STRUCTURE ESTIMATED QUANTITIES

Bridge No. SUM-77-0927R

Ramp C2 over I.R. 77 NB

SUM-77/277/224-VARIOUS
PID No. 106002

Summit County, Ohio

Prepared For:

The Ohio Department of Transportation
District 4

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January 18, 2021

Project: **Bridge No. SUM-77-0927R** Design: RHC
Subject: Stage 3 Estimated Quantities Check: DGN
Date: 1/18/2021

ITEM 202 - STRUCTURE REMOVED, OVER 20 FOOT SPAN

area =	7010	sf
unit cost =	$18.00	per sf

Lump sum = **$126,180**

ITEM 202 - APPROACH SLAB REMOVED

length =	25	ft
width =	28	ft
No. of approach slabs =	2	

Total = **156** **sy**

ITEM 503 - UNCLASSIFIED EXCAVATION

Rear Abutment:

length =	49.33	ft
width =	7.75	ft
depth =	15	ft

Forward Abutment:

length =		ft
width =		ft
depth =		ft

Abutment Subtotal = **212.39** **cy**

Piers:

length =	24.5	ft
width =	24.5	ft
depth =	6.5	ft
no. of ftgs per pier =	1	
no. of piers =	2	

Pier Subtotal = **289.01** **cy**

Total = **502** **cy**

ITEM 505 - PILE DRIVING EQUIPMENT MOBILIZATION

Lump sum = **$15,000**

ITEM 507 - STEEL PILES HP10x42, FURNISHED

Frwd. Abutment:		
length =	40	ft
no. of piles =	10	
Total =	**400**	**ft**

ITEM 507 - STEEL PILES HP10x42, DRIVEN

Frwd. Abutment:		
length =	35	ft
no. of piles =	10	
Total =	**350**	**ft**

ITEM 509 - EPOXY COATED REINFORCING STEEL

Abutments =	13,275	lbs
Pier =	97,512	lbs
Parapets =	19,903	lbs
Slab=	92,954	lbs
Total =	**223,644**	**lbs**

ITEM 509 - NO. 4 GFRP DEFORMED BARS

SBR-1-20 Parapets =	12,353	lbs
Total =	**12,353**	**lbs**

ITEM 511 - CLASS QC2 CONCRETE WITH QC/QA, BRIDGE DECK

BRIDGE

Deck:				
thickness =	8.5	in		
edge of deck				
to bridge limits =	0.75	ft		
total sum of spans =	343.25	ft		
total length =	344.75	ft		
O/O of deck width =	29.33	ft		
Deck Volume =	**265**	**cy**		
Haunch:				
t/flange width =	22	in		
t/deck to t/web =	13	in		
haunch thick. =	2.7	in		
t/flange thick. (avg) =	1.8	in		
total no. of beams =	4			
Over C.I.P. integral pier caps:				
pier cap width =	7.00	ft.		
length between beams =	6.17	ft.		
Number of Pier caps =	2			
Pier Cap Haunch Subtotal =	**3**	**cy**		
Haunch Volume =			**24**	**cy**
Cantilever:				
cantilever length (right) =			2.66	ft
cantilever length (left) =			2.66	ft
Cantilever Volume =			**17**	**cy**
Total =	**306**	**cy**		

ITEM 511 - CLASS QC2 CONCRETE WITH QC/QA, BRIDGE DECK (PARAPET)

area (left) =	4.08	sf
area (right) =	4.08	sf
length (left) =	425.13	ft (Includes App Slab Parapets)
length (rightt) =	402.91	ft (Includes App Slab Parapets)

Total = **126 cy**

ITEM 511 - CLASS QC4 MASS CONCRETE, SUBSTRUCTURE (PIER COLUMNS)

Column area =	28.27	sf
Column diameter =	6.00	ft
Total column height Pier 1=	22.07	ft
Total column height Pier 2=	20.86	ft

