GUE-70-0994R
3001385

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

Re-inspection

10-4 and 10-6-2011
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 in-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 in 2000. The cracks varied in length from 1" to 3.25".

In August of 2007 a re-inspection of the cracks was done using dye penetrant to look for growth of the existing cracks and to find any newly formed cracks.

RE-INSPECTION
October 4 and 6, 2011

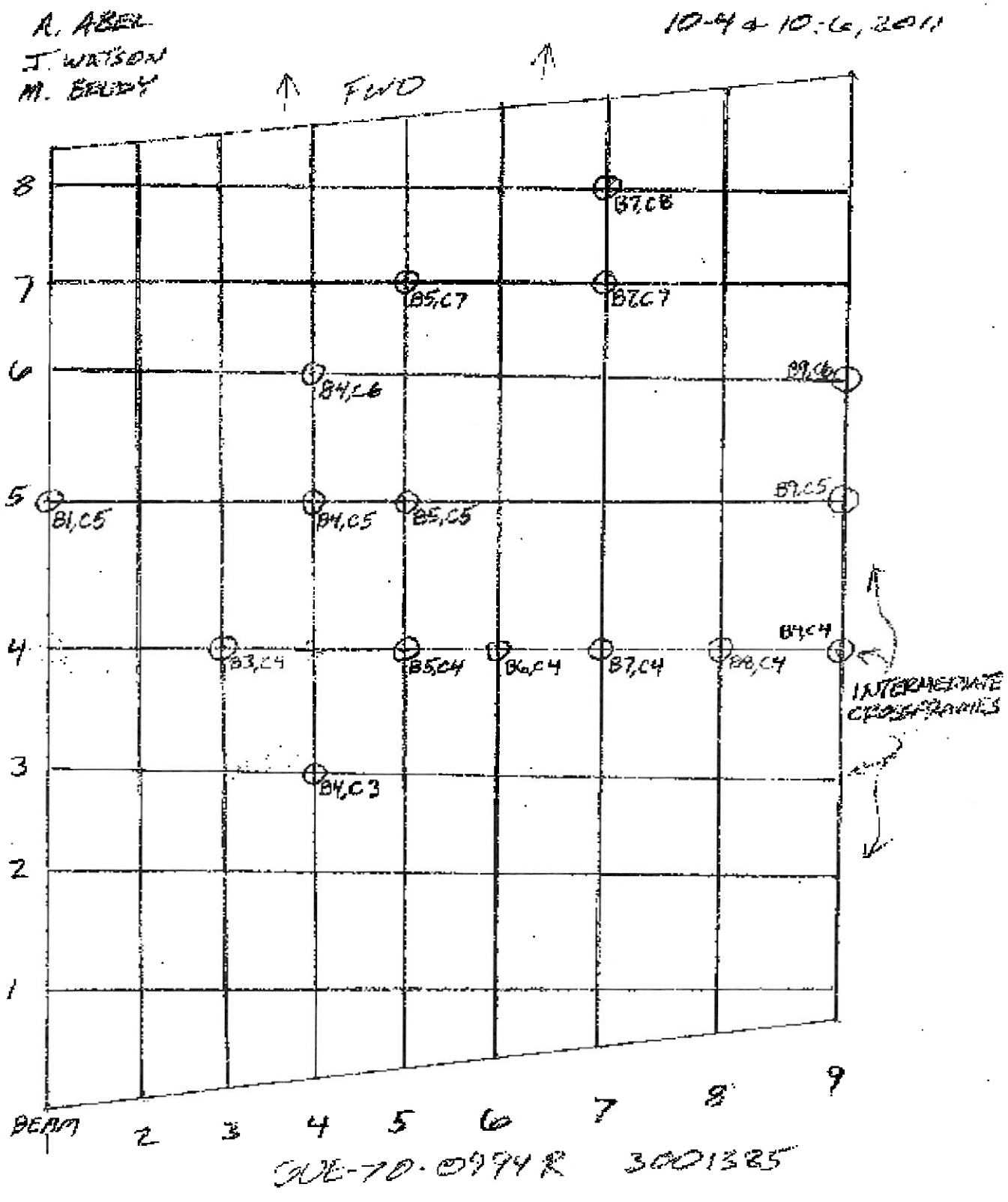
By: Albert Abel
Matt Beedy(in bucket truck)
Jeff Watson

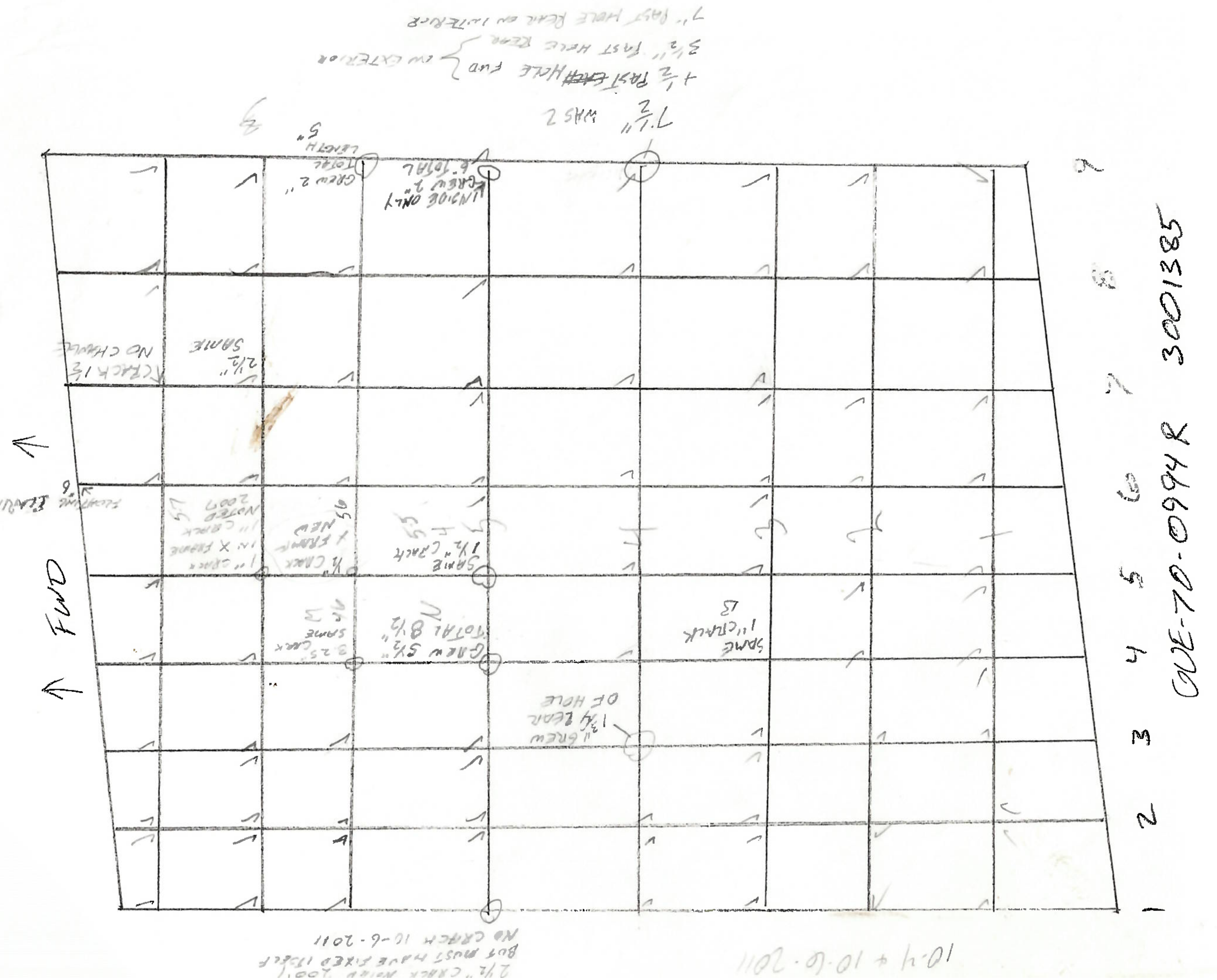
FOR CRACK LOCATIONS SEE SKETCH BELOW

Legend: B = beam, C = Intermediate crossframe from rear abutment

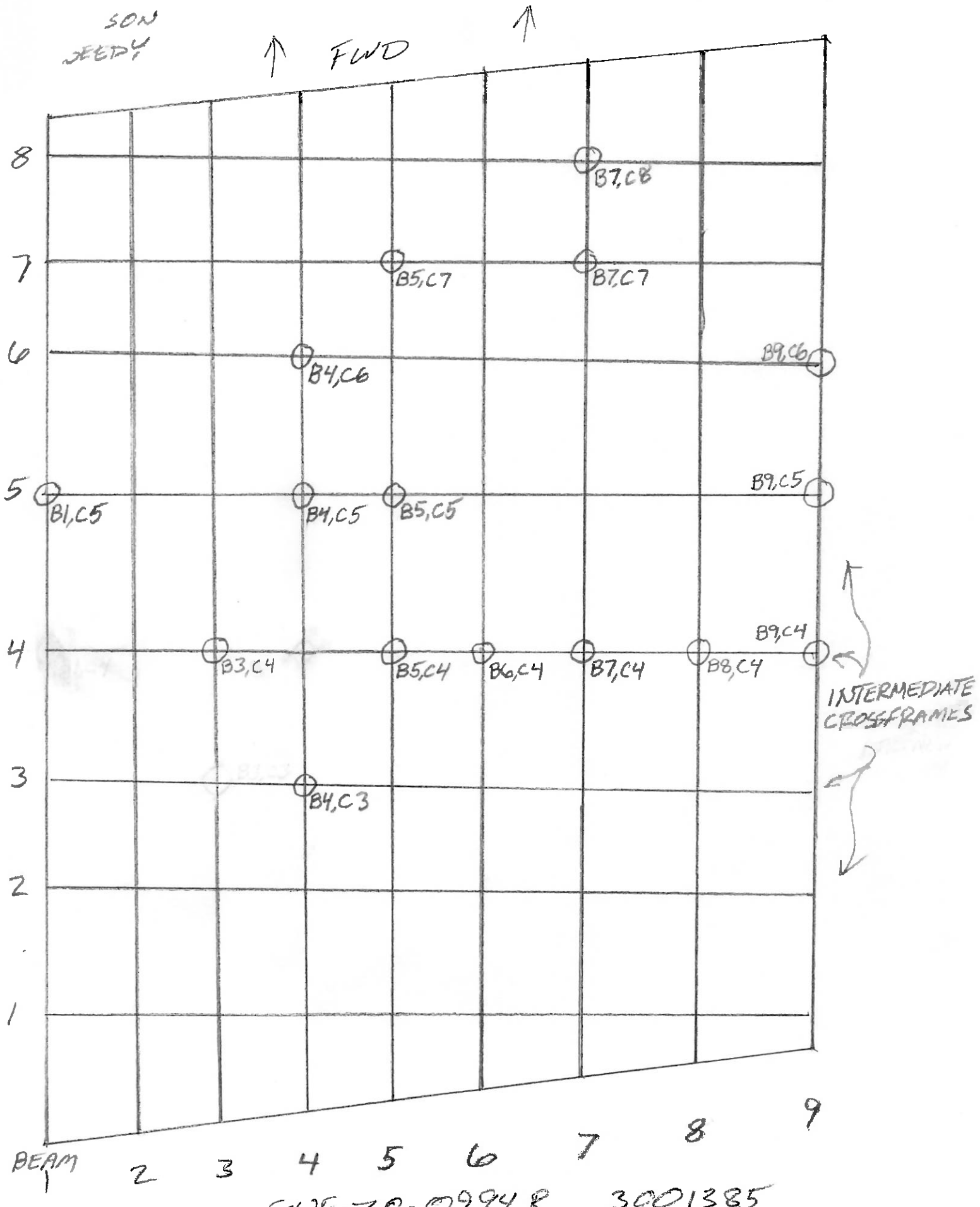
B1,C5 1.5" long crack on the right interior face of beam but no crack on the exterior side of the beam, no change.
B3,C4 The crack grew 1.75" longer rear of drilled hole and is now a total of 2.25"
B4,C3 1" crack, no change.
B4,C5 The crack grew 5.5" longer past the drilled holes and is now 8.5" long.
B4,C6 3.25" long crack, no change.
B5,C4 Possible crack, no change.
B5,C5 1.5" crack, no change.
B5,C6 New 0.5" crack in crossframe weld.
B5,C7 1" long crack, no change.
B6,C4 2" long crack, no change.
B7,C4 1" long crack, no change.
B7,C7 2.5" long crack, no change.
B7,C8 1.5" long crack, no change.
B8,C4 1.75" long crack, no change.
B9,C4 The crack grew 5.5" longer past drilled holes and in now a total of 7.5" long.
B9,C5 Crack showing on the interior side of beam only, has grew 2" longer and is now a total of 6" long.
B9,C6 The crack grew 2" longer and is now a total of 5" long.

