**PID 108092, MOT-BH-FY24: QUANTITY CALCULATIONS**

Calculated by: *Parker Brown, Date: 1/3/23*

Checked by:

Revised by: Parker Brown 4/26/23-5/4/23 , Parker Brown 5/17/23-5/18/23, Parker Brown 5/23/23

*Plan Splits:*

1. *01/IMS/13*
   1. *MOT-70-1062*
   2. *MOT-70-1420N*
2. *02/S>2/13*
   1. *MOT-201-0990*
3. *03/NHS/13*
   1. *MOT-49-0621*
   2. *MOT-49-0810*

**Roadway**

1. CLEARING AND GRUBBING
   1. MOT-70-1420N : 600sf + 800sf + 500sf + 700sf = 2600sf / 9 = 289sy LS
2. Item 202 Curb Removed
   1. *01/IMS/13* 
      1. *MOT-70-1420N = 40ft +40ft = 80ft*
3. Item 202E23500 wearing course removed
   1. MOT-49-0621:
      1. Off Bridge: 14553.4sf (from ORD)/9 = 1617sy
      2. On Bridge: ((72’ x 66.72’)) = 4805.28sf/9= 534sy
      3. Total = 2151sy
   2. MOT-49-0810:
      1. Off Bridge: 16479.82sf (from ORD)/9 = 1832sy
      2. On Bridge: ((72’ x 66.52’)) = 4789.44sf/9= 533sy
      3. Total = 2365sy
   3. MOT-70-1062:
      1. Off Bridge: 5201.65sf (from ORD)/9 = 578sy
      2. Total = 578sy
   4. MOT-70-1420N:
      1. Off Bridge: 4009.29sf (from ORD)/9 = 446sy
      2. Total = 446sy
   5. MOT-201-0990:
      1. Off Bridge: 4838.51sf (from ORD)/9 = 537
      2. Total = = 537
4. *01/IMS/13 = 1024sy*
   1. *MOT-70-1062*
   2. *MOT-70-1420N*
5. *02/S>2/13 = 537*
   1. *MOT-201-0990*
6. *03/NHS/13 = 4516sy*
   1. *MOT-49-0621*
   2. *MOT-49-0810*
7. *Item 606 Guardrail, Type MGS*
   1. *01/IMS/13* 
      1. *MOT-70-1420N*
         1. *NE = 3posts 3 panels = 12.5ft x 3 = 38ft*
         2. *NW = 1 post*
         3. *SW = 3posts 3 panels = 12.5ft x 3 = 38ft*
         4. *Total = 76ft*
   2. *03/NHS/13* 
      1. *MOT-49-0621 =137.5’+112.5+50’+125’ = 425’*
      2. *MOT-49-0810 = 25’+87.5’+87.5+25 = 225’*
      3. *Total = 650’*
8. *Item 606 Anchor Assembly, MGS Type E*
   1. *03/NHS/13* 
      1. *MOT-49-0810 = 1 each*
9. *Item 606 Anchor Assembly, MGS Type B*
   1. *03/NHS/13* 
      1. *MOT-49-0621 = 1 each*
10. *Item 606 Anchor Assembly, MGS Type T*
    1. *03/NHS/13* 
       1. *MOT-49-0621 = 2 each*
       2. *MOT-49-0810 = 3 each*
11. *Item 202 Guardrail Removed*
    1. *01/IMS/13* 
       1. *MOT-70-1420N*
          1. *NE = 3posts 3 panels = 12.5ft x 3 = 38ft*
          2. *NW = 1 post*
          3. *SW = 3posts 3 panels = 12.5ft x 3 = 38ft*
          4. *Total = 76ft*
    2. *03/NHS/13* 
       1. *MOT-49-0621 = 25’NW+50’NE+138’SE+150’SW = 363’*
       2. *MOT-49-0810 = 113’SE+63’NE+113’NW+63SW=352’*
       3. *Total = 715’*
12. *Item 202 Guardrail Removed for Reuse*
    1. *01/IMS/13* 
       1. *MOT-70-1420N*
          1. *1 Panel at each bridge limit for joint replacement = 4 x 12.5’ = 50ft*
13. *Item 202 Anchor Assembly Removed, Type E*
    1. *03/NHS/13* 
       1. *MOT-49-0810: 1 Lt Fwd*
14. *Item 202 Anchor Assembly Removed, Type T*
    1. *03/NHS/13* 
       1. *MOT-49-0621: Each quad except Rt Fwd and Lt Fwd = 2*
       2. *MOT-49-0810: Each quad = 4*
       3. *Total = 6*
15. *Item 606 MGS Bridge Terminal Assembly*
    1. *8 total. 4 at each 49 bridge*

