



A division of The Mannik & Smith Group, Inc.
29 North Park Street, Mansfield, OH 44902
Phone: 419-524-0074
Fax: 419-524-1812

CALCULATION SHEET

JOB NO. 21595 SHEET NO. 1 OF 6
SUBJECT SUM-271-0854L - Structure Estimated Quantities
CALCULATED BY DHT DATE 3/26
CHECKED BY DPH DATE 3/26
REVISED BY _____ DATE _____

Bridge SUM-271-0854L (SFN 7709100) - over Boston Mills Road

ITEM 202E11203 - PORTIONS OF STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN

LS

ITEM 202E22900 - APPROACH SLAB REMOVED

Existing Rear Approach Slab = 25 FT x 50 FT / 9 SF/SY = 138.89 SY
Existing Forward Approach Slab = 25 FT x 50 FT / 9 SF/SY = 138.89 SY

Bridge Totals

General Total = 278 SY

278 SY

ITEM 503E21300 - UNCLASSIFIED EXCAVATION

LS

ITEM 509E10000 - EPOXY COATED STEEL REINFORCEMENT

Bridge Totals

Abutment Total = 5,418 LB
Pier Total = 13,675 LB

19,093 LB

ITEM 509E26000 - GALVANIZED STEEL REINFORCEMENT

Bridge Totals

Superstructure Total = 107,066 LB

107,066 LB

ITEM 509E30020 - NO. 4 DEFORMED GFRP REINFORCEMENT

Bridge Totals

Superstructure Total = 5,452 FT

5,452 FT

ITEM 510E10000 - DOWEL HOLES WITH NONSHRINK, NONMETALLIC GROUT

Rear Abutment = 10 EA
Forward Abutment = 10 EA

Bridge Totals

Abutment Total = 20 EA

20 EACH



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CALCULATION SHEET

JOB NO. 21595 SHEET NO. 2 OF 6
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Bridge SUM-271-0854L (SFN 7709100) - over Boston Mills Road

ITEM 511E33500 - SEMI-INTEGRAL DIAPHRAGM GUIDE

Rear Abutment = 1 EA
Forward Abutment = 1 EA

Bridge Totals

Abutment Total = 2 EA
2 EACH

ITEM 511E34446 - CLASS QC2 CONCRETE WITH QC/QA, BRIDGE DECK

Minimum Thickness Over Whole Area = $53.667 \text{ FT} \times 181.813 \text{ FT} \times 8.75 \text{ IN} / 12 \text{ IN/FT} = 7,410.8 \text{ CF}$
Abutment Diaphragms = $2 \times 59.857 \text{ FT} \times (3.932 \text{ FT} \times 3.75 \text{ FT} - 0.5 \text{ FT} \times 0.521 \text{ FT}) = 1,734.06 \text{ CF}$
Haunches = $5 \times 182.935 \text{ FT} \times 0.167 \text{ FT} \times 0.998 \text{ FT} = 164.26 \text{ CF}$
Edge Overhangs = $2 \times 182.935 \text{ FT} \times [0.208 \text{ FT} \times 3.251 \text{ FT} - 0.499 \text{ FT} \times 0.078 \text{ FT}] = 252.13 \text{ CF}$

Bridge Totals

Superstructure Total = $\Sigma \text{CF} / 27 \text{ CF/CY} = 355 \text{ CY}$
355 CY

ITEM 511E34450 - CLASS QC2 CONCRETE WITH QC/QA, BRIDGE DECK (PARAPET)

Nontransitioning Parapet = $328.229 \text{ FT} \times 4.083 \text{ SF} = 1,340.27 \text{ CF}$
Parapet Transition 1 = $4 \text{ TRANSITIONS} \times 10 \text{ FT/TRANSITION} \times 0.5 \times (4.083 \text{ SF} + 3.271 \text{ SF}) = 147.08 \text{ CF}$
Parapet Transition 1 = $4 \text{ TRANSITIONS} \times 2.5 \text{ FT/TRANSITION} \times 2.431 \text{ SF} = 32.71 \text{ CF}$
Parapet Transition 1 = $4 \text{ TRANSITIONS} \times 1.5 \text{ FT/TRANSITION} \times 0.5 \times (3.271 \text{ SF} + 2.431 \text{ SF}) = 17.11 \text{ CF}$

Bridge Totals

Superstructure Total = $\Sigma \text{CF} / 27 \text{ CF/CY} = 57 \text{ CY}$
57 CY

ITEM 511E41012 - CLASS QC1 CONCRETE WITH QC/QA, PIER, ABOVE FOOTINGS

Pier 1 Cap = $3 \text{ FT} \times 56.917 \text{ FT} \times 4.988 \text{ FT} = 851.7 \text{ CF}$
Pier 2 Cap = $3 \text{ FT} \times 56.917 \text{ FT} \times 5.104 \text{ FT} = 871.51 \text{ CF}$

