



Federal Communications Commission
Washington, D.C. 20554

May 8, 2015

In Reply Refer To:
FOIA 2015-466

Mr. Benjamin Yu

5

Dear Mr. Yu:

This letter is in response to your Freedom of Information Act (FOIA) request for copies of the minor change application (BPED-199208061A) concerning WMFO-FM, Medford, Massachusetts, the Commission's decision disposing of this application, and any related correspondence that the Commission sent to WMFO. The Commission received your request on April 27, 2015.

Commission staff has searched agency records for the materials identified in your request and located paper facsimiles of the application and the Commission decision. Photocopies of the application (39 pages) and the Commission decision (3 pages) are enclosed herewith.

The Commission's FOIA Control Office has categorized you as an "All Others" requester for the purpose of assessing FOIA fees. Accordingly, you are required to pay for search time in excess of two hours and for reproducing records in excess of 100 pages. (See 47 C.F.R. §0.470(a)(3)). Because your request involved less than two hours of search time and 41 pages of duplication, there are no fees associated with your request.

If you consider this to be a denial of your FOIA request, you may seek review by filing an application for review with the Office of General Counsel. An application for review must be *received* by the Commission within 30 calendar days of the date of this letter.¹ You may file an application for review by mailing the application to Federal Communications Commission, Office of General Counsel, 445 12th St SW, Washington, DC 20554, or you may file your application for review electronically by e-mailing it to FOIA-Appeal@fcc.gov. Please caption

¹ 47 C.F.R. §§ 0.461(j), 1.115; 47 C.F.R. § 1.7 (documents are considered filed with the Commission upon their receipt at the location designated by the Commission).

Page 2—Mr. Benjamin Yu

the envelope (or subject line, if via e-mail) and the application itself as "Review of Freedom of Information Action."

Sincerely,

A handwritten signature in dark ink, appearing to read "Michael S. Perko". The signature is fluid and cursive, with the first name "Michael" being the most prominent part.

Michael S. Perko
Chief, Office of Communications and
Industry Information
Media Bureau

Enclosures

332N

FOR SECTION

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

MAY 3 1993

MAY 7 11 31 AM '93

IN REPLY REFER TO:
1800B3-TDN

DIS Trustees of Tufts College
Ballou Hall, 4th Floor
Medford, MA 02155

In re: WMFO (FM), Medford, MA
Trustees of Tufts College
BPED-920806IA

Dear Applicant:

This letter is in reference to the above-captioned minor change application to add a directional antenna to the existing directional antenna.

An engineering study has revealed that your proposal would receive objectional interference, based on contour overlap, from the licensed facility (BLH-982) of co-channel Class A FM station WJUL, Lowell, Massachusetts. The enclosed computerized contour overlap study shows that WMFO's proposed protected (60 dBu) contour would overlap WJUL's licensed interfering (40 dBu) contour by as much as 0.58 kilometers between the 250' and 290' radials (relative to WMFO). Therefore, your proposal is in violation of 47 C.F.R. § 73.509. This prohibited overlap, which was not addressed in your application, renders it unacceptable for filing pursuant to 47 C.F.R. § 73.3566(a).¹

In addition, your proposal would cause increased objectional interference, based on contour overlap, to the licensed facility (BLED-870518KC) of third-adjacent Channel Class B FM station WBUR, Boston, Massachusetts. Specifically, your proposal's interfering (100 dBu) contour would increase the overlap caused to WBUR's protected (60 dBu) contour. Therefore, your proposal is in violation of 47 C.F.R. § 73.509.

You state that the proposed WMFO operation will result in slightly increased overlap of WMFO's undesired 123.5 dBu contour with WBUR's desired 83.5 dBu contour. You further state that "...the contour does not extend beyond the campus green of the University. Hence, no actual interference to WBUR will occur." Finally, you state that in the event a waiver of the FCC's Rule is required, a waiver is requested.

When an applicant seeks waiver of the rules, it must plead with particularity the facts and circumstances which warrant such action. Columbia Communications Corp. v. FCC, 832 F.2d 189,192 (D.C. Cir. 1987) (quoting Rio Grand Family Radio Fellowship, Inc. v. FCC), 406 F.2d 644,666 (D.C. Cir. 1968) (per curiam)). In

¹ Our study further reveals that there would be no overlap between your proposal and WJUL's construction permit File No. BPH-890202MH. However, until a license to cover that construction permit is filed, your proposal must consider WJUL's licensed facility (BLH-982) as well as WJUL's permit facility.

this regard, you have failed to identify the rule for which waiver is sought. Specifically, you have failed to recognize the violation of Section 73.509. Accordingly, your request does not constitute a colorable request for waiver.

Section 73.509 specifies that, with respect to third-adjacent channel stations, the protected contour is the 60 dBu contour and the interfering contour is the 100 dBu contour not the 83.5 dBu contour and the 123.5 dBu contour, respectively, as stated in your proposal. As stated above, our study shows that your licensed interfering (100 dBu) contour is totally encompassed by WBUR's protected (60 dBu) contour. Since your proposed interfering (100 dBu) contour would extend beyond your licensed 100 dBu contour, the present overlap caused to WBUR's facilities would be increased in contravention of 47 C.F.R. § 73.509. This also renders your application unacceptable for filing.

Even if you had properly requested waiver of 47 C.F.R. § 73.509, while you state in your proposal that the interfering contour would not extend beyond the University campus lawn, you did not provide any information regarding the area of predicted interference gained or the number of persons affected. Instead, the basis of your waiver request rests entirely upon the conclusory assertion that "the proposed WMFO operation will result in slightly increased overlap" Insufficient data was submitted to support this assertion. It is unreasonable to expect the Commission to reach the public interest finding necessary to waive its interference protection rules based solely on an applicant's determination that the increase in prohibited overlap would only be "slight" and that the increase in service area would be "substantial" without specific data to support this determination. The burden is on the applicant seeking waiver to plead specific facts and circumstances which would make the general rule inapplicable. See Tucson Radio, Inc. v. FCC, 452 F.2d 1380, 1382 (D.C. Cir. 1971). Additionally, there is no indication in the application that WBUR has consented to the proposed increase in prohibited overlap. Therefore, we could not have concluded that the facts and circumstances set forth in your application were sufficient to establish that a grant of a waiver would better serve the public interest than adherence to the rule. Accordingly, the request for waiver of 47 C.F.R. § 73.509 would have been denied.

In addition, an engineering study reveals that your proposed directional antenna pattern has a maximum rate of change of 2.77 dB per 10 degrees between the 280° and 290° radials. This is in violation of 47 C.F.R. § 73.316(b) (2) which restricts the maximum rate of change to 2 dB per 10 degrees. The Commission's policy regarding the 2 dB per 10 degrees rate of change limitation is longstanding and has been consistently applied to all FM directional stations for many years. The requirements for both commercial and educational stations were reaffirmed in the Report and Order in Docket 87-121, 54 Fed. Reg. 09800, adopted December 12, 1988, released February 22, 1989. Exceptions to this policy have been limited primarily to stations employing directional antennas for the sole purpose of protecting non-broadcast facilities such as quiet zones or Commission monitoring stations or to avoid wasting power over large bodies of water. In the present case, none of these situations are applicable.

Moreover, you propose to add the Scala directional antenna to the existing Telrex Laboratories directional antenna. You state that the addition of the Scala antenna is to improve the existing coverage area toward the southwest region, a region of suppressed radiation from the existing antenna. You further state that because of the manner of mounting of the Telrex and Scala antennas and the high degree of radiation suppression each antenna has in the direction of the other, little interaction is expected. However, pursuant to 47 C.F.R. § 73.1620(a)(2), a proof of performance for any directional antenna must be submitted before program test authority will be granted. Therefore, you must specify how the proof of performance will be accomplished.

Pursuant to 47 C.F.R. § 73.525(b)(4), applications for modification must include a certification that the applicant has given early written notice of the proposed modification to all affected TV Channel 6 TV stations. A review of the application reveals that no certification was submitted.

Finally, if you resubmit the application, you must include a statement stating the permittee will reduce power or cease operation as necessary to assure safety with respect to radiofrequency radiation.

Accordingly, the request for waiver of 47 C.F.R. § 73.509 with respect to Station WBUR(FM) IS HEREBY DENIED and, for the reasons stated above, Application BPED-920806IA IS HEREBY DISMISSED. This action is taken pursuant to 47 C.F.R. § 0.283.

Sincerely,



Dennis Williams
Chief, FM Branch
Audio Services Division
Mass Media Bureau

Enclosures

cc: Jules Cohen & Associates, P.C.
Mr. Kurt Maitland
Mr. John Grebe

DUPLICATE
FCC 340

Approved by OMB

3060-0034

Expires 4/30/92

See Page 23 for information
regarding public burden estimate

**APPLICATION FOR CONSTRUCTION PERMIT FOR
NONCOMMERCIAL EDUCATIONAL BROADCAST STATION**
(Carefully read instructions before filing form) Return only form to FCC

RECEIVED

Section I - GENERAL INFORMATION

AUG 6 1992

1. Name of Applicant Trustees of College MAIL BRANCH		
Street Address or P.O. Box Ballou Hall, 4th Floor, Tufts University		
City Medford	State MA	ZIP Code 02155
Telephone No. (Include Area Code) (617) 627-3320		

For Commission Use Only

BPED-

File No. **920806IA**

Send notices and communications to the following person
at the address below:

Name Kurt Maitland, General Manager, WMFO and John Grebe, Operations Director		
Street Address or P.O. Box P.O. Box 65		
City Medford	State MA	ZIP Code 02153
Telephone No. (Include Area Code) (617) 625-0800		

2. This application is for:

☐

AM

☒

FM

☐

TV

(a) Channel No. or Frequency 91.5

(b) Principal Community	City	State
	Medford	MA

(c) Check one of the following boxes:

- ☐ Application for NEW station
- ☐ MAJOR change in licensed facilities; call sign: _____
- ☒ MINOR change in licensed facilities; call sign: _____ **WMFO**
- ☐ MAJOR modification of construction permit; call sign: _____
- File No. of construction permit: _____
- ☐ MINOR modification of construction permit; call sign: _____
- File No. of construction permit: _____
- ☐ AMENDMENT to pending application; application file number: _____

NOTE: It is not necessary to use this form to amend a previously filed application. Should you do so, however, please submit only Section I and those other portions of the form that contain the amended information.

3. Is this application mutually exclusive with a renewal application?

☐

Yes

☒

No

If Yes, state:	Call letters	Community of License	
		City	State

Section II - LEGAL QUALIFICATIONS

Name of Applicant _____

1. Applicant is: (Check one box below)

☐ (a) governmental or public educational agency, board or institution

☒ (b) private nonprofit educational institution.

☐ (c) Other (specify) _____

2. For applicants 1(c) only, describe in an Exhibit the nature and educational purposes of the applicant.

Exhibit No.

N/A

3. For applicants 1(c) applying for a new noncommercial educational television station only, describe in an Exhibit how the applicant's officers, directors and members of its governing board are broadly representative of the educational, cultural and civic segments of the principal community to be served.

Exhibit No.

N/A

4. Describe in an Exhibit how the proposed station will be used, in accordance with 47 C.F.R. Section 73.503 or Section 73.521, for the advancement of an educational program.

Exhibit No.

N/A

5. Is there any provision contained in any by-laws, articles of incorporation, partnership agreement, charter, statute or other document which would restrict the applicant in advancing an educational program or complying with any Commission rule, policy or provision of the Communications Act of 1934, as amended?

☐ Yes ☒ No

If Yes, provide particulars in an Exhibit.

