GOVERNMENT OF THE DISTRICT OF COLUMBIA
OFFICE OF PLANNING

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MEMORANDUM

TO: Board of Zoning Adjustment

FROM: Andrew Altman, Director

DATE February 19, 2003

SUBJECT: BZA Application **16988**
320 McMillan Drive, NW – Public Safety Communications Project (OCTO)

APPLICATION
The Office of the Chief Technology Officer (OCTO) is requesting a **special exception** to install a new telecommunications lattice tower as a replacement for an existing tower and two monopoles at 320 McMillan Drive, N.W.

SUMMARY RECOMMENDATION
Office of Planning **recommends approval** of the special exception request for OCTO to upgrade its existing communications network with the installation of a new lattice tower at 320 McMillan Drive, N.W.

SITE AND AREA DESCRIPTION
The existing tower is located on a portion of the McMillan Reservoir campus known as Parcel 108 Lot 6 and is bounded by McMillan Drive to the north and Bryant Street to the south. Improvements on the subject parcel include two 30-foot tall brick buildings, a 54-space parking lot, one-180 foot lattice tower and two monopoles for telecommunication purposes, all owned by the District of Columbia. The facility and property is used as the District's Public Safety Communications Center (PSCC). The property is un-zoned, however OP has applied the provisions that govern the surrounding R-5-B zone for antennas and towers as outlined in the most restrictive R-1 zone.

PROJECT DESCRIPTION
As part of its wider strategy, OCTO proposes to consolidate the current tower and two monopoles on the subject site with a new 180-foot lattice tower and a related equipment shelter. The project involves the replacement of the aging public safety communications system. Eleven new antennas including four microwave dishes and seven whips will replace four antennas. The new system is a state of the art digital radio emergency communications system, which will allow Fire, Paramedic, Police and Public works

BZA
Case No. 16988
Exhibit No. 28

Board of Zoning Adjustment
District of Columbia
CASE NO. 16988
EXHIBIT NO. 28

employees within the District to communicate directly with each other. The emergency communications system needs to be at a high enough elevation to provide the required coverage and positioned such that it clears terrain and other structures.

