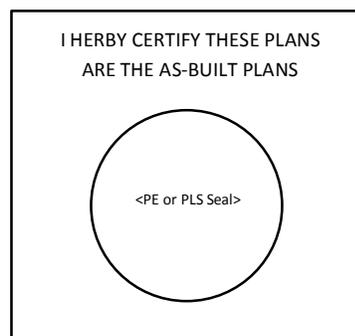


Guide for Preparing As-Built Plans for FEMA Compliance

In order to comply with the National Flood Insurance Program (NFIP) regulations administered by the Federal Emergency Management Agency (FEMA), the Department must provide sealed As-Built Construction Plans within six (6) months of structure completion, certifying that the major drainage structure(s) and associated roadway embankment that are located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically.

The Hydraulics Unit is responsible for ensuring that the Department meets FEMA compliance by submitting the certified As-Built Plans for these major drainage structures. Projects requiring FEMA Certification will be identified in the Green Sheet Commitments (in the environmental document), and the Hydraulics Unit will submit a FEMA Certification Request for the affected structures. The appropriate sheets of the As-Built Plans requiring certification will have a title block for the certification as follows:



Certification consists of a professional licensed surveyor's (PE) or professional engineer's (PE) seal, signature, and date. In the absence of the title block, the certification consists of a PLS or PE seal, signature, and date with the following note placed above the seal: "I hereby certify these plans are the as-built plans."

For BRIDGES, the Structure General Drawing Layout Sheet will contain the title block.

For CULVERTS, the following Culvert Plan Sheets will contain the title block:

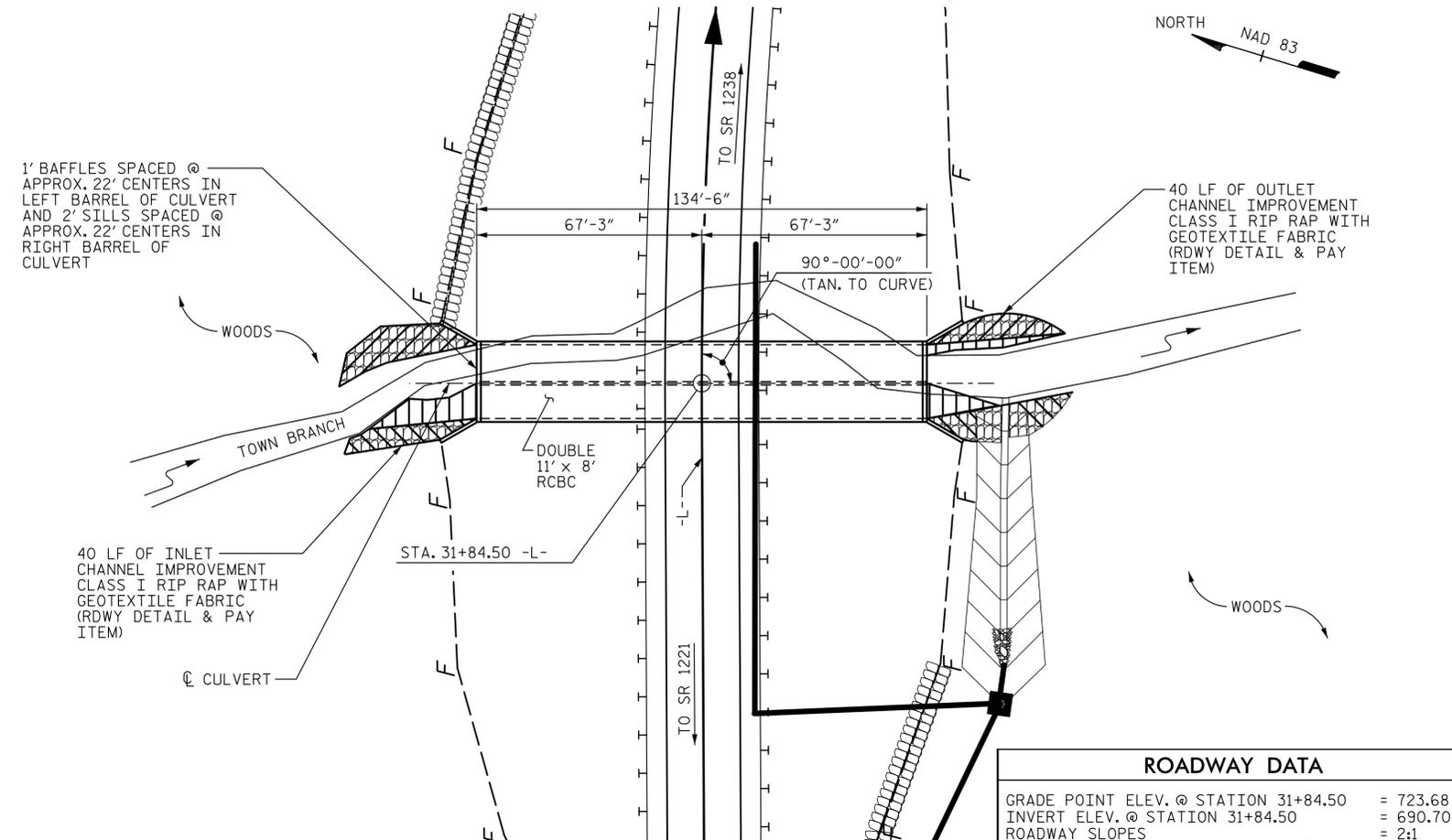
- The sheet showing the location sketch, plan, and profile along centerline of the culvert
- The sheet showing the culvert section normal to the roadway and end elevation
- The sheet showing the roadway profile in the area of the structure

