

## **ENGINEERING EXHIBIT**

### **Application for Digital Television Station Construction Permit**

prepared for

#### **CBS Television Stations Inc.**

WFOR-TV Miami, FL

Facility ID 47902

Ch. 22 1000 kW 307 m

*CBS Television Stations Inc.* (“CBS”) is the licensee of television station WFOR-TV, digital Channel 22, Miami, FL. WFOR-TV is licensed to operate with 1000 kW effective radiated power (“ERP”) with a nondirectional antenna at a height above average terrain (“HAAT”) of 298 meters. CBS herein seeks a Construction Permit to increase antenna HAAT and employ a directional antenna at the licensed site.

The proposed WFOR-TV facility will operate at 1000 kW ERP and 307 m HAAT with a directional antenna. The proposed antenna will be installed on the shared WFOR-TV tower structure (FCC Antenna Structure Registration number 1026553), as part of the replacement of certain top-mounted antennas which were previously in use during the transition. No change to the overall structure height will result from this proposal.

The proposed WFOR-TV will employ a new shared UHF broadband antenna, a Dielectric model TUM20-3BP-16/36U-2-R, to be installed in place of an existing antenna on the tower’s candelabra. Elliptical polarization is proposed (17.8 percent vertical polarization). The maximum horizontally polarized ERP is 1000 kW, and the maximum vertically polarized ERP is 178 kW. The directional antenna’s azimuthal patterns are provided in Figures 1 and 1A for horizontal polarization, and in Figures 2 and 2A for vertical polarization.

The proposed antenna system has panel-type radiators oriented in three different azimuths. In order to achieve the desired horizontal plane radiation pattern, a “bent peanut” shape intended to complement the heavily populated Florida coastline region surrounding Miami, the number of

stacked panels in each azimuth is varied. Towards the North and South, where maximum power is achieved, a stack of 16 panels is used in each of these directions. To the East (where power is reduced), a stack of four panels is specified. Electrical beamtilt of 0.8 degree will be employed for the North and South panel stacks. The electrical beamtilt for the East panel stack is 0.01 degree. The amount of beamtilt specified in the accompanying FCC Form 301 Section III-D “Tech Box” item 10B is given as 0.8 degrees as that represents the beamtilt along the major lobes (North and South). Figures 3 and 3A supply the theoretical elevation pattern for the North and South panel stacks, while Figures 4 and 4A show the elevation pattern for the East panel stack.

A map is supplied as Figure 5 which depicts the standard predicted coverage contours. This map includes the location of Miami, WFOR-TV’s principal community. As demonstrated thereon, the proposed facility complies with §73.625(a)(1), as the entire principal community will be encompassed by the 48 dBμ contour.

Regarding the proposed elliptically polarized signal, the vertically polarized component will exceed the horizontally polarized component at certain azimuths. Figure 6 supplies a contour comparison of the horizontally and vertically polarized signals. The vertically polarized power is greater over certain radials that extend over the Atlantic Ocean. The regions where the corresponding vertical polarized 41 dBμ service contour extends beyond the horizontally polarized 41 dBμ contour are entirely over water, as depicted in Figure 6. The maximum difference in power where the vertical component exceeds the horizontal component at any of these regions is 2.18 dB. These regions are in areas of suppression and not within the major lobes of the directional antenna. If a waiver of §73.682(a)(14) of the FCC’s rules is necessary, then one is requested on behalf of the applicant. It is noted that §73.682(a) refers to analog television technical specifications (*i.e.*, visual and aural frequency tolerances and power levels, monochrome and color synchronizing waveforms, white and black levels, etc.) and there is not a companion rule regarding elliptical polarization for digital television stations.<sup>1</sup> For the case at hand, factors such as the site’s location along a coastline, the predominant North-South alignment of the heavily populated areas along the coast and the

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<sup>1</sup>For comparison, the maximum directional antenna maximum to minimum limits of legacy rule §73.685(e) have never been applied to digital television stations.

corresponding directional antenna major lobes, the affected azimuths being in Easterly directions over water, the design challenges associated with a shared (multi-station) UHF directional antenna using elliptical polarization, and the minimal amount of power difference should be considered in support of the waiver request should a waiver be required.

The proposed WFOR-TV facility's predicted service population provides a 99.4 percent match of the MB Docket 87-268 Seventh Report and Order Appendix B facility, as detailed in the following table.

**Digital Television Population Summary**

Population Summary (2000 Census) OET Bulletin 69 method	Appendix B	Proposed
Within Noise Limited Contour	4,922,299	4,894,853
Not affected by terrain losses	4,922,299	4,894,853
Lost to all interference	0	0
Net DTV Service	<b>4,922,299</b>	<b>4,894,853</b>
Match of Appendix B	---	<b>99.44%</b>

The contour comparison map of Figure 7 demonstrates that there will be minor areas of theoretical service contour loss resulting from the proposal, when compared to the licensed WFOR-TV facility. Most of the loss area is within the service contour of another television station of the same network affiliation (CBS). Figure 7 also supplies the overlapping contours from other nearby CBS Network stations. The overlapping CBS Network station contours cover all of the loss area except for two areas containing a population of 2,968 persons. This represents 0.06 percent of the population within the licensed WFOR-TV service contour (4,903,432 persons). The Longley-Rice predicted coverage map provided as Figure 8 provides further analysis of the contour loss areas which are beyond the service contours of other CBS affiliate stations. The flat terrain in southern Florida departs widely from the average upon which the FCC standard F(50,90) curves are based. As shown on Figure 8, those theoretical loss areas are predicted to receive service in excess of 41 dB $\mu$  from the proposed WFOR-TV facility. Thus, the applicant does not anticipate any actual loss of CBS network service within the WFOR-TV licensed 41 dB $\mu$  contour area.

The proposed facility expands the WFOR-TV service contour beyond that established by Appendix B values. A detailed interference study per OET Bulletin 69<sup>2</sup> shows that the proposal complies with the 0.5 percent limit of new interference caused to pertinent nearby digital television stations. The interference study output report is provided as Table 1. Protection requirements towards authorized Class A stations are also satisfied.

The nearest FCC monitoring station is 186 km distant at Vero Beach, FL. This exceeds the threshold minimum distance specified in §73.1030(c)(3) that would suggest consideration of the monitoring station. The site is not located within the areas requiring coordination with “quiet” zones specified in §73.1030(a) and (b). There are no AM stations within 3.2 kilometers of the site, based on information contained within the Commission’s database. The site location is beyond the border areas requiring international coordination.

### **Human Exposure to Radiofrequency Electromagnetic Field**

The proposed operation was evaluated for human exposure to RF energy using the procedures outlined in the Commission’s OET Bulletin Number 65. Based on OET-65 equation (10), and considering 10 percent antenna relative field in downward elevations (pattern data shows less than 10 percent relative field at angles 30 to 90 degrees below the antenna), the calculated signal density near the tower at two meters above ground level attributable to the proposed facility is  $4.2 \mu\text{W}/\text{cm}^2$ , which is 1.2 percent of the general population/uncontrolled maximum permitted exposure limit. This is below the five percent threshold limit described in §1.1307(b) regarding sites with multiple emitters, categorically excluding the applicant from responsibility for taking any corrective action in the areas where the proposal’s contribution is less than five percent.

The general public will not be exposed to RF levels attributable to the proposal in excess of the FCC’s guidelines. RF exposure warning signs will continue to be posted. With respect to worker safety, the applicant will coordinate exposure procedures with all pertinent stations and will

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<sup>2</sup>FCC Office of Engineering and Technology Bulletin number 69, *Longley-Rice Methodology for Evaluating TV Coverage and Interference*, February 6, 2004 (“OET-69”). The implementation of OET-69 for this study followed the guidelines of OET-69 as specified therein. A standard cell size of 2 km was employed. Comparisons of various results of this computer program (run on a Sun Sparc processor) to the Commission’s implementation of OET-69 show excellent correlation.

reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from RF electromagnetic field exposure in excess of FCC guidelines.

This exhibit is limited to the evaluation of exposure to RF electromagnetic field. The proposed transmitting antenna will be side-mounted on an existing antenna support structure which was constructed prior to March 16, 2001. No change in structure height is proposed.

### **Certification**

The undersigned hereby certifies that the foregoing statement and associated attachments were prepared by him or under his direction, and that they are true and correct to the best of his knowledge and belief.



Joseph M. Davis, P.E.  
August 2, 2011

### **Chesapeake RF Consultants, LLC**

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### List of Attachments

- Figure 1, 1A Antenna Azimuthal Pattern - Horizontal Polarization
- Figure 2, 2A Antenna Azimuthal Pattern - Vertical Polarization
- Figure 3, 3A Antenna Elevation Pattern - North and South Faces
- Figure 4, 4A Antenna Elevation Pattern - East Face
- Figure 5 Proposed Coverage Contours
- Figure 6 Coverage Contour Comparison - Elliptical Polarization
- Figure 7 Coverage Contour Comparison - Alternate CBS Services
- Figure 8 Longley Rice Predicted Coverage
- Table 1 OET Bulletin 69 Interference Study
- Form 301 Saved Version of Engineering Sections from FCC Form at Time of Upload

