PROPOSAL TO PERFORM FEASIBILITY STUDY OF CIRC HOTEL HOLLYWOOD, FL

January 22, 2019

INTRODUCTION

The CIRC Hotel located at 1780 Polk Street in Hollywood, FL 33020 is being evaluated as an alternate location to the originally planned Broward County Public Safety Communications tower at the West Lake Park site. The boiler room of the Hotel will be considered for all the necessary RF equipment, including the DC power system. An environmentally controlled room must be constructed in the boiler room to sufficiently house the RF equipment, with accommodations to avoid water intrusion. Considerations will also be made for the mounting of the six radio system antennas and two microwave dishes onto the Hotel rooftop, as well as routing of all required RF cables into the proposed equipment room. Installation of a new generator to support the County's equipment is also included in the evaluation.

Given the added scope of work and level of effort, it is anticipated that there will be an impact on the targeted completion date of Broward County's Public Safety Radio Tower Replacement Project. With current unknown aspects (i.e. the location to place the generator, and confirmation that the boiler room flooring is structurally capable of accommodating all of the RF equipment, etc.), and the level of effort and complexity to build, the time that it will take to build, the cost to build, and the added complexities for post implementation support and maintenance of the site, it is Motorola Solutions' recommendation that the County not move forward with the alternate tower site. Additionally, the expert recommendation of KCI Communications Systems Engineering Firm (Motorola subcontractor) will be provided as a separate document.

SITE DETAILS

SITE SURVEY 1/11/2019:

- Met with County and Building representative (who provided access to boiler room and rooftop).
- Measured required space of 20'x30' in boiler room which would be used for the equipment room. Took pictures of space.
- The proposed equipment room (within the existing boiler room) will require the floor to be raised a minimum of 8", within the required 20' x 30' space, due to the possibility of the flooding.
- The proposed equipment room requires a minimum height of 9' and the ceiling/roof of the equipment room will require a protective membrane to protect against any possible overhead leaks.
- The existing boiler room has a large column near the outer wall that will necessarily be contained within the proposed enclosed space. This is unavoidable due to the size and shape of the existing boiler room. The proposed enclosed space will need to be framed with masonry material. The roof/ceiling of the proposed room will necessarily be framed in as well to ensure that any debris from the boiler or potential leaking from the ceiling above will not damage any of the equipment. Installation of four air conditioners will be necessary on the wall adjacent to the boilers, and a drainage pipe will need to be added to route condensation from the HVAC.

- The existing water-based fire suppression system will need to be removed from above the proposed equipment room. The roof/ceiling of the proposed room will be designed to minimize leakage, however the existing fire suppression system would pose a risk of damage to grounding and other electrical service from the chemical discharge, and therefore would need to be removed.
- For the antenna coax cables and waveguides, two entry ports into the boiler room would need to be installed to ensure that the cables do not impact the existing roof climbing ladder or existing water drains. Cables will be attached to the inner parapet wall and if able to mount on the outer parapet wall, the wall above the flashing will be penetrated, and then the cables will be routed inside the outer parapet wall to the antennas. All antennas must be sufficiently elevated above all roof obstructions to avoid shadowing from the building structure. This will require either pipe mounts attached with wall mounts and a guyed system, or wall mounts and some other form of tieback to the roof or the wall to stabilize the antennas. The stabilization system is necessary to minimize movement of the antennas in high wind conditions.
- The following details must be provided by the building owner as prerequisites to completing final site plans and costing:
  - Location of commercial power feed(s) and routing layout of service feed(s) to the boiler room proposed space.
  - Electrical riser diagram to show where power comes from, in order to provide 400A service to the proposed equipment room.
  - The location of the generator, and routing of required cabling to ATS and equipment room.
  - Location of TELCO service and routing layout of service feed to the boiler room proposed space. Also need to know if fiber has been run to the building and the ability to extend service to the proposed equipment room.
  - Any aesthetic requirements of building owner.

PRE-REQUISITE SITE ENGINEERING

If it is decided to proceed with constructing at the Circ, the following items must be completed:

- Determine if the existing boiler room floor will be able to support the load of the required 20’ x 30’ equipment room buildout. This task is expected to take three weeks, from notice to proceed from County.
- Installation of the required RF and microwave antennas on the rooftop can be accomplished with strengthened mounts and supports that will need to be specifically designed for this site. An evaluation of radio antenna mounting on both the inner and outer parapets is necessary. It is expected that mounting on the inner parapet to a higher elevation will be necessary for the antennas to clear the building structure to avoid shadowing. The microwave dishes must be installed in a manner that enables their paths to have a clear line of sight to the adjacent microwave sites. The height and azimuth of the microwave antennas for the outer parapet walls must be evaluated. It is expected that mounting on the inner parapet will be necessary to provide for higher elevations to establish the required line of sight. Higher elevations will require additional structural design, such as guying the mast or developing additional tieback support arms.

- Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the proposed construction activity. This does not include the additional field investigations to document site conditions if it is determined that the proposed communication facility "may have a significant environmental impact" and thus require additional documentation, submittals, or work. Regional Environmental Review (RER) report submittals if required by FEMA have not been included.
- Perform Cultural Resource study as needed to identify sensitive historical and archaeological monuments that might be impacted by proposed construction; typical minimum expected duration is 180 days. However, this may be extended due the government shutdown.
- Prepare, submit, and track application for local permits (zoning, electrical, building, structural, mechanical, fire suppression.) Typical duration is 60-90 days.
- Prepare FAA filings and procure information necessary for filing. Typically, the duration is 30-45 days. However, this may be extended due to the government shutdown.
- Submit FCC and Region 9 frequency license applications. Typically, the duration is 60-90 days. However, this may be extended due to the government shutdown.
- Modify the microwave Previous Coordination Notice PCNs; typically a minimum of 60 days. However, this may be extended due to the government shutdown.
- Provide a structural analysis for the cable ladder attachment to the outside walls
- Perform physical path surveys to verify the microwave paths
- Perform path reliability studies for the microwave paths
- Verify that the floor of the boiler room is structurally capable to support the additional loading of the proposed equipment and room structure plus the 8" raised concrete floor.
- Perform coverage analysis to verify the CIRC site location meets or exceeds coverage reliability requirements of the contract; two-week duration.
- Provide a structural engineering analysis for all antenna support structures
  Re-evaluate microwave paths/heights/waveguide lengths/tower loading at "remote" end; approximately 30 days. This requires a physical path survey and path analysis. This step will also determine if the dish at the remote sites will need to be moved and additional analysis completed.
- Identify any building owner aesthetic requirements or constraints for the roof mounted antennas and microwave dishes.
- Identify FPL 400A service originating point and routing to the new equipment room.
- Identify the Telco (AT&T) service originating point and routing to the new equipment room.
- Identify location of diesel generator (ground floor install).
    - Generator will require to be in a location where it can be fueled and easily maintained. (Note: County is opposed to installing a rooftop generator as initially proposed by Circ representative.)
    - Identify location and routing for all required cabling and the automatic transfer switch for the generator.

SITE DESIGN REQUIREMENTS

If it is decided to proceed with constructing at the Circ, the following items define the requirements to construct an 8" raised 20' x 30' environmentally controlled equipment room.

- Masonry Wall construction
- Fire suppression system
- HVAC
- Electrical Requirements
- Design Grounding per Motorola Solutions Specification R-56 - 2017 Standards and Guidelines for Communication Sites (68P81089E50-C) or latest version
- Cable trays
- Elevated Floor Slab
- Prepare site construction drawings showing the layout of various new and existing site components.
- Contractor to provide recommended delivery method to deliver equipment to boiler room (elevator, crane, helicopter)
- Identify route of transmission lines and waveguide (building penetrations aesthetics)
- Identify location of microwave dishes and RF antennas and mounting method
- Identify the location and design for the generator.
- Design the ventilation requirements for the HVAC units
- Design draining system for the condensation from the HVAC units.
- Obtain the permits such as electrical, building, and construction permits, and any inspections that may need to be coordinated with the local authorities to complete site development work.
- Site touchup on disturbed areas after completion of construction work if required i.e. painting, landscaping, decorative fencing or any other aesthetic improvement that may be required by local jurisdictions has not been included and will be handled through a negotiated contract change notice.

Existing Facility Improvement Work:

- Fabricate concrete platform to elevate the newly constructed room.
- Construct the 20' x 30' environmentally controlled equipment room (i.e ceiling, walls, etc.)
- Upgrade grounding to the latest revision of R56.
- Construct new generator on ground level.
- Install 400A AC power in the newly constructed equipment room.
- Extend TELCO (AT&T) demarcation in the newly constructed equipment room.

SUMMARY

Final buildout plans, schedules, and pricing are contingent on the critical items listed under the Pre-requisite Site Engineering. Given the added scope of work and level of effort, it is Motorola Solutions and KCI's recommendation that the County not move forward with the Circ.

The following should only be viewed as an estimate pending further analysis and discovery. A complete feasibility study of the site will take approximately six (6) months, to include:

- Federal responses to:

    - Flight plan clearance from the Federal Aviation Administration (FAA)
    - Radio frequency authorizations by the Federal Communications Commission (FCC)
- Complete RF design of the rooftop site
- Complete electrical and mechanical design of the rooftop site

Delays currently being experienced as a result of the federal government shutdown may impact completion intervals of tasks that are dependent on responses from federal agencies. The zoning and permitting processes for the site are expected to be 60-90 days. Final buildout and construction plans, schedules, and pricing shall be provided upon completion of the feasibility study.

PRICING

The pricing provided herein is solely for the detail engineering package and does not include any buildout or construction costs. All prices are subject to the terms and conditions of this proposal or a mutually agreeable version thereof. This proposal is valid for 30 days.

$131,025.00

KCI

ENGINEERS • SCIENTISTS • SURVEYORS • CONSTRUCTION MANAGERS

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January 21, 2019

Mr. Jeff Erhardt
Motorola Solutions

RE: **Telecommunications Facility at CIRC Hotel**
KCI Project Number 011900093B

Dear Mr. Erhardt:

EXECUTIVE SUMMARY AND PURPOSE

Pursuant to your request, KCI Technologies, Inc. has completed a review of the proposed colocation of the Broward County Public Safety Communication System at this location. The purpose is to provide a recommendation of the use of the CIRC Hotel located at Polk Street in Hollywood, Florida for the colocation of the communication antennas and support equipment. This letter is intended to provide supporting documentation to the overall feasibility study proposal prepared by Motorola Solutions and Broward County Emergency Management Division.

My overall recommendation is that this site **NOT** be utilized for this project, particularly when compared to a new tower location specifically designed for the new system. The site can be made to work, but it will require extensive construction efforts and will have several potential long term challenges, in particular maintenance related. Ultimately, this remediation could result in compromised serviceability under the most extreme conditions, which is the precise circumstances this site has to be 100% operable. The support of the underlying first responders and supported civilians who will rely on this system cannot afford compromise, specifically those that result in a degraded service.

