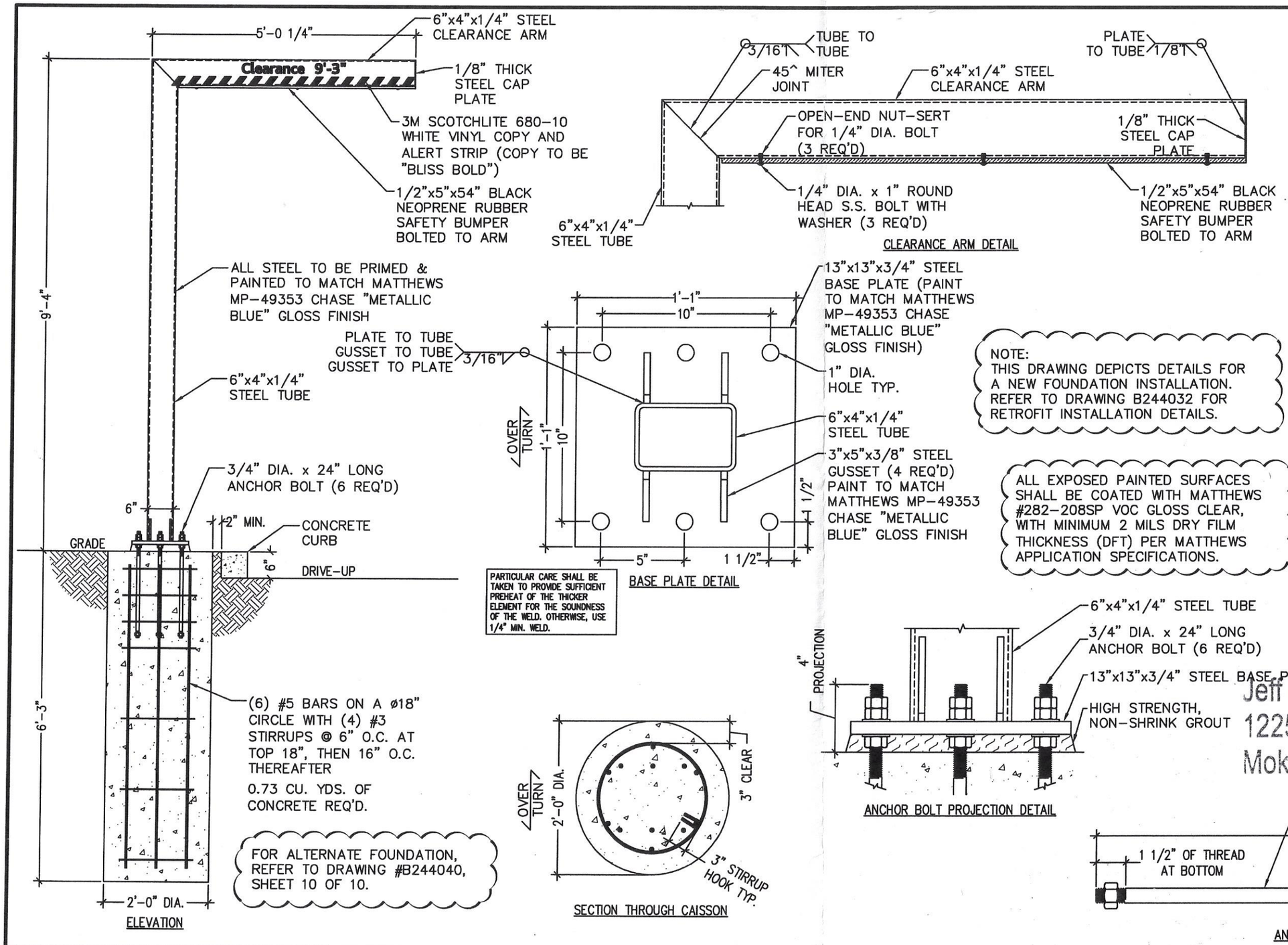

NOTES:

1. Design is based on a 115 mph, 3 second gust wind design per IBC 2015, Risk Category II, Exposure C. 40psf Ground Snow Load.
2. Foundation is based on a safe lateral soil bearing pressure minimum of 100 psf per foot of depth based on Class 5 soils. Do not place foundation in fill.
3. Concrete shall be mixed to attain a minimum compressive strength of 3000 psi in 28 days.
4. Support member shall be free from defects and shall meet ASTM A500 grade B with a minimum yield strength of 46000 psi for tube. Plate and angle shall meet ASTM A36.
5. Structural bolts shall be zinc coated A307 unless otherwise noted.
6. Anchor bolts shall be cut from A36 round stock. Exposed surfaces shall be galvanized or coated to prevent corrosion.
7. All voids between column base plate and foundation surface shall be completely filled with high strength, non-shrink grout.
8. Welds shall be made with E70xx electrodes by persons qualified in accordance with AWS standards within the past two years.
9. Steel reinforcing bars shall conform to ASTM 615 grade 60 with deformations in accordance with ASTM A-305. Welding of reinforcing bars is prohibited.

STATE OF MISSOURI
JEFF L GRIFFIN
NUMBER PE-25608
PROFESSIONAL ENGINEER

Jeff L. Griffin
12255 W. 187th St.
Mokena, IL 60448

4/23/20

CHASE

SHT.	BY:	Project No.
1	TMD	08-1218
OF 1	DATE: 1/12/09	Drawing No. B224027

REV.	DATE	DESCRIPTION	BY:	APR:
4	12/15/10	ADDED ALTERNATE FOUNDATION NOTE	TRR	IK
3	7/28/10	ADDED CLEAR COAT NOTE	TRR	IK
2	7/23/10	CALLED OUT RUBBER TO BE 1/2" BLACK NEOPRENE	TRR	IK
1	5/6/09	ADDED PAINT COLOR TO ALL STEEL ADDED FONT CALLOUT	TMD	IK

GRAPHICS DEPICTED ARE FOR ILLUSTRATIVE PURPOSES ONLY! USE ONLY APPROVED ARTWORK FOR PRODUCTION.

DESIGNATION: HB-U

File : IconIdentSolut3389b.mcd

Site : Chase Bank
Location No. 64063
276 South West Blue Parkway
Lees Summit, Missouri 64063

Project : 9'-4" maximum clearance headache bar for ATM kiosk for installation on a caisson footing with anchor bolts.
Drawing No. B244027

Design loads are based on the 2015 International Building Code (ASCE 7-10) using Exposure C and 115 mph wind speed.

Design Wind Speed : (mph.) $V := 115.0$ Based on Risk Category II

Velocity Pressure Coefficient at a Height of Less Than 15', Exposure C : $Kz := 0.85$ Based on Table 29.3-1

Topographic Factor : $Kzt := 1.00$ Based on Table 26.8-1

Wind Directionality Factor : $Kd := 0.85$ Based on Table 26.6-1

Velocity Pressure : (PSF) $qz := 0.00256 \cdot Kz \cdot Kzt \cdot Kd \cdot V^2$ $qz = 24.461$ Based on 29.3-1

Force Coefficient : $Cf := 1.80$ Based on Figure 29.4-1

Gust Effect Factor : $G := 0.85$ Based on 26.9.4 for Other Structures

Load Combination Factor : $LCF := 0.60$ Based on 2.4.1, Case 7

Design Pressure : (PSF) $F := qz \cdot Cf \cdot G \cdot LCF$ $F = 22.455$ Use : $WL := 22.5$

Design Snow Load : (PSF) $SL := 40.0$ Based on Ground Snow Loads.

Reference : Manual of Steel Construction, AISC 13th Edition.

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

Plate : ASTM A-36 $Fy = 36.0$ ksi. ; $Fb = 27.00$ ksi. ; $Fv = 14.40$ ksi.

Anchor Bolts : ASTM F-1554 Gr. 36 $Fu = 58.0$ ksi. ; $Ft = 19.14$ ksi. ; $Fv = 14.40$ ksi.

