LOG OF BORING NO. 1

OWNER: Iowa Public Television

ARCHITECT/ENGINEER:

SITE: Ottumwa, Iowa

PROJECT: Iowa Public Television Tower

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	TYPE	RECOVERY	SPT - N BLOWS / FT.	TESTS MOISTURE, %	DRY DENSITY PCF	UNCONFINED STRENGTH PSF
	Lean to fat CLAY, trace sand and calcareous nodules, yellowish brown, very stiff	30	CL-CH	6	SS	18"	11	25.4		
					HS					
		35	CL-CH	7	SS	18"	12	21.2		
					HS					
	37.0 Elastic SILT, trace sand and gravel, dark gray, stiff	40	MH	8	SS	18"	11	18.3		
	40.5 Bottom of Boring Center									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS			
WL	None	WD	22' 24 hrs AD
WL	None	AD	
WL			

TEAM Services, Inc.

BORING STARTED	5-10-05		
BORING COMPLETED	5-10-05		
RIG	ATV	FOREMAN	DC
APPROVED	JCC	JOB #	1-1571

LOG OF BORING NO. 2

OWNER: Iowa Public Television

ARCHITECT/ENGINEER:

SITE: Ottumwa, Iowa

PROJECT: Iowa Public Television Tower

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	TYPE	RECOVERY	SPT - N BLOWS / FT.	TESTS MOISTURE, %	DRY DENSITY PCF	UNCONFINED STRENGTH PSF
	Lean CLAY, trace organic matter, dark yellowish brown -- end organic matter @ about 1'		CL	1	AS			20.5		
					HS					
		5	CL	2	AS			25.1		
	8.0									
	SILT, trace sand and ferrous staining, yellowish brown, very stiff		ML	3	SS	10"	17	11.3		
		10			HS					
	14.0									
	Lean to fat CLAY, trace sand, ferrous staining, and calcareous nodules, dark yellowish brown, very stiff		CL-CH	4	SS	18"	16	19.7		
		15			HS					
		20	CL-CH	5	AS			19.1		
			CL-CH	6	AS			18.1		
	25.0									
	Bottom of Boring	25								

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS		
WL	▽ None WD	▼ None AD
WL		
WL		

TEAM Services, Inc.

BORING STARTED	5-11-05		
BORING COMPLETED	5-11-05		
RIG	ATV	FOREMAN	DC
APPROVED	JCC	JOB #	1-1571

LOG OF BORING NO. 3

OWNER: Iowa Public Television

ARCHITECT/ENGINEER:

SITE: Ottumwa, Iowa

PROJECT: Iowa Public Television Tower

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	TYPE	RECOVERY	SPT - N BLOWS / FT.	TESTS MOISTURE, %	DRY DENSITY PCF	UNCONFINED STRENGTH PSF
	1.0 Lean CLAY, trace organic matter, dark brown		CL	1	AS			27.2		
	Lean CLAY, trace sand, dark yellowish brown, stiff				HS					
		5	CL	2	AS			25.1		
		10	CL	3	ST	21"		21.1	103	950 2500*
					HS					
	13.0 Lean to fat CLAY, trace gravel and calcareous nodules, yellowish brown, very stiff	15	CL-CH	4	ST	17"		18.2	111	7000*
					HS					
	20.0		CL-CH	5	AS			23.7		
	Bottom of Boring	20								

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS			
WL	None	WD	18' 24 hrs AD
WL	None	AD	
WL			

TEAM Services, Inc.

BORING STARTED	5-10-05		
BORING COMPLETED	5-10-05		
RIG	ATV	FOREMAN	DC
APPROVED	JCC	JOB #	1-1571

LOG OF BORING NO. 4

OWNER: Iowa Public Television

ARCHITECT/ENGINEER:

SITE: Ottumwa, Iowa

PROJECT: Iowa Public Television Tower

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY	SAMPLES SPT - N BLOWS / FT.	TESTS MOISTURE, %	TESTS DRY DENSITY PCF	TESTS UNCONFINED STRENGTH PSF
	1.0 Lean CLAY, trace organic matter, dark yellowish brown		CL	1	AS			22.7		
	Lean CLAY, dark yellowish brown				HS					
		5	CL	2	AS			24.8		
	9.0 Lean to fat CLAY, trace sand, ferrous staining, and calcareous nodules, dark yellowish brown, stiff		CL-CH	3	ST	16"		18.7	110	3500*
		10			HS					
	13.0 Fat CLAY, trace ferrous staining, gray, stiff		CH	4	ST	19"		22.7	103	4000*
		15			HS					
	17.0 Lean CLAY, trace sand, olive brown									
		20	CL	5	AS			21.6		
			CL	6	AS			20.7		
	25.0 Bottom of Boring	25								

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS		
WL	▽ None WD	▼ None AD
WL		
WL		

TEAM Services, Inc.

BORING STARTED	5-11-05		
BORING COMPLETED	5-11-05		
RIG	ATV	FOREMAN	DC
APPROVED	JCC	JOB #	1-1571

LOG OF BORING NO. 5

OWNER: Iowa Public Television

ARCHITECT/ENGINEER:

SITE: Ottumwa, Iowa

PROJECT: Iowa Public Television Tower

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY	SAMPLES SPT - N BLOWS / FT.	TESTS MOISTURE, %	TESTS DRY DENSITY PCF	TESTS UNCONFINED STRENGTH PSF	
	1.0 SILT, trace organic matter, dark brown		ML	1	AS			19.1			
	Lean CLAY, dark yellowish brown				HS						
	6.0	5	CL	2	AS			25.5			
	Lean CLAY, with sand, dark yellowish brown, medium stiff										
		10	CL	3	ST	20"		19.6	106	2000*	Torvane 800 psf
	13.0				HS						
	Fat CLAY, trace ferrous staining, gray, very stiff	15	CH	4	ST	22"		23.5	100	5500*	
	17.0				HS						
	Lean CLAY, trace sand, dark yellowish brown		CL	5	AS			22.2			
	20.0	20									
	Bottom of Boring										

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS		
WL	▽ None WD	▼ None AD
WL		
WL		

TEAM Services, Inc.

BORING STARTED	5-11-05		
BORING COMPLETED	5-11-05		
RIG	ATV	FOREMAN	DC
APPROVED	JCC	JOB #	1-1571

LOG OF BORING NO. 6

OWNER: Iowa Public Television

ARCHITECT/ENGINEER:

SITE: Ottumwa, Iowa

PROJECT: Iowa Public Television Tower

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	TYPE	RECOVERY	SPT - N BLOWS / FT.	TESTS MOISTURE, %	DRY DENSITY PCF	UNCONFINED STRENGTH PSF
	SILT, trace organic matter, dark yellowish brown		ML	1	AS			23.8		
	-- end organic matter @ about 1'				HS					
		5								
	7.0									
	Sandy fat CLAY, trace ferrous staining, olive brown, very stiff									
		10	CH	2	SS	16"	16	15.8		
					HS					
	-- color change to yellowish brown @ about 12'									
		15	CH	3	SS	18"	16	15.5		
					HS					
	18.0									
	Lean CLAY, with sand, dark yellowish brown									
		20	CL	4	AS			16.2		
			CL	5	AS			17.8		
	25.0	25								
	Bottom of Boring									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS			
WL	∇ None	WD	▼ None 24 hrs AD
WL	None	AD	
WL			

TEAM Services, Inc.

