

ESTIMATED STRUCTURAL QUANTITIES						CALC.	DATE	CHK'D	DATE
						LLB	11/1/2024	SK	11/5/2024
ITEM	ITEM EXT.	TOTAL	UNIT	DESCRIPTION	ABUT.	PIERS	SUPER.	GENERAL	SHEET REF.
202	11003	LS	LS	STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN					1/51
202	22900	87	SY	APPROACH SLAB REMOVED			87		
503	11101	LS	LS	COFFERDAMS AND EXCAVATION BRACING, AS PER PLAN					1/51
503	21100	1,540	CY	UNCLASSIFIED EXCAVATION	1,160	380			
505	11100	LS	LS	PILE DRIVING EQUIPMENT MOBILIZATION					
507	00100	6,705	FT	STEEL PILES HP10X42, FURNISHED	4,095	2,610			
507	00150	6,100	FT	STEEL PILES HP10X42, DRIVEN	3,780	2,320			
507	92201	555	FT	PREBORED HOLES, AS PER PLAN	555	0			4/51
509	10000	337,235	LB	EPOXY COATED STEEL REINFORCEMENT	96,226	73,433	167,576		
509	30020	14,644	FT	NO. 4 DEFORMED GFRP REINFORCEMENT			14,644		
511	34447	564	CY	CLASS QC2 CONCRETE WITH QC/QA, BRIDGE DECK, AS PER PLAN			564		
511	34450	137	CY	CLASS QC2 CONCRETE WITH QC/QA, BRIDGE DECK (PARAPET)			137		
511	41012	177	CY	CLASS QC1 CONCRETE WITH QC/QA, PIER ABOVE FOOTINGS		177			
511	44112	253	CY	CLASS QC1 CONCRETE WITH QC/QA, ABUTMENT NOT INCLUDING FOOTING	253				
511	46512	422	CY	CLASS QC1 CONCRETE WITH QC/QA, FOOTING	422				
512	10100	1,647	SY	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)	210	510	927		
512	10300	70	SY	SEALING CONCRETE BRIDGE DECKS WITH HMWM RESIN				70	
512	33000	91	SY	TYPE 2 WATERPROOFING	91				
513	10300	771,146	LB	STRUCTURAL STEEL MEMBERS, LEVEL 5			771,146		
513	20000	9,048	EACH	WELDED STUD SHEAR CONNECTORS			9,048		
514	00060	34,727	SF	FIELD PAINTING STRUCTURAL STEEL, INTERMEDIATE COAT			34,727		
514	00066	34,727	SF	FIELD PAINTING STRUCTURAL STEEL, FINISH COAT			34,727		
516	11210	153	FT	STRUCTURAL EXPANSION JOINT INCLUDING ELASTOMERIC STRIP SEAL				153	
516	44101	12	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE), AS PER PLAN (11 IN x 18 IN x 2.1284 IN) (PTFE)	12				4/51
516	44100	6	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE) (15 IN x 24 IN x 2.7784 IN)		6			
516	44100	6	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE) (16 IN x 24 IN x 2.9084 IN)		6			
516	44200	6	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE) (17 IN x 26 IN x 3.0884 IN)		6			
518	20000	226	SY	PREFABRICATED GEOCOMPOSITE DRAIN	226				
518	40000	202	FT	6" PERFORATED CORRUGATED PLASTIC PIPE	202				
518	40010	98	FT	6" NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS	98				
526	30010	327	SY	REINFORCED CONCRETE APPROACH SLABS WITH QC/QA (T=17")				327	
526	90010	154	FT	TYPE A INSTALLATION				154	
601	20000	656	SY	CRUSHED AGGREGATE SLOPE PROTECTION				656	

From SUB & SUP Excel Bar Lists

Epoxy Coated Reinforcing Steel

R. Abut.	19473
F. Abut	26811
R. Approach Slab	23260
F. Approach Slab	26682
Abut. Total	96226

Pier 1	24148
Pier 2	24365
Pier 3	24920
Pier Total	73433

Deck	145079
Barrier	22497
Super. Total	167576

Quantity Total 337235

No. 4 GFRP Deformed Bars

Barrier 14643.41667

Quantity Total 14644

Barrier GFRP bar lengths from SUP Excel

288	10'- 2"	2928
8	11'- 10"	94.66667
8	14'- 0"	112
8	17'- 3"	138
4	18'- 0"	72
4	19'- 4"	77.33333
		0
48	10'- 0"	480
24	6'- 4"	152
24	5'- 1"	122
22	20'- 6"	451
11	21'- 4"	234.6667
11	22'- 9"	250.25
154	30'- 0"	4620
154	30'- 0"	4620
11	21'- 1"	231.9167
11	5'- 5"	59.58333

