**PID 110148, AUG-219-0927: QUANTITY CALCULATIONS**

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Revised by:

Roadway, Pavement, Traffic Control (Subsummary on Sheet 9 GP on Sheet 10)

1. Item 202 Pavement Removed
   1. EPV-1:
      1. NW shoulder: 127 SF area
         1. Excavation 127 SF x 1.5’ depth = 7 CY
      2. SW shoulder: 91 SF area
         1. Excavation 91 SF x 1.5’ depth = 5 CY
      3. Full depth area excluding approach slab
         1. Pavement removed 319 SF/9 = 36 SY
   2. EPV-2:
      1. NE shoulder: 107 SF area
         1. Excavation 107 SF x 1.5’ depth = 6 CY
      2. SE shoulder: 101 SF area
         1. Excavation 101 SF x 1.5’ depth = 6 CY
      3. Full depth area excluding approach slab
         1. Pavement removed 307 SF/9 = 35 SY
2. Item 202 Wearing course removed
   1. EPV-1: Rear approach full depth line to proposed butt joint tie in. approach slabs WC to count = 1328 + 500 SF/9 = 203 SY
   2. EPV-2: Forward approach full depth line to proposed butt joint tie in. approach slabs WC to count = 1119 + 500 SF/9 = 180 SY
      1. Total: 203 + 180 = 383 SY
   3. EPV-3 Bridge: 36 FT x 86.06 FT /9 = 344.24 SY
      1. Grand Total= 383 + 344 = 727 SY
3. Item 202 Guardrail Removed
   1. GR-1: 150 FT
   2. GR-2: 150 FT
   3. GR-3: 150 FT
   4. GR-4: 150 FT
4. Item 202 Removal Misc.: Removal of Bridge ID sign and re-erection
   1. S-1: 1 ID sign to be removed and replaced.
5. Item 204 Subgrade Compaction
   1. PV-1: 934 SF from Microstation 934/9 = 104 SY
   2. PV-2: 1107 SF from Microstation 1107/9 = 123 SY
      1. Total: 104+123 = 227 SY
6. Item 209 Linear Grading
   1. PV-1: GR-1 and GR-2, Sta. 487+98.50 to Sta. 489+32. Sta. 487+81.98 to Sta. 489+35 : 133.5, 153.02
   2. PV-2: GR-3 and GR-4, Sta. 490+30 to Sta. 491+64. Sta. 490+21 to Sta. 491+73 : 134, 152
      1. Round both PV-1 and PV-2 to 3 STA. for a total of 6 STA. or 600 ft linear grading.
7. Item 301 Asphalt Concrete Base, PG64-22, (449)
   1. PV-1: 5 feet of full depth before approach slab. 213 SF from MS, 213 x 8/12 = 142 CF/27 = 6 CY
   2. PV-2: 12 feet of full depth after approach slab. 387 SF from MS, 387 x 8/12 = 258 CF/27 = 10 CY
      1. Total: 6 + 10 = 16 CY
8. Item 304 Aggregate Base
   1. PV-1: 6” under approach slab and full depth locations. From MS, 934 SF x 6/12 = 467 CF/27 = 18 CY
   2. PV-2: 6” under approach slab and full depth locations. From MS, 1107 SF x 6/12 = 554 CF/27 = 21 CY
      1. Total: 18 + 21 = 49 CY
9. Item 407 Tack Coat
   1. PV-1: 5’ Full depth section all applications will be 0.05 gal/SY. From MS, 214 SF/9 = 24 SY x 0.05 x 3 applications = 3.6 GAL
      1. Mill and fill 1.5” surface course will be 0.085 gal/SY. From MS, 1300 SF/9 = 145 SY x 0.085 = 12.33 GAL
   2. PV-2: 12’ Full depth section all applications will be 0.05 gal/SY. From MS, 387 SF/9 = 43 SY x 0.05 x 3 applications = 6.45 GAL
      1. Mill and fill 1.5” surface course will be 0.085 gal/SY. From MS, 1112 SF/9 = 124 SY x 0.085 = 10.54 GAL
         1. Total: 4 + 12 + 7 + 11 = 34 GAL
10. Item 441 asphalt concrete surface course, type 1, (449), PG70-22M
    1. PV-1: 5’ full depth and wedges area from MS, 214 SF x 1.5/12 = 27 CF/27 = 1 CY
       1. Final surface course area from MS, 1515 SF x 1.5/12 = 190 CF/27 = 7 CY
    2. PV-2: 12’ full depth and wedges area from MS, 387 SF x 1.5/12 = 49 CF/27 = 2 CY
       1. Final surface course area from MS, 1499 SF x 1.5/12 = 188 CF/27 = 7 CY
          1. Total: 17 CY
11. Item 605 Aggregate Drains
    1. Per PDM, every 25’ staggered along roadway. Full depth sections are only 5 and 12 feet long. 4 total 1 in each quadrant. 4 at approx. 8 feet long = 32 Feet
12. Item 606 Guardrail, Type MGS
    1. GR-5: 50 FT
    2. GR-6: 62.5 FT
    3. GR-7: 50 FT
    4. GR-8: 62.5 FT
       1. Transition GR to tie bridge terminal assemblies to end anchors or existing guardrail.
13. Item 606 Anchor Assembly, MGS, Type E
    1. GR-5: 1 EACH
    2. GR-6: 1 EACH
    3. GR-7: 1 EACH
    4. GR-8: 1 EACH
       1. All GR runs on the project need Type E anchor assemblies. Pay length is 57’-1.5” found from Approved Product List for the longest accepted terminal.
14. Item 606 MGS Bridge Terminal Assembly, Type TST-2
    1. GR-5: 1 EACH
    2. GR-6: 1 EACH
    3. GR-7: 1 EACH
    4. GR-8: 1 EACH
       1. Each GR run needs this bridge terminal assembly. Pay length is almost 27 Feet per SCD.
15. Item 626 Barrier Reflector, Type 2 Bi-Directional
    1. Need reflectors on all new GR. 375 FT along North. 382 FT along South. 100 foot spacing per CMS 626.03. 375/100 = 4 Reflectors 382/100 = 4 Reflectors.
       1. 8 total reflectors.
16. Item 630 Sign, Flat Sheet, As per Plan
    1. 1 SF for new bridge sign. S-2
17. Item 630 ground mounted support no. 2 post
    1. 2 posts at approx. 5’ each = 10 FT. S-3
18. Item 630 Removal of ground mounted sign and reerection
    1. 1 sign. 1 Each. S-3
19. Item 630 Removal of ground mounted post support and disposal
    1. 2 Each. S-3
20. Item 646 Edge Line
    1. EL-1: 0.05 Miles. CALC: STA. 491+04.85 – STA. 488+58.85 = 246 FT/5280 FT/MILE = 0.04659 MILE
    2. EL-2: 0.05 Miles.
21. Item 646 CenterLine
    1. CL-1: 0.05 Miles.

