US ARMY CORPS
OF ENGINEERS
NEW ENGLAND DIVISION

INVENTORY INSPECTION REPORT

NORTH HARTLAND LAKE SERVICE BRIDGE
NORTH HARTLAND LAKE DAM
NORTH HARTLAND, VT

MAY 1995

NEW ENGLAND DIVISION

Lichtenstein

NEW YORK NEW JERSEY PENNSYLVANIA MASSACHUSETTS OHIO CONNECTICUT FLORIDA ALABAMA

BRIDGES HIGHWAYS RAILROADS SITE ENGINEERING DAMS

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I. INTRODUCTION

II. BRIDGE DESCRIPTION AND HISTORY

III. INSPECTION PROCEDURE

IV. FRACTURE CRITICAL EVALUATION

I. INTRODUCTION

North Hartland Lake Service Bridge is located in North Hartland, Vermont and provides access to the Intake Control Tower for the North Hartland Lake Dam. The structure was inspected on October 19 and 20, 1994.

II. BRIDGE DESCRIPTION AND HISTORY

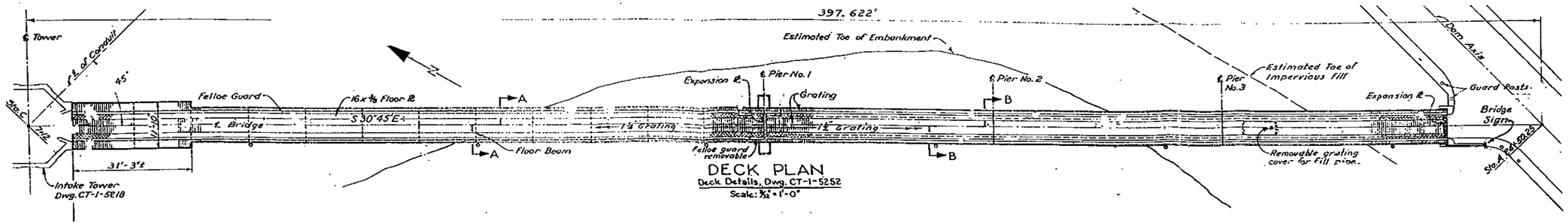
The four-span, 363 foot structure consists of a 12 foot deep, 180 foot long (centerline to centerline of bearings) deck truss with floorbeams and stringers for the northernmost span, with the remaining three spans being plate girders with floorbeams and stringers all supporting a steel grid deck (See Report Photos 1 and 2). The three remaining spans are 58 feet 0 inches centerline to centerline of bearings. All spans are simply supported. The Intake Control Tower supports one end of the northernmost span, while the remaining substructure units are three reinforced concrete piers and a reinforced concrete abutment. The distance from centerline to centerline of truss is 8 feet. The distance from centerline to centerline of girders is 5 feet. The inside to inside distance between rail posts is 8 feet 10 inches for most of the structure and widens to 11 feet 10 inches for the last 31 feet 3 inches adjacent to the Intake Control Tower (see General Plan and Elevation, Sheet 2).

III. INSPECTION PROCEDURE

The field inspection included a complete hands-on/visual inspection of all bridge components above ground and water level, excluding the interior of the Intake Control Tower. Special attention was given to fracture critical members. Free-climbing, utilizing a horizontal belay technique, was used to inspect the truss, the girder spans and accessible portions of the substructure. All pertinent data concerning condition findings of the various bridge elements was recorded on field inspection forms. 35mm color photographs were taken and field sketches made to document the typical conditions of the structure as well as any deteriorated areas which deviated from the typical conditions. The complete set of field inspection forms are included in Section VIII. - FIELD NOTES of this report.

IV. FRACTURE CRITICAL EVALUATION

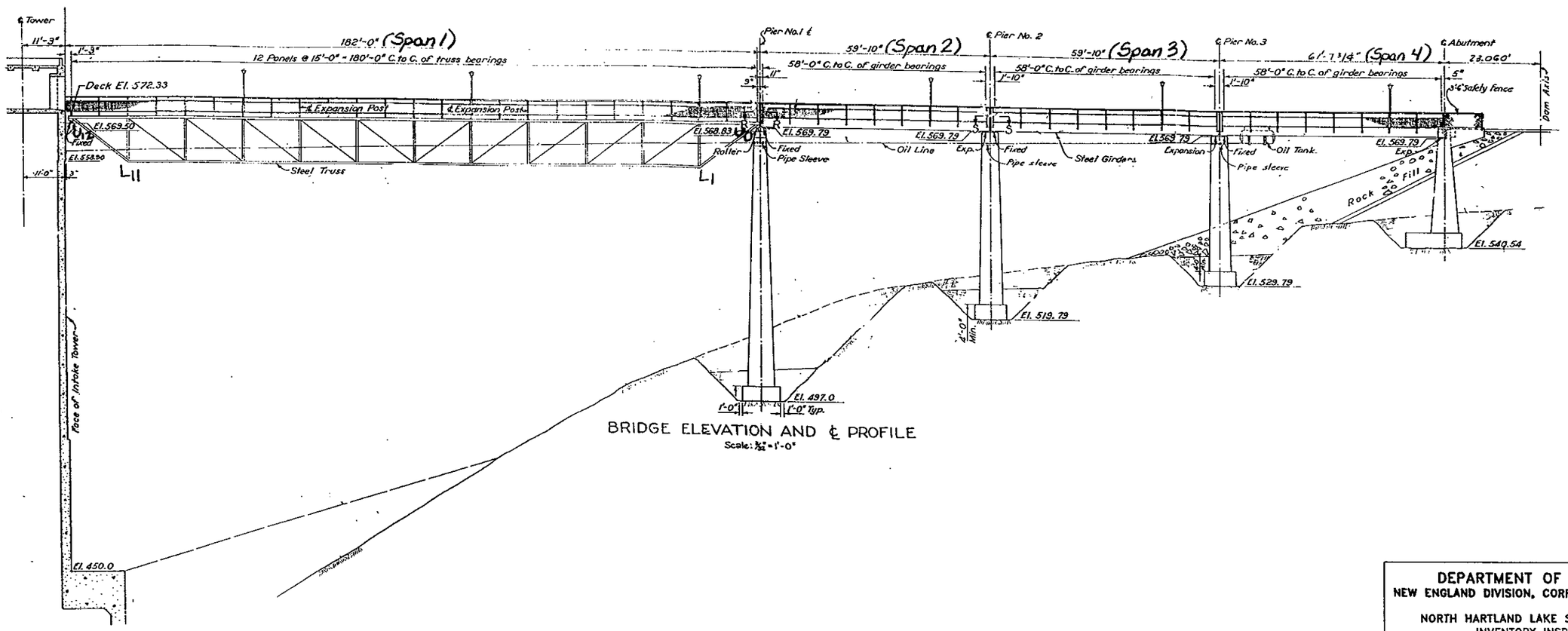
A Fracture Critical Member (FCM) is a member in tension or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse. FCM's are subject to fracture due to brittle fracture or fatigue failure. Brittle fracture of a steel members can be caused by the sudden application of a load which causes high total stresses in the presence of a defect in the metal (i.e. nick, notch, crack) and is more likely to occur during cold weather when the steel tends to be more brittle. The formation of a fatigue crack in a steel member is caused by repeated cycles of stress due to live loads. The fatigue life of a steel bridge is dependent on the magnitude of the stress range and the fatigue strength of details. The fracture critical members on this bridge consist of the truss tension members, girders and floorbeams. These members appear to be in good condition. Further testing does not appear necessary although special attention should be given to these members in subsequent scheduled inspections.



DECK PLAN

Deck Details, Dwg. CT-1-5252

Scale: 1/32" = 1'-0"



BRIDGE ELEVATION AND ℄ PROFILE

Scale: 1/32" = 1'-0"

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS

NORTH HARTLAND LAKE SERVICE BRIDGE
INVENTORY INSPECTION

Lichtenstein
A.G. LICHTENSTEIN & ASSOCIATES, INC.
CONSULTING ENGINEERS

FILE: D:\NHARGPE.DWG

GENERAL PLAN
AND ELEVATION

SCALE: N.T.S.

DATE: 5/95

V. SUMMARY OF INSPECTION

V. SUMMARY OF INSPECTION FINDINGS

The following pages provide a summary of typical conditions observed during the inspection with significant deviation from typical conditions noted. Cross references are made as required to Section VI. - Photographs of this Report which detail specific condition findings.

One condition which requires immediate repair was found at both truss expansion bearings at Pier 1. The two bolts connecting the rocker bearing to the stub stringer were broken (see Report Photo 3). The COE has been contacted and sent a copy of the pertinent Field Notes (dated 10/19/94).

The evaluations (e.g. "satisfactory", "good", etc.) used in the text of the condition description are based upon the attached FHWA *Structure Inventory, Condition, and Appraisal Rating Guidelines* included in the Appendix.

A. Substructure

The bridge substructure was generally in good condition. Isolated locations of minor deterioration due to map cracking and spalling were present on some of the substructure elements as noted below.

The following is a summary of condition findings:

1. Abutment: (GOOD CONDITION)

   The abutment was in good condition with isolated locations of rust stains on the backwall and bearing seat (see Report Photo 4).

2. Piers: (GOOD CONDITION)

   The three piers were generally in good condition.

   - Pier 1 had one location of map cracking 2' in diameter (surrounding concrete appears sound) (see Report Photo 5), a 4 inch diameter by up to a 1 inch deep spall on the northeast corner of the east pedestal for Span 2 (no undermining of bearing), and rust stains on the pier cap adjacent to the conduit hole.

   - Pier 2 exhibited a 1/2 inch deep by approximately 1 foot in diameter spall on the west face (see Report Photo 6). Rust stains on the pier cap surrounding the conduit hole, north face, were also observed.

- Pier 3 displayed rust stains on the pier cap surrounding the conduit hole, north face.

3. Intake Control Tower, Exterior only: (GOOD CONDITION)

The Intake Control Tower was generally in good condition with a few locations of hairline cracks on the corbels (longest = 1') and rust stains surrounding the conduit hole. Tree limbs and debris were found adjacent to the intake grate at the tower base.

B. Superstructure

The bridge superstructure was generally in satisfactory condition.

The following is a summary of condition findings with locations of minor deterioration noted:

1. Truss Members, Bracing and Connections: (GOOD CONDITION)

The truss members and connections were generally in good condition.

- Member L8U8, east truss, outstanding leg of east angle bent 3/8 inch south approximately 3' above bottom chord apparently due to construction damage.

- The splice plates in members U9U10 and L9L10, east and west trusses exhibit 3/16" impacted rust between splice plates and member angles (see Report Photo 7).

- The vertical leg of the lateral bracing strut angle at Panel Point L5 is bent 1/4" approximately 18" east of west truss (see Report Photo 8).

2. Stringers: (GOOD CONDITION)

The stringers were in good condition with no significant defects noted.

3. Floorbeams: (GOOD CONDITION)

The floorbeams were in good condition with no significant defects noted.

4. Girders: (GOOD CONDITION)

The girders were in good condition with no significant defects noted.

5. Bearings: (SATISFACTORY CONDITION)

The bearings were generally in satisfactory condition with two locations in poor condition at the truss expansion bearings, Pier 1. The following is a summary of condition findings:

- Both truss expansion bearings at Pier 1 exhibit broken bolts (2 out of 2 at each bearing) connecting the rocker to the stub stringer. Both rockers were found to be overextended and rotated out of alignment (see Report Photo 3).

- The east anchor bolt nut was not secured at the Intake Control Tower, Span 1, west bearing.

- An 1/8" gap was found between the west anchor bolt nut and the washer at Pier 1, Span 2, west bearing.

- The masonry plate appeared to have shifted from underneath the bearing pad at the abutment, east bearing (see Report Photo 9).

6. Floor System Lateral Bracing: (GOOD CONDITION)

The lateral bracing was in good condition with no significant defects noted.

7. Deck: (SATISFACTORY CONDITION)

The deck was generally in satisfactory condition (see Report Photo 10). The following is a summary of condition findings:

- A section of the east steel floor plate (16" x 18") was found to be loose on Span 4.

- The access door to the oil tank was not secured in Span 4.

8. Expansion Joints: (SATISFACTORY CONDITION)

The expansion joints were in satisfactory condition.

9. Paint: (GOOD CONDITION)

The paint on the bridge was in good condition with no significant problems observed.

10. Miscellaneous

a. Light Standards: (GOOD CONDITION)

The light standards on the bridge were in good condition with no significant defects observed.

b. Railings: (SATISFACTORY CONDITION)

The railings were generally in satisfactory condition. The following is a summary of condition findings:

- A bolt was missing on the west side top rail/post connection over Pier 2.
- West side steel fencing damaged in Span 4, second panel north of abutment.

VI. PHOTOGRAPHS

PHOTO SECTION

PHOTO NO 1. — PHOTO NO 10.

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CONSULTING ENGINEERS

DATE: MAY, 1995

PROJECT: 1784

INVENTORY INSPECTION OF THE NORTH HARTLAND LAKE SERVICE BRIDGE

NORTH HARTLAND LAKE DAM – HARTLAND, VT

PHOTO NO. 1

DESCRIPTION: EAST ELEVATION OF BRIDGE.

PHOTO NO. 2

DESCRIPTION: WEST ELEVATION OF BRIDGE LOOKING NORTHEAST.

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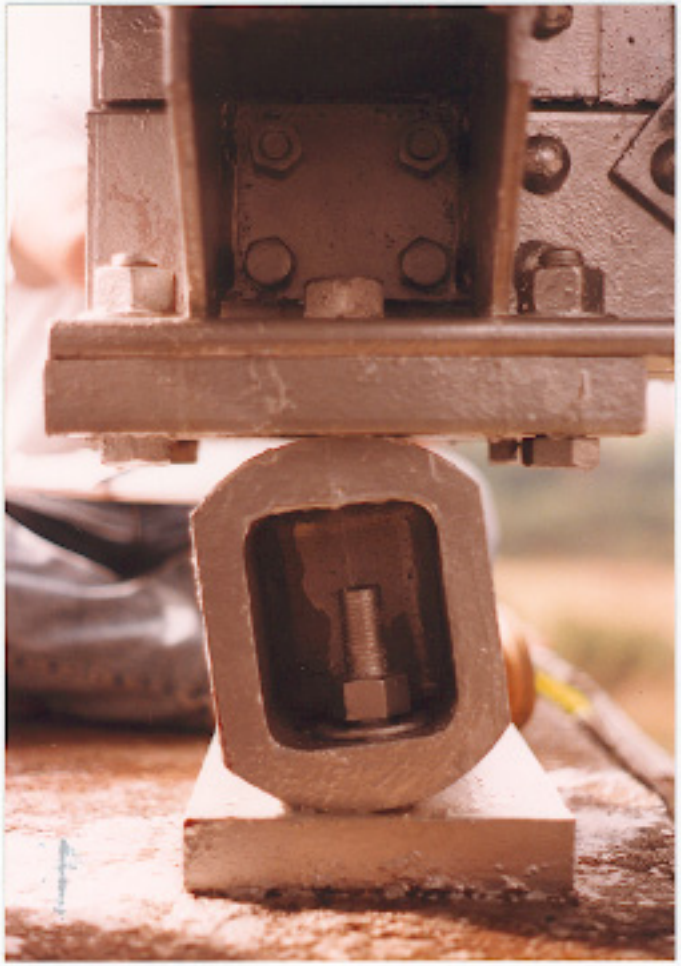
PROJECT: 1784

INVENTORY INSPECTION OF THE NORTH HARTLAND LAKE SERVICE BRIDGE

NORTH HARTLAND LAKE DAM – HARTLAND, VT

PHOTO NO. 3



DESCRIPTION: EAST ELEVATION, WEST BEARING, PIER 1, TRUSS SPAN. NOTE THE BROKEN BOLT BETWEEN THE ROCKER AND STUB STRINGER.

PHOTO NO. 4

DESCRIPTION: NORTH ELEVATION OF SOUTH ABUTMENT.

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DATE: MAY, 1995

PROJECT: 1784

INVENTORY INSPECTION OF THE NORTH HARTLAND LAKE SERVICE BRIDGE

NORTH HARTLAND LAKE DAM – HARTLAND, VT

PHOTO NO. 5

DESCRIPTION: PIER 1, SOUTH ELEVATION. NOTE MAP CRACKING.

PHOTO NO. 6

DESCRIPTION: PIER 2, WEST ELEVATION. NOTE SPALL.

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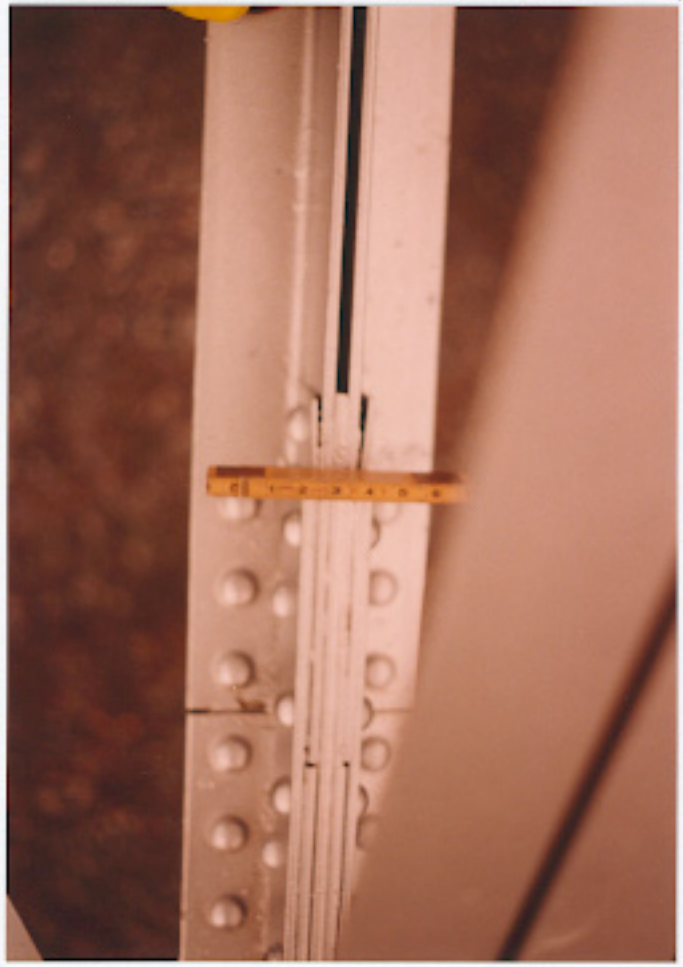
DATE: MAY, 1995

PROJECT: 1784

INVENTORY INSPECTION OF THE NORTH HARTLAND LAKE SERVICE BRIDGE

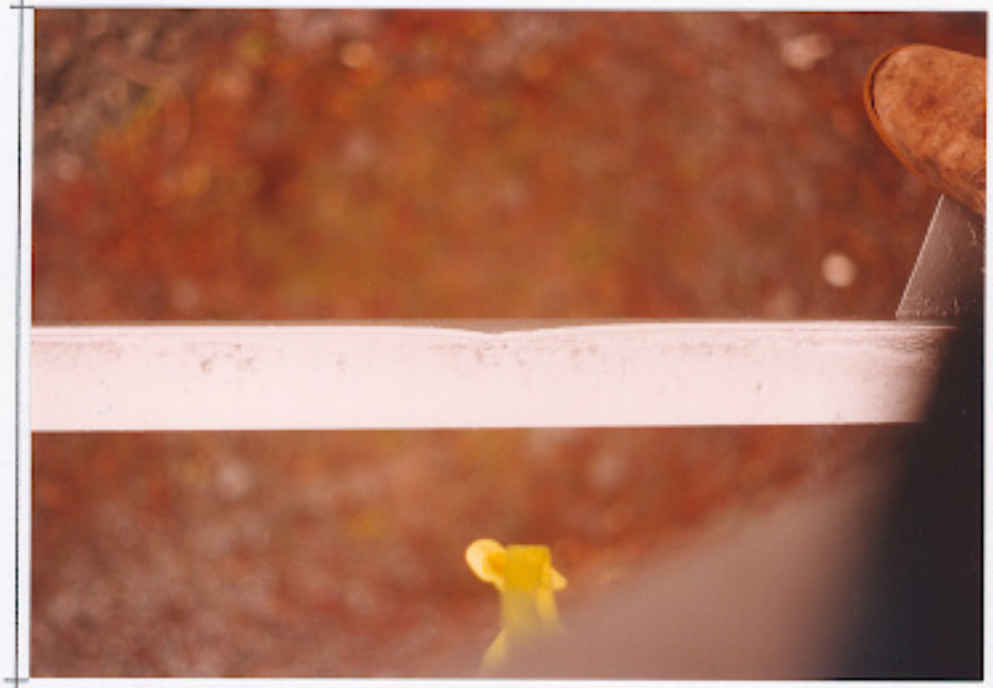
NORTH HARTLAND LAKE DAM – HARTLAND, VT

PHOTO NO. 7



DESCRIPTION: BOTTOM CHORD SPLICE, ADJACENT TO L9. NOTE IMPACTED RUST.

PHOTO NO. 8



DESCRIPTION: LATERAL BRACING ANGLE AT L5. NOTE APPARENT CONSTRUCTION DAMAGE.

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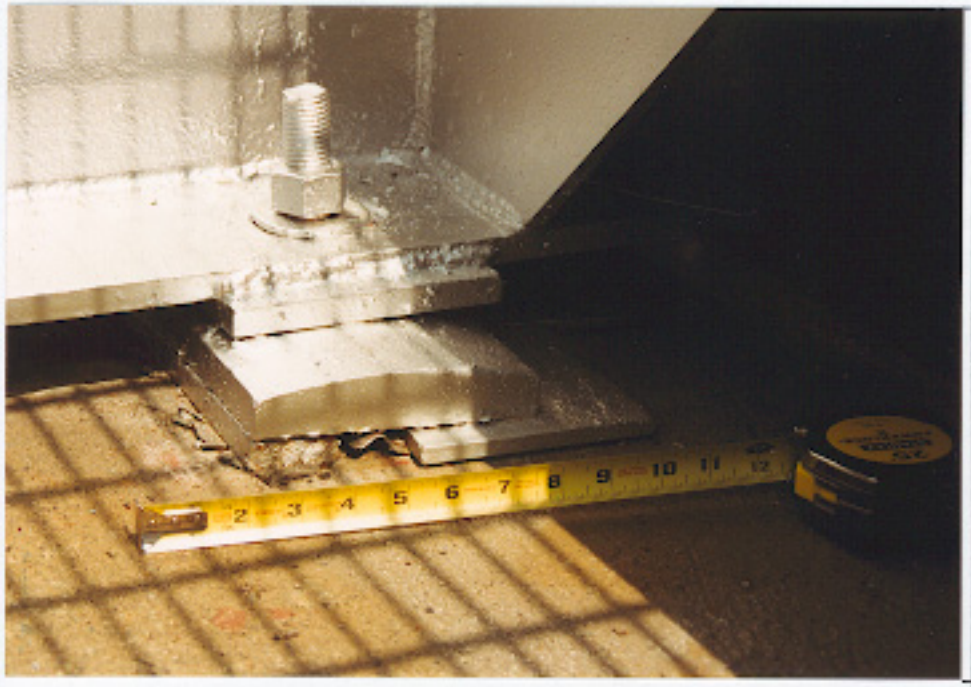
DATE: MAY, 1995

PROJECT: 1784

INVENTORY INSPECTION OF THE NORTH HARTLAND LAKE SERVICE BRIDGE

NORTH HARTLAND LAKE DAM – HARTLAND, VT

PHOTO NO. 9



DESCRIPTION: EAST BEARING, SOUTH ABUTMENT. NOTE GAP IN BEARING PADS AND SHIFTING OF MASONRY PLATE.