Sealing of Concrete Surfaces (Epoxy-Urethane)			
	Length (ft)	Height (ft)	Area (SY)
Rear Abut.	72.42	9.00	72.42
Rear Abut. Left Wing	11.00	5.53	6.76
Rear Abut. Right Wing	21.00	4.06	9.47
Forward Abut.	96.43	9.14	97.93
Forward Abut. Left Wing	22.00	6.19	15.13
Forward Abut. Right Wing	23.00	3.31	8.46
Total:			210.00
Pier 1 - Columns	9.42	13.95	87.65
Pier 1 - Cap			82.32
Pier 2 - Columns	9.42	13.08	82.18
Pier 2 - Cap			87.50
Pier 3 - Columns	9.42	10.64	66.85
Pier 3 - Cap			103.86
Total:			510.00
Deck	389.52	9.50	822.32
Approach Slab	120.10	7.83	104.50
Total:			927.00
Sealing Concrete Bridge Decks with HMWM Resin			
	Length (ft)	Height (ft)	Area (SY)
Deck Joint 1	386.00	0.71	30.38
Deck Joint 2	384.75	0.71	30.28
Rear App. Slab	30.05	1.42	4.73
Forward App. Slab	30.15	1.42	4.75
Total:			70.14

Pier 1			
Height	Total	Length	Area
5.53	14.06	9.17	128.88
5.03	13.06	11.33	148.01
4.53	12.06	11.33	136.68
4.03	11.06	14.83	164.06
1.17	2.34	6.82	15.95
3.52	10.04	7.83	78.59
3.00	9.00	9.50	85.50
5.53	5.53	3	16.59
3.00	3.00	3.00	9.00
Col. Dia.	Col. Area	# of Col.	Total Area
3	7.07	6	42.41
Total			740.86

Pier 2			
Height	Total Height	Length	Area
5.95	14.90	9.17	136.58
5.38	13.76	12.17	167.41
4.80	12.60	12.17	153.30
4.21	11.42	12.17	138.94
3.61	10.22	12.17	124.34
3.00	9.00	9.17	82.50
5.95	5.95	3	17.85
3.00	3.00	3.00	9.00
Col. Dia.	Col. Area	# of Col.	Total Area
3	7.07	6	42.41
Total			787.52

Pier 3			
Height	Total Height	Length	Area
6.65	16.30	11.00	179.30
5.95	14.90	12.75	189.98
5.23	13.46	12.75	171.62
4.50	12.00	17.03	204.36
0.93	1.86	7.99	14.86
3.76	10.52	8.47	89.09
3.00	9.00	11.00	99.00
6.65	6.65	3	19.95
3.00	3.00	3.00	9.00
Col. Dia.	Col. Area	# of Col.	Total Area
3	7.07	6	42.41
Total			934.74

Length From CAD	
Perforated Corrugated Plastic Pipe	
Rear Abutment	91.672
Forward Abutment	110
Total Length	201.67

Non-Perforated Corrugated Plastic Pipe sloped @ 1%

Location	T. Wing EL. (ft)	Ftg. EL. (ft)	EL. Difference (ft)	Length to Wing Edge (ft)	Wing Edge to prop 2:1 side slope surface (ft)	Calculated Length (ft)
Rear Abutment Left	814.25	803.22	11.03	3.5	22.5712	26.07
Rear Abutment Right	811.93	803.22	8.71	3.5	17.8384	21.34
Forward Abutment Left	809.96	797.03	12.93	3.5	26.4472	29.95
Forward Abutment Right	805.26	797.03	8.23	3.5	16.8592	20.36
Total Length						97.72

Porous Backfill

Rear Abutment	Width (ft.)	Length (ft.)	Ht (footing)	Width (footing)	Height (top)	Width (top)	Area	Vol (cf)	Vol (cy)
Backwall	2	59.500	3.000	1.000	1.000	2.000	5.000	297.500	11.0
Lt. Wing	2	13.500	3.000	1.000	1.000	4.500	7.500	101.250	3.8
Rt. Wing	2	8.000	3.000	1.000	1.000	4.500	7.500	60.000	2.2
Total Rear									17.0

Forward Abutment	Width (ft.)	Length (ft.)	Ht (footing)	Width (footing)	Height (top)	Width (top)	Area	Vol (cf)	Vol (cy)
Backwall	2	75.500	3.000	1.000	1.000	2.000	5.000	377.500	14.0
Lt. Wing	2	7.000	3.000	1.000	1.000	5.000	8.000	56.000	2.1
Rt. Wing	2	18.000	3.000	1.000	1.000	4.500	7.500	135.000	5.0
Total Rear									21.1

