THROUGH THE BACKWALL SHALL BE LOCATED BY THE ENGINEER. THE K2 BARS MAY BE SHIFTED AS NECESSARY TO CLEAR TOP OF CAP.

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 93+23.34 -L-

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/22/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 DETAILS

RIGHT LANE

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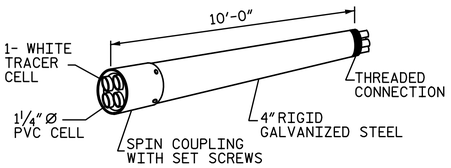
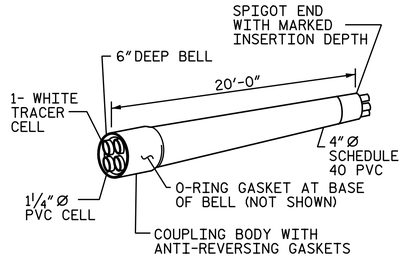
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-57
1			3			TOTAL SHEETS
2			4			63

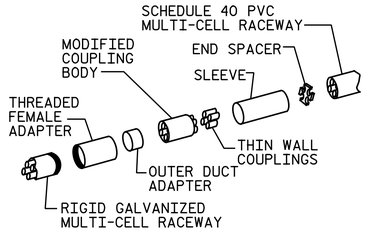
DRAWN BY : C. E. MAYHEW DATE : 5-21-18
CHECKED BY : T. M. GARRISON DATE : 5-21-18



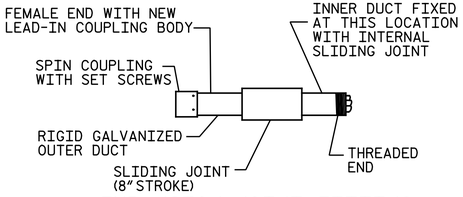
RIGID GALVANIZED (RGC)
MULTI-CELL RACEWAY



SCHEDULE 40 PVC
MULTI-CELL RACEWAY



TRANSITION ADAPTER



EXPANSION JOINT FITTING

NOTES

THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE TOTAL QUANTITY OF CONDUIT NEEDED TO COMPLETE THE WORK AND THAT THE CONDUIT(S) ARE PLACED AT THE NOTED DIMENSION AND ABOVE THE BOTTOM OF THE GIRDER.

THE INSTALLATION OF THE CONDUIT SYSTEM SHALL BE PAID FOR AS LUMP SUM. THE PRICE SHALL INCLUDE ALL CONDUIT, HANGERS, STABILIZERS, EXPANSION JOINTS, CONCRETE INSERTS, PVC SLEEVES AND ALL NECESSARY HARDWARE TO COMPLETE THE WORK.

THE CONTRACTOR SHALL FIELD VERIFY THAT THE CONDUIT SYSTEM IS NOT IN CONFLICT WITH THE GUARDRAIL POSTS.

SEE DETAIL "C" FOR HANGER ASSEMBLY INSTALLATION.

INSTALL SLEEVES PARALLEL TO GIRDERS. SEE DETAIL "B" FOR SLEEVE INSTALLATION.

PROVIDE TRANSITION ADAPTOR (AND EXPANSION JOINT) FOR CONDUIT AT END BENT 1 (AND END BENT 2).

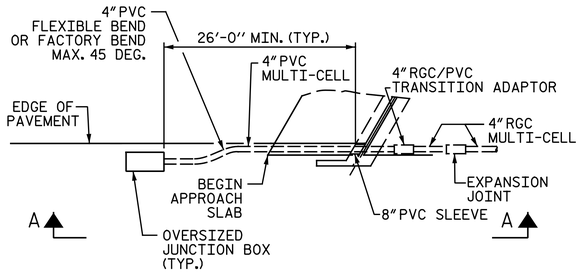
INSTALL STABILIZER'S MIDWAY BETWEEN DECK EXPANSION JOINTS. STABILIZER CAN NOT BE USED INSTEAD OF A HANGER ASSEMBLY.

INSTALL EXPANSION JOINTS AT BENT 3.

THE CONCRETE SCREW INSERT SHALL HAVE A ROD SIZE OF 5/8" AND A PULL FORCE OF 1260 lbs.

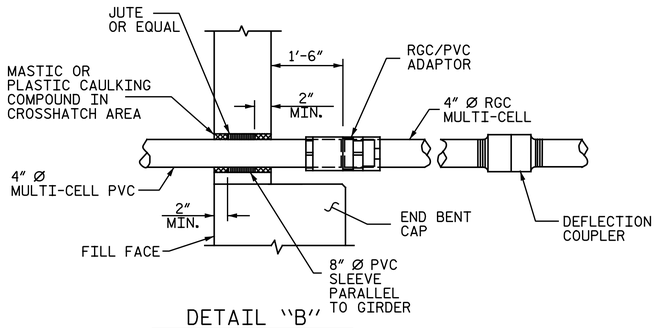
FOR ELECTRICAL CONDUIT SYSTEM FOR SIGNALS, SEE SPECIAL PROVISIONS.

FOR OVERSIZED JUNCTION BOX, SEE ARTICLE 1098-5 OF THE STANDARD SPECIFICATIONS.

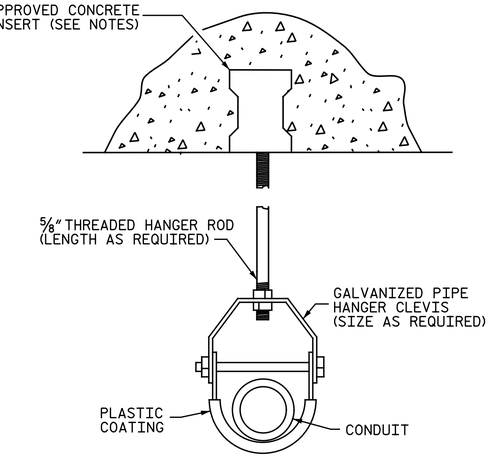


DETAIL "A"
TERMINATION OF CONDUIT THROUGH WING WALL TO OVERSIZED JUNCTION BOX

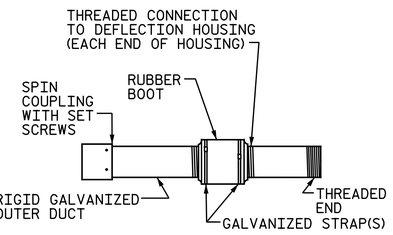
DETAIL "D"
4″ MULTI-CELL COMPONENTS



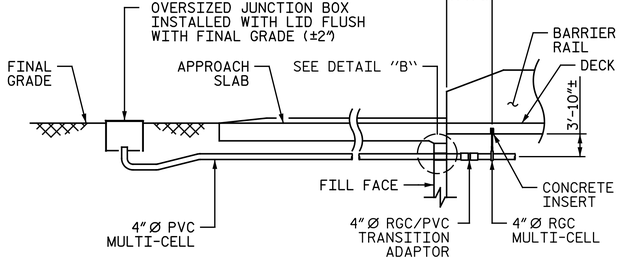
DETAIL "B"
PVC SLEEVE INSTALLATION & RGC/PVC ADAPTOR AT BACKWALL.



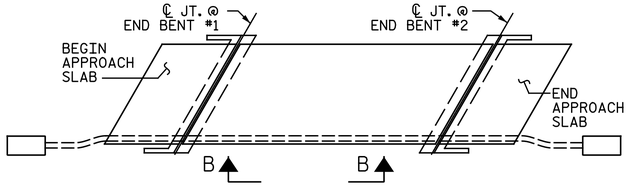
DETAIL "C"
HANGER ASSEMBLY



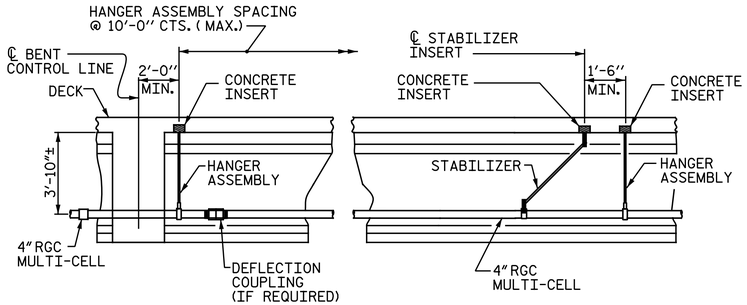
DETAIL "F"
DEFLECTION COUPLING



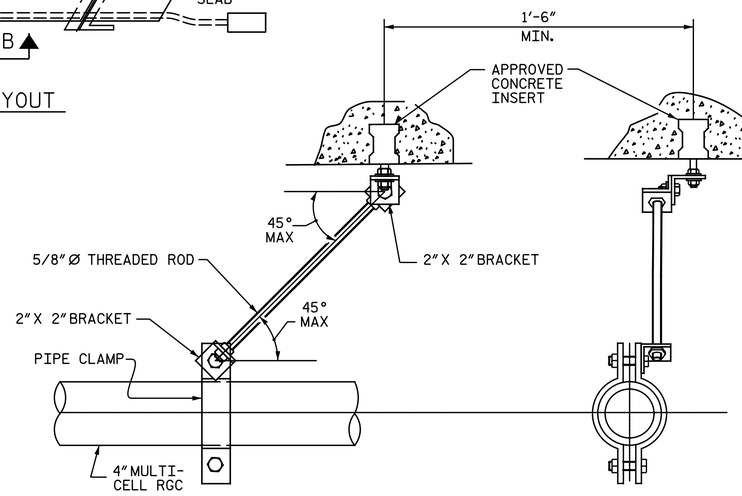
VIEW "A-A"



CONDUIT LAYOUT



VIEW B-B
PRESTRESSED GIRDERS CONTINUOUS FOR LIVE LOAD



DETAIL "E"
STABILIZER

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 93+23.34 -L-

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL
DocuSigned by: Bradley J. Bell 5/7/2018
C41A3F8ECA3C434...

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

ELECTRICAL CONDUIT SYSTEM FOR SIGNALS

RIGHT LANE

ASSEMBLED BY : N.B. SPEAKS	DATE : 4-23-18
CHECKED BY : V.A. PATEL	DATE : 5-3-18

DRAWN BY : RWW	2-4-03	REV. 5/1/06	TLA/GM
CHECKED BY : DBM	2-4-03	REV. 10/1/11	MAA/GM
		REV. 12/17	MAA/THC

ELECTRIC CONDUIT DETAILS

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Cary, North Carolina 27518
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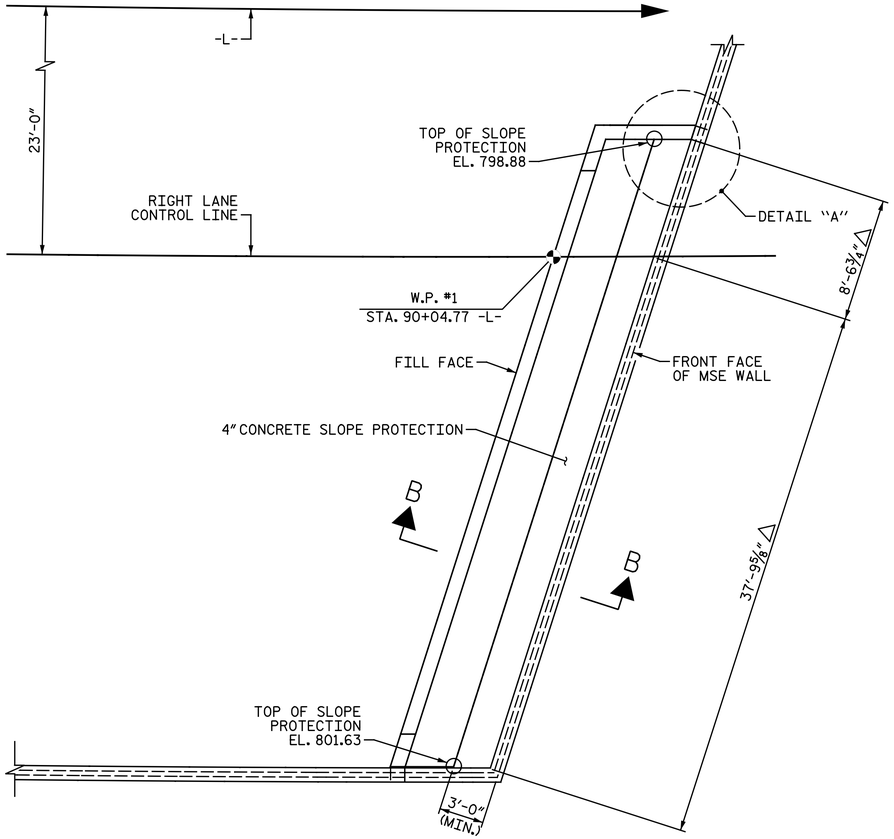
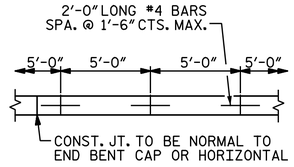
1			3			TOTAL SHEETS
2			4			63

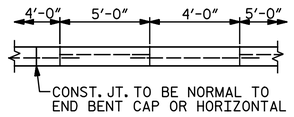
STD. NO. ECS1



PLAN AT END BENT 1



POURING DETAIL

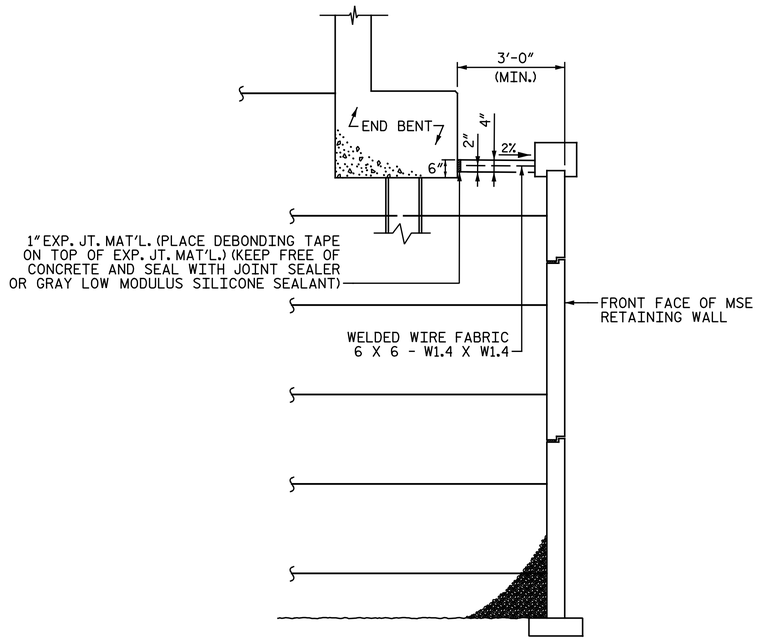


OPTIONAL POURING DETAIL

POUR A 4'-0" STRIP FIRST.

△ DIMENSION TO BE ADJUSTED AS REQUIRED IN FIELD TO MATCH MSE WALL.

DETAIL "A"



SECTION B-B

NOTES:

SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS.

SLOPE PROTECTION SHALL CONSIST OF 4'' POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B''. THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60'' WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE "POURING DETAIL'' WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL'' WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6''. THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

BRIDGE @ STA. 93+23.34 -L- (RIGHT LANE)	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	13	25

* QUANTITY SHOWN IS BASED ON 5' POURS.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/7/2018 C41A3F8ECA3C434...

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION DETAILS

RIGHT LANE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : C. E. MAYHEW DATE : 2-2-18
CHECKED BY : T. M. GARRISON DATE : 2-2-18

Michael Baker INTERNATIONAL
Michael Baker Engineering
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518
NC License No. : F-1084

REVISIONS						SHEET NO.
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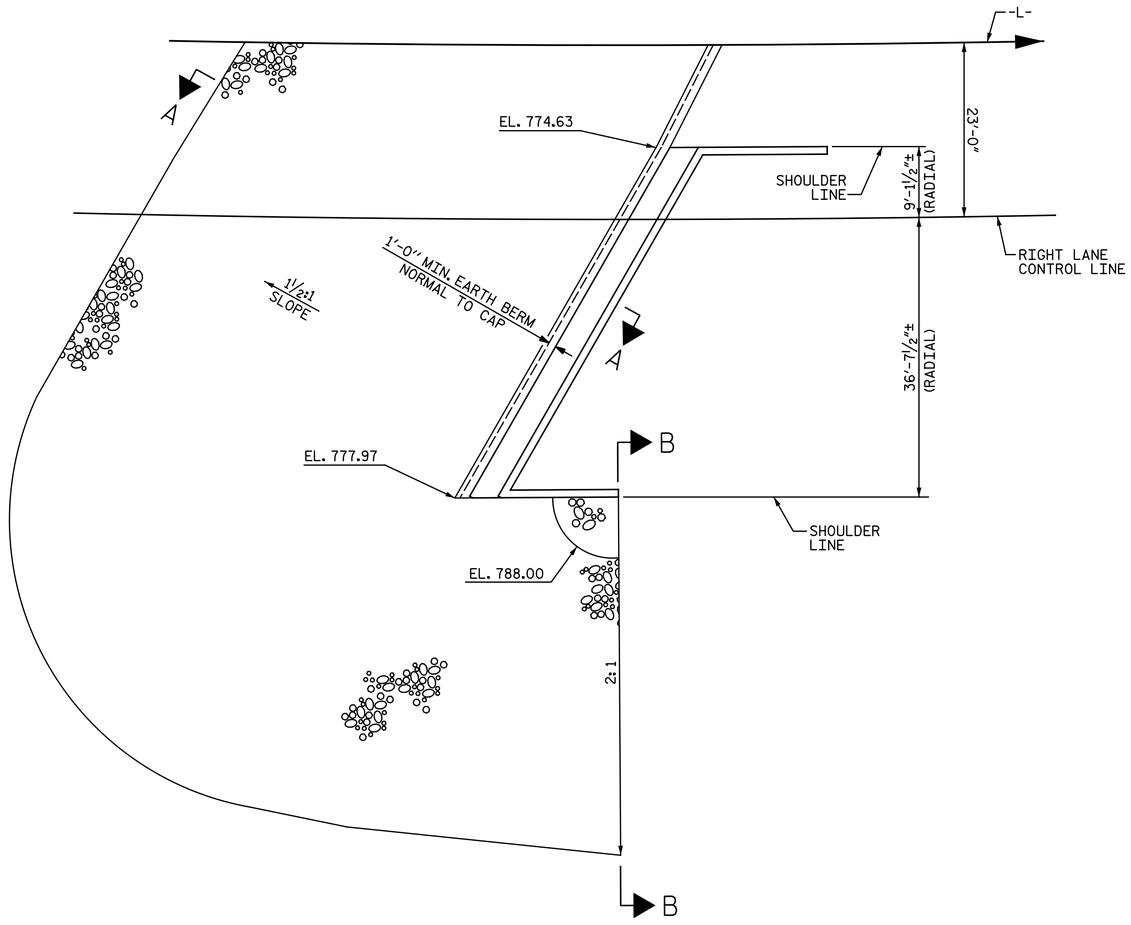
1			3			TOTAL SHEETS
2			4			63

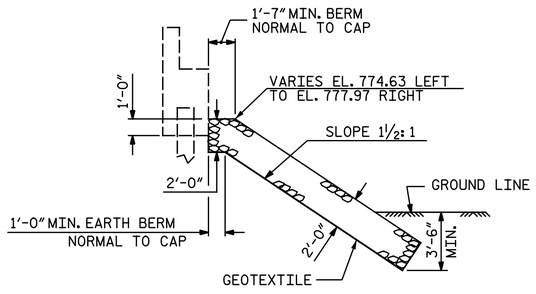
NOTES :

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

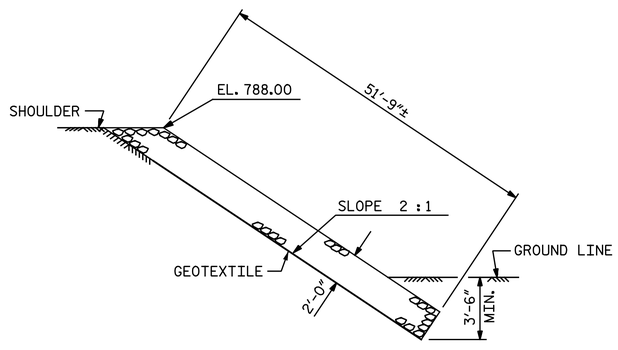


END BENT 2

SHOULDER RIP RAP IS HIGHER THAN BERM RIP RAP



SECTION A-A



SECTION B-B

ESTIMATED QUANTITIES		
BRIDGE @ STA. 93+23.34 -L- (RIGHT LANE)	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 2	890	985

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/7/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP DETAILS

RIGHT LANE

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NC License No.: F-1084

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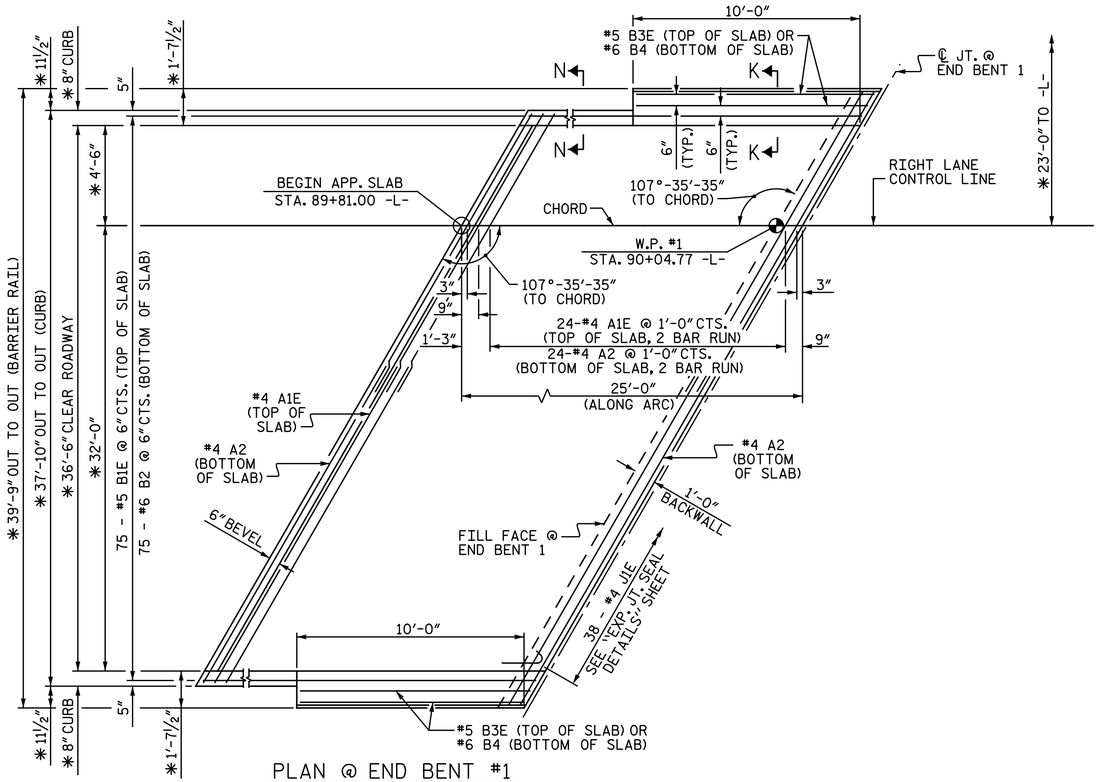
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-60
1			3			TOTAL SHEETS
2			4			63

DRAWN BY : N. B. SPEAKS DATE : 1-30-18

CHECKED BY : T. M. GARRISON DATE : 1-31-18



PLAN @ END BENT #1

*RADIAL DIMENSIONS

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, MSE WALL REINFORCEMENT AND BACKFILL MATERIAL SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

BACKFILL MATERIAL SHALL BE THE SAME MATERIAL USED IN THE MSE REINFORCED ZONE.

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

ARC OFFSETS ARE NEGLIGIBLE AND THEREFORE NOT SHOWN.

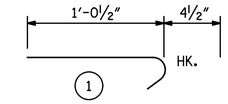
THE QUANTITY OF #4 J1E BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1E BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1E BARS SPECIFIED, ADDITIONAL J1E BARS WILL NOT BE REQUIRED.

BILL OF MATERIAL

APPROACH SLAB AT BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1E	50	#4	STR.	21' - 9"	726
A2	52	#4	STR.	21' - 8"	753
B1E	75	#5	STR.	23' - 8"	1,851
B2	75	#6	STR.	24' - 7"	2,769
B3E	4	#5	STR.	9' - 7"	40
B4	4	#6	STR.	9' - 7"	58
J1E	38	#4	1	1' - 5"	36
REINFORCING STEEL				LBS.	3,580
EPOXY COATED REINFORCING STEEL				LBS.	2,653
CLASS AA CONCRETE				C.Y.	42.0

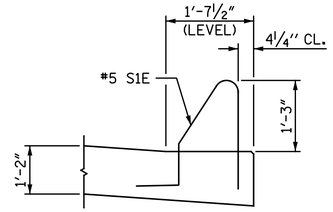
BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

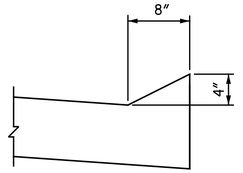
"E" SUFFIX DENOTES EPOXY COATED REINFORCING STEEL.

QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE "BRIDGE APPROACH SLAB DETAILS".

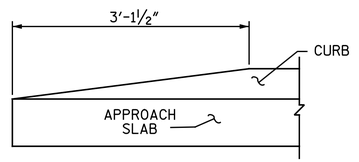


SECTION K-K

SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"

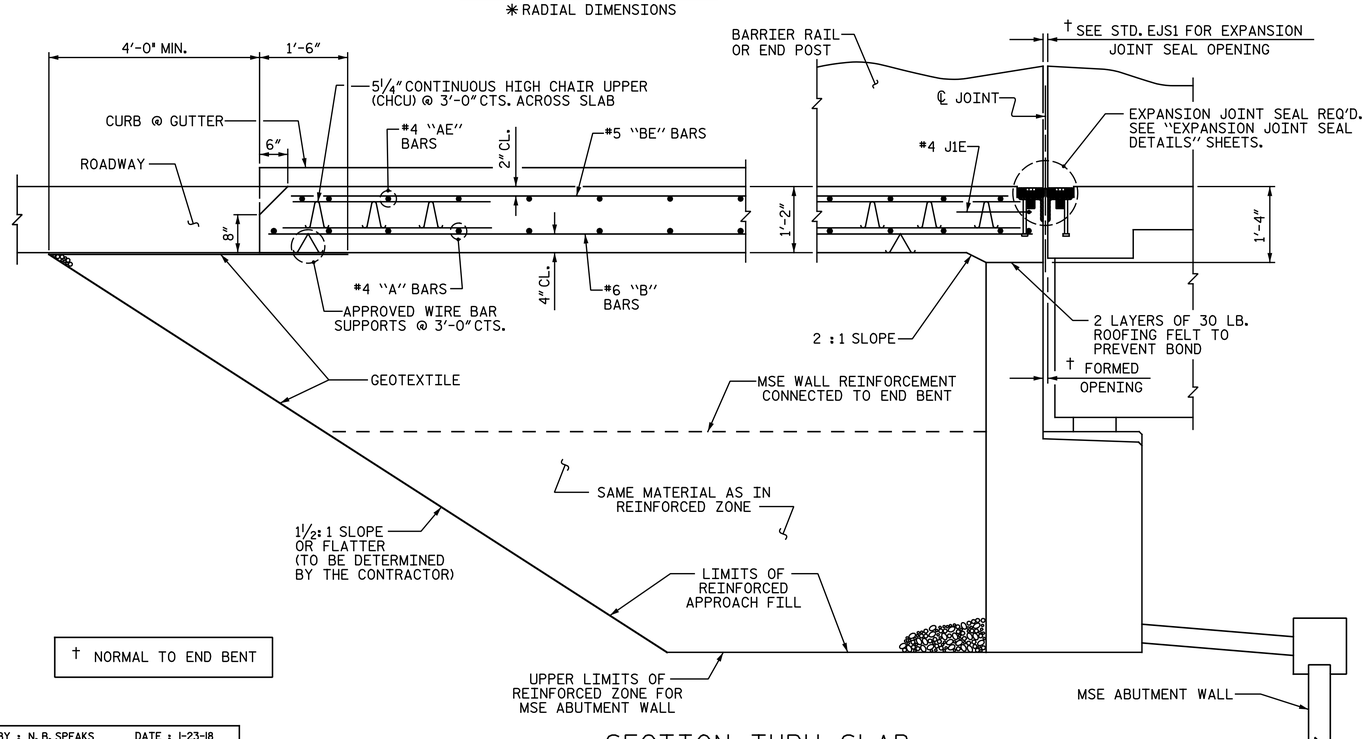


SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS



† NORMAL TO END BENT

SECTION THRU SLAB

(TYPE III - REINFORCED APPROACH FILL)

ASSEMBLED BY : N. B. SPEAKS		DATE : 1-23-18	
CHECKED BY : V. A. PATEL		DATE : 4-11-18	
DRAWN BY : EEM 3/95	REV. 12/21/11		MAA/GM
CHECKED BY : VAP 3/95	REV. 6/13		MAA/GM
	REV. 12/17		MAA/THC

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/7/2018

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Michael Baker Engineering
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

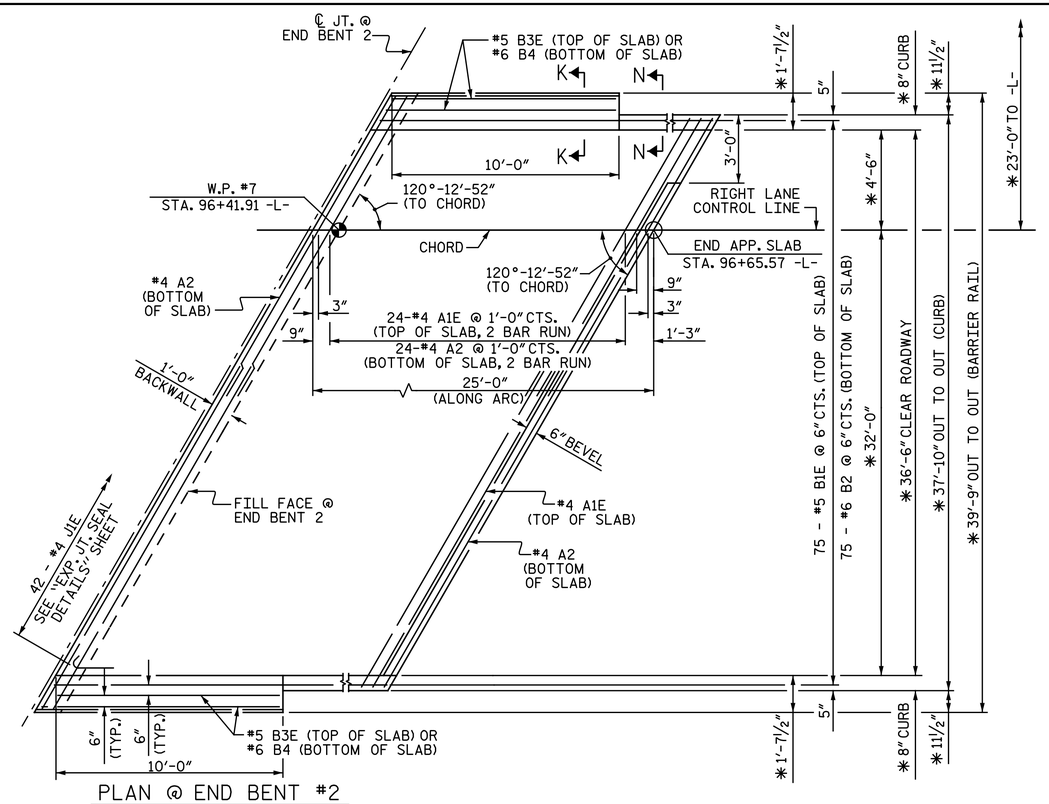
STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-61
1			3			TOTAL SHEETS
2			4			63

STD. NO. BAS2



PLAN @ END BENT #2

* RADIAL DIMENSIONS

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

ARC OFFSETS ARE NEGLIGIBLE AND THEREFORE NOT SHOWN.

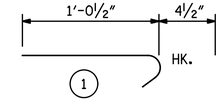
THE QUANTITY OF #4 J1E BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1E BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1E BARS SPECIFIED, ADDITIONAL J1E BARS WILL NOT BE REQUIRED.

BILL OF MATERIAL

APPROACH SLAB AT BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1E	50	#4	STR.	23' - 11"	799
A2	52	#4	STR.	23' - 9"	825
B1E	75	#5	STR.	23' - 8"	1,851
B2	75	#6	STR.	24' - 7"	2,769
B3E	4	#5	STR.	9' - 7"	40
B4	4	#6	STR.	9' - 7"	58
J1E	42	#4	1	1' - 5"	40
REINFORCING STEEL				LBS.	3,652
EPOXY COATED REINFORCING STEEL				LBS.	2,730
CLASS AA CONCRETE				C.Y.	42.0

BAR TYPE



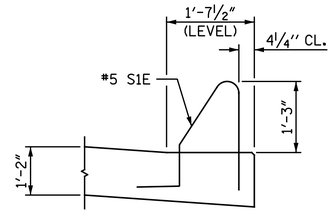
ALL BAR DIMENSIONS ARE OUT TO OUT

"E" SUFFIX DENOTES EPOXY COATED REINFORCING STEEL.

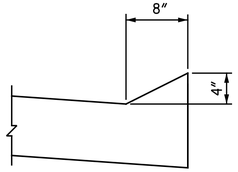
QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE "BRIDGE APPROACH SLAB DETAILS".

SPLICE LENGTHS

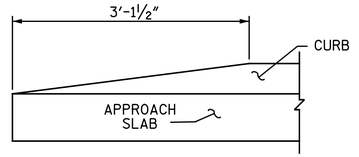
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"



SECTION K-K

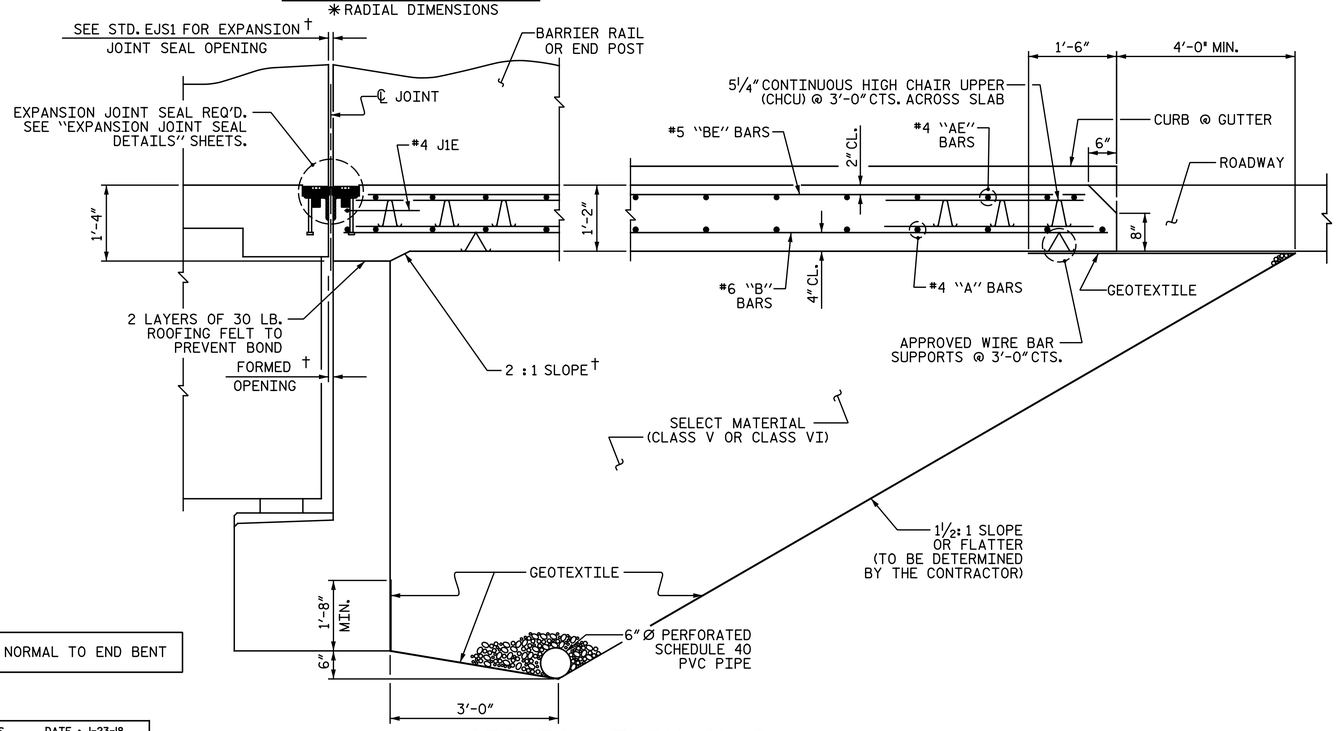


SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS



† NORMAL TO END BENT

SECTION THRU SLAB

(TYPE I - STANDARD APPROACH FILL)

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/7/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

RIGHT LANE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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8000 Regency Parkway, Suite 600
Cary, North Carolina 27518
NC License No.: F-1084

REVISIONS						SHEET NO.
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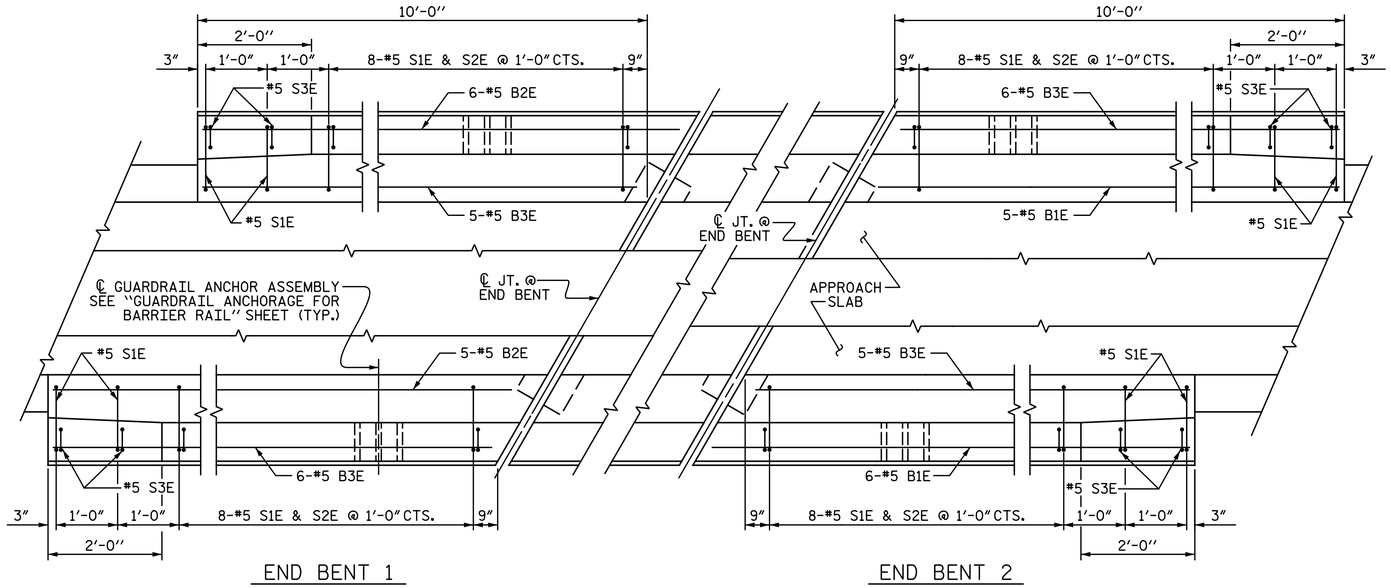
1			3			TOTAL SHEETS
2			4			63

ASSEMBLED BY : N. B. SPEAKS		DATE : 1-23-18	
CHECKED BY : V. A. PATEL		DATE : 4-11-18	
DRAWN BY : EEM 3/95	REV. 12/21/11		MAA/GM
CHECKED BY : VAP 3/95	REV. 6/13		MAA/GM
	REV. 12/17		MAA/THC

STD. NO. BAS2



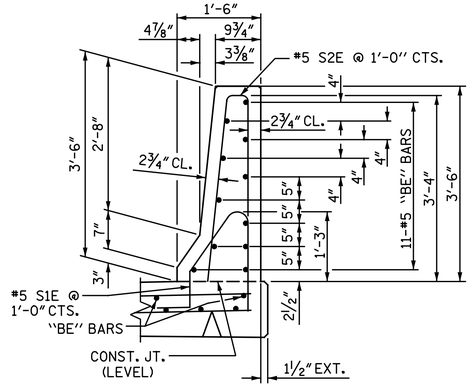
PLAN OF BARRIER RAIL

NOTES

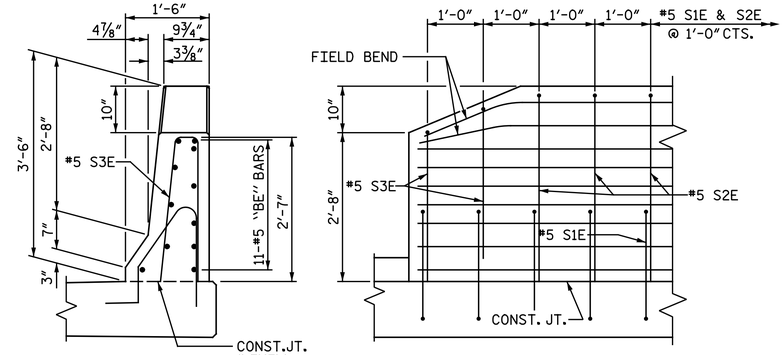
THE COST OF THE BARRIER RAIL ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "CONCRETE BARRIER RAIL".

THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.



SECTION THRU RAIL

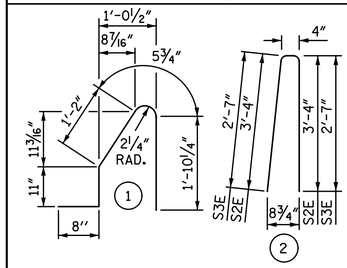


END VIEW

SIDE VIEW

END OF RAIL DETAILS

BAR TYPES



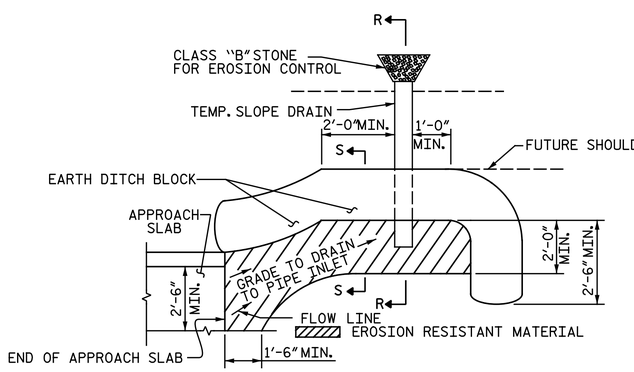
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BARRIER RAIL ONLY

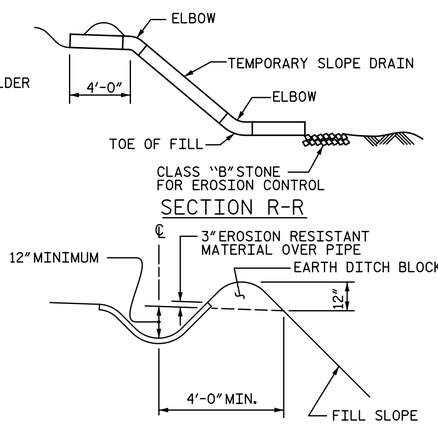
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1E	11	#5	STR.	10′ - 3″	118
B2E	11	#5	STR.	10′ - 0″	115
B3E	22	#5	STR.	9′ - 8″	222
S1E	40	#5	1	5′ - 1″	212
S2E	32	#5	2	7′ - 0″	234
S3E	8	#5	2	5′ - 6″	46
EPOXY COATED REINFORCING STEEL				LBS.	947
CLASS AA CONCRETE				C.Y.	5.4
CONCRETE BARRIER RAIL				LIN. FT.	40.0

"E" SUFFIX DENOTES EPOXY COATED REINFORCING STEEL.



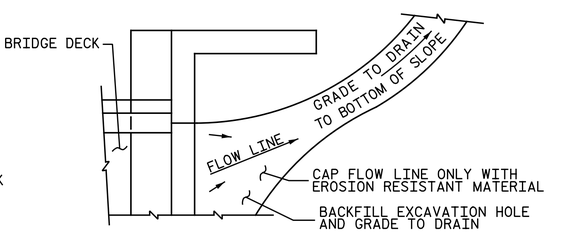
NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2″ DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

PLAN VIEW



SECTION R-R

SECTION S-S



NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.

TEMPORARY DRAINAGE DETAIL

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

ASSEMBLED BY : N. B. SPEAKS		DATE : 1-23-18	
CHECKED BY : V. A. PATEL		DATE : 4-11-18	
DRAWN BY : FCJ 11/88	REV. 7/12	MAA/GM	
CHECKED BY : ARB 11/88	REV. 6/13	MAA/GM	
	REV. 12/17	MAA/THC	

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 93+23.34 -L-

NORTH CAROLINA PROFESSIONAL SEAL 042399 ENGINEER BRADLEY J. BELL

DocuSigned by: Bradley J. Bell 5/7/2018 C41A3FBEC43C434...

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

RIGHT LANE

Michael Baker INTERNATIONAL

Michael Baker Engineering
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518
NC License No.: F-1084

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-63
1			3			TOTAL SHEETS
2			4			63

STD. NO. BAS4(SHT 3b)

F.A. PROJECT NO.: STP-4121(3)

137+00 137+50 138+00 138+50 139+00 139+50 140+00 140+50 141+00 141+50 142+00 142+50

-2.6333% +3.0306%

PI = 137+00.00
EL. = 727.42
VC = 1700'

GRADE DATA -L-

SPAN A SPAN B SPAN C

760 750 740 730 720 710 700 690

FILL FACE @ END BENT 1
STA. 137+96.96 -L-
GRADE PT. EL. 739.81

BEGIN FRONT SLOPE
STA. 137+77.01 -L-
GRADE PT. EL. 739.71

EXP.

LOW CHORD
EL. 732.08

CLASS II RIP RAP
(2'-0" THICK) (TYP.)

1½:1 SLOPE
(NORMAL TO CAP)
(TYP.)

1'-0"
(TYP.)

EL. 728±

EL. 719±

HP 12 X 53
STEEL PILES
(TYP.)

3'-6"
MIN.

FILL

END BENT 1

FIX. FIX.

EL. 717±

TOP OF DRILLED PIER
EL. = 717.62

TEMPORARY
CONSTRUCTION
ACCESS
(TYP.)

EL. 714±

EL. 719±

EL. 710±

4'-0" Ø DRILLED PIERS
(TYP.)

BENT 1

BASE DISCHARGE (Q100)
H.W. EL. 729.90

WSE
EL. 712.81
(08-21-06)

EL. 709±

FIX. FIX.

EL. 711±

EL. 713±

EL. 717±

APPROXIMATE
EXISTING
GROUND LINE

TOP OF DRILLED PIER
EL. = 715.59

BENT 2

FILL FACE @ END BENT 2
STA. 141+96.03 -L-
GRADE PT. EL. 744.54

BEGIN FRONT SLOPE
STA. 142+16.00 -L-
GRADE PT. EL. 744.93

1'-7" BERM
NORMAL TO CAP
(TYP.)

EXP.

LOW CHORD
EL. 736.78

EL. 730±

EL. 724±

3'-6"
MIN.

FILL

END BENT 2

SECTION ALONG LEFT LANE GRADE LINE

(SECTIONS AT END BENTS AND BENTS ARE TAKEN AT RIGHT ANGLES)

CLASS II
RIP RAP
(TYP.)

1'-0" MIN. EARTH BERM
EL. 726.51 (LEVEL)

TEMPORARY
CONSTRUCTION
ACCESS
(TYP.)

℄ BENT 1 & BENT 1
CONTROL LINE

DEEP RIVER

℄ BENT 2 & BENT 2
CONTROL LINE

1'-0" MIN. EARTH BERM
EL. 731.21 (LEVEL)

NAD 83'95

W.P. #1
FILL FACE @ END BENT 1
STA. 137+96.96 -L-

W.P. #2
@ BENT 1
STA. 139+24.16 -L-

℄ BRIDGE
STA. 139+96.49 -L-

W.P. #3
@ BENT 2
STA. 140+78.80 -L-

W.P. #4
FILL FACE @ END BENT 2
STA. 141+96.03 -L-

BEGIN FRONT SLOPE
STA. 142+16.00 -L-

END APPROACH SLAB
STA. 142+19.46 -L-

TO SR 1334

RADIAL 23'-0"

BEGIN APPROACH SLAB
STA. 137+73.46 -L-

43°-48'-46"
(TAN. TO CURVE)

BEGIN FRONT SLOPE
STA. 137+77.01 -L-

43°-04'-09"
(TAN. TO CURVE)

BRIDGE ID
STA. 140+21.50 -L-

42°-30'-00"
(TAN. TO CURVE)

57'-3⅝" (ALONG -L-)

LEFT LANE
GRADE LINE

42°-09'-54"
(TAN. TO CURVE)

-L-

TO SR 1352

41°-28'-47"
(TAN. TO CURVE)

127'-6" SPAN A (ALONG ARC)

155'-0" SPAN B (ALONG ARC)

117'-6" SPAN C (ALONG ARC)

400'-0" (FILL FACE TO FILL FACE) (ALONG ARC)

HORIZONTAL CURVE DATA -L-

P.I. STA. = 149+31.07
Δ = 15°-31'-58" (RT.)
D = 00°-35'-05"
L = 2,656.76'
T = 1,336.57'
R = 9,800.00'
S.E. = 0.03

I HEREBY CERTIFY THESE PLANS
ARE THE AS-BUILT PLANS

PLAN ALONG LEFT LANE GRADE LINE

(FOR CLARITY, PILES, COLUMNS, AND DRILLED PIERS ARE NOT SHOWN IN PLAN VIEW)

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 1 OF 4 BRIDGE NO. 401272

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
Digitally signed by Justin Robinson
3/28/2018

RS&H

RS&H Architects-Engineers-Planners, Inc.
8521 Six Forks Road, Suite 400
919-926-4100 FAX 919-846-9080
www.rsandh.com
North Carolina License Nos. 50073 ° F-0493 ° C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LEFT LANE BRIDGE OVER
DEEP RIVER ON SR 4121
BETWEEN SR 1334 AND SR 1352

LEFT LANE

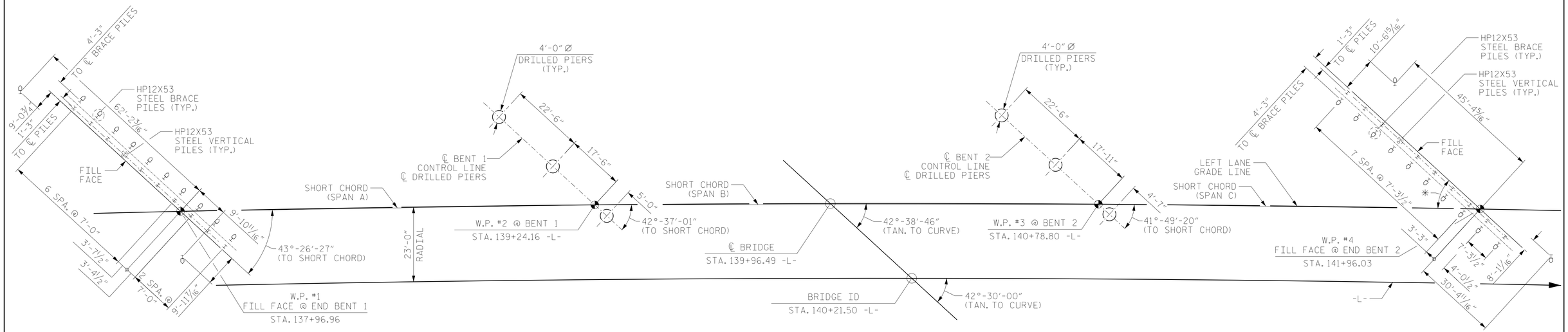
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-1
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : MRA DATE : 10/2017
CHECKED BY : TLC DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 10/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

3/27/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\403_U2412A_SMU_GD1_401272.dgn
AcostaM

STR. #3



NOTES:

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 1 AND END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 200 TONS PER PILE.

FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

DRILLED PIERS AT BENT NO. 1 AND BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 900 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 90 TSF.

PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO. 2. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 705 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.

INSTALL DRILLED PIERS AT BENT NO. 1 TO A TIP ELEVATION NO HIGHER THAN 690 FT (LEFT), 692 FT (CENTER) AND 694 FT (RIGHT) WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 8 FT INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

INSTALL DRILLED PIERS AT BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 698 FT WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 8 FT INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

THE SCOUR CRITICAL ELEVATIONS FOR BENT NO. 1 AND BENT NO. 2 IS ELEVATION 702 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

DO NOT USE SLURRY CONSTRUCTION FOR DRILLED PIERS AT BENT NO. 1 AND BENT NO. 2.

SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTIONS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

FOUNDATION LAYOUT

DRAWN BY :	MRA	DATE :	02/2018
CHECKED BY :	TLC	DATE :	02/2018
DESIGN ENGINEER OF RECORD:	JMR	DATE :	12/2017

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039813 Justin Morgan Robinson REGISTERED PROFESSIONAL ENGINEER JUSTIN MARK ROBINSON
3/28/2018

RS&H

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8521 Six Forks Road, Suite 400
919-926-4100 FAX 919-846-9080
www.rsandh.com
North Carolina License Nos. 50073 * F-0493 * C-28

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

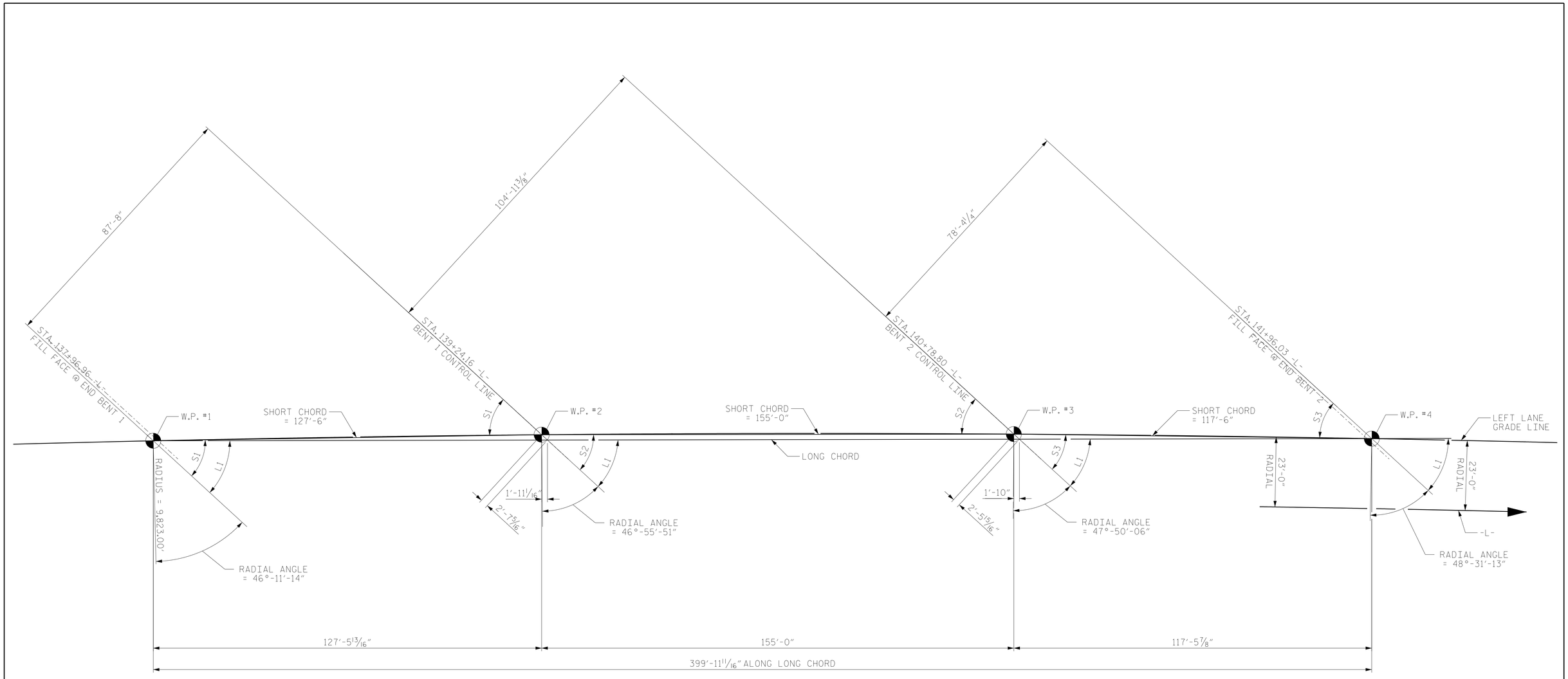
LEFT LANE BRIDGE OVER DEEP RIVER ON SR 4121 BETWEEN SR 1334 AND SR 1352

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-2
1			3			TOTAL SHEETS
2			4			45

STR. #3

3/27/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\403_U2412A_SMU_GD2_401272.dgn
AcostaM



LONG CHORD LAYOUT

NOTE: ALL BENTS ARE PARALLEL

ANGLES	
LONG CHORD	SHORT CHORD
L1 = 42°-38'-46"	S1 = 43°-26'-27"
	S2 = 42°-37'-01"
	S3 = 41°-49'-20"

HORIZONTAL CURVE DATA -L-

P.I. STA. = 149+31.07
Δ = 15°-31'-58"(RT.)
D = 00°-35'-05"
L = 2,656.76'
T = 1,336.57'
R = 9,800.00'
S.E. = 0.03

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LEFT LANE BRIDGE OVER DEEP RIVER ON SR 4121 BETWEEN SR 1334 AND SR 1352

LEFT LANE

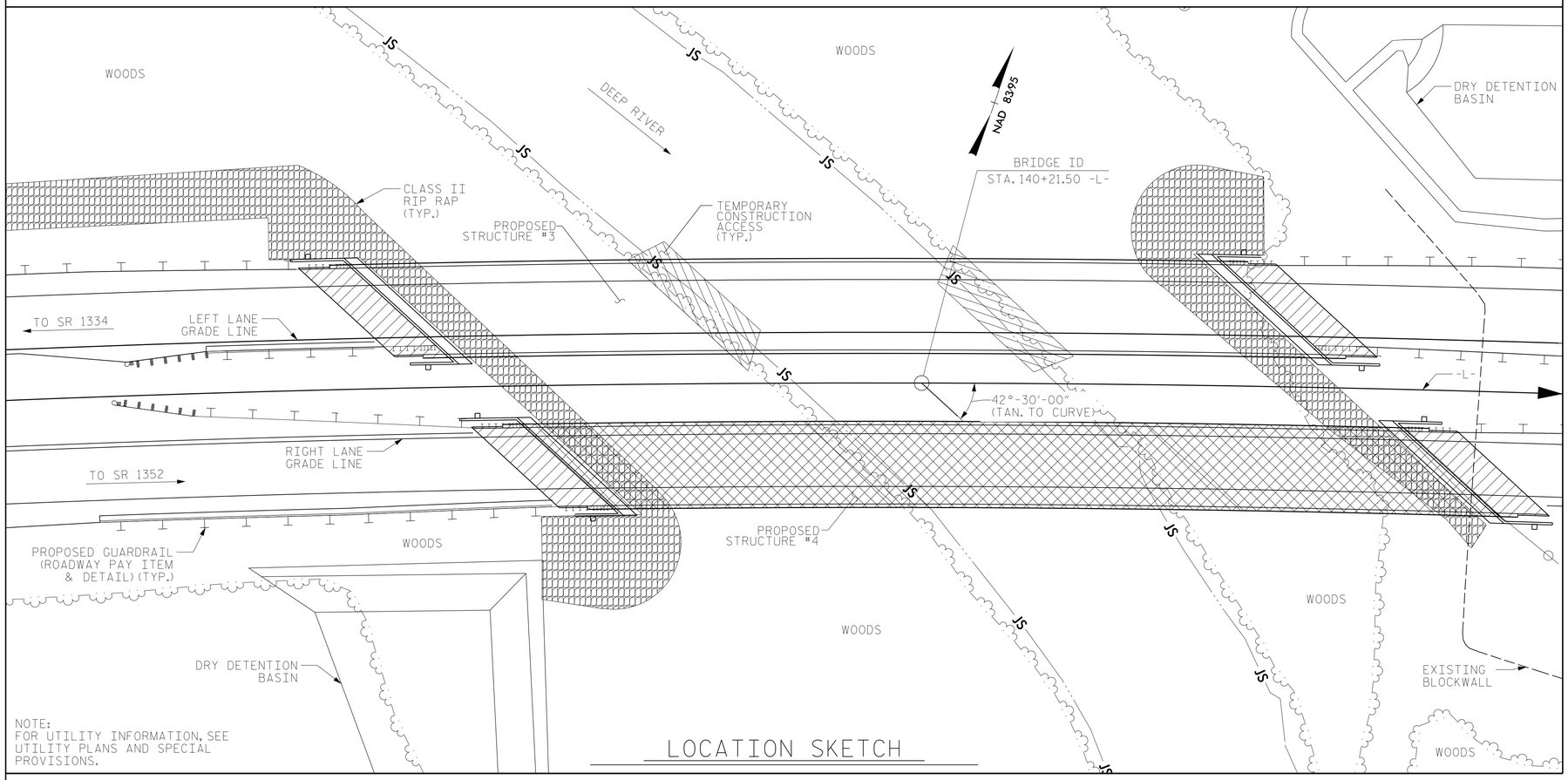
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-3
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : MRA DATE : 10/2017
CHECKED BY : TLC DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 10/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

3/27/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\403_U2412A_SMU_GD3_401272.dgn
AcostaM

BENCH MARK #10: -L- STATION 138+72.27 377.38' LEFT, RR SPIKE IN 36" HICKORY (DEAD), EL. 725.40



LOCATION SKETCH

NOTE:
FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

NOTES:

ASSUMED LIVE LOAD = HL 93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR DETAILS OF 78" F.I.B. PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.

NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.

THE CLASS AA CONCRETE IN THE BRIDGE DECK SHALL CONTAIN FLY ASH OR GROUND GRANULATED BLAST FURNACE SLAG AT THE SUBSTITUTION RATE SPECIFIED IN ARTICLE 1024-1 AND IN ACCORDANCE WITH ARTICLES 1024-5 AND 1024-6 OF THE STANDARD SPECIFICATIONS. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE COST OF THE REINFORCED CONCRETE DECK SLAB.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18 - EVALUATING SCOUR AT BRIDGES."

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

THE CONTRACTOR WILL BE REQUIRED TO CONSTRUCT, MAINTAIN AND AFTERWARDS REMOVE THE TEMPORARY ACCESS AT STATION 140+21.50 -L- FOR USE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE.

FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS (360,000 KG) OF REINFORCING STEEL, ONE 30 INCH (760 MM) SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS (360,000 KG) OF REINFORCING STEEL, TWO 30 INCH (760 MM) SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

TOTAL BILL OF MATERIALS

	CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMP. ACCESS AT STA. 140+21.50 -L-	4'-0 ∅ DRILLED PIER IN SOIL	4'-0 ∅ DRILLED PIER NOT IN SOIL	PERMANENT STEEL CASING FOR 4'-0 DIA. DRILLED PIER	SID INSPECTION	CSL TESTING	GROOVING BRIDGE FLOORS	REINFORCED CONCRETE DECK SLAB	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	78" F.I.B. PRESTRESSED CONCRETE GIRDERS	
	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	EACH	EACH	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	APPROX. LBS.	NO.	LIN. FT.
SUPERSTRUCTURE							16,458	17,131		LUMP SUM			12	1,558.7
END BENT NO. 1									108.5		16,441			
BENT NO. 1		48	29						91.3		19,821	2,662		
BENT NO. 2		30	24	31.8					94.0		20,952	2,376		
END BENT NO. 2									108.9		17,206			
TOTAL	LUMP SUM	78	53	31.8	1	1	16,458	17,131	402.7	LUMP SUM	74,420	5,038	12	1,558.7

	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12x53 STEEL PILES		CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	EACH	NO.	LIN. FT.	LIN. FT.	TONS	SQ. YDS.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE				832.6			LUMP SUM	LUMP SUM
END BENT NO. 1	22	22	495		790	878		
BENT NO. 1								
BENT NO. 2								
END BENT NO. 2	22	22	440		397	441		
TOTAL	44	44	935	832.6	1,187	1,319	LUMP SUM	LUMP SUM

HYDRAULIC DATA

DESIGN DISCHARGE	= 14,000 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS
DESIGN HIGH WATER ELEVATION	= 729.00
DRAINAGE AREA	= 66.10 SQ. MI.
BASE DISCHARGE (0100)	= 15,000 CFS
BASE HIGH WATER ELEVATION	= 729.50

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= >25,000 CFS
FREQUENCY OF OVERTOPPING FLOOD	= >500 YRS
OVERTOPPING FLOOD ELEVATION	= 734.30
✳ SAG AT STA 136+40.38	

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
Digitally signed by Justin Mark Robinson
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LEFT LANE BRIDGE OVER DEEP RIVER ON SR 4121 BETWEEN SR 1334 AND SR 1352

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-4
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : MRA DATE : 01/2018
CHECKED BY : JMR DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

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STR. #3

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE							COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.12	--	1.75	0.87	1.21	A	EL	60.62	1.21	1.46	A	I	36.18	0.80	0.89	1.12	B	EL	76.14	
		HL-93 (OPERATING)	N/A		1.57	--	1.35	0.87	1.57	A	EL	60.62	1.21	2.27	A	I	23.89	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.76	63.360	1.75	0.87	1.78	A	EL	60.62	1.21	2.40	A	I	23.89	0.80	0.89	1.76	B	EL	76.14	
		HS-20 (OPERATING)	36.000		2.31	83.160	1.35	0.87	2.31	A	EL	60.62	1.21	3.14	A	I	23.89	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.37	58.995	1.40	0.87	5.43	A	EL	60.62	1.21	7.69	A	I	23.89	0.80	0.89	4.37	B	EL	76.14	
		SNGARBS2	20.000		3.08	61.600	1.40	0.87	3.86	A	EL	60.62	1.21	5.33	A	I	23.89	0.80	0.89	3.08	B	EL	76.14	
		SNAGRIS2	22.000		2.84	62.480	1.40	0.87	3.58	A	EL	60.62	1.21	4.90	A	I	23.89	0.80	0.89	2.84	B	EL	76.14	
		SNCOTTS3	27.250		2.17	59.133	1.40	0.87	2.69	A	EL	60.62	1.21	3.76	A	I	23.89	0.80	0.89	2.17	B	EL	76.14	
		SNAGGRS4	34.925		1.74	60.770	1.40	0.87	2.18	A	EL	60.62	1.21	3.03	A	I	23.89	0.80	0.89	1.74	B	EL	76.14	
		SNS5A	35.550		1.71	60.791	1.40	0.87	2.14	A	EL	60.62	1.21	3.04	A	I	23.89	0.80	0.89	1.71	B	EL	76.14	
		SNS6A	39.950		1.54	61.523	1.40	0.87	1.93	A	EL	60.62	1.21	2.73	A	I	23.89	0.80	0.89	1.54	B	EL	76.14	
		SNS7B	42.000		1.47	61.740	1.40	0.87	1.84	A	EL	60.62	1.21	2.65	A	I	23.89	0.80	0.89	1.47	B	EL	76.14	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.87	61.710	1.40	0.87	2.35	A	EL	60.62	1.21	3.30	A	I	23.89	0.80	0.89	1.87	B	EL	76.14	
		TNT4A	33.075		1.87	61.850	1.40	0.87	2.35	A	EL	60.62	1.21	3.24	A	I	23.89	0.80	0.89	1.87	B	EL	76.14	
		TNT6A	41.600		1.50	62.400	1.40	0.87	1.90	A	EL	60.62	1.21	2.77	A	I	23.89	0.80	0.89	1.50	B	EL	76.14	
		TNT7A	42.000		1.50	63.000	1.40	0.87	1.90	A	EL	60.62	1.21	2.72	A	I	23.89	0.80	0.89	1.50	B	EL	76.14	
		TNT7B	42.000		1.53	64.260	1.40	0.87	1.95	A	EL	60.62	1.21	2.63	A	I	23.89	0.80	0.89	1.53	B	EL	76.14	
		TNAGRIT4	43.000		1.47	63.210	1.40	0.87	1.86	A	EL	60.62	1.21	2.53	A	I	23.89	0.80	0.89	1.47	B	EL	76.14	
		TNAGT5A	45.000		1.40	63.000	1.40	0.87	1.76	A	EL	60.62	1.21	2.48	A	I	23.89	0.80	0.89	1.40	B	EL	76.14	
		TNAGT5B	45.000	3	1.39	62.550	1.40	0.87	1.75	A	EL	60.62	1.21	2.41	A	I	23.89	0.80	0.89	1.39	B	EL	76.14	

LOAD FACTORS:

	LIMIT STATE	γ_{DC}	γ_{DW}
DESIGN LOAD RATING FACTORS	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1. TRANSFORMING ALL PRESTRESSING TENDONS.
2. GIRDERS DESIGNED AS SIMPLE SPANS FOR FLEXURE.
3. GIRDERS DESIGNED AS SIMPLE-MADE-CONTINUOUS (FOR LIVE AND SUPERIMPOSED DEAD LOAD) FOR SHEAR.
4. FACTORED SHEAR AND MOMENT CAPACITIES PROVIDED FOR STRENGTH I LIMIT STATE. SECTION PROPERTIES PROVIDED FOR SERVICE III LIMIT STATE.
5. GIRDER LOAD RATED AS SIMPLE SPAN.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

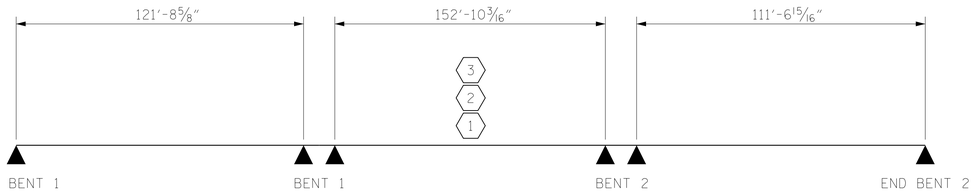
(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER

TABLE OF SECTION RESISTANCES (SPAN A)												
		℄ BRG.	.01L	.02L	.03L	.04L	.05L	.06L	.07L	.08L	.09L	℄ BRG.
INTERIOR GIRDER (I)	ΦVn (KIPS)	707	1067	470	350	328	332	339	358	477	1067	708
	ΦMn (KIP-FT)	--	12939	14011	14237	14463	14577	14463	14237	14011	12939	--
EXTERIOR GIRDER (EL, ER)	ΦVn (KIPS)	707	1065	462	342	320	323	332	351	472	1065	707
	ΦMn (KIP-FT)	--	12864	13928	14156	14383	14497	14383	14156	13928	12864	--



LRFR SUMMARY

SECTION PROPERTIES			
SPAN A & B - EXTERIOR LEFT			
	UNITS	NON-COMPOSITE	COMPOSITE
HEIGHT	IN	78	86.7
AREA	IN^2	1100.6	1900.44
Ixx	IN^4	903861	1964890
Ycg	IN	34.63	54.72
SELF WT.	PLF	1147	2274
EFF. WIDTH	IN	-	123.7
SPAN A - INTERIOR			
	UNITS	NON-COMPOSITE	COMPOSITE
HEIGHT	IN	78	86.7
AREA	IN^2	1100.6	1994
Ixx	IN^4	903861	2033814
Ycg	IN	34.63	56.02
SELF WT.	PLF	1147	2406
EFF. WIDTH	IN	-	138.2

SECTION PROPERTIES PROVIDED AT MIDSPAN

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

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3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS
(NON-INTERSTATE TRAFFIC)
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-5
1			3			TOTAL SHEETS
2			4			45

STD. NO. LRFR1

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ASSEMBLED BY : MRA		DATE : 02/2018	
CHECKED BY : MAL		DATE : 03/2018	
DRAWN BY : MAA 1/08	REV. 11/12/08RR	MAA/GM	
CHECKED BY : GM/DI 2/08	REV. 10/1/11	MAA/GM	
	REV. 12/17	MAA/THC	

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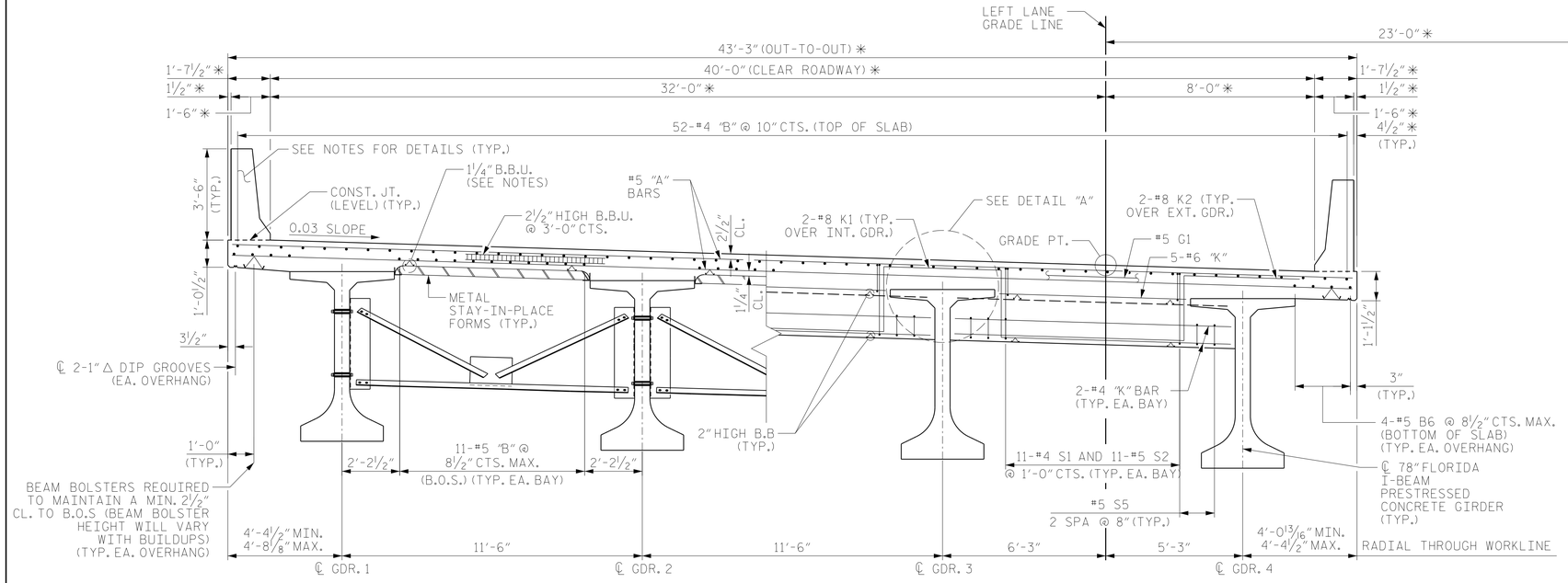
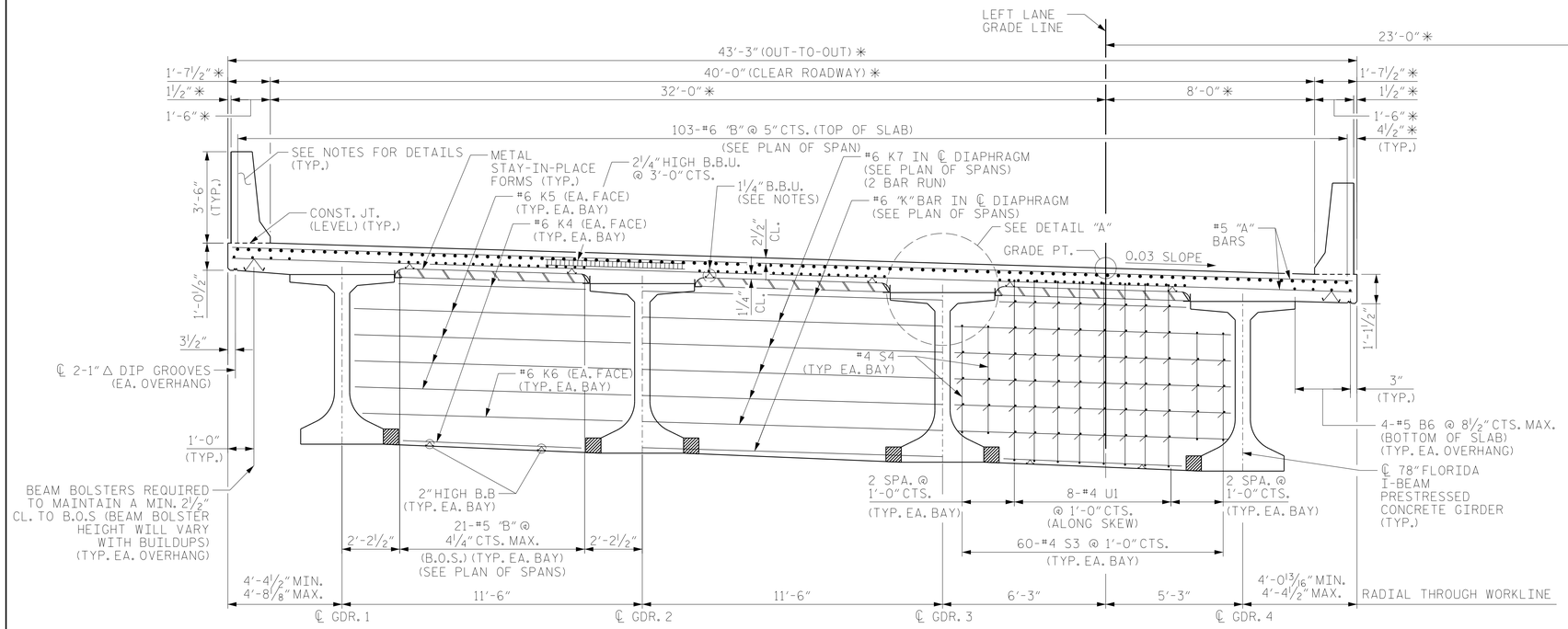


SECTION AT INTERMEDIATE DIAPHRAGM

SECTION AT END BENT

TYPICAL SECTION

*DIMENSIONS ARE RADIAL TO ℄ -L-



TYPICAL SECTION AT BENT DIAPHRAGM

*DIMENSIONS ARE RADIAL TO ℄ -L-

NOTES:

PROVIDE 1¼" HIGH BEAM BOLSTERS UPPERS AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (CHCM) AT 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

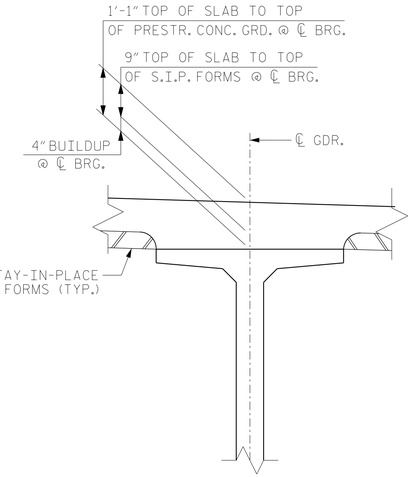
FOR CONCRETE BARRIER RAIL REINFORCING STEEL AND DETAILS, SEE "CONCRETE BARRIER RAIL" SHEETS.

PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

CONCRETE BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL DECK SLAB CONCRETE IN THAT UNIT HAS BEEN CAST AND HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

B.O.S. = BOTTOM OF SLAB

T.O.S. = TOP OF SLAB



DETAIL "A"

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039913 JUSTIN MARK ROBINSON
Digitally signed by Justin Robinson
DocuSigned by: 831326A9-BD9E-43E8-A279-AF7C3A0C3A6C
5/4/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-6
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : MRA DATE : 12/2017
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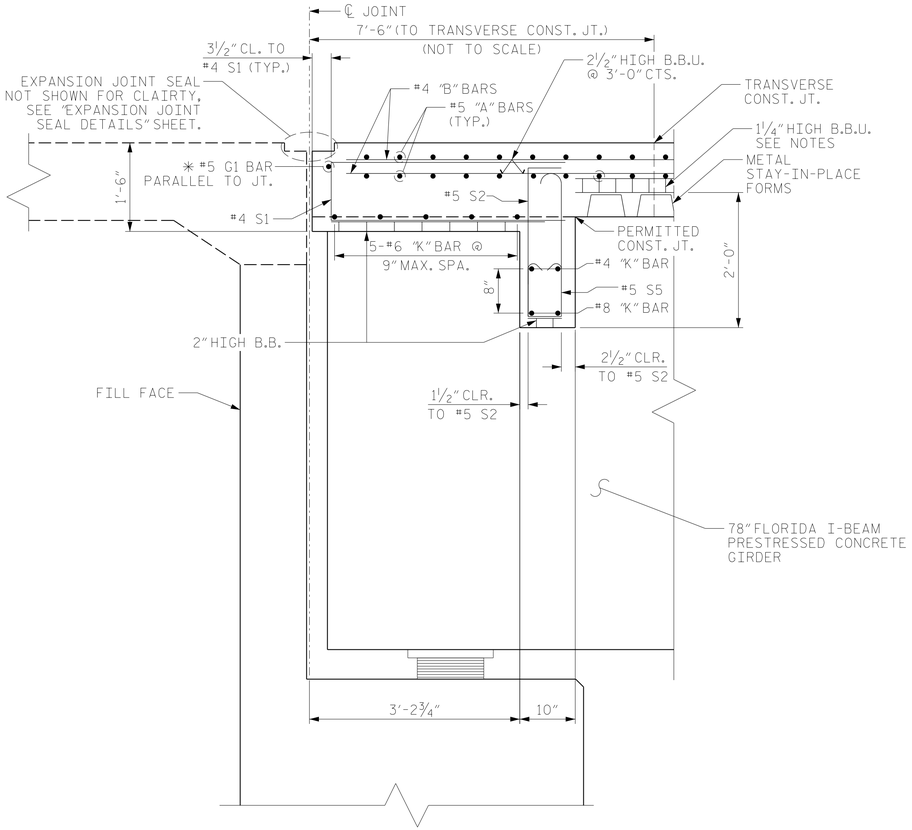
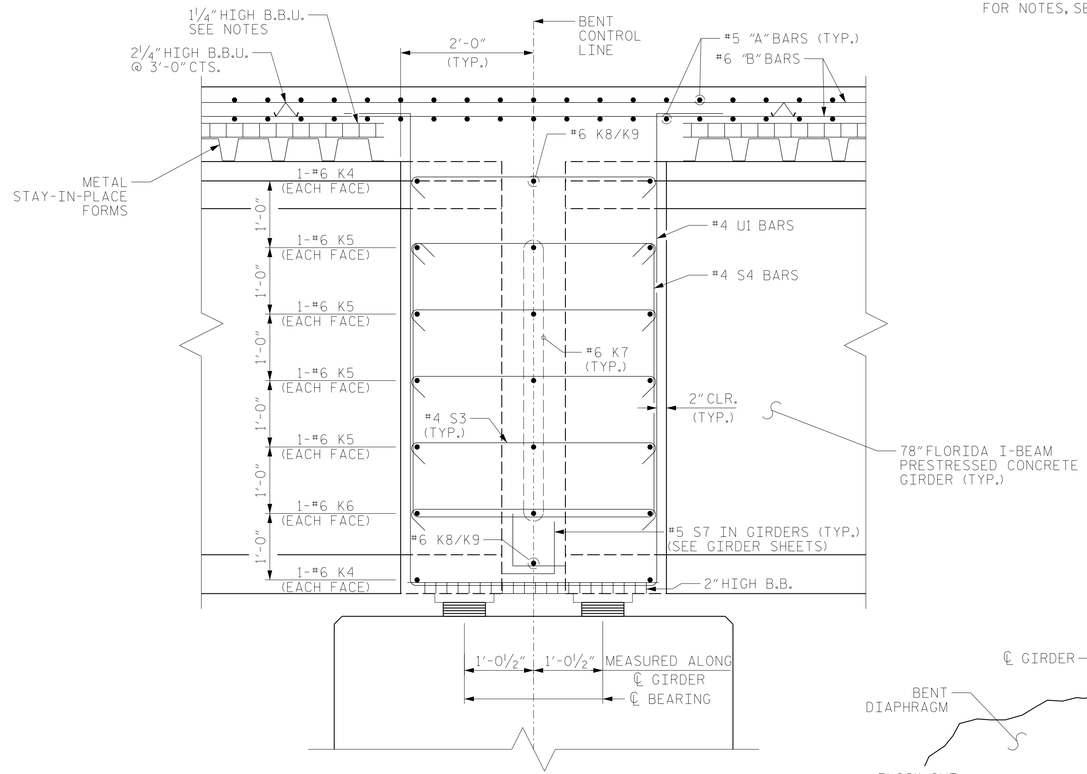
STR. #3



SECTION AT END BENT DIAPHRAGM

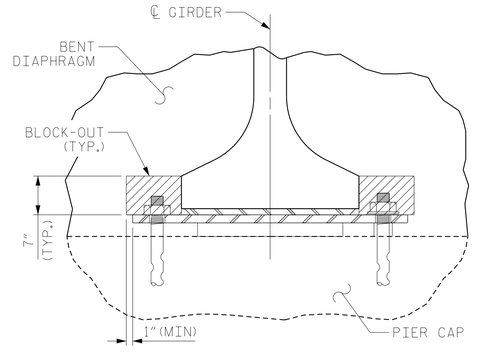
* "G" BAR MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR REINFORCING STEEL & STIRRUPS



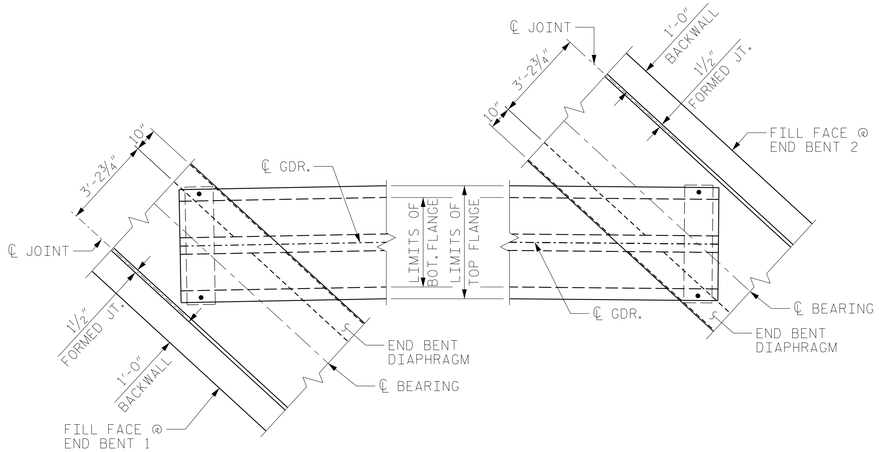
SECTION AT BENT DIAPHRAGM

NOTES:

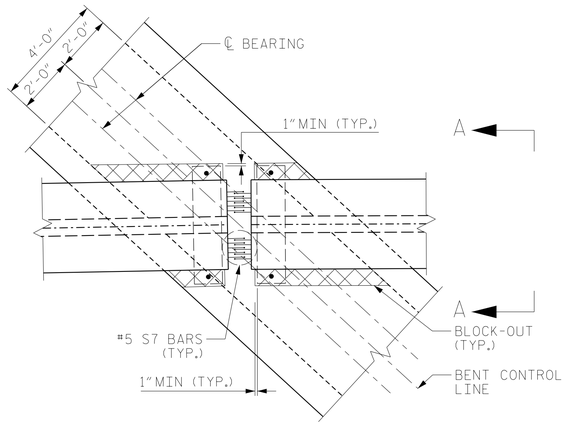
FOR NOTES, SEE SHEET 1 OF 2.



VIEW A-A



END BENT DIAPHRAGM



BENT DIAPHRAGM BLOCKOUT DETAIL

FIELD BEND S7 BARS TO FIT

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-7
1			3			TOTAL SHEETS
2			4			45

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DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

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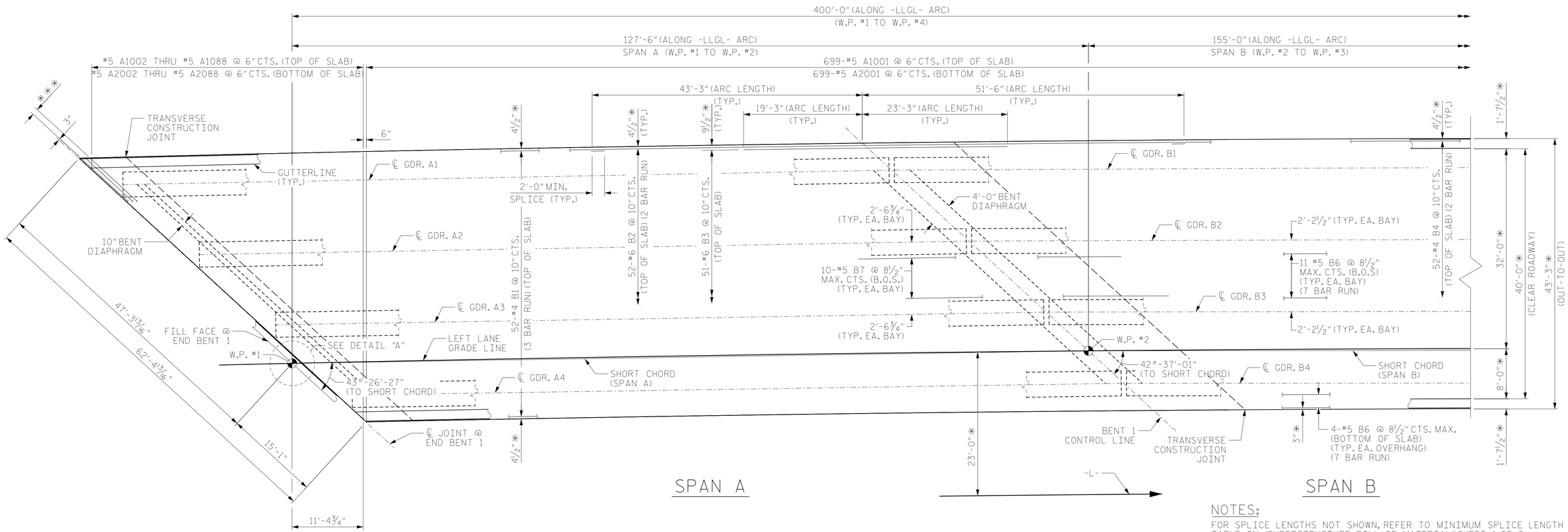
STR. #3



NOTES:

FOR SPLICE LENGTHS NOT SHOWN, REFER TO MINIMUM SPLICE LENGTH TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 1 OF 2

FOR END BENT DIAPHRAGM BARS AND BENT DIAPHRAGM BARS, SEE "TYPICAL SECTION DETAILS"

STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE "FRAMING PLAN" SHEETS.

FOR POURING SEQUENCE, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 2 OF 2.

FOR BARRIER RAIL REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEETS.

#5 "A" BARS ARE SPACED PERPENDICULAR TO LONG CHORD, EXCEPT A1180

FOR TOP OF SLAB REINFORCING STEEL LAYOUT, SEE SHEET 2 OF 2.

T.O.S = TOP OF SLAB

B.O.S = BOTTOM OF SLAB

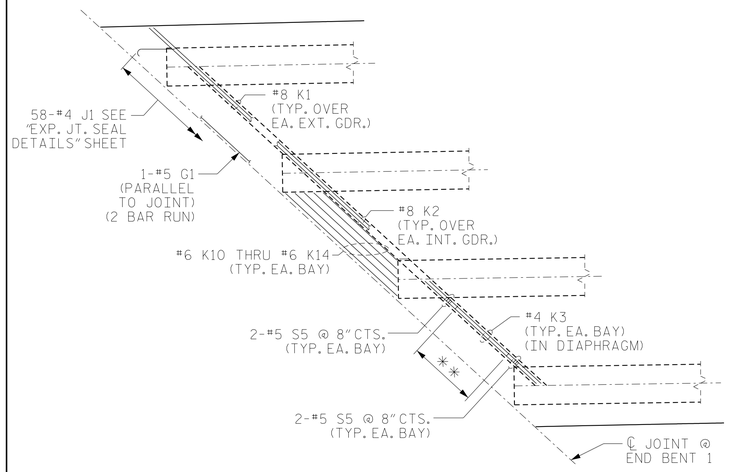
LLGL = LEFT LANE GRADE LINE

PLAN OF SPAN A AND PART PLAN OF SPAN B

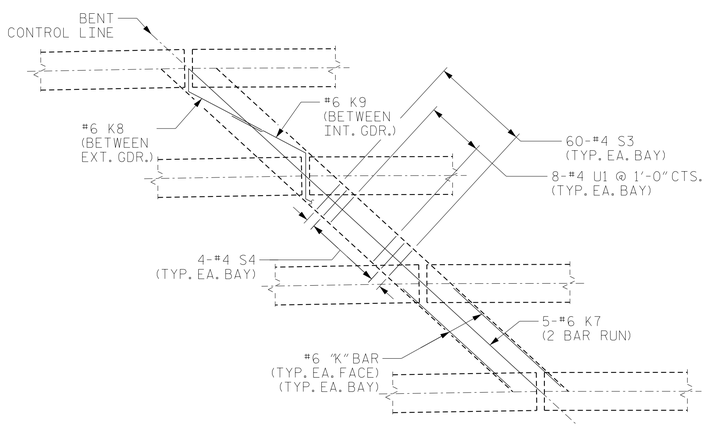
* DIMENSIONS ARE RADIAL TO ℄ -L-

** 11-#4 S1 AND 11-#5 S2 @ 1'-0" CTS. (TYP. EA. BAY)

*** 3-#6 A1180 @ 6" CTS. (TOP OF SLAB) PLACED PARALLEL TO JOINT



END BENT DIAPHRAGM REINFORCING DETAILS



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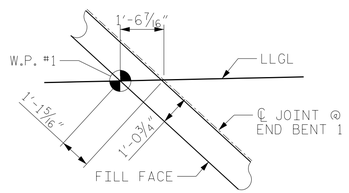

DETAIL A

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

DRAWN BY :	MRA	DATE :	12/2017		
CHECKED BY :	JMR	DATE :	02/2018		
DESIGN ENGINEER OF RECORD:	JMR	DATE :	02/2018		

4/17/2018
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4/18/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

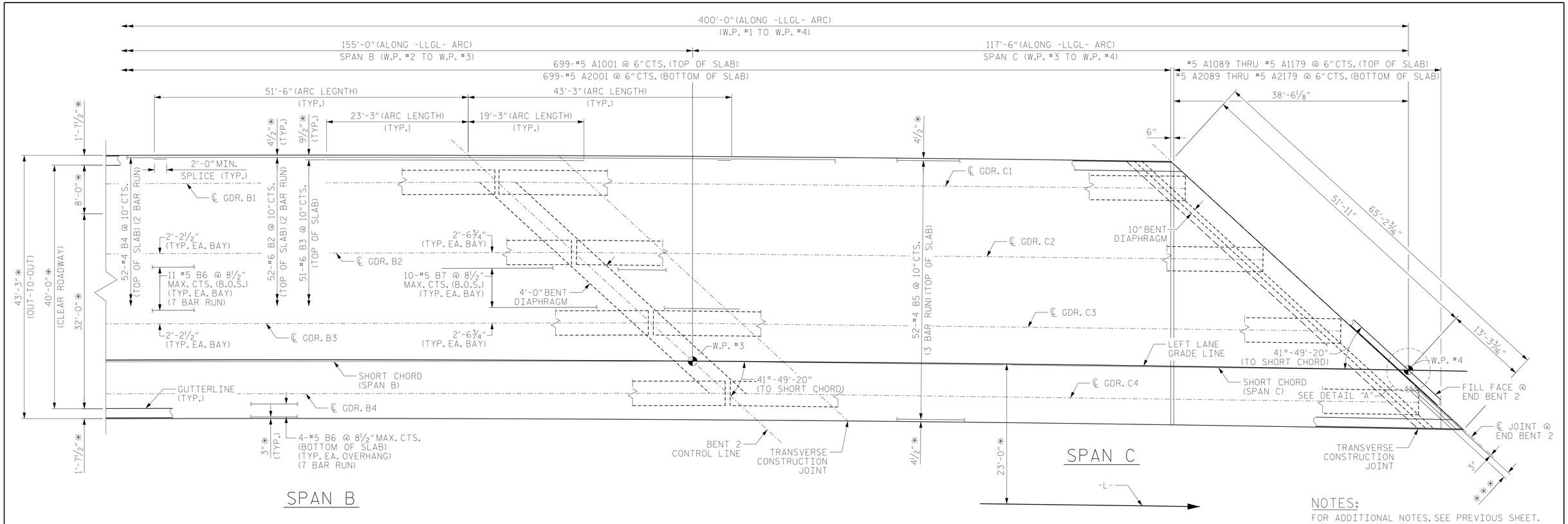
SUPERSTRUCTURE

PLAN OF SPAN A PART PLAN OF SPAN B

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-8
1			3			TOTAL SHEETS
2			4			45

STR. #3



NOTES:

FOR ADDITIONAL NOTES, SEE PREVIOUS SHEET.

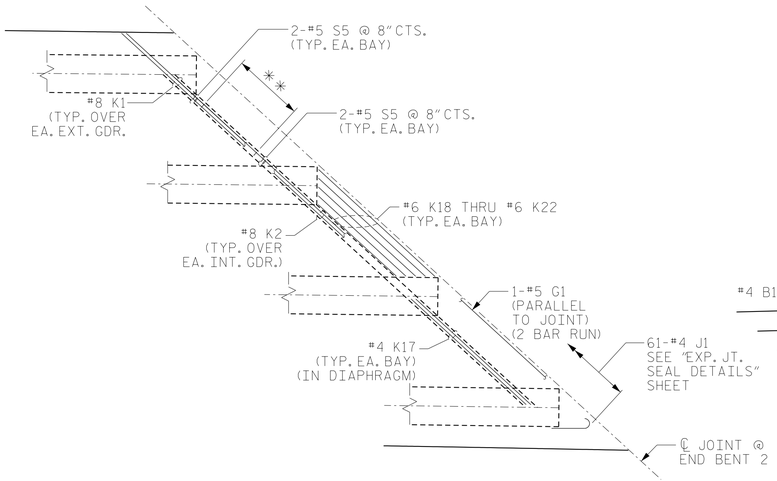
SEE SHEET S3-8 FOR BENT DIAPHRAGM REINFORCEMENT DETAILS.

PART PLAN OF SPAN B AND PLAN OF SPAN C

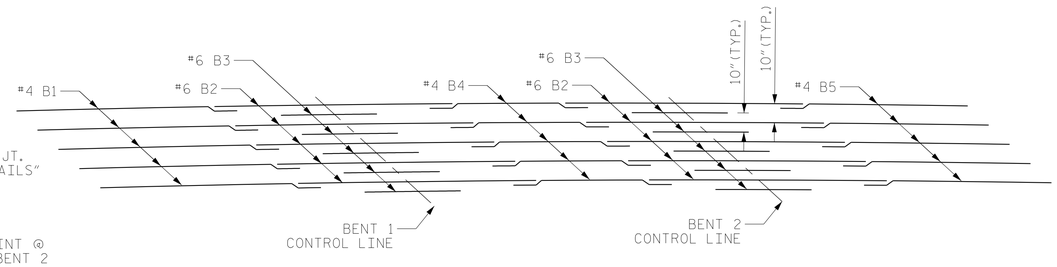
* DIMENSIONS ARE RADIAL TO ℄ -L-

** 11-#4 S1 AND 11-#5 S2 @ 1'-0" CTS. (TYP. EA. BAY)

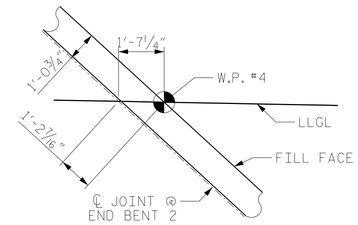
*** 3-#6 A1180 @ 6" CTS. (TOP OF SLAB) PLACED PARALLEL TO JOINT



END BENT DIAPHRAGM REINFORCING DETAILS



TOP OF SLAB REINFORCING STEEL LAYOUT



DETAIL A

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

DRAWN BY : MRA DATE : 12/2017

CHECKED BY : JMR DATE : 02/2018

DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

5/4/2018
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Digitally signed by: Justin Robinson
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

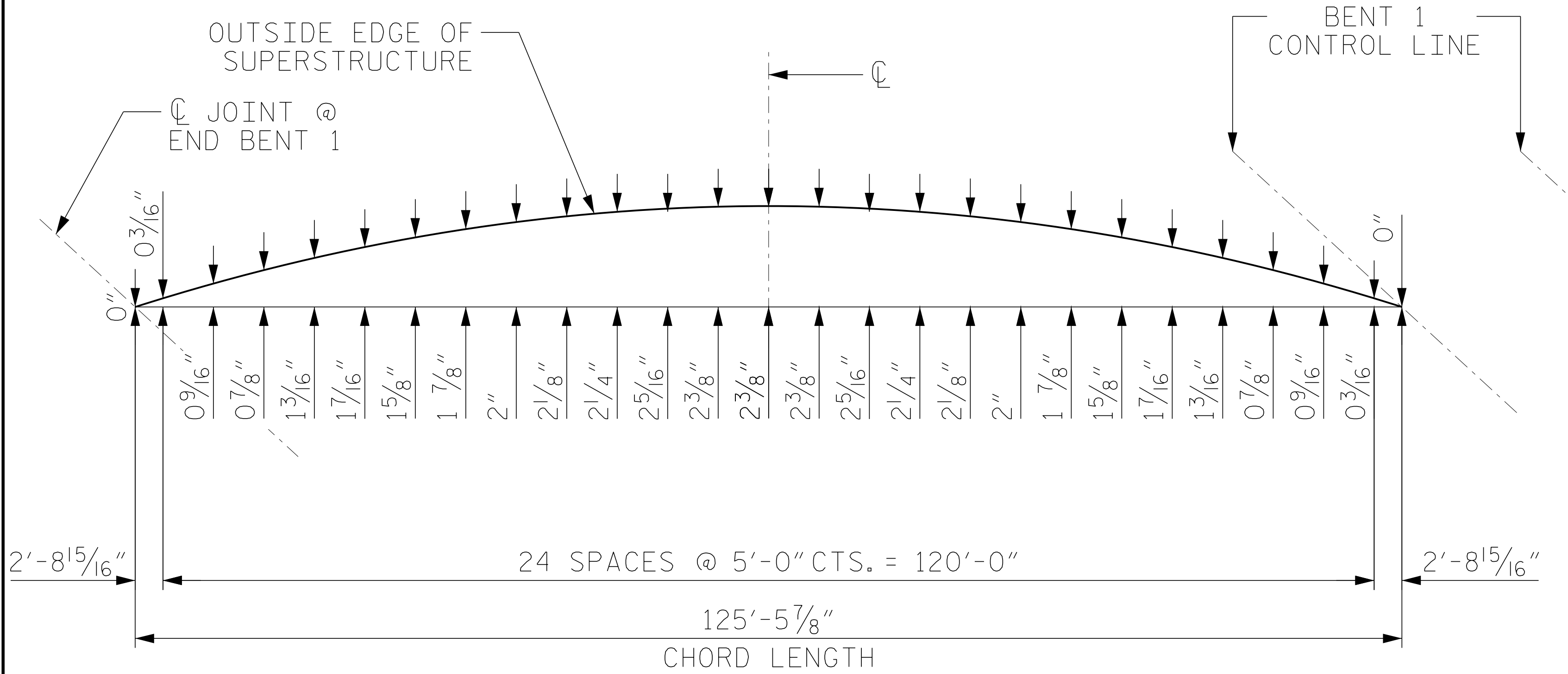
SUPERSTRUCTURE

PART PLAN OF SPAN B PLAN OF SPAN C

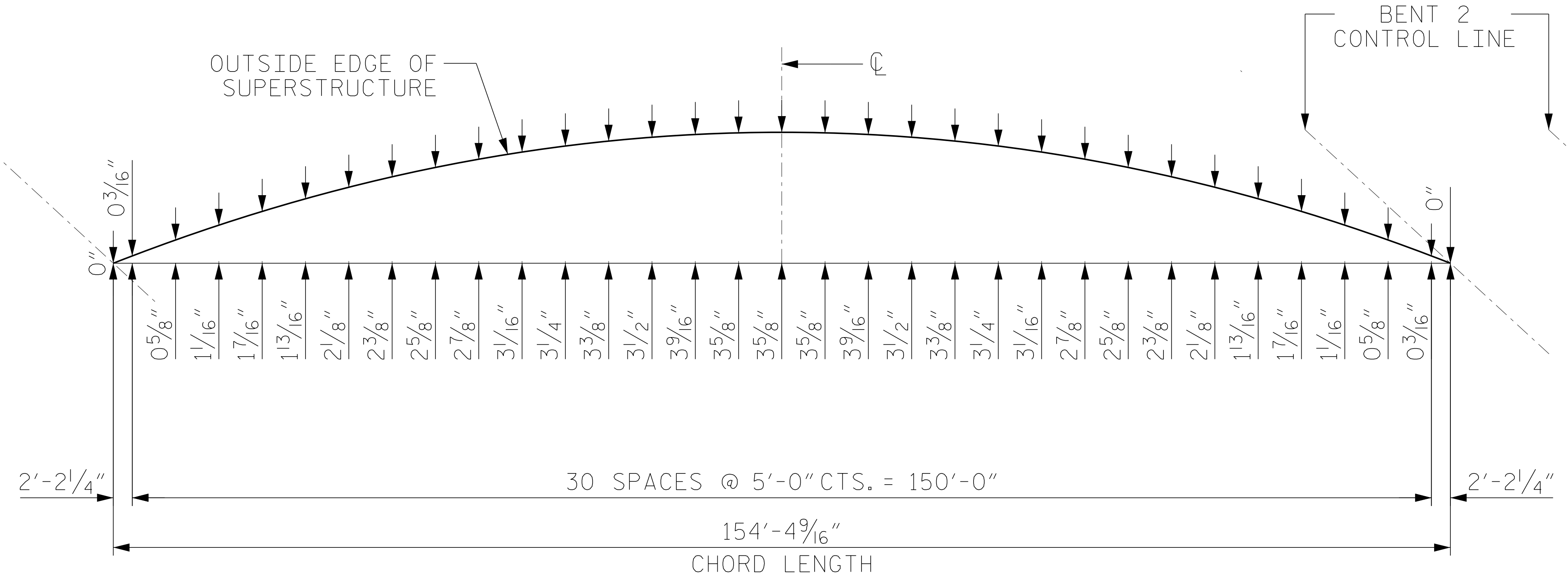
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-9
1			3			TOTAL SHEETS
2			4			45

STR. #3



LEFT SIDE SPAN "A" ARC OFFSETS



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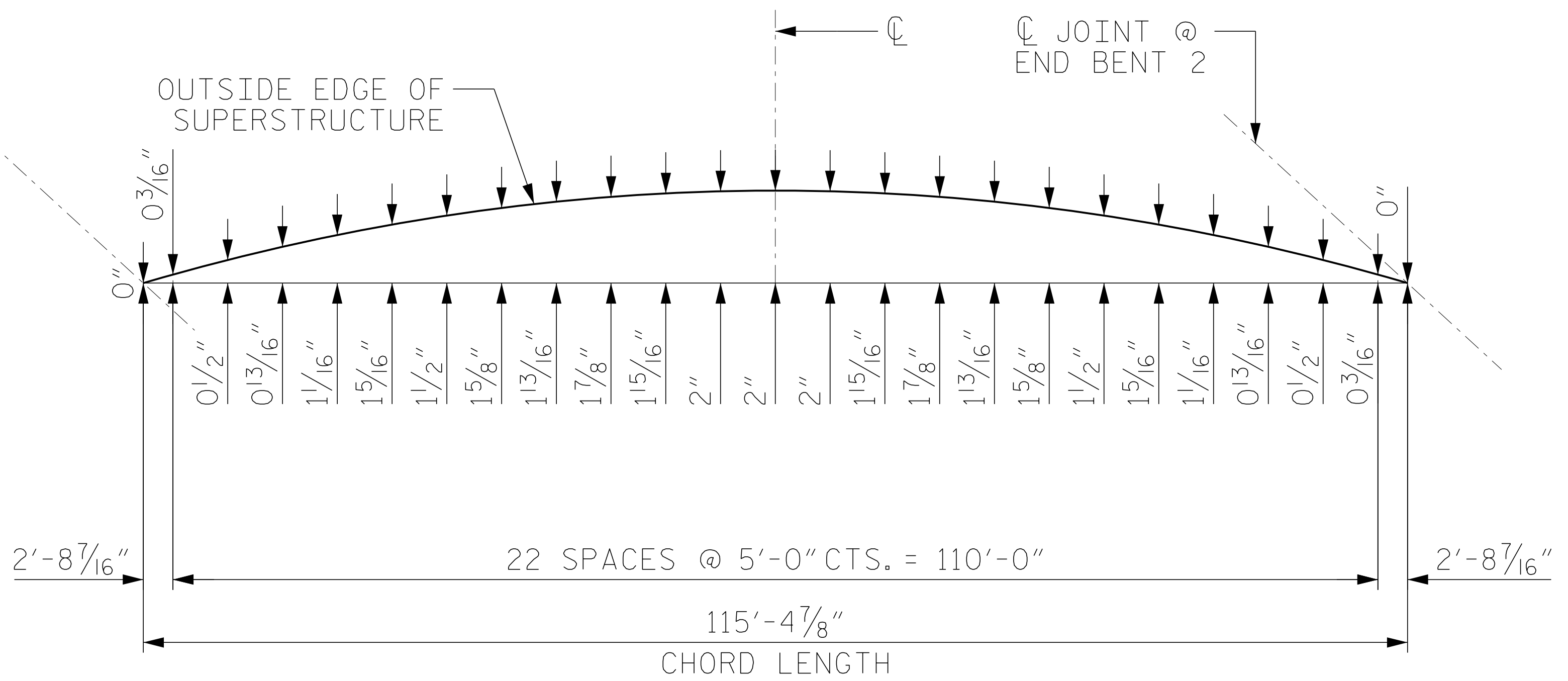
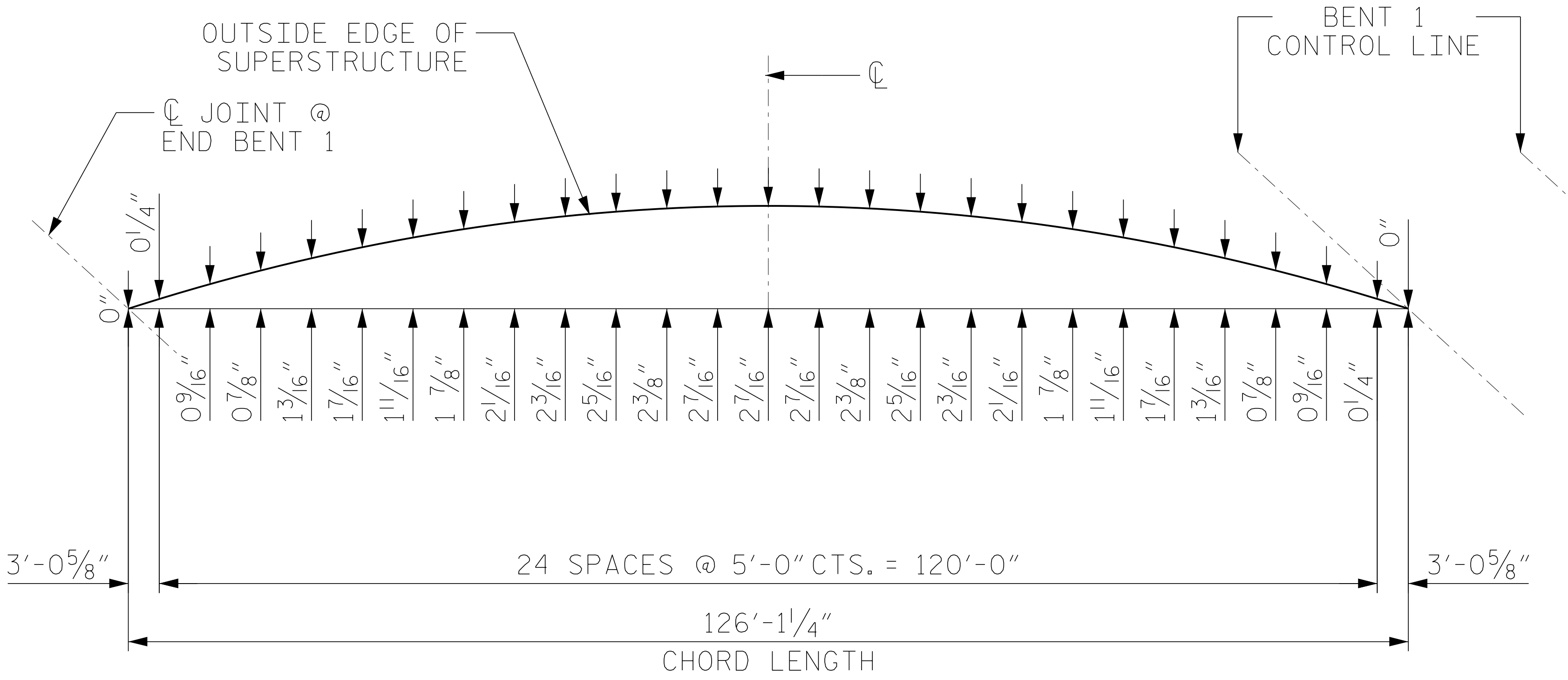


LEFT SIDE SPAN "C" ARC OFFSETS



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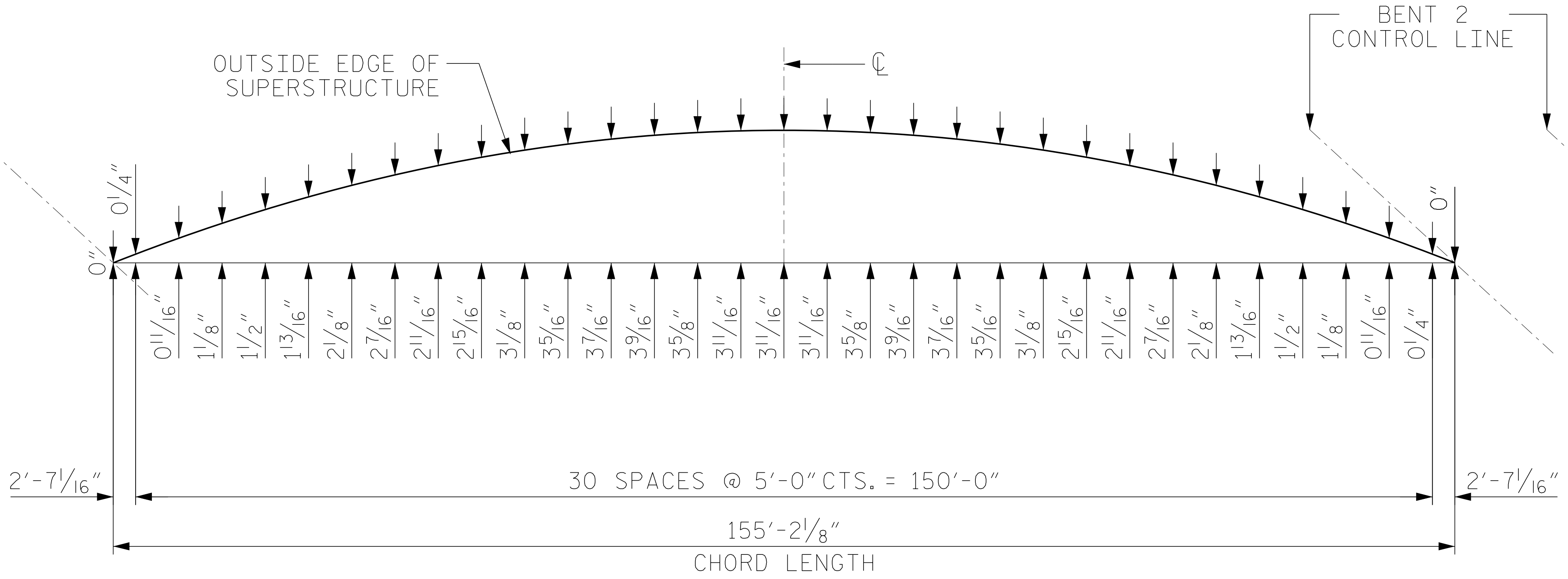
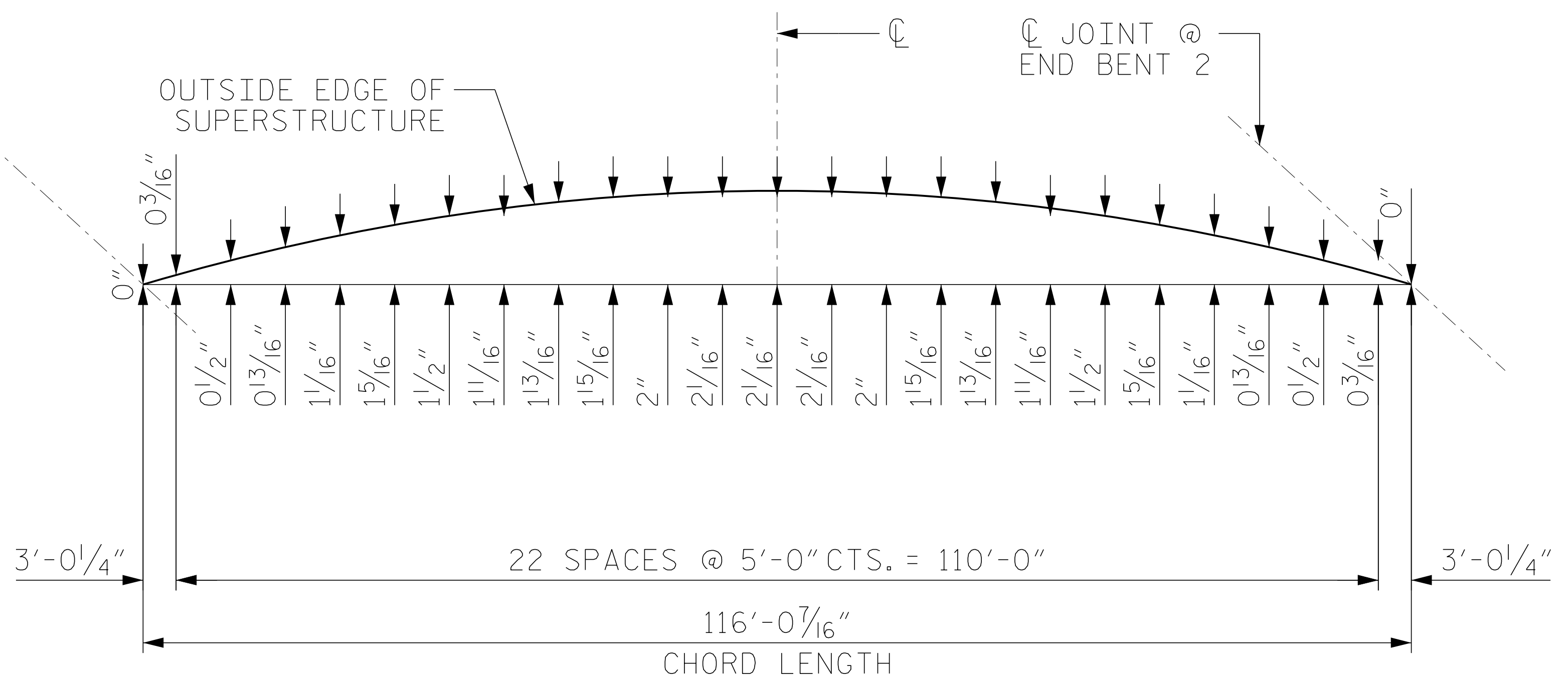


RIGHT SIDE SPAN "B" ARC OFFSETS



RIGHT SIDE SPAN "C" ARC OFFSETS

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
DocuSigned by:
Justin Robinson
5D37A31EDCDC44B...
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SUPERSTRUCTURE
ARC OFFSETS

LEFT LANE

REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S3-10
TOTAL SHEETS 45

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STR. #3

3/27/2018
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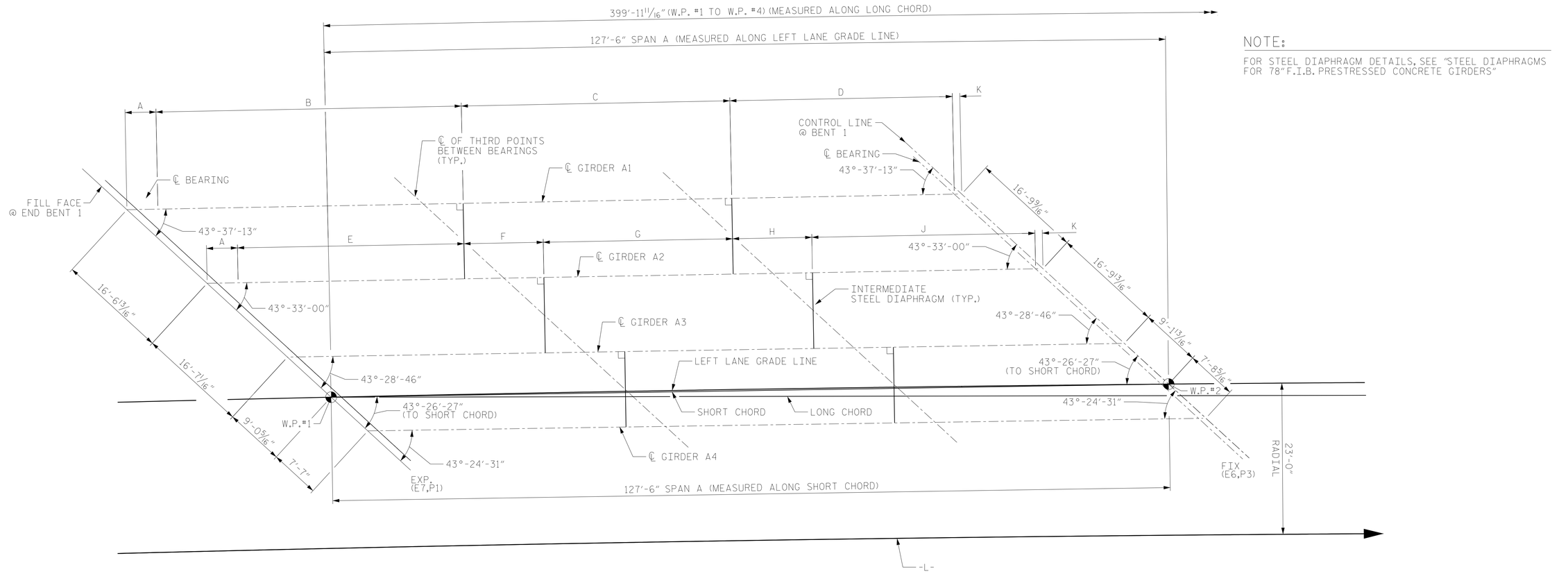

NOTE:

FOR STEEL DIAPHRAGM DETAILS, SEE "STEEL DIAPHRAGMS FOR 78"F.I.B. PRESTRESSED CONCRETE GIRDERS"

SPAN A

FRAMING PLAN

END BENT DIAPHRGAM AND BENT DIAPHRAGM NOT SHOWN.
FOR LOCATION OF END BENT, SEE SHEET S3-2.