Exhibit No.

CITIZENSHIP AND OTHER STATUTORY REQUIREMENTS

6. (a) Is the applicant in violation of the provisions of Section 310 of the Communications Act of 1934, as amended, relating to interests of aliens and foreign governments? (See Instruction B to Section II.)

☐ Yes ☒ No

(b) Will any funds, credits or other financial assistance for the construction, purchase or operation of the station(s) be provided by aliens, foreign entities, domestic entities controlled by aliens, or their agents?

☐ Yes ☒ No

If the answer to (b) above is Yes, attach an Exhibit giving full disclosure concerning this assistance.

Exhibit No.

7. (a) Has an adverse finding been made or an adverse final action taken by any court or administrative body as to the applicant or any party to this application in a civil or criminal proceeding brought under the provisions of any law related to the following:

Any felony; broadcast-related antitrust or unfair competition; criminal fraud or fraud before another governmental unit; or discrimination?

☐ Yes ☒ No

(b) Is there now pending in any court or administrative body any proceeding involving any of the matters referred to in (a) above?

☐ Yes ☒ No

If the answer to (a) and/or (b) above is Yes, attach an Exhibit giving full disclosure concerning persons and matters involved, including an identification of the court or administrative body and the proceeding (by dates and file numbers), a statement of the facts upon which the proceeding is or was based or the nature of the offense alleged or committed, and a description of the current status or disposition of the matter.

Exhibit No.

Section 11 - LEGAL QUALIFICATIONS (Page 2)

PARTIES TO APPLICATION

8. Complete the following Table with respect to all parties to this application:

(NOTE: If the applicant considers that to furnish complete information would pose an unreasonable burden, it may request that the Commission waive the strict terms of this requirement with appropriate justification.)

INSTRUCTIONS: If applicant is a corporation or an unincorporated association with 50 or fewer stockholders, stock subscribers, holders of membership certificate or other ownership interest, fill out all columns, giving the information requested as to all officers, directors and members of governing board. In addition, give the information as to all persons or entities who are the beneficial or record owners of or have the right to vote capital stock, membership or ownership interests or are subscribers to such interests. If the applicant has more than 50 stockholders, stock subscribers or holders of membership certificates or other ownership interests, furnish the information as to officers, directors, members of governing board, and all persons or entities who are the beneficial or record owners of or have the right to vote 1% or more of the capital stock, membership or ownership interests. If applicant is a governmental or public educational agency, board or institution, fill out columns (a), (b), and (c) as to all members of the governing board and chief executive officers.

Name and Residence Address(es) (a)	Office Held (b)	Director or Member of Governing Board		% of: Ownership (O) or Voting Stock (VS) or Membership (M) (d)
		YES	NO	
		(c)		
See attached list of trustees				

Officers of the Corporation

Nelson S. Gifford, Chair
Roslyn S. Berenberg (Mrs. Arnold), Vice
Chair
Jean Mayer, President of the University
Sol Gittleman, Senior VP and Provost
Steven S. Manos, Executive VP and
Treasurer
Thomas W. Murnane, Senior VP
Peter C. McKenzie, VP Finance and
Associate Treasurer
David B. Moffatt, VP Operations
Marianne Rusk, VP Human Resources
Joseph J. Lambert, Overseer and Secretary
of the Corporation
Sarah Walsh Kiely, Assistant Secretary of
the Corporation

Members of the Board of Trustees

Nelson S. Gifford, Chair
Roslyn S. Berenberg (Mrs. Arnold), Vice
Chair
Placido Arango
Fred G. Arragg
John G.L. Cabot
Robert S. Cohen
William S. Cummings
Henry L. Foster, extra ordinem
Nathan Gantcher
Leslie H. Gelb
Maurene L. Golden
Frederick H. Hauck
Jean Mayer, ex officio
Edward H. Merrin
William G. Meserve
Joseph E. Neubauer
Thomas O'Brien
Brian O'Connell
John T. O'Neill

Jane Redfern
Inez Smith Reid
D. Kenneth Richardson
Barbara Ann Payne Rockett
Jill Sackler
William L. Saltonstall
William W. Sellers
JoAnn Giffuni Sher
Ira Stepanian
James A. Stern
Jonathan M. Tisch
Ione Dugger Vargus
Paul I. Wren

Trustees Emeriti

Charles F. Adams (1974-1980)
John Baronian (1972-1982)
Louis Berger (1969-1984)
Irene Eisenman Bernstein (1971-1981)
Harvey Brooks (1981-1987)
Paul A. Brown (1980-1990)
Barbara B. Burn (1982-1987)
Matthew J. Burns (1973-1987)
Allan D. Callow (1971-1986)
Warren E. Carley (1964-1981)
William J. Halligan (1964-1974)
Weston Howland (1963-1989)
Kenneth F. Leach (1981-1990)
Jacob Lewiton (1961-1979)
Earl F. Littleton (1974-1982)
Ursula Bailey Marvin (1975-1985)
Alexander N. McFarlane (1959-1979)
William A. McMahon (1970-1980)
Robert W. Meserve (1955-1979)
John M. Mugar (1963-1989)
Ruth L. Remis (1980-1990)
Hester Lloyd Sargent (1964-1979)
Morris Tanenbaum (1977-1986)
Malcolm Toon (1981-1987)

Section 11 - LEGAL QUALIFICATIONS (Page 3)

9. Does the applicant or any party to this application have, or have they had, any interest in:

(a) a broadcast station, or pending broadcast station application before the Commission?

☐ Yes ☒ No

(b) a broadcast application which has been dismissed with prejudice by the Commission?

☐ Yes ☒ No

(c) a broadcast application which has been denied by the Commission?

☐ Yes ☒ No

(d) a broadcast station, the license of which has been revoked?

☐ Yes ☒ No

(e) a broadcast application in any pending or concluded Commission proceeding which left unresolved character issues against the applicant?

☐ Yes ☒ No

If the answer to any of the questions in (a)-(e) above is Yes, state in an Exhibit the following information:

Exhibit No.

- (1) Name of party having interest;
- (2) Nature of interest or connection, giving dates;
- (3) Call letters of stations or file number of application or docket; and
- (4) Location.

SECTION III - FINANCIAL QUALIFICATIONS

Note: If this application is for a change in an operating facility, DO NOT fill out this Section. N/A

1. Is this application contingent upon receipt of a grant from the National Telecommunications and Information Administration? ☐ Yes ☐ No
2. Is this application contingent upon receipt of a grant from a charitable organization, the approval of the budget of a school or university, or an appropriation from a state, county, municipality or other political subdivision? ☐ Yes ☐ No

NOTE: If either Questions 1 or 2 is answered "Yes," your application cannot be granted until all of the necessary funds are committed or appropriated. In the case of grants from the National Telecommunications and Information Administration, no further action on your part is required. If you rely on funds from a source specified in Question 2, you must advise the F.C.C. when the funds are committed or appropriated. This should be accomplished by letter amendment to your application, in triplicate, signed in the same manner as the original application, and clearly identifying the application to be amended.

3. The applicant certifies, except as noted above, that sufficient net liquid assets are on hand or that sufficient funds are available from committed sources to construct and operate the requested facilities for three months without additional funds. ☐ Yes ☐ No

SECTION IV - PROGRAM SERVICE STATEMENT

Attach as an Exhibit, a brief description, in narrative form, of the planned programming service relating to the issues of public concern facing the proposed service area.

Exhibit No.

NOTE: No program service statement need be filed where the proposed station's programming would be wholly "instructional" as that type of programming is defined in the instructions to this Section.

See File BLED 820928AO

ORIGINAL

Section V-8 - FM BROADCAST ENGINEERING DATA

FOR COMMISSION USE ONLY

File No. _____

ASB Referral Date _____

Referred by _____

Name of Applicant

Tufts University

Call letters (if issued)

WMFO

Is this application being filed in response to a window? ☐ Yes ☒ No

If Yes, specify closing date: _____

Purpose of Application: (check appropriate box(es))

☐ Construct a new (main) facility☐ Construct a new auxiliary facility☐ Modify existing construction permit for main facility☐ Modify existing construction permit for auxiliary facility☒ Modify licensed main facility☐ Modify licensed auxiliary facility

If purpose is to modify, indicate below the nature of change(s) and specify the file number(s) of the authorizations affected.

☐ Antenna supporting-structure height☐ Effective radiated power☐ Antenna height above average terrain☐ Frequency☐ Antenna location☐ Class☐ Main Studio location☒ Other (Summarize briefly) Modify directional antennaFile Number(s) BLED-820928AO

1. Allocation:

Channel No.	Principal community to be served:		
	City	County	State
218	Medford	Middlesex	MA

Class (check only one box below)

☒ A ☐ B1 ☐ B ☐ C3☐ C2 ☐ C1 ☐ C ☐ D

Exact location of antenna.

(a) Specify address, city, county and state. If no address, specify distance and bearing relative to the nearest town or landmark.

Ballou Hall, Tufts University Campus, Medford, Middlesex County, Massachusetts.

(b) Geographical coordinates (to nearest second). If mounted on element of an AM array, specify coordinates of center of array.

Otherwise, specify tower location. Specify South Latitude or East Longitude where applicable; otherwise, North Latitude or West Longitude will be presumed.

Latitude	42°	24'	27"	Longitude	71°	07'	15"
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3. Is the supporting structure the same as that of another station(s) or proposed in another pending application(s)? ☐ Yes ☒ No

If Yes, give call letter(s) or file number(s) or both. _____

If proposal involves a change in height of an existing structure, specify existing height above ground level including antenna, all other appurtenances, and lighting, if any. _____

N/A

4. Does the application propose to correct previous site coordinates?
If Yes, list old coordinates.

☐ Yes ☒ No

Latitude	0	Longitude	0
----------	---	-----------	---

5. Has the FAA been notified of the proposed construction?

☐ Yes ☒ No

If Yes, give date and office where notice was filed and attach as an Exhibit a copy of FAA determination, if available.

Exhibit No. N/A

Date _____ Office where filed _____

6. List all landing areas within 8 km of antenna site. Specify distance and bearing from structure to nearest point of the nearest runway.

	Landing Area	Distance (km)	Bearing (degrees True)
(a)	Logan International Airport	8.0	120
(b)			

7. (a) Elevation: *(to the nearest meter)*

(1) of site above mean sea level;	44	meters
(2) of the top of supporting structure above ground (including antenna, all other appurtenances, and lighting, if any); and	30	meters
(3) of the top of supporting structure above mean sea level [(aX1) + (aX2)]	74	meters
(b) Height of radiation center: <i>(to the nearest meter)</i> H = Horizontal; V = Vertical		
(1) above ground	26	meters (H)
	26	meters (V)
(2) above mean sea level [(aX1) + (bX1)]	70	meters (H)
	70	meters (V)
(3) above average terrain	41	meters (H)
	41	meters (V)

8. Attach as an Exhibit sketch(es) of the supporting structure, labelling all elevations required in Question 7 above, except item 7(bX3). If mounted on an AM directional-array element, specify heights and orientations of all array towers, as well as location of FM radiator.

Exhibit No. Eng. Fig. 1

9. Effective Radiated Power:

(a) ERP in the horizontal plane

$\frac{0.125}{(\text{Max-DA})}$ kw (H*) $\frac{0.125}{(\text{Max-DA})}$ kw (V*)

(b) Is beam tilt proposed?

☐ Yes ☒ No

If Yes, specify maximum ERP in the plane of the tilted beam, and attach as an Exhibit a vertical elevational plot of radiated field.