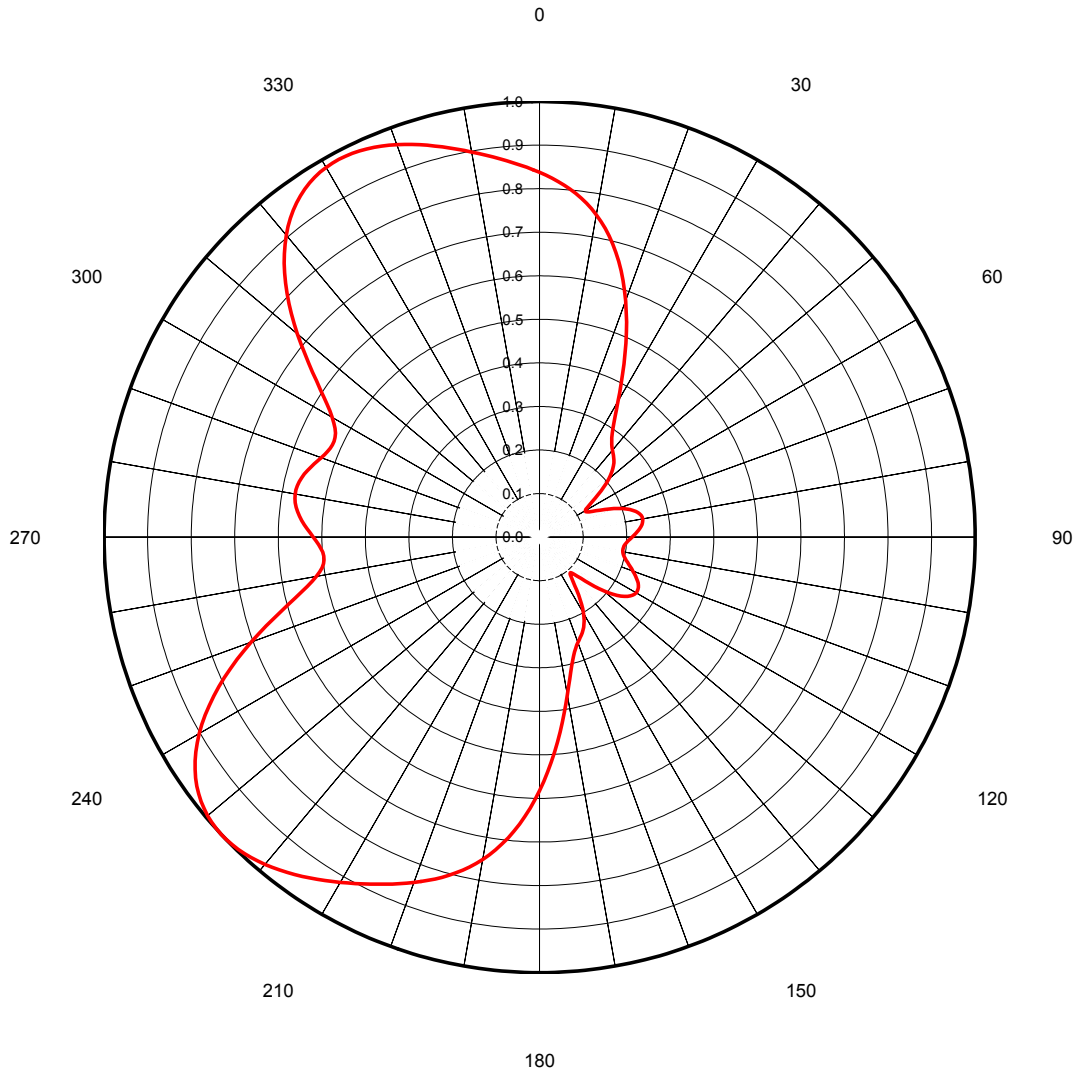
*This material was entered August 2, 2011 for filing electronically. Since the FCC's electronic filing system may be accessed by anyone with the applicant's account number and password, and electronic data may otherwise be altered in an unauthorized fashion, we cannot be responsible for changes made subsequent to our entry of this data and related attachments.*

Proposal Number	<b>C-04551</b>	Revision:	<b>1</b>
Date	<b>8-Mar-11</b>		
Call Letters	<b>WFOR</b>	Channel	<b>22</b>
Location	<b>Miami, FL</b>		
Customer			
Antenna Type	<b>TUM20-3BP-16/36U-2-R</b>		

**AZIMUTH PATTERN**

Gain **2.64** **(4.22 dB)**  
 Calculated / Measured **Calculated**

Frequency **521.00 MHz**  
 Drawing # **TUM-3BP-22H**



**Figure 1**  
**Antenna Azimuthal Pattern Plot**  
**Horizontal Polarization**  
**WFOR-TV Miami, FL**  
**Facility ID 47902**  
**Ch. 22 1000 kW 307 m**

prepared for  
**CBS Television Stations Inc.**

August, 2011



Proposal Number **C-04551** Revision: **1**  
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Call Letters **WFOR** Channel **22**  
Location **Miami, FL**  
Customer  
Antenna Type **TUM20-3BP-16/36U-2-R**

### TABULATION OF AZIMUTH PATTERN

Azimuth Pattern Drawing #: **TUM-3BP-22H**

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
0	0.837	45	0.241	90	0.212	135	0.134	180	0.582	225	0.998	270	0.520	315	0.825
1	0.831	46	0.236	91	0.209	136	0.124	181	0.603	226	1.000	271	0.527	316	0.843
2	0.825	47	0.230	92	0.205	137	0.116	182	0.623	227	1.000	272	0.534	317	0.860
3	0.817	48	0.223	93	0.202	138	0.111	183	0.642	228	0.999	273	0.541	318	0.876
4	0.810	49	0.215	94	0.199	139	0.108	184	0.661	229	0.998	274	0.548	319	0.891
5	0.802	50	0.207	95	0.197	140	0.109	185	0.678	230	0.995	275	0.554	320	0.905
6	0.794	51	0.197	96	0.195	141	0.113	186	0.695	231	0.991	276	0.559	321	0.918
7	0.784	52	0.187	97	0.194	142	0.119	187	0.710	232	0.986	277	0.563	322	0.929
8	0.774	53	0.177	98	0.193	143	0.128	188	0.725	233	0.980	278	0.567	323	0.940
9	0.763	54	0.166	99	0.193	144	0.138	189	0.738	234	0.973	279	0.569	324	0.949
10	0.751	55	0.156	100	0.194	145	0.149	190	0.751	235	0.964	280	0.570	325	0.957
11	0.738	56	0.146	101	0.195	146	0.160	191	0.763	236	0.954	281	0.570	326	0.964
12	0.725	57	0.137	102	0.197	147	0.171	192	0.775	237	0.943	282	0.569	327	0.970
13	0.710	58	0.130	103	0.199	148	0.182	193	0.785	238	0.931	283	0.567	328	0.974
14	0.694	59	0.124	104	0.203	149	0.192	194	0.795	239	0.917	284	0.563	329	0.978
15	0.677	60	0.121	105	0.206	150	0.201	195	0.804	240	0.902	285	0.559	330	0.980
16	0.659	61	0.121	106	0.210	151	0.210	196	0.813	241	0.887	286	0.555	331	0.982
17	0.640	62	0.123	107	0.214	152	0.218	197	0.821	242	0.870	287	0.549	332	0.982
18	0.620	63	0.128	108	0.219	153	0.224	198	0.829	243	0.851	288	0.544	333	0.982
19	0.599	64	0.135	109	0.223	154	0.230	199	0.836	244	0.832	289	0.539	334	0.981
20	0.577	65	0.143	110	0.228	155	0.236	200	0.844	245	0.813	290	0.533	335	0.979
21	0.555	66	0.153	111	0.233	156	0.241	201	0.851	246	0.792	291	0.529	336	0.976
22	0.533	67	0.162	112	0.238	157	0.245	202	0.858	247	0.771	292	0.525	337	0.972
23	0.510	68	0.173	113	0.242	158	0.249	203	0.865	248	0.749	293	0.522	338	0.968
24	0.487	69	0.183	114	0.246	159	0.253	204	0.872	249	0.727	294	0.521	339	0.964
25	0.464	70	0.192	115	0.249	160	0.257	205	0.879	250	0.704	295	0.521	340	0.959
26	0.442	71	0.201	116	0.252	161	0.262	206	0.887	251	0.682	296	0.522	341	0.954
27	0.420	72	0.209	117	0.255	162	0.268	207	0.894	252	0.660	297	0.526	342	0.948
28	0.399	73	0.217	118	0.256	163	0.275	208	0.901	253	0.638	298	0.532	343	0.942
29	0.379	74	0.223	119	0.256	164	0.283	209	0.908	254	0.617	299	0.540	344	0.936
30	0.360	75	0.228	120	0.256	165	0.294	210	0.915	255	0.597	300	0.550	345	0.930
31	0.343	76	0.233	121	0.254	166	0.305	211	0.923	256	0.579	301	0.562	346	0.923
32	0.327	77	0.236	122	0.252	167	0.318	212	0.930	257	0.561	302	0.575	347	0.917
33	0.313	78	0.238	123	0.248	168	0.333	213	0.937	258	0.546	303	0.591	348	0.910
34	0.301	79	0.240	124	0.243	169	0.350	214	0.944	259	0.532	304	0.608	349	0.904
35	0.291	80	0.240	125	0.237	170	0.368	215	0.951	260	0.521	305	0.626	350	0.898
36	0.282	81	0.240	126	0.230	171	0.387	216	0.958	261	0.511	306	0.645	351	0.892
37	0.275	82	0.239	127	0.222	172	0.407	217	0.964	262	0.504	307	0.664	352	0.885
38	0.269	83	0.237	128	0.213	173	0.428	218	0.970	263	0.500	308	0.684	353	0.879
39	0.264	84	0.234	129	0.203	174	0.450	219	0.976	264	0.498	309	0.705	354	0.873
40	0.260	85	0.231	130	0.192	175	0.472	220	0.981	265	0.498	310	0.726	355	0.867
41	0.257	86	0.228	131	0.181	176	0.495	221	0.986	266	0.499	311	0.746	356	0.861
42	0.253	87	0.224	132	0.169	177	0.517	222	0.990	267	0.503	312	0.767	357	0.856
43	0.250	88	0.220	133	0.157	178	0.539	223	0.994	268	0.507	313	0.787	358	0.850
44	0.246	89	0.216	134	0.145	179	0.561	224	0.996	269	0.513	314	0.806	359	0.844



**Figure 1A**  
**Antenna Azimuthal Pattern Data**  
**Horizontal Polarization**  
**WFOR-TV Miami, FL**  
**Facility ID 47902**  
**Ch. 22 1000 kW 307 m**

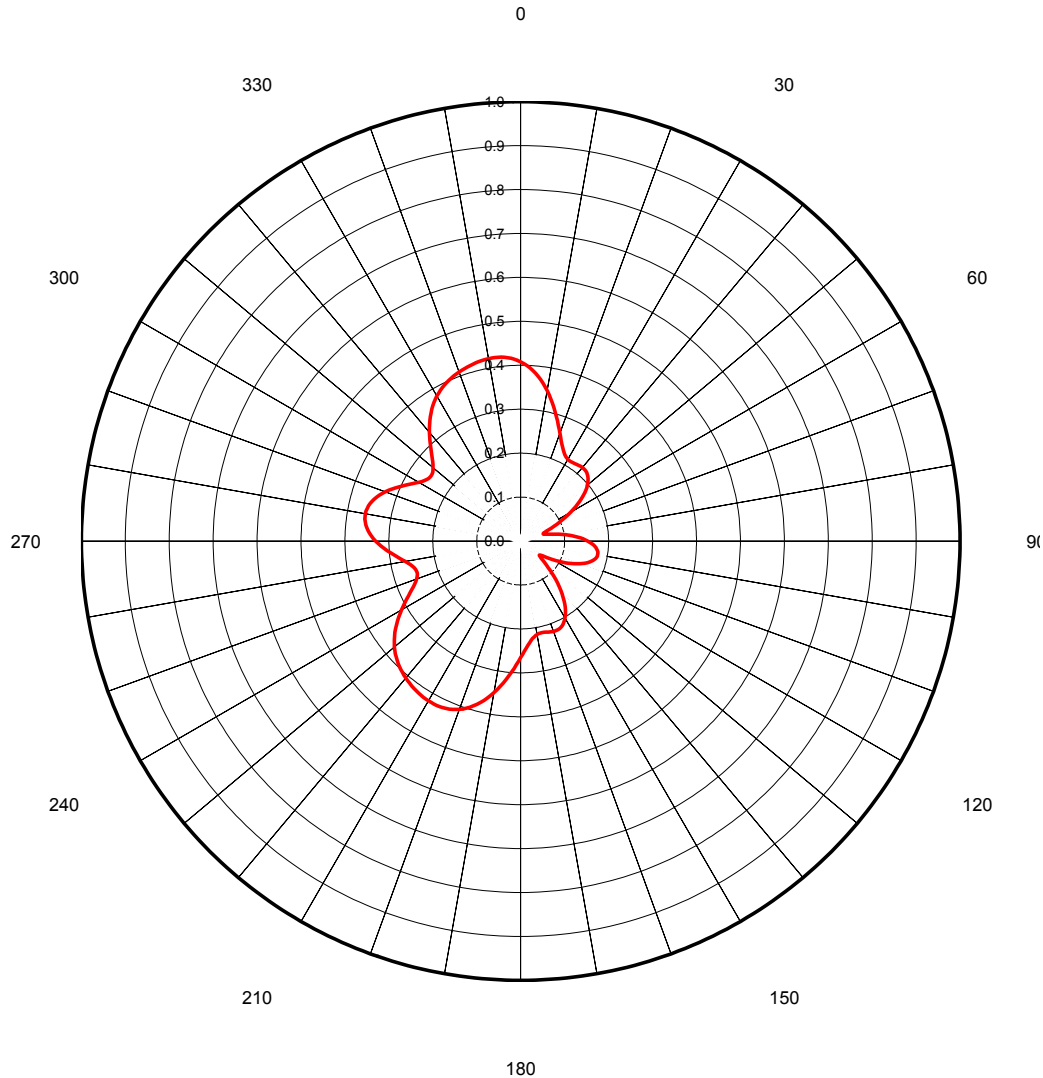
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Location	<b>Miami, FL</b>		
Customer			
Antenna Type	<b>TUM20-3BP-16/36U-2-R</b>		