The certification should be made upon completion of the work in the floodplain. All approach fills, unclassified structure excavation, bents, and superstructure members should be complete prior to making the certification. The certification should be made on the half-sized Structure General Drawing or Culvert Plan Sheets as noted above and submitted to the Hydraulics Unit at the following email address: NCDOT_Hydraulics_As-Built_Plans@ncdot.gov. It is preferred that the certification be transmitted electronically (PDF) via this email address; however, a hardcopy delivered through the mail to the Hydraulics Unit FEMA Coordinator is also acceptable.

CULVERT AS-BUILT PLAN VIEW EXAMPLE

BENCH MARK #1 CHISELED SQUARE IN NW CORNER OF CONCRETE SIGN PAD; 627.97' LT. OF STA 17+19.28 -L-, EL. 764.18

F.A. PROJECT NO. : HSIP-1221(18)

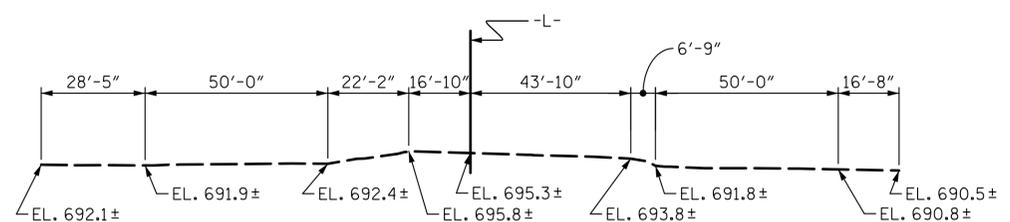


ROADWAY DATA	
GRADE POINT ELEV. @ STATION 31+84.50	= 723.68
INVERT ELEV. @ STATION 31+84.50	= 690.70
ROADWAY SLOPES	= 2:1

LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

✓
**VERIFY
LOCATION
SKETCH**



PROFILE ALONG CULVERT

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
BARREL @ 3.854 CY/FT	518.4 C.Y.
WINGS, ETC.	24.4 C.Y.
SILLS/BAFFLES	8.6 C.Y.
TOTAL	551.4 C.Y.
REINFORCING STEEL	
BARREL, SILLS, BAFFLES	75,844 LBS.
WINGS, ETC.	1,453 LBS.
TOTAL	77,297 LBS.
FOUNDATION CONDITIONING MATERIAL	231 TONS
CULVERT EXCAVATION	LUMP SUM
PLACEMENT OF NATURAL STREAM BED MATERIAL	LUMP SUM

HYDRAULIC DATA	
DESIGN DISCHARGE	= 1,000 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YR.
DESIGN HIGH WATER ELEVATION	= 698.2
DRAINAGE AREA	= 1.3 SQ MI
BASE DISCHARGE (Q 100)	= 1,100 CFS
BASE HIGH WATER ELEVATION	= 698.82
OVERTOPPING FLOOD DATA	
OVERTOPPING DISCHARGE	= 4,700 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500 YR +
OVERTOPPING FLOOD ELEVATION	= 724.0