**Erosion Control**

1. *Item 203 Embankment* 
   1. *NE = 10’ x 5’ x 1’ = 50cf/27 = 2cy*
   2. *NW = 15’ x 5’ x 1’ =75cf/27 = 3cy*
   3. *MOT-70-1420N Total = 5cy*
2. Item 659E10000 Seeding and Mulching
   1. MOT-49-0621 : 1900sf + 1900sf + (450sf x 4quads) = 5600sf / 9 = 623sy
   2. MOT-49-0810 : 1200sf + 1900sf + (450sf x 4quads) = 4900sf / 9 = 545sy
   3. MOT-70-1062 : none should be needed
   4. MOT-70-1420N : 600sf + 800sf + 500sf + 700sf + 900sf = 3500sf / 9 = 389sy
   5. *MOT-201-0990 (East Side only): 492 + 517 = 1009sf/9 =113sy*
   6. *01/IMS/13 = 389sy*
      1. *MOT-70-1062*
      2. *MOT-70-1420N*
   7. *02/S>2/13 = 113sy*
      1. *MOT-201-0990 (Median only)*
   8. *03/NHS/13 = 1168sy / 2 (per Dans recommendation) = 584sy*
      1. *MOT-49-0621*
      2. *MOT-49-0810*
3. *Item 659E10100 Seeding and Mulching for Wildlife*
   1. *02/S>2/14 = ~~312sy~~ = 318sf + 377sf = 695sf/9 = 78sy*
      1. *MOT-201-0990 (East Side only)*
4. Item 659E14000 Repair Seeding and Mulching
   1. 5% of total
   2. *01/IMS/14 = 389sy x 0.05 =20sy*
      1. *MOT-70-1062*
      2. *MOT-70-1420N*
   3. *02/S>2/14 = (113sy+78sy) x 0.05 =10sy*
      1. *MOT-201-0990*
   4. *03/NHS/14 = 584sy x 0.05 =30sy*
      1. *MOT-49-0621*
      2. *MOT-49-0810*
5. Item 659E20000 Commercial Fertilizer
   1. *01/IMS/14 = 3501sf* x (30lbs/1000sf) = 105lbs/ (2000lbs/ton) = = 0.05tons
      1. *MOT-70-1062*
      2. *MOT-70-1420N*
   2. *02/S>2/14 = 1719sf* x (30lbs/1000sf) = 51.57lbs / (2000lbs/ton) = = 0.03tons
      1. *MOT-201-0990*
   3. *03/NHS/14 = 10512sf 5256sf* x (30lbs/1000sf) = 157.68lbs/ (2000lbs/ton) = = 0.08ton
      1. *MOT-49-0621*
      2. *MOT-49-0810*
6. Item 659E35000 Water
   1. *01/IMS/14 =* 2 applications of 0.0027M.Gal/1sy : 2(389sy x (0.0027M.Gal/1sy)) = 2M.Gal
      1. *MOT-70-1062*
      2. *MOT-70-1420N*
   2. *02/S>2/14 =* 2 applications of 0.0027M.Gal/1sy : 2(191sy x (0.0027M.Gal/1sy)) = 1M.Gal
      1. *MOT-201-0990*
   3. *03/NHS/14 = 1168sy* 2 applications of 0.0027M.Gal/1sy : 2(584sy x (0.0027M.Gal/1sy)) = = 3M.Gal
      1. *MOT-49-0621*
      2. *MOT-49-0810*
7. Item 832E30000 Erosion Control
   1. 1000 each for each structure (per Dan)
   2. *01/IMS/14 =* 2000
      1. *MOT-70-1062*
      2. *MOT-70-1420N*
   3. *02/S>2/14 =* 1000
      1. *MOT-201-0990*
   4. *03/NHS/14 = 2000*
      1. *MOT-49-0621*
      2. *MOT-49-0810*

