

SHAFFER POMEROY, LTD.

Consulting Engineers

909 S. Main Street Mansfield, OH 44907
 3477 Commerce Pkwy Ste C Wooster, OH 44691
 2550 Corporate Exchange Dr., Ste. 10 Columbus, OH 43231

JOB EM-1727 ASD-42-9.43

SHEET NO. 1 OF 6

CALCULATED BY CJS DATE 7/8/19

CHECKED BY KJA DATE 7/11/19

SCALE

ESTIMATED QUANTITIES

ITEM 202E11003 - STRUCTURE REMOVED, OVER 20 FOOT SPAN AS PER PLAN 1 LS

ITEM 202E22900 - APPROACH SLAB REMOVED 135 SY

$$A = 2(40.50')(15')(1yd/3')^2 = 135.0 SY$$

ITEM 503E11101 - COFFERDAMS AND EXCAVATION BRACING AS PER PLAN 1 LS

ITEM 503E21100 - UNCLASSIFIED EXCAVATION 97 CY

REAR ABUTMENT

$$E_{AVG.} = (978.04 + 976.09 + 978.29 + 977.77 + 975.28 + 978.11) / 6 = 977.26$$

$$V_{RA} = (977.26 - 972.82)(295 ft^2) = 1309.80 ft^3$$

FORWARD ABUTMENT

$$E_{AVG.} = (977.86 + 977.88 + 978.35 + 978.20 + 976.99 + 977.15) / 6 = 977.66$$

$$V_{FA} = (977.66 - 973.19)(295 ft^2) = 1318.65 ft^3$$

$$V_{EX} = (1309.80 ft^3 + 1318.65 ft^3)(1yd/3')^3 = 97.35 yd^3 \rightarrow 97 CY$$

ITEM 505E11100 - PILE DRIVING EQUIPMENT MOBILIZATION 1 LS

ITEM 507E00500 - 12" CAST-IN-PLACE REINFORCED CONCRETE PILES, DRIVEN 720 FT

$$L = 8(40' + 50') = 720 FT$$

ITEM 507E00550 - 12" CAST-IN-PLACE REINFORCED CONCRETE PILES, FURNISHED 800 FT

$$L = 8(45' + 55') = 800 FT$$

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SHEET NO. 2 OF 6

CALCULATED BY CJS DATE 7/8/19 rev. 9/11/19

CHECKED BY BAA DATE 7/11/19

SCALE _____

ITEM S09E10001 - EPOXY COATED REINFORCING STEEL, AS PER PLAN

153
~~17,278~~ LB

ABUT. = ~~5,815~~ LB 6,353 LB

SUPERSTR. = ~~4,403~~ LB 10,800 LB

TOTAL = ~~5,815~~ LB + ~~4,403~~ LB = ~~17,278~~ LB
 6,353 10,800 17,153

ITEM S11E31611 - CLASS QCA CONCRETE, SUPERSTRUCTURE, AS PER PLAN 76 CY

DECK

$$V_c = 40,375' \left[6" + \frac{(8.5" - 6")}{3} \right] \left(\frac{1}{12} \right) (72') = 1655.38 \text{ ft}^3$$

END DIAPHRAGM

$$V_c = 2 \left(\frac{1.8125' + 20.1875'}{2} \right) \left(\frac{1" + 27" + 8.5"}{12} \right) (3') - 2 \left(\frac{20.1875'}{2} \right) \left(\frac{1" + 27" + 8.5"}{12} \right) (1.5')$$

$$- 2 \left(\frac{20'}{2} \right) \left(\frac{15"}{12} \right) (0.5')$$

$$= 192.29 \text{ ft}^3$$

SHEAR KEYS

$$V_c = \left[\frac{(8.5" + 25") (2.5") (33" + 25")}{(1/12)^3} \right] (10 \text{ BMJ}) = 5.65 \text{ ft}^3$$

$$V_{c,T} = [1655.38 \text{ ft}^3 + 2(192.29 \text{ ft}^3 + 5.65 \text{ ft}^3)] \left(\frac{1 \text{ yd}}{3'} \right)^3 = 75.97 \text{ yd}^3 \rightarrow 76 \text{ CY}$$

ITEM S11E43510 - CLASS QCI CONCRETE, ABUTMENT INCLUDING FOOTING 80 CY

FOOTING

$$V_c = 57' (3')^2 = 513.00 \text{ ft}^3$$

BREASTWALL/WINGWALL - BELOW BRIDGE SEAT

$$V_{BW} = \left[\frac{(978.79 + 979.12) - (972.82 + 3')}{2} \right] (1.8125' + 20.1875') (3') (2) = 413.82 \text{ ft}^3$$

$$V_{WW} = [978.79 - (972.82 + 3')] (0.5') (2.5') (2) = 96.53 \text{ ft}^3$$

WINGWALL - ABOVE BRIDGE SEAT

$$V_c = \left\{ (981.83 - 978.79) \left(\frac{0.5' + 0.5'}{2} \right) - 0.5' (981.83 - 979.34) (5.5') \right\} (2.5') (2) = 63.30 \text{ ft}^3$$

$$V_{BT} = 2 \left(513.00 \text{ ft}^3 + 413.82 \text{ ft}^3 + 96.53 \text{ ft}^3 + 63.30 \text{ ft}^3 \right) \left(\frac{1 \text{ yd}}{3'} \right)^3 = 80.49 \text{ yd}^3$$