CRACK LOCATION SKETCH




FWD
GUE-TD-0994R 3001385
7.1" WHS 2
+1/2 FAST HOLE FWD } ON EXTERIOR
5 1/2" FAST HOLE REAR
7" FAST HOLE REAR ON INTERIOR
10-4 + 10-6-2011
2 1/2" CRACK NOTED 2001
BUT MUST HAVE FIXED ITSELF
NO CRACK 10-6-2011

10-4 & 10-6, 2011



CUE-70-0994R 3001385

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)

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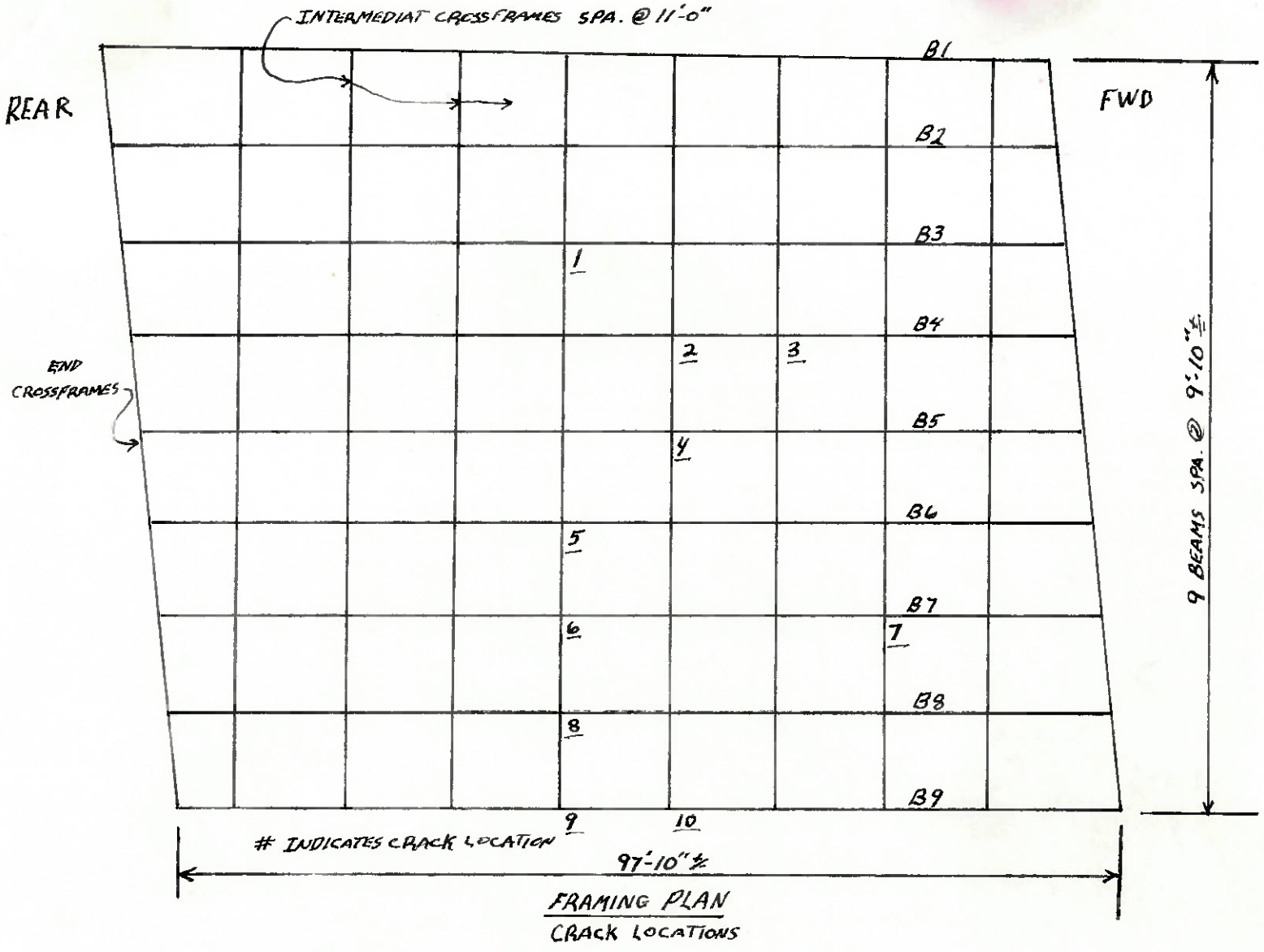
On June 27, 2000 during the annual inspection of the structure what appeared to be cracks were noticed in the webs of beams 4 and 5 near mid span at the top flange welds over the X bracing. The next day a close up inspection using Dye Penetrant was used to confirm the existence of the cracks.

After consultation between D-5 and the Office of Structural Engineering, it was decided that an in-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".

GUE-70-0994 R

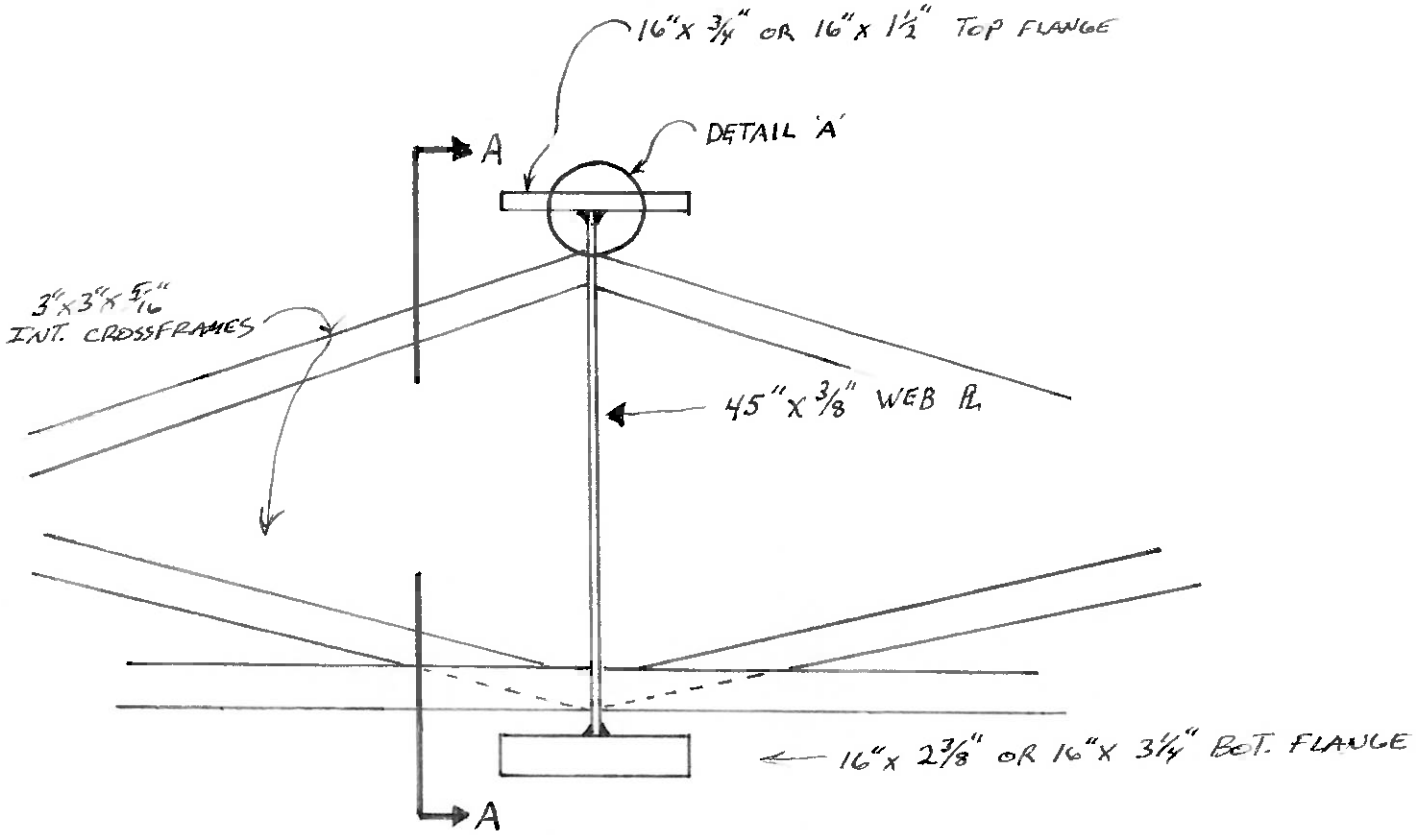


FRAMING PLAN
CRACK LOCATIONS

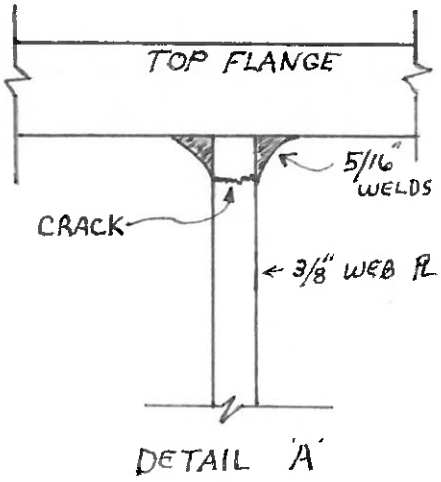
#1. 1.5" long crack, .75" hole drilled at ends.
#2. 3" long crack, .75" hole drilled at ends.
#3. 3.25" long crack, .75" holes drilled at ends.
#4. 1.5" long crack, .75" holes drilled at ends.
#5 2" long crack, .75" holes drilled at ends.
#6 1" long crack, .75" holes drilled at ends.
#7 1" long crack 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.

GUE-70-0994R

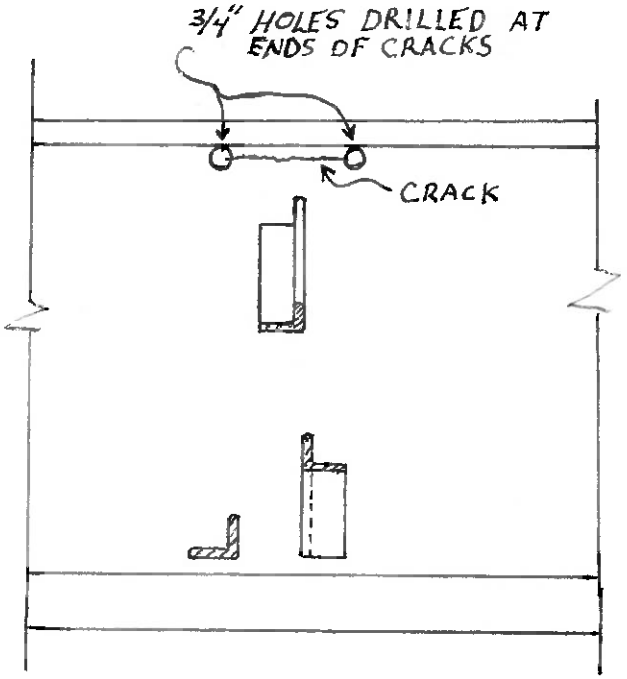
TYPICAL CRACK DETAILS



TYP. SECTION THRU BEAM



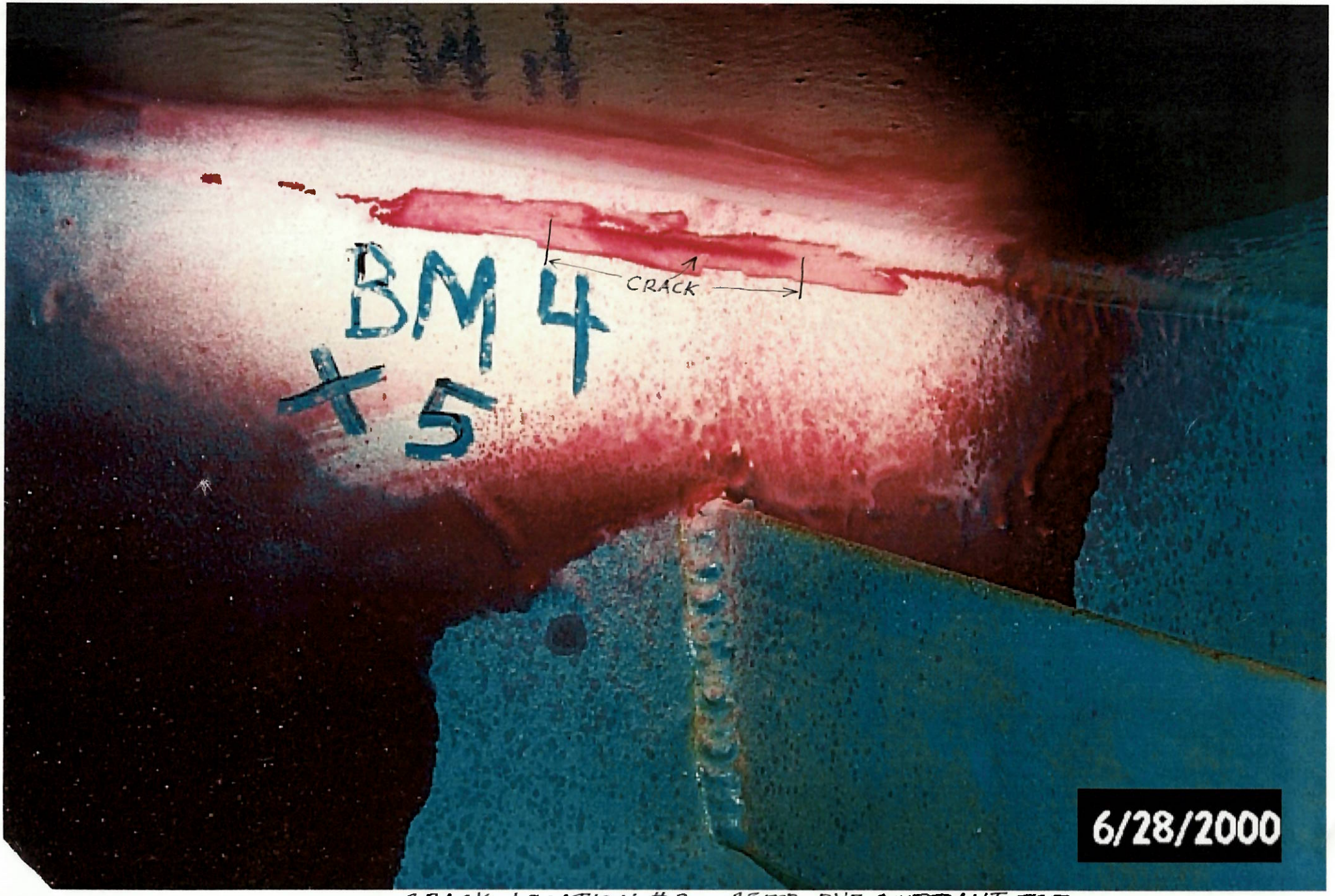
DETAIL 'A'



