

PROJECT N.J. BRIDGE INSPECTION OF STRUCTURE No. 0508-151 MADE BY RWM DATE 11/93
 SUBJECT RATING UPDATE DUE TO ADDITIONAL OVERLAY AND CHECKED BY DATE
REVISION OF ALLOWABLE STRESSES.

SUMMARY OF RATINGS.

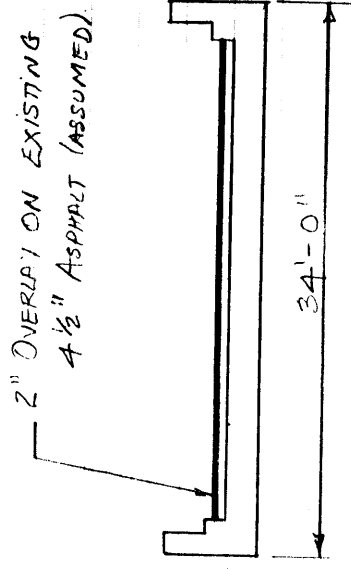
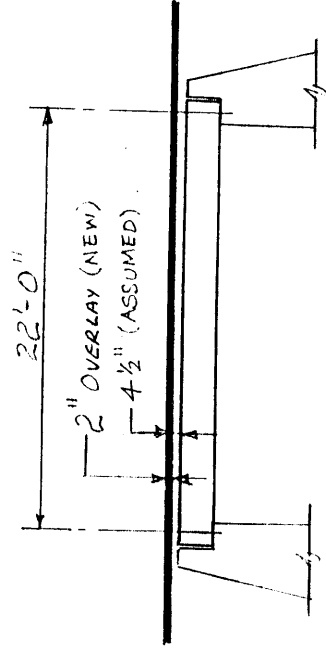
	TRUCK TYPE (Tons)		
	<u>TYPE 3</u> (25)	<u>TYPE 3S2</u> (40)	<u>TYPE 3-3</u> (40)
INVENTORY	31	49	60
OPERATING	53	93 6	104

ALLOWABLE STRESSES (Psi)

UPDATED BASED ON INFORMATION FROM N.J. DOT.

CONCRETE ($F'_c = 2,000$)
 REINFORCING STEEL

<u>INVENTORY</u>	<u>OPERATING</u>
800	1,100
18,000	25,000

PROJECT N.J. BRIDGE INSPECTION OF STRUCTURE IN 2003-05 MADE BY RWM DATE 11/03SUBJECT RATING UPDATE DUE TO ADDITIONAL OVERLAY CHECKED BY _____ DATE _____AND REVISION OF ALLOWABLE STRESSES.DATA FROM 1ST AND 2ND CYCLE REPORTEFFECTIVE DEPTH = $d = 19.5$; $f_c = 2,000 \text{ psi}$; $n = 15$; $A_s = 1.72 \text{ in}^2$; SPAN (L) = 22 FT.UPDATED ALLOWABLE STRESSES (PSI)

CONCRETE	<u>INVENTORY</u>	<u>OPERATING</u>
	800	1,100

STEEL	18,000	25,000
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$$np = n A_s / bd = (15 \times 1.72) / (12 \times 19.5) = 0.11026$$

$$K = \sqrt{2np + (np)^2} - np = 0.372$$

$$j = 1 - \frac{K}{3} = 0.976$$

CHECK FOR CONTROLLING STRESS

$$f_c = \frac{F_s}{n} \times \frac{K}{1-K} = \frac{18,000}{15} \times \frac{0.372}{(1-0.372)} = 710 < 800 \therefore \text{STEEL STRESS CONTROLS}$$

$$\therefore M_{CAP, INV.} = F_s A_s j d / 12 = (18 \times 1.72 \times 0.976 \times 19.5) / 12 = 44.0 \times 43.87 \text{ K-FT/FT.}$$

DEAD LOAD MOMENT.FROM 1ST CYCLE REPORT = 19.17 K-FT. (REF. SHEET 13 IN APPENDIX II) ✓ADDITIONAL DUE TO OVERLAY OF 2" ; ASPHALT D.L. = $2 \times 12 \times 145 = 24.16 \text{ PLF}$.

$$\therefore \text{TOTAL DEAD LOAD MOMENT} = 10.17 \text{ K-FT} + 14.62 \text{ K-FT} = 24.79 \text{ K-FT}$$

PROJECT N.J. BRIDGE INSPECTION OF STRUCTURE NO. 0503-151 MADE BY PWJ DATE 11/93SUBJECT REPORT FOR REPAIRS DUE TO ADDITIONAL OVERLAY AND CHECKED BY DATESECTION OF ALLOWABLE STRESSESDESIGN DATAEXISTING SLAB WIDTH (AASHTO ART 3.24.3.2.) ✓

$$E = 4 + 0.06S = 4 + 0.06(22) = 5.32$$

$$IMPACT = I = 0.3$$
 ✓

$$\therefore K = MULTIPLICATION FACTOR = 1.3 \times 1/5.32 = 0.244$$

LIVE LOAD MOMENT INCLUDING IMPACT

(LLM TAKEN FROM N.J. DESIGN MANUAL PG. 1.42A-11 - REVISED AASHTO PLATE 2)

