**PID 97766, CLA-42/68-0462/1516: QUANTITY CALCULATIONS**

Calculated by: *Lawton Gerlinger, P.E., Date: 8/2/21*

Checked by: *Daniel Grilliot, P.E., Date:*

Revised by:

Roadway

1. Item 201 clearing and grubbing
	1. Lump Sum
2. Item 202 wearing course removed
	1. CLA-42-0462: 13724 SF + 66.60 x 44 = 16,655 SF/9 = 1851 SY
	2. CLA-68-1516: 3296 SF/9 = 367 SY
		1. Total: 1851+367 = 2,218 SY

Erosion Control

1. Item 659 Seeding and mulching
	1. 367 SY from temp paving + 50 SY per structure = 467 SY
2. Item 659 Commercial Fertilizer
	1. 0.06 TON from excel spreadsheet in directory
3. Item 659 Water
	1. 3 MGAL from excel spreadsheet in directory
4. Item 832 Erosion control
	1. 500 per structure: 1000 EACH

Pavement

1. Item 407 Tack coat
	1. CLA-42-0462: 13724/9 = 1525 SY x 0.08 gal/SY = 122 GAL
	2. CLA-68-1516: 3296/9 = 367 SY x 0.08 gal/SY = 30 GAL
		1. Total: 122+30 = 152 GAL
2. Item 441 Asphalt concrete surface course, Type 1, (448), PG70-22M
	1. CLA-42-0462: 6871 SF + 6853 SF = 13724 SF x 2/12 = 2287.33/27= 85 CY
	2. CLA-68-1516: 1655 SF + 1641 SF = 3296 SF x 1.75/12 = 481/27 = 18 CY
		1. Total: 85+18 = 103 CY

Traffic control

1. Item 621 Raised Pavement marker removed
	1. 7 EACH, all 7 within paving limits on CLA-42 structure.
2. Item 642 Removal of pavement marking, lane line
	1. See sheet 9, 0.38 MILE
3. Item 644 Lane line, 6”, Lane line
	1. See sheet 9, 0.38 MILE
4. Item 644 Removal of pavement marking
	1. See sheet 6, 2,888 FT
5. Item 646 Edge line, 6”
	1. CLA-42-0462: STA. 248+13.50 – STA. 239+18 = 896 FT x 2 = 1792 FT/5280 = 0.34 MILE
	2. CLA-68-1516: STA. 16+81.90 – STA. 13+18.10 = 364 FT x 2 = 728 FT/5280 = 0.14 MILE
		1. Total: 0.34+0.14 = 0.48 MILE
6. Item 646 Centerline
	1. CLA-42-0462: STA. 253+63.50 – STA. 233+68 = 1995 FT / 5280 = 0.38 MILE
	2. CLA-68-1516: STA. 16+81.90 – STA. 13+18.10 = 364 FT / 5280 = 0.07 MILE
		1. Total: 0.38 + 0.07 = 0.45 MILE