EXTERIOR GIRDERS					
	A	B	C	D	K
GIRDER A1	4'-8 9/16"	46'-5 5/16"	40'-5 5/16"	34'-4 3/8"	1'-1 1/2"
GIRDER A4	4'-8 3/4"	34'-6 3/16"	40'-6 9/16"	46'-7 7/8"	1'-1 1/2"

INTERIOR GIRDERS							
	A	E	F	G	H	J	K
GIRDER A2	4'-8 5/8"	34'-5 5/16"	12'-0 13/16"	28'-4 3/8"	12'-1 7/16"	34'-4 13/16"	1'-1 1/2"
GIRDER A3	4'-8 11/16"	34'-5 3/4"	12'-1 3/16"	28'-4 3/4"	12'-1 13/16"	34'-5 1/4"	1'-1 1/2"

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-
SHEET 1 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
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RALEIGH

FRAMING PLAN
SPAN A
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-11
1			3			TOTAL SHEETS
2			4			45

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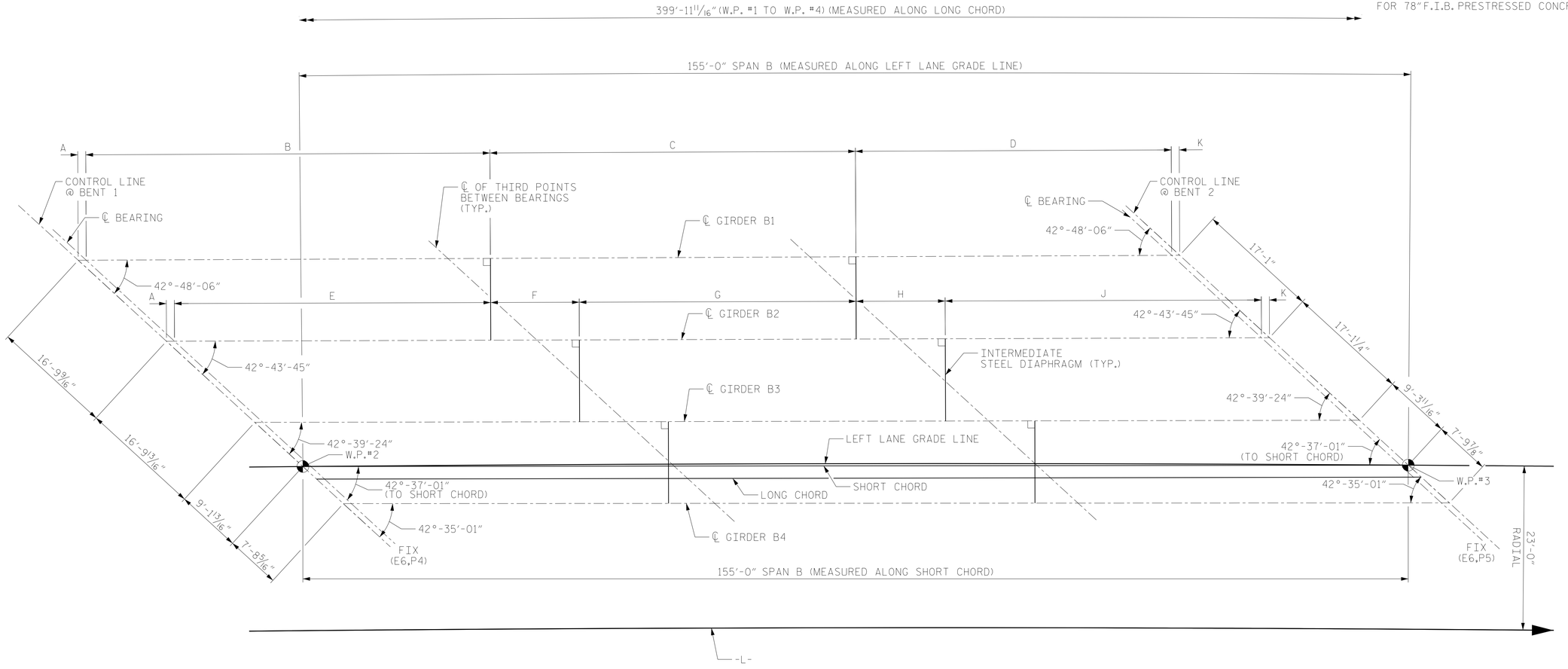
STR. #3

NOTE:

FOR STEEL DIAPHRAGM DETAILS, SEE "STEEL DIAPHRAGMS FOR 78"F.I.B. PRESTRESSED CONCRETE GIRDERS"



SPAN B

FRAMING PLAN

BENT DIAPHRAGMS NOT SHOWN.

EXTERIOR GIRDERS					
	A	B	C	D	K
GIRDER B1	1'-1 1/2"	56'-11 3/16"	50'-9 1/4"	44'-6 1/16"	1'-1 1/2"
GIRDER B4	1'-1 1/2"	44'-8 5/8"	50'-10 15/16"	57'-2 9/16"	1'-1 1/2"

INTERIOR GIRDERS							
	A	E	F	G	H	J	K
GIRDER B2	1'-1 1/2"	44'-7 5/16"	12'-4 7/8"	38'-4 3/8"	12'-5 3/4"	44'-6 11/16"	1'-1 1/2"
GIRDER B3	1'-1 1/2"	44'-8"	12'-5 1/4"	38'-4 13/16"	12'-6 1/8"	44'-7 3/8"	1'-1 1/2"

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 AUSTIN MARK ROBINSON
Digitally signed by Austin Mark Robinson
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FRAMING PLAN
SPAN B
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-12
1			3			TOTAL SHEETS
2			4			45

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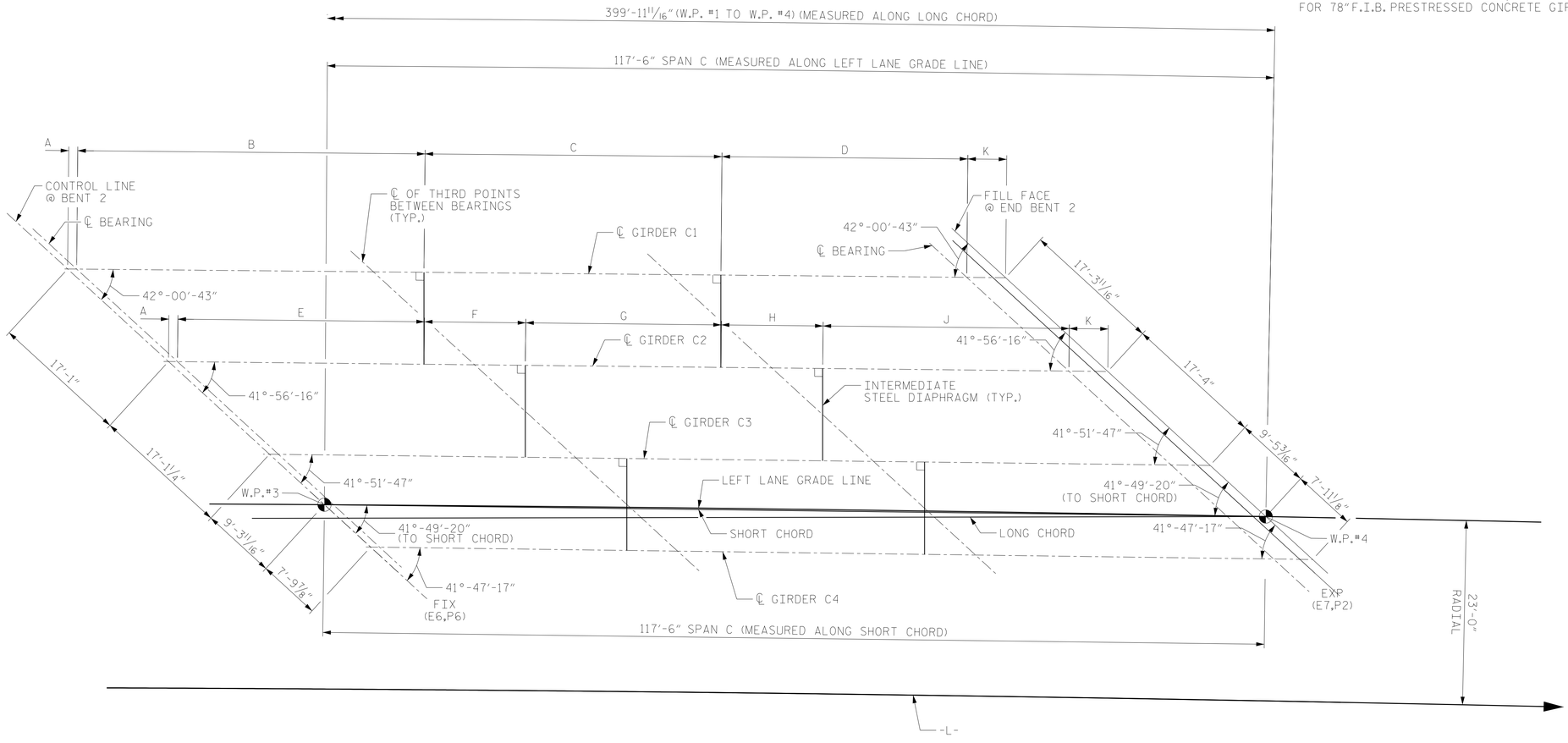
STR. #3

NOTE:

FOR STEEL DIAPHRAGM DETAILS, SEE "STEEL DIAPHRAGMS FOR 78" F.I.B. PRESTRESSED CONCRETE GIRDERS"



SPAN C

FRAMING PLAN

END BENT DIAPHRGAM AND BENT DIAPHRAGM NOT SHOWN.
FOR LOCATION OF END BENT, SEE SHEET S3-2.

EXTERIOR GIRDERS					
	A	B	C	D	K
GIRDER C1	1'-1 1/2"	43'-4 13/16"	37'-0 11/16"	30'-9 3/8"	4'-10 1/4"
GIRDER C4	1'-1 1/2"	30'-9 7/16"	37'-2"	43'-7 1/2"	4'-10 1/2"

INTERIOR GIRDERS							
	A	E	F	G	H	J	K
GIRDER C2	1'-1 1/2"	30'-8 1/2"	12'-9 3/16"	24'-3 1/2"	12'-9 13/16"	30'-8"	4'-10 3/8"
GIRDER C3	1'-1 1/2"	30'-9"	12'-9 9/16"	24'-3 3/4"	12'-10 3/16"	30'-8 7/16"	4'-10 7/16"

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-
SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
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FRAMING PLAN
SPAN C
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-13
1			3			TOTAL SHEETS
2			4			45

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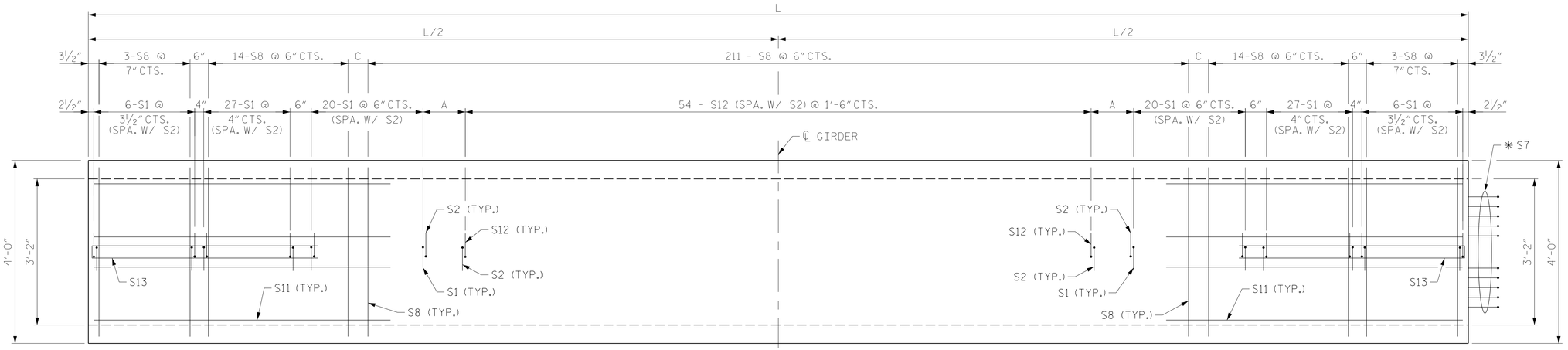
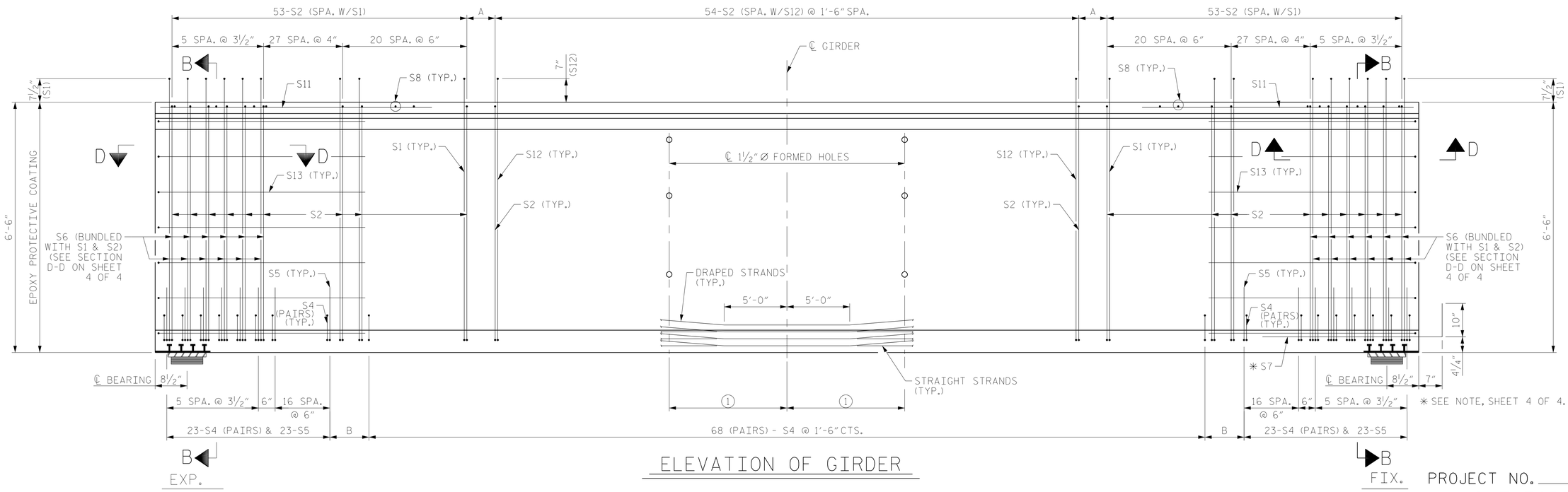
STR. #3



PLAN OF GIRDER



ELEVATION OF GIRDER

SPAN A GIRDER DIMENSIONS				
GIRDER	L	A	B	C
GIRDER A1	122'-8"	10 15/16"	11 7/16"	4 1/2"
GIRDER A2	122'-9 13/16"	11 5/16"	12 3/8"	5 7/16"
GIRDER A3	122'-11 3/4"	12 7/8"	13 3/8"	6 3/8"
GIRDER A4	123'-1 5/8"	13 13/16"	14 5/16"	7 5/16"

NOTES

SEE PARTIAL ELEVATION ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" FOR ADDITIONAL 'S' BARS.

(1) SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR FORMED HOLE LOCATIONS.

ALTERNATE DIRECTION OF #5S1, #5S2, AND #5S12 BARS.

ALL VERTICAL BARS TO BE PLACED WITH S1 BARS.

FOR SECTION A-A AND SECTION B-B, SEE SHEET 4 OF 4.

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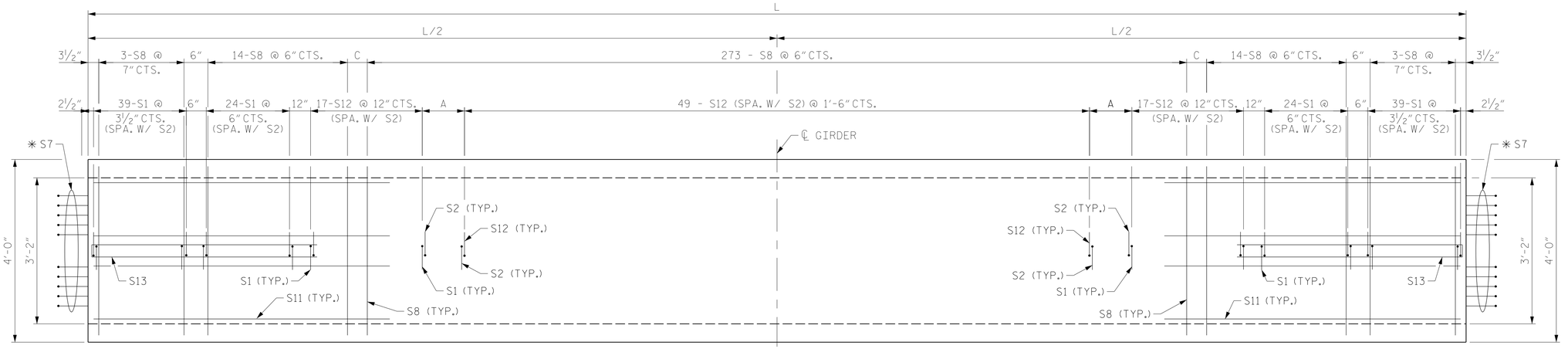
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
F.I.B. 78"
PRESTRESSED
CONCRETE GIRDER
SPAN A
LEFT LANE

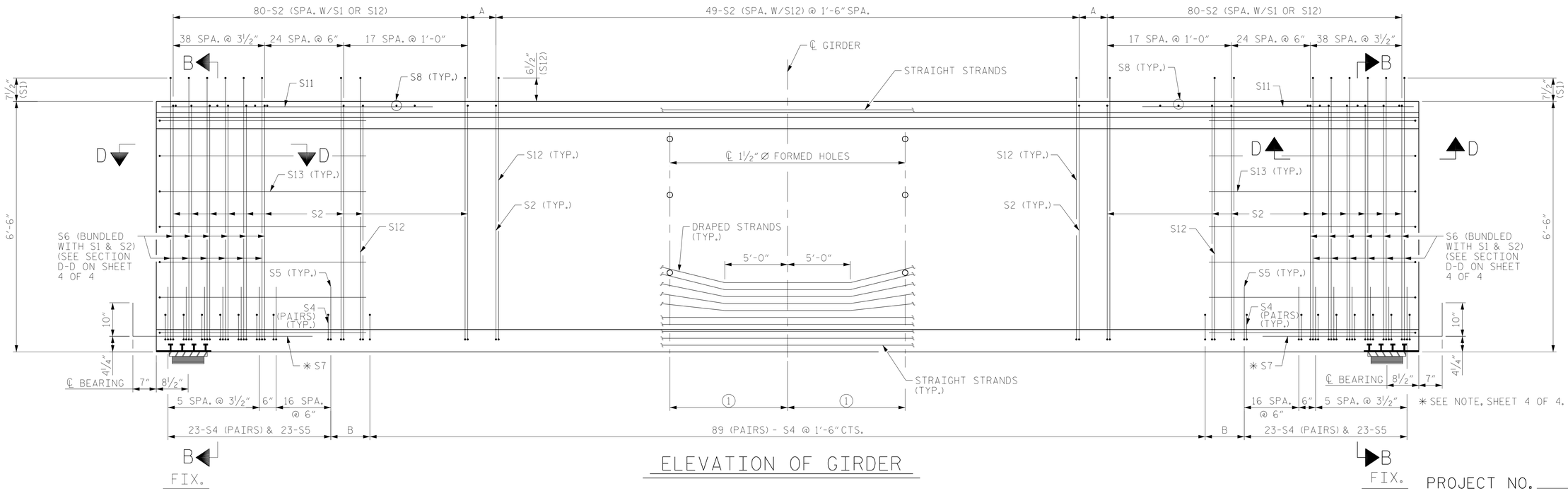
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY: DATE:	S3-14
1			3		TOTAL SHEETS
2			4		45

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-
SHEET 1 OF 4

STR. #3



PLAN OF GIRDER



ELEVATION OF GIRDER

SPAN B GIRDER DIMENSIONS				
GIRDER	L	A	B	C
GIRDER B1	153'-7½"	6¼"	8¼"	4¼"
GIRDER B2	153'-10 1/16"	7½"	9½"	5½"
GIRDER B3	154'-0 9/16"	8¾"	10¾"	6 13/16"
GIRDER B4	154'-3 3/16"	10⅛"	12 1/16"	8 1/16"

NOTES

SEE PARTIAL ELEVATION ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" FOR ADDITIONAL 'S' BARS.

① SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR FORMED HOLE LOCATIONS.

ALTERNATE DIRECTION OF #5S1, #5S2, AND #5S12 BARS.

ALL VERTICAL BARS TO BE PLACED WITH S1 BARS.

FOR SECTION B-B, SEE SHEET 4 OF 4.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 4

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LICENSED LANDSCAPE ARCHITECT SEAL 2233 JUSTIN M. ROBINSON
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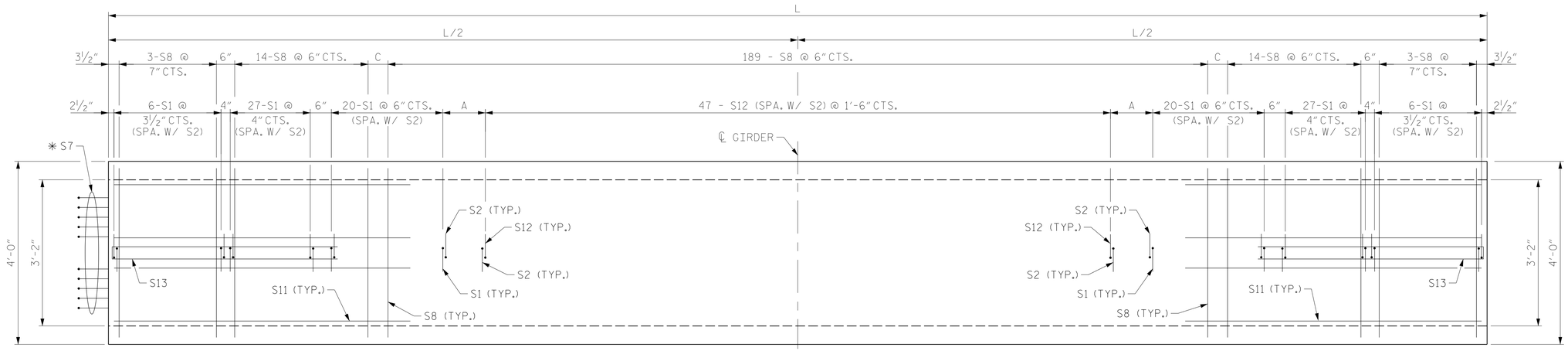
RALEIGH

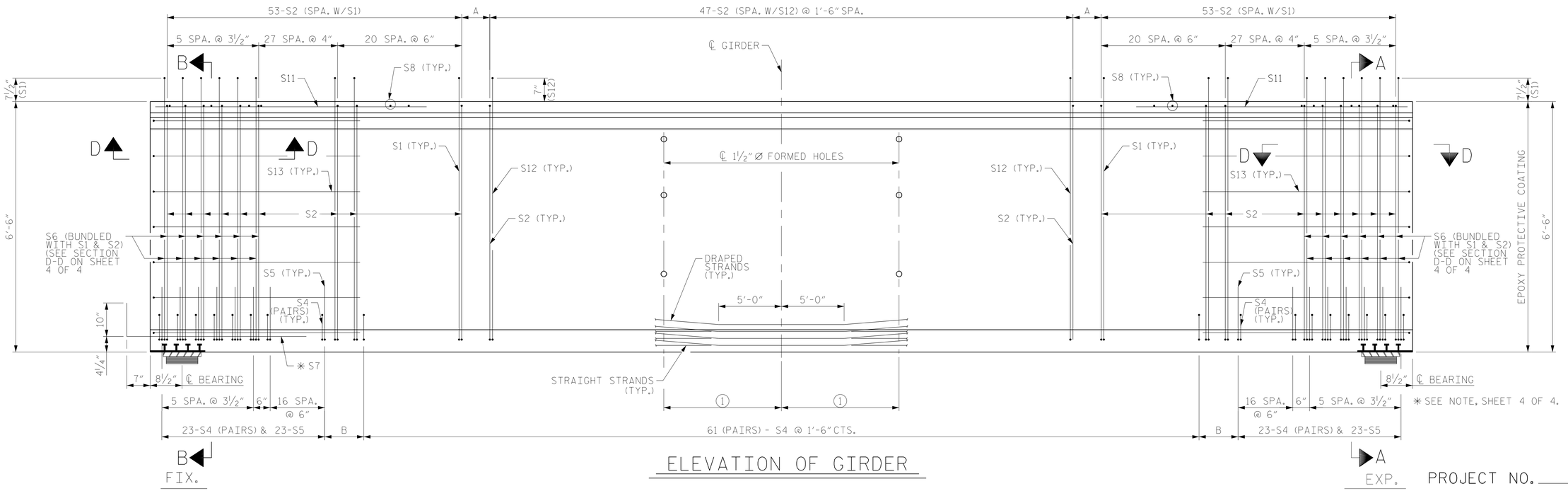
SUPERSTRUCTURE
F.I.B. 78" PRESTRESSED CONCRETE GIRDER
SPAN B
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-15
1			3			TOTAL SHEETS
2			4			45

STR. #3



PLAN OF GIRDER



ELEVATION OF GIRDER

B FIX.

A EXP.

SPAN C GIRDER DIMENSIONS				
GIRDER	L	A	B	C
GIRDER C1	112'-6"	1'-1"	1'-1½"	9½"
GIRDER C2	112'-8"	1'-2"	1'-2½"	10½"
GIRDER C3	112'-9 15/16"	1'-2 15/16"	1'-3 7/16"	11½"
GIRDER C4	112'-11 15/16"	1'-3 15/16"	1'-4 7/16"	12 7/16"

NOTES

SEE PARTIAL ELEVATION ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" FOR ADDITIONAL 'S' BARS.

(1) SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR FORMED HOLE LOCATIONS.

ALTERNATE DIRECTION OF #5S1, #5S2, AND #5S12 BARS.

ALL VERTICAL BARS TO BE PLACED WITH S1 BARS.

FOR SECTION A-A AND SECTION B-B, SEE SHEET 4 OF 4.

DRAWN BY : MRA DATE : 02/2018
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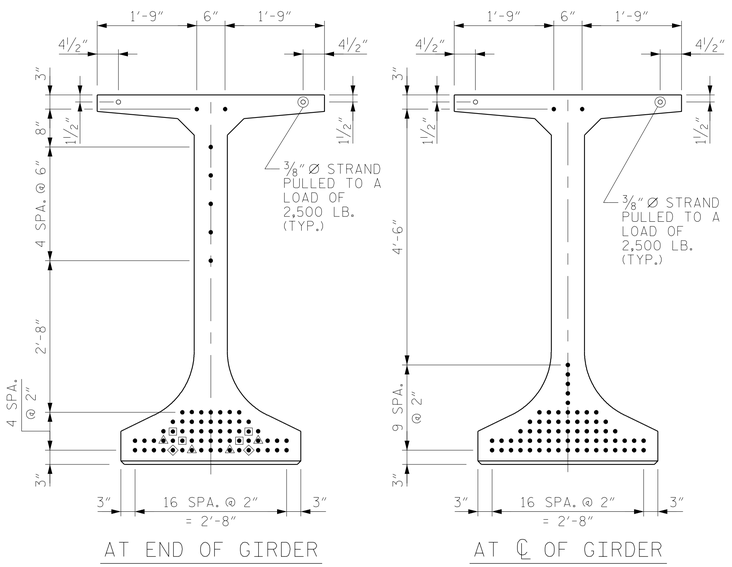
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
F.I.B. 78" PRESTRESSED CONCRETE GIRDER
SPAN C
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-16
1			3			TOTAL SHEETS
2			4			45

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 3 OF 4

STR. #3



0.6" Ø LOW RELAXATION STRAND LAYOUT

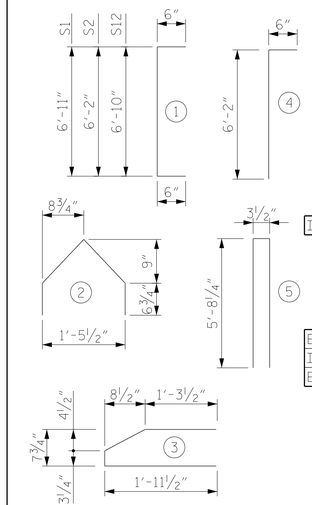
(SPAN B - 68 STRANDS REQUIRED)

DEBONDING LEGEND

- FULLY BONDED STRANDS
- DEBONDED FOR 10'-0" FROM END OF GIRDER
- DEBONDED FOR 8'-0" FROM END OF GIRDER
- DEBONDED FOR 6'-0" FROM END OF GIRDER

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



NOTE:
* S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED. SEE SHEET S3-17 DETAIL A-A ON FOR SPACING.

SPAN A

0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INS.)	ULTIMATE STRENGTH (LBS/STRAND)	APPLIED PRESTRESS (LBS/STRAND)
0.217	58,600	43,950

REINF. STEEL FOR ONE GIRDER

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	106	#5	1	7'-11"	875
	S2	160	#5	1	7'-2"	1196
INTERIOR	S3	16	#4	STR	20'-2"	216
	S4	228	#3	3	4'-4"	371
	S5	46	#3	2	3'-3"	56
	S6	24	#5	STR	6'-0"	150
	* S7	10	#5	STR	3'-8"	38
	S8	245	#4	STR	3'-8"	600
EXTERIOR	S9	16	#4	STR	8'-0"	86
INTERIOR	S10	32	#4	4	6'-8"	143
EXTERIOR	S10	16	#4	4	6'-8"	71
	S11	8	#6	STR	26'-0"	312
	S12	54	#5	1	7'-10"	441
	S13	14	#4	5	11'-8"	109

QUANTITIES FOR ONE GIRDER

GIRDER	REINFORCING STEEL	10,000 PSI CONCRETE	0.6" Ø L. R. GRADE
GDR. 1	4,305	34.7	38
GDR. 2	4,507	34.8	38
GDR. 3	4,507	34.8	38
GDR. 4	4,305	34.9	38

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	VARIES	491.60'

SPAN B

0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INS.)	ULTIMATE STRENGTH (LBS/STRAND)	APPLIED PRESTRESS (LBS/STRAND)
0.217	58,600	43,950

REINF. STEEL FOR ONE GIRDER

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	126	#5	1	7'-11"	1040
	S2	209	#5	1	7'-2"	1562
INTERIOR	S3	16	#4	STR	20'-7"	220
	S4	270	#3	3	4'-4"	440
	S5	46	#3	2	3'-3"	56
	S6	24	#5	STR	6'-0"	150
	* S7	20	#5	STR	3'-8"	76
	S8	307	#4	STR	3'-8"	752
EXTERIOR	S9	16	#4	STR	8'-0"	86
INTERIOR	S10	32	#4	4	6'-8"	143
EXTERIOR	S10	16	#4	4	6'-8"	71
	S11	8	#6	STR	26'-0"	312
	S12	83	#5	1	7'-10"	678
	S13	14	#4	5	11'-8"	109

QUANTITIES FOR ONE GIRDER

GIRDER	REINFORCING STEEL	10,000 PSI CONCRETE	0.6" Ø L. R. GRADE
GDR. 1	5,332	43.5	68
GDR. 2	5,538	43.5	68
GDR. 3	5,538	43.6	68
GDR. 4	5,332	43.7	68

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	VARIES	615.78'

SPAN C

0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INS.)	ULTIMATE STRENGTH (LBS/STRAND)	APPLIED PRESTRESS (LBS/STRAND)
0.217	58,600	43,950

REINF. STEEL FOR ONE GIRDER

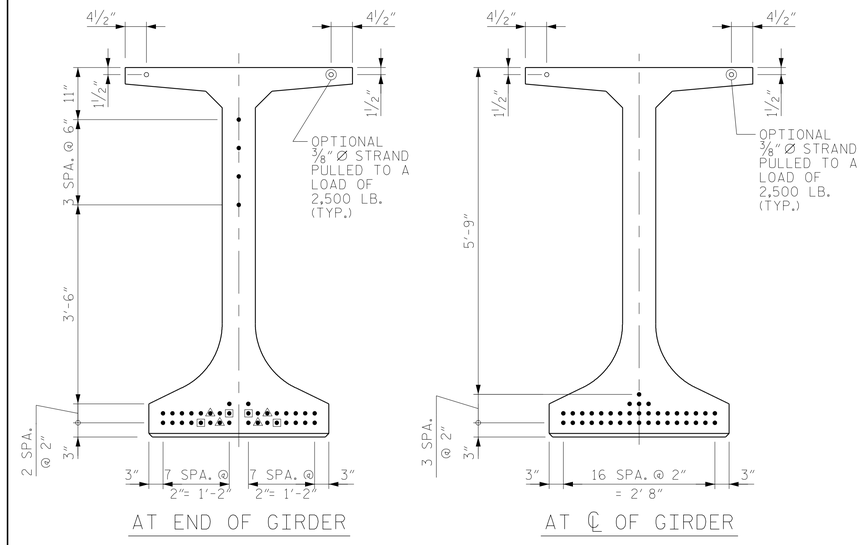
	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	153	#5	1	7'-11"	1263
	S2	153	#5	1	7'-2"	1144
INTERIOR	S3	16	#4	STR	20'-11"	224
	S4	214	#3	3	4'-4"	349
	S5	46	#3	2	3'-3"	56
	S6	24	#5	STR	6'-0"	150
	* S7	10	#5	STR	3'-8"	38
	S8	223	#4	STR	3'-8"	546
EXTERIOR	S9	16	#4	STR	8'-0"	86
INTERIOR	S10	32	#4	4	6'-8"	143
EXTERIOR	S10	16	#4	4	6'-8"	71
	S11	8	#6	STR	26'-0"	312
	S12	47	#5	1	7'-10"	384
	S13	14	#4	5	11'-8"	109

QUANTITIES FOR ONE GIRDER

GIRDER	REINFORCING STEEL	10,000 PSI CONCRETE	0.6" Ø L. R. GRADE
GDR. 1	4,508	31.9	38
GDR. 2	4,718	31.9	38
GDR. 3	4,718	31.9	38
GDR. 4	4,508	32.0	38

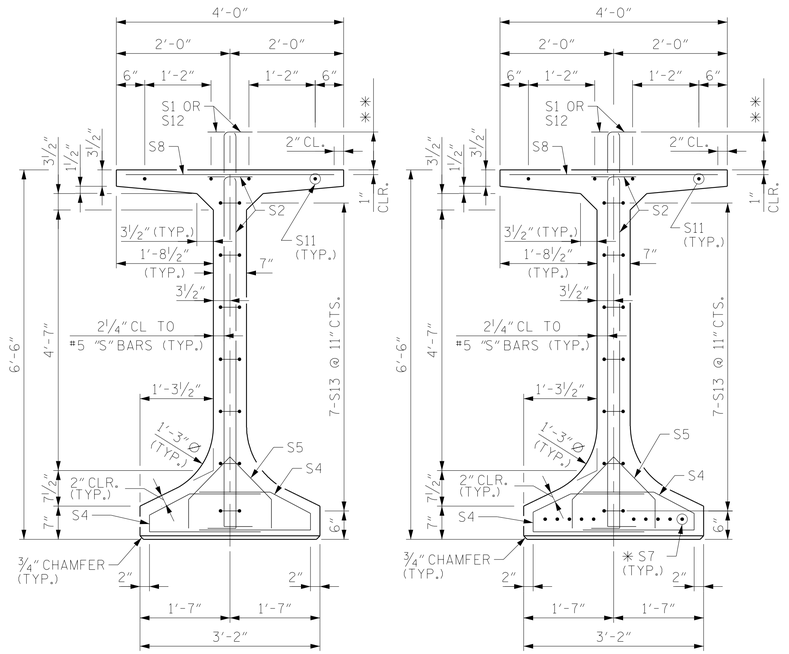
GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	VARIES	450.99'

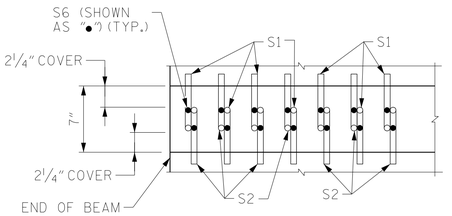


0.6" Ø LOW RELAXATION STRAND LAYOUT

(SPAN A & C - 38 STRANDS REQUIRED)



** SEE GIRDER SHEETS FOR EXTENSION.



SECTION D-D

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
F.I.B. 78" PRESTRESSED CONCRETE GIRDER
(SPANS A, B & C)
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-17
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : MRA DATE : 02/2018
CHECKED BY : MKO DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 01/2018

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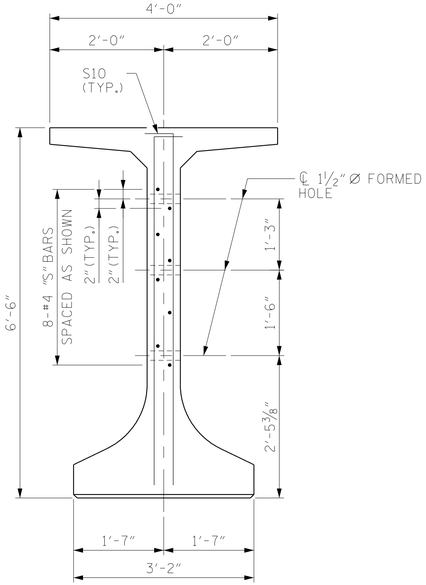
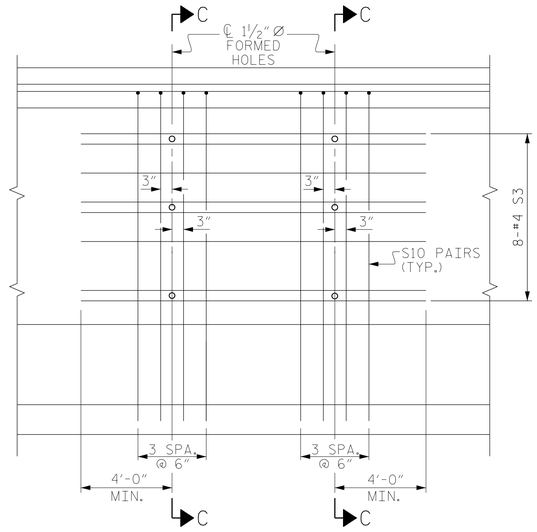
STR. #3

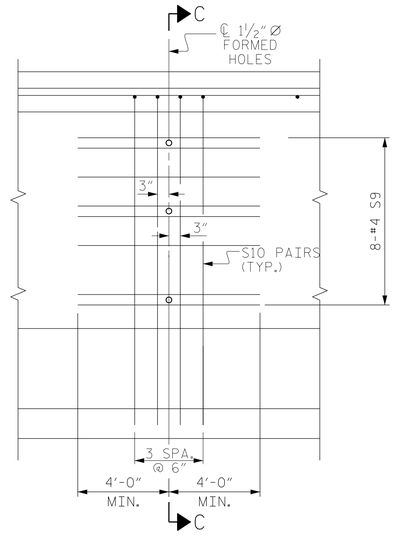


SECTION C-C

(S12 AND S2 BARS NOT SHOWN)



INTERIOR GIRDER



EXTERIOR GIRDER

PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM
REINFORCING STEEL FOR ALL GIRDERS

NOTES:

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL SHALL BE GRADE 60.

APPLY EPOXY PROTECTIVE COATING TO END OF GIRDER SURFACES INDICATED IN ELEVATION VIEW.

EMBEDDED PLATE "B-1" SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. BEVEL EDGES OF PLATE "B-1" TO GIVE CLOSE FIT BUT NOT TIGHT FIT TO STEEL CASTING FORM.

ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE "B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

AT THE END OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 7,000 P.S.I.

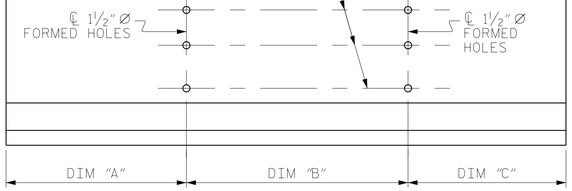
DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF ¼".

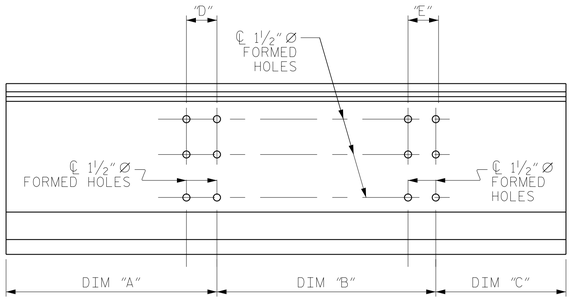
WHEN DRAPED STRANDS ARE DETAILED, THE LONGITUDINAL LOCATION OF THE HOLD DOWN DEVICE SHALL BE WITHIN 6" OF THE LOCATION SHOWN AND THE CENTER OF GRAVITY OF THE GROUP OF DRAPED STRANDS SHALL BE LOCATED WITHIN ½" OF THE THEORETICAL LOCATION SHOWN.

THE COST OF ALL CONCRETE, REINFORCING STEEL, PRESTRESSED STRANDS, INSERTS EMBEDDED IN THE CONCRETE, EMBEDDED PLATES, TEMPORARY BRACING AND INCIDENTAL ITEMS SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE FOR PRESTRESSED CONCRETE GIRDERS.

PRIOR TO CASTING THE GIRDERS, THE CONTRACTOR SHALL SUBMIT COMPLETE WORKING DRAWINGS WITH EXACT LOCATION, AND COMPLETE DESCRIPTION OF ALL INSERTS CAST IN THE GIRDERS, TO THE DEPARTMENT FOR APPROVAL. SUCH INSERTS INCLUDE BUT ARE NOT LIMITED TO, INSERTS FOR SUPPORTING FALSEWORK AND FORMWORK, INSERT FOR ATTACHING DIAPHRAGMS, INSERT FOR CONNECTING TEMPORARY BRACING, AND LIFTING INSERTS.



EXTERIOR GIRDER - SPANS A, B & C



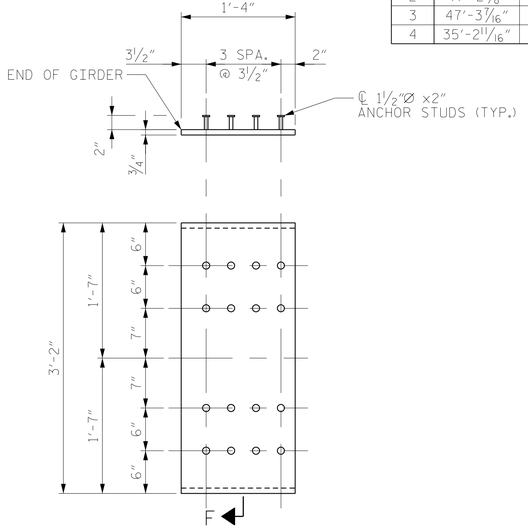
INTERIOR GIRDER - SPANS A, B & C

BOLT HOLE PLACEMENT

DRAWN BY :	MRA	DATE :	01/2018
CHECKED BY :	MKO	DATE :	02/2018
DESIGN ENGINEER OF RECORD:	JMR	DATE :	01/2018

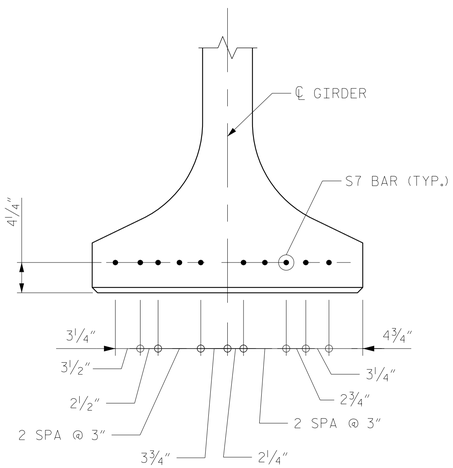
SECTION "F"

(SEE NOTES)



EMBEDDED PLATE "B-1" DETAILS

(2 REQ'D PER GIRDER)



DETAIL A-A

BOLT HOLE PLACEMENT DIMENSIONS

GDR. NO.	SPAN A					SPAN B					SPAN C				
	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"
1	47'-1 3/16"	40'-5 5/16"	35'-0 3/16"	-	-	57'-7 11/16"	50'-9 1/4"	45'-2 9/16"	-	-	44'-1 5/16"	37'-0 11/16"	31'-4 1/16"	-	-
2	47'-2 5/8"	40'-5 5/16"	35'-1 5/16"	12'-0 3/16"	12'-1 7/16"	57'-8 3/4"	50'-10 1/8"	45'-3 3/16"	12'-4 7/8"	12'-5 3/4"	44'-2 3/16"	37'-1 5/16"	31'-4 1/2"	12'-9 3/16"	12'-9 13/16"
3	47'-3 7/16"	40'-6 9/16"	35'-1 3/4"	12'-1 3/16"	12'-1 13/16"	57'-9 3/4"	50'-10 15/16"	45'-3 7/8"	12'-5 1/4"	12'-6 1/8"	44'-3"	37'-2"	31'-4 15/16"	12'-9 9/16"	12'-10 3/16"
4	35'-2 11/16"	40'-6 9/16"	47'-4 3/8"	-	-	45'-5 1/8"	50'-10 15/16"	57'-11 1/16"	-	-	31'-5 15/16"	37'-2"	44'-4"	-	-

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 SEAN ROBINSON
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL MARK ROBINSON
DocuSigned by: Sean Robinson / Justin Mark Robinson
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-18
1			3			TOTAL SHEETS
2			4			45

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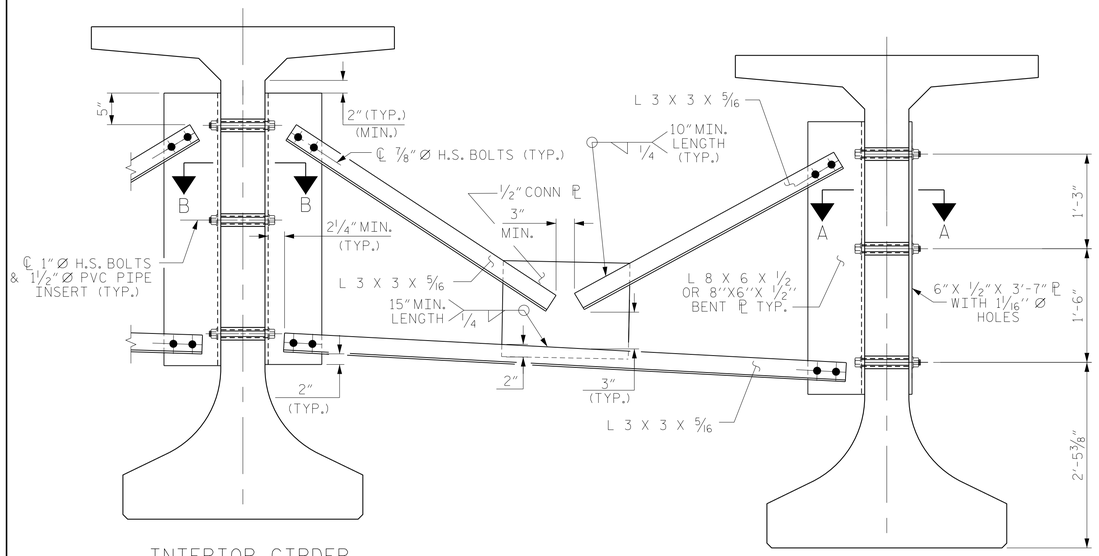
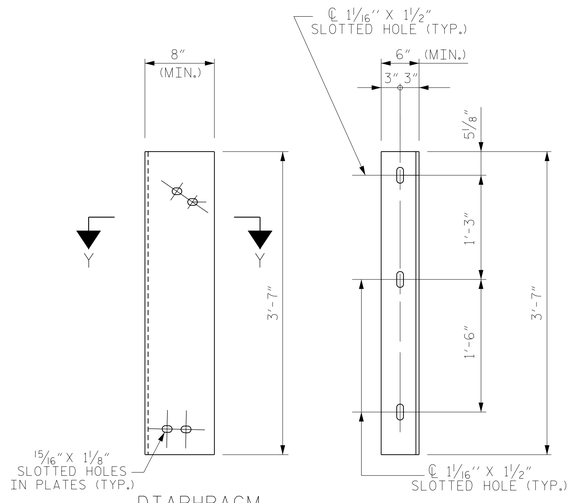


INTERIOR GIRDER

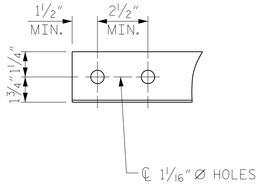
EXTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

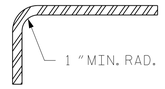


DIAPHRAGM FACE

WEB FACE



ANGLE END
(L 3 X 3 X 5/16)



SECTION Y-Y

CONNECTOR PLATE DETAIL

STRUCTURAL STEEL NOTES

ALL INTERMEDIATE DIAPHRAGM STEEL AND CONNECTOR PLATES SHALL BE AASHTO M270 GRADE 50 OR APPROVED EQUAL.

TENSION ON THE ASTM A325 BOLTS THROUGH THE ANGLE MEMBER SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL 1/4 TURN.

THE PLATES, BENT PLATES, AND ANGLES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

FOR METALLIZATION, APPLY A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENTS THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM, THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

GALVANIZE THE HIGH STRENGTH BOLTS, NUTS, WASHERS AND DIRECT TENSION INDICATORS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

USE AN ASTM F436 HARDENED WASHER WITH STANDARD AND SLOTTED HOLES UNDER EACH BOLT HEAD AND NUT.

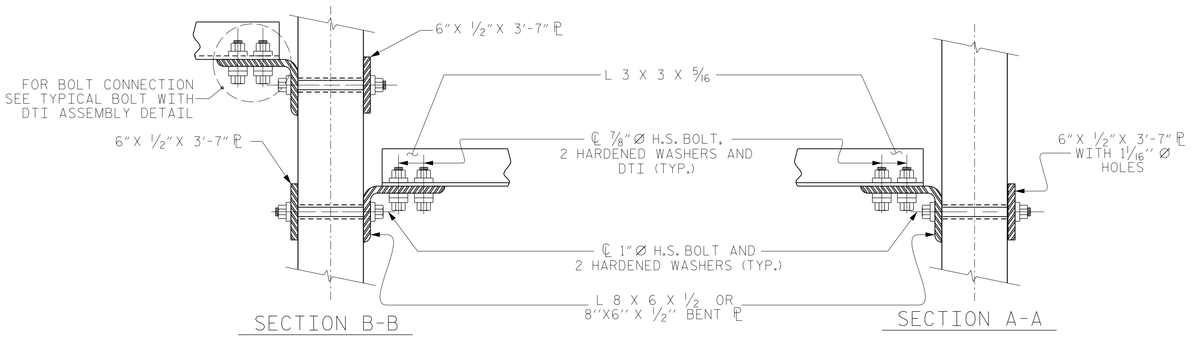
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4"PROJECTION BEYOND THE NUT.

INTERMEDIATE DIAPHRAGM ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

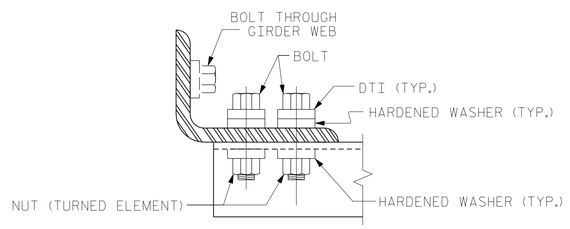
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.



SECTION B-B

SECTION A-A

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON

3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
INTERMEDIATE STEEL DIAPHRAGMS FOR 78" FIB PRESTRESSED CONCRETE GIRDERS
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-19
1			3			TOTAL SHEETS
2			4			45

DRAWN BY :	MRA	DATE : 01/2018
CHECKED BY :	JMR	DATE : 02/2018
DESIGN ENGINEER OF RECORD:	JMR	DATE : 02/2018

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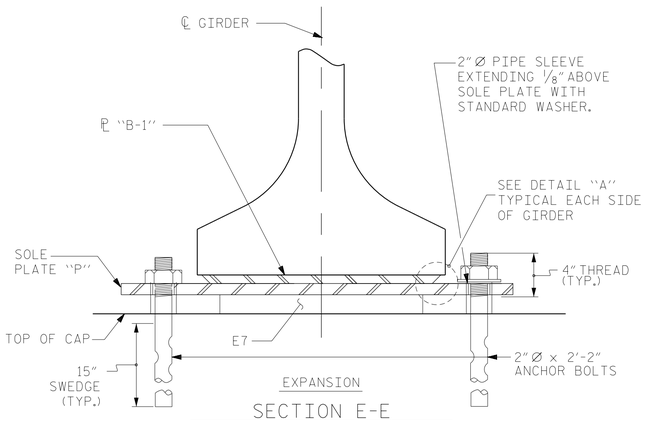
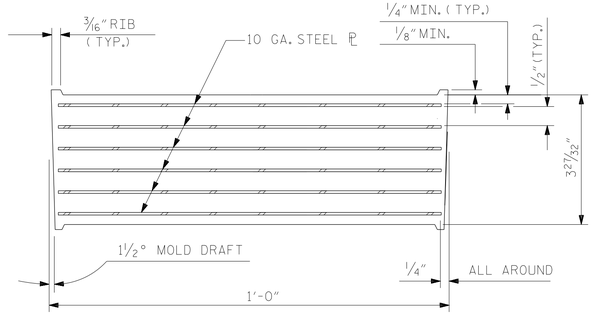
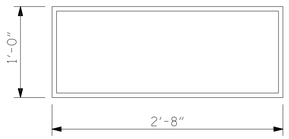
STR. #3



SECTION E-E



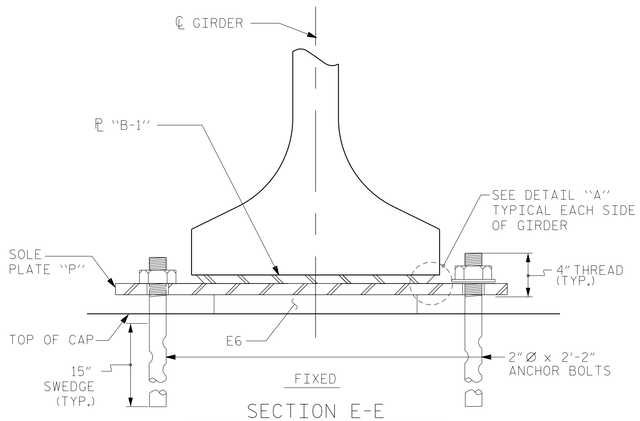
TYPICAL SECTION OF ELASTOMERIC BEARINGS



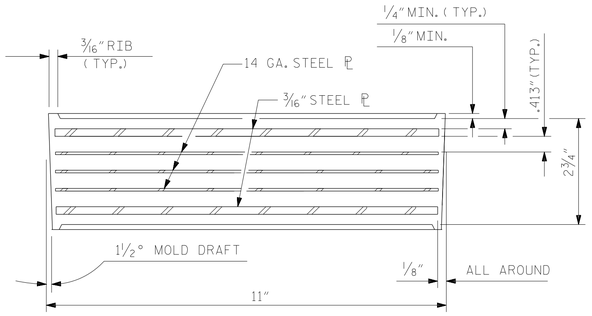
E7 (8 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

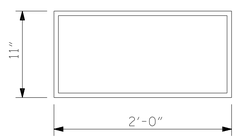
TYPE VIII



SECTION E-E



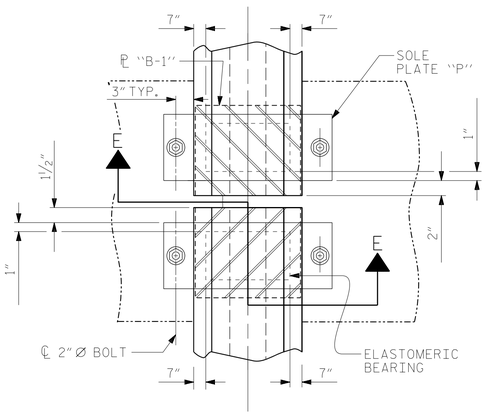
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E6 (16 REQ'D)

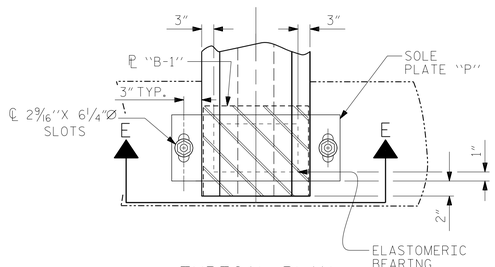
PLAN VIEW OF ELASTOMERIC BEARING

TYPE VII



TYPICAL PLAN

(SHOWING CONTINUOUS BENT)



TYPICAL PLAN

(SHOWING SIMPLE SPAN END BENT)

NOTES

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF 1/2 TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

THE 2"Ø PIPE SLEEVE SHALL BE CUT FROM SCHEDULE 40 PVC PLASTIC PIPE. THE PVC PLASTIC PIPE SHALL MEET THE REQUIREMENTS OF ASTM D1785.

STEEL SOLE PLATES, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

PRIOR TO WELDING, GRIND THE GALVANIZED SURFACE OF THE PORTION OF THE EMBEDDED PLATE AND SOLE PLATE THAT ARE TO BE WELDED. AFTER WELDING, DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

WHEN WELDING THE SOLE PLATE TO THE EMBEDDED PLATE IN THE GIRDER, USE TEMPERATURE INDICATING WAX PENS, OR OTHER SUITABLE MEANS, TO ENSURE THAT THE TEMPERATURE OF THE SOLE PLATE DOES NOT EXCEED 300°F. TEMPERATURES ABOVE THIS MAY DAMAGE THE ELASTOMER.

SOLE PLATE "P", BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

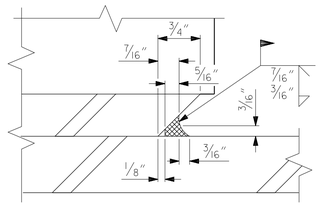
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

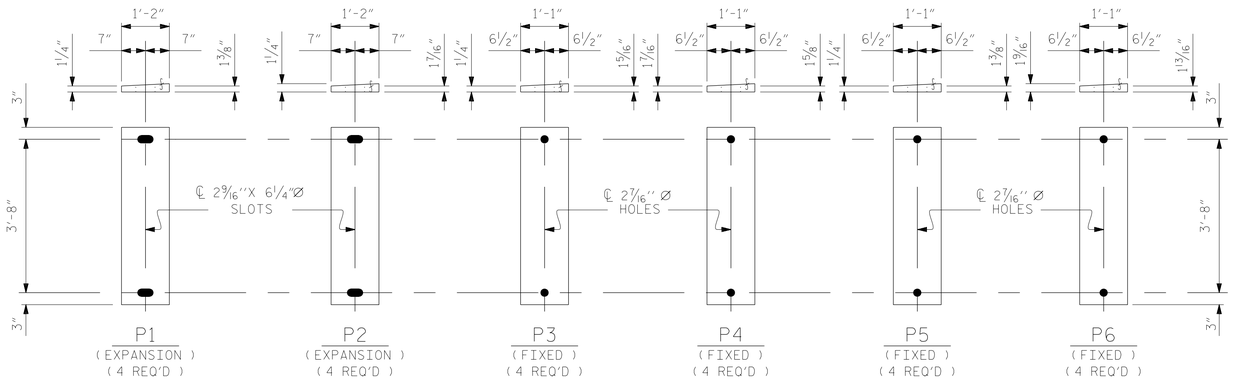
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.



DETAIL "A"



SOLE PLATE DETAILS ("P")

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JOHN MARK ROBINSON

3/28/2018

RS&H

RS&H Architects-Engineers-Planners, Inc.

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

ELASTOMERIC BEARING DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-20
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : MRA DATE : 01/2018

CHECKED BY : JMR DATE : 02/2018

DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

3/27/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\403_U2412A_SMU_BRG01_401272.dgn
AcostaM

STR. #3

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION																						
	SPAN A																					
	GIRDER 1 (EXTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.027	0.054	0.079	0.102	0.123	0.140	0.154	0.164	0.170	0.172	0.170	0.164	0.154	0.140	0.123	0.102	0.079	0.054	0.027	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.021	0.042	0.061	0.079	0.095	0.108	0.119	0.127	0.132	0.133	0.132	0.127	0.119	0.108	0.095	0.079	0.061	0.042	0.021	0.000
FINAL CAMBER ↑	0''	1/16''	1/8''	3/16''	1/4''	5/16''	3/8''	7/16''	7/16''	7/16''	7/16''	7/16''	7/16''	7/16''	3/8''	5/16''	1/4''	3/16''	1/8''	1/16''	0''
	GIRDER 2 (INTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.027	0.054	0.079	0.102	0.123	0.140	0.154	0.164	0.170	0.172	0.170	0.164	0.154	0.140	0.123	0.102	0.079	0.054	0.027	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.022	0.044	0.064	0.083	0.100	0.114	0.125	0.133	0.138	0.140	0.138	0.133	0.125	0.114	0.100	0.083	0.064	0.044	0.022	0.000
FINAL CAMBER ↑	0''	1/16''	1/8''	3/16''	1/4''	1/4''	5/16''	3/8''	3/8''	3/8''	3/8''	3/8''	3/8''	3/8''	5/16''	1/4''	1/4''	3/16''	1/8''	1/16''	0''
	GIRDER 3 (INTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.027	0.054	0.079	0.102	0.123	0.140	0.154	0.164	0.170	0.172	0.170	0.164	0.154	0.140	0.123	0.102	0.079	0.054	0.027	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.022	0.044	0.065	0.084	0.100	0.114	0.126	0.134	0.139	0.141	0.139	0.134	0.126	0.114	0.100	0.084	0.065	0.044	0.022	0.000
FINAL CAMBER ↑	0''	1/16''	1/8''	3/16''	1/4''	1/4''	5/16''	5/16''	3/8''	3/8''	3/8''	3/8''	3/8''	5/16''	5/16''	1/4''	1/4''	3/16''	1/8''	1/16''	0''
	GIRDER 4 (EXTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.027	0.054	0.079	0.102	0.123	0.140	0.154	0.164	0.170	0.172	0.170	0.164	0.154	0.140	0.123	0.102	0.079	0.054	0.027	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.021	0.042	0.061	0.079	0.095	0.108	0.119	0.127	0.131	0.133	0.131	0.127	0.119	0.108	0.095	0.079	0.061	0.042	0.021	0.000
FINAL CAMBER ↑	0''	1/16''	1/8''	3/16''	5/16''	5/16''	3/8''	7/16''	7/16''	7/16''	1/2''	7/16''	7/16''	7/16''	3/8''	5/16''	5/16''	3/16''	1/8''	1/16''	0''

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION																						
	SPAN B																					
	GIRDER 1 (EXTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.181	0.233	0.280	0.319	0.351	0.374	0.388	0.393	0.388	0.374	0.351	0.319	0.280	0.233	0.181	0.123	0.062	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.051	0.102	0.149	0.192	0.231	0.263	0.289	0.308	0.320	0.324	0.320	0.308	0.289	0.263	0.231	0.192	0.149	0.102	0.051	0.000
FINAL CAMBER ↑	0''	1/8''	1/4''	3/8''	1/2''	9/16''	11/16''	3/4''	13/16''	13/16''	13/16''	13/16''	13/16''	3/4''	11/16''	9/16''	1/2''	3/8''	1/4''	1/8''	0''
	GIRDER 2 (INTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.181	0.233	0.280	0.319	0.351	0.374	0.388	0.393	0.388	0.374	0.351	0.319	0.280	0.233	0.181	0.123	0.062	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.054	0.106	0.155	0.200	0.241	0.274	0.302	0.321	0.333	0.337	0.333	0.321	0.302	0.274	0.241	0.200	0.155	0.106	0.054	0.000
FINAL CAMBER ↑	0''	1/8''	3/16''	5/16''	3/8''	1/2''	9/16''	5/8''	5/8''	11/16''	11/16''	11/16''	5/8''	5/8''	9/16''	1/2''	3/8''	5/16''	3/16''	1/8''	0''
	GIRDER 3 (INTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.181	0.233	0.280	0.319	0.351	0.374	0.388	0.393	0.388	0.374	0.351	0.319	0.280	0.233	0.181	0.123	0.062	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.054	0.106	0.156	0.201	0.242	0.275	0.303	0.323	0.335	0.339	0.335	0.323	0.303	0.275	0.242	0.201	0.156	0.106	0.054	0.000
FINAL CAMBER ↑	0''	1/8''	3/16''	5/16''	3/8''	7/16''	1/2''	9/16''	5/8''	5/8''	5/8''	5/8''	5/8''	9/16''	1/2''	7/16''	3/8''	5/16''	3/16''	1/8''	0''
	GIRDER 4 (EXTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.181	0.233	0.280	0.319	0.351	0.374	0.388	0.393	0.388	0.374	0.351	0.319	0.280	0.233	0.181	0.123	0.062	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.051	0.101	0.147	0.190	0.228	0.260	0.286	0.305	0.316	0.320	0.316	0.305	0.286	0.260	0.228	0.190	0.147	0.101	0.051	0.000
FINAL CAMBER ↑	0''	1/8''	1/4''	3/8''	1/2''	5/8''	11/16''	3/4''	13/16''	7/8''	7/8''	7/8''	13/16''	3/4''	11/16''	5/8''	1/2''	3/8''	1/4''	1/8''	0''

* INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER ", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
Digitally signed by Justin Robinson
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTION SPANS A & B

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-21
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : MRA DATE : 02/2018
CHECKED BY : MKO DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

3/27/2018
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AcostaM

STR. #3

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION	SPAN C																				
	GIRDER 1 (EXTERIOR)																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.026	0.052	0.076	0.098	0.118	0.134	0.148	0.157	0.163	0.165	0.163	0.157	0.148	0.134	0.118	0.098	0.076	0.052	0.026	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.015	0.029	0.043	0.056	0.067	0.076	0.084	0.089	0.093	0.094	0.093	0.089	0.084	0.076	0.067	0.056	0.043	0.029	0.015	0.000
FINAL CAMBER ↑	0''	1/8''	1/4''	3/8''	1/2''	5/8''	11/16''	3/4''	13/16''	7/8''	7/8''	7/8''	13/16''	3/4''	11/16''	5/8''	1/2''	3/8''	1/4''	1/8''	0''
	GIRDER 2 (INTERIOR)																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.026	0.052	0.076	0.098	0.118	0.134	0.148	0.157	0.163	0.165	0.163	0.157	0.148	0.134	0.118	0.098	0.076	0.052	0.026	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.016	0.031	0.045	0.058	0.070	0.080	0.088	0.094	0.097	0.098	0.097	0.094	0.088	0.080	0.070	0.058	0.045	0.031	0.016	0.000
FINAL CAMBER ↑	0''	1/8''	1/4''	3/8''	1/2''	9/16''	5/8''	11/16''	3/4''	13/16''	13/16''	13/16''	3/4''	11/16''	5/8''	9/16''	1/2''	3/8''	1/4''	1/8''	0''
	GIRDER 3 (INTERIOR)																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.026	0.052	0.076	0.098	0.118	0.134	0.148	0.157	0.163	0.165	0.163	0.157	0.148	0.134	0.118	0.098	0.076	0.052	0.026	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.016	0.031	0.045	0.059	0.070	0.080	0.088	0.094	0.098	0.099	0.098	0.094	0.088	0.080	0.070	0.059	0.045	0.031	0.016	0.000
FINAL CAMBER ↑	0''	1/8''	1/4''	3/8''	1/2''	9/16''	5/8''	11/16''	3/4''	13/16''	13/16''	13/16''	3/4''	11/16''	5/8''	9/16''	1/2''	3/8''	1/4''	1/8''	0''
	GIRDER 4 (EXTERIOR)																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.026	0.052	0.076	0.098	0.118	0.135	0.148	0.158	0.164	0.166	0.164	0.158	0.148	0.135	0.118	0.098	0.076	0.052	0.026	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.015	0.029	0.043	0.055	0.066	0.076	0.083	0.089	0.092	0.093	0.092	0.089	0.083	0.076	0.066	0.055	0.043	0.029	0.015	0.000
FINAL CAMBER ↑	0''	1/8''	1/4''	3/8''	1/2''	5/8''	11/16''	3/4''	13/16''	7/8''	7/8''	7/8''	13/16''	3/4''	11/16''	5/8''	1/2''	3/8''	1/4''	1/8''	0''

* INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT " FINAL CAMBER ", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039373 Registered to: Justin Mark Johnson 3/28/2018

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North Carolina License Nos. 50073 * F-0493 * C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTION
SPAN C

LEFT LANE

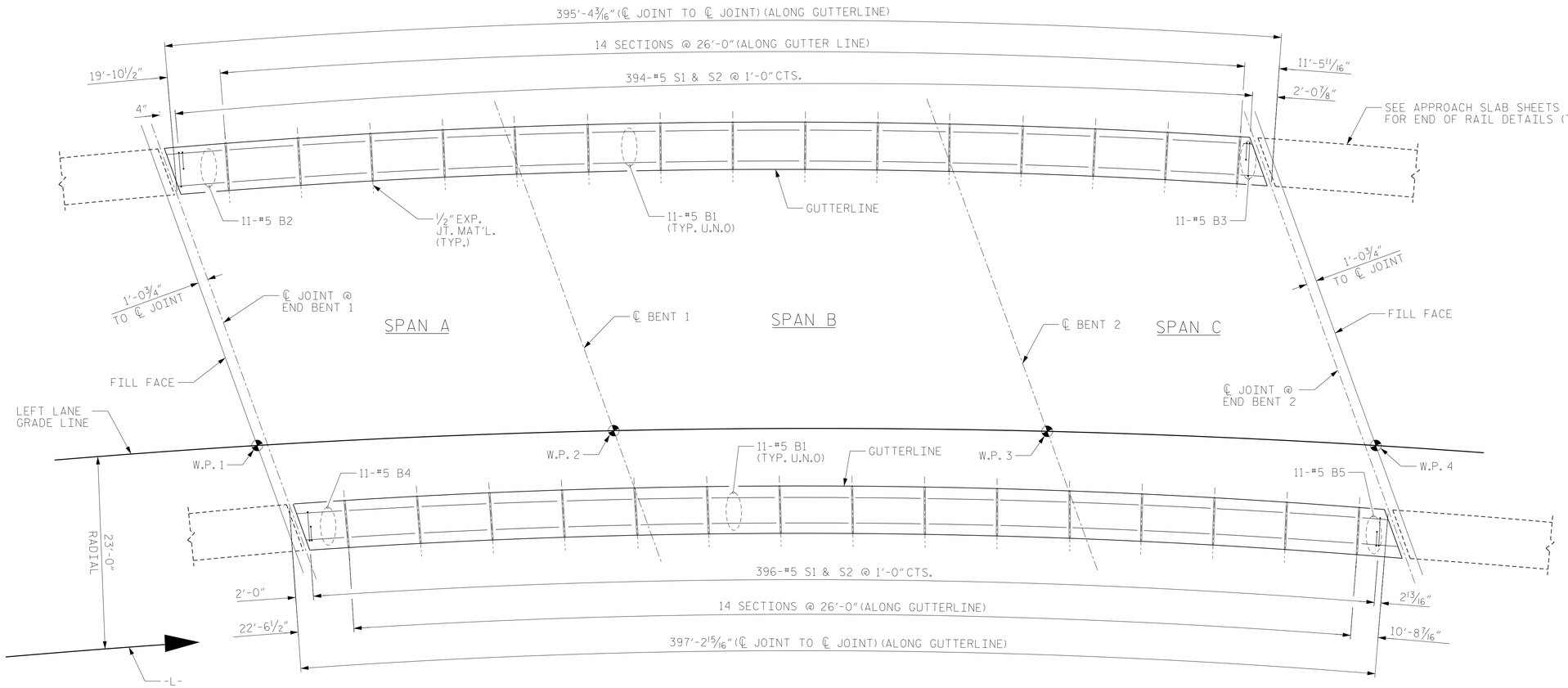
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-22
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : MRA DATE : 02/2018
CHECKED BY : MKO DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

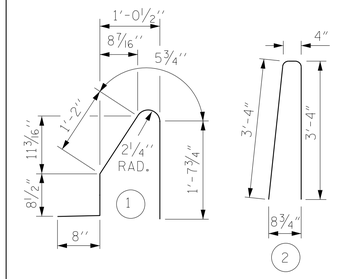
3/27/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\403_U2412A_SMU_DL2_401272.dgn
AcostaM

STR. #3



PLAN OF BARRIER RAIL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	308	#5	STR	25'-6"	8192
✳ B2	11	#5	STR	19'-5"	223
✳ B3	11	#5	STR	9'-5"	108
✳ B4	11	#5	STR	20'-7"	236
✳ B5	11	#5	STR	10'-2"	117
✳ S1	790	#5	1	4'-8"	3845
✳ S2	790	#5	2	7'-0"	5768

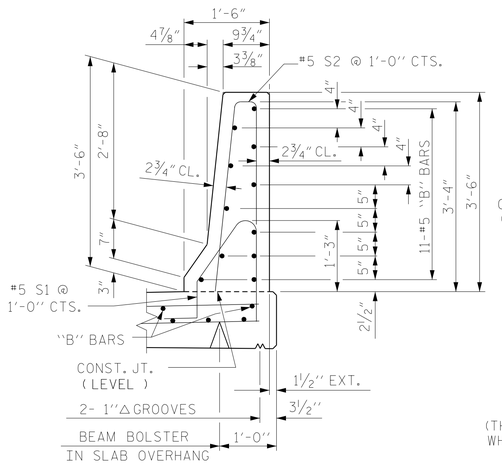
✳ EPOXY COATED REINFORCING STEEL	18,489 LBS.
CLASS AA CONCRETE	107.8 CU. YDS.
CONCRETE BARRIER RAIL	792.6 LIN. FT.

NOTES

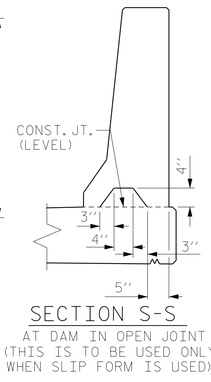
THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

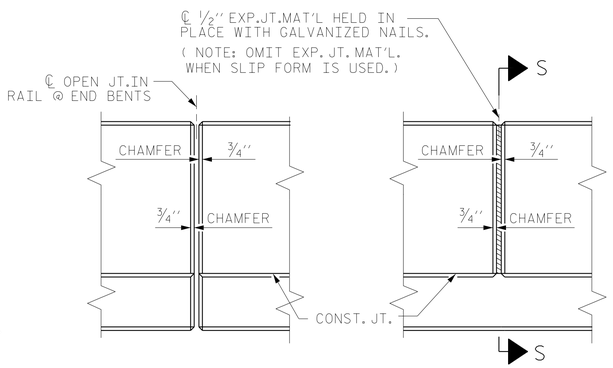


SECTION THRU RAIL



SECTION S-S

AT DAM IN OPEN JOINT (THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039513 JOHN MARK ROBINSON — Digitally signed by John Mark Robinson — DocuSigned by: 3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONCRETE BARRIER RAIL

LEFT LANE

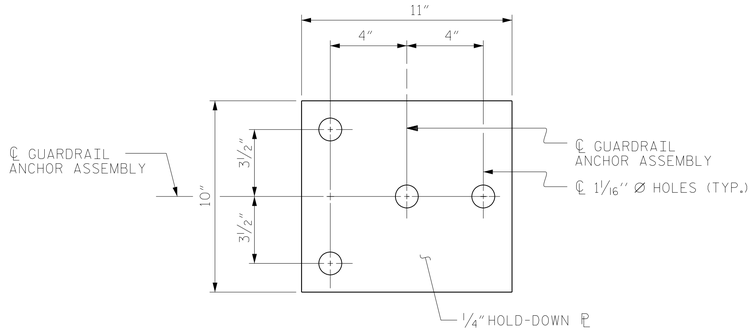
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-23
1			3			TOTAL SHEETS
2			4			45

DRAWN BY :	NSC	DATE : 01/2018
CHECKED BY :	MAL	DATE : 02/2018
DESIGN ENGINEER OF RECORD:	JMR	DATE : 02/2018

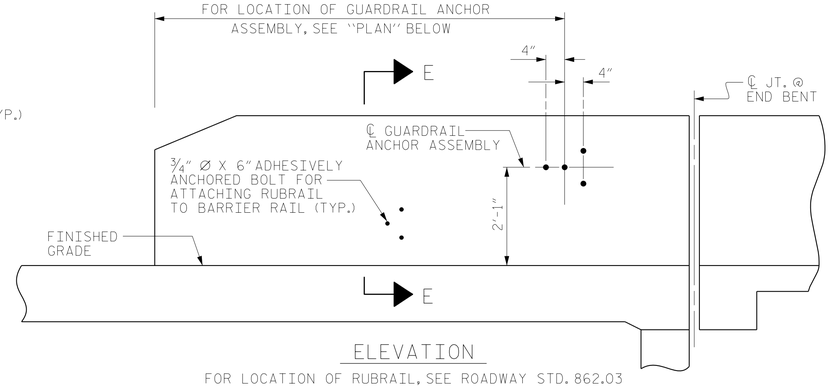
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

3/27/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\403_U2412A_SMU_BR1_401272.dgn
AcostaM

STR. #3



PLAN



ELEVATION

FOR LOCATION OF RUBRAIL, SEE ROADWAY STD. 862.03

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4'' HOLD-DOWN PLATE AND 4 - 7/8'' Ø BOLTS WITH NUTS AND WASHERS, RUBRAIL, AND ADHESIVELY ANCHORED BOLTS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 7/8'' Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

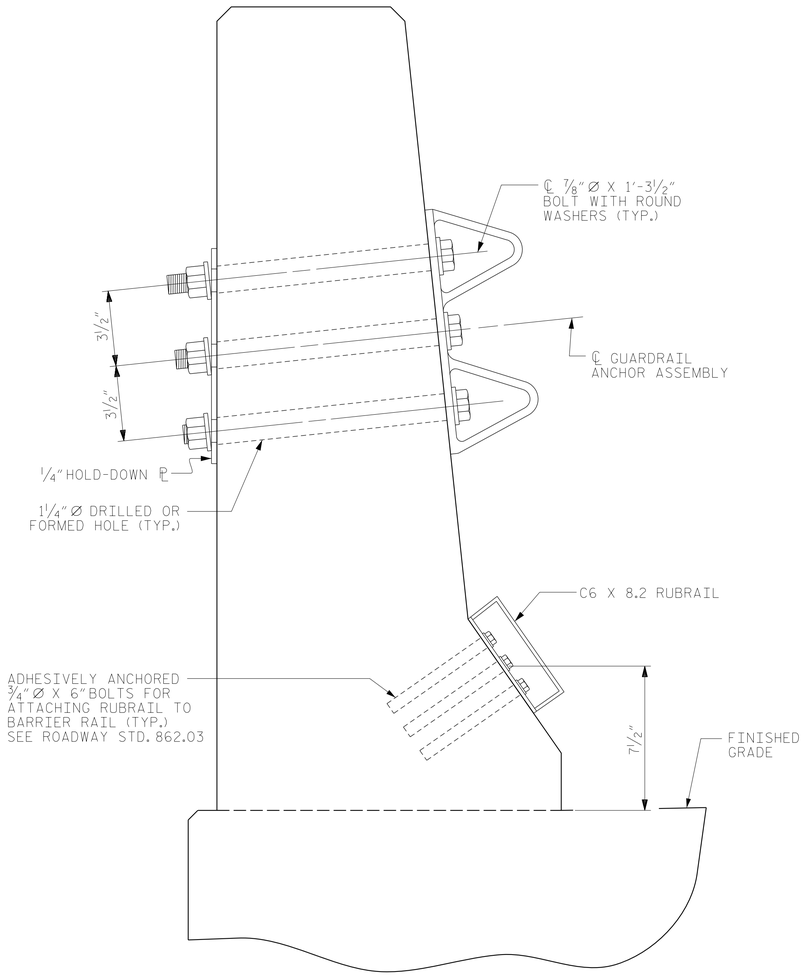
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CONCRETE BARRIER RAIL.

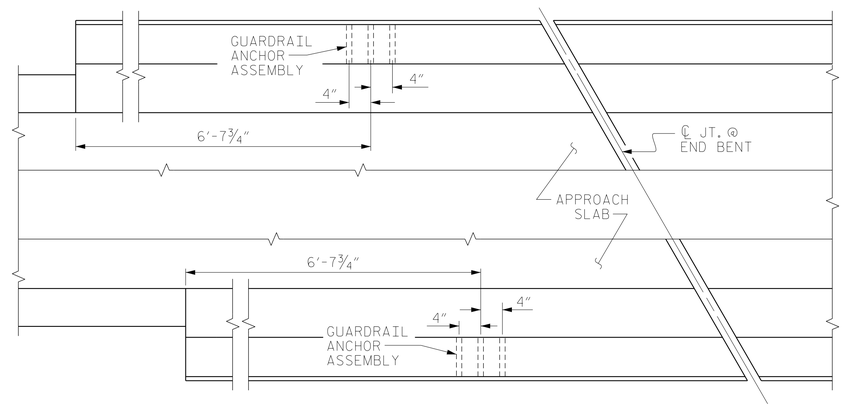
THE 1 1/4'' Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4″ Ø X 6″ BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4″ Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT #1 SHOWN, END BENT #2 SIMILAR.

SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039913 JUSTIN MARK ROBINSON
Docusigned by: Justin Robinson
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-24
1			3			TOTAL SHEETS
2			4			45

ASSEMBLED BY :	NSC	DATE :	01/2018
CHECKED BY :	MAL	DATE :	02/2018
DRAWN BY : TLA 5/06	REV. 7/12		MAA/GM
CHECKED BY : GM 5/06	REV. 6/13		MAA/GM
	REV. 12/17		MAA/THC

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3/27/2018
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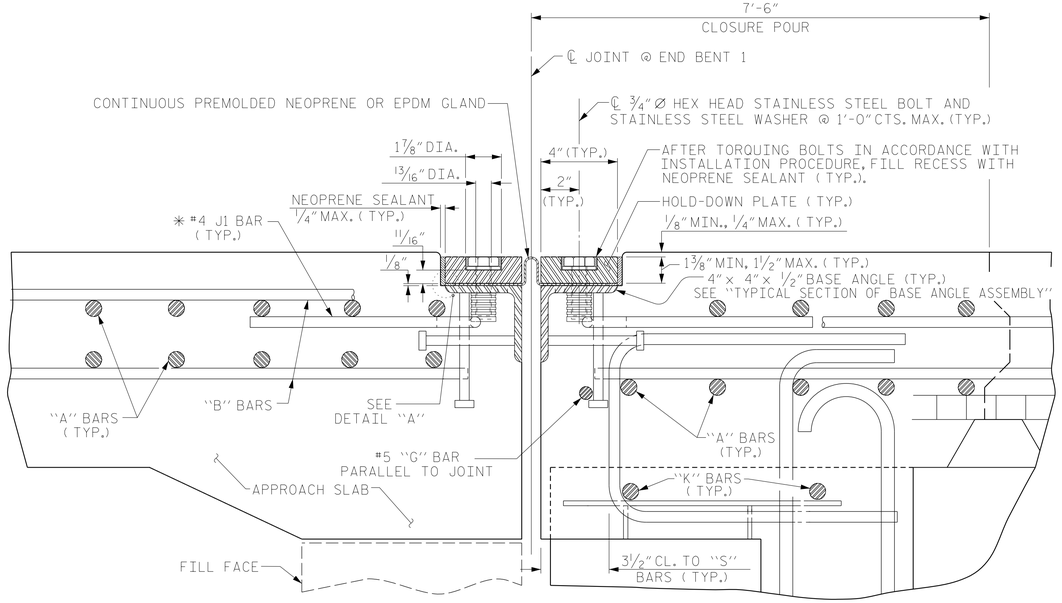
AcostaM

(SHT 3a) STD. NO. GRA2 STR. #3



EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

END BENT 1 SHOWN, END BENT 2 SIMILAR

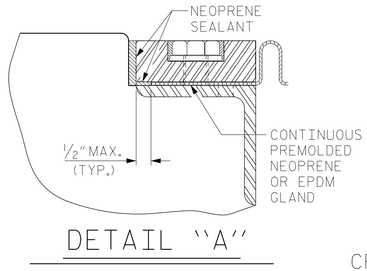
* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE

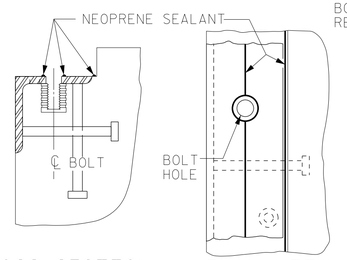
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4 1/8" TO 4 1/4" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO THE BASE ANGLE ASSEMBLY WITH THE ¾" Ø HEX HEAD BOLTS PROVIDED FOR THE HOLD-DOWN PLATES. A 1" Ø HOLE SHALL BE PROVIDED IN THE TEMPLATE CENTERED OVER EACH WEEP HOLE IN THE 4" X 4" X ½" BASE ANGLE. OTHER METHODS OF INSURING DRAINAGE THROUGH WEEP HOLES MAY BE EMPLOYED SUBJECT TO ENGINEER'S APPROVAL.
2. AFTER THE CONCRETE HAS BEEN CAST ON BOTH SIDES OF THE JOINT, REMOVE THE TEMPLATE. THOROUGHLY CLEAN THE BOLT HOLES AND THE ANGLE PLATE. REMOVE ANY EXCESS CONCRETE THAT COMES OUT OF THE WEEP HOLES. ANY DAMAGED STEEL SHALL BE COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
3. LAY THE GLAND ON THE BASE ANGLE AND FIELD MARK THE GLAND FOR THE BOLT HOLES. HOLES IN THE GLAND SHALL BE PUNCHED ⅞" IN DIAMETER WITH A HAND PUNCH.
4. IN ORDER TO CHECK FOR PROPER ALIGNMENT, PLACE THE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. DO NOT APPLY NEOPRENE SEALANT. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE BUT DO NOT TIGHTEN. THE ENGINEER SHALL INSPECT THE JOINT SEAL DEVICE FOR PROPER ALIGNMENT.
5. AFTER INSPECTION, REMOVE THE HOLD-DOWN PLATES AND GLAND. APPLY NEOPRENE SEALANT TO THE BASE ANGLE IN ACCORDANCE WITH THE "INSTALLATION SKETCH". PLACE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE ASSEMBLY AND TORQUE THE BOLTS TO 88 FT-LBS WITH A TORQUE WRENCH. CHECK THE TORQUE AFTER THREE (3) HOURS AND, IF NECESSARY, RETIGHTEN TO 88 FT-LBS. A FINAL CHECK SHALL BE MADE AT SEVEN (7) DAYS. TORQUE SHALL NOT BE LESS THAN 80 FT-LBS AFTER SEVEN (7) DAYS.
6. AFTER PROPER TORQUING, CLEAN THE BOLT HOLE RECESSES AND THE RECESS BETWEEN THE JOINT SEAL DEVICE AND CONCRETE, COMPLETELY FILL THESE RECESSES WITH NEOPRENE SEALANT.

GENERAL NOTES

1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL. ALL STUD ANCHORS SHALL CONFORM TO AASHTO M169, GRADES 1010 THRU 1020 OR APPROVED EQUAL. ALL CONCRETE INSERTS SHALL BE CLOSED END AND SHALL CONFORM TO AASHTO M169, GRADE 12L14. TENSILE CAPACITY SHALL BE 3000 LBS. MIN.
3. A PREMOLDED CORRUGATED OR NON-CORRUGATED GLAND SHALL BE USED FOR JOINTS SKEWED BETWEEN 50° THRU 130°. FOR JOINTS SKEWED LESS THAN 50° OR MORE THAN 130°, ONLY A CORRUGATED GLAND SHALL BE USED.
4. CLOSED END FERRULES AND STUD ANCHORS SHALL BE SHOP WELDED AND ALL HOLES SHALL BE SHOP DRILLED AS SHOWN ON PLANS. STUD ANCHORS SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.
5. SURFACES COMING IN CONTACT WITH NEOPRENE SHALL BE GROUND SMOOTH PRIOR TO METALLIZING.
6. UPON COMPLETION OF SHOP FABRICATION, THE HOLD DOWN PLATE AND BASE ANGLE ASSEMBLY, AS SHOWN IN THE "TYPICAL SECTION OF BASE ANGLE ASSEMBLY", SHALL BE METALLIZED. SEE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
7. BASE ANGLE ASSEMBLY SHALL BE CONTINUOUS FOR THE LENGTH OF THE JOINT. AT CROWN BREAKS, THE ENDS OF THE BASE ANGLE ASSEMBLY SHALL BE CUT PARALLEL TO THE BRIDGE CENTERLINE FOR SKEWS LESS THAN 80° AND GREATER THAN 100°. FINISHED WELD SHALL BE GROUND SMOOTH AND COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
8. FIELD SPLICES OF HOLD-DOWN PLATES SHALL BE KEPT TO A MINIMUM. CONTRACTOR SHALL FURNISH DETAILED PLANS SHOWING PROPOSED SPLICE LOCATIONS FOR APPROVAL. HOLD-DOWN PLATES SHALL NOT EXCEED 20' LENGTHS UNLESS APPROVED BY THE ENGINEER.
9. NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.
10. THE CONTRACTOR MAY, AT HIS OPTION, USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CONCRETE INSERTS FOR COVER PLATES. THE YIELD LOAD OF THE ¾" Ø BOLT IS 10 KIPS. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

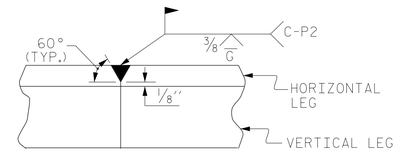


DETAIL "A"

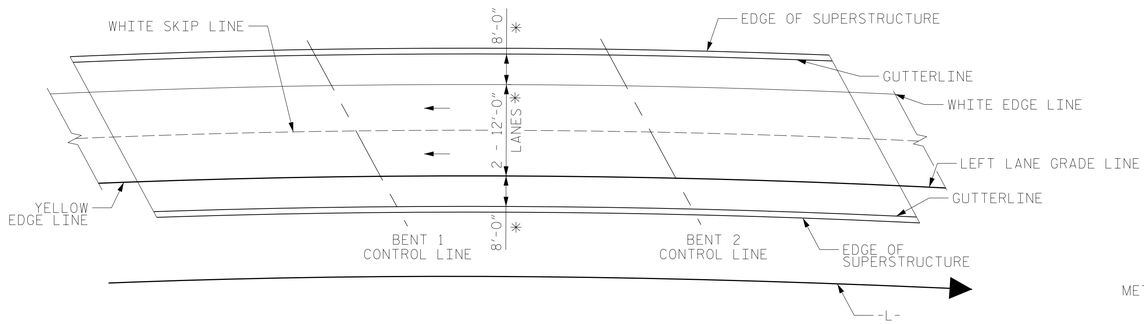


CROSS SECTION PLAN VIEW

INSTALLATION SKETCH



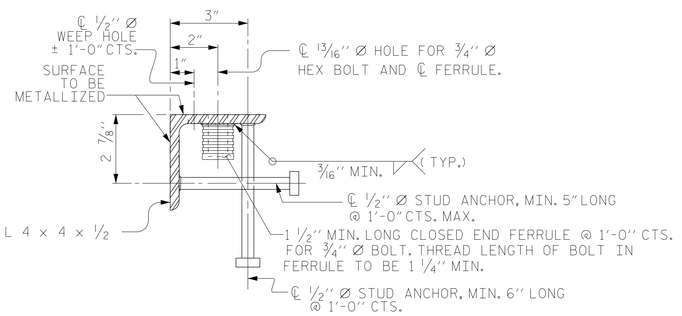
DETAIL- FIELD WELD SPLICE OF BASE ANGLE



PAVEMENT MARKING ALIGNMENT

* DENOTES RADIAL DIMENSION

MOVEMENT AND SETTING AT JOINT					
END BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
1	42.50	1.25	1.60	1.45	1.15
2	42.50	1.19	1.57	1.43	1.14



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 Justin Malinsan REGISTERED LANDSCAPE ARCHITECT JUSTIN MARK ROBINSON

3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

EXPANSION JOINT SEAL DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-25
1			3			TOTAL SHEETS
2			4			45

STD. NO. EJS1 STR. #3

ASSEMBLED BY : NSC		DATE : 01/2018
CHECKED BY : MKO		DATE : 02/2018
DRAWN BY : REK 9/87	REV. 7/12	MAA/GM
CHECKED BY : CRK 10/87	REV. 6/13	MAA/GM
	REV. 12/17	MAA/THC

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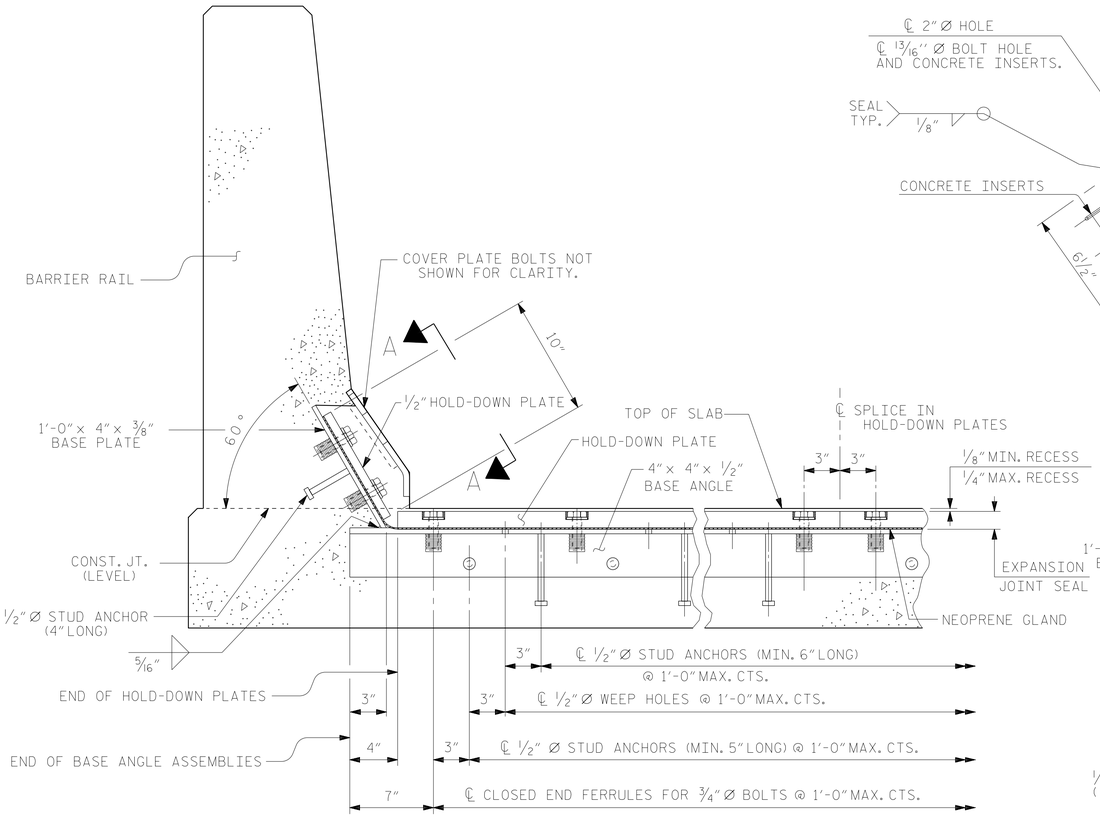
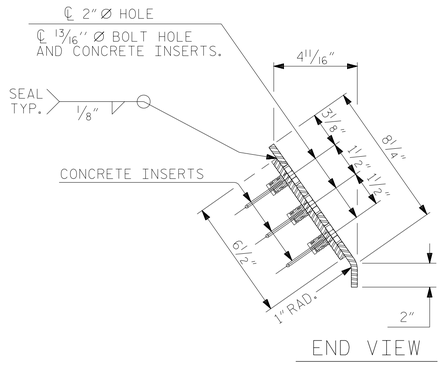
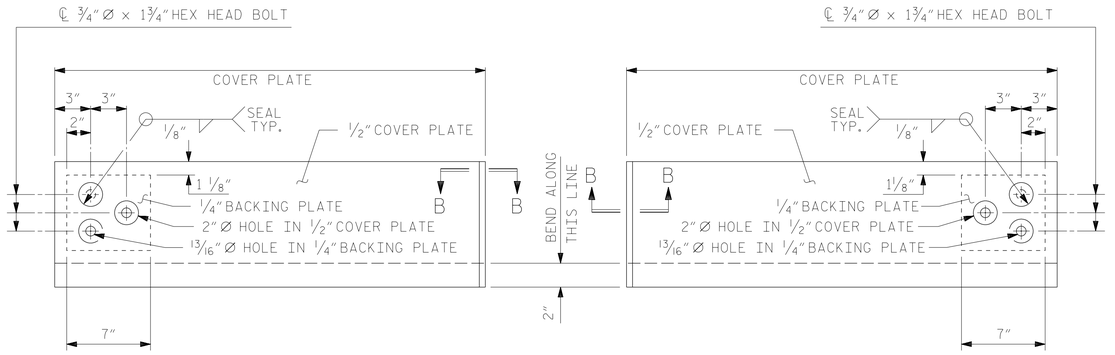
AcostaM



SECTION THRU RAIL NORMAL TO JOINT



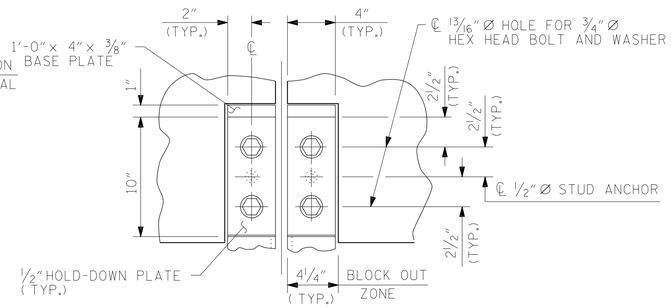
END VIEW



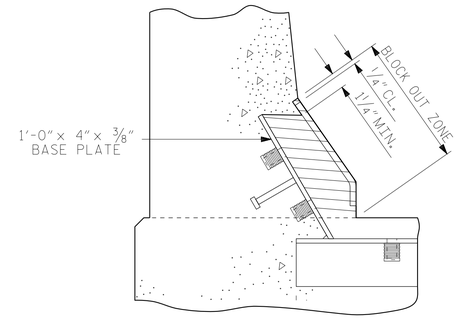
TYPE I - ELEVATION VIEW

TYPE II - ELEVATION VIEW

COVER PLATE DETAILS

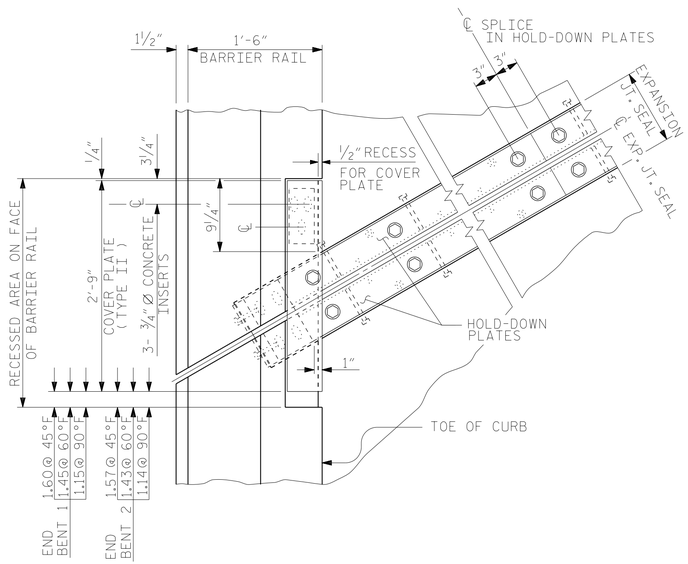


SECTION A - A

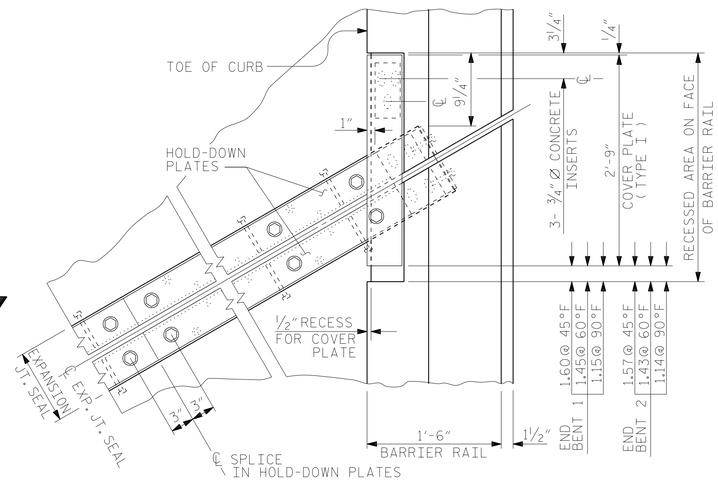


BLOCK OUT DETAIL

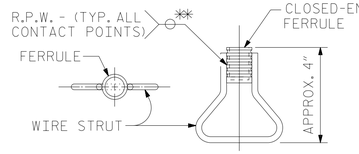
SEE "SECTION A - A" FOR OTHER DETAILS.



FLOW OF TRAFFIC



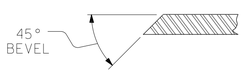
PLAN OF EXPANSION JOINT SEAL



PLAN ELEVATION

CONCRETE INSERT

** EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.



SECTION B - B

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

ASSEMBLED BY : NSC	DATE : 01/2018
CHECKED BY : MKO	DATE : 02/2018
DRAWN BY : REK 9/87	REV. 7/12 MAA/GM
CHECKED BY : CRK 10/87	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

3/27/2018
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NORTH CAROLINA PROFESSIONAL SEAL 039513 ENGINEER JUSTIN MARK ROBINSON
Docusigned by: Justin Robinson
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-26
1			3			TOTAL SHEETS
2			4			45

STD. NO. EJS2 STR. #3

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1001	699	#5	STR	42'-10"	31228
✳ A1002	1	#5	STR	1'-11"	2
✳ A1003	1	#5	STR	2'-4"	2
✳ A1004	1	#5	STR	2'-10"	3
✳ A1005	1	#5	STR	3'-4"	3
✳ A1006	1	#5	STR	3'-9"	4
✳ A1007	1	#5	STR	4'-3"	4
✳ A1008	1	#5	STR	4'-9"	5
✳ A1009	1	#5	STR	5'-2"	5
✳ A1010	1	#5	STR	5'-8"	6
✳ A1011	1	#5	STR	6'-2"	6
✳ A1012	1	#5	STR	6'-7"	7
✳ A1013	1	#5	STR	7'-1"	7
✳ A1014	1	#5	STR	7'-7"	8
✳ A1015	1	#5	STR	8'-0"	8
✳ A1016	1	#5	STR	8'-6"	9
✳ A1017	1	#5	STR	8'-11"	9
✳ A1018	1	#5	STR	9'-5"	10
✳ A1019	1	#5	STR	9'-11"	10
✳ A1020	1	#5	STR	10'-4"	11
✳ A1021	1	#5	STR	10'-10"	11
✳ A1022	1	#5	STR	11'-4"	12
✳ A1023	1	#5	STR	11'-9"	12
✳ A1024	1	#5	STR	12'-3"	13
✳ A1025	1	#5	STR	12'-9"	13
✳ A1026	1	#5	STR	13'-2"	14
✳ A1027	1	#5	STR	13'-8"	14
✳ A1028	1	#5	STR	14'-1"	15
✳ A1029	1	#5	STR	14'-7"	15
✳ A1030	1	#5	STR	15'-1"	16
✳ A1031	1	#5	STR	15'-6"	16
✳ A1032	1	#5	STR	16'-0"	17
✳ A1033	1	#5	STR	16'-6"	17
✳ A1034	1	#5	STR	16'-11"	18
✳ A1035	1	#5	STR	17'-5"	18
✳ A1036	1	#5	STR	17'-11"	19
✳ A1037	1	#5	STR	18'-4"	19
✳ A1038	1	#5	STR	18'-10"	20
✳ A1039	1	#5	STR	19'-4"	20
✳ A1040	1	#5	STR	19'-9"	21
✳ A1041	1	#5	STR	20'-3"	21
✳ A1042	1	#5	STR	20'-8"	22
✳ A1043	1	#5	STR	21'-2"	22
✳ A1044	1	#5	STR	21'-8"	23
✳ A1045	1	#5	STR	22'-1"	23
✳ A1046	1	#5	STR	22'-7"	24
✳ A1047	1	#5	STR	23'-1"	24
✳ A1048	1	#5	STR	23'-6"	25
✳ A1049	1	#5	STR	24'-0"	25
✳ A1050	1	#5	STR	24'-6"	26
✳ A1051	1	#5	STR	24'-11"	26
✳ A1052	1	#5	STR	25'-5"	27
✳ A1053	1	#5	STR	25'-11"	27
✳ A1054	1	#5	STR	26'-4"	27
✳ A1055	1	#5	STR	26'-10"	28
✳ A1056	1	#5	STR	27'-3"	28
✳ A1057	1	#5	STR	27'-9"	29
✳ A1058	1	#5	STR	28'-3"	29
✳ A1059	1	#5	STR	28'-9"	30
✳ A1060	1	#5	STR	29'-2"	30
✳ A1061	1	#5	STR	29'-8"	31
✳ A1062	1	#5	STR	30'-2"	31
✳ A1063	1	#5	STR	30'-7"	32
✳ A1064	1	#5	STR	31'-1"	32
✳ A1065	1	#5	STR	31'-7"	33
✳ A1066	1	#5	STR	32'-0"	33
✳ A1067	1	#5	STR	32'-6"	34
✳ A1068	1	#5	STR	33'-0"	34
✳ A1069	1	#5	STR	33'-5"	35
✳ A1070	1	#5	STR	33'-11"	35
✳ A1071	1	#5	STR	34'-5"	36
✳ A1072	1	#5	STR	34'-10"	36
✳ A1073	1	#5	STR	35'-4"	37
✳ A1074	1	#5	STR	35'-9"	37
✳ A1075	1	#5	STR	36'-3"	38
✳ A1076	1	#5	STR	36'-9"	38

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1077	1	#5	STR	37'-2"	39
✳ A1078	1	#5	STR	37'-8"	39
✳ A1079	1	#5	STR	38'-2"	40
✳ A1080	1	#5	STR	38'-7"	40
✳ A1081	1	#5	STR	39'-1"	41
✳ A1082	1	#5	STR	39'-7"	41
✳ A1083	1	#5	STR	40'-0"	42
✳ A1084	1	#5	STR	40'-6"	42
✳ A1085	1	#5	STR	41'-0"	43
✳ A1086	1	#5	STR	41'-5"	43
✳ A1087	1	#5	STR	41'-11"	44
✳ A1088	1	#5	STR	42'-4"	44
✳ A1089	1	#5	STR	42'-6"	44
✳ A1090	1	#5	STR	42'-1"	44
✳ A1091	1	#5	STR	41'-7"	43
✳ A1092	1	#5	STR	41'-2"	43
✳ A1093	1	#5	STR	40'-9"	43
✳ A1094	1	#5	STR	40'-3"	42
✳ A1095	1	#5	STR	39'-10"	42
✳ A1096	1	#5	STR	39'-4"	41
✳ A1097	1	#5	STR	38'-11"	41
✳ A1098	1	#5	STR	38'-5"	40
✳ A1099	1	#5	STR	38'-0"	40
✳ A1100	1	#5	STR	37'-7"	39
✳ A1101	1	#5	STR	37'-1"	39
✳ A1102	1	#5	STR	36'-8"	38
✳ A1103	1	#5	STR	36'-2"	38
✳ A1104	1	#5	STR	35'-9"	37
✳ A1105	1	#5	STR	35'-4"	37
✳ A1106	1	#5	STR	34'-10"	36
✳ A1107	1	#5	STR	34'-5"	36
✳ A1108	1	#5	STR	33'-11"	35
✳ A1109	1	#5	STR	33'-6"	35
✳ A1110	1	#5	STR	33'-1"	35
✳ A1111	1	#5	STR	32'-7"	34
✳ A1112	1	#5	STR	32'-2"	34
✳ A1113	1	#5	STR	31'-8"	33
✳ A1114	1	#5	STR	31'-3"	33
✳ A1115	1	#5	STR	30'-10"	32
✳ A1116	1	#5	STR	30'-4"	32
✳ A1117	1	#5	STR	29'-11"	31
✳ A1118	1	#5	STR	29'-5"	31
✳ A1119	1	#5	STR	29'-0"	30
✳ A1120	1	#5	STR	28'-7"	30
✳ A1121	1	#5	STR	28'-1"	29
✳ A1122	1	#5	STR	27'-8"	29
✳ A1123	1	#5	STR	27'-2"	28
✳ A1124	1	#5	STR	26'-9"	28
✳ A1125	1	#5	STR	26'-4"	27
✳ A1126	1	#5	STR	25'-10"	27
✳ A1127	1	#5	STR	25'-5"	27
✳ A1128	1	#5	STR	24'-11"	26
✳ A1129	1	#5	STR	24'-6"	26
✳ A1130	1	#5	STR	24'-1"	25
✳ A1131	1	#5	STR	23'-7"	25
✳ A1132	1	#5	STR	23'-2"	24
✳ A1133	1	#5	STR	22'-8"	24
✳ A1134	1	#5	STR	22'-3"	23
✳ A1135	1	#5	STR	21'-10"	23
✳ A1136	1	#5	STR	21'-4"	22
✳ A1137	1	#5	STR	20'-11"	22
✳ A1138	1	#5	STR	20'-5"	21
✳ A1139	1	#5	STR	20'-0"	21
✳ A1140	1	#5	STR	19'-6"	20
✳ A1141	1	#5	STR	19'-1"	20
✳ A1142	1	#5	STR	18'-8"	19
✳ A1143	1	#5	STR	18'-2"	19
✳ A1144	1	#5	STR	17'-9"	19
✳ A1145	1	#5	STR	17'-3"	18
✳ A1146	1	#5	STR	16'-10"	18
✳ A1147	1	#5	STR	16'-5"	17
✳ A1148	1	#5	STR	15'-11"	17
✳ A1149	1	#5	STR	15'-6"	16
✳ A1150	1	#5	STR	15'-0"	16
✳ A1151	1	#5	STR	14'-7"	15
✳ A1152	1	#5	STR	14'-2"	15
✳ A1153	1	#5	STR	13'-8"	14

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1154	1	#5	STR	13'-3"	14
✳ A1155	1	#5	STR	12'-9"	13
✳ A1156	1	#5	STR	12'-4"	13
✳ A1157	1	#5	STR	11'-10"	12
✳ A1158	1	#5	STR	11'-5"	12
✳ A1159	1	#5	STR	10'-11"	11
✳ A1160	1	#5	STR	10'-6"	11
✳ A1161	1	#5	STR	10'-0"	10
✳ A1162	1	#5	STR	9'-7"	10
✳ A1163	1	#5	STR	9'-2"	10
✳ A1164	1	#5	STR	8'-8"	9
✳ A1165	1	#5	STR	8'-3"	9
✳ A1166	1	#5	STR	7'-9"	8
✳ A1167	1	#5	STR	7'-4"	8
✳ A1168	1	#5	STR	6'-11"	7
✳ A1169	1	#5	STR	6'-5"	7
✳ A1170	1	#5	STR	6'-0"	6
✳ A1171	1	#5	STR	5'-7"	6
✳ A1172	1	#5	STR	5'-1"	5
✳ A1173	1	#5	STR	4'-8"	5
✳ A1174	1	#5	STR	4'-3"	4
✳ A1175	1	#5	STR	3'-9"	4
✳ A1176	1	#5	STR	3'-4"	3
✳ A1177	1	#5	STR	2'-10"	3
✳ A1178	1	#5	STR	2'-5"	3
✳ A1179	1	#5	STR	1'-11"	2
✳ A1180	6	#6	STR	23'-0"	207
A2001	699	#5	STR	42'-10"	31228
A2002	1	#5	STR	1'-11"	2
A2003	1	#5	STR	2'-4"	2
A2004	1	#5	STR	2'-10"	3
A2005	1	#5	STR	3'-4"	3
A2006	1	#5	STR	3'-9"	4
A2007	1	#5	STR	4'-3"	4
A2008	1	#5	STR	4'-9"	5
A2009	1	#5	STR	5'-2"	5
A2010	1	#5	STR	5'-8"	6
A2011	1	#5	STR	6'-2"	6
A2012	1	#5	STR	6'-7"	7
A2013	1	#5	STR	7'-1"	7
A2014	1	#5	STR	7'-7"	8
A2015	1	#5	STR	8'-0"	8
A2016	1	#5	STR	8'-6"	9
A2017	1	#5	STR	8'-11"	9
A2018	1	#5	STR	9'-5"	10
A2019	1	#5	STR	9'-11"	10
A2020	1	#5	STR	10'-4"	11
A2021	1	#5	STR	10'-10"	11
A2022	1	#5	STR	11'-4"	12
A2023	1	#5	STR	11'-9"	12
A2024	1	#5	STR	12'-3"	13
A2025	1	#5	STR	12'-9"	13
A2026	1	#5	STR	13'-2"	14
A2027	1	#5	STR	13'-8"	14
A2028	1	#5	STR	14'-1"	15
A2029	1	#5	STR	14'-7"	15
A2030	1	#5	STR	15'-1"	16
A2031	1	#5	STR	15'-6"	16
A2032	1	#5	STR	16'-0"	17
A2033	1	#5	STR	16'-6"	17
A2034	1	#5	STR	16'-11"	18
A2035	1	#5	STR	17'-5"	18
A2036	1	#5	STR	17'-11"	19
A2037	1	#5	STR	18'-4"	19
A2038	1	#5	STR	18'-10"	20
A2039	1	#5	STR	19'-4"	20
A2040	1	#5	STR	19'-9"	21
A2041	1	#5	STR	20'-3"	21
A2042	1	#5	STR	20'-8"	22
A2043	1	#5	STR	21'-2"	22
A2044	1	#5	STR	21'-8"	23
A2045	1	#5	STR	22'-1"	23
A2046	1	#5	STR	22'-7"	24
A2047	1	#5	STR	23'-1"	24
A2048	1	#5	STR	23'-6"	25

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A2049	1	#5	STR	24'-0"	25
A2050	1	#5	STR	24'-6"	26
A2051	1	#5	STR	24'-11"	26
A2052	1	#5	STR	25'-5"	27
A2053	1	#5	STR	25'-11"	27
A2054	1	#5	STR	26'-4"	27
A2055	1	#5	STR	26'-10"	28
A2056	1	#5	STR	27'-3"	28
A2057	1	#5	STR	27'-9"	29
A2058	1	#5	STR	28'-3"	29
A2059	1	#5	STR	28'-9"	30
A2060	1	#5	STR	29'-2"	30
A2061	1	#5	STR	29'-8"	31
A2062	1	#5	STR	30'-2"	31
A2063	1	#5	STR	30'-7"	32
A2064	1	#5	STR	31'-1"	32
A2065	1	#5	STR	31'-7"	33
A2066	1	#5	STR	32'-0"	33
A2067	1	#5	STR	32'-6"	34
A2068	1	#5	STR	33'-0"	34
A2069	1	#5	STR	33'-5"	35
A2070	1	#5	STR	33'-11"	35
A2071	1	#5	STR	34'-5"	36
A2072	1	#5	STR	34'-10"	36
A2073	1	#5	STR	35'-4"	37
A2074	1	#5	STR	35'-9"	37
A2075	1	#5	STR	36'-3"	38
A2076	1	#5	STR	36'-9"	38
A2077	1	#5	STR	37'-2"	39
A2078	1	#5	STR	37'-8"	39
A2079	1	#5	STR	38'-2"	40
A2080	1	#5	STR	38'-7"	40
A2081	1	#5	STR	39'-1"	41
A2082	1	#5	STR	39'-7"	41
A2083	1	#5	STR	40'-0"	42
A2084	1	#5	STR	40'-6"	42
A2085	1	#5	STR	41'-0"	43
A2086	1	#5	STR	41'-5"	43
A2087	1	#5	STR	41'-11"	44
A2088	1	#5	STR	42'-4"	44
A2089	1	#5	STR	42'-6"	44
A2090	1	#5	STR	42'-1"	44
A2091	1	#5	STR	41'-7"	43
A2092	1	#5	STR	41'-2"	43
A2093	1	#5	STR	40'-9"	43
A2094	1	#5	STR	40'-3"	42
A2095	1	#5	STR	39'-10"	42
A2096	1	#5	STR	39'-4"	41
A2097	1	#5	STR	38'-11"	41
A2098	1	#5	STR	38'-5"	40
A2099	1	#5	STR	38'-0"	40
A2100	1	#5	STR	37'-7"	39
A2101	1	#5	STR	37'-1"	39
A2102	1	#5	STR	36'-8"	38
A2103	1	#5	STR	36'-2"	38
A2104	1	#5	STR	35'-9"	37
A2105	1	#5	STR	35'-4"	37
A2106	1	#5	STR	34'-10"	36
A2107	1	#5	STR	34'-5"	36
A2108	1	#5	STR	33'-11"	35
A2109	1	#5	STR	33'-6"	35
A2110	1	#5	STR	33'-1"	35
A2111	1	#5	STR	32'-7"	34
A2112	1	#5	STR	32'-2"	34
A2113	1	#5	STR	31'-8"	33
A2114	1	#5	STR	31'-3"	33
A2115	1	#5	STR	30'-10"	32
A2116	1	#5	STR	30'-4"	32
A2117	1	#5	STR	29'-11"	31
A2118	1	#5	STR	29'-5"	31
A2119	1	#5	STR	29'-0"	30
A2120	1	#5	STR	28'-7"	30
A2121	1	#5	STR	28'-1"	29
A2122	1	#5	STR	27'-8"	29
A2123	1	#5	STR	27'-2"	28
A2124	1	#5	STR	26'-9"	28
A2125	1	#5	STR	26'-4"	27

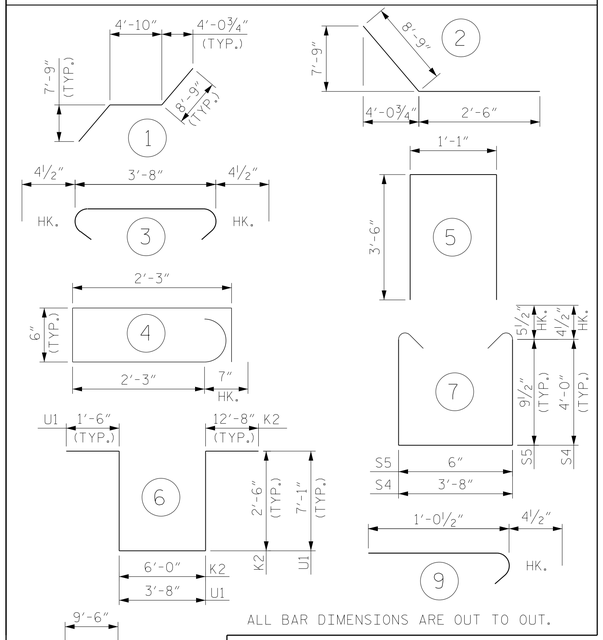
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A2126	1	#5	STR	25'-10"	27
A2127	1	#5	STR	25'-5"	27
A2128	1	#5	STR	24'-11"	26
A2129	1	#5	STR	24'-6"	26
A2130	1	#5	STR	24'-1"	25
A2131	1	#5	STR	23'-7"	25
A2132	1	#5	STR	23'-2"	24
A2133	1	#5	STR	22'-8"	24
A2134	1	#5	STR	22'-3"	23
A2135	1	#5	STR	21'-10"	23
A2136	1	#5	STR	21'-4"	22
A2137	1	#5	STR	20'-11"	22
A2138	1	#5	STR	20'-5"	21
A2139	1	#5	STR	20'-0"	21
A2140	1	#5	STR	19'-6"	20
A2141	1	#5	STR	19'-1"	20
A2142	1	#5	STR	18'-8"	19
A2143	1	#5	STR	18'-2"	19
A2144	1	#5	STR	17'-9"	19
A2145	1	#5	STR	17'-3"	18
A2146	1	#5	STR	16'-10"	18
A2147	1	#5	STR	16'-5"	17
A2148	1	#5	STR	15'-11"	17
A2149	1	#5	STR	15'-6"	16
A2150	1	#5	STR	15'-0"	16
A2151	1	#5	STR	14'-7"	15
A2152	1	#5	STR	14'-2"	15
A2153	1	#5	STR	13'-8"	14
A2154	1	#5	STR	13'-3"	14
A2155	1	#5	STR	12'-9"	13
A2156	1	#5	STR	12'-4"	13
A2157	1	#5	STR	11'-10"	12
A2158	1	#5	STR	11'-5"	12
A2159	1	#5	STR	10'-11"	11
A2160	1	#5	STR	10'-6"	11
A2161	1	#5	STR	10'-0"	10
A2162	1	#5	STR	9'-7"	10
A2163	1	#5	STR	9'-2"	10
A2164	1	#5	STR	8'-8"	9
A2165	1	#5	STR	8'-3"	9
A2166	1	#5	STR	7'-9"	8
A2167	1	#5	STR	7'-4"	8
A2168	1	#5	STR	6'-11"	7
A2169	1	#5	STR	6'-5"	7
A2170	1	#5	STR	6'-0"	6
A2171	1	#5	STR	5'-7"	6
A2172	1	#5	STR	5'-1"	5
A2173	1	#5	STR	4'-8"	5
A2174	1	#5	STR	4'-3"	4
A2175	1	#5	STR	3'-9"	4
A2176	1	#5	STR	3'-4"	3
A2177	1	#5	STR	2'-10"	3
A2178	1	#5	STR	2'-5"	3
A2179	1	#5	STR	1'-11"	2
✳ B1	156	#4	STR	29'-2"	3039
✳ B2	208	#6	STR	49'-0"	15308
✳ B3	102	#6	STR	42'-6"	6511
✳ B4	104	#4	STR	29'-0"	2015
✳ B5	156	#4	STR	26'-4"	2744
B6	287	#5	STR	58'-5"	17487
B7	60	#5	STR	42'-6"	2660
✳ J1	119	#4	9	1'-5"	113
✳ K1	8	#8	8	36'-4"	776
✳ K2	8	#8	6	24'-8"	527
K3	6	#4	STR	15'-3"	61
K4	24	#6	STR	10'-8"	385
K5	48	#6	STR	15'-6"	1117
K6	12	#6	STR	14'-6"	261
K7	20	#6	STR	26'-6"	796
K8	8	#6	2	11'-6"	138
K9	8	#6	1	22'-4"	268
K10	3	#6	STR	16'-0"	72
K11	3	#6	STR	14'-8"	66
K12	3	#6	STR	13'-4"	60

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
K13	3	#6	STR	11'-11"	54
K14	3	#6	STR	10'-7"	48
K17	6	#4	STR	16'-0"	64
K18	3	#6	STR	11'-2"	50
K19	3	#6	STR	12'-7"	57
K20	3	#6	STR	13'-11"	63
K21	3	#6	STR	15'-4"	69
K22	3	#6	STR	16'-9"	75
✳ S1	66	#4	5	8'-1"	356
✳ S2	66	#5	4	6'-1"	419
S3	360	#4	3	4'-5"	1062
S4	24	#4	7	12'-5"	199
S5	24	#5	7	3'-0"	75
✳ U1	48	#4	STR	20'-10"	668
✳ G1	4	#5	STR	34'-0"	142

REINFORCING STEEL 60,533 LBS.