Total = 45 cy

ITEM 511 - CLASS QC1 CONCRETE WITH QC/QA, ABUTMENT NOT INCLUDING FOOTING

Skew angle = 0.00 degrees

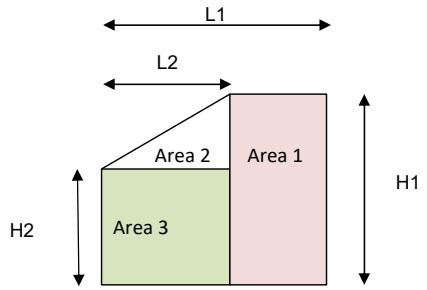
Rear Abutment:

Beam Seat

beam seat length =	29.00	ft
average beam seat height =	5.00	ft
beam seat width =	3.00	ft
Beam Seat Volume =	*688.75*	*cf*

Backwall

average backwall height	7.05	ft
backwall thickness =	1.75	ft
approach slab thickness =	1.42	ft
backwall length =	29.00	ft
Back Wall Volume =	*337.20*	*cf*



Wingwalls

Left

thickness =	1.75	ft
L1 =	10.20	ft
L2 =	7.25	ft
H1 =	12.50	ft
H2 =	9.00	ft
Left wingwall area =	114.8125	sf
Left Wingwall Volume =	*200.92188*	*cf*

Right

thickness =	1.75	ft
L1 =	10.14	ft
L2 =	7.25	ft
H1 =	11.30	ft
H2 =	7.80	ft
Right wingwall area =	101.8945	sf
Right Wingwall Volume =	*178.31538*	*cf*

Rear Abutment Subtotal **52 cy**

Forward Abutment:

Beam Seat

beam seat length =	29.00	ft
average beam seat height =	4.21	ft
beam seat width =	3.00	ft
Beam Seat Volume =	*579.93*	*cf*

Backwall

average backwall height	6.97	ft
backwall thickness =	1.75	ft
approach slab thickness =	1.42	ft
backwall length =	29.00	ft
Back Wall Volume =	*333.14*	*cf*

Wingwalls

Left

thickness =	1.75	ft
L1 =	12.65	ft
L2 =	8.71	ft
H1 =	11.40	ft
H2 =	7.00	ft
Left wingwall area =	125.048	sf
Left Wingwall Volume =	*218.834*	*cf*

Right

thickness =		ft
L1 =		ft
L2 =		ft
H1 =		ft
H2 =		ft
Right wingwall area =	0	sf
Right Wingwall Volume =	*0*	*cf*

Forward Abutment Subtotal = **42 cy**

Total = **94 cy**

ITEM 511 - CLASS QC1 CONCRETE WITH QC/QA, FOOTING

Pier:

thickness =	4.75	ft
width =	22.5	ft
length =	22.5	ft
no. of footing =	2	
Footing Volume =	*178.13*	*cy*

Rear Abut. Footing

footing thickness =	3.00	ft
footing width =	5.75	ft
footing length =	35.33	ft
Footing Volume =	*22.57*	*cy*

Frwd. Abut. Footing

footing thickness =	3.00	ft
footing width =	7.25	ft
footing length =	33.67	ft
Footing Volume =	*27.12*	*cy*

Total = **228** cy

ITEM 511 - CLASS QC4 CONCRETE MISC.: INTEGRAL POST-TENSIONED PIER CAPS

Pier Caps:

pier cap width =	7.00	ft
pier cap height =	5.17	ft
pier cap length =	29.33	ft
no. of pier caps =	2	

Total = **79** cy

ITEM 512 - SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)

