OHIO DEPARTMENT OF TRANSPORTATION
Mike DeWine, *Governor* Jack Marchbanks, Ph.D., *Director*

District 7
1001 Saint Marys Ave., Sidney, OH 45365
937-492-1141
transportation.ohio.gov

PID 105403, D07-BP-FY23: QUANTITY CALCULATIONS

Calculated by: *Dan Grilliot, P.E., Date: 4/1/2022*

Checked by: *Lawton Gerlinger, P.E., Date: 5/12/2022*

Revised by: *Dan Grilliot, P.E., Date: 8/10/2022*

Plan Split #1 = 01/NHS/BR = AUG-33-1310L, AUG-33-1310R, LOG-68-0040

Plan Split #2 = 02/IMS/BR = SHE-75-0888L, SHE-75-0888R

<u>Roadway</u>

1. Item 202-Fence Removed (FT)
   a. AUG-33-1310 L/R Rear Abutment = 35 ft.
   b. AUG-33-1310 L/R Forward Abutment = 32 ft.
   c. Plan Split #1 = 67 ft.
   d. SHE-75-0888L/R Forward Abutment = 50 ft.
   e. Plan Split #2 = 50 ft.
   f. Total = 117 ft.
2. Item 202-Fence, Type CLT (FT)
   a. Same as Fence Removed = Plan Split #1 = 67 ft.; Plan Split #2 = 50 ft.; Total = 117 ft.

<u>Erosion Control</u>

3. Item 659-Seeding and Mulching (SY)
   a. AUG-33-1310L/R = 540 sq. yd.
   b. Plan Split #1 = 540 sq. yd.
   c. SHE-75-0888L/R = 590 sq. yd.
   d. Plan Split #2 = 590 sq. yd.
   e. Total = 1130 sq. yd.
4. Item 659-Repair Seeding and Mulching (SY)
   a. 5% of permanent per Designer Note
   b. AUG-33-1310L/R = 540 sq. yd. * 0.05 = 27 sq. yd.
   c. Plan Split #1 = 27 sq. yd.
   d. SHE-75-0888L/R = 590 sq. yd. * 0.05 = 30 sq. yd.
   e. Plan Split #2 = 30 sq. yd.
   f. Total = 57 sq. yd.
5. Item 659-Commercial Fertilizer (TON)
   a. Rates per Designer Note
   b. AUG-33-1310L/R = 540 sq. yd. * *1 ton/7410 sq. yd.* = 0.07 ton
   c. Plan Split #1 = 0.07 ton
   d. SHE-75-0888L/R = 590 sq. yd. * *1 ton/7410 sq. yd.* = 0.08 ton
   e. Plan Split #2 = 0.08 ton
   f. Total = 0.15 ton

6. Item 659-Water (MGAL)
   a. Rates per Designer Note
   b. AUG-33-1310L/R = 540 sq. yd. * *0.0027Mgal/sy x 2 applications* = 3 MGAL
   c. Plan Split #1 = 3 MGAL
   d. SHE-75-0888L/R = 590 sq. yd. * *0.0027Mgal/sy x 2 applications* = 3 MGAL
   e. Plan Split #2 = 3 MGAL
   f. Total = 6 MGAL
7. *Item 832-Erosion Control (EA)*
   a. Work considered maintenance with $1,000 provided for each bridge.
   b. Plan Split # 1 = $3,000
   c. Plan Split #2 = $2,000

