

# New Carbon Fiber Anchor to Secure Carbon Fiber-Reinforced Polymer (CFRP) Flexural Strengthening Sheets

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***Beam 1 Setup before Testing***

## Introduction

Externally bonded fiber-reinforced polymer (FRP) is commonly used to strengthen concrete structures, but

research is needed to ensure that optimal design practices are implemented. This study utilized externally bonded carbon FRP (CFRP) to strengthen bridge-scale reinforced concrete T-beams. In addition to flexural CFRP, new CFRP splay anchors were used as an anchorage system on four beams to qualify anchor performance. The anchorage system was added to prevent premature failure due to debonding and allow the CFRP to reach its full capacity with a rupture failure.

## Project Description

This experimental program designed, built, and tested six T-beams in four-point bending. The first beam was tested as a control specimen, while the second beam was strengthened with one sheet of CFRP V-Wrap C200HM with no anchors. The third beam was strengthened similarly to the second beam with CFRP splay anchors added to each shear span. The fourth beam was strengthened with a CFRP sheet and four splay anchors per shear span, while the fifth beam contained five splay anchors per shear span. The sixth beam was strengthened with five anchors per shear span with smaller splay areas for each anchor.

## Project Results

Test results showed that the use of six anchors per shear span led to full flexural capacity by attaining CFRP rupture. However, although the use of four and five anchors per shear span significantly delayed the debonding, the CFRP sheets debonded at loads close to the load needed to rupture the CFRP sheet when six anchors were used.



**Beam 1 after Testing**

## Project Information

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