**AZIMUTH PATTERN/VERTICAL POLARIZATION**

Gain	<b>2.20</b>	<b>( 3.42 dB)</b>	Frequency	<b>521.00 MHz</b>
Calculated / Measured		<b>Calculated</b>	Drawing #	<b>TUM-3BP-22V</b>



**Figure 2**  
**Antenna Azimuthal Pattern Plot**  
**Vertical Polarization**  
**WFOR-TV Miami, FL**  
**Facility ID 47902**  
**Ch. 22 1000 kW 307 m**

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Call Letters **WFOR** Channel **22**  
Location **Miami, FL**  
Customer  
Antenna Type **TUM20-3BP-16/36U-2-R**

### TABULATION OF AZIMUTH PATTERN/VERTICAL POLARIZATION

Azimuth Pattern Drawing #: **TUM-3BP-22V**

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
0	0.408	45	0.215	90	0.153	135	0.096	180	0.265	225	0.394	270	0.330	315	0.288
1	0.404	46	0.212	91	0.157	136	0.104	181	0.274	226	0.391	271	0.335	316	0.295
2	0.400	47	0.210	92	0.162	137	0.113	182	0.282	227	0.388	272	0.340	317	0.302
3	0.395	48	0.206	93	0.166	138	0.121	183	0.291	228	0.384	273	0.345	318	0.309
4	0.390	49	0.203	94	0.169	139	0.129	184	0.299	229	0.380	274	0.349	319	0.316
5	0.384	50	0.198	95	0.172	140	0.137	185	0.308	230	0.375	275	0.352	320	0.323
6	0.377	51	0.193	96	0.174	141	0.145	186	0.317	231	0.370	276	0.355	321	0.330
7	0.371	52	0.188	97	0.176	142	0.153	187	0.326	232	0.365	277	0.357	322	0.337
8	0.363	53	0.182	98	0.177	143	0.161	188	0.334	233	0.360	278	0.358	323	0.344
9	0.356	54	0.176	99	0.178	144	0.168	189	0.342	234	0.354	279	0.359	324	0.350
10	0.347	55	0.169	100	0.178	145	0.175	190	0.350	235	0.348	280	0.359	325	0.356
11	0.339	56	0.162	101	0.178	146	0.181	191	0.358	236	0.341	281	0.359	326	0.362
12	0.331	57	0.155	102	0.177	147	0.187	192	0.365	237	0.335	282	0.357	327	0.367
13	0.322	58	0.147	103	0.175	148	0.193	193	0.372	238	0.328	283	0.356	328	0.372
14	0.313	59	0.139	104	0.173	149	0.198	194	0.379	239	0.320	284	0.353	329	0.377
15	0.304	60	0.131	105	0.170	150	0.202	195	0.385	240	0.313	285	0.350	330	0.381
16	0.295	61	0.123	106	0.167	151	0.206	196	0.390	241	0.306	286	0.347	331	0.385
17	0.286	62	0.115	107	0.163	152	0.209	197	0.395	242	0.298	287	0.343	332	0.389
18	0.277	63	0.107	108	0.159	153	0.212	198	0.400	243	0.291	288	0.338	333	0.392
19	0.269	64	0.098	109	0.155	154	0.215	199	0.404	244	0.284	289	0.333	334	0.395
20	0.261	65	0.090	110	0.150	155	0.217	200	0.408	245	0.277	290	0.328	335	0.398
21	0.253	66	0.083	111	0.144	156	0.218	201	0.411	246	0.271	291	0.322	336	0.401
22	0.246	67	0.076	112	0.138	157	0.219	202	0.413	247	0.265	292	0.316	337	0.403
23	0.240	68	0.069	113	0.132	158	0.219	203	0.416	248	0.260	293	0.310	338	0.406
24	0.234	69	0.063	114	0.126	159	0.219	204	0.417	249	0.256	294	0.303	339	0.408
25	0.229	70	0.059	115	0.119	160	0.219	205	0.419	250	0.252	295	0.297	340	0.409
26	0.225	71	0.055	116	0.112	161	0.218	206	0.420	251	0.249	296	0.291	341	0.411
27	0.221	72	0.054	117	0.105	162	0.217	207	0.420	252	0.247	297	0.284	342	0.413
28	0.218	73	0.054	118	0.098	163	0.217	208	0.420	253	0.246	298	0.278	343	0.414
29	0.216	74	0.056	119	0.091	164	0.216	209	0.420	254	0.247	299	0.273	344	0.416
30	0.215	75	0.059	120	0.084	165	0.215	210	0.420	255	0.248	300	0.268	345	0.417
31	0.214	76	0.064	121	0.078	166	0.214	211	0.420	256	0.250	301	0.263	346	0.418
32	0.214	77	0.069	122	0.071	167	0.214	212	0.419	257	0.253	302	0.259	347	0.420
33	0.214	78	0.076	123	0.065	168	0.214	213	0.418	258	0.257	303	0.256	348	0.420
34	0.215	79	0.082	124	0.061	169	0.215	214	0.417	259	0.262	304	0.254	349	0.421
35	0.215	80	0.089	125	0.057	170	0.216	215	0.415	260	0.267	305	0.253	350	0.422
36	0.216	81	0.096	126	0.054	171	0.218	216	0.414	261	0.273	306	0.252	351	0.422
37	0.217	82	0.103	127	0.053	172	0.220	217	0.412	262	0.279	307	0.253	352	0.422
38	0.218	83	0.110	128	0.054	173	0.223	218	0.411	263	0.285	308	0.254	353	0.422
39	0.218	84	0.117	129	0.057	174	0.227	219	0.409	264	0.292	309	0.257	354	0.421
40	0.219	85	0.123	130	0.061	175	0.232	220	0.407	265	0.299	310	0.260	355	0.420
41	0.219	86	0.130	131	0.067	176	0.238	221	0.405	266	0.305	311	0.265	356	0.418
42	0.218	87	0.136	132	0.073	177	0.244	222	0.402	267	0.312	312	0.270	357	0.416
43	0.217	88	0.142	133	0.080	178	0.250	223	0.400	268	0.318	313	0.275	358	0.414
44	0.216	89	0.147	134	0.088	179	0.258	224	0.397	269	0.324	314	0.281	359	0.411



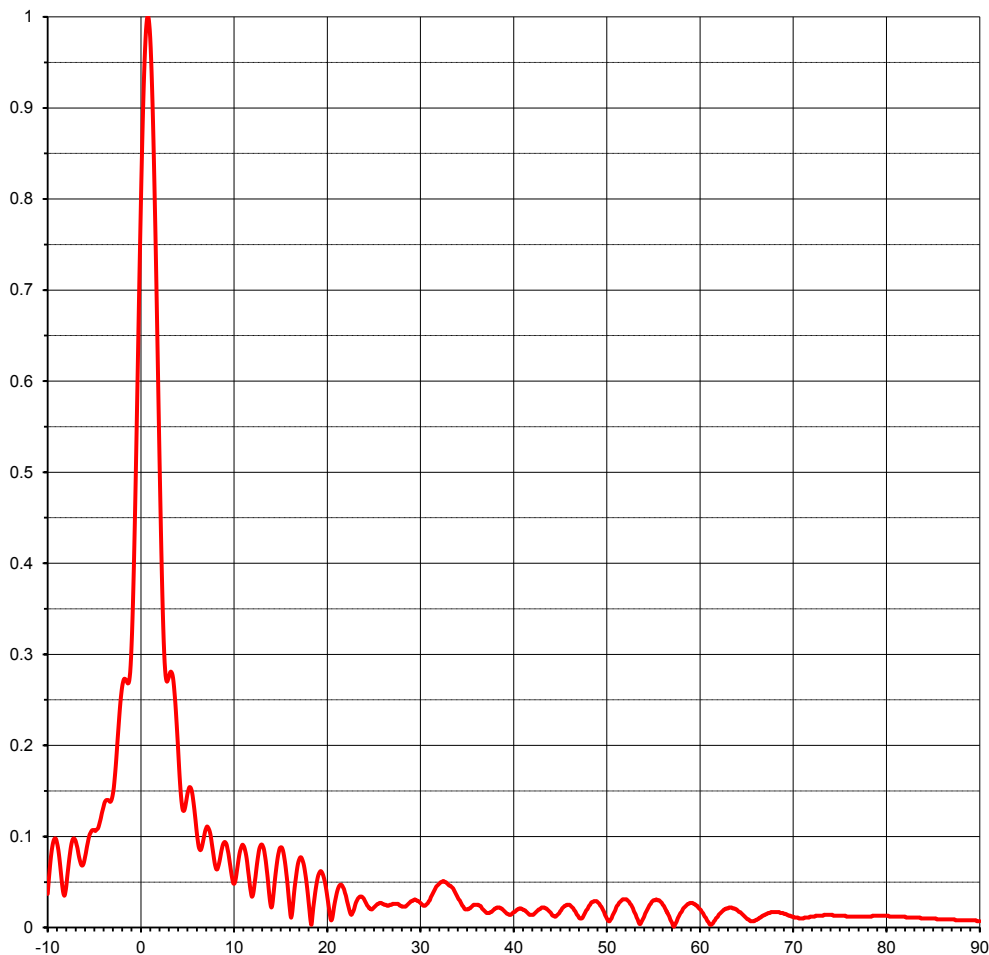
**Figure 2A**  
**Antenna Azimuthal Pattern Data**  
**Vertical Polarization**  
**WFOR-TV Miami, FL**  
**Facility ID 47902**  
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### ELEVATION PATTERN North and South

