# STATE OF CONNECTICUT

*CONNECTICUT SITING COUNCIL*

Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@po.state.ct.us
Web Site: www.state.ct.us/csc/index.htm


May 21, 2003

Christopher B. Fisher, Esq.
Cuddy & Feder & Worby LLP
90 Maple Avenue
White Plains, NY 10601-5196

RE: **EM-AT&T-069-030501** - AT&T Wireless notice of intent to modify an existing telecommunications facility located at 79 Putnam Turnpike, Killingly, Connecticut.

Dear Attorney Fisher:

At a public meeting held on May 20, 2003, the Connecticut Siting Council (Council) acknowledged your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies.

The proposed modifications are to be implemented as specified here and in your notice received in our office on May 1, 2003. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

Pamela B. Katz, P.E.
Chairman

PBK/laf

c: Honorable John E. Burke, Jr., Chairman Town Council, Town of Killingly
Peter Curry, Acting Town Manager, Town of Killingly
Roger Gandolf, Zoning Officer, Town of Killingly
Stephen J. Humes, Esq., LeBoeuf, Lamb, Greene & MacRae LLP
Thomas J. Regan, Esq., Brown Rudnick Berlack Israels LLP

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# STATE OF CONNECTICUT

*CONNECTICUT SITING COUNCIL*

Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@po.state.ct.us
Web Site: www.state.ct.us/csc/index.htm


May 8, 2003

Honorable John E. Burke, Jr.
Chairman Town Council
Town of Killingly
172 Main Street
P. O. Box 6000
Danielson, CT 06239-6000

RE: **EM-AT&T-038-020626** - AT&T Wireless notice of intent to modify an existing telecommunications facility located at 79 Putnam Turnpike, Killingly, Connecticut.

Dear Mr. Burke:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

The Council will consider this item at the next meeting tentatively scheduled for May 20, 2003, at 1:30 p.m., in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

Please call me or inform the Council if you have any questions or comments regarding this proposal.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/laf

Enclosure: Notice of Intent

c: Peter Curry, Acting Town Manager, Town of Killingly
Roger Gandolf, Zoning Officer, Town of Killingly

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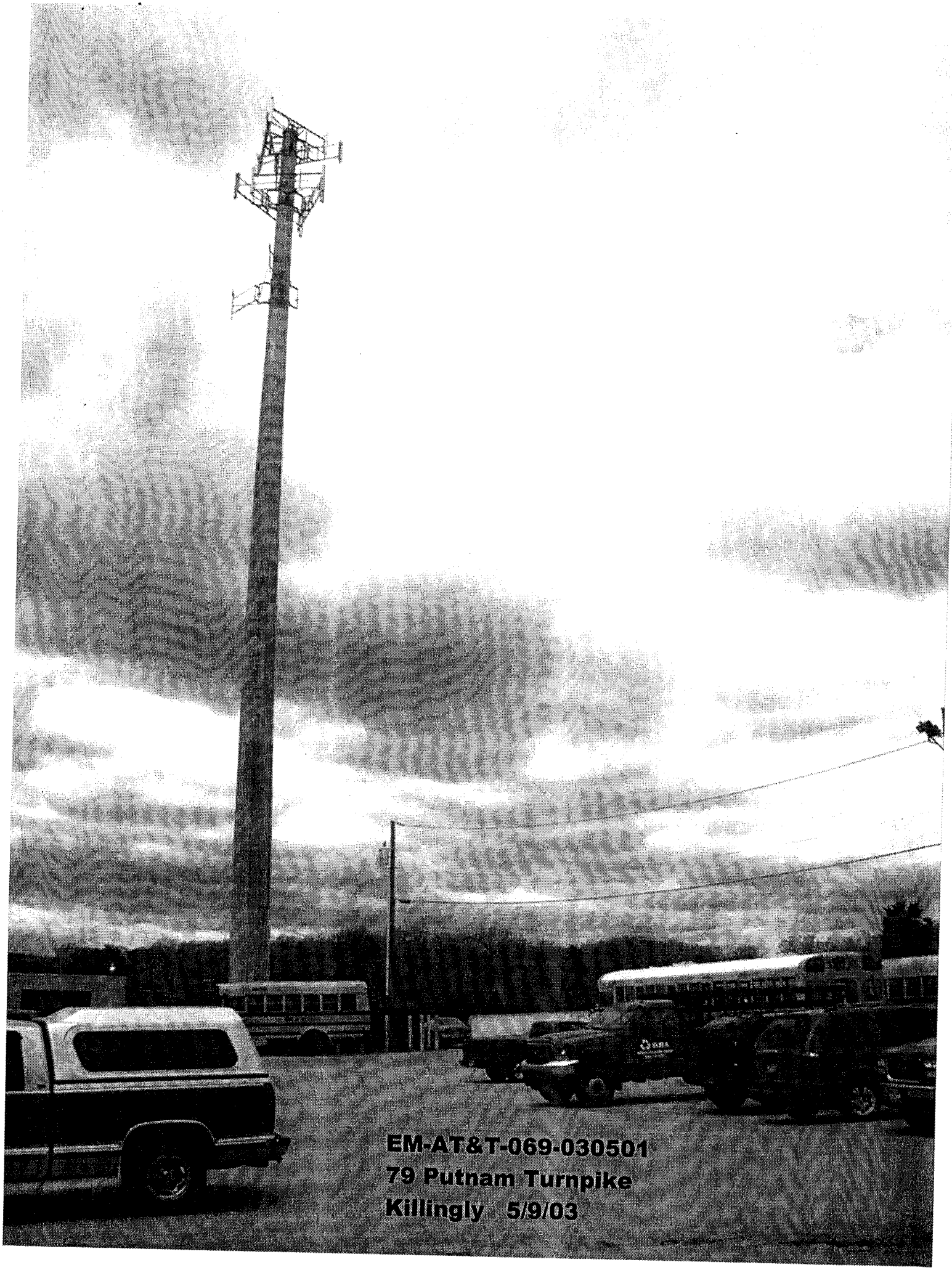

EM-AT&T-069-030501
79 Putnam Turnpike
Killingly 5/9/03

# Table of Contents

## 1. Introduction

This report constitutes an RF exposure analysis for the proposed AT&T Wireless antenna facility to be located at *79 Putnam Ave, Killingly, CT.* This analysis uses site-specific engineering data to determine the predicted levels of radio frequency (RF) electromagnetic energy in the vicinity of the proposed facility and compares those levels with the Maximum Permissible Exposure (MPE) limits established by the Federal Communications Commission.

## 2. Site Data

| Site Name: ***Killingly North*** | |
|---|---|
| Number of simultaneously operating channels | 12 |
| Type of antenna | Allgon 7250.03 |
| Power per channel (Watts ERP) | 250.0 Watts |
| Height of antenna (feet AGL) | 130.00 feet |
| Antenna Aperture Length | 5 feet |

## 3. RF Exposure Prediction

The following equations established by the FCC, in conjunction with the site data, were used to determine the levels of RF electromagnetic energy present in the vicinity of the proposed facility[1]:

$$PowerDensity = \frac{0.64 * N * EIRP(\theta)}{\pi * R^2} \ (mW/cm^2) \qquad \textit{Eq. 1-Far-field}$$

Where, ***N***= Number of channels, ***R***= distance in cm from the RC (Radiation Center) of antenna, and ***EIRP(θ)*** = The isotropic power expressed in milliwatts in the direction of prediction point. This is the correct equation for antennas which have their gain expressed in dBi, which is the usual case for the PCS bands.

$$PowerDensity = \frac{P_{in} / ch * N * 10^3}{2 * \pi * R * h * \alpha / 360} \ (mW/cm^2) \qquad \textit{Eq. 2-Near-field}$$

Where $P_{in}/ch$ = Input power to antenna terminals in watts/ch, $R$ = distance to center of radiation, $h$ = aperture height in meters, $\alpha$ = 3 dB beam-width of horizontal pattern.

[1] RF exposure is measured and predicted in terms of power density in units of milliwatts (mW), a thousandth of a watt, or microwatts ( $\mu$ W), a millionth of a watt, per square centimeter ($cm^2$). Data comparing predictive analysis with on site measurements has demonstrated that power density can be effectively predicted at given locations in the vicinity of a wireless antenna facility.

## 4. FCC Guidelines for Evaluating the Environmental Effects of RF Radiation

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by a Second Memorandum Opinion and Order. These new rules represent a consensus of the federal agencies responsible for the protection of public health and the environment, including the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), the National Institute for Occupational Health and Safety (NIOSH), and the Occupational Safety and Health Administration (OSHA).

Under the laws that govern the delivery of wireless communications services in the United States, as amended by the Telecommunications Act of 1996, the FCC has exclusive jurisdiction over RF emissions from personal wireless antenna facilities, which include cellular, PCS, messaging and aviation sites. [2] Pursuant to its authority under federal law, the FCC has established rules to regulate the safety of emissions from these facilities.

## 5. Comparison with Standards

Exhibit A shows the levels of RF electromagnetic energy as one moves away from the antenna facility. As shown in Exhibit A, the maximum power density is 0.000983 mW/cm$^2$ which occurs at 310 feet from the antenna facility. The chart in exhibit A also shows that the power density is only 0.000050 mW/cm$^2$ at a distance of 4 feet. Table 1 below shows the Maximum Permissible Exposure (MPE) limits established by the FCC. There are different MPE limits for public/uncontrolled and occupational/controlled environments.

***Table 1: Maximum Permissible Exposure limits for RF radiation***

| *Frequency* | *Public/Uncontrolled* | *Occupational/controlled* | *Maximum power density at Accessible location* |
|---|---|---|---|
| Cellular | .580 mW/cm$^2$ | 2.9 mW/cm$^2$ | 0.000983 mW/cm$^2$ |
| PCS | 1 mW/cm$^2$ | 5 mW/cm$^2$ | |

