



**ANDERSON ENGINEERING AND SURVEYING, INC.**  
PROFESSIONAL ENGINEERS AND LAND SURVEYORS

17681 Hwy. 395, Lakeview, Oregon 97630

(541) 947-4407 Fax (541) 947-2321

[www.andersonengineering.com](http://www.andersonengineering.com)

July 15, 2024

Chad Carpenter  
Mile High Community Management  
376 SW Bluff Dr #4  
Bend, OR 97702

**RE: Wood Duck Bridge #20783 Oregon Water Wonderland**

Dear Mr. Carpenter

The Wood Duck Bridge is a timber bridge that was constructed in 1984 and serves as the only access to the Oregon Water Wonderland residential development. The one lane bridge is constructed from three (3) 24-inch by 94 pounds per foot wide flange beams with 6x12 wood decking. Foundation abutments at each end are constructed with 4x14 pressure treated cribbing, filled with fill material.

Some rot is present in the abutments. Some of the 4x12 sleepers are totally rotted along with rot in the next up cribbing board. These issues will need to be addressed. These sleepers and cribbing planks will need to be replaced, or an optional repair considered. Photographs are attached, along with an as-built drawing and a suggested repair drawing.

The bridge was analyzed for legal loads and emergency vehicle loads as recommended by ODOT. The Lapine Fire District noted that a 40,000-pound single axle loading should be used also, although this amount is not noted in the approved emergency loads from ODOT. Only 31,000-pound axles are noted by ODOT. However, the 40,000-pound axle was used in the decking analysis.

The bridge superstructure has adequate capacity to handle the loadings. Rating numbers were well over 1 for the beams supporting the bridge. The decking, however, is not adequate to support the higher single axle loads unless the single axle distribution is over at least three decking boards. This requires a better running plank system than the existing 2X12 material on the bridge.

Installing 6x12 running planks would be the quickest and most cost-effective approach to meet the emergency loading requirements and remove the posting.

1. Install four (4) 16-foot long 6x12 treated running planks with joints staggered at 4-foot intervals. Anchor with 12-inch x ½-inch galvanized lag bolts. 2 per plank at 24-inch intervals.
2. Replace rotten cribbing boards and sleepers that are rotted.
3. Sign bridge for 20 miles per hour.



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In the long term, Mile High Community Management should look at replacing the abutments with a more permanent foundation or consider a large culvert installation to alleviate bridge maintenance.

