2400 MARKET STREET, 4TH FLOOR
PHILADELPHIA, PA 19103

August 5, 2021

***via* EMAIL**
Marlene Dortch, Secretary
Federal Communications Commission
Office of the Secretary
45 L Street NE
Washington, DC 20554
Attn: Audio Division, Media Bureau
james.bradshaw@fcc.gov
nazifa.sawez@fcc.gov

Re: KNSS(AM), Wichita, KS (Facility ID No. 53152)
FCC Form 302-AM

Dear Ms. Dortch:

Audacy License, LLC ("Audacy"), licensee of KNSS(AM), Wichita, KS (Facility ID No. 53152), hereby submits an application on Form 302-AM requesting a license employing moment method modeling.

In accordance with the instructions set forth in *Audio Division Announces Procedures Related to Coronavirus*, Public Notice, DA 20-266 (rel. Mar. 13, 2020), Audacy is submitting this application via email. The filing fee for the application was paid via Fee Filer. Enclosed is a copy online payment confirmation.

Please contact me if there are any questions.

Sincerely,

Laura Berman
Vice President, Legal

Enclosure

AUD:126820

Remittance ID:3619413 Authorization Number:26SURDVE
Successful Authorization -- Date Paid: 8/5/21
FILE COPY ONLY!!

READ INSTRUCTIONS CAREFULLY BEFORE PROCEEDING (1) LOCKBOX #**979089**	FEDERAL COMMUNICATIONS COMMISSION **REMITTANCE ADVICE** **FORM 159** PAGE NO 1 OF 1	APPROVED BY OMB 3060-059 SPECIAL USE FCC USE ONLY

SECTION A - Payer Information

(2) PAYER NAME (if paying by credit card, enter name exactly as it appears on your card)	(3) TOTAL AMOUNT PAID (dollars and cents)
Audacy, Inc.	**$1905.00**

(4) STREET ADDRESS LINE NO. 1
2400 Market Street

(5) STREET ADDRESS LINE NO. 2
4th Floor

(6) CITY	(7) STATE	(8) ZIP CODE
Philadelphia	**PA**	**19103**

(9) DAYTIME TELEPHONE NUMBER (INCLUDING AREA CODE)	(10) COUNTRY CODE (IF NOT IN U.S.A.)
484-2706312	**US**

FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED

(11) PAYER (FRN)	(12) FCC USE ONLY
0006113955	

IF PAYER NAME AND THE APPLICANT NAME ARE DIFFERENT, COMPLETE SECTION B
IF MORE THAN ONE APPLICANT, USE CONTINUATION SHEETS (FORM 159-C)

(13) APPLICANT NAME
Audacy License, LLC

(14) STREET ADDRESS LINE NO. 1
2400 Market Street

(15) STREET ADDRESS LINE NO. 2
4th Floor

(16) CITY	(17) STATE	(18) ZIP CODE
Philadelphia	**PA**	**19103**

(19) DAYTIME TELEPHONE NUMBER (INCLUDING AREA CODE)	(20) COUNTRY CODE (IF NOT IN U.S.A.)
484-2706312	**US**

FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED

(21) APPLICANT (FRN)	(22) FCC USE ONLY
0004434866	

COMPLETE SECTION C FOR EACH SERVICE, IF MORE BOXES ARE NEEDED, USE CONTINUATION SHEET

(23A) FCC Call Sign/Other ID	(24A) Payment Type Code(PTC)	(25A) Quantity
KNSS	**MMR**	**1**
(26A) Fee Due for (PTC)	(27A) Total Fee	FCC Use Only
$645.00	**$645.00**	
(28A) FCC CODE 1	(29A) FCC CODE 2	
53152	**FCCForm302-AM**	

(23B) FCC Call Sign/Other ID	(24B) Payment Type Code(PTC)	(25B) Quantity
KNSS	**MOR**	**1**
(26B) Fee Due for (PTC)	(27B) Total Fee	FCC Use Only
$1,260.00	**$1260.00**	
(28B) FCC CODE 1	(29B) FCC CODE 2	
53152	**FCCForm302-AM**	

Federal Communications Commission
Washington, D. C. 20554

Approved by OMB
3060-0627
Expires 01/31/98

FOR FCC USE ONLY

FCC 302-AM
APPLICATION FOR AM BROADCAST STATION LICENSE

(Please read instructions before filling out form.)

FOR COMMISSION USE ONLY

FILE NO.

SECTION I - APPLICANT FEE INFORMATION

1. PAYOR NAME (Last, First, Middle Initial)

Audacy, Inc.

MAILING ADDRESS (Line 1) (Maximum 35 characters)

2400 Market Street, 4th Floor

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Philadelphia	PA	19103

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
6106605610	KNSS	53152

2. A. Is a fee submitted with this application? ☑ Yes ☐ No

B. If No, indicate reason for fee exemption (see 47 C.F.R. Section

☐ Governmental Entity ☐ Noncommercial educational licensee ☐ Other (Please explain):

C. If Yes, provide the following information:

Enter in Column (A) the correct Fee Type Code for the service you are applying for. Fee Type Codes may be found in the "Mass Media Services Fee Filing Guide." Column (B) lists the Fee Multiple applicable for this application. Enter fee amount due in Column (C).

(A) FEE TYPE CODE	(B) FEE MULTIPLE	(C) FEE DUE FOR FEE TYPE CODE IN COLUMN (A)	FOR FCC USE ONLY
M M R	0 0 0 1	$ 645.00	

To be used only when you are requesting concurrent actions which result in a requirement to list more than one Fee Type Code.