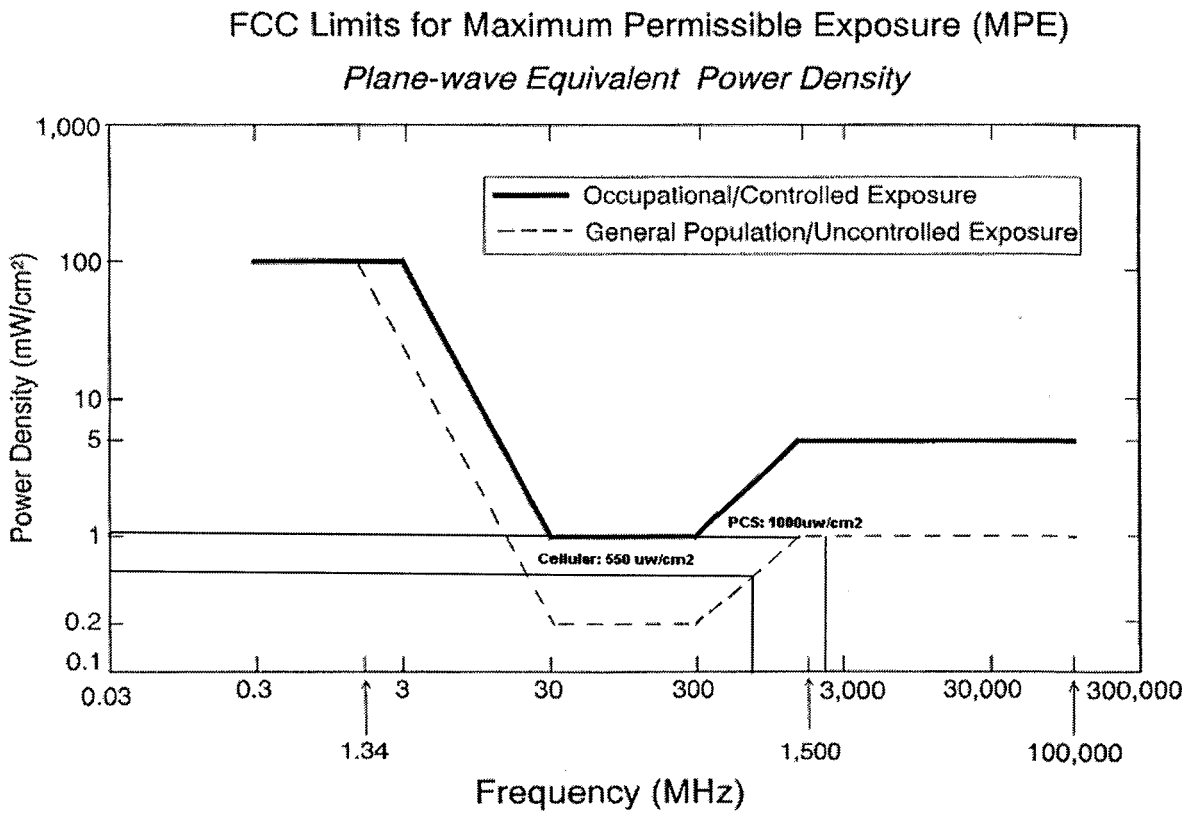
The maximum power density at the proposed facility represents only 0.18% of the public MPE limit for PCS frequencies.

## 6. Conclusion

This analysis show that the maximum power density in accessible areas at this location is 0.000983 mW/cm$^2$, a level of RF energy that is well below the Maximum Permissible Exposure limit established by the FCC.

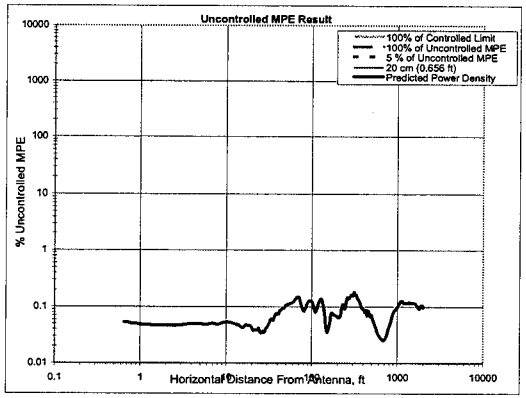
[2] 47 U.S. C. Section 332 ( c ) (7)(B)(iv) states that "[n]o State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions."

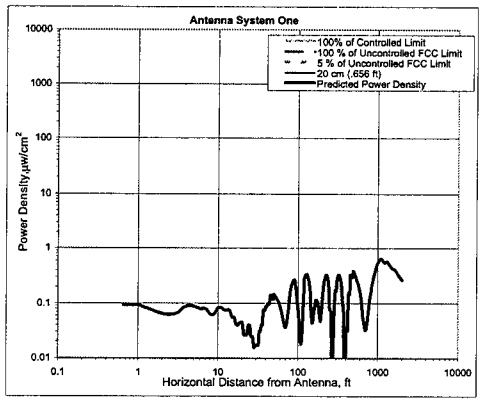
## 7. FCC Limits for Maximum Permissible Exposure

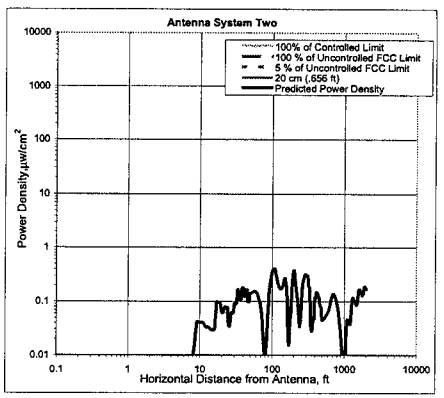


## 8. Exhibit A

## MPE CALCULATIONS FOR: 907-009-463




**Number of Antenna Systems:** 5

Meets FCC Controlled Limits for The Antennas Systems.

Meets FCC Uncontrolled Limits for The Antenna Systems.

**Meets 5% of FCC Uncontrolled Limits for The Antenna Systems.**

No Further Maximum Permissible Exposure (MPE) Analysis Required.

| | Power Density | | @Horiz. Dist. |
|---|---|---|---|
| | mW/cm$^2$ | % of limit | feet |
| Maximum Power Density = | 0.000983 | 0.18 | 310.00 |
| 552.95 times lower than the MPE limit for uncontrolled environment | | | |
| Composite Power (ERP) = | 10,600.00 | Watts | |

**Site ID:** 907-009-463
**Site Name:** KILLINGLY NORTH
**Site Location:** 79 Putnam Ave
Killingly, CT.

**Performed By:** Satish Bhandare

**Date:** 4/30/03

**Antenna System One**

| | units | Value |
|---|---|---|
| Frequency | MHz | 1945.00 |
| # of Channels | # | 12 |
| Max ERP/Ch | Watts | 250.00 |
| Max Pwr/Ch Into Ant. | Watts | 5.86 |
| (Center of Radiator) | feet | 130.00 |
| Calculation Point (above ground or roof surface) | feet | 5.50 |
| | | 0.00 |
| | | 0.00 |
| Antenna Model No. | | Allgon 7250.03 |
| Max Ant Gain | dBd | 16.30 |
| Down tilt | degrees | 2.00 |
| Miscellaneous Att. | dB | 0.00 |
| Height of aperture | feet | 5.11 |
| Ant HBW | degrees | 65.00 |
| Distance to Ant$_{bottom}$ | feet | 121.95 |
| WOS? | Y/N? | n |

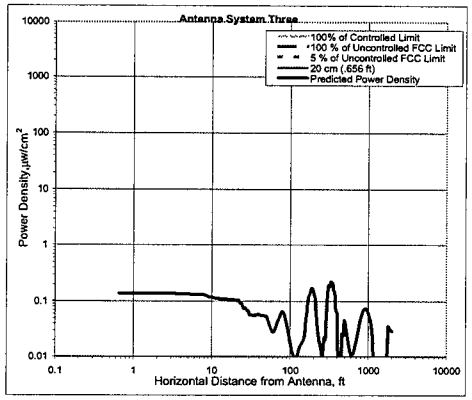
**Ant System ONE Owner:** AT&T
**Sector:** 3
**Azimuth:** 0/120/240

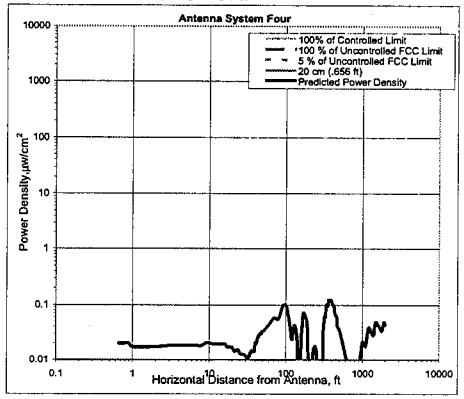
**Antenna System Two**

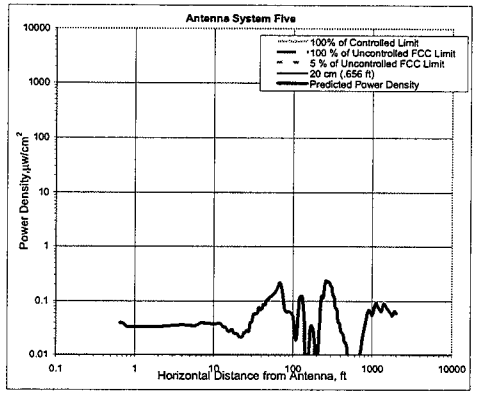
| | units | Value |
|---|---|---|
| Frequency | MHz | 1970.00 |
| # of Channels | # | 12 |
| Max ERP/Ch | Watts | 250.00 |
| Max Pwr/Ch Into Ant. | Watts | 9.08 |
| (Center of Radiator) | feet | 150.00 |
| Calculation Point (above ground or roof surface) | feet | 5.50 |
| | | 0.00 |
| | | 0.00 |
| Antenna Model No. | | RR901702 |
| Max Ant Gain | dBd | 14.40 |
| Down tilt | degrees | 0.00 |
| Miscellaneous Att. | dB | 0.00 |
| Height of aperture | feet | 4.66 |
| Ant HBW | degrees | 90.00 |
| Distance to Ant$_{bottom}$ | feet | 142.17 |
| WOS? | Y/N? | n |

**Ant System TWO Owner:** Voicestream
**Sector:** 3
**Azimuth** 0/120/240

# MPE CALCULATIONS FOR:




**Antenna System Three**

| | units | Value |
|---|---|---|
| Frequency | MHz | 1975.00 |
| # of Channels | # | 12 |
| Max ERP/Ch | Watts | 250.00 |
| Max Pwr/Ch Into Ant. | Watts | 7.73 |
| (Center of Radiator) | feet | 140.00 |
| Calculation Point (above ground or roof surface) | feet | 5.50 |
| | | 0.00 |
| | | 0.00 |
| Antenna Model No. | | DB980G90 |
| Max Ant Gain | dBd | 15.10 |
| Down tilt | degrees | 0.00 |
| Miscellaneous Att. | dB | 0.00 |
| Height of aperture | feet | 5.00 |
| Ant HBW | degrees | 90.00 |
| Distance to $Ant_{bottom}$ | feet | 132.00 |
| WOS? | Y/N? | n |

**Ant System Three Owner:** Sprint PCS
**Sector:** 3
**Azimuth** 0/120/240

**Antenna System Four**

| | units | Value |
|---|---|---|
| Frequency | MHz | 155.72 |
| # of Channels | # | 4 |
| Max ERP/Ch | Watts | 200.00 |
| Max Pwr/Ch Into Ant. | Watts | 18.32 |
| (Center of Radiator) | feet | 118.00 |
| Calculation Point (above ground or roof surface) | feet | 5.50 |
| | | 0.00 |
| | | 0.00 |
| Antenna Model No. | | DAPA08000 |
| Max Ant Gain | dBd | 10.38 |
| Down tilt | degrees | 0.00 |
| Miscellaneous Att. | dB | 0.00 |
| Height of aperture | feet | 5.50 |
| Ant HBW | degrees | 360.00 |
| Distance to $Ant_{bottom}$ | feet | 109.75 |
| WOS? | Y/N? | n |

**Ant System Four Owner:** Town of Killingly
**Sector:** 1
**Azimuth:** 0

**Antenna System Five**

| | units | Value |
|---|---|---|
| Frequency | MHz | 155.74 |
| # of Channels | # | 4 |
| Max ERP/Ch | Watts | 200.00 |
| Max Pwr/Ch Into Ant. | Watts | 18.32 |
| (Center of Radiator) | feet | 86.00 |
| Calculation Point (above ground or roof surface) | feet | 5.50 |
| | | 0.00 |
| | | 0.00 |
| Antenna Model No. | | DAPA08000 |
| Max Ant Gain | dBd | 10.38 |
| Down tilt | degrees | 0.00 |
| Miscellaneous Att. | dB | 0.00 |
| Height of aperture | feet | 5.50 |
| Ant HBW | degrees | 360.00 |
| Distance to $Ant_{bottom}$ | feet | 77.75 |
| WOS? | Y/N? | n |

**Ant System Five Owner:** Town of Killingly
**Sector:** 1
**Azimuth:** 0

## 9. For Further Information

Additional information about the environmental impact of RF energy from personal wireless antenna facilities can be obtained from the Federal Communications Commission:

Dr. Robert Cleveland
Federal Communications Commission
Office of Engineering and Technology
Washington, DC 20554

RF Safety Program: 202-418-2464
Internet address: rfsafety@fcc.gov
RF Safety Web Site: www.fcc.gov/oet/rfsafety

## 10. References

[1] The Communications Act of 1934, as amended by the Telecommunications Act of 1996, 47 U.S.C. Section 332 ( c)(7)(B)(iv).

