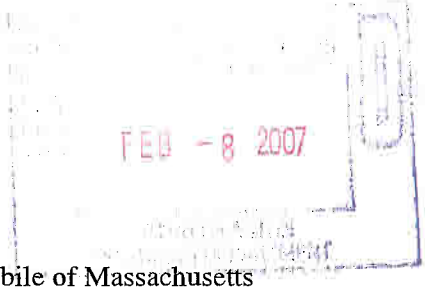
James A. Valeriani, Attorney at Law

Admitted in Massachusetts, New Hampshire and Connecticut

Phone: 781-587-0206 • Fax 781-587-0207

jamesvaleriani@comcast.net



TO: Gregory Niemsyski, Chairman, Acton Planning Board
Roland Bartl, Town Planner

CC: David Maxson, Broadcast Signal Lab

FR: James Valeriani, Attorney for Verizon Wireless (Bell Atlantic Mobile of Massachusetts Corporation, Ltd.), Applicant

DA: February 7, 2007

VIA: Federal Express, delivery on Thursday Feb. 8th.

RE: 820 Main Street, North Acton; Pending Wireless Communication Facility (WCF) Petition.

Please find enclosed the following documents and materials being submitted to the Planning Board and Planning Department prior to the next hearing on Tuesday, February 13th.

- Correspondence from my office to the McKays, sent federal express on Wed. 2/7 for delivery on Thu 2/8 as a follow-up to the previous correspondence sent to the McKays on January 17th.
- Email memo from Crown Castle dated Monday, Feb. 5th, indicating Crown's scheduled meeting with the McKays was cancelled at the request of the McKays due to a family matter and indicating Crown's efforts to reschedule. As of Wed, 2/7, Crown had not heard back from the McKays to reschedule.
- Letter from Cingular Wireless indicating its problems with securing telephone upgrades at the 982 Main Street site.
- Memo to the Planning Board and Broadcast Signal Labs comparing different monopole and antenna system designs along with a copy of an article from Telephony Magazine, a wireless industry publication, on "space vs. polarization diversity" in antenna systems.
- Copies of internal memoranda from the Acton Police and Fire Departments on the desire to have access to tower structures for public safety antennas.
- Radio Frequency Engineering Plots showing existing and proposed coverage in North Acton.
- Photographs of standard monopoles with standard antenna arrays and "flush-mounted" arrays and photo of a stealth pole with notations on each photo pertinent to the petition for the proposed 120 monopole at 820 Main Street.

Please feel free to contact me via telephone or email with any questions or comments on the contents of this memo and the enclosed materials.

End of Memo.

10 ARTHUR ROAD • WAKEFIELD • MASSACHUSETTS • 01880

James A. Valeriani, Attorney at Law

Admitted in Massachusetts, New Hampshire and Connecticut

Phone: 781-587-0206 • Fax 781-587-0207

jamesvaleriani@comcast.net

January 17, 2007

VIA FEDERAL EXPRESS

Guy and Sheryl McKay

181 Grant Street
Lexington, MA 02173

982 Main Street
North Acton, MA 01720

RE: Existing Wireless Communications Facility, 982 Main Street, North Acton.
Easement to Verizon New England.

Dear Mr. and Mrs. McKay:

The Acton Planning Board has requested that Verizon Wireless contact you in connection with a Grant of Easement document (the Easement, copy enclosed) required by Verizon New England, Inc., (Verizon) so that Verizon can perform the necessary telephone utility upgrades and improvements to the existing Wireless Communication Facility (WCF) located in the rear of your property at 982 Main Street. These upgrades are necessary for Verizon Wireless and other carriers to provide the full range of wireless services to their customers. Verizon Wireless is currently utilizing this WCF at 982 Main Street under a sub-tenancy agreement with Crown Castle (Crown), which is a tenant of yours by virtue of a land lease agreement dating back to 1997. The Easement would basically allow Verizon to run fiber-optic lines through or alongside the existing underground conduit to the WCF, and any above-ground equipment associated with the fiber-optic connection would be placed inside the fenced area leased by Crown from you. The equipment is small in size and would only require a few square feet of ground space inside the existing fenced compound leased by Crown. This equipment will not interfere with the existing use of the WCF at 982 Main Street by the existing wireless carriers using the WCF nor prohibit future wireless carriers from using the WCF. In fact, the utility upgrade would only benefit and encourage the continued use of this WCF at 982 Main Street.

I have enclosed a copy of the Easement, which is a standard document required by Verizon's Right-of-Way Department for this type of utility connection. Without this Easement being signed and recorded, Verizon can not as a matter of law, and will not as a matter of company practice, proceed with the utility upgrades at the site. I understand that David Velez of Verizon Wireless contacted you this past Friday, January 12th, to discuss this matter with you and to let you know that he is willing to meet with you on site to further discuss this matter over the next week or so.

Since Crown's efforts, dating back to March of 2000, on behalf of Verizon Wireless and other carriers at the site have been unsuccessful in obtaining this Easement from you as the landowner, Verizon Wireless found itself with no choice but to commence a relocation effort to move its wireless facility to an alternative location in North Acton, and that alternative location is presently before the Planning Board under a special permit process. The Planning Board has requested that Verizon Wireless contact you on this matter before it undertakes any further significant review of the alternative location prior to its next hearing on February 13th.

It is kindly requested that after your review of this letter and the enclosed Easement, that you proceed with signing the Easement in the presence of a Notary and that you forward the executed and notarized Easement to my attention at my office address listed below (a self-addressed stamped envelope is enclosed). If you have any questions or comments, please feel free to contact Mr. Velez at (617) 699-7771. If the Easement is not signed and returned by February 12th, or if you indicate no genuine or sincere commitment to cooperate with Verizon Wireless over the next two weeks in its effort to secure the Easement and with Verizon to perform the necessary on-site utility work, then Verizon Wireless will have no alternative but to continue its effort to relocate from the existing WCF at 982 Main Street.

Thank you for your attention to this matter.

Sincerely,

James A. Valeriani

James A. Valeriani
Attorney for Verizon Wireless
10 Arthur Road
Wakefield, MA 01880
Tel. 781 587 0206

Enclosures: Grant of Easement Document to Verizon New England, Inc.

Copies to: Mr. David Velez, Verizon Wireless, Real Estate Group
Mr. Gregory Niemyski, Chairman, Acton Planning Board
Mr. Roland Bartl, Acton Town Planner

EASEMENT

KNOW ALL MEN BY THESE PRESENTS that **Guy A. McKay** and **Sheryll E. McKay** of 181 Grant Street, Lexington, Massachusetts 02173 (hereinafter referred to as the "Grantors"), in consideration of less than one hundred dollars ($100.00) paid and the mutual covenants herein contained, hereby grant to **Verizon New England Inc.**, a New York corporation having its usual place of business at 185 Franklin Street, Boston, Massachusetts 02110, its successors and assigns, (hereinafter referred to as the "Grantee"), a non-exclusive right, privilege and easement for the sole purpose of locating, relocating, erecting, constructing, reconstructing, installing, operating, maintaining, patrolling, inspecting, repairing, replacing, altering, extending, and/or removing one or more overhead and/or underground telecommunication cables and lines for communication, microwave and/or electricity and any necessary manholes, handholes, equipment, poles, appurtenances and attachments incidental thereto for all the above purposes within, along, under and across the hereinafter described portion of Grantor's land.

Said Grantor's land is situated on the easterly side of **Main Street** in the Town of **Acton**, Middlesex County, Massachusetts and is further shown as Lot 4 on a plan of land entitled: "Plan of Land in Acton & Westford Massachusetts", dated March 13, 1987, rev. June 14, 1987 and recorded with the South District Middlesex County Registry of Deeds as Plan No. 13 of 1988 at Book 18803, Page 421.

The herein granted right and easement is more particularly described as a strip of land situated within and along a portion of said Grantors' land for Grantee to install the necessary poles, cables, wires, conduit, equipment and facilities as described above to be owned, operated and maintained by said Grantee for the transmission and distribution of intelligence and communication by electricity or otherwise to specifically to serve the telecommunication tower, various equipment and equipment shelters located within Grantors' property (hereinafter "Easement Area"). It is also agreed that any poles, cables, lines, equipment and appurtenant facilities and each and every part thereof, whether fixed to the realty or not, shall be and remain the property of the Grantee, its successors and assigns, as its interest appears.

2. It is agreed that the exact location of the facilities shall be established by the installation and placements of said facilities within said easement area. It is mutually agreed that the parties shall not unreasonably interfere with each other's use of the Easement Area, Grantors shall have the right to use the Easement Area herein granted for any purpose not inconsistent with the rights granted to Grantee hereunder.