PHOTO NO. 10

DESCRIPTION: BRIDGE DECK LOOKING NORTH.

VII. CONCLUSIONS AND RECOMMENDATIONS

VII. CONCLUSIONS AND RECOMMENDATIONS

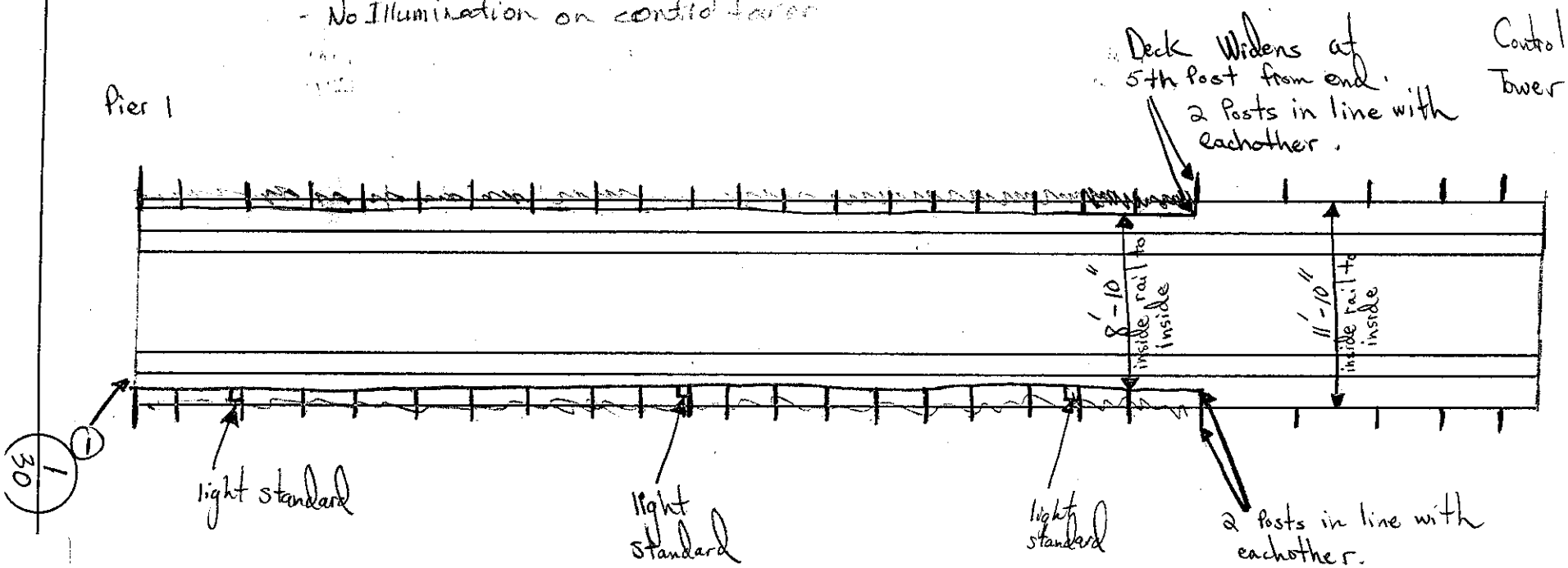
Based upon the results of the 1994 Inventory Inspection, the North Hartland Lake Service Bridge is considered to be in overall good condition. Isolated locations of satisfactory condition are present on the structure. Two locations require immediate attention. The following is a list of recommendations:

	Description	Estimated Construction Cost
*1)	The two truss rocker expansion bearings at Pier 1 should be removed and replaced.	$10,000.
2)	Pier 1, Span 2, west bearing; the west anchor bolt nut should be tightened. Intake control tower, Span 1, west bearing; the east anchor bolt nut should be secured.	$ 1,200.
3)	The masonry plate at the east bearing on the abutment should be removed and replaced.	$ 3,000.
4)	The loose section of the east floor plate in Span 4 should be secured.	$ 800.
5)	The access door to the oil tank in Span 4 should be secured.	$ 600.
6)	Remove debris adjacent to grate at Intake Control Tower base.	$ 600.
7)	Replace missing bolt in west top rail/post connection at Pier 2.	$ 300.
8)	Replace damaged section of west rail, Span 4.	$ 400.
9)	Continue regular maintenance schedule	

* Requires immediate attention, the ACOE has been contacted about this condition.

VIII. FIELD NOTES

Typ. Note: - Lighting Standards not illuminated @ 6:30 p.m. (dark out), lights on access road were on, but not on bridge.
- No Illumination on control tower



1/30 ①

Note: Spoke with Mark Rosenthall, Park Ranger for U.S. Army Corp. of Engineers and said that the bridge is rated in their manual for 5 Ton Continuous Loading.

SPAN 1

NOTES:

① Expansion Measurement taken of gap between outside deck stringers supporting steel grating = 7/8"

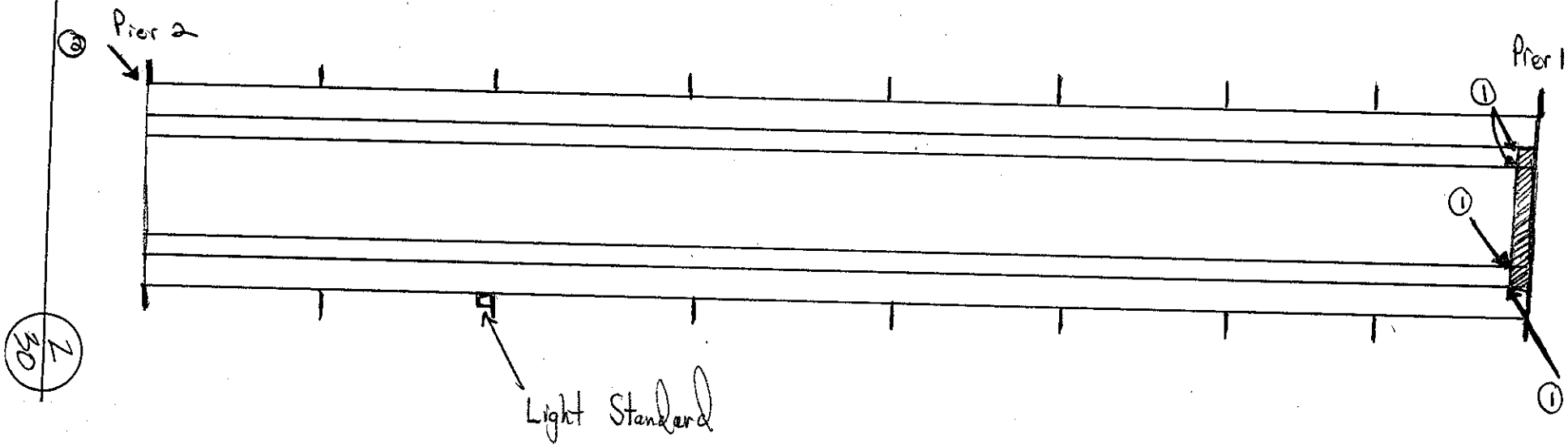
TOP OF DECK

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN
CONSULTING ENGINEERS

JOB #1784 | DATE: 10/19/94
CREW: BH, APB, AWN | SHEET 1 OF 27



*Welds broken to allow expansion, ℄ is welded to span 1

NOTES: ① Tack Weld Broken for Steel Plate on East Side & West Side of bridge (Span 2) at Pier 1 NH3-15

② Bolt Missing on Top of Rail to Post (Pier 2 – Span 2)

SPAN 2

TOP OF DECK

DEPARTMENT OF THE ARMY
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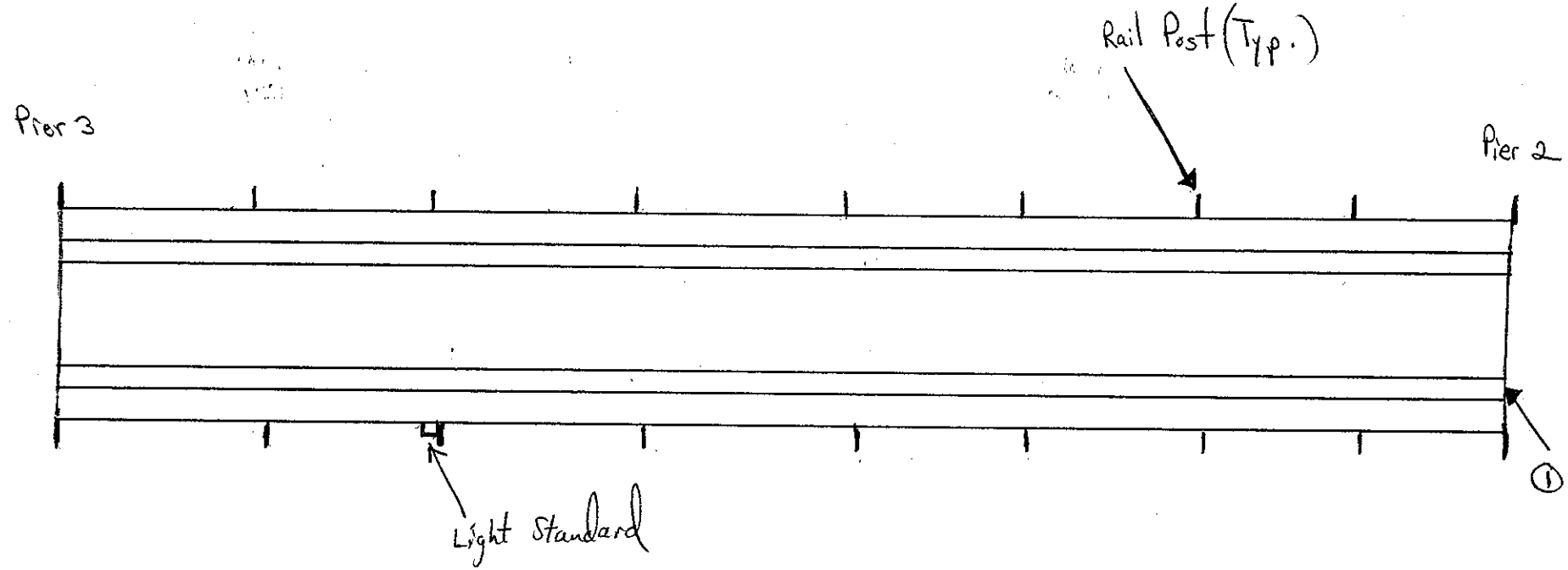
NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN
CONSULTING ENGINEERS

JOB #1784 | DATE: 10/19/94

CREW: BH, APB, PWN | SHEET 2 OF 27



SPAN 3

NOTES:

① Expansion Measurement taken of gap between Floor Beam's Top Flanges on Pier 2 (1 3/4", Measured through grating)

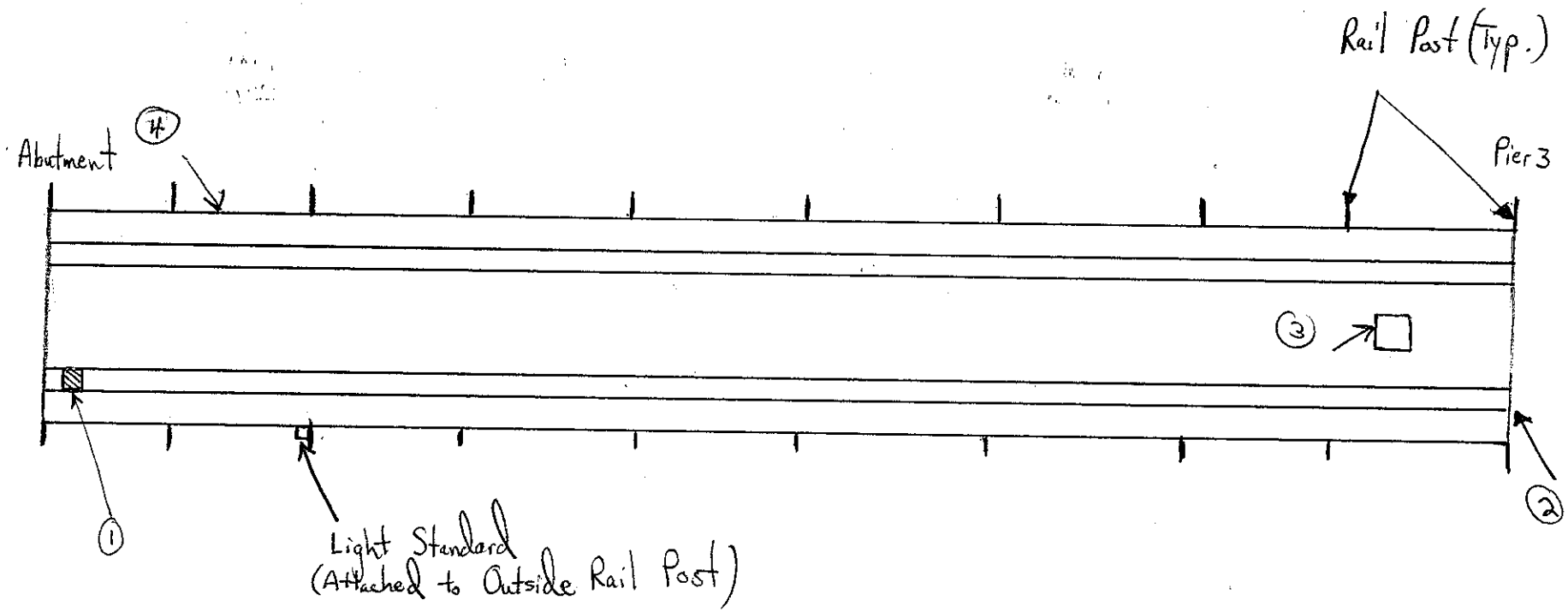
TOP OF DECK

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN
CONSULTING ENGINEERS

JOB #1784	DATE: 10/19/94
CREW: BH, APB, PWN	SHEET 3 OF 27



SPAN 4

NOTES:

1. Steel Plate 16" x 18" x 3/8" on deck loose (able to remove it)
2. Measurement taken of gap between floor beam's top flanges on Pier 3 (1 5/8" , x)(Meas. thru grating)
3. Steel grating panel door for access to oil tanker from deck not latched.
4. Steel grating for fencing on 3rd panel bent or damaged.

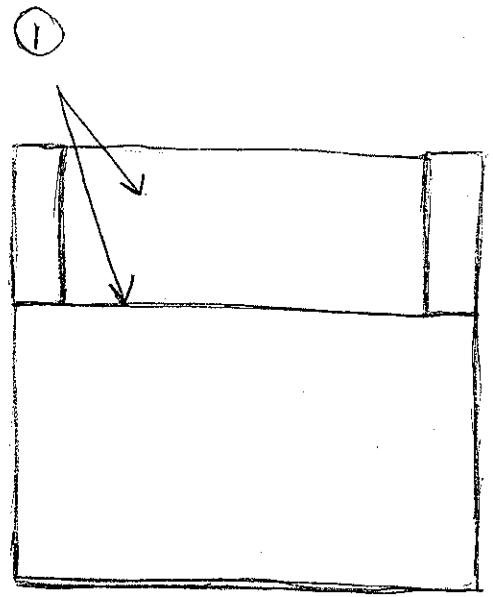
TOP OF DECK

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS

JOB #1784	DATE: 10/19/94
CREW: BH, APB, PWN	SHEET 4 OF 27



S. Abutment

NOTES:

1 Rust Stains on backwall and bearing seat of Abutment NH1-23, Remainder of Abut. O.K.

FIELD NOTES

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN
CONSULTING ENGINEERS

JOB #1784 | DATE: 10/19/94
CREW: BH, APB, PWN | SHEET 5 OF 27

A.G. LICHTENSTEIN

Consulting Engineers

JOB 1784 North Hartland Bridge Insp.

SHEET NO. C6 OF 27

CALCULATED BY CREW BH, PWN, APB DATE 10-19-94

CHECKED BY _____ DATE _____

SCALE _____

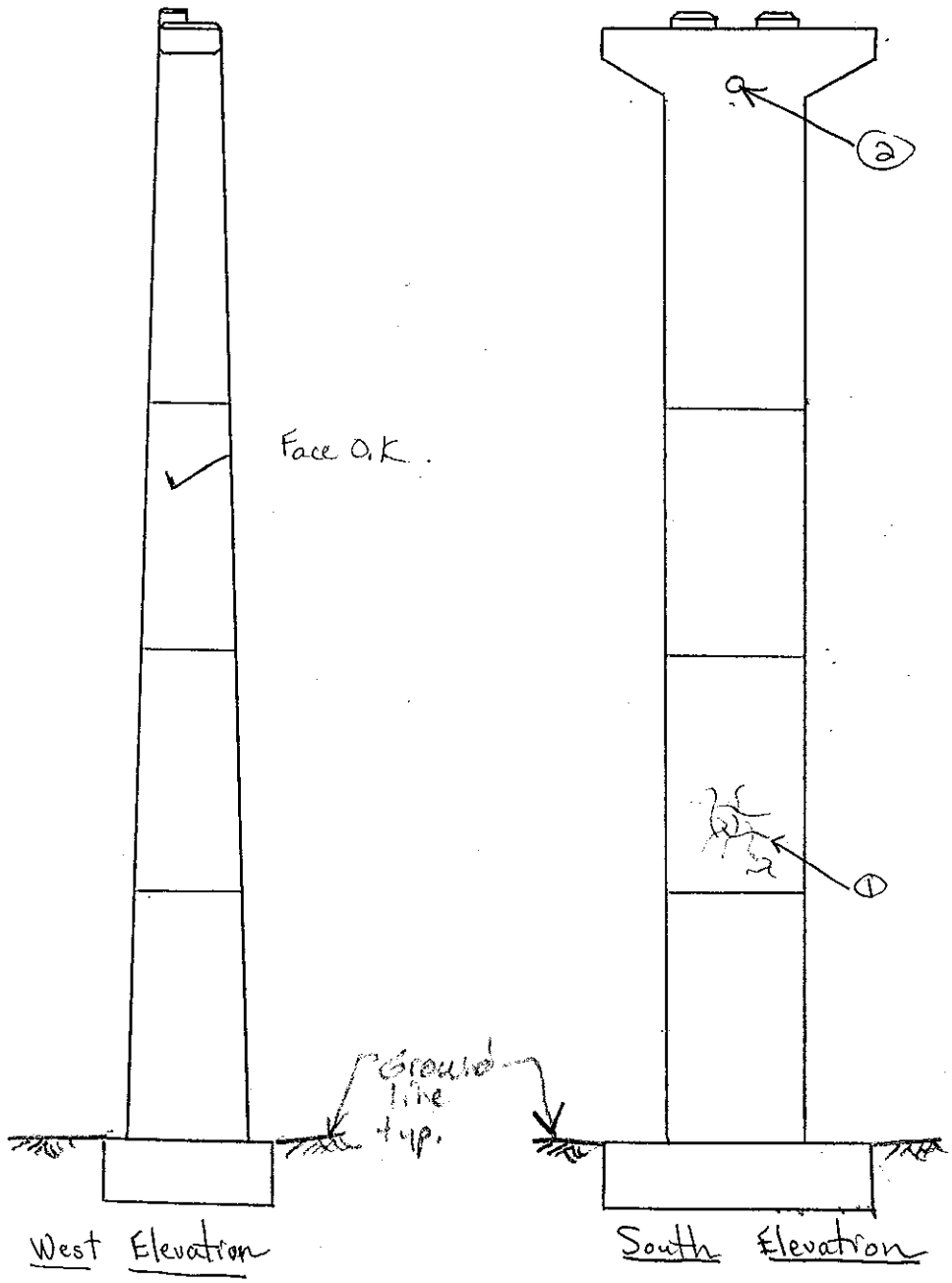
PIER 1

EAST PEDESTAL : 4"Ø SPALL 1" DEEP N.E. CORNER → NO UNDERMINING OF BEARING

SPAN 2 NH2-21

FIELD NOTES

	JOB NO. 1784	BRIDGE NO. N. Hartland
	DATE 10/19/94	SHEET 7 of 27
PREPARED BY: A.G. LICHTENSTEIN	CREW BH, APB, PWN	



(Surrounding Concrete is sound)

