

TOTAL STRUCTURE QUANTITIES		
CULVERT EXCAVATION, STA. 105+70.00		L.S.
REMOVAL OF EXISTING STRUCTURE		L.S.
PHASE 2		
CLASS A CONCRETE		
BARREL @ 2.774 CY/FT	190.7	C.Y.
WING ETC.	34.1	C.Y.
TOTAL	224.8	C.Y.
REINFORCING STEEL		
BARREL	29,805	LBS.
WINGS ETC.	2,101	LBS.
TOTAL	31,906	LBS.
FOUNDATION CONDITIONING MAT'L	167	TONS
GEOTEXTILE FOR DRAINAGE	560	S.Y.
PHASE 3		
CLASS A CONCRETE		
BARREL @ 2.774 CY/FT	113.1	C.Y.
WING ETC.	31.7	C.Y.
TOTAL	144.8	C.Y.
REINFORCING STEEL		
BARREL	17,395	LBS.
WINGS ETC.	1,901	LBS.
TOTAL	19,296	LBS.
FOUNDATION CONDITIONING MAT'L	116	TONS
GEOTEXTILE FOR DRAINAGE	393	S.Y.

BAR SIZE	SPLICE LENGTH
#4	1'-9"
#5	2'-2"
#6	2'-9"
#7	3'-9"
#8	4'-11"

FA. PROJECT NO. STPDA-0505(29)

**NOTES**

ASSUMED LIVE LOAD \_\_\_\_\_ HL-93 OR ALTERNATE LOADING.

DESIGN FILL \_\_\_\_\_ 4'-6" MAX, 2'-0" MIN.

FOR OTHER DESIGN DATA, SEE SHEET SN.

DESIGN PARAMETERS:  
MINIMUM ALLOWABLE SOIL BEARING PRESSURE = 2500 PSF  
SOIL DENSITY = 120 PCF  
COEFFICIENT OF FRICTION = 0.33  
PHI ANGLE FOR SOIL BACKFILL = 25°  
K<sub>a</sub> VALUE = 0.41  
K<sub>p</sub> VALUE = 2.46

MINIMUM CONCRETE COMPRESSIVE STRENGTH = 3,000 PSI  
ALL REINFORCING SHALL BE GRADE 60.

CONCRETE IN CULVERTS FOR EACH PHASE OF CONSTRUCTION TO BE POURED IN THE FOLLOWING ORDER:  
1. WING FOOTINGS AND FLOOR SLAB INCLUDING 3/2" OF ALL VERTICAL WALLS.  
2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

NO TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL EXCEPT AT THE PHASE LINE.

3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH NCDOT SPECIFICATIONS. THE CONTRACTOR SHALL CHECK THE LENGTH OF BOX CULVERT BEFORE STAKING IT OUT TO CONFIRM IT IS ADEQUATE TO RETAIN FILL.

DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING WALL SHEETS.

AT THE CONTRACTOR'S OPTION HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE THE 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.

EXCAVATION OF THE SUBGRADE MATERIAL MAY BE SIMILAR TO ROCK EXCAVATION DUE TO THE HARDNESS OF THE MATERIAL. HOWEVER, AS SOON AS THE MATERIAL GETS WET, IT BECOMES VERY UNSTABLE AND SOFT, WHICH IS UNSUITABLE FOR FOUNDATION SUPPORT. THE CONTRACTOR MAY PREVENT WATER INTRUSION FROM IMPACTING THE FOUNDATION SUBGRADE SURFACE WITH A MUD-MAT BEING PLACED IMMEDIATELY UPON COMPLETION OF FOUNDATION EXCAVATION. MUD-MAT TO EXTEND 10-12 FEET BELOW LAND SURFACE AS INDICATED IN AMENDMENT TO GEOTECH REPORT DATED NOVEMBER 4, 2010. NO SEPARATE PAYMENT WILL BE MADE FOR MUD-MAT OR FOR REMOVING AND REPLACING SUBGRADE MATERIAL THAT WAS ALLOWED TO GET WET. PAYMENT IS INCLUDED IN THE LUMP SUM PRICE FOR CULVERT EXCAVATION. CONTRACTOR SHALL SUBMIT METHOD AND SCHEDULE FOR PROTECTING THE SUBGRADE FOR REVIEW BEFORE CULVERT EXCAVATION SHALL START.