3. Upon the request of the Grantors, Grantee agrees to relocate the Easement Area and all facilities thereon or thereunder to another portion of Grantors' land, provided that (i) the

proposed new easement area is reasonably adequate for the Grantee's purposes and is mutually satisfactory to both parties; and (ii) Grantors shall pay all costs of such relocation and obtain all necessary permits and approvals therefor.

4. If at any time Grantee shall do or cause to be done, and damage as the result of Grantee's construction, installation, excavation, maintenance, repair, replacement, reconstruction or relocation activities as permitted hereunder, Grantee, at its sole cost and expense, shall restore said damaged area to the same condition that existed just prior to such damage.

5. Grantee shall have the right of ingress and egress to pass by foot or motor vehicle of any type over the herein-mentioned premises of the Grantors insofar as the same is necessary for the purposes stated herein to exercise the rights set forth herein; provided that such passage shall not unreasonably interfere with Grantors' ingress and egress.

6. If and/or when telephone or telecommunication service is no longer required to serve the telecommunications tower, equipment and equipment shelters located within Grantors' premises, it is agreed that the Grantee shall notify the Grantors in writing, within ninety days of such occurrence. It is further agreed that the Grantee, as soon as possible thereafter shall execute and deliver unto the Grantors, a Release of Easement relinquishing and releasing any and all rights, privileges and easements granted hereunder.

7. The Grantee shall have the right to trim and cut trees and underbrush and, if necessary, completely remove trees and underbrush in the easement area to the extent necessary to operate and maintain the equipment and to prevent damage to the equipment or injury to Grantee's agents or employees.

8. Further, the Grantee shall have the right to connect the lines and equipment with the poles, conduits, cables and wires which are located or which may be placed upon and under the public ways or streets within, adjacent or contiguous to Grantors' land provided that the lines and equipment shall service Grantors' land only.

9. Any notice required to be given hereunder shall be mailed, certified mail, return receipt requested, or hand delivered, if to the Grantors at Mr. and Mrs. Guy A. McKay, 181 Grant Street, Lexington, Massachusetts 02173, and if to the Grantee at Verizon New England Inc., Attn: Right of Way, 15 Chestnut Street, Worcester, Massachusetts 01609. The names and addresses may be changed by either party at any time by giving notice each to the other in the manner provided in the preceding sentence.

For Grantor's title, see deed from Guy A. McKay to Guy A. McKay and Sheryll E. McKay dated May 22, 2001 and recorded with the South District Middlesex County Registry of Deeds at Book 32911, Page 92.

EXECUTED as a sealed instrument this _____ day of _____, 2007.

_____ _____

Guy A. McKay **Sheryll E. McKay**

THE COMMONWEALTH OF MASSACHUSETTS

County of _____

On this _____ day of _____, 2007, before me, the undersigned Notary Public, personally appeared **Guy A. McKay**, proved to me through satisfactory evidence of identification, which was _____, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose.

_____

Signature of Notary Public

_____

Printed Name of Notary Public

My Commission expires:_____

THE COMMONWEALTH OF MASSACHUSETTS

County of _____

On this _____ day of _____, 2007, before me, the undersigned Notary Public, personally appeared **Sheryll E. McKay**, proved to me through satisfactory evidence of identification, which was _____, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that she signed it voluntarily for its stated purpose.

_____

Signature of Notary Public

_____

Printed Name of Notary Public

My Commission expires:_____

From: Origin ID: (781)771-8100
JAMES VALERIANI

10 ARTHUR ROAD

WAKEFIELD, MA 01880

FedEx Express

CLS 100308/19/23

Ship Date: 17JAN07
ActWgt: 1 LB
System#: 3160308/INET2500
Account#: S **********

REF: VZW-NORTH.ACTON

Delivery Address Bar Code

SHIP TO: (978)264-9636 **BILL SENDER**

GREGORY NIEMYSKI, CHAIRMAN,
TOWN OF ACTON, PLANNING BOARD
472 MAIN STREET

ACTON, MA 01720

STANDARD OVERNIGHT

THU
Deliver By:
18JAN07

TRK# 7980 8763 6913

FORM 0201

BOS

A4

01720 -MA-US

01 AYEA

Shipping Label: Your shipment is complete

1. Use the 'Print' feature from your browser to send this page to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com. FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim. Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss. Maximum for items of extraordinary value is $500, e.g. jewelry, precious metals, negotiable instruments and other items listed in our Service Guide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

Track Shipments

Detailed Results

Quick Help

Tracking number	790160647949	**Reference**	VZW-NORTH.ACTON
Signed for by	M.MCKAY	**Destination**	ACTON, MA
Ship date	Jan 17, 2007	**Delivered to**	Receptionist/Front Desk
Delivery date	Jan 18, 2007 10:05 AM	**Service type**	Priority Envelope
		Weight	0.5 lbs.

Status Delivered

Date/Time		Activity	Location	Details
Jan 18, 2007	10:05 AM	**Delivered**	ACTON, MA	
	8:40 AM	At dest sort facility	EAST BOSTON, MA	
	8:26 AM	On FedEx vehicle for delivery	FRAMINGHAM, MA	
	7:37 AM	At local FedEx facility	FRAMINGHAM, MA	
	4:11 AM	At dest sort facility	EAST BOSTON, MA	
Jan 17, 2007	11:26 PM	At local FedEx facility	EAST BOSTON, MA	
	9:11 PM	Left origin	MEDFORD, MA	
	9:10 PM	At dest sort facility	EAST BOSTON, MA	
	6:28 PM	Picked up	MEDFORD, MA	

Signature proof | E-mail results | Track more shipments

Subscribe to tracking updates (optional)

Your Name: _____ **Your E-mail Address:** _____

E-mail address	Language	Exception updates	Delivery updates
	English	☐	☐
	English	☐	☐
	English	☐	☐
	English	☐	☐

Select format: ◉ HTML ○ Text ○ Wireless

Add personal message:

Not available for Wireless or non-English characters.

☐ By selecting this check box and the Submit button, I agree to these Terms and Conditions

Submit

Track Shipments

Detailed Results

Quick Help

Tracking number	799071243267	**Reference**	VZW-NORTH.ACTON
Signed for by	Signature release on file	**Destination**	LEXINGTON, MA
Ship date	Jan 17, 2007	**Delivered to**	Residence
Delivery date	Jan 18, 2007 10:11 AM	**Service type**	Priority Envelope
		Weight	0.5 lbs.

Status Delivered

Date/Time		Activity	Location	Details
Jan 18, 2007	10:11 AM	**Delivered**	LEXINGTON, MA	Left at front door. Package delivered to recipient address - release authorized
	8:40 AM	At dest sort facility	EAST BOSTON, MA	
	8:28 AM	On FedEx vehicle for delivery	NEEDHAM, MA	
	8:10 AM	At dest sort facility	EAST BOSTON, MA	
	7:27 AM	At local FedEx facility	NEEDHAM, MA	
	4:11 AM	At dest sort facility	EAST BOSTON, MA	
Jan 17, 2007	11:10 PM	At local FedEx facility	EAST BOSTON, MA	
	9:11 PM	Left origin	MEDFORD, MA	
	9:10 PM	At dest sort facility	EAST BOSTON, MA	
	6:28 PM	Picked up	MEDFORD, MA	
	4:38 PM	Package data transmitted to FedEx		

Signature proof | E-mail results | Track more shipments

Subscribe to tracking updates (optional)

Your Name: _____ **Your E-mail Address:** _____

E-mail address	Language	Exception updates	Delivery updates
	English	☐	☐
	English	☐	☐
	English	☐	☐
	English	☐	☐

Select format: ◉ HTML ○ Text ○ Wireless

Add personal message:

Not available for Wireless or non-English characters.

☐ By selecting this check box and the Submit button, I agree to these Terms and Conditions

Submit

James A. Valeriani, Attorney at Law

Admitted in Massachusetts, New Hampshire and Connecticut

Phone: 781-587-0206 • Fax 781-587-0207

jamesvaleriani@comcast.net

February 7, 2007

VIA FEDERAL EXPRESS

Guy and Sheryl McKay

181 Grant Street
Lexington, MA 02173

982 Main Street
North Acton, MA 01720

RE: Existing Wireless Communications Facility, 982 Main Street, North Acton.
Easement to Verizon New England.

Dear Mr. and Mrs. McKay:

This letter follows my letter to you of January 17th (copy enclosed) in which I introduced and described the Verizon New England Grant of Easement document and in which I indicated a willingness on the part of Verizon Wireless to further discuss this matter with you prior to Verizon Wireless's next hearing with the Planning Board on Tuesday, February 13th. Although neither I nor David Velez has been contacted by you as of this writing, I understand that representatives of Crown Castle, including its New England Property Manager, Mr. James Albiani (781-970-0052), have recently been in contact with you in an effort to hold a meeting over this matter. I understand from my recent discussions with Mr. Albiani that a meeting date was set for last Thursday, February 1st, but the meeting had to be rescheduled. I understand that representatives of Crown Castle are willing to meet with you at your earliest convenience to resume discussions over this matter.