RMS Gain at Main Lobe	<b>27.50 ( 14.39 dB )</b>	Beam Tilt	<b>0.80 deg</b>
RMS Gain at Horizontal	<b>17.40 ( 12.41 dB )</b>	Frequency	<b>521.00 MHz</b>
Calculated / Measured	<b>Calculated</b>	Drawing #	<b>16U275080-90</b>



**Figure 3**  
**Antenna Elevation Pattern**  
**North and South Faces**  
**WFOR-TV Miami, FL**  
**Facility ID 47902**  
**Ch. 22 1000 kW 307 m**

prepared for  
**CBS Television Stations Inc.**

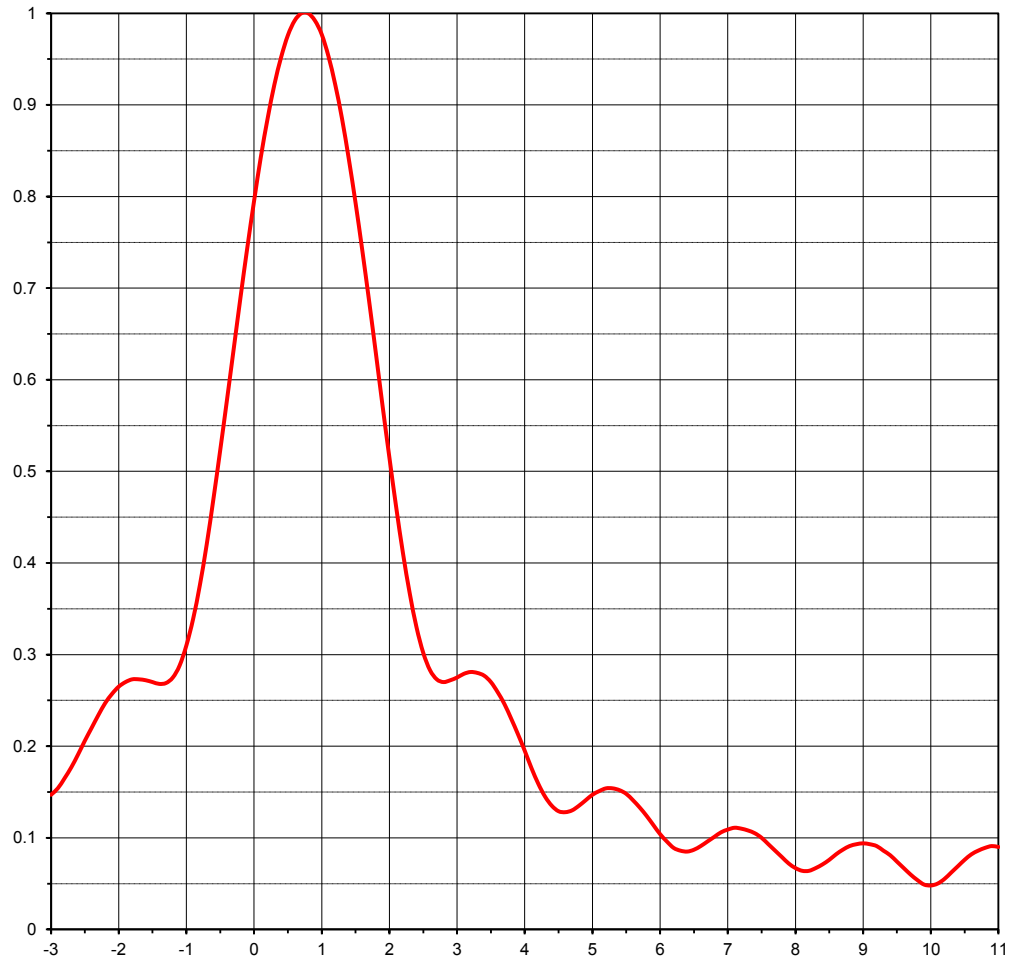
August, 2011



Proposal Number	<b>C-04551</b>	Revision:	<b>1</b>
Date	<b>8-Mar-11</b>		
Call Letters	<b>WFOR</b>	Channel	<b>22</b>
Location	<b>Miami, FL</b>		
Customer			
Antenna Type	<b>TUM20-3BP-16/36U-2-R</b>		

### ELEVATION PATTERN North and South

RMS Gain at Main Lobe	<b>27.50 ( 14.39 dB )</b>	Beam Tilt	<b>0.80 deg</b>
RMS Gain at Horizontal	<b>17.40 ( 12.41 dB )</b>	Frequency	<b>521.00 MHz</b>
Calculated / Measured	<b>Calculated</b>	Drawing #	<b>16U275080</b>



Degrees Below Horizontal



**Figure 3A**  
**Antenna Elevation Pattern - Detail**  
**North and South Faces**  
**WFOR-TV Miami, FL**  
**Facility ID 47902**  
**Ch. 22 1000 kW 307 m**

prepared for  
**CBS Television Stations Inc.**

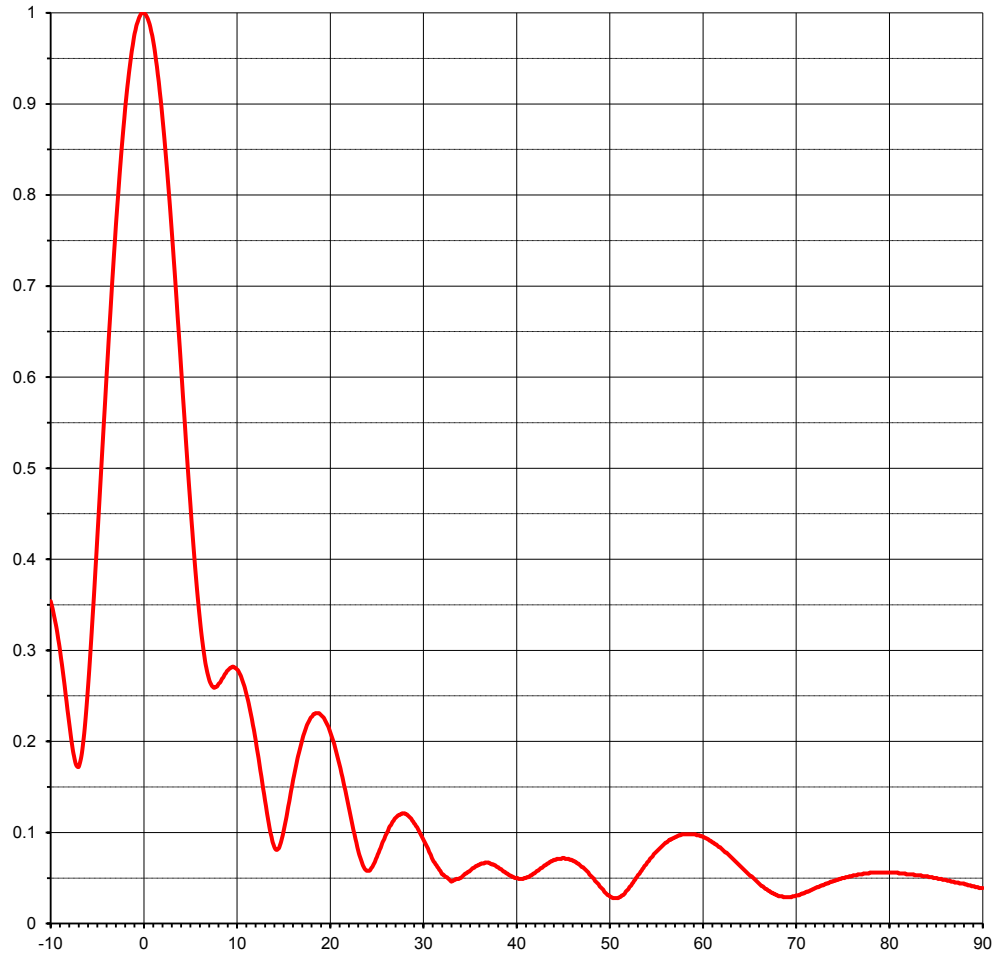
August, 2011



Proposal Number **C-04551**  
Date **8-Mar-11**  
Call Letters **WFOR** Channel **22**  
Location **Miami, FL**  
Customer  
Antenna Type **TUM20-3BP-16/36U-2-R**

### ELEVATION PATTERN EAST

RMS Gain at Main Lobe	<b>7.50 ( 8.75 dB )</b>	Beam Tilt	<b>0.01 deg</b>
RMS Gain at Horizontal	<b>7.50 ( 8.75 dB )</b>	Frequency	<b>521.00 MHz</b>
Calculated / Measured	<b>Calculated</b>	Drawing #	<b>04U075010</b>



**Figure 4**  
**Antenna Elevation Pattern**  
**East Face**  
**WFOR-TV Miami, FL**  
**Facility ID 47902**  
**Ch. 22 1000 kW 307 m**

prepared for  
**CBS Television Stations Inc.**

August, 2011

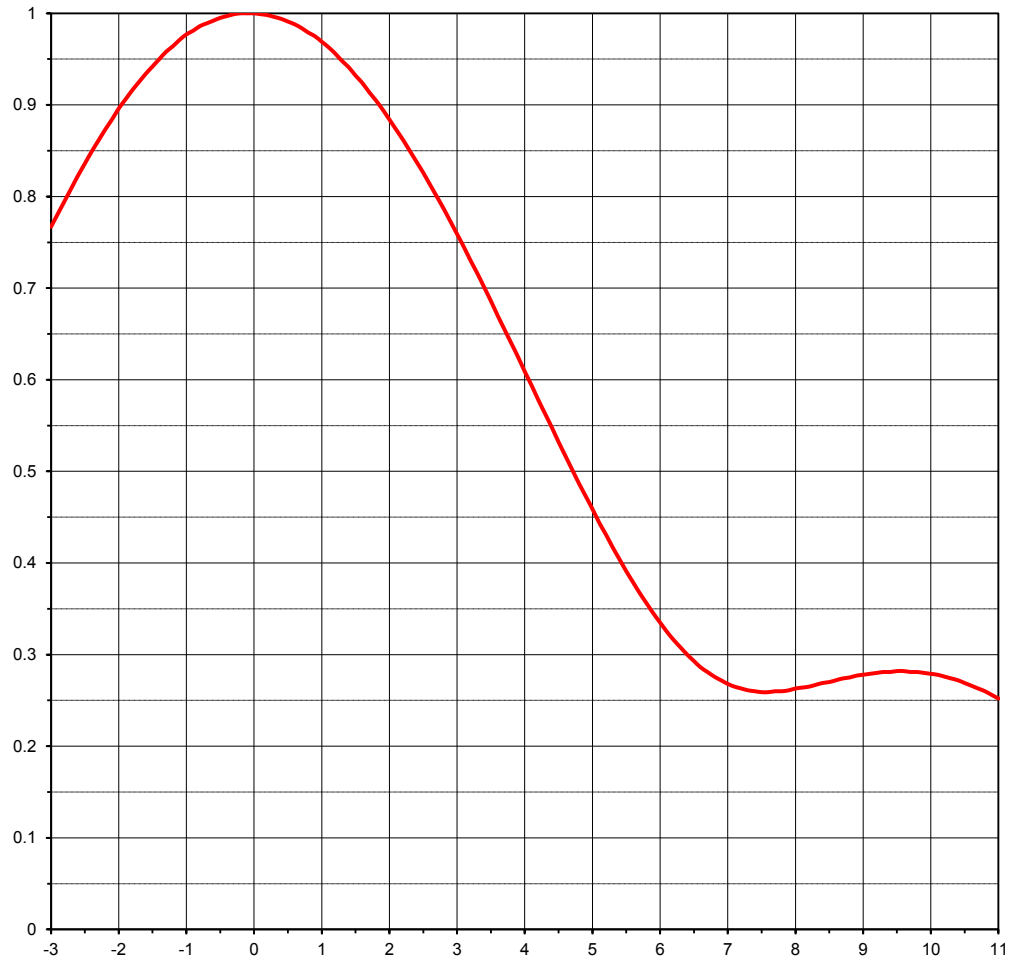




Proposal Number **C-04551**  
Date **8-Mar-11**  
Call Letters **WFOR** Channel **22**  
Location **Miami, FL**  
Customer  
Antenna Type **TUM20-3BP-16/36U-2-R**