**Pavement**

1. Item 203E10000 Excavation
   1. *01/IMS/13*
      1. *MOT-70-1420N =* ((117.71+39.46)x2) = 314.34sf x 1.25ft depth = 392.93cf / 27 = 14.55cy = 15cy
2. Item 204E10000 Subgrade Compaction
   1. *01/IMS/13*
      1. *MOT-70-1420N =* ((117.71+39.46)x2) = 314.34sf / 9 = 34.93sy = 35sy
3. Item 304E20000 Aggregate Base
   1. *01/IMS/13*
      1. *MOT-70-1420N =* 314.34sf x 0.5ft thick = 157.17cf / 27 = 5.82cy = 6cy
4. Item 301E56000 Asphalt Concrete Base, PG64-22, (449)
   * 1. *01/IMS/13*
     2. *MOT-70-1420N =* 314.34sf x 0.5ft thick = 157.17cf / 27 = 5.82cy = 6cy
5. Item 407 Non-tracking Tack coat
   1. MOT-49-0621: 14553.4sf (from ORD)/9 = 1617sy x 0.085 = 138Gal
   2. MOT-49-0810: 16479.82sf (from ORD)/9 = 1832sy x 0.085 = 156Gal
   3. MOT-70-1062: 5201.65sf (from ORD)/9 = 578sy x 0.085 = 50Gal
   4. MOT-70-1420N: 3679.63sf + 314.34sf (from ORD)/9 =443.78sy x 0.085 = 38Gal
   5. MOT-201-0990: 4838.51sf (from ORD)/9 = 537sy x 0.085 = 46Gal
   6. *01/IMS/14 =* 88Gal
      1. *MOT-70-1062*
      2. *MOT-70-1420N*
   7. *02/S>2/14 =* 46Gal
      1. *MOT-201-0990*
   8. *03/NHS/14 = 294Gal*
      1. *MOT-49-0621*
      2. *MOT-49-0810*
6. Item 441 Asphalt concrete surface course, Type 1, (449), PG70-22M
   1. MOT-49-0621: 14553.4sf (from ORD) = 14553.4 x (1.5”/12) = 1819.18 CF / 27 = 68cy
   2. MOT-49-0810: 16479.82sf (from ORD) = 16479.82sf x (1.5”/12) = 2059.98 CF / 27 = 77cy
   3. MOT-70-1062: 5201.65sf (from ORD) = 5201.65sf x (1.5”/12) = 650.21 CF / 27 = 24cy
   4. MOT-70-1420N: 3679.63sf x (1.5”/12) = = 459.96cf / 27 = 18cy
   5. MOT-70-1420N Pavement Rebuild (from ORD): 314.34sf x 0.25ft thick = 78.59cf / 27 = 2.91cy = 3cy
   6. MOT-201-0990: 4838.51sf (from ORD) = 4838.51sf x (1.5”/12) = 604.81 CF / 27 = 23cy
   7. *01/IMS/14* = 45cy
      1. *MOT-70-1062*
      2. *MOT-70-1420N*
   8. *02/S>2/14 =* 23cy
      1. *MOT-201-0990*
   9. *03/NHS/14 = 145cy*
      1. *MOT-49-0621*
      2. *MOT-49-0810*
7. Item 609E24510 Curb, Type 4-C
   1. MOT-70-1420N = 80ft

**Traffic Control**

1. Item 621E5400 Raised Pavement Marker Removed
   1. MOT-70-1420N: 2 Each
2. Item 626E01100 Barrier Reflector, Type 2, One way
   1. *03/NHS/14*
      1. *MOT-49-062: 11*
      2. *MOT-49-0810: 10*
      3. *Total = 21*
3. Item 630E80101 Sign, Flat Sheet, APP
   1. *01/IMS/14* 
      1. *MOT-70-1420N: 1 sign each abut,* See sheet 3, MOT-70-1420N = 2sf
   2. *03/NHS/14*
      1. *MOT-49-062: 1 signs on each rail = 2 each = 2sf*
      2. *MOT-49-0810: 1 signs on each rail = 2 each = 2sf*
4. Item 646E10010: Edge Line 6” (Mile)
   1. *01/IMS/14* 
      1. *MOT-70-1420N: (312.45’ x 2 edge lines) = 624.9’ = 0.118 Miles*
   2. *03/NHS/14*
      1. *MOT-49-0621: 0.77 Miles*
      2. *MOT-49-0810: 0.69 Miles*
      3. *Total = 1.46 Miles*
5. Item 646E10200: Center Line (Double Solid) (Mile)
   1. *01/IMS/14* 
      1. *MOT-70-1062: 0.31 Miles*
      2. *MOT-70-1420N: 312.45’ = 0.059 Miles*
      3. *Total = 0.37 Miles*
6. Item 646E10110: Lane Line 6” (Mile)
   1. *01/IMS/14* 
      1. *MOT-70-10620: 0.31 Miles*
   2. *02/S>2/14* 
      1. *MOT-201-0990: (122.5’ x 2 lane lines) = 245’ = 0.046 Miles*
   3. *03/NHS/14* 
      1. *MOT-49-0621: 0.50 Miles*
      2. *MOT-49-0810: 1.06 Miles*
7. Item 646E10300: Channelizing Line, 8”
   1. *01/IMS/14* 
      1. *MOT-70-1062: 50’*
   2. *03/NHS/14* 
      1. *MOT-49-0810: 45’*
   3. *Total = 95’*
8. Item 646E20300: Lane Arrow
   1. *01/IMS/14* 
      1. *MOT-70-1062: 3 each*
   2. *03/NHS/14* 
      1. *MOT-49-0810: 1 each*
   3. *Total = 4 each*

