THE CITY OF NAPOLEON

BUILDING & ZONING DEPARTMENT

255 W. RIVERVIEW

(419)592-4010

Sign Permit Zoning Only Page 1 of 1

Permit Number: SG2005-15 Printed: 8/11/2005

Property Address: 905 American Rd.

Applicant Address: Signs Unlimited
3505 Brooklyn Ave.
Ft Wayne, IN 46809

Approval Date: 8/11/2005

Phone: 260-747-0872

Owners

Contractors Address: Signs Unlimited
3505 Brooklyn Ave.
Ft Wayne, IN 46809

Phone 260-747-0872

Fees and Receipts:

Number	Description	Amount
FEE2005-615	Sign (Auto)	$75.00
	Total Fees:	**$75.00**

Description of work to be done: Marathon sign

Zoning Permit Only!
other permits may be required

APPROVED

Applicant signature:_____ **Date:**_____

City of Napoleon
Engineering Department

Office Use Only	
Permit No:	
App. Date:	
Est. Cost:	
Base Fee:	
Plus Fee:	
Total Fee:	

Application for Sign Permit

Owner Name: National Oil

Owner Address: Bluffton IN.

Contractor Name : Signs Unlimited

Contractor Address: 3505 Brooklyn PH: 260-747-0872

Location of Project: 905 American RD Napoleon OH.

Additional Information: Sign Type - Post ✓ Wall ____ Ground ____ Awning ____

Dimensions: 1-14'x11' 2-7'x10' 1-12'x12' Total S.F. 418 #

Date: 8/9/05 Applicant Signature: Marie Clay

Application must include a site drawing or a description of the location of the sign (where applicable) and a sketch of the proposed sign(s).

The permit fee is as follows: $25.00 base which includes up to 50 square feet of sign area, plus .10 per square foot after 50 square feet, not to exceed $100.00 in any case.

2ND Sign Post 7'-1 3/8" x 15'-7 1/4"

112 #

Dave White

260-497 0009 ext 314

-9155

493 3010

File : FFCEng196.mcd

Sign : 25'-0" cantilever pole for flag mounted Marathon 7' wide (nom.) signage with caisson footing 2'-0" above grade.

Site : Marathon Station
905 American Road
Napoleon, Ohio 43545

Design Windload : (PSF) $WL := 30.0$ Based on the 2002 Ohio Building Code using Exposure C and 90 mph winds.

Reference : Manual of Steel Construction, AISC 9th Edition.

Tube : ASTM A-500 Gr. B $Fy = 46.0$ ksi. ; $Fb = 30.36$ ksi. (Compact section) ; $Fv = 18.40$ ksi.

Plate : ASTM A-36 $Fy = 36.0$ ksi. ; $Fb = 23.76$ ksi.

Anchor Bolts : AASHTO specification M314-90 Gr. 55 $Fu = 75.0$ ksi. ; $Ft = 24.75$ ksi.

Reference : American Concrete Institute, Code 318.02.

Rebar : ASTM A-615 Grade 60 $Fy = 60.0$ ksi.

Concrete : 3,000 psi. compressive strength at 28 days.

8-8-05

Summation of Stresses at Cantilever Arms :

Wind Load :

Signs, Arms and End Tube : $SgnStrctWL := (7.37 \cdot 15.61 \cdot WL) \cdot \left(\frac{7.37}{2}\right)$ $SgnStrctWL = 12718.302$ ft.lbs.

Moment : (ft.lbs.) $MtWL := SgnStrctWL$ $MtWL = 12718.302$

Dead Load :

Signs, Arms and End Tube : (Based on 8.75 lbs./ft.^{2}) $SgnStrctDL := (7.37 \cdot 15.61 \cdot 8.75) \cdot \left(\frac{7.37}{2}\right)$ $SgnStrctDL = 3709.505$ ft.lbs.