Bridge Totals

Pier Total = $\Sigma \text{CF} / 27 \text{ CF/CY} = 64 \text{ CY}$
64 CY



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Bridge SUM-271-0854L (SFN 7709100) - over Boston Mills Road

ITEM 511E45712 - CLASS QC1 CONCRETE WITH QC/QA, ABUTMENT

RA Breastwall = $3.75 \text{ FT} \times 60.232 \text{ FT} \times 6.112 \text{ FT} + 60.232 \text{ FT} \times 0.313 \text{ SF} - 11.975 \text{ FT} \times 3.75 \text{ SF} = 1,354.54 \text{ CF}$
RA Left WW = $2.5 \text{ FT} \times (10.63 \text{ FT} \times 9.26 \text{ FT} - 0.5 \times 6.531 \text{ FT} \times 2.906 \text{ FT}) = 222.37 \text{ CF}$
RA Right WW = $2.5 \text{ FT} \times (9.94 \text{ FT} \times 9.901 \text{ FT} - 0.5 \times 8.448 \text{ FT} \times 3.76 \text{ FT}) = 206.33 \text{ CF}$
FA Breastwall = $3.75 \text{ FT} \times 60.232 \text{ FT} \times 4.357 \text{ FT} + 60.232 \text{ FT} \times 0.313 \text{ SF} = 1,003.04 \text{ CF}$
FA Left WW = $2.5 \text{ FT} \times (8.85 \text{ FT} \times 7.938 \text{ FT} - 0.5 \times 6.49 \text{ FT} \times 2.885 \text{ FT}) = 152.21 \text{ CF}$
FA Right WW = $2.5 \text{ FT} \times (9.43 \text{ FT} \times 12.193 \text{ FT} - 0.5 \times 9.458 \text{ FT} \times 4.208 \text{ FT}) = 237.69 \text{ CF}$

Bridge Totals

Abutment Total = $\Sigma \text{CF} / 27 \text{ CF/CY} = 118 \text{ CY}$

118 CY

ITEM 512E10100 - SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)

RA Breastwall = $60.232 \text{ FT} \times 1.023 \text{ FT} + 1.403 \text{ FT} \times (0.428 \text{ FT} + 0.697 \text{ FT}) = 63.165 \text{ SF}$
RA Left WW = $4.915 \text{ FT} \times 9.896 \text{ FT} + 3 \text{ FT} \times 9.878 \text{ FT} + 0.5 \times (2.009 \text{ FT} + 0.5 \text{ FT}) \times 2.5 \text{ FT} - 0.5 \times 6.531 \text{ FT} \times 2.906 \text{ FT} = 73.017 \text{ SF}$
RA Right WW = $5.225 \text{ FT} \times 9.26 \text{ FT} + 3 \text{ FT} \times 10.7 \text{ FT} + 0.5 \times (1.465 \text{ FT} + 0.5 \text{ FT}) \times 2.5 \text{ FT} - 0.5 \times 8.448 \text{ FT} \times 3.76 \text{ FT} = 68.634 \text{ SF}$
FA Breastwall = $60.232 \text{ FT} \times 1.257 \text{ FT} + 1.403 \text{ FT} \times (0.548 \text{ FT} + 1.058 \text{ FT}) = 77.993 \text{ SF}$
FA Left WW = $5.125 \text{ FT} \times 7.297 \text{ FT} + 3 \text{ FT} \times 8.55 \text{ FT} + 0.5 \times (2.24 \text{ FT} + 0.5 \text{ FT}) \times 2.5 \text{ FT} - 0.5 \times 6.49 \text{ FT} \times 2.885 \text{ FT} = 58.193 \text{ SF}$
FA Right WW = $5.705 \text{ FT} \times 12.833 \text{ FT} + 3 \text{ FT} \times 13.087 \text{ FT} + 0.5 \times (1.497 \text{ FT} + 0.5 \text{ FT}) \times 2.5 \text{ FT} - 0.5 \times 9.458 \text{ FT} \times 4.208 \text{ FT} = 97.204 \text{ SF}$

Pier 1 = $3 \text{ FT} \times (4.64 \text{ FT} + 5 \text{ FT}) + 2 \times 56.917 \text{ FT} \times 4.989 \text{ FT} + 3 \text{ FT} \times 56.917 \text{ FT} + 5 \times (9.425 \times 20.41 - 7.069 \text{ SF}) = 1,694.051 \text{ SF}$
Pier 2 = $3 \text{ FT} \times (4.71 \text{ FT} + 5.15 \text{ FT}) + 2 \times 56.917 \text{ FT} \times 5.108 \text{ FT} + 3 \text{ FT} \times 56.917 \text{ FT} + 5 \times (9.425 \times 20.51 - 7.069 \text{ SF}) = 1,712.979 \text{ SF}$

