

FULL-LENGTH DEBONDING OF PRETENSIONED STRANDS

PROPOSED NOTES FOR GENERAL NOTES AND PLAN SHEETS

Existing General Note for Cored Slabs (and Box Beams)

The following note appears in the strand debonding legend on current NCDOT standard cored slab drawings which show full length debonded strands (Std. No. 24PCS4_39_90S is shown). A similar note appears on current standard box beam drawings.

- 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

Proposed General Note for Girders

The following standard girder sheet note is proposed to allow a girder fabricator the option to add a limited number of full-length debonded strands to a girder. The number of strands indicated is not based on analysis, but rather on the maximum number of full-length debonded strands currently shown on NCDOT cored slab standards. This note would allow full-length debonded strands where they are not shown in the plans and would not require the designer to determine where they may be required and to show them in the plans. This also allows girders from different projects to be combined in a bed where this would be beneficial. The note and a form of the preceding discussion should be added to the NCDOT *Structure Design Manual*. It is recommended that this approach be encouraged, where the girder fabricator determines if and when full length debonded strands should be used, rather than requiring the Engineer to make that determination. See also discussion proposed to be added to *Structure Design Manual* that is presented below.

GIRDER FABRICATOR HAS THE OPTION, AT NO ADDITIONAL COST TO THE DEPARTMENT, TO ADD UP TO 10 FULL LENGTH DEBONDED STRANDS IN A GIRDER TO ALLOW GIRDERS WITH DIFFERENT STRAND PATTERNS TO BE FABRICATED IN THE BED AT THE SAME TIME. THE GIRDER DESIGN IS CONSIDERED TO BE NOT AFFECTED BY ADDING THESE STRANDS WHICH WILL BE UNTENSIONED AND UNBONDED AFTER STRANDS ARE RELEASED. ADDED FULL LENGTH DEBONDED STRANDS SHALL BE SEALED AT EACH END OF THE GIRDER IN THE SAME MANNER AS PARTIAL LENGTH DEBONDED STRANDS. ADDED STRANDS SHALL BE SHOWN ON GIRDER SHOP DRAWING SUBMITTAL. SEE STANDARD SPECIFICATIONS ARTICLE 1078-7.

Proposed General Note for Girders when Engineer Identifies Full Length Debonded Strand Locations

Proposed note for standard girder sheet for strand debonding legend when full-length debonded strands are indicated on plans (to be added to *Structure Design Manual* – see below). This note is based on the note on the NCDOT standard cored slab drawings, with the only changes being replacing “cored slab” with “girder” and adding “TO THE DEPARTMENT” at end of 3rd sentence

OPTIONAL FULL LENGTH DEBONDED STRANDS.

THESE STRANDS ARE NOT REQUIRED. IF THE FABRICATOR CHOOSES TO INCLUDE THESE STRANDS IN THE GIRDER, THE STRANDS SHALL BE DEBONDED FOR THE FULL LENGTH OF THE GIRDER AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

PROPOSED MODIFICATIONS TO NCDOT *STRUCTURE DESIGN MANUAL*

In the proposed modifications to the Structure Design Manual that follow, added text is underlined.

6.3 PRESTRESSED CONCRETE GIRDERS

6.3.1 Design

Prestressed concrete girders shall be AASHTO Type II, Type III, Type IV, 63" (1600 mm) Modified Bulb Tee or 72" (1829 mm) Modified Bulb Tee, as shown in [Figures 6-66](#) and [6-67](#). Design for the pretensioning method of prestressing with strands as described below. In general, the buildup shall be neglected in the section properties for composite design. For approximate span length limits, see [Figure 11-3](#).

For continuous for live load deck slabs, use the same depth girders at continuous bent diaphragms.

Frequently, girders of the same size and similar length in the same bridge or within bridges of the same project require only slightly different number of strands. In this situation, consideration should be given to using the same number of strands for these girders.

For the use of prestressed concrete girders at Corrosive Sites, see Section 12-12.

We propose that text be added to the 3rd paragraph shown above (current paragraph is repeated below and added text is underlined) to provide the option for girder fabricators to use full length debonding.

Frequently, girders of the same size and similar length in the same bridge or within bridges of the same project require only slightly different number of strands. In this situation, consideration should be given to using the same number of strands for these girders. Girder fabricators may add up to 10 strands that are debonded for the full length of the girder to allow girders with different strand patterns to be fabricated in a prestressing bed at the same time. Provisions of *Standard Specifications* Article 1078-7 shall apply.

We propose that the following be added to the end of *Structure Design Manual* **Section 6.3.1.2 Prestressing Strands** which applies to girders.

Full Length Debonded Strands

The optional of adding full length debonded stands to girders allows girder fabricators to manufacture girders with different strand patterns in the bed at the same time. This technique improves the efficiency and economy of fabrication by reducing material waste and by shortening fabrication schedules.

When full length debonded strands are not shown on the girder drawings, place the following note on the plans which gives the girder fabricator the option to add a limited number of full-length debonded strands to a girder. This note allows full-length debonded strands where they are not shown in the plans and therefore does not require the designer to determine whether they may

be required and to show them on the plans. This note also allows girders from different projects to be combined in a bed where this would be beneficial. The maximum number of full-length debonded strands indicated in the note is not based on analysis, but rather on the maximum number of full-length debonded strands currently shown on NCDOT cored slab standards.

