

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TYPICAL FLOOR BEAM

Span Length = 20'-0"
Beam Size = W24x84
 $I_{Gross} = 2370 \text{ in}^4$
 $S_{x-x} = 196 \text{ in}^3$

TABLE OF STRESSES

	END REACTION Kips	SHEAR STRESS Ksi	BENDING MOMENT Ft. Kips	BENDING STRESS BOTTOM FLANGE Ksi
DEAD LOAD	8.55	0.81	50.1	3.07
LIVE LOAD (E90)	28.75	2.71	215.6	13.20
Impact +Rocking Effect (20.75+20)%	11.59	1.09	86.9	5.32
Total DL+LL+I	48.89	4.61	352.6	21.59
Allowable Stress	-	17.50	-	27.5
Ratio of Working Stress to allowable	-	0.26	-	0.79

$$\frac{\Delta LL+Imp}{Span} = \frac{0.298}{20 \times 12} = 0.0013$$

Span / deflection = 779

$$\frac{Max \text{ Stress Range}}{Permissible \text{ Fatigue Stress}} = \frac{(13.20 + 0.35 \times 5.32)}{24} = 0.63$$

MAIN GIRDER

Span Length = 115'-2"
Top Flange Plate Size = 3/2"x22"
Web Plate Size = 7/8"x108"
Bottom Flange Plate Size = 3/2"x22"
 $I_{Gross} = 570652 \text{ in}^4$
 $S_{x-x \text{ Top}} = 9924 \text{ in}^3$
 $S_{x-x \text{ Bot}} = 9924 \text{ in}^3$

TABLE OF STRESSES

	END REACTION Kips	SHEAR STRESS Ksi	BENDING MOMENT Ft. Kips	BENDING STRESS BOTTOM FLANGE Ksi
DEAD LOAD	240	2.54	6550	7.92
LIVE LOAD (E90)	378	4.00	9624	11.64
Impact +Rocking Effect (20.75+5)%	97	1.03	2478	3.00
Total DL+LL+I	715	7.44	18652	22.56
Allowable Stress	-	17.50	-	27.5
Ratio of Working Stress to allowable	-	0.43	-	0.83

$$\frac{\Delta LL+Imp}{Span} = \frac{1.80}{115.17 \times 12} = 0.0013$$

Span / deflection = 768

Allowable Stress Range for Fatigue
Category "B" for $N > 2,000,000$ cycles
 $S_{Rfat} = 16 \text{ Ksi}$

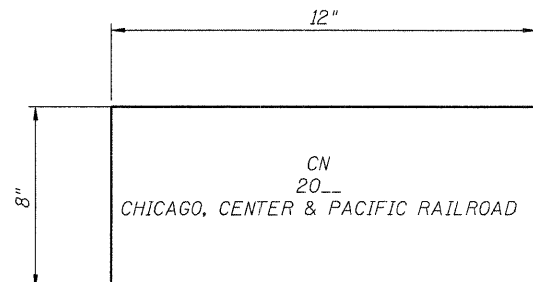
Maximum Design Stress Range at
Bottom Flange to Web weld at Midspan

$$MPa = (11.64 + 0.35 \times 3.00) = 12.69 \text{ ksi}$$

NOTES:

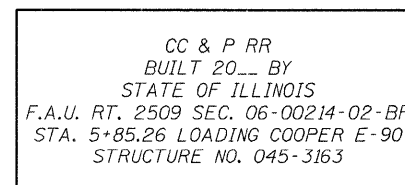
- For General Notes see Sheet S2.
- Design and Workmanship shall be in accordance with AREMA Manual Chapter 15.
- Material shall be in accordance with the following Spec's:
 - Structural Steel :
All structural steel except as noted ASTM A709, grade 50.
Deck plates, ballast stop plates & upper floor plates
ASTM A709, grade 50 corrosion resistant.
 - Welding :
Aws D1.5.
 - H.S. Bolts :
ASTM A325 mechanical galvanized

- All holes shall be drilled or sub-punched and reamed.
- All H.S. bolts shall be tightened by the turn-of-nut-method.



NAME PLATE, SPECIAL

Locate Name Plate, Special on the inside of the web of the North Girder, near the East End. Locate in plain view above the upper floor plate.



NAME PLATE

See STD 515001

DESIGNED	KJH
CHECKED	MGB
DRAWN	RJ
CHECKED	BKB

McDonough Associates Inc.
Engineers / Architects
130 East Randolph Street
Chicago, Illinois 60601
(312) 946-8600

FREEPORT SUBDIVISION BRIDGE NO. W40.07	
SHEET NO. S12	RTE.
S21 SHEETS	361

DESIGN DATA - STRESS TABLES
STRUCTURE NO. 045-3163

SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
06-00214-02-BR	KANE	219	139
SN 045-3163		CONTRACT NO. 63073	
FED. ROAD DIST. NO. 1 ILLINOIS FED. AID PROJECT			