Total (cy)	38.0
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Shear Studs 7/8" x 7"

Wt. per 1000 Count (lbs) = 1314 References: Fraser Molloy (frasermolloy.com) Shear Connector 3/4" & 7/8" Diameter Stud Specifications;

No. Shear Studs / Row 3 Northland Fastening Systems (norfas.com) 7/8 Shear Connector Weld Stud Specifications

	G1	G2	G3	G4	G5	G6	Total
Total No. Shear Studs	1008	1596	1650	1668	1863	1263	9048
Wt. Shear Studs (lbs)	1324.5	2097.1	2168.1	2191.8	2448.0	1659.6	11889

	G1				G2				G3			
	Row Spa. (in)	No. Spa.	Length	Plan Length	Row Spa. (in)	No. Spa.	Length	Plan Length	Row Spa. (in)	No. Spa.	Length	Plan Length
Y1	15.000	25.000	31.250	30.250	9.000	81.000	60.750	60.750	9	81	60.750	60.750
Y2	12.000	60.000	60.000	60.000	7.000	40.000	23.333	23.333	7	53	30.917	30.833
Y3	0.000	0.000	0.000	0.000	9.000	9.000	6.750	6.750	0	0	0.000	0.000
Y4 FS1	56.375	1.000	4.698	4.698	52.4375	1.000	4.370	4.370	44.75	1	3.729	3.729
Y5	15.000	20.000	25.000	25.000	9.000	83.000	62.250	62.250	9	76	57.000	57.000
Y6	12.000	58.000	58.000	58.000	7.000	46.000	26.833	26.833	7	40	23.333	23.333
Y7	15.000	7.000	8.750	8.750	9.000	8.000	6.000	6.000	9	18	13.500	13.500
Y8 FS2	63.688	1.000	5.307	5.307	61.125	1.000	5.094	5.094	52.6875	1	4.391	4.391
Y9	15.000	53.000	66.250	66.250	9.000	25.000	18.750	18.500	9	13	9.750	9.750
Y10	10.000	49.000	40.833	40.833	7.000	40.000	23.333	23.333	7	70	40.833	40.833
Y11	15.000	10.000	12.500	12.500	9.000	46.000	34.500	34.500	9	40	30.000	30.000
Y12	0.000	0.000	0.000	0.000	7.000	31.000	18.083	18.083	7	37	21.583	21.583
Y13	0.000	0.000	0.000	0.000	9.000	32.000	24.000	24.000	9	34	25.500	25.500
Y14 FS3	63.938	1.000	5.328	5.328	51.6875	1.000	4.307	4.307	51.5625	1	4.297	4.297
Y15	15.000	34.000	42.500	42.500	9.000	17.000	12.750	12.750	7	44	25.667	25.667
Y16	12.000	16.000	16.000	16.000	7.000	32.000	18.667	18.667	9	40	30.000	29.464
Y17	0.000	0.000	0.000	0.000	9.000	38.000	28.500	28.208	0	0	0.000	0.000
Total		335.000	377.917	376.917		531.000	379.771	379.229		549.000	382.750	382.130
Length fr/ Grdr Calc				376.922				379.229				382.125
Check			OK	OK			OK	OK			OK	OK

Checks are to ensure "Length" is >= "Plan Length" and that the "Plan Length" = Girder Length from previous calculation sheet.

G4				G5				G6			
Row Spa. (in)	No. Spa.	Length	Plan Length	Row Spa. (in)	No. Spa.	Length	Plan Length	Row Spa. (in)	No. Spa.	Length	Plan Length
9	75	56.250	56.250	8	101	67.333	67.333	9	10	7.500	7.500
7	61	35.583	35.583	6	50	25.000	25.000	12	53	53.000	53.000
0	0	0.000	0.000	0	0	0.000	0.000	8	48	32.000	32.000
49.375	1	4.115	4.115	48.3125	1	4.026	4.026	55.625	1	4.635	4.635
9	75	56.250	55.750	8	93	62.000	62.000	12	60	60.000	60.000
7	39	22.750	22.750	6	46	23.000	23.000	9	47	35.250	35.250
9	21	15.750	15.750	8	15	10.000	10.000	0	0	0.000	0.000
52.375	1	4.365	4.365	50.25	1	4.188	4.188	52.3125	1	4.359	4.359
9	29	21.750	21.750	8	15	10.000	10.000	12	80	80.000	80.000
7	62	36.167	36.167	6	41	20.500	20.500	9	41	30.750	30.750
9	27	20.250	20.250	8	77	51.333	51.333	12	18	18.000	18.000
7	33	19.250	19.250	6	37	18.500	18.500	0	0	0.000	0.000
9	35	26.250	26.250	8	37	24.667	24.667	0	0	0.000	0.000
49.75	1	4.146	4.146	46.0625	1	3.839	3.839	44.875	1	3.740	3.740
7	59	34.417	34.333	6	47	23.500	23.500	12	60	60.000	60.000
9	36	27.000	26.667	8	58	38.667	38.359	0	0	0.000	0.000
0	0	0.000	0.000	0	0	0.000	0.000	0	0	0.000	0.000
	555.000	385.792	384.875		620.000	388.052	387.744		420.000	390.734	390.734
			384.885				387.745				390.734
		OK	OK			OK	OK			OK	OK

