

Licensee Cell Site Name: Capitol Hill
Licensee Cell Site #: COL01220
Licensee FA#: 10101152

LICENSE AGREEMENT

This **LICENSE AGREEMENT** (“Agreement”) is made and effective on this 1st day of August, 2022 (the “Effective Date”) by and between the **CITY AND COUNTY OF DENVER**, a municipal corporation of the State of Colorado (hereinafter referred to as the “City”) and **NEW CINGULAR WIRELESS PCS, LLC**, a Delaware limited liability company authorized to do business in the State of Colorado with a principal place of business address of 1025 Lenox Park Blvd NE, 3rd Floor, Atlanta, GA 30319 (the “Licensee”). The Parties are referred to herein, collectively, as the “Parties.”

RECITALS

WHEREAS, the City owns and operates the real property located at 303 W Colfax Ave, Denver, CO 80202 and all appurtenances thereto (the “Subject Property”);

WHEREAS, the City has right, title, and interest in and to the Subject Property together with the facilities, easements, rights, licenses, and privileges hereinafter granted, and has full power and authority to enter into an agreement in respect thereof;

WHEREAS, the Parties desire to enter into this Agreement regarding Licensee’s use of certain designated areas at the Subject Property for Licensee’s operation of a Roof-Mounted Communication Antenna, specifically, Licensee’s use of the portion of the mezzanine rooftop of the Subject Property and its equipment room on the 3rd parking level as described in **Exhibit A** attached hereto (the “Licensed Area”);

NOW, THEREFORE, in consideration of the premises and the mutual covenants and obligations herein set forth, the Parties agree as follows:

DEFINITIONS

The capitalized terms used in this Agreement and any and all exhibits hereto, will have the meanings given such terms in the paragraph in which such terms are parenthetically defined. The meanings given to terms defined will be equally applicable to the singular and plural forms of such terms. In addition, the following capitalized terms shall have the following meanings:

- A.** “Agreement” shall have the meaning set forth in the preamble hereto.
- B.** “ADA” means Americans with Disabilities Act and any other federal or state laws requiring access for the disabled to public accommodations.
- C.** “Applicable Law” means all federal, state, and local laws applicable in the context of the specific matter addressed in this Agreement, including but not limited to: 1) the constitutions, laws, and rules and regulations of the United States of America and the State of Colorado; 2) the City Charter, the Denver Revised Municipal Code, and building, fire, electrical,

plumbing and other applicable codes, as they may be amended from time to time; 3) rules and regulations, including any standards and specifications, promulgated or amended by the Denver Department of Safety and the Denver Fire Department; 4) any rules and regulations promulgated or amended by other City departments and agencies applicable to this Agreement; 5) executive orders issued by the Mayor; 6) any court order, judgment, or decree or any appellate decision applicable to this Agreement; 7) any federal, state, or local administrative decision or order applicable to this Agreement; 8) any anti-discrimination laws;

D. “Cancellation” means the revocation of the License and the termination or cancellation of the Agreement, including mutual termination by the parties, in the manner specified in this Agreement.

E. “City Representative” means the Division of Real Estate’s designee(s) who will oversee and direct all activities of Licensee under this Agreement. The City Representative(s) may be employees or contractors of the City, Denver’s Facilities Management division, Denver’s Technology Services, the Electronic Engineering Bureau of the Department of Safety, and/or Denver’s Division of Real Estate. Contact information for the City Representative and the assigned responsibilities, if there is more than one City Representative, shall be provided to Licensee upon execution of this Agreement. The City may identify, change, add or delete City Representative(s) by written notice to Licensee.

F. “City System” means all existing and future communication and other electronic facilities, equipment and instrumentation and related infrastructure and utility connections located at the Subject Property including, but not limited to, public safety channels, radio system or other electronic means of sending, receiving, processing and recording information and data for public safety purposes.

G. “DRMC” means the Denver Revised Municipal Code as it may be amended from time to time.

H. “Effective Date” means the date this Agreement goes into effect, as specified in section 2.01(a).

I. “Emergency” means an occurrence or incident that presents an imminent threat of widespread or severe damage, injury, or loss of life or property resulting from any natural cause or cause of human origin, including but not limited to fire, explosion, flood, earthquake, wind, storm, structural failure, hazardous substance, environmental contamination, civil disturbance, vandalism, or breach of security.

J. “FCC” means the Federal Communications Commission.

K. “Director” means the director of the City’s Division of Real Estate.

L. “Interference Study” means a site and technical interference study, **Exhibit C**, field tests or other activities or investigations related to the resolution of RF Interference that may be associated with the Licensed System as specified in section 5.02.

M. “License” means the license granted as specified in section 1.01(a) which is exclusive only to the extent specified in this Agreement and which is restricted and revocable as specified in this Agreement. No property or leasehold interest or right is granted by the License.

N. “Licensed Area” means the location at the Subject Property where Licensee is authorized to install and operate the Licensed System, as specified in section 1.01(a).

O. “Licensed System” means the radio frequency equipment and wireless communication facility, and related equipment, infrastructure and utility connections authorized by the City and installed and operated by Licensee within the Licensed Area of the Subject Property, as specified in section 1.01(a).

P. “Licensee” means the legal entity to which the License is granted under and in accordance with this Agreement, as identified in opening paragraph of this Agreement. To the extent that Licensee retains contractors, consultants, or subcontractors to perform any of Licensee’s rights and obligations under the Agreement, Licensee shall also mean those contractors, consultants, and subcontractors.

Q. “License Fee” means the compensation to be paid by Licensee to the City for the use of the Licensed Area and the operation of the Licensed System at the Subject Property as specified in section 3.01.

R. “Minimum Technical Standards” mean those standards set forth in **Exhibit B** as these Minimum Technical Standards may be updated from time-to-time, as needed, to address the state-of-the-art.

S. “Party” means either the City or Licensee, as appropriate in the context, and Parties means both the City and Licensee.

T. “Permitted Use” means the uses (subject to restrictions) as specified in section 1.02, which Licensee may make of the Licensed Area in the installation and operation of the Licensed System.

U. “RF” (Radio Frequency) Interference means any emission, radiation or induction from or associated with the Licensed System that affects the functioning of or degrades, obstructs, or interrupts radio or other wireless communications being made by the City or other authorized parties to or from the Subject Property or the operation of any communication system located at the Subject Property.

V. “Point of Contact” means the Director of Real Estate at the City and County of Denver, or the Director’s designated representative during regular business hours.

W. “Term” means the duration of the Agreement running from the Effective Date of the Agreement, as specified in section 2.01 including any Term Extensions as specified in section 2.02.

X. “Term Extension” means any extensions of the duration of the Agreement as specified in section 2.02.

SECTION 1
LICENSE; PERMITTED USE; and ACCESS

1.01 Grant of License.

(a) City hereby grants a License to Licensee for the use of certain designated areas at the Subject Property as depicted on **Exhibit A** (the “Licensed Area”) for the installation and operation by Licensee, of the Licensed System, as the Licensed System is technically described, also in **Exhibit A**. The Licensed System shall be situated within the Licensed Area, which will include a limited space for an equipment cabinet, and shall be located in relation to the City System, if any, as depicted in **Exhibit A**. The Licensed Area shall not include the City System. Any proposed change to the Licensed Area depicted in **Exhibit A** shall require an amendment in writing to this Agreement.

1.02 Permitted Use/Restrictions.

(a) The Licensed Area at the Subject Property shall be used for the installation, maintenance, alteration, repair, replacement, operation, and removal of the Licensed System within the Licensed Area, in accordance with this Agreement (“Permitted Use”). The Licensed System shall be owned by Licensee. Except as expressly provided in this Agreement, the City may not disturb or modify the Licensed System without the prior written permission of Licensee.

(b) Licensee may access the Subject Property, use the Licensed Area, and install and operate the Licensed System only as set forth in this Agreement. The Permitted Use does not authorize any activity that would conflict or interfere with the public health, safety or welfare purpose or operation of the Subject Property or City System. Such prohibited conflict or interference includes RF Interference as set forth in this Agreement and **Exhibit C**. Licensee shall likewise take every reasonable measure to promptly and effectively avoid or remedy any emergency situation within its control that could adversely impact the Subject Property, the City System, the Licensed Area, or the Licensed System.

1.03 Access.

(a) Provided that Licensee gives at least twenty-four (24) hours prior notice to the Point of Contact, Licensee has the reasonable right of access, ingress to and egress from the Licensed Area during regular business hours for Licensee’s employees, contractors and agents, including suppliers of materials and furnishers of service (collectively “Licensee’s Personnel”). To gain access to the Licensed Area, Licensee must provide written notice to realestate@denvergov.org and facilities.helpdeskPOB@denvergov.org in concordance with the time limits on prior notice as stated herein. .

(b) In the event of an urgent situation where Licensee needs prompt access to the Licensed System during or outside of regular business hours, which shall be deemed to include any failure of Licensed System or any portion thereof, Licensee shall communicate with the

Point of Contact to arrange for access by Licensee's Personnel.

(c) With respect to all access to the Subject Property, Licensee's Personnel must present legally sufficient identification, preferably in the form of a badge with picture ID issued by Licensee; will be subject to escort by the City's Designee and search and inspection of items brought onto the Subject Property; and will comply with all restrictions and security protocols set by the Director and the City Representative. All equipment, vehicles, machinery and other materials brought onto the Subject Property site must be necessary for the work authorized to be performed.

(d) Should Licensee require access into a secure area of the Subject Property which may require prior approval or escort, then the permission of the City Representative must be obtained and any security protocols must be strictly observed by Licensee.

(e) The exercise of access by Licensee or Licensee's personnel shall not conflict or interfere with the operations of the Subject Property or the City System and may not block access at or the use of the Subject Property nor be in violation of the ADA. In addition, the exercise of access shall not conflict or interfere with the City System unless prior written permission is obtained from the City Representative.

(f) Any particular access on the Subject Property may, at any time, temporarily or permanently, be closed, so long as an alternative means of access is made available to Licensee within a reasonable time. During the duration of any state of Emergency declared by the President of the United States, the Governor of the State of Colorado, or the Mayor of the City and County of Denver, access may be denied for security and public safety reasons. Licensee hereby releases and discharges the City from any and all claims, demands or causes of action which Licensee may now, or at any time hereafter, have against the City, arising or alleged to arise out of the closing of any point of access on the Subject Property site or the temporary unavailability of such access.

SECTION 2 TERM and TERM EXTENSION

2.01 Term.

The Term of this Agreement shall be effective as of August 1, 2022 (the "Effective Date"), and shall expire on July 31, 2032 unless Licensee terminates the Agreement upon sixty (60) days written notice.

2.02 Term Extension.

Licensee may exercise one (1) option to renew the License for one additional ten-year period with a 3% increase over the most recent lease rate at the end of the Term. Licensee shall

provide notice to the City of its intent to exercise the renewal option by no later than sixty (60) days before the end of a Term. All terms and conditions shall remain in effect in accordance with this Agreement during the renewal period, including the percentage fee increase under Section 3.01, unless otherwise modified by mutual written agreement. Modifications, if any, must be set forth in an amendment to this Agreement and processed for approval in the same manner as the Agreement.

SECTION 3 LICENSE FEE

3.01 License Fee.

(a) Licensee agrees to pay City a monthly License Fee of **FOUR THOUSAND FIVE HUNDRED TWENTY-THREE DOLLARS AND THIRTY-FIVE CENTS (\$4,523.35)**, payable in equal monthly installments beginning on the Effective Date and continuing on the first day of each month thereafter for the Term of the Agreement and any Term renewal. The License Fee shall increase three percent (3%) each year, with the increased License Fee taking effect on the anniversary of the Effective Date of this Agreement each year.

(b) The License Fee does not include the payment for electrical service for the Licensed System. Licensee shall bear the costs of all maintenance and repairs to the Licensed System, and Licensee shall pay for a separate electric meter for the operation of the Licensed System, as well as all monthly costs of utility and electricity associated with the use and operation of the Licensed System. Licensee shall make these payments directly to the utility provider, not to the City.

(c) Any License Fee paid to the City shall not be refundable in the event of Cancellation, as provided in this Agreement.

3.02 Maximum Contract Amount

(a) Notwithstanding any other provision of the Agreement and any renewal options exercised by the Licensee, the maximum payment obligation under this Agreement shall not exceed **ONE MILLION FOUR HUNDRED FIFTY-EIGHT THOUSAND, FIVE HUNDRED TWENTY-FIVE DOLLARS AND TWENTY-FOUR CENTS (\$1,458,525.24)** (the "Maximum Contract Amount").

3.03 Place and Manner of Payments.

All sums payable to City, including the License Fee and other costs and expenses incurred by the City and reimbursable by Licensee under this Agreement, shall be made payable, without notice, to the "Manager of Finance for the City and County of Denver" and delivered to:

City and County of Denver
Division of Real Estate
201 West Colfax Avenue, Dept. 1010
Denver, Colorado 80202

All payments shall be made in legal tender of the United States. Any payment not made to City accrues interest at the lesser of (i) 18% per annum, or (ii) the maximum interest rate allowed under law, commencing on the fifth (5th) calendar day after the date such amount is due and owing until paid to City. Licensee agrees to pay any charges, fees, or costs incurred by the City for collection of unpaid License Fees or other unpaid costs and expenses of Licensee specified in this Agreement, including reasonable attorney's fees.

SECTION 4 DESIGN, CONSTRUCTION, AND INSTALLATION

4.01 General.

(a) On or after the Effective Date of this Agreement, Licensee shall, at its sole cost and expense, properly maintain and preserve within the Licensed Area, the Licensed System in accordance with **Exhibit A** (unless changes are authorized under section 4.02), and in accordance with the terms and conditions of this Agreement.

(b) The Licensed System shall in all respects be designed and maintained in accordance with Applicable Law, and pursuant to any required building permit and zoning permit to be obtained by Licensee from the City, and according to requirements or design guidelines of the Denver's Technology Services division, the Denver Department of Safety and the Denver Fire Department.

4.02 Plans and Specifications.

(a) Prior to any installation of any modification to the Licensed System, a copy of complete and accurate plans and specifications for the Licensed System must be submitted to the City Representative for review. These plans and specifications must include complete specifications of transmitter power, operating frequencies, filter passband and rejection characteristics, antenna model numbers and radiation patterns (both horizontal and vertical plane patterns), antenna height and location, and placement of utilities servicing the Licensed System.

(b) Licensee shall cooperate with the City Representative in the review of the plans and specifications and shall make any reasonable modifications required by the City Representative. Upon completion of the review and any required modifications, the City Representative will approve the plans and specifications. Modification to the Licensed System may be denied in the City's sole and absolute discretion. An amendment to this License, including a possible increase in license fee, may be required.

4.03 Maintenance, Preservation, and Modifications of Licensed Area and Licensed System

(a) Licensee is responsible for undertaking all measures necessary and appropriate under Applicable Law in the maintenance of the Licensed Area and operation of the Licensed System to protect the health and safety of the public, City employees, and Licensee's employees and contractors and to lawfully conduct the work associated with the use, maintenance, and preservation of the Licensed Area and the Licensed System. Licensee shall be responsible for securing and maintaining all required and valid permits, licenses and approvals for Licensee's maintenance and preservation of the Licensed Area and Licensed System.

(b) Licensee shall include in Licensee's contract(s) with its consultants, contractors, and sub-contractors, provisions whereby such consultants, contractors, and subcontractors shall defend and hold harmless the City from all costs, liens, damages and expenses related to the design, construction, installation, and modification work regarding the Licensed Area or Licensed System.

(c) Licensee shall be responsible for obtaining utility locates prior to starting any authorized digging on City property. If damage should occur to any existing underground utilities or other underground facilities on City property, whether or not a utility locate was obtained, Licensee shall immediately report the damage to the City Representative and shall take all actions and incur all costs and expenses necessary to repair the damage in a manner satisfactory to the City Representative.

(d) Upon completion of the installation of any modifications or alterations, Licensee shall timely furnish to the City Representative with documented evidence of payment, contractor's affidavits and full and final waivers of all liens for labor, services, or materials.

(e) Equipment shall be located in designated locations as depicted on **Exhibit A** within the Licensed Area. The temporary placement of any equipment or materials outside of the Licensed Area shall require the prior written approval of the City Representative. No equipment or materials shall be placed so as to block access at or use of the Subject Property or in violation of the ADA.

(f) Licensee is responsible for acquiring land lines required for the installation and operation of the Licensed System. The installation or modification of land lines at the Subject Property shall be subject to the prior written approval of the City Representative. Licensee shall be solely responsible for paying any fees, charges, surcharges, taxes, assessments, and similar costs and expenses associated with the land lines.

(g) The City is not responsible for the Licensed System or Licensee's other authorized installations or modifications. Licensee shall be responsible for securing the Licensed System and Licensee's other authorized installations or modifications and keeping them in good working order.

SECTION 5 USE AND OPERATION

5.01 Authorized Frequencies.

In the operation of the Licensed System, Licensee may only operate Licensee's System in the radio bands and frequencies (and no others) which Licensee or FirstNet are authorized by the FCC to use. Operation in any radio band licensed for use by a City System is prohibited. Addition or change in radio bands or frequencies is prohibited unless Licensee first provides prior written notice to the Director and first provides an intermodulation report to the Director.

5.02 RF (Radio Frequency) Interference.

(a) Licensee acknowledges that City's unimpeded use and operation of 303 W Colfax Avenue is critical to the health, safety and welfare of the City and County of Denver and its inhabitants. Licensee shall use its best efforts, at all times, to avoid any RF Interference or interference of any kind with the operation or use of any City System as set forth in this Agreement and **Exhibit C**. Licensee shall diligently work to prevent and, in the event of failure to do so, immediately correct radio frequency interference to the City System and any component elements, including the City's WiFi system, and to cooperate with, and comply with the directions from, the City Representative assigned to deal with RF Interference matters. To help achieve this goal, Licensee shall comply with the following:

(b) Licensee agrees to comply with all federal, state, local, or other government regulations applicable to Licensee and its activities operating or using the Licensed System, including, but not limited to, regulations and standards published by the FCC.

(c) Upon written request by the City Representative, Licensee agrees to conduct an Interference Study prior to commencing operations and/or during the entire Term or Term Extension of this Agreement, and to furnish the City Representative with the results of the Site Study and to include it as part of Licensee's System Plans and Specifications. If Licensee should fail within a period specified by the City Representative to undertake or complete an Interference Study, the City may arrange for such an Interference Study and Licensee shall reimburse the City for the cost and expense of conducting and preparing the Interference Study.

(d) Licensee agrees to comply with the current Minimum Technical Standards attached hereto as **Exhibit B**.

(e) In order to prevent RF Interference, Licensee shall maintain and repair, at no cost to the City, the Licensed System, in order to comply with FCC rules and the reasonable requirements of the City Representative. If this maintenance should necessitate changing out or replacing existing antennas, the requirements of section 5.04 shall be applicable.

(f) If authorized to make changes, Licensee shall notify the City Representative of the specific changes to associated RF equipment, transmit and receive frequencies, transmitter output power, antenna configurations, and effective radiated power before making the changes. An Interference Study shall be conducted by Licensee, as directed by the City Representative and at Licensee's sole cost and expense, prior to any proposed frequency changes. The requirements of section 5.04 shall be applicable to the changes addressed herein.

(g) To extent there are more than one licensee operating RF equipment at the Subject Property, all licensees are encouraged to resolve potential or real interference problems amongst themselves. Licensee agrees to cooperate fully with City and other licensees to diagnose and correct interference problems. Such cooperation may require Licensee to temporarily reduce or shut down transmit power to help diagnose problems.

(h) When the City Representative, based on inquiry and evaluation, becomes aware of a potential or existing RF Interference problem caused directly or indirectly, wholly or partially, by the Licensed System, the City may require Licensee to reimburse City for the cost of an Interference Study to include radio frequency measurements. The purpose of this Interference Study is to identify the problem and determine if the problem is caused directly or indirectly, wholly or partially, by the Licensed System. This Interference Study shall be conducted by a consulting engineer selected by the Director after consultation with Licensee and the City Representative. In the event there are additional licensees operating at the Subject Property, Licensee shall pay for a pro rata share of the costs of the Interference Study, unless Licensee or another party is determined to be solely responsible for the interference, in which case the responsible party shall pay all costs and expenses. Pro rata share shall be determined by dividing the costs by the number of non-City licensees operating at the Subject Property.

(i) When necessary to correct RF Interference problems, as determined by the Chief in the Chief's reasonable discretion, Licensee agrees, at its sole cost and expense, to install cavity-type bandpass filters, notch filters, isolators, or other state-of-the-art equipment. These equipment items are in addition to the minimum equipment of the Minimum Technical Standards. The minimum equipment items shall be installed regardless.

(j) Licensee shall ensure that its frequencies used for the operation of the Licensed System do not interfere with any operation of the Subject Property, including without limitation interference with public safety or the City System. Licensee shall provide documentation of the frequencies that it is authorized to use and is using for the Licensed System. Licensee shall not occupy any frequencies that they are not using for the purposes of blocking other licensees from operating. Prior to modifying the Licensed System, Licensee shall be responsible for conducting an RF scan to verify there will be no RF Interference with other systems.

(k) If Licensee's equipment or operations cause RF Interference, as determined by

the Director in the Director's reasonable discretion, including without limitation interference with the City System, and if the interference is not eliminated within ten (10) days after written notice from the Director, then City may, at Licensee's sole cost and expense, temporarily turn off the power to the Licensed System, except for intermittent testing. The City Representative shall contact Licensee at the time the Licensed System needs to be deactivated so Licensee can facilitate the effort to deactivate the Licensed System, isolate any interference, and turn the Licensed System back on with minimal interruption. Licensee, at its sole cost and expense and subject to the requirements of section 5.06, shall (i) have the right to make such repairs, maintenance, replacements or adjustments to the Licensed System as may be reasonably necessary to prevent such RF Interference, and (ii) have the right to conduct intermittent tests of the Licensed System at times mutually agreeable to the City Representative to determine if the Licensed System will continue to cause such RF Interference.

(l) The City requires that Licensee operate its Licensed System with no RF Interference to other licensees' systems. Any unresolved disputes regarding the cause or resolution of specific RF Interference problems or complaints must be evaluated by an independent third party selected by the Director who is competent to evaluate the potential causes of the interference and the measures required for its resolution. If it is determined that RF Interference to the equipment, frequencies or channels of Licensee or other licensees operating at the Subject Property is a result of the non-compliance of those facilities with the Minimum Technical Standards, it shall be the responsibility of Licensee or other licensees to resolve the interference in accordance with the Minimum Technical Standards. If the RF Interference continues when these facilities are brought into compliance with the Minimum Technical Standards, then it shall be Licensee's responsibility to take whatever measures are necessary to resolve the interference promptly and effectively or disengage the operation of the Licensed System or equipment causing the RF Interference until the RF Interference is resolved to the satisfaction of the City Representative.

5.03 Operational Test Procedures.

The following test procedures shall be approved by City prior to or during, whichever is applicable, Licensee's operation of the Licensed System.

(a) Perform a desktop interference study to include all frequencies to be used by Licensee to ensure no RF Interference is likely from intermodulation products or out-of-band emissions.

(b) Verify the results of the Interference Study by conducting appropriate measurements of the installed systems.

(c) If problems are found, make recommendations for additional filtering, channel changes, greater antenna separation, or other fixes, as necessary.

5.04 Changes to Licensed System.

(a) Licensee shall provide prior written notice to the Director of any proposed change in radio cabinets, transmitter power, frequencies, filters, number of antennae, antenna locations, antenna height, antenna orientation, or related aspects of the Licensed System. Any proposed new, or proposed changes to, antennae, antenna mounts or mounting hardware, or structural changes to the Subject Property or tower, require that Professional Engineer stamped structural drawings be provided for review and approval. All reviews of proposed changes shall be subject to such process as prescribed by the Director and undertaken by the City Representative.

(b) Any proposed changes which are significant (as determined by the Director) will require a review of the current lease rate and may result in an additional License Fee being charged to Licensee and possible other changes to the terms and conditions of the Agreement. These changes, along with any addition, relocation or replacement of antennae or other equipment outside the Licensed Area, shall require an amendment to the Agreement which must be approved in the same manner as this Agreement. Changes or occupation or use of areas outside of the Licensed Area which are not authorized as provided herein will be considered to be in breach of this Agreement.

(c) All such changes shall be subject to the Minimum Technical Standards and the installation and operational conditions set forth in this Agreement. The approval form must be attached to the scope of work and stamped structural drawings sheets (not separate). All contractors, subcontractors and vendors must have a copy of the signed approval sheets to present to the officer in charge of the Subject Property, before any work may begin.

5.05 Repairs and Maintenance; Removal.

(a) The maintenance, care, repair, alteration, enhancement or replacement of the Licensed System or infrastructure within the Licensed Area shall be made by Licensee at its sole cost and expense. Licensee covenants and agrees during the Term or Term Extension of this Agreement, after the installation of the Licensed System and occupancy of the Licensed Area, that Licensee:

(1) shall keep the Licensed System in good order and condition, and will make all necessary and appropriate repairs or changes thereof if approved as required in section 5.04 above;

(2) shall not permit rubbish, debris, waste materials or anything unsightly or detrimental to health, or likely to create a fire or explosion hazard, or conducive to deterioration, to remain in any part of the Licensed Area or the Subject Property or to be disposed of improperly;

(3) shall at all times maintain the Licensed System in accordance with

Applicable Law, the Minimum Technical Standards, FCC requirements, and manufacturer's specifications;

(4) shall promptly repair any and all damage to, among other things, the structures, equipment and surrounding property at the Subject Property which result from Licensee's installation and operation of its Licensed System including, but not limited to, any leaks or physical damage as a result of roof penetrations or other physical penetrations or structural damage to the building or structures, including the significant reduction in the useful life of buildings or structures or any parts thereof, caused by the Licensed System or its operation and/or other workmen and maintenance and repair activities involving the Licensed System;

(5) shall store tools, test equipment and work materials only in areas at Subject Property approved by the City Representative; and

(6) shall restore any damage resulting from roof or other building penetrations and actions or omissions of the License in the Licensed Area or at the Subject Property so that the damaged property is restored to original condition.

(b) All portions of the Licensed System brought onto the Subject Property by Licensee will be and remain Licensee's personal property and, at Licensee's option, may be removed by Licensee at any time during or after the Term. City waives any and all lien rights it may have, statutory or otherwise, concerning the Licensed System or any portion thereof. Removal or other modifications are subject to Section 1.03 regarding access to the Licensed Area. The Licensed System shall be deemed personal property for purposes of this Agreement, regardless of whether any portion is deemed real or personal property under applicable law; City consents to Licensee's right to remove all or any portion of the Licensed System from time to time in Licensee's sole discretion subject to Section 1.03.

(c) If Licensee should be of the opinion that repair, alteration or replacement of the Subject Property is needed ("Alteration"), Licensee shall submit in writing a request to the Director explaining the perceived need for the Alteration. City will maintain and repair the Subject Property, and all areas of the Licensed Area where Licensee does not have exclusive control, in reasonably good condition, subject to reasonable wear and tear and damage from the elements. Any obligation of the City to perform the work shall be strictly contingent upon approvals, including contracts, required by Applicable Law and obtaining all funding needed for the Alteration. If Licensee proposes to make and pay for the Alterations, it should provide plans and a budget with the request submitted to the Director.

5.06 Right to Enter, Inspect and Make Repairs and Improvements.

(a) The City and its authorized officers, employees, agents, contractors, subcontractors and other representatives shall have the right (at such times as may be reasonable under the circumstances to avoid unreasonable interruption of Licensee's operations) to access the Licensed Area for the following purposes:

(1) to inspect such equipment at reasonable intervals during regular business hours (or at any time in case of Emergency or urgent need to protect the City System) to determine whether Licensee has complied and is complying with the terms and conditions of this Agreement;

(2) to perform maintenance and make repairs and replacements in cases where Licensee is obligated but has failed to do so, after the City has given Licensee reasonable notice so to do, in which event Licensee shall reimburse the City for the reasonable cost thereof within thirty (30) days of Licensee's receipt of City's invoice accompanied by reasonable substantiation of the costs incurred. The City shall have the right to seek recovery of the cost of the maintenance or repair by any judicial remedy available should Licensee fail to pay the cost of the repair. Under no circumstances will City attempt to repair or alter in any way Licensee's operational equipment such as base station radios, other electronic equipment, alarm systems, antennas, coaxial cable, DAS, UPS, etc.; however, this restriction shall not limit the City in performing inspections and repairs and protecting the City System and the Subject Property as provided in this Agreement.

(b) The City reserves the right at all times to take any action it deems necessary, in its sole discretion, to repair, maintain, alter, expand, or improve the City System and the Subject Property and the improvements thereon in connection with their use and operation. The City agrees to give reasonable advance notice of any such activities to Licensee and to reasonably cooperate with Licensee to carry out such activities with a minimum amount of interference to Licensee's use of the Licensed Area. Licensee agrees to cooperate with the City with respect to such repairs, maintenance, alterations, expansions, or improvements and to accommodate such work to the extent the City deems necessary and at Licensee's sole expense.

5.07 Utilities.

(a) Licensee shall pay for a separate electric meter for the operation of the Licensed System, as well as all monthly costs of utility and electricity associated with the use and operation of the Licensed System. Licensee shall make these payments directly to the utility provider, not to the City.

(b) Licensee shall be responsible for providing and properly maintaining and replacing, subject to the requirements of section 5.04 above and the installation requirements of section 4.03 above, an independent ventilation, heating, and air conditioning system for those portions of the Licensed System, if any, that are expressly required by the manufacturer of the System to maintain manufacturer's warranties based upon Licensee's installation of the Licensed System at the Subject Property.

5.08 Interruption of Utility Services.

(a) Licensee agrees that City shall not be liable for failure of any utility services to

be supplied to the Licensed System, or for a failure of the electrical generator, or for any interruption of utility services to the Licensed System caused by third parties.

(b) The City reserves the right to temporarily interrupt utility services at such time as may be necessary by reason of accident, unavailability of employees, repairs, alterations or improvements or whenever by reason of *force majeure*, including any state of Emergency declared by the President of the United States, the Governor of the State of Colorado, or the Mayor of the City and County of Denver for which such interruption is reasonable for security and public safety reasons. The City shall not be liable for operational or business losses or for damages to persons or property due to such interruptions. Nor shall such interruptions in any way be construed as cause for abatement of the License Fee, unless caused by the demonstrated gross negligence or intentional misconduct of the City or its agents, contractors or employees.

(c) No backup power supplies shall be placed within the Licensed Area or elsewhere on the Subject Property without the prior, written approval of the City Representative and after obtaining any required permits, licenses or approvals for such backup power supplies.

SECTION 6
INSURANCE; INDEMNITY and DEFENSE; GOVERNMENTAL IMMUNITY;
LIMITS ON LIABILITY; and TAXES, LICENSES, LIENS AND FEES

6.01 Insurance.

(a) **General Conditions:** Licensee agrees to secure, at or before the time of execution of this Agreement, the following insurance covering all operations, goods or services provided pursuant to this Agreement. Licensee shall keep the required insurance coverage in effect at all times during the term of the Agreement, including any extension thereof, and during any warranty period. The required insurance shall be underwritten by an insurer eligible to do business in Colorado and rated by A.M. Best Company as "A-VII" or better. Each policy shall require notification to the City in the event any of the required policies be canceled or non-renewed before the expiration date thereof. Such written notice shall be sent to the parties identified in the Notices section of this Agreement. Such notice shall reference the City contract number listed on the signature page of this Agreement. Said notice shall be sent thirty (30) days prior to such cancellation or non-renewal unless due to non-payment of premiums for which notice shall be sent ten (10) days prior. If such written notice is unavailable from the insurer, Licensee shall provide written notice of cancellation, non-renewal of any required coverage that is not replaced to the parties identified in the Notices section by - mail, referencing the City's contract number. Licensee shall be responsible for the payment of any deductible or self-insured retention. The insurance coverages specified in this Agreement are the requirements, and these requirements do not lessen or limit the liability of the Licensee. The Licensee shall maintain, at its own expense, any additional kinds or amounts of insurance that it may deem necessary to cover its obligations and liabilities under this Agreement.

(b) **Proof of Insurance:** Licensee may not commence services or work relating to this Agreement prior to placement of coverages required under this Agreement. Licensee

certifies that the certificate of insurance attached as **Exhibit D**, preferably an ACORD form, complies with all insurance requirements of this Agreement. The City requests that the City's contract number be referenced on the certificate of insurance. The City's acceptance of a certificate of insurance or other proof of insurance that does not comply with all insurance requirements set forth in this Agreement shall not act as a waiver of Licensee's breach of this Agreement or of any of the City's rights or remedies under this Agreement. The City's Risk Management Office may require additional proof of insurance, including but not limited to policies and endorsements.

(c) **Additional Insureds:** For Commercial General Liability, Auto Liability and Excess Liability/Umbrella (if required), Licensee's insurer(s) shall include the City and County of Denver, its elected and appointed officials, employees and volunteers as additional insured.

(d) **Waiver of Subrogation:** For all coverages required under this Agreement, Licensee's insurer shall waive subrogation rights against the City.

(e) **Subcontractors and Subconsultants:** Licensee shall confirm and document that all subcontractors and subconsultants (including independent contractors, suppliers or other entities providing goods or services required by this Agreement) procure and maintain coverage as approved by the Licensee and appropriate to their respective primary business risks considering the nature and scope of services provided.