VIEW A-A

CRACK LOCATION #2

CRACK LOCATION # 2

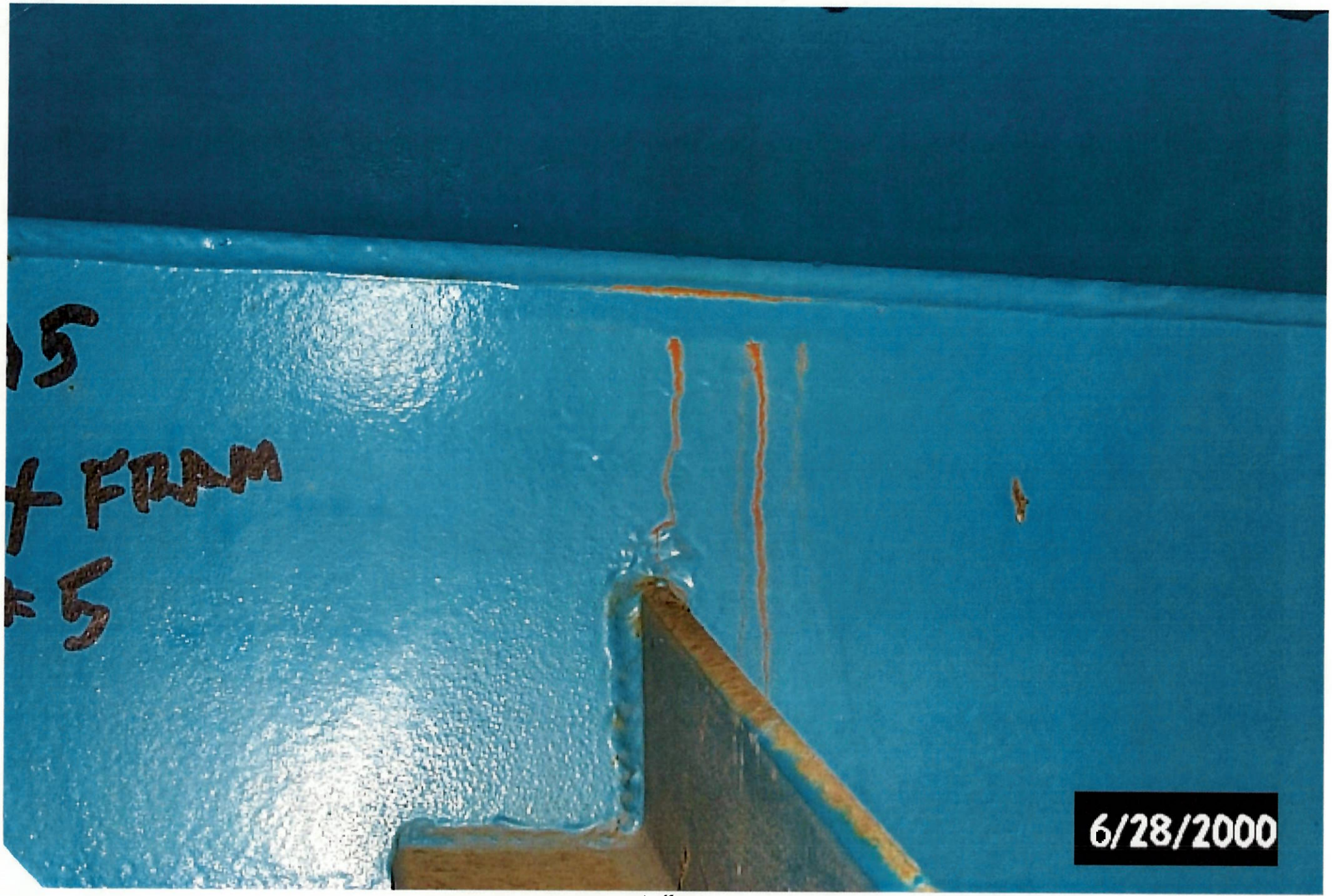


CRACK LOCATION #2 AFTER DYE PENETRANT TEST

CRACK LOCATION #2 WITH 3/4" HOLES DRILLED

CRACK LOCATION #3

CRACK LOCATION #3 AFTER 3/4" HOLES DRILLED



CRACK LOCATION #4

BM X #6

TYPICAL TEST LOCATION WITH NO CRACK

Ohio Department of Transportation
inter-office communication

TO: File GUE-70-0994R, 3001385

FROM: Albert Abel, Bridge Specialist II

SUBJECT: Crack inspection

DATE: 4-20-06

NOTE TO FILE:

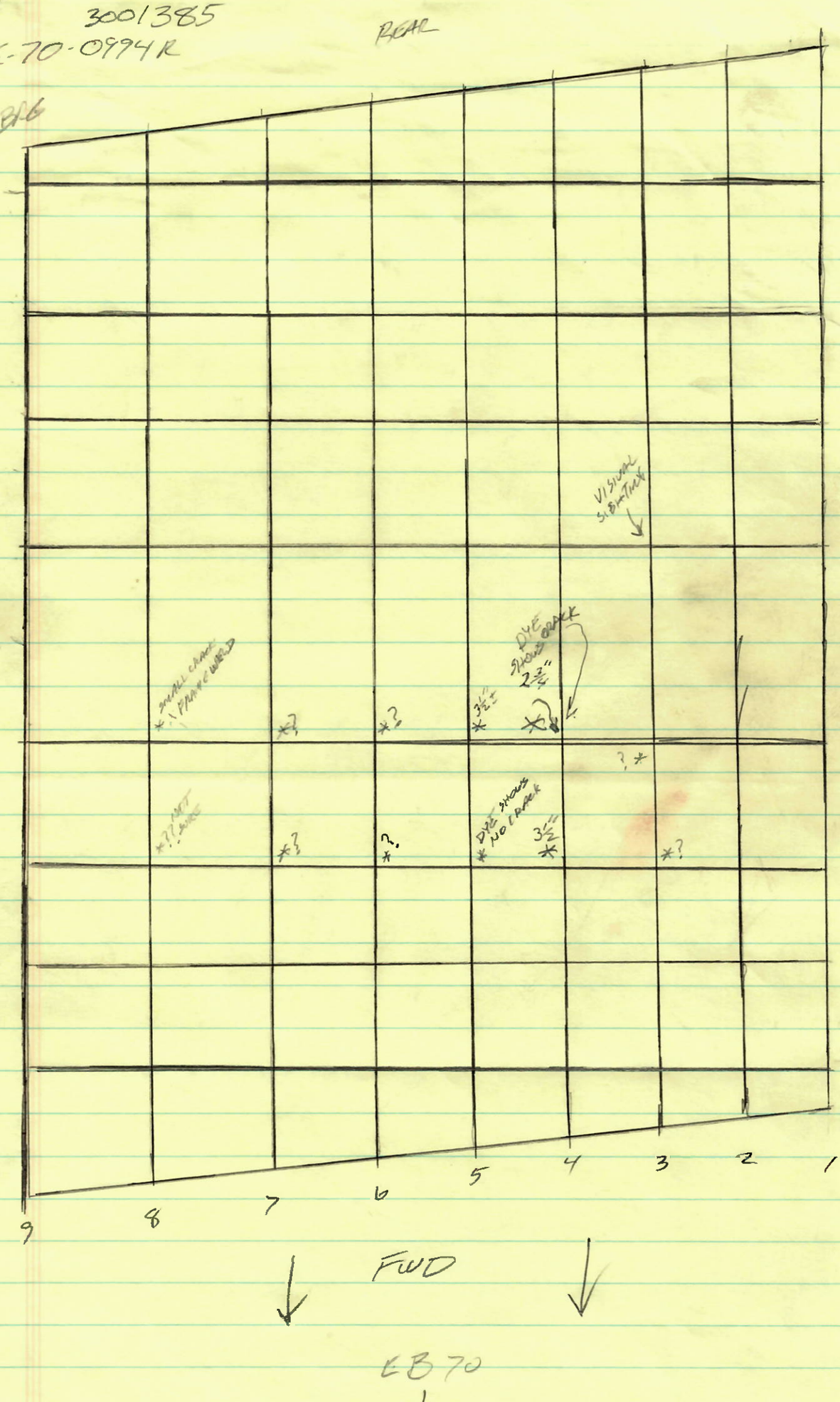
On 4-20-06 a re-inspection of the cracked girders was preformed. Dye penetrant was used to see if any further growth of the drilled cracks had occurred. No growth of the cracks was detected.

6-28-00

3001385

GVE-70-0994R

FIXED BIG

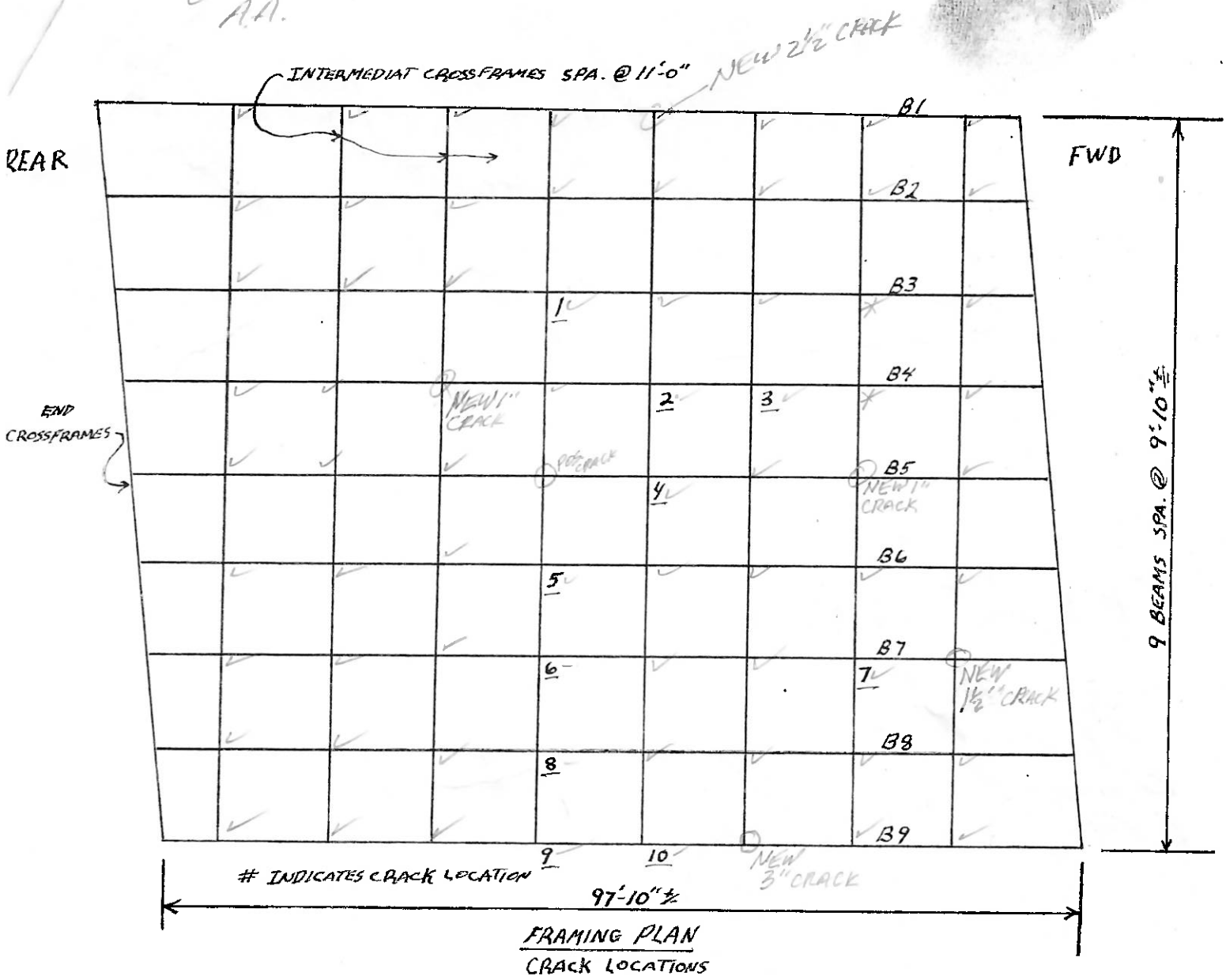


FWD

EB 70

8-2007
A.A.

