**PID 105416, D07-BP/BH-FY23: QUANTITY CALCULATIONS**

Calculated by: *Brian Cao, P.E., Date: 10/13/2023*

Checked by:

Revised by: *Brian Cao, P.E., Date: 1/31/2024*

**Roadway**

1. Item 607, Fence Removed and Rebuilt
   1. MOT-725-1089
      1. Chain link fence between all beams @ intermediate crossframes
   2. Grand Total = 56 FT

**Erosion Control**

1. Item 201, Clearing and Grubbing
   1. Grand Total = Lump Sum (LS)
2. Item 659, Seeding and Mulching
   1. Part. 01/IM/13: MIA-75-12.90 L/R + MOT-675-4.47 + MOT-725-16.06
      1. MIA-75-12.90 L/R
         1. Median grass worst case GR run to GR run each side. 1200 SY
      2. MIA-571-2.34
         1. Shoulder grass for staging & MOT. 180 SY
      3. MOT-675-4.47
         1. Misc. grass areas. 70 SY
      4. MOT-725-10.89
         1. Misc. grass areas. 80 SY
      5. MOT-725-16.06
         1. Misc. grass areas. 70 SY
      6. Total = 1200 SY + 70 SY + 70 SY = 1340 SY
   2. Part. 02/NHS/13: MOT-725-10.89
      1. Total = 80 SY = 80 SY
   3. Part. 03/STR/13: MIA-571-2.34
      1. Total = 180 SY
   4. Grand Total = 1340 SY + 80 SY + 180 SY = 1600 SY
3. Item 659, Repair Seeding and Mulching
   1. Part. 01/IM/13: MIA-75-12.90 L/R + MOT-675-4.47 + MOT-725-16.06
      1. Total = 5% Seeding and Mulching = 0.05 \* 1340 SY = 67 SY
   2. Part. 02/NHS/13: MOT-725-10.89
      1. Total = 5% Seeding and Mulching = 0.05 \* 80 SY = 4 SY
   3. Part. 03/STR/13: MIA-571-2.34
      1. Total = 5% Seeding and Mulching = 0.05 \* 180 SY = 9 SY
   4. Grand Total = 67 SY + 4 SY + 9 SY = 80 SY
4. Item 659, Commercial Fertilizer
   1. Part. 01/IM/13: MIA-75-12.90 L/R + MOT-675-4.47 + MOT-725-16.06
      1. Total = 1340 SY Seeding and Mulching \* 1 TON/7410 SY = 0.18 TON
   2. Part. 02/NHS/13: MOT-725-10.89
      1. Total = 80 SY Seeding and Mulching \* 1 TON/7410 SY = 0.01 TON
   3. Part. 03/STR/13: MIA-571-2.34
      1. Total = 180 SY Seeding and Mulching \* 1 TON/7410 SY = 0.02 TON
   4. Grand Total = 0.18 TON + 0.01 TON + 0.02 TON = 0.21 TON
5. Item 659, Water
   1. Part. 01/IM/13: 1340 SY \* 0.0027 MGAL/SY \* 2 applications = 7.24 MGAL
   2. Part. 02/NHS/13: 80 SY \* 0.0027 MGAL/SY \* 2 applications = 0.43 MGAL
   3. Part. 03/STR/13: 180 SY \* 0.0027 MGAL/SY \* 2 applications = 0.97 MGAL
   4. Grand Total = 7.24 MGAL + 0.43 MGAL + 0.97 MGAL = 8.64 MGAL
6. Item 832, Erosion Control
   1. Part. 01/IM/13: MIA-75-12.90 L/R + MOT-675-4.47 + MOT-725-16.06
      1. Total = 4 bridges \* 1000 EACH = 4,000 EACH
   2. Part. 02/NHS/13: MOT-35-16.19 L/C + MOT-35-18.48 + MOT-725-10.89
      1. Total = 4 bridges \* 1000 EACH = 4,000 EACH
   3. Part. 03/STR/13: MIA-571-2.34
      1. Total = 1 bridge \* 1000 EACH = 1,000 EACH
   4. Grand Total = 4,000 EACH + 4,000 EACH + 1,000 EACH = 9,000 EACH

**Traffic Control**

1. Item 642, Edge Line, 6”, Type 1
   1. MIA-571-0234
      1. 0.06 mile (WZEL-2)
   2. Grand Total = 0.06 MILE
2. Item 642, Center Line, Type 1
   1. MIA-571-0234
      1. 0.09 mile (WZEL-1)
   2. Grand Total = 0.09 MILE

