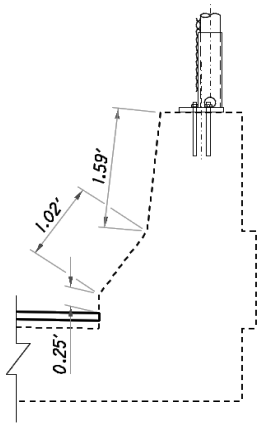
512 E 10100 SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)



STRUCTURE:

BRIDGE PARAPET (BP):

FRONT FACE = 0.25 FT + 1.02 FT + 1.59 FT = 2.86 FT
PARAPET LENGTH = 327.92 FT

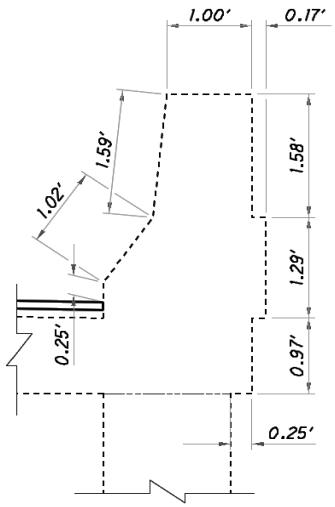
BP = 2.86 FT x 327.92 FT / 9 x 2 SIDES = 208.41 SY

WINGWALLS:

WINGWALL PARAPET (WWP):

PERIMETER = 0.25 FT + 1.02 FT + 1.59 FT + 1 FT + 1.58 FT + 0.17 FT + 1.29 FT + 0.17 FT + 0.97 FT + 0.25 FT = 8.29 FT
REAR WINGWALL (LT) = 17 FT
REAR WINGWALL (RT) = 17 FT
FORWARD WINGWALL (LT) = 25 FT
FORWARD WINGWALL (RT) = 25 FT

WWP =
(17 FT + 17 FT + 25 FT + 25 FT) x 8.29 FT / 9 = 77.37 SY



WINGWALL SIDES (WWS):

REAR (LT) = (4'-1" + 1'-10" (H)) x 17 FT (L) / 2 / 9 = 5.59 SY
REAR (RT) = (4'-1" + 1'-10" (H)) x 17 FT (L) / 2 / 9 = 5.59 SY
FORWARD (LT) = (5'-7" + 1'-11 3/8" (H)) x 25 FT (L) / 2 / 9 = 10.46 SY
FORWARD (RT) = (5'-7" + 1'-11 3/8" (H)) x 25 FT (L) / 2 / 9 = 10.46 SY

WWS = 5.59 SY + 5.59 SY + 10.46 SY + 10.46 SY = 32.1 SY

ABUTMENTS:

BEAM SEATS (BS):

REAR = (5.5FT (LT) + 5.5 FT (RT)) x 2 FT / 9 = 2.44 SY
FORWARD = (5.5FT (LT) + 5.5 FT (RT)) x 2 FT / 9 = 2.44 SY

BS = 2.44 SY + 2.44 SY = 4.88 SY

BREASTWALL, ALL SIDES (BRW):

REAR = EL 1233.4 - EL 1232 = 1.4 FT x (2 FT + 5.5 FT + 2 FT) / 9 = 1.48 SY
FORWARD = EL 1244.86 - EL 1241 = 3.86 FT x (2 FT + 5.5 FT + 2 FT) / 9 = 4.07 SY

BRW = 1.48 SY + 4.07 SY = 5.55 SY

BACKWALL (BCW):

REAR TOP = EL 1239.41 - EL 1233 = 6.41 FT x 30.5 FT / 9 = 21.72 SY
FORWARD TOP = EL 1251.09 - EL 1244.86 = 6.23 FT x 30.5 FT / 9 = 21.11 SY
FORWARD BOTTOM = EL 1244.86 - EL 1242 = 2.86 FT x 22.5 FT / 9 = 7.15 SY

BCW = 21.72 SY + 21.11 SY + 7.15 SY = 49.98 SY

ITEM TOTAL = BP + WWP + WWS + BS + BRW + BCW = 378.29 SY
(USE 378 SY)

512 E 74001 REMOVAL OF EXISTING COATINGS FROM CONCRETE SURFACES, AS PER PLAN:

WINGWALLS:

