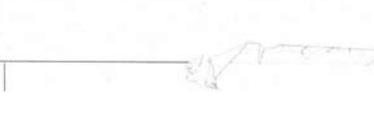
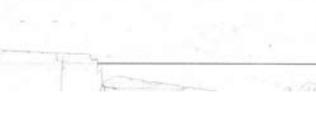
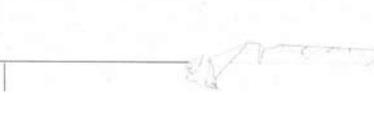
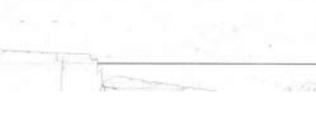
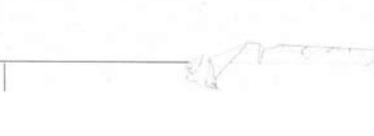
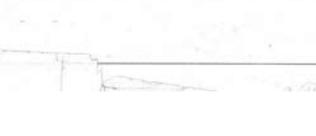
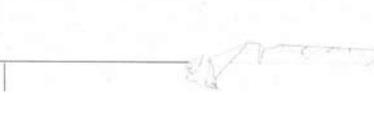
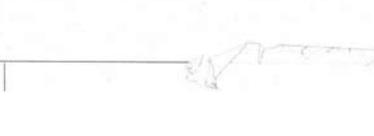
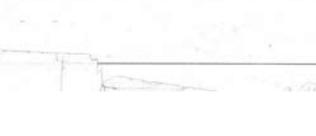
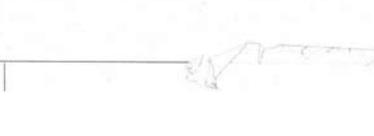
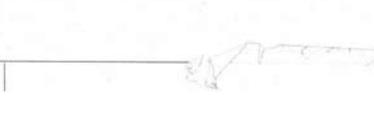
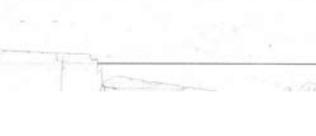
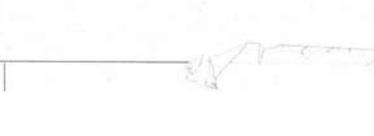
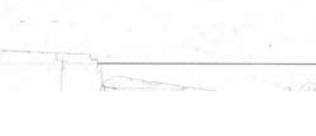
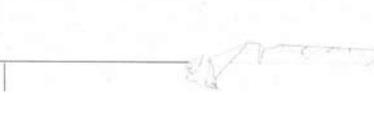
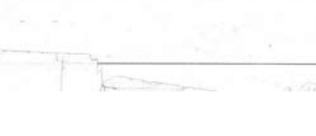
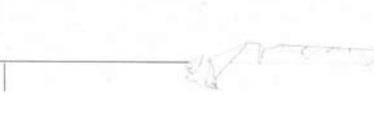
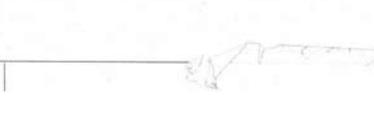
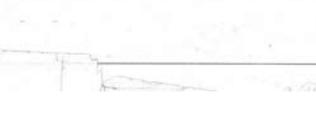
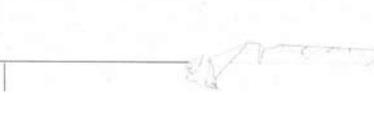
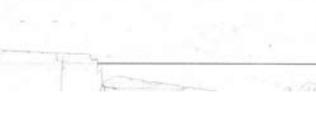
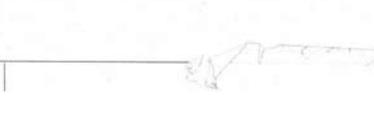
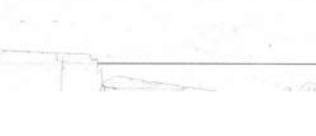
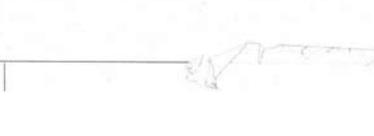
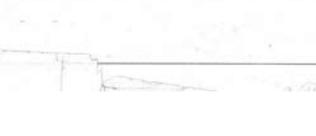
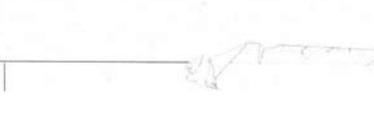
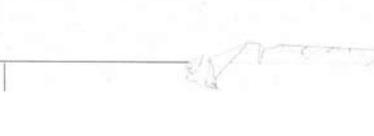
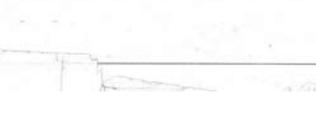
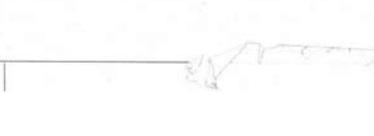
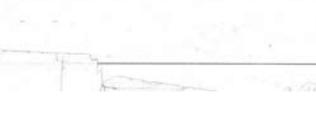
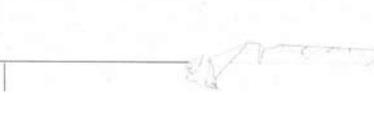
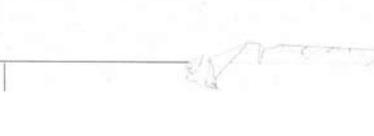
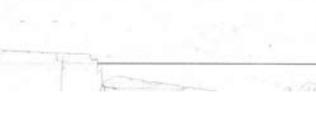
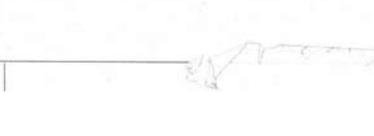
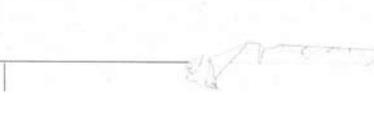
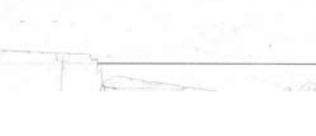
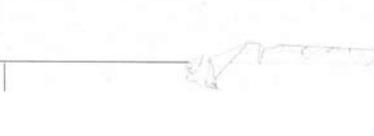
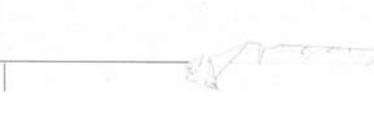
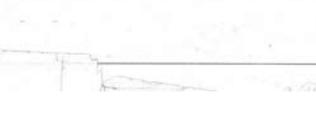
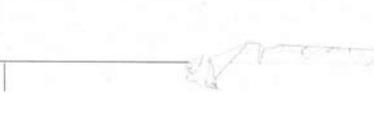
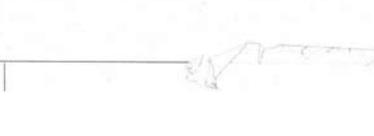
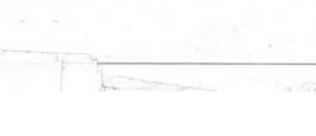
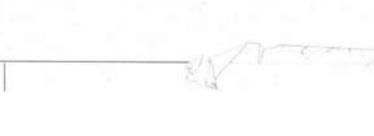
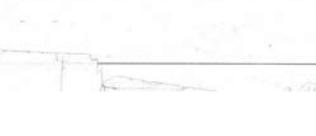
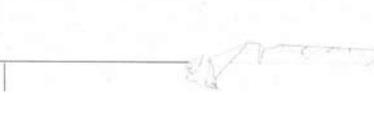
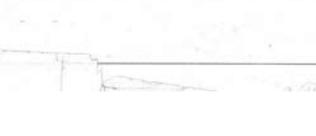
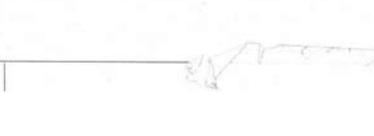
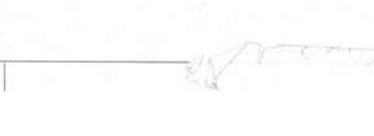
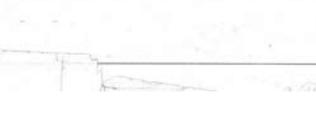
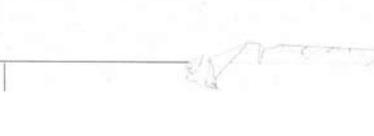
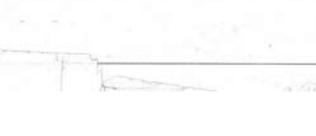
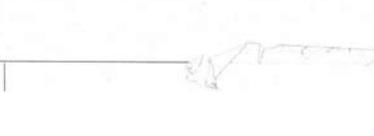
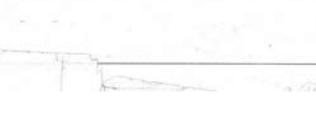
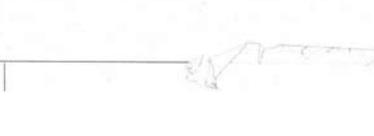
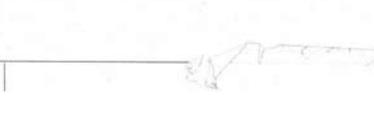
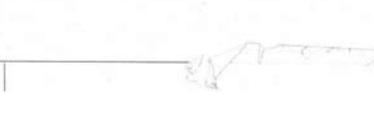
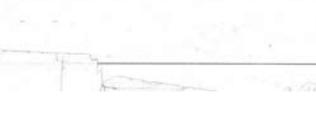
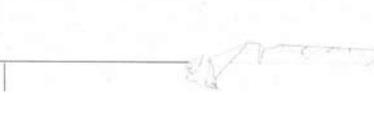
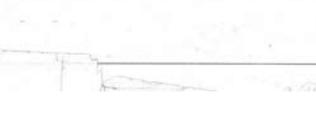
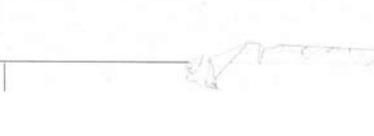
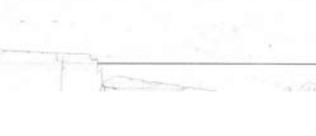
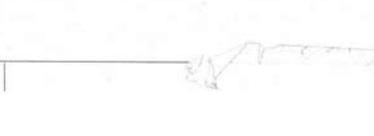
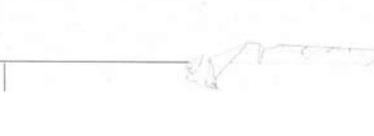
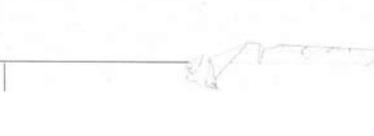
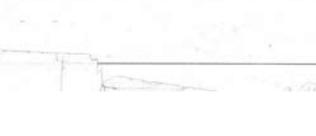
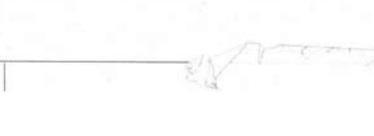
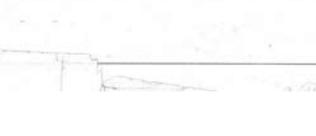
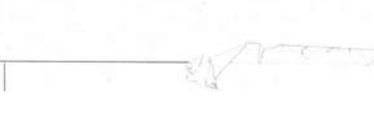
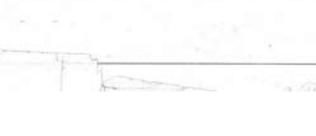
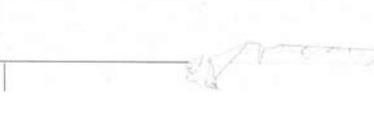
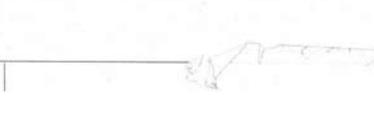
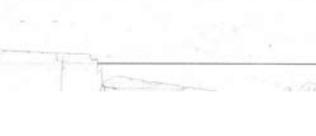
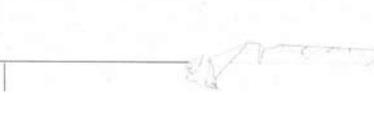
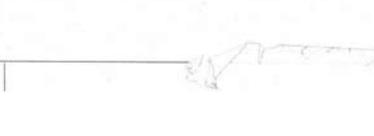
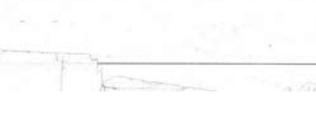
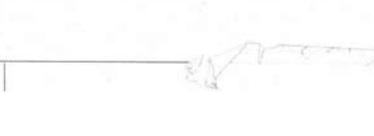
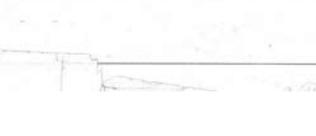
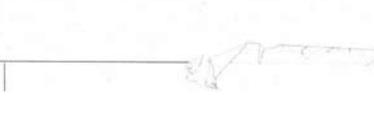
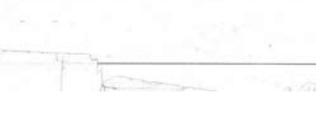
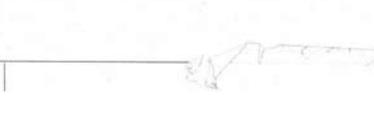
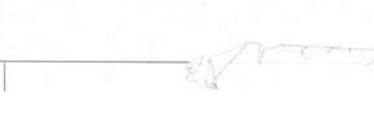
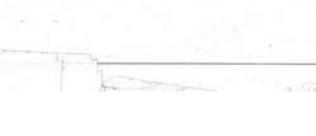
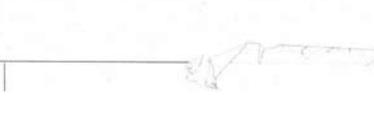
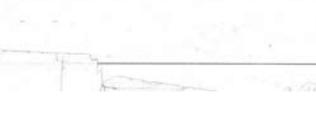
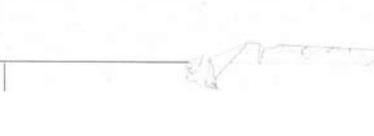
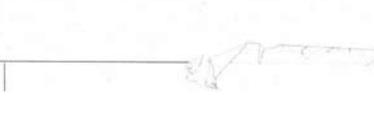
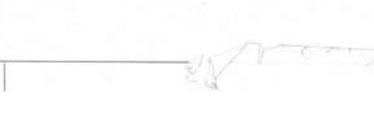
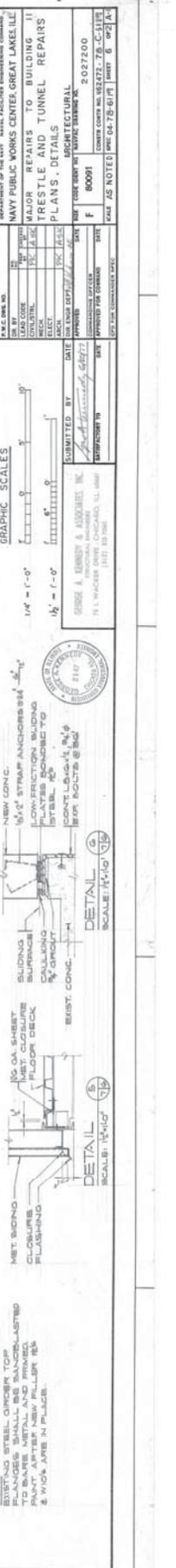
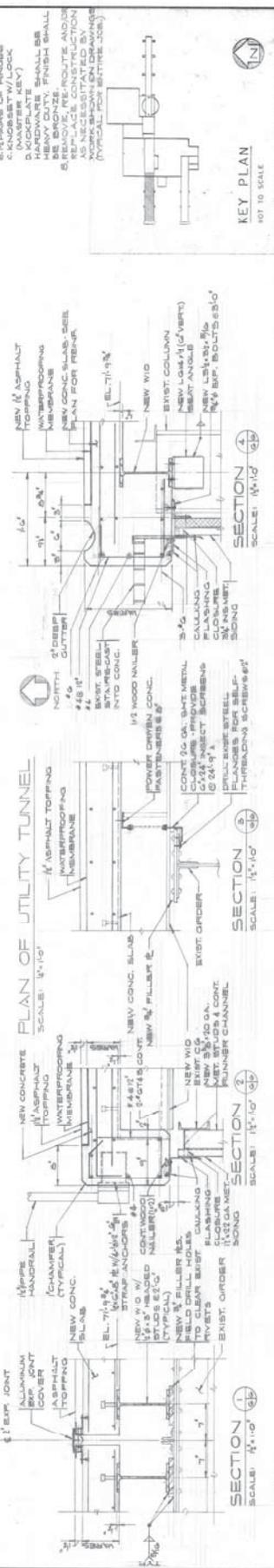
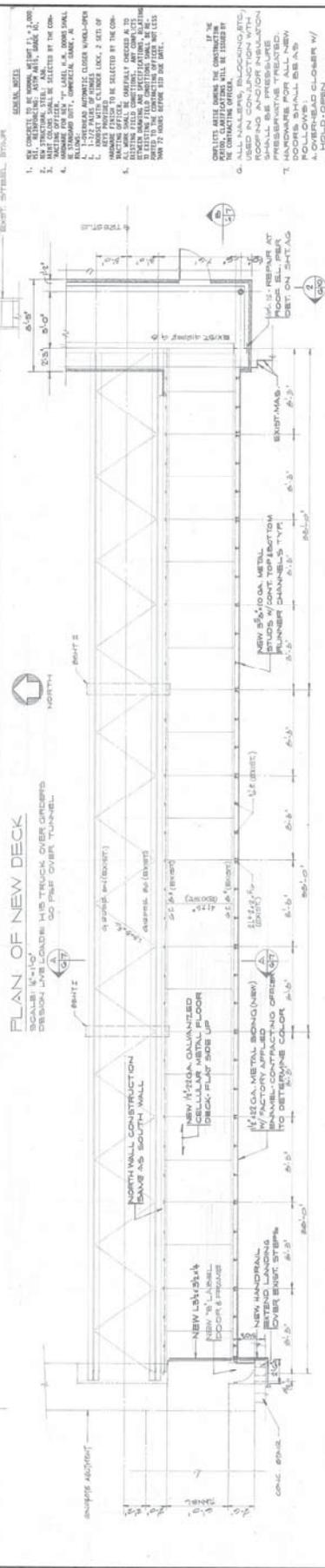
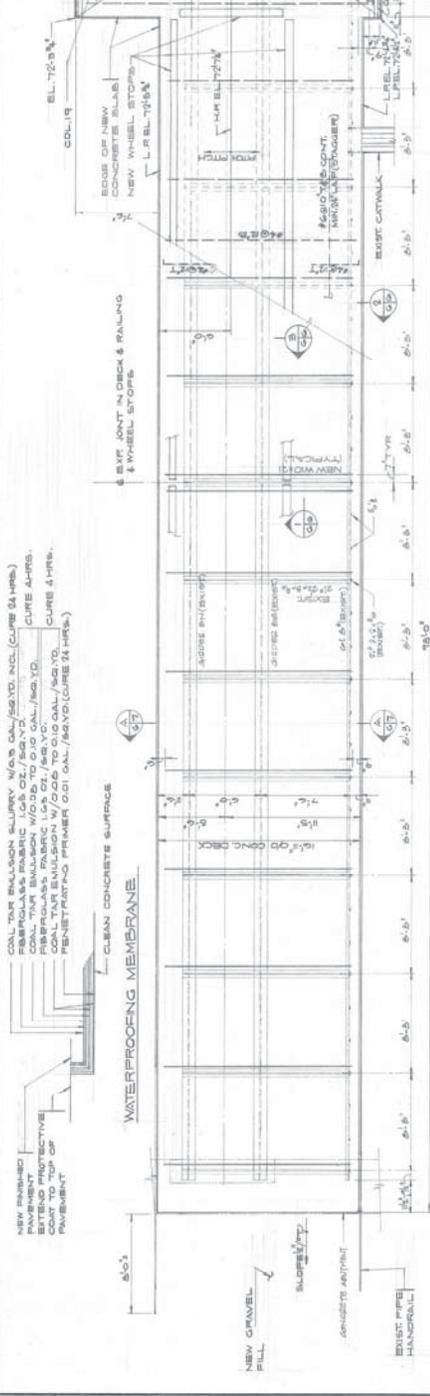
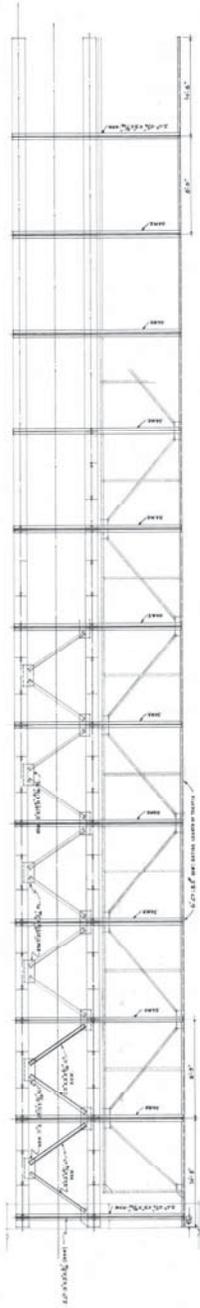
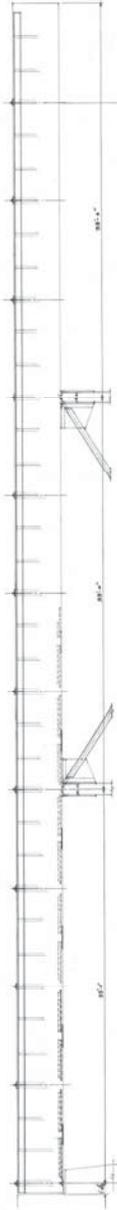