BORING STARTED	5-10-05		
BORING COMPLETED	5-10-05		
RIG	ATV	FOREMAN	DC
APPROVED	JCC	JOB #	1-1571

LOG OF BORING NO. 7

OWNER: Iowa Public Television

ARCHITECT/ENGINEER:

SITE: Ottumwa, Iowa

PROJECT: Iowa Public Television Tower

GRAPHIC LOG	DESCRIPTION	DEPTH (ft.)	USCS SYMBOL	SAMPLES NUMBER	TYPE	RECOVERY	SPT - N BLOWS / FT.	TESTS MOISTURE, %	DRY DENSITY PCF	UNCONFINED STRENGTH PSF
	SILT, trace organic matter, dark brown		ML	1	AS			19.6		
					HS					
	2.0 Lean CLAY, dark yellowish brown	5	CL	2	AS			26.4		
	7.0 Lean CLAY, with sand, dark yellowish brown, stiff	10	CL	3	ST	20"		19.3	107	2000*
					HS					
	13.0 Fat CLAY, with sand, dark yellowish brown, trace gray, very stiff ▼	15	CH	4	ST	18"		20.4	107	7500*
					HS					
			CH	5	AS			20.1		
	20.0 Bottom of Boring	20								

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

Calibrated Hand Penetrometer*

WATER LEVEL OBSERVATIONS			
WL	▽ None	WD	▼ 17' 24 hrs AD
WL	None	AD	
WL			

TEAM Services, Inc.

BORING STARTED	5-10-05		
BORING COMPLETED	5-10-05		
RIG	ATV	FOREMAN	DC
APPROVED	JCC	JOB #	1-1571

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]					Soil Classification	
					Group Symbol	Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	Cu ≥ 4 and 1 ≤ Cc ≤ 3[E]		GW	Well-graded gravel[F]
			Cu < 4 and/or 1 > Cc > 3[E]		GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH		GM	Silty gravel[F, G, H]
			Fines classify as CL or MH		GC	Clayey gravel[F, G, H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[E]	Cu ≤ 6 and 1 ≤ Cc ≤ 3[E]		SW	Well-graded sand[I]
			Cu < 6 and/or 1 > Cc > 3[E]		SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH		SM	Silty sand[G, H, I]
			Fines classify as CL or CH		SC	Clayey sand[G, H, I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]		CL	Lean clay[K, L, M]
			PI < 4 or plots below "A" line[J]		ML	Silt[K, L, M]
		organic	Liquid limit – oven dried	< 0.75	OL	Organic clay[K, L, M, N]
			Liquid limit – not dried			Organic silt[K, L, M, O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line		CH	Fat clay[K, L, M]
			PI plots below "A" line		MH	Elastic silt[K, L, M]
		organic	Liquid limit – oven dried	< 0.75	OH	Organic clay[K, L, M, P]
			Liquid limit – not dried			Organic silt[K, L, M, Q]
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols:
- GW-GM well-graded gravel with silt
- GW-GC well-graded gravel with clay
- GP-GM poorly graded gravel with silt
- GP-GC poorly graded gravel with clay

[D] Sands with 5 to 12% fines require dual symbols:
- SW-SM well-graded sand with silt
- SW-SC well-graded sand with clay
- SP-SM poorly graded sand with silt
- SP-SC poorly graded sand with clay

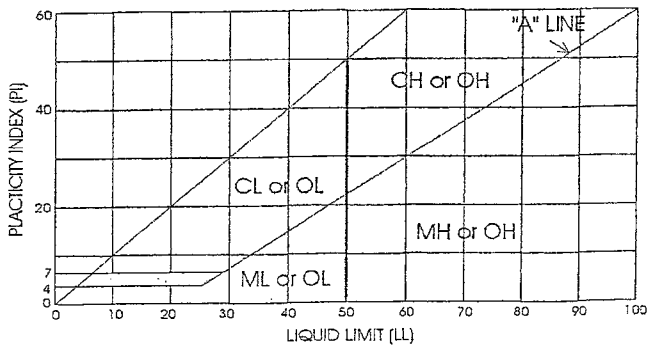
For classification of fine-grained soils and fine grained fraction of coarse-grained soils.

Equation of "A" Line:
Horizontal at PI = 4 to LL = 25.5.
then PI = 0.73 (LL-20)

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

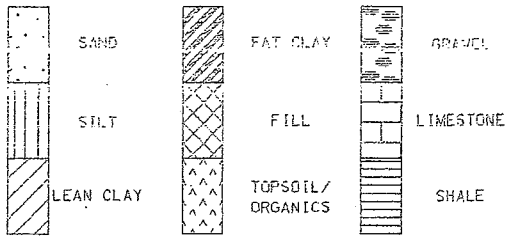
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains > 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plots in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



GENERAL NOTES

SOIL and ROCK TYPES



DRILLING & SAMPLING SYMBOLS

SS	Split Spoon - 1 1/2" I.D., 2" O.D., unless otherwise noted
ST	Thin-Walled Tube - 3" O.D., unless otherwise noted
PA	Power Auger
HA	Hand Auger
DB	Diamond Bit - 4", N, B
AS	Auger Sample
HS	Hollow Stem Auger
WS	Wash Sample
RB	Rock Bit
BS	Bulk Sample
DC	Dutch Cone
WB	Wash Bore

CONSISTENCY OF FINE-GRAINED SOILS
(major portion passing No. 200 sieve)

Consistency	Unconfined Compressive Strength, Qu, psf	N-Blows/ft* (Approx. Correlation)
Very Soft	< 500	0 - 2
Soft	500 - 1,000	3 - 4
Medium	1,001 - 2,000	5 - 8
Stiff	2,001 - 4,000	9 - 15
Very Stiff	4,001 - 8,000	16 - 30
Hard	8,001 - 16,000	31 - 50
Very Hard	> -16,000	50 +

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N-Blows/ft. *
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	10 - 29
Dense	30 - 49
Very Dense	50 - 80
Extremely Dense	80 +

* Standard "N" Penetration Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch OD split spoon, except where noted.

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) (of components also present in sample)	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) (of components also present in sample)	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Size Range
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300 mm to 4.75 mm)
Gravel	3 in. to #4 sieve (75 mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75 mm to 0.075 mm)
Silt or Clay	Passing #200 sieve (0.075 mm)

WATER LEVELS:

Depth groundwater first encountered during drilling

Groundwater level after 24 hours (unless otherwise noted, i.e. "AB" – after boring)

TERMS DESCRIBING SOIL STRUCTURE

Parting:	paper thin in size
Seam:	1/8" to 3" in thickness
Layer:	greater than 3" in thickness
Ferrous:	containing appreciable quantities of iron
Well-Graded:	having wide range in grain size and substantial amounts of all intermediate sizes.
Poorly-Graded:	predominately one grain size or having a range of sizes with some intermediate sizes missing.j
Fissured:	containing shrinkage cracks, frequently filled with fine sand or silt, usually more or less vertical.
Interbedded:	composed of alternate layers of different soil types.
Laminated:	composed of thin layers of varying color and texture.
Slickensided:	having inclined planes of weakness that are slick and glossy in appearance.
NOTE:	Clays possessing slickensided or fissured structure may exhibit lower unconfined strength than indicated above. Consistency of such soils interpreted using the unconfined strength along with pocket penetrometer results.

Appendix D
Tower Population Information

Antenna and Mounting Hardware Information

The information included in this documentation in most cases does not include the mechanical information for the hardware to mount the antennas to the tower.

