



**Global RF Solutions<sup>SM</sup>**

*PREDICT, DETECT, PROTECT*

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## **Evaluation of Human Exposure to Radio Frequency Emissions**



**Preliminary Analysis of Site T609-  
Canyon Del Oro High School  
Oro Valley, AZ**

## **LIMITED WARRANTY**

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# 1. SUMMARY AND CONCLUSION

## Summary:

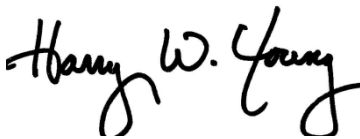
A **preliminary** analysis of this proposed Communications Facility has been completed to determine if it will be compliant with guidelines set forth by the Federal Communications Commission (FCC) with regards to maximum human exposure limits. The analysis has been performed with the use of predictive modeling software and includes the impact of a proposed LTE technology addition to an existing site.

Global RF Solutions has performed this analysis to determine if AT&T Mobility will be compliant with FCC guidelines concerning RF exposure. The Radio Frequency Power Density predictions have been done using 100% transmitter duty cycle. This will predict a worst-case scenario for safety reasons. The predictive software tool utilizes a cylindrical model that provides spatially averaged power density that is calculated in one square foot increments (pixels). The composite RF fields are displayed as a percentage of the exposure limit. The software tool utilized for predictive analysis is RoofView®, a product developed by Richard Tell Associates, Inc. The FCC recognizes this software tool as a valid means of determining Maximum Permissible Exposure levels (MPE). This determination of FCC Compliance is applicable to AT&T Mobility transmitting equipment at this location.

## Conclusion:

The predictive software analysis has shown that AT&T Mobility transmitter equipment located at this site **cannot exceed** the maximum permissible exposure levels for the FCC Public or FCC Occupational standards in readily accessible locations, i.e. ground level or the nearby grand stand. Workers servicing the lights below the antennas can safely climb to the level of the lights. This site **will be compliant** with FCC Guidelines as proposed, as long as it is built per the supplied drawings.