### ELEVATION PATTERN EAST

RMS Gain at Main Lobe	<b>7.50 ( 8.75 dB )</b>	Beam Tilt	<b>0.10 deg</b>
RMS Gain at Horizontal	<b>7.50 ( 8.75 dB )</b>	Frequency	<b>521.00 MHz</b>
Calculated / Measured	<b>Calculated</b>	Drawing #	<b>04U075010</b>



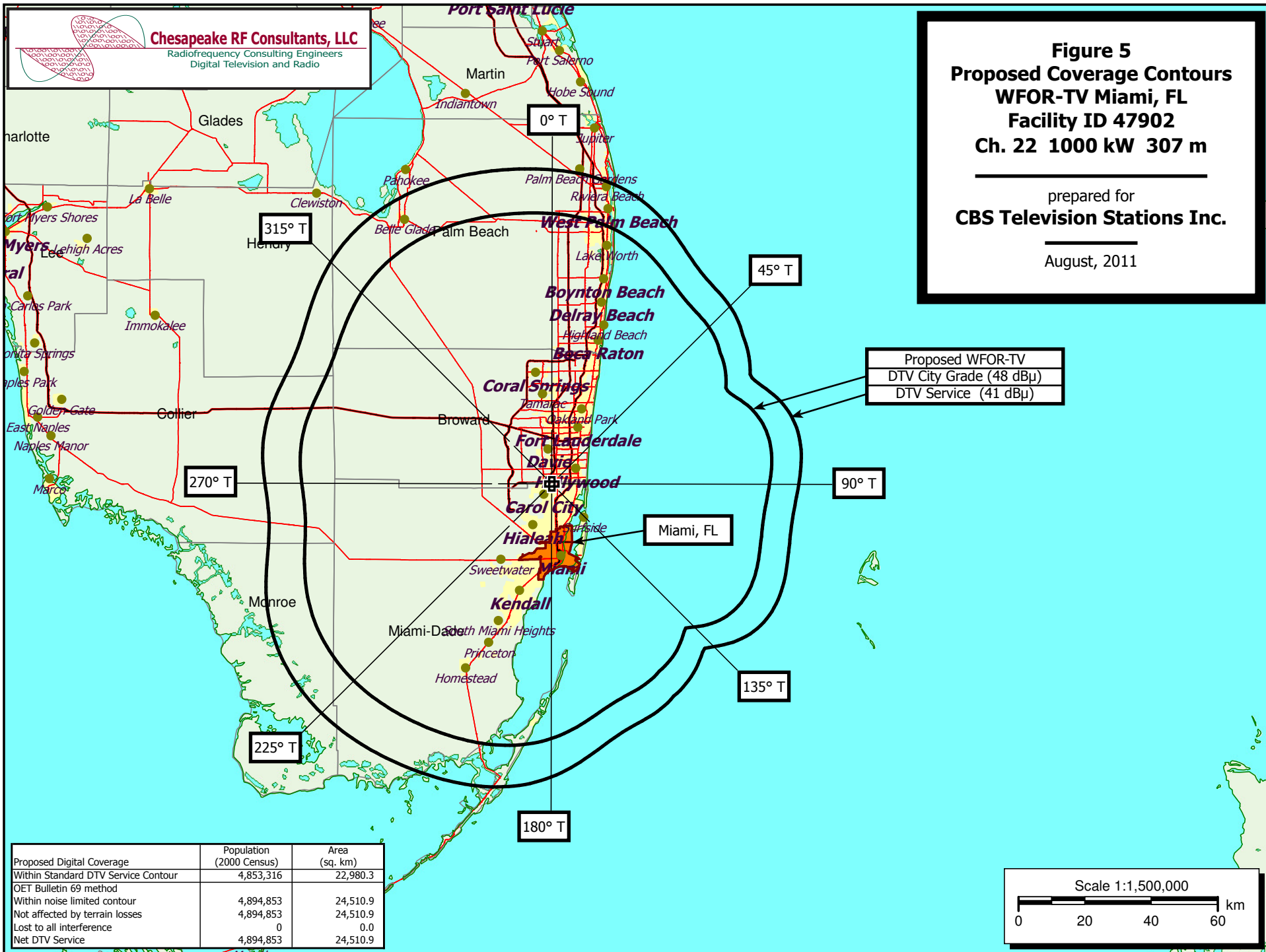
Degrees Below Horizontal



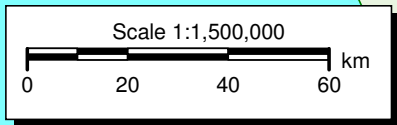
**Figure 4A**  
**Antenna Elevation Pattern - Detail**  
**East Face**  
**WFOR-TV Miami, FL**  
**Facility ID 47902**  
**Ch. 22 1000 kW 307 m**

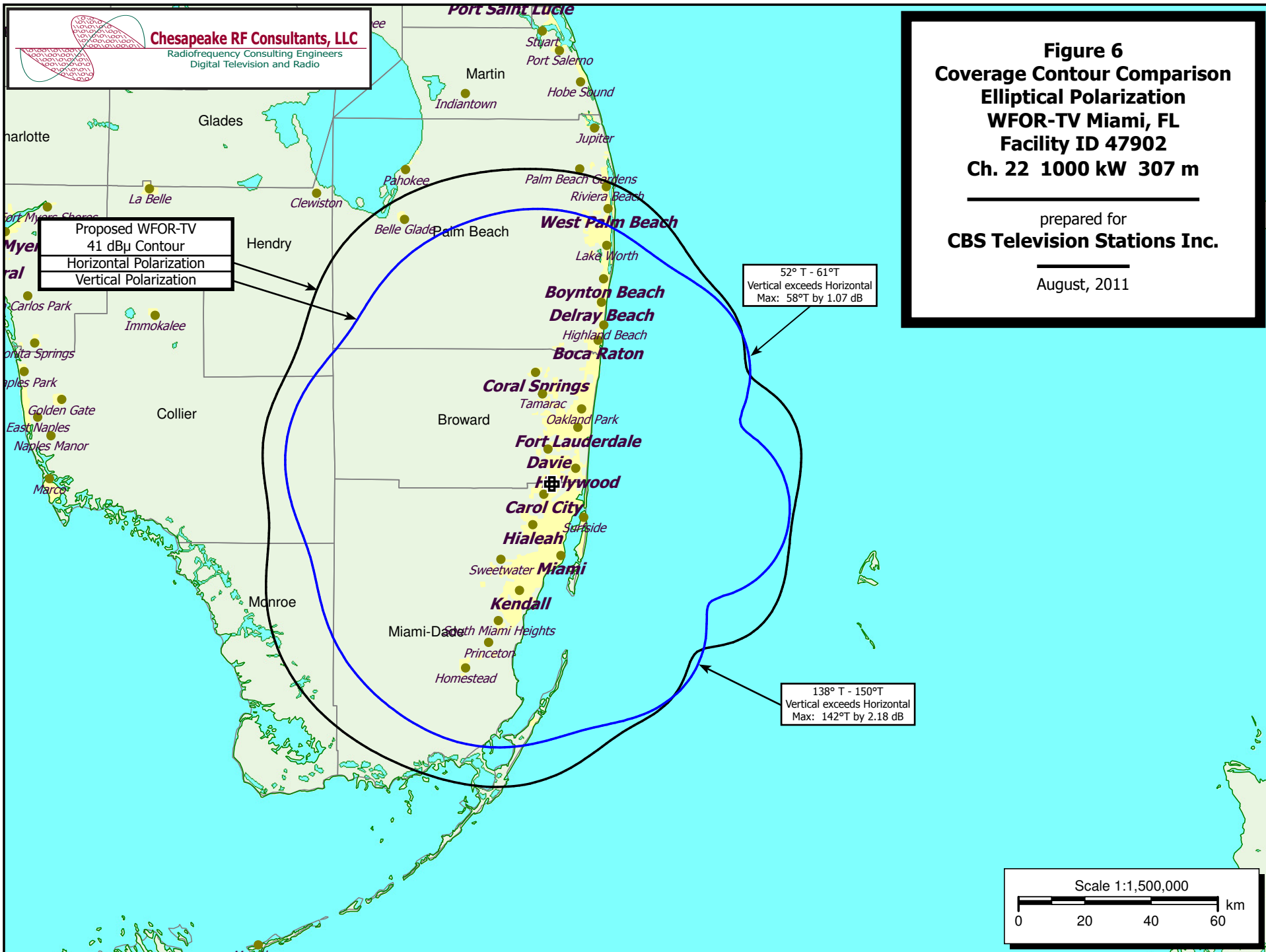
prepared for  
**CBS Television Stations Inc.**