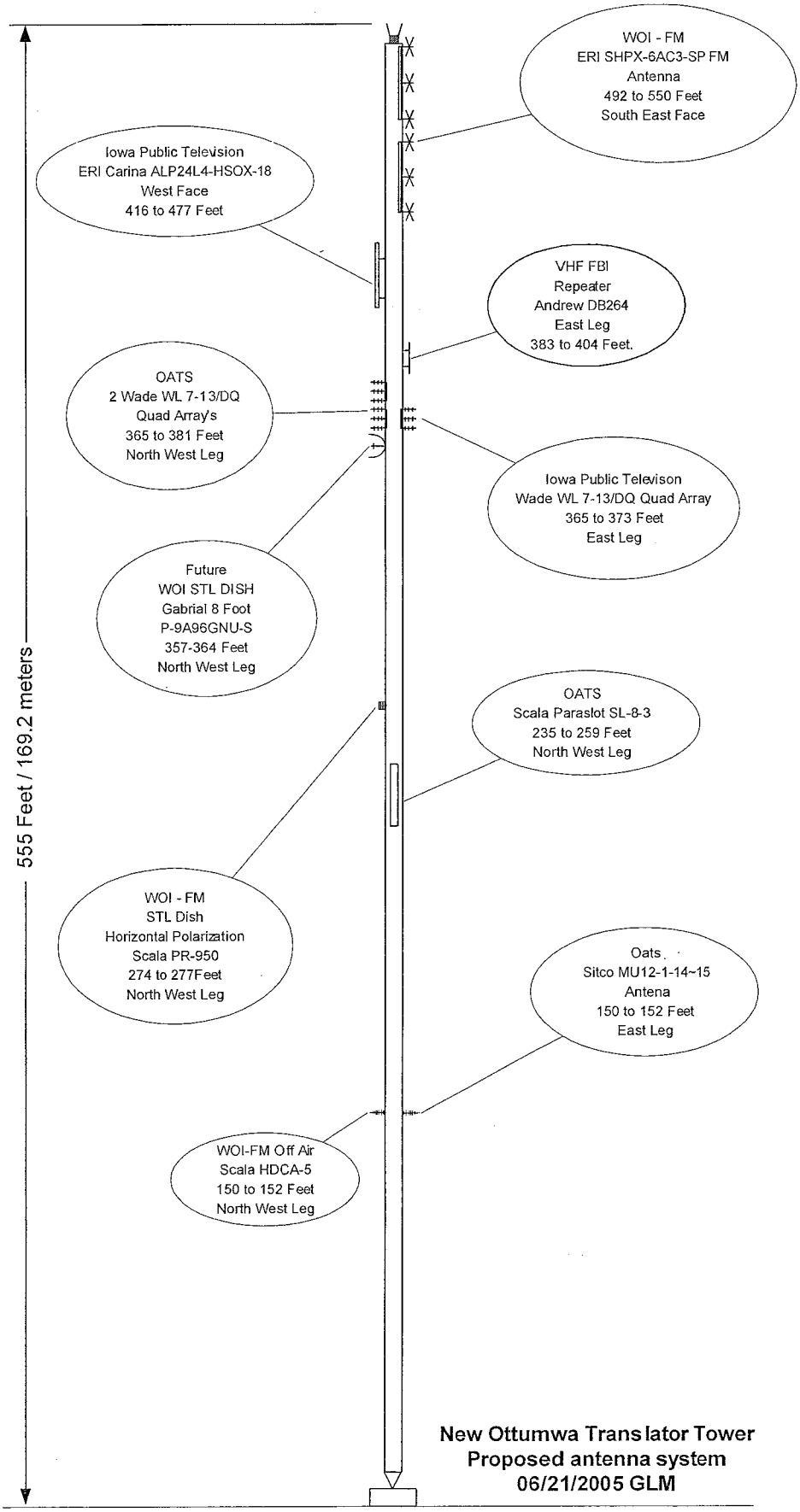
It will be the winning vendor's responsibility to determine the proper antenna mounting equipment to fit the tower proposed. It will be the winning vendor's responsibility to obtain mechanical (windloading) specifications for the proposed mounting systems and antennas in every case.

In all cases mechanical information for the proposed antennas and in certain cases mounting hardware information has been included with this document. This information should be considered for your information only. **In all events it shall remain the responsibility of the winning vendor to verify mechanical (windloading) information for all antenna systems to be installed on the proposed tower..**

Tower Population - New Ottumwa Tower

Antenna and Feed/Down Line information
From tower top to tower bottom
6/21/2005

492 to 550 Feet South East face	WOI-FM- broadcast antenna Electronics Research Inc. SHPX-6AC3-SP-FM Feed Line = Andrew HJ8-50B 3 inch heilax
416-477 Feet West face	Iowa Public Television broadcast antenna ERI Carina ALP24L4-HSOX-18 Feed Line = ERI HJ8-50B Air Dielectric Coaxial Cable 3 1/8"
383-404 Feet East Leg	FBI VHF repeater antenna Andrew DB264 Feed Line = Andrew LDF5-50A 7/8 heliax
365-373 Feet East leg	One Iowa Public Television receive antenna Wade WL-7-13/DQ Quad Array Down Line = TFC T10 750 semiflex cable jacketed
365 to 381 Feet North West leg	Two OATS - receive antennas Wade WL-7-13/DQ Quad Array's Down Line = 2 runs of ½ inch foam filled heilax
357-364 Feet North West leg	Future WOI - Studio Transmitter Link Gabriel P-9A96GNU-S Feed Line = Andrew LDF550A 7/8" Heliax
274 to 277 Feet North West leg	WOI-FM - Studio Transmitter Link Scala PR-950 Feed Line = Andrew LDF550A 7/8" Heliax
235 to 259 Feet North West leg	OATS - Transmit antenna Scala Paraslot SL-8-3 Feed Line = Andrew 2 1/4" Air Core heilax
150 to 152 Feet North West Leg	WOI FM – Off air antenna Scala HDCA-5 Down Line = 5/8" foam core heilax
Also 150 to 152 Feet East Leg	OATS – Off air antenna Sitco MU12-1-14~15 Down Line = 5/8" foam core heilax



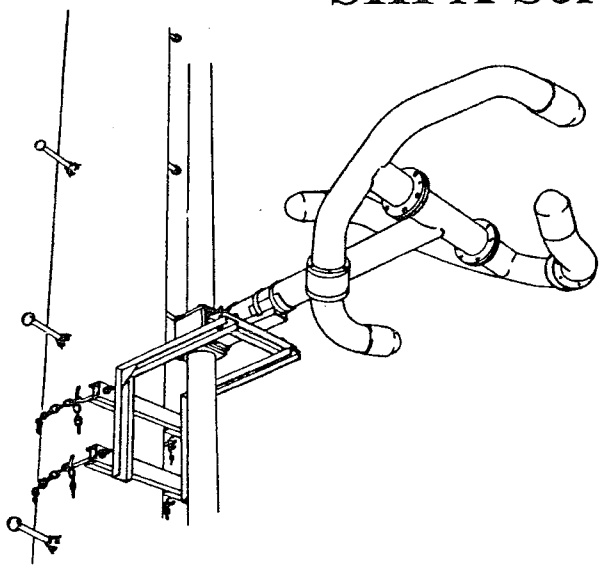
New Ottumwa Translator Tower
Proposed antenna system
06/21/2005 GLM

ERI® ELECTRONICS RESEARCH, INC.

