



## PID 122512, MOT-75-1832: QUANTITY CALCULATIONS

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Revised by: *Matt Blythe, PE 12/17/24*

Erosion Control - None required for this project.

1. Item 832E30000 (EA): Assume ~~\$2,000-~~ - Use \$1,000
  - a. ~~Comparing past projects.~~ - per JDN comment, 12/17/24

### Traffic Control

2. Item 646e10000 (Mile):  $10' + 59.75' + 10' = 79.75'$  x2ea = 160' /5,280 = 0.03 mile
  - a. Assuming 10' beyond removal for cleanup (typ).
3. Item 646e10200 (Mile):  $10' + 59.75' + 10' = 79.75'$  x1ea = 80' /5,280 = 0.02 mile

### Structure Repair (MOT-75-1832)

1. Item 202e11203 (LS): *limits confirmed in field 12/3/24.*
  - a. Deck area =  $59.75' \times 36' = 2,151\text{sf}$  /9 = 239sy
  - b. Parapet =  $3.5' \times (0.83' + 1.5') / 2 + 1.08' \times 0.17' = 4.26\text{sf}$  x59.75' x2ea = 19cy
2. Item 202e11401 (LB):
  - a. W24x146 beam:  $35.83' \times 146\text{plf} = 5,231\#$  x3ea = 15,694#
  - b. L3x3x5/16 XF:
    - i. Strut:  $7.67' \times 6.1\text{plf} = 47\#$  x6ea = 282#
    - ii. Diag:  $7.92' \times 6.1\text{plf} = 48\#$  x24ea = 1,152#
  - c. Splices
    - i. Web plate:  $(22.5'' \times 17.38'' - 0.93\text{si} \times 36\text{ea}) = 357.47\text{si} \times 0.63'' = 225\text{ci}$  /1728 = 0.13cf
      1.  $0.13\text{cf} \times 490\text{pcf} = 64\#$  x2ea = 128# x3ea = 384#
    - ii. Inside Flange plate:  $(5'' \times 37'' - 0.93'' \times 10\text{ea}) = 175.7\text{si} \times 0.44'' = 77\text{ci}$  /1728 = 0.04cf
      1.  $0.04\text{cf} \times 490\text{pcf} = 22\#$  x4ea = 88# x3ea = 264#
    - iii. Outside Flange plate:  $(12.5'' \times 37'' - 0.93'' \times 20\text{ea}) = 443.9\text{si} \times 0.44'' = 195\text{ci}$  /1728 = 0.11cf
      1.  $0.11\text{cf} \times 490\text{pcf} = 55\#$  x2ea = 110# x3ea = 330#
    - iv. Fill plate:  $(12.5'' \times 18.5'' - 0.93'' \times 10\text{ea}) = 221.95\text{si} \times 0.19'' = 42\text{ci}$  /1728 = 0.02cf
      1.  $0.02\text{cf} \times 490\text{pcf} = 12\#$  x2ea = 24# x3ea = 72#
    - v. Ex. F.S.#2 Web Bolts:
      1. Grip =  $0.65'' + 0.625'' \times 2\text{ea} = 1.9''$
      2. CMS 513.20: Length =  $1.9'' + 1.5'' + 0.16'' = 3.56''$ , use 3.75''
      3. Portland bolt.com: Wt = 209/100bolts (w/ nut) x36ea = 75# x3ea = 226#
    - vi. Ex. F.S.#2 Flange Bolts:
      1. Grip =  $1.09'' + 0.44'' \times 2\text{ea} = 1.97''$
      2. CMS 513.20: Length =  $1.97'' + 1.5'' + 0.16'' = 3.63''$ , use 3.75''

3. Portland bolt.com: Wt = 209/100bolts (w/ nut) x20ea = 42# x2ea = 84# x3ea = 252#

d. Total = 15,694#+282#+1,152#+384#+264#+330#+72#+226#+252# = 18,656#

3. Item 202e75267 (FT): 65' x2ea = 130'

a. *Removing fencing back to 1<sup>st</sup> post beyond removal limits. - field confirmed 12/3/24*