<u>Traffic Control</u>

8. Item 642-Center Line, Type 1
   a. LOG-68-0040 – STA. 18+96 to STA. 25+08 = 0.12 mile
   b. Plan Split #1 = 0.12 mile

<u>Structure Repair (AUG-33-1310L) Plan Split #1</u>

9. Item 514-Surface Preparation of Existing Structural Steel (SF)
   a. Beams #1—W30x108 perimeter to paint = beam has deck edge going onto part of web = (29 7/8”-3/4”)*(2 sides) + ((10 ½”-9/16”)/2))*(3) + (29.875” – 6.25”) + 10 ½” = 78.16 in. = 6.513 ft., Beam Length = 124.07 ft. + (0.75 ft. * 2) = 125.57 ft., Beam Lines = 1, Beam #1 to be painted = 6.513 ft. * 1 beam * 125.57 ft. = 817.84 sq. ft.
   b. Beams #2—W30x108 perimeter to paint = ((10.5” – 9/16”) * 2) + (29 7/8”-3/4”)*(2 sides) + 10 ½” = 88.625 in. = 7.3854 ft., Beam Length = 123.5 ft. + (0.75 ft. * 2) = 125 ft., Beam Lines = 1, Beam #2 to be painted = 7.3854 ft. * 1 beam * 125 ft. = 923.175 sq. ft.
   c. Beams #3-7—W30x124 perimeter to paint = ((10.5” – 9/16”) * 2) + (30 1/8”- 15/16”)*(2 sides) + 10 ½” = 88.75 in. = 7.39583 ft., Beam Length = 123.5 ft. + (0.75 ft. * 2) = 125 ft., Beam Lines = 5, Beams #3-7 to be painted = 7.39583 ft. * 5 beams * 125 ft. = 4622.39 sq. ft.
   d. Beams #8—W30x124 perimeter to paint = (30 1/8” – 15/16”) + (((10 ½ - 9/16”)/2) * 3) + 10.5 in. + (30 1/8” – 6 ¼”) = 78.47 in = 6.54 ft.; Beam Length = 123.5 ft. + (0.75 ft. * 2) = 125 ft., Beam Lines = 1, Beams #8 to be painted = 6.54 ft. * 1 beam * 125 ft. = 817.5 sq. ft.
   e. Total Beams to be Painted = 817.84 sq. ft. + 923.175 sq. ft. + 4622.39 sq. ft. + 817.5 sq. ft. = 7180.91 sq. ft.
   f. Intermediate Crossframes between beams #3-8—Crossframe unit length = (8.27 ft. * 2) + 7.875 ft. = 24.42 ft., 3”x3”x5/16” perimeter = 1 ft., # crossframe units = 59 each, 24.42 ft. * 1 ft. * 59 each = 1440.78 sq. ft.
   g. Intermediate Crossframes between beams #2-3—Crossframe unit length = (6.5 ft. * 2) + 6 ft. = 19 ft., 3”x3”x5/16” perimeter = 1 ft., # crossframe units = 12 each, 19 ft. * 1 ft. * 12 each = 228 sq. ft.
   h. Intermediate Crossframes between beams #1-2—Crossframe unit length = (5.5 ft. * 2) + 4.91 ft. = 15.91 ft., 3”x3”x5/16” perimeter = 1 ft., # crossframe units = 12 each, 15.91 ft. * 1 ft. * 12 each = 190.92 sq. ft.
   i. Total Intermediate Crossframes to be Painted = 1440.78 sq. ft. + 228 sq. ft. + 190.92 sq. ft. = 1859.70 sq. ft.
   j. End Crossframes between beams #3-8—Crossframe unit length = (3.84 ft * 2) + (2.9 ft. * 2) + 8.69 ft. = 22.17 ft.; # crossframe units = 10 each, 4”x4”x5/16” perimeter = 1.33 ft., Total End Crossframes = 22.17 ft. * 1.33 ft. * 10 each = 294.86 sq. ft.
   k. End Crossframe Plates say 3 each @ 4”x5” = 3 each * 10 locations * 20 sq. in. * 2 sides* (1 sq. ft./144 sq. in.) = 8.33 sq. ft.
   l. End Crossframes between beams #2-3—Crossframe unit length = (7.08 ft * 2) + 6.625 ft. = 20.79 ft.; # crossframe units = 2 each, 4”x4”x5/16” perimeter = 1.33 ft., Total End Crossframes = 20.79 ft. * 1.33 ft. * 2 each = 55.3 sq. ft.

m. End Crossframe Plates say 1 each @ 4”x5” = 1 each * 2 locations * 20 sq. in. * 2 sides* (1 sq. ft./144 sq. in.) = 0.56 sq. ft.

n. End Crossframes between beams #1-2—Crossframe unit length = ((6.58 ft * 2) + 6.094 ft.) + ((5.36 ft. * 2) + 4.75 ft.) = 34.724 ft.; # crossframe units = 2 each, 4”x4”x5/16” perimeter = 1.33 ft., Total End Crossframes = 34.724 ft. * 1.33 ft. = 46.18 sq. ft.

o. End Crossframe Plates say 1 each @ 4”x5” = 1 each * 2 locations * 20 sq. in. * 2 sides* (1 sq. ft./144 sq. in.) = 0.56 sq. ft.

