Staff Report to the Zoning Administrator

Application Number: 111185

Applicant: Radha Sharma, FMHC (for AT&T Wireless)
Owner: Park Place Enterprises
APN: 027-142-02

Agenda Date: March 16, 2012
Agenda Item #: 3
Time: After 10:00 a.m.

Project Description: Proposal to add three additional flat panel antennas at an existing multi-carrier (co-located) wireless communication facility (WCF) located on the rooftop of an existing two-story commercial office building (Park Place). Requires an Amendment to Commercial Development Permits 79-199-PD, 96-0605 and 02-0176, and a Coastal Development Permit.

Location: Property located on the east side of 7th Avenue (200 7th Avenue) at the corner of 7th Avenue and Bonnie Street.

Supervisoral District: 1st District (District Supervisor: John Leopold)

Permits Required: Requires a Level 5 Commercial Development Permit and a Level 5 Coastal Development Permit.

Technical Reviews: None

Staff Recommendation:

- Approval of Application # 111185, based on the attached findings and conditions.

Exhibits

A.	Project plans	E.	Assessor's, Location, Zoning and General Plan Maps
B.	Findings	F.	RF Report
C.	Conditions	G.	Photo Simulations
D.	CEQA Notice of Exemption		

Parcel Information

Parcel Size:	28,612 sq. ft. (0.66 acres)
Existing Land Use - Parcel:	Office Building
Existing Land Use - Surrounding:	Residential and neighborhood-serving commercial
Project Access:	7th Avenue

Planning Area:	Live Oak
GP/LCP Land Use Designation:	Neighborhood Commercial (C-N)
Zone District:	Neighborhood Commercial (C-1)
Coastal Zone:	_X_ Inside ___ Outside
Appealable to Calif. Coastal Comm.	___ Yes _X_ No

Environmental Information

Geologic Hazards:	N/A
Soils:	N/A
Fire Hazard:	N/A
Slopes:	N/A
Env. Sen. Habitat:	N/A
Grading:	No grading proposed
Tree Removal:	No trees proposed to be removed
Scenic:	N/A
Drainage:	Existing drainage adequate
Archeology:	N/A

Services Information

Urban/Rural Services Line:	_X_ Inside ___ Outside
Water Supply:	N/A – Project will not require water service
Sewage Disposal:	N/A – Project will not require sewer service
Fire District:	Central Fire District
Drainage District:	Zone 5

History & Discussion

The site is currently developed with a two story commercial building which contains a variety of office uses, including a radio station (KUSP-FM) approved under Permit 79-199-PD. This approval included installation of an approximately 25-foot tall lattice tower antenna and two microwave dish antennas (approx. 4-feet and 10-feet in diameter respectively) on the roof of the building to serve the radio station. Application 96-0605 was approved as a Minor Variation to 79-199-PD and allowed for the installation of three pairs of 5.25 foot high panel antennas (6 total), mounted on the upper portions of four approximately 11-foot tall masts, and base station equipment cabinets, on the roof as part of a Pacific Bell Mobile Services Wireless Communications Facility (WCF) site (which later became a Cingular site and is now a T-Mobile cell site). Commercial Development and Coastal Development Permit 02-0176 was subsequently approved in 2005 to allow 6 additional WCF antennas, this time for AT&T Wireless, which were installed behind the building's rooftop parapet (hidden from view from the street), with equipment cabinets located inside the building.

The current proposal is to install 3 additional AT&T "4G" (4th Generation) "LTE" ("Long Term Evolution") flat panel antennas, approx. 5.25'x 2' in size, and 6 suitcase-sized remote radio unit cabinets (RRUs), to be installed behind the roof parapet (i.e., out of sight from street level) at a height of approx. 32-feet above grade, along with several smaller pieces of associated equipment,

including 2 surge suppressors, 1 GPS receiver, and associated conduit and cabling, all to be located on the roof and out of public view.

Zoning and General Plan Consistency

The subject property is an approximately 28,619 square foot parcel, located in the Neighborhood Commercial (C-1) zone district. The C-1 zone district allows WCFs with a Level V review, and is consistent with the site's Neighborhood Commercial (C-N) General Plan/LCP designation. Neighborhood Commercial zoning exists to the north and south of the site, while areas of single family residential (R-1-3.5) development exist to the east and west.

The proposed project is also consistent with the provision of the County's WCF Ordinance [County Code Subsections 13.10.661(c)(3), 13.10.661(g) 13.10.663(a)(2) and 13.10.663(b(12)], which only allows more than 9 WCF antennas on any single rooftop if the additional antennas will be hidden from public view. This rooftop will house 15 WCF antennas after this project is constructed, but the 3 proposed new antennas will be installed behind an radio-frequency (RF) radiation transparent parapet (as are 6 of the existing antennas) and will thus be completely invisible from the street.

Local Coastal Program Consistency

The proposed co-located WCF antennas are in conformance with the County's certified Local Coastal Program (LCP), in that the proposed structures are sited and designed to have the least visual impact possible. Because the 3 proposed antennas are to be located behind existing parapets, and the other equipment will be low lying upon the roof, they will not be visible from the street.

The proposed site is not located between the shoreline and the first public through road and is not identified as a priority acquisition site in the County's LCP. Consequently the proposed project will not interfere with public access to the beach, ocean, or other nearby bodies of water.

Radio Frequency Radiation Emissions

A radio-frequency (RF) radiation exposure compliance study report has been prepared by TRK Engineering (Exhibit F) that estimates the worst case scenario (i.e., at maximum power output) cumulative RF emission levels that could be expected once the new antennas go into operation. This report calculates the cumulative RF emissions from all the existing WCF antennas on the rooftop, plus the 3 proposed new ones, and estimates that under a worst case scenario the highest exposures at street level would be 7.3% the FCC's maximum permissible exposure limit for the public at street level, and 38.2% of the FCC limit for members of the public on nearby rooftops.

According to the RF report, the rooftop of the Park Place office building is off limits to the general public, and only authorized and/or trained persons are permitted to access the rooftop and antennas. The RF report states that it is possible that RF exposures to rooftop workers could exceed the FCC's occupational exposure limits under worst case conditions on certain portions of the roof. Therefore, the RF report recommends that an RF exclusion zone of 25-feet in front of the "Sector A" antennas be maintained, and that warning signs be posted on the rooftop and near

the antennas, to allow workers to exercise control over their exposure such that it remains within the FCC occupational/controlled limits. These recommendations have been included in the proposed Conditions of Approval for this project.

Environmental Review

Staff has determined that the proposed project is Categorically Exempt from the requirements of the California Environmental Quality Act (CEQA) because it qualifies as a minor change to the site improvements in an approved commercial development (Class 1, Sec. 15301). The CEQA Categorical Exemption form is attached as Exhibit D.

Conclusion

As proposed and conditioned, the project is consistent with all applicable codes and policies of the Zoning Ordinance and the General Plan/LCP. Please see Exhibit "B" ("Findings") for a complete listing of findings and evidence related to the above discussion.

Staff Recommendation

- **APPROVAL** of Application Number **111185,** based on the attached findings and conditions.
- Certification that the proposal is exempt from further environmental review under the California Environmental Quality Act.

Supplementary reports and information referred to in this report are on file and available for viewing at the Santa Cruz County Planning Department, and are hereby made a part of the administrative record for the proposed project.

The County Code and General Plan, as well as hearing agendas and additional information are available online at: www.co.santa-cruz.ca.us

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Coastal Development Permit Findings

1. That the project is a use allowed in one of the basic zone districts, other than the Special Use (SU) district, listed in section 13.10.170(d) as consistent with the General Plan and Local Coastal Program LUP designation.

This finding can be made in that the 3 proposed new Wireless Communication Facility (WCF) antennas are to be mounted on the roof of an office building on land that is zoned C-1 (Neighborhood Commercial) which is one of the zones in which WCFs are an allowed use, consistent with the site's C-N (Neighborhood Commercial General Plan/LCP designation.

2. That the project does not conflict with any existing easement or development restrictions such as public access, utility, or open space easements.

This finding can be made, in that the proposal does not conflict with any existing easement or development restriction such as public access, utility, or open space easements as no such easements or restrictions are known to encumber the project site.

3. That the project is consistent with the design criteria and special use standards and conditions of this chapter pursuant to section 13.20.130 et seq.

This finding can be made, in that the proposed WCF antennas and equipment will be hidden from view behind an existing parapet and are thus compatible with the surrounding neighborhood. The development site is not on a prominent ridge, beach, or bluff top.

4. That the project conforms with the public access, recreation, and visitor-serving policies, standards and maps of the General Plan and Local Coastal Program land use plan, specifically Chapter 2: figure 2.5 and Chapter 7, and, as to any development between and nearest public road and the sea or the shoreline of any body of water located within the coastal zone, such development is in conformity with the public access and public recreation policies of Chapter 3 of the Coastal Act commencing with section 30200.

This finding can be made, in that the project site is not located between the shoreline and the first public road. Consequently, the proposed WCF antennas will not interfere with public access to the beach, ocean, or any nearby body of water. Further, the project site is already developed with a commercial building and is not identified as a priority acquisition sites in the County Local Coastal Program.

5. That the proposed development is in conformity with the certified local coastal program.

This finding can be made, in that the proposed WCF antennas and equipment will be hidden from view behind an existing parapet and are thus sited and designed to be visually compatible, in scale with, and integrated with the character of the surrounding neighborhood. Additionally, commercial uses such as WCFs are allowed uses in the C-1 (Neighborhood Commercial) zone district as well as the C-N (Neighborhood Commercial) General Plan/LCP land use designation.

Wireless Communication Facility Use Permit Findings

1. That the development of the proposed wireless communications facility as conditioned will not significantly affect any designated visual resources, environmentally sensitive habitat resources (as defined in the Santa Cruz County General Plan/LCP Sections 5.1, 5.10, and 8.6.6.), and/or other significant County resources, including agricultural, open space, and community character resources; or there are no other environmentally equivalent and/or superior and technically feasible alternatives to the proposed wireless communications facility as conditioned (including alternative locations and/or designs) with less visual and/or other resource impacts and the proposed facility has been modified by condition and/or project design to minimize and mitigate its visual and other resource impacts.

This finding can be made, in that the proposed project located atop an existing commercial structure, is not visible from any designated scenic road, and will not affect any of these listed sensitive resources. The project complies with General Plan Policy 5.10.3 (Protection of Public Vistas) in that, by co-locating behind a parapet on an existing commercial building rooftop, the antennas and equipment will result in no disruption of landform and aesthetic character.

2. That the proposed sites are adequate for the development of the proposed wireless communications facilities and, for sites located in one of the prohibited and/or restricted areas set forth in Sections 13.10.661(b) and 13.10.661 (c), that the applicant has demonstrated that there are not environmentally equivalent or superior and technically feasible: (1) alternative sites outside the prohibited and restricted areas; and/or (2) alternative designs for the proposed facility as conditioned.

This finding can be made, in that the proposed site is already a rooftop co-location site and not located in one of the prohibited and/or restricted areas set forth in Sections 13.10.661(b) and 13.10.661(c). The proposed project is also consistent with the provision of the County's WCF Ordinance [County Code Subsections 13.10.661(c)(3), 13.10.661(g) 13.10.663(a)(2) and 13.10.663(b(12)], which only allows more than 9 WCF antennas on any single rooftop if the additional antennas will be hidden from public view. This rooftop will house 15 WCF antennas after this project is constructed, but the 3 proposed new antennas will be installed behind an RF transparent parapet (as are 6 of the existing antennas) and will thus be completely invisible from the street.

3. The subject property upon which the wireless communications facility is to be built is in compliance with all rules and regulations pertaining to zoning uses, subdivisions and any other applicable provisions of this title (County Code 13.10.660) and that all zoning violation abatement costs, if any, have been paid.

This finding can be made, in that the proposed location of the WCF site and the conditions under which it will be operated or maintained will be consistent with all rules and regulations pertaining to zoning uses, subdivisions and any other applicable provisions of the WCF Ordinance (County Code 13.10.660-668). No zoning violation abatement fees are applicable to the subject property.

4. The proposed wireless communication facilities as conditioned will not create a hazard for aircraft in flight.

This finding can be made, in that the proposed wireless communications facility will be located on an existing two-story office building approximately 35-feet tall, which is too low to interfere with aircraft in flight.

5. The proposed wireless communication facility as conditioned is in compliance with all FCC and California PUC standards and requirements.

This finding can be made, in that the maximum ambient radio-frequency (RF) radiation levels at ground level due to the proposed WCF operations (including the 3 proposed new antennas and all other co-located antennas on the rooftop, all operating at full power) are calculated to be no more than 7.3% the FCC's maximum permissible exposure limit for the public at street level, and 38.2% of the FCC limit for members of the public on nearby rooftops.

6. The proposed wireless communication facilities as conditioned are consistent with the all applicable requirements of the Local Coastal Program.

This finding can be made, in that the proposed roof mounted wireless communication facility is designed and located in a manner that will minimize potential impacts to scenic and biotic resources, and that the construction of the proposed facility will not impede access to the beach or other recreational resources.

Development Permit Findings

1. That the proposed locations of the project and the conditions under which it would be operated or maintained, will not be detrimental to the health, safety, or welfare of persons residing or working in the neighborhood or the general public, and will not result in inefficient or wasteful use of energy, and will not be materially injurious to properties or improvements in the vicinity.

This finding can be made, in that the maximum ambient RF levels at ground level due to the proposed WCF operations (including the 3 proposed new antennas and all other co-located antennas on the rooftop, all operating at full power) are calculated to be no more than 7.3% the FCC's maximum permissible exposure limit for the public at street level, and 38.2% of the FCC limit for members of the public on nearby rooftops. The location and operation of the proposed WCF on the roof of an existing structure will not result in any negative effects on public health, safety or welfare. Construction will comply with prevailing building technology, the California Building Code, and the County Building ordinance to insure the optimum in safety and the conservation of energy and resources. The proposed WCF will not deprive adjacent properties or their neighborhood of light, air, or open space, in that the installation of the WCF equipment behind the roof parapet will be completely hidden from public view, and will be located far away from neighboring structures. The existing office building is located on a large parcel and complies with all site standards, including setbacks.

2. That the proposed location of the project and the conditions under which it would be operated or maintained, will be consistent with all pertinent County ordinances and the purpose of the zone districts in which the site is located.

This finding can be made, in that the co-location of WCFs are allowed uses in the C-1 (Neighborhood Commercial) zone district, without the requirement for further alternatives analysis. The proposed developed site is the environmentally superior site. The primary use of the property will continue to be commercial and the site has a C-N (Neighborhood Commercial) general Plan/LCP land use designation.

3. That the proposed use is consistent with all elements of the County General Plan and with any specific plan which has been adopted for the area.

This finding can be made, in that the proposed WCF will be co-located on the rooftop of an existing office building. Co-located WCF installations are an environmentally superior alternative to the creation of new WCFs such as cell towers with their associated visual impacts.