GUE-70-0994 R



FRAMING PLAN
CRACK LOCATIONS

* - X-FRAME WAS TO CLOSE TO FLANGE TO CHECK - TRY NORTH FACE OF BEAMS NEXT TIME

#1. 1.5" long crack, .75" hole drilled at ends. NO CHANGE
#2. 3" long crack, .75" hole drilled at ends. NO CHANGE
#3. 3.25" long crack, .75" holes drilled at ends. NO CHANGE
#4. 1.5" long crack, .75" holes drilled at ends. NO CHANGE
#5 2" long crack, .75" holes drilled at ends. - POSSIBLE ½" CRACK PAST END HOLE RT SIDE OF WEB (NOT SURE)
#6 1" long crack, .75" holes drilled at ends. - ⅜" NEW CRACKS PAST HOLES
#7 1" long crack detected on right side of the beam, this crack was not drilled.. NOW 2½" LONG
#8 1.75" long crack, .75" holes drilled at ends. NO CHANGE
#9 2" long crack, .75" holes drilled at ends. NO CHANGE
#10 2" long crack, this crack was not drilled. - NOW 4" ± LONG

GUE-70-0994R
3001385

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

Re-inspection

8-29-2007
By: Albert Abel
Bridge Specialist II

BRIDGE DATA

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A total of 10 cracks were found. The cracks varied in length from 1" to 3.25".

RE-INSPECTION
8-14 and 8-23- 2007

A re-inspection of the cracks was done using dye penetrant to look for growth of the existing cracks and to find any newly formed cracks.

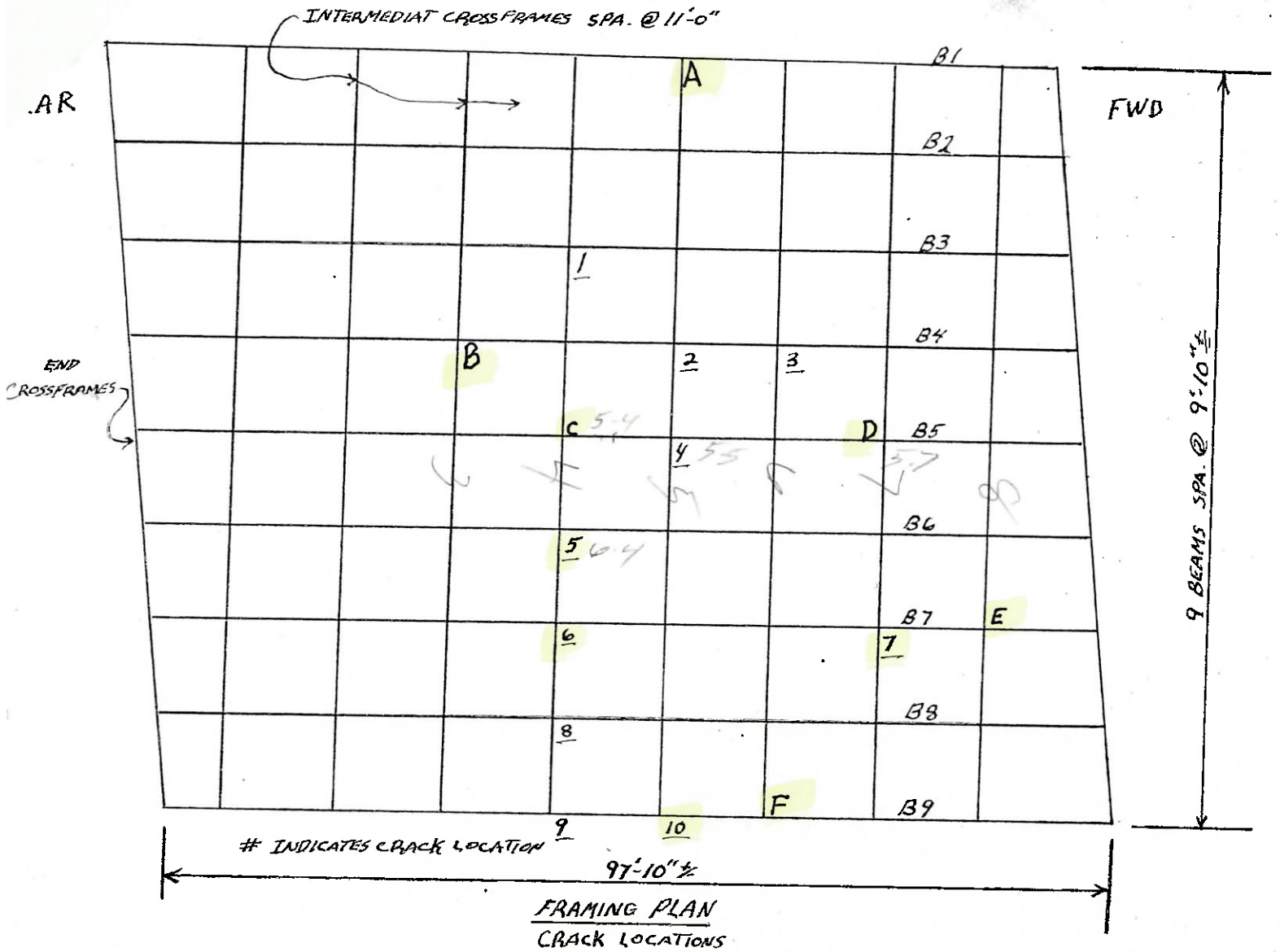
Existing crack #5 had a possible .25" crack past the forward drill hole on the right side of the web. The dye indication was very faint and I'm not sure if this is truly cracked.

Existing crack #6 had possible .375" cracks past both forward and rear drill holes. Here again the dye indication was very faint and I'm not sure of the existence of further cracking.

Existing crack #7 has grown form 1" to 2.5" in length.
Existing crack # 10 has grown from 2" to 4" in length.

New cracks that were found:

A New 2.5" long crack
B New 1" long crack
C Possible new crack forming, dye indication was faint.
D New 1" long crack
E New 1.5" crack
F New 3" long crack



FRAMING PLAN
CRACK LOCATIONS

EXISTING CRACKS (2000)

#1. 1.5" long crack, .75" hole drilled at ends. (no change)
#2. 3" long crack, .75" hole drilled at ends. (no change)
#3. 3.25" long crack, .75" holes drilled at ends. (no change)
#4. 1.5" long crack, .75" holes drilled at ends. (no change)
#5 2" long crack, .75" holes drilled at ends. (possible .25" crack past forward drill hole on right side of web)
#6 1" long crack, .75" holes drilled at ends.(possible .375" cracks past both forward and rear drill holes)
#7 1" long crack detected on right side of the beam, this crack was not drilled. (crack has grown to 2.5" in length.)
#8 1.75" long crack, .75" holes drilled at ends. (no change)
#9 2" long crack, .75" holes drilled at ends. (no change)
#10 2" long crack, this crack was not drilled. (crack has grown to 4" in length)

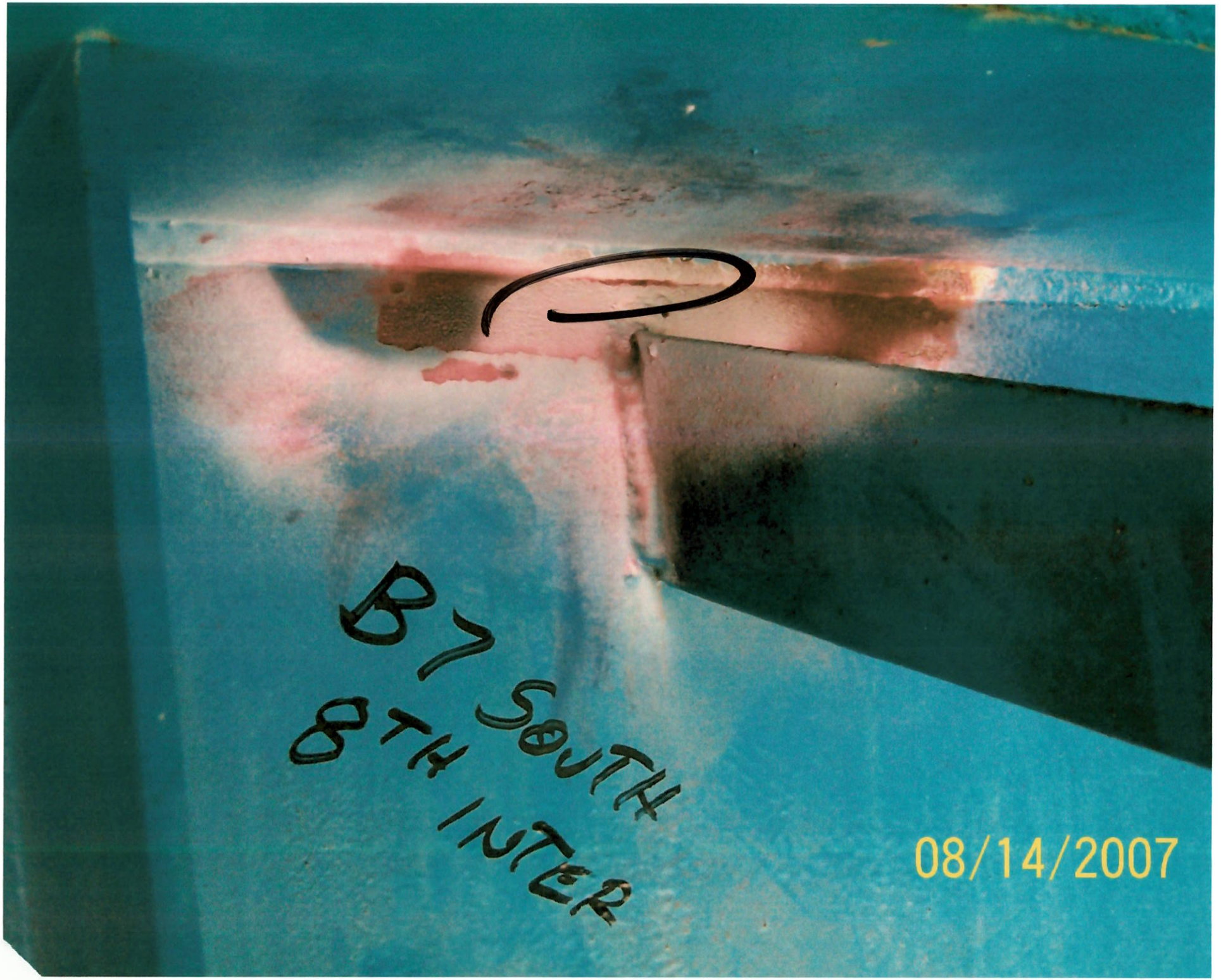
NEW CRACKS (2007)