55 Years 1943 - 1998

7777 Gardner Road • Chandler, Indiana 47610 • (812) 925-6000 • Fax: (812) 925-4030 • Home Page: www.ERIinc.com

SHPX Series FM Antenna



SPECIFICATIONS

Frequency Range:	88 to 108 MHz. (10 MHz diplexed)
Polarization:	Circular (Clockwise)
Input:	3-1/8" or 6-1/8" EIA Flange
Azimuthal Pattern:	± 2 dB in free space
Axial Ratio:	Less than 3 dB in free space
VSWR at Input:	1.07:1 or less (with field matching)
VSWR at Input:	1.25:1 or less, top pole or Lambda Section mounting; 1.5:1 or less side mount (without field matching)

FEATURES

- Low VSWR
- Internal Feed
- Fully Pressurized
- Series Fed Radiating Elements
- Circular Polarization
- Welded Feed Connections
- Superior VSWR Band Width
- High Input Power Capacity
- Custom Modifications Are Available
- Corrosion Resistant Construction
- Modular Construction Facilitates Easy Installation and Repair
- Minimal Weather Related VWSR Problems
- Beam Tilt and/or Null Fill Available
- Half-wave Spacing Between Elements Available
- Rugged Brass Construction - TIG Welding
- Stainless Steel Support Brackets and Hardware
- Radomes or Deicing Heaters Not Normally Required For Radial Ice Less Than 1/2 Inch
- Teflon Coating, Radomes or Deicing Heaters Are Available
- Custom Designed Antenna Supports; Poles or Lambda Sections are also available from ERI

Type	Power Gain Horiz	Power Gain db	Female 50 Ohm Input	Input Power Rating kW
SHPX-1AE	0.4611	-3.3623	3-1/8"	32
SHPX-2AE	0.9971	-0.0128	3-1/8"	32
SHPX-2AC	0.9971	-0.0128	3-1/8"	39
SHPX-2AC6	0.9971	-0.0128	6-1/8"	64
SHPX-3AE	1.5588	1.9278	3-1/8"	32
SHPX-4AE	2.1332	3.2903	3-1/8"	32
SHPX-4AC	2.1332	3.2903	3-1/8"	39
SHPX-4AC6	2.1332	3.2903	6-1/8"	64
SHPX-5AE	2.7154	4.3384	3-1/8"	32
SHPX-6AE	3.3028	5.1888	3-1/8"	32
SHPX-6AC	3.3028	5.1888	3-1/8"	39
SHPX-6AC6	3.3028	5.1888	6-1/8"	64
SHPX-7AE	3.8935	5.9034	3-1/8"	32
SHPX-8AC	4.4872	6.5197	3-1/8"	39
SHPX-8AE	4.4872	6.5197	3-1/8"	32
SHPX-8AC6	4.4872	6.5197	6-1/8"	64
SHPX-10AC	5.6800	7.5435	3-1/8"	39
SHPX-10AC6	5.6800	7.5435	6-1/8"	64
SHPX-12AC	6.8781	8.3747	3-1/8"	39
SHPX-12AC6	6.8781	8.3747	6-1/8"	64

Type	Power Gain Horiz.	Power Gain db	Female 50 Ohm Input	Input Power Rating kW
"B" Model, 4-1/8" Interbay Line, 4-1/8" Element Stem				
SHPX-1BE	0.4611	-3.3623	6-1/8"	40
SHPX-2BE	0.9971	-0.0128	6-1/8"	56
SHPX-2BC	0.9971	-0.0128	6-1/8"	80
SHPX-3BE	1.5888	1.9278	6-1/8"	56
SHPX-4BE	2.1332	3.2903	6-1/8"	56
SHPX-4BC	2.1332	3.2903	6-1/8"	112
SHPX-5BE	2.7154	4.3384	6-1/8"	56
SHPX-6BE	3.3028	5.1888	6-1/8"	56
SHPX-6BC	3.3028	5.1888	6-1/8"	112
SHPX-7BE	3.8935	5.9034	6-1/8"	56
SHPX-8BE	4.4872	6.5197	6-1/8"	56
SHPX-8BC	4.4872	6.5197	6-1/8"	112
SHPX-10BC	5.6800	7.5435	6-1/8"	112
SHPX-12BC	6.8781	8.3747	6-1/8"	112
"C" Model, 6-1/8" Interbay Line, 4-1/8" Element Stem				
SHPX-1CE	0.4611	-3.3623	6-1/8"	40
SHPX-2CE	0.9971	-0.0128	6-1/8"	80
SHPX-4CE	2.1332	3.2903	6-1/8"	120
SHPX-6CE	3.3028	5.1888	6-1/8"	120

SHPX Series FM Antenna Weight and Windload Information

Type	Antenna Weight (pounds) Antenna Only	with 1/2" Radial Ice	with Radome	w/Radome & 1/2" Radial Ice	Antenna CaAa (sq-ft) Antenna Only	with 1/2" Radial Ice	with Radome	w/Radome & 1/2" Radial Ice	Antenna Windload (pounds) Antenna Only	with 1/2" Radial Ice	with Radome	w/Radome & 1/2" Radial Ice
"A" MODEL, 3-1/8" INTERBAY LINE, 3-1/8" ELEMENT STEM												
1AE	114	194.63	185	340.79	6.52	8.99	14.78	17.72	137	244.87	354	485.15
2AE	225	383.65	376	684.98	13.36	18.35	29.89	35.80	304	499.81	742	980.37
2AC	250	417.07	385	702.40	14.03	19.13	30.56	36.58	319	521.77	749	1002.33
2AC6	301	482.37	436	767.69	16.16	21.23	32.69	38.68	421	580.18	851	1060.70
3AE	336	572.67	568	1030.16	20.20	27.71	45.00	53.89	470	754.75	1130	1475.59
4AE	447	761.70	759	1374.35	27.05	37.07	60.10	71.97	637	1009.68	1518	1970.81
4AC	472	795.11	768	1391.77	27.72	37.69	60.78	72.59	652	1027.78	1525	1988.90
4AC6	523	860.41	819	1457.06	29.85	39.79	62.90	74.69	758	1086.14	1631	2047.26
5AE	558	950.72	951	1719.53	33.89	46.42	75.21	90.05	804	1264.62	1905	2466.03
6AE	669	1139.74	1142	2063.72	40.74	55.78	90.32	108.13	971	1519.56	2294	2961.24
6AC	694	1173.16	1151	2081.13	41.41	56.25	90.99	108.60	986	1533.78	2300	2975.47
6AC6	745	1238.45	1202	2146.43	43.53	58.35	93.12	110.70	1096	1592.15	2410	3033.83
7AE	780	1328.76	1334	2408.90	47.58	65.14	105.43	126.22	1138	1774.50	2682	3456.46
8AE	891	1517.78	1525	2753.08	54.42	74.49	120.54	144.30	1305	2029.44	3070	3951.68
8AC	916	1551.20	1534	2770.50	55.10	74.81	121.21	144.61	1320	2039.79	3076	3962.04
8AC6	967	1616.50	1585	2835.80	57.22	76.91	123.33	146.71	1433	2098.16	3190	4020.40
10AC	1138	1929.24	1917	3459.87	68.78	93.37	151.42	180.62	1653	2545.80	3852	4948.61
10AC6	1189	1994.54	1968	3525.17	70.91	95.47	153.55	182.72	1770	2604.16	3970	5006.97
12AC	1360	2307.29	2300	4149.24	82.47	111.92	181.64	216.63	1987	3051.81	4628	5935.18
12AC6	1411	2372.58	2351	4214.54	84.60	114.03	183.76	218.73	2108	3110.17	4750	5993.54

For wind and weight data for B & C models, contact ERI Structural Engineers.