WINGWALL SIDES (WWS):
REAR (LT) = (4'-1" + 1'-10" (H)) x 17 FT (L) / 2 / 9 = 5.59 SY
REAR (RT) = (4'-1" + 1'-10" (H)) x 17 FT (L) / 2 / 9 = 5.59 SY
FORWARD (LT) = (5'-7" + 1'-11 3/8" (H)) x 25 FT (L) / 2 / 9 = 10.46 SY
FORWARD (RT) = (5'-7" + 1'-11 3/8" (H)) x 25 FT (L) / 2 / 9 = 10.46 SY

WWS = 5.59 SY + 5.59 SY + 10.46 SY + 10.46 SY = 32.1 SY

ABUTMENTS:

BEAM SEATS (BS):
REAR = (5.5FT (LT) + 5.5 FT (RT)) x 2 FT / 9 = 2.44 SY
FORWARD = (5.5FT (LT) + 5.5 FT (RT)) x 2 FT / 9 = 2.44 SY

BS = 2.44 SY + 2.44 SY = 4.88 SY

BREASTWALL, ALL SIDES (BRW):
REAR = EL 1233.4 - EL 1232 = 1.4 FT x (2 FT + 5.5 FT + 2 FT) / 9 = 1.48 SY
FORWARD = EL 1244.86 - EL 1241 = 3.86 FT x (2 FT + 5.5 FT + 2 FT) / 9 = 4.07 SY

BRW = 1.48 SY + 4.07 SY = 5.55 SY

BACKWALL (BCW):
REAR TOP = EL 1239.41 - EL 1233 = 6.41 FT x 30.5 FT / 9 = 21.72 SY
FORWARD TOP = EL 1251.09 - EL 1244.86 = 6.23 FT x 30.5 FT / 9 = 21.11 SY
FORWARD BOTTOM = EL 1244.86 - EL 1242 = 2.86 FT x 22.5 FT / 9 = 7.15 SY

BCW = 21.72 SY + 21.11 SY + 7.15 SY = 49.98 SY

ITEM TOTAL = WWS + BS + BRW + BCW = 92.51 SY
(USE 93 SY)

516 E 31000 JOINT SEALER

327.92 FT x 2 SIDES OF THE DECK = 655.84 FT **(USE 656 FT)**

514 E 00050 SURFACE PREPARATION OF EXISTING STRUCTURAL STEEL

(SEE GIRDER DETAILS IN PLAN FOR WEB AREA CALCULATIONS)

GIRDER # 1:

WEB AREA (G1WA):

REAR SURFACE AREA = 2445.08 SF
FORWARD SURFACE AREA = 2673.76 SF

G1WA = 2445.08 SF + 2673.76 SF = 5118.84 SF

FLANGES (G1F):

REAR FLANGES:

REAR TOP FLANGE = 155.03 FT x (16 IN / 12) x 1 SIDE = 206.71 SF
A1 BOTTOM FLANGE = 69.06 FT x (16 IN / 12) x 2 SIDES = 184.16 SF
A2 BOTTOM FLANGE = (13.53 FT + 22.45 FT) x (16 IN / 12) x 2 SIDES = 95.95 SF
A3 BOTTOM FLANGE = 54.56 FT x (16 IN / 12) x 2 SIDES = 145.49 SF
A4 FLANGES = (40.96 FT + 40.96 FT) x (16 IN / 12) x 2 SIDES = 218.45 SF

TOTAL REAR FLANGES =
206.71 SF + 184.16 SF + 95.95 SF + 145.49 SF + 218.45 SF = 850.76 SF

FORWARD FLANGES:

FORWARD TOP FLANGE = 173.18 FT x (16 IN / 12) x 1 SIDE = 230.91 SF
A5 BOTTOM FLANGE = 53.26 FT x (16 IN / 12) x 2 SIDES = 142.03 SF
A6 BOTTOM FLANGE = (21.42 FT + 13.46 FT) x (16 IN / 12) x 2 SIDES = 93.01 SF
A7 BOTTOM FLANGE = 89.09 FT x (16 IN / 12) x 2 SIDES = 237.57 SF
A8 FLANGES = (46.28 FT + 46.28 FT) x (16 IN / 12) x 2 SIDES = 246.83 SF

TOTAL FORWARD FLANGES =
230.91 SF + 142.03 SF + 93.01 SF + 237.57 SF + 246.83 SF = 950.35 SF

G1F = REAR + FORWARD = 850.76 SF + 950.35 SF = 1801.11 SF

STIFFENERS (G1STF):

