County of Fairfax, Virginia

MEMORANDUM

DATE: February 7, 2011

TO: Chris B. Caperton, Chief
Facilities Planning Branch, Planning Division, DPZ

FROM: Kevin Guinaw, Chief
Special Projects/Applications Management Branch, Zoning Evaluation Division, DPZ

SUBJECT: Proposed Clearwire Telecommunications Facility at 8616 Pohick Road;
Tax Map 98-1 ((1)) 21; 2232 Application FS-V10-47

This is in response to a request for a determination as to whether the telecommunications facility proposed by Clearwire at 8616 Pohick Road is in substantial conformance with the development conditions approved by the Board of Supervisors with Special Exception Amendment SEA 2004-MV-001 (to permit additional antennas and site modifications for a previously approved mobile and land-based telecommunication facility) and the development conditions approved by the Board of Zoning Appeals with Special Permit Amendment SPA 2004-MV-025 (to permit site modifications for a previously approved church). As described in the 2232 application dated July 30, 2010, from Adam Knubel, agent for the applicant, three (3) panel antennas (42" high x 12" wide x 5" deep) and one (1) microwave antenna (14.5" diameter) are proposed to be mounted at a height of 85 feet on the existing 125-foot tall treepole. In addition, one (1) equipment cabinet (54" high x 28" wide x 29" deep) is proposed for installation in an expanded area (10' x 10') on the east side of the equipment compound next to the base of the treepole. A copy of the 2232 application with illustrations of the proposed locations of the telecommunications equipment is attached.

The Zoning Administration Division has determined that a telecommunications facility as described above is a permitted use pursuant to the provisions of Sect. 2-514 of the Zoning Ordinance provided that it is determined to be in substantial conformance with any applicable special exception and special permit. It is my determination that the proposed telecommunications facility described above is in substantial conformance with the above-referenced applications, provided that additional branches are added to maintain the appearance of the treepole per Development Condition 14, and that no existing trees are removed with the expansion of the equipment compound. Please note that this proposal is subject to 2232 review requirements and that the applicant's ability to proceed is dependent upon approval of the pending 2232 feature-shown application by the Fairfax County Planning Commission. This determination has been made in my capacity as the duly authorized agent of the Zoning Administrator. If you have any questions regarding this memorandum, please call Carrie Lee at (703) 324-1290.

KG/CDL/O:\clee01\ActionAssignments\Antennas\8616 Pohick Rd_monopole\8616 Pohick Rd_Clearwire.doc

Attachments: A/S

cc: Gerald W. Hyland, Supervisor, Mount Vernon District
Earl Flanagan Planning Commissioner, Mount Vernon District
Barbara C. Berlin, Director, Zoning Evaluation Division, DPZ
Diane Johnson-Quinn, Deputy Zoning Administrator, Zoning Permit Review, ZAD, DPZ
Steve Weber, Network Building & Consulting LLC, 7380 Coca Cola Dr., Suite 106, Hanover, MD 21076
File: SEA 2004-MV-001, SPA 2004-MV-025, ANT 1008 064, Imaging, Reading File

MEMORANDUM

TO: Lorrie Kirst, Deputy Zoning Administrator, ZAD **DATE:** 8-3-10
Other: _____

FAIRFAX COUNTY RECEIVED
AUG - 3 2010
2010-0559
DIVISION OF ZONING ADMINISTRATION

FROM: David B. Marshall, Chief
Facilities Planning Branch, DPZ

SUBJECT: Request for Review: 2232 Application

RE: Application Number: FS-V10-47 Tax Map: 98-1(01) 21

Attached for your review and comment is a 2232 Review application:

RECEIVED
Department of Planning & Zoning
AUG 19 2010
Zoning Evaluation Division

RECEIVED FROM: Clearwire
PROPOSED USE: Tree pole Collocation
LOCATION OF USE: 8616 Pohick Road
ADDITIONAL COMMENTS: T

Please send your comments to David Marshall by: 8/30/10
Staff Coordinator: Connie Mayer **Phone:** 324-1263 **Email:** Constance.mayer@fairfaxcounty.gov

****ZAD COMMENTS:**

Property is zoned R-1
_____ Proposed use is permitted by Zoning Ordinance and meets all zoning requirements.
___/___ Proposed use does not meet all Zoning requirements as follows:

See attached

Referred to ZED for the following: Must be in substantial conformance with
ZAD comments prepared by: Brian Parsons Date: 8/4/10

****ZED COMMENTS:** SEA 2004-MV-001 and SPA 2004-MV-025.
_____ Proposed use is in substantial conformance with all development conditions and/or proffers.
_____ Proposed use is not in substantial accord with all development conditions and proffers.

**ZED comments prepared by: _____ Date: _____

Department of Planning and Zoning
Planning Division
12055 Government Center Parkway, Suite730
Fairfax, Virginia 22035-5509
Phone 703-324-1380
Fax 703-324-3056
www.fairfaxcounty.gov/dpz/

DEPARTMENT OF PLANNING & ZONING

Kirst, Lorrie

From: Kirst, Lorrie
Sent: Wednesday, August 18, 2010 4:17 PM
To: Maier, Constance A.
Cc: Parsons, Brian S.
Subject: FW: FS-V10-47, Clearwire, 8616 Pohick Road

FS-V10-47

Clearwire- treepole collocation

8616 Pohick Road (Calvary Korean Baptist Church)

Tax Map Ref.: 98-1 ((1)) 21

Zoning District: R-1

The proposed use meets the requirements of Par. 1 of Sect. 2-514 of the Zoning Ordinance.

Refer to ZAD: Must be in substantial conformance with SEA 2004-MV-001 and SPA 2004-MV-025.

RECEIVED
JUL 30 2010
DEPARTMENT OF PLANNING & ZONING
PLANNING DIVISION

COUNTY OF FAIRFAX, VIRGINIA

APPLICATION FOR DETERMINATION PURSUANT TO SECTION 15.2–2232 OF THE CODE OF VIRGINIA

Application Number: FS-V10-47
(assigned by staff)

The application con ains three parts: I. Application Summary; II. Statement of Justification; and I Telecommunication Proposal Details. Please do not staple, bind or hole-punch this application. Please provide at least one copy of all pages, including maps and drawings, on 8.5 x 11 inch paper.

(Please Type or Print All Requested Information)

PART I: APPLICATION SUMMARY

ADDRESS OF PROPOSED USE

Street Address 8616 Pohick Road

City/Town Springfield Zip Code 22153

APPLICANT(S)

Name of Applicant Adam Knubel for Clearwire

Street Address 7380 Coca Cola Drive, Suite 106

City/Town Hanover State MD Zip Code 21076~~410~~

Telephone Number: Work (410) 712-7092 Fax (410) 712-4056

E-mail Address aknubel@nbcllc.com

Name of Applicant's Agent/Contact (if applicable) N/A Steve Weber

Agent's Street Address _____

City/Town _____ State _____ Zip Code _____

Telephone: Work (___) _____ Fax (___) _____

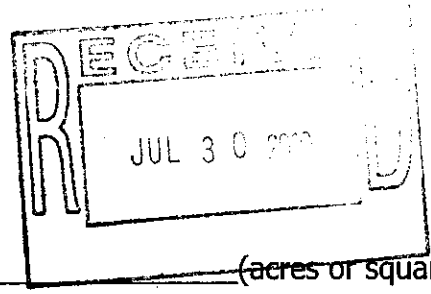
PROPOSED USE

Street Address 8616 Pohick Road

Fairfax Co. Tax Map and Parcel Number(s) 0981 01 0021

Brief Description of Proposed Use

At 8616 Pohick Road, Clearwire proposes to install an unmanned telecommunications, the proposed installation includes three (3) 42"x12"x5" panel antennas, one (1) microwave antenna and one (1) equipment cabinet. The radio cabinet will be located inside a fenced compound. The fence will be board on board.



Total Area of Subject Parcel(s) 3.9792 ac (acres or square feet)

Portion of Site Occupied by Proposed Use 100 sf (acres or square feet)

Fairfax County Supervisor District Mt. Vernon

Planned Use of Subject Property (according to Fairfax County Comprehensive Plan)

Zoning of Subject Property R-1

List all applicable Proffer Conditions, Development Plans, Special Exceptions, Special Permits or Variances previously approved and related to this site

PROPERTY OWNER(s) OF RECORD

Owner CHURCH BAPTIST, CALVARY KOREAN TRS OF

Street Address 8616 Pohick Road

City/Town Springfield State VA Zip Code 22153

PART II, *entitled "Statement of Justification," pages 4 through 6, shall be completed by all applicants and included as part of the application.* ***PART III,*** *entitled "Telecommunication Proposal Details," pages 7 through 9, also shall be completed and included for all proposed telecommunication uses.*

Name of Applicant or Agent Adam Knubel for Clearwire

Signature of Applicant or Agent

Date 29 July 2010

****

Please do not staple, bind or hole-punch this application. Please provide at least one copy of all pages, including maps and drawings, on 8.5 x 11 inch paper.

Submit completed application to:

RECEIVED July 30, 2010

Fairfax County
Department of Planning and Zoning, Planning Division
Herrity Building
12055 Government Center Parkway, Suite 730
Fairfax, Virginia 22035

****

FOR STAFF USE ONLY

Date application received: 7/30/10

By: CTM

Additional information requested to complete application:

Date application accepted: __/__/__

By:

NETWORK BUILDING
& CONSULTING, LLC

July 29, 2010

Mr. James P. Zook, Director
Fairfax County Office of Comprehensive Planning
12055 Government Center Parkway, Suite 730
Fairfax, Virginia 22035-5505

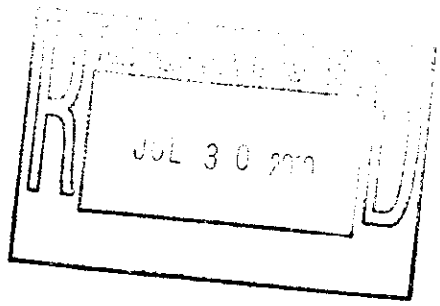
RE: Feature Shown Application
8616 Pohick Road
Springfield, VA 22153
Applicant: Clearwire
Clearwire Site Number: VA-WSH416

Dear Mr. Zook:

Clearwire, an FCC licensed provider of wireless personal telecommunications services, proposes to install an unmanned telecommunications, the proposed installation includes three (3) 42"x12"x5" panel antennas, one (1) microwave antenna and one (1) equipment cabinet. The radio cabinet will be located inside a fenced compound. The fence will be board on board.

APPLICANT:

Clearwire
5808 Lake Washington Blvd., Suite 300
Kirkland, WA 98033



APPLICANT'S AGENT:

Adam Knubel
7380 Coca Cola Drive, Suite 106
Hanover, Maryland 21076
410.712.7092
aknubel@nbcllc.com

SITE LOCATION:

Tax Map: 0981 01 0021
Address: 8616 Pohick Road
Zoning District: R-1
Use: Telecommunication Facility
Use Group: U
Supervisor District: Mt. Vernon

DESCRIPTION OF PROPOSAL:

NETWORK BUILDING
& CONSULTING, LLC

At 8616 Pohick Road, Clearwire proposes to install an unmanned telecommunications, the proposed installation includes three (3) 42"x12"x5" panel antennas, one (1) microwave antenna and one (1) equipment cabinet. The radio cabinet will be located inside a fenced compound. The fence will be board on board.

The facility will operate automatically and will not require personnel or hours of attendance. It will operate twenty-four (24) hours a day, 365 days a year. It is anticipated that a technician will need to perform routine maintenance on the facility at a rate of once or twice per month or on an "as needed" basis for cases of emergency repair.

RECEIVED
JUL 30 2010

REQUIREMENT FOR PROPOSED USE:

The proposed installation is part of Clearwire's communications network. Clearwire's technology is line of site technology, which accounts for the placement of its installations on existing towers and tall structures.

ANTICIPATED IMPACTS ON ADJOINING PROPERTIES:

Clearwire has eliminated the need for a new telecommunications monopole or tower in the search area and employs an antenna and equipment cabinet configuration that minimizes the visual impact of the project on the surrounding property owners. Due to the fact that the facility will be unmanned, there will be no other impact of the underlying Amendment to Feature Shown.

RELATIONSHIP OF THE PROPOSAL TO THE COMPREHENSIVE PLAN:

The location, character and extent of the application should be found to be in substantial accord with the Comprehensive Plan.

The instant application is also consistent with the objectives found under the Policy Plan of the Comprehensive Plan concerning "Mobile and Land-Based Telecommunication Services."

Under the "General Guidelines" section, it states:

Objective 42: In order to provide for the multiple and land-based telecommunication network for wireless telecommunication systems licensed by the Federal Communications Commission, and in order to achieve opportunities for the collocation of related facilities and the reduction of their visual impact, locate the network's necessary support facilities which include antennas, monopoles, lattice towers and equipment building in accordance with the following policies:

Policy b. ***Avoid construction of new structures by locating mobile and land-based telecommunication facilities on available existing structures such as building rooftops, telecommunication broadcast poles and towers, electrical utility poles and towers, and water storage facilities when the telecommunication facilities can be placed inconspicuously to blend with existing structures.***

Proposal is consistent.

Policy g. ***Design, site and/or landscape mobile and land-based telecommunication facilities to minimize impacts on the character of the property and surrounding areas. Demonstrate the appropriateness of the design through facility schematics and plans which detail the type, location, height, and material of the proposed structures and their relationship to other structures on the property and surrounding areas.***

Proposal is consistent.

RECEIVED
JUL 30 2021

Policy i. ***Locate telecommunication facilities to ensure the protection of historically significant landscapes. The views of and vistas from architecturally and/or historically significant structures should not be impaired or diminished by the placement of telecommunication facilities.***

Proposal is consistent.

Policy j. ***Site proposed facilities to avoid areas of environmental sensitivity.***

Proposal is consistent.

Objective 43: Design telecommunication facilities to mitigate their visual presence and prominence, particularly when located in residential areas, by concealing their intended purpose in a way that is consistent with the character of the surrounding area.

Policy a. ***Disguise and camouflage the appearance of telecommunication facilities so as to resemble other man-made structures and natural features (such as flagpoles, bell towers, and trees) that are typically found in a similar context and belong to the setting where placed.***

Co-location on an existing tree pole minimizes impact by avoiding a need for a new site.

Objective 44: With Planning Commission approval, consider mobile and land-based telecommunication facilities to be located on existing or replacement structures a "feature shown" of the Comprehensive Plan to be processed without a public hearing when placed in conformance with the following policies:

Policy a.: ***Locate telecommunication facilities on existing buildings and structures at the following properties:***

- ***commercial and industrial zoned property and in the commercial areas of PDH, PDC, PRM and PRC zoning districts***

The proposed facility is located within R-1 zoning district. However, by utilizing an existing tree pole Clearwire has avoided the need to construct a new tower or monopole.

RECEIVED

Policy c.: ***In determining that the proposed telecommunication facilities are a feature shown of the Comprehensive Plan, ensure that the following general factors are met:***

- ***the proposed installation has no material adverse impact on the visual quality or character of the general area in which it is to be placed including any surrounding residential properties;***

Proposal is consistent.

- ***the proposed installation is located and designed to blend with the structure on which it is placed such as flush-mounting antennas or screening the antennas and equipment as appropriate to the site;***

This is a co-location on an existing 120' tree pole.

- ***the proposed installation, when in a grouping of other similar structures, is consistent with the pattern of those surrounding structures;***

Proposal is consistent.