REVISION	BY	DATE	REMARK
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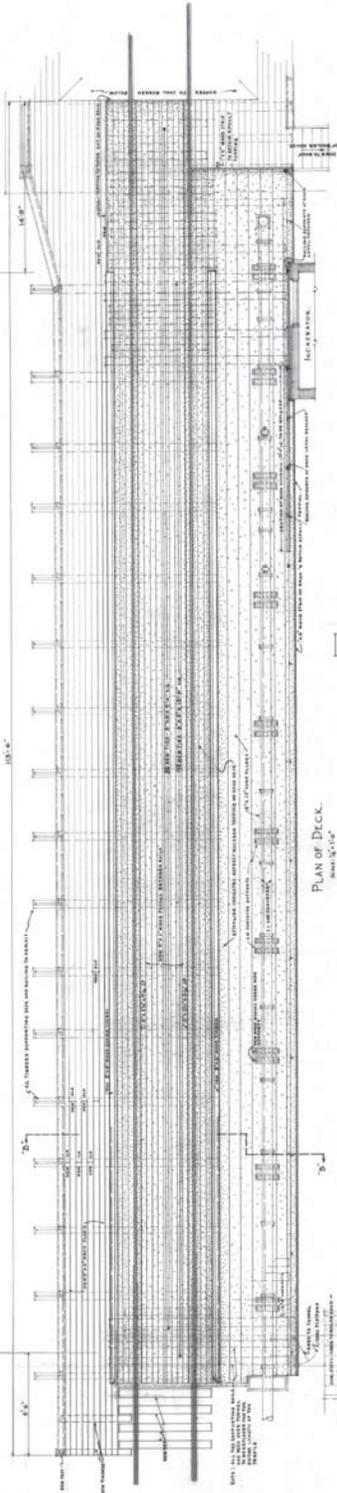