We look forward to learning the results of your meeting with representatives of Crown Castle.

Sincerely,

James A. Valeriani
Attorney for Verizon Wireless
10 Arthur Road
Wakefield, MA 01880
Tel. 781 587 0206

Enclosures: Copy of January 21, 2007 Letter.
Grant of Easement Document to Verizon New England, Inc.

Copies to: Mr. David Velez, Verizon Wireless, Real Estate Group
Mr. Gregory Niemyski, Chairman, Acton Planning Board
Mr. Roland Bartl, Acton Town Planner

From: Albiani, Jim [mailto:Jim.Albiani@crowncastle.com]
Sent: Monday, February 05, 2007 8:59 AM
To: david@vssinc.net
Cc: jamesvaleriani
Subject: RE: North Acton, MA

David:

I had planned to meet with the LL on Thursday but they had a family emergency and were not able to keep our appointment.
I explained to them that I want to meet with them as soon as they are able and will call them this week to move this ahead.

I will keep all posted on my meeting after it takes place. If we, in Property, can assist you in any other way, please let me know.

Take care,

Jim Albiani
Crown Castle
East Area - Property Manager
(781) 970-0052 office
(724) 416-4775 fax
(781) 789-7114 cell

January 31, 2007

David Velez
VitalSite Services Inc.
73 Union Square
Somerville, MA 02143

Re: **982-988 Main Street, Acton, MA cell site**

Dear Mr. Velez:

I am writing to follow up on our conversation regarding the Crown Castle International ("Crown") cell tower located at 982-988 Main Street, Acton, MA.

As you know, Cingular Wireless is a tenant of Crown at this cell site location along with Verizon Wireless and other cell carriers. Cingular is currently experiencing a problem with securing additional telco facilities at this site. We understand that our telco provider, Verizon Communications is unable to provide additional facilities due to an on-going dispute between Crown and the underlying property owner.

Cingular has been patiently waiting for this issue to be resolved for over a year now. This issue has prevented Cingular from upgrading its facilities as desired to provide service to the North Acton area. At this time, Cingular is willing to consider all possible options to continue providing service in this area.

Please keep us informed of your progress in this matter.

Sincerely,

Kevin L. Mason
Project Manger - Cingular Wireless

Cc: Eric Campbell, Cingular Wireless
Bob Donovan, Cingular Wireless

verizon wireless

TO: Gregory Niemsyski, Chairman, Acton Planning Board
Roland Bartl, Town Planner

CC: David Maxson, Consultant, Town of Acton

FR: Verizon Wireless (Bell Atlantic Mobile of Massachusetts Corporation, Ltd.)
The Applicant

DA: February 7, 2007

RE: 820 Main Street, North Acton; Pending Wireless Communication Facility (WCF) Petition. Information on Antenna Systems and Support Structure Designs and Requirements

At the last continued hearing on January 9th, the Applicant learned that that the Planning Board is seeking additional information on the radio frequency engineering requirements, the antenna design, the support structure design and the collocation opportunities for other wireless carriers and public safety antennas at this proposed WCF. Currently before the Board is an application to remove an existing 120-foot lattice-type tower and to construct a monopole support structure of 120 feet in height supporting the Applicant's twelve cellular/pcs panel antennas, divided into three sectors consisting of four antennas per sector, arrayed horizontally at the top of the pole. At the last hearing on January 9th, the Planning Board requested that Verizon Wireless compare its proposed monopole structure and antenna design and system performance with the design of other antenna and support structure designs that have been utilized at other wireless facilities in Acton and elsewhere. For the sake of this comparison effort, we label these different designs as follows: a "standard monopole", a "flush-mount monopole" and a "stealth pole". Photos showing these three different types of antennas are enclosed.

The "Standard Monopole"

Verizon Wireless is currently running both cellular and PCS frequency bands at its wireless facilities in its FCC-licensed area including Acton. Whenever possible, Verizon Wireless uses four antennas per sector, two for each frequency band, with the antennas arrayed horizontally on the pole structure.

There are currently four major operators in this area (Verizon Wireless, Cingular Wireless, T-Mobile and Sprint/Nextel) (not including other operators of other wireless services) and the proposed monopole has been designed for four carriers and can also be designed to increase the height of the 120 pole in ten-foot increments. The standard monopole is designed to accommodate the maximum feasible number of users as required by Section 3.10.6.5 of the Acton Zoning Bylaw. Although a monopole height of 120-feet is being sought by Verizon Wireless, Section 3.10.6.1 of the Acton Zoning Bylaw (the "Bylaw") limits the height of WCFs to 175 feet.

Antenna arrays spaced vertically at ten-foot increments (measured from the "center-line" of the antenna) is the industry custom for wireless carriers and major tower companies that operate WCFs and is intended to 1) minimize interference (particularly for those carriers operating on neighboring frequencies), 2) maximize the use of a tower structure, and 3) provide carriers with the ability to modify antenna systems as may be required for changes in system requirements and technologies.

Just as significantly for radio frequency engineering, in suburban areas such as North Acton, the use of spatial diversity antennas results in better system performance. Using space-diversity reception techniques to improve uplink performance, a carrier can expect to see improvements by horizontally spacing two antennas at least 10 wavelengths apart. This is based on the concept that during a deep fade at one antenna location, the fade will not be as severe at the other receive-antenna location. A diversity combiner then is used to mix both signals together. There are clear benefits to using space diversity as it offers proven improvement in uplink performance for reception of both mobiles and portables. But, a suitable structure (i.e., the standard monopole) is required to allow for the 10-wavelength spacing of the two receive antennas. (Note: see enclosed article by Andy Singer, Telephony Online, February 15, 1998, entitled "Space vs. Polarization Diversity").

The width of the standard monopole shaft at the top of the pole structure would be approximately 18" (approx. 24" to allow for the expansion to a higher height) and the horizontal span for the standard antenna array would be approximately 12-feet. The standard antenna array would be mounted horizontally to a "T-Sector" pipe-mount system attached to the pole, or similar mounting/support apparatus.

The standard monopole can be easily utilized to allow antenna mounting apparatus to support multiple whip-type antennas of the type that are frequently used by public safety agencies and for other two-way communications, including the existing FCC-licensed two-way radio operated by the Capizzi Company, which has been operating at this site for many years. Please refer to the memo from the Acton police department (dated October 4, 2006) on its interest in utilizing space on any new towers in Acton for public safety antennas.

The "Flush-Mount Monopole"
This flush-mount pole utilizes the same steel shaft pole design as the Standard Monopole, but the antennas are mounted very close to or "flush" with the outside surface of the pole to reduce the horizontal span of the antennas.

The flush-mounted monopole can also be utilized to allow antenna mounting apparatus to support multiple whip-type antennas of the type that are frequently used by public safety agencies and for other two-way communications. The flush-mounted monopole can also be designed to accommodate extensions for future users and provides carriers with the ability to easily modify antenna systems as may be required for changes in system requirements and technologies.

A flush mounted installation would require the use of dual-band quad port antennas, or even two band specific antennas, to be placed on the outside of the pole where space constraints are not a factor.

The width at the top of the pole structure would be approximately 18" (approx. 24" to allow for the expansion to a higher height) and the total horizontal width for the antenna array would be approximately 42 inches.

The applications of quad-port or dual-port cross polarization antennas can be considered inferior for use in suburban and rural areas, such as North Acton. Polarization diversity is based on the concept that in high multi-path ("reflection") environments, such as urban areas like Boston or Worcester, the signal from a portable mobile phone received at the base station will have varying polarization. The mechanism of decorrelation (differentiating) for the different polarizations is the multi-path reflections encountered by a signal traveling between the portable and base station. The reflection coefficient (level of reflection) encountered by each polarization typically is different. There can be improvement to uplink performance by using two receive antennas with orthogonal (usually +45° and -45°) polarizations and combining these signals. Because the two receive antennas do not need to be spaced apart horizontally to accomplish this, you can mount them under the same radome. But note that where high multi-path environments do not exist (such as in suburban or rural areas like North Acton), the performance of the polarization-diversity antennas may not be as good as the space-diversity system. (Note: Refer to enclosed Singer article).

The "Stealth Pole"
By building an internally mounted stealth pole, there would be limited, if any, available space on the tower for the town or others to locate whip-type antennas, as there would be no place to attach the antennas.

The width at the top of the stealth pole would be approximately 36" to 42" to allow for adequate space inside the fiberglass canisters for the antennas and cables and future antenna modifications. Designing any type of extension for this pole would be difficult and would increase the diameter at the top of the stealth pole structure.

Where stealth poles have been used, it is quite often in residential, historical, or town center locations.