Determine weight of proposed structural steel

Girders	Girder #1	Girder #2	Girder #3	Girder #4	Girder #5	Girder #6
Girder length (ft) =	376.92	379.47	382.13	384.89	387.74	390.73
Girder Weight (lbs) =	99,118.52	99,926.11	101,012.20	101,267.09	102,148.38	103,102.54

Cross Frames	End Frame	Pier Diaph.	Type 1-A	Type 1-C	Type 2-A
No. Cross Frames =	10	15	79	0	28
Weight per CF (lbs/CF) =	1250	1250	650	875	875
Total Weight (lbs) =	12500	18750	51350	0	24500

Additional Bearing Stiffeners	Abutments	Piers
No. Additional Bearing Stiffeners =	4	6
Weight of Stiffener (lbs) =	50	175
Weight of Stiffener (lbs) =	200	1050

Field Splices	Girder #1	Girder #2	Girder #3	Girder #4	Girder #5	Girder #6
Field Splice 1	1050	1050	1050	1050	1050	1050
Field Splice 2	1050	1050	1050	1050	1050	1050
Field Splice 3	1150	1150	1150	1150	1150	1150
Weight of Field Splice (lbs) =	3250	3250	3250	3250	3250	3250

Total Weight Structural Steel (lbs) =	734424.8	
Hardware & Mis. =	36721.2	5%
Say (lbs) =	771146.0	

Backup calculation for steel girders

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
A	74.2240	74.5521	74.8854	75.2344	75.5885	75.9583
B	91.7552	92.2552	92.7760	93.3125	93.8646	94.4375
C	116.6146	117.4531	118.3281	119.2344	120.1719	121.1563
D	92.8281	93.7135	94.6354	95.6042	96.6198	97.6823
	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500
	55.6615	55.9115	56.1563	56.4271	56.6927	56.9688
E	18.5625	18.6406	18.7292	18.8073	18.8958	18.9896
F	18.3750	18.4688	18.5625	18.6563	18.7552	18.9427
G	55.0313	55.3333	55.6563	55.9948	55.1094	56.6094
H	18.3490	18.4531	18.5573	18.6615	20.0000	18.8854
I	23.3750	26.0208	23.6771	23.8281	24.0000	24.1719
J	69.0833	67.1094	70.1510	70.7240	71.3021	71.9219
K	23.7396	23.9063	24.0833	24.2656	24.4531	24.6458
L	31.6615	31.9375	37.3594	32.5260	32.8385	35.8125
M	61.1667	61.7760	57.2760	63.0781	63.7813	61.8698
	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500

Bottom Flange		Top Flange		Web		Weight					
Thick	Width	Thick	Width	Height	Thick	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
1.25	16	1.25	16	44	0.5	158	158	158	158	158	158
1.25	16	1.25	16	44	0.5	11743	11796	11847	11905	11961	12019
1.75	16	1.5	16	44	0.5	4674	4694	4716	4736	4758	4782
1.75	16	1.5	16	44	0.5	4627	4651	4674	4698	4723	4770
1.5	16	1	16	44	0.5	11610	11674	11742	11813	11627	11943
2.125	16	2	16	44	0.5	5494	5526	5557	5588	5989	5655
2.125	16	2	16	44	0.5	7000	7792	7090	7135	7187	7238
1.75	16	1.5	16	44	0.5	17396	16899	17664	17809	17954	18110
2.75	16	2.5	16	44	0.5	8563	8623	8687	8752	8820	8890
2.75	16	2.5	16	44	0.5	11420	11520	13475	11732	11845	12917
1.75	16	1.75	16	44	0.5	16235	16396	15202	16742	16929	16421
1.75	16	1.75	16	44	0.5	199	199	199	199	199	199
Total						99,119	99,926	101,012	101,267	102,148	103,103