Bridge deck		
Left		
perimeter =	9.81	ft
length =	425.13	ft
Right		
perimeter =	9.81	ft
length =	402.91	ft
Bridge Deck Subtotal =	*8123*	*sf*
Abutments		
Rear Abutment:		
backwall height =	7.05	ft
beam seat width =	3.00	ft
exposed breastwall height =	1.00	ft
backwall/breastwall length =	29.00	ft
Abutment total =	320.45	
Rear left wingwall		
depth of fill in front of wall =	5.00	ft
exposed height behind wall =	0.50	ft
front exposed area =	63.81	sf
top of wall =	15.80	sf
back of wall =	2.29	sf
Rear left total =	81.90	sf
Rear right wingwall		
depth of fill in front of wall =	5.00	ft
exposed height behind wall =	0.50	ft
front exposed area =	51.19	sf
top of wall =	15.63	sf
back of wall =	2.27	sf
Rear right total =	69.09	sf
Rear Abutment Subtotal =	*471*	*sf*
Forward Abutment:		
backwall height =	6.97	ft
beam seat width =	3.00	ft
exposed breastwall height =	4.21	ft
backwall/breastwall length =	29.00	ft
Abutment total =	411.22	
Forward left wingwall		
depth of fill in front of wall =	2.00	ft
exposed height behind wall =	0.50	ft
front exposed area =	99.75	sf
top of wall =	19.86	sf
back of wall =	2.95	sf
Forward left total =	122.56	sf
Forward right wingwall		
depth of fill in front of wall =	0.00	ft
exposed height behind wall =	0.00	ft
front exposed area =	0.00	sf
top of wall =	0.00	sf
back of wall =	0.00	sf
Forward right total =	0.00	sf
Forward Abutment Subtotal =	*534*	*sf*
Abutment Subtotal =	*1005*	*sf*

Piers

Caps		
length =	29.33	
thickness =	7.00	
height =	5.17	
Cap area =	552.6879	
Columns		
diameter =	6.00	ft
average exposed height =	18.00	ft
no. of columns =	1	
Column area =	339.292	sf
No. of Piers =	2	
Pier Subtotal =	*1784*	*sf*
Total =	1,213	sy

ITEM 513 - STRUCTURAL STEEL MEMBERS, LEVEL 5, AS PER PLAN

BRIDGE

Girders Properties

Section ID	Unit Weight (lb./ft.)	Dimension Input (for plate girders) (all units are inches) $B_{fl.\ top}$	$t_{fl.\ top}$	D_{web}	t_{web}	$B_{fl.\ bot}$	$t_{fl.bot.}$
Section 1	267.5434	18	1	62	0.6875	18	1
Section 2	519.349	22	2.5	62	0.6875	22	2.5
Section 3	519.349	22	2.5	62	0.6875	22	2.5
Section 4	350.9115	22	1	62	0.6875	22	1.75

Section Lengths

Section ID	Unit Weight (lb./ft.)	Girder 1	Girder 2	Girder 3	Girder 4	Total Lengths
Section 1	267.54	90.00	88.83	87.66	86.5	352.99
Section 2	519.35	126.01	123.52	121.3	119	489.83
Section 3	519.35	36.42	35.92	35.42	35	142.76
Section 4	350.91	108.41	106.28	104.14	102	420.83

Detail factor = 1.010

Girder Subtotal = 576,400 lbs

Splices:

Splice 1

Top Flange	# of plates	length (in)	width (in)	thick (in)
outside plates =	1	36.75	18	0.625
inside plates =	2	36.75	8	0.75
fill plates =	1	18	18	1.5
Bottom Flange				
outside plates =	1	36.75	18	0.625
inside plates =	2	36.75	8	0.75
fill plates =	1	18.5	18	1.5
Web				
plates =	2	56.5	15.75	0.375

Plate weight/splice = 953 lbs

Splice 2

Top Flange	# of plates	length (in)	width (in)	thick (in)
outside plates =	1	43.75	22	0.625
inside plates =	2	43.75	10	0.75
fill plates =	1	21.5	22	1.5
Bottom Flange				
outside plates =	1	64.75	22	1
inside plates =	2	64.75	10	1.125
fill plates =	1	32.375	22	0.75
Web				
plates =	2	55.25	15.75	0.375

Plate weight/splice = 1711 lbs

Splice Bolts

Splice 1	# of bolts	length (in)	bolt wt.	washer wt.
Top Flange =	40	1.5	148	11.3
Bot. Flange =	40	1.5	148	11.3
Web =	44	1.5	148	11.3

* from steel manual
* washer weight is per 100 ct.