The proposed project complies with General Plan Policy 5.10.3 (Protection of Public Vistas) in that no disruption to the landform or aesthetic character will occur. The project has been designed and conditioned to mitigate visual impacts in that the antennas will be enclosed in existing parapets and will be invisible from the street. Conditions of approval require maintenance of the antenna enclosures. No new overhead utility lines are proposed. The subject property for the proposed project is not located within any scenic corridors.

The project is located in the Neighborhood Commercial (C-N) General Plan/LCP land use designation, which is implemented by and consistent with the C-1 (Neighborhood Commercial zone district. A specific plan has not been adopted for this portion of the County.

4. That the proposed use will not overload utilities and will not generate more than the acceptable level of traffic on the streets in the vicinity.

This finding can be made, in that the proposed WCF will not require the use of public services such as water or sewer. While the project will require some additional electric power and telephone connection capacity, it will not overtax these infrastructure systems. The WCF will not require any additional inspection visits by maintenance personnel, as they already inspect the site on a monthly basis. There is no additional traffic expected to be generated by the proposed project.

5. That the proposed project will complement and harmonize with the existing and proposed land uses in the vicinity and will be compatible with the physical design aspects, land use intensities, and dwelling unit densities of the neighborhood.

This finding can be made, in that the proposed WCF will be co-located on the roof of an existing commercial building and will be hidden behind an existing parapet, and thus will be compatible with the existing and any proposed land uses in the vicinity, and with the physical design aspects, land use intensities, and dwelling unit densities of the surrounding neighborhood.

6. The proposed development project is consistent with the Design Standards and Guidelines (sections 13.11.070 through 13.11.076), and any other applicable requirements of this chapter.

This finding can be made, in that the proposed WCF will be co-located on the roof of an existing commercial building and will be hidden behind an existing parapet and thus will be of an appropriate scale and type of design that will not diminish the aesthetic qualities of the surrounding properties and will not reduce or visually impact available open space in the surrounding area.

Conditions of Approval

Exhibit A: Project plans for 3 additional flat panel antennas at an existing multi-carrier (co-located) wireless communication facility (WCF) located on the rooftop of an existing two-story commercial office building (Park Place), and associated equipment, 3 sheets, prepared by FMHC, dated 9/16/11.

I. This permit authorizes the construction of a wireless communications facility, consisting of three additional flat panel antennas and associated equipment at an existing multi-carrier (co-located) wireless communication facility (WCF) located on the rooftop of an existing two-story commercial office building (Park Place) on APN 027-142-02. Prior to exercising any rights granted by this permit including, without limitation, any construction or site disturbance, the applicant/owner shall:

A. Sign, date, and return to the Planning Department one copy of the approval to indicate acceptance and agreement with the conditions thereof.

B. Obtain a Building Permit from the Santa Cruz County Building Official.

1. Any outstanding balance due to the Planning Department must be paid prior to making a Building Permit application. Applications for Building Permits will not be accepted or processed while there is an outstanding balance due.

C. Obtain an Encroachment Permit from the Department of Public Works for all work performed in the County road right-of-way.

D. Submit proof that these conditions have been recorded in the official records of the County of Santa Cruz (Office of the County Recorder) within 30 days from the effective date of this permit.

II. Prior to issuance of a Building Permit the applicant/owner shall:

A. Submit final architectural plans for review and approval by the Planning Department. The final plans shall be in substantial compliance with the plans marked Exhibit "A" on file with the Planning Department. Any changes from the approved Exhibit "A" for this development permit on the plans submitted for the Building Permit must be clearly called out and labeled by standard architectural methods to indicate such changes. Any changes that are not properly called out and labeled will not be authorized by any Building Permit that is issued for the proposed development. The final plans shall include the following additional information:

1. One elevation (for each site) shall indicate materials and colors as they were approved by this Discretionary Application. If specific materials and colors have not been approved with this Discretionary Application, in

addition to showing the materials and colors on the elevation, the applicant shall supply a color and material board in 8 1/2" x 11" format for Planning Department review and approval.

2. Details showing compliance with fire department requirements.

3. For the protection of emergency response personnel, at any wireless communication facility where there is the possibility that RF radiation levels in excess of the FCC public exposure limit could be experienced by emergency response personnel working in close proximity to antennas/RF-emitting devices, said facility shall have an on-site emergency power shut-off (e.g., "kill switch") to de-energize all RF-related circuitry/componentry at the base station site, or some other method (acceptable to the local Fire Chief) for de-energizing the facility. As a multi-WCF (co-location) site, where there is a possibility that RF radiation levels in excess of the FCC public exposure limit could be experienced by emergency response personnel working in close proximity to antennas/RF-emitting devices, a single power shut off switch (or other method acceptable to the local Fire Chief) shall be installed that will de-energize all facilities at the site in the event of an emergency.

4. The outer perimeter of the NIER hazard shall be posted with bilingual NIER hazard warning signage that also indicates the name and phone number for the facility operator and an emergency contact. The emergency contact shall be someone available on a 24-hour a day basis who is authorized by the applicant to act on behalf of the applicant regarding an emergency situation. An RF exclusion zone of at least 25-feet in front of the "Sector A" antennas shall be maintained and shown on revised plans. Warning signs shall be posted on the rooftop and near the antennas to allow workers to exercise control over their exposure such that it remains within the FCC occupational/controlled limits.

B. Submit four copies of the approved Discretionary Permit with the Conditions of Approval attached. The Conditions of Approval shall be recorded prior to submittal, if applicable.

C. Meet all requirements and pay any applicable plan check fee of the appropriate County Fire Protection District.

D. Pay the current fees for Roadside and Transportation improvements (as applicable).

III. All construction shall be performed according to the approved plans for the Building Permit. Prior to final building inspection, the applicant/owner must meet the following conditions:

A. All site improvements shown on the final approved Building Permit plans shall be installed.

B. All inspections required by the building permit shall be completed to the satisfaction of the County Building Official.

C. The project must comply with all recommendations of the approved soils reports.

D. Pursuant to Sections 16.40.040 and 16.42.100 of the County Code, if at any time during site preparation, excavation, or other ground disturbance associated with this development, any artifact or other evidence of an historic archaeological resource or a Native American cultural site is discovered, the responsible persons shall immediately cease and desist from all further site excavation and notify the Sheriff-Coroner if the discovery contains human remains, or the Planning Director if the discovery contains no human remains. The procedures established in Sections 16.40.040 and 16.42.100, shall be observed.

IV. Operational Conditions

A. In the event that future County inspections of the subject property disclose noncompliance with any Conditions of this approval or any violation of the County Code, the owner shall pay to the County the full cost of such County inspections, including any follow-up inspections and/or necessary enforcement actions, up to and including permit revocation.

B. Post-Construction Non-Ionizing Electromagnetic Radiation (NIER) Measurement and Reporting: Post-construction monitoring of NIER/Radio-Frequency (RF) radiation to verify compliance with the FCC's NIER standards is required for the WCF built as part of this proposal. This requirement shall be met through submission of a report documenting NIER measurements at the facility site within 90-days after the commencement of normal operations. The NIER measurements shall be made, at the applicant's expense, by a qualified third-party telecommunications or radio-frequency engineer, during typical peak-use periods, utilizing the Monitoring Protocol described in County Code Section 13.10.660(d). The report shall list and describe each transmitter/antenna present at the facility, indicating the effective radiated power of each. The report shall include field measurements of NIER emissions generated by the facility and also other emission sources, from various directions and particularly from adjacent areas with residential dwellings. The report shall compare the measured results to the FCC NIER standards for such facilities. The report documenting the measurements, and the findings with respect to compliance with the established FCC NIER exposure standards, shall be submitted to the Planning Director within 90-days of

commencement of operation. Failure to comply with this requirement may result in the initiation of permit revocation proceedings by the County.

C. The sites shall be restored as nearly as possible to its pre-construction state within six months of termination of use or abandonment of the sites.

V. As a condition of this development approval, the holder of this development approval ("Development Approval Holder"), is required to defend, indemnify, and hold harmless the COUNTY, its officers, employees, and agents, from and against any claim (including attorneys' fees), against the COUNTY, it officers, employees, and agents to attack, set aside, void, or annul this development approval of the COUNTY or any subsequent amendment of this development approval which is requested by the Development Approval Holder.

A. COUNTY shall promptly notify the Development Approval Holder of any claim, action, or proceeding against which the COUNTY seeks to be defended, indemnified, or held harmless. COUNTY shall cooperate fully in such defense. If COUNTY fails to notify the Development Approval Holder within sixty (60) days of any such claim, action, or proceeding, or fails to cooperate fully in the defense thereof, the Development Approval Holder shall not thereafter be responsible to defend, indemnify, or hold harmless the COUNTY if such failure to notify or cooperate was significantly prejudicial to the Development Approval Holder.

B. Nothing contained herein shall prohibit the COUNTY from participating in the defense of any claim, action, or proceeding if both of the following occur:

1. COUNTY bears its own attorney's fees and costs; and

2. COUNTY defends the action in good faith.

C. Settlement. The Development Approval Holder shall not be required to pay or perform any settlement unless such Development Approval Holder has approved the settlement. When representing the County, the Development Approval Holder shall not enter into any stipulation or settlement modifying or affecting the interpretation or validity of any of the terms or conditions of the development approval without the prior written consent of the County.

D. Successors Bound. "Development Approval Holder" shall include the applicant and the successor'(s) in interest, transferee(s), and assign(s) of the applicant.

Minor variations to this permit which do not affect the overall concept or density may be approved by the Planning Director at the request of the applicant or staff in accordance with Chapter 18.10 of the County Code.

Please note: This permit expires three years from the effective date listed below unless a building permit (or permits) is obtained for the primary structures described in the

development permit (does not include demolition, temporary power pole or other site preparation permits, or accessory structures unless these are the primary subject of the development permit). Failure to exercise the building permit and to complete all of the construction under the building permit, resulting in the expiration of the building permit, will void the development permit, unless there are special circumstances as determined by the Planning Director.

Approval Date: _____

Effective Date: _____

Expiration Date: _____

Steven Guiney, AICP	Frank Barron, AICP
Deputy Zoning Administrator	Project Planner

Appeals: Any property owner, or other person aggrieved, or any other person whose interests are adversely affected by any act or determination of the Zoning Administrator, may appeal the act or determination to the Planning Commission in accordance with chapter 18.10 of the Santa Cruz County Code.

Application #: 111185
APN: 027-142-02
Owner: Park Place Enterprises

CALIFORNIA ENVIRONMENTAL QUALITY ACT
NOTICE OF EXEMPTION

The Santa Cruz County Planning Department has reviewed the project described below and has determined that it is exempt from the provisions of CEQA as specified in Sections 15061 - 15332 of CEQA for the reason(s) which have been specified in this document.

Application Number: 111185
Assessor Parcel Number: 027-142-02
Project Location: 200 7th Ave., Santa Cruz, CA 95062

Project Description: Proposal to Expand Existing Co-Located Rooftop Cell Site

Person or Agency Proposing Project: Radha Sharma, FMHC (for AT&T Wireless)

Contact Phone Number: (510) 912-2313

A. _____ The proposed activity is not a project under CEQA Guidelines Section 15378.
B. _____ The proposed activity is not subject to CEQA as specified under CEQA Guidelines Section 15060 (c).
C. _____ **Ministerial Project** involving only the use of fixed standards or objective measurements without personal judgment.
D. _____ **Statutory Exemption** other than a Ministerial Project (CEQA Guidelines Section 15260 to 15285).

Specify type:

E. __X__ **Categorical Exemption**

Specify type: Class 1, Section 15301

F. Reasons why the project is exempt:

Minor change to the site improvments in an approved commercial development.

In addition, none of the conditions described in Section 15300.2 apply to this project.

_____ Date: _____
Frank Barron, Project Planner

EXHIBIT D

FOR TAX PURPOSES ONLY

THE ASSESSOR MAKES NO GUARANTEE AS TO MAP ACCURACY NOR ASSUMES ANY LIABILITY FOR OTHER USES. NOT TO BE REPRODUCED. ALL RIGHTS RESERVED.

(10) POR. N.W. 1/4 SEC. 20, T.11S., R.1W., M.D.B. & M.

Tax Area Code 82-040

27-14

(11)

CARMEL

TWIN LAKE PARK SUB. NO. 1
10MB26 5/29/90

ST.

AVE.

AVE.

AVE.

N
1"= 50'

(13)

SEVENTH

PARK PL.

(15)

EIGHTH

NINTH

(15)

(16)

(17)

BONNIE ST.

Twin Lakes Baptist Church

Note - Assessor's Parcel & Block Numbers Shown in Circles.

Assessor's Map No. 27-14
County of Santa Cruz, Calif.
August, 1998

-16-

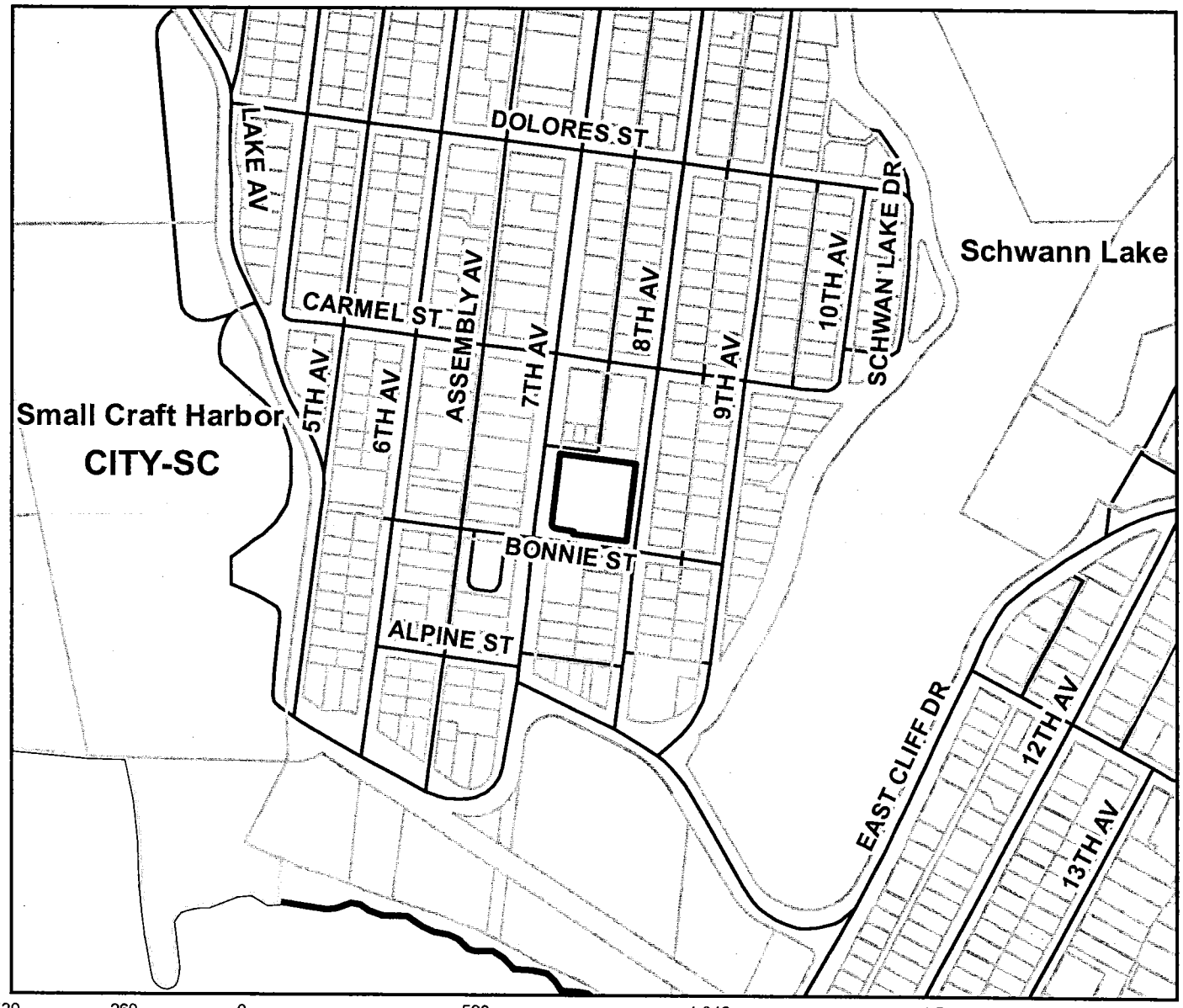
Electronically Redrawn 8/12/98 rw
Rev. 4/2/01 hvn (Changed page refs.)