(A)	(B)	(C)	FOR FCC USE ONLY
M O R	0 0 0 1	$ 1,260.00	

ADD ALL AMOUNTS SHOWN IN COLUMN C, AND ENTER THE TOTAL HERE. THIS AMOUNT SHOULD EQUAL YOUR ENCLOSED REMITTANCE.

TOTAL AMOUNT REMITTED WITH THIS APPLICATION	FOR FCC USE ONLY
$ 1,905.00	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT Audacy License, LLC		
MAILING ADDRESS 2400 Market Street, 4th Floor		
CITY Philadelphia	STATE PA	ZIP CODE 19103

2. This application is for:

☑ Commercial ☐ Noncommercial

☑ AM Directional ☐ AM Non-Directional

Call letters	Community of License	Construction Permit File No.	Modification of Construction Permit File No(s).	Expiration Date of Last Construction Permit
KNSS	Wichita, KS	N/A	N/A	N/A

3. Is the station now operating pursuant to automatic program test authority in accordance with 47 C.F.R. Section 73.1620?

☐ Yes ☑ No

If No, explain in an Exhibit.

Exhibit No. BESTA-20210615AAA

4. Have all the terms, conditions, and obligations set forth in the above described construction permit been fully met?

☐ Yes ☐ No

If No, state exceptions in an Exhibit.

Exhibit No. N/A MoM License

5. Apart from the changes already reported, has any cause or circumstance arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect?

☐ Yes ☑ No

If Yes, explain in an Exhibit.

Exhibit No.

6. Has the permittee filed its Ownership Report (FCC Form 323) or ownership certification in accordance with 47 C.F.R. Section 73.3615(b)?

☐ Yes ☐ No

☑ Does not apply

If No, explain in an Exhibit.

Exhibit No.

7. Has an adverse finding been made or an adverse final action been taken by any court or administrative body with respect to the applicant or parties to the application in a civil or criminal proceeding, brought under the provisions of any law relating to the following: any felony; mass media related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination?

☐ Yes ☑ No

If the answer is Yes, attach as an Exhibit a full disclosure of the persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), and the disposition of the litigation. Where the requisite information has been earlier disclosed in connection with another application or as required by 47 U.S.C. Section 1.65(c), the applicant need only provide: (i) an identification of that previous submission by reference to the file number in the case of an application, the call letters of the station regarding which the application or Section 1.65 information was filed, and the date of filing; and (ii) the disposition of the previously reported matter.

Exhibit No.

8. Does the applicant, or any party to the application, have a petition on file to migrate to the expanded band (1605-1705 kHz) or a permit or license either in the existing band or expanded band that is held in combination (pursuant to the 5 year holding period allowed) with the AM facility proposed to be modified herein?

☐ Yes ☑ No

If Yes, provide particulars as an Exhibit.

Exhibit No.

The APPLICANT hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because use of the same, whether by license or otherwise, and requests and authorization in accordance with this application. (See Section 304 of the Communications Act of 1934, as amended).

The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations and that all the exhibits are a material part hereof and are incorporated herein as set out in full in

CERTIFICATION

1. By checking Yes, the applicant certifies, that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 862, or, in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits that includes FCC benefits pursuant to that section. For the definition of a "party" for these purposes, see 47 C.F.R. Section 1.2002(b).

☑ Yes ☐ No

2. I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

Name	Signature	
John Kennedy		
Title	Date	Telephone Number
SVP of Technical Operations	July 23, 2021	617-779-5367

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended. The Commission will use the information provided in this form to determine whether grant of the application is in the public interest. In reaching that determination, or for law enforcement purposes, it may become necessary to refer personal information contained in this form to another government agency. In addition, all information provided in this form will be available for public inspection. If information requested on the form is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Your response is required to obtain the requested authorization.

Public reporting burden for this collection of information is estimated to average 639 hours and 53 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, can be sent to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0627), Washington, D. C. 20554. Do NOT send completed forms to this address.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

SECTION III - LICENSE APPLICATION ENGINEERING DATA

Name of Applicant

Audacy License, LLC

PURPOSE OF AUTHORIZATION APPLIED FOR: (check one)

☐ Station License ☒ Direct Measurement of Power

1. Facilities authorized in construction permit

Call Sign	File No. of Construction Permit (if applicable)	Frequency (kHz)	Hours of Operation	Power in kilowatts	
				Night	Day
KNSS		1330	Unlimited	5.0	5.0

2. Station location

State	City or Town
Kansas	Wichita

3. Transmitter location

State	County	City or Town	Street address (or other identification)
KS	Sedwick	Wichita	1621 N. Rock Road

4. Main studio location

State	County	City or Town	Street address (or other identification)
KS	Sedwick	Wichita	9111 E Douglas Av #130

5. Remote control point location (specify only if authorized directional antenna)

State	County	City or Town	Street address (or other identification)
KS	Sedwick	Wichita	9111 E Douglas Av #130

6. Has type-approved stereo generating equipment been installed? ☐ **Yes** ☒ **No**

7. Does the sampling system meet the requirements of 47 C.F.R. Section 73.68? ☒ **Yes** ☐ **No** ☐ Not Applicable

Attach as an Exhibit a detailed description of the sampling system as installed. Exhibit No. Eng Rpt

8. Operating constants: * ND day power measured at common point

RF common point or antenna current (in amperes) without modulation for night system	RF common point or antenna current (in amperes) without modulation for day system
10.39	10.0*

Measured antenna or common point resistance (in ohms) at operating frequency		Measured antenna or common point reactance (in ohms) at operating frequency	
Night	Day	Night	Day
50	50	j0	j0

Antenna indications for directional operation

Towers	Antenna monitor Phase reading(s) in degrees		Antenna monitor sample current ratio(s)		Antenna base currents	
	Night	Day	Night	Day	Night	Day
1	0		1			
2	-75.5		0.580			

Manufacturer and type of antenna monitor: Potomac Instruments AM-1901

SECTION III - Page 2

9. Description of antenna system ((f directional antenna is used, the information requested below should be given for each element of the array. Use separate sheets if necessary.)