- ***related equipment cabinets or shelters located on the ground or on a rooftop should be appropriately screened or placed to obscure their visibility from surrounding properties;***

NETWORK BUILDING
& CONSULTING, LLC

Proposal is consistent.

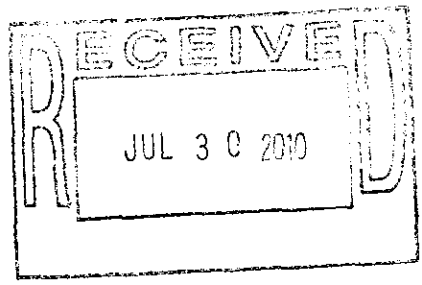
ALTERNATIVE SITES CONSIDERED FOR THIS PROPOSAL

Clearwire is expanding its own antenna installation to meet its customers needs in this area and for this reason chose to collocate additional antennas at this site. Since the installation is a collocation and meets the objectives of the plan, Clearwire does not see any need to evaluate alternative locations.

The applicant submits to the Planning Commission that the proposal is consistent with the Comprehensive Plan as to character, location and extent and requests that the Planning Commission determine that the facility is a feature shown. If you have any questions, or need further information, please feel free to contact me at 410.459.8573 or **aknubel@nbcllc.com**.

Sincerely,

Adam Knubel
Zoning Project Manager
Network Building & Consulting
Consultant to ClearWire



PART III: TELECOMMUNICATION PROPOSAL DETAILS

Please complete and provide all requested information. If question is not applicable to the proposed use, please indicate with N/A.

PROPOSED TELECOMMUNICATION USE

Use is (check one):

- ☐ New structure (monopole, tower or camouflaged facility)
- ☐ Replacement of existing pole or tower at same location with another pole or tower
- ☐ Antenna placement on building or penthouse facade
- ☐ Antenna placement on building or penthouse rooftop
- ☑ Collocation on other existing telecommunications structure (monopole or tower)
- ☐ Collocation on other non-telecommunications structure (such as an electric transmission tower/pole, utility pole, water tower, etc.)
- ☐ Modification to telecommunications facility previously approved for same applicant:
  Prior 2232 Review application number: _____
  Date of Planning Commission approval: _____

RECEIVED
JUL 30 2010

PROJECT DETAILS

1. ANTENNA

Number and Type: 3 panel antennas and one (1) ~~microwave~~ antenna
Dimensions: height 42" width 12" depth 5" diameter 14.5"
Location / Placement: Stealth Tree Pole
Wattage: 250 watts
Material and Color: Plastic & Steel; Paint to Match
Material and Color of the Antenna Mounting: Steel; Paint to match
Height Above Ground: 85 feet

2. EQUIPMENT

Number and Type of Cabinets or Structures: 1 cabinet
Cabinet / Structure Dimensions: height 54" width 28" depth 29"
Height of equipment platforms, if any: N/A
Material and Color: Steel, Grey
Location: Fenced Compound
Method of Screening: 8 ft board fence

3. STRUCTURE ON WHICH ANTENNAS WILL BE MOUNTED

Maximum Height: 120 feet
Material: Steel
Color: Stealth Tree Pole
If structure is within a utility right-of-way, state right-of-way width:

MAP #: 0981 01 0021
CHURCH BAPTIST **8616 POHICK RD**

Owner

Name	CHURCH BAPTIST, CALVARY KOREAN TRS OF
Mailing Address	8616 POHICK RD SPRINGFIELD VA 22153
Book	08212
Page	0966

Parcel

Property Location	8616 POHICK RD
Map #	0981 01 0021
Tax District	60000
District Name	MT VERNON
Land Use Code	Churches, Synagogues
Land Area (acreage)	3.9792
Land Area (SQFT)	
Zoning Description	R-1(Residential 1 DU/AC)
Utilities	WATER CONNECTED SEWER NOT AVAILABLE GAS NOT AVAILABLE
County Historic Overlay District	NO For further information about Historic Overlay Districts, Click here
Street/Road	PAVED
Site Description	BUILDABLE-GOOD LOT

Legal Description

Legal Description	MIDDLE RUN CHURCH

Sales History

Date	Amount	Seller	Buyer
08/04/1992	$480,000		CHURCH BAPTIST
07/26/1971	$0		

Sales

1 of 2

Date	08/04/1992
Amount	$480,000
Seller	
Buyer	CHURCH BAPTIST
Notes	Valid and verified sale
Deed Book and Page	08212-0966
Additional Notes	

Values

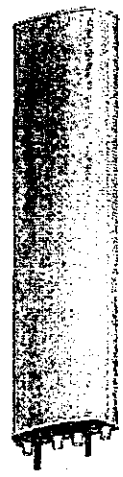
Current Land	$1,121,000
Current Building	$411,400
Current Assessed Total	$1,532,400
Tax Exempt	YES
Note	

Values History

Tax Year	Land	Building	Assessed Total	Tax Exempt
2010	$1,121,000	$411,400	$1,532,400	YES
2009	$1,121,000	$411,400	$1,532,400	YES
2008	$1,121,000	$411,400	$1,532,400	YES
2007	$830,000	$411,400	$1,241,400	YES

2300-2700MHz Remote Tilt Panel Antenna

Electrical Specifications



Frequency Range	2300 - 2700 MHz / 2300 - 2700 MHz
Gain	17.3 dBi 2.4 GHz18 dBi 2.6 GHz
Return Loss	> 15 dB
Polarization	Dual Slant ± 45°
Horizontal Beamwidth	65°
Vertical Beamwidth	6.5° with nullfill
Electrical Downtilt	0° - 10° Independently continuously adjustable
Upper Sidelobe Level	< -18 dB
Front to Back Ratio	> 30 dB
Isolation Between Ports	> 30 dB
Power Rating	250W
Impedance	50 ohm
Lightning Protection	DC grounded
Connector Type	N-Type female or 4.1-9.5 DIN
RET Type	Internal motor & manual override
RET Interface	AISG1 Remotely upgradeable
RET Connector	Single AISG1 8 pin male

Mechanical Specifications

Antenna Dimensions	1070x300x115 mm
Packed Dimensions	1200x330x200 mm
Antenna Weight	13 kg
Radome Material	Polyester Fibreglass pultrusion

Maximum Environmental Ratings

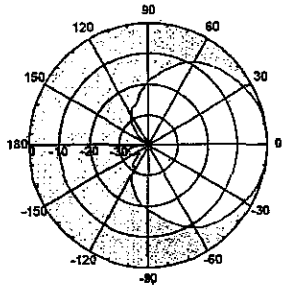
Humidity	95% RH @ +30°C
Lateral Loading (Front)	0.45 kN @ 160 km/h
Lateral Loading (Rear)	0.48 kN @ 160 km/h
Rain	140mm per hour
Rated Wind Velocity	200 km/h
Temperature	-40°C to +70°C

Mounting Options

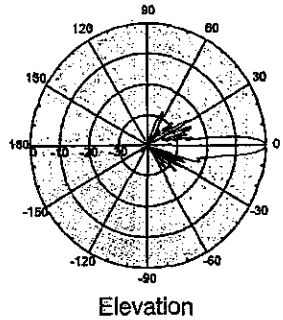
F-042-GL-E	Fixed Clamps
T-045-GL-E	Adjustable Clamps

Product Options

LLPX310R	N-Type female
LLPX310R-D	4.1-9.5 DIN



Azimuth



Elevation

Last Updated: 09-12-2008

Argus Technologies (Australia) Pty Ltd
10-12 Lexington Drive, Norwest Business Park, Bella Vista NSW 2153 Australia
T +61 2 8884 0888 F +61 2 8884 0882 E info@argusantennas.com W www.argusantennas.com
Argus Technologies is continually improving products. Specifications may change at any time without notice

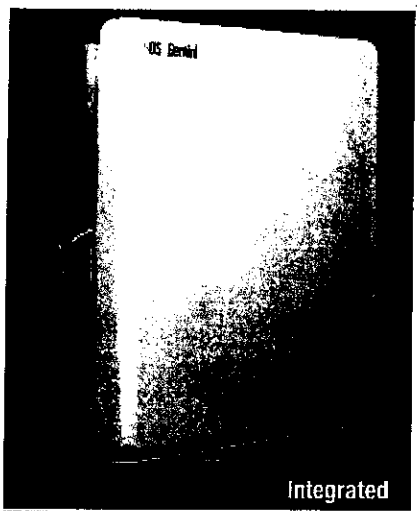
Data Sheet

OS Gemini & OS Gemini Lite

OS-GEMINI FAMILY OF PRODUCTS

High-Availability 5.4 GHz and 5.8 GHz Wireless Ethernet Bridges

Your Solutions for Obstructed and High-Interference Environments as well as Long-Range Line-of-Sight Links, Including Those Over Water



Integrated

Connectorized

Which word best defines success in wireless connectivity? Is it availability? Reliability? How about speed?

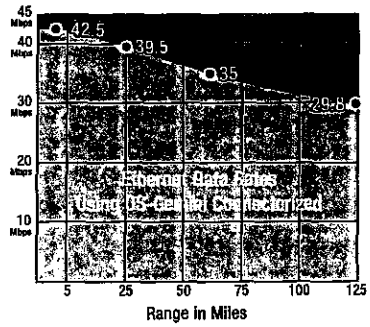
Consider this: 85% of properties 1500 feet apart have no optical Line-of-Sight path between their roofs. For them, a conventional wireless solution won't work 75% of the time. OS-Gemini succeeds over 99% of the time.

Operating in the 5.4 GHz and 5.8 GHz unlicensed bands, the OS-Gemini point-to-point wireless Ethernet bridges succeed where more conventional solutions disappoint. We achieve far more reliable connections, much more often, at faster data rates – because OS-Gemini solutions can maintain as high as 99.999% availability in challenging environments. Even in supposedly connection-friendly applications, OS-Gemini radios protect against the transient attenuation, fading and dispersion that degrade all wireless signals. (It is recommended that regulatory conditions for radio-frequency bands be confirmed prior to system purchase.)

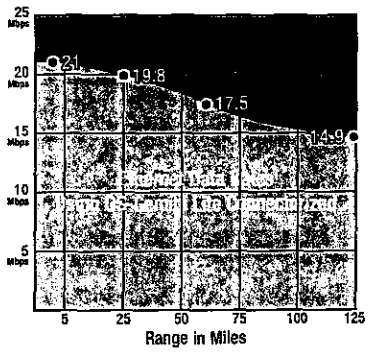
There are four products within the OS-Gemini line:

- **OS-Gemini Integrated:** With up to 43 Mbps Ethernet data rate and a built-in antenna, the OS-Gemini Integrated is the perfect choice for Non-Line-of-Sight (NLoS) and near-Line-of-Sight (nLoS) environments.
- **OS-Gemini Lite Integrated:** The OS-Gemini Lite includes all the same robust technology of the OS-Gemini Integrated, but at less cost. It's an excellent entry-level solution for growing WISPs and ISPs and for any budget-constrained organization that needs a robust solution to overcome interference and navigate obstructions. With up to 21 Mbps Ethernet data rate, the OS-Gemini Lite is software upgradeable to 43 Mbps as throughput requirements increase.
- **OS-Gemini Connectorized:** The OS-Gemini Connectorized combines all the innovative Orthogon technology found in the OS-Gemini Integrated with the high-gain advantage of external antennas. In extremely adverse environments, including deep Non-Line-of-Sight, this solution lets you connect over greater distance, at a higher level of reliability and at higher speed than other wireless bridges.
- **OS-Gemini Lite Connectorized:** With all the performance and reliability of the OS-Gemini Connectorized, at less cost, this solution delivers up to 21 Mbps in extremely adverse environments. Then as bandwidth requirements grow, you can easily upgrade from 21 Mbps to 43 Mbps.

Performance with OS-Gemini Connectorized



Performance with OS-Gemini Lite Connectorized



How Far Will OS-Gemini Connectorized Take You?

Each OS-Gemini Connectorized and OS-Gemini Lite Connectorized radio connects to an external antenna to increase signal gain, and, therefore, the range and robustness of the link. As the diagrams show, throughput rates remain consistently high from a distance of a few miles to 124 miles (200 km). At the maximum range, 29.8 Mbps and 14.9 Mbps Ethernet data rates – OS-Gemini and OS-Gemini Lite respectively – can be sustained over a Line-of-Sight path, using a six-foot antenna. (A list of Orthogon-approved antennas that meet FCC requirements is provided on our web site.) In Non-Line-of-Sight environments, both Connectorized systems can increase link availability up to 99.999%. Prior to purchase, you can use our OS-Gemini Link Estimator to predict link reliability and throughput for your specific wireless application.

A Unique Technology Combination

OS-Gemini's success (and therefore yours as well) results from a unique combination of technologies – the overall effect of which is much more powerful than using any of them individually. You can acquire this combination in a surprisingly small form factor that is easy to install and maintain, even in aesthetically or physically restrictive environments. These technologies include:

- **Multi-Beam Space Time Coding:** OS-Gemini radiates multiple beams from the antenna – the effect of which is to significantly protect against fading and to radically increase the probability that the receiver will decode a useable signal.

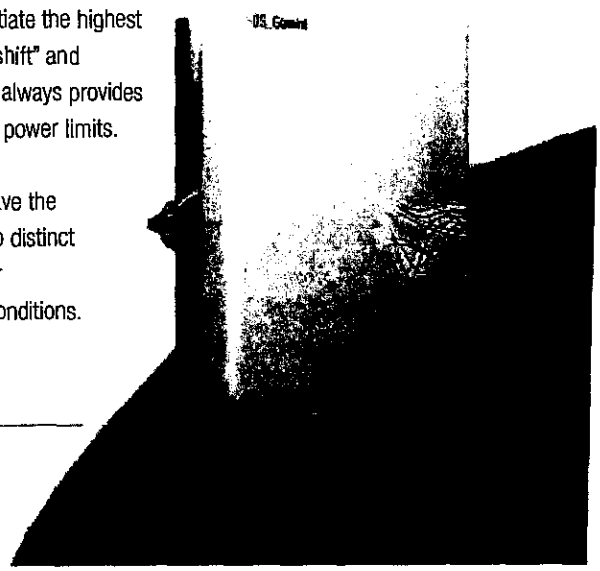
- **Best-In-Class Radio:** A powerful transmitter combined with a super-sensitive receiver delivers a class-leading 168 dB system gain. This is 25 times better than the performance of our closest competitor.

- ***Intelligent* Orthogonal Frequency Division Multiplexing (*i*-OFDM):** OFDM is now the industry-recognized method of reducing interference caused by signals that take multiple paths arriving out of phase at the receiver. OS-Gemini takes this technology further by using more sub-carriers and pilot tones than our competitors to provide class-leading capability for handling multipath dispersion and instant fade recovery.

- **Advanced Spectrum Management with *i*-DFS:** Our *intelligent* Dynamic Frequency Selection (*i*-DFS) is at the heart of our exceptional spectrum management capabilities. At power-up and all during operation, OS-Gemini scans the band – 500 times a second – and automatically switches to the clearest channel. Our 25-hour, time-stamped database alerts you to any interference that does exist and provides statistics that help you pinpoint which channels offer the clearest data paths. This is "licensed-band, interference-free performance in an unlicensed band!"

- **Adaptive Modulation:** Transmitter and receiver negotiate the highest mutually sustainable data rate – then dynamically "upshift" and "downshift" the rate as conditions change. OS-Gemini always provides the maximum performance possible within the current power limits.