[2] *Guidelines for Evaluating the Environmental Effects of Radio frequency Radiation*, Notice of Proposed Rulemaking, ET Docket 93-62, 8 FCC Rcd 2849 (1993).

[3] *Guidelines for Evaluating the Environmental Effects of Radio frequency Radiation*, Report and Order, ET Docket 93-62, FCC 96-326, adopted August 1, 1996. 61 Federal Register 41006 (1996).

[4] *Guidelines for Evaluating the Environmental Effects of Radio frequency Radiation*, Second Memorandum Opinion and Order, ET Docket 93-62, adopted August 25, 1997.

[5] *Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields*, OET Bulletin 65, August, 1997.

EM-AT&T-069-030501



**NOTICE OF INTENT TO MODIFY AN EXISTING TELECOMMUNICATIONS FACILITY AT 79 PUTNAM TURNPIKE, KILLINGLY, CONNECTICUT**

Pursuant to the Public Utility Environmental Standards Act, Connecticut General Statutes § 16-50g et. seq. ("PUESA"), and Sections 16-50j-72(b) of the Regulations of Connecticut State Agencies adopted pursuant to the PUESA, AT&T Wireless PCS, LLC d/b/a AT&T Wireless ("AT&T Wireless") hereby notifies the Connecticut Siting Council of its intent to modify an existing facility located at 79 Putnam Turnpike, Killingly, Connecticut (the "Putnam Turnpike Facility"), owned by VoiceStream Communications ("VoiceStream"). AT&T Wireless and VoiceStream have agreed to share the use of the Putnam Turnpike Facility, as detailed below.

**The Putnam Turnpike Facility**

The Putnam Turnpike Facility consists of an approximately one hundred fifty foot (150) foot monopole (the "Tower") and associated equipment currently being used for wireless communications by VoiceStream, Sprint and the municipality.

**AT&T Wireless' Facility**

As shown on the enclosed plans prepared by Natcomm, LLC, including a site plan and tower elevation of the Putnam Turnpike Facility, AT&T Wireless proposes shared use of the Facility by placing antennas on the Tower and equipment cabinets at grade needed to provide personal communications services ("PCS"). AT&T Wireless will install 6 panel antennas at approximately the 130 foot level of the Tower and associated equipment cabinets (2 proposed, 2 future, each 76"H x 30" W x 30" D) located on a concrete pad within an expanded fenced compound which is already part of the lease parcel maintained by VoiceStream. As evidenced in the structural evaluation prepared by Walker Engineering, Inc., annexed hereto as Exhibit A, AT&T has confirmed that the Tower is structurally capable of supporting the addition of AT&T Wireless' antennas.

**AT&T Wireless' Facility Constitutes An Exempt Modification**

The proposed addition of AT&T Wireless' antennas and equipment to the Putnam Turnpike Facility constitutes an exempt "modification" of an existing facility as defined in Connecticut General Statutes Section 16-50i(d) and Council regulations promulgated pursuant thereto. Addition of AT&T Wireless' antennas and equipment to the Tower will not result in an increase of the Tower's height nor extend the site boundaries. Further, there will be no increase in noise levels by six (6) decibels or more at the Tower site's boundary. As set forth in an Emissions Report prepared by Satish Bhandare, RF Engineer, annexed hereto as Exhibit B, the total radio frequency electromagnetic radiation power density at the Tower site's boundary will not be increased to or above the standard adopted by the Connecticut Department of

Environmental Protection as set forth in Section 22a-162 of the Connecticut General Statutes and MPE limits established by the Federal Communications Commission. For all the foregoing reasons, addition of AT&T Wireless' facility to the Tower constitutes an exempt modification which will not have a substantially adverse environmental effect.

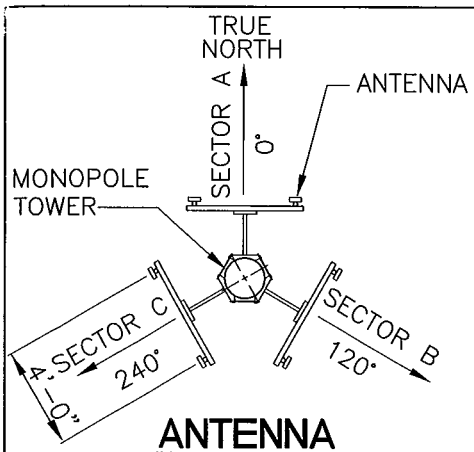
**Conclusion**

Accordingly, AT&T Wireless requests that the Connecticut Siting Council acknowledge that its proposed modification to the Putnam Turnpike Facility meets the Council's exemption criteria.

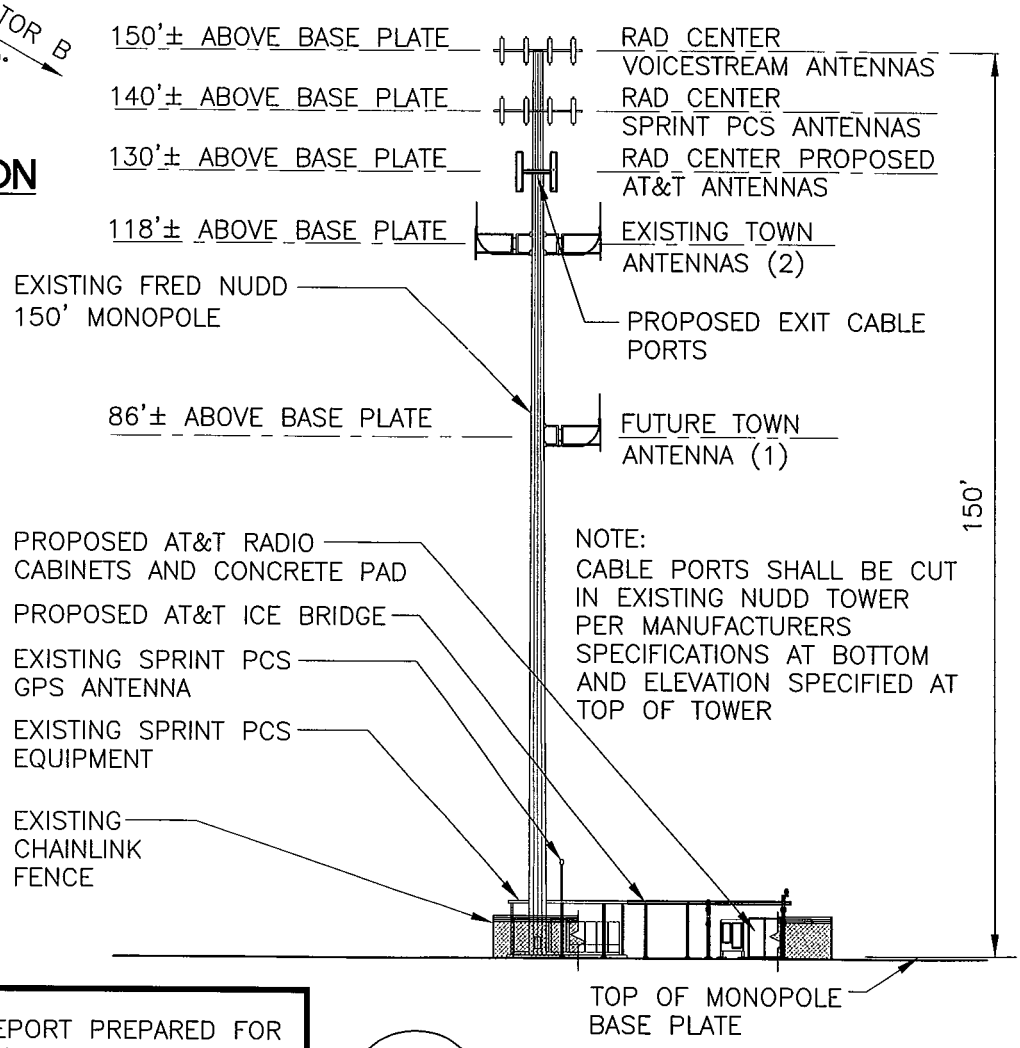
Respectfully Submitted,

Christopher B. Fisher, Esq.
On behalf of AT&T Wireless

cc: Town Manager, Town of Killingly
Johnny R. Salmon, Bechtel




## ANTENNA CONFIGURATION




1 **TOWER ELEVATION**

SCALE: 1" = 30'-0"

STRUCTURAL ANALYSIS REPORT PREPARED FOR THE 150 FT MONOPOLE (FRED NUDD DRAWING NO. 98-6090-1 DATED 7/24/98) LOCATED AT 79 PUTNAM PIKE, KILLINGLY, CT
BY WALKER ENGINEERING, INC.
8451 DUNWOODY PLACE DUNWOODY, GA 30350
STAMPED AND SIGNED BY JIM WALKER LICENSE NO. 21197 DATED 3/13/03

**"ISSUED FOR SITING COUNCIL"**


Natcomm, LLC
63-2 North Branford Road
Branford, Connecticut 06405
Tel. (203) 488-0580
Fax (203) 488-8587
Consulting Engineers · Project Management
Civil · Structural · Mechanical · Electrical

