July 2014

Draftsmen's Sketch Book for Parts for the Ford Motor Company

M. M.

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NO UNUSUAL EFFORT SHOULD BE MADE AT NICETY, BUT EACH ENTRY SHOULD INvariably BE COMMENCED WITH THE SUBJECT AND DATE OF THE WORK, AND FULL NOTES MADE OF DATA ON WHICH CALCULATIONS ARE BASED AND THE RESULTS OBTAINED CLEARLY STATED.

BOOKS ARE TO BE ALWAYS QUICKLY AVAILABLE TO RECEIVE INSTRUCTIONS, SKETCHES AND DATA AS MAY BE GIVEN THE DRAFTSMAN AND HE WILL BE RESPONSIBLE FOR THEIR DELIVERY AT ANY TIME.

MORGAN CONSTRUCTION CO.
WORCESTER MASS.
Weight of coupling spindle:

- Section A: 
  - $10.13 \times 3.3 = 23.420$
  - $7 \times 3.5 \times 3 = 31.80$
  - Weight of section A: $5,670 \text{ lbs}$

- Section B: 
  - $241 \times 63 = 12,660 \text{ cu in}$
  - Weight of section B: $3,550 \text{ lbs}$

Weight of section C:

- $12.56 \times 39 = 49,000$
- $12 \times 2.5 \times 40 = 12,000$
- Total: $81,000$

Total:

- $20,240$
- $12,660$
- $37,000$
- $699,000 \text{ cu in}$
- $X \times 1.25$
- $19,600 \text{ lbs}$
- Total: $20,000 \text{ lbs}$
SUBJECT
Company

Date

25th June 25

Face of impact on carriageway
Assume cylin-der to drop from a
height of 2
Then \(13,500 \times 2 = 27,000\)
Assume deflection of 1
Then force of impact \(= \frac{27,000}{12.5} = 216,000\)

Beam 50 by 100

Tension above with two sections
Then \(x = 5(4) = 53\)
and \(x = 3(16) = 48\)

45 = Section modulus

Tensile moment = 216,000 = 108,000
\((108,000)(35) = 234,000,000\) 15 M.

2,700,000 = 108 required S.M.

\[\frac{125}{25000} = \frac{W(125,000)}{48(23,000,0000)}\]

\((0.16)(30,050,000,000) = 125,000 \ W\)

\[W = \frac{3,870,000,000}{125,000} = 30,000\]

\(W = \frac{125}{25000} = \frac{W(125,000)}{48(23,000,0000)}\)

\((0.16)(30,050,000,000) = 125,000 \ W\)

\[W = \frac{3,870,000,000}{125,000} = 30,000\]
To find reaction on beams B

\[ \text{Reaction} = \frac{3}{2} \times 82,500 \times 36 = 1,485,000 \text{ lb} \]

\[ q = \text{Section Modulus} \]

\[ 99 = q \text{ of beam from SM of 102.} \]

\[ \text{Weight of beam} = 0.35 \times q = 0.35 \times 99 = 350 \text{ lb} \]
**SUBJECT**

**COMPANY**

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<table>
<thead>
<tr>
<th>Date</th>
<th>Subject</th>
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<tbody>
<tr>
<td>1922</td>
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**Property of Morgan Construction**

**Worcester, Mass.**

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A depression "depress" had been provided on each end of gutters over the whole length to permit gutters to be connected with grating flush with floor.

Cellar floor: The lowest elevation of cellar floor is at edge of gutters, slope cellar floor slanting towards gutters.

Foundation: An allowance of 1' for grading has been left under all beds. Make pockets around foundation bolts 2'-long hardwood tongue bolt and make bottoms affixed 6" above top and sanded level. For plate: hanger table foundations extend 4" beyond edges of tables to allow for grouting under edges of floor plates. See A3534A.
Elevation of bottom of scale level on 12" wall on 1st floor at 105 1' - 0" in h. of 1st floor is 105 1' - 0"

Elevation from 1st floor 12" wall to 1st floor 32" wall is 1' - 0.45"

\[ \frac{3}{4} \times 12'' \\
\frac{7}{2} + \frac{4}{2} = 28.6 = 28 9\frac{1}{2}'' \]

\[ \frac{28.6}{2} = 14.3 \]
Sb

8 x 2\(\frac{1}{2}\) x 1 = 20
6\(\frac{1}{2}\) x 2 = 13
11.75 x 7.5 = 86.25
86 sq. ft. area of top of foundations

349 cubic ft. on first floor

86.4 = 110 cubic ft.
153.8 = 158.2 cubic ft. total of first floor

Vol. of cable foundations:
12 x 8\(\frac{1}{2}\) x 41 = 460 cubic ft.
7 x 11 x 31 = 2310 cubic ft.
560 cubic ft. = vol. of cable foundation

158.2 - 132.2 = 26 cubic yds.

