**PID 99862, SHE-47-0396: QUANTITY CALCULATIONS**

Calculated by: *Lawton Gerlinger, P.E., Date: 6/30/23*

Checked by: *Dan Grilliot, P.E., Date: x/xx/xx*

Revised by:

Roadway, Pavement, Traffic Control (Subsummary on Sheet 8 GP on Sheet 9)

1. Item 202 Pavement Removed
	1. PV-1: 1344 SF from Microstation – existing approach slab area (600 SF) = 744 SF/9 = 83 SY
	2. PV-2: 1350 SF from Microstation - existing approach slab area (600 SF) = 750 SF/9 = 83 SY
		1. Total: 83 + 83 = 166 SY
2. Item 202 Wearing course removed
	1. PV-1: old approach slab area- 25’ x 24’ = 600 SF/9 = 66.67 or 67 SY
	2. PV-2 old approach slab area- 25’ x 24’ = 600 SF/9 = 66.67 or 67 SY
3. Item 202 Guardrail Removed
	1. GR-1: 100 FT
	2. GR-2: 75 FT
	3. GR-3: 75 FT
	4. GR-4: 75 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: Approach slab area (45 x 25)/9 + (5 x 26.67)/9 = 140 SY
	2. PV-2: Approach slab area (45 x 25)/9 + (5 x 26.67)/9 = 140 SY
		1. Total: 140+140 = 280 SY
6. Item 254 Pavement Planing, Asphalt Concrete 2” depth.
	1. PV-1: 2339 SF from Microstation; from full depth to existing tie in. 2339/9 = 260 SY
	2. PV-2: 2701 SF from Microstation; from full depth to existing tie in. 2701/9 = 301 SY
		1. Total: 260 + 301 = 561 SY
7. Item 302 Asphalt Concrete Base, PG64-22, (449)
	1. PV-1: 5 feet of full depth before approach slab. (6”/12 x 25.67’ x 5’)/27 = 2.38 CY + 1.5 CY wedges
	2. PV-2: 5 feet of full depth after approach slab. (6”/12 x 25.67’ x 5’)/27 = 2.38 CY + 1.5 CY wedges
		1. Total: 4 +4 = 8 CY
8. Item 304 Aggregate Base
	1. PV-1: 5 feet before approach slab. Shoulders: 2 x 10’ x 5’ x .5’ + Base: 26.67’ x 5’ x .5’ = 117 CF. Under approach slab: 45’ x 25’ x .5’ = 563 CF. 680/27 = 25 CY
	2. PV-2: 5 feet after approach slab. Shoulders: 2 x 10’ x 5’ x .5’ + Base: 26.67’ x 5’ x .5’ = 117 CF. Under approach slab: 45’ x 25’ x .5’ = 563 CF. 680/27 = 25 CY
		1. Total: 117+563+117+563 = 1360CF/27 = 50 CY
9. Item 407 Tack Coat (0.085 GAL/SY)
	1. PV-1: Approach slab: (25’ x 44’ x 3 applications) + 5 foot full depth: (5’ x 24’ x 2 applications + 5’ x 44’ x 1 application) 70’ section to intersection: (32’ x 70’) = 6000 SF/9 = 667 SY x 0.085 GAL/SY = 57 GAL
	2. PV-2: Approach slab: (25’ x 44’ x 3 applications) + 5 foot full depth: (5’ x 24’ x 2 applications + 5’ x 44’ x 1 application) 114’ section: (32’ x 114’) = 7408 SF/9 = 823 SY x 0.085 GAL/SY = 70 GAL
		1. Total: 57 + 70 = 127 GAL
10. Item 441 Asphalt Concrete Intermediate Course, Type 2 (448)
	1. PV-1: Approach and 5’ full depth: 44’ x 25’ x 4/12 =366.67 CF, 5’ depth- 25’ x 5’ x (4/12) = 366.67+41.67 = 409 CF/27 = 15.15 CY, 16 CY
	2. PV-2: Approach and 5’ full depth: 44’ x 25’ x 4/12 =366.67 CF, 5’ depth- 25’ x 5’ x (4/12) = 366.67+41.67 = 409 CF/27 = 15.15 CY, 16 CY
11. Item 443 Stone Matrix Asphalt Concrete, (446) PG76-22M
	1. PV-1: Approach and 5’ full depth: 44’ x 30’ x 2”/12 + 70’ transition pavement to intersection: 70’ x 32’ x 2/12 = 593.33 CF/27 = 22 CY
	2. PV-2: Approach and 5’ full depth: 44’ x 30’ x 2”/12 + 84.30’ transition pavement to intersection: 84.30’ x 32’ x 2/12 = 669.60 CF/27 = 25 CY
12. Item 606 Guardrail, Type MGS
	1. GR-1: 37.5 FT
	2. GR-2: 12.5 FT
	3. GR-3: 50 FT
	4. GR-4: 50 FT
		1. Transition GR to tie bridge terminal assemblies to end anchors or existing guardrail.
13. Item 606 Anchor Assembly, MGS, Type B
	1. GR-1: 1 EACH
	2. GR-2: 1 EACH
		1. Both GR runs on the West side of the project need Type B anchor assemblies. Pay length is 39’-7” found from Approved Product List.
14. Item 606 MGS Bridge Terminal Assembly, Type TST-2
	1. GR-1: 1 EACH
	2. GR-2: 1 EACH
	3. GR-3: 1 EACH
	4. GR-4: 1 EACH
		1. Each GR run needs this bridge terminal assembly. Pay length is almost 27 Feet per SCD.
15. Item 617 Compacted Aggregate
	1. PV-1: South aggregate shoulder: Edge of proposed pavement to proposed guardrail, 556 SF. North aggregate shoulder: Edge of proposed pavement to proposed guardrail, 539 SF. 556+539 = (1095 x 2”/12)/27 = 7 CY
	2. PV-2: South aggregate shoulder: Edge of proposed pavement to proposed guardrail, 824 SF. North aggregate shoulder: Edge of proposed pavement to proposed guardrail, 497 SF. 824+497 = (1321x 2”/12)/27 = 8 CY
		1. Total: 7+8 = 15 CY
16. Item 621 RPM
	1. PV-1: 5 RPM. See standard drawing for RPM approaching intersection. TC-65.11
	2. PV-2: 4 RPM. See standard drawing for RPM approaching intersection. TC-65.11
17. Item 626 Barrier Reflector, Type 2 Bi-Directional
	1. Need reflectors on all new GR. 368 FT along North. 344 FT along South. 100 foot spacing per CMS 626.03. 368/100 = 4 Reflectors 344/100 = 4 Reflectors.
		1. 8 total reflectors.
18. Item 644 Stop Line
	1. SB-1: 12 Ft
19. Item 646 Edge Line
	1. EL-1: 0.08 Miles. CALC: STA. 212+19.99 – STA. 208+19.99 = 400 FT/5280 FT/MILE = 0.07575 MILE
	2. EL-2: 0.08 Miles. Add 0.01 Miles to extend past the 400 feet being disturbed.
20. Item 646 CenterLine
	1. CL-1: 0.08 Miles. Add 0.01 Miles to extend past the 400 feet being disturbed.

