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October 26, 1994

Experimental Radio License
Renewal and Modification

Call Sign: KO2XEU

File Number: 3545-EX-PL-93

Effective: June 11, 1993

Expires: January 1, 1995

**BNR INC.
Exhibit Number #1**

FCC Form 442

¶ 3 This is a request for a **Renewal** and **Modification** of the Experimental License issued to BNR Inc. the Research and Development Subsidiary of Northern Telecom Inc. for joint BNR/NT (hereinafter called BNR/NT) Authorization.

Authorization is requested for:

- Section 5.202 (i) of the Regulations for: Development of radio technique, equipment, operational data or engineering data related to an existing or proposed radio service;
- Section 5.202 (d) of the Regulations for: Technical demonstrations of equipment or techniques, and;
- Section 5.202 (f) of the Regulations for Demonstrations of equipment to prospective purchasers for proposed stations in existing services by persons engaged in the business of selling radio equipment.

The additional authority for demonstration is needed to conduct demonstrations of equipment on-site, within the BNT/NT buildings, described in this application. The demonstrations will be for existing and prospective users of the radio equipment.

BNR Inc. is the Research and Development Subsidiary of Northern Telecom Inc., one of the largest communication equipment manufacturers in the world. The BNR/NT low-power Cellular Microcell test program is being conducted in and between the BNR and Northern Telecom buildings in Richardson Texas with addresses of 2201, 2221, and 2150 Lakeside Blvd., Richardson Texas. Further, BNR/NT conducts training for Cellular System licensee employees at the BNR/NT training center buildings located at 1055, 1057, and 1059 Sherman Street in Richardson, Texas.

¶ 4F Particulars of Operation

4A Frequency MHz	4B Max Terminal Power Watts	4C Max Antenna Power Watts	4D Mean or Peak Power Watts	4E Emission Type	4F Signal Modulation	4G Bandwidth kHz
869-894	1.0	Closed Loop	Peak	F7W	EIA/TIA Is-553, IS-54 TDMA, CDPD	30 per channel, (30K)
824-849	0.600	Closed Loop	Peak	F7W	EIA/TIA Is-553, IS-54 TDMA, CDPD	30 per channel, (30K)
880.020- 889.980 & 891.510- 893.970	0.10	0.25 (ERP)	Peak	F7W	EIA/TIA Is-553, IS-54 TDMA, CDPD	30 per channel, (30K)
835.020- 844.980 & 846.510- 848.970	0.01	0.02(ERP)	Peak	F7W	EIA/TIA Is-553, IS-54 TDMA, CDPD	30 per channel, (30K)

¶ 4(G) BNR/NT will use up to 16 channels at the BNR/NT campus location for live air testing (or a total of 480 kHz, 16x30 kHz) in the channel blocks allocated to the "B" wireline cellular operator in the Dallas MSA, with no more than 4 channels for the outdoor Microcell system. BNR/NT will obtain written permission from local cellular operator to identify which channels should be used for the test program.

¶ 5(b) The live air test program will use low-power Fixed stations at **Various Fixed locations all within the Vicinity of Richardson, Texas.** Indoor Cellular Microcell testing, using NT TRU radios, is currently conducted within the BNR/NT buildings at:
 2201 Lakeside Blvd., Richardson, Texas NL32° 58' 48", WL 96° 42' 44"
 2221 Lakeside Blvd., Richardson, Texas NL 32° 58' 47", WL 96° 42' 38"
 2150 Lakeside Blvd., Richardson, Texas NL 32° 58' 40", WL 96° 42' 37"

Outdoor Cellular Microcell antennas for the live air Cellular Microcell program are located at the 2150 Lakeside building, on an antenna structure, that has the location of: NL 32° 58' 40", WL 96° 42' 37"

See Exhibit # 2 for further details of the BNR/NT Campus of buildings, where Cellular Microcell testing is being conducted

Training with closed loop systems using Cellular frequencies are conducted at the Training Center campus of buildings at:

1055 Sherman St., Richardson, Texas	NL32° 56' 12", WL 96° 44' 25"
1057 Sherman St., Richardson, Texas	NL32° 56' 14", WL 96° 44' 25"
1059 Sherman St., Richardson, Texas	NL32° 56' 16", WL 96° 44' 23"

See Exhibit # 3 for further details of the BNR/NT Training Center campus of buildings.