ERI's original and distinctive design combines the exceptional engineering features of an internally fed, fully pressurized system with superior fabrication characterized by totally welded feed connections, rugged brass material and TIG welding.

The SHPX series antennas unique design consists of two series fed, bent dipole elements which form a space phased, circularly polarized radiator. The antenna's configuration and the large diameter of the radiating elements contributes to the excellent bandwidth of the antenna system, and also inhibits corona discharge.

The horizontally polarized horizontal plane azimuthal pattern of the SHPX series antenna is omnidirectional within ±2 dB when the antenna is pole or Lambda mounted atop a tower. Side mounting the antenna on a typical tower structure will affect the azimuthal pattern. ERI offers a pattern measurement service to assist in determining the effect of the mounting structure on the antenna's pattern. Using ERI's pattern optimization service the pattern's circularity may be improved through the addition of parasitically excited elements.

NOTE: The VSWR specifications apply over a frequency ±200 kHz from the tuning point of the antenna. Where radomes or deicing heaters are not used, this tuning point is customarily set 200 kHz above the station operating frequency to provide improved performance under icing conditions. Parasitic elements tend to reduce the VSWR bandwidth of the antenna.

Utilize the ERI advantage. Combine an ERI antenna with an ERI Lambda Mounting Structure, Pattern Measurement and Installation. Assure yourself of the best antenna/tower interaction. ERI's Pattern Measurement service will provide the crucial answers concerning the relationship between the antenna mounting orientation and antenna pattern. Lambda Sections are designed to achieve optimum antenna performance while reducing weight and windloads. Only ERI can offer you an antenna/tower/installation package that will achieve your highest expectations in a demanding FM market.

If you demand Excellence,
make ERI your SINGLE SOURCE for Antenna and Tower Products!

PRELIMINARY SPECIFICATION FOR ERI CARINA™ HORIZONTALLY POLARIZED COAXIAL SLOTTED ARRAY ANTENNA

Prepared For
Iowa Public Television
K33AA
Ottumwa, IA
June 1, 2005

ANTENNA TYPE:
ALP24L4-HSOX-18

SPECIFICATION NO:
KO051805-1486

PRELIMINARY SPECIFICATION FOR ERI CARINA™ HORIZONTALLY POLARIZED COAXIAL SLOTTED ARRAY ANTENNA

ELECTRICAL CHARACTERISTICS:

CHANNEL:	18	
FREQUENCY RANGE:	494.00 - 500.00 MHz	
AZIMUTH PATTERN NUMBER:	Hor Pol:	ALP-O
ELEVATION PATTERN NUMBER:	Hor Pol:	ALP24L4
AZIMUTH DIRECTIVITY:	Hor Pol:	1.00 (0.00 dB)
ELEVATION DIRECTIVITY:	Hor Pol:	25.21 (14.02 dBd)
PEAK POWER GAIN:	Hor Pol:	25.21 (14.02 dBd)
GAIN AT HORIZONTAL:	Hor Pol:	7.57 (8.79 dBd)
ELECTRICAL BEAM TILT:	-1.00 Degrees	
INPUT POWER REQUIRED:	3.967 kW Peak Visual plus 10% Aural	
MAXIMUM INPUT POWER:	6.0 kW Peak Visual plus 10% Aural, 4.0 kW Average	
INPUT TYPE:	3-1/8" EIA	
ANTENNA VSWR (MAXIMUM):	NTSC: 1.05 Visual + 0.5 MHz 1.08 Chroma 1.10 Over remainder of Channel	

PRELIMINARY SPECIFICATION FOR ERI CARINA™ HORIZONTALLY POLARIZED COAXIAL SLOTTED ARRAY ANTENNA

MECHANICAL CHARACTERISTICS:

MOUNTING CONFIGURATION: *(Tower Interface supplied and installed by others.)	Side Mount
HEIGHT OF ANTENNA:	60.8 feet
HEIGHT OF CENTER OF RADIATION:	30.4 feet
OVERALL HEIGHT (A):	60.8 feet
DEICING:	Unpressurized Slot Cover Radome Enclosure
RADOME DIAMETER (C):	CONTACT ERI
RADOME COLOR:	AVIATION ORANGE
CLIMBING DEVICE:	NOT APPLICABLE
CALCULATED WEIGHT[1]:	350 lbs.
ANTENNA AREA[3]:	FRONT AREA: C_AA_C: 21.5 square feet A_C: 17.9 square feet SIDE AREA: C_AA_C: 31.7 square feet A_C: 26.4 square feet

This antenna is designed to be supported by a structure that can resist the antenna base reactions and which provides a support that is rigid in the three transitional and three rotational degrees of freedom.

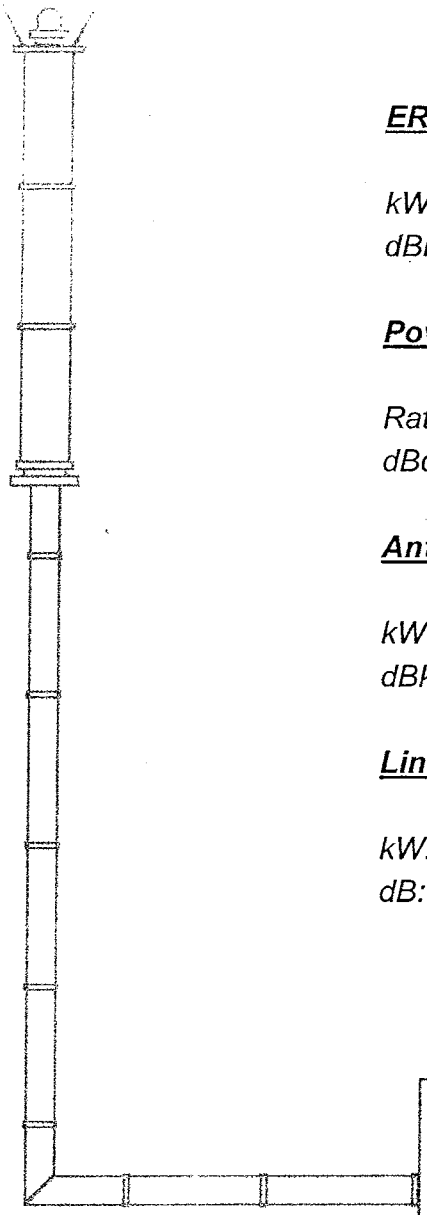
[1] *Calculated weight is based on the PRELIMINARY design of the antenna. The actual weight of the antenna will be within ± 10% of the calculated weight. The actual weight will be given in the technical manual that accompanies the antenna.*

[3] *Antenna Area is calculated per EIA/TIA-RS222-F.*

Note: Localized conditions may require higher wind speed specifications than TIA/EIA specifications. Check with local authorities to verify wind speed requirements.