**Structure: MOT-49-0621**

1. *Item 202 Portions of Structure removed, Over 20-foot span, as per plan*
   1. *Lump Sum (LS)*
2. *Item 202 Bridge Railing Removed*
   1. *66.74ft x 2 = 134ft*
3. *Item 202 Bridge Terminal Assembly Removed*
   1. *4 each*
4. *Item 509 Reinforcing Steel, Replacement of reinforcing steel, APP*
   1. *Total = 100lb*
5. *Item 509 Uncoated Steel Reinforcement (LB)*
   1. *Rear Abut = 843lbs*
   2. *Fwd Abut = 837lbs*
   3. *Deck Edges = 3572lbs*
   4. *Total = 5252lbs*
6. *Item 510 Dowel holes with nonshrink, nonmetallic grout*
   1. *Abutment Refacing = 78 + 79 = 157 total*
7. *Item 511 Class QC2 concrete, Superstructure*
   1. *Deck edges =4.33sf x 66.74ft = 289cf x 2 sides =578cf/27 = 22cy*
8. *Item 511 Concrete Misc.: Embedded Galvanic Anodes (EGA)*
   1. *2ft spacing = 33 anodes each side = 66anodes*
9. *Item 514 Field Painting, Misc: Zinc Rich Primer*
   1. *Estimated from pictures*
      1. *2sf + 8sf + 24sf + 8sf + 21sf + 2sf + 2sf = 67sf*
10. *Item 516 2” deep joint sealer, APP*
    1. *((36/cos(30)) x 2 = 83.14’ road width x 2) = 167ft*
11. *Item 516 1/2” Preformed Expansion Joint Filler*
    1. *Rear Abutment = (50ft + 50.666) x 0.5ft = 50.333sf = 51sf*
    2. *Fwd Abutment = (50ft + 49.25ft) x 0.5ft = 49.63sf = 50sf*
    3. *Total = 101sf*
12. *Item 516 1” Preformed Expansion Joint Filler*
    1. *Rear Abutment = 4.79ft x 0.5ft = 2.40sf*
    2. *Fwd Abutment = 4.73ft x 0.5ft = 2.37sf*
    3. *Total = 4.77sf = 5sf*
13. *Item 517 Railing (Three Steel tube bridge railing)*
    1. *Typical Railing Plan Details = (60ft + 8ft + 8ft) x 2 sides = 152ft*
14. *Item SPECIAL 51822300 Steel Drip Strip*
    1. *(9 Posts on bridge per side x 1.5’ + 66.74’) x 2 sides = 161sf*
15. *Special Item 530 Structures, Misc.: Abutment Refacing with Galvanic Anode Protection*
    1. *Rear Abutment*
       1. *Abutment Detail Table = 300sf + 200sf = 500sf*
    2. *Fwd Abutment*
       1. *Abutment Detail Table 295sf + 200sf = 495sf*
    3. *Total = 995sf*
16. *Item 848 Superplasticized Dense concrete overlay using hydrodemolition, 1 ¾”*
    1. *(38’x66.74’) x 2 sides = 5073sf/9 = 564sy*
17. *Item 848 Surface preparation using hydrodemolition, APP*
    1. *See above = 564sy – (3ft deck edge x 66.74ft x 2sides)/9 = 520sy*
18. *Item 848 Superplasticized Dense concrete overlay (variable thickness), Material Only*
    1. *Buried Slabs*
    2. *Project photos/digiphotos shows moderate wearing surf distress (~20%).*
    3. *Both inside curbs are like gravel due to partial Curb removal*
    4. *Saturated areas on floor, spalls and eflo.*
    5. *Slab, built in 1966 without asphalt wearing surf.*
    6. *Orig cover 2" & prop. Cover 1.25”*
    7. *Assume 50% variable depth (visible condition + asphalt)*
    8. *Variable area = 50% x 4672 sf = 2336sf*
    9. *Use BDM 403.4.1 Thick = 2"*
    10. *Var. Vol = 2336sf x 2"/12 = 389cf/27 = 14cy*
19. *Item 848 hand chipping*
    1. *BDM 403.4.1: 10% of variable area*
       1. *D7: Use 20% var area (for asphalt)*
       2. *0.20 x 2336sf = 467sf (10% hydro area, OK)/9 = 52sy*
20. *Item 848 Test slab*
    1. *Lump Sum (LS)*
21. *Item 848 Full-Depth Repair*
    1. *Assume Vol = 1cy*