(f) **Workers' Compensation and Employer's Liability Insurance:** Licensee shall maintain the coverage as required by statute for each work location and shall maintain Employer's Liability insurance with limits of \$100,000 per occurrence for each bodily injury claim, \$100,000 per occurrence for each bodily injury caused by disease claim, and \$500,000 aggregate for all bodily injuries caused by disease claims.

(g) **Commercial General Liability:** Licensee shall maintain a Commercial General Liability insurance policy per ISO form CG 00 01 or equivalent with - limits of \$1,000,000 for each bodily injury and property damage occurrence, \$2,000,000 products and completed operations aggregate (if applicable), and \$2,000,000 policy aggregate.

(h) **Automobile Liability:** Licensee shall maintain Automobile Liability with - limits of \$1,000,000 per accident combined single limit applicable to all owned, hired and non-owned vehicles used at the Leased Premises.

(i) **Property Insurance:** Licensee shall provide 100% replacement cost for Licensee's tenant improvements and personal property. - Licensee understands and acknowledges that the City does not provide any insurance coverage for any property of the Licensee, its agents, employees or assignees located in the Leased Premises and Licensee acknowledges and agrees that the Licensee, its agents, employees and assignees have no claim against the City for any damage or loss of personal property and belongings of Licensee, its agents, employees or assignees in the Leased Premises. Licensee self-insures property risk.

(j) Failure to comply with the requirements of this section 6.01 shall be legal

grounds under this Agreement for work by Licensee at the Subject Property to be ordered to cease or to be restricted, as deemed appropriate by the Director or the Denver Risk Management Office, until compliance is achieved and any unpaid claims are resolved to the reasonable satisfaction of the City Representative and the Denver Risk Management Office. These insurance obligations shall survive the expiration of the Agreement and Cancellation for three (3) years.

6.02 Indemnification & Defense.

(a) Licensee hereby agrees to defend, indemnify, and hold harmless City, its appointed and elected officials, agents and employees against all liabilities, claims, judgments, suits or demands for damages to persons or property arising out of, resulting from, or relating to regarding the use and occupancy of, and activities and operations on, the Subject Property site by Licensee (including its officers, employees, representatives, suppliers, contractors, subcontractors and agents) under this Agreement (“Claims”), unless such Claims have been specifically determined by the trier of fact to be the sole negligence or willful misconduct of City. This indemnity shall be interpreted in the broadest possible manner to indemnify City for any acts or omissions of Licensee (including its officers, employees, representatives, suppliers, contractors, subcontractors and agents) either passive or active, irrespective of fault, including City’s concurrent negligence whether active or passive, except for the sole negligence or willful misconduct of City.

(b) Licensee’s duty to defend and indemnify City shall arise at the time written notice of the Claim is first provided to City regardless of whether an action has been filed in court on the Claim. Licensee’s duty to defend and indemnify the City shall arise even if City is the only party sued and/or it is alleged that City’s negligence or willful misconduct was the sole cause of the alleged damages.

(c) Licensee will defend any and all Claims which may be brought or threatened against City and will pay on behalf of City any expenses incurred by reason of such Claims including, but not limited to, court costs and attorney fees incurred in defending and investigating such Claims or seeking to enforce this indemnity obligation. Such payments on behalf of City shall be in addition to any other legal remedies available to City and shall not be considered City’s exclusive remedy.

(d) Insurance coverage requirements specified in this Agreement shall in no way lessen or limit the liability of Licensee under the terms of this indemnification obligation. Licensee shall obtain, at its own expense, any additional insurance that it deems necessary for City’s protection.

(e) This indemnification and defense obligation shall survive the expiration of this Agreement and Cancellation.

6.03 Colorado Governmental Immunity Act.

Licensee understands and agrees that City is relying upon, and has not waived, the monetary limitations and all other rights, immunities and protection provided by the Colorado Governmental Act, § 24-10-101 *et seq.*, C.R.S., and any related statutory protections against liability.

6.04 Limitation on Liability.

Licensee agrees that no liability shall attach to the City for any damages or losses incurred or claimed by Licensee or any other person or party on account of the installation, construction or operation of the Licensed System by Licensee. Licensee agrees that it shall not in any way seek damages or make any claims against the City for any interference or delay caused by construction in adjacent areas, other businesses or operations, including without limitation damages or losses in the nature of delay damages, lost labor productivity, and impact damages.

6.05 Environmental Requirements.

(a) Licensee and its contractor(s) and subcontractor(s) shall obtain all federal, state, and local environmental permits necessary for the work to be performed and shall comply with all applicable federal, state, and local environmental permit requirements applicable to any work performed on the Subject Property. Licensee and its contractor(s) and subcontractor(s) shall comply with all applicable local, state, and federal environmental guidelines, rules, regulations, statutes, laws, and orders applicable to the work (collectively, “Environmental Requirements”), including but not limited to Environmental Requirements regarding the storage, use, transportation, and disposal of Hazardous Materials and regarding releases or threatened releases of Hazardous Materials to the environment.

(b) The term “Hazardous Materials” shall mean asbestos, asbestos-contaminated soils, and asbestos-containing materials, special wastes, polychlorinated biphenyls (PCBs), any petroleum products, natural gas, radioactive source material, pesticides, any hazardous waste as defined at 42 U.S.C. § 6903(5) of the Solid Waste Disposal Act, any hazardous substance as defined at 42 U.S.C. § 9601(14) of the Comprehensive Environmental Response, Compensation and Liability Act, and chemical substance as defined at 15 U.S.C. § 2602(2) of the Toxic Substances Control Act, and any guidelines issued and rules or regulations promulgated pursuant to such statutes, or any other applicable federal or state statute.

(c) No Hazardous Materials shall be brought onto, or stored on, the Subject Property site without the prior, written approval of the City Representative and, if required by the City Representative, the prior, written approval of the Denver Department of Environmental Health and/or the Colorado Department of Public Health and Environment.

(d) The obligations of Licensee set out in this section 6.04 shall survive the expiration of the Agreement and Cancellation.

6.06 Taxes, Licenses, Liens and Fees.

(a) Licensee agrees to promptly pay all taxes, excises, license fees and permit fees of whatever nature applicable to its operations hereunder and to take out and keep current all municipal, state or federal licenses required for the conduct of its business or operations under this Agreement and further agrees not to permit any of said taxes, excises, license fees or permit fees to become delinquent.

(b) Licensee also agrees not to permit any mechanic's or materialman's or any other lien to become attached or be foreclosed upon the Subject Property or the tower, or improvements thereto, or any part or parcel thereof, by reason of any work or labor performed or materials furnished by any mechanic or materialman for Licensee, as contractors or subcontractors.

(c) Licensee further agrees to promptly pay when due all bills, debts and obligations incurred by it in connection with its operations hereunder, and not to permit the same to become delinquent and to suffer no lien, mortgage, judgment or execution to be filed against the Subject Property, the City System, the Licensed System, or related improvements, which may in any way impair the rights of the City under this Agreement or to the City's property.

(d) The obligations of Licensee set out in this section 6.05 shall survive the expiration of the Agreement and Cancellation.

6.07 No Waiver.

No failure of either Party to insist upon the strict performance of a term, covenant or agreement contained in this Agreement shall be deemed or taken to be a waiver by such Party of any succeeding failure to perform or any breach or default.

SECTION 7 CITY RIGHTS

7.01 City's Rights.

(a) City shall retain all the rights to the use, occupancy and ownership of the Subject Property; and such use, occupancy and ownership by the City shall be the primary use of the Subject Property and shall not be interfered with by the exercise of the rights granted hereunder during the Term or Term Extension of the Agreement, except to the extent interference shall be a result of Licensee's reasonable uses and actions in the installation, inspection, maintenance, alteration, repair, replacement, operation and removal of the Licensed System as authorized under this Agreement; provided, however, that Licensee shall be liable to the City for any damage to improvements that may result from such installation, inspection, maintenance,

alteration, repair, replacement, operation and removal.

(b) If the City desires Licensee to leave in place any modifications made by Licensee to the Tower and so states in a written notice to Licensee, then Licensee shall leave such modifications in place without compensation from or to the City. If Licensee is required to remove the modifications and does not restore damage resulting from said removal and thereby causing the City to have to undertake the restoration, then Licensee shall promptly reimburse the City for the work. The City specifically reserves for itself, other Licensees, licensees and assignees of City, all rights which do not materially and adversely interfere with Licensee's exercise of its License under this Agreement; provided, however, the City will not materially and adversely interfere with, and will not knowingly permit or allow other licensees to materially and adversely interfere with, the rights of Licensee under the terms of this Agreement except to the extent expressly provided in this Agreement.

(c) Upon expiration of the Agreement or Cancellation or on the date specified in any demand for possession by the City after any default by Licensee (after any applicable notice and cure periods), Licensee covenants and agrees to surrender possession of the Licensed Area and all other parts of the Subject Property site to the City in the same condition as when first occupied, ordinary wear and tear excepted but subject to the repair and restoration requirements provided in this Agreement.

(d) Licensee shall remove, at its sole cost, upon expiration of the Agreement or Cancellation, the Licensed System and all of Licensee's personal property within thirty (30) calendar days after expiration or Cancellation, as applicable. If such removal should damage the Subject Property, Licensee agrees, at its sole cost, to immediately repair such damage in a good and workmanlike manner and to put the property in the same condition as it would have been if the Licensed System had not been installed, reasonable wear and tear excepted but subject to the repair and restoration requirements provided in this Agreement. If Licensee fails to remove the Licensed System and Licensee's personal property within thirty (30) calendar days after the expiration of this Agreement or Cancellation, as applicable, the City, at its option, may remove, store and/or dispose of same and retain any proceeds therefrom, and further is entitled to recover any cost incurred by the City in removing same and in restoring the Subject Property.

(e) If Licensee holds over after the expiration of this Agreement or Cancellation, and so long as the Licensed System is still situated on the Subject Property site (even if it has been disconnected), Licensee shall pay to City a holdover fee equal to 250% of the then total License Fee prorated from the effective expiration or Cancellation date, whichever is applicable, to the date the Licensed System is properly and completely removed from the property. Nothing herein shall be construed to give Licensee the right to hold over at any time, and the City may exercise any and all remedies at law or in equity to recover possession of the Property, as well as any damages caused by Licensee.

SECTION 8
LOSS OF, AND LIABILITIES PERTAINING TO THE LICENSED SYSTEM

8.01 Damage or Destruction and Restoration.

In case of damage or loss of all or any portion of the Licensed System or the Tower, Licensee will give prompt notice thereof to the City; and, except as otherwise provided herein, Licensee shall promptly commence and complete with due diligence (subject to delays beyond its control), the restoration of the Licensed System as nearly as reasonably practicable to the value and condition thereof immediately prior to such damage or destruction. In the event of such damage or destruction, Licensee shall be entitled to use or receive reimbursement from the proceeds of all property insurance policy or policies held by Licensee for the Licensed System. The License Fee payable under section 3.01 shall continue to be due and owing.

8.02 Licensee's Election Not to Restore Damaged Licensed System.

In case of the damage or destruction of all or any part of the Licensed System, Licensee, within ninety (90) days thereafter, may elect not to restore or replace the Licensed System, and this Agreement shall be terminated. Licensee must notify the City within said 90 days of the damage or destruction to all or any part of the Licensed System of its intentions not to restore or replace the Licensed System and shall pay the City, in full, six (6) months of payments for the License Fee under section 3.01 from the date that the notice not to restore or replace is provided to the City. Licensee shall promptly proceed to remove the Licensed System from the Licensed Area and to repair and restore the Subject Property in accordance with Section 4 and section 7.01 and as otherwise provided in this Agreement within thirty (30) days after Licensee elects not to restore or replace the Licensed System. The obligations of Licensee under this section 8.02 shall survive the expiration of this Agreement and Cancellation.

SECTION 9
DEFAULT; REMEDIES; and DISPUTES

9.01 Licensee Default.

Licensee shall be in substantial default under this Agreement if Licensee:

(a) Fails to timely pay to the City on the fifth (5th) calendar day after the date License Fee or any other payments are due and owing under this Agreement; provided, however, default shall not occur until the tenth (10th) calendar day after written notice is provided by the City to Licensee; or

(b) Becomes insolvent, or takes the benefit of any present or future insolvency or bankruptcy statute, or makes a general assignment for the benefit of creditors, or consents to the

appointment of a receiver, trustee or liquidator of any or substantially all of its property; or

(c) Transfers its interest under this Agreement, unless such transfer is specifically authorized pursuant to section 10.01; or

(d) Fails to submit or fails to timely submit complete and accurate plans and specifications, bonds, proof of insurance and other submittals as required by the express terms of this Agreement, and such failure continues for a period of thirty (30) calendar days after Licensee has received written notice from the City of such failure; or

(e) Abandons, deserts or vacates the Licensed System or Licensed Area; or

(f) Suffers any materialmen's or mechanic's lien or attachment to be filed against the Licensed System, the City System, or the Subject Property because of any act or omission of Licensee, and such lien or attachment is not discharged or contested by Licensee in good faith by proper legal proceedings within thirty (30) calendar days after Licensee's receipt of written notice thereof from City; or

(g) Fails to keep, perform and observe any other promise, covenant or agreement set forth in this Agreement and such failure continues for a period of more than thirty (30) calendar days after delivery by City of a written notice of such breach or default, except where a shorter period is specified herein, or where fulfillment of its obligation requires activity over a period of time and Licensee within thirty (30) days of Licensee notice Licensee commences in good faith to perform whatever may be required to correct its failure to perform and continues such performance without interruption except for causes beyond its control (which must be documented in a written notice to the City); or

(h) Gives its permission to any person to use for any illegal or unauthorized purpose any portion of the City's property made available to Licensee for its use under this Agreement; or

(i) Or any of its officers or employees are convicted, plead nolo contendere, enter into a formal agreement in which they admit guilt, enter a plea of guilty, or otherwise admit culpability to criminal offenses of bribery, kickbacks, collusive bidding, bid-rigging, antitrust, fraud, undue influence, theft, racketeering, extortion or any offense of a similar nature, in connection with the Licensee's business or operations in the State of Colorado.

9.02 Remedies.

If Licensee substantially defaults in any of the covenants, terms and conditions herein and such default is not cured within any applicable notice and cure periods, the City may exercise any one or more of the following remedies:

(a) The City may elect to allow this Agreement to continue in full force and effect and to enforce all of City's rights and remedies hereunder, including without limitation the right to collect compensation as it becomes due together with interest or recover any damages or losses resulting from the action or inaction of Licensee.

(b) The City may engage in Cancellation and repossess the Licensed Area, without liability for so doing and without having to comply with any eviction process under state law, upon giving thirty (30) calendar days written notice to Licensee of the intended Cancellation, at the end of which time all the rights hereunder of Licensee shall terminate, unless the default shall have been cured as prescribed in section 9.01 or elsewhere in this Agreement. Licensee shall be liable to the City for all amounts owing to the City or any other party with respect to Licensee's operations at the Subject Property or under this Agreement.

(c) The remedies provided in this Agreement shall be cumulative and shall in no way affect any other remedy available to the City under law or equity. The obligations of Licensee under this section 9.02 shall survive the expiration of the Agreement and Cancellation.

9.03 City Default.

City's failure to perform any term or condition under this Agreement within thirty (30) days after written notice from Licensee specifying the failure will be deemed a default by City and a breach of this Agreement. No such failure, however, will be deemed to exist if City has commenced to cure the default within such period and provided such efforts are prosecuted to completion with reasonable diligence. Delay in curing a default will be excused if due to causes beyond the reasonable control of City. If City remains in default beyond any applicable cure period, Licensee will have: (i) the right to cure City's default and to deduct the costs of such cure from any monies due to City from Licensee, and (ii) any and all other rights available to it under law and equity. The Parties agree to work diligently together and in good faith, using reasonable efforts to resolve any unforeseen issues and disputes and to expeditiously take such actions as are necessary and appropriate to perform the duties and obligations of this Agreement. Any dispute between the City and Licensee, including whether a default by Licensee is substantial or has been timely and effectively cured, shall be taken to administrative hearing, pursuant to the procedure established by Section 56-106, DRMC. For the purpose of that procedure, the City official rendering a final determination shall be the Executive Director of the Denver Department of Safety.

SECTION 10 MISCELLANEOUS PROVISIONS

10.01 Assignments.

(a) Licensee shall not assign or otherwise transfer its interest in this Agreement, in whole or in part, or otherwise transfer any rights or interest in or to the License granted under this Agreement, without the prior written consent of the Director, which consent can be given or denied in Director's sole discretion, and subject to approval, under section 10.16 below, of an amendment to this Agreement authorizing the assignment. The Director may require any

proposed assignee to demonstrate that it is appropriately licensed and authorized to provide the same services as Licensee and has the ability to perform the terms and conditions of this Agreement including any financial obligations under this Agreement.

(b) Notwithstanding the foregoing, Licensee may assign this Agreement, and the License granted herein, in whole, to any business entity which is parent, subsidiary, affiliate of Licensee, or to any party that acquires all or substantially all of Licensee's radio spectrum assets in the Denver market area, by reason of a merger, acquisition or other business reorganization. The burden shall be on Licensee to demonstrate, to the satisfaction of the Director, that any proposed assignment qualifies under this sub-section 10.01(b).

(c) The License granted under this Agreement may not be sold under any circumstances. Any contract entered by Licensee to sell or convey the License granted herein shall not be binding on the City and shall be grounds for terminating the Agreement, at the discretion of the Director.

(d) Under no circumstances shall Licensee be authorized to allow any other licensee or sub-licensee to co-locate or operate any system at the Subject Property.

10.02 Fair Dealing; Further Assurances.

(a) In all cases where the consent or approval of one Party is required before the other may act, or where the agreement or cooperation of the Parties is separately or mutually required as a legal or practical matter, then in that event the Parties agree that each will act in a fair and reasonable manner with a view to carrying out the intents and goals of this Agreement as the same are set forth herein, subject to the terms hereof.

(b) From time to time, upon the request of a Party, the other Party agrees to make, execute and deliver or cause to be made, executed and delivered to the requesting Party any and all further instruments, certificates and documents consistent with the provisions of this Agreement as may, in the reasonable opinion of the requesting Party, be necessary or desirable in order to effectuate, complete or perfect the rights of said Party under this Agreement, provided said requesting Party is currently in full compliance with the provisions of this Agreement and has tendered or offered to tender any reciprocal instruments, certificates and documents to which the other Party is entitled under the Agreement.

10.03 Bond Ordinance.

This Agreement and the rights granted or conveyed hereby are in all respects subject and subordinate to any and all City bond ordinances related to the Subject Property and to any other bond ordinances which should amend, supplement or replace such bond ordinances.

10.04 Financial Interests.

Except for financial interests authorized by the City in accordance with the City Charter and ordinances, any financial interests created in, or used to secure financing and payment for the costs of, any work performed or improvements made under this Agreement by Licensee, including but not limited to any bonds, certificates of participation, purchase agreements, and Uniform Commercial Code filings, shall expressly exclude from such debt or financial security contained in such financial instrument(s) any title, rights and interests held by the City in the property subject to this Agreement. The terms and conditions of this Agreement must be expressly recognized in any such financial instrument(s) created or entered by or on behalf of Licensee, which must specifically acknowledge and affirm that any financial interests created by the financial instrument(s) are subordinate to this Agreement and may not encumber the City's title, rights and interests in the subject property or under this Agreement.

10.05 Appropriation.

Notwithstanding any provision of this Agreement to the contrary, the rights and obligations of the City under this Agreement are contingent upon all funds necessary for work or expenditures contemplated under this Agreement being budgeted, appropriated and otherwise made available by the City. The Parties acknowledge that this Agreement is not intended to create a multiple-fiscal year direct or indirect debt or financial obligation of the City, except to the extent that capital improvement funds that are lawfully appropriated can be lawfully carried over to subsequent years.

10.06 Contracting or Subcontracting.

Any work that is allowed to be contracted or subcontracted under this Agreement shall be subject, by the terms of the contract or subcontract, to every provision of this Agreement. Compliance with this provision shall be the responsibility of the Party who arranged the contract or authorized the subcontract. Except as otherwise expressly stated in this Agreement, no Party shall be liable or have a financial obligation to or for any contractor, subcontractor, supplier, or other person or entity with which the other Party contracts or has a contractual arrangement.

10.07 Third Parties.

This Agreement does not, and shall not be deemed or construed to, confer upon or grant to any third party or parties any right to claim damages or to bring any suit, action or other proceeding against either the City or Licensee because of any breach hereof or because of any of the terms, covenants, agreements and conditions herein.

10.08 Force Majeure.

Neither Party hereto shall be liable to the other for any failure, delay or interruption in the performance of any of the terms, covenants or conditions of this Agreement due to causes beyond the reasonable control of that Party, including without limitation strikes, boycotts, labor

disputes, embargoes, shortages of materials, acts of God, acts of the public enemy, acts of superior governmental authority, severe weather conditions, fire, floods, riots, rebellion, sabotage or any other circumstance for which such Party is not responsible or which is not in its power to control, but in no event shall this section be construed so as to allow Licensee to reduce or abate its obligation to pay the License Fee prescribed in this Agreement.

10.09 No Discrimination in Employment (City Executive Order No. 8):

In connection with the performance of work under the Agreement, Licensee may not refuse to hire, discharge, promote, demote, or discriminate in matters of compensation against any person otherwise qualified, solely because of race, color, religion, national origin, ethnicity, citizenship, immigration status, gender, age, sexual orientation, gender identity, gender expression, marital status, source of income, military status, protective hairstyle, or disability. Licensee shall insert the foregoing provision in all subcontracts.

10.10 Non-Discrimination and Equal Employment Opportunity

(a) In carrying out its obligations under the Agreement, Licensee and its officers, employees, members, and subcontractors hereby affirm current and ongoing compliance with 29 CFR Part 37, Title VII of the Civil Rights Act of 1964, The Americans With Disabilities Act of 1990, Section 504 of the Rehabilitation Act of 1973, the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and all other nondiscrimination and equal employment opportunity statutes, laws, and regulations. Licensee agrees not discriminate against any employee or applicant for employment because of race, religion, national origin, ancestry, color, gender, gender identity, sexual orientation, age, disability, political affiliation or belief, or veteran status. Licensee will ensure that all qualified applicants are hired, and all employees are considered for promotion, demotion, transfer; recruitment or recruitment advertising, layoff, termination, rates of pay, other forms of compensation, selection for training (including apprenticeship), or any other employment-related opportunities, without regard to race, religion, national origin, ancestry, color, gender, gender identity, sexual orientation, age, disability, political affiliation or belief, or veteran status.

(b) Licensee agrees to post notices affirming compliance with all applicable federal and state non-discrimination laws in conspicuous places accessible to all employees and applicants for employment. Licensee will affirm that all qualified applicants will receive consideration for employment without regard to race, religion, national origin, ancestry, color, gender, gender identity, sexual orientation, age, disability, political affiliation or belief, or veteran status in all solicitations or advertisements for employees placed by or on behalf of Licensee.

(c) Licensee will incorporate the foregoing requirements of this Section in all of its subcontracts.

(d) Licensee agrees to collect and maintain data necessary to show compliance with the nondiscrimination provisions of this section.

10.11 Conflict of Interest.

The Parties agree that no official, officer or employee of the City shall have any personal or beneficial interest whatsoever in the services or property described herein, and Licensee further agrees not to hire or contract for services any official, officer or employee of the City or any other person which would be in violation of the Denver Revised Municipal Code Chapter 2, Article IV, Code of Ethics, or Denver City Charter provisions 1.2.9 and 1.2.12.

10.12 Applicable Law; Authority; Venue; Enforcement; and Claims.

(a) The Parties agree to comply with all Applicable Law in existence as of the Effective Date of this Agreement or as may be subsequently enacted or adopted and become applicable.

(b) This Agreement shall be construed and enforced in accordance with the laws of the United States, the State of Colorado, and the applicable provisions of the Charter and Revised Municipal Code of the City and County of Denver.

(c) Venue for any legal action relating to this Agreement shall lie in the District Court in and for the City and County of Denver.

(d) The Parties agree that this Agreement may be enforced in law or in equity for specific performance, injunctive, or other appropriate relief, including actual damages (notwithstanding Cancellation), as may be available according to the laws and statutes of the State of Colorado; provided, however, the Parties agree to and hereby release any claims for incidental, consequential, or punitive damages; provided, further, no provision of this Agreement may be enforced by the creation or recording of any type of lien against real property owned by the City, nor may any foreclosure process be utilized to recover any moneys owed by the City to Licensee. It is specifically understood that, by executing this Agreement, each Party commits itself to perform pursuant to these terms and conditions contained in this Agreement, and that any failure to comply which results in any recoverable damages shall not cause, by itself, the revocation or termination of any rights or obligations under this Agreement.

(e) Nothing in this section 10.11 shall be construed as a waiver, release, reduction or modification of any insurance, bond, indemnification or other liability obligations of Licensee or Licensee's design professional, contractor or sub-contractor expressly provided for in this Agreement.

(f) No official, officer, director, agent, or employee of either Party shall be charged personally or held contractually liable to the other Party or its officials, officers, directors, agents, or employees under any term or condition of this Agreement or for any breach, default, or violation under this Agreement.

(g) In the event that any claim, demand, suit, or action is made or brought in writing by any person or entity against one of the Parties related in any way to this Agreement, the Party in receipt of same shall promptly notify and provide a copy of said claim, demand, suit, or action to the other Party.

10.13 Use, Possession or Sale of Alcohol or Drugs; Smoking Policy.

(a) Licensee and its officers, agents, employees, and contractors shall cooperate and comply with the provisions of the City and County of Denver's policy or order or any successor policy or order concerning the use, possession or sale of alcohol or drugs on City property.

(b) Licensee and its officers, agents, employees, and contractors shall cooperate and comply with the provisions of the City's policy or order prohibiting smoking in buildings and certain facilities, and Licensee agrees it will take reasonable action to prohibit smoking by its employees in the public areas of the Subject Property.

10.14 Notices.

All legal and administrative notices hereunder shall be given in writing to the following by hand delivery, by a nationally recognized overnight courier, or by certified mail, postage prepaid, return receipt requested.

To the City: City and County of Denver
Division of Real Estate
Attn: Director of Real Estate
201 W Colfax Ave, Dept 1010
Denver, CO 80202

And to: City Attorney's Office
City and County of Denver
1437 Bannock Street, Room 353
Denver, CO 80202

To the Licensee: New Cingular Wireless PCS, LLC
Attn: Network Real Estate Administration
FA #: 10101152
Cell Site Name; Capitol Hill (CO)
Cell Site #: COL01220
1025 Lenox Park Blvd NE, 3rd Floor
Atlanta, GA 30319

With a copy to: New Cingular Wireless PCS, LLC
Attn: Legal Dept
FA #: 10101152
Cell Site Name; Capitol Hill (CO)
Cell Site #: COL01220
208 S. Akard Street
Dallas, TX 75202 4206

All proposed amendments to the Agreement, letter approvals for proposed actions by Licensee, proposed changes to the exhibits, and any document or affidavit seeking the signature of the Director or the Executive Director of Safety, shall be provided to both the Director and the City Attorney's Office. Licensee and City shall designate local contact personnel for operational and otherwise day-to-day business communications which may be made by telephone or email. Any changes to this contact information shall be provided immediately once known.

10.15 Examination of Records and Audit

Any authorized agent of the City, including the City Auditor or his or her representative, has the right to access, and the right to examine, copy and retain copies, at City's election in paper or electronic form, any pertinent books, documents, papers and records related to Licensee's performance pursuant to this Agreement, and any other transactions related to this Agreement. Licensee shall cooperate with City representatives and City representatives shall be granted access to the foregoing documents and information during reasonable business hours and until the latter of three (3) years after the final payment under the Agreement or expiration of the applicable statute of limitations. When conducting an audit of this Agreement, the City Auditor shall be subject to government auditing standards issued by the United States Government Accountability Office by the Comptroller General of the United States, including with respect to disclosure of information acquired during the course of an audit. No examination of records and audits pursuant to this paragraph shall require Licensee to make disclosures in violation of state or federal privacy laws. Licensee shall at all times comply with D.R.M.C. 20-276.

10.16 Parties' Obligation Regarding Confidential Information.

The Parties agree that issues governing the use and disclosure of Confidential Information, as defined below, provided to or made available to the City by Licensee will be governed by the following provisions:

(a) As used herein, the term "Confidential Information" means all information, of any nature and in any form, regardless of when given, that (i) is disclosed or provided by or through Licensee to the City pursuant to performance of this Agreement; and (ii) has been clearly marked or indicated in writing as being confidential by Licensee; provided, that no part of this Agreement or the exhibits attached to this Agreement shall be deemed to contain Confidential Information. Information falling within this definition shall be treated by the City as confidential

proprietary information of Licensee pursuant to the provisions of the Colorado Open Records Act and under any rule of court. Information not so marked or indicated will not be so considered.

(b) Except as expressly provided in this Agreement or as otherwise mandated by the Colorado Open Records Act or other applicable law, the City will not disclose Confidential Information to anyone other than individuals designated by the Director, including the City Representative, without the prior written consent of Licensee. The City will not use, or permit others to use, Confidential Information for any purpose other than actions incidental to the performance and enforcement of this Agreement between the City and Licensee, including but not limited to auditing of records of Licensee by the City Auditor and/or other representatives of the City. The City will take all reasonable measures to avoid disclosure, dissemination or unauthorized use of Confidential Information, including, at a minimum, those measures that it takes to protect its own Confidential Information of a similar nature.

(c) The Parties recognize that the mere marking of a document as “Confidential” does not render it conclusively confidential under the Colorado Open Records Act. Consequently, in the event that the City is served with an Open Records Request or subpoena from any third party requesting all or part of any Confidential Information as defined herein, the City shall give timely notice to Licensee of such request or subpoena within the time parameters of the Colorado Open Records Act or of any applicable court rule. In that event, Licensee agrees upon receipt of actual notice from the City of such Open Records Request or subpoena to immediately undertake, at its own cost and expense, to defend such Confidential Information from disclosure pursuant to the Colorado Open Records Act or applicable court rule and shall defend, save and hold harmless and indemnify the City and its agents and employees with respect to such issues.

(d) Licensee shall not at any time or in any manner, either directly or indirectly, divulge, disclose or communicate to any person, firm or corporation in any manner whatsoever any information concerning any matters which are not subject to public disclosure, including without limitation the trade secrets of businesses or entities doing business with the City, security measures utilized by the City, and other privileged or confidential information.

10.17 Entire Agreement; Amendment.

The Parties acknowledge and agree that the provisions contained herein, including all exhibits attached hereto, constitute the entire agreement and that all representations made by any officer, agent or employee of the respective Parties unless included herein are null and void and of no effect. No alterations, amendments, changes or modifications, unless expressly reserved to the City herein, shall be valid unless executed by an instrument in writing by all the Parties with the same formality as this Agreement.

10.18 Severability.

If any term or provision of this Agreement is held by a court of law (following all legal rights of appeal or the expiration of time therefore) to be illegal or unenforceable or in conflict with any law of the State of Colorado or the City Charter or City ordinance, the validity of the remaining portions or provisions shall not be affected, and the rights and obligations of the Parties shall be construed and enforced as if the Agreement did not contain the particular term or provision held to be invalid; provided, however, if the invalidated term or provision was a critical or material consideration of either Party in entering this Agreement, the Parties shall work together, in good faith, to come up with an amendment to this Agreement that substantially satisfies the previously intended consideration while being in compliance with Applicable Law and the judgment of the court. Judicial invalidation of the License Fee, in whole or part, shall result in a failure of consideration and termination of this Agreement.

10.19 Time of Essence.

The Parties agree that in the performance of the terms and requirements of this Agreement by Licensee and the City, time is of the essence.

10.20 Section Headings.

The section headings herein are for convenience in reference only and are not intended to define or limit the scope of any provision of this Agreement.

10.21 Approval and Execution of Agreement.

This Agreement is expressly subject to and shall not be or become effective or binding on the City until City Council approval, if required by Charter, is obtained and the Agreement is fully executed by all required City signatories and all required Licensee signatories.

10.22 Authority

Each Party represents and warrants that it has taken all actions that are necessary or that are required by its applicable law to legally authorize the undersigned signatories to execute this Agreement on behalf of the Party and to bind the Party to its terms. The person(s) executing this Agreement on behalf of each Party warrants that he/she/they have full authorization to execute this Agreement. The City shall have the right, in its discretion, to either temporarily suspend or permanently terminate the Agreement if there is any valid dispute as to the legal authority of Licensee or the person signing this Agreement on behalf of Licensee to enter into this Agreement.

10.23 Electronic Signatures and Electronic Records.

The Parties consent to the use of electronic signatures. The Agreement, and any other documents requiring a signature hereunder, may be signed electronically. The Parties agree not to deny the legal effect or enforceability of the Agreement solely because it is in electronic form

or because an electronic record was used in its formation. The Parties agree not to object to the admissibility of the Agreement in the form of an electronic record, or a paper copy of an electronic document, or a paper copy of a document bearing an electronic signature, on the ground that it is an electronic record or electronic signature or that it is not in its original form or is not an original.

SIGNATURE PAGES AND EXHIBITS FOLLOW THIS PAGE

Contract Control Number:

FINAN-202262133-00

Contractor Name:

New Cingular Wireless PCS, LLC

IN WITNESS WHEREOF, the parties have set their hands and affixed their seals at Denver, Colorado as of:

SEAL

CITY AND COUNTY OF DENVER:

ATTEST:

By:

APPROVED AS TO FORM:

REGISTERED AND COUNTERSIGNED:

Attorney for the City and County of Denver

By:

By:

By:

Contract Control Number:
Contractor Name:

FINAN-202262133-00
New Cingular Wireless PCS, LLC

By: AT&T Mobility Corporation
Its: Manager

By: *Please see next page for signature*

Name: _____
(please print)

Title: _____
(please print)

ATTEST: [if required]

By: _____

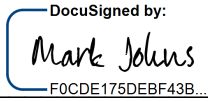
Name: _____
(please print)

Title: _____
(please print)

Contract Control Number:
Contractor Name:

FINAN-202262133-00
New Cingular Wireless PCS, LLC

By: AT&T Mobility Corporation
Its: Manager

By:  _____
F0CDE175DEBF43B...

