

SUBJECT DESC.: LAK-271-0127, Bridge over SR 271

Project ID Number: 102232 JOB NUMBER: -

DESIGNED BY: CPM DATE: 7/1/20 CHECKED BY: APM DATE: 7/1/20

Item 202 - Portions Of Structure Removed, Over 20 Foot Span, As Per Plan (LS)

1 lump sum

Item 202 - Approach Slab Removed (SY) & Wearing Course Removed (SY)

Area of Rear Slab: 25ft * 28ft =	700 SF	Area of wingwall mounted curb: 9 SF * 4 = 36 SF
Area of Forward Slab = 25ft * 28ft =	700 SF	= 4 SY
Total=	152 SY	

Item 503 - Unclassified Excavation (LS)

Pier 2

Height = 841.10 - 835.30 = 5.8 FT
 Outer Radius = 8.5 FT
 Inner Radius = 2.5 FT
 Volume = $3 * [(\pi * \text{Outer R}^2 * (h/3)) - (\pi * \text{Inner R}^2 * (2.5/3)) - (\pi * 1.5^2 * h)] = 1757.2 \text{ CF}$

Pier 4

Height = 837.55 - 834.05 = 3.5 FT
 Outer Radius = 6 FT
 Inner Radius = 2.5 FT
 Volume = $3 * [(\pi * \text{Outer R}^2 * (h/3)) - (\pi * \text{Inner R}^2 * (2.5/3)) - (\pi * 1.5^2 * h)] = 555.28 \text{ CF}$

Pier 7

Height = 836.25 - 832.30 = 3.95 FT
 Outer Radius = 6.5 FT
 Inner Radius = 2.5 FT
 Volume = $3 * [(\pi * \text{Outer R}^2 * (h/3)) - (\pi * \text{Inner R}^2 * (2.5/3)) - (\pi * 1.5^2 * h)] = 729.91 \text{ CF}$

Rear Abutment

Left Wingwall = $(0.5 * (858.70 - 851.56) * 14.0) * (0.25 (858.70 - 851.56)) + (1 * 14.0 * (858.70 - 851.56)) = 189.174 \text{ CF}$
 Right Wingwall = $(0.5 * (858.00 - 851.56) * 14.0) * (0.25 (858.00 - 851.56)) + (1 * 14.0 * (858.00 - 851.56)) = 162.739 \text{ CF}$
 Back = $28.0 * (858.70 - 851.56) * 12.3 + (858.70 - 851.56)^2 * 0.5 * 28.0 = 3172.7 \text{ CF}$

Forward Abutment

Left Wingwall = $(0.5 * (854.71 - 846.62) * 14.0) * (0.25 (854.71 - 846.62)) + (1 * 14.0 * (854.71 - 846.62)) = 227.794 \text{ CF}$
 Right Wingwall = $(0.5 * (854.81 - 846.62) * 14.0) * (0.25 (854.81 - 846.62)) + (1 * 14.0 * (854.81 - 846.62)) = 232.043 \text{ CF}$
 Back = $28.0 * (854.81 - 846.62) * 12.3 + (854.81 - 846.62)^2 * 0.5 * 28.0 = 3759.7 \text{ CF}$

Total = 10786.6 CF = 400 CY

Item 509 - Epoxy Coated Reinforcing Steel (LB)

see rebar sheet for details

total rebar = 156755 LB

Item 510 - Dowel Holes With Nonshrink, Nonmetallic Grout, As Per Plan (EACH)

Abutments = 2 * 72 per abutment = 144
 Wingwalls = 4 * 12 per one side of wingwall = 48
 Piers = 6 * 50 (typ. pier) + 54 (pier 4) = 354

Total = 546 dowel holes

FISHBECKSHEET 2 OF 7 SHEETSSUBJECT DESC.: LAK-271-0127, Bridge over SR 271Project ID Number: 102232 JOB NUMBER: -DESIGNED BY: CPM DATE: 7/1/20 CHECKED BY: APM DATE: 7/1/20**Item 511 - Class QC2 Concrete with QC/QA, Bridge Deck (CY)**

Deck = $0.70833\text{ft} * 31.333\text{ft} * 499.84\text{ft} = 11093.5\text{CF}$
Interior Haunches = $(11.5/12)\text{ft} * 499.84\text{ft} * 0.1667\text{ft} * 2\text{beams} = 159.7\text{CF}$
Exterior haunches = $4.15\text{ft} * 0.333\text{ft} * 2\text{beams} * 499.84 = 1381.5\text{CF}$

