

HOUSTON TOWER COMMISSION

Members

Rob Todd, Chair
John R. Melcher
Kerrick Henny
Teresa Lynn Flores
Christy B. Smidt
Linda Smith
Asim Tufail

Secretary

Margaret Wallace-
Brown

Agenda

Monday, April 27, 2020
3:30 pm

Via: Microsoft Teams Meeting Web:
<https://bit.ly/2XW3xFd> Phone: +1 936-
755-1521 Conference ID: 567 065 974#

Submit Written Comments to:
planning.tower@houstontx.gov

Make Comments by Phone to:
832-393-6624

To download the full agenda package
visit:
https://www.houstontx.gov/planning/Commissions/commission_tower.html

SPEAKERS GUIDELINES

The public is encouraged to take an active interest in matters that come before the **Tower Commission**. Anyone wishing to speak before the Commission may do so. The Commission has adopted the following procedural rules on public participation for virtual meetings:

1. Anyone wishing to speak before the Commission should sign up to speak via phone **832-393-6624** or email **planning.tower@houston.tx.gov**, 24 hours in advance preferred.
2. Please note what item you wish to speak on, or if it is for general public comments.
3. You may also sign up to speak in the chat feature of Microsoft Teams, and either ask to speak, or write your comments there, which will be read into the record by staff.
4. All comments submitted in writing or by phone will be read into the record by staff.
5. Keep your phone or computer on "MUTE" unless identified by the Chair to speak. When your name is called, unmute your phone by pressing your mute button or *6, or unmute your computer. State your name, spell your last name, and make your comments. When you are done, please mute yourself.
6. If the speaker wishes to discuss any subject not otherwise on the agenda, time will be allocated or allotted after all agenda items have been processed and "public comments" are taken.
7. Applicants will be allowed to speak first and are allowed **five** minutes for an opening presentation. The applicant is also permitted a two-minute rebuttal after all speakers have been heard. If there are no speakers other than the applicant, there is no rebuttal period.
8. All other speakers will be permitted two minutes to address the Commission.
9. No speaker is permitted to accumulate speaking time from another person.
10. Time devoted to answering any questions from the Commission is not charged against allotted speaking time. The Commission may extend any speaker's speaking time if it is the Commission's judgment that additional time is needed to sufficiently discuss an item.
11. The Commission reserves the right to limit speakers if it is the Commission's judgment that an issue has been sufficiently discussed and additional speakers are repetitive.
12. The Commission reserves the right to stop speakers who are unruly or abusive.

NOTE: The Tower Commission may only act to approve or disapprove the placement of a tower under Chapter 28, Article XVI, City of Houston Code of Ordinances.

HOUSTON TOWER COMMISSION

AGENDA

Monday, April 27, 2020 3:30 p.m.

Due to health and safety concerns related to the COVID-19 coronavirus, the Tower Commission will conduct meetings by videoconference for the duration of social distancing restrictions. The Commission will be participating by videoconference using Microsoft Teams in accordance with the provisions of Section 551.127 of the Texas Government Code that have not been suspended by order of the Governor. This platform will allow for a two-way video/audio communication with the members of the Tower Commission.

To join the April 27 Tower Commission, please see the following options:

- Join via Microsoft Teams by installing the Microsoft Teams app; or
- Join via Web Browser: (<https://bit.ly/2XW3xFd>); or
- Join via Phone: +1 936-755-1521 Conference ID: 567 065 974#

Please visit <https://bit.ly/3bwvbwj> to download the full agenda package.

Call to Order

Secretary's Report

- I. Approve the February 24, 2020 Tower Commission Meeting minutes
- II. Public hearing and consideration of a waiver request
 - A. 19-T-0741 3206 2/3 Webster Street for a waiver of Section 28-524 (g): Fall zone, of the Code of Ordinances of the City of Houston, Texas.
- III. Public Comment
- IV. Adjournment

Minutes of the Houston Tower Commission

(A CD of the full proceedings is on file in the Planning and Development Department)

February 24, 2020

Meeting held in

Council Chambers, Public Level, City Hall Annex

3:30 p.m.

CALL TO ORDER

Chair Rob Todd called the meeting to order at 3:35 p.m., with a quorum present.

Rob Todd, Chair

Teresa Lynn Flores

Kerrick Henny Absent

John R. Melcher

Christy B. Smidt Absent

Linda Smith

Asim Tufail

I. APPROVAL OF THE JANUARY 27, 2020 TOWER COMMISSION MEETING MINUTES

Motion was made by Commissioner Flores, seconded by Commissioner Tufail, to approve the January 27, 2020 Tower Commission meeting minutes. Motion carried unanimously.

SECRETARY'S REPORT

The Secretary's Report was given by Hector Rodriguez, Planner Manager, Planning and Development Department.

Commission took a brief recess at 3:37 p.m. No business was discussed.

Commission reconvened at 4:08 p.m.

II. PUBLIC HEARING AND CONSIDERATION OF WAIVER REQUEST

A. 19-T-0741 3206 2/3 Webster Street

Chairman Rob Todd requested item II A to be deferred for Legal review. Motion was made by Commissioner Tufail, seconded by Commissioner Flores to defer the application, for item II A. Motion carried unanimously.

III. PUBLIC COMMENT

NONE

IV. ADJOURNMENT

There being no further business before the Commission, Chairman Rob Todd adjourned the meeting at 4:09 p.m. Motion was made by Commissioner Flores and seconded by Commissioner Melcher. Motion carried unanimously.

Rob Todd
Chair

Hector Rodriguez
Secretary

AGENDA ITEM: II - A

TOWER APPLICATION AND WAIVER REQUEST - STAFF REPORT

Location:	File No.	Zip	Lamb. No.	Key Map
3206 2/3 Webster Street Applicant: Jared Ledet, Branch Towers III, LLC Application Date: 10/14/2019 Location: South of I-45 and west of Oliver & Dreyling Existing Use: Religious - Vacant Proposed Use: 100' Monopole tower Proposed Tower Users: Branch	19-T-0741	77004	5456	
Waivers Request: Section 28-524 (g): Fall zone, of the Code of Ordinances of the City of Houston, Texas.				

28-524 (g): Fall zone

Relevant Tower Ordinance Waiver Provisions:

28-524 (g): A tower permit shall not be approved for the construction or alteration of a tower structure unless the distance between the center of the base of a tower and the nearest residential lot is at least one and one-half times the height of the tower or tower structure.

BASIS OF REQUEST:

Reason for waiver: At the request of the anchor tenant, Branch as the proposed tower owner/operator has designed a monopole structure that will accommodate potential needs for the proposed anchor tenant and future tenants as well. The structure will meet all federal, state, and local building codes and standards, and it will be engineered to local wind speed requirements. The new cell site location will help us provide coverage to our customers. Daily business commuters and residents will find improved network coverage as coverage surrounding the area location will be enhanced. The proposed tower location meets all requirements of the code except the 150' setback to residential. The Residential Test ratio for this location is 61% NON-Residential, 39% Residential. Branch asks that the request for a waiver be granted, so that the wireless infrastructure in Houston may be improved.

STAFF COMMENTS:**Approval Criteria****Staff Findings**

Tower is not prohibited by deed restrictions	The proposed tower will not violate deed restrictions.
Tower is not located in a residential area Residential test area is a 375' radius measured from the base of the tower. More than 50% of the tracts or parcels are used or restricted for residential purposes	Tower is not located in a residential area 39.31% of the properties within the residential test area are single family.
Tower is not within a scenic area, in a park or on a tract of land surrounded by a park	The tower is not within a scenic area, park or in a tract of land surrounded by a park as defined by the ordinance.
Tower must setback 1-1/2 times the height of the tower from a residential lot (150')	Nearest residential lot is less than 150' away. The nearest residential structure is approximately 35' from the proposed tower.
Must not be within 1,000' of an approved tower structure	There is no approved tower structure within 1000'

CRITERIA FOR CONSIDERATION OF A TOWER APPLICATION WAIVER REQUEST:

Per 28-532 (d) (formerly 41-59): The commission is authorized to consider and grant a waiver from the provisions of this article, following a public hearing, when the commission finds that each of these conditions exist:

- 1.) That a literal application of this article will result in undue and unnecessary hardship to the applicant, taking into account any federal or state licenses the applicant may have received to conduct its business;
- 2.) The waiver, if granted, will not be contrary to the public interest as implemented in this article;
- 3.) Consistent with the city's police power authority over towers, the waiver, if granted, will not be detrimental to the public health, safety or welfare;
- 4.) The waiver, if granted, will not result in a violation of any other applicable ordinance, regulation or statute enforceable by the city; and
- 5.) The waiver, if granted, will not result in the violation of any applicable deed restriction or zoning regulation or the location of the tower in a park.

TOWER WAIVER REQUEST: 3206 2/3 Webster Street
Statement of the Applicant
Tower Ordinance Sec 41-59 (d)

- 1. a literal application of this article will result in undue and unnecessary hardship to the applicant, taking into account any federal or state licenses the applicant may have received to conduct its business because...;**

This location was selected as the preferred location with the least residential impact. Branch attempted to locate the tower on a lot that would afford the fewest variances required while minimizing views of the tower from the residences while balancing the need for service in this area.

The following would be considered a hardship if this application is not granted:

- Coverage Parity – without the specific location that has been selected, customer experience and call/data quality will continue to degrade. In addition, the surround sites will continue to have capacity issues that will only increase drop calls and latency in data consumption by the wireless customers
- Residential Test Ratio – any other parcel within the immediate area would require an additional variance for this proposal. This is the only parcel in the area that is less than fifty percent residential ratio. If we move to an alternative location, it will require two variances (test ratio and distance to residential).
- Multiple sites – with the proposal of a 100' structure, this would afford the coverage objective to be met with a single tower solution. If denied, the carriers would look to split the solution into a two-tower solution at a slightly lower height.
-

- 2. the waiver, if granted, will not be contrary to the public interest as implemented in this article because...;**

The proposed site offers multiple benefits from a providing increased coverage capacity and enhanced high speed cellular signal to residents and businesses alike. The location of this tower will provide enhanced E911 coverage for users of the system. Moreover, the proposal furthers the City's policy of collocation by being designed to accommodate up to three additional carriers' antennas.

- 3. consistent with the city's police power authority over towers, the waiver, if granted, will not be detrimental to the public health, safety, or welfare because...;**

The Branch anchor tenant for the proposed location is expanding their infrastructure to accommodate system traffic which has been produced by LTE Technology. The technology is similar to the older cellular services introduced more than 20 years ago, but with additional enhanced features. An extension of the land-line telephone system, LTE & GSM technology utilizes radio waves in place of wires to transmit and receive calls. It is similar to radio and TV broadcasts, but the signals utilized by wireless telephones are much weaker, as they utilize two-way communication (handset to base station and vice versa) and provide signal to a smaller service area. The proposed anchor tenant and any other incoming carrier will operate within their FCC issued and /or granted licenses. Their antenna will operate well within the Federally mandated requirements with an ERP range of 100-1000 watts maximum which are similar power levels for a remote-control car, heating blanket, or hair dryer. The proposed communications facility will not interfere with either television or radio reception, as all carriers are licensed by the FCC to operate in a very specific frequency at a different location on the spectrum.

4. the waiver, if granted, will not result in a violation of any other applicable ordinance, regulation or statute enforceable by the city because...; and

The proposed facility will be privacy fenced and locked. The proposed facility will have a landscape design. The facility will emit no noise, glare or odor, and will have no signage other than those required by the FCC for identification. The facility will comply with the strict guidelines of the FCC and FAA, which are designed to protect public safety. To ensure structural integrity of the tower, Branch Communications will construct and maintain it in compliance with all federal, state, and local building codes and standards, and it will be engineered to local wind speed requirements.

5. the waiver, if granted, will not result in the violation of any applicable deed restriction or zoning regulation or the location of a tower in a park because....

There are no known applicable Deed Restrictions governing the location of this proposed tower. The proposed facility is not near any parks and does not violate any zoning regulations.

Conclusion

At the request of the anchor tenant, Branch as the proposed tower owner/operator has designed a monopole structure that will accommodate potential needs for the proposed anchor tenant and future tenants as well. The structure will meet all federal, state, and local building codes and standards, and it will be engineered to local wind speed requirements. The new cell site location will help us provide coverage to our customers. Daily business commuters and residents will find improved network coverage as coverage surrounding the area location will be enhanced. The proposed tower location meets all requirements of the code except the 150' setback to residential. The Residential Test ratio for this location is 61% NON-Residential, 39% Residential. Branch asks that the request for a waiver be granted, so that the wireless infrastructure in Houston may be improved.

Opposition letter

Petition to Oppose Tower Application # 19-T-0741

3206 2/3 Webster Street

Houston, TX 77004

The Planning and Development Department of the City of Houston has received an application to construct a tower on a tract of land being approximately 0.358 acres, out of the north 1/4 of lot 6 and 7, in block 2, of Coli Harris County, Texas.

Name	Signature	Address
Lot's Coal	<i>[Signature]</i>	3135 Trulley 77004
Carmine Coal	<i>[Signature]</i>	3135 Trulley St 77004
Maria Carrasco	<i>[Signature]</i>	3126 Webster St. 77004
Marisol Hernandez	<i>[Signature]</i>	3122 Webster St 77004
Marces Hernandez	<i>[Signature]</i>	3122 Webster St 77004
Esteban Guzman	<i>[Signature]</i>	3122 Webster St 77004
Della Buford	<i>[Signature]</i>	3205 Webster St 77004
Willie Buford	<i>[Signature]</i>	3205 Webster St 77004
Lizeth Martinez	<i>[Signature]</i>	3205 Tienmaster St 77004
Christophe Mendez	<i>[Signature]</i>	3205 Tienmaster St 77004
Harold Sanchez	<i>[Signature]</i>	3205 Tienmaster St 77004
Marina Kano	<i>[Signature]</i>	2204 Tienmaster St
Rosemarie Morales	<i>[Signature]</i>	2206 Tienmaster
Supak Rany	<i>[Signature]</i>	2223 Webster 77004
Amrit L. Randle	<i>[Signature]</i>	323 Webster St.
Yusefa Randle	<i>[Signature]</i>	3201 Webster St.
Motervand Mendez	<i>[Signature]</i>	3117 Webster St.
Sonny Allen	<i>[Signature]</i>	3117 Webster St.
Tomas Allen	<i>[Signature]</i>	3117 Webster St.
Yusefa Randle	<i>[Signature]</i>	3117 Webster St.
Adriana Soto	<i>[Signature]</i>	3117 Webster St.
Donna Mae	<i>[Signature]</i>	3117 Webster St.
Teng Teng	<i>[Signature]</i>	3117 Webster St.