**Structures: MIA-75-12.90 L**

1. Item 514, Surface Preparation of Existing Structural Steel
   1. Beams:
      1. (W30x173) 2 sections: 46.5’ span \* 8.53’ perimeter = 396.65 SF \* 8 beams = 3173.16 SF
         1. depth = 30.4”, width = 15”, web thickness = 0.655”, flange thickness = 1.07”
      2. (W30x191) 2 sections: 75.0’span \* 8.56’ perimeter = 642 SF \* 8 beams = 5136 SF
         1. depth = 30.68”, width = 15.04”, web thickness = 0.71”, flange thickness = 1.185”
      3. (W30x211) 1 section: 75.0’ span \* 8.58’ perimeter = 643.5 SF \* 4 beams = 2574 SF
         1. depth = 30.94”, width = 15.105”, web thickness = 0.775”, flange thickness = 1.315”
      4. (36WF150) 2 sections: 46.5’ span \* 8.71’ perimeter = 405.02 SF \* 10 beams = 4050.2 SF
         1. depth = 35.85”, width = 11.975”, web thickness = 0.625”, flange thickness = 0.94”
      5. (36WF194) 3 sections: 75.0’ span \* 8.77’ perimeter = 657.75 SF \* 15 beams = 9866.25 SF
         1. depth = 36.49”, width = 12.115”, web thickness = 0.765”, flange thickness = 1.26”
      6. Total Beams = 3173.16 SF + 5136 SF + 2574 SF + 4050.2 + 9866.25 SF = 24799.61 SF
   2. Intermediate Crossframes
      1. 8.32’ spacings:
         1. Strut/Diagonals: (8.32’ span \* 1.33’ perimeter) + (2 diagonals \* 1.33’ perimeter \* sqrt[(8.32’ span)^2 + (2.53’ depth)^2] = 34.22 SF \* 63 intermediate crossframes = 2155.86 SF
      2. 7.41’ spacing:
         1. Strut/Diagonals: (7.41’ span \* 1.33’ perimeter) + (2 diagonals \* 1.33’ perimeter \* sqrt[(7.41’ span)^2 + (2.76’ depth)^2] = 30.89 \* 21 intermediate crossframes = 648.69 SF
      3. 7.83’ spacings:
         1. Strut/Diagonals: (7.83’ span \* 1.33’ perimeter) + (2 diagonals \* 1.33’ perimeter \* sqrt[(7.83’ span)^2 + (2.99’ depth)^2] = 32.71 SF \* 84 intermediate crossframes = 2747.64 SF
      4. Total Intermediate Crossframes = 2155.86 SF + 648.89 SF + 2747.64 SF = 5552.39 SF
   3. End Crossframes:
      1. 14.21’ end crossframes:
         1. Strut/Vertical/Diagonals: (14.21’ span \* 1.33’ perimeter) + (2.99 depth \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(3.55’ span)^2 + (2.99’ depth)^2] = 47.57 SF
         2. Plates approximated: (0.5’ span \* 0.5’ width) \* 4 plates = 1 SF
         3. Total = 47.57 SF + 1 SF = 48.57 SF \* 8 end crossframes = 388.56 SF
      2. 13.13’ end crossframes:
         1. Strut/Vertical/Diagonals (13.13’ span \* 1.33’ perimeter) + (2.53’ depth \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(3.29’ span)^2 + (2.53’ depth)^2] = 42.91 SF
         2. Plates approximated: (0.5’ span \* 0.5’ width) \* 4 plates = 1 SF
         3. Total = 42.91 SF + 1 SF = 43.91 SF \* 4 end crossframes = 175.64 SF
      3. 13.75’ end crossframes:
         1. Strut/Vertical/Diagonals: (13.75’ span \* 1.33’ perimeter) + (2.76’ depth \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(3.44’ span)^2 + (2.76’ depth)^2] = 45.42 SF
         2. Plates approximated: (0.5’ span \* 0.5’ width) \* 4 plates = 1 SF
         3. Total = 45.42 SF + 1 SF = 46.42 SF
      4. 17.02’ end crossframes:
         1. Strut/Vertical/Diagonals: (17.02’ span \* 1.33’ perimeter) + (6 diagonals \* 1.33’ perimeter \* sqrt[(4’ span)^2 + (2.53’ depth)^2] + (2 diagonals \* 1.33’ perimeter \* sqrt[(2.51’ span)^2 + (2.53’ depth)^2] = 69.89 SF
         2. Plates approximated: (0.5’ span \* 0.5’ width) \* 7 plates = 1.75 SF
         3. Total = 69.89 SF + 1.75 SF = 71.64 SF
      5. Total End Crossframes = 388.56 SF + 175.64 SF + 46.42 SF + 71.64 SF = 682.26 SF
   4. Scuppers:
      1. (2 \* π \* .25’ radius) \* 3’ depth approx. = 4.71 SF \* 26 scuppers = 122.46 SF
   5. Bearings:
      1. 2 SF approx. \* 18 bearings = 36 SF
   6. Grand Total = Beams + Intermediate Crossframes + End Crossframes + Scuppers + Bearings = 24799.61 SF + 5552.39 SF + 682.26 SF + 122.46 SF + 36 SF = 31,192.72 SF round to 31,200 SF
2. Item 514, Field Painting of Existing Structural Steel, Prime Coat
3. Grand Total = 31,200 SF
4. Item 514, Field Painting Structural Steel, Intermediate Coat
5. Grand Total = 31,200 SF
6. Item 514, Field Painting Structural Steel, Finish Coat
7. Grand Total = 31,200 SF
8. Item 514, Grinding Fins, Tears, Slivers on Existing Structural Steel
   1. BDM 404.1.11 1 minute for each linear foot of beam/girder to be coated.
      1. Total linear beam line: 315’ \* 9 beam lines = 2835’
   2. Grand Total = 2835’ \* 1 min \* 1/60 (hr/min) = 47.25 MNHR round to 48 MNHR
9. Item 514, Final Inspection Repair
10. Total linear beam line: 315’ \* 9 beam lines = 2835’/300’ = 9.45
11. 2.5% of all crossframes: 167 crossframes \* 0.025 = 4.2
12. Grand Total = 9.45 + 4.2 = 13.65 round to 14 EACH

**Structures: MIA-75-12.90 R**

1. Item 514, Surface Preparation of Existing Structural Steel
   1. Beams:
      1. (36WF150) 2 sections: 46.5’ span \* 8.71’ perimeter = 405.02 SF \* 10 beams = 4050.2 SF
         1. depth = 35.85”, width = 11.975”, web thickness = 0.625”, flange thickness = 0.94”
      2. (36WF194) 3 sections: 75.0’ span \* 8.77’ perimeter = 657.75 SF \* 15 beams = 9866.25 SF
         1. depth = 36.49”, width = 12.115”, web thickness = 0.765”, flange thickness = 1.26”
      3. (W30x99) 1 section: 46.5’ span \* 7.36’ perimeter = 342.24 SF \* 5 beams = 1711.2 SF
         1. depth = 29.65”, width = 10.45”, web thickness = 0.52”, flange thickness = 0.67”
      4. (W30x173) 1 section: 75.0’ span \* 8.53’ perimeter = 396.65 SF \* 5 beams = 1983.25 SF
         1. depth = 30.4”, width = 15”, web thickness = 0.655”, flange thickness = 1.07”
      5. (W30x191) 2 sections: (75.0’ span \* 8.56’ perimeter \* 5 beams) + (45.75’ span \* 8.56’ perimeter \* 5 beams) = 5168.1 SF
         1. depth = 30.68”, width = 15.04”, web thickness = 0.71”, flange thickness = 1.185”
      6. (W30x211) 1 section: 75.0’ span \* 8.58’ perimeter = 643.5 SF \* 5 beams = 3217.5 SF
         1. depth = 30.94”, width = 15.105”, web thickness = 0.775”, flange thickness = 1.315”
      7. Total Beams = 4050.2 SF + 9866.25 SF + 1711.2 SF + 1983.25 SF + 5168.1 SF + 3217.5 SF = 25996.5 SF
   2. Intermediate Crossframes
      1. 7.83’ spacings:
         1. Strut/Diagonals: (7.83’ span \* 1.33’ perimeter) + (2 diagonals \* 1.33’ perimeter \* sqrt[(7.83’ span)^2 + (2.99’ depth)^2] = 32.71 SF \* 80 intermediate crossframes = 3656.8 SF
      2. 6.24’ spacing:
         1. Strut/Diagonals: (6.24’ span \* 1.33’ perimeter) + (2 diagonals \* 1.33’ perimeter \* sqrt[(6.24’ span)^2 + (2.76’ depth)^2] = 26.45 SF \* 20 intermediate crossframes = 529 SF
      3. 8.06’ spacings:
         1. Strut/Diagonals: (8.06’ span \* 1.33’ perimeter) + (2 diagonals \* 1.33’ perimeter \* sqrt[(8.06’ span)^2 + (2.53’ depth)^2] = 33.19 SF \* 80 intermediate crossframes = 2655.27 SF
      4. Total Intermediate Crossframes = 3656.8 SF + 529 SF + 2655.27 SF = 6841.07 SF
   3. End Crossframes
      1. 8.83’ end crossframes:
         1. Strut/Diagonals: (8.83’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(2.92’ span)^2 + (2.47’ depth)^2] = 32.09 SF
         2. Plates approximated: (0.5’ span \* 0.5’ width) \* 3 plates = 0.75 SF
         3. Total = 32.09 SF + 0.75 SF = 32.84 SF \* 5 end crossframes = 164.2 SF
      2. 13.79’ end crossframes:
         1. Strut/Vertical/Diagonals: (13.79’ span \* 1.33’ perimeter) + (2.77 depth \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(3.45’ span)^2 + (2.77’ depth)^2] = 45.56 SF
         2. Plates approximated: (0.5’ span \* 0.5’ width) \* 4 plates = 1 SF
         3. Total = 45.56 SF + 1 SF = 46.56 SF
      3. 14.21’ end crossframes:
         1. Strut/Vertical/Diagonals: (14.21’ span \* 1.33’ perimeter) + (2.99 depth \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(3.55’ span)^2 + (2.99’ depth)^2] = 47.57 SF
         2. Plates approximated: (0.5’ span \* 0.5’ width) \* 4 plates = 1 SF
         3. Total = 47.57 SF + 1 SF = 48.57 SF \* 8 end crossframes = 388.56 SF
      4. 20.42’ end crossframes:
         1. Strut/Verticals/Diagonals: (20.42’ span \* 1.33’ perimeter) + (2 verticals \* 2.56 depth \* 1.33’ perimeter) + (6 diagonals \* 1.33’ perimeter \* sqrt[(3.41’ span)^2 + (2.56’ depth)^2] = 67.99 SF = 67.99 SF
         2. Plates approximated: (0.5’ span \* 0.5’ width) \* 7 plates = 1.75 SF
         3. Total = 67.99 SF + 1.75 SF = 69.74 SF \* 4 end crossframes = 278.96 SF
      5. Total End Crossframes = 164.2 SF + 46.56 SF + 388.56 SF + 278.96 SF = 878.28 SF
   4. Scuppers:
      1. (.48’ x .81’ scuppers) \* 3.5’ depth approx. = 1.36 SF \* 26 scuppers = 35.38 SF
   5. Bearings:
      1. 2 SF approx. \* 18 bearings = 36 SF
   6. Grand Total = Beams + Intermediate Crossframes + End Crossframes + Scuppers + Bearings = 25996.5 SF + 6841.07 SF + 878.28 SF + 35.38 SF + 36 SF = 33,787.16 SF round to 33,800 SF
2. Item 514, Field Painting of Existing Structural Steel, Prime Coat
   1. Grand Total = 33,800 SF
3. Item 514, Field Painting Structural Steel, Intermediate Coat
   1. Grand Total = 33,800 SF
4. Item 514, Field Painting Structural Steel, Finish Coat
   1. Grand Total = 33,800 SF
5. Item 514, Grinding Fins, Tears, Slivers on Existing Structural Steel
   1. BDM 404.1.11 1 minute for each linear foot of beam/girder to be coated.
      1. Total linear beam line = 315’ \* 9 beam lines = 2835’
   2. Grand Total = 2835’ \* 1 min \* 1/60 (hr/min) = 47.25 MNHR round to 48 MNHR
6. Item 514, Final Inspection Repair
   1. Total linear beam line: 315’ \* 9 beam lines = 2835’/300’ = 9.45
   2. 2.5% of all crossframes: 181 crossframes \* 0.025 = 4.53
   3. Grand Total = 9.45 + 4.53 = 13.98 round to 14 EACH

