Prestressed Concrete Bridge Design Seminar

Atlanta, GA – October 3, 2019

5. Design Concepts: Draping, Debonding, Lateral Stability

Full Length Debonding of Strands

To allow casting of prestressed girders, box beams, or cored slabs with different strand patterns in the same bed, full length debonding of unneeded strands can be used

NCDOT includes this in standard plans for cored slabs and box beams

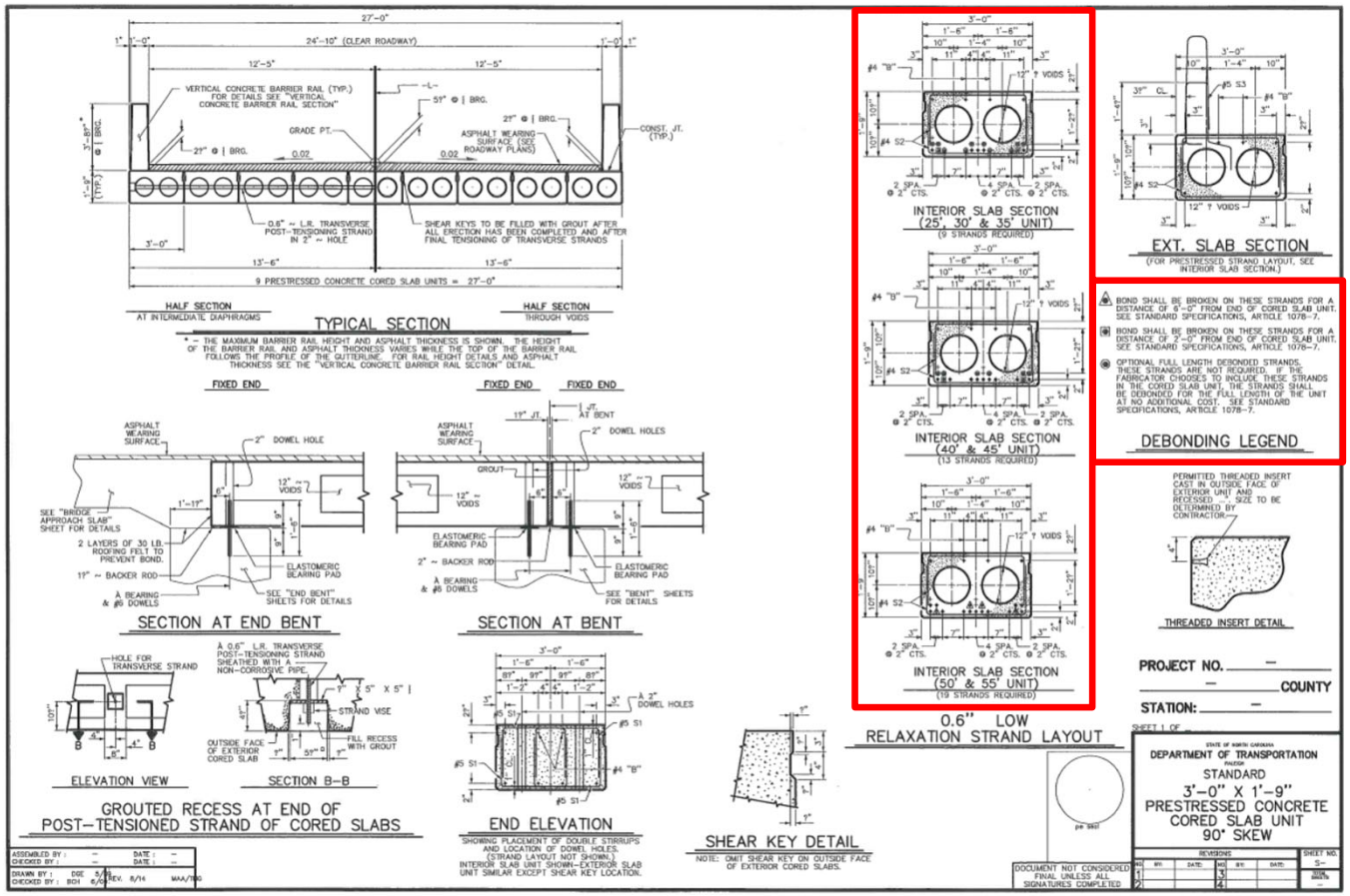
- **Note allowing full length debonding appears on plans so fabricators can bid project this way**
- **Max. no. of full length debonded strands is 10**

