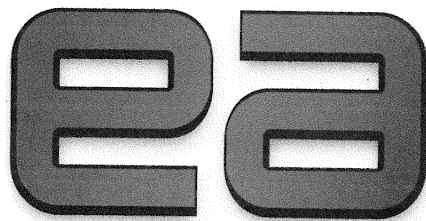


STRUCTURE ESTIMATED QUANTITY CALCULATIONS

**BRIDGE NO. RIC-30-1236
OVER S.R. 545**

STRUCTURE FILE NO. 7001267

RIC-30-9.26



PREPARED BY

ENGINEERING ASSOCIATES, INC.

SEPTEMBER 2019

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BRIDGE NO. RIC-30-1236 OVER S.R. 545

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BRIDGE NO. RIC-30-1236 OVER S.R. 545

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STRUCTURE ESTIMATED QUANTITIES

SFN: 7001267

ITEM 202-11203 PORTIONS OF STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN

Lump Sum

ITEM 202-22900 APPROACH SLAB REMOVED

REAR : 78.00' WIDE x 20.00' LONG x $\frac{1}{4}$ = 173.3 SQ YD

FORWARD : 78.00' WIDE x 20.00' LONG x $\frac{1}{4}$ = 173.3 SQ YD

346.6 SQ YD

347 S.Y.

ITEM 202-23500 WEARING COURSE REMOVED

REAR APPROACH SLAB : 37.50' WIDE x 20.00' LONG x $\frac{1}{4}$ = 83.3 SQ YD

FWD. APPROACH SLAB : 37.50' WIDE x 20.00' LONG x $\frac{1}{4}$ = 83.3 SQ YD

166.6 SQ YD

167 S.Y.

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 503-11101 COFFERDAMS AND EXCAVATION BRACING, AS PER PLAN

LUMP SUM

ITEM 503-2100 UNCLASSIFIED EXCAVATION

REAR ABUTMENT - LEFT (WB LANES)

$$(8.00') \times (1241.19 - 1228.73) \times (80.75') \times \left(\frac{1}{27}\right) = 298.1 \text{ CY}$$

REAR ABUTMENT - RIGHT (EB LANES)

$$(8.00') \times (1239.56 - 1228.73) \times (92.24') \times \left(\frac{1}{27}\right) = 296.0 \text{ CY}$$

FWD. ABUTMENT - LEFT (WB LANES)

$$(8.00') \times (1249.96 - 1236.43) \times (82.25') \times \left(\frac{1}{27}\right) = 329.7 \text{ CY}$$

FWD. ABUTMENT - RIGHT (EB LANES)

$$(8.00') \times (1248.41 - 1236.43) \times (87.30') \times \left(\frac{1}{27}\right) = 309.9 \text{ CY}$$

$$\text{Total (ABUTMENTS)} = 1233.7 \text{ CY}$$

$$\approx 1234 \text{ CY}$$

PIER No. 1 - LEFT (WB LANES)

$$(9.25') \times (10.00') \times (6.58') \times (4 \text{ FOOTINGS}) \times \left(\frac{1}{27}\right) = 90.2 \text{ CY}$$

PIER No. 1 - RIGHT (EB LANES)

$$(9.25') \times (10.00') \times (6.58') \times (5 \text{ FOOTINGS}) \times \left(\frac{1}{27}\right) = 112.7 \text{ CY}$$

PIER No. 2 - LEFT (WB LANES)

$$(10.00') \times (10.00') \times (7.67') \times (4 \text{ FOOTINGS}) \times \left(\frac{1}{27}\right) = 113.6 \text{ CY}$$

PIER No. 2 - RIGHT (EB LANES)

$$(10.00') \times (10.00') \times (7.67') \times (5 \text{ FOOTINGS}) \times \left(\frac{1}{27}\right) = 142.0 \text{ CY}$$

$$\text{Total (PIERS)} = 458.5 \text{ CY}$$

$$\approx 459 \text{ CY}$$

$$\text{Total} = 1234 \text{ CY} + 459 \text{ CY}$$

$$= 1693 \text{ CY}$$

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COMP. BY BDH DATE 7.23.19 CHKD. BY HK DATE 8.30.19SUBJECT B.N. RIC-30-1236 OVER S.R. 545

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIESITEM 505-11100 PILE DRIVING EQUIPMENT MOBILIZATION

LUMP SUM

ITEM 507-00100 STEEL PILES HP10x42, FURNISHED

R.A. LEFT : 22 PILES x 65' = 1430'

R.A. RIGHT : 23 PILES x 65' = 1495'

PIER No. 1 LEFT : 17 PILES x 50' = 850'

PIER No. 1 RIGHT : 22 PILES x 45' = 990'

PIER No. 2 LEFT : 16 PILES x 35' = 560'

PIER No. 2 RIGHT : 20 PILES x 35' = 700'

F.A. LEFT : 17 PILES x 40' = 680'

F.A. RIGHT : 18 PILES x 45' = 810'

ABUTMENTS = 1430' + 1495' + 680' + 810' = 4415'

PIERS = 850' + 990' + 560' + 700' = 3100'

7515 FT

ITEM 507-00150 STEEL PILES HP10x42, DRIVEN

R.A. LEFT : 22 PILES x 60' = 1320'

R.A. RIGHT : 23 PILES x 60' = 1380'

PIER No. 1 LEFT : 17 PILES x 45' = 765'

PIER No. 1 RIGHT : 22 PILES x 40' = 880'

PIER No. 2 LEFT : 16 PILES x 30' = 480'

PIER No. 2 RIGHT : 20 PILES x 30' = 600'

F.A. LEFT : 17 PILES x 35' = 595'

F.A. RIGHT : 18 PILES x 40' = 720'

ABUTMENTS : 1320' + 1380' + 595' + 720' = 4015'

PIERS : 765' + 880' + 480' + 600' = 2725'

6740 FT

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 507-92200 PREBORED HOLES

PIER No. 1 - LEFT

17 PILES x 15'

= 255'

PIER No. 1 - RIGHT

22 PILES x 15'

= 330'

585'

585 F

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 509-10000 EPOXY COATED REINFORCING STEEL

FROM REINFORCING STEEL LISTS IN THE PLANS:

SUPERSTRUCTURE

198,553 LBS

= 198,553 LBS

ABUTMENTS

19,948 LBS + 19,189 LBS

= 39,137 LBS

PIERS

56,695 LBS

= 56,695 LBS

TOTAL

= 294,385 LBS

ITEM 511-21523 CLASS QC2 CONCRETE WITH QC/QA, SUPERSTRUCTURE, AS PER PLAN

DECK SLAB (WB LANES)

9.00 in. x 1/2 x 53.42' x 188.41'

= 7548.6 CF

3.00 in. x 1/2 x (3.00' - 0.50') x 188.41' x 2 (OVERHANGS)

= 235.5 CF

3.50 in. x 1/2 x 12.00 in. x 1/2 x 188.41' x 6 (HANDRAILS)

= 329.7 CF

{ [(1.25' - 0.75') x 1.00' x 1/2 + (1.25' - 0.75') x 2.50'] x 53.42' x SEC 33.88° x 2

= 193.0 CF

(ADDITIONAL CONCRETE OVER ABUTMENT DIAPHRAGMS)

8306.8 CF

8306.8 CF x 1/27

= 307.7 CY

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 511-21523 CLASS QC2 CONCRETE WITH QC/QA, SUPERSTRUCTURE,
 AS PER PLAN (CONTINUED)

DEFLECTOR PARAPET (SBE-1-13) (WB LANES)

$$\frac{1}{2} \times (0.83' + 1.50') \times 3.50' \times 160.60' \times \frac{1}{27} = 24.3 \text{ CY}$$

$$1.82 \text{ CYD} \times 2 \text{ TRANSITIONS} = 3.6 \text{ CY}$$

27.9 CY

MEDIAN BARRIER (WB LANES)

$$\frac{1}{2} \times (0.84' + 1.75') \times 4.75' \times 245.67' \times \frac{1}{27} = 56.0 \text{ CY}$$

$$\text{TOTAL WB LANES} = 307.7 \text{ CY} + 27.9 \text{ CY} + 56.0 \text{ CY} = 391.6 \text{ CY}$$