Name: Mark Johns
(please print)

Title: Area Manager
(please print)

ATTEST: [if required]

By:  _____
729DCAB75B4C479...

Name: Gary Alchin
(please print)

Title: Sr. Specialist-Tech Vendor Management
(please print)

EXHIBIT A

CONSTRUCTION DRAWING

- LTE 1C
- LTE 2C
- LTE 3C
- LTE 4C
- LTE 5C
- LTE 6C
- 5C STAND ALONE



at&t

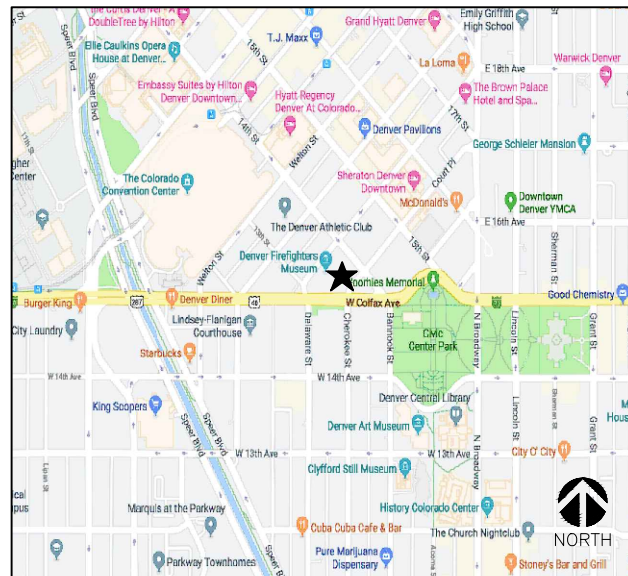
DRIVING DIRECTIONS

- FROM:
188 INVERNESS DRIVE WEST
ENGLEWOOD, CO 80122
- DEPART INVERNESS DR W TOWARD INVERNESS DR E
 - TURN RIGHT ONTO E COUNTY LINE RD
 - TAKE RAMP RIGHT FOR I-25 NORTH TOWARD DENVER
 - TAKE RAMP RIGHT AND FOLLOW SIGNS FOR US-287 / US-40
 - TURN RIGHT ONTO I-70 E BL / US-40 E / US-287 E / W COLFAX AVE
 - TURN LEFT ONTO COURT PL
 - ARRIVE AT 303 WEST COLFAX AVE, DENVER, CO 80204

DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS & EXISTING DIMENSIONS & CONDITIONS ON THE JOB SITE AND SHALL NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR THE SAME.

VICINITY MAP

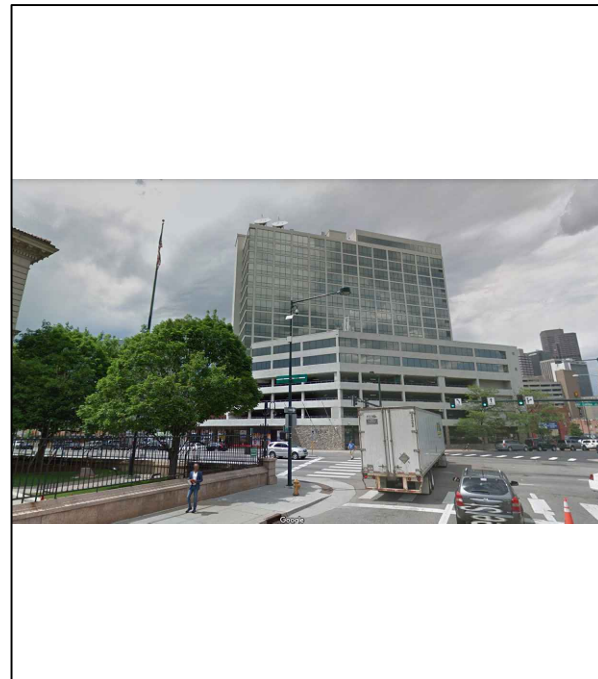


AT&T SITE NAME
CAPITOL HILL
AT&T SITE NUMBER
COL01220
AT&T FA NUMBER
10101152
AT&T PACE NUMBER
MRUTH034369
SITE ADDRESS
303 WEST COLFAX AVE
DENVER, CO 80204
STRUCTURE TYPE

PROJECT DESCRIPTION

- AT&T PROPOSES TO MODIFY AN EXISTING UNMANNED TELECOMMUNICATION FACILITY:
- REMOVE AND REPLACE (2) PANEL ANTENNAS
 - REMOVE AND REPLACE (4) RRHS
 - MOVE 850 JUMPER ON UMTS ANTENNA FROM PORT 5 TO PORT 2
 - INSTALL (4) DIPLEXERS WITHIN EXISTING AT&T EQUIPMENT AREA
 - INSTALL (1) FSM4 & (2) ASIK WITHIN EXISTING AT&T EQUIPMENT AREA
 - REMOVE EXISTING (6) STRINGS OF 15AH BATTERIES FROM SITE
 - INSTALL (3) NEW BATTERY SHELVES WITHIN POWER DISTRIBUTION FRAME
 - INSTALL (32) EAST PENN HT170ET BATTERIES CONFIG AT (8) STRINGS
 - INSTALL (5) RECTIFIERS FOR A TOTAL OF (17) & (2) CONVERTERS FOR A TOTAL OF (5) WITHIN EXISTING AT&T EQUIPMENT AREA
 - INSTALL 16 X 8 X 8 HOLLOW CMU BLOCKS OF QUANTITY 23 ON FRONT TRAY AND 30 ON BACK TRAY SPACED EVENLY FOR THE BETA AND GAMMA SECTORS. BALLAST FRAMES ASSUMED TO BE VALMONT RTP12-496 PER BLACK AND VEATCH SA DATED JUNE 1, 2017
 - INSTALL (2) 25A BREAKERS FOR FSM4 & (4) 25A BREAKERS FOR AHCA

SITE PHOTO



PROJECT TEAM

10590 W. OCEAN AIR DRIVE, SUITE 300
SAN DIEGO, CA 92130

PROJECT MANAGER

2500 W. HIGGINS RD, SUITE 500
HOFFMAN ESTATES, IL 60169
OFFICE # (847) 648-4068

ENGINEER

PROJECT NOTES

- NOTES:
- HANDICAP ACCESS REQUIREMENTS ARE NOT REQUIRED.
 - FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.
 - FACILITY HAS NO PLUMBING OR REFRIGERANTS.
 - THIS FACILITY SHALL MEET OR EXCEED ALL FAA AND FCC REGULATORY REQUIREMENTS.
 - ANTENNAS AND EQUIPMENT SHALL BE PAINTED TO MATCH EXISTING BUILDING.



PROJECT SUMMARY

AT&T SITE NAME: CAPITOL HILL
AT&T SITE #: COL01220
AT&T FA SITE #: 10101152
AT&T RFDS #: 3512044, REV. 2.0
SITE ADDRESS: 303 WEST COLFAX AVE
DENVER, CO 80204
COUNTY: DENVER
LATITUDE: 39° 44' 25.2" N (NAD 83)
LONGITUDE: 104° 59' 29.5" W (NAD 83)
PROJECT MANAGER: MD7
10590 W OCEAN AIR DR., STE. 300
SAN DIEGO, CA 92130
CONTACT: HAILEE PERUCCI
(858) 248-6960
APPLICANT: AT&T MOBILITY
188 INVERNESS DRIVE WEST
ENGLEWOOD, CO 80112
ENGINEER: INFINIGY ENGINEERING, PLLC
2500 W. HIGGINS RD, SUITE 500
HOFFMAN ESTATES, IL 60169
CONTACT: NANCY HERNANDEZ
(847) 648-4068
SITE ACQUISITION CONTACT: RAYMOND TAYLOR
(720) 220-8954
CONSTRUCTION MANAGER: DEREK BONK
(775) 750-5818
BUILDING CODE: 1. INTERNATIONAL BUILDING CODE (2018 IBC)
2. TIA-EIA-222-G OR LATEST EDITION
3. 2017 NFPA 780 - LIGHTNING PROTECTION CODE
4. ANY OTHER NATIONAL OR LOCAL APPLICABLE CODES, MOST RECENT EDITIONS
5. CO BUILDING CODE
6. LOCAL BUILDING CODE
7. CITY/COUNTY ORDINANCES
ELECTRIC CODE: 2017 NATIONAL ELECTRIC CODE OR LATEST EDITION

SHEET INDEX

NO.	DESCRIPTION
T-1	TITLE SHEET
GN-1	GENERAL NOTES
GN-2	GENERAL NOTES
C-1	SITE PLAN
C-1.1	ENLARGED SITE PLAN
C-2	EXISTING EQUIPMENT LAYOUT
C-2.1	PROPOSED EQUIPMENT LAYOUT
C-2.2	EQUIPMENT PHOTOS
C-3	NORTH ELEVATION
C-4	EAST ELEVATION
C-5	SOUTH ELEVATION
C-6	ANTENNA LAYOUTS
C-7	ANTENNA LAYOUTS & LOADING CHART
D-1	EQUIPMENT DETAILS
D-2	EQUIPMENT DETAILS
E-1	DC SCHEMATIC DIAGRAM
G-1	GROUNDING SCHEMATIC DIAGRAM
G-2	GROUNDING DETAILS
RF-1	PLUMBING DIAGRAM

PLANS PREPARED FOR:



PLANS PREPARED BY:

INFINIGY ENGINEERING, PLLC
 2500 W. HIGGINS RD, SUITE 500
 HOFFMAN ESTATES, IL 60169
 Office # (847) 648-4068
 JOB NUMBER: 674-003

PROJECT MANAGER:

md7
 10590 W. OCEAN AIR DRIVE, SUITE 300
 SAN DIEGO, CA 92130

ENGINEERING LICENSE:



DRAWING NOTICE:

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REVISIONS:

DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/03/20	CAP	0
REVISED/ISSUED FOR REVIEW	01/21/20	CAP	B
ISSUED FOR REVIEW	07/01/19	CAP	A

AT&T SITE NAME:

CAPITOL HILL

AT&T SITE NUMBER:

COL01220

AT&T FA NUMBER:

10101152

SITE ADDRESS:

**303 W. COLFAX AVE.
DENVER, CO 80204**

SHEET DESCRIPTION:

TITLE SHEET

SHEET NUMBER:

T-1

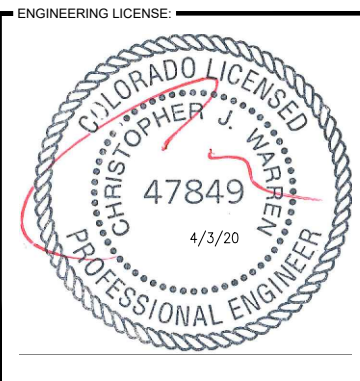
INFINIGY ENGINEERING HAS NOT EVALUATED THE EXISTING BUILDING OR MOUNT FOR THIS SITE AND ASSUMES NO RESPONSIBILITY FOR IT STRUCTURAL INTEGRITY. REFER TO STRUCTURAL ANALYSIS BY OTHERS PRIOR TO ANY CONSTRUCTION



PLANS PREPARED BY:
INFINIGY
 ENGINEERING, PLLC
 2500 W. HIGGINS RD, SUITE 500
 HOFFMAN ESTATES, IL 60169
 Office # (847) 648-4068
 JOB NUMBER: 674-003

PROJECT MANAGER:

 10590 W. OCEAN AIR DRIVE, SUITE 300
 SAN DIEGO, CA 92130



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CAPITOL HILL

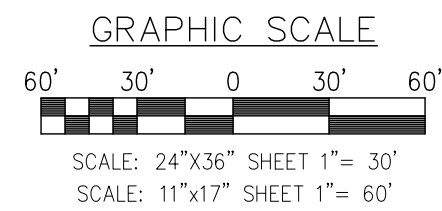
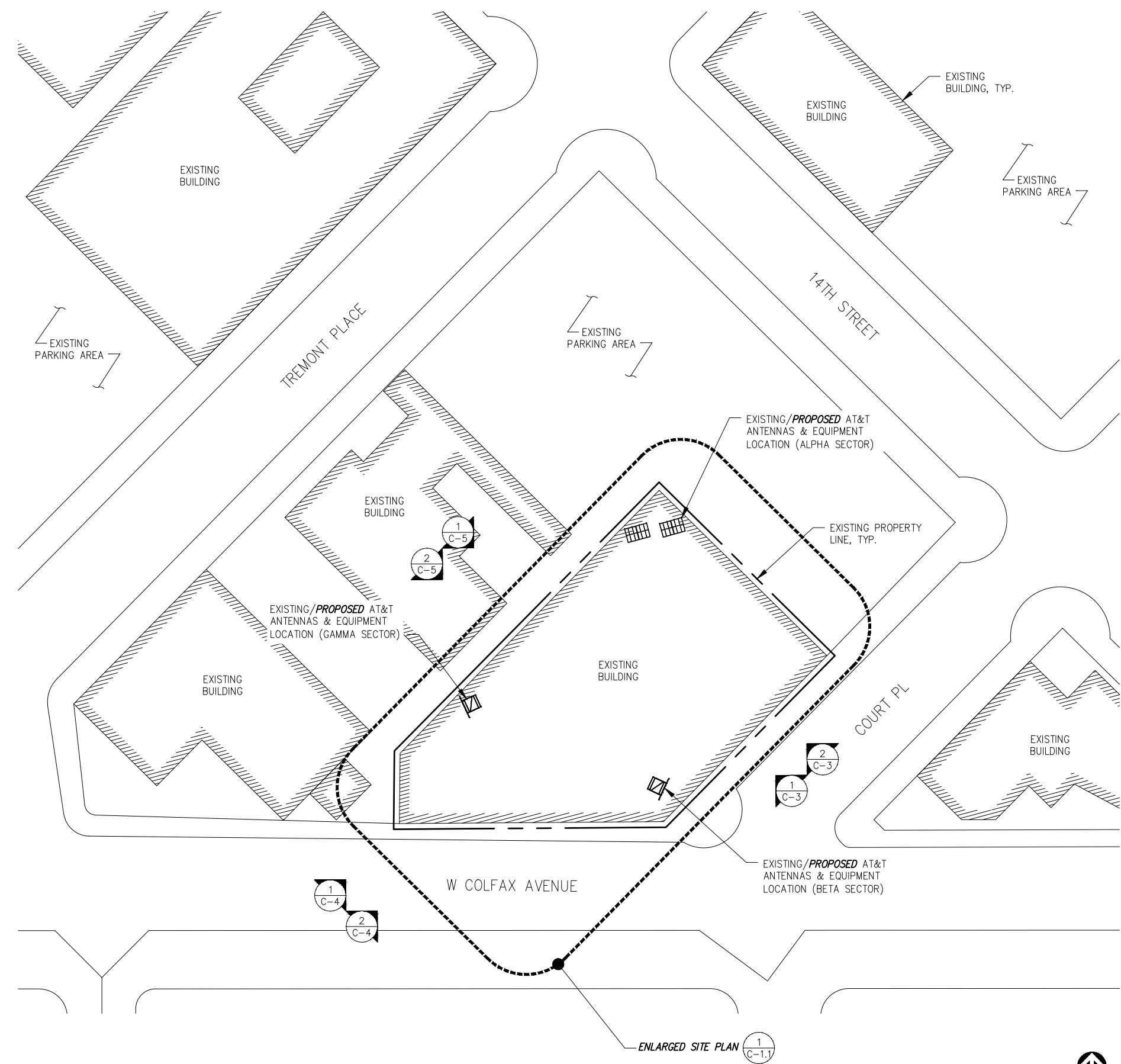
AT&T SITE NUMBER:
COL01220

AT&T FA NUMBER:
10101152

SITE ADDRESS:
**303 W. COLFAX AVE.
 DENVER, CO 80204**

SHEET DESCRIPTION:
SITE PLAN

SHEET NUMBER:
C-1



SITE PLAN

SCALE: AS NOTED 1

INSTALL 16 X 8 X 8 HOLLOW CMU BLOCKS OF QUANTITY 23 ON FRONT TRAY AND 30 ON BACK TRAY SPACED EVENLY FOR THE BETA AND GAMMA SECTORS. BALLAST FRAMES ASSUMED TO BE VALMONT RTP12-496 PER BLACK AND VEATCH SA DATED JUNE 1, 2017

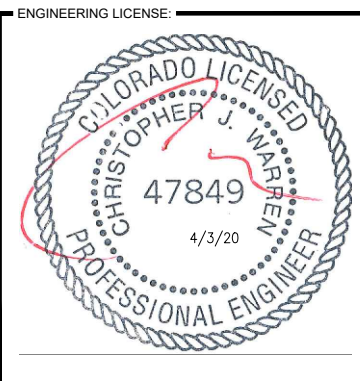
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PLANS PREPARED BY:
INFINIGY ENGINEERING, PLLC
 2500 W. HIGGINS RD, SUITE 500
 HOFFMAN ESTATES, IL 60169
 Office # (847) 648-4068
 JOB NUMBER: 674-003

PROJECT MANAGER:

 10590 W. OCEAN AIR DRIVE, SUITE 300
 SAN DIEGO, CA 92130



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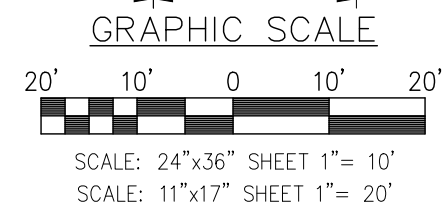
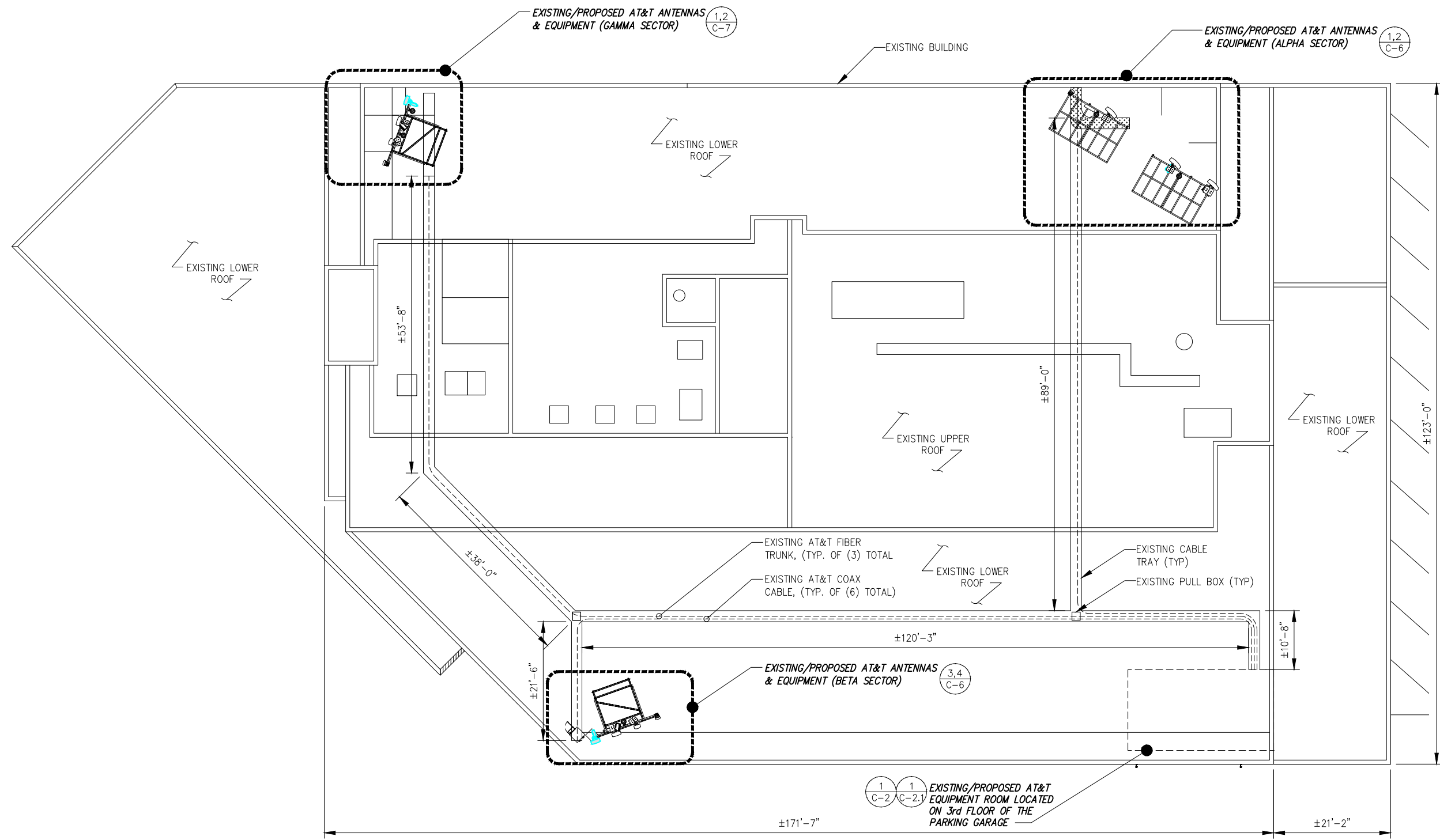
AT&T SITE NUMBER:
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AT&T FA NUMBER:
10101152

SITE ADDRESS:
**303 W. COLFAX AVE.
 DENVER, CO 80204**

SHEET DESCRIPTION:
**ENLARGED
 SITE PLAN**

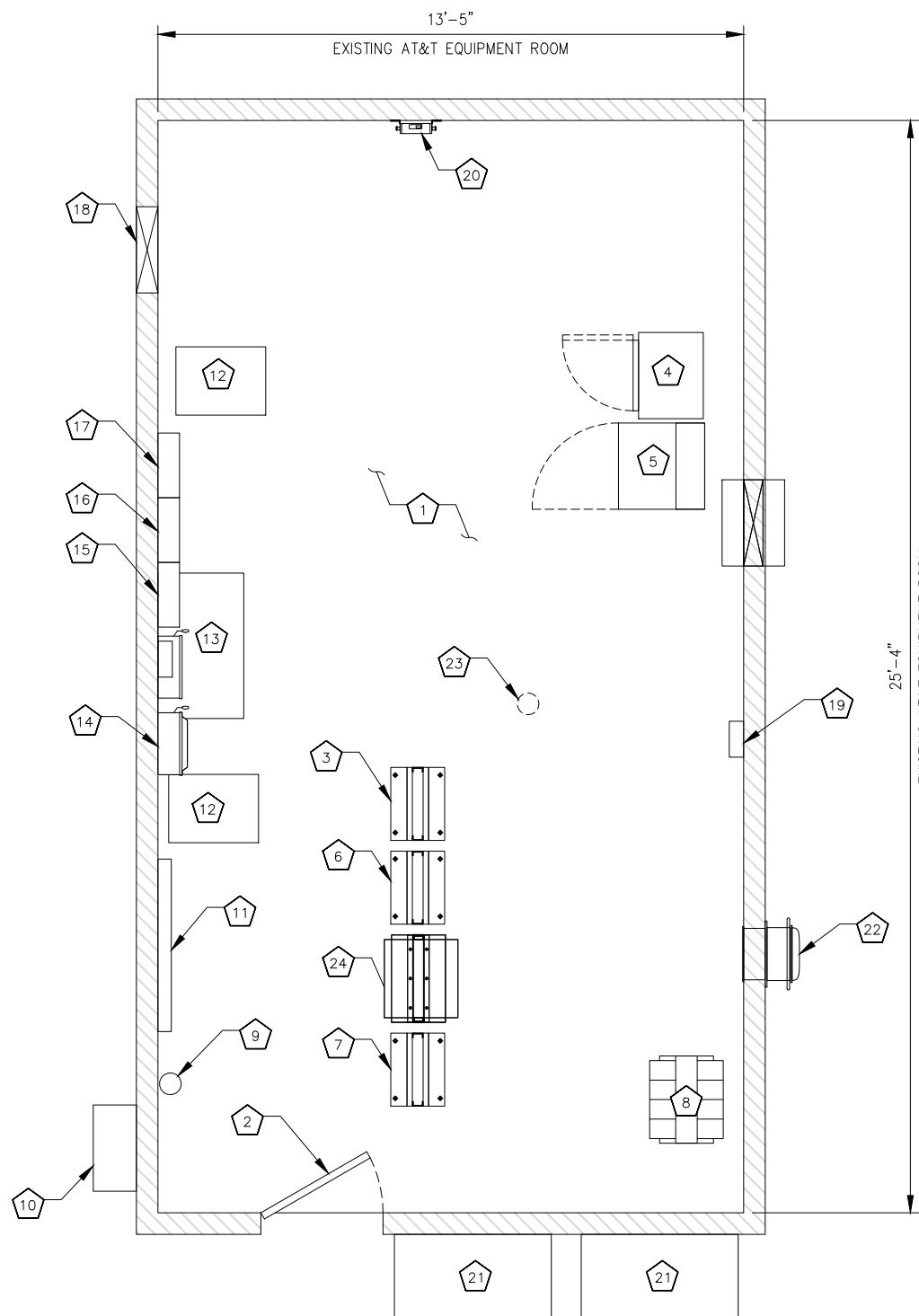
SHEET NUMBER:
C-1.1



ENLARGED SITE PLAN

CODED DRAWING NOTES:

- 1 EXISTING AT&T EQUIPMENT AREA
- 2 EXISTING ACCESS DOOR
- 3 EXISTING DC RACK
- 4 EXISTING GSM CABINET
- 5 EXISTING UMS CABINET
- 6 EXISTING RF RACK
- 7 EXISTING EQUIPMENT RACK
- 8 EXISTING BATTERY RACK (REMOVE (20) EXISTING M12V155FT BATTERIES FROM SITE)
- 9 EXISTING FIRE EXTINGUISHER
- 10 EXISTING JUNCTION BOX
- 11 EXISTING ALARM BACKBOARD
- 12 EXISTING TRANSFORMER
- 13 EXISTING STORAGE CABINET
- 14 EXISTING DISCONNECT SWITCH
- 15 EXISTING AC SUB PANEL A
- 16 EXISTING AC MAIN PANEL
- 17 EXISTING AC SUB PANEL B
- 18 EXISTING COAX ENTRY PANEL
- 19 EXISTING HYDROGEN GAS DETECTOR
- 20 EXISTING DIPLEXERS (TYP OF 6, STACKED)
- 21 EXISTING HVAC
- 22 EXISTING EXHAUST FAN
- 23 EXISTING SMOKE DETECTOR (ABOVE)
- 24 EXISTING -48V POWER DISTRIBUTION FRAME WITH (12) RECTIFIERS AND (3) CONVERTERS (REMOVE (4) M12V155FT BATTERIES FROM SITE)



Summary:

DC POWER PLANT, RECTIFIERS & CONVERTERS:

1. **PASSES RECTIFIER CAPACITY:** EXISTING EMERSON INDOOR 721 -48V DCPD IS EQUIPPED WITH (12) EA. 2 KW -48VDC RECTIFIERS [NEQ.15930]. (11) REQUIRED FOR N+1.
2. **PASSES CONVERTER CAPACITY N+1:** EXISTING EMERSON INDOOR NETSURE 721 -48V DCPD IS EQUIPPED WITH (3) EA. 1.5 KW -48VDC/+24VDC CONVERTER MODULES [NEQ.15929].

GENERATOR:

1. **NO PERMANENT STANDBY GENERATOR**

BATTERIES:

1. **NOT EVALUATED:** Per Client Direction - No Site Audit performed and previous SPCT provided by client does not provide any info regarding type and/or quantity of existing batteries on site.
2. A minimum of (24) 155 Ahr batteries i.e. (6) strings each configured @ -48VDC nominal required for an estimated 4.48 HRS of battery reserve capacity required for existing conditions.

HVAC:

1. **PASSES HVAC TONNAGE CAPACITY:** SPACE IS EQUIPPED WITH (2) EA. 5-TON HVAC's.

PLANS PREPARED FOR:



PLANS PREPARED BY:

INFINIGY
ENGINEERING, PLLC

2500 W. HIGGINS RD, SUITE 500
HOFFMAN ESTATES, IL 60169
Office # (847) 648-4068

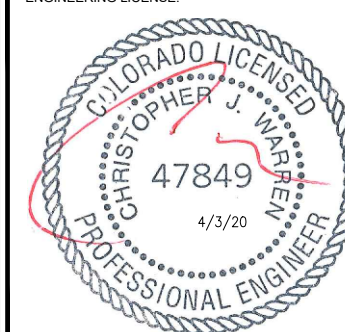
JOB NUMBER: 674-003

PROJECT MANAGER:



10590 W. OCEAN AIR DRIVE, SUITE 300
SAN DIEGO, CA 92130

ENGINEERING LICENSE:



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AT&T SITE NAME:

CAPITOL HILL

AT&T SITE NUMBER:

COL01220

AT&T FA NUMBER:

10101152

SITE ADDRESS:

303 W. COLFAX AVE.
DENVER, CO 80204

SHEET DESCRIPTION:

EXISTING
EQUIPMENT LAYOUT

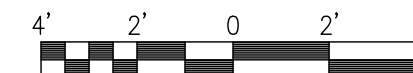
SHEET NUMBER:

C-2

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EXISTING EQUIPMENT LAYOUT

GRAPHIC SCALE



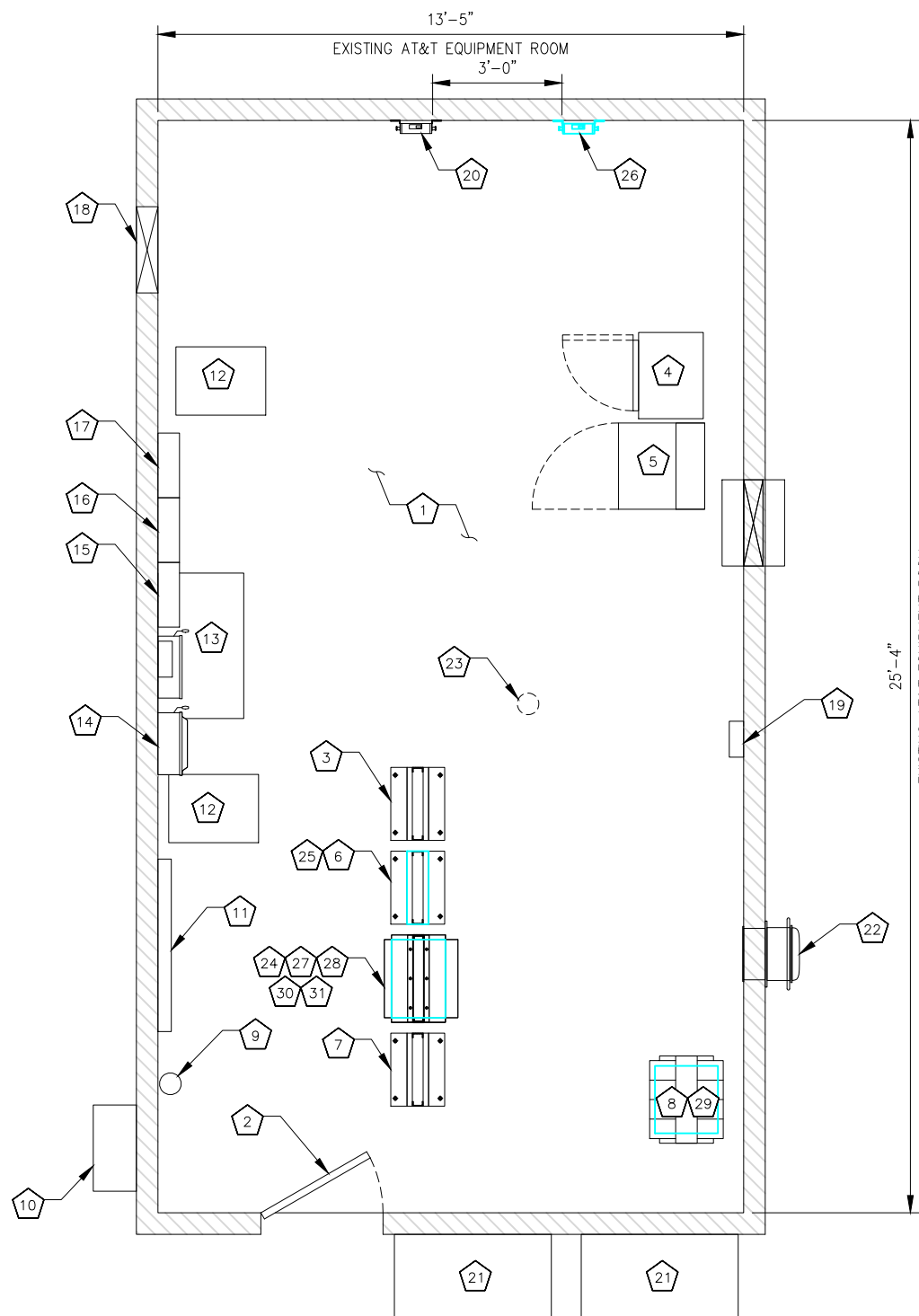
SCALE: 24"x36" SHEET 1"= 2'

SCALE: 11"x17" SHEET 1"= 4'

SCALE: AS NOTED

CODED DRAWING NOTES:

- 1 EXISTING AT&T EQUIPMENT AREA
- 2 EXISTING ACCESS DOOR
- 3 EXISTING DC RACK
- 4 EXISTING GSM CABINET
- 5 EXISTING UMTS CABINET
- 6 EXISTING RF RACK
- 7 EXISTING EQUIPMENT RACK
- 8 EXISTING BATTERY RACK
- 9 EXISTING FIRE EXTINGUISHER
- 10 EXISTING JUNCTION BOX
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- 20 EXISTING DIPLEXERS (TYP OF 6, STACKED)
- 21 EXISTING HVAC
- 22 EXISTING EXHAUST FAN
- 23 EXISTING SMOKE DETECTOR (ABOVE)
- 24 EXISTING -48V POWER DISTRIBUTION FRAME WITH (12) RECTIFIERS AND (3) CONVERTERS
- 25 **INSTALL (2) NOKIA 5G NR (ASIK C-1) & (1) FSM4 BBU [CEQ.20975].** 4.5
D-1
- 26 **INSTALL (4) CBC78T-DS-43 DIPLEXERS (STACKED) (ALPHA SECTOR)** 1
D-2
- 27 **INSTALL 5 RECTIFIERS AND (2) CONVERTERS WITHIN EXISTING POWER DISTRIBUTION FRAME** 2
D-2
- 28 **INSTALL (2) 25A BREAKERS FOR FSM4 & (4) 25A BREAKERS FOR AHCA**
- 29 **INSTALL (20) NEW EAST PENN HT170ET BATTERIES WITHIN BATTERY RACK**
- 30 **INSTALL (3) NEW BATTERY SHELVES WITHIN POWER DISTRIBUTION FRAME**
- 31 **INSTALL (12) NEW EAST PENN HT170ET BATTERIES WITHIN POWER DISTRIBUTION FRAME**



INFINIGY ENGINEERING HAS NOT EVALUATED THE EXISTING BUILDING OR MOUNT FOR THIS SITE AND ASSUMES NO RESPONSIBILITY FOR IT STRUCTURAL INTEGRITY. REFER TO STRUCTURAL ANALYSIS BY OTHERS PRIOR TO ANY CONSTRUCTION

PROPOSED EQUIPMENT LAYOUT

Summary:

DC POWER PLANT, RECTIFIERS & CONVERTERS:

1. **PASSES RECTIFIER CAPACITY;** EXISTING EMERSON INDOOR 721 -48V DCPD IS EQUIPPED WITH (12) EA. 2 KW -48VDC RECTIFIERS [NEQ.15930]. (17) REQUIRED FOR N+1. 5 Additional Rectifiers required
2. **PASSES CONVERTER CAPACITY N+1;** EXISTING EMERSON INDOOR NETSURE 721 -48V DCPD IS EQUIPPED WITH (3) EA. 1.5 KW -48VDC/+24VDC CONVERTER MODULES [NEQ.15929]. 2 Additional Converter required for a revised total of 5

GENERATOR:

1. **NO PERMANENT STANDBY GENERATOR**

BATTERIES:

1. **NOT EVALUATED;** Per Client Direction - No Site Audit performed and previous SPCT provided by client does not provide any info regarding type and/or quantity of existing batteries on site. Based on a few previously proposed projects there appears to be 2 strings of 1020 AH.
 2. **A minimum of (24) 170 Ahr batteries i.e. (6) strings each configured @ -48VDC nominal required for an estimated 4.49 HRS of battery reserve capacity required for existing conditions. Installed on Alpha Sector Split Project.**
- (20) existing Marathon 12V155MA @ -48VDC to be replaced with (32) East Penn HT170ET Batteries configured @ -48VDC strings for a back up of 4.09 HRS.