EXHIBIT E

pln028

EXHIBIT E

Location Map



520 260 0 520 1,040 1,560 2,080 Feet

LEGEND

- APN: 027-142-02
- Assessors Parcels
- Streets
- SANTA CRUZ
- County Boundary
- Lakes

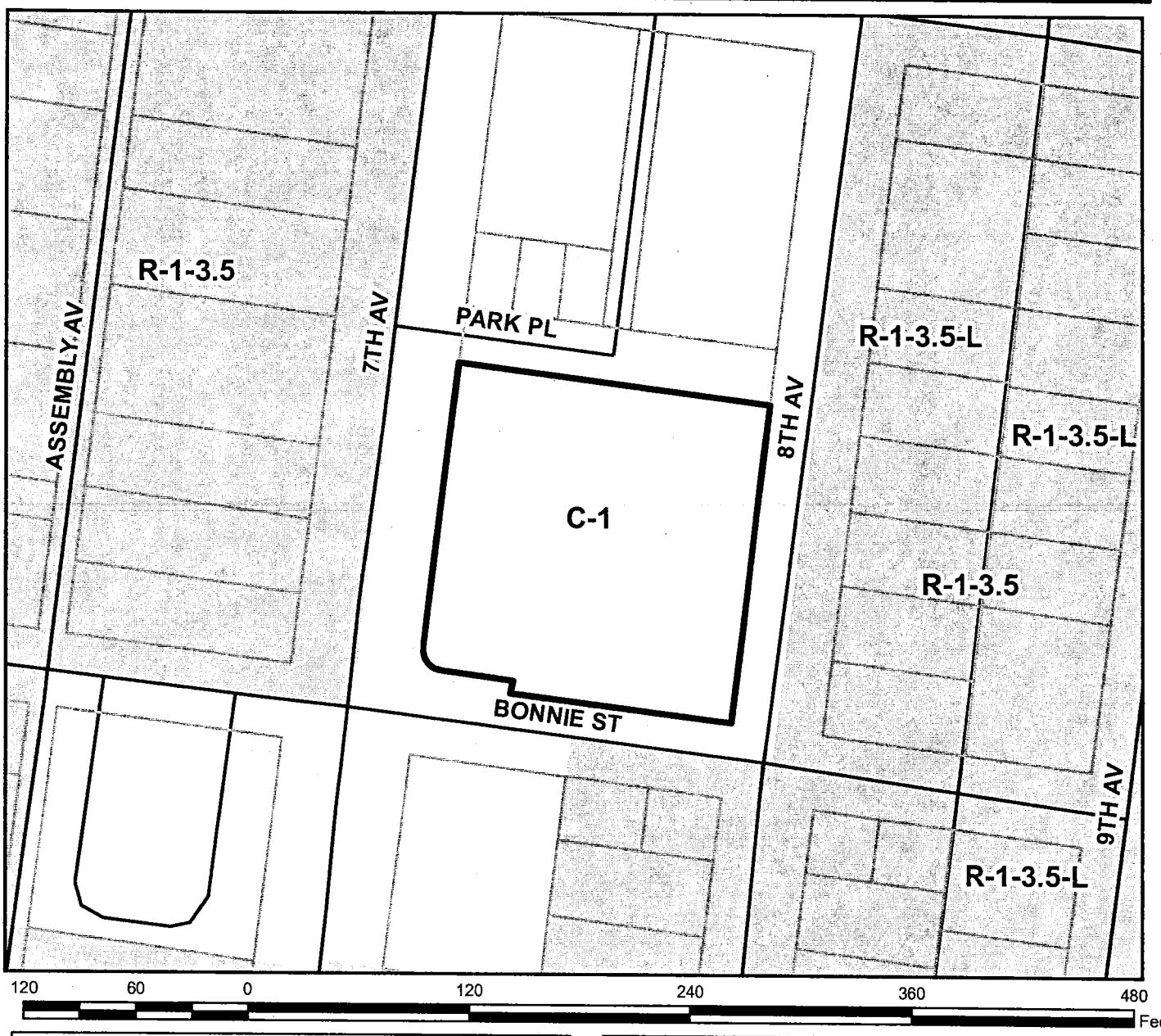
N W E S

Map Created by
County of Santa Cruz
Planning Department
October 2011

plm028

EXHIBIT E

Zoning Map



LEGEND

- APN: 027-142-02
- Assessors Parcels
- Streets
- COMMERCIAL-NEIGHBORHOOD
- RESIDENTIAL-SINGLE FAMILY

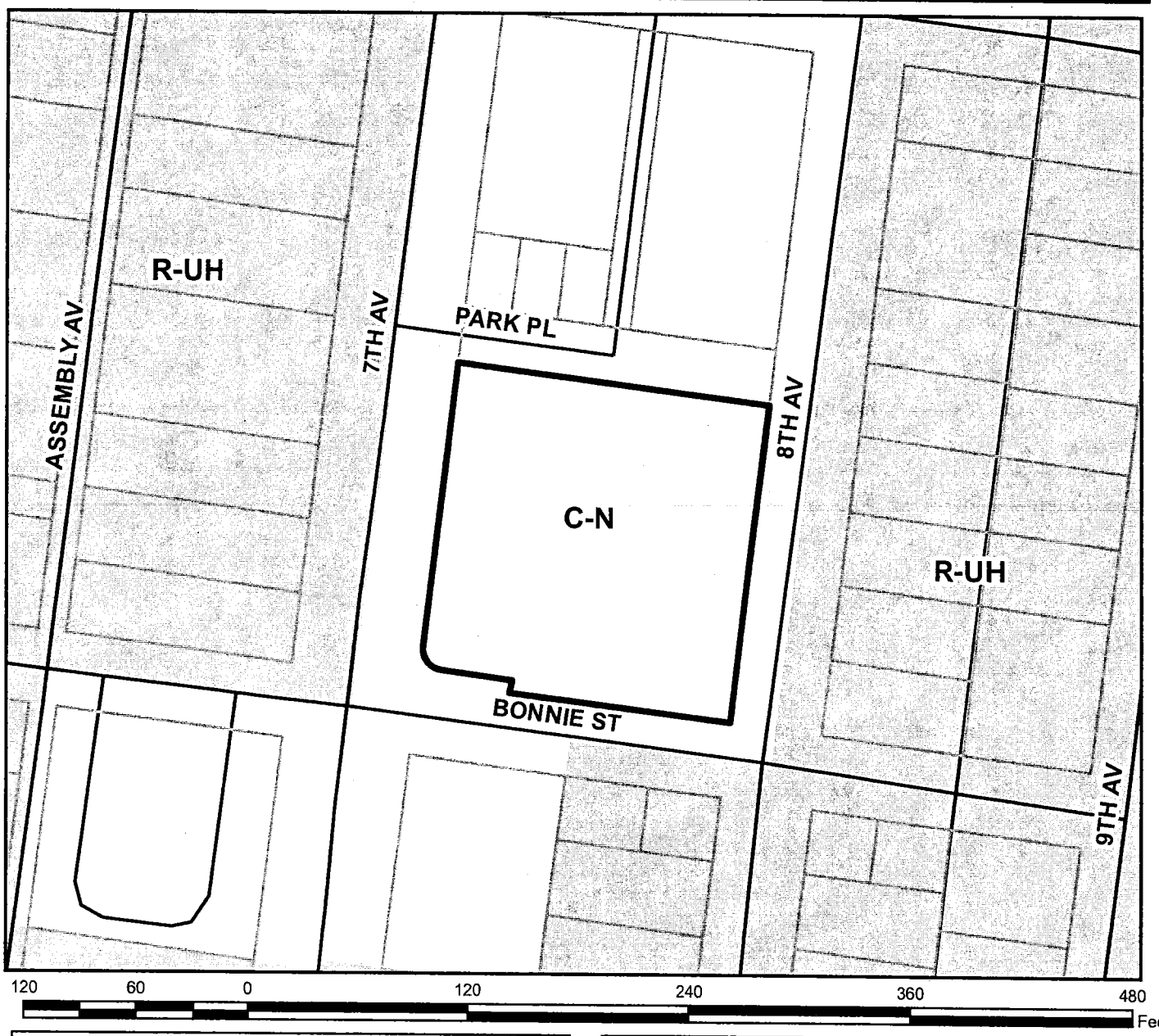
N
W E
S

Map Created by
County of Santa Cruz
Planning Department
October 2011

pln028

EXHIBIT E

General Plan Designation Map



LEGEND

- APN: 027-142-02
- Assessors Parcels
- Streets
- Commercial-Neighborhood
- Residential - Urban High Density

N
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Map Created by
County of Santa Cruz
Planning Department
October 2011

plno28

EXHIBIT F

TRK ENGINEERING

FEDERAL COMMUNICATIONS COMMISSION (FCC)
COMPLIANCE STUDY ON
RADIO FREQUENCY
ELECTROMAGNETIC FIELDS EXPOSURE

Prepared for:

at&t

CNU3627
TWIN LAKES
200 7TH AVENUE
SANTA CRUZ
CA 95062

NOVEMBER 15/11, REV. 0

1137-128

SITE DESCRIPTION:

Carrier:	AT&T
Site Address:	200 7th Avenue, Santa Cruz, CA 95062
Type of Service:	i) GSM ii) UMTS iii) LTE
Sectors:	3 (70°, 0°, 290°)
Antenna Type:	i) Kathrein 742-264 ii) Powerwave 7780.00 iii) Kathrein 800-10764
Number of Antennas:	9 (3 per sector)
Frequencies *(MHz)*:	i) & ii) 850/1900 iii) 704/AWS
Maximum Power *(ERP)*:	i) 630/1000 W ii) 1260/2000 W iii) 950/1500W
Antenna Height:	32'-6"± *(Radiation center AGL)*

Table 1. AT&T RF summary

AT&T is proposing to modify its existing wireless communication facility on the rooftop of the Five Branches University Santa Cruz campus (Figure 1). Three new LTE panel antennas will be added behind the existing parapet walls. Six existing antennas continue to provide GSM and UMTS services. Access to the facility is restricted to authorized personnel only.

Figure 1. Facility and surrounding area

There is another existing wireless communication facility co-locating on the same building rooftop. The RF summary for the facility is shown in the following Table.

Carrier:	T-Mobile
Type of Service:	GSM/UMTS
Antenna Quantity:	4 (2 per sector)
Antenna Type:	RFS APXV18-206516S-C-A20 *(typical)*
Maximum Power:	1100 W *(Maximum ERP per sector)*
Antenna Height:	36'± *(Radiation center AGL)*

Table 2. T-Mobile RF summary

PROTOCOL:

This study, and the calculations performed therein, is based on OET Bulletin 65[1] which adopts ANSI C95.1-1992 and NCRP standards. In particular, equation 10 from section 2 of the guideline is used as a model (in conjunction with known antenna radiation patterns) for calculating the power density at different points of interest. This information will be used to judge the RF exposure level incident upon the general population, and any employee present in the area. It should be noted that ground reflection of RF waves has been taken into account.

FCC'S MAXIMUM PERMISSIBLE EXPOSURE (MPE) LIMIT:

In order to evaluate the RF exposure level, the power densities at different locations of interest have been examined. Equation 10 from Bulletin 65 is reproduced here as equation 1:

$$S = \frac{33.4 F^2 ERP}{R^2} \qquad (1)$$

Where: S = *Power density [$\mu W/cm^2$]*
ERP = *Effective radiated power [W]*
R = *Distance [m]*
F = *Relative field factor (relative numeric gain)*

Scenario 1: *Standing near the facility on street level*

The RF exposure level of a six-foot tall person standing on street level close to the facility is evaluated. For the worst-case scenario, we assume that all the antennas are transmitting the maximum number of channels at the same time, with each channel at its maximum power level. In addition, the azimuths of the antennas of both carriers are assumed to be directed in the studied location. Please refer to scenario 1 in appendix A for the complete geometry and analysis. The highest exposure location is found to be approximately 26' from the AT&T antennas. The calculations of maximum cumulative power density are summarized in Table 3.

[1] Cleveland, Robert F, et al. Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. OET Bulletin 65, Edition 97-01, August 1997.

Service	Max. ERP	F^2	R (m)	S (μW/cm²) (from eq. 1)	MPE %
AT&T 850 UMTS	1260 W	-16 dB (0.0251)	11.1	8.5732	1.4781
AT&T 1900 UMTS	2000 W	-18 dB (0.0158)	11.1	8.5662	0.8566
AT&T 850 GSM	630 W	-11 dB (0.0794)	11.1	13.5601	2.3379
AT&T 1900 GSM	1000 W	-15 dB (0.0316)	11.1	8.5662	0.8566
AT&T LTE 700	950 W	-17 dB (0.0200)	11.1	5.1506	1.0982
AT&T LTE AWS	1500 W	-18 dB (0.0158)	11.1	6.4246	0.6425
T-Mobile	1100 W	-24 dB (0.0040)	17.1	0.5026	0.0503
Total					7.3202

Table 3. Worst-case predicted power density values for scenario 1.