DECK SLAB (EB LANES)

$$9.00 \text{ in.} \times \frac{1}{2} \times \frac{1}{2} \times (57.97' + 61.66') \times 188.41 = 8452.3 \text{ CF}$$

$$3.00 \text{ in.} \times \frac{1}{2} \times (3.00' - 0.50') \times 122.41' \times 2 \text{ (OVERHANGS)} = 153.0 \text{ CF}$$

$$3.00 \text{ in.} \times \frac{1}{2} \times (3.00' - 0.67') \times 66.00' \times 2 \text{ (OVERHANGS)} = 76.9 \text{ CF}$$

$$3.50 \text{ in.} \times \frac{1}{2} \times 12.00 \text{ in.} \times \frac{1}{2} \times 122.41' \times 7 \text{ (HAUNCHES)} = 249.9 \text{ CF}$$

$$3.50 \text{ in.} \times \frac{1}{2} \times 16.00 \text{ in.} \times \frac{1}{2} \times 66.00' \times 7 \text{ (HAUNCHES)} = 179.7 \text{ CF}$$

$$\left\{ \begin{aligned} & [(1.25' - 0.75') \times 1.00' \times \frac{1}{2} \\ & + (1.25' - 0.75') \times 2.50'] \times 61.66' \times \text{SEC } 33.88^\circ \end{aligned} \right. = 111.4 \text{ CF}$$

(ADDITIONAL CONCRETE OVER REAR ABUTMENT DIAPHRAGM)

$$\left\{ \begin{aligned} & [(1.25' - 0.75') \times 1.00' \times \frac{1}{2} \\ & + (1.25' - 0.75') \times 2.50'] \times 57.89' \times \text{SEC } 33.88^\circ \end{aligned} \right. = 104.6 \text{ CF}$$

(ADDITIONAL CONCRETE OVER FWD. ABUTMENT DIAPHRAGM)

9327.8 CF

$$9327.8 \text{ CF} \times \frac{1}{27} = 345.5 \text{ CY}$$

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 511-21523 CLASS QC2 CONCRETE WITH QC/QA, SUPERSTRUCTURE,
AS PER PLAN (CONTINUED)

DEFLECTOR PARAPET (SBR-1.13) (EB LANES)

$$\frac{1}{2} \times (0.83' + 1.50') \times 3.50' \times 163.18' \times \frac{1}{27} = 24.6 \text{ cy}$$

$$1.82 \text{ CU YD} \times 2 \text{ TRANSITIONS} = 3.6 \text{ cy}$$

28.2 cy

MEDIAN BARRIER (SBR-2.13) (EB LANES)

$$\frac{1}{2} \times (0.84' + 1.75') \times 4.75' \times 245.67' \times \frac{1}{27} = 56.0 \text{ cy}$$

$$\text{TOTAL EB LANES} = 345.5 \text{ cy} + 28.2 \text{ cy} + 56.0 \text{ cy} = 429.7 \text{ cy}$$

$$\text{TOTAL (WB \& EB LANES)} = 391.6 \text{ cy} + 429.7 \text{ cy} = 821.3 \text{ cy}$$

821 cy

ITEM 511-33500 SEMI-INTEGRAL DIAPHRAGM GUIDE

R.A. (WB LANES)

1 EACH

R.A. (EB LANES)

1 EACH

F.A. (WB LANES)

1 EACH

F.A. (EB LANES)

1 EACH

4 EACH

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 511.41012 CLASS QCI CONCRETE WITH QC/QA, PIER ABOVE FOOTINGS

PIER No. 1 - LEFT (WB LANES)

$$\begin{aligned} \text{COLUMNS: } & \frac{\pi (3.00')^2}{4} [(1236.45' - 1221.71') \\ & + (1236.27' - 1221.71') + (1236.08' - 1221.71') \\ & + (1235.93' - 1221.71')] \times \frac{1}{27} = 15.2 \text{ CY} \end{aligned}$$

CAP: AVG. TOP OF CAP ELEV.

$$\begin{aligned} & = (1240.45 + 1240.35 + 1240.24 + 1240.14 \\ & + 1240.03 + 1239.93) \div 6 = 1240.19 \end{aligned}$$

AVG. BOT. OF CAP ELEV.

$$\begin{aligned} & = (1236.45 + 1236.27 + 1236.08 \\ & + 1235.93) \div 4 = 1236.18 \end{aligned}$$

$$\text{AVG. CAP HEIGHT} = 1240.19 - 1236.18 = 4.01'$$

$$\begin{aligned} & [(4.01' \times 60.25' \times 3.00') \\ & - \frac{1}{2} (4.00') (0.50') (3.00') (2)] \times \frac{1}{27} = 26.6 \text{ CY} \end{aligned}$$

PIER No. 1 - RIGHT (EB LANES)

$$\begin{aligned} \text{COLUMNS: } & \frac{\pi (3.00')^2}{4} [(1235.43 - 1219.72) \\ & + (1234.93 - 1219.72) + (1234.43 - 1219.72) \\ & + (1233.93 - 1219.72) + (1233.42 - 1219.72)] \times \frac{1}{27} = 19.3 \text{ CY} \end{aligned}$$

CAP: AVG. TOP OF CAP ELEV.

$$\begin{aligned} & = (1239.77 + 1239.38 + 1238.98 + 1238.58 \\ & + 1238.19 + 1237.81 + 1237.42) \div 7 = 1238.59 \end{aligned}$$

AVG. BOT. OF CAP ELEV.

$$\begin{aligned} & = (1235.43 + 1234.93 + 1234.43 + 1233.93 \\ & + 1233.42) \div 5 = 1234.43 \end{aligned}$$

$$\text{AVG. CAP HEIGHT} = 1238.59 - 1234.43 = 4.16'$$

$$\begin{aligned} & [(4.16' \times 68.79' \times 3.00') \\ & - \frac{1}{2} (3.50') (0.50') (3.00') (2)] \times \frac{1}{27} = 31.6 \text{ CY} \end{aligned}$$

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 511-41012 CLASS RC1 CONCRETE WITH RC/QA, PIER ABOVE FOOTINGS

PIER No. 2 - LEFT (WB LANES)

$$\begin{aligned} \text{COLUMNS: } & \frac{\pi (3.00')^2}{4} [(1239.49 - 1223.21) \\ & + (1239.35 - 1223.21) + (1239.21 - 1223.21) \\ & + (1239.06 - 1223.21)] \times \frac{1}{27} = 16.8 \text{ cy} \end{aligned}$$

CAP: AVG. TOP OF CAP ELEV.

$$= (1243.59 + 1243.48 + 1243.38 + 1243.27 + 1243.16 + 1243.06) \div 6 = 1243.32$$

AVG. BOT. OF CAP ELEV.

$$= (1239.49 + 1239.35 + 1239.21 + 1239.06) \div 4 = 1239.28$$

$$\text{AVG. CAP HEIGHT} = 1243.32 - 1239.28 = 4.04'$$

$$\begin{aligned} & [(4.04' \times 60.25' \times 3.00') \\ & - \frac{1}{2} (4.00') (0.50') (3.00') (2)] \times \frac{1}{27} = 26.8 \text{ cy} \end{aligned}$$

PIER No. 2 - RIGHT (EB LANES)

$$\begin{aligned} \text{COLUMNS: } & \frac{\pi (3.00')^2}{4} [(1238.47 - 1221.22) \\ & + (1237.98 - 1221.22) + (1237.50 - 1221.22) \\ & + (1237.01 - 1221.22) + (1236.62 - 1221.22)] \times \frac{1}{27} = 21.3 \text{ cy} \end{aligned}$$

CAP: AVG. TOP OF CAP ELEV.

$$= (1242.91 + 1242.51 + 1242.11 + 1241.71 + 1241.34 + 1240.98 + 1240.62) \div 7 = 1241.74$$