A1 STIFFENERS:

AVERAGE STIFFENER HEIGHT = 5.39 FT

BEARING STIFFENERS (3/4" x 7") (BS):

PERIMETER: 0.5833 FT + 0.0625 FT + 0.5833 FT = 1.23 FT
NO. OF STIFFENERS: 2

BS SURFACE AREA: 1.23 FT x 5.39 FT x 2 = 13.26 SF

INTERMEDIATE STIFFENERS (5/16" x 5") (IS):

PERIMETER: 0.4167 FT + 0.026 FT + 0.4167 FT = 0.86 FT
NO. OF STIFFENERS: 13

IS SURFACE AREA: 0.86 FT x 5.39 FT x 13 = 60.26 SF

(Continued on next sheet…)

514 E 00050 SURFACE PREPARATION OF EXISTING STRUCTURAL STEEL (Continued…)

A1 STIFFENERS (Continued…):

FLOOR BEAM STIFFENERS (7/16" x 7") (FBS):
PERIMETER: 0.5833 FT + 0.0365 FT + 0.5833 FT = 1.2 FT
NO. OF STIFFENERS: 3

FBS SURFACE AREA: 1.2 FT x 5.39 FT x 3 = 19.4 SF

A1 STIFFENER AREA = BS + IS + FBS = 13.26 SF + 60.26 SF + 19.4 SF = 92.92 SF

A2 STIFFENERS:
(LENGTHS GIVEN WITH EACH STIFFENER HAVE BEEN CADD MEASURED)

FLOOR BEAM, RADIAL AND LEG SPLICE STIFFENERS (7/16" x 7") (FBS):
COMBINED APPROXIMATE LENGTH = 57.11 FT
PERIMETER: 0.5833 FT + 0.0365 FT + 0.5833 FT = 1.2 FT

FBS SURFACE AREA: 57.11 FT x 1.2 FT = 68.53 SF

VERTICAL STIFFENERS AT LEG INTERSECTION (3/8" x 6") (VS):
COMBINED APPROXIMATE LENGTH = 39.33 FT
PERIMETER: 0.5 FT + 0.0313 FT + 0.5 FT = 1.03 FT

VS SURFACE AREA: 39.33 FT x 1.03 FT = 40.51 SF

HORIZONTAL STIFFENERS AT LEG INTERSECTION (7/16" x 6") (HS):
COMBINED APPROXIMATE LENGTH = 40.92 FT
PERIMETER: 0.5 FT + 0.0365 FT + 0.5 FT = 1.04 FT

HS SURFACE AREA: 40.92 FT x 1.04 FT = 42.56 SF

A2 STIFFENER AREA = FBS + VS + HS = 68.53 SF + 40.51 SF + 42.56 SF = 151.6 SF

A3 STIFFENERS:
AVERAGE STIFFENER HEIGHT = 5.57 FT

FLOOR BEAM STIFFENERS (7/16" x 7") (FBS):
PERIMETER: 0.5833 FT + 0.0365 FT + 0.5833 FT = 1.2 FT
NO. OF STIFFENERS: 3

FBS SURFACE AREA: 1.2 FT x 5.57 FT x 3 = 20.05 SF

(Continued on next sheet…)

514 E 00050 SURFACE PREPARATION OF EXISTING STRUCTURAL STEEL (Continued…)

A3 STIFFENERS (Continued…):

INTERMEDIATE STIFFENERS (5/16" x 5") (IS):
PERIMETER: 0.4167 FT + 0.026 FT + 0.4167 FT = 0.86 FT
NO. OF STIFFENERS: 8

IS SURFACE AREA: 0.86 FT x 5.57 FT x 8 = 38.32 SF

VERTICAL STIFFENERS AT LEG INTERSECTION (3/8" x 6") (VS):
PERIMETER: 0.5 FT + 0.0313 FT + 0.5 FT = 1.03 FT
NO. OF STIFFENERS: 1