<u>Prefabricated Geocomposite Drain</u>						
	Bottom Elv	Left Elv	Right Elv	*Length	Avg. Ht	Area (SY)
Rear Abutment	803.2200	813.3600	810.4100	68.3438	8.6650	65.80
Rear Right Wing	803.2200	811.8300	811.9300	8.3000	8.6600	7.99
Rear Left Wing	803.2200	814.7800	814.2500	14.0000	11.2950	17.57
Forward Abutment	797.0300	803.6300	809.4000	92.0000	9.4850	96.96
Forward Right Wing	797.0300	810.8200	809.9600	18.0000	13.3600	26.72
Forward Left Wing	797.0300	805.0500	805.2600	12.0000	8.1250	10.83
Total:						226.00

* Lengths measure from plan view in Rear and Forward Abutment Plan and Elevation dgns

96.6041667

FIELD PAINTING STRUCTURAL STEEL,

LENGTH OF GIRDER	A	B	C	D	Beyond stiffener	Total Length
GIRDER 1	74.22	91.76	116.61	92.83	0.75	376.92
GIRDER 2	74.55	92.26	117.45	93.71	0.75	379.47
GIRDER 3	74.89	92.78	118.33	94.64	0.75	382.13
GIRDER 4	75.23	93.31	119.23	95.60	0.75	384.89
GIRDER 5	75.59	93.86	120.17	96.62	0.75	387.74
GIRDER 6	75.96	94.44	121.16	97.68	0.75	390.73

TOP FLANGE 1"x16" 16 inch
 Web 1/2"x44" 44 inch
 Bottom Flange 1 3/4"x 16" 16 inch

Unit Exposed length = 11.7 ft
 Bearing Stiffener = 9.2 ft²
 number of bearing stiffener = 10.0
 Total exposed area of girder = 27042.9 ft²

Area of L5xL5x1/2 = 1.67 ft
 Area of L6xL6x5/8 = 2.00 ft
 Area of L4x4x3/8 = 1.33 ft
 Horizontal bracing = 6.5 ft
 cross bracing = 6.75 ft

Stiffener = 9 inch
 Depth of stiffener = 44 inch
 width of connection plate 15 inch

TYPE 1 total bay = 79
 Type 2 total bay = 28
 Total endframe bay = 10
 End Frame = 45.2 ft² for one bay
 Total exposed area of one bay= 55.9 ft², Type 1
 Total exposed area of one bay= 64.8 ft², Type 2
 Use 15% contingency on steel in bays
 Total area of the cross frames = 7684.396 ft²