NOTES

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
- DESIGN FILL = 24'
- DETAILED DRAWINGS FOR FALSEWORK AND FORMS FOR THIS CULVERT SHALL BE SUBMITTED, SEE SHEET SN.
- STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- A 3 FOOT STRIP OF GEOTEXTILE SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
- NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.
- CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
 - WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
 - THE REMAINING PORTIONS OF THE WALLS, SILLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.
- THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
- DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
- AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALLS AND BOTH FACES OF THE INTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- NATURAL STREAM BED MATERIAL SHALL BE USED TO BACKFILL THE CULVERT BETWEEN SILLS AND BAFFLES. SEE SPECIAL PROVISIONS FOR "PLACEMENT OF NATURAL STREAM BED MATERIAL."
- THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH 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 BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

✓
**SEAL, SIGN,
AND DATE**

PROJECT NO. _____

_____ COUNTY

STATION: _____

SHEET 1 OF 5

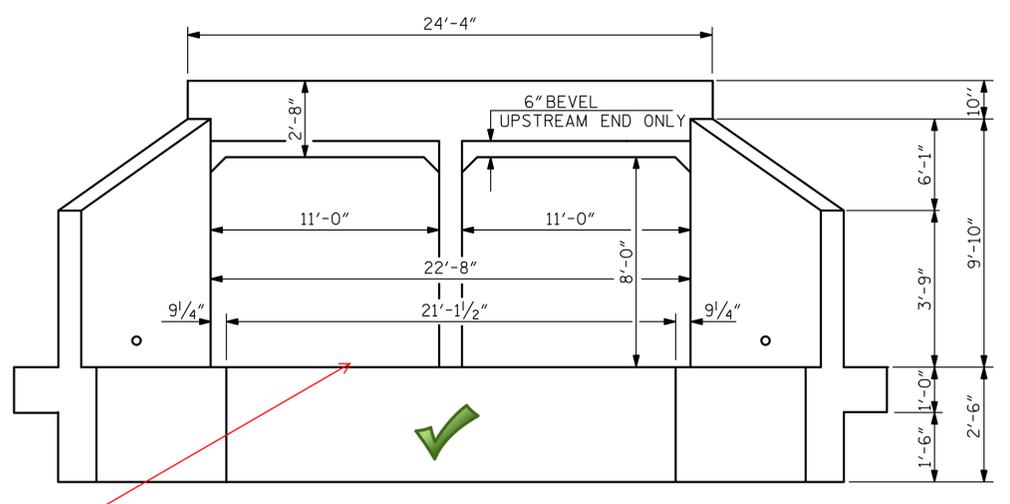
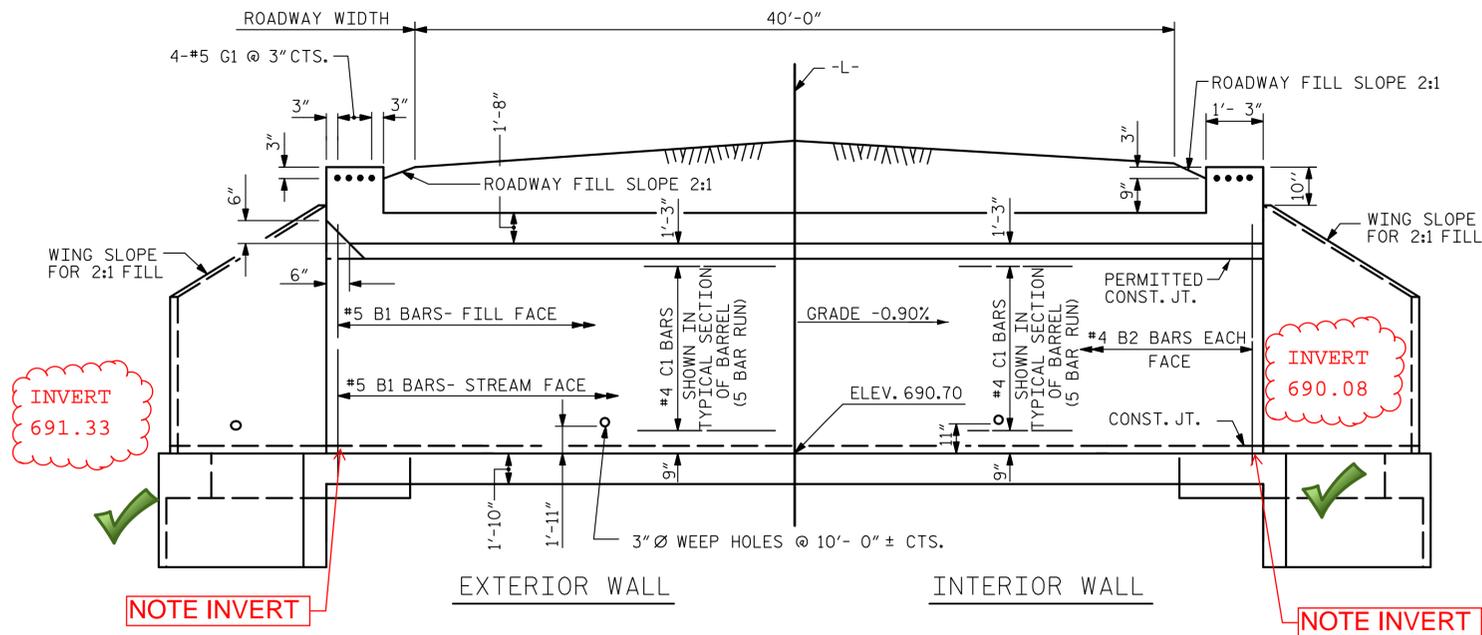
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
**BARREL STANDARD
DOUBLE 11 FT. X 8 FT.
CONCRETE BOX CULVERT
90° SKEW**