Erosion Control

1. Item 832 Erosion Control
   1. 8900 EACH. See BMP estimator spreadsheet
2. Item 659 Seeding and Mulching
   1. NW Quadrant: 298 SY
   2. SW Quadrant: 409 SY
   3. SE Quadrant: 292 SY
   4. NE Quadrant: 410 SY
      1. Total Seeding and Mulching: 1409 SY (See Google Earth File)
3. Item 659 Repair Seeding and Mulching
   1. 5% of seeding and mulching: 0.05 x 1400 = 70 SY
4. Item 659 Commercial Fertilizer
   1. (1 TON/7410SY permanent) x 1400 = 0.19 TON
5. Item 659 Water
   1. (2 x 0.0027 M. GAL/SY) x 1400 = 8 M. GAL

Structures: AUG-219-0927 (Estimated Quantities on Sheet 13)

1. Item 202 Portions of Structure Removed, Over 20 foot Span, APP
   1. Lump Sum (LS)
2. Item 202 Approach Slab Removed
   1. 25 FT long x 20 FT wide x 2 Approach slabs = 1000 SF/9 = 112 SY
3. Item 202 Bridge Railing Removed
   1. First post off the bridge North run: 490+34.30 -6.25 – 489+34.30 = 93.75
   2. First post off the bridge South run: 490+43.94 -6.25 – 489+43.94 = 93.75
      1. Total bridge rail removed per existing plans = 187.5 FT
4. Item 503 Cofferdams and excavation
   1. Lump Sum (LS)
5. Item 503 Unclassified Excavation
   1. Lump Sum (LS)
6. Item 505 Pile Driving Equipment Mobilization
   1. Lump Sum (LS)
7. Item 507 12” cast in place reinforced concrete piles, Driven
   1. 16 Total abutment piles x 35 feet = 560 FT
8. Item 507 12” cast in place reinforced concrete piles, furnished
   1. 16 Total abutment piles x 40 feet = 640 FT
9. Item 507 16” cast in place reinforced concrete piles, driven
   1. 12 Total pier piles x 50 feet = 600 FT
10. Item 507 16” cast in place reinforced concrete piles, furnished
    1. 12 Total pier piles x 55 feet = 660 FT
11. Item 509 Epoxy coated Steel Reinforcement
    1. Abutment/Footing, pier and Approach slab rebar: See sheet 23.
12. Item 509 Galvanized Steel Reinforcement
    1. Diaphragm and Bridge deck steel: See sheet 26.
13. Item 511 Class QC2 Concrete with QC/QA, Superstructure
    1. Diaphragms: 3.55 SQ FT from section view, 40.38 feet is the length of Diaphragm. 3.55 SF x 40.38 x 2 diaphragms = 287 CF/27 = 11 CY
    2. Transverse Section area, MS is 53.14 SF x 86.01’ bridge limits = 4571 CF/27 = 170 CY
    3. Pier cap section area, MS: 5.77 SF x 35.78 FT – [6 x 1.33FT x pi x 1.5 FT] x 2 piers = 338 CF/27 = 13 CY
    4. Pier shear key section area, MS is 0.92 SF x 35.78’ x 2 piers = 66 CF/27 = 3 CY
       1. Grand Total: 11 + 170 + 13 + 3 = 197 CY
14. Item 511 Class QC1 Concrete, Abutment including footing
    1. Abutment and footing section area from MS, 14.28 SF x 54.15’ length x 2 abut. = 1547 CF/27 = 58 CY
    2. Wingwalls: Left elevation area from MS – 14.79 SF, Right elevation area from MS – 16.65 SF. (14.79 + 16.65) x 2 abutments x 2.25’ thickness = 142 CF/27 = 6 CY
       1. Total: 58 + 6 = 64 CY
15. Item 516 ½” preformed expansion joint filler
