

RAILROAD BRIDGES 101



WAYNE DUFFETT P.E.

A Bit About Myself...

- 1972 At age 12, began working as a volunteer with what would become in 1974 the Conway Scenic Railroad in New Hampshire.
- 1988 Graduated from University of Maine with B.S. in Civil Engineering.
Began a career in railroad bridge engineering with Reid H. Potter Associates
- 1993 Obtained Professional Engineer's License.
- 1994 Became owner and President of TEC Associates Consulting Engineers with a focus in railroad and marine structures.
- 2019 Returned to Conway Scenic Railroad on Saturdays now old enough to run the locomotive.
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Current P.E. Registrations:

Maine	Connecticut	Maryland
New Hampshire	New York	Delaware
Vermont	Pennsylvania	Virginia
Massachusetts	Ohio	New Brunswick



... and TEC Associates

- Founded in 1979.
- Bought by Wayne Duffett and Randolph Pike in 1994 with a focus in railroad bridge engineering.
- 7 current employees, including 3 Professional Engineers.

Our Services/Areas of Expertise Include...

Bridge Design



Clearances



Bridge/Structural Inspection



Track Design



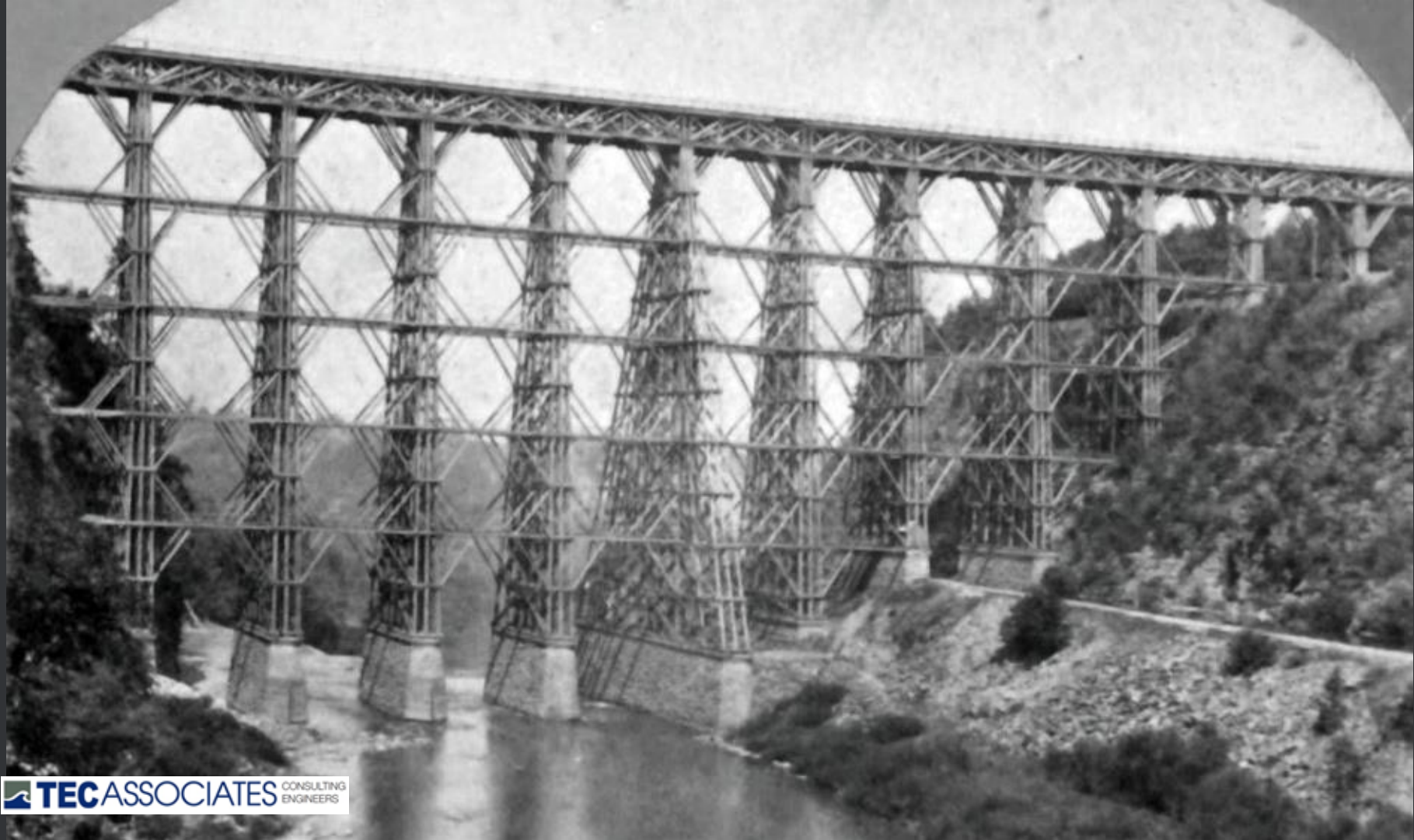
Marine Structures



...and more!!







N. W. PEASE, No. CONWAY, N. H.



A. AMERICAN
S. CENERY.

No. 19—Artists Brook and Meadows, North Conway, N. H.







CSX TRANSPORTATION, INC.

NO TRESPASSING

UNSAFE
TO WALK TRAIN
BEYOND THIS
POINT



















1883

ISAAC M. STORY,
CHIEF ENGINEER.

EDWARD S. SHAW,
BRIDGE ENGINEER.

BOSTON BRIDGE WORKS,
CONTRACTORS.















BUILT BY THE
FITCHBURG RAILROAD CO.
E.D.CODMAN PRESIDENT
A.S.CHEEVER CHIEF ENGINEER
HOLBROOK, CABOT & DALY,
CONTRACTORS.
BEGUN SEPT. 13., FINISHED DEC. 10.,
1899.