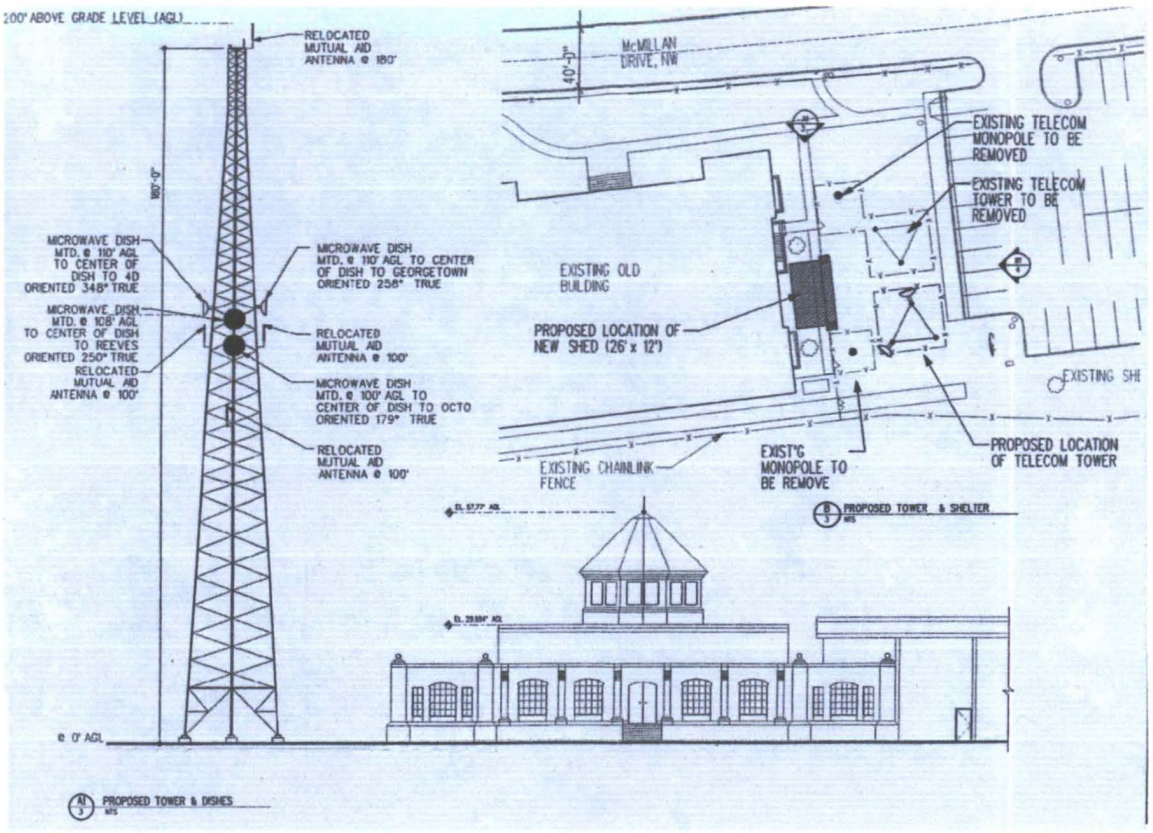


Figure 1 – Tower and Site Information

ANALYSIS

Installation of telecommunication systems involving towers and monopoles in residentially zoned districts require special exception approval by the Board of Zoning Adjustment. Current Zoning Regulations pertaining to tower structures in residential zones are defined by §212 as antennas, other than commercial broadcast antennas, not permitted as a matter-of-right pursuant to §201. OP believes that the proposed new tower complies with the provisions of §212, including:

Section 212

212.1 *An antenna, other than a commercial broadcast antenna, that is not permitted or approved pursuant to § 201 may be permitted by the Board of Zoning Adjustment as a special exception in an R-1 District under § 3104; provided, that the requirements in this section are met.*

The property is un-zoned, however OP has applied the provisions that govern the surrounding R-5-B zone for antennas and towers as outlined in the most restrictive R-1 zone.

212.2 *The proposed use, location, and related conditions shall be consistent with the purposes set forth in § 2520.*

The proposed use, location and related condition are consistent with the purposes of §2520. The new tower replacement will be no higher than the existing lattice tower at 180 feet. The existing towers are located inside of a well-fenced campus with access provided by a security-manned entrance located to the west of the parcel. As such, the health, safety and welfare of the immediate residential neighborhood will not be affected due to the potential of falling antennas or any other structures supported by the tower. The hilly terrain and existing trees on the property shield the visibility of the proposed tower structure from nearby residences. There are no other structures with the required height in the immediate area that would support the installation of these antennas. This location provides the least visual impact on the surrounding neighborhood.

212.3 *If review by the Historic Preservation Review Board or Commission of Fine Arts is required, concept review and approval shall have occurred before review by the Board of Zoning Adjustment.*

The Historic Preservation Review Board will review the application by the date of the Board's review.

212.4 *The Board may impose conditions relating to operation, location, screening, or other requirements as it deems necessary to protect adjacent and nearby property, consistent with the general purpose and intent of this section.*

As shown in the submitted plans, the tower will be secured from the parking lot and the communications center by chain-link fencing. No landscaping is suggested in the plans. OP does not feel additional landscape is needed as the site is well-treed. The public does not easily access the site, since it is located within a secured campus.

212.5 *The Board may require the removal of any nonconforming antenna as a condition to the approval of an antenna.*

Submitted plans show the removal of the existing monopoles and the lattice tower. There will be no non-conforming antennas.

212.6 *The location and other characteristics of the antenna shall be reasonably necessary for the intended use of the antenna.*

The location of the tower is necessary to support the required coverage area.[1] The whip antennas receive and transmit data and other information and their allotted heights on the tower are necessary for their efficiency.

212.7 *The present character and future development of the neighborhood shall not be adversely affected.*

The existing towers are not readily visible from nearby public space, including Bryant Street, which bounds the south of the parcel, due to trees and the hilly terrain in this area. The adverse visibility of the site would be minimized by the consolidation of three towers into one, with no increase in average height and the future character of the neighborhood will not be affected. In addition, there are no residences within a 200-foot radius of the proposed tower, so the health, welfare or safety of the population is not compromised due to the antennas.[2] There are other sites in the system located near residential neighborhoods, however the distance from this site to the nearest residence is far greater. The proposed location of the new tower does not detract from the neighborhood's existing streetscape or the future development of the neighborhoods, which abuts the reservoir.

OCTO is responsible for improvement of the District's emergency communications system used exclusively by District and federal public safety and emergency preparedness personnel. Emergency communications have not been effective using the current system, including coordination with personnel in Maryland and Virginia. The current system does not provide the necessary capacity to support communications among the various agencies. The replacement tower will support newer antennas with improved receiving and sending capabilities, while eliminating the need for the two existing monopoles and an older lattice structure. This is also an improvement on the visual impact of the current system.

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[1] **Coverage & Antennas**
Each site in the system provides coverage to that local area which allows communication with all of the other sites through a prime site. The antennas and equipment located at each site provide a radio communication link between the system and its members as well as between each site and the central communications office. The transmit antennas send the transmissions in a focused direction. The whip antennas receive the transmissions from mobile or portable radios. Other sites have microwave dishes, which provide a site-to-site link, or backbone, for the system.