    1. Abutment section back side joint filler from MS, 9”/12 wide x 40.55’ long x 2 abutments = 60 SF
16. Item 516 1” Preformed Expansion Joint Filler
    1. Approach slab filler: 6” length, 1.57’ section view of approach slab x 4 quads = 3 SF
    2. Wingwall filler: 3.083’ height x 2.25’ width x 4 quads = 28 SF
    3. Abutment filler: 8”/12 width x 40.55’ long x 2 abutments = 54 SF
       1. Grand Total: 3 + 28 + 54 = 85 SF
17. Item 516 Integral abutment expansion joint seal
    1. Deck and approach slab interface: 36’ wide x 1/cos(15) = 37.27 FT x 2 approaches = 75 FT
18. Item 516 2” Deep Joint Sealer, APP
    1. At interface between concrete and asphalt: 36’ wide x 1/cos(15) = 37.27 FT x 2 approaches = 75 FT
19. Item 517 Railing (Three Steel Tube Bridge Railing)
    1. 8’ + 72’ + 5’ + 8’ = 93 FT each side x 2 sides = 186 FT
20. Item 518 Porous Backfill with Geotextile Fabric
    1. 350 SF face of abutment elevation, from MS x 2’ deep x 2 abutments = 1400 CF/27 = 52 CY.
21. Item 518 Steel Drip Strip
    1. [5.43’ + 5 + 72’ FT per side + (11 posts x 2.0 FT)] x 2 sides = 208.86 or 209 FT
22. Item 518 6” Perforated Corrugated Plastic Pipe
    1. Perforated is buried pipe behind abutments: 2 abutments x 55 FT = 110 FT
23. Item 518 6” Non-Perforated Corrugated Plastic Pipe, Including Specials
    1. Non-Perforated is 90-degree bend and out towards the creek: 15 FT each segment x 4 segments = 60 FT
24. Item 523 Dynamic load testing
    1. 2 EACH
25. Item 526 Reinforced Concrete Approach Slabs with QC/QA (T=13”), APP
    1. 36 FT wide x 20 FT long x 2 = 1440 SF/9 = 160 SY
26. Item 601 Tied concrete block mat with type 1 underlayment
    1. 4 total at 2 SY each = 8 SY
27. Item 601 Rock Channel Protection, Type C With Filter
    1. From MS area 1 of RCP = 1149 SF ; area 2 = 1140 SF x 2 FT deep = 4578 CF/27 = 170 CY
28. Item 611 Precast reinforced concrete outlet
    1. 4 EACH, 1 per quad
29. Item 625 Structure Grounding system
    1. 1 EACH

Maintenance of Traffic

1. Item 614 Detour signing
   1. Lump Sum (LS)

Incidentals

1. Item 614-Maintaining Traffic (LS)
2. Item 619-Field Office, Type B 3 (MNTH)
3. Item 623-Construction Layout Stakes and Surveying (LS)
4. Item 624-Mobilization (LS)

**END OF CALCULATIONS**

**Misc.**

BDM 306.2.4 Wingwalls. Max slope behind the wingwall is 1 vertical to 2 horizontal.

909.57’ rear abutment deck edge elevation. Top of rear bench elevation is 906.50’. 3.08 feet. 3.08 x 2 = 6.16 feet or 6’-2” is min. wingwall length to get from roadway grade to bench elevation.

909.36’ forward abutment deck edge elevation. Top of fwd bench elevation is 906.30’. 3.06 feet. 3.06 x 2 = 6.12 feet is min. wingwall length to get from roadway grade to bench elevation.

Each wingwall per plan is just over 8 feet long from roadway grade to the end. Plan wingwall length will accommodate 2:1 slope from roadway grade to bench elevation. 6’-6” is non-skew dimension. Still fits the requirement.