**Structures: MIA-571-2.34**

1. Item 514, Surface Preparation of Existing Structural Steel
   1. Beams:
      1. (W36x160) 2 sections: 58.5’ span \* 8.72’ perimeter = 510.12 SF \* 10 girders = 5101.2 SF
         1. depth = 36.01”, width = 12”, web thickness = 0.65”, flange thickness = 1.02”
      2. (W36x230) 1 section: 39’ span \* 9.76’ perimeter = 380.64 SF \* 5 girders = 1903.2 SF
         1. depth = 35.90”, width = 16.47”, web thickness = 0.76”, flange thickness = 1.26”
      3. (W21x44) 2 sections: 32.0’ span \* 4.94’ perimeter = 158.08 SF \* 2 beams = 316.16 SF
         1. depth = 20.7”, width = 6.5”, web thickness = 0.35”, flange thickness = 0.45”
      4. Total Beams = 5101.2 SF + 1903.2 SF + 316.16 SF = 7320.56 SF
   2. Intermediate Crossframes: (8’ span \* 1’ perimeter) + (2 diagonals \* 1’ perimeter \* sqrt[(8’ span)^2 + (3.0’ depth)^2] = 25.09 SF \* 48 intermediate crossframes = 1204.32 SF
   3. End Crossframes:
   4. Grand Total = Beams + Intermediate Crossframes = 7320.56 SF + 1204.32 SF = 8524.88 SF round to 8525 SF
2. Item 514, Field Painting of Existing Structural Steel, Prime Coat
   1. Grand Total = 8525 SF
3. Item 514, Field Painting Structural Steel, Intermediate Coat
   1. Grand Total = 8525 SF
4. Item 514, Field Painting Structural Steel, Finish Coat
   1. Grand Total = 8525 SF
5. Item 514, Grinding Fins, Tears, Slivers on Existing Structural Steel
   1. BDM 404.1.11 1 minute for each linear foot of beam/girder to be coated.
      1. Total linear beam line = 156’ \* 5 beam lines = 780’
   2. Grand Total = 780’ \* 1 min \* 1/60 (hr/min) = 13 MNHR
6. Item 514, Final Inspection Repair
   1. Total linear beam line: 156’ \* 5 beam lines = 780’/300’ = 2.6
   2. 2.5% of all crossframes: 48 crossframes \* 0.025 = 1.2
   3. Grand Total = 2.6 + 1.2 = 3.8 round to 4 EACH