The Maximum Permissible Exposure (MPE) limit for 1900 MHz and 2100 MHz facilities[2] for general population/uncontrolled exposure is 1000 μW/cm², 580 μW/cm² for 850 MHz facilities[3], and 469 μW/cm² for 700 MHz facilities[4]. The maximum cumulative power density is calculated to be 7.3% of the MPE limit.

Scenario 2: *Nearby building rooftops*

There are various types of buildings in the surrounding area. The RF exposure levels on nearby building rooftops are evaluated. We assume again, all antennas within a sector are transmitting with maximum power level. Please refer to scenario 2 in appendix A for the analysis. The highest exposure location is on the rooftop of the nearest building northeast of the facility. The calculations for the maximum possible power density are summarized in Table 4.

Service	Max. ERP	F^2	R (m)	S (μW/cm²) (from eq. 1)	MPE %
AT&T 850 UMTS	1260 W	0 dB (1.0000)	26.9	58.1584	10.0273
AT&T 1900 UMTS	2000 W	-1 dB (0.7943)	26.9	73.3257	7.3326
AT&T 850 GSM	630 W	-1 dB (0.7943)	26.9	23.0976	3.9823
AT&T 1900 GSM	1000 W	-3 dB (0.5012)	26.9	23.1341	2.3134
AT&T LTE 700	950 W	0 dB (1.0000)	26.9	43.8496	9.3496
AT&T LTE AWS	1500 W	-2 dB (0.6310)	26.9	43.6880	4.3688
T-Mobile	1100 W	-5 dB (0.3162)	37.6	8.2172	0.8217
Total					38.1957

Table 4. Worst-case predicted power density values for scenario 2.

The maximum cumulative power density is calculated to be 38.2% of the MPE limit. There is a relatively low level of RF energy directed either above or below the horizontal plane of the antennas, and there are no locations in the surrounding areas near the facility that will have RF exposure levels close to the MPE limit.

[2] Ibid., page 67.
[3] Ibid.
[4] Ibid.

Scenario 3: *Facility rooftop*

Only authorized or trained persons will be permitted to access the rooftop and the antennas. The radiation center of the AT&T sector A antennas will be approximately 8' from the roof deck. There are locations where a six-foot tall person may be partially exposed within the main beam path of an antenna. In this situation, the occupational/controlled exposure limits will apply, as long as the exposed person has been made fully aware of the potential for the exposure. Please refer to scenario 3 in appendix A for the calculations.

The MPE limit for occupational/controlled exposure is 5 mW/cm² for 1900 and 2100 MHz facilities[5], 2.9 mW/cm² for 850 MHz facilities[5], and 2.45 mW/cm² for 700 MHz facilities[5]. Under worst-case conditions, the area between the sector A antennas and the north edge of the building rooftop may have the power density exceeding the occupational/controlled MPE limit. Please refer to scenario 3 in appendix A for the calculations.

Conclusion:

Under "worst-case" conditions, the calculations shown above predict that the maximum possible RF exposure is 38.2% of the MPE limit for general population/uncontrolled exposure. There will be less RF exposure on the ground level or nearby buildings as a person moves away from the site. Therefore, the proposed modifications to the AT&T facility will comply with the general population/uncontrolled limit.

For occupational/controlled exposure to trained persons or transient workers working on the rooftop, an RF exclusion zone of 25' in front of the sector A antennas should be maintained. RF exposure warning signage should be posted on the rooftop and near the antennas. This will make trained persons or transient workers fully aware of the potential for RF exposure when there is a necessity to work near the antennas, and allow them to exercise control over their exposure that is within the occupational/controlled limit.

RF SAFETY SIGNS:

An Information Sign and Notice Sign as shown in the appendix should be maintained at the facility access. A Caution Sign should be maintained near the sector A antennas on the rooftop.

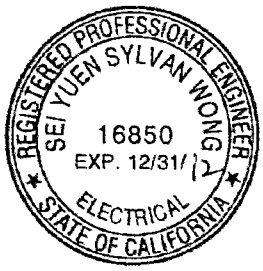
[5] Ibid.

FCC COMPLIANCE:

The general population/uncontrolled exposure near the antennas, including persons on the street level, in nearby open areas, and inside or on existing nearby buildings will have RF exposure much lower than the "worst-case" scenario, which is only a small percentage of the MPE limit.

As for trained persons or transient workers, they will be made fully aware of the potential for RF exposure and can choose to exercise control over their exposure that is within the occupational/controlled limits.

Sei Yuen Sylvan Wong, PE
California PE Reg. No. E 16850

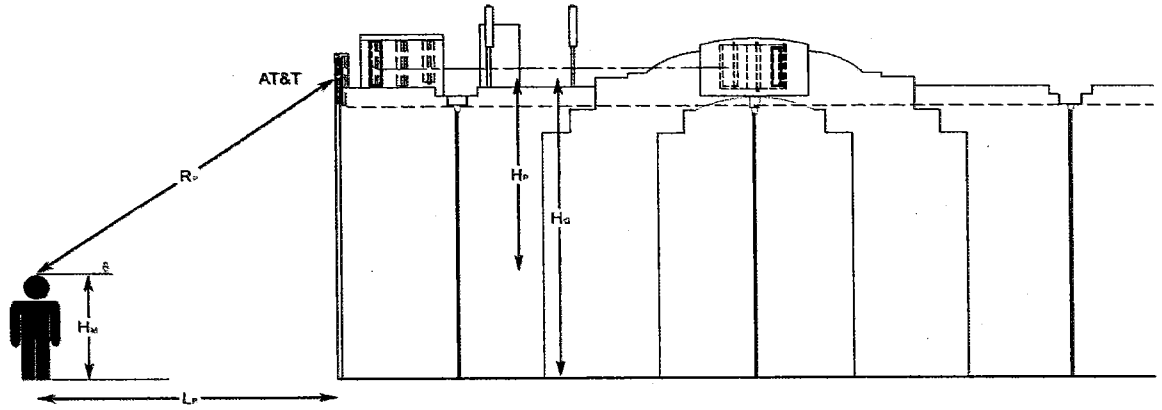


November 15, 2011

EXHIBIT F

APPENDIX A

Scenario 1: Surrounding Area of the Facility



person's height (H_M) = 6 ft

Antennas elevation 53 ft

Horizontal distance from antennas Lp is 20 ft at Θ= 52 ° Elevation above sea level: 54 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	25.50	1260.0	Θ = 52 °	-17 dB (0.0200)	9.9	8.5877	1.4806
AT&T 1900 MHz UMTS	32.50	25.50	2000.0	Θ = 52 °	-20 dB (0.0100)	9.9	6.8156	0.6816
AT&T 850 MHz GSM	32.50	25.50	630.0	Θ = 52 °	-15 dB (0.0316)	9.9	6.7843	1.1697
AT&T 1900 MHz GSM	32.50	25.50	1000.0	Θ = 52 °	-24 dB (0.0040)	9.9	1.3631	0.1363
AT&T LTE 700	32.50	25.50	950.0	Θ = 52 °	-22 dB (0.0063)	9.9	2.0396	0.4349
AT&T LTE AWS	32.50	25.50	1500.0	Θ = 52 °	-23 dB (0.0050)	9.9	2.5559	0.2556
Lp is 42 ft								
T-Mobile	36.00	29.00	1100.0	Θ = 35 °	-23 dB (0.0050)	15.6	0.7548	0.0755
						Total		4.2342

Horizontal distance from antennas Lp is 26 ft at Θ= 44 ° Elevation above sea level: 54 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	25.50	1260.0	Θ = 44 °	-16 dB (0.0251)	11.1	8.5732	1.4781
AT&T 1900 MHz UMTS	32.50	25.50	2000.0	Θ = 44 °	-18 dB (0.0158)	11.1	8.5662	0.8566
AT&T 850 MHz GSM	32.50	25.50	630.0	Θ = 44 °	-11 dB (0.0794)	11.1	13.5601	2.3379
AT&T 1900 MHz GSM	32.50	25.50	1000.0	Θ = 44 °	-15 dB (0.0316)	11.1	8.5662	0.8566
AT&T LTE 700	32.50	25.50	950.0	Θ = 44 °	-17 dB (0.0200)	11.1	5.1506	1.0982
AT&T LTE AWS	32.50	25.50	1500.0	Θ = 44 °	-18 dB (0.0158)	11.1	6.4246	0.6425
Lp is 48 ft								
T-Mobile	36.00	29.00	1100.0	Θ = 31 °	-24 dB (0.0040)	17.1	0.5026	0.0503
						Total		7.3202

Horizontal distance from antennas Lp is 49 ft at Θ= 27 ° Elevation above sea level: 54 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	25.50	1260.0	Θ = 27 °	-12 dB (0.0631)	16.8	9.4087	1.6222
AT&T 1900 MHz UMTS	32.50	25.50	2000.0	Θ = 27 °	-14 dB (0.0398)	16.8	9.4198	0.9420
AT&T 850 MHz GSM	32.50	25.50	630.0	Θ = 27 °	-14 dB (0.0398)	16.8	2.9672	0.5116
AT&T 1900 MHz GSM	32.50	25.50	1000.0	Θ = 27 °	-23 dB (0.0050)	16.8	0.5917	0.0592
AT&T LTE 700	32.50	25.50	950.0	Θ = 27 °	-11 dB (0.0794)	16.8	8.9263	1.9033
AT&T LTE AWS	32.50	25.50	1500.0	Θ = 27 °	-22 dB (0.0063)	16.8	1.1183	0.1118
Lp is 71 ft								
T-Mobile	36.00	29.00	1100.0	Θ = 22 °	-25 dB (0.0032)	23.4	0.2147	0.0215
						Total		5.1716

EXHIBIT F

Horizontal distance from antennas Lp is 52 ft at Θ= 26 ° Elevation above sea level: 54 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	25.50	1260.0	Θ = 26 °	-12 dB (0.0631)	17.7	8.4762	1.4614
AT&T 1900 MHz UMTS	32.50	25.50	2000.0	Θ = 26 °	-13 dB (0.0501)	17.7	10.6824	1.0682
AT&T 850 MHz GSM	32.50	25.50	630.0	Θ = 26 °	-14 dB (0.0398)	17.7	2.6732	0.4609
AT&T 1900 MHz GSM	32.50	25.50	1000.0	Θ = 26 °	-23 dB (0.0050)	17.7	0.5331	0.0533
AT&T LTE 700	32.50	25.50	950.0	Θ = 26 °	-11 dB (0.0794)	17.7	8.0416	1.7146
AT&T LTE AWS	32.50	25.50	1500.0	Θ = 26 °	-22 dB (0.0063)	17.7	1.0075	0.1008
Lp is 74 ft								
T-Mobile	36.00	29.00	1100.0	Θ = 21 °	-23 dB (0.0050)	24.2	0.3137	0.0314
						Total		4.8906

Horizontal distance from antennas Lp is 99 ft at Θ= 14 ° Elevation above sea level: 54 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	25.50	1260.0	Θ = 14 °	-7 dB (0.1995)	31.2	8.6248	1.4870
AT&T 1900 MHz UMTS	32.50	25.50	2000.0	Θ = 14 °	-11 dB (0.0794)	31.2	5.4486	0.5449
AT&T 850 MHz GSM	32.50	25.50	630.0	Θ = 14 °	-10 dB (0.1000)	31.2	2.1616	0.3727
AT&T 1900 MHz GSM	32.50	25.50	1000.0	Θ = 14 °	-14 dB (0.0398)	31.2	1.3656	0.1366
AT&T LTE 700	32.50	25.50	950.0	Θ = 14 °	-11 dB (0.0794)	31.2	2.5881	0.5518
AT&T LTE AWS	32.50	25.50	1500.0	Θ = 14 °	-20 dB (0.0100)	31.2	0.5147	0.0515
Lp is 121 ft								
T-Mobile	36.00	29.00	1100.0	Θ = 13 °	-15 dB (0.0316)	37.9	0.8083	0.0808
						Total		3.2253

Horizontal distance from antennas Lp is 126 ft at Θ= 11 ° Elevation above sea level: 54 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	25.50	1260.0	Θ = 11 °	-3 dB (0.5012)	39.2	13.7264	2.3666
AT&T 1900 MHz UMTS	32.50	25.50	2000.0	Θ = 11 °	-5 dB (0.3162)	39.2	13.7457	1.3746
AT&T 850 MHz GSM	32.50	25.50	630.0	Θ = 11 °	-5 dB (0.3162)	39.2	4.3299	0.7465
AT&T 1900 MHz GSM	32.50	25.50	1000.0	Θ = 11 °	-14 dB (0.0398)	39.2	0.8651	0.0865
AT&T LTE 700	32.50	25.50	950.0	Θ = 11 °	-5 dB (0.3162)	39.2	6.5292	1.3922
AT&T LTE AWS	32.50	25.50	1500.0	Θ = 11 °	-19 dB (0.0126)	39.2	0.4108	0.0411
Lp is 148 ft								
T-Mobile	36.00	29.00	1100.0	Θ = 11 °	-5 dB (0.3162)	46.0	5.4902	0.5490
						Total		6.5565

Horizontal distance from antennas Lp is 153 ft at Θ= 9 ° Elevation above sea level: 54 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	25.50	1260.0	Θ = 9 °	-2 dB (0.6310)	47.3	11.8693	2.0464
AT&T 1900 MHz UMTS	32.50	25.50	2000.0	Θ = 9 °	-3 dB (0.5012)	47.3	14.9646	1.4965
AT&T 850 MHz GSM	32.50	25.50	630.0	Θ = 9 °	-3 dB (0.5012)	47.3	4.7139	0.8127
AT&T 1900 MHz GSM	32.50	25.50	1000.0	Θ = 9 °	-16 dB (0.0251)	47.3	0.3747	0.0375
AT&T LTE 700	32.50	25.50	950.0	Θ = 9 °	-3 dB (0.5012)	47.3	7.1082	1.5156
AT&T LTE AWS	32.50	25.50	1500.0	Θ = 9 °	-12 dB (0.0631)	47.3	1.4130	0.1413
Lp is 175 ft								
T-Mobile	36.00	29.00	1100.0	Θ = 9 °	-5 dB (0.3162)	54.1	3.9692	0.3969
						Total		6.4469

Horizontal distance from antennas Lp is 216 ft at Θ= 6 ° Elevation above sea level: 55 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	24.50	1260.0	Θ = 6 °	0 dB (1.0000)	66.3	9.5739	1.6507
AT&T 1900 MHz UMTS	32.50	24.50	2000.0	Θ = 6 °	-1 dB (0.7943)	66.3	12.0707	1.2071
AT&T 850 MHz GSM	32.50	24.50	630.0	Θ = 6 °	-1 dB (0.7943)	66.3	3.8023	0.6556
AT&T 1900 MHz GSM	32.50	24.50	1000.0	Θ = 6 °	-5 dB (0.3162)	66.3	2.4026	0.2403
AT&T LTE 700	32.50	24.50	950.0	Θ = 6 °	-1 dB (0.7943)	66.3	5.7336	1.2225
AT&T LTE AWS	32.50	24.50	1500.0	Θ = 6 °	-3 dB (0.5012)	66.3	5.7124	0.5712
Lp is 238 ft								
T-Mobile	36.00	28.00	1100.0	Θ = 7 °	-11 dB (0.0794)	73.1	0.5459	0.0546
						Total		5.6020