AVG. BOT. OF CAP ELEV.

$$= (1238.47 + 1237.98 + 1237.50 + 1237.01 + 1236.62) \div 5 = 1237.52$$

$$\text{AVG. CAP HEIGHT} = 1241.74 - 1237.52 = 4.22'$$

$$\begin{aligned} & [(4.22' \times 66.89' \times 3.00') \\ & - \frac{1}{2} (3.52') (0.50') (3.00') - \frac{1}{2} (3.38') (0.50') (3.00')] \times \frac{1}{27} = 31.2 \text{ cy} \end{aligned}$$

188.8 cy

189 cy

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 511-44112 CLASS OCl CONCRETE WITH QC/QA, ABUTMENT NOT INCLUDING FOOTINGS

REAR ABUTMENT - LEFT (WB LANES)

AVG. SEAT ELEV.

$$= (1237.27 + 1237.37 + 1237.48 + 1237.58 + 1237.69 + 1237.79) \div 6 = 1237.53$$

TOP OF FOOTING ELEV. = 1231.73

$$\text{SEAT CONCRETE} = (1237.53 - 1231.73)(3.00')(64.11')(\frac{1}{27}) = 41.3 \text{ CY}$$

WINGWALL CONCRETE

$$[(1243.05 - 1231.73)(\frac{1}{2})(1.75' + 3.43')(2.50') + \frac{1}{2}((1243.05 - 1231.73) + (1239.50 - 1231.73))(11.27')(2.50')](\frac{1}{27}) = 12.7 \text{ CY}$$

DIAPHRAGM CONCRETE

AVG. TOP OF DIAPHRAGM ELEV.

$$= (1241.47 + 1240.91) \div 2 = 1241.19$$

AVG. BOT. OF DIAPHRAGM ELEV.

$$= 1237.53 + 0.17' = 1237.70$$

AVG. DIAPHRAGM HEIGHT = 1241.19 - 1237.70 = 3.49'

$$[(3.49')(64.27')(3.00')$$

$$- (3.00')(3.00')(2.00') \text{ (DEDUCT DIAPHRAGM GUIDE)}](\frac{1}{27}) = 24.3 \text{ CY}$$

78.3 CY

REAR ABUTMENT - RIGHT (EB LANES)

AVG. SEAT ELEV.

$$= (1234.71 + 1235.11 + 1235.51 + 1235.91 + 1236.31 + 1236.71 + 1237.11) \div 7 = 1235.91$$

TOP OF FOOTING ELEV. = 1231.73

$$\text{SEAT CONCRETE} = (1235.91 - 1231.73)(3.00')(76.20')(\frac{1}{27}) = 35.4 \text{ CY}$$

WINGWALL CONCRETE

$$[(1239.88 - 1231.73)(\frac{1}{2})(1.75' + 3.50')(2.50') + \frac{1}{2}((1239.88 - 1231.73) + (1235.50 - 1231.73))(15.28')(2.50')](\frac{1}{27}) = 10.4 \text{ CY}$$

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 511-44112 CLASS QC1 CONCRETE WITH QC/QA, ABUTMENT NOT INCLUDING FOOTING

REAR ABUTMENT - RIGHT (EB LANES) (CONTINUED)

DIAPHRAGM CONCRETE

AVG. TOP OF DIAPHRAGM ELEV.
 $= (1240.81 + 1238.30) \div 2 = 1239.56$

AVG. BOT. OF DIAPHRAGM ELEV.
 $= 1235.91 + 0.17 = 1236.08$

AVG. DIAPHRAGM HEIGHT = $1239.56 - 1236.08 = 3.48'$

$[(3.48')(74.20')(3.00')$

$- (3.00')(3.00')(2.00') \text{ (DEDUCT DIAPHRAGM GUIDE)}] (\frac{1}{27}) = \underline{28.0 \text{ CY}}$

73.8 CY

TOTAL (R.A.) = $78.3 \text{ CY} + 73.8 \text{ CY} = 152.1 \text{ CY}$

FORWARD ABUTMENT - LEFT (WB LANES)

AVG. SEAT ELEV.

$= (1245.31 + 1245.20 + 1245.10 + 1244.99 + 1244.88 + 1244.78) \div 6 = 1245.04$

TOP OF FOOTING ELEV. = 1239.43

SEAT CONCRETE = $(1245.04 - 1239.43)(3.00')(64.64') (\frac{1}{27}) = 40.3 \text{ CY}$

WINGWALL CONCRETE

$= [((1250.56 - 1239.43)(\frac{1}{2})(3.21 + 4.89')(2.50'))$

$+ \frac{1}{2}((1250.56 - 1239.43) + (1246.75 - 1239.43))(12.40')(2.50')] (\frac{1}{27}) = 8.6 \text{ CY}$

DIAPHRAGM CONCRETE

AVG. TOP OF DIAPHRAGM ELEV.

$= (1250.23 + 1249.68) \div 2 = 1249.96$

AVG. BOT. OF DIAPHRAGM ELEV.

$= 1245.04 + 0.17' = 1245.21$

AVG. DIAPHRAGM HEIGHT = $1249.96 - 1245.21 = 4.75'$

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 511.4412 CLASS QCI CONCRETE WITH QC/QA, ABUTMENT NOT INCLUDING FOOTING

FORWARD ABUTMENT - LEFT (WB LANES) (CONTINUED)

$$\begin{aligned} & [(4.75')(64.27')(3.00') \\ & - (3.00')(3.00')(2.00') \langle \text{DEDUCT DIAPHRAGM GUIDE} \rangle] (\frac{1}{27}) = 33.3 \text{ CY} \\ & \underline{\hspace{10em}} \\ & 82.2 \text{ CY} \end{aligned}$$

FORWARD ABUTMENT - RIGHT (EB LANES)

AVG. SEAT ELEV.

$$= (1244.62 + 1244.22 + 1243.83 + 1243.43 + 1243.08 + 1242.73 + 1242.38) \div 7 = 1243.47$$

TOP OF FOOTING ELEV. = 1239.43

$$\text{SEAT CONCRETE} = (1243.47 - 1239.43)(3.00')(69.41') (\frac{1}{27}) = 31.2 \text{ CY}$$

WINGWALL CONCRETE

$$\begin{aligned} & [(1247.56 - 1239.43)(\frac{1}{2})(3.04' + 5.20')(2.50) \\ & + (\frac{1}{2})((1247.56 - 1239.43) + (1243.50 - 1239.43))(12.53')(2.50)] (\frac{1}{27}) = 10.2 \text{ CY} \end{aligned}$$

DIAPHRAGM CONCRETE

AVG TOP OF DIAPHRAGM ELEV.

$$= (1249.58 + 1247.23) \div 2 = 1248.41$$

AVG. BOT. OF DIAPHRAGM ELEV.

$$= 1243.47 + 0.17' = 1243.64$$

AVG. DIAPHRAGM HEIGHT = 1248.41 - 1243.64 = 4.77'

$$\begin{aligned} & [(4.77')(69.66')(3.00') \\ & - (3.00')(3.00')(2.00') \langle \text{DEDUCT DIAPHRAGM GUIDE} \rangle] (\frac{1}{27}) = 36.3 \text{ CY} \end{aligned}$$

77.7 CY

$$\text{TOTAL (F.A.)} = 82.2 \text{ CY} + 77.7 \text{ CY} = 159.9 \text{ CY}$$

$$\begin{aligned} \text{TOTAL (ABUTMENTS)} & = 152.1 \text{ CY} + 159.9 \text{ CY} \\ & = 312.0 \text{ CY} \end{aligned}$$

312 CY

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 511-46512 CLASS QC1 CONCRETE WITH QC/QA, FOOTING

ABUTMENTS

R.A. = 3.00' x 6.00' x 170.99' x 1/27	=	114.0 cy
F.A. = 3.00' x 6.00' x 167.73' x 1/27	=	111.8 cy
		225.8 cy
	≈	226 cy