Structures: CLA-42-0462

1. Item 202 Portions of Structure removed, Over 20-foot span, as per plan
	1. Lump Sum (LS)
2. Item 503 Unclassified excavation
	1. Lump Sum (LS)
3. Item 509 Reinforcing Steel, Replacement of reinforcing steel, APP
	1. 50 (LB) Just in case steel needs replaced.
4. Item 509 Uncoated Reinforcing Steel
	1. 619 (LB) see sheet 18
5. Item 510 Dowel holes with nonshrink, nonmetallic grout
	1. 148 (EACH) sheet 18
6. Item 511 Class QC1 concrete, Substructure
	1. 4.167’ x 1.25’ x 2.0’ x 2 wingwalls = 21 CF
	2. 3.167’ x 1.25’ x 2.0’ x 2 wingwalls = 16 CF
		1. Total: 21+16 = 37/27 = 2 CY
7. Item 512 Sealing of concrete surfaces (epoxy urethane)
	1. RA: 2’x 46’+2’x.5’ x 2 faces = 94 (SF)
	2. FA: 2’ x 46’ +2’x.5’ x 2 faces= 94 (SF)
	3. Deck edges: 1.67’ x 66.60’ x 2 deck edges = 223 (SF)
	4. Wingwalls: [4.167’ x 2’ + 1.25’ x 2’ + 1.25’ x 4.167’]x2 wingwalls + [3.167’ x 2’ + 1.25’ x 2’ + 1.25’ x 3.167’]x2 wingwalls = 32+26 (SF) = 58 SF
	5. Centerspan spall: 3’ x 46’ length = 138 SF
		1. Total: [94+94+223+58+138]/9 = 68 (SY)
8. Item 514 Field painting, Misc.: Zinc rich primer
	1. See site plan: 52 SF called out
9. Item 516 ½” Preformed expansion joint filler
	1. 46 x .5 x 2 abutments = 46 SF
10. Item 516 1” Preformed expansion joint filler
	1. 2’ x 1.25’ x4 wingwalls = 10 SF
11. Item 516 2” deep joint sealer, APP
	1. 1/cos(20) x 44’ x 2 joints = 94 FT
12. Item 517 Deep Beam bridge retrofit railing
	1. 62.5’ x 2 sides + 4 x 6.25’ = 150 FT
13. Item 517 Railing, MISC.: Repair of compromised top anchor bolts
	1. 5 EACH, see sheet 20
14. Item SPECIAL 51822300 Steel Drip Strip
	1. 22x1.5’ + 66.6’ x 2 = 167 FT
15. Item SPECIAL 53000600 Structures, MISC.: Abutment refacing with galvanic anode protection
	1. 92 SF x 2 faces = 184 SF see sheet 18
16. Item 848 Superplasticized Dense Concrete Overlay using hydrodemolition, APP, 1¾”
	1. 44’ x 66.60’ = 2931/9 = 326 SY
17. Item 848 Surface preparation using hydrodemolition, APP
	1. 44’ x 66.60’ = 2931/9 = 326 SY
18. Item 848 Superplasticized dense concrete overlay (variable thickness), material only
	1. Hard to obtain value- deck is covered with asphalt. Assume 50% unsound.
		1. 1465/2930 SF = 50%
		2. BDM T403-3 % variable thickness = 75%
		3. D07 factors- Clark County factor- 1.05
		4. Adjusted variable thickness area = 1465 x 1.05 = 1539 SF
		5. Use 2” variable depth. 2/12 x 1539 = 257 CF/27 = 10 CY
19. Item 848 Hand chipping
	1. Usually 10% of unsound area. Assume 50% (163 SY) unsound, 17 SY
20. Item 848 Test slab
	1. Lump sum (LS)
21. Item 848 Full-Depth repair
	1. 2 CY included for centerspan deck joint repair.