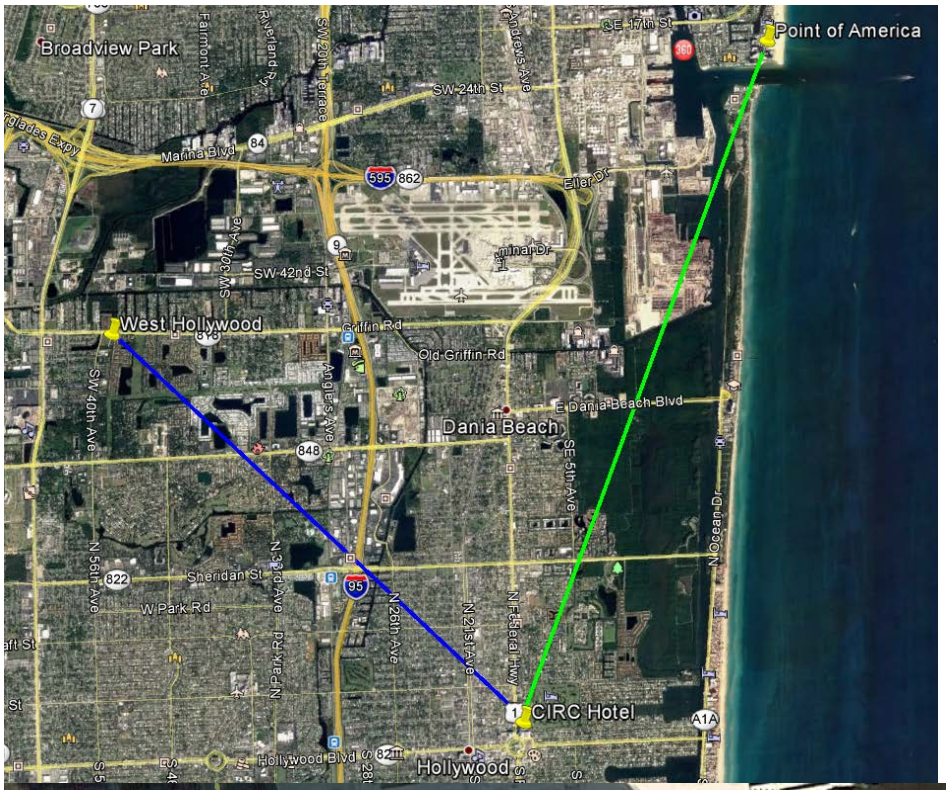
PROFESSIONAL BACKGROUND

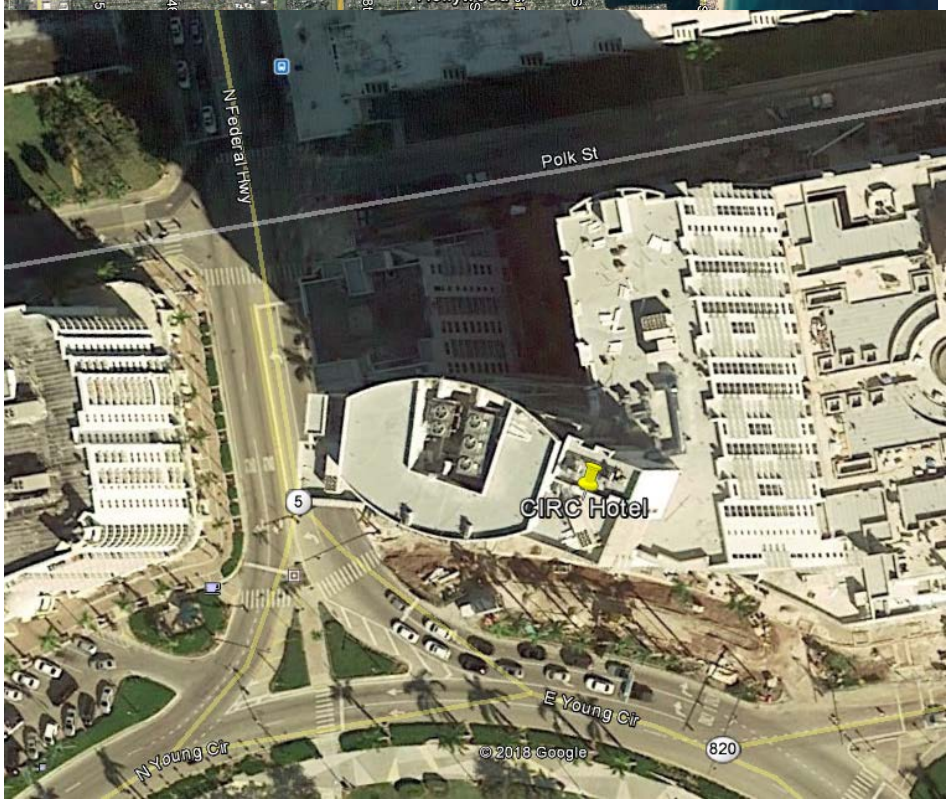
I am a licensed, Florida Professional Engineer who has practiced telecommunications engineering since 1997 with an emphasis on civil and structural design. I have completed hundreds of rooftop designs including both the civil aspects of the colocation, electrical design and structural analysis for wireless providers and other public safety providers. The most recent include microwave mount design for Manatee County, Florida with both tower and rooftop sites; microwave mount design for Charlotte County, Florida with both tower and rooftop sites; City of Portsmouth, Virginia P25 upgrade with both tower and rooftop sites; several rooftop sites in District of Columbia and Baltimore area for T-Mobile and Crown Castle. My professional resume is enclosed with a sampling of projects.

LOCATION BACKGROUND

The CIRC Hotel has been presented as a possible substitute site for the West Lake Park Site, which is a proposed self supported tower with ground equipment. The West Lake Park site will serve as a template as all of the antennas, tower support equipment, ground equipment, and generator will be replicated within the candidate site. Please refer to the overall feasibility study proposal for a listing of the requirements for the site. The site will include both transmit and receive antennas for the system as well as two microwave antennas for backhaul capability that will link to the Point of America site and the West Hollywood site.

