pulled to the same elongation as strands with no broken wires, but not on the same load. Theoretically, the elongation should be obtained with approximately 86% of the load required for whole strand because the effective cross-sectional area is reduced by about 14%. The permissible wire breaks reflect a reduction in tensioning force for a strand pattern of about ½%.

If a strand is stressed to the full required load and locked in placed, and at a later time, one wire has broken, it is not necessary to reconnect the tensioning device in order to reduce the load. However, if a broken wire found at a later time results in the maximum number of wire breaks to be exceeded, then the strand shall be removed and replaced. This is a dangerous process because a higher load typically is required to be placed on the strand in order to release the grip of the chuck. The Producer shall take appropriate safety measures whenever performing this operation.

(10) Strand Debonding. To reduce the potential for beam end cracking due to high internal stresses, the bottom (non-harped) strands may be detailed on the contract plans to be partially debonded. Debonding shall be achieved by wrapping the ends of the strands with sheathing. The sheathing shall be a flexible PVC closed, tubular type (i.e. without a slit along its length) a minimum 0.025 in. (25 mils) thick. The inside diameter of the sheathing shall be 0.025 to 0.14 inches (25 to 140 mils) greater than the outside diameter of the strand. After strands are fully tensioned, the sheathing ends shall be sealed by either tying with wire or using a suitable material, such as silicone sealant.

In order to measure the extent of debonding, strands shall be marked at a known distance from the end of the beam to measure the amount of retraction after cutting. Other methods to determine the extent of debonding may be considered with the approval of the BBS. Debonding measurements may be required by the Department if there is a concern.

The extent of debonding can be estimated based on the anticipated retraction of the debonded strands as a portion of the total net corrected elongation (e_{CN}). The portion is the ratio of the total length of debonded strand (including distance between end of beam and anchorage) to the total bed length (i.e., strand length between anchors).

(11) Self-Stressing Forms. The shortening of self-stressing forms during strand tensioning operations requires a correction be made to the elongation and pulling force and is considered a Group I loss (see Section 2.2.9). An identical correction is made for each strand. However, once final tensioning is completed for all strands in a beam, the initial strands are “under-pulled” and the final strands are “over-pulled”. This is because the bed shortens with each successive single strand tensioning operation. The average correction for all the under-pulled and over-pulled strands is approximately zero for form shortening after all the strands have been tensioned.

Producers shall annually determine the calibration factor between predicted (theoretical) and actual form shortening for a range of strand patterns according to the calibration procedure outlined in Appendix A and the Departmental spreadsheet for calibration of beds with self-stressing forms. The QC Manager shall sign and submit the calibration report from the spreadsheet to the District or Bureau responsible for inspection.