Exhibit No. N/A

_____ kw (H*) _____ kw (V*)

*Polarization

SECTION V-B - FM BROADCAST ENGINEERING DATA (Page 3)

10. Is a directional antenna proposed?

☒ Yes ☐ No

If Yes, attach as an Exhibit a statement with all data specified in 47 C.F.R. Section 73.316, including plot(s) and tabulations of horizontally and vertically polarized radiated components in terms of relative field.

Exhibit No.
Eng. Figs.
3&4

11. Will the main studio be located within the 70 dBu or 3.16 mV/m contour?

☒ Yes ☐ No

If No, attach as an Exhibit justification pursuant to 47 C.F.R. Section 73.1125.

Exhibit No.
N/A

12. Are there: (a) within 60 meters of the proposed antenna, any proposed or authorized FM or TV transmitters, or any nonbroadcast *(except citizens band or amateur)* radio stations; or (b) within the blanketing contour, any established commercial or government receiving stations, cable head-end facilities, or populated areas; or (c) within ten (10) kilometers of the proposed antenna, any proposed or authorized FM or TV transmitters which may produce receiver-induced intermodulation interference?

☐ Yes ☒ No

If Yes, attach as an Exhibit a description of any expected, undesired effects of operations and remedial steps to be pursued if necessary, and a statement accepting full responsibility for the elimination of any objectionable interference (including that caused by receiver-induced or other types of modulation) to facilities in existence or authorized or to radio receivers in use prior to grant of this application. (See 47 C.F.R. Sections 73.315(b), 73.316(d) and 73.318.)

Exhibit No.
N/A

13. Attach as an Exhibit a 7.5 minute series U.S. Geological Survey topographic quadrangle map that shows clearly, legibly, and accurately, the location of the proposed transmitting antenna. This map must comply with the requirements set forth in Instruction D for Section V. Further, the map must clearly and legibly display the original printed contour lines and data as well as latitude and longitude markings, and must bear a scale of distance in kilometers.

Exhibit No.
Eng. Fig. 2

14. Attach as an Exhibit *(name the source)* a map which shows clearly, legibly, and accurately, and with the original printed latitude and longitude markings and a scale of distance in kilometers:

Exhibit No.
Eng. Fig. 6

(a) the proposed transmitter location, and the radials along with profile graphs have been prepared;

(b) the 1 mV/m predicted contour and, for noncommercial educational applicants applying on a commercial channel, the 3.16 mV/m contour; and

(c) the legal boundaries of the principal community to be served.

15. Specify area in square kilometers (1 sq. mi. = 2.59 sq. km.) and population (latest census) within the predicted 1 mV/m contour.

Area 89 sq. km. Population 361,855

16. Attach as an Exhibit a map *(Sectional Aeronautical charts where obtainable)* showing the present and proposed 1 mV/m (60 dbu) contours.

Exhibit No.
Fig. 6

Enter the following from Exhibit above:

Gain Area 6.6 sq. mi. (17 sq. km.)
Loss Area 0 sq. mi.

Percent change (gain area plus loss area as percentage of present area) 24 %.

If 50% or more this constitutes a major change. Indicate in question 2(c), Section I, accordingly.

Exhibit No.
N/A

17. For an application involving an auxiliary facility only, attach as an Exhibit a map (Sectional Aeronautical Chart or equivalent) that shows clearly, legibly, and accurately, and with latitude and longitude markings and a scale of distance in kilometers:

(a) the proposed auxiliary 1 mV/m contour; and

(b) the 1 mV/m contour of the licensed main facility for which the applied-for facility will be auxiliary. Also specify the file number of the license. See 47 C.F.R. Section 73.1675. (File No.: _____)

18. Terrain and coverage data (to be calculated in accordance with 47 C.F.R. Section 73.313).

Source of terrain data: (check only one box below)

☐ Linearly interpolated 30-second database

☐ 7.5 minute topographic map

(Source: _____)

☒ Other (briefly summarize) Taken from BLED-820928A0 in feet and converted to the nearest meter.

Radial bearing (degrees True)	Height of radiation center above average elevation of radial from 3 to 16 km (meters)	Predicted Distances. to the 1 mV/m contour** (kilometers)
0	33	3.3
45	34	4.6
90	60	8.5
135	68	6.5
180	58	4.5
225	47	6.4
270	9*	4.3
315	22*	2.9

* 30 meters used.

** Directional antenna employed. See Figure 5 for effective radiated powers in specific directions.

Allocation Studies

(See Subpart C of 47 C.F.R. Part 73)

19. Is the proposed antenna location within 320 kilometers (199 miles) of the common border between the United States and Mexico?

☐ Yes ☒ No

If Yes, attach as an Exhibit a showing of compliance with all provisions of the Agreement between the United States of America and the United Mexican States concerning Frequency Modulation Broadcasting in the 88 to 108 MHz band.

Exhibit No.
N/A

20. Is the proposed antenna location within 320 kilometers of the common border between the United States and Canada?

☒ Yes ☐ No

If Yes, attach as an Exhibit a showing of compliance with all provisions of the Working Agreement for Allocation of FM Broadcasting Stations on Channels 201-300 under The Canada-United States FM Agreement of 1947.

Exhibit No.
Eng.

21. If the proposed operation is for a channel in the range from channel 201 through 220 (88.1 through 91.9 MHz), or if this proposed operation is for a class D station in the range from Channel 221 through 300 (92.1 through 107.9 MHz), attach as an Exhibit a complete allocation study to establish the lack of prohibited overlap of contours with other U.S. stations. The allocation study should include the following:

Exhibit No.
Fig. 7

- (a) The normally protected interference-free and the interfering contours for the proposed operation along all azimuths.
- (b) Complete normally protected interference-free contours of all other proposals and existing stations to which objectionable interference would be caused.
- (c) Interfering contours over pertinent arcs of all other proposals and existing stations from which objectionable interference would be received.
- (d) Normally protected and interfering contours over pertinent arcs, of all other proposals and existing stations, which require study to show the absence of objectionable interference.
- (e) Plot of the transmitter location of each station or proposal requiring investigation, with identifying call letters, file numbers and operating or proposed facilities.
- (f) When necessary to show more detail, an additional allocation study will be attached utilizing a map with a larger scale to clearly show interference or absence thereof.
- (g) A scale of kilometers and properly labeled longitude and latitude lines, shown across the entire Exhibit(s). Sufficient lines should be shown so that the location of the sites may be verified.
- (h) The name of the map(s) used in the Exhibit(s).

22. With regard to any stations separated by 53 or 54 channels (10.6 or 10.8 MHz) attach as an Exhibit information required in 1/ (*separation requirements involving intermediate frequency i.f. interference*).

Exhibit No.
Eng.

23.(a) Is the proposed operation on Channel 218, 219, or 220?

☒ Yes ☐ No

(b) If the answer to (a) is yes, does the proposed operation satisfy the requirements of 47 C.F.R. Section 73.207?

☒ Yes ☐ No

(c) If the answer to (b) is yes, attach as an Exhibit information required in 1/ regarding separation requirements with respect to stations on Channels 221, 222 and 223. See Engineering Statement.

Exhibit No.
Eng.

(d) If the answer to (b) is no, attach as an Exhibit a statement describing the short spacing(s) and how it or they arose.

Exhibit No.
N/A

1/ A showing that the proposed operation meets the minimum distance separation requirements. Include existing stations, proposed stations, and cities which appear in the Table of Allotments; the location and geographic coordinates of each antenna, proposed antenna or reference point, as appropriate; and distance to each from proposed antenna location.

- (e) If authorization pursuant to 47 C.F.R. Section 73.215 is requested, attach as an Exhibit a complete engineering study to establish the lack of prohibited overlap of contours involving affected stations. The engineering study must include the following:

Exhibit No.
N/A

- (1) Protected and interfering contours, in all directions (360°), for the proposed operation.
- (2) Protected and interfering contours, over pertinent arcs, of all short-spaced assignments, applications and allotments, including a plot showing each transmitter location, with identifying call letters or file numbers, and indication of whether facility is operating or proposed. For vacant allotments, use the reference coordinates as transmitter location.
- (3) When necessary to show more detail, an additional allocation study utilizing a map with a larger scale to clearly show prohibited overlap will not occur.
- (4) A scale of kilometers and properly labeled longitude and latitude lines, shown across the entire exhibit(s). Sufficient lines should be shown so that the location of the sites may be verified.
- (5) The official title(s) of the map(s) used in the exhibit(s).

24. Is the proposed station for a channel in the range from Channel 201 to 220 (88.1 through 91.9 MHz) and the proposed antenna location within the distance to an affected TV Channel 6 station(s) as defined in 47 C.F.R. Section 73.525?

☒ Yes ☐ No

If Yes, attach as an Exhibit either a TV Channel 6 agreement letter dated and signed by both parties or a map and an engineering statement with calculations demonstrating compliance with 47 C.F.R. Section 73.525 for each affected TV Channel 6 station.

Exhibit No.
Eng.

25. Is the proposed station for a channel in the range from Channel 221 to 300 (92.1-107.9 MHz)?

☐ Yes ☒ No

If Yes, attach as an Exhibit information required in 1/. (Except for Class D (secondary) proposals.)

Exhibit No.
N/A

26. Environmental Statement (See 47 C.F.R. Section 1.1301 et seq.)

Would a Commission grant of this application come within Section 1.1307 of the FCC Rules, such that it may have a significant environmental impact?

☐ Yes ☒ No

If you answer Yes, submit as an Exhibit an Environmental Assessment required by Section 1.1311.


Exhibit No.

If No, explain briefly why not.

The proposed construction is categorically excluded from environmental processing pursuant to Section 1.1306(b) of the Rules. See Engineering Statement.

CERTIFICATION

I certify that I have prepared this Section of this application on behalf of the applicant, and that after such preparation, I have examined the foregoing and found it to be accurate and true to the best of my knowledge and belief.

Name (Typed or Printed) Bernard R. Segal	Relationship to Applicant (e.g., Consulting Engineer) Consulting Engineer
Signature 	Address (Include ZIP Code) 1725 De Sales Street, NW, Suite 600 Washington, DC 20036
Date August 10, 1990	Telephone No. (Include Area Code) (202) 659-3707

SECTION VI - EQUAL EMPLOYMENT OPPORTUNITY PROGRAM

1. Does the applicant propose to employ five or more full-time employees?

☐ Yes ☒ No

If Yes, the applicant must include an EEO program called for in the separate Broadcast Equal Employment Opportunity Program Report (FCC 396-A).