Conserervativly TYPE A choosen as it has more exposed surface

514 0060 34727.3 ft²
 514 0066 34727.3 ft²

TABLE OF DIMENSIONS

<i>DIMENSION</i>	<i>GIRDER 1</i>	<i>GIRDER 2</i>	<i>GIRDER 3</i>	<i>GIRDER 4</i>	<i>GIRDER 5</i>	<i>GIRDER 6</i>
"A"	74'-2 ¹¹ / ₁₆ "	74'-6 ⁵ / ₈ "	74'-10 ⁵ / ₈ "	75'-2 ¹³ / ₁₆ "	75'-7 ¹ / ₁₆ "	75'-11 ¹ / ₂ "
"B"	91'-9 ¹ / ₁₆ "	92'-3 ¹ / ₁₆ "	92'-9 ⁵ / ₁₆ "	93'-3 ³ / ₄ "	93'-10 ³ / ₈ "	94'-5 ¹ / ₄ "
"C"	116'-7 ³ / ₈ "	117'-5 ⁷ / ₁₆ "	118'-3 ¹⁵ / ₁₆ "	119'-2 ¹³ / ₁₆ "	120'-2 ¹ / ₁₆ "	121'-1 ⁷ / ₈ "
"D"	92'-9 ¹⁵ / ₁₆ "	93'-8 ⁹ / ₁₆ "	94'-7 ⁵ / ₈ "	95'-7 ¹ / ₄ "	96'-7 ⁷ / ₁₆ "	97'-8 ³ / ₁₆ "
"E"	18'-6 ³ / ₄ "	18'-7 ¹¹ / ₁₆ "	18'-8 ³ / ₄ "	18'-9 ¹¹ / ₁₆ "	18'-10 ³ / ₄ "	18'-11 ⁷ / ₈ "
"F"	18'-4 ¹ / ₂ "	18'-5 ⁵ / ₈ "	18'-6 ³ / ₄ "	18'-7 ⁷ / ₈ "	18'-9 ¹ / ₁₆ "	18'-11 ⁵ / ₁₆ "
"G"	55'-0 ³ / ₈ "	55'-4"	55'-7 ⁷ / ₈ "	55'-11 ¹⁵ / ₁₆ "	55'-1 ⁵ / ₁₆ "	56'-7 ⁵ / ₁₆ "
"H"	18'-4 ³ / ₁₆ "	18'-5 ⁷ / ₁₆ "	18'-6 ¹¹ / ₁₆ "	18'-7 ¹⁵ / ₁₆ "	20'-0"	18'-10 ⁵ / ₈ "
"I"	23'-4 ¹ / ₂ "	26'-0 ¹ / ₄ "	23'-8 ¹ / ₈ "	23'-9 ¹⁵ / ₁₆ "	24'-0"	24'-2 ¹ / ₁₆ "
"J"	69'-1"	67'-1 ⁵ / ₁₆ "	70'-1 ¹³ / ₁₆ "	70'-8 ¹¹ / ₁₆ "	71'-3 ⁵ / ₈ "	71'-11 ¹ / ₁₆ "
"K"	23'-8 ⁷ / ₈ "	23'-10 ⁷ / ₈ "	24'-1"	24'-3 ³ / ₁₆ "	24'-5 ⁷ / ₁₆ "	24'-7 ³ / ₄ "
"L"	31'-7 ¹⁵ / ₁₆ "	31'-11 ¹ / ₄ "	37'-4 ⁵ / ₁₆ "	32'-6 ⁵ / ₁₆ "	32'-10 ¹ / ₁₆ "	35'-9 ³ / ₄ "
"M"	61'-2"	61'-9 ⁵ / ₁₆ "	57'-3 ⁵ / ₁₆ "	63'-0 ¹⁵ / ₁₆ "	63'-9 ³ / ₈ "	61'-10 ⁷ / ₁₆ "

***INSTALL ITEM 512 - TYPE 2 WATERPROOFING,
3'-0" WIDE, CENTERED ON THE CONSTRUCTION
JOINT ON THE INSIDE FACE OF EACH ABUTMENT
AND WINGWALL.***

Width of Type 2 waterproofing = 3 ft

R.A vertical C.J. =	12.87	ft
Horizontal C.J at R.A =	72.42	ft
Horizontal C.J at wingwall =	21	ft
Horizontal C.J at wingwall =	11	ft
F.A Vertical C.J =	13.92	ft
Horizontal C.J at F.A =	96.43	ft
Horizontal C.J at wingwall =	22	ft
Horizontal C.J at wingwall =	23	ft

Total Type 2 Waterproofing = 91.00 SY

Abutment Footing*				
	Area	Depth	CY	
Rear	676.66	3	75.18444	
	from CAD			
Forward	898.11	3	99.79	
	from CAD			
Total			174.97	
Pier Footing				
	Length	Width	Depth	CY
Pier 1	66	9	3.5	77
Pier 2	70	9	3.5	81.66667
Pier 3	75	9	3.5	87.5
Total				246.17
Footing Total	421.14			
Use:	422.00			

Abutment Not Including Footing*											
Wings					Backwall			Seats			
		Area	Thickness	CY	Area*	Thickness	A.S. Seat	CY	Area*	Thickness	CY
Rear	Left	95.22	1.5	5.29	730.32	1.75	46.03	45.63074	343.01	3	38.11
	Right	237.23	1.5	13.18							
Forward	Left	293.91	1.5	16.33	1051.42	1.75	61.84	65.85722	522.57	3	58.06
	Right	186.76	1.5	10.38							
Abutment		253.00									

Pier Above Footings**							
	Cap Area	Cap Thckr	Col Area	Col Ht	S. P. A	S. P. Th	CY
Pier 1	275.12	3	7.068583	16.36	10	3	57.38
Pier 2	301.0417	3	7.068583	15.5	0	0	57.80
Pier 3	357.48	3	7.068583	13.05	9.79	3	61.31
Pier Total	177.00						

Deck***			
	Area	Length	CY
Girder 1	7.683	377.825	107.5122
Girder 2	6.415	380.393	90.37856
Girder 3	6.415	383.062	91.01269
Girder 4	6.415	385.837	91.67201
Girder 5	6.415	388.725	92.35818
Girder 6	6.921	391.735	100.4147
Deck Total	564.00		

