FOURTH AMENDMENT TO BROWARD COUNTY P25 SYSTEM AND SERVICES MASTER AGREEMENT WITH MOTOROLA SOLUTIONS, INC.

This Fourth Amendment ("Fourth Amendment") is entered into by and between Broward County, a political subdivision of the State of Florida ("County"), and Motorola Solutions, Inc., a Delaware corporation ("Motorola Solutions" or "Provider") (collectively County and Provider are referenced as the "Parties").

RECITALS

A. The Parties entered into the Broward County P25 System and Services Master Agreement with Motorola Solutions, Inc., dated May 23, 2017 for a new 700 MHz, P25 Phase II system to replace the County's existing 800 MHz SmartNet System, a new IP-based microwave system to replace the existing Tadiran 6 GHz system and providing backward compatibility for legacy circuits, and related civil work, software, equipment, and support and maintenance.

B. The Parties subsequently entered into a First Amendment, dated June 28, 2018, to, among other things, change the master Site from the Core Site to the Davie Site and add new shelters to multiple Sites; a Second Amendment, dated October 23, 2018, to provide for the purchase of additional Subscriber Equipment by other County agencies; and a Third Amendment, dated November 7, 2018, to provide for the discounted purchase of additional Subscriber Equipment. As amended, the Parties' agreement is referred to herein as the "Agreement."

C. The Parties desire to further amend the Agreement to, among other things, expand the scope of Equipment supported by Motorola Solutions to include the existing generators at certain Sites, to provide for the purchase of via Work Authorizations of certain additional equipment and services for a security system at the Sites and a microwave system for certain locations for County's Water and Wastewater Services, and to reflect certain modifications in scope at certain Sites and associated pricing.

Now, therefore, for good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, County and Motorola Solutions agree as follows:

1. The above Recitals are true and correct and are incorporated herein by reference. All capitalized terms not expressly defined within this Fourth Amendment shall retain the meaning ascribed to such terms in the Agreement.

2. Except as modified herein, all terms and conditions of the Agreement remain in full force and effect. Amendments are indicated herein by use of strikethroughs to indicate deletions and bold/underlining to indicate additions.

3. Section 1.5 of the Agreement is amended as follows:

1.5 Contract Administrator. The Director of Office of Regional **Emergency Services and** Communications ~~and Technology~~ or other person as designated in writing by the Director of the Office of Regional **Emergency Services and** Communications ~~and Technology~~ for all or portions of this Agreement and the Services provided hereunder **relating to the P25 System**. **Solely for the purposes of the Work Authorization for the Microwave System for WWS (to the extent elected by County as Optional Services), the Contract Administrator shall refer to the Director of Broward County's Water and Wastewater Services Division.**

4. Section 3.4 of the Agreement is amended as follows:

3.4 Support and Maintenance Services. For so long as requested by County, Provider shall provide Support and Maintenance Services for the P25 System at the rates set forth in the Payment Schedule to ensure the proper functioning and optimal performance of the P25 System as set forth in the Documentation pursuant to the terms of Exhibit C. ~~For~~ **Until completion of** the first year following Final Acceptance, all Support and Maintenance Services for the P25 System are included at no additional cost **unless otherwise stated in Exhibit B**. For subsequent years, Support and Maintenance Services for the applicable System shall be invoiced and paid in accordance with the Payment Schedule set forth in Exhibit B. County may elect to suspend, discontinue, or recommence Support and Maintenance Services for the P25 System or for any or all of the component Systems upon thirty (30) days' prior notice, with the applicable fees prorated for the applicable term, without reinstatement or other penalty.

5. Section 4.7 of the Agreement is amended as follows:

4.7 Liquidated Damages. Liquidated damages are hereby fixed and agreed upon between the Parties as set below, recognizing the impossibility of precisely ascertaining the amount of damages that will be sustained by County as a consequence of such delay, and both Parties desiring to obviate any question of dispute concerning the amount of said damages and the cost and effect of the failure of Provider to complete each System, the inability to continue to operate and maintain each Site, and the failure to complete the P25 System on time. These amounts are not penalties but liquidated damages to County for its inability to obtain full beneficial use of the P25 System. For purposes of this paragraph, any delays caused by County prior to Final Acceptance or Final Completion shall extend the deadline for the affected System(s) by the same number of days as the delay caused by County. The liquidated damages stated herein are cumulative, unless waived by County Contract Administrator, and shall be continuing until remedied. The total liquidated damages charged to Provider under this Section 4.7 shall not exceed ten percent (10%) of the System Total as set forth on Exhibit B.

In the event the County Contract Administrator, after consultation with Provider, determines that an unusual circumstance or insurmountable obstacle beyond Provider's reasonable control prohibits timely completion of a portion of the Work and adversely impacts the Project Schedule, Provider and the County Contract Administrator will agree in writing on any extended deadline(s) to the Work impacted, and Schedule 10 and any other impacted deadlines so extended in writing shall be deemed automatically updated. Any such extension requires the written approval of the County Contract Administrator.

The Parties agree that the deadlines referenced in this Section 4.7 were amended by the Fourth Amendment and that some or all of the original deadlines expired prior to the execution of the Fourth Amendment. To the extent any liquidated damages accrued prior to the effective date of the Fourth Amendment, all rights and remedies are reserved.

4.7.1. Damages for Failure to Achieve Substantial Completion. Upon failure of Provider to achieve Substantial Completion of any Site within the time periods specified in the applicable Project Schedule (plus approved extensions, if any), Provider shall pay to County liquidated damages in the amount of $250 for each calendar day after the time specified in the Project Schedule.

4.7.2. Operation and Maintenance of Sites During Construction. Upon failure of Provider to meet the operating and maintenance criteria set forth in Exhibit A-2 for any Site, Provider shall pay to County liquidated damages in the amount as stated in Exhibit A-2 (if none stated, then the amount of $100) for each occurrence or series of occurrences of operating or maintenance failure.

4.7.3. Damages for Failure to Milestones or Final Acceptance. If any System fails to achieve the milestones stated below, Provider shall pay to County liquidated damages in the amount of $2,500 for each calendar day by which the date of the achievement of the applicable milestone exceeds the applicable deadline.

4.7.3.1. Completion of FNE installation at all RF Sites: ~~August 30, 2018~~ **December 31, 2019.**

4.7.3.2. Commencement of 30 Day Operational Test: ~~November 21, 2018~~ **March 30, 2020.**

4.7.3.3. P25 System Final Acceptance: ~~December 31, 2018~~ **April 24, 2020.**

4.7.4. Deduction from Amounts Otherwise Due. County is authorized to deduct any liquidated damages due under this Agreement from monies due Provider for Services or other work under this Agreement or as much thereof as County may, in its sole option and discretion, deem just and reasonable.

6. Not-To-Exceed Amounts. Section 5.1 of the Agreement is amended as follows:

5.1 For the duration of the Agreement, County will pay Provider in accordance with the Payment Schedule (Exhibit B) up to the following maximum amount(s):

Services/Goods	Term	Not-To-Exceed Amount
P25 System Implementation (including Radio System, Microwave System, and Facilities and Infrastructure System)	From Effective Date to Final Acceptance	~~$34,500,000~~ **$37,500,000**
Additional Training	Initial Term (10 years)	$200,000
Support and Maintenance Services	Initial Term (10 years)	$11,000,000
Optional renewal terms	First 5 year renewal term Second 5 year renewal term	$7,100,000 (includes $100,000 for additional training) $8,300,000 (includes $100,000 for additional training)
Optional Services (including County purchases of Subscriber Equipment)	Duration of the Agreement (inclusive of any renewals)	~~$2,500,000~~ **$3,500,000** (any Optional Services) $10,097,000 (County purchases of Subscriber Equipment)
Microwave System for WWS (Optional Services)	**Duration of the Agreement (inclusive of any renewals)**	**$500,000**
TOTAL NOT TO EXCEED		~~**$73,697,000**~~ **$78,197,000**

* * *

7. Updated Statement of Work. Exhibit A-2, Facilities and Infrastructure Development, is amended as set forth in Exhibit A-2 hereto (including the entirety of the schematics as Attachment B thereto, which are included in this Fourth Amendment in only excerpted format due to length) in selected portions of Section 2, as well as Section 3 and Section 4. All sections not included in the attached amendment to Exhibit A-2 remain unchanged. The amended portions of Section 2 are as follows:

a) Section 2.1 (Core Site);
b) Section 2.2 (Coconut Creek Site);
c) Section 2.3 (Markham Park Site);
d) Section 2.5 (Davie Site);
e) Section 2.7 (Miramar Site);
f) Section 2.10 (Tamarac Site);
g) Section 2.12 (Sunrise Dispatch);
h) Section 2.13 (Coconut Creek Dispatch);
i) Section 2.14 (Pembroke Pines Dispatch);
j) Section 2.15 (FS 106 Site);
k) Section 2.16 (Parkland Site);
l) Section 2.17 (West Hollywood Site);
m) Section 2.18 (Pompano Beach Club Site); and
n) Section 2.19 (EMS Site).