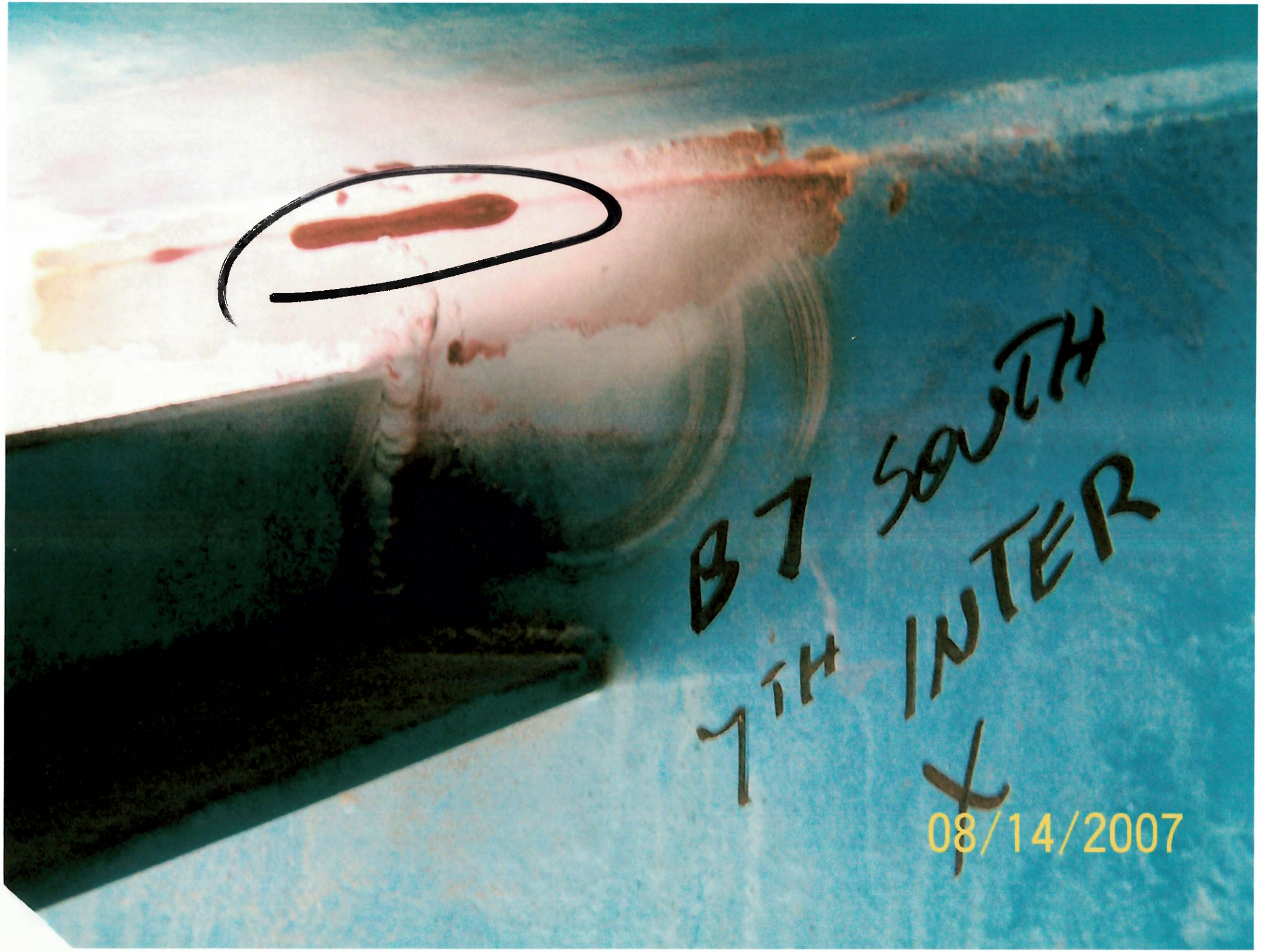
A New 2.5" long crack
B New 1" long crack
C Possible new crack forming, dye indication was faint.
D New 1" long crack
E New 1.5" crack
F New 3" long crack

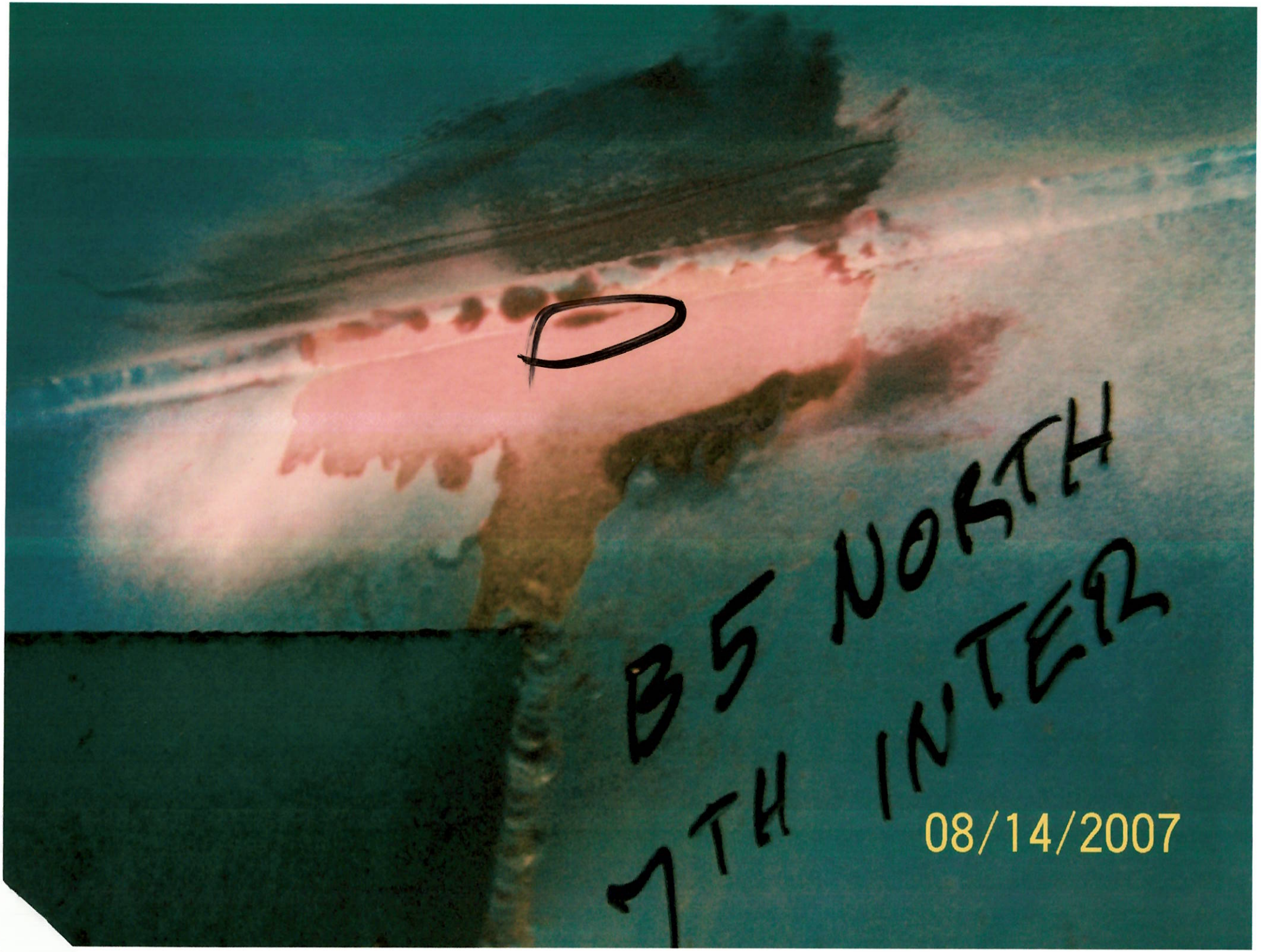

B9 NORTH
INT. #6
08/14/2007


B9 NORTH
INT. #5
EXISTING 2'-
NOW 4'-
08/14/2007

08/14/2007


B7 SOUTH
8TH INTER
08/14/2007


B1 SOUTH
7TH INTER
08/14/2007


B5 NORTH
7TH INTER
08/14/2007

Ohio Department of Transportation
inter-office communication

TO: File GUE-70-0994R, 3001385

FROM: Albert Abel, Bridge Specialist II

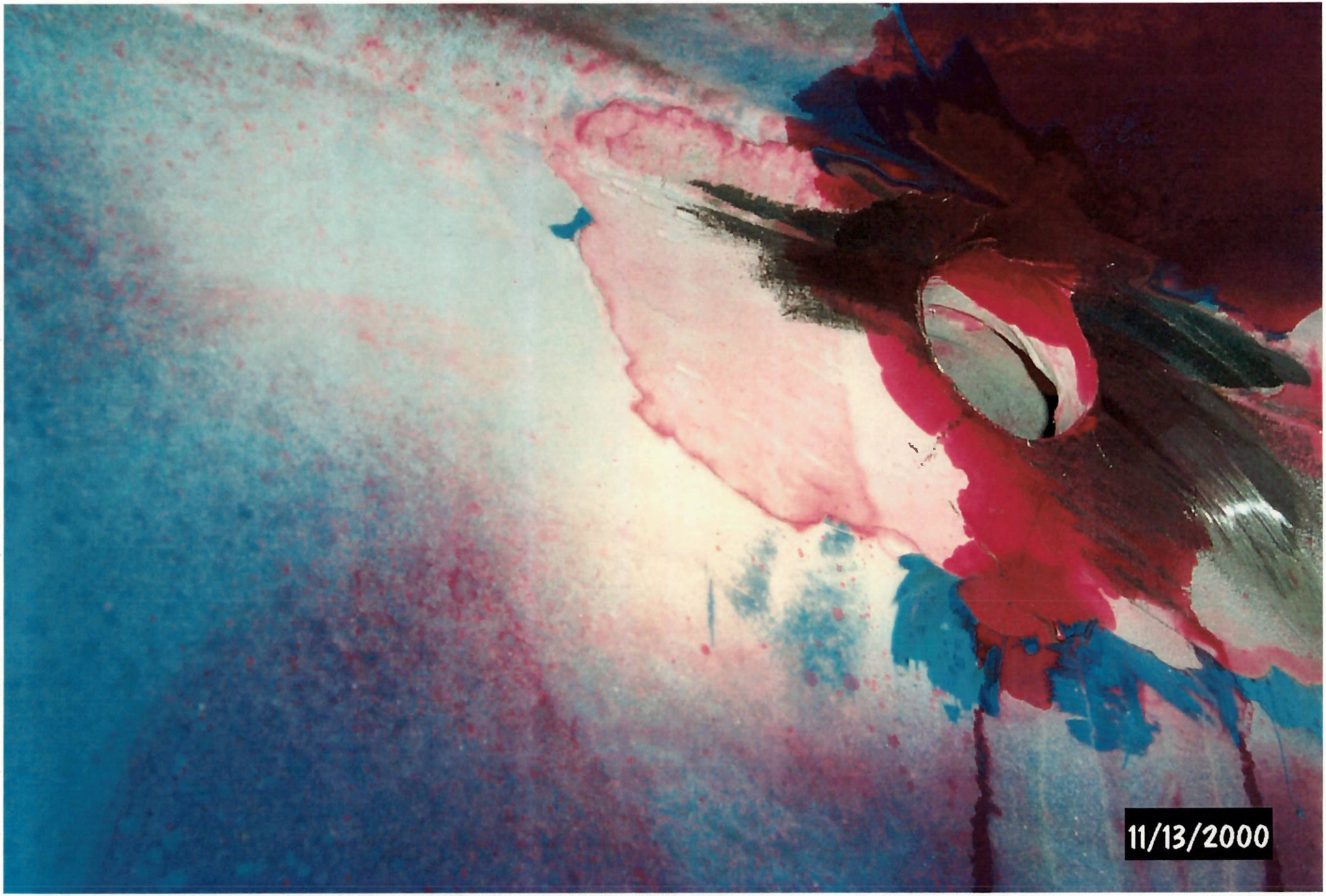
SUBJECT: Crack inspection

DATE: 4-20-06

NOTE TO FILE:

On 4-20-06 a re-inspection of the cracked girders was preformed. Dye penetrant was used to see if any further growth of the drilled cracks had occurred. No growth of the cracks was detected.