LOADLLM x KLL+I MOMENT

TYPE 3

$$77.3 \times 0.244$$

$$18.86 \text{ K-FT}$$

TYPE 3S2

$$77.3 \times 0.244$$

$$18.86 \text{ K-FT}$$

TYPE 3-3

$$63.6 \times 0.244$$

$$15.52 \text{ K-FT}$$

DESCRIPTION	INVENTORY			OPERATING		
	TYPE 3	TYPE 3S2	TYPE 3-3	TYPE 3	TYPE 3S2	TYPE 3-3
MOMENT CAPACITY (K-FT)	43.87 ₄₄	43.87 ₄₄	43.87 ₄₄	60.93 _{61.2}	60.93 _{61.2}	60.93 _{61.2}
DEAD LOAD MOMENT (K-FT)	20.63	20.63	20.63	20.63	20.63	20.63
AVAILABLE MOMENT FOR LL+I (K-FT)	23.24 ₂₃	23.24 ₂₃	23.24 ₂₃	40.30 _{40.57}	40.30 _{40.57}	40.30 _{40.57}
LIVE LOAD MOMENT (K-FT)	18.86	18.86	15.52	18.86	18.86	15.52
RATING FACTOR	1.23 _{1.24}	1.23 _{1.24}	1.50 _{1.24}	2.14 _{2.15}	2.14 _{2.15}	2.60 _{2.61}
RATING in TONS (T).	31	49.6	60.4	53.9	85.6	104.4

BY VNR DATE DEE SHEET NO. 1 OF 3
CHKD. BY DEE BRIDGE NO. 0508-157 RRYING JOB NO.
RT: NJ-47 OVER BRANCH OF DENNIS CREEK

STRUCTURAL ANALYSIS AND RATINGS:

YEAR DESIGNED : 1928
YEAR BUILT : 1928
DRG'S. AVAILABLE : YES
OVERALL BRIDGE LENGTH : 22'
TOTAL BRIDGE WIDTH : 34'
SPAN ARRANGEMENT : SIMPLY SUPPORTED
NO. OF SPANS : ONE
TOTAL ROADWAY WIDTH : 30'-0"
SIDE WALK WIDTH : NONE

ALLOWABLE STRESSES: From 1st cycle Report

	INVENTORY		OPERATING	
	FLEXURE	SHEAR	FLEXURE	SHEAR
CONCRETE $F'_c = 2000 \text{ psi}$	800	650 psi	1100	psi
REINFORCING STEEL	18000	16000 psi	22000	psi
STRUCTURAL STEEL	-	-	25000	

SUMMARY OF RATINGS:

DESCRIPTION	INVENTORY (TONS)			OPERATING (TONS)		
	TYPE 'B'	TYPE '352'	TYPE '33'	TYPE 'B'	TYPE '352'	TYPE '33'
STEEL STRESS OF DECK SLAB CONTROLS (Ref. SHEET NO: 30F3)	27T	42T	52T	46T	74T	89T

BY VNR DATE SUBJECT CAPACITY RATING OF SHEET NO. 2 OF 3
 CHD. BY DEB DATE BRIDGE NO. 0508-151 CARRYING JOB NO.
RI NJ 470 OVER BRANCH OF DENNIS CREEK

DATA AVAILABLE FROM 1st CYCLE REPORT: EFFECTIVE DEPTH = $d = 19.5"$

$f_c = 2000$ psi ; $n = 15$; $A_s = 1.72$ in² ; SPAN = 22 ft

ALLOWABLE STRESSES: INVENTORY OPERATING

Concrete 650 psi 1100 psi

Steel 16000 psi 22000 psi

$$\therefore np = n A_s / b d = 15 \times 1.72 / (12 \times 19.5) = 0.11026$$

$$\therefore K = \frac{\sqrt{(np)^2 + 2(np)} - np}{2} = \frac{\sqrt{(0.11026)^2 + 2(0.11026)} - 0.11026}{2} = 0.372$$

$$J = 1 - K/3 = 1 - 0.372/3 = 0.876$$

$$\text{CHECK FOR CONTROLLING STRESS } f_c : \frac{F_s \times K}{n \times 1-K} = \frac{16000 \times 0.372}{15 \times 1-0.372} = 632 < 650$$

\therefore Steel stress controls

$$\therefore \text{Moment Capacity} = M_e = F_s A_s J d / 12 = \frac{1.72 \times 16 \times 0.876 \times 19.5}{12} = 39.17 \text{ k}$$