8. Updated Schedules. Schedule 2 (Equipment Schedule) has been updated by agreement of the Parties to incorporate the additional equipment included pursuant to this Fourth Amendment, including Attachment A. Schedule 10 (Project Schedule) is amended and replaced in its entirety with the corresponding Schedule attached hereto. All references in the Agreement to any such Schedule shall be deemed to refer to the Schedule as updated and amended as stated in this Fourth Amendment.

9. Exhibit A-5 of the Agreement is amended to include a new Section 4 as follows (bold/underlining omitted):

4. County Water Wastewater (WWS) Microwave System

Subject to the applicable not-to-exceed amount stated in Exhibit 5.1 ("Microwave System for WWS"), County may acquire as Optional Services any equipment, software, and services that County may deem appropriate to acquire for a microwave system at any County Water and Wastewater (WWS) site(s). Provider may subcontract such goods and services to the extent authorized in writing by the WWS Contract Administrator.

10. Payment Schedules. Section 1 of Exhibit B to the Agreement, System Implementation and Services Fees, is hereby amended as set forth below to align the Payment Schedule, Milestone Payments, Pricing Summary, and allocation of Milestone 3 payments among the Sites with the modifications made to the Schedules. The remainder of Exhibit B is unaffected and remains in full force and effect as originally stated.

1. System Implementation and Services Fees

Milestone	Description	% of Original Total System Cost	Approx. % of Amended Total System Cost	Milestone Payment
1	Completion of Contract Design Review **(paid)**	15%	~~13%~~ **12%**	$4,337,734.95
2	Completion of Factory System Acceptance Testing & Staging **(paid)**	30%	~~26%~~ **24%**	$8,675,469.90
3	Completion of FNE Installation on a site-by-site basis (radio and microwave) (see breakdown below)	25% on site by site basis	~~31%~~ **33%** on site by site basis	~~$10,088,466.05~~ **$11,785,485.05** (total all sites)
4	Completion of Acceptance Testing & Cutover	15%	15%	~~$4,950,358.05~~ **$5,314,005.05**
5	Final System Acceptance (Civil, Radio and Microwave)	15%	15%	~~$4,950,358.05~~ **$5,314,005.05**
P25 SYSTEM TOTAL			~~$33,002,387.00~~	**$35,426,700.00**

Broward County P25 System Pricing Summary	
P25 Simulcast Equipment Total	**$ 33,508,089**
P25 Simulcast SI Total	**$ 9,494,298**
Sub Total	**$ 43,003,387**
Performance Bond	**$ 250,000**
Additional Features Include: **OTAR** **GPS Locationing (Includes GPS & OTAP)** **Enhanced Data** **P1 Integration (ARL) - 10,000 Radios**	**$ (no additional cost; included in P25 Simulcast Equipment Total above)**
System Total:	**$ 43,252,387**
Discounts: ($10,250,000)	
Fourth Amendment Modifications	**$ 2,424,313**
Increased Broward County Customer Loyalty Discount	**$ (4,250,000)**
Software Licenses	**$ (3,000,000)**
P25 Dynamic Dual Mode TDMA	**$ (1,500,000)**
SmartX and SmartZone Trade In	**$ (1,500,000)**
P25 System Total:	**$ ~~33,002,387~~** **$ 35,426,700**

P25 System Initial Purchase Order Amount (per Agreement, Section 4.4): $39,138,713.57 –*The foregoing amount may be comprised of multiple purchase orders to allow the County to allocate support and maintenance funding across multiple years' budgets. The P25 System Initial Purchase Order Amount includes the P25 System Total, Support and Maintenance Services Fees for years 2 through 10, and $200,000.00 for additional training.*

The payment milestone for completion of FNE Installation on a site-by-site basis (radio and microwave) shall be allocated among the Sites as follows:

Site	Estimated Acceptance Date	Agreed Allocation	Payment per FNE Milestone completion at Site
Core	~~11/16/18~~ **2/22/19**	5%	~~$565,685.61~~ **$589,274.25**
Coconut Creek	~~11/28/18~~ **2/22/19**	~~5%~~ **10%**	~~$1,131,371.23~~ **$1,178,548.51**
Markham Park	~~1/8/19~~ **3/20/19**	5%	~~$565,685.61~~ **$589,274.25**
Davie	~~10/22/18~~ **3/29/19**	5%	~~$565,685.61~~ **$589,274.25**
EMS	~~8/6/18~~ **3/20/19**	5%	~~$565,685.61~~ **$589,274.25**
EOC	N/A	~~5%~~ **0%**	$0
Pompano Beach Club	~~1/30/19~~ **8/31/19**	10%	~~$1,131,371.23~~ **$1,178,548.51**
Points of America	~~9/20/18~~ **3/20/19**	5%	~~$565,685.61~~ **$589,274.25**
Playa	~~10/18/18~~ **3/20/19**	5%	~~$565,685.61~~ **$589,274.25**
Miramar	~~11/8/18~~ **3/20/19**	5%	~~$565,685.61~~ **$589,274.25**
Channel 2	~~1/2/19~~ **10/21/19**	5%	~~$565,685.61~~ **$589,274.25**
Deerfield	~~1/9/19~~ **7/31/19**	5%	~~$565,685.61~~ **$589,274.25**
West Lake Park	~~2/24/19~~ **12/31/19**	5%	~~$565,685.61~~ **$589,274.25**
West Hollywood	~~2/24/19~~ **12/31/19**	10%	~~$1,131,371.23~~ **$1,178,548.51**
Tamarac	~~7/12/19~~ **8/31/19**	5%	~~$565,685.61~~ **$589,274.25**
FS 106	~~12/13/19~~ **7/20/19**	5%	~~$565,685.61~~ **$589,274.25**
Parkland	~~7/10/19~~ **8/31/19**	10%	~~$1,131,371.23~~ **$1,178,548.52**
Total Completion of FNE Installation on a site-by-site basis			~~$11,313,712.25~~ **$11,785,485.05**

11. The Parties agree and stipulate that Motorola Solutions will provide Support and Maintenance Services for both the generators and uninterrupted power supplies inclusive of battery banks (UPS) provided by Motorola Solutions (the "new generators and UPS"), as well as for the existing generators and UPS at certain Sites that will not be replaced as listed below (the "existing generators and UPS"). Support and Maintenance Services for the new generators and UPS commences upon installation of the applicable equipment, and is included in the P25 System Total at no additional cost until one year after Final Acceptance, pursuant to the Agreement and as stated in Exhibit B. Support and Maintenance Services for the existing generators and UPS commences upon the effective date of this Fourth Amendment and shall be invoiced to County quarterly in arrears at the rate of not to exceed $75,016.00/annually, with an annual escalator of 1.75% commencing upon Final Acceptance. To the extent County elects to modify the additional

equipment included in Support and Maintenance Services pursuant to this paragraph, the Support and Maintenance Services fee will be adjusted accordingly (currently: $3,104/annually/UPS; $2,400/annually/generator). The following existing generators and UPS shall be deemed included as part of the "Equipment" included in Support and Maintenance Services under the Agreement and supported by Motorola Solutions:

Existing Generators

Site	Address	Capacity	Manufacturer, Model	SN
Pembroke Park	3300 SW 52 Avenue, Hollywood	80 kW Diesel	Onan 80DGDA 1 phase 417 Amp 120/240 V	39898G
Coconut Creek	5150 Regency Lakes Dr, Coconut Creek	80 kW Diesel	GENERAC 80DGDA	1910419070
Core	1725 NW 31 Avenue, Ft. Lauderdale	80 kW Diesel	GENERAC 80DGDA	L900360846
Miramar	14401 SW 55 Street, Miramar	80 kW Diesel	Generac 1867170500	2064936
Markham Park	16001 W. State Road 84, Sunrise	80kw Diesel	Generac 1867170500	2064937
EMS	2150 NW 26 Avenue, Ft. Lauderdale	180 kW Diesel	Generac 3240970100 3phase 120/208	2072705
Davie	4501 SW 142 Avenue, Davie	80 kW Diesel	Baldor 10J3080G4	P0709050003