SECTION VII - CERTIFICATION

1. Has or will the applicant comply with the public notice requirements of 47 C.F.R. Section 73.3580?

☒ Yes ☐ No

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

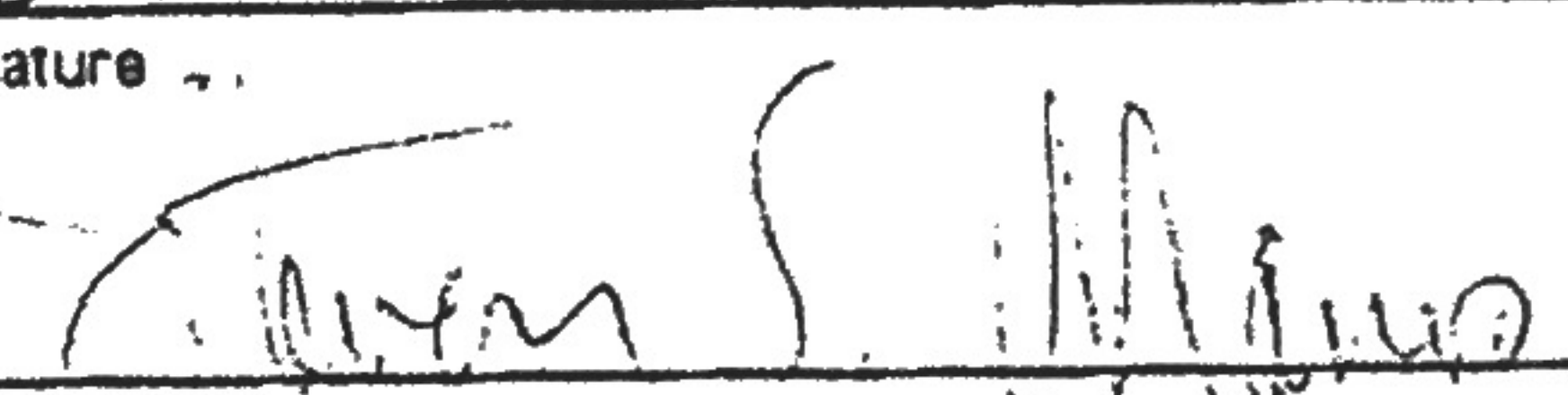
The APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations, and that all exhibits are a material part hereof and incorporated herein.

The APPLICANT represents that this application is not filed for the purpose of impeding, obstructing, or delaying determination on any other application with which it may be in conflict.

In accordance with 47 C.F.R. Section 1.65, the APPLICANT has a continuing obligation to advise the Commission, through amendments, of any substantial and significant changes in information furnished.

**WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND IMPRISONMENT.
U.S. CODE, TITLE 18, SECTION 1001.**

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

Name of Applicant WMFO (Steven S. Manos)	Title Executive Vice Pres., Tufts College
Signature 	Date 4/30/92

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 principal purpose for which the information will be used is to determine if the benefit requested is consistent with the public interest. The staff, consisting variously of attorneys, analysts, engineers and applications examiners, will use the information to determine whether the application should be granted, denied, dismissed, or designated for hearing. If all the information 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. Accordingly, every effort should be made to provide all necessary information. Your response is required to obtain the requested authority.

Public reporting burden for this collection of information is estimated to vary from 76 to 80 hours with an average of 78 hours 04 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, Office of Managing Director, Washington, D.C. 20554, and to the Office of Management and Budget, Paperwork Reduction Project (3060-0034), Washington, D.C. 20503.

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.

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WASHINGTON, D.C. 20036

ENGINEERING EXHIBIT
APPLICATION FOR CONSTRUCTION PERMIT
TUFTS UNIVERSITY
STATION WMFO
MEDFORD, MASSACHUSETTS

CH 218A 125 W(MAX-DA, H&V) 41 METERS

August 10, 1990

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TUFTS UNIVERSITY
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Engineering Statement

The engineering exhibit of which this statement is part was prepared in accordance with the Rules and Regulations of the Federal Communications Commission and pursuant to the provisions of Section V-B of FCC Form 340 on behalf of Tufts University (hereafter, Tufts), in support of an application for construction permit to modify the antenna system for station WMFO, Medford, Massachusetts. Station WMFO operates on channel 218A with a directional antenna which produces a maximum effective radiated power of 125 watts (H&V) along an axis of 90 degrees true. The antenna radiation center height above average terrain is 41 meters. By means of the instant proposal, Tufts seeks to add another antenna which will permit improved coverage toward the southwest, a region of suppressed radiation from the existing antenna. Specifically, a Scala, model HDCA-5, Yagi-type antenna would be added such that the center line of the main lobe of radiation would be oriented 240 degrees true.

Authorization of the construction proposed herein would be categorically excluded from environmental processing pursuant to the provisions of Section 1.1306 of the Rules. A discussion concerning this matter is presented in later paragraphs. Since the proposed construction will not increase the height of the existing antenna supporting structure, notification to the Federal Aviation Administration has not been made. As will be demonstrated elsewhere herein, the instant proposal is one for a minor change.

Proposed Equipment

As earlier mentioned, Tufts proposes to add a Scala, model HDCA-5, Yagi-type antenna with the main lobe of radiation oriented 240 degrees true to the existing antenna supporting structure. Figure 1 is a vertical plane sketch showing the antenna supporting structure and elevation data for both the present and proposed antennas. Figure 2 is a map showing the transmitter site and vicinity. The existing Telrex Laboratories (hereafter, Telrex), model CR78-98, antenna consists of two bays: one horizontally polarized and the other vertically polarized. The bays are mounted colinearly and are oriented such that the main beam of radiation for each is along an axis of 90 degrees true. Each Telrex antenna bay has a maximum gain of 4.32 and the current authorization is for a maximum effective radiated power of 125 watts (H&V). No change in that antenna is proposed. A 50%/50% power splitter feeds each antenna bay with power of 29 watts so as to produce maximum effective radiated power of 125 watts along the 90-degree true bearing. The new antenna, a Scala, model HDCA-5, will be installed on the opposite side of the tower so as to produce maximum radiation along an azimuth of 240 degrees true. The maximum power gain for the Scala antenna is 5.6. The antenna input power will be 14.3 watts, resulting in a maximum effective radiated power of 80 watts for the Scala antenna.

The Telrex and Scala antennas will be fed power in phase. Because of the manner of mounting of the Telrex and Scala antennas and the high degree of radiation suppression each antenna has in the direction of the other, little interaction is expected. However, in the interest of conservatism and taking into account the 90-degree space phase lag that one antenna pattern will have with respect to the other, a composite pattern has been developed for best-case coverage and for worst-case allocation consideration scenarios. Figure 3 is a tabulation of data for the horizontal radiation patterns for each

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antenna separately and for the derived composite pattern with the composite pattern given in terms of relative field and in terms of effective radiated power in decibels referenced to one kilowatt. Figure 4, Sheet 1, shows the individual antenna radiation patterns in terms of relative field and the composite pattern derived by vector addition taking into account the 90-degree space phase lag of the Scala antenna with respect to the Telrex antenna. Figure 4, Sheet 2, shows the composite pattern in terms of dBk for convenient use in the coverage and allocation studies provided herein.

The transmitter power output will be fed by means of 75 feet of Cablewave, type FCC 12-50J, transmission line to an 82-percent/18-percent power splitter. Eighty-two percent of the power will be fed to the Telrex antenna and 18 percent will be fed to the Scala antenna. The 82-percent power to the Telrex antenna will again be split so as to feed equal amounts of power to the horizontally polarized and vertically polarized antenna elements. The following table shows the power budget for the system.

Item	Power	
	Input (watts)	Output (watts)
Transmitter	---	100
75' Cablewave FCC12-50J transmission line (efficiency: 88.8%)	100	88.8
82%-18% power splitter (efficiency: 90%)	88.8	79.9 (65.4/14.5)
10' Cablewave, FCC 12-50J, transmission line to Scala antenna (efficiency: 98.4%)	14.5	14.3
Scala antenna (max. power gain: 5.6)	14.3	80 (ERP)

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Item	Power	
	Input (watts)	Output (watts)
5' Cablewave, FCC 12-50J, transmission line (efficiency: 99.2%)	65.4	64.9
50%-50% power splitter (efficiency: 90%)	64.9	58.4
5' Cablewave, FCC 12-50J, transmission line to Telrex (H.P.) antenna (efficiency: 99.2%)	29.2	29
Telrex (H.P.) antenna (max. power gain: 4.32)	29	125 (ERP)
5' Cablewave, FCC 12-50J, transmission line to Telrex (V.P.) antenna (efficiency: 99.2%)	29.2	29
Telrex (V.P.) antenna (max. power gain: 4.32)	29	125 (ERP)

Note: Some adjustments in transmission line lengths may be needed to achieve in-phase power distribution to the Scala and Telrex antennas.

Coverage Contours

Figure 5 is a tabulation of elevation data and distances to the present and proposed 1 mV/m contours for WMFO. Those contours are plotted on Figure 6. The present WMFO 1 mV/m contour includes 72 square kilometers. With the addition of the Scala antenna, the new 1 mV/m contour includes 89 square kilometers, for a net gain of 17 square kilometers. The change in 1 mV/m area is 24 percent referenced to the 1 mV/m area for the present operation. According to FCC criteria, the proposed change is considered "minor."

Allocation Considerations

In the design of the modified antenna system, consideration has been given to allocation factors involving close-by stations on the same channel as WMFO and on channels within plus and minus 600 kilohertz of WMFO's channel 218 (91.5 megahertz). No concern arises regarding stations 53 and 54 channels removed from channel 218. Also, consideration has been given to prospective interference to channel 6 television station WLNE, New Bedford, Massachusetts, and to the impact of the proposal with regard to the Working Agreement for Allocation of FM Broadcasting Stations on Channels 201-300 under the Canada-United States FM Agreement of 1947, since WMFO is within 320 kilometers of the common border between the United States and Canada.

Turning first to cochannel and adjacent channel allocation concerns, Figure 7 is a map showing the complete 60 dBu F(50,50), 54 dBu F(50,10), and 40 dBu F(50,10) contours for the proposed WMFO operation based on the composite pattern of Figure 4, Sheet 2. The map shows also the appropriate contour arcs for other stations close enough to merit consideration with respect to the proposed WMFO operation, except for station WBUR, Boston, Massachusetts. The map of Figure 7 demonstrates that the proposed operation will neither cause nor receive interference from any station.

With respect to station WBUR, which operates on channel 215B with maximum effective radiated power of 7.2 kW and antenna radiation center height above average terrain of 305 meters, the proposed WMFO operation will result in slightly increased overlap of specified contours over that currently occurring. Stations WMFO and WBUR are separated 14 kilometers from one another. The WBUR signal strength at the WMFO transmitter site is 83.5 dBu based on a maximum effective radiated power of 7.2 kW and antenna radiation center height above average terrain of 323 meters in the WMFO direction, 37

degrees true. The WMFO new Scala antenna will produce increased overlap of the undesired 123.5 dBu contour with the WBUR desired 83.5 dBu contour within an angular range of approximately 100 degrees centered on 240 degrees true. The maximum effective radiated power within the bracket angle will be 85 watts (-10.7 dBk). Assuming free-space propagation, the 123.5 dBu (1.5 V/m) contour extends outward, at most, 43 meters, or less than 150 feet from the antenna. At that distance, the contour does not extend beyond the campus green of the University. Hence, no actual interference to WBUR will occur. In the event a waiver of the FCC's Rule in this regard is required, a waiver is requested. Figure 8 is a tabulation of the data employed in preparing the allocation study map of Figure 7.

Station WMFO is located within the Grade B contour of channel 6 station WLNE, New Bedford, Massachusetts. The increased radiation proposed in the southwesterly direction will result in increased interference according to the criteria established in Section 73.525(e) of the Rules. However, the interference area is entirely outside the Providence-New Bedford area of dominant influence (ADI) in which WLNE is located, and completely outside the Grade A field strength contour for station WLNE. Also, the interference area is within the predicted City Grade field strength contour of station WNEV, Boston, channel 7, which has the same network affiliation, CBS, as does station WLNE. Figure 9 depicts the Providence-New Bedford ADI, the WLNE Grade A and Grade B contours, and the City Grade contour for station WNEV.

The projected interference from WMFO is based on a simplified assumption of uniform radiation of 125 watts in all directions using a maximum possible undesired to desired ratio of 32.5 dB as determined from Figure 2 of Section 73.599 of the Rules. The coarse assumptions made overstate the interference area, but since the area involved is too small for precise definition, and, in any event, Section 73.525(e)(3)(iii) permits the entire

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interference population to be excluded from the 3000-person limit otherwise permitted, a precise demarcation of the interference zone is unnecessary. In other words, the exact definition of the area and the exact number of persons involved are not critical since all the persons involved are deductible. With all the tests having been met for nonviewership of WLNE in the vicinity of the WMFO transmitter, no actual interference occurs now, or would occur if the instant proposal is implemented.

