

**City of Providence**

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

**CHAPTER 2008-35****No. 286****AN ORDINANCE****CREATING CHAPTER VIII OF TITLE 5  
REGARDING IN-BUILDING PUBLIC SAFETY RADIO  
SYSTEM COVERAGE AND OBSTRUCTION TO  
MICROWAVE COMMUNICATIONS FACILITIES***Approved July 14, 2008****Be it ordained by the City of Providence:***

WHEREAS, the City of Providence ("City") provides public safety services to its community including fire services through the Providence Fire Department ("PFD") and police services through the Providence Police Department ("PPD").

WHEREAS, as the city enjoys rapid growth, many new buildings are being constructed within the city and some of these buildings have been, and will in the future be, constructed out of substances (e.g., metal and concrete), which impede and/or impair radio communications or obstruct fixed point-to-point microwave operations used by the PFD and PPD. The City's fire and police personnel have been finding it increasingly difficult to effectively communicate with each other and PFD and PPD's communications centers during critical situations while in dense or subterranean residential and commercial structures. As a result, both the public at large and emergency personnel may face an increased risk of harm; and

WHEREAS, in order to minimize the danger to life caused by ineffective communication, all planned construction of new buildings that do not allow for the necessary level of communication under the 800 MHz Citywide Coordinated Communications System be equipped with technology that will allow effective and continuous radio communication to be maintained. Moreover, microwave connectivity between sites must continue to maintain highly reliable link availability ; and

WHEREAS, the proposed ordinance constitutes a "local security standard" regulating the erection, construction, or alteration of buildings within the City;

THEREFORE, THE CITY COUNCIL OF THE CITY OF PROVIDENCE ORDAINS AS FOLLOWS:

**SECTION 1.** Title 5 of the Providence Municipal Code entitled "Building and Structures," is hereby amended to add Chapter VIII, entitled "IN-BUILDING PUBLIC SAFETY RADIO SYSTEM COVERAGE AND OBSTRUCTION TO FIXED POINT-TO-POINT MICROWAVE NETWORK" as follows:

**Sec. 5-110. Intent and purpose.**

The intent of the chapter is to provide a regulatory framework for the purpose of providing effective 800 MHz Citywide Coordinated Communication System in-building coverage and to maintain current availability specification for fixed point-to-point microwave network throughout the City of Providence for police and fire emergency services.

#### **Sec. 5-111. Definitions.**

The following words, terms, and phrases when used in this chapter shall have the meanings ascribed to them in this section, except where the context clearly indicates a differing meaning:

**Communications:** City of Providence Communications Division.

**Citywide Coordinated Communication System:** That radio system used by all local law enforcement and fire departments within the City of Providence for emergency and non-emergency radio communication on the 800 MHz radio band. Citywide Coordinated Communications System also includes fixed point-to-point microwave sub-system.

**City of Providence In-Building Public Safety Radio System Coverage Specifications:**

Those specifications designed to provide optimum coverage and radio effectiveness within buildings and structures under the Citywide Coordinated Communication System. Also, minimize obstruction to existing microwave point-to-point links supporting both radio and data communications.

**DAQ - Delivered Audio Quality:**

DAQ as described in TIA-TSB88 Technical Bulletin. TSB-88 are principles set forth by the Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin, titled "*Wireless Communications Systems - Performance in Noise and Interference-Limited Situations - Recommended Methods for Technology-Independent Modeling, Simulation, and Verification*".

Delivered audio quality is a numeric rating of perceived speech intelligibility as follows:

- DAQ 1: Unusable Speech present and not intelligible.
- DAQ 2: Speech understandable with considerable effort. Requires frequent repetition due to noise and or distortion.
- DAQ 3: Speech understandable with slight effort. Requires occasional repetition due to noise and or distortion.
- DAQ 3.4: Speech understandable without repetition. Some noise and or distortion.
- DAQ 4: Speech easily understood. Occasional noise and or distortion.
- DAQ 5: Speech easily understood. No noise and or distortion.

**The Citywide Coordinated Communication System shall have a minimum specification of DAQ 3.4.**

**Coverage Reliability:** The reliability to communicate between a portable radio and Communications, to include the ability of the portable radio to hear Communications and the ability of the portable radio to transmit back and be heard by the system.

**800 MHz Radio. The usable radio signal minimum reliability of the Citywide Coordinated Communication System shall be 95% in General Areas and 99% in Critical Areas.**

**General Area.** Shall be provided with 95% floor area radio coverage. These areas include all other areas not specified as a Critical Area.

