



Osborn Engineering
1100 Superior Avenue - Suite 300
Cleveland, Ohio 44114

Project				Job Ref.	
Estimated Quantities – CUY-480-08.70 ES				J20200855.000	
Section				Sheet no./rev.	
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JDH	9-8-2022	MJD	9-26-2022		

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

- Include parapets, crossframes, bearings, and any other appurtenances to complete work as described, etc.

LUMP SUM



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ITEM SPECIAL – URETHANE TOP COAT SEALER

*Per PN 519 – on those areas that receive E-glass fiber wrap.

Total area Urethane top coat (SF); $A_{URETHANE} = A_{EGLASS} = 3144.900$

TOTAL AREA OF URETHANE TOP COAT (SY); $T_{512_UR} = \text{ceiling}(A_{URETHANE} / 9, 1) = 350.000$



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

Patched Railings:

Perimeter (FT); $P_{512} = 8.20$
Length (FT); $L_{512} = 393.54 \text{ (RT)} + 388.41 \text{ (LT)} = 781.950$

TOTAL Area at railings (SF); $T_{512_RAIL} = \text{ceiling } (P_{512} \times L_{512}) = 6411.99$

Breastwalls:

Top seat - REAR; $EL_{SL_REAR} = 816.20$
Top seat - FWD; $EL_{SL_FWD} = 805.86$
Width of breastwall; $W_{BRW_REAR} = 49.840$
 $W_{BRW_FWD} = 61.780$
GL – avg height at breastwall; $GL = 2.75 \text{ ft}$

TOTAL Area – REAR (SF) $(W_{BRW_REAR} \times GL) = 137.06 \text{ SF}$
TOTAL Area – FWD (SF) $(W_{BRW_FWD} \times GL) = 169.90 \text{ SF}$

TOTAL Area at breastwalls (SF); $T_{512_BRW} = \text{ceiling } (A\text{-REAR} + A\text{-FWD}) = 306.96$

Backwalls:

Top seat - REAR; $EL_{SL_REAR} = 816.20$
Top seat - FWD; $EL_{SL_FWD} = 805.86$
Width of backwalls; $W_{BRW_REAR} = 49.840$
 $W_{BRW_FWD} = 61.780$
BWH – avg height at breastwall; $BWH_R = 6.01 \text{ ft}$
BWH – avg height at breastwall; $BWH_F = 5.75 \text{ ft}$

TOTAL Area – REAR (SF) $(W_{BRW_REAR} \times BWH_R) = 299.54 \text{ SF}$
TOTAL Area – FWD (SF) $(W_{BRW_FWD} \times BWH_F) = 355.24 \text{ SF}$

TOTAL Area at backwalls (SF); $T_{512_BW} = \text{ceiling } (A\text{-REAR} + A\text{-FWD}) = 654.78$

TOTAL QUANTITY OF SEALING (SY); $T_{512} = \text{ceiling } (T_{512_RAIL} + T_{512_BRW} + T_{512_BW}) / 9, 1) = 820.00$



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ITEM 513 – STRUCTURAL STEEL MEMBERS, LEVEL UF, AS PER PLAN

*All end crossframes – to facilitate patching of backwalls

End crossframe (L 4x4x3/8) (lbs/ft); $W_{EXT} = 9.8$

Length/complete end replaced - bay (ft); $H_{EXT} = 47.78$

Number complete exterior replaced = 8

Length of exteriors (ft); $L_{EXT} = (H_{EXT} \times 8) = 382.24$

Weight of steel (lbs); $W_{ST} = (W_{EXT} \times L_{EXT}) = 3745.95$

TOTAL WEIGHT OF STRUCTURAL STEEL (lbs); $W_{ST} = \text{ceiling}(W_{ST}, 1) = 3746.00$



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ITEM 516 – REFURBISH BEARING DEVICE, AS PER PLAN

FWD ABUTMENT (EA); $E_{FA} = 5$
REAR ABUTMENT (EA); $E_{RA} = 5$

TOTAL NUMBER OF ROCKERS REFURBISHED (EA); $R_{REF} = \text{ceiling}(E_{FA} + E_{RA}, 1) = \underline{10.00}$

ITEM 516 – JACKING AND TEMPORARY SUPPORT OF SUPERSTRUCTURE, AS PER PLAN

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ITEM 519 – COMPOSITE FIBER WRAP SYSTEM

E-GLASS (EGFRP)



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*Per BDM C405.10 – on pier columns requiring 15% or more patching as required.