January 21, 2019
Motorola Solutions & Broward County
CIRC Hotel Study



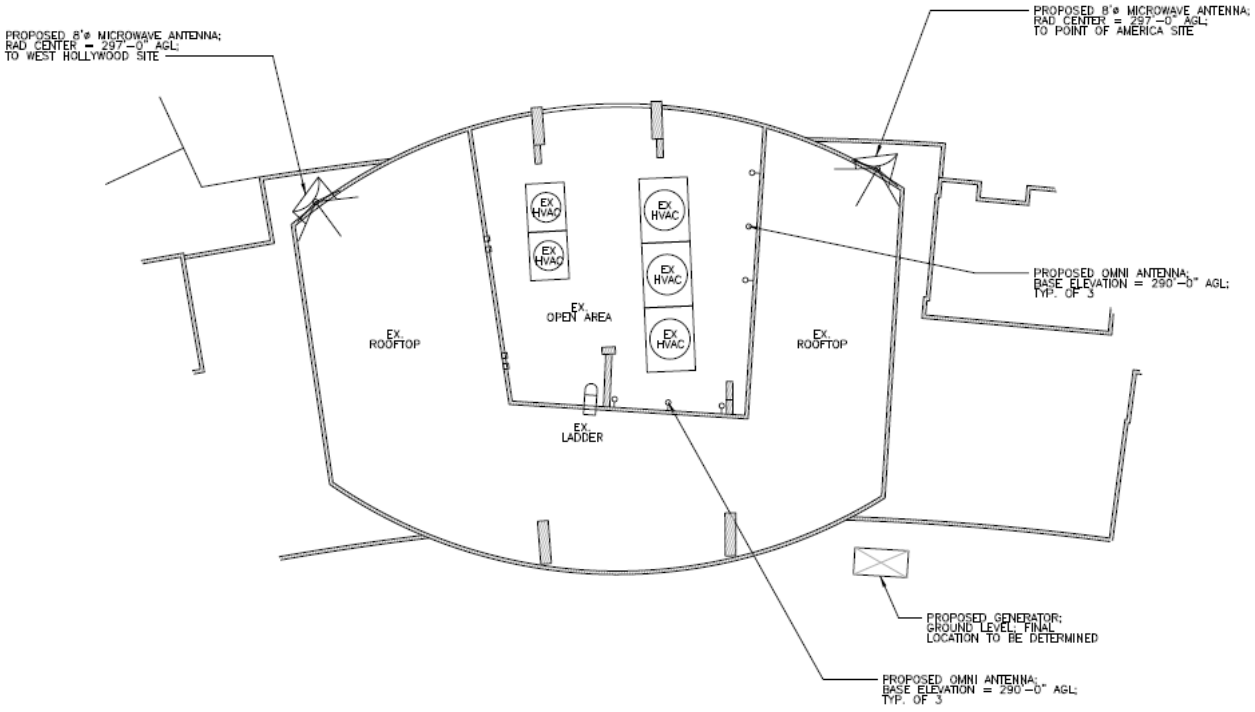


ANTENNA PLACEMENT / DESIGN CONSIDERATIONS

The antennas will be placed on the upper roof of the building and attached to the inner parapet walls near the air conditioners as shown in the photo above. The microwaves considered are 8-ft RFS antennas to ensure future capacity within the design. The Receive antennas are Sinclair SC412 and the Transmit antennas are RFI CC807 antennas. The SC412 antennas are 5-inch diameter x 21-ft tall and the CC807 antennas are 3-inch diameter x 17.5-ft tall. KCI utilized these dimensions along with a 180 mph (3 second gust, ultimate) wind speed for the analysis.

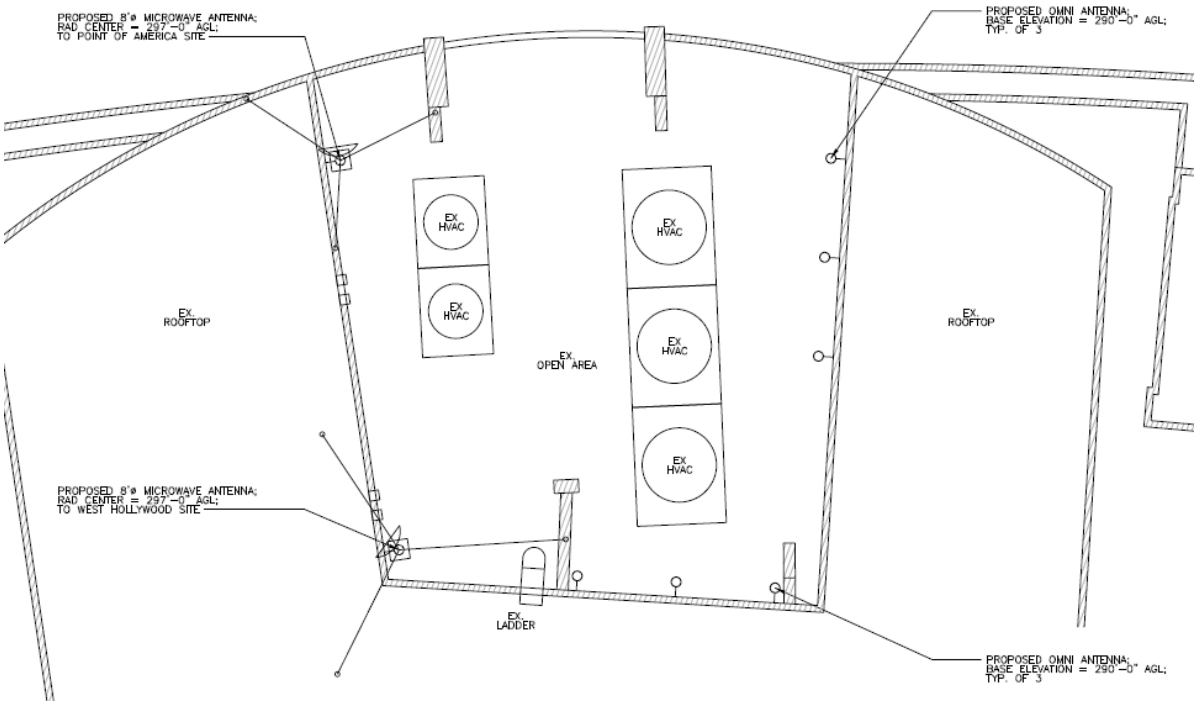
The best location of the microwave antennas is on the outer parapet wall. This provides the clearest path without any shadowing or RF emission hazards. Microwaves have a very tight bandwidth (1.3 degrees), but have a very concentrated RF emission, which requires the area in front of the microwave to be left clear to be in compliance with the FCC guidelines on human exposure. Due to the size of the microwave dish, 8-ft and the desired azimuths to the receive antennas, the microwave will need to be elevated above the parapet wall to be able to rotate it. This is going to be very difficult to achieve with the high wind speed and limited area to attach to on the parapet wall, so we had to use multiple standoffs