HVAC:

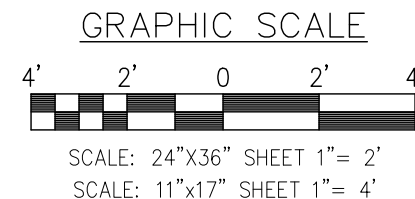
1. **PASSES HVAC TONNAGE CAPACITY;** SPACE IS EQUIPPED WITH (2) EA. 5-TON HVAC'S.

PROPOSED BATTERIES:

BATTERY TYPE:	EAST PENN HT170ET	
NUMBER OF RACKS W/ BATTERIES:	2	
NUMBER OF BATTERIES PER SITE:	32	
MATERIAL: ELECTROLYTE	VOLUME: 1.53 GALLONS	BATTERY TOTAL: 48.96 GALLONS
MATERIAL: ACID WEIGHT	WEIGHT: 2.36 LBS	BATTERY TOTAL: 755.2 LBS
MATERIAL: ACID VOLUME	VOLUME: .59 GALLONS	BATTERY TOTAL: 18.88 GALLONS
MATERIAL: LEAD WEIGHT:	WEIGHT: 118.0 LBS	BATTERY TOTAL: 3,776 LBS

- NOTES:**
1. A SEPARATE PERMIT SHALL BE REQUIRED FROM S.F.F.D. IF BATTERY ELECTROLYTE EXCEEDS 50 GALLONS.

- ▶ BATTERIES ARE ENCLOSED IN A ROOM THAT IS ONLY ACCESSIBLE BY AUTHORIZED PERSONNEL.
- ▶ ACCESS DOOR HAS REQUIRED BATTERY SIGNAGE ON IT.
- ▶ ROOM IS EQUIPPED WITH A FIRE EXTINGUISHER.
- ▶ SPILL PROTECTION IS NOT REQUIRED SINCE BATTERIES ARE VRLA
- ▶ EQUIPMENT ROOM CONTAINS (2) EA. 5-TON HVAC SYSTEMS TO PREVENT THERMAL RUNAWAY PROTECTION FOR BATTERIES AND VENTILATION.



SCALE: AS NOTED 1

PLANS PREPARED FOR:



PLANS PREPARED BY:
INFINIGY ENGINEERING, PLLC

2500 W. HIGGINS RD, SUITE 500
HOFFMAN ESTATES, IL 60169
Office # (847) 648-4068

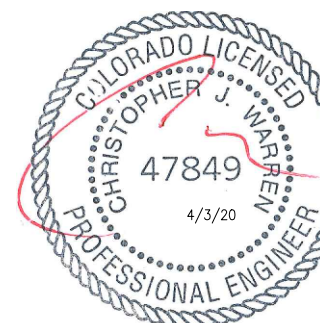
JOB NUMBER: 674-003

PROJECT MANAGER:



10590 W. OCEAN AIR DRIVE, SUITE 300
SAN DIEGO, CA 92130

ENGINEERING LICENSE:



DRAWING NOTICE:

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DESCRIPTION	DATE	BY	REV
ISSUED FOR CONSTRUCTION	04/03/20	CAP	0
REVISED/ISSUED FOR REVIEW	01/21/20	CAP	B
ISSUED FOR REVIEW	07/01/19	CAP	A

AT&T SITE NAME:

CAPITOL HILL

AT&T SITE NUMBER:

COL01220

AT&T FA NUMBER:

10101152

SITE ADDRESS:

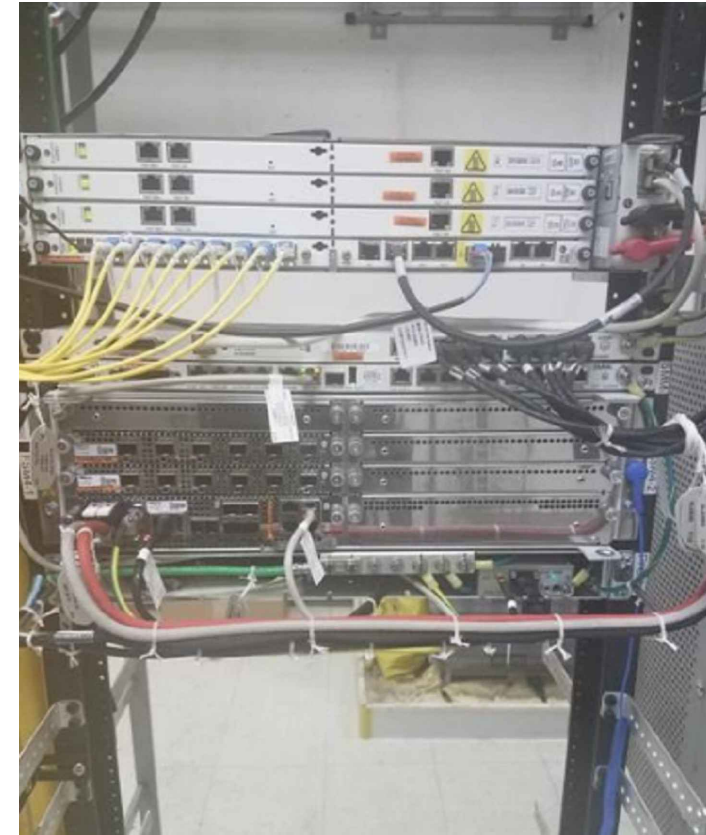
**303 W. COLFAX AVE.
DENVER, CO 80204**

SHEET DESCRIPTION:

**PROPOSED
EQUIPMENT LAYOUT**

SHEET NUMBER:

C-2.1




PLANS PREPARED FOR:


PLANS PREPARED BY:
INFINIGY
 ENGINEERING, PLLC
 2500 W. HIGGINS RD, SUITE 500
 HOFFMAN ESTATES, IL 60169
 Office # (847) 648-4068
 JOB NUMBER: 674-003

PROJECT MANAGER:

 10590 W. OCEAN AIR DRIVE, SUITE 300
 SAN DIEGO, CA 92130

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AT&T FA NUMBER:
10101152

SITE ADDRESS:
**303 W. COLFAX AVE.
 DENVER, CO 80204**

SHEET DESCRIPTION:
EQUIPMENT PHOTOS

SHEET NUMBER:
C-2.2

EQUIPMENT RACK

NO SCALE

1

POWER DISTRIBUTION FRAME

NO SCALE

2

EXISTING RF RACK

NO SCALE

3

NOT USED

NO SCALE

4

NOT USED

NO SCALE

5

NOT USED

NO SCALE

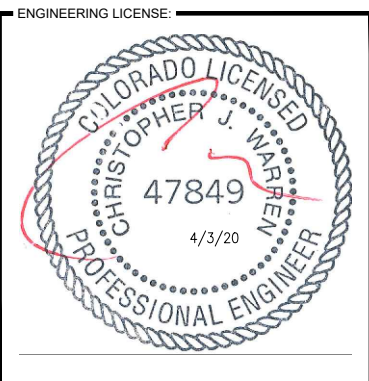
6

NOTES:
 1. ANTENNAS AND EQUIPMENT SHALL BE PAINTED TO MATCH EXISTING BUILDING.
 2. INSTALL (2) ADDITIONAL CONVERTERS WITHIN DCP.



PLANS PREPARED BY:
INFINIGY
 ENGINEERING, PLLC
 2500 W. HIGGINS RD, SUITE 500
 HOFFMAN ESTATES, IL 60169
 Office # (847) 648-4068
 JOB NUMBER: 674-003

PROJECT MANAGER:
mdj
 10590 W. OCEAN AIR DRIVE, SUITE 300
 SAN DIEGO, CA 92130



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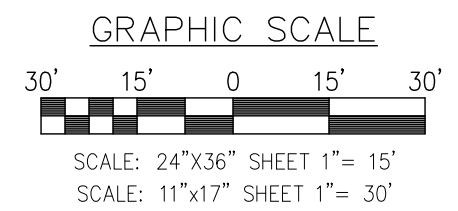
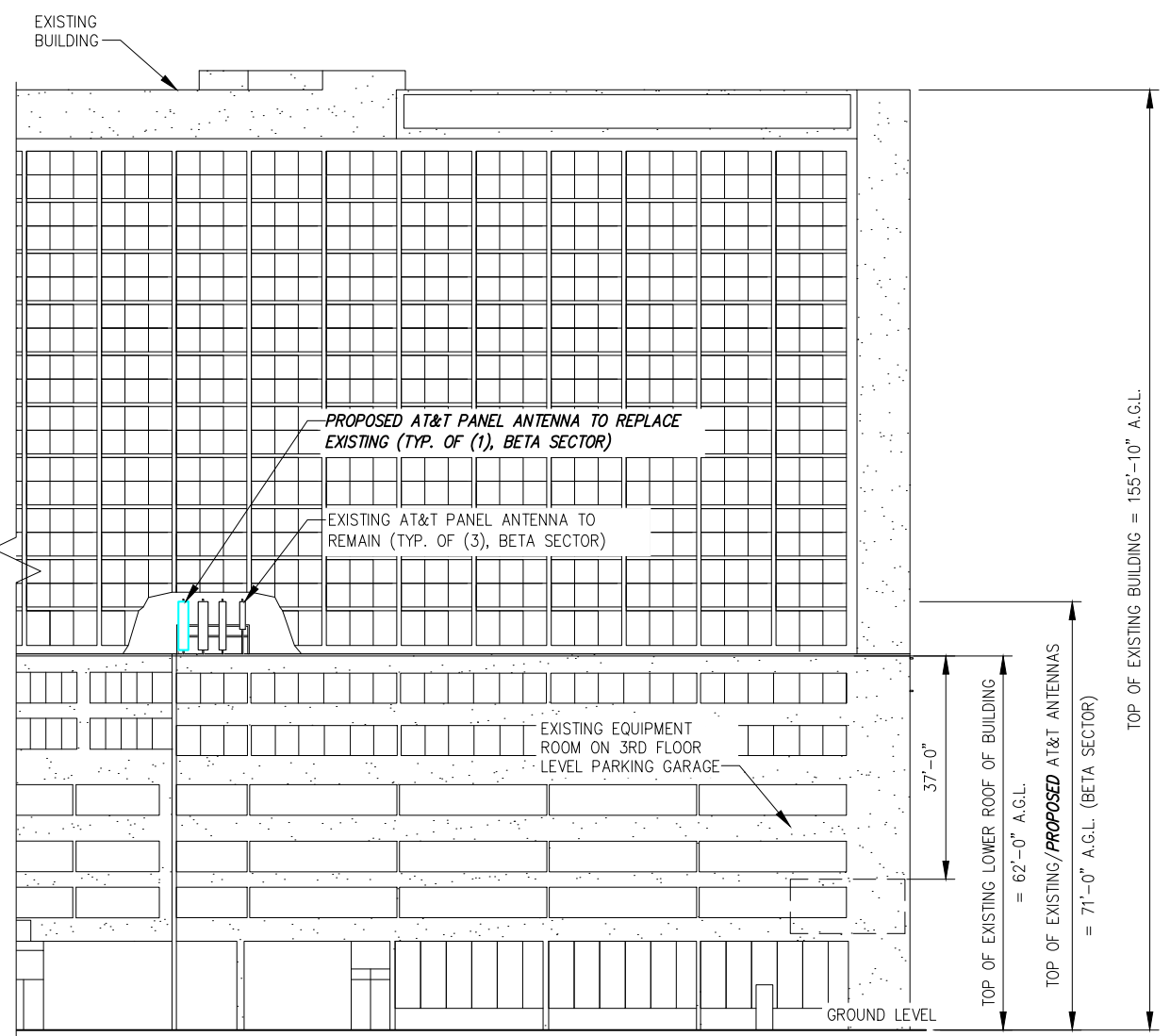
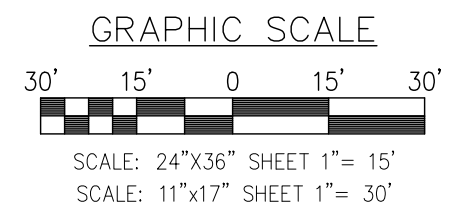
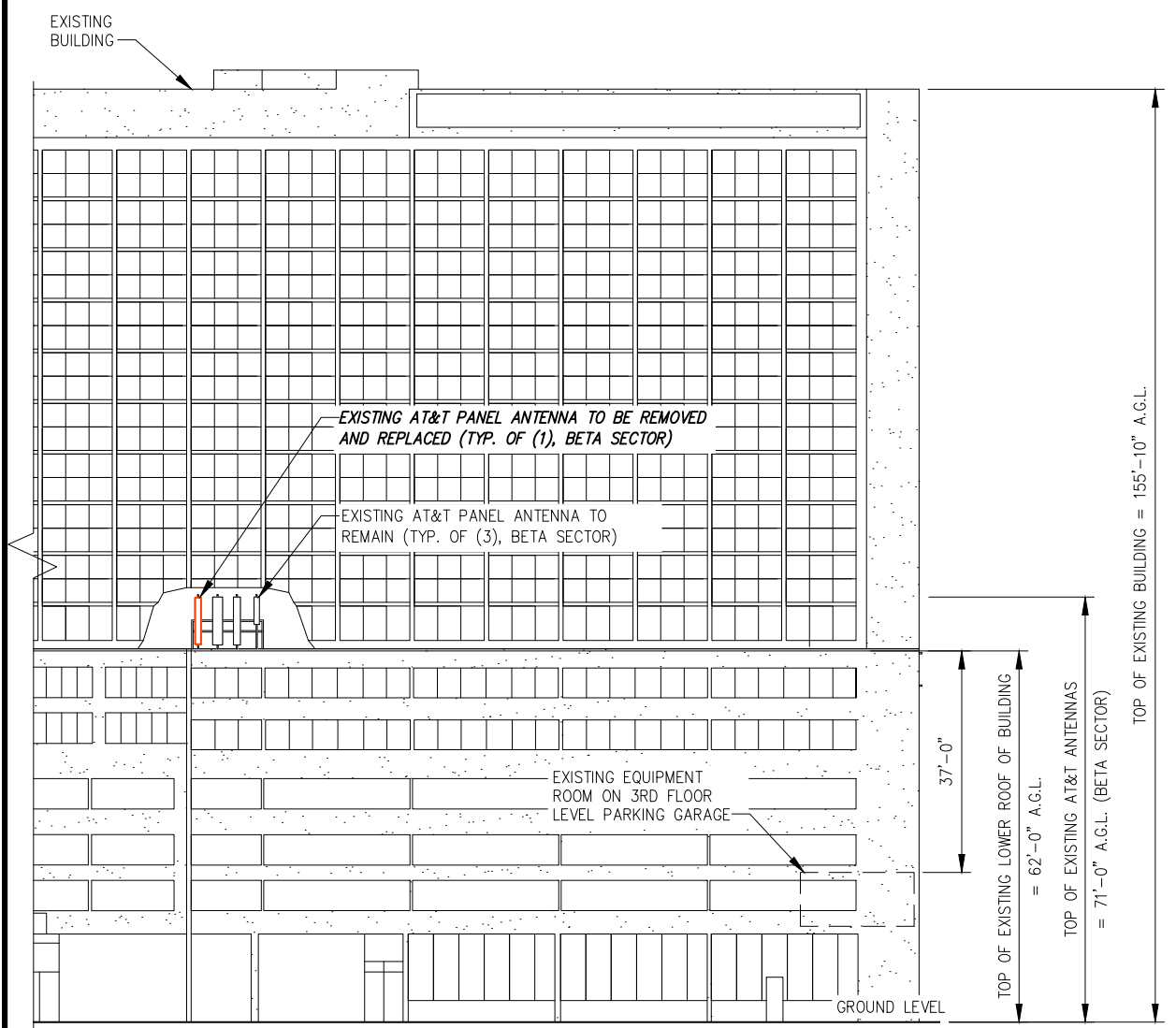
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AT&T FA NUMBER:
10101152

SITE ADDRESS:
**303 W. COLFAX AVE.
 DENVER, CO 80204**

SHEET DESCRIPTION:
SOUTHEAST ELEVATION

SHEET NUMBER:
C-3



EXISTING SOUTHEAST ELEVATION (BETA)

SCALE: AS NOTED 1

PROPOSED SOUTHEAST ELEVATION (BETA)

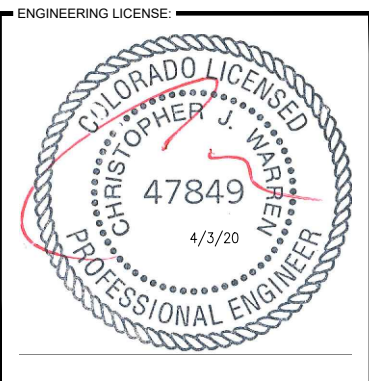
SCALE: AS NOTED 2

NOTES:
 1. ANTENNAS AND EQUIPMENT SHALL BE PAINTED TO MATCH EXISTING BUILDING.
 2. INSTALL (2) ADDITIONAL CONVERTERS WITHIN DCCPP.



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 ENGINEERING, PLLC
 2500 W. HIGGINS RD, SUITE 500
 HOFFMAN ESTATES, IL 60169
 Office # (847) 648-4068
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PROJECT MANAGER:
mdj
 10590 W. OCEAN AIR DRIVE, SUITE 300
 SAN DIEGO, CA 92130



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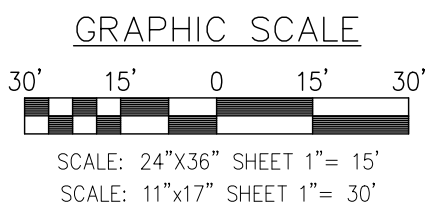
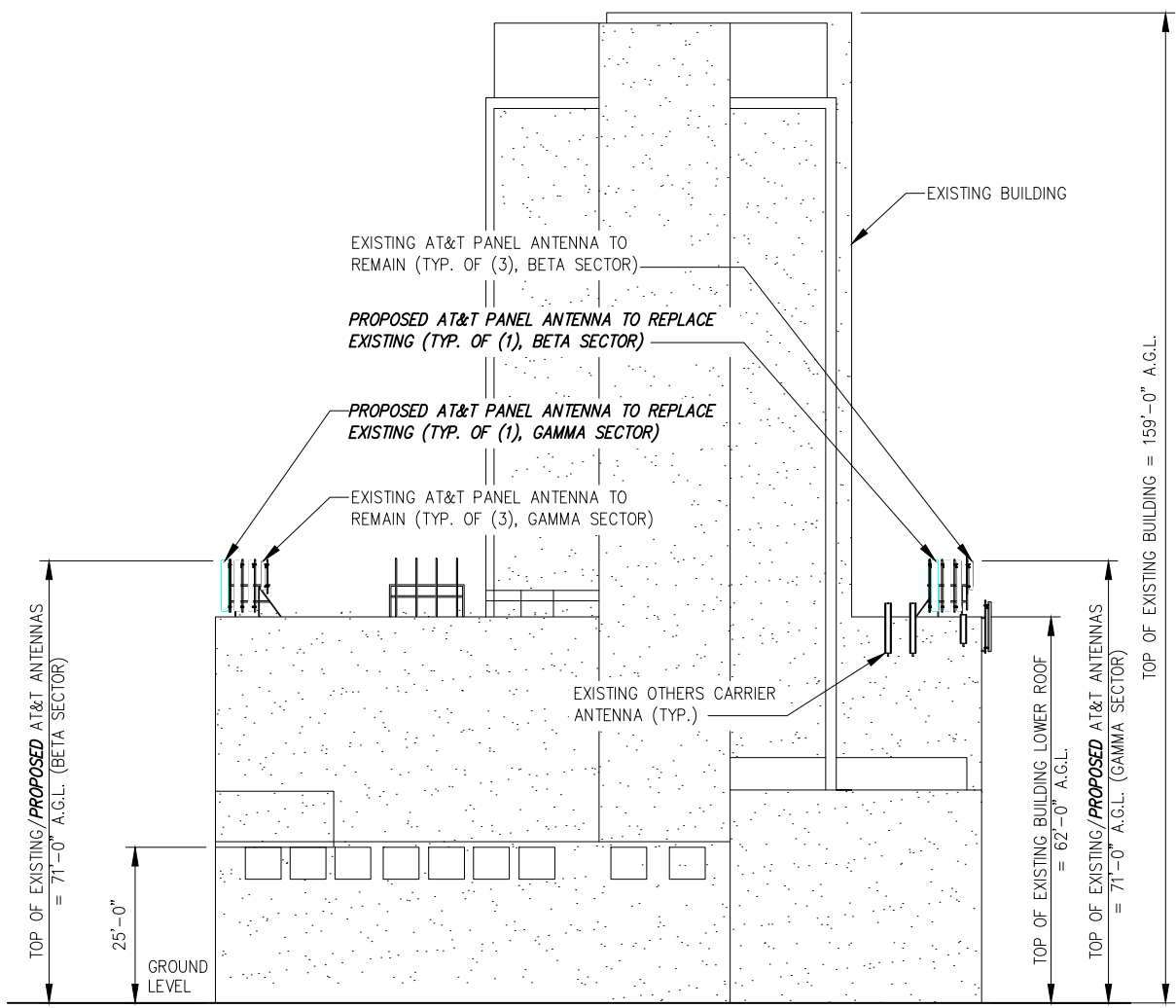
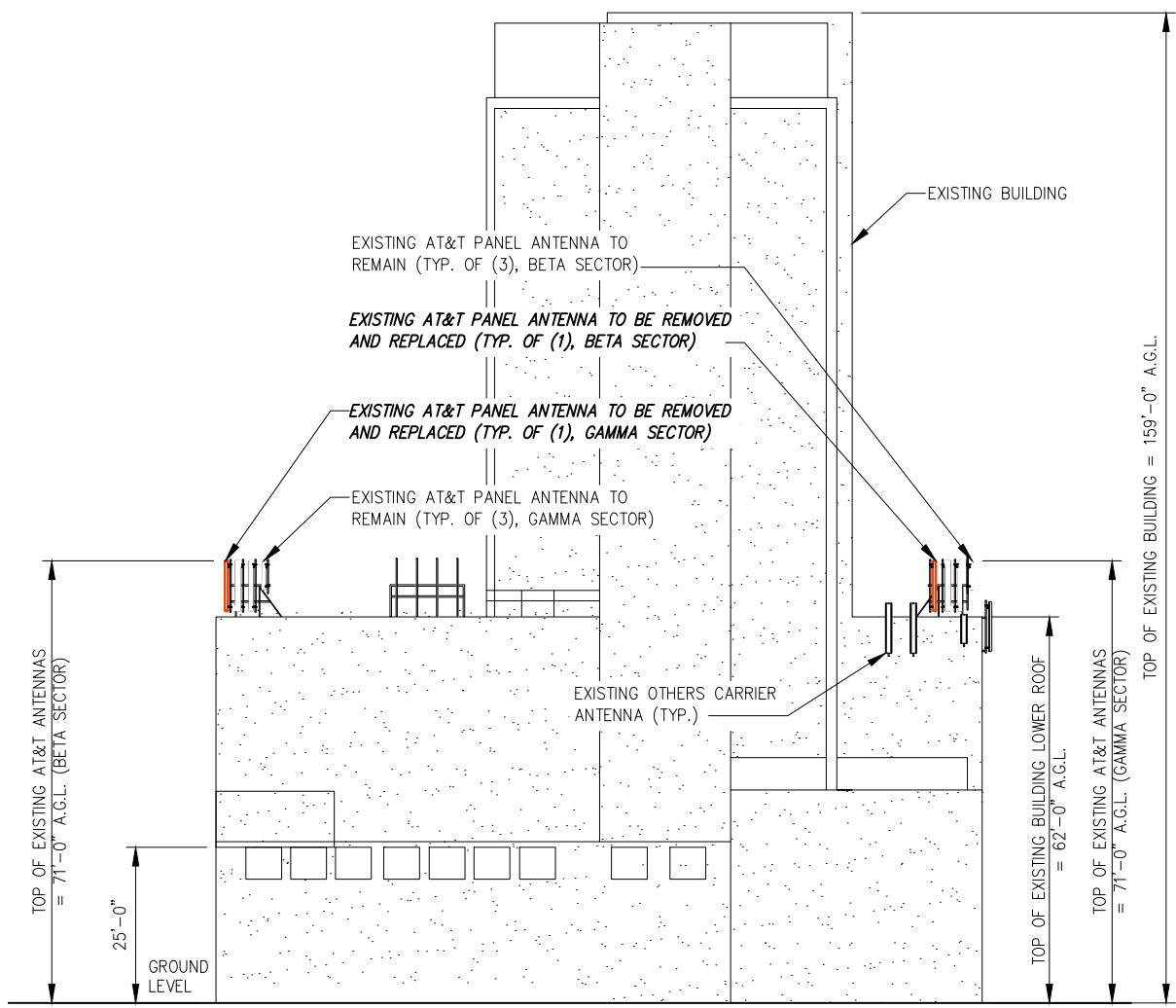
AT&T SITE NUMBER:
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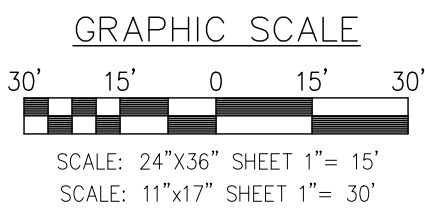
SITE ADDRESS:
**303 W. COLFAX AVE.
 DENVER, CO 80204**

SHEET DESCRIPTION:
SOUTHWEST ELEVATION

SHEET NUMBER:
C-4



INSTALL (23) 16 X 8 X 8 HOLLOW CMU BLOCKS ON FRONT TRAY AND (30) ON BACK TRAY SPACED EVENLY FOR THE BETA AND GAMMA SECTORS. BALLAST FRAMES ASSUMED TO BE VALMONT RTP12-496 PER BLACK AND VEATCH SA DATED JUNE 1, 2017



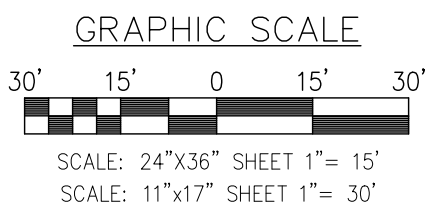
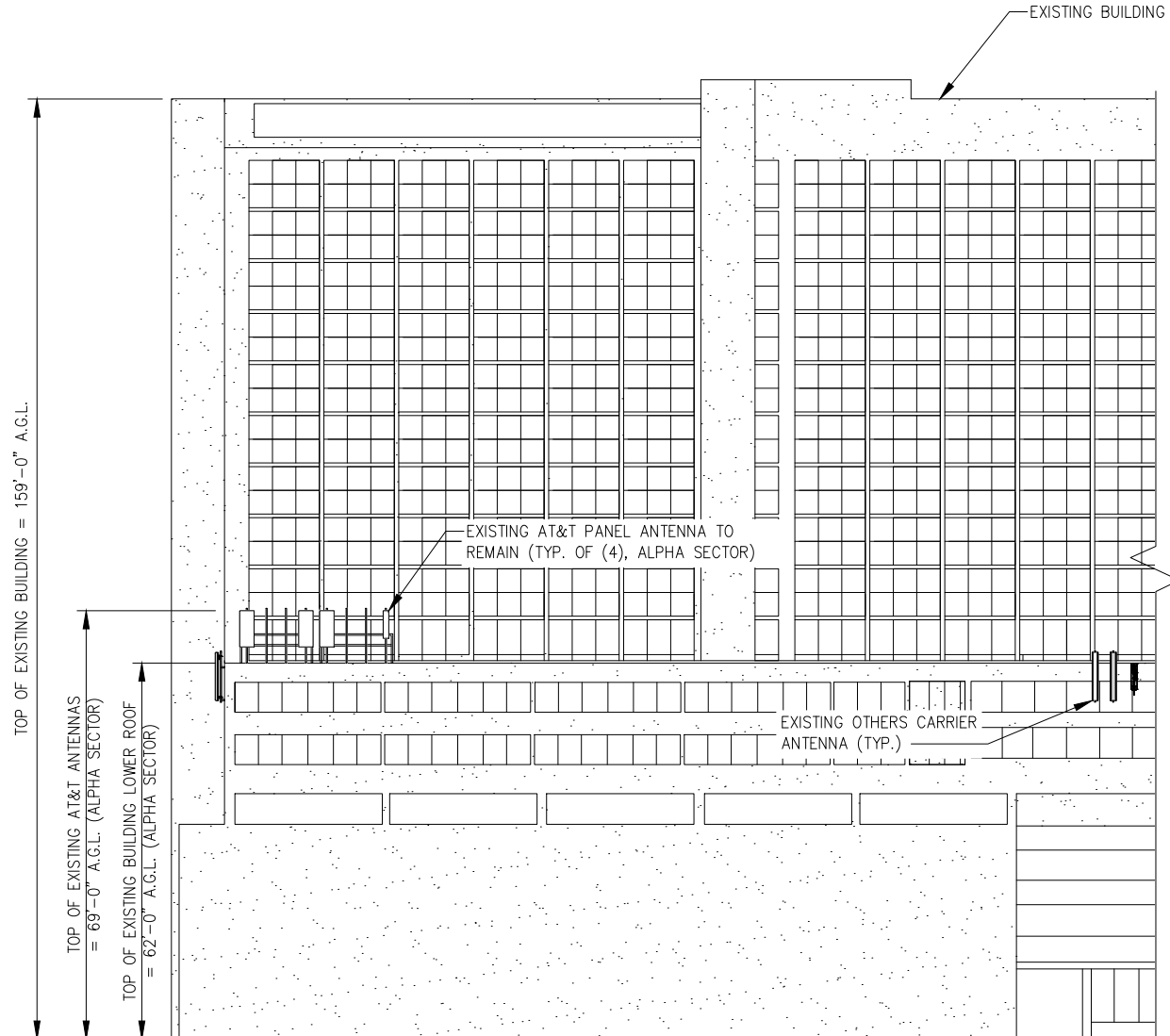
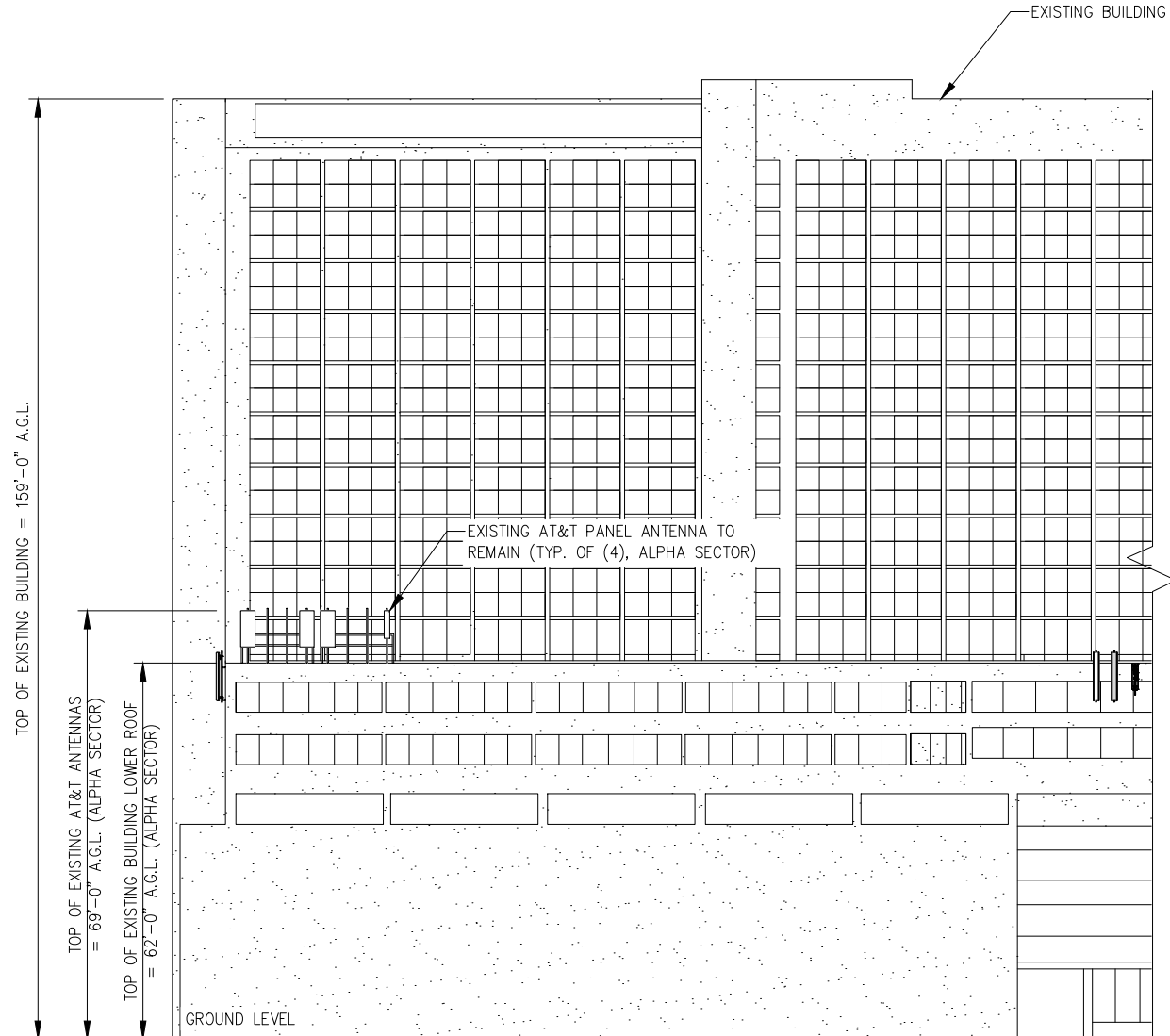
EXISTING SOUTHWEST ELEVATION

SCALE: AS NOTED 1

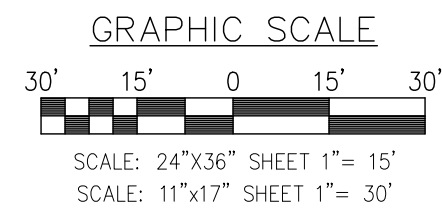
PROPOSED SOUTHWEST ELEVATION

SCALE: AS NOTED 2

NOTES:
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 2. INSTALL (2) ADDITIONAL CONVERTERS WITHIN DCP.