**Structure: MOT-49-0810**

1. *Item 202 Portions of Structure removed, Over 20-foot span, as per plan*
   1. *Lump Sum (LS)*
2. *Item 202 Bridge Railing Removed*
   1. *66.52ft x 2 = 134ft*
3. *Item 202 Bridge Terminal Assembly Removed*
   1. *2 each*
4. *Item 509 Reinforcing Steel, Replacement of reinforcing steel, APP*
   1. *Total = 100lb*
5. *Item 509 Uncoated Steel Reinforcement (LB)*
   1. *Deck Edges = ~~3403lbs~~ 3572lbs*
6. *Item 511 Class QC2 concrete, ~~Bridge Deck~~ , Superstructure*
   1. *Deck edges = 4.33sf x 66.74ft = 289cf x 2 sides =578cf/27 =22cy*
7. *Item 511 Concrete Misc.: Embedded Galvanic Anodes (EGA)*
   1. *2ft spacing = 33 anodes each side = 66anodes*
8. *Item 516 2” deep joint sealer, APP*
   1. *((36/cos(10)) x 2 = 73.11’ road width x 2) = 147ft*
9. *Item 517 Railing (Three Steel tube bridge railing)~~, APP~~*
   1. *Typical Railing Plan Details = (60ft + 8ft + 8ft) x 2 sides = 152ft*
10. *Item SPECIAL 51822300 Steel Drip Strip*
    1. *(9 Posts on bridge per side x 1.5’ + 66.52’) x 2 sides =161ft*
11. *Item 844 Patching Concrete Structure, APP*
    1. *Forward and Rear Abut table = 80sf*
12. *Item 848 Superplasticized Dense concrete overlay using hydrodemolition, 1 ¾”*
    1. *(36’x66.52’) x 2 sides = 4790/9 = 532.22sy = 533sy*
13. *Item 848 Surface preparation using hydrodemolition, APP*
    1. *See above = 533sy - (3ft deck edge x 66.52ft x 2sides)/9 = 489sy*
14. *Item 848 Superplasticized Dense concrete overlay (variable thickness), Material Only* 
    1. *Buried Slabs, New pavement*
    2. *Asphalt up to curbs*
    3. *Saturated areas on floor, spalls and eflo.*
    4. *Slab, built in 1966 without asphalt wearing surf.*
    5. *Orig cover 2" & prop. Cover 1.25”*
    6. *Assume 50% variable depth (visible condition + asphalt)*
    7. *Variable Area = 50% x 4390sf = 2195sf*
    8. *Use BDM 403.4.1 Thick = 2"*
    9. *Var. Vol = 2195sf x 2"/12 = 366cf/27 = 14cy*
15. *Item 848 hand chipping*
    1. *BDM 403.4.1: 10% of variable area*
       1. *D7: Use 20% var area (for asphalt)*
       2. *0.20 x 2195sf = 439sf (10% hydro area, OK)/9 = 49sy*