Existing UPS

Site	Address	UPS	Manufacturer, Model	SN
Pembroke Park	3300 SW 52 Avenue, Hollywood	(2) 16 KVA / w extended runtime cabinet	APC Symmetra	AD1821120083/ AD1821120082
Coconut Creek	5150 Regency Lakes Dr, Coconut Creek	(2) 16 KVA / w extended runtime cabinet	APC Symmetra	AD1807120087/ AD1807120100
Core	1725 NW 31 Avenue, Ft. Lauderdale	(2) 16 KVA / w extended runtime cabinet	APC Symmetra	AD1828120004/ AD1828120002
Miramar	14401 SW 55 Street, Miramar	(2) 16 KVA / w extended runtime cabinet	APC Symmetra	AD1807120096/ AD1807120079
Markham Park	16001 W. State Road 84, Sunrise	(2) 16 KVA / w extended runtime cabinet	APC Symmetra	AD1811121144/ AD1810120241
Davie	4501 SW 142 Avenue, Davie	(2)16KVA	Powerware Ferrups FE18KVA	EA266FN004/ EA364FN018

Site	Address	UPS	Manufacturer, Model	SN
Tamarac	7515 NW 88th Avenue Tamarac	(1) 15 Kva	Eaton 9166	1024064C0000151127
Points of America	2100 S Ocean Lane, Ft. Lauderdale Fl	(2) 16Kva	Best Ferrups FD18KVA	FD18KO04698/ FD18KO04704
Playa Del mar	3900 S Galt Ocean Dr, Ft Lauderdale Fl	(2) 16KVA	Best Ferrups FD18KVA	FD18KO04706/ FD18KO04702
Deerfield	300 NE 2nd St Deerfield Beach	(1) 16Kva	Liebert NX	M13K7H0036
EMS	2150 NW 26 Avenue, Ft. Lauderdale	(2) 50Kva	Mitsubishi 2033C	05-7M71143EG0001-01/ 05-7M71143 EG0001-02

12. Exhibit C is amended at Section 3.A (Equipment Support and Maintenance Services, Equipment Annual Preventative Maintenance) as follows:

A. <u>Equipment Annual Preventive Maintenance</u>.
Routine maintenance provided by Provider shall include the periodic cleaning, adjusting, calibrating, system diagnostics, and fine tuning of the Equipment; replacement or repair of worn parts; prompt installation of any updates, upgrades, or releases of embedded software or firmware; and component replacement with equal or better equipment with the approval of the Contract Administrator when the component is approaching the end of its useful life. Provider shall perform routine maintenance on at least a monthly basis (or more frequently if appropriate as a result of equipment usage or standards set by the Equipment manufacturer) **<u>unless otherwise expressly stated below</u>**. Provider shall contact the end user agency at least three (3) business days prior to arrival for the performance of routine maintenance.

* * *

	Standard Preventive Maintenance
Batteries (non-UPS)	
Visual inspection (condition of cells/cabling) – Verify no corrosion, physical connections, dirt/dust**<u>,</u>** etc.	X
UPS	
Visual inspection (condition of cells/cabling)**<u>:</u>** **<u>–</u>** Verify **<u>no</u>** corrosion, physical connections, dirt/dust**<u>, etc.</u>**	X
<u>For Valve Regulated Lead Acid (VRLA) Batteries: Review battery maintenance logs and make entries into customer logs; Safety Checks (Warning/hazard labels; Operational information, placards, and labels for operation); provide inspection report</u>	**<u>X</u>**

Quarterly inspections: Measure and record every cell terminal voltage; Measure and record all of the following: overall system voltage, ambient room temperature, cell temperatures, overall AC ripple voltage, AC ripple current, impedance or resistance of each cell; Check jar/case and/or cover for signs of leakage; Check for corrosion on terminal post or connector; Check for general appearance and cleanliness of battery room.	**X (quarterly)**
Annual visit: Measure and record impedance or resistance of each inter-cell connection; Re-torque all battery terminal, and jumper connections as needed, if accessible; Clean and neutralize jar/case and/ or cover of each cell/unit as needed	**X (annually)**
Generator	
Visual inspection; Verify, check panel housing, cracks, rust, and weathering. Physical connections, **no** corrosion, dirt/dust, etc.	X **(quarterly)**
Verify operation (no switchover); Check, verify running of Generator, ease of start or difficult. Is generator throttling or running smooth? Any loud unusual noise? Etc.	X **(quarterly)**
Other maintenance (oil change, fuel filter); Check/adjust voltages, current and meter readings. Verify software version. Check and change all fluids, filters, belts, etc. Perform full operational checks and confirm proper operation of motors and sensors.~~.~~	X **(annually)**
Four (4) hour load bank test	**X (annually)**

13. Exhibit C to the Agreement is amended in Section 2.A, System Monitoring, to include all generators and UPS (at any Site) within the Monitored Elements Table.

14. The County intends to enter into Work Authorization for Optional Services for a Radio Towers Security System in the not-to-exceed amount of One Million Two Hundred Fifty Thousand Dollars ($1,250,000) plus Support and Maintenance Services ("Security System WA"). The County authorizes its County Administrator to negotiate and execute the Security System WA on behalf of the County. If executed by the Parties, the goods and services provided pursuant the Security System WA will be included as part of Final Acceptance testing and the Final Acceptance Test Plan (Final ATP) for the System, and will be included within the 30 Day Operational Test, unless County Administrator otherwise approves in advance in writing. The Parties authorize Motorola Solutions to subcontract services to ER Tech Systems Group Inc. d/b/a Broadcast Systems in connection with the Radio Towers Security System. The software and equipment provided as part of the Security System WA will be deemed included within the Software and Equipment provided as part of the System, warranted in accordance therewith, and shall be included within the scope of Software and Equipment supported as part of the Support and Maintenance Services at the fees stated in the Security System WA. Any security and access requirements stated in the Security System WA shall be deemed incorporated in the Agreement as if fully set forth herein.

15. The effective date of this Fourth Amendment shall be the date of complete execution by both Parties.

16. This Fourth Amendment may be executed in counterparts, each of which shall be deemed to be an original, but all of which, taken together, shall constitute one and the same agreement.

(The remainder of this page is blank.)

IN WITNESS WHEREOF, the Parties hereto have made and executed this Fourth Amendment: BROWARD COUNTY through its BOARD OF COUNTY COMMISSIONERS, signing by and through its Mayor or Vice-Mayor, authorized to execute same by Board action on the ___ day of _____, 2019, and MOTOROLA SOLUTIONS, INC., signing by and through its _____, duly authorized to execute same.

BROWARD COUNTY

ATTEST:

_____
Broward County Administrator, as
ex officio Clerk of the Broward County
Board of County Commissioners

BROWARD COUNTY, by and through
its Board of County Commissioners

By_____
Mayor

____ day of _____, 2019

Approved as to form by
Andrew J. Meyers
Broward County Attorney
Governmental Center, Suite 423
115 South Andrews Avenue
Fort Lauderdale, Florida 33301
Telephone: (954) 357-7600
Telecopier: (954) 357-7641

By_____
René D. Harrod (Date)
Deputy County Attorney

RDH
5/23/2019
P25 Fourth Amendment
#437461.5

FOURTH AMENDMENT TO BROWARD COUNTY P25 SYSTEM AND SERVICES MASTER AGREEMENT WITH MOTOROLA SOLUTIONS, INC.

PROVIDER

WITNESSES:

_____
Signature

_____
Print Name of Witness

_____
Signature

_____
Print Name of Witness

MOTOROLA SOLUTIONS, INC.