EXHIBIT P

Horizontal distance from antennas Lp is 312 ft at Θ= 4 ° Elevation above sea level: 55 feet

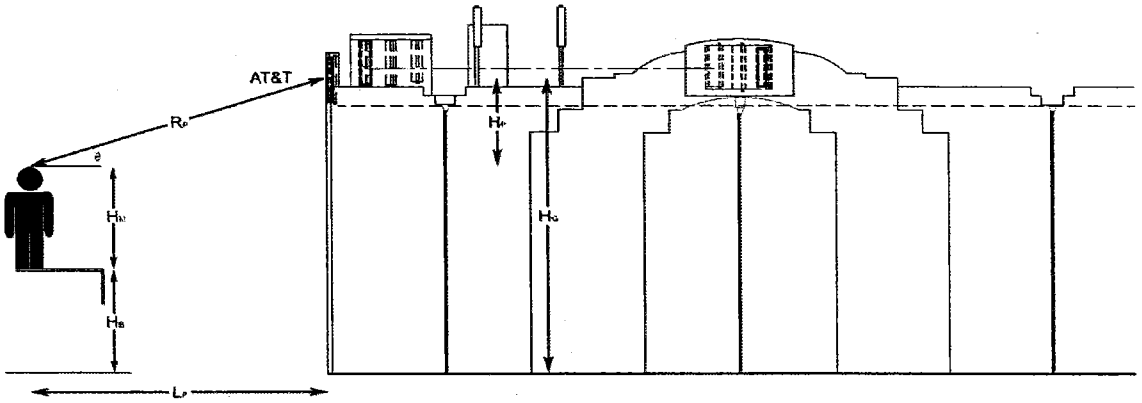
Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	24.50	1260.0	Θ = 4 °	0 dB (1.0000)	95.4	4.6240	0.7972
AT&T 1900 MHz UMTS	32.50	24.50	2000.0	Θ = 4 °	0 dB (1.0000)	95.4	7.3397	0.7340
AT&T 850 MHz GSM	32.50	24.50	630.0	Θ = 4 °	0 dB (1.0000)	95.4	2.3120	0.3986
AT&T 1900 MHz GSM	32.50	24.50	1000.0	Θ = 4 °	-2 dB (0.6310)	95.4	2.3157	0.2316
AT&T LTE 700	32.50	24.50	950.0	Θ = 4 °	0 dB (1.0000)	95.4	3.4864	0.7434
AT&T LTE AWS	32.50	24.50	1500.0	Θ = 4 °	-1 dB (0.7943)	95.4	4.3725	0.4373
Lp is 334 ft								
T-Mobile	36.00	28.00	1100.0	Θ = 5 °	-5 dB (0.3162)	102.2	1.1122	0.1112
						Total		3.4533

Horizontal distance from antennas Lp is 401 ft at Θ= 4 ° Elevation above sea level: 54 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	25.50	1260.0	Θ = 4 °	0 dB (1.0000)	122.5	2.8044	0.4835
AT&T 1900 MHz UMTS	32.50	25.50	2000.0	Θ = 4 °	0 dB (1:0000)	122.5	4.4515	0.4452
AT&T 850 MHz GSM	32.50	25.50	630.0	Θ = 4 °	0 dB (1.0000)	122.5	1.4022	0.2418
AT&T 1900 MHz GSM	32.50	25.50	1000.0	Θ = 4 °	-2 dB (0.6310)	122.5	1.4044	0.1404
AT&T LTE 700	32.50	25.50	950.0	Θ = 4 °	0 dB (1.0000)	122.5	2.1145	0.4509
AT&T LTE AWS	32.50	25.50	1500.0	Θ = 4 °	-1 dB (0.7943)	122.5	2.6519	0.2652
Lp is 423 ft								
T-Mobile	36.00	29.00	1100.0	Θ = 4 °	-2 dB (0.6310)	129.3	1.3867	0.1387
						Total		2.1657

EXHIBIT F 4

Scenario 2: Nearby Buildings/Rooftop



person's height (H_M) = 6 ft

Location 1: Nearest building surface within Sector A

H_B= 18.0 ft, L_P is 88 ft Elevation above sea level: 54 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	7.50	1260.0	Θ = 5 °	0 dB (1.0000)	26.9	58.1584	10.0273
AT&T 1900 MHz UMTS	32.50	7.50	2000.0	Θ = 5 °	-1 dB (0.7943)	26.9	73.3257	7.3326
AT&T 850 MHz GSM	32.50	7.50	630.0	Θ = 5 °	-1 dB (0.7943)	26.9	23.0976	3.9823
AT&T 1900 MHz GSM	32.50	7.50	1000.0	Θ = 5 °	-3 dB (0.5012)	26.9	23.1341	2.3134
AT&T LTE 700	32.50	7.50	950.0	Θ = 5 °	0 dB (1.0000)	26.9	43.8496	9.3496
AT&T LTE AWS	32.50	7.50	1500.0	Θ = 5 °	-2 dB (0.6310)	26.9	43.6880	4.3688
Lp is 123 ft								
T-Mobile	36.00	11.00	1100.0	Θ = 5 °	-5 dB (0.3162)	37.6	8.2172	0.8217
						Total		38.1957

H_B= 14.0 ft, L_P is 196 ft Elevation above sea level: 52 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	13.50	1260.0	Θ = 4 °	0 dB (1.0000)	59.9	11.7291	2.0223
AT&T 1900 MHz UMTS	32.50	13.50	2000.0	Θ = 4 °	0 dB (1.0000)	59.9	18.6176	1.8618
AT&T 850 MHz GSM	32.50	13.50	630.0	Θ = 4 °	0 dB (1.0000)	59.9	5.8645	1.0111
AT&T 1900 MHz GSM	32.50	13.50	1000.0	Θ = 4 °	-2 dB (0.6310)	59.9	5.8738	0.5874
AT&T LTE 700	32.50	13.50	950.0	Θ = 4 °	0 dB (1.0000)	59.9	8.8433	1.8856
AT&T LTE AWS	32.50	13.50	1500.0	Θ = 4 °	-1 dB (0.7943)	59.9	11.0909	1.1091
Lp is 232 ft								
T-Mobile	36.00	17.00	1100.0	Θ = 4 °	-2 dB (0.6310)	70.9	4.6119	0.4612
						Total		8.9385

Location 2: Nearest building surface within Sector B

H_B= 12.0 ft, L_P is 68 ft Elevation above sea level: 54 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	13.50	1260.0	Θ = 11 °	-3 dB (0.5012)	21.1	47.3765	8.1684
AT&T 1900 MHz UMTS	32.50	13.50	2000.0	Θ = 11 °	-5 dB (0.3162)	21.1	47.4431	4.7443
AT&T 850 MHz GSM	32.50	13.50	630.0	Θ = 11 °	-5 dB (0.3162)	21.1	14.9446	2.5767
AT&T 1900 MHz GSM	32.50	13.50	1000.0	Θ = 11 °	-14 dB (0.0398)	21.1	2.9858	0.2986
AT&T LTE 700	32.50	13.50	950.0	Θ = 11 °	-5 dB (0.3162)	21.1	22.5355	4.8050
AT&T LTE AWS	32.50	13.50	1500.0	Θ = 11 °	-19 dB (0.0126)	21.1	1.4179	0.1418
Lp is 90 ft								
T-Mobile	36.00	17.00	1100.0	Θ = 11 °	-5 dB (0.3162)	27.9	14.9243	1.4924
						Total		22.2272

EXHIBIT F

H_B= 18.0 ft, L_P is 270 ft Elevation above sea level: 55 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	6.50	1260.0	Θ = 1 °	0 dB (1.0000)	82.3	6.2132	1.0712
AT&T 1900 MHz UMTS	32.50	6.50	2000.0	Θ = 1 °	0 dB (1.0000)	82.3	9.8623	0.9862
AT&T 850 MHz GSM	32.50	6.50	630.0	Θ = 1 °	0 dB (1.0000)	82.3	3.1066	0.5356
AT&T 1900 MHz GSM	32.50	6.50	1000.0	Θ = 1 °	0 dB (1.0000)	82.3	4.9311	0.4931
AT&T LTE 700	32.50	6.50	950.0	Θ = 1 °	0 dB (1.0000)	82.3	4.6846	0.9988
AT&T LTE AWS	32.50	6.50	1500.0	Θ = 1 °	0 dB (1.0000)	82.3	7.3967	0.7397
Lp is 292 ft								
T-Mobile	36.00	10.00	1100.0	Θ = 2 °	0 dB (1.0000)	89.1	4.6279	0.4628
						Total		5.2874

Location 3: Nearest building surface within Sector C

H_B= 14.0 ft, L_P is 116 ft Elevation above sea level: 52 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	13.50	1260.0	Θ = 7 °	-1 dB (0.7943)	35.6	26.3756	4.5475
AT&T 1900 MHz UMTS	32.50	13.50	2000.0	Θ = 7 °	-2 dB (0.6310)	35.6	33.2587	3.3259
AT&T 850 MHz GSM	32.50	13.50	630.0	Θ = 7 °	-1 dB (0.7943)	35.6	13.1878	2.2738
AT&T 1900 MHz GSM	32.50	13.50	1000.0	Θ = 7 °	-9 dB (0.1259)	35.6	3.3180	0.3318
AT&T LTE 700	32.50	13.50	950.0	Θ = 7 °	-1 dB (0.7943)	35.6	19.8863	4.2401
AT&T LTE AWS	32.50	13.50	1500.0	Θ = 7 °	-6 dB (0.2512)	35.6	9.9302	0.9930
Lp is 147 ft								
T-Mobile	36.00	17.00	1100.0	Θ = 7 °	-11 dB (0.0794)	45.1	1.4342	0.1434
						Total		15.8555

H_B= 22.0 ft, L_P is 180 ft Elevation above sea level: 51 feet

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	32.50	6.50	1260.0	Θ = 2 °	0 dB (1.0000)	54.9	13.9628	2.4074
AT&T 1900 MHz UMTS	32.50	6.50	2000.0	Θ = 2 °	0 dB (1.0000)	54.9	22.1632	2.2163
AT&T 850 MHz GSM	32.50	6.50	630.0	Θ = 2 °	0 dB (1.0000)	54.9	6.9814	1.2037
AT&T 1900 MHz GSM	32.50	6.50	1000.0	Θ = 2 °	0 dB (1.0000)	54.9	11.0816	1.1082
AT&T LTE 700	32.50	6.50	950.0	Θ = 2 °	0 dB (1.0000)	54.9	10.5275	2.2447
AT&T LTE AWS	32.50	6.50	1500.0	Θ = 2 °	0 dB (1.0000)	54.9	16.6224	1.6622
Lp is 210 ft								
T-Mobile	36.00	10.00	1100.0	Θ = 3 °	-1 dB (0.7943)	64.1	7.1024	0.7102
						Total		11.5527

Scenario 3: Facility Rooftop

Horizontal distance from antenna L_P is 5 ft at Θ= 17 °

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	7.50	1.50	1260.0	Θ = 17 °	-14 dB (0.0398)	1.6	654.2747	22.5612
AT&T 1900 MHz UMTS	7.50	1.50	2000.0	Θ = 17 °	-18 dB (0.0158)	1.6	412.2813	8.2456
AT&T 850 MHz GSM	7.50	1.50	630.0	Θ = 17 °	-16 dB (0.0251)	1.6	206.3102	7.1141
AT&T 1900 MHz GSM	7.50	1.50	1000.0	Θ = 17 °	-18 dB (0.0158)	1.6	206.1406	4.1228
AT&T LTE 700	7.50	1.50	950.0	Θ = 17 °	-18 dB (0.0158)	1.6	195.8336	8.3333
AT&T LTE AWS	7.50	1.50	1500.0	Θ = 17 °	-23 dB (0.0050)	1.6	97.8516	1.9570
						Total		52.3340

Horizontal distance from antenna L_P is 10 ft at Θ= 9 °

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	7.50	1.50	1260.0	Θ = 9 °	-2 dB (0.6310)	3.1	2763.2678	95.2851
AT&T 1900 MHz UMTS	7.50	1.50	2000.0	Θ = 9 °	-3 dB (0.5012)	3.1	3483.8876	69.6778
AT&T 850 MHz GSM	7.50	1.50	630.0	Θ = 9 °	-3 dB (0.5012)	3.1	1097.4246	37.8422
AT&T 1900 MHz GSM	7.50	1.50	1000.0	Θ = 9 °	-16 dB (0.0251)	3.1	87.2362	1.7447
AT&T LTE 700	7.50	1.50	950.0	Θ = 9 °	-3 dB (0.5012)	3.1	1654.8466	70.4190
AT&T LTE AWS	7.50	1.50	1500.0	Θ = 9 °	-12 dB (0.0631)	3.1	328.9605	6.5792
						Total		281.5480

Horizontal distance from antenna L_P is 15 ft at Θ= 6 °

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	7.50	1.50	1260.0	Θ = 6 °	0 dB (1.0000)	4.6	1988.8469	68.5809
AT&T 1900 MHz UMTS	7.50	1.50	2000.0	Θ = 6 °	-1 dB (0.7943)	4.6	2507.5255	50.1505
AT&T 850 MHz GSM	7.50	1.50	630.0	Θ = 6 °	-1 dB (0.7943)	4.6	789.8705	27.2369
AT&T 1900 MHz GSM	7.50	1.50	1000.0	Θ = 6 °	-5 dB (0.3162)	4.6	499.1059	9.9821
AT&T LTE 700	7.50	1.50	950.0	Θ = 6 °	-1 dB (0.7943)	4.6	1191.0746	50.6840
AT&T LTE AWS	7.50	1.50	1500.0	Θ = 6 °	-3 dB (0.5012)	4.6	1186.6786	23.7336
						Total		230.3680

Horizontal distance from antenna L_P is 24 ft at Θ= 4 °

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	7.50	1.50	1260.0	Θ = 4 °	0 dB (1.0000)	7.3	789.7166	27.2316
AT&T 1900 MHz UMTS	7.50	1.50	2000.0	Θ = 4 °	0 dB (1.0000)	7.3	1253.5185	25.0704
AT&T 850 MHz GSM	7.50	1.50	630.0	Θ = 4 °	0 dB (1.0000)	7.3	394.8583	13.6158
AT&T 1900 MHz GSM	7.50	1.50	1000.0	Θ = 4 °	-2 dB (0.6310)	7.3	395.4851	7.9097
AT&T LTE 700	7.50	1.50	950.0	Θ = 4 °	0 dB (1.0000)	7.3	595.4213	25.3371
AT&T LTE AWS	7.50	1.50	1500.0	Θ = 4 °	-1 dB (0.7943)	7.3	746.7523	14.9350
						Total		114.0996