MATERIAL FOR MUD-MAT SHALL BE FLOWABLE FILL AND CONFORM TO SECTION 1000-6 OF THE STANDARD SPECIFICATION.

BENEATH THE CULVERT AND WINGWALL FOOTINGS, A MINIMUM OF 1'-0" OF STONE SHALL BE PLACED AND WRAPPED IN ENGINEERING FABRIC AS ILLUSTRATED IN THE BEDDING DETAIL. THE FABRIC SHALL HAVE A MINIMUM 3'-0" LAP ON TOP AND A MINIMUM OF 2'-0" OVERLAP ON THE SIDES BETWEEN ADJACENT SECTIONS.

FOR FURTHER INFORMATION, REFERENCE GEOTECHNICAL REPORT BY CATLIN ENGINEERS AND SCIENTISTS DATED DECEMBER 2, 2008 AND AMENDMENT DATED NOVEMBER 4, 2010.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS; FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 IN SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 IN 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 OF THE SAMPLE PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS.

AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE AND NUMBER OF BARRELS AS USED ON THE CAST-IN-PLACE DESIGN.

FOR EROSION CONTROL PLAN, SEE ROADWAY EROSION CONTROL SHEET(S).

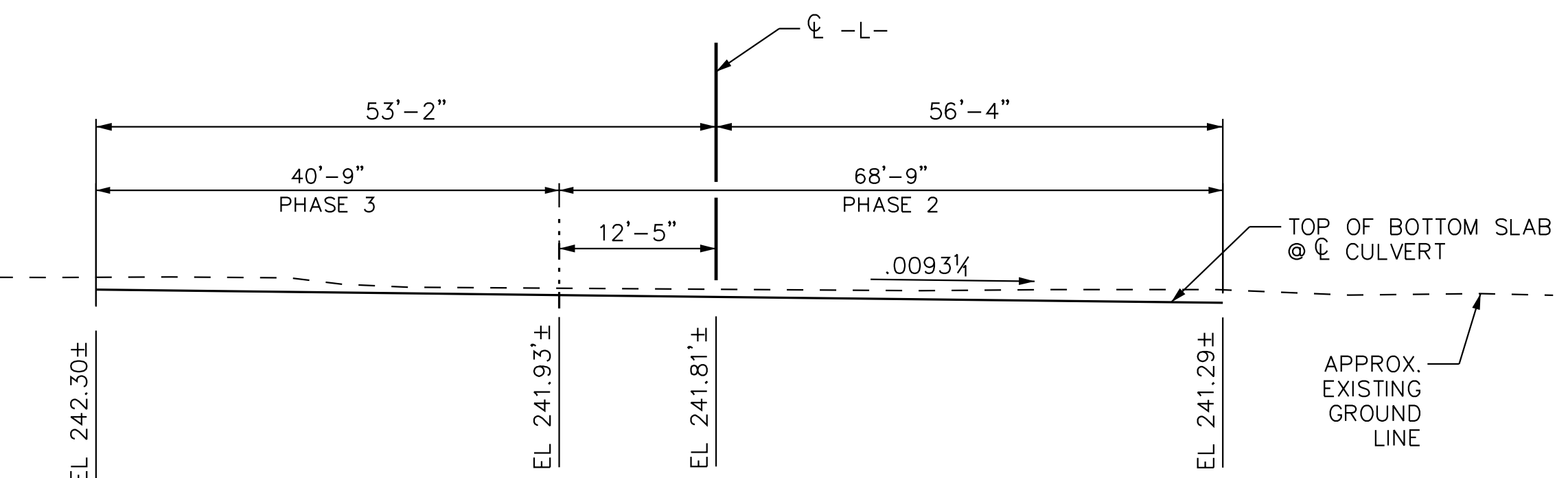
FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