Indoor closed loop laboratory validation and development testing , is currently conducted within the BNR/NT buildings at:

2201 Lakeside Blvd., Richardson, Texas	NL32° 58' 48", WL 96° 42' 44"
2221 Lakeside Blvd., Richardson, Texas	NL 32° 58' 47", WL 96° 42' 38"
2150 Lakeside Blvd., Richardson, Texas	NL 32° 58' 40", WL 96° 42' 37"

- ¶5(c) Fixed location radios for the Cellular Microcell program are being at used at Various locations all within the Vicinity of Richardson, Texas, in and around the buildings described in Exhibit #2.

As the test activities are at various locations, Authority is requested for authority to use fixed location radios "Within the Vicinity of Richardson, Texas."

- ¶5(d) & (e)

Mobile handsets for the Cellular Microcell program are being at used at Various locations all within the Vicinity of Richardson, Texas, in and around the buildings described in Exhibit #2.

Mobile handsets for training at the Training Center campus are all used indoors, within the buildings described in Exhibit #3

As the test activities are at various locations, Authority is requested to use fixed location radios "Within the Vicinity of Richardson, Texas."

For the purpose of ¶5 the "Vicinity of Richardson, Texas, should include locations within 15 miles of the City limits of Richardson, Texas.

Exhibit #2
BNR/NT Campus Facility,
Lakeside Drive,
Richardson, TX

BNR/NT Antenna Description(s)