With respect to the provisions of the Working Agreement for Allocation of FM Broadcast Stations on Channels 201-300 under the Canada-United States FM Agreement of 1947, the instant proposal is in compliance. The proposed antenna addition will not result in any measurable increase in radiation toward the Canadian boundary. Hence, insofar as Canada is concerned, the proposal has no impact.

Environmental Impact Considerations

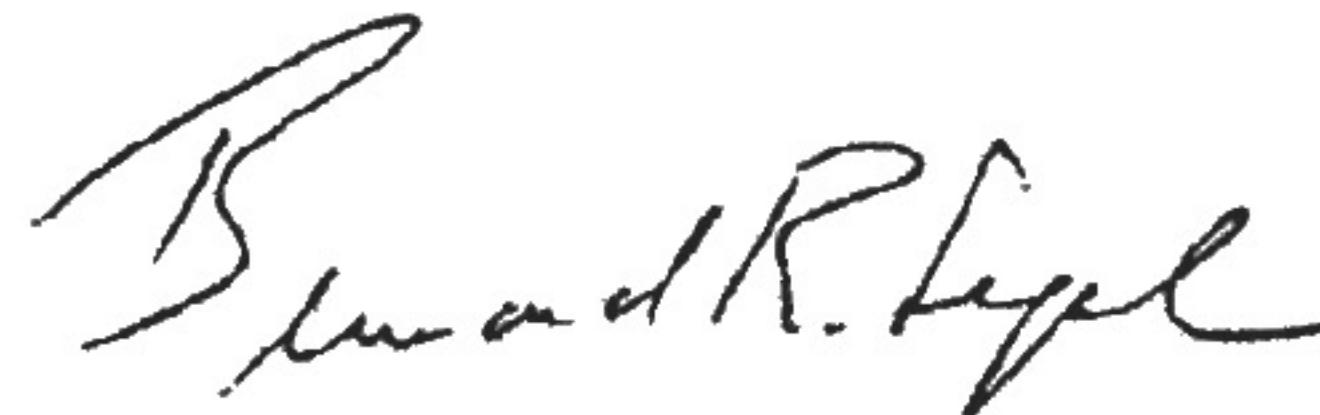
The proposed construction is categorically excluded from environmental processing pursuant to the provisions of Section 1.1306(b) of the Rules. Since the only new construction involved is the addition of an antenna to an existing antenna supporting structure, the concerns of Section 1.1306(b)(1) and (2) are not involved. Only the provision of sub-Section (3) concerning radio-frequency radiation exposure merits attention.

The WMFO antenna supporting tower is mounted atop the roof of Ballou Hall on the Tufts University Campus. The lowest antenna element is 6.4 meters above the rooftop level. Assuming maximum effective radiated power for all three antennas concentrated in the lowest antenna element; i.e., 335 watts, all the energy directed downward, and a 1.6 reflection coefficient, the 1 milliwatt per square centimeter maximum allowed under the FCC's

adopted ANSI C95.1-1982 guideline occurs at a distance of 3.4 meters below the lowest antenna element. With the lowest antenna element being 6.4 meters above the rooftop, a clearance of three meters, or roughly ten feet, from the rooftop level results. Hence no person on the rooftop or at any location below the rooftop would experience excessive radiation.

Warning signs will be placed on the antenna supporting tower so that any worker who may have occasion to climb the tower will be forewarned of possible exposure hazard and will be able to coordinate his work effort in a manner which will not result in excessive exposure.

Based on the foregoing, the proposed construction is categorically excluded from environmental processing according to the FCC's rules implementing the Environmental Policy Act of 1969.



Bernard R. Segal, P.E.

August 10, 1990

Figure 1

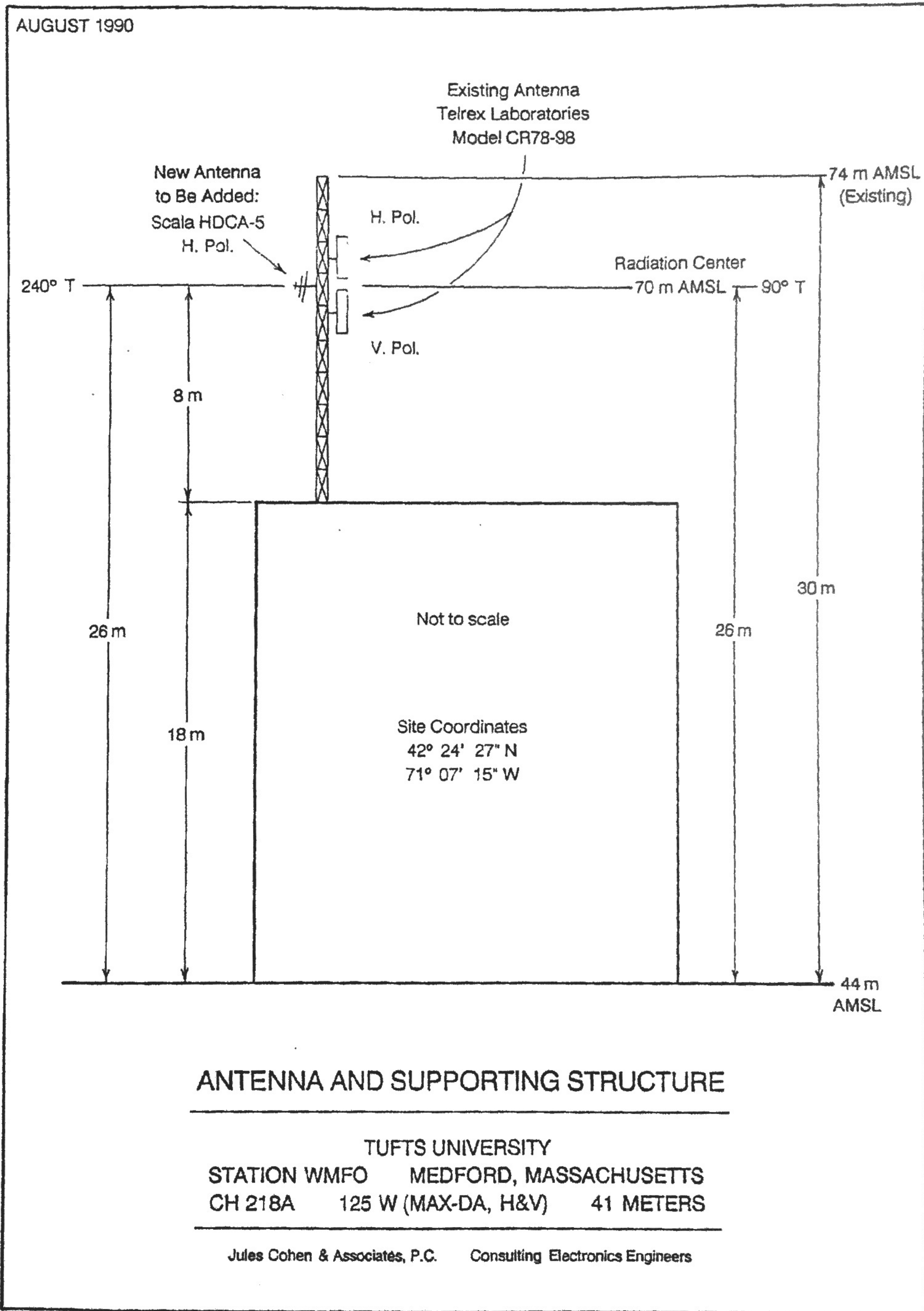
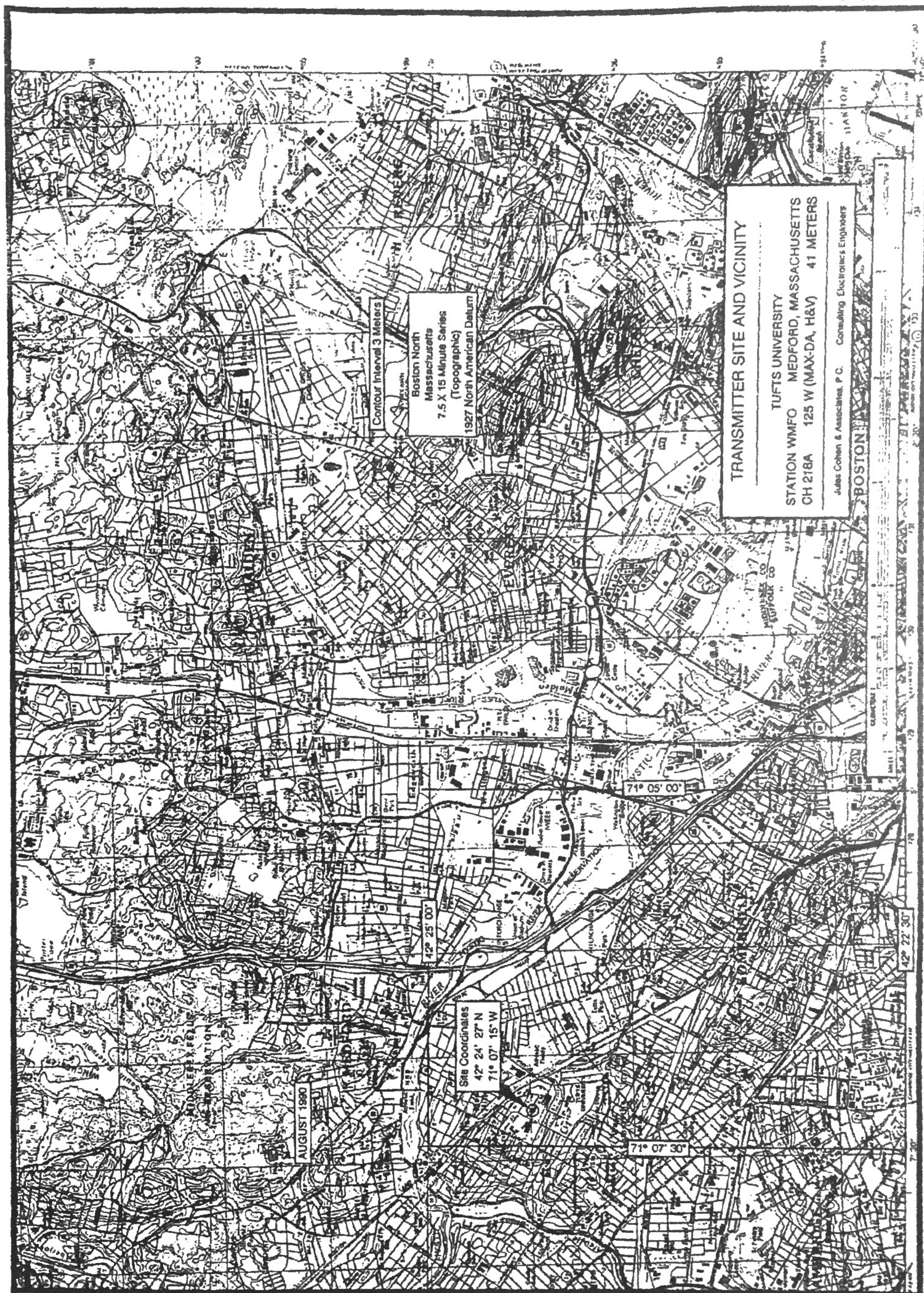


Figure 2
Sheet 1 of 2



Figure 2
Sheet 2 of 2



ENGINEERING EXHIBIT
APPLICATION FOR CONSTRUCTION PERMIT
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MEDFORD, MASSACHUSETTS
CH 218A 125 W(MAX-DA, H&V) 41 METERS

Tabulation of Antenna Horizontal Plane Pattern Data

<u>Azimuth</u>	<u>E_T, Telrex Hor. Pol. Rel. Field</u>	<u>E_S, Scala Rel. Field</u>	<u>Composite* E_{rel}</u>	<u>Composite ERP (dBk)</u>
0	0.280	0.032	0.282	-20.0
10	0.260	0.088	0.274	-20.2 (min.)
20	0.290	0.098	0.306	-19.3
30	0.355	0.098	0.368	-17.3
40	0.460	0.098	0.470	-15.6
50	0.595	0.098	0.603	-13.4
60	0.735	0.110	0.743	-11.6
70	0.885	0.098	0.890	-10.0
80	0.975	0.098	0.980	-9.2
90	1.00	0.098	1.00	-9.0 (max.)
100	0.975	0.098	0.980	-9.2
110	0.885	0.088	0.889	-10.1
120	0.740	0.032	0.741	-11.6
130	0.595	0.016	0.595	-13.5
140	0.465	0.014	0.465	-15.7
150	0.360	0.016	0.360	-17.9
160	0.290	0.016	0.290	-19.8
170	0.255	0.030	0.257	-20.8 (min.)
180	0.280	0.080	0.291	-19.8
190	0.320	0.232	0.395	-17.1
200	0.300	0.369	0.476	-15.5

NOTE: See Sheet 2 for footnote.