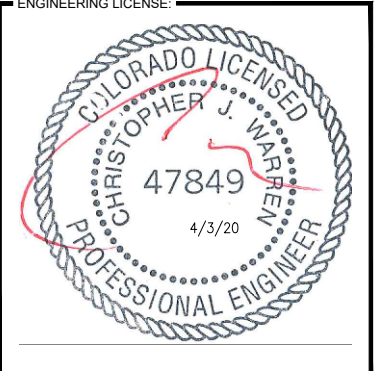
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 Office # (847) 648-4068
 JOB NUMBER: 674-003

PROJECT MANAGER:

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 SAN DIEGO, CA 92130



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AT&T SITE NUMBER:
COL01220

AT&T FA NUMBER:
10101152

SITE ADDRESS:
**303 W. COLFAX AVE.
 DENVER, CO 80204**

SHEET DESCRIPTION:
**NORTHWEST
 ELEVATION**

SHEET NUMBER:
C-5

EXISTING NORTHWEST ELEVATION

SCALE: AS NOTED 2

PROPOSED NORTHWEST ELEVATION

SCALE: AS NOTED 2

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COL01220

AT&T FA NUMBER:

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SITE ADDRESS:

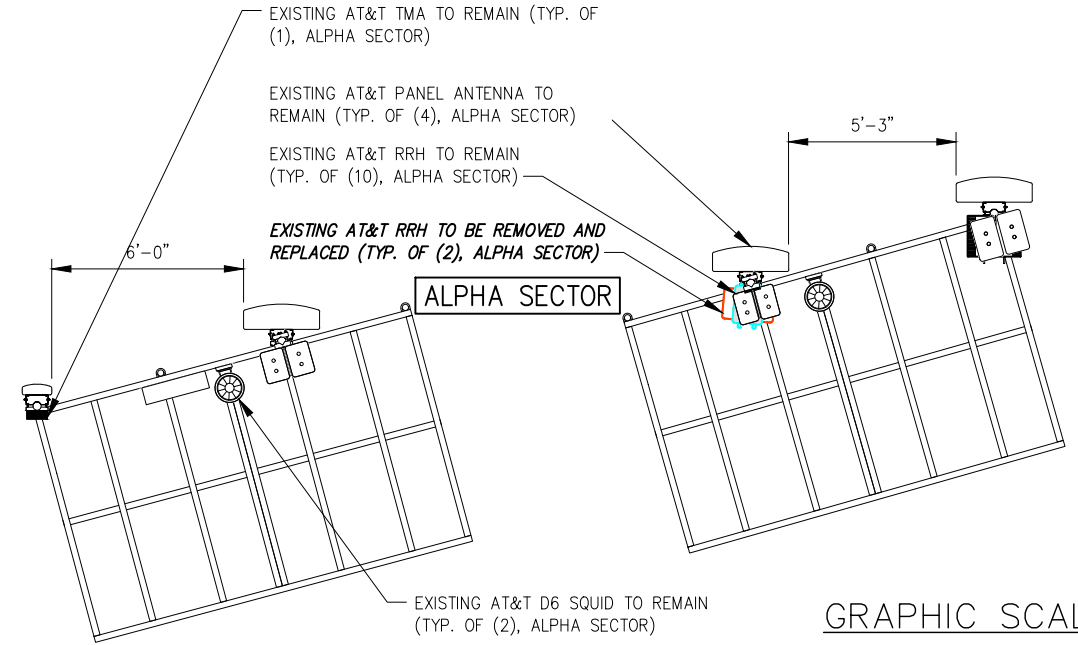
**303 W. COLFAX AVE.
DENVER, CO 80204**

SHEET DESCRIPTION:


ANTENNA LAYOUTS

SHEET NUMBER:

C-6



GRAPHIC SCALE

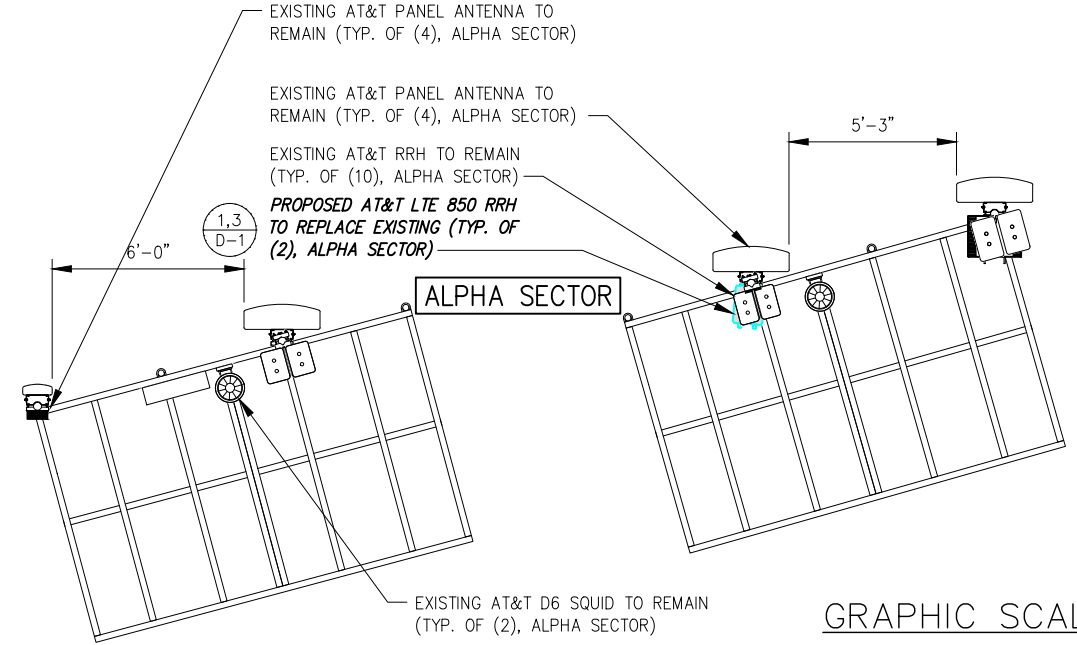


SCALE: 24"X36" SHEET 1"= 3'
SCALE: 11"X17" SHEET 1"= 6'

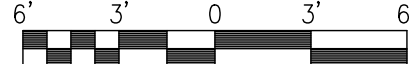
NORTH

EXISTING ANTENNA LAYOUT (ALPHA)

SCALE: AS NOTED 1



GRAPHIC SCALE



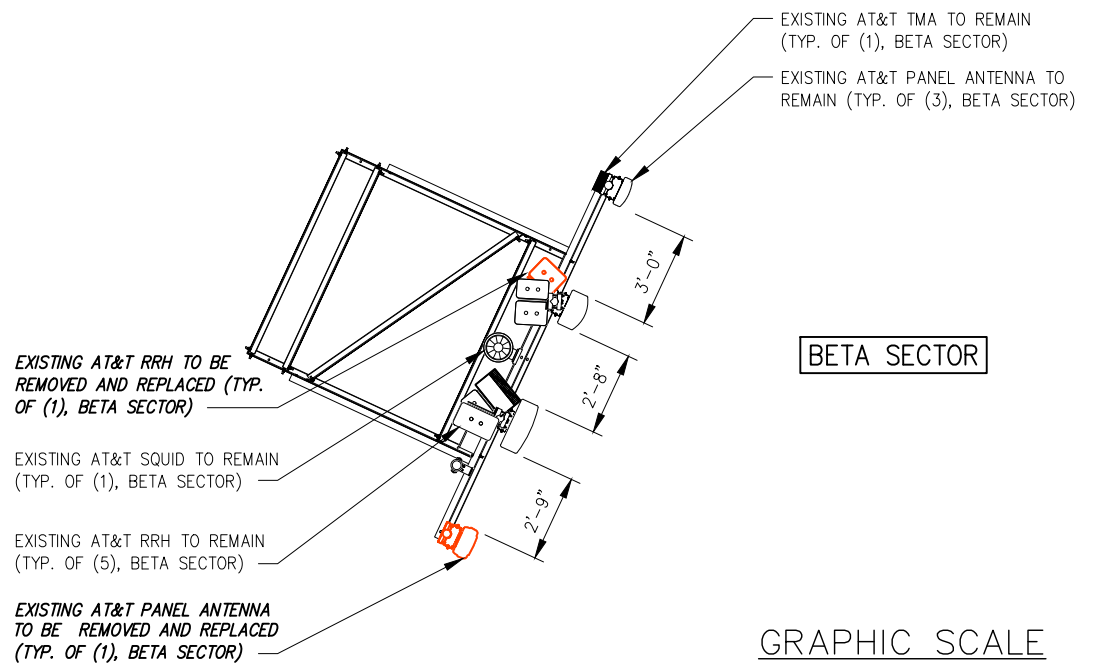
SCALE: 24"X36" SHEET 1"= 3'
SCALE: 11"X17" SHEET 1"= 6'

NORTH


PROPOSED ANTENNA LAYOUT (ALPHA)

SCALE: AS NOTED 2

INSTALL (23) 16 X 8 X 8 HOLLOW CMU BLOCKS ON FRONT TRAY AND (30) ON BACK TRAY SPACED EVENLY FOR THE BETA AND GAMMA SECTORS. BALLAST FRAMES ASSUMED TO BE VALMONT RTP12-496 PER BLACK AND VEATCH SA DATED JUNE 1, 2017



GRAPHIC SCALE

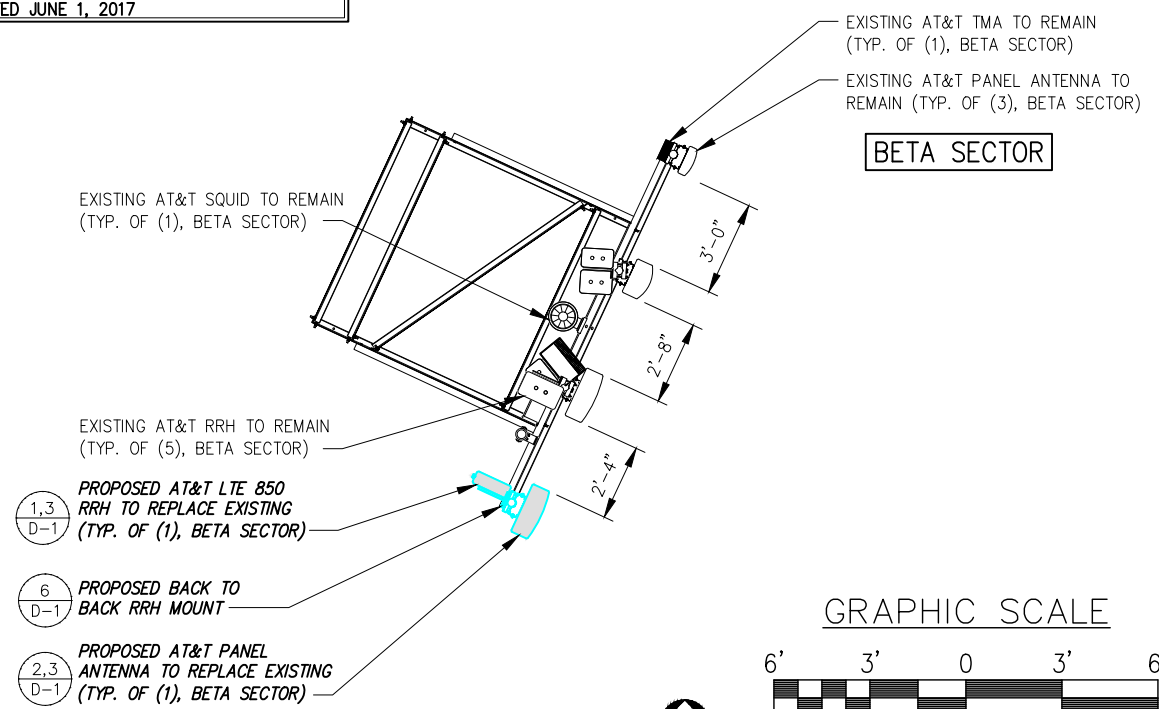


SCALE: 24"X36" SHEET 1"= 3'
SCALE: 11"X17" SHEET 1"= 6'


NORTH

EXISTING ANTENNA LAYOUT (BETA)

SCALE: AS NOTED 3



GRAPHIC SCALE



SCALE: 24"X36" SHEET 1"= 3'
SCALE: 11"X17" SHEET 1"= 6'

NORTH

PROPOSED ANTENNA LAYOUT (BETA)

SCALE: AS NOTED 4

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AT&T SITE NAME:

CAPITOL HILL

AT&T SITE NUMBER:

COL01220

AT&T FA NUMBER:

10101152

SITE ADDRESS:

**303 W. COLFAX AVE.
DENVER, CO 80204**

SHEET DESCRIPTION:

**ANTENNA LAYOUTS
& LOADING CHART**

SHEET NUMBER:

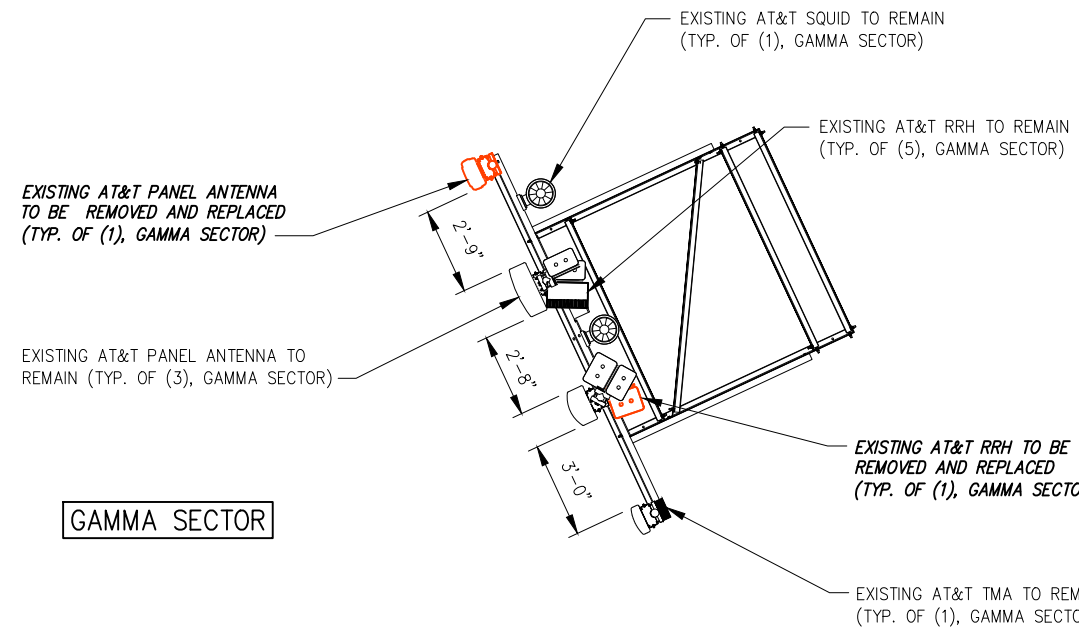
C-7

INSTALL (23) 16 X 8 X 8 HOLLOW CMU BLOCKS ON FRONT TRAY AND (30) ON BACK TRAY SPACED EVENLY FOR THE BETA AND GAMMA SECTORS. BALLAST FRAMES ASSUMED TO BE VALMONT RTP12-496 PER BLACK AND VEATCH SA DATED JUNE 1, 2017

(2,3) D-1 PROPOSED AT&T PANEL ANTENNA TO REPLACE EXISTING (TYP. OF (1), GAMMA SECTOR)

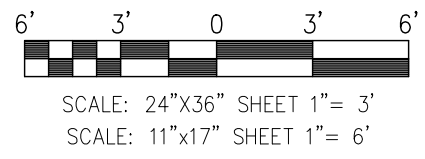
EXISTING AT&T PANEL ANTENNA TO REMAIN (TYP. OF (3), GAMMA SECTOR)

GAMMA SECTOR



GAMMA SECTOR

GRAPHIC SCALE



EXISTING ANTENNA LAYOUT (GAMMA)

SCALE: AS NOTED

1

PROPOSED ANTENNA LAYOUT (GAMMA)

SCALE: AS NOTED

2

ANTENNA SCHEDULE					
SECTOR	POSITION	ANTENNA (VENDOR/TYPE)	TECHNOLOGY	RRH (QTY/TYPE)	TMA/DIPLEXER/SQUID (QTY/TYPE)
ALPHA	1	(E) POWERWAVE 7750	UMTS 850/1900	--	(E) 1/TT19-08BP111-001 (AT ANTENNA) (E) 2/CM1007-DBPXBC-003 (EQUIPMENT ROOM)
ALPHA	2	(E) BSA-M65R-BUU-H6	LTE 700/1900/WCS	(E) 2/B25 RRH4X30-4R (E) 2/RRH4X25-WCS-4R	(E) 1/DC6-48-18-8F (AT ANTENNA) (E) 4/CBC1726-DP-2X (EQUIPMENT ROOM)
ALPHA	3	(E) BSA-M65R-BUU-H6	LTE 700/1900/850, 5G 850	(E) 2/B25 RRH4X30-4R (P) 2/AHCA	(E) 1/DC6-48-18-8F (AT ANTENNA) (P) 2/CBC1726-DP-2X (EQUIPMENT ROOM)
ALPHA	4	(E) BSA-M65R-BUU-H6	LTE 700/AWS/850, 5G 850	(E) 2/AHLBA (E) 2/B66A RRH4X45-4R	(P) 2/CBC1726-DP-2X (EQUIPMENT ROOM)
BETA	1	(E) POWERWAVE 7750	UMTS 850/1900	--	(E) 1/TT19-08BP111-001 (AT ANTENNA) (E) 2/CM1007-DBPXBC-003 (EQUIPMENT ROOM)
BETA	2	(E) RV49X310R-V2	LTE 1900/WCS	(E) 1/B25 RRH4X30-4R (E) 1/RRH4X25-WCS-4R	--
BETA	3	(E) NNH4-65C-R6	LTE 700/1900/AWS	(E) 1/AHLBA (E) 1/B25 RRH4X30-4R (E) 1/B66A RRH4X45-4R	--
BETA	4	(P) NNH4-65C-R6	LTE 850, 5G 850	(P) 1/AHCA	(E) 1/DC6-48-18-8F (AT ANTENNA)
GAMMA	1	(E) POWERWAVE 7750	UMTS 850/1900	--	(E) 1/TT19-08BP111-001 (AT ANTENNA) (E) 2/CM1007-DBPXBC-003 (EQUIPMENT ROOM)
GAMMA	2	(E) RV49X310R-V2	LTE 1900/WCS	(E) 1/B25 RRH4X30-4R (E) 1/RRH4X25-WCS-4R	--
GAMMA	3	(E) NNH4-65C-R6	LTE 700/1900/AWS	(E) 1/AHLBA (E) 1/B25 RRH4X30-4R (E) 1/B66A RRH4X45-4R	--
GAMMA	4	(P) NNH4-65C-R6	LTE 850, 5G 850	(P) 1/AHCA	(E) 1/DC6-48-18-8F (AT ANTENNA)

CABLE INVENTORY			
SECTOR	CABLE TYPE	CABLE AMOUNT	CABLE LENGTH
ALPHA	2	FIBER	±170'
ALPHA	4	DC LINES	±170'
ALPHA	2	AVA7-50A	±170'
BETA	1	FIBER	±190'
BETA	2	DC LINES	±190'
BETA	2	AVA7-50A	±190'
GAMMA	1	FIBER	±220'
GAMMA	2	DC LINES	±220'
GAMMA	2	AVA7-50A	±220'

- NOTES:
- INFORMATION BASED ON PROVIDED RFDS CURRENT AT THE TIME DRAWINGS WERE ISSUED. CONTRACTOR SHALL BASE CONSTRUCTION ON FINAL APPROVED RFDS. IN CASE OF CONFLICT, FINAL APPROVED RFDS SUPERSEDES THIS INFORMATION.
 - SEE RFDS FOR EXISTING AND PROPOSED ANTENNA MODEL/DIMENSIONS/AZIMUTHS/RAD CENTERS/TILTS. CONTRACTOR TO VERIFY REQUIRED CABLE LENGTHS PRIOR TO CONSTRUCTION.
 - CONTRACTOR TO REMOVE UNUSED GSM COAX CABLES AS NECESSARY TO ACCOMMODATE PROPOSED DC & FIBER TRUNKS

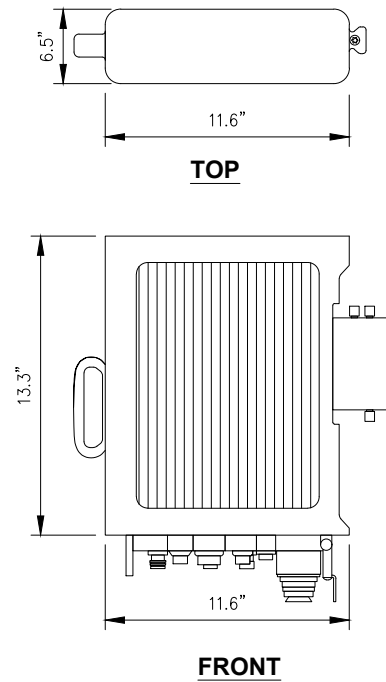
LOADING CHART

NO SCALE

3

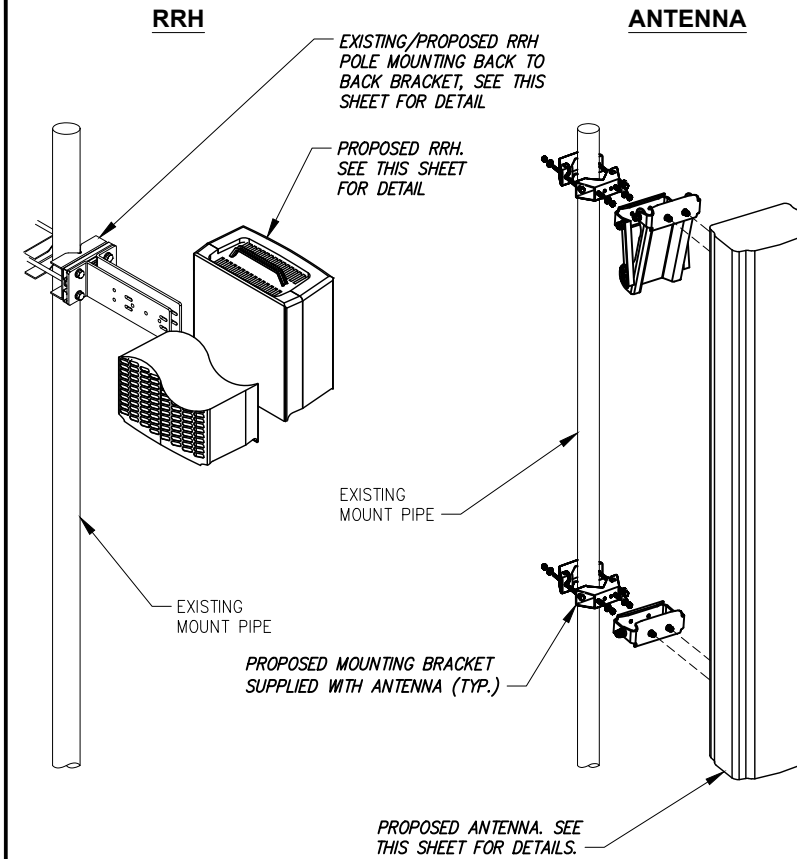
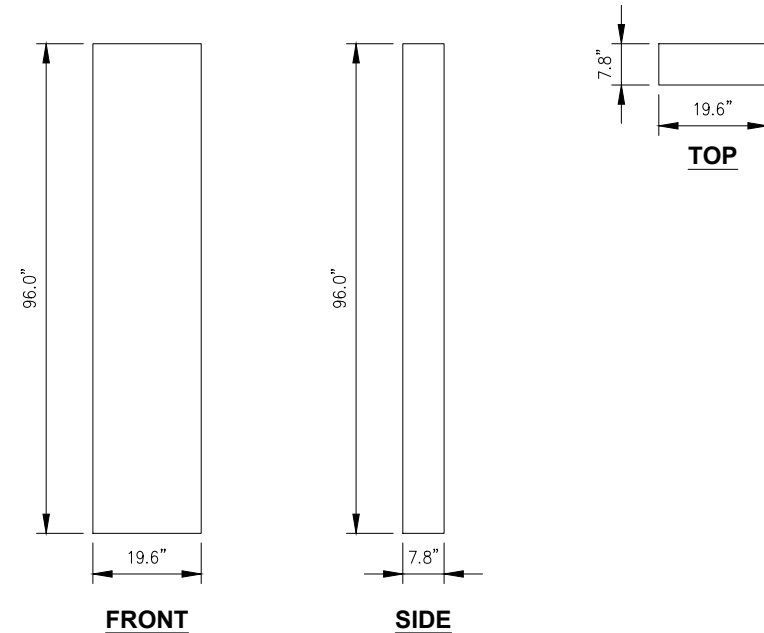
AIRSCALE RADIO MODULE (AHCA)

DIMENSIONS (WxDxH): 11.6"x6.5"x13.3"
 WEIGHT, WITHOUT BRACKETS: 36.8 lbs.



COMMSCOPE PANEL ANTENNA (NNH4-65C-R6)

DIMENSIONS, HxWxD: 96.0"x19.6"x7.8"
 WEIGHT, W/O BRACKETS: 103.2 lbs
 12 PORTS



REMOTE RADIO HEAD SPECIFICATIONS (OR SIMILAR)

NO SCALE

1

PANEL ANTENNA SPECIFICATIONS

NO SCALE

2

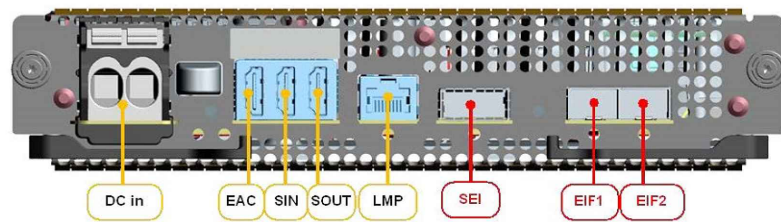
EQUIPMENT MOUNTING DETAIL

NO SCALE

3

NOKIA ASIK UNIT

DIMENSIONS, HxWxD: 1.9"x8.6"x14.8" (UNIT ONLY)
 WEIGHT: 7.1 LBS. (UNIT ONLY)



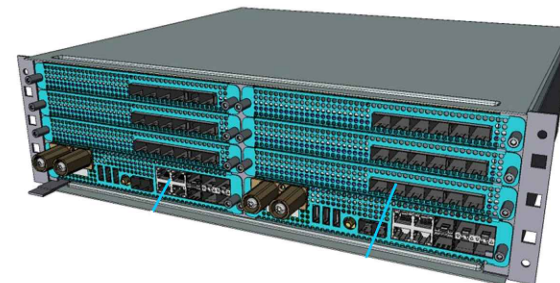
ASIK SPECIFICATIONS

NO SCALE

4

NOKIA FSM4 BBU

DIMENSIONS (WxDxH): 17.6"x15.7"x5.1"



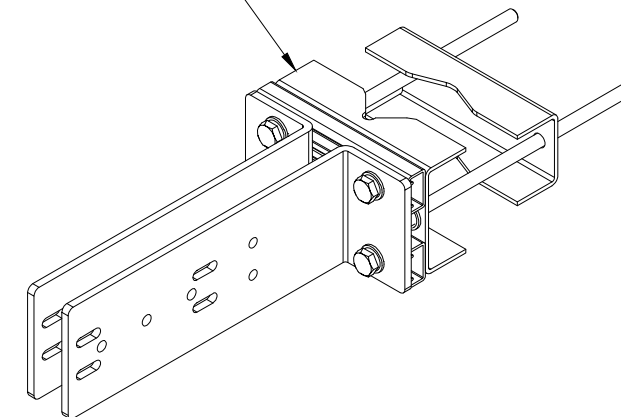
FSM4 BBU SPECIFICATIONS

NO SCALE

5

UNIVERSAL PIPE MOUNT BRACKET FOR 2" TO 5" OD PIPE. FITS UP TO 20 DEGREE TAPERS. FITS 2"-6" ROUND TOWER LEGS AND 2-1/2" - 6" ANGLE TOWER LEGS

SABRE P/N: C10123105 OR APPROVED EQUAL



BACK TO BACK MOUNT DETAIL

NO SCALE

6

PLANS PREPARED FOR:

PLANS PREPARED BY:

INFINIGY
 ENGINEERING, PLLC

2500 W. HIGGINS RD, SUITE 500
 HOFFMAN ESTATES, IL 60169
 Office # (847) 648-4068

JOB NUMBER: 674-003

PROJECT MANAGER:

10590 W. OCEAN AIR DRIVE, SUITE 300
 SAN DIEGO, CA 92130

ENGINEERING LICENSE:

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ISSUED FOR CONSTRUCTION	04/03/20	CAP	0
REVISED/ISSUED FOR REVIEW	01/21/20	CAP	B
ISSUED FOR REVIEW	07/01/19	CAP	A

AT&T SITE NAME:

CAPITOL HILL

AT&T SITE NUMBER:

COL01220

AT&T FA NUMBER:

10101152

SITE ADDRESS:

**303 W. COLFAX AVE.
 DENVER, CO 80204**

SHEET DESCRIPTION:

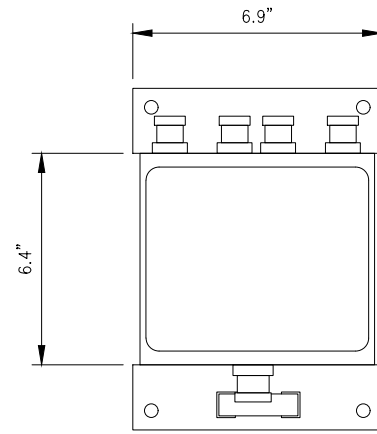
EQUIPMENT DETAILS

SHEET NUMBER:

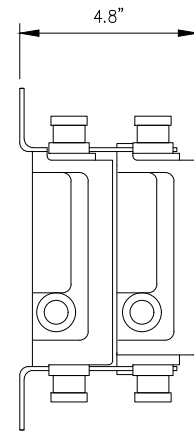
D-1

COMMSCOPE CBC78T-DS-43-2X

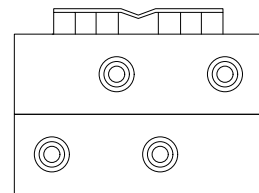
DIMENSIONS, HxWxD: 6.4"x6.9"x4.8"
 WEIGHT: 10.4 LBS



FRONT



SIDE



TOP

RECTIFIER SPECIFICATIONS NOT AVAILABLE
 UPON ISSUANCE OF THESE PLANS

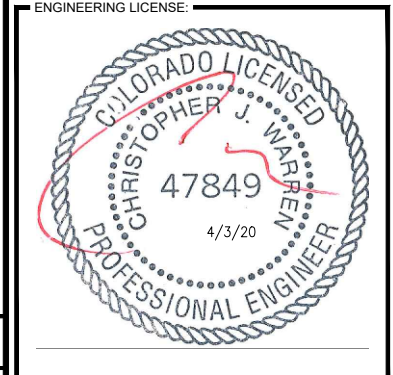
CONVERTER SPECIFICATIONS NOT AVAILABLE
 UPON ISSUANCE OF THESE PLANS



PLANS PREPARED BY:
INFINIGY
 ENGINEERING, PLLC
 2500 W. HIGGINS RD, SUITE 500
 HOFFMAN ESTATES, IL 60169
 Office # (847) 648-4068
 JOB NUMBER: 674-003

PROJECT MANAGER:

 10590 W. OCEAN AIR DRIVE, SUITE 300
 SAN DIEGO, CA 92130



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AT&T FA NUMBER:
10101152

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 DENVER, CO 80204**

SHEET DESCRIPTION:
EQUIPMENT DETAILS

SHEET NUMBER:
D-2

DIPLEXERS SPECIFICATION

NO SCALE

1

RECTIFIER & CONVERTER SPECIFICATIONS

NO SCALE

2

NOT USED

NO SCALE

3

NOT USED

NO SCALE

4

- NOTE:**
- DC POWER WIRING SHALL BE COLOR CODED AT EACH END FOR IDENTIFYING +24V AND -48V CONDUCTORS. RED MARKINGS SHALL IDENTIFY +24V AND BLUE MARKINGS SHALL IDENTIFY -48V. REFER TO ATT-002-290-701.
 - NON-LTE DC POWER WIRING SIZE 14AWG TO 10AWG SHALL BE TELCOFLEX III. DC POWER WIRING 8AWG AND LARGER SHALL BE TELCOFLEX IV.
 - LTE POWER WIRING SHALL BE IN ACCORDANCE WITH ATT-002-290-531.
 - DC ELECTRICAL LOAD DEMAND FOR PROPOSED ADDITIONS WERE INCLUDED IN PRIOR AC LOAD CALCULATIONS.
 - ALL UPGRADES TO EXISTING SERVICE IS RESPONSIBILITY OF THE OWNER.