Type Radiator	Overall height in meters of radiator above base insulator, or above base, if grounded.	Overall height in meters above ground (without obstruction lighting)	Overall height in meters above ground (include obstruction lighting)	If antenna is either top loaded or sectionalized, describe fully in an Exhibit.
Eng Rpt #1/#2	127/68.8	128.4/69.9	128.4/69.9	Exhibit No.

Excitation [X] Series [ ] Shunt

Geographic coordinates to nearest second. For directional antenna give coordinates of center of array. For single vertical radiator give tower location.

North Latitude	West Longitude
37° 42' 47"	97° 14' 49"

If not fully described above, attach as an Exhibit further details and dimensions including any other antenna mounted on tower and associated isolation circuits. Exhibit No. Eng Rpt

Also, if necessary for a complete description, attach as an Exhibit a sketch of the details and dimensions of ground system. Exhibit No.

10. In what respect, if any, does the apparatus constructed differ from that described in the application for construction permit or in the permit?

11. Give reasons for the change in antenna or common point resistance.

Replacement of ATU, chokes & isocoupler.

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Name (Please Print or Type)	Signature (check appropriate box below)
Thomas S. Gorton	
Address (include ZIP Code) Hatfield & Dawson Consulting Engineers 9500 Greenwood Ave N Seattle, WA 98103-3012	Date July 19, 2021
	Telephone No. (Include Area Code) 206 783-9151

[ ] Technical Director

[X] Registered Professional Engineer

[ ] Chief Operator

[ ] Technical Consultant

[ ] Other (specify)

STEPHEN S. LOCKWOOD, PE, PMP
———
THOMAS M. ECKELS, PE
THOMAS S. GORTON, PE
———
JAMES B. HATFIELD, PE
BENJAMIN F. DAWSON III, PE
ERIK C. SWANSON, PE, PMP
DAVID J. PINION, PE
STEPHEN PUMPLE, M.Eng, MBA, PMP
CONSULTANTS

HATFIELD & DAWSON
CONSULTING ELECTRICAL ENGINEERS
9500 GREENWOOD AVE. N.
SEATTLE, WASHINGTON 98103

TELEPHONE (206) 783-9151
FACSIMILE (206) 789-9834
E-MAIL hatdaw@hatdaw.com
———
MAURY L. HATFIELD, PE
(1942-2009)
PAUL W. LEONARD, PE
(1925-2011)

Revised Method of Moments Proof of Performance
and
Application for Modified Station License

KNSS (AM)

Wichita, Kansas

Facility ID 53152

1330 kHz

5 kW DA-N

Audacy License, LLC

July 2021

APPLICATION FOR LICENSE

RADIO STATION KNSS-AM Wichita, KS

1330 kHz 5kW DA-N

Purpose of Application

Item 1	Analysis of Tower Impedance Measurements to Verify Method of Moments Model
Item 2	Method of Moments Model Details for Towers Driven Individually
Item 3	Method of Moments Model Details for Directional Antenna Pattern
Item 4	Derivation of Operating Parameters for Directional Antenna

Appendix A	FCC Form 302-AM

Purpose of Application

This engineering exhibit supports an application for a modified station license for KNSS(AM), Wichita, Kansas. It contains an updated version of the Method of Moments Proof of Performance filed in 2016, file number BMML-20160801AFM. This update is necessitated by the replacement of the Antenna Tuning Unit (ATU) on the #1 tower of the KNSS array following destruction of the previous ATU caused by a lightning strike. In addition, the isocoupler and static drain choke on tower #2 have been replaced, therefore this application contains updated impedance measurements for both towers.

Information is provided herein demonstrating that the directional antenna parameters for the patterns authorized by the station license have been determined in accordance with the requirements of section §73.151(c) of the FCC Rules. The system has been adjusted to produce antenna monitor parameters within +/- 5 percent in ratio and +/- 3 degrees in phase of the modeled values, as required by the Rules.

All measurements used in this report were made by Stephen S. Lockwood P.E.

Item 1

Analysis of Tower Impedance Measurements to Verify Method of Moments Model - KNSS

Tower base impedance measurements were made at the locations of the sample system current transformers using a Hewlett Packard 8751A network analyzer in a calibrated measurement system. The other towers were grounded at the same point where impedance measurements were made (the "reference points") for each of the measurements.

KNSS Measured "Reference Point" Impedances

Tower	Measured R	Measured X
1	38.6	-j108.5
2	106.1	+j52.3

Circuit calculations were performed to relate the method of moments modeled impedances at the tower base feed points to those at the measurement locations as shown in the diagram titled *Analysis of Tower Impedance Measurements to Verify Method of Moments Model*. The impedance of X_s was used in the moment method model as a load at ground level (lumped load) for the grounded tower, as it directly connects the tower base to ground, and is orders of magnitude lower than the other base region impedances in parallel to it in the model. In all cases, the modeled impedance at the reference point is within one ohm of the measured reference point impedance.

The impedance of the isocouplers[1] at tower #1 are based on measurements taken by the undersigned engineer during the 2016 proof. The impedance values used for the tower lighting choke at tower #1, the STL isocoupler at tower #2 and the static drain chokes at both towers are from measurement data provided by the manufacturer, Kintronic Labs.