[illegible]

Houston Tower Commission ITEM:II - A

Planning and Development Department

Meeting Date:4/27/2020



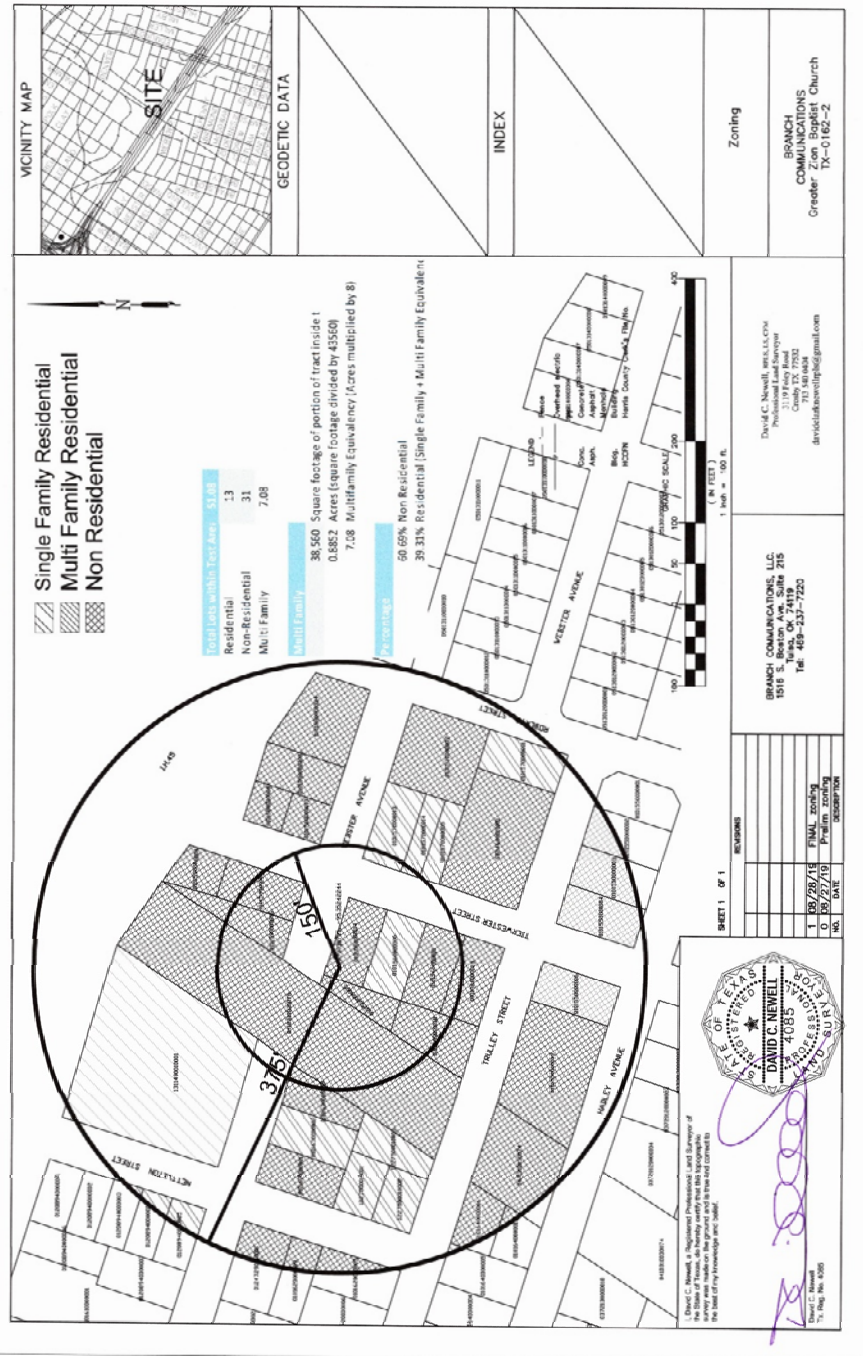
Exhibit 1

Area Map

Houston Tower Commission ITEM:II - A

Planning and Development Department

Meeting Date:4/27/2020



Exhibit

Residential Test Map

Calculations including
multifamily 1/8 ratio

48 total parcels

29 =non residential

19 =residential

39.58 = residential %

60.42 = non residential

Total Lots within Test Area	51.08
Residential	13
Non-Residential	31
Multi Family	7.08

Multi Family	
38,560	Square footage of portion of tract inside test a
0.8852	Acres (square footage divided by 43560)
7.08	Multifamily Equivalency (Acres multiplied by 8)

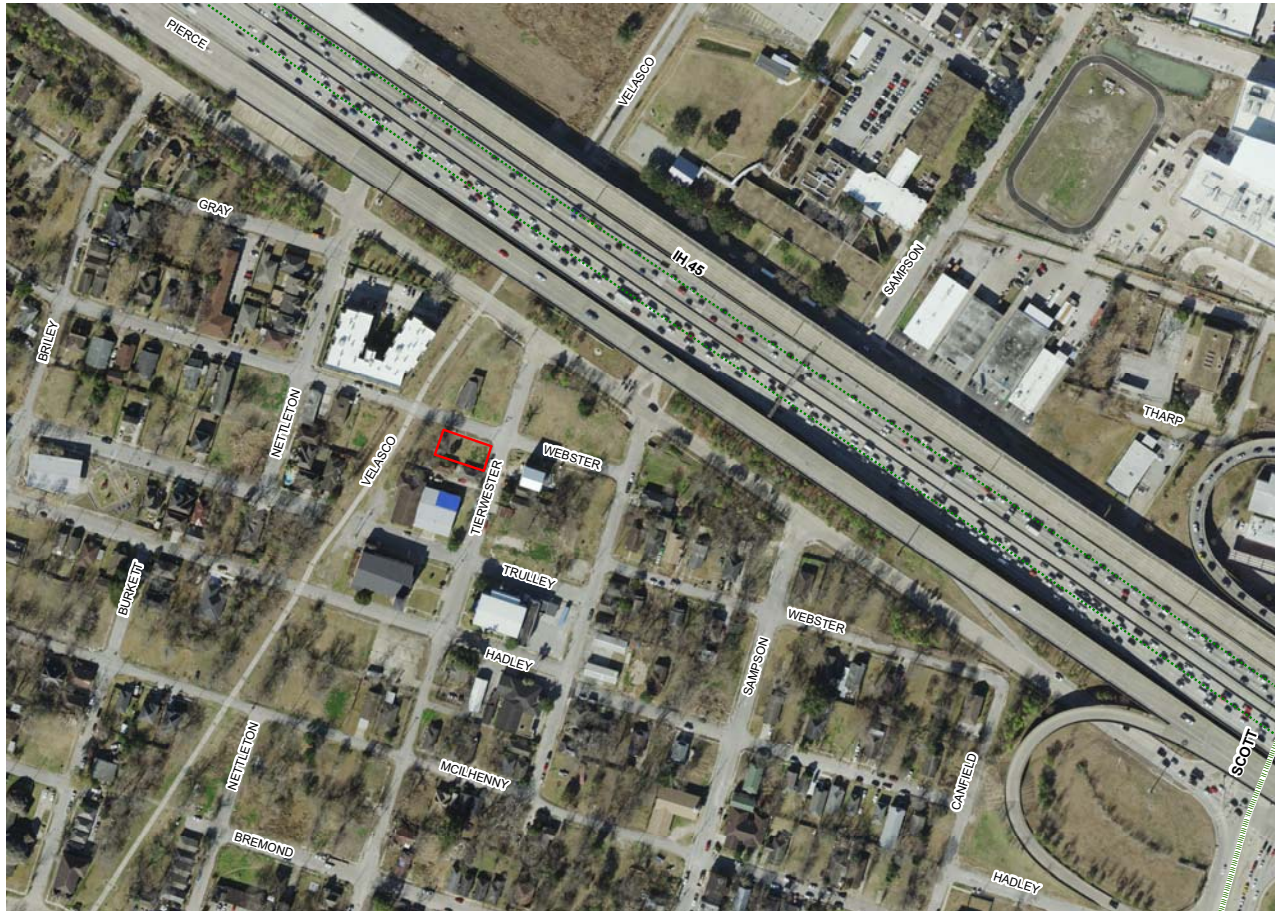
Percentage	
60.69%	Non Residential
39.31%	Residential (Single Family + Multi Family Equivalency)

