Fletcher, Heald & Hildreth

1300 NORTH 17th STREET, 11th FLOOR
ARLINGTON, VIRGINIA 22209

OFFICE: (703) 812-0400
FAX: (703) 812-0486
www.fhhlaw.com
www.commlawblog.com

COPY

March 9, 2012

ANNE GOODWIN CRUMP
(703) 812-0426
CRUMP@FHHLAW.COM

BY FEDEX
Federal Communications Commission
Media Bureau
P.O. Box 979089
St. Louis, MO 63197-9000

Re: Application for License to Cover Construction Permit
KLRK(AM), Facility ID No. 21493
Mexia, Texas

Dear Sir or Madam:

Transmitted herewith in triplicate, on behalf of M&M Broadcasters, Ltd., licensee of KLRK(AM), is its application for license to cover construction permit (File No. BP-20100514ABJ) for modification of licensed facilities, together with FCC Form 159 reflecting credit card payment in the amount of $1,365.00 to cover the filing fee for the above-referenced license application.

Please date-stamp the attached confirmation copy and return it to the courier. Should any questions arise concerning this matter, please communicate with this office.

Very truly yours,

Anne Goodwin Crump

Anne Goodwin Crump
Counsel for M&M Broadcasters, Ltd.

Enclosures

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 BMML-20120312ADH

SECTION I - APPLICANT FEE INFORMATION

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

M&M Broadcasters, Ltd.

MAILING ADDRESS (Line 1) (Maximum 35 characters)
P.O. Box 1629

MAILING ADDRESS (Line 2) (Maximum 35 characters)

CITY	STATE OR COUNTRY (if foreign address)	ZIP CODE
Cleburne	TX	76033

TELEPHONE NUMBER (include area code)	CALL LETTERS	OTHER FCC IDENTIFIER (If applicable)
817-645-6643	KLRK	21493

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
MMR	0001	$ 635.00	

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
MOR	0001	$ 730.00	

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
	$ 1,365.00	

SECTION II - APPLICANT INFORMATION		
1. NAME OF APPLICANT M&M Broadcasters, Ltd.		
MAILING ADDRESS P.O. Box 1629		
CITY Cleburne	STATE TX	ZIP CODE 76033

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
KLRK	Mexia, TX	BP-20100514ABJ		02/23/2014

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. 1

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.

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

N/A

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
Gary L Moss	
Title	Date / Telephone Number
President	3-6-12 / 817-645-6643

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
M&M BROADCASTERS, LTD

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
KLRK	BP-20100514ABJ	1590	Unlimited	.065	2.5

2. Station location

State	City or Town
Texas	MEXIA

3. Transmitter location

State	County	City or Town	Street address (or other identification)
TX	LIMESTONE	PRAIRIE HILL	LCR 326

4. Main studio location

State	County	City or Town	Street address (or other identification)
TX	MCLENNAN	WACO	5501 BAGBY

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

State	County	City or Town	Street address (or other identification)
TX	MCLENNAN	WACO	5501 BAGBY

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. SEE TECH EXHIBIT

8. Operating constants:

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
1.18	7.35
Measured antenna or common point resistance (in ohms) at operating frequency	**Measured antenna or common point reactance (in ohms) at operating frequency**
Night: 50 Day: 50	Night: 0 Day: 0

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	0	1.0	1.0		
2	+52.0	+52.0	.508	.508		
3	-.3	-.3	.468	.468		
4	+.5	+.5	.673	.673		

Manufacturer and type of antenna monitor: N/A

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.
UNIFORM CROSS SECTION 24" FACE GUYED TOWER	47.14	48.2	48.2	Exhibit No. N/A

Excitation ☑ 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
31 ° 37 ' 12 "	96 ° 45 ' 06 "

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. SEE TECH EXHIBIT

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?

NONE

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

N/A

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)
Charles W. Staples	Charles W Staples
Address (include ZIP Code)	Date
4424 Glenwick Lane University Park, TX 75205-1037	03/3/2012
	Telephone No. (Include Area Code)
	2145266200

☐ Technical Director ☐ Registered Professional Engineer

☐ Chief Operator ☑ Technical Consultant

☐ Other (specify)

FCC Form 302 - Application for License
M&M Broadcasters, Ltd.
KLRK(AM), Mexia, Texas

Exhibit 1

KLRK is currently operating pursuant to Special Temporary Authority, File No. BSTA-20120213AAI, granted by the Commission on February 14, 2012. Pursuant to the terms of the underlying construction permit, the licensee must submit a proof of performance before it will be granted program test authority. The required information is submitted herewith, and applicant hereby requests a grant of program test authority.

KLRK (AM)
Facility ID 21493
Form AM302
Application for License
Construction Permit BP20100514ABJ

KLRK (AM)
Facility ID 21493
Form AM302
Application for License
Construction Permit BP20100514ABJ
Table of Contents

Engineering Exhibit
Application For License
BP-20100514ABJ
M&M Broadcasters, LTD
KLRK (AM) 1590 KHz
2.5 KW DA-D .07 KW DA-Night
Facility ID 21493
Mexia, Texas

Purpose of Application

M&M Broadcasters, LTD ("M&M") the licensee of KLRK has constructed the facility authorized by BP-20100514ABJ and herby submits the application to license the facility. M&M has chosen to use the method of moments proof authorized under 47 CFR 73.151(c). The construction consisted of building a new four tower array. The constructed site is as described in the above referenced construction permit. The towers utilized are four identical cross section twenty four inch face, uniform, guyed triangular towers. The towers are all a 47.14 meter radiator height. Tower number two has a six foot grid dish mounted at approximately 146 feet (44.5 m) and 7/8" coax running to an isocopuler at the base of the tower. The coax is bonded to the tower at twenty foot intervals.

Methodology

Impedances were measured at each tower at the location of ATU output J-plugs. All other towers floated by removing ATU output J-plugs. There were no other components shunted across the bases of the other towers with the exception of the static drain chokes and the isocoupler at tower 2. The isocoupler has a reactance of approximately 10 Pico farads. The static drain chokes are extremely high reactance and in this case are slightly capacitive (-12600 ohms at 1590 kHz) according to manufacturer's specifications. Each tower utilizes an Austin A4197L base insulator.

Towers were modeled using Mininec Broadcast Professional Expert Version 23. Twelve segments were used to represent each of the four towers using the geometry of the array specified in the above referenced construction permit. The tower feeds were measured individually with the OIB-3 and SG32/RG31 equipment. Towers one through three were measured and found to have feed reactance of 42.9 Ohms, and tower 4 measured 38.1 Ohms at 1590 kHz. The modeled values of the tower self impedance were then calculated to include the base components, such as stray capacitance of the Austin A4197L base insulator, feed reactance, etc., using the Phasetek nodal circuit analysis program. All modeled values of were found to be equivalent to measured values within ± 2 ohms and ± 4 percent for both resistance and reactance. See Exhibit One for details and verification of the modeling procedure. .