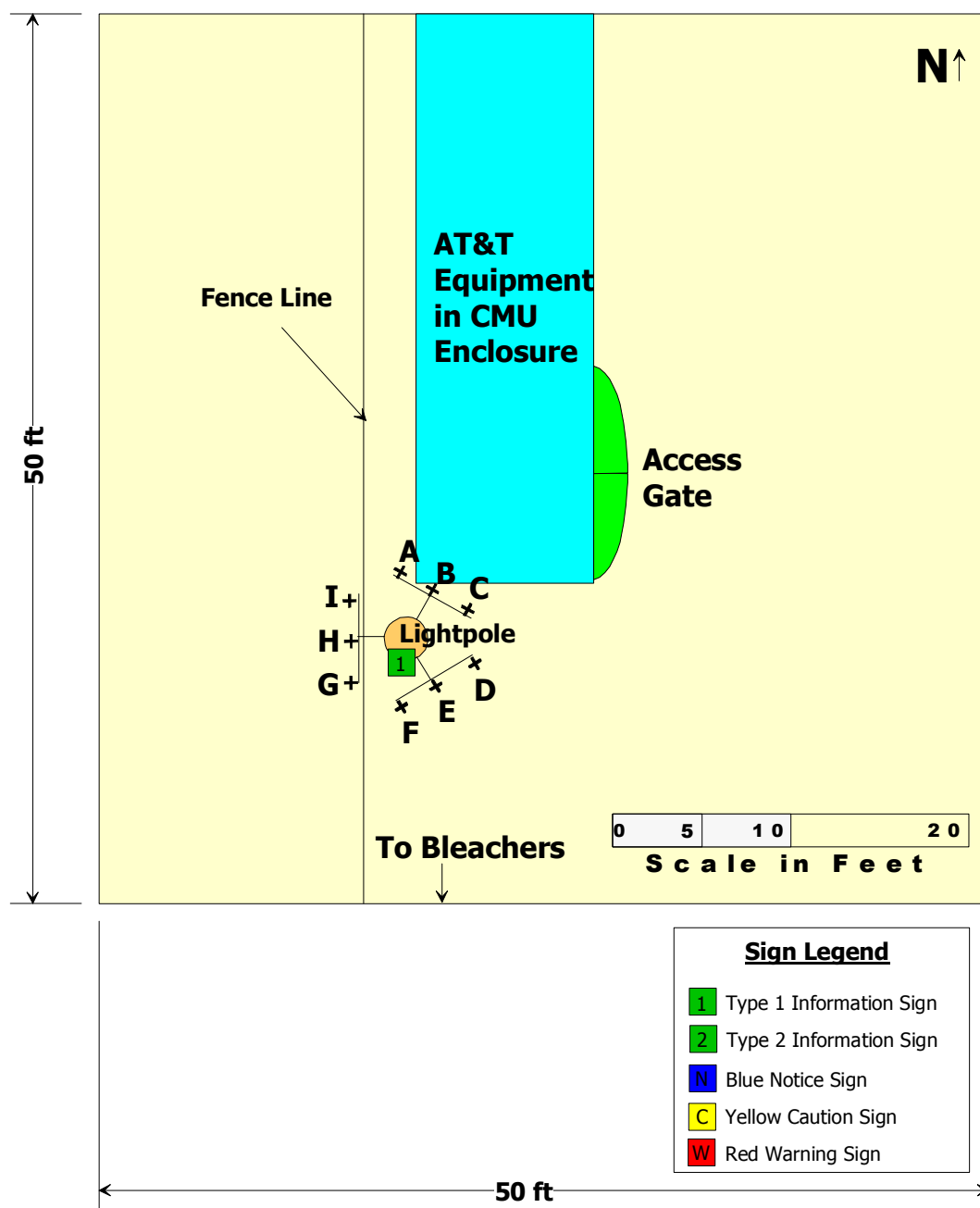
## 2. SITE DESCRIPTION

<b>Site ID: Bechtel #T609-Canyon Del Oro High School</b>		<b>USID: 24116</b>			
		<b>FA Code: 10094431</b>			
<b>Date of Evaluation:</b> <b>March 23, 2012</b>	<b>Contact Information:</b> <b>Robert Hammersmark 602-625-2372</b>		<b>Site Evaluator (name): Harry Young</b> <b>Is a qualified Field Engineer for GRFS and has collected the data and completed the analysis for this report.</b>		
		 <b>Signed:</b>			
<b>Site Type</b>	<b>Building</b>		<b>Tower/Monopole</b>	<b>XX</b>	<b>Water Tower</b>
<b>Address: 25 W. Calle Concordia, Oro Valley, AZ 85704 Pima County</b>					
<b>GPS NAD83</b>	<b>N 32 33 36.52</b>		<b>W 110 58 16.50</b>		
<b>Access Restricted</b>	<b>Yes</b>				

This site will be located on a high school football stadium light pole. Site access is not restricted. Antenna access will be restricted by design (e.g. mounting height, location). Access will not be restricted to EME awareness trained personnel, and an RF safety plan will not be in place.

## 2. SITE DESCRIPTION (continued)

This drawing depicts the antenna detail and recommended sign placement layout of the T609-Canyon Del Oro High School communications facility. The antenna legend is on the following page.



## 2. SITE DESCRIPTION (continued)

This is the antenna legend for the drawing on the preceding page. The ERP values used to model this site are 832w per GSM channel and 912w per UMTS channel. LTE service is modeled at 40w per channel, a typical maximum power output of the RRU equipment.