[1]There are two FM antennas on tower number 1, and therefore two similar but not identical isocouplers.

Item 2

Method of Moments Model Details for Towers Driven Individually - KNSS

The array of towers was modeled using Expert MININEC Broadcast Professional Ver 14.0. Multiple wires were used to represent each tower because of the differences in tower radius at different elevations. The top and bottom wire end points were specified in feet in the geographic coordinate system, using the theoretical directional antenna specifications for tower spacing and orientation. All segments are less than 10° in length, as required by the Commission's rules.

Each tower's modeled height relative to its physical height falls within the required range of 75 to 125 percent and each modeled radius falls within the required range of 80 percent to 150 percent of the radius of a circle having a circumference equal to the sum of the widths of the tower faces.

KNSS Tower Dimensions - Physical and Modeled

Tower	Physical Height (feet)	Modeled Height (feet)	Modeled Percentage of Height	Modeled Radius (meters)	Percentage of Equivalent Radius
1	417.4	434.0	104.0	See Below	See Below
2	225.6	236.0	104.6	See Below	See Below

KNSS MININEC Model Node and Wire Numbering

Tower	Wires	Base Node
1	1-2	1
2	3-7	26

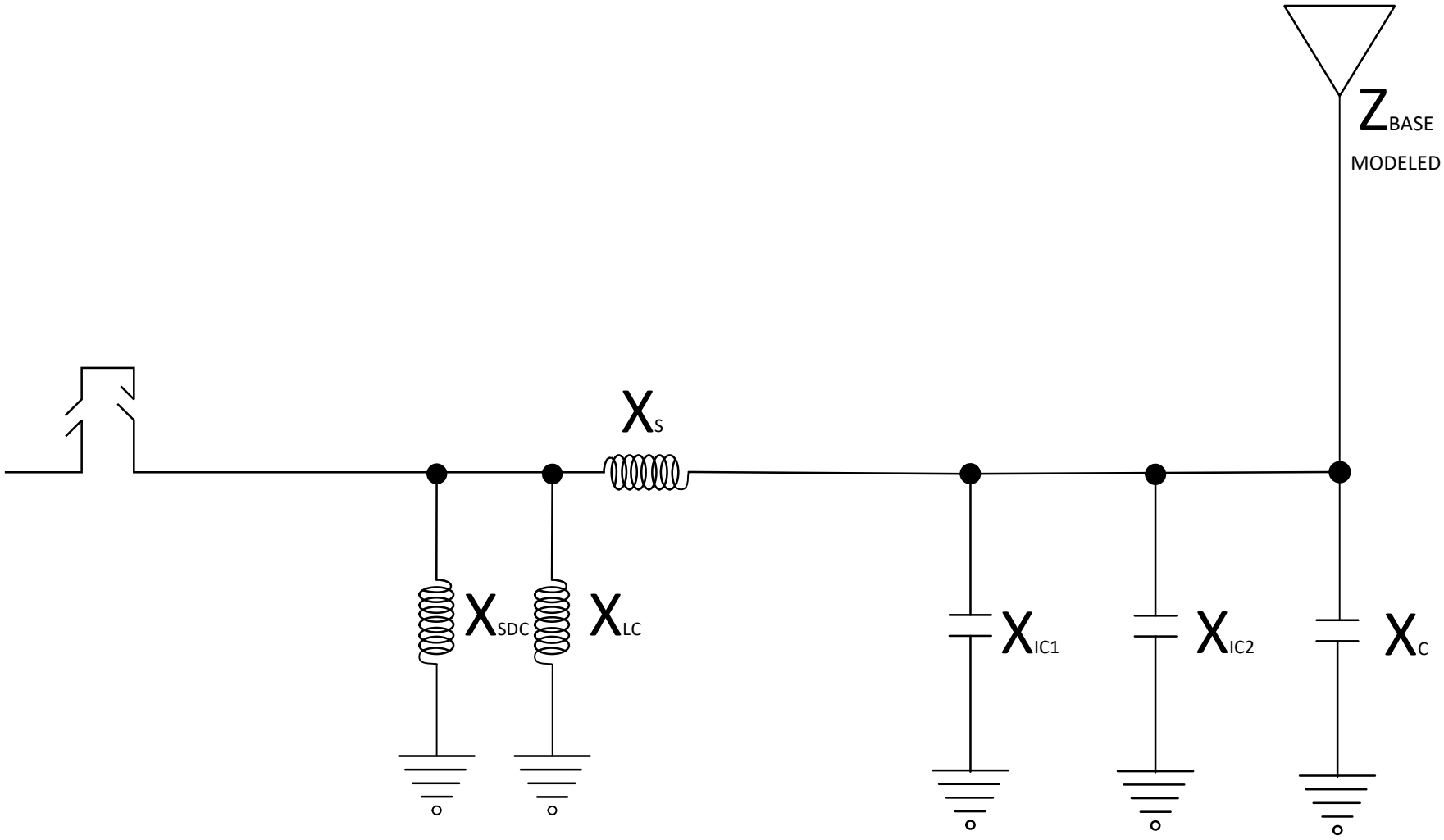
KNSS Array Geometry and Model

Tower #1 of the KNSS array is a uniform cross section guyed tower. This tower has four sides, each with a face width of 6 feet, to a height of 376 feet. Above 376 feet the tower is reduced to a 18 inch face width to an overall height of 421.4 feet above ground level. The top of the base insulator is 4 feet above ground. This tower was modeled using a two layer "wedding cake" design, with the wire radius of each segment equal to 100% of the radius of a circle with a circumference equal to the sum of the widths of the tower sides.