4. Item 509e10000 (LB): See P.16 = ~~21,183#~~ - use 21,287#

5. Item 509e20001 (LB): Estimated based off projects w/ similar work = 100#

6. Item 510e10000 (EA): See P.16 = 28ea

7. Item 511e34444 (CY):

a. Uniform thick: 36' x8.5" x59.75' = 1,524cf

b. Overhangs: 2.67' x3.09"/12 x59.75' x2ea = 82cf

i. P.14 Avg width = 2.67'

c. Haunch: ½ x(9"x3.09") /144 x59.75' x8ea = 46cf

d. Total = 1,524cf+82cf+46cf = 1,652cf /27 = 62cy

8. Item 511e34448 (CY): 3.5' x(0.83'+1.5')/2 +1.08'x0.17' = 4.26sf x59.75' x2ea = 509cf /27 = 19cy

9. Item 512e10100 (SY):

a. P.14 Avg width = 2.67'

b. Perimeter = 2.67' +(3.09" +8.5" +2" +13" +2")/12 +2.42' +0.83' +3.56' = 11.86'

c. Total = 11.86' x59.75' x2ea = 1,417sf /9 = ~~157sy~~ +0.75'x59.75'x2ea/9 = 167sy

i. *To match adjacent sealing.*

10. Item 513e10241 (LB):

a. W24x146 beam: 35.83' x146plf = 5,231# x3ea = 15,694#

b. L3x3x5/16 XF:

i. Strut: 7.67' x6.1plf = 47# ~~x6ea-x12ea~~ = ~~282#~~ 564#

ii. Diag: 7.92' x6.1plf = 48# x24ea = 1,152#

c. Splices

i. Web plate: (22.5" x17.38" -0.93si x36ea) = 357.47si x0.63" =225ci /1728 = 0.13cf

1. 0.13cf x490pcf = 64# x2ea = 128# x3ea = 384#

ii. Inside Flange plate: (5" x37" -0.93" x10ea) = 175.7si x0.5" = 88ci /1728 = 0.05cf

1. 0.05cf x490pcf = 25# x4ea = 100# x3ea = 300#

iii. Outside Flange plate: (12.5" x37" -0.93" x20ea) = 443.9si x0.5" = 222ci /1728 = 0.13cf

1. 0.13cf x490pcf = 64# x2ea = 128# x3ea = 384#

iv. Pr. F.S.#4 Web Bolts:

1. Grip = 0.65" +0.625"x2ea = 1.9"

2. CMS 513.20: Length = 1.9" +1.5" +0.16" = 3.56", use 3.75"

3. Portland bolt.com: Wt = 209/100bolts (w/ nut) x36ea = 75# x3ea = 226#

v. Pr. F.S.#4 Flange Bolts:

1. Grip = 1.09" +0.5"x2ea = 2.09"

2. CMS 513.20: Length = 2.09" +1.5" +0.16" = 3.75", use 4.0"

3. Portland bolt.com: Wt = 216/100bolts (w/ nut) x20ea = 43# x2ea = 86# x3ea = 258#

vi. Ex. F.S.#2 Web Bolts:

1. Grip = 0.65" +0.625"x2ea = 1.9"

2. CMS 513.20: Length = 1.9" +1.5" +0.16" = 3.56", use 3.75"

3. Portland bolt.com: Wt = 209/100bolts (w/ nut) x36ea = 75# x3ea = 226#
- vii. Ex. F.S.#2 Flange Bolts:
1. Grip = 1.09" +0.44"x2ea = 1.97"
  2. CMS 513.20: Length = 1.97" +1.5" +0.16" = 3.63", use 3.75"
  3. Portland bolt.com: Wt = 209/100bolts (w/ nut) x20ea = 42# x2ea = 84# x3ea = 252#

d. Total = 15,694#+~~282#~~ 564#+1,152#+384#+300#+384#+226#+258#+226#+252# = ~~19,158#~~ 19440#

11. Item 513e20000 (EA): 1row +43rows +1row = 45rows x3stud/row = 135studs/beam x3beam = 405ea

12. Item 514e20001 (SF):

- a. Beam 1 W24x146: Paint area damaged by heat straightening repair.
  - i. Perim.: 24.7" x2ea +12.9" x3ea - 0.65" x2ea - 1.09" x2ea = 84.62" /12 = 7.05'
  - ii. Length: 1' +44.25' +1' = 46.25'
  - iii. Area: 7.05' x46.25' = 326sf
- b. Beam 2 W24x146: Paint area outside of replaced shop painted SS, include splice plates.
  - i. Length: 1' +44.08' +1' = 46.08' -35.83' = 10.25'
  - ii. Add'l length for splice plates: ½ (3.08') = 1.54' +0.83' = 2.37' x2ea = 4.74'
    1. CMS 514.22: stripe faying surfaces 6" max from flange splice ends.
  - iii. Area: 7.05' x(10.25' +4.74') = 106sf
- c. Beam 3 W24x146: Paint area outside of replaced shop painted SS, include splice plates.
  - i. Length: 1' +44' +1' = 46' -35.83' = 10.17'
  - ii. Area: 7.05' x(10.17' +4.74') = 106sf
- d. Beam 4 W24x146: Paint area damaged by grinding repair & crossframe welding.
  - i. Grinding Area: 1.08' x2' = 2sf
  - ii. Welding Area: 0.5'x18ea = 9sf
- e. Beam 5 W24x146: Paint area outside of replaced shop painted SS, include splice plates.
  - i. Length: 1' +43.67' +1' = 45.67' -35.83' = 9.84'
  - ii. Area: 7.05' x(9.84' +4.74') = 103sf
- f. Touch up of shop paint for welding crossframes is included with 514e80020
- g. Add'l prime area for backside of Ex.F.S.#2 splice plates:
  - i. Web: 1.88'x1.78' = 3.35sf x2ea = 7sf
  - ii. Out flange: 1.04'x3.08' = 3.20sf x2ea = 7sf
  - iii. Inside flange = 0.42'x3.08' = 1.29sf x4ea = 5sf
  - iv. Total = 7sf+7sf+5sf = 20sf x3ea = 60sf
- h. Total = 326sf+106sf+106sf+2sf+9sf+103sf+60sf = 712sf