- **Spatial Diversity:** As the only license-free radio to have the capabilities of Spatial Diversity, OS-Gemini enables two distinct paths that are not simultaneously affected by fading or multipath – giving you a very reliable link in adverse conditions.



OS-Gemini operates over the license-exempt 5.4 GHz and 5.8 GHz bands and involves no ongoing expense – so cost of ownership is low and ROI is typically less than one year.

That's another definition of success.

OS-Gemini 5.4 Part Numbers

2413 OS-Gemini 5.4 Integrated
2414 OS-Gemini 5.4 Connectorized
2415 OS-Gemini Lite 5.4 Integrated
2416 OS-Gemini Lite 5.4 Connectorized

OS-Gemini 5.8 Part Numbers

1770 OS-Gemini 5.8 Integrated
1800 OS-Gemini 5.8 Connectorized
1771 OS-Gemini Lite 5.8 Integrated
1804 OS-Gemini Lite 5.8 Connectorized

Power Up and Point

OS-Gemini radios are easy to install and automatically select the clearest channel, modulation scheme and transmit power for the link. A link comprises two outdoor units and two indoor units complete with the required mounting kit. Large antenna beamwidth simplifies the initial connection, and an audio tone assists the installer to optimize link alignment. The indoor unit (about the size of a pocket dictionary) connects to power and your LAN. The small outdoor unit is a neutral color, making it ideal for aesthetically restrictive areas.

Productivity Payoff

OS-Gemini's performance means more productive users, fewer connection points and, ultimately, much lower cost of ownership. You avoid the expense of leased lines, the disruptions of unreliable service and the hassles of trying to find Line-of-Sight locations. OS-Gemini is usually the lower-cost option when you consider:

- The business impact from low-availability and unreliable or slow wireless solutions
- Easy remote management and maintenance with our onboard software
- The effects of relocations, foliage growth or building construction

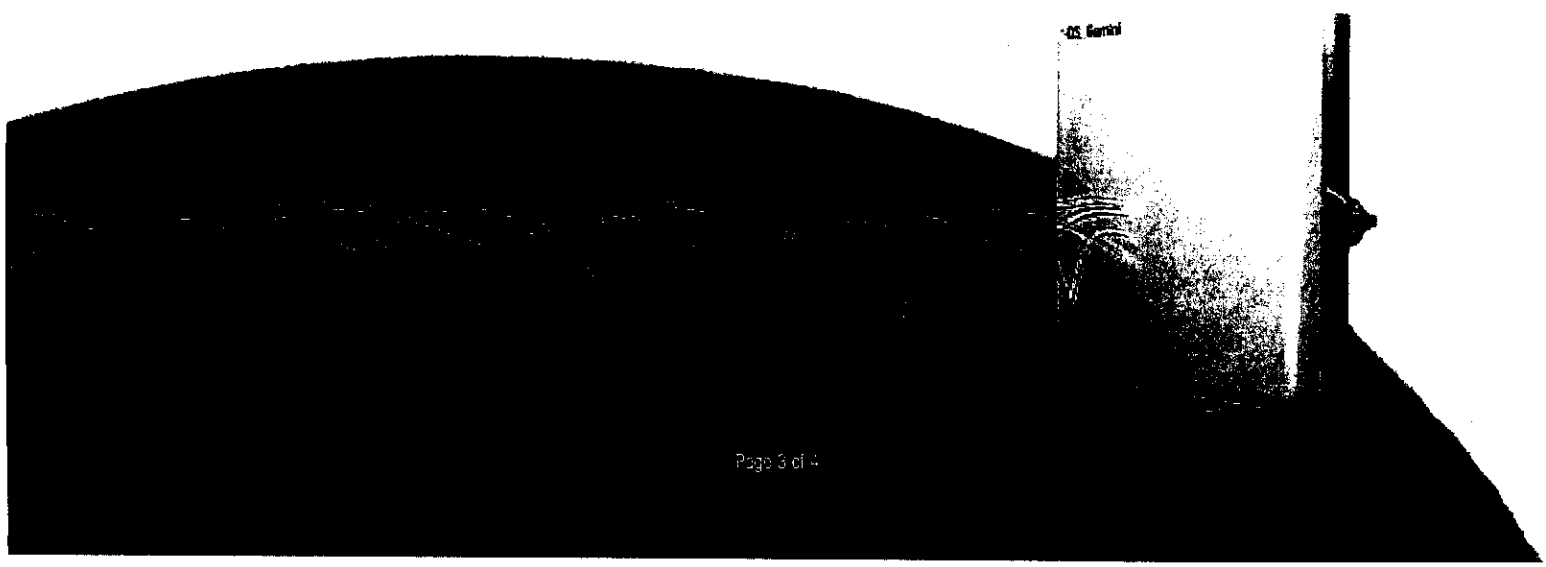
Put OS-Gemini To Work for You

- **Service Providers:** Where geography is a challenge and infrastructure a priority, mobile operators and Internet providers can offer super-reliable, robust coverage. Simply use OS-Gemini to backhaul traffic from multiple wireless LAN access points to a point of presence.

- **Vertical Markets:** Are you looking to create a seamless meshed network over a wide geographic area covering multiple buildings and open spaces? OS-Gemini is an extraordinarily cost-effective, high-powered alternative for a wide variety of organizations including government agencies, universities, schools and hospitals.

- **Enterprises:** A single OS-Gemini link can provide a high-capacity, secure link, quickly creating a seamless local area network between company headquarters and a warehouse, branch office, service center or other facility.

Orthogon Systems' products are available through our value-added distributors around the world. Our Authorized Distributors can be found in our Partner section at http://www.orthogonsystems.com/partners/partners.html. Distributors are listed under the "Where to Buy" links within each respective Geographic Territory.



Technical Specifications for the

OS-Gemini Systems

Radio Technology	Remarks
RF band	5.725 GHz – 5.850 GHz*
	5.470 GHz – 5.725 GHz*
Channel size	12 MHz
Channel selection / dynamic frequency control	By *Intelligent* Dynamic Frequency Selection (i-DFS) or manual intervention; automatic detection on start-up and continual adaptation to avoid interference
Transmit power control	Adaptive, varying between 25 dBm and -10 dBm according to modulation selected and radio path**
System gain	**Integrated & Connectorized:** Varies with modulation mode and antenna type between 138 dB and 168 dB with 23.5 dBi integrated antenna**
	Connectorized: Up to 166 dB and 195 dB**
Receiver sensitivity	Adaptive, varying between -96.0 dBm and -72 dBm according to modulation selected
Modulation	Dynamic; 8 modes adapting between BPSK and 64 QAM
Error correction	FEC, ARQ
Duplex scheme	TDD ratio 50:50, 66:33; same or split frequency Tx/Rx
Antenna: type / gain / B / W	**Integrated:** Integrated flat plate 23 dBi / 7°
	Connectorized: Approved to operate with flat plate up to 28 dBi. Parabolic dish up to 37.7 dBi; connected via 2 x N-type female
Range	Up to 124 miles (200 km)***
Data rates	**OS-Gemini:** Up to 43 Mbps; dynamically variable with modulation range from 3.0 Mbps to 43 Mbps (aggregate)
	OS-Gemini Lite: Up to 21 Mbps; dynamically variable with modulation range from 1.5 Mbps to 21 Mbps (aggregate)
Security & encryption	Proprietary scrambling mechanism; optional AES 128 Bit Encryption
	** Regulatory conditions for RF bands should be confirmed prior to system purchase*
	*** Gain and maximum transmit power may vary based on regulatory domain*
	**** In all cases the range limit is set by the latest software release*

Ethernet Bridging	Remarks
Protocol	IEEE 802.3
User data throughput	**OS-Gemini:** Dynamically variable up to 43 Mbps at the Ethernet (aggregate)
	OS-Gemini Lite: Dynamically variable up to 21 Mbps at the Ethernet (aggregate)
Packet prioritization	IEEE 802.1p
Interface	10 BASE-T / 100 BASE-T (RJ-45)-auto MDI/MDIX switching

Management & Installation	Remarks
LED indicators	Power status, Ethernet link status and activity
System management	Web Server and SNMP
Installation	Built-in audio assistance for link optimization
Connection	Distance between outdoor unit and primary network connection: up to 330' (100 meters)

Physical	Remarks
Dimensions	**Integrated Outdoor Unit (ODU):** Width 14.5" (370 mm), Height 14.5" (370 mm), Depth 3.75" (95 mm)
	Connectorized ODU: Width 12" (305 mm), Height 12" (305 mm), Depth 4.1" (105 mm)
	Powered Indoor Unit (PIDU *Plus*): Width 9.75" (250 mm), Height 1.5" (40 mm), Depth 3" (80 mm)
Weight	**Integrated ODU:** 12.1 lbs (5.5 kg) including bracket
	Connectorized ODU: 9.1 lbs (4.3 kg) including bracket
	PIDU *Plus*: 1.9 lbs (864 g)
Wind speed	150 mph (242 kph)
Power supply	Integrated with Indoor Unit
Power source	90-240 VAC, 50-60 Hz / 36-60V DC
Power consumption	55 W max

Environmental & Regulatory	Remarks
Operating temperature	-40°F (-40°C) to +140°F (+60°C), including solar radiation
Protection & safety	IP65/UL60950; IEC60950; EN60950; CSA-C22.2 No. 60950
Radio	**5.8 GHz:** FCC Part 15, sub-part C 15.247, Eire ComReg 03/42, UK Approval to IR2007
	5.4 GHz: EN 301 893
EMC	USA-FCC Part 15, Class B; Europe-EN 301 489-4

HEADQUARTERS

Orthogon Systems
Unit A1, Linhay Business Park
Eastern Road, Ashburton
Devon, TQ13 7UP, UK

Outside of North America:
Sales: +44 1364 655500
Tech Support: +44 1364 655656

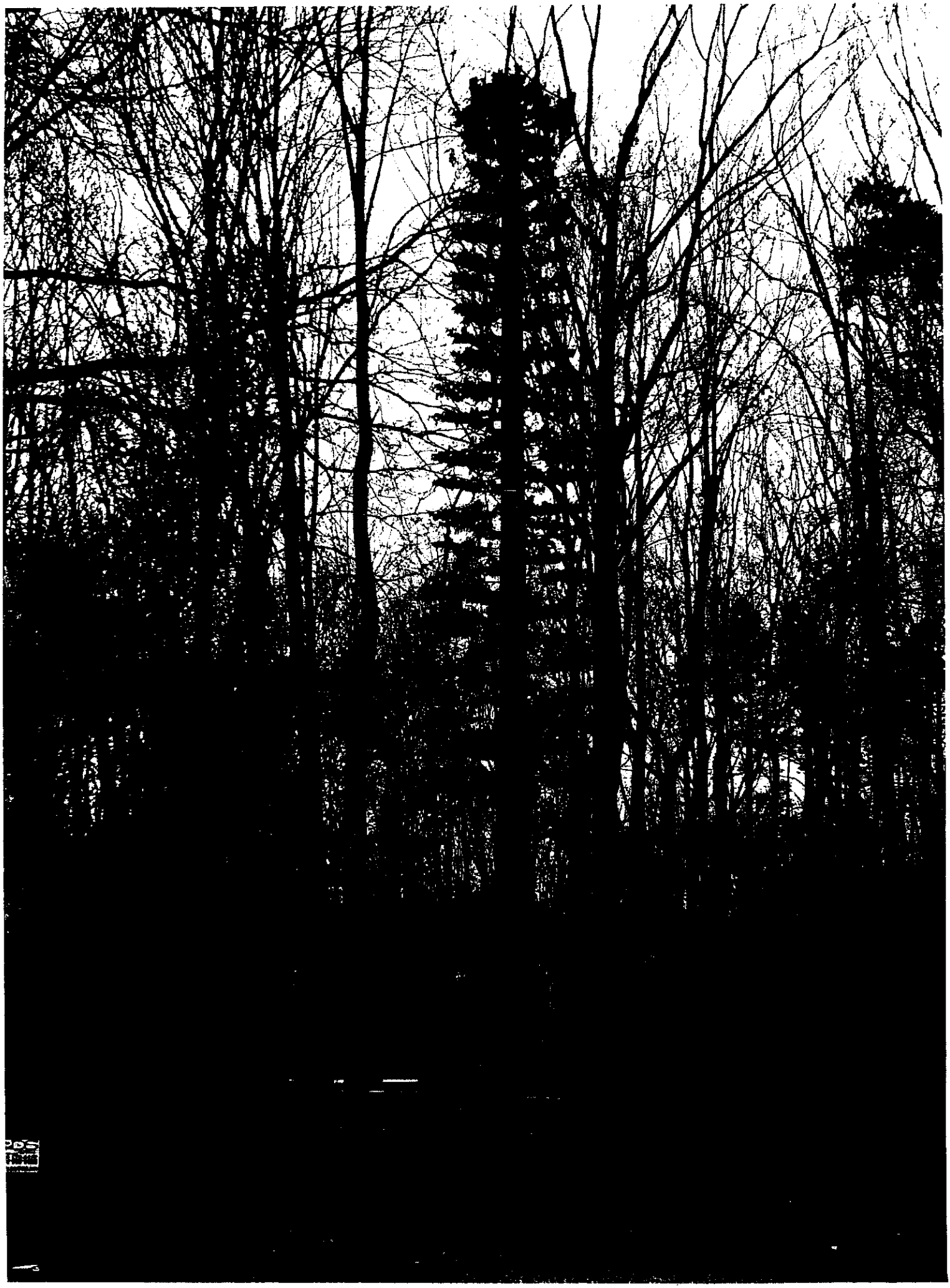
USA OFFICE

Orthogon Systems LLC
890 Winter Street, Suite 320
Waltham, MA 02451

Sales and Tech Support In North America:
+1 877 515-0400

www.orthogonsystems.com

©Copyright 2006 Orthogon Systems. All rights reserved. All trademarks are the property of their respective owners. All statements of fact contained herein are provided for informational purposes only and are subject to change without notice. No warranty of accuracy is expressed or implied, and the user of this information assumes all liability.



clearwire®
wireless broadband

SHEET INDEX

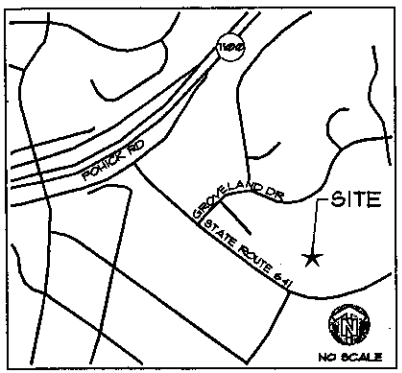
NO.	DESCRIPTION
T-1	TITLE SHEET
C-1	OVERALL SITE PLAN
C-1A	SITE PLAN
C-2	ENLARGED SITE PLAN
C-3	SITE ELEVATION
C-4	ANTENNA DETAILS
C-5	CABINET & CONCRETE SLAB DETAILS
C-6	SITE DETAILS
C-7	ANTENNA LINE DIAGRAM & NOTES
C-8	FENCE DETAILS
E-1	UTILITY PLAN & DETAILS
E-2	GROUNDING PLAN & DETAILS
E-3	GROUNDING DETAILS

DRIVING DIRECTIONS

DEPART FROM CLEARWIRE OFFICE:
593 HERNDON PKWY, HERNDON, VA 20170.