By_____
Authorized Signor

_____
Print Name and Title

_____ day of _____, 2019

ATTEST:

_____
Corporate Secretary or authorized agent

(CORPORATE SEAL)

ATTACHMENT A
ADDITIONAL EQUIPMENT PROVIDED PURSUANT TO FOURTH AMENDMENT

QTY	NOMENCLATURE	DESCRIPTION	BLOCK	SUB SYS
1	SP1#585938	COCONUT CREEK SPECIAL ORDER TOWER MODIFICATIONS	TOWER	COCONUT CREEK
5	DSAPM7487K248	ADVANCED POWER MONITOR, 740-870 MHZ, 36-60V DC (INC SINGLE COUPLER)	RSM MONITORING	ALL SITES
22	DSRSM000048	RECEIVE SYSTEMS MONITOR, 36-60VDC	RSM MONITORING	ALL SITES
3	DSSP74964440DFF1RU	ANT LINE COUPLER 740-960MHZ 40DB 4-PORTS SUIT APM748 AND APM8796	RSM MONITORING	ALL SITES
70	DSSPNFMALC	SIX PACK RF SAMPLE PORT FOR COMBINER LMPS	COMBINER TEST PORTS	ALL SITES
1	DQMWBROW7705RT	18.US.832502 V1 INCLUDES1.01-2.08 7705-SAR-8, SPARES & ADJ	ROUTERS	ALL SITES
1	DQMWBROWNFMPNM	18.US.832502 V1 INCLUDES 3.01-3.02 NFM-P & ADJ	ROUTERS	ALL SITES
23	DSHPJ9782A	HP PROCURVE 2530-24 SWITCH	ROUTERS	ALL SITES
1	CVN7151	RED HAT 7.X - MULTI CPU AND 4 GUESTS	ROUTERS	ALL SITES
1	DLN7001	HIGH CAPACITY NON REDUNDANT SERVER FRE	ROUTERS	ALL SITES
1	DSP203MONITOR	HP PRODISPLAY P203 20-INCH MONITOR	ROUTERS	ALL SITES
1	DVN4381	SOFTWARE,VMWARE VSPHERE 6.X ENT PLUS 2 CPU SW	ROUTERS	ALL SITES
1	T8126	FORTINET FIREWALL APPLIANCE	ROUTERS	ALL SITES
1	TT3225	Z2 MINI WORKSTATION 258G 8G NON RET	ROUTERS	ALL SITES
10	DSMW3HE05838AA	250W 120/240V AC POWER CONVERTER	ROUTERS	ALL SITES
10	DSMW3HE05837BA	7705 AC POWER CONVERTER PIGTAIL - O-RING	ROUTERS	ALL SITES

Amended Excerpts of SOW A-2 Facilities and Infrastructure Development

2.1 Site Name: Core

Core is an existing Broward County Radio site. In accordance with Solicitation R1422515P1 Appendix B- Addendum 2, a new 24’ X 32’ pre- cast shelter will be installed in addition to the existing 24' X 32' shelter. A new DC Power System will be installed in the new shelter, along with a new generator and transfer switch. The existing shelter will utilize the existing UPS and existing generator. **The existing tower will be modified to support the antenna loads per the tower structural analysis, as further detailed in Attachment B.**

Figure 2-1: Core

Site Details:

Site Engineering:

- Perform National Environmental Policy Act (NEPA) Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 Code of Federal Regulations (CFR) Chapter 1, subsection 1.1307 that may be potentially impacted by the construction activity, and perform all actions necessary to alleviate or remedy that impact.
- Provide a structural engineering analysis for antenna support structure to support the antenna system.
- Provide tower climbing and tower mapping services to collect information about structural members and existing equipment.
- Redesign the compound to add an additional new 24’ X 32’ shelter and 100KW, 120/240VAC, single phase diesel generator with a 500 gal belly tank.
- Calculate wind loading requirements for the shelter and generator foundations.
- Calculate wind loading requirements for new shelter, including shelter door and new ice bridge.

Antenna and Transmission Line:

- Remove 2 Bogner Rx Antennas and their associated TTA’s, transmission line, Side Arms and mounts from the top of the tower
- Install five antennas for the RF system to top of tower.
- Supply and install side arm(s) for all antenna and dish mounts.
- Install two tower top amplifiers.
- Install 1/2-inch transmission line as required.
- Install 7/8-inch transmission line as required.
- Install 1-1/4-inch transmission line as required.

- Install three Microwave Dishes.
- Install Elliptical waveguide as required.
- Perform alignment of each of the microwave paths to ensure that the microwave dishes are optimally positioned.
- Perform sweep tests on transmission lines.
- Install 30 ft of new ice bridge between the new shelter and existing tower.
- Supply and install one ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

Existing Facility Improvement Work:

- Provide all necessary equipment and services necessary to fully cutover users from the old system to the new system

Compound Expansion:

- Install new 24' X 32' shelter and 100KW, 120/240VAC, single phase diesel generator with a 500 gal belly tank
- Expand Compound 45' 5" X 85' 10" to accommodate space required for new 24' X 32' shelter
- Add new fence and gates as required
- Install new 100KW Diesel Generator

Existing Tower Improvement Work:

- **Modify tower to support specified antenna loads per the tower structural analysis as further detailed in Attachment B (consisting of tower modification schedule, design loading , pictorial elevation drawings, equipment lists, etc.)**
- **Provide all material and services necessary to implement the design specified in the attached structural analysis.**
- **Include all necessary construction cranes to support the installation of all material and services.**

Table 2-1: System and Site Improvements

SYSTEM				
Ground Elevation (Ft.)	10			
Site Acquisition	No			
Zoning	No			
A&E Services	Yes			
Latitude	Longitude			
26 09 00.0	80 11 16.0			
Site Owner				
Broward County, FL				
Existing Tower Ht (Ft.)	Existing Tower Type			
296	Self-supported tower			
SITE IMPROVEMENTS				
New Compound/Expansion Size				
Width (Ft).	Length (Ft.)	Clearing Type		
85’ 10”	109’ 9”	N/A		
New Ice Bridge Length (Ft.)				
30’				
New Shelter Type				
Thermobond				
New Shelter Width (Ft.)	New Shelter Length (Ft.)			
24 feet	32 feet			
New Fuel Tank (Gal.)	New Fuel Tank (Type)			
500	Diesel			
New Generator / Transfer Switch	New Generator (Type)			
Generac	Generac			
Amps/Volts	Type	Cable (Ft.)		
400A/120/230VAC	N/A	N/A		
New Antenna: RF	New Antenna: TTA	New MW Dish:		
5	2	3		
New RF Lines (Linear Ft.)[1]				
1/2-inch	7/8-inch	1-1/4-inch	1-5/8-inch	Wave Guide
975	975	1500	N/A	660

[1] Or as required.

2.2 Site Name: Coconut Creek

Coconut Creek is an existing Broward County Radio site. In accordance with Solicitation R1422515P1 Appendix B- Addendum 2, a new 24’ X 32’ pre- cast shelter will be installed in addition to the existing 24' X 32' shelter. A new DC Power System will be installed in the new Shelter; along with a new generator and transfer switch. The existing shelter will utilize the existing UPS and existing generator. **The existing tower will be modified to support the antenna loads per the tower structural analysis, as further detailed in Attachment B.**

Figure 2-2: Coconut Creek

Site Details:

Site Engineering:

- Perform National Environmental Policy Act (NEPA) Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 Code of Federal Regulations (CFR) Chapter 1, subsection 1.1307 that may be potentially impacted by the construction activity.
- Provide a structural engineering analysis for antenna support structure, to support the antenna system.
- Provide tower climbing and tower mapping services to collect information about structural members and existing equipment.
  - Redesign the compound to add an additional new 24’ X 32’ shelter and 100KW, 120/240VAC, single phase diesel generator with a 500 gal belly tank.
  - Calculate wind loading requirements for the shelter and generator foundations.
  - Calculate wind loading requirements for new shelter, including shelter door and new ice bridge.

Antenna and Transmission Line:

- Remove 2 Bogner Rx Antennas and their associated TTA’s, transmission line, Side Arms and mounts from the top of the tower.
- Relocate 4 BCR80010 Transmit Antennas to 380’ level
- Install eight antennas for the RF Systems to the top of the tower.
- Supply and install side arm(s) for all antenna and dish mounts.
- Install three tower top amplifiers.
- Install 1/2-inch transmission line as required.
- Install 7/8-inch transmission line as required.
- Install 1-1/4-inch transmission line as required.
- Install four Microwave Dishes,
- Install Elliptical waveguide as required.
- Perform alignment of each of the microwave paths to ensure that the microwave dishes are optimally positioned.
- Perform sweep tests on transmission lines.