**Structure: MOT-70-1062**

1. *Item 509E20001 Reinforcing Steel, Replacement of reinforcing steel, APP*
   1. *Total = 100lb*
2. *Item 516 1/2” Preformed Expansion Joint Filler*
   1. *(3.5ft x 4”/12) x 2 sides = 3sf*
3. *Item 519 patching Concrete Structure, APP*
   1. *Fwd Catch basin curtain = 3sf x 2 = 6sf*
   2. *Fwd curb = 4sf*
   3. *Rear curb = 7sf*
   4. *Total = = 17sf*
4. *Item 607 Special – Vandal Protection Fence, APP*
   1. *VPF spacing = (7’ + 89.917’ + 4.917’ + 89.917’ + 7’) x 2 sides = 398ft*
5. *Item 611 Manhole adjusted to Grade*
   1. *1 Manhole*
6. *Item 848 Superplasticized Dense concrete overlay using hydrodemolition, 1 ¾”*
   1. *212’ x 52’ = 11024sf/9 = 1224.89sy = 1225sy*
7. *Item 848 Surface preparation using hydrodemolition, APP*
   1. *See above = 1225sy*
8. *Item 848 Superplasticized Dense concrete overlay (variable thickness), Material Only*
   1. *Recent Inspection report has ~10% of WS in CS2 for cracks, delams, and a 50sf patch. ~1% is in CS3 for wide cracks and heavy scale.*
   2. *~4% of floor is in CS2 for trans/diag cracks and some efflo. Isolated heavy efflo as well*
   3. *Slab, built in 1994*
   4. *Orig cover 2.5" & prop. Cover 1.75”*
   5. *Assume unsound area of 30% (due to eflo, spalls, and inside curb condition) from field notes.*
   6. *BDM T403-3: Var. Thick. Area = 55%*
   7. *Winter adjustment = 55% x 1.10 (one winter) = 60.5%*
   8. *Var. Area = 11024sf x 0.605 = 6669.5sf/9 = 742sy*
   9. *Use BDM 403.4.1 Thick = 2"*
   10. *Var. Vol = 6669.5sf x 2"/12 = 1111.58cf/27 = 42cy*
9. *Item 848 hand chipping*
   1. *BDM 403.4.1: 10% of variable area*
      1. *0.10 x 6669.5sf = ~~1102.4sf~~ 666.95sf/9 = ~~122.5sy = 123sy~~ = 75sy*
10. *Item 848 Full-Depth Repair*
    1. *Assume Vol = 2cy @ pier*

**Structure: MOT-70-1420N**

1. *Item 202 Portions of Structure removed, Over 20-foot span, as per plan*
   1. *Lump Sum (LS)*
2. *Item 202 Vandal Protection Fence Removed and Reset*
   1. *1 post at each end and each side = (4posts x 9’) =36ft*
3. *Item 509 Reinforcing Steel, Replacement of reinforcing steel, APP*
   1. *Total = 100lb*
4. *Item 509 Epoxy Coated Reinforcing Steel (LB)*
   1. *Joint Replacement = ~~920lbs~~ = 1100lbs*
5. *Item 510 Dowel holes with nonshrink, nonmetallic grout*
   1. *Joint repair ~~= 89~~ = 142*
6. *Item 511 Class QC2 concrete, Superstructure*
   1. *Areas from Bluebeam*
   2. *Abutment backwalls = (81.37sf x 1.25’) x 2 backwalls =203.43cf*
   3. *Backwall Barrier = (1.7sf x 2’) x 2 backwalls = 6.8cf*
   4. *2’-0” Deck replacement (underside only) = (1.5sf x 57.06’) x 2 joints = 171.18cf*
   5. *Deck Barrier = (1.83sf x ~2.5’) x 2 joints = 9.15cf*
   6. *Total = 390cf/ 27 = 15cy*
7. *Item 513 Structural Steel for Rehabilitation*

Diagram, engineering drawing

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* 1. *End Frame Angle 1 = 4.75’ x 4angles x 4 bays x 2 abuts = 152ft x 8.2lbs/ft = 1247 lbs*
     1. *4.167’ was based on GSD-1-19 for exactly 10” welds. After a discussion with Dan G on 4/26/23 updating to 4.75” to allow more flexibility in field.*
  2. *End Frame Angle 2 = 4.167 x 1angles x 4 bays x 2 abuts = 33.34ft x 8.2lbs/ft = 274 lbs*
     1. *3.69’ was based on GSD-1-19 for exactly 10” welds. After a discussion with Dan G on 4/26/23 updating to 4.167” to allow more flexibility in field*
  3. *End Frame Angle 3 = 13.04’ x 1angles x 4 bays x 2 abuts = 104.32ft x 8.2lbs/ft = 856lbs*
  4. *Missing XFrame (3x3x5/16)= sqrt(10.5’^2 + (52”/12)^2) = 11.36’ x 6.10lbs/ft = 70lbs*
  5. *Stiffener plates =* *(1.417’ x 1.25’) x 4bays x 2sides = 14.17sf x 20.4lbs/sf (for ½” plates) = 290sf*
  6. *Total = 735 + 1247 + 274 +856 + 70 + 290 = 3472 lbs*