Utilizing a stealth pole installation will require that all four elements of the individual antennas will need to be combined into one dual-band quad port antenna. The applications of quad-port or dual-port cross polarization antennas may be considered inferior for use in suburban and rural areas, such as North Acton. Also, these antennas can be challenging and difficult to fit inside the pole for maintenance and future-antenna change-outs. With the changing technologies and the use of future or additional frequency bands, finding antennas that are appropriate for these applications and with the necessary dimensions that will fit into the stealth pole often pose difficulty.

Summary

The applications of quad-port or dual-port cross polarization antennas can be considered inferior for use in suburban and rural areas, such as North Acton. There are technical articles about the benefits and uses of polarization diversity antennas. The conclusions made are that a polarization diversity antenna provides satisfactory performance in urban, high density population areas, where there many instances of multi-path. In suburban areas such as North Acton, the use of spatial diversity antennas is shown to have better performance. Utilizing either a flush-mounted monopole or a stealth pole would require the use of dual or even quad-port polarization diversity antennas. While these antennas do have their uses as described above, an installation such as a monopole with a standard four antenna sector mount utilizing special diversity is a system that will perform the best in the type of rural and suburban area of North Acton. Additionally, the standard monopole design allows for a more varied and more intensive use of the pole, including future height increases, for wireless carriers and public safety departments.

(Note: Portions of this memo were cited or paraphrased from an article by Andy Singer, Telephony Online, February 15, 1998, entitled "Space vs. Polarization Diversity", a copy of which is enclosed).

TELEHPHONY ONLINE

www.telephonyonline.com

Space vs. Polarization Diversity

Andy Singer

Feb 15, 1998 12:00 PM

Many cellular and PCS carriers have been experimenting with polarization-diversity receive systems as substitutes for proven space-diversity receive systems. But before you make this change in your diversity scheme, you need to gain a clear understanding of the trade-offs involved between space-diversity and polarization-diversity techniques.

For several years, both cellular and PCS operators have been using space-diversity reception techniques to improve uplink performance. They expect to see improvements by horizontally spacing two antennas at least 10 wavelengths apart. This is based on the concept that during a deep fade at one antenna location, the fade will not be as severe at the other receive-antenna location. A diversity combiner then is used to either mix both signals together or select the best one.

There are clear benefits to using space diversity. It offers proven improvement in uplink performance for reception of both mobiles and portables. But a suitable structure is required to allow for the 10-wavelength spacing of the two receive antennas.

During the last two years, carriers have been experimenting with the use of polarization-diversity techniques. Polarization diversity is different from space diversity. It is based on the concept that in high multipath environments, the signal from a portable received at the base station will have varying polarization. The mechanism of decorrelation for the different polarizations is the multipath reflections encountered by a signal traveling between the portable and base station. The reflection coefficient encountered by each polarization typically is different. You can improve uplink performance by using two receive antennas with orthogonal polarizations and combining these signals. Because the two receive antennas do not need to be spaced apart horizontally to accomplish this, you can mount them under the same radome.

When communicating with portables, polarization diversity works like space diversity in high multipath environments such as dense urban. However, it doesn't offer the same performance when communicating to mobiles.

As early as 1990, experimenters such as Rodney Vaughan were testing the concept of polarization-diversity systems.

"For suburban base stations, the dominance of the vertical polarization makes the diversity gain rather small -- only a couple of decibels at the 99.5% probability level," he said. "In urban environments, however, the diversity gain is nearly 7dB at the 99.5% level, offering much promise for system design using polarization diversity."

Polarization diversity does have its benefits. It's easy to obtain a suitable site because you will not need the large structures that are required for space-diversity techniques. But polarization diversity is completely effective only in high multipath environments.

Some manufacturers have promoted polarization diversity as performing better than space diversity in all environments. But note that where high multipath environments do not exist, the performance of the polarization- diversity antennas may not be as good as the space-diversity system.

Also, polarization diversity does not appear to be effective for communicating to mobiles using vertically polarized antennas. It is best used in systems with a high percentage of portables. If you are considering polarization diversity, evaluate polarization diversity in its environment to see how it compares with space diversity before making any assumptions about performance.

PCS providers also should consider the potential for long-term intermodulation (IM) issues with the current polarization-diversity designs. The basic test consists of two 20W cameras simultaneously applied to the antenna and then looking at third- and fifth-order IM products. To be considered acceptable, the antenna should have a third-order IM product below -100dBm. None of these antennas passed this standard IM test. If a system carrier used any of these antennas in its system, it potentially could suffer serious intermodulation problems once the system is fully loaded.

Realize that when you duplex transmitters and receivers on one antenna, you lose additional isolation protection from inter-modulation products. Polarization-diversity antennas for PCS systems all are designed for duplex operation. In addition, none of the current antennas on the market passes a basic IM test.

Polarization diversity is a useful technique in the proper environment. But be aware -- you may not have optimized systems if it is used in an environment without the necessary multipath. Before assuming that polarization diversity works in a particular environment, perform field testing to compare space diversity and polarization diversity. Polarization diversity antennas do not have as high of a front-to-back ratio as some optimized vertically polarized antennas.

Many companies also are not aware that the front-to-back ratio of polarization diversity antennas typically is measured incorrectly.

Also, be aware of the potential long-term IM problems with current PCS polarization-diversity antenna offerings. Undoubtedly, manufacturers will develop new polarization-diversity antenna products in the future that do not suffer from these potential, long-term IM issues

Roland Bartl

From: Mark Hald
Sent: Wednesday, October 04, 2006 11:22 AM
To: Frank Widmayer; Roland Bartl; Don Palma
Cc: Robert Craig; Kevin Lyons; John Surette
Subject: RE: Cell towers

To elaborate on Frank's point, we need the following:

- Space at the highest point on the tower for approximately six antennas.
- An independent and Town-secured structure of dimensions large enough to hold public safety communications equipment (10 foot square).
- A six-strand fiber optic cable run from the structure to the Memorial Library (or the closest municipal building on the I-net would suffice) at the fire alarm level on the poles.
- Electricity to the structure, preferably generator backed-up (we would also install batteries of our own).

If they refuse to install a dedicated structure or are unable to physically place one, space in theirs would be sufficient provided we have unencumbered access by way of combinations, keys and alarm codes provided to the Town at construction and at any time they are changed. We continue to have a significant issue where we can no longer access our radio equipment on Great Hill because keys have changed.

From: Frank Widmayer
Sent: Wednesday, October 04, 2006 11:07 AM
To: Roland Bartl; Don Palma
Cc: Robert Craig; Kevin Lyons; Mark Hald; John Surette
Subject: Cell towers

Roland,

I am requesting space for public safety communications equipment on any new cellular towers proposed in the town in order to enhance our communications capability.

Regards,
Frank

Frank J. Widmayer III
Chief of Police
(978) 263-2911

ACTON PLANNING DEPARTMENT
Inter-departmental Memo
978-264-9636

RECEIVED
OCT 10 2006
TOWN OF ACTON
PLANNING DEPARTMENT

Date: ***September 6, 2006***

To: Assessors
Conservation Commission
Fire Department
Municipal Properties
Water District
Building Commissioner
Engineering Administrator
Health Department
Police Department, fyi

From: Kim DelNigro, Secretary

Subject: Review of a Wireless Communications Facility Special Permit at 820 Main Street

Attached is an application for a Special Permit for a Wireless Communications Facility – 820 Main Street . General information about the address is as follows:

Location:	820 Main Street
Applicant & Owners:	Bell Atlantic Mobile of Massachusetts Corporation, Ltd. d/b/a Verizon Wireless and Cellco Partnership
Address:	400 Friberg Parkway Westborough, MA 01581
Record Owners:	Orlando P. Capizzi 820 Main Street Acton, MA 01720
Attorney for Applicant:	James A. Valeriani, Esq.
Area of site:	3.86 acres
Map:	C-5
Parcel:	60
Zoning:	SM
Decision Date:	December 27, 2006

Please review the enclosed application and send your comments to the Planning Department no later than **October 2, 2006.** The public hearing is scheduled for **October 10, 2006** at **7:45 PM.**

If you have any questions, please call the Planning Department at 264-9636

Review Comments: (1) L P Gas Tank may need to be protected by bollards.
(2) Lock-box or suitable alternative required to gain emergency access.
(3) Request standard access provisions for public safety antennas. *

Signature: Robert L. Ling, Fire Chief Date: 10/10/06

Verizon Wireless; Petition for WCF 820 Main Street, North Acton.

Radio Frequency Plots showing existing and proposed coverage involving the following four sites:

"North Acton", 982 Main Street, Acton (Existing North Acton Site)

"North Acton Relo", 820 Main Street, Acton (Proposed North Acton Site)

"Acton 2", Post Office Square (Town Center, Omnipoint Pole), Acton

"Acton", Crown Castle Tower at Town-Owned Water Dept. Site, Great Hill

Plot 1: Proposed coverage from North Acton Relo with Acton 2 and Acton shown active and with North Acton as inactive.