✳ EPOXY COATED REINFORCING STEEL 68,171 LBS.

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON

4/18/2018

RS&H

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

LEFT LANE

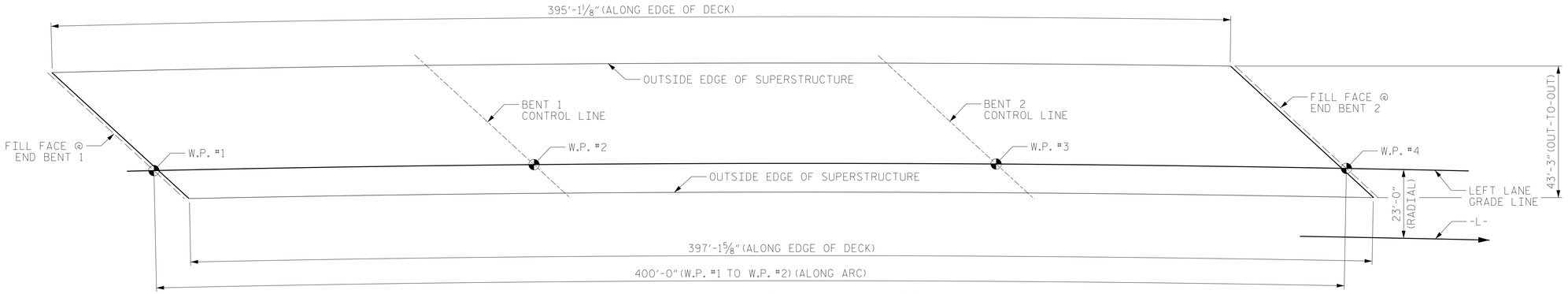
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-27
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : MRA DATE : 01/2018
CHECKED BY : JMR DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

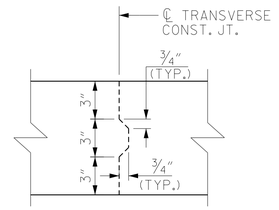
4/17/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\403_U2412A_SMU_BM1_401272.dgn
AcostaM

STR. #3



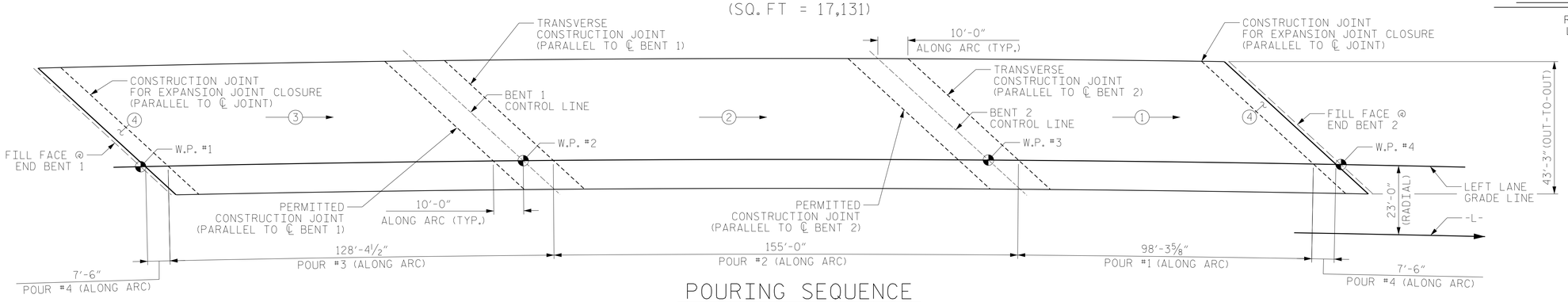
LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB

(SQ. FT = 17,131)

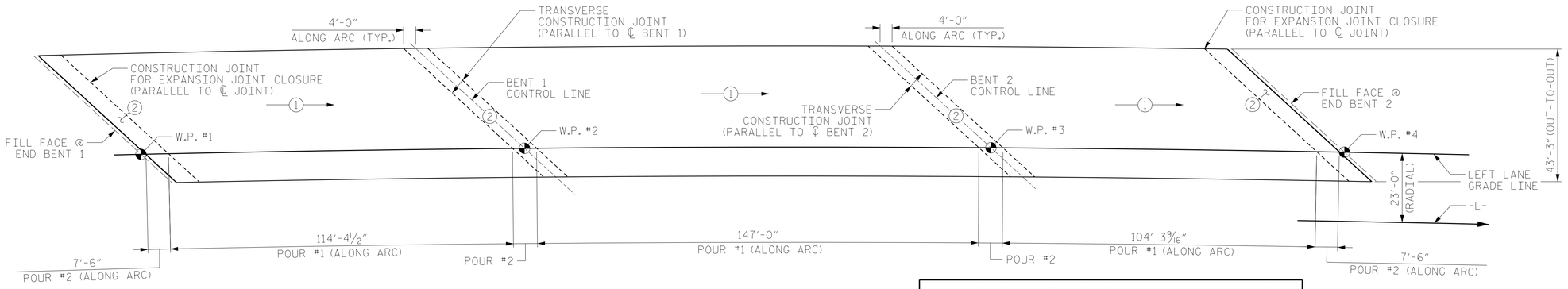


TRANSVERSE CONSTRUCTION JOINT DETAIL

REINFORCING STEEL IN SLAB NOT SHOWN.
LONGITUDINAL REINFORCEMENT SHALL BE
CONTINOUS THROUGH JOINT.



POURING SEQUENCE



OPTIONAL POURING SEQUENCE

POUR ② CANNOT BE STARTED UNTIL ADJACENT POUR ① REACHES A MINIMUM STRENGTH OF 3,000 PSI.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	151		
POUR 2	283		
POUR 3	245		
POUR 4	36		
TOTALS**	715	60,533	68,171

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

DRAWN BY : MRA DATE : 01/2018
CHECKED BY : JMR DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 01/2018

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,818 SQ.FT.
BRIDGE DECK	14,640 SQ.FT.
TOTAL	16,458 SQ.FT.

SUPERSTRUCTURE REINFORCING STEEL LENGTHS ARE BASED ON THE FOLLOWING MINIMUM SPLICE LENGTHS

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	2'-0"	1'-9"	2'-0"	1'-9"	2'-9"
#5	2'-6"	2'-2"	2'-6"	2'-2"	3'-5"
#6	3'-0"	2'-7"	3'-10"	2'-7"	4'-4"
#7	5'-3"	3'-6"			
#8	6'-10"	4'-7"			

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NORTH CAROLINA PROFESSIONAL SEAL 039313 ENGINEER JUSTIN MARK ROBINSON
4/18/2018

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PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

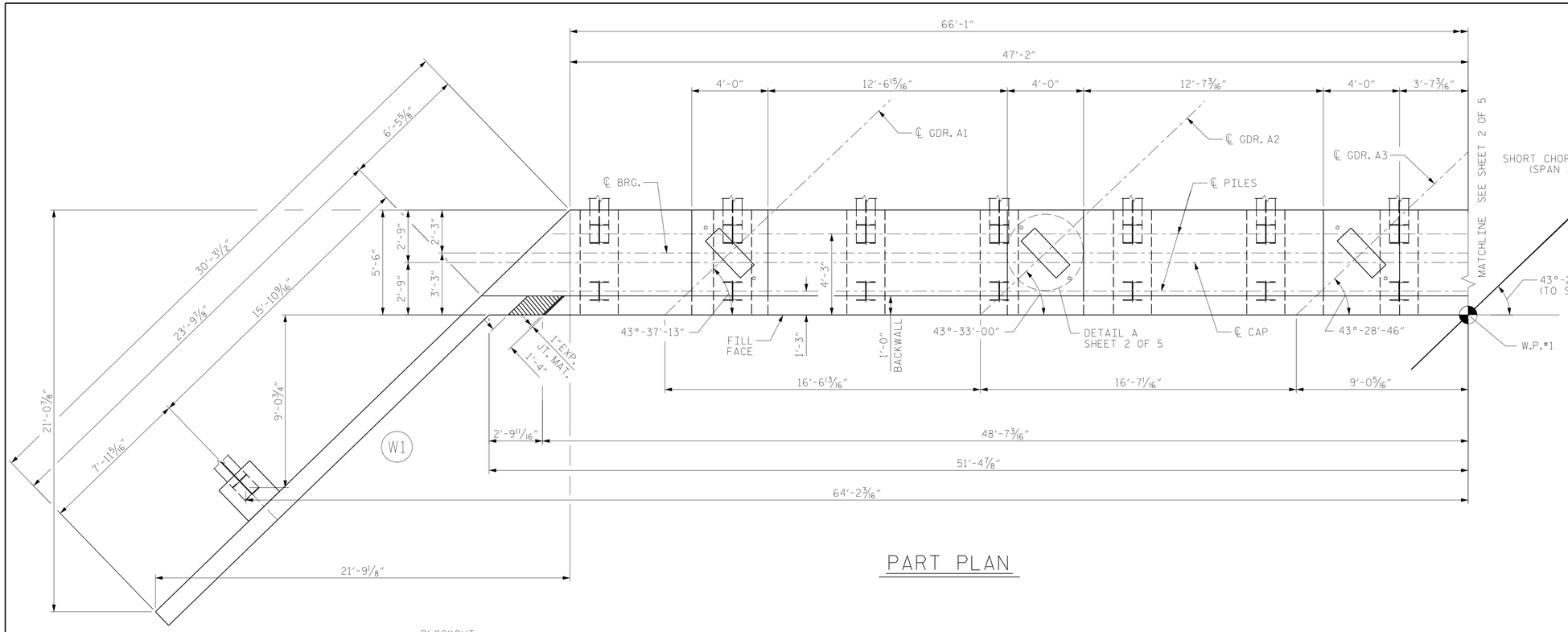
SUPERSTRUCTURE

BILL OF MATERIAL

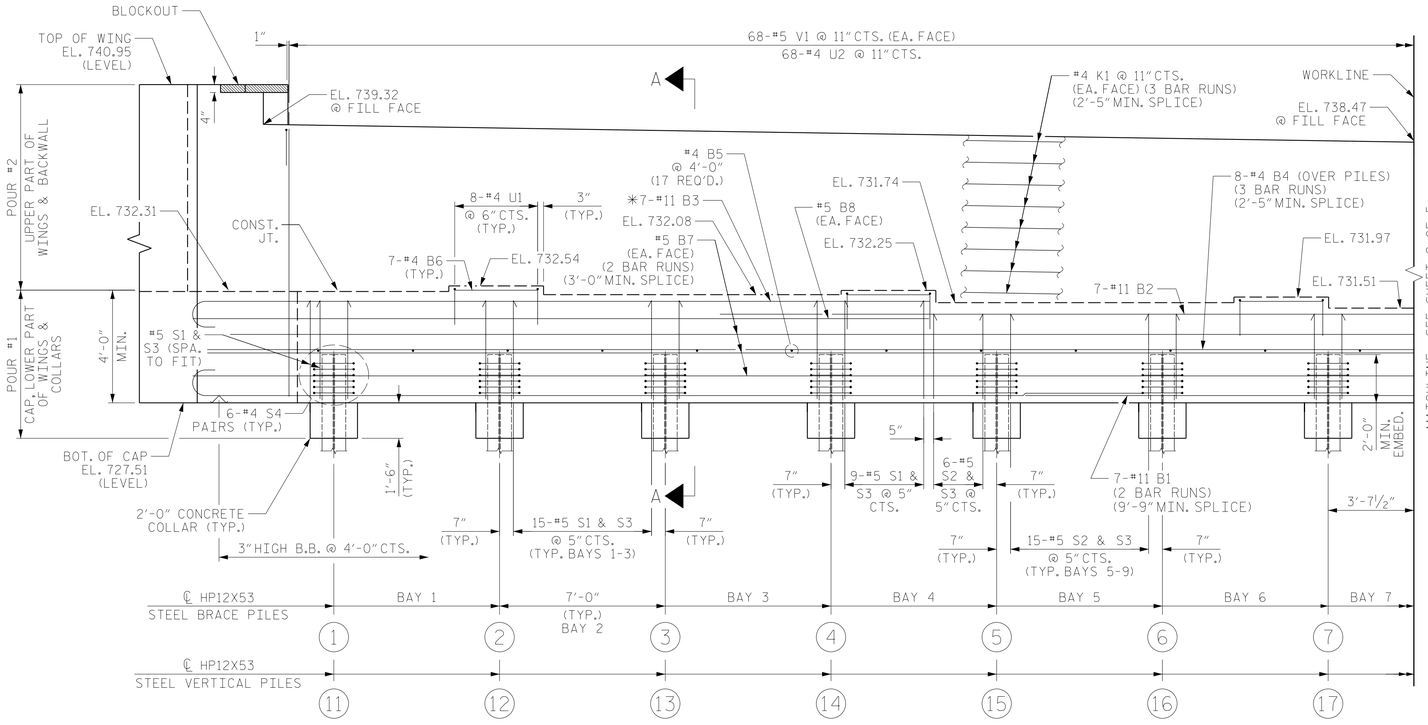
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-28
1			3			TOTAL SHEETS
2			4			45

STR. #3



PART PLAN



PART ELEVATION

WINGS AND WING PILES NOT SHOWN FOR CLARITY

NOTES

STIRRUPS AND #4 U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR SECTION A-A AND PARTIAL SECTION AT BRIDGE SEAT, SEE SHEET 5 OF 5.

FOR PILE SPLICE DETAILS, SEE SHEET 5 OF 5.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

*FIELD CUT B3 BARS AS NECESSARY TO PROVIDE 2" MINIMUM CLEAR COVER.

LLGL = LEFT LANE GRADE LINE

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 5

NORTH CAROLINA PROFESSIONAL SEAL 039313 ENGINEER JUSTIN MARK ROBINSON
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3/28/2018

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STATE OF NORTH CAROLINA
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RALEIGH

SUBSTRUCTURE

END BENT NO. 1

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-29
1			3			TOTAL SHEETS
2			4			45

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DESIGN ENGINEER OF RECORD: PDS DATE : 02/2018

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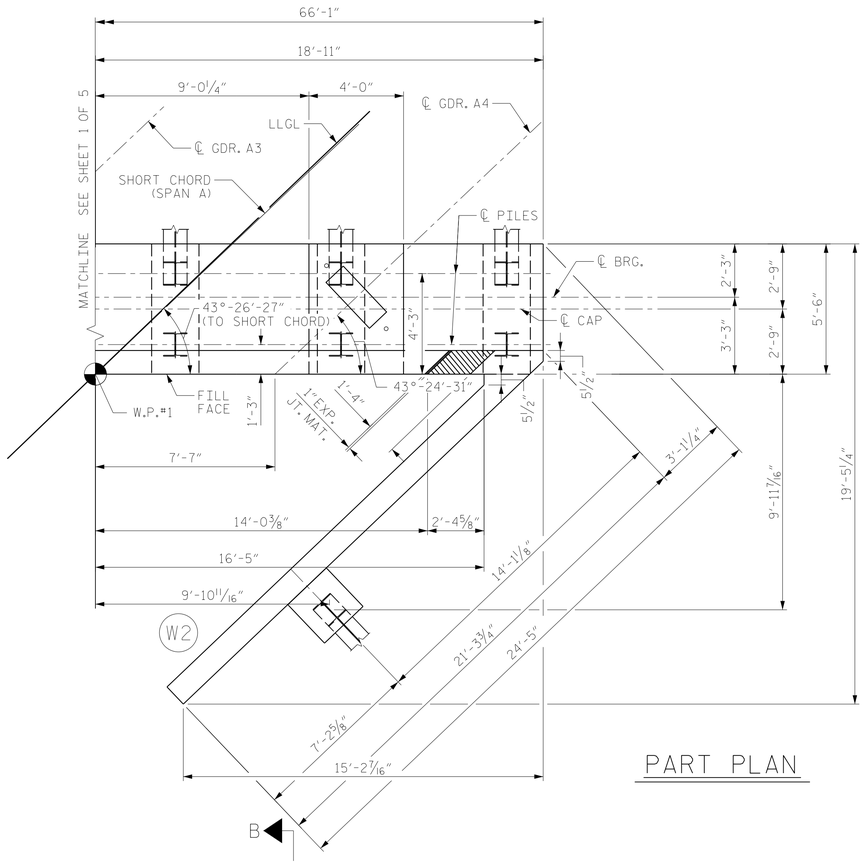
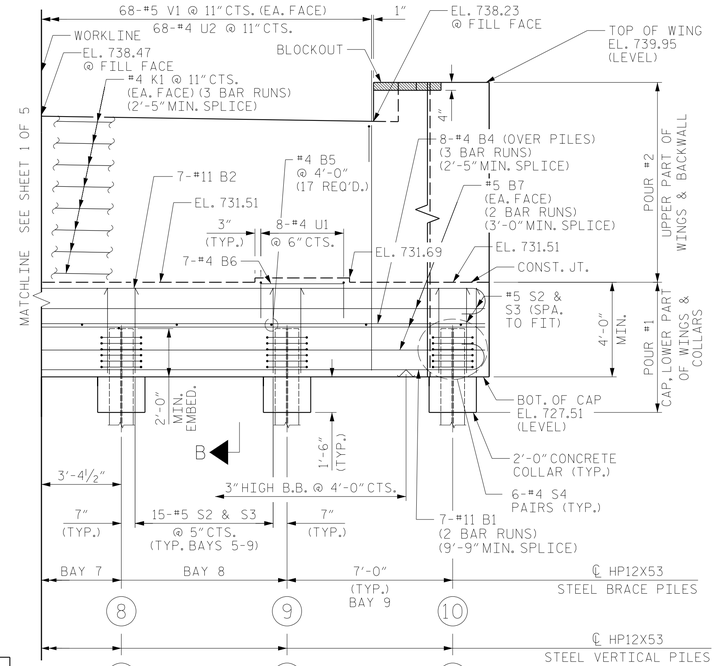
STR. #3

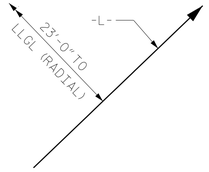


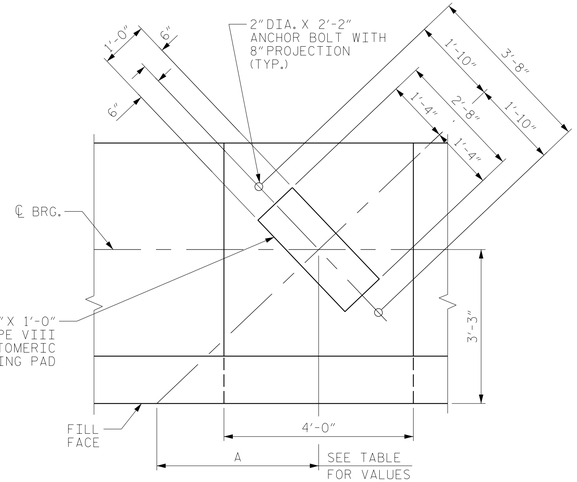
PART PLAN



PART ELEVATION

WINGS AND WING PILES NOT SHOWN FOR CLARITY





DETAIL A

DIMENSIONS TYP. EA. BRG. PILES NOT SHOWN FOR CLARITY

TABLE	
GDR.	A
A1	3'-4 15/16"
A2	3'-5"
A3	3'-5 1/8"
A4	3'-5 1/4"

NOTES

STIRRUPS AND #4 U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR SECTION B-B AND PARTIAL SECTION AT BRIDGE SEAT, SEE SHEET 5 OF 5.

FOR PILE SPLICE DETAILS, SEE SHEET 5 OF 5.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

LLGL = LEFT LANE GRADE LINE

PROJECT NO. U-2412A

GUILFORD COUNTY

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SHEET 2 OF 5

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 1

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-30
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : JTC DATE : 12/2017
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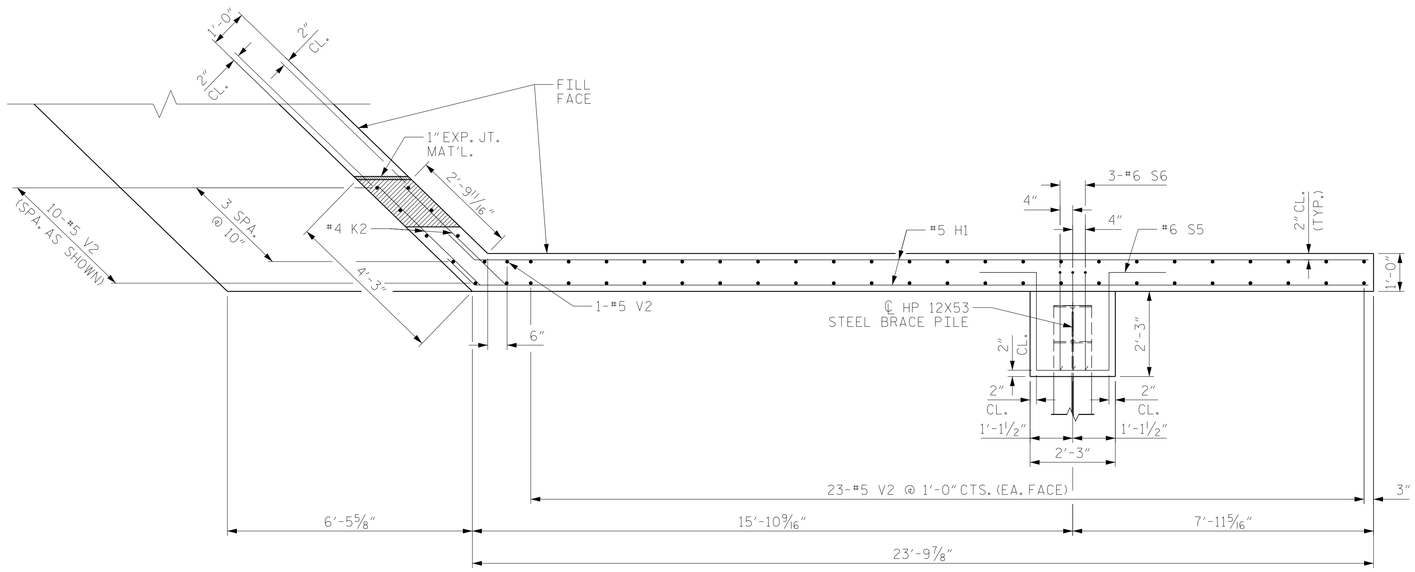
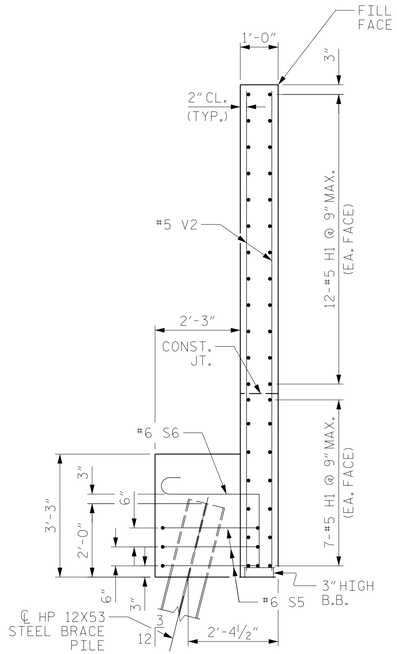
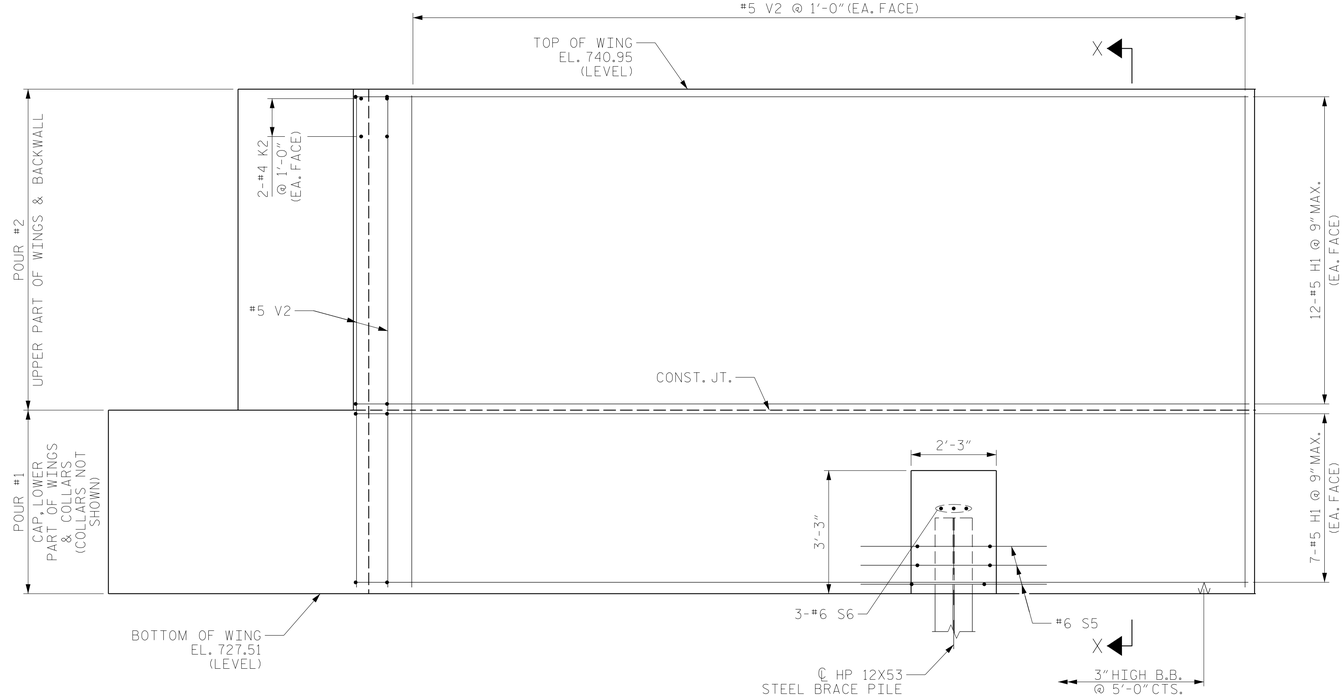
STR. #3



PLAN OF WING W1



SECTION X-X



ELEVATION OF WING W1

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 3 OF 5

DRAWN BY : JTC DATE : 12/2017

CHECKED BY : JMR DATE : 02/2018

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DEPARTMENT OF TRANSPORTATION
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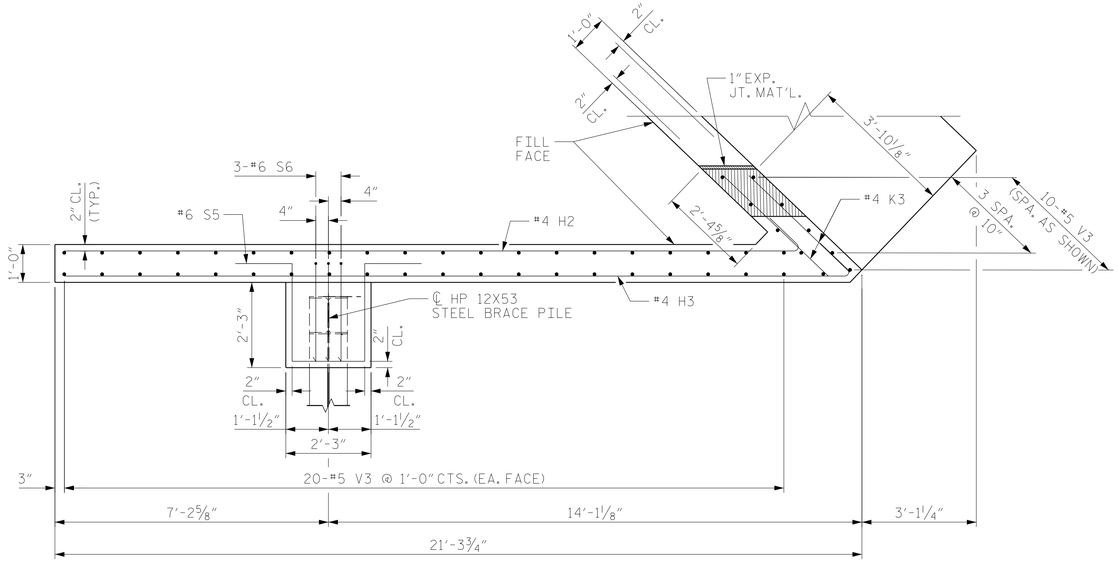
SUBSTRUCTURE

END BENT NO. 1

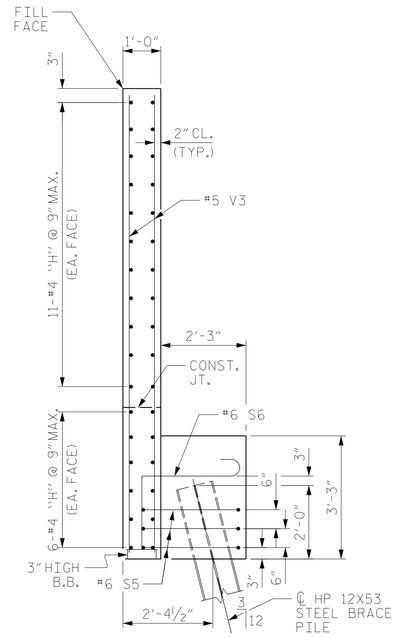
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-31
1			3			TOTAL SHEETS
2			4			45

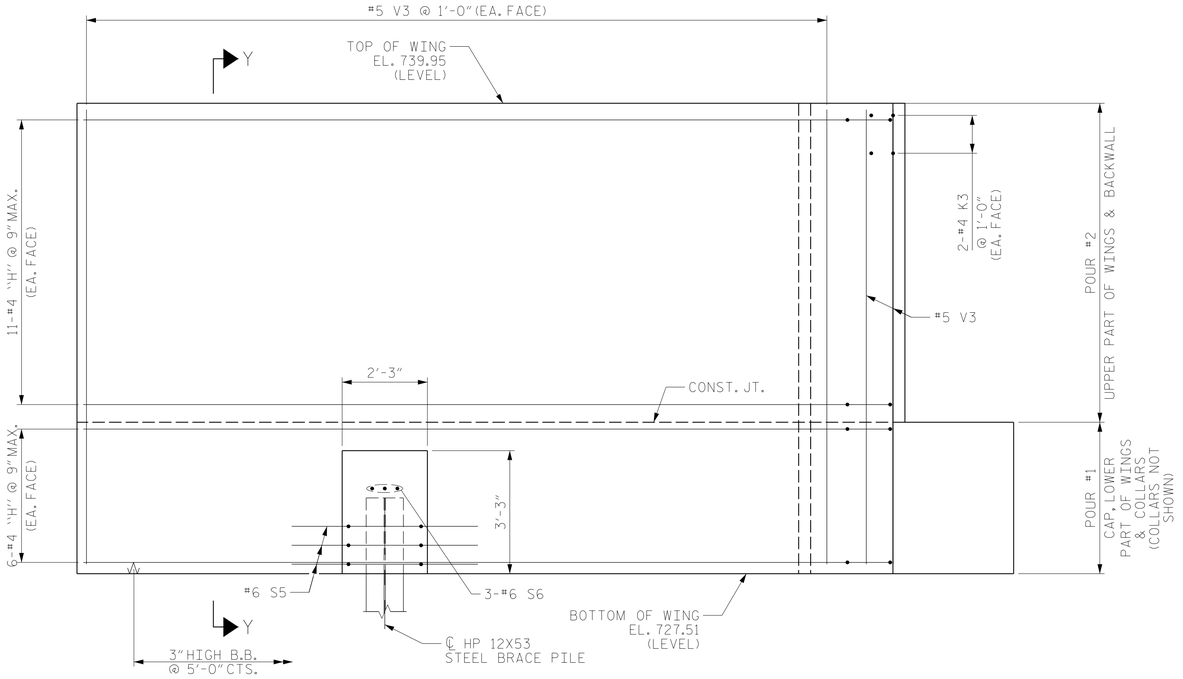
STR. #3



PLAN OF WING W2



SECTION Y-Y



ELEVATION OF WING W2

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 4 OF 5

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DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT NO. 1

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-32
1			3			TOTAL SHEETS
2			4			45

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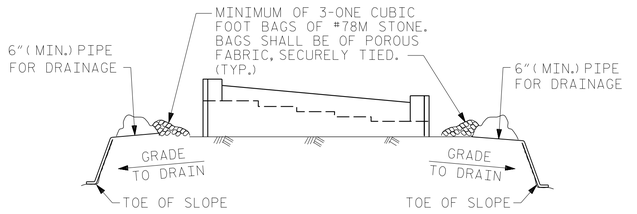
STR. #3

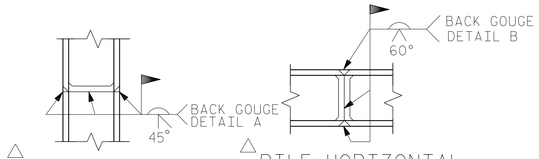


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

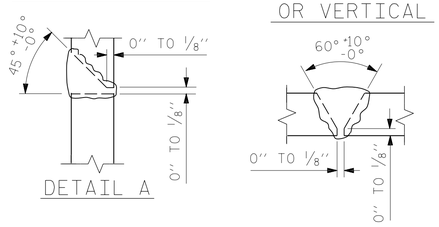
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



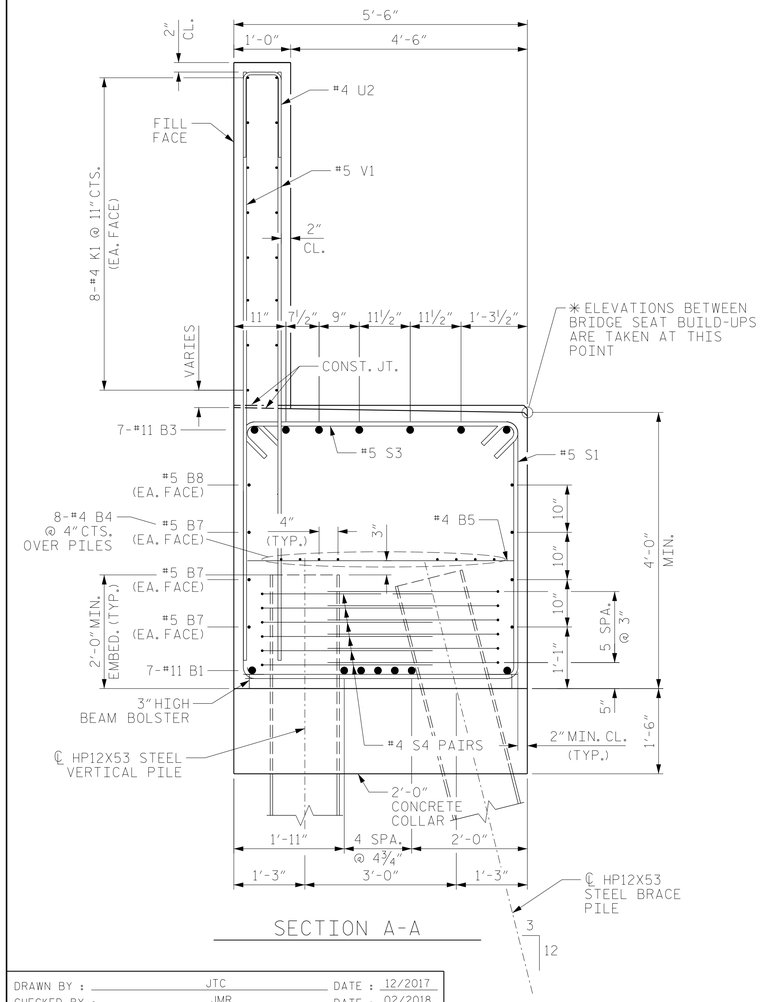
△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL

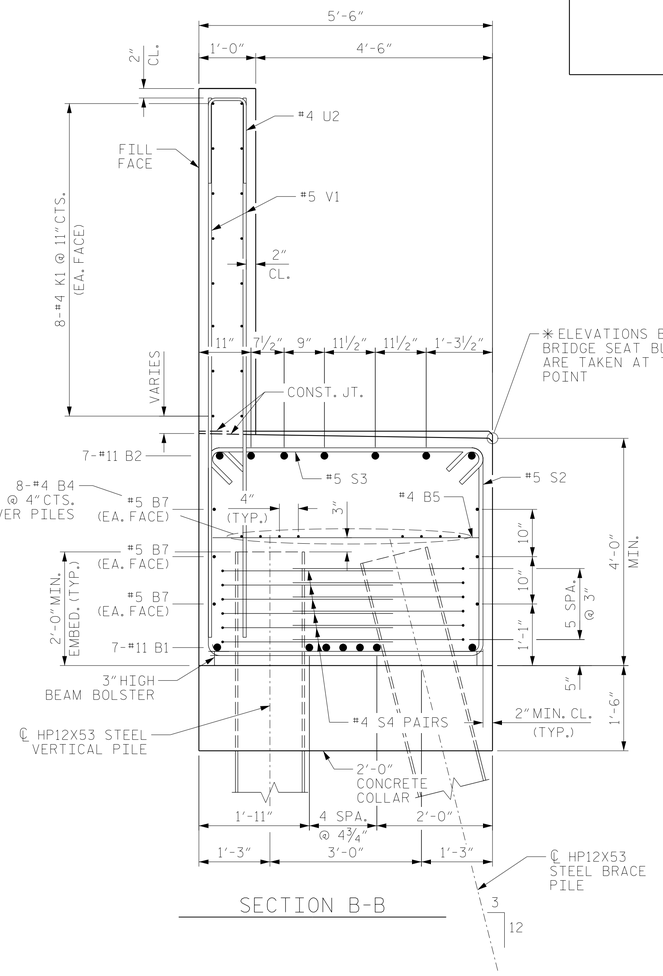


△ POSITION OF PILE DURING WELDING.

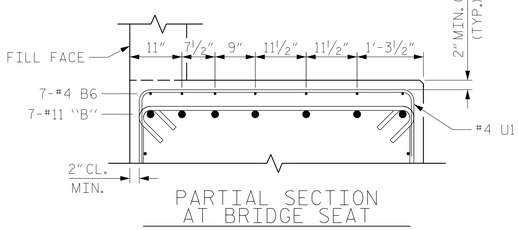
PILE SPLICE DETAILS



SECTION A-A

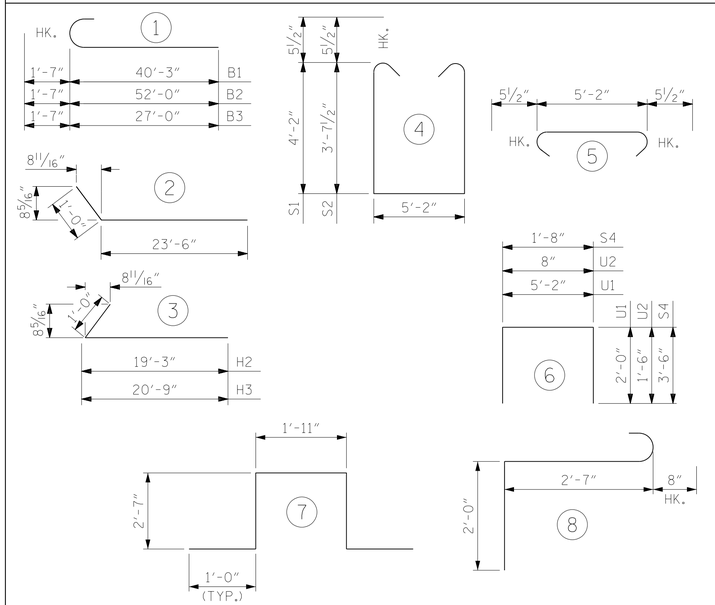


SECTION B-B



PARTIAL SECTION AT BRIDGE SEAT

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#11	1	41'-10"	3112
B2	7	#11	1	53'-7"	1993
B3	7	#11	1	28'-7"	1063
B4	24	#4	STR	25'-0"	401
B5	17	#4	STR	5'-2"	59
B6	28	#4	STR	3'-8"	69
B7	12	#5	STR	37'-0"	463
B8	2	#5	STR	35'-0"	73
H1	38	#5	2	24'-6"	971
H2	17	#4	3	20'-3"	230
H3	17	#4	3	21'-9"	247
K1	48	#4	STR	25'-3"	810
K2	4	#4	STR	3'-8"	10
K3	4	#4	STR	3'-7"	10
S1	56	#5	4	14'-5"	842
S2	83	#5	4	13'-4"	1154
S3	139	#5	5	6'-1"	882
S4	120	#4	6	8'-8"	695
S5	6	#6	7	9'-1"	82
S6	6	#6	8	5'-3"	47
U1	32	#4	6	9'-2"	196
U2	68	#4	6	3'-8"	167
V1	136	#5	STR	10'-4"	1466
V2	57	#5	STR	13'-0"	773
V3	50	#5	STR	12'-0"	626

REINFORCING STEEL 16,441 LBS.

CLASS A CONCRETE BREAKDOWN

POUR #1 CAP, LOWER PART OF WING & COLLARS 76.4 C.Y.

POUR #2 UPPER PART OF WING & BACKWALL 32.1 C.Y.

TOTAL CLASS A CONCRETE 108.5 C.Y.

HP 12 X 53 STEEL PILES
NO: 22 LIN. FT.= 495

PILE DRIVING EQUIPMENT SETUP
HP 12 X 53 NO. = 22

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 5 OF 5

DRAWN BY : JTC DATE : 12/2017
CHECKED BY : JMR DATE : 02/2018
DESIGN ENGINEER OF RECORD: PDS DATE : 02/2018

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RALEIGH

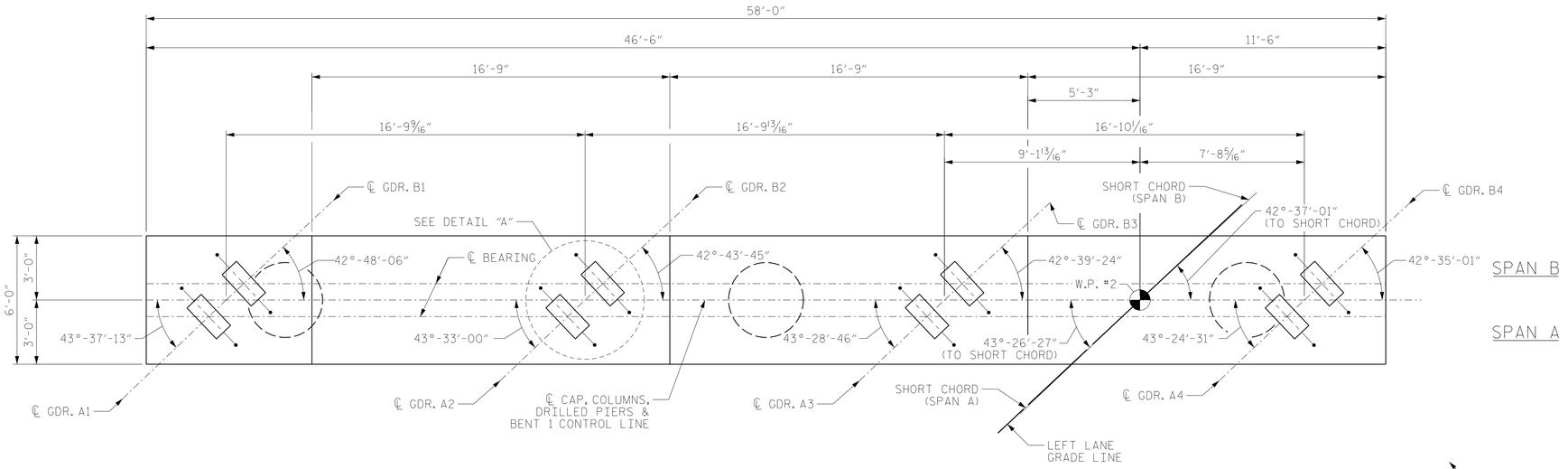
SUBSTRUCTURE

END BENT NO. 1

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-33
1			3			TOTAL SHEETS
2			4			45

STR. #3



NOTES:

FOR SECTION CUTS AND VIEWS, SEE SHEET 2 OF 2.

FOR REINFORCING BILL OF MATERIAL, SEE SHEET 2 OF 2.

STIRRUPS AND U3 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

ALL STEEL IN THE DRILLED SHAFTS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL".

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

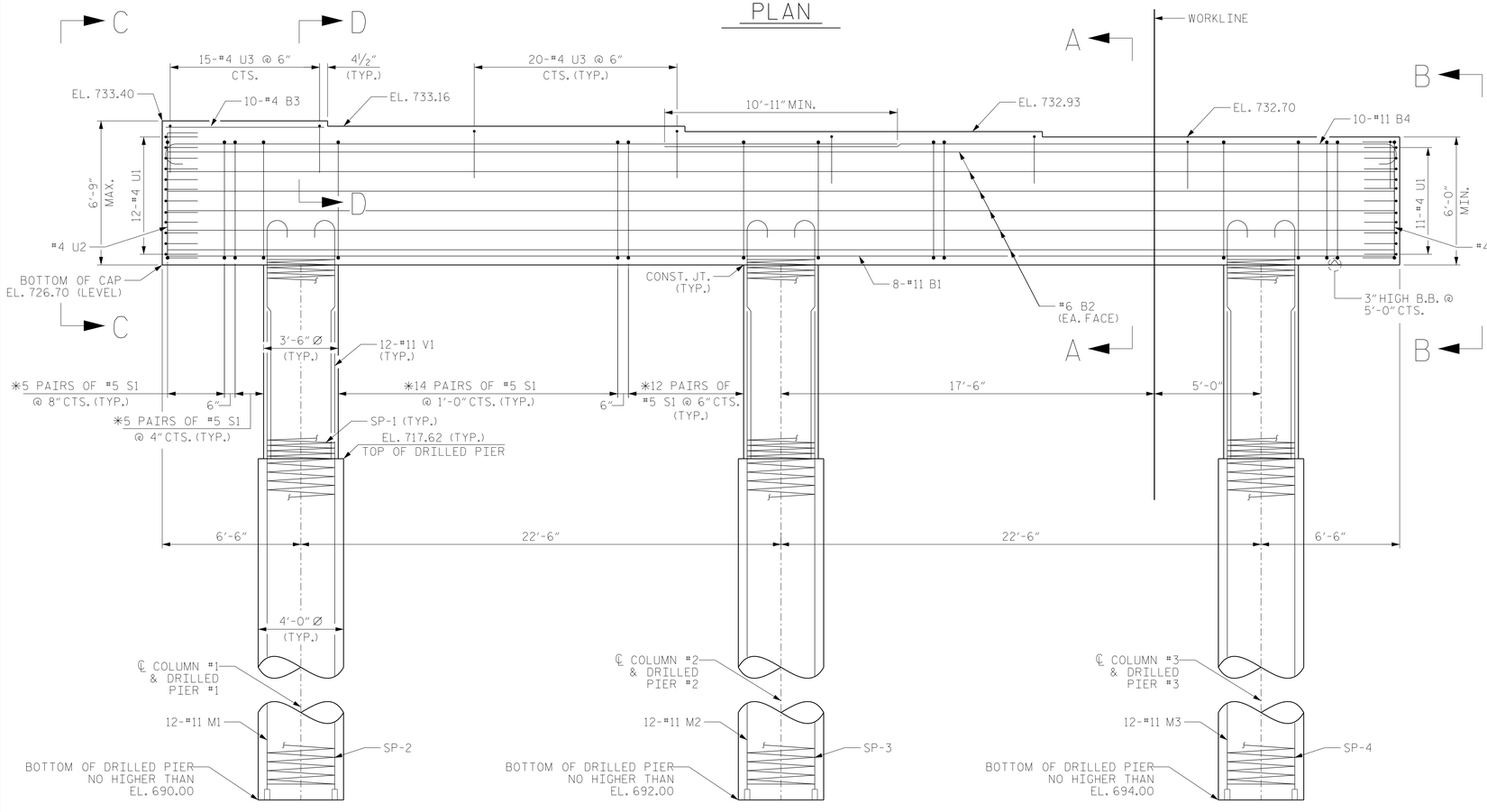
* INVERT ALTERNATE #5 S1 STIRRUP PAIRS.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FOOT BELOW THE GROUND LINE.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

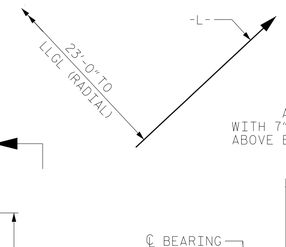
LLGL = LEFT LANE GRADE LINE

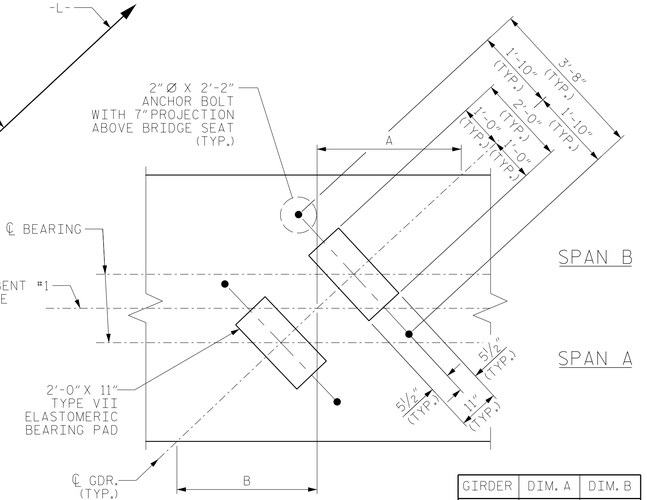
PLAN



ELEVATION

LOOKING AHEAD STATION





DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER, UNLESS NOTED OTHERWISE

GIRDER	DIM. A	DIM. B
1	3'-2 7/8"	3'-1 3/4"
2	3'-3"	3'-1 7/8"
3	3'-3 1/16"	3'-1 15/16"
4	3'-2 1/16"	3'-3 3/16"

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

DRAWN BY : MRA DATE : 01/2018

CHECKED BY : MAL DATE : 02/2018

DESIGN ENGINEER OF RECORD: JMR DATE : 01/2018

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON

DocuSigned by: Justin Robinson

3/28/2018

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www.rsandh.com
North Carolina License Nos. 50073 * F-0493 * C-28

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 1

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-34
1			3			TOTAL SHEETS
2			4			45

STR. #3

3/27/2018
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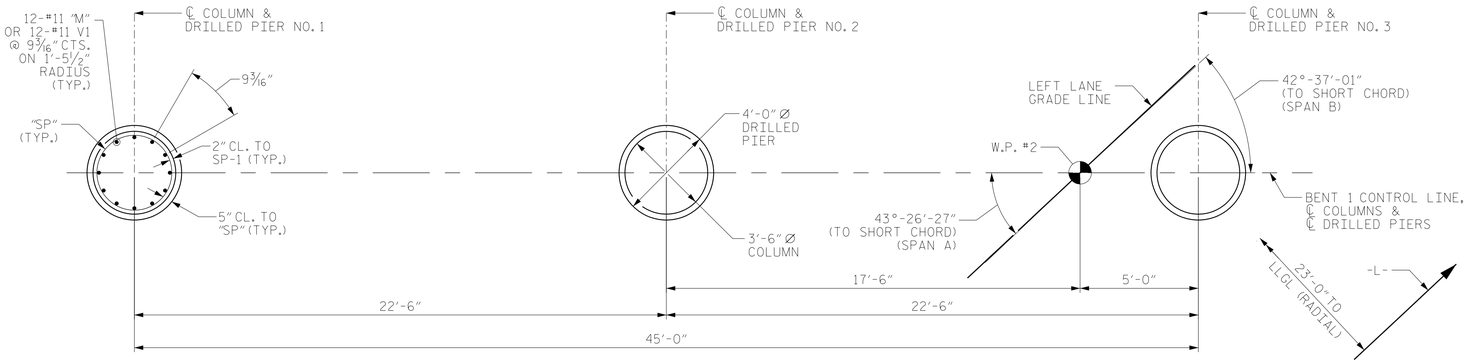
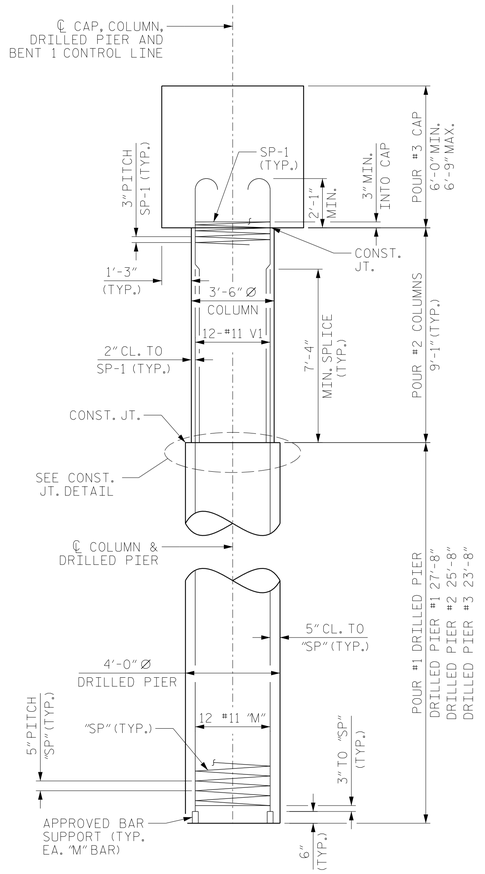
AcostaM

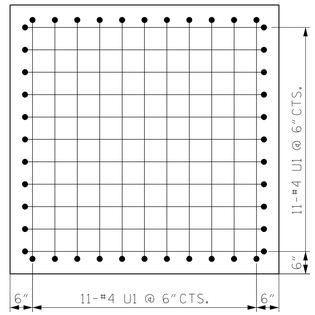


PLAN OF DRILLED PIERS & COLUMNS

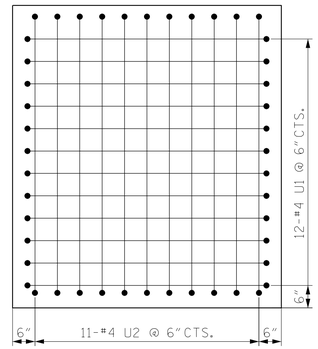
LLGL = LEFT LANE GRADE LINE



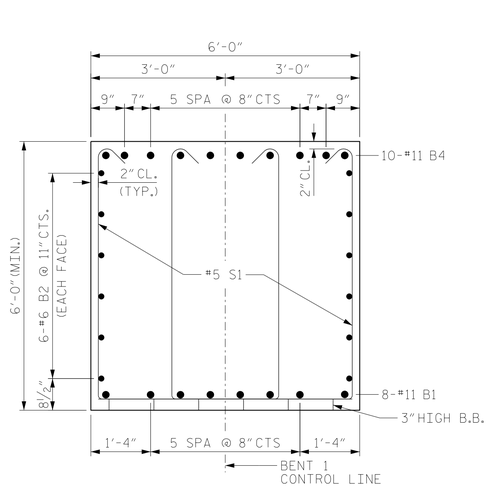
END ELEVATION



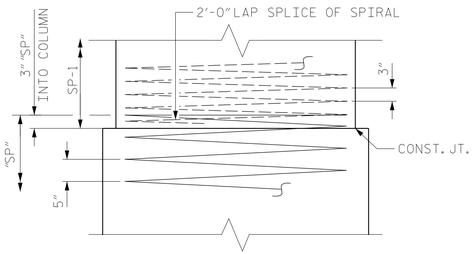
VIEW B-B



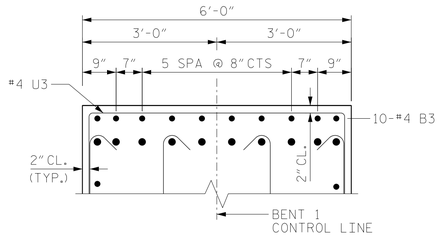
VIEW C-C



SECTION A-A

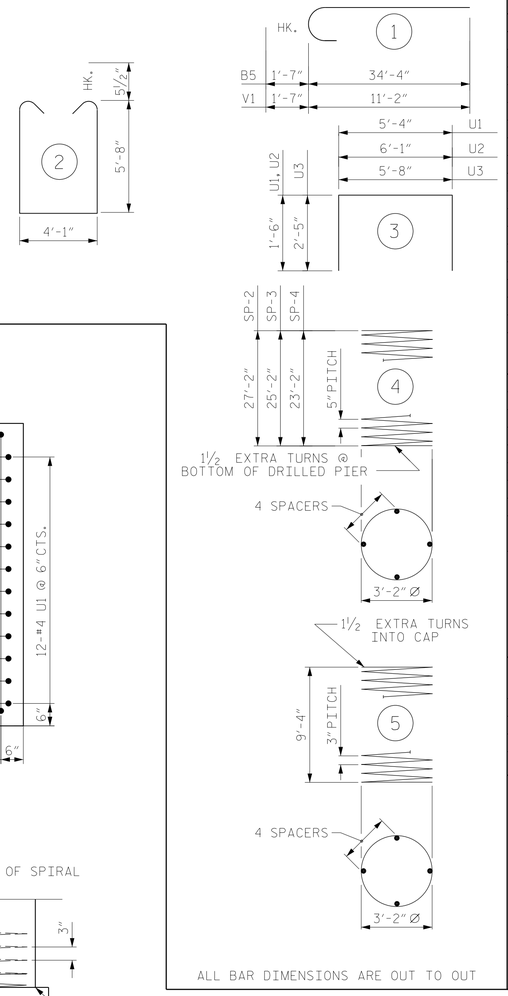


CONSTRUCTION JOINT DETAIL



SECTION D-D

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	STR	57'-8"	2451
B2	12	#6	STR	57'-8"	1039
B3	10	#4	STR	7'-5"	50
B4	20	#11	1	35'-11"	3817
M1	12	#11	STR	37'-7"	2391
M2	12	#11	STR	35'-7"	2263
M3	12	#11	STR	33'-7"	2136
S1	144	#5	2	16'-4"	2453
U1	34	#4	3	8'-4"	189
U2	11	#4	3	9'-1"	67
U3	75	#4	3	10'-6"	526
V1	36	#11	1	12'-9"	2439

REINFORCING STEEL (FOR BENT 1) 19,821 LBS.

SP-1	3	✳	4	383'-0"	768
SP-2	1	✳✳	5	651'-3"	679
SP-3	1	✳✳	5	602'-4"	628
SP-4	1	✳✳	5	563'-2"	587

SPIRAL COLUMN REINFORCING STEEL (FOR BENT 1) 2,662 LBS.

✳✳ THE SP-2, SP-3, SP-4 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

✳ THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN (FOR BENT 1)

POUR #2 (COLUMNS)	9.8 C.Y.
POUR #3 (CAP)	81.5 C.Y.
TOTAL CLASS A CONCRETE	91.3 C.Y.

DRILLED PIERS: (FOR BENT 1)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	35.9 C.Y.
4'-0" Ø DRILLED PIER NOT IN SOIL	29.00 LIN. FT.
4'-0" Ø DRILLED PIER IN SOIL	48.00 LIN. FT.
△ CSL TUBES	326.1 LIN. FT.

△ NO SEPERATE PAYMENT WILL BE MADE FOR CSL TUBES. CSL TUBES WILL BE INCLUDED IN THE UNIT BID PRICE FOR DRILLED PIERS.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

DRAWN BY : MRA DATE : 12/2017
CHECKED BY : MAL DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 01/2018

3/27/2018
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3/28/2018

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RALEIGH

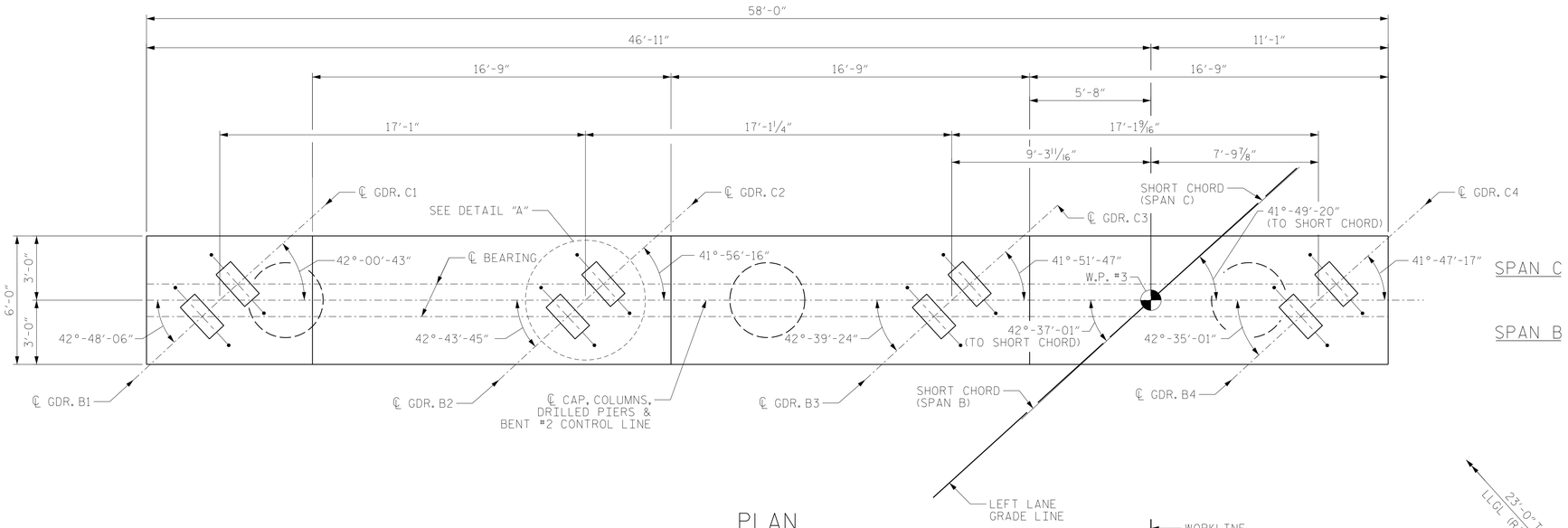
SUBSTRUCTURE

BENT NO.1 DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-35
1			3			TOTAL SHEETS
2			4			45

STR. #3



NOTES:

FOR SECTION CUTS AND VIEWS, SEE SHEET 2 OF 2.

FOR REINFORCING BILL OF MATERIAL, SEE SHEET 2 OF 2.

STIRRUPS AND U3 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

ALL STEEL IN THE DRILLED SHAFTS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL".

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

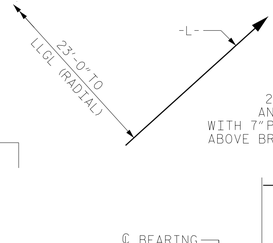
* INVERT ALTERNATE #5 S1 STIRRUP PAIRS.

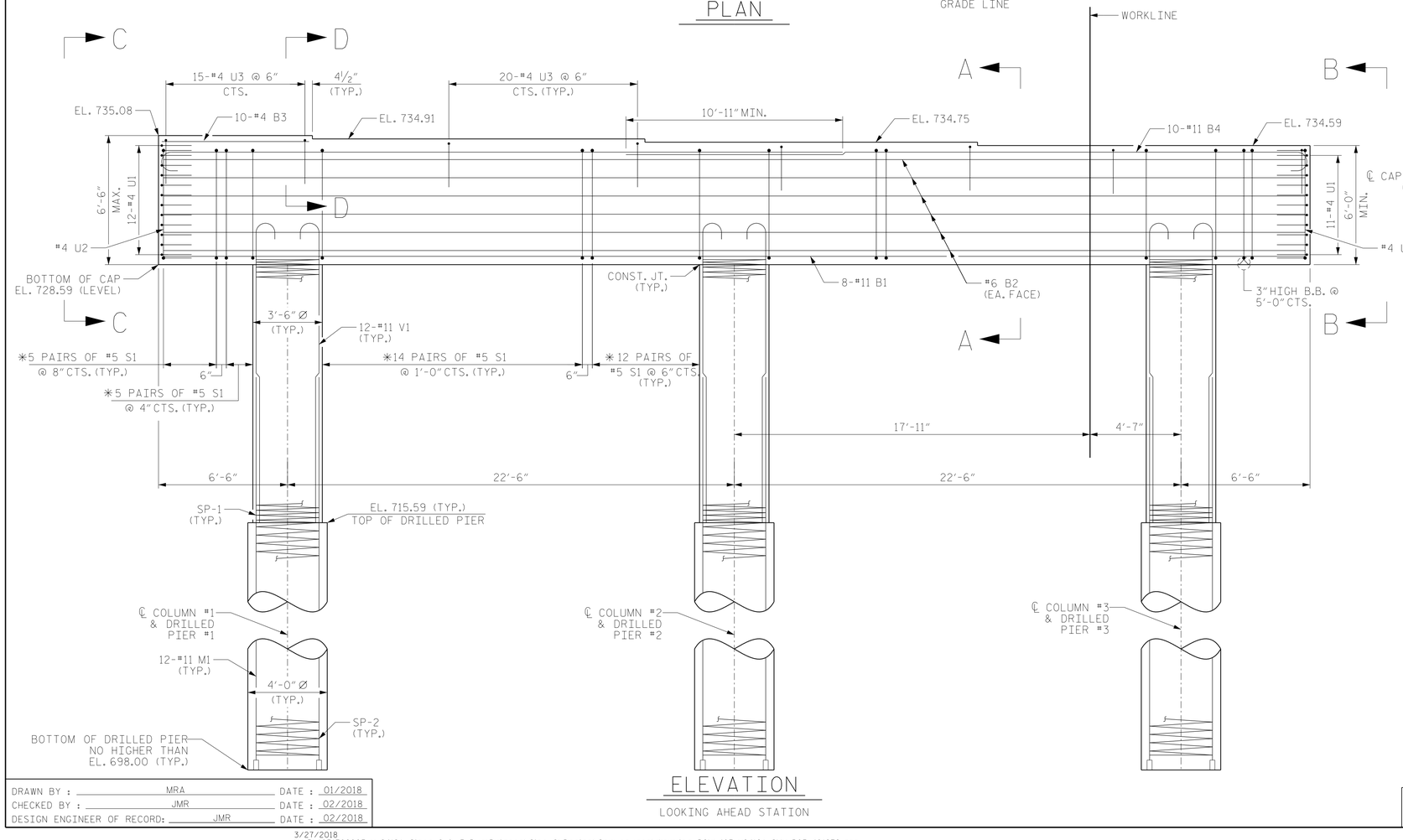
THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FOOT BELOW THE GROUND LINE.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

LLGL = LEFT LANE GRADE LINE

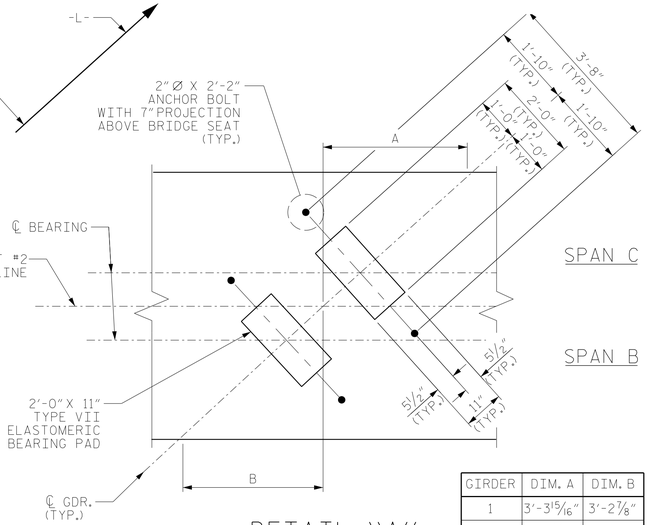
PLAN





ELEVATION

LOOKING AHEAD STATION



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER, UNLESS NOTED OTHERWISE

GIRDER	DIM. A	DIM. B
1	3'-3 15/16"	3'-2 7/8"
2	3'-4 1/16"	3'-3"
3	3'-4 3/16"	3'-3 1/16"
4	3'-4 1/4"	3'-3 3/16"

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

DRAWN BY : MRA DATE : 01/2018

CHECKED BY : JMR DATE : 02/2018

DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

NORTH CAROLINA PROFESSIONAL ENGINEER JUSTIN MARK ROBINSON SEAL 039313 Digitally signed by Justin Mark Robinson

3/28/2018

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SUBSTRUCTURE

BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-36
1			3			TOTAL SHEETS
2			4			45

STR. #3

3/27/2018
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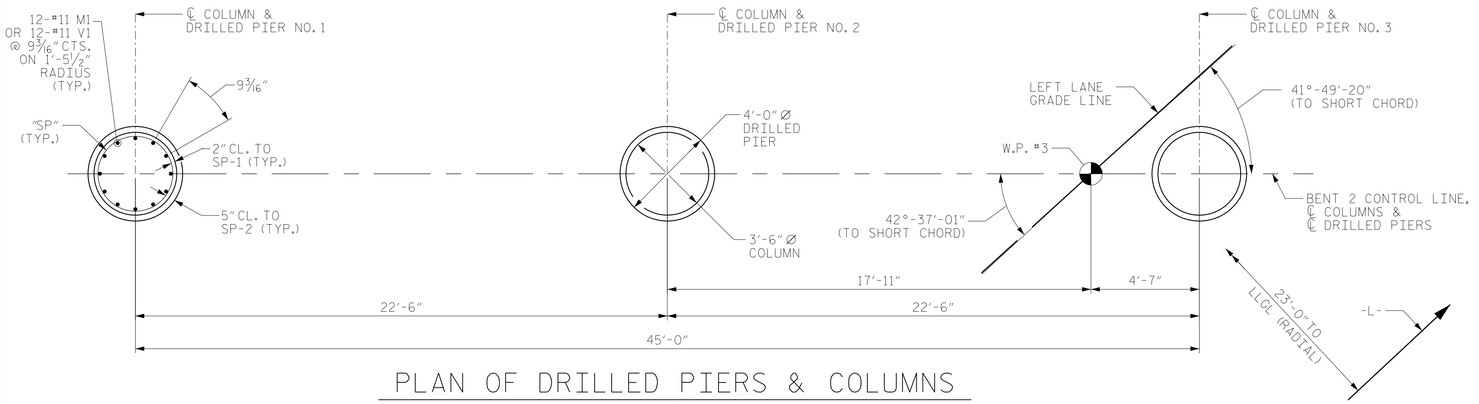
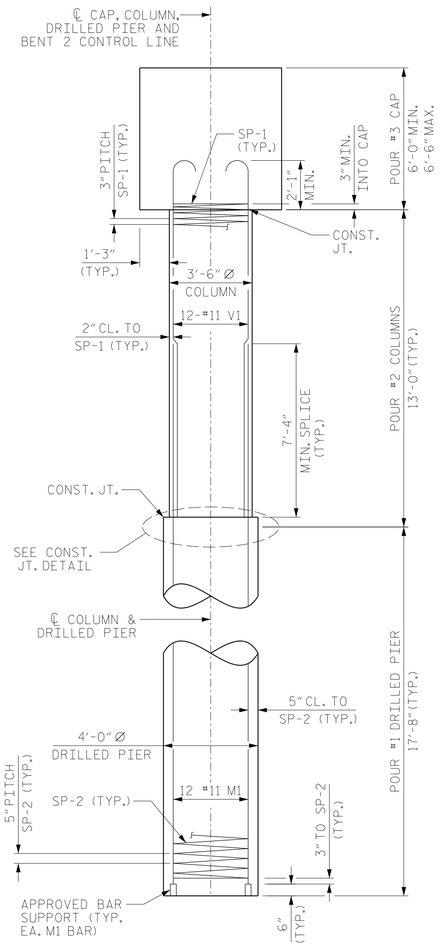
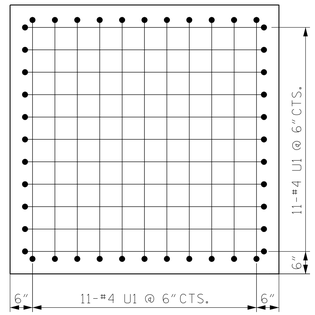


PLAN OF DRILLED PIERS & COLUMNS

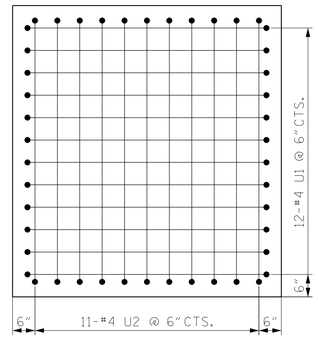
LLGL = LEFT LANE GRADE LINE



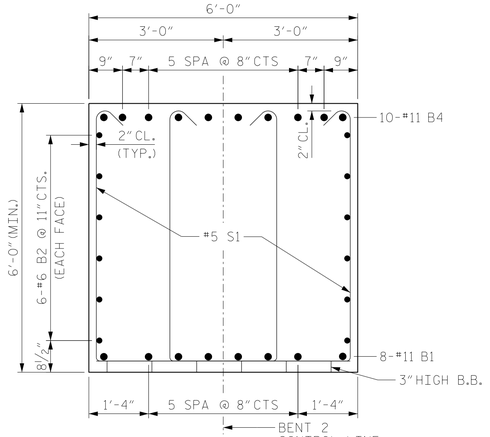
END ELEVATION



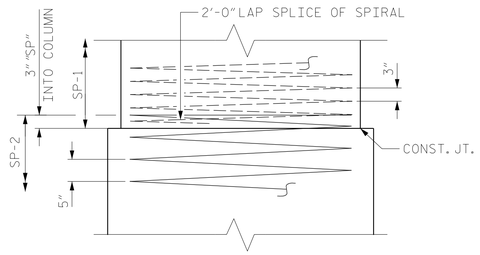
VIEW B-B



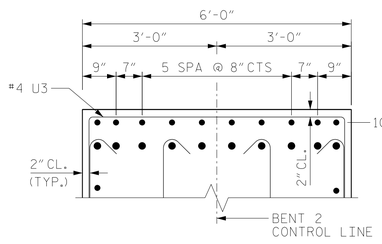
VIEW C-C



SECTION A-A

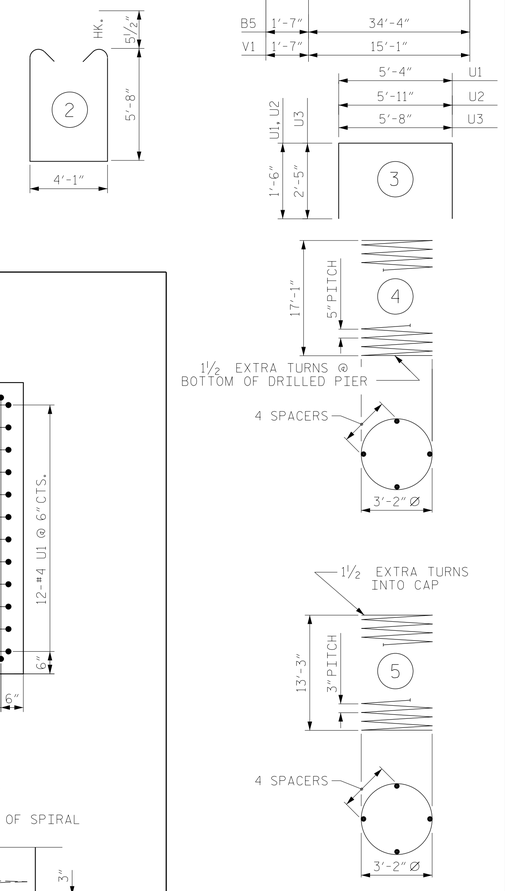


CONSTRUCTION JOINT DETAIL



SECTION D-D

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	STR	57'-8"	2452
B2	12	#6	STR	57'-8"	1040
B3	10	#4	STR	7'-5"	50
B4	30	#11	4	35'-11"	5725
M1	36	#11	STR	27'-6"	5260
S1	144	#5	2	16'-4"	2454
U1	34	#4	3	8'-4"	190
U2	11	#4	3	8'-11"	66
U3	75	#4	3	10'-6"	527
V1	36	#11	1	16'-8"	3188

REINFORCING STEEL (FOR BENT 2) 20,952 LBS.

SP-1	3	*	4	535'-3"	1073
SP-2	3	**	5	416'-3"	1303

SPIRAL COLUMN REINFORCING STEEL (FOR BENT 2) 2,376 LBS.

** THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN (FOR BENT 2)

POUR #2 (COLUMNS)	13.9 C.Y.
POUR #3 (CAP)	80.1 C.Y.
TOTAL CLASS A CONCRETE	94.0 C.Y.

DRILLED PIERS: (FOR BENT 2)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	24.7 C.Y.
4'-0" Ø DRILLED PIER NOT IN SOIL	24.0 LIN. FT.
4'-0" Ø DRILLED PIER IN SOIL	30.0 LIN. FT.
PERMANENT STEEL CASING FOR 4'-0" Ø DRILLED PIERS	31.8 LIN. FT.
△ CSL TUBES	230.1 LIN. FT.

△ NO SEPERATE PAYMENT WILL BE MADE FOR CSL TUBES. CSL TUBES WILL BE INCLUDED IN THE UNIT BID PRICE FOR DRILLED PIERS.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON Digitally signed by Justin Robinson 3/28/2018

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RALEIGH

SUBSTRUCTURE

BENT NO. 2 DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-37
1			3			TOTAL SHEETS
2			4			45

STR. #3

DRAWN BY :	MRA	DATE :	12/2017
CHECKED BY :	JMR	DATE :	02/2018
DESIGN ENGINEER OF RECORD:	JMR	DATE :	02/2018

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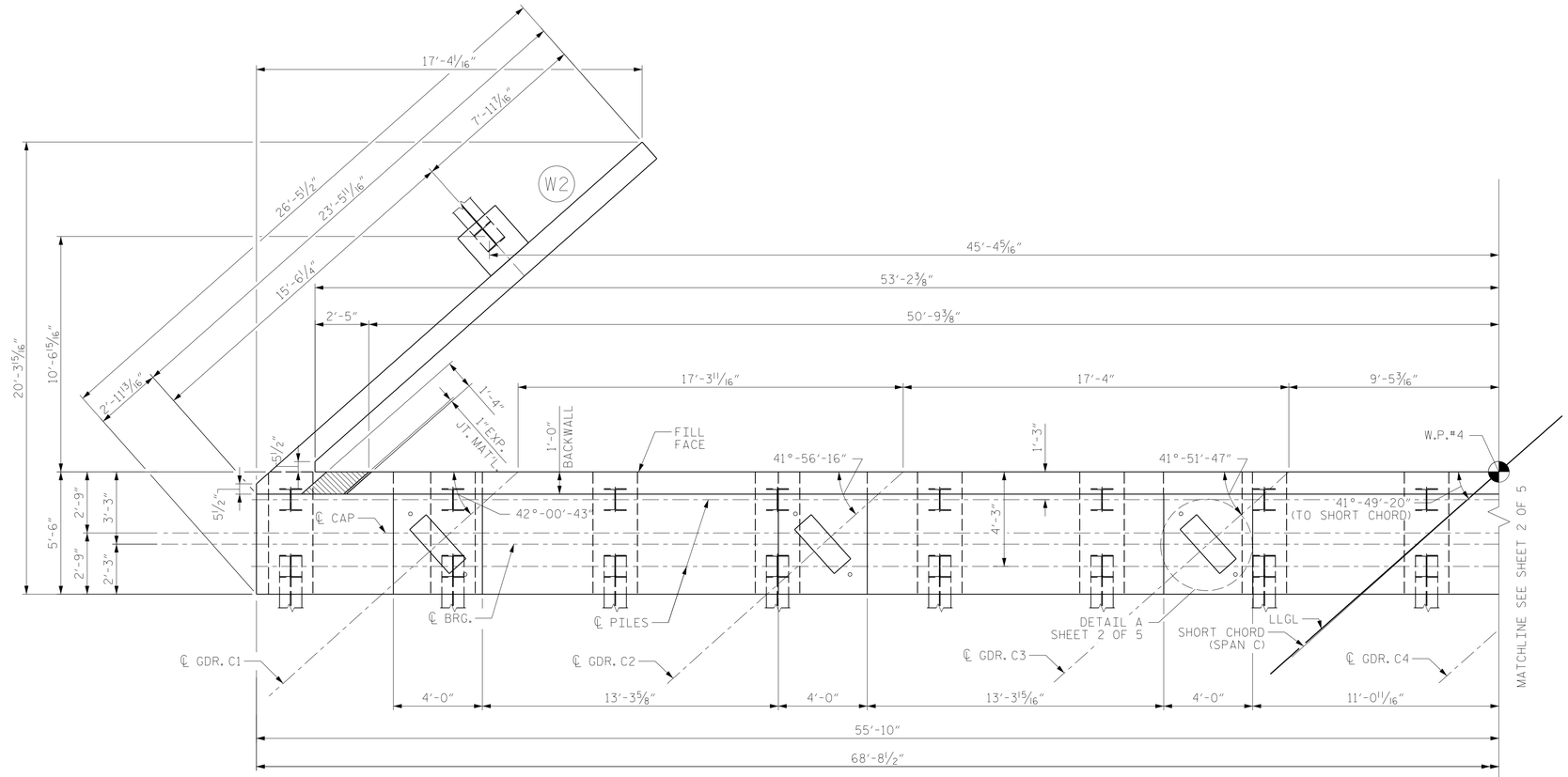
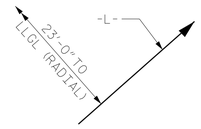
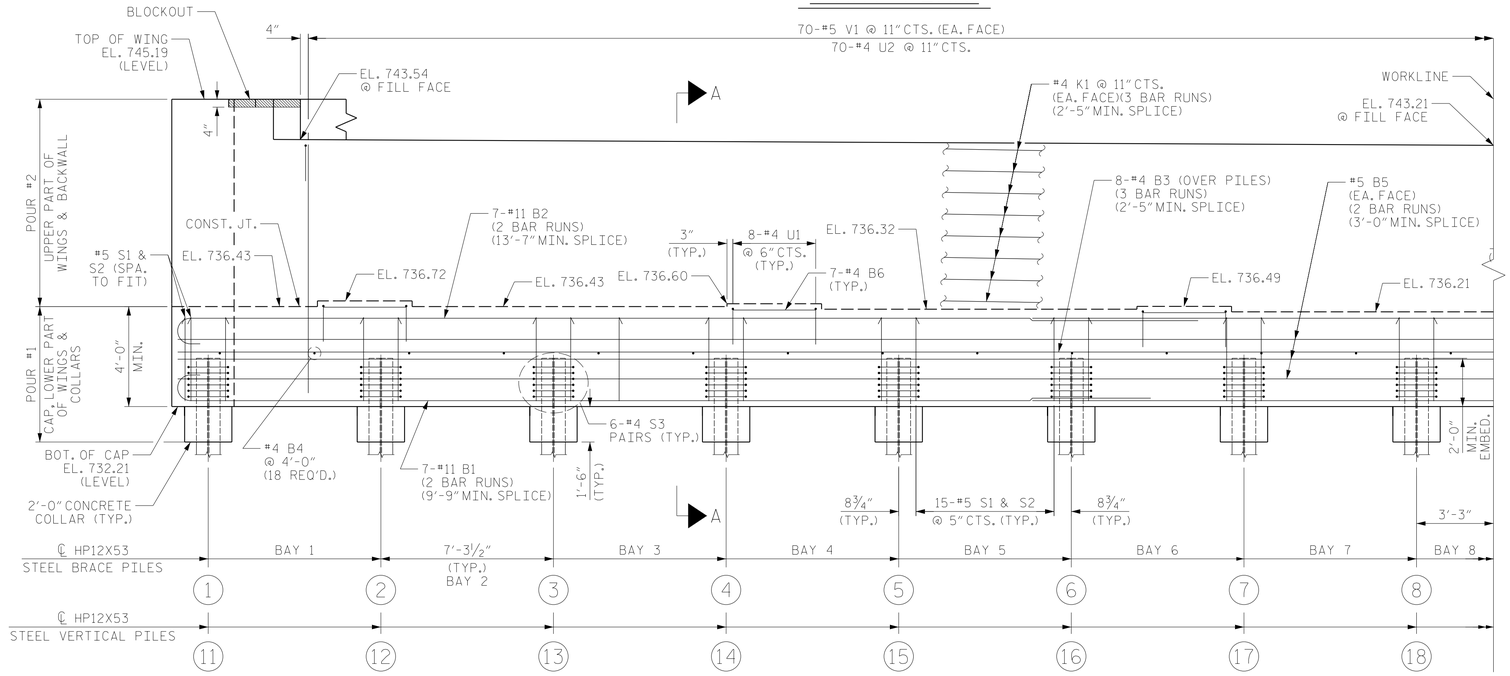


PART PLAN





PART ELEVATION

WINGS AND WING PILES NOT SHOWN FOR CLARITY

NOTES

STIRRUPS AND #4 U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR SECTION A-A AND PARTIAL SECTION AT BRIDGE SEAT, SEE SHEET 5 OF 5.

FOR PILE SPLICE DETAILS, SEE SHEET 5 OF 5.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

LLGL = LEFT LANE GRADE LINE

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 5

NORTH CAROLINA PROFESSIONAL SEAL 039313 ENGINEER JUSTIN MARK ROBINSON — Digitally Signed by Justin Mark Robinson

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-38
1			3			TOTAL SHEETS
2			4			45

DRAWN BY :	JTC	DATE : 12/2017
CHECKED BY :	JMR	DATE : 02/2018
DESIGN ENGINEER OF RECORD:	PDS	DATE : 02/2018

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AcostaM

STR. #3

NOTES

STIRRUPS AND #4 U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR SECTION A-A AND PARTIAL SECTION AT BRIDGE SEAT, SEE SHEET 5 OF 5.

FOR PILE SPLICE DETAILS, SEE SHEET 5 OF 5.

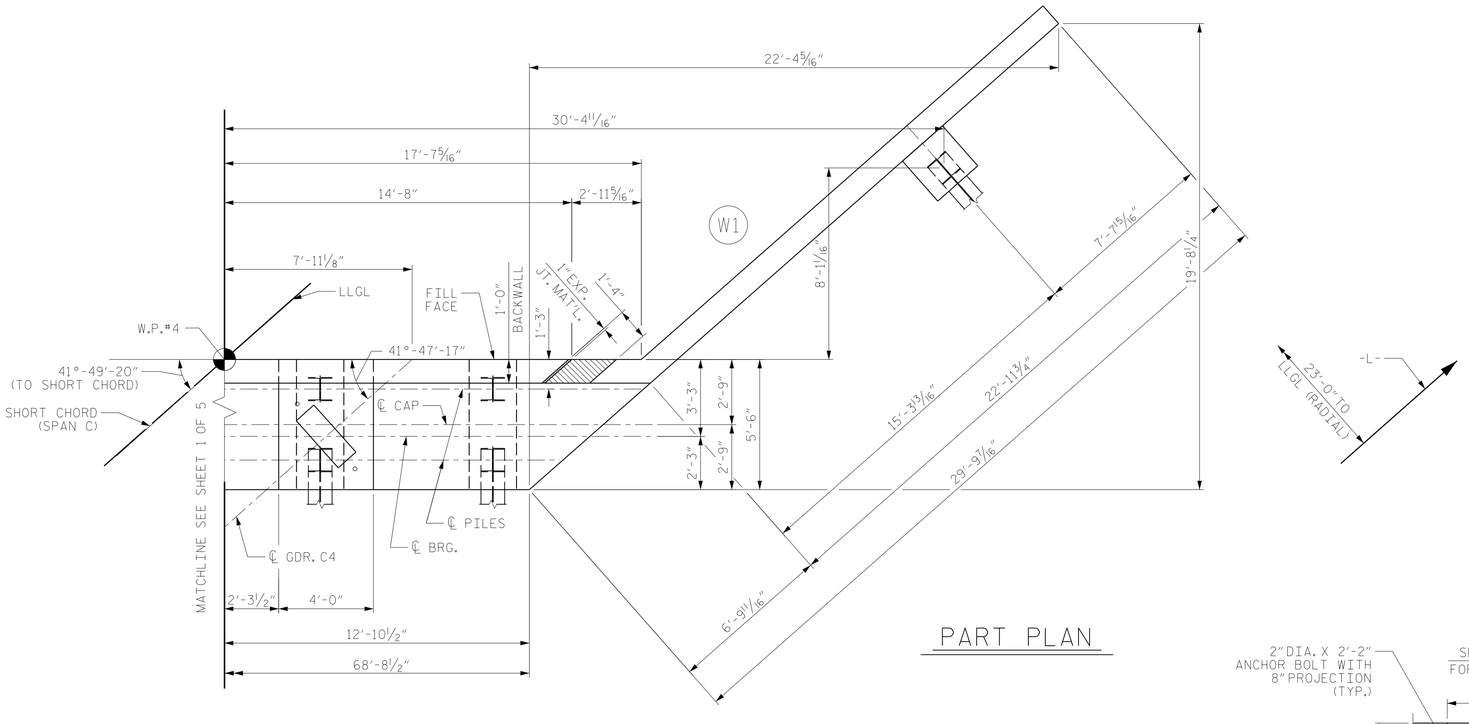
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

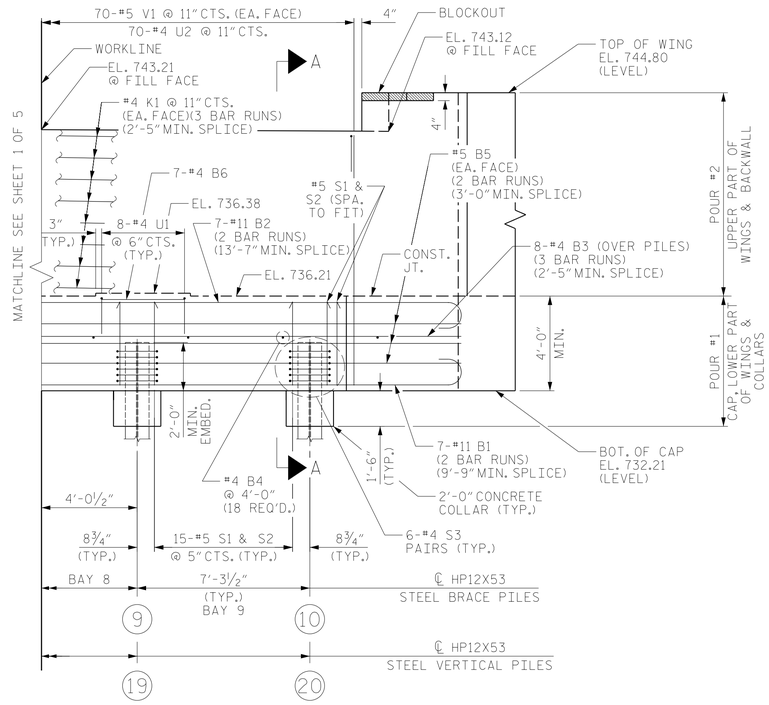
THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

LLGL = LEFT LANE GRADE LINE



PART PLAN



PART ELEVATION

WINGS AND WING PILES NOT SHOWN FOR CLARITY

TABLE	
GDR.	A
C1	3'-7 5/16"
C2	3'-7 7/16"
C3	3'-7 1/2"
C4	3'-7 5/8"

DETAIL A

DIMENSIONS TYP. EA. BRG. PILES NOT SHOWN FOR CLARITY

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 5

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-39
1			3			TOTAL SHEETS
2			4			45

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DESIGN ENGINEER OF RECORD:	PDS	DATE : 02/2018

3/27/2018
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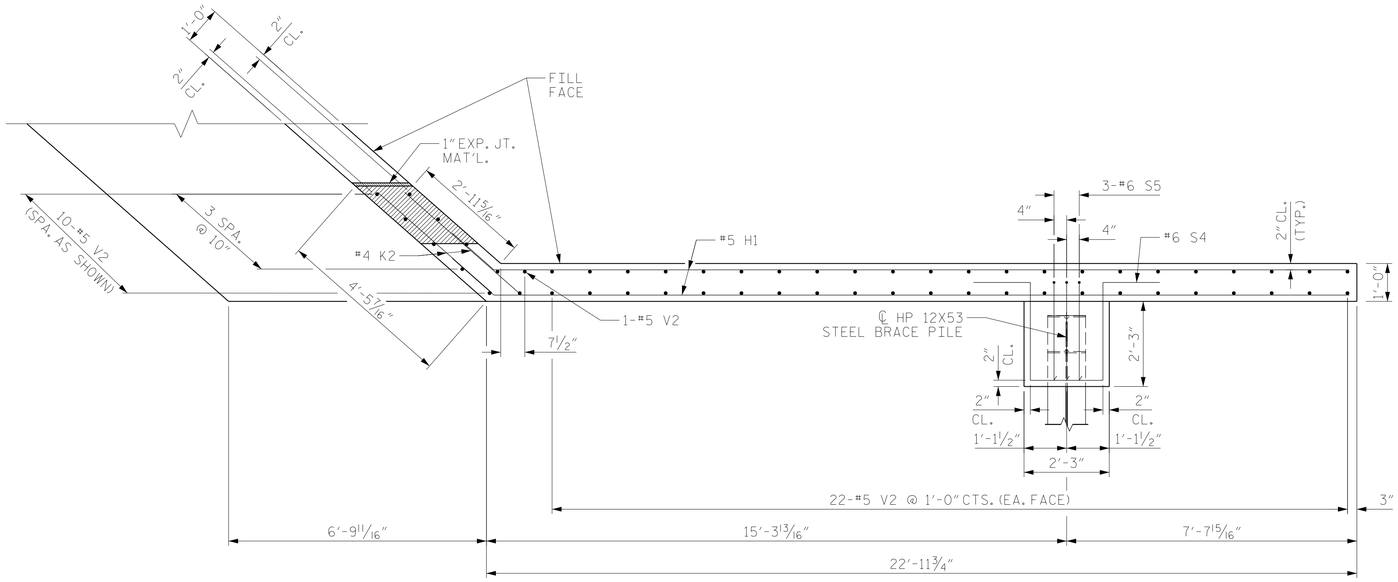
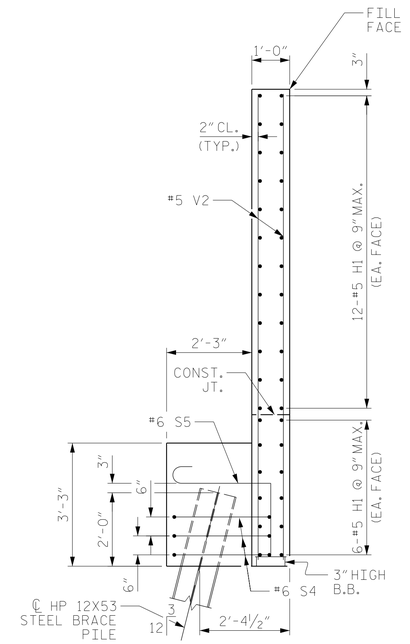
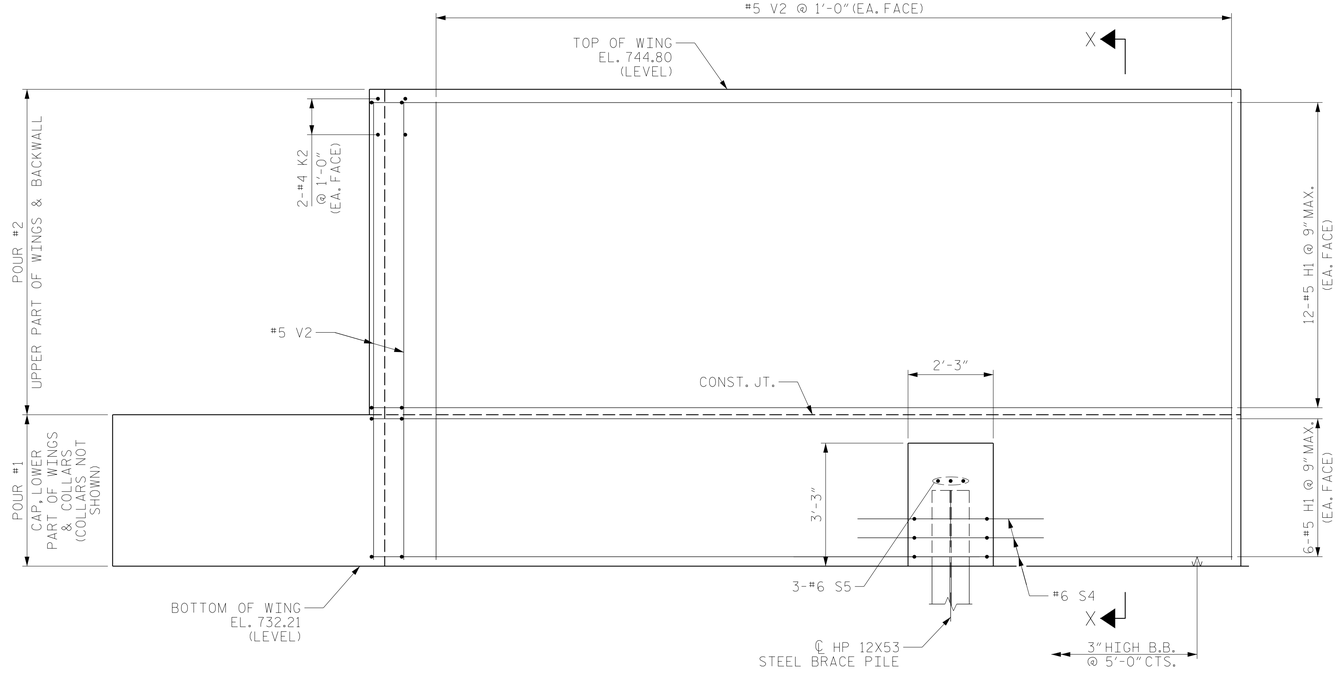
STR. #3



PLAN OF WING W1



SECTION X-X



ELEVATION OF WING W1

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 3 OF 5

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036879 JUSTIN MARK ROBINSON
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-40
1			3			TOTAL SHEETS
2			4			45

DRAWN BY : JTC DATE : 12/2017
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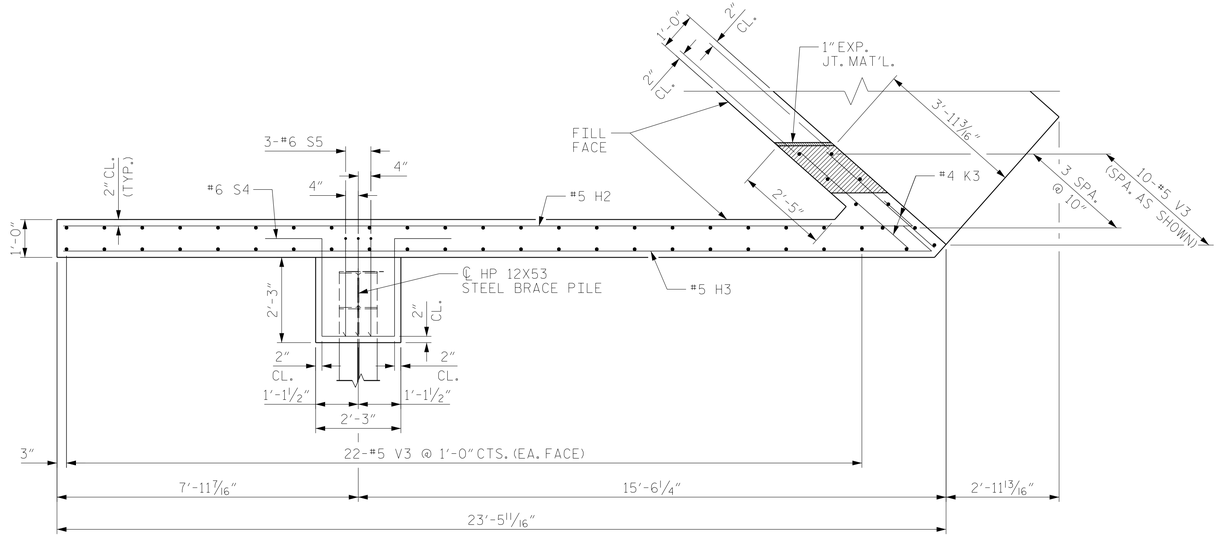
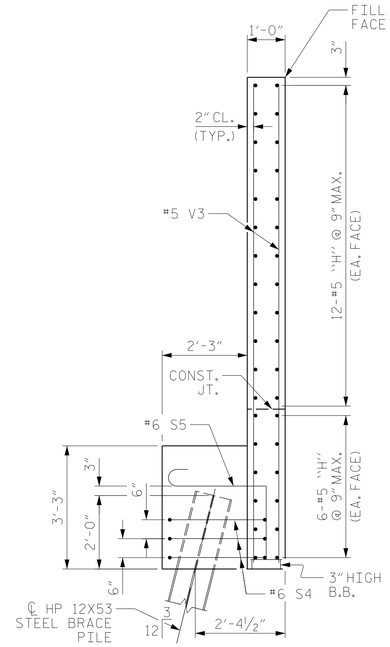
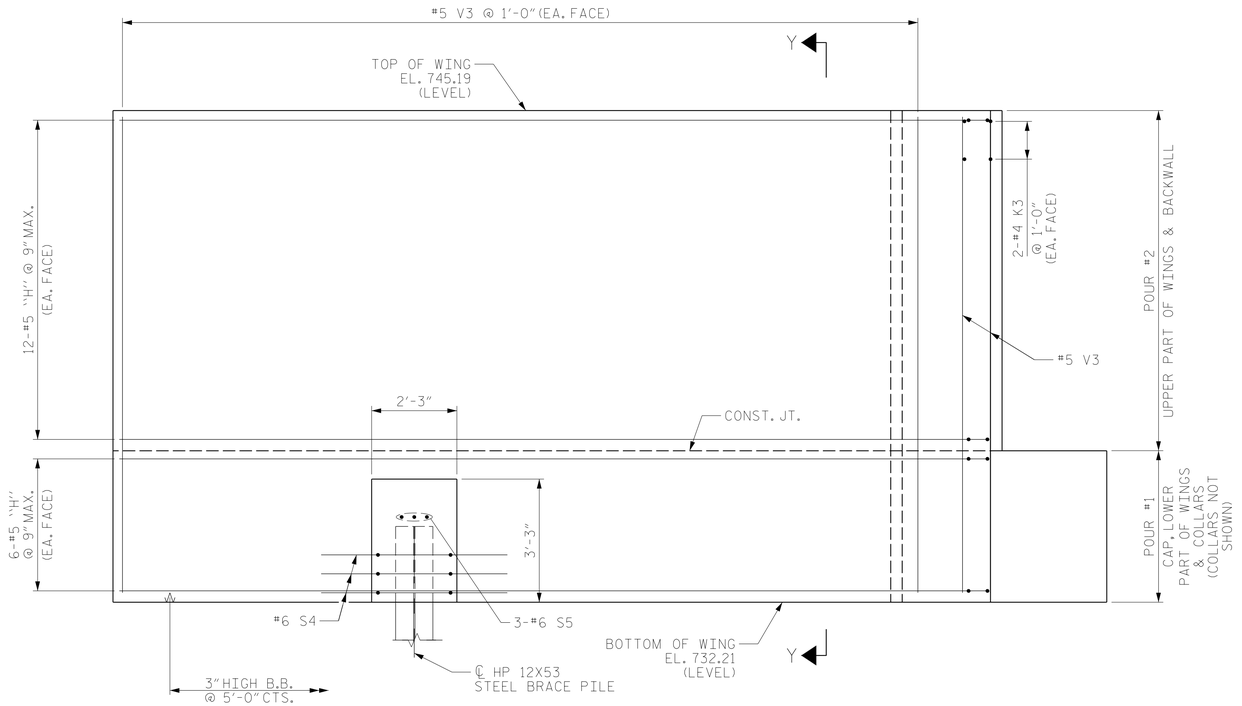
STR. #3



PLAN OF WING W2



SECTION Y-Y



ELEVATION OF WING W2

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 4 OF 5

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Docusigned by: Justin Robinson 0937A51EDC0E4BC...
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SUBSTRUCTURE

END BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-41
1			3			TOTAL SHEETS
2			4			45

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DESIGN ENGINEER OF RECORD:	PDS	DATE :	02/2018

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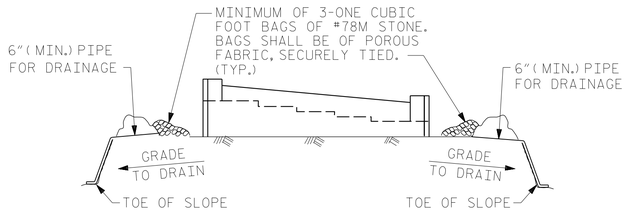
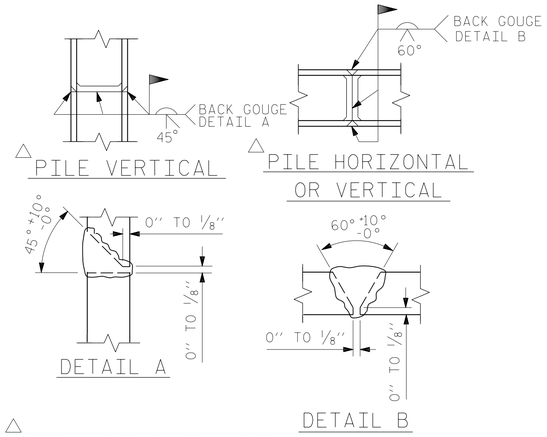


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

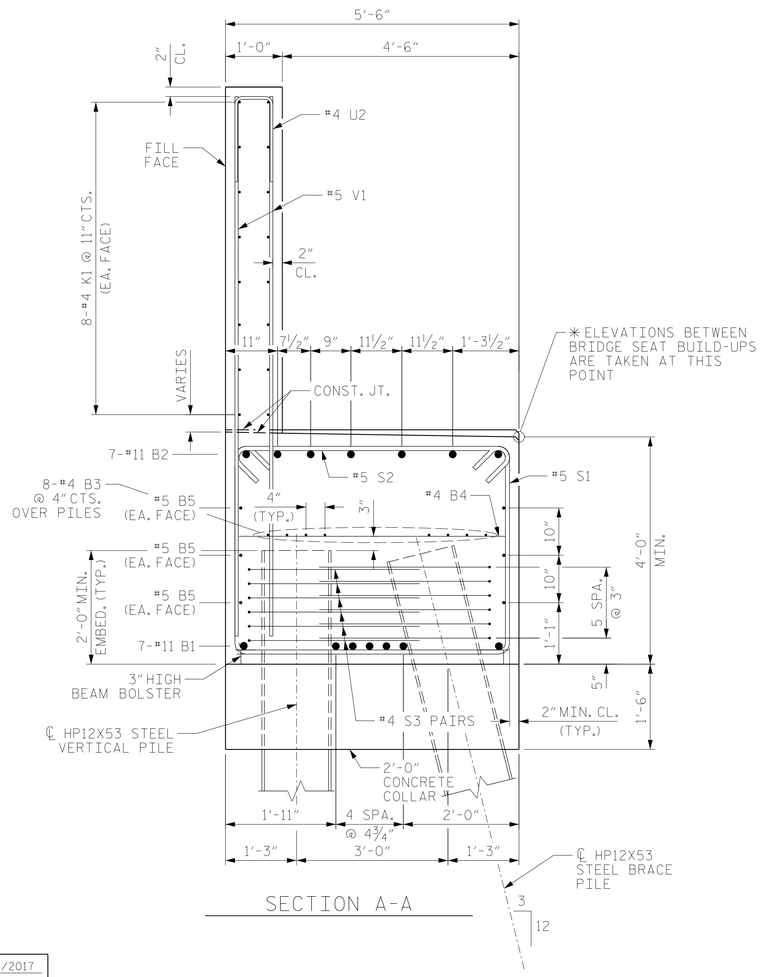
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



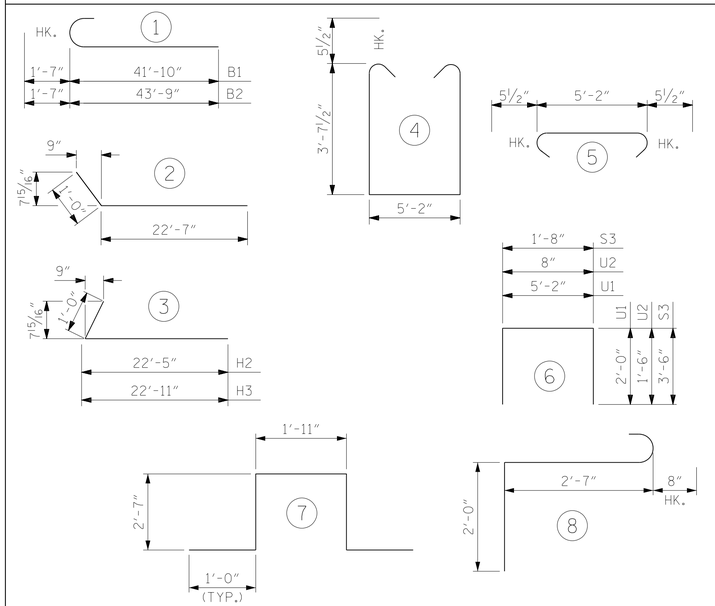
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

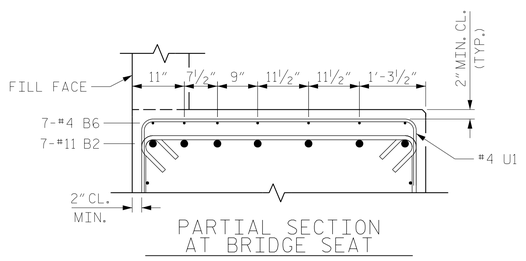


SECTION A-A

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.



PARTIAL SECTION AT BRIDGE SEAT

BILL OF MATERIAL

END BENT #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#11	1	43'-5"	3229
B2	14	#11	1	45'-4"	3372
B3	24	#4	STR	26'-0"	417
B4	18	#4	STR	5'-2"	62
B5	12	#5	STR	38'-6"	482
B6	28	#4	STR	3'-8"	69
H1	36	#5	2	23'-7"	886
H2	18	#5	3	23'-5"	440
H3	18	#5	3	23'-11"	449
K1	48	#4	STR	26'-2"	839
K2	4	#4	STR	3'-11"	10
K3	4	#4	STR	3'-8"	10
S1	139	#5	4	13'-4"	1933
S2	139	#5	5	6'-1"	882
S3	120	#4	6	8'-8"	695
S4	6	#6	7	9'-1"	82
S5	6	#6	8	5'-3"	47
U1	32	#4	6	9'-2"	196
U2	70	#4	6	3'-8"	171
V1	140	#5	STR	10'-6"	1533
V2	55	#5	STR	12'-2"	698
V3	54	#5	STR	12'-6"	704

REINFORCING STEEL 17,206 LBS.

CLASS A CONCRETE BREAKDOWN

POUR #1	CAP, LOWER PART OF WING & COLLARS	75.1 C.Y.
POUR #2	UPPER PART OF WING & BACKWALL	33.8 C.Y.
TOTAL CLASS A CONCRETE		108.9 C.Y.

HP 12 X 53 STEEL PILES

NO: 22 LIN. FT.= 440

PILE DRIVING EQUIPMENT SETUP

HP 12 X 53 NO. = 22

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 5 OF 5

DRAWN BY : JTC DATE : 12/2017

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SUBSTRUCTURE

END BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-42
1			3			TOTAL SHEETS
2			4			45

STR. #3

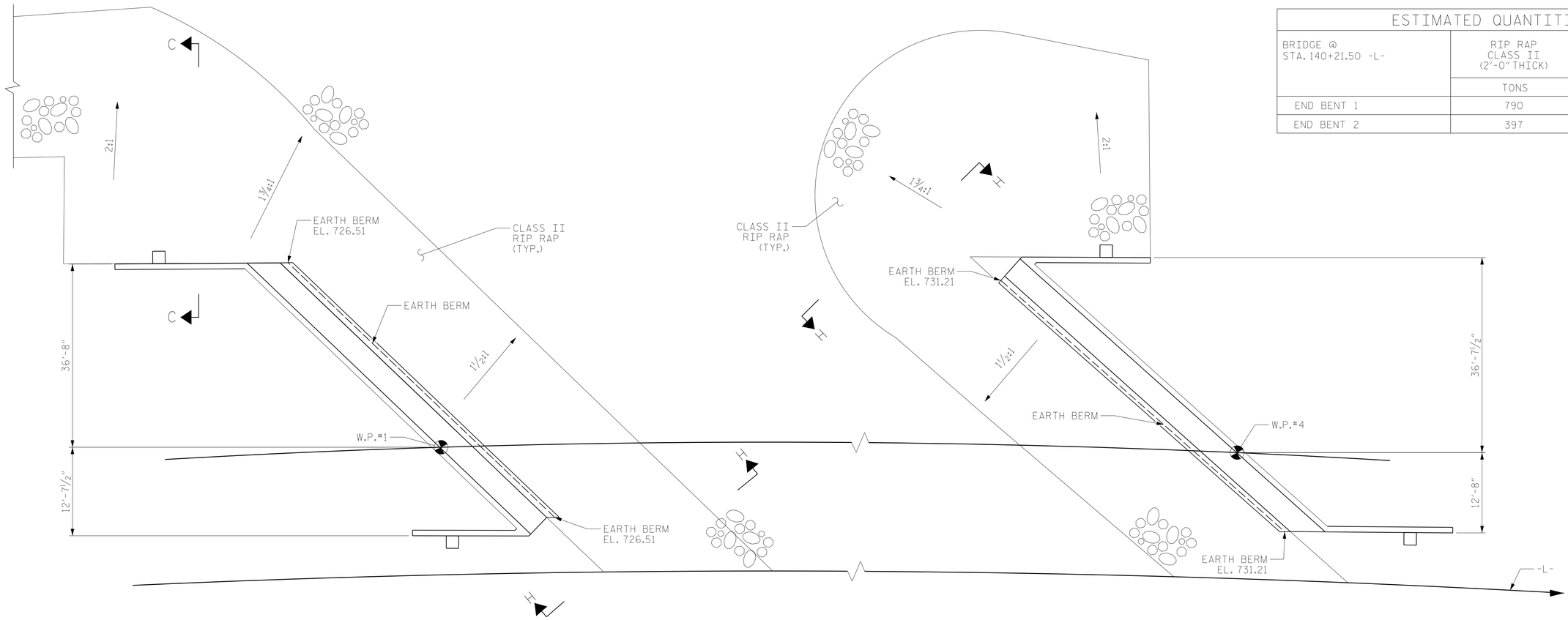
NOTES

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

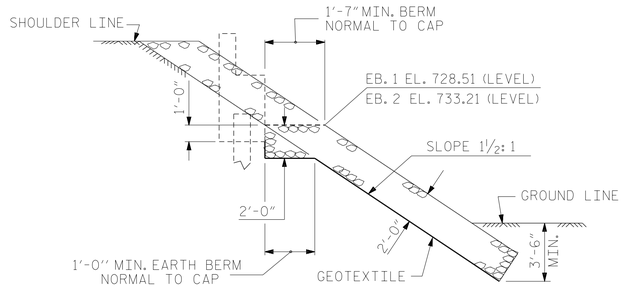
SEE BRIDGE HYDRAULIC REPORT FOR SLOPE STABILIZATION REQUIREMENTS ALONG STREAMBANK SLOPE STABILIZATION IS A ROADWAY PAY ITEM.