Moment : (ft.lbs.) $MtDL := SgnStrctDL$ $MtDL = 3709.505$

Combined of Moment at Cantilever Arms :

Summation : (in.lbs.) $MtArms_{Comb} := MtWL + MtDL$ $MtArms_{Comb} = 16427.807$

Design of Cantilever Arms :

Moment per Arm : (in.lbs.) $MtArm := \frac{MtArms_{Comb}}{2}$ $MtArm = 8213.903$

Required Section Modulus : (in.^{3}) (Compact Tube Section) $ReqdSM := \frac{MtArm \cdot 12}{30360}$ $ReqdSM = 3.247$

Pipe Section Modulus : (in.^{3}) TS 8" x 3" x 1/4" wall - (y-y axis) $TubeSy := 5.26$

Unity Check : $UCSectMod := \frac{ReqdSM}{TubeSy}$ $UCSectMod = 0.617$ < 1.00 OK

Summation of Stress at Base of Pole :

Wind Load :

Signs and Arms : $SgnsArms := (15.61 \cdot 7.37 \cdot WL) \cdot \left[\left(\frac{15.61}{2}\right) + 9.39\right]$ SgnsArms = 59346.324 ft.lbs.

Pole : $Pole := \left[25.0 \cdot \left(\frac{8}{12}\right) \cdot WL\right] \cdot \left(\frac{25.0}{2}\right)$ Pole = 6250 ft.lbs.

Summation : (ft.lbs.) MtWL := SgnsArms + Pole MtWL = 65596.324

Torsion from Signs - Wind Load :

Signs and Arms : $SgnsArms := (15.61 \cdot 7.37 \cdot WL) \cdot \left(\frac{7.37}{2}\right)$ SgnsArms = 12718.302 ft.lbs.

Summation : (ft.lbs.) MtTorWL := SgnsArms MtTorWL = 12718.302

Torsion from Signs - Dead Load :

Signs and Arms : $SgnsArms := (15.61 \cdot 7.37 \cdot 8.75) \cdot \left(\frac{7.37}{2}\right)$ SgnsArms = 3709.505 ft.lbs.

Summation : (ft.lbs.) MtTorDL := SgnsArms MtTorDL = 3709.505

Combined Moment :

Summation : (ft.lbs.) $Mt_{Comb} := MtWL + MtTorDL$ Mt_{Comb} = 69305.829

Combined Shear :

Summation : (ft.lbs.) $Shr_{Comb} := (15.61 \cdot 7.37 \cdot WL) + \left[25.0 \cdot \left(\frac{8}{12}\right) \cdot WL\right] + (15.61 \cdot 7.37 \cdot 8.75)$

Shr_{Comb} = 4958.021

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Design of Tube - Bending :

Section Modulus of Tube : ($in.^3$) TS 8" x 8" x 3/8" wall - TubeSM := 26.4

Bending Stress : (psi.) $f_b := \frac{Mt_{Comb} \cdot 12}{TubeSM}$ f_b = 31502.65

Unity Check - Bending : $UCBnd := \frac{f_b}{30360 \cdot 1.33}$ UCBnd = 0.78 < 1.00 OK

Design of Tube - Shear :

Tube : TS 8" x 8" x 1/2" wall - Width : (in.) Wdth := 8

Depth : (in.) Dpth := 8

Area : ($in.^2$) A := 11.1

Wall Thickness : (in.) wt := 0.375

Torsional Stiffness Constant : ($in.^4$) J := 170

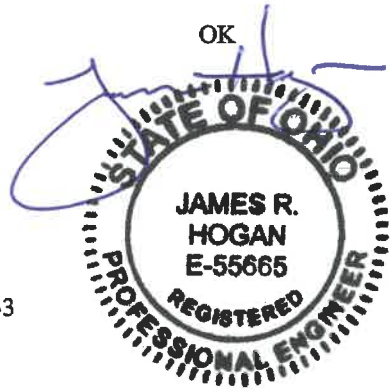
Tube Diagonal : (in.) $c := \sqrt{\left[\left(\frac{Wdth}{2}\right) - (2 \cdot wt)\right]^2 + \left[\left(\frac{Dpth}{2}\right) - (2 \cdot wt)\right]^2} + (2 \cdot wt)$ $c = 5.346$

Shear Stress : (psi.) $fv := \frac{Shr_{Comb}}{A}$ $fv = 446.669$

Torsional Stress : (psi.) $ft := \frac{MtTorWL \cdot 12 \cdot c}{J}$ $ft = 4799.613$

Combined Shear Stress : (psi.) $fv_{Comb} := \sqrt{(fv + ft)^2 + ft^2}$ $fv_{Comb} = 7110.538$