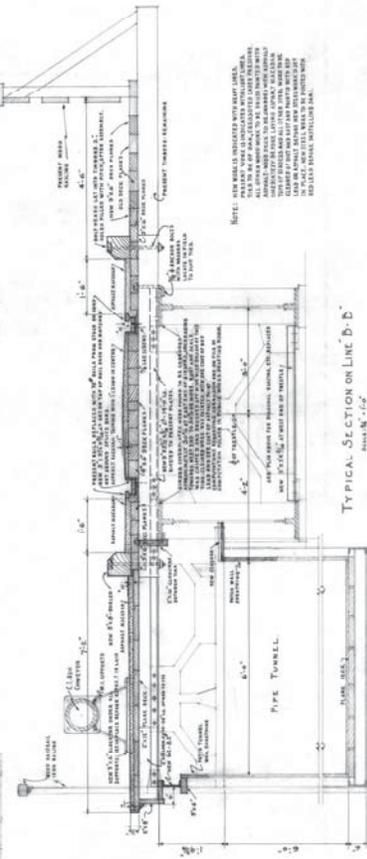
PLAN OF STEEL WORK.
sheet 1/2"



SOUTH ELEVATION OF SOUTH GIRDER OF TRESTLE.
sheet 1/2"



PLAN OF DECK.
sheet 1/2"



TYPICAL SECTION ON LINE D-D.
sheet 1/2"

NOTE: THIS DRAWING IS A GENERAL INDICATION OF THE STRUCTURE AND IS NOT TO BE USED FOR CONSTRUCTION WITHOUT THE ASSISTANCE OF THE ARCHITECT. ALL DIMENSIONS ARE TO BE TAKEN FROM THE FACE UNLESS OTHERWISE SPECIFIED. ALL MATERIALS ARE TO BE OF THE BEST QUALITY AVAILABLE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING UTILITIES AND STRUCTURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING UTILITIES AND STRUCTURES.