p. Total End Crossframes and Plates to be Painted = 294.86 sq. ft. + 8.33 sq. ft. + 55.30 sq. ft. + 0.56 sq. ft. + 46.18 sq. ft. + 0.56 sq. ft. = 405.79 sq. ft.

q. Bearings = 4 bearings * 8 beams = 32 bearings; 32 bearings * 2 sq. ft. = 64 sq. ft.

r. Piles to be painted at the piers between top of ex. pier encasements and bottom of pier cap = Perimeter of 12 x 53 to paint = (12 in. * 2) + (11.5625 in. * 2) + (11.75 in. * 2) = 70.625 in. = 5.89 ft.; Perimeter of 5”x5”x5/8” to paint = 20 in. = 1.66 ft.; Piles to paint = H-piles (10 piles * 3.7 ft. * 5.89 ft.) + H-piles at widening (2 piles * 6.2 ft. * 5.89 ft) + horizontal angle (1.66 ft. * 6.59 ft. * 2 angles) + (1.66 ft. * 7.708 ft. * 2 angles) = 217.93 sq. ft. + 73.04 sq. ft. + 21.88 sq. ft. + 25.59 sq. ft. = 338.44 sq. ft./pier * 2 piers = 676.88 sq. ft.

s. Total = Beams + Intermediate Crossframes + End Crossframes + Bearings + H-Piles at Piers = 7180.91 sq. ft. + 1859.70 sq. ft. + 405.79 sq. ft. + 64 sq. ft. + 676.88 sq. ft. = 10187.27 = 10188 sq. ft.

10. Item 514-Field Painting of Existing Structural Steel, Prime Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 10188 sq. ft.
11. Item 514-Field Painting Structural Steel, Intermediate Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 10188 sq. ft.
12. Item 514-Field Painting Structural Steel, Finish Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 10188 sq. ft.
13. Item 514-Grinding Fins, Tears, Slivers on Existing Structural Steel (MNHR)
    a. Per 2020 BDM section 404.1.11 1 min./ft. beam/girder to be painted, Total length of beams = (125 ft. * 6 beams) + 125 ft. + 125.57 ft. = 1000.57 ft.; 1000.57 ft. * (1 min./ft.) * (1 hr./60 min.) = 17 hr.
14. Item 514-Final Inspection Repair (EA)
    a. 1000.57 ft. * (1 each/300 ft.) + (0.025) * (83 intermediate crossframe units + 14 end crossframe units) = 5.76 each = 6 each = total

<u>Structure Repair (AUG-33-1310R) Plan Split #1</u>

15. Item 514-Surface Preparation of Existing Structural Steel (SF)
    a. Beams #1 and #7—W30x108 perimeter to paint = beams has deck edge going onto part of web = (29 7/8”-3/4”)*(2 sides) + ((10 ½”-9/16”)/2))*(3) + (29.875” – 10”) + 10 ½” = 74.41 in. = 6.2 ft., Beam Length = Beam #1 = 117 ft. – (1 ft. * 2 ends) = 115 ft.; Beam Length Beam #7 = 115.98 ft. – (1 ft. * 2 ends) = 113.98 ft.; Beam Lines = 2, Beam #1 and #7 to be painted = 6.2 ft. * (115 ft. + 113.98 ft.) = 1419.68 sq. ft.

    b. Beams #2-#6—W30x108 perimeter to paint = ((10 ½”-9/16”) * 2) + (29 7/8”-3/4”)*(2 sides) + 10 ½” = 88.625 in. = 7.3854 ft., Beam Length = 117 ft. – (1 ft. * 2 ends) = 115 ft.; Beam Lines = 5, Beam #2-#6 to be painted = 7.3854 ft. * 575 ft. = 4246.61 sq. ft.

    c. Total Beams to be Painted = 1419.68 sq. ft. + 4246.61 sq. ft. = 5666.29 sq. ft.

    d. Intermediate Crossframes Between Beam #1 through #6—Crossframe unit length = (8.94 ft. * 2) + 8.583 ft. = 26.46 ft.; 3”x3”x5/16” perimeter = 1 ft., # crossframe units between beam #1 through #6 = 50 each; 26.46 ft. * 1 ft. * 50 each = 1323 sq. ft.

    e. Intermediate Crossframes Between Beam #6 through #7—Crossframe unit length = (7.43 ft. * 2) + 7 ft. = 21.86 ft.; 3”x3”x5/16” perimeter = 1 ft., # crossframe units between beam #6 through #7 = 10 each; 21.86 ft. * 1 ft. * 10 each = 218.60 sq. ft.