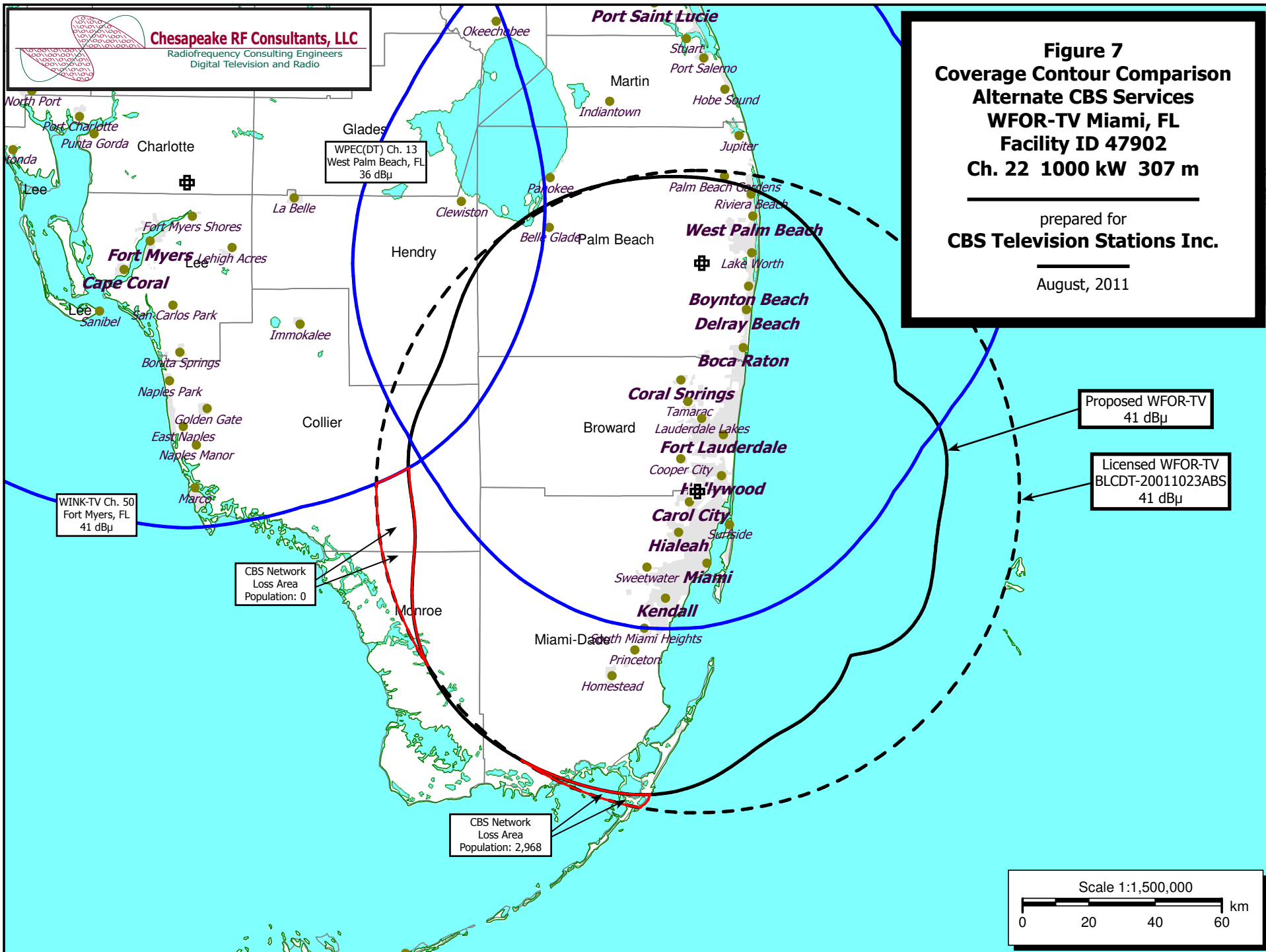
August, 2011



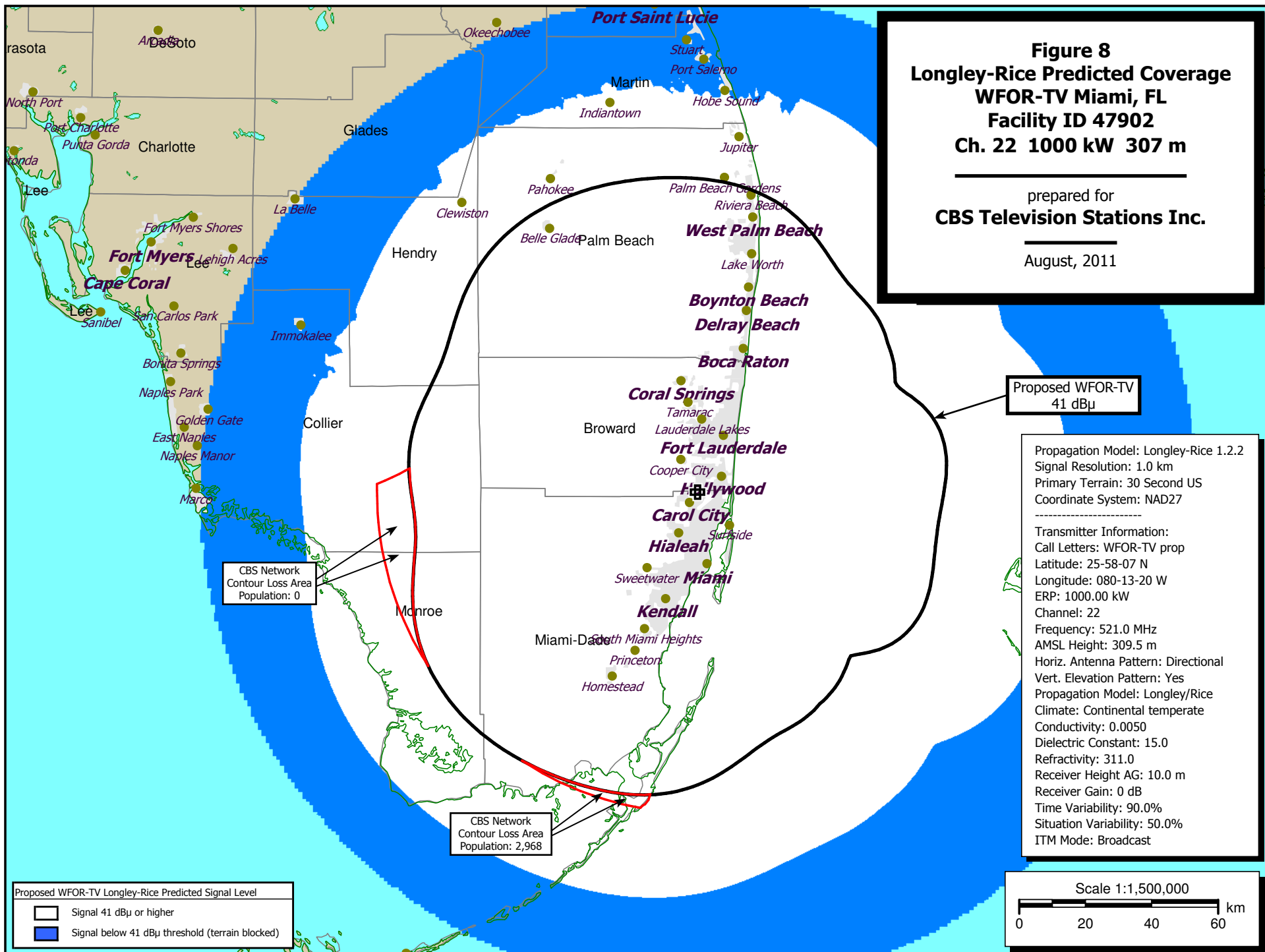
Proposed Digital Coverage	Population (2000 Census)	Area (sq. km)
Within Standard DTV Service Contour	4,853,316	22,980.3
OET Bulletin 69 method		
Within noise limited contour	4,894,853	24,510.9
Not affected by terrain losses	4,894,853	24,510.9
Lost to all interference	0	0.0
Net DTV Service	4,894,853	24,510.9











**Table 1 WFOR-TV OET Bulletin 69 Interference Study**  
(worst-case scenarios shown page 1 of 6)

TW Census data selected 2000  
Data Base Selected  
/space/software/cdbs/pt\_tvdb.sff

TV INTERFERENCE and SPACING ANALYSIS PROGRAM

Date: 08-02-2011 Time: 12:01:37

Record Selected for Analysis

WFOR-TV USERRECORD-01 MIAMI FL US  
Channel 22 ERP 1000. kW HAAT 308. m RCAMSL 00310 m  
Latitude 025-58-07 Longitude 0080-13-20  
Status APP Zone 3 Border Site number: 01  
Dir Antenna Make usr Model WFOR\_TUMmax Beam tilt N Ref Azimuth 0.  
Last update Cutoff date Docket  
Comments  
Applicant

Cell Size for Service Analysis 2.0 km/side

Distance Increments for Longley-Rice Analysis 1.00 km

Facility (site # 01) meets maximum height/power limits

Site number	1		
Azimuth	ERP	HAAT	41.0 dBu F(50,90)
(Deg)	(kW)	(m)	(km)
0.0	700.569	307.0	94.4
45.0	54.522	307.8	75.5
90.0	44.944	309.2	74.5
135.0	27.060	308.9	71.6
180.0	338.724	308.0	88.0
225.0	993.677	307.9	97.7
270.0	270.400	307.0	86.0
315.0	665.040	307.0	93.9

Evaluation toward Class A Stations from site # 01

Station inside contour of Class A station  
WDLF-CA 21 MIAMI, POMPANO BEACH FL BLTTA 20080206ADA

Class A Evaluation Complete

Checks to Site Number 01

Proposed facility OK to FCC Monitoring Stations

Proposed facility OK toward West Virginia quiet zone

**Table 1 WFOR-TV OET Bulletin 69 Interference Study**  
(worst-case scenarios shown page 2 of 6)

Proposed facility OK toward Table Mountain

Proposed facility is beyond the Canadian coordination distance

Proposed facility is beyond the Mexican coordination distance

Proposed station is OK toward AM broadcast stations

\*\*\*\*\*  
Start of Interference Analysis

Channel	Proposed Station	City/State	ARN
22	WFOR-TV	MIAMI FL	USERRECORD01

Stations Potentially Affected by Proposed Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
21	WDLF-CA	MIAMI, POMPANO BEACH FL	3.4	LIC	BLTTA	20080206ADA
21	WDLF-CA	POMPANO BEACH FL	3.4	CP	BDFCDTA	20100716AAD
22	WOFL	ORLANDO FL	305.1	LIC	BLCDT	20000706AEZ
22	WOFL	ORLANDO FL	305.1	CP MOD	BMPCDT	20110620AHO
23	WLTU-DT	MIAMI FL	0.0	LIC	BLCDT	20100304AAE

\*\*\*\*\*

Analysis of Interference to Affected Station 1

Analysis of current record  
Channel Call City/State Application Ref. No.  
21 WDLF-CA MIAMI, POMPANO BEACH FL BLTTA -20080206ADA

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
18	WPBT	MIAMI FL	3.6	LIC	BLEDT	-20010712AGD
19	WSFL-TV	MIAMI FL	3.4	CP	BPCDT	-20080620AFI
19	WSFL-TV	MIAMI FL	3.4	LIC	BLCDT	-20070124ABF
20	WLRN-TV	MIAMI FL	0.8	LIC	BLEDT	-20090611ABR
21	WCLF	CLEARWATER FL	289.0	CP	BPCDT	-20080619AHV
21	WCLF	CLEARWATER FL	289.0	LIC	BLCDT	-20060627AAQ
22	WFOR-TV	MIAMI FL	3.4	PLN	DTVPLN	-DTVP0778
23	WLTU-DT	MIAMI FL	3.4	LIC	BLCDT	-20100304AAE
28	WFLX	WEST PALM BEACH FL	65.9	LIC	BLCDT	-20020417AAP
35	WPXM-TV	MIAMI FL	0.0	LIC	BLCDT	-20090612AIT
35	WPXM-TV	MIAMI FL	0.0	APP	BMPCDT	-20080620AMR
36	WPXP-TV	LAKE WORTH FL	67.1	LIC	BLCDT	-20030808ABE
22	WFOR-TV	MIAMI FL	3.4	APP	USERRECORD-01	