Unity Check - Shear : $UCShr := \frac{fv_{Comb}}{18400}$ $UCShr = 0.386$ < 1.00 OK



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Design of Anchor Bolts :

Number of Anchor Bolts in Tension per Plate : $No := 2$

Front to Back Distance Between Anchor Bolts : (in.) $LvrArm := 15.0$

Tension Load per Anchor Bolt : (lbs.) $TenAncBlt := \frac{Mt_{Comb} \cdot 12}{No \cdot LvrArm}$ $TenAncBlt = 27722.33$

Anchor Bolt Diameter : (in.) $AnchBltDia := 1.25$

Stress Area : (in.^{2}) (Based on nominal diameter per AISC 4-3) $AnchBltArea := \frac{\pi \cdot AnchBltDia^2}{4}$ $AnchBltArea = 1.227$

Allowable Tension : (lbs.) (Based on AASHTO M314-90 Gr. 55.) $AllwTen := 24750 \cdot AnchBltArea$ $AllwTen = 30373$

Unity Check - Anchor Bolt Tension : $UCABTen := \frac{TenAncBlt}{AllwTen}$ $UCABTen = 0.913$ < 1.00 OK

Allowable Bond Stress : (lbs./ in.^{2}) $U := \frac{1}{2} \cdot \left(\frac{4.8 \cdot \sqrt{4000}}{AnchBltDia}\right)$ $U = 121.431$

Developement Length : (in.) $Ld := \frac{TenAncBlt}{U \cdot \pi \cdot AnchBltDia}$ $Ld = 58.135$

Embedment Length of 48" Anchor Bolt minus 6" of Thread : (in.) $AncBltEmb := 72 - 6$ $AncBltEmb = 66$

Unity Check - Anchor Bolt Embedment : $UCABEmb := \frac{Ld}{AncBltEmb}$ $UCABEmb = 0.881$ < 1.00 OK

Use : Four (4) 1-1/4" Diameter x 72" long plus 15" right angle bend anchor bolts.

Design of Base Plate :

Plate Width : (in.) $PltWdth := 19$ Plate Thickness : (in.) $PLThk := 1.50$

Plate Specimen : (in.) $PLS := \frac{LvrArm - Wdth}{2}$ $PLS = 3.5$

Minimum Thickness Required : (in.) $ReqdThk := \sqrt{\frac{TenAncBlt \cdot No \cdot PLS \cdot 6}{(PltWdth \cdot 23760 \cdot 1.33)}}$ $ReqdThk = 1.393$

Unity Check : $UC := \frac{ReqdThk}{PLThk}$ $UC = 0.928$ < 1.00 OK

Use : 1-1/2" thick x 19" x 20" base plate with four (4) 1-1/2" diameter holes on 15" x 16-1/2" bolt pattern.

Summation of Stress at Grade :

Wind Load :

Signs and Arms : $SgnsArms := (15.61 \cdot 7.37 \cdot WL) \cdot \left[\left(\frac{15.61}{2}\right) + 11.39\right]$ SgnsArms = 66249.066 ft.lbs.

Pole : $Pole := \left[25.0 \cdot \left(\frac{8}{12}\right) \cdot WL\right] \cdot \left[\left(\frac{25.0}{2}\right) + 2.0\right]$ Pole = 7250 ft.lbs.

Exposed Caisson : $ExpCasn := (2.0 \cdot 3.0 \cdot WL) \cdot \left(\frac{2.0}{2}\right)$ ExpCasn = 180 ft.lbs.

Summation : (ft.lbs.) $MtWL := SgnsArms + Pole + ExpCasn$ MtWL = 73679.066

Torsion from Signs - Dead Load :

Signs and Arms : $SgnsArms := (15.61 \cdot 7.37 \cdot 8.75) \cdot \left(\frac{7.37}{2}\right)$ SgnsArms = 3709.505 ft.lbs.