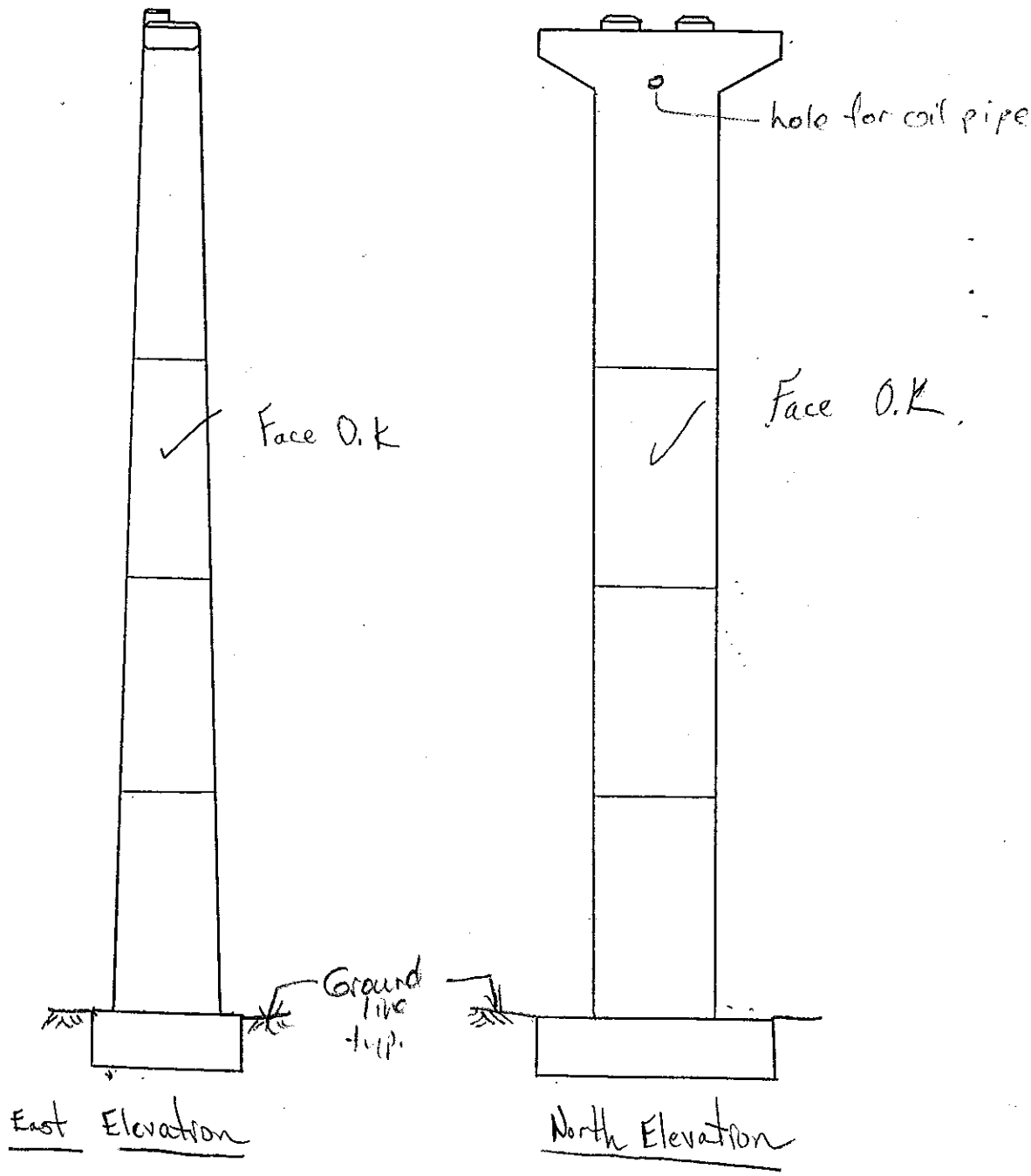
① Small Area 1.5' x 2' of Map Cracking NH1-12

② Rust stains due to negligible corrosion of metal conduit at Pier NH1-16

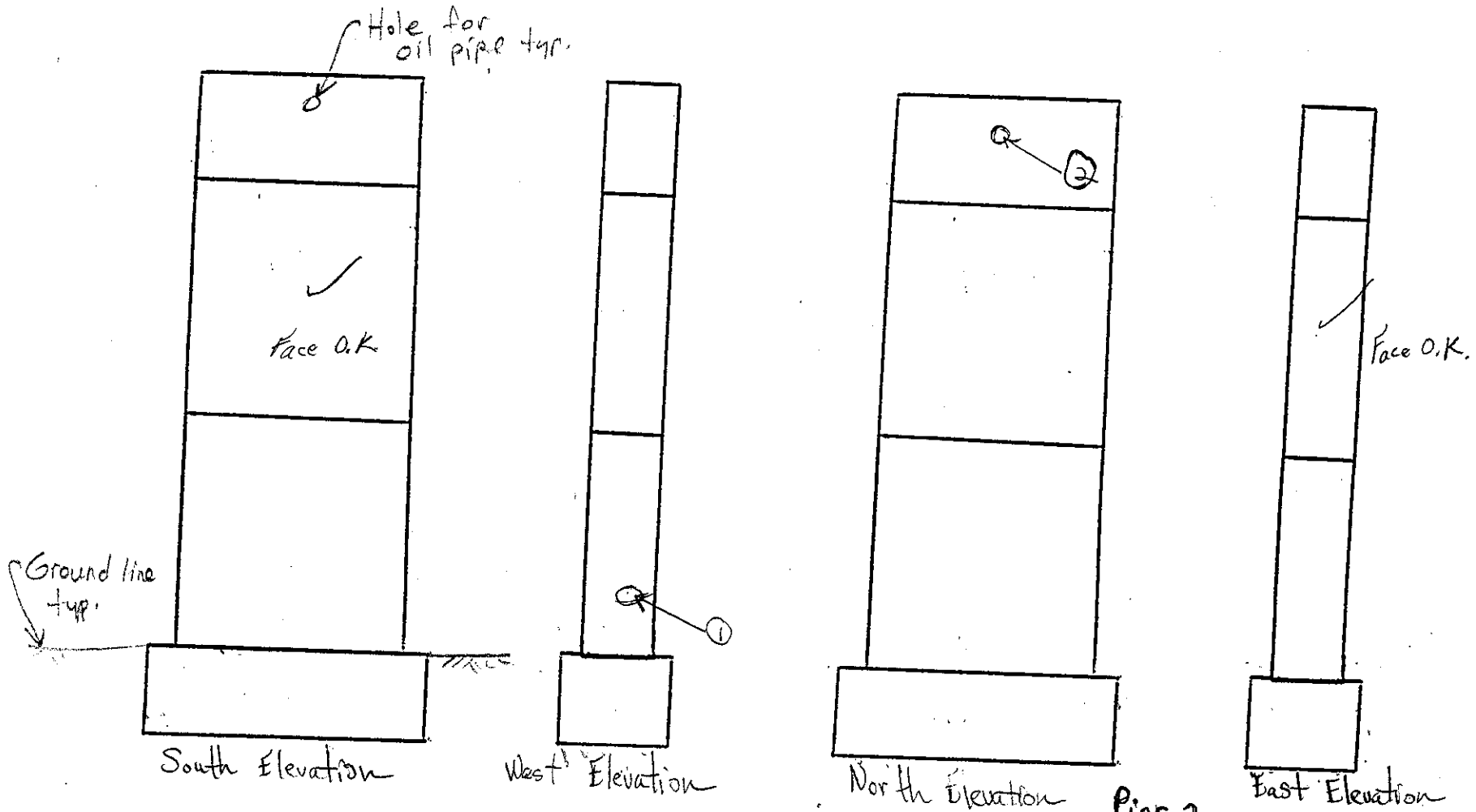
(Pipe probably not painted inside Pier)

Pier 1

FIELD NOTES	JOB NO. 1784	BRIDGE NO. N. Hartland
	DATE 10/19/94	SHEET 8 of 27
PREPARED BY: A.G. LICHTENSTEIN	CREW BH, APB, PWN	



Pier 1



NOTES:

① Small Area 5" x 8" x ½" deep of spalled concrete NH1-15

② Rust stains due to negligible corrosion of metal conduit at Pier on North Elevation NH1-17 (Pipe probably not painted inside pier

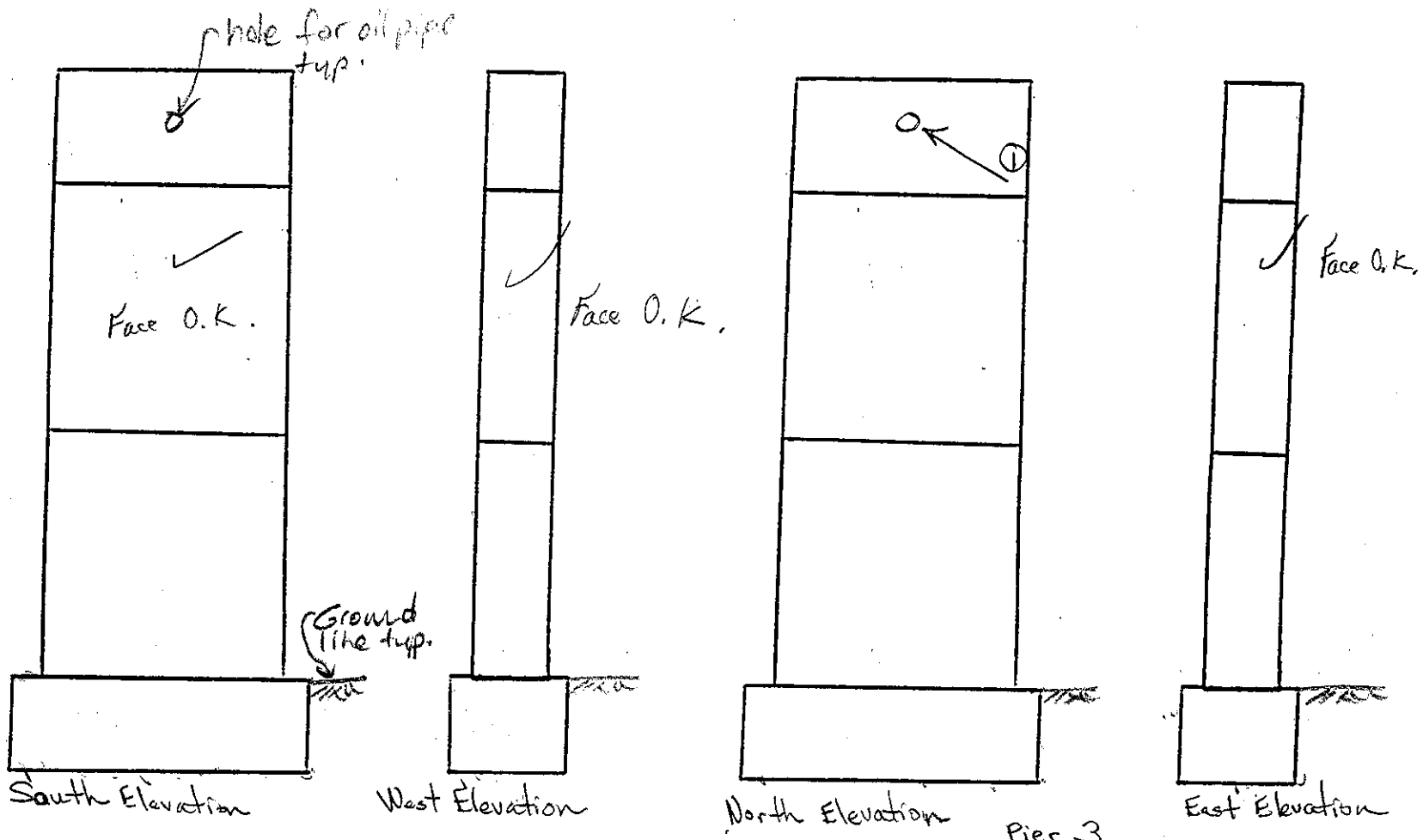
FIELD NOTES

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN
CONSULTING ENGINEERS

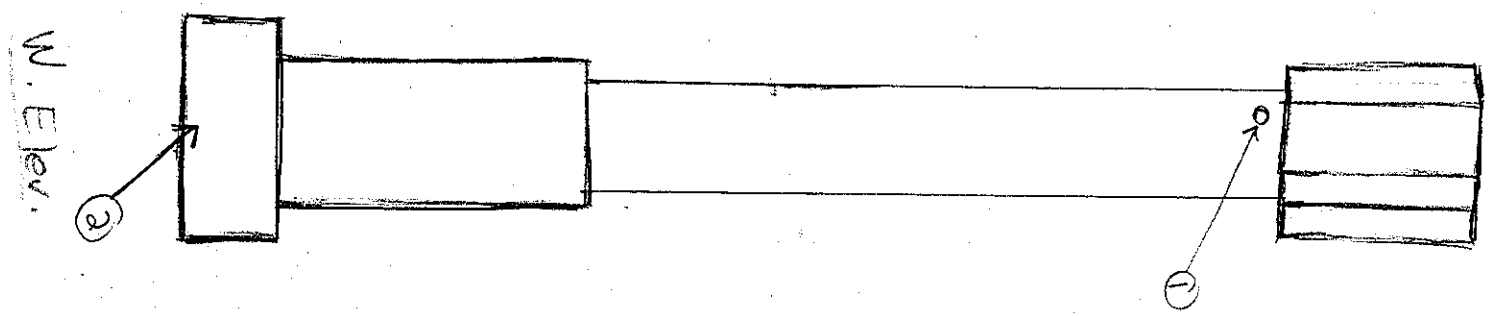
JOB #1784 | DATE: 10/19/94
CREW: BH, APB, DWN | SHEET 9 OF 27



NOTES:

1. Rust stain due to negligible corrosion of metal conduit on North face of Pier 3 NH1-19 (Pipe probably not painted in place)

FIELD NOTES	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10/19/94
CREW: BH, RPB, PWN	SHEET 10 OF 27



All faces of tower O.K.

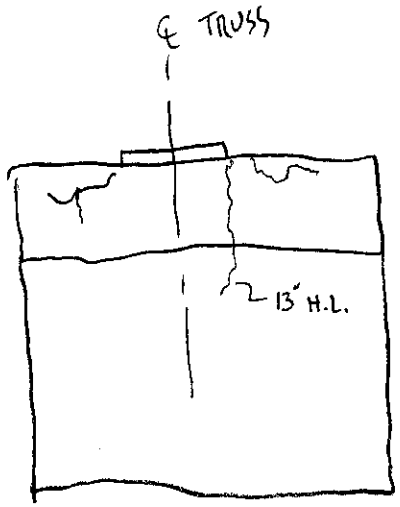
Control Tower

NOTES: ① Rust stains due to negligible corrosion of metal conduit on North face and South face of control tower.
② Tree limbs and debris found in grate opening below the base of control tower.

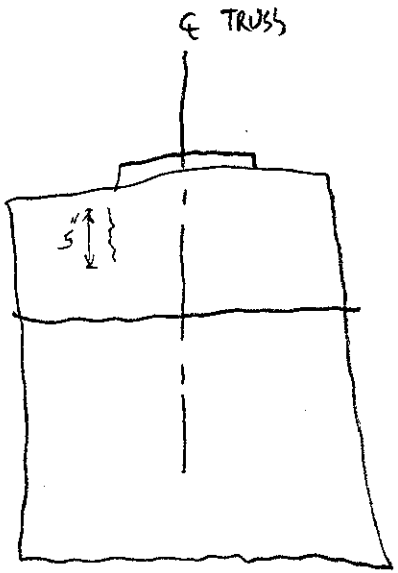
(Pipe probably not painted in pier)

FIELD NOTES	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10/19/94
CREW: BH, APB PWN	SHEET 11 OF 27

11/30



PEDESTAL @ W. BEARING
@ TOWER

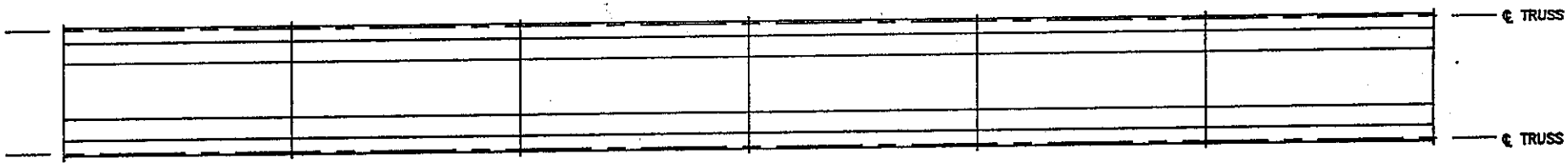


PEDESTAL AT E. BEARING
@ TOWER

* All cracks hairline unless noted

NOTES:

FIELD NOTES	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10-19-94
CREW: PWN, BH, APB	SHEET 12 OF 27



13/30

*For all notes on truss framing see truss elev. field notes sheets 17 & 18 of 27, 10-19-94

Truss Framing

SPAN 4

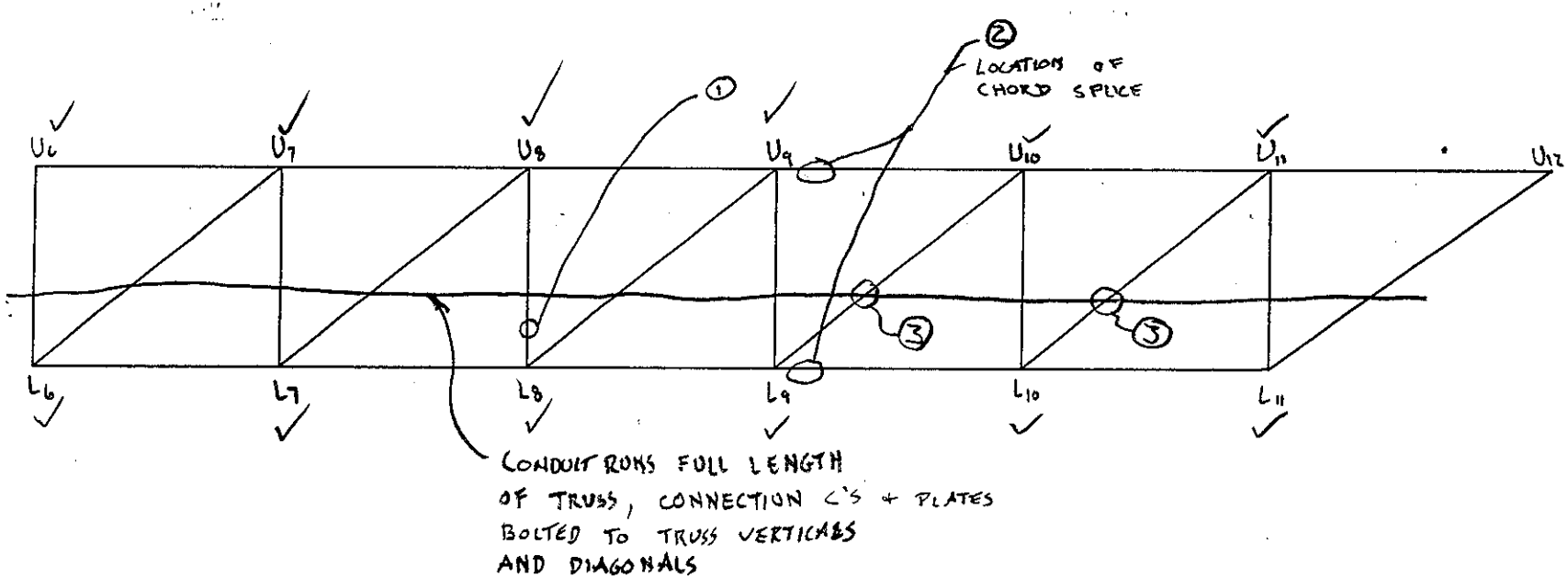
NOTES:

SUPERSTRUCTURE	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10-20-94
CREW: BH, PWW, AHB	SHEET 2 OF 3

Typical Conditions
- Welded seat angle to floor beam and sway brace gusset pl. at all upper panel points NHZ-2
- Blind bolt holes in top chord at floor beams NHZ-3

} East & West Trusses

All notes for west truss, East truss o.k. unless noted



W TRUSS
E ELEVATION

NOTES:
1. APPARENT CONSTRUCTION DAMAGE ON OUTSTANDING LEG OF VERTICAL (EAST TRUSS) ≈ 3' UP FROM BOTTOM CHORD, Bent 3/8" OVER 6" SOUTH NHZ-10
2. 3/16" PL @ SPLICE PLATES BETWEEN ∠ + SPLICE PLATES TYP E + W TRUSS NHZ-11 NHZ-12
3. UTILITY CONN. ∠ WELDED TO DIAGONAL NHZ-13

SUPERSTRUCTURE

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS

JOB #1784 | DATE: 10-19-94
CREW: PWN, BA, AAB | SHEET 17 OF 27

14/30

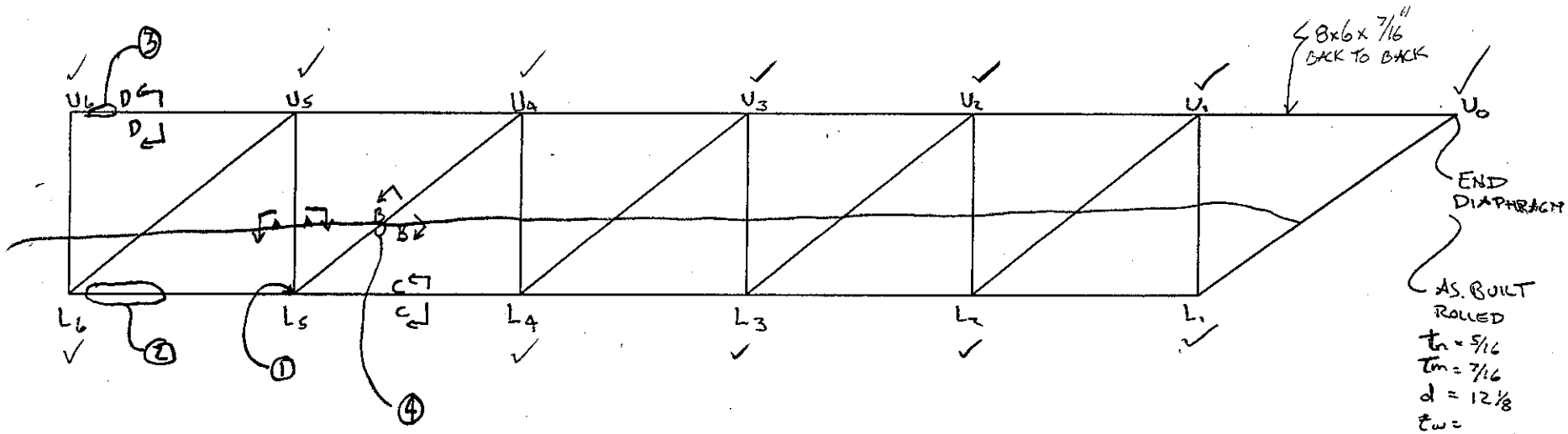
26

TYPICAL CONDITIONS:

- WELDED SEAT ANGLE TO FLOOR BEAM and Sway Brace gusset PL AT ALL UPPER PANEL POINTS NH2-2
- EMPTY BOLT HOLES IN TOP CHORD @ FLOOR BEAMS NH2-3

All notes for West Truss, East truss O.K. unless noted

East & West Trusses



$t_N = 1/4$"
$b_f = 5\ 5/16$
$t_n = 5/16$
$d = 4$"

SEC AA

SEC BB

∠ 4x3x 5/16 BACK TO BACK

SEC CC

∠ 6x4x 9/16 BACK TO BACK

SEC DD

∠ 8x6x ½" BACK TO BACK

W TRUSS
W ELEVATION

NOTES:

① Apparent CONSTRUCTION DAMAGE @ LATERAL BRACING ∠, ¼" BEND FOR 5" LONG 1½" FROM ℄ TRUSS L5 - WEST TRUSS NH2-5

② LOCATION OF BOTTOM CHORD SPLICE ~ BOLTED

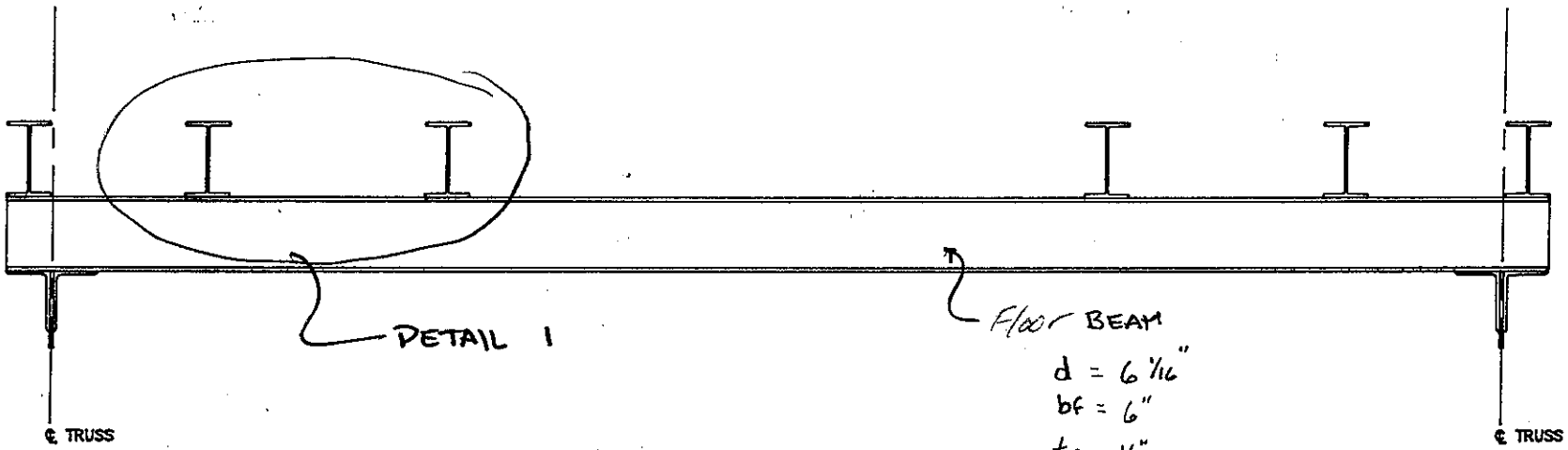
③ LOCATION OF UPPER CHORD BOLTED SPLICE

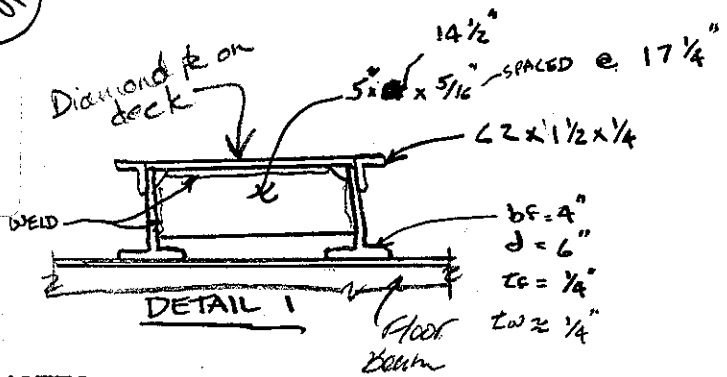
④ WELDED UTILITY CONN. ∠ TO DIAGONAL L5U4 NH2-17

SUPERSTRUCTURE	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10/19/94
CREW: PWN, BH, APB	SHEET 18 OF 27

27

30





SPAN TRUSS
FLOORBEAM ___
___ ELEVATION

NOTES:

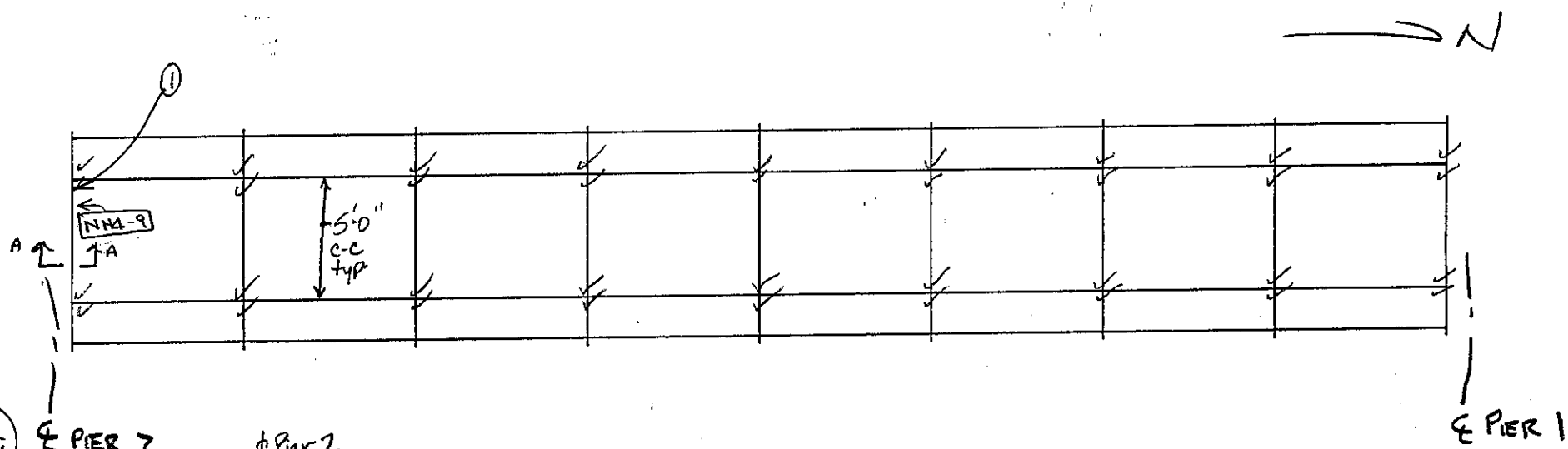
SUPERSTRUCTURE

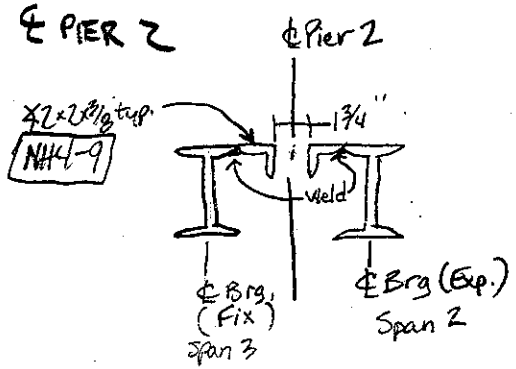
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN
CONSULTING ENGINEERS

JOB #1784 | DATE: 10-19-94
CREW: PWN, PH, APB | SHEET 13 OF 27





SPAN 2

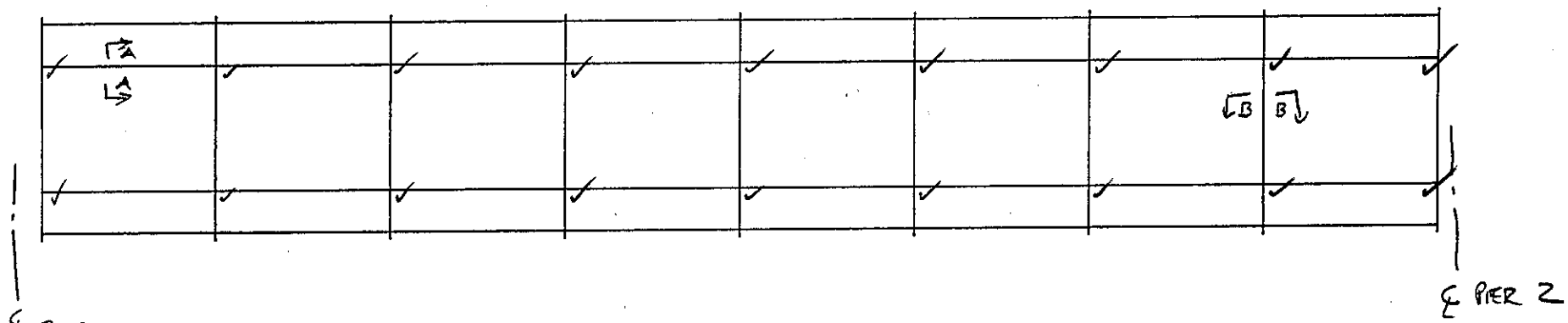
NOTES:

① Typ. for end floor beams over Abut., Piers 2 and 3: 3-1' ø fabrication holes in web centered vertically and edge of 1st & last hole start 6" from stringer NH4-10

SUPERSTRUCTURE	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10-19-94
CREW: BH, RWN, APB	SHEET 14 OF 27

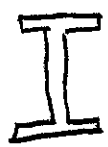
- TYPICAL - FLOORBEAMS WELDED ALL AROUND NH4-5 (interior)
- TYP. LAT. X BRACING WELDED TO Bottom of GIRDER TOP FLANGE NH4-6
- TYP WELDED UTILITY BRACKET TO Top of BOTT FE GIRDER NH4-7

N →



$t_w = 1/2''$
$d = 27''$
$b_f = 10''$
$t_n = 5/8''$
$t_m = 3/4''$

SEC A.A



$t_w \approx 1/2''$
$d = 16''$
$b_f = 7''$
$t_n = 5/16$
$t_m = 7/16$

SEC BB

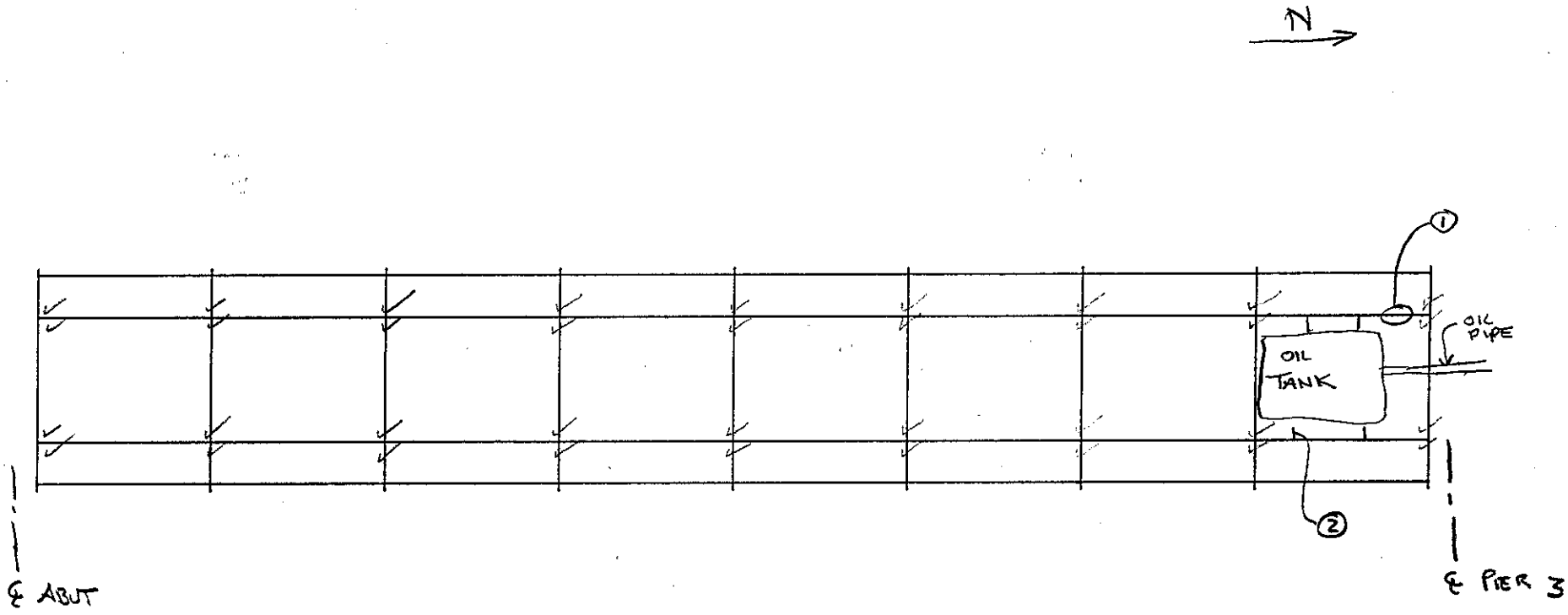
SPAN 3

NOTES:

SUPERSTRUCTURE	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10-19-84
CREW: BH, RWN, APB	SHEET 15 OF 27

30

30

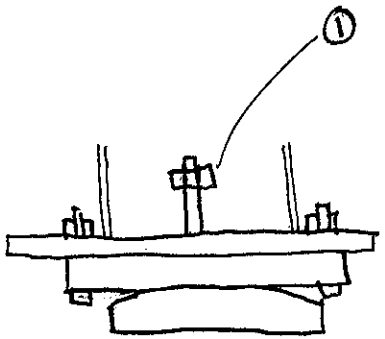


SPAN 4

NOTES:

1. WELDED girder SPLICE NH4-2 WELDED ALL AROUND
2. STIFFENERS WELDED ALL AROUND ON GIRDER ABOVE SUSPENDED OIL TANK

SUPERSTRUCTURE	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10-19-94
CREW: PWW, BH, APB	SHEET 16 OF 27



W. BEARING E. ELEV @
TOWER

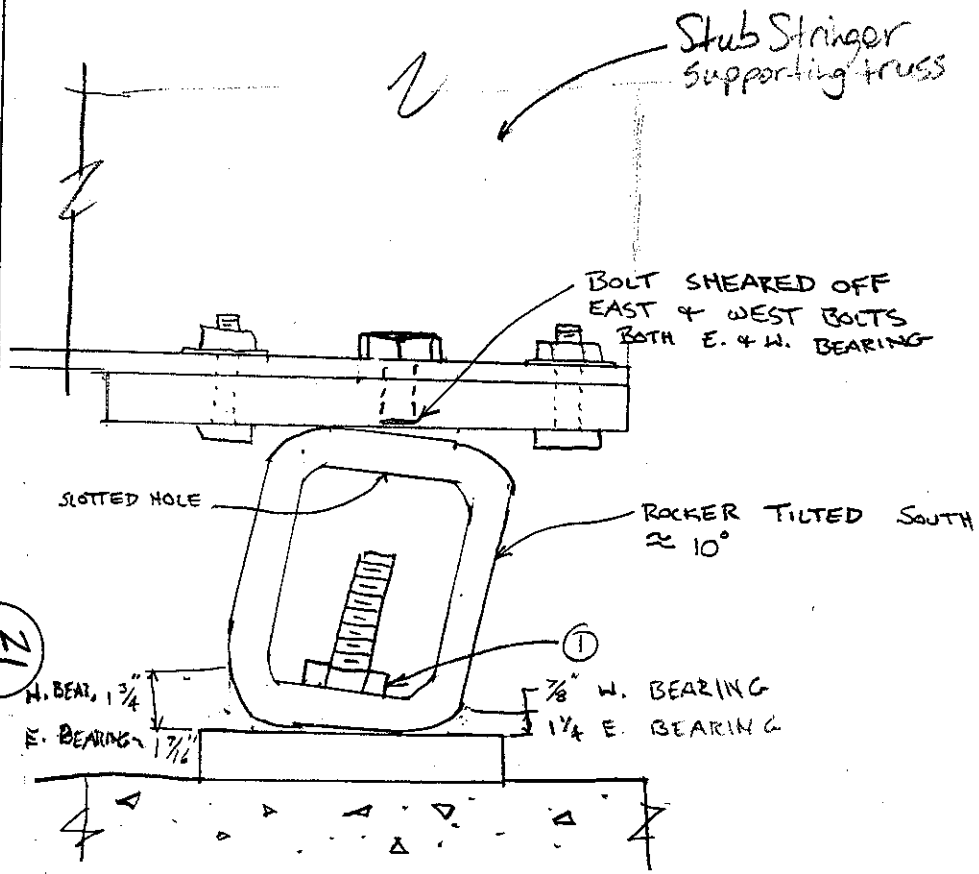
SPAN 1
E & W. BEARING
@ CONTROL TOWER

NO SIGNS OF MOVEMENT TYP. E & W. BEARINGS

NOTES:

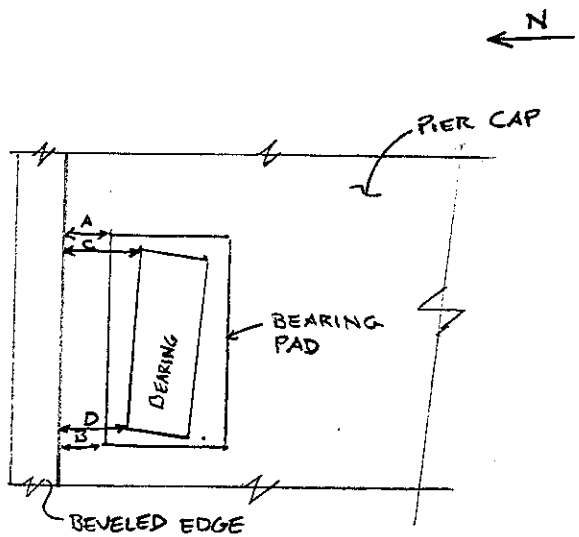
1. ANCHOR BOLT NUT NOT THREADED TIGHT
2. GLOBS OF PAINT ON TOP OF E. CONC. PEDESTAL

FIELD NOTES	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10/19/94
CREW: PWN, BW, APD	SHEET 19 OF 27



W. ELEV W. BEARING TO TRUSS @ PIER 1

BEARING IS SKEWED
BOTH E. & W. BEARINGS



PLAN

SPAN 1
PIER 1
E & W. BEARINGS

NOTES:

MEASUREMENTS	E. BEARING	W. BEARING
A	4 3/8"	3 1/2"
B	4 1/8"	3 3/4"
C	5 5/8"	5 1/4"
D	5 1/8"	5 1/2

① E. nut, W. Brg; E & W nut, E. Brg. gap btwn. nut and bearing (Nut not threaded all the way down)

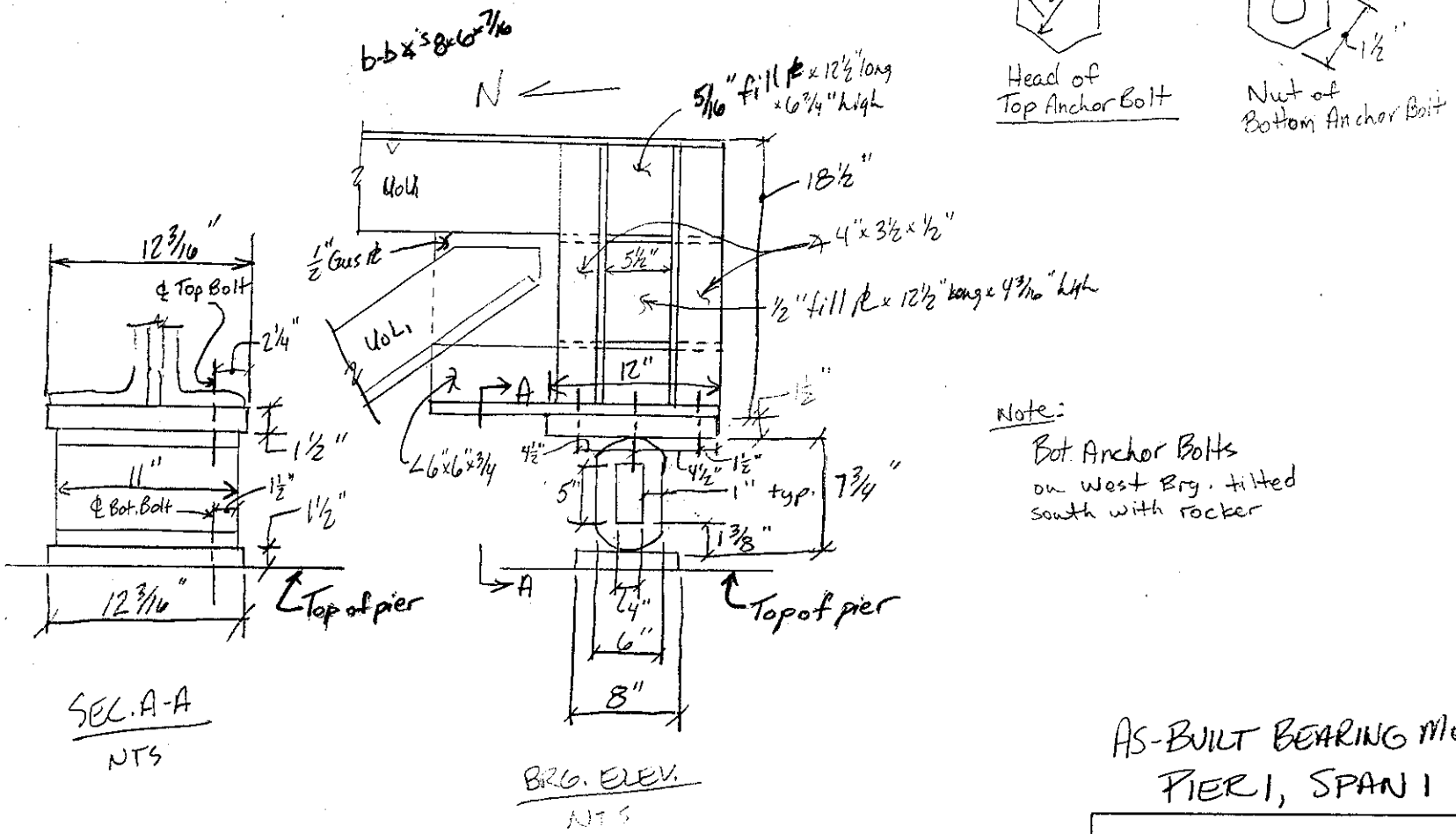
FIELD NOTES

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN
CONSULTING ENGINEERS

JOB #1784 | DATE: 10-19-94
CREW: BH, PWN, APB | SHEET 20 OF 27



SEC. A-A
NTS

BRG. ELEV.
NTS

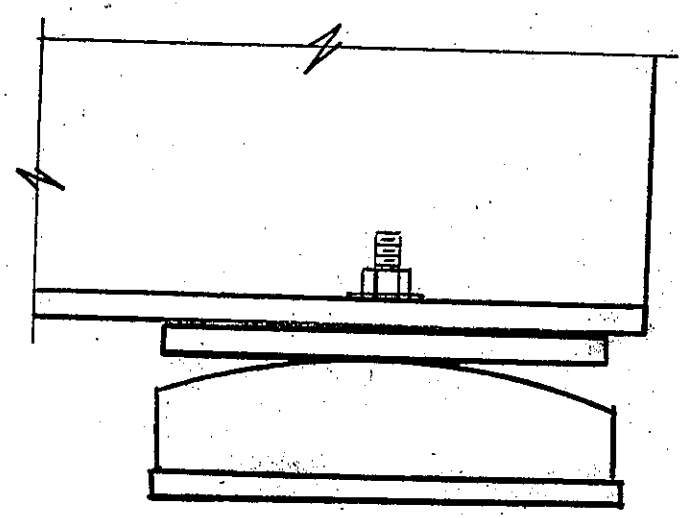
AS-BUILT BEARING MEASURE.
PIER 1, SPAN 1