Dead Load Moment From 1st cycle = 19.17 k-ft (Ref Sheet 13 in Appendix II)

$$\text{EFFECTIVE SLAB WIDTH (AASHTO ART 13.2)} \quad E = 4 + 0.065 = 4 + 0.06 \times 22 = 5.32$$

$$\text{IMPACT FACTOR} = I = 0.3$$

$$\therefore K = \text{MULTIPLICATION FACTOR} = 1.3 \times \frac{1}{5.32} = 0.244$$

LIVELOAD MOMENTS INCLUDING IMPACT PER FOOT WIDTH OF SLAB = LLM X
 (WHERE LLM IS LIVE LOAD MOMENTS FROM REV PLATE 2 MOM 54 ET 84-B2)

LOAD LLM X K

LIVELOAD MOMENT INCLUDING
IMPACT PER FOOT WIDTH

TYPE '3'
TYPE '3S2'

$$77.3 \times 0.244$$

$$= 18.86 \text{ k-ft}$$

TYPE '3-3'

$$63.6 \times 0.244$$

$$= 15.52 \text{ k-ft}$$

BY VNR DATE _____ SUBJECT CAPACITY RATINGS OF _____
CHKD. BY DES DATE _____ BRIDGE NO: 0508-151 CARRYING _____
Rt NJ 47 OVER BRANCH OF DENNIS CREEK _____

SHEET NO. 3 OF 3
JOB NO. _____

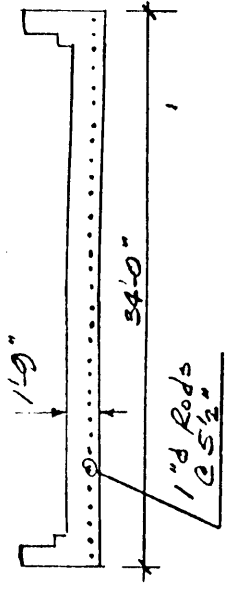
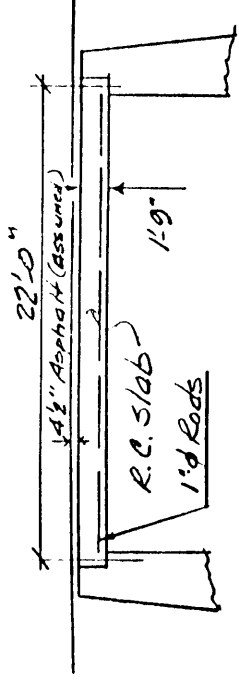
DESCRIPTION	INVENTORY (K-FT)	OPERATING (K-FT)
MOMENT CAPACITY	$\begin{array}{r} 44.07 \\ 39.17 \\ \hline \end{array}$	$\begin{array}{r} 39.17 \times 22 \\ \hline 16 \end{array} = 53.86$
DEAD LOAD MOMENT	$\begin{array}{r} 19.17 \\ \hline \end{array}$	$\begin{array}{r} 19.17 \\ \hline \end{array}$
AVAILABLE MOMENT FOR LL+I	$\begin{array}{r} 20.0 \\ \hline \end{array}$	$\begin{array}{r} 34.69 \\ \hline \end{array}$

CAPACITY RATINGS:

LOAD	INVENTORY (TONS)	OPERATING (TONS)
TYPE '3'	$\begin{array}{r} 20 \times 25 \\ \hline 18.86 \end{array} = 27T$	$\begin{array}{r} 34.69 \times 25 \\ \hline 18.86 \end{array} = 46T$
TYPE '3S'	$\begin{array}{r} 20 \times 40 \\ \hline 18.86 \end{array} = 42T$	$\begin{array}{r} 34.69 \times 40 \\ \hline 18.86 \end{array} = 74T$
TYPE '3-3'	$\begin{array}{r} 20 \times 40 \\ \hline 15.52 \end{array} = 52T$	$\begin{array}{r} 34.69 \times 40 \\ \hline 15.52 \end{array} = 89T$

STORCH ENGINEERS

Sheet 13 of
 Project BRIDGE SAFETY INSPECTION S.E. #1032 Made By CC Date 10-23-75
 Bridge # 0508151 DENNIS TWSR, CAPE MAY CO. Chkd By AE Date 12-22-75