**Critical Areas.** Shall be provided with 99% floor area radio coverage. Critical areas include: the emergency command center(s), the fire pump room(s), exit stairs, exit

passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations, and other areas deemed critical by the City.

**Fixed Point-To-Point Microwave Radio.** Shall be provided with 99.999% link availability.

**Sec. 5-112. Use and occupancy.**

Except as otherwise provided, no person shall own, erect, construct or occupy, any building or structure, or any part thereof, or cause the same to be done, which fails to support adequate radio coverage for City emergency service workers operating on the 800 MHz Citywide Coordinated Communication System. Further, owners must maintain a reasonable standard of reliable radio communication within their buildings and structures once a Certificate of Occupancy is issued.

For the purposes of this section, adequate radio coverage shall include those specifications in the City of Providence In-Building Public Safety Radio System Coverage Specifications, attached and incorporated herein as Attachment "A", and Obstruction to Fixed Point-to-Point Microwave Network specification is found in Attachment "B".

**Sec. 5-113. Testing procedures.**

Test of radio coverage will be conducted pursuant to those specifications in the City of Providence In-Building Public Safety Radio System Coverage Specifications, attached and incorporated herein as Attachment "A", as summarized below.

**A. Initial Tests.**

**1. New Buildings.** Initial Tests will be performed by FCC certified technicians, authorized by the Communications Division, or by such agency in accordance with Test Standards as listed in the City of Providence In-Building Public Safety Radio System Coverage Specifications, attached and incorporated herein as Attachment "A". A Certificate of Occupancy shall not be issued to any structure if said structure, or any part thereof, fails to comply with these Test Standards.

**2. Existing Buildings.** Within twelve (12) months of an approved Ordinance, Initial Tests will be performed by FCC certified technicians, authorized by the Communications Division, or by such agency in accordance with Test Standards as listed in the City of Providence In-Building Public Safety Radio System Coverage Specifications, attached and incorporated herein as Attachment "A". If building owner fails to comply with these Test Standards, the building will be considered as non compliant

**B. Annual Tests.**

Annual tests will be conducted by PFD, the local fire department personnel, or their agent in accordance with the Test Standards as listed in the City of Providence In-Building Public Safety Radio System Coverage Specifications, attached and incorporated herein as Attachment "A".

**Sec. 5-114. Amplification systems allowed.**

Buildings and structures that cannot support the required level of radio coverage shall be equipped with amplification systems as specified in the City of Providence In-Building Safety

Radio System Coverage Specifications, attached and incorporated herein as Attachment "A" or any other system approved by the Communications, in writing.

**Sec. 5-115. Who Must Comply.**

This ordinance shall apply to the following:

**A. New Buildings**

All newly constructed buildings and structures greater than 5,000 square-feet, whether constructed above or below earth grade, and at any time that may be occupied by employees or the public in general. Must be capable by design and test of receiving and transmitting voice radio signals from the Citywide Coordinated Communication System portable radio on each floor or level from and too Communications, and with coverage reliability equal to as described in the City of Providence In-Building Public Safety Radio System Coverage Specifications, attached and incorporated herein as Attachment "A".

**B. Existing Buildings**

Within five years after the enactment of this ordinance, any existing building or structure of a size larger then 5000-sq feet not meeting the required radio coverage of this ordinance by testing as delineated in Attachment-A, whether constructed above or below ground, and at any time that may be occupied by employees or the public in general; must be capable of receiving and transmitting voice radio signals from the Citywide Coordinated Communication System on each floor or level from, or to Communications with coverage reliability equal to as described in the City of Providence In-Building Public Safety Radio System Coverage Specifications, attached and incorporated herein as Attachment "A".

**Sec. 5-116. Exemptions:**

This ordinance shall not apply to any single, two, or three family residences.

There are no automatic exemptions for any buildings or structures under this ordinance that are serviced by public safety responders; except that, should there be a building or structure as previously described, and proven by the owner not to at any time, or in any way be used or occupied or responded to by public safety responders; then such owner may submit a letter stating their request for such exemption and the reasons therefore.

The letter must be addressed to; Director, Communications Division, City of Providence Public Safety, 1 Communications Place. Providence, RI 02903

A decision will then be rendered within sixty (60) days of receipt of the request for exemption.