Height (avg) of pier cap (ft); $h_{PC1_3} = 20.40$
 $h_{PC2} = 16.38$

Column perimeter (ft); $C_P = 11$

Area P1 (SF); $A_{CF1} = 5 \times (h_{PC1_3} \times C_P) = 1122.000$

Area P2 (SF); $A_{CF2} = 5 \times (h_{PC2} \times C_P) = 900.900$

Area P3 (SF); $A_{CF3} = 5 \times (h_{PC1_3} \times C_P) = 1122.000$

Total area E-glass fiber wrap (SF); $A_{EGLASS} = A_{CF1} + A_{CF2} + A_{CF3} = 3144.900$

TOTAL AREA OF E_GLASS FIBER WRAP (SY); $T_{519_FIBER} = \text{ceiling}(A_{EGLASS} / 1) = 3145.000$

ITEM 519 – PATCHING CONCRETE STRUCTURE, AS PER PLAN

NOTE: Areas of abutments included here are those that are too small to include within the galvanized anode patching.
All areas field measured.



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Per BDM C405.2.1 – add 25% to all quantities for final.

Area of abutment repairs (SF);

$$A_{\text{ABUT}} = 3 + 13 = \mathbf{16.00} \times 1.25 = 21$$

Area of pier repairs (SF);

$$A_{\text{PIERS}} = 135 + 53 + 29 = \mathbf{217.00} \times 1.25 = 272$$

Area of railing repairs (SF);

$$A_{\text{RAILS}} = 336 + 207 = \mathbf{543.00} \times 1.25 = 680$$

TOTAL CONCRETE PATCHING – PIERS ABUTS, RAILS (SF); $P_{\text{CONC_misc}} = \text{ceiling}(A_{\text{ABUT}} + A_{\text{PIERS}} + A_{\text{RAILS}}, \mathbf{1}) = \mathbf{973.000}$

ITEM 519 – PATCHING CONCRETE STRUCTURE, MISC.: APPROACH SLABS

Approach slabs – from field measurements



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Per BDM C405.2.1 – add 25% to all quantities for final.

Area of REAR slab repairs (SF); $A_{\text{REAR}} = 105 \times 1.25 = 132$

Area of FWD slab repairs (SF); $A_{\text{FWD}} = 65 \times 1.25 = 81$

TOTAL CONCRETE PATCHING - AS (SF); $P_{\text{CONC_AS}} = \text{ceiling}(A_{\text{REAR}} + A_{\text{FWD}}, 1) = \underline{213.000}$

ITEM 519 – PATCHING CONCRETE BRIDGE DECK – TYPE B

Per BDM C405.2.1 – add 25% to all quantities for final.



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Area of deck repairs – field measured (SF); $A_{deck} = 10$
SY measurement = $10 / 9 = 2.0$
And, $2 \times 1.25 = 3.0$

TOTAL PATCHING BRIDGE DECK (SY); $P_{BR} = \text{ceiling}(A_{deck}, 1) = \underline{3.00}$

ITEM 844 –CONCRETE PATCHING WITH GALVANIC ANODE PROTECTION, AS PER PLAN

Includes abutments and backwalls – field measured



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Per BDM C405.2.1 – add 25% to all quantities for final.

Area of REAR ABUT & BW repairs (SF); $A_{\text{REAR}} = 77 \times 1.25 = 97$

Area of FWD ABUT & BW repairs (SF); $A_{\text{FWD}} = 309 \times 1.25 = 387$

TOTAL CONCRETE PATCHING WITH GALV ANODE (SF); $P_{\text{CONC_GAP}} = \text{ceiling}(A_{\text{REAR}} + A_{\text{FWD}}, 1) = \underline{484.000}$



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UNDER ROADWAY QUANTITIES:

ITEM 441 – ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2 (448), AS PER PLAN

Use width between barriers at each abutment:

$L_{FWD} = 32.5 \text{ FT} / \text{COS } 54.58^\circ = \mathbf{56.10}$

$L_{REAR} = 32.5 \text{ FT} / \text{COS } 46.01^\circ = \mathbf{46.80}$

Width of PRJ – FIELD MEASURED (ft); $W_{PRJ} = \mathbf{4.00}$

Depth of PRJ – STD DWG (ft); $D_{PRJ} = \mathbf{1.00}$

TOTAL CY PRJ (CY);

$T_{441_PRJ} = \text{ceiling}((L_{FWD} + L_{REAR}) \times W_{PRJ} \times D_{PRJ} / 27, 1) = \mathbf{16.00}$