- Supply and install one ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

Compound Expansion

- Modify existing compound to accommodate space required for new 24' X 32' shelter
- Install new 24' X 32' shelter
- Install new 100KW, 120/240VAC, single phase diesel generator with a 500 gal belly tank
- Add new fence and gates as required

Existing Facility Improvement Work:

- Provide all necessary equipment and services necessary to fully cutover users from the old system to the new system
- Replace UPS Systems in existing facility

Existing Tower Improvement Work:

- **Modify tower to support specified antenna loads per the tower structural analysis as further detailed in Attachment B (consisting of tower modification schedule, design loading , pictorial elevation drawings, equipment lists, etc.)**
- **Provide all material and services necessary to implement the design specified in the attached structural analysis.**
- **Include all necessary construction cranes to support the installation of all material and services.**

Table 2-2: System and Site Improvements

SYSTEM				
Ground Elevation (Ft.)	10			
Site Acquisition	No			
Zoning	No			
A&E Services	Yes			
Latitude	Longitude			
26 18 10	80 11 45			
Site Owner				
Broward County, FL				
Existing Tower Ht (Ft.)	Existing Tower Type			
400	Self-supported tower			
SITE IMPROVEMENTS				
New Compound/Expansion Size				
Width (Ft).	Length (Ft.)	Clearing Type		
N/A	N/A	N/A		
New Ice Bridge Length (Ft.)				
~~16 feet~~ **95 feet**				
New Shelter Type				
Thermobond				
New Shelter Width (Ft.)	New Shelter Length (Ft.)			
24	32			
New Fuel Tank (Gal.)	New Fuel Tank (Type)			
500	Diesel Belly Tank			
New Generator / Transfer Switch	New Generator (Type)			
Generac	Generac			
New Electrical Circuits				
Amps/Volts	Type	Cable (Ft.)		
400/120/240	N/A	N/A		
New Antenna: RF	New Antenna: TTA	New MW Dish:		
8	3	4		
New RF Lines (Linear Ft.)[2]				
1/2-inch	7/8-inch	1-1/4-inchor l	1-5/8-inch	Wave Guide
1720	1290	2025	320	300

[2] Or as required

2.3 Site Name: Markham Park

Markham Park is an existing Broward County Radio site. In accordance with Solicitation R1422515P1 Appendix B - Addendum 2, a new 24' X 32' pre-cast shelter will be installed, in addition to the existing shelter. A new DC Power System will be installed in the new shelter, along with a new generator and transfer switch. The existing UPS and generator will remain as is. The existing guyed tower will be utilized. **Additional gates will be provided.**

Figure 2-3: Markham Park

Site Details:

Site Engineering:

- Perform National Environmental Policy Act (NEPA) Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 Code of Federal Regulations (CFR) Chapter 1, subsection 1.1307 that may be potentially impacted by the construction activity.
- Provide a structural engineering analysis for antenna support structure, to support the antenna system.
- Provide tower climbing and tower mapping services to collect information about structural members and existing equipment.
- Redesign the compound to add an additional new 24' X 32' shelter and 100KW, 120/240VAC, single phase diesel generator with a 500 gal belly tank.
- Calculate wind loading requirements for the shelter and generator foundations.
- Calculate wind loading requirements for new shelter, including shelter door and new ice bridge.

Antenna and Transmission Line:

- Remove 2 Bogner Rx Antennas and their associated TTA's, transmission line, Side Arms and mounts from the top of the tower.
- Install five antennas for the RF system to top of tower.
- Supply and install side arm(s) for all antenna and dish mounts.
- Install two tower top amplifiers.
- Install 1/2-inch transmission line as required.
- Install 7/8-inch transmission line as required.
- Install 1-1/4-inch transmission line as required.

- Install three Microwave Dishes.
- Install Elliptical waveguide as required.
- Install 60 ft of new ice bridge between the new shelter and existing tower.
- Perform alignment of each of the microwave paths to ensure that the microwave dishes are optimally positioned.
- Perform sweep tests on transmission lines.
- Supply and install one ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

Compound Expansion

- Expand Compound 60' X 80' to accommodate space required for new 24' X 32' shelter
- Install new 24' X 32' shelter
- Remove existing abandoned equipment shelter and generator.
- Add new fence as required
- **Additional sliding and personnel gates for ease of maintenance & access. Includes labor and heavy-duty hardware for rolling gates (as opposed to the standard swing gates).**
- Install new 100KW, 120/240VAC, single phase diesel generator with a 500 gal belly tank
- Fabricate steel weight distribution plate and make electrical modifications in order for the existing shelter to receive the new DC Power System.
- Upgrade site grounding to the latest revision of R56
- Provide all necessary equipment and services necessary to fully cutover users from the old system to the new system
- ~~Upgrade shelter and supporting systems to optimal conditions, including the following:~~
  - ~~Ensure roof is in good condition and free of leaks~~
  - ~~Repair any damaged flooring or siding to building~~
  - ~~Seal building to prevent pest entry~~
  - ~~Service all HVAC units and upgrade or, if necessary, to ensure proper cooling of equipment, replace. (County may elect to replace as part of Optional Services, if the HVAC units are not required to be replaced to ensure proper cooling of equipment.)~~

Table 2-3: System and Site Improvements

SYSTEM				
Ground Elevation (Ft.)	9			
Site Acquisition	No			
Zoning	No			
A&E Services	Yes			
Latitude	Longitude			
26 08 43.1	80 11 43.8			
Site Owner				
Broward County, FL				
Existing Tower Ht (Ft.)	Existing Tower Type			
415	Guyed tower			
SITE IMPROVEMENTS				
New Compound/Expansion Size				
Width (Ft).	Length (Ft.)	Clearing Type		
60	80	LIGHT		
New Ice Bridge Length (Ft.)				
15				
New Shelter Type				
Precast				
New Shelter Width (Ft.)	New Shelter Length (Ft.)			
24	32			
New Fuel Tank (Gal.)	New Fuel Tank (Type)			
1000	Diesel			
New Generator / Transfer Switch	New Generator (Type)			
175KW	Outdoor			
New Electrical Circuits				
Amps/Volts	Type	Cable (Ft.)		
400-amp; 120/240-volt, single phase	Underground	50		
New Antenna: RF	New Antenna: TTA	New MW Dish:		
5	2	3		
New RF Lines (Linear Ft.)[3]				
/2-inch	7/8-inch	1-1/4-inch	1-5/8-inch	Wave Guide
850	850	1200	N/A	540

[3] Or as required

2.5 Site Name: Davie

Davie is an existing Broward County Radio site. In accordance with Solicitation R1422515P1 Appendix B-Addendum 2, a new 24' X 32' pre-cast shelter will be installed, in addition to the existing shelter. A new DC Power System will be installed in the new shelter, along with a new generator and transfer switch. The existing UPS and generator will remain as is. The existing guyed tower will be utilized **and modified to support the antenna loads per the tower structural analysis, as further detailed in Attachment B**.

Figure 2-5: Davie

Site Details:

Site Engineering:

- Perform National Environmental Policy Act (NEPA) Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 Code of Federal Regulations (CFR) Chapter one, subsection 1.1307 that may be potentially impacted by the construction activity.
- Provide a structural engineering analysis for antenna support structure, to support the antenna system.
- Provide tower climbing and tower mapping services to collect information about structural members and existing equipment.
- Redesign the compound to add an additional new 24' X 32' shelter and 100KW, 120/240VAC, single phase diesel generator with a 500 gal belly tank.
- Calculate wind loading requirements for the shelter and generator foundations.
- Calculate wind loading requirements for new shelter, including shelter door and new ice bridge.