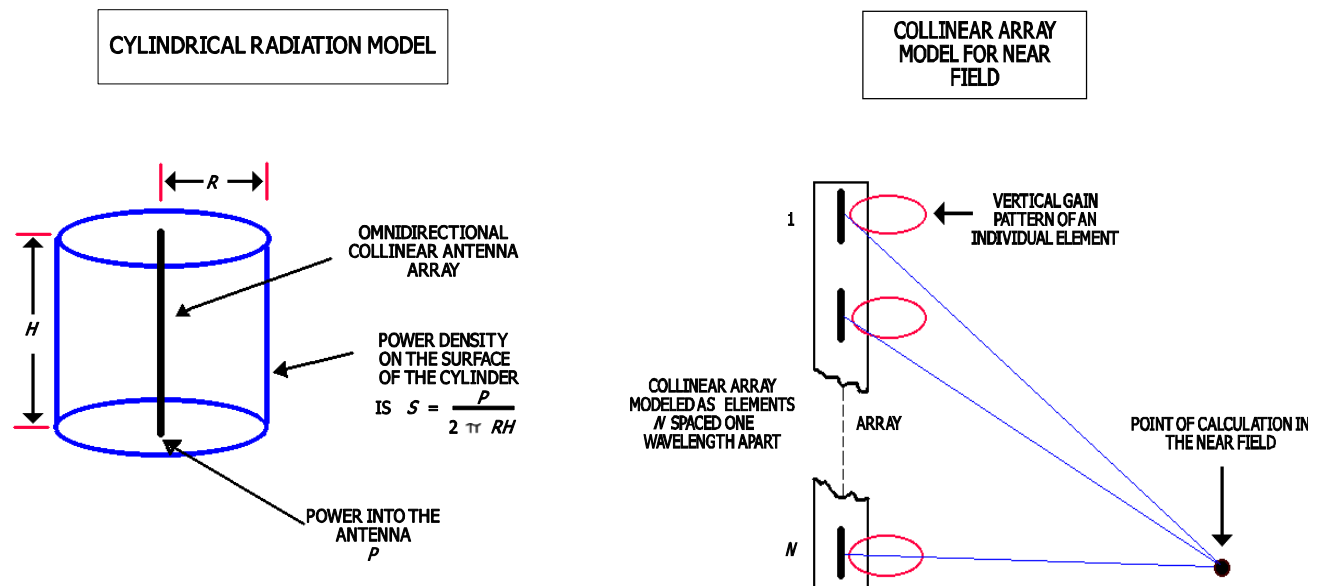
S	S	(MHz)	S	S	S	S	S	S	S	S	S	S	S
ID	Name	Freq	Input Power	Calc Power	Mfg	Model	(ft) X	(ft) Y	(ft) Z	Type	Aper	dBa Gain	BWwidth Pt Dir
A	AT&T	1930.00000		76.2	Andrew	SBNH-1D6565C	17.0	19.0	80.0		8.0	15.7	65;30
B	AT&T	1975.00000		63.9	Pow erw ave	7760	19.0	18.0	82.0		4.3	15.8	65;30
C	AT&T	740.00000		40.0	Andrew	SBNH-1D6565C	21.0	16.5	80.0		8.0	13.4	65;30
D	AT&T	1930.00000		76.2	Andrew	SBNH-1D6565C	21.0	13.5	80.0		8.0	15.7	65;150
E	AT&T	1975.00000		42.6	Pow erw ave	7760	19.0	12.0	82.0		4.3	15.8	65;150
F	AT&T	740.00000		40.0	Andrew	SBNH-1D6565C	17.0	11.0	80.0		8.0	13.4	65;150
G	AT&T	1930.00000		76.2	Andrew	SBNH-1D6565C	14.0	12.5	80.0		8.0	15.7	65;270
H	AT&T	1975.00000		42.6	Pow erw ave	7760	14.0	14.5	82.0		4.3	15.8	65;270
I	AT&T	740.00000		40.0	Andrew	SBNH-1D6565C	14.0	17.0	80.0		8.0	13.4	65;270

### 3. ANALYSIS

#### Site Modeling:

Electromagnetic energy (EME) exposure situations have been modeled at this site by using the following techniques. A cylindrical model in the near field of a vertical collinear antenna is run through a computer calculation engine. This model was used to compute the average power density on the surface of an imaginary cylinder, with a height equal to the antenna's aperture, and a radius equal to the distance of interest.