U.S. NAVAL TRAINING STATION
GREAT LAKES, ILL.
RAILROAD TRESTLE
TO POWER HOUSE
REPLACEMENTS AND REPAIRS.

Approved: *[Signature]*
Supt. of Buildings

P.W. Drawing No. 201-58

Scale: as shown

REPORT
on
INSPECTION, STRUCTURAL ANALYSIS
AND CLASSIFICATION FOR:

Utility Bridge S-4

submitted to the:

DEPARTMENT OF THE NAVY

**Engineering Field Activity, Midwest
Naval Facilities Engineering Command**

Building 1-A
2703 Sheridan Road, Suite No. 120
Great Lakes, Illinois 60088-5600



Public Works Center

prepared by:



Rubinos & Mesia Engineers, Inc.

200 S. MICHIGAN AVENUE, SUITE 1500 CHICAGO, IL 60604-2482

February 1997

Cencula, Jerome M

From: Burdo, Janel L
Sent: Wednesday, March 10, 1999 9:49 AM
To: Cencula, Jerome M
Subject: S4 bridge Repair

Jerry:

Here is an update on where we are on this one.

Initial concerns:

In order to paint and perform the required maintenance on the bridges, old peeling and flaking paint would need to be removed. The old paint is high in lead content (2.8-35mg/L Pb), thus removal and disposal of this old paint would need to follow lead based paint and disposal requirements. Disposal this lead paint debris would need to follow the hazardous waste requirements and would significantly increase the cost of the project.

In an effort to keep cost down, we experimented with a sprayed on coating called Enviro Prep. Our approach was to see if we could reduce the hazardous characteristic of the waste (paint chips) below the limits required for hazardous waste disposal. Thus in theory we could dispose of the paint debris as normal waste. The results of our test showed that the paint which was treated with Enviro Prep did pass the TCLP for extractable lead (Pb), and thus was no longer a characteristic Hazardous Waste. Every test area showed Pb(lead) levels less than 1.

During my initial discussions with the State of Illinois, there were questions raised by the state that we may be pre treating a waste which is supposed to be hazardous. I have been trying to get clarification on this issue for nearly 9 months. The state hesitates to tell me in writing it is ok to use this process. I am currently working with a new point of contact (Ms. Connie Sullinger) on this issue. I have requested the state provide the an answer not later than 15 March 1999 otherwise we will proceed.

In the meantime I am proposing to both you and the state that we move forward with this project. We can classify the paint chips as an industrial process waste (Construction or demolition debris). I am saying that we should consider the paint chips as special waste which is a characteristic hazardous waste rendered nonhazardous by treating with Enviro Prep. If the state agrees with this logic, I would then say that the paint chips have been decharacterized by virtue of the fact that treating it made it's characteristics nonhazardous. I would then ask that the state consider a nonspecial waste certification. If we can get a nonspecial waste certification for our paint chips our disposal cost will be the same as standard waste.

ok I hope this helps.

If you have any further question please give me a call at 5999, ext 46.

v/r

Janel

REPORT ON
INSPECTION, STRUCTURAL ANALYSIS
AND CLASSIFICATION OF
UTILITY BRIDGE S-4

SUBMITTED TO:
NAVAL FACILITIES ENGINEERING COMMAND



PREPARED BY:
RUBINOS & MESIA ENGINEERS, INC.

Teresa Mesia Rubinos

FEBRUARY 1997

FEB 19 1997

UTILITY BRIDGE S-4

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1.0 INTRODUCTION AND SCOPE

This report contains the findings of field inspections, the results of structural analysis and evaluations and recommendations for needed repairs for Utility Structure S-4 located within the National Historic District of the Great Lakes Naval Training Center.

The report is submitted in fulfillment of professional engineering services of the Navy Public Works Center, Great Lakes, Facilities Inspection Program, in accordance with Contract No. N68950-95-D-9041, Delivery Order No. 1, dated May 24, 1996, with Rubinos & Mesia Engineers, Inc.

2.0 INSPECTION PROCEDURES

Detailed visual inspection was conducted on this structure on June 7th, 1996. The inspection conformed to recommended procedures outlined in the American Association of State Highway and Transportation Officials "Manual for Condition Evaluation of Bridges", dated 1994.

The inspection consisted of a close examination of all exposed areas of the structure. Elements were checked for deterioration, cracking, distortion and unusual movement. Exposed concrete elements were probed and sounded with geologist hammers to determine the extent of damage. Steel structures were checked for metal loss by cleaning the area with wire brushes and recording measurements made with calipers or "D" meter (electronic thickness measuring device) to determine the remaining thickness of the metal. All deficient Architectural/Structural areas and observations on the existing utilities were carefully noted and photographed.

All areas of the structures were physically reached by using climbing techniques or with the aid of a mounted aerial man lift.

3.0 REFERENCES

Following is the list of references used throughout this report.

1. Report by Envirodyne Engineers, Inc. June 1987
2. Report by Baker Engineers, Inc. May 1982
3. Records of repairs

Existing inspection and classification reports were obtained and used as a basis for evaluations in this report.

Records of repairs were reviewed and compared with the previous reports along with the field conditions to determine the recommendations contained in this evaluation.

4.0 DESCRIPTION AND BACKGROUND

The structure was constructed in 1911 and is considered a "non-contributing property within the Historic District".

The utility bridge is the northern one of two bridges that extend from building 11 to the parking lot on the top of the bluff. This three span riveted plate deck girder bridge supported coal trains before 1972, when the track was removed after fire damage. It now carries steam pipes under a 17 foot wide concrete deck that cantilevers 8 feet out over the south side of the steel girders. At the west end, the two parallel girders are supported on a concrete abutment that has an entrance to a utility tunnel. The two intermediate supports are provided by a four column tower that rest on individual footings. Both girders are framed into a transfer girder that is an integral part of the building at the east end.

Each of the three equal steel spans is 33 feet long, and the girders are spaced 6 feet apart. The steam pipes are carried between the girders, and under the south side cantilever. The pipes under the cantilever deck are supported by steel trusses that also support a metal shell. Traffic is restricted from the outer 6 feet of cantilever deck by timber curbs. Steel pipe handrails extend the entire length on both sides of the bridge deck. A layer of asphalt protects the deck between side handrails.

5.0 EXISTING CONDITIONS

5.1 Bridge Approaches

The west bridge approach has a large chain link fence entrance gate with two signs attached to it. The signs indicate a "Restricted Area - Keep Out". There is no other barrier to restrict vehicles from using the bridge (See Photograph 1). There is no pavement at west bridge approach. There is a

heavy 14 inch pipe blocking the pedestrian way. The east end of bridge is a dead end, with stairs that go down to the roof of building 11. (See Photograph No. 2)

5.2 Bridge Deck

There is bituminous pavement, 3" to 2" thick, on the concrete slab deck of the bridge. There is an expansion joint located 59' from the west end of the bridge, which is in good condition. The pavement between the west abutment and expansion joint is in good condition. The pavement between expansion joint and the east end of the bridge is in fair condition. Bituminous pavement has cracks over 30% of the east part of deck area.

The concrete deck is in good condition. Hairline cracks and efflorescence were noted on the bottom surface of the deck. In the vicinity of the masonry wall, at the east end of the bridge, there are steam pipes which release steam. The steam from the pipes has caused corrosion of the structural members in that area, and created a wet surface at the underside of the concrete deck. This condition will cause steel reinforcement of the deck to corrode.

The timber curbs, 7 ½" x 7 ½" x 16'-0", are located at 1'-2" and 11'-0" from north edge of deck and are anchored to the bridge deck (See Photograph 2). The function of the south timber curb is to prevent vehicle access over the cantilevered part of the deck at the south. Presently, a truck can access that part of the deck. Therefore, a sign must be installed to alert the user to this fact. The handrails are in good condition.

5.3 Superstructure

Girder Bearings

Both girders are supported by steel plate bearings at the west end of the bridge. Both bearings, at that location, are in poor condition. The masonry plates are corroded and the sole plates are severely corroded. The exposed portion and the nut of both anchor bolts at the north girder and one at the south girder are rusted away (See Photograph No. 3). Because of poor condition of bearings, longitudinal movement of bridge is restricted.

Girders

The two riveted plate girders are fair to poor condition. The girder bearing stiffener angles above the west abutment are severely corroded at both girders, and there is significant rust packing between outstanding legs (See Photograph No. 3). There are severe rust packs between angles and cover plate at the bottom flange of girders (See Photograph No. 4). The rust packs have caused the cover plates to bulge out. The bottom flange angle and rivets on south side of the south girder are severely corroded. Most of the stiffener angles at that location are rusted away (See Photograph 21). The top flange cover plate of both girders have 50% to 80% section loss in all spans due to corrosion (See Photograph 5). The bottom flange angles of both girders have about 25% of section loss due to corrosion. Additionally, during installation of new floor beams, the top flange cover plates of both girders were cut (See Photograph 6). This condition has created a discontinuous cover plate, which drastically affects the load carrying capacity of the bridge.