Broadcast Antenna System
Power Analysis

Type: ALP24L4-HSOX-18



Transmission Line:

Type:
HJ8-50B
3" Air HELIAX
Vert. Length: 425 ft.
Horz. Length: 100 ft.
Attenuation:
0.361 dB/100 ft.
Efficiency: 64.64 %

ERP:	Hor Pol:
kW:	100.00
dBk:	20.00

Power Gain:

Ratio:	25.21
dBd:	14.02

Antenna Input:

kW:	3.97
dBk:	5.98

Line Loss:

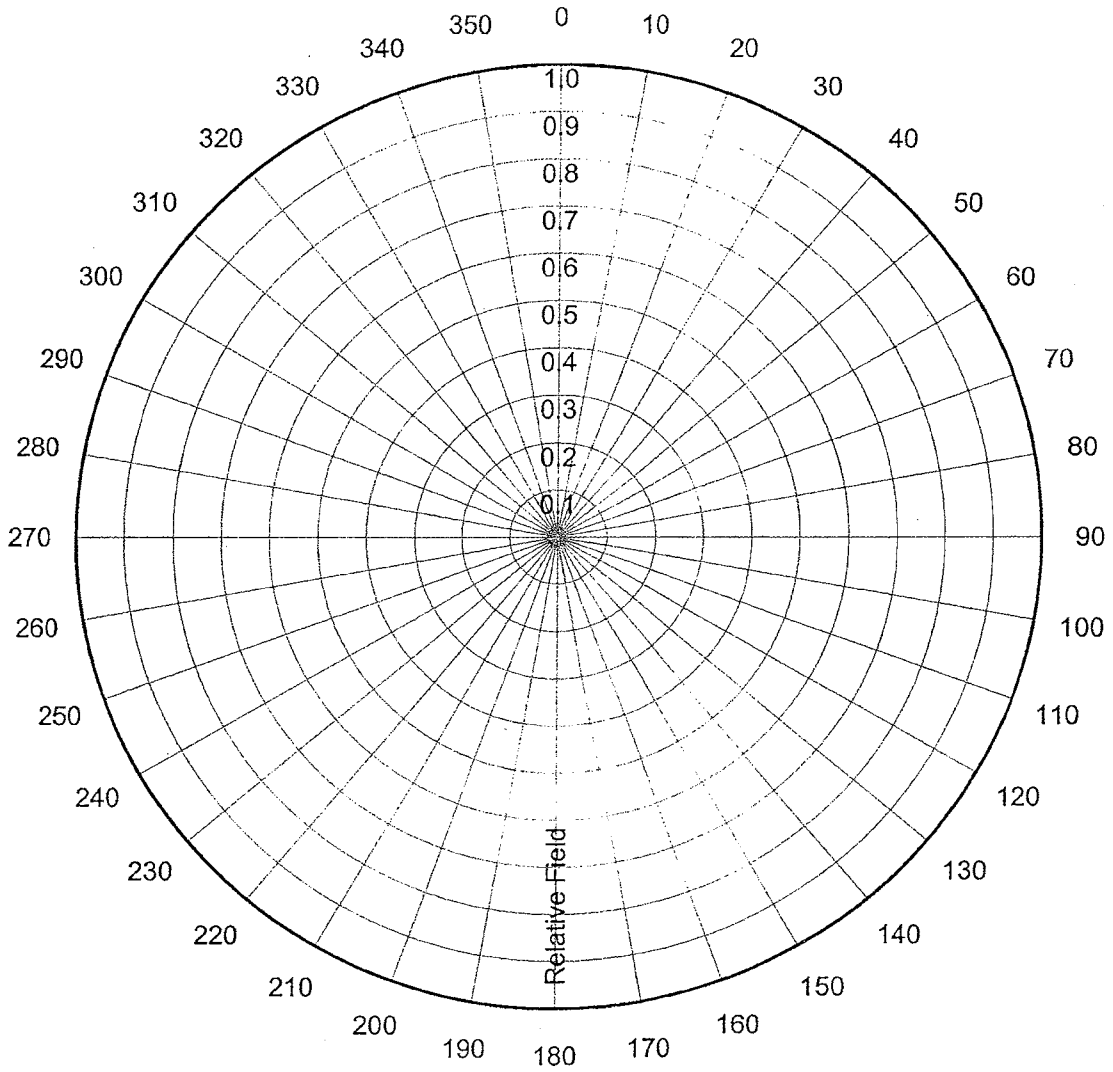
kW:	2.17
dB:	1.89

Transmitter Power

kW:	6.14
dBk:	7.88

AZIMUTH PATTERN

Type:	ALP-O	
	Numeric	dBd
Directivity:	1.00	0.00
Peak(s) at:		
Polarization:	Horizontal	
Channel:	18	
Location:	Ottumwa, IA	
Note:		



ERI®

AZIMUTH TABULATED DATA

Type: ALP-O

Polarization: Horizontal

Angle	Field	dB	Angle	Field	dB	Angle	Field	dB	Angle	Field	dB
0	1.000	0.00	92	1.000	0.00	184	1.000	0.00	276	1.000	0.00
2	1.000	0.00	94	1.000	0.00	186	1.000	0.00	278	1.000	0.00
4	1.000	0.00	96	1.000	0.00	188	1.000	0.00	280	1.000	0.00
6	1.000	0.00	98	1.000	0.00	190	1.000	0.00	282	1.000	0.00
8	1.000	0.00	100	1.000	0.00	192	1.000	0.00	284	1.000	0.00
10	1.000	0.00	102	1.000	0.00	194	1.000	0.00	286	1.000	0.00
12	1.000	0.00	104	1.000	0.00	196	1.000	0.00	288	1.000	0.00
14	1.000	0.00	106	1.000	0.00	198	1.000	0.00	290	1.000	0.00
16	1.000	0.00	108	1.000	0.00	200	1.000	0.00	292	1.000	0.00
18	1.000	0.00	110	1.000	0.00	202	1.000	0.00	294	1.000	0.00
20	1.000	0.00	112	1.000	0.00	204	1.000	0.00	296	1.000	0.00
22	1.000	0.00	114	1.000	0.00	206	1.000	0.00	298	1.000	0.00
24	1.000	0.00	116	1.000	0.00	208	1.000	0.00	300	1.000	0.00
26	1.000	0.00	118	1.000	0.00	210	1.000	0.00	302	1.000	0.00
28	1.000	0.00	120	1.000	0.00	212	1.000	0.00	304	1.000	0.00
30	1.000	0.00	122	1.000	0.00	214	1.000	0.00	306	1.000	0.00
32	1.000	0.00	124	1.000	0.00	216	1.000	0.00	308	1.000	0.00
34	1.000	0.00	126	1.000	0.00	218	1.000	0.00	310	1.000	0.00
36	1.000	0.00	128	1.000	0.00	220	1.000	0.00	312	1.000	0.00
38	1.000	0.00	130	1.000	0.00	222	1.000	0.00	314	1.000	0.00
40	1.000	0.00	132	1.000	0.00	224	1.000	0.00	316	1.000	0.00
42	1.000	0.00	134	1.000	0.00	226	1.000	0.00	318	1.000	0.00
44	1.000	0.00	136	1.000	0.00	228	1.000	0.00	320	1.000	0.00
46	1.000	0.00	138	1.000	0.00	230	1.000	0.00	322	1.000	0.00
48	1.000	0.00	140	1.000	0.00	232	1.000	0.00	324	1.000	0.00
50	1.000	0.00	142	1.000	0.00	234	1.000	0.00	326	1.000	0.00
52	1.000	0.00	144	1.000	0.00	236	1.000	0.00	328	1.000	0.00
54	1.000	0.00	146	1.000	0.00	238	1.000	0.00	330	1.000	0.00
56	1.000	0.00	148	1.000	0.00	240	1.000	0.00	332	1.000	0.00
58	1.000	0.00	150	1.000	0.00	242	1.000	0.00	334	1.000	0.00
60	1.000	0.00	152	1.000	0.00	244	1.000	0.00	336	1.000	0.00
62	1.000	0.00	154	1.000	0.00	246	1.000	0.00	338	1.000	0.00
64	1.000	0.00	156	1.000	0.00	248	1.000	0.00	340	1.000	0.00
66	1.000	0.00	158	1.000	0.00	250	1.000	0.00	342	1.000	0.00
68	1.000	0.00	160	1.000	0.00	252	1.000	0.00	344	1.000	0.00
70	1.000	0.00	162	1.000	0.00	254	1.000	0.00	346	1.000	0.00
72	1.000	0.00	164	1.000	0.00	256	1.000	0.00	348	1.000	0.00
74	1.000	0.00	166	1.000	0.00	258	1.000	0.00	350	1.000	0.00
76	1.000	0.00	168	1.000	0.00	260	1.000	0.00	352	1.000	0.00
78	1.000	0.00	170	1.000	0.00	262	1.000	0.00	354	1.000	0.00
80	1.000	0.00	172	1.000	0.00	264	1.000	0.00	356	1.000	0.00
82	1.000	0.00	174	1.000	0.00	266	1.000	0.00	358	1.000	0.00
84	1.000	0.00	176	1.000	0.00	268	1.000	0.00	360	1.000	0.00
86	1.000	0.00	178	1.000	0.00	270	1.000	0.00			
88	1.000	0.00	180	1.000	0.00	272	1.000	0.00			
90	1.000	0.00	182	1.000	0.00	274	1.000	0.00			