Tower #2 is a self-supporting tower, with a face width of 13.25 feet at the base, tapering linearly to 2 feet at the top of the tower. This tower also has four sides. The overall height of the tower is 229.3 feet above ground level, the top of the base insulators is at 3.7 feet above ground. This tower was modeled using a five layer "wedding cake" design, with the wire radius of each segment equal to 100% of the radius of a circle with a circumference equal to the sum of the widths of the tower sides at the mid-point of each "layer".

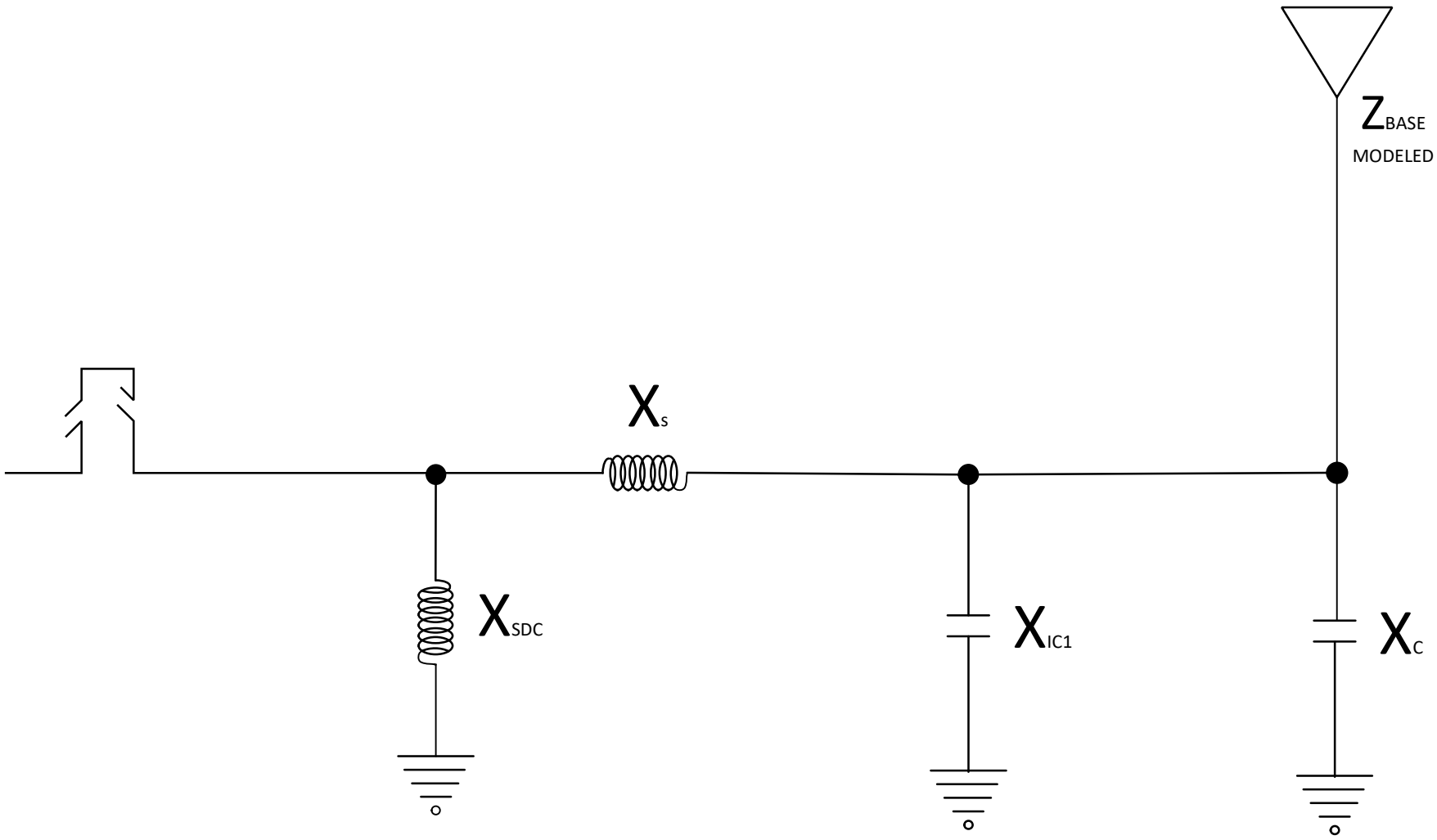
The following pages show the details of the method of moments model.