Erosion Control

1. Item 832 Erosion Control
	1. 5000 EACH
2. Item 659 Seeding and Mulching
	1. NW Quadrant: 2160 SF worst case (10 to 15 feet off roadway edge)
	2. SW Quadrant: 1025 SF worst case
	3. NE Quadrant: 1120 SF worst case
	4. SE Quadrant: 1800 SF worst case
		1. Total Seeding and Mulching: 2160+1025+1120+1800 = 6105 SF/9 = 680 SY
3. Item 659 Repair Seeding and Mulching
	1. 5% of seeding and mulching: 0.05 x 680 = 34 SY
4. Item 659 Inter-seeding
	1. 5% of seeding and mulching: 0.05 x 680 = 34 SY
5. Item 659 Commercial Fertilizer
	1. (1 TON/7410SY permanent) x 680 + (1 TON/11,111 SY interseeding) x 34 = 0.10 TON
6. Item 659 Water
	1. (2 x 0.0027 M. GAL/SY) x 680 + (0.0027 M. GAL/SY) x 34 = 4 M. GAL

Structures: SHE-47-0397 (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 24 FT wide x 2 Approach slabs = 1200 SF/9 = 134 SY
3. Item 202 Wearing course removed
	1. 25 FT long x 24 FT wide x 2 Approach slabs = 1200 SF/9 = 134 SY
4. Item 202 Bridge Railing Removed
	1. 187.5 FT each side (Existing Plans) = 375 FT
5. Item 503 Unclassified Excavation
	1. Lump Sum (LS)
6. Item 505 Pile Driving Equipment Mobilization
	1. Lump Sum (LS)
7. Item 507 Steel Piles HP10x42, Furnished
	1. 8 additional abutment piles. 2 at each wingwall. 25 feet deep = 200 FT
8. Item 507 Steel Piles HP10x42, Driven, APP