After completion of the verification of the modeling procedure, the method of moments model of the array was utilized for directional antenna calculation of complex voltage values at ground level under each tower using the theoretical parameters of parameters in the above referenced construction permit. Using these voltage sources, current magnitudes and phases for each element of the array were derived for the day array. As the night array is an identical pattern with a lower power level, no separate calculations were made for the night pattern. The Phasetek nodal circuit analysis program was used to calculate the base model input/output voltages and currents the directional mode. The calculated Mininec tower base drive voltage was used to determine the base network input current. This point is the location of the sampling TCT. Node one to ground represents the ATU shunt impedance. Node 1 to node 2 represents the tower feed impedance, and node 2 to ground represents the tower base impedance. These values of current and phase at the sampling point in the ATU were normalized to the reference tower to determine operating parameters. See Exhibit two for details of the calculations for values at the sampling point using this program and the final antenna monitor parameters specified on the Form 302AM. See Exhibit Two for the method of moment calculations of the

directional array, and corrections for base circuitry used in calculating the final operating parameters

Impedance measurements made of the sampling system were made with an Array Solutions AIM4170C analyzer in a calibrated measurement system. Measurements were made at the antenna monitor end of the sample lines connected to the sampling transformers at the tower bases while under open circuit conditions. Additionally measurements were made at the antenna monitor end of the sample lines with the sample lines disconnected from the sampling transformers. Frequencies above and below carrier frequency where resonance occurred were determined. As the length of a distortionless transmission line is 180 electrical degrees at the difference frequency between adjacent frequencies of resonance, and frequencies of resonance occur at odd multliples of 90 degrees electrical length, the sample line length at resonant frequency below or above carrier frequency (closest one to carrier frequency in terms of the ratio of frequencies) was found to be approximately 1584 KHz and 270 degrees. The lengths were calculated by the ratio of the frequencies using the formula: (F Carrier/Fmeas)/n90)= Electrical Length. To determine characteristic impedance values of the lines, open circuit measurements were made with frequencies offset to produce $\pm$ 45 degrees of electrical line length at the resonant frequency (approximately 1320 KHz and 1848 KHz). The characteristic impedance was calculated (using the equation $Z_0=(R^2_1+X_1^2)^{1/2} X (R_2^2+X_2^2))^{1/2})^{1/2}$) the electrical lengths of the sample lines was determined to be within .396° of each other. The characteristic impedance of the sample lines was within 2 ohms of the characteristic manufacturer's stated impedance of the line. The sample transformers utilized were three Phasetek P600-203 1.0V/A. The Phasetek toroidial sampling transformers were disconnected and measured with a common signal from a HP 8752A Network Analyzer (SN. 2901A00339). The signal was a CW signal from the reflection test port (RF Out) at 1590 KHz. The output port of each transformer was fed to the transmission test port (RF In) of the analyzer and compared against the reference transformer for phase and magnitude.

They were found to be within .527% ratio and .5° accuracy of each other. This equals or exceeds the manufacturer's specifications. See Exhibit Three for details of sample system measurements.

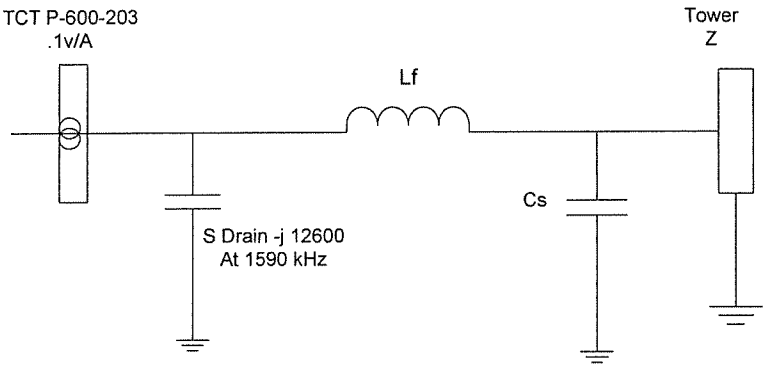
The new Potomac AM 1901-4 antenna monitor, S. N. 862, was calibrated according the manufacturer's instructions. Additionally, a CW signal from a Potomac SG31 generator was fed to the reference tower, and each tower port of the monitor to verify the monitor was within manufacturer's specifications of plus or minus .010 and 1 degree of the reference.

Reference measurements were made on both the day and night power levels with the array adjusted for the antenna monitor parameters calculated. See Exhibit Four for reference readings.

KLRK EXHIBIT 1
Tower Self Impedances
And
Verification Of Modeling

KLRK VERIFICATION OF MODELING

Tower	Measured Impedance At ATU J-Plug	Static Drain Impedance	Measured Feed Impedance	Base Insulator	Iso Coupler And Base	Modeled Base Impedance	Corrected Model At ATU J-Plug
1	51.85 +j85.9	-j12600	+j42.9	-j6673.2		50.11 + j43.15	51.46 + j86.33
2	58.2 + j99.4	-j12600	+j42.9		-j4003.9	55.27 + j56.39	57.75 + j99.83
3	50.5 + j87.5	-j12600	+j42.9	-j6673.2		49.6 + j44.85	50.98 + j88
4	50.0 + j82.7	-j12600	+j38.2	-j6673.2		48.78 + j43.615	50.07 + j82.08


TCT P-600-203
.1v/A
Lf
Tower
Z
Cs
S Drain -j 12600
At 1590 kHz

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

KLRK
NETWORK ID : TOWER 1 OTHERS OPEN

FREQUENCY : 1590.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-12600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 42.90 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -6673.20 OHMS
TOWER IMPEDANCE (R,X) : 50.11, 43.15 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-12600.00
2		GROUND	50.76	43.05
1		2	0.00	42.90

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	66.68	-19.13

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	51.46	86.33	100.50	59.20
INPUT CURRENT (AMPS) :	0.51	-0.85	0.99	-59.20
OUTPUT CURRENT (AMPS) :	0.51	-0.87	1.01	-59.87

INPUT/OUTPUT CURRENT RATIO = 0.9868
INPUT/OUTPUT PHASE = 0.67 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

KLRK
NETWORK ID : TOWER 2 OTHERS OPEN

FREQUENCY : 1590.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-12600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 42.90 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -4003.90 OHMS
TOWER IMPEDANCE (R,X) : 55.27, 56.39 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-12600.00
2		GROUND	56.85	56.40
1		2	0.00	42.90

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	69.99	-15.44

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	57.75	99.83	115.33	59.95
INPUT CURRENT (AMPS) :	0.43	-0.75	0.87	-59.95
OUTPUT CURRENT (AMPS) :	0.43	-0.78	0.89	-61.01

INPUT/OUTPUT CURRENT RATIO = 0.9783
INPUT/OUTPUT PHASE = 1.06 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

KLRK
NETWORK ID : TOWER 3 OTHERS OPEN

FREQUENCY : 1590.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-12600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 42.90 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -6673.20 OHMS
TOWER IMPEDANCE (R,X) : 49.60, 44.85 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-12600.00
2		GROUND	50.27	44.78
1		2	0.00	42.90

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	66.61	-18.48

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	50.98	88.09	101.77	59.94
INPUT CURRENT (AMPS) :	0.49	-0.85	0.98	-59.94
OUTPUT CURRENT (AMPS) :	0.49	-0.87	1.00	-60.60

INPUT/OUTPUT CURRENT RATIO = 0.9864
INPUT/OUTPUT PHASE = 0.66 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

KLRK
NETWORK ID : TOWER 4 OTHERS OPEN

FREQUENCY : 1590.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-12600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 38.20 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -6673.20 OHMS
TOWER IMPEDANCE (R,X) : 48.78, 43.62 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-12600.00
2		GROUND	49.42	43.54
1		2	0.00	38.20

NODE	VOLTAGE MAGNITUDE	PHASE
1	100.00	0.00
2	68.96	-17.46

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	50.07	82.08	96.14	58.62
INPUT CURRENT (AMPS) :	0.54	-0.89	1.04	-58.62
OUTPUT CURRENT (AMPS) :	0.54	-0.91	1.05	-59.26

INPUT/OUTPUT CURRENT RATIO = 0.9871
INPUT/OUTPUT PHASE = 0.65 DEGREES

KLRK Tower One Self Impedance
All Other Towers Floating

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.34	12
		0	0	94.6		
2	none	115.	10.	0	.4	12
		115.	10.	97.8		
3	none	180.	355.	0	.37	12
		180.	355.	95.8		
4	none	270.	355.	0	.29	12
		270.	355.	94.7		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	7.88333	2	8.15
radius	4	.29	2	.4