63.30

→ 80 CY

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SHEET NO. 3

OF 6

CALCULATED BY CJS

DATE 7/8/19

CHECKED BY *Kah*

DATE 7/11/19

SCALE *Kah*

ITEM SIZE 0100 - SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)

104
~~102~~ SY

SUPERSTRUCTURE

$$T_{AVG} = 6" + (8.5" - 6") / 3 = 6.83"$$

$$A_{STR} = 2 [71' - 2(9.5')] (6.83" + 27" + 6") (1/12") = ~~464.68~~ 458.05 \text{ ft}^2$$

$$A_{ED} = 2 (1.8125') (981.83 - 978.79) = 11.02 \text{ ft}^2$$

ABUTMENT

$$A_{BESTMTC} = \left\{ \left[\frac{979.12 + 978.79}{2} - 977.30 \right] + 1.50' \right\} (20.1875') (2) + (978.79 - 977.30) (0.5') (2) = ~~128.89~~ 140.31 \text{ ft}^2$$

$$A_{W,FRONT} = \left\{ (978.79 - 977.55) (6.5') + (981.83 - 978.79) (6.5' - 0.1667') - 0.5 (981.83 - 979.34) (5.5') \right\} (2) = 40.93 \text{ ft}^2$$

$$A_{W,END} = \left\{ 978.81 - \left[977.55 + (2.5' / 4) \right] \right\} (2.5') (2) = ~~3.33~~ 5.82 \text{ ft}^2$$

$$A_{W,TOP} = \left[(981.83 - 979.34)^2 + (5.5')^2 + 0.8333' \right] (2.5') (2) = 34.35 \text{ ft}^2$$

$$A_{W,BACK} = \left[(981.83 - 979.34)^2 + (5.5')^2 + 0.8333' \right] (0.5') (2) = 6.87 \text{ ft}^2$$

$$A_T = ~~464.68~~ 458.05 \text{ ft}^2 + 2 (11.02 \text{ ft}^2 + ~~128.89~~ 140.31 \text{ ft}^2 + 40.93 \text{ ft}^2 + ~~3.33~~ 5.82 \text{ ft}^2 + 34.35 \text{ ft}^2 + 6.87 \text{ ft}^2) = 915.42 \text{ ft}^2$$

$$A = \left(\frac{915.42 \text{ ft}^2}{3} \right) (1 \text{ yd} / 3 \text{ ft})^2 = ~~101.71~~ 104.07 \text{ yd}^2 \rightarrow 104 \text{ SY}$$

ITEM SIZE 10300 - SEALING CONCRETE BRIDGE DECKS WITH HMWU RESIN

16 SY

$$A = 74' (2') (1 \text{ yd} / 3 \text{ ft})^2 = 16.44 \text{ yd}^2 \rightarrow 16 \text{ SY}$$

ITEM SIZE 33000 - TYPE 2 WATERPROOFING

3 SY

$$L = 2 (980.90 - 975.82) (3') (1 \text{ yd} / 3 \text{ ft})^2 = 3.39 \text{ yd}^2 \rightarrow 3 \text{ SY}$$

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SHEET NO. 4 OF 6

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ITEM SISE12071 - PRESTRESSED CONCRETE COMPOSITE BOX BEAM
 BRIDGE MEMBERS, LEVEL 1, CB27-48, AS PER PLAN, 72'-0" 10 EA.

ITEM S10E14014 - INTEGRAL ABUTMENT EXPANSION JOINT SEAL 15 FT
 $L = 4 [(981.83 - 0.75') - 978.79 + 1.5'] = 15.16' \rightarrow 15 \text{ FT}$

ITEM S10E43100 - ELASTOMERIC BEARINGS WITH INTERNAL LAMINATES 40 EA.
 ONLY (NEOPRENE), 1" x 8" x 8" 11"
 $N = 2(10 \text{ BEAMS})(2/\text{BEAM}) = 40 \text{ EA.}$

ITEM S17E70000 - RAILING (TWIN STEEL TUBE) 153.83 FT
 $L = 2 [62.50' + 2(4.75') + 2(2.4583')] = 153.83 \text{ FT}$

ITEM S18E21200 - POROUS BACKFILL WITH GEOTEXTILE FABRIC 60 CY
 $V_{PA} = \left\{ \left[\frac{980.90 + 980.58}{2} - 973.82 \right] (40') + \left[\frac{980.83 + 980.33}{2} - 973.82 \right] (3')(2) \right. \\ \left. + \left[\frac{980.33 + 977.84}{2} - 973.82 \right] (5.5')(2) \right\} (2') = 750.55 \text{ ft}^3$