NOTES:

FIELD NOTES	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10-20-94
CREW: AH, PWW, APB	SHEET 3 OF 3

22/30

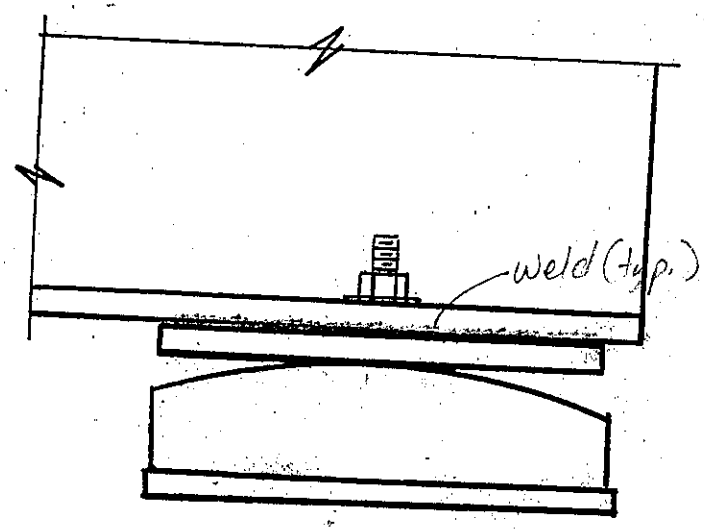
34



FIXED
PIER 1
E + W BEARINGS
SPAN 2

NOTES: - NO SIGNS OF MOVEMENT
- TYPICAL WELD BETWEEN BEARING PL + BOTT FL GIRDER
① 1/8" GAP BETWEEN NUT + WASHER W NUT OF WEST BEARING

FIELD NOTES	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10/19/94
CREW: RWJ, BH, APB	SHEET 21 OF 27

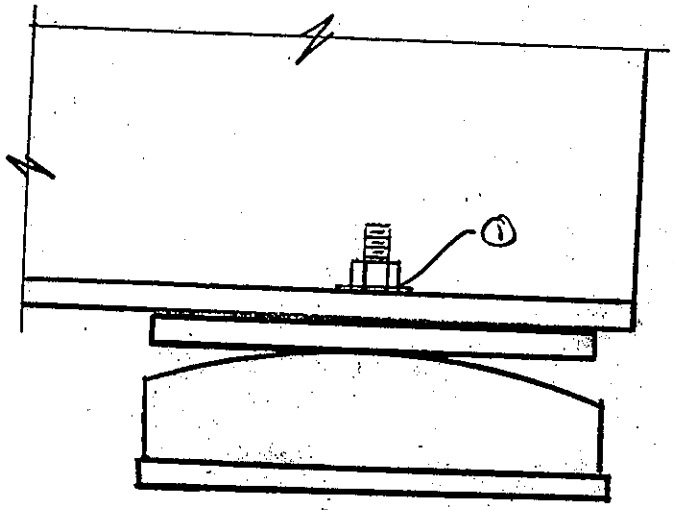


NH4-8

EXPANSION
PIER 2
E & W BEARINGS
SPAN 2

NOTES: - NO SIGNS OF MOVEMENT TYPICAL, PAINT SEALED BTWEEN ANCHOR BOLT & SLOTTED HOLE
- TYPICAL WELD BETWEEN BEARING R & BOTTOM FL GIRDER

FIELD NOTES	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10/19/94
CREW: PWN, BH, APB	SHEET 22 OF 27



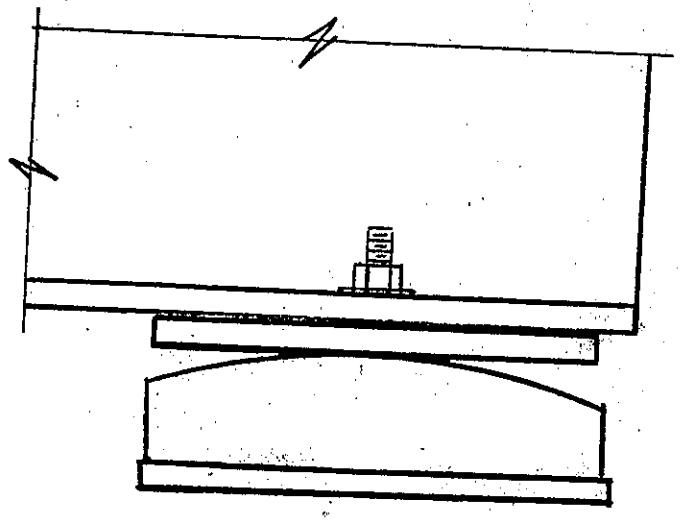
FIXED
PIER 2
E & W BEARINGS
SPAN 3

NOTES: NO SIGNS OF MOVEMENT TYP
TYP. WELDED BEARING R TO BOTT E GIRDER

1 5 WASHERS E. OF W BEARING ANCHOR BOLT
3 WASHERS W. OF E. BEARING ANCHOR BOLT

FIELD NOTES	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10/19/96
CREW: RON, BH, ARB	SHEET 23 OF 27

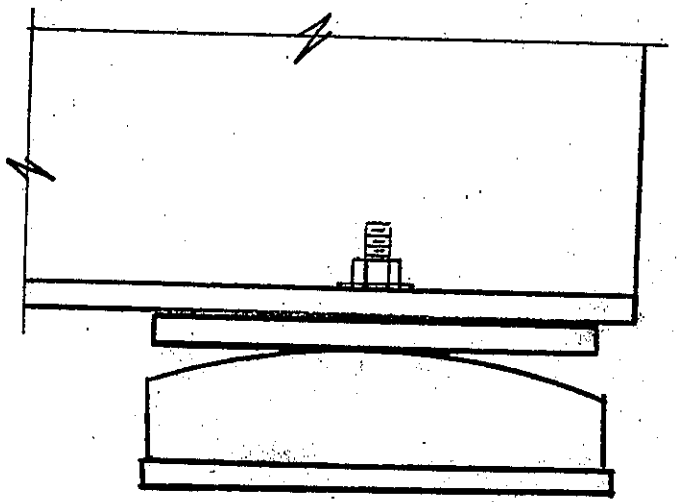
25/30



PIER 3
SPAN 3
E. & W. BEARING
EXPANSION

NOTES: - NO SIGNS OF MOVEMENT - PAINT STILL SEALED BETWEEN BOLT & SLOT (TYP.)
- TYP. WELD BETWEEN BEARING PL & BOTTOM FL NH4-4

FIELD NOTES	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10/19/94
CREW: RWM, BH, APB	SHEET 24 OF 27



PIER 3
SPAN 4
E. & W. BEARINGS
FIXED

NOTES: - NO SIGNS OF MOVEMENT
- TYPICAL WELD BETWEEN BEARING PAD & BOTTOM FE GIRDER

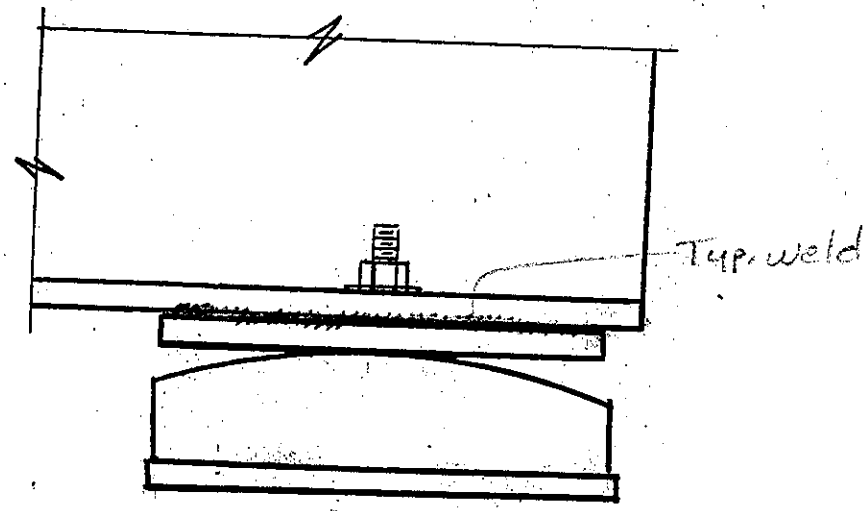
FIELD NOTES

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN
CONSULTING ENGINEERS

JOB #1784 | DATE: 10/19/94
CREW: PWN, BN, AB3 | SHEET 25 OF 27

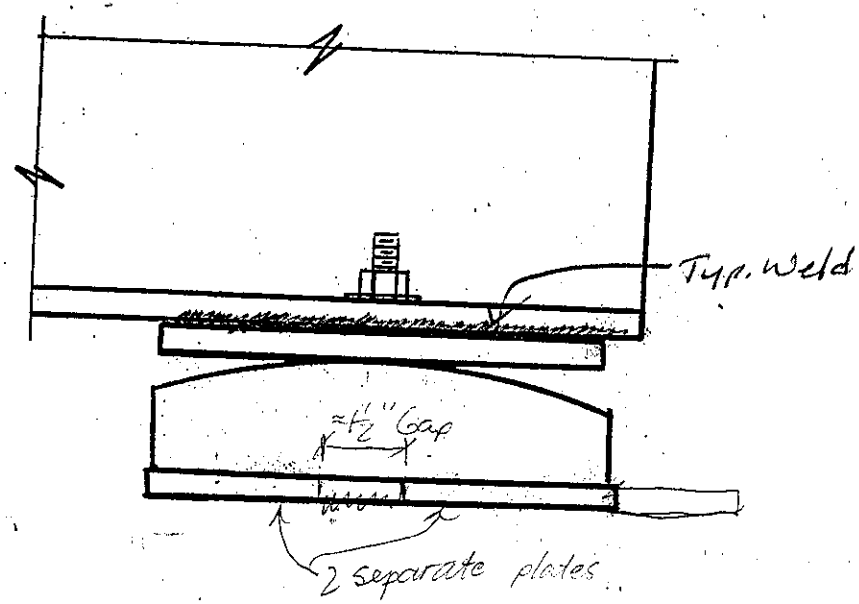


Bearing at West Side of Abutment

SPAN 4
ABUTMENT
W. BEARING

NOTES:

FIELD NOTES	
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	
NORTH HARTLAND DAM SERVICE BRIDGE	
NOTES BY: LICHTENSTEIN CONSULTING ENGINEERS	
JOB #1784	DATE: 10/19/94
CREW: BH, APB, PWN	SHEET 26 OF 27



Bearing at East Side of Abutment

SPAN 4
ABUTMENT
E. BEARING

NOTES:

FIELD NOTES

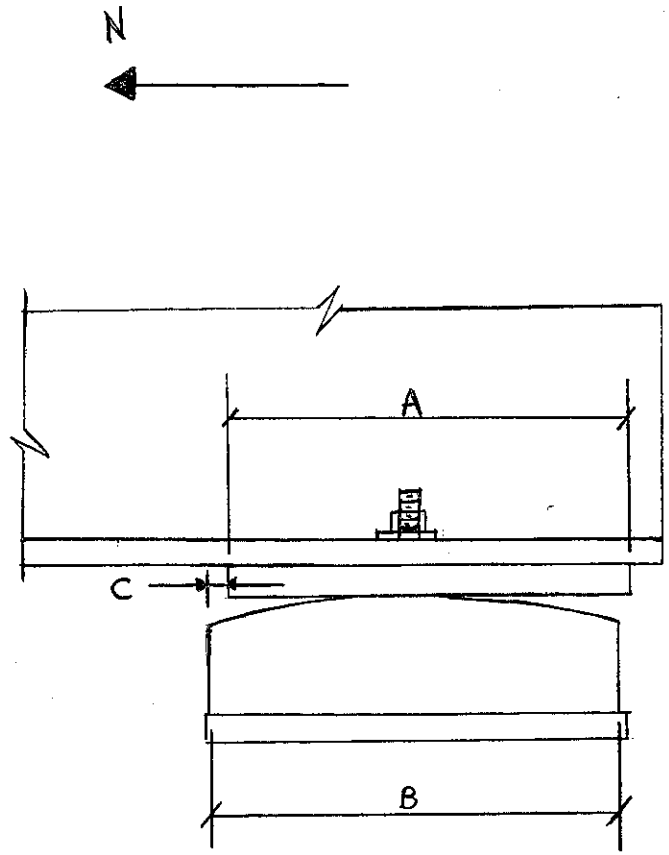
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN
CONSULTING ENGINEERS

JOB #1784 | DATE: 10/19/94
CREW: BH, APB, RWN | SHEET 27 OF 27

29
30



Expansion Bearings

Location	Measurement A	B	C
Pier 2 Span 2 (E)	6"	6"	1/16"
Pier 2 Span 2 (W)	6"	6"	- 3/16"
Pier 3 Span 3 (E)	6"	6"	1/8"
Pier 3 Span 3 (W)	6"	6"	0"
South Abutment (E)	6"	6"	1/4"
South Abutment (W)	6"	6"	1/8"

NOTES:

FIELD NOTES

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

NORTH HARTLAND DAM
SERVICE BRIDGE

NOTES BY: LICHTENSTEIN
CONSULTING ENGINEERS

JOB #1784 | DATE: 10/20/94

CREW: BH, PWJ, APB | SHEET 1 OF 3

30

IX. RATING ANALYSIS
(By Others)

Service Bridge Rating Analysis

North Hartland Service Bridge
North Hartland Dam
North Hartland VT

29 Apr 1994

Vehicle: 10 Ton light duty vehicle with 2 axles 10 feet apart due to limited access

Rating Summary:

	Inventory	Operating
Truss span		
Sringers	44.8	61.2
Floor Beams	14.8	21.0
Truss Member	18.9	29.5
Girder Span		
Girder	21.5	31.9

Rating:

Inventory	14.8 T
Operating	21.0 T

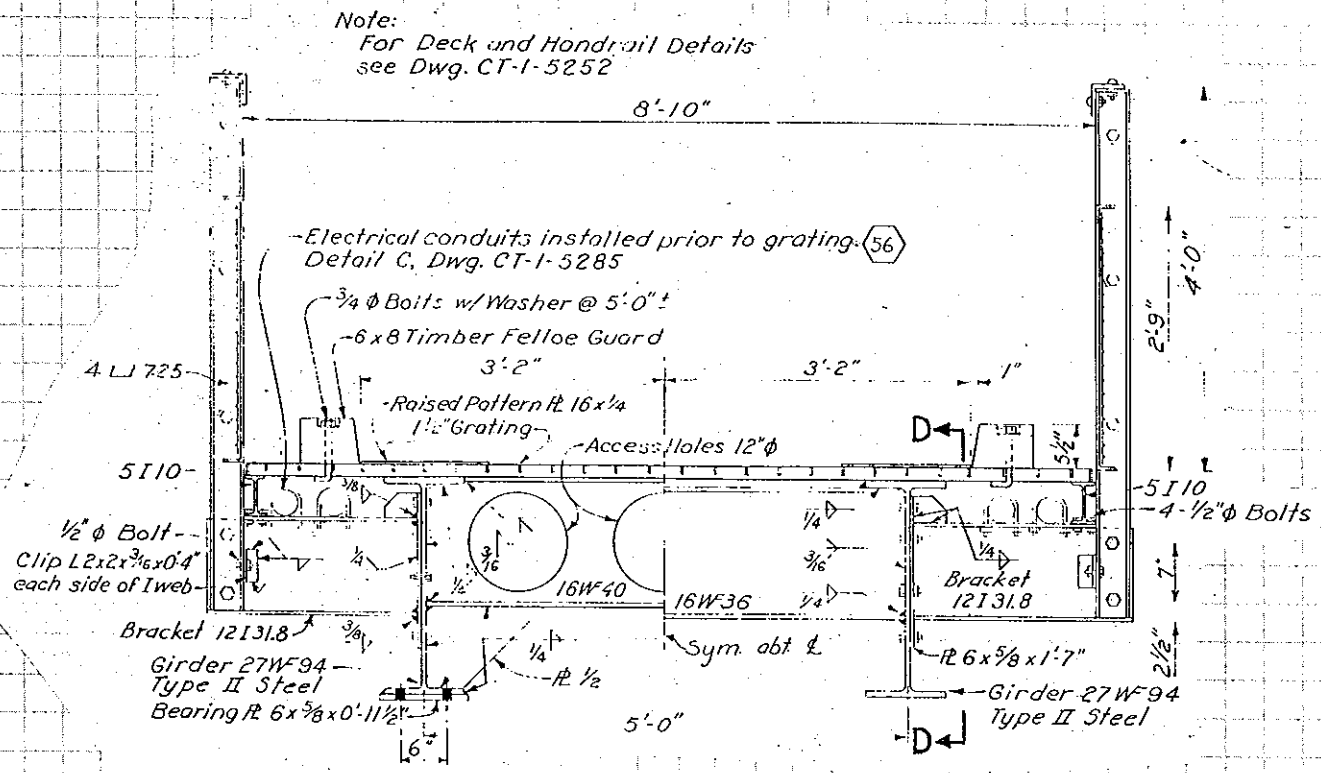
NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

PAGE 1

SUBJECT NORTH HARTLAND SERVICE BRIDGE
COMPUTATION BRIDGE RATING ANALYSIS
COMPUTED BY M.D. CHECKED BY DATE 4/19/94

APPROACH SPANS $L_{C\,MAX}$ = 59'-10"



ROADWAY WIDTH RESTRICTS ACCESS TO H-TYPE VEHICLES

DETERMINE CAPACITY OF ROAD GRATING IN PSF

BEARING BARS 1¼ x 3/16

$I = 0.031\ in^4$

$S = 0.049\ in^3$

$f_b = 18\ ksi$

$M_{MAX} = 18(0.049) = 0.882\ in\cdot k$

$= 0.074\ ft\cdot k/bar$

$10\ bars/ft = 0.74\ ft\cdot k/ft$

$M_{MAX} = 0.74 = \frac{W(l^2)}{8}$ $\quad l = 5'0" - \left(\frac{9.9}{12}\right) = 4.175'$

$W_{MAX} = \frac{.74(8)}{l^2} = 0.34\ k/ft = \underline{\underline{340\ lb/ft^2}}$

NED FORM 225
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

PAGE 2

SUBJECT NORTH HARTLAND SERVICE BRIDGE
COMPUTATION BRIDGE RATING ANALYSIS APPROACH SPANS
COMPUTED BY M.O. CHECKED BY DATE 4/22/94

CALCULATE DEAD LOAD ON GIRDERS 59' 10" SPAN.

RAILINGS	TOP RAIL	L 4x4x 5/16	=	8.2 lb/ft
	MIDDLE RAIL	L 2½x2½x¼	=	4.1 lb/ft
	BASE RAIL	L 2½x2½x¼	=	4.1 lb/ft
	POSTS	(7.25x5)x9/59.83	=	5.5 lb/ft
	MESH	ASSUME 2 lb/ft	=	2.0 lb/ft
				23.9 lb/ft
			SAY	25 lb/ft
BRACKETS	(2.25)(31.8)(9)/59.83			10.8 lb/ft
5I 10				10 lb/ft
DIAPHRAGMS	36(2.5)(5)/59.83			13.5 lb/ft
DECK	(4.415)(11 5/16)(10.16 bms/ft)			44.6 lb/ft
DL OF GIRDER	94 lb/ft			94 lb/ft
WIND BRACING	(4.9)(8.8)(8)/59.83			15.8 lb/ft
				203.7 lb/ft

DL MOMENT = $\frac{wL^2}{8} = \frac{(.204)(59.83)^2}{8}$ 91.3 k.ft

DL STRESS ON GIRDER $f = \frac{91.3(12)}{243.} = 4.5$ ksi

$f_{allowable}$ = 18 ksi

f_{AVAIL} FOR LL = 18 - 4.5 = 13.5 KSI INVENTORY

f_{AVAIL} FOR LL = 24.5 - 4.5 = 20.0 KSI OPER.

SUBJECT NORTH HARTLAND
COMPUTATION BRIDGE RATING ANALYSIS
COMPUTED BY M.D CHECKED BY DATE 4/22/94

LIVE LOAD STRESSES:

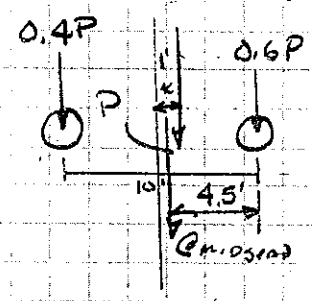
SINCE THE DECK IS NOT WIDE ENOUGH FOR H-TYPE TRUCK, ALTERNATIVE TRUCK LOAD WILL NEED TO BE ASSUMED DUE TO ODD LOADING, MAX WT OF TRUCK WILL BE DETERMINED, TRUCK IS ASSUMED TO BE TWO AXLE WITH 10' SPACING, VEHICLES OVERWEIGHT THAN GIVEN RATING WILL NEED TO BE ANALYZED ON INDIVIDUAL CASE BY CASE BASIS.

MAX ℄ MOMENT

$13.5\,ksi = \frac{M}{S} = \frac{M}{243\,in^4}$ $M = 273.4$ k.ft INVENTORY

$20.0 = \frac{M}{S} = \frac{M}{243}$ $M = 405.0$ k.ft OPERATING

MAX MOMENT WHEN WHEEL LOADS



MAX MOMENT @ WHEEL 0.6P.