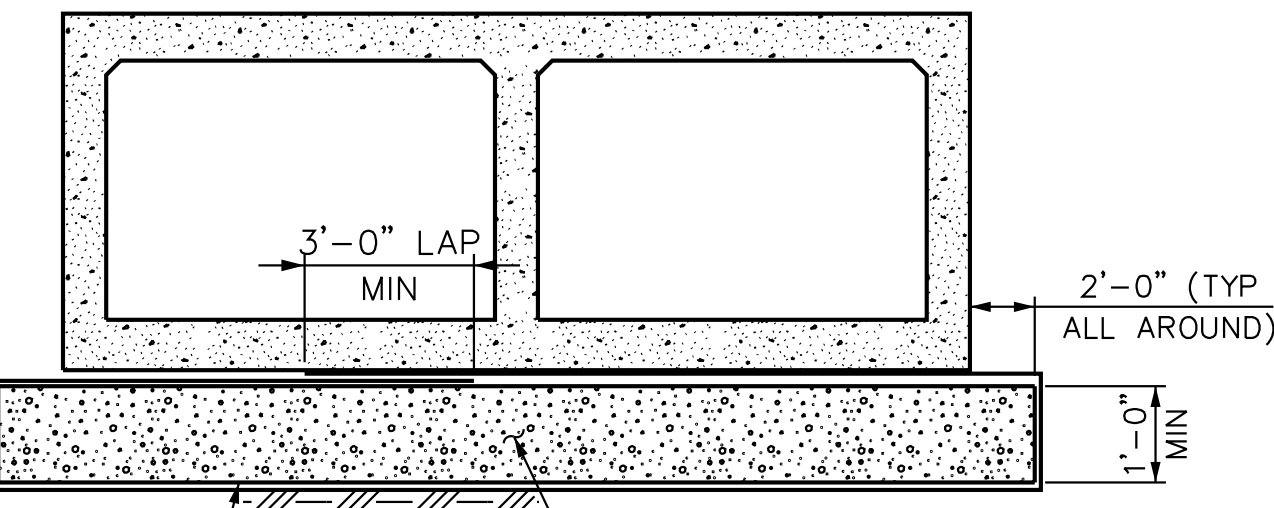
FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

**LOCATION SKETCH**

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS. ALL EXISTING UTILITY LOCATIONS SHALL BE FIELD VERIFIED.