Antenna and Transmission Line:

- Remove 2 BMR 10 Antennas and their associated Transmission line, TTA's, SA's and mounts.
- Relocate 4 existing BMR10 antennas 10 – 15 feet down from their current location
- Install six antenna(s) for the RF system.
- Supply and install side arm(s) for all antenna and dish mounts.
- Install three tower top amplifiers.
- Install 1/2-inch transmission line as required.
- Install 7/8-inch transmission line as required.
- Install 1-1/4-inch transmission line as required.
- Install five Microwave Dishes.
- Install Elliptical waveguide as required.
- Perform alignment of each of the microwave paths to ensure that the microwave dishes are optimally positioned.
- Install 15' of Waveguide Bridge (ice bridge)

- Perform sweep tests on transmission lines.
- Supply and install one ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

Existing Facility Improvement Work:

- Install one new 100 KW diesel generator and automatic transfer switch.
- Provide all necessary equipment and services necessary to fully cutover users from the old system to the new system

Compound Expansion:

- Expand Compound 30' X 88' 2" to accommodate space required for new 24' X 32' shelter
- Install new 24' X 32' shelter
- Add new fence and gates as required
- Install new 100KW 120/240VAC, single phase diesel generator with a 500 gal belly tank
- **Provide and implement landscape plan design that includes arborist study, landscape plan, tree survey and tree mitigation plan**

Existing Tower Improvement Work:

- **Modify tower to support specified antenna loads per the tower structural analysis as further detailed in Attachment B (consisting of tower modification schedule, design loading , pictorial elevation drawings, equipment lists, etc.)**
- **Provide all material and services necessary to implement the design specified in the attached structural analysis.**
- **Include all necessary construction cranes to support the installation of all material and services.**

Table 2-5: System and Site Improvements

SYSTEM				
Ground Elevation (Ft.)	7			
Site Acquisition	No			
Zoning	No			
A&E Services	Yes			
Latitude	Longitude			
26 03 56	80 20 18			
Site Owner				
Broward County, FL				
Existing Tower Ht (Ft.)	Existing Tower Type			
315	Self Supported			
SITE IMPROVEMENTS				
New Compound/Expansion Size				
Width (Ft).	Length (Ft.)	Clearing Type		
30	88’ 2”	N/A		
New Ice Bridge Length (Ft.)				
15				
New Shelter Type				
Thermobond				
New Shelter Width (Ft.)	New Shelter Length (Ft.)			
24	32			
New Fuel Tank (Gal.)	New Fuel Tank (Type)			
500	Diesel			
New Generator /Transfer Switch	New Generator (Type)			
100KW / 400 A	Outdoor			
New Electrical Circuits				
Amps/Volts	Type	Cable (Ft.)		
400/120/240	N/A	N/A		
New Antenna: RF	New Antenna: TTA	New MW Dish:		
6	2	5		
New RF Lines (Linear Ft.)[5]				
1/2-inch	7/8-inch	1-1/4-inch	1-5/8-inch	Wave Guide
975	975	1200	N/A	660

2.7 Site Name: Miramar

Miramar is an existing Broward County Radio site. In accordance with Solicitation R1422515P1 Appendix B- Addendum 2, a new 12' X 32' pre-cast shelter with a new DC Power System will be installed in addition to the existing shelter. The existing tower will be used. A new DC Power System will be installed for the new shelter, along with a new generator and transfer switch. The existing generator, automatic transfer switch and UPS will not be decommissioned. **The existing tower will be modified to support the antenna loads per the tower structural analysis, as further detailed in Attachment B.**

Figure 2-7: Miramar

Site Details

Site Engineering:

- Perform National Environmental Policy Act (NEPA) Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 Code of Federal Regulations (CFR) Chapter 1, subsection 1.1307 that may be potentially impacted by the construction activity.
- Provide a structural engineering analysis for antenna support structure, to support the antenna system.
- Provide tower climbing and tower mapping services to collect information about structural members and existing equipment.
- Redesign the compound to add an additional new 12' X 32' shelter and 100KW, 120/240VAC, single phase diesel generator with a 500 gal belly tank.
- Calculate wind loading requirements for the shelter and generator foundations.
- Calculate wind loading requirements for new shelter, including shelter door and new ice bridge.

Antenna and Transmission Line:

- Relocate 2 existing BMR12 Rx Antennas and their associated TTA's, SA's and mounts.
- Install five antennas for the RF system.
- Supply and install side arm(s) for all antenna and dish mounts.
- Install two tower top amplifiers.
- Install 1/2-inch transmission line as required.
- Install 7/8-inch transmission line as required.
- Install 1-1/4-inch transmission line as required.
- Install two Microwave Dishes.
- Install Elliptical waveguide as required.
- Perform alignment of each of the microwave paths to ensure that the microwave dishes are

optimally positioned.

- Install 25’ of Waveguide Bridge (ice bridge)
- Perform sweep tests on transmission lines.
- Supply and install one ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

Existing Facility Improvement Work:

- Install one new 100KW diesel generator and automatic transfer switch.
- Provide all necessary equipment and services necessary to fully cutover users from the old system to the new system
- Replace existing UPS systems

Compound Expansion

- Expand Compound 5’ X 64’ 11” to accommodate space required for new 12’ X 32’ shelter
- Install new 12’ X 32’ shelter
- Add new fence as required
- **Additional sliding and personnel gates requested by Broward County for ease of maintenance & access. Includes labor and heavy-duty hardware for rolling gates (as opposed to the standard swing gates).**
- Install new 100KW, 120/240VAC, single phase diesel generator with a 500 gal belly tank

Existing Tower Improvement Work:

- **Modify tower to support specified antenna loads per the tower structural analysis as further detailed in Attachment B (consisting of tower modification schedule, design loading , pictorial elevation drawings, equipment lists, etc.)**
- **Provide all material and services necessary to implement the design specified in the attached structural analysis.**
- **Include all necessary construction cranes to support the installation of all material and services.**

Table 2-7: System and Site Improvements

SYSTEM				
Ground Elevation (Ft.)	10			
Site Acquisition	No			
Zoning	No			
A&E Services	Yes			
Latitude	Longitude			
25 57 30.7	80 20 18.5			
Site Owner				
Broward County, FL				
Existing Tower Ht (Ft.)	Existing Tower Type			
315	Self-Supported			
SITE IMPROVEMENTS				
New Compound/Expansion Size				
Width	Length (Ft.)	Clearing Type		
60	80	Light		
New Ice Bridge Length (Ft.)				
15				
New Shelter Type				
Precast				
New Shelter Width (Ft.)	New Shelter Length (Ft.)			
12	32			
New Fuel Tank (Gal.)	New Fuel Tank (Type)			
650	Diesel			
New Generator /Transfer Switch	New Generator (Type)			
100kw / 00 A	Outdoor			
New Electrical Circuits				
Amps/Volts	Type	Cable (Ft.)		
400-amp - 120/240-volt, single-phase	Underground	50		
New Antenna: RF	New Antenna: TTA	New MW Dish:		
5	2	2		
New RF Lines (Linear Ft.)[7]				
1/2-inch	7/8-inch	1-1/4-inch	1-5/8-inch	Wave Guide
650	650	900	N/A	305

[7] Or as required.

2.10 Site Name: Tamarac

Tamarac is a new Broward County Radio site at the existing Tamarac location. In accordance with Solicitation R1422515P1 Appendix B-Addendum 2, the site will receive a new 24' X 32' precast shelter with a new DC Power System, generator and a new 300' self-supported tower.

Figure 2-10: Tamarac

Site Details:

Tower Work:

- Construct drilled pier type tower foundations including excavation, rebar, and concrete.
- Erect new 300' self-supporting tower
- Supply and install grounding for the tower base.

Antenna and Transmission Line:

- Install five antennas for the RF system.
- Supply and install side arm(s) for all antenna and dish mounts.
- Install one tower-top amplifier.
- Install 1/2-inch transmission line as required.
- Install 7/8-inch transmission line as required.
- Install 1-1/4-inch transmission line as required.
- Install two Microwave Dishes.
- Install Elliptical waveguide as required.
- Perform alignment of each of the microwave paths to ensure that the microwave dishes are optimally positioned.
- Perform sweep tests on transmission lines.
- Perform alignment of each of three microwave paths to ensure that the microwave dishes are optimally positioned.
- Supply and install one ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

Compound Work:

- **Expand the site to accommodate building an access walkway between the Sprint and Broward County radio site compounds, including removing trees, building a retaining wall, and additional site grading.**

Table 2-10: System and Site Improvements

SYSTEM				
Ground Elevation (Ft.)	10			
Site Acquisition	No			
Zoning	No			
A&E Services	Yes			
Latitude	Longitude			
26 12 43.5	80 16 20.5			
Site Owner				
City of Tamarac				
New Tower Ht (Ft.)	New Tower Type			
300	Self-Supported			
SITE IMPROVEMENTS				
New Compound/Expansion Size				
Width (Ft).	Length (Ft.)	Clearing Type		
60	80	Light		
New Ice Bridge Length (Ft.)				
15				
New Shelter Type				
Custom pre-cast				
New Shelter Width (Ft.)	New Shelter Length (Ft.)			
24	32			
New Fuel Tank (Gal.)	New Fuel Tank (Type)			
500	Diesel			
New Generator (kW)	New Generator (Type)			
100 kw / 400 A	Outdoor			
New Electrical Circuits				
Amps/Volts	Type	Cable (Ft.)		
400-amp - 120-240-volt, single-phase	Underground	50		
New Antenna: RF	New Antenna: TTA	New MW Dish:		
5	1	2		
New RF Lines (Linear Ft.)[10]				
1/2-inch	7/8-inch	1-1/4-inch	1-5/8-inch	Wave Guide
660	660	1005	N/A	330

10 Or as required.

2.12 Site Name: Sunrise Dispatch

Sunrise Dispatch is an existing dispatch site. Any services or work necessary to be performed at this site to achieve the specifications of the System and meet the other requirements of the Agreement shall be completed by Motorola as part of the scope of services hereunder.