TOWER 1 WEST

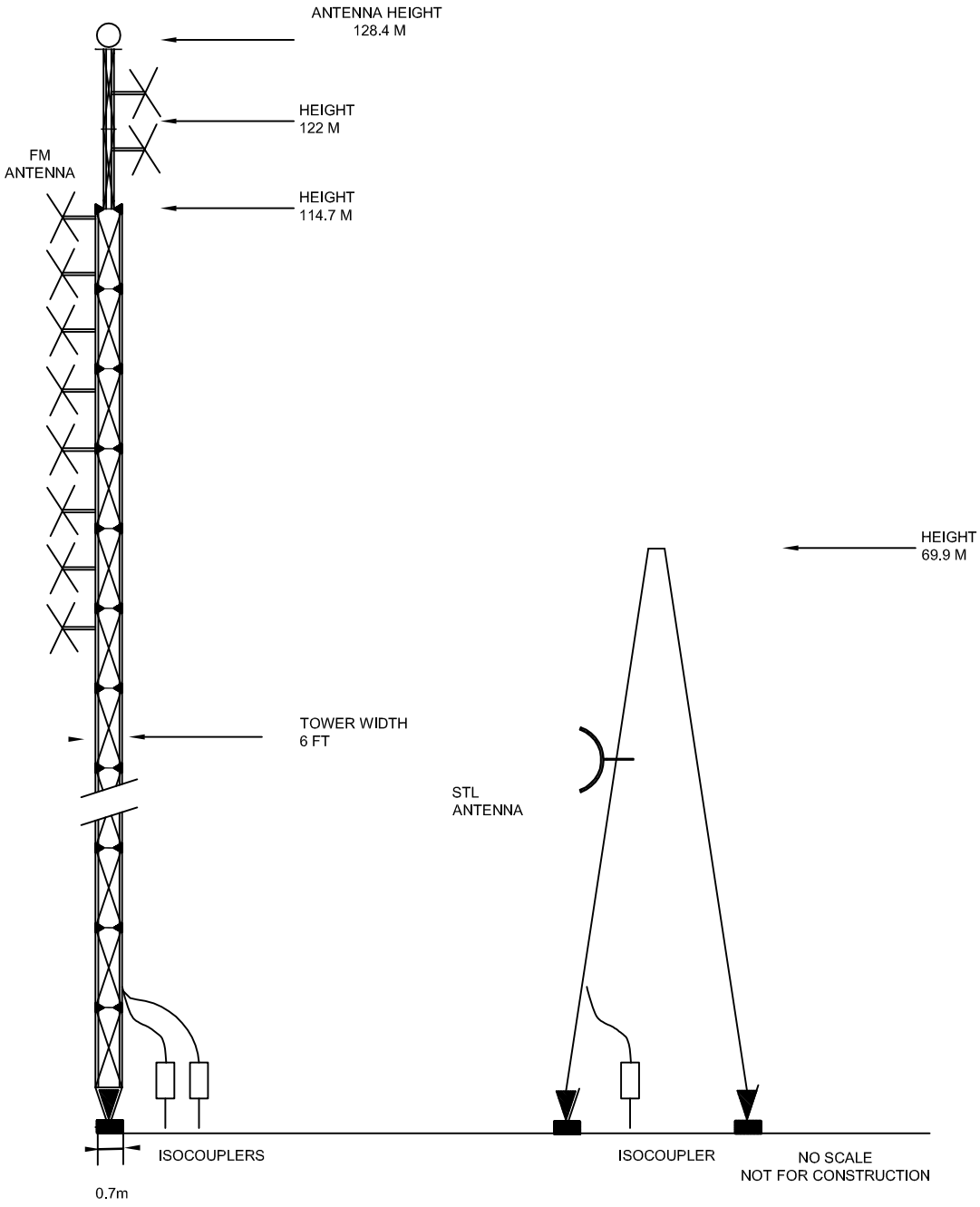


HATFIELD & DAWSON	KNSS 1330 kHz WITCHITA, KANSAS	6/2021 HEL

TOWER 2 EAST



HATFIELD & DAWSON	KNSS 1330 kHz WITCHITA, KANSAS	6/2021 HEL



Dwayne Straume, H&D 7/19/2014 2:30 PM KNSS antenna.dwg

HATFIELD & DAWSON
CONSULTING ENGINEERS

KNSS-AM WICHITA, KANSAS 07/2016

KNSS Tower 1 Driven with Tower 2 Grounded at Current Transformer Location

GEOMETRY
Dimensions in feet
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	3.819	20
		0	0	380.		
2	none	0	0	380.	.9549	5
		0	0	434.		
3	none	346.75	69.	0	7.639	3
		346.75	69.	60.		
4	none	346.75	69.	60.	6.045	3
		346.75	69.	125.		
5	none	346.75	69.	125.	4.615	3
		346.75	69.	160.		
6	none	346.75	69.	160.	3.342	3
		346.75	69.	210.		
7	none	346.75	69.	210.	2.037	3
		346.75	69.	236.		

Number of wires = 7
current nodes = 40

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	7	8.66667	4	21.6667
segment/radius ratio	5	2.52799	2	11.3101
radius	2	.9549	3	7.639

ELECTRICAL DESCRIPTION
Frequencies (MHz)

frequency			no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.33	0	1	.0117189	.0292973

Sources

source	node	sector	magnitude	phase	type
1	1	1	1,771.35	64.7	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	26	0	17.	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.33	**75.585**	**-192.36**	206.68	291.5	11.88	-1.4657	-5.4296

KNSS Tower 2 Driven with Tower 1 Grounded at Current Transformer Location

```
GEOMETRY
Dimensions in feet
Environment: perfect ground

wire  caps Distance     Angle        Z            radius      segs
 1    none 0            0           0            3.819        20
           0            0           380.
 2    none 0            0           380.         .9549        5
           0            0           434.
 3    none 346.75       69.         0            7.639        3
           346.75       69.         60.
 4    none 346.75       69.         60.          6.045        3
           346.75       69.         125.
 5    none 346.75       69.         125.         4.615        3
           346.75       69.         160.
 6    none 346.75       69.         160.         3.342        3
           346.75       69.         210.
 7    none 346.75       69.         210.         2.037        3
           346.75       69.         236.

Number of wires          =  7
          current nodes  =  40

                         minimum                  maximum
Individual wires      wire    value             wire  value
segment length         7      8.66667            4    21.6667
segment/radius ratio   5      2.52799            2    11.3101
radius                 2      .9549              3    7.639


ELECTRICAL DESCRIPTION
Frequencies (MHz)
     frequency                 no. of  segment length (wavelengths)
 no. lowest       step         steps   minimum        maximum
 1   1.33         0             1      .0117189       .0292973

Sources
source node    sector  magnitude      phase          type
 1      26      1       1,771.35       64.7           voltage

Lumped loads
             resistance    reactance     inductance  capacitance passive
load  node   (ohms)        (ohms)        (mH)        (uF)        circuit
 1     1     0             34.           0           0            0


IMPEDANCE
   normalization = 50.
freq     resist   react    imped    phase    VSWR    S11      S12
(MHz)    (ohms)   (ohms)   (ohms)   (deg)            dB       dB
source =  1; node 26, sector 1
1.33     101.88   41.232   109.91   22.      2.4547  -7.5126  -.84764
```