$M_{MAX} = P/2(29.95 - 4.5)$

$P/2(25.45)$

$M_{MAX} = 12.7P$

@ INVENTORY $12.7P = 273.4$

$P = 21.5k$ $\boxed{= 21.5T}$

HIGH DUE TO DESIGN OF BRIDGE AS ERECTION PLATFORM FOR TRUSS SPAN OF THE BRIDGE

@ OPER $12.7P = 405.0$

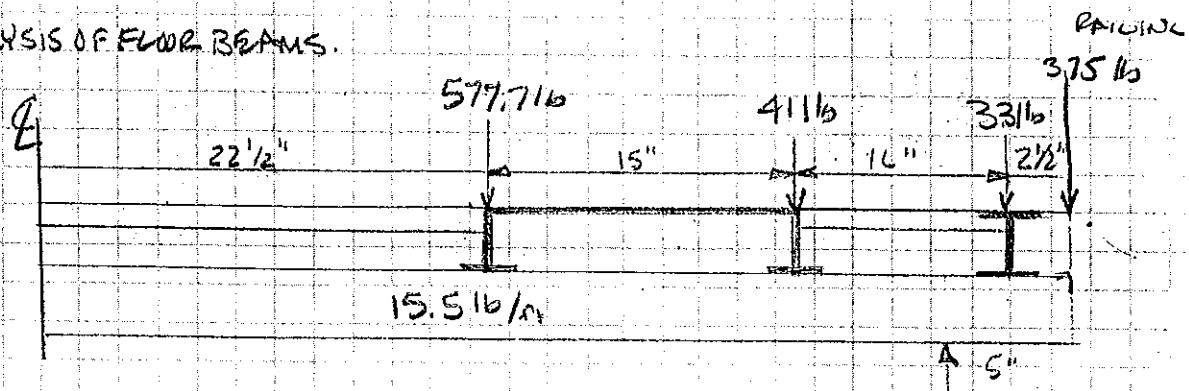
$P = 31.9k$ $= \boxed{31.9T}$

NED FORM 225
27 Sept 49

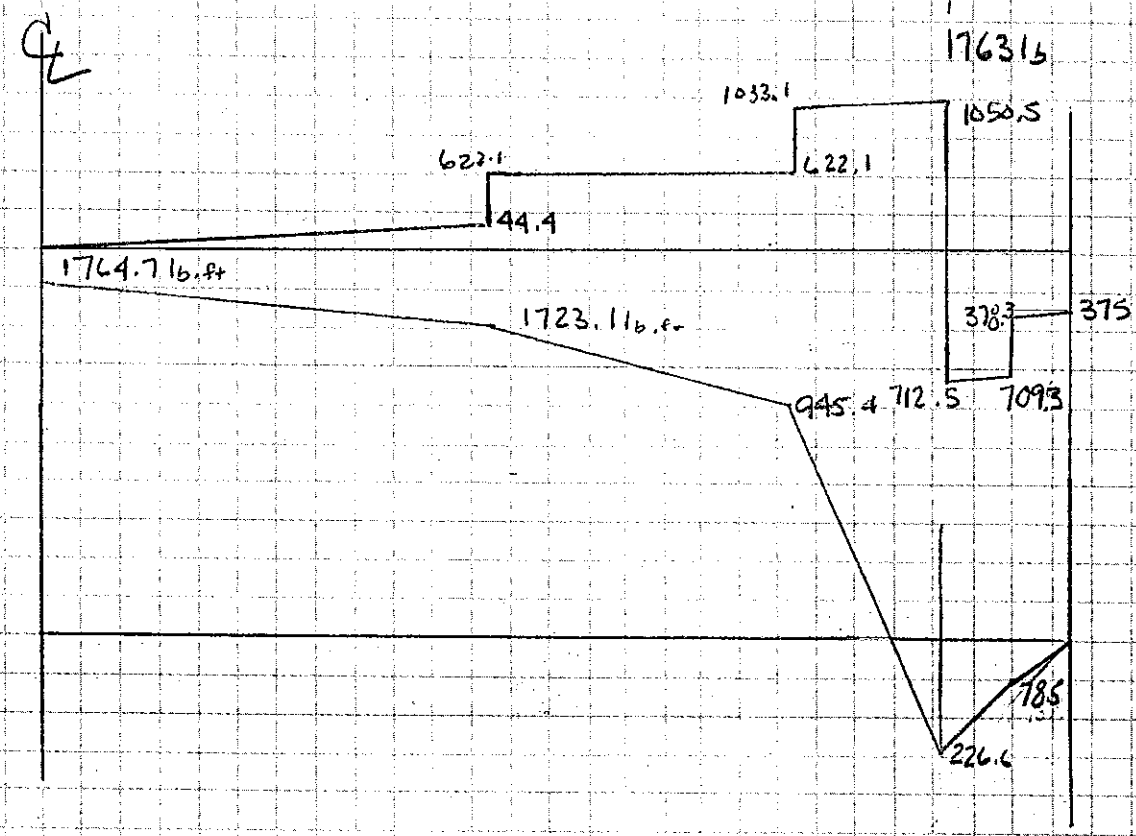
NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT NORTH HARTLAND SERVICE BRIDGE
COMPUTATION BRIDGE RATING ANALYSIS
COMPUTED BY M.D. CHECKED BY DATE 4/22/94

ANALYSIS OF FLOOR BEAMS.



DECK WT 9.1 lb/sf



$V_{MAX} = 1050.5$ lb.

$M_{MAX} = 1765$ lb.ft

NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT NORTH HARTLAND SERVICE BRIDGE
COMPUTATION BRIDGE RATING ANALYSIS
COMPUTED BY M.D. CHECKED BY DATE 4/22/84

$\mathcal{D}$ STRESS $= \dfrac{1.76\,(12)}{(10.1)} = 2.09$ ksi

$\mathcal{D}$ SHEAR $f_v = \dfrac{V}{d(t_w)} = \dfrac{1.05}{(6)(.25)}$ 0.7 ksi

MOM STRESS AVAIL FOR ℄ 18 − 2.09 = 15.91 INV
24.5 − 2.09 = 22.41 OPER

SHEAR STRESS AVAIL FOR ℄ 11 − 0.70 = 10.3 ksi INV
15 − 0.70 = 14.3 ksi OPER.

AVAIL ℄ moment INV $\dfrac{10.1\,(15.91)}{12}$ 13.4 k.ft

OPER $\dfrac{10.1\,(22.41)}{12}$ 18.9 k.ft

AVAIL ℄ SHEAR 10.3 (6)(.25) = 15.5k
14.3 (6)(.25) = 21.5

$M_{MAX} = 13.4 = P(4) - P/2(1.875) - P/2(3.125)$
$4P - .9375P - 1.56P$
INV 13.4 = 1.5P
P = 8.9 k/wheel = $\boxed{14.8T}$

OPER 18.9 = 1.5P
P = 12.6 k/wheel = $\boxed{21.0T}$

SUBJECT NORTH HARTLAND SERVICE BRIDGE
COMPUTATION BRIDGE RATING ANALYSIS
COMPUTED BY N.D CHECKED BY DATE 4/28/94

DL DECK.

GRATING 45" + 15" + 15" 75" 6.25' × 9.1 lb/ft = 57 lb/ft
bars 0.8 lb/ft + .1 lb/ft STIFFNERS 56.88

10.11 bars/ft @ 1 lb/ft = 9.1 lb/sf

FLOOR BEAMS 6 WF 15.5 × 8.83' = 137 lb/beam × 13/180 = 9.89 = 10 lb/ft

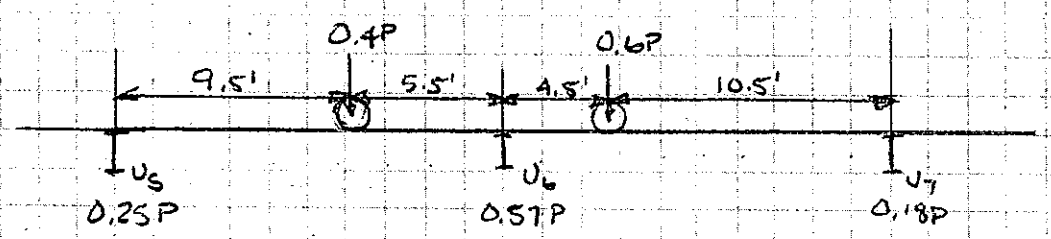
STRINGERS (2) 5 WF 16 = 32 lb/ft
(4) ST L 8.25 33 lb/ft
PLATE 41 lb/ft
STIFFNERS 11.3 lb/ft = 117.3 lb/ft 117.3 lb/ft

RAILING 25 lb/ft 50 lb/ft

234.3 lb/ft

234.3 lb/ft × 15'/panel point = 3514.5 lb/panel point
= 1.76 k/panel point/girder

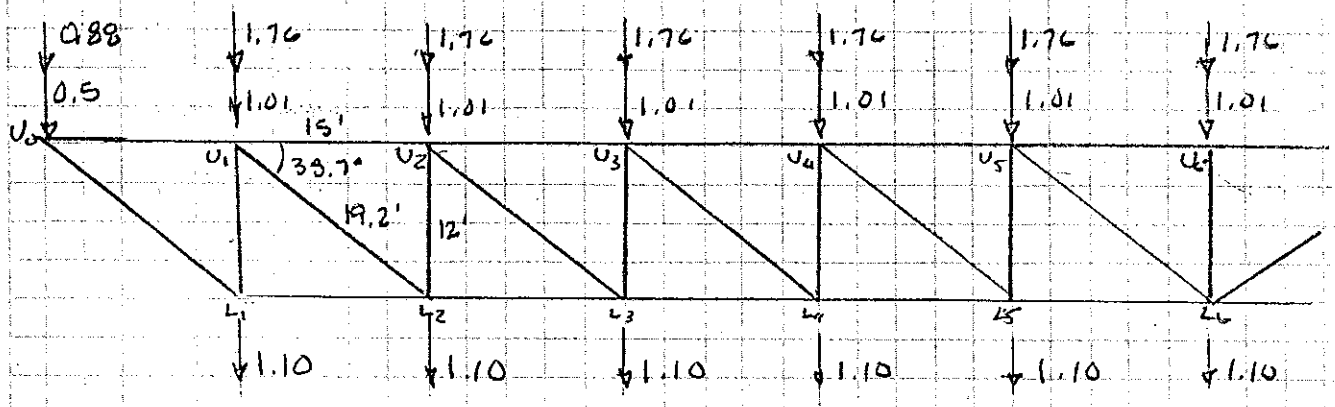
MAX LIVE LOAD USED FOR COMPUTATION.



P = WEIGHT OF TRUCK WHEEL LOAD.

SUBJECT NORTH HARTLAND SERVICE BRIDGE
COMPUTATION BRIDGE RATING ANALYSIS
COMPUTED BY M.D. CHECKED BY DATE 4/28/94

DEAD LOAD ON TRUSS



TRUSS DL

DIAGONALS	10(14.4)(19.2)	2765
END	2(24.6)(19.2)	944
VERTICALS	11(20)(12)	2640
BOT CHORD 1	(24.6)(60)	1476
BOT CHORD 2	(36.2)(90)	3258
TOP CHORD 1	(40.4)(90)	3636
TOP CHORD 2	(46)(90)	4140
		18860 # /TRUSS

BRACING

LOWER STRUTS	11(8)(5.8)	510
LOWER BRACING	20(17)(4.5)	1530
CROSS BRACING	11(13)(9)	1286
UPPER BRACING	40(11)(4.5)	1980
		5306 #/TRUSS

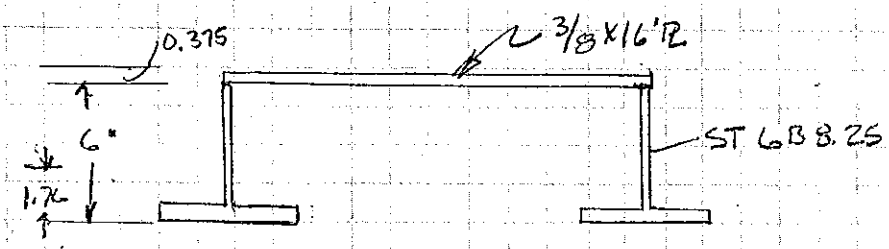
TOTAL TRUSS 18860
5306
24165

DL TOP = 12082.5/12 PANEL PTS = 1.01 K/PP

DL BOT = 12082.5/11 PANEL PTS = 1.10 K/PP

SUBJECT NORTH HAMPTON SERVICE BRIDGE
COMPUTATION BRIDGE RATING ANALYSIS
COMPUTED BY M.D. CHECKED BY DATE 4/29/94

RATING OF FLOOR STRINGER (TRUSS SPAN)



MEMBER	A	$\bar{Y}$	$A\bar{Y}$	I_b	AY^2	I_t
ST6B8.25 (2)	4.86	1.76	8.55	2.13	15.05	17.18
3/8 X 16" PL	6.0	6.188	37.13	0.07	229.7	229.8
	10.86		45.7			247.0

$A\bar{Y} = 45.7 \quad \bar{Y} = 4.2''$

$AY^2 =$ 191.6

55.4 in^4

$$D = \frac{(42.7\ \text{lb/ft})(15)^2}{8} = 1200\ \text{lb.ft}$$

$$f_{DL} = \frac{1.2(12)}{55.4} = 0.26\ \text{ksi}$$

AVAIL LL MOM: $18 - 0.26 = 17.74$ ksi
$24.5 - 0.26 = 24.24$ ksi

MAX LL MOM = INV $17.74(55.4) = 81.9$ k.ft
OPR $24.24(55.4) = 111.9$ k.ft

WHEEL LOAD
ASSUME CONT OVER 2 SUPPORTS

$M_{MAX} = \frac{13PL}{64} = 81.9 \quad P = 26.9k = \boxed{44.8T}$

OPR $\frac{13PL}{64} = 111.9 \quad P = 36.7k = \boxed{61.2T}$

North Hartland Service Bridge
Truss Analysis
Live load 10 T truck, 2 axles 10 feet apart

Inventory Rating:

	Dead Load (kips)	Area (in^2)	Allowable Stress (ksi)	Dead Load Stress (ksi)	Available Stress (ksi)	Live Load (kips)	Live Load Stress (ksi)	Rating 10 Ton
U0U1	-25.30	11.86	11.07	2.13	8.94	-6.32	0.53	167.63
U1U2	-46.00	11.86	11.07	3.88	7.19	-12.65	1.07	67.42
U2U3	-62.10	11.86	11.07	5.24	5.83	-18.97	1.60	36.47
U3U4	-73.60	13.50	11.02	5.45	5.57	-25.29	1.87	29.72
U4U5	-80.50	13.50	11.02	5.96	5.06	-31.61	2.34	21.60
U5U6	-82.80	13.50	11.02	6.13	4.89	-34.81	2.58	18.95
L1L2	25.30	7.22	18.00	3.50	14.50	6.32	0.88	165.52
L2L3	46.00	7.22	18.00	6.37	11.63	12.65	1.75	66.37
L3L4	62.10	10.62	18.00	5.85	12.15	18.97	1.79	68.03
L4L5	73.60	10.62	18.00	6.93	11.07	25.29	2.38	46.48
L5L6	80.50	10.62	18.00	7.58	10.42	31.61	2.98	35.01
U1L1	-19.14	5.88	11.31	3.26	8.05	-5.06	0.86	93.64
U2L2	-15.46	5.88	11.31	2.63	8.68	-5.06	0.86	100.91
U3L3	-11.78	5.88	11.31	2.00	9.31	-5.06	0.86	108.19
U4L4	-8.10	5.88	11.31	1.38	9.93	-5.06	0.86	115.47
U5L5	-4.42	5.88	11.31	0.75	10.56	-5.06	0.86	122.74
U6L6	-2.58	5.88	11.31	0.44	10.87	-5.70	0.97	112.14
U0L1	32.40	7.22	18.00	4.49	13.51	8.10	1.12	120.49
U1L2	26.51	4.18	18.00	6.34	11.66	8.10	1.94	60.18
U2L3	20.62	4.18	18.00	4.93	13.07	8.10	1.94	67.46
U3L4	14.73	4.18	18.00	3.52	14.48	8.10	1.94	74.73
U4L5	8.84	4.18	18.00	2.11	15.89	8.10	1.94	82.01
U5L6	2.95	4.18	18.00	0.70	17.30	4.10	0.98	176.54

Operating Rating:

	Dead Load (kips)	Area (in^2)	Allowable Stress (ksi)	Dead Load Stress (ksi)	Available Stress (ksi)	Live Load (kips)	Live Load Stress (ksi)	Rating 10 Ton
U0U1	-25.30	11.86	13.81	2.13	11.68	-6.32	0.53	219.02
U1U2	-46.00	11.86	13.81	3.88	9.93	-12.65	1.07	93.11
U2U3	-62.10	11.86	13.81	5.24	8.57	-18.97	1.60	53.60
U3U4	-73.60	13.50	13.75	5.45	8.30	-25.29	1.87	44.28
U4U5	-80.50	13.50	13.75	5.96	7.78	-31.61	2.34	33.25
U5U6	-82.80	13.50	13.75	6.13	7.61	-34.81	2.58	29.53
L1L2	25.30	7.22	24.50	3.50	21.00	6.32	0.88	239.74
L2L3	46.00	7.22	24.50	6.37	18.13	12.65	1.75	103.47
L3L4	62.10	10.62	24.50	5.85	18.65	18.97	1.79	104.42
L4L5	73.60	10.62	24.50	6.93	17.57	25.29	2.38	73.78
L5L6	80.50	10.62	24.50	7.58	16.92	31.61	2.98	56.85
U1L1	-19.14	5.88	14.11	3.26	10.85	-5.06	0.86	126.17
U2L2	-15.46	5.88	14.11	2.63	11.48	-5.06	0.86	133.45
U3L3	-11.78	5.88	14.11	2.00	12.11	-5.06	0.86	140.72
U4L4	-8.10	5.88	14.11	1.38	12.73	-5.06	0.86	148.00
U5L5	-4.42	5.88	14.11	0.75	13.36	-5.06	0.86	155.28
U6L6	-2.58	5.88	14.11	0.44	13.67	-5.70	0.97	141.02
U0L1	32.40	7.22	24.50	4.49	20.01	8.10	1.12	178.45
U1L2	26.51	4.18	24.50	6.34	18.16	8.10	1.94	93.74
U2L3	20.62	4.18	24.50	4.93	19.57	8.10	1.94	101.01
U3L4	14.73	4.18	24.50	3.52	20.98	8.10	1.94	108.29
U4L5	8.84	4.18	24.50	2.11	22.39	8.10	1.94	115.57
U5L6	2.95	4.18	24.50	0.70	23.80	4.10	0.98	242.89

```
0100 North Hartland Truss
0110 PSI FT FT IN KIP
0120 24 45 1 29000 .3
0150 1 15.000 0.000 2 30.000 0.000 3 45.000 0.000 4 60.000 0.000
0160 5 75.000 0.000 6 90.000 0.000 7 105.00 0.000 8 120.00 0.000

0170 9 135.00 0.000 10 150.0 0.000 11 165.0 0.000 12 0.000 12.00
0180 13 15.00 12.00 14 30.00 12.00 15 45.00 12.00 16 60.00 12.00
0190 17 75.00 12.00 18 90.00 12.00 19 105.0 12.00 20 120.0 12.00
0200 21 135.0 12.00 22 150.0 12.00 23 165.0 12.00 24 180.0 12.00
0210 FIX X 24 FIX Y 12 24 FIX R 1 TO 24
0220 1 1 2 2 2 3 3 3 4 4 4 5 5 5 6 6 6 7 7 7 8 8 8 9 9 9 10 10 10
11
0230 11 12 13 12 13 14 13 14 15 14 15 16 15 16 17 16 17 18 17 18 1
9
0240 18 19 20 19 20 21 20 21 22 21 22 23 22 23 24 23 12 1 24 1 13
0250 25 13 2 26 2 14 27 14 3 28 3 15 29 15 4 30 4 16 31 16 5 32 5
17
0260 33 17 6 34 6 18 35 7 19 36 8 20 37 9 21 38 10 22 39 11 23
0270 40 6 19 41 7 20 42 8 21 43 9 22 44 10 23 45 11 24
0300 PIN A 1 TO 45 PIN B 1 TO 45
0310 1000 100 100 1 TO 45
0320 LOAD CASE 1 0 0 0 3 0 DEAD
0325 0 -1.29 0 12 24
0330 0 -2.58 0 13 TO 23
0340 0 -1.1 0 1 TO 11
```

```
1*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
 PROGRAM CFRAME
 *-*-*-*-*-*-*-*-*-*-*-*-*-*-*


 RUN DATE = 28-APR-1994
 RUN TIME = 11.34.12


 NORTH HARTLAND TRUSS


 *** JOINT DATA ***

                                  ------------------FIXITY------------------
 JOINT      X          Y        X   Y   R       KX          KY          KR
            --- FT ---                          ---KIP / IN---       IN-KIP/RAD

    1      15.00       .00            *
    2      30.00       .00            *
    3      45.00       .00            *
    4      60.00       .00            *
    5      75.00       .00            *
    6      90.00       .00            *
    7     105.00       .00            *
    8     120.00       .00            *
    9     135.00       .00            *
   10     150.00       .00            *
   11     165.00       .00            *
   12        .00     12.00        *   *
   13      15.00     12.00            *
   14      30.00     12.00            *
   15      45.00     12.00            *
   16      60.00     12.00            *
   17      75.00     12.00            *
   18      90.00     12.00            *
   19     105.00     12.00            *
   20     120.00     12.00            *
   21     135.00     12.00            *
   22     150.00     12.00            *
   23     165.00     12.00            *
   24     180.00     12.00    *   *   *


 *** MEMBER DATA ***

         END END
 MEMBER   A   B     LENGTH       I           A          AS          E
  G
```

			FT	FT**4	FT**2	FT**2	PSI	PSI
1	-1	-2	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
2	-2	-3	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
3	-3	-4	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
4	-4	-5	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
5	-5	-6	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
6	-6	-7	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
7	-7	-8	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
8	-8	-9	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
9	-9	-10	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
10	-10	-11	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
11	-12	-13	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
12	-13	-14	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
13	-14	-15	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
14	-15	-16	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
15	-16	-17	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
16	-17	-18	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
17	-18	-19	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
18	-19	-20	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
19	-20	-21	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
20	-21	-22	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
21	-22	-23	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
22	-23	-24	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
23	-12	-1	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
24	-1	-13	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05

25	-13	-2	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
26	-2	-14	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
27	-14	-3	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
28	-3	-15	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
29	-15	-4	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
30	-4	-16	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
31	-16	-5	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
32	-5	-17	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
33	-17	-6	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
34	-6	-18	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
35	-7	-19	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
36	-8	-20	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
37	-9	-21	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
38	-10	-22	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
39	-11	-23	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
40	-6	-19	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
41	-7	-20	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
42	-8	-21	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
43	-9	-22	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
44	-10	-23	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							
45	-11	-24	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05
.1115E+05							

*** LOAD CASE 1 DEAD

JOINT	FORCE X KIP	FORCE Y KIP	MOMENT FT-KIP

1	.0000E+00	-.1100E+01	.0000E+00
2	.0000E+00	-.1100E+01	.0000E+00
3	.0000E+00	-.1100E+01	.0000E+00
4	.0000E+00	-.1100E+01	.0000E+00
5	.0000E+00	-.1100E+01	.0000E+00
6	.0000E+00	-.1100E+01	.0000E+00
7	.0000E+00	-.1100E+01	.0000E+00
8	.0000E+00	-.1100E+01	.0000E+00
9	.0000E+00	-.1100E+01	.0000E+00
10	.0000E+00	-.1100E+01	.0000E+00
11	.0000E+00	-.1100E+01	.0000E+00
12	.0000E+00	-.1290E+01	.0000E+00
13	.0000E+00	-.2580E+01	.0000E+00
14	.0000E+00	-.2580E+01	.0000E+00
15	.0000E+00	-.2580E+01	.0000E+00
16	.0000E+00	-.2580E+01	.0000E+00
17	.0000E+00	-.2580E+01	.0000E+00
18	.0000E+00	-.2580E+01	.0000E+00
19	.0000E+00	-.2580E+01	.0000E+00
20	.0000E+00	-.2580E+01	.0000E+00
21	.0000E+00	-.2580E+01	.0000E+00
22	.0000E+00	-.2580E+01	.0000E+00
23	.0000E+00	-.2580E+01	.0000E+00
24	.0000E+00	-.1290E+01	.0000E+00