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.59	0	1	.0218982	.0226389

Sources

source	node	sector	magnitude	phase	type
1	1	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	13	0	-4,003.9	0	0	0
2	25	0	-6,673.2	0	0	0
3	37	0	-6,673.2	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							
1.59	50.112	43.148	66.129	40.7	2.3102	-8.0504	-.73998

CURRENT rms
Frequency = 1.59 MHz
Input power = .00572971 watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	.0106929	319.3	8.1E-03	-6.98E-03
2	0	0	7.88333	.0110746	316.5	8.04E-03	-7.62E-03
3	0	0	15.7667	.0110899	315.	7.85E-03	-7.84E-03
4	0	0	23.65	.0108689	313.9	7.53E-03	-7.84E-03
5	0	0	31.5333	.0104273	312.9	7.1E-03	-7.64E-03
6	0	0	39.4167	9.78E-03	312.	6.55E-03	-7.26E-03
7	0	0	47.3	8.93E-03	311.3	5.89E-03	-6.71E-03
8	0	0	55.1833	7.9E-03	310.6	5.14E-03	-6.E-03
9	0	0	63.0667	6.7E-03	310.	4.31E-03	-5.13E-03
10	0	0	70.95	5.34E-03	309.5	3.39E-03	-4.12E-03
11	0	0	78.8333	3.83E-03	308.9	2.4E-03	-2.98E-03
12	0	0	86.7167	2.15E-03	308.4	1.33E-03	-1.68E-03
END	0	0	94.6	0	0	0	0
GND	113.253	-19.9695	0	8.49E-05	159.8	-7.97E-05	2.93E-05
14	113.253	-19.9695	8.15	4.52E-04	159.8	-4.24E-04	1.56E-04
15	113.253	-19.9695	16.3	6.46E-04	159.8	-6.06E-04	2.23E-04
16	113.253	-19.9695	24.45	7.81E-04	159.8	-7.33E-04	2.69E-04
17	113.253	-19.9695	32.6	8.65E-04	159.8	-8.12E-04	2.99E-04
18	113.253	-19.9695	40.75	9.04E-04	159.8	-8.48E-04	3.12E-04
19	113.253	-19.9695	48.9	8.99E-04	159.8	-8.44E-04	3.11E-04
20	113.253	-19.9695	57.05	8.53E-04	159.8	-8.E-04	2.95E-04
21	113.253	-19.9695	65.2	7.67E-04	159.7	-7.2E-04	2.66E-04
22	113.253	-19.9695	73.35	6.44E-04	159.7	-6.03E-04	2.24E-04
23	113.253	-19.9695	81.5	4.83E-04	159.6	-4.53E-04	1.68E-04
24	113.253	-19.9695	89.65	2.84E-04	159.5	-2.66E-04	9.93E-05
END	113.253	-19.9695	97.8	0	0	0	0
GND	179.315	15.688	0	3.86E-05	98.3	-5.6E-06	3.82E-05
26	179.315	15.688	7.98333	3.04E-04	98.3	-4.37E-05	3.01E-04
27	179.315	15.688	15.9667	4.47E-04	98.2	-6.35E-05	4.42E-04
28	179.315	15.688	23.95	5.48E-04	98.	-7.65E-05	5.42E-04
29	179.315	15.688	31.9333	6.12E-04	97.9	-8.4E-05	6.07E-04
30	179.315	15.688	39.9167	6.44E-04	97.7	-8.65E-05	6.39E-04
31	179.315	15.688	47.9	6.45E-04	97.5	-8.47E-05	6.39E-04
32	179.315	15.688	55.8833	6.15E-04	97.4	-7.88E-05	6.1E-04
33	179.315	15.688	63.8667	5.57E-04	97.2	-6.95E-05	5.52E-04
34	179.315	15.688	71.85	4.69E-04	97.	-5.69E-05	4.66E-04
35	179.315	15.688	79.8333	3.54E-04	96.8	-4.16E-05	3.52E-04
36	179.315	15.688	87.8167	2.09E-04	96.5	-2.37E-05	2.07E-04
END	179.315	15.688	95.8	0	0	0	0
GND	268.973	23.5321	0	3.1E-05	9.9	3.05E-05	5.35E-06
38	268.973	23.5321	7.89167	2.2E-04	9.9	2.17E-04	3.78E-05
39	268.973	23.5321	15.7833	3.28E-04	9.8	3.23E-04	5.57E-05
40	268.973	23.5321	23.675	4.04E-04	9.7	3.98E-04	6.79E-05
41	268.973	23.5321	31.5667	4.53E-04	9.6	4.47E-04	7.52E-05
42	268.973	23.5321	39.4583	4.79E-04	9.4	4.72E-04	7.83E-05
43	268.973	23.5321	47.35	4.8E-04	9.3	4.74E-04	7.73E-05
44	268.973	23.5321	55.2417	4.6E-04	9.1	4.54E-04	7.27E-05
45	268.973	23.5321	63.1333	4.17E-04	8.9	4.11E-04	6.46E-05
46	268.973	23.5321	71.025	3.52E-04	8.7	3.48E-04	5.35E-05
47	268.973	23.5321	78.9167	2.65E-04	8.5	2.62E-04	3.94E-05

48	268.973	23.5321	86.8083	1.55E-04	8.3	1.54E-04	2.25E-05
END	268.973	23.5321	94.7	0	0	0	0

KLRK Tower Two Self Impedance
All Other Towers Floating

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.34	12
		0	0	94.6		
2	none	115.	10.	0	.4	12
		115.	10.	97.8		
3	none	180.	355.	0	.37	12
		180.	355.	95.8		
4	none	270.	355.	0	.29	12
		270.	355.	94.7		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	7.88333	2	8.15
radius	4	.29	2	.4

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.59	0	1	.0218982	.0226389

Sources

source	node	sector	magnitude	phase	type
1	13	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-6,673.2	0	0	0
2	25	0	-6,673.2	0	0	0
3	37	0	-6,673.2	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 13, sector 1							
1.59	55.272	56.388	78.959	45.6	2.8039	-6.4802	-1.1064