TURN RIGHT (EAST) ONTO SPRING ST. TAKE RAMP (RIGHT) ONTO SR-7100 (FAIRFAX COUNTY PKWY)TOWARDS VA-7100 /FAIRFAX CO PKWY. TURN LEFT ONTO RAMP TOWARDS VA-636/HOODES RD/POHICK RD SOUTH, KEEP STRAIGHT ONTO LOCAL ROADS TOWARDS VA-7100 S/FAIRFAX CO PKWY/POHICK RD, TURN RIGHT ONTO SR-641, ARRIVE AT SITE.

VICINITY MAP



SITE NAME

VZW MONOPINE

SITE NUMBER

VA-WSH416-C

SITE ADDRESS

8616 POHICK ROAD
SPRINGFIELD, VA 22153

RECEIVED

PROJECT TYPE

NEW 4G CABINET & ANTENNAS/BACKHAUL DISHES

PROJECT SUMMARY

SITE NAME:	VZW MONOPINE
SITE NO:	VA-WSH416-C
SITE ADDRESS:	8616 POHICK ROAD SPRINGFIELD, VA 22153
JURISDICTION:	FAIRFAX COUNTY
ZONING:	R-1
PARCEL ID #:	0981-01-0021
TAX DISTRICT:	60000
PROPERTY OWNER:	CHURCH BAPTIST, CALVARY KOREAN TRS OF
APPLICANT:	CLEARWIRE WIRELESS BROADBAND 593 HERNDON PKWY HERNDON, VA 20170
FAX:	(703) 547-5400

SITE COORDINATES
FROM CANDIDATE PACKAGE

LATITUDE:	N. 38° 44' 35.16"	(NAD 83)
LONGITUDE:	W. 77° 14' 34.44"	(NAD 83)
GROUND ELEVATION:	- FT. AMSL	(NAVD 88)

CONSTRUCTION MANAGER: KEVIN DAVIS
PHONE: (240) 216-1118

HANDICAPPED REQUIREMENTS

FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION, HANDICAP ACCESS REQUIREMENTS NOT REQUIRED.

PLUMBING REQUIREMENTS

FACILITY HAS NO PLUMBING.

ENGINEER'S LICENSE

I CERTIFY THAT THESE DRAWINGS WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND CONTROL AND TO THE BEST OF MY KNOWLEDGE AND BELIEF COMPLY WITH THE REQUIREMENTS OF THE IBC 2006 EDITION

LICENSED ENGINEER - STATE OF VIRGINIA

EXPIRES: SIGNED:

PROJECT INFORMATION

- NEW 4G CABINET ON NEW CONCRETE PAD
- TELECOMMUNICATION 4G ANTENNAS & BACKHAUL DISH ANTENNA MOUNTED ON EXISTING MONOPINE
- SITE PLANS AND CONSTRUCTION DETAILS ARE PROVIDED WITHIN
- CODES REFERENCED: IBC 2006 EDITION

ELECTRICAL INFORMATION

- CODES REFERENCED: NATIONAL ELECTRICAL CODE, 2005 EDITION

APPROVALS

CONSTRUCTION		DATE
RF		DATE
OPS		DATE
LANDLORD		DATE

DRAWING SCALED TO 11"x17"

clearwire
wireless broadband
593 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 547-5400

Fullerton Engineering Consultants, Inc.
2600 W. BRYN MAWR AVE, SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0200
FAX: 847-292-0206

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY: FD
APPROVED BY: MB

#	DATE	DESCRIPTION	INT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE SIGNED: _____

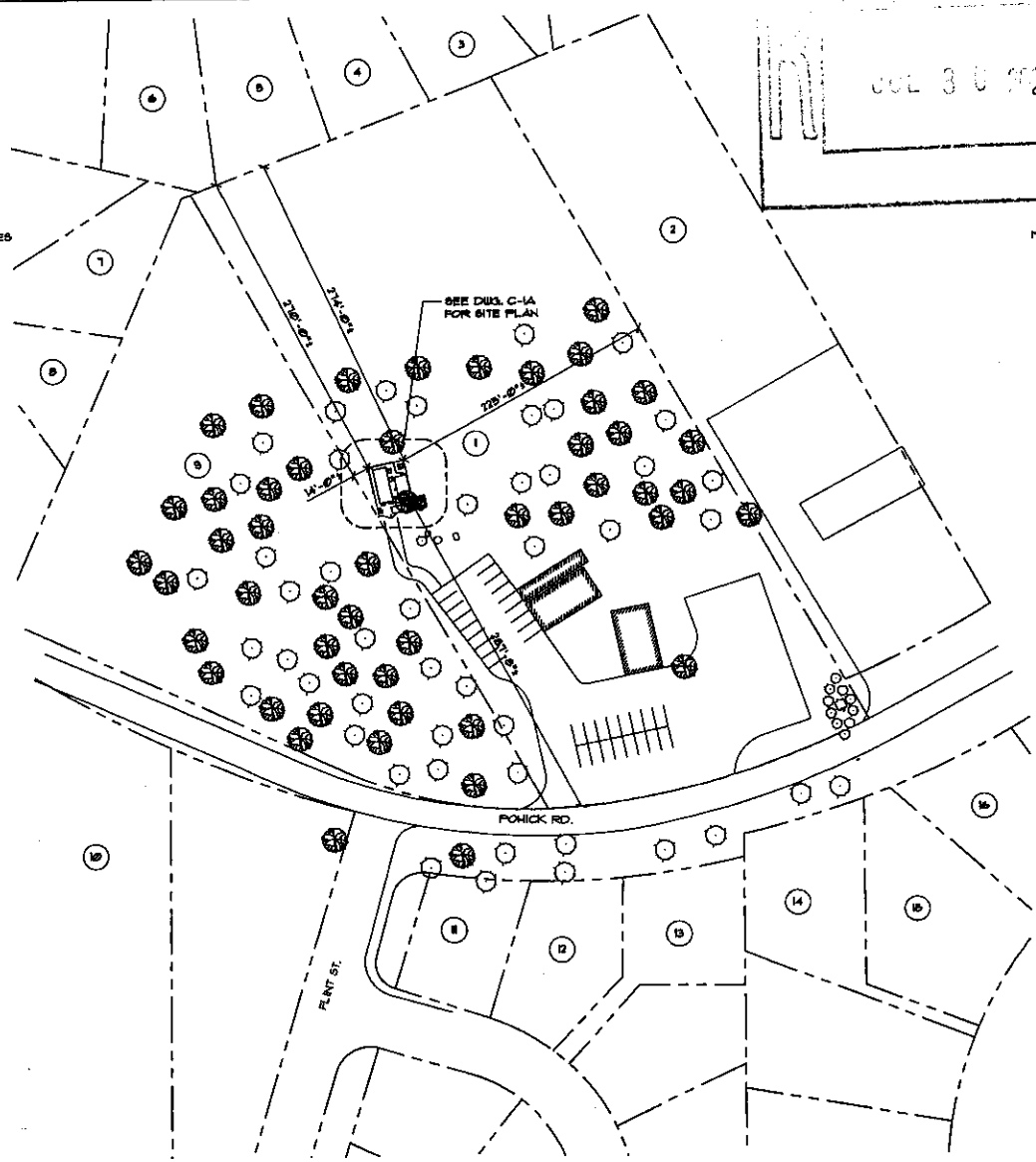
SITE NAME
VZW MONOPINE

SITE NUMBER
VA-WSH416-C

SITE ADDRESS
8616 POHICK ROAD
SPRINGFIELD, VA 22153

SHEET NAME
TITLE SHEET

SHEET NUMBER
T-1



(9)
PARCEL #: 1981 01 0020
ADDRESS: 8612 POHICK RD.
SPRINGFIELD, VA 22153
SHIRLEY M TR HUNTER & WILLIAM TR DOWDY T
DEED BOOK: 10220, PAGE: 0147
ZONING: R-1
AREA: 2.3 ACR

(10)
PARCEL #: 1981 01 0058
ADDRESS: 8701 POHICK RD.
SPRINGFIELD, VA 22153
STYLIANI A PLOUTIS & KOSTANTINOS KOUKIDES
DEED BOOK: 10500, PAGE: 0886
ZONING: R-1
AREA: 0.9329 ACR

(11)
PARCEL #: 1981 11 0001
ADDRESS: 8664 POHICK RD.
SPRINGFIELD, VA 22153
THANG V TRAN & TAM T PHAM
DEED BOOK: 15032, PAGE: 1469
ZONING: R-3C
AREA: - ACR

(12)
PARCEL #: 1981 11 0002
ADDRESS: 8662 POHICK RD.
SPRINGFIELD, VA 22153
KO & PARITA MOUKDARATH
DEED BOOK: 13418, PAGE: 1062
ZONING: R-3C
AREA: - ACR

(13)
PARCEL #: 1981 11 0003
ADDRESS: 8660 POHICK RD.
SPRINGFIELD, VA 22153
CLYDE L & LANETA MC CORKLE
DEED BOOK: 06456, PAGE: 0412
ZONING: R-3C
AREA: - ACR

(14)
PARCEL #: 1981 04 0531
ADDRESS: 8060 WINDING WAY CT.
SPRINGFIELD, VA 22153
TERRENCE G & STEPHANIE W JACKSON
DEED BOOK: 01323, PAGE: 1216
ZONING: PDH-3
AREA: 0.3526 ACR

(15)
PARCEL #: 1981 04 0537
ADDRESS: 8058 WINDING WAY CT.
SPRINGFIELD, VA 22153
PHILIP J L TR CHENG
DEED BOOK: 13173, PAGE: 0978
ZONING: PDH-3
AREA: 0.4065 ACR

(16)
PARCEL #: 1981 04 0533
ADDRESS: 8056 WINDING WAY CT.
SPRINGFIELD, VA 22153
DAVID T & CHRIS M KORNIS
DEED BOOK: 08071, PAGE: 0930
ZONING: PDH-3
AREA: 0.326 ACR

(1)
PARCEL #: 1981 01 0021
ADDRESS: 8616 POHICK RD.
SPRINGFIELD, VA 22153
CALVARY KOREAN TRS OF BAPTIST CHURCH
DEED BOOK: 08212, PAGE: 0966
ZONING: R-1
AREA: 3.9782 ACR

(2)
PARCEL #: 1981 01 0022
ADDRESS: 8604 POHICK RD.
SPRINGFIELD, VA 22153
MUSLIMEEN OF NORTHERN ANJUMANE ISLAHUL
DEED BOOK: 09653, PAGE: 1126
ZONING: R-1
AREA: 1.9043 ACR

(3)
PARCEL #: 1981 15 0022
ADDRESS: 8611 GROVELAND DR.
SPRINGFIELD, VA 22153
JAMES B MARY D ROBERTSON
DEED BOOK: 09112, PAGE: 1465
ZONING: PDH-3
AREA: 0.275 ACR

(4)
PARCEL #: 1981 15 0021
ADDRESS: 8615 GROVELAND DR.
SPRINGFIELD, VA 22153
SUNIL K & NISHI KHANNA
DEED BOOK: 11095, PAGE: 1761
ZONING: PDH-3
AREA: 0.243 ACR

(5)
PARCEL #: 1981 15 0020
ADDRESS: 8621 GROVELAND DR.
SPRINGFIELD, VA 22153
TUAN M NGUYEN
DEED BOOK: 15111, PAGE: 1259
ZONING: PDH-3
AREA: 0.29 ACR

(6)
PARCEL #: 1981 15 0019
ADDRESS: 8623 GROVELAND DR.
SPRINGFIELD, VA 22153
SUSAN E H LAZAROAE
DEED BOOK: 15381, PAGE: 0035
ZONING: PDH-3
AREA: 0.2728 ACR

(7)
PARCEL #: 1981 15 0009
ADDRESS: 7811 BLUE JASMINE CT
SPRINGFIELD, VA 22153
JAMES P & KRISTIN L MCDANIEL
DEED BOOK: 14814, PAGE: 1632ZONING:
PDH-3
AREA: 0.296 ACR

(8)
PARCEL #: 1981 15 0008
ADDRESS: 7812 BLUE JASMINE CT
SPRINGFIELD, VA 22153
MICHAEL G MACRINA
DEED BOOK: 17326, PAGE: 1342
ZONING: PDH-3
AREA: 0.209 ACR

OVERALL SITE PLAN

SCALE: 1" = 100'-0"

clearwire
wireless broadband
533 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 547-5400

Fullerton Engineering Consultants, Inc.
2600 W. BRYN MAWR AVE.
SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0200
FAX: 847-292-0206

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY:	PD		
APPROVED BY:	MB		
#	DATE	DESCRIPTION	INT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE FINISHED: _____