Sincerely,

Darryl Anderson PE PLS











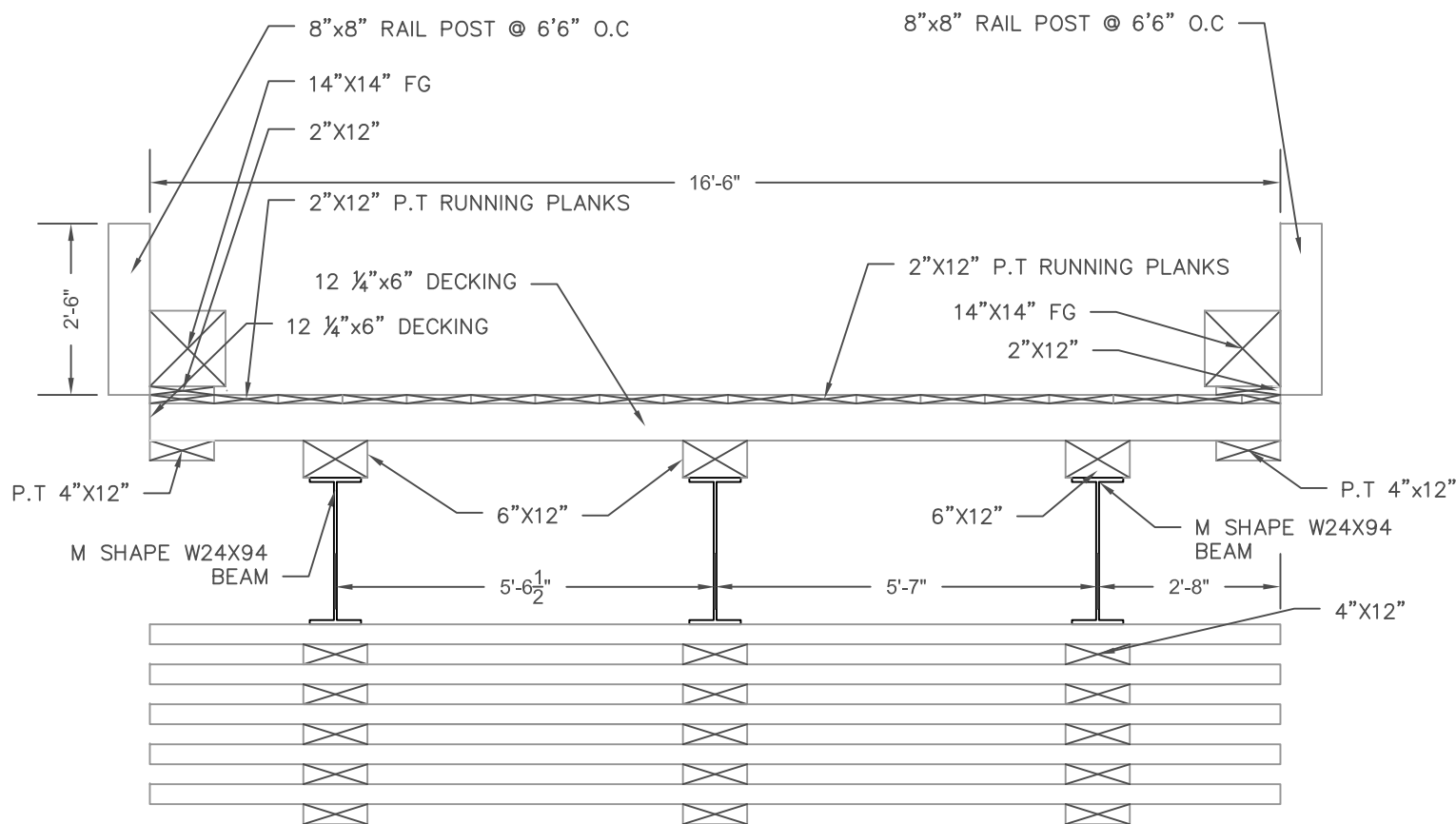




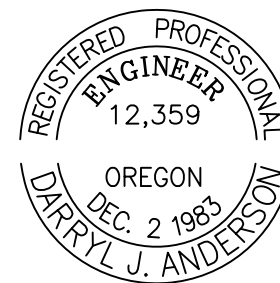




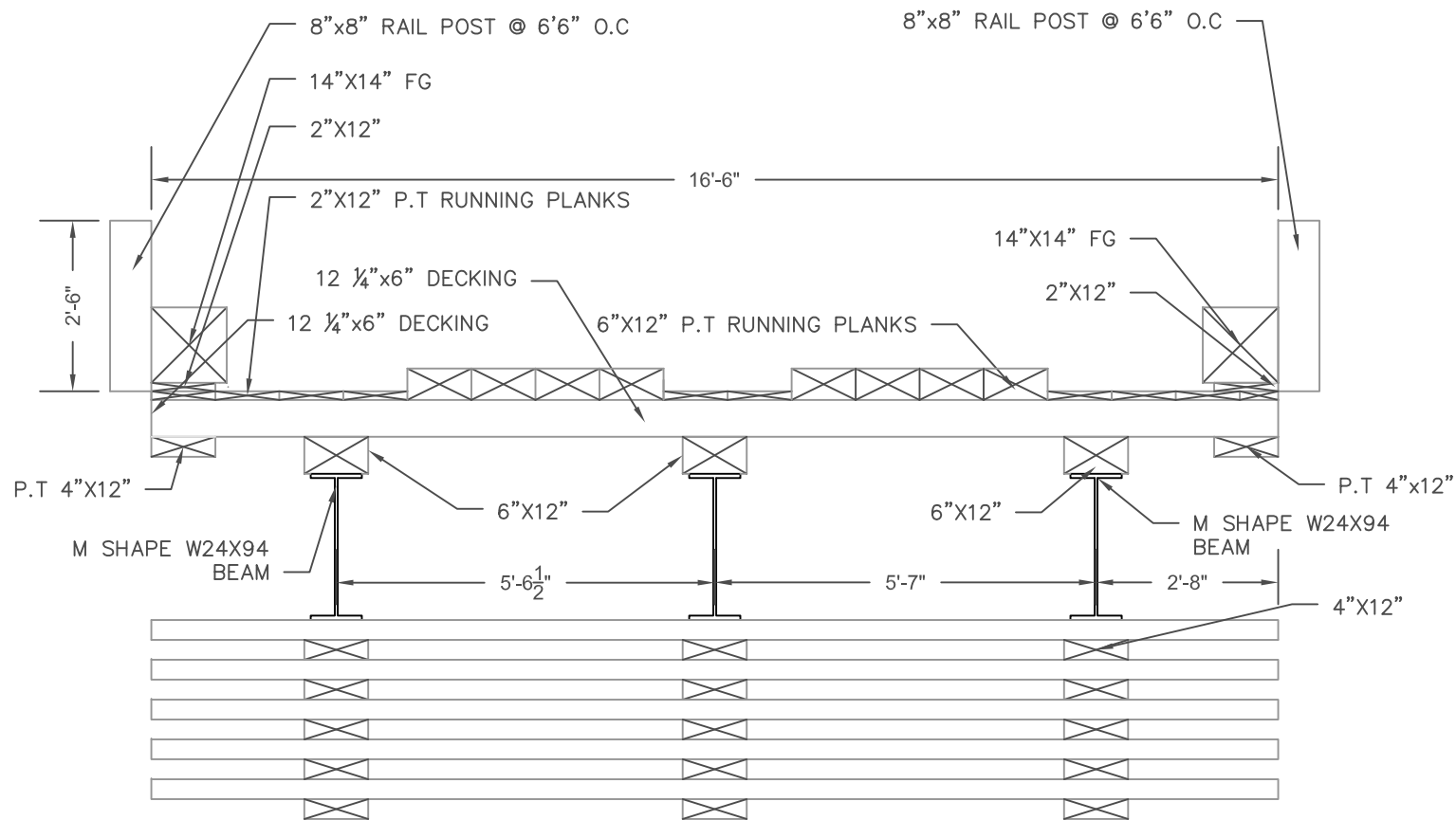




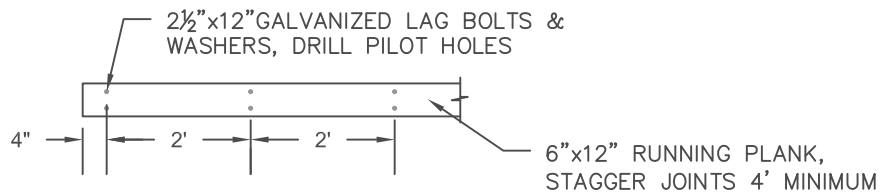
1 AS BUILT WOODDUCK BRIDGE  
S1 SCALE: 3/8" = 1'-0"



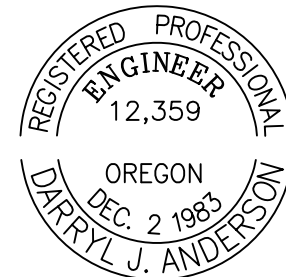
EXPIRES DEC. 31, 2025



1 WOOD DUCK BRIDGE  
S2 SCALE: 3/8" = 1'-0"

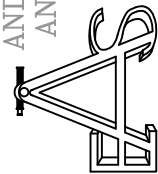


2 RUNNING PLANK DETAIL  
S2 SCALE: 3/8" = 1'-0"



EXPIRES DEC. 31, 2025

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LAKEVIEW, OREGON 97630  
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WOODDUCK BRIDGE #20783 IMPROVEMENTS  
WOODDUCK BRIDGE IMPROVEMENT PROJECT  
376 SW BLUFF DRIVE, SUITE 4 BEND,  
OR 97702

DATE: 7/12/2024  
SCALE: 3/8"=1'  
JOB: 2023-116  
DWG. BY: J.M.C  
FILE: 2023-116

S2



## Anderson Engineering & Surveying, Inc.

PO Box 28, 17681 Hwy 395  
Lakeview, OR 97630  
541-947-4407 / 541-947-2321 fax

July 15, 2024

### Wood Duck Bridge

#### Bridge Information

Fac Crossed: Canal  
Fac Carried: Access Road  
Bridge Length: 42 ft  
Bridge Width: 16 ft

#### Dead Loads

Wood Deck 19.5 lbs/ft  
Nailer / rail 74.4 lbs/ft  
Girders 94 lbs/ft  
Total Dead Load 187.9 lbs/ft  
Shear Dead Load 3.95 Kips  
Moment Dead Load 41.43 kip-ft