attached back to the parapet wall as well as the roof surface to achieve. This will also be very visible. Please refer to the photo above for an indication of the location of the microwaves viewed from street level as well as plan view shown below.



Outer Parapet Microwave Design Layout

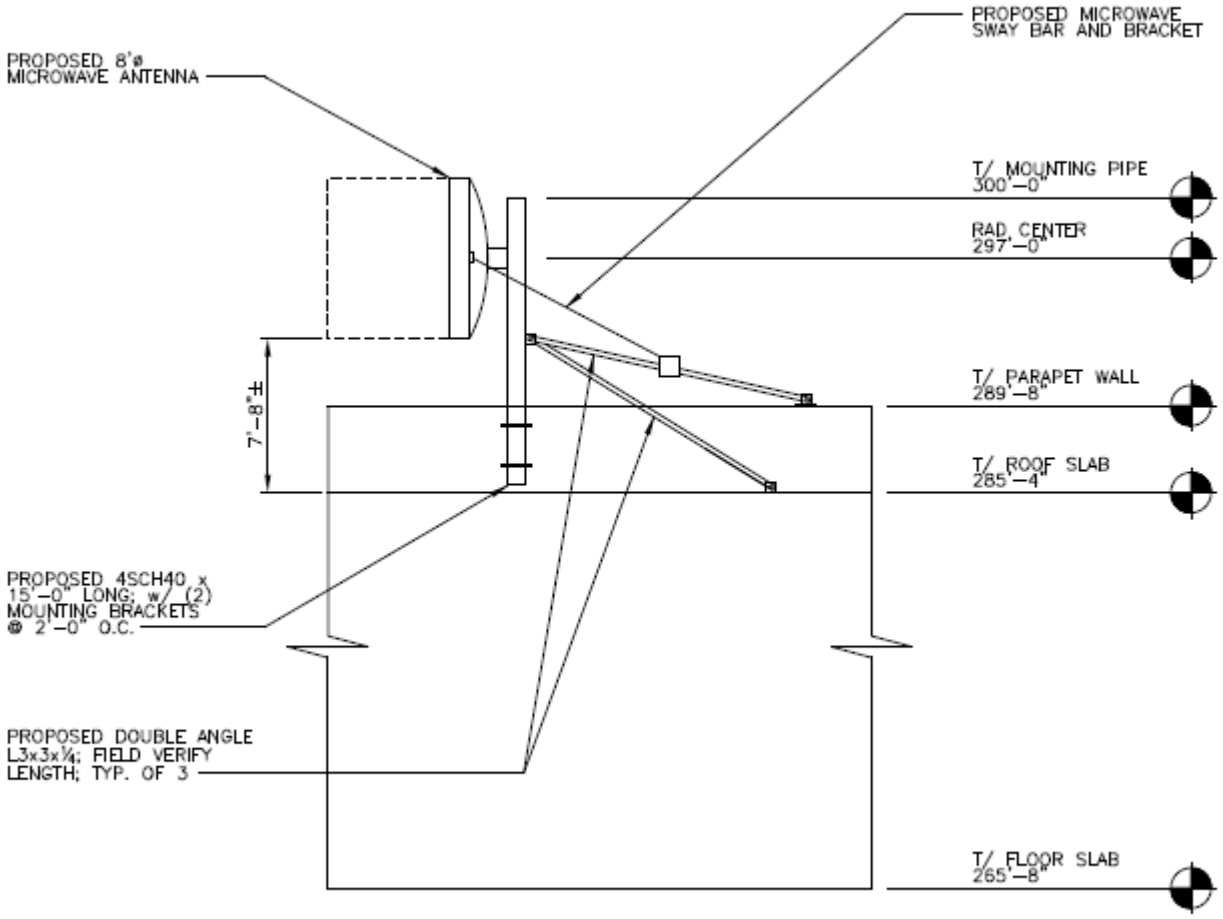
KCI also examined a location of the microwave antennas on the inner parapet wall. To achieve the RF safety of this location, either the roof in front of the microwave will need to be kept clear or the microwave will need to be elevated to ensure the path is clear. KCI elevated the base of the microwave 8-ft above the roof elevation. Refer to diagram below showing the microwave placement. The beam width is very tight, so there will not be much scatter or spread of the RF below the base of the microwave.