Reference : American Concrete Institute, Code 318.14

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

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

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Design Loads at EL 9.08' :

Wind Load :

Shear : (lbs.) $ShrWL := \left[4.75 \cdot \left(\frac{6}{12}\right) \cdot WL\right]$ $ShrWL = 53.438$

Moment : (ft.lbs.) $MtWL := ShrWL \cdot \left(\frac{4.75}{2}\right)$ $MtWL = 126.914$

Dead Load :

Shear : (lbs.) $ShrDL := (4.75 \cdot 15.58)$ $ShrDL = 74.005$

Moment : (ft.lbs.) $MtDL := ShrDL \cdot \left(\frac{4.75}{2}\right)$ $MtDL = 175.762$

Snow Load :

Shear : (lbs.) $ShrSL := \left[4.75 \cdot \left(\frac{4}{12}\right) \cdot SL\right]$ $ShrSL = 63.333$

Moment : (ft.lbs.) $MtSL := ShrSL \cdot \left(\frac{4.75}{2}\right)$ $MtSL = 150.417$

Combined Shear :

Summation : (ft.lbs.) $ShrEL9_{08} := ShrWL + ShrDL + ShrSL$ $ShrEL9_{08} = 190.776$

Design of Clearance Arm :

Section Modulus of Tube - X Axis : ($in.^3$) HSS 6" x 4" x 1/4" wall - $XAxisSM := 6.96$

Bending Stress - X Axis : (psi.) $f_{bxaxis} := \frac{(MtDL + MtSL) \cdot 12}{XAxisSM}$ $f_{bxaxis} = 562.377$

Section Modulus of Tube - Y Axis : ($in.^3$) HSS 6" x 4" x 1/4" wall - $YAxisSM := 5.56$

Bending Stress - Y Axis : (psi.) $f_{byaxis} := \frac{MtWL \cdot 12}{YAxisSM}$ $f_{byaxis} = 273.915$

Area of Tube : ($in.^2$) HSS 6" x 4" x 1/4" wall - $TubeArea := 4.30$

Shear Stress : (psi.) $f_v := \frac{ShrEL9_{08}}{TubeArea}$ $f_v = 44.366$

Unity Check : Clearance Arm $UCClrncArm := \frac{f_{bxaxis}}{30360} + \frac{f_{byaxis}}{30360} + \frac{f_v}{18400}$ $UCClrncArm = 0.03 < 1.00$ OK

Design Loads at Top of Footing :

Wind Load :

Arm : $Arm := \left[4.75 \cdot \left(\frac{6}{12}\right) \cdot WL\right] \cdot \left[\left(\frac{0.5}{2}\right) + 8.83\right]$ $Arm = 485.212$ ft.lbs.

Pole : $Pole := \left[9.33 \cdot \left(\frac{6}{12}\right) \cdot WL\right] \cdot \left(\frac{9.33}{2}\right)$ $Pole = 489.65$ ft.lbs.

Moment : (ft.lbs.) $MtWL := Arm + Pole$ $MtWL = 974.863$

Shear : (lbs.) $ShrWL := \left[4.75 \cdot \left(\frac{6}{12}\right) \cdot WL\right] + \left[9.33 \cdot \left(\frac{6}{12}\right) \cdot WL\right]$ $ShrWL = 158.4$

Offset Wind Load :

Shear : (lbs.) $ShrOSWL := \left[4.52 \cdot \left(\frac{6}{12}\right) \cdot WL\right]$ $ShrOSWL = 50.85$

Summation : (ft.lbs.) $MtOSWL := ShrOSWL \cdot \left(\frac{4.52}{2}\right)$ $MtOSWL = 114.921$

Offset Dead Load :

Shear : (lbs.) $ShrOSDL := (4.52 \cdot 15.58)$ $ShrOSDL = 70.422$

Moment : (ft.lbs.) $MtOSDL := ShrOSWL \cdot \left(\frac{4.52}{2}\right)$ $MtOSDL = 114.921$

Offset Snow Load :

Shear : (lbs.) $ShrOSSL := \left[4.52 \cdot \left(\frac{4}{12}\right) \cdot SL\right]$ $ShrOSSL = 60.267$

Moment : (ft.lbs.) $MtOSSL := ShrOSSL \cdot \left(\frac{4.52}{2}\right)$ $MtOSSL = 136.203$

Combined Moment :