GVE-70-0994R 3001385

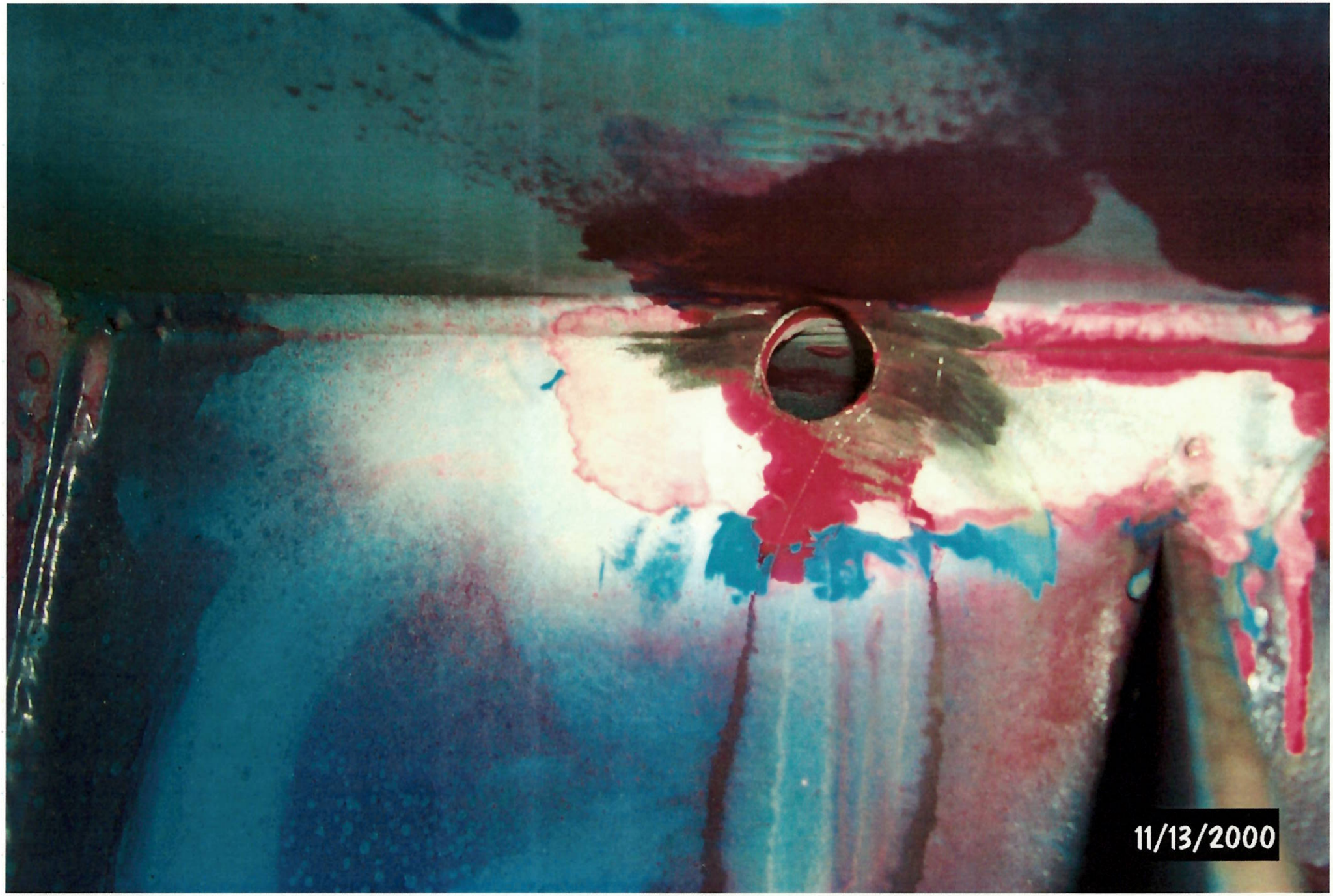

11/13/2000

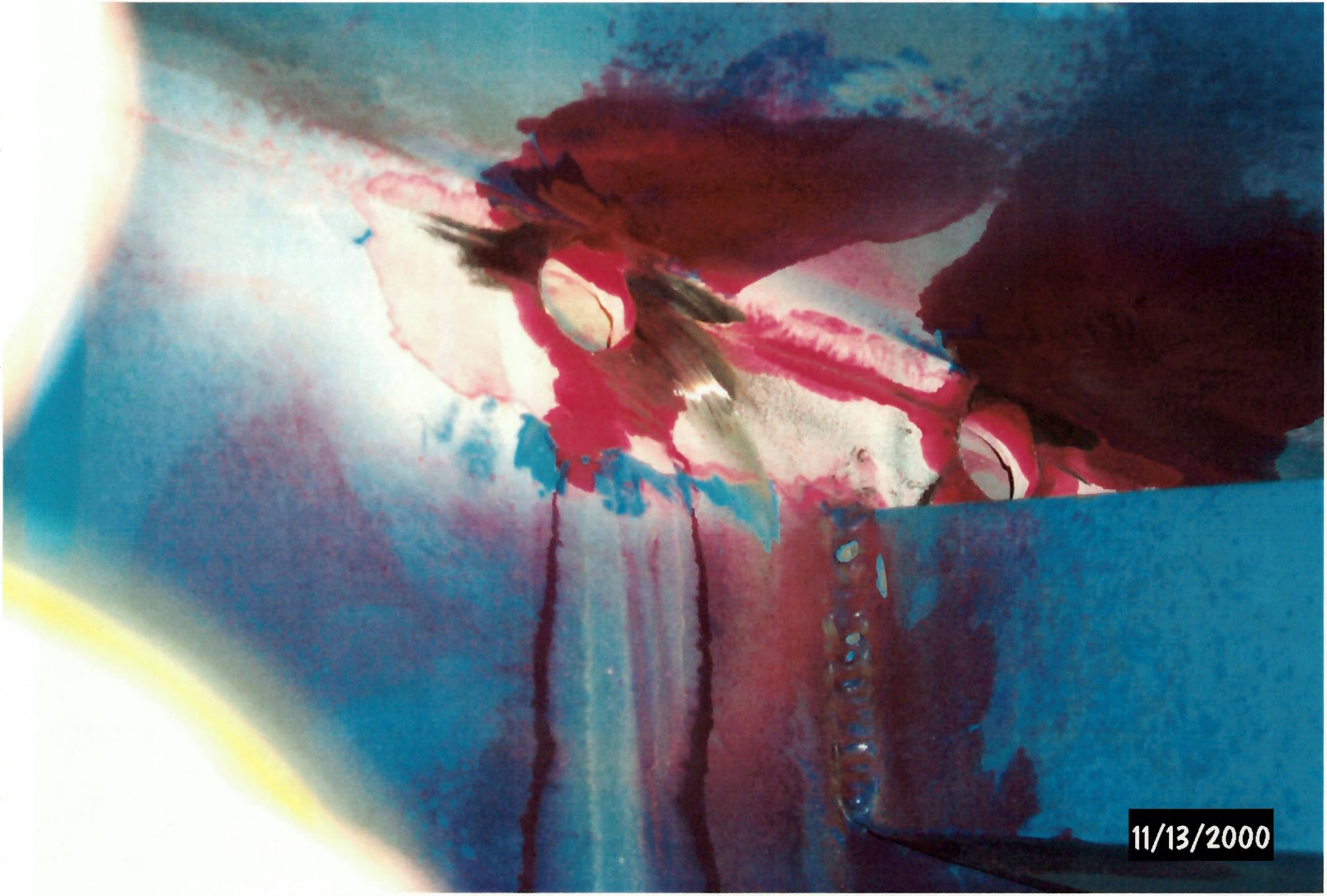

BM4
X=6
6/28/2000


11/13/2000

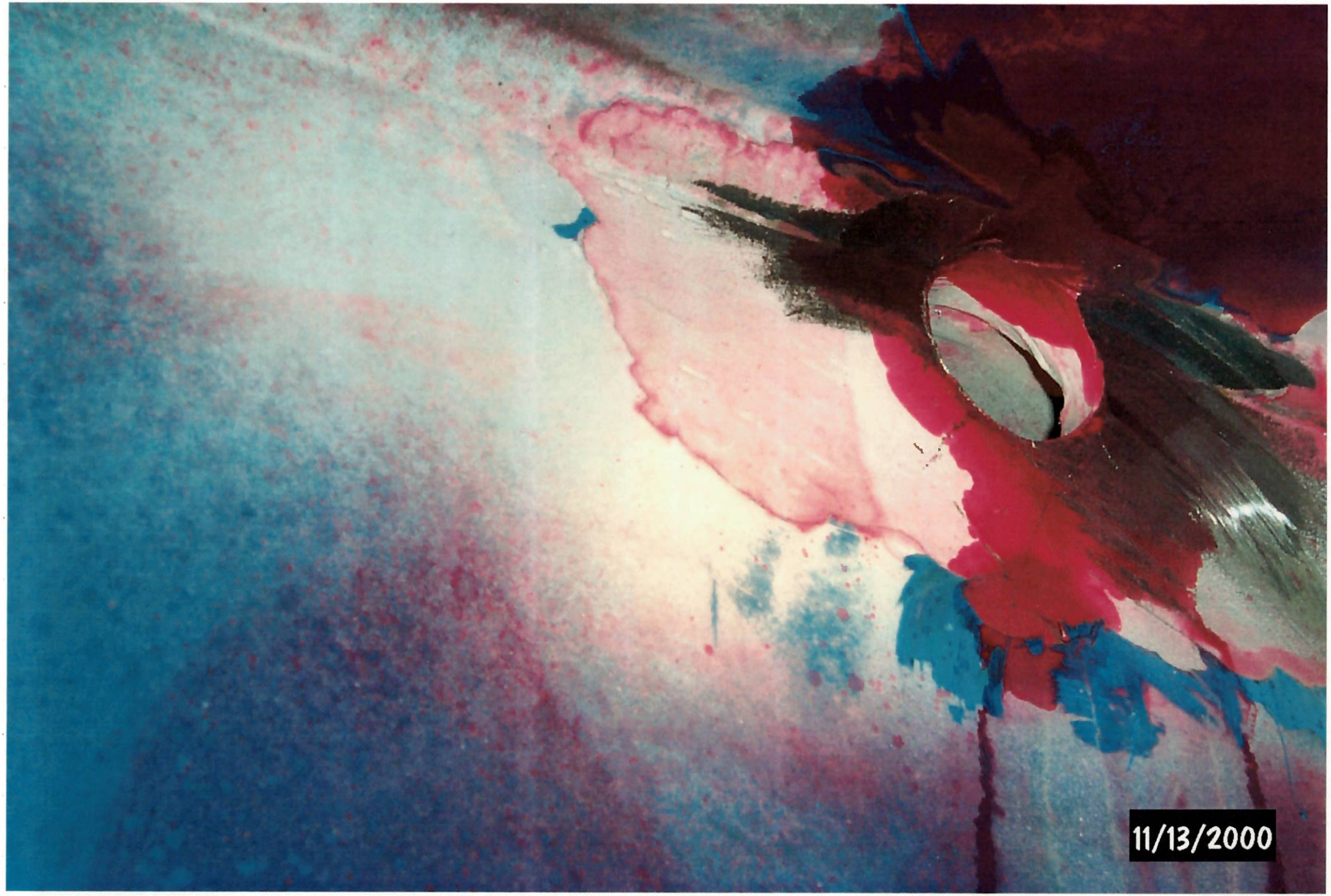

11/13/2000


11/13/2000

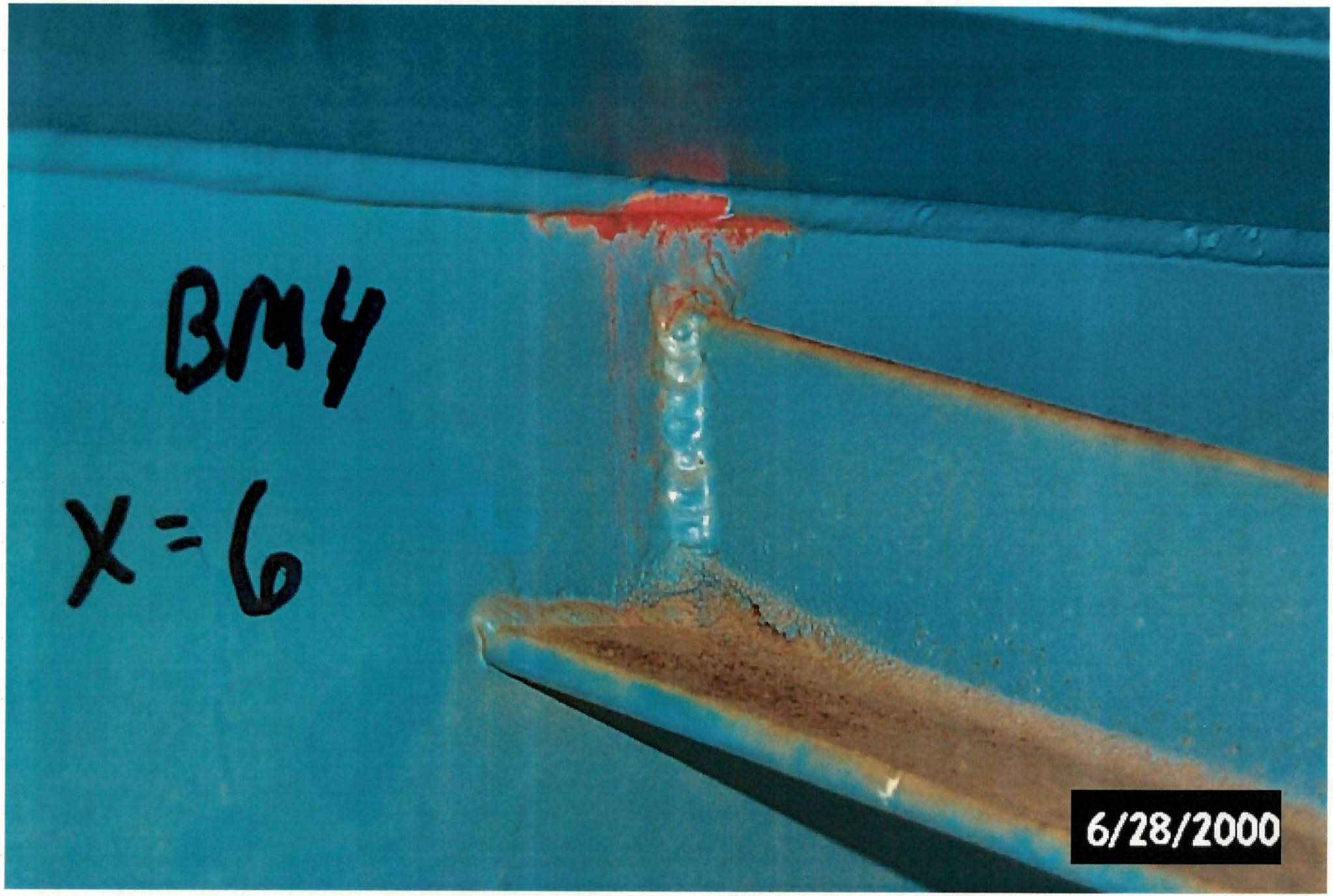

11/13/2000

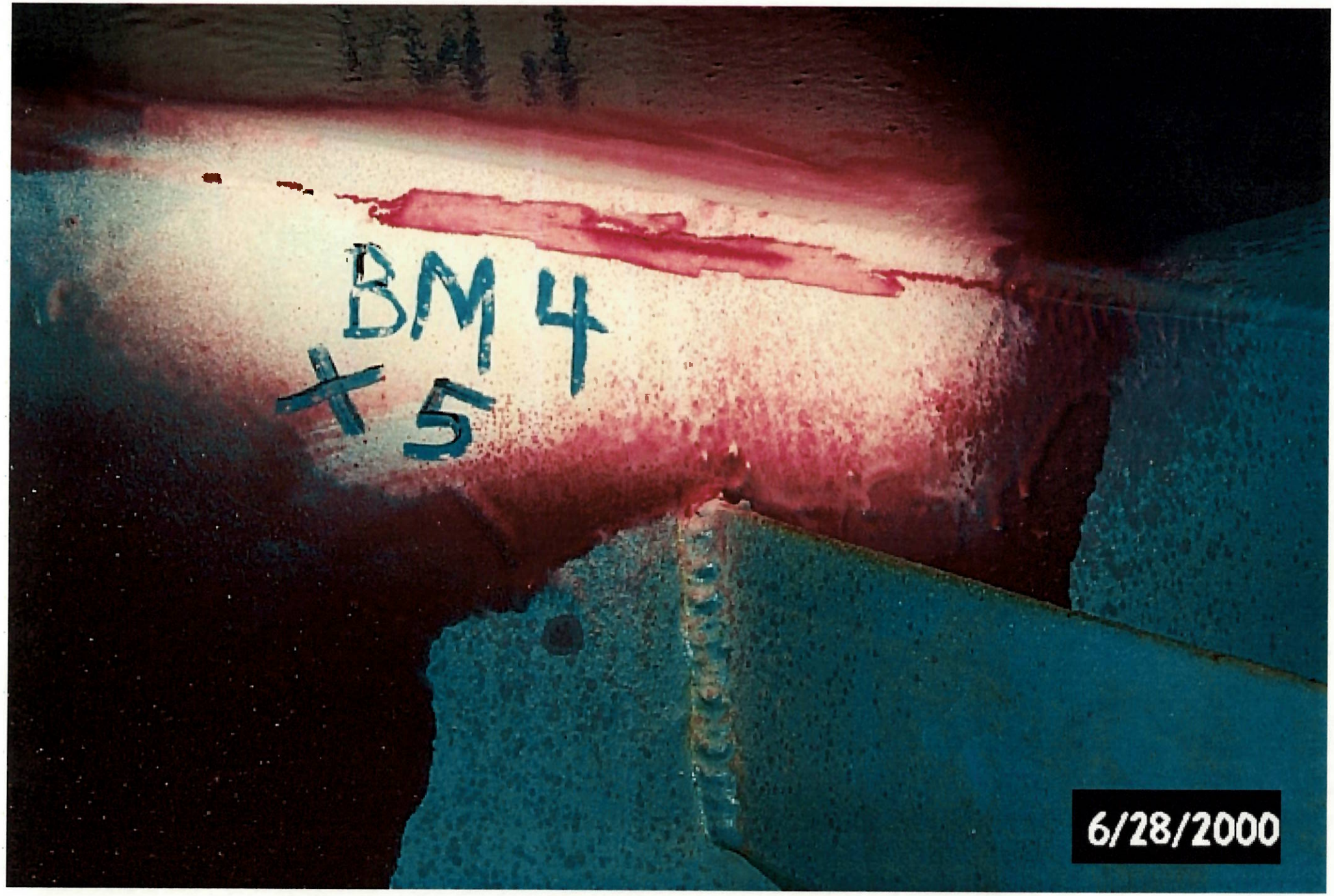

11/13/2000

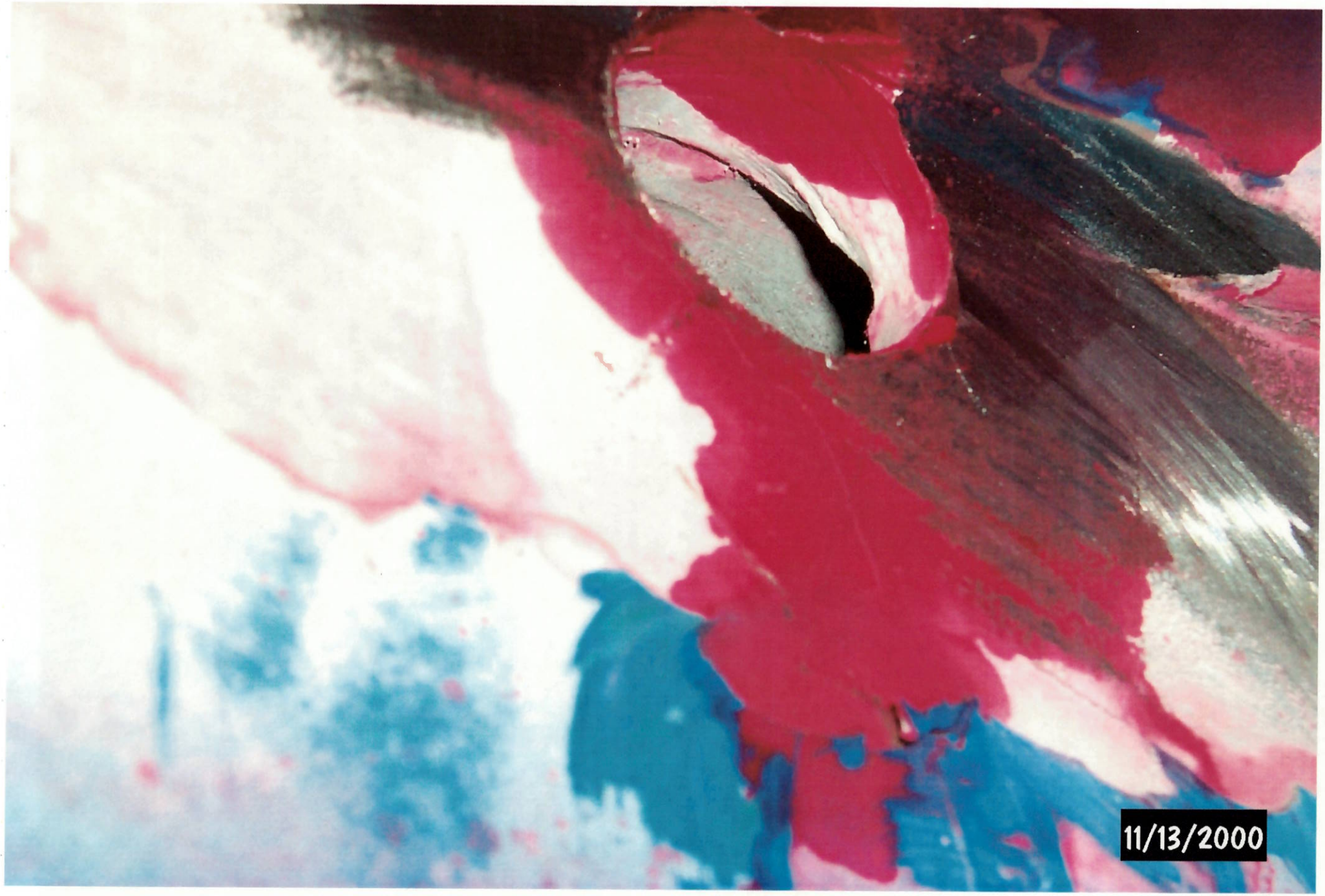

11/13/2000

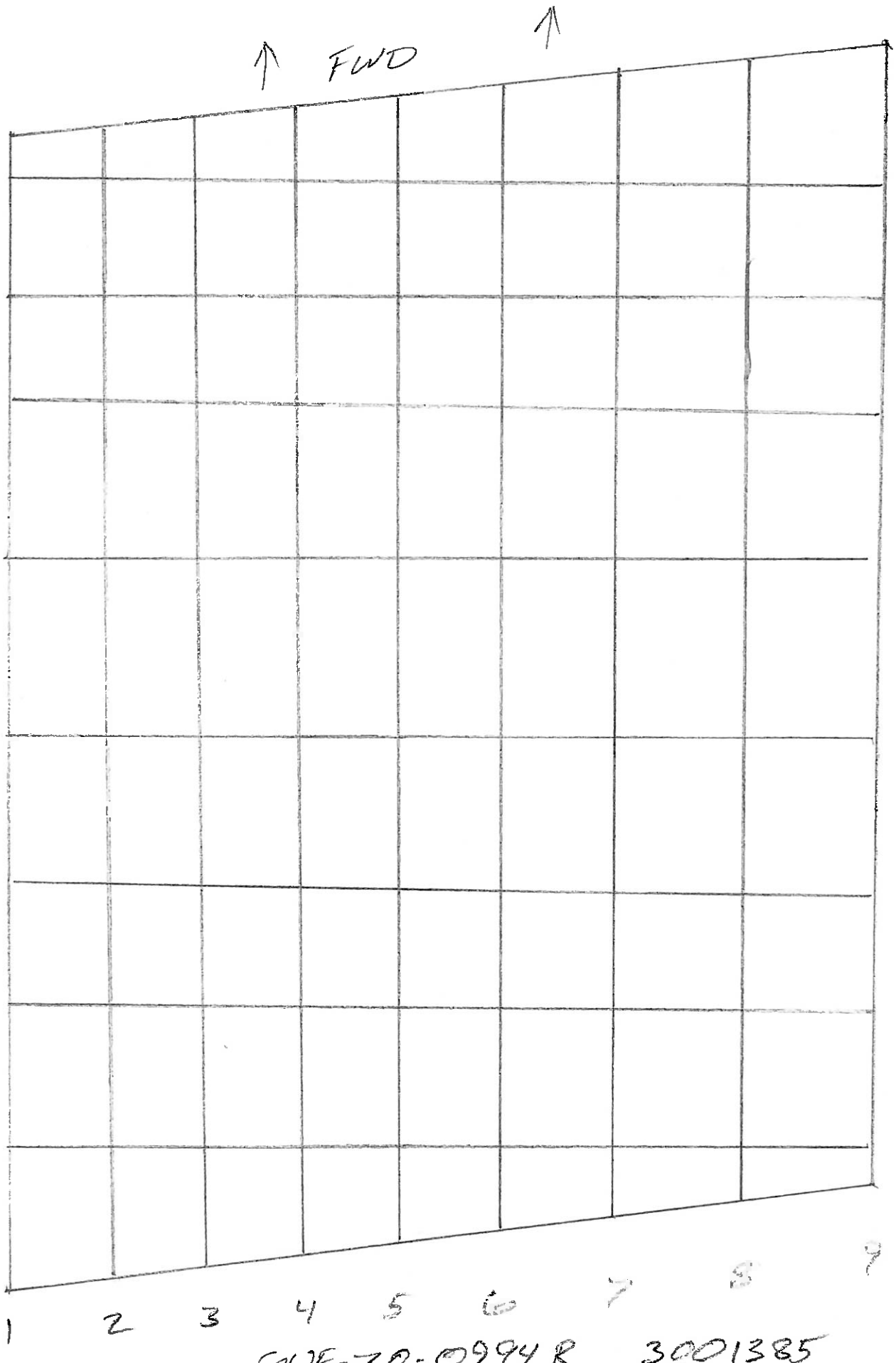

11/13/2000


BM 4
X 5
6/28/2000

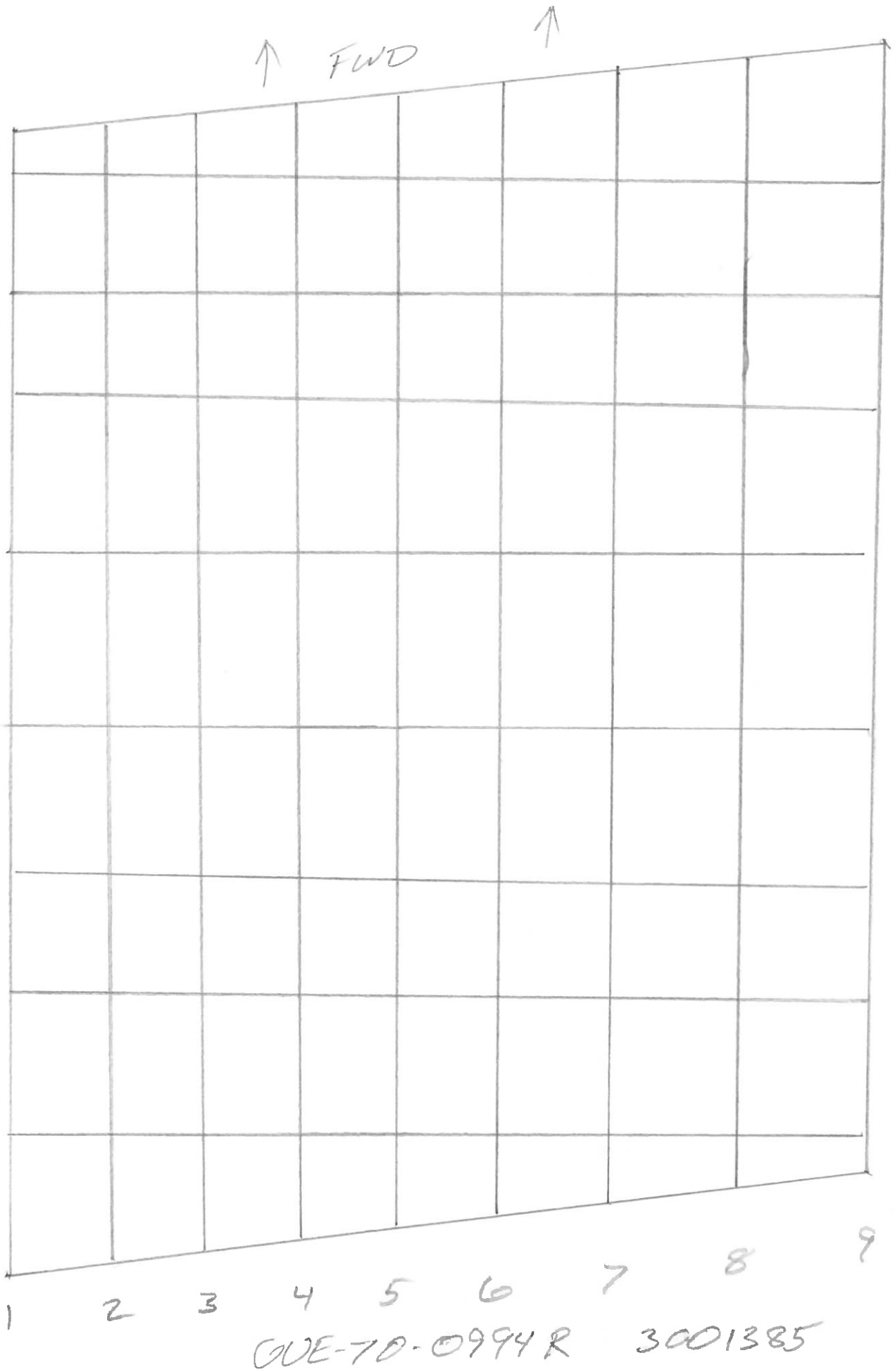

BM4
X=6
6/28/2000


BM 4
+5
6/28/2000


11/13/2000



OVE-70-0994R 3001385



GUE-70-0994R 3001385

TRAFFIC ORDER

TYPE OF ORDER: ORDER # _____

_____ MAINTENANCE (Repair or replace sign or signal)

X WORK (New sign or signal install, or paint crew)

COUNTY: COS 16 FAI 23 (GUE 30) KNO 42 LIC 45 MUS 60 PER 64

WRITTEN BY John Ryan DATE 7/29/13 TIME 1:36 PM

