

**GUE-70-0994R
3001385**

**Identification and Inspection
of Fatigue Cracks
in the Built-up Welded Beams**

**11-28-2000
By: Albert Abel
Bridge Specialist II**

BRIDGE DATA

TYPE: Single Span Composite welded built-up steel beam.
SPAN: 96'-6" c/c bearings
Substructure: Full height concrete abutments on spread footings
Roadway: Varies 80'-5" average f/f rails
Deck: 9.25" concrete
Wearing Surface: .75" monolithic concrete and 1.75" SDC (placed 1990)
Skew: 3deg. 19 min. 19sec. right forward
Alignment: 2 deg curve and spiral
Design Loading: CF-2000(57)
Minimum Vertical Clearance: 16'-3" on I-77NB
Year Built: 1965 Proj. 312(63)

This structure carries east bound I-70 and ramps H and F over north bound I-77 and ramps F and D for a total of 4 lanes of traffic on the bridge and 4 lanes of traffic under. In 1990 new bridge rails, expansion joints, approach slabs and a SDC overlay were placed.

On June 27, 2000 during the annual inspection of the structure what appeared to be cracks were noticed in the webs of beams 4 and 5 near mid span at the top flange welds over the X bracing. The next day a close up inspection using Dye Penetrant was used to confirm the existence of the cracks.

After consultation between D-5 and the Office of Structural Engineering, it was decided that an depth inspection of suspected crack locations be performed to locate all existing cracks. After all the cracks are located the ends of the cracks would be drilled to try and stop any further propagation of the cracks. This work was performed by the D-5 Bridge Inspectors starting November 6, 2000 and was completed November 17, 2000. The drilled cracks will be monitored on an annual cycle to determine if the drilling has stopped the cracks from growing. A total of 10 cracks were found. The cracks varied in length from 1" to 3.25".

- #1. 1.5" long crack, .75" hole drilled at ends.
- #2. 3" long crack, .75" hole drilled at ends.
- #3. 3.25" long crack, .75" holes drilled at ends.
- #4. 1.5" long crack, .75" holes drilled at ends.
- #5. 2" long crack, .75" holes drilled at ends.
- #6. 1" long crack, .75" holes drilled at ends.
- #7. 1" long crack detected on right side of the beam, this crack was not drilled.
- #8. 1.75" long crack, .75" holes drilled at ends.
- #9. 2" long crack, .75" holes drilled at ends.
- #10. 2" long crack, this crack was not drilled.