PIERS

PIER No. 1: 7.25' x 8.00' x 3.00' x 9 x 1/27	=	58.0 cy
PIER No. 2: 9.67' x 7.25' x 3.00' x 1 x 1/27	=	7.8 cy
8.00' x 7.25' x 3.00' x 1 x 1/27	=	6.4 cy
8.00' x 7.25' x 3.00' x 1 x 1/27	=	6.4 cy
12.50' x 7.25' x 3.00' x 1 x 1/27	=	10.1 cy
9.67' x 7.25' x 3.00' x 1 x 1/27	=	7.8 cy
12.50' x 7.25' x 3.00' x 1 x 1/27	=	10.1 cy
12.50' x 7.25' x 3.00' x 1 x 1/27	=	10.1 cy
9.67' x 7.25' x 3.00' x 1 x 1/27	=	7.8 cy
8.00' x 7.25' x 3.00' x 1 x 1/27	=	6.4 cy
		130.9 cy
	≈	131 cy

TOTAL = 226 cy + 131 cy = 357 cy

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

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

ABUTMENTS

REAR ABUTMENT - LEFT (WB LANES)

$\frac{1}{2}(1.50' + 0.38')(64.11') + (0.38')(0.50')$ FACE OF ABUT.	=	60.5 SF
+ $(1243.05 - 1237.66)(1.75')$ WINGWALL	=	9.4 SF
+ $(\frac{1}{2})[(1243.05 - 1237.66) - (1239.50 - 1237.66)](11.27')$ WW	=	20.0 SF
+ $(1239.50 - 1237.66)(2.50')$ END OF WINGWALL	=	4.6 SF
+ $(2.00')(14.70')$ R.F. OF WINGWALL	=	29.4 SF
+ $(2.50')(14.70')$ TOP OF WINGWALL	=	36.8 SF

REAR ABUTMENT - RIGHT (EB LANES)

$\frac{1}{2}(1.50' + 0.50')(74.88') + (0.50')(0.50')$ FACE OF ABUT.	=	75.1 SF
+ $(1239.88 - 1235.00)(3.50')$ WINGWALL	=	17.1 SF
+ $\frac{1}{2}[(1239.88 - 1235.00) - (1235.50 - 1235.00)](15.28')$ WW	=	33.5 SF
+ $(1235.50 - 1235.00)(2.50')$ END OF WINGWALL	=	1.3 SF
+ $(2.00')(17.03')$ R.F. OF WINGWALL	=	34.1 SF
+ $(2.50')(17.03')$ TOP OF WINGWALL	=	42.6 SF

TOTAL (REAR ABUTMENT) = 364.4 SF

FORWARD ABUTMENT - LEFT (WB LANES)

$\frac{1}{2}(1.50' + 0.50')(64.98') + (0.50')(0.50')$ FACE OF ABUT.	=	65.2 SF
+ $(1250.56 - 1246.25)(4.89')$ WINGWALL	=	21.1 SF
+ $(\frac{1}{2})[(1250.56 - 1246.25) - (1246.75 - 1246.25)](12.40')$ WW	=	23.6 SF
+ $(1246.75 - 1246.25)(2.50')$ END OF WINGWALL	=	1.3 SF
+ $(2.00')(15.60')$ R.F. OF WINGWALL	=	31.2 SF
+ $(2.50')(17.28')$ TOP OF WINGWALL	=	43.2 SF

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

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

FORWARD ABUTMENT - RIGHT (EB LANES)

$$\begin{aligned} & \frac{1}{2}(1.50' + 0.50')(69.72') + (0.50')(0.50') \text{ FACE OF ABUT.} = 70.0 \text{ SF} \\ & + (1247.56 - 1243.00)(3.04') \text{ WINDOW WALL} = 13.9 \text{ SF} \\ & + \frac{1}{2}[(1247.56 - 1243.00) - (1243.50 - 1243.00)](12.53') \text{ WW} = 25.4 \text{ SF} \\ & + (1243.50 - 1243.00)(2.50') \text{ END OF WINDOW WALL} = 1.3 \text{ SF} \\ & + (2.00')(17.73') \text{ R.F. OF WINDOW WALL} = 35.5 \text{ SF} \\ & + (2.50')(17.73') \text{ TOP OF WINDOW WALL} = 44.3 \text{ SF} \end{aligned}$$

Total (FORWARD ABUTMENT) = 376.0 SF

$$\begin{aligned} \text{Total (ABUTMENTS)} &= (364.4 \text{ SF} + 376.0 \text{ SF}) \left(\frac{1}{4}\right) \\ &= 82.3 \text{ SY} \approx 82 \text{ SY} \end{aligned}$$

PIERS

PIER No. 1 - LEFT (WB LANES)

$$\begin{aligned} \text{CAP: } & [(1240.19 - 1236.18)(60.25') - \frac{1}{2}(4.00')(0.50')(2)] \\ & \times (2 \text{ SIDES}) \times \frac{1}{4} \\ & + (5.50')(3.00')(2) \left(\frac{1}{4}\right) \\ & + (3.50')(3.00')(2) \left(\frac{1}{4}\right) \\ & + [(52.50')(3.00') - (\pi)(3.00')^2 \left(\frac{1}{4}\right)(4)] \times \frac{1}{4} = 73.6 \text{ SY} \\ \text{COLUMNS: } & (\pi)(3.00')(12.10')(4) \left(\frac{1}{4}\right) = 50.7 \text{ SY} \end{aligned}$$

PIER No. 1 - RIGHT (EB LANES)

$$\begin{aligned} \text{CAP: } & [(1238.59 - 1234.43)(68.67') - \frac{1}{2}(3.50')(0.49')(2)] \\ & \times 2 \text{ SIDES} \times \frac{1}{4} \\ & + (5.00')(3.00')(2) \left(\frac{1}{4}\right) \\ & + (3.50')(3.00')(2) \left(\frac{1}{4}\right) \\ & + [(58.67')(3.00') - (\pi)(3.00')^2 \left(\frac{1}{4}\right)(5)] \times \frac{1}{4} = 84.4 \text{ SY} \\ \text{COLUMNS: } & (\pi)(3.00')(12.10')(5) \left(\frac{1}{4}\right) = 63.4 \text{ SY} \end{aligned}$$

Total (PIER No. 1) = 272.1 SY

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

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

PIER NO. 2 - LEFT (WB LANES)

$$\begin{aligned}
 \text{CAP: } & [(1243.32 - 1239.28)(60.25') - \frac{1}{2}(4.00')(0.50')(2)] \\
 & \times 2 \text{ SIDES} \times \frac{1}{4} \\
 & + (5.50')(3.00')(2)(\frac{1}{4}) \\
 & + (3.50')(3.00')(2)(\frac{1}{4}) \\
 & + [(49.25')(3.00') - (\pi)(3.00')^2(\frac{1}{4})(4)] \times \frac{1}{4} = 73.9 \text{ SY} \\
 \text{COLUMNS: } & (\pi)(3.00')(13.90')(4)(\frac{1}{4}) = 58.2 \text{ SY}
 \end{aligned}$$

PIER NO. 2 - RIGHT (EB LANES)

$$\begin{aligned}
 \text{CAP: } & [(1241.74 - 1237.52)(66.89') - \frac{1}{2}(3.375')(0.5')] \\
 & - \frac{1}{2}(3.52')(0.5')] \times 2 \text{ SIDES} \times \frac{1}{4} \\
 & + (4.875')(3.00')(\frac{1}{4}) + (5.02')(3.00')(\frac{1}{4}) \\
 & + (3.50')(3.00')(2)(\frac{1}{4}) \\
 & + [(57.00')(3.00') - (\pi)(3.00')^2(\frac{1}{4})(4)] \times \frac{1}{4} = 83.8 \text{ SY} \\
 \text{COLUMNS: } & (\pi)(3.00')(13.90')(5)(\frac{1}{4}) = 72.8 \text{ SY}
 \end{aligned}$$