    f. Total Intermediate Crossframes to be Painted = 1323 sq. ft. + 218.6 sq. ft. = 1541.6 sq. ft.

    g. End Crossframes—No end crossframes to paint since beam ends are encased in concrete.

    h. Bearings = 2 bearings * 7 beams * 2 sq. ft. = 28 sq. ft.

    i. Piles to be painted at the piers between top of ex. pier encasements and bottom of pier cap = Perimeter of 12 x 53 to paint = (12 in. * 2) + (11.5625 in. * 2) + (11.75 in. * 2) = 70.625 in. = 5.89 ft.; Piles to paint = H-piles (11 piles * 2 piers * 5.89 ft. * 3.583 ft.) = 464.33 sq. ft.

j. Total = Beams + Intermediate Crossframes + End Crossframes + Bearings + H-Piles at Piers = 5666.29 sq. ft. + 1541.60 sq. ft. + 0 sq. ft. + 28 sq. ft. + 464.33 sq. ft. = 7700.22 = 7701 sq. ft.

16. Item 514-Field Painting of Existing Structural Steel, Prime Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 7701 sq. ft.
17. Item 514-Field Painting Structural Steel, Intermediate Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 7701 sq. ft.
18. Item 514-Field Painting Structural Steel, Finish Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 7701 sq. ft.
19. Item 514-Grinding Fins, Tears, Slivers on Existing Structural Steel (MNHR)
    a. Per 2020 BDM section 404.1.11 1 min./ft. beam/girder to be painted, Total Beam Lengths = Beams #1-#6 (115 ft. * 6 beams) + Beam #7 (113.98 ft. * 1 beam) = 804 ft.; 804 ft. * (1 min./ft.) * (1 hr./60 min) = 13.4 hr. = 14 hr.
20. Item 514-Final Inspection Repair (EA)
    a. 804 ft. total beam lengths * (1 each/300 ft.)) + (0.025 * (60 intermediate crossframe units + 0 end crossframe units)) = 4.18 each = 5 each = total

<u>Structure Repair (LOG-68-0040) Plan Split #1</u>

21. Item 514-Surface Preparation of Existing Structural Steel (SF)
    a. Beams #2-#5—W36x230 perimeter to paint = (35 7/8" – 1 ¼")*(2 sides) + (16 ½" – 3/4")*(2) + 16 ½" = 117.25 in. = 9.771 ft., Beam Length = 75 ft. + (1 ft. * 2 ends) = 77 ft.; Beam Lines = 4, Total Beams to be Painted = 9.771 ft. * 77 ft. * 4 beam lines = 3009.47 sq. ft.
    b. Beams #1 and #6—W36x230 perimeter to paint = beams have deck edge going onto part of web and beam length where there is no plate on the flange = (35 7/8" – 7 3/4") + ((16 ½" – ¾")/2) * 3) + 16 ½" + (35 7/8" – 1 ¼") = 102.875 in. = 8.573 ft.; Beam Length = (0 to 13 ft. and 64 to 77 ft. this is where there is no plate on the flange = 26 ft.; Beam Lines = 2, Total Beams to be Painted = 8.573 ft. * 26 ft. * 2 beams = 445.80 sq. ft.
    c. Beams #1 and #6—W36x230 perimeter to paint = beams have deck edge going onto part of web and beam length where there is a plate on the flange = (35 7/8" – 7 3/4") + ((16 ½" – ¾")/2) * 3) + (0.75 in. * 2) + (0.75 in. * 2) + 18 in. = 107.375 in. = 8.948 ft.; Beam Length = (13 to 64 ft. this is where there is no plate on the flange = 51 ft.; Beam Lines = 2, Total Beams to be Painted = 8.948 ft. * 51 ft. * 2 beams = 912.70 sq. ft.
    d. Total Beams to be Painted = 3009.47 sq. ft. + 445.8 sq. ft. + 912.70 sq. ft. = 4367.97 sq. ft.
    e. End and Intermediate Crossframes exterior bays—Crossframe unit length = 6 ft. + (6.703 ft. * 2) = 19.41 ft.; 3"x3"x3/8" perimeter = 1 ft., # crossframe units = 10 each; Total End and Intermediate Crossframes = 19.41 ft. * 1 ft. * 10 each = 194.10 sq. ft.
    f. End and Intermediate Crossframes interior bays—Crossframe unit length = 6.703 ft. * 2 = 13.406 ft., # crossframe units = 15 each, 3"x3"x3/8" perimeter = 1 ft., Total End and Intermediate Crossframes = 13.406 ft. * 1 ft. * 15 each = 201.09 sq. ft.
    g. Total End and Intermediate Crossframes Exterior and Interior Bays = 194.10 sq. ft. + 201.09 sq. ft. = 395.19 sq. ft.
    h. Bearings = 12 bearings * 2 sq. ft. = 24 sq. ft.
    i. Total = Beams + Intermediate and End Crossframes both exterior and interior bays + Bearings = 4367.97 sq. ft. + 395.19 sq. ft. + 24 sq. ft. = 4787.16 sq. ft. = 4788 sq. ft.
22. Item 514-Field Painting of Existing Structural Steel, Prime Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 4788 sq. ft.
23. Item 514-Field Painting Structural Steel, Intermediate Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 4788 sq. ft.
24. Item 514-Field Painting Structural Steel, Finish Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 4788 sq. ft.
25. Item 514-Grinding Fins, Tears, Slivers on Existing Structural Steel (MNHR)
    a. Per 2020 BDM section 404.1.11 1 min./ft. beam/girder to be painted, 77 ft * 6 beams = 462 ft.; 462 ft. * (1 min./ft.) * (1 hr./60 min.) = 7.7 hr. = 8 hr.
26. Item 514-Final Inspection Repair (EA)