Inner Parapet Layout Diagram

Most microwave designs are not necessarily a structural concern, i.e. a capacity challenge, but a serviceability challenge. As stated before the beam width is very concentrated so any movement can result in a degraded signal or loss of data on either side of the link. For those not familiar with digital communication versus analog, signal loss will leave holes (missing words, etc.) in communication versus the old analog where the single may sound garbled, but still understandable. The loss of data can have significant impacts depending on the severity as a computer can recreate some, but not necessarily all the gaps, leaving holes in pictures, video or more importantly files that can't even be opened as they are corrupted. It is important that under the most intense wind conditions that microwave deflections be limited to as near to zero as possible. This requires significant stabilization efforts for the three items contributing to the possible movement, the microwave itself, the mount and the underlying structure. Self-Supported towers are designed with large bases and microwaves are generally placed in areas with wide face widths to resist movement under extreme conditions. Buildings are generally good at resisting movement as well, but the mounting systems placed on buildings often don't have the same stability mechanisms as those used on communication towers. It is expensive to construct and often involve numerous penetrations into the "skin" of the building, either the side or roof, which can lead to long term water intrusion challenges because any penetration has a high potential of leaking. This particular building and mounting system is no exception.

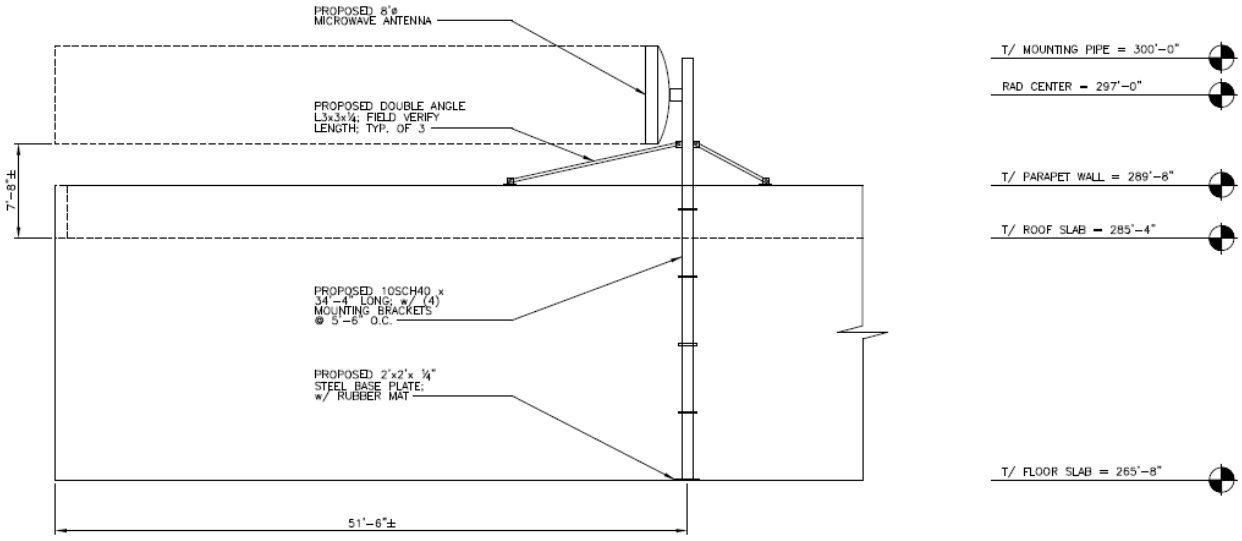
For the outer parapet wall design, KCI utilized a 4-inch pipe mast with four kicker arms to provide sufficient lateral restraint of the smaller pipe diameter. Two will be to the adjacent parapet wall and two will be down to the roof floor level. We also will attach stabilizer arms to the outside of the microwave antenna in, which will then be connected to one of the kicker attachments, either on the wall or the roof slab.



Microwave Mounting Detail Outer Parapet Wall

On the inner parapet wall option, which is not the best location, KCI utilized a 10-inch diameter mounting pipe to support the microwaves. These will be attached to the inside of the inner parapet wall and will rest on the floor of the lower roof (adjacent to the air conditioner units). This is to allow the weight of the pipe/microwave to transfer the load directly to the roof slab as opposed to numerous tie backs to the wall relying on friction for resistance. The tie backs will be utilized to resist the overturning moment which is significant. In order to resist the deflection the pipe mount will either require guy wires (similar to those used on the square tubes on the roof) or an alternate kicker support system. The microwave itself has two stabilizer arms, which will require a tie back point to attach to on the building or rooftop. The

mounting pipe(s) will be over 25-ft tall and will require significant effort to get them to the roof as they will be heavy, around 800 lbs. Refer to the drawings attached to this document for further details and schematics on the microwave mounting system.



Inner Parapet Design (note that the microwave stabilizer arms are not shown for clarity)

The omni antennas are easier from a design/construction aspect, but still should not experience significant movement, particularly at the base. The omni antennas are fiberglass and have been known to crack or break with excessive movement. This movement can also cause cracking and other serviceability concerns in the structure they are attached to. Therefore, KCI chose a 4 inch pipe, which can be attached back to the wall in several locations to resist all of the loads as well as the overturning moment. These will be situated 2-ft above the top of the wall, which provides a clear view of all sides of the roof from an RF perspective taken from the antenna centerline and the underlying 2.5 degree beam width. This ensures shadowing of the antenna with respect to the rooftop will be minimized. The RF safety of these antennas is not a concern based on the wattage of the RF output. They will not require additional height for RF exposure.