Item 3

Method of Moments Model Details for Directional Antenna- KNSS

The array of towers was modeled using MININEC with the individual tower characteristics that were verified by the individual tower impedance measurements. Calculations were made to determine the complex voltage values for sources located at ground level under each tower of the array to produce current moment sums for the towers that, when normalized, equated to the theoretical field parameters of the authorized directional antenna patterns. The following pages contain details of the method of moments models of the directional antenna patterns.

Tower	$X_{LC/SDC}$	X_S	X_{IC}	X_C	Z_{Base} Modeled	Z_{MP} Modeled	Z_{MP} Measured
1	+j4k	+j34	-j1k/-j1.2k	-j3k	75.6 -j192.4	39.2 -j108.6	38.6 -j108.5
2	+j20k	+j17	-j3k	-j3k	101.9 +j41.2	106.7 +j52.3	106.1 +j52.3

X_{LC} Tower Lighting Choke
X_{SDC} Static Drain Choke
X_S Feedline from ATU to tower
X_{IC} Isocoupler
X_C Capacitance from tower to ground, including base insulator

For tower #1 the listed X_{LC} value is the parallel combination of a tower lighting choke and a static drain choke.

KNSS Driven Array - Night

GEOMETRY
Dimensions in feet
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	3.819	20
		0	0	380.		
2	none	0	0	380.	.9549	5
		0	0	434.		
3	none	346.75	69.	0	7.639	3
		346.75	69.	60.		
4	none	346.75	69.	60.	6.045	3
		346.75	69.	125.		
5	none	346.75	69.	125.	4.615	3
		346.75	69.	160.		
6	none	346.75	69.	160.	3.342	3
		346.75	69.	210.		
7	none	346.75	69.	210.	2.037	3
		346.75	69.	236.		

Number of wires = 7
current nodes = 40

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	7	8.66667	4	21.6667
segment/radius ratio	5	2.52799	2	11.3101
radius	2	.9549	3	7.639

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.33	0	1	.0117189	.0292973

Sources

source	node	sector	magnitude	phase	type
1	1	1	1,737.91	65.8	voltage
2	26	1	589.835	97.9	voltage

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 1, sector 1							
1.33	**94.271**	**-181.05**	204.12	297.5	9.262	-1.8829	-4.537
source = 2; node 26, sector 1							
1.33	**64.71**	**54.063**	84.322	39.9	2.5831	-7.095	-.94317

CURRENT rms
Frequency = 1.33 MHz
Input power = 5,000. watts
Efficiency = 100. %
coordinates in feet

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	**6.02038**	**128.3**	-3.73084	4.72501
2	0	0	19.	3.98317	111.8	-1.47958	3.69818
3	0	0	38.	3.14419	95.7	-.312317	3.12864
4	0	0	57.	2.68248	73.5	.761755	2.57205
5	0	0	76.	2.67645	49.3	1.74632	2.02824
6	0	0	95.	3.04484	29.4	2.65312	1.49399
7	0	0	114.	3.6107	15.7	3.47677	.974284
8	0	0	133.	4.23415	6.5	4.20723	.476644
9	0	0	152.	4.83306	.1	4.83305	9.62E-03
10	0	0	171.	5.35948	355.5	5.34315	-.418098
11	0	0	190.	5.78312	352.1	5.72777	-.798206
12	0	0	209.	6.08379	349.4	5.97922	-1.12316
13	0	0	228.	6.24798	347.2	6.09221	-1.38646
14	0	0	247.	6.26728	345.4	6.06411	-1.58285
15	0	0	266.	6.13761	343.8	5.89504	-1.70843
16	0	0	285.	5.85863	342.5	5.58779	-1.76074
17	0	0	304.	5.4332	341.3	5.1475	-1.73865
18	0	0	323.	4.8665	340.3	4.58104	-1.64222
19	0	0	342.	4.16376	339.3	3.89494	-1.47187
20	0	0	361.	3.33195	338.4	3.09701	-1.22899
END	0	0	380.	2.25098	337.3	2.07642	-.86913
2J1	0	0	380.	2.25098	337.3	2.07642	-.86913
22	0	0	390.8	1.93161	337.	1.77805	-.754769
23	0	0	401.6	1.53643	336.7	1.41073	-.608635
24	0	0	412.4	1.09933	336.3	1.0068	-.441438
25	0	0	423.2	.61834	336.	.564803	-.251678
END	0	0	434.	0	0	0	0
GND	124.264	-323.719	0	**4.94625**	**58.**	2.61947	4.19568
27	124.264	-323.719	20.	5.93397	47.2	4.03142	4.35426
28	124.264	-323.719	40.	6.08503	44.7	4.32214	4.2833
END	124.264	-323.719	60.	6.08299	42.6	4.47999	4.1149
2J3	124.264	-323.719	60.	6.08299	42.6	4.47999	4.1149
30	124.264	-323.719	81.6667	5.87664	41.1	4.42849	3.86309
31	124.264	-323.719	103.333	5.46027	39.9	4.19197	3.49884
END	124.264	-323.719	125.	4.81164	38.7	3.75262	3.01159
2J4	124.264	-323.719	125.	4.81164	38.7	3.75262	3.01159
33	124.264	-323.719	136.667	4.47294	38.3	3.50813	2.77494
34	124.264	-323.719	148.333	4.06847	37.9	3.20924	2.50065
END	124.264	-323.719	160.	3.59142	37.5	2.84907	2.18657
2J5	124.264	-323.719	160.	3.59142	37.5	2.84907	2.18657
36	124.264	-323.719	176.667	2.97277	37.	2.37267	1.79104
37	124.264	-323.719	193.333	2.24379	36.6	1.80134	1.33782
END	124.264	-323.719	210.	1.3717	36.1	1.10774	.808983
2J6	124.264	-323.719	210.	1.3717	36.1	1.10774	.808983
39	124.264	-323.719	218.667	1.01813	36.	.823818	.598257
40	124.264	-323.719	227.333	.610701	35.8	.495311	.357244
END	124.264	-323.719	236.	0	0	0	0

```
Medium wave array vertical current moment (amps-feet) peak
(Calculation assumes tower wires are grouped together.
The first wire of each group must contain the source.)

tower  magnitude    phase (deg)
 1     620.516      0.0
 2     434.361      41.9
```