a. 77 ft. * 6 beam lines * (1 each/300 ft.) + (0.025) * (10 exterior bay crossframes + 15 interior bay crossframes) = 2.17 each = 3 each = total

Structure Repair (SHE-75-0888L) Plan Split #2

27. Item 514-Surface Preparation of Existing Structural Steel (SF)
    a. Beams #1-#6 without splice plate—W33x200 perimeter to paint = ((15 ¾" – 11/16") * 2) + (33 5/8"-1 1/8")*(2 sides) + 15 ¾" = 110.875 in. = 9.2396 ft.; Beam Length = Assumed 9" longer past c/l bearing, (0 to 50.5 ft.) + (55 to 115.5 ft.) + (120 to 170.5 ft.) = 50.5 ft. + 60.5 ft. + 50.5 ft. = 161.50 ft.; Beam Lines = 6, Total Beams to be Painted = 9.2396 ft. * 161.50 ft. * 6 beams = 8953.17 sq. ft.
    b. Beams #1-#6 with splice plate—W33x200 perimeter to paint = ((15 ¾" – 11/16") * 2) + (33 5/8" - 1 1/8")*(2 sides) + (0.625 in * 2) + (0.6875 in. * 2) + 17" = 114.75 in. = 9.5625 ft.; Beam Length = (50.5 to 55 ft. + (115.5 to 120 ft) = 4.5 ft. + 4.5 ft. = 9 ft.; Beam Lines = 6; Total Beams to be Painted = 9.5625 ft. * 9 ft. * 6 beams = 516.375 sq. ft.
    c. Total Beams to be Painted = 8953.17 ft. + 516.375 ft. = 9469.55 sq. ft.
    d. Intermediate Crossframes—Crossframe unit length = (8.4 ft. * 2) + 7.917 ft. = 24.717 ft.; 3"x3"x5/16" perimeter = 1 ft., # crossframe units = 56 each, 24.717 ft. * 1 ft. * 56 each = 1384.15 sq. ft.
    e. End Crossframes—Crossframe unit length = (4.129 ft * 2) + (3.186 ft. * 2) + 9.099 ft. = 23.729 ft.; # crossframe units = 10 each, 4"x4"x5/16" perimeter = 1.33 ft., Total End Crossframes = 23.729 ft. * 1.33 ft. * 10 each = 315.6 sq. ft.
    f. End Crossframe Plates say 2 each @ 4"x6" = (2 each top plates * 10 locations * 24 sq. in. * (1 sq. ft./144 sq. in.) * 2 sides) + say 1 each @ 4"x4" = (1 each bottom plate * 10 locations * 16 sq. in. * (1 sq. ft/144 sq. in.) * 2 sides) = 6.66 sq. ft. + 2.22 sq. ft. = 8.89 sq. ft.
    g. Bearings = 4 bearings * 6 beams * 2 sq. ft. = 48 sq. ft.
    h. Scuppers—Scupper approx. length to be painted 33 5/8" + 8" = 41.625 in. = 3.46875 ft.; 6" diameter scupper surface area = 2 * pi * r = 2 * 3.14529 * 3 in. = 18.85 in. = 1.57 ft., # of scuppers = 16 each, 1.571 ft. * 3.46875 ft. * 16 each = 87.19 sq. ft.
    i. Total = Beams + Intermediate Crossframes + End Crossframes + Bearings + Scuppers = 9469.55 sq. ft. + 1384.15 sq. ft. + 324.49 sq. ft. + 48 sq. ft. + 87.19 sq. ft. = 11313.38 sq. ft. = 11314 sq. ft.
28. Item 514-Field Painting of Existing Structural Steel, Prime Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 11314 sq. ft.
29. Item 514-Field Painting Structural Steel, Intermediate Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 11314 sq. ft.
30. Item 514-Field Painting Structural Steel, Finish Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 11314 sq. ft.
31. Item 514-Grinding Fins, Tears, Slivers on Existing Structural Steel (MNHR)
    a. Per 2020 BDM section 404.1.11 1 min./ft. beam/girder to be painted, 170.5 ft * 6 beam lines = 1023 ft.; 1023 ft. * (1 min./ft.) * (1 hr./60 min.) = 17.05 hr. = 17 hr.
32. Item 514-Final Inspection Repair (EA)
    a. 170.5 ft. * 6 beam lines * (1 each/300 ft.) + (0.025) * (55 intermediate crossframe units + 10 end crossframe units) = 5.06 each = 5 each = total
33. Item 844-Concrete Patching with Galvanic Anode Protection, As Per Plan (SF)
    a. Rear Abutment = 0 sq. ft.
    b. Fwd. Abutment = 46 sq. ft.
    c. Rear Pier = 54 sq. ft.
    d. Fwd. Pier = 0 sq. ft.
    e. Total = 100 sq. ft.