8 additional abutment piles. 2 at each wingwall. 20 feet deep = 160 FT

1. Item 507 Steel points or shoes
	1. 8 EACH
2. Item 509 Uncoated Steel Reinforcement
	1. Abutment/Footing and Approach slab rebar: See sheet 26.
3. Item 509 Galvanized Steel Reinforcement
	1. Diaphragm and Bridge deck steel: See sheet 26.
4. Item 510 Dowel Holes with Nonshrink, Nonmetallic Grout
	1. 288 to tie into existing abutment/footings. See sheet 26.
5. Item 511 Semi-Integral Diaphragm Guide, APP
	1. 1 at each wingwall and abutment interface (acute angle only). 2 EACH
6. Item 511 Class QC2 Concrete, Superstructure
	1. Diaphragms: 10.14 SQ FT from section view, 54.27 feet is the length of Diaphragm. 10.14 SF x 54.27 x 2 diaphragms = 1101 CF/27 = 41 CY
7. Item 511 Class QC2 Concrete with QC/QA, Bridge Deck
	1. Transverse section area from ORD: 35.78 SF x 185.70 FT = 6645 CF/27 = 247 CY
8. Item 511 Class QC1 Concrete Abutment
	1. Area from Microstation 110 SF (between construction joints) x 3 FT depth x 2 abutments = 660 CF/27 = 25 CY
	2. Wingwalls: (34.87 SF + 27.5 SF)/2 x 2 wingwalls + (14.16 SF + 21.52 SF)/2 x 2 wingwalls= 62.37 + 35.68 = 98.05 SF x 3 FT deep = 294.15 CF/27 = 11 CY
		1. Total: 25 + 11 = 36 CY
9. Item 511 Class QC1 Concrete, Footing
	1. 8’ long x 6’-3” deep x 3’ tall x 4 footing sections = 600CF/27 = 23 CY
10. Item 512 Sealing of Concrete Surfaces (Non-Epoxy)
	1. Front face of abutments and wingwall: From Microstation; area above groundline approx. 235 SF per abutment x 2 = 470 SF/9 = 53 SY
	2. Diaphragm face sealing: 183 SF from Microstation per diaphragm x 2 = 366 SF/9 = 41 SY
	3. Wingwall top: 3 feet wide, perimeter from face view groundline to 2” PEJF = 13.25 FT + 8 FT per abutment. (13.25+8) x 2 wingwalls per abutment = 43 SF/9 = 5 SY
	4. Deck edges: 2 edges x 179.75 FT long x (.5 FT + 1.7292) = 802 SF/9 = 90 SY
		1. Grand Total: (53+41+5+90) = 190 SY. Add 15 SY for groundline unknown. 205 SY total.
11. Item 512 Concrete Repair by Epoxy Injection
	1. See sheet 18 Pier repair: 21 FT
12. Item 513 Structural Steel Members, Level UF, APP
	1. Added crossframes near diaphragm and piers: 3x3x 5/16” lb per linear foot: 6.1. 1 bar 7.825 feet; 2 bars 8.20 feet. Total length of angle per cross frame = 24.23 ft x 6.1 lb/ft = 148 lb per crossframe. 148 x 10 additional crossframes = 1480 LBS
13. Item 513 Welded Stud Shear Connectors
	1. See sheet 22: 1 beam line has 105+102+51+168+102=528 x 6 beamlines = 3168 EACH
14. Item 514 Surface Preparation of Existing Structural Steel
	1. 36WF135 beams interior: 8.70 SF per linear foot. 4 beamlines x 183.5 FT long x 8.70 SF/lin FT = 6385.80 SF
	2. 36WF135 beams exterior: 7.31 SF per linear foot. 2 beamlines x 183.5 FT long x 7.31 SF/lin FT = 2682.77 SF
	3. Intermediate Cross Frames: 7.88 FT + 2[sqrt(7.88)^2 + (2.5)^2] = 24.41 SF per cross frame. 24.41 SF x 82 = 2001.62 FT
		1. Total: 6385.80 + 2682.77 + 2001.62 = 11070 SF
15. Item 514 Field Painting of Existing Structural Steel, Prime Coat
16. 36WF135 beams interior: 8.70 SF per linear foot. 4 beamlines x 183.5 FT long x 8.70 SF/lin FT = 6385.80 SF
17. 36WF135 beams exterior: 7.31 SF per linear foot. 2 beamlines x 183.5 FT long x 7.31 SF/lin FT = 2682.77 SF
18. Intermediate Cross Frames: 7.88 FT + 2[sqrt(7.88)^2 + (2.5)^2] = 24.41 SF per cross frame. 24.41 SF x 82 = 2001.62 FT
	* 1. Total: 6385.80 + 2682.77 + 2001.62 – 288 SF = 10782 SF