**Sec. 5-117 Costs.**

The FCC certified and Communications approved technician required by section 5-113 to conduct Initial Tests shall be employed by the owner, the engineer or architect of record, or agent of the owner, but not by the contractor or any other person responsible for the work.

**Sec. 5-118. Noncompliance.**

After discovery of noncompliance following issuance of Certificate of Occupancy or failure to perform initial tests required in 5-113.A.2, the building owner is provided six (6) months to remedy the deficiency and gain compliance.

**Sec. 5-119. Penalties.**

Any person violating any of the provisions of this Ordinance shall be subject to a fine pursuant to Section 1-10 of the Providence Code of Ordinances. Each individual day of operation in violation of the provisions of this Ordinance shall be a separate violation. In addition, any continued non-compliance by any building shall be subject to fines and/or penalties as set forth by the currently adopted International Fire Codes.

**SECTION 2. Environmental Determination.**

The Ordinance sets forth specifications and procedures for the maintenance, restoration, enhancement, and protection of the environment.

**SECTION 3. Inconsistencies.**

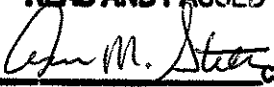
Any provision of the Providence Municipal Code or appendices thereto inconsistent with the provisions of this Ordinance, to the extent of such inconsistencies and no further, is hereby repealed or modified to the extent necessary to affect the provisions of this Ordinance.


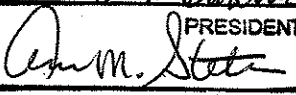
**SECTION 4. Severability**

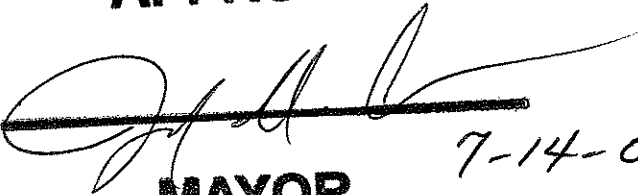
If any chapter, article, section, subsection, subdivision, sentence, clause, phrase, or portion of this Ordinance, or the application thereof to any person, is for any reason held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portion of this Ordinance or its application to other persons. The City Council hereby declares that it would have adopted this Ordinance and each chapter, article, section, subsection, subdivision, sentence, clause, phrase or portion thereof, irrespective of the fact that any one or more subsections, subdivisions, sentences, clauses, phrases, or portions of the application thereof to any person, be declared invalid or unconstitutional. No portion of this Ordinance shall supersede any local, State, or Federal law, regulation, or codes dealing with life safety factors

**SECTION 5.** This Ordinance shall take effect and be in full force thirty (30) days from and after the passage thereof and prior to the expiration of fifteen (15) days from its passage shall be published once in the THE PROVIDENCE JOURNAL, a newspaper of general circulation, printed and published in the City of Providence or, in the alternative, the City Clerk may cause to be published a summary of this Ordinance and a certified copy of the text of this Ordinance shall be posted in the office of the City Clerk five (5) days prior to the date of adoption of this ordinance, and within fifteen (15) days after adoption, the City Clerk shall cause to be

published the aforementioned summary and shall post in the office of the City Clerk a certified copy of this Ordinance together with the names and members of the City Council voting for and against the same.

**IN CITY COUNCIL**  
JUN 19 2008  
FIRST READING  
READ AND PASSED  
  
CLERK

**IN CITY COUNCIL**  
JUL 3 2008  
FINAL READING  
READ AND PASSED  
  
PRESIDENT  
  
CLERK

**APPROVED**  
  
7-14-08  
**MAYOR**

**ATTACHMENT "A"**  
**CITY OF PROVIDENCE IN-BUILDING PUBLIC SAFETY RADIO SYSTEM**  
**COVERAGE SPECIFICATIONS**

**1. Performance.**

Specifications are provided to assist property owners in satisfying a delivered audio quality (DAQ) of 3.4 with a 95% [99% in critical areas] reliability factor for emergency personnel using radio communication in their buildings and structures. Property owners who can demonstrate full compliance with the reliability factor without adhering to all of the following specifications may be excused from all or part of these provisions. Property owners who adhere to all of the specifications and fail to reach the reliability factor must employ all resources necessary to ensure full compliance.

Performance and compliance will be inspected annually as part of the PFD's Fire Inspection.