CURRENT rms
Frequency = 1.59 MHz
Input power = .00443271 watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	4.23E-05	155.3	-3.85E-05	1.77E-05
2	0	0	7.88333	3.2E-04	155.3	-2.9E-04	1.33E-04
3	0	0	15.7667	4.71E-04	155.3	-4.28E-04	1.97E-04
4	0	0	23.65	5.77E-04	155.3	-5.24E-04	2.41E-04
5	0	0	31.5333	6.44E-04	155.3	-5.85E-04	2.69E-04
6	0	0	39.4167	6.77E-04	155.3	-6.15E-04	2.83E-04
7	0	0	47.3	6.76E-04	155.3	-6.14E-04	2.83E-04
8	0	0	55.1833	6.43E-04	155.2	-5.84E-04	2.7E-04
9	0	0	63.0667	5.8E-04	155.2	-5.27E-04	2.43E-04
10	0	0	70.95	4.88E-04	155.2	-4.43E-04	2.05E-04
11	0	0	78.8333	3.66E-04	155.1	-3.32E-04	1.54E-04
12	0	0	86.7167	2.15E-04	155.1	-1.95E-04	9.04E-05
END	0	0	94.6	0	0	0	0
GND	113.253	-19.9695	0	8.96E-03	314.4	6.27E-03	-6.4E-03
14	113.253	-19.9695	8.15	9.45E-03	311.2	6.22E-03	-7.11E-03
15	113.253	-19.9695	16.3	9.55E-03	309.5	6.07E-03	-7.37E-03
16	113.253	-19.9695	24.45	9.42E-03	308.2	5.82E-03	-7.41E-03
17	113.253	-19.9695	32.6	9.09E-03	307.1	5.48E-03	-7.25E-03
18	113.253	-19.9695	40.75	8.56E-03	306.2	5.06E-03	-6.91E-03
19	113.253	-19.9695	48.9	7.85E-03	305.4	4.55E-03	-6.4E-03
20	113.253	-19.9695	57.05	6.97E-03	304.7	3.96E-03	-5.73E-03
21	113.253	-19.9695	65.2	5.93E-03	304.	3.32E-03	-4.92E-03
22	113.253	-19.9695	73.35	4.74E-03	303.4	2.61E-03	-3.96E-03
23	113.253	-19.9695	81.5	3.41E-03	302.8	1.85E-03	-2.86E-03
24	113.253	-19.9695	89.65	1.92E-03	302.3	1.03E-03	-1.63E-03
END	113.253	-19.9695	97.8	0	0	0	0
GND	179.315	15.688	0	5.26E-05	192.6	-5.13E-05	-1.15E-05
26	179.315	15.688	7.98333	4.13E-04	192.7	-4.03E-04	-9.07E-05
27	179.315	15.688	15.9667	6.07E-04	192.8	-5.92E-04	-1.34E-04
28	179.315	15.688	23.95	7.42E-04	193.	-7.23E-04	-1.66E-04
29	179.315	15.688	31.9333	8.27E-04	193.1	-8.05E-04	-1.88E-04
30	179.315	15.688	39.9167	8.67E-04	193.3	-8.44E-04	-2.E-04
31	179.315	15.688	47.9	8.65E-04	193.6	-8.41E-04	-2.03E-04
32	179.315	15.688	55.8833	8.23E-04	193.8	-7.99E-04	-1.97E-04
33	179.315	15.688	63.8667	7.41E-04	194.2	-7.19E-04	-1.81E-04
34	179.315	15.688	71.85	6.22E-04	194.5	-6.03E-04	-1.56E-04
35	179.315	15.688	79.8333	4.67E-04	194.8	-4.52E-04	-1.2E-04
36	179.315	15.688	87.8167	2.74E-04	195.2	-2.65E-04	-7.19E-05
END	179.315	15.688	95.8	0	0	0	0
GND	268.973	23.5321	0	3.76E-05	111.4	-1.38E-05	3.5E-05
38	268.973	23.5321	7.89167	2.67E-04	111.4	-9.76E-05	2.49E-04
39	268.973	23.5321	15.7833	3.97E-04	111.3	-1.44E-04	3.7E-04
40	268.973	23.5321	23.675	4.88E-04	111.2	-1.77E-04	4.55E-04
41	268.973	23.5321	31.5667	5.47E-04	111.1	-1.97E-04	5.11E-04
42	268.973	23.5321	39.4583	5.77E-04	111.	-2.06E-04	5.38E-04
43	268.973	23.5321	47.35	5.77E-04	110.8	-2.05E-04	5.4E-04
44	268.973	23.5321	55.2417	5.51E-04	110.7	-1.95E-04	5.15E-04

45	268.973	23.5321	63.1333	4.98E-04	110.6	-1.75E-04	4.66E-04
46	268.973	23.5321	71.025	4.19E-04	110.4	-1.46E-04	3.93E-04
47	268.973	23.5321	78.9167	3.15E-04	110.2	-1.09E-04	2.95E-04
48	268.973	23.5321	86.8083	1.84E-04	110.	-6.3E-05	1.73E-04
END	268.973	23.5321	94.7	0	0	0	0

KLRK Tower Three Self Impedance
All Other Towers Floating

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.34	12
		0	0	94.6		
2	none	115.	10.	0	.4	12
		115.	10.	97.8		
3	none	180.	355.	0	.37	12
		180.	355.	95.8		
4	none	270.	355.	0	.29	12
		270.	355.	94.7		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	7.88333	2	8.15
radius	4	.29	2	.4

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.59	0	1	.0218982	.0226389

Sources

source	node	sector	magnitude	phase	type
1	25	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-6,673.2	0	0	0
2	13	0	-4,003.9	0	0	0
3	37	0	-6,673.2	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 25, sector 1							
1.59	49.608	44.848	66.875	42.1	2.3931	-7.7323	-.80172

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CURRENT rms
Frequency = 1.59 MHz
Input power = .00554614 watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	3.82E-05	96.9	-4.62E-06	3.79E-05
2	0	0	7.88333	2.88E-04	96.9	-3.46E-05	2.86E-04
3	0	0	15.7667	4.26E-04	96.8	-5.05E-05	4.23E-04
4	0	0	23.65	5.22E-04	96.7	-6.1E-05	5.18E-04
5	0	0	31.5333	5.84E-04	96.6	-6.7E-05	5.8E-04
6	0	0	39.4167	6.15E-04	96.4	-6.91E-05	6.11E-04
7	0	0	47.3	6.16E-04	96.3	-6.76E-05	6.12E-04
8	0	0	55.1833	5.88E-04	96.1	-6.28E-05	5.84E-04
9	0	0	63.0667	5.32E-04	96.	-5.52E-05	5.29E-04
10	0	0	70.95	4.48E-04	95.8	-4.5E-05	4.46E-04
11	0	0	78.8333	3.38E-04	95.6	-3.27E-05	3.36E-04
12	0	0	86.7167	1.98E-04	95.3	-1.84E-05	1.98E-04
END	0	0	94.6	0	0	0	0
GND	113.253	-19.9695	0	1.04E-04	195.7	-1.E-04	-2.82E-05
14	113.253	-19.9695	8.15	5.54E-04	195.8	-5.33E-04	-1.51E-04
15	113.253	-19.9695	16.3	7.92E-04	195.9	-7.61E-04	-2.17E-04
16	113.253	-19.9695	24.45	9.56E-04	196.1	-9.19E-04	-2.65E-04
17	113.253	-19.9695	32.6	1.06E-03	196.3	-1.02E-03	-2.97E-04
18	113.253	-19.9695	40.75	1.11E-03	196.5	-1.06E-03	-3.15E-04
19	113.253	-19.9695	48.9	1.1E-03	196.8	-1.05E-03	-3.18E-04
20	113.253	-19.9695	57.05	1.04E-03	197.1	-9.95E-04	-3.07E-04
21	113.253	-19.9695	65.2	9.36E-04	197.5	-8.93E-04	-2.81E-04
22	113.253	-19.9695	73.35	7.85E-04	197.8	-7.47E-04	-2.4E-04
23	113.253	-19.9695	81.5	5.88E-04	198.2	-5.59E-04	-1.84E-04
24	113.253	-19.9695	89.65	3.45E-04	198.6	-3.27E-04	-1.1E-04
END	113.253	-19.9695	97.8	0	0	0	0
GND	179.315	15.688	0	.0105736	317.9	7.84E-03	-7.09E-03
26	179.315	15.688	7.98333	.0109915	315.1	7.78E-03	-7.76E-03
27	179.315	15.688	15.9667	.011025	313.5	7.6E-03	-7.99E-03
28	179.315	15.688	23.95	.010819	312.4	7.29E-03	-7.99E-03
29	179.315	15.688	31.9333	.0103896	311.4	6.87E-03	-7.8E-03
30	179.315	15.688	39.9167	9.75E-03	310.5	6.34E-03	-7.41E-03
31	179.315	15.688	47.9	8.91E-03	309.8	5.7E-03	-6.85E-03
32	179.315	15.688	55.8833	7.89E-03	309.1	4.98E-03	-6.12E-03
33	179.315	15.688	63.8667	6.69E-03	308.5	4.17E-03	-5.24E-03
34	179.315	15.688	71.85	5.34E-03	307.9	3.28E-03	-4.21E-03
35	179.315	15.688	79.8333	3.83E-03	307.4	2.32E-03	-3.04E-03
36	179.315	15.688	87.8167	2.15E-03	306.9	1.29E-03	-1.72E-03
END	179.315	15.688	95.8	0	0	0	0
GND	268.973	23.5321	0	5.35E-05	180.6	-5.35E-05	-5.38E-07
38	268.973	23.5321	7.89167	3.8E-04	180.6	-3.8E-04	-4.11E-06
39	268.973	23.5321	15.7833	5.63E-04	180.7	-5.63E-04	-6.78E-06
40	268.973	23.5321	23.675	6.91E-04	180.8	-6.91E-04	-9.38E-06
41	268.973	23.5321	31.5667	7.73E-04	180.9	-7.73E-04	-1.19E-05
42	268.973	23.5321	39.4583	8.12E-04	181.	-8.12E-04	-1.42E-05
43	268.973	23.5321	47.35	8.1E-04	181.1	-8.1E-04	-1.6E-05
44	268.973	23.5321	55.2417	7.7E-04	181.3	-7.7E-04	-1.72E-05
45	268.973	23.5321	63.1333	6.93E-04	181.4	-6.93E-04	-1.74E-05
46	268.973	23.5321	71.025	5.82E-04	181.6	-5.81E-04	-1.62E-05
47	268.973	23.5321	78.9167	4.35E-04	181.8	-4.35E-04	-1.35E-05
48	268.973	23.5321	86.8083	2.53E-04	181.9	-2.53E-04	-8.6E-06
END	268.973	23.5321	94.7	0	0	0	0