Total = 468 CY

Item 511 - Class QC2 Concrete with QC/QA, Bridge Deck (Parapet) (CY)

Area of parapet = $423.25\text{SI} / 144\text{SI/SF} = 2.93924\text{SF}$ (See STD. DWG. BR-1-13)
Length = 499.84 ft
14'-0" Transitions = $1.63\text{CY} * 4 = 6.52\text{CY}$

Total = $(499.84\text{ft} * 2.94\text{SF} * 2\text{sides}) + 6.52\text{CY} = 116\text{CY}$

Item 511 - Class QC1 Concrete, Pier (CY)

Area of pier cap = $(3\text{ft} * 24.0625\text{ft}) + (1.5\text{ft}^2 * 3.14) = 79.26\text{SF}$
Height = 1.65 ft

Number of Piers = 7

Total = 34 CY

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Item 511 - Class QC1 Concrete, Abutment (CY)

RR_WW Elev 1 = 859.66 ft RR_WW L1 = 6.698 ft
 RR_WW Elev 2 = 859.26 ft RR_WW L2 = 7.302 ft
 RR_WW Elev 3 = 854.96 ft
 RR_WW Elev 4 = 852.60 ft RR_WW Width = 1.5 ft
 RR_WW Elev 5 = 851.56 ft

Right Rear Area = [(((859.66-854.96)+(859.26-854.96))/2)*14.0]+(854.96-852.600)*7.302*0.5+(854.96-851.56)*6.698
 = 94.39 SF

Right Rear Volume = 94.39 SF * 1.5 ft = 141.584 CF

LR_WW Elev 1 = 859.73 ft LR_WW L1 = 6.865 ft
 LR_WW Elev 2 = 859.33 ft LR_WW L2 = 7.255 ft
 LR_WW Elev 3 = 854.98 ft
 LR_WW Elev 4 = 852.70 ft LR_WW Width = 1.5 ft
 LR_WW Elev 5 = 851.56 ft

Left Rear Area = [(((859.73-854.98)+(859.33-854.98))/2)*14.0625]+(854.98-852.70)*7.255*0.5+(854.98-851.56)*6.865
 = 95.7 SF

Left Rear Volume = 95.7 SF * 1.5ft = 143.6 CF

LF_WW Elev 1 = 854.71 ft LF_WW L1 = 6.698 ft
 LF_WW Elev 2 = 854.03 ft LF_WW L2 = 7.302 ft
 LF_WW Elev 3 = 850.04 ft
 LF_WW Elev 4 = 847.37 ft LF_WW Width = 1.5 ft
 LF_WW Elev 5 = 846.62 ft

Left Forward Area = [(((854.71-850.04)+(854.03-850.04))/2)*14.0]+(850.04-847.37)*7.302*0.5+(850.04-846.62)*6.698
 = 93.275 SF

Left Forward Volume = 93.28 SF * 1.5 ft = 139.913 CF

RF_WW Elev 1 = 854.81 ft RF_WW L1 = 6.865 ft
 RF_WW Elev 2 = 854.14 ft RF_WW L2 = 7.255 ft
 RF_WW Elev 3 = 850.13 ft
 RF_WW Elev 4 = 847.50 ft RF_WW Width = 1.5 ft
 RF_WW Elev 5 = 846.62 ft

Right Forward Area = [(((854.81-850.13)+(854.14-850.13))/2)*14.0625]+(850.13-847.50)*7.255+(850.13-846.62)*6.865
 = 94.7 SF

Right Forward Volume = 94.7 SF * 1.5ft = 142 CF

rear Abutment seat = 3.75 ft * 31.104 ft * 1.16 ft = 135.3 CF

rear Abutment backwall = (859.73-855.48)ft * 28.0ft * 1.25ft + (0.5 ft * 28.0 ft * (858.73-855.48)) = 194.3 CF

Forward Abutment seat = 3.75 ft * 31.104 ft * 1.20 ft = 140 CF

Forward Abutment backwall = (854.81-850.63)ft * 28.0 ft * 1.25ft + (853.81-850.63)ft * 28.0 ft * 0.5ft = 190.8 CF

Rear Abutment total = 614.74 CF = 23 CY

Forward Abutment total = 612.81 CF = 23 CY

Abutment total = 46 CY

FISHBECK

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Item 512 - Sealing Of Concrete Surfaces (Epoxy-Urethane) (SY)