ROUTE CR 347 VILLAGE _____

DIRECTION: (N) S E W TOWNSHIP Jackson

SLM or APPROXIMATE LOCATION Intersection of CR 347 (Oakwood Rd) and TR 4395 (Hope Ave)

PROBLEM: (Use up to 4 sign codes) (RESET) REPLACE OTHER

Reset sign per attached drawing.

Quantity	Sign No.	Description
Signs to be Ordered:		

UNABLE TO COMPLETE WORK BECAUSE _____

A322502350 8-15-13 2:10 pm DONE

Date Work Completed 08-19-13 Crew J.L.

Time Work Completed _____ _____

OHIO DEPARTMENT OF TRANSPORTATION
DISTRICT 5 CONSTRUCTION

PROJECT NO. _____ INITIALS: _____

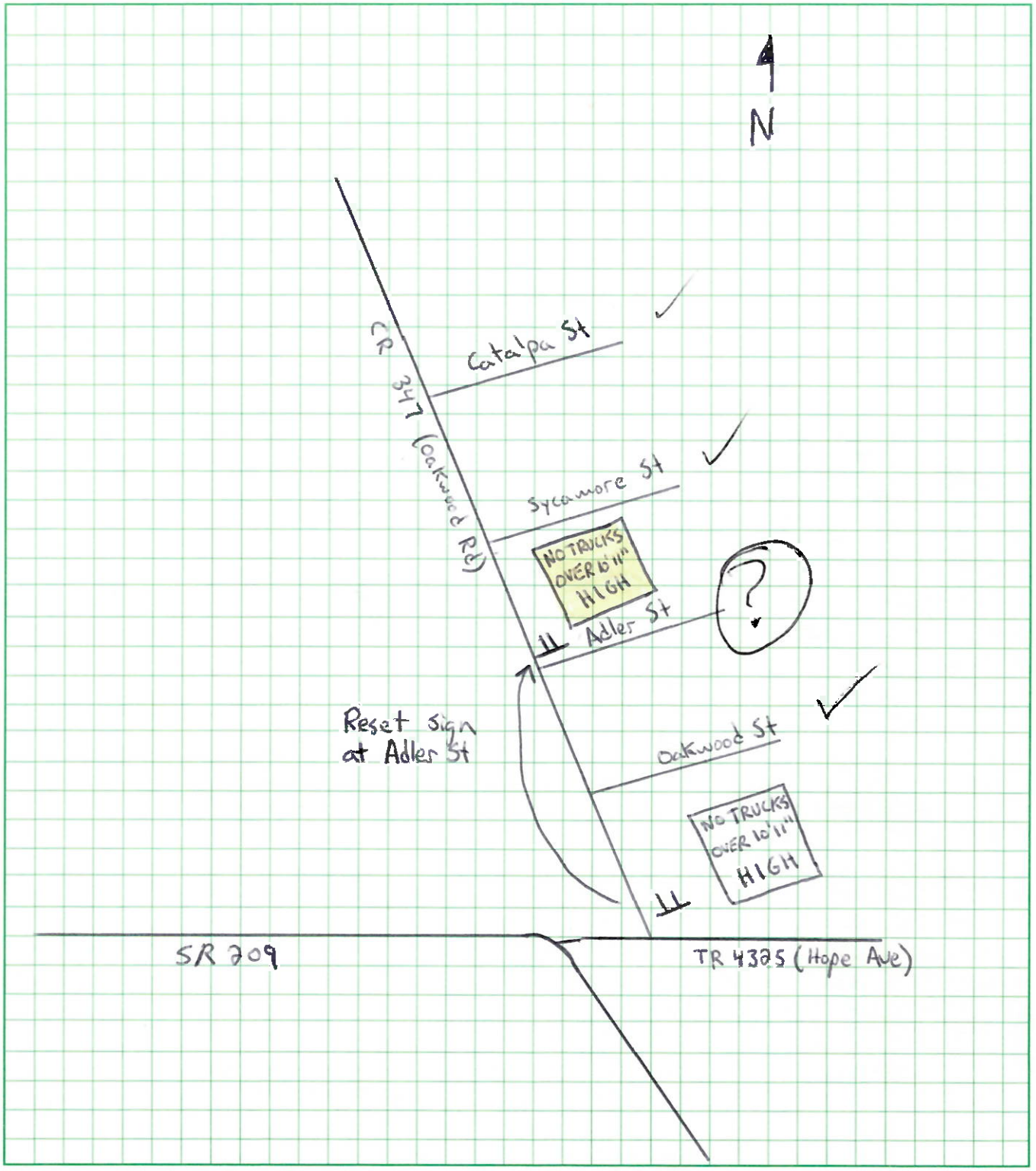
REF. NO. _____ ITEM NO. _____

SUBJECT: _____

LOCATION: _____

DATE: _____

CALCULATION SHEET



TRAFFIC ORDER

TYPE OF ORDER: ORDER # _____

_____ MAINTENANCE (Repair or replace sign or signal)

X WORK (New sign or signal install, or paint crew)