1 LOAD CASE 1 DEAD

JOINT DISPLACEMENTS

JOINT	DX IN	DY IN	DR RAD
1	.3569E-01	-.3830E+00	.0000E+00
2	.4659E-01	-.7402E+00	.0000E+00
3	.6642E-01	-.1041E+01	.0000E+00
4	.9319E-01	-.1269E+01	.0000E+00
5	.1249E+00	-.1411E+01	.0000E+00
6	.1596E+00	-.1460E+01	.0000E+00
7	.1943E+00	-.1411E+01	.0000E+00
8	.2260E+00	-.1269E+01	.0000E+00
9	.2528E+00	-.1041E+01	.0000E+00
10	.2726E+00	-.7402E+00	.0000E+00
11	.2835E+00	-.3830E+00	.0000E+00
12	.3192E+00	.0000E+00	.0000E+00

13	.3083E+00	-.3896E+00	.0000E+00
14	.2885E+00	-.7456E+00	.0000E+00
15	.2617E+00	-.1045E+01	.0000E+00
16	.2300E+00	-.1272E+01	.0000E+00
17	.1953E+00	-.1413E+01	.0000E+00
18	.1596E+00	-.1461E+01	.0000E+00
19	.1239E+00	-.1413E+01	.0000E+00
20	.8922E-01	-.1272E+01	.0000E+00
21	.5750E-01	-.1045E+01	.0000E+00
22	.3073E-01	-.7456E+00	.0000E+00
23	.1091E-01	-.3896E+00	.0000E+00
24	.0000E+00	.0000E+00	.0000E+00

MEMBER END FORCES

MEMBER	JOINT	AXIAL	SHEAR	MOMENT	MOMENT EXTREMA	LOCATION
		KIP	KIP	FT-KIP	FT-KIP	FT
1	1	.2530E+02	.0000E+00	.0000E+00	.0000E+00	.00
	2	.2530E+02	.0000E+00	.0000E+00	.0000E+00	.00
2	2	.4600E+02	.0000E+00	.0000E+00	.0000E+00	.00
	3	.4600E+02	.0000E+00	.0000E+00	.0000E+00	.00
3	3	.6210E+02	.0000E+00	.0000E+00	.0000E+00	.00
	4	.6210E+02	.0000E+00	.0000E+00	.0000E+00	.00
4	4	.7360E+02	.0000E+00	.0000E+00	.0000E+00	.00
	5	.7360E+02	.0000E+00	.0000E+00	.0000E+00	.00
5	5	.8050E+02	.0000E+00	.0000E+00	.0000E+00	.00
	6	.8050E+02	.0000E+00	.0000E+00	.0000E+00	.00
6	6	.8050E+02	.0000E+00	.0000E+00	.0000E+00	.00
	7	.8050E+02	.0000E+00	.0000E+00	.0000E+00	.00
7	7	.7360E+02	.0000E+00	.0000E+00	.0000E+00	.00
	8	.7360E+02	.0000E+00	.0000E+00	.0000E+00	.00
8	8	.6210E+02	.0000E+00	.0000E+00	.0000E+00	.00
	9	.6210E+02	.0000E+00	.0000E+00	.0000E+00	.00
9	9	.4600E+02	.0000E+00	.0000E+00	.0000E+00	.00
	10	.4600E+02	.0000E+00	.0000E+00	.0000E+00	.00
10	10	.2530E+02	.0000E+00	.0000E+00	.0000E+00	.00
	11	.2530E+02	.0000E+00	.0000E+00	.0000E+00	.00
11	12	-.2530E+02	.0000E+00	.0000E+00	.0000E+00	.00
	13	-.2530E+02	.0000E+00	.0000E+00	.0000E+00	.00
12	13	-.4600E+02	.0000E+00	.0000E+00	.0000E+00	.00
	14	-.4600E+02	.0000E+00	.0000E+00	.0000E+00	.00
13	14	-.6210E+02	.0000E+00	.0000E+00	.0000E+00	.00
	15	-.6210E+02	.0000E+00	.0000E+00	.0000E+00	.00
14	15	-.7360E+02	.0000E+00	.0000E+00	.0000E+00	.00
	16	-.7360E+02	.0000E+00	.0000E+00	.0000E+00	.00
15	16	-.8050E+02	.0000E+00	.0000E+00	.0000E+00	.00
	17	-.8050E+02	.0000E+00	.0000E+00	.0000E+00	.00

16	17	-.8280E+02	.0000E+00	.0000E+00	.0000E+00	.00
	18	-.8280E+02	.0000E+00	.0000E+00	.0000E+00	.00
17	18	-.8280E+02	.0000E+00	.0000E+00	.0000E+00	.00
	19	-.8280E+02	.0000E+00	.0000E+00	.0000E+00	.00
18	19	-.8050E+02	.0000E+00	.0000E+00	.0000E+00	.00
	20	-.8050E+02	.0000E+00	.0000E+00	.0000E+00	.00
19	20	-.7360E+02	.0000E+00	.0000E+00	.0000E+00	.00
	21	-.7360E+02	.0000E+00	.0000E+00	.0000E+00	.00
20	21	-.6210E+02	.0000E+00	.0000E+00	.0000E+00	.00
	22	-.6210E+02	.0000E+00	.0000E+00	.0000E+00	.00
21	22	-.4600E+02	.0000E+00	.0000E+00	.0000E+00	.00
	23	-.4600E+02	.0000E+00	.0000E+00	.0000E+00	.00
22	23	-.2530E+02	.0000E+00	.0000E+00	.0000E+00	.00
	24	-.2530E+02	.0000E+00	.0000E+00	.0000E+00	.00
23	12	.3240E+02	.0000E+00	.0000E+00	.0000E+00	.00
	1	.3240E+02	.0000E+00	.0000E+00	.0000E+00	.00
24	1	-.1914E+02	.0000E+00	.0000E+00	.0000E+00	.00
	13	-.1914E+02	.0000E+00	.0000E+00	.0000E+00	.00
25	13	.2651E+02	.0000E+00	.0000E+00	.0000E+00	.00
	2	.2651E+02	.0000E+00	.0000E+00	.0000E+00	.00
26	2	-.1546E+02	.0000E+00	.0000E+00	.0000E+00	.00
	14	-.1546E+02	.0000E+00	.0000E+00	.0000E+00	.00
27	14	.2062E+02	.0000E+00	.0000E+00	.0000E+00	.00
	3	.2062E+02	.0000E+00	.0000E+00	.0000E+00	.00
28	3	-.1178E+02	.0000E+00	.0000E+00	.0000E+00	.00
	15	-.1178E+02	.0000E+00	.0000E+00	.0000E+00	.00
29	15	.1473E+02	.0000E+00	.0000E+00	.0000E+00	.00
	4	.1473E+02	.0000E+00	.0000E+00	.0000E+00	.00
30	4	-.8100E+01	.0000E+00	.0000E+00	.0000E+00	.00
	16	-.8100E+01	.0000E+00	.0000E+00	.0000E+00	.00
31	16	.8836E+01	.0000E+00	.0000E+00	.0000E+00	.00
	5	.8836E+01	.0000E+00	.0000E+00	.0000E+00	.00
32	5	-.4420E+01	.0000E+00	.0000E+00	.0000E+00	.00
	17	-.4420E+01	.0000E+00	.0000E+00	.0000E+00	.00
33	17	.2945E+01	.0000E+00	.0000E+00	.0000E+00	.00
	6	.2945E+01	.0000E+00	.0000E+00	.0000E+00	.00
34	6	-.2580E+01	.0000E+00	.0000E+00	.0000E+00	.00
	18	-.2580E+01	.0000E+00	.0000E+00	.0000E+00	.00
35	7	-.4420E+01	.0000E+00	.0000E+00	.0000E+00	.00
	19	-.4420E+01	.0000E+00	.0000E+00	.0000E+00	.00
36	8	-.8100E+01	.0000E+00	.0000E+00	.0000E+00	.00
	20	-.8100E+01	.0000E+00	.0000E+00	.0000E+00	.00
37	9	-.1178E+02	.0000E+00	.0000E+00	.0000E+00	.00
	21	-.1178E+02	.0000E+00	.0000E+00	.0000E+00	.00
38	10	-.1546E+02	.0000E+00	.0000E+00	.0000E+00	.00
	22	-.1546E+02	.0000E+00	.0000E+00	.0000E+00	.00
39	11	-.1914E+02	.0000E+00	.0000E+00	.0000E+00	.00
	23	-.1914E+02	.0000E+00	.0000E+00	.0000E+00	.00
40	6	.2945E+01	.0000E+00	.0000E+00	.0000E+00	.00
	19	.2945E+01	.0000E+00	.0000E+00	.0000E+00	.00
41	7	.8836E+01	.0000E+00	.0000E+00	.0000E+00	.00

	20	.8836E+01	.0000E+00	.0000E+00	.0000E+00	.00
42	8	.1473E+02	.0000E+00	.0000E+00	.0000E+00	.00
	21	.1473E+02	.0000E+00	.0000E+00	.0000E+00	.00
43	9	.2062E+02	.0000E+00	.0000E+00	.0000E+00	.00
	22	.2062E+02	.0000E+00	.0000E+00	.0000E+00	.00
44	10	.2651E+02	.0000E+00	.0000E+00	.0000E+00	.00
	23	.2651E+02	.0000E+00	.0000E+00	.0000E+00	.00
45	11	.3240E+02	.0000E+00	.0000E+00	.0000E+00	.00
	24	.3240E+02	.0000E+00	.0000E+00	.0000E+00	.00

STRUCTURE REACTIONS

JOINT	FORCE X KIP	FORCE Y KIP	MOMENT FT-KIP
1	.0000E+00	.0000E+00	.0000E+00
2	.0000E+00	.0000E+00	.0000E+00
3	.0000E+00	.0000E+00	.0000E+00
4	.0000E+00	.0000E+00	.0000E+00
5	.0000E+00	.0000E+00	.0000E+00
6	.0000E+00	.0000E+00	.0000E+00
7	.0000E+00	.0000E+00	.0000E+00
8	.0000E+00	.0000E+00	.0000E+00
9	.0000E+00	.0000E+00	.0000E+00
10	.0000E+00	.0000E+00	.0000E+00
11	.0000E+00	.0000E+00	.0000E+00
12	.0000E+00	.2153E+02	.0000E+00
13	.0000E+00	.0000E+00	.0000E+00
14	.0000E+00	.0000E+00	.0000E+00
15	.0000E+00	.0000E+00	.0000E+00
16	.0000E+00	.0000E+00	.0000E+00
17	.0000E+00	.0000E+00	.0000E+00
18	.0000E+00	.0000E+00	.0000E+00
19	.0000E+00	.0000E+00	.0000E+00
20	.0000E+00	.0000E+00	.0000E+00
21	.0000E+00	.0000E+00	.0000E+00
22	.0000E+00	.0000E+00	.0000E+00
23	.0000E+00	.0000E+00	.0000E+00
24	.0000E+00	.2153E+02	.0000E+00
TOTAL	.0000E+00	.4306E+02	

1 MEMBER END FORCES

MEMBER LOCATION	LOAD CASE	JOINT	AXIAL KIP	SHEAR KIP	MOMENT FT-KIP	MOMENT EXTREMA FT-KIP

FT

1	1	1	.2530E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		2	.2530E+02	.0000E+00	.0000E+00	.0000E+00
.00						
2	1	2	.4600E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		3	.4600E+02	.0000E+00	.0000E+00	.0000E+00
.00						
3	1	3	.6210E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		4	.6210E+02	.0000E+00	.0000E+00	.0000E+00
.00						
4	1	4	.7360E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		5	.7360E+02	.0000E+00	.0000E+00	.0000E+00
.00						
5	1	5	.8050E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		6	.8050E+02	.0000E+00	.0000E+00	.0000E+00
.00						
6	1	6	.8050E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		7	.8050E+02	.0000E+00	.0000E+00	.0000E+00
.00						
7	1	7	.7360E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		8	.7360E+02	.0000E+00	.0000E+00	.0000E+00
.00						
8	1	8	.6210E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		9	.6210E+02	.0000E+00	.0000E+00	.0000E+00
.00						
9	1	9	.4600E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		10	.4600E+02	.0000E+00	.0000E+00	.0000E+00
.00						
10	1	10	.2530E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		11	.2530E+02	.0000E+00	.0000E+00	.0000E+00

.00						
11	1	12	-.2530E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		13	-.2530E+02	.0000E+00	.0000E+00	.0000E+00
.00						
12	1	13	-.4600E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		14	-.4600E+02	.0000E+00	.0000E+00	.0000E+00
.00						
13	1	14	-.6210E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		15	-.6210E+02	.0000E+00	.0000E+00	.0000E+00
.00						
14	1	15	-.7360E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		16	-.7360E+02	.0000E+00	.0000E+00	.0000E+00
.00						
15	1	16	-.8050E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		17	-.8050E+02	.0000E+00	.0000E+00	.0000E+00
.00						
16	1	17	-.8280E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		18	-.8280E+02	.0000E+00	.0000E+00	.0000E+00
.00						
17	1	18	-.8280E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		19	-.8280E+02	.0000E+00	.0000E+00	.0000E+00
.00						
18	1	19	-.8050E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		20	-.8050E+02	.0000E+00	.0000E+00	.0000E+00
.00						
19	1	20	-.7360E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		21	-.7360E+02	.0000E+00	.0000E+00	.0000E+00
.00						
20	1	21	-.6210E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		22	-.6210E+02	.0000E+00	.0000E+00	.0000E+00
.00						

```
21        1      22  -.4600E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                 23  -.4600E+02   .0000E+00   .0000E+00   .0000E+00
 .00

22        1      23  -.2530E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                 24  -.2530E+02   .0000E+00   .0000E+00   .0000E+00
 .00

23        1      12   .3240E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                  1   .3240E+02   .0000E+00   .0000E+00   .0000E+00
 .00

24        1       1  -.1914E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                 13  -.1914E+02   .0000E+00   .0000E+00   .0000E+00
 .00

25        1      13   .2651E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                  2   .2651E+02   .0000E+00   .0000E+00   .0000E+00
 .00

26        1       2  -.1546E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                 14  -.1546E+02   .0000E+00   .0000E+00   .0000E+00
 .00

27        1      14   .2062E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                  3   .2062E+02   .0000E+00   .0000E+00   .0000E+00
 .00

28        1       3  -.1178E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                 15  -.1178E+02   .0000E+00   .0000E+00   .0000E+00
 .00

29        1      15   .1473E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                  4   .1473E+02   .0000E+00   .0000E+00   .0000E+00
 .00

30        1       4  -.8100E+01   .0000E+00   .0000E+00   .0000E+00
 .00
                 16  -.8100E+01   .0000E+00   .0000E+00   .0000E+00
 .00
```

31	1	16	.8836E+01	.0000E+00	.0000E+00	.0000E+00
.00						
		5	.8836E+01	.0000E+00	.0000E+00	.0000E+00
.00						
32	1	5	-.4420E+01	.0000E+00	.0000E+00	.0000E+00
.00						
		17	-.4420E+01	.0000E+00	.0000E+00	.0000E+00
.00						
33	1	17	.2945E+01	.0000E+00	.0000E+00	.0000E+00
.00						
		6	.2945E+01	.0000E+00	.0000E+00	.0000E+00
.00						
34	1	6	-.2580E+01	.0000E+00	.0000E+00	.0000E+00
.00						
		18	-.2580E+01	.0000E+00	.0000E+00	.0000E+00
.00						
35	1	7	-.4420E+01	.0000E+00	.0000E+00	.0000E+00
.00						
		19	-.4420E+01	.0000E+00	.0000E+00	.0000E+00
.00						
36	1	8	-.8100E+01	.0000E+00	.0000E+00	.0000E+00
.00						
		20	-.8100E+01	.0000E+00	.0000E+00	.0000E+00
.00						
37	1	9	-.1178E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		21	-.1178E+02	.0000E+00	.0000E+00	.0000E+00
.00						
38	1	10	-.1546E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		22	-.1546E+02	.0000E+00	.0000E+00	.0000E+00
.00						
39	1	11	-.1914E+02	.0000E+00	.0000E+00	.0000E+00
.00						
		23	-.1914E+02	.0000E+00	.0000E+00	.0000E+00
.00						
40	1	6	.2945E+01	.0000E+00	.0000E+00	.0000E+00
.00						
		19	.2945E+01	.0000E+00	.0000E+00	.0000E+00
.00						
41	1	7	.8836E+01	.0000E+00	.0000E+00	.0000E+00

```
 .00
                 20   .8836E+01   .0000E+00   .0000E+00   .0000E+00
 .00

42        1       8   .1473E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                21   .1473E+02   .0000E+00   .0000E+00   .0000E+00
 .00

43        1       9   .2062E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                22   .2062E+02   .0000E+00   .0000E+00   .0000E+00
 .00

44        1      10   .2651E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                23   .2651E+02   .0000E+00   .0000E+00   .0000E+00
 .00

45        1      11   .3240E+02   .0000E+00   .0000E+00   .0000E+00
 .00
                24   .3240E+02   .0000E+00   .0000E+00   .0000E+00
 .00
```

```
0100 North Hartland Truss
0110 PSI FT FT IN KIP
0120 24 45 1 29000 .3
0150 1 15.000 0.000 2 30.000 0.000 3 45.000 0.000 4 60.000 0.000
0160 5 75.000 0.000 6 90.000 0.000 7 105.00 0.000 8 120.00 0.000

0170 9 135.00 0.000 10 150.0 0.000 11 165.0 0.000 12 0.000 12.00
0180 13 15.00 12.00 14 30.00 12.00 15 45.00 12.00 16 60.00 12.00
0190 17 75.00 12.00 18 90.00 12.00 19 105.0 12.00 20 120.0 12.00
0200 21 135.0 12.00 22 150.0 12.00 23 165.0 12.00 24 180.0 12.00
0210 FIX X 24 FIX Y 12 24 FIX R 1 TO 24
0220 1 1 2 2 2 3 3 3 4 4 4 5 5 5 6 6 6 7 7 7 8 8 8 9 9 9 10 10 10
11
0230 11 12 13 12 13 14 13 14 15 14 15 16 15 16 17 16 17 18 17 18 1
9
0240 18 19 20 19 20 21 20 21 22 21 22 23 22 23 24 23 12 1 24 1 13
0250 25 13 2 26 2 14 27 14 3 28 3 15 29 15 4 30 4 16 31 16 5 32 5
17
0260 33 17 6 34 6 18 35 7 19 36 8 20 37 9 21 38 10 22 39 11 23
0270 40 6 19 41 7 20 42 8 21 43 9 22 44 10 23 45 11 24
0300 PIN A 1 TO 45 PIN B 1 TO 45
0310 1000 100 100 1 TO 45
0320 LOAD CASE 1 0 0 0 3 0 LIVE
0330 0 -.25 0 17
0340 0 -.57 0 18
0350 0 -.18 0 19
```

1*-*-*-*-*-*-*-*-*-*-*-*-*-*-*

PROGRAM CFRAME

--*-*-*-*-*-*-*-*-*-*-*-*-*

RUN DATE = 28-APR-1994
RUN TIME = 07.10.47

NORTH HARTLAND TRUSS

*** JOINT DATA ***

JOINT	X	Y	FIXITY X	FIXITY Y	FIXITY R	KX	KY	KR
	--- FT ---					---KIP / IN---		IN-KIP/RAD
1	15.00	.00			*			
2	30.00	.00			*			
3	45.00	.00			*			
4	60.00	.00			*			
5	75.00	.00			*			
6	90.00	.00			*			
7	105.00	.00			*			
8	120.00	.00			*			
9	135.00	.00			*			
10	150.00	.00			*			
11	165.00	.00			*			
12	.00	12.00		*	*			
13	15.00	12.00			*			
14	30.00	12.00			*			
15	45.00	12.00			*			
16	60.00	12.00			*			
17	75.00	12.00			*			
18	90.00	12.00			*			
19	105.00	12.00			*			
20	120.00	12.00			*			
21	135.00	12.00			*			
22	150.00	12.00			*			
23	165.00	12.00			*			
24	180.00	12.00	*	*	*			

*** MEMBER DATA ***

MEMBER	END A	END B	LENGTH	I	A	AS	E	G

			FT	FT**4	FT**2	FT**2	PSI	PSI
1	-1	-2	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
2	-2	-3	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
3	-3	-4	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
4	-4	-5	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
5	-5	-6	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
6	-6	-7	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
7	-7	-8	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
8	-8	-9	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
9	-9	-10	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
10	-10	-11	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
11	-12	-13	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
12	-13	-14	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
13	-14	-15	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
14	-15	-16	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
15	-16	-17	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
16	-17	-18	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
17	-18	-19	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
18	-19	-20	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
19	-20	-21	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
20	-21	-22	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
21	-22	-23	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
22	-23	-24	15.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
23	-12	-1	19.21	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05
24	-1	-13	12.00	.1000E+04	.1000E+03	.1000E+03	.2900E+05	.1115E+05

```
    25  -13   -2     19.21  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    26   -2  -14     12.00  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    27  -14   -3     19.21  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    28   -3  -15     12.00  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    29  -15   -4     19.21  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    30   -4  -16     12.00  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    31  -16   -5     19.21  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    32   -5  -17     12.00  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    33  -17   -6     19.21  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    34   -6  -18     12.00  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    35   -7  -19     12.00  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    36   -8  -20     12.00  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    37   -9  -21     12.00  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    38  -10  -22     12.00  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    39  -11  -23     12.00  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    40   -6  -19     19.21  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    41   -7  -20     19.21  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    42   -8  -21     19.21  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    43   -9  -22     19.21  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    44  -10  -23     19.21  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05
    45  -11  -24     19.21  .1000E+04  .1000E+03  .1000E+03  .2900E+05
.1115E+05


 *** LOAD CASE      1  LIVE


 JOINT    FORCE X      FORCE Y      MOMENT
            KIP          KIP        FT-KIP
```