Bolt + Washer weight		
Top Flange =	64	lbs
Bot. Flange =	64	lbs
Web =	70	lbs
Total weight/splice =	1151	lbs
No. of splices =	8	

Splice 2	# of bolts	length (in)	bolt wt.	washer wt.
Top Flange =	48	1.5	148	11.3
Bot. Flange =	72	1.5	148	11.3
Web =	44	1.5	148	11.3

* from steel manual
* washer weight is per 100 ct.

Bolt + Washer weight		
Top Flange =	76	lbs
Bot. Flange =	115	lbs
Web =	70	lbs
Total weight/splice =	1973	lbs
No. of splices =	8	

Splice + Bolts Subtotal = 24,988 lbs

Intermediate Crossframes:

Length of Diagonals =	7.00	ft (weighted avg.)
No. of Diagonals =	2	
Length of Horiz. =	6.50	ft (weighted avg.)
No. of Horiz. =	2	
Angle weight / ft. =	15.00	lbs/ft
Crossframe weight =	405	lbs ==> per x-frame assembly
x-frame stiffeners?	y	y or n
Length =	62.000	in ==> web depth
Width =	8.000	in
Thickness =	0.500	in
Stiffener weight =	141	lbs ==> per x-frame assembly
x-frame gusset plates?	y	y or n
Length =	17.500	in ==> web depth
Width =	15.000	in
Thickness =	0.500	in
Gusset plate weight =	149	lbs ==> per x-frame assembly
Total Intermediate Crossframe Assembly Weight =	695	lbs. ==> per x-frame assembly
No. of assemblies =	72	
Detail Factor =	1.05	

Intermediate Crossframe Subtotal = 52506 lbs

End Crossframes:

Length of Diagonals =	6.50	ft (weighted avg.)
No. of Diagonals =	2	
Length of Horiz. =	8.00	ft (weighted avg.)
No. of Horiz. =	1	
Angle weight / ft. =	9.80	lbs/ft
End crossframe weight =	206	lbs. ==> per x-frame assembly
End x-frame stiffeners (bearing stiffeners)?	y	y or n
Length =	62.000	in ==> web depth
Width =	8.500	in
Thickness =	1.000	in
Stiffener weight =	299	lbs ==> per x-frame assembly
Total x-frame End Assembly Weight =	505	lbs ==> per x-frame assembly
No. of assemblies =	8	
Detail Factor =	1.10	
End Crossframe Subtotal =	**4441**	**lbs**
Crossframe Subtotal =		**56,947 lbs**
		Total = 658,400 lbs

ITEM 513 - WELDED STUD SHEAR CONNECTORS

No. rows per beam:	
Girder 1	391
Girder 2	449
Girder 3	443
Girder 4	384
No. per row =	3

Total = 5,001 ea

ITEM 514 - FIELD PAINTING STRUCTURAL STEEL, INTERMEDIATE COAT
ITEM 514 - FIELD PAINTING STRUCTURAL STEEL, FINISH COAT

Average Flange width =	21.00	in
Total Girder Depth =	66.00	in
Total beam Length =	1406.41	
Detail Factor =	1.20	
Total =	**27,500**	**sf**

ITEM 514 - FINAL INSPECTION REPAIR

Length =	1406.41	ft	
No. Girders =	4	ea	
No. Crossframes =	80	ea	
	Total =		**42 ea**