13. Item 514e80030 (LS):

- a. Beam 1: 0sf
- b. Beam 2:
  - i. Prime Area:
    1. Beam Perim: 24.7" x2ea +12.9" x4ea -0.65" x2ea = 99.7" /12 = 8.31'
    2. Beam Length: 35.83'
    3. Beam Area: 8.31'x35.83' = 298sf
    4. Web plate: 3.35sf x2ea x2ea = 14sf
    5. Out flange plate: 3.20sf x2ea x2ea = 13sf
    6. Inside flange plate: 1.29sf x2ea x4ea = 11sf
    7. Splice Area = 14sf+13sf+11sf = 38sf
  - ii. Int. & Finish Area:
    1. Beam Perim: 7.05'
    2. Beam Length: 35.83' - (1.54'+0.08') x2ea = 32.59'
    3. Beam Area = 7.05'x32.59' = 230sf
- c. Beam 3:

- i. Prime Area =  $298\text{sf} + 38\text{sf} = \underline{336\text{sf}}$
  - ii. Int. & Finish Area =  $\underline{230\text{sf}}$
- d. Beam 4:  $\underline{0\text{sf}}$
- e. Beam 5:
  - i. Prime Area =  $\underline{336\text{sf}}$
  - ii. Int. & Finish Area =  $\underline{230\text{sf}}$
- f. Crossframes:
  - i. Perim: 1'
  - ii. Length =  $7.67' + 7.82' \times 2\text{ea} = 23.31'$
  - iii. Prime Area:  $1' \times 23.31' = 24\text{sf} \times 12\text{ea} = \underline{288\text{sf}}$
  - iv. Int. & Finish Area:  $\underline{288\text{sf}}$
- g. Total Prime:  $336\text{sf} \times 3\text{ea} + 288\text{sf} = \underline{1,296\text{sf}}$
- h. Total Int. & Finish =  $230\text{sf} \times 3\text{ea} + 288\text{sf} = \underline{978\text{sf}}$

14. Item 5164e46900 (EA):  $\underline{1\text{ea}}$

- a. Contingency item if heat straightening of Beam 5 is required beyond Pier 2 bearing and if damage assessment determines the heating cannot be done with bearing attached.

15. Item 849e10001 (LS): No calcs for this item.

16. Item 849e10500 (LS): No calcs for this item.

17. Item 849e10600 (HR):

- a. Beam 4 =  $2' \times 0.1\text{hr}/\text{ft} = 0.2\text{hr}$ , say 1hr.

18. Item 849e10700 (LS):

- a. Beam 5 length: 43.67' w/ 35.83' replacement. Straightening full length not expected.
- b. Beam 4 length: 0'
- c. Beam 3 length: 44' w/ 35.83' replacement. Straightening full length not expected.
- d. Beam 2 length: 44.08' w/ 35.83' replacement. Straightening full length not expected.
- e. Beam 1 length: 44.25'

#### Maintenance of Traffic

19. Item 614e11110 (HR): Estimated by scaling up PID 107355 (2019) = ~~600hrs~~ - use 450hrs  
 a. ~~To be confirmed by construction.~~ - per JDN comment, 12/17/24

20. Item 614e18600 (SNMT): 2 signs, x4mths = 8 sign months.

#### Incidentals

21. Item 614e11000 (LS): No calcs for this item

~~22. Item 619e16020 (MT): 4 months.~~

- a. ~~To be confirmed by construction.~~ - Remove per JDN comment, 12/17/24

23. Item 623e10000 (LS): No calcs for this item

24. Item 624e10000 (LS): No calcs for this item

END OF DESIGNER CALCULATIONS