ERI®

AZIMUTH PATTERN
FCC FILING FORMAT

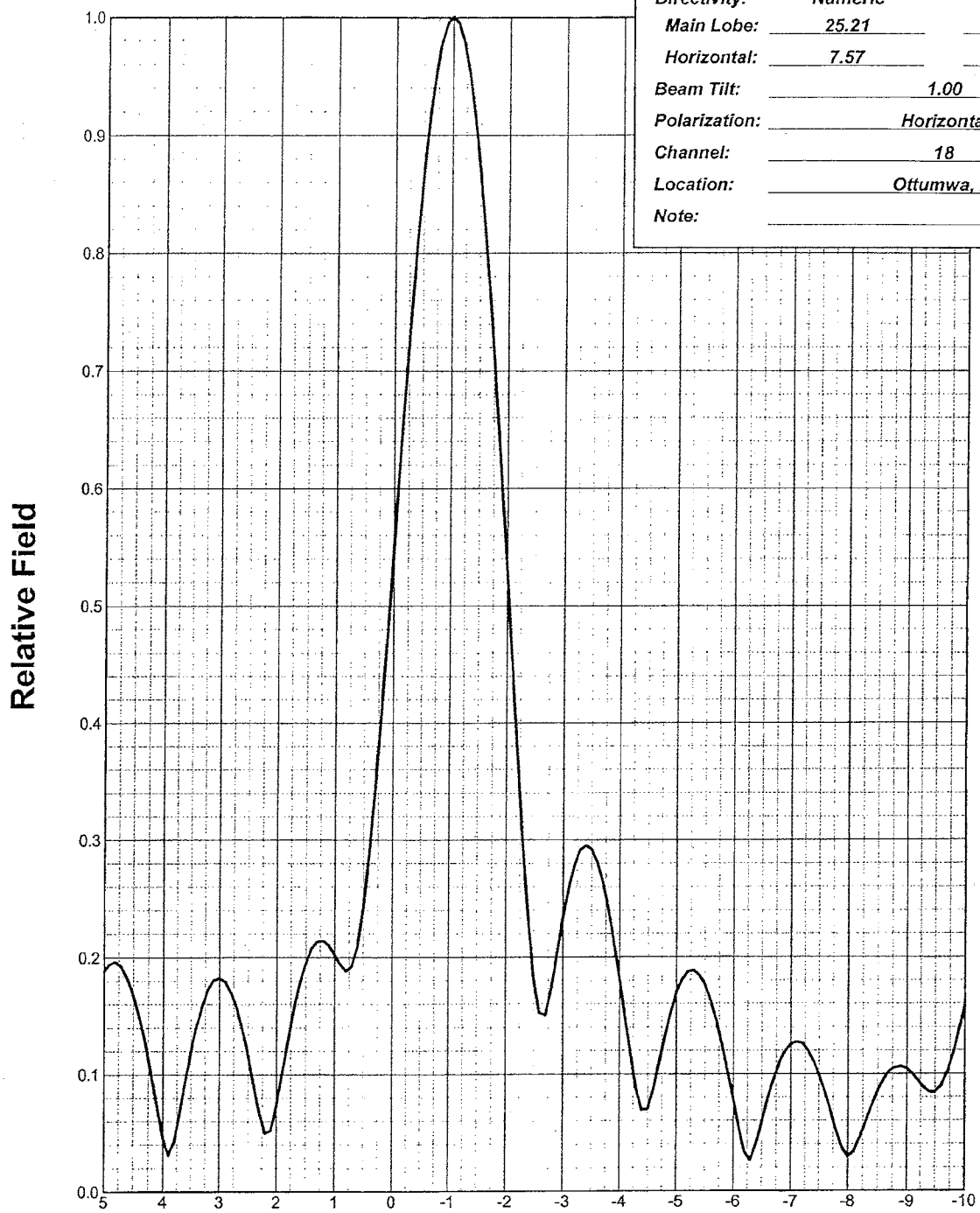
Type: ALP-O

Polarization: Horizontal

Angle	Field	ERP (kW)	ERP (dBk)
0	1.000	100.000	20.000
10	1.000	100.000	20.000
20	1.000	100.000	20.000
30	1.000	100.000	20.000
40	1.000	100.000	20.000
50	1.000	100.000	20.000
60	1.000	100.000	20.000
70	1.000	100.000	20.000
80	1.000	100.000	20.000
90	1.000	100.000	20.000
100	1.000	100.000	20.000
110	1.000	100.000	20.000
120	1.000	100.000	20.000
130	1.000	100.000	20.000
140	1.000	100.000	20.000
150	1.000	100.000	20.000
160	1.000	100.000	20.000
170	1.000	100.000	20.000
180	1.000	100.000	20.000
190	1.000	100.000	20.000
200	1.000	100.000	20.000
210	1.000	100.000	20.000
220	1.000	100.000	20.000
230	1.000	100.000	20.000
240	1.000	100.000	20.000
250	1.000	100.000	20.000
260	1.000	100.000	20.000
270	1.000	100.000	20.000
280	1.000	100.000	20.000
290	1.000	100.000	20.000
300	1.000	100.000	20.000
310	1.000	100.000	20.000
320	1.000	100.000	20.000
330	1.000	100.000	20.000
340	1.000	100.000	20.000
350	1.000	100.000	20.000

ELEVATION PATTERN

Type:	ALP24L4	
Directivity:	Numeric	dBd
Main Lobe:	25.21	14.02
Horizontal:	7.57	8.79
Beam Tilt:	1.00	
Polarization:	Horizontal	
Channel:	18	
Location:	Ottumwa, IA	
Note:		