AT&T WIRELESS PCS LLC
12 OMEGA DRIVE
STAMFORD, CONNECTICUT 06907


DRAWING TITLE: SITING COUNCIL

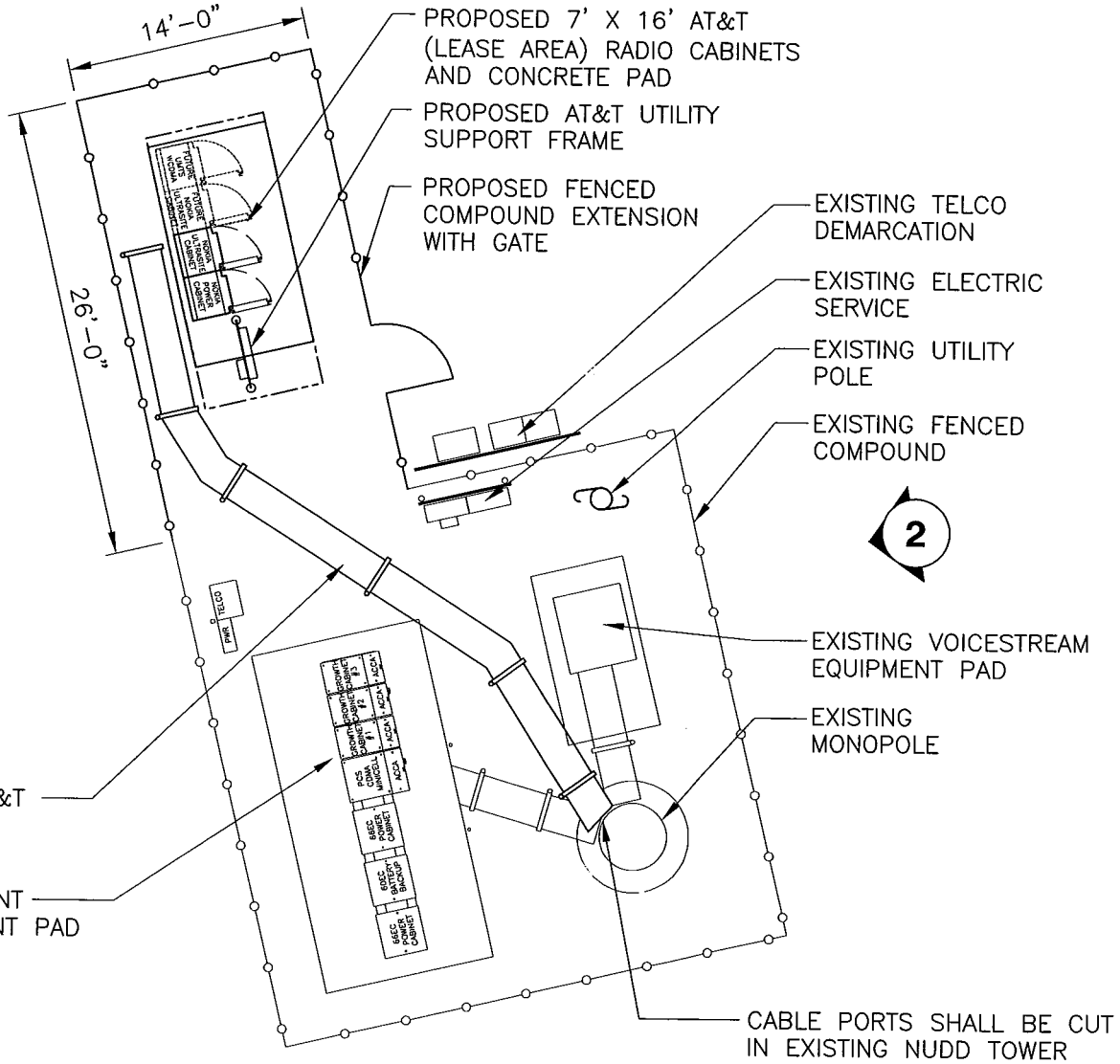
PROJECT INFORMATION: KILLINGLY NORTH
CT-463
79 PUTNAM PIKE
KILLINGLY, CT

LESSOR: TOWN OF KILLINGLY

DRAWING NO. 907-009-CT463-SC2

| | |
|---|---|
| REVISION NO. 2 | DRAWN BY: P.A.M. |
| DATE ISSUED: 04/22/03 | CHECKED BY: JJP |
| SCALE: AS NOTED | APPROVED BY: CFC |
| | SHEET NO. 2 OF 2 |
| A/E PROJECT NO: 462A | |

462ASC02.dwg 4-22-03 9:30 am EST




1 **COMPOUND PLAN**

SCALE: 1" = 10'-0"

NOTE:
LATITUDE: 41.8473°
LONGITUDE: 73.8712°
COORDINATES WHERE TAKEN WITH A HAND HELD GPS

**"ISSUED FOR SITING COUNCIL"**


Natcomm, LLC
63-2 North Branford Road
Branford, Connecticut 06405
Tel. (203) 488-0580
Fax (203) 488-8587
Consulting Engineers - Project Management
Civil - Structural - Mechanical - Electrical

AT&T
AT&T WIRELESS PCS LLC
12 OMEGA DRIVE
STAMFORD, CONNECTICUT 06907


DRAWING TITLE: SITING COUNCIL

PROJECT INFORMATION: KILLINGLY NORTH
CT-463
79 PUTNAM PIKE
KILLINGLY, CT

LESSOR: TOWN OF KILLINGLY

DRAWING NO. 907-009-CT463-SC1

| | |
|---|---|
| REVISION NO. 2 | DRAWN BY: P.A.M. |
| DATE ISSUED: 04/22/03 | CHECKED BY: JJP |
| SCALE: AS NOTED | APPROVED BY: CFC |
| | SHEET NO. 1 OF 2 |
| A/E PROJECT NO: 462A | |

462ASC01.dwg 4-22-03 9:23 am EST

# WALKER ENGINEERING, INC.

8451 DUNWOODY PLACE
NORTHRIDGE 400, BLDG. 8
DUNWOODY, GA 30350
(770) 641-7306 FAX (770) 587-2196

CIVIL • STRUCTURAL
N 33° 59' 13.6" W 84° 20' 26.8"


Mr. **Jason Pintek, PE**
**Natcomm, LLC**
63-2 North Branford Road
Branford, CT 06405

03/13/03
**CT-463**
**Killingly North**

Sub: Structural Analysis of 150-ft Nudd Monopole
79 Putnam Pike, Killingly, CT

Dear Mr. Pintek:

Walker Engineering has performed a Level-Two finite element, P-Δ structural analysis of the above subject monopole in accordance with your Authorization for Services for the addition of the ***AT&T Wireless*** proposed antennas outlined below. This analysis consists of determining the forces on the monopole caused by existing, proposed, and future loads. The existing, proposed, and future loads were provided by your office, in conjunction with field observations by Walker Engineering.

The subject monopole is a 150-foot, five-section, tapered monopole, designed and manufactured by Fred A. Nudd Corporation in 1998. The monopole manufacturer's drawings, Fred A. Nudd Corp., Drawing No.: 98-6090-1, dated 07/24/98, were provided by your office. The monopole geometry, section sizes, and foundation design loads were obtained from these data and are assumed to be accurate. The monopole has also been assumed to be in good condition and capable of supporting its full original design capacity.

Our analysis was performed in accordance with EIA-222-F for an 85 mph[1] base windload, and 75% of the base windload with ½" radial ice, as specified by Natcomm, LLC.

**Existing, future, and proposed loads consist of the following:**

at 150 ft — Voicestream: Six existing EMS RV-90-17-02DP panel antennas and six FE-1580-1-P72 amplifiers on three sector mounts, fed by six 1-5/8"∅ coax cables routed inside the monopole.

[1] The minimum windspeed specified by EIA-222-F for Windham County, CT is 85 mph.

at 140 ft — Sprint: Twelve existing Decibel DB980 panel antennas on three sector mounts, fed by twelve 1-5/8"∅ coax cables routed inside the monopole.

***at 130 ft*** — ***AT&T (Proposed)***: Six Allgon 7250.03 panel antennas on three EEI universal T-Arm mounts, fed by twelve 1-5/8"∅ coax cables routed inside the monopole.

at 118 ft — Town of Killingly: Two Dapa antennas on two side-arm mounts, fed by two 1-5/8"∅ coax cables routed inside the monopole.

at 86 ft — Town of Killingly: One Dapa antenna on a side-arm mount, fed by one 1-5/8"∅ coax cable routed inside the monopole.

at 80 ft — Sprint PCS: One existing GPS antenna on side-arm mount, fed by one 1/2"∅ coax cable routed inside the monopole.

**Note:** The analysis ***assumes*** that the coax cables (existing, future, and proposed) are installed on the monopole per the *Cable Plan Drawing E-7, Walker Engineering Job No. 0303-070, dated 03/13/03. Please notify the undersigned prior to altering the cable routing configuration or if the coax configuration is different than indicated above.* Placement of small cables for beacons, ground rods, etc. are not critical.

**Monopole Summary:**

This analysis shows that the subject monopole **is adequate** to support the existing, future, and proposed loads.

A copy of the full analysis is enclosed. A summary of the controlling load cases is provided below:

| Monopole Section | Elevation | CSI[2] |
|---|---|---|
| Section 5 (Top) | 130 ft to 150 ft | 0.08 |
| Section 4 | 95 ft to 130 ft | 0.28 |
| Section 3 | 50 ft to 95 ft | 0.39 |
| Section 2 | 18 ft to 50 ft | 0.48 |
| Section 1 (Bottom) | 0 ft to 18 ft | 0.50 |

[2] "**Combined Stress Index**" Ratio of calculated loads verses total allowable loads; should be less than, or equal to, 1.00.

**Foundation Summary:**

The original monopole foundation design loads are unavailable. Walker Engineering, Inc. has performed an existing foundation evaluation according to the original foundation design drawings by Fred A. Nudd Corp., Drawing No.: 98-6090-1, dated 07/24/98. The results indicated that the existing monopole foundation ***is adequate*** to support the existing, future, and proposed loads.

***Note:*** *The base plate is at approximately 96% of its capacity. Therefore, the base plate will most likely require reinforcing prior to adding any future loads.*

**Other Considerations:**

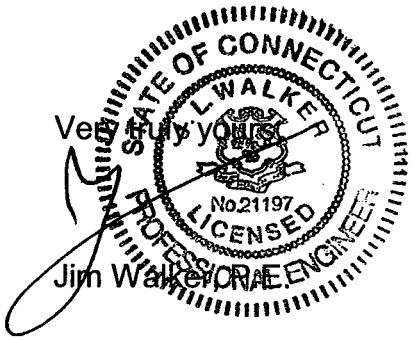
Installation of access ports ("Handholes") for the proposed equipment may be required. The monopole drawing does not indicate that access ports are available at the proposed elevation. Walker Engineering can design these access ports (if required) at your request; the design can also be provided by the monopole manufacturer. Use extreme caution during the installation of the access ports to insure temporary bracing of the pole, and prevention of fires inside the pole during cutting and welding operations.

As future loads are installed, the monopole should be re-evaluated on a case-by-case basis.

The analysis is based, in part, on information provided to this office by Natcomm, LLC. If the existing conditions are different than the information in this report, Walker Engineering should be contacted for resolution of any issues.