19. Item 514 Field Painting structural steel, Intermediate coat
20. 36WF135 beams interior: 8.70 SF per linear foot. 4 beamlines x 180 FT long x 8.70 SF/lin FT = 6264 SF
21. 36WF135 beams exterior: 7.31 SF per linear foot. 2 beamlines x 180 FT long x 7.31 SF/lin FT = 2632 SF
22. Intermediate Cross Frames: 7.88 FT + 2[sqrt(7.88)^2 + (2.5)^2] = 24.41 SF per cross frame. 24.41 SF x 82 = 2001.62 FT
	* 1. Total: 6264 + 2632 + 2001.62 = 10898 SF
23. Item 514 Field Painting structural steel, Finish Coat
24. 36WF135 beams interior: 8.70 SF per linear foot. 4 beamlines x 180 FT long x 8.70 SF/lin FT = 6264 SF
25. 36WF135 beams exterior: 7.31 SF per linear foot. 2 beamlines x 180 FT long x 7.31 SF/lin FT = 2632 SF
26. Intermediate Cross Frames: 7.88 FT + 2[sqrt(7.88)^2 + (2.5)^2] = 24.41 SF per cross frame. 24.41 SF x 82 = 2001.62 FT
	* 1. Total: 6264 + 2632 + 2001.62 = 10898 SF
27. Item 514 Grinding Fins, Tears, slivers on Existing Structural Steel
	1. BDM 404.1.11: 1 minute per linear foot of beam to be coated. 1 beam line is 183.50 FT x 6 beamlines = 1101 linear feet/60 minutes = 19 HOURS
28. Item 514 Final Inspection Repair
	1. CMS 514.2.A: 1 location per 300 linear feet of beam line. 2.5% for all cross-frame assemblies.
		1. 1101/300 = 4. 82 x 0.025 = 2. 6 EACH NEED TO ADD CROSSFRAMES 3/30/23
29. Item 514 Field Painting, Misc.: Coating of Beam Ends
	1. 2.75’ each beam end: 12 beam ends x 2.75’ x 8.702 SF/lin FT = 288 SF
30. Item 516 1” Preformed Expansion Joint Filler
	1. .58 feet long x 3 feet deep = 1.75 SF x 4 joints = 7 SF
31. Item 516 2” Preformed Expansion Joint Filler
	1. 63.167 feet around abutment and diaphragm interface. 63.167 feet x 3 feet deep x 2 abutment/diaphragms = 379 SF
32. Item 516 Semi-Integral Abutment Expansion Joint Seal
	1. 63.167 feet x 2 abutment/diaphragms = 127 FT
33. Item 516 2” Deep Joint Sealer, APP
	1. At interface between concrete and asphalt: 44’ wide x 1/cos(30) = 51 FT x 2 approaches = 102 FT
34. Item 516 Elastomeric Bearing with Internal Laminates and Load Plate (Bearing: 10”x13”x2.52”; Load Plate: 11”x14”x1.5”)
	1. 6 Beams, 1 bearing at each abutment = 12 EACH
35. Item 516 Jacking and Temporary Support of Superstructure, APP
	1. Lump Sum (LS)
36. Item 517 Railing (Three Steel Tube Bridge Railing)
	1. See sheet 10: 191.26 FT each side x 2 sides = 383 FT
37. Item 518 Porous Backfill with Geotextile Fabric
	1. 69 Ft long at each abutment, 2 foot wide, approx. 6 feet deep: 69 feet x 2 feet wide x 6 feet deep x 2 abutments = 1656 CF/27 = 62 CY.
38. Item 518 Steel Drip Strip
	1. [179.75 FT per side + (23 posts x 1.5 FT)] x 2 sides = 428.5 or 429 FT
39. Item 518 6” Perforated Corrugated Plastic Pipe
	1. Perforated is buried pipe behind abutments: 2 abutments x 73 FT = 146 FT
40. Item 518 6” Non-Perforated Corrugated Plastic Pipe, Including Specials
	1. Non-Perforated is 90-degree bend and out towards the creek: 11 FT each segment x 4 segments = 44 FT
41. Item 526 Reinforced Concrete Approach Slabs with QC/QA (T=15”), APP
	1. 44 FT wide x 25 FT long x 2 = 2200 SF/9 = 245 SY
42. Item 526 Type B Installation
	1. 44 FT x 1/cos(30) x 5 FT wide x 2 approach slab installs = 510 SF/9 = 57 SY
43. Item 601 Rock Channel Protection, Type B With Filter
	1. See Sheet 10: 25 FT x cos(30) x 20 FT x 2 FT deep = 866 CF/27 = 32 CY

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**