The girders transverse bracings are in fair to poor condition. The horizontal leg of the top horizontal angles above west abutment have corroded to knife condition (See Photograph 7). All gusset plates, for the transverse bracing at west abutment, are severely corroded. (See Photograph 19).

Floor Beams

The floor beams, supporting concrete deck, are in good condition. They are unpainted and have moderate rusting condition. (See Photograph 9).

Walkways

The north walkway under the deck is in good condition. Cross channels, angles and hang rods are not painted. Walkway planks are new, and are in very good condition (See Photograph No. 8).

The south walkway is supported by truss cantilevers out from the south girder (See Photograph 9). The top angles of the cantilever trusses are severely corroded. The horizontal leg of these angles are corroded to knife condition, or corroded away in the vicinity of the south bridge girder (See Photograph No. 10). The cantilevers are deflected 1" to 3" at the south end (See Photograph 9).

The bottom longitudinal channels, supporting tunnel floor cross beams, are in poor condition. There are heavy corrosion losses in the channel flanges (See Photograph No. 18).

The 4" beams supporting the light gauge metal flooring, and the lateral bracing, are in fair condition (See Photograph No. 11). The south metal panel wall is in good condition (See Photograph 12).

The south edge of the tunnel is deflected downward, and additional supports at the trestle columns should be considered.

5.4 Substructure

West Abutment

The concrete of west abutment is in fair condition. There are hairline cracks and spalls on the backwall. There is a horizontal open crack with efflorescence 2'-0" below the top of the breast wall (See Photograph 13). It appears that this crack has formed at location of a construction joint. There is also a vertical crack below the south utility tunnel support, and a spall beneath the masonry plate of north bearing. Dirt and debris has accumulated on the top of the breast wall (See Photograph 3).

The wingwalls are in fair condition. The concrete walls, ceiling and slab at the entrance to the underground utility tunnel are in poor condition. The concrete edge of tunnel ceiling has a severe spall, and the I-4 beam is severely corroded (See Photograph 20). There are large open horizontal and vertical cracks between abutment and the north tunnel wall.

Concrete Pedestals

The concrete pedestals of bent 1 and 2 are in good condition. South pier of bent 2 has hairline cracks. There is dirt accumulation on top of the pedestals.

Steel Pier Structure

The columns and transverse vertical bracings at bent 1 and 2 are in good condition. The south and north lower longitudinal bracing member is bent inward 3" to 5" (See Photograph No.15 and 16). There is a tree which has grown between the two angles of the bottom steel member. There is rust

packing in areas adjacent to the column channel lacing bars, column channels, bracing angles gusset plates, and bracing stay and batten plates.

East Bridge Support

The east ends of bridge girders are supported by a riveted steel plate bent which is located inside the building 11. The accessible part of the steel bent is in fair condition. It was noted that the bent members are rusted since they have not been painted (See Photograph 17). All parts of the steel bent are not accessible for verification.

6.0 EVALUATION AND RATING

We have reviewed the analysis performed by Envirodyne Engineers, Inc., and concur with their conclusions. The 1987 report analyzed the slab assuming minimum reinforcement, and concluded that the concrete deck can support 42 psf uniform live load, or a truck with 0.8 ton axle load at inventory level. The actual amount of reinforcement steel in the concrete slab deck cannot be verified.

The 1987 report identified the floor beams as the weakest component of the bridge. The cantilevered spans of the W10X22 floor beams were analyzed as noncomposite members, and were found to be 8% overstressed at inventory level for dead load only. (No live load is allowed over the bridge deck cantilever.) This is, most likely, conservative, but composite mechanism cannot be verified from existing drawings.

Remaining components of the bridge, such as the girders and columns, were originally designed for supporting coal trains. The extent of deterioration observed would not overstress these components. However, in order to prevent further deterioration critical components should be repaired as discussed below.

The top chords of the cantilever trusses at the south are heavily corroded. As evident by the structure, the applied loads from utility pipes and the south walkway have caused permanent deflection of those trusses. This deflection would increase with time, and eventually cause failure of the south walkway. In order to avoid expensive repairs to the structure and pipes, we recommend repairing the corroded truss members as soon as possible.

7.0 RECOMMENDATIONS

The structure is in fair condition, and can safely carry the load of utility pipes and trucks with axle weight of 0.8 ton. The south cantilevered part of the deck should be restricted from pedestrian load or snow piling. Heavy vehicles should not be allowed on the bridge. We recommend the following repairs to restore the capacity of the critical components and prolong the useful life of the structure.

1. Post a sign at the gate to limit the maximum axle weight to 0.8 ton.
2. Remove south timber curb, and reinstall it above the south bridge girder (7'-2" from north deck edge).
3. Post a sign at the bridge abutment south end indicating that "No truck or pedestrian load is permitted between the south timber curb and south railing", or, remove existing pedestrian railing on the south, and reinstall the railing just at the southern timber curb.
4. On the bridge deck, extend the south timber curb to Building 11 as shown on the plan.
5. As indicated in Section 6.0, repair of the top chords of the cantilever trusses under the bridge deck at the south girder is a high priority.
6. Replace the transverse bracing and bearing stiffener angles over the west abutment.
7. Straighten the lower longitudinal trestle bracing members, and reinforce by adding lateral bracing between them.
8. For the girder bearings at the west abutment, replace the anchor bolts, clean and paint bearing plates, and grease sliding surfaces.
9. Repair the longitudinal floor channels of the south walkway.
10. Sand-blast and paint all floor beams.

11. Remove rust and paint the steel structure. Approximately 40% of the surface area should be painted.
12. Paint cross channels and hang rods at the north walkway.
13. Extend the outlet on the condensate vent to discharge steam and vapor away from the bridge.
14. Repair the horizontal and vertical cracks in the breast wall and the north underground tunnel wall at the abutment, by epoxy injection.
15. Remove all unsound concrete on the exposed surfaces of abutment and at the entrance to the underground tunnel, and repair with non-shrink grout.
16. Regrade the west bridge approach. Provide slope away from the abutment.
17. Remove all trees and vegetation in the vicinity of the structure.

All repair work should be performed under the supervision of a Structural Engineer licensed in the State of Illinois.

CLIENT Dept. of Navy
 PROJECT Naval Training Center Bridge Inspection
 SUBJECT S-H - Repair quantities

Estimating Surface area of structural Steel elements.

1- Floorbeams; sand-blast and paint
 perimeter x length x number S.D.F
 $3.01 \times 15.2 \times 12$ = 595

Surface area of steel members:

a) Girders = 2402.0
 $12.13 \times 99 \times 2$

b) Stiffeners:
 $6 \left(\frac{5'' \times 46''}{144} \right) \times 4 \times 12$ = 460.0

c) Diaphragms between girders:

2- cross angles $3 \times 2 \frac{1}{2} \times \frac{5}{16}$	= 11.38	}
$\frac{11}{12} \times 6.2 \times 2$		
gusset plate		
$5 \times 3.75 \times 2$	= 3.75	
2-L $3 \times 3 \times \frac{5}{16}$ (bottom)		
$(1' \times 5') 2$	= 10.0	} \times 8
2-L $3 \times 2 \frac{1}{2} \times \frac{5}{16}$ (top)	= 9.2	
	<u>275</u>	
	<u>3137</u>	

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 SUBJECT S-4 Repair Quantities

previous page = SQ.F = 3127

a) Cantilever diaphragms:

7 gusst plates
 5(1) + 2x2

= 9.0

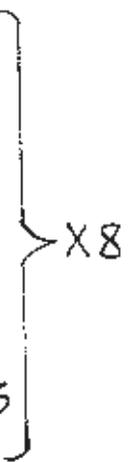
diagonals

3(2.89') x .875 + .875 x 1.25 = 8.7

.875 x 6.75 x 2 x 2 = 23.625

= 23.625

330.6



e) - East bent

2 [12" x 20.5"

2 (48.7') x 2 x 2 = 389.6

Lacing

48' (1.2) x 2 x 2 (.33) = 76.0

diagonal and lateral bracing

2 L'S 4x3 x 5/16

[(20 x 2 + 17 x 2 + 14 x 2 + 10 x 10) + (22 + 19 + 15 + 11) 2] .92 = 348.0

Gusset plates:

11 x 2 = 22.0

835.6

430.2



CLIENT Dept-Of Navy
 PROJECT Naval Training Center-Bridge Inspection
 SUBJECT S-H- Repair quantities

SHEET 3 of 6
 DATE JUN-August 1996
 PROJECT NO RM 042296
 COMPUTED BY H- Odeh
 CHECKED BY

previous page = 50.F
 = 4302
 f)- West bent:
 = 417.8
 $\frac{1}{2} \times 835.6$ (East bent)

g)- North and south slope (vertical, diagonal and horizontal bracing:

2 L's $6 \times 3 \frac{1}{2} \times \frac{3}{8}$	}	= 260.0
2 x 41 x 1.58 x 2		= 234.0
2 L's $6 \times 3 \frac{1}{2} \times \frac{3}{8}$		= 75.0
(33+41) x 2 x 1.58		= 14.0
2 L $3 \frac{1}{2} \times 3 \frac{1}{2} \times \frac{5}{16}$	}	= 583.0
(20+12) x 2 x 1.16		
gusset plates		
7 x 2		

h)- Transverse cantilever:
 4" I 7.5 beams
 per x Length x Num
 1.52 x 6.67 x 24 = 243

j)- Bottom Longitudinal C beam (south)
 6" C 8
 1.6' x 99' x 2 = 317

5363

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 SUBJECT S-4- Repair quantities

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previous page = SQ.F
 = 5863

x) - Bottom diagonal angles (Tunnel)
 1L 3" x 2 1/2" x 5/16"
 .916 x 10' x 12 = 110.0

m) - Lateral bottom diagonal angles (between girders):
 .916 x 7' x 24 = 154.0

n) - Cross bottom members between two girdes:
 2L's 3 x 2 1/2 x 5/16
 .916 (6 x 2) x 12 = 132

p) - Gusset horizontal plates between two girders:
 2 x 24 = 48

r) - Additional: = 500

Horizontal hanger beams carrying steam pipes (N. side)

East far end supported by building No. 11

6807

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 SUBJECT S-4 - Repair quantities

2- Clean to remove rusted area
 40% x

= 2723 SQ.F

3- Paint 40% Structural Steel Members = 2723 SQ. FT.

4- Extend the outlet on the condensate vent
 to discharge steam and vapor away
 from the Bridge: 4" DIA, STD. PIPE; 40' LONG \times 10.79 = 432 Lb

5- Remove rusted area, Paint
 and grease the expansion
 bearing at W-abutment: = 2 Num

6- Replace the transverse
 diaphragm at W-abutment:
 $(L 3 \times 2 \frac{1}{2} \times 5 \frac{1}{16} \times 5' - 8") \times 2 \times 5.6 + 4 \times (5 \frac{1}{16} \times 14 \times 1' - 3") \times 4 \times \frac{49}{12}$ = 137 Lb.

7- Replace anchor bolts = 4 NUM

8- Replace bearing
 stiffeners $(L 5 \times 3 \times 5 \frac{1}{16} \times 3' - 9") \times 8 \times 0.2$ = 246 Lb

~~= Repair the west approach
 by casting 17' x 15' R/C = 255 SQ.F~~

9. Straighten south and north lower
 longitudinal trestle bracing members
 and reinforce by adding lateral bracing
 between them. $(2 L 3 \times 3 \frac{1}{2} \times 5 \times 16)$
 $(24' + 18' + 21' + 14.5' + 18.5') \times 5.6 \times 2 \times 1.05$ = 1,130 Lb
 2 GUSSET PL

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 PROJECT Naval Training Center Bridge Inspection
 SUBJECT S-4 - Repair Quantities

SHEET 6 of 6
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- 10 - Repair the top chord of the cantilever trusses at the south girder (50%); $(L 3 \times 2 \frac{1}{2} \times \frac{5}{16} \times 14' - 0) \times 2 \times 11 \times 5.6 \times 0.50 = 862 \text{ Lb.}$
- 11 - Repair the South tunnel floor Channels (25%); $6 \times 8.2; 99' \times 2 \times 0.25 \times 8.2 = 406 \text{ Lb.}$
- 12 - Repair the horizontal and vertical cracks in breast wall and underground tunnel wall at abutment. = 30 L.F.
- 13 - Remove all vegetation underneath the bridge: $20' \times 50' = 1000 \text{ SQ.F}$
- 14 - Clean spalls and scalings to the sound concrete on abutment and at entrance to underground tunnel = 15 SQ.FT.
- 15 - Regrade west bridge approach with slope from abutment $15' \times 15' = 225 \text{ SQ.FT}$

RUBINOS & MESIA ENGINEERS, INC.

CLIENT US DEPARTMENT OF NAVY
PROJECT NAVAL TRAINING CENTER BRIDGE INSPECTION
SUBJECT UTILITY BRIDGE S-4
BRIDGE DECK AND FLOORBEAM RATINGS

SHEET 1 of 1
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FLOORBEAM CAPACITY AND RATING

REFER TO ENVIRODYNE ENGINEERS CALCULATIONS INCLUDED
IN 1987 YEAR REPORT

INVENTORY LEVEL RATING:

W10X22 FLOORBEAM IS OVERSTRESSED FOR $\frac{19,133-17,663}{17,663} = 8\%$
DUE TO DEAD LOAD ONLY.

NO LIVE LOAD IS ALLOWED OVER THE BRIDGE DECK CANTILEVER
AT THE INVENTORY RATING.

OPERATING LEVEL RATING:

ALLOWABLE LIVE LOAD AT THIS LEVEL IS 33 LB/SQ.FT.

BRIDGE CONCRETE SLAB

INVENTORY LEVEL RATING

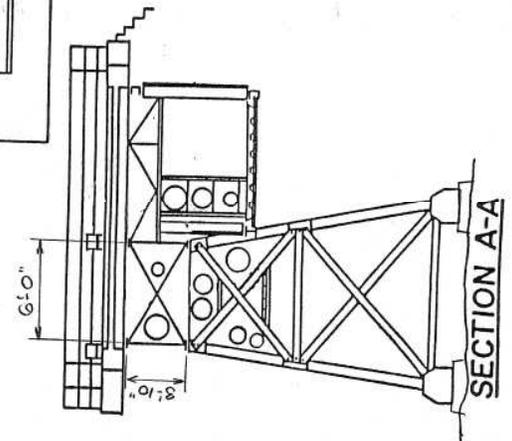
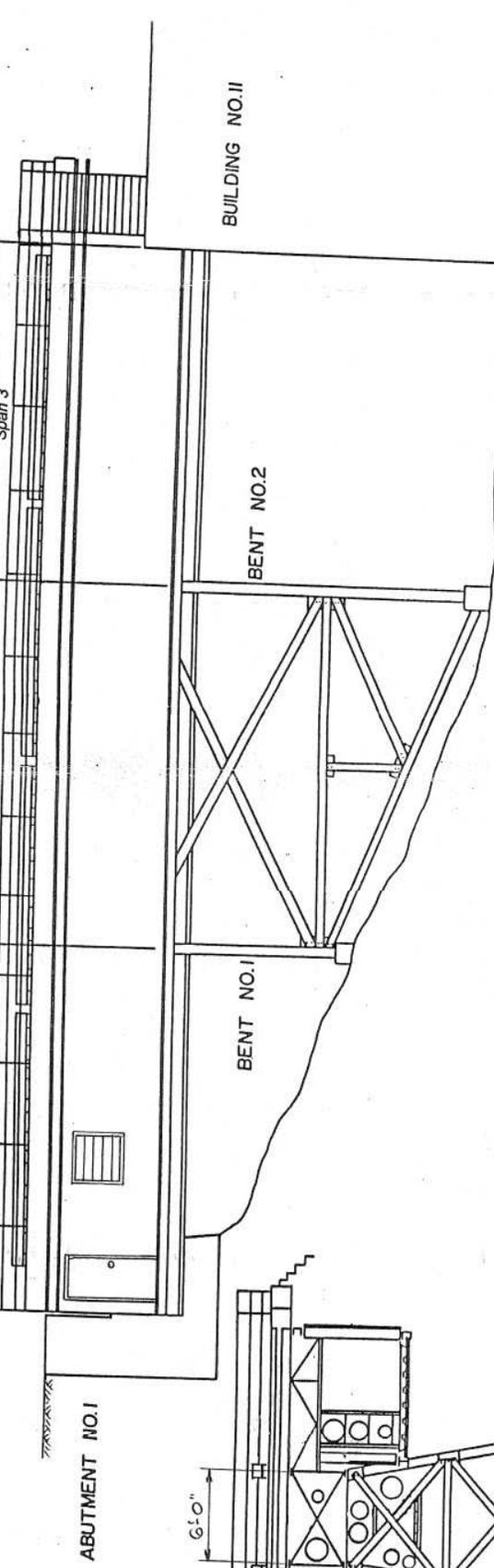
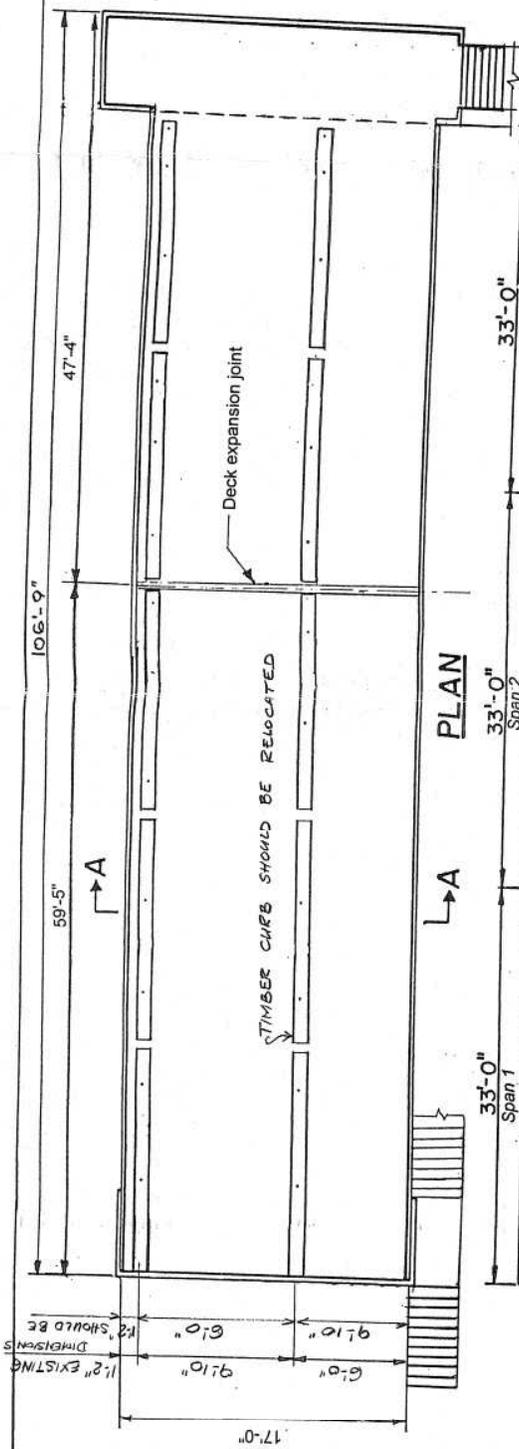
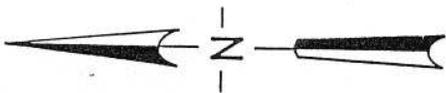
ALLOWABLE ^(UNIFORM) LIVE LOAD ON THE DECK BETWEEN BRIDGE
GIRDERS IS: $W_L = 42$ LB/SQ.FT. OR TRUCK WHEEL
LOAD = 771 LB.;