ESTIMATED QUANTITIES

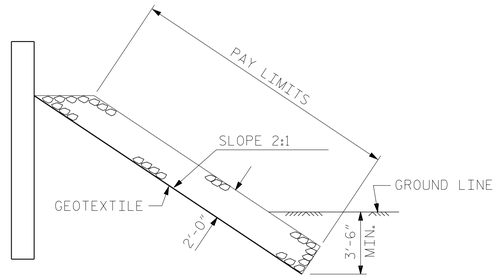
BRIDGE @ STA. 140+21.50 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	790	878
END BENT 2	397	441



PLAN



VIEW H-H



SECTION C-C

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 Justin Mark Robinson REGISTERED 3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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RIP RAP DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-43
1			3			TOTAL SHEETS
2			4			45

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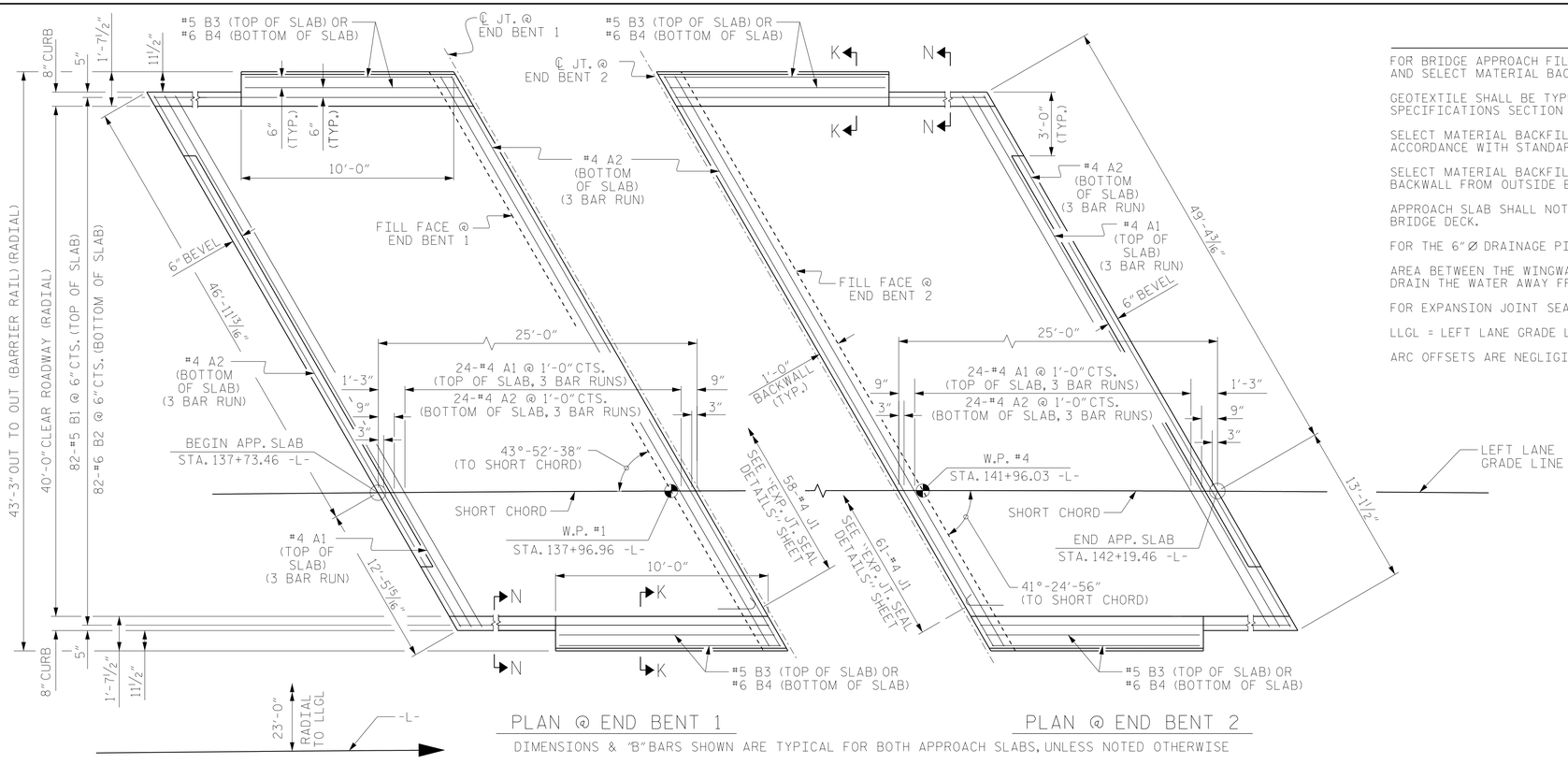
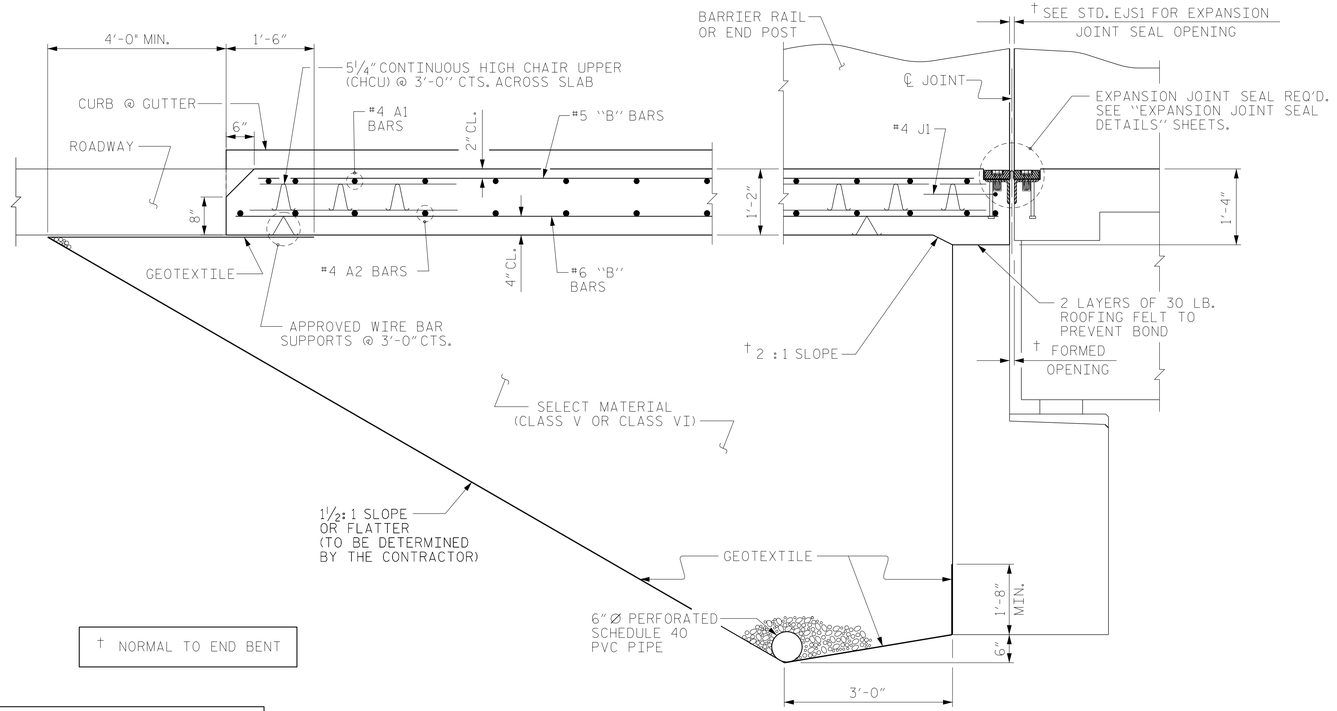
STR. #3



PLAN @ END BENT 1

PLAN @ END BENT 2

DIMENSIONS & "B" BARS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS, UNLESS NOTED OTHERWISE



† NORMAL TO END BENT

SECTION THRU SLAB

(TYPE I - STANDARD APPROACH FILL)

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

LLGL = LEFT LANE GRADE LINE.

ARC OFFSETS ARE NEGLIGIBLE & THEREFORE NOT SHOWN.

SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"

BILL OF MATERIAL

APPROACH SLAB AT END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	75	#4	STR	22'-2"	1111
A2	78	#4	STR	22'-0"	1146
✳ B1	82	#5	STR	23'-9"	2031
B2	82	#6	STR	24'-6"	3018
✳ B3	4	#5	STR	9'-7"	40
B4	4	#6	STR	9'-7"	58
✳ J1	58	#4	1	1'-5"	55
REINFORCING STEEL ✳✳					4,222 LBS.
✳ EPOXY COATED REINFORCING STEEL ✳✳					3,237 LBS.
CLASS AA CONCRETE ✳✳					45.5 C.Y.

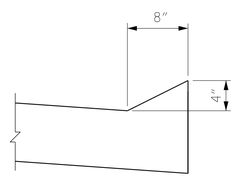
APPROACH SLAB AT END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	75	#4	STR	23'-1"	1156
A2	78	#4	STR	22'-11"	1194
✳ B1	82	#5	STR	23'-8"	2024
B2	82	#6	STR	24'-6"	3018
✳ B3	4	#5	STR	9'-7"	40
B4	4	#6	STR	9'-7"	58
✳ J1	61	#4	1	1'-5"	58
REINFORCING STEEL ✳✳					4,270 LBS.
✳ EPOXY COATED REINFORCING STEEL ✳✳					3,278 LBS.
CLASS AA CONCRETE ✳✳					45.5 C.Y.

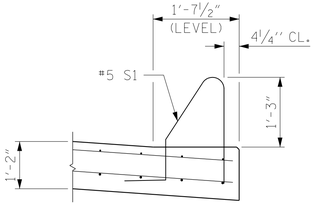
BAR TYPE

ALL BAR DIMENSIONS ARE OUT TO OUT

✳✳ QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE SHEET 2 OF 2.



SECTION N-N



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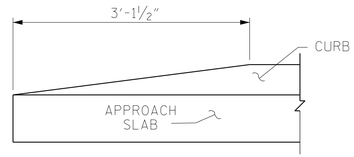

END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039813 ENGINEERING INC. MARK ROBINSON

Electronically Signed by: Justin Schmitz

3/28/2018

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RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-44
1			3			TOTAL SHEETS
2			4			45

ASSEMBLED BY : NSC	DATE : 12/2017	
CHECKED BY : MAL	DATE : 01/2018	
DRAWN BY : EEM 3/95	REV. 12/21/11	MAA/GM
CHECKED BY : VAP 3/95	REV. 6/13	MAA/GM
	REV. 12/17	MAA/THC

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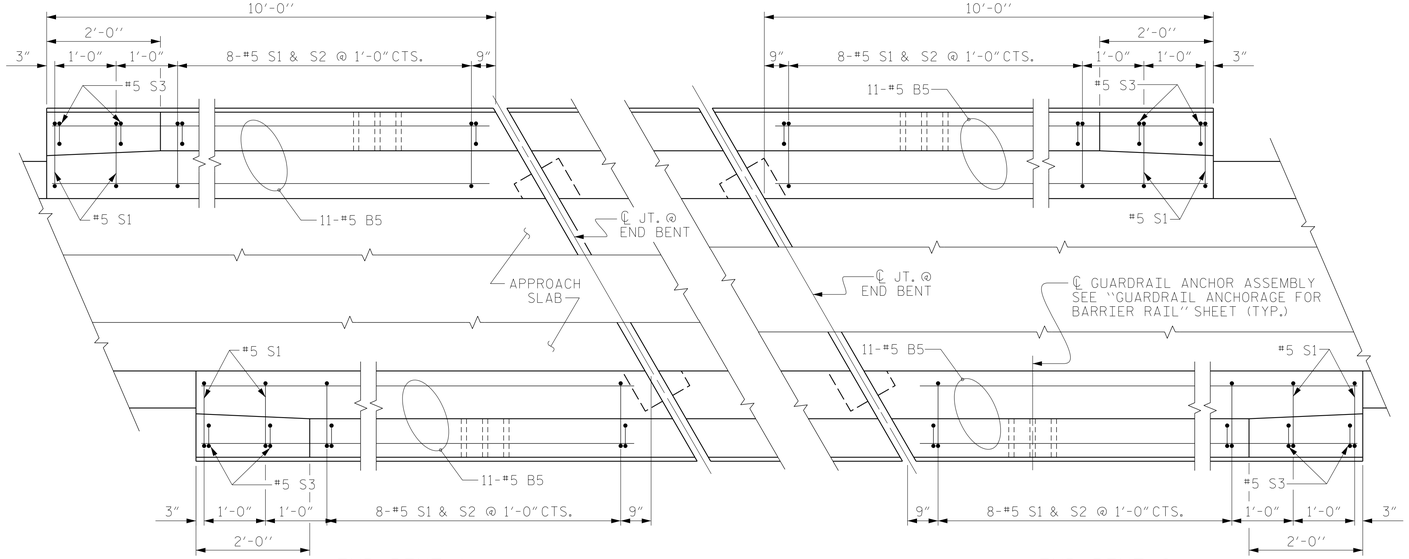
STD. NO. BAS2 (SHT 3a) STR. #3



PLAN OF BARRIER RAIL

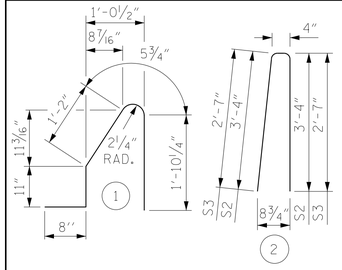
NOTES

THE COST OF THE BARRIER RAIL ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "CONCRETE BARRIER RAIL".

THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

BAR TYPES



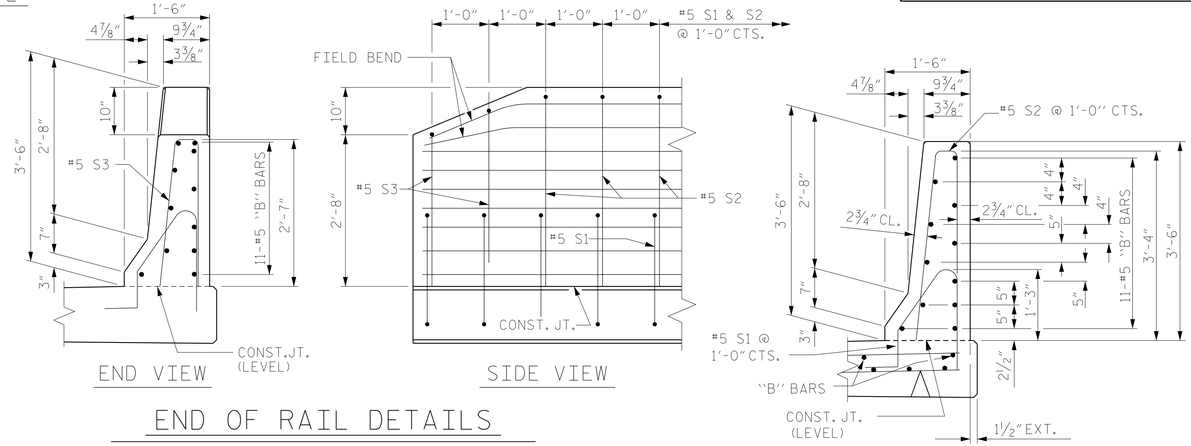
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

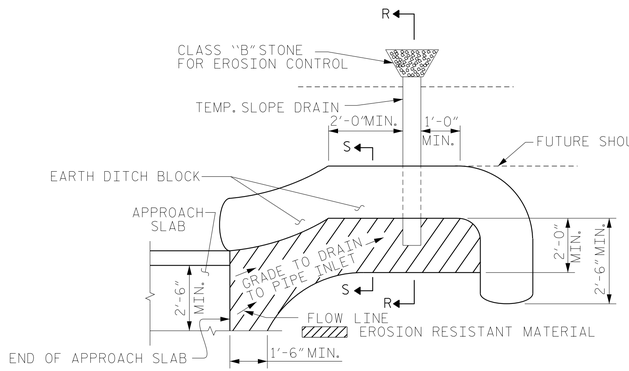
BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B5	44	#5	STR	9'-7"	440
✳ S1	40	#5	1	5'-1"	212
✳ S2	32	#5	2	7'-0"	234
✳ S3	8	#5	2	5'-6"	46

✳ EPOXY COATED REINFORCING STEEL	932 LBS.
CLASS AA CONCRETE	5.5 C.Y.
CONCRETE BARRIER RAIL	40.0 LIN.FT.

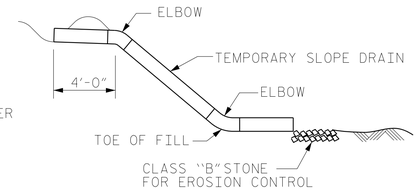


END OF RAIL DETAILS

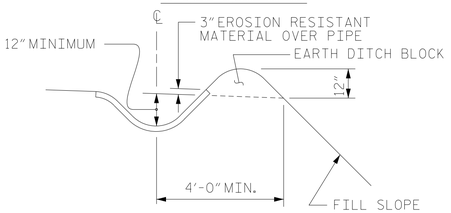


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

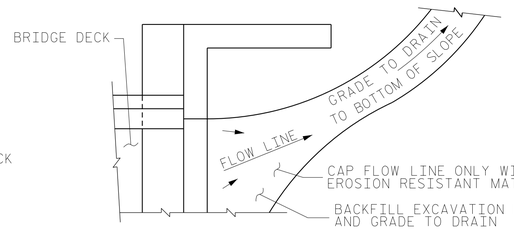
PLAN VIEW



SECTION R-R



SECTION S-S



NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.

TEMPORARY DRAINAGE DETAIL

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 Digitally signed by JUSTIN MARK ROBINSON
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-45
1			3			TOTAL SHEETS
2			4			45

ASSEMBLED BY : NSC		DATE : 12/2017	
CHECKED BY : MAL		DATE : 01/2018	
DRAWN BY : FCJ 11/88	REV. 7/12	MAA/GM	
CHECKED BY : ARB 11/88	REV. 6/13	MAA/GM	
	REV. 12/17	MAA/THC	

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3/27/2018
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AcostaM

STD. NO. BAS4(SHT 3a) STR. #3

F.A. PROJECT NO.: STP-4121(3)

GRADE DATA -L-

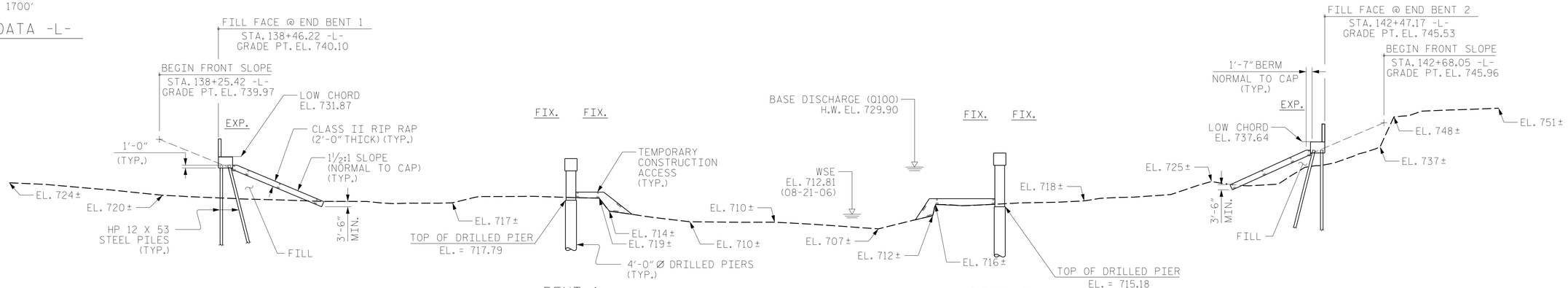
-2.6333% +3.0306%

PI = 137+00.00
EL. = 727.42
VC = 1700'

138+00 138+50 139+00 139+50 140+00 140+50 141+00 141+50 142+00 142+50 143+00

760 750 740 730 720 710 700 690

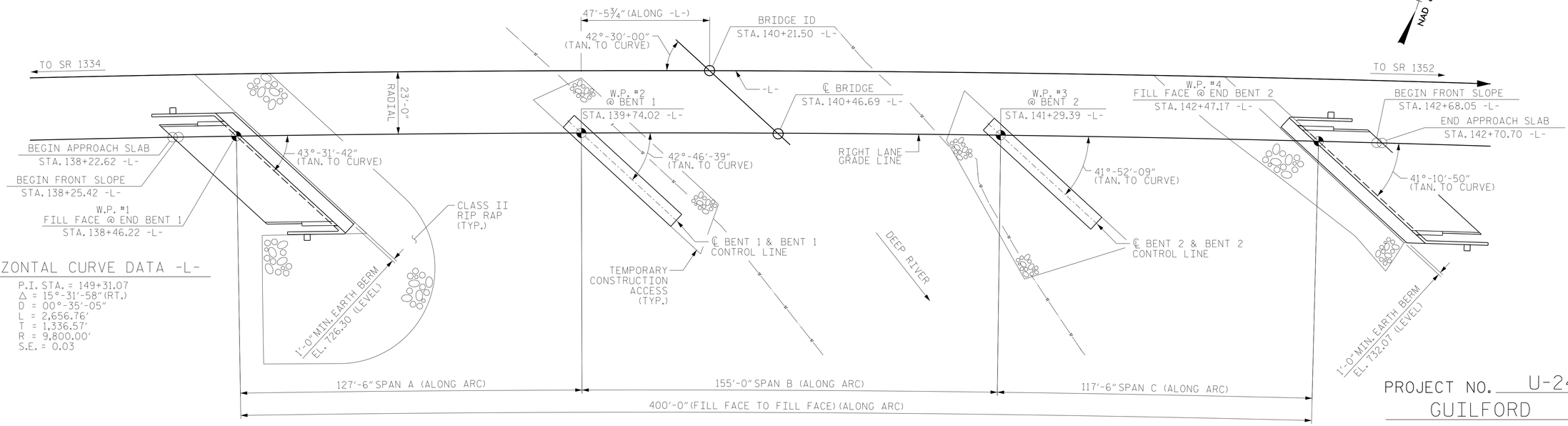
SPAN A SPAN B SPAN C



END BENT 1 BENT 1 BENT 2 END BENT 2

SECTION ALONG RIGHT LANE GRADE LINE

(SECTIONS AT END BENTS AND BENTS ARE TAKEN AT RIGHT ANGLES)



NAD 83'95

HORIZONTAL CURVE DATA -L-

P.I. STA. = 149+31.07
Δ = 15°-31'-58" (RT.)
D = 00°-35'-05"
L = 2,656.76'
T = 1,336.57'
R = 9,800.00'
S.E. = 0.03

PLAN ALONG RIGHT LANE GRADE LINE

(FOR CLARITY, PILES, COLUMNS AND DRILLED PIERS ARE NOT SHOWN IN PLAN VIEW)

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 1 OF 4 BRIDGE NO. 401273

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

DRAWN BY : MRA DATE : 10/2017
CHECKED BY : TLC DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 10/2017

3/27/2018
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
Docusigned by: Justin Robinson
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

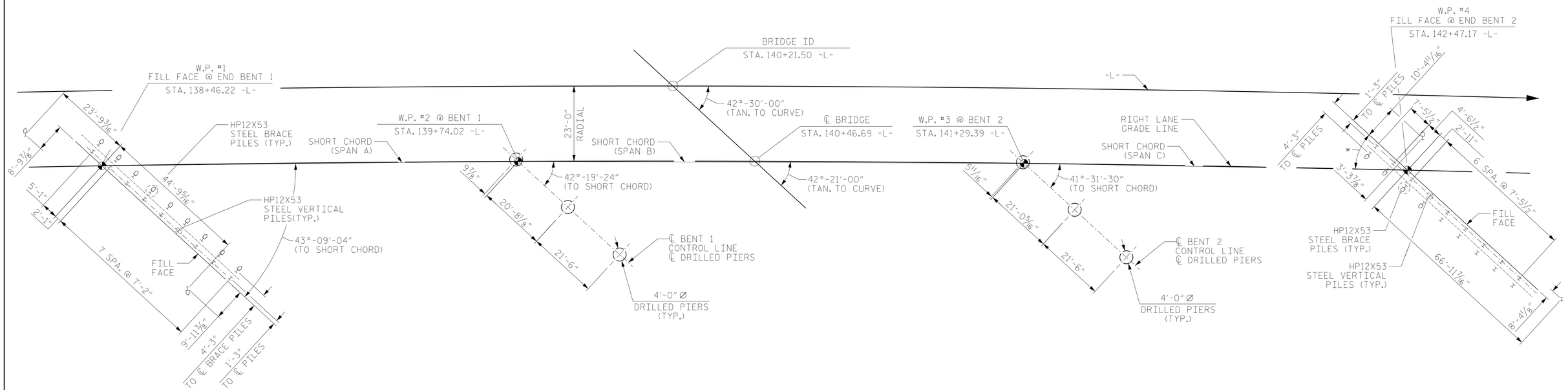
GENERAL DRAWING

RIGHT LANE BRIDGE OVER DEEP RIVER ON SR 4121 BETWEEN SR 1334 AND SR 1352

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-1
1			3			TOTAL SHEETS
2			4			46

STR. #4



END BENT 1 | BENT 1 | BENT 2 | END BENT 2

* 41°-31'-30"(TO SHORT CHORD)

NOTES:

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 1 AND END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 115 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 195 TONS PER PILE.

STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT NO. 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

DRILLED-IN PILES ARE REQUIRED FOR END BENT NO. 2, PILES #5 THROUGH #9, #14 THROUGH #18 AND WING PILE #W1. EXCAVATE HOLES AT PILE LOCATIONS TO ELEVATION 723 FT. FOR PILE EXCAVATION, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

DRILLED PIERS AT BENT NO. 1 AND BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 900 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 90 TSF.

INSTALL DRILLED PIERS AT BENT NO. 1 TO A TIP ELEVATION NO HIGHER THAN 696 FT (LEFT & CENTER) AND 694 FT (RIGHT) WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 8 FT INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

INSTALL DRILLED PIERS AT BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 691 FT WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 8 FT INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

THE SCOUR CRITICAL ELEVATIONS FOR BENT NO. 1 AND BENT NO. 2 IS ELEVATION 701 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

DO NOT USE SLURRY CONSTRUCTION FOR DRILLED PIERS AT BENT NO. 1 AND BENT NO. 2.

SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTIONS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

FOUNDATION LAYOUT

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 4

DRAWN BY :	MRA	DATE :	02/2018
CHECKED BY :	TLC	DATE :	02/2018
DESIGN ENGINEER OF RECORD:	JMR	DATE :	12/2017

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3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

RIGHT LANE BRIDGE OVER DEEP RIVER ON SR 4121 BETWEEN SR 1334 AND SR 1352

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-2
1			3			TOTAL SHEETS
2			4			46

STR. #4

3/27/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\404_U2412A_SMU_GD2_401273.dgn
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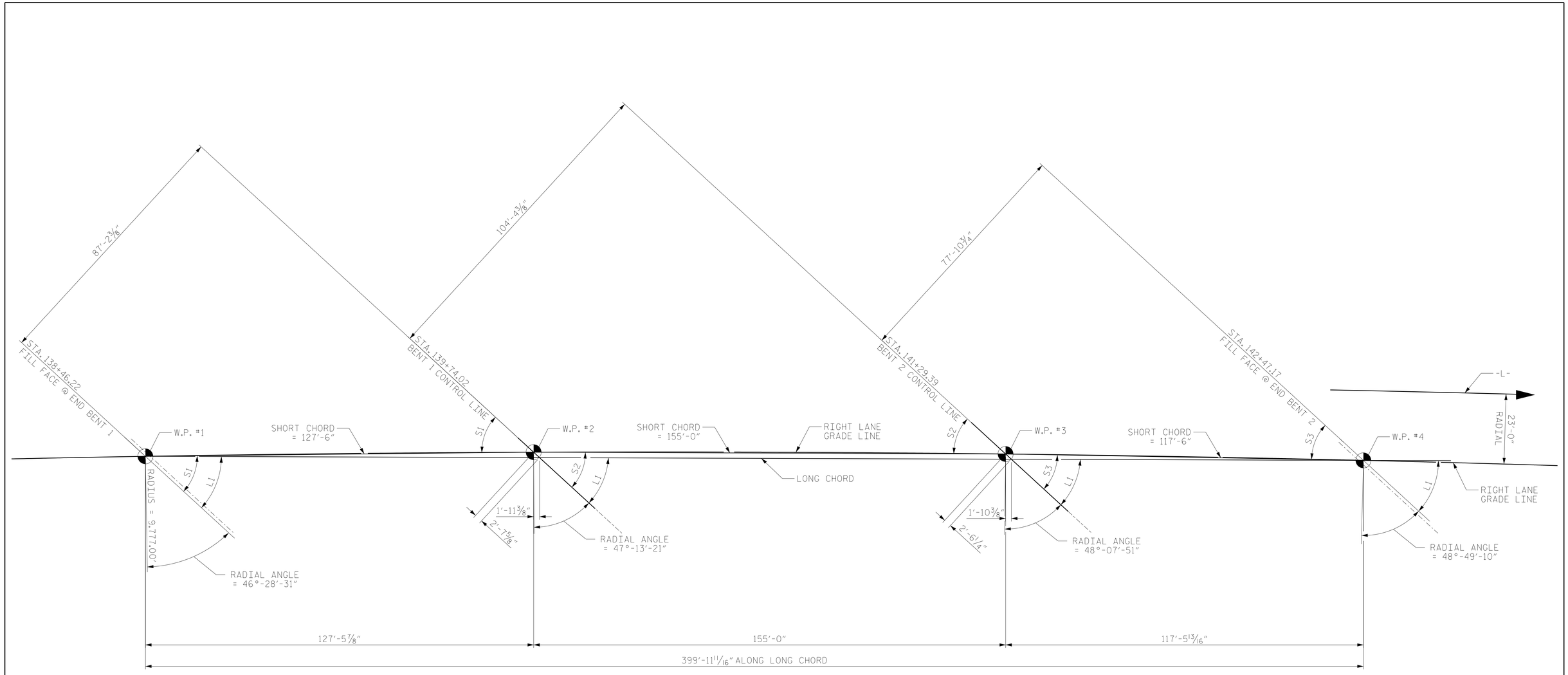

LONG CHORD LAYOUT

NOTE: ALL BENTS ARE PARALLEL

ANGLES	
LONG CHORD	SHORT CHORD
L1 = 42°-21'-10"	S1 = 43°-09'-04"
	S2 = 42°-19'-24"
	S3 = 41°-31'-30"

HORIZONTAL CURVE DATA -L-

P.I. STA. = 149+31.07
Δ = 15°-31'-58" (RT.)
D = 00°-35'-05"
L = 2,656.76'
T = 1,336.57'
R = 9,800.00'
S.E. = 0.03

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 3 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039373 Registered to: Justin Mark Robinson DIRECTION OF LINE DIRECTION OF LINE JUSTIN MARK ROBINSON
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

RIGHT LANE BRIDGE OVER DEEP RIVER ON SR 4121 BETWEEN SR 1334 AND SR 1352

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-3
1			3			TOTAL SHEETS
2			4			46

DRAWN BY : MRA DATE : 10/2017
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DESIGN ENGINEER OF RECORD: JMR DATE : 10/2017

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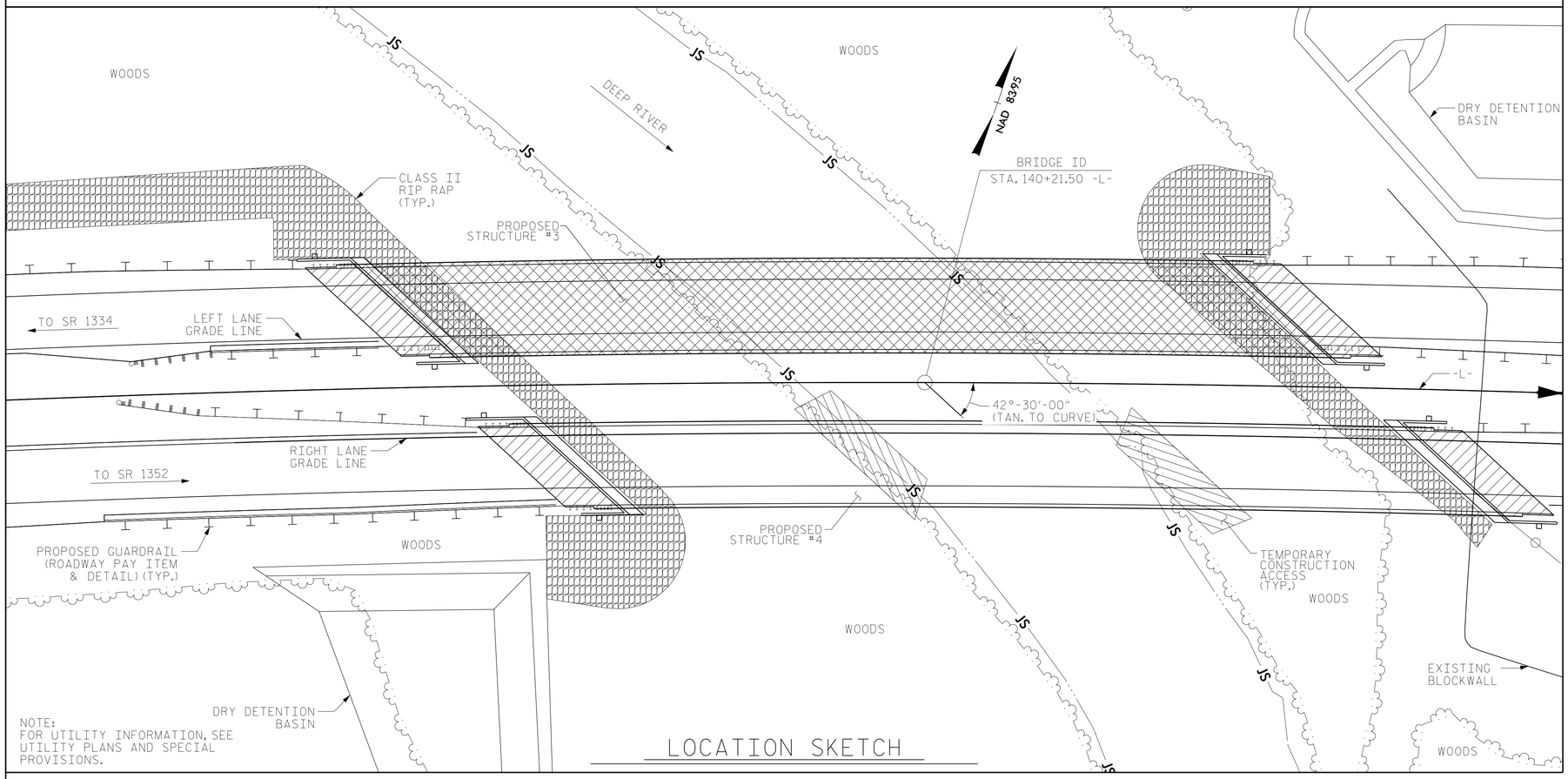
STR. #4

BENCH MARK #10: -L- STATION 138+72.27 377.38' LEFT, RR SPIKE IN 36" HICKORY (DEAD), EL. 725.40



LOCATION SKETCH

NOTES:

ASSUMED LIVE LOAD = HL 93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR DETAILS OF 78"F.I.B. PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.

NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.

THE CLASS AA CONCRETE IN THE BRIDGE DECK SHALL CONTAIN FLY ASH OR GROUND GRANULATED BLAST FURNACE SLAG AT THE SUBSTITUTION RATE SPECIFIED IN ARTICLE 1024-1 AND IN ACCORDANCE WITH ARTICLES 1024-5 AND 1024-6 OF THE STANDARD SPECIFICATIONS. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE COST OF THE REINFORCED CONCRETE DECK SLAB.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18 - EVALUATING SCOUR AT BRIDGES."

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

THE CONTRACTOR WILL BE REQUIRED TO CONSTRUCT, MAINTAIN AND AFTERWARDS REMOVE THE TEMPORARY ACCESS AT STATION 140+21.50 -L- FOR USE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE.

FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS (360,000 KG) OF REINFORCING STEEL, ONE 30 INCH (760 MM) SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS (360,000 KG) OF REINFORCING STEEL, TWO 30 INCH (760 MM) SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

TOTAL BILL OF MATERIALS

	CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMP. ACCESS AT STA. 140+21.50 -L-	4'-0 Ø DRILLED PIER IN SOIL	4'-0 Ø DRILLED PIER NOT IN SOIL	SID INSPECTION	CSL TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	78"F.I.B. PRESTRESSED CONCRETE GIRDERS		PILE EXCAVATION IN SOIL	PILE EXCAVATION NOT IN SOIL
	LUMP SUM	LIN. FT.	LIN. FT.	EACH	EACH	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	LIN. FT.	LIN. FT.
SUPERSTRUCTURE						15,596	14,694		LUMP SUM			12	1,563.1		
END BENT NO. 1								100.6		12,622					
BENT NO. 1		32	33					84.7		17,667	2,418				
BENT NO. 2		45	30					89.0		18,944	2,939				
END BENT NO. 2								101.6		13,120				82	28
TOTAL	LUMP SUM	77	63	1	1	15,596	14,694	375.9	LUMP SUM	62,353	5,357	12	1563.1	82	28

	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12x53 STEEL PILES		STEEL PILE POINTS	CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS	ELECTRICAL CONDUIT SYSTEM FOR SIGNALS	OVERSIZED JUNCTION BOX
	EACH	NO.	LIN. FT.	EACH	LIN. FT.	TONS	SQ. YDS.	LUMP SUM	LUMP SUM	LUMP SUM	EACH
SUPERSTRUCTURE					835.1			LUMP SUM	LUMP SUM	LUMP SUM	
END BENT NO. 1	20	20	475			410	455				
BENT NO. 1											
BENT NO. 2											
END BENT NO. 2	20	20	234	20		135	150				
TOTAL	40	40	709	20	835.1	545	605	LUMP SUM	LUMP SUM	LUMP SUM	2

HYDRAULIC DATA

DESIGN DISCHARGE	= 14,000 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS
DESIGN HIGH WATER ELEVATION	= 729.00
DRAINAGE AREA	= 66.10 SQ. MI.
BASE DISCHARGE (Q100)	= 15,000 CFS
BASE HIGH WATER ELEVATION	= 729.50

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= >25,000 CFS
FREQUENCY OF OVERTOPPING FLOOD	= >500 YRS
OVERTOPPING FLOOD ELEVATION	= 734.30
* SAG AT STA 136+40.38	

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033913 JUSTIN MARK ROBINSON
5/4/2018

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DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

RIGHT LANE BRIDGE OVER DEEP RIVER ON SR 4121 BETWEEN SR 1334 AND SR 1352

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-4
1			3			TOTAL SHEETS
2			4			46

STR. #4

DRAWN BY : MRA DATE : 01/2018
CHECKED BY : JMR DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 10/2017

5/4/2018
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AcostaM

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE							COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.40	--	1.75	0.75	1.42	A	I	60.96	1.15	1.70	A	I	36.26	0.80	0.71	1.40	B	I	76.54	
		HL-93 (OPERATING)	N/A		1.84	--	1.35	0.75	1.84	A	I	60.96	1.16	2.62	B	I	107.37	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	2.09	75.240	1.75	0.75	2.09	A	I	60.96	1.15	2.74	A	I	36.26	0.80	0.75	2.17	A	I	60.96	
		HS-20 (OPERATING)	36.000		2.70	97.200	1.35	0.75	2.70	A	I	60.96	1.16	3.75	B	I	45.72	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		5.31	71.685	1.40	0.75	6.36	A	I	60.96	1.16	9.28	B	I	45.72	0.80	0.75	5.31	A	I	60.96	
		SNGARBS2	20.000		3.78	75.600	1.40	0.75	4.53	A	I	60.96	1.16	6.40	B	I	45.72	0.80	0.75	3.78	A	I	60.96	
		SNAGRIS2	22.000		3.50	77.000	1.40	0.75	4.19	A	I	60.96	1.16	5.88	B	I	45.72	0.80	0.75	3.50	A	I	60.96	
		SNCOTTS3	27.250		2.62	71.395	1.40	0.75	3.15	A	I	60.96	1.16	4.48	B	I	45.72	0.80	0.75	2.62	A	I	60.96	
		SNAGGRS4	34.925		2.13	74.390	1.40	0.75	2.55	A	I	60.96	1.16	3.80	B	I	45.72	0.80	0.75	2.13	A	I	60.96	
		SNS5A	35.550		2.09	74.300	1.40	0.75	2.50	A	I	60.96	1.16	3.69	B	I	107.37	0.80	0.75	2.09	A	I	60.96	
		SNS6A	39.950		1.89	75.506	1.40	0.75	2.27	A	I	60.96	1.16	3.31	B	I	107.37	0.80	0.75	1.89	A	I	60.96	
		SNS7B	42.000		1.80	75.600	1.40	0.75	2.15	A	I	60.96	1.16	3.15	B	I	107.37	0.80	0.75	1.80	A	I	60.96	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.30	75.900	1.40	0.75	2.76	A	I	60.96	1.16	4.16	B	I	45.72	0.80	0.75	2.30	A	I	60.96	
		TNT4A	33.075		2.30	76.073	1.40	0.75	2.76	A	I	60.96	1.16	3.91	B	I	45.72	0.80	0.75	2.30	A	I	60.96	
		TNT6A	41.600		1.85	76.960	1.40	0.75	2.22	A	I	60.96	1.16	3.25	B	I	107.37	0.80	0.75	1.85	A	I	60.96	
		TNT7A	42.000		1.85	77.700	1.40	0.75	2.22	A	I	60.96	1.16	3.39	B	I	107.37	0.80	0.75	1.85	A	I	60.96	
		TNT7B	42.000		1.90	79.800	1.40	0.75	2.28	A	I	60.96	1.15	3.20	A	I	36.26	0.80	0.75	1.90	A	I	60.96	
		TNAGRIT4	43.000		1.81	77.830	1.40	0.75	2.17	A	I	60.96	1.15	3.02	A	I	36.26	0.80	0.75	1.81	A	I	60.96	
		TNAGT5A	45.000		1.72	77.400	1.40	0.75	2.06	A	I	60.96	1.15	2.93	A	I	36.26	0.80	0.75	1.72	A	I	60.96	
		TNAGT5B	45.000	3	1.71	76.950	1.40	0.75	2.05	A	I	60.96	1.15	2.76	A	I	36.26	0.80	0.75	1.71	A	I	60.96	

LOAD FACTORS:

	LIMIT STATE	γ_{DC}	γ_{DW}
DESIGN LOAD RATING FACTORS	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1. TRANSFORMING ALL PRESTRESSING TENDONS.
2. GIRDERS DESIGNED AS SIMPLE SPANS FOR FLEXURE.
3. GIRDERS DESIGNED AS SIMPLE-MADE-CONTINUOUS (FOR LIVE AND SUPERIMPOSED DEAD LOAD) FOR SHEAR.
4. FACTORED SHEAR AND MOMENT CAPACITIES PROVIDED FOR STRENGTH I LIMIT STATE. SECTION PROPERTIES PROVIDED FOR SERVICE III LIMIT STATE.
5. GIRDER LOAD RATED AS SIMPLE SPAN.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

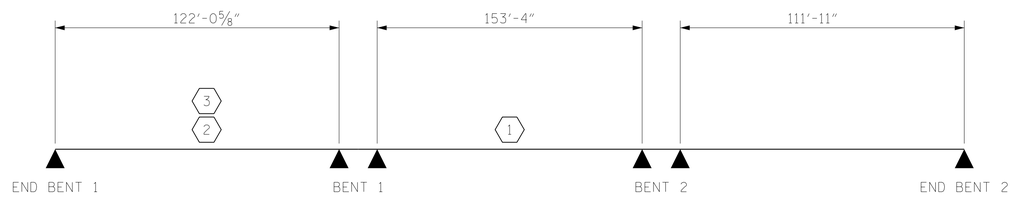
(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER

TABLE OF SECTION RESISTANCES												
		℄ BRG.	.01L	.02L	.03L	.04L	.05L	.06L	.07L	.08L	.09L	℄ BRG.
INTERIOR GIRDER (I) SPAN A	ΦVn (KIPS)	705	1062	500	364	340	344	350	371	500	1062	705
	ΦMn (KIP-FT)	--	14882	14146	14373	14599	14713	14599	14373	14146	14882	--
INTERIOR GIRDER (I) SPAN B	ΦVn (KIPS)	1245	1042	620	480	409	414	410	473	620	1041	1245
	ΦMn (KIP-FT)	--	24039	23535	23745	23954	24061	23954	23745	23535	24039	--



LRFR SUMMARY

SECTION PROPERTIES			
SPAN A - INTERIOR			
	UNITS	NON-COMPOSITE	COMPOSITE
HEIGHT	IN	78	86.5
AREA	IN^2	1100.6	1912
Ixx	IN^4	903861	1968169
Ycg	IN	34.63	54.84
SELF WT.	PLF	1147	2291
EFF. WIDTH	IN	-	129.2
SPAN B - INTERIOR			
	UNITS	NON-COMPOSITE	COMPOSITE
HEIGHT	IN	78	86.5
AREA	IN^2	1100.6	1905.2
Ixx	IN^4	903861	1962743
Ycg	IN	34.63	54.74
SELF WT.	PLF	1147	2280.5
EFF. WIDTH	IN	-	128.1

SECTION PROPERTIES PROVIDED AT MIDSPAN

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

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RALEIGH

STANDARD
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS
(NON-INTERSTATE TRAFFIC)
RIGHT LANE

REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S4-5
TOTAL SHEETS 46

STD. NO. LRFR1 STR. #4

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CHECKED BY : MAL	DATE : 03/2018	
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CHECKED BY : GM/DI 2/08	REV. 10/1/11	MAA/GM
	REV. 12/17	MAA/THC

3/27/2018
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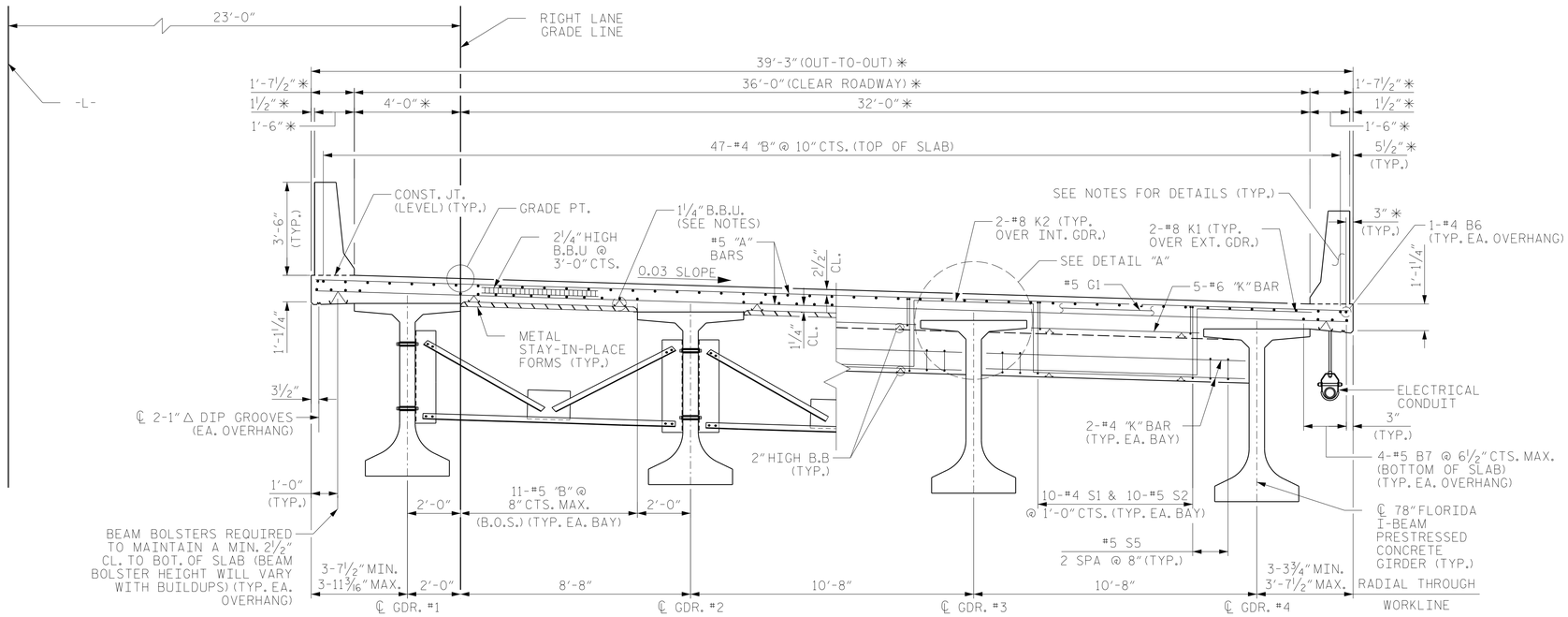
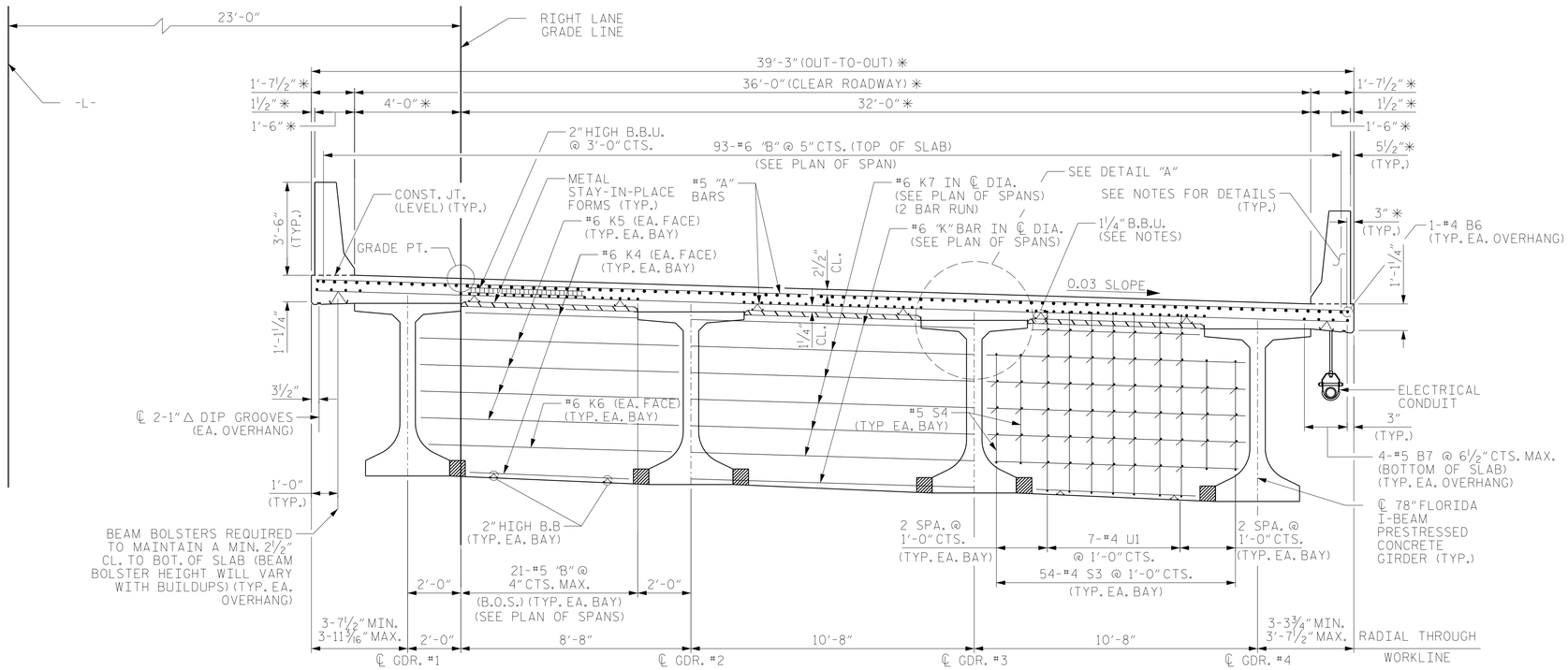


SECTION AT INTERMEDIATE DIAPHRAGM

SECTION AT END BENT

TYPICAL SECTION

✳ DIMENSIONS ARE RADIAL TO ℄ -L-



TYPICAL SECTION AT BENT DIAPHRAGM

✳ DIMENSIONS ARE RADIAL TO ℄ -L-

NOTES:

PROVIDE 1¼" HIGH BEAM BOLSTERS UPPERS AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (CHCM) AT 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

FOR CONCRETE BARRIER RAIL REINFORCING STEEL AND DETAILS, SEE "CONCRETE BARRIER RAIL" SHEETS.

PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

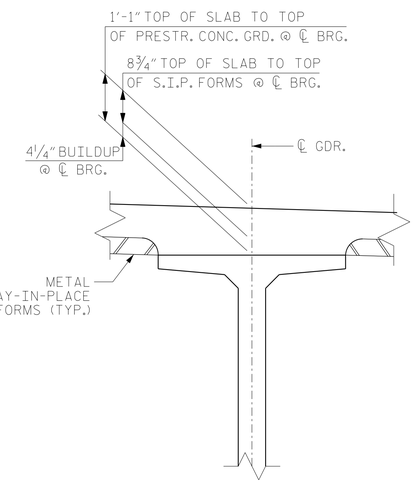
CONCRETE BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL DECK SLAB CONCRETE IN THAT UNIT HAS BEEN CAST AND HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

LOCATION OF THE ELECTRICAL CONDUIT SYSTEM SHALL BE DETERMINED BY THE ENGINEER.

SEE "ELECTRICAL CONDUIT SYSTEM FOR SIGNALS" SHEET FOR CONDUIT DETAILS.

B.O.S. = BOTTOM OF SLAB

T.O.S. = TOP OF SLAB



DETAIL "A"

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 030448 ENGINEER JUSTIN MARK ROBINSON
Justin Robinson
5/4/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-6
1			3			TOTAL SHEETS
2			4			46

STR. #4

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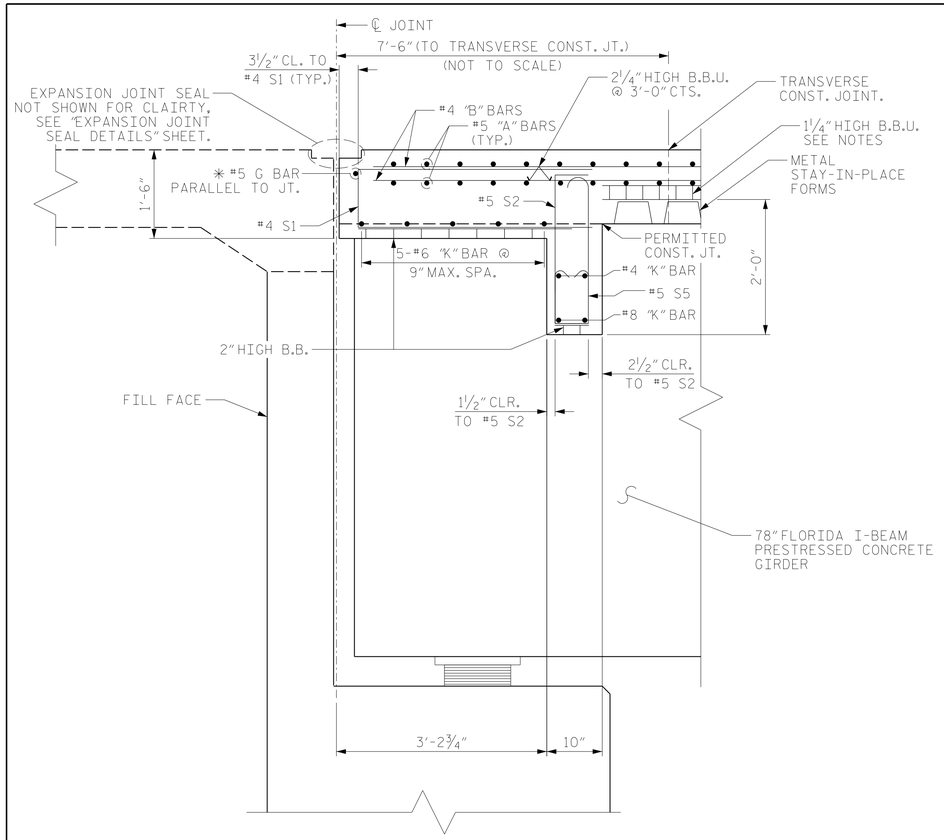
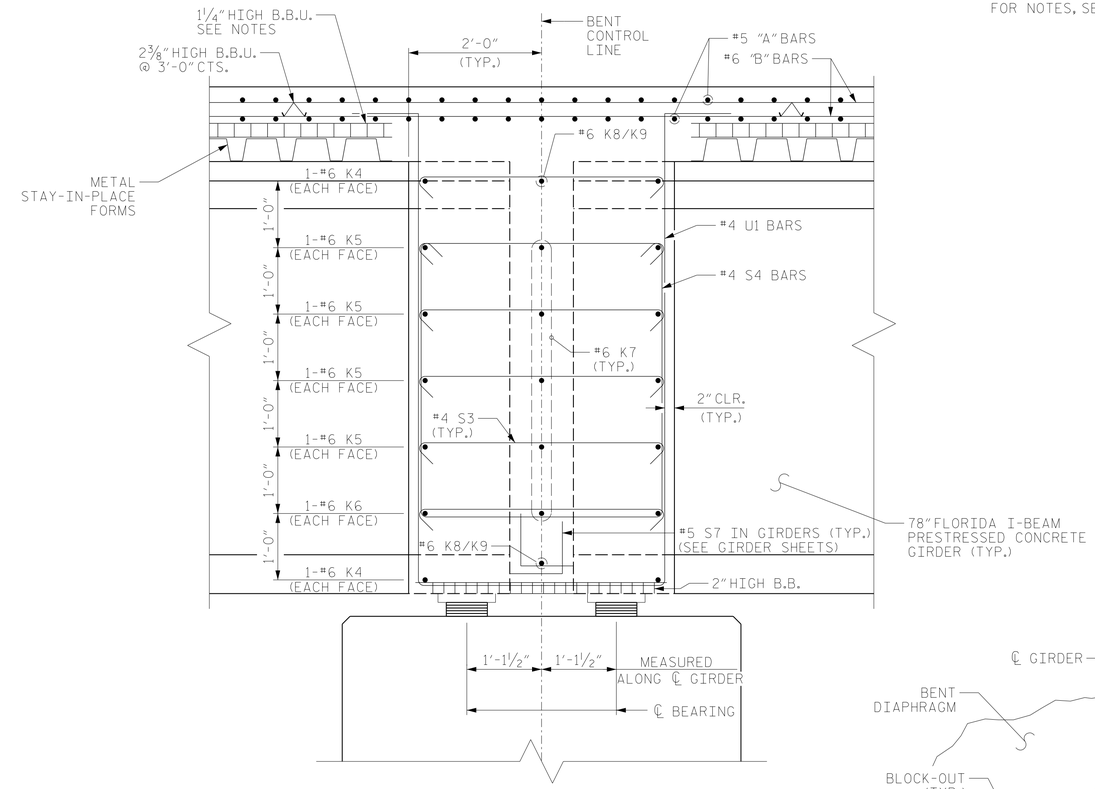
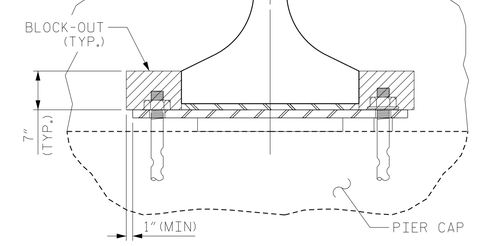


SECTION AT END BENT DIAPHRAGM

* G "BAR MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR REINFORCING STEEL & STIRRUPS



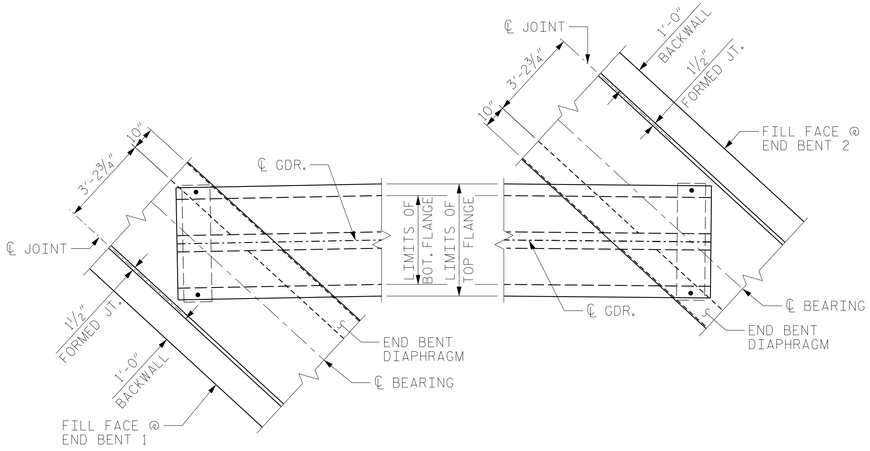
SECTION AT BENT DIAPHRAGM



VIEW A-A

NOTES:

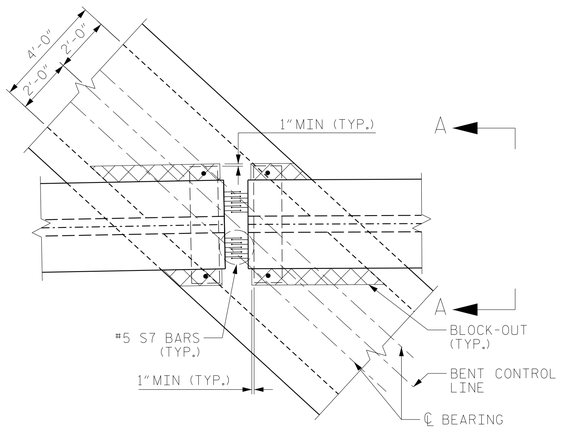
FOR NOTES, SEE SHEET 1 OF 2.



END BENT 1

END BENT 2

END BENT DIAPHRAGM



BENT DIAPHRAGM BLOCKOUT DETAIL

FIELD BEND S7 BARS TO FIT

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-7
1			3			TOTAL SHEETS
2			4			46

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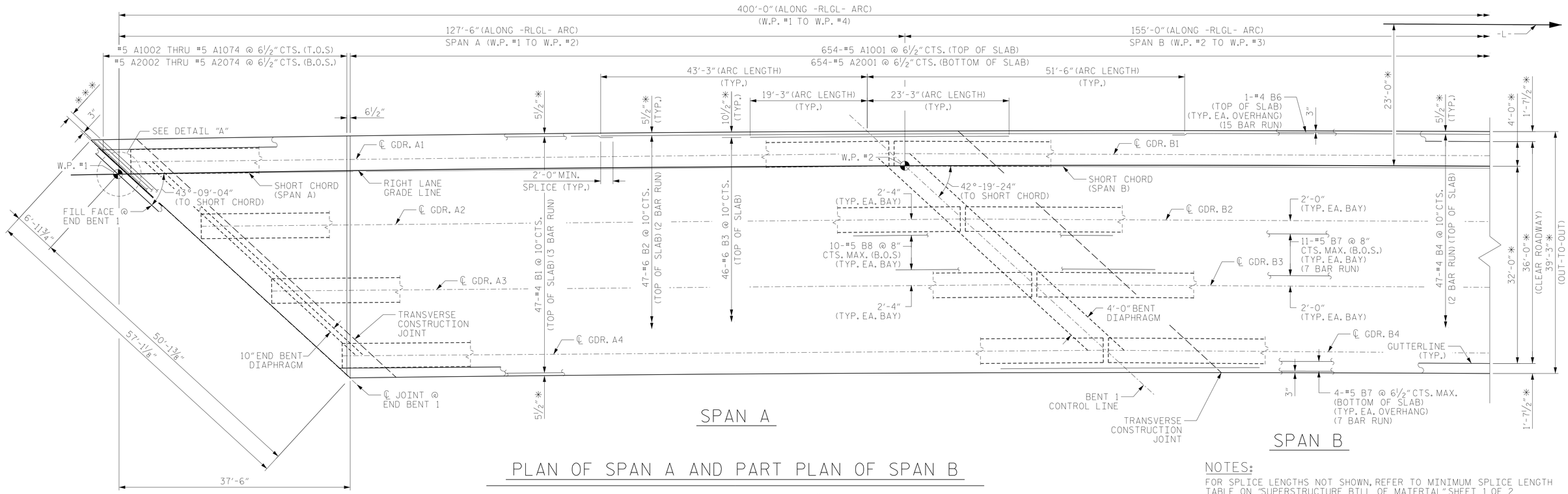


SPAN A

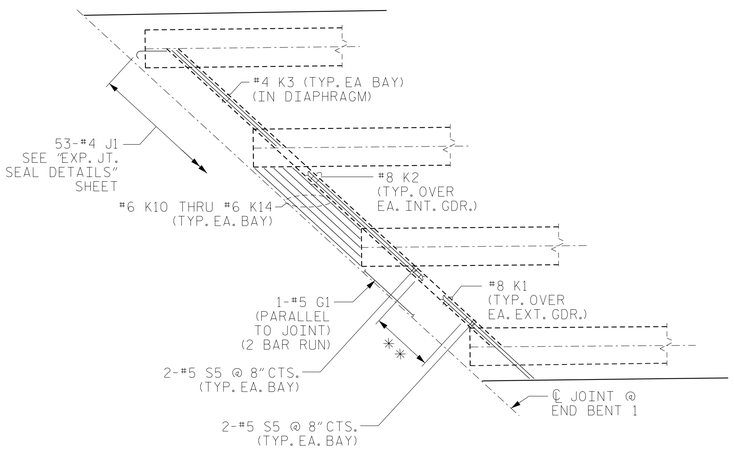
SPAN B

PLAN OF SPAN A AND PART PLAN OF SPAN B

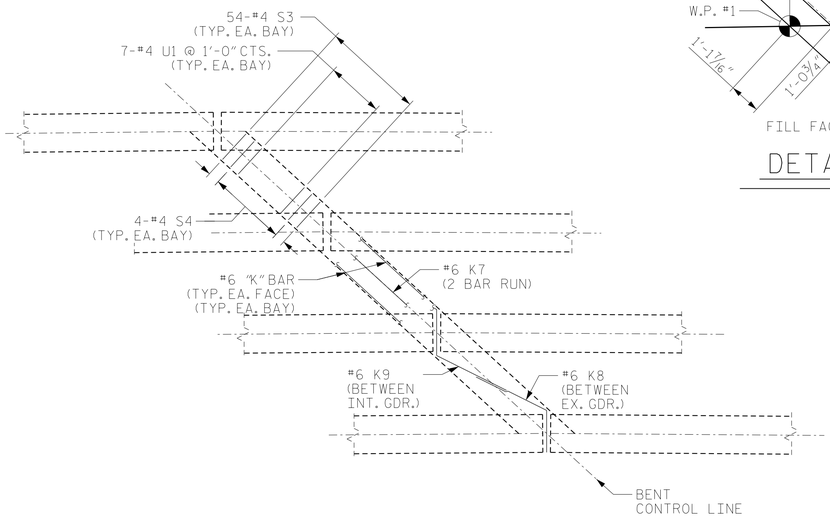
* DIMENSIONS ARE RADIAL TO ℄ -L-

** 10-#4 S1 AND 10-#5 S2 @ 1'-0" CTS. (TYP. EA. BAY)

*** 3-#6 A1151 @ 6" CTS. TOP OF SLAB PLACED PARALLEL TO JOINT



END BENT DIAPHRAGM REINFORCING DETAILS



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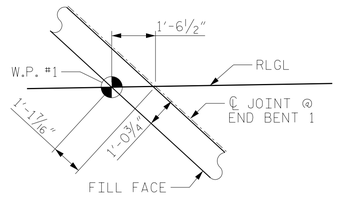

DETAIL A

NOTES:

FOR SPLICE LENGTHS NOT SHOWN, REFER TO MINIMUM SPLICE LENGTH TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 1 OF 2

FOR END BENT DIAPHRAGM BARS AND BENT DIAPHRAGM BARS, SEE "TYPICAL SECTION DETAILS"

STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE FRAMING PLAN SHEETS.

FOR POURING SEQUENCE, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 2 OF 2.

FOR BARRIER RAIL REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEETS.

#5 "A" BARS ARE SPACED PERPENDICULAR TO LONG CHORD, EXCEPT A1151.

FOR TOP OF SLAB REINFORCING STEEL LAYOUT, SEE SHEET 2 OF 2.

T.O.S = TOP OF SLAB

B.O.S = BOTTOM OF SLAB

RLGL = RIGHT LANE GRADE LINE

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

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SUPERSTRUCTURE

PLAN OF SPAN A PART PLAN OF SPAN B

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-8
1			3			TOTAL SHEETS
2			4			46

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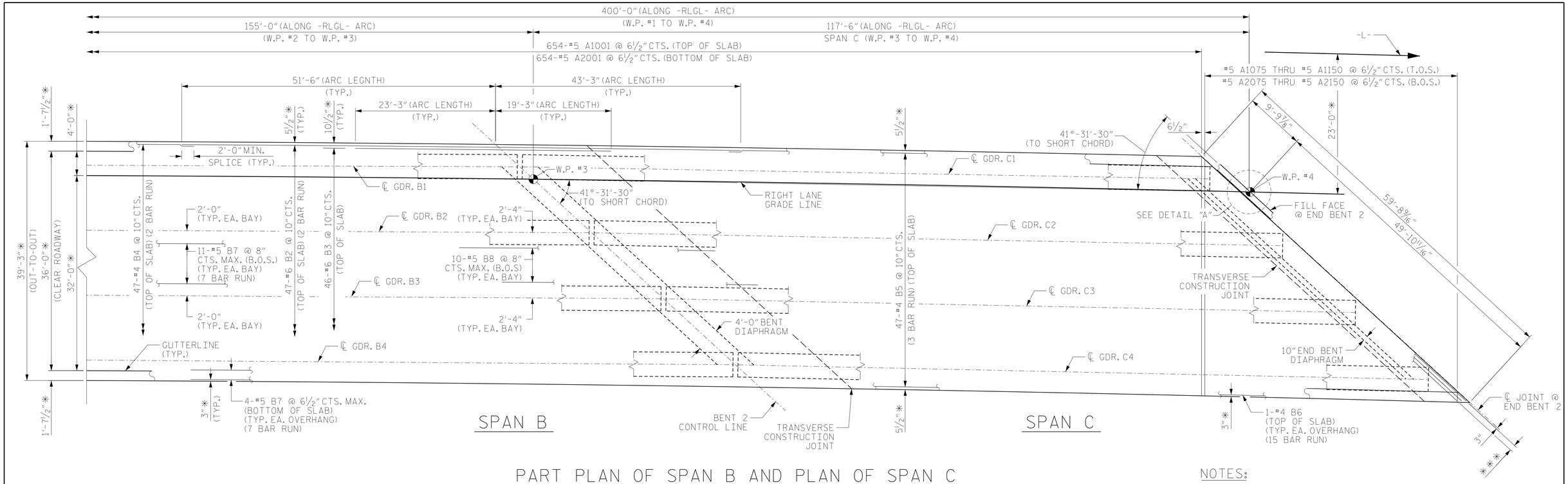
STR. #4



PART PLAN OF SPAN B AND PLAN OF SPAN C

* DIMENSIONS ARE RADIAL TO ℄ -L-

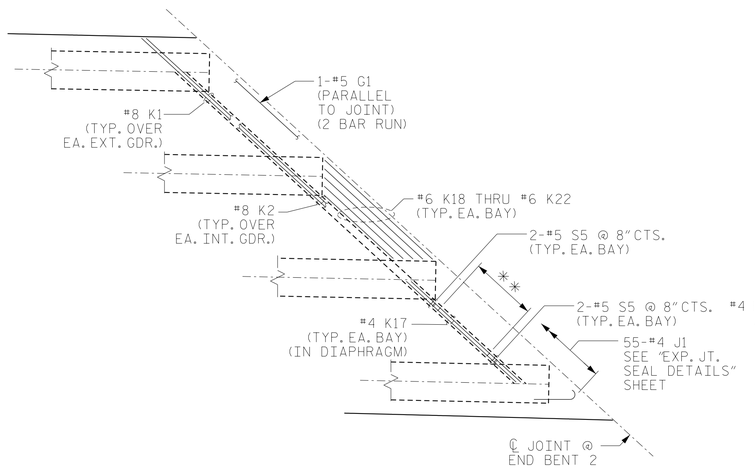
** 10-#4 S1 AND 10-#5 S2 @ 1'-0" CTS. (TYP. EA. BAY)

*** 3-#6 A1151 @ 6" CTS. TOP OF SLAB PLACED PARALLEL TO JOINT

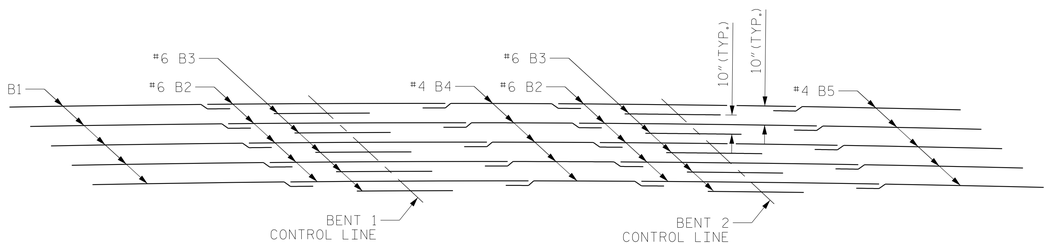
NOTES:

FOR ADDITIONAL NOTES, SEE PREVIOUS SHEET.

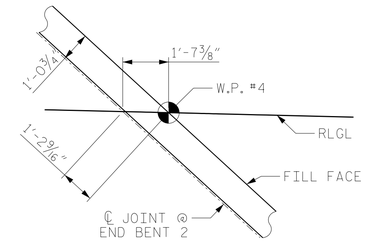
SEE SHEET S4-8 FOR BENT DIAPHRAGM REINFORCING DETAILS.



END BENT DIAPHRAGM REINFORCING DETAILS



TOP OF SLAB REINFORCING STEEL LAYOUT



DETAIL A

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

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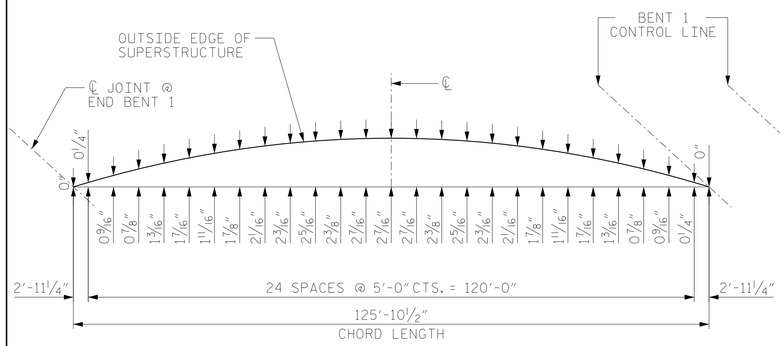
SUPERSTRUCTURE

PART PLAN OF SPAN B PLAN OF SPAN C

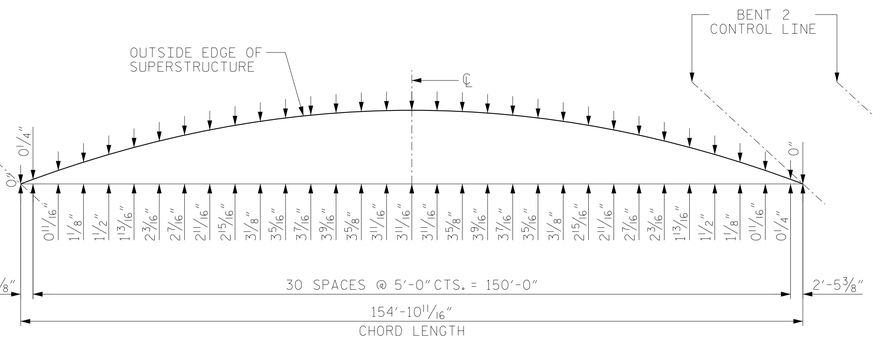
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-9
1			3			TOTAL SHEETS
2			4			46

STR. #4



LEFT SIDE SPAN "A" ARC OFFSETS



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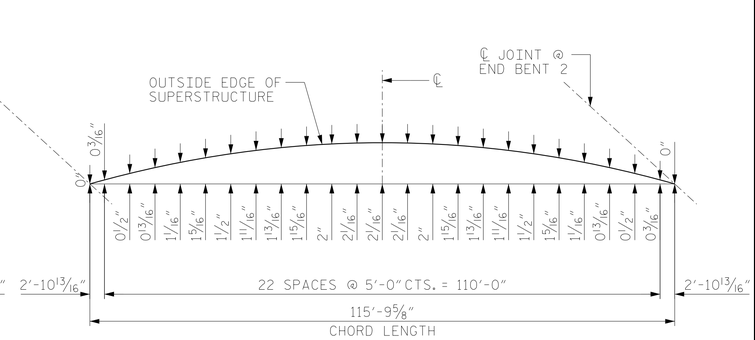
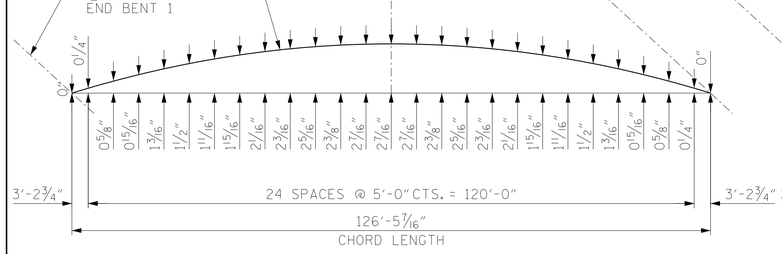


LEFT SIDE SPAN "C" ARC OFFSETS



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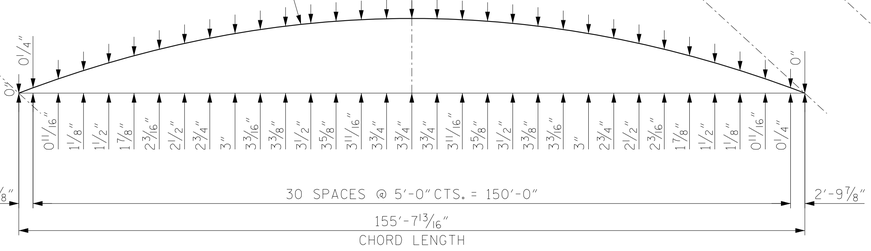
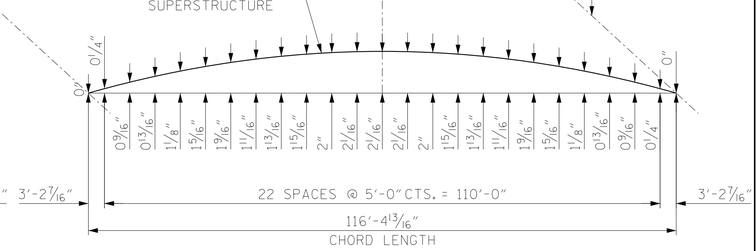


RIGHT SIDE SPAN "B" ARC OFFSETS



RIGHT SIDE SPAN "C" ARC OFFSETS

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
Registered by: JUSTIN MARK ROBINSON
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
ARC OFFSETS
RIGHT LANE

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NO.	BY:	DATE:	NO.	BY:	DATE:	S4-10
1			3			TOTAL SHEETS
2			4			46

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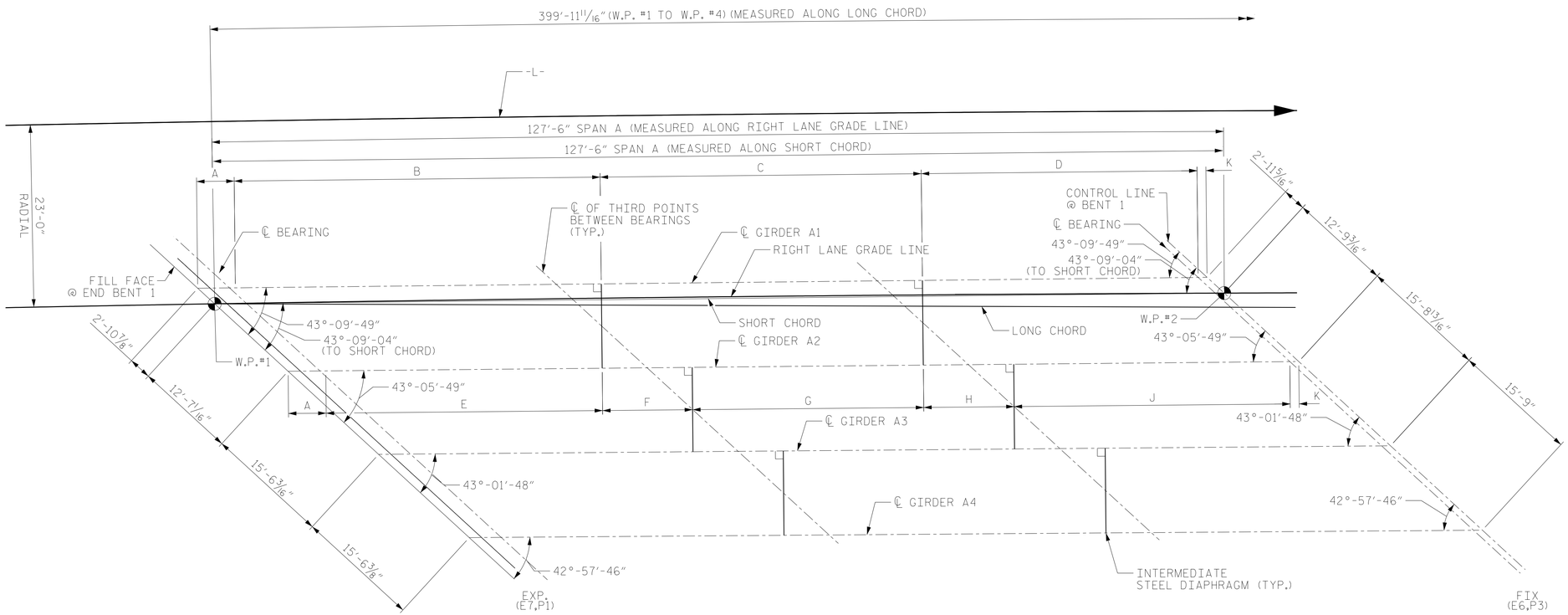
STR. #4

NOTE:

FOR STEEL DIAPHRAGM DETAILS, SEE "STEEL DIAPHRAGMS FOR 78" F.I.B. PRESTRESSED CONCRETE GIRDERS".



SPAN A

FRAMING PLAN

END BENT DIAPHRAGM AND BENT DIAPHRAGM ARE NOT SHOWN.
FOR LOCATION OF END BENT, SEE SHEET S4-2.

EXTERIOR GIRDERS					
	A	B	C	D	K
GIRDER A1	4'-9"	46'-2 7/16"	40'-6 11/16"	34'-9 15/16"	1'-1 1/2"
GIRDER A4	4'-9 1/4"	34'-11 3/4"	40'-7 15/16"	46'-5"	1'-1 1/2"

INTERIOR GIRDERS							
	A	E	F	G	H	J	K
GIRDER A2	4'-9 1/16"	34'-10 7/8"	11'-4 7/16"	29'-2 1/4"	11'-5 1/16"	34'-10 3/8"	1'-1 1/2"
GIRDER A3	4'-9 1/8"	34'-11 5/16"	11'-4 13/16"	29'-2 1/2"	11'-5 7/16"	34'-10 13/16"	1'-1 1/2"

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-
SHEET 1 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

FRAMING PLAN
SPAN A
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-11
1			3			TOTAL SHEETS
2			4			46

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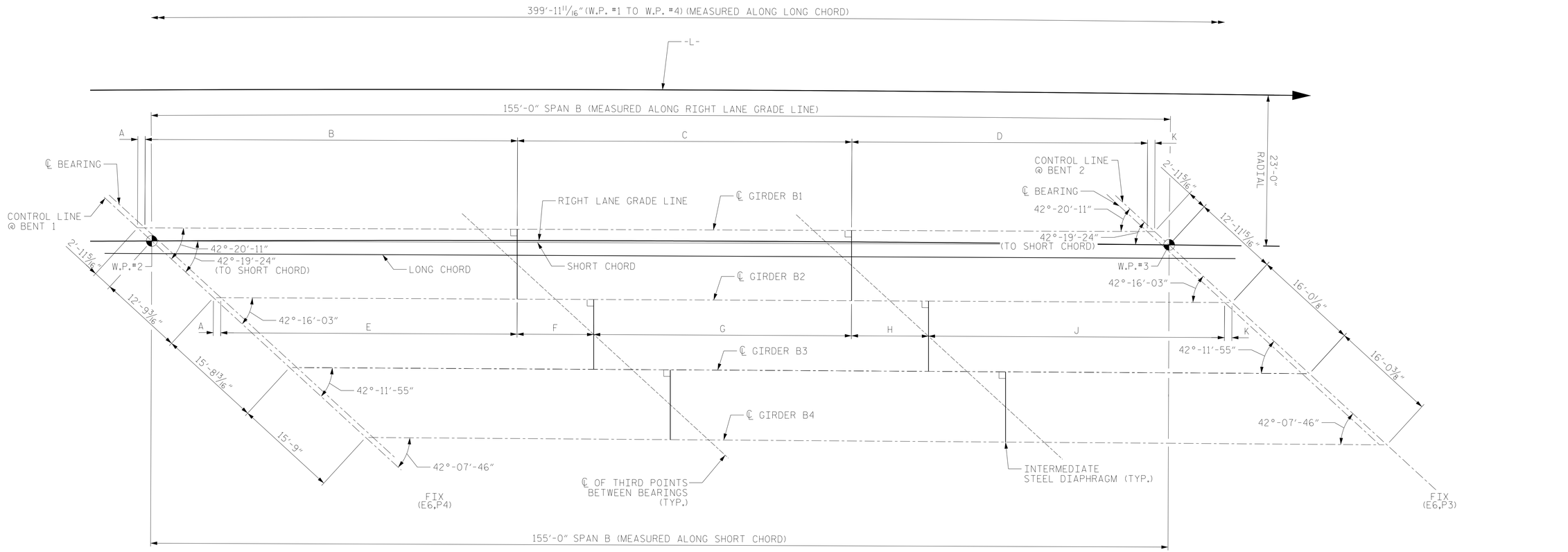
STR. #4

NOTE:

FOR STEEL DIAPHRAGM DETAILS, SEE "STEEL DIAPHRAGMS FOR 78"F.I.B. PRESTRESSED CONCRETE GIRDERS".



SPAN B

FRAMING PLAN

BENT DIAPHRAGMS ARE NOT SHOWN

EXTERIOR GIRDERS					
	A	B	C	D	K
GIRDER B1	1'-1 1/2"	56'-8 7/8"	50'-11 1/4"	45'-0 1/4"	1'-1 1/2"
GIRDER B4	1'-1 1/2"	45'-2 7/8"	51'-0 7/8"	56'-0 3/16"	1'-1 1/2"

INTERIOR GIRDERS							
	A	E	F	G	H	J	K
GIRDER B2	1'-1 1/2"	45'-1 9/16"	11'-8 3/8"	39'-2 7/8"	11'-9 3/16"	45'-1"	1'-1 1/2"
GIRDER B3	1'-1 1/2"	45'-2 1/4"	11'-8 11/16"	39'-3 3/8"	11'-9 1/2"	45'-1 5/8"	1'-1 1/2"

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON ASSOCIATED ENGINEERING LINE

Justin Robinson Digitally signed by Justin Robinson

3/28/2018

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FRAMING PLAN SPAN B

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-12
1			3			TOTAL SHEETS
2			4			46

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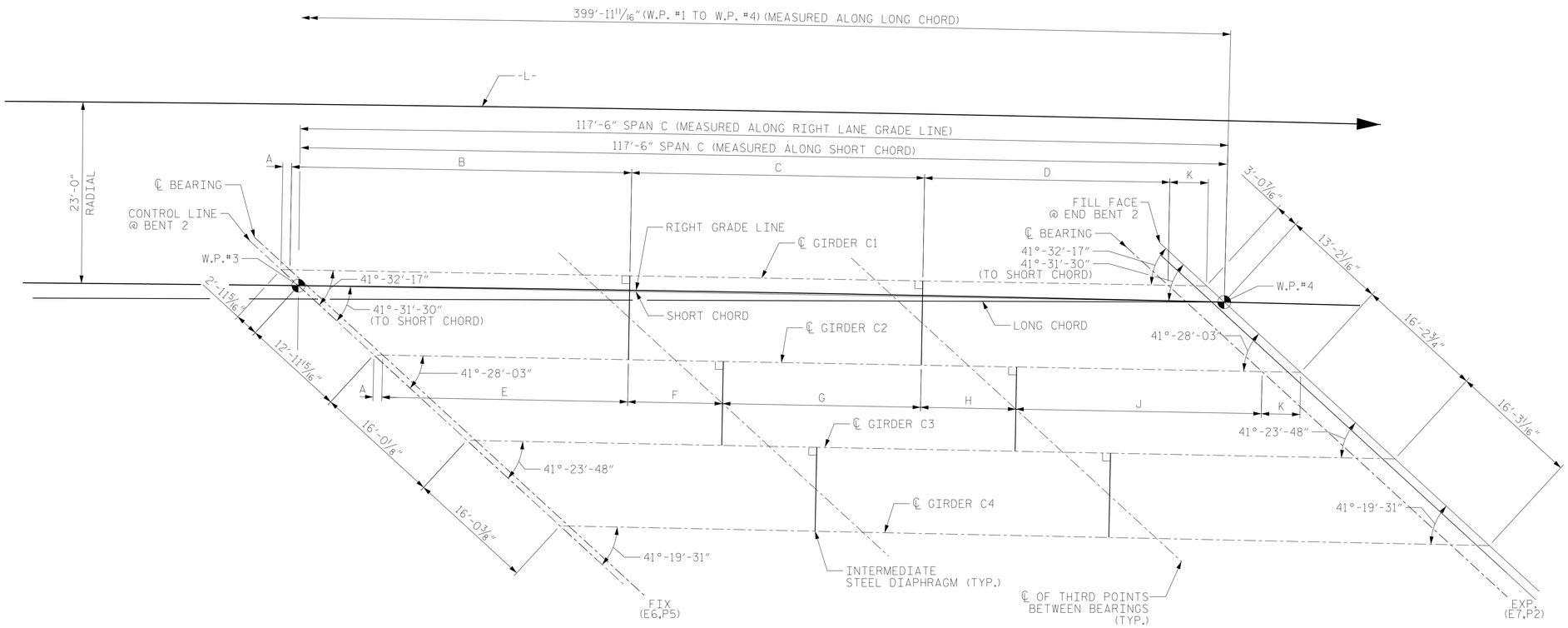
STR. #4

NOTE:

FOR STEEL DIAPHRAGM DETAILS, SEE "STEEL DIAPHRAGMS FOR 78" F.I.B. PRESTRESSED CONCRETE GIRDERS".



EXTERIOR GIRDERS					
	A	B	C	D	K
GIRDER C1	1'-1 1/2"	43'-1 15/16"	37'-2 1/16"	31'-1 1/4"	4'-10 13/16"
GIRDER C4	1'-1 1/2"	31'-3 3/16"	37'-3 3/8"	43'-4 7/16"	4'-11 1/16"

INTERIOR GIRDERS							
	A	E	F	G	H	J	K
GIRDER C2	1'-1 1/2"	31'-2 1/4"	12'-3 7/8"	24'-10 3/16"	12'-4 1/2"	30'-10 5/16"	4'-10 7/8"
GIRDER C3	1'-1 1/2"	31'-6 3/16"	12'-0 3/4"	25'-1 15/16"	12'-1 7/16"	31'-10 13/16"	4'-11"

SPAN C

FRAMING PLAN

END BENT DIAPHRAGM AND BENT DIAPHRAGM ARE NOT SHOWN.
FOR LOCATION OF END BENT, SEE SHEET S4-2.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 MARK ROBINSON
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DEPARTMENT OF TRANSPORTATION
RALEIGH

FRAMING PLAN SPAN C

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-13
1			3			TOTAL SHEETS
2			4			46

STR. #4

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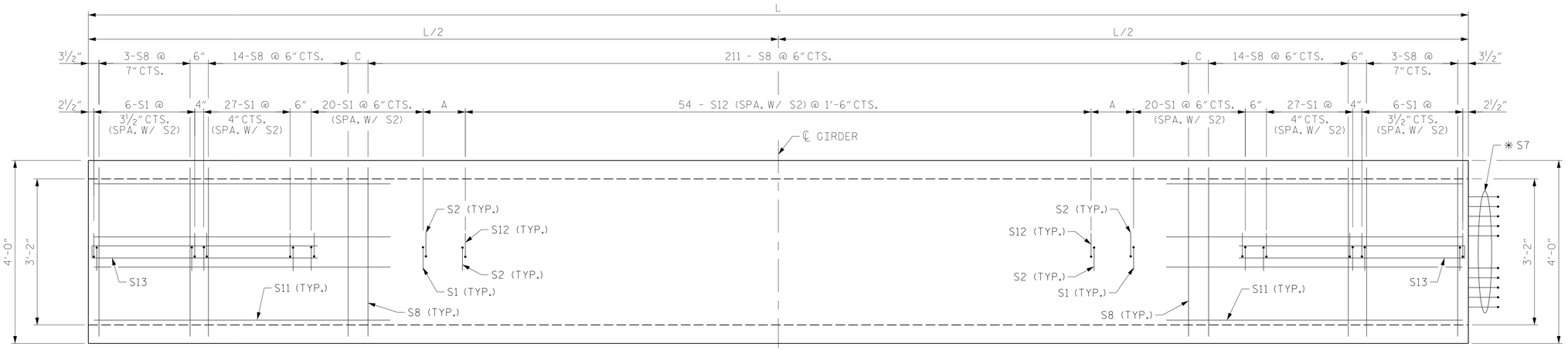
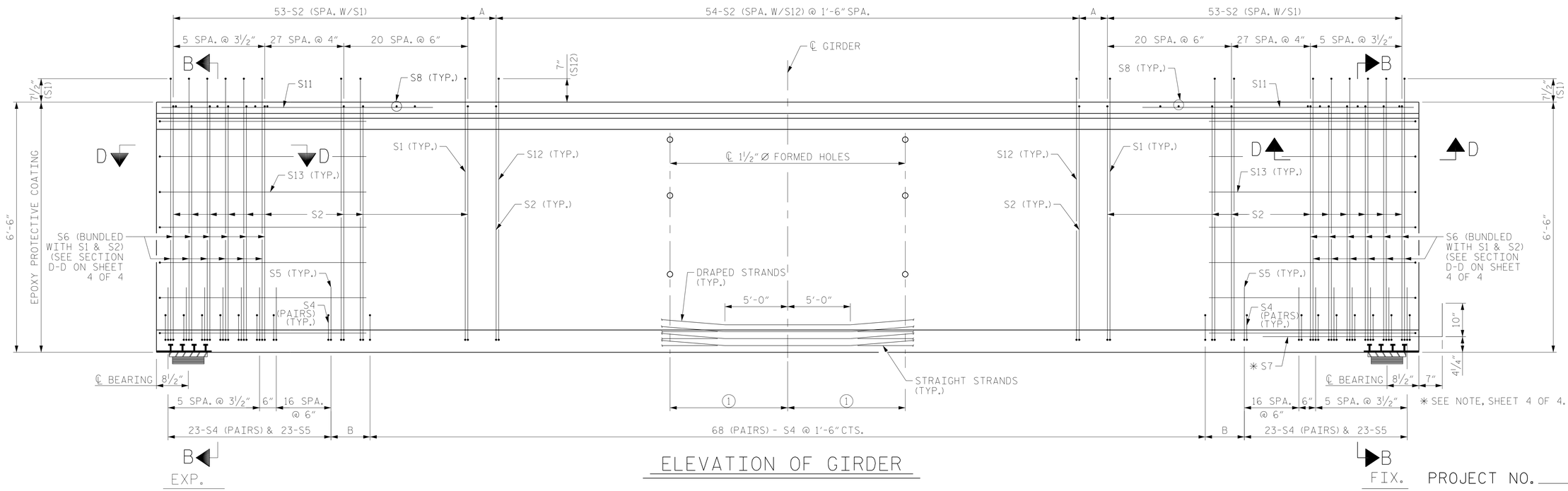


PLAN OF GIRDER



ELEVATION OF GIRDER

SPAN A GIRDER DIMENSIONS				
GIRDER	L	A	B	C
GIRDER A1	123'-0 1/8"	1'-1 13/16"	1'-1 9/16"	6 9/16"
GIRDER A2	123'-2"	1'-2"	1'-2 1/2"	7 1/2"
GIRDER A3	123'-3 13/16"	1-2 7/8"	1'-3 3/8"	8 3/8"
GIRDER A4	123'-5 5/8"	1'-3 13/16"	1'-4 5/16"	9 3/8"

NOTES

SEE PARTIAL ELEVATION ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" FOR ADDITIONAL 'S' BARS.

(1) SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR FORMED HOLE LOCATIONS.

ALTERNATE DIRECTION OF #5S1, #5S2, AND #5S12 BARS.

ALL VERTICAL BARS TO BE PLACED WITH S1 BARS.

FOR SECTION A-A AND SECTION B-B, SEE SHEET 4 OF 4.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 DocuSigned by: Justin Robinson 5E4A... NOTARIZED DOCUMENT SEAL LINE 1 JUSTIN MARK ROBINSON 3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
F.I.B. 78"
PRESTRESSED
CONCRETE GIRDER
SPAN A
RIGHT LANE

REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY: DATE:	S4-14
1			3		TOTAL SHEETS
2			4		46

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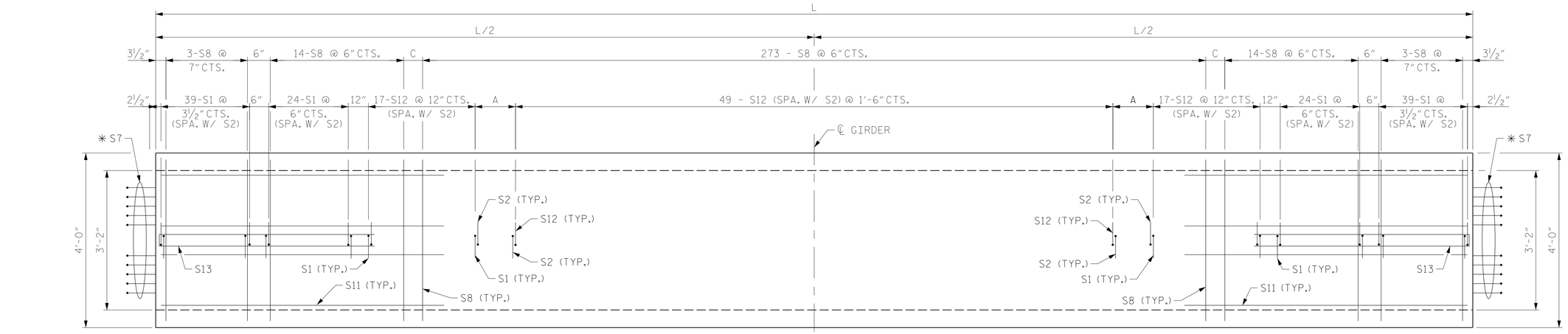
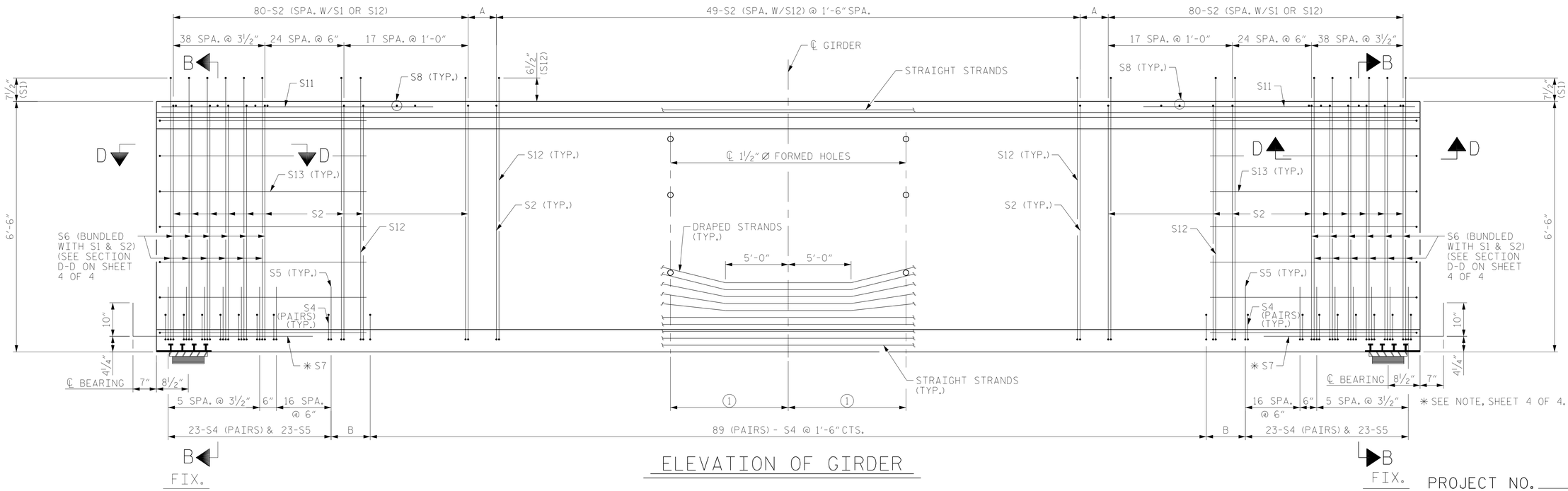
STR. #4



PLAN OF GIRDER



ELEVATION OF GIRDER

SPAN B GIRDER DIMENSIONS				
GIRDER	L	A	B	C
GIRDER B1	154'-1 7/16"	9 1/4"	11 1/4"	7 1/4"
GIRDER B2	154'-4"	10 1/2"	1'-0 1/2"	8 1/2"
GIRDER B3	154'-6 1/2"	11 3/4"	1'-1 3/4"	9 3/4"
GIRDER B4	154'-9"	12 15/16"	1'-2 15/16"	11"

NOTES

SEE PARTIAL ELEVATION ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" FOR ADDITIONAL 'S' BARS.

① SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR FORMED HOLE LOCATIONS.

ALTERNATE DIRECTION OF #5S1, #5S2, AND #5S12 BARS.

ALL VERTICAL BARS TO BE PLACED WITH S1 BARS.

FOR SECTION B-B, SEE SHEET 4 OF 4.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 4

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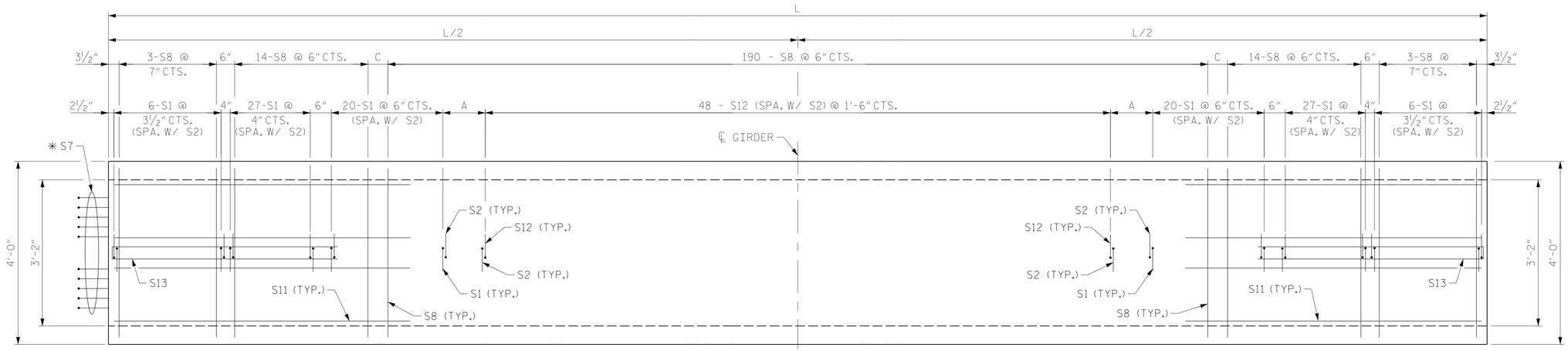
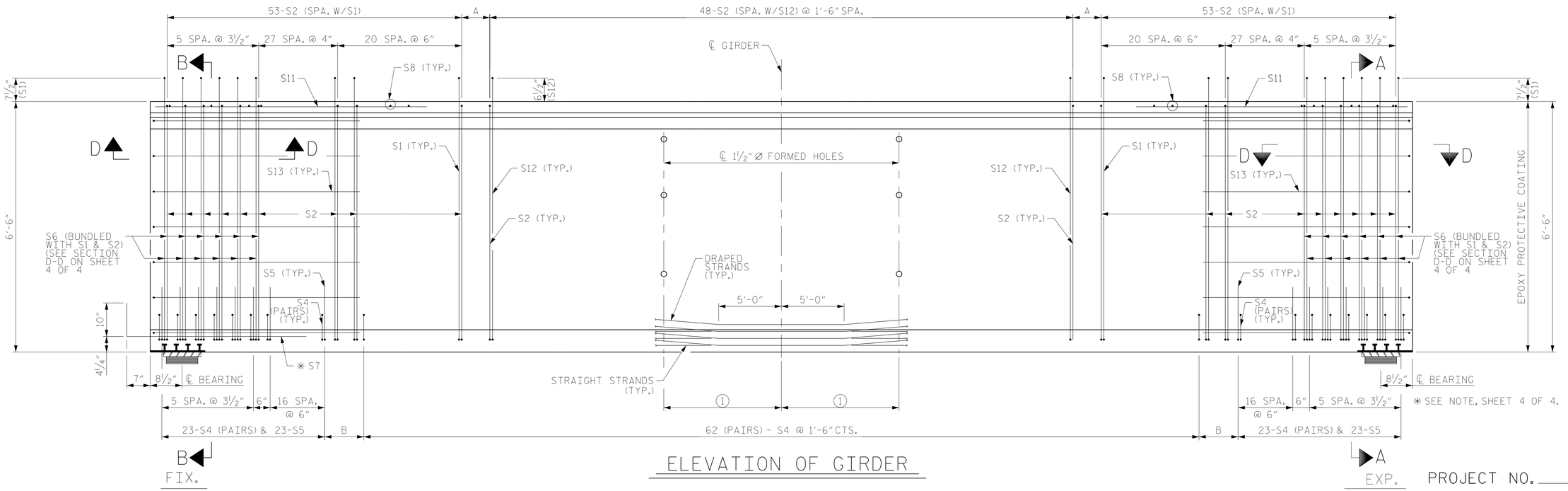
SUPERSTRUCTURE
F.I.B. 78" PRESTRESSED CONCRETE GIRDER
SPAN B
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-15
1			3			TOTAL SHEETS
2			4			46

STR. #4



PLAN OF GIRDER



ELEVATION OF GIRDER

SPAN C GIRDER DIMENSIONS				
GIRDER	L	A	B	C
GIRDER C1	112'-10 5/16"	6 1/8"	6 5/8"	8 5/8"
GIRDER C2	113'-0 1/4"	7 1/8"	7 5/8"	9 5/8"
GIRDER C3	113'-2 3/16"	8 1/16"	8 9/16"	10 9/16"
GIRDER C4	113'-4"	9"	9 1/2"	11 1/2"

NOTES

SEE PARTIAL ELEVATION ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" FOR ADDITIONAL 'S' BARS.

(1) SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR FORMED HOLE LOCATIONS.

ALTERNATE DIRECTION OF #5S1, #5S2, AND #5S12 BARS.

ALL VERTICAL BARS TO BE PLACED WITH S1 BARS.

FOR SECTION A-A AND SECTION B-B, SEE SHEET 4 OF 4.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 3 OF 4

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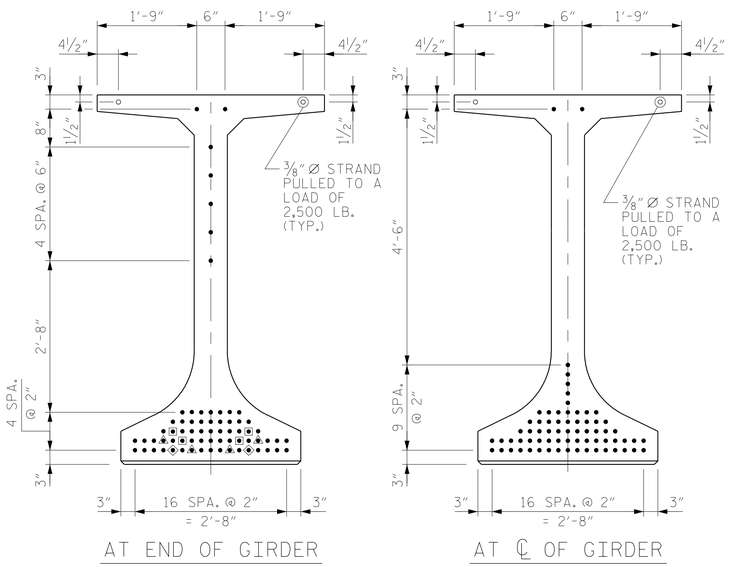
RALEIGH

SUPERSTRUCTURE
F.I.B. 78" PRESTRESSED CONCRETE GIRDER
SPAN C
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-16
1			3			TOTAL SHEETS
2			4			46

STR. #4

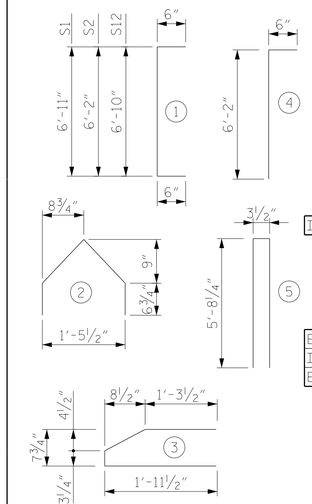


0.6"Ø LOW RELAXATION STRAND LAYOUT

(SPAN B - 68 STRANDS REQUIRED)

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ◉ DEBONDED FOR 10'-0" FROM END OF GIRDER
- ◉ DEBONDED FOR 8'-0" FROM END OF GIRDER
- ◉ DEBONDED FOR 6'-0" FROM END OF GIRDER



BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT

NOTE:
✳ S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED. SEE SHEET S4-17 DETAIL A-A ON FOR SPACING.

SPAN A

0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INS.)	ULTIMATE STRENGTH (LBS/STRAND)	APPLIED PRESTRESS (LBS/STRAND)
0.217	58,600	43,950

REINF. STEEL FOR ONE GIRDER

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	106	#5	1	7'-11"	875
	S2	160	#5	1	7'-2"	1196
INTERIOR	S3	16	#4	STR	19'-6"	208
	S4	228	#3	3	4'-4"	371
	S5	46	#3	2	3'-3"	56
	S6	24	#5	STR	6'-0"	150
	✳ S7	10	#5	STR	3'-8"	38
	S8	245	#4	STR	3'-8"	600
EXTERIOR	S9	16	#4	STR	8'-0"	86
INTERIOR	S10	32	#4	4	6'-8"	143
EXTERIOR	S10	16	#4	4	6'-8"	71
	S11	8	#6	STR	26'-0"	312
	S12	54	#5	1	7'-10"	441
	S13	14	#4	5	11'-8"	109

QUANTITIES FOR ONE GIRDER

GIRDER	REINFORCING STEEL	10,000 PSI CONCRETE	0.6"Ø L. R. GRADE
GDR. 1	4,305	34.8	38
GDR. 2	4,499	34.9	38
GDR. 3	4,499	34.9	38
GDR. 4	4,305	35.0	38

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	VARIES	492.96'

SPAN B

0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INS.)	ULTIMATE STRENGTH (LBS/STRAND)	APPLIED PRESTRESS (LBS/STRAND)
0.217	58,600	43,950

REINF. STEEL FOR ONE GIRDER

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	126	#5	1	7'-11"	1040
	S2	209	#5	1	7'-2"	1562
INTERIOR	S3	16	#4	STR	19'-10"	212
	S4	270	#3	3	4'-4"	440
	S5	46	#3	2	3'-3"	56
	S6	24	#5	STR	6'-0"	150
	✳ S7	20	#5	STR	3'-8"	76
	S8	307	#4	STR	3'-8"	752
EXTERIOR	S9	16	#4	STR	8'-0"	86
INTERIOR	S10	32	#4	4	6'-8"	143
EXTERIOR	S10	16	#4	4	6'-8"	71
	S11	8	#6	STR	26'-0"	312
	S12	83	#5	1	7'-10"	678
	S13	14	#4	5	11'-8"	109

QUANTITIES FOR ONE GIRDER

GIRDER	REINFORCING STEEL	10,000 PSI CONCRETE	0.6"Ø L. R. GRADE
GDR. 1	5,332	43.6	68
GDR. 2	5,538	43.7	68
GDR. 3	5,530	43.8	68
GDR. 4	5,332	43.8	68

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	VARIES	617.74'

SPAN C

0.6" Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INS.)	ULTIMATE STRENGTH (LBS/STRAND)	APPLIED PRESTRESS (LBS/STRAND)
0.217	58,600	43,950

REINF. STEEL FOR ONE GIRDER

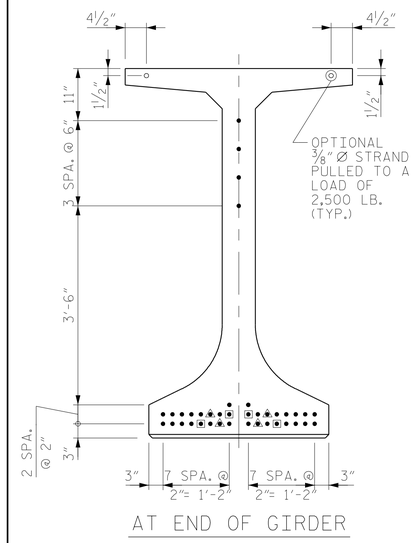
	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	153	#5	1	7'-11"	1263
	S2	154	#5	1	7'-2"	1151
INTERIOR	S3	16	#4	STR	20'-5"	218
	S4	216	#3	3	4'-4"	352
	S5	46	#3	2	3'-3"	56
	S6	24	#5	STR	6'-0"	150
	✳ S7	10	#5	STR	3'-8"	38
	S8	224	#4	STR	3'-8"	549
EXTERIOR	S9	16	#4	STR	8'-0"	86
INTERIOR	S10	32	#4	4	6'-8"	143
EXTERIOR	S10	16	#4	4	6'-8"	71
	S11	8	#6	STR	26'-0"	312
	S12	48	#5	1	7'-10"	392
	S13	14	#4	5	11'-8"	109

QUANTITIES FOR ONE GIRDER

GIRDER	REINFORCING STEEL	10,000 PSI CONCRETE	0.6"Ø L. R. GRADE
GDR. 1	4,529	31.9	38
GDR. 2	4,733	32.0	38
GDR. 3	4,733	32.0	38
GDR. 4	4,529	32.1	38

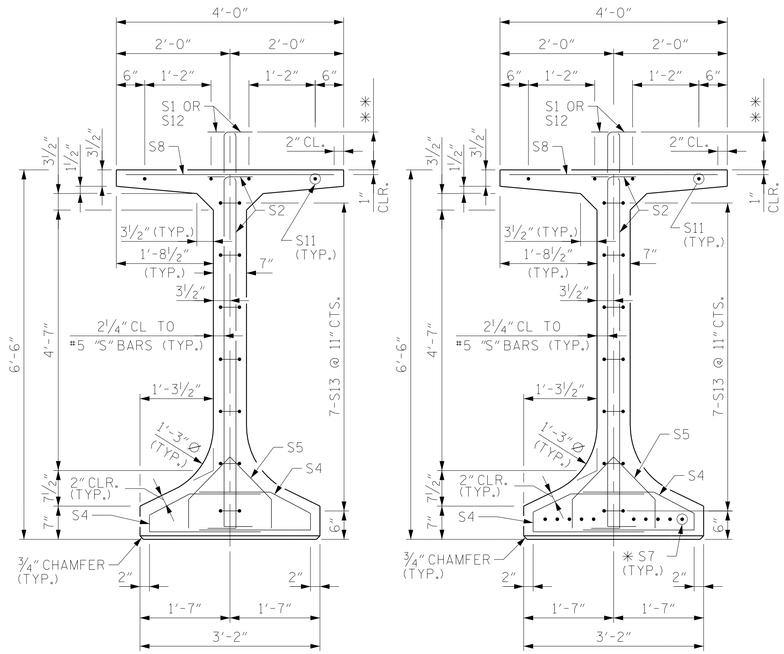
GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	VARIES	452.40'

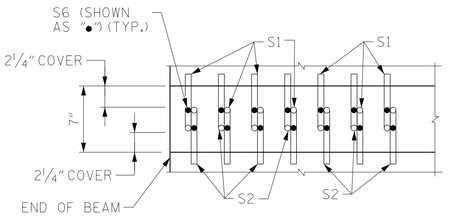


0.6"Ø LOW RELAXATION STRAND LAYOUT

(SPAN A & C - 38 STRANDS REQUIRED)



✳✳ SEE GIRDER SHEETS FOR EXTENSION.



SECTION D-D

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 4 OF 4

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
F.I.B. 78" PRESTRESSED CONCRETE GIRDER
(SPANS A, B & C)
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-17
1			3			TOTAL SHEETS
2			4			46

DRAWN BY : MRA DATE : 02/2018
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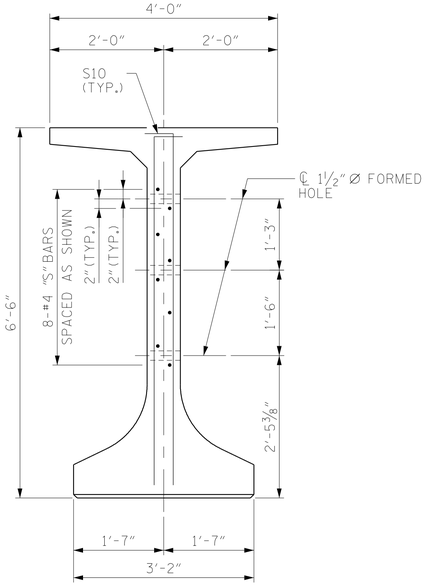
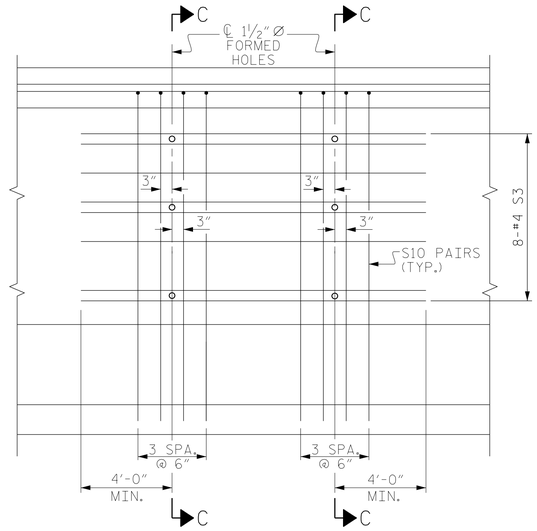
AcostaM

STR. #4

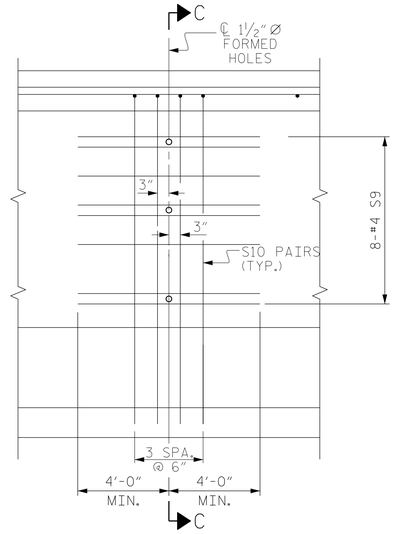


SECTION C-C

(S12 AND S2 BARS NOT SHOWN)



INTERIOR GIRDER



EXTERIOR GIRDER

PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM
REINFORCING STEEL FOR ALL GIRDERS

NOTES:

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL SHALL BE GRADE 60.