**2. Signal Strength, Signal Rejection, Modulation Compatibility, and Delivered Audio Quality and Technical Specifications.**

The following defines the minimum required level of radio signal strength:

- 95% [99% in Critical Areas] of the area of each floor of the building with a DAQ of 3.4 from both the 800 MHz Citywide Communications System and from within the building is required.
- The frequency range supported from the 800 MHz Citywide communications System shall be [851 - 854 MHz] & [764 - 776 MHz] (base transmitter frequencies).
- The frequency range supported to the 800 MHz Citywide Communications System shall be [806 - 809 MHz] & [794 - 806 MHz] (subscriber radio frequencies).
- A public safety radio amplification system shall include filters to reject frequencies below 764 MHz and frequencies above 854 MHz by a minimum of 35 dB.
- All system components must be 100% compatible with analog and digital modulations after installation without additional adjustments or modifications. The systems must be capable of encompassing the frequencies stated herein and capable of future modifications to a frequency range subsequently established by the City of Providence. If the system is not capable of modification to future frequencies, then a new system will need to be installed to accommodate the new frequency band.
- Active devices shall have a minimum of -50 dB 3 rd order intermodulation protection.
- Any in-building coverage system shall be designed by a qualified engineer or designer with experience in public fire service communications and BDA use.
- Any in-building coverage system shall be installed by a City approved, manufacturer trained and certified installer to provide delivered audio quality of DAQ 3.4 with a reliability of 95% [99% in critical areas].

**3. Remedies to achieve compliance (Acceptable Amplification Systems):**

If needed to ensure compliance with the 95% [99% in critical areas] reliability factor with a DAQ 3.4, the property owner must install each of the following:

- An in-building coverage system composed of a radiating cable system, or an internal multiple antenna system with FCC certified 800 MHz bidirectional amplifier (s) [BDA], distribution system, and subcomponents.
- Buildings and structures that do not require additional radio signal amplification as provided by a BDA; that by design and test may be served by a passive or non-powered antenna system; may be so, providing that the coverage requirements are met by the passive devices.

- Multi-band pass filters as required.
- Other technology solutions may be proposed that will provide coverage as described in this ordinance, and that meet or exceed the 95% [99% in critical areas] reliability DAQ 3.4 requirement.

In the event of a power outage, all electrical components must be equipped with independent auxiliary battery power or generators to function at full capacity for at least twelve (12) hours.

Once a system is installed, a Spectrum Analyzer will be used to evaluate the system for harmful interference to the 800 MHz Citywide Coordinated Communications system backbone initially, and annually thereafter by a City of Providence approved FCC certified technician. Any interference must be identified and removed before the system can be accepted.

#### **4. Applicable Installation Standards and Compliance.**

All systems must be constructed in accordance with applicable Federal, State and Local Law; construction must meet at a minimum these requirements:

- Only active bi-directional amplifiers may be installed, and used that meet Federal Communications Commission (FCC) rules 90.7, and 90.219. Any active BDA must have FCC Type Acceptance and display such acceptance information on the device chassis or cabinet.
- BDA and passive installations must conform to the RI State Uniform Fire Prevention & Building Code, the National Electric Code (NEC), Underwriters Laboratories (UL) and Motorola R-56 Standards for fixed network equipment.
- The BDA unit and backup power supply system will be enclosed in NEMA 4 steel cabinet(s) with suitable access for servicing the unit. The BDA and backup electric power housing will be wall mounted side by side, or may be house in a single suitably sized cabinet. All electrical wiring will be routed in conduit. Only ridged radio transmission coaxial cable, carrier or slotted (leaky), sized for the length of the antenna systems application will be used.
- The cabinet will be painted with FIRE ENGINE RED color and marked as follows: CITY OF PROVIDENCE RADIO SYSTEM BDA - [include phone Communications number here] in bright three (3) inch yellow letters.
- The BDA unit will include a sub-system that monitors amplifier operation and primary power. Upon failure, a local audible warning device (90 dB minimum) will activate. Silencing of this alarm is the responsibility of the equipment maintenance contractor. The system may be also monitored by a twenty-four (24) hour alarm station.
- Fire Alarm System. The public safety radio enhancement system shall include automatic supervisory and trouble signals of malfunctions of the signal booster(s) and power supplies that are annunciated by the fire alarm system. Power supply supervisory signals shall include the following for each signal booster:
  1. Loss of normal ac power
  2. Failure of battery charger
  3. Low battery capacity, alarming at 70% of battery capacity.
- Dedicated Panel. A dedicated monitoring panel shall be provided within the emergency command center to annunciate the status of all signal boosters location. The monitoring panel shall provide visual and labeled indication of the following for each booster:
  1. Normal ac power
  2. Signal booster trouble
  3. Loss of normal ac power
  4. Failure of battery charger
  5. Low battery capacity