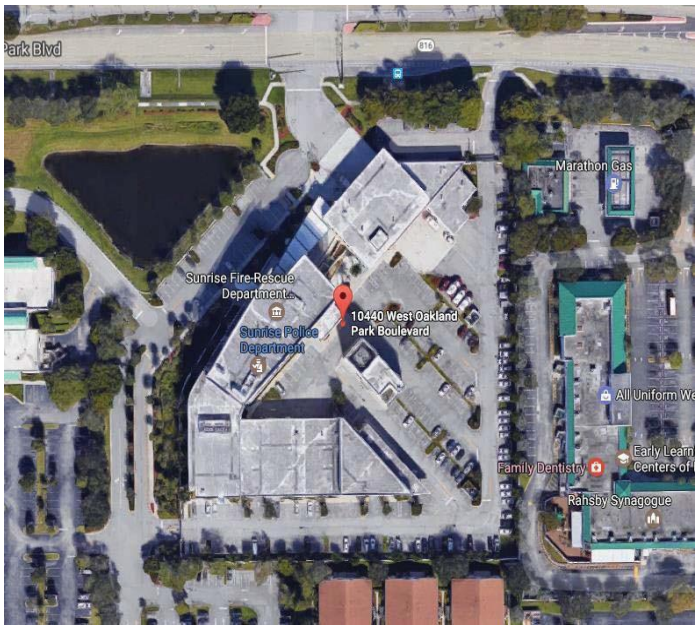


Figure 2-13: Sunrise Dispatch Tower

Additional Work:

- **Motorola will provide and install an extreme switch to temporarily connect the Sunrise Dispatch Center, Coconut Creek Dispatch, and Pembroke Dispatch Center to the Hosted Master Site.**
- **There are 4 switches in this configuration which will allow the Existing Console Sites connected to the HMS Core to be changed over to an Ethernet Connection utilizing the ATT Network.**
- **This configuration will also allow the Firenet System to use the ATT Network as a backup network path.**

2.13 Site Name: Coconut Creek Dispatch

Coconut Creek Dispatch is an existing dispatch site. Any services or work necessary to be performed at this site to achieve the specifications of the System and meet the other requirements of the Agreement shall be completed by Motorola as part of the scope of services hereunder.

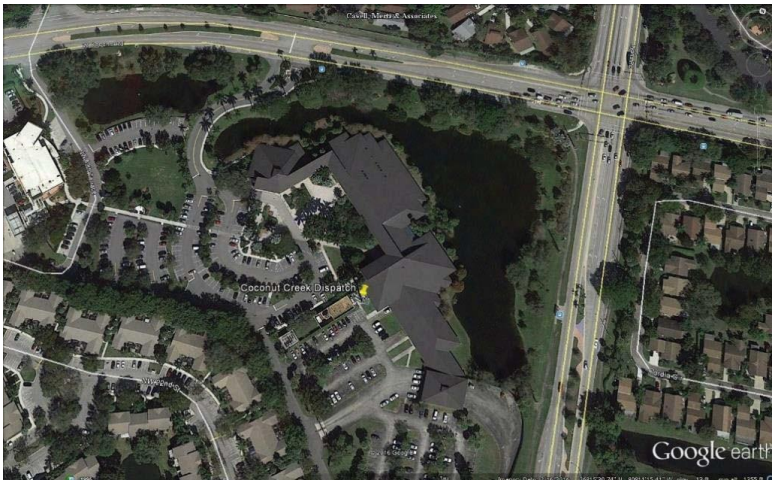


Figure 2-14: Coconut Creek Dispatch

Additional Work:

- **Motorola will provide and install an extreme switch to temporarily connect the Sunrise Dispatch Center, Coconut Creek Dispatch, and Pembroke Dispatch Center to the Hosted Master Site.**
- **There are 4 switches in this configuration which will allow the Existing Console Sites connected to the HMS Core to be changed over to an Ethernet Connection utilizing the ATT Network.**
- **This configuration will also allow the Firenet System to use the ATT Network as a backup network path.**

2.14 Site Name: Pembroke Pines Dispatch

Pembroke Pines Dispatch is an existing dispatch site. Any services or work necessary to be performed at this site to achieve the specifications of the System and meet the other requirements of the Agreement shall be completed by Motorola as part of the scope of services hereunder.

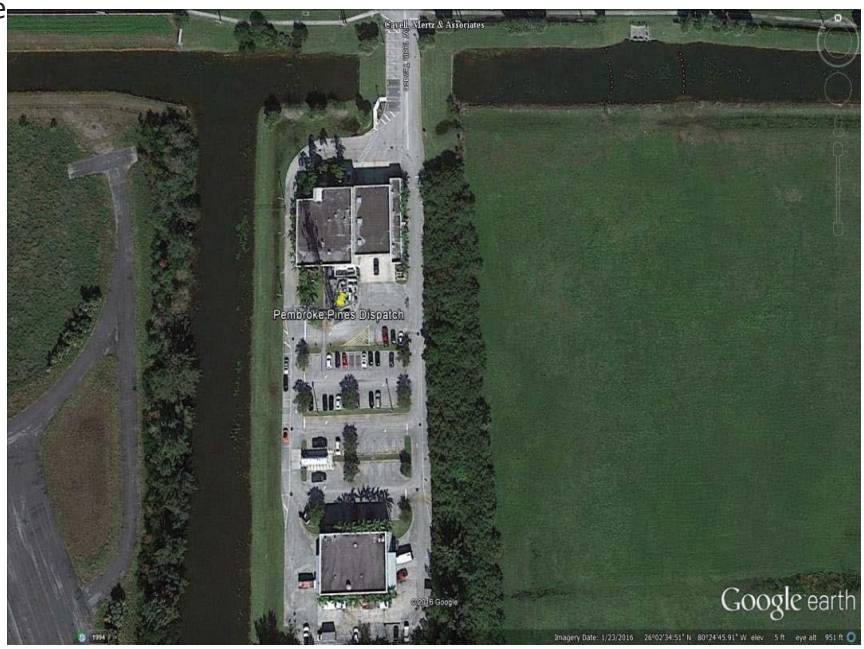


Figure 2-15: Pembroke Pines Dispatch

Additional Work:

- **Motorola will provide and install an extreme switch to temporarily connect the Sunrise Dispatch Center, Coconut Creek Dispatch, and Pembroke Dispatch Center to the Hosted Master Site.**
- **There are 4 switches in this configuration which will allow the Existing Console Sites connected to the HMS Core to be changed over to an Ethernet Connection utilizing the ATT Network.**
- **This configuration will also allow the Firenet System to use the ATT Network as a backup network path.**

2.15 Site Name: FS 106

Broward County FS 106 is a new Broward County Radio site. In accordance with Solicitation R1422515P1 Appendix B- Addendum 2, the site will receive a new 24' X 32' precast shelter with a new DC Power System, generator and a new 300' self-supported tower. Any services or work necessary to be performed at this site to achieve the specifications of the System and meet the other requirements of the Agreement shall be completed by Motorola as part of the scope of services hereunder.

Figure 2-16: FS 106

Site Details:

Engineering Services:

- **Provide helicopter evaluation to determine the helicopter communications range**

Tower Work:

- **Implement required FDOT traffic plan during construction of the Alligator Alley Site. Includes rental of barricades as required.**
- **Install reinforced conduits for required FDOT tower foundation testing. Conduits required to be installed in each caisson and run the entire length of the caissons. Requires a foundation redesign and extra labor and materials.**
- Construct drilled pier type tower foundations including excavation, rebar, and concrete
- Erect new 300' self-supported tower.
- Supply and install grounding for the tower base.