APPLY EPOXY PROTECTIVE COATING TO END OF GIRDER SURFACES INDICATED IN ELEVATION VIEW.

EMBEDDED PLATE "B-1" SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. BEVEL EDGES OF PLATE "B-1" TO GIVE CLOSE FIT BUT NOT TIGHT FIT TO STEEL CASTING FORM.

ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE "B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

AT THE END OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 7,000 P.S.I.

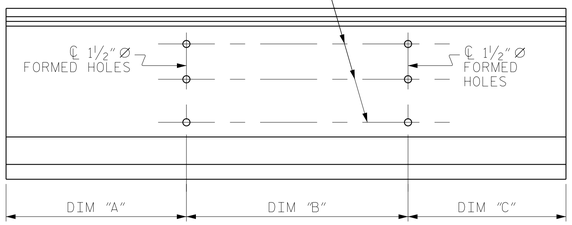
DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF ¼".

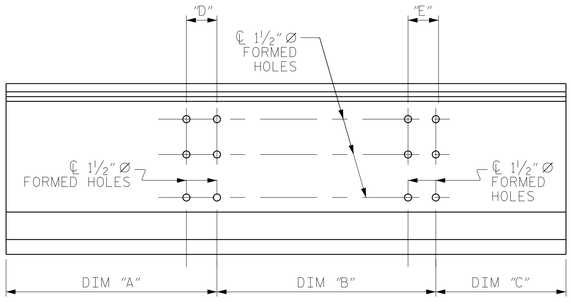
WHEN DRAPED STRANDS ARE DETAILED, THE LONGITUDINAL LOCATION OF THE HOLD DOWN DEVICE SHALL BE WITHIN 6" OF THE LOCATION SHOWN AND THE CENTER OF GRAVITY OF THE GROUP OF DRAPED STRANDS SHALL BE LOCATED WITHIN ½" OF THE THEORETICAL LOCATION SHOWN.

THE COST OF ALL CONCRETE, REINFORCING STEEL, PRESTRESSED STRANDS, INSERTS EMBEDDED IN THE CONCRETE, EMBEDDED PLATES, TEMPORARY BRACING AND INCIDENTAL ITEMS SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE FOR PRESTRESSED CONCRETE GIRDERS.

PRIOR TO CASTING THE GIRDERS, THE CONTRACTOR SHALL SUBMIT COMPLETE WORKING DRAWINGS WITH EXACT LOCATION, AND COMPLETE DESCRIPTION OF ALL INSERTS CAST IN THE GIRDERS, TO THE DEPARTMENT FOR APPROVAL. SUCH INSERTS INCLUDE BUT ARE NOT LIMITED TO, INSERTS FOR SUPPORTING FALSEWORK AND FORMWORK, INSERT FOR ATTACHING DIAPHRAGMS, INSERT FOR CONNECTING TEMPORARY BRACING, AND LIFTING INSERTS.



EXTERIOR GIRDER - SPANS A, B & C



INTERIOR GIRDER - SPANS A, B & C

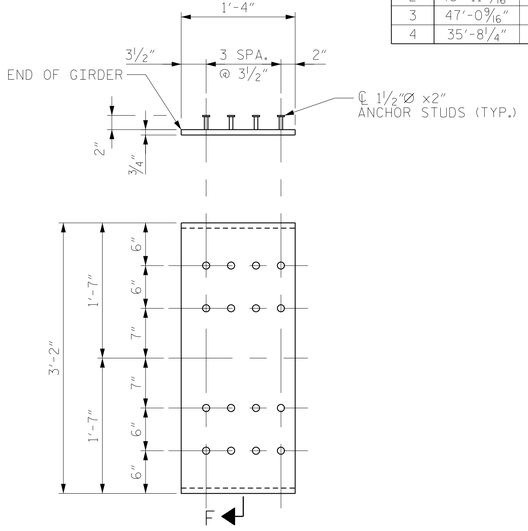
BOLT HOLE PLACEMENT

BOLT HOLE PLACEMENT DIMENSIONS

GDR. NO.	SPAN A					SPAN B					SPAN C				
	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"
1	46'-10 15/16"	40'-6 11/16"	35'-6 7/16"	-	-	57'-5 3/8"	50'-11 1/4"	45'-8 3/4"	-	-	43'-10 7/16"	37'-2 1/16"	31'-9 3/4"	-	-
2	46'-11 13/16"	40'-7 5/16"	35'-6 7/8"	11'-4 7/16"	11'-5 1/16"	57'-6 7/16"	51'-0 1/16"	45'-9 1/2"	11'-8 3/8"	11'-9 3/16"	44'-2 5/8"	37'-2 3/4"	31'-6 13/16"	12'-3 7/8"	12'-4 1/2"
3	47'-0 9/16"	40'-7 15/16"	35'-7 5/16"	11'-4 13/16"	11'-5 7/16"	57'-7 7/16"	51'-0 7/8"	45'-10 1/8"	11'-8 11/16"	11'-9 1/2"	44'-3 7/16"	37'-3 3/8"	31'-7 5/16"	12'-0 3/4"	12'-1 1/16"
4	35'-8 1/4"	40'-7 15/16"	47'-1 1/2"	-	-	45'-11 3/8"	51'-0 7/8"	57'-8 11/16"	-	-	32'-3 1/8"	37'-3 3/8"	43'-9 1/2"	-	-

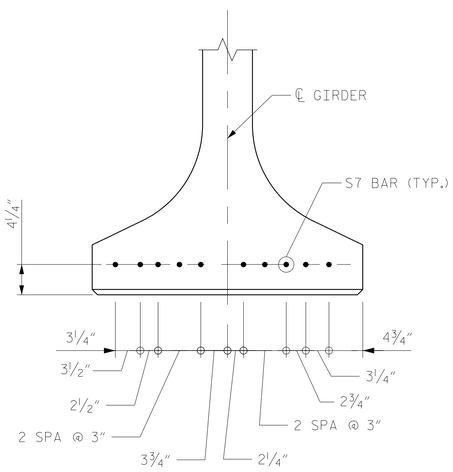
SECTION "F"

(SEE NOTES)



EMBEDDED PLATE "B-1" DETAILS

(2 REQ'D PER GIRDER)



DETAIL A-A

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

DRAWN BY :	MRA	DATE :	01/2018		
CHECKED BY :	MKO	DATE :	02/2018		
DESIGN ENGINEER OF RECORD:	JMR	DATE :	01/2018		

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JOSHUA MARK ROBINSON DocuSigned by: Joshua Robinson 3/28/2018

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RALEIGH

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS
RIGHT LANE

REVISIONS						SHEET NO.
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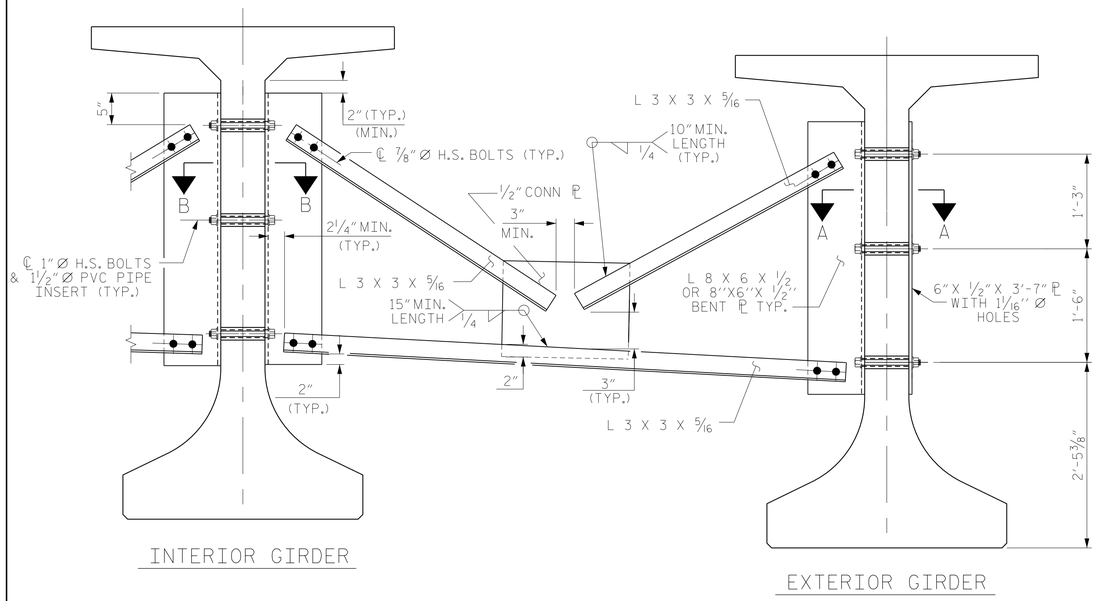
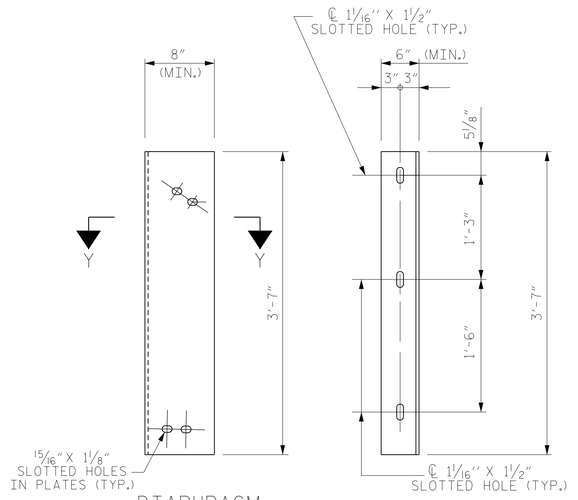
STR. #4



INTERIOR GIRDER

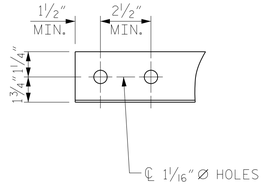
EXTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

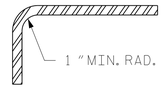


DIAPHRAGM FACE

WEB FACE



ANGLE END
(L 3 X 3 X 5/16)



SECTION Y-Y

STRUCTURAL STEEL NOTES

ALL INTERMEDIATE DIAPHRAGM STEEL AND CONNECTOR PLATES SHALL BE AASHTO M270 GRADE 50 OR APPROVED EQUAL.

TENSION ON THE ASTM A325 BOLTS THROUGH THE ANGLE MEMBER SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL 1/4 TURN.

THE PLATES, BENT PLATES, AND ANGLES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

FOR METALLIZATION, APPLY A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENTS THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM. THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

GALVANIZE THE HIGH STRENGTH BOLTS, NUTS, WASHERS AND DIRECT TENSION INDICATORS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

USE AN ASTM F436 HARDENED WASHER WITH STANDARD AND SLOTTED HOLES UNDER EACH BOLT HEAD AND NUT.

FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

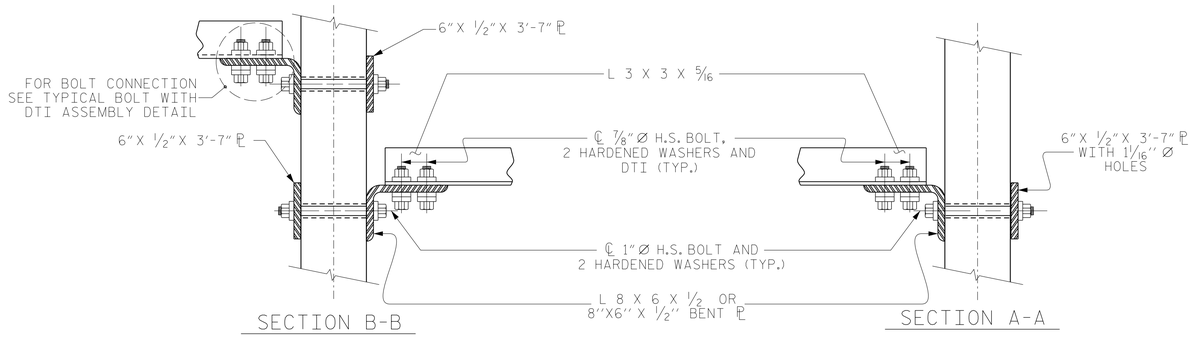
INTERMEDIATE DIAPHRAGM ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.

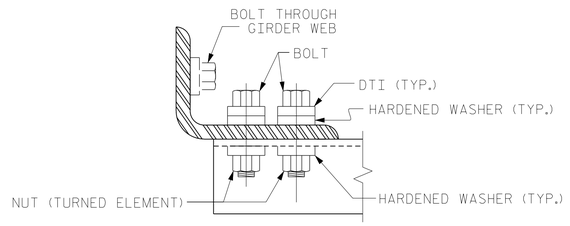
CONNECTOR PLATE DETAIL



SECTION B-B

SECTION A-A

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039513 REGISTERED ENGINEERING MARK ROBINSON
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE INTERMEDIATE STEEL DIAPHRAGMS FOR 78" FIB PRESTRESSED CONCRETE GIRDERS RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-19
1			3			TOTAL SHEETS
2			4			46

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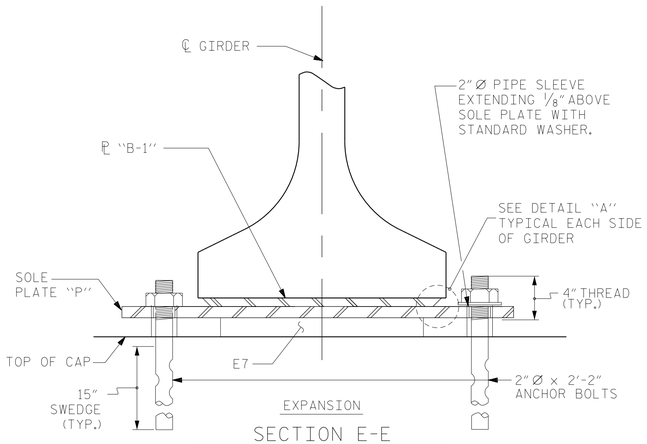
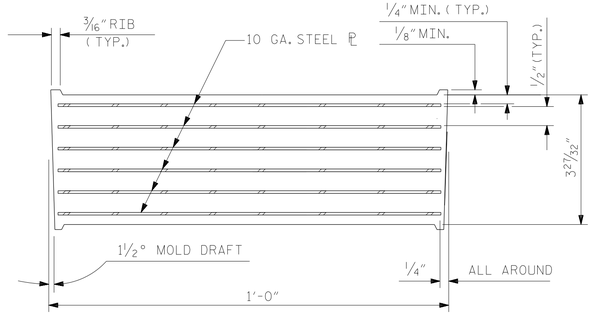
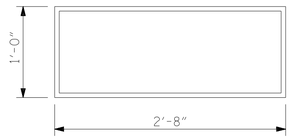
STR. #4



SECTION E-E



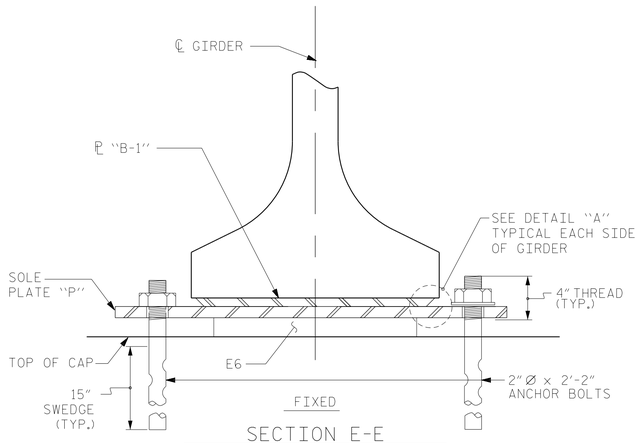
TYPICAL SECTION OF ELASTOMERIC BEARINGS



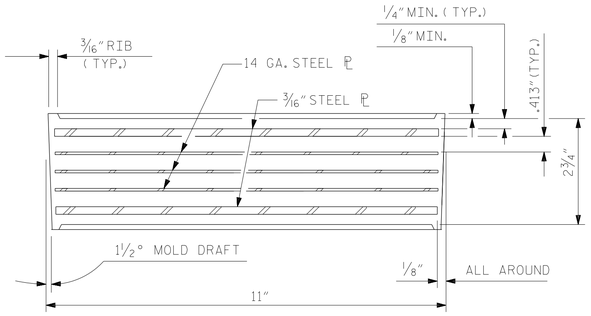
E7 (8 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

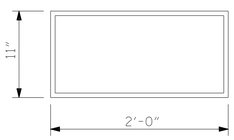
TYPE VIII



SECTION E-E



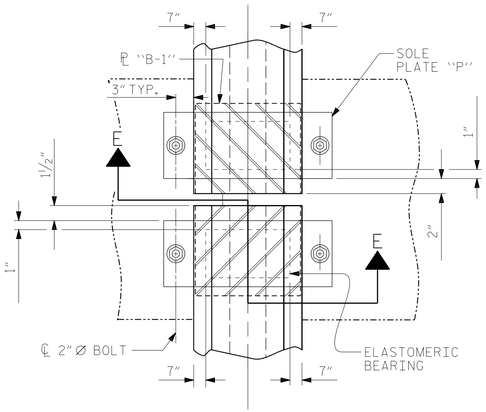
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E6 (16 REQ'D)

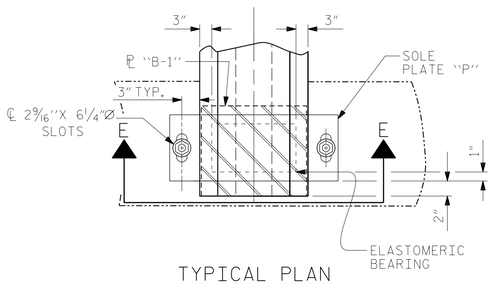
PLAN VIEW OF ELASTOMERIC BEARING

TYPE VII



TYPICAL PLAN

(SHOWING CONTINUOUS BENT)



TYPICAL PLAN

(SHOWING SIMPLE SPAN END BENT)

NOTES

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF 1/2 TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

THE 2" Ø PIPE SLEEVE SHALL BE CUT FROM SCHEDULE 40 PVC PLASTIC PIPE. THE PVC PLASTIC PIPE SHALL MEET THE REQUIREMENTS OF ASTM D1785.

STEEL SOLE PLATES, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

PRIOR TO WELDING, GRIND THE GALVANIZED SURFACE OF THE PORTION OF THE EMBEDDED PLATE AND SOLE PLATE THAT ARE TO BE WELDED. AFTER WELDING, DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

WHEN WELDING THE SOLE PLATE TO THE EMBEDDED PLATE IN THE GIRDER, USE TEMPERATURE INDICATING WAX PENS, OR OTHER SUITABLE MEANS, TO ENSURE THAT THE TEMPERATURE OF THE SOLE PLATE DOES NOT EXCEED 300°F. TEMPERATURES ABOVE THIS MAY DAMAGE THE ELASTOMER.

SOLE PLATE "P", BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

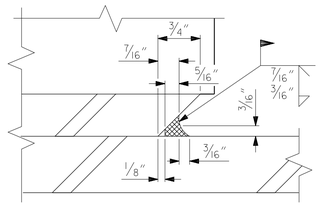
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

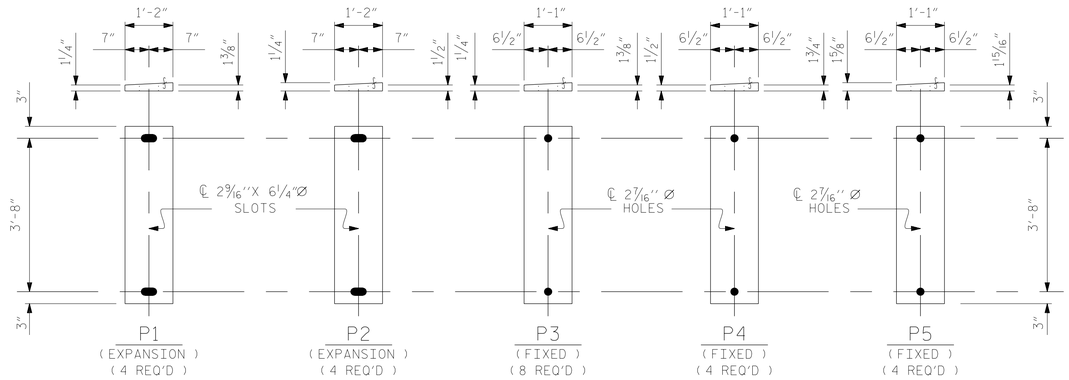
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.



DETAIL "A"



SOLE PLATE DETAILS ("P")

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ELASTOMERIC BEARING DETAILS

RIGHT LANE

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NORTH CAROLINA PROFESSIONAL SEAL 039213 ENGINEER JUSTIN MARK ROBINSON
DocuSigned by: Justin Robinson
3/28/2018

DRAWN BY : MRA DATE : 01/2018
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STR. #4

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION																						
SPAN A																						
GIRDER 1 (EXTERIOR)																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.027	0.054	0.079	0.102	0.123	0.140	0.154	0.164	0.170	0.172	0.170	0.164	0.154	0.140	0.123	0.102	0.079	0.054	0.027	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.018	0.036	0.053	0.068	0.082	0.093	0.103	0.109	0.113	0.115	0.113	0.109	0.103	0.093	0.082	0.068	0.053	0.036	0.018	0.000
FINAL CAMBER ↑	0''	1/8''	3/16''	5/16''	7/16''	1/2''	9/16''	5/8''	11/16''	11/16''	11/16''	11/16''	11/16''	5/8''	9/16''	1/2''	7/16''	5/16''	3/16''	1/8''	0''
GIRDER 2 (INTERIOR)																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.027	0.054	0.079	0.102	0.123	0.140	0.154	0.164	0.170	0.172	0.170	0.164	0.154	0.140	0.123	0.102	0.079	0.054	0.027	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.021	0.042	0.062	0.080	0.096	0.109	0.120	0.128	0.133	0.134	0.133	0.128	0.120	0.109	0.096	0.080	0.062	0.042	0.021	0.000
FINAL CAMBER ↑	0''	1/16''	1/8''	3/16''	1/4''	5/16''	3/8''	7/16''	7/16''	7/16''	7/16''	7/16''	7/16''	7/16''	3/8''	5/16''	1/4''	3/16''	1/8''	1/16''	0''
GIRDER 3 (INTERIOR)																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.027	0.054	0.079	0.102	0.123	0.140	0.154	0.164	0.170	0.172	0.170	0.164	0.154	0.140	0.123	0.102	0.079	0.054	0.027	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.021	0.042	0.062	0.080	0.096	0.109	0.120	0.128	0.133	0.135	0.133	0.128	0.120	0.109	0.096	0.080	0.062	0.042	0.021	0.000
FINAL CAMBER ↑	0''	1/16''	1/8''	3/16''	1/4''	5/16''	3/8''	3/8''	7/16''	7/16''	7/16''	7/16''	7/16''	3/8''	3/8''	5/16''	1/4''	3/16''	1/8''	1/16''	0''
GIRDER 4 (EXTERIOR)																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.027	0.054	0.079	0.102	0.123	0.140	0.154	0.164	0.170	0.172	0.170	0.164	0.154	0.140	0.123	0.102	0.079	0.054	0.027	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.018	0.036	0.053	0.069	0.083	0.094	0.103	0.110	0.114	0.116	0.114	0.110	0.103	0.094	0.083	0.069	0.053	0.036	0.018	0.000
FINAL CAMBER ↑	0''	1/8''	3/16''	5/16''	3/8''	1/2''	9/16''	5/8''	5/8''	11/16''	11/16''	11/16''	5/8''	5/8''	9/16''	1/2''	3/8''	5/16''	3/16''	1/8''	0''

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION																						
SPAN B																						
GIRDER 1 (EXTERIOR)																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.181	0.233	0.280	0.319	0.351	0.374	0.388	0.393	0.388	0.374	0.351	0.319	0.280	0.233	0.181	0.123	0.062	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.046	0.091	0.133	0.172	0.206	0.235	0.259	0.275	0.286	0.289	0.286	0.275	0.259	0.235	0.206	0.172	0.133	0.091	0.046	0.000
FINAL CAMBER ↑	0''	3/16''	3/8''	9/16''	3/4''	7/8''	1''	1 1/8''	1 3/16''	1 1/4''	1 1/4''	1 1/4''	1 3/16''	1 1/8''	1''	7/8''	3/4''	9/16''	3/8''	3/16''	0''
GIRDER 2 (INTERIOR)																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.181	0.233	0.280	0.319	0.351	0.374	0.388	0.393	0.388	0.374	0.351	0.319	0.280	0.233	0.181	0.123	0.062	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.051	0.102	0.149	0.192	0.231	0.263	0.290	0.308	0.320	0.324	0.320	0.308	0.290	0.263	0.231	0.192	0.149	0.102	0.051	0.000
FINAL CAMBER ↑	0''	1/8''	1/4''	3/8''	1/2''	9/16''	11/16''	3/4''	13/16''	13/16''	13/16''	13/16''	13/16''	3/4''	11/16''	9/16''	1/2''	3/8''	1/4''	1/8''	0''
GIRDER 3 (INTERIOR)																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.181	0.233	0.280	0.319	0.351	0.374	0.388	0.393	0.388	0.374	0.351	0.319	0.280	0.233	0.181	0.123	0.062	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.052	0.102	0.150	0.193	0.232	0.264	0.291	0.310	0.321	0.325	0.321	0.310	0.291	0.264	0.232	0.193	0.150	0.102	0.052	0.000
FINAL CAMBER ↑	0''	1/8''	1/4''	3/8''	1/2''	9/16''	11/16''	3/4''	3/4''	13/16''	13/16''	13/16''	3/4''	3/4''	11/16''	9/16''	1/2''	3/8''	1/4''	1/8''	0''
GIRDER 4 (EXTERIOR)																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.181	0.233	0.280	0.319	0.351	0.374	0.388	0.393	0.388	0.374	0.351	0.319	0.280	0.233	0.181	0.123	0.062	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.045	0.090	0.131	0.170	0.204	0.232	0.255	0.272	0.282	0.286	0.282	0.272	0.255	0.232	0.204	0.170	0.131	0.090	0.045	0.000
FINAL CAMBER ↑	0''	3/16''	3/8''	9/16''	3/4''	15/16''	1 1/16''	1 1/8''	1 1/4''	1 1/4''	1 5/16''	1 1/4''	1 1/4''	1 1/8''	1 1/16''	15/16''	3/4''	9/16''	3/8''	3/16''	0''

✳ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER ", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 1 OF 2

DRAWN BY : NSC DATE : 02/2018
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DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

3/27/2018
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3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTION
SPANS A & B

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-21
1			3			TOTAL SHEETS
2			4			46

STR. #4

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION																						
	SPAN C																					
	GIRDER 1 (EXTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.026	0.052	0.077	0.099	0.119	0.135	0.149	0.158	0.164	0.166	0.164	0.158	0.149	0.135	0.119	0.099	0.077	0.052	0.026	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.013	0.026	0.039	0.050	0.060	0.068	0.075	0.080	0.083	0.084	0.083	0.080	0.075	0.068	0.060	0.050	0.039	0.026	0.013	0.000
FINAL CAMBER ↑	0''	3/16''	5/16''	7/16''	9/16''	11/16''	13/16''	7/8''	15/16''	1''	1''	1''	15/16''	7/8''	13/16''	11/16''	9/16''	7/16''	5/16''	3/16''	0''
	GIRDER 2 (INTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.026	0.052	0.077	0.099	0.119	0.135	0.149	0.159	0.165	0.167	0.165	0.159	0.149	0.135	0.119	0.099	0.077	0.052	0.026	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.015	0.030	0.044	0.056	0.068	0.077	0.085	0.090	0.094	0.095	0.094	0.090	0.085	0.077	0.068	0.056	0.044	0.030	0.015	0.000
FINAL CAMBER ↑	0''	1/8''	1/4''	3/8''	1/2''	5/8''	11/16''	3/4''	13/16''	7/8''	7/8''	7/8''	13/16''	3/4''	11/16''	5/8''	1/2''	3/8''	1/4''	1/8''	0''
	GIRDER 3 (INTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.027	0.052	0.077	0.099	0.119	0.136	0.149	0.159	0.165	0.167	0.165	0.159	0.149	0.136	0.119	0.099	0.077	0.052	0.027	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.015	0.030	0.044	0.057	0.068	0.077	0.085	0.091	0.094	0.095	0.094	0.091	0.085	0.077	0.068	0.057	0.044	0.030	0.015	0.000
FINAL CAMBER ↑	0''	1/8''	1/4''	3/8''	1/2''	5/8''	11/16''	3/4''	13/16''	7/8''	7/8''	7/8''	13/16''	3/4''	11/16''	5/8''	1/2''	3/8''	1/4''	1/8''	0''
	GIRDER 4 (EXTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.027	0.052	0.077	0.099	0.119	0.136	0.149	0.159	0.165	0.167	0.165	0.159	0.149	0.136	0.119	0.099	0.077	0.052	0.027	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.013	0.026	0.038	0.049	0.059	0.067	0.074	0.079	0.082	0.083	0.082	0.079	0.074	0.067	0.059	0.049	0.038	0.026	0.013	0.000
FINAL CAMBER ↑	0''	3/16''	5/16''	7/16''	5/8''	11/16''	13/16''	7/8''	15/16''	1''	1''	1''	15/16''	7/8''	13/16''	11/16''	5/8''	7/16''	5/16''	3/16''	0''

✳ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT " FINAL CAMBER ", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 2 OF 2

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTION
SPANS C

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-22
1			3			TOTAL SHEETS
2			4			46

DRAWN BY : NSC DATE : 02/2018
CHECKED BY : MKO DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

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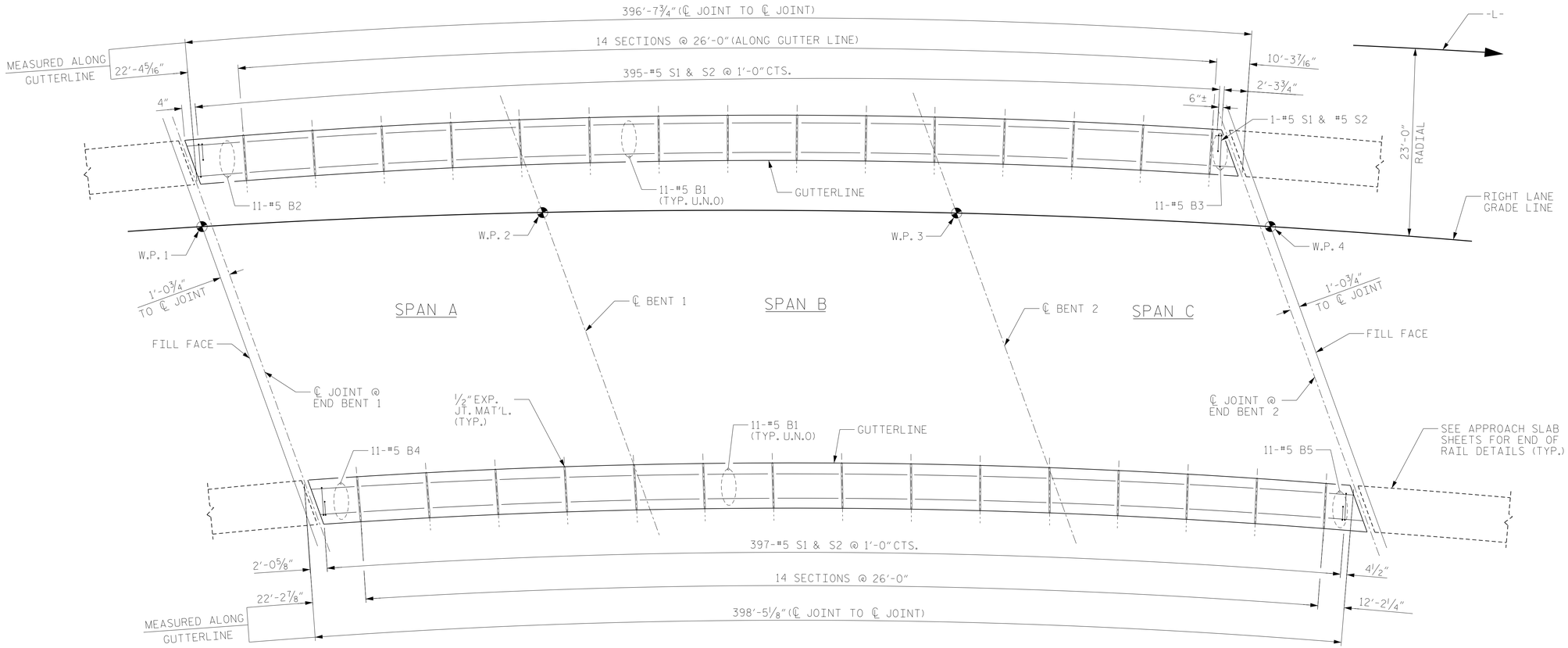
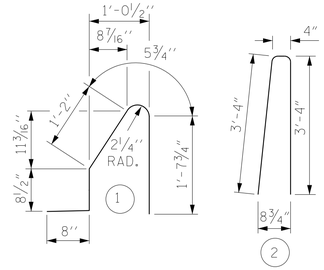
STR. #4



PLAN OF BARRIER RAIL

BAR TYPES



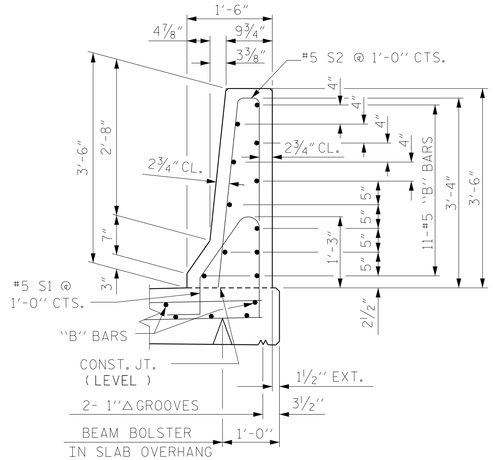
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

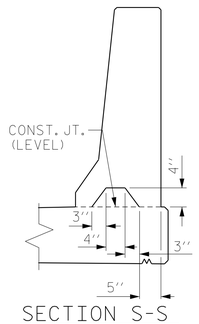
FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	308	#5	STR	25'-6"	8192
✳B2	11	#5	STR	22'-0"	252
✳B3	11	#5	STR	9'-7"	110
✳B4	11	#5	STR	20'-7"	236
✳B5	11	#5	STR	11'-10"	136
✳S1	793	#5	1	4'-8"	3860
✳S2	793	#5	2	7'-0"	5790

✳ EPOXY COATED REINFORCING STEEL	18,576 LBS.
CLASS AA CONCRETE	108.2 CU. YDS.
CONCRETE BARRIER RAIL	795.1 LIN. FT.

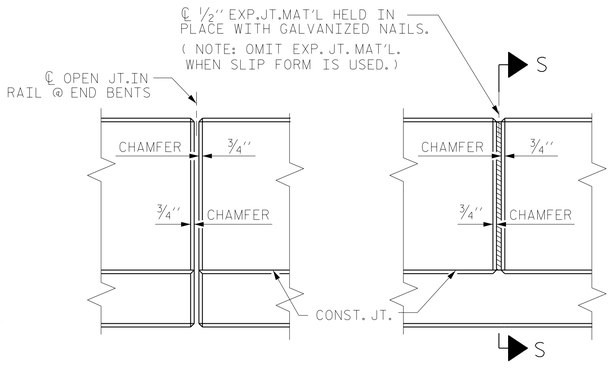


SECTION THRU RAIL



SECTION S-S

AT DAM IN OPEN JOINT (THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

NOTES

THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 038913 JOHN MARK ROBINSON
Docusigned by: Justin Robinson
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

CONCRETE BARRIER RAIL

RIGHT LANE

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			46

DRAWN BY : NSC DATE : 1/2018
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DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

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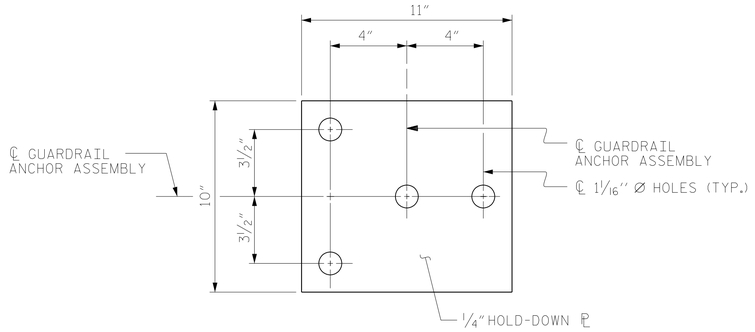
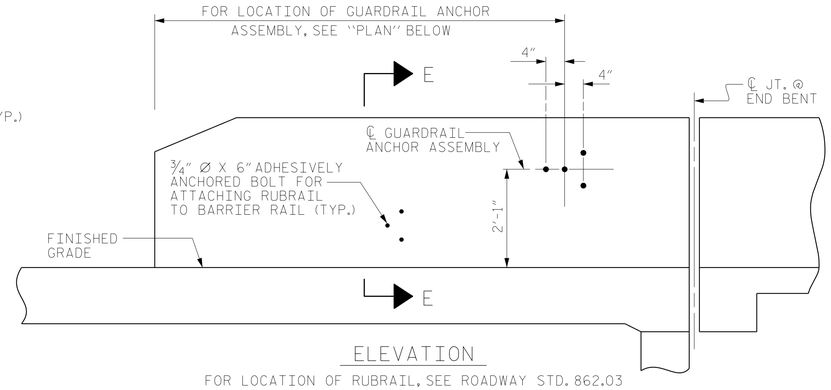
STR. #4

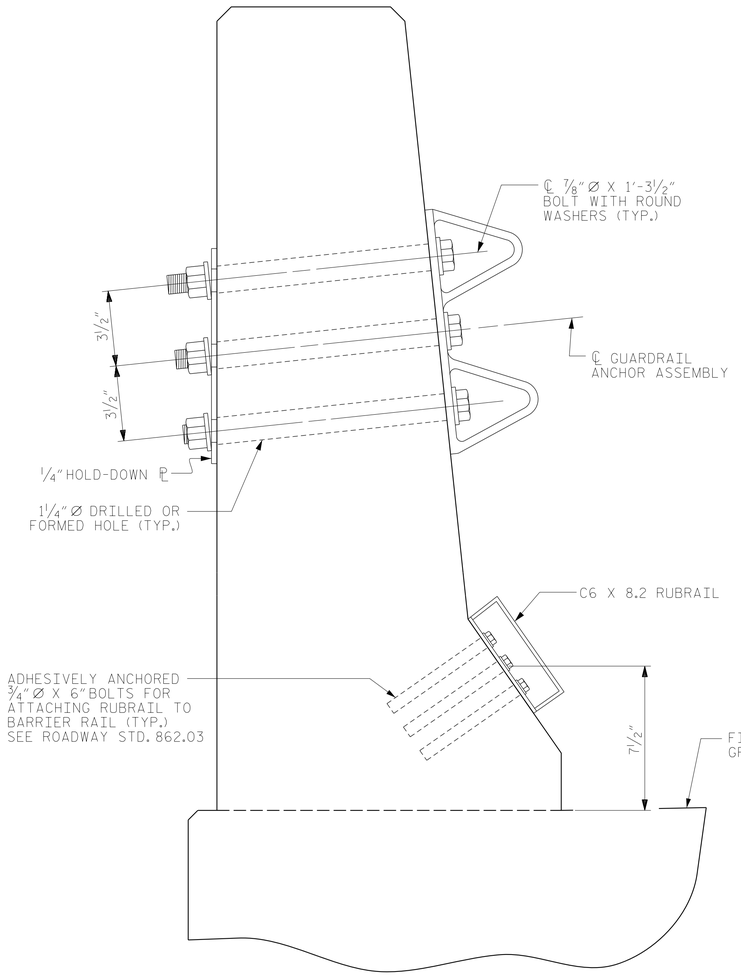


PLAN



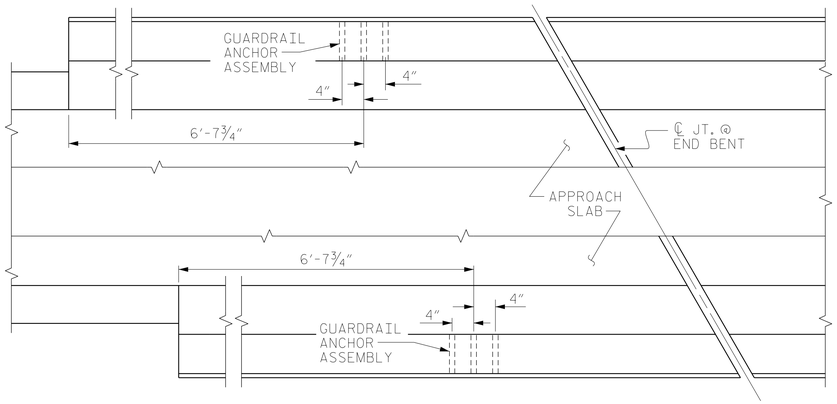
ELEVATION

FOR LOCATION OF RUBRAIL, SEE ROADWAY STD. 862.03



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT #1 SHOWN, END BENT #2 SIMILAR.

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4'' HOLD-DOWN PLATE AND 4 - 7/8'' Ø BOLTS WITH NUTS AND WASHERS, RUBRAIL, AND ADHESIVELY ANCHORED BOLTS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 7/8'' Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CONCRETE BARRIER RAIL.

THE 1 1/4'' Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4″ Ø X 6″ BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4″ Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.

SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON

DocuSigned by: Justin Robinson 6D09A31EDC0C4FE...

3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

RIGHT LANE

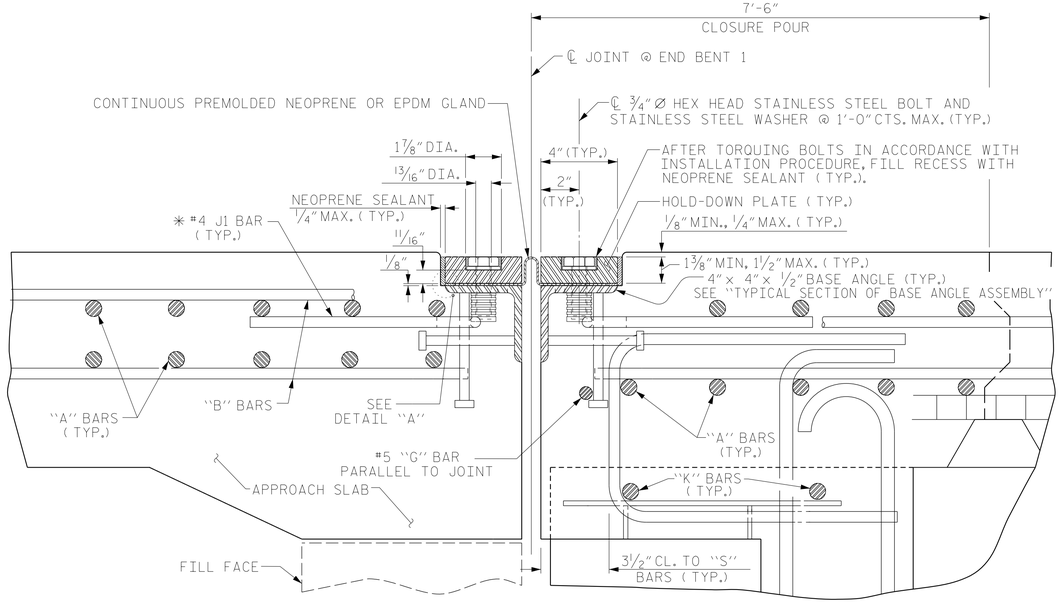
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-24
1			3			TOTAL SHEETS
2			4			46

ASSEMBLED BY :	NSC	DATE :	01/2018
CHECKED BY :	MKO	DATE :	02/2018
DRAWN BY : TLA	5/06	REV. 7/12	MAA/GM
CHECKED BY : GM	5/06	REV. 6/13	MAA/GM
		REV. 12/17	MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

3/27/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\404_U2412A_SMU_GR1_401273.dgn
AcostaM

(SHT 3a) STD. NO. GRA2 STR. #4



EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

END BENT 1 SHOWN, END BENT 2 SIMILAR

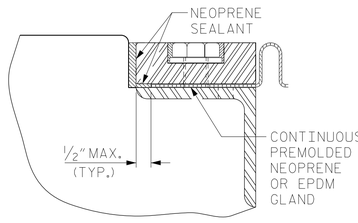
* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE

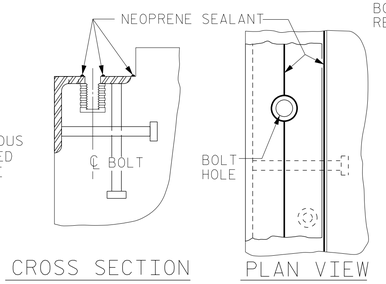
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4 1/8" TO 4 1/4" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO THE BASE ANGLE ASSEMBLY WITH THE ¾" Ø HEX HEAD BOLTS PROVIDED FOR THE HOLD-DOWN PLATES. A 1" Ø HOLE SHALL BE PROVIDED IN THE TEMPLATE CENTERED OVER EACH WEEP HOLE IN THE 4" X 4" X ½" BASE ANGLE. OTHER METHODS OF INSURING DRAINAGE THROUGH WEEP HOLES MAY BE EMPLOYED SUBJECT TO ENGINEER'S APPROVAL.
2. AFTER THE CONCRETE HAS BEEN CAST ON BOTH SIDES OF THE JOINT, REMOVE THE TEMPLATE. THOROUGHLY CLEAN THE BOLT HOLES AND THE ANGLE PLATE. REMOVE ANY EXCESS CONCRETE THAT COMES OUT OF THE WEEP HOLES. ANY DAMAGED STEEL SHALL BE COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
3. LAY THE GLAND ON THE BASE ANGLE AND FIELD MARK THE GLAND FOR THE BOLT HOLES. HOLES IN THE GLAND SHALL BE PUNCHED ⅞" IN DIAMETER WITH A HAND PUNCH.
4. IN ORDER TO CHECK FOR PROPER ALIGNMENT, PLACE THE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. DO NOT APPLY NEOPRENE SEALANT. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE BUT DO NOT TIGHTEN. THE ENGINEER SHALL INSPECT THE JOINT SEAL DEVICE FOR PROPER ALIGNMENT.
5. AFTER INSPECTION, REMOVE THE HOLD-DOWN PLATES AND GLAND. APPLY NEOPRENE SEALANT TO THE BASE ANGLE IN ACCORDANCE WITH THE "INSTALLATION SKETCH". PLACE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE ASSEMBLY AND TORQUE THE BOLTS TO 88 FT-LBS WITH A TORQUE WRENCH. CHECK THE TORQUE AFTER THREE (3) HOURS AND, IF NECESSARY, RETIGHTEN TO 88 FT-LBS. A FINAL CHECK SHALL BE MADE AT SEVEN (7) DAYS. TORQUE SHALL NOT BE LESS THAN 80 FT-LBS AFTER SEVEN (7) DAYS.
6. AFTER PROPER TORQUING, CLEAN THE BOLT HOLE RECESSES AND THE RECESS BETWEEN THE JOINT SEAL DEVICE AND CONCRETE, COMPLETELY FILL THESE RECESSES WITH NEOPRENE SEALANT.

GENERAL NOTES

1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL. ALL STUD ANCHORS SHALL CONFORM TO AASHTO M169, GRADES 1010 THRU 1020 OR APPROVED EQUAL. ALL CONCRETE INSERTS SHALL BE CLOSED END AND SHALL CONFORM TO AASHTO M169, GRADE 12L14. TENSILE CAPACITY SHALL BE 3000 LBS. MIN.
3. A PREMOLDED CORRUGATED OR NON-CORRUGATED GLAND SHALL BE USED FOR JOINTS SKEWED BETWEEN 50° THRU 130°. FOR JOINTS SKEWED LESS THAN 50° OR MORE THAN 130°, ONLY A CORRUGATED GLAND SHALL BE USED.
4. CLOSED END FERRULES AND STUD ANCHORS SHALL BE SHOP WELDED AND ALL HOLES SHALL BE SHOP DRILLED AS SHOWN ON PLANS. STUD ANCHORS SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.
5. SURFACES COMING IN CONTACT WITH NEOPRENE SHALL BE GROUND SMOOTH PRIOR TO METALLIZING.
6. UPON COMPLETION OF SHOP FABRICATION, THE HOLD DOWN PLATE AND BASE ANGLE ASSEMBLY, AS SHOWN IN THE "TYPICAL SECTION OF BASE ANGLE ASSEMBLY", SHALL BE METALLIZED. SEE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
7. BASE ANGLE ASSEMBLY SHALL BE CONTINUOUS FOR THE LENGTH OF THE JOINT. AT CROWN BREAKS, THE ENDS OF THE BASE ANGLE ASSEMBLY SHALL BE CUT PARALLEL TO THE BRIDGE CENTERLINE FOR SKEWS LESS THAN 80° AND GREATER THAN 100°. FINISHED WELD SHALL BE GROUND SMOOTH AND COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
8. FIELD SPLICES OF HOLD-DOWN PLATES SHALL BE KEPT TO A MINIMUM. CONTRACTOR SHALL FURNISH DETAILED PLANS SHOWING PROPOSED SPLICE LOCATIONS FOR APPROVAL. HOLD-DOWN PLATES SHALL NOT EXCEED 20' LENGTHS UNLESS APPROVED BY THE ENGINEER.
9. NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.
10. THE CONTRACTOR MAY, AT HIS OPTION, USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CONCRETE INSERTS FOR COVER PLATES. THE YIELD LOAD OF THE ¾" Ø BOLT IS 10 KIPS. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

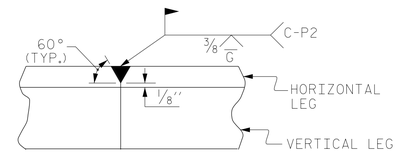


DETAIL "A"

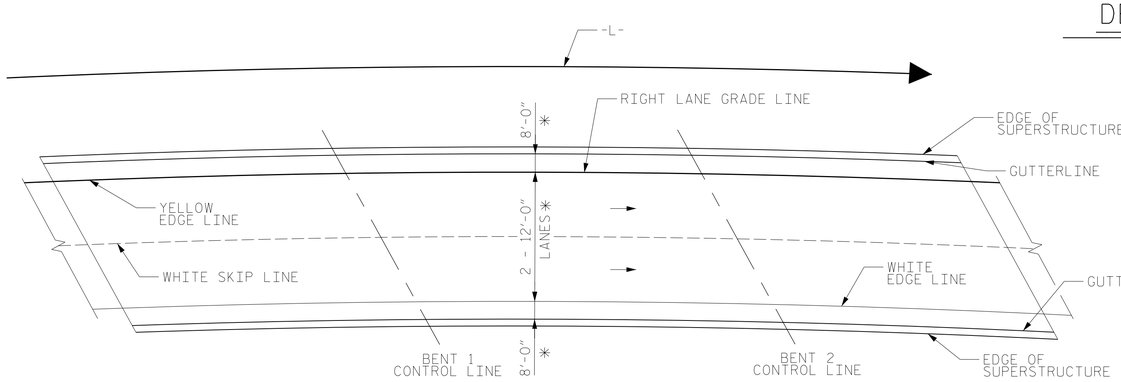


CROSS SECTION PLAN VIEW

INSTALLATION SKETCH



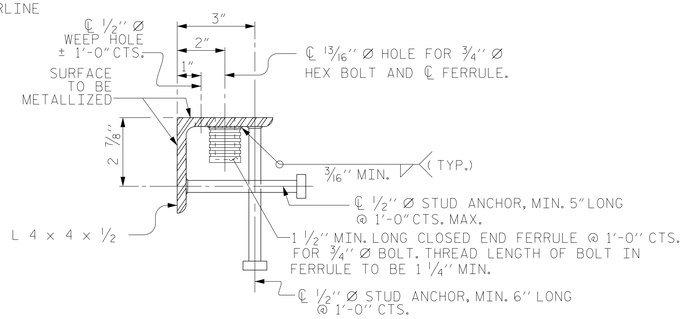
DETAIL- FIELD WELD SPLICE OF BASE ANGLE



PAVEMENT MARKING ALIGNMENT

* DENOTES RADIAL DIMENSION

MOVEMENT AND SETTING AT JOINT					
END BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
1	42.50	1.25	1.60	1.45	1.15
2	42.50	1.19	1.57	1.43	1.14



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 039313 ENGINEER JOHN MARK ROBINSON
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

EXPANSION JOINT SEAL DETAILS

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-25
1			3			TOTAL SHEETS
2			4			44

STD. NO. EJS1 STR. #4

ASSEMBLED BY : NSC		DATE : 01/2018
CHECKED BY : MKO		DATE : 02/2018
DRAWN BY : REK 9/87	REV. 7/12	MAA/GM
CHECKED BY : CRK 10/87	REV. 6/13	MAA/GM
	REV. 12/17	MAA/THC

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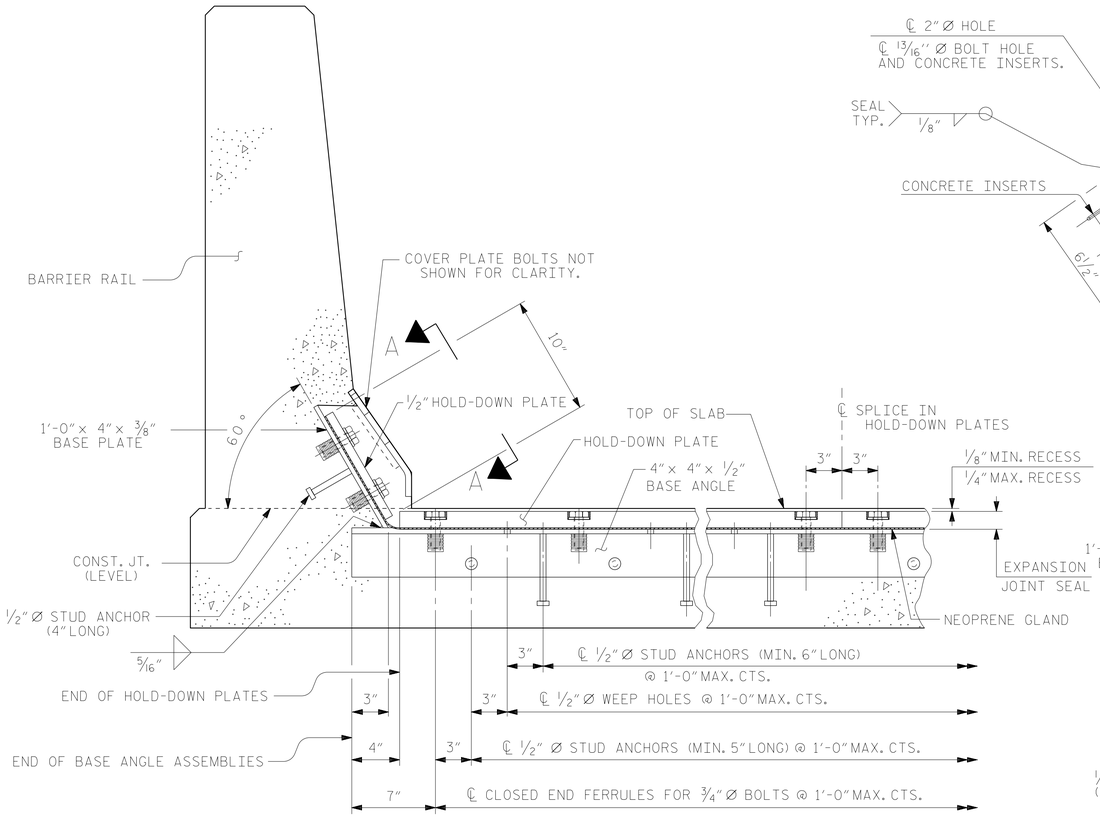
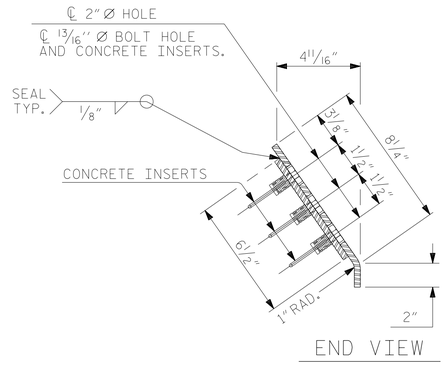
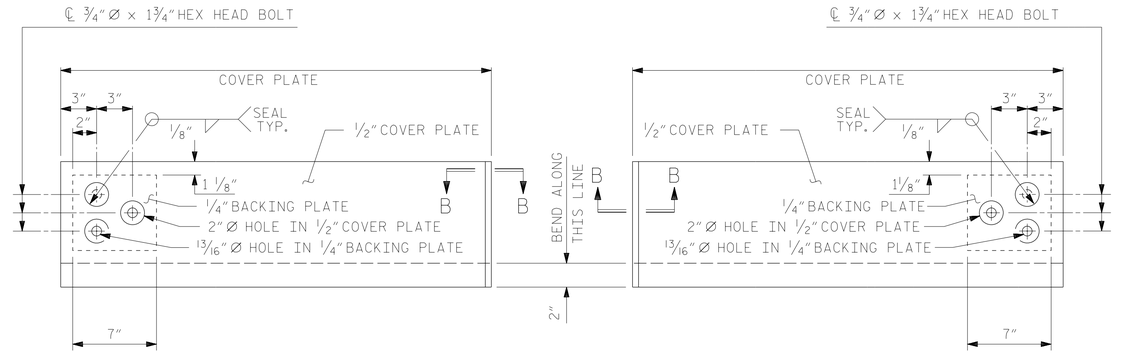
AcostaM



SECTION THRU RAIL NORMAL TO JOINT



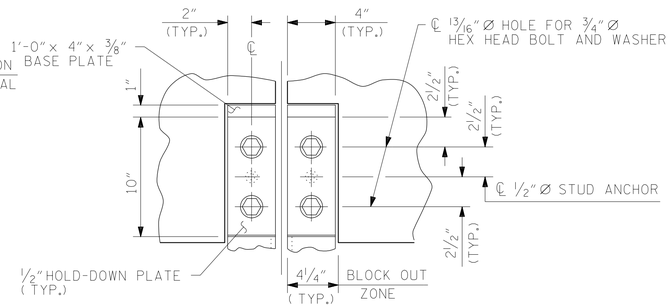
END VIEW



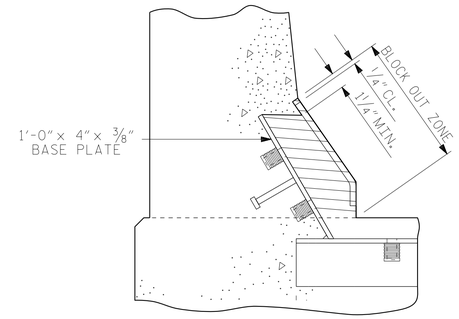
TYPE I - ELEVATION VIEW

TYPE II - ELEVATION VIEW

COVER PLATE DETAILS

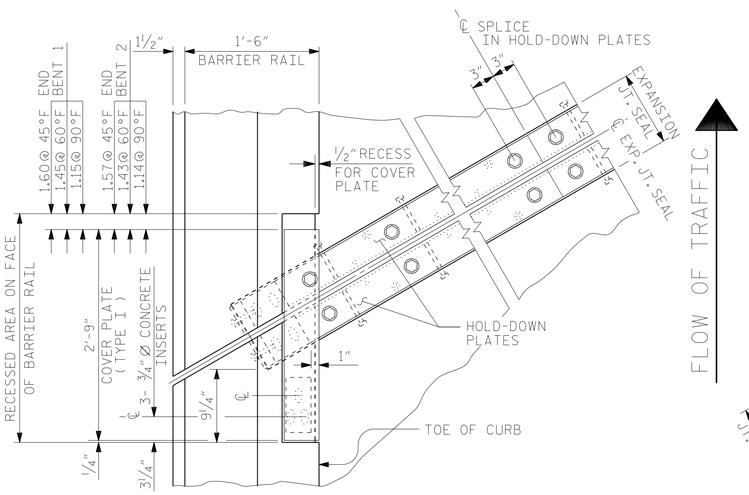


SECTION A - A

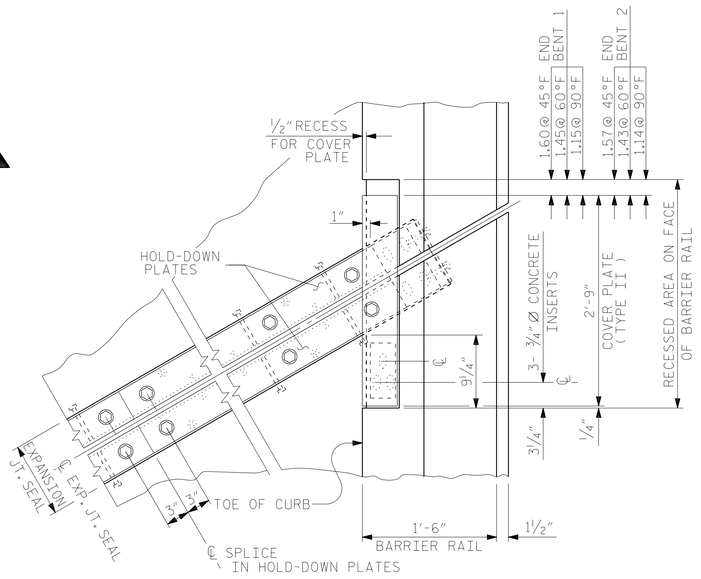


BLOCK OUT DETAIL

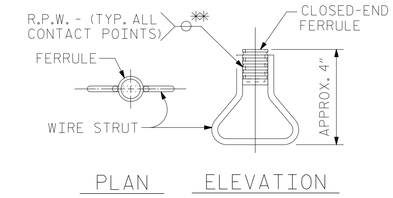
SEE "SECTION A - A" FOR OTHER DETAILS.



FLOW OF TRAFFIC



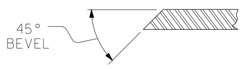
PLAN OF EXPANSION JOINT SEAL



PLAN ELEVATION

CONCRETE INSERT

** EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.



SECTION B - B

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

ASSEMBLED BY : NSC		DATE : 01/2018
CHECKED BY : MKO		DATE : 02/2018
DRAWN BY : REK 9/87	REV. 7/12	MAA/GM
CHECKED BY : CRK 10/87	REV. 6/13	MAA/GM
	REV. 12/17	MAA/THC

3/27/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\404_U2412A_SMU_JS2_401273.dgn
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-26
1			3			TOTAL SHEETS
2			4			44

STD. NO. EJS2

STR. #4

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1001	654	#5	STR	38′-11″	26546
✳ A1002	1	#5	STR	2′-2″	2
✳ A1003	1	#5	STR	2′-8″	3
✳ A1004	1	#5	STR	3′-2″	3
✳ A1005	1	#5	STR	3′-8″	4
✳ A1006	1	#5	STR	4′-2″	4
✳ A1007	1	#5	STR	4′-8″	5
✳ A1008	1	#5	STR	5′-2″	5
✳ A1009	1	#5	STR	5′-8″	6
✳ A1010	1	#5	STR	6′-2″	6
✳ A1011	1	#5	STR	6′-9″	7
✳ A1012	1	#5	STR	7′-3″	8
✳ A1013	1	#5	STR	7′-9″	8
✳ A1014	1	#5	STR	8′-3″	9
✳ A1015	1	#5	STR	8′-9″	9
✳ A1016	1	#5	STR	9′-3″	10
✳ A1017	1	#5	STR	9′-9″	10
✳ A1018	1	#5	STR	10′-3″	11
✳ A1019	1	#5	STR	10′-9″	11
✳ A1020	1	#5	STR	11′-3″	12
✳ A1021	1	#5	STR	11′-9″	12
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✳ A1024	1	#5	STR	13′-3″	14
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✳ A1026	1	#5	STR	14′-3″	15
✳ A1027	1	#5	STR	14′-9″	15
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✳ A1029	1	#5	STR	15′-9″	16
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✳ A1031	1	#5	STR	16′-10″	18
✳ A1032	1	#5	STR	17′-4″	18
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✳ A1114	1	#5	STR	19′-7″	20
✳ A1115	1	#5	STR	19′-1″	20
✳ A1116	1	#5	STR	18′-7″	19
✳ A1117	1	#5	STR	18′-1″	19
✳ A1118	1	#5	STR	17′-7″	18
✳ A1119	1	#5	STR	17′-2″	18
✳ A1120	1	#5	STR	16′-8″	17
✳ A1121	1	#5	STR	16′-2″	17
✳ A1122	1	#5	STR	15′-8″	16
✳ A1123	1	#5	STR	15′-2″	16
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✳ A1127	1	#5	STR	13′-3″	14
✳ A1128	1	#5	STR	12′-9″	13
✳ A1129	1	#5	STR	12′-3″	13
✳ A1130	1	#5	STR	11′-10″	12
✳ A1131	1	#5	STR	11′-4″	12
✳ A1132	1	#5	STR	10′-10″	11
✳ A1133	1	#5	STR	10′-4″	11
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✳ A1149	1	#5	STR	2′-8″	3
✳ A1150	1	#5	STR	2′-2″	2
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A2150	1	#5	STR	2′-2″	2
✳ B1	141	#4	STR	29′-9″	2802
✳ B2	188	#6	STR	49′-0″	13836
✳ B3	92	#6	STR	37′-5″	5873
✳ B4	94	#4	STR	29′-1″	1826
✳ B5	141	#4	STR	26′-4″	2480
✳ B6	30	#4	STR	28′-5″	569
B7	287	#5	STR	58′-9″	17586
B8	60	#5	STR	42′-6″	2660
✳ J1	108	#4	9	1′-5″	102
✳ K1	8	#8	8	23′-6″	502
✳ K2	8	#8	6	34′-6″	737
K3	6	#4	STR	14′-2″	57
K4	24	#6	STR	9′-10″	354
K5	48	#6	STR	14′-5″	1039
K6	12	#6	STR	13′-5″	242
K7	20	#6	STR	26′-0″	781
K8	8	#6	2	10′-9″	129
K9	8	#6	1	21′-4″	256
K10	3	#6	STR	15′-3″	69
K11	3	#6	STR	13′-10″	62
K12	3	#6	STR	12′-6″	56
K13	3	#6	STR	11′-1″	50
K14	3	#6	STR	9′-9″	44
K17	6	#4	STR	14′-7″	58
K18	3	#6	STR	9′-11″	45
K19	3	#6	STR	11′-4″	51
K20	3	#6	STR	12′-9″	57
K21	3	#6	STR	14′-1″	63
K22	3	#6	STR	15′-6″	70
✳ S1	60	#4	5	8′-1″	324
✳ S2	60	#5	4	6′-1″	381
S3	324	#4	3	4′-5″	956
S4	24	#4	7	12′-5″	199
S5	24	#5	7	3′-0″	75
✳ U1	42	#4	STR	20′-10″	585
✳ G1	4	#5	STR	31′-3″	130

REINFORCING STEEL	54,657 LBS.
✳EPOXY COATED REINFORCING STEEL	59,935 LBS.

GROOVING BRIDGE FLOORS

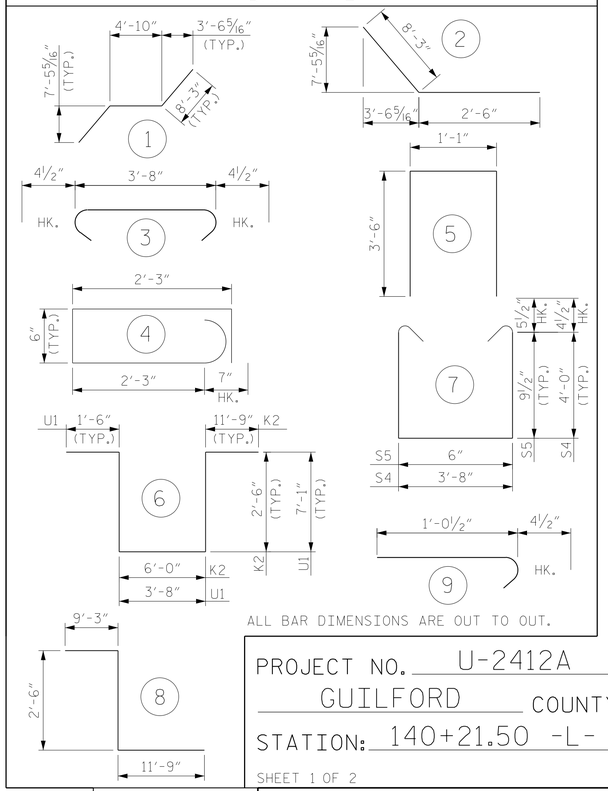
APPROACH SLABS	1,597 SQ.FT.
BRIDGE DECK	13,097 SQ.FT.
TOTAL	14,694 SQ.FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	136		
POUR 2	255		
POUR 3	222		
POUR 4	33		
TOTALS**	646	54,657	59,935

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

DRAWN BY : MRA DATE : 01/2018

CHECKED BY : JMR DATE : 02/2018

DESIGN ENGINEER OF RECORD: JMR DATE : 01/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
4/18/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-27
1			3			TOTAL SHEETS
2			4			46

4/17/2018
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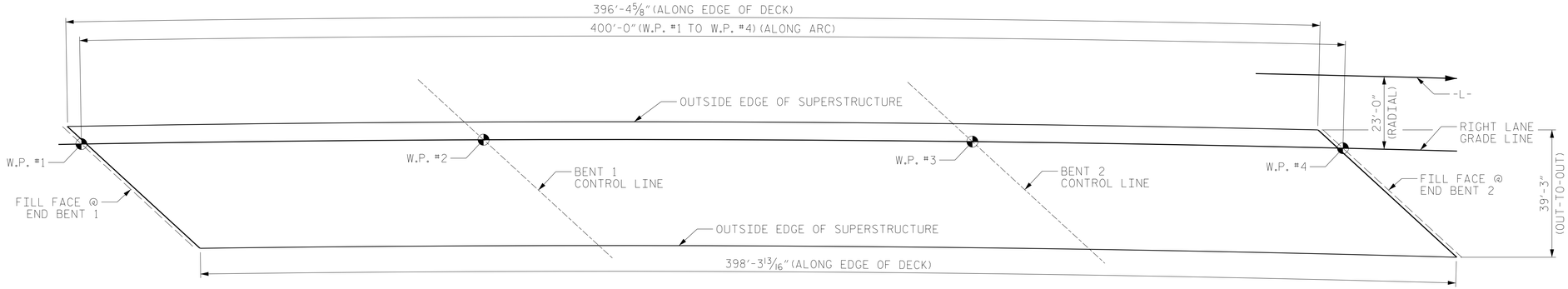
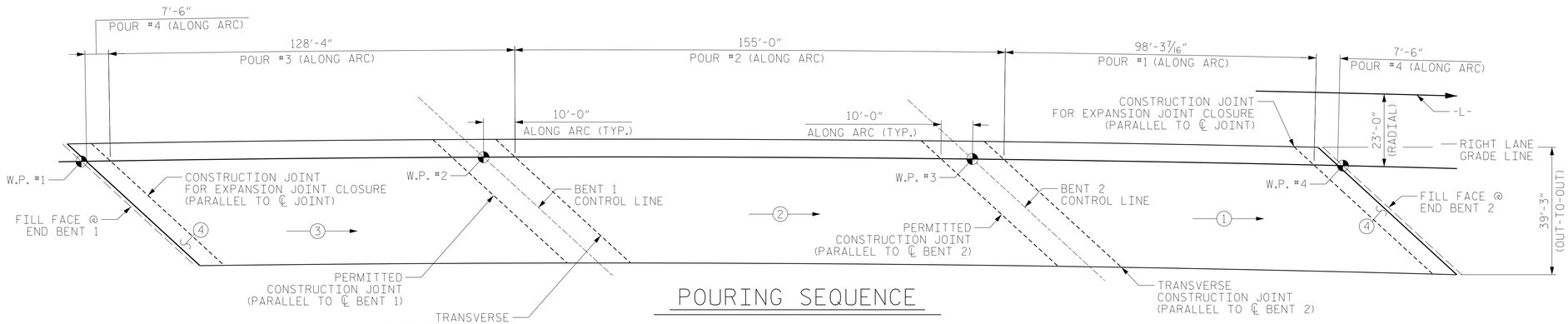
STR. #4

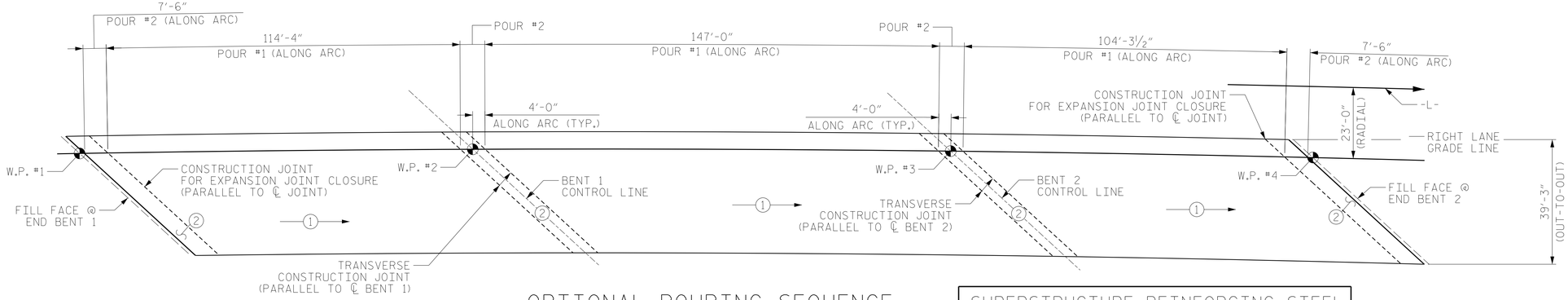


LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB

(SQ. FT = 15,596)

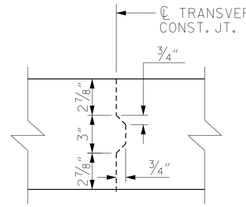


POURING SEQUENCE



OPTIONAL POURING SEQUENCE

POUR ② CANNOT BE STARTED UNTIL THE ADJACENT POUR ① REACHES A MINIMUM STREGNTH OF 3,000 PSI.



TRANSVERSE CONSTRUCTION JOINT DETAIL

REINFORCING STEEL IN SLAB NOT SHOWN.
LONGITUDINAL REINFORCEMENT SHALL BE
CONTINOUS THROUGH JOINT.

SUPERSTRUCTURE REINFORCING STEEL LENGTHS ARE BASED ON THE FOLLOWING MINIMUM SPLICE LENGTHS

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	2′-0″	1′-9″	2′-0″	1′-9″	2′-9″
#5	2′-6″	2′-2″	2′-6″	2′-2″	3′-5″
#6	3′-0″	2′-7″	3′-10″	2′-7″	4′-4″
#7	5′-3″	3′-6″			
#8	6′-10″	4′-7″			

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PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JOSHUA MARK ROBINSON
4/18/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-28
1			3			TOTAL SHEETS
2			4			46

STR. #4

DRAWN BY :	MRA	DATE : 01/2018
CHECKED BY :	JMR	DATE : 02/2018
DESIGN ENGINEER OF RECORD:	JMR	DATE : 01/2018

4/17/2018
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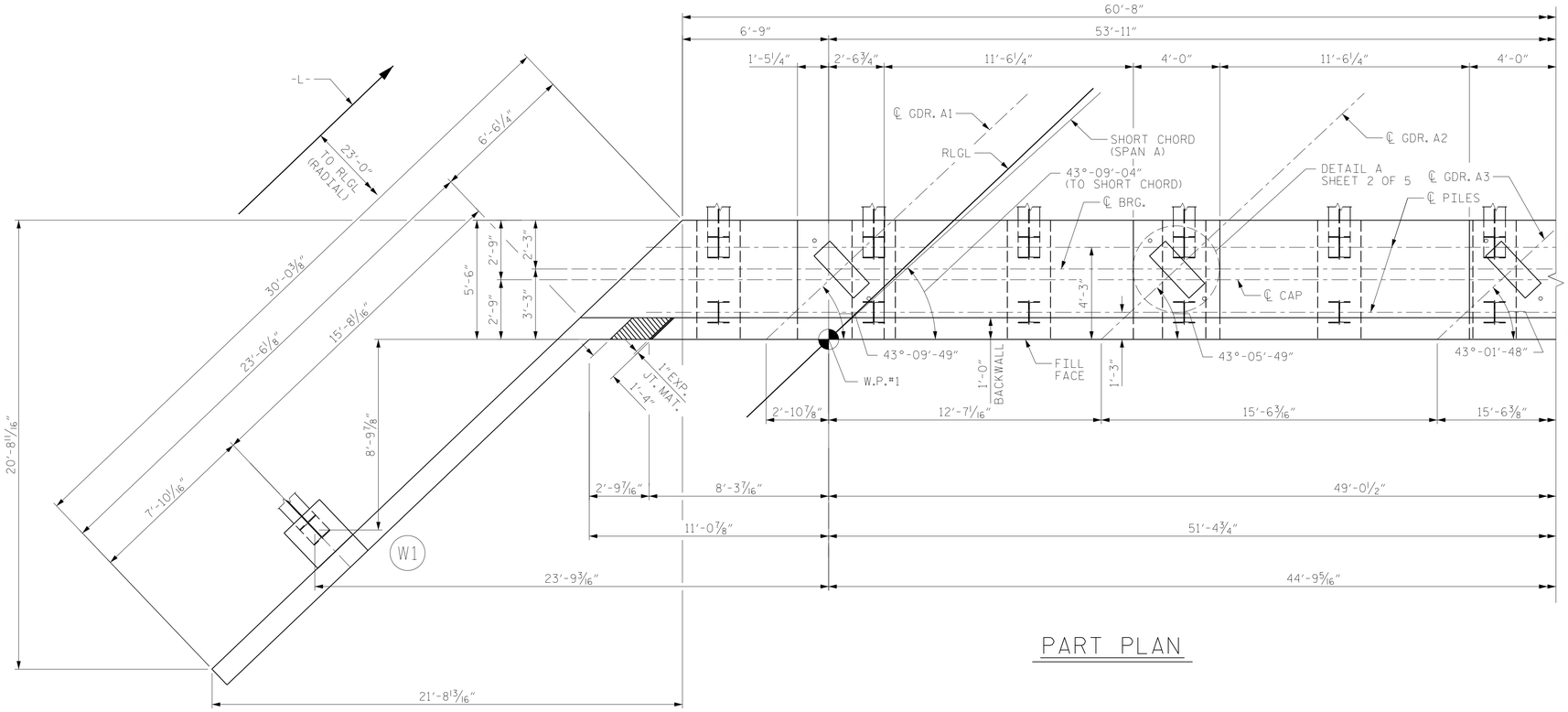
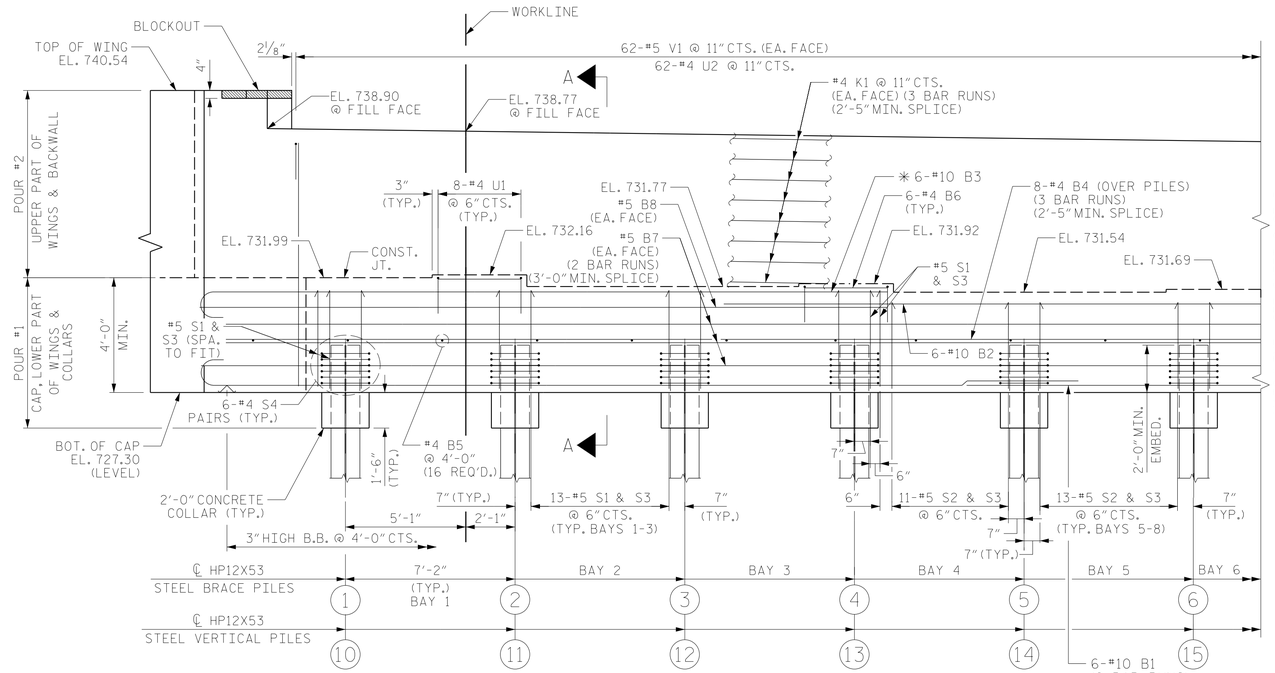


PART PLAN



PART ELEVATION

WINGS AND WING PILES NOT SHOWN FOR CLARITY

NOTES

STIRRUPS AND #4 U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR SECTION A-A AND PARTIAL SECTION AT BRIDGE SEAT, SEE SHEET 5 OF 5.

FOR PILE SPLICE DETAILS, SEE SHEET 5 OF 5.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

✳FIELD CUT B3 BARS AS NECESSARY TO PROVIDE 2" MINIMUM CLEAR COVER.

RLGL = RIGHT LANE GRADE LINE

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 5

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 DocuSigned by: Justin Robinson 03A31EDCD8E4496... JUSTIN MARK ROBINSON 3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 1

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-29
1			3			TOTAL SHEETS
2			4			46

DRAWN BY :	JTC	DATE :	01/2018
CHECKED BY :	PDS	DATE :	02/2018
DESIGN ENGINEER OF RECORD:	PDS	DATE :	02/2018

3/27/2018
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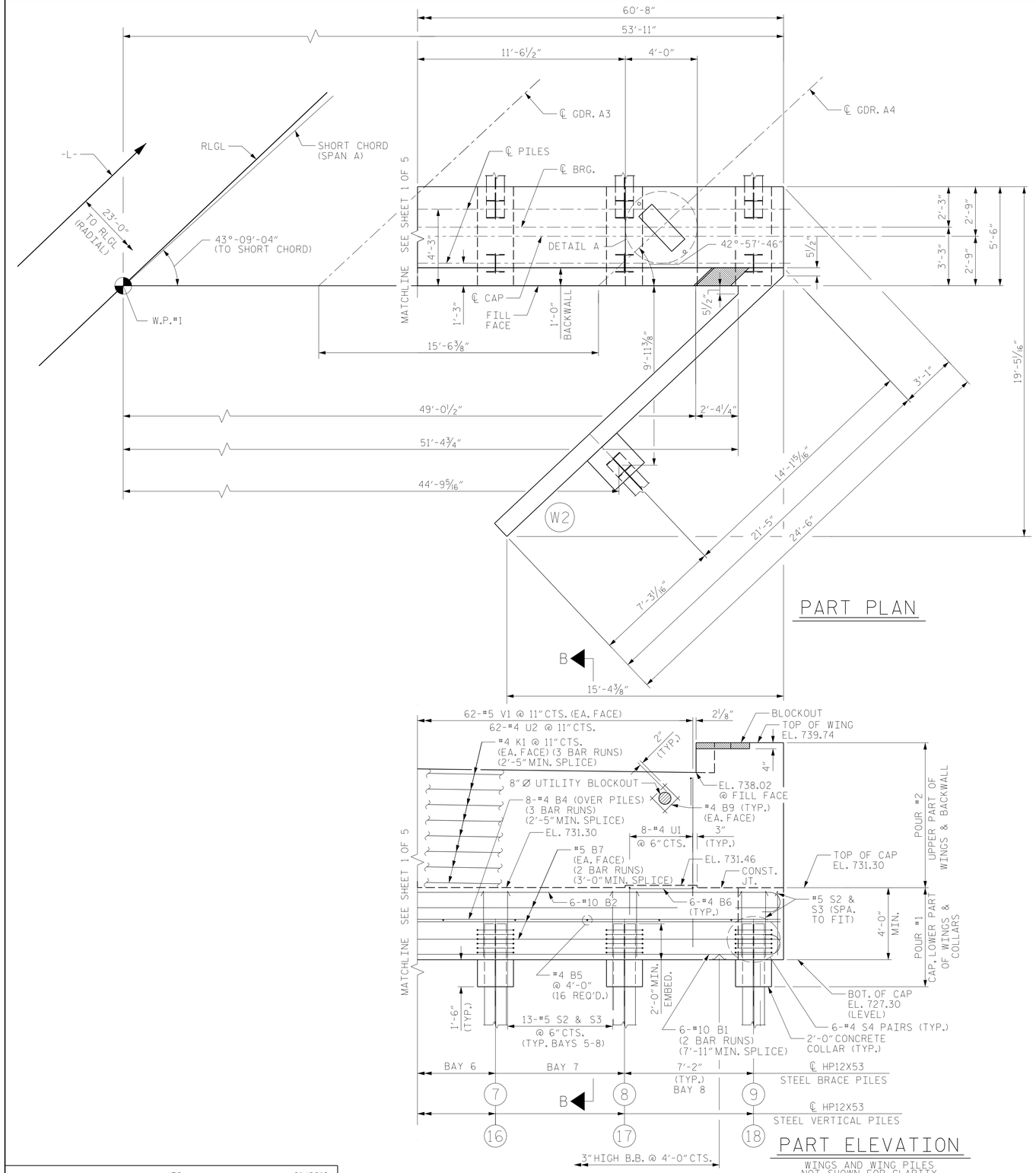
AcostaM

STR. #4



PART PLAN

PART ELEVATION

WINGS AND WING PILES NOT SHOWN FOR CLARITY

NOTES

STIRRUPS AND #4 U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR SECTION B-B AND PARTIAL SECTION AT BRIDGE SEAT, SEE SHEET 5 OF 5.

FOR PILE SPLICE DETAILS, SEE SHEET 5 OF 5.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

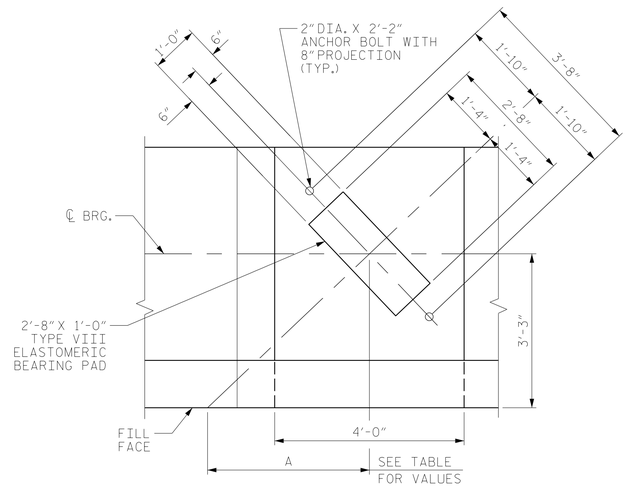
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

CENTER UTILITY IN BLOCKOUT AND FILL ANNULAR SPACE AROUND UTILITY PIPE WITH JOINT FILLER IN ACCORDANCE WITH STANDARD SPECIFICATION ARTICLE 1028-1.

THE LOCATION OF THE UTILITY BLOCKOUT SHALL BE VERIFIED BY THE ENGINEER PRIOR TO CONSTRUCTION OF THE END BENT. PLACE BLOCKOUT ALONG SKEW.

REINFORCING STEEL IN THE BACKWALL MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR THE UTILITY BLOCKOUT.

RLGL = RIGHT LANE GRADE LINE



DETAIL A

DIMENSIONS TYP. EA. BRG. PILES NOT SHOWN FOR CLARITY

TABLE	
GDR.	A
A1	3'-5⁹⁄₁₆"
A2	3'-5¹¹⁄₁₆"
A3	3'-5¾"
A4	3'-5⅞"

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 5

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047993 JOHN MARK ROBINSON
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 1

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-30
1			3			TOTAL SHEETS
2			4			46

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DRAWN BY :	JTC	DATE :	01/2018
CHECKED BY :	PDS	DATE :	02/2018
DESIGN ENGINEER OF RECORD:	PDS	DATE :	02/2018

3/27/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\404_U2412A_SMU_E2_401273.dgn
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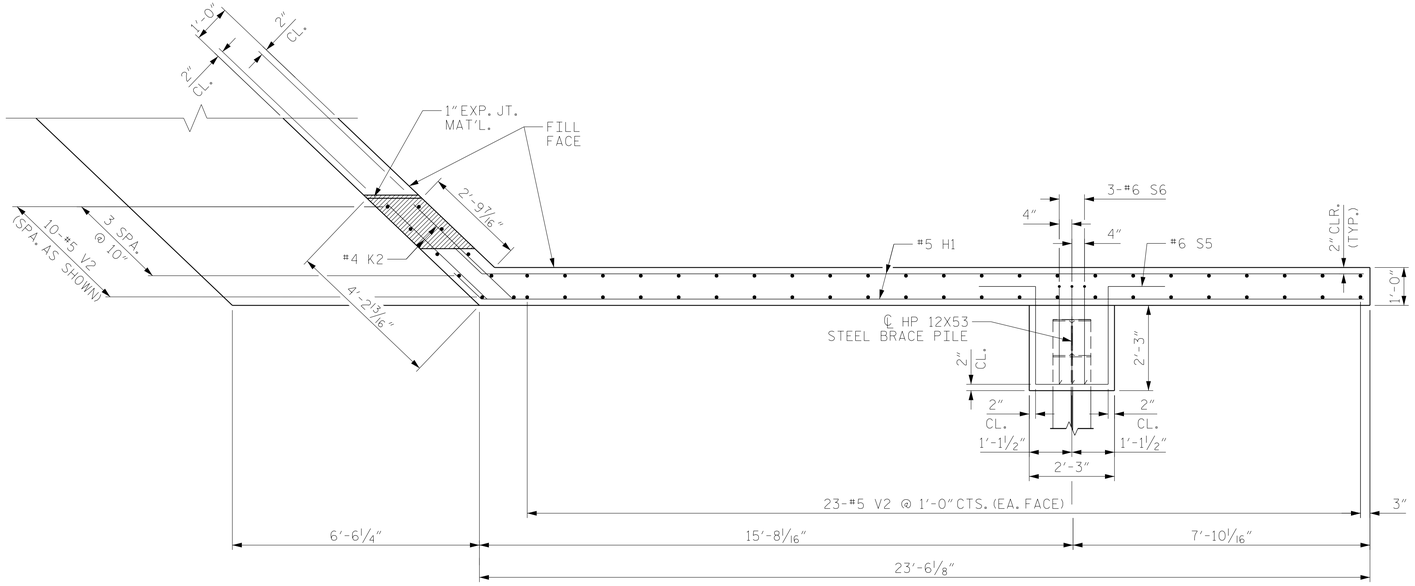
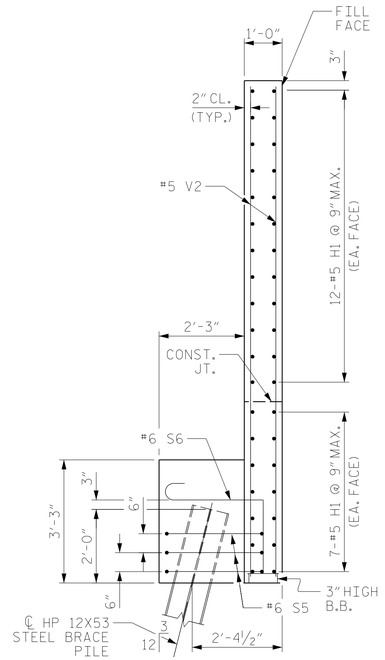
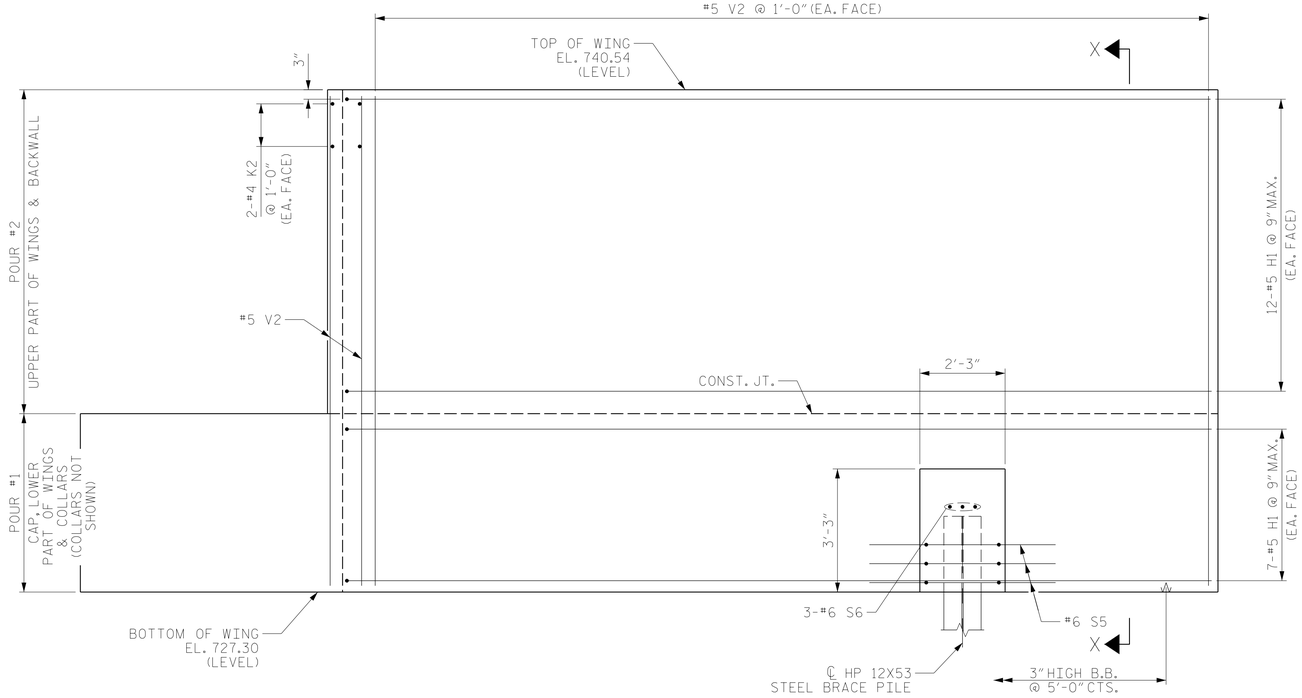
STR. #4



PLAN OF WING W1



SECTION X-X



ELEVATION OF WING W1

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 3 OF 5

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
Preliminary Plans Not Designed for Construction
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT NO. 1

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-31
1			3			TOTAL SHEETS
2			4			46

DRAWN BY : JTC DATE : 01/2018
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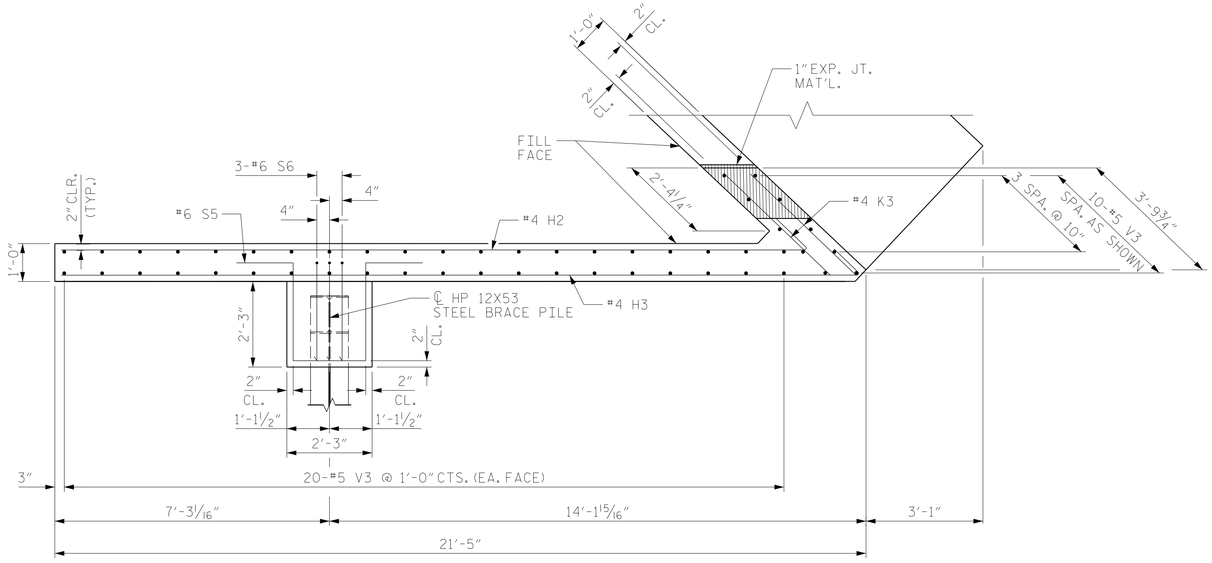
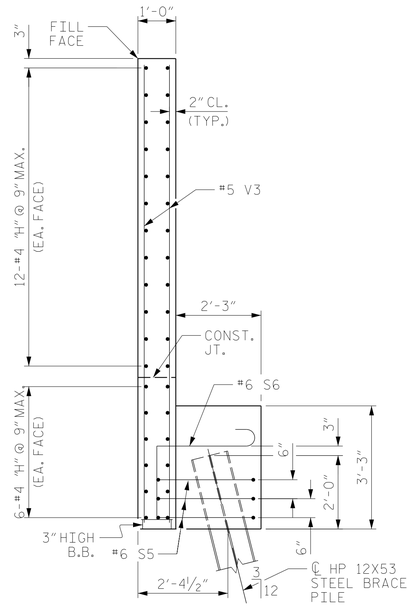
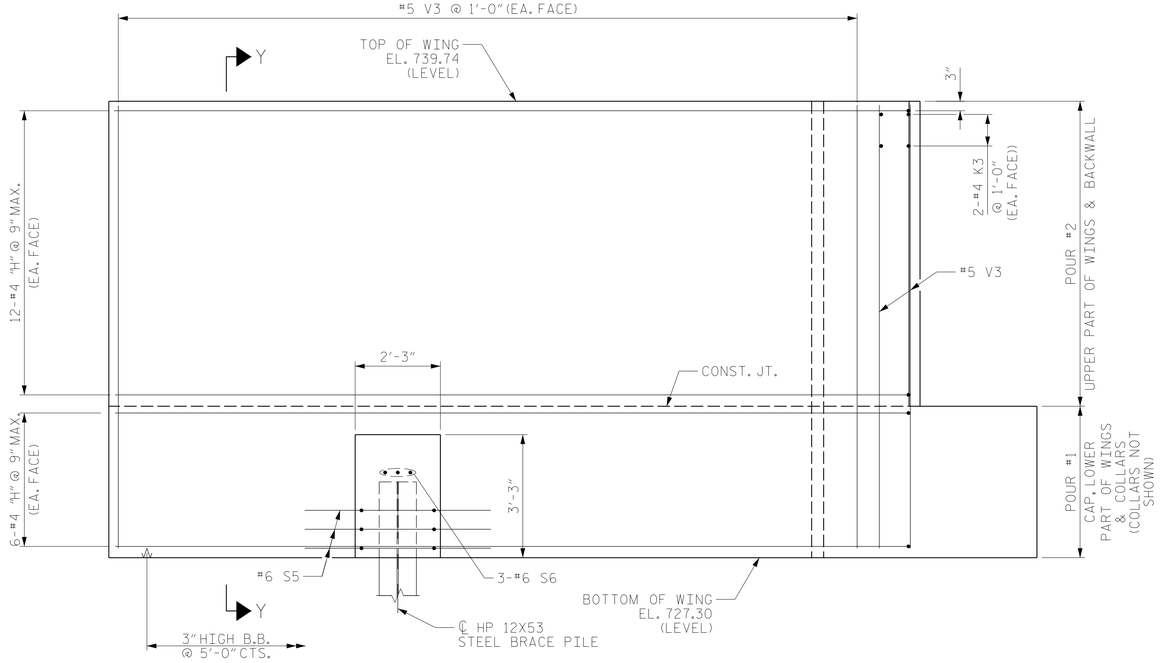
STR. #4



PLAN OF WING W2



SECTION Y-Y



ELEVATION OF WING W2

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 4 OF 5

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
Digitally signed by Justin Mark Robinson
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 1

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-32
1			3			TOTAL SHEETS
2			4			46

DRAWN BY : JTC DATE : 01/2018
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DESIGN ENGINEER OF RECORD: PDS DATE : 02/2018

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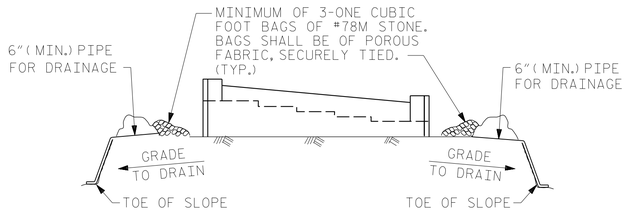
STR. #4

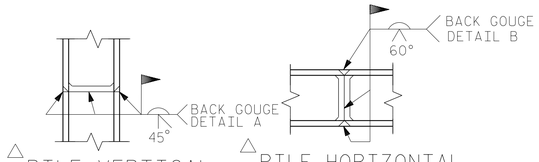


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

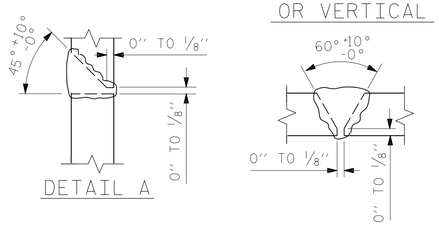
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



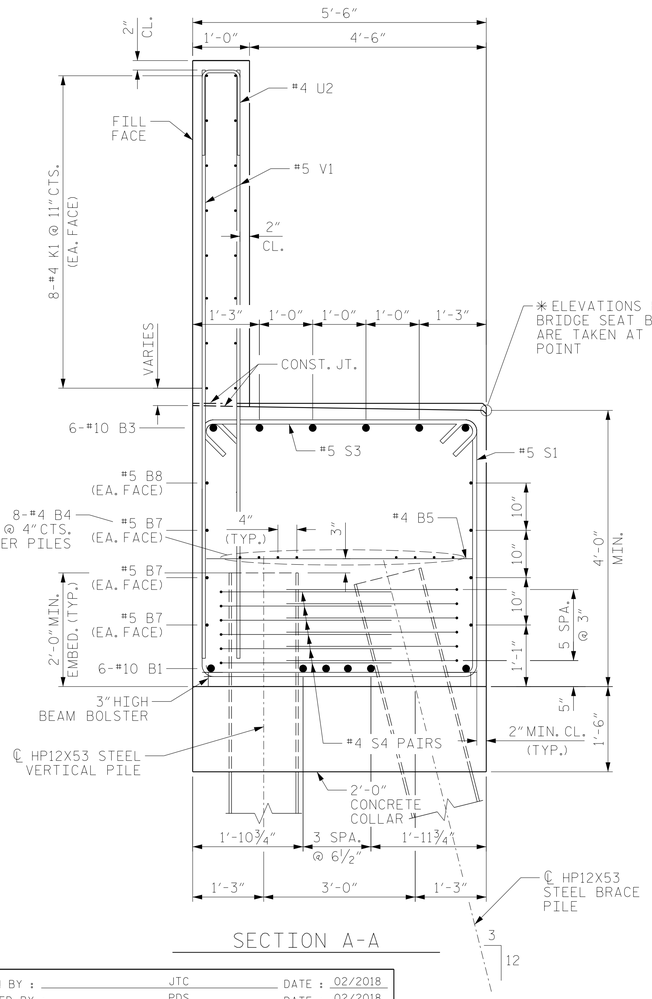
△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL

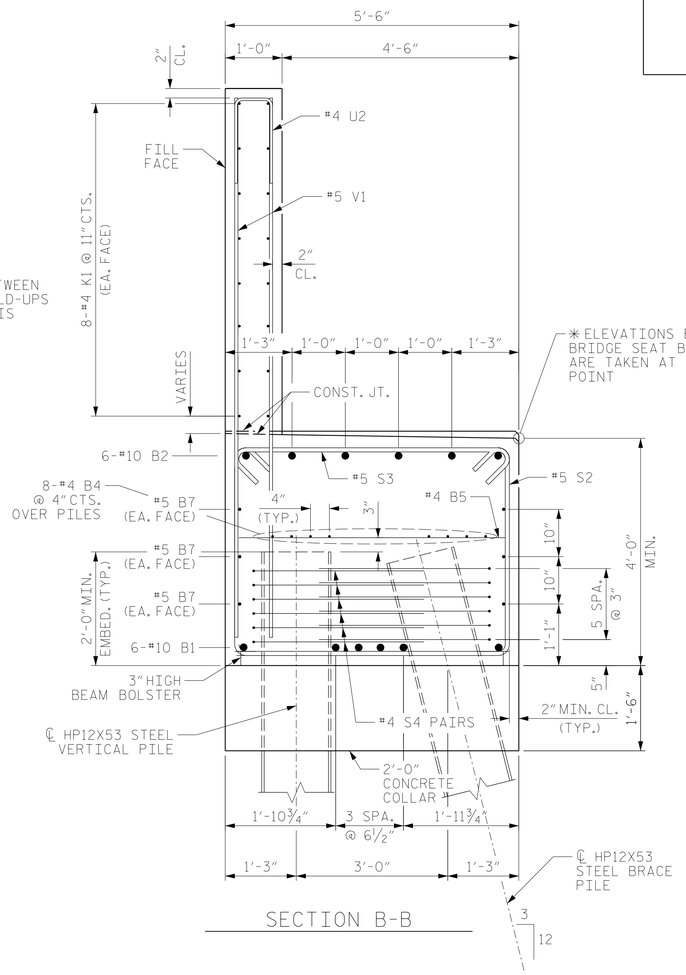


△ POSITION OF PILE DURING WELDING.

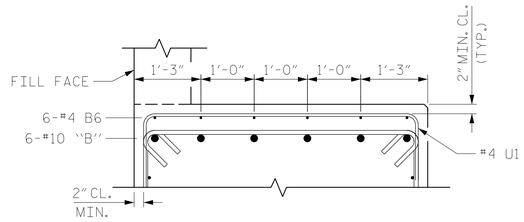
PILE SPLICE DETAILS



SECTION A-A

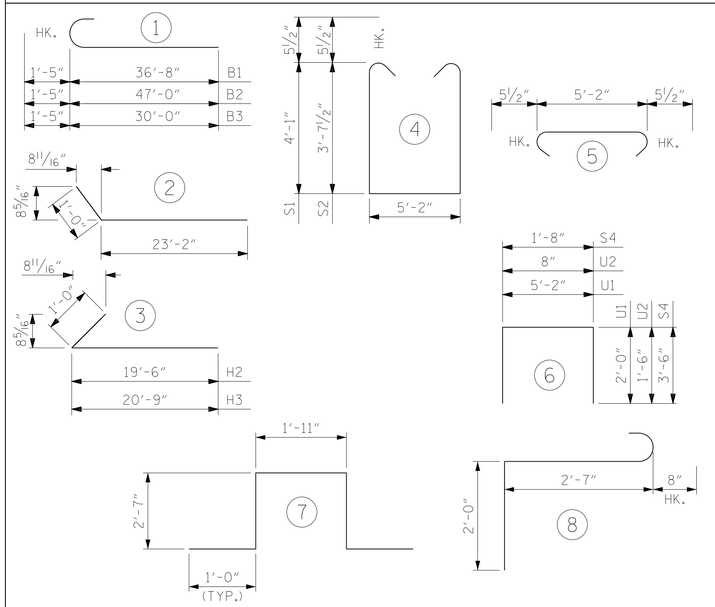


SECTION B-B



PARTIAL SECTION AT BRIDGE SEAT

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#10	1	38'-1"	1966
B2	6	#10	1	48'-5"	1250
B3	6	#10	1	31'-5"	811
B4	24	# 4	STR	23'-4"	374
B5	16	# 4	STR	5'-2"	55
B6	24	# 4	STR	3'-8"	59
B7	12	# 5	STR	34'-3"	429
B8	2	# 5	STR	29'-9"	62
B9	8	# 4	STR	1'-4"	7
H1	38	# 5	2	24'-2"	958
H2	18	# 4	3	20'-6"	246
H3	18	# 4	3	21'-9"	262
K1	48	# 4	STR	23'-6"	754
K2	4	# 4	STR	3'-8"	10
K3	4	# 4	STR	3'-7"	10
S1	43	# 5	4	14'-3"	639
S2	65	# 5	4	13'-4"	904
S3	108	# 5	5	6'-1"	685
S4	108	# 4	6	8'-8"	625
S5	6	# 6	7	9'-1"	82
S6	6	# 6	8	5'-3"	47
U1	32	# 4	6	9'-2"	196
U2	62	# 4	6	3'-8"	152
V1	62	# 5	STR	10'-3"	663
V2	56	# 5	STR	12'-10"	750
V3	50	# 5	STR	12'-0"	626

REINFORCING STEEL 12,622 LBS.

CLASS A CONCRETE BREAKDOWN

POUR #1 CAP, LOWER PART OF WING & COLLARS 70.2 C.Y.

POUR #2 UPPER PART OF WING & BACKWALL 30.4 C.Y.

TOTAL CLASS A CONCRETE 100.6 C.Y.

HP 12 X 53 STEEL PILES

NO: 20 LIN. FT.= 475

PILE DRIVING EQUIPMENT SETUP

HP 12 X 53 NO. = 20

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 5 OF 5

DRAWN BY :	JTC	DATE :	02/2018
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Justin Robinson
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

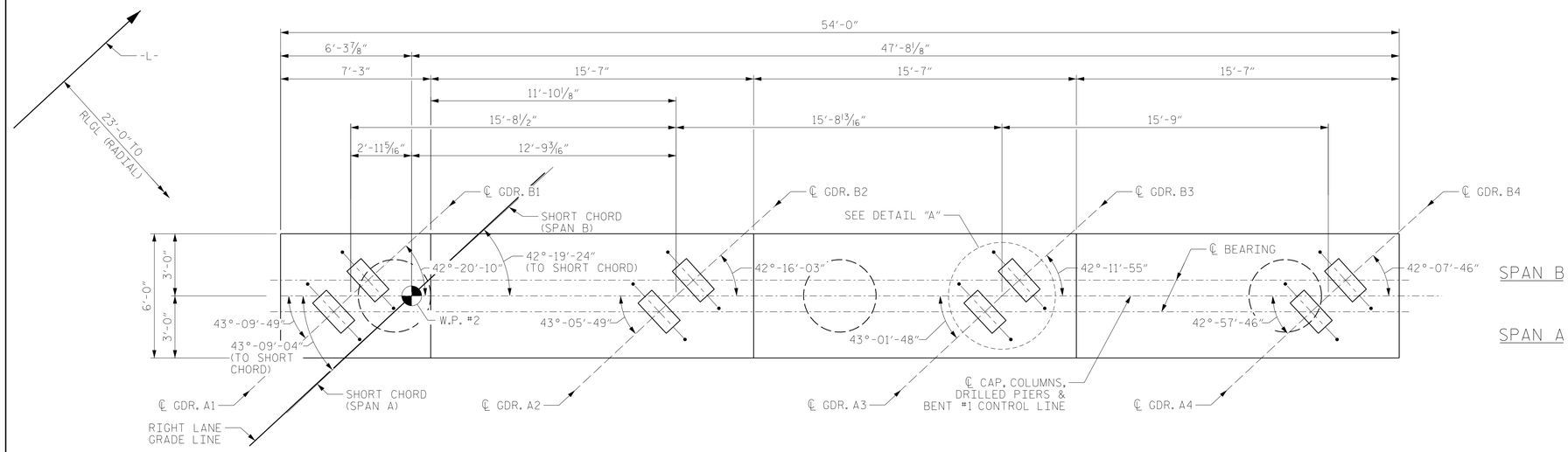
SUBSTRUCTURE

END BENT NO. 1

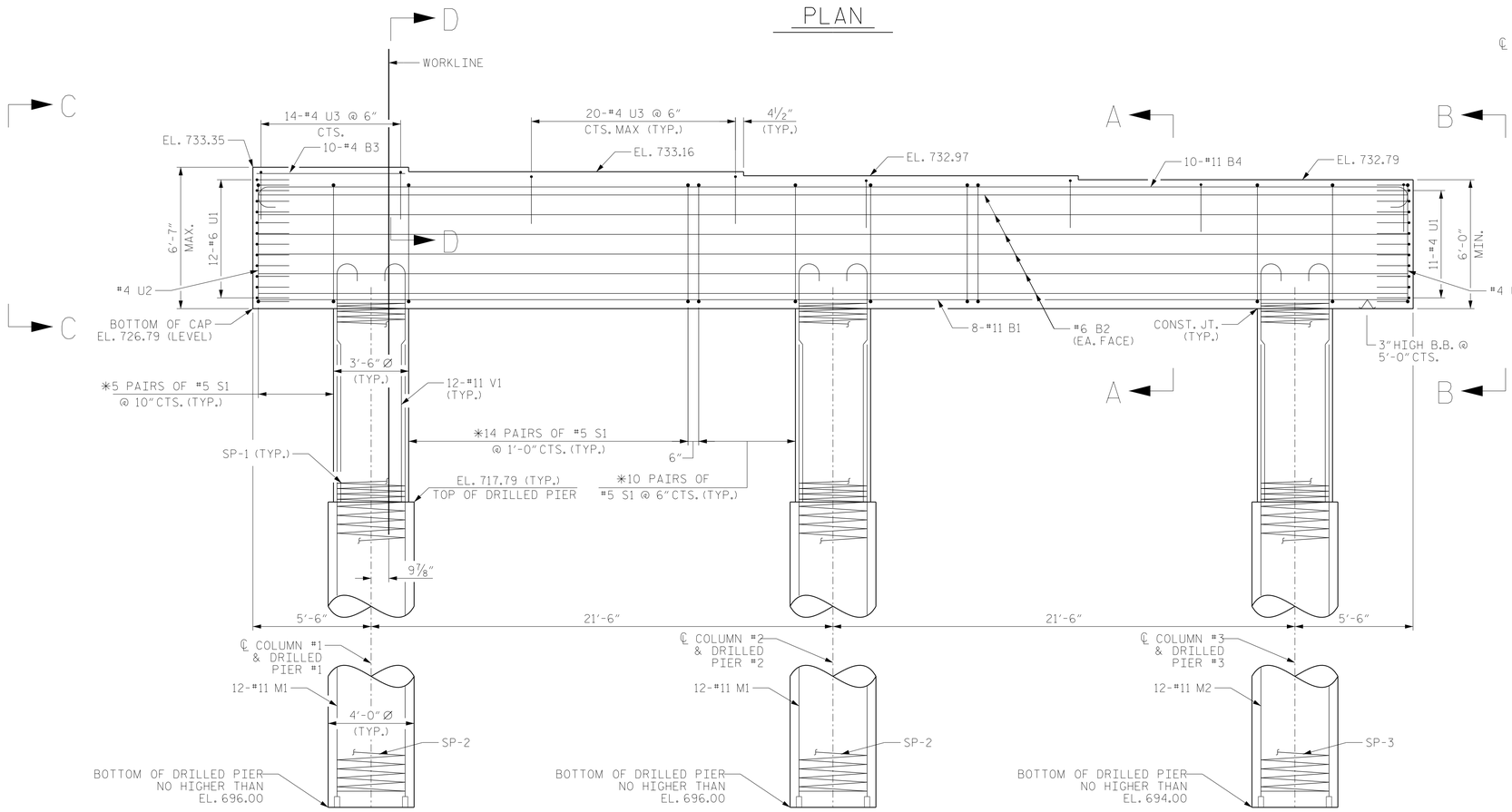
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-33
1			3			TOTAL SHEETS
2			4			46

STR. #4



PLAN



ELEVATION

LOOKING AHEAD STATION

NOTES:

FOR SECTION CUTS AND VIEWS, SEE SHEET 2 OF 2.

FOR REINFORCING BILL OF MATERIAL, SEE SHEET 2 OF 2.

STIRRUPS AND U3 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

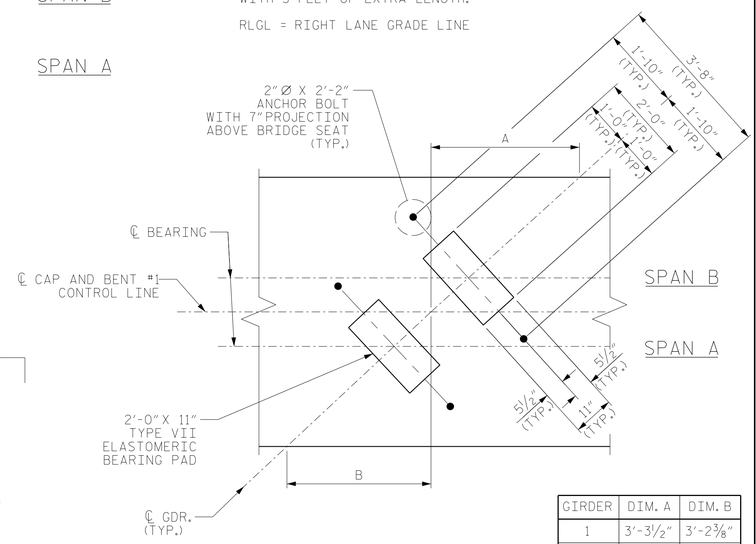
ALL STEEL IN THE DRILLED SHAFTS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL".