Wingwalls = $4 * (14.0ft * 0.5ft) + (0.5 * 14.0ft * 4.25ft) + (2.5ft * 3ft) =$ 177 SF
 Rear Abutment = $(2ft + (859.92-855.62)ft) * 28.104ft + (855.63-853.50) * 31.104ft =$ 243.31 SF
 Forward Abutment = $(2ft + (854.98-850.72)ft) * 28.104ft + (850.72-849.50) * 31.104ft =$ 213.88 SF

Piers 1, 3, 5, & 6:

Pier cap sides = $24.0625ft * 4.7ft * 2 =$ 226.2 SF
 Pier cap ends = $(1.5ft * 2 * 3.1415) * 4.7ft =$ 44.3 SF
 Pier cap bottom = $24.0625ft * 3ft - (2 * (1.5ft^2) * 3.1415) =$ 58.05 SF

Columns =
 Avg Height = Avg Elev "E" - (Avg Elev "F" + 2 ft)
 Avg Height = $851.94 - (833.74 + 2.0) =$ 16.2 ft
 Area = $3 * (avg Height * 3ft * 3.1415) =$ 458.044 SF

Total per pier = 786.58 SF/Pier

Piers 2, 4, & 7:

Pier cap sides = $24.0625ft * 4.7ft * 2 =$ 226.2 SF
 Pier cap ends = $(1.5ft * 2 * 3.1415) * 4.7ft =$ 44.3 SF
 Pier cap bottom = $24.0625ft * 3ft - (2 * (1.5ft^2) * 3.1415) =$ 58.05 SF

Total per pier = 328.5334 SF/Pier

Railing:

Perimeter = 84.5 inches = 7.04 FT
 Length = $2 * (14ft + 499.844ft + 14ft) =$ 1055.7 FT
 Total railing = 7433.803 SF

Fascia

Fascia edge = 2 IN + 1.04 FT = 1.21 FT
 Bottom of overhang = $3.6667 FT - (11.5/2) / 12 FT =$ 3.1878333 FT
 Length = $2 * 499.844 FT =$ 999.688 FT
 Total Overhang = $(1.2 + 3.188) FT * 999.7 FT =$ 4393.13 SF

Total Sealing = 177 SF + 243 SF + 214 SF + (4 * 787 SF) + (3 * 329 SF) + 7434 SF + 4393 SF = 16593 SF
 1844 SY

Item 512 - Removal of Existing Coatings from Concrete Surfaces (SY)

Rear Abutment = $(854.41-853.50) * 31.104ft + 29.437 FT * 2ft =$ 87.18 SF
 Forward Abutment = $(849.48-846.30) * 31.104ft + 29.437 ft * 2.0ft =$ 157.78 SF

from 1992 rehab plans, pier total = 562 SY

Total = 589 SY

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Item 513 - Structural Steel Members, Level UF, As Per plan (LB)

Length = $((3 * 8 \text{ ft}) * 3 = 72.0 \text{ FT}$ Bolts =
 Weight = $\text{Length} * 42.7 \text{ lb/ft} + 18 * ((11.5 * 33 * 0.5) * 0.283 \text{ lbs/Cubic In}) = 4041 \text{ LB}$

Item 513 Welded Stud Shear Connectors (EACH)

Total = $334 \text{ rows per beam} * 4 \text{ beams} * 3 \text{ studs/row} = 4008$

Item 514 - Surface Preparation of Existing Structural Steel (SY)

perimeter of beam = 101.1 IN
 Length c/c bearing = 500 ft
 beam total = $\text{perimeter} * \text{length} * 4 \text{ beams} = 16850 \text{ SF}$
 existing cross frames = $(3 \text{ In} * 4) * (8 \text{ ft} + 2 * 8.38 \text{ ft}) * (3 * 40 \text{ locations per beam}) = 2972 \text{ SF}$
 total = $16850 \text{ SF} + 2972 \text{ SF} = 19822 \text{ SF}$

Item 514 - Field Painting of Existing Structural Steel, Prime Coat (SF)

total = 19822 SF

Item 514 - Field Painting of Structural Steel, Intermediate Coat (SF)

perimeter of beam = 101.1 IN
 Length c/c bearing = 500 ft
 beam total = $\text{perimeter} * \text{length} * 4 \text{ beams} = 16850 \text{ SF}$
 existing cross frames = $(3 \text{ In} * 4) * (8 \text{ ft} + 2 * 8.38 \text{ ft}) * (3 * 40 \text{ locations per beam}) = 2972 \text{ SF}$
 proposed cross frames = $3 * 8 \text{ ft} * (52 \text{ in}) * 3 \text{ locations per beam} = 312 \text{ SF}$
 total = $16850 \text{ SF} + 2972 \text{ SF} + 312 \text{ SF} = 20134 \text{ SF}$