1. *Item 514 Surface preparation of existing structural steel*
   1. *EndFrame plates = [(2’x1.5’x2plates) + (1’x1.17’) + (3x1.5) + (1.417’ x 1.25’)] x 2 faces x 4 bays x 2 sides = 216sf*
   2. *Endframe Ls = (5’x5/bay+13’) x 1.33’ x 4bays x 2 sides = 404sf*
   3. *Beams = [(18”x2+1.5”x2+18”+52”x2)/12] x 10ft x 10beam ends = 1342sf*
   4. *Stiffiners = [(52”x8”)/144] x 2 faces x 2/beam x 10beams = 116sf*
   5. *Total = 2078sf*
2. *Item 514 prime coat*
   1. *EndFrame plates = [(2’x1.5’x2plates) + (1’x1.17’) + (3x1.5) + (1.417’ x 1.25’)] x 2 faces x 4 bays x 2 sides = 216sf*
   2. *Endframe Ls = (5’x5/bay+13’) x 1.33’ x 4bays x 2 sides = 404sf*
   3. *Beams = [(18”x2+1.5”x2+18”+52”x2)/12] x 10ft x 10beam ends = 1342sf*
   4. *Stiffiners = [(52”x8”)/144] x 2 faces x 2/beam x 10beams = 116sf*
   5. *Total = 2078sf*
3. *Item 514 Intermediate coat*
   1. *EndFrame plates = [(2’x1.5’x2plates) + (1’x1.17’) + (3x1.5) + (1.417’ x 1.25’)] x 2 faces x 4 bays x 2 sides = 216sf*
   2. *Endframe Ls = (5’x5/bay+13’) x 1.33’ x 4bays x 2 sides = 404sf*
   3. *Beams = [(18”x2+1.5”x2+18”+52”x2)/12] x 10ft x 10beam ends = 1342sf*
   4. *Stiffiners = [(52”x8”)/144] x 2 faces x 2/beam x 10beams = 116sf*
   5. *Total = 2078sf*
4. *Item 514 Finish coat*
   1. *EndFrame plates = [(2’x1.5’x2plates) + (1’x1.17’) + (3x1.5) + (1.417’ x 1.25’)] x 2 faces x 4 bays x 2 sides = 216sf*
   2. *Endframe Ls = (5’x5/bay+13’) x 1.33’ x 4bays x 2 sides = 404sf*
   3. *Beams = [(18”x2+1.5”x2+18”+52”x2)/12] x 10ft x 10beam ends = 1342sf*
   4. *Stiffiners = [(52”x8”)/144] x 2 faces x 2/beam x 10beams = 116sf*
   5. *Total = 2078sf*
5. *Item 516 Structural Expansion Joint Including Elastomeric Strip Seal* 
   1. *2abuts x [(54.40’ + 0.83’ x 2ea)] = = 113ft*
6. *Item 516 2” deep joint sealer, APP*
   1. *42.833/cos(33d33’26”) = 53.3’ x 2sides = 106.64’ = 107ft*
7. *Item 613 Low Strength Mortar Backfill*
   1. *(6’ x 3’ x 0.5’) x 2 sides = 18cf/27 = 1cy*
8. *Item 844 Patching Concrete Structure, APP*
   1. *Rear Abut table = 31sf*
9. *Item 848 Superplasticized Dense concrete overlay using hydrodemolition, 1 ¾”*
   1. *(212.45’ – 1.54’x2) x 42.83’ = 8967.32sf/9 = 997sy*
10. *Item 848 Surface preparation using hydrodemolition, APP*
    1. *= 997sy – [(2.483’ x 2) x 42.83’]/9 = 973sy*
11. *Item 848 Superplasticized Dense concrete overlay (variable thickness), Material Only*
    1. *Recent Inspection report has ~2% of WS in CS2 for patches, delams and popouts. ~4% is in CS3 for Potholes, asphalt patches and large delam areas.*
    2. *~2% of floor is in CS2 for tran cracks and some efflo.*
    3. *Slab, built in 1982*
    4. *Orig cover 2" & prop. Cover 1.75”*
    5. *Assume unsound area of 30% (due to eflo, spalls, and inside curb condition) from field notes.*
    6. *BDM T403-3: Var. Thick. Area = 55%*
    7. *Winter adjustment = 55% x 1.10 (one winter) = 60.5%*
    8. *Var. Area = 8796sf x 0.605 = 5321.58sf/9 = 592sy*
    9. *Use BDM 403.4.1 Thick = 2"*
    10. *Var. Vol = 5321.58sf x 2"/12 = 886.93cf/27 = 33cy*
12. *Item 848 hand chipping*
    1. *BDM 403.4.1: 10% of variable area*
       1. *0.10 x 5321.58sf = ~~910sf~~ 532.16sf/9 = 60sy*
13. *Item 848 Full-Depth Repair*
    1. *Assume Vol = 1cy*