**Structures: MOT-35-1619 C**

1. Item 513, Structural Steel for Rehabilitation, As Per Plan
   1. Crossframes:
      1. F4 between Girders 1 & 2:
         1. Diagonal 1 (L3x3x5/16) = 5.75’ span \* 6.1 lbs/lf = 35.075 lbs \* 4 members = 140.3 lbs
         2. Diagonal 2 (L3x3x5/16) = 5.75’ span \* 6.1 lbs/lf = 35.075 lbs \* 4 members = 140.3 lbs
         3. Strut (L3x3x5/16) = 8.745’ span \* 6.1 lbs/lf = 53.34 lbs \* 4 members = 213.38 lbs
         4. Plate (10x8x1/2) = 0.56 SF \* 20.4 lbs/sf = 11.42 lbs \* 4 members = 45.7 lbs
      2. F4 between Girders 3 & 4:
         1. Diagonal 1 L3x3x5/16 = 5.75’ span \* 6.1 lbs/lf = 35.1 lbs
         2. Diagonal 2 L3x3x5/16 = 5.75’ span \* 6.1 lbs/lf = 35.1 lbs
         3. Strut L3x3x5/16 = 8.745’ span \* 6.1 lbs/lf = 53.34 lbs
         4. Plate 10x8x1/2 = 0.56 SF \* 20.4 lbs/sf = 11.42 lbs
      3. Total Crossframes = 140.3 lbs + 140.3 lbs + 213.38 lbs + 45.7 lbs + 35.1 lbs + 35.1 lbs + 53.34 lbs +11.42 lbs = 674.64 lbs
   2. Plates:
      1. Girder 1 Span 1 @ Hinge 1 Web Repair (9x6x3/8) = 0.375 sf \* 15.3 lbs/sf = 5.74 lbs
      2. Girder 1 Span 2 @ Hinge 1 Web Repair (9x6x3/8) = 0.375 sf \* 15.3 lbs/sf = 5.74 lbs
      3. Girder 1 Span 2 @ Hinge 2 Web Repair (12x6x3/8) = 0.5 sf \* 15.3 lbs/sf = 7.65 lbs
      4. Girder 1 Span 3 @ Hinge 2 Web Repair (9x6x3/8) = 0.375 sf \* 15.3 lbs/sf = 5.74 lbs
      5. Girder 1 Span 3 @ Flange Repair (30x12x5/8) = 2.5 sf \* 25.5 lbs/sf = 63.75 lbs
      6. Girder 1 Span 3 @ Fwd. Abut. Web Repair (5x6x3/8) = 0.21 sf \* 15.3 lbs/sf = 3.21 lbs
      7. Girder 1 Span 1 @ 6th Intermediate Stiffener Repair (6x6x3/8) = 0.25 sf \* 15.3 lbs/sf = 3.83 lbs
      8. Girder 7 Span 2 @ Hinge 2 Web Repair (12x6x3/8) = 0.50 sf \* 15.3 lbs/sf = 7.65 lbs
      9. Total Plates = 5.74 lbs + 5.74 lbs + 7.65 lbs + 5.74 lbs + 63.75 lbs + 3.21 lbs + 3.83 lbs + 7.65 lbs = 103.31 lbs
   3. Grand Total = Crossframes + Plates = 674.64 lbs + 103.31 lbs = 778 lbs
2. Item 514, Field Painting Structural Steel, Intermediate Coat
   1. Crossframe F4 (Diagonals/Strut): 101.2’ length \* 1’ perimeter = 101.2 SF
   2. Crossframe F4 Plate: 1.11 SF \* 5 members = 5.6 SF
   3. Due to Welding Angles to Web: 1 SF \* 20 members = 20 SF
   4. Plate (30x12x5/8): 13.5 SF \* 1 member = 13.5 SF
   5. Plate (12x6x3/8): 7.5 SF \* 2 members = 15 SF
   6. Plate (9x6x3/8): 6.9 SF \* 3 members = 20.7 SF
   7. Plate (6x6x3/8) both sides: 12.5 SF \* 1 member = 12.5 SF
   8. Plate (5x6x3/8): 6 SF \* 1 member = 6 SF
   9. Grand Total = 101.2 SF + 5.6 SF + 20 SF + 13.5 SF + 15 SF + 20.7 SF + 12.5 SF + 6 SF = 194.5 SF round to 195 SF
3. Item 514, Field Painting Structural Steel, Finish Coat
   1. Grand Total = 195 SF

**Structures: MOT-35-1619 L**

1. Item 513, Structural Steel for Rehabilitation, As Per Plan
   1. Crossframes:
      1. F4 between Girders 1 & 2:
         1. Diagonal 1 (L3x3x5/16) = 5.27’ span \* 6.1 lbs/lf = 32.15 lbs \* 3 members = 96.44 lbs
         2. Diagonal 2 (L3x3x5/16) = 5.27’ span \* 6.1 lbs/lf = 32.15 lbs \* 3 members = 96.44 lbs
         3. Strut (L3x3x5/16) = 8.41’ span \* 6.1 lbs/lf = 51.3 lbs \* 3 members = 153.9 lbs
         4. Plate (10x8x1/2) = 0.56 SF \* 20.4 lbs/sf = 11.42 lbs \* 3 members = 34.26 lbs
      2. F4 between Girders 3 & 4:
         1. Diagonal 1 L3x3x5/16 = 5.27’ span \* 6.1 lbs/lf = 32.15 lbs
         2. Diagonal 2 L3x3x5/16 = 5.27’ span \* 6.1 lbs/lf = 32.15 lbs
         3. Strut L3x3x5/16 = 8.41’ span \* 6.1 lbs/lf = 51.3 lbs
         4. Plate 10x8x1/2 = 0.56 SF \* 20.4 lbs/sf = 11.42 lbs
      3. Total Crossframes = 96.44 lbs + 96.44 lbs + 153.9 lbs + 34.26 lbs + 32.15 lbs + 32.15 lbs + 51.3 lbs + 11.42 lbs = 508.06 lbs
   2. Plates:
      1. Girder 1 Span 1 @ Hinge 1 Web Repair (12x6x3/8) = 0.5 sf \* 15.3 lbs/sf = 7.65 lbs
      2. Girder 1 Span 2 @ Hinge 1 Web Repair (12x6x3/8) = 0.5 sf \* 15.3 lbs/sf = 7.65 lbs
      3. Girder 1 Span 2 @ Hinge 2 Web Repair (12x6x3/8) = 0.5 sf \* 15.3 lbs/sf = 7.65 lbs
      4. Girder 1 Span 3 @ Fwd. Abut. Web Repair (5x6x3/8) = 0.21 sf \* 15.3 lbs/sf = 3.21 lbs
      5. Girder 7 Span 1 @ 6th Intermediate Stiffener Repair (6x6x3/8) = 0.25 sf \* 15.3 lbs/sf = 3.83 lbs
      6. Girder 7 Span 2 @ Hinge 2 Web Repair (12x6x3/8) = 0.5 sf \* 15.3 lbs/sf = 7.65 lbs
      7. Girder 7 Span 3 @ Fwd. Abut. Web Repair (5x6x3/8) = 0.21 sf \* 15.3 lbs/sf = 3.2 lbs
      8. Total Plates = 7.65 lbs + 7.65 lbs + 7.65 lbs + 3.21 lbs + 3.83 lbs + 7.65 lbs + 3.2 lbs = 40.84 lbs
   3. Grand Total = Crossframes + Plates = 508.06 lbs + 40.84 lbs = 548.9 lbs round to 549 lbs
2. Item 514, Field Painting Structural Steel, Intermediate Coat
   1. Crossframe F4 (Diagonals/Strut): 75.4’ length \* 1’ perimeter = 75.4 SF
   2. Crossframe F4 Plate: 1.11 SF \* 4 members = 4.44 SF
   3. Due to Welding Angles to Web: 1 SF \* 16 members = 16 SF
   4. Plate (12x6x3/8): 7.5 SF \* 4 members = 30 SF
   5. Plate (6x6x3/8) both sides: 12.5 SF \* 1 member = 12.5 SF
   6. Plate (5x6x3/8): 6 SF \* 2 members = 12 SF
   7. Grand Total = 75.4 SF + 4.44 SF + 16 SF + 30 SF + 12.5 SF + 12 SF = 150.34 SF round to 151 SF
3. Item 514, Field Painting Structural Steel, Finish Coat
   1. Grand Total = 151 SF