17	.0000E+00	-.2500E+00	.0000E+00
18	.0000E+00	-.5700E+00	.0000E+00
19	.0000E+00	-.1800E+00	.0000E+00

1 LOAD CASE 1 LIVE

JOINT DISPLACEMENTS

JOINT	DX IN	DY IN	DR RAD
1	.1465E-02	-.1274E-01	.0000E+00
2	.1738E-02	-.2497E-01	.0000E+00
3	.2283E-02	-.3584E-01	.0000E+00
4	.3100E-02	-.4466E-01	.0000E+00
5	.4191E-02	-.5076E-01	.0000E+00
6	.5553E-02	-.5310E-01	.0000E+00
7	.6885E-02	-.5053E-01	.0000E+00
8	.7950E-02	-.4439E-01	.0000E+00
9	.8748E-02	-.3558E-01	.0000E+00
10	.9281E-02	-.2477E-01	.0000E+00
11	.9547E-02	-.1263E-01	.0000E+00
12	.1108E-01	.0000E+00	.0000E+00
13	.1081E-01	-.1291E-01	.0000E+00
14	.1027E-01	-.2514E-01	.0000E+00
15	.9448E-02	-.3601E-01	.0000E+00
16	.8358E-02	-.4484E-01	.0000E+00
17	.6995E-02	-.5093E-01	.0000E+00
18	.5494E-02	-.5329E-01	.0000E+00
19	.3994E-02	-.5070E-01	.0000E+00
20	.2663E-02	-.4456E-01	.0000E+00
21	.1598E-02	-.3575E-01	.0000E+00
22	.7988E-03	-.2494E-01	.0000E+00
23	.2663E-03	-.1280E-01	.0000E+00
24	.0000E+00	.0000E+00	.0000E+00

MEMBER END FORCES

MEMBER	JOINT	AXIAL	SHEAR	MOMENT	MOMENT EXTREMA	LOCATION
		KIP	KIP	FT-KIP	FT-KIP	FT

1	1	.6323E+00	.0000E+00	.0000E+00	.0000E+00	.00
	2	.6323E+00	.0000E+00	.0000E+00	.0000E+00	.00
2	2	.1265E+01	.0000E+00	.0000E+00	.0000E+00	.00
	3	.1265E+01	.0000E+00	.0000E+00	.0000E+00	.00
3	3	.1897E+01	.0000E+00	.0000E+00	.0000E+00	.00
	4	.1897E+01	.0000E+00	.0000E+00	.0000E+00	.00
4	4	.2529E+01	.0000E+00	.0000E+00	.0000E+00	.00
	5	.2529E+01	.0000E+00	.0000E+00	.0000E+00	.00
5	5	.3161E+01	.0000E+00	.0000E+00	.0000E+00	.00
	6	.3161E+01	.0000E+00	.0000E+00	.0000E+00	.00
6	6	.3089E+01	.0000E+00	.0000E+00	.0000E+00	.00
	7	.3089E+01	.0000E+00	.0000E+00	.0000E+00	.00
7	7	.2471E+01	.0000E+00	.0000E+00	.0000E+00	.00
	8	.2471E+01	.0000E+00	.0000E+00	.0000E+00	.00
8	8	.1853E+01	.0000E+00	.0000E+00	.0000E+00	.00
	9	.1853E+01	.0000E+00	.0000E+00	.0000E+00	.00
9	9	.1235E+01	.0000E+00	.0000E+00	.0000E+00	.00
	10	.1235E+01	.0000E+00	.0000E+00	.0000E+00	.00
10	10	.6177E+00	.0000E+00	.0000E+00	.0000E+00	.00
	11	.6177E+00	.0000E+00	.0000E+00	.0000E+00	.00
11	12	-.6323E+00	.0000E+00	.0000E+00	.0000E+00	.00
	13	-.6323E+00	.0000E+00	.0000E+00	.0000E+00	.00
12	13	-.1265E+01	.0000E+00	.0000E+00	.0000E+00	.00
	14	-.1265E+01	.0000E+00	.0000E+00	.0000E+00	.00
13	14	-.1897E+01	.0000E+00	.0000E+00	.0000E+00	.00
	15	-.1897E+01	.0000E+00	.0000E+00	.0000E+00	.00
14	15	-.2529E+01	.0000E+00	.0000E+00	.0000E+00	.00
	16	-.2529E+01	.0000E+00	.0000E+00	.0000E+00	.00
15	16	-.3161E+01	.0000E+00	.0000E+00	.0000E+00	.00
	17	-.3161E+01	.0000E+00	.0000E+00	.0000E+00	.00
16	17	-.3481E+01	.0000E+00	.0000E+00	.0000E+00	.00
	18	-.3481E+01	.0000E+00	.0000E+00	.0000E+00	.00
17	18	-.3481E+01	.0000E+00	.0000E+00	.0000E+00	.00
	19	-.3481E+01	.0000E+00	.0000E+00	.0000E+00	.00
18	19	-.3089E+01	.0000E+00	.0000E+00	.0000E+00	.00
	20	-.3089E+01	.0000E+00	.0000E+00	.0000E+00	.00
19	20	-.2471E+01	.0000E+00	.0000E+00	.0000E+00	.00
	21	-.2471E+01	.0000E+00	.0000E+00	.0000E+00	.00
20	21	-.1853E+01	.0000E+00	.0000E+00	.0000E+00	.00
	22	-.1853E+01	.0000E+00	.0000E+00	.0000E+00	.00
21	22	-.1235E+01	.0000E+00	.0000E+00	.0000E+00	.00
	23	-.1235E+01	.0000E+00	.0000E+00	.0000E+00	.00
22	23	-.6177E+00	.0000E+00	.0000E+00	.0000E+00	.00
	24	-.6177E+00	.0000E+00	.0000E+00	.0000E+00	.00
23	12	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
	1	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
24	1	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00
	13	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00
25	13	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
	2	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
26	2	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00

	14	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00
27	14	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
	3	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
28	3	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00
	15	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00
29	15	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
	4	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
30	4	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00
	16	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00
31	16	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
	5	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
32	5	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00
	17	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00
33	17	.4095E+00	.0000E+00	.0000E+00	.0000E+00	.00
	6	.4095E+00	.0000E+00	.0000E+00	.0000E+00	.00
34	6	-.5700E+00	.0000E+00	.0000E+00	.0000E+00	.00
	18	-.5700E+00	.0000E+00	.0000E+00	.0000E+00	.00
35	7	-.4942E+00	.0000E+00	.0000E+00	.0000E+00	.00
	19	-.4942E+00	.0000E+00	.0000E+00	.0000E+00	.00
36	8	-.4942E+00	.0000E+00	.0000E+00	.0000E+00	.00
	20	-.4942E+00	.0000E+00	.0000E+00	.0000E+00	.00
37	9	-.4942E+00	.0000E+00	.0000E+00	.0000E+00	.00
	21	-.4942E+00	.0000E+00	.0000E+00	.0000E+00	.00
38	10	-.4942E+00	.0000E+00	.0000E+00	.0000E+00	.00
	22	-.4942E+00	.0000E+00	.0000E+00	.0000E+00	.00
39	11	-.4942E+00	.0000E+00	.0000E+00	.0000E+00	.00
	23	-.4942E+00	.0000E+00	.0000E+00	.0000E+00	.00
40	6	.5029E+00	.0000E+00	.0000E+00	.0000E+00	.00
	19	.5029E+00	.0000E+00	.0000E+00	.0000E+00	.00
41	7	.7911E+00	.0000E+00	.0000E+00	.0000E+00	.00
	20	.7911E+00	.0000E+00	.0000E+00	.0000E+00	.00
42	8	.7911E+00	.0000E+00	.0000E+00	.0000E+00	.00
	21	.7911E+00	.0000E+00	.0000E+00	.0000E+00	.00
43	9	.7911E+00	.0000E+00	.0000E+00	.0000E+00	.00
	22	.7911E+00	.0000E+00	.0000E+00	.0000E+00	.00
44	10	.7911E+00	.0000E+00	.0000E+00	.0000E+00	.00
	23	.7911E+00	.0000E+00	.0000E+00	.0000E+00	.00
45	11	.7911E+00	.0000E+00	.0000E+00	.0000E+00	.00
	24	.7911E+00	.0000E+00	.0000E+00	.0000E+00	.00

STRUCTURE REACTIONS

JOINT	FORCE X KIP	FORCE Y KIP	MOMENT FT-KIP
1	.0000E+00	.0000E+00	.0000E+00
2	.0000E+00	.0000E+00	.0000E+00
3	.0000E+00	.0000E+00	.0000E+00
4	.0000E+00	.0000E+00	.0000E+00
5	.0000E+00	.0000E+00	.0000E+00

6	.0000E+00	.0000E+00	.0000E+00
7	.0000E+00	.0000E+00	.0000E+00
8	.0000E+00	.0000E+00	.0000E+00
9	.0000E+00	.0000E+00	.0000E+00
10	.0000E+00	.0000E+00	.0000E+00
11	.0000E+00	.0000E+00	.0000E+00
12	.0000E+00	.5058E+00	.0000E+00
13	.0000E+00	.0000E+00	.0000E+00
14	.0000E+00	.0000E+00	.0000E+00
15	.0000E+00	.0000E+00	.0000E+00
16	.0000E+00	.0000E+00	.0000E+00
17	.0000E+00	.0000E+00	.0000E+00
18	.0000E+00	.0000E+00	.0000E+00
19	.0000E+00	.0000E+00	.0000E+00
20	.0000E+00	.0000E+00	.0000E+00
21	.0000E+00	.0000E+00	.0000E+00
22	.0000E+00	.0000E+00	.0000E+00
23	.0000E+00	.0000E+00	.0000E+00
24	.0000E+00	.4942E+00	.0000E+00
TOTAL	.0000E+00	.1000E+01	

1 MEMBER END FORCES

MEMBER LOCATION FT	LOAD CASE	JOINT	AXIAL KIP	SHEAR KIP	MOMENT FT-KIP	MOMENT EXTREMA FT-KIP
1 .00	1	1	.6323E+00	.0000E+00	.0000E+00	.0000E+00
.00		2	.6323E+00	.0000E+00	.0000E+00	.0000E+00
2 .00	1	2	.1265E+01	.0000E+00	.0000E+00	.0000E+00
.00		3	.1265E+01	.0000E+00	.0000E+00	.0000E+00
3 .00	1	3	.1897E+01	.0000E+00	.0000E+00	.0000E+00
.00		4	.1897E+01	.0000E+00	.0000E+00	.0000E+00
4 .00	1	4	.2529E+01	.0000E+00	.0000E+00	.0000E+00
		5	.2529E+01	.0000E+00	.0000E+00	.0000E+00

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.00

5        1        5   .3161E+01   .0000E+00   .0000E+00   .0000E+00
.00
                  6   .3161E+01   .0000E+00   .0000E+00   .0000E+00
.00

6        1        6   .3089E+01   .0000E+00   .0000E+00   .0000E+00
.00
                  7   .3089E+01   .0000E+00   .0000E+00   .0000E+00
.00

7        1        7   .2471E+01   .0000E+00   .0000E+00   .0000E+00
.00
                  8   .2471E+01   .0000E+00   .0000E+00   .0000E+00
.00

8        1        8   .1853E+01   .0000E+00   .0000E+00   .0000E+00
.00
                  9   .1853E+01   .0000E+00   .0000E+00   .0000E+00
.00

9        1        9   .1235E+01   .0000E+00   .0000E+00   .0000E+00
.00
                 10   .1235E+01   .0000E+00   .0000E+00   .0000E+00
.00

10       1       10   .6177E+00   .0000E+00   .0000E+00   .0000E+00
.00
                 11   .6177E+00   .0000E+00   .0000E+00   .0000E+00
.00

11       1       12  -.6323E+00   .0000E+00   .0000E+00   .0000E+00
.00
                 13  -.6323E+00   .0000E+00   .0000E+00   .0000E+00
.00

12       1       13  -.1265E+01   .0000E+00   .0000E+00   .0000E+00
.00
                 14  -.1265E+01   .0000E+00   .0000E+00   .0000E+00
.00

13       1       14  -.1897E+01   .0000E+00   .0000E+00   .0000E+00
.00
                 15  -.1897E+01   .0000E+00   .0000E+00   .0000E+00
.00

14       1       15  -.2529E+01   .0000E+00   .0000E+00   .0000E+00
.00
                 16  -.2529E+01   .0000E+00   .0000E+00   .0000E+00
.00
```

15	1	16	-.3161E+01	.0000E+00	.0000E+00	.0000E+00	.00
		17	-.3161E+01	.0000E+00	.0000E+00	.0000E+00	.00
16	1	17	-.3481E+01	.0000E+00	.0000E+00	.0000E+00	.00
		18	-.3481E+01	.0000E+00	.0000E+00	.0000E+00	.00
17	1	18	-.3481E+01	.0000E+00	.0000E+00	.0000E+00	.00
		19	-.3481E+01	.0000E+00	.0000E+00	.0000E+00	.00
18	1	19	-.3089E+01	.0000E+00	.0000E+00	.0000E+00	.00
		20	-.3089E+01	.0000E+00	.0000E+00	.0000E+00	.00
19	1	20	-.2471E+01	.0000E+00	.0000E+00	.0000E+00	.00
		21	-.2471E+01	.0000E+00	.0000E+00	.0000E+00	.00
20	1	21	-.1853E+01	.0000E+00	.0000E+00	.0000E+00	.00
		22	-.1853E+01	.0000E+00	.0000E+00	.0000E+00	.00
21	1	22	-.1235E+01	.0000E+00	.0000E+00	.0000E+00	.00
		23	-.1235E+01	.0000E+00	.0000E+00	.0000E+00	.00
22	1	23	-.6177E+00	.0000E+00	.0000E+00	.0000E+00	.00
		24	-.6177E+00	.0000E+00	.0000E+00	.0000E+00	.00
23	1	12	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
		1	.8097E+00	.0000E+00	.0000E+00	.0000E+00	.00
24	1	1	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00
		13	-.5058E+00	.0000E+00	.0000E+00	.0000E+00	.00

25	1	13	.8097E+00	.0000E+00	.0000E+00	.0000E+00
.00						
		2	.8097E+00	.0000E+00	.0000E+00	.0000E+00
.00						
26	1	2	-.5058E+00	.0000E+00	.0000E+00	.0000E+00
.00						
		14	-.5058E+00	.0000E+00	.0000E+00	.0000E+00
.00						
27	1	14	.8097E+00	.0000E+00	.0000E+00	.0000E+00
.00						
		3	.8097E+00	.0000E+00	.0000E+00	.0000E+00
.00						
28	1	3	-.5058E+00	.0000E+00	.0000E+00	.0000E+00
.00						
		15	-.5058E+00	.0000E+00	.0000E+00	.0000E+00
.00						
29	1	15	.8097E+00	.0000E+00	.0000E+00	.0000E+00
.00						
		4	.8097E+00	.0000E+00	.0000E+00	.0000E+00
.00						
30	1	4	-.5058E+00	.0000E+00	.0000E+00	.0000E+00
.00						
		16	-.5058E+00	.0000E+00	.0000E+00	.0000E+00
.00						
31	1	16	.8097E+00	.0000E+00	.0000E+00	.0000E+00
.00						
		5	.8097E+00	.0000E+00	.0000E+00	.0000E+00
.00						
32	1	5	-.5058E+00	.0000E+00	.0000E+00	.0000E+00
.00						
		17	-.5058E+00	.0000E+00	.0000E+00	.0000E+00
.00						
33	1	17	.4095E+00	.0000E+00	.0000E+00	.0000E+00
.00						
		6	.4095E+00	.0000E+00	.0000E+00	.0000E+00
.00						
34	1	6	-.5700E+00	.0000E+00	.0000E+00	.0000E+00
.00						
		18	-.5700E+00	.0000E+00	.0000E+00	.0000E+00
.00						
35	1	7	-.4942E+00	.0000E+00	.0000E+00	.0000E+00

```
 .00
                 19  -.4942E+00   .0000E+00   .0000E+00   .0000E+00
 .00

36        1       8  -.4942E+00   .0000E+00   .0000E+00   .0000E+00
 .00
                 20  -.4942E+00   .0000E+00   .0000E+00   .0000E+00
 .00

37        1       9  -.4942E+00   .0000E+00   .0000E+00   .0000E+00
 .00
                 21  -.4942E+00   .0000E+00   .0000E+00   .0000E+00
 .00

38        1      10  -.4942E+00   .0000E+00   .0000E+00   .0000E+00
 .00
                 22  -.4942E+00   .0000E+00   .0000E+00   .0000E+00
 .00

39        1      11  -.4942E+00   .0000E+00   .0000E+00   .0000E+00
 .00
                 23  -.4942E+00   .0000E+00   .0000E+00   .0000E+00
 .00

40        1       6   .5029E+00   .0000E+00   .0000E+00   .0000E+00
 .00
                 19   .5029E+00   .0000E+00   .0000E+00   .0000E+00
 .00

41        1       7   .7911E+00   .0000E+00   .0000E+00   .0000E+00
 .00
                 20   .7911E+00   .0000E+00   .0000E+00   .0000E+00
 .00

42        1       8   .7911E+00   .0000E+00   .0000E+00   .0000E+00
 .00
                 21   .7911E+00   .0000E+00   .0000E+00   .0000E+00
 .00

43        1       9   .7911E+00   .0000E+00   .0000E+00   .0000E+00
 .00
                 22   .7911E+00   .0000E+00   .0000E+00   .0000E+00
 .00

44        1      10   .7911E+00   .0000E+00   .0000E+00   .0000E+00
 .00
                 23   .7911E+00   .0000E+00   .0000E+00   .0000E+00
 .00

45        1      11   .7911E+00   .0000E+00   .0000E+00   .0000E+00
 .00
```

	24	.7911E+00	.0000E+00	.0000E+00	.0000E+00
.00					

X. APPENDIX

The numerical condition ratings should characterize the general condition of the entire component being rated. They should not attempt to describe localized or nominally occurring instances of deterioration or disrepair. Correct assignment of a condition rating must, therefore, consider both the severity of the deterioration or disrepair and the extent to which it is widespread throughout the component being rated.

However, in some cases, a deficiency will occur on a single element or in a single location. If that one deficiency reduces the load carrying capacity or serviceability of the component, then the element can be considered a "weak link" in the structure, and the rating of the component should be reduced accordingly.

The following general condition rating guidelines (obtained from the 1988 version of the *Coding Guide*) are to be used in the evaluation of the deck, superstructure, and substructure.

Code	Description
N	NOT APPLICABLE
9	EXCELLENT CONDITION
8	VERY GOOD CONDITION - no problems noted.
7	GOOD CONDITION - some minor problems.
6	SATISFACTORY CONDITION - structural elements show some minor deterioration.
5	FAIR CONDITION - all primary structural elements are sound but may have minor section loss, cracking, spalling, or scour.
4	POOR CONDITION - advanced section loss, deterioration, spalling, or scour.
3	SERIOUS CONDITION - loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	CRITICAL CONDITION - advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
1	"IMMINENT" FAILURE CONDITION - major deterioration or section loss present in critical structural components, or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put bridge back in light service.
0	FAILED CONDITION - out of service; beyond corrective action.

STRUCTURES INSPECTION FIELD REPORT
INVENTORY INSPECTION

city/town	bridge dept. no.	8-structure no.	90-date inspected
NORTH HARTLAND			1094

2-dist.	104-highway system	22-owner	27-year built	106-year rebuilt	11-milepoint
		COE	1961		

43-structure type: DECK TRUSS (1 SPAN) PLATE GIRDER (3 SPANS)	quality control engineer: TOMAS G. STUOPIS, P.E. (MA # 36835)
07-facility carried: SERVICE ROAD TO INTAKE CONTROL TOWER	team leader: ROBERT R. HINDMAN, P.E. (MA # 37800)
06-features intersected:	team members: P. NAGLE, A. BRUNDIDGE

item 58 [6]

DECK

1. Wearing Surface	NA
2. Deck-Condition	6
3. Stay in Place Forms	NA
4. Curbs	NA
5. Median	NA
6. Sidewalks	NA
7. Parapet	NA
8. Railing	6
9. Anti Missile Fence	NA
10. Drains	NA
11. Lighting Standards	7
12. Utilities	7
13. Deck Joints	6
14. Approach Settlement	7

item 59 [6]

SUPERSTRUCTURE

1. Bearing Devices	6
2. Stringers	NA
3. Diaphragms	NA
4. Girders or Beams	7
5. Floor Beams	7
6. Trusses	7
7. Rivets or Bolts	7
8. Welds	7
9. Collision Damage	8
10. Load Deflection	7
11. Member Alignment	7
12. Load Vibration	7
13. Paint-Epoxy	7
14. Year Painted	
15. Under Clearance ____ ft ____ in	
Clearance Signs	☐ yes ☒ no

item 60 [7]

SUBSTRUCTURE

1. Abutments	
a-Wings	7
b-Backwall	7
c-Bridge Seats	7
d-Breastwall	7
e-Footings	NA
f-Piles	NA
g-Erosion	7
h-Settlement	7
2. Piers or Bents	
a-Caps	7
b-Column	7
c-Web	7
d-Footing	NA
e-Piles	NA
f-Scour	NA
g-Settlement	7
3. Collision Damage	8
4. Hydraulic-Adequacy	NA

	H	3	3S2	Single
Actual Posting	☐	☐	☐	☐
Recommended Posting From Rating Book	☐	☐	☐	☐

SIGNS IN PLACE Y or N	at bridge	advance
	N	N
LEGIBILITY	☐	☐

Overhead Signs (attached to bridge) ☐ yes ☒ no

1. Welds	☐
2. Bolts	☐
3. Condition	☐

Item93b U/W Inspection Date: _____

ITEM 61-channel and channel protection [NA]

1. channel scour	☐	5. rip rap or slope paving	☐
2. embankment erosion	☐	6. effectiveness	☐
3. fender system	☐	7. debris	☐
4. spur dikes & jetties	☐	8. vegetation	☐

36-Traffic Safety features

	36	condition
1. bridge railing	☐	7
2. transitions	☐	NA
3. approach guardrail	☐	NA
4. guardrail terminal	☐	NA

X=UNKNOWN NA=NOT APPLICABLE IA=INACCESSIBLE

BI 8-1-90

Remarks, Photos and Sketches

city/town	bridge dept. no.	8-structure no.	90-date inspected
NORTH HARTLAND			1094

ACCESSABILITY:

Y/N	LIFT BUCKET	BOAT	RAILROAD FLAGMAN	INSPECTOR 50	OTHER	RIGGING	STAGING	TRAFFIC CONTROL	UNDERWATER INSPECTION	HOURS
Y										

CURB REVEAL: NA

PLANS? Y/N: Y

SCOUR: Y/N N

RATING REPORT:

Y/N	DATE
N	

RE-RATE?

Y/N	PRIORITY H/M/L
N	