**PROFILE ALONG CULVERT**



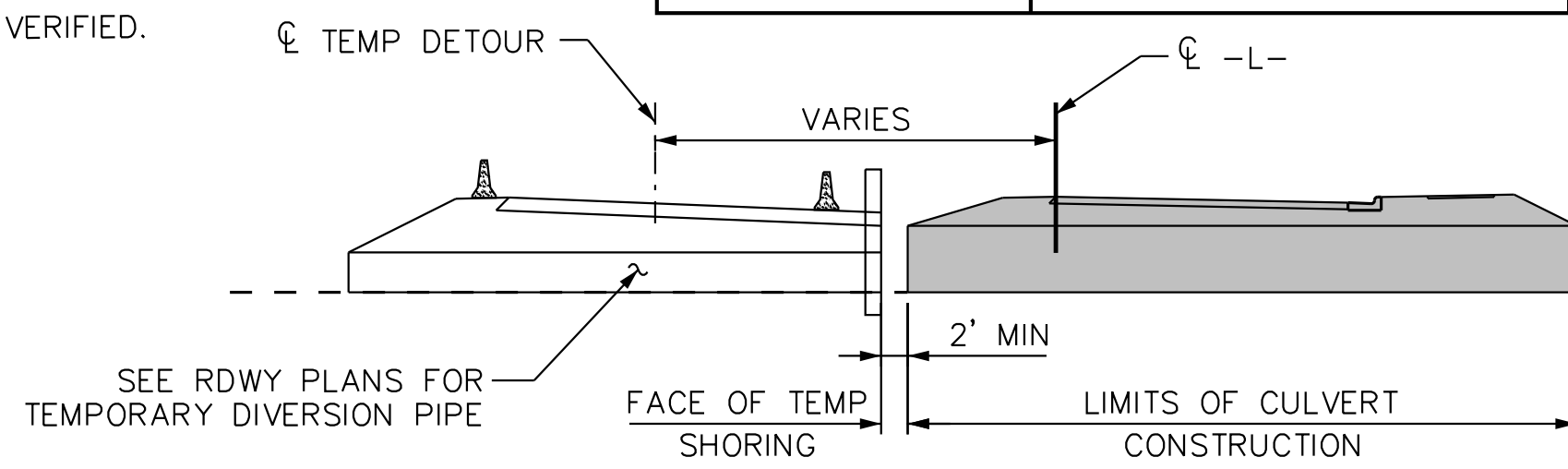
**BEDDING DETAIL**

**HYDRAULIC DATA**

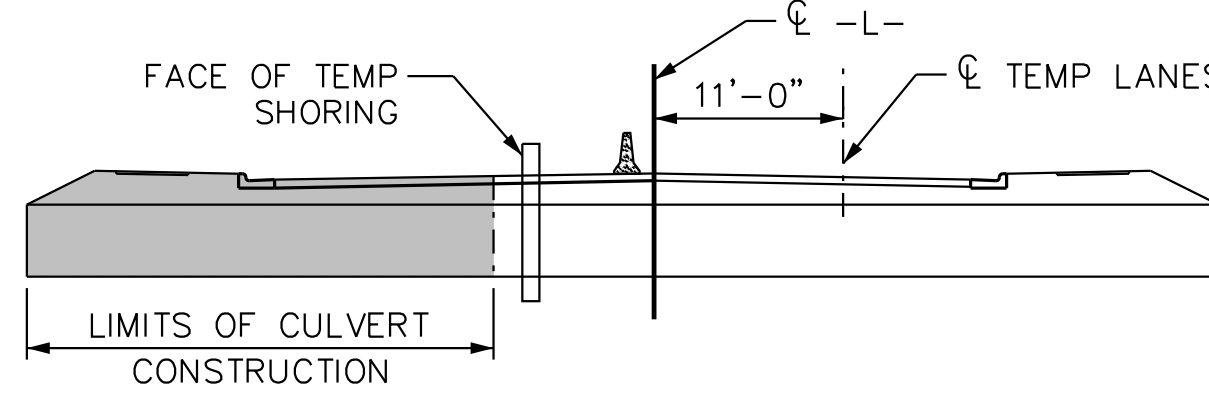
DESIGN DISCHARGE: 900 cfs  
FREQUENCY OF DESIGN FLOOD: 50 yr  
DESIGN HIGH WATER ELEVATION: 250.4 ft  
DRAINAGE AREA: 0.62 sq. mi  
BASIC DISCHARGE (Q100): 1000 cfs  
BASIC HIGH WATER ELEVATION: 250.9 ft

**OVERTOPPING FLOOD DATA**

OVERTOPPING DISCHARGE: > 1265 cfs  
FREQUENCY OF OVERTOPPING FLOOD: > 100 YEAR EVENT  
OVERTOPPING FLOOD ELEVATION: > 252.4 ft



**PHASE 2 - CONSTRUCTION**



**PHASE 3 - CONSTRUCTION**

**NOTES CONTINUED**

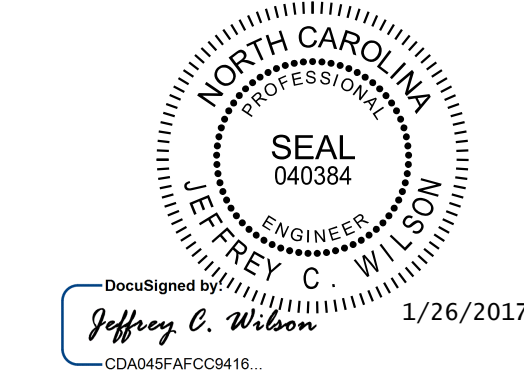
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES WILL BE PAID FOR BY THE CONTRACTOR.

FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.

THE EXISTING STRUCTURE CONSISTING OF 1 10'x6' RCBB SHALL BE REMOVED.



**Kimley-Horn**

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PROJECT NO. EB-4707B  
DURHAM COUNTY  
STATION: 105+70.00 -L-

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**DOUBLE 10' x 7'  
CONCRETE BOX CULVERT  
53° SKEW**

**GENERAL DRAWING**

REVISIONS					SHEET NO. C1
NO.	BY	DATE	NO.	BY	
1			3		TOTAL SHEETS 24
2			4		

DRAWN BY: JIK DATE: 1/17  
CHECKED BY: DJW DATE: 1/17