AXLE LOAD = $2 \times 771 = 1,542$ LB = 0.77 TON

OPERATING LEVEL RATING

ALLOWABLE UNIFORM LIVE LOAD $W_o = 96$ LB/SQ.FT.
OR TRUCK WHEEL LOAD = 1774 LB.

AXLE LOAD = $2 \times 1774 = 3548$ LB = 1.77 TONS



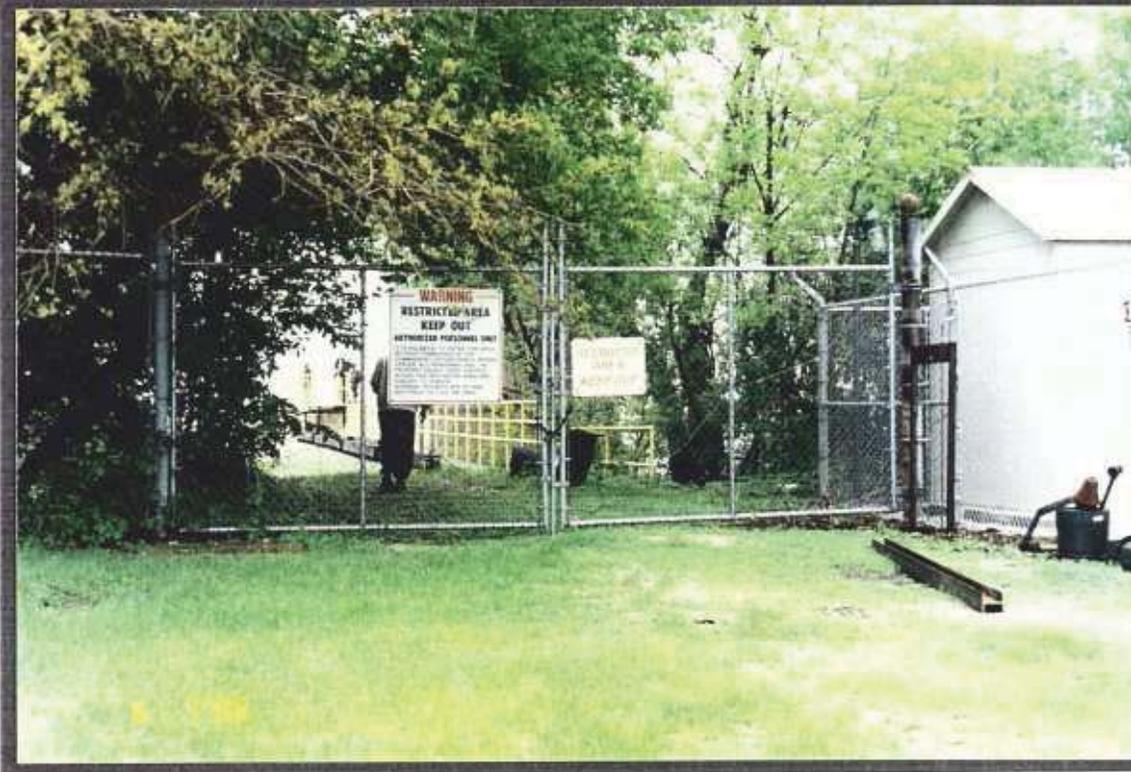
NAVAL TRAINING CENTER
Great Lakes, Illinois
PWC STRUCTURE NO. S-4



RUBINOS & MESIA ENGINEERS, INC.
200 E. Michigan Ave. / 1500 Chicago, IL 60604-2482 (312) 843-3878

Looking East at the West bridge approach and entrance gate.

Photograph No. 1



Looking East at the Bridge deck.

Photograph No. 2



West bearing plate of North girder. Missing anchor bolt, corroded masonry plate and bearing stiffeners are noted.

Photograph No. 3



Photograph No. 4

Bottom flange of North girder is shown. This is a typical condition for bottom flange of both girders.



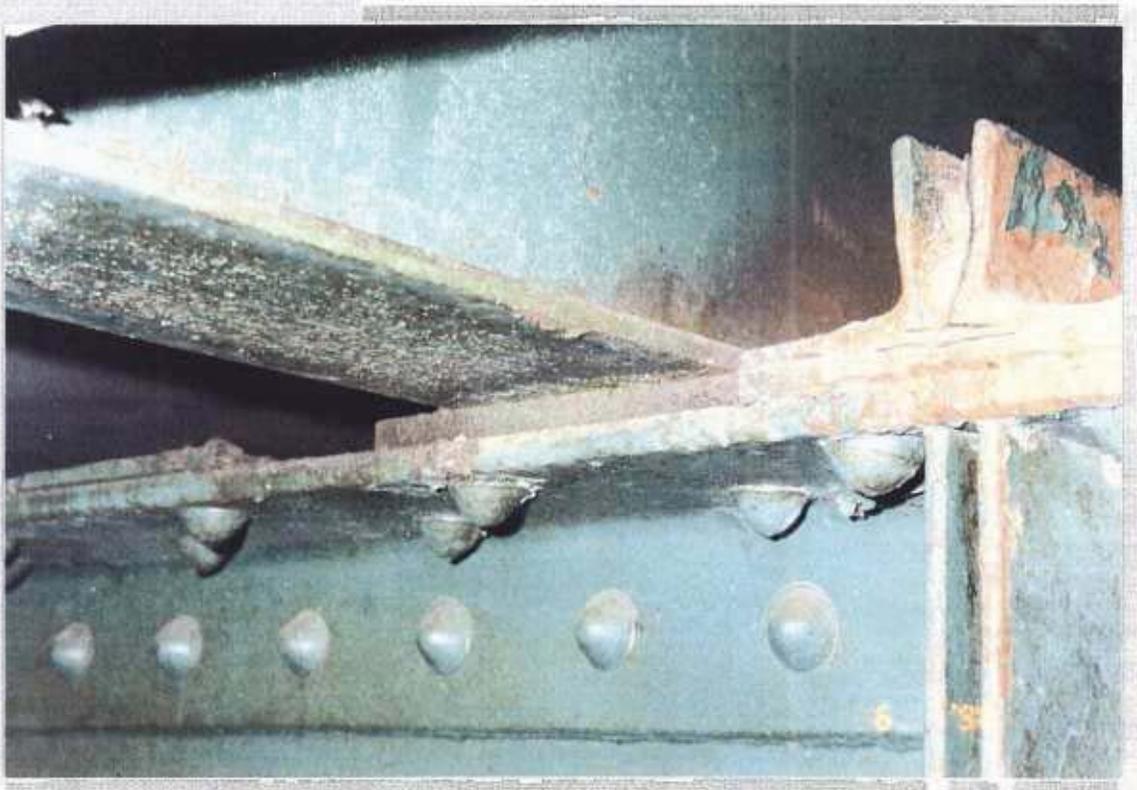
Top cover plate and rivets of South girders is severely corroded.
A typical condition for both girders.