KLRK Tower 4 Self Impedance
All Others Floating

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.34	12
		0	0	94.6		
2	none	115.	10.	0	.4	12
		115.	10.	97.8		
3	none	180.	355.	0	.37	12
		180.	355.	95.8		
4	none	270.	355.	0	.29	12
		270.	355.	94.7		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	7.88333	2	8.15
radius	4	.29	2	.4

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.59	0	1	.0218982	.0226389

Sources

source	node	sector	magnitude	phase	type
1	37	1	1.	0	voltage

Lumped loads

load	node	resistance (ohms)	reactance (ohms)	inductance (mH)	capacitance (uF)	passive circuit
1	1	0	-6,673.2	0	0	0
2	13	0	-4,003.9	0	0	0
3	25	0	-6,673.2	0	0	0

IMPEDANCE
normalization = 50.

freq (MHz)	resist (ohms)	react (ohms)	imped (ohms)	phase (deg)	VSWR	S11 dB	S12 dB
source = 1; node 37, sector 1							
1.59	48.78	43.615	65.435	41.8	2.3561	-7.8707	-.77418

CURRENT rms
Frequency = 1.59 MHz
Input power = .00569623 watts
Efficiency = 100. %
coordinates in degrees

current	mag	phase	real	imaginary

no.	X	Y	Z	(amps)	(deg)	(amps)	(amps)
GND	0	0	0	3.13E-05	8.9	3.09E-05	4.82E-06
2	0	0	7.88333	2.37E-04	8.8	2.34E-04	3.62E-05
3	0	0	15.7667	3.5E-04	8.7	3.46E-04	5.3E-05
4	0	0	23.65	4.29E-04	8.6	4.25E-04	6.43E-05
5	0	0	31.5333	4.81E-04	8.5	4.76E-04	7.11E-05
6	0	0	39.4167	5.08E-04	8.4	5.02E-04	7.38E-05
7	0	0	47.3	5.09E-04	8.2	5.04E-04	7.27E-05
8	0	0	55.1833	4.87E-04	8.	4.82E-04	6.82E-05
9	0	0	63.0667	4.42E-04	7.9	4.37E-04	6.04E-05
10	0	0	70.95	3.73E-04	7.7	3.7E-04	4.98E-05
11	0	0	78.8333	2.82E-04	7.5	2.8E-04	3.66E-05
12	0	0	86.7167	1.66E-04	7.2	1.65E-04	2.09E-05
END	0	0	94.6	0	0	0	0
GND	113.253	-19.9695	0	7.62E-05	114.8	-3.2E-05	6.92E-05
14	113.253	-19.9695	8.15	4.06E-04	114.8	-1.7E-04	3.68E-04
15	113.253	-19.9695	16.3	5.81E-04	114.7	-2.43E-04	5.28E-04
16	113.253	-19.9695	24.45	7.03E-04	114.6	-2.92E-04	6.4E-04
17	113.253	-19.9695	32.6	7.81E-04	114.4	-3.23E-04	7.11E-04
18	113.253	-19.9695	40.75	8.17E-04	114.3	-3.36E-04	7.45E-04
19	113.253	-19.9695	48.9	8.15E-04	114.1	-3.33E-04	7.44E-04
20	113.253	-19.9695	57.05	7.75E-04	114.	-3.15E-04	7.08E-04
21	113.253	-19.9695	65.2	6.99E-04	113.8	-2.82E-04	6.39E-04
22	113.253	-19.9695	73.35	5.88E-04	113.7	-2.36E-04	5.38E-04
23	113.253	-19.9695	81.5	4.42E-04	113.5	-1.76E-04	4.06E-04
24	113.253	-19.9695	89.65	2.61E-04	113.3	-1.03E-04	2.39E-04
END	113.253	-19.9695	97.8	0	0	0	0
GND	179.315	15.688	0	5.47E-05	180.9	-5.47E-05	-8.44E-07
26	179.315	15.688	7.98333	4.3E-04	180.9	-4.3E-04	-7.04E-06
27	179.315	15.688	15.9667	6.31E-04	181.	-6.31E-04	-1.13E-05
28	179.315	15.688	23.95	7.71E-04	181.1	-7.71E-04	-1.53E-05
29	179.315	15.688	31.9333	8.6E-04	181.3	-8.6E-04	-1.9E-05
30	179.315	15.688	39.9167	9.01E-04	181.4	-9.01E-04	-2.21E-05
31	179.315	15.688	47.9	8.99E-04	181.6	-8.98E-04	-2.43E-05
32	179.315	15.688	55.8833	8.54E-04	181.7	-8.53E-04	-2.54E-05
33	179.315	15.688	63.8667	7.69E-04	181.9	-7.68E-04	-2.5E-05
34	179.315	15.688	71.85	6.45E-04	182.	-6.45E-04	-2.27E-05
35	179.315	15.688	79.8333	4.84E-04	182.2	-4.84E-04	-1.84E-05
36	179.315	15.688	87.8167	2.84E-04	182.3	-2.84E-04	-1.15E-05
END	179.315	15.688	95.8	0	0	0	0
GND	268.973	23.5321	0	.0108062	318.2	8.06E-03	-7.2E-03
38	268.973	23.5321	7.89167	.011163	315.7	7.99E-03	-7.79E-03
39	268.973	23.5321	15.7833	.0111674	314.3	7.8E-03	-7.99E-03
40	268.973	23.5321	23.675	.010935	313.2	7.49E-03	-7.97E-03
41	268.973	23.5321	31.5667	.0104816	312.3	7.05E-03	-7.76E-03
42	268.973	23.5321	39.4583	9.82E-03	311.5	6.5E-03	-7.36E-03
43	268.973	23.5321	47.35	8.96E-03	310.8	5.85E-03	-6.79E-03
44	268.973	23.5321	55.2417	7.92E-03	310.1	5.1E-03	-6.05E-03
45	268.973	23.5321	63.1333	6.7E-03	309.6	4.27E-03	-5.17E-03
46	268.973	23.5321	71.025	5.33E-03	309.	3.36E-03	-4.14E-03
47	268.973	23.5321	78.9167	3.81E-03	308.5	2.37E-03	-2.98E-03
48	268.973	23.5321	86.8083	2.13E-03	308.	1.31E-03	-1.67E-03
END	268.973	23.5321	94.7	0	0	0	0