Houston Tower Commission

ITEM:II - A

Planning and Development Department

Meeting Date:4/27/2020



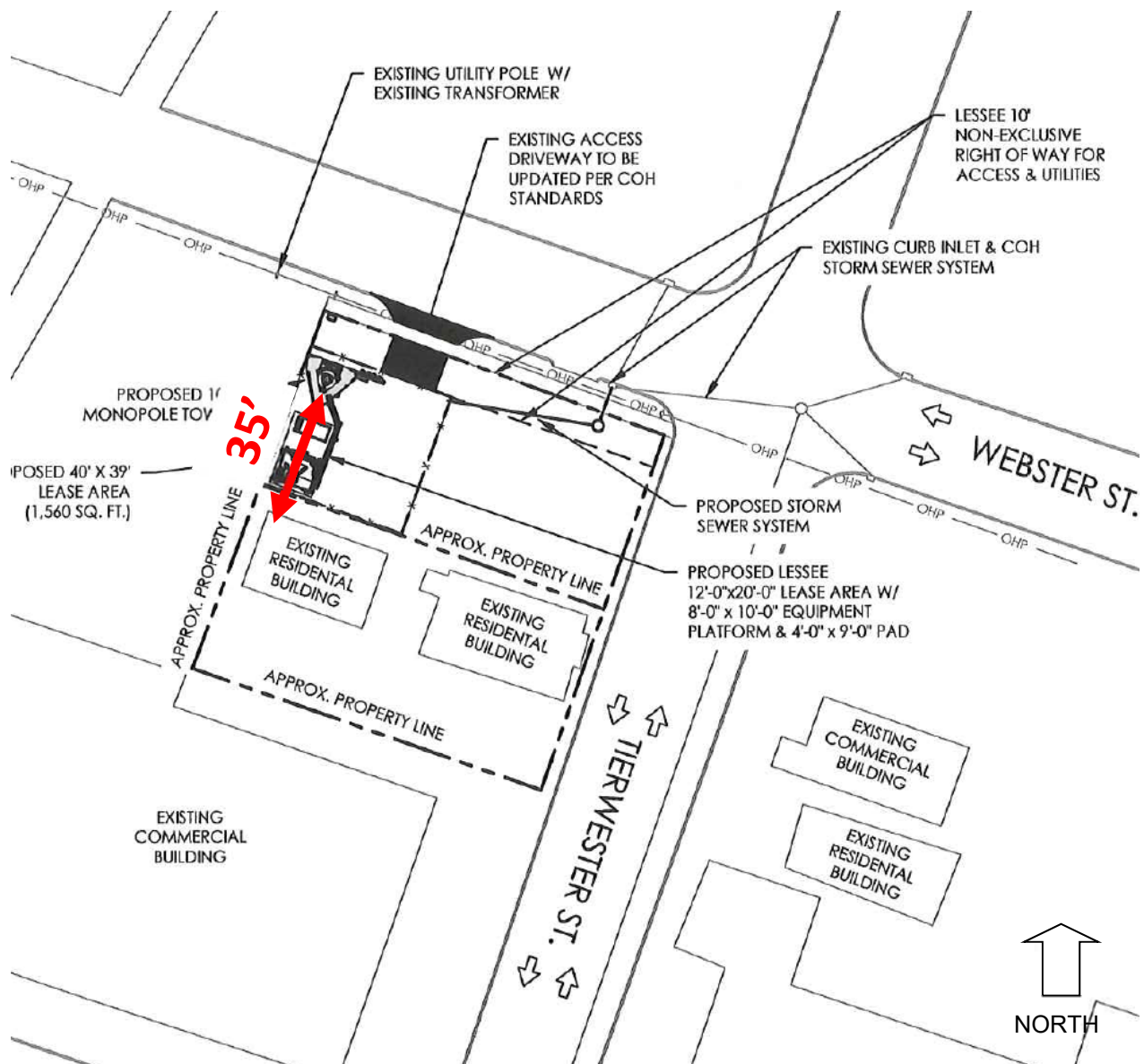
Exhibit

Aerial Map

Houston Tower Commission ITEM:II - A

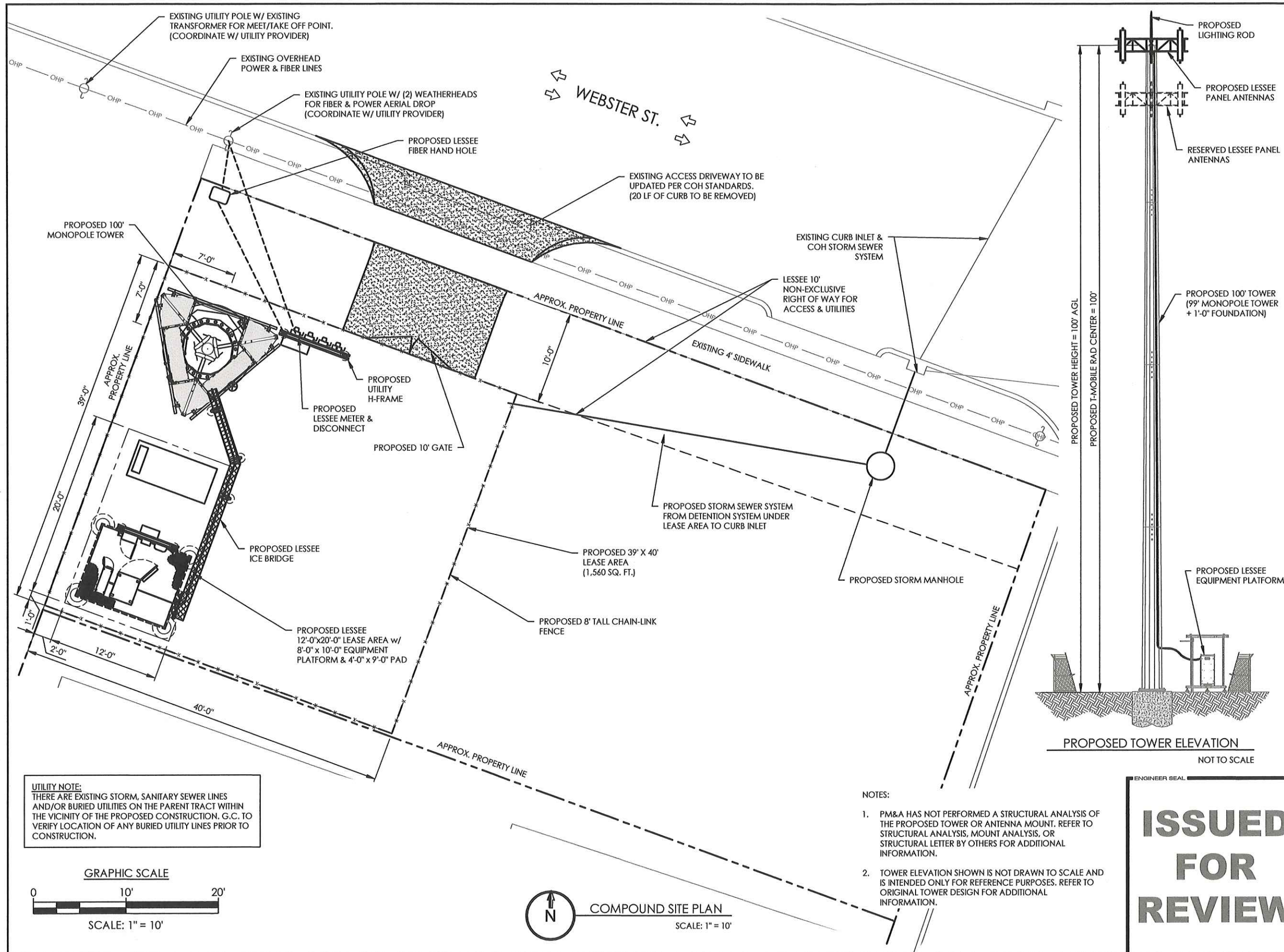
Planning and Development Department

Meeting Date:4/27/2020



Exhibit

Site Map



PREPARED FOR

Branch
A SOLUTIONS PROVIDER

PREPARED BY

PM&A
P. MARSHALL & ASSOCIATES

DESIGN REVISIONS

LE	09/16/19	LEASE EXHIBIT	SBE
NO.	DATE	REVISIONS	BY
NOT VALID WITHOUT SIGNATURE AND DATE			

PREPARED FOR

T-Mobile
4126 SOUTHWEST FWY.
SUITE 1400
HOUSTON, TX 77027

MARKET

HOUSTON

BRANCH SITE NUMBER

TX-0162

BRANCH SITE NAME

ZION BAPTIST CHURCH

SITE ADDRESS

3210 WEBSTER ST.
HOUSTON, TX 77004

SITE COORDINATES

LAT: 29.737164°
LONG: -95.352403°

SITE TYPE

MONOPOLE

PREPARED BY

P. MARSHALL

DESIGNED BY

B. WILSON

PROJECT NO.

18TN19-037

DATE

9/4/19

SHEET NAME

COMPOUND SITE PLAN

SHEET NUMBER

LE-2

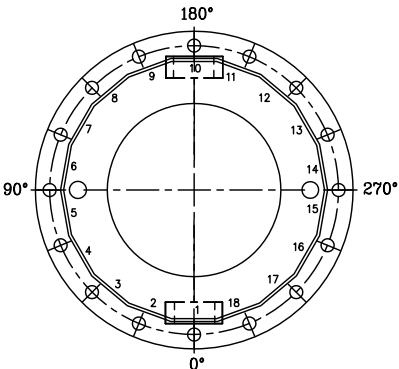
ISSUED
FOR
REVIEW

NOTICE: ALL PARTS ARE TO BE INVENTORIED AND ANY SHORTAGES REPORTED WITHIN 48 HOURS OF DELIVERY. SHORTAGES REPORTED AFTER THIS TIME PERIOD WILL BE CHARGED TO THE CONTRACTOR.

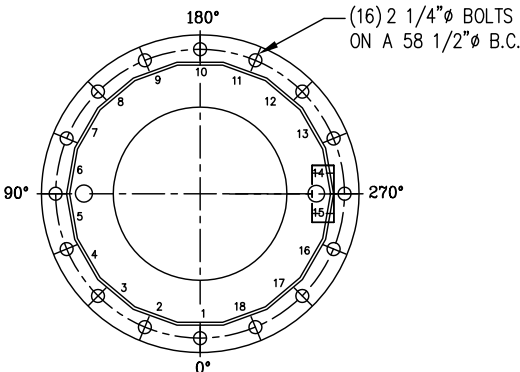
CALL 800/369-6690 ASK FOR THE CONTRACTS DEPARTMENT

DRAWING LIST

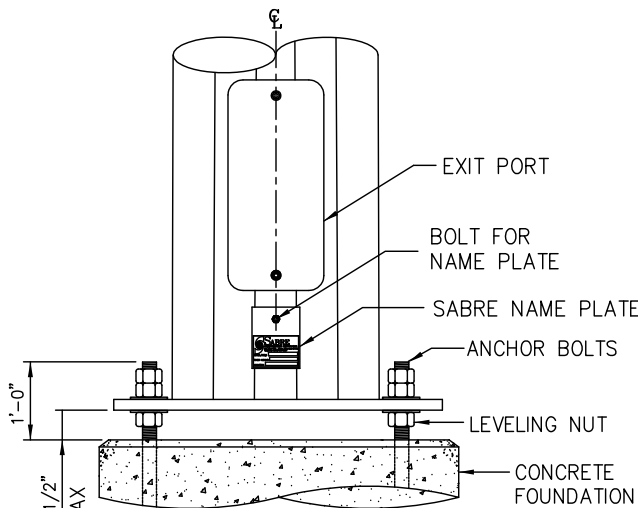
MONOPOLE ERECTION	436189-MM
MONOPOLE FOUNDATION(S)	436189-F1
MONOPOLE FABRICATION	436189-01
BILL OF MATERIALS	BOM-1



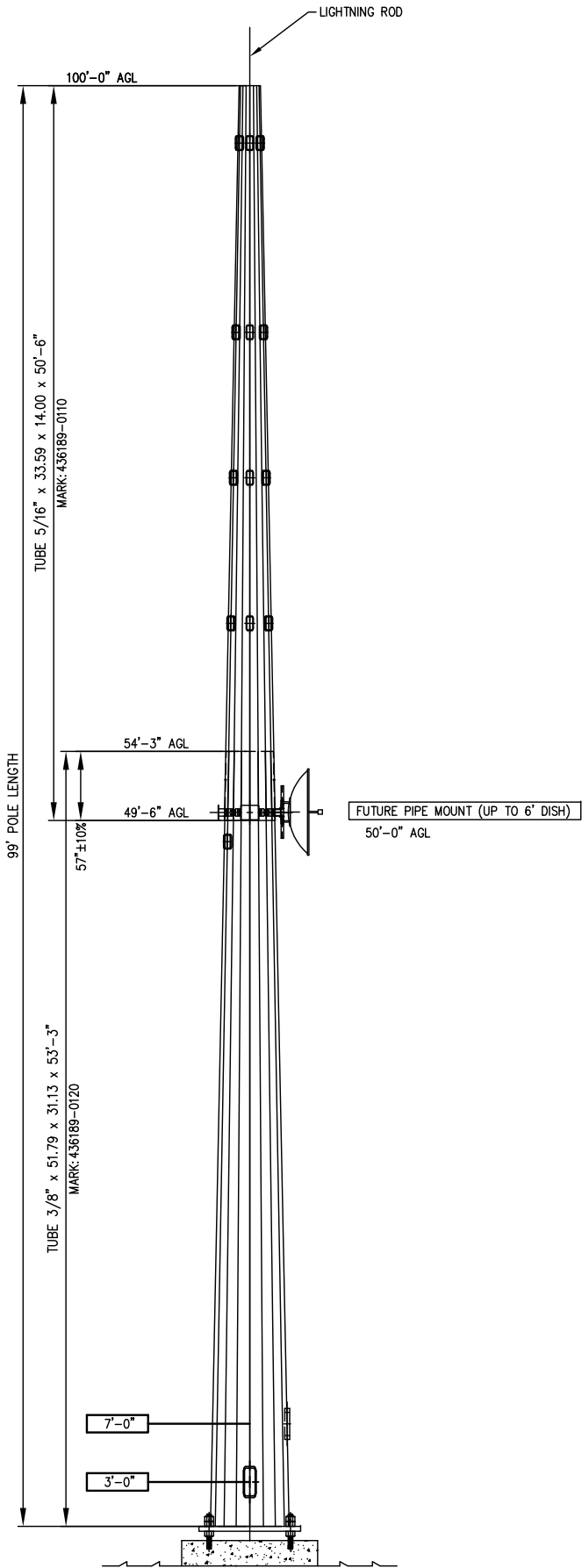
ACCESS PORT @ 3'-0"
ORIENT POLE IN THE FIELD TO SUIT



ACCESS PORT @ 7'-0"
ORIENT POLE IN THE FIELD TO SUIT



BASE INSTALLATION




POLE ELEVATION


ANCHOR ROD INSTALLATION DETAIL

ALL ANCHOR ROD NUTS (TOP & LEVELING NUTS) SHALL BE TIGHTENED TO A SNUG TIGHT CONDITION. TOP NUTS SHALL BE ROTATED, WITH THE LEVELING NUT SECURED AN ADDITIONAL 1/3 TURN FOR ANCHOR RODS 1.5 INCHES OR LESS IN DIAMETER & AN ADDITIONAL 1/6 TURN FOR ANCHOR ROD DIAMETERS GREATER THAN 1.5 INCHES.

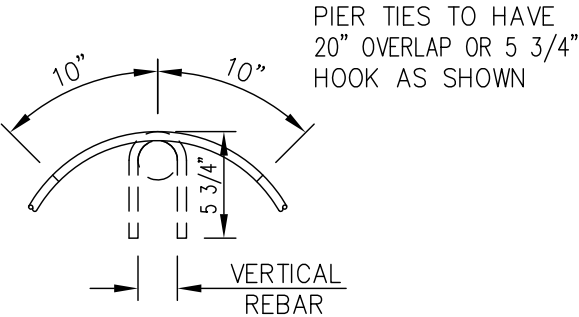
BOLT INSTALLATION DETAILS

- INSTALLATION OF BOLTS: BOLTS FOR TOWERS AND ANTENNAS SHALL BE INSTALLED WITH THE NUTS FACING TO THE OUTSIDE AND/OR TO THE TOP OF THE TOWER, UNLESS PROHIBITED BY LACK OF CLEARANCE.
- TIGHTENING OF BOLTS: ALL HIGH STRENGTH BOLTS SHALL BE TIGHTENED TO A SNUG-TIGHT CONDITION, AS DEFINED BY AISC.
- NUT LOCKING DEVICE: ALL NUTS SHALL BE EQUIPPED WITH SOME TYPE OF NUT LOCKING DEVICE. SEE THE INDIVIDUAL DRAWINGS FOR THE TYPE OF NUT LOCKING DEVICE TO BE USED FOR EACH INDIVIDUAL APPLICATION.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS INCLUDE FINISHES AND ARE IN INCHES				MATERIAL:			BRANCH COMMUNICATIONS JR RICHARD, TX #TX-0158 100.00 MONOPOLE						
TOLERANCES: FRACTIONS ± 1/16" ANGLES ± 1/2 DEG. DECIMALS ± .010"				TOLERANCES DO NOT APPLY TO RAW MATERIAL									
						<p>CONFIDENTIAL</p> <p>This Document and the information contained herein is the confidential trade secret property of Sabre Communication Corporation ("Sabre") and must not be reproduced, copied or used, in whole or in part, for any purpose without the prior written consent of Sabre. ©2019 Sabre Communications Corporation. All rights reserved.</p>	JOB 436189		SIZE B	DRAWING NO. 436189-MM		REV 0	
							DATE 7/2/19						
							DRAWN BY JKW						
							CHECKED BY WJ						
Rev	DATE	DRW	CHK	DESCRIPTION									

REINFORCING STEEL SCHEDULE							
LOCATION	NO REQ'D.	BAR SPC'G.	SIZE	CUT LGTH.	TOTAL LGTH.	TOTAL WT.	SHAPE
PIER VERTICAL REINFORCING	28	NOTED ON DWG.	#10	29'-0"	812'-0"	3494 LBS.	STRAIGHT
PIER TIES	46	NOTED ON DWG.	#5	22'-0"	1012'-0"	1056 LBS.	
TOTAL REBAR WT.						4550 LBS.	