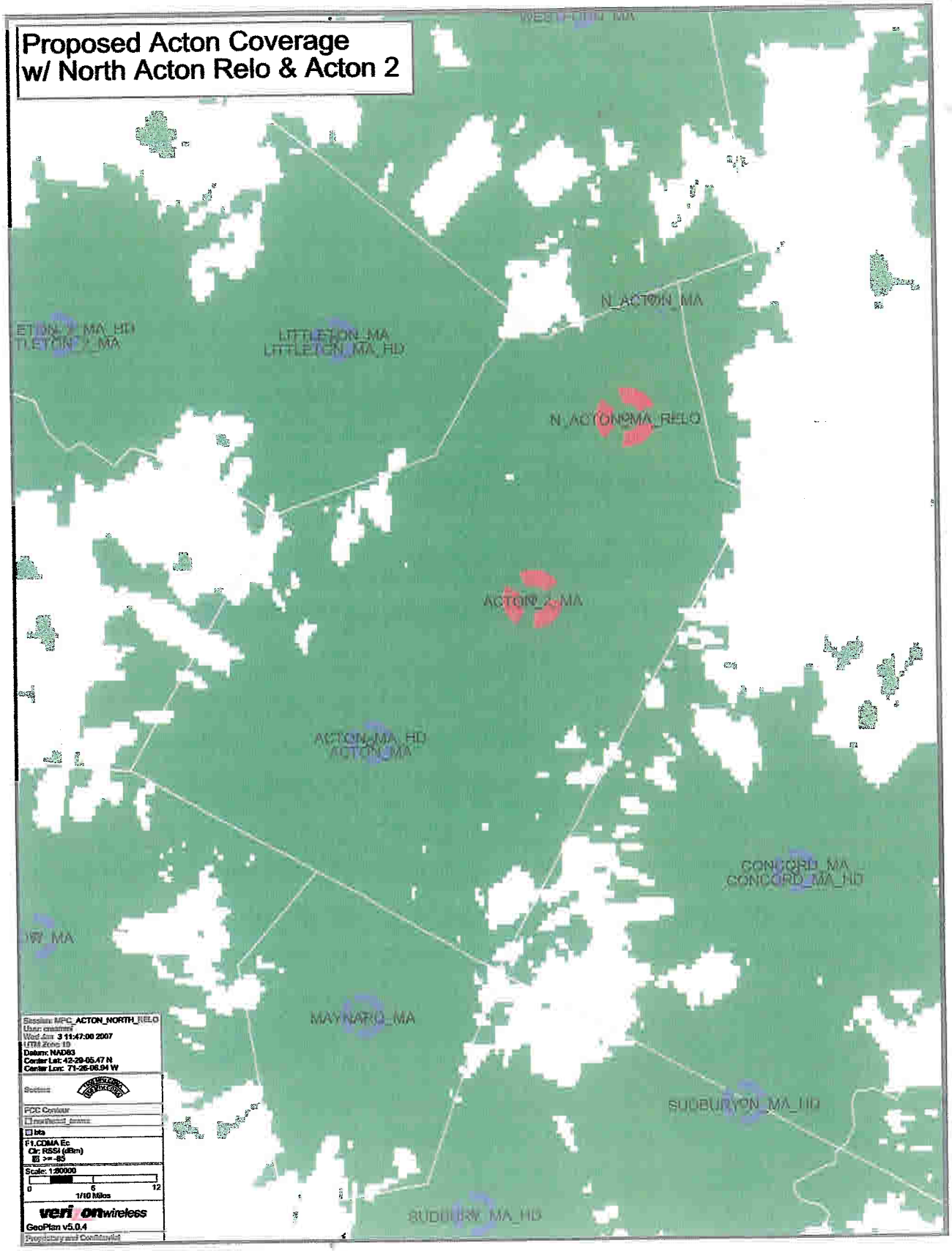
Plot 2: Proposed PCS coverage from North Acton Relo with Acton 2 and Acton shown active and with North Acton as inactive.

Plot 3: Existing coverage from North Acton with Acton 2 and Acton shown active and with North Acton Relo as inactive.

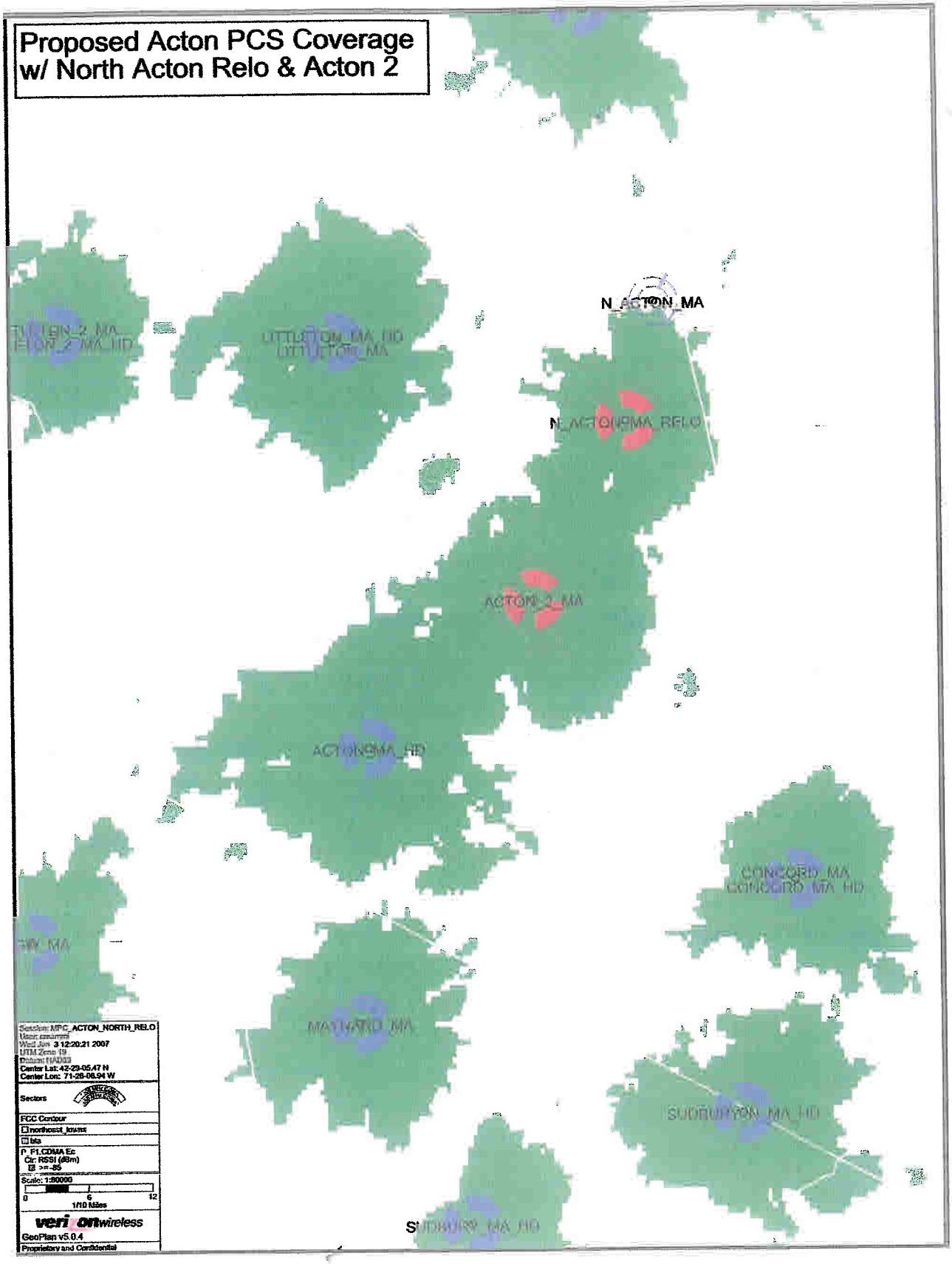
Plot 4: Existing PCS coverage from North Acton with Acton 2 and Acton shown active and with North Acton Relo as inactive.