Tabulation of Antenna Horizontal Plane
Pattern Data
WMFO, Medford, Massachusetts

Figure 3
Sheet 2 of 2

<u>Azimuth</u>	<u>E_T, Telrex Hor. Pol. Rel. Field</u>	<u>E_S, Scala Rel. Field</u>	<u>Composite* E_{rel}</u>	<u>Composite ERP (dBk)</u>
210	0.290	0.514	0.590	-13.6
220	0.245	0.652	0.697	-12.2
230	0.220	0.756	0.787	-11.1
240	0.195	0.800	0.823	-10.7 (max.)
250	0.170	0.756	0.775	-11.2
260	0.145	0.652	0.668	-12.5
270	0.110	0.514	0.526	-14.6
280	0.145	0.369	0.396	-17.1
290	0.170	0.232	0.288	-19.8
300	0.195	0.080	0.211	-22.5 (min.)
310	0.220	0.030	0.222	-22.1
320	0.245	0.016	0.246	-21.2
330	0.290	0.016	0.290	-19.8
340	0.300	0.014	0.300	-19.5
350	0.320	0.016	0.320	-18.9 (max.)

$$* \quad E_{rel} = \sqrt{[E_T + E_S \cos (90 \cos \theta)]^2 + [E_S \sin (90 \cos \theta)]^2}$$

Where: E_{rel} = composite relative field

E_T = relative field for Telrex antenna

90° = space phase displacement of Scala antenna relative to Telrex antenna

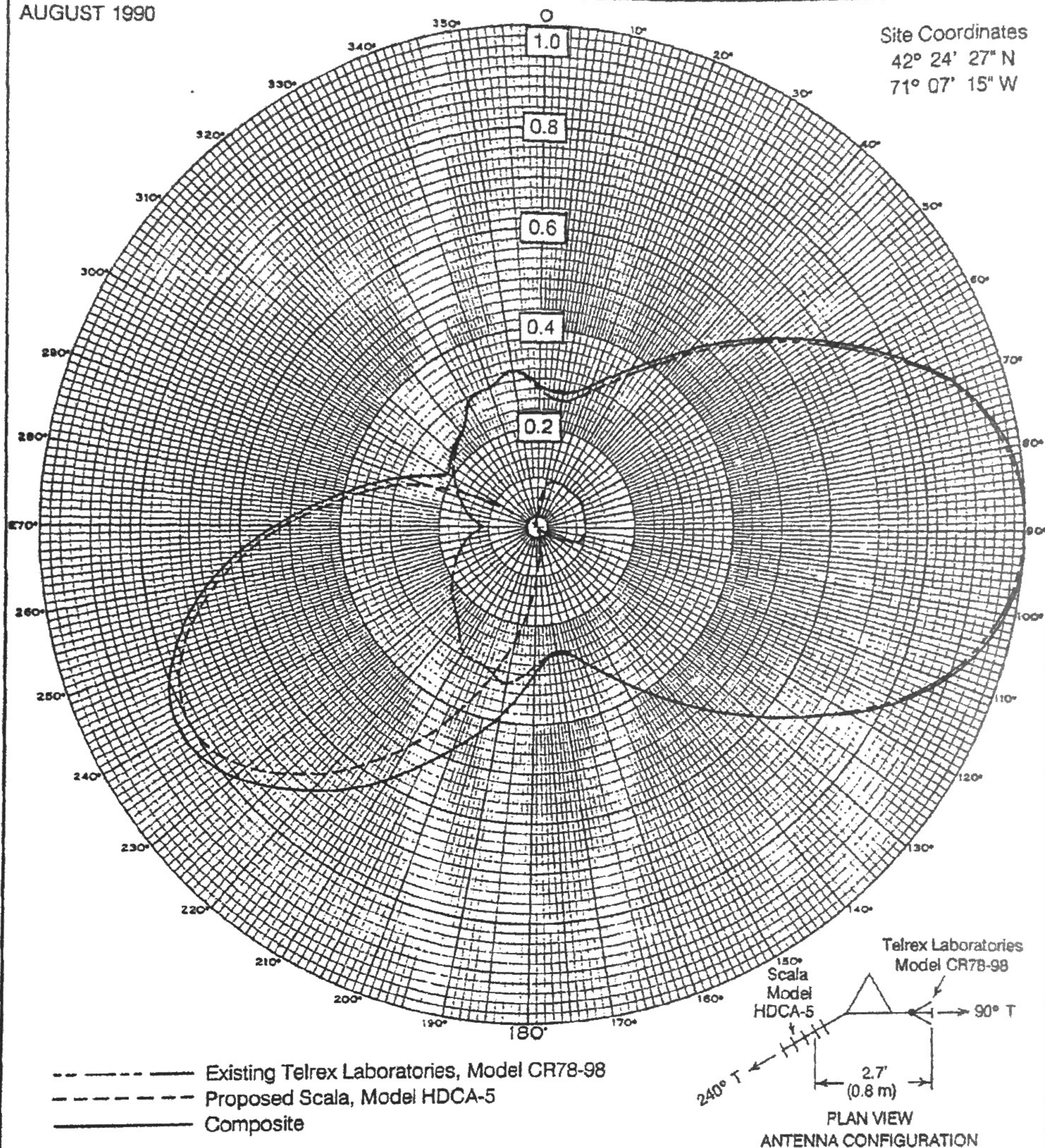
θ = displacement angle with respect to reference angle.
For the instant case, $\theta = 0^\circ$ at each azimuthal angle.

$$\text{Hence,} \quad E_{rel} = \sqrt{(E_T)^2 + (E_S)^2}$$

Note: The antennas will be fed energy in phase.

AUGUST 1990

Site Coordinates
42° 24' 27" N
71° 07' 15" W

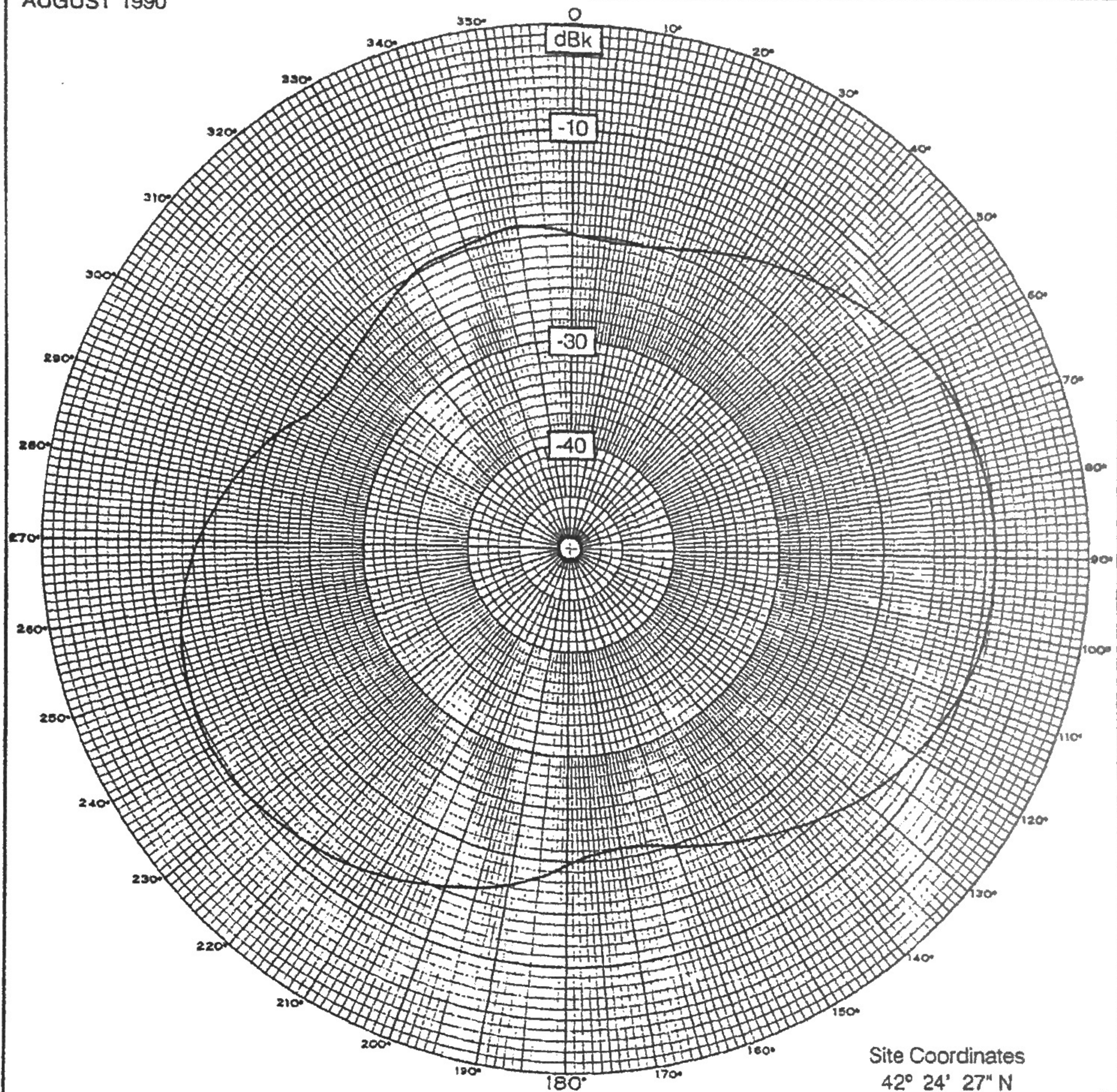


ANTENNA HORIZONTAL PLANE RADIATION PATTERNS (RELATIVE FIELD)

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CH 218A 125 W (MAX-DA, H&V) 41 METERS

Jules Cohen & Associates, P.C. Consulting Electronics Engineers

AUGUST 1990



Site Coordinates
42° 24' 27" N
71° 07' 15" W

Note: Pattern is the composite for the existing Telrex Laboratories, Model CR78-98, and proposed Scala, Model HDCA-5 antennas.