Modification and Renewal Request

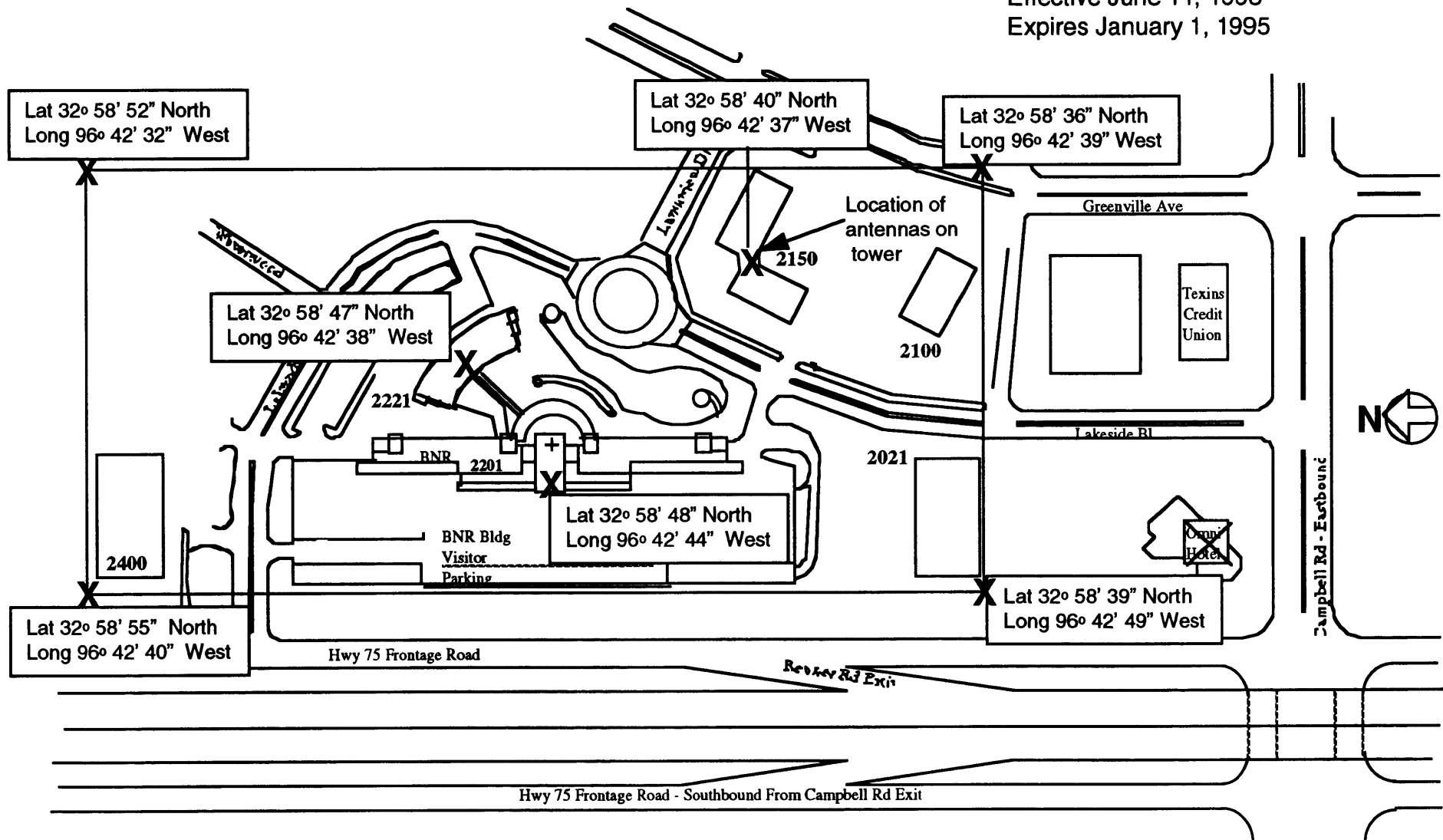
Experimental Radio License

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X = Location Information Reference

Exhibit #3
BNR/NT Training Campus,
Sherman Street,
Richardson, TX

BNR/NT Antenna Description(s)

Modification and Renewal Request

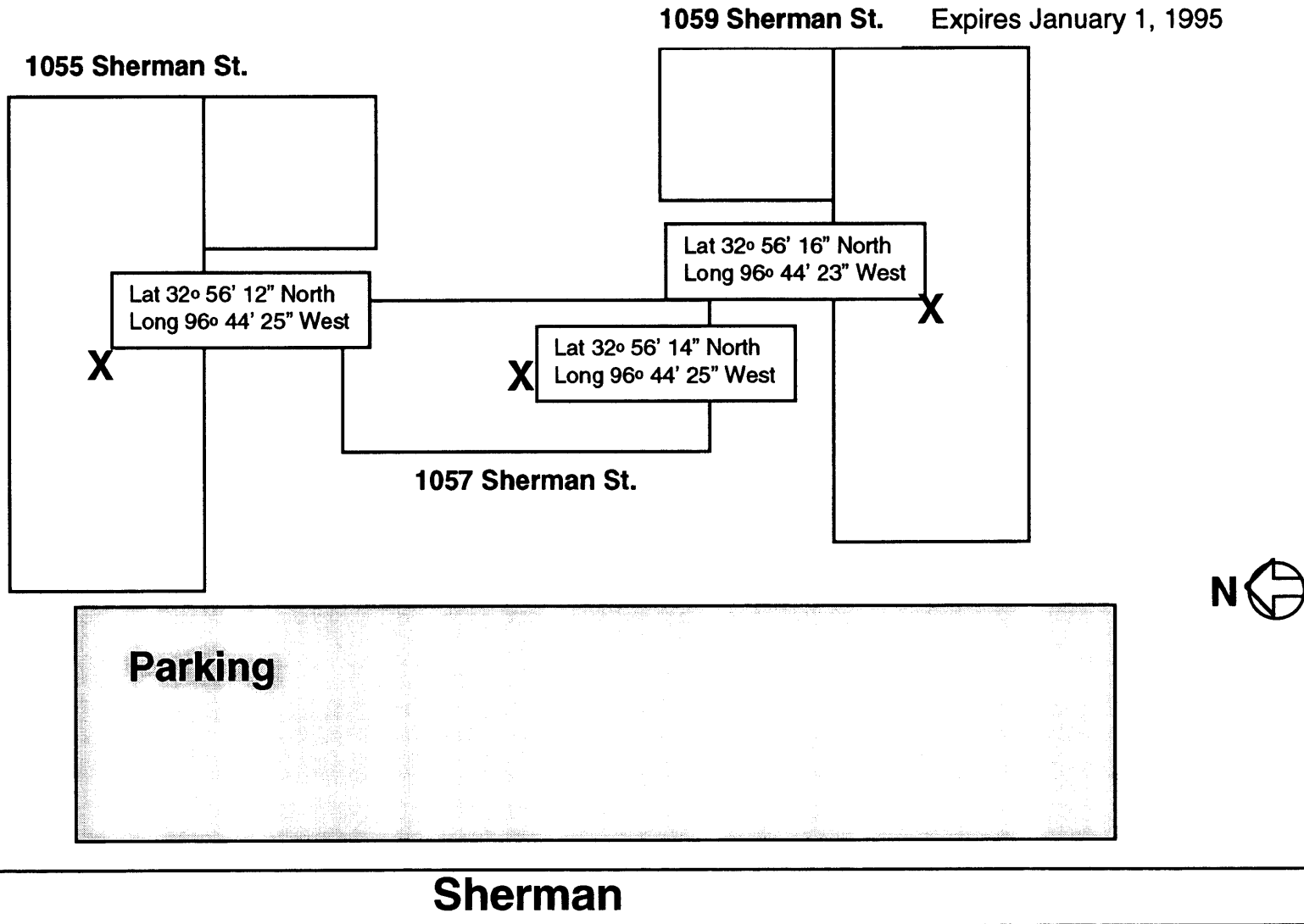
Experimental Radio License

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**BNR INC.
Exhibit Number #4**

