



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

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 axel 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



EXPIRES DEC. 31, 2025



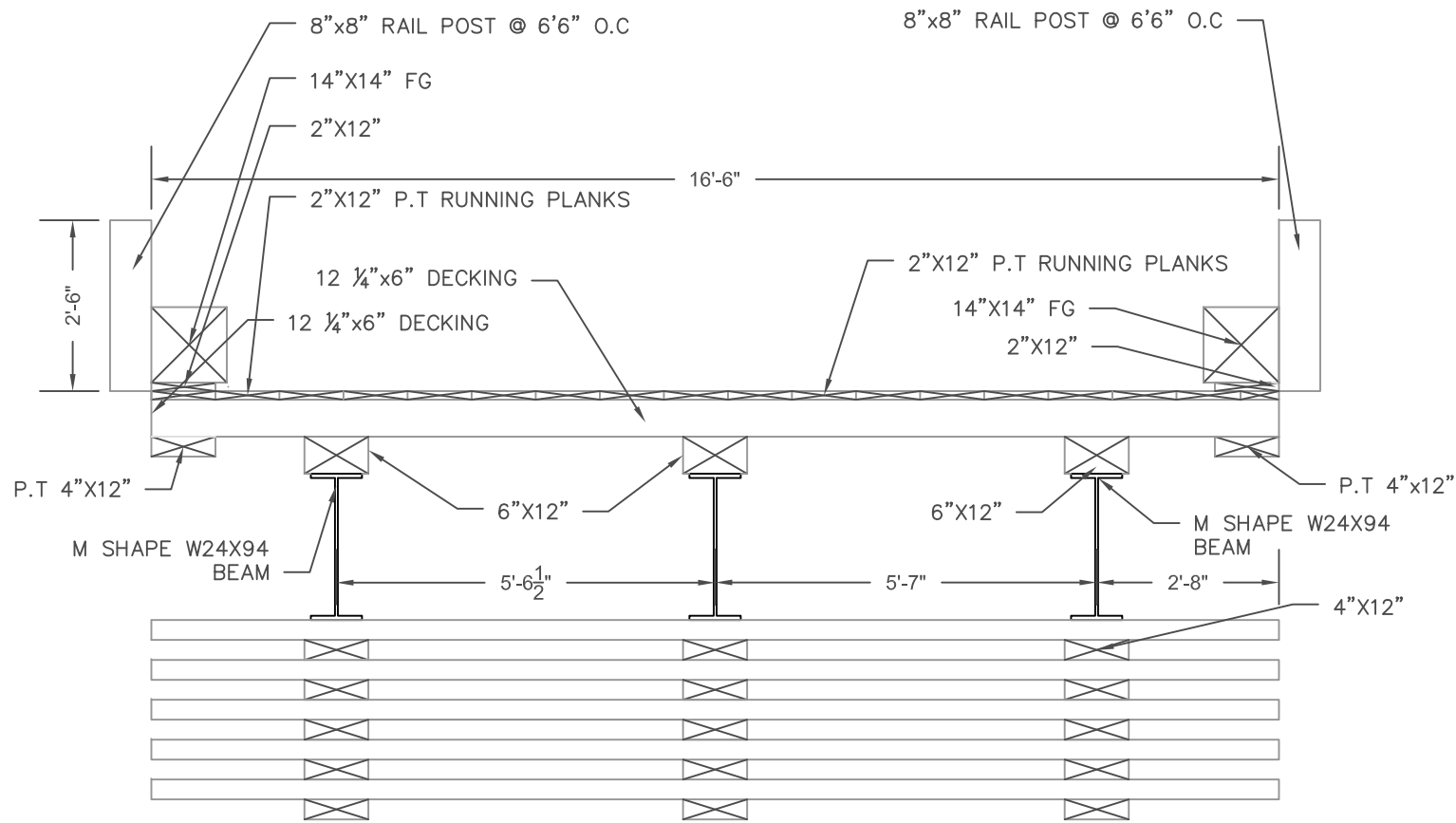






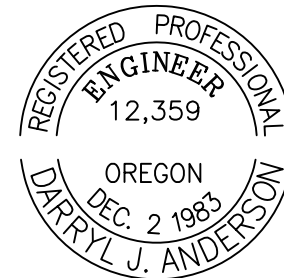






AS BUILT WOODDUCK BRIDGE #20783
WOODDUCK BRIDGE IMPROVEMENT PROJECT
376 SW BLUFF DRIVE, SUITE 4 BEND,
OR 97702