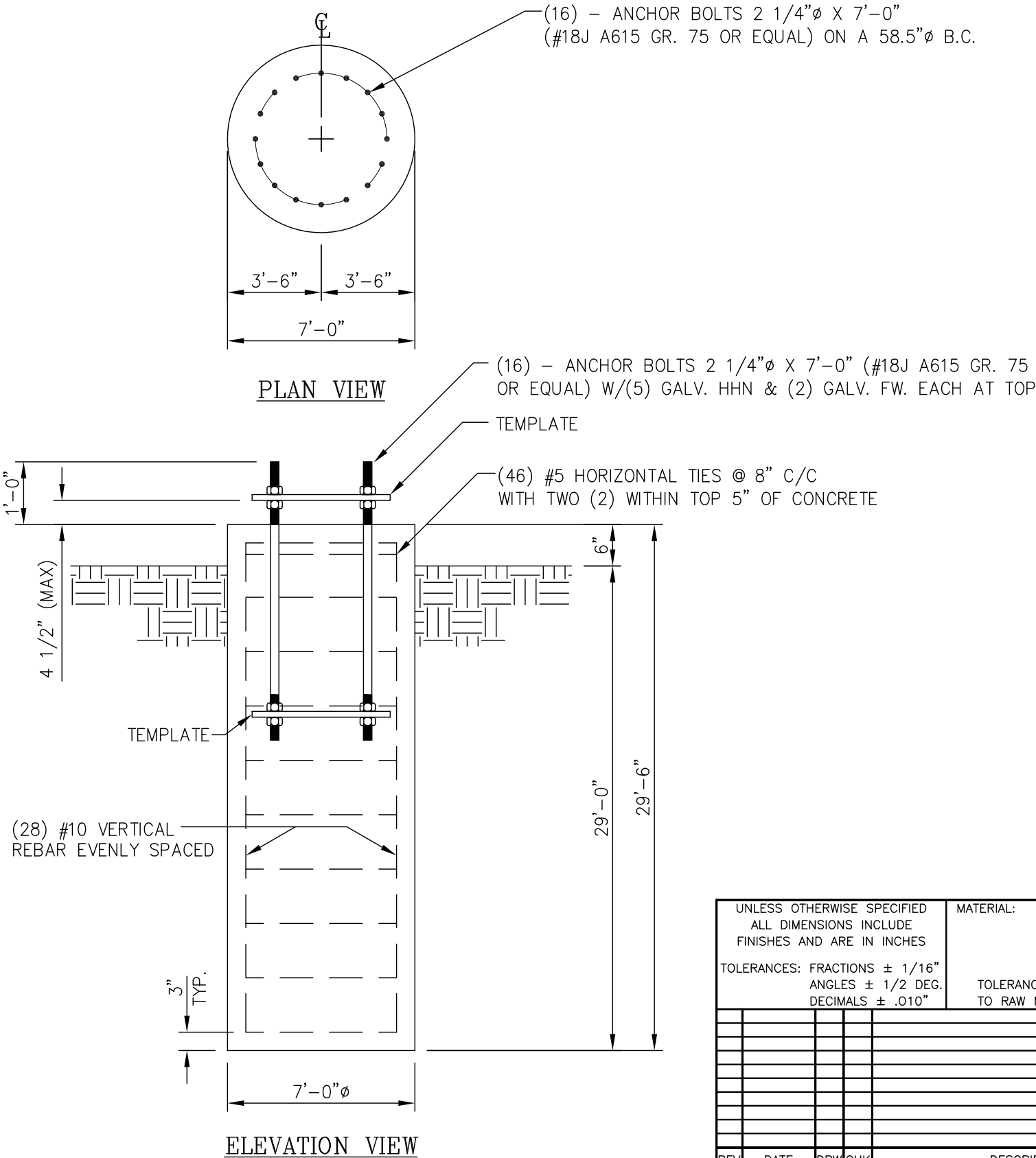
TOP & BOTTOM TEMPLATES
PART NO.: 436189-9001




PIER TIE HOOK DETAIL

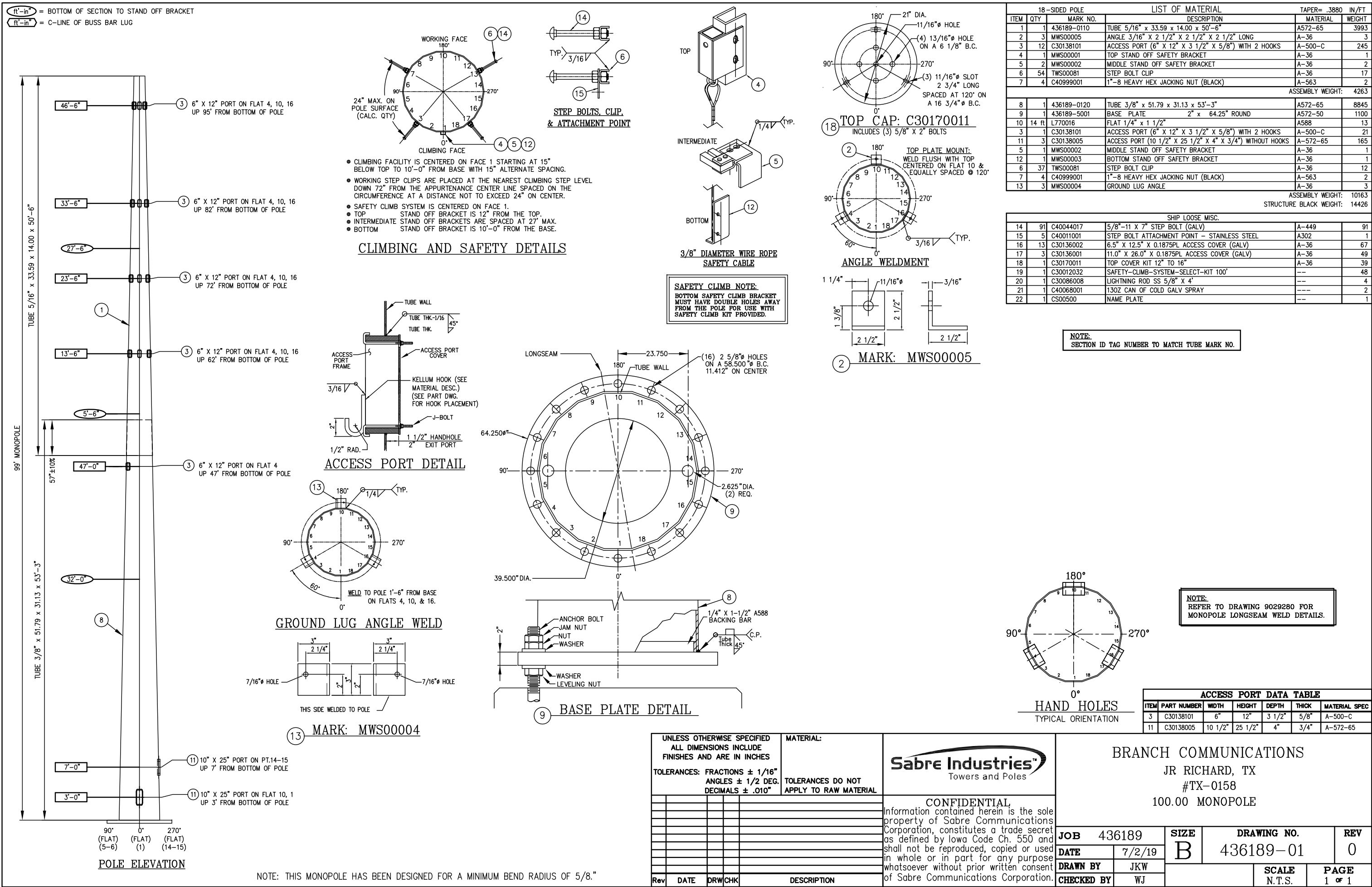
GENERAL NOTES:

1. ALL ANCHOR BOLTS AND VERTICAL REINFORCING BARS ARE TO BE SECURELY TIED BEFORE CONCRETE IS PLACED SO THEY WILL REMAIN PARALLEL TO THE CENTERLINE OF THE PIER.
2. THE GROUND ELEVATION SHALL BE A MAXIMUM OF 6" BELOW THE TOP OF THE PIER.
3. ALL EXPOSED CONCRETE CORNERS ARE TO BE CHAMFERED 3/4 INCH.
4. ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60 DEFORMED BARS.
5. CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4500 PSI, IN ACCORDANCE WITH ACI 318-11.
6. REINFORCING STEEL TO HAVE A 3" MINIMUM CONCRETE COVER.
7. FOUNDATION DESIGN IS BASED ON THE GEOTECHNICAL REPORT BY GEOTEL ENGINEERING, INC., PROJECT NO. E19-170, DATED 5/19/19.
8. ANCHOR BOLTS 2 1/4"Ø X 7'-0" (#18J A615 GR. 75 OR EQUAL) ON A 58.5"Ø BOLT CIRCLE (16 REQ'D).
9. CONCRETE REQUIRED 42.05 CUBIC YARDS.
10. SEE THE GEOTECHNICAL REPORT FOR DRILLED PIER INSTALLATION REQUIREMENTS, IF SPECIFIED.
11. THE FOUNDATION IS BASED ON THE FOLLOWING FACTORED LOADS:
MOMENT (KIP-FT) = 4294.36
AXIAL (KIPS) = 39.83
SHEAR (KIPS) = 56.16
12. DISTANCE BETWEEN CENTER OF ANCHOR BOLT CAGE & THE CENTER OF PIER NOT TO EXCEED 1/2" WITHOUT APPROVAL FROM ENGINEER OF RECORD.



UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS INCLUDE FINISHES AND ARE IN INCHES				MATERIAL:			BRANCH COMMUNICATIONS JR RICHARD, TX 100.00 MONOPOLE					
TOLERANCES: FRACTIONS ± 1/16" ANGLES ± 1/2 DEG. DECIMALS ± .010"				TOLERANCES DO NOT APPLY TO RAW MATERIAL								
						<div>CONFIDENTIAL</div> <div>This document and the information contained herein is the confidential trade secret property of Sabre Communications Corporation ("Sabre") and must not be reproduced, copied or used, in whole or in part, for any purpose without the prior written consent of Sabre.</div> <div>© 2019 Sabre Communications Corporation. All rights reserved.</div>	JOB NO. 436189		SIZE B	DRAWING NO. 436189-F1		REV 0
							DATE 7/2/19					
							DRAWN BY JKW		SCALE None			PAGE 1 OF 1
							CHECKED BY WJ					
REV	DATE	DRW	CHK	DESCRIPTION								

ft'-in" = BOTTOM OF SECTION TO STAND OFF BRACKET
ft'-in" = C-LINE OF BUSS BAR LUG



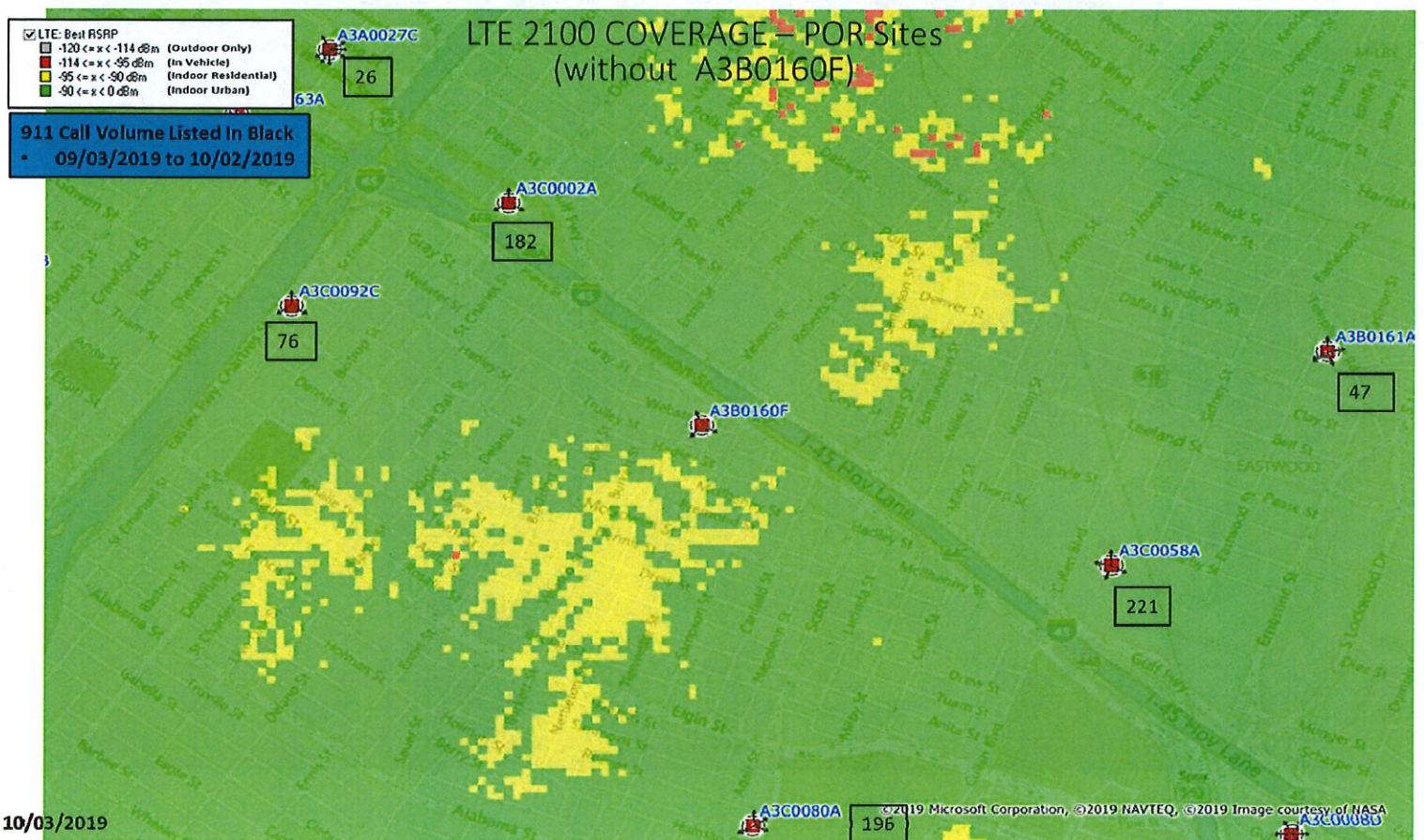
NOTE: THIS MONOPOLE HAS BEEN DESIGNED FOR A MINIMUM BEND RADIUS OF 5/8."