- The unit will be installed in a secured environment, to prevent tampering. Installed in a location where there is a Fire Command Center, the BDA and related back-up power supply will be installed in the Fire Command Center. For any other installation, the secured room location should be as secure from fire and or explosion as possible.
- The equipment room must have access to the building halo or electrical ground system, and shall be well ventilated with a maximum temperature at any time not exceeding 80 degrees Fahrenheit. An electric circuit breaker panel with two, 117 VAC, 15 amp branch circuits shall be installed in the equipment room to service the bi-directional amplifier unit and backup power supply.
- Passive antenna systems installation shall follow all applicable parts of this section as they will relate to antenna systems grounding.

## 5. Test Standards.

### A. Design Review and Certification.

1. To obtain a building permit, the applicant shall do the following:
  - i. Retain an FCC certified and Communications approved technician who will review construction plans in order to ensure that such plans meet aforementioned radio communication criteria, and recommend, if needed, an in-building solution for reliable radio communication:
  - ii. Submit copies of plans certified with the signature of the technician to the Building Official of the City of Providence, PFD, and Communications within a timely manner:
2. To obtain a Certificate of Occupancy, the applicant shall do the following once the building or structure is constructed:
  - i. Retain an FCC certified and Communications approved technician who will test all areas of the building or structure and certify all of the findings stated herein on the date of inspection with his/her signature. A passing test is one that demonstrates DAQ 3.4 with a 95% [99% in critical areas] reliability factor on each floor. Owners of buildings or structures that fail to meet this standard will not be in compliance with this ordinance.
  - ii. The building owner must retain all records of initial and annual inspections and submit copies to the Building Official of the City of Providence, PFD, and Communications within a timely manner.
3. *For existing buildings, Tests Standard and Design Review includes Section 5.A.1.i, 5.A.1.ii, 5.A.2.I, 5.A.2.II above.*

### B. Initial Test Procedure.

For the Critical Area tests [99%], each area must pass.

For the General Area tests [95%], each floor of the building shall be divided into a grid of approximately twenty (20) equal areas. A maximum of one (1) nonadjacent area will be permitted to fail the test. In the event that two (2) of the areas fail the test, and to provide greater statistical accuracy, the floor may be divided into forty (40) equal areas.

In such an event, a maximum of four (4) nonadjacent areas will be permitted to fail the test. As specified by the authority having jurisdiction, the test shall be conducted by using a Motorola ASTRO XTS 5000 or equivalent [XTS 1500, XTS 2500] portable radio talking through the 800 MHz Citywide Coordinated Communications System. A spot located approximately in the center of a grid area will be selected for the test. The radio will then be keyed with a voice transmission. A DAQ level will then be determined to verify the quality of two way communication to and from the outside of the building through the 800 MHz

Citywide Communications System. Once the spot has been selected, prospecting for a better spot within the grid area will not be permitted.

All auxiliary power systems shall be tested under load for a period of twelve (12) hour to verify that the system will operate properly in the event of a power outage. The testing technician reserves the discretion to determine whether or not the battery exhibits symptoms of failure. The FCC certified technician will ultimately decide if the auxiliary system needs to be replaced or upgraded.

**C. Annual Test Procedure.**

After a Certificate of Occupancy is issued, the PFD Inspector or appointed agent will annually test the in-building system components to determine general functional operability. If non-compliance is found, an approved FCC certified technician will reassess the improvement upon scheduling by the building owner.

**D. Battery Replacement**

Every two years battery backup systems shall be replaced per manufacturer's specifications.

**E. System Failure Notification**

Should after a period of time or when discovered, a BDA fail to perform, the building / structure owner must immediately notify Communications and cause the BDA to be repaired and tested. The owner of the building / structure shall notify the Communications when the BDA has been repaired and has been tested and verified to provide the specified level of signal coverage.

**6. Additional equipment feature requirements.**

Active devices shall be alarmed.

Access to the active components of the in-building coverage system (if any) is required twenty-four (24) hours a day by City technicians/engineers.