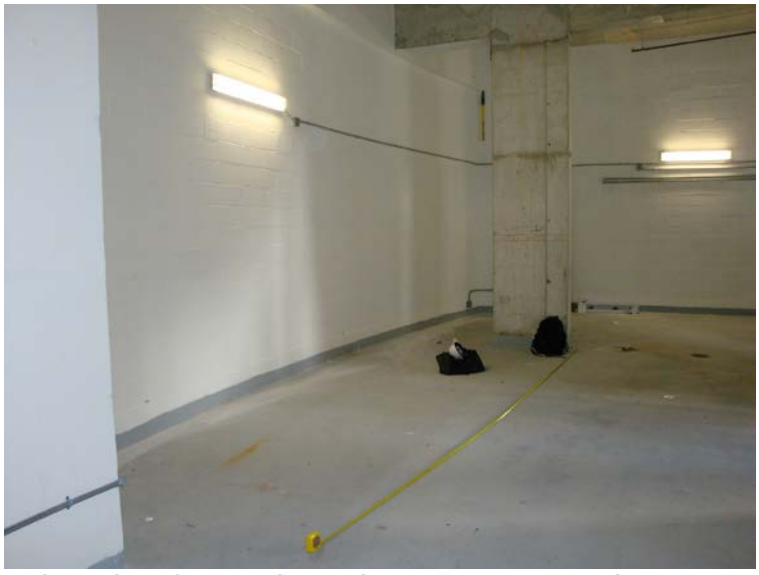
EQUIPMENT ROOM AND GENERATOR DESIGN CONSIDERATIONS

KCI also examined the equipment room to be built within the boiler room to house the County radio equipment. This may also become a structural concern as we recommend that the floor be elevated a minimum of 8 inches similar to the adjacent boilers in the room. The 8 inches will allow drainage pipes to be placed underneath the floor to a drain that is located in the area chosen for the 20-ft x 30-ft enclosed space. We also recommend that masonry walls be utilized along with a roof system for physical security as well as keeping the conditioned space enclosed. Four HVAC wall mounted units will be attached to the 20-ft wall on the boiler side with drain pipes routed to the floor drain to catch the condensation from the units. Within the enclosed area is a large battery box, that will be a structural challenge. Typically, we try to locate this over an underlying beam or column, but the space provided does not provide this in the location of the batteries. Further study will need to account for the location of the batteries and equipment inside of the room from a floor capacity standpoint. This may limit the potential movement of equipment

inside the room and future expansion capability. Technology improvements continually generate the requirement to replace or add equipment to the system to maintain the latest innovations. The floor slab capacity may limit the ability to change or add new equipment/racks to the room. This will not be an issue in the equipment shelter as the entire floor is designed for the worst case load of the battery box anywhere within the shelter.

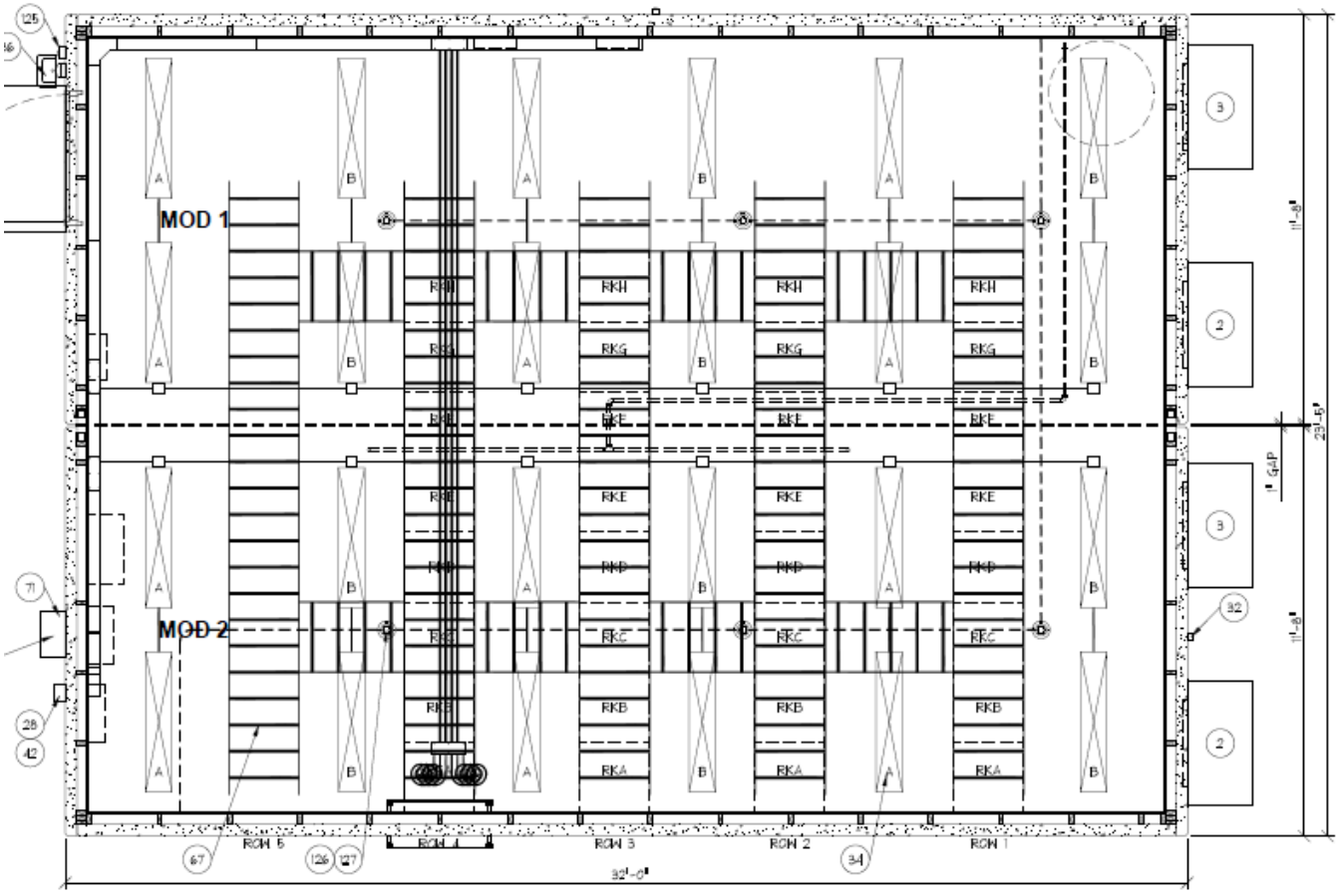
Fire Suppression System to be Relocated

Raised floor slab and evidence of standing water



Column interference in Equipment Room Location

Vents near wall penetration location



Inside of the boiler room, in the proposed location of the equipment room, there is a column impeding the floor plan for the equipment racks. Above diagram is a typical shelter layout diagram. This is a preliminary layout for the equipment to be used for this site. The column will interfere with the normal walkway of this layout design and force a constrained option for the rack layout. Currently there is one empty row, with the column some of the proposed racks will need to be relocated to the empty row and then remove future upgrade capacity. This is even more critical during transition periods as the new equipment is often temporarily located in these open areas and then when the cutover is complete, they are relocated to the permanent locations when the old equipment is removed. Without the ability to utilize these spaces, technology upgrades and equipment swaps could result in system downtime, which is unacceptable for emergency communications.