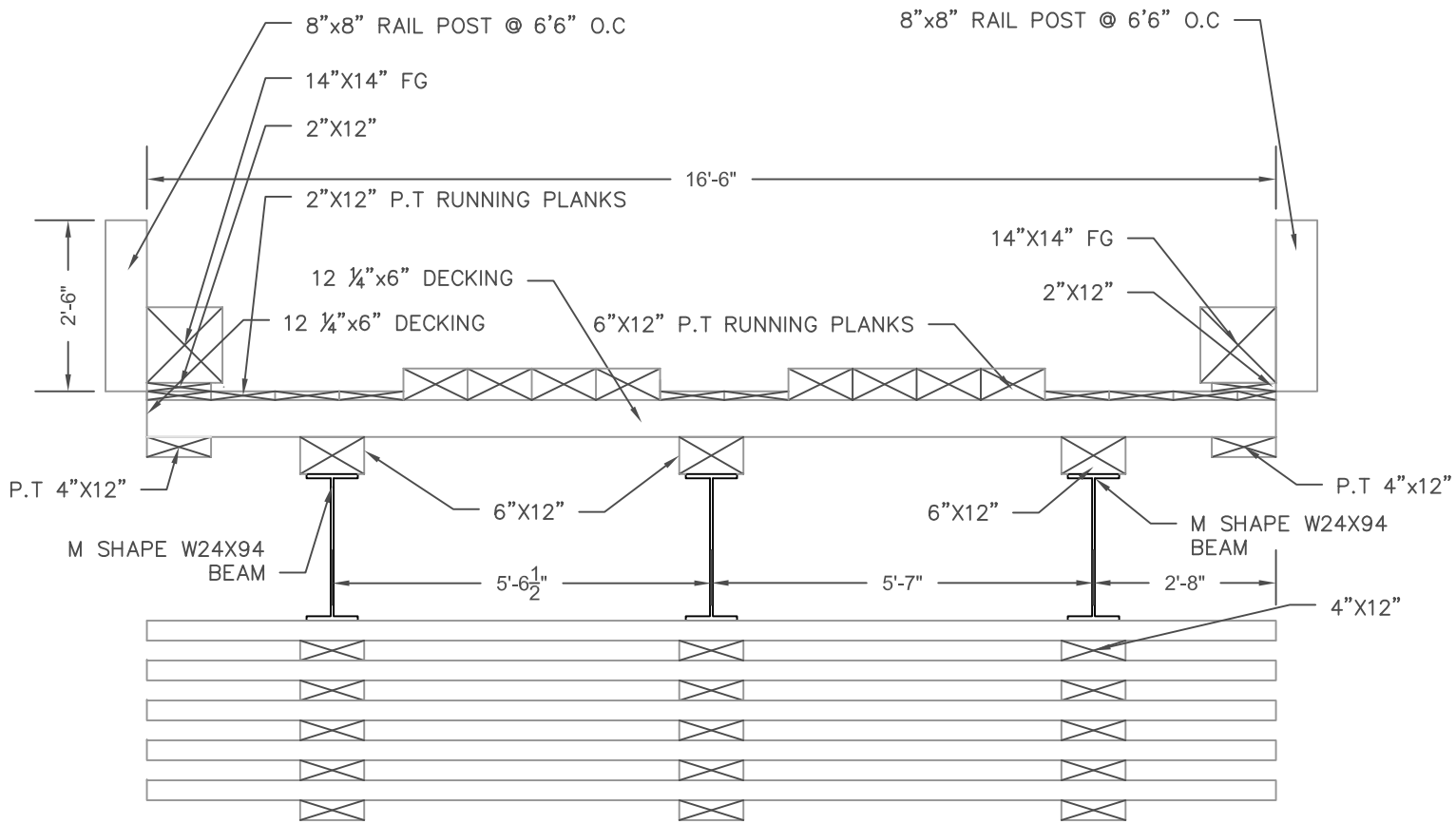
AS BUILT WOODDUCK BRIDGE
SCALE: 3/8" = 1'-0"



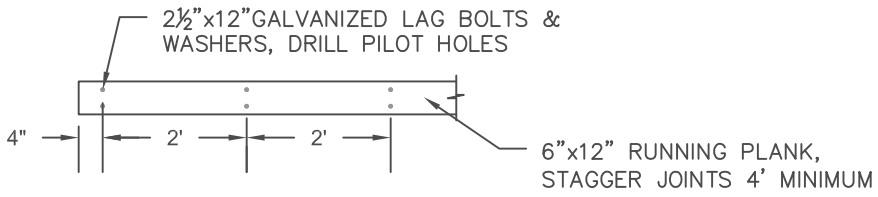
EXPIRES DEC. 31, 2025

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

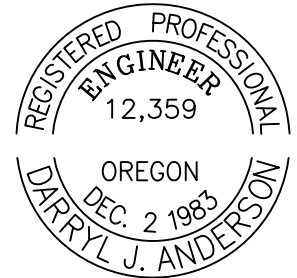
S1



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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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