**Structure: MOT-201-0990**

1. *Item 516 2” deep joint sealer, APP*
   1. *2abuts x (24’/cos20) x 2= 103ft*
2. *Item 848 Superplasticized Dense concrete overlay using hydrodemolition, 1 ¾”*
   1. *(22.60’ x 24’) x 2 = 1085sf/9 = 120.53sy = 121sy*
3. *Item 848 Surface preparation using hydrodemolition, APP*
   1. *See above = 121sy*
4. *Item 848 Superplasticized Dense concrete overlay (variable thickness), Material Only*
   1. *Recent Inspection report has ~11% of WS in CS2 for long/trans cracks, delams, and asphalt patches.*
   2. *Light saturation in floor, minor leakage in CJs, some efflo*
   3. *Slab, built in 1982*
   4. *Orig cover 2" & prop. Cover 1.75”*
   5. *Assume variable thick area of 30% (due asphalt patches and large delams)*
   6. *BDM T403-3: Var. Thick. Area = 55%*
   7. *Winter adjustment = 55% x 1.10 (one winter) = 60.5%*
   8. *Var. Area = 1085f x 0.605 = 656.43sf/9 = 73sy*
   9. *Use BDM 403.4.1 Thick = 2"*
   10. *Var. Vol = 656.43sf x 2"/12 = 109.4cf/27 = 5cy*
5. *Item 848 hand chipping*
   1. *BDM 403.4.1: 10% of variable area*
      1. *0.10 x 656.43sf = 65.64sf/9 = 8sy*

**Maintenance of Traffic**

1. *Item 614 Law Enforcement Officer with Patrol Car for Assistance*
   1. *160 Hours*
2. *Item 614 Detour signing*
   1. *Lump Sum (LS)*
3. Item 614 Work Zone Edge Line, Class III, 6”, 642 Paint (Jackie N. asked to include this these Class III quantities for in between MOT and permanent painting)
   1. *01/IMS/14* 
      1. *MOT-70-1420N: (312.45’ x 2 edge lines) = 624.9’ = 0.118 Miles*
   2. *03/NHS/14*
      1. *MOT-49-0621: (292’ x 4 edge lines) = 1168’ = 0.221 Miles*
      2. *MOT-49-0810: (292’ x 4 edge lines) = 1168’ = 0.221 Miles*
      3. *Total = 0.442miles*
4. Item 614 Item Work Zone Center Line, Class III, 642 Paint
   1. *01/IMS/14* 
      1. *MOT-70-1062: (312’ x 2 center lines) = 624’ = 0.118 Miles*
      2. *MOT-70-1420N: 312.45’ = 0.059 Miles*
      3. *Total = 0.18*
5. Item 614 Item Work Zone Lane Line, Class III, 6”, 642 Paint
   1. *02/S>2/14* 
      1. *MOT-201-0990: (122.5’ x 2 lane lines) = 245’ = 0.046 Miles*
   2. *03/NHS/14* 
      1. *MOT-49-062: (292’ x 2 lane lines) = 584’ = 0.111 Miles*
      2. *MOT-49-0810: (292’ x 2 lane lines) = 584’ = 0.111 Miles*
6. Item 614 Item WORK ZONE CHANNELIZING LINE, CLASS III, 8", 642 PAINT
   1. *03/NHS/14* 
      1. *MOT-49-0810: 45’*
7. Item 614 Work Zone Arrow, Class III, 642 Paint
   1. *03/NHS/14* 
      1. *MOT-49-0810: 1 each*

**Incidentals**

1. *Item 614-Maintaining Traffic*
   1. *Lump Sum (LS)*
2. *Item 623-Construction Layout Stakes and Surveying*
   1. *Lump Sum (LS)*
3. *Item 624-Mobilization*
   1. *Lump Sum (LS)*

**END OF CALCULATIONS**