TOTAL (PIER NO. 2) = 288.7 SY

TOTAL (PIERS) = 272.1 SY + 288.7 SY = 560.8 SY ≈ 561 SY

SUPERSTRUCTURE

FACE OF ABUTMENT DIAPHRAGMS

REAR ABUTMENT DIAPHRAGM - LEFT (WB LANES)

$(1241.19 - 1237.76)(64.27')(\frac{1}{4}) = 24.9 \text{ SY}$

REAR ABUTMENT DIAPHRAGM - RIGHT (EB LANES)

$(1239.56 - 1236.08)(74.20')(\frac{1}{4}) = 28.7 \text{ SY}$

FWD. ABUTMENT DIAPHRAGM - LEFT (WB LANES)

$(1249.96 - 1245.21)(64.27')(\frac{1}{4}) = 33.9 \text{ SY}$

FWD. ABUTMENT DIAPHRAGM - RIGHT (EB LANES)

$(1248.41 - 1243.64)(69.66')(\frac{1}{4}) = 36.9 \text{ SY}$

124.4 SY

STRUCTURE ESTIMATED QUANTITIES

SFN: 7001267

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

SUPERSTRUCTURE (CONTINUED)

PARAPETS - LEFT (WB LANES)

$$\text{LEFT SIDE} = (3.50' + 0.83' + 3.50' + 1.00' + 0.50') (188.60') (\frac{1}{4}) = 195.5 \text{ SY}$$

$$\text{RIGHT SIDE} = (4.75' + 0.84') (245.67') (\frac{1}{4}) = 152.6 \text{ SY}$$

PARAPETS - RIGHT (EB LANES)

$$\text{LEFT SIDE} = (4.75' + 0.84') (245.67') (\frac{1}{4}) = 152.6 \text{ SY}$$

$$\text{RIGHT SIDE} = (3.50' + 0.83' + 3.50' + 1.00' + 0.50') (191.18') (\frac{1}{4}) = 198.2 \text{ SY}$$

$$\text{TOTAL (SUPERSTRUCTURE)} = 823.3 \text{ SY}$$

$$\approx 823 \text{ SY}$$

MEDIAN BARRIER ON APPROACH SLABS

$$(4.84' + 0.84') (28.64') (2) (\frac{1}{4}) = 72.3 \text{ SY}$$

$$\approx 73 \text{ SY}$$

$$\text{TOTAL} = 82 \text{ SY} + 561 \text{ SY} + 823 \text{ SY} + 73 \text{ SY} =$$

$$1539 \text{ SY}$$

ITEM 512-10300 SEALING CONCRETE BRIDGE DECKS WITH HMWM RESIN

LEFT STRUCTURE (WB LANES)

$$5.33' \text{ WIDE} \times 2 \times 188.41' \times \frac{1}{4} =$$

$$223.2 \text{ SY}$$

RIGHT STRUCTURE (EB LANES)

$$5.33' \text{ WIDE} \times 188.41' \times \frac{1}{4} =$$

$$111.6 \text{ SY}$$

$$334.8 \text{ SY}$$

$$\approx 335 \text{ SY}$$

APPROACH SLABS

$$(2) (25.00') (3 \text{ CLOSURE POURS}) (2) (\frac{1}{4}) = 33.3 \text{ SY} \approx$$

$$34 \text{ SY}$$

$$\text{TOTAL} = 335 \text{ SY} + 34 \text{ SY} =$$

$$369 \text{ SY}$$

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PROJECT RIC-30-9.26 PROJ. NO. 17-074 PG. 17 OF 32
COMP. BY BDH DATE 8.30.19 CHKD. BY HK DATE 8.30.19
SUBJECT B.N. RIC-30-1236 OVER S.R. 545

STRUCTURE ESTIMATED QUANTITIES

SFN: 7001267

ITEM 512-33000 TYPE 2 WATERPROOFING

REAR ABUTMENT - LEFT (WB LANES)
 $(3.00') (9.44' + 9.48' + 9.22' + 9.26') (\frac{1}{4}) = 12.5 \text{ SY}$

REAR ABUTMENT - RIGHT (EB LANES)
 $(3.00') (7.98' + 8.13') (\frac{1}{4}) = 5.4 \text{ SY}$

FWD. ABUTMENT - LEFT (WB LANES)
 $(3.00') (9.29' + 9.26' + 8.99' + 8.96') (\frac{1}{4}) = 12.2 \text{ SY}$

FWD. ABUTMENT - RIGHT (EB LANES)
 $(3.00') (7.94' + 7.80') (\frac{1}{4}) = 5.3 \text{ SY}$

35.4 SY

35 SY

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

Item 513-10260 STRUCTURAL STEEL MEMBERS, LEVEL 3

WB LANES

$$W36 \times 150 : 150 \text{ PLF} \times (37.10' + 37.10') \times 6 \text{ BEAMS} = 66,780 \text{ LBS}$$

$$W36 \times 210 : 210 \text{ PLF} \times (33.00' + 33.00') \times 6 \text{ BEAMS} = 83,160 \text{ LBS}$$

$$W36 \times 160 : 160 \text{ PLF} \times 47.00' \times 6 \text{ BEAMS} = 45,120 \text{ LBS}$$

SPlice No. 1 (WB LANES)

$$\text{FLANGE PL'S} : 490 \text{ PLF} \times 0.5 \text{ in.} \times 12.0 \text{ in.} \times 2.50' \times \frac{1}{144} \times 2 \times 6 = 613 \text{ LBS}$$

$$490 \text{ PLF} \times 0.625 \text{ in.} \times 4.50 \text{ in.} \times 2.50' \times \frac{1}{144} \times 4 \times 6 = 574 \text{ LBS}$$

$$490 \text{ PLF} \times 0.438 \text{ in.} \times 12.0 \text{ in.} \times 1.25' \times \frac{1}{144} \times 2 \times 6 = 268 \text{ LBS}$$

$$\text{WEB PL'S} : 490 \text{ PLF} \times 0.625 \text{ in.} \times 1.875' \times 2.583' \times \frac{1}{2} \times 2 \times 6 = 1483 \text{ LBS}$$

$$490 \text{ PLF} \times 0.125 \text{ in.} \times 11.25 \text{ in.} \times 2.583' \times \frac{1}{144} \times 2 \times 6 = 148 \text{ LBS}$$

NUTS & BOLTS: Bolt $\phi = 1\frac{1}{8}$ "

$$\begin{aligned} \text{FLANGE BOLT LENGTH} &= \text{GRIP} + 1.50 \text{ in.} \\ &= 2.485 \text{ in.} + 1.50 \text{ in.} \\ &= 3.985 \text{ in.} \approx 4 \text{ in.} \end{aligned}$$

$$\begin{aligned} \text{WEB BOLT LENGTH} &= \text{GRIP} + 1.50 \text{ in.} \\ &= 2.08 \text{ in.} + 1.50 \text{ in.} \\ &= 3.58 \text{ in.} \approx 3\frac{3}{4} \text{ in.} \end{aligned}$$

WEIGHT OF FLANGE BOLTS,

$$\text{NUTS & WASHERS} = 216 + 11.3$$

$$= 227.3$$

$$\approx 228 \frac{\text{LBS}}{100} \times 32 \times 6 = 438 \text{ LBS}$$

WEIGHT OF WEB BOLTS,

$$\text{NUTS & WASHERS} = 209 + 11.3$$

$$= 220.3$$

$$\approx 221 \frac{\text{LBS}}{100} \times 54 \times 6 = 716 \text{ LBS}$$

DEDUCT FLANGE HOLES

$$= \frac{\pi (1.25 \text{ in.})^2 \times 2.485 \text{ in.} \times \frac{1}{1728}}{4}$$

$$\times 490 \text{ PLF} \times 32 \times 6 = -166 \text{ LBS}$$

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 513-10260 STRUCTURAL STEEL MEMBERS, LEVEL 3