ITEM 516 -ARMORLESS PREFORMED JOINT SEAL

Forward approach slab width =	29.00	ft	
	Total =		**29 ft**

ITEM 516 -STRUCTURAL EXPANSION JOINT INCLUDING ELASTOMERIC STRIP SEAL

RA Length =	28.50	ft	
FA Length =	28.50	ft	
	Total =		**57 ft**

ITEM 518 - POROUS BACKFILL WITH GEOTEXTILE FABRIC

Rear Abutment:			
Thickness =	2.00	ft	
Height =	10.63	ft	
app. Slab thickness =	1.42	ft	
length =	29.00	ft	
Left wingwall =	104.61	sf	
Right wingwall =	91.75	sf	
Rear Abutment Subtotal =	927	cf	
Forward Abutment:			
Thickness =	2.00	ft	
Height =	9.76	ft	
app. Slab thickness =	1.42	ft	
length =	29.00	ft	
Left wingwall =	112.40	sf	
Right wingwall =	0.00	sf	
Frwd. Abutment Subtotal =	709	cf	
	Total =		**61 cy**

ITEM 518 - 6" PERFORATED CORRUGATED PLASTIC PIPE

Rear Abutment:			
length =	49.34	ft	
Forward Abutment:			
length =	41.65	ft	
	Total =		**91 ft**

ITEM 518 - 6" NON-PERFORATED CORRUGATED PLASTIC PIPE INCLUDING SPECIALS

Forward Abutment:			
length =	10.00	ft	
Forward Abutment:			
length =	0.00	ft	
	Total =		**10 ft**

ITEM 524 - DRILLED SHAFTS, 42" DIAMETER, INTO BEDROCK WITH QC/QA, AS PER PLAN

Rear Abutment:

length =	6	ft
no. of shafts =	3	

Total = 18 **ft**

ITEM 524 - DRILLED SHAFTS, 48" DIAMETER, ABOVE BEDROCK WITH QC/QA, AS PER PLAN

Rear Abutment:

length =	11.2	ft
no. of shafts =	3	

Total = 34 **ft**

ITEM 524 - DRILLED SHAFTS, 48" DIAMETER, INTO BEDROCK WITH QC/QA, AS PER PLAN

Pier 1

length =	7	ft
no. of shafts =	4	

Pier 2

length =	7	ft
no. of shafts =	4	

Total = 56 **ft**

ITEM 524 - DRILLED SHAFTS, 54" DIAMETER, ABOVE BEDROCK WITH QC/QA, AS PER PLAN

Pier 1

length =	27	ft
no. of shafts =	4	

Pier 2

length =	27.3	ft
no. of shafts =	4	

Total = 218 **ft**

ITEM 526 - REINFORCED CONCRETE APPROACH SLABS WITH QC/QA (T=17")

Rear Approach Slab:

Width =	29	ft
Length =	30	ft

Frwd. Approach Slab:

Width =	29	ft
Length =	30	ft

Total = 194 **sy**

ITEM 526 - TYPE A INSTALLATION

Rear Approach Slab:

length =	26	ft

Total = 26 **ft**

ITEM 526 - TYPE C INSTALLATION

Forward Approach Slab:

length =	29	ft

Total = 29 **ft**

ITEM SPECIAL - STRUCTURES: TEMPORARY SUPPORT OF STEEL GIRDERS

Temporary Bents:

Cost per temporary bent =	$20,000.00
No. of temporary bents =	5

Lump sum = $100,000

ITEM 846 - POLYMER MODIFIED EXPANSION JOINT SYSTEM

Rear approach slab =	26.00	ft
depth =	2	in
width =	20	in

Total = 8 **cf**

ITEM 855 - POST-TENSIONING STRAND TENDON

Unit wieght per strand=	0.74	lbs./ft.
No. strands of per tendon =	19.00	each
Tendon 1 length =	27.9	ft
Tendon 2 length =	27.4	ft
No. of Tendon 1 =	6	each
No. of Tendon 2 =	6	each

Total = 4665 **lbs.**

ITEM 869 - HIGH LOAD MULIT-ROTATIONAL (HLMR) BEARINGS, AS PER PLAN

Rear abutment =	4	each
Forward abutment =	4	each

Total = 8 **each**