SITE NAME
VZW MONOPINE

SITE NUMBER
VA-WSH416-C

SITE ADDRESS
8616 POHICK ROAD
SPRINGFIELD, VA 22153

SHEET NAME
OVERALL SITE PLAN

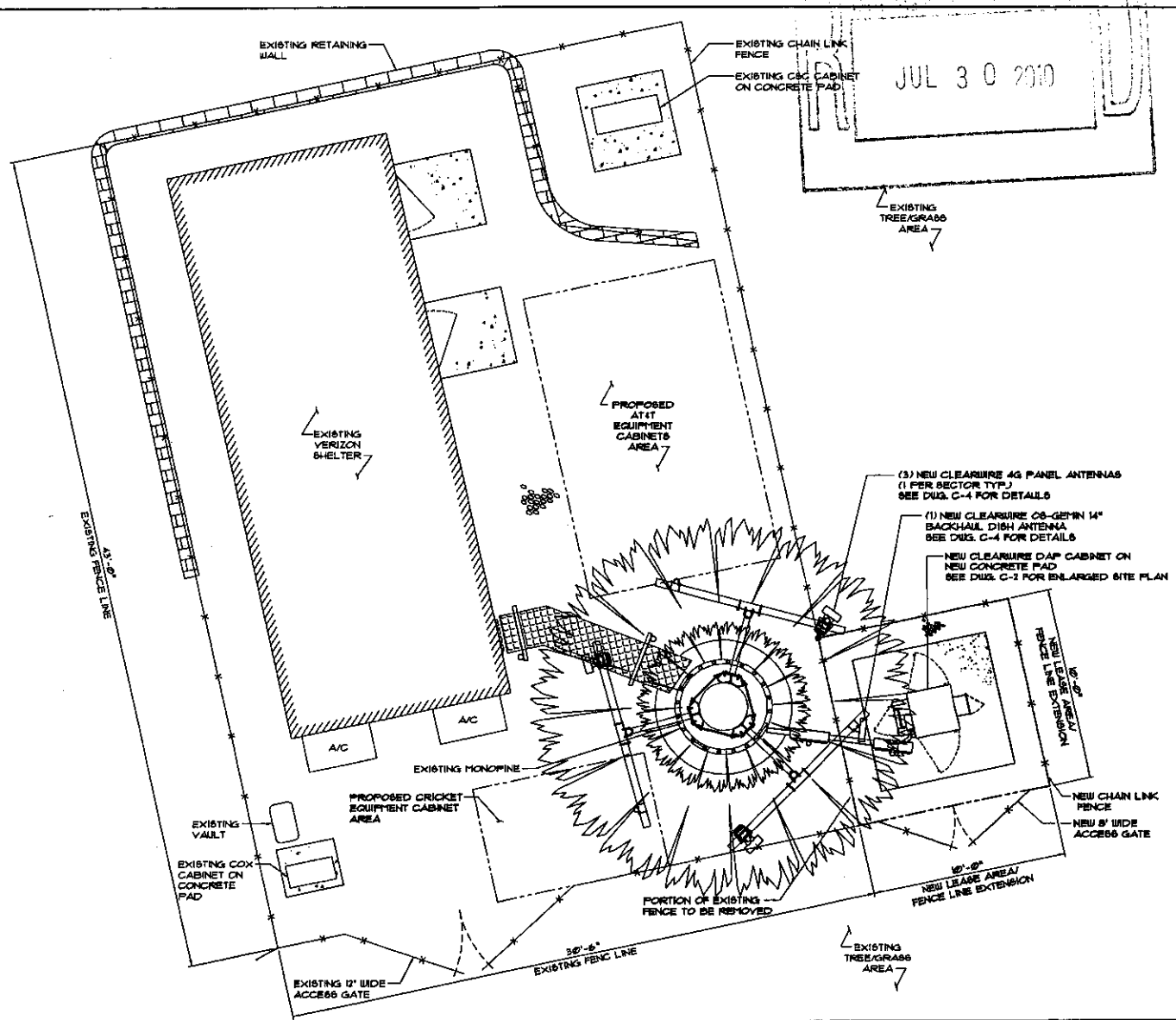
SHEET NUMBER
C-1

ABBREVIATIONS

4G	4th GENERATION
AFF	ABOVE FINISHED FLOOR
AGL	ABOVE GRADE LEVEL
AMSL	ABOVE MEAN SEA LEVEL
APPROX	APPROXIMATE
AWG	AMERICAN WIRE GAUGE
BH	BACKHAUL
BLDG	BUILDING
BTS	BASE TRANSMISSION STATION
CAB	CABINET
COL	COLUMN
CONC	CONCRETE
CND	CONDUIT
DWG	DRAWING
FT	FOOT(FEET)
EGB	EQUIPMENT GROUND BAR
ELEC	ELECTRICAL
EMT	ELECTRICAL METALLIC TUBING
ELEV	ELEVATION
EQUIP	EQUIPMENT
(E)	EXISTING
FND	FOUNDATION
GALV	GALVANIZED
GPS	GLOBAL POSITIONING SYSTEM
GND	GROUND
MAX	MAXIMUM
MFR	MANUFACTURER
MGB	MASTER GROUND BAR
MIN	MINIMUM
(N)	NEW
NEC	NATIONAL ELECTRIC CODE
NTS	NOT TO SCALE
OE/OT	OVERHEAD ELECTRIC/TELCO
(P)	PROPOSED
PCS	PERSONAL COMMUNICATIONS SERVICES
POS	POSITION
RGS	RIGID GALVANIZED STEEL
IN	INCHES()
LB(S)	POUND(S)
SF	SQUARE FOOT
STL	STEEL
TYP	TYPICAL
UE/UT	UNDERGROUND ELECTRIC/TELCO
UNO	UNLESS NOTED OTHERWISE
VIF	VERIFY IN FIELD
W/	WITH
XFMR	TRANSFORMER
℄	CENTERLINE
Ø	PLATE

SYMBOLS

- UTILITY POLE
- WORK POINT
- REVISION
- MASONRY
- BRICK
- CONCRETE
- EARTH
- STEEL
- GRAVEL
- CENTER LINE
- PROPERTY LINE
- LEASE LINE
- EASEMENT LINE
- CHAIN LINK FENCE
- WOOD FENCE
- BELOW GRADE ELECTRIC
- BELOW GRADE TELEPHONE
- OVERHEAD ELECTRIC/TELEPHONE
- SECTION REFERENCE



SITE PLAN
SCALE: 3/16" = 1'-0"

RECEIVED
JUL 30 2010

clearwire
wireless broadband
593 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 547-5400

Fullerton Engineering Consultants, Inc.
9600 W. BRYN MAWR AVE. SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0200
FAX: 847-292-0206

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY: FD
APPROVED BY: MB

#	DATE	DESCRIPTION	INT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE SIGNED:

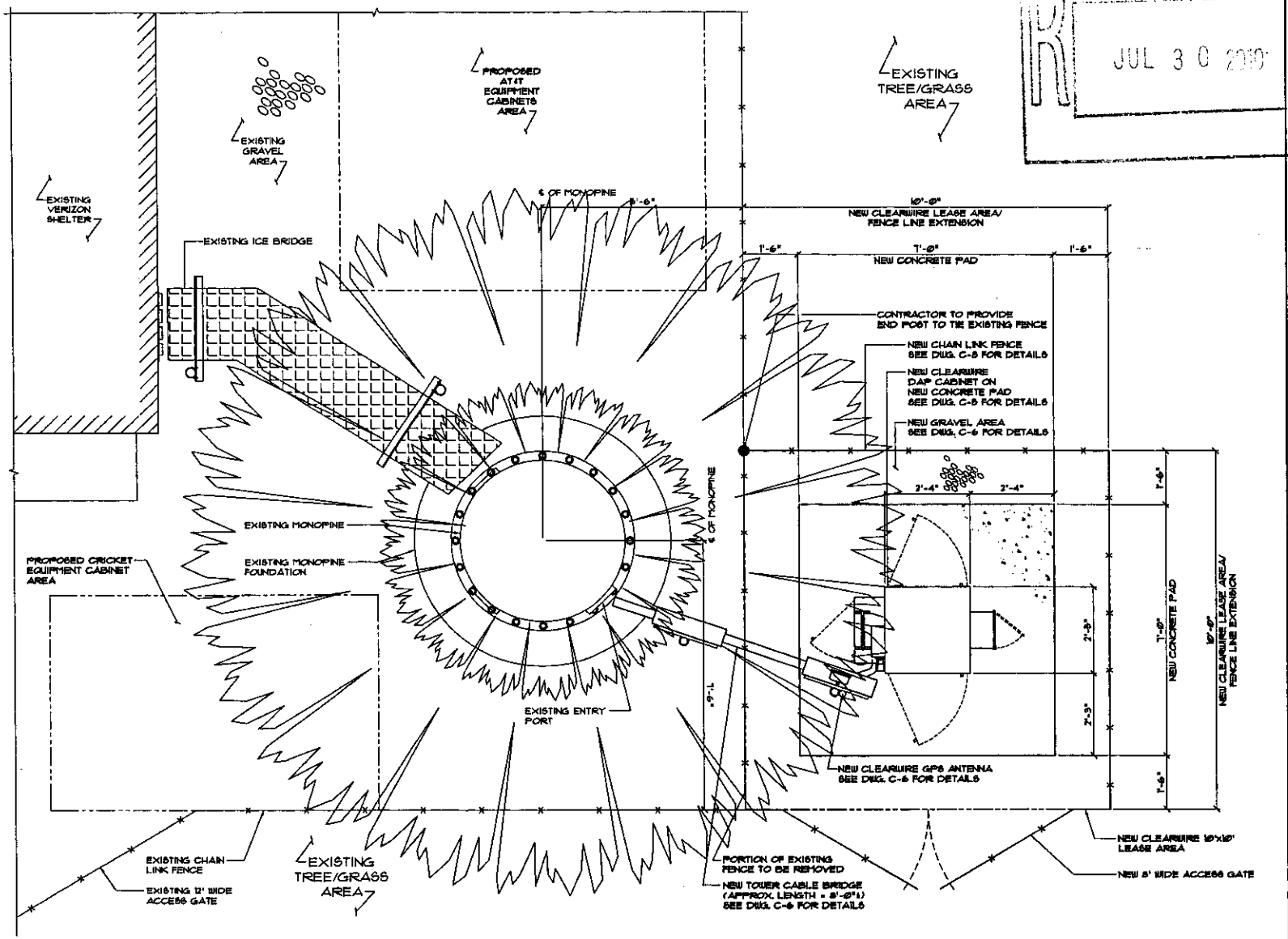
SITE NAME
VZW MONOPINE

SITE NUMBER
VA-WSH416-C

SITE ADDRESS
8616 POHICK ROAD
SPRINGFIELD, VA 22153

SHEET NAME
SITE PLAN

SHEET NUMBER
C-1A



ENLARGED SITE PLAN
SCALE: 3/8" = 1'-0"

RECEIVED
JUL 30 2010

clearwire
wireless broadband
8133 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 841-5400

Fullerton Engineering Consultants, Inc.
9600 W. BRYN MAWR AVE.
SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0200
FAX: 847-292-0206

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY:	FD		
APPROVED BY:	MB		
#	DATE	DESCRIPTION	INT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE SIGNED: _____

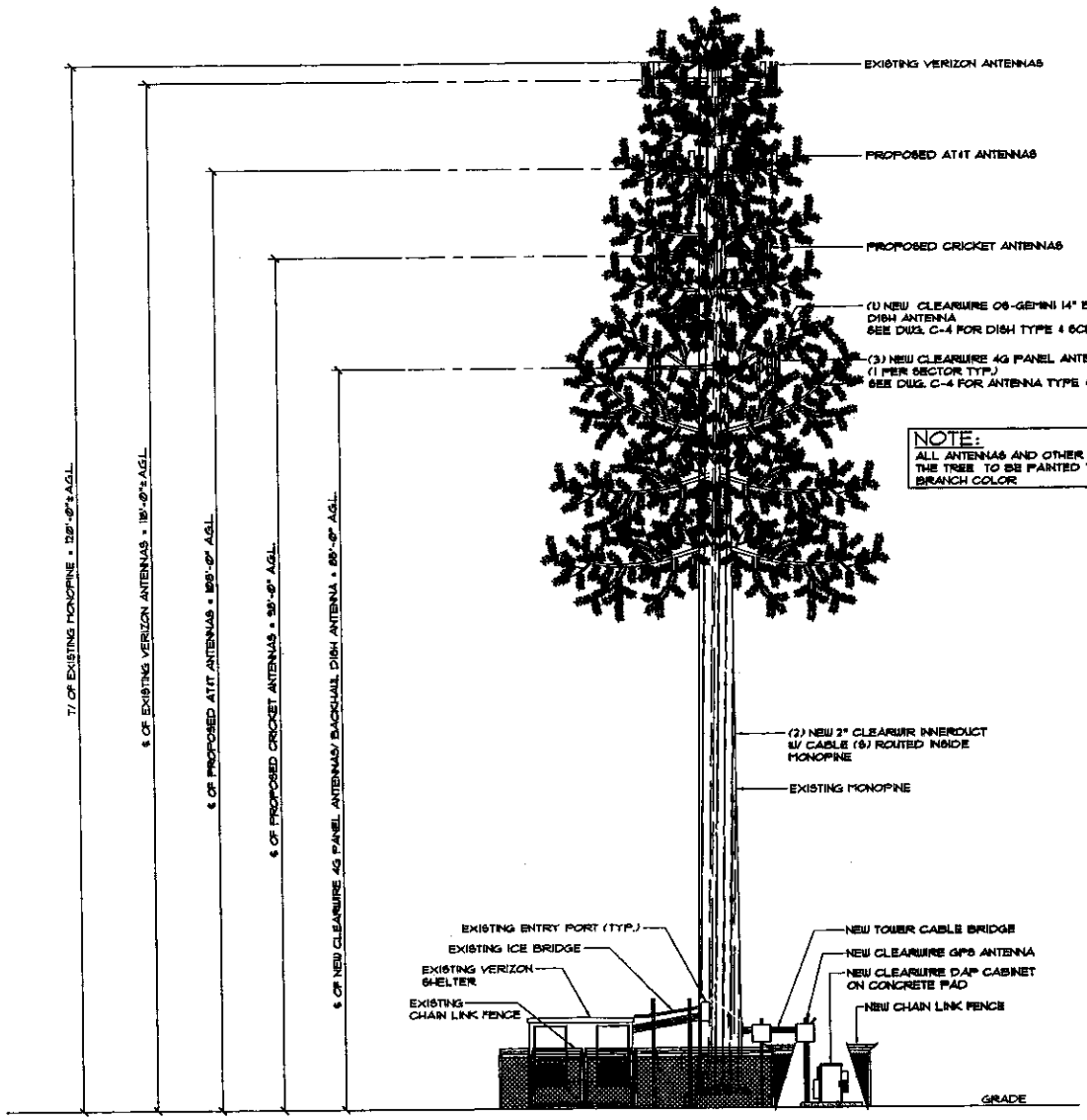
SITE NAME
VZW MONOPINE

SITE NUMBER
VA-WSH416-C

SITE ADDRESS
8616 POHICK ROAD
SPRINGFIELD, VA 22153

SHEET NAME
ENLARGED SITE PLAN

SHEET NUMBER
C-2



EAST ELEVATION
SCALE: N.T.S

STRUCTURAL NOTES:

1. STRUCTURAL CALCULATION PREPARED BY OTHERS. CONTRACTOR TO COORDINATE WITH CLEARWIRE REPRESENTATIVE TO OBTAIN A COPY.
2. CONTRACTOR TO REFER TO TOWER STRUCTURAL CALCULATIONS FOR ADDITIONAL LOADS. NO ERECTION OR MODIFICATION OF TOWER SHALL BE MADE WITHOUT APPROVAL OF STRUCTURAL ENGINEER.

ANTENNA NOTES:

1. THE DIRECTION OF THE ANTENNA SHALL BE ADJUSTED TO MEET SYSTEM REQUIREMENTS.
2. CONTRACTOR SHALL VERIFY HEIGHT OF ANTENNA WITH CLEARWIRE REPRESENTATIVE.
3. ALL ANTENNA AZIMUTH TO BE FROM TRUE NORTH.

clear wire
wireless broadband
593 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 547-5400

Fullerton Engineering Consultants, Inc.
9600 W. BRYN MAWR AVE.
SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0200
FAX: 847-292-0206

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY:	FD		
APPROVED BY:	MS		
#	DATE	DESCRIPTION	INT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE SIGNED:

SITE NAME
VZW MONOPINE

SITE NUMBER
VA-WSH416-C

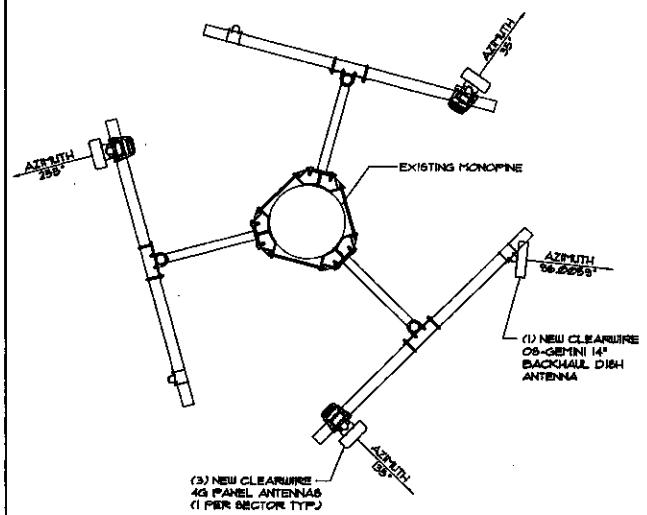
SITE ADDRESS
6616 POHICK ROAD
SPRINGFIELD, VA 22153

SHEET NAME
SITE ELEVATION

SHEET NUMBER
C-3

ANTENNA TYPE			
(N) 4G		(N) BH	

RECEIVED
JUL 30 2010



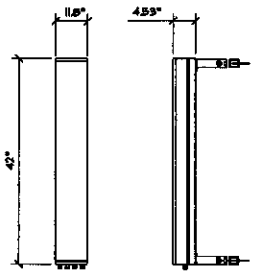
NEW ANTENNA CONFIGURATION
SCALE: 1/4" = 1'-0"

SEC	ANT.# (FT.)	AZ (DEG.)	ANTENNA MFR/ MODEL	ELEC. DT.	MECH. DT.	CABLE TABLE QUANTITY	CABLE TABLE LENGTH (FT.)	CABLE TABLE DIA (IN)	COLOR CODE	TECH'N CODE	TRX ANTENNA CONFIG.
1	85	35	ARGUS LLPX310R	-2	0	1	95	1/2	PURPLE	YB	TX/RX1
							95	1/2	ORANGE	YB	TX/RX1
2	85	135	ARGUS LLPX310R	-2	0	1	95	1/2	DOUBLE PURPLE	YB	TX/RX1
							95	1/2	DOUBLE ORANGE	YB	TX/RX1
3	85	255	ARGUS LLPX310R	-2	0	1	95	1/2	TRIPLE PURPLE	YB	TX/RX1
							95	1/2	TRIPLE ORANGE	YB	TX/RX1
GPS			PRIMARY				10	1/2	TRIPLE YELLOW-Y/B		

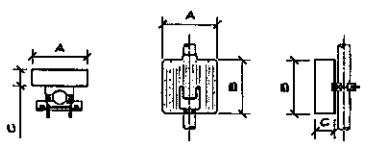
4G PANEL ANTENNA & CABLE SCHEDULE
SCALE: N.T.S.