[2] **RF & Safety Standards**
Radio frequency (RF) energy is widely used for telecommunication purposes and is closely regulated by the Federal Communication Commission (FCC). The FCC mandates that all communication facilities meet strict exposure guidelines that have been established by leading scientific and medical research associations. The RF energy is measured based upon the type of transmitter, power of the transmission, the angle of the transmission, and distance to the site being measured. RF energy drops exponentially as distance grows from the source (RF Site Study Attached)

purpose and integrity of the zone plan. The installation of the new system complies with current and proposed Zoning Regulations, which encourage co-location on structures to diminish the adverse visual impact of numerous antennas at various locations within a given coverage area.

COMMUNITY COMMENTS

ANC 1B voted unanimously to support the special exception request at its regularly scheduled meeting on February 6, 2003 (Attached). Due to its location on the McMillan Reservoir campus, staff has determined that the Historic Preservation Board should review the application.

CONCLUSION

The Office of Planning **recommends approval** of the installation of the replacement lattice tower to accommodate the District's upgrade of its emergency telecommunications network. The intent of the antenna regulation is to ensure that antennas have as little visibility as possible from public space. Whenever possible, co-location of antennas on an existing tower is encouraged to limit the visual intrusion of antennas. OP supports the installation of the new lattice structure, which would structurally support more antennas to enhance the communication capability among emergency personnel in the District and the Metropolitan Region.

Attachments:

1. Aerial Photo
2. ANC 1B Recommendation
3. RF Study - McMillan Site


R-5-B
Existing Lattice Tower
GOV
5-B
Adams St NW
Feature Key
Zoning Boundaries
Square Index
Board of Zoning Adjustment
Application No. # 16988
OCTO - 320 McMillan Dlve, NW
DC Office of Planning
February 21, 2003
Scale 1:1030
Attachment 1

ADVISORY NEIGHBORHOOD COMMISSION 1B
GOVERNMENT OF THE DISTRICT OF COLUMBIA
COLUMBIA HEIGHTS / LEDROIT PARK / SHAW / UNIVERSITY HEIGHTS

1B01 Lawrence T. Guyot, Jr.
1B02 Philip C. Spalding
1B03 Catherine Hammonds
1B04 Deborah R. Thomas
1B05 Jarvis Houston
1B06 Theodore "Ted" Butler
1B07 Sertira "Cookie" A. Wilson
1B08 Charles E. Glover
1B09 Sinclair "Nupe" Skinner
1B10 Kelvin P. Esters
1B11 Arabella F. Littlepage

7 February 2003

Geoffrey Griffis, Chairperson
Board of Zoning Adjustment
Office of Zoning
441 4th Street, NW, Suite 210
Washington, DC 20001

RE: **320 McMillan Drive, NW (Parcel 108/6)**
BZA Application No. 16988

Dear Mr. Griffis:

At the regularly scheduled meeting of ANC1B (notice of which was properly given) on February 6, 2003, at which a quorum of nine of eleven members voted, ANC1B voted unanimously (9-0-0) to support the application of the Government of the District of Columbia, Office of the Chief Technology Officer, pursuant to 11 DCMR #3104.1, for special exception to replace an existing telecommunications tower and poles with one lattice tower and equipment shelter as part of the District's emergency communications network under Section 212 (Section 2520) in the R-5-B District at premises 320 McMillan Drive, NW (Parcel 108/6). Commissioner questions regarding the public safety of microwave installations were allayed by Lavelle Saunders of the Chief Technology Officer's Office.

Understanding the importance of this system to the public's welfare, ANC1B requests that the Board of Zoning Adjustment act on this request expeditiously.

Sincerely,

Deborah R. Thomas, Chairperson

Philip C. Spalding, Secretary

Jules Cohen, P.E.
Consulting Engineer

ENGINEERING STATEMENT
RADIO-FREQUENCY EXPOSURE ANALYSIS
OCTO PROJECT
MCMILLAN RESERVOIR, WASHINGTON, DC

An analysis has been made of the radio-frequency (RF) exposure in the vicinity of the proposed installation of radio communications facilities to be used by the Fire Department/Emergency Medical System at a tower adjacent to the McMillan Reservoir. This engineering statement describes the results of the analysis and the methodology employed.

The Public Safety Service radio installations, operating on dedicated frequencies, as proposed in the OCTO Project, are environmentally benign. They are compliant with the RF exposure standards adopted by the Federal Communications Commission (AFCC@) and do not constitute a health hazard. They are not a potential source of interference to television or radio broadcast station reception or to electrical or electronic devices. They are neither a noise source nor a generator of traffic, nor do they emit noxious fumes.