Bridge Deck = $2 \times 182.935 \text{ FT} \times 1.604 \text{ FT} = 586.918 \text{ SF}$
Railing = $328.229 \text{ FT} \times 7.799 \text{ FT} + 4 \times (14 \text{ FT} \times 7.002 \text{ FT} + 2.431 \text{ SF}) = 2,961.589 \text{ SF}$
Diaphragm at RA = $59.857 \text{ FT} \times 3.693 \text{ FT} + 1.403 \text{ FT} \times (4.8 \text{ FT} + 4.84 \text{ FT}) = 234.597 \text{ SF}$
Diaphragm at FA = $59.857 \text{ FT} \times 3.796 \text{ FT} + 1.403 \text{ FT} \times (4.89 \text{ FT} + 4.96 \text{ FT}) = 241.027 \text{ SF}$

Bridge Totals

Abutment Total = $\Sigma \text{SF} / 9 \text{ SF/SY} = 49 \text{ SY}$
Pier Total = $\Sigma \text{SF} / 9 \text{ SF/SY} = 379 \text{ SY}$
Superstructure Total = $\Sigma \text{SF} / 9 \text{ SF/SY} = 448 \text{ SY}$

876 SY

ITEM 512E74000 - REMOVAL OF EXISTING CONCRETE COATINGS FROM CONCRETE SURFACE

Pier 1 Columns = $5 \times 9.425 \text{ FT} \times 20.41 \text{ FT} = 961.799 \text{ SF}$
Pier 2 Columns = $5 \times 9.425 \text{ FT} \times 20.51 \text{ FT} = 966.511 \text{ SF}$

Bridge Totals

Pier Total = $\Sigma \text{CF} / 9 \text{ SF/SY} = 215 \text{ SY}$

215 SY



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Bridge SUM-271-0854L (SFN 7709100) - over Boston Mills Road

ITEM 513E10261 - STRUCTURAL STEEL MEMBERS, LEVEL 3, AS PER PLAN

Weight of Beams = 6 BEAMS x 160 PLF/BEAM x 186.177 FT = 178,730.0 LB
Weight of Diaphragms = 49 DIAPHRAGMS x [42.7 PLF x 9 FT + 2 CONN PLS x 0.103 CF/CONN PLS x 490 PCF
+ 30 BOLTS x 1.167 LBS/BOLT]/DIAPHRAGM = 25,472.82 LB
Weight of Splices = 24 SPLICES x [0.89 CF x 490 PCF + 100 BOLTS x 1.167 LBS/BOLT]/SPLICE = 13,266.89 LB

Bridge Totals

Superstructure Total = 217,470.0 LB

217,470 LB

ITEM 513E20000 - WELDED STUD SHEAR CONNECTORS

Beams = 6 BEAMS x 2 ROWS/BEAM x 419 STUDS/ROW = 5028 EACH

Bridge Totals

Superstructure Total = 5028 EACH

5,028 EACH

ITEM 516E10010 - ARMORLESS PREFORMED JOINT SEAL

@ Rear Abutment = 57.24 FT
@ Forward Abutment = 57.24 FT

Bridge Totals

Superstructure Total = 115 FT

115 FT

ITEM 516E13600 - 1" PREFORMED EXPANSION JOINT FILLER

Rear Abutment = 2 x 1.458 FT X (0.5 FT + 0.561 FT) = 3.1 SF
Rear Abutment = 2 x 1.458 FT X (0.5 FT + 0.561 FT) = 3.1 SF

Bridge Totals

Abutment Total = 7 SF

7 SF

ITEM 516E13900 - 2" PREFORMED EXPANSION JOINT FILLER

Rear Abutment = 2.806 FT X (4.55 FT + 4.59 FT) = 25.65 SF
Forward Abutment = 2.806 FT X (4.64 FT + 4.71 FT) = 26.23 SF

Bridge Totals

Abutment Total = 52 SF

52 SF



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Bridge SUM-271-0854L (SFN 7709100) - over Boston Mills Road

ITEM 516E14020 - SEMI-INTERGRAL ABUTMENT EXPANSION JOINT SEAL

Rear Abutment = $60.232 \text{ FT} + 3 \text{ FT} + 3.342 + 1.5 \text{ FT} + 3.382 + 1.5 \text{ FT} = 72.95 \text{ FT}$
Foward Abutment = $60.232 \text{ FT} + 3 \text{ FT} + 3.432 + 1.5 \text{ FT} + 3.502 + 1.5 \text{ FT} = 73.16 \text{ FT}$