Total scenarios = 2

Result key: 1  
Scenario 1 Affected station 1  
Before Analysis

Results for: 21N FL MIAMI, POMPANO BEACH BLTTA 20080206ADA LIC  
POPULATION AREA (sq km)  
within Noise Limited Contour 3445088 3685.4

**Table 1 WFOR-TV OET Bulletin 69 Interference Study**  
(worst-case scenarios shown page 3 of 6)

not affected by terrain losses	3445088	3685.4	
lost to NTSC IX	0	0.0	
lost to additional IX by ATV	295623	533.4	
lost to all IX	295623	533.4	
Potential Interfering Stations Included in above Scenario	1		
19A FL MIAMI	BPCDT	20080620AFI	CP
20A FL MIAMI	BLEDT	20090611ABR	LIC
23A FL MIAMI	BLCDT	20100304AAE	LIC
22A FL MIAMI	DTVPLN	DTVP0778	PLN
After Analysis			
Results for: 21N FL MIAMI, POMPANO BEACH BLTTA	20080206ADA	LIC	
	POPULATION	AREA (sq km)	
within Noise Limited Contour	3445088	3685.4	
not affected by terrain losses	3445088	3685.4	
lost to NTSC IX	0	0.0	
lost to additional IX by ATV	95048	160.4	
lost to all IX	95048	160.4	
Potential Interfering Stations Included in above Scenario	1		
19A FL MIAMI	BPCDT	20080620AFI	CP
20A FL MIAMI	BLEDT	20090611ABR	LIC
23A FL MIAMI	BLCDT	20100304AAE	LIC
22A FL MIAMI	USERRECORD01	APP	
Percent new IX =	-5.8221%		
Worst case new IX	-5.8221% Scenario	1	
#####			

Analysis of Interference to Affected Station 2

Analysis of current record

Channel	Call	City/State	Application	Ref. No.
21	WDLF-CA	POMPANO BEACH FL	BDFCDTA	-20100716AAD

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
20	WLRN-TV	MIAMI FL	0.8	LIC	BLEDT	-20090611ABR
21	WCLF	CLEARWATER FL	289.0	CP	BPCDT	-20080619AHV
21	WCLF	CLEARWATER FL	289.0	LIC	BLCDT	-20060627AAQ
21	W2ICL	MARATHON FL	155.0	LIC	BLTT	-20080324ADL
22	WFOR-TV	MIAMI FL	3.4	PLN	DTVPLN	-DTVP0778
22	WFOR-TV	MIAMI FL	3.4	APP	USERRECORD-01	

Total scenarios = 1

Result key: 3  
Scenario 1 Affected station 2  
Before Analysis

Results for: 21A FL POMPANO BEACH BDFCDTA 20100716AAD CP  
HAAT 247.0 m, ATV ERP 15.0 kW

**Table 1 WFOR-TV OET Bulletin 69 Interference Study**  
(worst-case scenarios shown page 4 of 6)

within Noise Limited Contour	POPULATION	AREA (sq km)	
4043784	7222.5		
not affected by terrain losses	4043784	7222.5	
lost to NTSC IX	0	0.0	
lost to additional IX by ATV	437794	3488.9	
lost to ATV IX only	437794	3488.9	
lost to all IX	437794	3488.9	
Potential Interfering Stations Included in above Scenario	1		
20A FL MIAMI	BLEDT	20090611ABR	LIC
22A FL MIAMI	DTVPLN	DTVP0778	PLN
After Analysis			
Results for: 21A FL POMPANO BEACH BDFCDTA	20100716AAD	CP	
HAAT 247.0 m, ATV ERP 15.0 kW	POPULATION	AREA (sq km)	
within Noise Limited Contour	4043784	7222.5	
not affected by terrain losses	4043784	7222.5	
lost to NTSC IX	0	0.0	
lost to additional IX by ATV	169381	890.3	
lost to ATV IX only	169381	890.3	
lost to all IX	169381	890.3	
Potential Interfering Stations Included in above Scenario	1		
20A FL MIAMI	BLEDT	20090611ABR	LIC
22A FL MIAMI	USERRECORD01	APP	
Percent new IX =	-7.4435%		
Worst case new IX	-7.4435% Scenario	1	
#####			

Analysis of Interference to Affected Station 3

Analysis of current record

Channel	Call	City/State	Application	Ref. No.
22	WOFL	ORLANDO FL	BLCDT	-20000706AEZ

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application	Ref. No.
21	WCLF	CLEARWATER FL	144.3	CP	BPCDT	-20080619AHV
21	WCLF	CLEARWATER FL	144.3	LIC	BLCDT	-20060627AAQ
22	WFOR-TV	MIAMI FL	305.1	PLN	DTVPLN	-DTVP0778
22	WJCL	SAVANNAH GA	384.7	LIC	BLCDT	-20091013AFS
23	WMFE-TV	ORLANDO FL	0.7	LIC	BLEDT	-20090225ABF
22	WFOR-TV	MIAMI FL	305.1	APP	USERRECORD-01	

Proposal causes no interference

#####

Analysis of Interference to Affected Station 4

Analysis of current record

**Table 1 WFOR-TV OET Bulletin 69 Interference Study**  
(worst-case scenarios shown page 5 of 6)

Channel	Call	City/State	Application Ref. No.
22	WOFL	ORLANDO FL	BMPCDT -20110620AHO

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application Ref. No.
21	WCLF	CLEARWATER FL	144.3	CP	BPCDT -20080619AHV
21	WCLF	CLEARWATER FL	144.3	LIC	BLCDT -20060627AAQ
22	WFOR-TV	MIAMI FL	305.1	PLN	DTVPLN -DTVP0778
22	WJCL	SAVANNAH GA	384.7	LIC	BLCDT -20091013AFS
23	WMFE-TV	ORLANDO FL	0.7	LIC	BLEDT -20090225ABF
22	WFOR-TV	MIAMI FL	305.1	APP	USERRECORD-01

Proposal causes no interference

#####

#### Analysis of Interference to Affected Station 5

Analysis of current record

Channel	Call	City/State	Application Ref. No.
23	WLTW-DT	MIAMI FL	BLCDT -20100304AAE

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application Ref. No.
22	WFOR-TV	MIAMI FL	0.0	PLN	DTVPLN -DTVP0778
23	WMFE-TV	ORLANDO FL	305.1	LIC	BLEDT -20090225ABF
22	WFOR-TV	MIAMI FL	0.0	APP	USERRECORD-01

Proposal causes no interference

#####

#### Analysis of Interference to Affected Station 6

Analysis of current record

Channel	Call	City/State	Application Ref. No.
22	WFOR-TV	MIAMI FL	USERRECORD-01

Stations Potentially Affecting This Station

Chan	Call	City/State	Dist(km)	Status	Application Ref. No.
22	WOFL	ORLANDO FL	305.1	LIC	BLCDT -20000706AEZ
22	WOFL	ORLANDO FL	305.1	CP MOD	BMPCDT -20110620AHO
23	WLTW-DT	MIAMI FL	0.0	LIC	BLCDT -20100304AAE

Total scenarios = 1

Result key: 4  
Scenario 1 Affected station 6  
Before Analysis

Results for: 22A FL MIAMI USERRECORD01 APP  
HAAT 308.0 m, ATV ERP 1000.0 kW

	POPULATION	AREA (sq km)
within Noise Limited Contour	4894853	24510.9
not affected by terrain losses	4894853	24510.9
lost to NTSC IX	0	0.0

**Table 1 WFOR-TV OET Bulletin 69 Interference Study**  
(worst-case scenarios shown page 6 of 6)

lost to additional IX by ATV	0	0.0
lost to ATV IX only	0	0.0
lost to all IX	0	0.0

Potential Interfering Stations Included in above Scenario 1

#####

FINISHED FINISHED FINISHED FINISHED FINISHED FINISHED

SECTION III-D - DTV Engineering	
Complete Questions 1-5, and provide all data and information for the proposed facility, as requested in Technical Specifications, Items 1-13.	
<p><b>Pre-Transition Certification Checklist:</b> An application concerning a pre-transition channel must complete questions 1(a)-(c), and 2-5. A correct answer of "Yes" to all of the questions will ensure an expeditious grant of a construction permit application to change pre-transition facilities. However, if the proposed facility is located within the Canadian or Mexican borders, coordination of the proposal under the appropriate treaties may be required prior to grant of the application. An answer of "No" will require additional evaluation of the applicable information in this form before a construction permit can be granted.</p> <p><b>Post-Transition Expedited Processing.</b> An application concerning a post-transition channel must complete questions 1(a), (d)-(e), and 2-5. A station applying for a construction permit to build its post-transition channel will receive expedited processing if its application (1) does not seek to expand the noise-limited service contour in any direction beyond that established by Appendix B of the Seventh Report and Order in MB Docket No. 87-268 establishing the new DTV Table of Allotments in 47 C.F.R. § 73.622(i) ("new DTV Table Appendix B"); (2) specifies facilities that match or closely approximate those defined in the new DTV Table Appendix B facilities; and (3) is filed within 45 days of the effective date of Section 73.616 of the rules adopted in the Report and Order in the Third DTV Periodic Review proceeding, MB Docket No. 07-91.</p>	
1. The proposed DTV facility complies with 47 C.F.R. Section 73.622 in the following respects:	
(a) It will operate on the DTV channel for this station as established in 47 C.F.R. Section 73.622.	<input checked="" type="radio"/> Yes <input type="radio"/> No
(b) It will operate a pre-transition facility from a transmitting antenna located within 5.0 km (3.1 miles) of the DTV reference site for this station as established in 47 C.F.R. Section 73.622.	<input type="radio"/> Yes <input type="radio"/> No
(c) It will operate a pre-transition facility with an effective radiated power (ERP) and antenna height above average terrain (HAAT) that do not exceed the DTV reference ERP and HAAT for this station as established in 47 C.F.R. Section 73.622.	<input type="radio"/> Yes <input type="radio"/> No
(d) It will operate at post-transition facilities that do not expand the noise-limited service contour in any direction beyond that established by Appendix B of the Seventh Report and Order in MB Docket No. 87-268 establishing the new DTV Table of Allotments in 47 C.F.R. § 73.622(i) ("new DTV Table Appendix B").	<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> N/A
(e) It will operate at post-transition facilities that match or reduce by no more than five percent with respect to predicted population from those defined in the new DTV Table Appendix B.	<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A
2. The proposed facility will not have a significant environmental impact, including exposure of workers or the general public to levels of RF radiation exceeding the applicable health and safety guidelines, and therefore will not come within 47 C.F.R. Section 1.1307. Applicant must <b>submit the Exhibit</b> called for in Item 13.	<input checked="" type="radio"/> Yes <input type="radio"/> No
3. Pursuant to 47 C.F.R. Section 73.625, the DTV coverage contour of the proposed facility will encompass the allotted principal community.	<input checked="" type="radio"/> Yes <input type="radio"/> No
4. The requirements of 47 C.F.R. Section 73.1030 regarding notification to radio astronomy installations, radio receiving installations and FCC monitoring stations have either been satisfied or are not applicable.	<input checked="" type="radio"/> Yes <input type="radio"/> No
5. The antenna structure to be used by this facility has been registered by the Commission and will not require registration to support the proposed antenna, OR the FAA has previously determined that the proposed structure will not adversely effect safety in air navigation and this structure qualifies for later registration under the Commission's phased registration plan, OR the proposed installation on this structure does not require notification to the FAA pursuant to 47 C.F.R. Section 17.7.	<input checked="" type="radio"/> Yes <input type="radio"/> No