Girder fabricator may add up to 10 full length debonded strands in a girder to allow casting of girders with different strand patterns in the bed at the same time. The girder design is considered to be not affected by adding these strands which will be untensioned and unbonded after strands are released. Added full length debonded strands shall be sealed at each end of the girder in the same manner as partial length debonded strands. Added strands shall be shown on girder shop drawings and shall be provided at no additional cost to the Department. See Standard Specifications Article 1078-7.

If the Engineer shows full length debonded strands on plans to allow girders with different strand patterns to be fabricated in the bed at the same time, place the following note on the plans:

Optional full length debonded strands. These strands are not required. If the fabricator chooses to include these strands in the girder, the strands shall be debonded for the full length of the girder at no additional cost to the Department. See Standard Specifications Article 1078-7.

We propose that a note be added to the *Structure Design Manual* after the 3rd paragraph and note for cored slabs in **Section 6.4.1 Design** (repeated below) and for box beams in **Section 6.5.1 Design** with “cored slabs” replaced by “box beams.”

Where debonded strands are required, indicate the strands to be debonded on the standard drawing, as illustrated in [Figure 6-82](#). Place the following note on the plans:

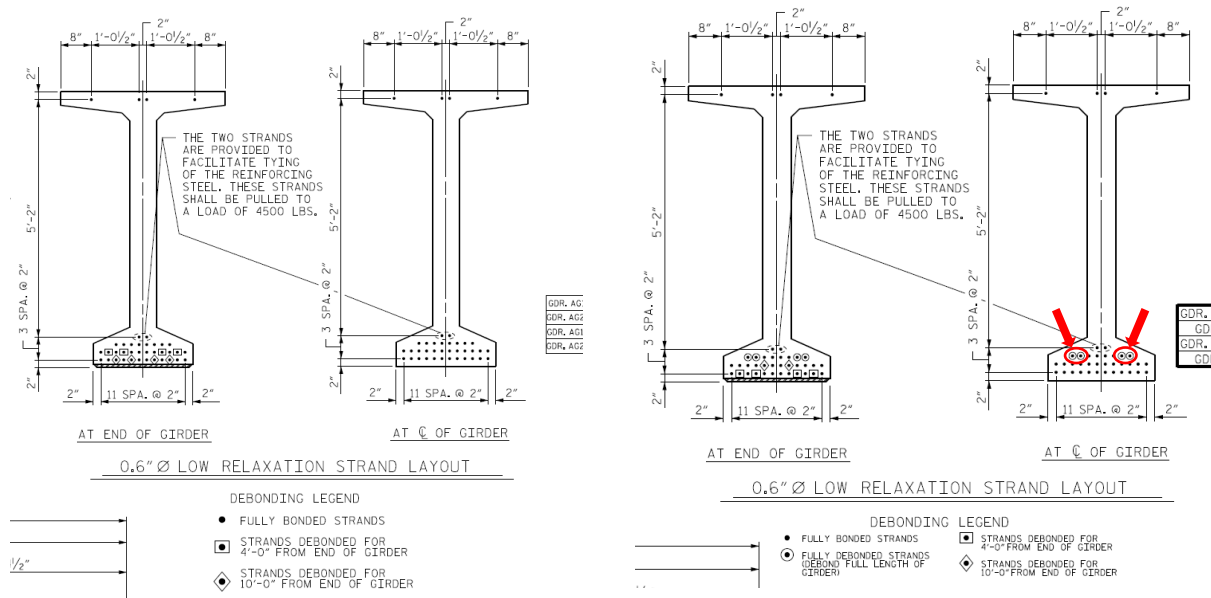
Bond shall be broken on these strands for a distance of _____ feet (meters) from end of cored slab unit. See Standard Specifications Article 1078-7.

Optional full length debonded strands are shown on the standard drawing to allow cored slabs with different strand patterns to be fabricated in a prestress bed at the same time.

We recommend that the Department consider adding language to the *Structure Design Manual* to limit the number and inform the placement of full length debonded strands.

EXAMPLE DETAILS

The following is an example of a project for which full length debonded strands are shown in the strand layout on the standard drawings. The note provided should have indicated that the fully debonded strands are optional (not required).



Girder Details for main span
All strands required

Girder Details for shorter 2nd Span
4 fewer strands required
4 optional locations marked for full-length debonding
Highlighted in section at CL of Girder

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
 CRAVEN COUNTY

LOCATION: US 70 (HAVELOCK BYPASS) FROM SOUTH OF CARTERET / CRAVEN COUNTY LINE TO SOUTH OF SR 1176, (CAROLINA PINES BLVD.)
TYPE OF WORK: GRADING, DRAINAGE, PAVING, WIDENING, CULVERTS AND STRUCTURES

NO.	DATE	BY	REVISION
N.C.			R-1015
34360.1.2		NHF-0070049	P.E.
34360.1.3		NHF-0070049	ENR. UTIL.
34360.1.4		NHF-0070049	CONST.