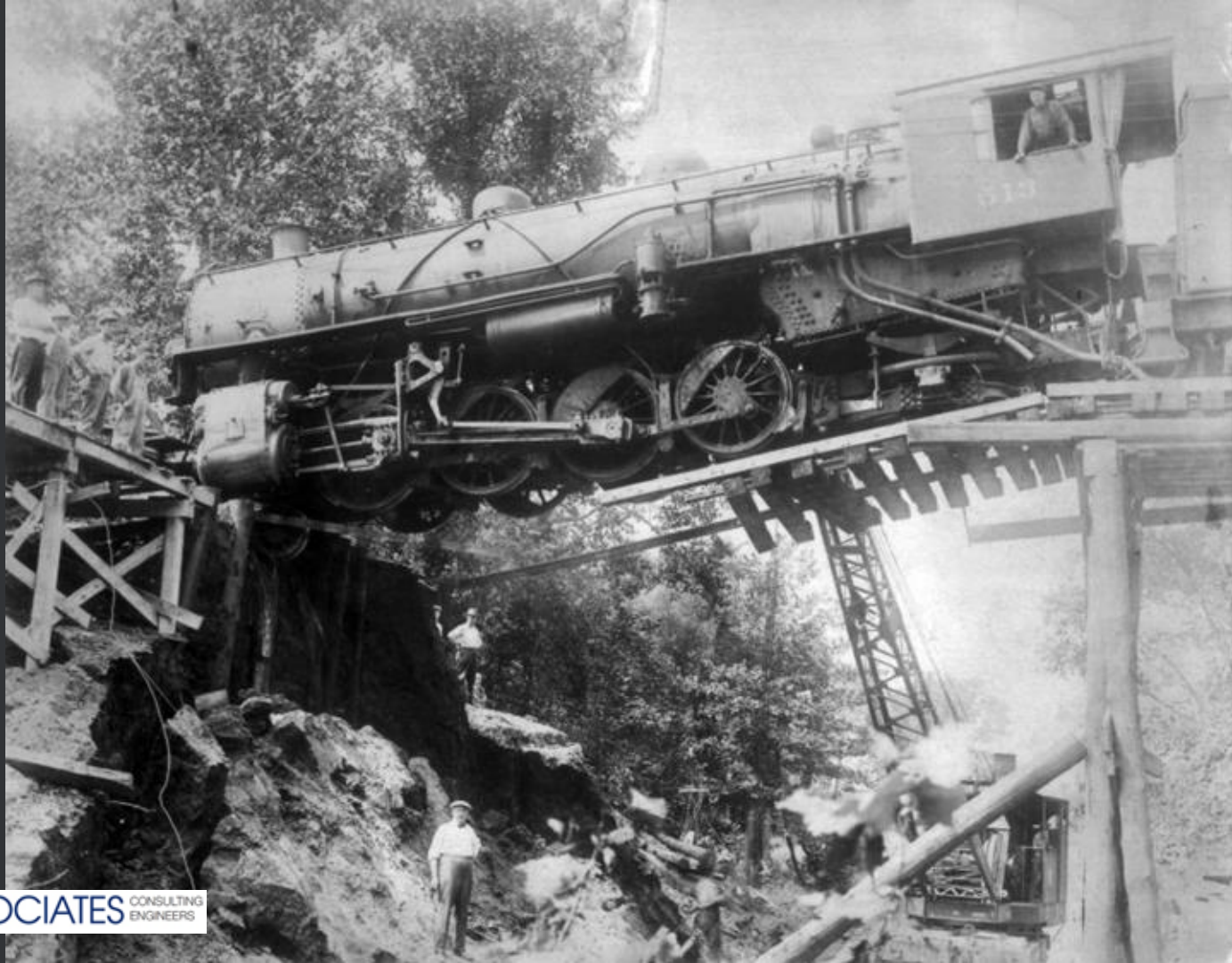












































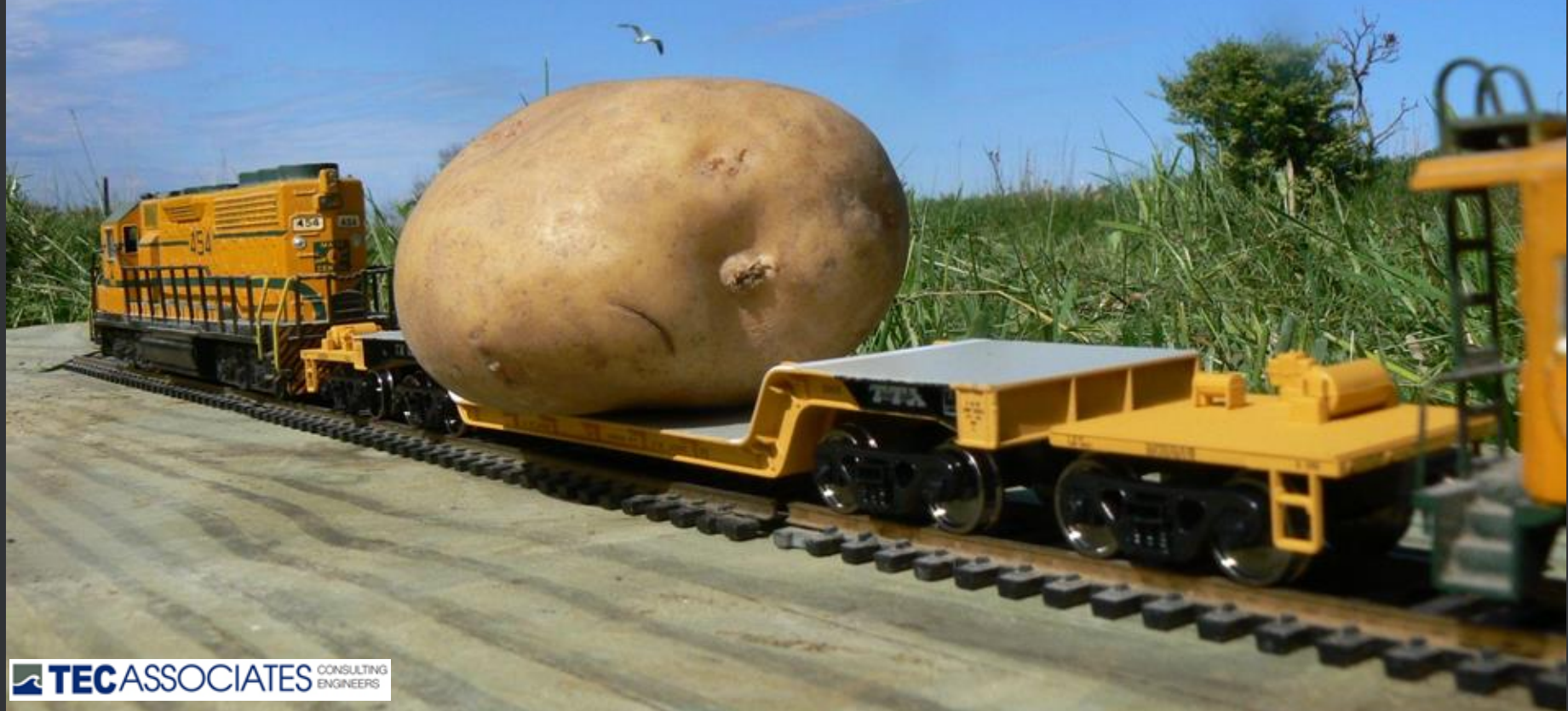




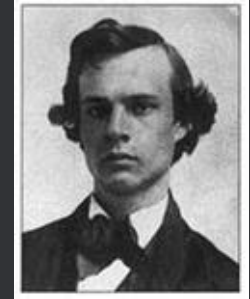




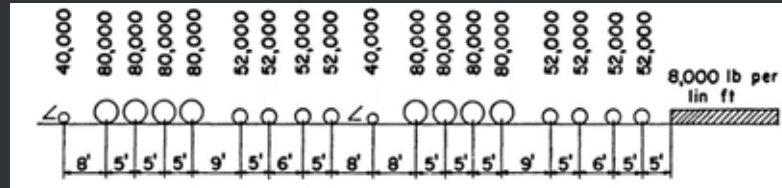
HEAVY DUTY CARS EFFECT ON BRIDGES

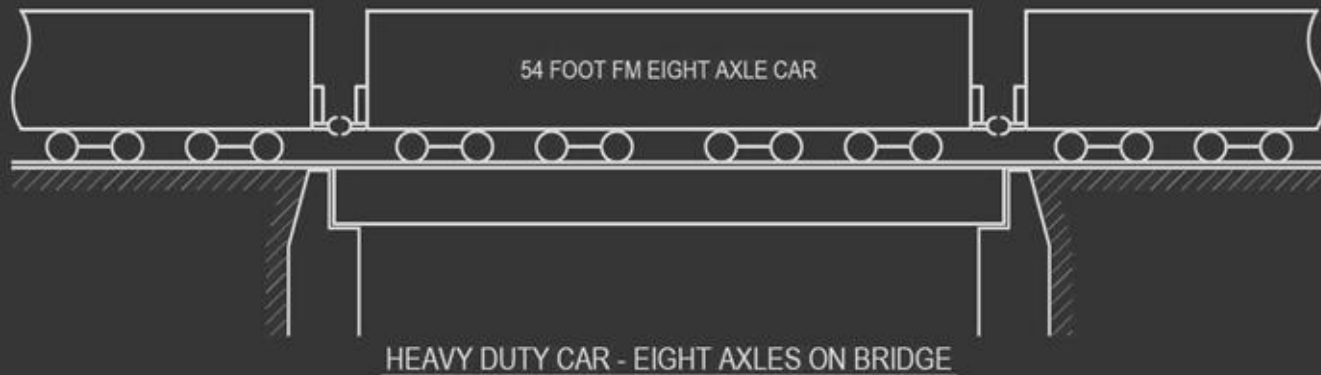
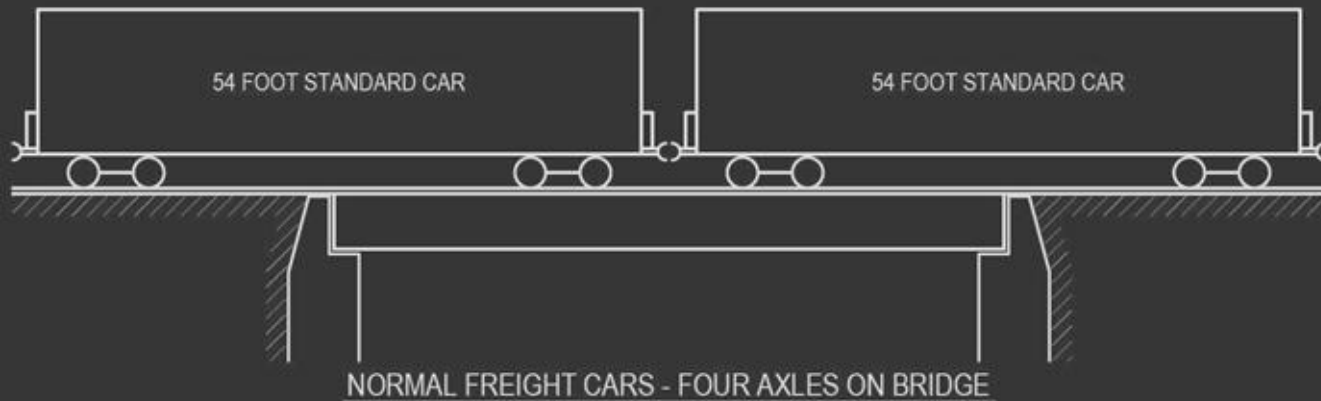


Who is Theodore Cooper?

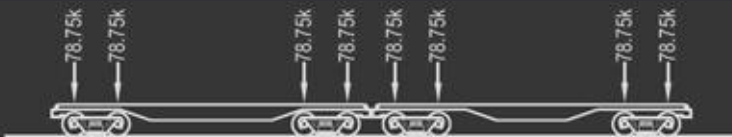


Theodore Cooper (1839-1919) graduated from Rensselaer Institute in 1858 with a degree in civil engineering. In 1894 he developed the standards for railroad bridge loading based on a configuration of two steam locomotives and a train of uniform weight. We still use this system today. The present design standard is COOPER E80 meaning steam locomotives with 80,000 pound load on driving axles followed by a train weighing 8,000 pounds per foot.





CAR



COUPLED STANDARD 4-AXLE CAR - 315k EACH



SHORT 8-AXLE CAR - 630k



LONG 8-AXLE CAR - 630k

BRIDGE LENGTH

COOPER E RATINGS

40 FEET

67.0

50 FEET

62.6

60 FEET

58.0

40 FEET

79.9

50 FEET

85.6

60 FEET

86.8

40 FEET

67.8

50 FEET

63.6

60 FEET

58.6

EMMERT

INTERNATIONAL

ENGINEERED TRANSPORT - RIGGING - STRUCTURE RELOCATION
HIGHWAY - MARINE - RAIL



Northeast Utilities Energy
NU SACO VALLEY SUBSTATION

BBCK - 1000

SCHNABEL RAIL CAR



HEAVY DUTY CARS - 2009 TRANSFORMER

TRAIN



































QUESTIONS?