**Structures: MOT-35-1848**

1. Item 514, Surface Preparation of Existing Structural Steel
   1. Beams:
      1. (36WF160): (162’ span – 2.75’ for encasement)/beam line \* 8.72’ perimeter = 1388.66 SF/beam line \* 15 beam lines = 20829.9 SF
         1. depth = 36.01”, width = 12”, web thickness = 0.65”, flange thickness = 1.02”
   2. Intermediate Crossframes:
      1. 8.73’ spacings:
         1. Strut/Diagonals: (8.73’ span \* 1’ perimeter) + (2 diagonals \* 1’ perimeter \* sqrt[(8.37’ span)^2 + (3’ depth)^2] = 26.51 SF \* 62 intermediate crossframes = 1643.62 SF
      2. 8.58’ spacings:
         1. Strut/Diagonals: (8.73’ span \* 1’ perimeter) + (2 diagonals \* 1’ perimeter \* sqrt[(8.58’ span)^2 + (3’ depth)^2] = 26.91 SF \* 72 intermediate crossframes = 1937.52 SF
      3. Total Intermediate Crossframes = 1643.62 SF + 1937.52 SF = 3581.14
   3. Grand Total = Beams + Intermediate Crossframes = 20829.9 SF + 3581.14 SF = 24,411.04 round to 24,450 SF
2. Item 514, Field Painting of Existing Structural Steel, Prime Coat
   1. Grand Total = 24,450 SF
3. Item 514, Field Painting Structural Steel, Intermediate Coat
   1. Grand Total = 24,450 SF
4. Item 514, Field Painting Structural Steel, Finish Coat
   1. Grand Total = 24,450 SF
5. Item 514, Grinding Fins, Tears, Slivers on Existing Structural Steel
   1. BDM 404.1.11 1 minute for each linear foot of beam/girder to be coated.
      1. Total linear beam line = 162’ \* 15 beam lines = 2430’
   2. Grand Total = 2430’ \* 1 min \* 1/60 (hr/min) = 40.5 MNHR round to 40 MNHR
6. Item 514, Final Inspection Repair
   1. Total linear beam line: 162’ \* 15 beam lines = 2430’/300’ = 8.1
   2. 2.5% of all crossframes: 134 crossframes \* 0.025 = 3.35
   3. Grand Total = 8.1 + 3.35 = 11.45 round to 11 EACH

**Structures: MOT-675-0447**

1. Item 512, Sealing of Concrete Surfaces (Epoxy-Urethane)
   1. Abutments:
      1. Rear:
         1. Front Face: 100.52’ span \* 23.4’ depth = 2352.17 SF
         2. Top Face: 100.52’ span \* 3’ depth = 301.56 SF
      2. Forward:
         1. Front Face: 106.67’ span \* 29.2’ depth = 3114.76 SF
         2. Top Face: 106.67’ span \* 3’ depth = 320.01 SF
      3. Total Abutments = 2352.17 SF + 301.56 SF + 3114.76 SF + 320.01 SF = 6088.5 SF
   2. Wingwalls:
      1. Wingwall A:
         1. Front Face: [(23.11’ depth + 9.41’ depth)/2] \* 46.5’ span = 756.09 SF
         2. Top Face: 46.5’ span \* 1.5’ depth = 69.75 SF
      2. Wingwall B:
         1. Front Face: [(22.55’ depth + 5.41’ depth)/2] \* 38’ span = 531.24 SF
         2. Top Face: 38’ span \* 1.5’ depth = 57 SF
      3. Wingwall C:
         1. Front Face: [(29.21’ depth + 4.5’ depth)/2] \* 72’ span = 1213.56 SF
         2. Top Face: 72’ span \* 1.5’ depth = 108 SF
      4. Wingwall D:
         1. Front Face: [(29.72’ depth + 10.3’ depth)/2] \* 46.5’ span = 930.47 SF
         2. Top Face: 46.5’ span \* 1.5’ depth = 69.75 SF
      5. Total Wingwalls = 756.09 SF + 69.75 SF + 531.24 SF + 57 SF + 1213.56 SF + 108 SF + 930.47 SF + 69.75 SF = 3735.86 SF
   3. Columns/Pier Cap:
      1. Columns: 2 \* π \* 1.5’ radius \* 8.18’ height = 77.09 SF \* 6 columns = 462.54 SF
      2. Pier Cap:
         1. Front/Back Face: (52.33’ span \* 5’ depth) + (53.67’ span \* 5.58’ depth) = 561.13 SF \* 2 faces = 1122.26 SF
         2. Top/Bot Face: 106.58’ span \* 3.5’ depth = 373.03 SF \* 2 faces = 746.06 SF
      3. Total Columns/Pier Cap = 462.54 SF + 1122.26 SF + 746.06 SF = 2330.86 SF
   4. Parapets:
      1. Front/Back Face: 278.2’ span \* 2.67’ height = 742.79 SF \* 2 faces = 1485.59 \* 2 parapet spans = 2971.18 SF
      2. Top Face: 278.2’ span \* 1’ thick = 278.2 SF \* 2 faces = 556.4 SF \* 2 parapet spans = 1112.8 SF
      3. Bot Face: 278.2’ span \* 2.03’ width = 564.75 SF \* 2 parapet faces = 1129.5 SF
      4. Total Parapets = 2971.18 SF + 1112.8 SF + 1129.5 SF = 5213.48 SF
   5. Grand Total = Abutments + Wingwalls + Columns/Pier Cap + Parapets = 6028.47 SF + 3735.86 SF + 2330.86 SF + 5213.48 SF = 17308.67 SF/9 SY = 1923.19 SY round to 1925 SY
2. Item 514, Surface Preparation of Existing Structural Steel
   1. Girders:
      1. Girder 1: (107.08’ span \* 15.31’ perimeter) + (72.54’ span \* 15.46’ perimeter) + (94.56’ span \* 14.81’ perimeter) = 4161.3 SF
      2. Girder 2: (107.08’ span \* 15.31’ perimeter) + (72.27’ span \* 15.46’ perimeter) + (94.20’ span \* 14.81’ perimeter) = 4151.8 SF
      3. Girder 3: (107.08’ span \* 15.31’ perimeter) + (72.01’ span \* 15.46’ perimeter) + (93.86’ span \* 14.81’ perimeter) = 4142.74 SF
      4. Girder 4: (107.08’ span \* 15.31’ perimeter) + (71.76’ span \* 15.46’ perimeter) + (93.55’ span \* 14.81’ perimeter) = 4134.28 SF
      5. Girder 5: (107.08’ span \* 15.31’ perimeter) + (71.53’ span \* 15.46’ perimeter) + (93.24’ span \* 14.81’ perimeter) = 4126.13 SF
      6. Girder 6: (107.08’ span \* 15.31’ perimeter) + (71.48’ span \* 15.46’ perimeter) + (93.17’ span \* 14.81’ perimeter) = 4124.32 SF
      7. Girder 7: (107.08’ span \* 15.31’ perimeter) + (71.48’ span \* 15.46’ perimeter) + (93.17’ span \* 14.81’ perimeter) = 4124.32 SF
      8. Girder 8: (107.08’ span \* 15.31’ perimeter) + (71.48’ span \* 15.46’ perimeter) + (93.17’ span \* 14.81’ perimeter) = 4124.32 SF
      9. Girder 9: (107.08’ span \* 15.31’ perimeter) + (71.48’ span \* 15.46’ perimeter) + (93.17’ span \* 14.81’ perimeter) = 4124.32 SF
      10. Girder 10: (105.47’ span \* 15.31’ perimeter) + (71.48’ span \* 15.46’ perimeter) + (93.17’ span \* 14.81’ perimeter) = 4103.81 SF
      11. Total Girders = 4161.3 SF + 4151.8 SF + 4142.74 SF + 4134.28 SF + 4126.13 SF + 4124.32 SF + 4124.32 SF + 4124.32 SF + 4124.32 SF + 4103.81 SF = 41317.32 SF
   2. Intermediate Crossframes:
      1. 8.53’ spacings:
         1. Strut/Diagonals: (8.53’ span \* 1.33’ perimeter) + (2 diagonals \* 1.33’ perimeter \* sqrt[(8.53’ span)^2 + (5.33’ depth)^2] = 38.1 SF \* 84 intermediate crossframes = 3200.4 SF
      2. 9’ spacings:
         1. Strut/Diagonals: (9’ span \* 1.33’ perimeter) + (2 diagonals \* 1.33’ perimeter \* sqrt[(9’ span)^2 + (5.33’ depth)^2] = 39.79 SF \* 108 intermediate crossframes = 4297.32 SF
      3. Total Intermediate Crossframes = 3200.4 SF + 4297.32 SF = 7497.72 SF
   3. Intermediate Plate Stiffener
      1. 8.77’ span \* 1.33’ perimeter = 11.66 SF \* 192 intermediate crossframes = 2238 SF
   4. End Crossframes:
      1. 10.97’ spacings: (10.97’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(10.97’ span)^2 + (5.33’ depth)^2] = 79.4 SF \* 4 end crossframes = 317.2 SF
      2. 11.58’ spacings: (11.58’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(11.58’ span)^2 + (5.33’ depth)^2] = 83.22 SF \* 6 end crossframes = 499.32 SF
      3. 10.72’ spacing: (10.72’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(10.72’ span)^2 + (5.33’ depth)^2] = 77.95 SF
      4. 9.39’ spacing: (9.39’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(9.39’ span)^2 + (5.33’ depth)^2] = 69.93 SF
      5. 11.1’ spacing: (11.1’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(11.1’ span)^2 + (5.33’ depth)^2] = 80.27 SF
      6. 11.89’ spacing: (11.89’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(11.89’ span)^2 + (5.33’ depth)^2] = 85.07 SF
      7. 11.84’ spacing: (11.84’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(11.84’ span)^2 + (5.33’ depth)^2] = 84.82 SF
      8. 11.80’ spacing: (11.80’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(11.80’ span)^2 + (5.33’ depth)^2] = 84.58 SF
      9. 11.77’ spacing: (11.77’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(11.77’ span)^2 + (5.33’ depth)^2] = 84.39 SF
      10. 11.07’ spacing: (11.07’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(11.07’ span)^2 + (5.33’ depth)^2] = 80.09 SF
      11. Total End Crossframes = 317.2 SF + 499.32 SF + 77.95 SF + 69.93 SF + 80.27 SF + 85.07 SF + 84.82 SF + 84.58 SF + 84.39 SF + 80.09 SF = 1463.62 SF
   5. Bearings:
      1. 2 SF \* 16 bearings = 32 SF
   6. Grand Total = Girders + Intermediate Crossframes + Intermediate Plate Stiffener + End Crossframes + Bearings = 41317.32 SF + 7497.72 SF + 2238 SF + 1463.62 SF + 32 SF = 52,548.66 SF round to 52,600 SF
3. Item 514, Field Painting of Existing Structural Steel, Prime Coat
   1. Grand Total = 52,600 SF
4. Item 514, Field Painting Structural Steel, Intermediate Coat
   1. Grand Total = 52,600 SF
5. Item 514, Field Painting Structural Steel, Finish Coat
   1. Grand Total = 52,600 SF
6. Item 514, Grinding Fins, Tears, Slivers on Existing Structural Steel
   1. BDM 404.1.11 1 minute for each linear foot of beam/girder to be coated.
      1. Total linear beam line = 271.94’ \* 10 beam lines = 2719.40’
   2. Grand Total = 2719.40’ \* 1 min \* 1/60 (hr/min) = 45.32 MNHR round to 46 MNHR
7. Item 514, Final Inspection Repair
   1. Total linear beam line: 271.94’ \* 10 beam lines = 2719.40’/300’ = 9.06
   2. 2.5% of all crossframes: 192 crossframes \* 0.025 = 4.95
   3. Grand Total = 9.06 + 4.8 = 13.86 round to 14 EACH
8. Item 516, Reset Bearing, As Per Plan
   1. Grand Total = 9 bearings rear abut. + 7 bearings fwd. abut. = 16 EACH
9. Item 516, Jacking and Temporary Support of Superstructure, As Per Plan
   1. Grand Total = Lump Sum (LS)