PLANS PREPARED BY:

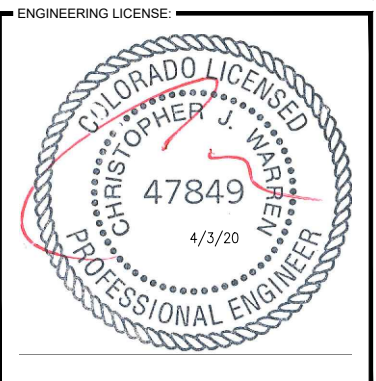
INFINIGY
ENGINEERING, PLLC

2500 W. HIGGINS RD, SUITE 500
HOFFMAN ESTATES, IL 60169
Office # (847) 648-4068

JOB NUMBER: 674-003

PROJECT MANAGER:

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SAN DIEGO, CA 92130



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AT&T SITE NUMBER:

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AT&T FA NUMBER:

10101152

SITE ADDRESS:

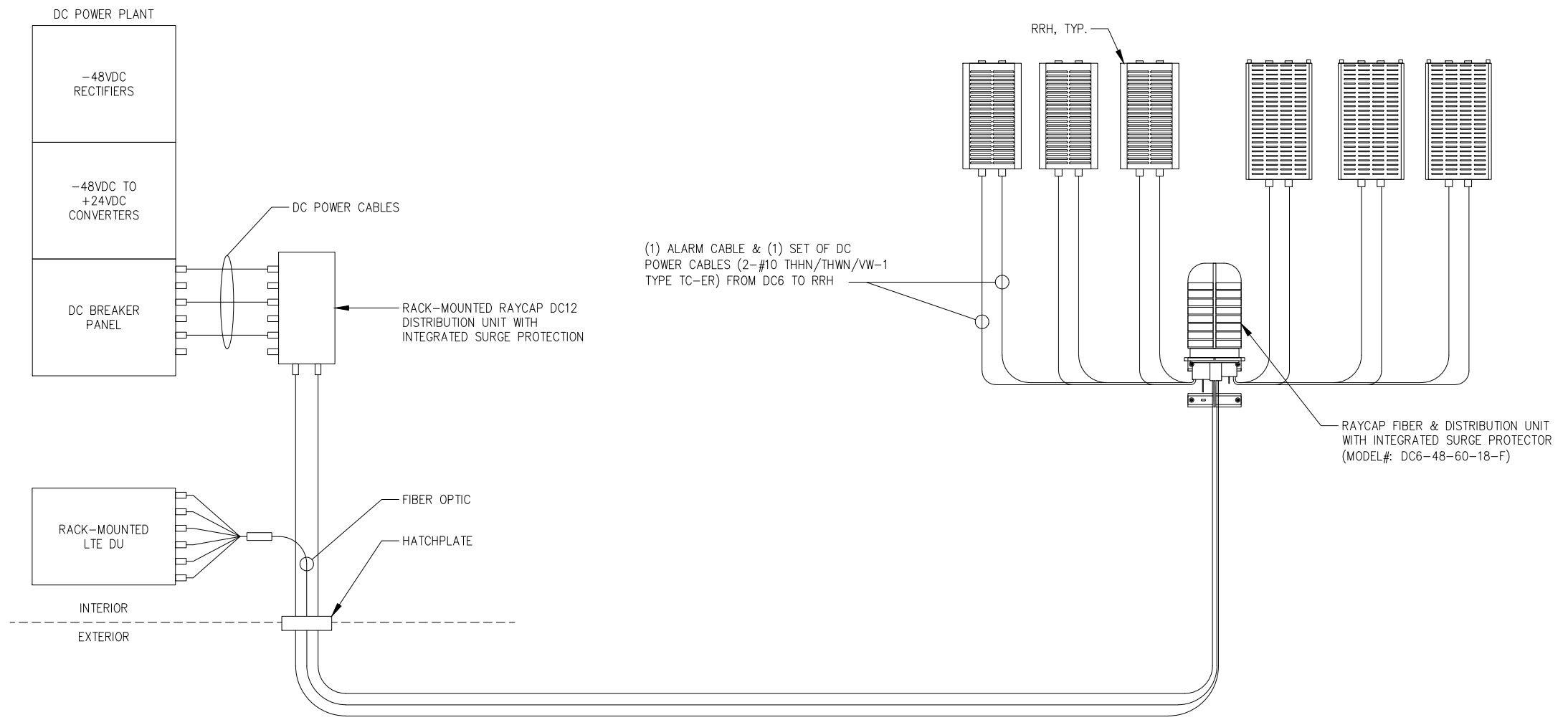
**303 W. COLFAX AVE.
DENVER, CO 80204**

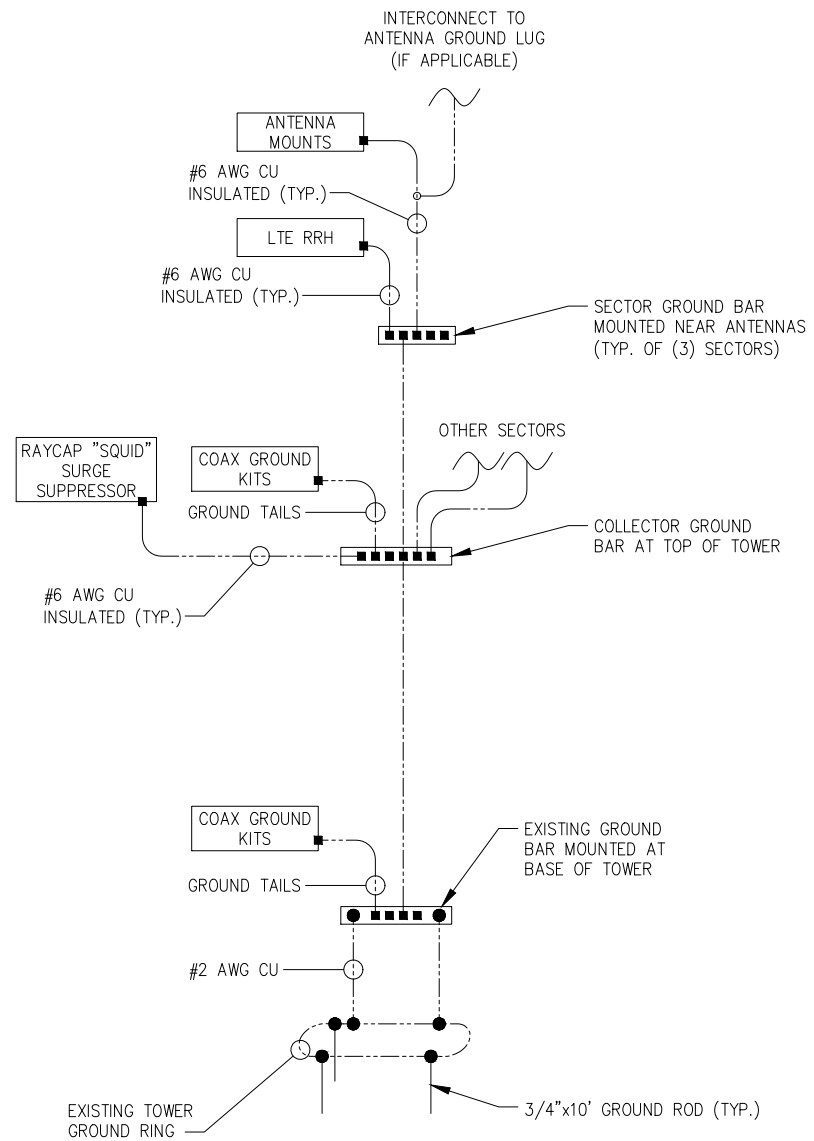
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**DC SCHEMATIC
DIAGRAM**

SHEET NUMBER:

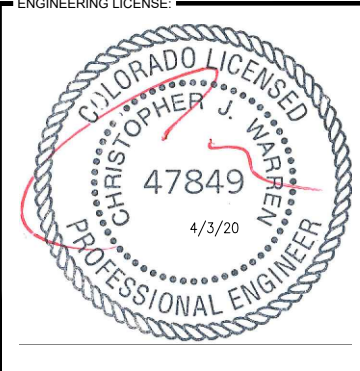
E-1





LEGEND:

- EXOTHERMIC
- COMPRESSION TYPE CONNECTIONS
- GROUNDING CONDUCTOR



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CAPITOL HILL

AT&T SITE NUMBER:

COL01220

AT&T FA NUMBER:

10101152

SITE ADDRESS:

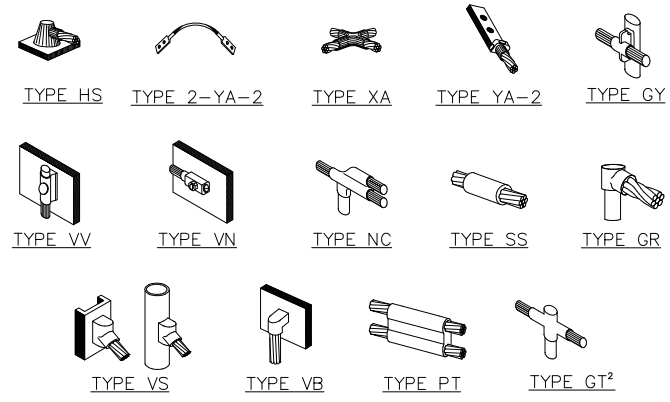
**303 W. COLFAX AVE.
DENVER, CO 80204**

SHEET DESCRIPTION:

**GROUNDING SCHEMATIC
DIAGRAM**

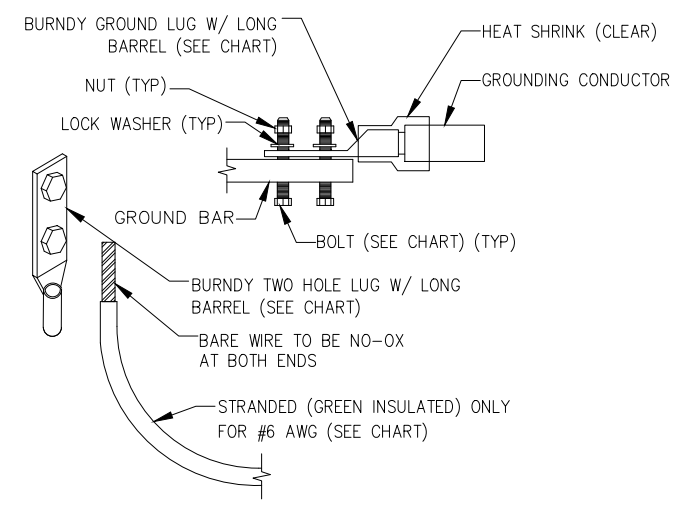
SHEET NUMBER:

G-1



NOTE:
 1. ERICO EXOTHERMIC "MOLD TYPES" SHOWN HERE ARE EXAMPLES. CONSULT WITH CONSTRUCTION MANAGER FOR SPECIFIC MOLDS TO BE USED FOR THIS PROJECT.
 2. MOLD TYPE ONLY TO BE USED BELOW GRADE WHEN CONNECTING GROUND RING TO GROUND ROD.

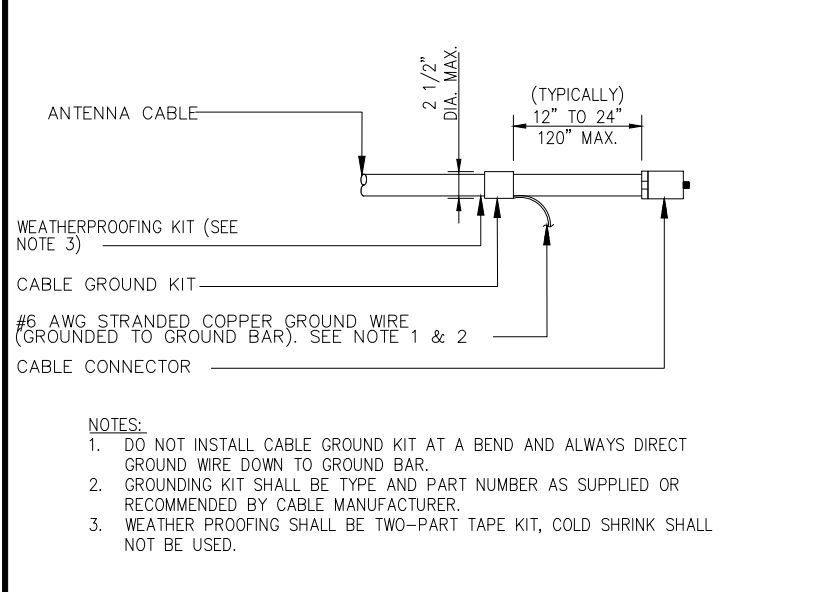
WIRE SIZE	BURNDY LUG	BOLT SIZE
#6 AWG GREEN INSULATED YA6C-2TC38	3/8" - 16 NC S 2 BOLT	
#2 AWG SOLID TINNED YA3C-2TC38	3/8" - 16 NC S 2 BOLT	
#2 AWG STRANDED YA2C-2TC38	3/8" - 16 NC S 2 BOLT	
#2/0 AWG STRANDED YA26-2TC38	3/8" - 16 NC S 2 BOLT	
#4/0 AWG STRANDED YA28-2N	1/2" - 16 NC S 2 BOLT	



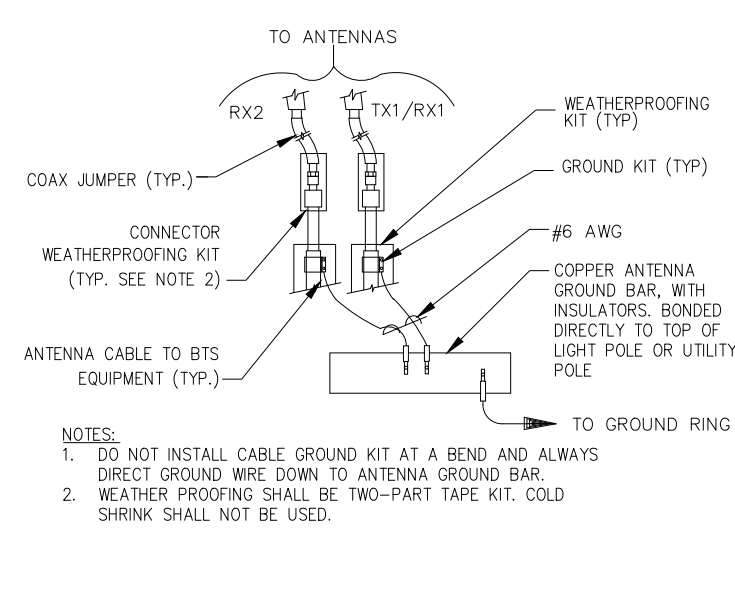
NOTES:
 1. ALL GROUND LUGS ARE TO BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. ALL HARDWARE BOLTS, NUTS, LOCK WASHERS SHALL BE STAINLESS STEEL. ALL HARDWARE ARE TO BE AS FOLLOWS: BOLT, FLAT WASHER, GROUND BAR, GROUND LUG, FLAT WASHER AND NUT.

EXOTHERMIC WELD GROUNDING CONNECTIONS

NO SCALE 1



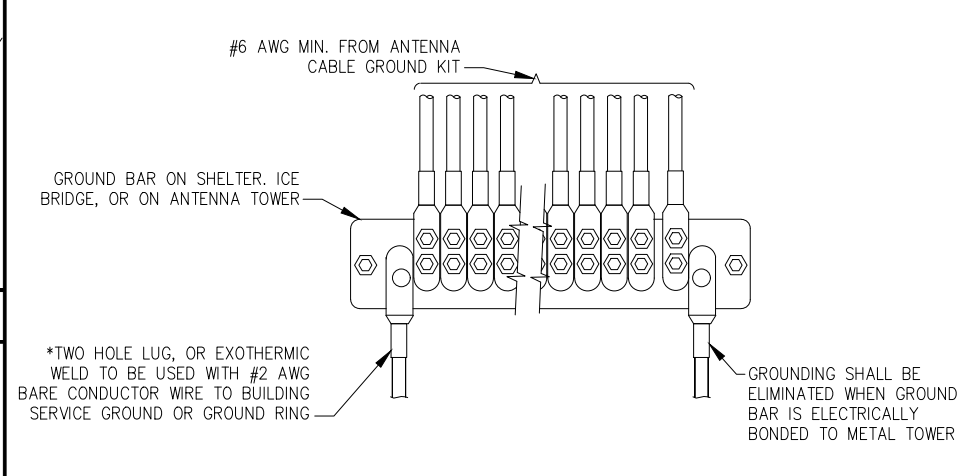
NOTES:
 1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
 2. GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
 3. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT, COLD SHRINK SHALL NOT BE USED.



NOTES:
 1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO ANTENNA GROUND BAR.
 2. WEATHER PROOFING SHALL BE TWO-PART TAPE KIT. COLD SHRINK SHALL NOT BE USED.

MECHANICAL LUG CONNECTION

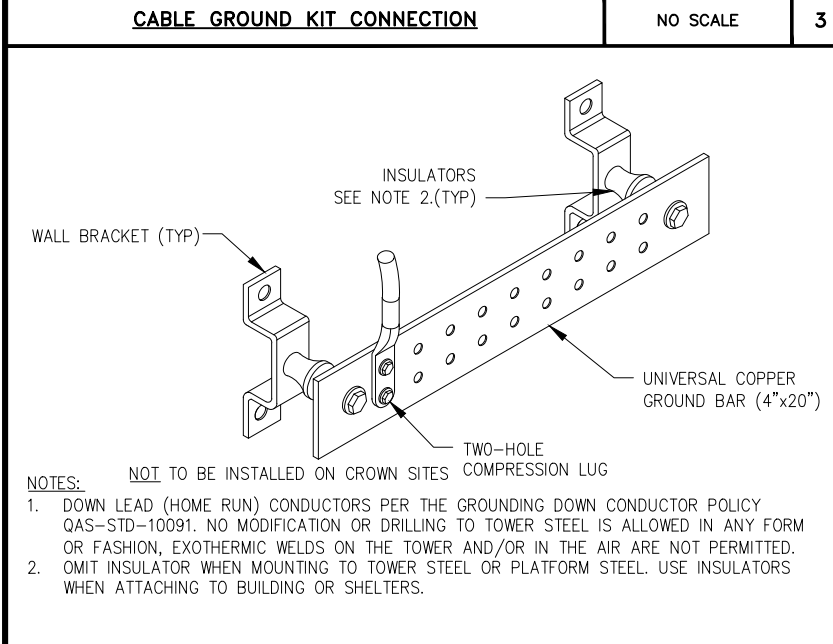
NO SCALE 2



*TWO HOLE LUG, OR EXOTHERMIC WELD TO BE USED WITH #2 AWG BARE CONDUCTOR WIRE TO BUILDING SERVICE GROUND OR GROUND RING

GROUND WIRE INSTALLATION

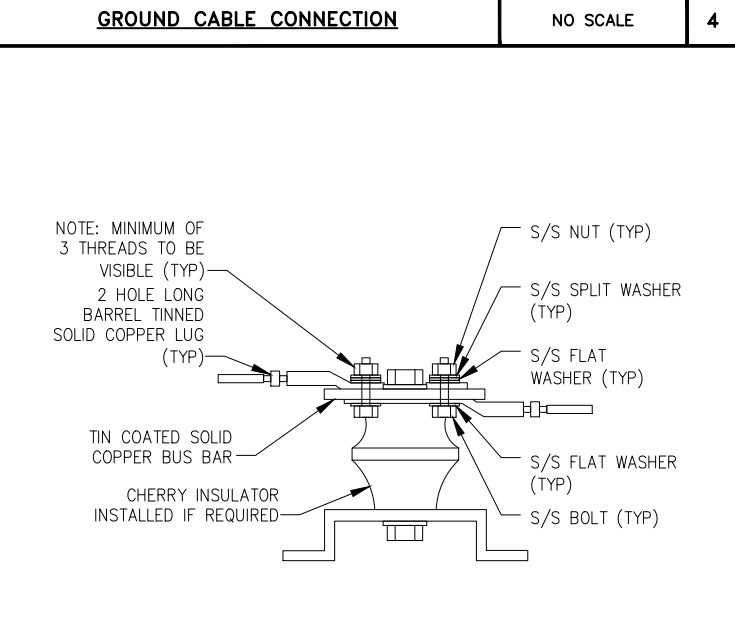
NO SCALE 5



NOTES:
 NOT TO BE INSTALLED ON CROWN SITES
 TWO-HOLE COMPRESSION LUG
 1. DOWN LEAD (HOME RUN) CONDUCTORS PER THE GROUNDING DOWN CONDUCTOR POLICY QAS-STD-10091. NO MODIFICATION OR DRILLING TO TOWER STEEL IS ALLOWED IN ANY FORM OR FASHION, EXOTHERMIC WELDS ON THE TOWER AND/OR IN THE AIR ARE NOT PERMITTED.
 2. OMIT INSULATOR WHEN MOUNTING TO TOWER STEEL OR PLATFORM STEEL. USE INSULATORS WHEN ATTACHING TO BUILDING OR SHELTERS.

GROUND BAR DETAIL

NO SCALE 6



LUG DETAIL

NO SCALE 7

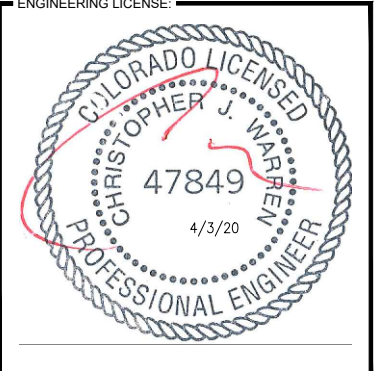
NOT USED

NO SCALE 8



PLANS PREPARED BY:
INFINIGY ENGINEERING, PLLC
 2500 W. HIGGINS RD, SUITE 500
 HOFFMAN ESTATES, IL 60169
 Office # (847) 648-4068
 JOB NUMBER: 674-003

PROJECT MANAGER:
mdj
 10590 W. OCEAN AIR DRIVE, SUITE 300
 SAN DIEGO, CA 92130



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AT&T SITE NAME:
CAPITOL HILL

AT&T SITE NUMBER:
COL01220

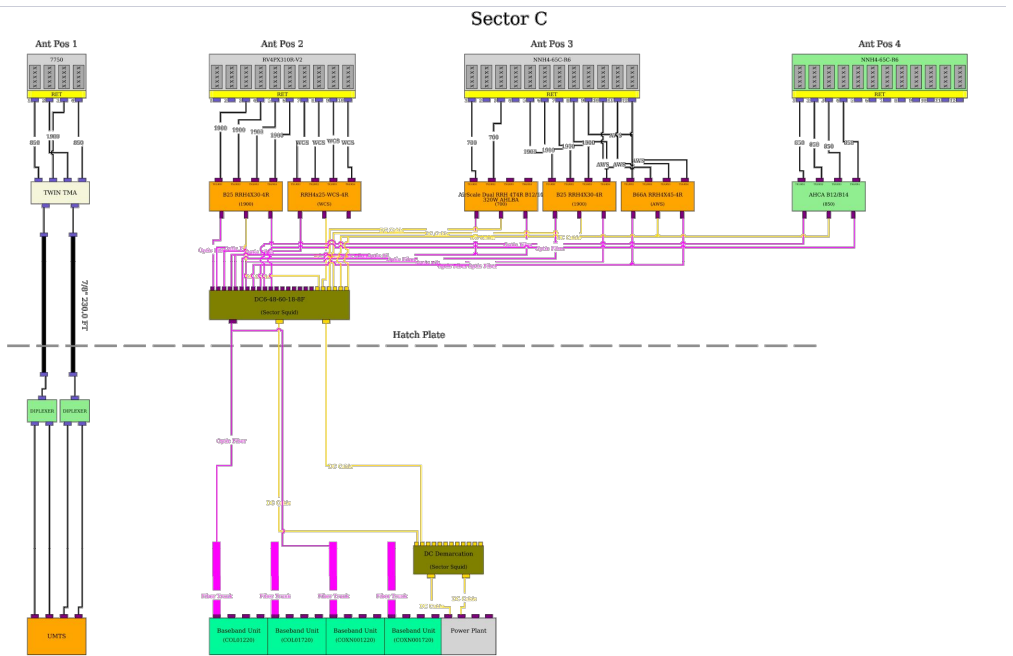
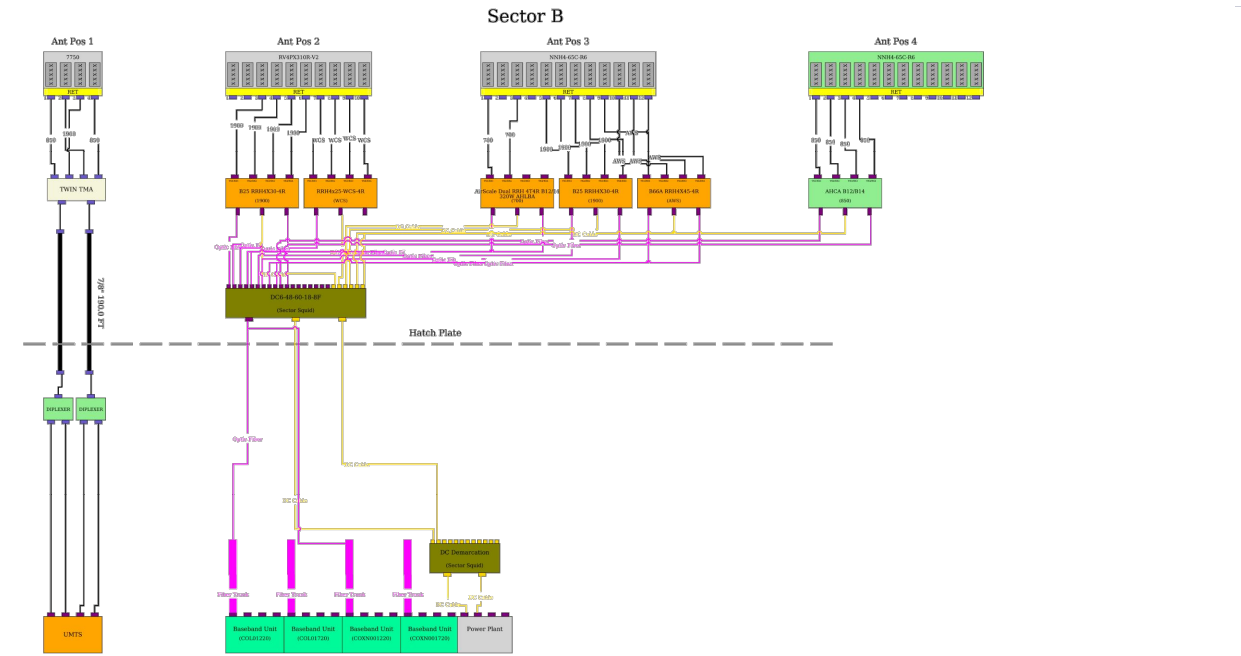
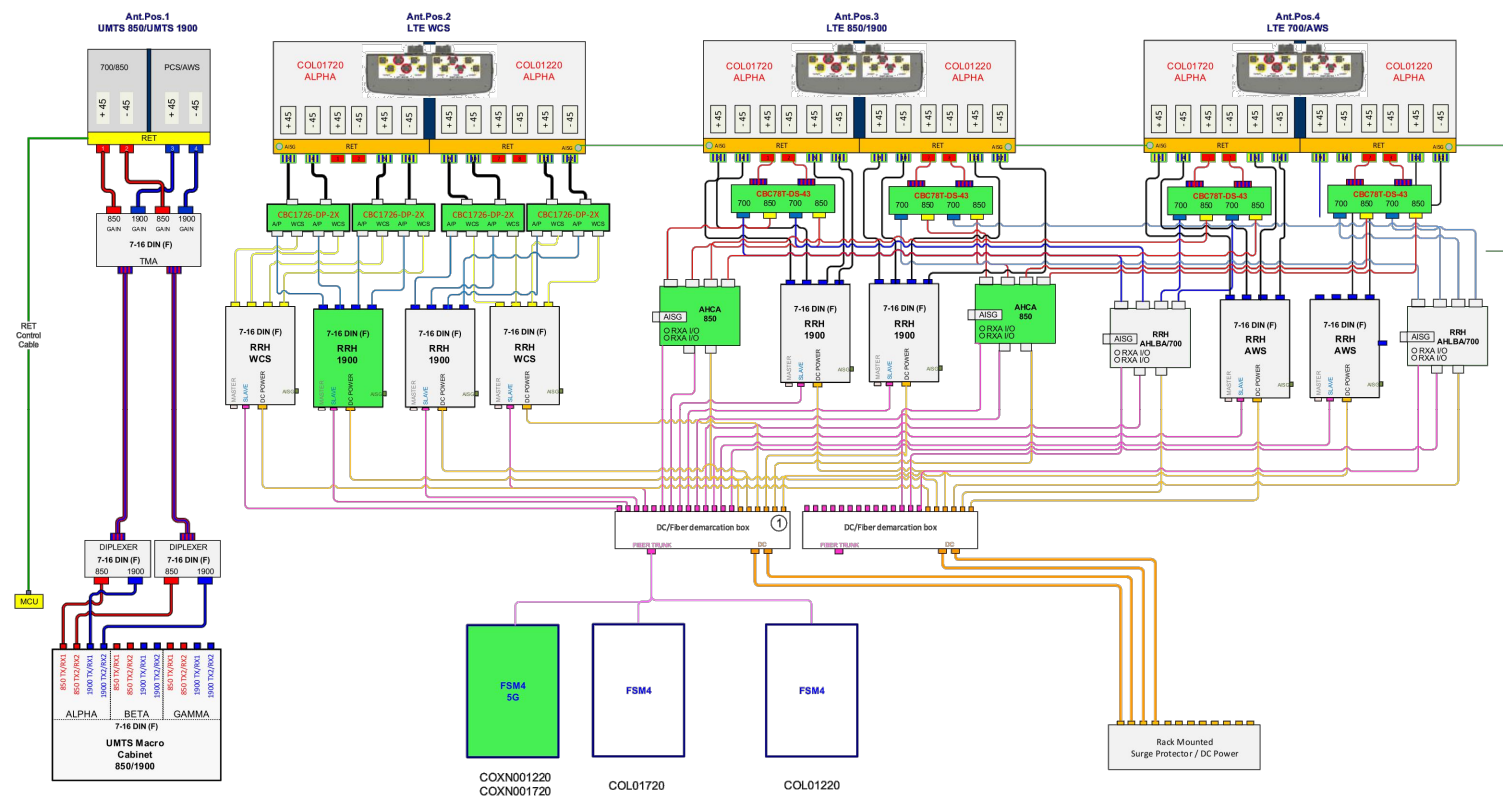
AT&T FA NUMBER:
10101152

SITE ADDRESS:
**303 W. COLFAX AVE.
 DENVER, CO 80204**

SHEET DESCRIPTION:
GROUNDING DETAILS

SHEET NUMBER:
G-2

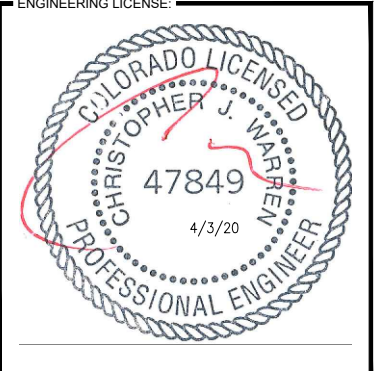
- ALPHA FACE SPLIT – COL01720 Alpha and COL01220 Alpha
- Pos 1: UMTS antenna remains
- Pos 2: No change.
- Pos 3: Add 700/850 diplexers. Swap 850 RRHs with AHCA for 5GNR.
- Pos 4: Add 700/850 diplexers. Reconnect 700 4T4R through the diplexers.