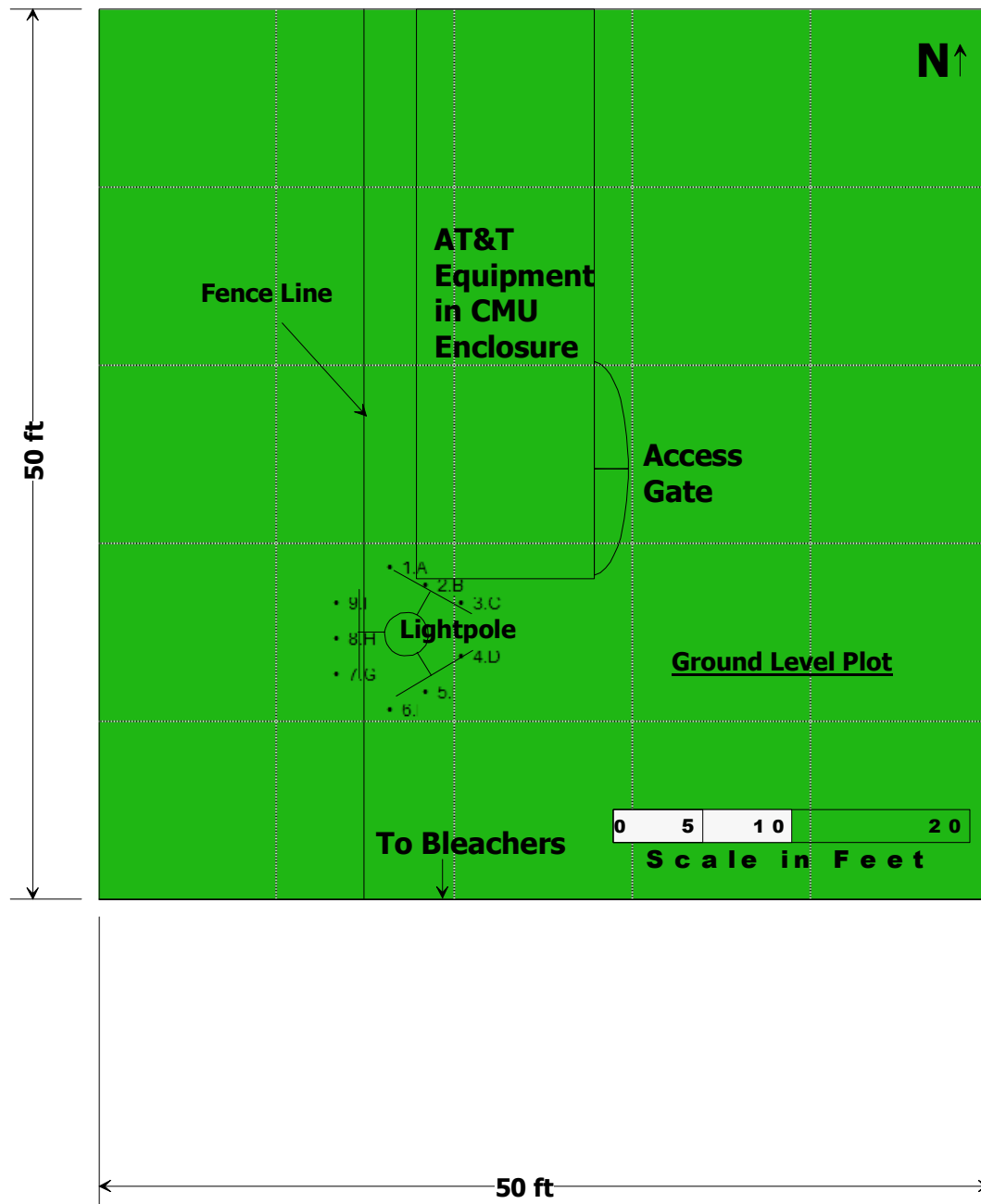
The collinear antenna model estimates the number of elements in the array and in the gain pattern of each element. The power density in the near field of the antenna is calculated by combining the contributions from each element in the array. The completed calculations of these models are plotted in the RESULTS section. The software tool utilized for predictive analysis is RoofView®, a product of Richard Tell Associates, Inc.





## 4. RESULTS

This is the predicted ground level software plot using the FCC PUBLIC and FCC OCCUPATIONAL standards. The grid is in 10-foot increments. This shows that the MPE limits **cannot be exceeded** in accessible areas at this site.