Structures: CLA-68-1516

1. Item 202 Portions of Structure removed, Over 20-foot span, as per plan
	1. Lump Sum (LS)
2. Item 509 Reinforcing Steel, Replacement of reinforcing steel, APP
	1. 50 (LB) Just in case steel needs replaced.
3. Item 509 Uncoated Reinforcing Steel
	1. 112+632 = 744 (LB)
4. Item 510 Dowel holes with nonshrink, nonmetallic grout
	1. See sheet 22, 96 EACH
5. Item 511 Class QC2 concrete, Bridge Deck
	1. Approach side:46.33’ x 1/cos(18.75) x 2 sides x end area of 1.82 SF (Microstation) = 178 CF/27 = 7 CY
	2. Deck end: 46.33’ x 1/cos(18.75) x 2 sides x end area of 1.63 SF (Microstation) = 160 CF/27 = 6 CY
	3. Parapets: 4’ long x 4 locations x end area of 4.58 SF (Microstation) = 74 CF/27 = 3 CY
		1. Total: 7+6+3 = 17 CY
6. Item 512 Sealing of concrete surfaces (epoxy urethane)
	1. RA:46.33’ x 1/cos(18.75) x 1.46’ = 72 SF (proposed area)
	2. RA: 46.33 x 1/cos(18.75) x 5.75’ (average height) + 2’ x 46.33’ x 1/cos(18.75) = 380 SF
	3. FA:46.33’ x 1/cos(18.75) x 1.46’ = 72 SF (proposed area)
	4. FA:46.33 x 1/cos(18.75) x 5.75’ (average height) + 2’ x 46.33’ x 1/cos(18.75) = 380 SF
	5. Bridge Railing, abutment: 1.33’ length x 4 locations x perimeter of 8.38’ = 45 SF
	6. Bridge Railing, deck: Perimeter of 8.60’ (From Microstation) x 2 sides x bridge length 251.30’ = 4323 SF
	7. Piers: pier 2 calculated, value x 3 for total.
		1. Columns: 10.5’ x 2 x pi x 1.5’ x 3 columns = 297 SF
		2. Elevation view pier cap: From Microstation, 2 sides x 222.21 SF = 445 SF
		3. Bottom of pier cap: 3’ x 48’ – [3 columns x pi x (1.5)^2] = 123 SF
		4. Top of pier cap: 3’ x 48’ = 144 SF
		5. Side of pier cap: 2 sides x 3’ x 3.5’ = 21 SF
		6. Pier total: [297+445+123+144+21] x 3 piers = 3090 SF
			1. Grand Total Sealing: [72+380+72+380+45+4323+3090]/9 = 930 SY
7. Item 512 Removal of Existing coatings from concrete surfaces
	1. 380 SF x 2 abutments (existing sealer removed) = 760 SF/9 = 85 SY
8. Item 513 Structural steel, Misc.: Damaged secondary member to be replaced
	1. See sheet 28, 960 L(B)
9. Item 513 Structural Steel, Misc.: CP Weld
	1. See sheet 27, 1 (FT)
10. Item 514 Surface Preparation of existing structural steel, Prime coat, Intermediate coat, finish coat
	1. Beams: 36WF135- perimeter of 8.68 ft per foot from Microstation. Length of 1 beamline is 51.385+14.67+51.385-14.67 = 102.77’
	2. 36WF182- perimeter of 8.76 ft per foot from Microstation. Length of 1 beamline is 73.385’-14.67+16+73.385-16-14.67 = 146.77’
		1. Total beamline calc: [8.68’x102.77’ + 8.76’x146.77’] x 6 beamlines = 13,067 SF
	3. Crossframes: 108 total, 3x3x5/16”, plan details of 8.5’ spacing between beams
		1. 1 crossframe: (2.67’^2 + 8.5’^2)^(1/2) = [8.91’ x 2 diagonals] + 8.5’ = 26.32 SF per crossframe
			1. Total crossframe SF: 26.32 x 108 = 2843 SF
	4. End frames: Calculate 1 bay, 10 bays total
		1. Larger bar- (2.833^2 + 2.67’^2 )^(1/2) = 3.89’x2 bars x 1.33’ (4x4x5/16 angle) = 10.35 SF
		2. Shorter bar- (2.67^2 + 1.42^2)^(1/2) = 3.02’ x 2 bars x 1.33’ (4x4x5/16 angle) = 8.03 SF
		3. Bottom bar- 8.5’x1.33 = 11.31 SF
		4. Plates: 2’x1.5’x 2 sides x 3 per bay = 18 SF
		5. Total: 1 bay, 10.35+8.03+11.31+18 = 48 Sf x 10 bays = 480 SF
	5. Total painting: 13,067+2843+480= 16390x1.02 (2% misc.) = 16718 SF
11. Item 514 Grinding fins, tears, slivers on existing structural steel
	1. Per BDM 1 min per linear foot of beam, 249.54’ x 6 beams = 1498 FT/60 = 25 MNHR
12. Item 514 Final inspection repair
	1. 0.05x108 + 1498/150 = 16 EACH
13. Item 516 Structural expansion joint including elastomeric strip seal, APP
	1. 46’/cos(18.75) x 2 joints = 97 FT
14. Item 516 2” deep joint sealer, APP
	1. 1/cos(18.75) x 42.5 x 2 joints = 90 FT
15. Item 516 Elastomeric bearing with internal laminates and load plate (neoprene), APP
	1. 12 EACH
16. Item 516 Jacking and temporary support of superstructure, APP
	1. Lump Sump (LS)
17. Item 518 Scupper, lengthening
	1. 10 EACH
18. Item 519 Patching concrete structure, APP
	1. 40 (SF) see sheet 22
19. Item 848 Superplasticized Dense Concrete Overlay using hydrodemolition, APP, 1¾”
	1. 42.5’ x 251.30’ = 10,680/9 = 1187 SY
20. Item 848 Surface preparation using hydrodemolition, APP
	1. 42.5’ x 251.30’ – [ 2.125’ x 42.5’ x 2 sides]= 10,500/9 = 1167 SY
21. Item 848 Superplasticized dense concrete overlay (variable thickness), material only
	1. 4,623 SF is the measured unsound area (11/12/2020)
		1. 4623/10680 SF = 43%
		2. BDM T403-3 % variable thickness = 70%
		3. BDM variable area- 0.7 x 10,680 SF = 7476 SF
		4. D07 factors- Clark County factor- 1.05, 2nd gen overlay- 1.15, 2 winters @ 1.10 factor
		5. Adjusted variable thickness area = 7,476 x 1.05 x 1.15 x 1.10 x 1.10 = 10,923 SF
		6. Capped variable area = 0.85 x 10,923 = 9,078 SF
		7. Use 2” variable depth. 2/12 x 9,078 = 1513 CF/27 = 56 CY
22. Item 848 Hand chipping
	1. Usually 10% of unsound area. 9,078 unsound x 0.10 = 908 CF/9 = 101 SY
23. Item 848 Test slab
	1. Lump sum (LS)
24. Item 848 Full-Depth repair
	1. Saturated map cracking on bottom of deck, approx. 222 SF – Assume 50% full depth
		1. 0.50 x 222 x 8/12 = 75 CF/27 = 3 CY
		2. Factor of 2 to cover future deterioration- 6 CY
25. Item 848 Existing concrete overlay removed, 1¼”
	1. 1,187 SY – same as SDC overlay
26. Item 848 Removal of debonded or deteriorated existing variable thickness concrete overlay
	1. 50% of hand chipping quantity
		1. 0.5 x 101 = 51 SY
27. Item 849 Damage assessment
	1. Lump Sum (LS)
28. Item 849 Surface preparation
	1. Lump Sum (LS)
29. Item 849 Repairing damaged members by grinding
	1. 4 HOUR (estimated)
30. Item 849 Straightening damaged members
	1. Lump Sum (LS)