PC=PIECE	OR=ORANGE
PLT=PALLET	WH=WHITE
BDL=BUNDLE	O/W=OR & WH
CRT=CRATE	N/R=NOT REQ'D
D=DRUM	SP=SPECIAL
BX=BOX	

PACKING

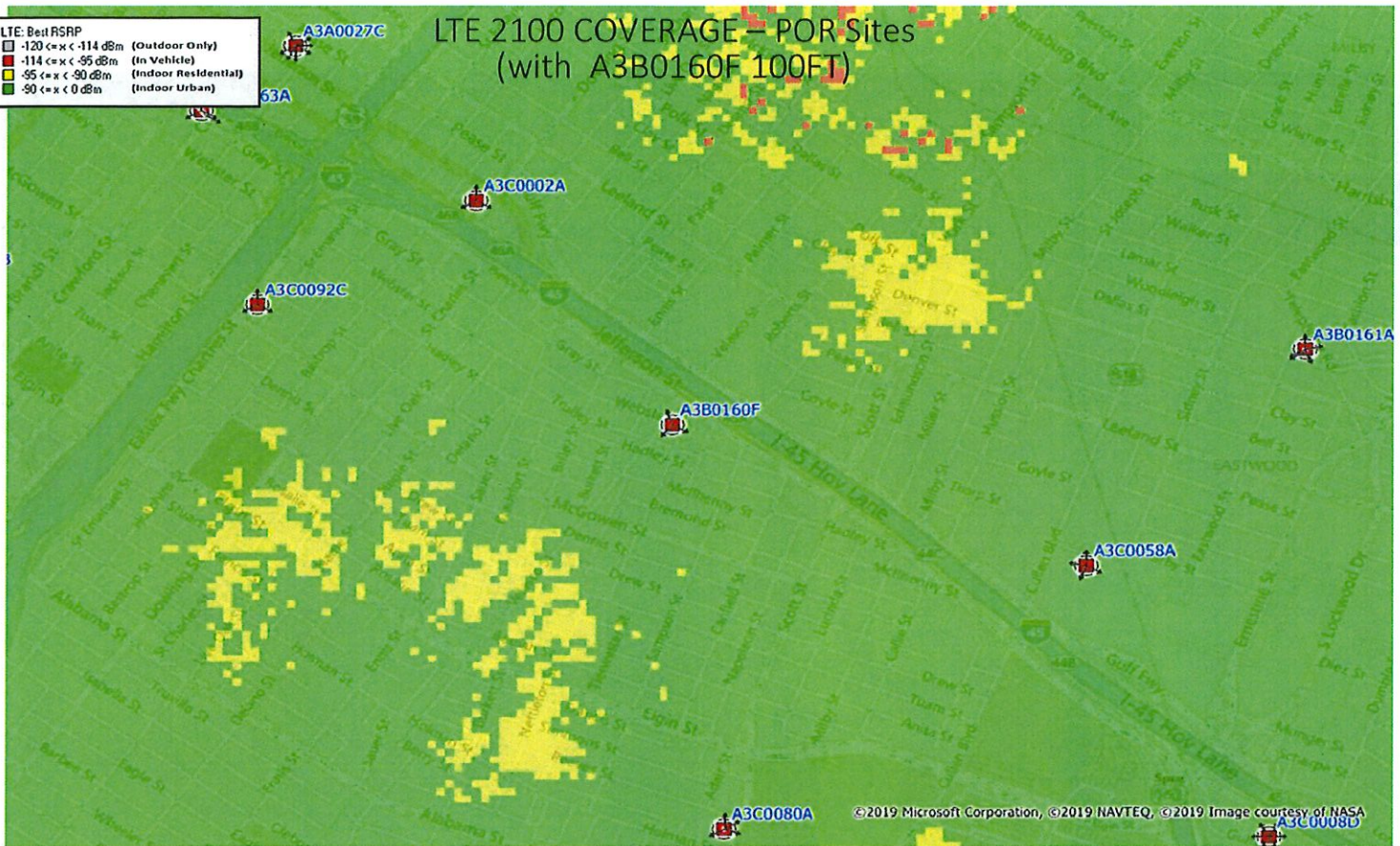
ITEM NO.	NO. REQ'D.	DRAWING		PART NO.	DESCRIPTION	TOTAL WEIGHT LBS.	PAINT	KIT	QTY OF PKG'S	PKG. NO.
		NUMBER	REV							
1					ANCHOR BOLTS AND TEMPLATES					
2	2			436189-9001	ANCHOR BOLT TEMPLATES (W\ 58.5" BOLT CIRCLE)	181				
3	16			C40041007	2-1/4" X 7'-0" (ASTM A615 GRADE 75) OR EQUAL	1938				
4					SECTIONS					
5	1			MR4361890110	50'-6" TOP SECTION	4515	G			
6	1			MR4361890120	53'-3" BOTTOM SECTION W\ BASE	10760	G			
7					SAFETY CLIMB					
8	1			C30012032	SAFETY-CLIMB-SYSTEM-SELECT-KIT 100'	49				
9					CLIMBING SYSTEM					
10	91			C40044017	STEP BOLT 5/8" X 7"	91				
11	5			C40011001	STEP BOLT ATTACHMENT POINT - STAINLESS STEEL	2				
12					GROUNDING					
13	1			C30086008	LIGHTNING ROD SS 5/8" X 4'	5				
14					MISCELLANEOUS					
15	3			C30136001	11" X 26" X 0.1875PL ACCESS COVER (GALV)	49				
16	13			C30136002	6.5" X 12.5" X 0.1875PL ACCESS COVER (GALV)	66				
17	1			C30170011	MONOPOLE TOP COVER KIT 12" TO 16"	39				
18	1			C40068001	13OZ CAN OF COLD GALV SPRAY	1				
19	1			CS00500	NAME PLATE	1				
20										
						DATE	7/2/19	JOB NO.	436189	
						DRAWN BY	JKW	PRINT NO.	BOM-1	
REV	DATE	DRW	CHK	DESCRIPTION		CHECKED BY	WJ	PAGE	1 OF 1	

E911 Call Volume



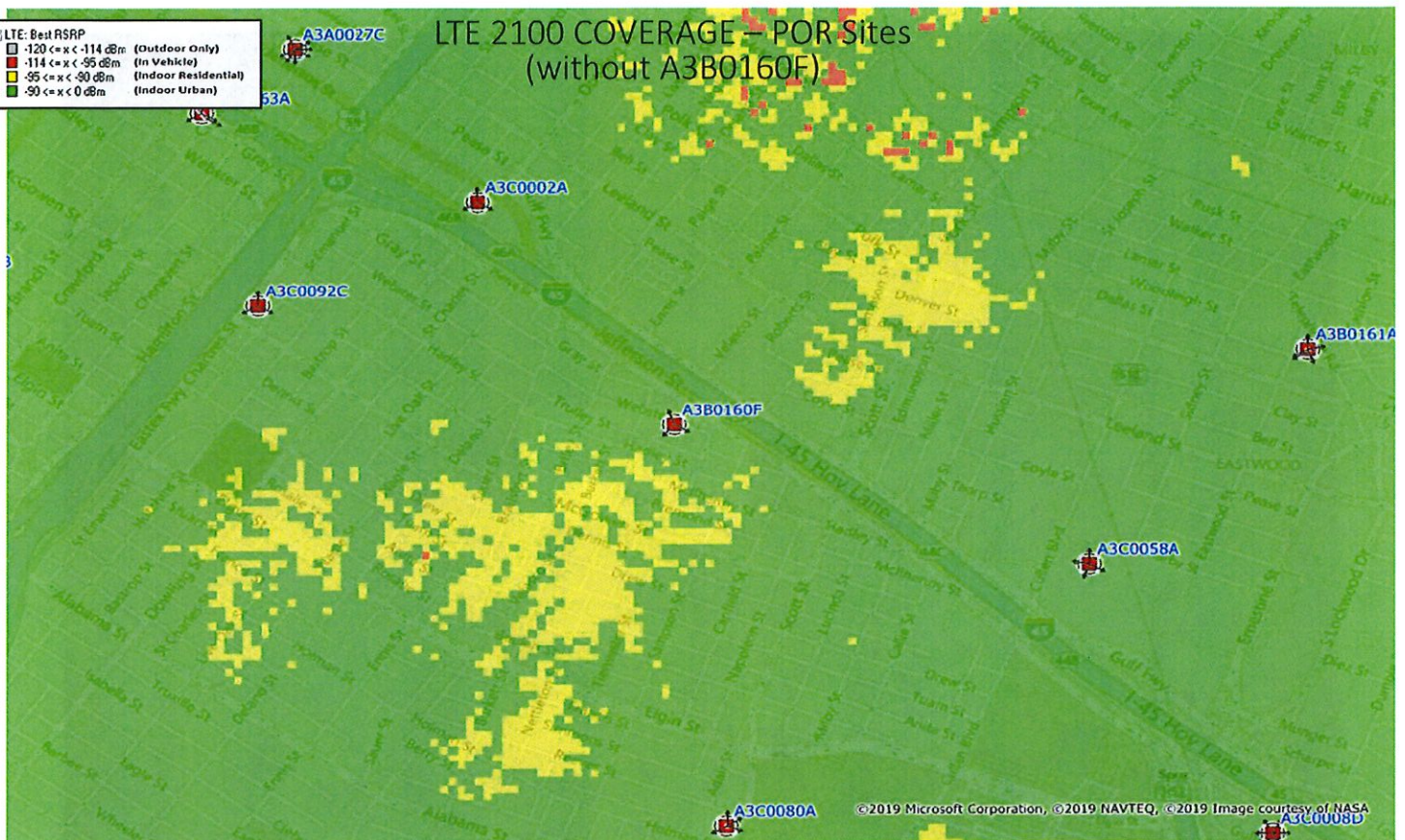
LTE 2100 COVERAGE – POR Sites (with A3B0160F 100FT)

- ☒ LTE: Best RSRP
- | | |
|----------------------|----------------------|
| -120 <= x < -114 dBm | (Outdoor Only) |
| -114 <= x < -95 dBm | (In Vehicle) |
| -95 <= x < -90 dBm | (Indoor Residential) |
| -90 <= x < 0 dBm | (Indoor Urban) |



LTE 2100 COVERAGE – POR Sites (without A3B0160F)

- ✓ LTE: Best RSRP
- 120 ≤ x < -114 dBm (Outdoor Only)
- 114 ≤ x < -95 dBm (In Vehicle)
- 95 ≤ x < -90 dBm (Indoor Residential)
- 90 ≤ x < 0 dBm (Indoor Urban)



City of Houston requirements



BUILDING CODE DESIGN CRITERIA

CONSTRUCTION CODES

Commercial

2012 International Building Code
2012 International Fire Code
2012 Uniform Mechanical Code
2012 Uniform Plumbing Code
2017 National Electrical Code (State Mandated)
2015 International Energy Conservation Code, or
ASHRAE 90.1-2013

Residential

2012 International Residential Code
2015 International Energy Conservation Code

Note: All construction codes on this list have been amended by the City of Houston. To access the amendments, visit:
<http://www.houstonpermittingcenter.org/code-enforcement/publications.html>

STRUCTURAL REQUIREMENTS

Basic Wind Speed:

- IRC** - 110 mph (3-second gust)
- IBC** - Risk Category I: V_{ult} 130 mph
Risk Category II: V_{ult} 139 mph
Risk Category III & IV: V_{ult} 150 mph

Seismic Design Category: A

Weathering Probability: Negligible (IRC)

Roof Design Load:

- IRC** - Varies (Refer to Table R301.6)
- IBC** - Varies (Refer to Table 1607.1 and Section 1607.12.2)

Soil Class: Expansive*

Wind Exposure Category: B*

Ground Snow Load: 0

Frost Line Depth: 6 inches

Maximum rainfall rate: 8 inches/hour

* These are general requirements for Houston and certain conditions may vary depending on the location.

PLAN REVIEW REQUIREMENTS

- 2 sets of plans
- Applicable Energy Software Report, or prescriptive compliance shown on the plans
- TDLR numbers for accessibility: <http://www.license.state.tx.us/ab/ab.htm#techinfo>
- Asbestos Survey for existing building(s) – (TDH Toxic Substances Control Division • (800) 572-5548)

Note: This information is general in nature; for minimum submittal requirements, you may obtain a copy of the prerequisite checklist online or at the CACD office. For specific questions, consult with a Senior Plan Analyst at (832) 394-8810 or Senior Inspector (832) 394-8840.

WEBSITE INFORMATION

Check plan review status and schedule inspections - www.houstonpermittingcenter.org/city-of-houston-permits/online-permits.html

Building Code Enforcement Home Page - www.houstonpermittingcenter.org/building-code-enforcement.html

Public Works and Engineering website - www.publicworks.houstontx.gov

Planning and Development website - www.houstontx.gov/planning

Fire Department website - www.houstontx.gov/fire/

City Website - www.houstontx.gov

For questions please contact the Plan Review Section at 832-394-8810 or email at rmcacd@houstontx.gov.

ENERGY REQUIREMENTS

Heating Degree Days: 1371

Climate Zone (Energy): 2-A

PLUMBING REQUIREMENTS

Minimum Plumbing Fixtures: See Table 2902.1 (of the Houston Amended Building Code)

OTHER GENERAL REQUIREMENTS

Designs for Parking lots, Sidewalks and Driveways: See Chapter 31 of the Building Code

The Life Safety Ordinance for existing buildings: Appendix L of the Building Code

Example of insurance policy



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

10/23/2019

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Novak Insurance Agency, Inc. 30775 Bainbridge Road, Ste 100 Solon OH 44139		CONTACT NAME: Kathryn Knesebeck PHONE (A/C, No, Ext): (440) 349-2120 E-MAIL ADDRESS: kathryn@novakinsurance.com FAX (A/C, No): (440) 349-2195	
		INSURER(S) AFFORDING COVERAGE	
		INSURER A: Federal Insurance Co.	
		INSURER B:	
		INSURER C:	
		INSURER D:	
		INSURER E:	
		INSURER F:	

COVERAGES **CERTIFICATE NUMBER:** CL19102318387 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:	Y		35993628	10/23/2019	10/23/2020	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 1,000,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000
A	<input type="checkbox"/> AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY	Y		73600411	10/23/2019	10/23/2020	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
A	<input checked="" type="checkbox"/> UMBRELLA LIAB <input type="checkbox"/> EXCESS LIAB DED <input checked="" type="checkbox"/> RETENTION \$ 0	Y		79898482	10/23/2019	10/23/2020	EACH OCCURRENCE \$ 10,000,000 AGGREGATE \$ 10,000,000
A	<input checked="" type="checkbox"/> WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N	N/A				PER STATUTE <input type="checkbox"/> OTH-ER <input type="checkbox"/> E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$
A	Property incl. Business Income and Builder's Risk			35993628	10/23/2019	10/23/2020	Property/BI Limit \$100,000,000 Builder's Risk \$750,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

RE: TX-0115/EI Eden Park. Certificate Holder is listed as an additional insured but only with respect to work performed by or on behalf of the named insured as required by written contract.

CERTIFICATE HOLDER

The City of Laredo 1120 San Bernardo Ave Laredo TX 78040	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE
--	--

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Engineering fall letter

December 12, 2019

Mr. John Kesner
Branch Communications
7335 South Lewis Ave Suite 300
Tulsa, OK 74136

RE: 100' Monopole for TX-0162 Greater Zion Church at 3206 2/3 Webster Street, Houston, TX

Dear Mr. Kesner,

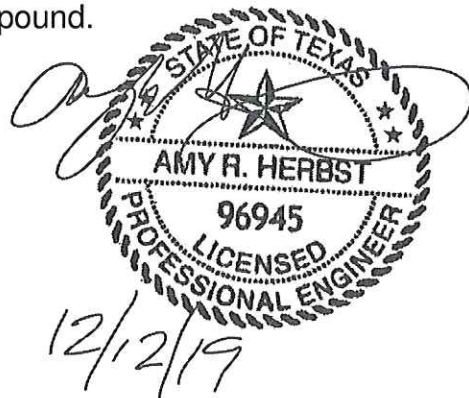
Upon receipt of order, we propose to design and supply the above referenced Sabre monopole for an Ultimate Wind Speed of 139 mph with no ice and 30 mph with 1" ice, Structure Class II, Exposure Category C, and Topographic Category 1, in accordance with the Telecommunications Industry Association Standard ANSI/TIA-222-G, "Structural Standard for Antenna Supporting Structures and Antennas".