Item 514 - Field Painting of Structural Steel, Finish Coat (SF)

total = 20134 SF

Item 514 - Grinding Fins, Tears, Slivers on Existing Structural Steel (MNHR)

Length of beams = $4 \text{ beams} * 500.0 \text{ ft} = 2000 \text{ FT}$
 1 min / Lin. Ft = $2000 \text{ mins} = 34 \text{ MNHR}$

Item 514 - Final Inspection Repair (EACH)

1 per 150 ft + 5 % of cross frames
 Length of beams = $4 \text{ beams} * 500.0 \text{ ft} = 2000 \text{ FT}$
 Existing Cross frames = $40 \text{ locations per beam} * 3 \text{ bays} = 120 \text{ assemblies}$

Final Inspection repair = $2000 \text{ Ft} / 150 \text{ Ft} = 14 \text{ repairs}$
 Final Inspection repair = $5\% * 120 \text{ assemblies} = 6 \text{ repairs}$

Total = 20

Item 516 - Structural expansion Joint including Elastomeric Strip Seal (FT)

Length = $30.6 \text{ ft} * 2 = 62 \text{ FT}$

Item 516 - 1" Preformed Expansion Joint Filler (SF)

Parallel to roadway = $1.25 \text{ FT} * 12.75 \text{ FT} * 4 = 64 \text{ SF}$

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Item 516 - Elastomeric Bearing with Internal Laminates and Load Plate (EACH)

total = 36 (see plans for breakdown)

Item 516 - Jacking and Temporary Support of Superstructure, As Per plan (LUMP)

Lump Sum

Item 518 - Poursous Backfill with Geotextile Fabric (CY)

Width = 2 ft
 Length = 26.07 ft = 26.07 FT
 RA Height = (859.92 - 851.56)ft - 1.25 ft = 7.11 FT
 FA height = (854.98 - 846.62)ft - 1.25 FT = 7.11 FT
 Wingwalls = (3.0 ft * 7.11 ft * 2) * 4 = 6.32 CY
 Volume = 34 CY

Item 518 - 6" Perforated Corrugated Plastic Pipe (FT)

Length Rear Abutment = 5.98 ft + 26.59 ft + 3.93 ft = 36.5 ft
 Length Forward Abutment = 5.98 ft + 26.59 ft + 3.93 ft = 36.5 ft
 Total Length = 73 FT

Item 518 - 6" Non-Perforated Corrugated Plastic Pipe, Including Specials (FT)

Length Rear Abutment = 23 ft
 Length Forward Abutment = 23 ft
 Total Length = 46 FT

Item Special - Composite Fiber Wrap System (SF)

Piers 2, 4, & 7:
 Columns =
 Pier 2 Height = 853.08 ft - 835.30 ft = 17.78 FT
 Pier 4 Height = 853.14 ft - 834.05 ft = 19.09 FT
 Pier 7 Height = 848.12 ft - 832.30 ft = 15.82 FT

 Total Height = 17.78 ft + 15.82 ft + 19.09 ft = 52.69 FT
 Circumference = 3ft*3.14159 * 3 columns per pier = 28.274 FT

 Total = Total Height * Circumference = 1490 SF

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$$\text{total} = 25 \text{ SF} + 63 \text{ SF} + 4 \text{ SF} + 7 \text{ SF} + 28 \text{ SF} + 280 \text{ SF} + 3 \text{ SF} = 410 \text{ SF}$$
Item 526 - Reinforced Concrete Approach Slabs With QC/QA (T = 15") (SY)

Rear App. Slab = 28.0 ft * 25.0 ft = 700 SF
Forward App. Slab = 28.0 ft * 25.0 ft = 700 SF
Curbs = 18.15 ft * 0.5 ft * 4 = 36.3 SF
Total Area = 1436 SF = 160 SY

Item 526 - Type A Installation (FT)

Rear App. Slab = 28.09 FT
Forward App. Slab = 28.09 FT
Curbs = 0.5 ft * 4 = 2 FT
Total = 59 FT

Item 607 - Vandal Protection Fence, 6' Straight, Coated Fabric (FT)
$$\text{Length} = 2 * 497.08 \text{ ft} = 994.16 \text{ ft}$$

Total = 995 FT