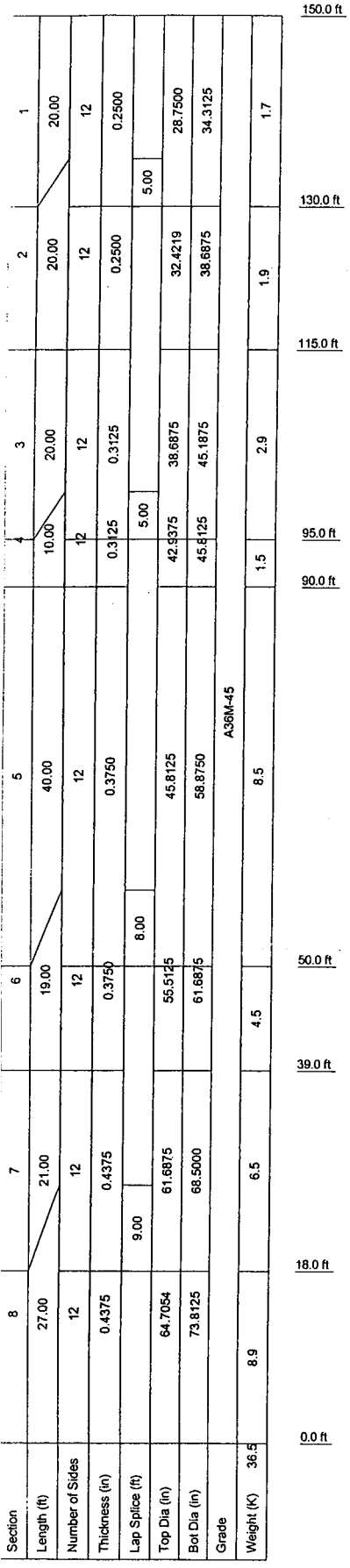
Walker Engineering Inc. appreciates the opportunity to be of service in this matter. Please do not hesitate to give me a call if you have any questions or comments.

Very truly yours,




Jim Walker, P.E.

encl




| Section | Length (ft) | Number of Sides | Thickness (in) | Lap Splice (ft) | Top Dia (in) | Bot Dia (in) | Grade | Weight (K) |
|---|---|---|---|---|---|---|---|---|
| 1 | 20.00 | 12 | 0.2500 | 5.00 | 28.7500 | 34.3125 | | 1.7 |
| 2 | 20.00 | 12 | 0.2500 | | 32.4219 | 38.6875 | | 1.9 |
| 3 | 20.00 | 12 | 0.3125 | | 38.6875 | 45.1875 | | 2.9 |
| 4 | 10.00 | 12 | 0.3125 | 5.00 | 42.9375 | 45.8125 | | 1.5 |
| 5 | 40.00 | 12 | 0.3750 | | 45.8125 | 58.8750 | A36M-45 | 8.5 |
| 6 | 19.00 | 12 | 0.3750 | 8.00 | 55.5125 | 61.6875 | | 4.5 |
| 7 | 21.00 | 12 | 0.4375 | | 61.6875 | 68.5000 | | 6.5 |
| 8 | 27.00 | 12 | 0.4375 | 9.00 | 64.7054 | 73.8125 | | 8.9 |

## DESIGNED APPURTENANCE LOADING

| TYPE | ELEVATION | TYPE | ELEVATION |
|---|---|---|---|
| (2) VoiceStream - RV90-17-DP panel antennas and FE-1580-1-P72 amps | 150 | Sprint PCS - Sector T-Arm Mount | 140 |
| | | (2) ATI Wireless Proposed - Allgon 7250.03 Panel Antennas | 130 |
| (2) VoiceStream - RV90-17-DP panel antennas and FE-1580-1-P72 amps | 150 | (2) ATI Wireless Proposed - Allgon 7250.03 Panel Antennas | 130 |
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| VoiceStream - Sector T-Arm Mount | 150 | | |
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| VoiceStream - Sector T-Arm Mount | 150 | ATI Wireless Proposed - Sector T-Arm Mount | 130 |
| (4) Sprint PCS - DB980 Panel Antennas | 140 | Town - Dapa Antenna on a Standoff Mount | 118 |
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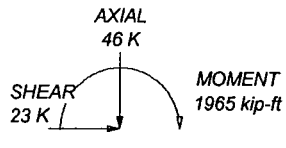
| (4) Sprint PCS - DB980 Panel Antennas | 140 | Town - Dapa Antenna on a Standoff Mount | 86 |
| Sprint PCS - Sector T-Arm Mount | 140 | | |
| Sprint PCS - Sector T-Arm Mount | 140 | Sprint PCS - GPS ANTENNA | 80 |

## MATERIAL STRENGTH

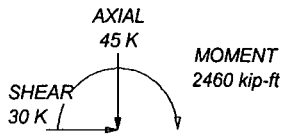
| GRADE | YIELD | GRADE | YIELD |
|---|---|---|---|
| A36M-45 | 45 ksi | | |

## TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Original Monopole Manufacturer: Fred A. Nudd Corporation; Drawing Number: 98-6090-1; Dated: 07/24/98.



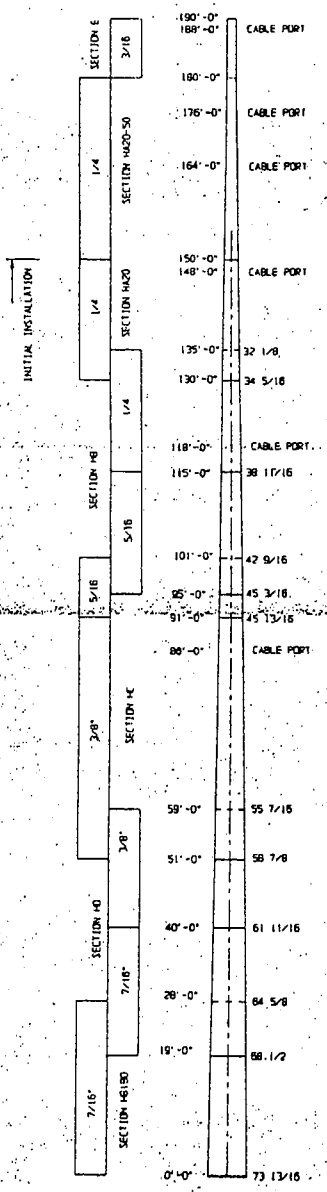

*TORQUE 0 kip-ft*
*74 mph WIND - 0.5000 in ICE*




*TORQUE 0 kip-ft*
*REACTIONS - 85 mph WIND*


Walker Engineering Inc.
8451 Dunwoody Place
Dunwoody, Georgia 30350
Phone: (770) 641-7306
FAX: (770) 587-2196
Tower Specialists


| | | | |
|---|---|---|---|
| Job: Natcomm-010; 0303-070 | | | |
| Project: Killingly North; AT&T - CT-463 | | | |
| Client: Natcomm, LLC | Drawn by: bhe | App'd: | |
| Code: TIA/EIA-222-F | Date: 03/14/03 | Scale: NTS | |
| Path: C:\Files\ERITower\MP\Natcomm-010 Nudd 150-ft MP.er | | Dwg No. E-1 | |




TOWER DESIGN CONDITIONS
This tower was designed to withstand 85 mph wind speed with concurrent 1/2" radial ice per ANSI/EIA/TIA 222-E recommended standard. Worst case load condition is wind without ice. Allowable steel stresses per AISC ASD 9th Edition Allowable concrete stresses per ACI 318-89.

MATERIAL SPECIFICATIONS
Monopole Plate: ASTM A36, Fy > 45 ksi. See Calculations.
All other steel: ASTM A36, Fy > 36 ksi
Hardware: A325 Hot Dipped Galvanized Bolts with Anco Nuts.
Galvanizing: ASTM A123
Anchor Bolts: A36 modified, Fu > 105 ksi, ~~Fy > 45 ksi~~

TOWER LOADING CONDITIONS

| QTY | Antenna | Elevation |
|---|---|---|
| 12 | DAPA 58000 | 188 |
| 3 | 12' Boom | 188 |
| 12 | DAPA 58000 | 176 |
| 3 | 12' Boom | 176 |
| 12 | DAPA 58000 | 164 |
| 3 | 12' Boom | 164 |
| 6 | RV-9017-020P | 150 |
| 6 | FE-1580-1-P72 | 150 |
| 3 | Extend Arm | 150 |
| 2 | DAPA 58000 | 118 |
| 2 | Gate Boom | 118 |
| 1 | DAPA 58000 | 86 |
| 1 | Gate Boom | 86 |

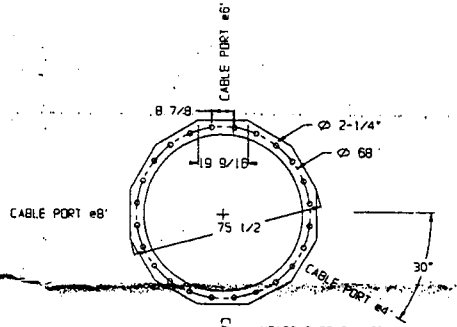
All transmission lines to be supported on the inside of pole thus adding no additional wind load.

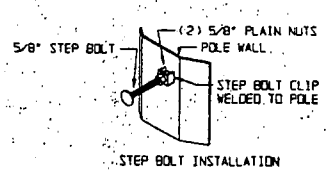
NOTE: Any deviation from the proposed design antenna loading will require a tower analysis for verification of structural integrity.

CONCRETE SPECIFICATIONS
1. Concrete shall have a minimum compressive strength of at least 3000 psi at 28 days. It is our recommendation that 4000 psi concrete be installed to account for any unknown installation variables that could degrade the concrete..
2. Concrete installation shall meet ACI 318-89 installation requirements for reinforced concrete.
3. All concrete shall be placed against undisturbed soil free of free standing water and all foreign objects and materials. If this is not possible, special pouring procedures will be required.
4. Minimum concrete cover shall be 3" over all reinforcing bars.
5. Reinforcing bars shall be ASTM A-615 Grade 60 deformed bars.
6. Assemble bars with tie wires or weld. Welding of bars must conform to AWS D1.4 specifications and must be inspected by a Fred A. Nudd engineering.
7. Proportion pouring: 80% 1's and 2's,
   20% 1's only for finishing.

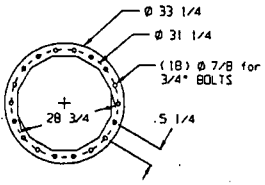
SOIL SPECIFICATIONS
SITE CONDITIONS PER OMNIPOINT, 07/23/98
1. The soil appears to be medium sand to little silt, followed by cored rock on the depth of 24'. Ground water was not encountered.
2. All foundations shall be free of free standing water as far as possible prior to pouring concrete and shall be kept thus until backfill is in place. If not possible, special pouring procedures must be followed.
3. Rock, non-cohesive, saturated or submerged soils are not to be considered as normal soil.. See EIA 7.2.2.
4. Backfill shall be compacted to 100 pcf in 6" lifts using excavated material.
5. Backfill shall be placed so as to prevent accumulation of water around foundations or anchors.

