

CULVERT QUANTITIES

Designer: BSH
CRS: CAR-164-10.22
PID: 117779
Date: 4/18/24

NOTE:
LEFT = INLET
RIGHT = OUTLET

ITEM 511 - CLASS QC1 CONCRETE, RETAINING WALL/WINGWALL NOT INCLUDING FOOTING

Wingwall #1

plan area = $8.25 \times 1 = 8.25$ s.f.
avg. height = $(6.5 + 4)/2 = 5.25'$
Volume = $8.25 \times 5.25 / 27 = 1.6$ c.y.

Wingwall #2

plan area = $8.25 \times 1 = 8.25$ s.f.
avg. height = $(6.5 + 4)/2 = 5.25'$
Volume = $8.25 \times 5.25 / 27 = 1.6$ c.y.

Wingwall #3

plan area = $6.33 \times 1 = 6.33$ s.f.
avg. height = $(6.5 + 4.75)/2 = 5.63'$
Volume = $6.33 \times 5.63 / 27 = 1.32$ c.y.

Wingwall #4

plan area = $6.33 \times 1 = 6.33$ s.f.
avg. height = $(6.5 + 4.75)/2 = 5.63'$
Volume = $6.33 \times 5.63 / 27 = 1.32$ c.y.

TOTAL CONCRETE, RET WALL/WINGWALL=

5.8 c.y.

USE 6 C.Y.

ITEM 511 - CLASS QC1 CONCRETE, FOOTING

Left Side

*plan area = 117 s.f.
Volume = $117 \times 1.5 / 27 = 6.50$ c.y.

*shear key area = 35 s.f.
Volume = $35 \times 2.5 / 27 = 3.24$ c.y.

*x-sectional

Lip area = 1.28 s.f.
Volume = $1.28 \text{ s.f.} \times 8' / 27 = 0.38$ c.y.

subtotal = 10.1 c.y.

* CADD Area

Right Side

*plan area = 117 s.f.
Volume = $117 \times 1.5 / 27 = 6.50$ c.y.

*shear key area = 35 s.f.
Volume = $35 \times 2.5 / 27 = 3.24$ c.y.

*x-sectional

Lip area = 1.28 s.f.
Volume = $1.28 \text{ s.f.} \times 8' / 27 = 0.38$ c.y.

subtotal = 10.1 c.y.

TOTAL CONCRETE, FOOTING =

20.2 c.y.

USE 21 C.Y.

ITEM 511 - CLASS QC1 CONCRETE, HEADWALL

Left Headwall

Volume = $(8 + 0.67 + 0.67) \times 1.17 \times 1 / 27 = 0.4 \text{ c.y.}$

Right Headwall

Volume = $(8 + 0.67 + 0.67) \times 1.17 \times 1 / 27 = 0.4 \text{ c.y.}$ **TOTAL CONCRETE, HEADWALL =****0.8 c.y.****USE 1 C.Y.****ITEM 512 - TYPE 2 WATERPROOFING**

Sides of Box including

1' overlap on each wingwall = $84' \times 2 \text{ sides} \times 5.34' \text{ (height of box)} = 897.1 \text{ s.f.}$

Top of Box

with 1' overlap = $(9.34 + 2) \times (84 - 1 - 1) = 929.88 \text{ s.f.}$ **TOTAL TYPE 2 WATERPROOFING =****203 s.y.****ITEM 512 - SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)***** CADD Area**

	top	back	side	*exposed front	
Wingwall #1 =	$(8.62 \times 1) +$	$(8.62 \times 0.5) +$	$(0.5 \times 1) +$	$(*44 \text{ s.f.}) =$	57.43 s.f.
Wingwall #2 =	$(8.62 \times 1) +$	$(8.62 \times 0.5) +$	$(0.5 \times 1) +$	$(*44 \text{ s.f.}) =$	57.43 s.f.
Wingwall #3 =	$(6.57 \times 1) +$	$(6.57 \times 0.5) +$	$(0.5 \times 1) +$	$(*36 \text{ s.f.}) =$	46.36 s.f.
Wingwall #4 =	$(6.57 \times 1) +$	$(6.57 \times 0.5) +$	$(0.5 \times 1) +$	$(*36 \text{ s.f.}) =$	46.36 s.f.

	top	back	front	inside top of box	
Left Headwall =	$(9.34 \times 1) +$	$(9.34 \times 1.17) +$	$(9.34 \times 1.84) +$	$(8 \times 2) =$	53.45 s.f.
Right Headwall =	$(9.34 \times 1) +$	$(9.34 \times 1.17) +$	$(9.34 \times 1.84) +$	$(8 \times 2) =$	53.45 s.f.

Exposed Sides on Face of Box = $2 \times 2(4' \times 0.67') = 10.72 \text{ s.f.}$ Inside Walls of box = $2 \times 2(4' \times 2') = 32.00 \text{ s.f.}$ **TOTAL SEALING OF CONCRETE SURFACES (EPOXY-URETHANE) =****40 s.y.****ITEM 516 - 1" PREFORMED EXPANSION JOINT FILLER**Sum of the wingwall heights = $(2 \times 6.5) + (2 \times 6.5) = 26'$

wingwall widths = 1.0 ft.

TOTAL 1" PREFORMED EXPANSION JOINT FILLER =**26 s.f.****ITEM 503 - UNCLASSIFIED EXCAVATION (WINGWALL FOOTING)***** CADD Area**

Note: offset footings 1.0' to get pay quantity

*LT Side Footing Area (1' offset) = 180 s.f.