**Structures: MOT-725-1089**

1. Item 202, Portions of Structure Removed, Over 20 Foot Span, As Per Plan
   1. Grand Total = Lump Sum (LS)
2. Item 513, Structural Steel for Rehabilitation
   1. End crossframe unit between beam 5 and 6 Rear Abutment (2 each) + End crossframe unit between beam 6 and 7 Fwd. Abutment (1 each) – diagonal angle, 4” x 4” 5/16”, 3/8” thick plate, 3 each x 2.807 ft. x 8.2 lb/ft. = 69.05 lbs
   2. End crossframe unit between (beam 5 and 6 Rear Abut.) + (beam 6 and 7 Rear Abut.) + (beam 6 and 7 Fwd. Abut.) – bottom angle = 3 each x 9.34 ft. x 8.2 lb/ft. = 229.76 lbs
   3. End crossframe unit between beam 6 and 7 Fwd. Abut. diagonal angle = 2 each x 4.61 ft. x 8.2 lb/ft/ = 75.60 lbs
   4. Rear Abutment crossframe plate: assume 12” x 16” plate, 3/8” thick = 15.3 lb/ft. x 16 in. x (1 ft./12 in.) x 1 plate = 20.4 lbs
   5. Fwd. Abutment crossframe plate: assume 12” x 16” plate, 3/8” thick = 15.3 lb/ft. x 16 in. x (1 ft./12 in.) x 1 plate = 20.4 lbs
   6. Grand Total = 415.21 lbs = 415 LBS
3. Item 514, Surface Preparation of Existing Structural Steel
   1. Girders:
      1. Span 1: (834.75’ span – 110.1’ span) \* 13’ perimeter = 9420.45 SF \* 7 girder lines = 65943.15 SF
      2. Span 2: 110.1’ span \* 9.09’ perimeter = 999.9 SF \* 7 girder lines = 6999.3 SF
      3. Total Girders = 65943.15 SF + 6999.3 SF = 72942.45 SF
   2. Intermediate Crossframes:
      1. 2.5’ depth/9.37’ spacings:
         1. Strut/Diagonals: (9.37’ span \* 1.33’ perimeter) + (2 diagonals \* 1.33’ perimeter \* sqrt[(9.37’ span)^2 + (2.5’ depth)^2] = 38.26 SF \* 12 intermediate crossframes = 459.12 SF
      2. 4.5’ depth/9.37’ spacings:
         1. Strut/Diagonals: (9.37’ span \* 1.33’ perimeter) + (2 diagonals \* 1.33’ perimeter \* sqrt[(9.37’ span)^2 + (4.5’ depth)^2] = 40.11 SF \* 38 intermediate crossframes = 1524.18 SF
      3. Total Intermediate Crossframes = 459.12 SF + 1524.18 SF = 1983.3 SF \* 7 girder lines = 13883.1 SF
   3. End Crossframes:
      1. 2.5’ depth/9.37’ spacings:
         1. Strut/Diagonals: (9.37’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(3.04’ span)^2 + (2.5’ depth)^2] = 33.4 SF
         2. Plates approximated: (0.5’ span \* 0.5’ width) \* 3 plates = 0.75 SF
         3. Total = 33.4 SF + 0.75 SF = 34.15 SF \* 6 end crossframes = 204.9 SF
      2. 4.5’ depth/9.37’ spacings:
         1. Strut/Diagonals: (9.37’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(3.04’ span)^2 + (4.5’ depth)^2] = 41.35 SF
         2. Plates approximated: (0.5’ span \* 0.5’ width) \* 3 plates = 0.75 SF
         3. Total = 41.35 SF + 0.75 SF = 42.1 SF \* 6 end crossframes = 252.6 SF
      3. Total End Crossframes = 204.9 SF + 252.6 SF = 457.5 SF
   4. Water Line Support Brackets:
      1. Strut/Diagonals/Vertical: (5.83’ span \* 1.33’ perimeter \* 2 struts) + (1’ perimeter \* sqrt[(2.25’ span)^2 + (4.02’ estimated average depth)^2]) + (4.02’ depth \* 0.42’ width vertical) = 21.80 SF \* 68 Brackets = 1482.4 SF
   5. Grand Total = Girders + Intermediate Crossframes + End Crossframes + Water Line Support Brackets = 72942.45 SF + 13883.1 SF + 457.5 SF + 1482.4 SF = 88,765.45 SF round to 88,800 SF
4. Item 514, Field Painting of Existing Structural Steel, Prime Coat
   1. Grand Total = 88,800 SF
5. Item 514, Field Painting Structural Steel, Intermediate Coat
   1. Grand Total = 88,800 SF
6. Item 514, Field Painting Structural Steel, Finish Coat
   1. Grand Total = 88,800 SF
7. Item 514, Grinding Fins, Tears, Slivers on Existing Structural Steel
   1. BDM 404.1.11 1 minute for each linear foot of beam/girder to be coated.
      1. Total linear beam line = 834’ \* 7 beam lines = 5838’
   2. Grand Total = 5838’ \* 1 min \* 1/60 (hr/min) = 97.3 MNHR round to 98 MNHR
8. Item 514, Final Inspection Repair
   1. Total linear beam line: 834’ \* 7 beam lines = 5838’/300’ = 19.46
   2. 2.5% of all crossframes: 354 crossframes \* 0.025 = 8.85
   3. Grand Total = 19.46 + 8.85 = 28.31 round to 29 EACH
9. Item 516, Joint Sealer
   1. Approach Slab Joint Width = 53.42’ \* 2 approach slabs = 106.84’ + 13.5’ rear abut. Wingwall 2 + 8’ fwd. abut. Wingwall 3 = 128.34 ft round to 129 FT
   2. Grand Total = 129 FT
10. Item 516, Refurbish Bearing Device, As Per Plan
    1. Grand Total = 7 bearings rear abut. + 7 bearings fwd. abut. = 14 EACH
11. Item 516, Jacking and Temporary Support of Superstructure, As Per Plan
    1. Grand Total = Lump Sum (LS)
12. Item 517, Bridge Railing Rebuilt, As Per Plan
    1. Top Rail = 3.5” outside diameter aluminum tube = 8.33’ span
    2. Bot Rail = 4.5” outside diameter aluminum tube = 8.33’ span
    3. Grand Total = 8.33’ + 8.33’ = 16.66’ round to 17 FT
13. Item 519, Patching Concrete Structure, As Per Plan
    1. Rear Abutment = 1 SF + 4 SF + 2 SF + 4 SF = 11 SF
    2. Fwd. Abutment = 16 SF + 6 SF + 1 SF + 4 SF + 25 SF = 52 SF
    3. Grand Total = Rear Abutment + Fwd. Abutment = 11 SF + 52 SF = 63 SF
14. Item 519, Patching Concrete Bridge Deck – Type B
    1. Rear Abutment/Approach Slab = 3 SF + 54 SF + 3 SF + 12 SF = 72 SF/9 SY = 8 SY
    2. Fwd. Abutment/Approach Slab = 12 SF + 110 SF + 12 SF + 28 SF = 162 SF/9 SY = 18 SY
    3. Grand Total = Rear Abutment/Approach Slab + Fwd. Abutment/Approach Slab = 8 SY + 18 SY = 26 SY
15. Item 53000400, Structures, Misc.: Cleaning of Abutment Seats
    1. Grand Total = 2 EACH
16. Item 842, Correcting Elevation of Concrete Approach Slabs with High Density Polyurethane
    1. Example project MOT-70-3.44 PID 79535 Old Plan Sheet Approach Slabs measured = (697.57 sq. ft. + 731.7 sq. ft. + 954.54 sq. ft. + 954.15 sq. ft. + 1016.57 sq. ft. + 1008.62 sq. ft. = 5363.15 sq. ft.; Plans had quantity of 7480 lbs., Paid quantity was 6,061 lbs
    2. For current project, MOT-725-1089 plan area (approach slab + pavement) = 4037.5 sq. ft.; (5363.15 sq. ft./6061 lbs) = (4037.5 sq. ft./x) = x = 4562.86 lbs x 1.10 (10% for unknowns) = 5019.14 lbs = 5020 lbs = Grand Total