NCDOT has also approved this practice for other sections

- **Savings are only available to the DOT if a note appears on plans so project can be bid this way**

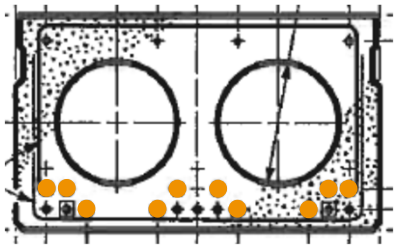
Full Length Debonding of Strands

NCDOT Cored Slab Standards



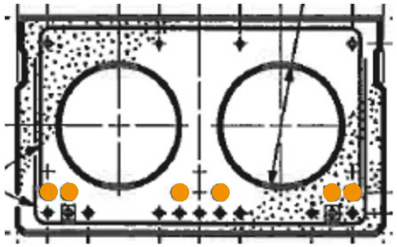
Full Length Debonding of Strands

NCDOT Cored Slab Standards



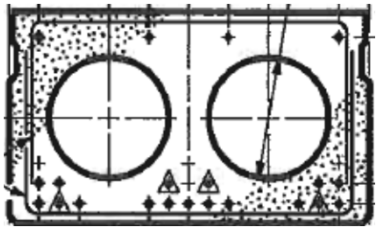
INTERIOR SLAB SECTION
(25', 30' & 35' UNIT)
(9 STRANDS REQUIRED)

10 STRANDS FULLY DEBONDED



INTERIOR SLAB SECTION
(40' & 45' UNIT)
(13 STRANDS REQUIRED)

6 STRANDS FULLY DEBONDED



INTERIOR SLAB SECTION
(50' & 55' UNIT)
(19 STRANDS REQUIRED)

BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 6'–0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078–7.

BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 2'–0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078–7.

OPTIONAL FULL LENGTH DEBONDED STRANDS. THESE STRANDS ARE NOT REQUIRED. IF THE FABRICATOR CHOOSES TO INCLUDE THESE STRANDS IN THE CORED SLAB UNIT, THE STRANDS SHALL BE DEBONDED FOR THE FULL LENGTH OF THE UNIT AT NO ADDITIONAL COST. SEE STANDARD SPECIFICATIONS, ARTICLE 1078–7.

DEBONDING LEGEND

SHEET 1 OF

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3'–0" X 1'–9"
PRESTRESSED CONCRETE
CORED SLAB UNIT
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S–
1			3			TOTAL SHEETS
2			4			–

Effect of Full Length Debonding of Strands

Full length debonding effectively places a void in the member cross section

- **Effect on section properties was evaluated**
- **18 in. cored slab, Type III girder, Mod BT-72 girder**
- **Looked at 10 strands and 4 or 6 strands debonded to give a range of results**
- **Composite section properties were also evaluated using 6 ft and 10 ft deck width**

Effect of Full Length Debonding of Strands

Change (%) from gross section properties to section with voids

Type of Girder	No. Strands	Area	y_b	y_t	I_{xx}	S_b	S_t
Type III	10	-1.4%	0.4%	-0.3%	-1.8%	-2.2%	-1.5%
	4	-0.6%	0.4%	-0.3%	-1.2%	-1.6%	-0.8%
Mod BT-72	10	-0.9%	0.8%	-0.9%	-2.8%	-3.6%	-2.0%
	4	-0.4%	0.3%	-0.3%	-1.1%	-1.4%	-0.8%
18" CS x 3 ft	10	-1.6%	1.0%	-1.0%	-3.3%	-4.3%	-2.2%
	6	-1.0%	0.5%	-0.5%	-1.4%	-2.0%	-0.9%

Changes for composite section properties were very similar and always equal or less (except for y_t)

Changes appear to be minor