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

ADDED NOV. 1, 1990

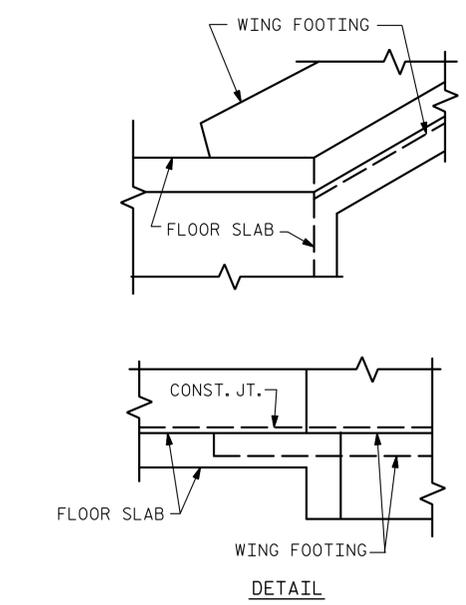
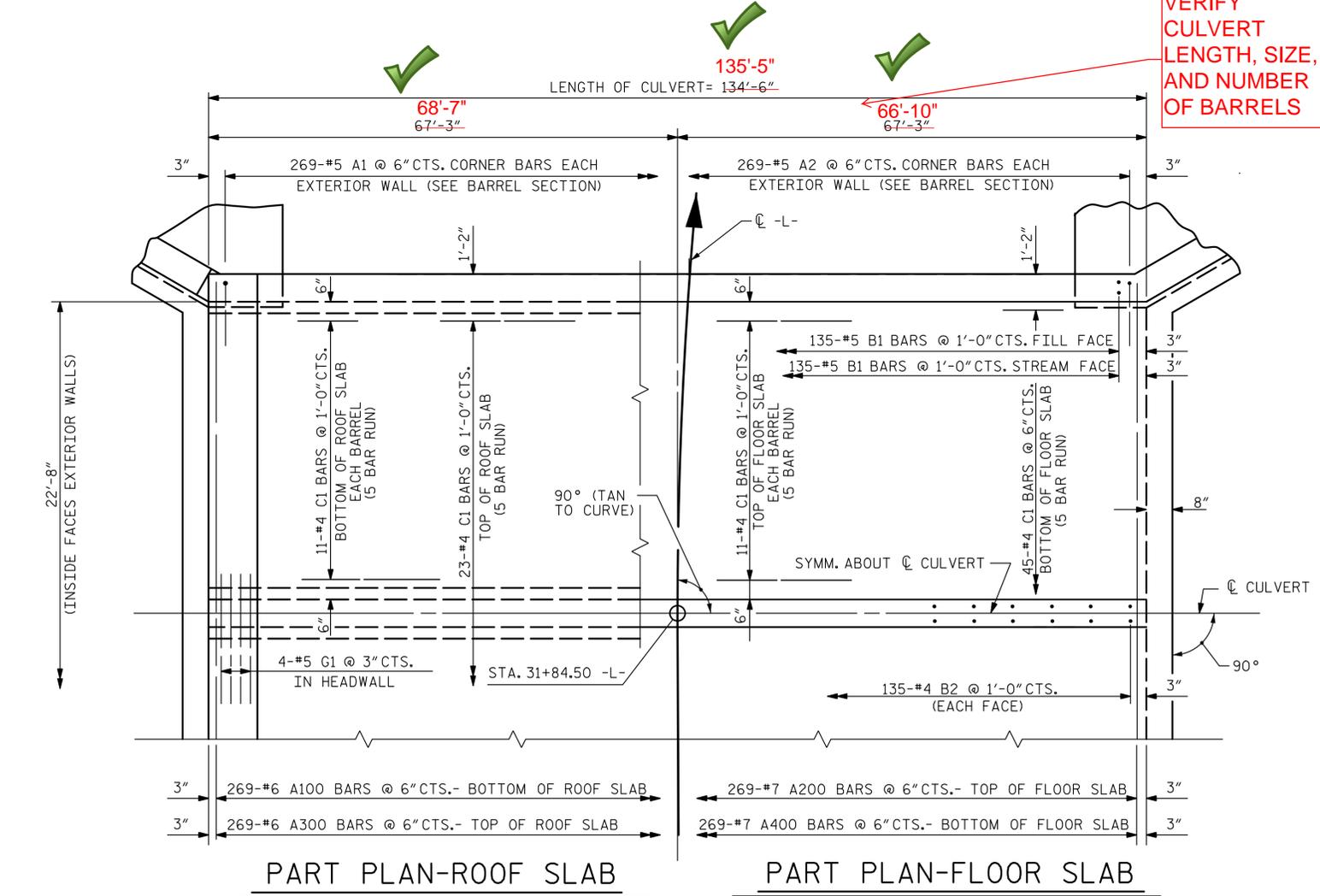
ASSEMBLED BY : _____	DATE : MAY 2015	SPECIAL
CHECKED BY : _____	DATE : MAY 2015	
DRAWN BY : _____	DATE : JULY, 1990	STANDARD
CHECKED BY : _____	DATE : JULY, 1990	

CULVERT AS-BUILT SECTION VIEW EXAMPLE



CULVERT SECTION NORMAL TO ROADWAY

END ELEVATION



CONNECTION OF WING FOOTING AND FLOOR SLAB WHEN SLAB IS THICKER THAN FOOTING

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

SEAL, SIGN, AND DATE

PROJECT NO. _____
 COUNTY _____
 STATION: _____
 SHEET 2 OF 5

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**BARREL STANDARD
 DOUBLE 11 FT. X 8 FT.
 CONCRETE BOX CULVERT
 90° SKEW**

ASSEMBLED BY : _____	DATE : _____	SPECIAL
CHECKED BY : _____	DATE : _____	
DRAWN BY : _____	DATE : MAY 1971	STANDARD
CHECKED BY : _____	DATE : JULY 1971	

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

CULVERT AS-BUILT ROADWAY PROFILE VIEW EXAMPLE

PROJECT REFERENCE NO.	SHEET NO.
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PIPE HYDRAULIC DATA
18" RCP-III STA 96+40 -L-