Total Concrete: 50 cuyd

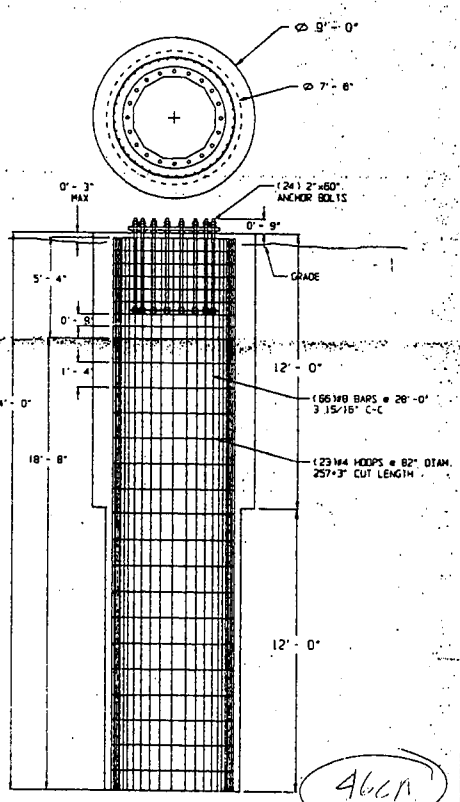



STEP BOLT INSTALLATION




HA20 FLANGE
3/4" A36 PLATE




HB180 BASE FLANGE
2" A36 PLATE

INSTALLATION GENERAL NOTES
1. Installation of tower must be performed by a qualified tower erector.
2. Install sections such that climbing device is aligned.
3. Install safety climb per manufacturer's recommendations.
4. Slip-joint jacking force: Minimum 6000 lb.
5. Tighten all structural and anchor bolts per AISC specifications.
6. Sections are numbered at the bottom, near the climbing face.
7. Installer must grind outside/top and inside/bottom of each section and at the weld locations of the squaring bracing to facilitate slip joint fit. Cover grind area with spray galvanizing.
8. When setting pole on foundation anchor bolts, remove template prior to setting pole. Return template to Nudd Corporation for reinbursement.
9. Tighten anchor bolts uniformly in alternating pattern. (ie: car wheel lug bolt pattern)

Pole section weights:
Section HA20: 2188 +/-
Section HB: 4693 +/-
Section HC: 8042 +/-
Section HD: 8000 +/-
Section HB180: 9000 +/-

46cn

**FRED A. NUDD CORPORATION**
Route 104 • Ontario, New York 14519 • 315/524-2531

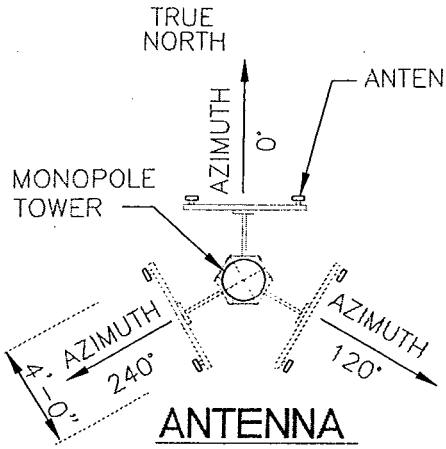
| SCALE: N/S | DRAWN BY: ELR | |
|---|---|---|
| DATE: 7/24/98 | | |



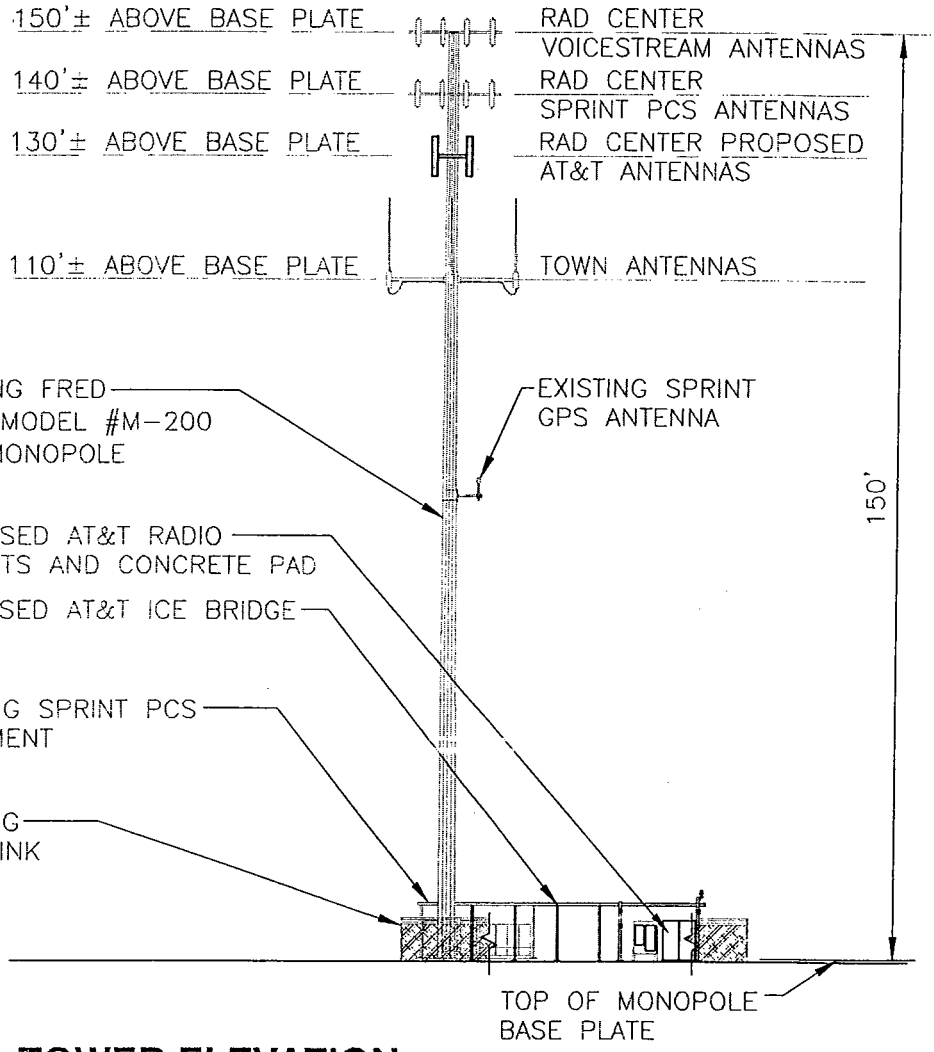
150'/190' HM-180 MONOPOLE

OMNIPOINT COMMUNICATIONS
KILLINGLY, CT SITE#: CT-11-3988

DRAWING NUMBER: 98-6090-1/




## ANTENNA CONFIGURATION




1 **TOWER ELEVATION**

SCALE: 1" = 30'-0"

NOTE:
LATITUDE: 41.8473°
LONGITUDE: 73.8712°
COORDINATES WHERE TAKEN
WITH A HAND HELD GPS

**"ISSUED FOR SITING COUNCIL"**


**Natcomm, LLC**
63-2 North Branford Road
Branford, Connecticut 06405
Tel. (203) 488-0580
Fax (203) 488-8587
Consulting Engineers · Project Management
Civil · Structural · Mechanical · Electrical

AT&T
AT&T WIRELESS PCS LLC
12 OMEGA DRIVE
STAMFORD, CONNECTICUT 06907


| | |
|---|---|
| *DRAWING TITLE:* SITING COUNCIL | *DRAWING NO.* 3CO-CT463-SC02-0 |
| *PROJECT INFORMATION:* KILLINGLY NORTH<br>CT-463<br>79 PUTNAM PIKE<br>KILLINGLY, CT 06 | REVISION NO. 0 — DRAWN BY: CMS<br>DATE ISSUED: 10/30/01 — CHECKED BY: JJP<br>SCALE: AS NOTED — APPROVED BY: CFC<br>SHEET NO. 2 OF 2 |
| *PROPERTY OWNER:* TOWN OF KILLINGLY | A/E PROJECT NO: 462A |

# RF Exposure Analysis for Proposed AT&T Wireless Antenna Facility

SITE ID: 907-007-463

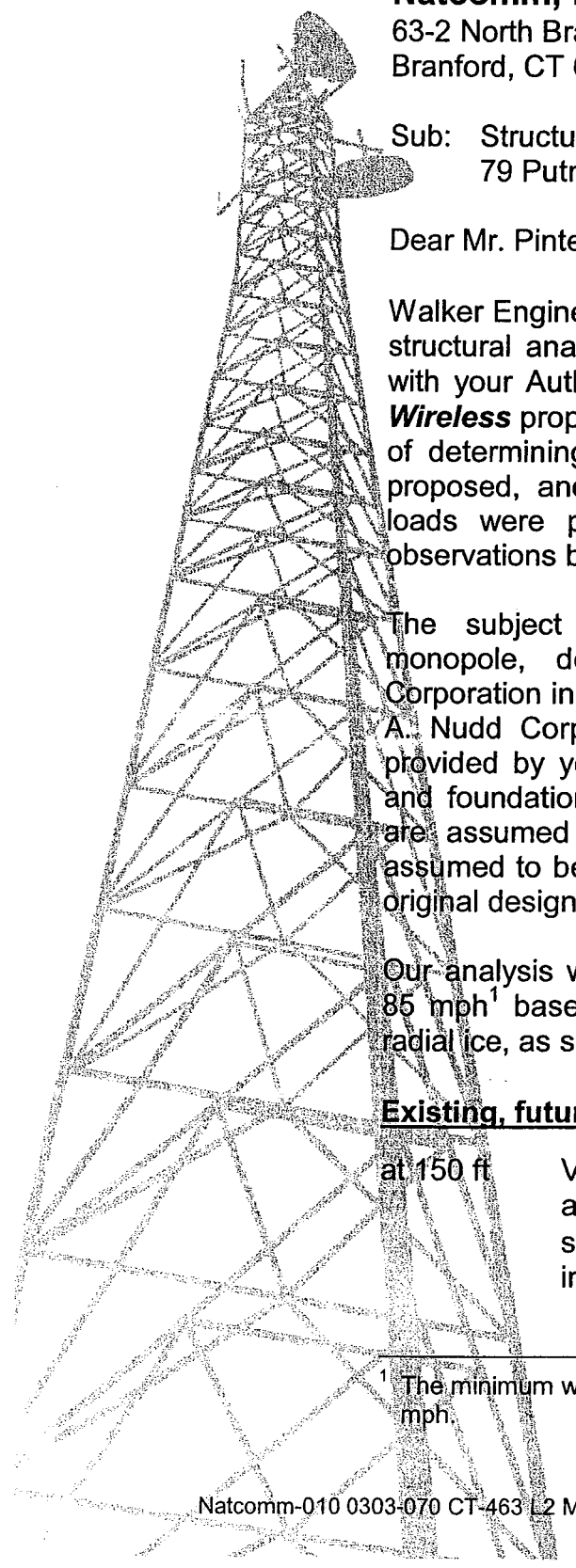
April 29, 2003

**Prepared by AT&T Wireless Services, Inc.**
Satish Bhandare, **RF Engineer**

# WALKER ENGINEERING, INC.

8451 DUNWOODY PLACE
NORTHRIDGE 400, BLDG. 8
DUNWOODY, GA 30350
(770) 641-7306 FAX (770) 587-2196

CIVIL • STRUCTURAL
N 33° 59' 13.6" W 84° 20' 26.8"

Mr. **Jason Pintek, PE**
**Natcomm, LLC**
63-2 North Branford Road
Branford, CT 06405

03/13/03
**CT-463**
**Killingly North**

Sub: Structural Analysis of 150-ft Nudd Monopole
79 Putnam Pike, Killingly, CT

Dear Mr. Pintek:

Walker Engineering has performed a Level-Two finite element, P-Δ structural analysis of the above subject monopole in accordance with your Authorization for Services for the addition of the ***AT&T Wireless*** proposed antennas outlined below. This analysis consists of determining the forces on the monopole caused by existing, proposed, and future loads. The existing, proposed, and future loads were provided by your office, in conjunction with field observations by Walker Engineering.