**Structures: MOT-725-1606**

1. Item 512, Sealing of Concrete Surfaces (Epoxy-Urethane)
   1. Abutments:
      1. Rear:
         1. Front Face: 103.61’ span \* 22.88’ depth = 2370.6 SF
         2. Side Face: 2 sides \* (0.5 \* 63.75’ span \* 22.81’ depth) = 1454.14 SF
         3. Top Face: 103.61’ span \* 1.5’ depth = 155.42 SF
         4. Total Rear = 2370.6 SF + 1454.14 SF + 155.42 SF = 3980.16 SF
      2. Forward:
         1. Front Face: 103.61’ span \* 22.64’ depth = 2345.73 SF
         2. Side Face: 2 sides \* (0.5 \* 66’ span \* 22.64’ depth) = 1494.24 SF
         3. Top Face: 103.61’ span \* 1.5’ depth = 155.42 SF
         4. Total Forward = 2345.73 SF + 1494.24 SF + 155.42 SF = 3995.39 SF
      3. Total Abutments = 3980.16 SF + 3995.39 SF = 7975.55 SF
   2. Columns/Pier Cap:
      1. Columns: 2 \* π \* 1.5’ radius \* 11.02’ height = 103.86 SF \* 8 columns = 830.89 SF
      2. Pier Cap:
         1. Front/Back Face: 52.33’ span \* 5.27’ depth = 275.78 SF \* 2 spans = 551.56 SF \* 2 faces = 1103.12 SF
         2. Top/Bot Face: 52.33’ span \* 3.5’ depth = 183.16 SF \* 2 spans = 366.32 SF \* 2 faces = 732.64 SF
      3. Total Columns/Pier Cap = 830.89 SF + 1103.12 SF + 732.64 SF = 2666.65 SF
   3. Parapets:
      1. Bot Face: 286.52’ span \* 3.73’ perimeter = 1068.72 SF
      2. Parapet Transitions: (65’+ 60’ + 63’ + 60’ spans) \* 6.34’ perimeter = 1572.32 SF
      3. Total Parapets = 1068.72 SF + 1572.32 SF = 2641.04 SF
   4. Grand Total = Abutments + Columns/Pier Cap + Parapets = 9485.25 SF + 2666.65 SF + 2641.04 SF = 7396.47 SF/9 SY = 1643.66 SY round to 1650 SY
2. Item 512, Removal of Existing Coatings from Concrete Surfaces
   1. Grand Total = 1650 SY
3. Item 513, Structural Steel, Misc.: End Frame Weld Repair
   1. Grand Total = Lump Sum (LS)
4. Item 514, Surface Preparation of Existing Structural Steel
   1. Girders:
      1. (280’ span \* 15.48’ perimeter) = 4334.4 SF \* 10 Girder lines = 43344 SF
   2. Intermediate Crossframes:
      1. 8.83’ spacings:
         1. Strut/Diagonals: (8.83’ span \* 1.33’ perimeter) + (2 diagonals \* 1’ perimeter \* sqrt[(8.33’ span)^2 \* (5.5’ depth)^2] = 31.71 SF \* 152 intermediate crossframes = 4819.92 SF
   3. Intermediate Plate Stiffeners:
      1. (1.5’ width \* 5.5’ depth) = 8.25 SF \* 56 plate stiffeners = 462 SF \* 10 Girders = 4620 SF
   4. End Crossframes:
      1. 11.51’ end crossframes:
         1. Strut/Diagonals: (11.51’ span \* 1.33’ perimeter) + (4 diagonals \* 1.33’ perimeter \* sqrt[(3.83’ span)^2 + (5.5’ depth)^2] = 50.96 SF
         2. Plates approximated: (0.5’ span \* 0.5’ width) \* 3 plates = 0.75 SF
         3. Total = 50.96 SF + 0.75 SF = 51.71 SF \* 18 end crossframes = 930.78 SF
   5. Scuppers:
      1. (2 \* π \* .33’ radius) \* 2.5’ depth = 5.18 SF \* 60’ span = 310.8 SF
   6. Bearings:
      1. 2 SF approx. \* 20 bearings = 40 SF
   7. Grand Total = Girders + Intermediate Crossframes + End Crossframes + Scuppers + Bearings = 43344 SF + 4819.92 SF + 4620 SF + 930.78 SF + 310.8 SF + 40 SF = 54,065.5 SF round to 54,100 SF
5. Item 514, Field Painting of Existing Structural Steel, Prime Coat
   1. Grand Total = 54,100 SF
6. Item 514, Field Painting Structural Steel, Intermediate Coat
   1. Grand Total = 54,100 SF
7. Item 514, Field Painting Structural Steel, Finish Coat
   1. Grand Total = 54,100 SF
8. Item 514, Grinding Fins, Tears, Slivers on Existing Structural Steel
   1. BDM 404.1.11 1 minute for each linear foot of beam/girder to be coated.
      1. Total linear beam line = 280’ \* 10 beam lines = 2800’
   2. Grand Total = 2800’ \* 1 min \* 1/60 (hr/min) = 46.67 MNHR round to 47 MNHR
9. Item 514, Final Inspection Repair
   1. Total linear beam line: 280’ \* 10 beam lines = 2800’/300’ = 9.33
   2. 2.5% of all crossframes: 162 crossframes \* 0.025 = 4.05
   3. Grand Total = 9.33 + 4.05 = 13.38 round to 14 EACH
10. Item 516, Reset Bearing, As Per Plan
    1. Grand Total = 2 bearings rear abut. + 4 bearings fwd. abut. = 6 EACH
11. Item 516, Jacking and Temporary Support of Superstructure, As Per Plan
    1. Grand Total = Lump Sum (LS)

**Maintenance of Traffic**

1. Item 614, Law enforcement officer with patrol car for assistance
   1. Grand Total = 200 HOUR
2. Item 614, Work Zone Impact Attenuator, 24” Wide Hazards, (Unidirectional)
   1. MOT-675-0447
      1. From 1 run portable barrier @ 1 end = 1
   2. MOT-725-1606
      1. From 3 run portable barrier @ 1 end each = 3
   3. Grand Total = 1 + 3 = 4 EACH
3. Item 614, Work Zone Impact Attenuator, 24” Wide Hazards, (Bidirectional)
   1. MIA-571-0234
      1. From 1 run portable barrier @ each end = 2
   2. Grand Total = 2 EACH
4. Item 614, Detour Signing
   1. Grand Total = Lump Sum (LS)
5. Item 614, Work Zone Lighting System
   1. MIA-571-0234
      1. 3 signals for signalized closure.
   2. Grand Total = 3 EACH
6. Item 614, Barrier Reflector, Type 1 (Bidirectional)
   1. MIA-571-0234
      1. (1 reflector/50’ portable barrier) \* 300’ length = 7 EACH
   2. Grand Total = 7 EACH
7. Item 614, Barrier Reflector, Type 1 (One Way)
   1. Grand Total = (1 reflector/50’ portable barrier) \* 1600’ length = 32 EACH
8. Item 614, Object Marker, One Way
   1. Grand Total = (1 reflector/50’ portable barrier) \* 1600’ length = 32 EACH
9. Item 614, Object Marker, Two Way
   1. MIA-571-0234
      1. (1 reflector/50’ portable barrier) \* 300’ length = 6 EACH
   2. Grand Total = 6 EACH
10. Item 614, Portable Changeable Message Sign, As Per Plan
    1. Grand Total = 1 SNMT
11. Item 614, Work Zone Edge Line, Class I, 6”, 740.06, Type 1
    1. MIA-571-0234
       1. 0.09 mile (WZEL-1) + 0.06 mile (WZEL-2) = 0.15 MILE
    2. MOT-725-1606
       1. NB inside lane = 0.24 MILE
    3. Grand Total = 0.15 MILE + 0.24 MILE = 0.39 MILE
12. Item 614, Work Zone Stop Line, Class I, 740.06, Type 1
    1. MIA-571-0234
       1. 2 stop bar locations \* 10’ length = 20’
    2. Grand Total = 20 FT
13. Item 622, Portable Barrier, Unanchored
    1. MIA-571-0234
       1. WB lane = 300’
    2. MOT-675-0447
       1. SB outside shoulder = 320’
    3. MOT-725-1606
       1. NB inside lane = 410’
       2. SB outside shoulder = 330’
       3. EB 725 to NB 675 ramp = 220’
    4. Grand Total = 300’ + 320’ + 410’ + 330’ + 220’ = 1580’ round to 1600 FT

**Incidentals**

1. Item 614, Maintaining Traffic
   1. Grand Total = Lump Sum (LS)
2. Item 624, Mobilization
   1. Grand Total = Lump Sum (LS)

**END OF CALCULATIONS**