SECTION III-D - DTV Engineering	
TECHNICAL SPECIFICATIONS	
Ensure that the specifications below are accurate. Contradicting data found elsewhere in this application will be disregarded. All items must be completed. The response "on file" is not acceptable.	
<b>TECH BOX</b>	
1.	Channel Number: DTV 22 Analog TV, if any
2.	Zone: <input type="radio"/> I <input type="radio"/> II <input checked="" type="radio"/> III
3.	Antenna Location Coordinates: (NAD 27) Latitude: Degrees 25 Minutes 58 Seconds 7 <input checked="" type="radio"/> North <input type="radio"/> South Longitude: Degrees 80 Minutes 13 Seconds 20 <input checked="" type="radio"/> West <input type="radio"/> East
4.	Antenna Structure Registration Number: 1026553 <input type="checkbox"/> Not Applicable <input type="checkbox"/> Notification filed with FAA
5.	Antenna Location Site Elevation Above Mean Sea Level: 2.4 meters
6.	Overall Tower Height Above Ground Level: 317.3 meters
7.	Height of Radiation Center Above Ground Level: 307.1 meters
8.	Height of Radiation Center Above Average Terrain : 307.2 meters
9.	Maximum Effective Radiated Power (average power): 1000 kW

10.	<p>Antenna Specifications:</p> <p>a. Manufacturer DIE    Model TUM20-3BP-16/36U-2-R</p> <p>b. Electrical Beam Tilt: 0.8 degrees    <input type="checkbox"/> Not Applicable</p> <p>c. Mechanical Beam Tilt: degrees toward azimuth degrees True    <input checked="" type="checkbox"/> Not Applicable</p> <p>Attach as an Exhibit all data specified in 47 C.F.R. Section 73.625(c). [Exhibit 45]</p> <p>d. Polarization: <input type="radio"/> Horizontal    <input type="radio"/> Circular    <input checked="" type="radio"/> Elliptical</p> <p>e. Directional Antenna Relative Field Values:    <input type="checkbox"/> Not applicable (Nondirectional)</p> <p>[For a composite directional (not off-the-shelf) antenna, press the following button to fill in the relative field values subform.] [Relative Field Values]</p> <div style="text-align: center;"><p><b>10e. Directional Antenna Relative Field Values</b></p><p>[Fill in this subform for a composite directional (not off-the-shelf) antenna, only.]</p></div> <table border="1"><tr><td colspan="12">e. Directional Antenna Relative Field Values:</td></tr><tr><td colspan="12">Rotation (Degrees): <input checked="" type="checkbox"/> No Rotation</td></tr><tr><td>Degrees</td><td>Value</td><td>Degrees</td><td>Value</td><td>Degrees</td><td>Value</td><td>Degrees</td><td>Value</td><td>Degrees</td><td>Value</td><td>Degrees</td><td>Value</td></tr><tr><td>0</td><td>0.837</td><td>10</td><td>0.751</td><td>20</td><td>0.577</td><td>30</td><td>0.36</td><td>40</td><td>0.26</td><td>50</td><td>0.207</td></tr><tr><td>60</td><td>0.131</td><td>70</td><td>0.192</td><td>80</td><td>0.24</td><td>90</td><td>0.212</td><td>100</td><td>0.194</td><td>110</td><td>0.228</td></tr><tr><td>120</td><td>0.256</td><td>130</td><td>0.192</td><td>140</td><td>0.137</td><td>150</td><td>0.202</td><td>160</td><td>0.257</td><td>170</td><td>0.368</td></tr><tr><td>180</td><td>0.582</td><td>190</td><td>0.751</td><td>200</td><td>0.844</td><td>210</td><td>0.915</td><td>220</td><td>0.981</td><td>230</td><td>0.995</td></tr><tr><td>240</td><td>0.902</td><td>250</td><td>0.704</td><td>260</td><td>0.521</td><td>270</td><td>0.52</td><td>280</td><td>0.57</td><td>290</td><td>0.533</td></tr><tr><td>300</td><td>0.55</td><td>310</td><td>0.726</td><td>320</td><td>0.905</td><td>330</td><td>0.98</td><td>340</td><td>0.959</td><td>350</td><td>0.898</td></tr><tr><td colspan="2">Additional Azimuths</td><td>226</td><td>1</td><td>332</td><td>0.982</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p style="text-align: center;"><a href="#">Relative Field Polar Plot</a></p>	e. Directional Antenna Relative Field Values:												Rotation (Degrees): <input checked="" type="checkbox"/> No Rotation												Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	Degrees	Value	0	0.837	10	0.751	20	0.577	30	0.36	40	0.26	50	0.207	60	0.131	70	0.192	80	0.24	90	0.212	100	0.194	110	0.228	120	0.256	130	0.192	140	0.137	150	0.202	160	0.257	170	0.368	180	0.582	190	0.751	200	0.844	210	0.915	220	0.981	230	0.995	240	0.902	250	0.704	260	0.521	270	0.52	280	0.57	290	0.533	300	0.55	310	0.726	320	0.905	330	0.98	340	0.959	350	0.898	Additional Azimuths		226	1	332	0.982						
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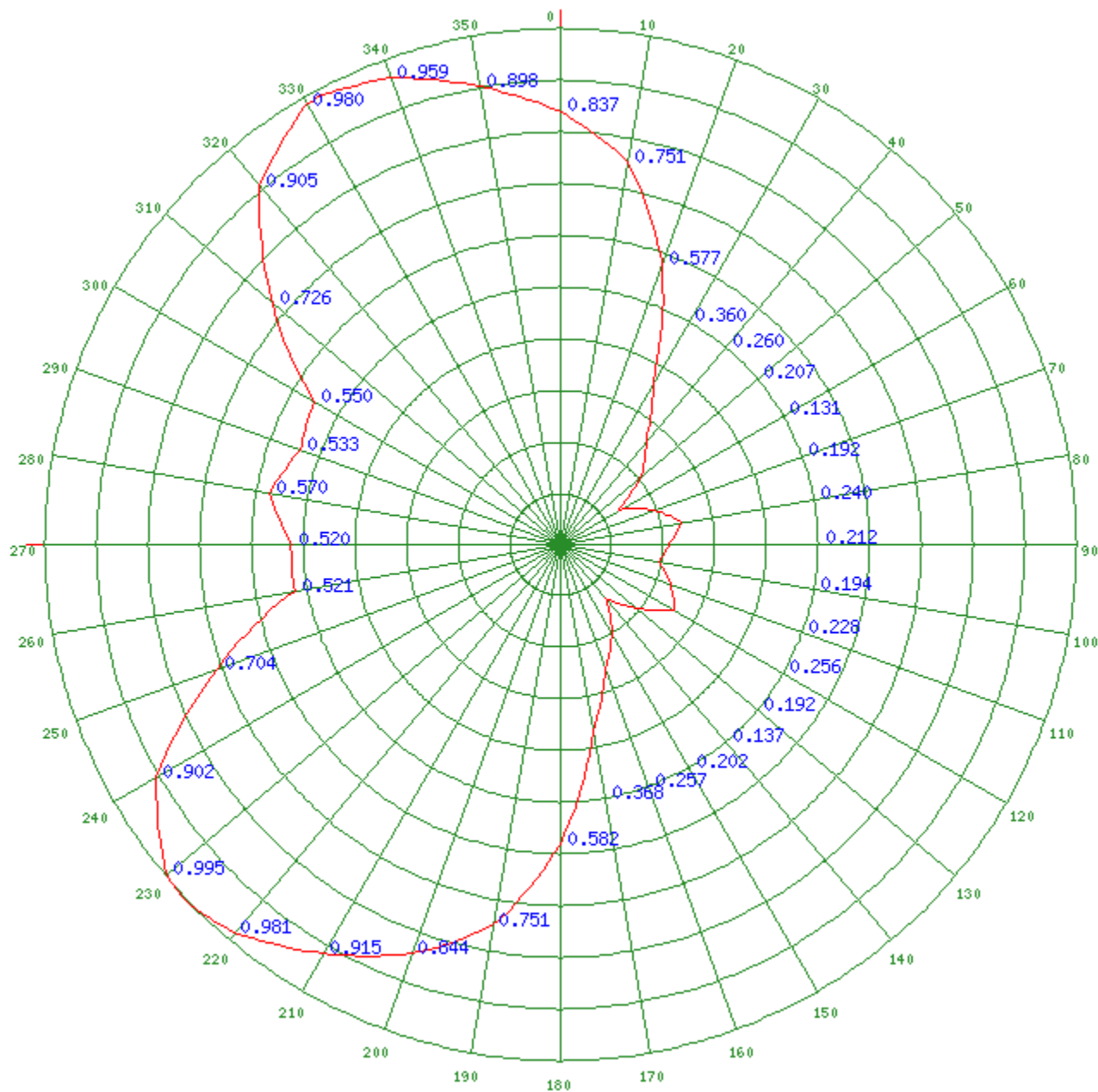
**SECTION III - PREPARER'S CERTIFICATION**

I certify that I have prepared Section III (Engineering Data) on behalf of the applicant, and that after such preparation, I have examined and found it to be accurate and true to the best of my knowledge and belief.

Name JOSEPH M. DAVIS, P.E.	Relationship to Applicant (e.g., Consulting Engineer) CONSULTING ENGINEER	
Signature	Date 08/02/2011	
Mailing Address CHESAPEAKE RF CONSULTANTS, LLC 207 OLD DOMINION ROAD		
City YORKTOWN	State or Country (if foreign address) VA	Zip Code 23692 -
Telephone Number (include area code) 7036509600	E-Mail Address (if available) JOSEPH.DAVIS@RF-CONSULTANTS.COM	

Any specified rotation has already been applied to the plotted pattern.  
Field strength values shown on a rotated pattern may differ from the listed values  
because intermediate azimuths are interpolated between entered azimuths.

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