Structure Repair (SHE-75-0888R) Plan Split #2

34. Item 202-Portions of Structure Removed, As Per Plan (Secondary Members) (EACH)
    a. End crossframe bottom angle between Beam 1 and 2 = 1 each
    b. End crossframe bottom angle between Beam 5 and 6 = 1 each

c. Intermediate crossframe bottom angle between Beam 1 and 2 = 1 each

d. Total = 3 each

35. Item 513-Structural Steel Members, Level UF, As Per Plan (LB)

a. End crossframe bottom angle Rear Abutment, 4”x4”x5/16” between Beam 1-2 and Beam 5-6; (8.332 ft. x 2 angles) x 8.2 lb/ft. = 136.64 lbs

b. Intermediate crossframe bottom angle near Rear Abutment, 3”x3”x5/16” between Beam 1-2; 7.25 ft. x 6.1 lb/ft. = 44.23 lbs

c. Total = 136.64 lbs + 44.23 lbs = 180.87 lbs = 181 lbs

36. Item 514-Surface Preparation of Existing Structural Steel (SF)

a. Beams 1-8 without splice plate on bottom—W33x152 perimeter to paint = (33 1/2”- 1 1/16”)*(2 sides) + (11 5/8”- 5/8”)*(2) + 11 5/8” = 98.5 in. = 8.2083 ft., Length of W33 x 152 beams 1-7 = (0-48 ft.) + (57.5-113 ft.) + (122.5-170.5 ft.) = 151.5 ft.; Length of W33x152 Beam 8 = (0-48.63 ft.) + (58.13-114.422 ft.) + (123.922-172.55 ft.) = 153.55 ft.; W33x152 Beams to Paint = (8.2083 ft/beam x 151.5 ft. x 7 beams) + (8.2083 ft/beam x 153.55 ft. x 1 beam) = 9965.29 sq. ft.

b. Beams 1-8 with splice plate on bottom of 13”x1/2”x9’-6”—W33x152 perimeter to paint = (33 1/2”- 1 1/16”)*(2 sides) + (11 5/8”- 5/8”)*(2) + (0.6875” x 2) + (0.5” x 2) + 13” = 102.25 in. = 8.5208 ft.; Length of W33 x 152 beams 1-7 with bottom splice plate = 9.5 ft. x 2 = 19 ft.; Length of W33x152 beam 8 with bottom splice plate = 9.5 ft. x 2 = 19 ft.; W33x152 Beams to Paint = (8.5208 ft/beam x 19 ft. x 7 beams) + (8.5208 ft/beam x 19 ft. x 1 beam) = 1295.16 sq. ft.