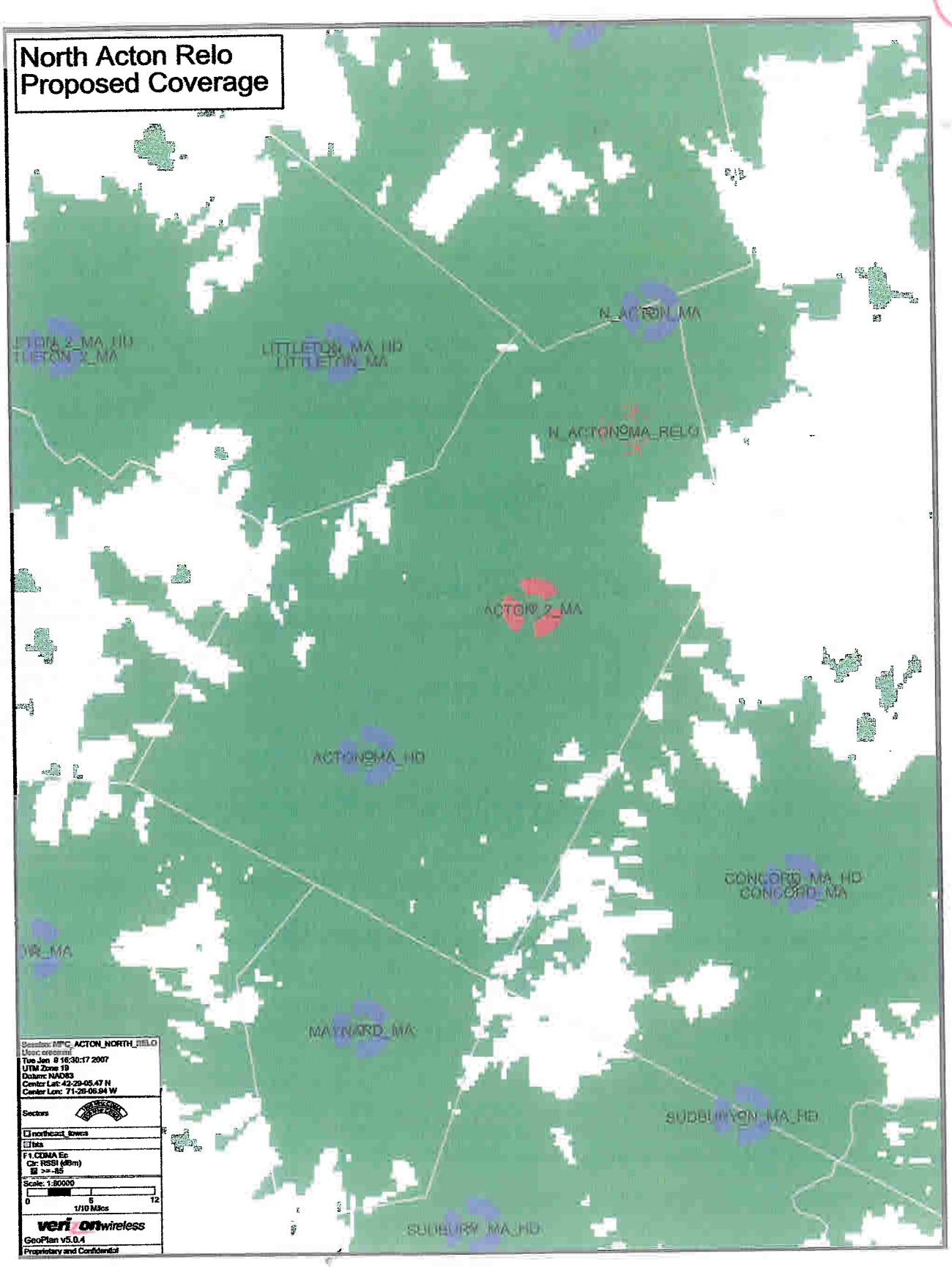
Plot 5: Coverage comparison of Cellular and PCS bands operating from a height of 120 from the North Acton Relo site standing alone.

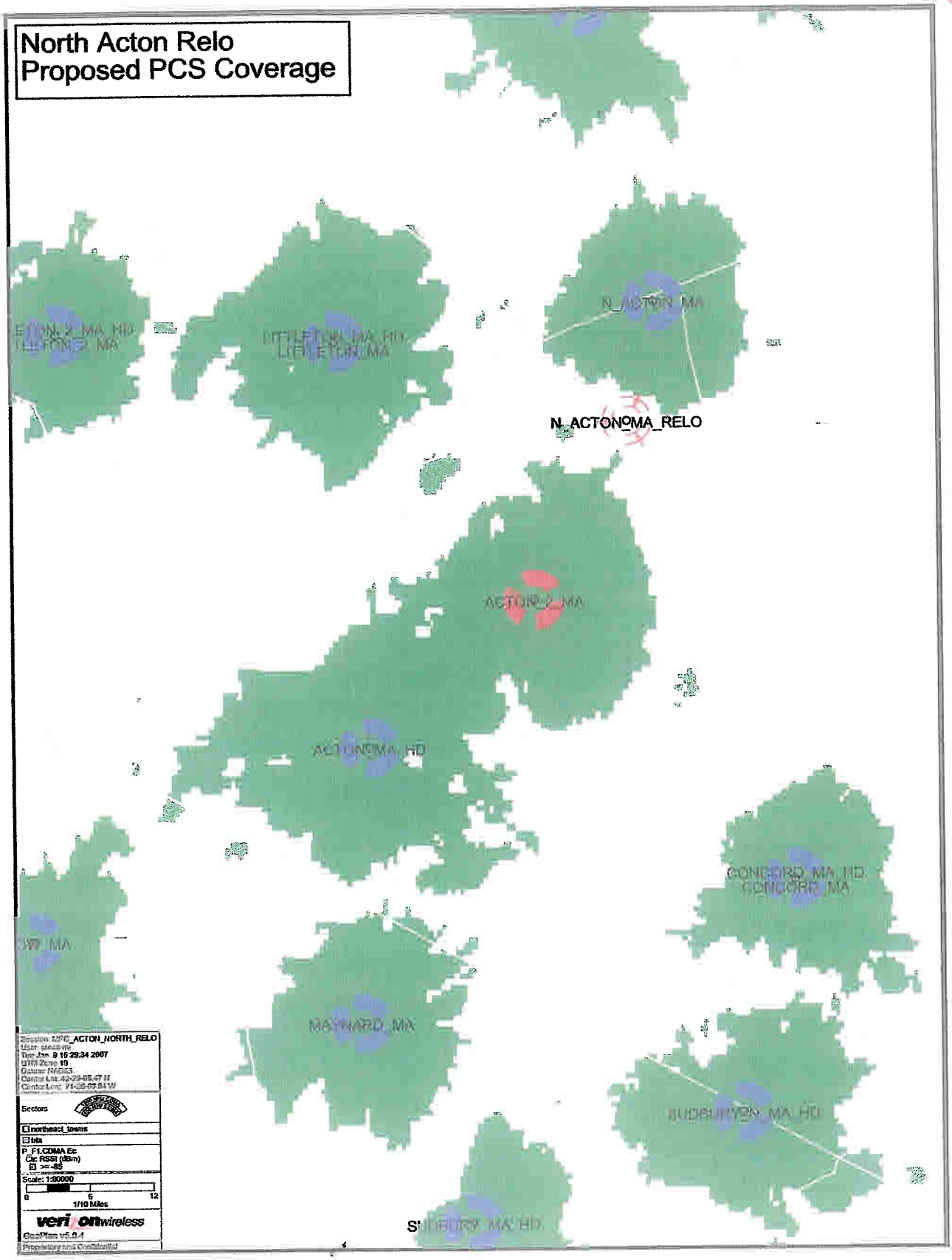
Plot 6: Coverage comparison of Cellular and PCS bands with cellular operating from a height of 120 and PCS operating from a height of 90 feet from the North Acton Relo site standing alone.


Proposed Acton Coverage
w/ North Acton Relo & Acton 2
N_ACTON_MA
LITTLETON_MA
LITTLETON_MA_HD
N_ACTON2MA_RELO
ACTON_2_MA
ACTON_MA_HD
ACTON_MA
CONCORD_MA
CONCORD_MA_HD
MAYNARD_MA
SUDBURY2_MA_HD
Session: MPC_ACTON_NORTH_RELO
User: cmatsui
Wed Jun 13 11:47:08 2007
UTM Zone: 19
Datum: NAD83
Center Lat: 42-29-05.47 N
Center Lon: 71-26-08.94 W
PDC Contour
bts
F1 CDMA Ec
Clr: RSSI (dBm)
>= -85
Scale: 120000
0
6
12
1/10 Miles
verizon wireless
GeoPlan v5.0.4
Proprietary and Confidential