COUNTY: COS 16 FAI 23 (GUE 30) KNO 42 LIC 45 MUS 60 PER 64

WRITTEN BY John Ryan DATE 7/29/13 TIME 1:17 PM

ROUTE C.R. 35 (Byesville Rd) VILLAGE _____

DIRECTION: N (S) E W TOWNSHIP Cambridge

SLM or APPROXIMATE LOCATION Intersection of U.S. 40 and CR 35

PROBLEM: (Use up to 4 sign codes) (RESET) REPLACE OTHER

Reset sign per attached drawing.

Quantity	Sign No.	Description

(Signs to be Ordered:)

UNABLE TO COMPLETE WORK BECAUSE _____

08-15-13 2:10 pm

A 322502317

DONE

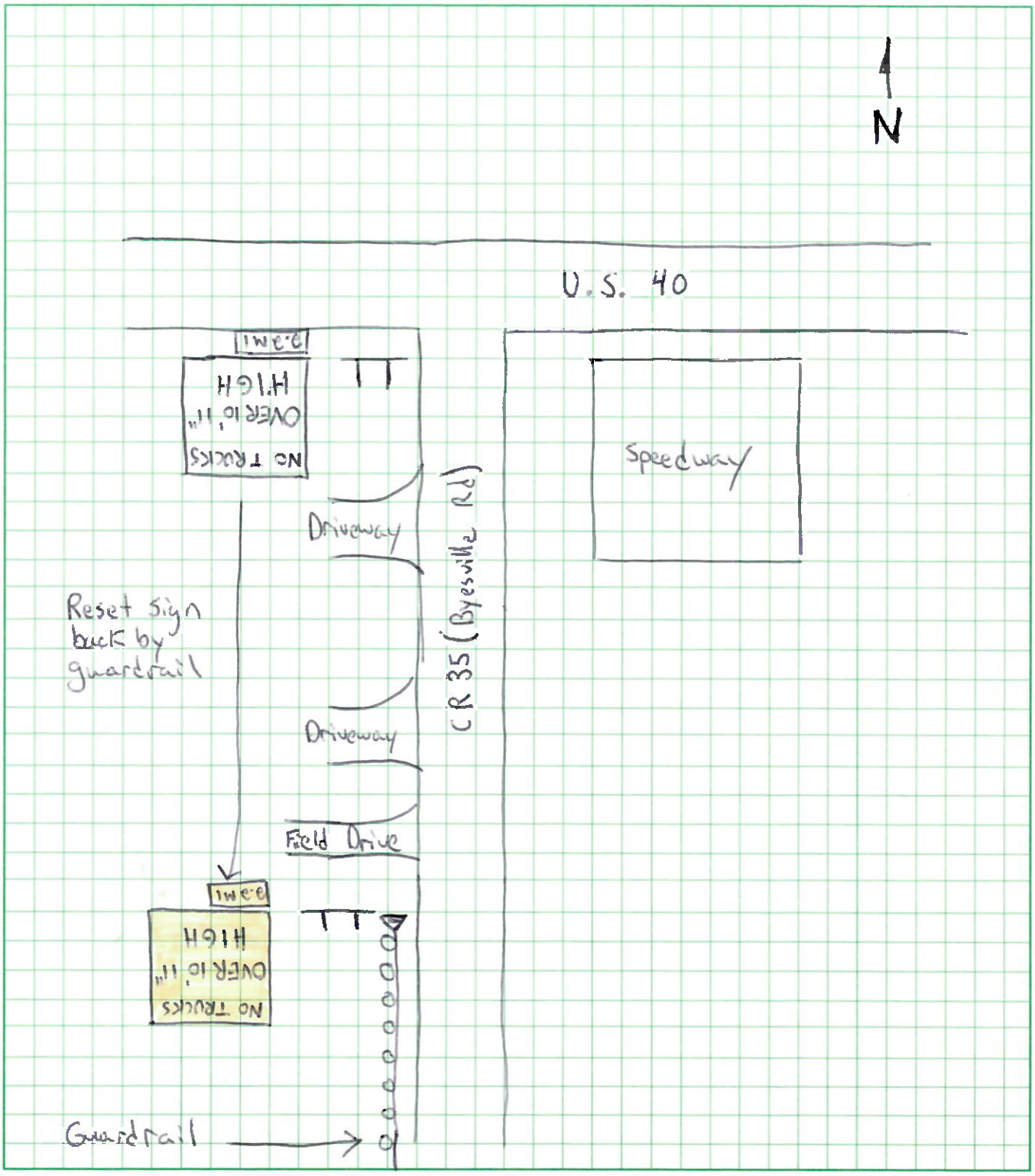
Date Work Completed 8-19-13 Crew J. L

Time Work Completed _____ _____

OHIO DEPARTMENT OF TRANSPORTATION
DISTRICT 5 CONSTRUCTION

PROJECT NO. _____ INITIALS: _____
REF. NO. _____ ITEM NO. _____
SUBJECT: _____
LOCATION: _____
DATE: _____

CALCULATION SHEET




NO TRUCKS
OVER 10' 11"
HIGH
2.2MI
Your Coffee.
Your Way.
99¢
10/08/2009