UNIFORM DEAD LOAD

$$\begin{aligned} \text{Slab } 1.75 \times 150 &= 262.5 \text{ PLT} \\ \text{Asphalt } \frac{4.5}{12} \times 145 &= \frac{54.4}{316.9} \text{ PLT} \end{aligned}$$

$$MDL = \frac{316.9 \times 22^2}{8} = 19,172 \text{ Lb}$$

LIVE LOAD - USE 12K CONC. WHEEL LOAD

$$\begin{aligned} E &= 4 + 0.06S = 4 + 0.06 \times 22 = 5.32 \\ \therefore 12K / 5.32 &= 2.26 \text{ K} \times 1.3 = 2.94 \text{ K} \end{aligned}$$

$$M_{LL} = \frac{2.94 \times 22}{4} = 16,170 \text{ Lb}$$

$$M_{TOTAL} = 35,342 \text{ Lb}$$

$$f_c = \frac{M}{0.5 b d^2 k j} \quad f_s = \frac{M}{A_s j d}$$

$$\begin{aligned} b &= 12' \quad d = 19.5' \\ f_s &= 16,000 \text{ PSI} \quad f_c (\text{allow}) = 650 \text{ PSI} \quad (f_c' = 2000 \text{ PSI}) \\ A_s &= (1\phi @ 5\frac{1}{2}') 1.72 \text{ in}^2 \quad k = 0.379 \quad j = 0.874 \end{aligned}$$

$$f_c = \frac{35,342 \times 12}{0.5 \times 12 \times 19.5^2 \times 0.379 \times 0.874} = 561 \text{ PSI} < 650 \text{ PSI OK}$$

$$f_s = \frac{35,342 \times 12}{1.72 \times 0.874 \times 19.5} = 14,468 \text{ PSI} < 16,000 \text{ PSI OK}$$

STORCH ENGINEERS

Sheet 14 of Project BRIDGE SAFETY INSPECTIONS.C. # 1032

Made By

CE

Date

10-23-78BRIDGE NO. 0508151

DENNIS TWP,

CAPE MAY CO.

Chkd By

ACE

Date

12/22/75

$$f_c (D.L.) = \frac{19,172 \times 12}{0.5 \times 12 \times 19.5 \times 0.379 \times 0.874} = 304 \text{ PSI}$$

$$f_c (L.L.) = \frac{16,170 \times 12}{0.5 \times 12 \times 19.5 \times 0.379 \times 0.874} = 257 \text{ PSI}$$

$$f_s (D.L.) = \frac{19,172 \times 12}{1.72 \times 0.874 \times 19.5} = 1,848 \text{ PSI}$$

$$f_s (L.L.) = \frac{16,170 \times 12}{1.72 \times 0.874 \times 19.5} = 1,619 \text{ PSI}$$

STORCH ENGINEERS

Sheet 15 of Project BRIDGE SAFETY INSPECTIONSE # 1032Made By REGDate 10-15-71BRIDGE # 0508151

Dennis Twp

CAPE MAY COUNTY

Chkd By Date TYPE 3 VEHICLE

(8K WHEEL LOAD)

DISTRIBUTION FACTOR

$$E = 4 + .065 = 4 + (.06)(22) = 5.32$$

$$\frac{8}{5.32} = 1.504 \text{ K}$$

$$M_{LL} = \frac{(1.504)(22)(1.3)}{4} = 10.75 \text{ 'K}$$

$$f_c = \frac{M}{.56d^2jk} = \frac{(10.75)(12000)}{(0.5)(12)(12.5)^2(.874)(.379)} = 170.7 \text{ psi}$$

INVENTORY RATING

$$\frac{650 - 304}{170.7} \times 23 = 46.6 \text{ TONS}$$

OPERATING RATING

$$\frac{1100 - 304}{170.7} \times 23 = 107.3 \text{ TONS}$$

TYPE 3S2 VEHICLE

(8K WHEEL LOAD)

$$M_{LL} = 10.75 \text{ 'K} \quad f_c = 170.7 \text{ psi}$$

INVENTORY RATING

$$\frac{650 - 304}{170.7} \times 36 = 73.0 \text{ TONS}$$

OPERATING RATING

$$\frac{1100 - 304}{170.7} \times 36 = 167.9 \text{ TONS}$$

STORCH ENGINEERS

Sheet 16 of Project BRIDGE SAFETY INSPECTIONSE # 1032Made By R.G.Date 10-15-BRIDGE # 0508-151DENNIS TWPCAPE MAY COUNTYChkd By Date

TYPE 3-3 VEHICLE

(7K WHEEL LOAD)

DISTRIBUTION FACTOR: $E = 4.065 = 5.32$

$$\frac{I}{5.32} = 1.316 \text{ K}$$

$$M_{LL+I} = \frac{(1.316)(22)(1.3)}{4} = 9.41 \text{ 'K}$$

$$f_c = \frac{M}{0.56 d^2 j k} = \frac{(9.41)(12000)}{(0.56)(12)(19.5)^2 (874)(.379)} = 149.4 \text{ psi}$$

INVENTORY RATING

$$\frac{650 - 304}{199.4} \times 37 = 85.7 \text{ TONS}$$

OPERATING RATING

$$\frac{1100 - 304}{199.4} \times 37 = 197.1 \text{ TONS}$$