KLRK EXHIBIT 2
MODELED DIRECTIONAL
ARRAY AND OPERATING PARAMETERS

KLRK Array Synthesis
MEDIUM WAVE ARRAY SYNTHESIS FROM FIELD RATIOS

Frequency = 1.59 MHz

tower	field ratio magnitude	phase (deg)
1	1.	0
2	.413	60.6
3	.422	-8.
4	.652	0

VOLTAGES AND CURRENTS - rms

source node	voltage magnitude	phase (deg)	current magnitude	phase (deg)
1	326.41	44.6	5.32702	6.1
13	119.375	314.7	2.63752	58.9
25	225.707	356.1	2.45676	5.1
37	209.303	32.9	3.57559	6.5

Sum of square of source currents = 108.308
Total power = 2,500. watts

TOWER ADMITTANCE MATRIX

admittance	real (mhos)	imaginary (mhos)
Y(1, 1)	.0110938	-.00726462
Y(1, 2)	.00434403	.00355318
Y(1, 3)	.00179525	-.000337482
Y(1, 4)	-.000354247	-.000451717
Y(2, 1)	.00434414	.00355304
Y(2, 2)	.00542243	-.00565781
Y(2, 3)	.00377071	.00601289
Y(2, 4)	.00120358	-.000342222
Y(3, 1)	.00179524	-.000337479
Y(3, 2)	.00377058	.00601301
Y(3, 3)	.00509302	-.00696959
Y(3, 4)	.00385159	.0051843
Y(4, 1)	-.000354226	-.000451735
Y(4, 2)	.00120355	-.000342223
Y(4, 3)	.0038516	.00518428
Y(4, 4)	.00906998	-.00807151

TOWER IMPEDANCE MATRIX

impedance	real (ohms)	imaginary (ohms)
Z(1, 1)	50.2473	42.961
Z(1, 2)	11.4177	-29.2647
Z(1, 3)	-15.3367	-18.2657
Z(1, 4)	-14.9442	11.7183
Z(2, 1)	11.4186	-29.2644
Z(2, 2)	55.4935	56.2981
Z(2, 3)	33.2253	-20.4913
Z(2, 4)	-10.5772	-25.6531
Z(3, 1)	-15.3366	-18.2658
Z(3, 2)	33.2244	-20.4921
Z(3, 3)	50.0383	44.9903
Z(3, 4)	23.09	-24.6628
Z(4, 1)	-14.9443	11.7183
Z(4, 2)	-10.5776	-25.653

KLRK Directional Model

GEOMETRY
Wire coordinates in degrees; other dimensions in meters
Environment: perfect ground

wire	caps	Distance	Angle	Z	radius	segs
1	none	0	0	0	.34	12
		0	0	94.6		
2	none	115.	10.	0	.4	12
		115.	10.	97.8		
3	none	180.	355.	0	.37	12
		180.	355.	95.8		
4	none	270.	355.	0	.29	12
		270.	355.	94.7		

Number of wires = 4
current nodes = 48

	minimum		maximum	
Individual wires	wire	value	wire	value
segment length	1	7.88333	2	8.15
radius	4	.29	2	.4

ELECTRICAL DESCRIPTION
Frequencies (MHz)

	frequency		no. of	segment length (wavelengths)	
no.	lowest	step	steps	minimum	maximum
1	1.59	0	1	.0218982	.0226389

Sources

source	node	sector	magnitude	phase	type
1	1	1	461.614	44.6	voltage
2	13	1	168.822	314.7	voltage
3	25	1	319.198	356.1	voltage
4	37	1	295.999	32.9	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							
1.59	47.909	38.201	61.274	38.6	2.1448	-8.7773	-.61739
source = 2; node 13, sector 1							
1.59	-11.109	-43.876	45.26	255.8	****	****	****
source = 3; node 25, sector 1							
1.59	90.728	-14.453	91.872	350.9	1.8797	-10.3	-.42547
source = 4; node 37, sector 1							
1.59	52.419	26.054	58.537	26.4	1.6581	-12.125	-.27474

Frequency = 1.59 MHz
Input power = 2,500. watts
Efficiency = 100. %
coordinates in degrees

current no.	X	Y	Z	mag (amps)	phase (deg)	real (amps)	imaginary (amps)
GND	0	0	0	5.32702	6.1	5.29722	.562723
2	0	0	7.88333	5.49088	3.4	5.48096	.329949
3	0	0	15.7667	5.48392	2.	5.48059	.191057
4	0	0	23.65	5.36361	.9	5.36301	.0803634
5	0	0	31.5333	5.13714	359.9	5.13714	-7.78E-03
6	0	0	39.4167	4.81021	359.1	4.80962	-.0755056
7	0	0	47.3	4.38853	358.4	4.38679	-.123643
8	0	0	55.1833	3.8783	357.7	3.8753	-.152594
9	0	0	63.0667	3.28593	357.2	3.2819	-.162643
10	0	0	70.95	2.61713	356.6	2.6126	-.15401
11	0	0	78.8333	1.87448	356.1	1.8702	-.126682
12	0	0	86.7167	1.05162	355.6	1.04858	-.0798847
END	0	0	94.6	0	0	0	0
GND	113.253	-19.9695	0	2.63752	58.9	1.36226	2.25849
14	113.253	-19.9695	8.15	2.49197	59.6	1.26009	2.14991
15	113.253	-19.9695	16.3	2.36347	60.1	1.17968	2.04801
16	113.253	-19.9695	24.45	2.21456	60.4	1.09338	1.92582
17	113.253	-19.9695	32.6	2.04351	60.7	.999538	1.78238
18	113.253	-19.9695	40.75	1.85087	61.	.897997	1.61843
19	113.253	-19.9695	48.9	1.6383	61.2	.789287	1.43563
20	113.253	-19.9695	57.05	1.40802	61.4	.674225	1.23609
21	113.253	-19.9695	65.2	1.1624	61.6	.553689	1.02205
22	113.253	-19.9695	73.35	.90361	61.7	.428456	.795573
23	113.253	-19.9695	81.5	.632756	61.8	.298814	.557755
24	113.253	-19.9695	89.65	.348236	61.9	.16383	.307291
END	113.253	-19.9695	97.8	0	0	0	0
GND	179.315	15.688	0	2.45675	5.1	2.447	.218713
26	179.315	15.688	7.98333	2.41205	359.7	2.412	-.0145773
27	179.315	15.688	15.9667	2.35103	356.5	2.34658	-.144656
28	179.315	15.688	23.95	2.25957	353.9	2.24672	-.24067
29	179.315	15.688	31.9333	2.13572	351.7	2.11331	-.308581
30	179.315	15.688	39.9167	1.9793	349.8	1.94792	-.351046
31	179.315	15.688	47.9	1.79109	348.1	1.75256	-.369465
32	179.315	15.688	55.8833	1.57251	346.6	1.52959	-.364888
33	179.315	15.688	63.8667	1.32534	345.2	1.28145	-.338277
34	179.315	15.688	71.85	1.05121	344.	1.01027	-.290501
35	179.315	15.688	79.8333	.750619	342.8	.717027	-.222037
36	179.315	15.688	87.8167	.420731	341.7	.399422	-.1322
END	179.315	15.688	95.8	0	0	0	0
GND	268.973	23.5321	0	3.57559	6.5	3.55271	.403828
38	268.973	23.5321	7.89167	3.63689	3.8	3.62899	.239621
39	268.973	23.5321	15.7833	3.60729	2.2	3.60462	.138882
40	268.973	23.5321	23.675	3.50929	1.	3.50881	.0585199
41	268.973	23.5321	31.5667	3.34632	359.9	3.34631	-5.54E-03
42	268.973	23.5321	39.4583	3.12147	359.	3.12099	-.0547581
43	268.973	23.5321	47.35	2.83818	358.2	2.83676	-.0897163
44	268.973	23.5321	55.2417	2.50028	357.5	2.49783	-.110695
45	268.973	23.5321	63.1333	2.11179	356.8	2.10849	-.1179
46	268.973	23.5321	71.025	1.67635	356.2	1.67264	-.111496
47	268.973	23.5321	78.9167	1.19571	355.6	1.1922	-.0914911
48	268.973	23.5321	86.8083	.665768	355.1	.663294	-.0573321