Parapet****					
	Area	Deck Length	Rear AS L	Fwd AS L	CY
Left	4.079	378.04	31.333	31.25	66.56671
Right	4.079	383.58	32.04	33.5	67.85039
	Area	Height			CY
Light Pole	4.618	3.5			1.197259
Parapet Total	137.00				

Deck total	564.00	376.92	379.47	382.13	384.89	387.74	390.73
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Measure Area

Method: Flood

☐ Mass Properties
☐ Display Centroid

Flatten Direction: None

Area Unit: Square'

Area: 18790.987 Sq'

Perimeter Unit: US Survey Feet

Perimeter: 924.861'

☐ Locate Interior Shapes
☐ Dynamic Area

Maximum Gap: 0.001

1.452777778
0.840277778

*Areas are taken from the Abutment Footing DGN for each respective abutment

**Areas are taken from the Pier Plan and Elev. DGN for each respective pier

***Areas are taken from the Transverse Section DGN

****Areas are taken from the Barrier Rail DGN

Steel Piles GP10x42 Furnished

	No. of Piles	Pile Length (ft)	Total length (ft)
Rear Abut.	26	65	1690
Pier 1	18	45	810
Pier 2	20	45	900
Pier 3	20	45	900
Forward Abut.	37	65	2405
	121		
	ABUT.		4095
	PIERS		2610
	Total:		6705

Steel Piles GP10x42 Driven

	No. of Piles	Pile Length (ft)	Total length (ft)
Rear Abut.	26	60	1560
Pier 1	18	40	720
Pier 2	20	40	800
Pier 3	20	40	800
Forward Abut.	37	60	2220
	ABUT.		3780
	PIERS		2320
	Total:		6100

Prebored Holes

	No. of Piles	Bottom of Footing	Total Bore Length
Rear Abut.	0	800.22	0
Pier 1	0	784	0
Pier 2	0	784	0
Pier 3	0	784	0
Forward Abut.	37	794.03	555
Prebored Depth:		779.03	
	ABUT.		555
	PIERS		0
	Total:		555

ITEM 507 PREBORED HOLES, AS PER PLAN

AT THE FORWARD ABUTMENT, PREBORE HOLES FOR DRIVEN PILES TO ELEVATION 779.03, IN ACCORDANCE WITH C&MS 507.11. A 3-FOOT-TICK ZONE OF COBBLES, BOULDER, OR CONSTRUCTION DEBRIS AS NOTED IN BORING B-008 FROM 25 TO 28 FEET DEEP BELOW GRADE (ABOUT ELEVATIONS 782.7 TO 779.7 FEET) WHICH IS ABOUT 12 TO 15 FEET BELOW PILE CAP.

Approach Slabs	Length (Along Arc)	Skew	C-C at Roadway	C-C at Bridge	Lt. Outside Curb	Lt. Inside Curb	Rt. Outside Curb	Rt. Inside Curb	Barrier +2"	Area	Plan View Area (dgn)
Rear Approach Slab	30.00 ft.	49.255	59.584 ft.	60.604 ft.	28.295 ft.	29.691 ft.	31.829 ft.	30.356 ft.	1.667 ft.	1466.00 sf.	1465.80 sf.
Forward Approach Slab	30.00 ft.	33.52328	83.803 ft.	81.338 ft.	31.466 ft.	29.080 ft.	28.508 ft.	31.138 ft.	1.667 ft.	1468.21 sf.	1467.80 sf.
										327.00 sy.	326.00 sy.

Type A Installation	Length
Rear A.S.	63.95 ft.
Forward A.S.	89.95 ft.
Total Length	154.00 ft.

0

Crushed Aggregate Slope Protection

	Area (SF)*	Area (SY)
Rear Abut.	2717.07428	301.8971
Forward Abut.	3178.26829	353.1409

* Area measurements taken from plan view of Site Plan dgn.

Total:	656
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Approach Slab to be Removed

	Area (SF)*	Area (SY)
Rear Abut.	377.204	41.91156
Forward Abut.	401.974	44.66378

* Area measurements taken from plan view of Site Plan dgn.

Total:	86.57533
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503.09 Method of Measurement. After the requirements of Items 201, 202, and 203 have been met, the Department will measure excavation on a lump sum basis or by the number of cubic yards (cubic meters) as follows:

A. Bounded on the bottom. Bounded bottom plane of the footing, crossbeam, or wall.

B. Bounded on the top

1. In cut sections, by the surface of the remaining ground.
2. In fill sections:
 - a. If excavation is performed before embankment is placed, by the surface of the original ground.
 - b. If excavation is performed after embankment is placed, by the surface of the embankment.