Proposed Acton PCS Coverage w/ North Acton Relo & Acton 2

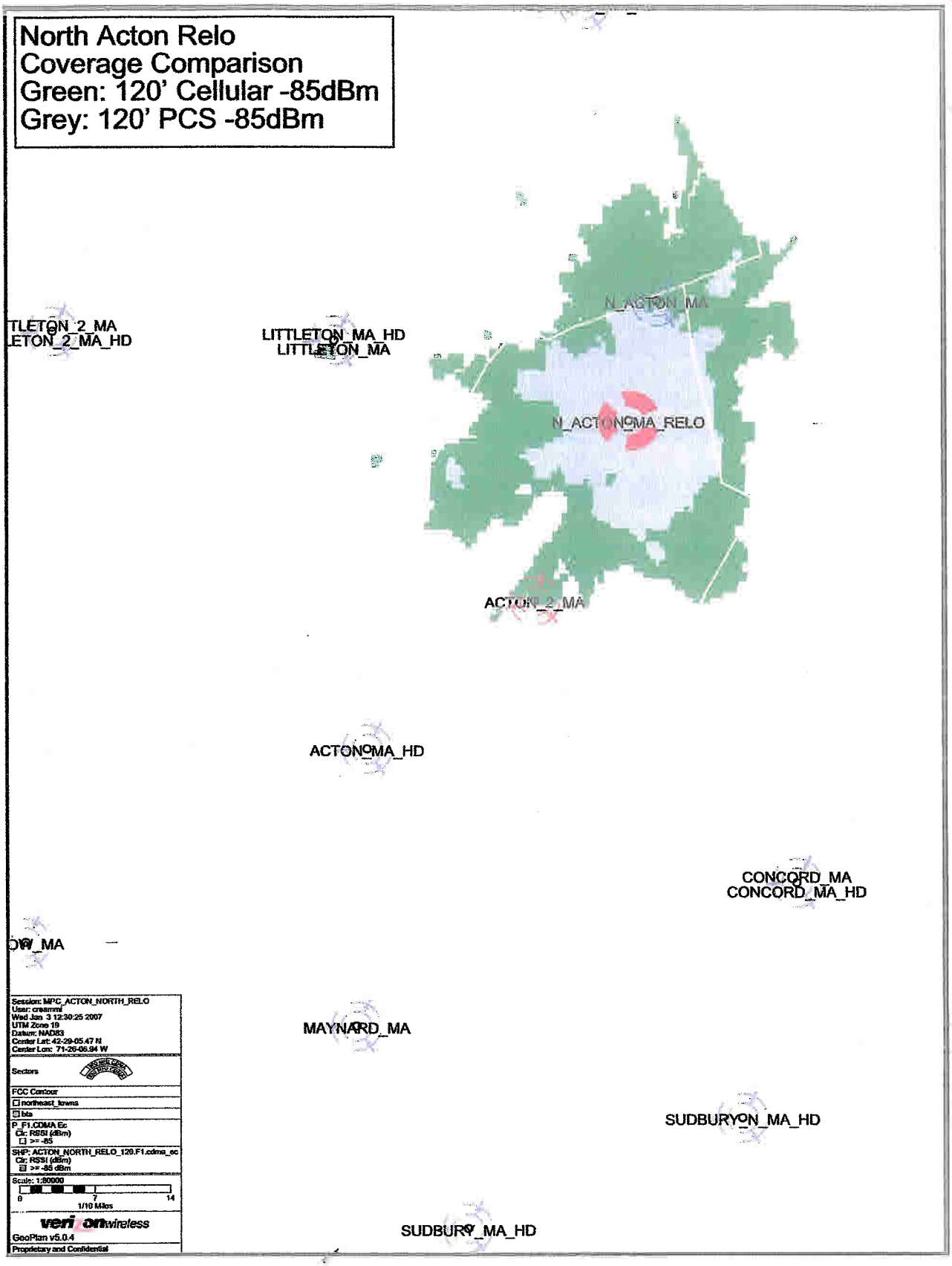


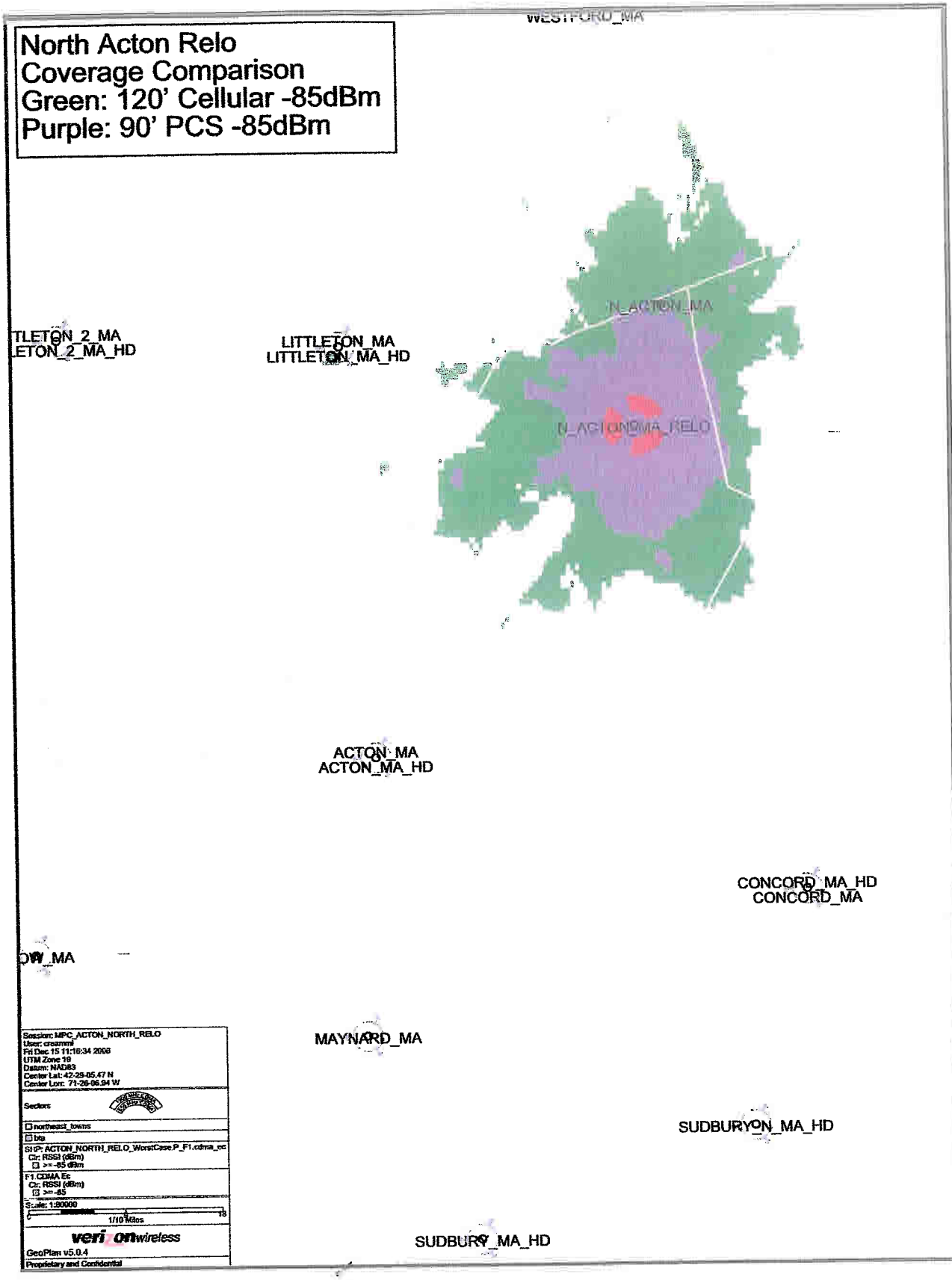

North Acton Relo
Proposed Coverage
N_ACTON_MA
N_ACTON9MA_RELO
ACTON9_2_MA
ACTON9MA_HD
CONCORD_MA_HD
CONCORD_MA
MAYNARD_MA
SUDBURY9N_MA_HD
SUDBURY_MA_HD
LITTLETON_MA_HD
LITTLETON_MA
Session: MPC_ACTON_NORTH_RELO
User: cesarmir
Tue Jan 8 16:30:17 2007
UTM Zone 19
Datum: NAD83
Center Lat: 42-29-05.47 N
Center Lon: 71-28-06.94 W
Sectors
northeast_towns
bts
F1 CDMA Ec
Clr: RSSI (dBm)
>= -85
Scale: 1:80000
0
6
12
1/10 Miles
verizonwireless
GeoPlan v5.0.4
Proprietary and Confidential


North Acton Relo
Proposed PCS Coverage
N_ACTONMA_RELO
ACTONMA_HD
MAYNARD_MA
CONCORD_MA_HD
CONCORD_MA
Sectors
northeast_towns
bta
Scale: 1:80000
0
6
12
1/10 Miles
verizon wireless

5

North Acton Relo
Coverage Comparison
Green: 120' Cellular -85dBm
Grey: 120' PCS -85dBm