Allowing for housing, foundation + cable foundation
35 cubic yds. difference


Property of Morgan Construction Co.

Subject: Mass. Foundation Company

Date: 11/1/27

10 to 20 ft.
15 to 19 ft.
16 to 19 ft.
15 to 19 ft.
16 to 19 ft.
15 to 19 ft.
16 to 19 ft.
15 to 19 ft.
16 to 19 ft.
15 to 19 ft.
Coupling Spindle Carrier

Assuming weight of coupling as static load,

\[ \text{Max BM} = 5'000 \times 22 = 125,400 \text{ ft-lbs} \]

\[ \frac{125,400}{10,000} = 12.5 \text{ S.M.} \]

\[ S.M. = \frac{12.5}{6} = \frac{5}{2} = 2.5 \]

\[ f = \frac{5}{2} = 2.5 \]

\[ f = 2.5 \text{ ft-lbs} \]

\[ 282,000 \times 12 = 3,384,000 \text{ ft-lbs} \]

\[ 3,384,000 \div 300 = 11,280 \text{ ft-lbs} \]

\[ 10,000 \times 300 = 3,000,000 \text{ ft-lbs} \]

\[ 3,000,000 \div 300 = 10,000 \text{ ft-lbs} \]

\[ F = 352 (1.04 - 0) = 2820 \text{ lbs} \]

\[ F = 282,000 \text{ lbs} \]

\[ 282,000 \div 22 = 12,818 \text{ lbs} \]

\[ 282,000 \div 22 = 12,818 \text{ lbs} \]

\[ \text{Shear Modulus} \]
weight of coupling which rests on
can. beam 11,400 lbs
Force of blow when 11,400 falls through
2 inches =

\[ F = \frac{WS}{d} + W \]
\[ F = \frac{(11,400)(2)}{12.5} + 11,400 \]
\[ F = 18,240 + 11,400 \]
\[ F = 19,380 \text{ lbs for striking beam.} \]

Bending moment on beam.

\[ \Delta = \frac{19,400 	imes 11}{2} = 2,134,000 \]

2,134,000 19,400

Bending moment at unit of beam

\[ = 2,134,000 \text{ ft-lb} \]

2,134,000 192 = 51,000

192 would be the necessary SM

pinned couple beam would be

supported directly on solid

concrete. As this is not the case

and as cannot be supported on

4 I beams it is not safe to assume

another 4" deflection will take

place in these I beams.

\[ F = \frac{(11,400)(2)}{12.5} + 11,400 \]

Bending moment on beam.

\[ = 19,380 \text{ ft-lb} \]

1119,800 = 52 SM

20,000

1 SM k f = 5 (64) = 5-3

105.5 = 3.34"

108 11.74

108 2.74
#1
640 x 33,000 x 12 = 253,500,000
(π x 63.62 x 23.017)
= 27,500

#2
575 x 33,000 x 12 = 227,850,000
(π x 58.16 x 30.89)
= 11,800

#3
432,000,000
14,870

#4
490,000,000
18,770

#5
1,265,000,000
9,270

Check for No.
25,350,000
9,270
TP (tan phi 2) (sin x)
(27,500) (3639) (1897) = 1,970 #
(20,100) (3639) (2509) = 1,840 #
(29,000) (3639) (3714) 3,920 #
(23,800) (3639) (4917) 4,260 #
(17,300) (3639) (6092) 4,770 #

Cross shaft

Special Angle thrust
Cross shaft

TP (tan phi x) (cos x)
\[
P = \frac{200,000 \times 3.45}{300} = \frac{690,000}{300} = 2,300
\]

\[
P_1 = \frac{50.5}{\frac{\text{additional calculation}}{3600}}
\]
### Calculation of a curve in suspect 2

Assume journal 12" in dia in all cases. Assume load of 10,000 lbs. all cases.