VS SURFACE AREA: 1.03 FT x 5.57 FT x 1 = 5.74 SF

A3 STIFFENER AREA = FBS + IS + VS = 20.05 SF + 38.32 SF + 5.74 SF = 64.11 SF

A4 STIFFENERS:
AVERAGE STIFFENER HEIGHT = 4.43 FT

INTERMEDIATE STIFFENERS (5/16" x 5") (IS):
PERIMETER: 0.4167 FT + 0.026 FT + 0.4167 FT = 0.86 FT
NO. OF STIFFENERS: 8

IS SURFACE AREA: 0.86 FT x 4.43 FT x 8 = 30.48 SF

A4 STIFFENER AREA = IS = 30.48 SF

A5 STIFFENERS:
AVERAGE STIFFENER HEIGHT = 5.51 FT

INTERMEDIATE STIFFENERS (5/16" x 5") (IS):
PERIMETER: 0.4167 FT + 0.026 FT + 0.4167 FT = 0.86 FT
NO. OF STIFFENERS: 8

IS SURFACE AREA: 0.86 FT x 5.51 FT x 8 = 37.91 SF

FLOOR BEAM STIFFENERS (7/16" x 7") (FBS):
PERIMETER: 0.5833 FT + 0.0365 FT + 0.5833 FT = 1.2 FT
NO. OF STIFFENERS: 2

FBS SURFACE AREA: 1.2 FT x 5.51 FT x 2 = 13.22 SF

(Continued on next sheet…)

514 E 00050 SURFACE PREPARATION OF EXISTING STRUCTURAL STEEL (Continued…)

A5 STIFFENERS (Continued…):

VERTICAL STIFFENERS AT LEG INTERSECTION (3/8" x 6") (VS):
PERIMETER: 0.5 FT + 0.0313 FT + 0.5 FT = 1.03 FT
NO. OF STIFFENERS: 1

VS SURFACE AREA: 1.03 FT x 5.51 FT x 1 = 5.68 SF

A5 STIFFENER AREA = IS + FBS + VS = 37.91 SF + 13.22 SF + 5.68 SF = 56.81 SF

A6 STIFFENERS:
(LENGTHS GIVEN WITH EACH STIFFENER HAVE BEEN CADD MEASURED)

FLOOR BEAM, RADIAL AND LEG SPLICE STIFFENERS (7/16" x 7") (FBS):
COMBINED APPROXIMATE LENGTH = 46.84 FT
PERIMETER: 0.5833 FT + 0.0365 FT + 0.5833 FT = 1.2 FT

FBS SURFACE AREA: 46.84 FT x 1.2 FT = 56.21 SF

VERTICAL STIFFENERS AT LEG INTERSECTION (3/8" x 6") (VS):
COMBINED APPROXIMATE LENGTH = 40.76 FT
PERIMETER: 0.5 FT + 0.0313 FT + 0.5 FT = 1.03 FT

VS SURFACE AREA: 40.76 FT x 1.03 FT = 41.98 SF

HORIZONTAL STIFFENERS AT LEG INTERSECTION (7/16" x 6") (HS):
COMBINED APPROXIMATE LENGTH = 40.3 FT
PERIMETER: 0.5 FT + 0.0365 FT + 0.5 FT = 1.04 FT

HS SURFACE AREA: 40.3 FT x 1.04 FT = 41.91 SF

A6 STIFFENER AREA = FBS + VS + HS = 56.21 SF + 41.98 SF + 41.91 SF = 140.1 SF

A7 STIFFENERS:
AVERAGE STIFFENER HEIGHT = 5.45 FT

BEARING STIFFENERS (3/4" x 7") (BS):
PERIMETER: 0.5833 FT + 0.0625 FT + 0.5833 FT = 1.23 FT
NO. OF STIFFENERS: 2

BS SURFACE AREA: 1.23 FT x 5.45 FT x 2 = 13.41 SF

(Continued on next sheet…)

514 E 00050 SURFACE PREPARATION OF EXISTING STRUCTURAL STEEL (Continued…)

A7 STIFFENERS (Continued…):