END	268.973	23.5321	94.7	0	0	0	0

Z(4, 3)	23.0899	-24.663
Z(4, 4)	48.8639	43.4783

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

KLRK
NETWORK ID : TOWER 1 DA

FREQUENCY : 1590.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-12600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 42.90 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -6673.20 OHMS
TOWER IMPEDANCE (R,X) : 47.91, 38.20 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-12600.00
2		GROUND	48.46	38.07
1		2	0.00	42.90

NODE	VOLTAGE MAGNITUDE	PHASE
1	499.81	65.55
2	326.41	44.60

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	49.09	81.30	94.97	58.88
INPUT CURRENT (AMPS) :	5.23	0.61	5.26	6.67
OUTPUT CURRENT (AMPS) :	5.30	0.56	5.33	6.03

INPUT/OUTPUT CURRENT RATIO = 0.9879
INPUT/OUTPUT PHASE = 0.64 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

KLRK
NETWORK ID : TOWER 2 DA

FREQUENCY : 1590.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-12600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 42.90 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -4003.90 OHMS
TOWER IMPEDANCE (R,X) : -11.11, -43.88 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-12600.00
2		GROUND	-10.87	-43.43
1		2	0.00	42.90

NODE	VOLTAGE MAGNITUDE	PHASE
1	29.02	-118.44
2	119.38	314.70

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	-10.87	-0.54	10.88	-177.14
INPUT CURRENT (AMPS) :	1.39	2.28	2.67	58.70
OUTPUT CURRENT (AMPS) :	1.36	2.26	2.64	58.91

INPUT/OUTPUT CURRENT RATIO = 1.0110
INPUT/OUTPUT PHASE = -0.21 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

KLRK
NETWORK ID : TOWER 3 DA

FREQUENCY : 1590.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-12600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 42.90 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -6673.20 OHMS
TOWER IMPEDANCE (R,X) : 90.73, -14.45 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-12600.00
2		GROUND	90.32	-15.64
1		2	0.00	42.90

NODE	VOLTAGE MAGNITUDE	PHASE
1	232.30	22.72
2	225.71	356.10

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	90.71	26.66	94.55	16.38
INPUT CURRENT (AMPS) :	2.44	0.27	2.46	6.34
OUTPUT CURRENT (AMPS) :	2.45	0.22	2.46	5.15

INPUT/OUTPUT CURRENT RATIO = 1.0001
INPUT/OUTPUT PHASE = 1.19 DEGREES

BASE NETWORK COMPUTATION
PHASETEK INC.
QUAKERTOWN PA

KLRK
NETWORK ID : TOWER 4 DA

FREQUENCY : 1590.00 kHz
ATU SHUNT IMPEDANCE (R,X) : 0.00,-12600.00 OHMS
TOWER FEED IMPEDANCE (R,X) : 0.00, 38.20 OHMS
TOWER SHUNT IMPEDANCE (R,X) : 0.00, -6673.20 OHMS
TOWER IMPEDANCE (R,X) : 52.42, 26.05 OHMS

NODE	TO	NODE	IMPEDANCE (OHMS) R	X
1		GROUND	0.00	-12600.00
2		GROUND	52.83	25.74
1		2	0.00	38.20

NODE	VOLTAGE MAGNITUDE	PHASE
1	295.40	57.36
2	209.30	32.90

	REAL	IMAGINARY	MAGNITUDE	PHASE
INPUT IMPEDANCE (OHMS) :	53.37	64.04	83.36	50.19
INPUT CURRENT (AMPS) :	3.52	0.44	3.54	7.17
OUTPUT CURRENT (AMPS) :	3.55	0.40	3.58	6.48

INPUT/OUTPUT CURRENT RATIO = 0.9911
INPUT/OUTPUT PHASE = 0.69 DEGREES

KLRK MODELED PARAMETERS AT ATU FROM MOM

	Modeled Current At Tower	Modeled Phase At Tower	Modeled Current Corrected for ATU TCT	Modeled Phase Corrected For ATU TCT	Normalized Ratio	Normalized Phase Degrees
Tower 1	5.327	6.1	5.26	6.67	1	0
Tower 2	2.6375	58.9	2.67	58.7	0.508	+52
Tower 3	2.456	5.1	2.46	6.37	0.468	-0.3
Tower 4	3.575	6.5	3.54	7.17	0.673	+.5

KLRK EXHIBIT 3
Sampling System

KLRK Tower Sample Line Measurements

	Resonance Below 1590KHz	Resonance Above 1590KHz	Calculated Electrical Length Deg.	Measured Impedance Terminated in TCT *
Tower 1	1584.4	2645.3	270.9	50.75 -j3.43
Tower 2	1584.5	2645.7	270.93	50.9 -j3.5
Tower 3	1582.4	2643	271.296	50.49 -J3.03
Tower 4	1583.5	2644.4	271.1	51.13 -j3.22

	+45 Degree Offset Frequency (KHz)	+45 Degree Measured Impedance (Ohms)	-45 Degree Offset Frequency (KHz)	-45 Degree Measured Impedance (Ohms)	Calculated Characteristic Impedance *
Tower 1	1848.46	5.3+ j49.91	1320.33	4.19 - j50.1	50.23
Tower 2	1848.58	5.3 + j49.75	1320.41	5.86 - j49.86	50.03
Tower 3	1846.1	5.42 + j49.48	1318.66	4.30 - j49.65	49.81
Tower 4	1847.4	5.3 + j49.91	1319.58	4.19 - j50.07	50.22
				MAX Impedance Ohms	50.23
				MIN Impedance Ohms	49.81
				MAXIMUM IMPEDANCE DELTA	**0.43**

*Ohms

TCT Verification

Tower	Serial Number	Magnitude mV	Phase (deg.)	Z in Ohms at 1590 KHz
1	304	37.9	163.8	49.6 +j3.3
2	305	37.8	163.6	49.4 +j3.4
3	306	37.7	163.3	49.4 +j3.1
4	307	37.7	163.5	49.4 +j3.1

KLRK EXHIBIT 4
Reference Readings

READINGS BY MITCH RICE
READINGS mV/m
DISTANCE km

KLRK REFERENCE READINGS

POTOMAC FIM 41 SN 497
AILL TIME CST

30.5 DEGREES

Point	Distance	Reading Day	Reading Night	Time	Date	Coordinates	Description
1	3	34	6.2	1605	2/23/12	31 38 31.65 96 44 06.6	5851 FM 1245
2	6.38	16	2.9	1614	"	31 40 11.42 96 42 59.61	LCR 146 in road
3	12.25	7.3	1.2	952	2/24/12	31 42 53.62 96 41 08.94	LCR 936 in road
4	15.72	6.7	1.0	1002	"	31 44 30.61 96 40 02.98	FM2310 & FN73