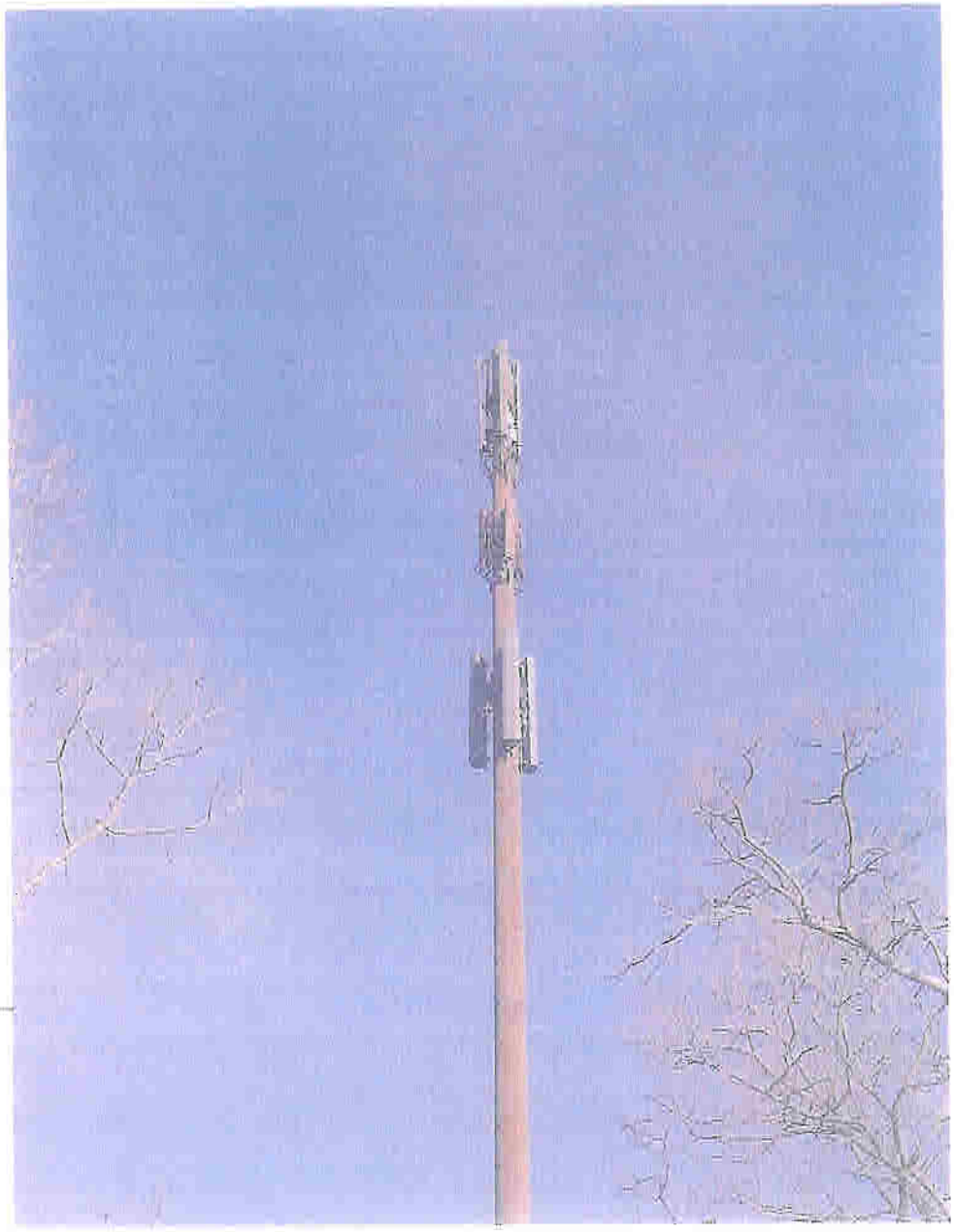

North Acton Relo
Coverage Comparison
Green: 120' Cellular -85dBm
Purple: 90' PCS -85dBm
WESTFORD_MA
N_ACTON_MA
N_ACTON_MA_RELO
TLETON_2_MA
LETON_2_MA_HD
LITTLETON_MA
LITTLETON_MA_HD
ACTON_MA
ACTON_MA_HD
CONCORD_MA_HD
CONCORD_MA
OW_MA
MAYNARD_MA
SUDBURYON_MA_HD
SUDBURY_MA_HD
Session: MPC_ACTON_NORTH_RELO
User: creamm
Fri Dec 15 11:16:34 2006
UTM Zone 19
Datum: NAD83
Center Lat: 42-29-05.47 N
Center Lon: 71-26-06.94 W
Sectors
northeast_towns
bts
SHP: ACTON_NORTH_RELO_WorstCase:P_F1.cdma_cc
Ctr: RSSI (dBm)
>= -85 dBm
F1 CDMA Es
Ctr: RSSI (dBm)
>= -85
Scale: 1:80000
1/10 Miles
verizonwireless
GeoPlan v5.0.4
Proprietary and Confidential

THIS PHOTO SHOWS A MONOPOLE AT THE WESTWOOD, MASS., FIRE DEPARTMENT WITH FLUSH-MOUNTED OR SURFACE-MOUNTED CELLULAR/PCS ANTENNAS AND VARIOUS PUBLIC-SAFETY WHIP-TYPE ANTENNAS AT VARIOUS HEIGHTS ON THE MONOPOLE.

THIS PHOTO SHOWS A MONOPOLE AT THE WESTWOOD, MASS., FIRE DEPARTMENT WITH FLUSH-MOUNTED OR SURFACE-MOUNTED CELLULAR/PCS PANEL ANTENNAS AND VARIOUS PUBLIC-SAFETY WHIP-TYPE ANTENNAS AT VARIOUS HEIGHTS ON THE TOWER.

THIS PHOTO SHOWS A MONOPOLE LOCATED OFF OF ROUTE 109 IN WESTWOOD, MASS., NEAR ROUTES 128/95. THE MONOPOLE SUPPORTS THE FLUSH-MOUNTED OR SURFACE-MOUNTED CELLULAR/PCS ANTENNAS FOR THREE CARRIERS AND HAS BEEN PAINTED BROWN. THIS POLE IS APPROXIMATELY 130 FEET IN HEIGHT. NOTE THE DIFFERENT SIZES/DIMENSIOINS OF THE ANTENNA SYSTEMS FOR EACH CARRIER.

THIS PHOTO SHOWS A MONOPOLE LOCATED OFF OF ROUTE 109 IN WESTWOOD, MASS., NEAR ROUTES 128/95. THE MONOPOLE SUPPORTS THE FLUSH-MOUNTED OR SURFACE-MOUNTED CELLULAR/PCS ANTENNAS FOR THREE CARRIERS AND HAS BEEN PAINTED BROWN. THIS POLE IS APPROXIMATELY 130 FEET IN HEIGHT. NOTE THE DIFFERENT SIZES/DIMENSIOINS OF THE ANTENNA SYSTEMS FOR EACH CARRIER.



THIS PHOTO SHOWS A MONOPOLE LOCATED OFF OF ROUTE 109 IN WESTWOOD, MASS., NEAR ROUTES 128/95. THE MONOPOLE SUPPORTS THE FLUSH-MOUNTED OR SURFACE-MOUNTED CELLULAR/PCS ANTENNAS FOR THREE CARRIERS AND HAS BEEN PAINTED BROWN. THIS POLE IS APPROXIMATELY 130 FEET IN HEIGHT. NOTE THE DIFFERENT SIZES/DIMENSIOINS OF THE ANTENNA SYSTEMS FOR EACH CARRIER.

THIS PHOTO SHOWS A STEALTH POLE AND A STANDARD MONOPOLE AND A SMALL PUBLIC-SAFETY TOWER LOCATED AT THE WESTON POLICE/DPW OFFICES. THESE POLES ARE APPROXIMATELY 100-FEET IN HEIGHT. THE STEALTH POLE SUPPORTS UP TO THREE CARRIER SLOTS BUT CANNOT SUPPORT ANY EXTERNAL PUBLIC-SAFETY WHIP ANTENNAS. THE MONOPOLE SUPPORTS UP TO THREE CARRIER SLOTS AND IS ALSO INTENDED TO SUPPORT PUBLIC-SAFETY WHIP-TYPE ANTENNAS.

THIS PHOTO SHOWS A MONOPOLE IN WAYLAND, MASS. THE MONOPOLE SUPPORTS THE FLUSH-MOUNTED OR SURFACE-MOUNTED CELLULAR/PCS ANTENNAS FOR UP TO FIVE CARRIERS. THIS POLE IS APPROXIMATELY 150 FEET IN HEIGHT. NOTE THE DIFFERENT SIZES/DIMENSIOINS OF THE ANTENNA SYSTEMS FOR EACH CARRIER. THIS POLE ALSO SUPPORTS PUBLIC-SAFETY DEPARTMENT WHIP-TYPE ANTENNAS THAT ARE BEING TRANSFERRED FROM THE LATTICE-TYPE-TOWER WHICH IS TO BE REMOVED.