Horizontal distance from antenna L_P is 25 ft at Θ= 3 °

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	7.50	1.50	1260.0	Θ = 3 °	0 dB (1.0000)	7.6	728.6011	25.1242
AT&T 1900 MHz UMTS	7.50	1.50	2000.0	Θ = 3 °	0 dB (1.0000)	7.6	1156.5097	23.1302
AT&T 850 MHz GSM	7.50	1.50	630.0	Θ = 3 °	0 dB (1.0000)	7.6	364.3006	12.5621
AT&T 1900 MHz GSM	7.50	1.50	1000.0	Θ = 3 °	0 dB (1.0000)	7.6	578.2548	11.5651
AT&T LTE 700	7.50	1.50	950.0	Θ = 3 °	0 dB (1.0000)	7.6	549.3421	23.3763
AT&T LTE AWS	7.50	1.50	1500.0	Θ = 3 °	0 dB (1.0000)	7.6	867.3823	17.3476
						Total		113.1055

Horizontal distance from antenna L_P is 50 ft at Θ= 2 °

Service Provider	Height H_G, ft	Height H_P, ft	Max. ERP	Angle Θ	F^2	R_P(m)	S (μW/cm2)	MPE%
AT&T 850 MHz UMTS	7.50	1.50	1260.0	Θ = 2 °	0 dB (1.0000)	15.3	179.7770	6.1992
AT&T 1900 MHz UMTS	7.50	1.50	2000.0	Θ = 2 °	0 dB (1.0000)	15.3	285.3603	5.7072
AT&T 850 MHz GSM	7.50	1.50	630.0	Θ = 2 °	0 dB (1.0000)	15.3	89.8885	3.0996
AT&T 1900 MHz GSM	7.50	1.50	1000.0	Θ = 2 °	0 dB (1.0000)	15.3	142.6802	2.8536
AT&T LTE 700	7.50	1.50	950.0	Θ = 2 °	0 dB (1.0000)	15.3	135.5462	5.7679
AT&T LTE AWS	7.50	1.50	1500.0	Θ = 2 °	0 dB (1.0000)	15.3	214.0202	4.2804
						Total		27.9079

EXHIBIT F

KATHREIN
SCALA DIVISION

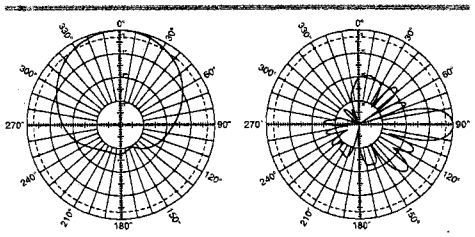
742 264

65° Dualband Directional Antenna

Kathrein's dual band antennas are ready for 3G applications, covering all existing wireless bands as well as all spectrum under consideration for future systems, AMPS, PCS and 3G/UMTS. These cross-polarized antennas offer diversity operation in the same space as a conventional 800 MHz antenna, and are mountable on our compact sector brackets.

- Wide band operation.
- Exceptional intermodulation characteristics.
- Remote control ready.
- Various gain, beamwidth and downtilt ranges.
- AISG compatible.
- High strength pultruded fiberglass radome.

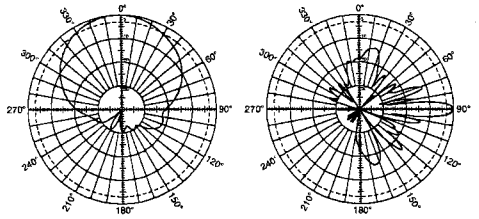
824–960 MHz



Horizontal pattern
±45°- polarization

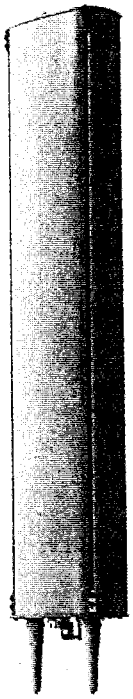
Vertical pattern
±45°- polarization
0°–14° electrical downtilt

1710–2180 MHz



Horizontal pattern
±45°- polarization

Vertical pattern
±45°- polarization
0°–8° electrical downtilt



General specifications:

Frequency range	824–960 MHz 1710–2180 MHz
Impedance	50 ohms
VSWR	<1.5:1
Intermodulation (2x20w)	IM3: -150 dBc
Polarization	+45° and -45°
Connector	4 x 7/16 DIN female (long neck)
Isolation intrasystem intersystem	>30 dB >50 dB (824–960 // 1710–2180 MHz)
Weight	36.4 lb (16.5 kg)
Dimensions	51.8 x 10.3 x 5.5 inches (1316 x 262 x 139 mm)
Equivalent flat plate area	4.13 ft² (0.384 m²)
Wind survival rating*	120 mph (200 kph) sustained 150 mph (240 kph) in a 3 second burst
Shipping dimensions	63.6 x 11.9 x 7.6 inches (1615 x 302 x 192 mm)
Shipping weight	45 lb (20.4 kg)
Mounting	Fixed mount options are available for 2 to 4.6 inch (50 to 115 mm) OD masts.
See reverse for order information.	

Specifications:	**824–894 MHz**	**870–960 MHz**	**1710–1880 MHz**	**1850–1990 MHz**	**1920–2180 MHz**
Gain	14 dBi	14 dBi	16.5 dBi	16.8 dBi	17 dBi
Front-to-back ratio	>26 dB (co-polar)	>26 dB (co-polar)	>25 dB (co-polar)	>25 dB (co-polar)	>25 dB (co-polar)
Maximum input power per input total power	500 watts (at 50°C) 1000 watts (at 50°C)	500 watts (at 50°C)	250 watts (at 50°C)	250 watts (at 50°C) 500 watts (at 50°C)	250 watts (at 50°C)
+45° and -45° polarization horizontal beamwidth	68° (half-power)	65° (half-power)	65° (half-power)	65° (half-power)	63° (half-power)
+45° and -45° polarization vertical beamwidth	16° (half-power)	14.5° (half-power)	7.8° (half-power)	7.3° (half-power)	6.8° (half-power)
Electrical downtilt continuously adjustable	0°–14°	0°–14°	0°–8°	0°–8°	0°–8°
Sidelobe suppression for first sidelobe above main beam	0° 7° 14° T 14 14 13 dB	0° 7° 14° T 14 14 13 dB	0° 4° 8° T 14 14 14 dB	0° 4° 8° T 16 16 15 dB	0° 4° 8° T 15 16 15 dB
Cross polar ratio Main direction 0° Sector ±60°	20 dB (typical) >10 dB	20 dB (typical) >10 dB	16 dB (typical) >10 dB	18 dB (typical) >10 dB	20 dB (typical) >10 dB

* Mechanical design is based on environmental conditions as stipulated in EIA-222-F (June 1996) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

RoHS
Lead-Free

10633-K
936.2887/b

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

EXHIBIT F

7780.00 Triple Broadband Cross Polarized

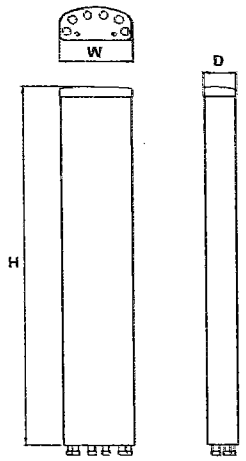
POLARIZATION: X-Pol
FREQUENCY (MHz): 824-960, 2x1710-2170
HORIZONTAL BEAM WIDTH (°): 65
GAIN (dBi/dBd): 14.7/12.6, 14.6/12.5, 14.6/12.5
TILT: MET
LENGTH: 1.4m (4'7")

ELECTRICAL SPECIFICATIONS*

Frequency range (MHz)	824-960		2x1710-2170		
Frequency band (MHz)	824-896	880-960	1710-1880	1850-1990	1900-2170
Gain (dBi/dBd)	14.1/12	14.7/12.6	14.4/12.3	14.6/12.5	14.8/12.7
Polarization	Dual linear ±45°			Dual linear ±45°	
Nominal Impedance (Ω)	50			50	
VSWR	1.5:1			1.5:1	
Horizontal beam width, -3 dB (°)	71	67	65	64	64
Vertical beam width, -3 dB (°)	14.9	13.9	13.3	12.6	12
Electrical down tilt (°)	2 to 12			0 to 12	
Side lobe suppression, vertical 1st upper (dB)	>18,17,16,16@ 2,4,8,12°	>17,16,15,14@ 2,4,8,12°	>17,16,15,14@ 0,4,8,12°	>17,16,15,14@ 0,4,8,12°	>17,16,15,14@ 0,4,8,12°
Isolation between inputs (dB)	30	30	30	30	>30
Inter band Isolation (dB)	38			38	
Tracking, horizontal plane ±60° (dB)	<1	<2	<1.5	<1.2	<4
First null fill (dB)	25	25	25	25	25
Vertical beam squint (°)	0.7	0.7	0.7	1	1
Front to back ratio (dB)	>27	>28	>28	>28	>28
Front to back ratio, total power (dB)	>24	>24	>24	>24	>24
Cross polar discrimination (XPD) 0° (dB)	15	14	16	18	18
Cross polar discrimination (XPD) ±60° (dB)	> 9.3	>7.7	>6	>5.5	> 5.5
Far field coupling	< 0.35	< 0.50	< 0.55	< 0.74	< 0.74
IM3, 2xTx@43dBm (dBc)	-153			-	
IM7, 2xTx@43dBm (dBc)	-			-160	
Power handling, average per input (W)	300			250	
Power handling, average total (W)	600			500	

MECHANICAL SPECIFICATIONS*

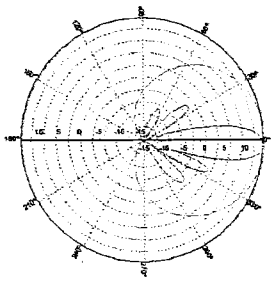
Connector	6 x 7/16 DIN Female
Connector position	Bottom
Dimensions, HxWxD, mm (ft)	1408x280x125mm (4'7"x11"x4")
Mounting	Pre-mounted heavy duty brackets
Weight, with brackets, kg (lbs)	19 (42)
Weight, without brackets, kg (lbs)	13.5 (30)
Wind load, frontal/lateral/rear side 42 m/s Cd=1.6 (N)	415
Maximum operational wind speed, m/s (mph)	42 (93)
Survival wind speed, m/s (mph)	55 (123)
Lightning protection	DC grounded
Radome material	GRP
Package size, HxWxD, mm (ft)	1550x355x200 (5'1"x1'2"x7")
Radome colour	Light Grey
Shipping weight, kg (lbs)	23 (50.7)
RET	7030.00, 7031.00, 7032.00, 7033.00
Brackets	7256.00, 7454.00, 2210.10



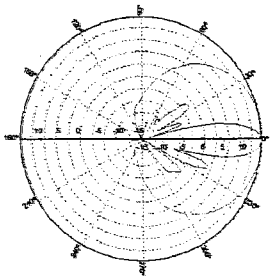
*All specifications subject to change without notice. Please contact your Powerwave representative for complete performance data.

ANTENNA PATTERNS*

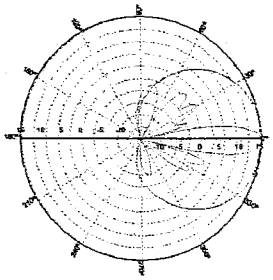
For detailed patterns visit http://www.powerwave.com/rpa/.



900 MHz



1800 MHz



2100 MHz

EXHIBIT F

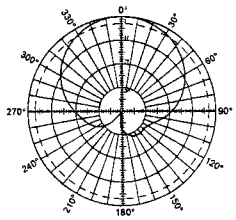
KATHREIN
SCALA DIVISION

800 10764
700 MHz Dual Band 4', 65 Degree Antenna RET

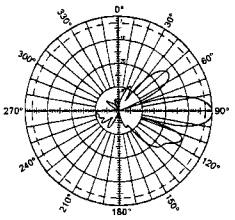
Kathrein's X-polarized antennas are designed for use in digital polarization diversity systems.

- X-polarized (+45° and -45°).
- UV resistant fiberglass radomes.
- Wideband vector dipole technology.
- DC Grounded metallic parts for impulse suppression.
- RET motor housed inside the radome and field replaceable.

698–894 MHz

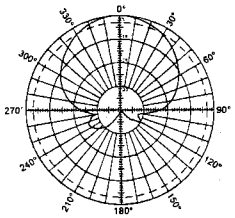


Horizontal pattern
±45°- polarization

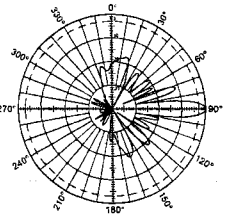


Vertical pattern
±45°- polarization
0°–16° electrical downtilt

1710–2170 MHz



Horizontal pattern
±45°- polarization



Vertical pattern
±45°- polarization
0°–10° electrical downtilt

General specifications:

Frequency range	698–894 MHz // 1710–2170 MHz
Impedance	50 ohms
VSWR	<1.5:1
Intermodulation (2x20w)	IM3:< -150 dBc
Polarization	+45° and -45°
Connector	4 x 7-16 DIN female (long neck)
Isolation	intrasystem >30 dB // intersystem >35 dB
See reverse for order information.	

IRT specifications:

Logical interface ex factory[1)]	AISG 1.1
Protocols	AISG 1.1 and 3GPP/AISG 2.0 compliant
Hardware interface[2)]	2 x 8pin connector acc. IEC 60130-9; according to AISG: – RCUin (male): Control / Daisy chain in – RCUout (female): Daisy chain out
Power supply	10–30 V
Power Consumption	<1 W (standby); <8.5 W (motor activated)
Adjustment time (full range)	40 seconds
Adjustment cycles	>50,000
Certification	FCC 15.107 Class B Computing Devices

1) The protocol of the logical interface can be switched from AISG 1.1 to 3GPP/AISG 2.0 and vice versa with a vendor specific command. Start-up operation of the RCU 86010149 is possible in an RET system supporting AISG 1.1 or supporting 3GPP/AISG 2.0 after performing a layer 2 reset before address assignment. The protocol can also be changed as follows: AISG 1.1 to 3GPP: Enter "3GPP" into the additional data filed "Installer's ID" and perform a layer 7 reset or a power reset. 3GPP to AISG 1.1: Enter "AISG 1" into the additional datafield "Installer's ID" and perform a layer 2 reset or a power reset. After switching the protocol any other information can be entered into the "Installer's ID" field.

2) The tightning torque for fixing the connector must be 0.5 – 1.0 Nm ('hand-tightened'). The connector should be tightened by hand only!