$V_{FA} = 750.55 \text{ ft}^3 + 1'(2')(57') = 864.55 \text{ ft}^3$

$V_T = (750.55 \text{ ft}^3 + 864.55 \text{ ft}^3) (1 \text{ yd}/3')^3 = 59.82 \text{ yd}^3 \rightarrow 60 \text{ CY}$

ITEM SPECIAL S18E2300 - STEEL DRIP STRIP 171 FT
 $L = 2 [71' - 2(0.5')] + 2(11 \text{ POSTS})(1.5'/\text{POST}) = 171.00 \text{ FT}$

ITEM S18E40000 - 6" PERFORATED CORRUGATED PLASTIC PIPE 108 FT
 $L = 4(27') = 108 \text{ FT}$

ITEM S18E40011 - 6" NON-PERFORATED CORRUGATED PLASTIC PIPE, 60 FT
 INCLUDING SPECIALS, AS PER PLAN
 $L = 2(11') + 2(3') = 48 \text{ FT}$
 $L = 21' + 3(13') = 60 \text{ FT}$

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SHEET NO. 5 OF 6

CALCULATED BY CJS DATE 7/9/19

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ITEM 523E20000 - DYNAMIC LOAD TESTING

1 EA

ITEM 520E25000 - REINFORCED CONCRETE APPROACH SLAB (T=15")

222 SY

$A = 2(25')(40')(1/4/31)^2 = 222.22 \text{ yd}^2 \rightarrow 222 \text{ SY}$

ITEM 520E90010 - TYPE A INSTALLATION

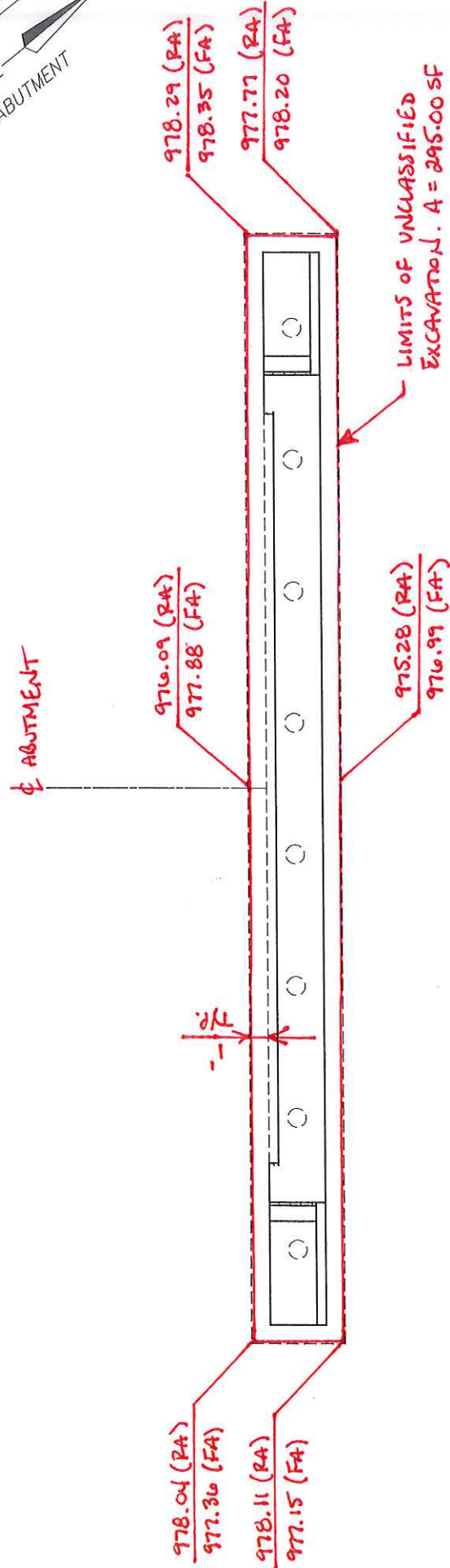
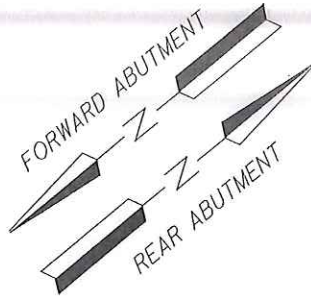
80 FT

$L = 2(40') = 80 \text{ FT}$

ITEM 840E00110 - POLYMER MODIFIED ASPHALT EXPANSION JOINT SYSTEM

33 CF

$V = 2(40')(1.6667')(0.25') = 33.33 \text{ ft}^3 \rightarrow 33 \text{ CF}$



PLAN

UNCLASSIFIED EXCAVATION