The subject monopole is a 150-foot, five-section, tapered monopole, designed and manufactured by Fred A. Nudd Corporation in 1998. The monopole manufacturer's drawings, Fred A. Nudd Corp., Drawing No.: 98-6090-1, dated 07/24/98, were provided by your office. The monopole geometry, section sizes, and foundation design loads were obtained from these data and are assumed to be accurate. The monopole has also been assumed to be in good condition and capable of supporting its full original design capacity.

Our analysis was performed in accordance with EIA-222-F for an 85 mph[1] base windload, and 75% of the base windload with ½" radial ice, as specified by Natcomm, LLC.

**Existing, future, and proposed loads consist of the following:**

at 150 ft — Voicestream: Six existing EMS RV-90-17-02DP panel antennas and six FE-1580-1-P72 amplifiers on three sector mounts, fed by six 1-5/8"∅ coax cables routed inside the monopole.

[1] The minimum windspeed specified by EIA-222-F for Windham County, CT is 85 mph.

at 140 ft — Sprint: Twelve existing Decibel DB980 panel antennas on three sector mounts, fed by twelve 1-5/8"∅ coax cables routed inside the monopole.

***at 130 ft*** — ***AT&T (Proposed)***: Six Allgon 7250.03 panel antennas on three EEI universal T-Arm mounts, fed by twelve 1-5/8"∅ coax cables routed inside the monopole.

at 118 ft — Town of Killingly: Two Dapa antennas on two side-arm mounts, fed by two 1-5/8"∅ coax cables routed inside the monopole.

at 86 ft — Town of Killingly: One Dapa antenna on a side-arm mount, fed by one 1-5/8"∅ coax cable routed inside the monopole.

at 80 ft — Sprint PCS: One existing GPS antenna on side-arm mount, fed by one 1/2"∅ coax cable routed inside the monopole.

**Note:** The analysis ***assumes*** that the coax cables (existing, future, and proposed) are installed on the monopole per the *Cable Plan Drawing E-7, Walker Engineering Job No. 0303-070, dated 03/13/03. Please notify the undersigned prior to altering the cable routing configuration or if the coax configuration is different than indicated above.* Placement of small cables for beacons, ground rods, etc. are not critical.

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***Note:*** *The base plate is at approximately 96% of its capacity. Therefore, the base plate will most likely require reinforcing prior to adding any future loads.*

**Other Considerations:**

Installation of access ports ("Handholes") for the proposed equipment may be required. The monopole drawing does not indicate that access ports are available at the proposed elevation. Walker Engineering can design these access ports (if required) at your request; the design can also be provided by the monopole manufacturer. Use extreme caution during the installation of the access ports to insure temporary bracing of the pole, and prevention of fires inside the pole during cutting and welding operations.

As future loads are installed, the monopole should be re-evaluated on a case-by-case basis.

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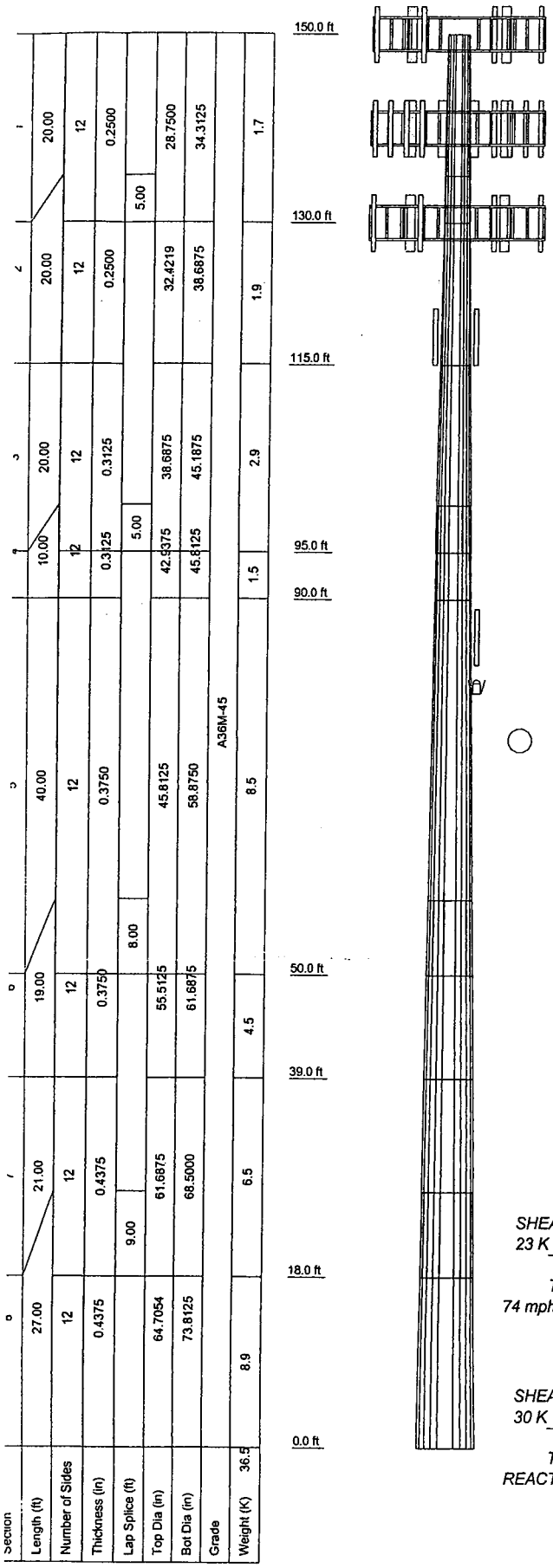
Walker Engineering Inc. appreciates the opportunity to be of service in this matter. Please do not hesitate to give me a call if you have any questions or comments.

Very truly yours,

STATE OF CONNECTICUT
JAMES L WALKER
No.21197
LICENSED
PROFESSIONAL ENGINEER

Jim Walker, P.E.

encl




| Section | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Length (ft) | 20.00 | 20.00 | 20.00 | 10.00 | 40.00 | 19.00 | 21.00 | 27.00 | |
| Number of Sides | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| Thickness (in) | 0.2500 | 0.2500 | 0.3125 | 0.3125 | 0.3750 | 0.3750 | 0.4375 | 0.4375 | |
| Lap Splice (ft) | 5.00 | | | 5.00 | | 8.00 | 9.00 | | |
| Top Dia (in) | 28.7500 | 32.4219 | 38.6875 | 42.9375 | 45.8125 | 55.5125 | 61.6875 | 64.7054 | |
| Bot Dia (in) | 34.3125 | 38.6875 | 45.1875 | 45.8125 | 58.8750 | 61.6875 | 68.5000 | 73.8125 | |
| Grade | A36M-45 | | | | | | | | |
| Weight (K) | 1.7 | 1.9 | 2.9 | 1.5 | 8.5 | 4.5 | 6.5 | 8.9 | 36.5 |

## DESIGNED APPURTENANCE LOADING

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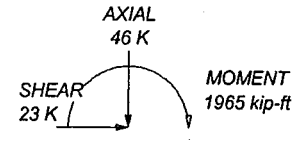
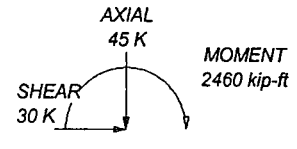



*TORQUE 0 kip-ft*
*74 mph WIND - 0.5000 in ICE*




*TORQUE 0 kip-ft*
*REACTIONS - 85 mph WIND*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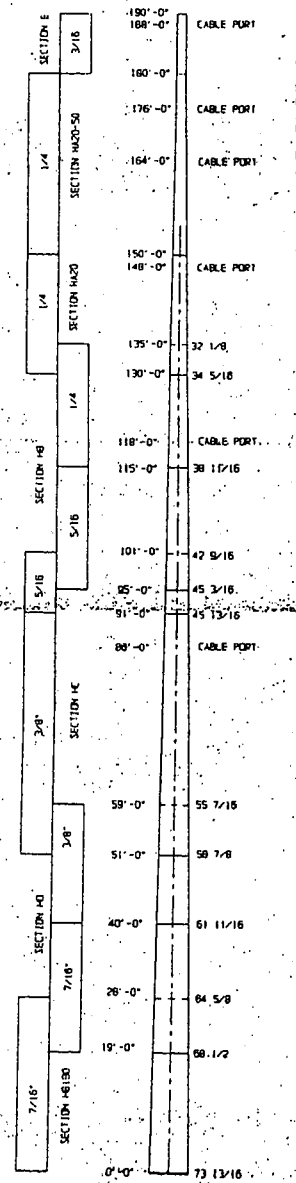
Phone: (770) 641-7306
FAX: (770) 587-2196
Tower Specialists


| | | | |
|---|---|---|---|
| Job: Natcomm-010; 0303-070 | | | |
| Project: Killingly North; AT&T - CT-463 | | | |
| Client: Natcomm, LLC | Drawn by: bhe | App'd: | |
| Code: TIA/EIA-222-F | Date: 03/14/03 | Scale: NTS | |
| Path: C:\Files\ERITower\MP\Natcomm-010 Nudd 150-ft MP.eri | | Dwg No. E-1 | |




TOWER DESIGN CONDITIONS
This tower was designed to withstand 85 mph wind speed with concurrent 1/2" radial ice per ANSI/EIA/TIA 222-E recommended standard. Worst case load condition is wind without ice. Allowable steel stresses per AISC ASD 9th Edition Allowable concrete stresses per ACI 318-89.