* INVERT ALTERNATE #5 S1 STIRRUP PAIRS.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FOOT BELOW THE GROUND LINE.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

RLGL = RIGHT LANE GRADE LINE



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER, UNLESS NOTED OTHERWISE

GIRDER	DIM. A	DIM. B
1	3'-3½"	3'-2⅜"
2	3'-3⅝"	3'-2½"
3	3'-3¹¹⁄₁₆"	3'-2⁹⁄₁₆"
4	3'-3¹³⁄₁₆"	3'-2⅝"

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

DRAWN BY : MRA DATE : 01/2018

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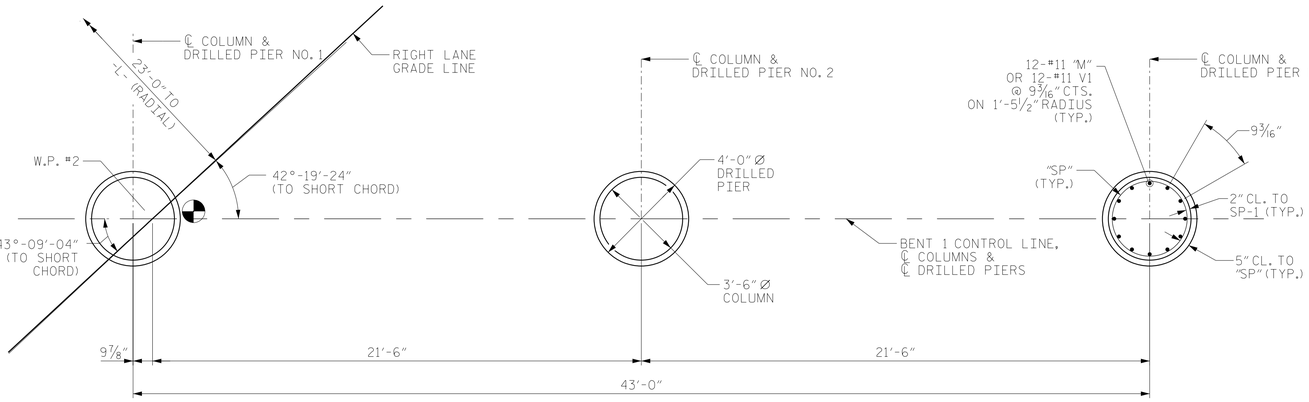
SUBSTRUCTURE

BENT NO. 1

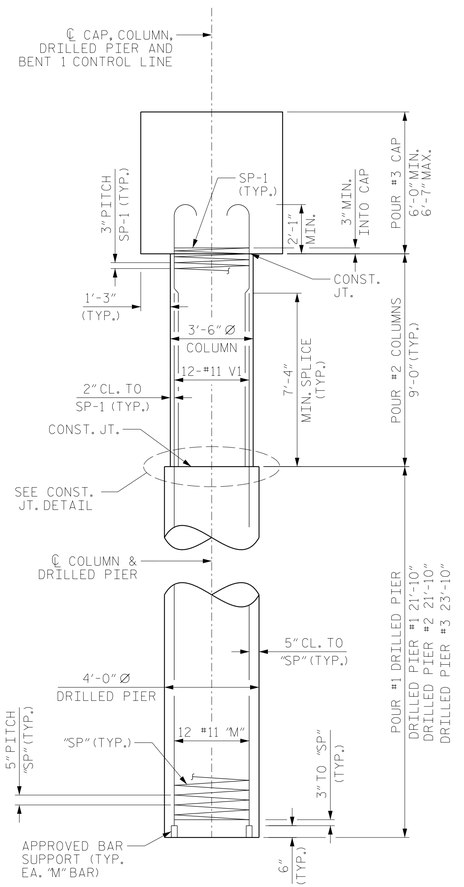
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-34
1			3			TOTAL SHEETS
2			4			46

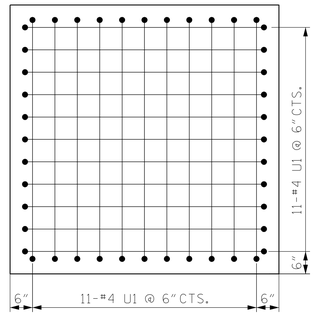
STR. #4



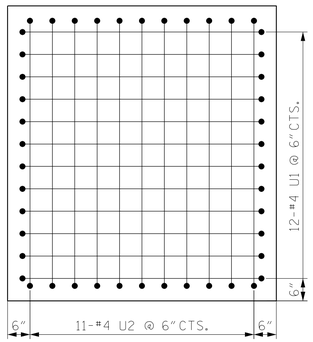
PLAN OF DRILLED PIERS & COLUMNS



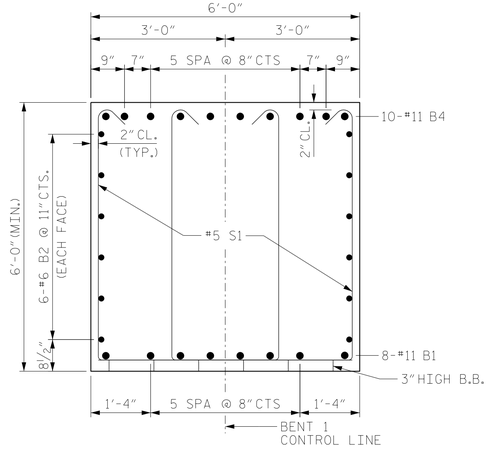
END ELEVATION



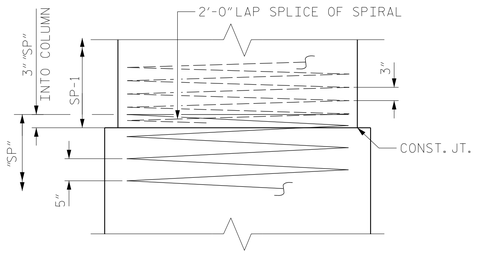
VIEW B-B



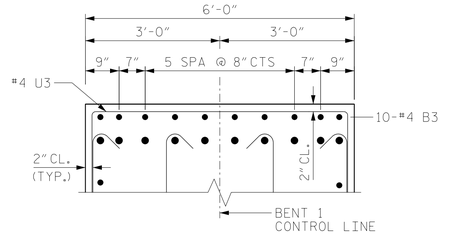
VIEW C-C



SECTION A-A

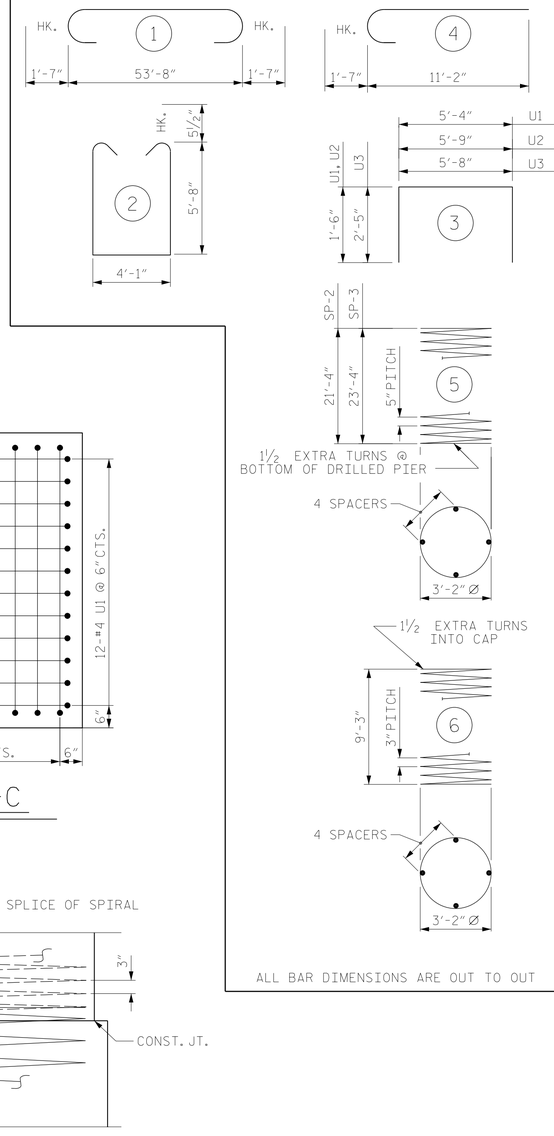


CONSTRUCTION JOIN DETAIL



SECTION D-D

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	STR	53'-8"	2281
B2	12	#6	STR	53'-8"	967
B3	10	#4	STR	6'-11"	46
B4	10	#11	1	56'-10"	3019
M1	24	#11	STR	31'-8"	4037
M2	12	#11	STR	33'-8"	2146
S1	116	#5	2	16'-4"	1976
U1	34	#4	3	8'-4"	189
U2	11	#4	3	8'-9"	64
U3	74	#4	3	10'-6"	519
V1	36	#11	4	12'-8"	2423

REINFORCING STEEL (FOR BENT 1) 17,667 LBS.

SP-1	3	*	6	378'-1"	758
SP-2	2	**	5	514'-2"	1073
SP-3	1	**	5	563'-2"	587

SPIRAL COLUMN REINFORCING STEEL (FOR BENT 1) 2,418 LBS.

** THE SP-2, SP-3 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN (FOR BENT 1)

POUR #2 (COLUMNS)	9.7 C.Y.
POUR #3 (CAP)	75.0 C.Y.
TOTAL CLASS A CONCRETE	84.7 C.Y.

DRILLED PIERS: (FOR BENT 1)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	31.5 C.Y.
4'-0" Ø DRILLED PIER NOT IN SOIL	33.0 LIN. FT.
4'-0" Ø DRILLED PIER IN SOIL	32.0 LIN. FT.
△ CSL TUBES	288.0 LIN. FT.

△ NO SEPERATE PAYMENT WILL BE MADE FOR CSL TUBES. CSL TUBES WILL BE INCLUDED IN THE UNIT BID PRICE FOR DRILLED PIERS.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

DRAWN BY : MRA DATE : 01/2018
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RALEIGH

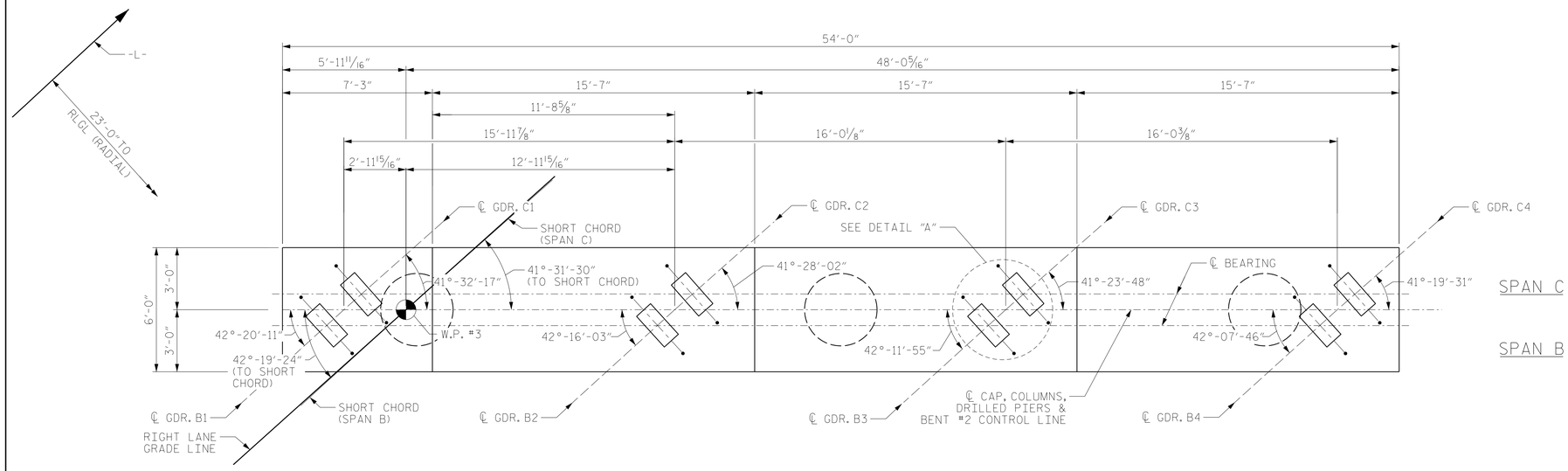
SUBSTRUCTURE

BENT NO.1 DETAILS

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-35
1			3			TOTAL SHEETS
2			4			46

STR. #4



PLAN

NOTES:

FOR SECTION CUTS AND VIEWS, SEE SHEET 2 OF 2.

FOR REINFORCING BILL OF MATERIAL, SEE SHEET 2 OF 2.

STIRRUPS AND U3 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

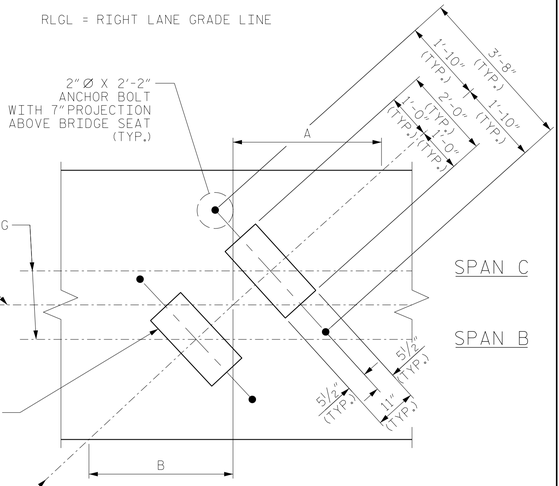
ALL STEEL IN THE DRILLED SHAFTS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL".

* INVERT ALTERNATE #5 S1 STIRRUP PAIRS.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FOOT BELOW THE GROUND LINE.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

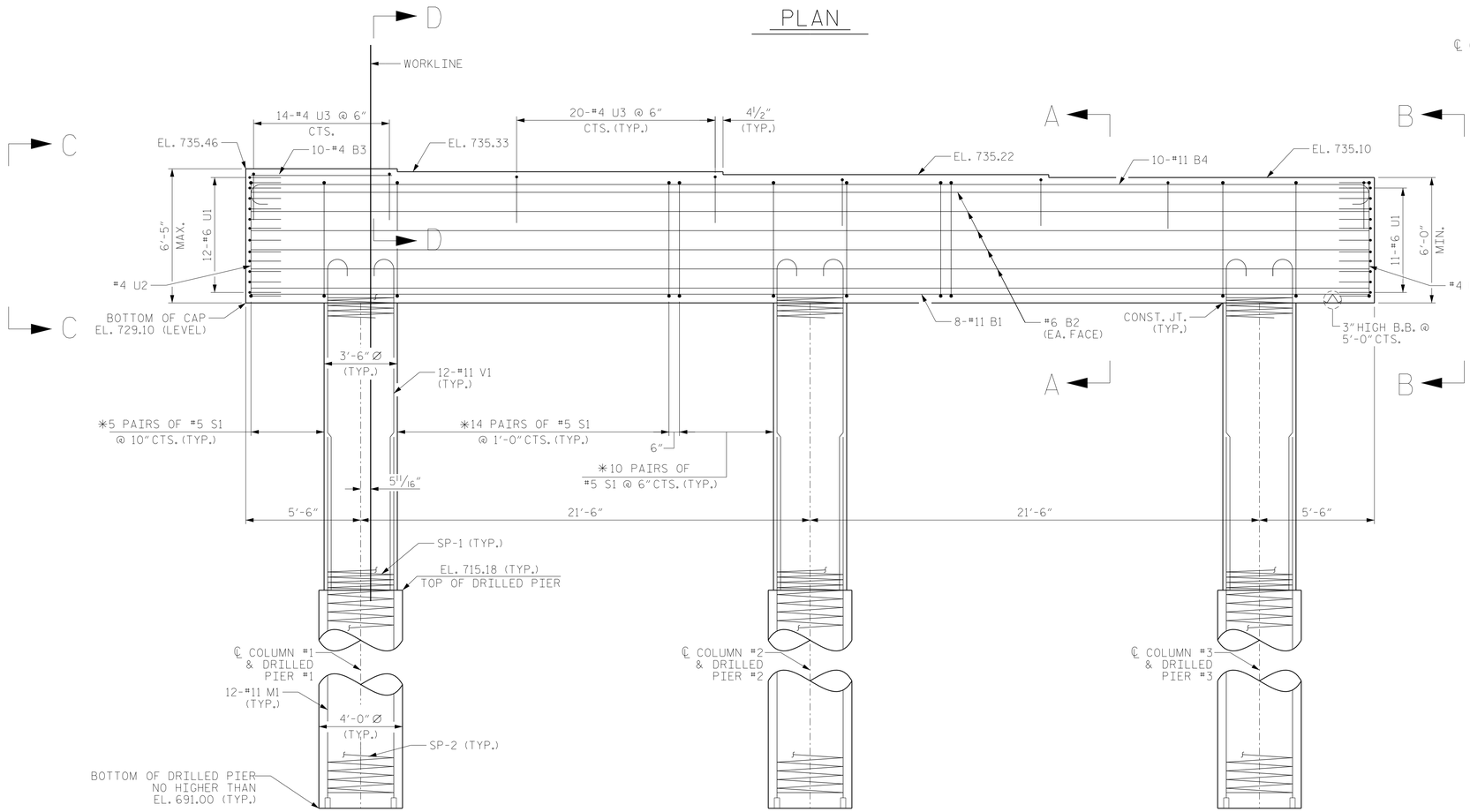
RLGL = RIGHT LANE GRADE LINE



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER, UNLESS NOTED OTHERWISE

GIRDER	DIM. A	DIM. B
1	3'-4 5/8"	3'-3 1/2"
2	3'-4 3/4"	3'-3 5/8"
3	3'-4 13/16"	3'-3 11/16"
4	3'-4 15/16"	3'-3 13/16"



ELEVATION

LOOKING AHEAD STATION

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

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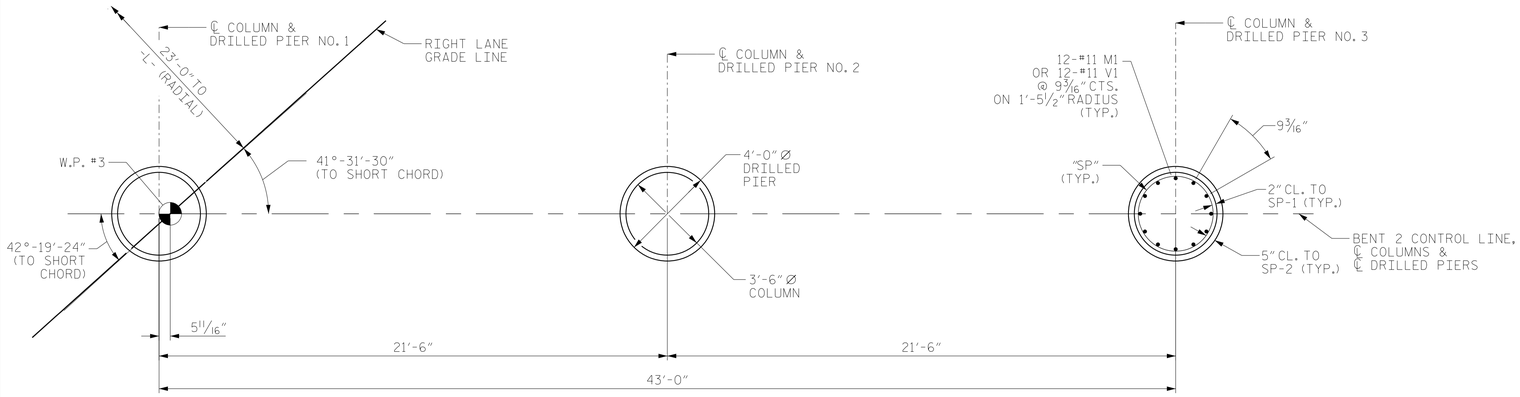
SUBSTRUCTURE

BENT NO. 2

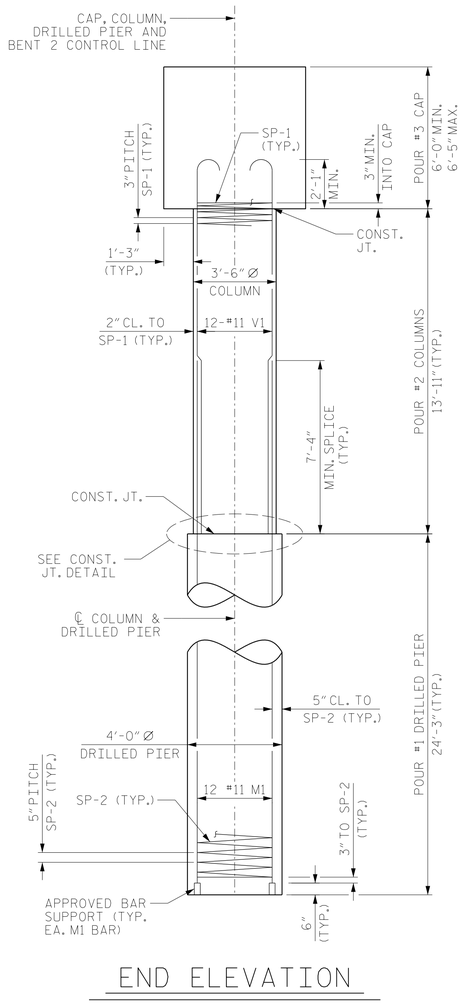
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-36
1			3			TOTAL SHEETS
2			4			46

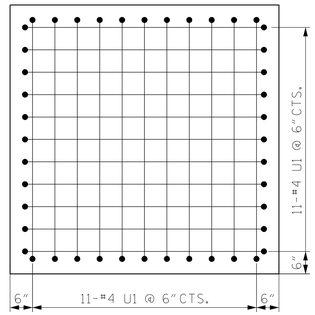
STR. #4



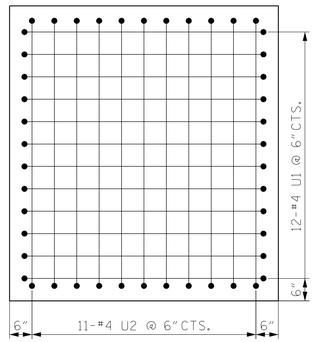
PLAN OF DRILLED PIERS & COLUMNS



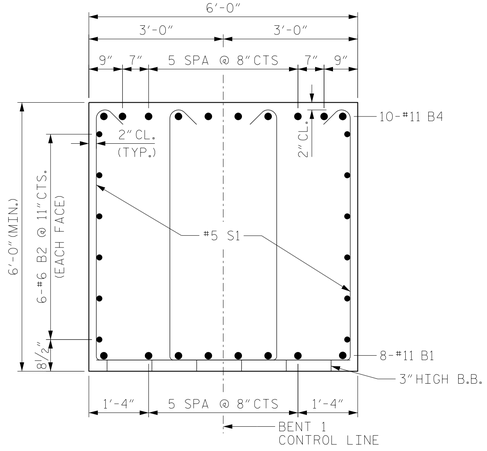
END ELEVATION



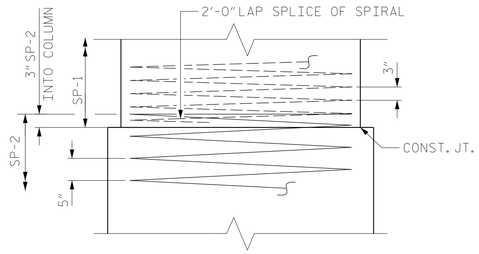
VIEW B-B



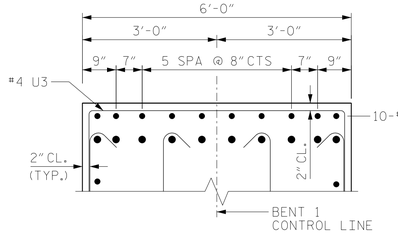
VIEW C-C



SECTION A-A

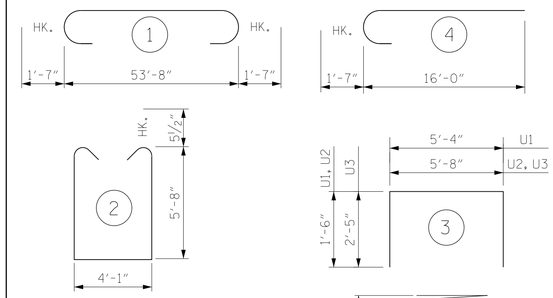


CONSTRUCTION JOINT DETAIL



SECTION D-D

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	STR	53'-8"	2281
B2	12	#6	STR	53'-8"	967
B3	10	#4	STR	6'-11"	46
B4	10	#11	1	56'-10"	3020
M1	36	#11	STR	34'-1"	6519
S1	116	#5	2	16'-4"	1976
U1	34	#4	3	8'-4"	189
U2	11	#4	3	8'-8"	64
U3	74	#4	3	10'-6"	519
V1	36	#11	4	17'-7"	3363
SP-1	3	✳	5	572'-1"	1146
SP-2	3	✳✳	6	572'-11"	1793

REINFORCING STEEL (FOR BENT 2) 18,944 LBS.

SPIRAL COLUMN REINFORCING STEEL (FOR BENT 2) 2,939 LBS.

✳✳ THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

✳ THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN (FOR BENT 2)

POUR #2 (COLUMNS)	14.9 C.Y.
POUR #3 (CAP)	74.1 C.Y.
TOTAL CLASS A CONCRETE	89.0 C.Y.

DRILLED PIERS: (FOR BENT 2)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	33.9 C.Y.
4'-0" Ø DRILLED PIER NOT IN SOIL	30.0 LIN. FT.
4'-0" Ø DRILLED PIER IN SOIL	45.0 LIN. FT.
△ CSL TUBES	309.0 LIN. FT.

△ NO SEPERATE PAYMENT WILL BE MADE FOR CSL TUBES. CSL TUBES WILL BE INCLUDED IN THE UNIT BID PRICE FOR DRILLED PIERS.

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 2 OF 2

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SUBSTRUCTURE

BENT NO. 2 DETAILS

RIGHT LANE

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			46

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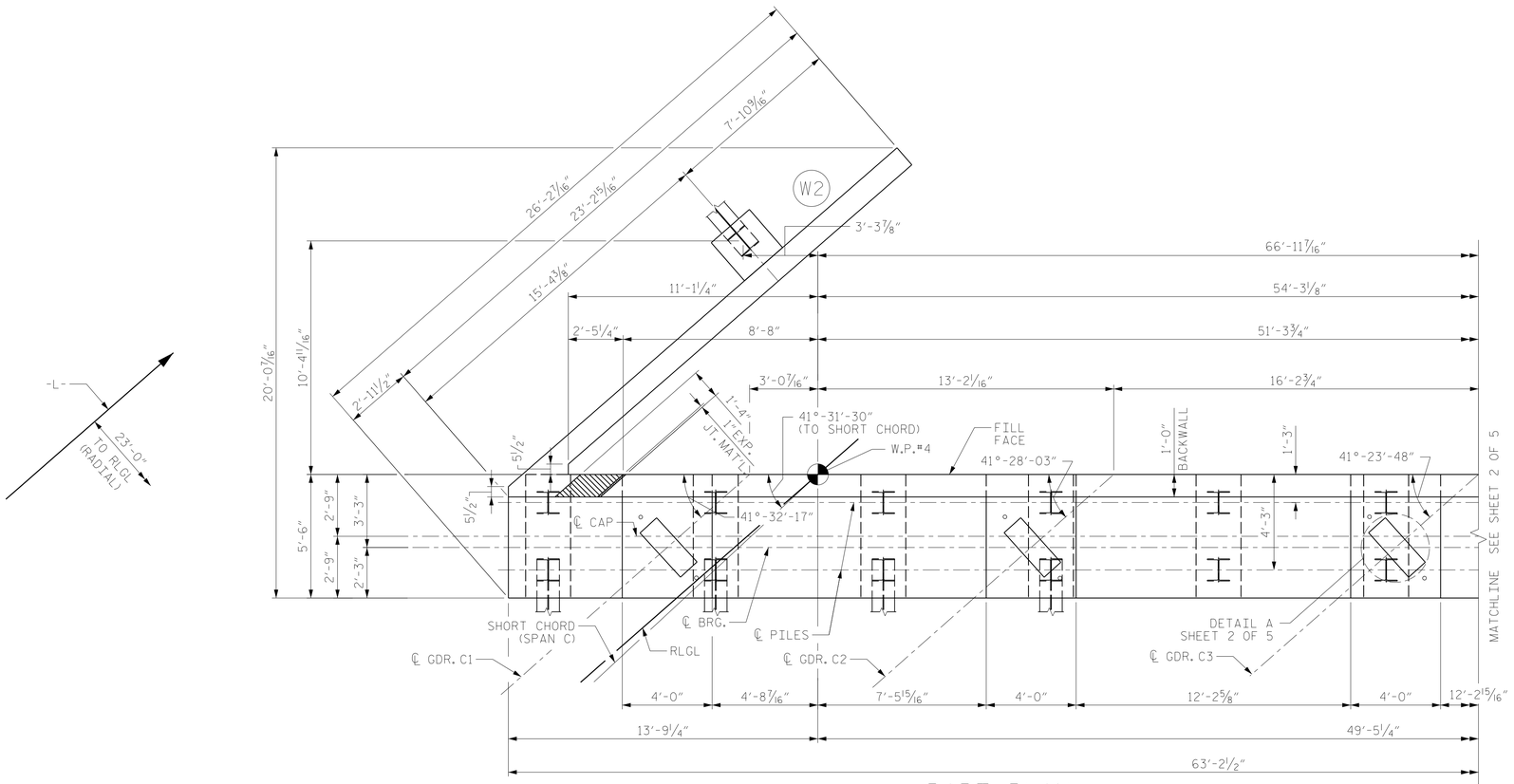
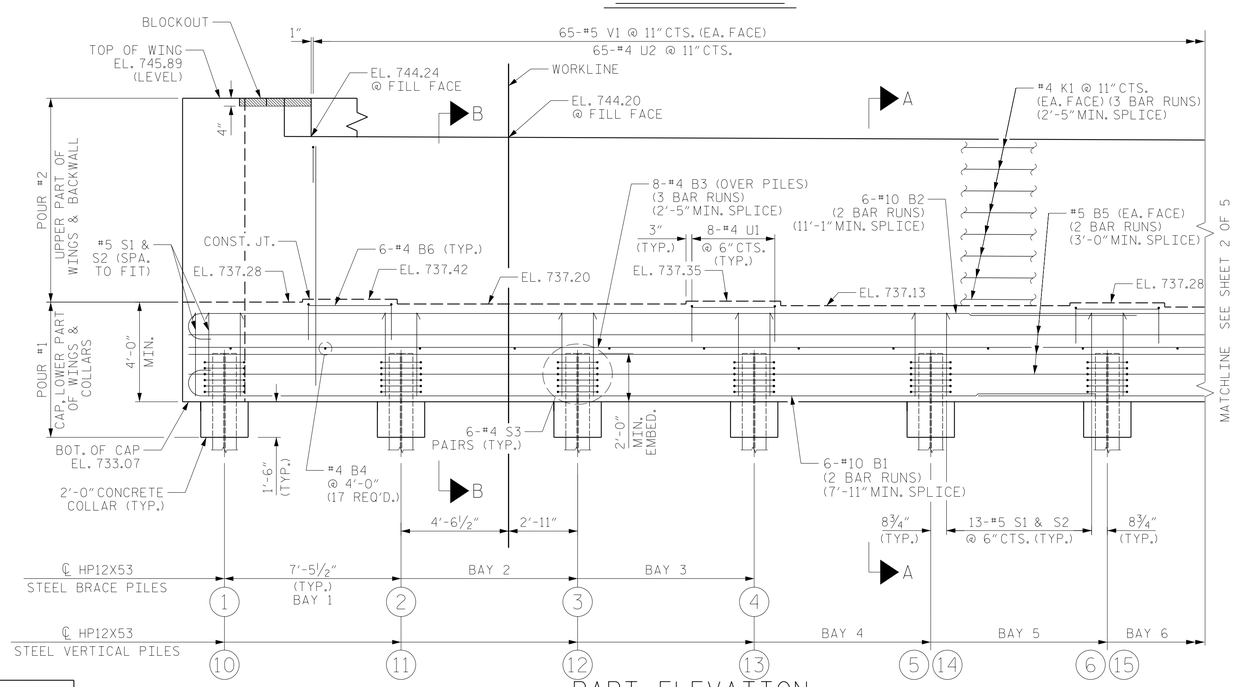
STR. #4



PART PLAN



PART ELEVATION

WINGS AND WING PILES NOT SHOWN FOR CLARITY

NOTES

STIRRUPS AND #4 U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR SECTION A-A, SECTION B-B AND PARTIAL SECTION AT BRIDGE SEAT, SEE SHEET 5 OF 5.

FOR PILE SPLICE DETAILS, SEE SHEET 5 OF 5.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

RLGL = RIGHT LANE GRADE LINE

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 5

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3/28/2018

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SUBSTRUCTURE

END BENT NO. 2

RIGHT LANE

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1			3			TOTAL SHEETS
2			4			46

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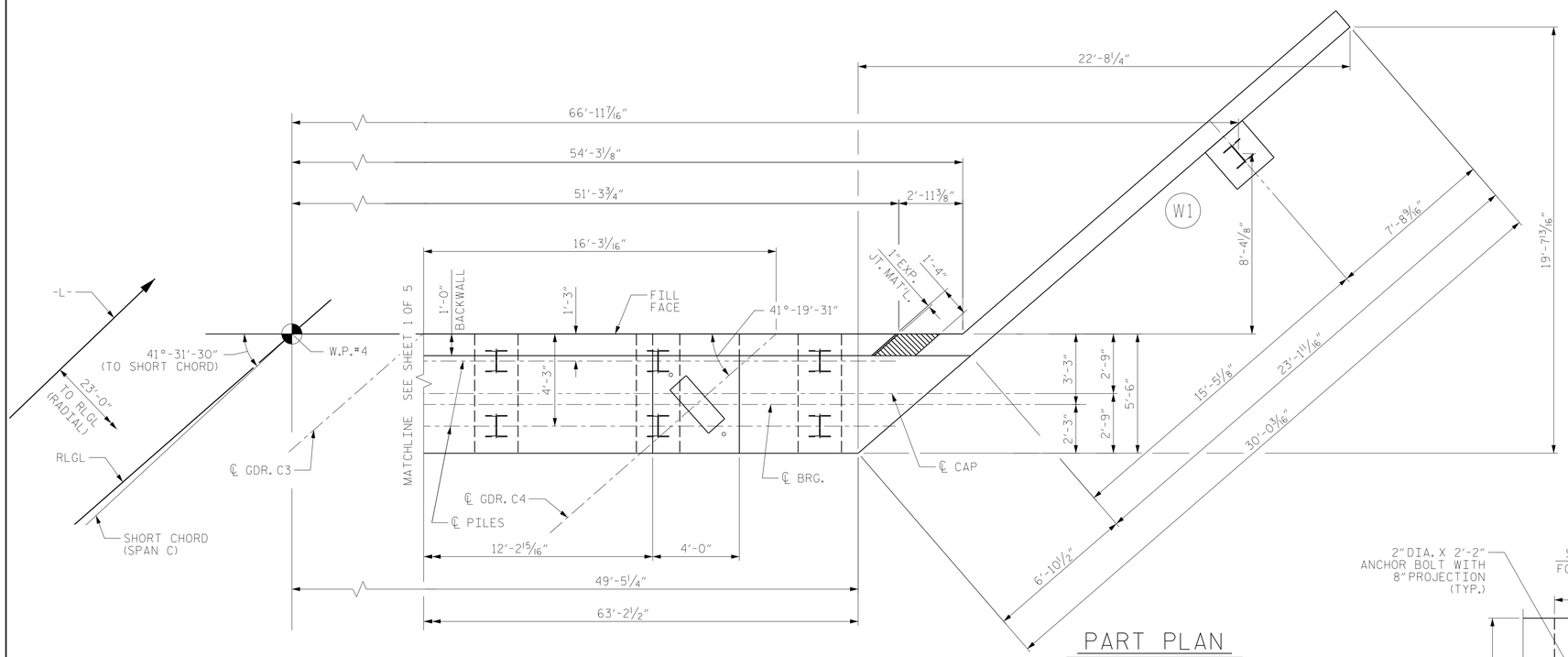
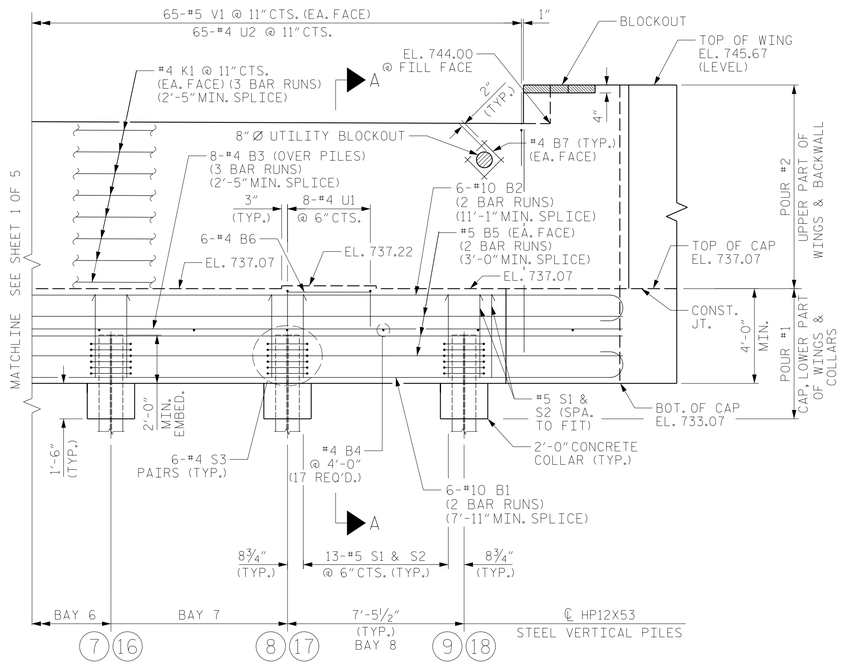
STR. #4



PART PLAN



PART ELEVATION

WINGS AND WING PILES NOT SHOWN FOR CLARITY

NOTES

STIRRUPS AND #4 U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR SECTION A-A AND PARTIAL SECTION AT BRIDGE SEAT, SEE SHEET 5 OF 5.

FOR PILE SPLICE DETAILS, SEE SHEET 5 OF 5.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE END BENT CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

CENTER UTILITY IN BLOCKOUT AND FILL ANNULAR SPACE AROUND UTILITY PIPE WITH JOINT FILLER IN ACCORDANCE WITH STANDARD SPECIFICATION ARTICLE 1028-1.

THE LOCATION OF THE UTILITY BLOCKOUT SHALL BE VERIFIED BY THE ENGINEER PRIOR TO CONSTRUCTION OF THE END BENT. PLACE BLOCKOUT ALONG SKEW.

REINFORCING STEEL IN THE BACKWALL MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR THE UTILITY BLOCKOUT.

RLGL = RIGHT LANE GRADE LINE

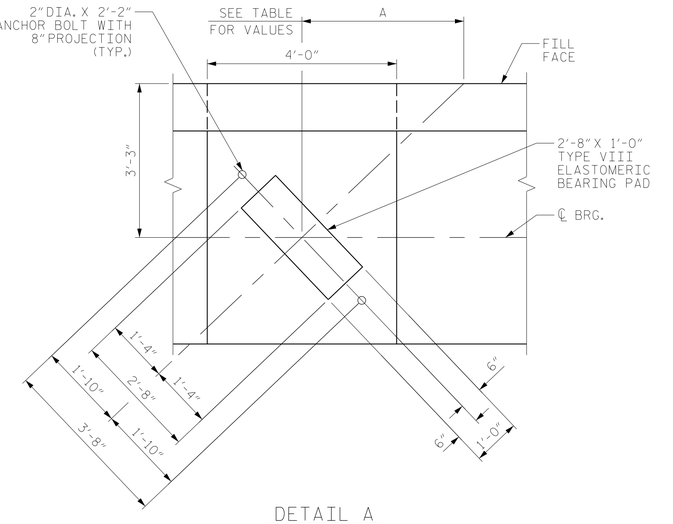


TABLE	
GDR.	A
A1	3'-8"
A2	3'-8⅛"
A3	3'-8¼"
A4	3'-8⅜"

DETAIL A

DIMENSIONS TYP. EA. BRG. PILES NOT SHOWN FOR CLARITY

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 5

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SUBSTRUCTURE

END BENT NO. 2

RIGHT LANE

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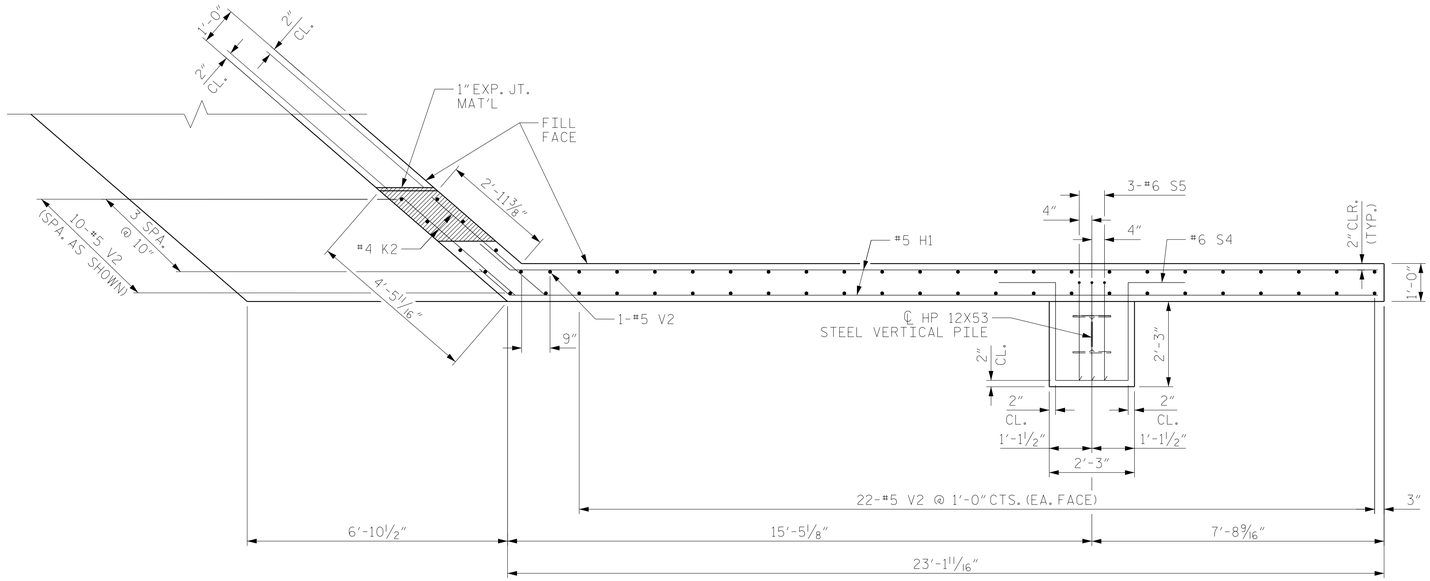
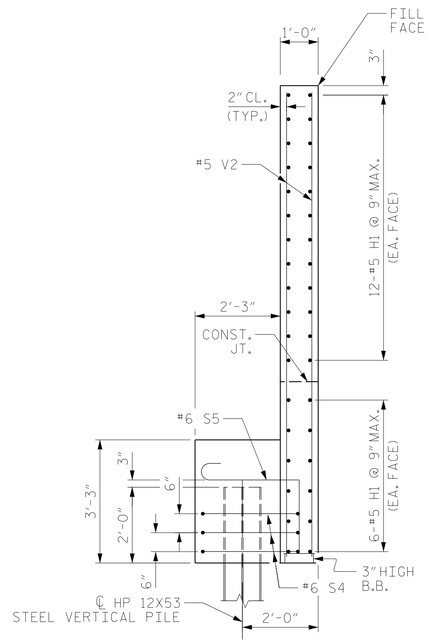
1			3			TOTAL SHEETS
2			4			46

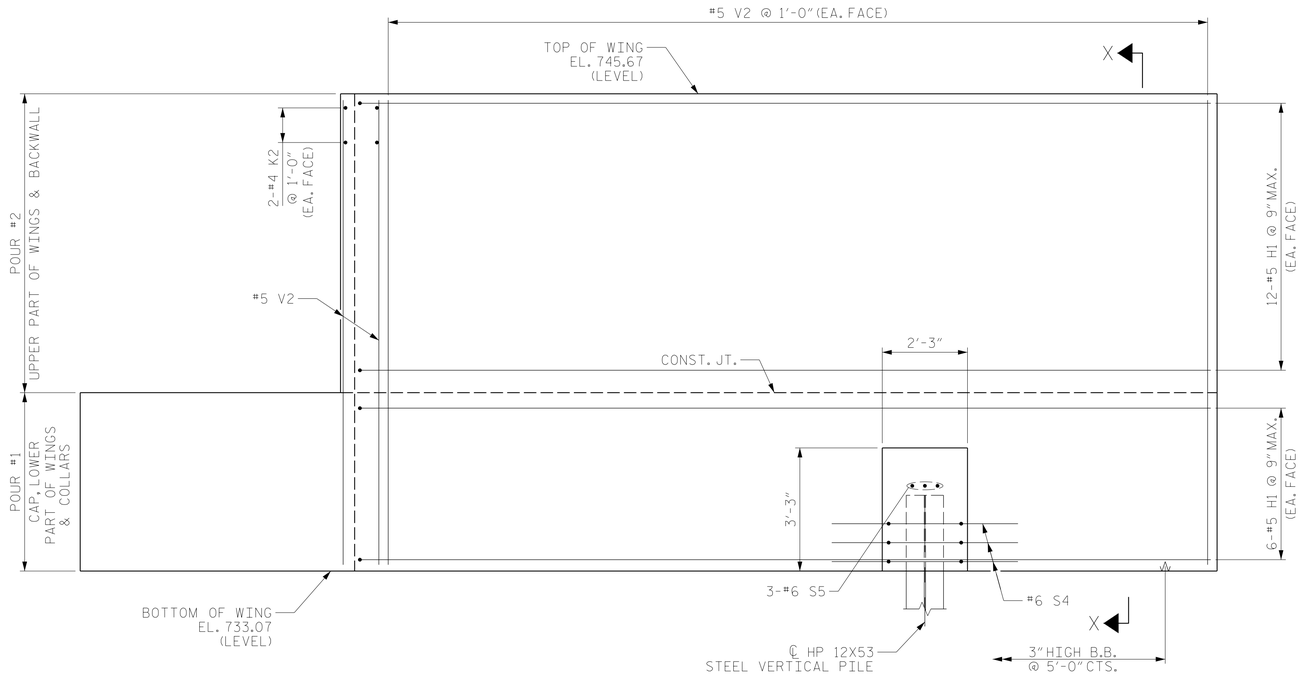
STR. #4



PLAN OF WING W1



SECTION X-X



ELEVATION OF WING W1

PROJECT NO. U-2412A
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SHEET 3 OF 5

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END BENT NO. 2

RIGHT LANE

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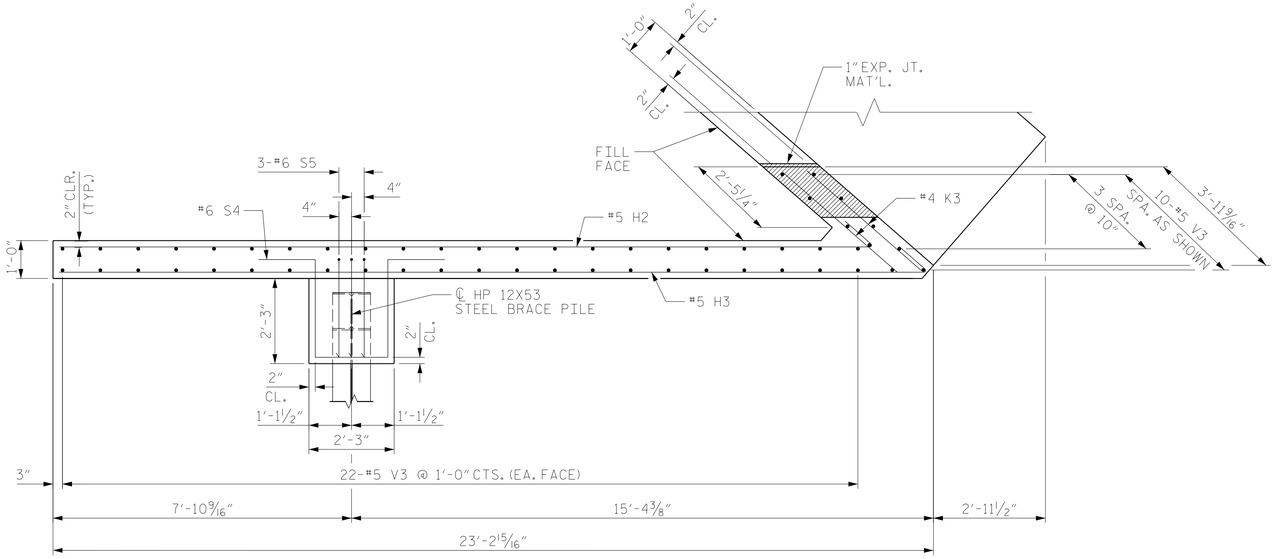
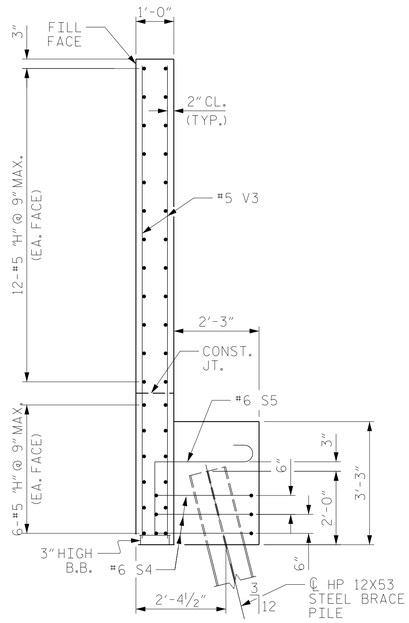
STR. #4



PLAN OF WING W2



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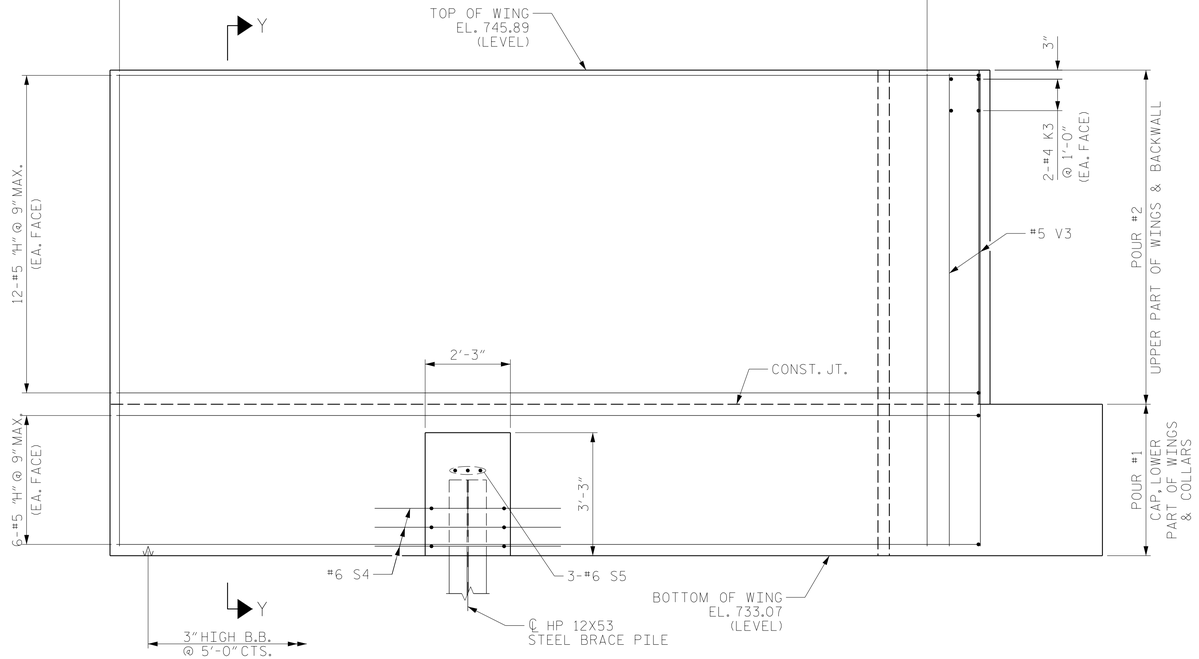

ELEVATION OF WING W2

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 4 OF 5

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SUBSTRUCTURE

END BENT NO. 2

RIGHT LANE

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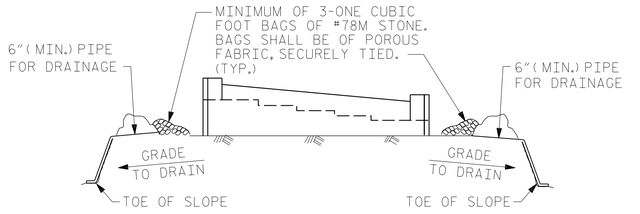
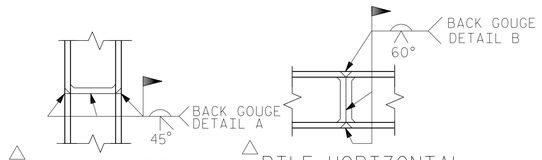


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

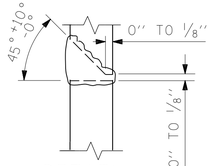
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

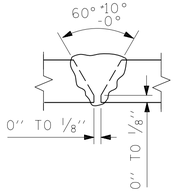


△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL



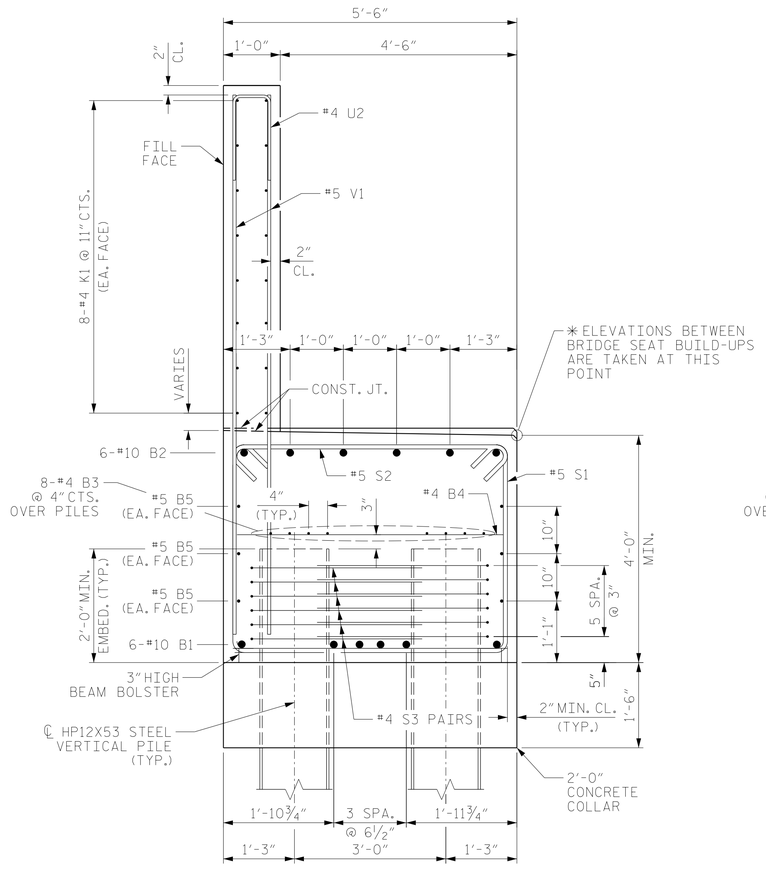
DETAIL A



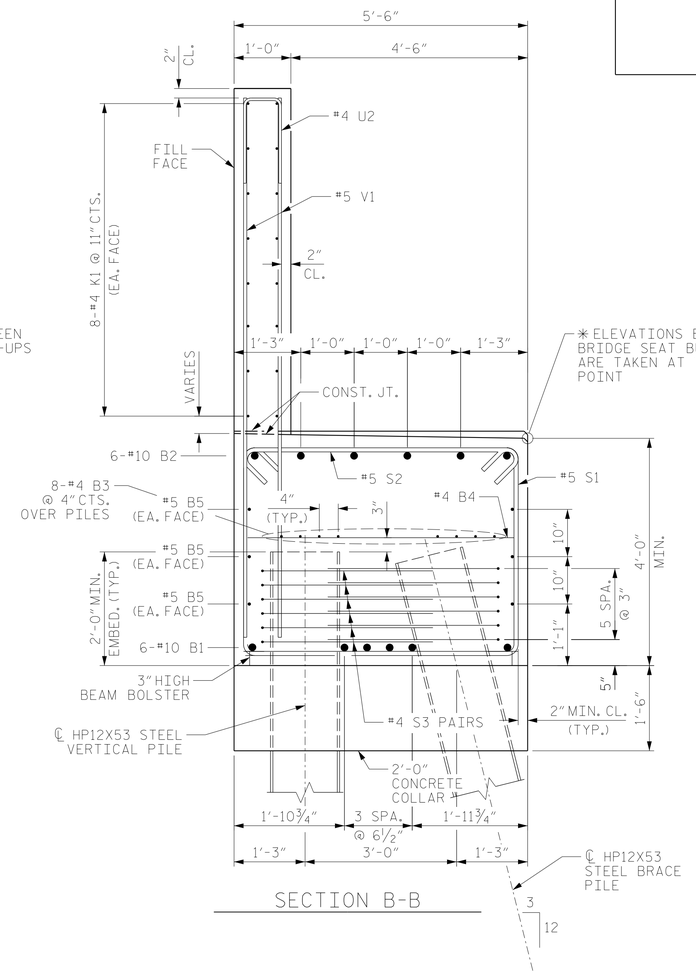
DETAIL B

△ POSITION OF PILE DURING WELDING.

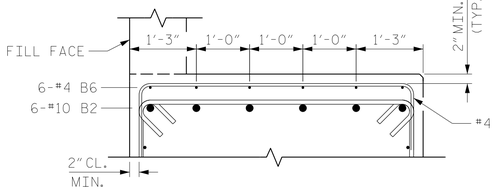
PILE SPLICE DETAILS



SECTION A-A

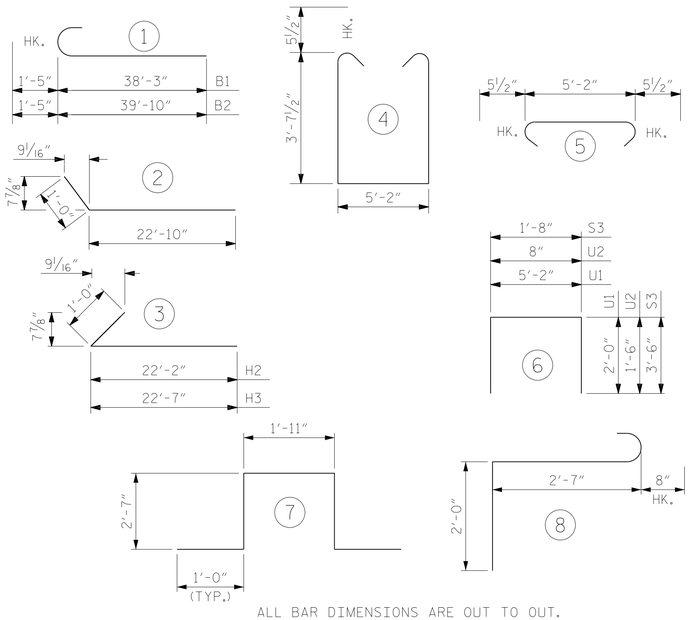


SECTION B-B



PARTIAL SECTION AT BRIDGE SEAT

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#10	1	39'-8"	2048
B2	12	#10	1	41'-3"	2130
B3	24	#4	STR	24'-3"	389
B4	17	#4	STR	5'-2"	59
B5	12	#5	STR	35'-9"	447
B6	24	#4	STR	3'-8"	59
B7	8	#4	STR	1'-4"	7
H1	36	#5	2	23'-10"	895
H2	18	#5	3	23'-2"	435
H3	18	#5	3	23'-7"	443
K1	48	#4	STR	24'-5"	783
K2	4	#4	STR	3'-10"	10
K3	4	#4	STR	3'-8"	10
S1	108	#5	4	13'-4"	1502
S2	108	#5	5	6'-1"	685
S3	108	#4	6	8'-8"	625
S4	6	#6	7	9'-1"	82
S5	6	#6	8	5'-3"	47
U1	32	#4	6	9'-2"	196
U2	65	#4	6	3'-8"	159
V1	65	#5	STR	10'-6"	712
V2	55	#5	STR	12'-2"	698
V3	54	#5	STR	12'-5"	699

REINFORCING STEEL 13,120 LBS.

CLASS A CONCRETE BREAKDOWN

POUR #1	CAP, LOWER PART OF WING & COLLARS	69.3 C.Y.
POUR #2	UPPER PART OF WING & BACKWALL	32.3 C.Y.
	TOTAL CLASS A CONCRETE	101.6 C.Y.

HP 12 X 53 STEEL PILES
NO: 17 LIN. FT.= 234

STEEL PILE POINTS NO. = 20

PILE DRIVING EQUIPMENT SETUP
HP 12 X 53 NO. = 20

PILE EXCAVATION
IN SOIL LIN. FT = 82
NOT IN SOIL LIN. FT = 28

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

SHEET 5 OF 5

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
Digitally signed by Justin Robinson
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3/28/2018

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North Carolina License Nos. 50073 ° F-0493 ° C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 2

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-42
1			3			TOTAL SHEETS
2			4			46

DRAWN BY : JTC DATE : 02/2018
CHECKED BY : PDS DATE : 02/2018
DESIGN ENGINEER OF RECORD: PDS DATE : 02/2018

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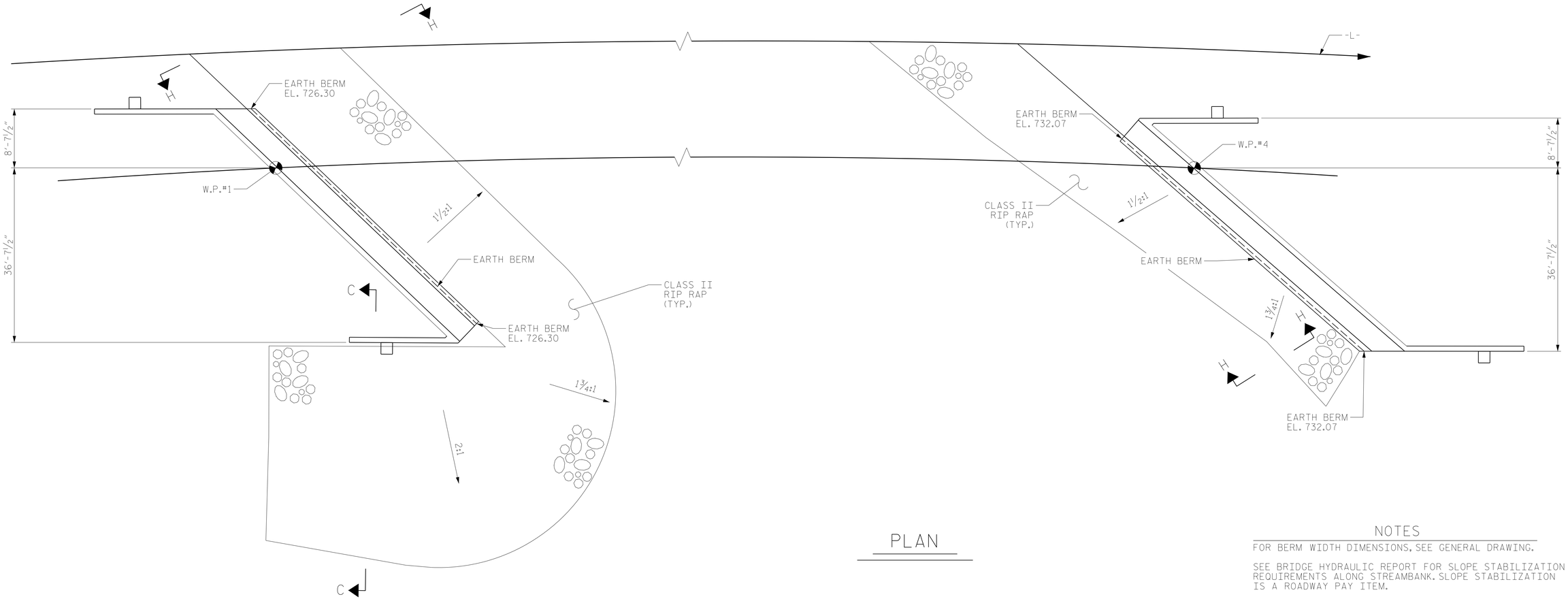
STR. #4



PLAN

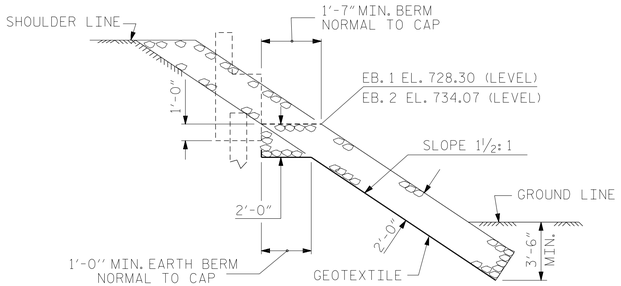
NOTES

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

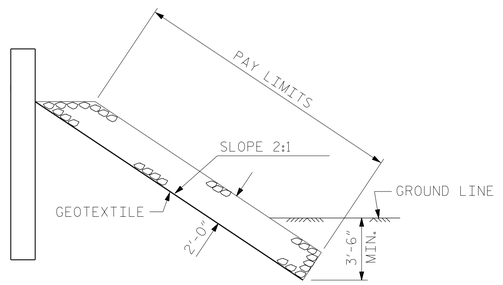
SEE BRIDGE HYDRAULIC REPORT FOR SLOPE STABILIZATION REQUIREMENTS ALONG STREAMBANK. SLOPE STABILIZATION IS A ROADWAY PAY ITEM.

ESTIMATED QUANTITIES

BRIDGE @ STA. 140+21.50 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	410	455
END BENT 2	135	150



VIEW H-H



SECTION C-C

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
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DN: cn=Justin Mark Robinson, o=RS&H, ou=Engineering, email=justin.robinson@rsandh.com, c=US
Date: 2018.03.28 08:47:10 -04'00'
3/28/2018

RS&H

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP DETAILS

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-43
1			3			TOTAL SHEETS
2			4			46

DRAWN BY : NSC DATE : 12/2017
CHECKED BY : TLC DATE : 02/2018
DESIGN ENGINEER OF RECORD: JMR DATE : 02/2018

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3/27/2018
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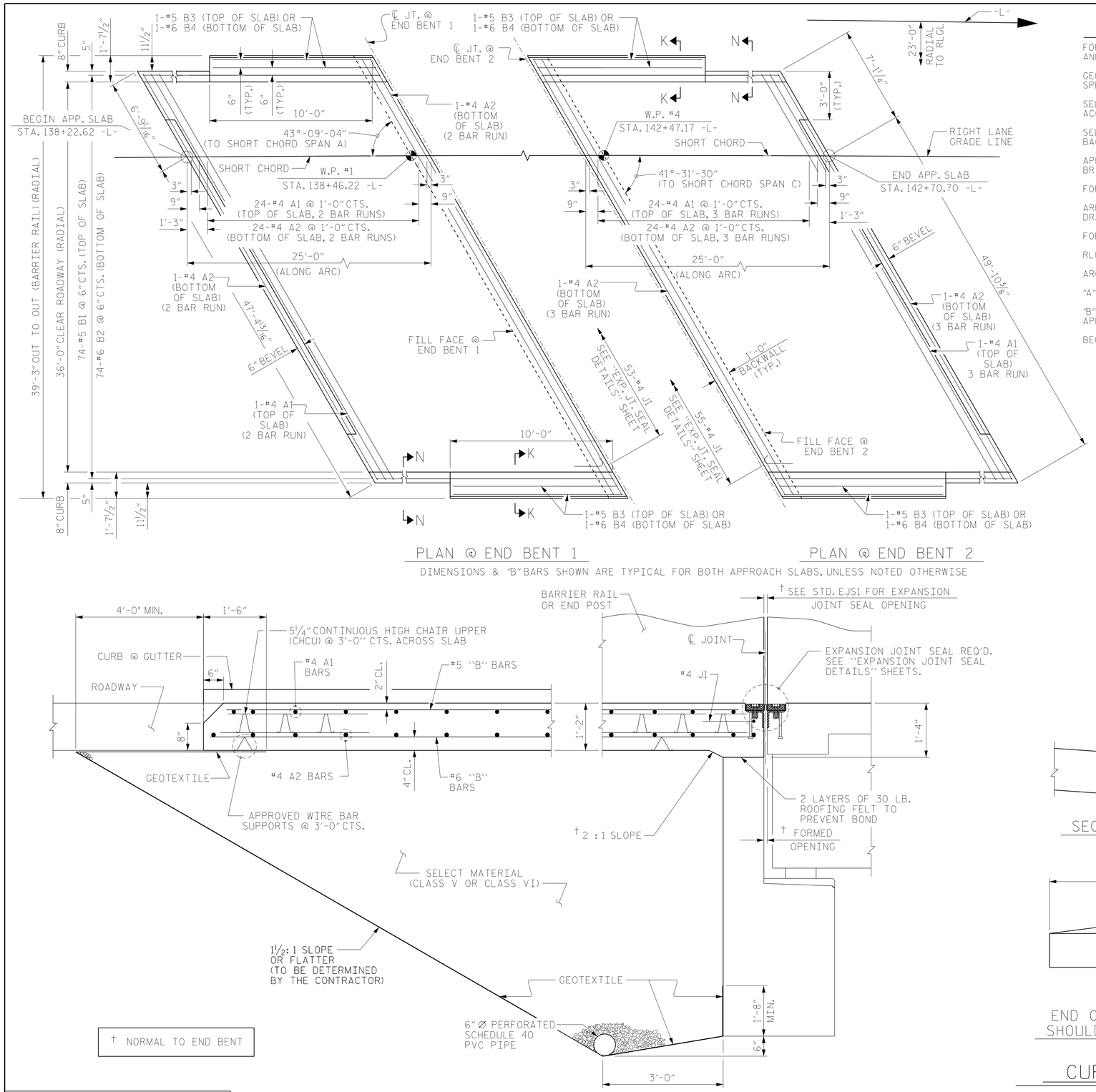
AcostaM

STR. #4



PLAN @ END BENT 1

PLAN @ END BENT 2

DIMENSIONS & "B" BARS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS, UNLESS NOTED OTHERWISE

† NORMAL TO END BENT

SECTION THRU SLAB

(TYPE I - STANDARD APPROACH FILL)

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

RLGL = RIGHT LANE GRADE LINE.

ARC OFFSETS ARE NEGLIGIBLE & THEREFORE NOT SHOWN.

"A" BARS ARE PLACED PARALLEL TO THE SKEW OF EACH APPROACH SLAB.

"B" BARS ARE PLACED PARALLEL TO THE SHORT CHORD OF EACH RESPECTIVE APPROACH SLAB.

BEGIN AND END APPROACH SLAB LIMITS ARE TO EACH RESPECTIVE FILL FACE.

SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"

BILL OF MATERIAL

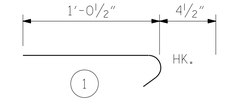
APPROACH SLAB AT END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	50	#4	STR	29'-6"	985
A2	52	#4	STR	29'-4"	1019
✱ B1	74	#5	STR	23'-8"	1827
B2	74	#6	STR	24'-6"	2723
✱ B3	4	#5	STR	9'-7"	40
B4	4	#6	STR	9'-7"	58
✱ J1	53	#4	1	1'-5"	50
REINFORCING STEEL ✱✱					3,800 LBS.
✱ EPOXY COATED REINFORCING STEEL ✱✱					2,902 LBS.
CLASS AA CONCRETE ✱✱					42.6 C.Y.

APPROACH SLAB AT END BENT 2

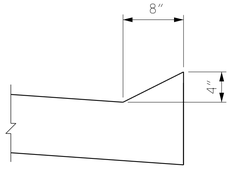
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	75	#4	STR	21'-1"	1056
A2	78	#4	STR	20'-11"	1090
✱ B1	74	#5	STR	23'-8"	1827
B2	74	#6	STR	24'-6"	2723
✱ B3	4	#5	STR	9'-7"	40
B4	4	#6	STR	9'-7"	58
✱ J1	55	#4	1	1'-5"	52
REINFORCING STEEL ✱✱					3,871 LBS..
✱ EPOXY COATED REINFORCING STEEL ✱✱					2,975 LBS.
CLASS AA CONCRETE ✱✱					42.6 C.Y.

BAR TYPE

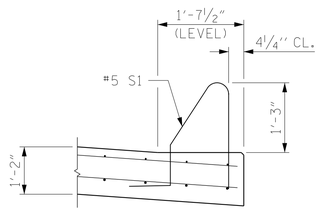


ALL BAR DIMENSIONS ARE OUT TO OUT

✱✱ QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE SHEET 2 OF 2.



SECTION N-N



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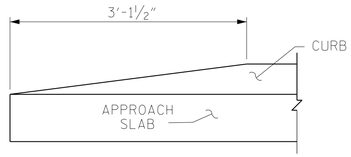

END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 1 OF 2

ASSEMBLED BY : NSC	DATE : 12/2017
CHECKED BY : MKO	DATE : 02/2018
DRAWN BY : EEM 3/95	REV. 12/21/11 MAA/GM
CHECKED BY : VAP 3/95	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

3/27/2018
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
Digitally signed by: Justin Robinson
3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

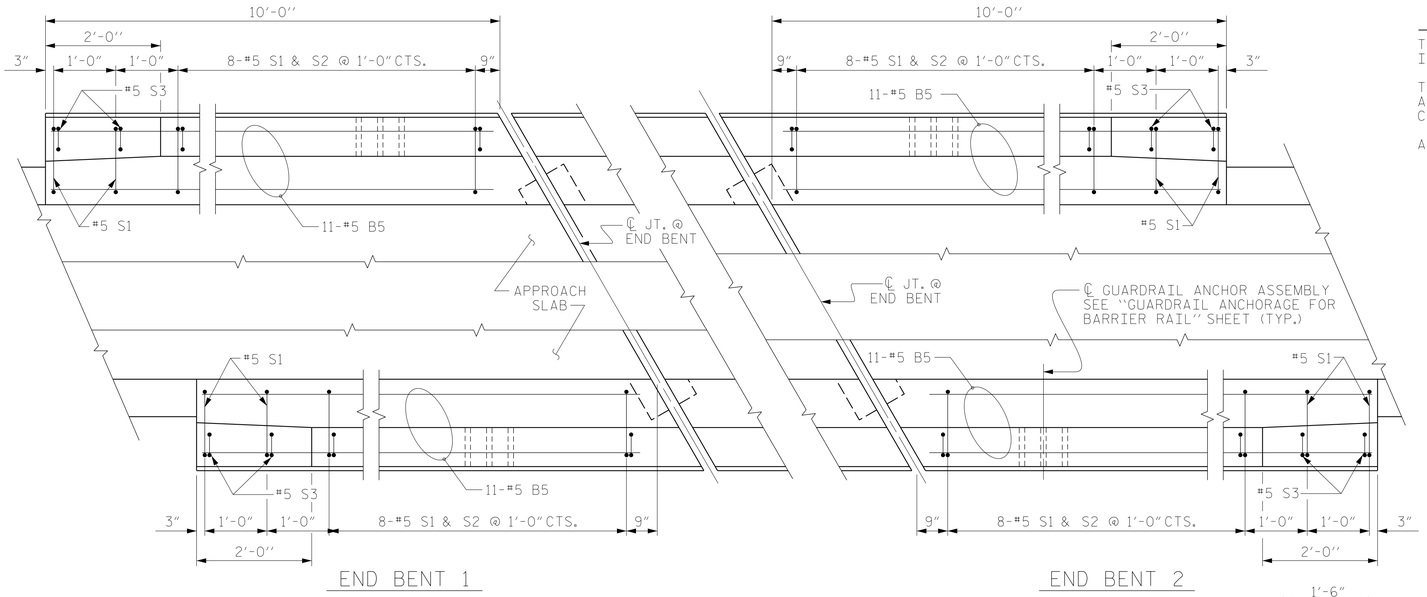
STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-44
1			3			TOTAL SHEETS
2			4			46

STD. NO. BAS2 (SHT 3a) STR. #4



PLAN OF BARRIER RAIL

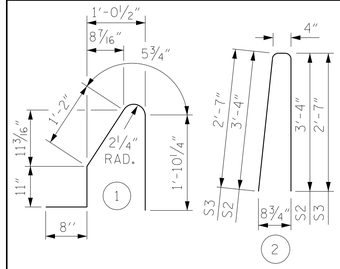
NOTES

THE COST OF THE BARRIER RAIL ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "CONCRETE BARRIER RAIL".

THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

BAR TYPES

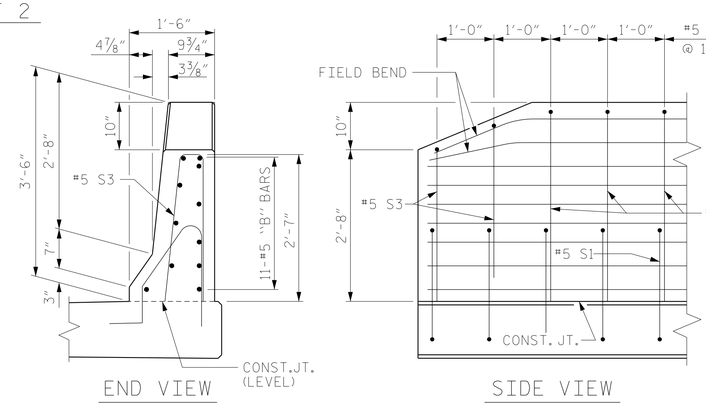


BILL OF MATERIAL

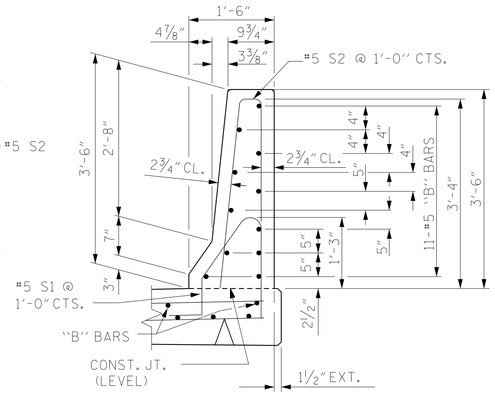
BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B5	44	#5	STR	9'-7"	440
✳ S1	40	#5	1	5'-1"	212
✳ S2	32	#5	2	7'-0"	234
✳ S3	8	#5	2	5'-6"	46

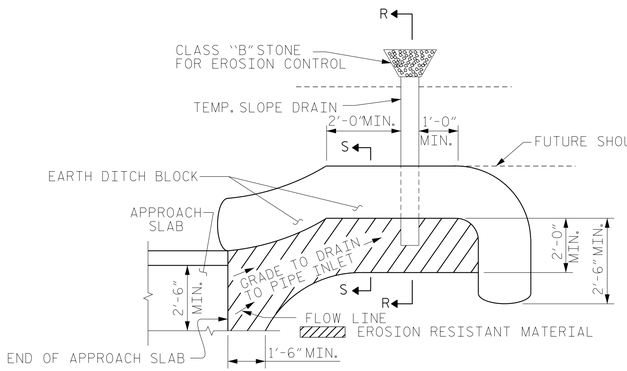
✳ EPOXY COATED REINFORCING STEEL	932 LBS.
CLASS AA CONCRETE	5.5 C.Y.
CONCRETE BARRIER RAIL	40.0 LIN. FT.



END OF RAIL DETAILS

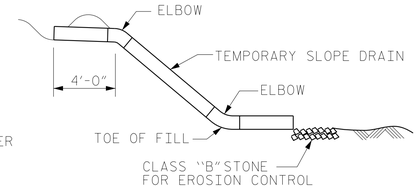


SECTION THRU RAIL

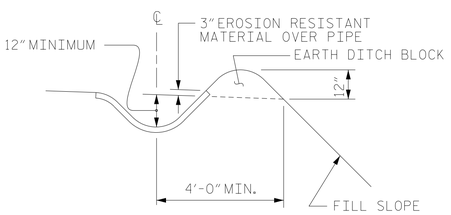


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

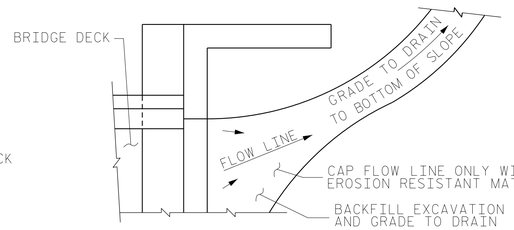
PLAN VIEW



SECTION R-R



SECTION S-S



NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.

TEMPORARY DRAINAGE DETAIL

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 140+21.50 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039384 JUSTIN MARK ROBINSON 3/28/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-45
1			3			TOTAL SHEETS
2			4			46

ASSEMBLED BY : NSC		DATE : 12/2017	
CHECKED BY : MKO		DATE : 02/2018	
DRAWN BY : FCJ	11/88	REV. 7/12	MAA/GM
CHECKED BY : ARB	11/88	REV. 6/13	MAA/GM
		REV. 12/17	MAA/THC

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3/27/2018
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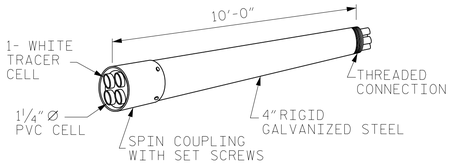
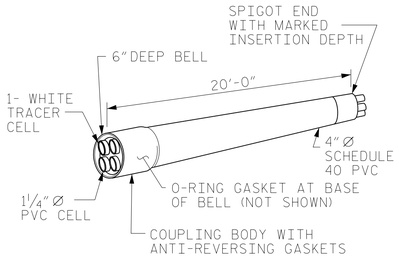
AcostaM

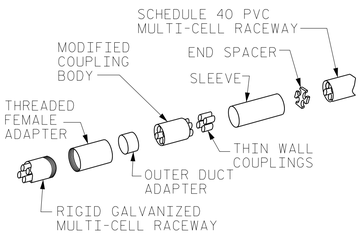
STD. NO. BAS4(SHT 3a) STR. #4



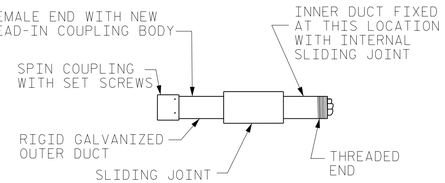
RIGID GALVANIZED (RGC)
MULTI-CELL RACEWAY



SCHEDULE 40 PVC
MULTI-CELL RACEWAY



TRANSITION ADAPTER



EXPANSION JOINT FITTING

NOTES

THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE TOTAL QUANTITY OF CONDUIT NEEDED TO COMPLETE THE WORK AND THAT THE CONDUIT(S) ARE PLACED AT THE NOTED DIMENSION AND ABOVE THE BOTTOM OF THE GIRDER.

THE INSTALLATION OF THE CONDUIT SYSTEM SHALL BE PAID FOR AS LUMP SUM. THE PRICE SHALL INCLUDE ALL CONDUIT, HANGERS, STABILIZERS, EXPANSION JOINTS, CONCRETE INSERTS, PVC SLEEVES AND ALL NECESSARY HARDWARE TO COMPLETE THE WORK.

THE CONTRACTOR SHALL FIELD VERIFY THAT THE CONDUIT SYSTEM IS NOT IN CONFLICT WITH THE GUARDRAIL POSTS.

SEE DETAIL "C" FOR HANGER ASSEMBLY INSTALLATION.

INSTALL SLEEVES PARALLEL TO GIRDERS. SEE DETAIL "B" FOR SLEEVE INSTALLATION.

PROVIDE TRANSITION ADAPTOR (AND EXPANSION JOINT) FOR CONDUIT AT END BENT 1 (AND END BENT 2).

INSTALL STABILIZER MIDWAY BETWEEN DECK EXPANSION JOINTS. STABILIZER CAN NOT BE USED INSTEAD OF A HANGER ASSEMBLY.

INSTALL EXPANSION JOINTS AT END BENT 1 AND END BENT 2.

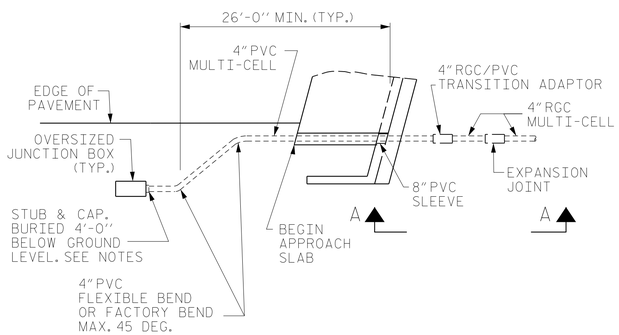
THE CONCRETE SCREW INSERT SHALL HAVE A ROD SIZE OF 5/8" AND A PULL FORCE OF 1260 lbs.

FOR ELECTRICAL CONDUIT SYSTEM FOR SIGNALS, SEE SPECIAL PROVISIONS.

FOR OVERSIZED JUNTION BOX, SEE STANDARD SPECIFICATIONS 1098-5.

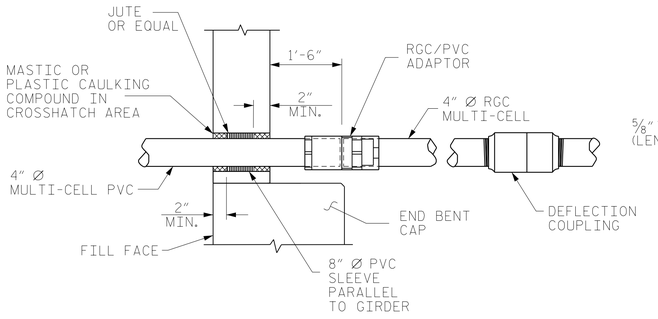
DETAIL "D"

4" MULTI-CELL COMPONENTS



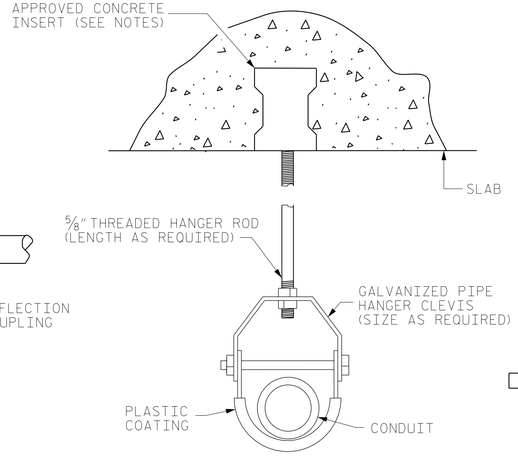
DETAIL "A"

TERMINATION OF CONDUIT AT WING WALL
END BENT 1 SHOWN, END BENT 2 SIMILAR



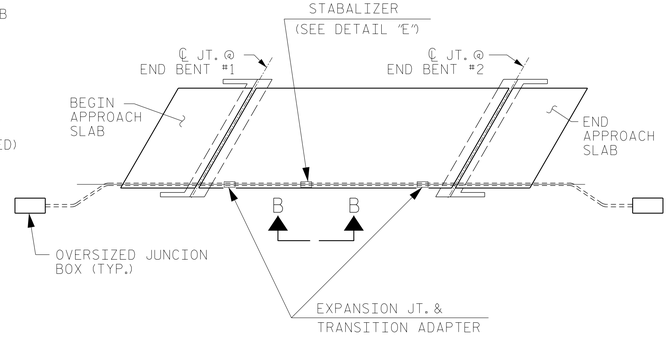
DETAIL "B"

PVC SLEEVE INSTALLATION & RGC/PVC
ADAPTOR AT BACKWALL.

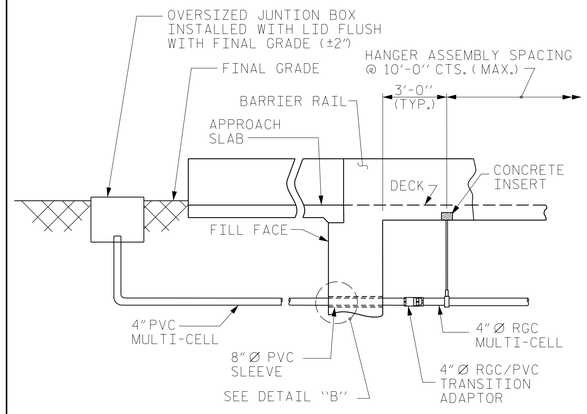


DETAIL "C"

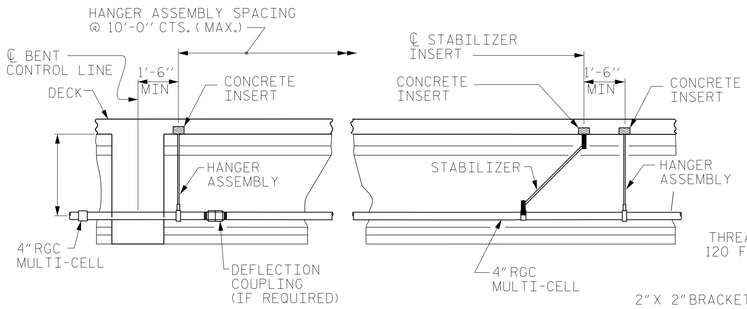
HANGER ASSEMBLY



CONDUIT LAYOUT

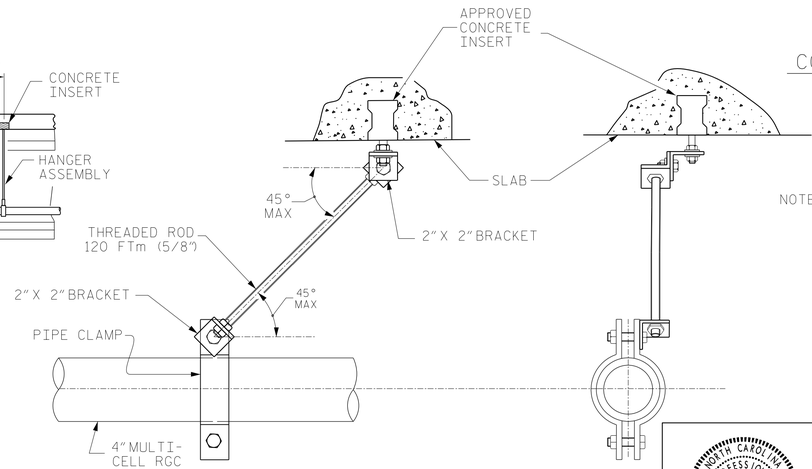


VIEW A-A



VIEW B-B

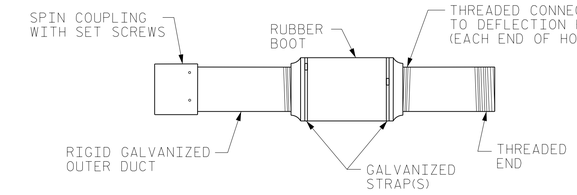
PRESTRESSED GIRDERS
CONTINUOUS FOR LIVE LOAD



DETAIL "E"

STABILIZER

NOTE: SUPERSTRUCTURE IS CONTINUOUS FOR LIVE LOAD OVER INTERIOR BENT.



DETAIL "F"

DEFLECTION COUPLING

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 140+21.50 -L-

ASSEMBLED BY : MRA	DATE : 01/2018
CHECKED BY : TLC	DATE : 02/2018
DRAWN BY : RWW 2-4-03	REV. 5/1/06 TLA/GM
CHECKED BY : DBM 2-4-03	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039444 — Documents Signed by: Justin Johnson, Mark Robinson — 5/4/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

ELECTRICAL CONDUIT SYSTEM FOR SIGNALS
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-46
1			3			TOTAL SHEETS
2			4			46

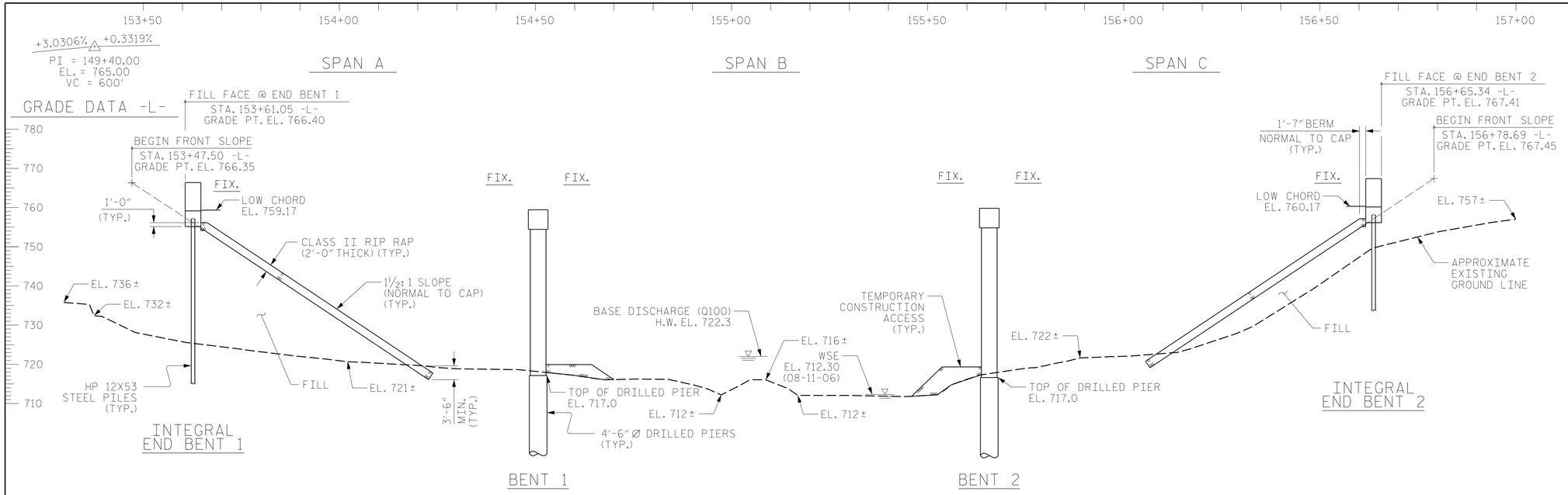
ELECTRIC CONDUIT DETAILS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

5/4/2018
X:\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 2\Design\Structures\Working DGN\404_U24121A_SMU_ECS1_401273.dgn
AcostaM

(SHT 2) STD. NO. ECS1 STR. #4

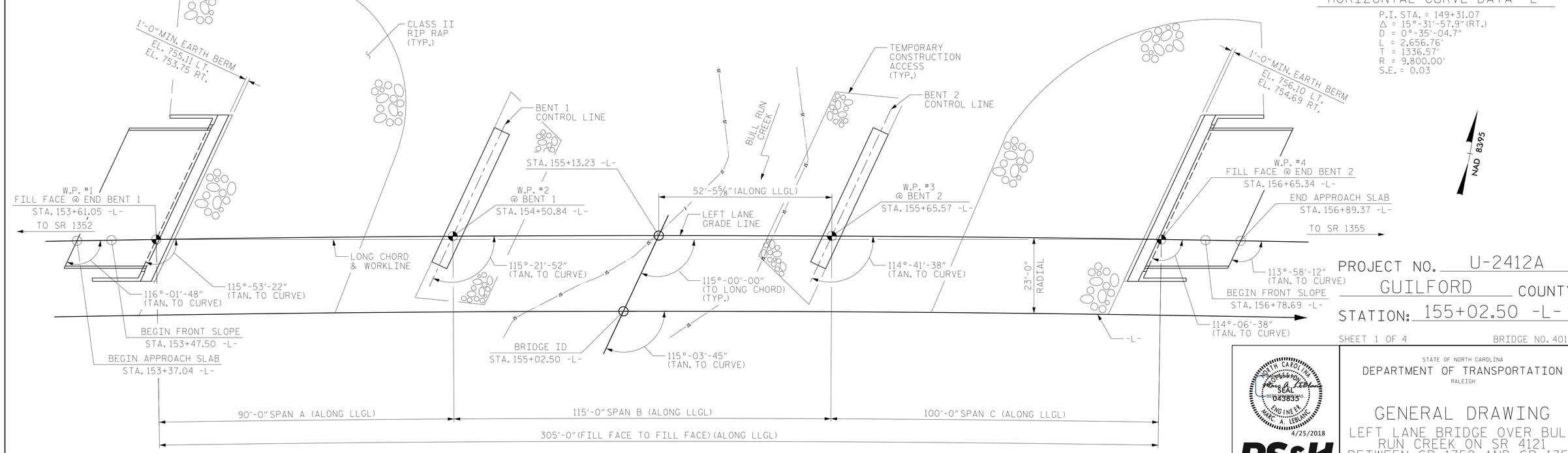
F.A. PROJECT NO.: STP-4121(3)



SECTION ALONG LEFT LANE GRADE LINE

(SECTIONS AT END BENTS AND BENTS ARE TAKEN AT RIGHT ANGLES)

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



PLAN ALONG LEFT LANE GRADE LINE

(FOR CLARITY, PILES, COLUMNS & DRILLED PIERS ARE NOT SHOWN IN PLAN VIEW)
LLGL = LEFT LANE GRADE LINE

HORIZONTAL CURVE DATA -L-

P.I. STA. = 149+31.07
Δ = 15°-31'-57.9" (RT.)
D = 0°-35'-04.7"
L = 2,656.76'
T = 1336.57'
R = 9,800.00'
S.E. = 0.03

NAD 8395

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 155+02.50 -L-

SHEET 1 OF 4 BRIDGE NO. 401274

DRAWN BY :	MAL DATE : 10/2017
CHECKED BY :	TLC DATE : 02/2018
DESIGN ENGINEER OF RECORD:	MAL DATE : 10/2017

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043833 MARC A. LEBLANC 4/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LEFT LANE BRIDGE OVER BULL RUN CREEK ON SR 4121 BETWEEN SR 1352 AND SR 1355

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-1
1			3			TOTAL SHEETS
2			4			36

STR. #5

4/24/2018
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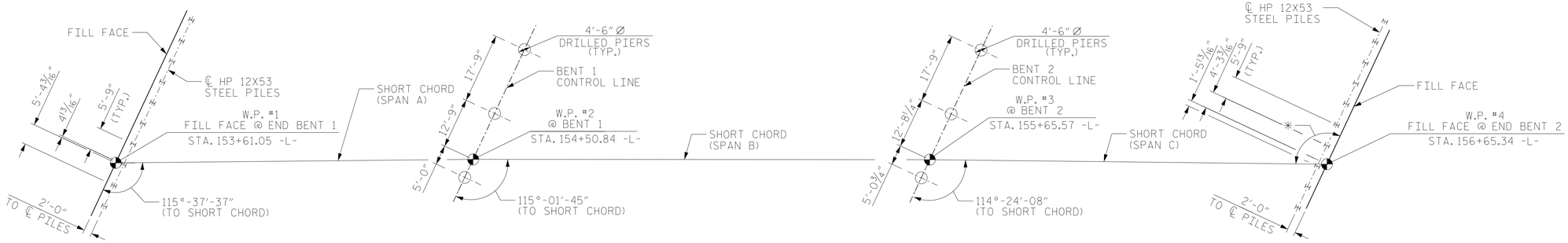

INTEGRAL END BENT 1 | BENT 1 | BENT 2 | INTEGRAL END BENT 2

∗ 114°-24'-08"(TO SHORT CHORD)

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES AND DRILLED PIERS ARE SHOWN TO PILE AND DRILLED PIER CENTERLINE.

NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 1 AND END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 95 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.

STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT NO. 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

DRILLED PIERS AT BENT NO. 1 AND BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 540 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 90 TSF.

PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO. 2. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 711 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.

INSTALL DRILLED PIERS AT BENT NO. 1 TO A TIP ELEVATION NO HIGHER THAN 700 FT WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 9 FT INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

INSTALL DRILLED PIERS AT BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 694 FT (LEFT), 696 FT (CENTER) AND 698 FT (RIGHT) WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 9 FT INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

THE SCOUR CRITICAL ELEVATIONS FOR BENT NO. 1 AND BENT NO. 2 ARE ELEVATION 712 FT AND 709 FT, RESPECTIVELY. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

DO NOT USE SLURRY CONSTRUCTION FOR DRILLED PIERS AT BENT NO. 1 AND BENT NO. 2.

SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTIONS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043835 MARC A. LEBLANC 9/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
LEFT LANE BRIDGE OVER BULL RUN CREEK ON SR 4121 BETWEEN SR 1352 AND SR 1355

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-2
1			3			TOTAL SHEETS
2			4			36

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DRAWN BY :	TWL	DATE : 12/2017
CHECKED BY :	TLC	DATE : 12/2017
DESIGN ENGINEER OF RECORD:	MAL	DATE : 12/2017

4/24/2018
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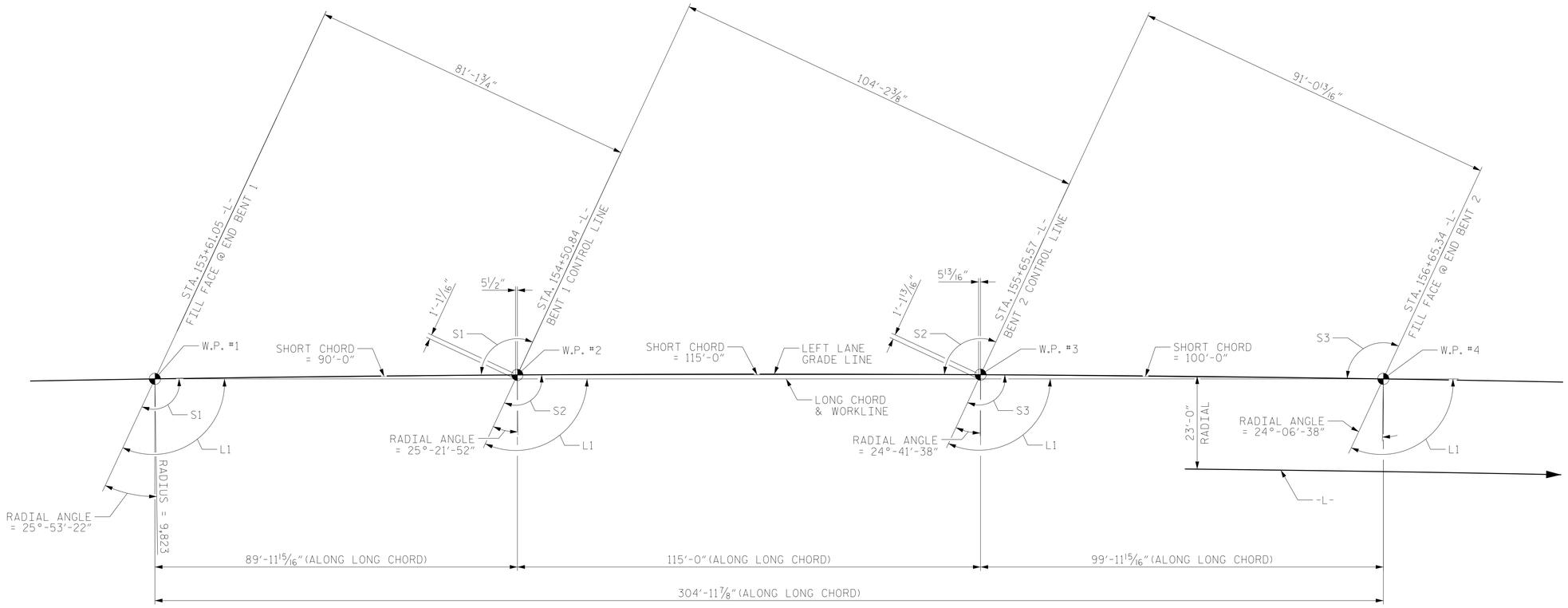
STR. #5



LONG CHORD LAYOUT

NOTE: ALL END BENTS & BENTS ARE PARALLEL

ANGLES	
LONG CHORD	SHORT CHORD
L1 = 115°-00'-00"	S1 = 115°-37'-37"
	S2 = 115°-01'-45"
	S3 = 114°-24'-08"

HORIZONTAL CURVE DATA -L-

P.I. STA. = 149+31.07
Δ = 15°-31'-57.9"(RT.)
D = 0°-35'-04.7"
L = 2,656.76'
T = 1336.57'
R = 9,800.00'
S.E. = 0.03

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 155+02.50 -L-

SHEET 3 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043833 MARC A. LEBLANC 4/25/2018

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STATE OF NORTH CAROLINA
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RALEIGH

GENERAL DRAWING

LEFT LANE BRIDGE OVER BULL RUN CREEK ON SR 4121 BETWEEN SR 1352 AND SR 1355

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-3
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MAL DATE : 10/2017
CHECKED BY : TLC DATE : 10/2017
DESIGN ENGINEER OF RECORD: MAL DATE : 10/2017

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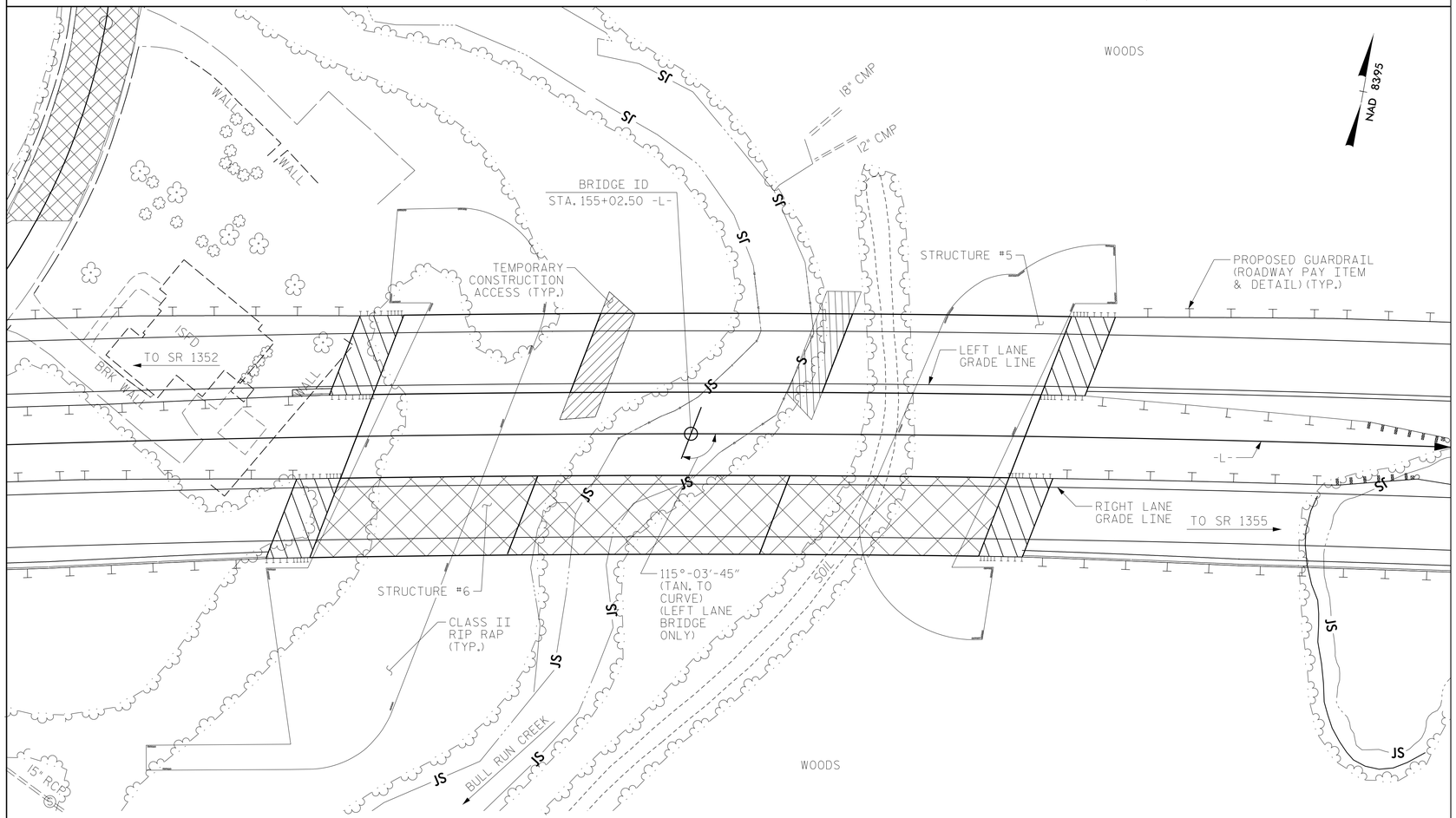
STR. #5

BENCH MARK #11: RAILROAD SPIKE IN 16" RED OAK 339.60' RIGHT OF STA. 153+77.17 -L-, EL. 729.91'



NOTE:
FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES:

ASSUMED LIVE LOAD = HL 93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.

NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18 - EVALUATING SCOUR AT BRIDGES."

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

THE CONTRACTOR WILL BE REQUIRED TO CONSTRUCT, MAINTAIN AND AFTERWARDS REMOVE THE TEMPORARY ACCESS AT STATION 155+02.50 -L- FOR USE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE.

FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS (360,000 KG) OF REINFORCING STEEL, ONE 30 INCH (760 MM) SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS (360,000 KG) OF REINFORCING STEEL, TWO 30 INCH (760 MM) SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

HYDRAULIC DATA

DESIGN DISCHARGE	= 3,660 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS
DESIGN HIGH WATER ELEVATION	= 721.9
DRAINAGE AREA	= 7.7 SQ. MI.
BASE DISCHARGE (Q100)	= 4,000 CFS
BASE HIGH WATER ELEVATION	= 722.3

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 4,930+ CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500 YRS
OVERTOPPING FLOOD ELEVATION	= 763.5 *

* AT STATION 149+75 -L-

TOTAL BILL OF MATERIALS

	CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMP. ACCESS AT STA. 155+02.50 -L-	4'-6" Ø DRILLED PIER IN SOIL	4'-6" Ø DRILLED PIER NOT IN SOIL	PERMANENT STEEL CASING FOR 4'-6" DIA. DRILLED PIER	SID INSPECTION	CSL TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	72" MODIFIED PRESTRESSED CONCRETE GIRDERS	
	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	EACH	EACH	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.
SUPERSTRUCTURE							13,490	13,464		LUMP SUM			12	1,201.33
END BENT No. 1									50.4		10,068			
BENT No. 1		18.0	33.0						91.3		24,836	4,980		
BENT No. 2		35.0	28.0	18.0					91.8		25,962	5,346		
END BENT No. 2									50.0		10,067			
TOTAL	LUMP SUM	53.0	61.0	18.0	1	1	13,490	13,464	283.5	LUMP SUM	70,933	10,326	12	1201.33

	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12x53 STEEL PILES		STEEL PILE POINTS	CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS
	EACH	NO.	LIN. FT.	EACH	LIN. FT.	TONS	SQ. YDS.	LUMP SUM
SUPERSTRUCTURE					606.3			LUMP SUM
END BENT No. 1	10	10	575			1,450	1,610	
BENT No. 1								
BENT No. 2								
END BENT No. 2	10	10	150	10		985	1,095	
TOTAL	20	20	725	10	606.3	2,435	2,705	LUMP SUM

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 155+02.50 -L-

SHEET 4 OF 4

DRAWN BY : MAL DATE : 10/2017
CHECKED BY : TLC DATE : 10/2017
DESIGN ENGINEER OF RECORD: MAL DATE : 10/2017

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NORTH CAROLINA SEAL 045835 ENGINEER MARC A. LEBLANC 10/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
LEFT LANE BRIDGE OVER BULL RUN CREEK ON SR 4121 BETWEEN SR 1352 AND SR 1355

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-4
1			3			TOTAL SHEETS
2			4			36

STR. #5

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LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.07	--	1.75	0.96	1.24	B	EL	56.36	1.170	1.38	B	I	10.71	0.80	0.89	1.07	B	I	56.36	
		HL-93 (OPERATING)	N/A		1.61	--	1.35	0.96	1.61	B	EL	56.36	1.170	1.79	B	I	10.71	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	(2)	1.54	55.440	1.75	0.96	1.79	B	EL	56.36	1.170	1.88	C	I	88.00	0.80	0.89	1.54	B	I	56.36	
		HS-20 (OPERATING)	36.000		2.33	83.880	1.35	0.96	2.33	B	EL	56.36	1.170	2.40	B	I	44.95	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.72	50.220	1.40	0.96	5.42	B	EL	56.36	1.17	5.44	B	I	67.78	0.80	0.89	3.72	B	I	56.36	
		SNGARBS2	20.000		2.67	53.400	1.40	0.96	3.88	B	EL	56.36	1.17	4.00	A	I	16.82	0.80	0.89	2.67	B	I	56.36	
		SNAGRIS2	22.000		2.48	54.560	1.40	0.96	3.61	B	EL	56.36	1.17	3.71	A	I	16.82	0.80	0.89	2.48	B	I	56.36	
		SNCOTTS3	27.250		1.85	50.413	1.40	0.96	2.69	B	EL	56.36	1.17	2.82	A	I	16.82	0.80	0.89	1.85	B	I	56.36	
		SNAGGRS4	34.925		1.50	52.388	1.40	0.96	2.19	B	EL	56.36	1.17	2.28	B	I	44.95	0.80	0.89	1.50	B	I	56.36	
		SNS5A	35.550		1.47	52.259	1.40	0.96	2.14	B	EL	56.36	1.17	2.25	B	I	44.95	0.80	0.89	1.47	B	I	56.36	
		SNS6A	39.950		1.34	53.533	1.40	0.96	1.94	B	EL	56.36	1.17	2.12	B	I	44.95	0.80	0.89	1.34	B	I	56.36	
		SNS7B	42.000		1.27	53.340	1.40	0.96	1.85	B	EL	56.36	1.17	2.07	B	I	44.95	0.80	0.89	1.27	B	I	56.36	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.62	53.460	1.40	0.96	2.36	B	EL	56.36	1.17	2.44	B	I	44.95	0.80	0.89	1.62	B	I	56.36	
		TNT4A	33.075		1.63	53.912	1.40	0.96	2.37	B	EL	56.36	1.17	2.33	B	I	44.95	0.80	0.89	1.63	B	I	56.36	
		TNT6A	41.600		1.31	54.496	1.40	0.96	1.91	B	EL	56.36	1.17	2.15	B	I	44.95	0.80	0.89	1.31	B	I	56.36	
		TNT7A	42.000		1.31	55.020	1.40	0.96	1.91	B	EL	56.36	1.17	2.06	B	I	44.95	0.80	0.89	1.31	B	I	56.36	
		TNT7B	42.000		1.35	56.700	1.40	0.96	1.97	B	EL	56.36	1.17	1.96	B	I	44.95	0.80	0.89	1.35	B	I	56.36	
		TNAGRIT4	43.000		1.29	55.470	1.40	0.96	1.87	B	EL	56.36	1.17	1.90	B	I	44.95	0.80	0.89	1.29	B	I	56.36	
		TNAGT5A	45.000		1.22	54.900	1.40	0.96	1.78	B	EL	56.36	1.17	1.89	B	I	44.95	0.80	0.89	1.22	B	I	56.36	
		TNAGT5B	45.000	(3)	1.21	54.450	1.40	0.96	1.76	B	EL	56.36	1.17	1.89	B	I	88.00	0.80	0.89	1.21	B	I	56.36	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ_{DC}	γ_{DW}
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1. TRANSFORMING ALL PRESTRESSING TENDONS.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

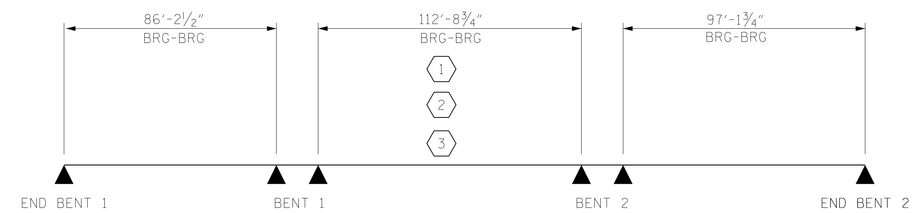
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

SECTION PROPERTIES SPANS A, B & C - INTERIOR			
	UNITS	NON-COMPOSITE	COMPOSITE
HEIGHT	IN	72	80.75
AREA	IN^2	833.1	1734.0
Ixx	IN^4	570260	1254245
Ycg	IN	36.79	57.36
SELF WT.	PLF	868.0	2180.3
EFF. WIDTH	IN	-	144.0

SECTION PROPERTIES PROVIDED AT MIDSPAN

SECTION PROPERTIES SPAN B - EXTERIOR			
	UNITS	NON-COMPOSITE	COMPOSITE
HEIGHT	IN	72	80.75
AREA	IN^2	833.1	1602.6
Ixx	IN^4	570260	1201989
Ycg	IN	36.79	55.80
SELF WT.	PLF	868.0	1988.9
EFF. WIDTH	IN	-	123.0

SECTION PROPERTIES PROVIDED AT MIDSPAN

PROJECT NO. U-2412A
GUILFORD COUNTY
STATION: 155+02.50 -L-

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4/25/2018

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SUPERSTRUCTURE
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS (NON-INTERSTATE TRAFFIC)
LEFT LANE

REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S5-5
TOTAL SHEETS 36

DRAWN BY : MAL DATE : 12/2017
CHECKED BY : CLG DATE : 01/2018
DESIGN ENGINEER OF RECORD: MAL DATE : 12/2017

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4/24/2018
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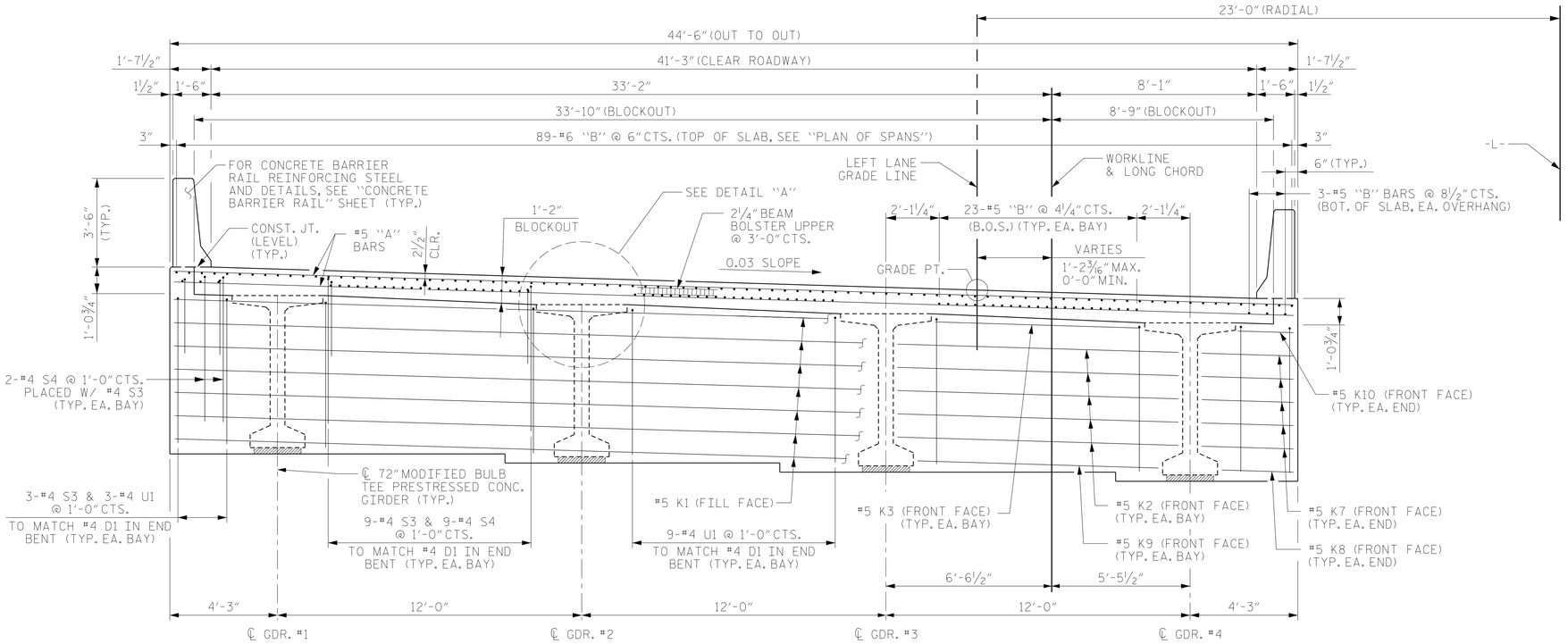
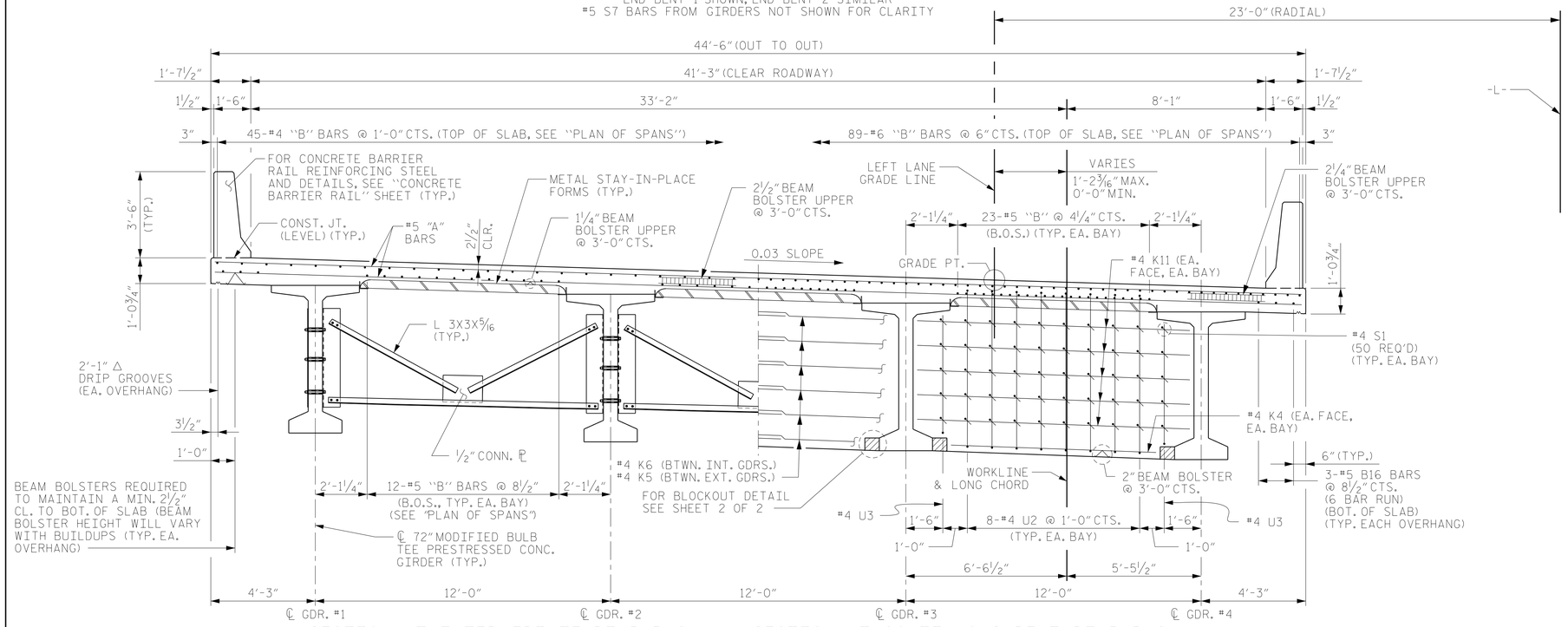
STR. #5



TYPICAL SECTION AT INTEGRAL END BENTS

END BENT 1 SHOWN, END BENT 2 SIMILAR
#5 S7 BARS FROM GIRDERS NOT SHOWN FOR CLARITY



SECTION AT INTERMEDIATE DIAPHRAGM

SECTION AT CONTINUOUS BENT DIAPHRAGM

TYPICAL SECTION

NOTES

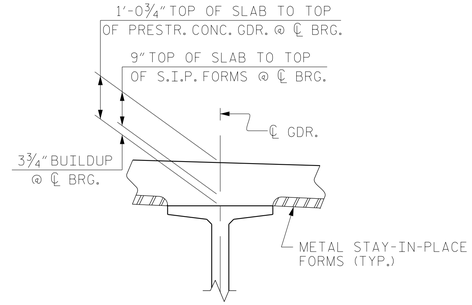
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER @ 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK @ 4'-0" CTS. WITH A HEIGHT TO PROVIDE 2½" CLEAR DISTANCE ABOVE THE FORMS.