In brief, the analysis shows that the RF exposure from the proposed transmissions anywhere in the vicinity of the site will not exceed approximately 0.2 percent of the maximum permissible exposure ("MPE") established by the FCC for uncontrolled (general population) environments.

Four RFS Model 455-7 antennas are to be located on the tower at a level of 180 feet (54.9 meters) above ground. Each of the four antennas will transmit energy from four transmitters. The effective radiated power per transmitter will be 575.4 watts. The frequency band to be employed is to be from 460.025 to 460.4750 megacycles per second (megahertz, or MHz). In addition, one Andrew Model PL4-107E microwave, dish-type antenna is to be located at a height of 175 feet (53.3 meters) above ground, and a similar antenna is to be located at a height of 165 feet (50.3 meters) above ground level. The power input to each microwave antenna will be approximately eight watts. When that power is multiplied by the gain of the antenna (38 decibels above dipole gain), the maximum effective radiated power is approximately 50,480 watts. The microwave antennas operate in the 11,000 MHz band. Each antenna concentrates the power toward the horizon. By so concentrating power, each antenna substantially reduces power delivered to nearby areas.

Calculations were made for distances starting from the base of the tower and extending for a distance of 2,000 feet. A tabulation of exposure versus distance at six feet above ground for the system is on the following page.

Distance[1] (feet)	Pwr. Density ($\mu W/cm^2$)[2]	% of FCC MPE[3]	Times Below MPE
0	1.207	0.2023	494
50	1.104	0.1857	538
100	0.982	0.1594	627
200	0.558	0.0909	1,101
300	0.354	0.0558	1,792
400	0.236	0.0365	2,741
500	0.201	0.0311	3,212
600	0.172	0.0272	3,682
700	0.202	0.0286	3,502
800	0.167	0.0240	4,163
900	0.167	0.0248	4,031
1000	0.159	0.0243	4,113
1500	0.156	0.0242	4,132
2000	0.146	0.0207	4,823

[1] Horizontal distance from tower.

[2] Microwatts (millionths of a watt) per square centimeter.

[3] Maximum permissible exposure.

The power density does not drop off uniformly as the distance increases because the antennas concentrate the energy toward the horizon. At close distances, the amount of signal suppression may counteract the distance factor. At greater distances, the direct ray toward the location of interest more closely approaches the maximum of the antenna pattern. At some distances, the increased transmitted signal strength is a greater factor than the increased distance factor. Beyond 2000 feet, the exposure level declines inversely as the square of the distance because the transmitted signal is at a maximum. That is, if the distance doubles, the power density drops by a factor of four.

Exposure levels were calculated by methods prescribed by the FCC in a technical bulletin produced by the Office of Engineering and Technology. The rules specify different levels of exposure for two environments: (1) Occupational/Controlled and (2) General Population/Uncontrolled. The second category permits the exposure at most frequencies, including those used for the public safety services, to be only one-fifth of the levels permissible for the first category. At 460 MHz, the maximum exposure level permitted is 307 $\mu W/cm^2$ averaged over a period of 30 minutes for the General Population/Uncontrolled environment. At 11,000 MHz, the maximum exposure level permitted is 1,000 $\mu W/cm^2$ averaged over a period of 30 minutes for the General Population/Uncontrolled environment.

In making the foregoing calculations, the assumption was made that all transmitters are operating simultaneously (an unlikely occurrence) and a reflecting surface is causing the exposure to be increased because the reflected signal is arriving in phase with the direct ray. The reflected signal could just as well arrive out of phase and act to reduce the exposure. Furthermore, the assumption was made that no intervening terrain obstructions, foliage or manmade structures reduced received signal strength.

The standard adopted by the FCC follows the maximum exposure limits set by the National Council on Radiation Protection and Measurements (NCRP), with some features taken from Standard C95.1/1992 of the American National Standards Institute/Institute of Electrical and Electronics Engineers. The NCRP is an independent expert group chartered by Congress.

The permissible exposures set, even for the Occupational/Controlled environment, are not at the threshold where biological harm may result. They are based on the scientific, peer-reviewed literature, including a data base of in excess of 10,000 papers, reporting experimental results. Studies show that the most sensitive indicator of a biological effect is behavioral. When animals are trained to do a particular task, their performance of that task is modified when exposure is equal to a level approximately ten times greater than the maximum exposures permitted for the Occupational/Controlled environment and fifty times greater than the exposures permitted for the General Population/Uncontrolled environment.

Behavior modification is not necessarily harmful and disappears when the field is reduced, but the assumption is made that prolonged exposure in excess of the level causing behavioral modification might be harmful.

Continuous exposure at the level cited above is well within the maximum exposure level permitted by the standards. Those standards are premised on avoidance of RF exposure that may have an adverse biological effect.

Jules Cohen, P.E.

February 21, 2003