Summation : (ft.lbs.) $MtTorDL := SgnsArms$ MtTorDL = 3709.505

Combined Moment :

Summation : (ft.lbs.) $MtGrd_{Comb} := MtWL + MtTorDL$ Mt_{Comb} = 69305.829

Combined Shear :

Summation : (ft.lbs.) $ShrGrd_{Comb} := (15.61 \cdot 7.37 \cdot WL) + \left[25.0 \cdot \left(\frac{8}{12}\right) \cdot WL\right] + (2.0 \cdot 3.0 \cdot WL) + (15.61 \cdot 7.37 \cdot 8.75)$

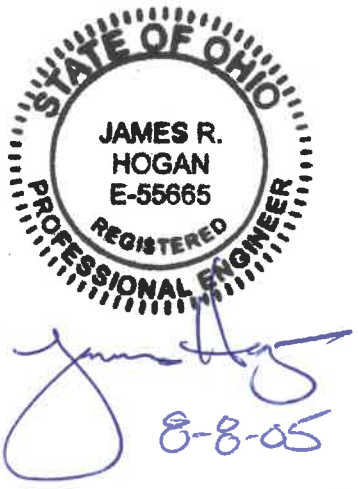
$ShrGrd_{Comb}$ = 5138.021

Design of Caisson Footing :

Overturning Moment : (ft.lbs.)	$Ma := MtGrd_{Comb}$	Ma = 77388.571
Shear : (lbs.)	$Va := ShrGrd_{Comb}$	Va = 5138.021
Applied Lateral Force : (lbs.)	$P := Va$	P = 5138.021
Allowable Lateral Soil Pressure : (lbs./ft.^{2} per ft.)		LP := 250
Diameter of Round Footing : (ft.)		b1 := 3.0
Distance in Feet From Ground Surface to Point of Application of "P"	$h := \frac{Ma}{Va}$	h = 15.062
Depth of Embedment in Earth in Feet But Not Over 12 Feet for Purpose of Computing Lateral Pressure		d1 := 10.0
Allowable Lateral Soil Bearing Pressure Pursuant to the 2003 International Building Code Section 1805.7 and Table 1804.2	$S1 := d1 \cdot \frac{(LP \cdot 1.33)}{3}$	S1 = 1108.333

$A := 2.34 \cdot \frac{P}{S1 \cdot b1}$ A = 3.616

$d2 := \left(\frac{A}{2}\right) \cdot \left[1 + \left(\sqrt{1 + 4.36 \cdot \frac{h}{A}}\right)\right]$ d2 = 9.722 $\leq$ d1 = 10 OK



Check Tensile Stress in Footing :

Overturning Moment About Heel Point : (ft.lbs.) $Mh := Ma + (Va \cdot d1)$ $Mh = 128768.78$
Treat as a cantilever at bottom.

Compressive Strength of Concrete : (psi.) $fc := 3000$

Yield Strength of Rebar : (psi.) $fy := 60000$

Section Modulus of Footing : ($in.^3$) $Sw := \frac{\pi \cdot (b1 \cdot 12)^3}{32}$ $Sw = 4580.442$

Allowable Concrete Stress : (psi.) $\phi Ft := 0.65 \cdot (5 \cdot \sqrt{fc})$ $\phi Ft = 178.01$

Tensile Stress in Concrete : (psi.) $ft := 1.3 \cdot \left[\frac{(Mh \cdot 12)}{Sw} \right]$ $ft = 438.559 > \phi Ft = 178.01$

REBAR REQUIRED FOR STRESS

Design of Reinforcing Steel in Caisson :

Moment for USD Design : $Mu := 1.7 \cdot Mh$ $Mu = 218906.926$

$d := [(b1 \cdot 12) \cdot .80] - 4$ $d = 24.8$

To Plot for " ju " : $coeff := \frac{Mu \cdot 12}{fc \cdot b1 \cdot 12 \cdot d^2}$ $coeff = 0.04$ $ju := 0.89$

Required Area : ($in.^2$) $As := \frac{Mu \cdot 12}{ju \cdot fy \cdot d \cdot 0.90}$ $As = 2.204$

Rebar Size : Number := 8 Rebar Area : ($in.^2$) $Area := \frac{\pi \cdot \left(\frac{Number}{8} \right)^2}{4}$ $Area = 0.79$

Number Required : $\left(\frac{As}{Area} \right) \cdot 2 = 5.612$ Use six (6) #8 Rebar x 11'-4" LG. equally spaced on a 28" circle with ten (10) #3 Rebar ties on 15" centers.

Quantity of Concrete : ($yds.^3$) $CY := \pi \cdot \frac{b1^2}{4 \cdot 27} \cdot (d1 + 2.0)$ $CY = 3.142$

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