Summation : (ft.lbs.) $MtTOF := MtWL + MtOSDL + MtOSSL$ $MtTOF = 1225.986$

Combined Shear :

Summation : (lbs.) $ShrTOF := ShrWL + ShrOSWL + ShrOSDL + ShrOSSL$ $ShrTOF = 339.938$

Design of Pole :

Tube : HSS 6" x 4" x 1/4" wall - Area : ($in.^2$) $TubeArea := 4.30$

Section Modulus : ($in.^3$) $YAxisSM := 5.56$ (y-y axis)

Torsional Stiffness Constant : ($in.^4$) $C := 10.1$

Bending Stress : (psi.) $f_b := \frac{MtTOF \cdot 12}{YAxisSM}$ $f_b = 2646.013$

Shear Stress : (psi.) $fv := \frac{ShrTOF}{TubeArea}$ $fv = 79.055$

Torsional Stress : (psi.) $ft := \frac{(MtOSWL \cdot 12)}{C}$ $ft = 136.54$

Combined Shear Stress : (psi.) $fv_{Comb} := \sqrt{\left[(fv + ft)^2 + ft^2\right]}$ $fv_{Comb} = 255.195$

Unity Check - Pole : $UCPole := \frac{f_b}{30360} + \frac{fv_{Comb}}{18400}$ $UCPole = 0.101 < 1.00$ OK

Design of Anchor Bolts :

Anchor Bolt Diameter : (in.) $AnchBltDia := 0.75$

Stress Area : ($in.^2$)
(Based on nominal diameter per AISC 4-3) $AnchBltArea := \frac{\pi \cdot AnchBltDia^2}{4}$ $AnchBltArea = 0.442$

Allowable Tension : (lbs.) $AllwTen := 19140 \cdot AnchBltArea$ $AllwTen = 8456$

Allowable Shear : (lbs.) $AllwShr := 14400 \cdot AnchBltArea$ $AllwShr = 6362$

Number of Anchor Bolts in Tension : $NoTen := 3$

Front to Back Distance Between Anchor Bolts : (in.) $LvrArm := 10.0$

Tension Load per Anchor Bolt : (lbs.) $TenAncBlt := \frac{MtTOF \cdot 12}{(NoTen \cdot LvrArm)}$ $TenAncBlt = 490.394$

Number of Anchor Bolts in Shear : $NoShr := 6$

Number of Bolt Couples : $NoBltCpls := 2$

Side to Side Distance Between Anchor Bolts : (in.) $BltSprd := 5.0$

Diagonal Distance Between Anchor Bolts : (in.) $BltDiagnl := \sqrt{(LvrArm^2 + BltSprd^2)}$

$BltDiagnl = 11.18$

Shear Load per Anchor Bolt : (lbs.) $ShrAncBlt := \frac{ShrTOF}{NoShr} + \frac{(MtOSWL \cdot 12)}{NoBltCpls \cdot BltDiagnl}$

$ShrAncBlt = 118.33$

Unity Check : Anchor Bolts $UCAncBlts := \frac{TenAncBlt}{AllwTen} + \frac{ShrAncBlt}{AllwShr}$ $UCAncBlts = 0.077 < 1.00$ OK

Allowable Bond Stress : (lbs./ in.^{2}) $U := \left(\frac{1}{2}\right) \cdot \left(\frac{4.8 \cdot \sqrt{3000}}{AnchBltDia}\right)$ $U = 175.271$

Developement Length : (in.) $Ld := \frac{TenAncBlt}{U \cdot \pi \cdot AnchBltDia}$ $Ld = 1.187$

Embedment Length : (in.)
(24" length minus 4" of thread projection.) $AncBltEmb := 24 - 4.0$ $AncBltEmb = 20$

Unity Check : Anchor Bolt Embedment $UCABEmb := \frac{Ld}{AncBltEmb}$ $UCABEmb = 0.059 < 1.00$ OK

Use : Six (6) 3/4" Dia. x 24" long anchor bolts with 5-1/2" top thread and 1-1/2" bottom thread.