Maintenance of Traffic

1. Item 614 LEO
	1. 50 per structure - 100 (HOUR)
2. Item 614 Work zone impact attenuator, 24” wide hazards, (Unidirectional)
	1. 4 (EACH)
3. Item 614 Work zone impact attenuator, 24” wide hazards, (Bidirectional)
	1. 4 (EACH)
4. Item 614 Detour signing
	1. LS
5. Item 614 Barrier Reflector, type 1 (bidirectional)
	1. 1500’ PB run /50’ space = 30 reflectors
6. Item 614 Barrier Reflector, type 1 (One Way)
	1. 440’ PB/50’ space = 8.8 spaces – 9 spaces – 10 reflectors
	2. 440’ PB/50’ space = 8.8 spaces – 9 spaces – 10 reflectors
	3. 240’ PB/50’ space = 4.8 spaces – 5 spaces – 6 reflectors
	4. 240’ PB/50’ space = 4.8 spaces – 5 spaces – 6 reflectors
		1. Total: 32 reflectors
7. Item 614 Object marker, One way
	1. 32 EACH, matches barrier reflectors
8. Item 614 Object marker, Two way
	1. 30 EACH, matches barrier reflectors
9. Item 614 Work Zone center line, class 1
	1. 500’ each side for signalized closure- 500/5280 = 0.10 x 2 sides = 0.20 MILE
10. Item 614 Work Zone Edge line, Class 1, 4”, 740.06, Type 1
	* 1. See sheet 6 (0.62 MILE) and sheet 9 (0.44 + 0.44) = 1.5 MILE
11. Item 614 Work zone stop line, Class 1, 740.06, Type 1
	1. 12’ wide x 2 stop lines = 24 FT
12. Item 615 Roads for maintaining traffic
	1. Lump Sum (LS)
13. Item 615 Pavement for maintaining traffic, class A
	1. Area from Microstation areas – 367 SY
14. Item 622 Portable Barrier, Unanchored
	1. 1360 and 1500 PB = 2860 FT

Incidentals

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

**END OF CALCULATIONS**