FLOOR BEAM STIFFENERS (7/16" x 7") (FBS):
PERIMETER: 0.5833 FT + 0.0365 FT + 0.5833 FT = 1.2 FT
NO. OF STIFFENERS: 4

FBS SURFACE AREA: 1.2 FT x 5.45 FT x 4 = 26.16 SF

INTERMEDIATE STIFFENERS (5/16" x 5") (IS):
PERIMETER: 0.4167 FT + 0.026 FT + 0.4167 FT = 0.86 FT
NO. OF STIFFENERS: 17

IS SURFACE AREA: 0.86 FT x 5.45 FT x 17 = 79.68 SF

A7 STIFFENER AREA = BS + FBS + IS = 13.41 SF + 26.16 SF + 79.68 SF = 119.25 SF

A8 STIFFENERS:
AVERAGE STIFFENER HEIGHT = 4.43 FT

INTERMEDIATE STIFFENERS (5/16" x 5") (IS):
PERIMETER: 0.4167 FT + 0.026 FT + 0.4167 FT = 0.86 FT
NO. OF STIFFENERS: 10

IS SURFACE AREA: 0.86 FT x 4.43 FT x 10 = 38.1 SF

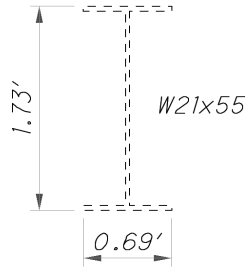
A8 STIFFENER AREA = IS = 38.1 SF

G1STF = A1 + A2 + A3 + A4 + A5 + A6 + A7 + A8 =
92.92 SF+151.6 SF+64.11 SF+30.48 SF+56.81 SF+140.1 SF+119.25 SF+38.1 SF = 693.37 SF

GIRDER #1 TOTAL = G1WA + G1F + G1STF = 5118.84 SF + 1801.11 SF + 693.37 SF = 7613.32 SF

GIRDER #2 TOTAL (SAME AS GIRDER #1) = 7613.32 SF

STRINGERS (STR), W21x55:

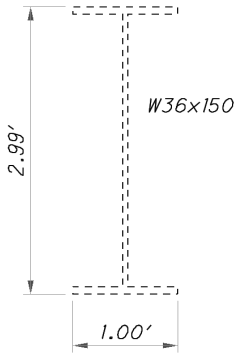


STRINGER PERIMETER = (1.73 FT x 2) + (0.69 FT x 3) = 5.53 FT
STRINGER LENGTH = 327.92 FT
NO. OF STRINGERS = 2

STR TOTAL = 5.53 FT x 327.92 FT x 2 STRINGERS = 3626.8 SF

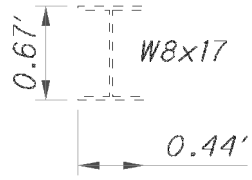
(Continued on next sheet…)

514 E 00050 SURFACE PREPARATION OF EXISTING STRUCTURAL STEEL (Continued…)



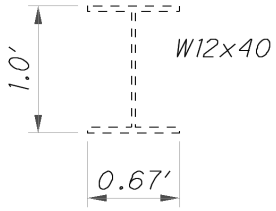
FLOOR BEAMS (FB) W36x150:
BEAM PERIMETER = (2.99 FT x 2) + (1 FT x 4) = 9.98 FT
BEAM LENGTH = 28 FT
NO. OF FLOOR BEAMS = 16

FB TOTAL = 9.98 FT x 28 FT x 16 BEAMS = 4471.04 SF



ANGLED CROSS BEAMS (ACB) W8x17:
BEAM PERIMETER = (0.67 FT x 2) + (0.44 FT x 4) = 3.1 FT
BEAM LEG LENGTH = 23.44 FT
NO. OF CROSS BEAM LEGS = 30

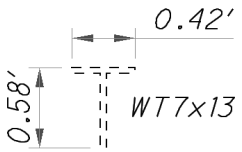
ACB TOTAL = 3.1 FT x 23.44 FT x 30 BEAM LEGS = 2179.92 SF



LEG CROSS BEAMS (LCB) W12x40:
REAR LEG:
BEAM PERIMETER = (1 FT x 2) + (0.67 FT x 4) = 4.68 FT
BEAM LENGTH = 32.98 FT
17.42 FT (^2) + 28 FT (^2) = 1087.46
SQUARE ROOT OF 1087.46 = 32.98 FT
NO. OF LEG CROSS BEAMS = 6

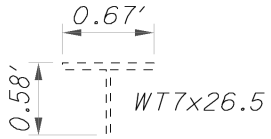
FORWARD LEG:
BEAM PERIMETER = (1 FT x 2) + (0.67 FT x 4) = 4.68 FT
BEAM LENGTH = 33.7 FT
18.75 FT (^2) + 28 FT (^2) = 1135.56
SQUARE ROOT OF 1135.56 = 33.7 FT
NO. OF LEG CROSS BEAMS = 6