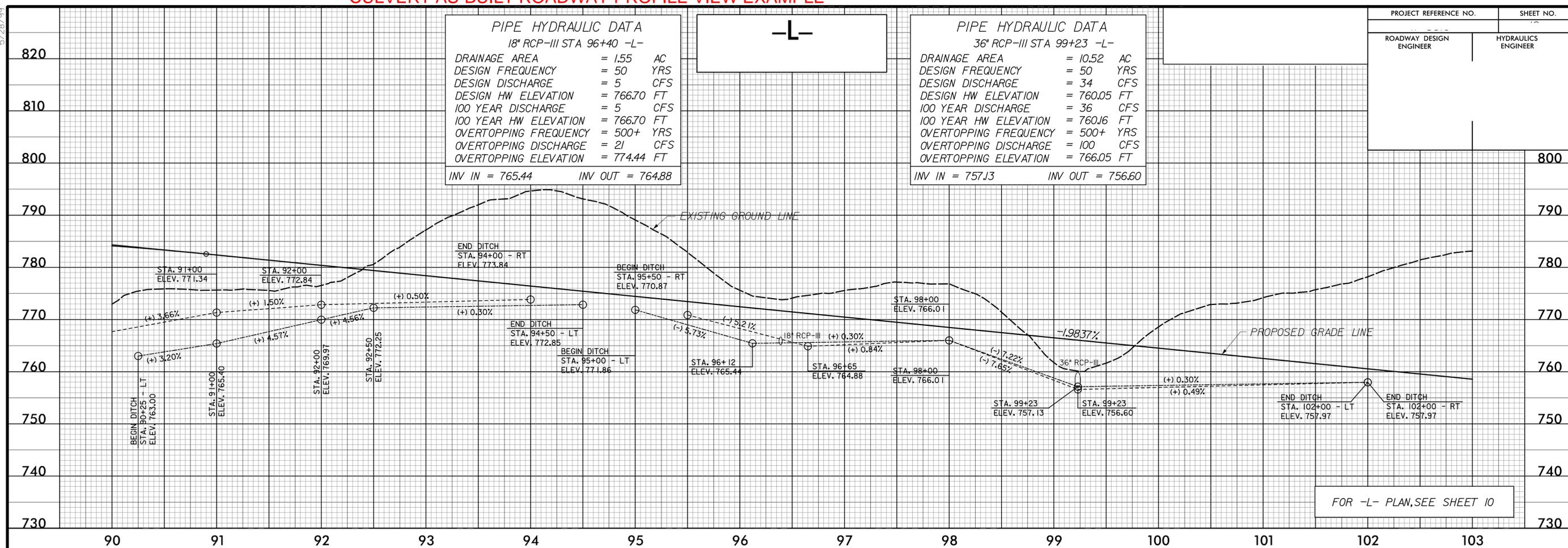
DRAINAGE AREA	= 1.55 AC
DESIGN FREQUENCY	= 50 YRS
DESIGN DISCHARGE	= 5 CFS
DESIGN HW ELEVATION	= 766.70 FT
100 YEAR DISCHARGE	= 5 CFS
100 YEAR HW ELEVATION	= 766.70 FT
OVERTOPPING FREQUENCY	= 500+ YRS
OVERTOPPING DISCHARGE	= 21 CFS
OVERTOPPING ELEVATION	= 774.44 FT

INV IN = 765.44 INV OUT = 764.88

PIPE HYDRAULIC DATA
36" RCP-III STA 99+23 -L-

DRAINAGE AREA	= 10.52 AC
DESIGN FREQUENCY	= 50 YRS
DESIGN DISCHARGE	= 34 CFS
DESIGN HW ELEVATION	= 760.05 FT
100 YEAR DISCHARGE	= 36 CFS
100 YEAR HW ELEVATION	= 760.16 FT
OVERTOPPING FREQUENCY	= 500+ YRS
OVERTOPPING DISCHARGE	= 100 CFS
OVERTOPPING ELEVATION	= 766.05 FT

INV IN = 757.13 INV OUT = 756.60



CULVERT HYDRAULIC DATA

DRAINAGE AREA	= 0.3 SQ MI
DESIGN DISCHARGE	= 500 CFS
DESIGN FREQUENCY	= 50 YRS
DESIGN HW ELEVATION	= 734.7 FT
BASE DISCHARGE	= 600 CFS
BASE HW ELEVATION	= 744.43 FT
OVERTOPPING FREQUENCY	= 500+ YRS
OVERTOPPING DISCHARGE	= 1400 CFS
OVERTOPPING ELEVATION	= 752.6 FT

VERIFY ROADWAY GRADE BUILT PER PLANS

PI = 107+95.00
EL = 748.75'
VC = 580'
K = 97
DS = 50 MPH

ADD SEAL AND NOTE "I HERBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS"

FOR -L- PLAN, SEE SHEET 11

5/28/99
5/23/2014 P:\AS-BUILT\6.-rdy.-p1.18.dgn