<table>
<thead>
<tr>
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<th>L (feet)</th>
<th>( \frac{1}{2} \times L \times c ) area</th>
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<tr>
<td>600</td>
<td>5.00</td>
<td>2.50 x 12 = 30 sq ft</td>
</tr>
<tr>
<td>750</td>
<td>4.00</td>
<td>2.50 x 12 = 30 sq ft</td>
</tr>
<tr>
<td>500</td>
<td>6.24</td>
<td>2.50 x 12 = 30 sq ft</td>
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</table>

### Calculation of a curve in suspect 3

Assume journal 12" in dia in all cases. Assume load of 10,000 lbs. all cases.

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<td>2.50 x 12 = 30 sq ft</td>
</tr>
<tr>
<td>500</td>
<td>6.24</td>
<td>2.50 x 12 = 30 sq ft</td>
</tr>
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</table>
Area of thrust collar on No 1 2 x 3 Pul

Area 20.3" x 33.8"
Area 13" x 13.3" = 205"

Area thrust collar No 4.5 x 6
Area 17.3" x 2.47
Area 11" x 9.5" = 152"

Outside circum. 20.3" thick collar = 5.43 ft

Surface speed at outside edge of collar

5.43 x 25.87 = 156 F.P.M.

Actual lining pressure

16700 - 815 = 205

2) 5.43 x 30.71 = 199 F.P.M

15300 = 74.5"

3) 5.43 x 51.62 = 481 F.P.M

1460 = 71 #/"
\[ S = \frac{\sqrt{2}}{2} \]

\[ 600 = \frac{\sqrt{2}}{2} \]

\[ 600 = \sqrt{774.4} \]

\[ \sqrt{774.4} = 12.9 \]

\[ S = \frac{\sqrt{2}}{2} \]

\[ S = 12.9 \]

\[ S = \frac{50}{\sqrt{2}} \]

\[ S = 500 \]

\[ S = 2500 \]

\[ S = 194 \]

\[ S = \frac{c\sqrt{P}}{c} \]

\[ 600 = \frac{c\sqrt{150}}{8.94c = 600} \]

\[ c = 72.7 \]

\[ S = 72.7 \]

\[ S = 515 \]

\[ S = \frac{\sqrt{P}}{c} \]

\[ \sqrt{P} = \frac{200000}{(51.62)(20.75)} \]

\[ P = 1070 = 187 \]

\[ P = \frac{200000}{(36.71)(20.75)} \]

\[ P = 263 \]

\[ \sqrt{P} = \frac{200000}{(5.83)(20.75)} \]

\[ S = \frac{156}{538} \]

\[ \sqrt{88} = 600C \]
<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>COMPANY</th>
<th>DATE</th>
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<tbody>
<tr>
<td>Scale down. Bottom of sewer has a 6% Reclaim.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>throughout its length. The angle of the bottom of the sewer is 90° from</td>
<td></td>
<td></td>
</tr>
<tr>
<td>print to downstream. Between points</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14'-6&quot; and 9'-1&quot; this angle constantly changes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>see plans H-H, J-J, K-K</td>
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<td></td>
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<td></td>
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<td>------</td>
<td></td>
</tr>
<tr>
<td>5.00</td>
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**PROPERTY OF MORGAN CONSTRUCTION CO.**
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<td>1 3/4</td>
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<tr>
<td>2 1/2</td>
<td>1 4/4</td>
</tr>
<tr>
<td>6 3/4</td>
<td>2 2/4</td>
</tr>
<tr>
<td>18.76</td>
<td>2.21</td>
</tr>
<tr>
<td>22.4375</td>
<td>11.6875</td>
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<tr>
<td>10.75</td>
<td>13.75</td>
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<td>11.6875</td>
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<td>76.56</td>
</tr>
<tr>
<td>74.58</td>
</tr>
<tr>
<td>124</td>
</tr>
<tr>
<td>153</td>
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<tr>
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| 76.56 |
| 74.58 |
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| 153  |
| 11  |

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<tr>
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<tr>
<td>43 7/16</td>
</tr>
<tr>
<td>2 7/8</td>
</tr>
<tr>
<td>46 5/16</td>
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<tr>
<td>2 5/16</td>
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<tr>
<td>49 13/16</td>
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