C. Bounded on the sides

1. For Unclassified Excavation, 1 foot (0.3 m) outside the outer edge of the footing, crossbeam, or wall.
2. For Rock Excavation or Shale Excavation:
 - a. If Rock Excavation is included in the Contract, by the outer edge of the footing or wall.
 - b. If rock or shale is removed as part of Unclassified Excavation Including Rock and/or Shale:
 - (1) Above the minimum specified depth of keying, the same as described in 503.09.C.1.
 - (2) For the remainder of the excavation, the same as described in 503.09.C.2.a.

For keys below footings, the Department will determine the volume of keys by the number of cubic yards (cubic meters) shown on the plans.

The Department will measure Cofferdams and Excavation Bracing on a lump sum basis.

Abutment Excavation

Area of Existing Rear Abutment	386.5419 sf (measured in CAD)	
Area of Rear Abutment Excavation	554.5162 sf (measured in CAD - 1' beyond Existing)	
Bottom of Exist. Footing Elev.	798.44	
Top of Exist. Grade Elev.	813	
Height of Excavation	14.56 ft	
Volume of RA Excavation	2445.706 cf	
	0 cy	<---not included in this pay item

Area of Existing Forward Abut.	452.7148 sf (measured in CAD)	
Area of Forward Abut. Excavation	655.9274 sf (measured in CAD - 1' beyond Existing)	
Bottom of Exist. Footing Elev.	794.64	
Top of Exist. Grade Elev.	809	
Height of Excavation	14.36 ft	
Volume of FA Excavation	2918.133 cf	
	0 cy	<---not included in this pay item

Area of Proposed Rear Abut.	676.6588 sf (measured in CAD)	
Area of Rear Abutment Excavation	876.971 sf (measured in CAD - 1' beyond Existing)	
Bottom of Proposed Footing	800.22	
Top of Exist. Grade Elev.	813	
Height of Excavation	12.78 ft	

Volume of RA Excavation	11207.69 cf
	415.0996 cy

Area of Proposed Forward Abut.	898.1131 sf (measured in CAD)
Area of Forward Abut. Excavation	1147.438 sf (measured in CAD - 1' beyond Existing)
Bottom of Proposed Footing	794.03
Top of Exist. Grade Elev.	809
Height of Excavation	14.97 ft
Volume of FA Excavation	17177.15 cf
	636.1907 cy

Total Abutment Excavation	1051.29 cy
Include 10% and round	1160 cy

Pier Excavation

Area of Existing Pier 1 Footing	420.85 sf
Area of Existing Pier 1 Excavation	531.875 sf
Bottom of Existing Footing Elev.	776.25
Top of Exist. Grade Elev.	790
Height of Excavation	13.75 ft
Volume of Exist. Pier 1 Excavation	1526.594 cf
	0 cy

<---not included in this pay item

Area of Proposed Pier 1 Excavatic	782 sf
Remove Exist. Pier 1 Area	250.125 sf
Bottom of Proposed Footing Elev	783.5
Top of Exist Grade Elev.	790
Height of Excavation	6.5 ft
Volume of Proposed Pier 1 Excav.	1625.813 cf
	60.21528 cy

Area of Existing Pier 2 Footing	480.375 sf
Area of Existing Pier 2 Excavation	596.875 sf
Bottom of Existing Footing Elev.	776.25
Top of Existing Grade Elev.	790
Height of Excavation	13.75 ft
Volume of Exist. Pier 2 Excavation	1601.875 cf
	0 cy

<---not included in this pay item

Area of Proposed Pier 2 Excavatic	900 sf
Remove Exist. Pier 2 Area	303.125 sf
Bottom of Proposed Footing Elev.	783.5
Top of Existing Grade Elev.	790
Height of Excavation	6.5 ft
Volume of Pier 2 Excavation	1970.313 cf
	72.97454 cy

Existing Pier 3 Footing Area	441 sf	
Existing Pier 3 Excavation Area	561 sf	
Bottom of Exist. Footing Elev.	776.25	
Top of Exist. Grade Elev.	787	
Height of Excavation	10.75 ft	
Volume of Pier 3 Excavation	1290 cf	
	0 cy	<---not included in this pay item

Proposed Pier 3 Excavation Area	847 sf
Bottom of Proposed Footing Elev	783.5
Top of Exist. Grade Elev.	790
Height of Excavation	6.5 ft
Volume of Pier 3 Excavation	5505.5 cf
	203.9074 cy

Total Pier Excavation	337.0972 cy
Include 10% and round	380 cy