The electrical service requirements of 400 amps is the requirement for the equipment room's power source. KCI was not able to obtain a riser diagram or any existing power information, so can only speculate based on typical buildings. Grounding is another challenge as the County has required and Motorola has to provide adherence to their R56 standard for grounding. This can be difficult to achieve in new construction and even more challenging in existing construction. Further study is required of the building grounding system to ensure compliance.

KCI then examined the generator, which originally was going to have it placed on the roof. Both considerations were examined, although without a definite location on the ground, only general requirements can be provided. As the initial discussion during the site visit was to place the generator on

the roof, this is shown first. We located a suitable spot on the upper roof for the generator, in the vicinity of the County equipment room as well as the natural gas source into the boiler room. Additional study will be required to ensure that there is sufficient ability to extend the service to the roof and the generator. On the roof, it will require a heavy platform with vibration dampers to ensure no negative impacts to the concrete roof as well as noise issues when the generator is operating. The generator will go through testing on a routine basis as well as for power outages. The routine testing is of greater concern as this will be unexpected to the tenants. During a power outage or extreme weather event leading to the power outage, it will be expected.

The latest correspondence indicates that the generator will be located on a ground floor and the electrical feed will be routed up through the building to the equipment room. Alarm wiring will also need to have conduits routed to the boiler room if the generator is not located near the equipment room. On the ground floor sound suppression may also be required to ensure the noise doesn't impact the residential nature of the site. Sound suppression and quiet generators are considerably more expensive than the ones typically utilized on tower site. The same affects can be achieved by a sound wall or some other means of damping the noise for additional cost. The largest drawback is the space required for the generator along with the setback from the fuel source, which is up to 25-ft for an above ground propane tank based on the size. Physical security of the generator should also be considered in the location and space provided.

For either rooftop or ground location, Broward County desires a multi-fuel source generator for any site in which the fuel source is provided by a single service provider. This site has natural gas, which can have the distribution discontinued without the ability of the County to manage, i.e. leakage, damage, etc. Therefore, a second fuel source is desired and propane would be the best source in this case. Each of the tower sites also include multiple means of backup power. The shelter designated for the tower site includes a Camlock box, which allows a backup portable generator to be connected to it and provide power should the primary generator not start. This is not possible for the rooftop location, based on the equipment room and the inability to get a large generator to connect. It will also be very difficult on the ground level and will take additional space for the standalone equipment. Therefore, the desire is for propane, which will need to have a location on the property identified for a tank as well as a route for the conduit and source to the generator.

ADDITIONAL CONSIDERATIONS

A couple other aspects, partially identified in the overall feasibility study proposal will be further elaborated here. The first is the means to get the equipment and materials to the roof. Normally a crane would be utilized for this, but as seen in the aerial view there are not very many areas that are conducive to park the crane to be able to swing the materials to the roof. This would mean that a helicopter may be the required means, which is considerably more expensive. Any future maintenance/replacement of equipment will require a similar approach as the means to get materials and equipment to the roof is very limited on the tenant elevators. The elevators and number of floors to the roof, also add another complexity, which is the requirement for any servicing required of the equipment during power outages to have the technician and all materials go up 27 flights of stairs to the roof. This requirement for maintenance and a helicopter could happen at any time, such as 3AM on Christmas and due to the operational requirements, the work will need to be done immediately with potential disruption Finally, the tie down systems for the microwaves and antennas on the roof will require additional maintenance, such as re-tensioning of guy wires, bolts, etc. that is not necessary with the tower mounts.

FINAL RECOMMENDATIONS

January 21, 2019
Motorola Solutions & Broward County
CIRC Hotel Study

Overall for this complete site install, KCI would recommend the tower site in favor of the hotel. The cost is going to be considerably higher and require significantly more time, please refer to the overall feasibility study proposal for more information on this aspect, but will also lead to sacrificing requirements to make this site an option. These possible sacrifices include: significantly higher maintenance costs, involving helicopters or large cranes with significant traffic impact on adjacent roads; the possible lack of dual fuel source for the generator and other backup means; microwave movement (even after significant restraining efforts) during extreme weather potentially leading to outages; lack of flexibility relocating and adding equipment inside of room based on floor structural capacity; and possible reduced power (i.e. less than 400 amps) and R56 compliance for grounding.

This is a preliminary engineering study and further analysis will need to be required to ensure full compliance and adherence to building codes and contract documents. Some examples of further study include (refer to overall study for many other areas of consideration):

1. Detailed study of microwave deflections with final mounting system design.
2. Need to know the location of the generator for several reasons; fuel source, space requirements, setbacks, noise abatement, accessibility for service.
3. NIER study of the impacts of the antennas on the roof.
4. Detailed analysis of the floor slab for the generator as well as the equipment room and elevated floor slab.
5. Detailed evaluation of the building electrical and grounding system for compliance with the Motorola R56 standard.

If you have any questions or need additional information, please do not hesitate to call me at (919) 783-9214.

Sincerely,

Eric S. Kohl, P.E.
Senior Associate

Enclosed:
Partial Design Drawings
Professional Resume