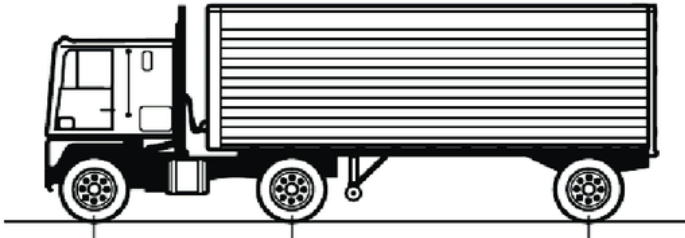
Allowable Loading

Girders:	W24x94
Girder Spacing:	67 5.60 FT

Shear	87.07 Kips
Moment	366.30 K-FT

AASHTO Vehicle Live Loads

HS20

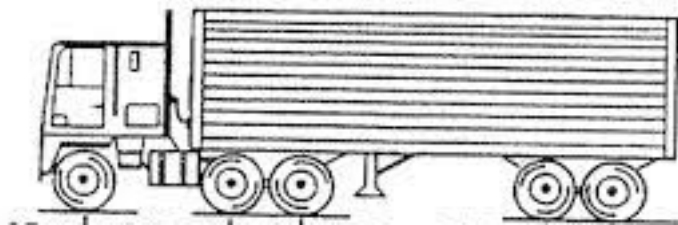


Moment Max	485.3 K-FT
Shear Max	56 Kips
Distribution Factor	2
Actual Moment	162.76
Actual Shear	17.95

Vehicle Load Ratings

Moment	2.25
Shear	4.85

3S2

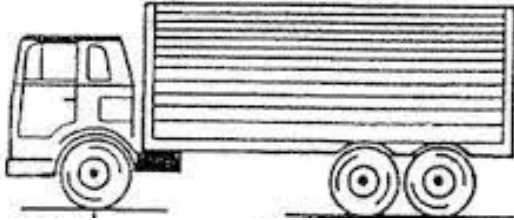


Moment Max	389.4 K-FT
Shear Max	40.4 Kips
Distribution Factor	2
Actual Moment	138.78
Actual Shear	14.05

Vehicle Load Ratings

Moment	2.64
Shear	6.20

Type 3



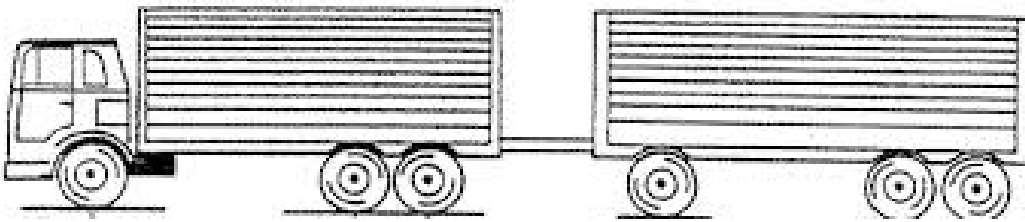
Moment Max 129.3 K-FT
Shear Max 30.4 Kips

Distribution Factor 2
Actual Moment 73.76
Actual Shear 11.55

Vehicle Load Ratings

Moment **4.97**
Shear **7.54**

Type 3-3



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



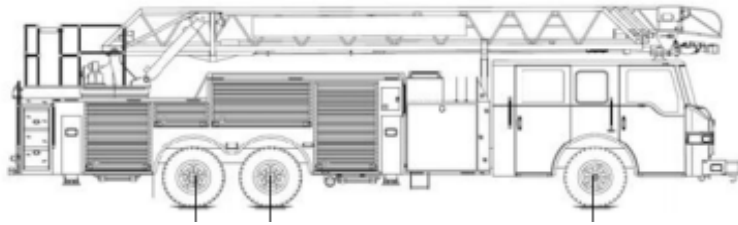
Moment Max 714.28 K-FT
Shear Max 80.2 Kips

Distribution Factor 2
Actual Moment 220
Actual Shear 24

Vehicle Load Ratings

Moment **1.66**
Shear **3.63**

EV3



Moment Max	1162.28 K-FT
Shear Max	128.2 Kips
Distribution Factor	2
Actual Moment	332.00
Actual Shear	36.00

Vehicle Load Ratings

Moment	1.10
Shear	2.42