MATERIAL SPECIFICATIONS
Monopole Plate: ASTM A36, Fy > 45 ksi. See Calculations.
All other steel: ASTM A36, Fy > 36 ksi
Hardware: A325 Hot Dipped Galvanized Bolts with Anco Nuts.
Galvanizing: ASTM A123
Anchor Bolts: A36 modified, Fu > 105 ksi, ~~Fy > 45 ksi~~

TOWER LOADING CONDITIONS

| QTY | Antenna | Elevation |
|---|---|---|
| 12 | DAPA 58000 | 188 |
| 3 | 12' Boom | 188 |
| 12 | DAPA 58000 | 176 |
| 3 | 12' Boom | 176 |
| 12 | DAPA 58000 | 164 |
| 3 | 12' Boom | 164 |
| 6 | RV-9017-020P | 150 |
| 6 | FE-1580-1-P72 | 150 |
| 3 | Extend Arm | 150 |
| 2 | DAPA 58000 | 118 |
| 2 | Gate Boom | 118 |
| 1 | DAPA 58000 | 86 |
| 1 | Gate Boom | 86 |

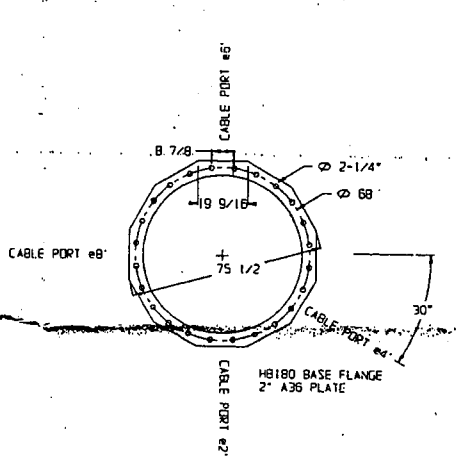
All transmission lines to be supported on the inside of pole thus adding no additional wind load.

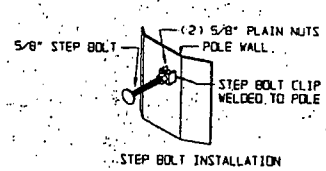
NOTE: Any deviation from the proposed design antenna loading will require a tower analysis for verification of structural integrity.

CONCRETE SPECIFICATIONS
1. Concrete shall have a minimum compressive strength of at least 3000 psi at 28 days. It is our recommendation that 4000 psi concrete be installed to account for any unknown installation variables that could degrade the concrete.
2. Concrete installation shall meet ACI 318-89 installation requirements for reinforced concrete.
3. All concrete shall be placed against undisturbed soil free of free standing water and all foreign objects and materials. If this is not possible, special pouring procedures will be required.
4. Minimum concrete cover shall be 3" over all reinforcing bars.
5. Reinforcing bars shall be ASTM A-615 Grade 60 deformed bars.
6. Assemble bars with tie wires or weld. Welding of bars must conform to AWS D1.4 specifications and must be inspected by a Fred A. Nudd engineering.
7. Proportion pouring: 80% 1's and 2's,
   20% 1's only for finishing.

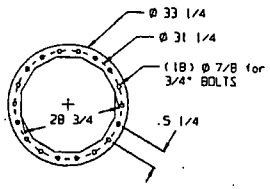
SOIL SPECIFICATIONS
SITE CONDITIONS PER OMNIPOINT, 07/23/98
1. The soil appears to be medium sand to little silt, followed by cored rock on the depth of 24'. Ground water was not encountered.
2. All foundations shall be free of free standing water as far as possible prior to pouring concrete and shall be kept thus until backfill is in place. If not possible, special pouring procedures must be followed.
3. Rock, non-cohesive, saturated or submerged soils are not to be considered as normal soil. See EIA 7.2.2.
4. Backfill shall be compacted to 100 pcf in 6" lifts using excavated material.
5. Backfill shall be placed so as to prevent accumulation of water around foundations or anchors.

Total Concrete: 50 cuyd

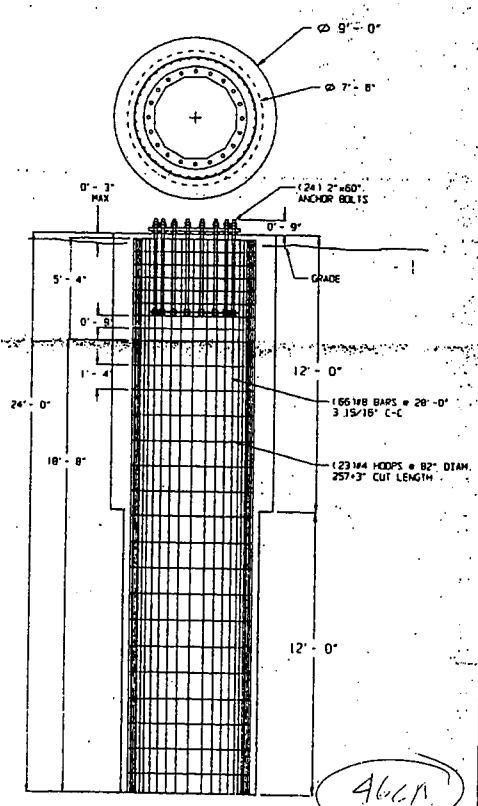


STEP BOLT INSTALLATION



HA20 FLANGE
3/4" A36 PLATE




INSTALLATION GENERAL NOTES
1. Installation of tower must be performed by a qualified tower erector.
2. Install sections such that climbing device is aligned.
3. Install safety climb per manufacturer's recommendations.
4. Slip-joint jacking force: Minimum 6000 lb.
5. Tighten all structural and anchor bolts per AISC specifications.
6. Sections are numbered at the bottom, near the climbing face.
7. Installer must grind outside/top and inside/bottom of each section and at the weld locations of the squaring bracing to facilitate slip joint fit. Cover grind area with spray galvanizing.
8. When setting pole on foundation anchor bolts, remove template prior to setting pole. Return template to Nudd Corporation for reimbursement.
9. Tighten anchor bolts uniformly in alternating pattern. (ie; car wheel lug bolt pattern)

Pole section weights:
Section HA20: 2188 +/-
Section HB: 4693 +/-
Section HC: 8042 +/-
Section HD: 8000 +/-
Section HB180: 9000 +/-

466A

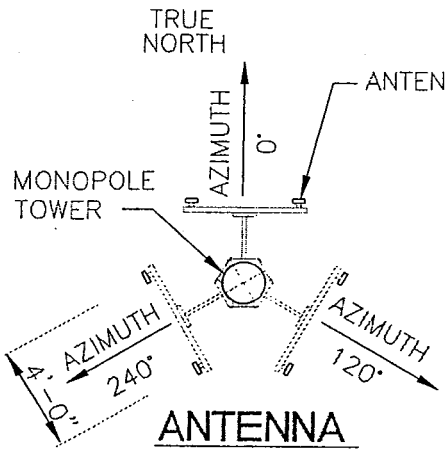
**FRED A. NUDD CORPORATION**
Route 104 • Ontario, New York 14519 • 315/524-2531

| SCALE: N/S | DRAWN BY: ELR |  |
|---|---|---|
| DATE: 7/24/98 | | |

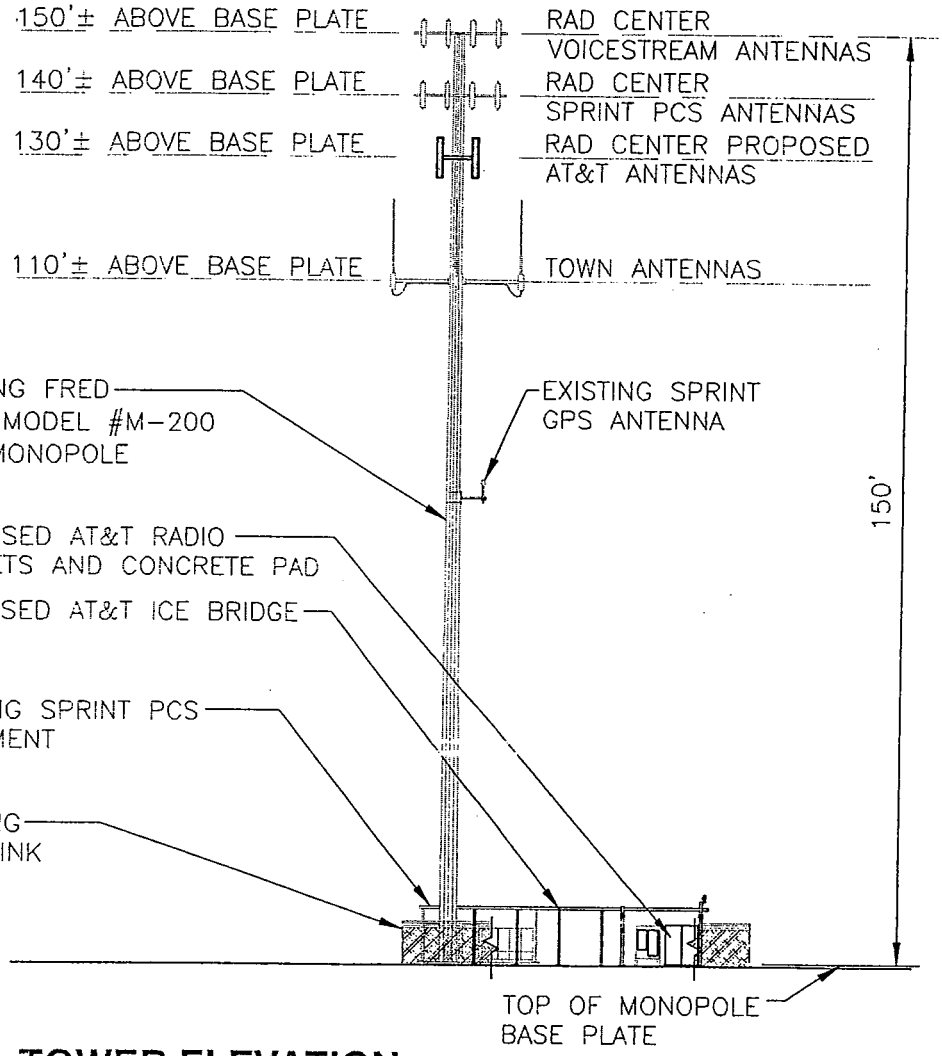
150'/190' HM-180 MONOPOLE

OMNIPOINT COMMUNICATIONS
KILLINGLY, CT SITE#:CT-11-3988

DRAWING NUMBER: 98-6090-17




## ANTENNA CONFIGURATION




**1** **TOWER ELEVATION**

SCALE: 1" = 30'-0"

NOTE:
LATITUDE: 41.8473°
LONGITUDE: 73.8712°
COORDINATES WHERE TAKEN
WITH A HAND HELD GPS

**"ISSUED FOR SITING COUNCIL"**


Natcomm, LLC
63-2 North Branford Road
Branford, Connecticut 06405
Tel. (203) 488-0580
Fax (203) 488-8587
Consulting Engineers - Project Management
Civil - Structural - Mechanical - Electrical

AT&T
AT&T WIRELESS PCS LLC
12 OMEGA DRIVE
STAMFORD, CONNECTICUT 06907


DRAWING TITLE: SITING COUNCIL

PROJECT INFORMATION: KILLINGLY NORTH
CT-463
79 PUTNAM PIKE
KILLINGLY, CT 06

PROPERTY OWNER: TOWN OF KILLINGLY

DRAWING NO. 3CO-CT463-SC02-0

| | |
|---|---|
| REVISION NO. 0 | DRAWN BY: CMS |
| DATE ISSUED: 10/30/01 | CHECKED BY: JJP |
| SCALE: AS NOTED | APPROVED BY: CFC |
| | SHEET NO. 2 OF 2 |
| A/E PROJECT NO: 462A | |