Design of Base Plate at Top of Footing :

Plate Thickness : (in.) $PltThk := 0.75$ Plate Width : (in.) $PltWdth := 13.0$

Side to Side Distance Between Outer Anchor Bolts : (in.) $BltSprd := 10.0$

Transfer Distance : (in.) $PLS := \frac{\sqrt{[(LvrArm - 4.0)^2 + (BltSprd - 6.0)^2]}}{2}$ $PLS = 3.606$

Minimum Thickness Required : (in.) $ReqdThk := \sqrt{\left[\frac{TenAncBlt \cdot NoTen \cdot PLS \cdot 6}{(PltWdth \cdot 27000)}\right]}$ $ReqdThk = 0.301$

Unity Check - Base Plate : $UCBasePlt := \frac{ReqdThk}{PltThk}$ $UCBasePlt = 0.401 < 1.00$ OK

Use : 3/4" thick x 13" x 13" base plate with four (6) 1" diameter holes on 5" + 5" x 10" bolt pattern.

Design of Caisson Footing :

Overturning Moment : (ft.lbs.) $Ma := MtTOF$ $Ma = 1225.986$

Shear : (lbs.) $Va := ShrTOF$ $Va = 339.938$

Applied Lateral Force : (lbs.) $P := Va$ $P = 339.938$

Allowable Lateral Soil Pressure : (lbs./ft.^{2} per ft.) $LP := 100$

Diameter of Round Footing : (ft.) $b1 := 2.0$

Distance in Feet From Ground Surface to Point of Application of "P" $h := \frac{Ma}{Va}$ $h = 3.606$

Depth of Footing Below Grade : (ft.) $d1 := 6.25$

Allowable Lateral Soil Bearing Pressure Pursuant to the 2015 International Building Code Section 1807.3.2.1 and Table 1804.2. $S1 := d1 \cdot \frac{LP}{3}$ $S1 = 208.333$

$$A := 2.34 \cdot \frac{P}{S1 \cdot b1} \qquad A = 1.909$$

$$d2 := \left(\frac{A}{2}\right) \cdot \left[1 + \left(\sqrt{1 + 4.36 \cdot \frac{h}{A}}\right)\right] \qquad d2 = 3.856 \leq d1 = 6.25 \qquad \text{OK}$$

Check Tensile Stress in Footing :

Overturning Moment About Heel Point : (ft.lbs.) Treat as a cantilever at bottom. $Mh := Ma + (Va \cdot d1)$ $Mh = 3350.6$

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

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

Section Modulus of Footing : (in.^{3}) $Sw := \frac{\pi \cdot (b1 \cdot 12)^3}{32}$ $Sw = 1357.168$

Tensile Stress in Concrete : (psi.) $ft := \left[\frac{(Mh \cdot 12)}{Sw}\right]$ $ft = 29.626$

Allowable Concrete Stress : (psi.) $\phi Ft := 0.65 \cdot (5 \cdot \sqrt{fc})$ $\phi Ft = 178.01 > ft = 29.626$

REBAR NOT REQUIRED FOR STRESS

Design of Temperature and Shrinkage Steel in Caisson :

Moment for USD Design : $Mu := 1.7 \cdot Mh$ $Mu = 5696.021$

$d := [(b1 \cdot 12) \cdot .80] - 3$ $d = 16.2$

To Plot for " ju " : $coeff := \frac{Mu \cdot 12}{fc \cdot b1 \cdot 12 \cdot d^2}$ $coeff = 0.004$ $ju := 0.56$

Required Area : (in.^{2}) $As := \frac{Mu \cdot 12}{ju \cdot fy \cdot d \cdot 0.90}$ $As = 0.14$

Rebar Size :

Number := 5

Rebar Area : ($in.^2$)

$$Area := \frac{\pi \cdot \left(\frac{Number}{8}\right)^2}{4}$$

Area = 0.31

Number Required :

$$\left(\frac{As}{Area}\right) \cdot 2 = 0.91$$

Use six (6) #5 Rebar x 5'-7" LG. equally spaced on a 16" circle with seven (7) #3 Rebar ties with top four (4) on 6" centers and the remainder on 16" centers.

Quantity of Concrete : ($yds.^3$)

$$CY := \frac{\pi \cdot b1^2 \cdot d1}{4 \cdot 27}$$

CY = 0.727