Comparison of Current Moments with Theoretical Antenna Field Parameters

Tower	Current Moment Magnitude	Current Moment Phase	Normalized Magnitude	Normalized Phase	Standard Pattern Ratio	Standard Pattern Phase
1	620.516	0	1.0	0	1.0	0
2	434.361	41.9	0.700	41.9	0.700	41.9

As shown in the tables above, the base currents used in the Method of Moments computer model produce current moments in each of the towers that are identical to the field ratios and phases of the theoretical antenna parameters specified in the KNSS station license.

Item 4

Derivation of Operating Parameters for Directional Antennas - KNSS

The currents at the tower reference points have been calculated by using the computer circuit simulation program pspice. A pspice model has been made for each tower using the antenna base currents and base impedances calculated by MININEC and shown above, and the reactances listed previously in the table *Analysis of Tower Impedance Measurements to Verify Method of Moments Model*. The magnitude and phase of the current source in the pspice model was adjusted such that the current calculated in the output branch of the pspice model (the current through resistor R_L) was the same as the base current for the tower calculated by MININEC. The current at the reference point is the current source in the pspice model. These calculated currents are then normalized to the reference tower to obtain the antenna monitor phase and ratio readings, as shown in the tables labeled Antenna Monitor Parameters, which follow the pspice data below.

```
 ## KNSS TOWER 1 NIGHT BASE MODEL

 ****     CIRCUIT DESCRIPTION

******************************************************************************


.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 1330kHz 1330kHz

IIN             0                       1       AC 8.254 135.9
LXlc            1                       2               478.7uH
Rlc             2                       0               .001ohms
LXs             1                       3               4.0686uH
CXc             3                       0               39.89pF
CXic            3                       0               119.65pF
CXic2           3                       0               99.7pF
CL              3                       4               660.952pF
RL              4                       0               94.271ohms


.PRINT AC IM(RL) IP(RL)

##.PROBE
.END




 ****     AC ANALYSIS                     TEMPERATURE =   27.000 DEG C


  FREQ         IM(RL)      IP(RL)

   1.330E+06   6.021E+00   1.283E+02
```

KNSS TOWER 2 NIGHT BASE MODEL

**** CIRCUIT DESCRIPTION

****

```
.OPT LIST NOPAGE NODE NOMOD
.AC LIN 1 1330kHz 1330kHz

IIN             0                       1       AC 4.7892 60.36
LXlc            1                       2               2393.3uH
Rlc             2                       0               .001ohms
LXs             1                       3               2.0343uH
CXc             3                       0               39.89pF
CXic            3                       0               39.89pF
LL              3                       4               6.4695uH
RL              4                       0               64.71ohms

.PRINT AC IM(RL) IP(RL)

##.PROBE
.END
```

**** AC ANALYSIS TEMPERATURE = 27.000 DEG C

FREQ	IM(RL)	IP(RL)
1.330E+06	**4.946E+00**	**5.800E+01**

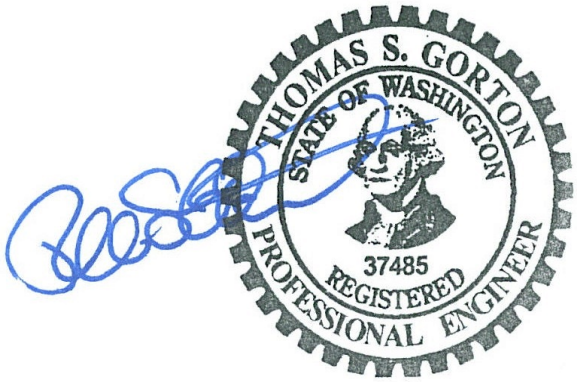
Antenna Monitor Parameters - Night Pattern - KNSS

Tower	Ref Point Current Magnitude	Ref Point Current Phase	Normalized Magnitude	Normalized Phase
1	8.254	135.9	1.0	0
2	4.7892	60.36	0.580	-75.5

Statement of Engineer

This Engineering Report, relative to an application for direct measurement of power for KNSS(AM), Wichita, KS. has been prepared by the undersigned. All representations contained herein are true to the best of my knowledge. I am an experienced radio engineer whose qualifications are a matter of record with the Federal Communications Commission. I am a staff engineer in the firm of Hatfield and Dawson Consulting Engineers and am Registered as a Professional Engineer in the States of Washington and Oregon.

Signed this 19th day of July 2021



Thomas S. Gorton, P.E.