LONGITUDINAL REINFORCING STEEL ("B" BARS) MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

CONCRETE BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL DECK SLAB CONCRETE IN THAT UNIT HAS BEEN CAST AND HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

B.O.S. = BOTTOM OF SLAB



DETAIL "A"

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 1 OF 2

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SUPERSTRUCTURE

TYPICAL SECTION

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-6
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : CLG DATE : 12/2017
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DESIGN ENGINEER OF RECORD: MAL DATE : 01/2018

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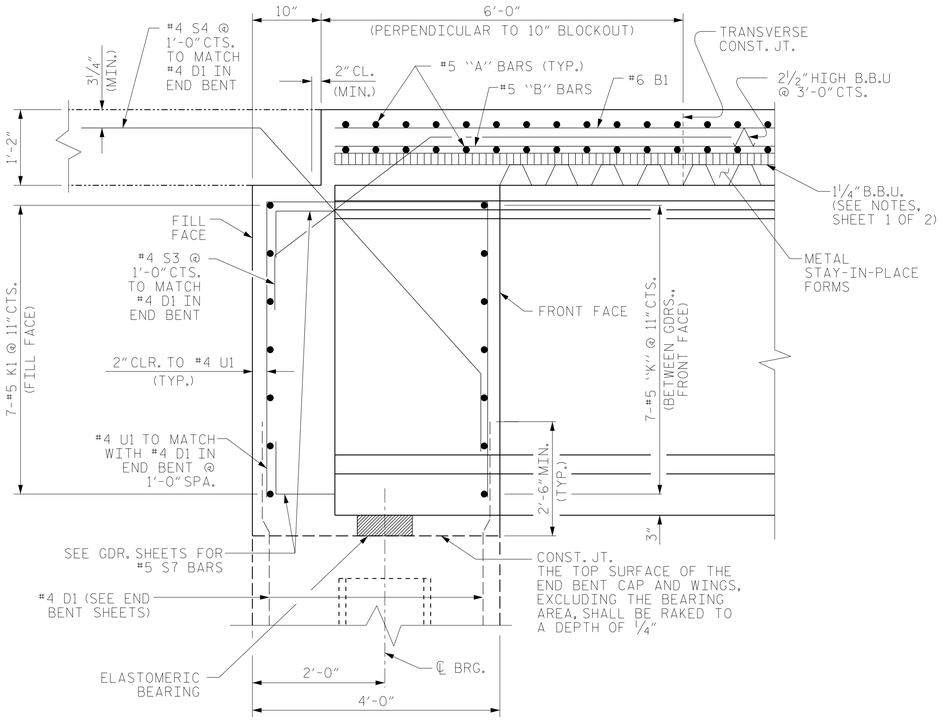
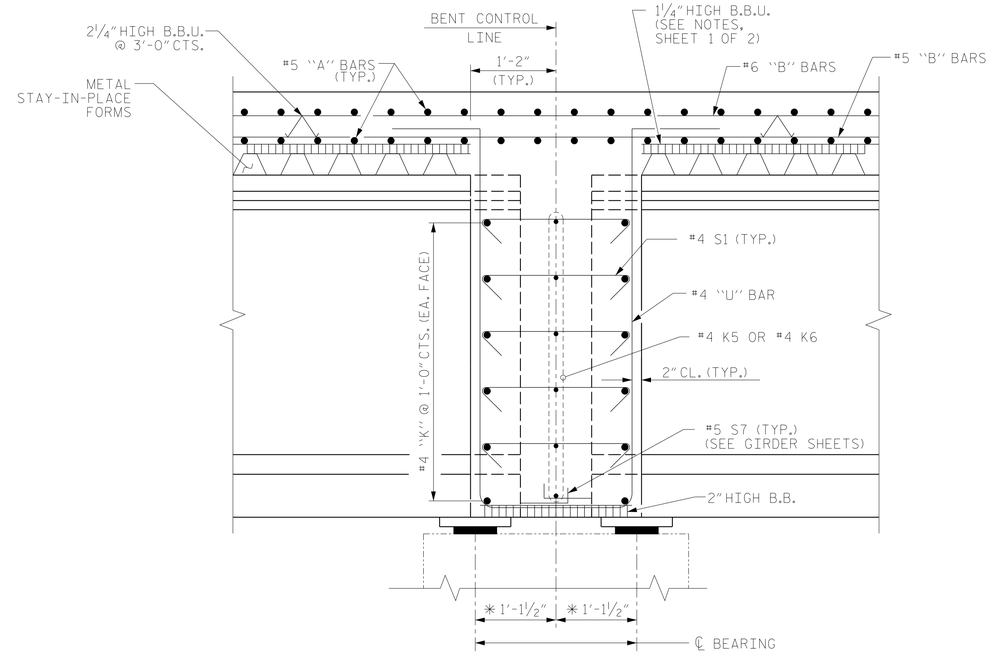
AcostaM

STR. #5

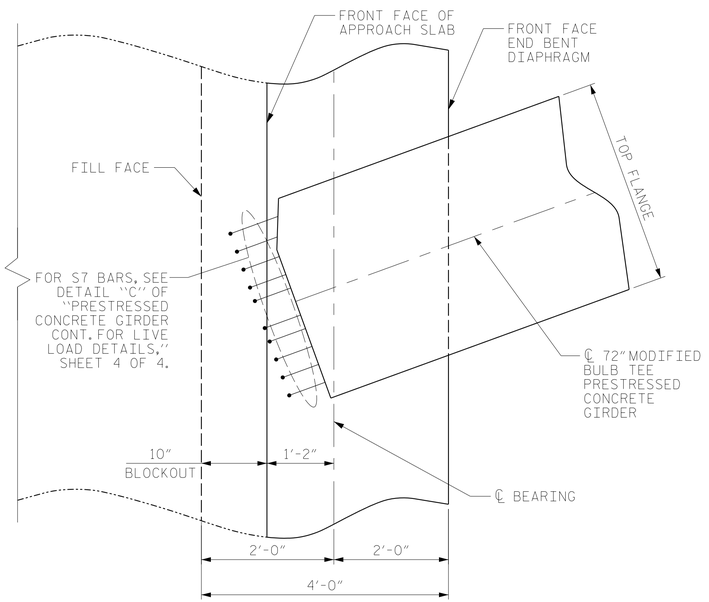


SECTION THRU INTEGRAL END BENT

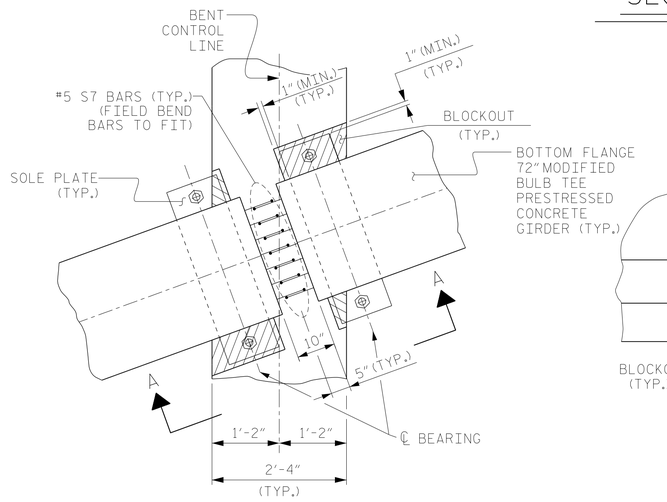


SECTION THRU CONTINUOUS BENT DIAPHRAGM

* MEASURED ALONG ℄ OF GIRDER

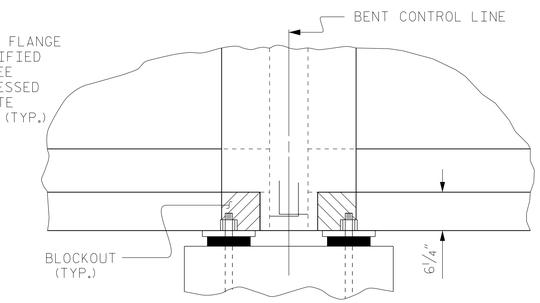


PLAN OF GIRDER @ INTEGRAL END BENT



PLAN VIEW

BENT CAP NOT SHOWN FOR CLARITY



SECTION A-A

BENT DIAPHRAGM BLOCKOUT DETAIL

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 2 OF 2

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SUPERSTRUCTURE

TYPICAL SECTION DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-7
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : CLG DATE : 12/2017
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DESIGN ENGINEER OF RECORD: TLC DATE : 01/2018

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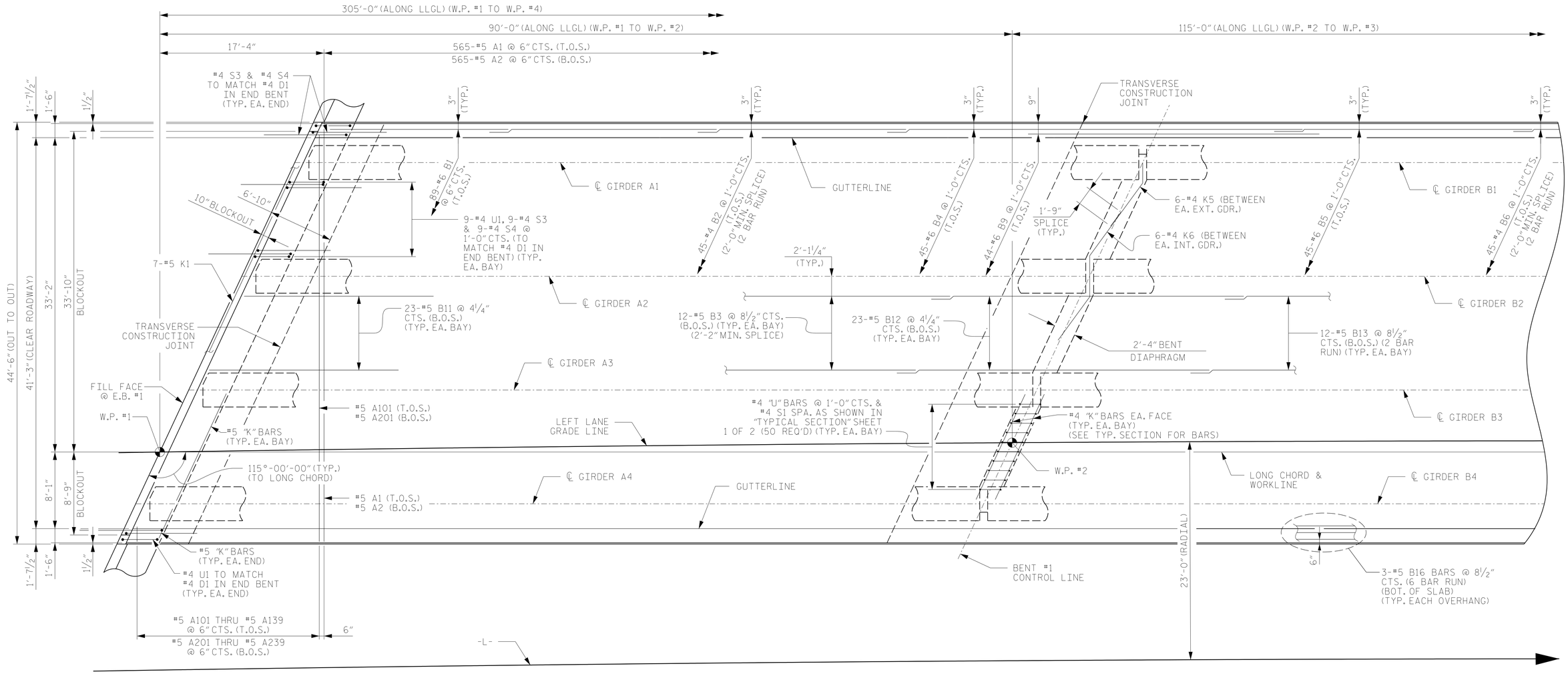
STR. #5



SPAN A

SPAN B

PLAN OF SPAN A AND PART PLAN OF SPAN B

BRIDGE DECK AND ALL GIRDERS ARE ALONG LONG CHORD

NOTES

FOR SPLICE LENGTHS NOT SHOWN, REFER TO MINIMUM SPLICE LENGTH TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 1 OF 2.

FOR END BENT DIAPHRAGM BARS AND BENT DIAPHRAGM BARS, SEE "TYPICAL SECTION DETAILS" SHEET 2 OF 2.

STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE "FRAMING PLAN" SHEET.

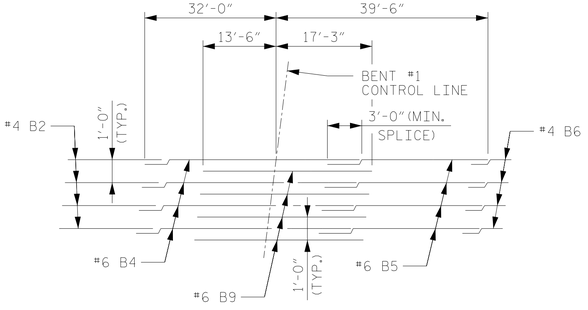
FOR POURING SEQUENCE, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 2 OF 2.

FOR BARRIER RAIL REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEET.

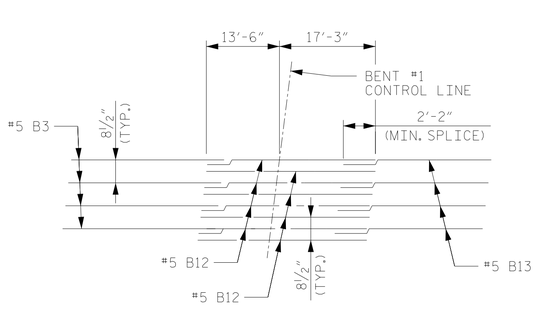
#5 "A" BARS ARE SPACED PERPENDICULAR TO LONG CHORD.

T.O.S. = TOP OF SLAB

B.O.S. = BOT. OF SLAB



TOP OF SLAB REINFORCING STEEL LAYOUT



BOTTOM OF SLAB REINFORCING STEEL LAYOUT

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 1 OF 2

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SUPERSTRUCTURE

PLAN OF SPAN A PART PLAN OF SPAN B

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-8
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : CLG DATE : 12/2017
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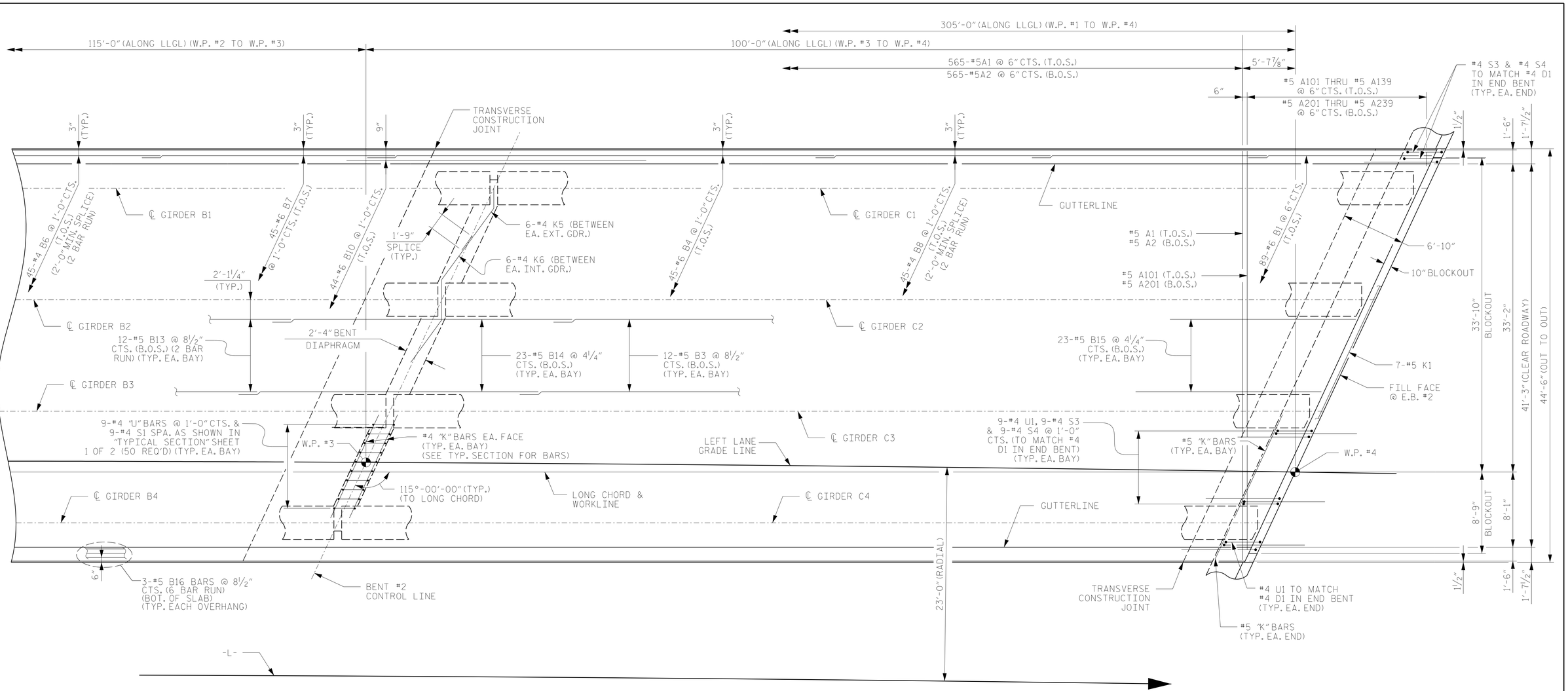
STR. #5



NOTES

FOR SPLICE LENGTHS NOT SHOWN, REFER TO MINIMUM SPLICE LENGTH TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 1 OF 2.

FOR END BENT DIAPHRAGM BARS AND BENT DIAPHRAGM BARS, SEE "TYPICAL SECTION DETAILS" SHEET 2 OF 2.

STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE "FRAMING PLAN" SHEET.

FOR POURING SEQUENCE, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 2 OF 2.

FOR BARRIER RAIL REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEET.

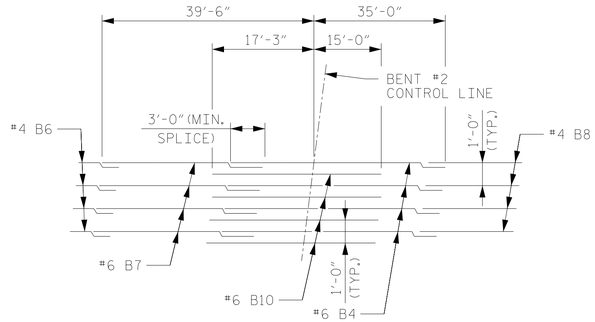
#5 "A" BARS ARE SPACED PERPENDICULAR TO LONG CHORD.

T.O.S. = TOP OF SLAB

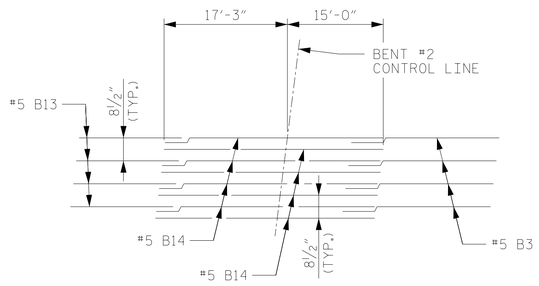
B.O.S. = BOT. OF SLAB

PART PLAN OF SPAN B AND PLAN OF SPAN C

BRIDGE DECK AND GIRDERS ARE ALONG LONG CHORD



TOP OF SLAB REINFORCING STEEL LAYOUT



BOTTOM OF SLAB REINFORCING STEEL LAYOUT

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 2 OF 2

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SUPERSTRUCTURE

PART PLAN OF SPAN B PLAN OF SPAN C

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-9
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : CLG DATE : 12/2017
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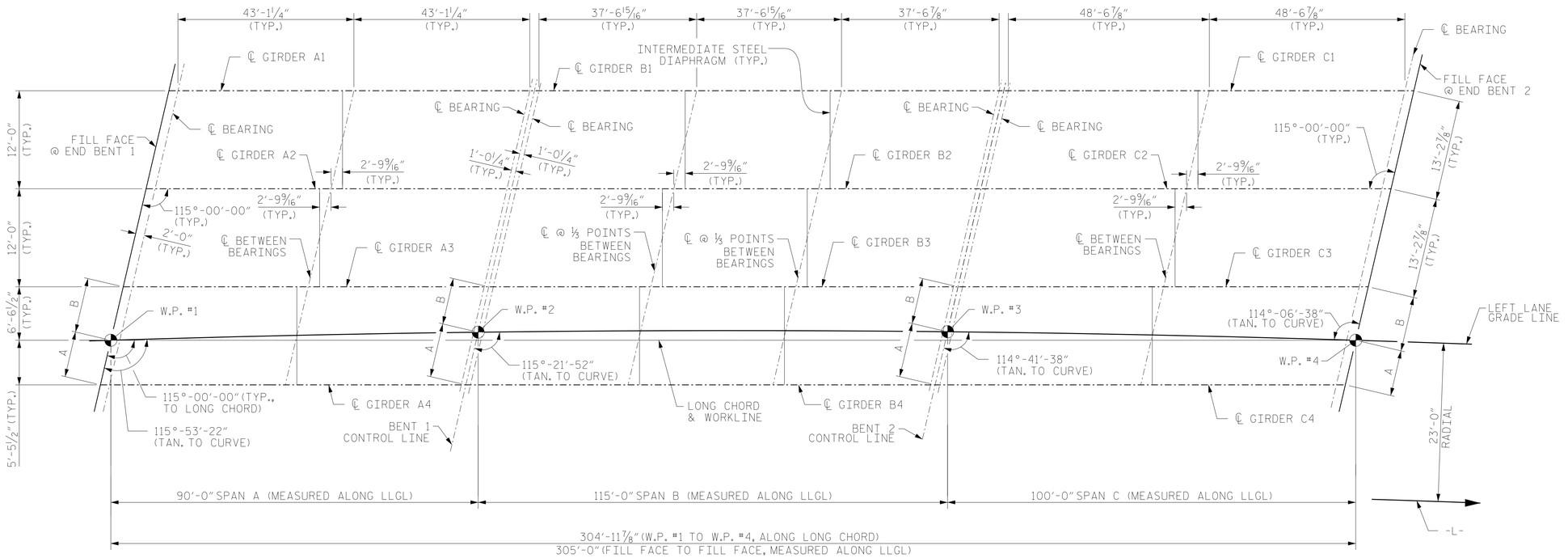
STR. #5



INTEGRAL (E4)	FIX. (P1,E4)	FIX. (P1,E4)	FIX. (P1,E4)	FIX. (P1,E4)	INTEGRAL (E4)
SPAN A		SPAN B			SPAN C

FRAMING PLAN

LOCATION	A	B
END BENT 1	6'-0 1/4"	7'-2 5/8"
BENT 1	7'-1 5/16"	6'-1 9/16"
BENT 2	7'-2 1/16"	6'-0 13/16"
END BENT 2	6'-0 1/4"	7'-2 5/8"

NOTES:

FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS DETAILS FOR PRESTRESSED MODIFIED BULB TEE GIRDERS" SHEET.

LLGL = LEFT LANE GRADE LINE

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

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SUPERSTRUCTURE

FRAMING PLAN

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-10
1			3			TOTAL SHEETS
2			4			36

STR. #5

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CHECKED BY :	JMR	DATE : 03/2018
DESIGN ENGINEER OF RECORD:	MAL	DATE : 01/2018

4/24/2018
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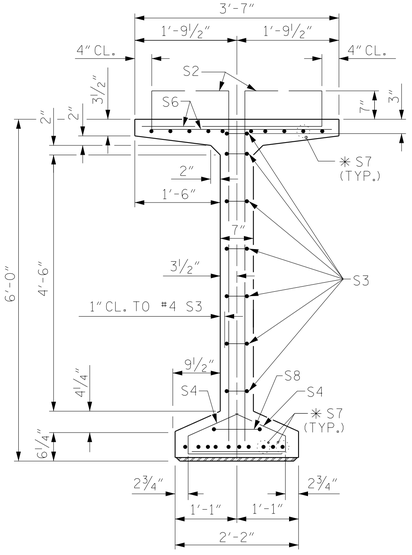
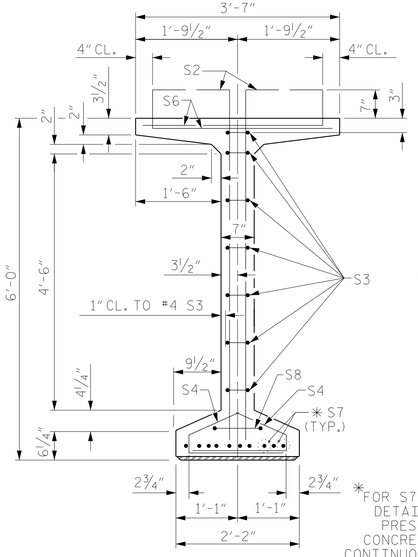
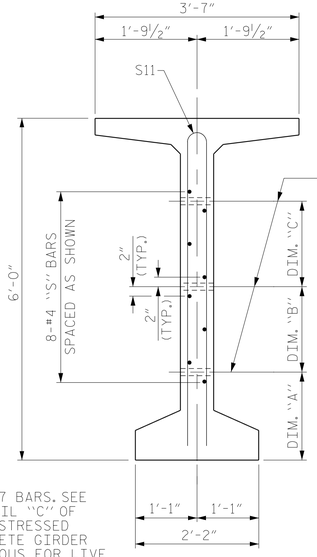
AcostaM



SECTION A-A



SECTION B-B



SECTION C-C

* FOR S7 BARS, SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

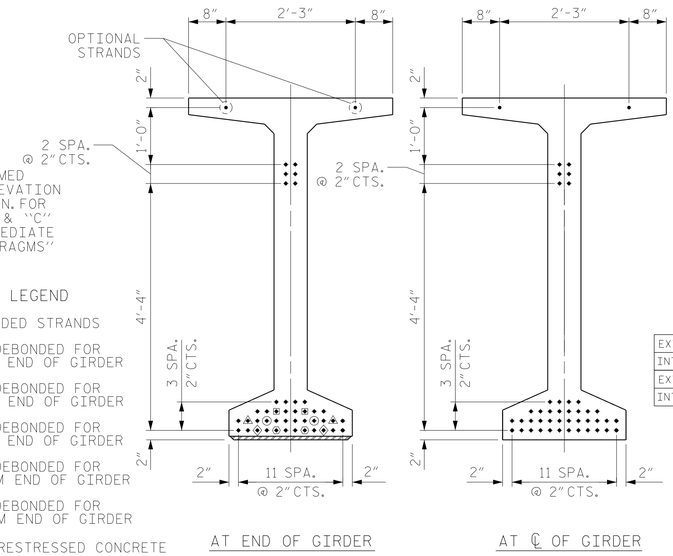
℄ 1½" Ø FORMED HOLE. SEE ELEVATION FOR LOCATION. FOR DIM. "A", "B" & "C" SEE "INTERMEDIATE STEEL DIAPHRAGMS" SHEET.)

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

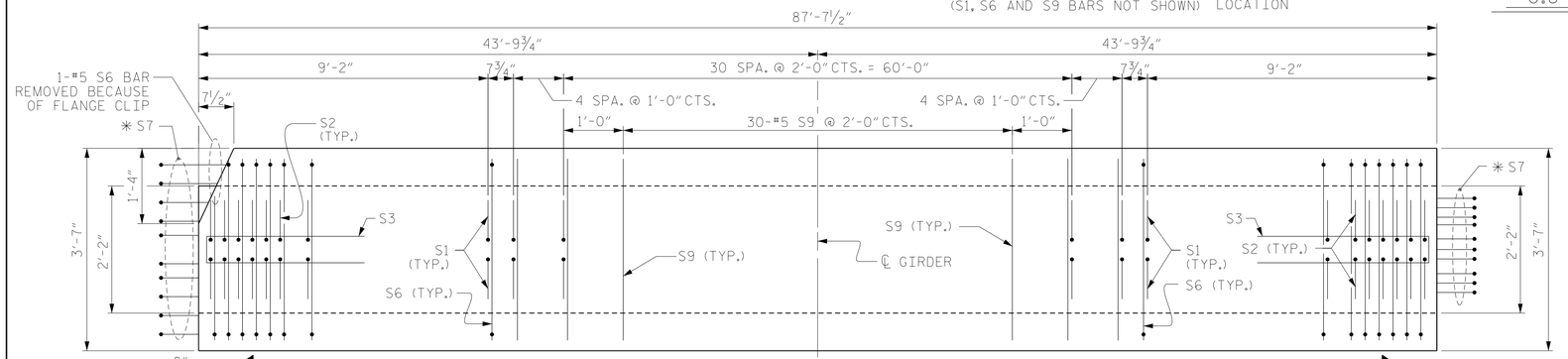
- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- ◆ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ⬢ STRANDS DEBONDED FOR 36'-0" FROM END OF GIRDER

NOTE: SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR SECTION C-C LOCATION

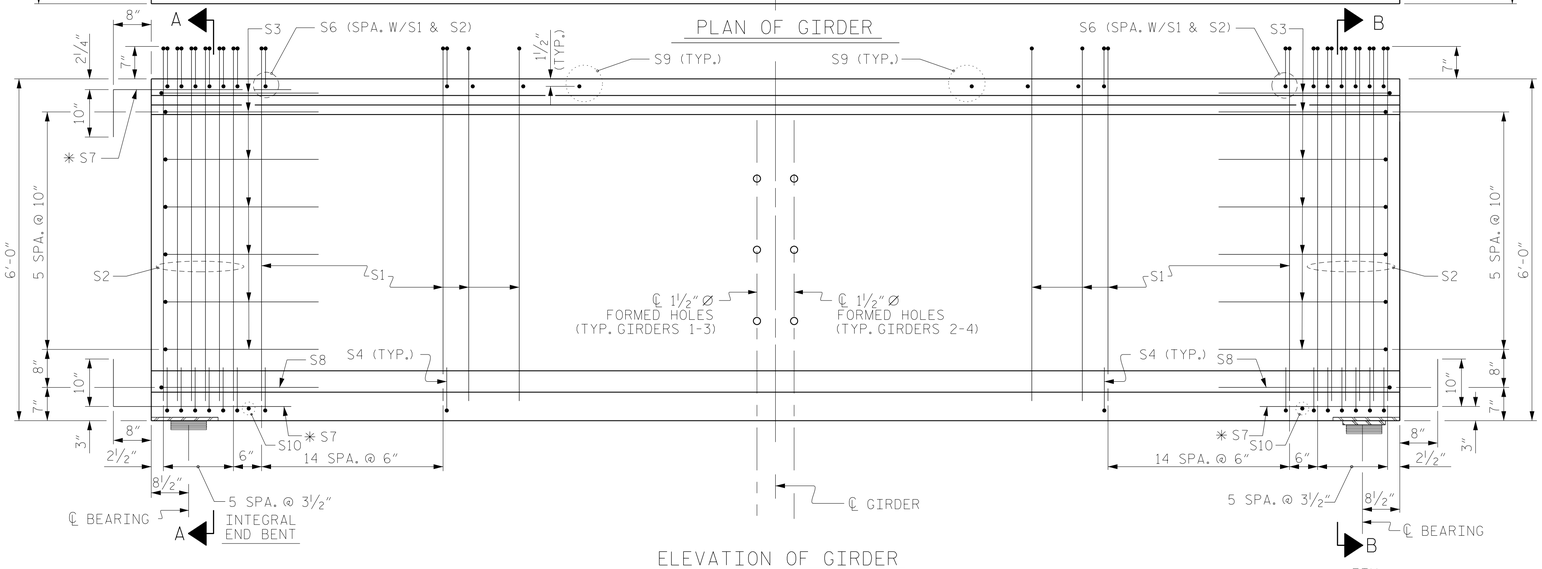


0.6" Ø LOW RELAXATION STRAND LAYOUT

(ALL STRANDS STRAIGHT)



PLAN OF GIRDER



ELEVATION OF GIRDER

FOR 1½" HOLE LOCATION, SEE FRAMING PLAN.

0.6" Ø L. R. GRADE 270 STRANDS

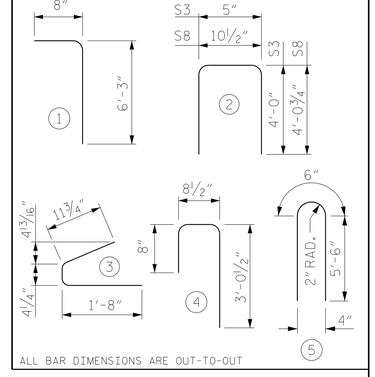
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	138	#4	1	6'-11"	638
	S2	24	#5	1	6'-11"	173
	S3	14	#4	2	8'-5"	79
	S4	84	#4	3	3'-0"	168
	S6	83	#5	4	4'-5"	382
	* S7	30	#5	STR	3'-8"	115
	S8	2	#5	2	9'-0"	19
	S9	40	#5	STR	3'-3"	136
	S10	2	#3	STR	1'-10"	1
EXTERIOR GDR.	S11	4	#5	5	11'-6"	48
INTERIOR GDR.	S11	8	#5	5	11'-6"	96
EXTERIOR GDR.	S12	8	#4	STR	8'-0"	43
INTERIOR GDR.	S13	8	#4	STR	13'-8"	73
	TOTAL					1971

* NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
EXTERIOR GIRDER	1802	18.8	42
INTERIOR GIRDER	1880	18.8	42

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	87'-7½"	350.50'

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 1 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043835 MARC A LEBLANC 4/25/2018

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SUPERSTRUCTURE
72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN A LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-11
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MAL DATE : 12/2017
CHECKED BY : CLG DATE : 01/2018
DESIGN ENGINEER OF RECORD: MAL DATE : 12/2017

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4/24/2018
\\rsandh.com\files\Transportation\P\10317090003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\405_021_U2412A_SMU_G*11_S5-11.dgn
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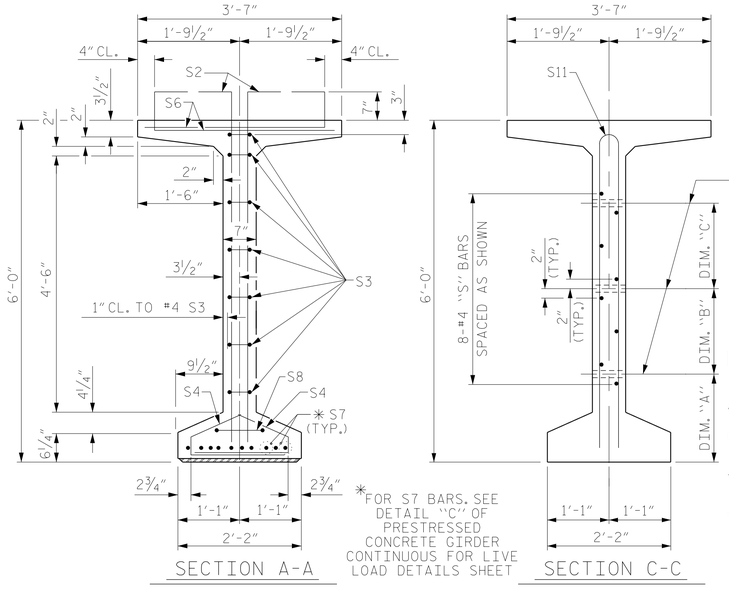
STR. #5



SECTION A-A

*FOR S7 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

SECTION C-C

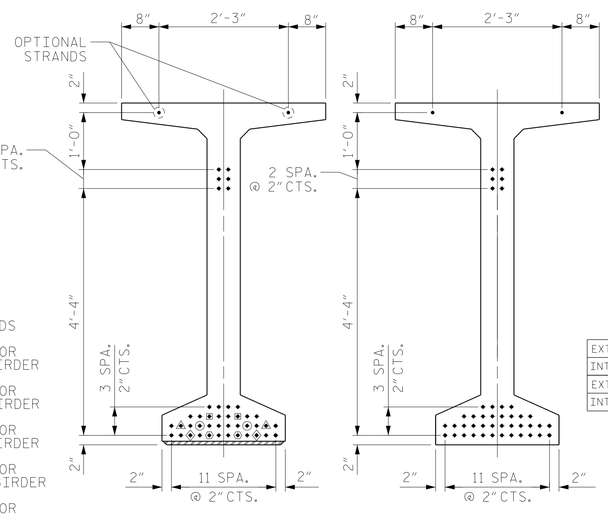
(S1, S6 AND S9 BARS NOT SHOWN)

℄ 1½"Ø FORMED HOLE. SEE ELEVATION FOR LOCATION. FOR DIM. "A", "B" & "C" SEE "INTERMEDIATE STEEL DIAPHRAGMS" SHEET.)

DEBONDING LEGEND

- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 36'-0" FROM END OF GIRDER

NOTE: SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR SECTION C-C LOCATION

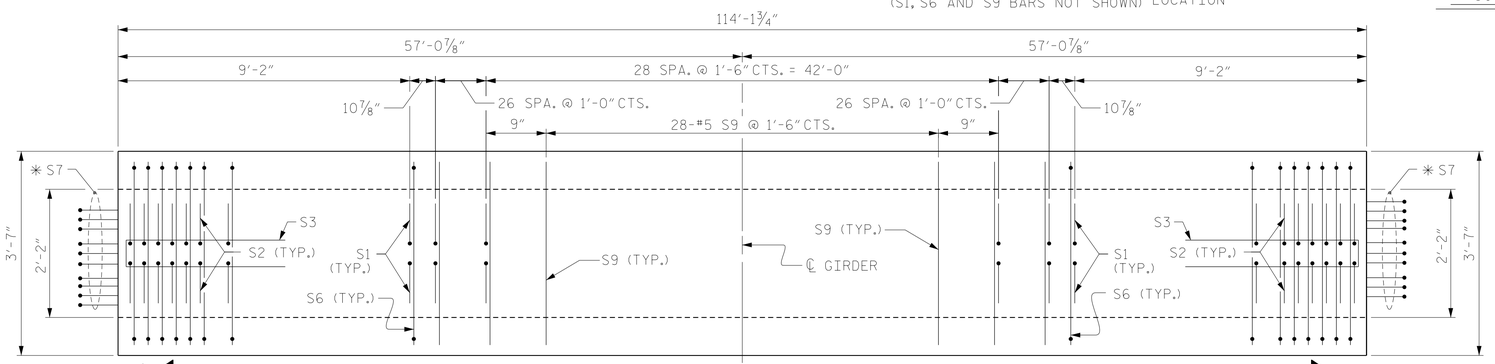


AT END OF GIRDER

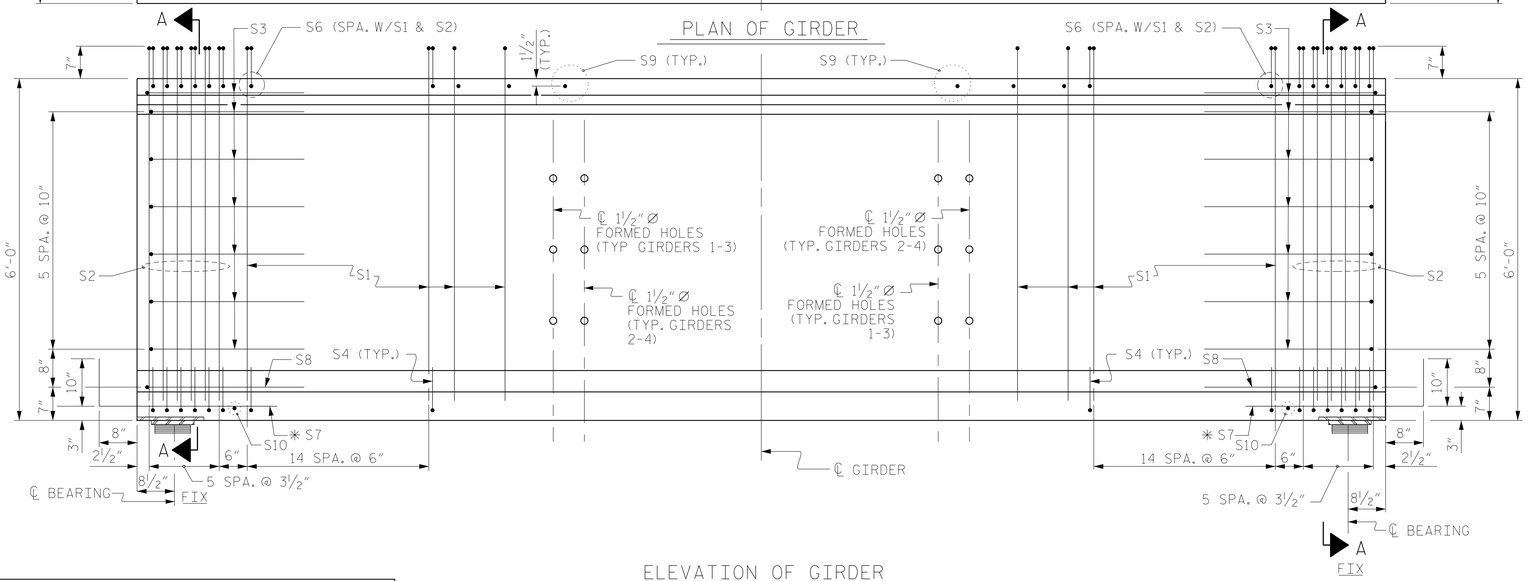
AT ℄ OF GIRDER

0.6"Ø LOW RELAXATION STRAND LAYOUT

(ALL STRANDS STRAIGHT)



PLAN OF GIRDER



ELEVATION OF GIRDER

FOR 1½" HOLE LOCATION, SEE FRAMING PLAN.

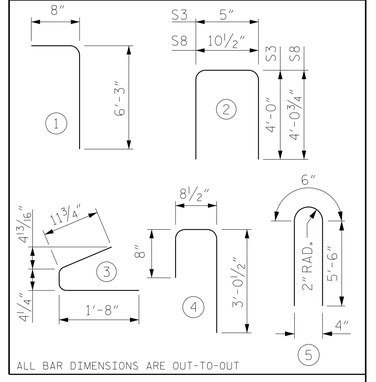
0.6"Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	222	#4	1	6'-11"	1026
	S2	24	#5	1	6'-11"	173
	S3	14	#4	2	8'-5"	79
	S4	84	#4	3	3'-0"	168
	S6	84	#5	4	4'-5"	387
	* S7	20	#5	STR	3'-8"	76
	S8	2	#5	2	9'-0"	19
	S9	82	#5	STR	3'-3"	278
	S10	2	#3	STR	1'-10"	1
EXTERIOR GDR.	S11	8	#5	5	11'-6"	96
INTERIOR GDR.	S11	16	#5	5	11'-6"	192
EXTERIOR GDR.	S12	16	#4	STR	8'-0"	86
INTERIOR GDR.	S13	16	#4	STR	13'-8"	146
	TOTAL					2727

* NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES



QUANTITIES FOR ONE GIRDER			
	REINFORCING STEEL	8000 PSI CONCRETE	0.6"Ø L.R. STRANDS
	LB.	C.Y.	No.
EXTERIOR GIRDER	2389	24.5	42
INTERIOR GIRDER	2545	24.5	42

GIRDERS REQUIRED		
NUMBER	LENGTH	TOTAL LENGTH
4	114'-1¾"	456.58'

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043835 MARC A LEBLANC 4/25/2018

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN B LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-12
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MAL DATE : 12/2017
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DESIGN ENGINEER OF RECORD: MAL DATE : 12/2017

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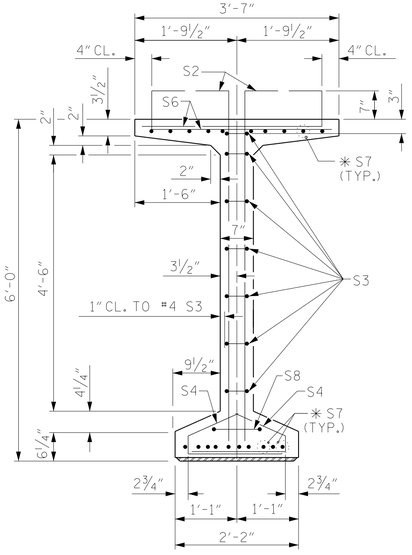
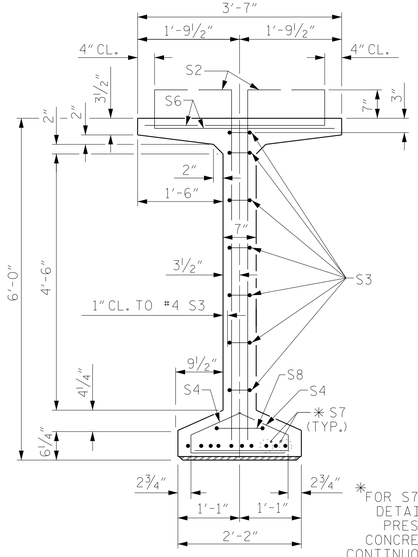
STR. #5

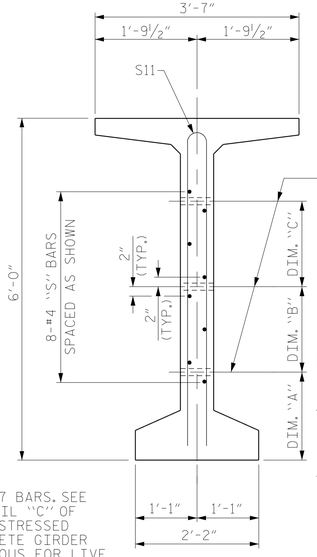


SECTION A-A



SECTION B-B

✱FOR S7 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET



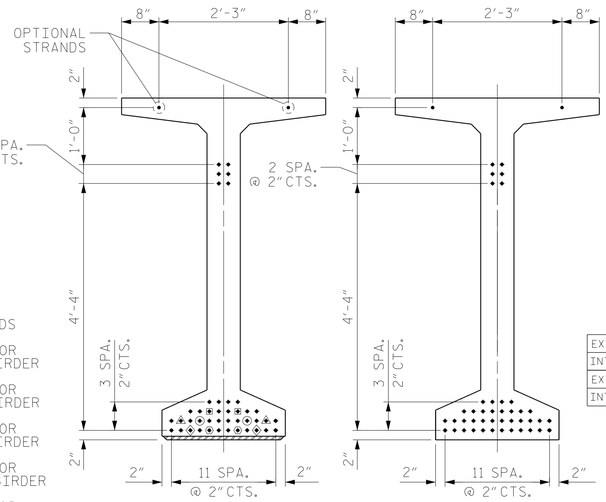
SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

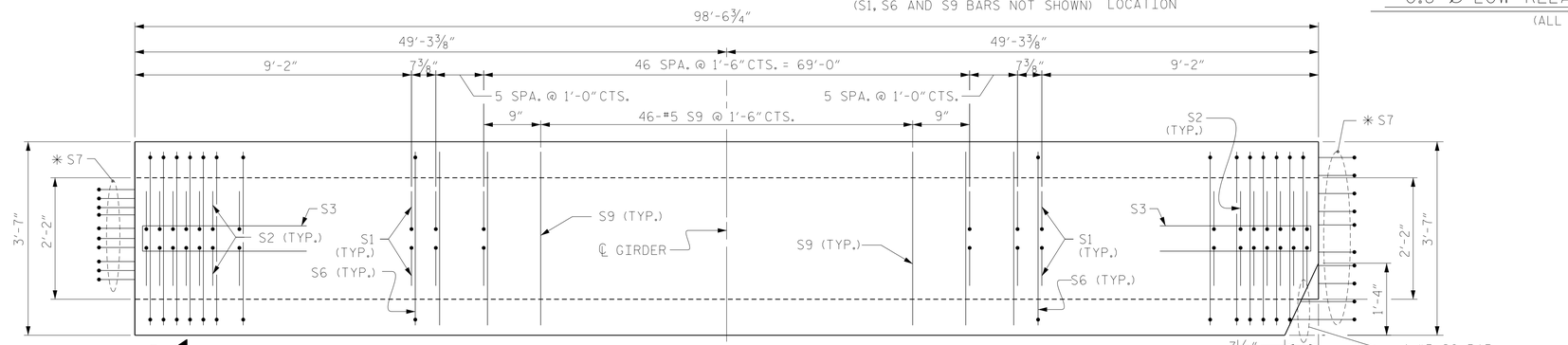
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 36'-0" FROM END OF GIRDER

NOTE: SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR SECTION C-C LOCATION



0.6" Ø LOW RELAXATION STRAND LAYOUT

(ALL STRANDS STRAGHT)



PLAN OF GIRDER

ELEVATION OF GIRDER

FOR 1½" HOLE LOCATION, SEE FRAMING PLAN.

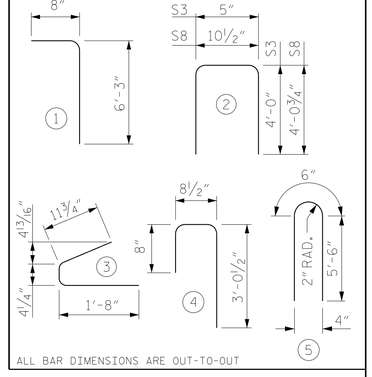
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	174	#4	1	6'-11"	804
	S2	24	#5	1	6'-11"	173
	S3	14	#4	2	8'-5"	79
	S4	84	#4	3	3'-0"	168
	S6	83	#5	4	4'-5"	382
	✱S7	30	#5	STR	3'-8"	115
	S8	2	#5	2	9'-0"	19
	S9	58	#5	STR	3'-3"	197
	S10	2	#3	STR	1'-10"	1
EXTERIOR GDR.	S11	4	#5	5	11'-6"	48
INTERIOR GDR.	S11	8	#5	5	11'-6"	96
EXTERIOR GDR.	S12	8	#4	STR	8'-0"	43
INTERIOR GDR.	S13	8	#4	STR	13'-8"	73
	TOTAL					2198

✱NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES



QUANTITIES FOR ONE GIRDER			
	REINFORCING STEEL	8000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
EXTERIOR GIRDER	2029	21.1	42
INTERIOR GIRDER	2107	21.1	42

GIRDERS REQUIRED		
NUMBER	LENGTH	TOTAL LENGTH
4	98'-6¾"	394.25'

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 3 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043835 MARSHALL A LEBLANC 4/25/2018

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RALEIGH

SUPERSTRUCTURE
72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN C LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-13
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MAL DATE : 12/2017
CHECKED BY : CLG DATE : 01/2018
DESIGN ENGINEER OF RECORD: MAL DATE : 12/2017

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4/24/2018
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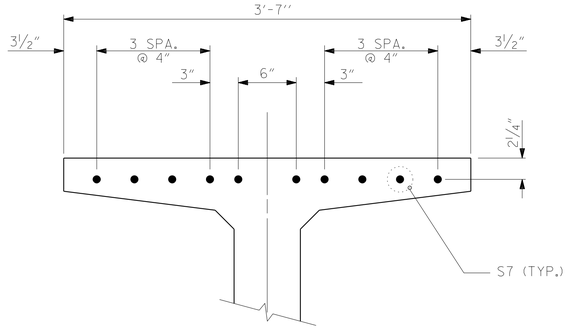
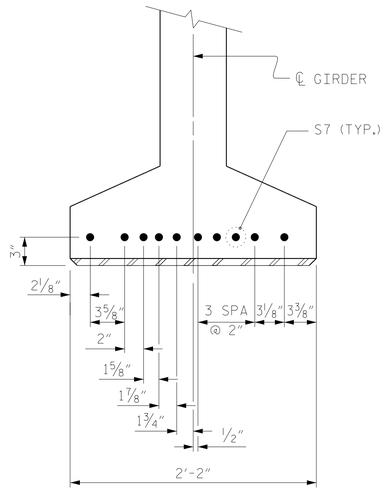
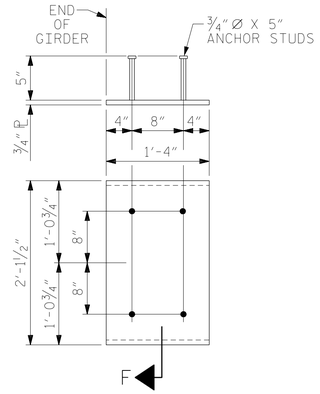
STR. #5



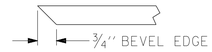


DETAIL "C"



EMBEDDED PLATE "B-1" DETAILS FOR 72" MODIFIED PRESTRESSED CONCRETE GIRDER

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)

NOTES

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL SHALL BE GRADE 60.

EMBEDDED PLATE "B-1" SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE "B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

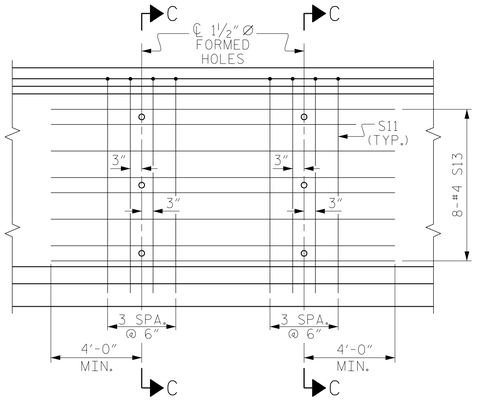
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6400 PSI.

DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF ¼".

A 2" x 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 72" MODIFIED BULB TEE.

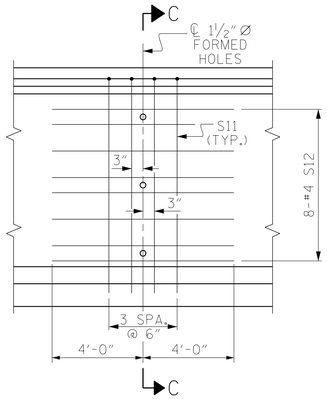
THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 lbs.



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 2 & 3

FOR SECTION C-C, SEE "72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD" SHEETS.



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1 & 4

FOR SECTION C-C, SEE "72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD" SHEETS.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 4 OF 4

ASSEMBLED BY : MAL	DATE : 12/2017
CHECKED BY : CLG	DATE : 12/2017
DRAWN BY : ELR 11/91	REV. 1/15 MAA/TMG
CHECKED BY : GRP 11/91	REV. 2/15 MAA/TMG
	REV. 12/17 MAA/THC

4/24/2018
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4/25/2018

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RALEIGH

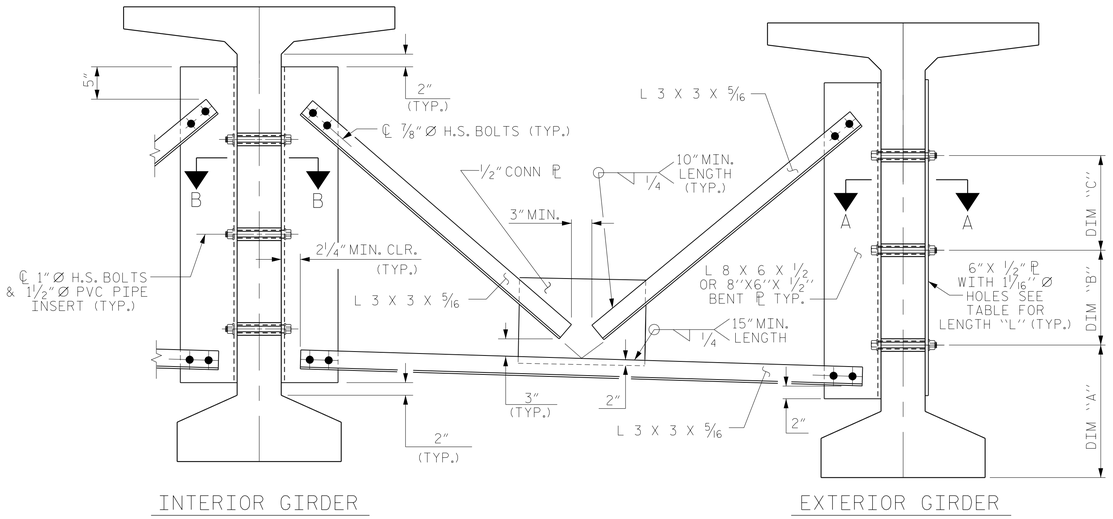
STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-14
1			3			TOTAL SHEETS
2			4			36

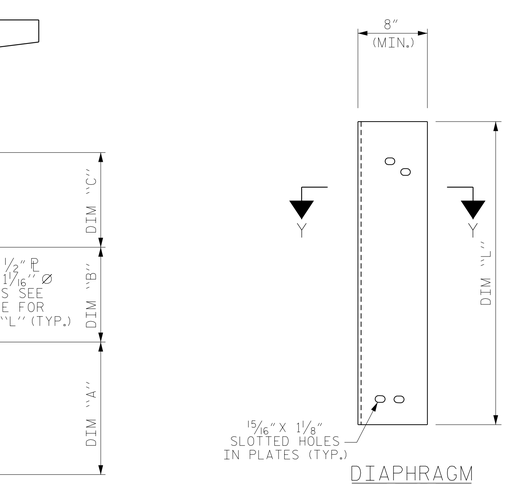
STD. NO. PCG9 STR. #5



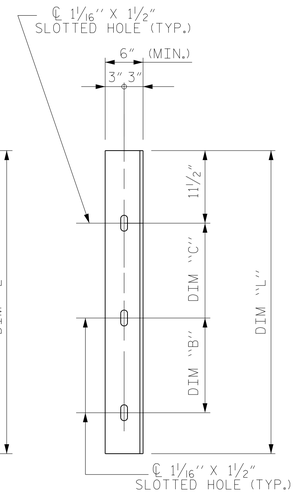
INTERIOR GIRDER

EXTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE



WEB FACE

STRUCTURAL STEEL NOTES

ALL INTERMEDIATE DIAPHRAGM STEEL AND CONNECTOR PLATES SHALL BE AASHTO M270 GRADE 50 OR APPROVED EQUAL.

TENSION ON THE ASTM A325 BOLTS THROUGH THE ANGLE MEMBER SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL 1/4 TURN.

THE PLATES, BENT PLATES, AND ANGLES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

FOR METALLIZATION, APPLY A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENTS THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM. THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

GALVANIZE THE HIGH STRENGTH BOLTS, NUTS, WASHERS AND DIRECT TENSION INDICATORS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

USE AN ASTM F436 HARDENED WASHER WITH STANDARD AND SLOTTED HOLES UNDER EACH BOLT HEAD AND NUT.

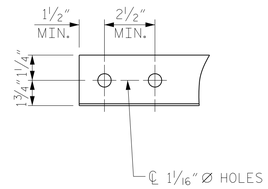
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

INTERMEDIATE DIAPHRAGM ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.



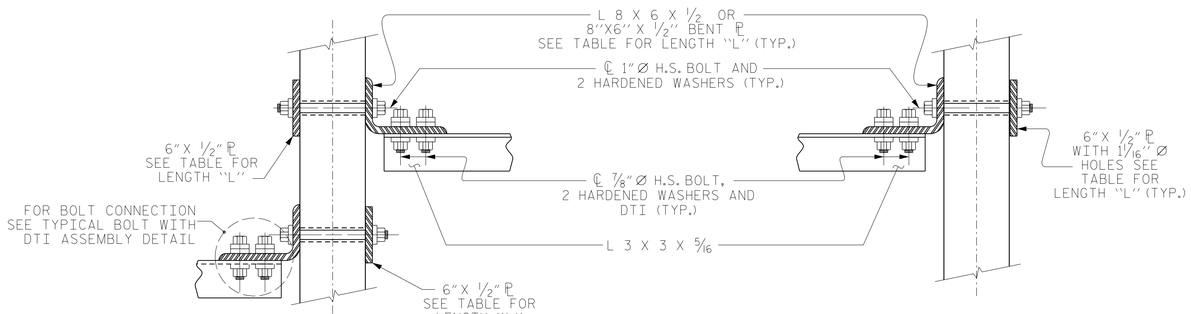
ANGLE END
(L 3 X 3 X 5/16)

SECTION Y-Y

CONNECTOR PLATE DETAIL

TABLE

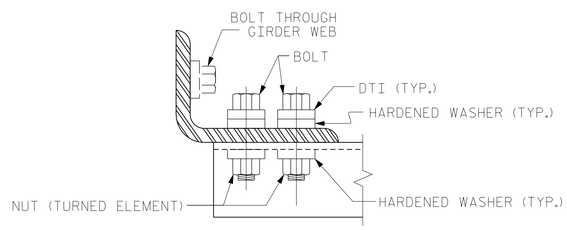
GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
72" BULB TEE	1'-9"	1'-3"	1'-3"	4'-2"



SECTION B-B

SECTION A-A

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043835 MARC A. LEBLANC 4/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-15
1			3			TOTAL SHEETS
2			4			36

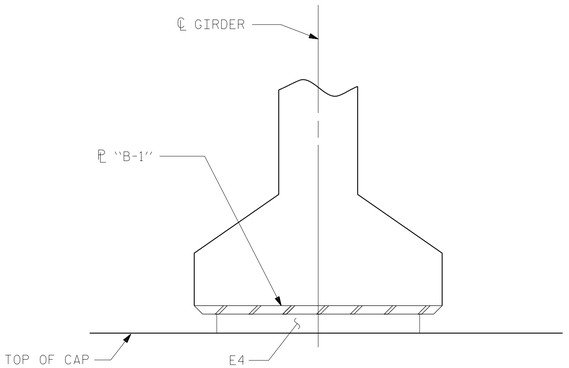
ASSEMBLED BY : MAL	DATE : 12/2017
CHECKED BY : CLG	DATE : 01/2018
DRAWN BY : ELR 11/91	REV. 1/15 MAA/TMG
CHECKED BY : GRP 11/91	REV. 2/15 MAA/TMG
	REV. 12/17 MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\405_029_U2412A_SMU_DIA15_S5-15.dgn
AcostaM

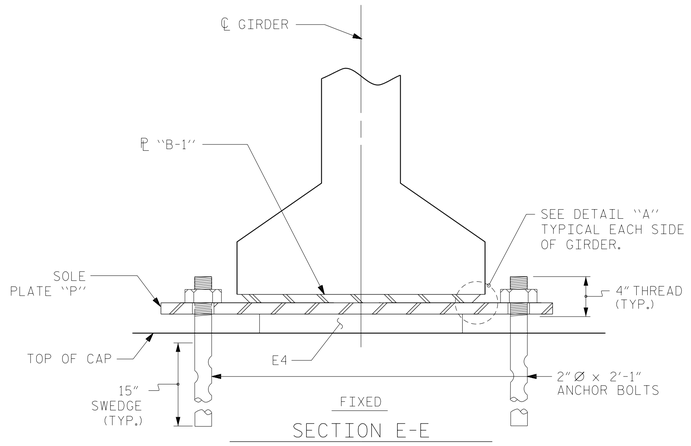
STD. NO. PCG11

STR. #5



INTEGRAL

SECTION D-D



FIXED

SECTION E-E

NOTES

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF 1/2 TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

STEEL SOLE PLATES, ANCHOR BOLTS AND NUTS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

PRIOR TO WELDING, GRIND THE GALVANIZED SURFACE OF THE PORTION OF THE EMBEDDED PLATE AND SOLE PLATE THAT ARE TO BE WELDED. AFTER WELDING, DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

WHEN WELDING THE SOLE PLATE TO THE EMBEDDED PLATE IN THE GIRDER, USE TEMPERATURE INDICATING WAX PENS, OR OTHER SUITABLE MEANS, TO ENSURE THAT THE TEMPERATURE OF THE SOLE PLATE DOES NOT EXCEED 300°F. TEMPERATURES ABOVE THIS MAY DAMAGE THE ELASTOMER.

SOLE PLATE "P", BOLTS AND NUTS SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

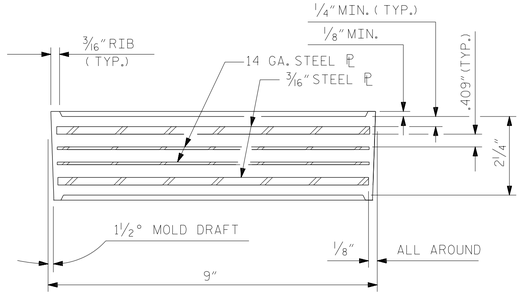
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS AND NUTS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

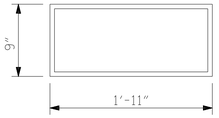
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.



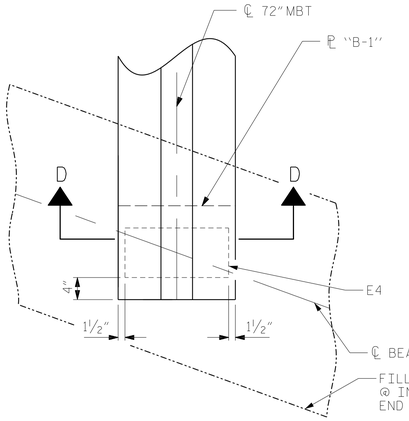
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E4 (24 REQ'D)

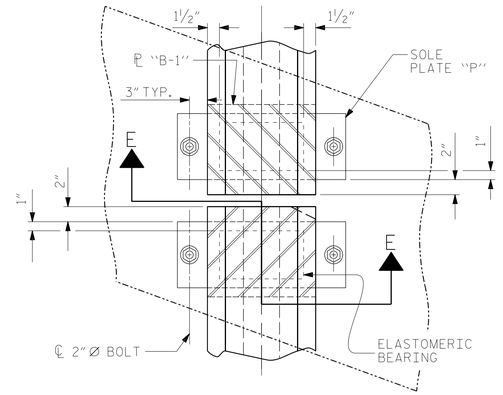
PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



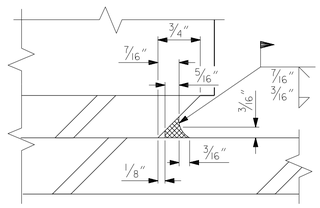
PLAN VIEW AT END BENTS

NOTE: BOTTOM FLANGE OF 72" MBT SHOWN, TOP FLANGE NOT SHOW FOR CLARITY

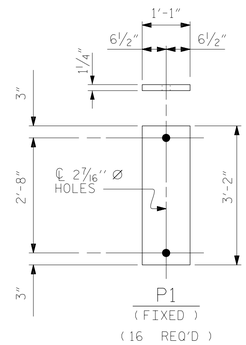


TYPICAL PLAN

(SHOWING CONTINUOUS BENT)



DETAIL "A"



P1
(FIXED)
(16 REQ'D)

SOLE PLATE DETAILS ("P")

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE V	365 k

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043835 MARC A. LEBLANC 4/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING AND SOLE PLATE DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-16
1			3			TOTAL SHEETS
2			4			36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : TWL		DATE : 12/2017	
CHECKED BY : TLC		DATE : 12/2017	
DRAWN BY : WJH 8/89	REV. 6/13	AAC/MAA.	
CHECKED BY : CRK 8/89	REV. 1/15	MAA/TMC.	
	REV. 12/17	MAA/THC	

4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\405_031_U2412A_SMU_BG16_S5-16.dgn
AcostaM

STR. #5

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION

SPAN A

GIRDER 1 (EXTERIOR)

TENTH POINTS	0	.10	.20	.30	.40	.50	.60	.70	.80	.90	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.059	0.111	0.152	0.178	0.187	0.178	0.152	0.111	0.059	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.018	0.034	0.047	0.055	0.058	0.055	0.047	0.034	0.018	0.000
FINAL CAMBER ↑	0''	1/2''	15/16''	1 1/4''	1 1/2''	1 9/16''	1 1/2''	1 1/4''	15/16''	1/2''	0''

GIRDER 2 (INTERIOR)

TENTH POINTS	0	.10	.20	.30	.40	.50	.60	.70	.80	.90	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.059	0.111	0.152	0.178	0.187	0.178	0.152	0.111	0.059	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.020	0.037	0.051	0.059	0.062	0.059	0.051	0.037	0.020	0.000
FINAL CAMBER ↑	0''	1/2''	7/8''	1 3/16''	1 7/16''	1 1/2''	1 7/16''	1 3/16''	7/8''	1/2''	0''

GIRDER 3 (INTERIOR)

TENTH POINTS	0	.10	.20	.30	.40	.50	.60	.70	.80	.90	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.059	0.111	0.152	0.178	0.187	0.178	0.152	0.111	0.059	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.020	0.037	0.051	0.059	0.062	0.059	0.051	0.037	0.020	0.000
FINAL CAMBER ↑	0''	1/2''	7/8''	1 3/16''	1 7/16''	1 1/2''	1 7/16''	1 3/16''	7/8''	1/2''	0''

GIRDER 4 (EXTERIOR)

TENTH POINTS	0	.10	.20	.30	.40	.50	.60	.70	.80	.90	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.059	0.111	0.152	0.178	0.187	0.178	0.152	0.111	0.059	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.018	0.033	0.046	0.054	0.056	0.054	0.046	0.033	0.018	0.000
FINAL CAMBER ↑	0''	1/2''	15/16''	1 1/4''	1 1/2''	1 9/16''	1 1/2''	1 1/4''	15/16''	1/2''	0''

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION

SPAN C

GIRDER 1 (EXTERIOR)

TENTH POINTS	0	.10	.20	.30	.40	.50	.60	.70	.80	.90	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.070	0.132	0.181	0.211	0.222	0.211	0.181	0.132	0.070	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.029	0.055	0.075	0.088	0.093	0.088	0.075	0.055	0.029	0.000
FINAL CAMBER ↑	0''	1/2''	15/16''	1 1/4''	1 1/2''	1 9/16''	1 1/2''	1 1/4''	15/16''	1/2''	0''

GIRDER 2 (INTERIOR)

TENTH POINTS	0	.10	.20	.30	.40	.50	.60	.70	.80	.90	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.070	0.132	0.181	0.211	0.222	0.211	0.181	0.132	0.070	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.031	0.060	0.082	0.095	0.100	0.095	0.082	0.060	0.031	0.000
FINAL CAMBER ↑	0''	7/16''	7/8''	1 3/16''	1 3/8''	1 7/16''	1 3/8''	1 3/16''	7/8''	7/16''	0''

GIRDER 3 (INTERIOR)

TENTH POINTS	0	.10	.20	.30	.40	.50	.60	.70	.80	.90	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.070	0.132	0.181	0.211	0.222	0.211	0.181	0.132	0.070	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.031	0.060	0.082	0.095	0.100	0.095	0.082	0.060	0.031	0.000
FINAL CAMBER ↑	0''	7/16''	7/8''	1 3/16''	1 3/8''	1 7/16''	1 3/8''	1 3/16''	7/8''	7/16''	0''

GIRDER 4 (EXTERIOR)

TENTH POINTS	0	.10	.20	.30	.40	.50	.60	.70	.80	.90	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.070	0.132	0.181	0.211	0.222	0.211	0.181	0.132	0.070	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.028	0.054	0.074	0.086	0.091	0.086	0.074	0.054	0.028	0.000
FINAL CAMBER ↑	0''	1/2''	15/16''	1 5/16''	1 1/2''	1 9/16''	1 1/2''	1 5/16''	15/16''	1/2''	0''

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION

SPAN B

GIRDER 1 (EXTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.042	0.083	0.122	0.157	0.188	0.215	0.236	0.252	0.261	0.264	0.261	0.252	0.236	0.215	0.188	0.157	0.122	0.083	0.042	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.027	0.053	0.078	0.101	0.121	0.138	0.152	0.161	0.168	0.170	0.168	0.161	0.152	0.138	0.121	0.101	0.078	0.053	0.027	0.000
FINAL CAMBER ↑	0''	3/16''	3/8''	1/2''	11/16''	13/16''	15/16''	1''	1 1/16''	1 1/8''	1 1/8''	1 1/8''	1 1/16''	1''	15/16''	13/16''	11/16''	1/2''	3/8''	3/16''	0''

GIRDER 2 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.042	0.083	0.122	0.157	0.188	0.215	0.236	0.252	0.261	0.264	0.261	0.252	0.236	0.215	0.188	0.157	0.122	0.083	0.042	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.029	0.058	0.085	0.109	0.131	0.149	0.164	0.175	0.182	0.184	0.182	0.175	0.164	0.149	0.131	0.109	0.085	0.058	0.029	0.000
FINAL CAMBER ↑	0''	1/8''	5/16''	7/16''	9/16''	11/16''	13/16''	7/8''	15/16''	15/16''	15/16''	15/16''	15/16''	7/8''	13/16''	11/16''	9/16''	7/16''	5/16''	1/8''	0''

GIRDER 3 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.042	0.083	0.122	0.157	0.188	0.215	0.236	0.252	0.261	0.264	0.261	0.252	0.236	0.215	0.188	0.157	0.122	0.083	0.042	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.029	0.058	0.085	0.109	0.131	0.149	0.164	0.175	0.182	0.184	0.182	0.175	0.164	0.149	0.131	0.109	0.085	0.058	0.029	0.000
FINAL CAMBER ↑	0''	1/8''	5/16''	7/16''	9/16''	11/16''	13/16''	7/8''	15/16''	15/16''	15/16''	15/16''	15/16''	7/8''	13/16''	11/16''	9/16''	7/16''	5/16''	1/8''	0''

GIRDER 4 (EXTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.042	0.083	0.122	0.157	0.188	0.215	0.236	0.252	0.261	0.264	0.261	0.252	0.236	0.215	0.188	0.157	0.122	0.083	0.042	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.026	0.052	0.076	0.099	0.118	0.135	0.148	0.158	0.164	0.166	0.164	0.158	0.148	0.135	0.118	0.099	0.076	0.052	0.026	0.000
FINAL CAMBER ↑	0''	3/16''	3/8''	9/16''	11/16''	13/16''	15/16''	1 1/16''	1 1/8''	1 3/16''	1 3/16''	1 3/16''	1 1/8''	1 1/16''	15/16''	13/16''	11/16''	9/16''	3/8''	3/16''	0''

✳ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT " FINAL CAMBER ", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

DRAWN BY : MAL DATE : 12/2017

CHECKED BY : CLG DATE : 01/2018

DESIGN ENGINEER OF RECORD: MAL DATE : 12/2017

4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 Dual Bridges\Site 3\Design\Structures\Working DGN\405_033_U2412A_SMU_DL17_S5-17.dgn
AcostaM

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 043835 ENGINEER MARC A LEBLANC
4/25/2018

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919-926-4100 FAX 919-846-9080
www.rsandh.com
North Carolina License Nos. 50073 * F-0493 * C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

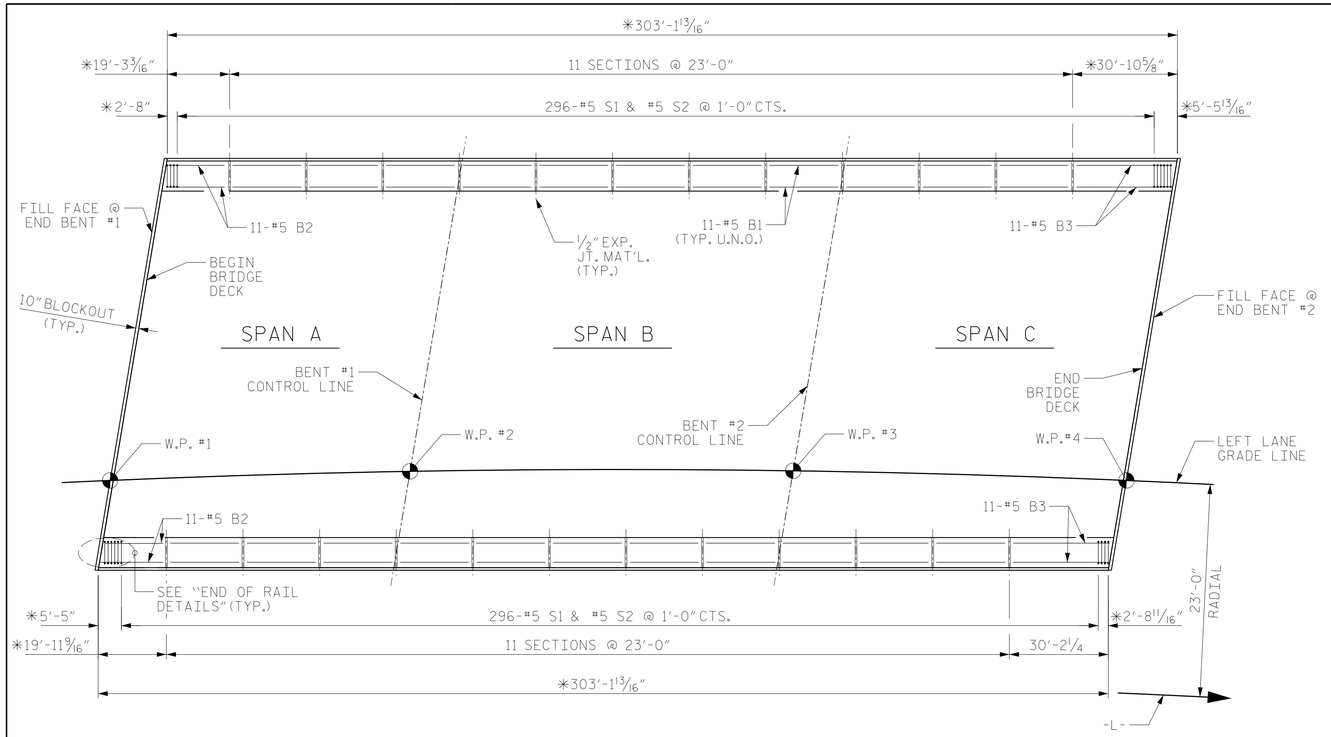
SUPERSTRUCTURE

DEAD LOAD DEFLECTION SPANS A, B & C

LEFT LANE

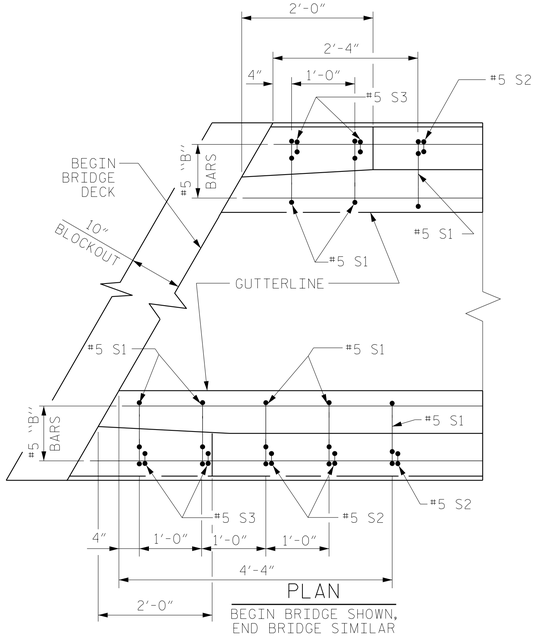
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-17
1			3			TOTAL SHEETS
2			4			36

STR. #5



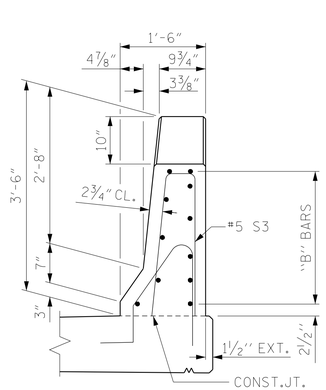
PLAN

* MEASURED ALONG THE EDGE OF BRIDGE DECK

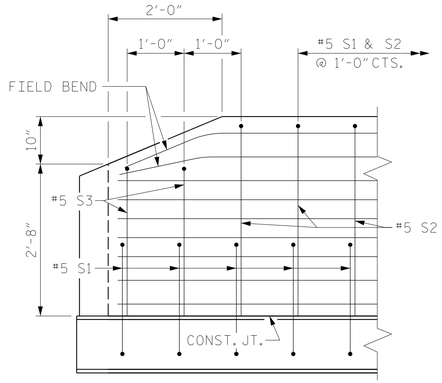


PLAN

BEGIN BRIDGE SHOWN, END BRIDGE SIMILAR



END VIEW



SIDE VIEW

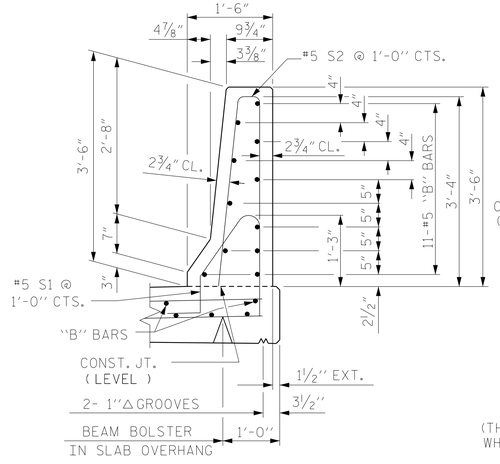
END OF RAIL DETAILS

NOTES

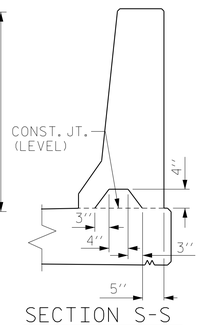
THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

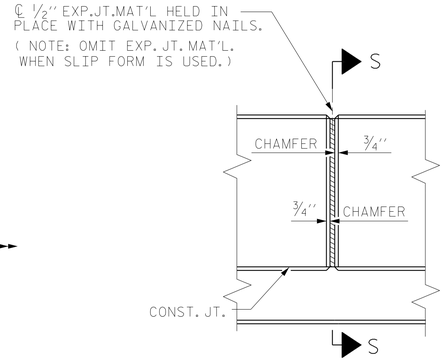


SECTION THRU RAIL



SECTION S-S

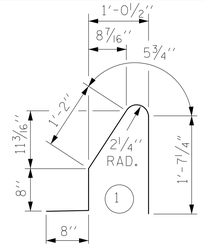
AT DAM IN OPEN JOINT (THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)

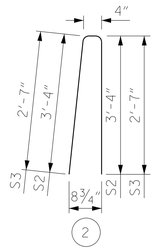


ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	242	#5	STR	22'-8"	5721
* B2	22	#5	STR	19'-0"	436
* B3	22	#5	STR	29'-10"	685
* S1	608	#5	1	4'-7"	2906
* S2	600	#5	2	7'-0"	4381
* S3	8	#5	2	5'-6"	46

* EPOXY COATED REINFORCING STEEL	14,175 LBS.
CLASS AA CONCRETE	82.4 CU. YDS.
CONCRETE BARRIER RAIL	606.3 LIN. FT.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

ASSEMBLED BY : TWL		DATE : 12/2017	
CHECKED BY : JMR		DATE : 03/2018	
DRAWN BY : ARB 5/87	REV. 7/12	MAA/GM	
CHECKED BY : SJD 9/87	REV. 6/13	MAA/GM	
	REV. 12/17	MAA/THC	

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

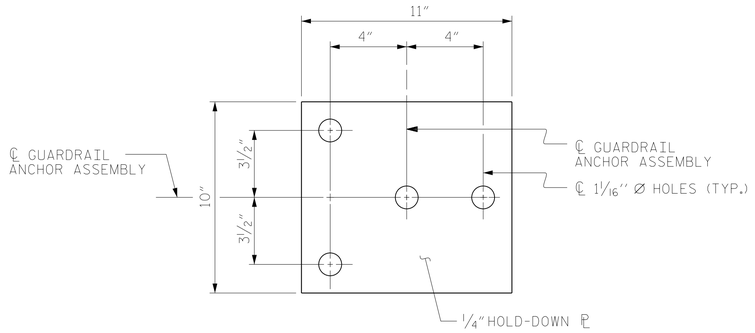
CONCRETE BARRIER RAIL

LEFT LANE

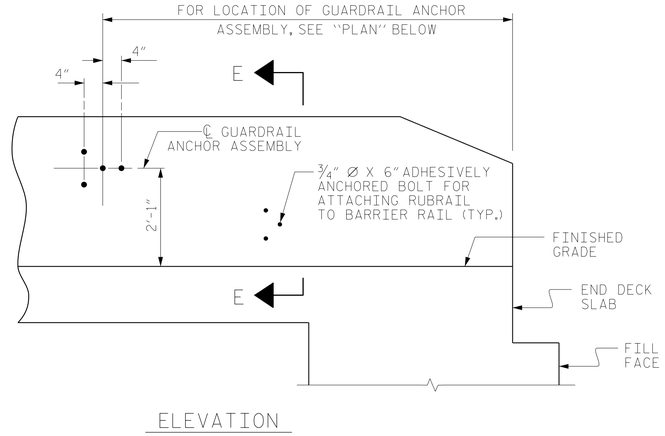
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-18
1			3			TOTAL SHEETS
2			4			36

STD. NO. CBR1 (SHT 2) STR. #5

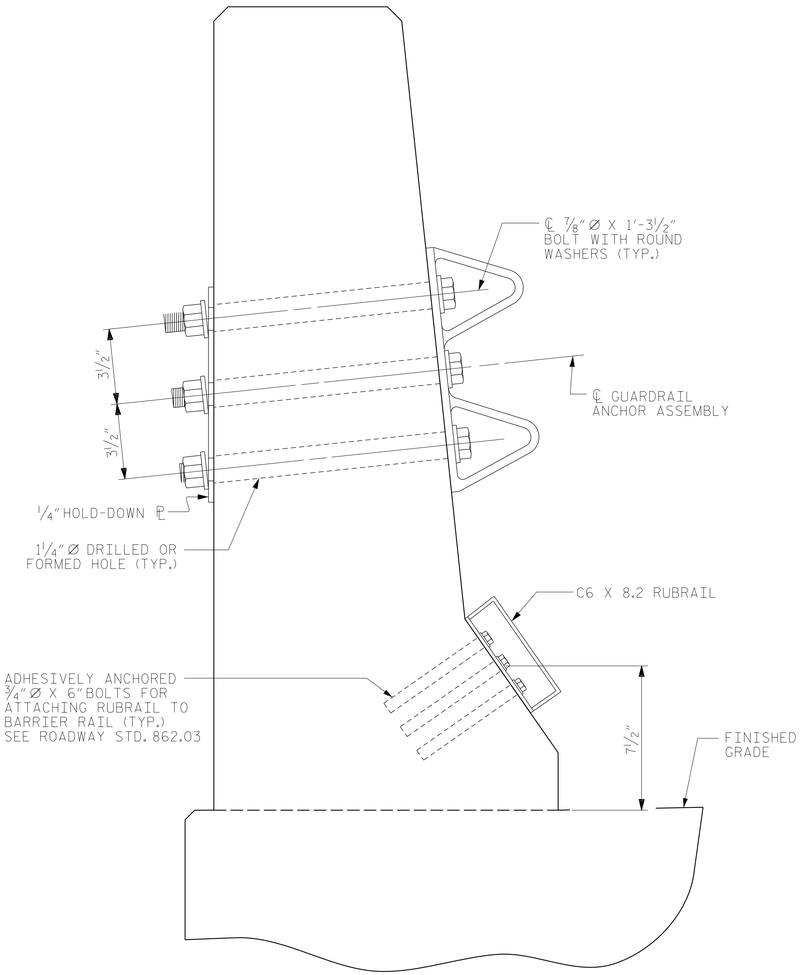
4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\405_035_U2412A_SMU_BR18_S5-18.dgn
AcostaM



PLAN

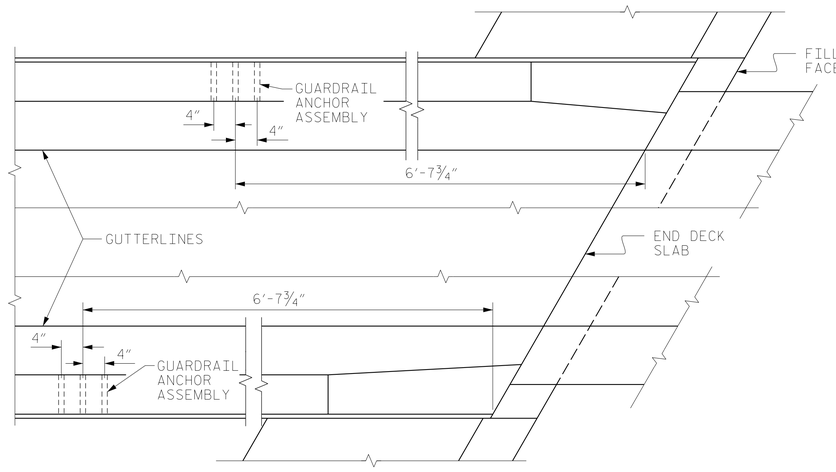


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT #2 SHOWN, END BENT #1 SIMILAR.

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A ¼" HOLD-DOWN PLATE AND 4 - ⅞" Ø BOLTS WITH NUTS AND WASHERS, RUBRAIL, AND ADHESIVELY ANCHORED BOLTS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE ⅞" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

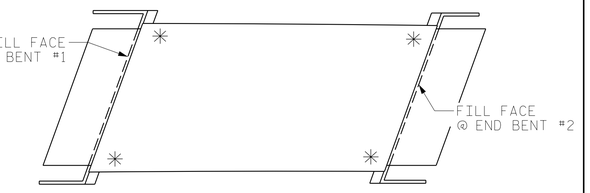
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CONCRETE BARRIER RAIL.

THE 1 ¼" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE ¾" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE ¾" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

ASSEMBLED BY : TWL	DATE : 12/2017
CHECKED BY : PDS	DATE : 01/2018
DRAWN BY : TLA 5/06	REV. 7/12 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

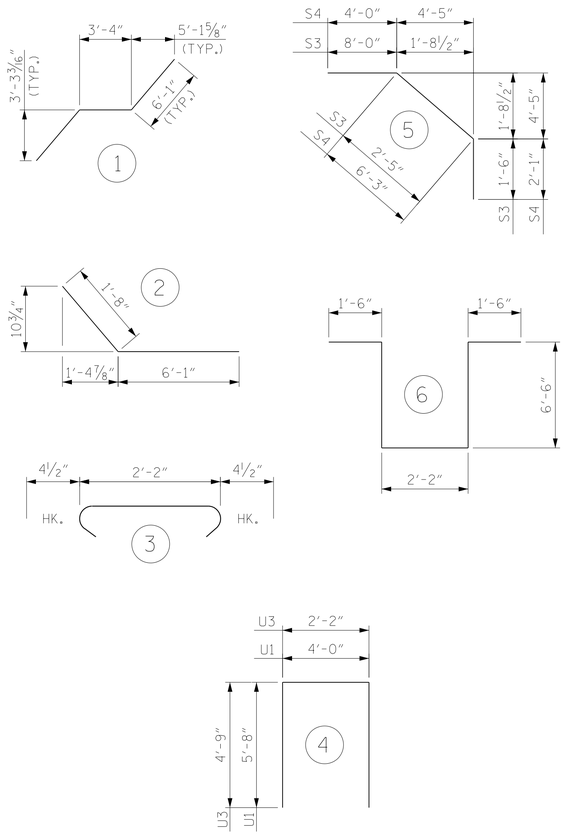
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-19
1			3			TOTAL SHEETS
2			4			36

4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 Dual Bridges\Site 3\Design\Structures\Working DGN\405_037_U2412A_SMU_GR19_S5-19.dgn
AcostaM

STD. NO. GRA2

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	565	#5	STR	44'-2"	26027	A204	2	#5	STR	39'-9"	83	✳ B10	44	#6	STR	32'-3"	2131
A2	565	#5	STR	44'-2"	26027	A205	2	#5	STR	38'-8"	81	B11	69	#5	STR	19'-4"	1391
						A206	2	#5	STR	37'-8"	79	B12	69	#5	STR	30'-9"	2213
✳ A101	2	#5	STR	43'-0"	90	A207	2	#5	STR	36'-7"	76	B13	72	#5	STR	43'-6"	3267
✳ A102	2	#5	STR	41'-11"	87	A208	2	#5	STR	35'-6"	74	B14	69	#5	STR	32'-3"	2321
✳ A103	2	#5	STR	40'-10"	85	A209	2	#5	STR	34'-5"	72	B15	69	#5	STR	28'-9"	2069
✳ A104	2	#5	STR	39'-9"	83	A210	2	#5	STR	33'-4"	70	B16	36	#5	STR	52'-4"	1965
✳ A105	2	#5	STR	38'-8"	81	A211	2	#5	STR	32'-3"	67						
✳ A106	2	#5	STR	37'-8"	79	A212	2	#5	STR	31'-2"	65	K1	14	#5	STR	48'-6"	708
✳ A107	2	#5	STR	36'-7"	76	A213	2	#5	STR	30'-2"	63	K2	30	#5	STR	12'-2"	381
✳ A108	2	#5	STR	35'-6"	74	A214	2	#5	STR	29'-1"	61	K3	6	#5	STR	8'-11"	56
✳ A109	2	#5	STR	34'-5"	72	A215	2	#5	STR	28'-0"	58	K4	12	#4	STR	9'-6"	76
✳ A110	2	#5	STR	33'-4"	70	A216	2	#5	STR	26'-11"	56	K5	24	#4	2	7'-9"	124
✳ A111	2	#5	STR	32'-3"	67	A217	2	#5	STR	25'-10"	54	K6	24	#4	1	15'-6"	248
✳ A112	2	#5	STR	31'-2"	65	A218	2	#5	STR	24'-9"	52	K7	20	#5	STR	3'-7"	75
✳ A113	2	#5	STR	30'-2"	63	A219	2	#5	STR	23'-8"	49	K8	4	#5	STR	2'-10"	12
✳ A114	2	#5	STR	29'-1"	61	A220	2	#5	STR	22'-8"	47	K9	6	#5	STR	10'-5"	65
✳ A115	2	#5	STR	28'-0"	58	A221	2	#5	STR	21'-7"	45	K10	4	#5	STR	2'-4"	10
✳ A116	2	#5	STR	26'-11"	56	A222	2	#5	STR	20'-6"	43	K11	60	#4	STR	12'-2"	488
✳ A117	2	#5	STR	25'-10"	54	A223	2	#5	STR	19'-5"	41						
✳ A118	2	#5	STR	24'-9"	52	A224	2	#5	STR	18'-4"	38	S1	300	#4	3	2'-11"	585
✳ A119	2	#5	STR	23'-8"	49	A225	2	#5	STR	17'-3"	36	✳ S3	66	#4	5	11'-11"	525
✳ A120	2	#5	STR	22'-8"	47	A226	2	#5	STR	16'-2"	34	✳ S4	62	#4	5	12'-4"	511
✳ A121	2	#5	STR	21'-7"	45	A227	2	#5	STR	15'-2"	32						
✳ A122	2	#5	STR	20'-6"	43	A228	2	#5	STR	14'-1"	29	U1	66	#4	4	15'-4"	676
✳ A123	2	#5	STR	19'-5"	41	A229	2	#5	STR	13'-0"	27	U2	48	#4	6	18'-2"	582
✳ A124	2	#5	STR	18'-4"	38	A230	2	#5	STR	11'-11"	25	U3	12	#4	4	11'-8"	94
✳ A125	2	#5	STR	17'-3"	36	A231	2	#5	STR	10'-10"	23						
✳ A126	2	#5	STR	16'-2"	34	A232	2	#5	STR	9'-9"	20						
✳ A127	2	#5	STR	15'-2"	32	A233	2	#5	STR	8'-8"	18						
✳ A128	2	#5	STR	14'-1"	29	A234	2	#5	STR	7'-8"	16						
✳ A129	2	#5	STR	13'-0"	27	A235	2	#5	STR	6'-7"	14						
✳ A130	2	#5	STR	11'-11"	25	A236	2	#5	STR	5'-6"	11						
✳ A131	2	#5	STR	10'-10"	23	A237	2	#5	STR	4'-4"	9						
✳ A132	2	#5	STR	9'-9"	20	A238	2	#5	STR	3'-3"	7						
✳ A133	2	#5	STR	8'-8"	18	A239	2	#5	STR	2'-3"	5						
✳ A134	2	#5	STR	7'-8"	16												
✳ A135	2	#5	STR	6'-7"	14	✳ B1	178	#6	STR	20'-0"	5347						
✳ A136	2	#5	STR	5'-6"	11	✳ B2	90	#4	STR	21'-4"	1283						
✳ A137	2	#5	STR	4'-4"	9	B3	72	#5	STR	60'-0"	4506						
✳ A138	2	#5	STR	3'-3"	7	✳ B4	90	#6	STR	60'-0"	8111						
✳ A139	2	#5	STR	2'-3"	5	✳ B5	45	#6	STR	14'-6"	980						
						✳ B6	90	#4	STR	21'-1"	1268						
A201	2	#5	STR	43'-0"	90	✳ B7	45	#6	STR	17'-6"	1183						
A202	2	#5	STR	41'-11"	87	✳ B8	90	#4	STR	25'-4"	1523						
A203	2	#5	STR	40'-10"	85	✳ B9	44	#6	STR	30'-9"	2032						

REINFORCING STEEL	49,781 LBS.
✳EPOXY COATED REINFORCING STEEL	52,763 LBS.

SUPERSTRUCTURE REINFORCING STEEL LENGTHS ARE BASED ON THE FOLLOWING MINIMUM SPLICE LENGTHS

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	2'-0"	1'-9"	2'-0"	1'-9"	2'-9"
#5	2'-6"	2'-2"	2'-6"	2'-2"	3'-5"
#6	3'-0"	2'-7"	3'-10"	2'-7"	4'-4"
#7	5'-3"	3'-6"			
#8	6'-10"	4'-7"			

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,883 SQ.FT.
BRIDGE DECK	11,581 SQ.FT.
TOTAL	13,464 SQ.FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	117.3		
POUR 2	202.1		
POUR 3	179.6		
POUR 4	107.2		
TOTALS✳✳	606.2	49,781 LBS.	52,763 LBS.

✳✳QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043835 MARC A. LEBLANC 4/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-20
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : NSC DATE : 12/2017
CHECKED BY : JMR DATE : 02/2018
DESIGN ENGINEER OF RECORD: MAL DATE : 03/2018

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4/24/2018
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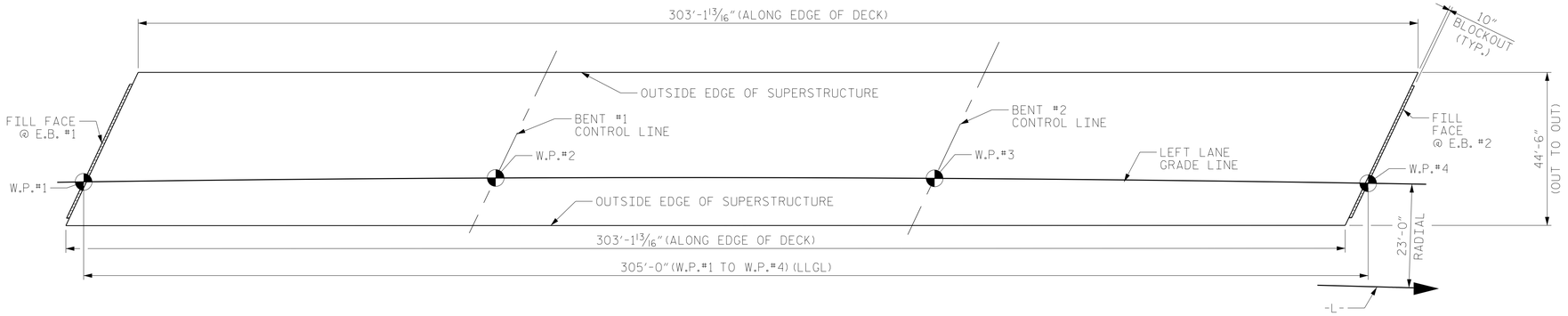
AcostaM

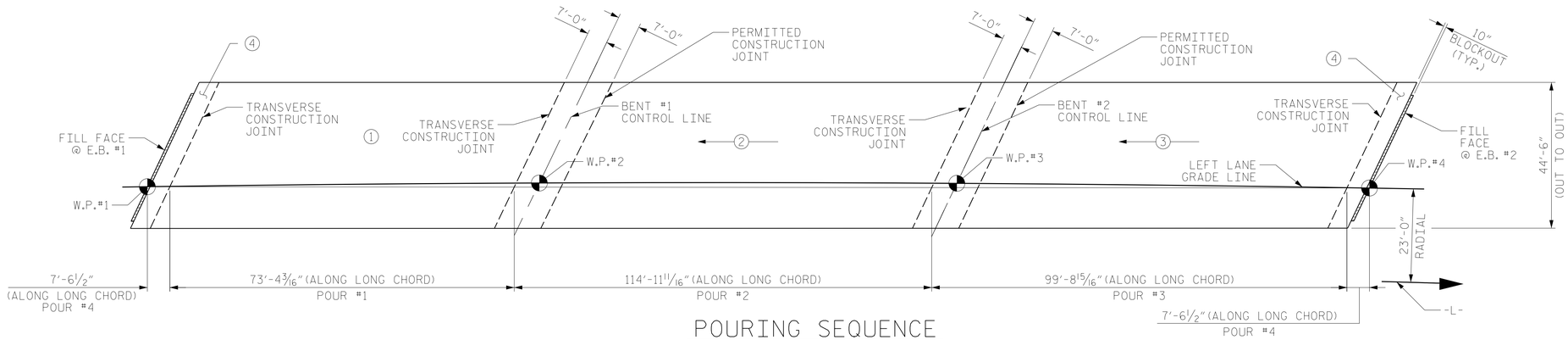
STR. #5

NOTE: BENT & INTEGRAL END BENT DIAPHRAGMS ARE PART OF SUPERSTRUCTURE POUR.

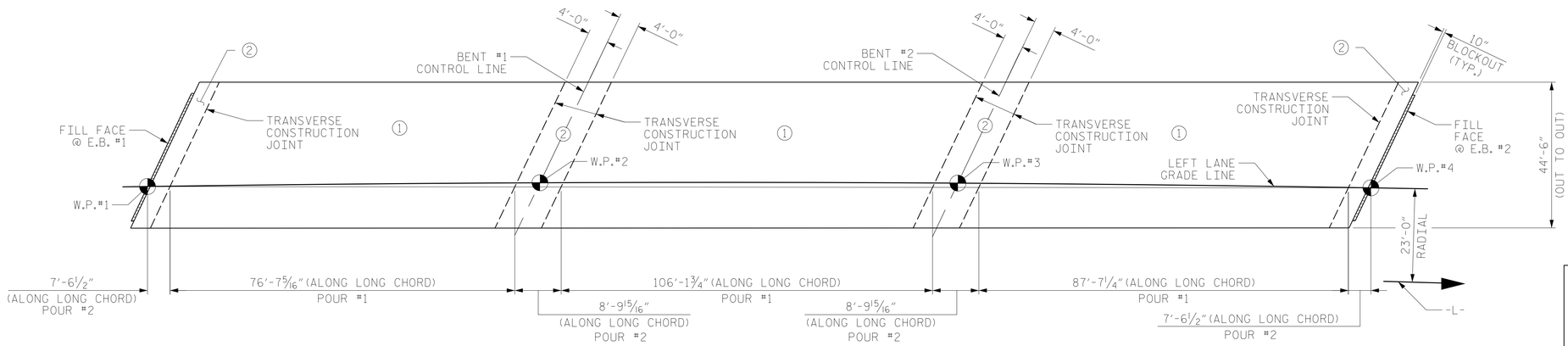


LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB

(SQ. FT = 13,490)

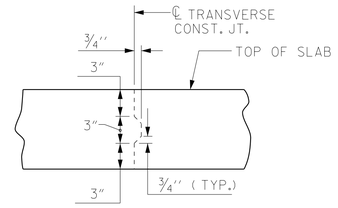


POURING SEQUENCE



OPTIONAL POURING SEQUENCE

POUR 2 CAN NOT BE STARTED UNTIL BOTH ADJACENT (1) POURS REACH A MINIMUM OF 3000 PSI



TRANSVERSE CONSTRUCTION JOINT DETAIL

NOTE: REINFORCING STEEL IN SLAB NOT SHOWN. LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THRU JOINT

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043835 MARC A LEBLANC
4/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-21
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : NSC DATE : 12/2017
CHECKED BY : TLC DATE : 01/2018
DESIGN ENGINEER OF RECORD: MAL DATE : 01/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

4/24/2018
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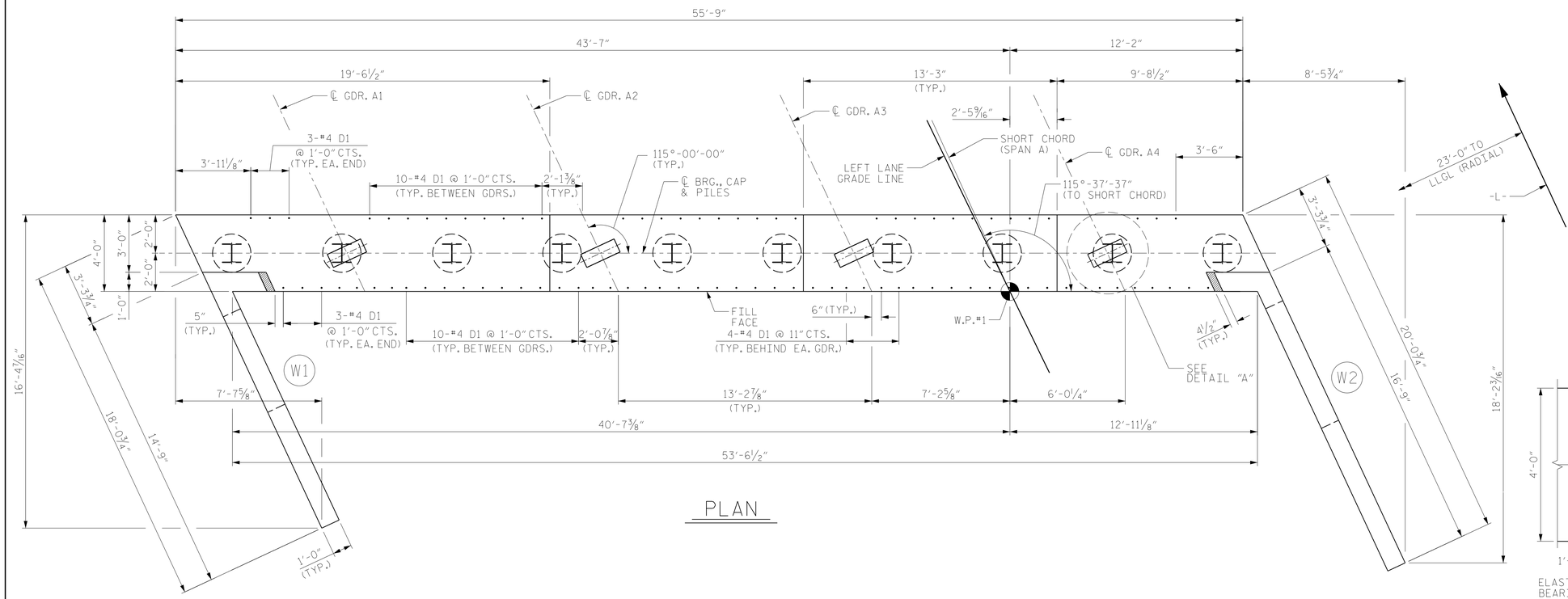
STR. #5



PLAN

NOTES:

THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 6"DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

FOR SECTION A-A AND SECTION B-B, SEE SHEET 4 OF 4.

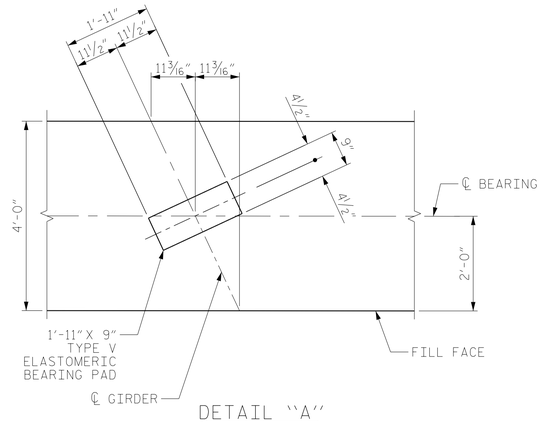
#4 D1 BARS MAY BE SHIFTED SLIGHTLY TO AVOID STIRRUPS IN CAP.

IT SHALL BE CALLED TO THE CONTRACTOR'S ATTENTION THAT THE WINGWALLS ARE TO RETAIN NO FILL UNTIL THE INTEGRAL END BENT DIAPHRAGM (SUPERSTRUCTURE POUR #4) CONCRETE HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.

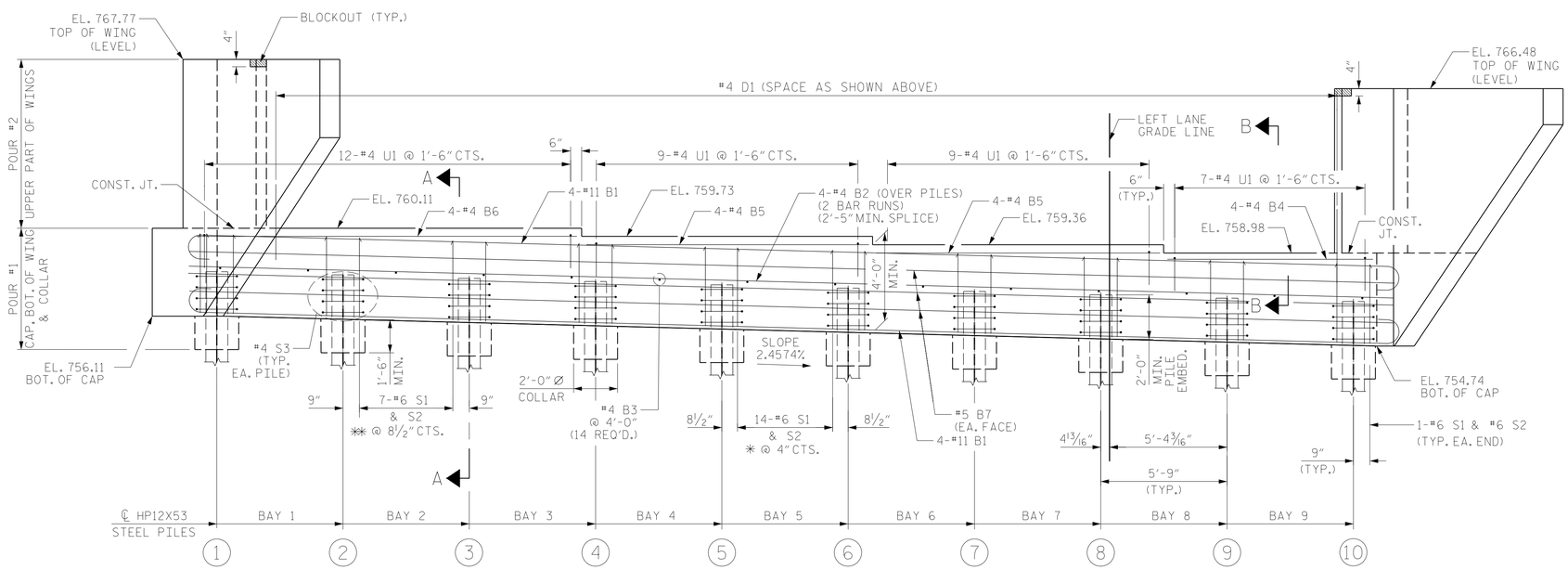
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE CONCRETE BARRIER IS CAST IF SLIP FORMING IS USED.

LLGL = LEFT LANE GRADE LINE.