**FCC MPE %**  
**UPTIME = 100%**

**GREEN**= <100% Public

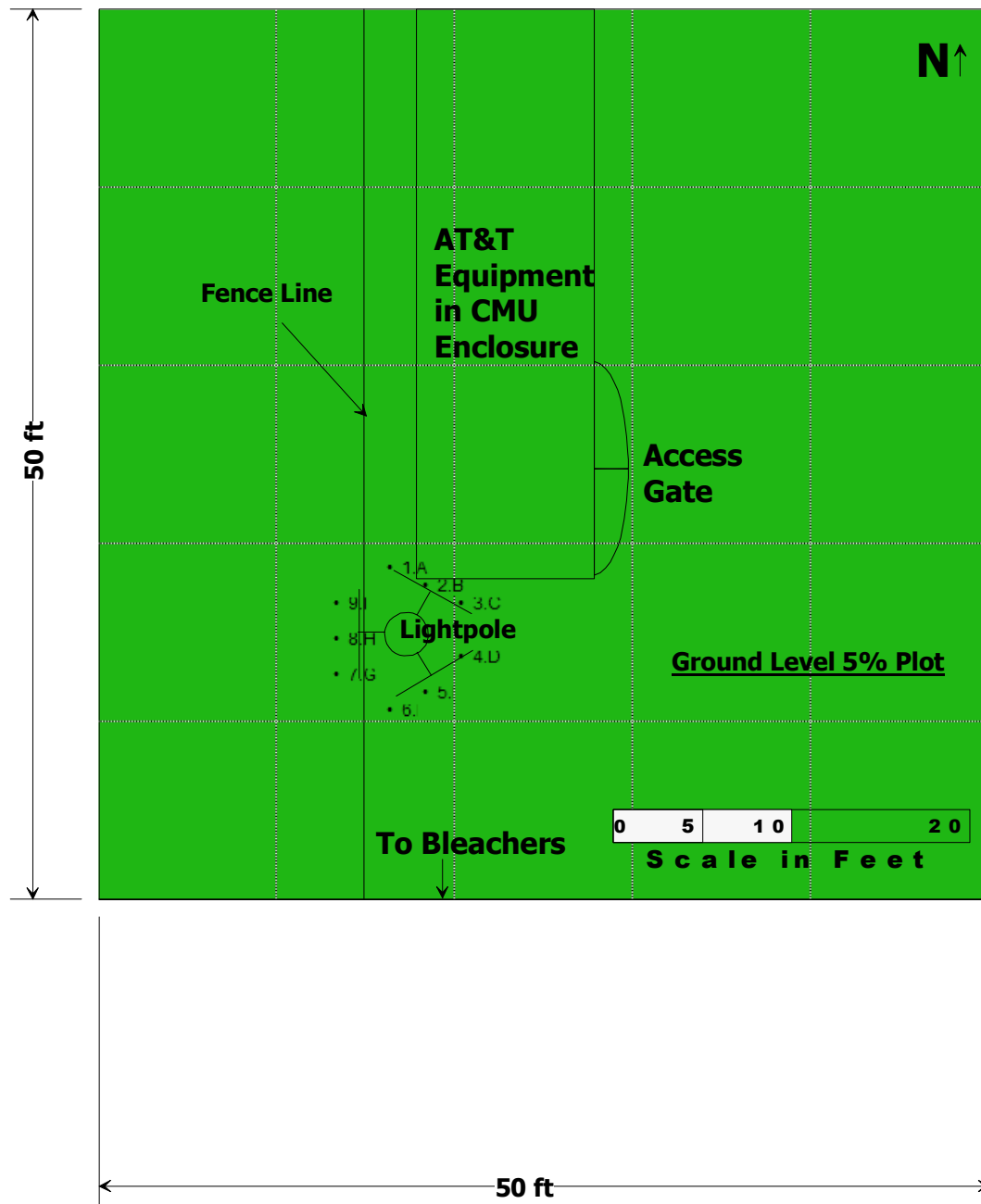
**BLUE**= 100% - 500% Public

**YELLOW**= 100%-1000%  
Occupational

**RED**= >1000% Occupational

## 4. RESULTS (continued)

This is the predicted ground level software plot with the threshold set to 5% of the FCC PUBLIC standard for AT&T Mobility antennas only. All other antennas are turned off! The grid is in 10-foot increments.



## 5. RECOMMENDATIONS

AT&T Mobility will be compliant with FCC Guidelines at this site as proposed. AT&T Mobility is not required to implement additional mitigation to the proposal for this site.

The following are the signs recommended:  
A Type 1 sign at the light pole.

The landlord must ensure that the antenna access will be restricted to personnel that have been authorized by AT&T Mobility (RF Safety Awareness trained personnel only). This would include all maintenance personnel and contractors accessing the antenna area (area directly in front of the antennas).

# APPENDIX A- LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(REFERENCE= TABLE 1. Title 47 CFR)

## (A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

## (B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz\*Plane-wave equivalent power density

NOTE 1: **Occupational/controlled** limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2: **General population/uncontrolled** exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.