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For Outdoor Antennas:

- ¶6(a) The width of beam in degrees at the half-power point for the outdoor antennas at the 2150 Lakeside building are 60°
- ¶6(b) The Orientation in the horizontal plane of the outdoor antennas at the 2150 Lakeside building are 330° from Magnetic North
- ¶6(c) The Orientation in the vertical plane of the outdoor antennas at the 2150 Lakeside building is 10° down

For Indoor Antennas:

- ¶6(a) The beam width in degrees at the half-power point for the indoor antennas in the 2201 and 2221 Lakeside building are 105°
- ¶6(b) The Orientation in the horizontal plane of the indoor antennas in the 2201 and 2221 Lakeside buildings are at various orientations from Magnetic North
- ¶6(c) The Orientation in the vertical plane of the indoor antennas in the 2201 and 2221 Lakeside buildings is 0°

For Closed Loop Systems:

Closed loop systems do not connect an antenna to any of the radios

Form 422

10(a)(b) & (c) Test Program

The BNR/NT microcell test program in Richardson, Texas, is an ongoing microcell product development program for Cellular system equipment. The license Renewal and Modification application only seeks authority to

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conduct live air test in frequencies assigned to the "B" carrier, Southwestern Bell Mobile Systems. Most live air radio emissions will be between low-power handsets and fixed stations, indoors, within the 2221 and 2201 Lakeside Blvd. buildings. Within the 2201 building, no emission is from a source that will exceed 18.3 meters (60 feet) in elevation above mean ground level. Within the 2221 building no emission is from a source that will exceed 63.4 meters (208 feet) in elevation above mean ground level. The live air microcell test program is necessary for development of equipment, for Cellular system operators, that will be used for very low power in building microcellular systems.

Live air microcell low-power emissions between the three buildings is accomplished with internal directional distributed antennas in the 2201 and 2221 Lakeside Blvd. buildings. Outdoor directional antenna at the 2150 Lakeside Blvd. building provide the overlay coverage between the 2150 Lakeside Blvd. building and the 2201 and 2221 Lakeside Blvd. buildings. The external antennas at the 2150 Lakeside Blvd. building ~~does~~ not exceed 13.72 meters (45 Feet) in height above mean ground level. The directional antennas are mounted and oriented to use the 2201 Lakeside Blvd. building to shield the radio signals from the 2150 Lakeside Blvd. building and reduce unintended coverage behind the buildings. Microcellular signal spillage into commercial cellular coverage areas in the vicinity of the test site are reduced to a negligible effect by reusing frequencies that are sufficiently distant from the macrocell, with close coordination and consultation with the local "B" carrier, as required. Fixed station transmissions at 2201 Lakeside Blvd. and 2221 Lakeside Blvd. buildings shall remain wholly in-building and shall meet the specifications as outlined for 2201 Lakeside Blvd. and 2221 Lakeside Blvd. The walkway connecting the 2201 and 2221 buildings will have indoor radio coverage between the buildings.

The live air microcell test program will develop and demonstrate new generations of cellular systems, that will permit cellular operators to provide in building microcell systems that can reuse the channels employed in the adjacent outdoor macrocellular systems. Handsets used for the indoor microcell will be capable of automatically increasing power (up to +12 dBm) as the user moves outside, and functions as the typical cellular call, with transparent hand-off to the user. The test program is designed to keep the signal strength sufficiently low, so that the Cellular channels can be used for traditional high-power Cellular communication on the streets surrounding the campus buildings where the low power tests are being conducted.

The outdoor antennas support test programs to develop future systems that will provide transparent hand-off between in-building and outdoor microcell systems and outdoor macrocell systems. The test mission is to

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develop a new generation of equipment for cellular operators that will permit them to support more users with their current spectrum allocations.

