



PID 117656, CLA-68-1147: QUANTITY CALCULATIONS

Calculated by: *Jun Xie, Date: 09/14/2022*

Checked by:

Revised by:

Erosion Control

1. Item 832 Erosion Control
 - a. Plan split 1(01/S50/44): 1 (EA)

Structures: CLA-68-1147

1. Item 513 Structural Steel, Misc.: Repair of Damaged Secondary Material by Replacement, Over 20-foot span
 - a. Quantity of 435 (LB) in the event of existing steel that needs replaced.
 - i. Refer to *Calculations for Damaged Secondary Members* table on sheet 6/6 for details.
 1. Strut 3S length = bay length= 7'-8" (See typical cross frame detail).
 2. Diag 1D and 2d length:
 - a. Trigonometry: $\text{SQRT}\{\text{SQ}[\text{Beam Depth } 33.5" - 2 \times \text{flange thickness } 1.06" - 2 \times \text{clearance } 1" - \text{leg depth } 3"] + \text{SQ}[\text{bay length } 92" - \text{web thickness } 0.625"]\} = 95.1" \text{ round up to } 96" = 8'$
 3. Weight:
 - a. Struts 3S: $7.67' \times 6.1 \text{ lbs./ft} = 46.787 \text{ lbs. Round up to } 47 \text{ lbs.}$
 - b. Diag 1D & 2D: $2 \times 8' \times 6.1 \text{ lbs./ft} = 97.6 \text{ lbs. Round up to } 98 \text{ lbs.}$
 - c. Total weight: $3 \times (47 \text{ lbs.} + 98 \text{ lbs.}) = 435 \text{ lbs.}$
2. Item 514 Field Painting of Damaged Structural Steel, as per plan
 - a. Quantity of 531 (SQ FT) in the event of area that needs painting
 - i. Refer to *Calculations for Field Painting* table on sheet 6/6 for details.
 1. Beam 1:
 - a. Perimeter: $2 \times (\text{flange width } 11.6" - \text{flange thickness } 0.625") + 2 \times (\text{beam depth } 33.5" - \text{flange thickness } 1.06") + \text{flange width } 11.6" = 98.43" = 8.2025'$. Round up to 8.3'
 - b. Length
 - i. Refer to *Heat Straightening Detail and Table #1 Damaged Main Members to be Heat Straightened* on sheet 5/6 and painting detail on sheet 6/6 for details.
 - ii. Dimension L for D-1; $16' + 2 \times \text{length of painting on each side of heat straightening edge } 12" = 18'$
 - c. Item 514 total area needs painting for Beam 1
 - i. $18 \text{ FT} \times 8.3 \text{ FT/Linear FT} = 149.4 \text{ SQ FT. Round up to } 150 \text{ SQ FT.}$
 2. Beam 3:
 - a. Perimeter: 8.3'

- b. Length:
 - i. No heat straightening needed
 - ii. Grind flange 4'
 - c. Item 514 total area needs painting for Beam 1
 - i. $4 \text{ FT} \times 8.3 \text{ FT/Linear FT} = 33.2 \text{ SQ FT}$. Round up to 34 SQ FT.
 - 3. Beam 4:
 - a. Perimeter: 8.3'
 - b. Length
 - i. Dimension L for D-2; $23.42' + 2 \times 12'' = 25.42'$
 - c. Item 514 total area needs painting for Beam 4
 - i. $25.42 \text{ FT} \times 8.3 \text{ FT/Linear FT} = 210.986 \text{ SQ FT}$. Round up to 211 SQ FT.
 - 4. Beam 5:
 - a. Perimeter: 8.3'
 - b. Length
 - i. Dimension M for D-3; $3.42' + 2 \times 12'' = 5.42'$
 - c. Item 514 total area needs painting for Beam 4
 - i. $5.42 \text{ FT} \times 8.3 \text{ FT/Linear FT} = 44.986 \text{ SQ FT}$. Round up to 45 SQ FT.
 - 5. Cross Frames:
 - a. Perimeter: $4 \times \text{depth of each leg } 3'' = 12'' = 1'$
 - b. Length
 - i. $3 \times (7'-8'' + 2 \times 8') = 71'$
 - c. Item 514 total area needs painting for Beam 4
 - i. $71 \text{ FT} \times 1 \text{ FT/Linear FT} = 71 \text{ SQ FT}$.
 - 6. Repair due to Welding:
 - a. Perimeter (each end of welding): $4 \times 3'' = 12'' = 1'$
 - b. Length: for each end of welding: 1' length of painting x 18 welding ends (for 9 bars) = 18'
 - c. Item 514 total area needs for painting due to welding:
 - i. $1' \times 18' = 18 \text{ SQ FT}$
 - ii. To account for repair due to welding for cross frames connecting to beam 3 (No heat straightening needed, beam painting area might not cover the entire welding area), round up to 20 SQ FT.
 - 7. Total painting area for Item 514:
 - a. $150 \text{ SQ FT} + 34 \text{ SQ FT} + 211 \text{ SQ FT} + 45 \text{ SQ FT} + 71 \text{ SQ FT} + 20 \text{ SQ FT} = 531 \text{ SQ FT}$

3. Item 849 Damage Assessment, as per Plan

- a. Lump Sum (LS)

4. Item 849 Surface Preparation

- a. Lump Sum (LS)

5. Item 849 Repairing Damaged Members by Grinding

- a. Total grind length:
 - i. $1' \text{ (Beam \#1)} + 4' \text{ (Beam \#3)} + 1' \text{ (Beam \#4)} = 6'$
 - ii. Total time needed based on calculation: $6' \times 1/10 \text{ Hour/FT} = 0.6 \text{ Hour}$
 - iii. Estimation:
 - 1. 1' grind for Beam #1 and Beam #4, assign 0.5 hour each beam, $2 \times 0.5 = 1 \text{ Hour}$
 - 2. 4' grind for beam #3, assign 1 hour for the beam.
- b. Item 849 total hours needs for grinding flange of beam #1, #3 and #4: $2 \times 0.5 \text{ Hour} + 1 \text{ Hour} = 2 \text{ Hours} > 0.6 \text{ Hour}$. Adopt 2 hours.

6. Item 849 Straightening Damaged Members

- a. Lump Sum (LS)

- b. Refer to *Heat Straightening Detail* and *Table #1 Damaged Main Members to be Heat Straightened* on sheet 5/6 for details.

Maintenance of Traffic

1. Item 614 Law Enforcement Officer with Patrol Car for Assistance
 - a. Reference project adopted 75 hours for this item. Change Order indicated use of LEOS fell into single digits. Estimate 25 hours here.

Incidentals

1. Item 614-Maintaining Traffic (LS)
2. Item 624-Mobilization (LS)

END OF CALCULATIONS