DEDUCT WEB HOLES

$$= \frac{\pi (1.25 \text{ in.})^2}{4} \times 2.08 \text{ in.} \times \frac{1}{1728}$$

$$\times 490 \text{ PCF} \times 54 \times 6 = \underline{-235 \text{ LBS}}$$

$$\text{Total Weight (Splice No 1)} = 3839 \text{ LBS}$$

Splice No. 2 (WB LANES)

$$\text{FLANGE PL'S: } 490 \text{ PCF} \times 0.50 \text{ in.} \times 12.0 \text{ in.} \times 3.05' \times \frac{1}{144} \times 2 \times 6 = 755 \text{ LBS}$$

$$490 \text{ PCF} \times 0.625 \text{ in.} \times 4.50 \text{ in.} \times 3.08' \times \frac{1}{144} \times 4 \times 6 = 707 \text{ LBS}$$

$$490 \text{ PCF} \times 0.375 \text{ in.} \times 12.0 \text{ in.} \times 1.54' \times \frac{1}{144} \times 2 \times 6 = 283 \text{ LBS}$$

$$\text{WEB PL'S: } 490 \text{ PCF} \times 0.625 \text{ in.} \times 1.875' \times 2.583' \times \frac{1}{2} \times 2 \times 6 = 1483 \text{ LBS}$$

$$490 \text{ PCF} \times 0.125 \text{ in.} \times 11.25 \text{ in.} \times 2.583' \times \frac{1}{144} \times 2 \times 6 = 148 \text{ LBS}$$

NUTS & BOLTS: Bolt $\phi = 1\frac{1}{8}$ "

$$\text{FLANGE Bolt LENGTH} = \text{GRIP} + 1.50 \text{ in.}$$

$$= 2.485 \text{ in.} + 1.50 \text{ in.}$$

$$= 3.985 \text{ in.} \approx 4"$$

$$\text{WEB Bolt LENGTH} = \text{GRIP} + 1.50 \text{ in.}$$

$$= 2.08 \text{ in.} + 1.50 \text{ in.}$$

$$= 3.58 \text{ in.} \approx 3\frac{3}{4}"$$

WEIGHT OF FLANGE BOLTS,

$$\text{NUTS \& WASHERS} = 216 + 11.3$$

$$= 227.3$$

$$\approx 228 \frac{\text{LBS}}{100} \times 40 \times 6 = 547 \text{ LBS}$$

WEIGHT OF WEB BOLTS,

$$\text{NUTS \& WASHERS} = 209 + 11.3$$

$$= 220.3$$

$$\approx 221 \frac{\text{LBS}}{100} \times 54 \times 6 = 716 \text{ LBS}$$

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 513.10260 STRUCTURAL STEEL MEMBERS, LEVEL 3

DEDUCT FLANGE HOLES

$$= \frac{\pi (1.25 \text{ in.})^2}{4} \times 2.485 \text{ in.} \times \sqrt{1728}$$

$$\times 490 \text{ PCF} \times 40 \times 6 = -208 \text{ LBS}$$

DEDUCT WEB HOLES

$$= \frac{\pi (1.25 \text{ in.})^2}{4} \times 2.08 \text{ in.} \times \sqrt{1728}$$

$$\times 490 \text{ PCF} \times 54 \times 6 = -235 \text{ LBS}$$

TOTAL WEIGHT (SPlice No 2) = 4196 LBS

SPlice No. 3 (WB LANES)

SAME AS SPlice No. 2 = 4196 LBS

SPlice No. 4 (WB LANES)

SAME AS SPlice No. 1 = 3839 LBS

INTERMEDIATE CROSSFRAMES (WB LANES) (STD. DNG GS-1-19)

BEAM DEPTH $\Rightarrow 3' \leq d < 4'$

OVERHANG $\Rightarrow \leq 3'$

BEAM SPA. $\Rightarrow 8.5' < S \leq 10.5'$

CROSSFRAME ANGLE SIZE $\Rightarrow L5 \times 5 \times \frac{1}{2}$

CALCULATE WEIGHT BASED ON TYPE B INT. CROSSFRAME

DIAGONAL ANGLES

$$16.2 \text{ PLF} \times 9.304' \times 2 \times 81 \text{ CROSSFRAMES} = 24,417 \text{ LBS}$$

HORIZONTAL ANGLES

$$16.2 \text{ PLF} \times 9.281' \times 81 \text{ CROSSFRAMES} = 12,179 \text{ LBS}$$

STRUCTURE ESTIMATED QUANTITIES

SFN: 7001267

CONNECTION PLATES

$$490 \text{ PCF} \times [(0.559')(2.615')(0.031') - (\frac{1}{2})(0.083')(0.208')(0.031')(2) - (\frac{1}{2})(0.103')(0.078')(0.031')(2)] \times 2 \times 81 \text{ X-FRAMES} = 3535 \text{ LBS}$$

FILL PLATES

$$490 \text{ PCF} \times 3.257' \times 0.479' \times 0.031' \times 81 \text{ X-FRAMES} = 1920 \text{ LBS}$$

5/8" ϕ BOLTS w/ WASHERS

$$\begin{aligned} \text{BOLT LENGTH} &= \text{GRIP} + \frac{7}{8}'' \\ &= 0.875 \text{ in.} + 0.875 \text{ in.} \\ &= 1.75 \text{ in.} \end{aligned}$$

$$\text{WEIGHT} = (35.3 + 3.6) \frac{\text{LBS}}{100} \times 6 \times 81 \text{ X-FRAMES} = 189 \text{ LBS}$$

WELDS

$$\begin{aligned} 490 \text{ PCF} \times [& (\frac{1}{2})(\frac{5}{16}')^2 (\frac{1}{144})(0.373' + 2.197' + 0.373')(4) \\ & + (\frac{1}{2})(\frac{5}{16}')^2 (\frac{1}{144})(0.428' + 0.417' + 0.477')(4) \\ & + (\frac{1}{2})(\frac{5}{16}')^2 (\frac{1}{144})(0.475' + 0.417' + 0.475')(2) \\ & + (\frac{1}{2})(\frac{1}{4}')^2 (\frac{1}{144})(3.257' + 0.417' + 3.257') \\ & + (\frac{1}{2})(\frac{1}{4}')^2 (\frac{1}{144})(1.778' + 1.778')] \times 81 \text{ X-FRAMES} = 357 \text{ LBS} \end{aligned}$$

Total (X-FRAMES) = 42,597 LBS

TOTALS (WB LANES)

BEAMS:	66,780 LBS + 83,160 LBS + 45,120 LBS	= 195,060 LBS
SPlice No. 1		= 3,839 LBS
SPlice No. 2		= 4,196 LBS
SPlice No. 3		= 4,196 LBS
SPlice No. 4		= 3,839 LBS
INTERMEDIATE CROSSFRAMES		= 42,597 LBS

Total (WB LANES) = 253,727 LBS

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 513-10260 STRUCTURAL STEEL MEMBERS, LEVEL 3

EB LANES

W36x150 = 150 PLF × (37.104' + 47.000' + 37.104') × 4 =	72,725 LBS
150 PLF × (37.271' + 47.208' + 37.271') × 1 =	18,263 LBS
150 PLF × (37.488' + 47.427' + 37.488') × 1 =	18,345 LBS
150 PLF × (37.604' + 47.646' + 37.604') × 1 =	18,428 LBS
W36x247 = 247 PLF × (33.00' + 33.00') × 4 =	65,208 LBS
247 PLF × (33.15' + 33.15') × 1 =	16,376 LBS
247 PLF × (33.31' + 33.31') × 1 =	16,455 LBS
247 PLF × (33.46' + 33.46') × 1 =	16,529 LBS

SPLICE No. 1 (EB LANES)

FLANGE P's = 490 PLF × 0.5 in. × 12.0 in. × 2.50' × $\frac{1}{144}$ × 2 × 7 =	715 LBS
490 PLF × 0.625 in. × 4.50 in. × 2.50' × $\frac{1}{144}$ × 4 × 7 =	670 LBS
490 PLF × 0.375 in. × 12.0 in. × 1.25' × $\frac{1}{144}$ × 2 × 7 =	268 LBS
WEB P's = 490 PLF × 0.625 in. × 1.875' × 2.583' × $\frac{1}{12}$ × 2 × 7 =	1730 LBS
490 PLF × 0.125 in. × 11.25 in. × 2.583' × $\frac{1}{144}$ × 2 × 7 =	173 LBS

NUTS & BOLTS: Bolt ϕ = 1 1/8"

FLANGE Bolt LENGTH = GRIP + 1.50 in.
= 2.475 in. + 1.50 in.
= 3.975 in. \approx 4 in.