The BNR/NT Training Center conducts hands-on training for the employees of licensed Cellular operators. Operator employees need hands on training with the BNR/NT Cellular equipment to provide more efficient and effective service to their Cellular customers. The Training Center uses Closed Loop radio systems that do not connect to a radio antenna. The Training Center, in Richardson, Texas, consists of three adjacent Northern Telecom Inc. buildings, all located on Sherman street in Richardson. The Closed Loop radio systems within the buildings are adjusted to contain the radio signals within the building, and the signal strength outside the buildings is below the level that could create interference to the Cellular customers that would be traveling on Sherman Street, outside the buildings. BNR/NT trains more than 3000 students per year at the Training Center.

The BNR/NT closed loop laboratory test programs are within the BNR/NT 2201 and 2150 Lakeside Blvd. buildings. The closed loop labs are essential for the validation and development of equipment, and are further used to evaluate and remedy equipment malfunctions reported by customers. Fixed station radios used in the labs are not connected to an antenna, and radio signals are terminated so that the signal cannot be detected beyond the grounds of the 2201 and 2150 Lakeside Blvd. buildings. Equipment is carefully monitored in the closed loop labs to assure that radios used in the program will not cause any harmful interference.

To provide the FCC with timely information regarding the location of new low power fixed stations BNR/NT proposes the following notice procedure:

For new indoor, fixed stations, inside BNR/NT buildings, BNR/NT will provide the building location information and the quantity of fixed stations in the next quarterly report filed with the FCC.

For new outdoor, fixed stations, BNR/NT will provide prior written notification, including the antenna location, height, frequency used, and if directional, the beam width and orientation, to the FCC before any new outdoor, fixed station is installed.

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¶ 13 List of transmitting equipment used for closed loop lab testing and development at the BNR/NT Campus Facility...Exhibit #2

Base Station Radios

Manufacturer	Type	No. of Units
Northern Telecom	Dual Mode/TRU Radios Experimental	<230
Northern Telecom	P Series AMPS Radios (P1/P2/P3)	<60
General Electric	AMPS Radios	<35

Mobile Radios

Manufacturer	Type	No of Units
Motorola	Assorted Models	<25
Ericsson	Assorted Models	<15
AT&T	Assorted Models	<10
General Electric	Assorted Models	<10
Uniden	Assorted Models	<10
Audiovox	Assorted Models	<10
NEC	Assorted Models	<10
Blaupunkt	Assorted Models	<10
Nokia	Assorted Models	<10
Technophone	Assorted Models	<10
Mitsubishi	Assorted Models	<10
Tandy	Assorted Models	<10
Hughes	Assorted Models	<10
Novatel	Assorted Models	<40
Oki	Assorted Models	<10
Sony	Assorted Models	<10
Sanyo	Assorted Models	<10

List of transmitting equipment used for closed loop training at the Training Center Campus ...Exhibit #3

Base Station Radios

Manufacturer	Type	No. of Units
Northern Telecom	Dual Mode/TRU Radios Experimental	<32
Northern Telecom	P Series AMPS Radios (P1/P2/P3)	<24
General Electric	AMPS Radios	<8

Mobile Radios

Manufacturer	Type	No of Units
Motorola	Assorted Models	<5
Ericsson	Assorted Models	<5

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AT&T	Assorted Models	<5
General Electric	Assorted Models	<5
Uniden	Assorted Models	<5
Audiovox	Assorted Models	<5
NEC	Assorted Models	<5
Blaupunkt	Assorted Models	<5
Nokia	Assorted Models	<5
Technophone	Assorted Models	<5
Mitsubishi	Assorted Models	<5
Tandy	Assorted Models	<5
Hughes	Assorted Models	<5
Novatel	Assorted Models	<5
Oki	Assorted Models	<5

Exhibit #5

Antenna Description, Directional and coverage

BNR/NT, Richardson, TX

BNR/NT Antenna Description(s)