Bridge Totals

Abutment Total = 147 FT
147 FT

ITEM 516E31010 - 2" DEEP JOINT SEALER

@ Rear Abutment = 56.12 FT
@ Forward Abutment = 56.12 FT

Bridge Totals

Superstructure Total = 113 FT
113 FT

ITEM 516E44100 - ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE

(2.564"x12.0"x20" PAD AND 2.0"x13"x21" BEVELED PLATE)

@ Pier 1 = 6 BEAMS x 1 EACH/BEAM = 6 EA
@ Pier 2 = 6 BEAMS x 1 EACH/BEAM = 6 EA

Bridge Totals

Superstructure Total = 12 EA
12 EACH

ITEM 516E44101 - ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE

(2.946"x10"x16" PAD AND 1.5"x11"x18" PLATE AND HP10X42 SECTION), AS PER PLAN

@ Rear Abutment = 6 BEAMS x 1 EACH/BEAM = 6 EA
@ Forward Abutment = 6 BEAMS x 1 EACH/BEAM = 6 EA

Bridge Totals

Superstructure Total = 12 EA
12 EACH



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ITEM 518E21200 - POROUS BACKFILL WITH GEOTEXTILE FABRIC

RA behind Breastwall = $2 \text{ FT} \times 50.172 \text{ FT} \times 9.972 \text{ FT} + 10.06 \text{ FT} \times (2 \text{ FT} \times 8.972 \text{ FT} + 3 \text{ FT} \times 1.5 \text{ FT}) = 1,226.47 \text{ CF}$
RA behind Left Wingwall = $2 \text{ FT} \times 8.625 \text{ FT} \times 0.5 \times (9.422 \text{ FT} + 6.474 \text{ FT}) = 139.25 \text{ CF}$
RA behind Left Wingwall = $2 \text{ FT} \times 10.542 \text{ FT} \times 0.5 \times (8.732 \text{ FT} + 4.93 \text{ FT}) + 1.5 \text{ FT} \times 3 \text{ FT} \times 10.542 \text{ FT} = 191.45 \text{ CF}$
FA behind Breastwall = $60.232 \text{ FT} \times (8.32 \text{ FT} \times 2 \text{ FT} + 3 \text{ FT} \times 1.5 \text{ FT}) = 1,273.29 \text{ CF}$
RA behind Left Wingwall = $2 \text{ FT} \times 8.578 \text{ FT} \times 0.5 \times (9.1 \text{ FT} + 4.715 \text{ FT}) = 120.65 \text{ CF}$
RA behind Left Wingwall = $2 \text{ FT} \times 11.552 \text{ FT} \times 0.5 \times (9.68 \text{ FT} + 3.972 \text{ FT}) + 1.5 \text{ FT} \times 3 \text{ FT} \times 11.552 \text{ FT} = 209.69 \text{ CF}$

Bridge Totals

Abutment Total = $\Sigma \text{CF} / 27 \text{ CF/CY} = 118 \text{ CY}$

118 CY

ITEM 518E40000 - 6" PERFORATED CORRUGATED PLASTIC PIPE

@ Rear Abutment = $[1 \text{ FT} + 79.398 \text{ FT} + 1 \text{ FT}] / \text{COS}[\text{ARCTAN}\{0.125 \text{ IN} / 12 \text{ IN}\}] = 81.4 \text{ FT}$
@ Forward Abutment = $[1 \text{ FT} + 80.362 \text{ FT} + 1 \text{ FT}] / \text{COS}[\text{ARCTAN}\{0.125 \text{ IN} / 12 \text{ IN}\}] = 82.37 \text{ FT}$

Bridge Totals

Abutment Total = 164 FT

164 FT

ITEM 518E40010 - 6" NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS

@ Rear Abutment = $10.75 \text{ FT} + 16.833 \text{ FT} = 27.58 \text{ FT}$
@ Forward Abutment = $14.833 \text{ FT} + 14.833 \text{ FT} = 29.67 \text{ FT}$

Bridge Totals

Abutment Total = 58 FT

58 FT

ITEM 526E25010 - REINFORCED CONCRETE APPROACH SLABS (T=15")

@ Rear Abutment = $25 \text{ FT} \times 51 \text{ FT} = 1,275.0 \text{ SF}$
@ Forward Abutment = $25 \text{ FT} \times 51 \text{ FT} = 1,275.0 \text{ SF}$

Bridge Totals

General Total = $\Sigma \text{SF} / 9 \text{ SF/SY} = 284 \text{ SY}$

284 SY

ITEM 526E90030 - TYPE C INSTALLATION

@ Rear Abutment = $51 \text{ FT} / \text{COS}(27 \text{ DEGREES}) = 57.24 \text{ FT}$
@ Forward Abutment = $51 \text{ FT} / \text{COS}(27 \text{ DEGREES}) = 57.24 \text{ FT}$

Bridge Totals

General Total = 115 FT

115 FT