**ATTACHMENT "B"**  
**CITY OF PROVIDENCE OBSTRUCTION TO FIXED POINT-TO-POINT**  
**MICROWAVE NETWORK SPECIFICATIONS**

**Obstruction to Microwave Paths**

The City of Providence operates microwave radio links for their citywide 800 MHz Public Safety Radio System. The microwave system is a critical and integrated component of the City's communications system, providing connectivity to the City's Communications Center for command and control. The 800 MHz Public Safety Radio System provides critical public safety communications for Law Enforcement, Fire, and EMS personnel protecting the public health, safety and general welfare of the citizens of Providence. This ordinance is to evaluate the potential impact of new structures on the 800 MHz Public Safety Radio System's Microwave Network used by first responders.

The ordinance requires that new structure construction not be an obstruction to existing microwave paths, or reduce path performance of this highly reliable communications backbone. Existing performance of the microwave system cannot be degraded. To ensure that no performance degradation or path obstruction occurs, the structure owner shall submit a certified plot that surveys all three locations (i.e. two microwave path end points and the new structure location) showing the proposed structure's closest point to a straight line drawn between the two microwave path end points. If the proposed structure is greater than 500-ft from the path centerline, there is no need for further work. An electronic GIS plot or a simple plot drawn on a USGS topo map is sufficient along with the professional engineer's certification.

A new structure that is closer than 500-ft will require additional engineering analysis to determine if any system performance will be reduced. Any reduction in performance shall be remedied by the structure owner. The structure owner shall bear all expense for additional studies, and if required, system reconfiguration. The structure owner shall be required to maintain the original system performance specifications.

A Structure is defined as anything that is constructed or erected on the ground or which is attached to something on the ground whether permanent or temporary. Structures include, but are not limited to, buildings, fill areas, water towers, silos, radio and TV towers, signs and billboards, and telephone poles. This requirement shall not apply to buildings less than 5,000 square-feet or buildings zoned for Residential 1 & 2 Family Units.

### **System Technical Data and Path Availability**

The City of Providence operates two independent point-to-point Microwave Systems.

- 1] 10.5 GHz microwave system providing 800 MHz radio network connectivity
- 2] 2.4 GHz ISM microwave system providing WLAN backhaul connectivity

Both networks are designed for a minimum of 99.999% [a/k/a five-nines] availability and takes into consideration existing structures along the microwave system transmission path, such as obstructions from natural terrain and, environmental factors. The proposed structure shall not protrude inside the 0.6 Fresnel zone of the microwave beam.

### **10.5 GHz Microwave Network**

The following diagram shows essential microwave system data for use in determining if mitigation is required.

## **CITY OF PROVIDENCE 10.5 GHz MICROWAVE ROUTING SYSTEM AND PATH DATA**

### **2.4 GHz ISM Fixed Point-to-Point Network**

The applicant shall contact either the City Hall or the Communications Division for a listing of fixed point microwave locations.

### **System Mitigation**

If the City determines that mitigation efforts are required, prior to the issuance of final permits or occupancy of the building, the structure owner shall mitigate the impact to the City's Microwave System paths so as to restore a minimum of 99.999% system availability. The City will perform all tasks required to restore the City's Microwave System to comparable facilities. Remedies may include relocating existing microwave relay/site equipment or providing a new microwave relay site/equipment at another site depending the outcome of the engineering study. The decision of the City will be final as to the need for mitigation.

### **Mitigation Process**

The process to maintain the City's microwave system reliability is as follows:

- The structure owner submits a certified plot to the City for evaluation. If no mitigation is required, no further action is required from the City or Structure Owner.
- If mitigation is required, tasks to maintain comparable facilities will occur in three [3] phase as follows:
  - Phase-1
    - The City will develop and submit cost estimates to the structure owner for reimbursement of an engineering analysis to maintain microwave facilities. Major tasks include but not limited to the work effort to determine alternative routing; identify alternate site facilities; define hardware requirements; conduct physical path surveys to determine proper clearance; frequency coordination and FCC licensing.
  - Phase-2

- The City will review the results of the Phase-1 analysis and develop a work plan and cost estimate to implement the solution to mitigate the obstruction and submit to the structure owner for cost reimbursement.
- Phase-3
  - Once the solution is implemented, there will be a performance period of 90-days. The City will monitor the system for zero bit-error-rate during this period. If remedial action is needed, the City will provide the structure owner with a cost estimate to eliminate the problem and bring the system back to comparable operation.