WEB Bolt LENGTH = 2.05 in. + 1.50 in.
= 3.55 in. \approx 3 3/4 in.

WEIGHT OF FLANGE BOLTS,

NUTS & WASHERS = 216 + 11.3
= 227.3

$\approx 228 \frac{\text{LBS}}{100} \times 32 \times 7 = 510 \text{ LBS}$

WEIGHT OF WEB BOLTS,

NUTS & WASHERS = 269 + 11.3
= 280.3

$\approx 221 \frac{\text{LBS}}{100} \times 54 \times 7 = 835 \text{ LBS}$

STRUCTURE ESTIMATED QUANTITIES

SFN: 7001267

ITEM 513.10260 STRUCTURAL STEEL MEMBERS, LEVEL 3

DEDUCT FLANGE HOLES

$$= \frac{\pi (1.25 \text{ in.})^2}{4} \times 2.475 \text{ in.} \times \frac{1}{1728}$$

$$\times 490 \text{ PCF} \times 32 \times 7 = -192 \text{ LBS}$$

DEDUCT WEB HOLES

$$= \frac{\pi (1.25 \text{ in.})^2}{4} \times 2.05 \text{ in.} \times \frac{1}{1728}$$

$$\times 490 \text{ PCF} \times 54 \times 7 = -270 \text{ LBS}$$

$$\text{TOTAL (SPlice No 1)} = 4439 \text{ LBS}$$

SPlice No. 2, 3, & 4 (EB LANES)

$$\text{SAME AS SPlice No. 1} \quad 3 \times 4439 \text{ LBS} = 13,317 \text{ LBS}$$

INTERMEDIATE CROSS FRAMES

DIAGONAL ANGLES

$$16.2 \text{ PLF} \times 8.9173' \times 2 \times 48 \text{ X-FRAMES} = 13,868 \text{ LBS}$$

$$16.2 \text{ PLF} \times 8.3142' \text{ Avg. LENGTH} \times 2 \times 48 \text{ X-FRAMES} = 12,930 \text{ LBS}$$

HORIZONTAL ANGLES

$$16.2 \text{ PLF} \times 8.8638' \times 1 \times 48 \text{ X-FRAMES} = 6,892 \text{ LBS}$$

$$16.2 \text{ PLF} \times 8.2643' \text{ Avg. LENGTH} \times 1 \times 48 \text{ X-FRAMES} = 6,426 \text{ LBS}$$

CONNECTION PLATES

$$490 \text{ PCF} \times [(0.559') (2.615') (0.031')$$

$$- (\frac{1}{2}) (0.083') (0.208') (0.031') (2)$$

$$- (\frac{1}{2}) (0.103') (0.078') (0.031') (2)] \times 2 \times 96 = 4,189 \text{ LBS}$$

FILL PLATES

$$490 \text{ PCF} \times 3.1093' \times 0.479' \times 0.031' \times 96 \text{ X-FRAMES} = 2,172 \text{ LBS}$$

STRUCTURE ESTIMATED QUANTITIES

SFN: 7001267

ITEM 513.10260 STRUCTURAL STEEL MEMBERS, LEVEL 3

5/8" φ BOLTS & WASHERS

$$\text{BOLT LENGTH} = G + P + \frac{7}{8}'' = 0.875 \text{ in.} + 0.875 \text{ in.} \\ = 1.75 \text{ in.}$$

$$\text{WEIGHT} = (35.3 + 3.6) \frac{\text{LBS}}{100} \times 6 \times 96 \text{ X-FRAMES} = 224 \text{ LBS}$$

WELDS

$$490 \text{ PLF} \times \left[\left(\frac{1}{2} \right) \left(\frac{5}{16}'' \right)^2 \left(\frac{1}{164} \right) (0.373' + 2.197' + 0.373') (4) \right. \\ \left. + \left(\frac{1}{2} \right) \left(\frac{5}{16}'' \right)^2 \left(\frac{1}{164} \right) (0.428' + 0.417' + 0.477') (4) \right. \\ \left. + \left(\frac{1}{2} \right) \left(\frac{5}{16}'' \right)^2 \left(\frac{1}{164} \right) (0.475' + 0.417' + 0.475') (2) \right. \\ \left. + \left(\frac{1}{2} \right) \left(\frac{1}{4}'' \right)^2 \left(\frac{1}{164} \right) (3.257' + 0.417' + 3.257') \right. \\ \left. + \left(\frac{1}{2} \right) \left(\frac{1}{4}'' \right)^2 \left(\frac{1}{164} \right) (1.778' + 1.778') \right] \times 96 \text{ X-FRAMES} = 423 \text{ LBS}$$

$$\text{TOTAL X-FRAMES} = 47,124 \text{ LBS}$$

TOTALS (EB LANES)

BEAMS :	242,329 LBS
SPLICE No. 1 :	4439 LBS
SPLICE No. 2 :	4439 LBS
SPLICE No. 3 :	4439 LBS
SPLICE No. 4 :	4439 LBS
INTERMEDIATE CROSSFRAMES :	47,124 LBS

$$\text{Total (EB LANES)} = 307,209 \text{ LBS}$$

$$\text{TOTAL} = 253,727 \text{ LBS} + 307,209 \text{ LBS} = \boxed{560,936 \text{ LBS}}$$

STRUCTURE ESTIMATED QUANTITIES

SFN: 7001267

ITEM 513-20000 WELDED STUD SHEAR CONNECTORS

WB LANES: 3 STUDS/ROW x 265 ROWS x 6 BEAMS = 4770 EACH

EB LANES: 3 STUDS/ROW x 265 ROWS x 7 BEAMS = 5565 EACH

10,335 EACH

ITEM 514-10000 FINAL INSPECTION REPAIR

ONE LOCATION PER 150 LINEAR FEET OF BEAM & 5% OF CROSSFRAMES

TOTAL LENGTH OF BEAMS

WB LANES: 187.2083' x 6 BEAMS = 1123.25'

EB LANES: 187.2083' x 4 BEAMS = 748.83'

188.0625' x 1 BEAM = 188.06'

188.9792' x 1 BEAM = 188.98'

189.7813' x 1 BEAM = 189.78'

2438.90'

2438.90' ÷ 150' = 16.3

0.05 x (81 + 96) = 8.9

25.2

25 EACH

STRUCTURE ESTIMATED QUANTITIES

SFN: 7001267

ITEM 514-80011 SHOP PAINTING AND FIELD TOUCH-UP OF STRUCTURAL STEEL
AS PER PLAN

FROM ITEM 513-10260 :

560,936 LBS

ITEM 516-10010 ARMORLESS PREFORMED JOINT SEAL

WB LANES

REAR APPROACH : 60.226'

FWD. APPROACH : 60.226'

120.452'

EB LANES

REAR APPROACH : 70.151'

FWD. APPROACH : 65.609'

135.760'

TOTAL = 120.452' + 135.760'

= 256.212'

256 FT

ITEM 516-13600 1" PREFORMED EXPANSION JOINT FILLER

MEDIAN BARRIER : END AREA = (2)(6.2309 SQ FT)(SEC 33.8808°)

= 15.01 SQ FT

REAR APPROACH : 15.01 SF

FWD. APPROACH : 15.01 SF

30.02 SF

30 SF

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 516-13900 2" PREFORMED EXPANSION JOINT FILLER

ABUTMENTS

REAR ABUTMENT - LEFT (WB LANES)

$$(5.292')(3.614') + (3.614')(2.00')(2) + (3.00')(3.00') + (5.26')(3.01') + (4.89')(3.614') = 76.1 \text{ SF}$$