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2150 Lakeside	Outdoor Microcell 1	Outdoor Microcell 2
Location	Lat 32°58'40"N Lon 96°42'37"W 198m (649')	Lat 32°58'40"N Lon 96°42'37"W 198m (649')
Ground Elevation	198m (649')	198m (649')
Ant Beamwidth	60°	60°
Ant Gain	16.4 dBi	16.4 dBi
Ant Height	45'	45'
Ant Orientation	330° from N	330° from N
Ant Tilt	10°	10°
EIRP	up to 24dBm or 250 mW	up to 16dBm or 16 mW
Signal level Contour	-100dBm @ 500m	-100dBm @ 281m
2201 Lakeside	Indoor Microcell 1 (Cafeteria)	Indoor Microcell 2
Location	Lat 32°58'44"N Lon 96°42'45"W 198m (649')	Lat 32°58'44"N Lon 96°42'45"W 198m (649')
Ground Elevation	198m (649')	198m (649')
Ant Beamwidth	105°	105°
Ant Gain	8dBi	8dBi
Ant Height	24' (mounted indoor)	36' (mounted indoor)
Ant Orientation	N/A	N/A
Ant Tilt	0°	0°
EIRP	up to 12dBm or 16 mW	up to 12dBm or 16 mW
Signal level contour	-100dBm @ 281m	-100dBm @ 281m
2221 Lakeside	Indoor Microcell 3 (NT Tower)	
Location	Lat 32°58'47"N Lon 96°42'36"W 198m (649')	
Ground Elevation	198m (649')	
Ant Beamwidth	105°	
Ant Gain	8dBi	
Ant Height	various, up to 208' (63.40m)(mounted indoor)	
Ant Orientation	N/A	
Ant Tilt	0°	
EIRP	up to 12dBm or 16 mW	
Signal level contour	-100dBm @ 281m	

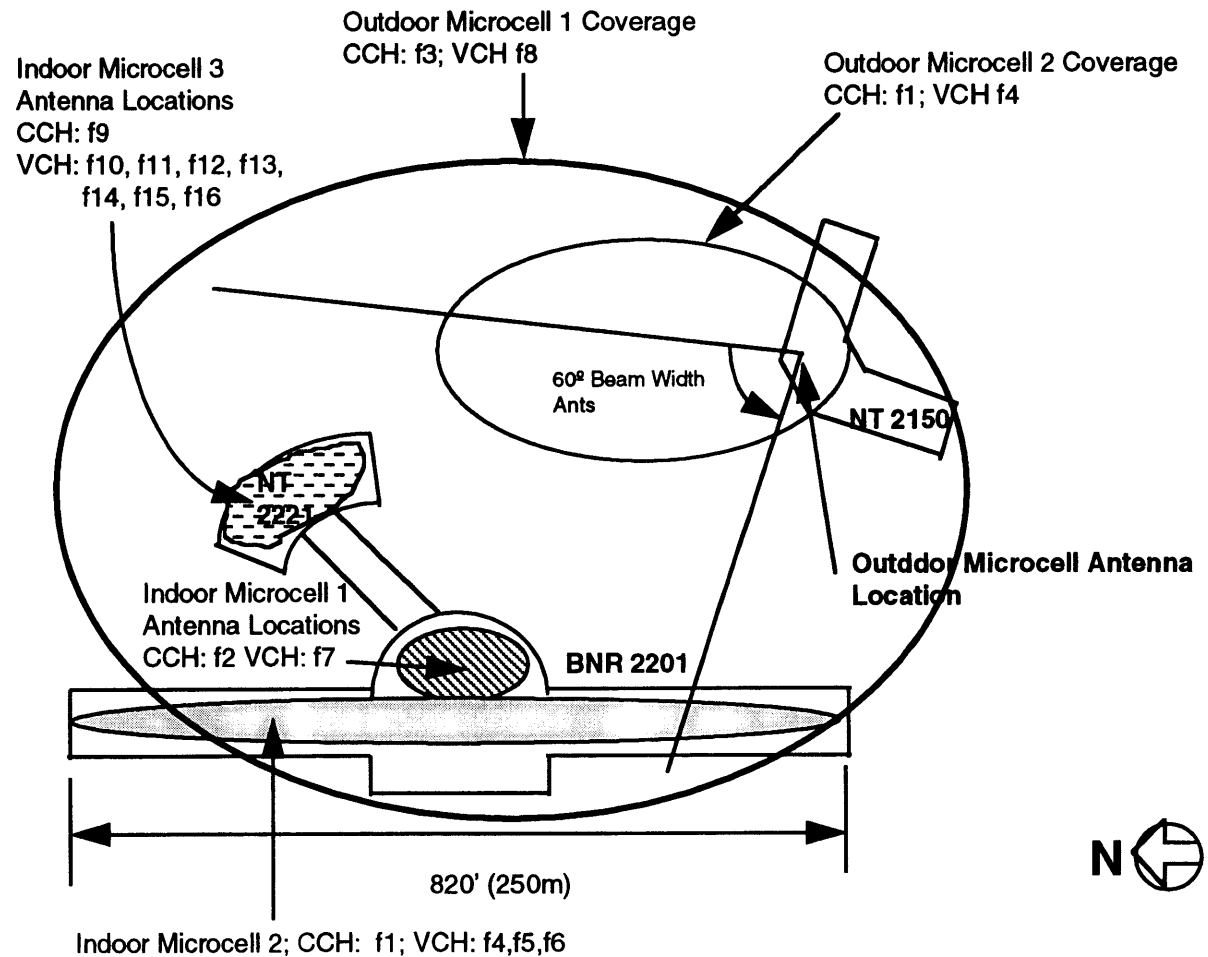


Exhibit #6
Antenna Description,
Building Layout
BNR/NT, Richardson, TX

BNR/NT Antenna Description(s)