When designed according to this standard, the wind pressures and steel strength capacities include several safety factors, resulting in an overall minimum safety factor of 25%. Therefore, it is highly unlikely that the monopole will fail structurally in a wind event where the design wind speed is exceeded within the range of the built-in safety factors.

Should the wind speed increase beyond the capacity of the built-in safety factors, to the point of failure of one or more structural elements, the most likely location of the failure would be within the monopole shaft, above the base plate. Assuming that the wind pressure profile is similar to that used to design the monopole, the monopole will buckle at the location of the highest combined stress ratio within the monopole shaft. This is likely to result in the portion of the monopole above leaning over and remaining in a permanently deformed condition. ***Please note that this letter only applies to the above referenced monopole designed and manufactured by Sabre Towers & Poles.*** This would effectively result in a fall radius within a 35' x 40' compound.

Sincerely,

Amy R. Herbst, P.E.
Senior Design Engineer



Supporting material



Structural Design Report

100' Monopole

Site: JR Richard, TX

Site Number: TX-0158

Address: 1691 2/3 S Highway 6, Houston, TX 77077

Prepared for: BRANCH COMMUNICATIONS

by: Sabre Towers & PolesTM

Job Number: 434718

Revision A

May 29, 2019

Monopole Profile.....	1
Foundation Design Summary.....	2
Pole Calculations.....	3-11
Foundation Calculations.....	12-18



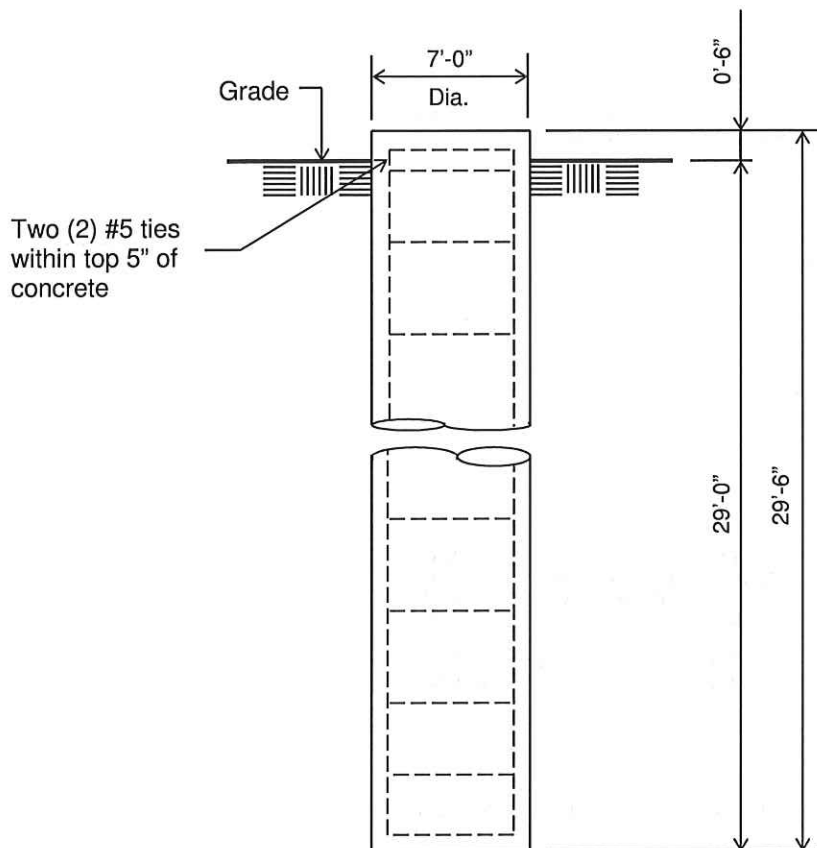
[Signature]
5/29/19

Sabre Communications Corporation
Texas Registration Number F-4365

Customer: BRANCH COMMUNICATIONS

Site: JR Richard, TX TX-0158

100' Monopole



ELEVATION VIEW

(42.05 Cu. Yds.)

(1 REQUIRED; NOT TO SCALE)

Notes:

- 1) Concrete shall have a minimum 28-day compressive strength of 4,500 psi, in accordance with ACI 318-11.
- 2) Rebar to conform to ASTM specification A615 Grade 60.
- 3) All rebar to have a minimum of 3" concrete cover.
- 4) All exposed concrete corners to be chamfered 3/4".
- 5) The foundation design is based on the geotechnical report by Geotel Engineering, Inc., project no. E19-170, dated May 19, 2019.
- 6) See the geotechnical report for drilled pier installation requirements, if specified.
- 7) The foundation is based on the following factored loads:
 Moment = 4,294.36 k-ft
 Axial = 39.83 k
 Shear = 56.16 k

Rebar Schedule for Pier	
Pier	(28) #10 vertical rebar w/ #5 ties, two within top 5" of pier, then 8" C/C

Note that the values of moment capacity in the table above are not factored by a strength reduction factor (ϕ -factor).

In ACI 318, the value of the strength reduction factor depends on whether the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318, Section 9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding bending stiffnesses computed for common resistance factor values used for reinforced concrete sections.

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in ²
1	0.65	77387.	21.593000	50302.	1.6186E+09
2	0.65	78012.	34.519333	50708.	1.6339E+09
1	0.70	77387.	23.254000	54171.	1.6134E+09
2	0.70	78012.	37.174667	54608.	1.6278E+09
1	0.75	77387.	24.915000	58040.	1.5589E+09
2	0.75	78012.	39.830000	58509.	1.5742E+09

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.5000	0.00	N.A.	No	0.00	1639.
2	2.5000	0.1037	No	No	1639.	72917.
3	6.5000	4.0945	Yes	No	74556.	204512.
4	14.5000	8.4754	No	No	279068.	460394.
5	20.5000	16.1310	Yes	No	739462.	938687.
6	32.5000	32.0000	No	No	1678150.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
 Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
 Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
 Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
 Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	74880.	M, in-lb	6.87E+07	53107.	15.9703	-0.07004	-622590.	7.36E+07
2	V, lb	9690.	M, in-lb	8886000.	33220.	0.09890	-5.18E-04	-49988.	9325398.

Maximum pile-head deflection = 15.9703059769 inches

Maximum pile-head rotation = -0.0700379178 radians = -4.012877 deg.

The analysis ended normally.

1	29000.0	490.0	80.0	65.0	0.00001170
2	29000.0	490.0	80.0	65.0	0.00001170

* Only 3 condition(s) shown in full

* Some concentrated wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A

139 mph ultimate wind with no ice. Wind Azimuth: 0°

LOADS ON POLE

LOAD TYPE	ELEV ft	APPLY.. RADIUS ft	LOAD..AT AZI	LOAD AZI	.....FORCES.....		.....MOMENTS.....	
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	99.000	0.00	0.0	0.0	13.3443	4.8366	0.0000	0.0000
C	97.000	0.00	0.0	0.0	0.0000	1.4527	0.0000	0.0000
C	84.000	0.00	0.0	0.0	0.0000	1.2580	0.0000	0.0000
C	84.000	0.00	0.0	0.0	11.0636	4.8366	0.0000	0.0000
C	74.000	0.00	0.0	0.0	0.0000	1.1082	0.0000	0.0000
C	74.000	0.00	0.0	0.0	10.7759	4.8366	0.0000	0.0000
C	64.000	0.00	0.0	0.0	0.0000	0.9585	0.0000	0.0000
C	64.000	0.00	0.0	0.0	10.4561	4.8366	0.0000	0.0000
C	49.000	0.00	0.0	0.0	0.0000	0.0612	0.0000	0.0000
D	99.000	0.00	180.0	0.0	0.0580	0.0678	0.0000	0.0000
D	83.750	0.00	180.0	0.0	0.0580	0.0678	0.0000	0.0000
D	83.750	0.00	180.0	0.0	0.0753	0.0914	0.0000	0.0000
D	68.500	0.00	180.0	0.0	0.0753	0.0914	0.0000	0.0000
D	68.500	0.00	180.0	0.0	0.0904	0.1151	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0904	0.1151	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0989	0.2850	0.0000	0.0000
D	48.500	0.00	180.0	0.0	0.0989	0.2850	0.0000	0.0000
D	48.500	0.00	180.0	0.0	0.1030	0.1701	0.0000	0.0000
D	36.375	0.00	180.0	0.0	0.1030	0.1701	0.0000	0.0000
D	36.375	0.00	180.0	0.0	0.1089	0.1928	0.0000	0.0000
D	24.250	0.00	180.0	0.0	0.1089	0.1928	0.0000	0.0000
D	24.250	0.00	180.0	0.0	0.1098	0.2155	0.0000	0.0000
D	12.125	0.00	180.0	0.0	0.1098	0.2155	0.0000	0.0000
D	12.125	0.00	180.0	0.0	0.1154	0.2381	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.1154	0.2381	0.0000	0.0000

ANTENNA LOADING

.....ANTENNA.....	ELEV	AZI	ATTACHMENT	.....ANTENNA FORCES.....
TYPE	ft		RAD AZI	AXIAL SHEAR GRAVITY TORSION
			ft	kip kip kip ft-kip
STD+R	49.0	0.0	2.1 0.0	1.33 0.00 0.24 0.00

LOADING CONDITION M

139 mph ultimate wind with no ice. Wind Azimuth: 0°

LOADS ON POLE

LOAD TYPE	ELEV ft	APPLY.. RADIUS ft	LOAD..AT AZI	LOAD AZI	.....FORCES.....		.....MOMENTS.....	
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	99.000	0.00	0.0	0.0	13.3443	3.6274	0.0000	0.0000
C	97.000	0.00	0.0	0.0	0.0000	1.0895	0.0000	0.0000
C	84.000	0.00	0.0	0.0	0.0000	0.9435	0.0000	0.0000
C	84.000	0.00	0.0	0.0	11.0636	3.6274	0.0000	0.0000
C	74.000	0.00	0.0	0.0	0.0000	0.8312	0.0000	0.0000
C	74.000	0.00	0.0	0.0	10.7759	3.6274	0.0000	0.0000
C	64.000	0.00	0.0	0.0	0.0000	0.7188	0.0000	0.0000
C	64.000	0.00	0.0	0.0	10.4561	3.6274	0.0000	0.0000
C	49.000	0.00	0.0	0.0	0.0000	0.0459	0.0000	0.0000
D	99.000	0.00	180.0	0.0	0.0580	0.0508	0.0000	0.0000
D	83.750	0.00	180.0	0.0	0.0580	0.0508	0.0000	0.0000

Num.	(p-y Curve Type)	ft	pcf	psf	deg.	krm	pci
1	Soft	0.5000	110.0000	14.4000	--	0.10000	--
	Clay	2.5000	110.0000	14.4000	--	0.10000	--
2	stiff clay	2.5000	122.0000	750.0000	--	0.01000	--
	w/o Free Water	6.5000	122.0000	750.0000	--	0.01000	--
3	stiff clay	6.5000	122.0000	750.0000	--	0.01000	--
	w/o Free Water	14.5000	122.0000	750.0000	--	0.01000	--
4	Sand	14.5000	6.0000	--	30.0000	--	60.0000
	(Reese, et al.)	20.5000	6.0000	--	30.0000	--	60.0000
5	Sand	20.5000	60.0000	--	30.0000	--	60.0000
	(Reese, et al.)	32.5000	60.0000	--	30.0000	--	60.0000
6	Sand	32.5000	60.0000	--	30.0000	--	60.0000
	(Reese, et al.)	40.5000	60.0000	--	30.0000	--	60.0000

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 2

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length
1	1	V = 74880. lbs	M = 68709760. in-lbs	53107.	No
2	1	V = 9690. lbs	M = 8886000. in-lbs	33220.	No

V = shear force applied normal to pile axis

M = bending moment applied to pile head

y = lateral deflection normal to pile axis

S = pile slope relative to original pile batter angle

R = rotational stiffness applied to pile head

Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).

Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	29.500000 ft
Shaft Diameter	=	84.000000 in
Concrete Cover Thickness (to edge of long. rebar)	=	3.625000 in
Number of Reinforcing Bars	=	28 bars
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shaft	=	5542. sq. in.
Total Area of Reinforcing Steel	=	35.469524 sq. in.
Area Ratio of Steel Reinforcement	=	0.64 percent
Edge-to-Edge Bar Spacing	=	7.181079 in

MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

MAST ELEV ft	DEFLECTIONS (ft).....			ROTATIONS (deg).....		
	HORIZONTAL ALONG	ACROSS	DOWN	TILT ALONG	ACROSS	TWIST
99.0	6.59A	0.01P	0.61A	7.56A	0.01P	0.00E
83.7	4.68A	0.01P	0.37A	6.86A	0.01P	0.00E
68.5	3.03A	0.00P	0.19A	5.59A	0.01P	0.00E
53.2	1.75A	0.00V	0.08A	4.07A	0.01P	0.00J
48.5	1.44A	0.00V	0.06A	3.66A	0.01P	0.00J
36.4	0.78A	0.00V	0.02A	2.60A	0.00V	0.00J
24.2	0.33A	0.00V	0.01A	1.63A	0.00V	0.00J
12.1	0.08A	0.00V	0.00A	0.77A	0.00V	0.00J
0.0	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A

MAXIMUM ANTENNA AND REFLECTOR ROTATIONS

ELEV	ANT	ANT	BEAM DEFLECTIONS (deg)				
ft	AZI	TYPE	ROLL	YAW	PITCH	TOTAL	
	deg						
49.0	0.0	STD+R	3.682 D	0.106 C	3.701 A	3.701 A	

MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

MAST ELEV ft	TOTAL AXIAL kip	SHEAR.w.r.t.WIND.DIR		MOMENT.w.r.t.WIND.DIR		TORSION ft-kip
		ALONG kip	ACROSS kip	ALONG ft-kip	ACROSS ft-kip	
99.0	9.31 AH	13.35 R	0.00 R	0.00 N	0.00 R	0.00 N
83.7	24.42 AG	25.29 R	0.00 R	-222.36 A	-0.01 D	-0.02 P
	24.42 AC	25.29 F	0.00 C	-222.36 A	-0.01 D	-0.02 P
68.5	38.33 AC	37.21 F	0.00 C	-697.29 L	-0.03 D	0.06 V
	38.33 AC	37.21 S	0.00 O	-697.29 A	-0.03 D	-0.06 P
53.2	52.48 AC	49.03 S	0.00 O	-1415.46 A	-0.07 D	-0.13 P
	52.48 AB	49.05 G	0.02 O	-1415.51 A	-0.07 D	-0.13 P
48.5	54.67 AB	50.85 M	0.21 D	-1658.67 G	1.23 AB	2.58 D
	54.67 AH	50.88 X	-0.20 J	-1658.69 G	-1.23 AH	2.58 D
36.4	57.29 AH	52.13 X	-0.20 J	-2300.59 A	-2.30 P	-2.66 J
	57.29 AB	52.14 X	-0.21 V	-2300.59 A	-2.30 P	-2.66 J
24.2	60.25 AB	53.46 X	-0.21 V	-2954.27 A	-4.80 P	-2.71 J
	60.25 AB	53.46 X	-0.20 V	-2954.27 A	-4.80 P	-2.71 J
12.1	63.51 AB	54.79 X	-0.20 V	-3618.87 A	7.30 V	-2.73 J
	63.51 AB	54.78 X	-0.20 V	-3618.87 A	7.30 V	-2.73 J
	67.04 AB	56.18 X	-0.20 V	-4294.36 A	9.79 V	-2.74 J

base

- Maximum number of iterations allowed = 999
 - Deflection tolerance for convergence = 1.0000E-05 in
 - Maximum allowable deflection = 100.0000 in
 - Number of pile increments = 100

Loading Type and Number of Cycles of Loading:

- Static loading specified
- Use of p-y modification factors for p-y curves not selected
- Analysis uses layering correction (Method of Georgiadis)
- No distributed lateral loads are entered
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Input of moment resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

- Output files use decimal points to denote decimal symbols.
- Report only summary tables of pile-head deflection, maximum bending moment, and maximum shear force in output report file.
- No p-y curves to be computed and reported for user-specified depths
- Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
 Total length of pile = 29.500 ft
 Depth of ground surface below top of pile = 0.5000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	84.0000
2	29.500	84.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile
 Length of section = 29.500000 ft
 Shaft Diameter = 84.000000 in
 Shear capacity of section = 0.0000 lbs

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
 = 0.000 radians
 Pile Batter Angle = 0.000 degrees
 = 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 0.500000 ft
 Distance from top of pile to bottom of layer = 2.500000 ft
 Effective unit weight at top of layer = 110.000000 pcf
 Effective unit weight at bottom of layer = 110.000000 pcf
 Undrained cohesion at top of layer = 14.400000 psf

LOADS ON POLE

=====

LOAD TYPE	ELEV ft	APPLY...LOAD... RADIUS ft	AT AZI	LOAD AZI	.....FORCES.....		.....MOMENTS.....	
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	99.000	0.00	0.0	0.0	2.3032	4.0305	0.0000	0.0000
C	97.000	0.00	0.0	0.0	0.0000	1.2106	0.0000	0.0000
C	84.000	0.00	0.0	0.0	0.0000	1.0483	0.0000	0.0000
C	84.000	0.00	0.0	0.0	1.9095	4.0305	0.0000	0.0000
C	74.000	0.00	0.0	0.0	0.0000	0.9235	0.0000	0.0000
C	74.000	0.00	0.0	0.0	1.8599	4.0305	0.0000	0.0000
C	64.000	0.00	0.0	0.0	0.0000	0.7987	0.0000	0.0000
C	64.000	0.00	0.0	0.0	1.8047	4.0305	0.0000	0.0000
C	49.000	0.00	0.0	0.0	0.0000	0.0510	0.0000	0.0000
D	99.000	0.00	180.0	0.0	0.0100	0.0565	0.0000	0.0000
D	83.750	0.00	180.0	0.0	0.0100	0.0565	0.0000	0.0000
D	83.750	0.00	180.0	0.0	0.0130	0.0762	0.0000	0.0000
D	68.500	0.00	180.0	0.0	0.0130	0.0762	0.0000	0.0000
D	68.500	0.00	180.0	0.0	0.0156	0.0959	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0156	0.0959	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0171	0.2375	0.0000	0.0000
D	48.500	0.00	180.0	0.0	0.0171	0.2375	0.0000	0.0000
D	48.500	0.00	180.0	0.0	0.0178	0.1418	0.0000	0.0000
D	36.375	0.00	180.0	0.0	0.0178	0.1418	0.0000	0.0000
D	36.375	0.00	180.0	0.0	0.0188	0.1607	0.0000	0.0000
D	24.250	0.00	180.0	0.0	0.0188	0.1607	0.0000	0.0000
D	24.250	0.00	180.0	0.0	0.0190	0.1795	0.0000	0.0000
D	12.125	0.00	180.0	0.0	0.0190	0.1795	0.0000	0.0000
D	12.125	0.00	180.0	0.0	0.0199	0.1984	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.0199	0.1984	0.0000	0.0000

ANTENNA LOADING

=====

.....ANTENNA..... TYPE	ELEV ft	AZI	ATTACHMENT		.....ANTENNA FORCES.....			
			RAD ft	AZI	AXIAL kip	SHEAR kip	GRAVITY kip	TORSION ft-kip
STD+R	49.0	0.0	2.1	0.0	0.23	0.00	0.20	0.00

MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

=====

MAST ELEV ft	.....DEFLECTIONS (ft).....			.....ROTATIONS (deg).....		
	HORIZONTAL ALONG	ACROSS	DOWN	TILT ALONG	ACROSS	TWIST
99.0	1.15L	0.00D	0.02A	1.31L	0.00H	0.00D
83.7	0.81L	0.00D	0.01A	1.19L	0.00H	0.00J
68.5	0.53L	0.00D	0.01A	0.97L	0.00H	0.00J
53.2	0.30L	0.00D	0.00A	0.70L	0.00H	0.00J
48.5	0.25L	0.00D	0.00A	0.63L	0.00H	0.00J
36.4	0.13L	0.00D	0.00A	0.45L	0.00D	0.00J
24.2	0.06L	0.00D	0.00A	0.28L	0.00D	0.00J
12.1	0.01L	0.00D	0.00A	0.13L	0.00D	0.00D
0.0	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A

MAXIMUM ANTENNA AND REFLECTOR ROTATIONS

=====

ELEV ft	ANT AZI deg	ANT TYPE	.... BEAM DEFLECTIONS (deg)			
			ROLL	YAW	PITCH	TOTAL
49.0	0.0	STD+R	0.636 D	0.004 C	-0.639 G	0.639 G

Round Base Plate and Anchor Rods, per ANSI/TIA 222-G

Pole Data

Diameter: 51.790 in (flat to flat)
Thickness: 0.375 in
Yield (Fy): 65 ksi
of Sides: 18 "0" IF Round
Strength (Fu): 80 ksi

Reactions

Moment, Mu: 4294.36 ft-kips
Axial, Pu: 39.83 kips
Shear, Vu: 56.16 kips

Anchor Rod Data

Quantity: 16
Diameter: 2.25 in
Rod Material: A615
Strength (Fu): 100 ksi
Yield (Fy): 75 ksi
BC Diam. (in): 58.5 BC Override:

Anchor Rod Results

Maximum Rod (Pu+ Vu/η): 229.7 Kips
Allowable $\Phi \cdot R_{nt}$: 260.0 Kips (per 4.9.9)
Anchor Rod Interaction Ratio: **88.4% Pass**

Plate Data

Diameter (in): 64.25 Dia. Override:
Thickness: 2 in
Yield (Fy): 50 ksi
Eff Width/Rod: 10.27 in
Drain Hole: 2.625 in. diameter
Drain Location: 23.75 in. center of pole to center of drain hole
Center Hole: 39.5 in. diameter

Base Plate Results

Base Plate (Mu/Z): 44.9 ksi
Allowable $\Phi \cdot F_y$: 45.0 ksi (per AISC)
Base Plate Interaction Ratio: **99.7% Pass**

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)

DOWN	SHEAR.w.r.t.WIND.DIR	MOMENT.w.r.t.WIND.DIR	TORSION
kip	ALONG kip	ACROSS ft-kip	ft-kip
33.22	9.69	0.04	-740.50
B	L	D	L
			D

MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

MAST ELEV ft	TOTAL AXIAL kip	SHEAR.w.r.t.WIND.DIR ALONG kip	WIND.DIR ACROSS kip	MOMENT.w.r.t.WIND.DIR ALONG ft-kip	WIND.DIR ACROSS ft-kip	TORSION ft-kip
99.0	4.03 E	2.30 F	0.00 L	0.00 D	0.00 L	0.00 I
83.7	11.18 E	4.37 F	0.00 L	-38.63 G	0.00 F	0.00 F
	11.18 G	4.37 E	0.00 I	-38.63 A	0.00 K	0.00 F
68.5	17.30 G	6.42 E	0.00 I	-120.81 G	0.00 F	0.00 F
	17.30 G	6.42 H	0.00 I	-120.81 B	0.00 F	0.00 F
53.2	23.59 G	8.47 H	0.00 I	-244.72 G	0.01 F	0.00 F
	23.59 G	8.47 L	0.00 K	-244.73 G	0.01 F	0.00 F
48.5	24.97 G	8.78 L	-0.03 J	-286.95 G	-0.39 J	-0.47 J
	24.97 B	8.78 L	0.04 D	-286.97 G	-0.39 J	-0.47 J
36.4	26.69 B	8.99 L	0.04 D	-397.10 G	-0.29 H	-0.47 J
	26.68 B	9.00 L	0.04 D	-397.10 G	-0.29 H	-0.47 J
24.2	28.63 B	9.22 L	0.04 D	-509.48 L	-0.46 D	0.47 D
	28.63 B	9.22 L	-0.04 J	-509.48 L	-0.46 D	-0.47 J
12.1	30.81 B	9.45 L	-0.04 J	-623.98 L	-0.89 D	-0.47 J
	30.81 B	9.45 L	0.04 D	-623.98 L	-0.89 D	0.47 D
	33.22 B	9.69 L	0.04 D	-740.50 L	-1.31 D	0.47 D
base reaction	33.22 B	-9.69 L	-0.04 D	740.50 L	1.31 D	-0.47 D

COMPLIANCE WITH 4.8.2 & 4.5.4

ELEV ft	AXIAL	BENDING	SHEAR + TORSIONAL	TOTAL	SATISFIED	D/t(w/t)	MAX ALLOWED
99.00	0.00E	0.00D	0.00F	0.00D	YES	6.14A	45.2
83.75	0.01E	0.07G	0.01F	0.07G	YES	9.47A	45.2
	0.01G	0.07A	0.01E	0.07A	YES	9.47A	45.2
68.50	0.01G	0.12G	0.01E	0.13G	YES	12.81A	45.2
	0.01G	0.12B	0.01H	0.13B	YES	12.81A	45.2
53.25	0.01G	0.16G	0.01H	0.17G	YES	16.15A	45.2
	0.01G	0.14G	0.01L	0.15G	YES	13.17A	45.2
48.50	0.01G	0.14G	0.01L	0.15G	YES	14.03A	45.2
	0.01B	0.15G	0.01L	0.16G	YES	13.74A	45.2
36.37	0.01B	0.16G	0.01L	0.17G	YES	15.95A	45.2
	0.01B	0.16G	0.01L	0.17G	YES	15.95A	45.2
24.25	0.01B	0.16L	0.01L	0.17L	YES	18.16A	45.2
	0.01B	0.16L	0.01L	0.17L	YES	18.16A	45.2
12.12	0.01B	0.17L	0.00L	0.18L	YES	20.38A	45.2
	0.01B	0.17L	0.00L	0.18L	YES	20.38A	45.2
0.00	0.01B	0.17L	0.00L	0.18L	YES	22.59A	45.2

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LPILE for windows(Beta), Version 2018-10.009

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
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Files Used for Analysis

Path to file locations:
\\Program Files (x86)\\Ensoft\\Lpile2018\\files\\

Name of input data file:
434718A.lp10

Name of output report file:
434718A.lp10

Name of plot output file:
434718A.lp10

Name of runtime message file:
434718A.lp10

Date and Time of Analysis

Date: May 29, 2019

Time: 9:11:56

Problem Title

Site : JR Richard, TX

Tower : 100' Monopole

Prepared for : BRANCH COMMUNICATIONS

Job Number : 434718 Revision A

Engineer : ARH

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)
Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

reaction 67.04 AB -56.18 X 0.20 V 4294.36 A -9.79 V 2.74 J

COMPLIANCE WITH 4.8.2 & 4.5.4

ELEV ft	AXIAL	BENDING	SHEAR + TORSIONAL	TOTAL	SATISFIED	D/t(w/t)	MAX ALLOWED
99.00	0.01AH	0.00R	0.03R	0.01Y	YES	6.14A	45.2
83.75	0.02Y	0.38A	0.04R	0.40A	YES	9.47A	45.2
	0.02AC	0.38A	0.04F	0.40A	YES	9.47A	45.2
68.50	0.02AC	0.71L	0.04F	0.72L	YES	12.81A	45.2
	0.02AC	0.71A	0.04S	0.72A	YES	12.81A	45.2
53.25	0.02AC	0.95A	0.04S	0.96A	YES	16.15A	45.2
	0.02AB	0.79A	0.04V	0.81A	YES	13.17A	45.2
48.50	0.02AB	0.83G	0.03M	0.84G	YES	14.03A	45.2
	0.02AH	0.86G	0.04X	0.87G	YES	13.74A	45.2
36.37	0.02AH	0.91A	0.03X	0.92A	YES	15.95A	45.2
	0.02AB	0.91A	0.03X	0.92A	YES	15.95A	45.2
24.25	0.02AB	0.95A	0.03X	0.96A	YES	18.16A	45.2
	0.02AB	0.95A	0.03X	0.96A	YES	18.16A	45.2
12.12	0.02AB	0.97A	0.03X	0.98A	YES	20.38A	45.2
	0.02AB	0.97A	0.03X	0.98A	YES	20.38A	45.2
0.00	0.02AB	0.98A	0.03X	1.00A	YES	22.59A	45.2

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)

DOWN kip	SHEAR.w.r.t.WIND.DIR ALONG kip	WIND.DIR ACROSS kip	MOMENT.w.r.t.WIND.DIR ALONG ft-kip	WIND.DIR ACROSS ft-kip	TORSION ft-kip
67.04 AB	56.18 X	-0.20 V	-4294.36 A	9.79 V	-2.74 J

(USA 222-G) - Monopole Spatial Analysis (c)2015 Guymast Inc.