Specifications:	**698–806 MHz**	**824–894 MHz**	**1710–1755 MHz**	**1850–1990 MHz**	**2110–2170 MHz**
Gain	14.3 dBi	14.8 dBi	17.3 dBi	17.5 dBi	17.3 dBi
Front-to-back ratio	>30 dB (co-polar) 32 dB (average)	>27 dB (co-polar) 30 dB (average)	>30 dB (co-polar) 34 dB (average)	>30 dB (co-polar) 34 dB (average)	>30 dB (co-polar) 34 dB (average)
Maximum input power per input	500 watts (at 50°C)	500 watts (at 50°C)	300 watts (at 50°C)	300 watts (at 50°C)	300 watts (at 50°C)
+45° and -45° polarization horizontal beamwidth	68° (half-power)	65° (half-power)	61° (half-power)	60° (half-power)	61° (half-power)
+45° and -45° polarization vertical beamwidth	15° (half-power)	13.5° (half-power)	7.5° (half-power)	7.5° (half-power)	7.5° (half-power)
Electrical downtilt continuously adjustable	0°–16°	0°–16°	0°–10°	0°–10°	0°–10°
Min sidelobe suppression for first sidelobe above main beam average	0° 8° 16° T 17 16 16 dB 19 19 18 dB	0° 8° 16° T 18 16 16 dB 22 20 20 dB	0° 5° 10° T 18 18 17 dB 20 20 20 dB	0° 5° 10° T 18 18 17 dB 20 20 20 dB	0° 5° 10° T 18 18 17 dB 20 20 20 dB
Cross polar ratio Main direction 0° Sector ±60°	25 dB (typical) >10 dB, 15 dB (avg)	25 dB (typical) >8 dB, 14 dB (avg)	25 dB (typical) >8 dB, 14 dB (avg)	25 dB (typical) >10 dB, 16 dB (avg)	25 dB (typical) >8 dB, 14 dB (avg)
Tracking	1.5 db	1.5 db	2.0 db	1.0 db	2.0 db
Squint	±2.5°	±4°	±4°	±1.5°	±4°

11223-D
936.4133
RoHS
Lead-Free
Feb 25, 2011

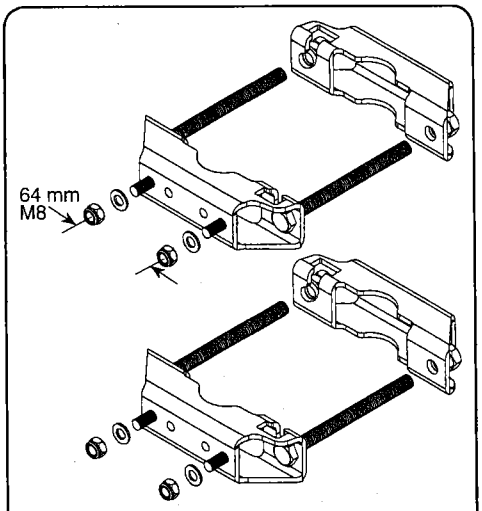
AISG
Antenna Interface Standards Group

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

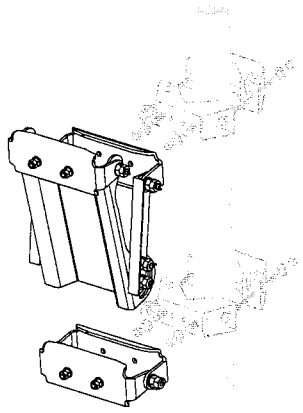
EXHIBIT F

KATHREIN
SCALA DIVISION

800 10764
700 MHz Dual Band 4', 65 Degree Antenna RET



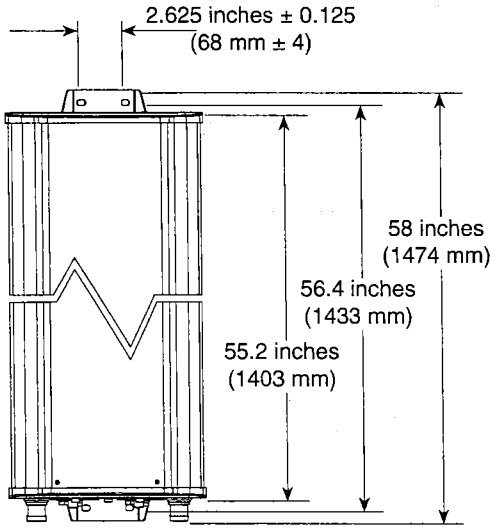
Mounting Brackets
for use with 2-point mount antennas
Mast dia. 2–4.5 inches (50–115 mm)
Weight: 4.4 lb (2 kg)



Mechanical Tilt Brackets
for use with 2-point mount antennas
Weight: 13 lb (5.9 kg)
(Model 850 10007)

Mechanical specifications:

Weight	40.8 lb (18.5 kg)
Dimensions	55.2 x 11.8 x 6 inches (1403 x 300 x 152 mm)
Wind load Front/Side/Rear Mounting category	at 93 mph (150kph) 156 lbf / 59 lbf / 160 lbf (690 N) / (260 N) / (710 N) M (Medium)
Wind survival rating*	150 mph (240 kph)
Shipping dimensions	64.8 x 12.6 x 7.5 inches (1646 x 322 x 190 mm)
Shipping weight	50 lb (22.7 kg)
Mounting	Mounting hardware included for 2 to 4.6 inch (50 to 115 mm) OD masts.

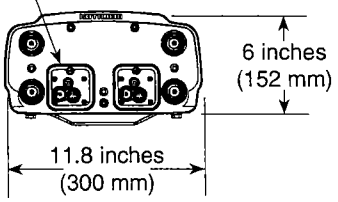


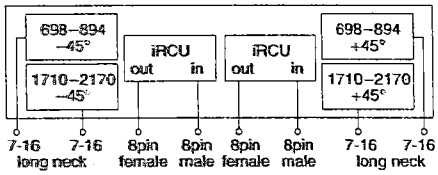
KATHREIN 860 10149

FC Tested To Comply With FCC Standards

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: Refer to part number 860 10149 for the specifications of the remote control actuator.





Order Information:

Model	Description
800 10764	Dualband antenna with mounting bracket 0°–16° // 0°–10° electrical downtilt
800 10764 K	Dualband antenna with mounting bracket and mechanical tilt bracket 0°–16° // 0°–10° electrical downtilt

* Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

All specifications are subject to change without notice. The latest specifications are available at www.kathrein-scala.com.

Kathrein Inc., Scala Division Post Office Box 4580 Medford, OR 97501 (USA) Phone: (541) 779-6500 Fax: (541) 779-3991
Email: communications@kathrein.com Internet: www.kathrein-scala.com

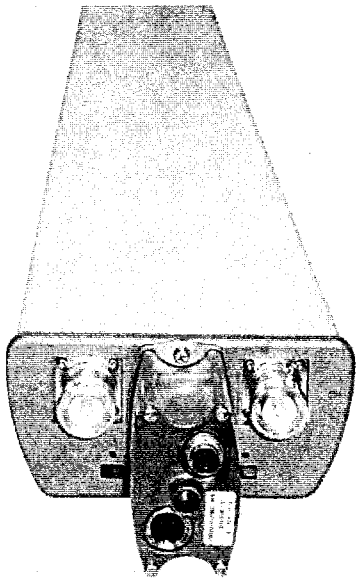
EXHIBIT F

Product Data Sheet APXV18-206516S-C-A20

Optimizer® Panel Dual Polarized Antenna equipped with AISG 2.0 ACU motor

Product Description

This X-Polarized variable tilt antenna provides exceptional suppression of all upper sidelobes at all downtilt angles. It also features a wide downtilt range. This antenna is optimized for performance across the entire AWS frequency band (1710-2155 MHz). The antenna comes pre-connected with one antenna control unit (ACU).



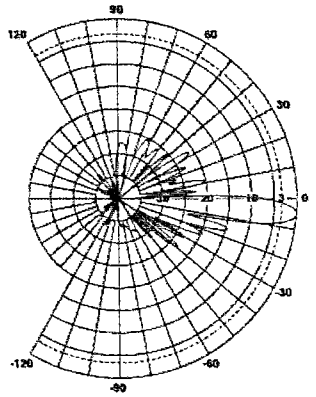
Features/Benefits

- **Variable electrical downtilt - provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.**
- **High Suppression of all Upper Sidelobes (Typically <-18dB).**
- **Gain tracking – difference between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz) <1dB.**
- **Azimuth horizontal beamwidth difference <6deg between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz)**
- **Low profile for low visual impact.**
- **Dual polarization; Broadband design.**
- **Includes AISG 2.0 Compatible ACU-A20-N antenna control unit**

Technical Specifications

Electrical Specifications

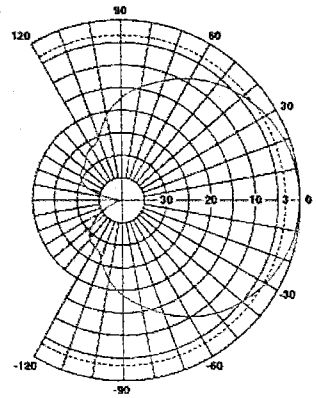
Frequency Range, MHz	1710-2170
Antenna Type	Panel Dual Polarized
Electrical Down Tilt Option	Variable
Gain, dBi (dBd)	18.4 (16.3)
Electrical Downtilt, deg	0-10 , 0-10
Horizontal Beamwidth, deg	65
VSWR	< 1.5:1
Vertical Beamwidth, deg	5.9 to 7.7
1st Upper Sidelobe Suppression, dB	> 18
Upper Sidelobe Suppression, dB	> 18 all
Polarization	Dual pol +/-45°
Front-To-Back Ratio, dB	>26 (typically 28)
Maximum Power Input, W	300
Isolation between Ports, dB	> 30
Lightning Protection	Direct Ground
3rd Order IMP @ 2 x 43 dBm, dBc	> 150 (155 Typical)



Vertical Pattern

Mechanical Specifications

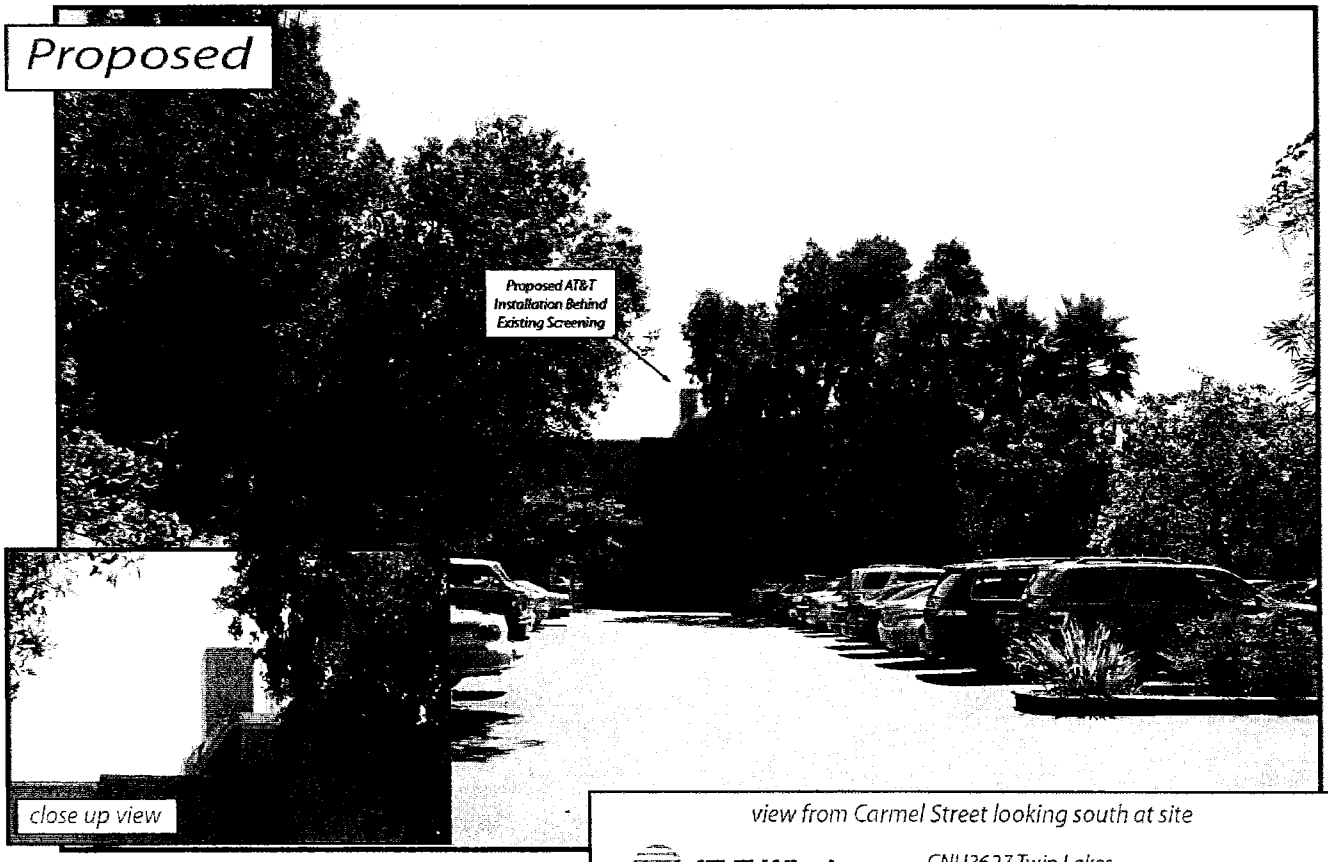
Rated Wind Speed, km/h (mph)	160 (100)
Survival Wind Speed, km/h (mph)	200 (125)
Max Wind Loading Area, m² (ft²)	0.29 (2.9)
Maximum Thrust @ Rated Wind, N (lbf)	380 (185)
Front Thrust @ Rated Wind, N (lbf)	380 (185)
Reflector Material	Aluminum
Radiating Element Material	Brass
Radome Material	Fiberglass
Connector Type	(2) 7-16 DIN Female
Connector Location	Bottom
Mount Type	Downtilt
Mounting Hardware	APM40-2
Weight w/o Mtg Hardware, kg (lb)	8.5 (18.7)
Packing Dimensions, HxWxD, mm (in)	1439 x 237 x 260 (56.6 x 9.3 x 10.3)
Dimensions - HxWxD, mm (in)	1349 x 175 x 80 (53.1 x 6.9 x 3.15)
Shipping Weight, kg (lb)	14.5 (31.9)



Horizontal Pattern

* This data is provisional and subject to change.