*RT Side Footing Area (1' offset) = 180 s.f.

Footing Depth = 1.5 ft.

Approximate existing soil

depth above footings = 5 ft.

Volume = $((1.5 + 5) \times 2) \times (180 + 180) / 27 = 173.3 \text{ c.y.}$

Shear Key excavation:

*Left side shear key area = 35 s.f.

*Right side shear key area = 35 s.f.

shear key depth = 2.5 ft.

Volume of Shear Key excavation = $(35 + 35) \times 2.5 / 27 = 6.5 \text{ c.y.}$ **TOTAL UNCLASSIFIED EXCAVATION = 180 c.y.**

ITEM 518 - POROUS BACKFILL WITH GEOTEXTILE FABRIC

Wingwall 1:		
Volume =	$[(1016.64 - 1012.64) - 1.5' + (1019.14 - 1012.64) - 1.5] / 2 \times 8.25' \times 1.5' / 27 =$	1.72 c.y.
Wingwall 2:		
Volume =	$[(1016.08-1012.08) - 1.5' + (1018.58-1012.08) - 1.5] / 2 \times 8.25' \times 1.5' / 27 =$	1.72 c.y.
Wingwall 3:		
Volume =	$[(1016.83-1012.08) - 1.5' + (1018.58-1012.08) - 1.5] / 2 \times 6.33' \times 1.5' / 27 =$	1.45 c.y.
Wingwall 4:		
Volume =	$[(1017.39-1012.64) - 1.5' + (1019.14-1012.64) - 1.5] / 2 \times 6.33' \times 1.5' / 27 =$	1.45 c.y.

TOTAL POROUS BACKFILL WITH GEOTEXTILE FABRIC = 6 c.y.

Pavement Calculations

CAR-164-(10.22)(11.98)(17.32)

PID: 117779

By: BSH

* includes 4 inch step
includes 10 inch step
+ includes 18 inch extension per spec 204.03

Station		Side	Length	Begin Width	End Width	Average Width	Surface Area	Item 441		Item 441		Item 301		Item 304		Item 204	Item 407		Item 408	Item 202	Item 254	Item 254											
								Surface Course		Intermediate Course		*Asphalt Base		#Aggregate Base			Tack Coat																
														(1 Application)	(2 Applications)		Prime Coat, As Per Plan																
From	To																0.085 Gal/SY	0.055 Gal/SY					0.4 Gal/Sq.Yd.										
								FT.	FT.	FT.	SQ. FT.	Thickness	CU. YD.	Thickness	CU. YD.		Thickness	CU. YD.					Thickness	CU. YD.	SQ. YD.	GAL.		GAL.	SQ. YD.	SQ. YD.	SQ. YD.		
CAR-164-10.22																																	
Mainline Pavement																																	
543+50.00	544+05.00	LT.	55.0	11.6	8.7	10.2	561.0	1.25"	2.16	1.75"	3.03	6.00"	10.73	6.00"	11.24	71.50		6.86		62.33													
543+50.00	544+05.00	RT.	55.0	10.8	13.8	12.3	676.5	1.25"	2.61	1.75"	3.65	6.00"	12.87	6.00"	13.38	84.33		8.27		75.17													
Shoulders																																	
543+25.00	544+25.00	LT.	100.0	4.0	4.0	4.0	400.0							8.00"	9.88				17.78														
543+25.00	544+25.00	RT.	100.0	4.0	4.0	4.0	400.0							8.00"	9.88				17.78														
CAR-164-11.98																																	
Mainline Pavement																																	
255+55.00	256+05.00	LT.	50.0	11.5	11.1	11.3	565.0	1.25"	2.18	1.75"	3.05	6.00"	10.77	6.00"	11.23	71.11		6.91		62.78													
254+75.00	256+50.00	RT.	175.0	11.1	11.9	11.5	2012.5	1.25"	7.76	1.75"	10.87	6.00"	38.35	6.00"	39.97	252.78		24.60		223.61													
Shoulders																																	
255+00.00	257+00.00	LT.	200.0	4.0	4.0	4.0	800.0							8.00"	19.75				35.56														
254+25.00	256+45.00	RT.	220.0	4.0	4.0	4.0	880.0							8.00"	21.73				39.11														
CAR-164-17.32																																	
Mainline Pavement - Full Depth																																	
594+30.00	595+92.00	LT.	162.0	7.5	7.5	7.5	1215.0	1.25"	4.69	1.75"	6.56	6.00"	23.50	6.00"	25.00	162.00		14.85															
594+30.00	595+92.00	LT.	162.0	5.5	5.9	5.7	923.4													102.60													
Mainline Pavement - Resurfacing																																	
594+30.00	595+92.00	LT.	162.0	5.5	5.5	5.5	891.0	1.25"	3.44								8.42			99.00													
A-1 Drive (CADD Areas) - Full Depth																																	
596+20.45		LT.					202.0	2.00"	1.25					6.00"	3.74	22.44				22.44													
A-1 Drive (CADD Areas) - Resurfacing																																	
596+20.45		LT.					319.0	2.00"	1.97								3.01					35.44											
Subtotals																	11.43	61.48															
Totals - Carried to the General Summary									26		27		96		166	664	73		110	549	99	35											

Note: Subgrade compaction for A-1 Full Depth area does not include 18" extension per spec 204.03