PLANS PREPARED BY:
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 ENGINEERING, PLLC
 2500 W. HIGGINS RD, SUITE 500
 HOFFMAN ESTATES, IL 60169
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PROJECT MANAGER:

 10590 W. OCEAN AIR DRIVE, SUITE 300
 SAN DIEGO, CA 92130



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AT&T SITE NUMBER:
COL01220

AT&T FA NUMBER:
10101152

SITE ADDRESS:
**303 W. COLFAX AVE.
 DENVER, CO 80204**

SHEET DESCRIPTION:
PLUMBING DIAGRAM

SHEET NUMBER:
RF-1

INFINIGY

FROM ZERO TO INFINIGY
the solutions are endless

1033 WATERVLIIET SHAKER RD, ALBANY, NY 12205

October 21, 2019

Hailee Perucci

MD7, LLC
10590 West Ocean Air Dr., Suite 300
San Diego, CA 92130

AT&T Rooftop Mount

Site Number:	COL01220
AT&T Site Name:	CAPITOL HILL
FA Site Number:	10101152
PACE ID:	MRUTH034369
Infinigy Job Number:	4078-A0001-B
Site Address:	303 West Colfax Ave., Denver, CO 80204
Building Code:	2015 IBC
Design Standard:	ANSI/TIA-222-G / ASCE 7-10
Result:	Contingent Pass
Notes:	Install 16 x 8 x 8 hollow CMU blocks of quantity 23 on front tray and 30 on back tray spaced evenly for the beta and gamma sectors. Ballast frames assumed to be Valmont RTP12-496 per Black and Veatch SA dated June 1, 2017.

Dear Mrs. Perucci:

At your request, Infinigy Engineering, PLLC has reviewed the existing AT&T equipment supports at the above referenced site for adequacy to support the existing and proposed loads for the referenced project. This evaluation is based on a review of the information from the Construction Drawings (dated 07/01/2019), Structural Analysis (dated 06/01/2017) provided by Black & Veatch, AT&T RFDS with updated loading (dated 04/01/2019), and Structural Analysis (dated 07/31/2018) provided by Black & Veatch.

This evaluation assumes that all structural members are in good condition, have not been altered from Reports referenced above, and have been installed per the manufacturer's requirements. Prior to installation of any new appurtenances, the contractor shall inspect the condition of all relevant members and connections and shall tighten all connections. The contractor is responsible for the means and methods of construction and shall notify Infinigy Engineering, PLLC immediately if any field conditions differ from those listed above.

Should there be any questions, please do not hesitate to contact us at (518) 690-0790.

Sincerely,

John S. Stevens, P.E.
CEO / Principal
518-060-0790
jstevens@infinigy.com
CO PE License No. 42534



Exhibit B — City's Minimum Technical Standards

Note: Some standards may not apply to your facility due to frequency of operation or type of service.

1.0 General

1.1 Posting of Information. The following information shall be posted on or near your cabinet:

Copy of FCC license (if applicable)

Equipment Identification Card with the following information:

Transmit and receive frequencies (or frequency bands in case of wireless operators)

Type of service

Authorized output power & ERP

Antenna model number

Transmission line model number and type

Name of licensee

Contact information for responsible person (name, phone, email)

Unidentified equipment shall be considered unauthorized and may be red tagged and removed after 30 days.

1.2 Installations at City Fire Stations. The City may require that the Tenant (Licensee) upgrade City radio equipment to ensure interference-free coexistence. Specifically, there is a problem with installing an isolator on the existing 900 MHz Alligator Model 1888 MAS transceiver used at most City fire stations. The isolator must be installed only on the transmit line, but the transceiver uses a duplexed (switched) output whereby both the transmitter and the receiver share the same antenna line. Similarly, separate cavity filters are required for the receiver and transmitter, but it is not possible to install both on a single duplexed line. For this reason, the City usually directs that the Alligator Model 1888 be replaced with a Model 1800 Master unit with separate transmit and receive antenna ports. A duplexer cavity filter should be used to combine transmit and receive into the existing antenna. Contact the City's Technical Representative for recommended vendors for these components.

1.3 Changes. Notify the City's Technical Representative immediately of any changes to frequencies, antennas or other equipment configuration. Obtain City's approval prior to making those changes as required by the Lease (License). Approved changes shall be shown on an updated Equipment ID Card.

2.0 Mobile Wireless Services

2.1 Land Mobile Radio Filter and Isolator Requirements. For land mobile radio (LMR), as a minimum, each transmitter shall employ a dual stage isolator followed by a single cavity

bandpass filter. All transmitters shall have built-in or external harmonic (low pass) filters. The low pass filter must be a true low pass filter, not a notch filter tuned to just one or two harmonic frequencies. Harmonic rejection shall be at least 60 dB at the second harmonic and at least 50 dB at the third harmonic. The following minimum isolator and bandpass cavity filter specifications apply:

30-50 MHz

Isolators - None required.

TX cavity - minimum of 20 dB rejection at + 0.5 MHz

72-76 MHz

Isolators - Minimum of 25 dB

TX cavity - minimum of 20 dB rejection at + 0.5 MHz

138-174, 216-222 MHz

Dual Stage Isolators - minimum of 60 dB

TX cavity - minimum of 20 dB rejection at + 1.5 MHz

406-512 MHz

Dual Stage Isolators - minimum of 60 dB

TX cavity - minimum of 20 dB rejection at + 3.5 MHz

698-941 MHz (excluding airphone)

Dual Stage Isolators - minimum of 60 dB

Tx cavity - minimum of 20 dB rejection at + 6 MHz

Explanation. The bandpass filter and lowpass filter must follow the isolator because ferrite isolators are nonlinear and can create harmonics. Please note that most bandpass cavity filters will pass odd harmonics of the tuned frequency, so an external lowpass filter following the isolator is also required. Transmitter combiners will be considered on a case-by-case basis. Please provide all combiner technical information to the City's Technical Representative.

2.2 Airphone (849-851 MHz transmit, 894-896 MHz receive)

Transmitter out-of-band emissions shall not cause harmful interference to cellular base station receivers (824-849 MHz). Tenant (Licensee) shall submit plans, including bandpass filter response curves, to the City's Technical Representative for approval prior to installation. Tenant (Licensee) shall install adequate receiver bandpass filtering to preclude receiver desensitization or receiver intermodulation caused indirectly by cellular base stations on the site.

2.3 LMR Duplexers. Notch duplexers are not adequate. The duplexer must also have a bandpass characteristic to ensure other transmit signals do not enter the transmitter or over drive the receiver. This is especially important for VHF repeaters which are vulnerable to FM broadcast signals and other closely-spaced VHF transmitters.

2.4 Personal Wireless Services. These services include, but are not limited to the 698-806, 806-

869, 1710-1755, 1850-2000, 2110-2155, 2500-2600 MHz bands (excluding 700 and 800 MHz public safety bands). Because the wireless provider is assumed to have exclusive use of a band of frequencies, out-of-band emissions are expected to be attenuated significantly by the manufacturer's standard combiners, duplexers and cross-band couplers. Ferrite isolators may not be required. Submit your plans to the City's Technical Representative for approval.

2.5 Unlicensed Band (License-Free) Radios. Unlicensed band radios and shared-band services, including, but not limited to those operating in the 902-928 MHz, 2.4-2.4835 GHz, 3.5 GHz, 4.9 GHz (public safety only) and 5 GHz bands are not allowed unless specifically authorized in the Tenant's (Licensee's) Lease (License). When authorized, Tenant (Licensee) shall not change operating frequencies without first getting approval from City. License-free radios are notorious for their poor quality in a harsh RF environment and specific make, model and technical specifications must be provided to the City's Technical Representative for approval. Additional protective devices, shielded CAT 6 cable and shielded NEMA cases may be required before such devices can be installed on the tower.

2.6 Receivers. The site may have relatively high radio frequency (RF) levels in all mobile radio bands. Your receiver amplifier must be robust to work in this environment. Ensure the receiver has good intermodulation (IM) rejection and high 1 dB compression point. If interference is encountered and we find the receiver is not performing up to the standards exhibited by state-of-the-art equipment, the City may require receiver improvements or upgrades before requiring changes to other tenant (licensee) equipment or configurations. This requirement applies to both new and existing tenants (licensees).

Filters are required for mobile radio receivers. Single receivers must employ a minimum of a single 7" diameter (or equivalent) cavity bandpass filter with a rejection curve corresponding to 1 dB insertion loss or better. Additional filter isolation may be required in special cases. Receiver multicouplers must use a bandpass filter (preselector) prior to the multicoupler amplifier.

2.7 Antennas. Select antennas designed to minimize passive intermodulation generation. Note that antennas that pass intermodulation tests at the factory may not provide good intermodulation rejection after years of exposure to heat, cold, vibration from wind, and humidity. Only new antennas are allowed for new installations. Select antennas specifically designed to reject intermodulation over the life of the antenna. Unless the antenna is a duplex configuration, transmit and receive antennas should be separated vertically on the tower. If the tower is owned by the City, the City will designate antenna locations. Antennas must be DC grounded to the tower for lightning protection.

2.8 Transmission Lines. Coaxial cable should be grounded at the top and the bottom of the run with an Andrew ground kit or equivalent. Ensure that ground conductors run straight down with no sharp bends because bends will increase the impedance of the grounding conductor. We also require that the line be marked so we can identify it later. We suggest bands of colored electrical tape at the bottom, middle and top of the run (similar to a resistor color code). Install a Huber-Suhner (or equivalent) coaxial surge arrester at the bulkhead. All exterior transmission lines must be solid outer conductors. If possible, receive and transmit lines should be separated by at

least one foot from cabinet to antenna.

2.9 Connectors. Connectors are often sources of RF leakage and passive intermodulation. UHF connectors (PL259) are not allowed on connections external to the radio cabinet. Type “N” connectors are allowed below 512 MHz. 7/16 DIN connectors should be used at 698 MHz and above and are required above 1.7 GHz. Connectors using dissimilar metal contacts or ferrous materials (e.g., nickel plating) are not allowed. The preferred connector uses a silver plated body with gold plated inner conductor. Brass bodies and silver or brass inner conductors are also allowed.

2.10 Additional Protective Devices May Be Required. The specifications above are minimum requirements. Additional protective devices may be required based upon evaluation of the following information:

- Theoretical TX mixes, particularly second and third order
- Antenna location and type
- Combiner/multicoupler configurations
- Transmitter specifications
- Receiver specifications
- Historical problems
- Transmitter to transmitter isolation
- Transmitter to antenna isolation
- Transmitter to receiver isolation
- Calculated and measured level of IM products
- Transmitter output power
- Transmitter ERP
- Spectrum analyzer measurements
- VSWR measurements
- Existing cavity selectivity
- Antenna to antenna proximity

3.0 FM & IBOC Broadcast (Part 73, ERP > 1 kW)

3.1 FM Broadcast Transmitters. FM and IBOC Broadcast transmitters will be either combined with other stations into a common antenna or stand-alone. If combined, the combiner design shall be approved by the City's Technical Representative. If stand-alone, the transmitter shall employ a bandpass cavity filter with the following minimum performance specifications:

3.1.1. Rejection. The bandpass filter shall provide the following minimum rejection for Class C, C0 and C1 stations:

From Center +/-	Minimum Rejection
800 kHz	22 dB
1 MHz	28 dB
1.2 MHz	32 dB

- 1.4 MHz 38 dB
- 1.6 MHz 43 dB

Note that four cavities are required to meet this specification. Class C2 and C3 stations may use three-cavity filters. These filter requirements also apply to stations with FM & IBOC combined outputs. A stand alone IBOC transmitter and antenna shall comply with the following requirements: IBOC ERP greater than 5,000 Watts: 4 cavity filter (see rejection above), IBOC ERP less than or equal to 5,000 Watts: 3 cavity filter.

3.1.2 Gain Flatness. +/-0.5 dB from +/-200 kHz from center frequency.

3.1.3. Group Delay Flatness. No greater than +/- 150 nanoseconds (symmetrical) in +/- 200 kHz (I.e., minimum to maximum delay difference shall be no greater than 300 nanoseconds in the band $f_c - 200$ kHz to $f_c + 200$ kHz).

3.1.4. VSWR. No greater than 1.1:1 in +/- 200 kHz (assuming filter is terminated in perfect 50 ohm load).

3.1.5. Insertion Loss. No greater than 0.3 dB in +/- 200 kHz.

The transmitter should comply with current FCC rules regarding out-of-band emissions at transmitter output (before the bandpass cavity filter). The external filter is required to provide further rejection of out-of-band emissions to ensure electromagnetic compatibility with other users on the site.

3.2 FM Broadcast Antennas. FM Broadcast antennas mounted below 250' AGL (center of radiation) shall employ short element spacing to reduce downward radiation and ensure compliance with CFR 47, Parts 1.1307-1.1310. This requirement does not apply to stations that employ a single element antenna. Examples of short element spacing are a 6 bay antenna with half-wavelength spacing or an 8 bay antenna with 3/4 wavelength spacing. Submit a plot of predicted power density versus distance at ground level for City's Technical Representative approval.

4.0 Full-Power Television

4.1 Full-power television transmitters shall include band pass and low pass filters.

4.2 For television transmitters, measured out-of-band emissions (including harmonics) greater than 3 MHz from the respective channel edge shall be more than 80 dB below the measured power over the entire channel. Both measurements shall use a 6 MHz measurement bandwidth.

5.0 Low Power Television (analog and digital)

5.1 Low Power Television (LPTV) transmitters and television translators must have low pass filters that attenuate all harmonics and spurious products at least 80 dB below the power

measured at the carrier frequency. To facilitate measurements of spurious products, each LPTV and translator transmitter shall have installed a line section and appropriate directional coupler element. For routine use, the line section may employ a standard DC element and be connected to a wattmeter capable of measuring forward and reflected power. In addition, the Tenant (Licensee) shall own or have access to an RF load capable of dissipating the full power of the transmitter for troubleshooting purposes.

6.0 Grounding, Bonding and Shielding

6.1 Shielding. RF interference can get directly into the electronics of a receiver or transmitter. Cabinet shielding must be in place and maintained to the manufacturer's specifications. Do not leave cabinet doors open because open cabinet doors defeat the shielding.

6.2 Grounding. Equipment grounding and bonding should be accomplished in accordance with Mil Std 188-124, Military Handbook 419 and Motorola R56. Contact the City's Technical Representative for guidance on grounding and bonding at your particular facility.

7.0 Site Work

7.1 Tower Work Insurance and Experience Requirements. All tower riggers or installers of antennas, transmission lines, cabinets, wiring or similar hardware or apparatus must meet the minimum basic requirements of the City. These will include, but not be limited to, the following:

- The rigging company must have a current Certificate of Insurance on file with the City. The certificate will include, but not be limited to the following:

1. General Comprehensive & Liability: \$5,000,000
2. Vehicle Liability: \$1,000,000
3. Workman's Compensation Insurance (By Statute)

- Demonstrated experience on similar tower types and similar work activity on similar towers within the past two years with a list of at least two recent clients or professional references with actual knowledge of experience and necessary qualifications, or in lieu thereof; previous working relationship with the City and known by the City's personnel.

City reserves the right, at its sole discretion, to reject the use of any person or tower rigging company on City-owned towers or properties.

7.2 Work Standards. The installation of any and all materials on the tower and in the accompanying shelter must be pre-authorized and approved by the City's Technical Representative. The following guidelines will be strictly enforced:

7.2.1 Equipment or cabinets mounted on platforms will be constructed of galvanized or stainless steel and will be securely attached to the tower members or platforms with J-bolts, U-

bolts or similar clamping devices which do not penetrate tower members or any part of the galvanized coating. All mounting hardware must be hot-dipped galvanized or stainless steel (NOT PLATED). All mounting nuts, bolts, washers or similar must be Grade 5 or better.

7.2.2 Antennas and the mounting thereof must be approved in advance of installation. Data in reference to antenna type, weight, wind loading, gain, bandwidth and mounting details must be provided to the City's Technical Representative and may not be modified or replaced without expressed written permission of City. Installation of antennas on City-owned towers may require a new structural study at the Tenant (Licensee)'s expense.

7.2.3 Transmission lines and hardware must be approved in advance of installation by the City's Technical Representative and must be specified as to manufacturer, size and type and shown on the City's New Tenant Questionnaire. All the mounting hardware must be of appropriate type and design to support the transmission lines with strain-reliefs installed at the manufacturer's recommended intervals. Under no circumstances will stainless steel automotive-type hose clamps be used to secure transmission lines or cables to tower members. Where not previously designated, all lines will be positioned on the tower to minimize wind loading and provide a minimum of obstruction to climbing or removal/replacement of other lines. Each line will be mounted independently of other lines on the tower. Cable trays, waveguide entrances, tower ladders, elevator rails and other similar members are to be kept clear of all cables on the tower. Stainless steel lashing ties are acceptable for use on the tower but are not to be used as strain reliefs.

7.2.4 Antenna jumper cables or cables to/from crossband couplers or similar devices on the tower will be kept to minimum required lengths and will be made of solid shield outer conductor cables with outer jackets capable of withstanding severe weather and ultraviolet rays. All such cable types must be pre-approved by the City.

7.2.5 UNDER NO CIRCUMSTANCES –

- will welding or drilling of tower members be allowed;
- will modifications to the tower, bridge, building entrance fittings or similar be permitted;
- will transmission line splices (a pair of connectors at other than the top or bottom of the run on the tower) be permitted except by prior approval or necessitated by damage only repairable by splicing;
- will any tampering, retuning, rerouting or other modifications be permitted to equipment owned by City or other tenants.

7.2.6 All installations will be performed in accordance with good engineering practice and within the guidelines of this document. Any deviation from these minimum requirements and technical standards must be approved in writing prior to installation or modification.

7.3 Removal of Unused Antennas and Lines. Tenant (Licensee) shall remove all unused antennas, transmission lines and associated mounting hardware from City's tower within 90 days of the date an antenna is no longer in service.

7.4 NO PRESENT INSTALLATION WILL BE "GRANDFATHERED" and must conform to these work standards within a reasonable time period to be determined by the City's Technical Representative. Periodic inspections may be performed to ensure that all installations meet technical standards.

8.0 Shelters

8.1 Cable Dressing Inside Building or Shelter. All wiring and cables within a given rack will be properly dressed and/or bundled with cable ties with excess cut close to the barbs. Twisted wire, tape, rope, twine, phone wire and similar bits of debris usually available on site ARE NOT ACCEPTABLE substitutes for proper securing hardware. All inter-rack cables and wiring must be properly routed and utilize the cable trays provided even if between adjacent racks. Overhead cables and RF lines must be easily removed or reworked within the cable trays. Proper care must be taken to ensure that new cables added to the trays are not stressed or intertwined with existing cables. OVERHEAD CABLES MAY NOT CROSS PERPENDICULARS OR BE SUSPENDED IN MID AIR WITHOUT SUPPORTS. NO SUPPORTS MAY BE INSTALLED WITHOUT PRIOR APPROVAL. All long cable runs must be properly identified at each end indicating the opposite cable end address. All cabling within the building must be cut to proper length except phasing harnesses, where required.

9.0 Towers

9.1 Tenant (Licensee) may not erect new towers without the City's prior written consent, which may be granted or denied in City's sole discretion, and towers that are approved may only be constructed after plans for the tower have been approved by the City and by the zoning authority.

9.2 New towers shall comply with TIA-222-G or the most recent edition adopted by the local zoning authority. Changes to an existing tower, including addition or replacement of antennas requires that TIA-222-G or the most recent edition be used. Tenant (Licensee)-owned towers that present an immediate safety hazard shall be corrected by Tenant (Licensee) regardless of the status of the current lease or the particular edition of TIA-222 in use at the time of tower construction. Installation of antennas on City-owned towers may require a new structural study at the Tenant (Licensee)'s expense.

10.0 Permits

10.1 Tenant (Licensee) shall comply with all local and Federal regulations. Tenant (Licensee) is responsible for acquiring all applicable permits, including, but not limited to FCC construction permits and building permits. Tenant (Licensee) is also responsible for performing any required studies, including RF exposure and RF interference studies required by the FCC, local government, and City. Tenant (Licensee) shall furnish all applicable permits, studies, and

approvals to the City for approval before starting any construction, including antenna installation.

11.0 Radio Frequency Safety

11.1 The engineering, design, configuration, installation, and maintenance of high power (> 1 kW ERP) radio facilities on the site shall be accomplished in a manner that minimizes downward radiation. Changes to proposed systems may be directed by City to comply with this objective.

11.2 Everyone on the site shall follow these guidelines:

- All personnel entering the site must be authorized
- Obey all posted signs
- Assume all antennas are active unless proven otherwise
- Before working on an antenna, notify the owner and disable the transmitter
- Use a radio frequency (RF) personal monitor when working near antennas
- Never operate transmitters without shields

11.3 Power densities on towers can be much higher than at ground level. For this reason, tower climbers should request power reductions from high-power tenants and carry RF personal monitors when climbing towers. The City's Technical Representative can tell you which transmitters should be turned down before climbing the tower.

11.4 Federal Government guidelines regarding human exposure to radio frequency energy are found in the Code of Federal Regulations (CFR) Title 47, Parts 1.1307-1.1310.



Figure 1 - Warning Sign to be Posted at Base of Tower
(Available from Tessco, Holaday, Narda and other Sources)

RADIO FREQUENCY INTERFERENCE ANALYSIS REPORT

B&V on behalf of AT&T

Site ID: 10101152 (MRUTH026184)

Site Name: CAPITOL HILL

November 13, 2018

Prepared By:

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Report Reviewed By:



No Harmful Interference is predicted as a result of AT&T's proposed modification affecting the existing operations on this structure and the Public Safety systems operating in the vicinity of the site.

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1.0 Executive Summary

This report presents a radio frequency interference (RFI) analysis which was performed on the 10101152 (MRUTH026184) - Capitol Hill site. The RFI analysis consists of transmitter noise, receiver desensitization, intermodulation, harmonic and transmitter spurious output interference. The report consists of Sections that provide details of the communications site, antenna systems, operational frequencies and each interference analysis mode.

A summary of the interference analysis results is depicted in the following Table.

Interference Analysis Mode	Type Mix	Status	Summary	Worst-Case Margin (dB)
Transmitter Noise	N/A	Passed	No Interference was predicted	41.9
Receiver Desensitization	N/A	Passed	No Interference was predicted	35.3
Transmitter Intermodulation	1 Tx	Passed	No Interference was predicted	N/A
Transmitter Intermodulation	2 Tx	Passed	No Interference was predicted	N/A
Transmitter Intermodulation	3 Tx	Passed	No Interference was predicted	N/A
Transmitter Intermodulation	4 Tx	Passed	No Interference was predicted	N/A
Transmitter Intermodulation	5 Tx	Passed	No Interference was predicted	N/A
Receiver Intermodulation	1 Tx	Passed	No Interference was predicted	N/A
Receiver Intermodulation	2 Tx	Passed	No Interference was predicted	N/A
Receiver Intermodulation	3 Tx	Passed	No Interference was predicted	N/A
Receiver Intermodulation	4 Tx	Passed	No Interference was predicted	N/A
Receiver Intermodulation	5 Tx	Passed	No Interference was predicted	N/A
Transmitter Harmonics	N/A	Passed	No Interference was predicted	N/A
Transmitter Spurious Output	N/A	Passed	No Interference was predicted	N/A
Interference Level Summing - C/(I+N)	N/A	Passed	No Interference was predicted	N/A
Wideband IM Spectral Analysis	N/A	N/A	No Analysis performed	N/A

The analysis was performed with the setup options depicted in the Table below.

Analysis	Description
Receiver Performance	Receiver Sensitivity Threshold
Receiver Bandwidth	Receiver Dependent
Antenna Patterns Considered	No (Worst Case)
Measured Antenna Isolation Data	No
Filters/Multicouplers Considered	Yes
Number of Simultaneous Transmitters Mixed	5
Highest Intermodulation Order Tested	7
Condense Intermodulation Hit Quantity	Yes - 1000/Order
TX IM Bandwidth Multiplication	Yes
Tx/Rx Systems Excluded	None
Site File Name	10101152 (MRUTH026184) - CAPITOL HILL.dta
Report File Name	10101152 (MRUTH026184) - CAPITOL HILL.docx
WirelessSiteRFI Software Version	10.0.10

2.0 Site Description

The communication systems located at this site are described in this section as well as the configuration of the antenna systems.

The site parameters are:

Site Name: 10101152 (MRUTH026184) - Capitol Hill
Owner: AT&T
Site Description: Rooftop = 60' (AGL)
Address: 303 West Colfax, Denver, CO 80265
Latitude: 39:44:25.24 N
Longitude: 104:59:29.49 W
Elevation: 5392' (AMSL)
Notes: AT&T is adding the 700 MHz band on sector antennas

2.1 Communications Systems

System	Provider	Technology	Frequency Band
1	AT&T	UMTS	1710 - 1990 MHz - PCS
2	AT&T	UMTS	806 - 896 MHz - Cellular
3	AT&T	LTE	2345-2360 MHz - WCS
4	AT&T	LTE	2345-2360 MHz - WCS
5	AT&T(proposed)	LTE	746 - 806 MHz - 700 MHz Band
6	AT&T(proposed)	LTE	746 - 806 MHz - 700 MHz Band
7	AT&T(proposed)	LTE	746 - 806 MHz - 700 MHz Band
8	AT&T(proposed)	LTE	746 - 806 MHz - 700 MHz Band
9	AT&T	LTE	1850 - 1995 MHz - PCS
10	AT&T	LTE	1850 - 1995 MHz - PCS
11	AT&T	LTE	1850 - 1995 MHz - PCS
12	AT&T	LTE	1850 - 1995 MHz - PCS
13	AT&T	LTE	806 - 896 MHz - Cellular
14	AT&T	LTE	806 - 896 MHz - Cellular
15	AT&T	LTE	2110 - 2200 MHz - AWS
16	AT&T	LTE	2110 - 2200 MHz - AWS
17	AT&T	LTE	2110 - 2200 MHz - AWS
18	KNNR200 - DENVER, CITY AND COUNTY OF	FM Land Mobile	806 - 896 MHz - Land Mobile
19	KNNR200 - DENVER, CITY AND COUNTY OF	FM Land Mobile	806 - 896 MHz - Land Mobile
20	KNNR200 - DENVER, CITY AND COUNTY OF	FM Land Mobile	806 - 896 MHz - Land Mobile
21	SkyTel Spectrum LLC	FM Land Mobile	901/930/940 MHz - Narrowband PCS
22	WQEQ952DENVER, CITY AND COUNTY OF	FM Land Mobile	150 - 174 MHz - Land Mobile
23	WQJY881 - DENVER, CITY AND COUNTY OF	FM Land Mobile	420 - 470 MHz - Land Mobile

2.2 Antenna Systems

Ant #	Mfg	Antenna Model	Gain (dBd)	Hgt (ft)	Orient (deg)	Sec-tor	Ant Use	Transmission Line Type	Line Loss (/100')	Line Length (ft)
1	Powerwave	7750	15.2	69	0	A	Dplx	7/8 in. Foam	1.8	99
2	Powerwave	7750	15.2	69	115	B	Dplx	7/8 in. Foam	1.8	99
3	Powerwave	7750	15.2	69	245	C	Dplx	7/8 in. Foam	1.8	99
4	Powerwave	7750	12.5	69	0	A	Dplx	7/8 in. Foam	1.31	99
5	Powerwave	7750	12.5	69	115	B	Dplx	7/8 in. Foam	1.31	99
6	Powerwave	7750	12.5	69	245	C	Dplx	7/8 in. Foam	1.16	99
7	CCI	BSA-M65R-BUU-H6 (L-Beam)	15.85	69	335	A	Dplx	Fiber	0.001	99
8	Commscope	RV4PX310R-V2	15.73	69	115	B	Dplx	Fiber	0.001	99
9	Commscope	RV4PX310R	15.73	69	245	C	Dplx	Fiber	0.001	99
10	CCI	BSA-M65R-BUU-H6 (R-Beam)	15.85	69	25	A	Dplx	Fiber	0.001	99
11	CCI	BSA-M65R-BUU-H6 (L-Beam)	14.25	69	335	A	Dplx	Fiber	0.001	99
12	Commscope	NNH4-65C-R6_700 MHz	12.76	69	115	B	Dplx	Fiber	0.001	99
13	Commscope	NNH4-65C-R6_700 MHz	12.76	69	245	C	Dplx	Fiber	0.001	99
14	CCI	BSA-M65R-BUU-H6 (L-Beam)	14.25	69	335	A	Dplx	Fiber	0.001	99
15	Kathrein	800-10766	13.72	69	115	B	Dplx	Fiber	0.001	99
16	Kathrein	800-10766	13.72	69	245	C	Dplx	Fiber	0.001	99
17	CCI	BSA-M65R-BUU-H6 (R-Beam)	14.25	69	25	A	Dplx	Fiber	0.001	99
18	CCI	BSA-M65R-BUU-H6 (R-Beam)	14.25	69	25	A	Dplx	Fiber	0.001	99
19	CCI	BSA-M65R-BUU-H6 (L-Beam)	15.84	69	335	A	Dplx	Fiber	0.001	99
20	Commscope	NNH4-65C-R6	15.44	69	115	B	Dplx	Fiber	0.001	99
21	Commscope	NNH4-65C-R6	15.44	69	245	C	Dplx	Fiber	0.001	99
22	CCI	BSA-M65R-BUU-H6 (R-Beam)	15.85	69	25	A	Dplx	Fiber	0.001	99
23	CCI	BSA-M65R-BUU-H6 (L-Beam)	15.84	69	335	A	Dplx	Fiber	0.001	99
24	Commscope	NNH4-65C-R6	15.44	69	115	B	Dplx	Fiber	0.001	99
25	Commscope	NNH4-65C-R6	15.44	69	245	C	Dplx	Fiber	0.001	99
26	CCI	BSA-M65R-BUU-H6 (R-Beam)	15.85	69	25	A	Dplx	Fiber	0.001	99
27	CCI	BSA-M65R-BUU-H6 (L-Beam)	15.15	69	335	A	Dplx	Fiber	0.001	99
28	Commscope	RV4PX310R-V2	14.32	69	115	B	Dplx	Fiber	0.001	99
29	Commscope	RV4PX310R-V2	14.32	69	245	C	Dplx	Fiber	0.001	99
30	CCI	BSA-M65R-BUU-H6 (R-Beam)	15.15	69	25	A	Dplx	Fiber	0.001	99
31	CCI	BSA-M65R-BUU-H6 (L-Beam)	16.25	69	335	A	Dplx	Fiber	0.001	99
32	Commscope	NNH4-65C-R6	15.15	69	115	B	Dplx	Fiber	0.001	99
33	Commscope	NNH4-65C-R6	15.15	69	245	C	Dplx	Fiber	0.001	99
34	CCI	BSA-M65R-BUU-H6 (R-Beam)	16.25	69	25	A	Dplx	Fiber	0.001	99
35	Kathrein	800-10766	15.75	69	245		Dplx	Fiber	0.001	99
36	Other	Generic	0	71	0		Tx	1/2 in. Foam	0.85	101
37	Other	Generic	0	71	0		Tx	1/2 in. Foam	0.85	101
38	Other	Generic	0	71	0		Rx	1/2 in. Foam	0.85	101
39	Other	Generic	0	129	0		Tx	1/2 in. Foam	0.85	99
40	Other	Generic	0	129	0		Tx/Rx	1-5/8 in. Foam	0.28	99
41	Other	Generic	0	69	0		Dplx	1-5/8 in. Foam	0.28	31