Modification and Renewal Request

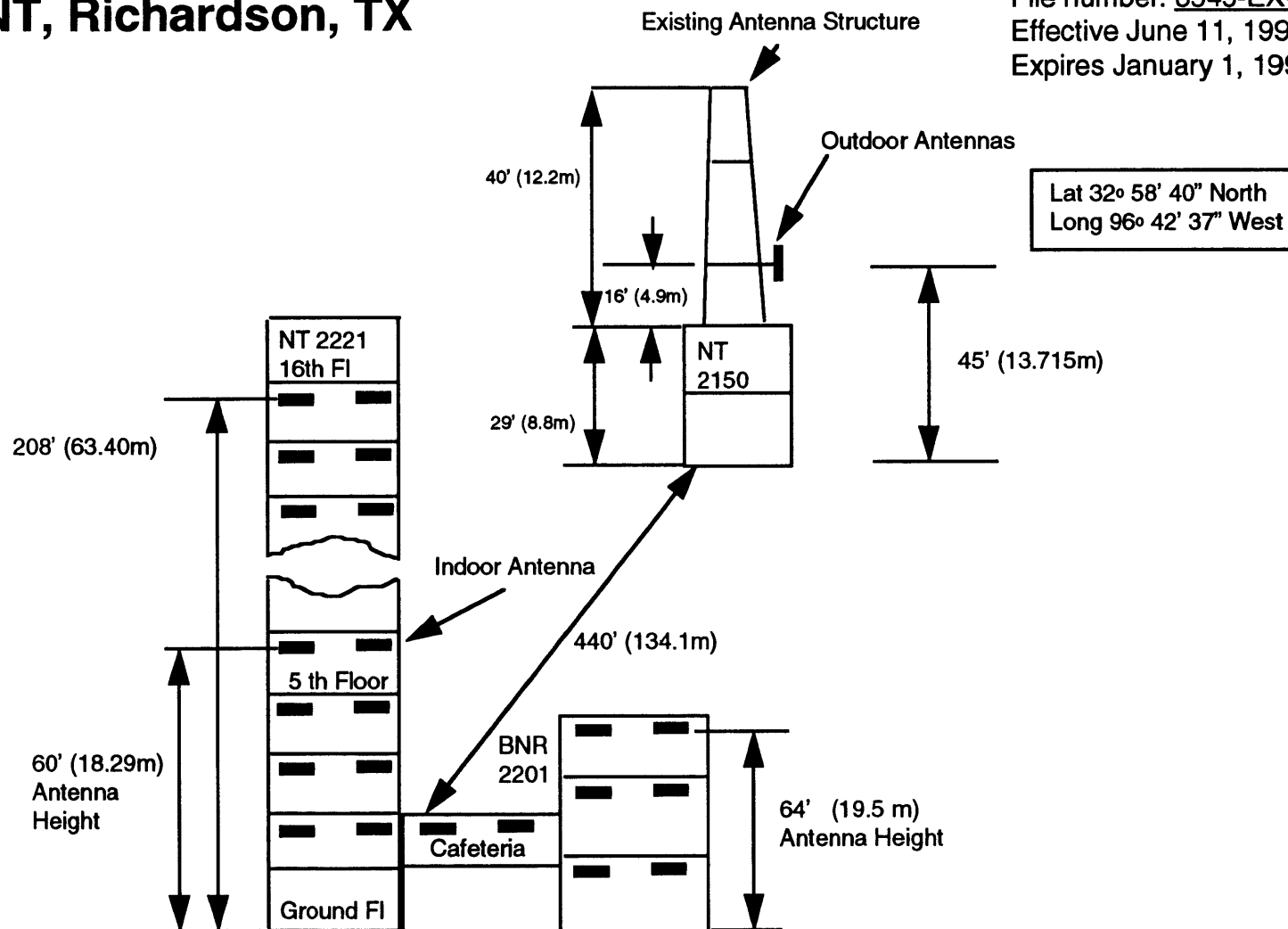
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Note: Drawing not to scale.