c. Total Beams to be Painted = 9965.29 sq. ft. + 1295.16 sq. ft. = 11260.45 sq. ft.

d. Intermediate Crossframes between beams 1 to 7—Crossframe unit length = (7.769 ft. x 2) + 7.25 ft. = 22.79 ft.; 3”x3”x5/16” perimeter = 1 ft., # crossframe units between beams 1 to 7 = 71 each; 22.79 ft. * 1 ft. * 71 each = 1618.09 sq. ft.

e. Intermediate Crossframes between beams 7 to 8—Crossframe unit length = (6.2518 ft. * 2) + 5.59375 ft. = 18.097 ft.; 3”x3”x5/16” perimeter = 1 ft.; # crossframe units between beams 7 to 8 = 12 each; 18.097 ft * 1 ft. * 12 each = 217.164 sq. ft.

f. Total Intermediate Crossframes = Between Beams 1 to 7 + Between Beams 7 to 8 = 1618.09 sq. ft. + 217.164 sq. ft. = 1835.25 sq. ft.

g. End Crossframes between Beams 1 to 7—Crossframe unit length = (3.938 ft. * 2) + (3.119 ft. * 2) + 8.332 ft. = 22.446 ft.; # crossframe units = 12 each, 4”x4”x5/16” perimeter = 1.33 ft., Total End Crossframes = 22.446 ft. * 1.33 ft. * 12 each = 358.24 sq. ft.

h. End Crossframe Plates say 2 each top plate @ 4”x6” and say 1 each bottom plate @ 4”x4” = (2 each * 24 sq. in. * 12 crossframes * (1 sq. ft./144 sq. in.) * 2 sides) + (1 each * 16 sq. in. * 12 crossframes * (1 sq. ft./144 sq. in.) * 2 sides) = 8 sq. ft. + 2.67 sq. ft. = 10.67 sq. ft.

i. End Crossframes between Beams 7 and 8 at rear abutment—Crossframe unit length = (3.972 ft. * 2) + (3.129 ft. * 2) + 8.476 ft. = 22.678 ft.; # crossframe units = 1 each, 4”x4”x5/16” perimeter = 1.33 ft., Total End Crossframes = 22.678 ft. * 1.33 ft. * 1 each = 30.16 sq. ft.

j. End Crossframe Plates say 2 each top plate @ 4”x6” and say 1 each bottom plate @ 4”x4” = (2 each * 24 sq. in. * 1 crossframes * (1 sq. ft./144 sq. in.) * 2 sides) + (1 each * 16 sq. in. * 1 crossframes * (1 sq. ft./144 sq. in.) * 2 sides) = 0.67 sq. ft. + 0.22 sq. ft. = 0.89 sq. ft.

k. End Crossframes between Beams 7 and 8 at fwd. abutment—Crossframe unit length = (3.549 ft. * 2) + 4.382 ft. = 11.48 ft.; # crossframe units = 1 each, 4”x4”x5/16” perimeter = 1.33 ft., Total End Crossframes = 11.48 ft. * 1.33 ft. * 1 each = 15.27 sq. ft.

l. End Crossframe Plates say 1 each top plate @ 4”x6” = (1 each * 24 sq. in. * 1 crossframes * (1 sq. ft./144 sq. in.) * 2 sides) = 0.33 sq. ft.

m. Total end crossframes and plates = 358.24 sq. ft. + 10.67 sq. ft. + 30.16 sq. ft. + 0.89 sq. ft. + 15.27 sq. ft. + 0.33 sq. ft. = 415.56 sq. ft.

n. Bearings = 4 bearings/beam * 8 beams * 2 sq. ft. = 64 sq. ft.

o. Scuppers—Scupper approx. length to be painted 33 1/2” + 8” = 41 1/2” = 3.4583 ft., 6” diameter scupper surface area = 2 * pi * r = 2 * 3.14529 * 3 in. = 18.85 in. = 1.57 ft., # of scuppers = 16 each, 3.4583 ft/scupper * 1.57 ft. * 16 scuppers = 86.93 sq. ft.

p. Total = Beams + Intermediate Crossframes + End Crossframes + Bearings + Scuppers = 11260.45 sq. ft. + 1835.25 sq. ft. + 415.56 sq. ft. + 64 sq. ft. + 86.93 sq. ft. = 13662.19 sq. ft. = 13663 sq. ft.