3.0 Transmitter Frequencies

Freq #	Ant #	Provider	Model	Technology	Channel Label	ID	Frequency	Power (Watts)	BW (KHz)
1	1	AT&T	Powerwave	UMTS		A	1977.500000	16	5000
2	2	AT&T	Powerwave	UMTS		B	1977.500000	16	5000
3	3	AT&T	Powerwave	UMTS		C	1977.500000	16	5000
4	4	AT&T	Powerwave	UMTS		D	876.800000	50	5000
5	5	AT&T	Powerwave	UMTS		E	876.800000	50	5000
6	6	AT&T	Powerwave	UMTS		F	876.800000	50	5000
7	9	AT&T	Ericsson	LTE		G	2355.000000	40	10000
8	8	AT&T	Ericsson	LTE		H	2355.000000	40	10000
9	7	AT&T	Ericsson	LTE		I	2355.000000	40	10000
10	10	AT&T	Ericsson	LTE		J	2355.000000	40	10000
11	11	AT&T	Ericsson	LTE		K	739.000000	40	10000
12	12	AT&T	Ericsson	LTE		L	739.000000	40	10000
13	13	AT&T	Ericsson	LTE		M	739.000000	40	10000
14	14	AT&T (proposed)	Ericsson	LTE		N	739.000000	40	10000
15	15	AT&T (proposed)	Ericsson	LTE		O	739.000000	40	10000
16	16	AT&T (proposed)	Ericsson	LTE		P	739.000000	40	10000
17	17	AT&T	Ericsson	LTE		Q	739.000000	40	10000
18	18	AT&T (proposed)	Ericsson	LTE		R	739.000000	40	10000
19	19	AT&T	Ericsson	LTE		S	1940.000000	30	20000
20	20	AT&T	Ericsson	LTE		T	1940.000000	30	20000
21	21	AT&T	Ericsson	LTE		U	1940.000000	30	20000
22	22	AT&T	Ericsson	LTE		V	1940.000000	30	20000
23	23	AT&T	Ericsson	LTE		W	1977.500000	30	1250
24	24	AT&T	Ericsson	LTE		X	1977.500000	30	1250
25	25	AT&T	Ericsson	LTE		Y	1977.500000	30	1250
26	26	AT&T	Ericsson	LTE		Z	1977.500000	30	1250
27	27	AT&T	Ericsson	LTE		AA	871.500000	60	5000
28	28	AT&T	Ericsson	LTE		AB	871.500000	60	5000
29	29	AT&T	Ericsson	LTE		AC	871.500000	60	5000
30	30	AT&T	Ericsson	LTE		AD	871.500000	60	5000
31	31	AT&T	Ericsson	LTE		AE	2137.500000	45	15000
32	32	AT&T	Ericsson	LTE		AF	2137.500000	45	15000
33	33	AT&T	Ericsson	LTE		AG	2137.500000	45	15000
34	34	AT&T	Ericsson	LTE		AH	2137.500000	45	15000
35	35	AT&T	Ericsson	LTE		HO	2137.500000	45	15000
36	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		HP	806.5625	100	20
37	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		HQ	807.1250	100	20
38	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		HR	807.3750	100	20
39	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		HS	807.7750	100	20
40	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		HT	808.1500	100	20
41	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		HU	808.2750	100	20
42	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		HV	808.4250	100	20
43	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		HW	808.7250	100	20
44	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		HX	808.8625	100	20
45	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		HY	809.0625	100	20
46	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		HZ	809.4375	100	20
47	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IA	809.5625	100	20
48	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IB	809.5875	100	20

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49	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IC	809.9875	100	20
50	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		ID	810.2375	100	20
51	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IE	810.4625	100	20
52	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IF	810.4875	100	20
53	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IG	810.7375	100	20
54	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IH	810.9875	100	20
55	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		II	811.1375	100	20
56	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IJ	811.2125	100	20
57	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IK	811.2375	100	20
58	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IL	811.4875	100	20
59	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IM	811.6375	100	20
60	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IN	811.7125	100	20
61	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IO	811.7375	100	20
62	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IP	812.0625	100	20
63	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IQ	812.1375	100	20
64	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IR	812.2375	100	20
65	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IS	812.4625	100	20
66	36	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IT	812.4875	100	20
67	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IU	812.7375	100	20
68	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IV	813.1375	100	20
69	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IW	813.2125	100	20
70	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IX	813.2375	100	20
71	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IY	813.4625	100	20
72	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		IZ	813.4875	100	20
73	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JA	813.7175	100	20
74	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JB	813.7375	100	20
75	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JC	814.2125	100	20
76	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JD	814.2375	100	20
77	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JE	814.2625	100	20
78	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JF	814.4625	100	20
79	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JG	814.4875	100	20
80	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JH	814.6125	100	20
81	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JI	814.7125	100	20
82	37	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JJ	814.7375	100	20

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83	39	SkyTel Spectrum LLC	Other	FM Land Mobile		LF	940.225000	3500	25
84	40	WQEQ952DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LG	155.955000	100	15
85	41	WQJY881 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LH	463.662500	4	11.2
86	41	WQJY881 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LI	467.112500	4	11.2
87	41	WQJY881 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LJ	468.225000	4	11.2
88	41	WQJY881 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LK	469.787500	4	11.2

4.0 Receiver Frequencies

Freq #	Ant #	Provider	Model	Technology	Channel Label	ID	Frequency	Sen (dBm)	BW (KHz)
1	1	AT&T	Powerwave	UMTS		A	1897.500000	-110	5000
2	2	AT&T	Powerwave	UMTS		B	1897.500000	-110	5000
3	3	AT&T	Powerwave	UMTS		C	1897.500000	-110	5000
4	4	AT&T	Powerwave	UMTS		D	831.800000	-119	5000
5	5	AT&T	Powerwave	UMTS		E	831.800000	-119	5000
6	6	AT&T	Powerwave	UMTS		F	831.800000	-119	5000
7	9	AT&T	Ericsson	LTE		G	2355.000000	-102	10000
8	8	AT&T	Ericsson	LTE		H	2355.000000	-102	10000
9	7	AT&T	Ericsson	LTE		I	2355.000000	-102	10000
10	10	AT&T	Ericsson	LTE		J	2355.000000	-102	10000
11	11	AT&T	Ericsson	LTE		K	709.000000	-102	10000
12	12	AT&T	Ericsson	LTE		L	709.000000	-102	10000
13	13	AT&T	Ericsson	LTE		M	709.000000	-102	10000
14	14	AT&T (proposed)	Ericsson	LTE		N	709.000000	-102	10000
15	15	AT&T (proposed)	Ericsson	LTE		O	709.000000	-102	10000
16	16	AT&T (proposed)	Ericsson	LTE		P	709.000000	-102	10000
17	17	AT&T	Ericsson	LTE		Q	709.000000	-102	10000
18	18	AT&T (proposed)	Ericsson	LTE		R	709.000000	-102	10000
19	19	AT&T	Ericsson	LTE		S	1860.000000	-102	20000
20	20	AT&T	Ericsson	LTE		T	1860.000000	-102	20000
21	21	AT&T	Ericsson	LTE		U	1860.000000	-102	20000
22	22	AT&T	Ericsson	LTE		V	1860.000000	-102	20000
23	23	AT&T	Ericsson	LTE		W	1897.500000	-102	5000
24	24	AT&T	Ericsson	LTE		X	1897.500000	-102	5000
25	25	AT&T	Ericsson	LTE		Y	1897.500000	-102	5000
26	26	AT&T	Ericsson	LTE		Z	1897.500000	-102	20000
27	27	AT&T	Ericsson	LTE		AA	826.500000	-102	5000
28	28	AT&T	Ericsson	LTE		AB	826.500000	-102	5000
29	29	AT&T	Ericsson	LTE		AC	826.500000	-102	5000
30	30	AT&T	Ericsson	LTE		AD	826.500000	-102	5000
31	31	AT&T	Ericsson	LTE		AE	1737.500000	-102	15000
32	32	AT&T	Ericsson	LTE		AF	1737.500000	-102	15000
33	33	AT&T	Ericsson	LTE		AG	1737.500000	-102	15000
34	34	AT&T	Ericsson	LTE		AH	1737.500000	-102	15000
35	35	AT&T	Ericsson	LTE		HO	1737.500000	-102	15000
36	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JK	761.5625	-116	20
37	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JL	762.1250	-116	20
38	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JM	762.3750	-116	20
39	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JN	762.7750	-116	20
40	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JO	763.1500	-116	20
41	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JP	763.2750	-116	20
42	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JQ	763.4250	-116	20
43	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JR	763.7250	-116	20
44	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JS	763.8625	-116	20
45	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JT	764.0625	-116	20
46	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JU	764.4375	-116	20
47	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JV	764.5625	-116	20
48	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JW	764.5875	-116	20

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49	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JX	764.9875	-116	20
50	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JY	765.2375	-116	20
51	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		JZ	765.4625	-116	20
52	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KA	765.4875	-116	20
53	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KB	765.7375	-116	20
54	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KC	765.9875	-116	20
55	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KD	766.1375	-116	20
56	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KE	766.2125	-116	20
57	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KF	766.2375	-116	20
58	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KG	766.4875	-116	20
59	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KH	766.6375	-116	20
60	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KI	766.7125	-116	20
61	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KJ	766.7375	-116	20
62	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KK	767.0625	-116	20
63	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KL	767.1375	-116	20
64	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KM	767.2375	-116	20
65	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KN	767.4625	-116	20
66	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KO	767.4875	-116	20
67	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KP	767.7375	-116	20
68	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KQ	768.1375	-116	20
69	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KR	768.2125	-116	20
70	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KS	768.2375	-116	20
71	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KT	768.4625	-116	20
72	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KU	768.4875	-116	20
73	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KV	768.7175	-116	20
74	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KW	768.7375	-116	20
75	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KX	769.2125	-116	20
76	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KY	769.2375	-116	20
77	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		KZ	769.2625	-116	20
78	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LA	769.4625	-116	20
79	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LB	769.4875	-116	20
80	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LC	769.6125	-116	20
81	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LD	769.7125	-116	20
82	38	KNNR200 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LE	769.7375	-116	20

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83	40	WQEQ952DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LG	155.955000	-110	15
84	41	WQJY881 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LH	463.662500	-116	11.2
85	41	WQJY881 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LI	467.112500	-116	11.2
86	41	WQJY881 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LJ	468.225000	-116	11.2
87	41	WQJY881 - DENVER, CITY AND COUNTY OF	Other	FM Land Mobile		LK	469.787500	-116	11.2

5.0 Transmitter Noise Analysis

Transmitter noise interference occurs because a transmitter radiates energy on its operating frequency as well as frequencies above and below the assigned frequency. The energy that is radiated above and below the assigned frequency is known as sideband noise energy and extends for several megahertz on either side of the operating frequency. This undesired noise energy can fall within the passband of a nearby receiver even if the receiver's operating frequency is several megahertz away. The transmitter noise appears as "on-channel" noise interference and cannot be filtered out at the receiver. It is on the receiver's operating frequency and competes with the desired signal, which in effect, degrades the operational performance.

The analysis predicts each transmitter's noise signal level present at the input of each receiver. It takes into account the transmitter's noise characteristics, frequency separation, power output, transmission line losses, filters, duplexers, combiners, isolators, multi-couplers and other RF devices that are present in both systems. Additionally, the analysis considers the antenna separation space loss, horizontal and vertical gain components of the antennas as well as how they are mounted on the structure. The gain components are derived from antenna pattern data published by each manufacturer.

The analysis determines how much isolation is required, if any, to prevent receiver performance degradation caused by transmitter noise interference. The Table below depicts the results of this analysis. For each receiver, the transmitter that has the worst-case impact is displayed. The Signal Margin represents the margin in dB, before the receiver's performance is degraded. A negative number indicates that the performance is degraded and the value indicates how much additional isolation is required to prevent receiver performance degradation.

Receiver Provider	Receive Channel	Receive Frequency (MHz)	Transmitter Provider	Transmit Channel	Transmit Frequency (MHz)	Attn Required (dB)	Attn Provided (dB)	Signal Margin (dB)
None								

No transmitter noise interference problems were predicted.

6.0 Receiver Desensitization Analysis

Receiver desensitization interference occurs when an undesired signal from a nearby "off-frequency" transmitter is sufficiently close to a receiver's operating frequency. The signal may get through the RF selectivity of the receiver. If this undesired signal is of sufficient amplitude, the receiver's critical voltage and current levels are altered and the performance of the receiver is degraded at its operating frequency. The gain of the receiver is reduced, thereby reducing the performance of the receiver.

A transmitter can be operating several megahertz away from the receiver frequency and/or its antenna can be located several thousand feet from the receiver's antenna and still cause interference.

The analysis predicts each transmitter's signal level present at the input of each receiver. It takes into account the transmitter's power output, frequency separation, transmission line losses, filters, duplexers, combiners, isolators, multi-couplers and other RF devices that are present in both systems. Additionally, the analysis considers the antenna separation space loss, horizontal and vertical gain components of the antennas as well as how they are mounted on the structure. The gain components are derived from antenna pattern data published by each manufacturer.

The analysis determines how much isolation is required, if any, to prevent receiver performance degradation caused by receiver desensitization interference. The Table below depicts the results of this analysis. For each receiver, the transmitter that has the worst-case impact is displayed. The Signal Margin represents the margin in dB, before the receiver's performance is degraded. A negative number indicates that the performance is degraded and the value indicates how much additional isolation is required to prevent receiver performance degradation.

Receiver Provider	Receive Channel	Receive Frequency (MHz)	Transmitter Provider	Transmit Channel	Transmit Frequency (MHz)	Attn Required (dB)	Attn Provided (dB)	Signal Margin (dB)
None								

No receiver desensitization interference problems were predicted.

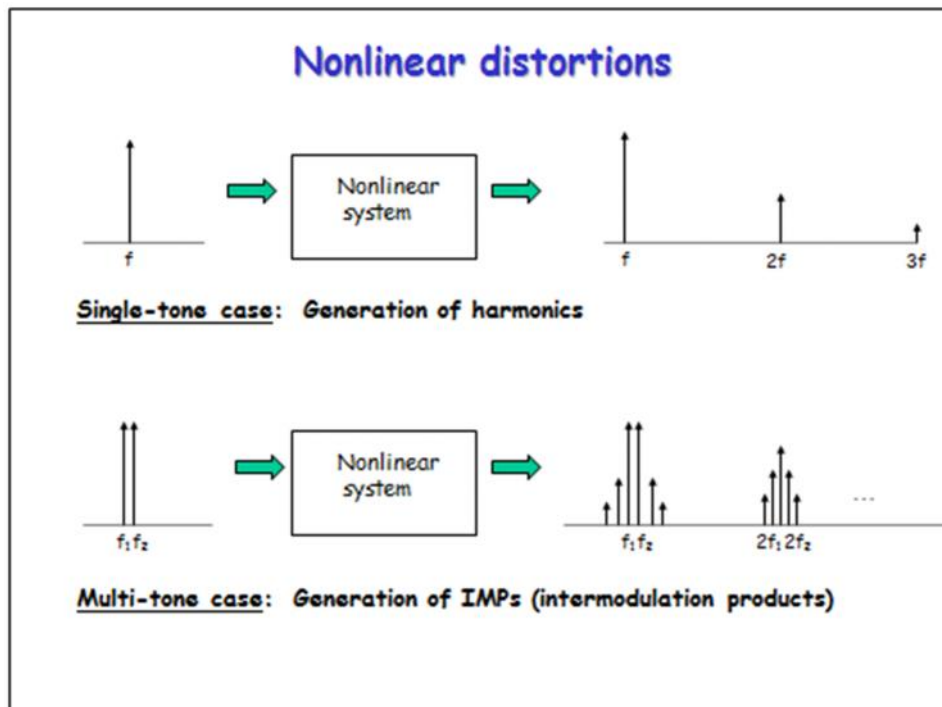
7.0 Intermodulation Interference Analysis

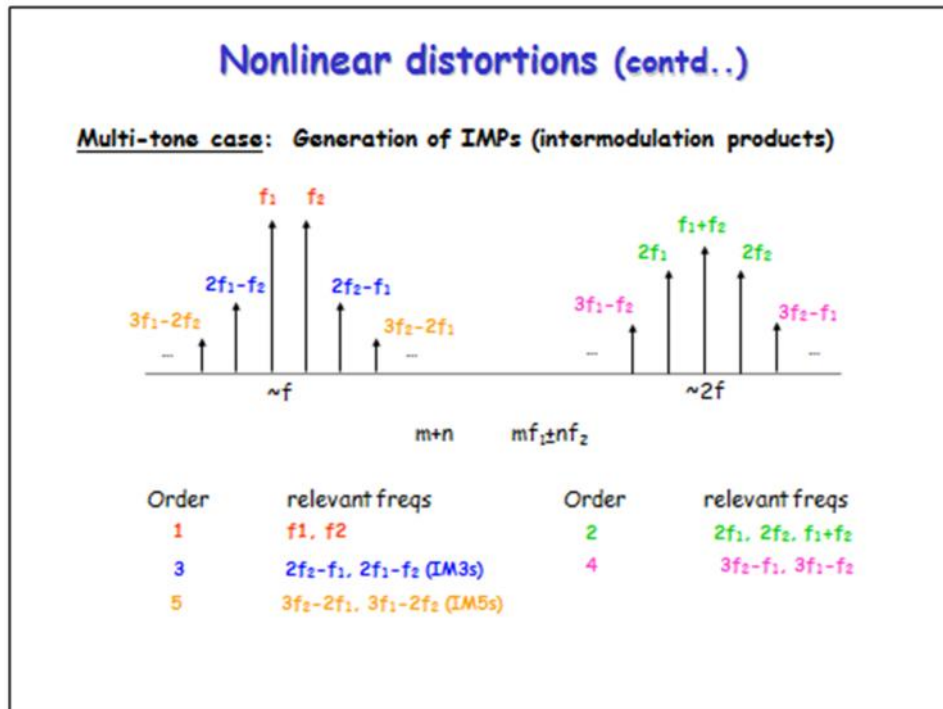
There are three basic categories of Intermodulation (IM) interference. They are receiver produced, transmitter produced, and "other" radiated IM. Transmitter produced IM is the result of one or more transmitters impressing a signal in the non-linear final output stage circuitry of another transmitter, usually via antenna coupling. The IM product frequency is then re-radiated from the transmitter's antenna. Receiver produced IM is the result of two or more transmitter signals mixing in a receiver RF amplifier or mixer stage when operating in a non-linear range.

"Other" radiated IM is the result of transmitter signals mixing in other non-linear junctions. These junctions are usually metallic, such as rusty bolts on a tower, dissimilar metallic junctions, or other non-linear metallic junctions in the area. IM products can also be caused by non-linearity in the transmission system such as antenna, transmission line, or connectors.

Communication sites with co-located transmitters, usually have RF coupling between each transmitter and antenna system. This results in the signals of each transmitter entering the nonlinear final output (PA) circuitry of the other transmitters. When intermodulation (IM) products are created in the output circuitry and they fall within the passband of the final amplifier, the IM products are re-radiated and may interfere with receivers at the same site or at other nearby sites. Additionally, these strong transmitter signals may directly enter a receiver and drive the RF amplifier into a nonlinear operation, or if not filtered effectively by the receiver input circuitry, these signals could mix in the nonlinear circuitry of the receiver front-end or mixer, creating IM products directly in the receiver.

The frequencies of IM mixing are known as nonlinear distortions. The images below depict how these IM products are derived when passing through a nonlinear junction/system.





Not all of the mixing possibilities are significant in creating interference signals. Some fall “out-of-band” of the receiver and the higher order IM products are usually weaker in signal strength.

7.1 Transmitter Generated Intermodulation Analysis

Intermodulation in transmitters occurs when a signal from another transmitter is impressed on the nonlinear final output stage circuitry, usually via antenna coupling. The power level of the IM product is determined by the power level of the incoming extraneous signal from another transmitter and by a conversion loss factor. The conversion loss factor takes into account the mixing efficiency of the transmitter’s final output stage. Conversion loss differs with transmitter design, adjustment, frequency separation of the source signals, and with the order of the IM product.

The analysis calculates all possible IM product frequencies that could potentially interfere with receivers at the communications site based on each receiver’s individual bandwidth. It then predicts each IM signal level present at the input of each affected receiver. For each IM frequency, the analysis considers all possible sources of IM generation in the transmitters. For example, if there are four transmitters involve, the analysis will calculate the IM signal level that would be generated in each transmitter. For this example, that would be four possible mixing conditions.

The analysis takes into account the transmitter’s power output, modulation bandwidth, conversion losses, transmission line losses, filters, duplexers, combiners, isolators, multi-couplers and other RF devices that are present in each system. Additionally, the analysis considers the antenna

separation space loss, horizontal and vertical gain components of the antennas as well as how they are mounted on the structure. The gain components are derived from antenna pattern data published by each manufacturer.

The analysis determines how much isolation is required to prevent receiver performance degradation for each IM interference signal that occurs. Receivers experiencing transmitter generated intermodulation interference are depicted in the following Table.

Tx 1 Source Mix Tx		Tx 2 Source		TX 3 Source		Tx 4 Source		Tx 5 Source		Intermod Hit		Affected Receiver		Attn Need
ID	Freq (MHz)	ID	Freq (MHz)	ID	Freq (MHz)	ID	Freq (MHz)	ID	Freq (MHz)	Freq (MHz)	Ord	ID	Freq (MHz)	
None														

No transmitter generated intermodulation interference problems were predicted.

7.2 Receiver Generated Intermodulation Analysis

Within a receiver, when two or more strong off-channel signals enter and mix in the receiver and one of the IM product frequencies created coincides with the receiver operating frequency, potential interference results. This internal IM mixing process takes place in the receiver's RF amplifier when it operates in a nonlinear range and/or in the first mixer, which, of course, has been designed to operate as a nonlinear device.

Receivers have a similar conversion loss type factor and receiver performance is commonly described in terms of conversion loss with respect to the 2A - B type products. Here, conversion loss is the ratio of a specified level of A and B to the level of the resulting IM product, when the product is viewed as an equivalent on-channel signal. Receiver conversion loss varies with input levels, AGC action, and product order.

The analysis calculates all possible IM product frequencies that could potentially interfere with receivers at the communications site based on each receiver's individual bandwidth. It then predicts each IM signal level present at the input of each affected receiver. For each IM frequency, the analysis considers that the IM signal is generated directly in the receiver.

The analysis takes into account the transmitter's power output, modulation bandwidth, conversion losses, transmission line losses, filters, duplexers, combiners, isolators, multi-couplers and other RF devices that are present in each system. Additionally, the analysis considers the antenna separation space loss, horizontal and vertical gain components of the antennas as well as how they are mounted on the structure. The gain components are derived from antenna pattern data published by each manufacturer.

The analysis determines how much isolation is required to prevent receiver performance degradation for each IM interference signal that occurs. Receivers experiencing receiver generated intermodulation interference are depicted in the following Table.

Tx 1 Source		Tx 2 Source		TX 3 Source		Tx 4 Source		Tx 5 Source		Intermod Hit		Affected Receiver		Attn Need
ID	Freq (MHz)	ID	Freq (MHz)	ID	Freq (MHz)	ID	Freq (MHz)	ID	Freq (MHz)	Freq (MHz)	Ord	ID	Freq (MHz)	
None														

No receiver generated intermodulation interference problems were predicted.

8.0 Transmitter Harmonic Output Interference Analysis

Transmitter harmonic interference is due to non-linear characteristics in a transmitter. The harmonics are typically created due to frequency multipliers and the non-linear design of the final output stage of the transmitter. If the harmonic signal falls within the passband of a nearby receiver and the signal level is of sufficient amplitude, it can degrade the performance of the receiver.

The analysis takes into account the transmitter's harmonic characteristics, output level, transmission line losses, filters, duplexers, combiners, isolators, multi-couplers and other RF devices that are present in each system. Additionally, the analysis considers the antenna separation space loss, horizontal and vertical gain components of the antennas as well as how they are mounted on the structure. The gain components are derived from antenna pattern data published by each manufacturer.

The analysis determines how much isolation is required to prevent receiver performance degradation for any harmonics that fall within a receiver's passband. Receivers experiencing transmitter harmonic interference are depicted in the following Table.

Transmitter		Harmonic		Affected Receiver		Attn Needed
ID	Frequency (MHz)	Frequency (MHz)	Order	ID	Frequency (MHz)	
None						

No transmitter generated harmonic interference problems were predicted.

9.0 Transmitter Spurious Output Interference Analysis

Transmitter spurious output interference can be attributed to many different factors in a transmitter. The generation of spurious frequencies could be due to non-linear characteristics in a transmitter or possibly the physical placement of components and unwanted coupling. If a spurious signal falls within the passband of a nearby receiver and the signal level is of sufficient amplitude, it can degrade the performance of the receiver.

The analysis takes into account a transmitter's spurious output specification, output levels, transmission line losses, filters, duplexers, combiners, isolators, multi-couplers and other RF devices that are present in each system. Additionally, the analysis considers the antenna separation space loss, horizontal and vertical gain components of the antennas as well as how they are mounted on the structure. The gain components are derived from antenna pattern data published by each manufacturer.

The analysis determines how much isolation is required to prevent receiver performance degradation for any transmitter spurious signals that fall within a receiver's passband. Receivers experiencing transmitter spurious output interference are depicted in the following Table.

Transmitter		Affected Receiver		Attn Needed
ID	Frequency (MHz)	ID	Frequency (MHz)	
None				

No transmitter generated spurious interference problems were predicted.

10.0 Interference Power Level Summing Analysis

This section of the report provides a simulation of Intermodulation (IM) interference, transmitter wideband noise and receiver desensitization interference occurring on each individual receiver when all transmitters at the site are active at the same instance in time. Even though individual interference modes may not be reported in other report sections, this summing analysis represents a worst-case interference scenario.

However, the probability of this interference occurrence for an individual receiver could be low since it depends on the utilization of the transmitters involved in the interference generation.

The carrier-to-noise $C/(I + N)$ ratio for each receiver is based on the aggregate of interference power levels. A negative $C/(I + N)$ ratio indicates that the performance of the receiver could possibly be degraded by the value shown.

The following Table presents this data:

Receiver		Interference Power Level (dBw)				
Channel Label	Freq (MHz)	Tx Noise	Rx Desense	IM Power	Aggregate	C / (I+N)
None						

11.0 Discussion and Recommendations

Public Safety system operated by the City of Denver at 210 West Colfax Avenue was included in this analysis as required. The City of Denver repeater antenna was modeled worse case at AT&T's antennas level of 69 feet. The City of Denver Public Safety antenna was included in this analysis at a distance of 250 feet and bearing of 90 degrees.

Conclusion: There is no indication that the proposed modification by AT&T will cause interference to the existing operations on this structure and Public Safety systems operating in the vicinity of the site.

12.0 Professional Certification

Engineering Statement Re:

Potential for Interference to Existing Services

At

10101152 (MRUTH026184)-CAPITOL HILL, for B&V on behalf AT&T

My signature on this study hereby certifies and affirms:

That I am employed by Sitesafe, LLC which provides engineering services to clients in the Radio Communications field; and

That I have examined the technical information supplied by B&V on behalf AT&T and their representatives relating to their intention to install antennas, transmitters and associated technical equipment on an existing communication site, on an existing tower/structure, currently identified as 10101152 (MRUTH026184)-CAPITOL HILL; and

That the technical equipment to be installed by AT&T represents the state of the art and that it has been carefully designed to preclude the possibility of interference to other services, including the transmission and reception of broadcast AM, FM, and Television and other communications services, such as police, fire, utility and other public safety and public service facilities as well as private communications installations, such as cordless telephones, and Citizen's Band and Radio Amateur stations; and

That the equipment to be installed by AT&T, meets or exceeds all Federal Communications Commission emission requirements to avoid interfering with other services and home/business equipment; and

That frequency information provided by B&V on behalf AT&T concerning existing installations on this structure has been examined to estimate the potential for interference to existing and proposed operations, resulting from the introduction of the AT&T's operation; and

That this examination involved the computation of intermodulation products, transmitter harmonics, receiver desensitization, and transmitter spurious emissions produced by the combination of frequencies associated with existing services known to currently operate at the 10101152 (MRUTH026184)-CAPITOL HILL site, and these frequencies, which could be used by others at the 10101152 (MRUTH026184)-CAPITOL HILL site

That intermodulation products were computed (as a minimum) for the fundamental (f_0), second ($2 f_0$) thru seventh ($7 f_0$) harmonic components of frequencies at this site; and

That predicted products were not found to potentially cause intermodulation to AT&T's proposed operations or to the other licenses currently operating at the 10101152 (MRUTH026184)-CAPITOL HILL site; and

That no additional isolation needs to be provided between antennas in the horizontal and vertical planes, and the attenuation along the nadir and zenith associated with vertical plane radiation patterns; and

That after examination the levels of RF energy present at the 10101152 (MRUTH026184)-CAPITOL HILL site, receiver sensitivity will not be degraded by either the existing or AT&T's proposed operations; and

That, if interference were to occur as a result of AT&T's operations, AT&T's would be expected to recognize its responsibility to act promptly to take steps necessary to correct the interference, including, but not limited to, filtering and frequency coordination; and

In summary, it is stated here that there is not an indication that the installation being proposed by AT&T's will create interference to their own operations, or the operations of any of the services currently operating at the 10101152 (MRUTH026184)-CAPITOL HILL site. Even in the event that, upon installation of AT&T's equipment, interference was determined to exist and to be the actual interference source, frequency coordination and filtering would be AT&T's primary corrective course of action, and should successfully eliminate the problem.

Certain generic technical assumptions regarding power settings, filtering, and equipment characteristics were made in preparing this analysis, as this technical information was not made available by the client.

Thank You for Using Sitesafe for Your RF Engineering Needs.



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
07/18/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Marsh USA, Inc. 800 Market Street, Suite 1800 St. Louis, MO 63101	CONTACT NAME: Marsh U.S. Operations	
	PHONE (A/C, No. Ext): 866-966-4664	FAX (A/C, No):
E-MAIL ADDRESS: Att.CertRequest@marsh.com		
INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A : Old Republic Insurance Company		24147
INSURER B :		
INSURER C :		
INSURER D :		
INSURER E :		
INSURER F :		

CN103150778-GAW-CRT-22-23 N Y ds8317 Y

INSURED
 New Cingular Wireless PCS, LLC
 One AT&T Plaza
 208 South Akard
 Room 1820
 Dallas, TX 75202

COVERAGES CERTIFICATE NUMBER: CHI-009113706-15 **REVISION NUMBER:**

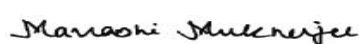
THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			MWZY 313636 22	06/01/2022	06/01/2023	EACH OCCURRENCE	\$ 2,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	\$ 1,000,000
							MED EXP (Any one person)	\$ N/A
							PERSONAL & ADV INJURY	\$ 2,000,000
							GENERAL AGGREGATE	\$ 10,000,000
							PRODUCTS - COMP/OP AGG	\$ 2,000,000
								\$
A	<input checked="" type="checkbox"/> AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS ONLY <input type="checkbox"/> NON-OWNED AUTOS ONLY			MWTB 313635 22	06/01/2022	06/01/2023	COMBINED SINGLE LIMIT (Ea accident)	\$ 1,000,000
							BODILY INJURY (Per person)	\$
							BODILY INJURY (Per accident)	\$
							PROPERTY DAMAGE (Per accident)	\$
								\$
	<input type="checkbox"/> UMBRELLA LIAB <input type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$						EACH OCCURRENCE	\$
							AGGREGATE	\$
								\$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? <input checked="" type="checkbox"/> Y <input checked="" type="checkbox"/> N <input type="checkbox"/> N/A (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below			MWC 313638 22 (AOS)	06/01/2022	06/01/2023	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTHER E.L. EACH ACCIDENT	\$ 1,000,000
							E.L. DISEASE - EA EMPLOYEE	\$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	\$ 1,000,000
A	Excess Workers' Compensation / Employers' Liability			MWXS 313639 22 (OH,WA) See Second Page	06/01/2022	06/01/2023	EL Each Accident / EL Disease EL Disease-Policy Limit	1,000,000 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
 Re: Capitol Hill / 303 West Colfax, Denver, CO 80265 / FA# 10101152.

The City and County of Denver, its Elected and Appointed Officials, Employees and Volunteers is/are included as Additional Insured under the General Liability and Automobile Liability policies but only with respect to the requirements of the contract between the Certificate Holder and the Insured. This insurance is primary with respect to the interest of the Additional Insured and any other insurance maintained by Additional Insured is excess and non-contributory with this insurance. Waiver of Subrogation is provided for General Liability, Automobile Liability and Workers' Compensation as required by written contract and allowable by law.

CERTIFICATE HOLDER**CANCELLATION**

The City and County of Denver Attn: Lisa Lumley 201 W. Colfax Ave., Dept. 1010 Denver, CO 80202	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE of Marsh USA Inc 

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ADDITIONAL REMARKS SCHEDULE

AGENCY Marsh USA, Inc.		NAMED INSURED New Cingular Wireless PCS, LLC One AT&T Plaza 208 South Akard Room 1820 Dallas, TX 75202	
POLICY NUMBER		EFFECTIVE DATE:	
CARRIER	NAIC CODE		

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,
FORM NUMBER: 25 **FORM TITLE:** Certificate of Liability Insurance

Excess Workers' Compensation -MWXS 313639 22 (OH-WA)
 Self Insured Retentions
 OH & WA - \$500,000,000 (except Terrorism)
 OH & WA - \$600,000,000 Terrorism