EXHIBIT G



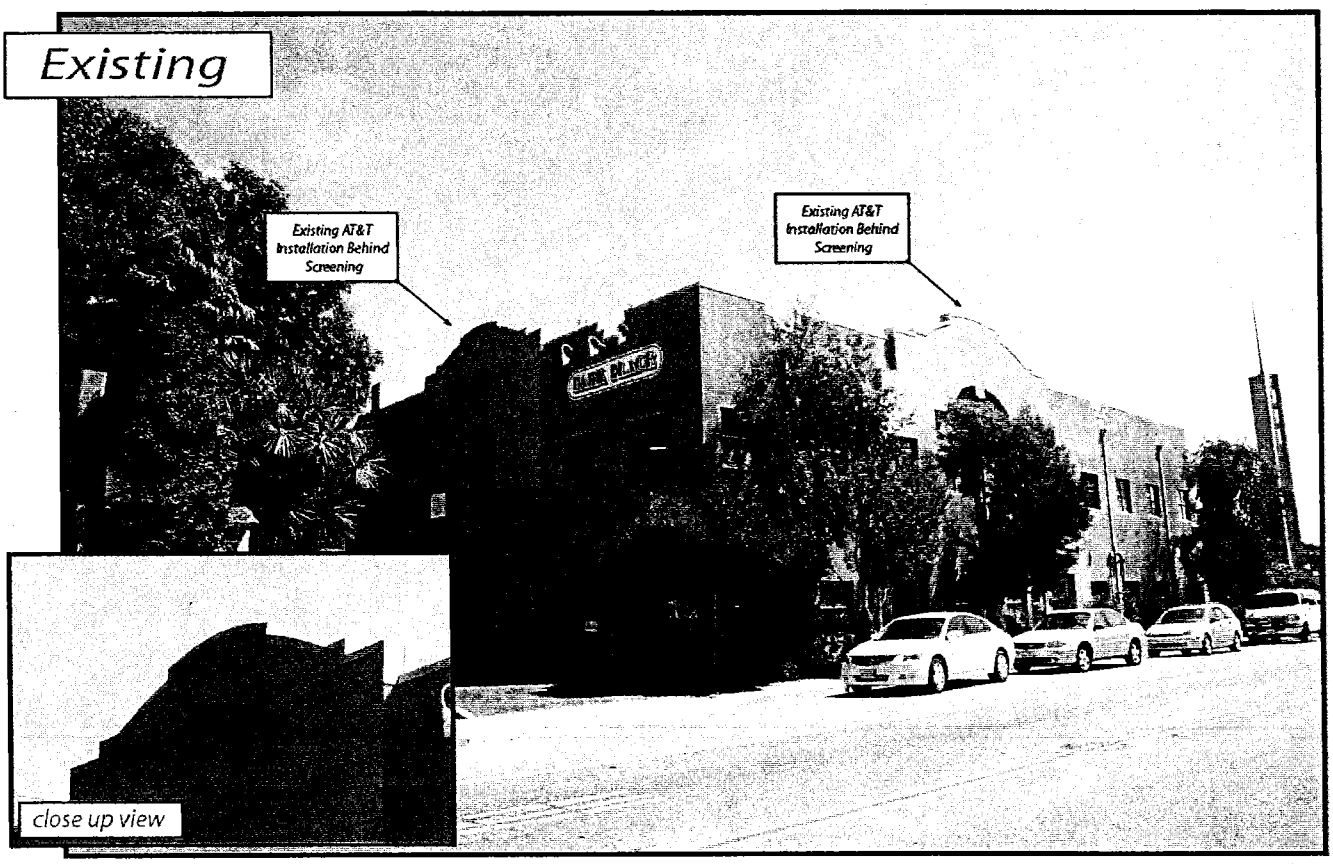
AdvanceSim
Photo Simulation Solutions
Contact (925) 202-8507

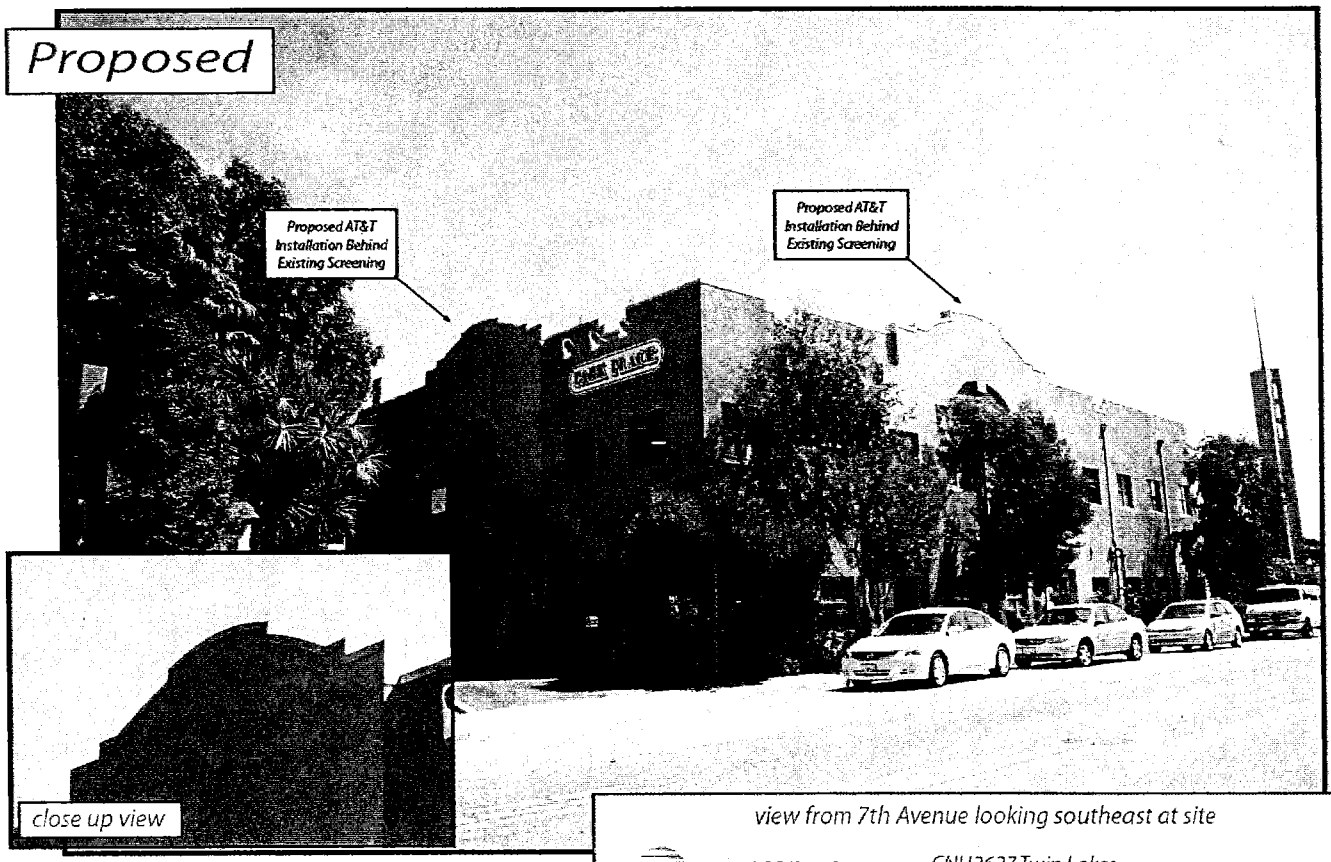
view from Carmel Street looking south at site

AT&T Wireless

CNU3627 Twin Lakes
200 7th Avenue. Santa Cruz, CA

EXHIBIT G





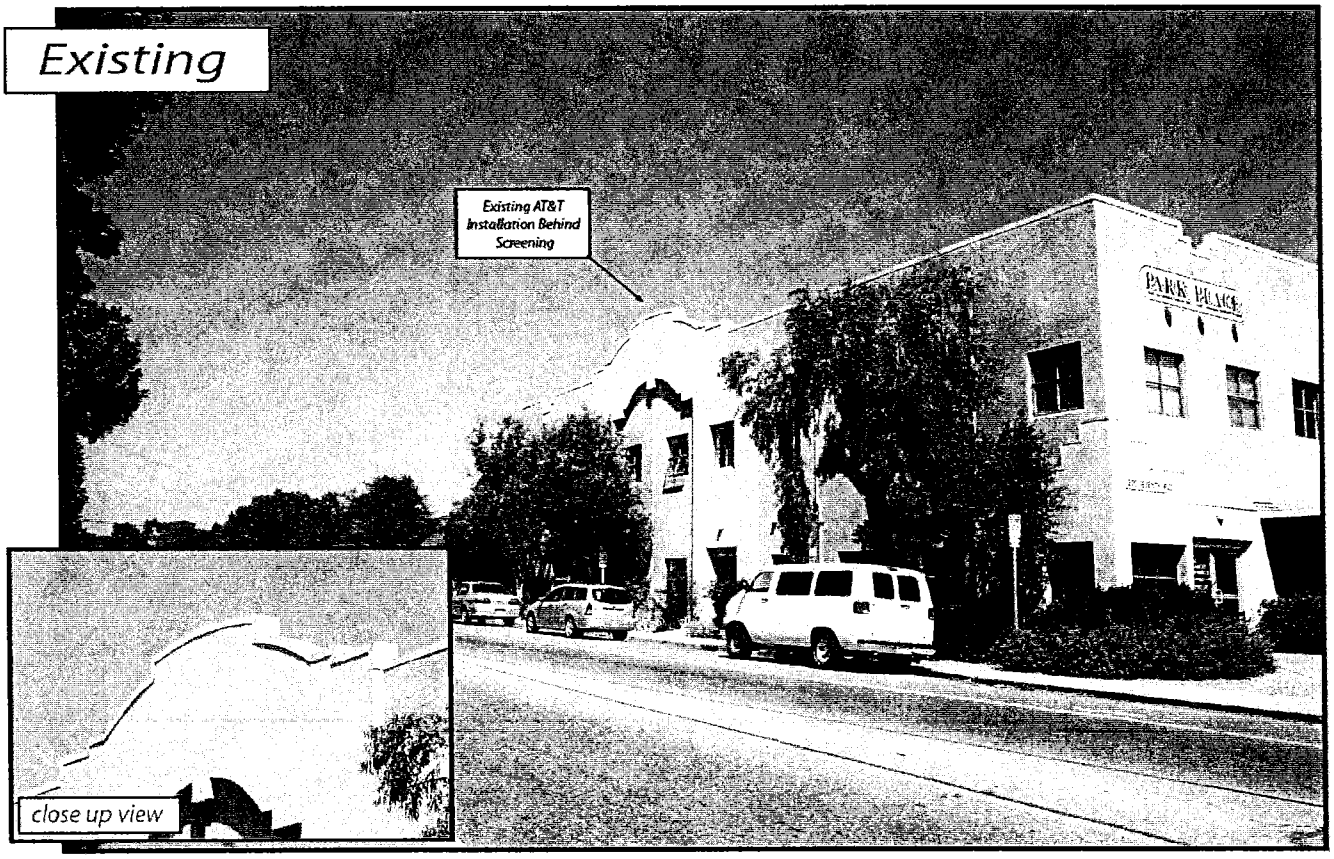
view from 7th Avenue looking southeast at site

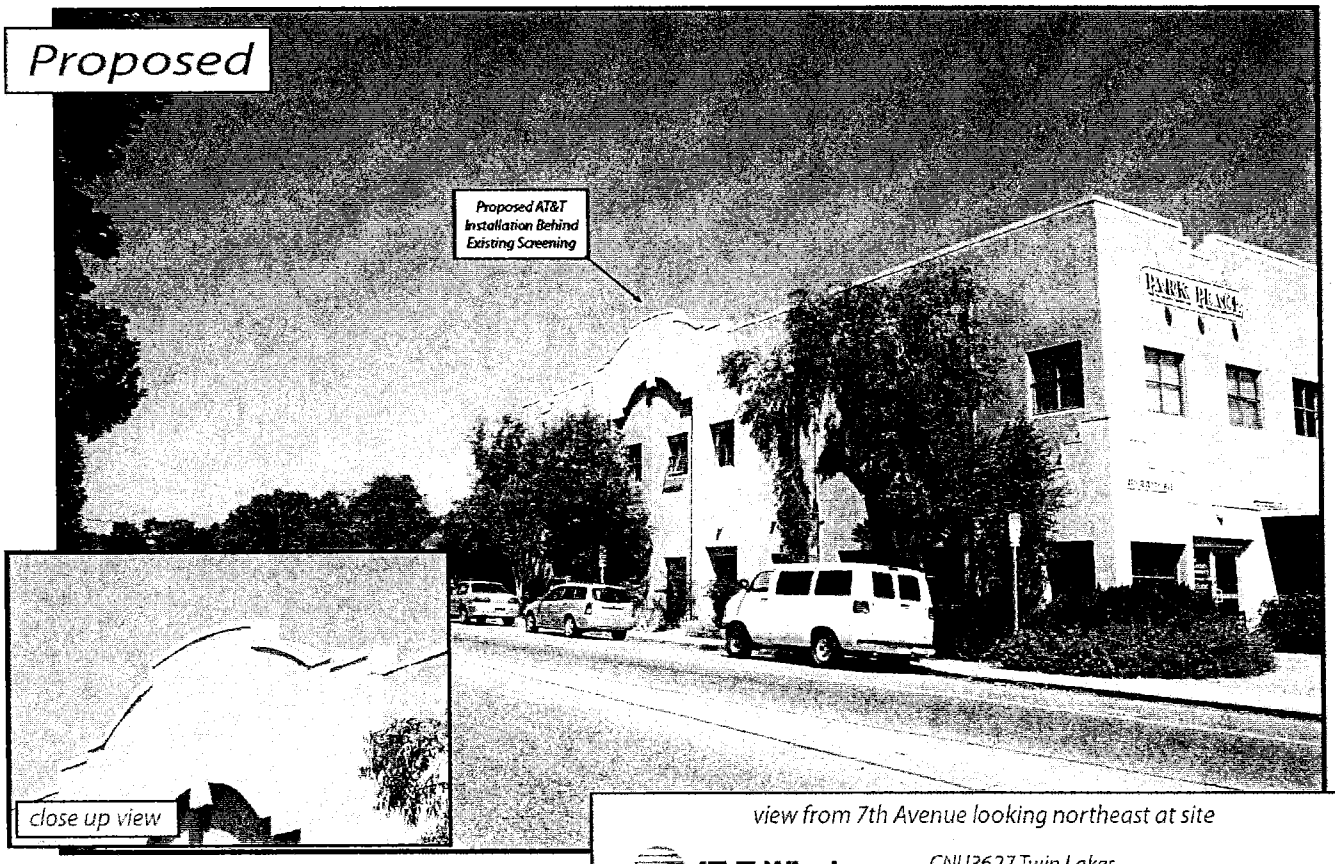
AT&T Wireless

CNU3627 Twin Lakes
200 7th Avenue. Santa Cruz, CA

AdvanceSim
Photo Simulation Solutions
Contact (925) 202-3507

EXHIBIT G





view from 7th Avenue looking northeast at site

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