#### Allowable Loading

Girders: W24x94  
Girder Spacing: 67 5.60 FT

Shear 87.07 Kips  
Moment 366.30 K-FT

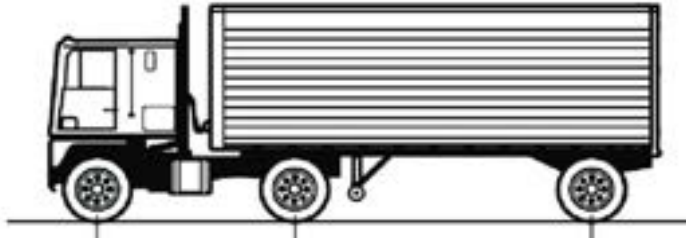


## AASHTO Vehicle Live Loads

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### HS20

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Moment Max                      485.3 K-FT  
Shear Max                        56 Kips

Distribution Factor                2  
Actual Moment                    162.76  
Actual Shear                      17.95

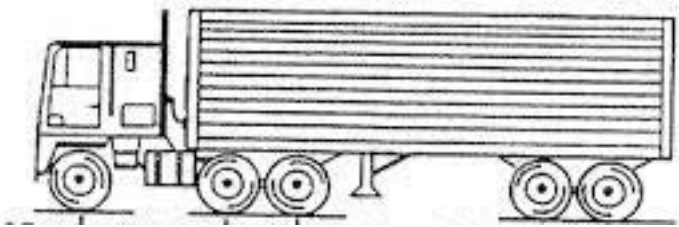
#### Vehicle Load Ratings

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Moment                      **2.25**  
Shear                        **4.85**

### 3S2

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Moment Max                      389.4 K-FT  
Shear Max                        40.4 Kips

Distribution Factor                2  
Actual Moment                    138.78  
Actual Shear                      14.05

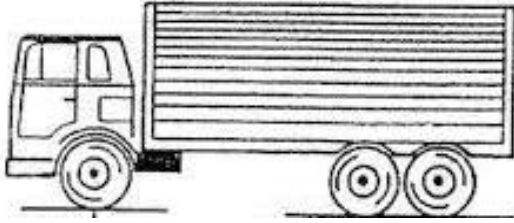
#### Vehicle Load Ratings

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Moment                      **2.64**  
Shear                        **6.20**

### Type 3

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Moment Max 129.3 K-FT  
Shear Max 30.4 Kips

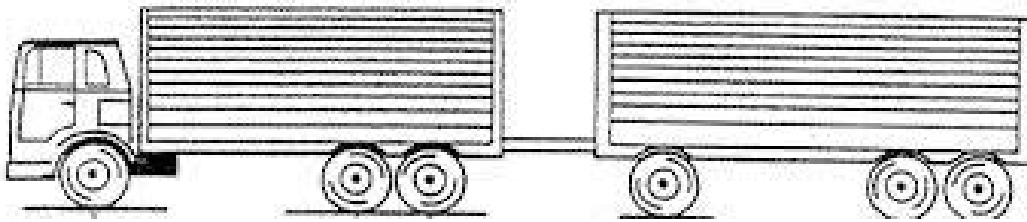
Distribution Factor 2  
Actual Moment 73.76  
Actual Shear 11.55

#### Vehicle Load Ratings

Moment 4.97  
Shear 7.54

### Type 3-3

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Moment Max 374.5 K-FT  
Shear Max 44.4 Kips

Distribution Factor 3  
Actual Moment 103.85  
Actual Shear 11.35

#### Vehicle Load Ratings

Moment 3.53  
Shear 7.67

### EV2

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Moment Max 714.28 K-FT  
Shear Max 80.2 Kips

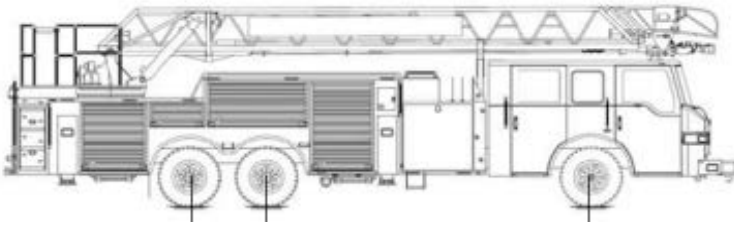
Distribution Factor 2  
Actual Moment 220  
Actual Shear 24

#### Vehicle Load Ratings

Moment 1.66  
Shear 3.63

## EV3

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Moment Max 1162.28 K-FT

Shear Max 128.2 Kips

Distribution Factor 2

Actual Moment 332.00

Actual Shear 36.00

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### Vehicle Load Ratings

Moment **1.10**

Shear **2.42**