ANTENNA HORIZONTAL PLANE RADIATION PATTERN (EFFECTIVE RADIATED POWER - dBk)

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Tabulation of Elevation Data and
Distances to Present and Proposed 1 mV/m Contours

<u>Azimuth</u> (degrees)	<u>Antenna Radiation Center Height Above Average Terrain</u> (meters)	<u>Present WMFO</u>		<u>Proposed WMFO</u>	
		<u>ERP</u> (dBk)	<u>1 mV/m</u> (km)	<u>ERP</u> (dBk)	<u>1 mV/m</u> (km)
0	33 ¹	-20.1	3.3	-20.0	3.3
15	33	-20.4	3.2	-20.0	3.3
30	34	-18.0	3.7	-17.3	3.9
45	34 ¹	-14.7	4.5	-14.4	4.6
60	43	-11.7	6.1	-11.6	6.1
75	51	-9.7	7.5	-9.7	7.5
90	60 ¹	-9.0	8.5	-9.0	8.5
105	63	-9.7	8.4	-9.6	8.4
120	65	-11.7	7.5	-11.6	7.5
135	68 ¹	-14.7	6.4	-14.6	6.5
150	65	-17.9	5.3	-17.9	5.3
165	61	-20.2	4.5	-20.7	4.4
180	58 ¹	-20.1	4.4	-19.8	4.5
195	54	-19.0	4.5	-16.2	5.3
210	51	-19.8	4.2	-13.6	6.0
225	47 ¹	-21.8	3.6	-11.7	6.4
240	34	-23.2	2.8	-10.7	5.7
255	22 ²	-25.0	2.4	-11.8	5.1
270	9 ^{1, 2}	-28.2	2.0	-14.6	4.3
285	13 ²	-25.0	2.4	-18.4	3.5
300	18 ²	-23.2	2.7	-22.5	2.8
315	22 ^{1, 2}	-21.8	2.9	-21.8	2.9
330	26 ²	-19.8	3.2	-19.8	3.2
345	29 ²	-19.0	3.4	-19.2	3.3

¹ Converted to metric from English value in BPED-791228AZ and rounded to the nearest meter. All other elevations were obtained by interpolation.

² 30 meters has been assumed for the calculations of distances to the present and proposed 1 mV/m contours.

Figure 6

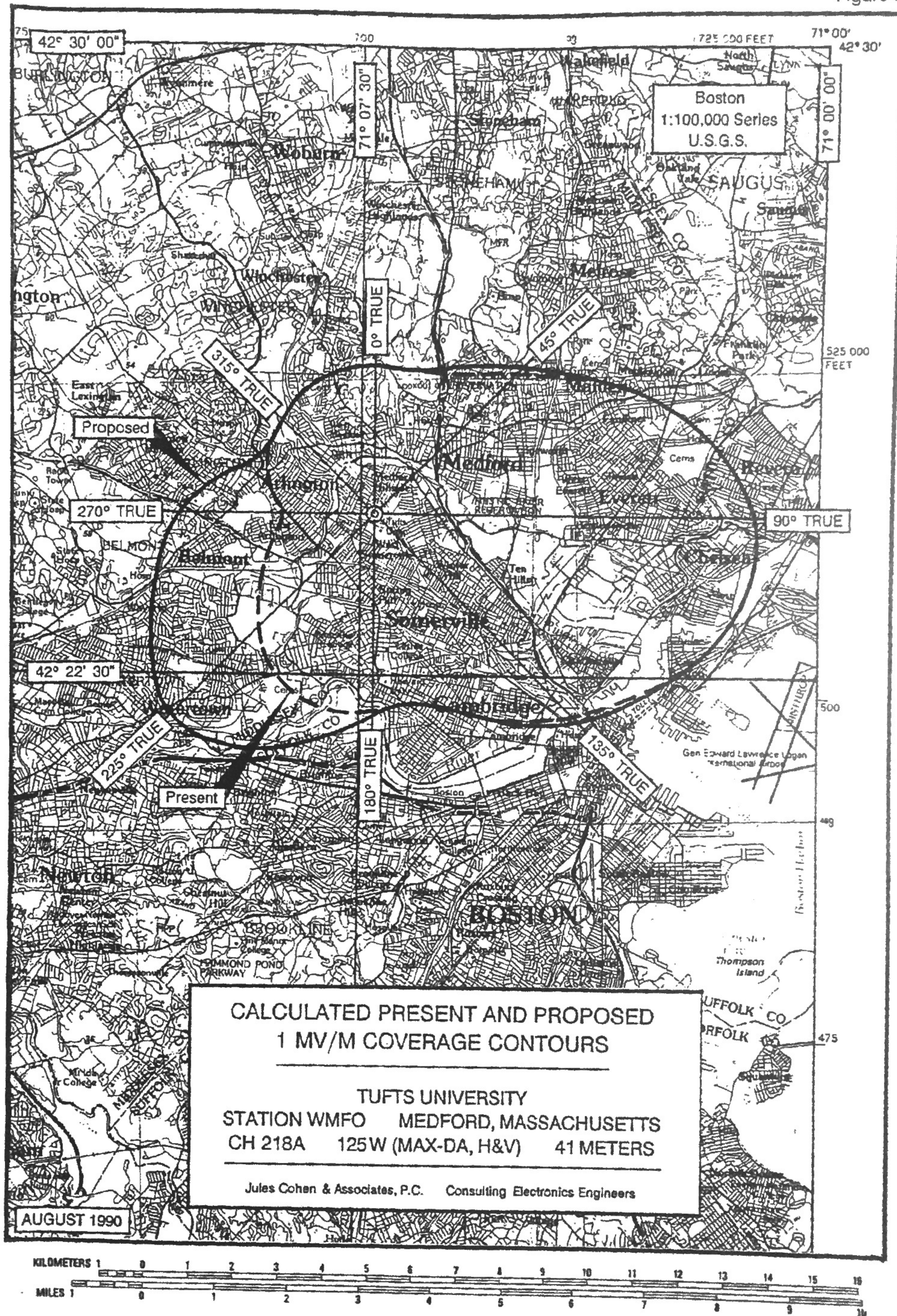
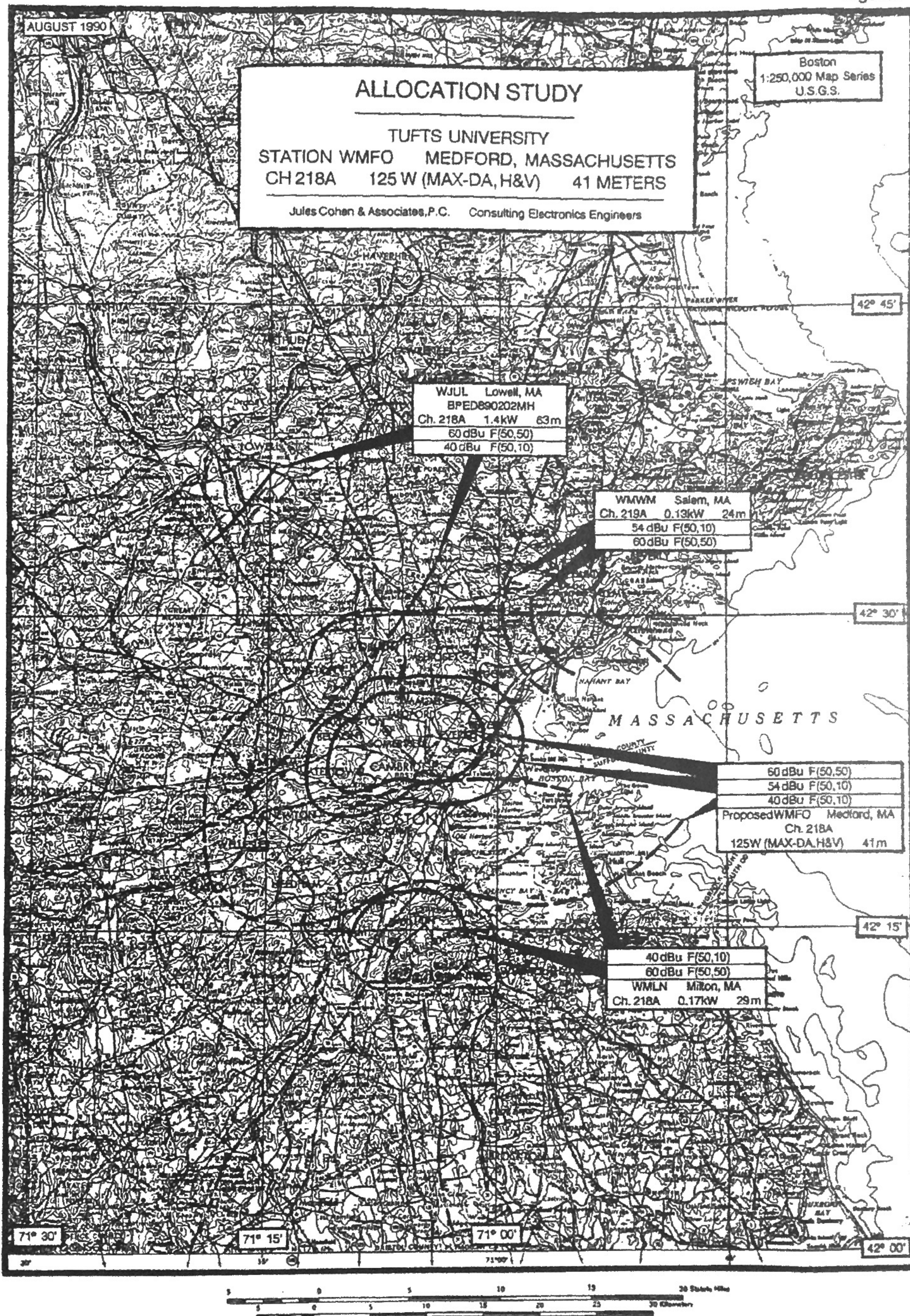


Figure 7



ENGINEERING EXHIBIT
APPLICATION FOR CONSTRUCTION PERMIT
TUFTS UNIVERSITY
STATION WMFO
MEDFORD, MASSACHUSETTS
CH 218A 125 W(MAX-DA, H&V) 41 METERS

Tabulation of Data Used In Allocation Study

WMFO, Medford, Massachusetts
Ch. 218A, 125 W(Max-DA, H&V), 41 meters

<u>Azimuth</u> (degrees)	Antenna Radiation Center Height Above <u>Average Terrain</u> (meters)	Proposed ERP (dBk)	<u>Distance to</u>	
			<u>54 dBu</u> <u>F(50,10)³</u> (km)	<u>40 dBu</u> <u>F(50,10)³</u> (km)
0	33 ¹	-20.0	4.6	10.6
15	33	-20.0	4.6	10.6
30	34	-17.3	5.5	12.5
45	34 ¹	-14.4	6.5	14.6
60	43	-11.6	8.8	20.4
75	51	-9.7	10.7	25.0
90	60 ¹	-9.0	12.0	28.2
105	63	-9.6	11.9	27.8
120	65	-11.6	10.8	25.2
135	68	-14.6	9.3	21.7
150	65	-17.9	7.4	17.3
165	61	-20.7	6.1	17.3
180	58 ¹	-19.8	6.3	14.1
195	54	-16.2	7.5	16.9
210	51	-13.6	8.5	19.2
225	47 ¹	-1.7	9.1	20.5
240	34	-10.7	8.1	18.4
255	22 ²	-11.8	7.2	16.3
270	9 ^{1, 2}	-14.6	6.1	13.8
285	13 ²	-18.4	4.9	11.2
300	18 ²	-22.5	3.9	8.8
315	22	-21.8	4.0	9.6
330	26 ²	-19.8	4.5	10.4
345	29 ²	-19.2	4.7	10.7

¹ Converted to metric from English value in BPED-791228AZ and rounded to the nearest meter.