Photograph No. 5



Photograph No. 6

Top cover plate of both girders has been cut.



Transverse bracing at West abutment.
Top horizontal member is severely corroded.

Photograph No. 7



Photograph No. 8

Looking East at the North walkway under the deck.
Generally in good condition.



Looking West inside the South tunnel. Note the deflection of the cantilever supporting the tunnel and unpainted floor beams.

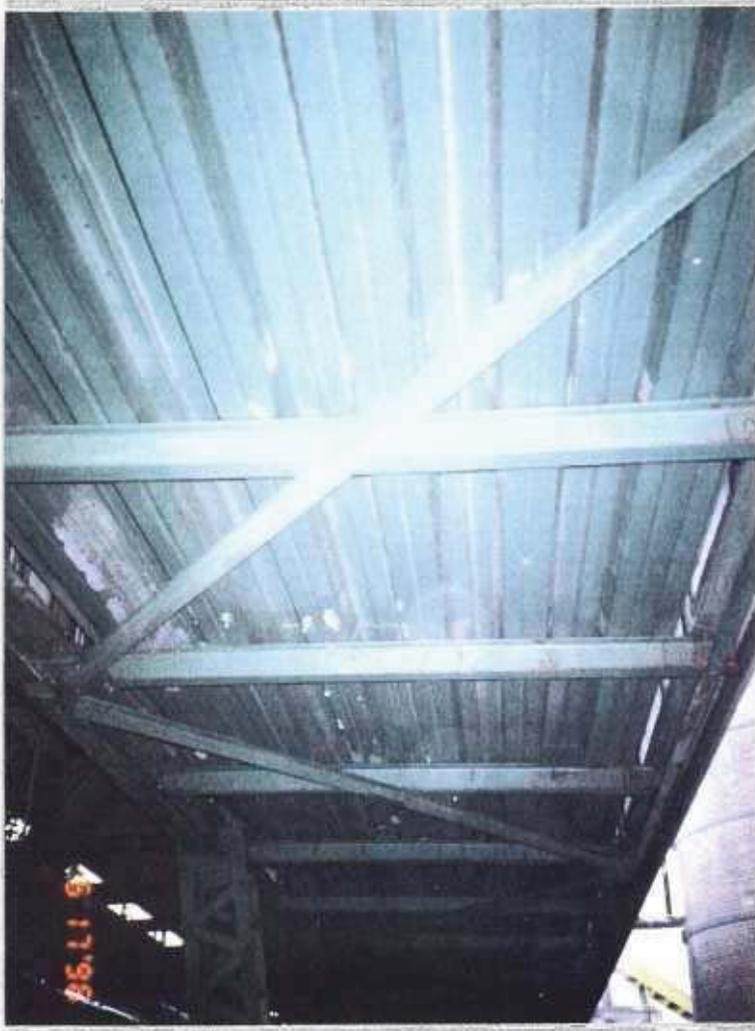
Photograph No. 9



Photograph No. 10

Top member of the South tunnel cantilever is severely corroded at the girder flange. A typical condition.





Photograph No. 11



Left:
Looking East at the underside of
South tunnel walkway.
Components generally in fair
condition.

Bottom:
Looking East at South wall
of the South tunnel.
Components generally in
fair condition.

Photograph No. 12



View of breast wall at West abutment which has an open horizontal crack.

Photograph No. 13



Photograph No. 14

View looking East at the superstructure. Trees growing around the base of the structure should be removed.





Photograph No. 15



Left:
Looking East. Sloped bottom member of South longitudinal bracing is bent inwards by 3" to 5".



Right:
Looking East.
Sloped bottom member of North longitudinal bracing is bent inwards by 3" to 5".

Photograph No. 16



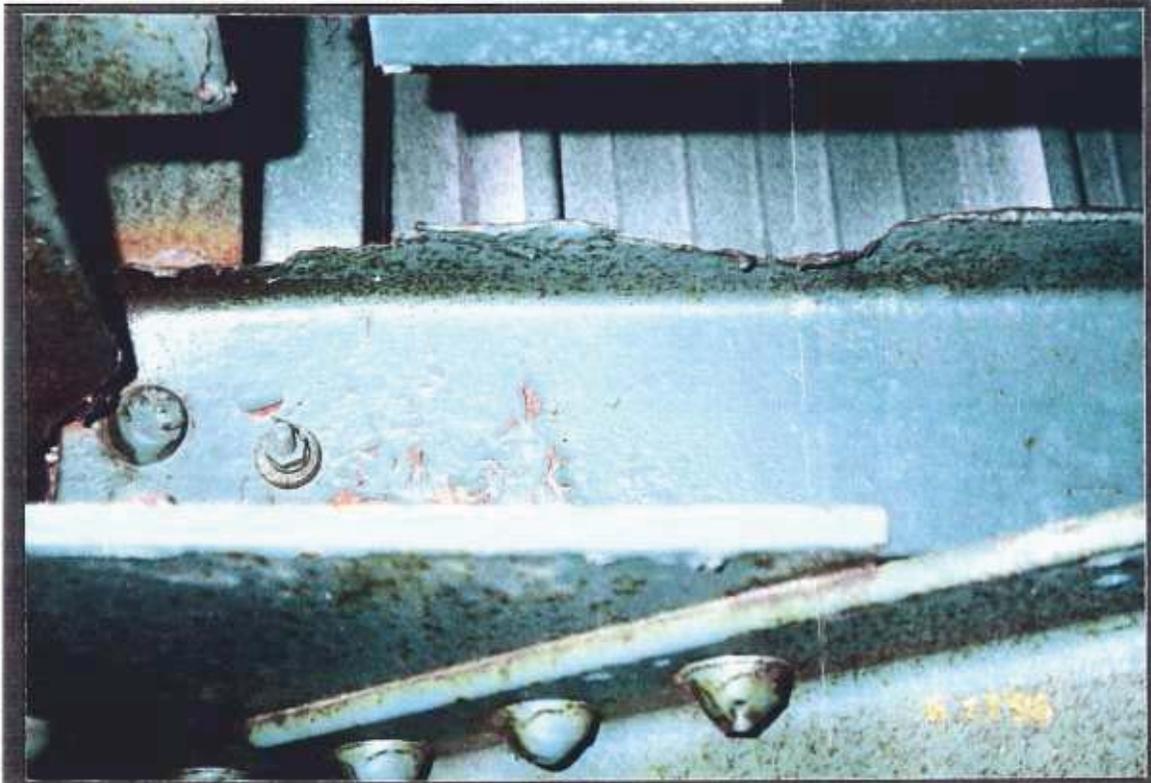
Photograph No. 17



Left:
Looking North at the steel frame supporting East end of bridge girders.
Accessible part of frame was verified to be in fair condition.

Bottom:
Severely corroded flange of longitudinal channel supporting South tunnel floor cross members.

Photograph No. 18



North top gusset plate of transverse bracing at abutment is severely corroded and has rust holes.

Photograph No. 19



Photograph No. 20

Concrete ceiling of the underground tunnel entrance, looking North up. Severe spalling and corroded steel beam.





Photograph No. 21

Top:
South face of South girder.
Note the rusted away
girder stiffener and rivets.
View is blocked by a pipe.



Left:
Looking West at the entrance the
underground utility tunnel.
Note general concrete deterioration
and water accumulation
in the tunnel.

Photograph No. 22