REAR ABUTMENT - RIGHT (EB LANES)

$$(3.614')(2.00')(2) + (3.00')(3.00') + (5.17')(3.01') = 39.0 \text{ SF}$$

FORWARD ABUTMENT - LEFT (WB LANES)

$$(5.35')(3.614') + (3.614')(2.00')(2) + (3.00')(3.00') + (5.25')(3.01') + (4.90')(3.614') = 76.3 \text{ SF}$$

FORWARD ABUTMENT - RIGHT (EB LANES)

$$(3.614')(2.00')(2) + (3.00')(3.00') + (4.85')(3.01') = 38.1 \text{ SF}$$

$$\text{TOTAL (ABUTMENTS)} = 229.5 \text{ SF}$$

$$\approx 230 \text{ SF}$$

APPROACH SLABS

BETWEEN MEDIAN BARRIER

$$(4.75')(31.707')(2 \text{ ENDS}) = 301.2 \text{ SF}$$

ENDS OF BARRIER

$$(13.1 \text{ SF})(2 \text{ ENDS}) = 26.2 \text{ SF}$$

$$\text{TOTAL (APPROACH SLABS)} = 327.4 \text{ SF}$$

$$\approx 327 \text{ SF}$$

$$\text{TOTAL} = 230 \text{ SF} + 327 \text{ SF} = \boxed{557 \text{ SF}}$$

ITEM 516-14020 SEMI-INTEGRAL ABUTMENT EXPANSION JOINT SEAL

$$64.11' + 74.58' + 3.00' + 64.64' + 69.58' + 3.00' = 278.91' \approx \boxed{279 \text{ FT}}$$

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 516-44101 ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND
LOAD PLATE (NEOPRENE), AS PER PLAN
 $2\frac{1}{2}'' \times 1'-0'' \times 1'-2''$ w/ $1\frac{3}{4}''$ (AVG.) $\times 1'-1'' \times 1'-3''$
BEVELLED LOAD PLATE

R.A. - LEFT (WB LANES) : 6 EACH

R.A. - RIGHT (EB LANES) : 7 EACH

F.A. - LEFT (WB LANES) : 6 EACH

F.A. - RIGHT (EB LANES) : 7 EACH

26 EACH

26 EACH

ITEM 516-44101 ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND
LOAD PLATE (NEOPRENE), AS PER PLAN
 $3\frac{1}{2}'' \times 1'-3'' \times 1'-6''$ w/ $2\frac{5}{16}''$ (AVG.) $\times 1'-4'' \times 1'-7''$
BEVELLED LOAD PLATE

PIER No. 1 - LEFT (WB LANES) : 6 EACH

PIER No. 1 - RIGHT (EB LANES) : 7 EACH

PIER No. 2 - LEFT (WB LANES) : 6 EACH

PIER No. 2 - RIGHT (EB LANES) : 7 EACH

26 EACH

26 EACH

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 518-21200 Porous Backfill With Geotextile Fabric

REAR ABUTMENT (WB LANES)

BEHIND ABUTMENT UNDER ROADWAY

AVG. TOP OF POROUS BACKFILL ELEV.

$$= 1241.19 - 1.25' = 1239.94$$

TOP OF FOOTING ELEV. = 1231.73

$$[(1239.94 - 1231.73)(65.05')(2.00')](\frac{1}{2}) = 39.6 \text{ CY}$$

BEHIND WINGWALL

$$[(1241.55 - 1231.73) + (1238.00 - 1231.73)](\frac{1}{2}) \times (14.70')(2.00')(\frac{1}{2}) = 8.8 \text{ CY}$$

REAR ABUTMENT (EB LANES)

BEHIND ABUTMENT UNDER ROADWAY

AVG. TOP OF POROUS BACKFILL ELEV.

$$= 1239.56 - 1.25' = 1238.31$$

TOP OF FOOTING ELEV. = 1231.73

$$[(1238.31 - 1231.73)(74.21')(2.00')](\frac{1}{2}) = 36.2 \text{ CY}$$

BEHIND WINGWALL

$$[(1238.38 - 1231.73) + (1234.00 - 1231.73)](\frac{1}{2}) \times (17.03')(2.00')(\frac{1}{2}) = 5.6 \text{ CY}$$

$$\text{TOTAL (REAR ABUTMENT)} = 90.2 \text{ CY}$$

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STRUCTURE ESTIMATED QUANTITIES

ITEM 518-21200 POROUS BACKFILL WITH GEOTEXTILE FABRIC

FORWARD ABUTMENT (WB LANES)

BEHIND ABUTMENT UNDER ROADWAY

AVG. TOP OF POROUS BACKFILL ELEV.
= 1249.96 - 1.25' = 1248.71

TOP OF FOOTING ELEV. = 1239.43

$[(1248.71 - 1239.43)(66.98')(2.00')](\frac{1}{2}) = 46.0 \text{ CY}$

BEHIND WINGWALL

$[(1249.06 - 1239.43) + (1245.25 - 1239.43)](\frac{1}{2})$
 $\times (15.60')(2.00')(\frac{1}{2}) = 8.9 \text{ CY}$

FORWARD ABUTMENT (EB LANES)

BEHIND ABUTMENT UNDER ROADWAY

AVG. TOP OF POROUS BACKFILL ELEV.
= 1243.41 - 1.25' = 1242.16

TOP OF FOOTING ELEV. = 1239.43

$[(1242.16 - 1239.43)(67.24')(2.00')](\frac{1}{2}) = 38.5 \text{ CY}$

BEHIND WINGWALL

$[(1246.06 - 1239.43) + (1242.00 - 1239.43)](\frac{1}{2})$
 $\times (17.73')(2.00')(\frac{1}{2}) = 6.0 \text{ CY}$

TOTAL (FORWARD ABUTMENT) = 99.4 CY

TOTAL = 90.2 CY (R.A.) + 99.4 CY (F.A.)
= 189.6 CY

190 CY

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 518-40000 6" PERFORATED CORRUGATED PLASTIC PIPE

REAR ABUTMENT : LENGTH = 170.99'

FWD. ABUTMENT : LENGTH = 167.55'

338.54'

339 FT

ITEM 518.40010 6" NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS

REAR ABUTMENT (WB LANES) : 25.00'

REAR ABUTMENT (EB LANES) : 7.77'

FWD. ABUTMENT (WB LANES) : 25.00'

FWD. ABUTMENT (EB LANES) : 8.67'

66.44'

66 FT

ITEM 526-25001 REINFORCED CONCRETE APPROACH SLABS (T=15"), AS PER PLAN

REAR APPROACH (WB LANES) : $(25.00')(52.50')(\frac{1}{4}) = 145.8$ SY

REAR APPROACH (EB LANES) : $(25.00')(\frac{1}{2})(61.05' + 60.51')(\frac{1}{4}) = 168.8$ SY

FWD APPROACH (WB LANES) : $(25.00')(52.50')(\frac{1}{4}) = 145.8$ SY

FWD APPROACH (EB LANES) : $(25.00')(\frac{1}{2})(56.67' + 56.12')(\frac{1}{4}) = 156.7$ SY

617.1 SY

617 SY

ITEM 526-90030 TYPE C INSTALLATION

REAR APPROACH : 130.62'

FWD. APPROACH : 130.80'

267.42'

267 FT

SFN: 7001267

STRUCTURE ESTIMATED QUANTITIES

ITEM 601-21000 CONCRETE SLOPE PROTECTION

REAR SLOPE : $4298.6 \text{ SF} \times \frac{1}{4} = 477.6 \text{ SY}$

FWD SLOPE : $6083.7 \text{ SF} \times \frac{1}{4} = 676.0 \text{ SY}$

1153.6 SY

1154 SY

ITEM SPECIAL 607-39900 VANDAL PROTECTION FENCE - 6 FT STRAIGHT,
COATED FABRIC

WB LANES : 158.60' MEASURED $\frac{1}{4}$ POSTS

EB LANES : 161.18' MEASURED $\frac{1}{4}$ POSTS

319.78'

320 FT