BNR/NT, Richardson, TX

Expires January 1, 1995



Exhibit #8

Antenna Description, Vertical Profile

BNR/NT, Richardson, TX

BNR/NT Antenna Description(s)

Modification and Renewal Request

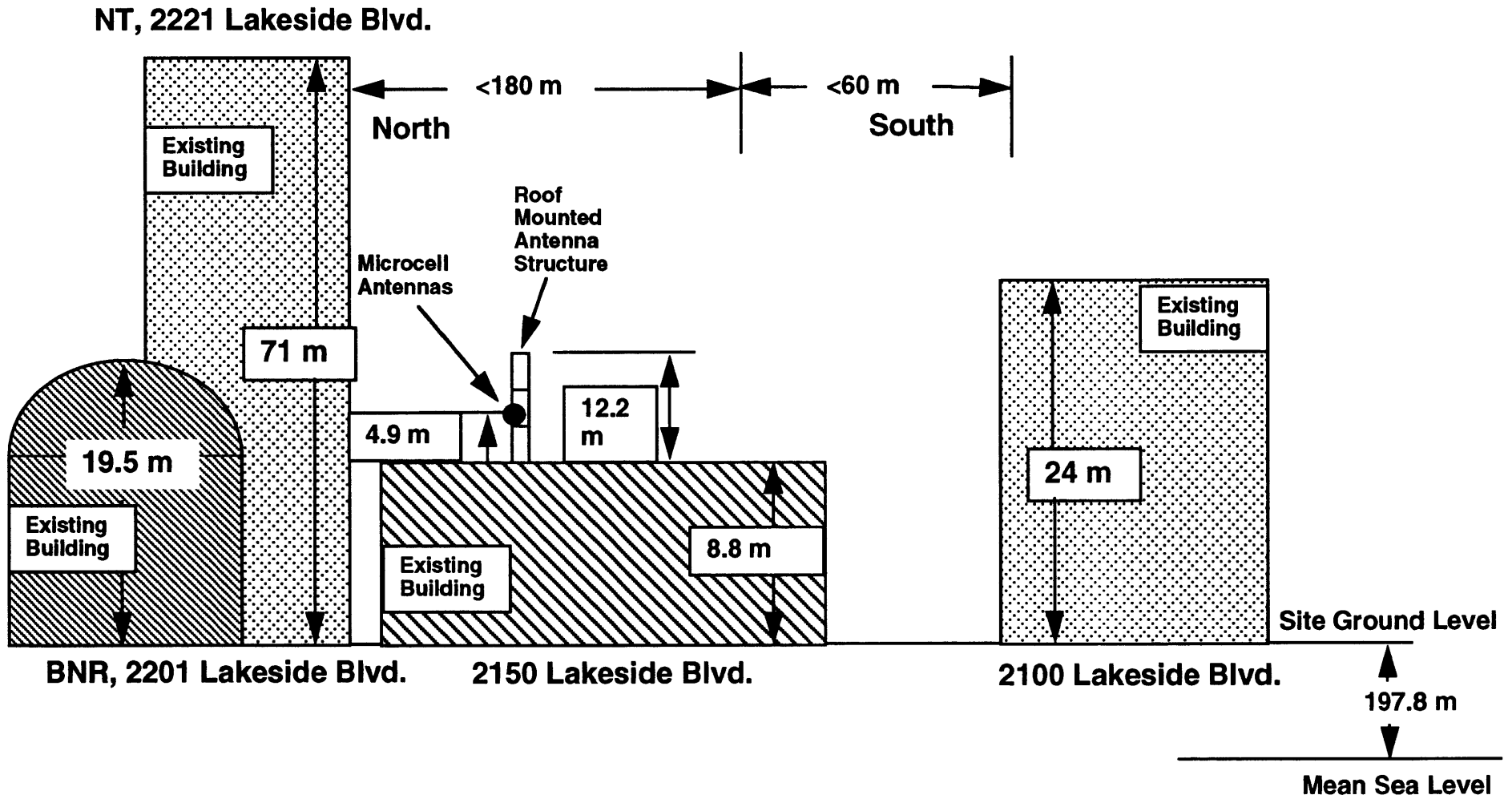
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Note: Drawing not to scale.

Showing locations of taller nearby existing buildings
which shield proposed structure from aircraft