DISH ID	MODEL NO.	BH TYPE	BH SIZE (WxHxD) (IN)	AZIMUTH (DEGREES)	FREQUENCY (GHz)	DISH # (FT.)	CABLE QTY.	CABLE SIZE (IN)	CABLE LENGTH (FT.)	RADIO TYPE	COLOR CODE	B END SITE ID NUMBER
DISH #1	OS-GEMINI 14"	HIGH PERFORMANCE	14.8x14.8x3.15	96.0059	5.8	85	1	1/2	95	PTP600	1 GRAY	DC-WSH8250

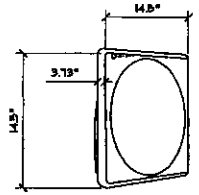
BACKHAUL DISH ANTENNA & CABLE SCHEDULE
SCALE: N.T.S.



ARGUS LLPX310R



OS-GEMINI 14"		A	B	C
	IN.	14.8	14.8	3.15



OS-GEMINI 14"

4G/BACKHAUL DISH ANTENNA DETAILS
SCALE: N.T.S.

clear wire
wireless broadband
593 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 547-5400

Fullerton Engineering Consultants, Inc.
2600 W. BRYN MAWR AVE, SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0700
FAX: 847-292-0266

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY FOR USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY: FD
APPROVED BY: MB

#	DATE	DESCRIPTION	INT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE SIGNED: _____

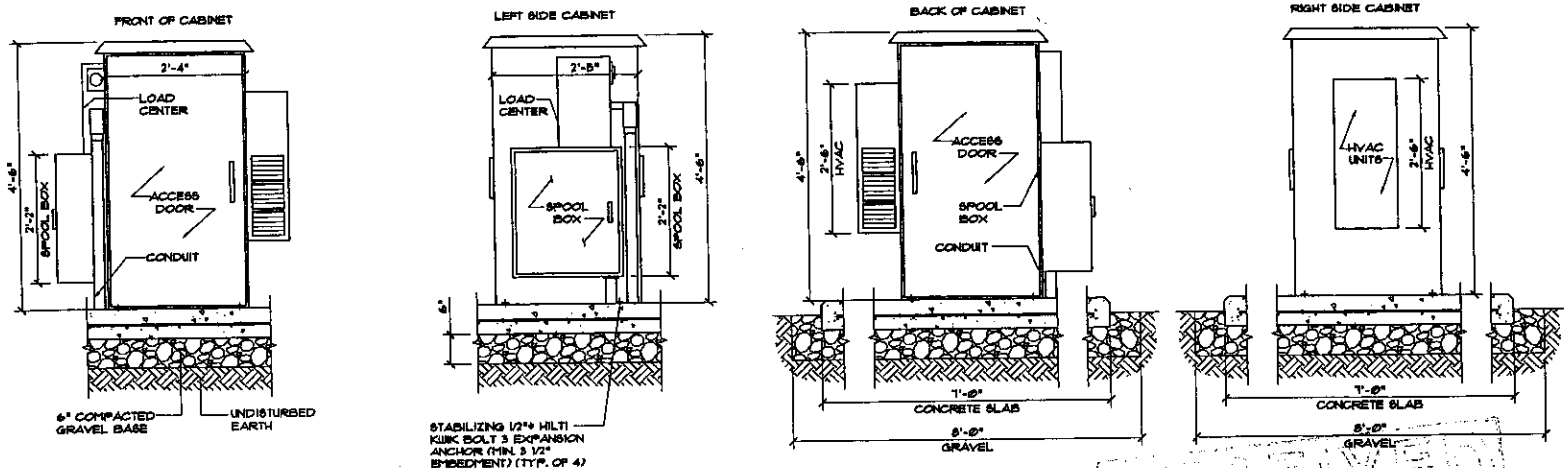
SITE NAME
VZW MONOPINE

SITE NUMBER
VA-WSH416-C

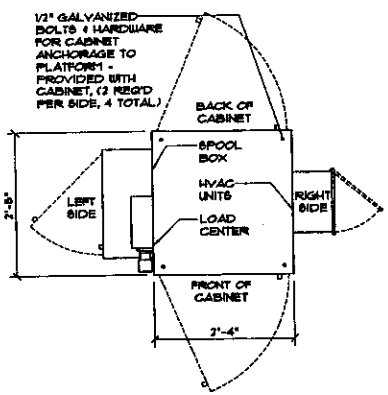
SITE ADDRESS
8616 POHICK ROAD
SPRINGFIELD, VA 22153

SHEET NAME
ANTENNA DETAILS

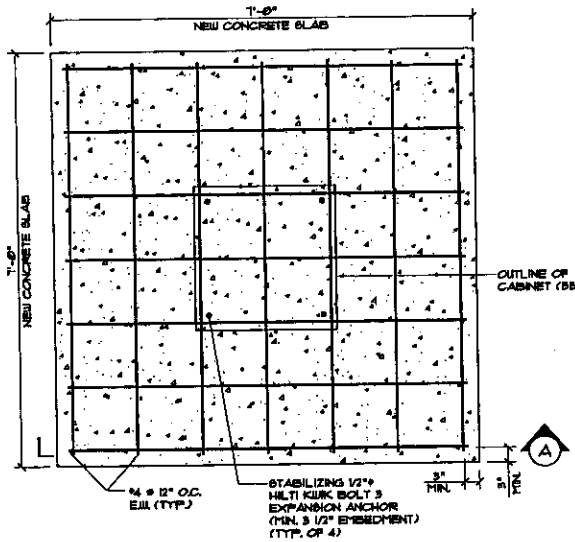
SHEET NUMBER
C-4



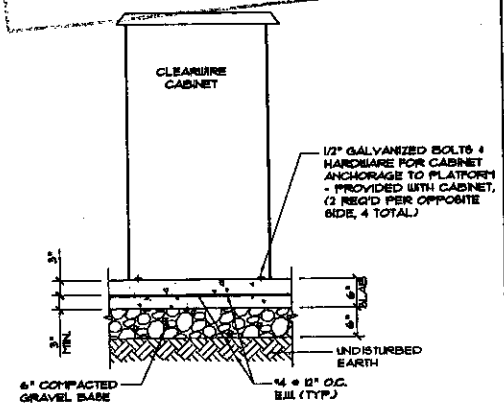
CABINET ELEVATION DETAILS — SCALE: 1/2" = 1'-0" | 1



CABINET DETAILS — SCALE: 1/2" = 1'-0" | 2



PLATFORM DETAILS — SCALE: N.T.S. | 3



SECTION A | 4

RECEIVED
JUL 30 2010

clear w're
wireless broadband
583 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 547-5400

Fullerton Engineering Consultants, Inc.
5600 W. BRYN MAWR AVE, SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0200
FAX: 847-292-0206

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY:	PD
APPROVED BY:	MB

#	DATE	DESCRIPTION	INT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE SIGNED: _____

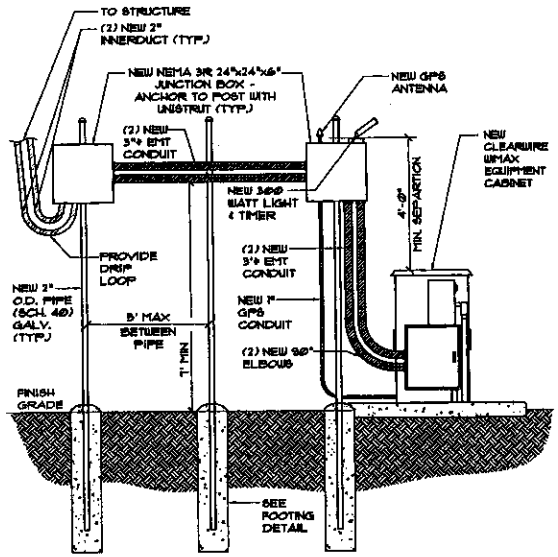
SITE NAME
VZW MONOPINE

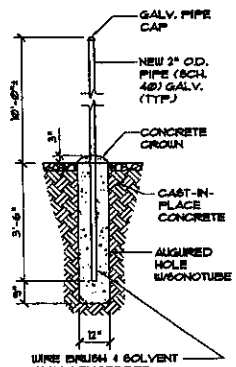
SITE NUMBER
VA-WSH416-C

SITE ADDRESS
8616 POHICK ROAD
SPRINGFIELD, VA 22153

SHEET NAME
CABINET & CONCRETE SLAB DETAILS

SHEET NUMBER
C-5

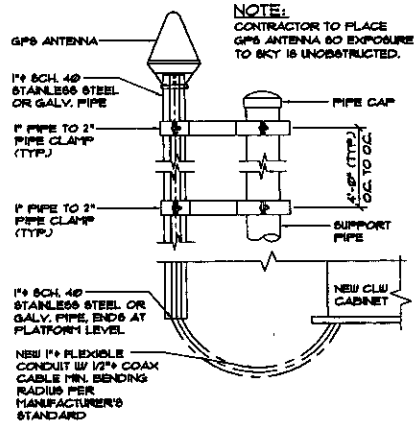




WIRE BRUSH & SOLVENT CLEAN EMBEDDED PORTION OF PIPE AS REQUIRED TO REMOVE ALL GREASE, LOOSE SCALE AND ALL MATERIAL DELETERIOUS TO CONCRETE BOND

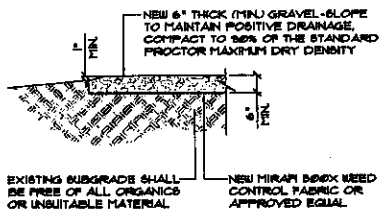
FOOTING DETAIL

TOWER CABLE BRIDGE DETAIL | 1



GPS ANTENNA DETAIL | 2

NOTE:
WEED CONTROL FABRIC SHALL BE USED UNDER ENTIRE PROPOSED GRAVELED AREA. CONTRACTOR SHALL INSTALL FABRIC PER MANUFACTURER'S RECOMMENDATIONS.



YARD DETAIL | 3

NOT USED | 4

RECEIVED
JUL 30 2010

clearwire
wireless broadband
593 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 547-5400

Fullerton Engineering Consultants, Inc.
9600 W. BRYN MAWR AVE. SUITE 300
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0100
FAX: 847-292-0106

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY:	FD	
APPROVED BY:	MB	
#	DATE	DESCRIPTION	INT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE SIGNED:

SITE NAME
YZW MONOPINE

SITE NUMBER
VA-WSH416-C

SITE ADDRESS
5616 POHICK ROAD SPRINGFIELD, VA 22153

SHEET NAME
SITE DETAILS

SHEET NUMBER
C-6

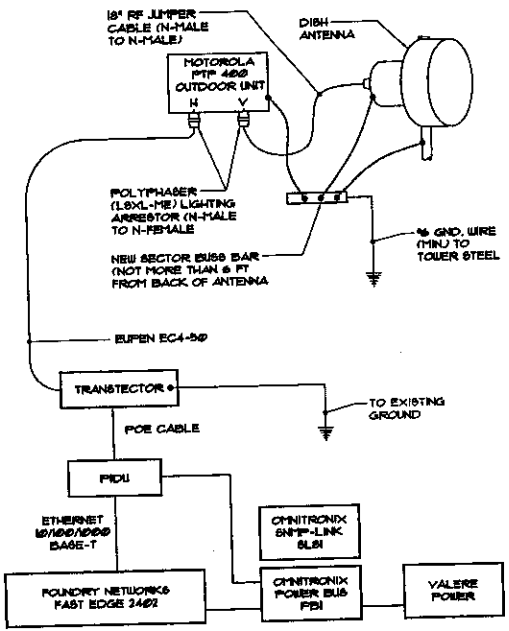
COAX COLOR CODING FOR MW BACKHAUL:

1. UTILIZE SIMPLE COLOR CODING AS MUCH AS POSSIBLE
2. PROPOSED TO USE SINGLE COLOR (GREY) FOR MW. "GREY" WAS CHOSEN AS PER COORDINATION WITH OPS/MWCM
3. NUMBER OF STRIPES CORRESPONDS TO THE DISH NUMBER ON A SITE BASED ON AZIMUTH FROM LOWEST TO HIGHEST (0,360)
4. FOR EXAMPLE, WE HAVE 3 DISHES ON A SITE AND HAVE FOLLOWING AZIMUTHS 35°, 160°, 328°
5. ONE GREY STRIPE IS THE DISH WITH 35° AZIMUTH (1st DISH)
6. TWO STRIPES IS THE DISH WITH 160° AZIMUTH (2nd DISH)
7. THREE GREY STRIPES IS THE DISH WITH 328° AZIMUTH (3rd DISH)
8. AND SO ON AND SO FORTH...
9. IF THERE'S A CASE THAT WE WILL NEED TWO (2) LINES IN ONE DISH, IT IS SUGGESTED TO ADD A STRIPE (BLUE) ON THE 2nd LINE TO DESIGNATE THAT THIS IS THE 2nd LINE ON THAT DISH (1 GREY + 1 BLUE-2nd LINE OF 1st DISH)

DISH COLOR CODING NOTES | 1

1. ANTENNA INSTALLATION SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS, TRANSMISSION LINES, AND SUPPORT STRUCTURES.
2. CONTRACT COMPANIES AND THEIR EMPLOYEES SHALL OBSERVE AND PRACTICE ALL O.S.H.A. SAFETY GUIDELINES WHILE PERFORMING SERVICE FOR CLEARWIRE.
3. CONTRACTOR SHALL PERFORM A SAFETY INSPECTION PRIOR TO COMMENCING ALL WORK ACTIVITIES AT A CLEARWIRE, LEASED OR OWNED SITE. CLEARWIRE, SHOULD BE IMMEDIATELY NOTIFIED OF SAFETY HAZARD(S) FOUND DURING THE INSPECTION THAT COULD CAUSE DAMAGE TO PROPERTY. ALL WORK SHALL BE HALTED UNTIL SUCH TIME THE REPORTED SAFETY HAZARD IS CORRECTED. THE SAFETY HAZARD, IF POSSIBLE, SHOULD BE CORRECTED BY THE CONTRACTOR WHILE ON SITE. AFTER THE CONTRACTOR HAS NOTIFIED CLEARWIRE TO PERFORM THE CORRECTION.