37. Item 514-Field Painting of Existing Structural Steel, Prime Coat (SF)

a. Same as Surface Preparation of Existing Structural Steel = 13663 sq. ft.

38. Item 514-Field Painting Structural Steel, Intermediate Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 13663 sq. ft.
39. Item 514-Field Painting Structural Steel, Finish Coat (SF)
    a. Same as Surface Preparation of Existing Structural Steel = 13663 sq. ft.
40. Item 514-Grinding Fins, Tears, Slivers on Existing Structural Steel (MNHR)
    a. Per 2020 BDM section 404.1.11 1 min./ft. beam/girder to be painted, (170.5 ft * 7 beams) + (172.55 ft. 1 beam) = 1366.05 ft. * (1 min./ft.) * (1 hr./60 min.) = 22.77 hr. = 23 hr.
41. Item 514-Final Inspection Repair (EA)
    a. (170.5 ft. * 7 beams) + (172.55 ft. * 1 beam) = 1366.05 ft.; (1366.05 ft. * (1 each/300 ft.)) + (0.025 * (83 intermediate crossframes + 14 end crossframes) = 6.98 each = 7 each
42. Item 844-Concrete Patching with Galvanic Anode Protection, As Per Plan (SF)
    a. Rear Abutment = 60 sq. ft., Fwd. Abutment = 10 sq. ft., Rear Pier = 30 sq. ft., Fwd. Pier = 36 sq. ft., Total = 136 sq. ft.

Maintenance of Traffic

43. Item 614-Law Enforcement Officer with Patrol Car for Assistance (HOUR)
    a. AUG-33-1310L/R = 8 hr. * 2 set up/removal = 16 hr.
    b. LOG-68-0040 = 8 hr. * 2 setup/removal = 16 hr.
    c. SHE-75-0888L/R = 25 hr
    d. Plan Split #1 = 32 hr. (make 35 hr.)
    e. Plan Split #2 = 25 hr.
    f. Total = 35 hr. + 25 hr. = 60 hr.
44. Item 614-Work Zone Impact Attenuator, 24” Wide Hazards, (Bidirectional) (EA)
    a. LOG-68-0040—STA. 20+30 to 23+70 barrier run = 2 each
    b. Total = 2 each = Plan Split #1
45. Item 614-Barrier Reflector, Type 1 (Bidirectional) (EA)
    a. LOG-68-0040—STA. 20+30 to 23+70 barrier run = 8 each
    b. Total = 8 each = Plan Split #1
46. Item 614-Barrier Reflector, Type 1 (One Way) (EA)
    a. SHE-75-0888L/R = 3 each
    b. Total = 3 each = Plan Split #2
47. Item 614-Object Marker, One Way (EA)
    a. SHE-75-0888L/R = 3 each
    b. Total = 3 each = Plan Split #2
48. Item 614-Object Marker, Two Way (EA)
    a. LOG-68-0040—STA. 20+30 to 23+70 barrier run = 8 each
    b. Total = 8 each = Plan Split #1
49. Item 614-Work Zone Edge Line, Class I, 4”, 740.06, Type 1 (MILE)
    a. LOG-68-0040—STA. 19+46 to 24+58 = 0.10 mile
    b. Total = 0.10 mile = Plan Split #1
50. Item 614-Work Zone Stop Line, Class I, 740.06, Type 1 (FT)
    a. LOG-68-0040—STA. 18+96 = 12 ft.
    b. LOG-68-0040—STA. 25+08 = 12 ft.
    c. Total = 24 ft. = Plan Split #1
51. Item 622-Portable Barrier, Unanchored (FT)
    a. LOG-68-0040—STA. 20+30 to 23+70 = 340 ft. = Plan Split #1
    b. SHE-75-0888L/R = 60 ft. = Plan Split #2
    c. Total = 340 ft. + 60 ft. = 400 ft.

Incidentals

52. Item 614-Maintaining Traffic (LS)

a. Lump Sum (LS)

53. Item 623-Construction Layout Stakes and Surveying (LS)
    a. Lump Sum (LS)
54. Item 624-Mobilization (LS)
    a. Lump Sum (LS)

END OF CALCULATIONS