LCB TOTAL = 4.68 FT x [(32.98 FT x 6 BEAMS) + (33.7 FT x 6 BEAMS)] = 1872.37 SF



VERTICAL LEG CONNECTION BEAMS (VLB) WT7x13:
BEAM PERIMETER = (0.58 FT x 2) + (0.42 FT x 2) = 2 FT
COMBINED BEAM LENGTH (REAR LEG, GIRDER #1 & #2) = 27.78 FT
COMBINED BEAM LENGTH (FWD LEG, GIRDER #1 & #2) = 27.78 FT

VLB TOTAL = 2 FT x (27.78 FT + 27.78 FT) = 111.12 SF



HORIZONTAL LEG CONNECTION BEAMS (HLB) WT7x26.5:
BEAM PERIMETER = (0.58 FT x 2) + (0.67 FT x 2) = 2.5 FT
COMBINED BEAM LENGTH (REAR LEG, GIRDER #1 & #2) = 43.22 FT
COMBINED BEAM LENGTH (FWD LEG, GIRDER #1 & #2) = 43.22 FT

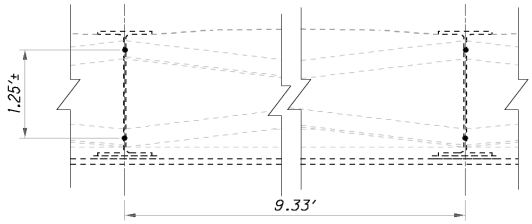
HLB TOTAL = 2.5 FT x (43.22 FT + 43.22 FT) = 216.1 SF

(Continued on next sheet…)

514 E 00050 SURFACE PREPARATION OF EXISTING STRUCTURAL STEEL (Continued…)

INTERMEDIATE CROSS FRAMES (ICF) Ls 3x3x5/16:

INFORMATION PER ASSEMBLY:
ANGLE PERIMETER = 3 IN x 4 SIDES / 12 = 1 FT
APPROXIMATE CROSSED ANGLE LENGTH = 9.41 FT
1.25 FT (^2) + 9.33 FT (^2) = 88.61
SQUARE ROOT OF 88.61 = 9.41 FT
APPROXIMATE LENGTH OF BOTTOM ANGLE = 9.33 FT



COMBINED LENGTHS OF ALL ANGLES = 9.41 FT + 9.41 FT + 9.33 FT = 28.15 FT
NO. OF ASSEMBLIES = 45

ICF TOTAL = 1 FT x 28.15 FT x 45 ASSEMBLIES = 1266.75 SF — 1266.75 SF

TOTAL OF GIRDER #1 + GIRDER #2 + STR + FB + ACB + LCB + VLB + HLB + ICF:
7613.32 + 7613.32 + 3626.8 + 4471.04 + 2179.92 + 1872.37 + 111.12 + 216.1 + 1266.75 = 28970.74 SF

5% ADDED FOR END FRAMES, GUSSET PLATES, HANGERS AND BEARINGS:
28970.74 SF x 1.05 = 30419.28 SF — **ITEM TOTAL = 30419.28 SF (USE 30419 SF)**

514 E 00056 FIELD PAINTING OF EXISTING STRUCTURAL STEEL, PRIME COAT
514 E 00060 FIELD PAINTING STRUCTURAL STEEL, INTERMEDIATE COAT
514 E 00066 FIELD PAINTING STRUCTURAL STEEL, FINISH COAT

ITEMS CALCULATED THE SAME AS ITEM 514E00050, SURFACE PREPARATION OF EXISTING STRUCTURAL STEEL (SEE PREVIOUS CALCULATIONS). — **ITEM TOTAL = 30419.28 SF (USE 30419 SF)**

514 E 00504 GRINDING FINS, TEARS, SLIVERS ON EXISTING STRUCTURAL STEEL

PROVIDE 1 MINUTE PER LINEAR FOOT OF BEAM/GIRDER TO BE PAINTED

GIRDERS: 327.92 FT x 2 GIRDERS =	655.84	FT
LEGS: (58.24 FT x 2) + (62.57 FT x 2) =	241.62	FT
STRINGERS: 327.92 FT x 2 BEAMS =	655.84	FT
FLOOR BEAMS: 28 FT x 16 BEAMS =	448.00	FT
	2001.30	FT

2001.3 FT / 60 = 33.36 MAN HOURS — **(USE 34 MNHR)**

514 E 10000 FINAL INSPECTION REPAIR

1 LOCATION PER EVERY 1200 SF OF CALCULATED STEEL SURFACE
30419 SF / 1200 = 26 EACH — **(USE 26 EACH)**