ANTENNA INSTALLATION NOTES | 2



TYPICAL SINGLE LINE DIAGRAM | 3

NOT USED | 4

clearwire
wireless broadband
593 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 547-5400

Fullerton Engineering Consultants, Inc.
5600 W. BRYN MAWR AVE.
SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0100
FAX: 847-292-0106

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY:	FD		
APPROVED BY:	MB		
#	DATE	DESCRIPTION	INT.
	4/21/10	ISSUED FOR REVIEW	AA

RECEIVED
JUL 30 2010

DATE SIGNED:

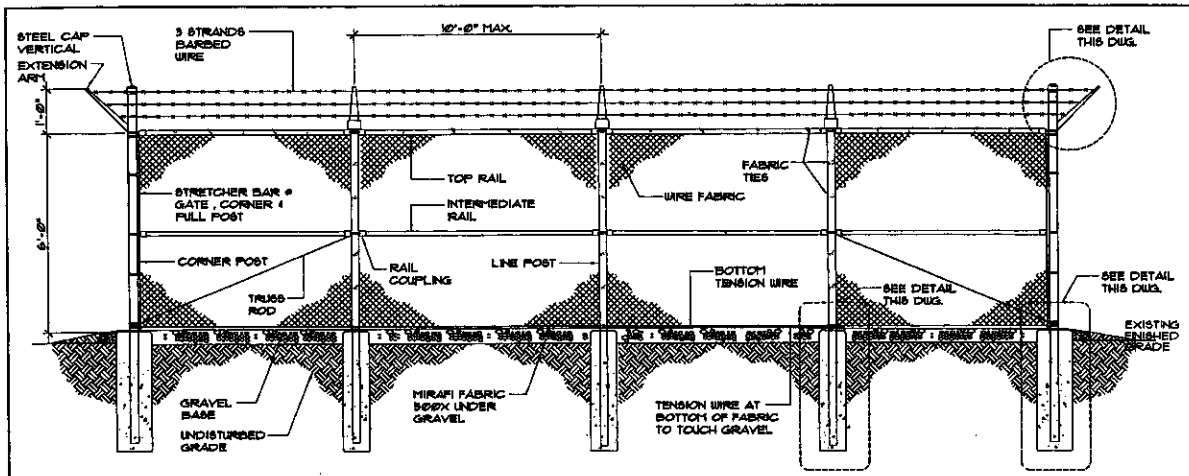
SITE NAME
VZW MONOPINE

SITE NUMBER
VA-WSH416-C

SITE ADDRESS
8616 POHICK ROAD
SPRINGFIELD, VA 22153

SHEET NAME
ANTENNA LINE DIAGRAM & NOTES

SHEET NUMBER
C-7



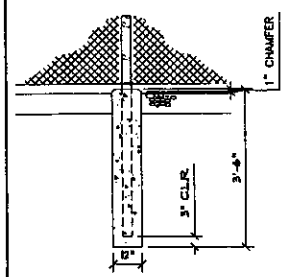
FENCE DETAIL | 1

FENCING NOTES:

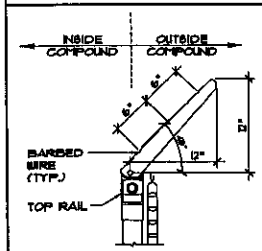
(INSTALL FENCING PER ASTM F-567, SWING GATES PER ASTM F-900)

1. ALL FENCING AND RELATED ASSEMBLIES SHALL BE HOT DIP GALVANIZED ZINC FINISH: FABRIC - ASTM A392-84, FRAME WORK - ASTM F669-81.
2. GATE POST: 3" STD. PIPE SCH. 40 FOR GATE WIDTHS UP THRU 6'-0" OR 12'-0" FOR DOUBLE SWING GATE.
3. END, CORNER & PULL POST: 3" STD. PIPE SCH. 40 LINE POST: 2 3/8" O.D. PIPE 16 GA.
4. GATE FRAME: 1 1/2" STD. PIPE SCH. 40 FOR GATE WIDTHS UP THRU 6'-0" OR 12'-0" FOR DOUBLE SWING GATE. GATE FRAME TO BE WELDED BEFORE GALVANIZING OR ASSEMBLY.
5. TOP RAIL & BRACE RAIL: 1 5/8" O.D. PIPE, 17 GA.
6. FABRIC: 9 GA. CORE WIRE SIZE, 2" MESH, CONFORMING TO ASTM A-392.
7. TIE WIRE: 11 GA. 12" O.C. SPACING @ POST/GATES, 24" O.C. AT RAILS / TENSION WIRE.
8. TENSION WIRE: 7 GA. GALVANIZED STEEL OR ALUMINUM COATED COIL SPRING WIRE.
9. STRETCHER BAR: 3/16" X 3/4" - FULL HEIGHT OF FABRIC. SPACE TENSION BANDS 15" O.C. FOR FULL HEIGHT OF FENCE.
10. GATE LATCH: 1 3/8" O.D. PLUNGER ROD W/ MUSHROOM TYPE CATCH AND COMBINATION LOCK.
11. PROVIDE A CORNER POST WHERE THE FENCE CHANGES IN DIRECTION, HORIZONTALLY OR VERTICALLY, BY MORE THAN 30 DEGREES.
12. ALL CONCRETE FOOTINGS SHALL BE 2500 PSI CONCRETE.

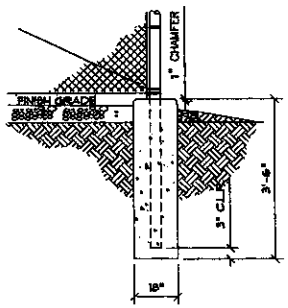
NOTES | 2



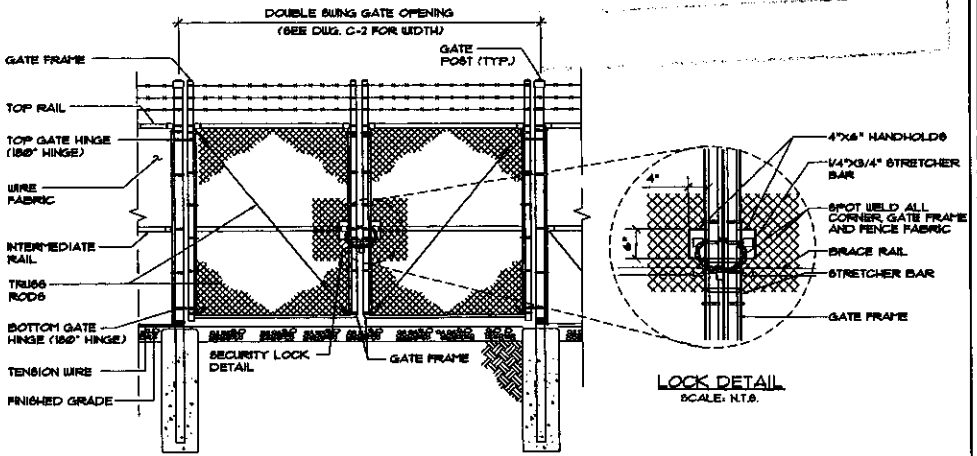
LINE POST FOOTING DETAIL | 3



BARBED WIRE DETAIL | 4



GATE & CORNER POSTS FOOTING DETAIL | 5



LOCK DETAIL
SCALE: N.T.S.

DOUBLE SWING GATE DETAIL | 6

clearwire
wireless broadband
593 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 547-5400

Fullerton Engineering Consultants, Inc.
2600 N. 5TH MAUR AVE., SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0200
FAX: 847-292-0206

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY:	PD	
APPROVED BY:	MB	
#	DATE	DESCRIPTION	INT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE SIGNED:

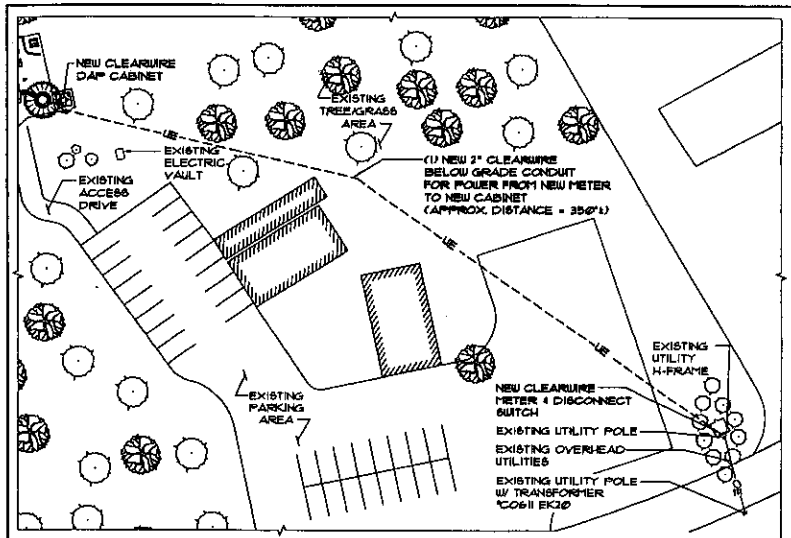
SITE NAME
VZW MONOPINE

SITE NUMBER
VA-WSH416-C

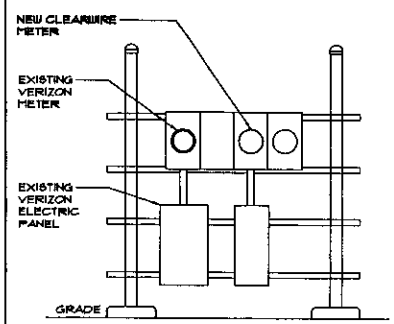
SITE ADDRESS
8616 POHICK ROAD
SPRINGFIELD, VA 22153

SHEET NAME
FENCE DETAILS

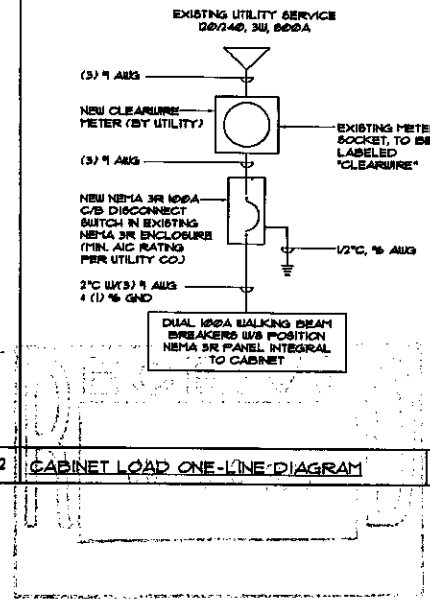
SHEET NUMBER
C-8



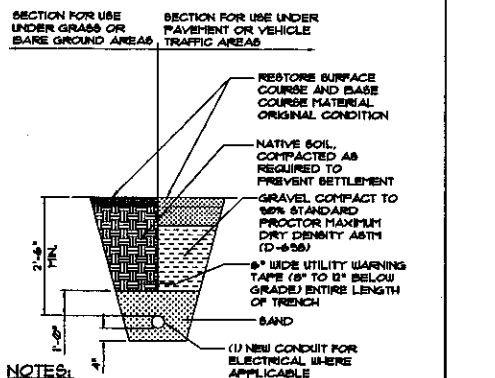
UTILITY PLAN — SCALE: 1/64" = 1'-0" | 1



EXISTING MULTI METER DETAIL | 2



CABINET LOAD ONE-LINE DIAGRAM | 3



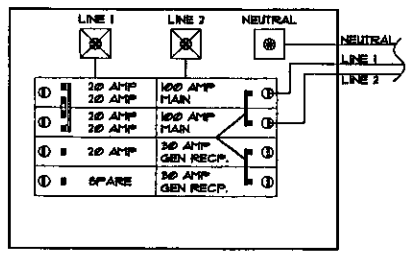
NOTES:

1. CONTRACTOR TO VERIFY LOCAL UTILITY REQUIREMENTS FOR DEPTH, SIZE & SEPARATION OF CONDUITS PRIOR TO INSTALLATION. NOTIFY CONSTRUCTION MANAGER IMMEDIATELY OF ANY DISCREPANCIES.
2. CONTRACTOR TO CALL MISS UTILITY (800) 257-7777 48 HRS PRIOR TO EXCAVATING FOR UNDERGROUND UTILITY LOCATIONS. LOCATION SURROUNDING EXCAVATED AREA MUST BE PRIVATELY LOCATED FOR NON-PUBLIC UTILITIES.

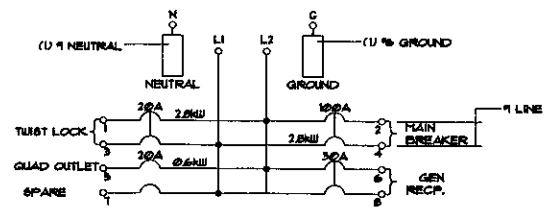
TRENCH DETAIL | 4

LOAD CENTER DATA:

- LOCATION: INTEGRAL TO CLEARWIRE CABINET, EXTERIOR MOUNTED
- LOAD CENTER: SIEMENS PART #S8816ML1125, UL #E107203
- GENERATOR AND UTILITY POWER MAIN BREAKERS: 100A MAIN (SIEMENS PART #Q2100, UL #E2618) 30A GENERATOR (SIEMENS PART #Q230, UL #EL82618) W/MECHANICAL LOCKOUT BAR (SIEMENS #QF1.2, UL #E107203)
- GENERATOR RECEPTACLE: LEVITON, 4 PRONG 220V 30A CONNECTOR, UL #E13983



LOAD CENTER-PANEL SCHEDULE | 5



TOTAL LOADS (KW): 3.4 2.8

TOTAL LOADS x 1.3 (KW): 6.2 x 1.3 = 8.06kW = 34A

LOAD CENTER CALCULATION | 6

clearwire
wireless broadband
533 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 547-5400

Fullerton Engineering Consultants, Inc.
2600 W. BRYN MAWR AVE, SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0200
FAX: 847-292-0286

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY: FD
APPROVED BY: MB

#	DATE	DESCRIPTION	INT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE SIGNED:

SITE NAME
VZW MONOPINE

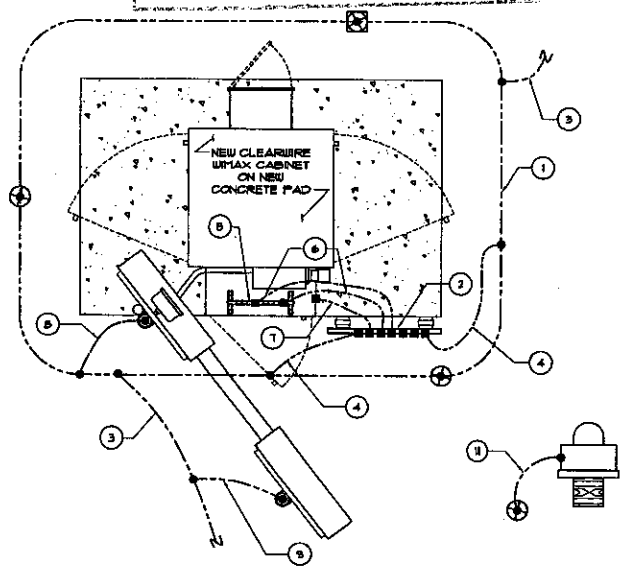
SITE NUMBER
VA-WSH416-C

SITE ADDRESS
8616 POHICK ROAD
SPRINGFIELD, VA 22153

SHEET NAME
UTILITY PLAN & DETAILS

SHEET NUMBER
E-1

JUL 30 2010



LEGEND:

1. NEW GROUND RING CONSTRUCTED OF #2 SOLID TINNED BARE COPPER WIRE IN ONE CONTINUOUS PIECE.
2. NEW EQUIPMENT GROUND BAR EXACT LOCATION T.B.D. IN FIELD. SEE DETAIL 3 THIS SHEET.
3. #2 SOLID TINNED BARE COPPER GROUND WIRE FOR CONNECTION TO NEW CLEARWIRE GROUND RING IN (2) LOCATIONS, MINIMUM 6 FT. APART.
4. #2 SOLID TINNED BARE COPPER GROUND WIRE FOR CONNECTION TO EXISTING TOWER GROUND RING IN (2) LOCATIONS, MINIMUM 6 FT. APART
5. GROUND BAR LOCATED INSIDE TELCO ENCLOSURE.
6. #2 SOLID TINNED BARE COPPER GROUND WIRE FROM NEW GROUND RING TO GROUND BAR INSIDE TELCO ENCLOSURE. FOR THIS CONNECTION, (2) 3/8" HOLES WILL BE DRILLED INTO THE TELCO ENCLOSURE. THIS CONNECTION OF THIS LEAD SHOULD NOT IMPEDE THE DOOR SWING OR ANY ITEMS WITHIN THE TELCO ENCLOSURE. THE LEADS SHALL BE INSTALLED IN 1/2" PVC AND SEALED ABOVE GRADE WITH SILICON. (2) PLACES (TYP.). SEE DWG. E-3/DETAIL 1.
7. #2 SOLID TINNED BARE COPPER GROUND WIRE CONNECTED TO THE CHASSIS OF THE TELCO ENCLOSURE. SEE DWG. E-3/DETAIL 2.
8. #2 SOLID TINNED BARE COPPER GROUND WIRE FOR TOWER CABLE BRIDGE POST. CONNECTED TO NEW GROUND RING.
9. #2 SOLID TINNED BARE COPPER GROUND WIRE FOR TOWER CABLE BRIDGE POST CONNECTED TO GROUND LEAD FROM THE NEW GROUND RING TO THE EXISTING TOWER GROUND.
10. INDEPENDENT SERVICE GROUND WIRE

SYMBOL LEGEND:

- ⊗ GROUND ROD (SEE DWG E-3/DETAIL 5)
- ⊠ GROUND ROD WITH ACCESS (SEE DWG E-3/DETAIL 6)
- — GROUND WIRE
- ● EXOTHERMIC CONNECTION
- ■ MECHANICAL CONNECTION
- ▲ EXOTHERMIC OR MECHANICAL CONNECTION

TYPICAL GROUNDING PLAN — SCALE: 1/2" = 1'-0" | 1

GROUND RING INSTALLATION:

1. GROUNDING SHALL COMPLY WITH ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE.
2. THE TRENCH FOR THE GROUND RING SHALL BE A MINIMUM OF 36" DEEP.
3. THE TRENCH SHALL BE INSTALLED AROUND THE CLEARWIRE EQUIPMENT PLATFORM AND TO THE TOWER WHERE THE BOTTOM BUSS BAR WILL BE INSTALLED.
4. ONCE ALL THE DIRT IS REMOVED FROM THE TRENCH, THE GROUND RODS WILL BE SPACED AT A MINIMUM OF 6' APART FROM EACH OTHER. THE GROUND RODS WILL BE DRIVEN INTO THE GROUND TO A MAXIMUM OF 6" ABOVE THE GROUND AT TRENCH LEVEL. THE TOP OF THE GROUND ROD MUST BE 36" BELOW GRADE.
5. AFTER THE GROUND RODS HAVE BEEN INSTALLED, MAKE A MEASUREMENT AND CUT FOR THE #2 WIRE TO BE INSTALLED FOR THE GROUND RING. ENSURE THE #2 WIRE IS LONG ENOUGH TO MAKE A CONTINUOUS RUN FOR THE GROUND RING.
6. THE GROUND RING MUST BE ONE WIRE AND SHOULD ONLY BE EXOTHERMICALLY WELDED AT THE END OF THE GROUND RING.
7. START AT ONE OF THE GROUND RODS PREVIOUSLY INSTALLED AND MAKE AN EXOTHERMIC WELD CONNECTION BETWEEN THE GROUND ROD AND THE #2 WIRE. CONTINUE THIS STEP UNTIL ALL GROUND RODS HAVE BEEN EXOTHERMICALLY CONNECTED TO THE #2 WIRE FOR THE GROUND RING.
8. ONCE YOU HAVE MADE A CONTINUOUS RUN WITH THE #2 WIRE FROM EACH GROUND ROD AND BACK TO WHERE YOU MADE THE FIRST CONNECTION OF THE GROUND ROD, OVERLAP THE #2 WIRE BY 12" AND SPLICE THE #2 WIRE TO ITSELF WITH A 2 TO 2 EXOTHERMIC WELD MOLD. THIS SHOULD BE THE ONLY SPLICE MADE WITHIN THE GROUND RING.
9. AFTER THE GROUND RING HAS BEEN INSTALLED YOU WILL NEED TO MAKE ADDITIONAL MEASUREMENT FOR THE STINGERS (LEADS) THAT WILL BE CONNECTED TO THE GROUND RING AND BROUGHT OUT ABOVE GRADE.
10. THE CONTRACTOR SHALL SELF-PERFORM OR ENGAGE AN INDEPENDENT ELECTRICAL TESTING FIRM TO TEST AND VERIFY THAT RESISTANCE TO EARTH NOT EXCEED 10.0 OHMS. PROVIDE A COPY OF TESTING REPORT, INCLUDING THE METHOD AND INSTRUMENTS USED TO VERIFY TO CLEARWIRE REPRESENTATIVE. CLEARWIRE STANDARD IS TO PERFORM A THREE POINT FALL-OF-POTENTIONAL TEST PROCUCE ALSO REFERRED TO AS A 62% 3 POINT 62% METHOD TEST.

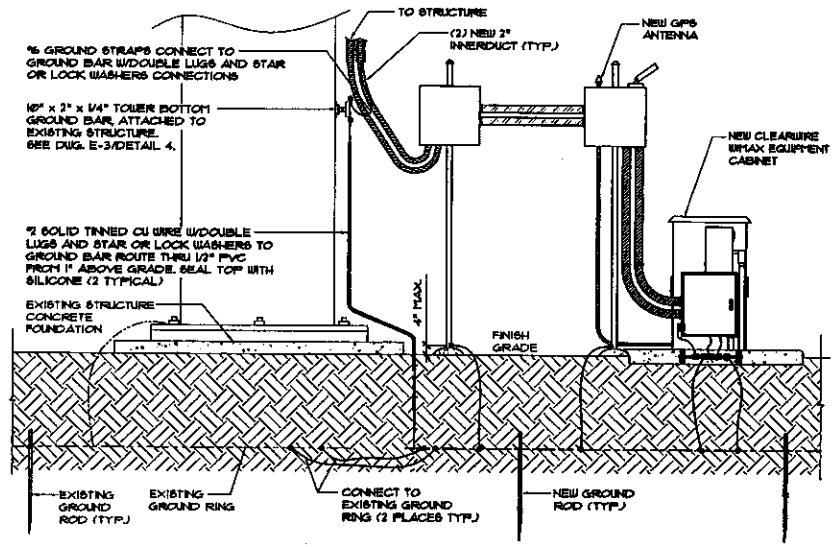
GROUND RING LEAD CONNECTIONS:

1. ALL CONDUCTORS USED IN THE GROUND RING AND GROUND RING STUBS SHALL BE #2 SOLID TINNED BARE COPPER WIRE. ALL STUBS SHALL BE CONNECTED TO THE GROUND RING USING EXOTHERMIC WELDS WITH TAC 2 BY 2 MOLDS AND 150 WELD METAL.
2. FOR SURFACE CONNECTIONS REMOVE ALL PAINT AND CORROSION DOWN TO SHINY METAL, TREAT ALL EXOTHERMIC WELDS WITH GALVANIZING PAINT OR TOUCH UP WITH GALVANOX OR EQUIVALENT.
3. WHERE BARE COPPER WIRES ARE ROUTED FOR CONNECTION ABOVE GRADE, INSTALL WIRE IN 1/2" PVC SLEEVE, FROM 1" ABOVE GRADE AND SEAL TOP WITH SILICONE MATERIAL.
4. MECHANICAL CONNECTIONS SHALL BE MADE WITH STAINLESS STEEL BOLTS, NUTS AND LOCK WASHERS, 3/8"ø MINIMUM.
5. USE NOALOX OR APPROVED EQUAL CONNECTIVE MATERIAL FOR ALL MECHANICAL CONNECTIONS.

DIRECT BURIAL PIPE GROUND:

1. ALL DIRECT BURIAL PIPES SHALL BE GROUNDED USING (1) #2 SOLID TINNED BARE COPPER GROUND WIRE
2. THESE PIPES SHALL BE CONNECTED TO THE GROUND RING WITH #2 SOLID TINNED BARE COPPER GROUND WIRE AND INTERMEDIATE GROUND RODS IF THE DISTANCE FROM THE PIPE EXCEEDS (6) FEET. EXOTHERMIC WELD TO THE SITE GROUND RING.

GROUNDING NOTES: 2



TYPICAL GROUNDING — SCALE: NTS | 3

clearwire
wireless broadband
8133 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 847-5400

Fullerton Engineering Consultants, Inc.
3600 W. BRYN MAWR AVE., SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0200
FAX: 847-292-0206

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY:	PD		
APPROVED BY:	MB		
#	DATE	DESCRIPTION	INT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE SIGNED:

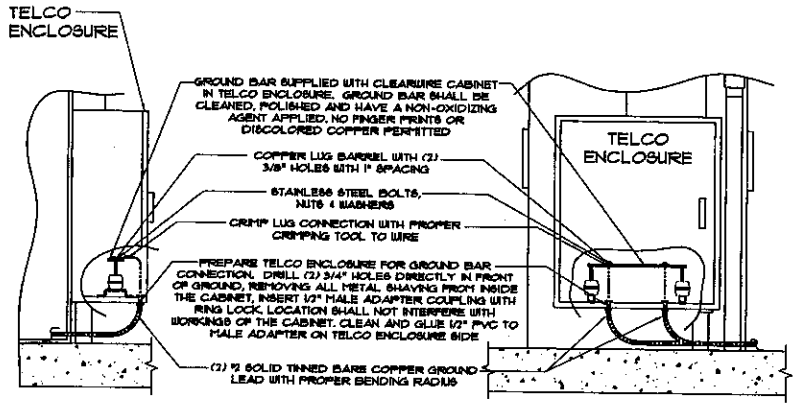
SITE NAME
VZW MONOPINE

SITE NUMBER
VA-WSH416-C

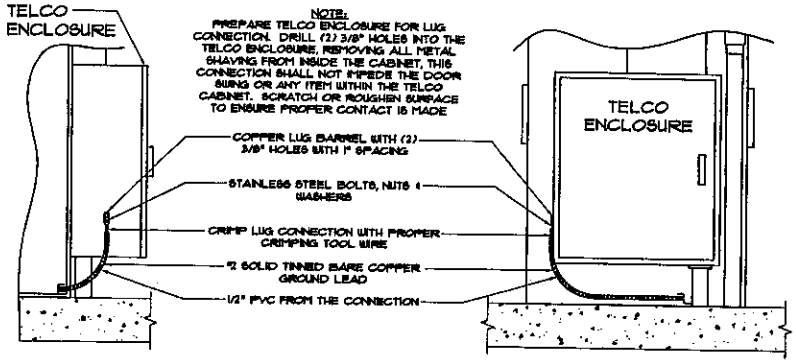
SITE ADDRESS
8616 POHICK ROAD SPRINGFIELD, VA 22153

SHEET NAME
GROUNDING PLAN & DETAILS

SHEET NUMBER
E-2



TELCO ENCLOSURE GROUND BAR DETAIL | 1



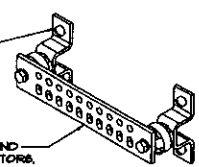
TELCO ENCLOSURE CHASSIS GROUND DETAIL | 2

RECEIVED
JUL 30 2010

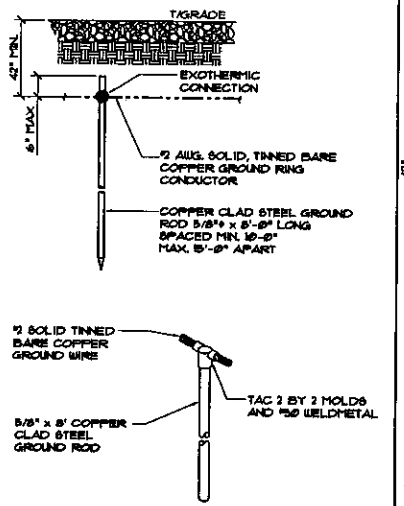
NOT USED | 3

INSTALL THE FOLLOWING GROUND LEADS:

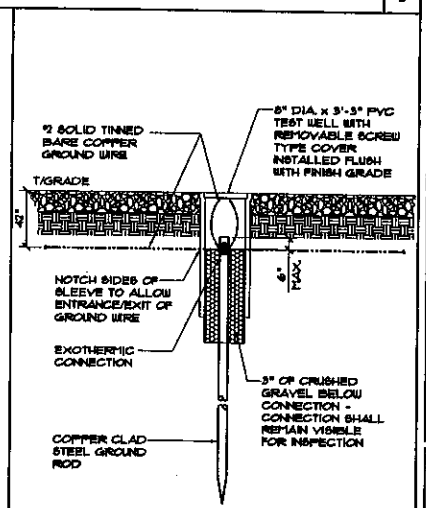
- TOWER TOP GROUND BAR
  1. RF CABLE GROUND KITS
  2. ALL MICROWAVE GROUND/DAP HEADS
  3. ANTENNA MOUNTING PIPES
  4. GROUND TO TOWER (TYP. OF 2)
- TOWER BOTTOM GROUND BAR
  1. RF CABLE GROUND KITS
  2. GROUND TO GROUND RING (TYP. OF 2)
  3. GROUND TO TOWER (TYP. OF 2)
- EQUIPMENT GROUND BAR
  1. RF CABLE GROUND KITS
  2. GROUND TO GROUND RING (TYP. OF 2)



GROUND BAR DETAIL | 4



GROUND ROD DETAIL | 5



GROUND TEST WELL DETAIL | 6

clearwire
wireless broadband
503 HERNDON PKWY
HERNDON, VA 20170
FAX: (703) 547-5400

Fullerton Engineering Consultants, Inc.
9600 W. BRYN MAWR AVE, SUITE 200
ROSEMONT, ILLINOIS 60018
TEL: 847-292-0200
FAX: 847-292-0206

THIS DRAWING IS THE PROPERTY OF FULLERTON ENGINEERING CONSULTANTS, INC. IT IS FOR THE EXCLUSIVE USE OF THIS PROJECT. ANY RE-USE OF THIS DRAWING WITHOUT THE EXPRESSED WRITTEN CONSENT OF FULLERTON ENGINEERING CONSULTANTS, INC. IS PROHIBITED.

CHECKED BY:	RD		
APPROVED BY:	MB		
#	DATE	DESCRIPTION	INIT.
	4/29/10	ISSUED FOR REVIEW	AA

DATE SIGNED:

SITE NAME
VZW MONOPINE

SITE NUMBER
VA-WSH416-C

SITE ADDRESS
8616 POHICK ROAD SPRINGFIELD, VA 22153

SHEET NAME
GROUNDING DETAILS

SHEET NUMBER
E-3