DETAIL "A"

DIMENSIONS TYP. EA. BRG. PILE NOT SHOWN FOR CLARITY



ELEVATION

✱ = TYPICAL BAY 4 THRU BAY 6

✱✱ = TYPICAL BAY 1 THRU BAY 3 AND BAY 7 THRU BAY 9

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
1	758.03
2	757.89
3	757.75
4	757.61
5	757.47
6	757.32
7	757.18
8	757.04
9	756.90
10	756.76

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 1 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043245 — Michael E. O'Connor, Jr. — 4/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 1

LEFT LANE

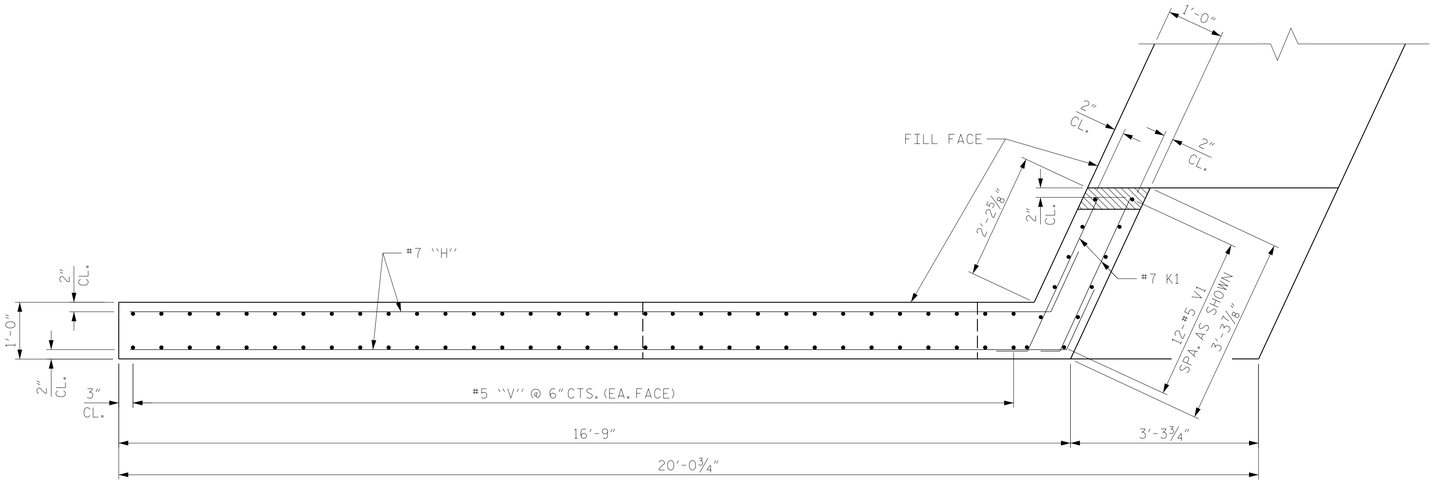
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-22
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : JTC DATE : 12/2017
CHECKED BY : MKO DATE : 04/2018
DESIGN ENGINEER OF RECORD: MKO DATE : 04/2018

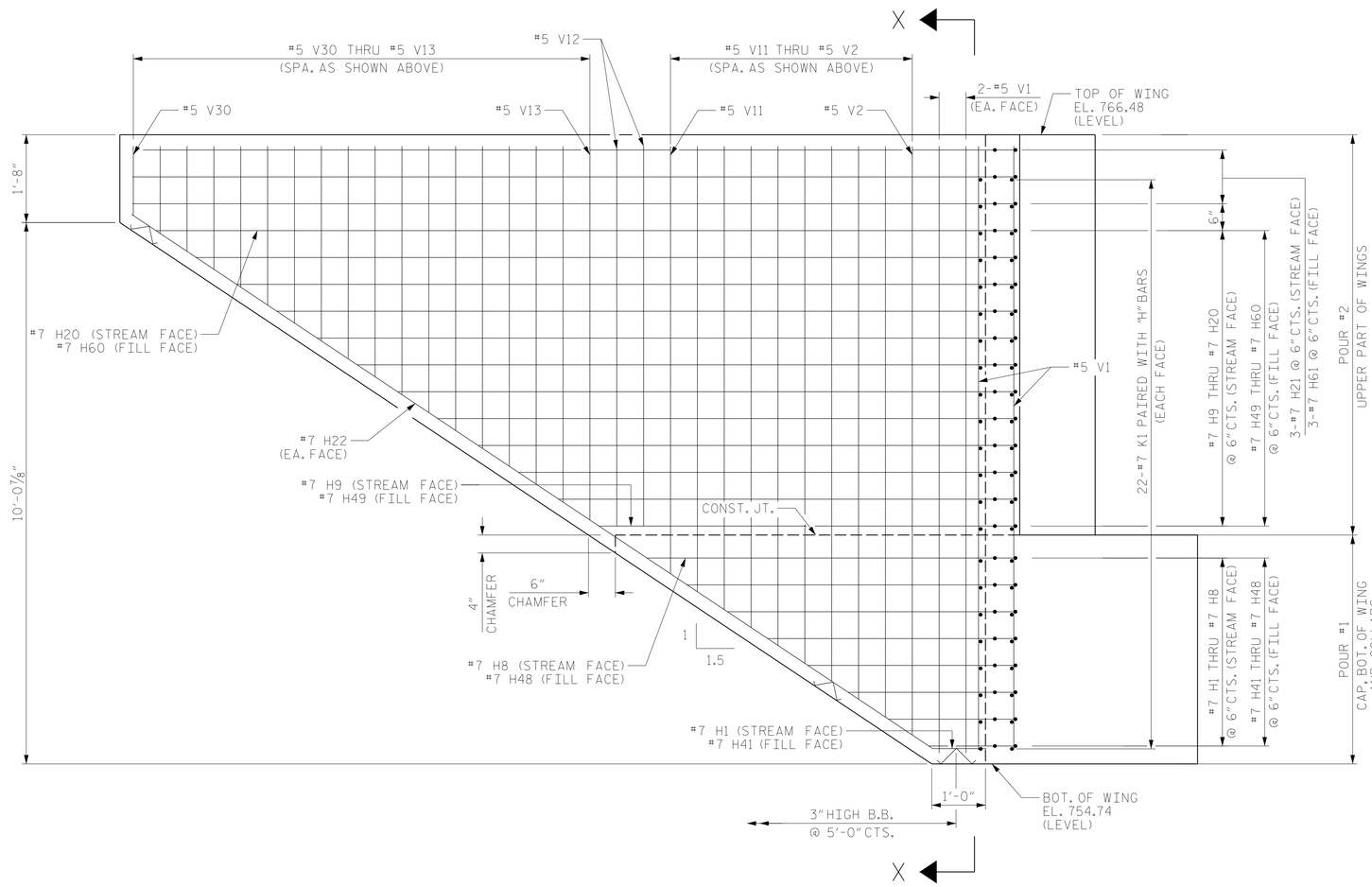
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\405_043_U2412A_SMU_E*22_S5-22.dgn
AcostaM

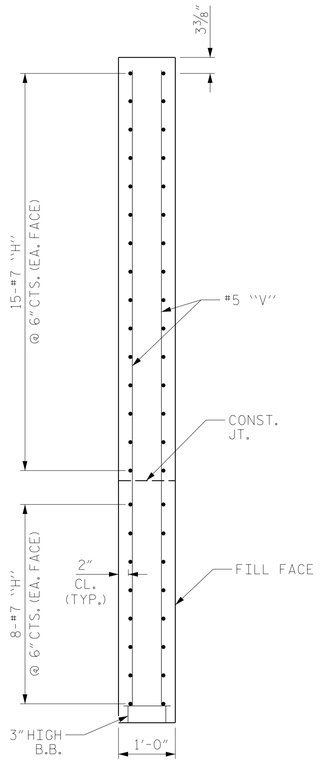
STR. #5



PLAN OF WING - W2



ELEVATION OF WING - W2



SECTION X-X

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 1

LEFT LANE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043245 Randall E. O'Connor, Jr. MICHAEL T. KENT O'CONNOR, JR. ENGINEER
4/25/2018

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-23
1			3			TOTAL SHEETS
2			4			36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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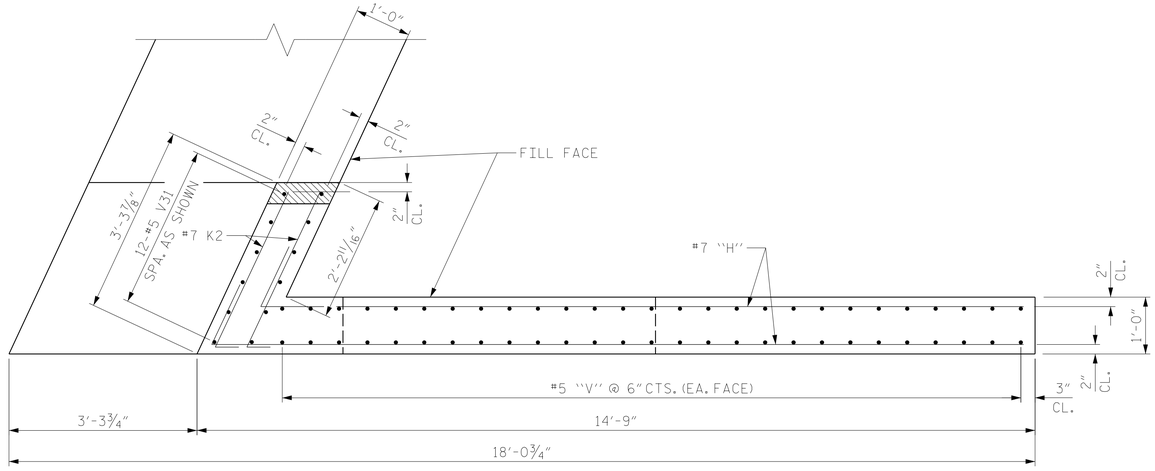
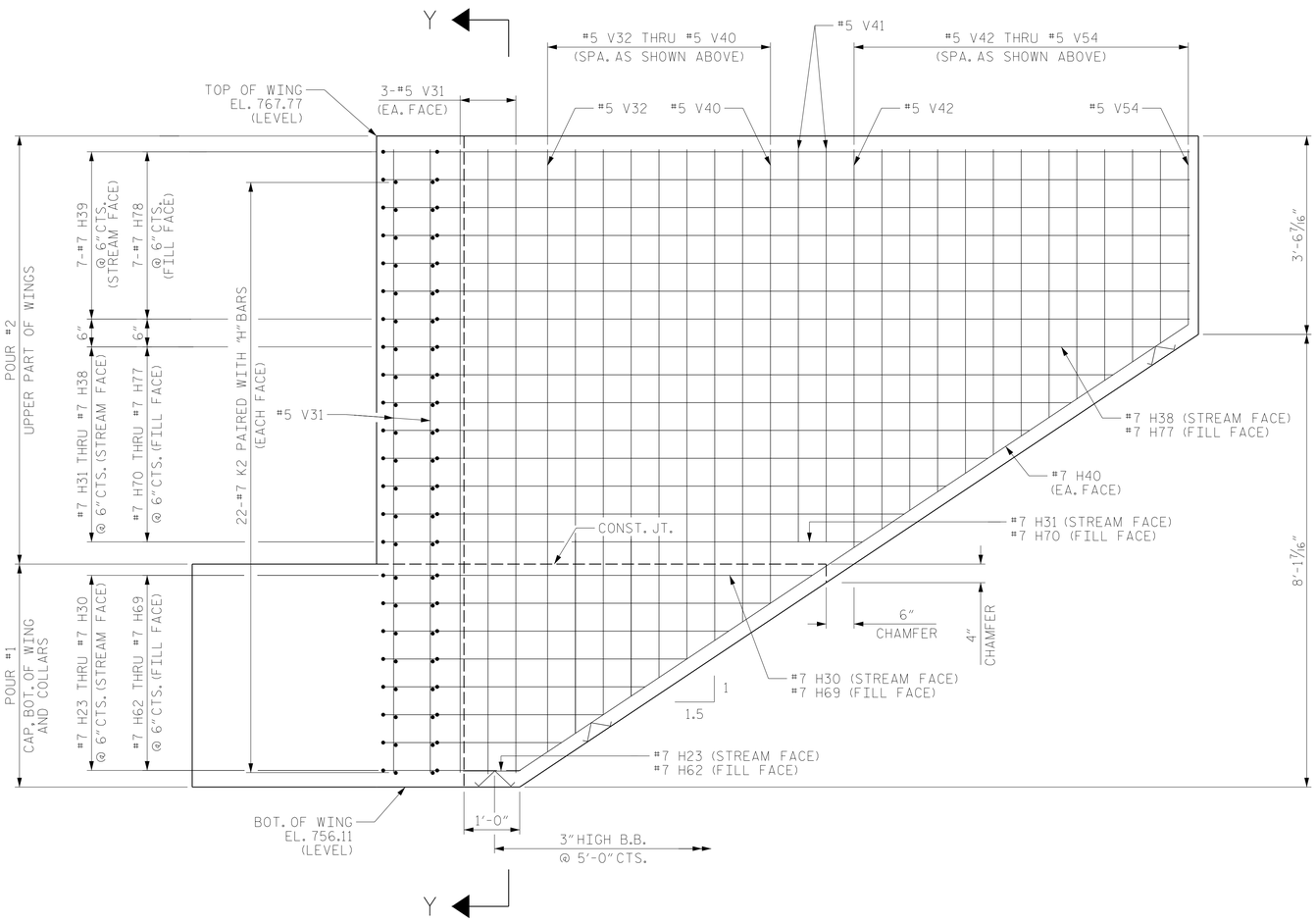
CHECKED BY :	PDS	DATE :	01/2018
DESIGN ENGINEER OF RECORD:	MAL	DATE :	04/2018

4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\405_045_U2412A_SMU_E*23_S5-23.dgn
AcostaM

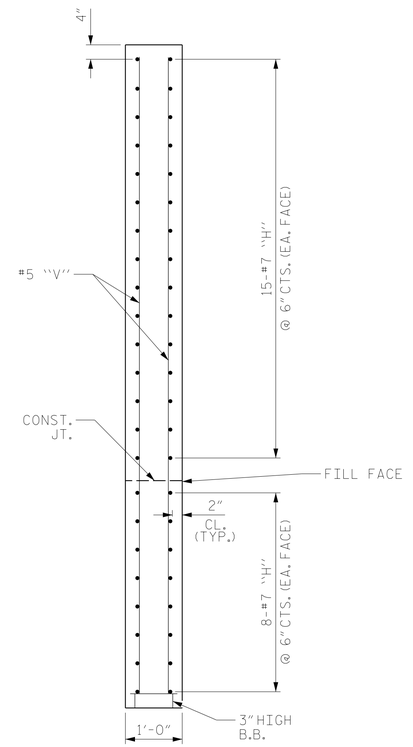
STR. #5



PLAN OF WING - W1



ELEVATION OF WING - W1



SECTION Y-Y

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 3 OF 4

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 1

LEFT LANE

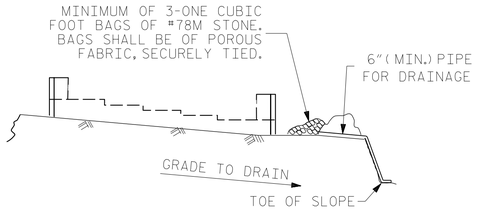
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-24
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : JTC DATE : 12/2017
CHECKED BY : PDS DATE : 01/2018
DESIGN ENGINEER OF RECORD: MAL DATE : 04/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\405_047_U2412A_SMU_E*24_S5-24.dgn
AcostaM

STR. #5

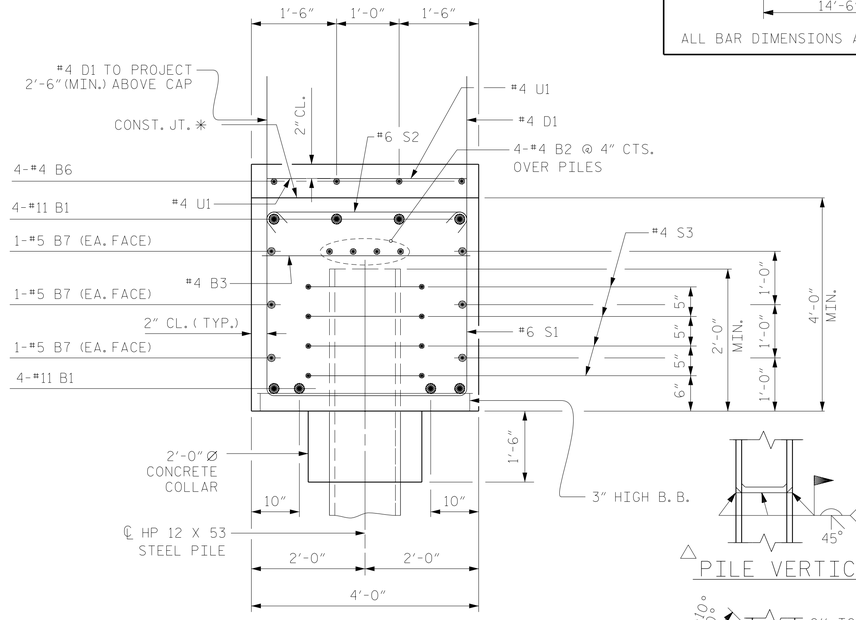


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

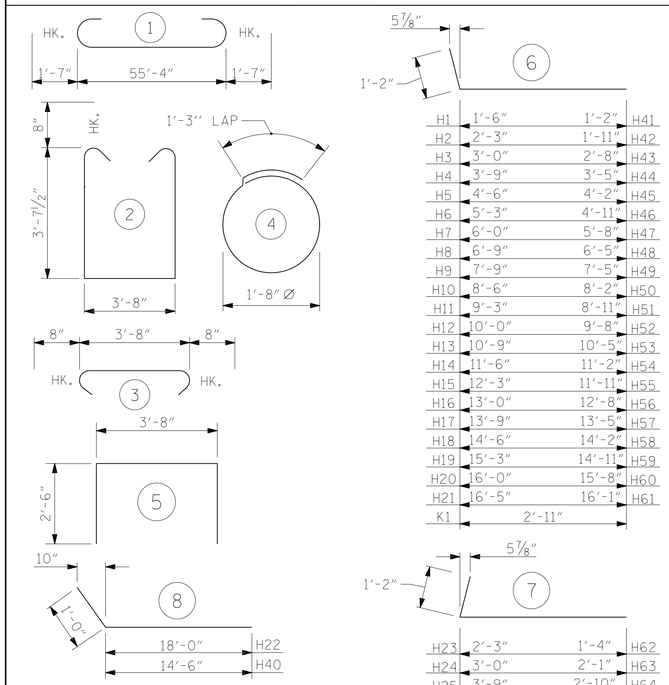
TEMPORARY DRAINAGE AT END BENT



SECTION A-A

✳ THE TOP SURFACE OF THE END BENT CAP & WINGS, EXCLUDING THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

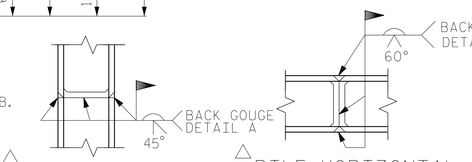
BILL OF MATERIAL

END BENT NO. 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	1	58'-6"	2486	H46	1	#7	6	6'-1"	12	V13	2	#5	STR	7'-0"	15
B2	8	#4	STR	29'-1"	155	H47	1	#7	6	6'-10"	14	V14	2	#5	STR	6'-8"	14
B3	14	#4	STR	3'-8"	34	H48	1	#7	6	7'-7"	16	V15	2	#5	STR	6'-4"	13
B4	4	#4	STR	11'-1"	30	H49	1	#7	6	8'-7"	18	V16	2	#5	STR	6'-0"	13
B5	8	#4	STR	12'-10"	69	H50	1	#7	6	9'-4"	19	V17	2	#5	STR	5'-8"	12
B6	4	#4	STR	19'-0"	51	H51	1	#7	6	10'-1"	21	V18	2	#5	STR	5'-4"	11
B7	6	#5	STR	55'-4"	346	H52	1	#7	6	10'-10"	22	V19	2	#5	STR	5'-0"	10
						H53	1	#7	6	11'-7"	24	V20	2	#5	STR	4'-8"	10
D1	88	#4	STR	4'-6"	265	H54	1	#7	6	12'-4"	25	V21	2	#5	STR	4'-4"	9
						H55	1	#7	6	13'-1"	27	V22	2	#5	STR	4'-0"	8
H1	1	#7	6	2'-8"	5	H56	1	#7	6	13'-10"	28	V23	2	#5	STR	3'-8"	8
H2	1	#7	6	3'-5"	7	H57	1	#7	6	14'-7"	30	V24	2	#5	STR	3'-4"	7
H3	1	#7	6	4'-2"	9	H58	1	#7	6	15'-4"	31	V25	2	#5	STR	3'-0"	6
H4	1	#7	6	4'-11"	10	H59	1	#7	6	16'-1"	33	V26	2	#5	STR	2'-8"	6
H5	1	#7	6	5'-8"	12	H60	1	#7	6	16'-10"	34	V27	2	#5	STR	2'-4"	5
H6	1	#7	6	6'-5"	13	H61	3	#7	6	17'-3"	106	V28	2	#5	STR	2'-0"	4
H7	1	#7	6	7'-2"	15	H62	1	#7	7	2'-6"	5	V29	2	#5	STR	1'-8"	3
H8	1	#7	6	7'-11"	16	H63	1	#7	7	3'-3"	7	V30	2	#5	STR	1'-4"	3
H9	1	#7	6	8'-11"	18	H64	1	#7	7	4'-0"	8	V31	18	#5	STR	11'-2"	210
H10	1	#7	6	9'-8"	20	H65	1	#7	7	4'-9"	10	V32	2	#5	STR	10'-10"	23
H11	1	#7	6	10'-5"	21	H66	1	#7	7	5'-6"	11	V33	2	#5	STR	10'-6"	22
H12	1	#7	6	11'-2"	23	H67	1	#7	7	6'-3"	13	V34	2	#5	STR	10'-2"	21
H13	1	#7	6	11'-11"	24	H68	1	#7	7	7'-0"	14	V35	2	#5	STR	9'-10"	21
H14	1	#7	6	12'-8"	26	H69	1	#7	7	7'-9"	16	V36	2	#5	STR	9'-6"	20
H15	1	#7	6	13'-5"	27	H70	1	#7	7	8'-8"	18	V37	2	#5	STR	9'-2"	19
H16	1	#7	6	14'-2"	29	H71	1	#7	7	9'-5"	19	V38	2	#5	STR	8'-10"	18
H17	1	#7	6	14'-11"	30	H72	1	#7	7	10'-2"	21	V39	2	#5	STR	8'-6"	18
H18	1	#7	6	15'-8"	32	H73	1	#7	7	10'-11"	22	V40	2	#5	STR	8'-2"	17
H19	1	#7	6	16'-5"	34	H74	1	#7	7	11'-8"	24	V41	4	#5	STR	7'-1"	30
H20	1	#7	6	17'-2"	35	H75	1	#7	7	12'-5"	25	V42	2	#5	STR	7'-2"	15
H21	3	#7	6	17'-7"	108	H76	1	#7	7	13'-2"	27	V43	2	#5	STR	6'-10"	14
H22	2	#7	8	19'-0"	78	H77	1	#7	7	13'-11"	28	V44	2	#5	STR	6'-6"	14
H23	1	#7	7	3'-5"	7	H78	7	#7	7	14'-6"	207	V45	2	#5	STR	6'-2"	13
H24	1	#7	7	4'-2"	9							V46	2	#5	STR	5'-10"	12
H25	1	#7	7	4'-11"	10	K1	44	#7	6	4'-1"	367	V47	2	#5	STR	5'-6"	11
H26	1	#7	7	5'-8"	12	K2	44	#7	7	4'-1"	367	V48	2	#5	STR	5'-2"	11
H27	1	#7	7	6'-5"	13							V49	2	#5	STR	4'-10"	10
H28	1	#7	7	7'-2"	15	S1	86	#6	2	12'-3"	1582	V50	2	#5	STR	4'-6"	9
H29	1	#7	7	7'-11"	16	S2	86	#6	3	5'-0"	646	V51	2	#5	STR	4'-2"	9
H30	1	#7	7	8'-8"	18	S3	40	#4	4	6'-6"	174	V52	2	#5	STR	3'-10"	8
H31	1	#7	7	9'-7"	20							V53	2	#5	STR	3'-6"	7
H32	1	#7	7	10'-4"	21	U1	37	#4	5	8'-8"	214	V54	2	#5	STR	3'-2"	7
H33	1	#7	7	11'-1"	23												
H34	1	#7	7	11'-10"	24	V1	16	#5	STR	11'-3"	188						
H35	1	#7	7	12'-7"	26	V2	2	#5	STR	11'-0"	23						
H36	1	#7	7	13'-4"	27	V3	2	#5	STR	10'-8"	22						
H37	1	#7	7	14'-1"	29	V4	2	#5	STR	10'-4"	22						
H38	1	#7	7	14'-10"	30	V5	2	#5	STR	10'-0"	21						
H39	7	#7	7	15'-5"	221	V6	2	#5	STR	9'-8"	20						
H40	2	#7	8	15'-6"	63	V7	2	#5	STR	9'-4"	19						
H41	1	#7	6	2'-4"	5	V8	2	#5	STR	9'-0"	19						
H42	1	#7	6	3'-1"	6	V9	2	#5	STR	8'-8"	18						
H43	1	#7	6	3'-10"	8	V10	2	#5	STR	8'-4"	17						
H44	1	#7	6	4'-7"	9	V11	2	#5	STR	8'-0"	17						
H45	1	#7	6	5'-4"	11	V12	4	#5	STR	7'-1"	30						

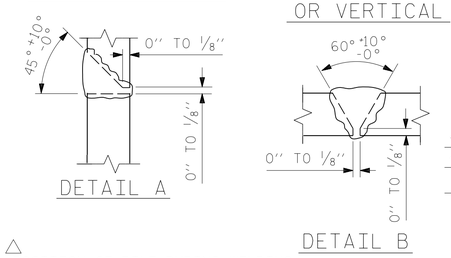
✳✳ B6 SHALL BE FIELD CUT TO MAINTAIN CLEAR COVER.

REINFORCING STEEL	10,068 LBS.
CLASS A CONCRETE	
POUR #1	
CAP, CONCRETE COLLARS & LOWER PART OF WINGS	41.0 C. Y.
POUR #2	
UPPER PART OF WINGS	9.4 C. Y.
TOTAL	50.4 C. Y.
HP 12 X 53 STEEL PILES	
NO. 10	575 LIN. FT.
PILE DRIVING EQUIPMENT SETUP	NO. 10



△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL

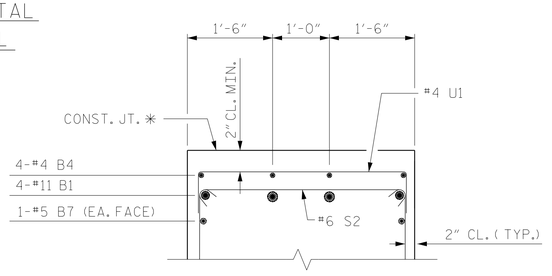


DETAIL A

DETAIL B

△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



PARTIAL SECTION B-B

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043245 MICHAEL KENT O'CONNOR, JR. 4/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 1

LEFT LANE

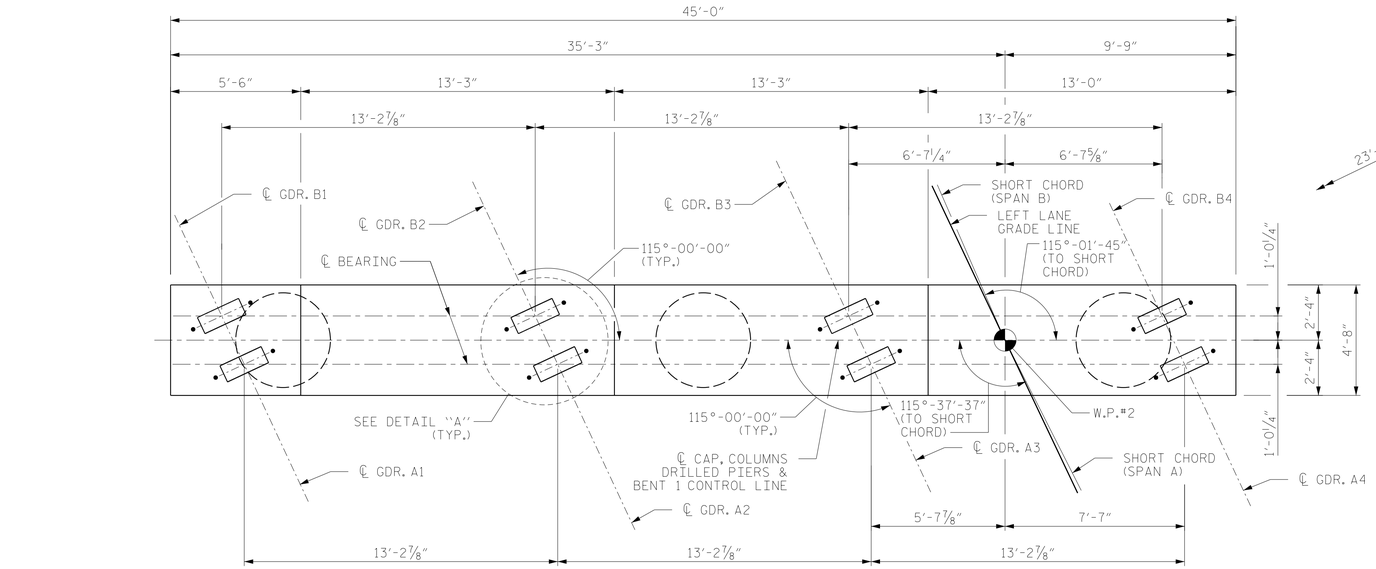
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-25
1			3			TOTAL SHEETS
2			4			36

DRAWN BY :	JTC	DATE :	12/2017
CHECKED BY :	MKO	DATE :	04/2018
DESIGN ENGINEER OF RECORD:	MKO	DATE :	04/2018

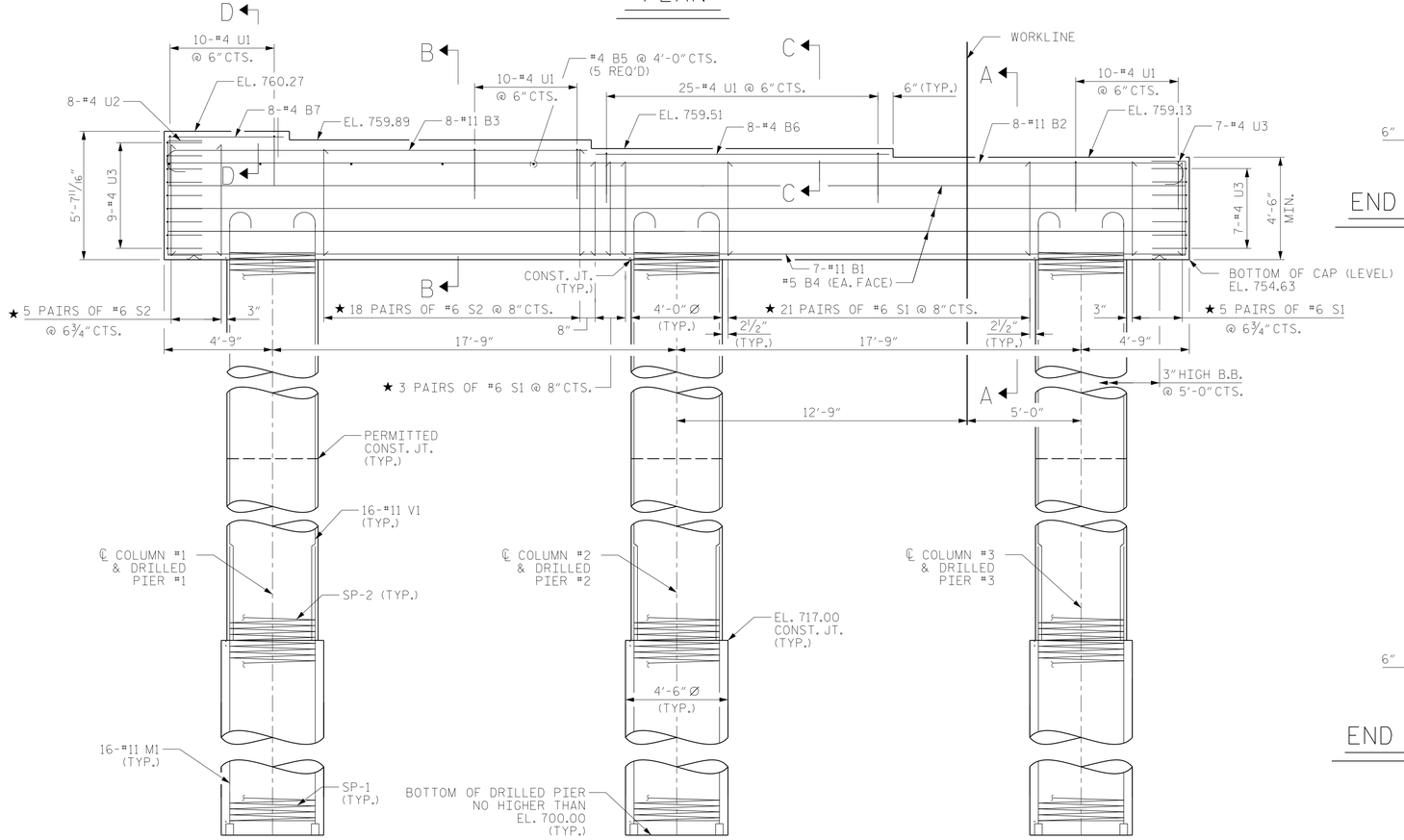
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\405_049_U2412A_SMU_E*25_S5-25.dgn
AcostaM

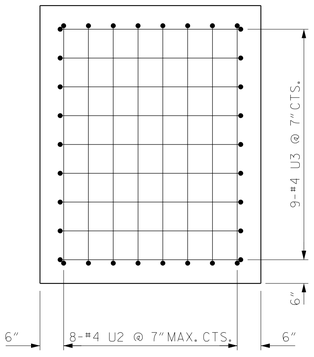
STR. #5



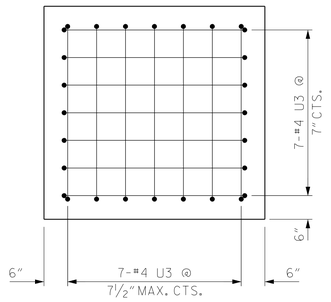
PLAN



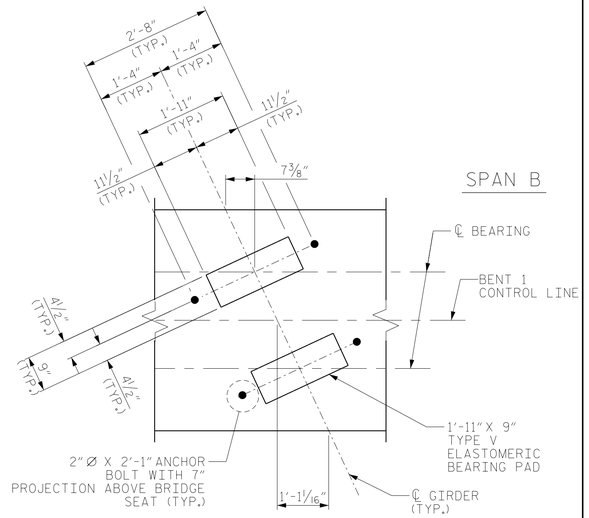
ELEVATION



END OF LEFT CAP VIEW



END OF RIGHT CAP VIEW



SPAN B

SPAN A

DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER

NOTES

FOR SECTIONS A-A AND B-B AND VIEWS C-C AND D-D, SEE SHEET 2 OF 2.

FOR REINFORCING STEEL BILL OF MATERIAL, SEE SHEET 2 OF 2.

"U" AND STIRRUP BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ INVERT ALTERNATE #6 S1 AND S2 STIRRUP PAIRS.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FOOT BELOW THE GROUND LINE.

LLGL = LEFT LANE GRADE LINE

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 049245 ENGINEER KENT O'CONNOR 4/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 1

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-26
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : JTC DATE : 12/2017
CHECKED BY : MKO DATE : 03/2018
DESIGN ENGINEER OF RECORD: MKO DATE : 04/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\405_051_U2412A_SMU_B#26_S5-26.dgn
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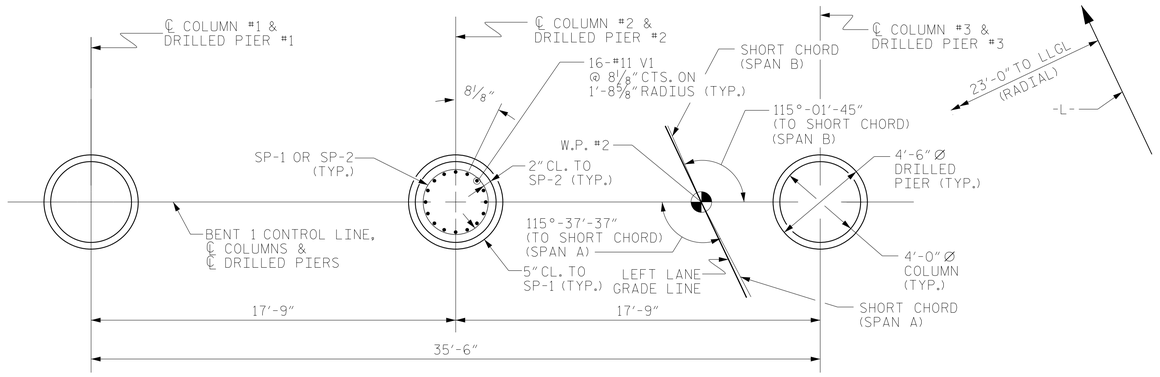
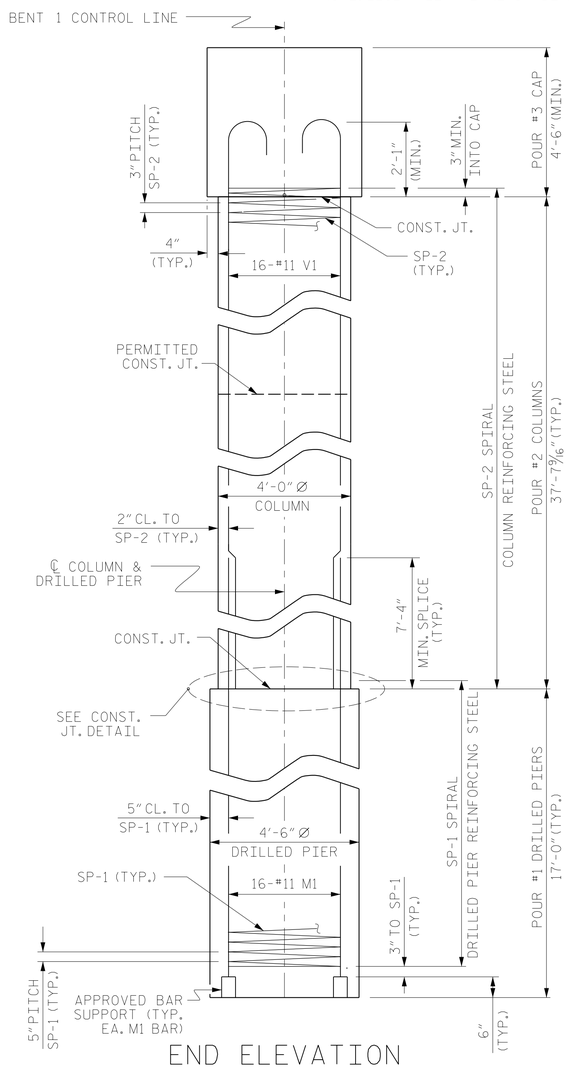
STR. #5

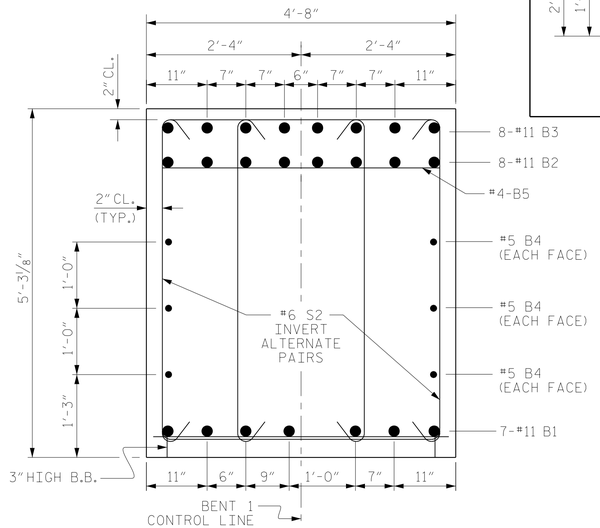


PLAN OF DRILLED PIERS & COLUMNS

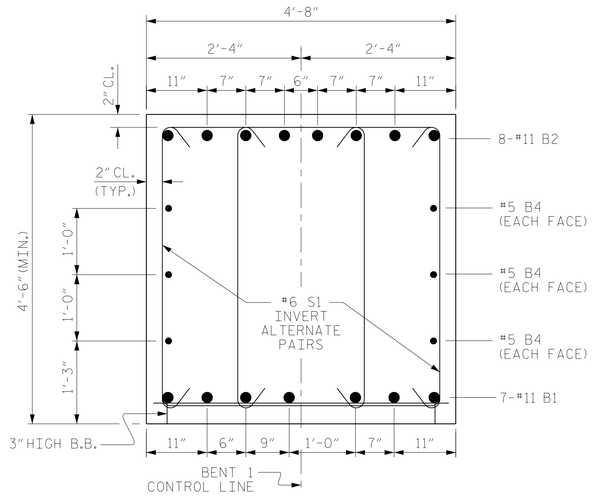
NOTE: LLGL = LEFT LANE GRADE LINE



END ELEVATION

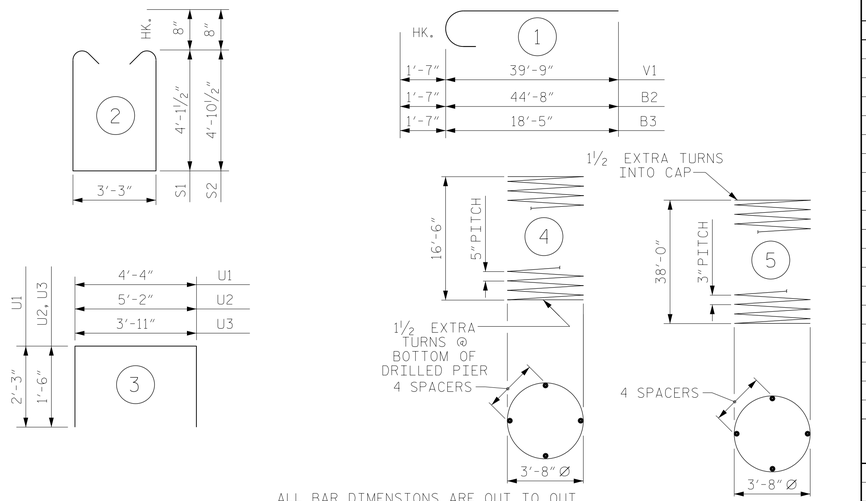


SECTION B-B

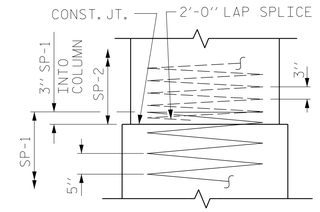


SECTION A-A

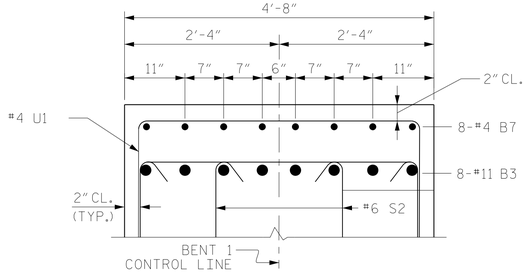
BAR TYPES



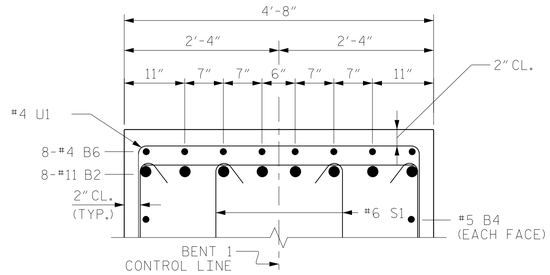
ALL BAR DIMENSIONS ARE OUT TO OUT



CONSTRUCTION JOINT DETAIL



VIEW D-D



VIEW C-C

BILL OF MATERIAL

FOR BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	7	#11	STR	44'-8"	1661
B2	8	#11	1	46'-3"	1966
B3	8	#11	1	20'-0"	850
B4	6	#5	STR	44'-8"	280
B5	5	#4	STR	4'-4"	14
B6	8	#4	STR	13'-1"	70
B7	8	#4	STR	5'-2"	28
M1	48	#11	STR	26'-10"	6843
S1	58	#6	2	12'-10"	1118
S2	46	#6	2	14'-4"	990
U1	55	#4	3	8'-10"	324
U2	8	#4	3	8'-2"	44
U3	23	#4	3	6'-11"	106
V1	48	#11	1	41'-4"	10541

REINFORCING STEEL (FOR BENT 1) 24,836 LBS.

SP-1	3	**	4	471'-7"	1476
SP-2	3	*	5	1748'-7"	3504

SPIRAL COLUMN REINFORCING STEEL (FOR BENT 1) 4,980 LBS.

** THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

* THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN (FOR BENT 1)

POUR #2 (COLUMNS)	52.6 C.Y.
POUR #3 (CAP)	38.7 C.Y.
TOTAL CLASS A CONCRETE	91.3 C.Y.

DRILLED PIERS: (FOR BENT 1)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	30.1 C.Y.
4'-6" Ø DRILLED PIER NOT IN SOIL	33.0 LIN. FT.
4'-6" Ø DRILLED PIER IN SOIL	18.0 LIN. FT.
CSL TUBES	222.0 LIN. FT.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 2 OF 2

DRAWN BY : JTC DATE : 12/2017
CHECKED BY : MKO DATE : 03/2018
DESIGN ENGINEER OF RECORD: MKO DATE : 04/2018

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048245 MICHAEL KENT O'CONNOR, JR. 4/25/2018

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 1 DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-27
1			3			TOTAL SHEETS
2			4			36

STR. #5

4/24/2018
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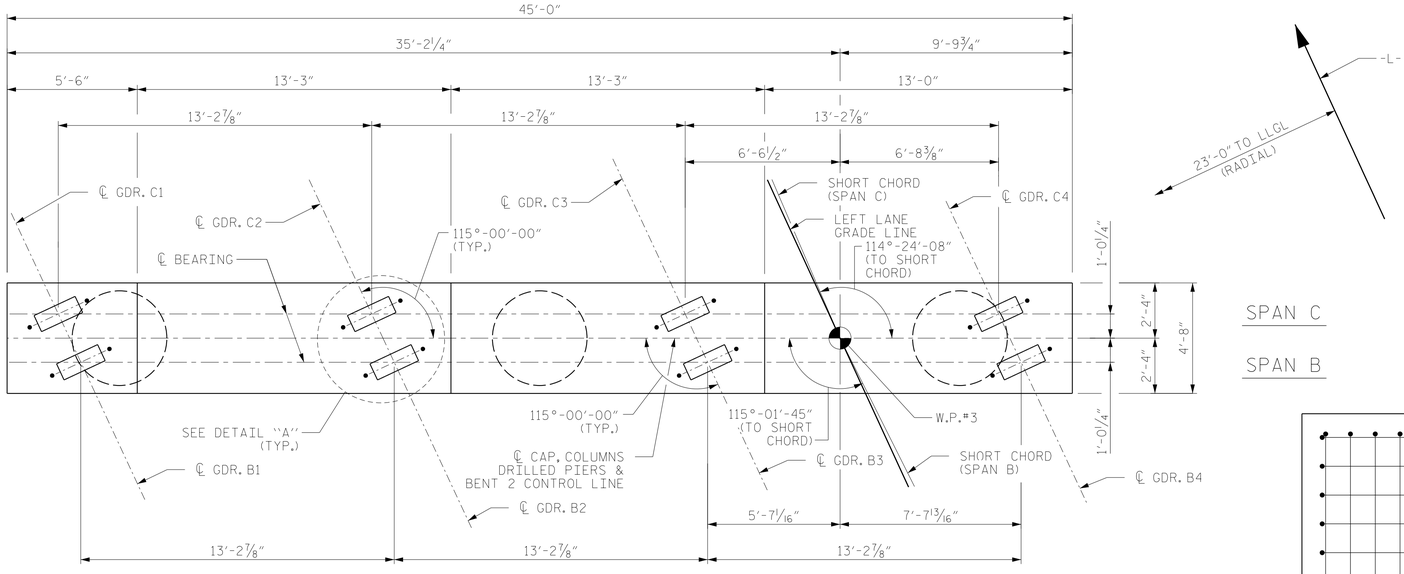
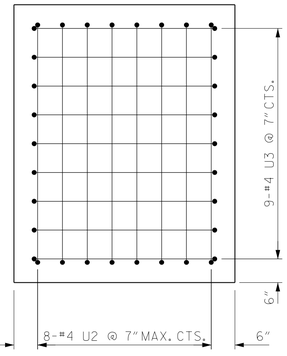


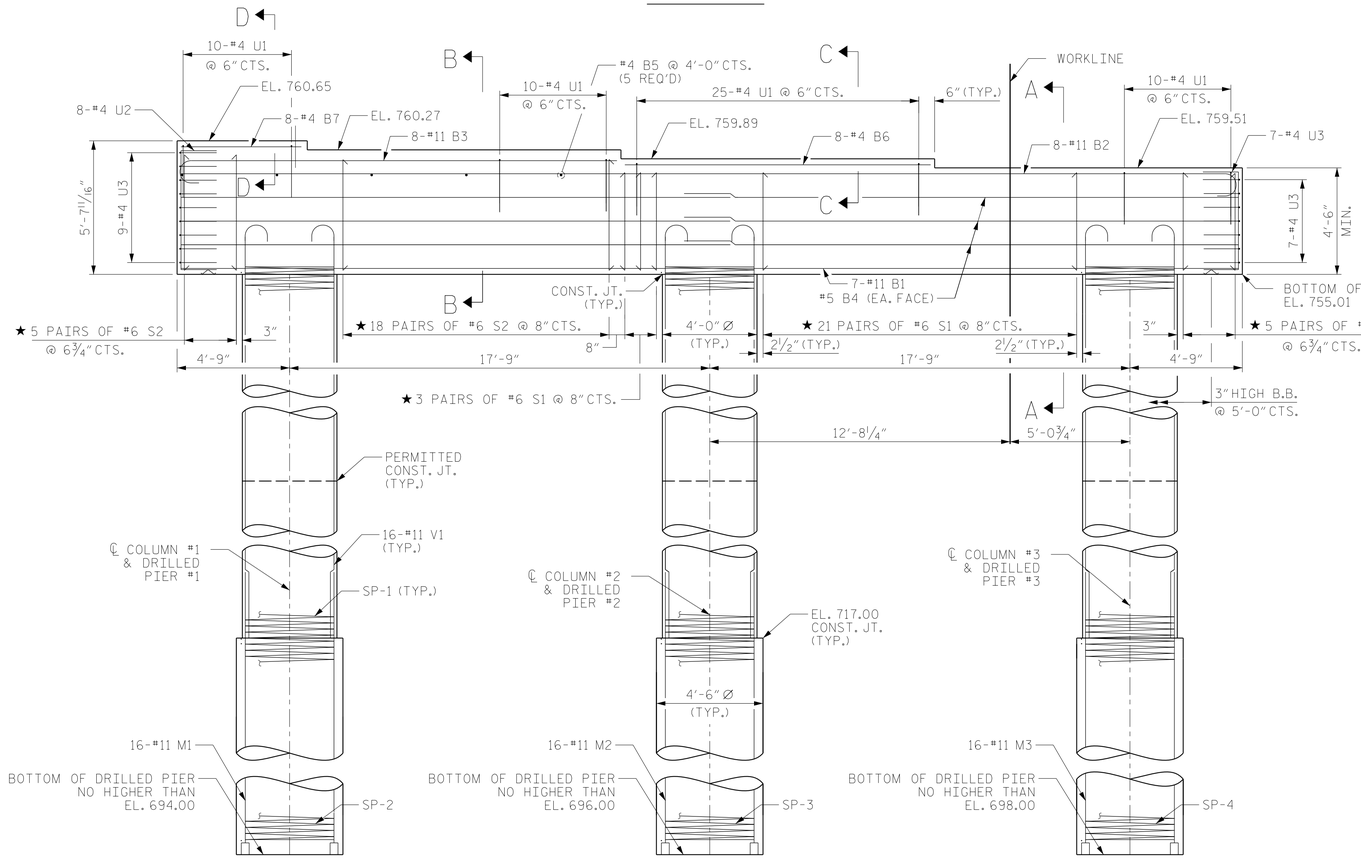
PLAN

SPAN C

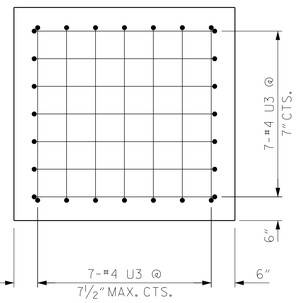
SPAN B



END OF LEFT CAP VIEW



ELEVATION



END OF RIGHT CAP VIEW

NOTES

FOR SECTIONS A-A AND B-B AND VIEWS C-C AND D-D, SEE SHEET 2 OF 2.

FOR REINFORCING STEEL BILL OF MATERIAL, SEE SHEET 2 OF 2.

"U" AND STIRRUP BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

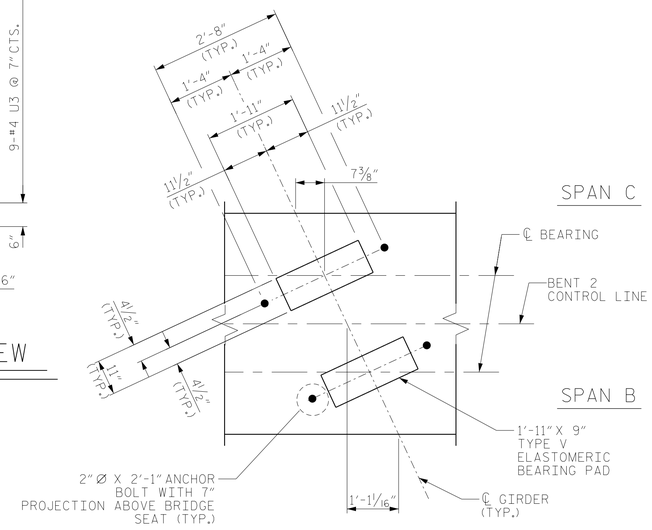
★ INVERT ALTERNATE #6 S1 AND S2 STIRRUP PAIRS.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FOOT BELOW THE GROUND LINE.

FOR TOP OF DRILLED PIERS, THE GROUND LINE VARIES AND THE CONTRACTOR IS RESPONSIBLE FOR GRADING SO THAT THE TOP OF DRILLED PIER IS 1'-0" BELOW GROUND LINE.

LLGL = LEFT LANE GRADE LINE



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043245 MICHAEL KENT O'CONNOR, JR.
Michael K. O'Connor, Jr.
4/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-28
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : JTC DATE : 12/2017
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DESIGN ENGINEER OF RECORD: MKO DATE : 04/2018

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4/24/2018
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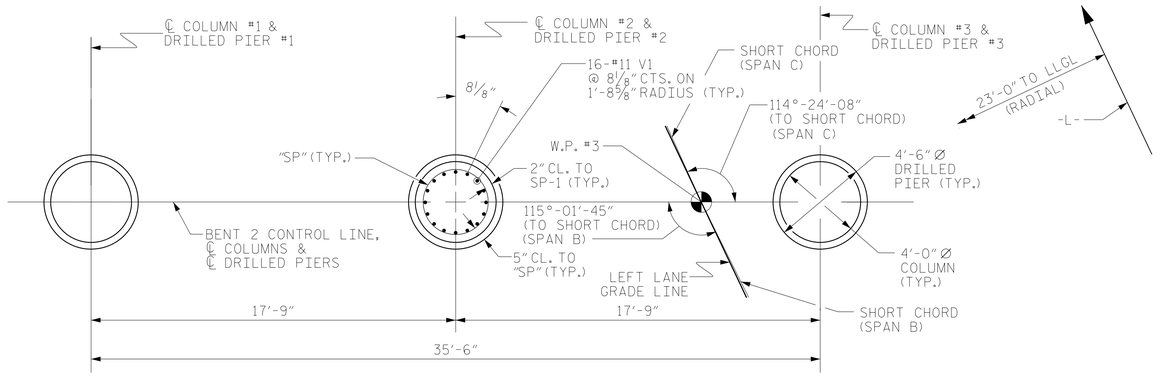
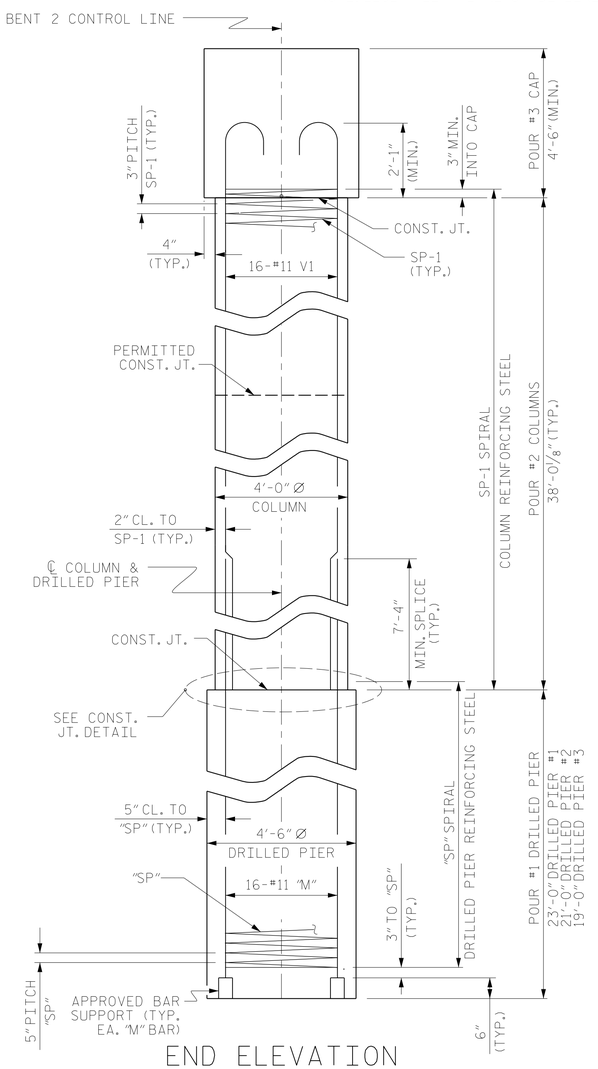
AcostaM

STR. #5

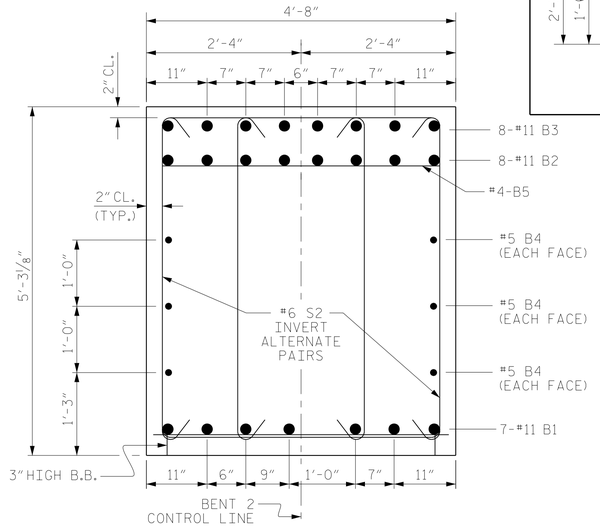


PLAN OF DRILLED PIERS & COLUMNS

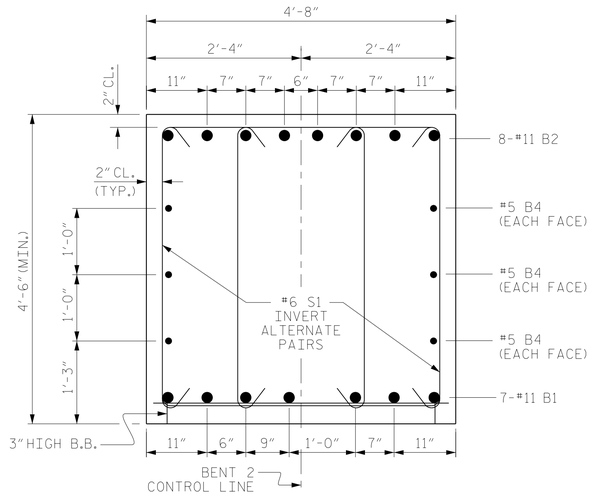
NOTE: LLGL = LEFT LANE GRADE LINE



END ELEVATION

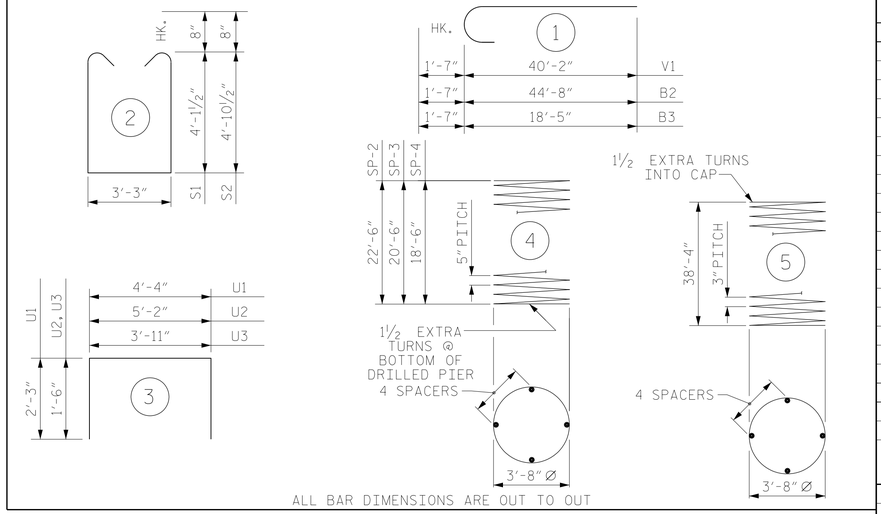


SECTION B-B

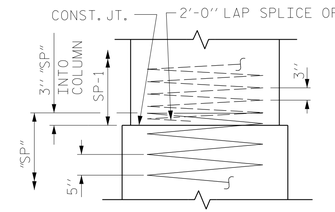


SECTION A-A

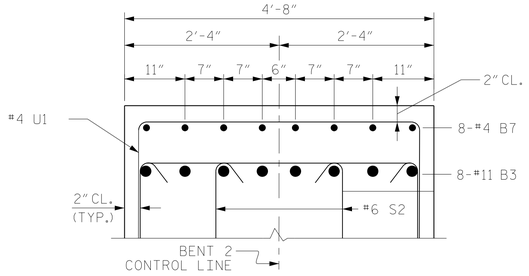
BAR TYPES



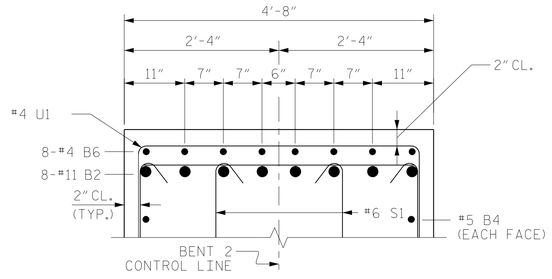
ALL BAR DIMENSIONS ARE OUT TO OUT



CONSTRUCTION JOINT DETAIL



VIEW D-D



VIEW C-C

BILL OF MATERIAL

FOR BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	7	#11	STR	44'-8"	1661
B2	8	#11	1	46'-3"	1966
B3	8	#11	1	20'-0"	850
B4	6	#5	STR	44'-8"	280
B5	5	#4	STR	4'-4"	14
B6	8	#4	STR	13'-1"	70
B7	8	#4	STR	5'-2"	28
M1	16	#11	STR	32'-10"	2791
M2	16	#11	STR	30'-10"	2621
M3	16	#11	STR	28'-10"	2451
S1	58	#6	2	12'-10"	1118
S2	46	#6	2	14'-4"	990
U1	55	#4	3	8'-10"	325
U2	8	#4	3	8'-2"	44
U3	23	#4	3	6'-11"	106
V1	48	#11	1	41'-9"	10647

REINFORCING STEEL (FOR BENT 2) 25,962 LBS.

SP-1	3	*	5	1765'-8"	3538
SP-2	1	**	4	630'-8"	658
SP-3	1	**	4	579'-7"	605
SP-4	1	**	4	522'-9"	545

SPIRAL COLUMN REINFORCING STEEL (FOR BENT 2) 5,346 LBS.

* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

** THE SP-2, SP-3, SP-4 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN (FOR BENT 2)

POUR #2 (COLUMNS)	53.1 C.Y.
POUR #3 (CAP)	38.7 C.Y.
TOTAL CLASS A CONCRETE	91.8 C.Y.

DRILLED PIERS: (FOR BENT 2)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	37.2 C.Y.
4'-6" Ø DRILLED PIER NOT IN SOIL	28.0 LIN. FT.
4'-6" Ø DRILLED PIER IN SOIL	35.0 LIN. FT.
PERMANENT STEEL CASING FOR 4'-6" Ø DRILLED PIERS	18.0 LIN. FT.
CSL TUBES	270.0 LIN. FT.

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 2 OF 2

DRAWN BY :	JTC	DATE :	12/2017
CHECKED BY :	MKO	DATE :	03/2018
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043245 Benjamin K. Williams, Jr. 4/25/2018

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 2 DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-29
1			3			TOTAL SHEETS
2			4			36

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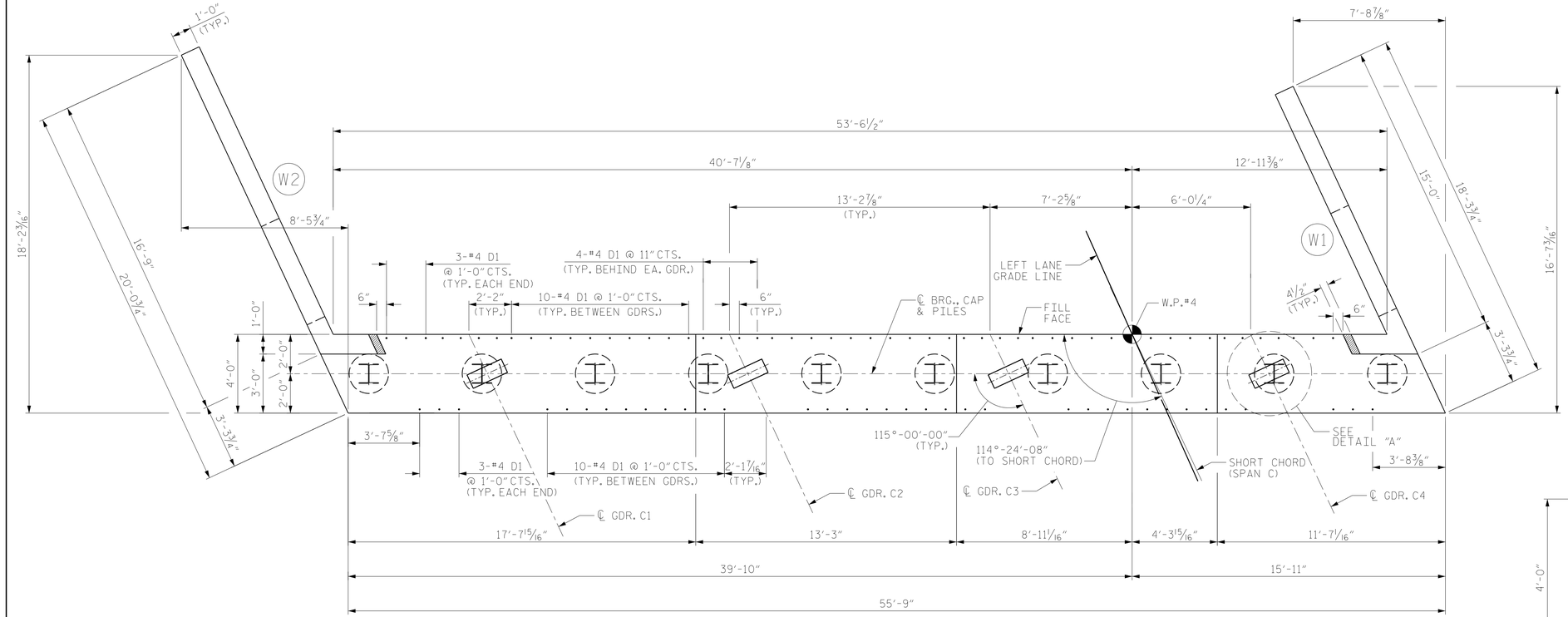
AcostaM

STR. #5



PLAN

NOTES:

THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 6" DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

FOR SECTION A-A AND SECTION B-B, SEE SHEET 4 OF 4.

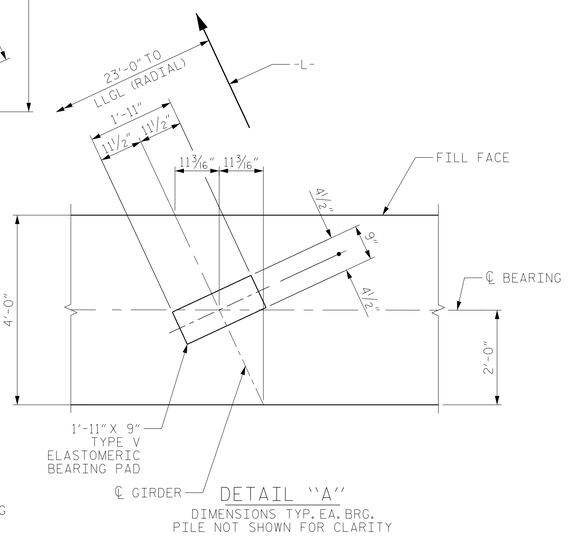
#4 D1 BARS MAY BE SHIFTED SLIGHTLY TO AVOID STIRRUPS IN CAP.

IT SHALL BE BROUGHT TO THE CONTRACTOR'S ATTENTION THAT THE WINGWALLS ARE TO RETAIN NO FILL UNTIL THE INTEGRAL END BENT DIAPHRAGM (SUPERSTRUCTURE POUR #4) CONCRETE HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.

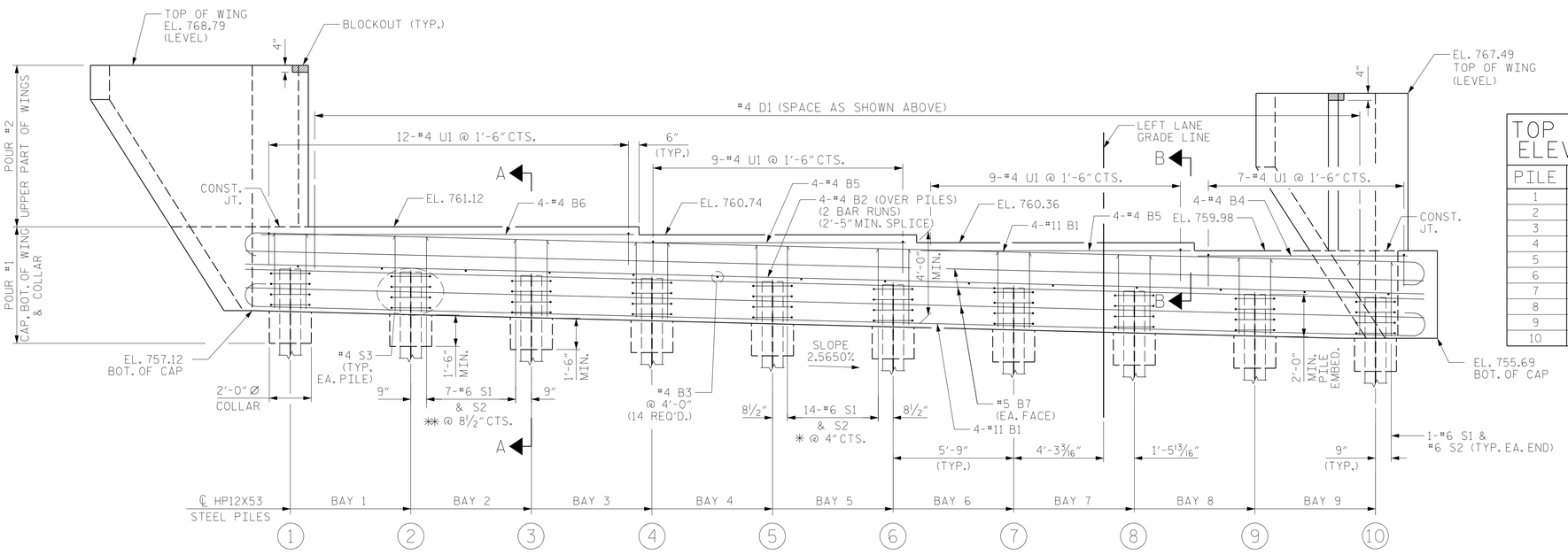
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE CONCRETE BARRIER IS CAST IF SLIP FORMING IS USED.

LLGL = LEFT LANE GRADE LINE



DETAIL "A"

DIMENSIONS TYP. EA. BRG. PILE NOT SHOWN FOR CLARITY



ELEVATION

✱ = TYPICAL BAY 4 THRU BAY 6
✱✱ = TYPICAL BAY 1 THRU BAY 3 AND BAY 7 THRU BAY 9

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
1	759.09
2	758.94
3	758.80
4	758.65
5	758.50
6	758.36
7	758.21
8	758.07
9	757.92
10	757.77

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 1 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043245 ENGINEERING INCORPORATED Richard K. Whitaker, Jr. 4/25/2018

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-30
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : JTC DATE : 12/2017
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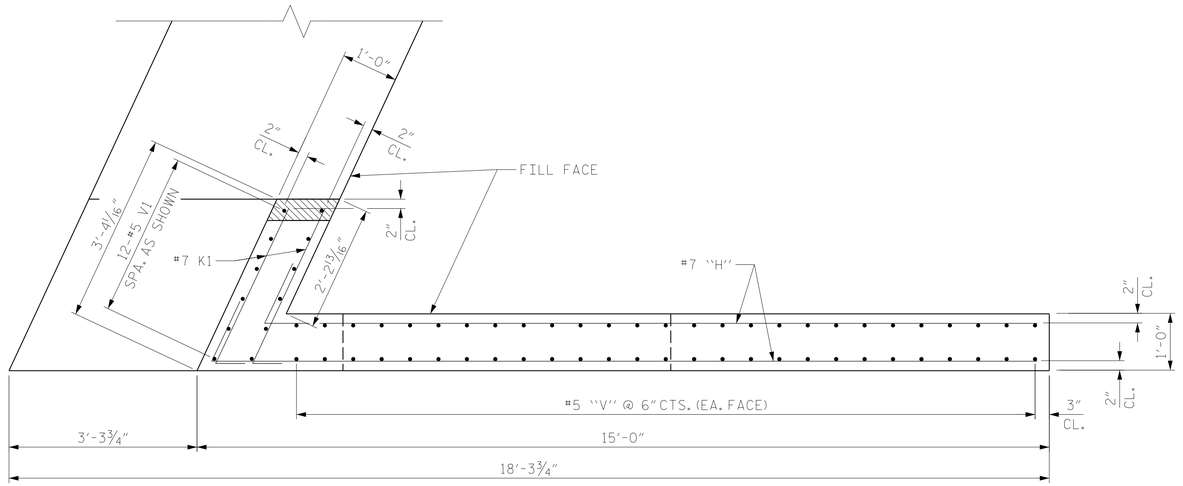
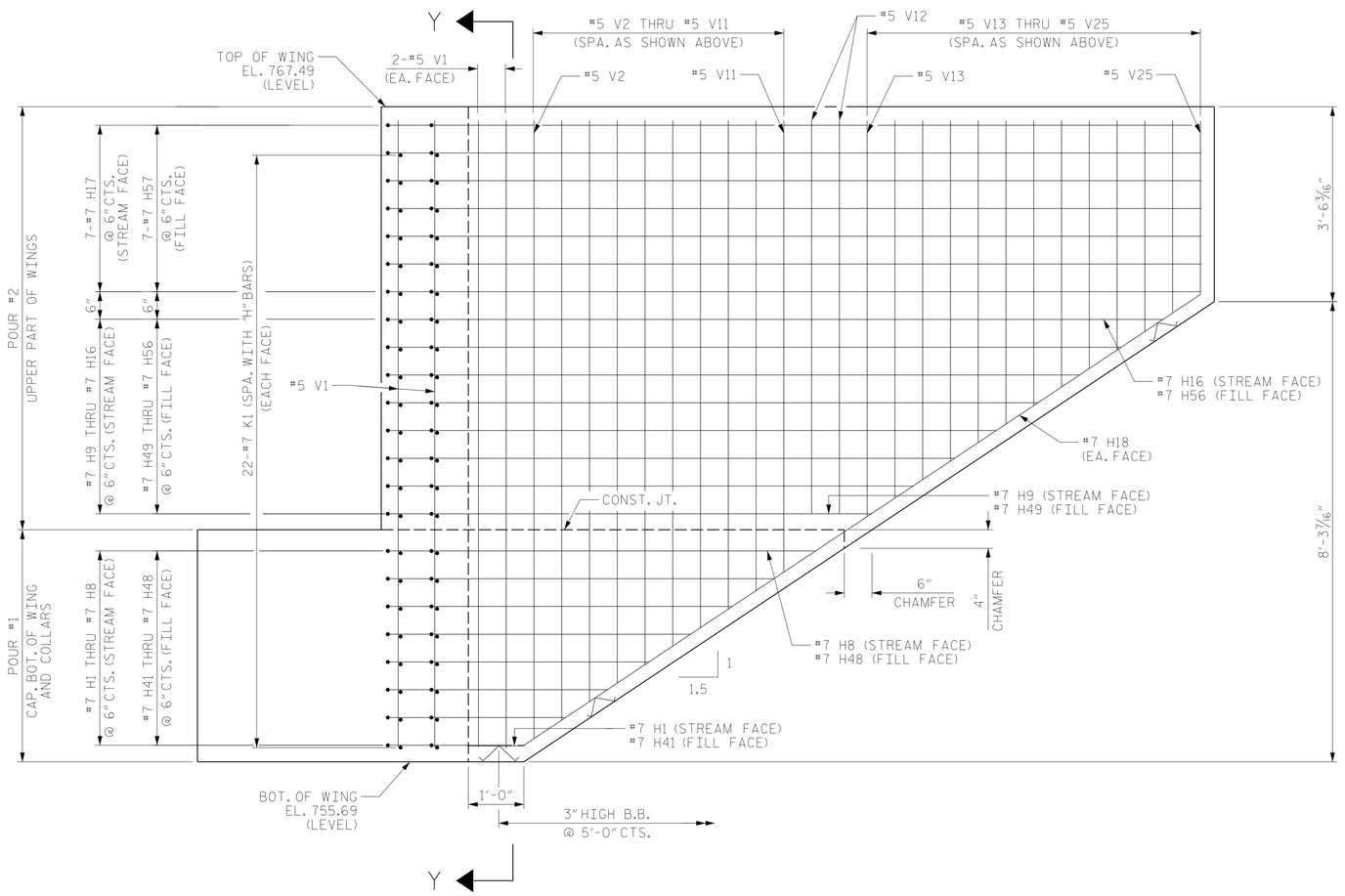
AcostaM

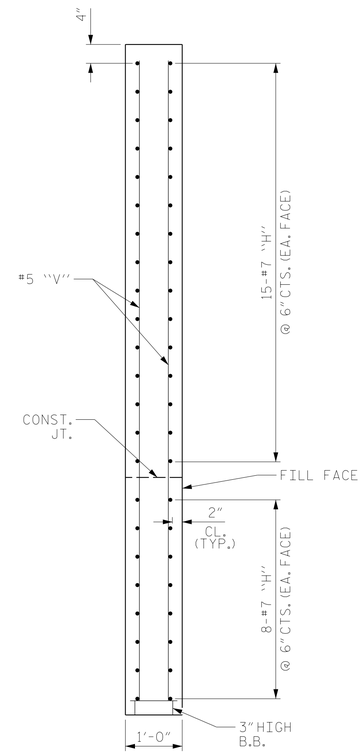
STR. #5



PLAN OF WING - W1



ELEVATION OF WING - W1



SECTION Y-Y

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043245 MICHAEL K. O'CONNOR, JR. 4/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

Michael K. O'Connor, Jr.

SUBSTRUCTURE

INTEGRAL END BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-31
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : JTC DATE : 12/2017
CHECKED BY : MKO DATE : 04/2018
DESIGN ENGINEER OF RECORD: MKO DATE : 04/2018

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4/25/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\405_061_U2412A_SMU_E*31_S5-31.dgn
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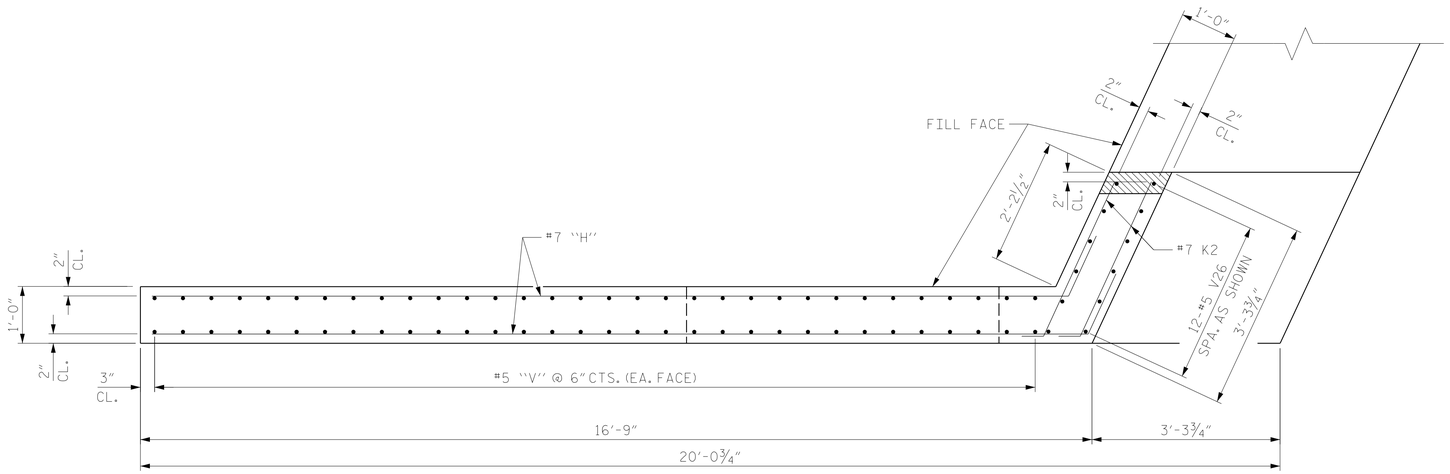
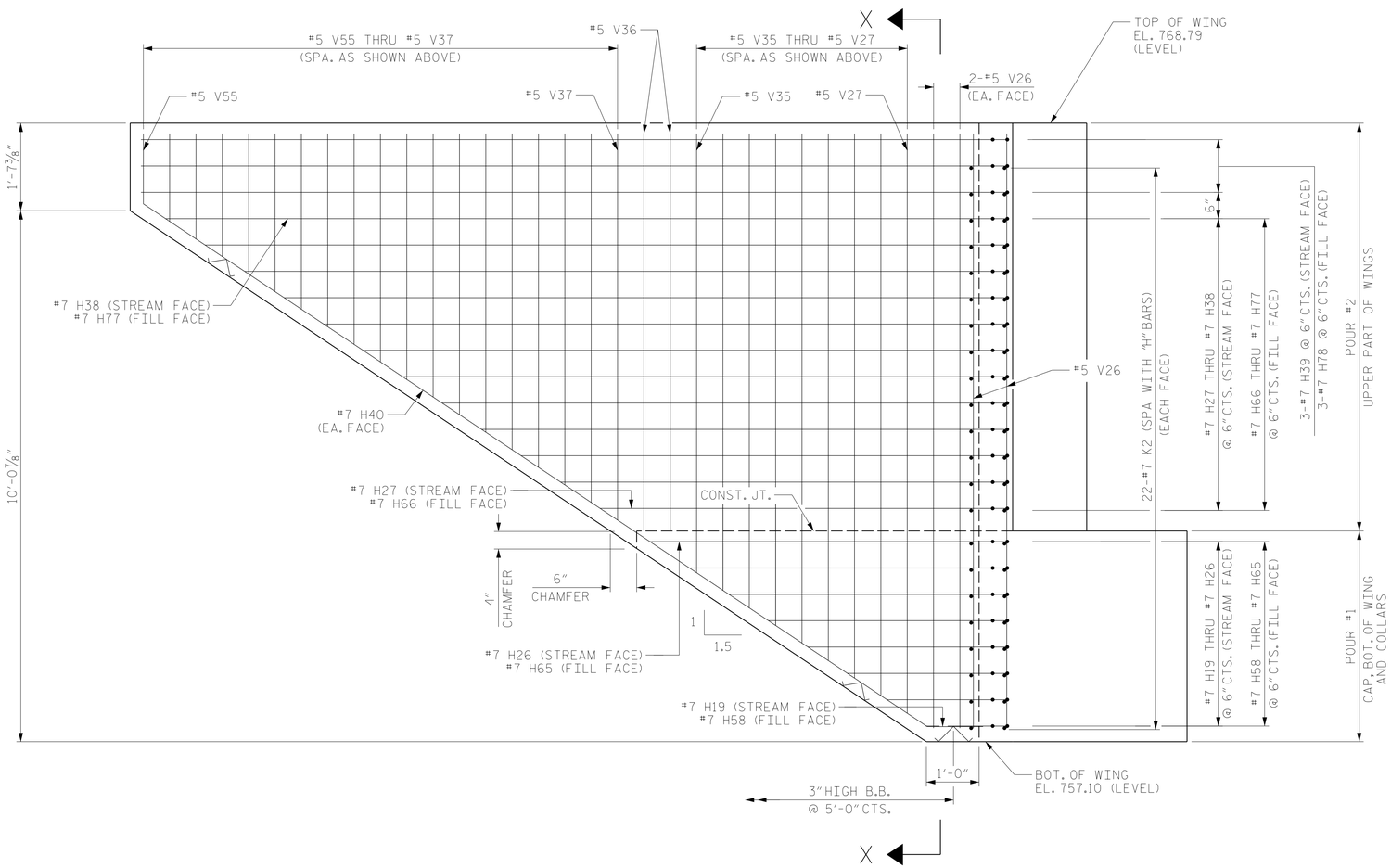
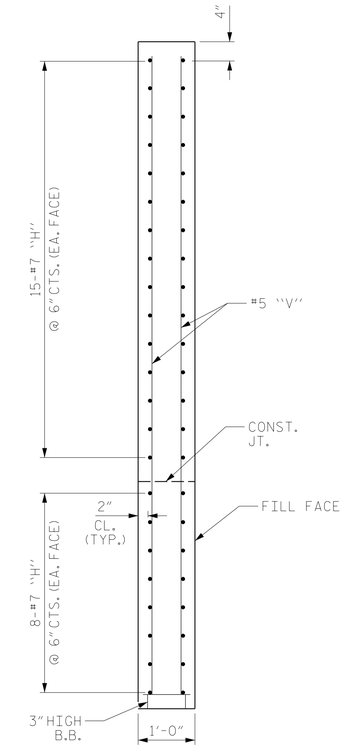
STR. #5



PLAN OF WING - W2



ELEVATION OF WING - W2



SECTION X-X

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 3 OF 4

DRAWN BY :	JTC	DATE :	12/2017
CHECKED BY :	MKO	DATE :	04/2018
DESIGN ENGINEER OF RECORD:	MKO	DATE :	04/2018

4/25/2018
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043245 MICHAEL K. O'CONNOR, JR.
Michael K. O'Connor, Jr.
4/25/2018

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DEPARTMENT OF TRANSPORTATION
RALEIGH

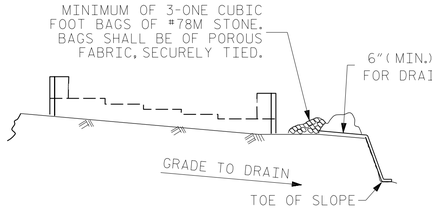
SUBSTRUCTURE

INTEGRAL END BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-32
1			3			TOTAL SHEETS
2			4			36

STR. #5

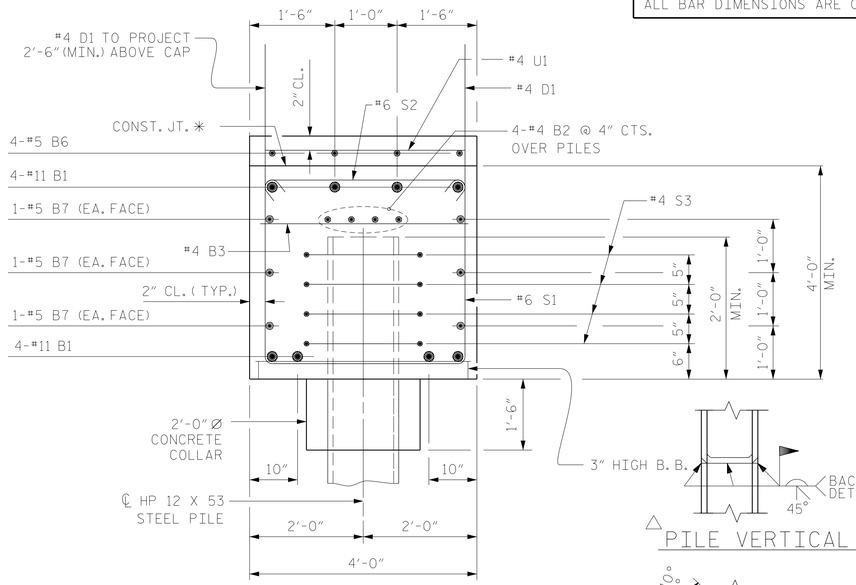


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

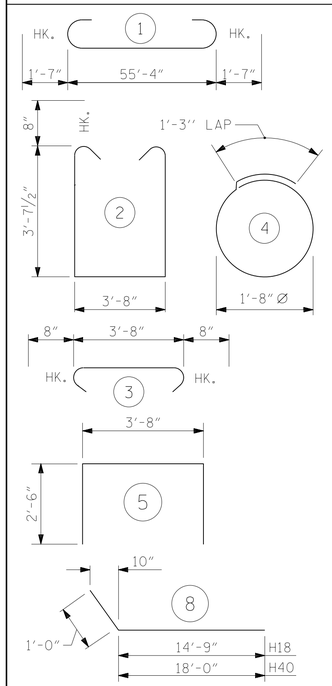
TEMPORARY DRAINAGE AT END BENT



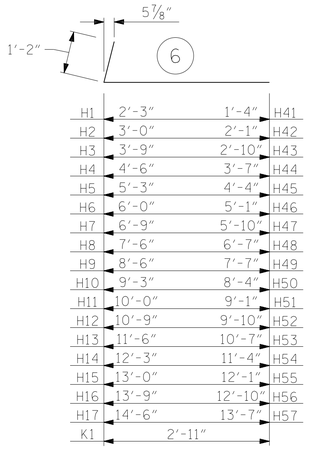
SECTION A-B

✳ THE TOP SURFACE OF THE END BENT CAP & WINGS, EXCLUDING THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.



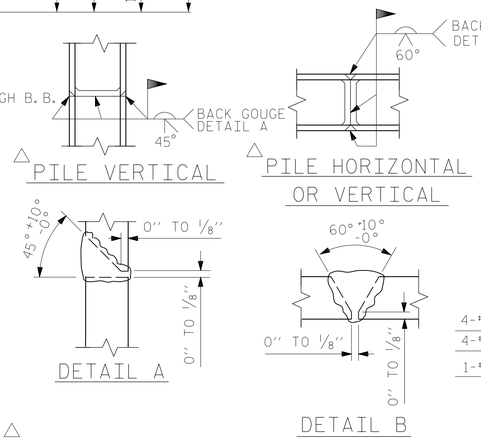
BILL OF MATERIAL

END BENT NO. 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	1	58'-6"	2486	H48	1	#7	6	7'-9"	18	V17	2	#5	STR	5'-10"	12
B2	8	#4	STR	29'-1"	155	H49	1	#7	6	8'-9"	18	V18	2	#5	STR	5'-6"	11
B3	14	#4	STR	3'-8"	34	H50	1	#7	6	9'-6"	19	V19	2	#5	STR	5'-2"	11
B4	4	#4	STR	11'-1"	30	H51	1	#7	6	10'-3"	21	V20	2	#5	STR	4'-10"	10
B5	8	#4	STR	12'-10"	69	H52	1	#7	6	11'-0"	22	V21	2	#5	STR	4'-6"	9
B6	4	#4	STR	19'-0"	51	H53	1	#7	6	11'-9"	24	V22	2	#5	STR	4'-2"	9
B7	6	#5	STR	55'-4"	346	H54	1	#7	6	12'-6"	26	V23	2	#5	STR	3'-10"	8
						H55	1	#7	6	13'-3"	27	V24	2	#5	STR	3'-6"	7
D1	88	#4	STR	4'-6"	265	H56	1	#7	6	14'-0"	29	V25	2	#5	STR	3'-2"	7
						H57	7	#7	6	14'-9"	211	V26	16	#5	STR	11'-3"	188
H1	1	#7	6	3'-5"	7	H58	1	#7	7	2'-4"	5	V27	2	#5	STR	11'-0"	23
H2	1	#7	6	4'-2"	9	H59	1	#7	7	3'-1"	6	V28	2	#5	STR	10'-8"	22
H3	1	#7	6	4'-11"	10	H60	1	#7	7	3'-10"	8	V29	2	#5	STR	10'-4"	22
H4	1	#7	6	5'-8"	12	H61	1	#7	7	4'-7"	9	V30	2	#5	STR	10'-0"	21
H5	1	#7	6	6'-5"	13	H62	1	#7	7	5'-4"	11	V31	2	#5	STR	9'-8"	20
H6	1	#7	6	7'-2"	15	H63	1	#7	7	6'-1"	12	V32	2	#5	STR	9'-4"	19
H7	1	#7	6	7'-11"	16	H64	1	#7	7	6'-10"	14	V33	2	#5	STR	9'-0"	19
H8	1	#7	6	8'-8"	18	H65	1	#7	7	7'-7"	16	V34	2	#5	STR	8'-8"	18
H9	1	#7	6	9'-8"	20	H66	1	#7	7	8'-4"	17	V35	2	#5	STR	8'-4"	17
H10	1	#7	6	10'-5"	21	H67	1	#7	7	9'-1"	19	V36	4	#5	STR	7'-3"	30
H11	1	#7	6	11'-2"	23	H68	1	#7	7	9'-10"	20	V37	2	#5	STR	7'-4"	15
H12	1	#7	6	11'-11"	24	H69	1	#7	7	10'-7"	22	V38	2	#5	STR	7'-0"	15
H13	1	#7	6	12'-8"	26	H70	1	#7	7	11'-4"	23	V39	2	#5	STR	6'-8"	14
H14	1	#7	6	13'-5"	27	H71	1	#7	7	12'-1"	25	V40	2	#5	STR	6'-4"	13
H15	1	#7	6	14'-2"	29	H72	1	#7	7	12'-10"	26	V41	2	#5	STR	6'-0"	13
H16	1	#7	6	14'-11"	30	H73	1	#7	7	13'-7"	28	V42	2	#5	STR	5'-8"	12
H17	7	#7	6	15'-8"	224	H74	1	#7	7	14'-4"	29	V43	2	#5	STR	5'-4"	11
H18	2	#7	8	15'-9"	64	H75	1	#7	7	15'-1"	31	V44	2	#5	STR	5'-0"	10
H19	1	#7	7	2'-8"	5	H76	1	#7	7	15'-10"	32	V45	2	#5	STR	4'-8"	10
H20	1	#7	7	3'-5"	7	H77	1	#7	7	16'-7"	34	V46	2	#5	STR	4'-4"	9
H21	1	#7	7	4'-2"	9	H78	3	#7	7	17'-4"	106	V47	2	#5	STR	4'-0"	8
H22	1	#7	7	4'-11"	10							V48	2	#5	STR	3'-8"	8
H23	1	#7	7	5'-8"	12	K1	44	#7	6	4'-1"	367	V49	2	#5	STR	3'-4"	7
H24	1	#7	7	6'-5"	13	K2	44	#7	7	4'-1"	367	V50	2	#5	STR	3'-0"	6
H25	1	#7	7	7'-2"	15							V51	2	#5	STR	2'-8"	6
H26	1	#7	7	7'-11"	16	S1	86	#6	2	12'-3"	1582	V52	2	#5	STR	2'-4"	5
H27	1	#7	7	8'-8"	18	S2	86	#6	3	5'-0"	646	V53	2	#5	STR	2'-0"	4
H28	1	#7	7	9'-5"	19	S3	40	#4	4	6'-6"	174	V54	2	#5	STR	1'-8"	3
H29	1	#7	7	10'-2"	21												
H30	1	#7	7	10'-11"	22	U1	37	#4	5	8'-8"	214						
H31	1	#7	7	11'-8"	24												
H32	1	#7	7	12'-5"	25	V1	16	#5	STR	11'-4"	189						
H33	1	#7	7	13'-2"	27	V2	2	#5	STR	11'-2"	23						
H34	1	#7	7	13'-11"	28	V3	2	#5	STR	10'-10"	23						
H35	1	#7	7	14'-8"	30	V4	2	#5	STR	10'-6"	22						
H36	1	#7	7	15'-5"	32	V5	2	#5	STR	10'-2"	21						
H37	1	#7	7	16'-2"	33	V6	2	#5	STR	9'-10"	21						
H38	1	#7	7	16'-11"	35	V7	2	#5	STR	9'-6"	20						
H39	3	#7	7	17'-7"	108	V8	2	#5	STR	9'-2"	19						
H40	2	#7	8	19'-0"	78	V9	2	#5	STR	8'-10"	18						
H41	1	#7	6	2'-6"	5	V10	2	#5	STR	8'-6"	18						
H42	1	#7	6	3'-3"	7	V11	2	#5	STR	8'-2"	17						
H43	1	#7	6	4'-0"	8	V12	4	#5	STR	7'-2"	30						
H44	1	#7	6	4'-9"	10	V13	2	#5	STR	7'-2"	15						
H45	1	#7	6	5'-6"	11	V14	2	#5	STR	6'-10"	14						
H46	1	#7	6	6'-3"	13	V15	2	#5	STR	6'-6"	14						
H47	1	#7	6	7'-0"	14	V16	2	#5	STR	6'-2"	13						

✳✳ B6 SHALL BE FIELD CUT TO MAINTAIN CLEAR COVER.

REINFORCING STEEL	10,067 LBS.
CLASS A CONCRETE	
POUR #1	
CAP, CONCRETE COLLARS & LOWER PART OF WINGS	40.6 C. Y.
POUR #2	
UPPER PART OF WINGS	9.4 C. Y.
TOTAL	50.0 C. Y.
HP 12 X 53 STEEL PILES	
NO. 10	150 LIN. FT.
STEEL PILE POINTS	NO.: 10
PILE DRIVING EQUIPMENT SETUP	NO. 10



△ PILE VERTICAL

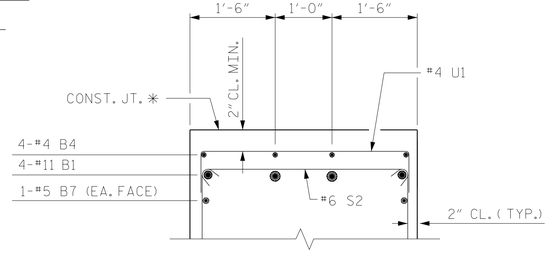
△ PILE HORIZONTAL OR VERTICAL

DETAIL A

DETAIL B

△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



PARTIAL SECTION B-B

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 4 OF 4

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

INTEGRAL END BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-33
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : JTC DATE : 12/2017
CHECKED BY : MKO DATE : 04/2018
DESIGN ENGINEER OF RECORD: MKO DATE : 04/2018

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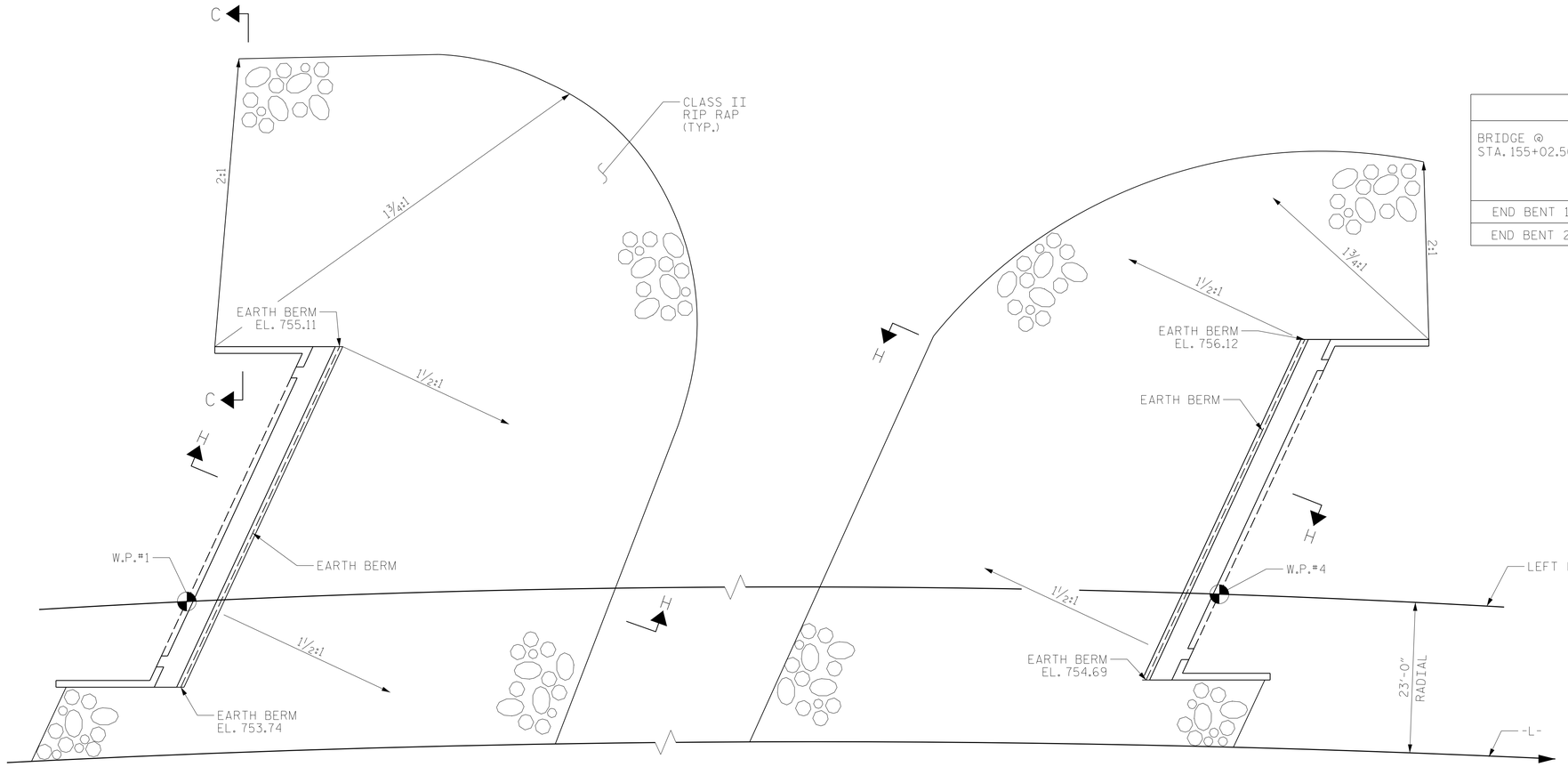
STR. #5

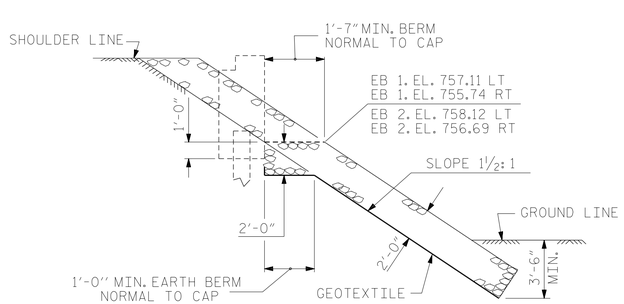
NOTES

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

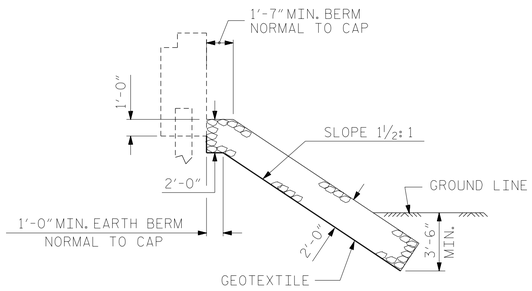
ESTIMATED QUANTITIES		
BRIDGE @ STA. 155+02.50 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	1,450	1,610
END BENT 2	985	1,095



PLAN VIEW

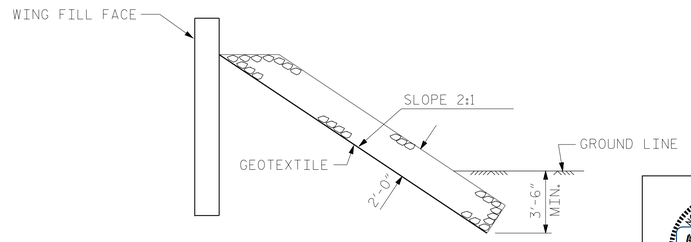


VIEW H-H



LEFT LANE GRADE LINE SECTION

BERM RIP RAPPED



SECTION C-C

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043245 ENGINEER MICHAEL KENT O'CONNOR, JR. 4/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-34
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : NSC DATE : 12/2017
CHECKED BY : PDS DATE : 1/2018
DESIGN ENGINEER OF RECORD: MKO DATE : 04/2018

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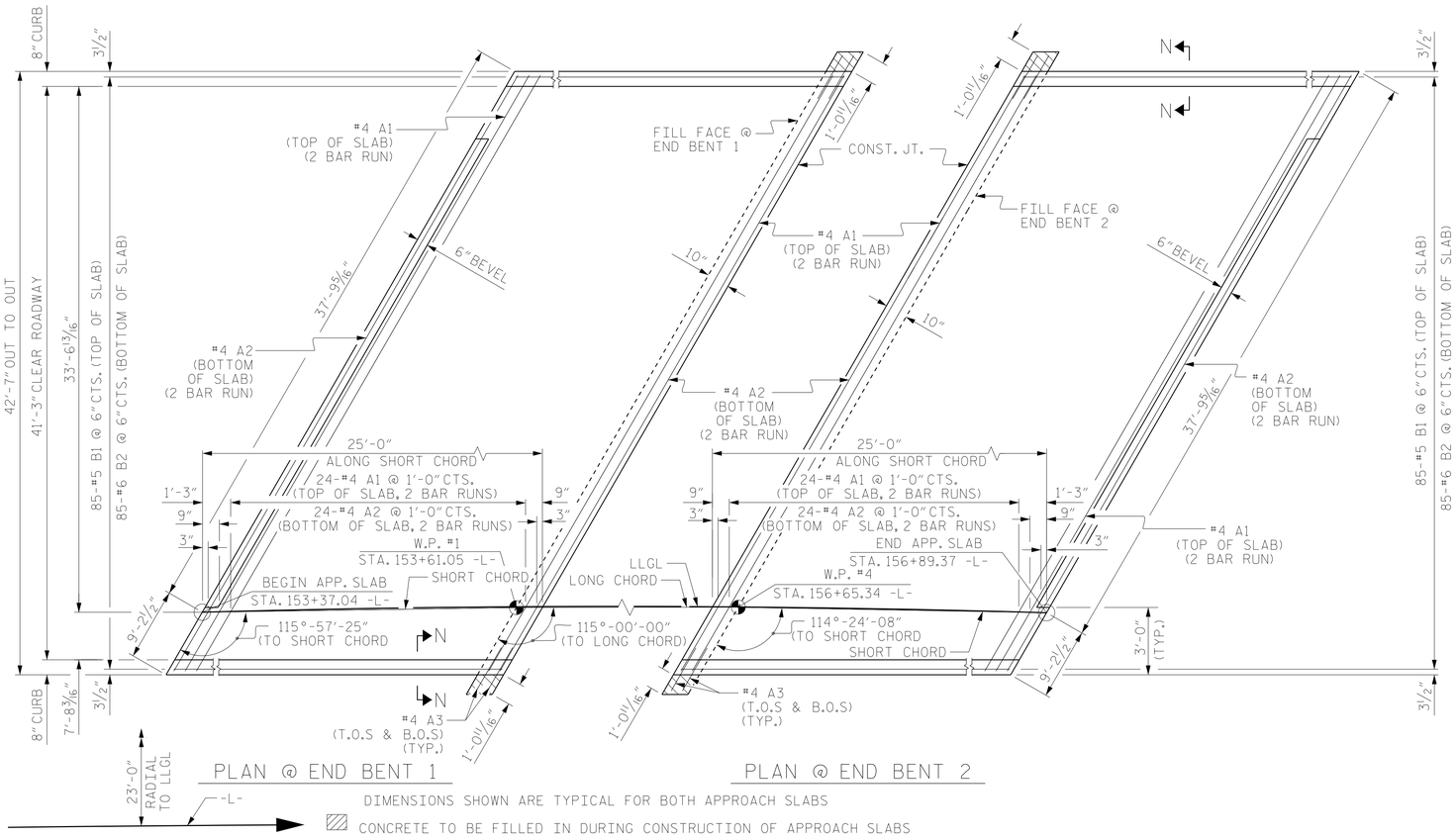
AcostaM

STR. #5



PLAN @ END BENT 1

PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

CONCRETE TO BE FILLED IN DURING CONSTRUCTION OF APPROACH SLABS

NOTES

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

T.O.S.= TOP OF SLAB

B.O.S.= BOTTOM OF SLAB

GEOTEXTILE SHALL BE TYPE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" DIAMETER DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

"A BARS ARE PLACED PARALLEL TO THE SKEW OF EACH END BENT.

"B" BARS ARE PLACED PARALLEL TO THE EDGES OF THE APPROACH SLAB.

LLGL = LEFT LANE GRADE LINE

BILL OF MATERIAL

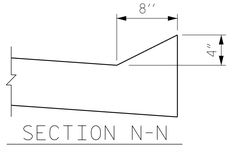
FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	52	#4	STR	24'-4"	845
A2	52	#4	STR	24'-3"	842
* A3	8	#4	STR	3'-0"	16
* B1	85	#5	STR	23'-10"	2113
B2	85	#6	STR	24'-5"	3117

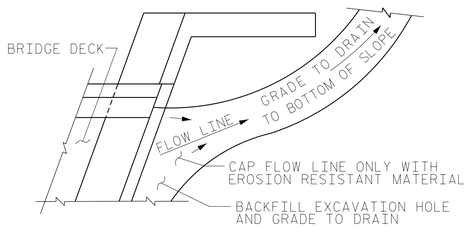
REINFORCING STEEL	LBS.	3,959
* EPOXY COATED REINFORCING STEEL	LBS.	2,974
CLASS AA CONCRETE	C.Y.	46.0

SPLICE LENGTHS

BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"

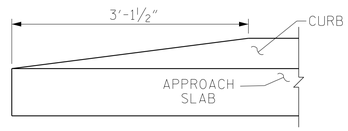


SECTION N-N



TEMPORARY DRAINAGE DETAIL

NOTE:
IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.



END OF CURB WITHOUT SHOULDER BERM GUTTER

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043835 ENGINEER MARC A LEBLANC
4/25/2018

RS&H

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North Carolina License Nos. 50073 * F-0493 * C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT WITH FLEXIBLE PAVEMENT LEFT LANE

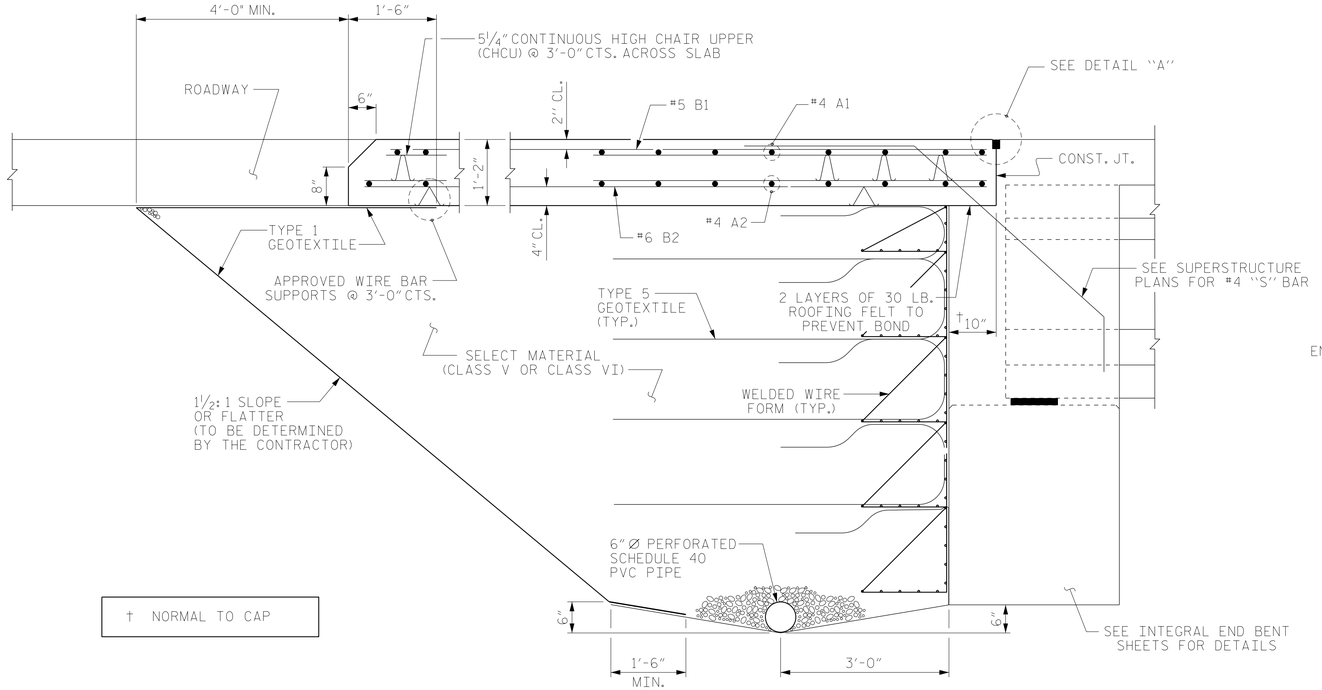
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-35
1			3			TOTAL SHEETS
2			4			36

ASSEMBLED BY : TWL	DATE : 12/2017	
CHECKED BY : PDS	DATE : 01/2018	
DRAWN BY : TLA 10/05	REV. 12/21/11	MAA/GM
CHECKED BY : GM 5/06	REV. 6/13	MAA/GM
	REV. 12/17	MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\405_069_U2412A_SMU_AS35_S5-35.dgn
AcostaM

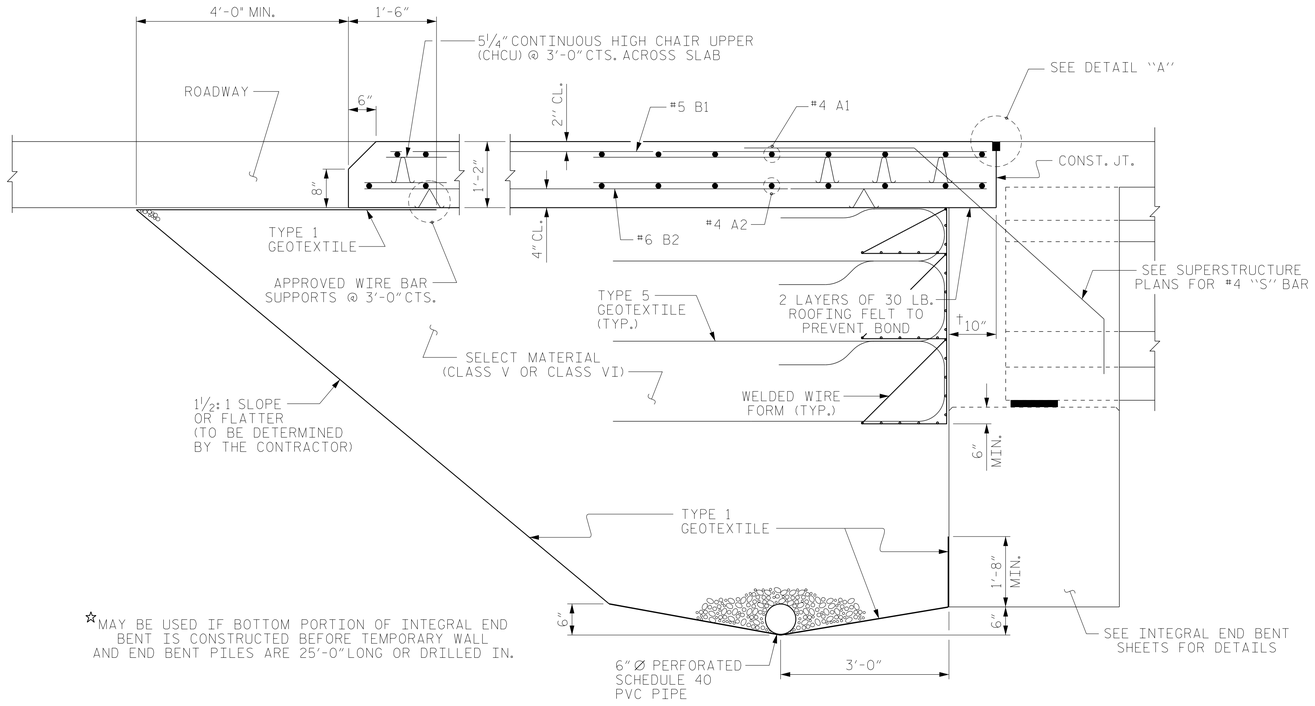
STD. NO. BAS5 (SHT 1b) STR. #5



† NORMAL TO CAP

SECTION THRU SLAB

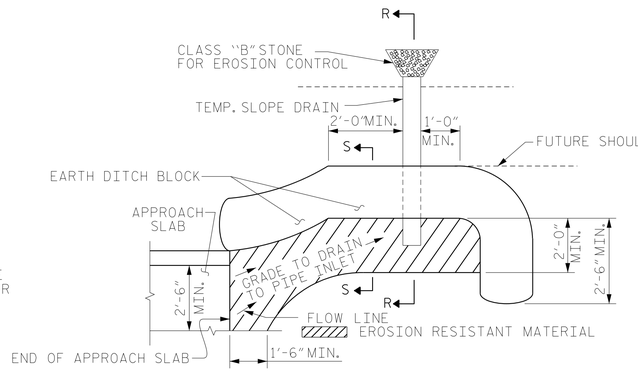
(TYPE A - ALTERNATE APPROACH FILL)



☆MAY BE USED IF BOTTOM PORTION OF INTEGRAL END BENT IS CONSTRUCTED BEFORE TEMPORARY WALL AND END BENT PILES ARE 25'-0" LONG OR DRILLED IN.

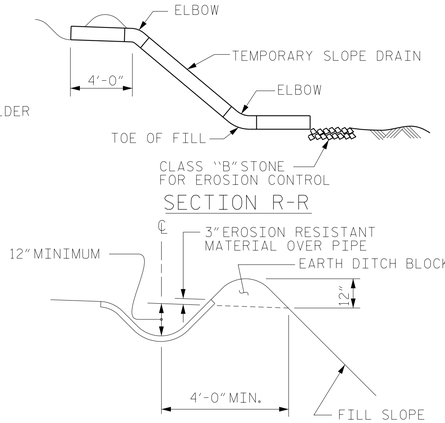
SECTION THRU SLAB

☆(TYPE A - ALTERNATE APPROACH FILL)



NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

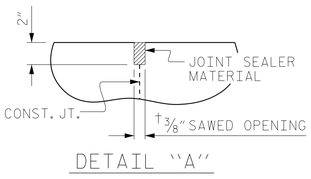
PLAN VIEW



SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



DETAIL "A"

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043835 MARC A. LEBLANC 7/25/2018

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-36
1			3			TOTAL SHEETS
2			4			36

ASSEMBLED BY : NSC	DATE : 12/2017
CHECKED BY : PDS	DATE : 01/2018
DRAWN BY : TLA 10/05	REV. 12/21/11 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

4/24/2018
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AcostaM

STD. NO. BAS5 (SHT 1b) STR. #5

F.A. PROJECT NO.: STP-4121(3)

153+00 153+50 154+00 154+50 155+00 155+50 156+00 156+50

+3.0306% △ +0.3319%
PI = 149+40.00
EL. = 765.00
VC = 600'

GRADE DATA -L-

780 770 760 750 740 730 720 710

SPAN A SPAN B SPAN C

FILL FACE @ END BENT 1
STA. 153+38.89 -L-
GRADE PT. EL. 766.32

BEGIN FRONT SLOPE
STA. 153+25.27 -L-
GRADE PT. EL. 766.28

FIX. FIX. FIX. FIX.

1'-0" (TYP.)

LOW CHORD EL. 758.36

CLASS II RIP RAP (2'-0" THICK) (TYP.)

HP 12X53 STEEL PILES (TYP.)

1½:1 SLOPE (NORMAL TO CAP) (TYP.)

EL. 724±
EL. 727±
EL. 721±

FILL

3'-6" MIN. (TYP.)

BASE DISCHARGE (Q100) H.W. EL. 722.3

WSE EL. 712 (08-11-06)

EL. 711±

TOP OF DRILLED PIER EL. 716.0

4'-6" Ø DRILLED PIERS (TYP.)

TEMPORARY CONSTRUCTION ACCESS (TYP.)

EL. 716±

EL. 712±

EL. 722±

TOP OF DRILLED PIER EL. 716.0

FILL FACE @ END BENT 2
STA. 156+44.61 -L-
GRADE PT. EL. 767.34

1'-7" BERM NORMAL TO CAP (TYP.)

BEGIN FRONT SLOPE
STA. 156+58.02 -L-
GRADE PT. EL. 767.38

LOW CHORD EL. 759.35

EL. 752±

EL. 757±

APPROXIMATE EXISTING GROUND LINE

FILL

EL. 724±

INTEGRAL END BENT 1

BENT 1

BENT 2

INTEGRAL END BENT 2

SECTION ALONG RIGHT LANE GRADE LINE

(SECTIONS AT END BENTS AND BENTS ARE TAKEN AT RIGHT ANGLES)

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

HORIZONTAL CURVE DATA -L-

P.I. STA. = 149+31.07
△ = 15°-31'-57.9" (RT.)
D = 0°-35'-04.7"
L = 2,656.76'
T = 1336.57'
R = 9,800.00'
S.E. = 0.03

305'-0" (FILL FACE TO FILL FACE) (ALONG RLGL)

90'-0" SPAN A (ALONG RLGL) 115'-0" SPAN B (ALONG RLGL) 100'-0" SPAN C (ALONG RLGL)

1'-0" MIN. EARTH BERM EL. 754.18 LT. EL. 752.90 RT.

CLASS II RIP RAP (TYP.)

W.P. #1 FILL FACE @ END BENT 1 STA. 153+38.89 -L-

TO SR 1352

BEGIN APPROACH SLOPE STA. 153+14.76 -L-

BEGIN FRONT SLOPE STA. 153+25.27 -L-

115°-53'-37" (TAN. TO CURVE)

116°-02'-05" (TAN. TO CURVE)

RIGHT LANE GRADE LINE

BENT 1 CONTROL LINE

W.P. #2 @ BENT 1 STA. 154+29.10 -L-

STA. 154+91.77 -L-

115°-21'-59" (TAN. TO CURVE)

TEMPORARY CONSTRUCTION ACCESS (TYP.)

BULL RUN CREEK

BRIDGE ID STA. 155+02.50 -L-

114°-56'-14" (TAN. TO CURVE)

52'-5 11/16" (ALONG RLGL)

LONG CHORD & WORKLINE

115°-00'-00" (TO LONG CHORD) (TYP.)

BENT 2 CONTROL LINE

W.P. #3 @ BENT 2 STA. 155+44.37 -L-

114°-41'-32" (TAN. TO CURVE)

23'-0" RADIAL

-L-

1'-0" MIN. EARTH BERM EL. 755.18 LT. EL. 753.87 RT.

W.P. #4 FILL FACE @ END BENT 2 STA. 156+44.61 -L-

END APPROACH SLOPE STA. 156+68.75 -L-

113°-57'-55" (TAN. TO CURVE)

TO SR 1355

BEGIN FRONT SLOPE STA. 156+58.02 -L-

114°-06'-23" (TAN. TO CURVE)

NAD 83'95

PLAN ALONG RIGHT LANE GRADE LINE

(FOR CLARITY, PILES, COLUMNS & DRILLED PIERS ARE NOT SHOWN IN PLAN VIEW)
RLGL = RIGHT LANE GRADE LINE

PROJECT NO. U-2412A

GUILFORD COUNTY

STATION: 155+02.50 -L-

SHEET 1 OF 4 BRIDGE NO. 401275

DRAWN BY : MAL DATE : 10/2017
CHECKED BY : TLC DATE : 02/2018
DESIGN ENGINEER OF RECORD: MAL DATE : 10/2017

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043835 MARC A. LEBLANC 4/25/2018

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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

RIGHT LANE BRIDGE OVER BULL RUN CREEK ON SR 4121 BETWEEN SR 1352 AND SR 1355

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-1
1			3			TOTAL SHEETS
2			4			37

STR. #6

4/24/2018
\\rsandh.com\files\Transportation\P\1031709003 U-2412A Sites 2 & 3 DualBridges\Site 3\Design\Structures\Working DGN\406_001_U2412A_SMU_GD01_S6-1.dgn
AcostaM