² 30 meters has been assumed for the calculation of distances to the contours.

³ F(50,50) propagation curves have been employed for distances under 15 kilometers.

WJUL, Lowell, MA
Ch. 218A (CP), 1.4 kW (Max-DA), 63 m

Site Coordinates: 42° 39' 07" NL
71° 19' 15" WL

<u>Azimuth</u> (deg. T)	3-16 km Terrain Average (m. AMSL)	Rad. Ctr. Height Above Average Terrain (meters)	<u>Relative Field</u>	<u>ERP</u> (kW)	<u>Distance to</u>	
					(60 dBu) F(50,50) (km)	(40 dBu) F(50,10) (km)
90	46.0	68.0	0.178	0.044	7.1	23.8
120	41 ¹	73	0.180	0.045	7.2	23.9
135	38	76	0.182	0.046	7.3	24.6
150	41 ¹	73	0.212	0.063	7.8	26.0
160	44 ¹	70	0.265	0.098	8.6	28.5
170	46 ¹	68	0.333	0.155	9.6	31.7
180	48	66	0.419	0.246	10.6	35.8

¹ Interpolated value

NOTE: Terrain elevation data and antenna radiation data obtained from BPED-890202MH.

WMLN, Milton, MA
Ch. 218A, 0.172 kW (Max-DA), 29 m

Site Coordinates: 42° 14' 27" NL
71° 06' 52" WL

<u>Azimuth</u> (deg. T)	<u>3-16 km</u> <u>Terrain</u> <u>Average</u> (m. AMSL)	<u>Rad. Ctr.</u> <u>Height Above</u> <u>Average</u> <u>Terrain</u> (meters)	<u>Relative</u> <u>Field¹</u>	<u>ERP</u> (kW)	<u>Distance to</u>	
					<u>(60 dBu)</u> <u>F(50,50)</u> (km)	<u>(40 dBu)</u> <u>F(50,10)</u> (km)
270	58	7 ²	0.355	0.022	3.9	12.4 ³
280		30 ²	0.325	0.018	3.7	11.8 ³
290		30 ²	0.320	0.018	3.7	11.8 ³
300		30 ²	0.320	0.018	3.7	11.8 ³
310		30 ²	0.314	0.017	3.6	11.6 ³
315	42	23 ²	0.312	0.017	3.6	11.6 ³
320		26 ^{2,4}	0.310	0.017	3.6	11.6 ³
330		33 ⁴	0.305	0.016	3.7	11.9 ³
340		39 ⁴	0.290	0.014	3.9	12.4 ³
350		46 ⁴	0.255	0.011	4.0	12.7 ³
0	13	52	0.240	0.010	4.2	13.2 ³
10		54 ⁴	0.255	0.011	4.4	13.8 ³
20		56 ⁴	0.300	0.015	4.8	15.5

¹ Data from BPED-830919AJ.

² 30 meters assumed as per Section 73.313(e).

³ F(50,50) propagation curves used for distances less than 15 km.

⁴ Interpolated value.

WMWM, Salem, MA
Ch. 219A 0.13 kW 24 m

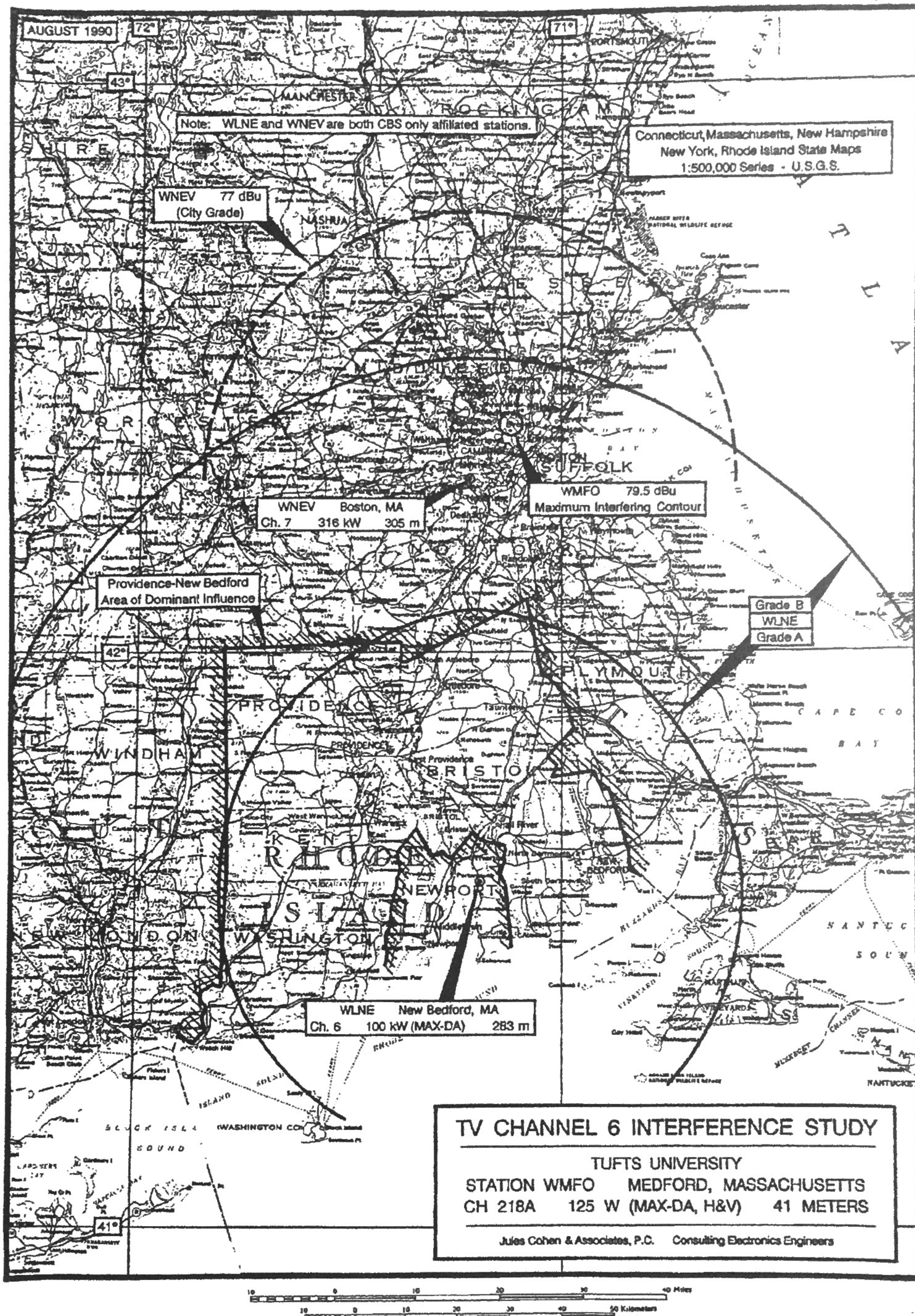
Site Coordinates: 42° 30' 14" NL
70° 53' 26" WL

<u>Azimuth</u> (deg. T)	3-16 km Terrain <u>Average</u> (m. AMSL)	Rad. Ctr. Height Above Average Terrain (meters)	<u>ERP</u> (kW)	<u>Distance to</u>	
				(60 dBu) <u>F(50,50)</u> (km)	(54 dBu) <u>F(50,10)</u> (km)
180	10	31	0.13	6.1	8.7
225	11	30	0.13	6.1	8.7
270	40	1 ¹	0.13	6.1	8.7

Above based on data from BPED-2332. Elevations for average terrain and HAAT converted from feet to meters and rounded to nearest meter.

¹ 30 meters assumed.

Figure 9




JULES COHEN & ASSOCIATES, P.C.
CONSULTING ELECTRONICS ENGINEERS
WASHINGTON, D.C. 20036

ENGINEERING EXHIBIT
APPLICATION FOR CONSTRUCTION PERMIT
TUFTS UNIVERSITY
STATION WMFO
MEDFORD, MASSACHUSETTS
CH 218A 125 W(MAX-DA, H&V) 41 METERS

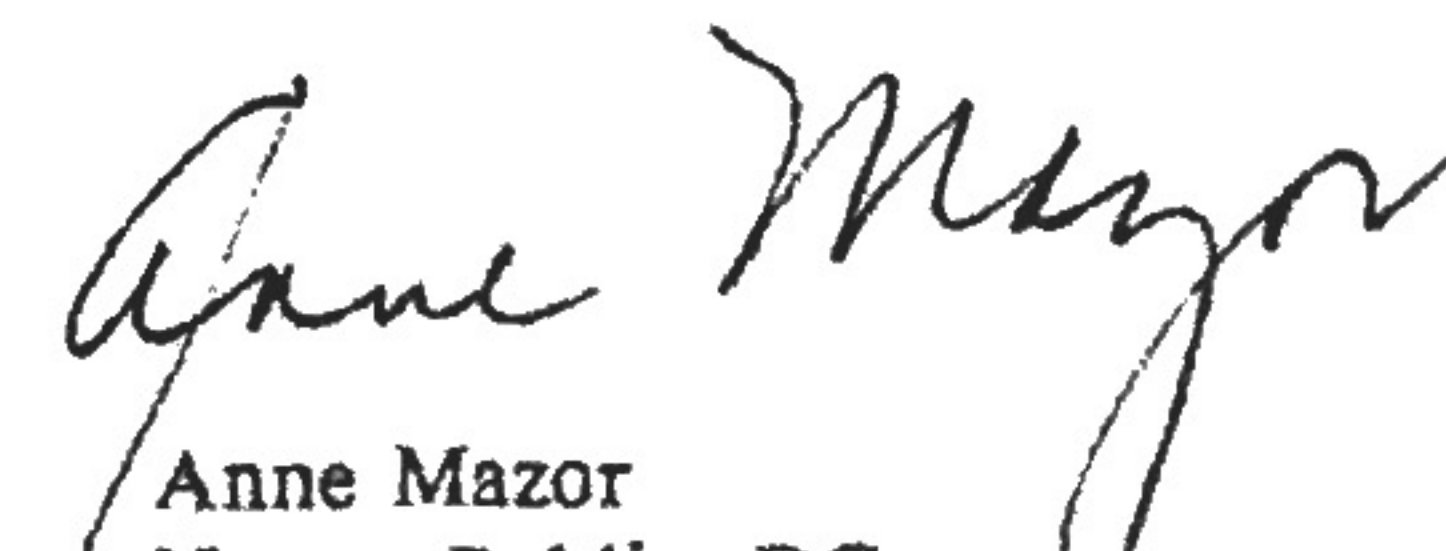
Affidavit

WASHINGTON)
)
DISTRICT OF COLUMBIA) ss:

Bernard R. Segal, being first duly sworn, says that he is president of Jules Cohen & Associates, P.C., consulting electronics engineers with offices in Washington, DC; that he is a professional engineer registered in the District of Columbia; that his qualifications as an expert in radio engineering are a matter of record with the Federal Communications Commission; that the foregoing exhibit was prepared by him and under his direction; and that the statements contained therein are true of his own personal knowledge except those stated to be on information and belief and, as to those statements, he verily believes them to be true and correct.


Bernard R. Segal, P.E.

Subscribed and sworn to before me this 10th day of August, 1990.


Anne Mazor
Notary Public, DC

My commission expires
October 31, 1991

(SEAL)