ELEVATION TABULATED DATA

Type: ALP24L4

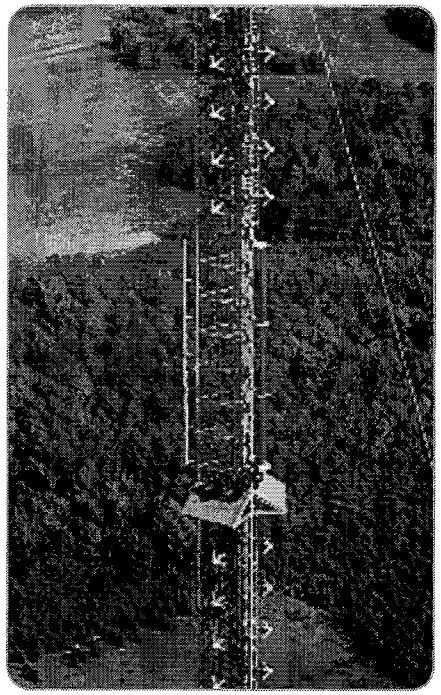
Polarization: Horizontal

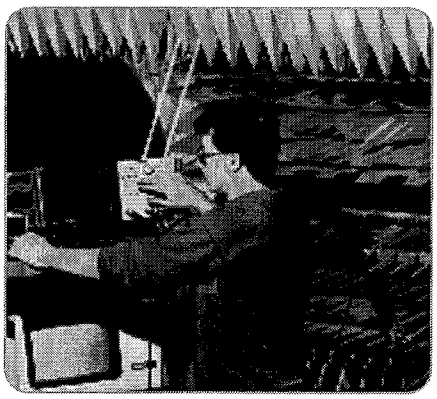
Angle	Field	dB	Angle	Field	dB	Angle	Field	dB	Angle	Field	dB
5.00	0.188	-14.52	-6.50	0.059	-24.58	-42.00	0.010	-40.00	-88.00	0.003	-50.46
4.75	0.194	-14.24	-6.75	0.102	-19.83	-43.00	0.028	-31.06	-89.00	0.001	-60.00
4.50	0.168	-15.49	-7.00	0.125	-18.06	-44.00	0.024	-32.40	-90.00	0.000	-40.00
4.25	0.114	-18.86	-7.25	0.123	-18.20	-45.00	0.049	-26.20			
4.00	0.047	-26.56	-7.50	0.099	-20.09	-46.00	0.069	-23.22			
3.75	0.055	-25.27	-7.75	0.061	-24.36	-47.00	0.045	-26.94			
3.50	0.119	-18.49	-8.00	0.029	-30.75	-48.00	0.010	-40.00			
3.25	0.165	-15.65	-8.25	0.052	-25.68	-49.00	0.002	-53.98			
3.00	0.182	-14.80	-8.50	0.085	-21.41	-50.00	0.013	-37.72			
2.75	0.164	-15.73	-8.75	0.104	-19.70	-51.00	0.016	-35.92			
2.50	0.116	-18.71	-9.00	0.104	-19.66	-52.00	0.009	-40.92			
2.25	0.059	-24.66	-9.25	0.091	-20.82	-53.00	0.029	-30.75			
2.00	0.073	-22.73	-9.50	0.084	-21.51	-54.00	0.026	-31.70			
1.75	0.141	-17.02	-9.75	0.109	-19.25	-55.00	0.008	-41.94			
1.50	0.194	-14.24	-10.00	0.158	-16.03	-56.00	0.035	-29.12			
1.25	0.214	-13.41	-11.00	0.286	-10.87	-57.00	0.035	-29.12			
1.00	0.202	-13.89	-12.00	0.146	-16.71	-58.00	0.011	-39.17			
0.75	0.190	-14.42	-13.00	0.019	-34.42	-59.00	0.042	-27.54			
0.50	0.242	-12.32	-14.00	0.010	-40.00	-60.00	0.054	-25.35			
0.25	0.377	-8.47	-15.00	0.005	-46.02	-61.00	0.053	-25.51			
0.00	0.548	-5.22	-16.00	0.020	-33.98	-62.00	0.118	-18.56			
-0.25	0.720	-2.85	-17.00	0.018	-34.89	-63.00	0.207	-13.68			
-0.50	0.867	-1.24	-18.00	0.028	-31.06	-64.00	0.267	-11.47			
-0.75	0.964	-0.32	-19.00	0.037	-28.64	-65.00	0.274	-11.24			
-1.00	1.000	0.00	-20.00	0.046	-26.74	-66.00	0.229	-12.80			
-1.25	0.966	-0.30	-21.00	0.174	-15.19	-67.00	0.150	-16.48			
-1.50	0.868	-1.23	-22.00	0.242	-12.32	-68.00	0.070	-23.10			
-1.75	0.715	-2.92	-23.00	0.110	-19.17	-69.00	0.043	-27.33			
-2.00	0.530	-5.51	-24.00	0.053	-25.51	-70.00	0.070	-23.10			
-2.25	0.338	-9.42	-25.00	0.043	-27.33	-71.00	0.079	-22.05			
-2.50	0.182	-14.80	-26.00	0.025	-32.04	-72.00	0.067	-23.48			
-2.75	0.161	-15.86	-27.00	0.022	-33.15	-73.00	0.043	-27.33			
-3.00	0.233	-12.65	-28.00	0.009	-40.92	-74.00	0.020	-33.98			
-3.25	0.285	-10.90	-29.00	0.006	-44.44	-75.00	0.020	-33.98			
-3.50	0.292	-10.69	-30.00	0.000	-40.00	-76.00	0.033	-29.63			
-3.75	0.253	-11.95	-31.00	0.008	-41.94	-77.00	0.039	-28.18			
-4.00	0.182	-14.80	-32.00	0.036	-28.87	-78.00	0.039	-28.18			
-4.25	0.102	-19.87	-33.00	0.102	-19.83	-79.00	0.034	-29.37			
-4.50	0.070	-23.10	-34.00	0.111	-19.09	-80.00	0.026	-31.70			
-4.75	0.121	-18.38	-35.00	0.037	-28.64	-81.00	0.019	-34.42			
-5.00	0.169	-15.44	-36.00	0.053	-25.51	-82.00	0.012	-38.42			
-5.25	0.188	-14.54	-37.00	0.036	-28.87	-83.00	0.006	-44.44			
-5.50	0.176	-15.09	-38.00	0.032	-29.90	-84.00	0.003	-50.46			
-5.75	0.135	-17.39	-39.00	0.040	-27.96	-85.00	0.003	-50.46			
-6.00	0.078	-22.16	-40.00	0.010	-40.00	-86.00	0.003	-50.46			
-6.25	0.030	-30.60	-41.00	0.035	-29.12	-87.00	0.003	-50.46			

Low to Medium Power UHF Broadcast Antennas

The ERI CARINA™ (ALP Series II) antennas deliver the versatility, power, and reliability that are the keys to success in today's competitive broadcast marketplace. For full-power stations transitioning to DTV, CARINA™ antennas offer field-proven solutions. Broadcasters with medium power requirements can benefit from this antenna's lightweight, low windloads, and easy installation which provide reductions in installation time and costs.

For Low Power Television (LPTV) stations the new, higher power handling capabilities of the CARINA™ UHF antennas make them the ideal choice for the higher ERPs now allowed for LPTV stations and translator facilities. The CARINA™ antennas offer the quality and performance needed to improve coverage and maintain competitiveness in today's broadcast marketplace.





Features

- Available for immediate implementation of DTV channels
- All CCIR bands IV/V channels available
- Lightweight/low wind load
  - Easy to install with less expense
  - Easier to lease tower space
- Radome enclosed for environmental protection
  - Long Life
  - Low maintenance
  - Reliable
- Power ratings up to 28 kW (peak) available
- Customized patterns
- Optimize coverage for your market area
- Wide selection of "off the shelf" patterns
  - Simplified application process
- Patterns measured at factory
  - Reliable performance in the field
  - Superior coverage
- Special designs available
  - Circular polarization (low and medium power)
  - Broadband versions available