133 DEGREES

Point	Distance	Reading Day	Reading Night	Time	Date	Coordinates	Description
1	4.49	47	8.4	1432	2/23/12	31 335 32.46 96 43 0.8	LCR358 in road
2	5.45	33.5	5.9	1424	"	31 35 11.95 96 42 33.98	LCR 354 in road
3	13.32	11	1.9	1251	"	31 32 17.2 96 38 56	LCR 616 in road
4	14.67	9.5	1.5	1242	"	31 31 47.6 96 38 18.8	220 LCR 632

211.5 DEGREES

Point	Distance	Reading Day	Reading Night	Time	Date	Coordinates	Description
1	1.99	49	9	1045	2/23/12	31-36-19.22 96 45 46.66	Fm 339 in road
2	4.6	30	5.6	1055	"	31 35 05.6 96 46 .37.18	FM 342
3	8.94	16.8	3.1	1110	"	31 33 05 96 47 59	Hwy 164
4	10.87	13	2.4	1129	"	31 32 10.4 96 48 41	S County Lne Rd

324 DEGREES

Point	Distance	Reading Day	Reading Night	Time	Date	Coordinates	Description
1	3.00	18.5	2.8	926	2/24/12	31 38 33.12 96 47 12.74	LCR 326 side of road
2	6.12	6.4	1	1022	"	31 39 52.18 96 47 21.4	LCR 137 in road
3	8.56	4.5	0.72	1031	"	31 40 54.59 96 48.18.02	LCR 140 in road
4	11.98	3.5	0.58	1043	"	31 42 24.6 96 49 34.43	LCR 134 in road

READINGS BY MITCH RICE
READINGS mV/m
DISTANCE km

KLRK REFERENCE READINGS

POTOMAC FIM 41 SN 497
AILL TIME CST

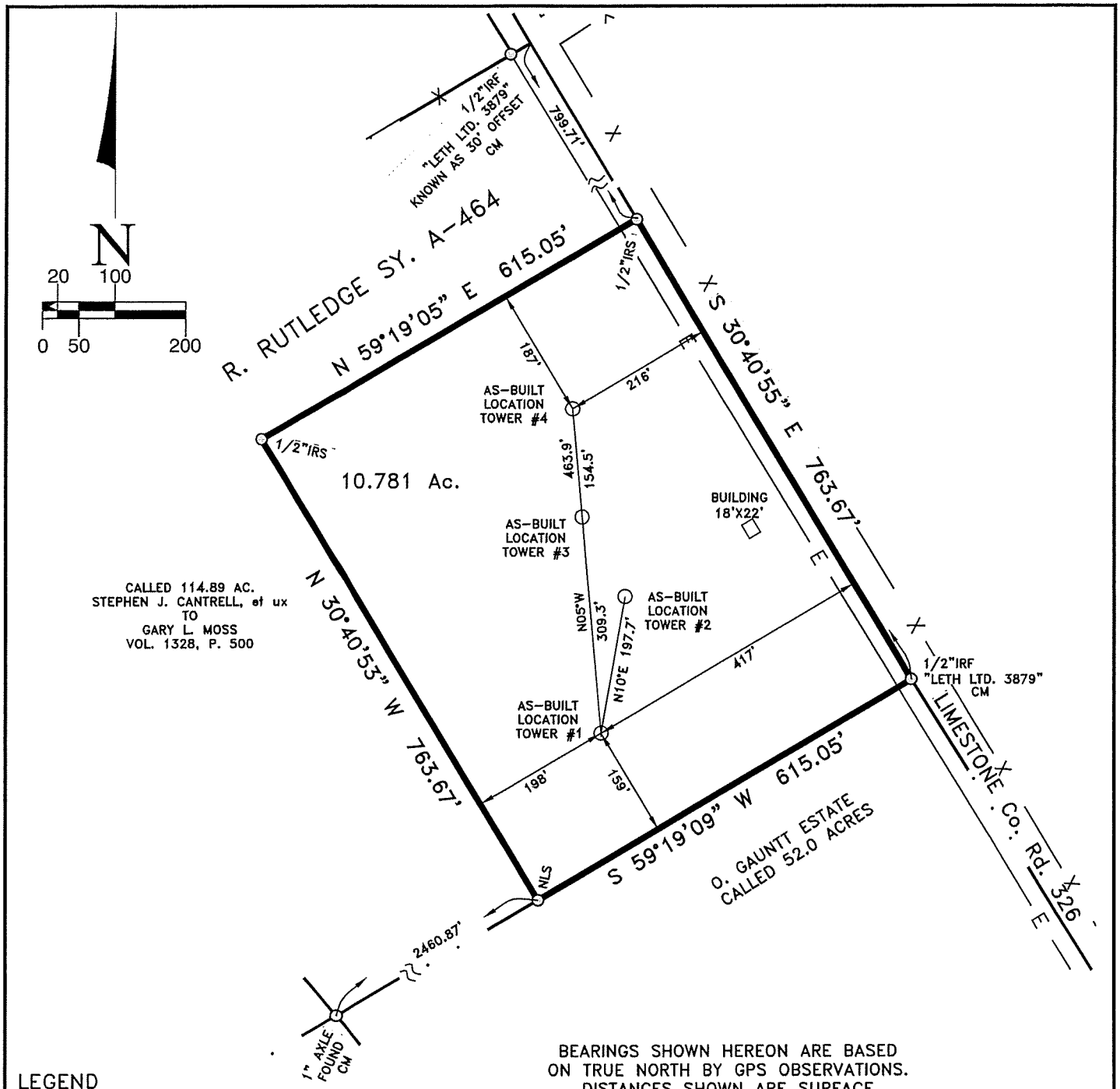
84 DEGREES

Point	Distance	Reading Day	Reading Night	Time	Date	Coordinates	Description
1	2.67	260	44.5	1451	2/23/12`	31 37 20 96 43 26.9	LCR 324 in road
2	6.15	85	14	1501	2/23212	31 37 33.77 96 41 10.55	LCR 356 in road
3	9.89	36	10.3	1521	2/23/12	31 37 43.75 96 38 51.11	LCR 368 in road
4	15.23	25	4.5	1542	2/23/12	31 38 03.36 96 35 29.96	LCR 376 & LCR 377

267 DEGREES

Point	Distance	Reading Day	Reading Night	Time	Date	Coordinates	Description
1	2.94	275	47	1033	2/24/12	31 37 03.12 96 46 54.63	LCR 322 in road
2	6.67	111.5	20	1019	"	31 37 02.21 96 49 19.19	LCR 310 in road
3	8.48	95	16	1004	"	31 36 56.43 96 50 26.92	Big Creek Rd.
4	11.62	65	11	944	"	31 36 53 96 52 26.45	2299 FM 939

KLRK EXHIBIT 5
Survey



BEARINGS SHOWN HEREON ARE BASED ON TRUE NORTH BY GPS OBSERVATIONS. DISTANCES SHOWN ARE SURFACE MEASUREMENTS

LEGEND

IRF..... IRON ROD FOUND
NLS .....NAIL SET
IRS ..... 1/2" IRON ROD SET W/YELLOW PLASTIC CAP STAMPED "COLEMAN RPLS 4001"
BOUNDARY LINE
— x — x — x — WIRE FENCE
— E — ELECTRIC LINE
PROPERTY LINE

MEXIA TOWERS

AS-BUILT LOCATION EXHIBIT
RICHARD RUTLEDGE SURVEY A-464
CITY OF MEXIA
LIMESTONE COUNTY, TEXAS

Preliminary, this document shall not be recorded for any purpose
William M. Coleman, R.P.L.S. 4001

DRAWN:	MGD	JOB #:	1685
CHECKED:	WMC	DATE:	03-02-12
REVISED:		SCALE:	1"=200'

Coleman & Associates Land Surveying
P. O. BOX 686 DENTON, TEXAS 76202
PH(940)565-8215,FAX (940)565-9800,
WWW.COLEMANSURVEYING.COM