Tel:(416)736-7453

Fax:(416)736-4372

Web:www.guymast.com

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Sabre Towers and Poles

on: 29 may 2019 at: 9:10:45

100' Monopole / JR Richard, TX

***** Service Load Condition *****

* only 1 condition(s) shown in full

* Some concentrated wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A

60 mph wind with no ice. Wind Azimuth: 0°

Undrained cohesion at bottom of layer	=	14.400000	psf
Epsilon-50 at top of layer	=	0.100000	
Epsilon-50 at bottom of layer	=	0.100000	

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer	=	2.500000	ft
Distance from top of pile to bottom of layer	=	6.500000	ft
Effective unit weight at top of layer	=	122.000000	pcf
Effective unit weight at bottom of layer	=	122.000000	pcf
Undrained cohesion at top of layer	=	750.000000	psf
Undrained cohesion at bottom of layer	=	750.000000	psf
Epsilon-50 at top of layer	=	0.010000	
Epsilon-50 at bottom of layer	=	0.010000	

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer	=	6.500000	ft
Distance from top of pile to bottom of layer	=	14.500000	ft
Effective unit weight at top of layer	=	122.000000	pcf
Effective unit weight at bottom of layer	=	122.000000	pcf
Undrained cohesion at top of layer	=	750.000000	psf
Undrained cohesion at bottom of layer	=	750.000000	psf
Epsilon-50 at top of layer	=	0.010000	
Epsilon-50 at bottom of layer	=	0.010000	

Layer 4 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	14.500000	ft
Distance from top of pile to bottom of layer	=	20.500000	ft
Effective unit weight at top of layer	=	6.000000	pcf
Effective unit weight at bottom of layer	=	6.000000	pcf
Friction angle at top of layer	=	30.000000	deg.
Friction angle at bottom of layer	=	30.000000	deg.
Subgrade k at top of layer	=	60.000000	pci
Subgrade k at bottom of layer	=	60.000000	pci

Layer 5 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	20.500000	ft
Distance from top of pile to bottom of layer	=	32.500000	ft
Effective unit weight at top of layer	=	60.000000	pcf
Effective unit weight at bottom of layer	=	60.000000	pcf
Friction angle at top of layer	=	30.000000	deg.
Friction angle at bottom of layer	=	30.000000	deg.
Subgrade k at top of layer	=	60.000000	pci
Subgrade k at bottom of layer	=	60.000000	pci

Layer 6 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	32.500000	ft
Distance from top of pile to bottom of layer	=	40.500000	ft
Effective unit weight at top of layer	=	60.000000	pcf
Effective unit weight at bottom of layer	=	60.000000	pcf
Friction angle at top of layer	=	30.000000	deg.
Friction angle at bottom of layer	=	30.000000	deg.
Subgrade k at top of layer	=	60.000000	pci
Subgrade k at bottom of layer	=	60.000000	pci

(Depth of the lowest soil layer extends 11.000 ft below the pile tip)

**** Warning - Possible Input Data Error ****

Values entered for effective unit weights of soil were outside the limits of 20 pcf to 140 pcf.

The minimum input value, in layer 4, for effective unit weight = 6.00 pcf

This data may be erroneous. Please check your data.

Summary of Input Soil Properties

Layer	Soil Type	Layer	Effective	Undrained	Angle of	E50
Layer	Name	Depth	Unit Wt.	Cohesion	Friction	or
						kpy

=====

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100' Monopole / JR Richard, TX

* All pole diameters shown on the following pages are across corners.
See profile drawing for widths across flats.

POLE GEOMETRY

ELEV ft	SECTION NAME	No. SIDE	OUTSIDE DIAM in	THICK -NESS in	RESISTANCES ♦*Pn kip	♦*Mn ft-kip	SPLICE TYPE	...OVERLAP... LENGTH ft	RATIO	w/t
99.0	A	18	14.22	0.312	1008.6	279.9				6.1
53.2	A/B	18	32.23	0.312	2312.1	1491.6	SLIP	4.75	1.73	
48.5	B	18	33.49	0.375	2883.1	1926.6				13.7
0.0			52.59	0.375	4121.3	4360.7				

POLE ASSEMBLY

SECTION NAME	BASE ELEV ft	BOLTS NUMBER	AT BASE OF SECTION TYPE	DIAM in	STRENGTH ksi	THREADS IN SHEAR PLANE	CALC BASE ELEV ft
A	48.500	0	A325	0.00	92.0	0	48.500
B	0.000	0	A325	0.00	92.0	0	0.000

POLE SECTIONS

SECTION NAME	No.of SIDES	LENGTH ft	OUTSIDE DIAMETER BOT *	TOP *	BEND RAD in	MAT- ERIAL ID	FLANGE.ID BOT	TOP	FLANGE.WELD ..GROUP.ID.. BOT	TOP
A	18	50.50	34.11	14.22	0.000	1	0	0	0	0
B	18	53.25	52.59	31.61	0.000	2	0	0	0	0

* - Diameter of circumscribed circle

MATERIAL TYPES

TYPE OF SHAPE	TYPE NO	NO OF ELEM.	ORIENT & deg	HEIGHT in	WIDTH in	.THICKNESS. WEB	FLANGE	IRREGULARITY ..PROJECTION.. % OF ORIENT AREA	deg
PL	1	1	0.0	34.11	0.31	0.312	0.312	0.00	0.0
PL	2	1	0.0	52.59	0.38	0.375	0.375	0.00	0.0

& - with respect to vertical

MATERIAL PROPERTIES

MATERIAL TYPE NO.	ELASTIC MODULUS ksi	UNIT WEIGHT pcf	.. STRENGTH .. Fu ksi	Fy ksi	THERMAL COEFFICIENT /deg
----------------------	---------------------------	-----------------------	-----------------------------	-----------	--------------------------------

Maximum Concrete Aggregate Size = 0.750000 in
Ratio of Bar Spacing to Aggregate Size = 9.57
Offset of Center of Rebar Cage from Center of Pile = 0.0000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = $0.85 F_c A_c + F_y A_s$ = 23189.769 kips
Tensile Load for Cracking of Concrete = -2542.986 kips
Nominal Axial Tensile Capacity = -2128.171 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.270000	1.266769	37.740000	0.000000
2	1.270000	1.266769	36.793779	8.397940
3	1.270000	1.266769	34.002565	16.374772
4	1.270000	1.266769	29.506320	23.530505
5	1.270000	1.266769	23.530505	29.506320
6	1.270000	1.266769	16.374772	34.002565
7	1.270000	1.266769	8.397940	36.793779
8	1.270000	1.266769	0.000000	37.740000
9	1.270000	1.266769	-8.397940	36.793779
10	1.270000	1.266769	-16.374772	34.002565
11	1.270000	1.266769	-23.530505	29.506320
12	1.270000	1.266769	-29.506320	23.530505
13	1.270000	1.266769	-34.002565	16.374772
14	1.270000	1.266769	-36.793779	8.397940
15	1.270000	1.266769	-37.740000	0.000000
16	1.270000	1.266769	-36.793779	-8.397940
17	1.270000	1.266769	-34.002565	-16.374772
18	1.270000	1.266769	-29.506320	-23.530505
19	1.270000	1.266769	-23.530505	-29.506320
20	1.270000	1.266769	-16.374772	-34.002565
21	1.270000	1.266769	-8.397940	-36.793779
22	1.270000	1.266769	0.000000	-37.740000
23	1.270000	1.266769	8.397940	-36.793779
24	1.270000	1.266769	16.374772	-34.002565
25	1.270000	1.266769	23.530505	-29.506320
26	1.270000	1.266769	29.506320	-23.530505
27	1.270000	1.266769	34.002565	-16.374772
28	1.270000	1.266769	36.793779	-8.397940

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 7.181 inches
between bars 24 and 25.

Ratio of bar spacing to maximum aggregate size = 9.57

Concrete Properties:

Compressive Strength of Concrete = 4500. psi
Modulus of Elasticity of Concrete = 3823676. psi
Modulus of Rupture of Concrete = -503.115295 psi
Compression Strain at Peak Stress = 0.002001
Tensile Strain at Fracture of Concrete = -0.0001152
Maximum Coarse Aggregate Size = 0.750000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 2

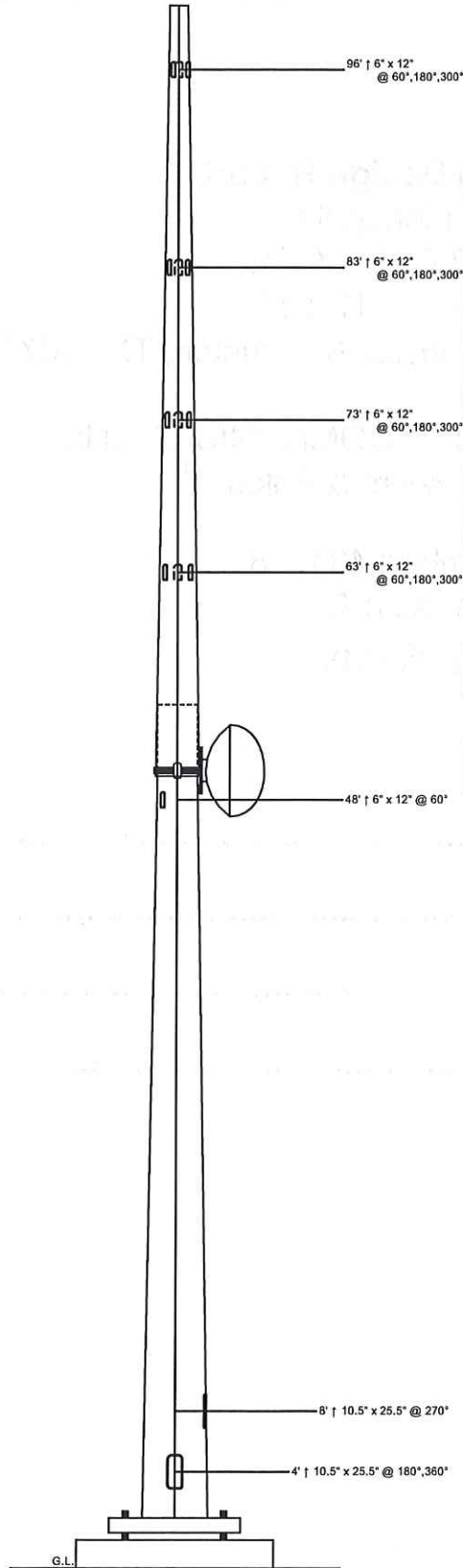
Number	Axial Thrust Force kips
1	33.220
2	53.107

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain
1	33.220	77387.068	0.00300000

Length (ft)	53'-3"	50'-6"
Number Of Sides	18	
Thickness (in)	3/8"	5/16"
Lap Splice (ft)		4' - 9"
Top Diameter (in)	31.13"	14"
Bottom Diameter (in)	51.79"	33.59"
Taper (in/ft)		0.388
Grade		A572-65
Weight (lbs)	10818	4581
Overall Steel Height (ft)		99



Designed Appurtenance Loading

Elev	Description	Tx-Line
100	(1) 210 sq. ft. EPA 4000# (no ice)	(12) 1 5/8"
85	(1) 180 sq. ft. EPA (no ice) 200 sq. ft. EPA (ice)	(12) 1 5/8"
75	(1) 180 sq. ft. EPA (no ice) 200 sq. ft. EPA (ice)	(12) 1 5/8"
65	(1) 180 sq. ft. EPA (no ice) 200 sq. ft. EPA (ice)	(12) 1 5/8"
50	(1) Dish Mount (Monopole Only) - Pipe Mount (up to 6' Dish)	
50	(1) 6' Solid Dish W/ Radome	(1) 1 5/8"

Design Criteria - ANSI/TIA-222-G

ASCE 7-16 Ultimate Wind Speed (No Ice)	139 mph
Wind Speed (Ice)	30 mph
Design Ice Thickness	1.00 in
Structure Class	II
Risk Category	II
Exposure Category	C
Topographic Category	1

Load Case Reactions

Description	Axial (kips)	Shear (kips)	Moment (ft-k)	Deflection (ft)	Sway (deg)
3s Gusted Wind	39.83	56.16	4294.36	6.59	7.56
3s Gusted Wind 0.9 Dead	29.88	56.18	4263.03	6.52	7.48
3s Gusted Wind&Ice	67.04	4.24	340.7	0.56	0.67
Service Loads	33.22	9.69	740.5	1.15	1.31

Base Plate Dimensions

Shape	Diameter	Thickness	Bolt Circle	Bolt Qty	Bolt Diameter
Round	64.25"	2"	58.5"	16	2.25"

Anchor Bolt Dimensions

Length	Diameter	Hole Diameter	Weight	Type	Finish
84"	2.25"	2.625"	1937.6	A615-75	Galv

Notes

- 1) Antenna Feed Lines Run Inside Pole
- 2) All dimensions are above ground level, unless otherwise specified.
- 3) Weights shown are estimates. Final weights may vary.
- 4) Full Height Step Bolts
- 5) This tower design and, if applicable, the foundation design(s) shown on the following page(s) also meet or exceed the requirements of the 2012 International Building Code.
- 6) Tower Rating: 99.7%



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Job:	434718A
Customer:	BRANCH COMMUNICATIONS
Site Name:	JR Richard, TX TX-0158
Description:	100' Monopole
Date:	5/29/2019
By:	ARH

1807.3.2.1 (2009 IBC, 2012 IBC, & 2015 IBC)

Moment (ft-k)	4,294.36	
Shear (k)	56.16	
Caisson diameter (ft)	7	
Caisson height above ground (ft)	0.5	
Caisson height below ground (ft)	27	
Lateral soil pressure (lb/ft ²)	350.00	
Ground to application of force, h (ft)	76.97	
Applied lateral force, P (lb)	56,160	
Lateral soil bearing pressure, S ₁ (lb/ft)	3,150.00	
Diameter, b (ft)	7	
A	5.96	$= (2.34P)/(S_1 b)$
Minimum depth of embedment, d (ft)	25.54	$= 0.5A[1 + (1 + (4.36h / A))^{1/2}]$