Compound Work

- **Establish account with Lee County Electrical Coop (LCEC) and provide temporary electrical service (does not include the recurring electrical fees).**
- **Provide directional boring to connect electrical source to shelter**

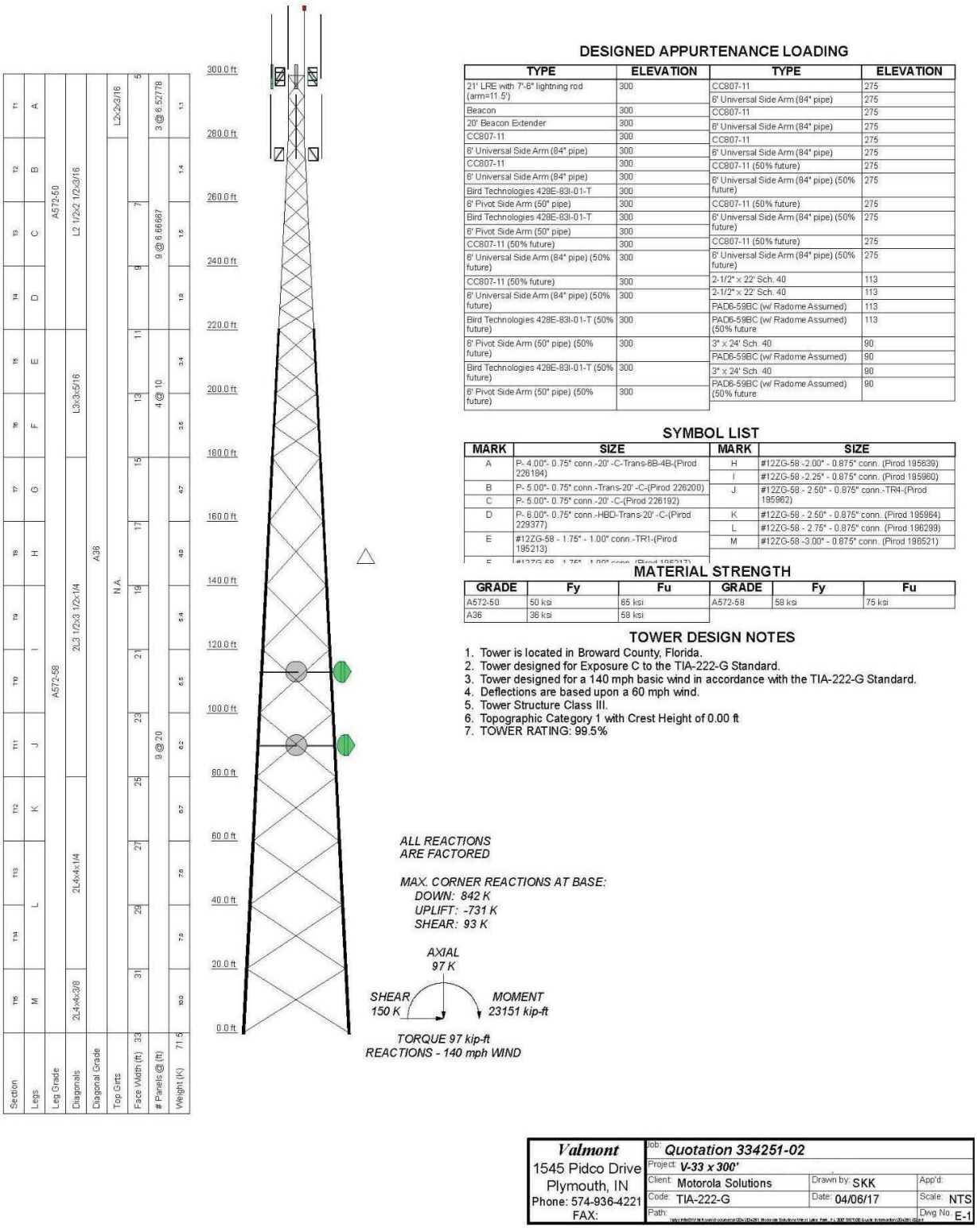
Antenna and Transmission Line:

- Install 4 antennas for the RF system.
- Supply and install side arm(s) for all antenna and dish mounts.
- Install two tower-top amplifiers.
- Install 1/2-inch transmission line as required.
- Install 7/8-inch transmission line as required.
- Install 1-1/4-inch transmission line as required.
- Install four Microwave Dishes.
- Perform sweep tests on transmission lines.
- Install Elliptical waveguide as required.
- Perform alignment of each of the microwave paths to ensure that the microwave dishes are optimally positioned.
- Perform sweep tests on transmission lines.
- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

Table 2-12: System and Site Improvements

SYSTEM				
Ground Elevation (Ft.)		17		
Site Acquisition		No		
Zoning		No		
A&E Services		Yes		
Latitude		Longitude		
26 08 44.2		80 37 42.5		
Site Owner				
Broward County				
New Tower Ht (Ft.)		New Tower Type		
300		Self-Supported		
SITE IMPROVEMENTS				
New Compound/Expansion Size				
Width (Ft).	Length (Ft.)	Clearing Type		
60	80	Light		
New Ice Bridge Length (Ft.)				
15				
New Shelter Type				
Custom pre-cast				
New Shelter Width (Ft.)		New Shelter Length (Ft.)		
24		32		
New Fuel Tank (Gal.)		New Fuel Tank (Type)		
500		Diesel		
New Generator (kW)		New Generator (Type)		
100 kw / 400 A		Outdoor		
New Electrical Circuits				
Amps/Volts	Type	Cable (Ft.)		
400-amp - 120-240-volt, single-phase	Underground	50		
New Antenna: RF	New Antenna: TTA	New MW Dish:		
4	2	4		
New RF Lines (Linear Ft.)[12]				
1/2-inch	7/8-inch	1-1/4-inch	1-5/8-inch	Wave Guide
660	660	660	N/A	560

[12] Or as required.



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
21' LRE with 7'-6" lightning rod (arm=11.5')	300	CC807-11	275
		6' Universal Side Arm (84" pipe)	275
Beacon	300	CC807-11	275
20' Beacon Extender	300	6' Universal Side Arm (84" pipe)	275
CC807-11	300	CC807-11	275
6' Universal Side Arm (84" pipe)	300	6' Universal Side Arm (84" pipe)	275
CC807-11	300	CC807-11 (50% future)	275
6' Universal Side Arm (84" pipe)	300	6' Universal Side Arm (84" pipe) (50% future)	275
Bird Technologies 428E-83I-01-T	300		
6' Pivot Side Arm (50" pipe)	300	CC807-11 (50% future)	275
Bird Technologies 428E-83I-01-T	300	6' Universal Side Arm (84" pipe) (50% future)	275
6' Pivot Side Arm (50" pipe)	300		
CC807-11 (50% future)	300	CC807-11 (50% future)	275
6' Universal Side Arm (84" pipe) (50% future)	300	6' Universal Side Arm (84" pipe) (50% future)	275
CC807-11 (50% future)	300	2-1/2" x 22' Sch. 40	113
6' Universal Side Arm (84" pipe) (50% future)	300	2-1/2" x 22' Sch. 40	113
		PAD6-59BC (w/ Radome Assumed)	113
Bird Technologies 428E-83I-01-T (50% future)	300	PAD6-59BC (w/ Radome Assumed) (50% future	113
6' Pivot Side Arm (50" pipe) (50% future)	300	3" x 24' Sch. 40	90
		PAD6-59BC (w/ Radome Assumed)	90
Bird Technologies 428E-83I-01-T (50% future)	300	3" x 24' Sch. 40	90
6' Pivot Side Arm (50" pipe) (50% future)	300	PAD6-59BC (w/ Radome Assumed) (50% future	90

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	P- 4.00"- 0.75" conn.-20' -C-Trans-6B-4B-(Pirod 226184)	H	#12ZG-58 -2.00" - 0.875" conn. (Pirod 195639)
		I	#12ZG-58 -2.25" - 0.875" conn. (Pirod 195960)
B	P- 5.00"- 0.75" conn.-Trans-20' -C-(Pirod 226200)	J	#12ZG-58 - 2.50" - 0.875" conn.-TR4-(Pirod 195962)
C	P- 5.00"- 0.75" conn.-20' -C-(Pirod 226192)		
D	P- 6.00"- 0.75" conn.-HBD-Trans-20' -C-(Pirod 229377)	K	#12ZG-58 - 2.50" - 0.875" conn. (Pirod 195964)
		L	#12ZG-58 - 2.75" - 0.875" conn. (Pirod 196299)
E	#12ZG-58 - 1.75" - 1.00" conn.-TR1-(Pirod 195213)	M	#12ZG-58 -3.00" - 0.875" conn. (Pirod 196521)

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A572-58	58 ksi	75 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower is located in Broward County, Florida.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 140 mph basic wind in accordance with the TIA-222-G Standard.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 99.5%

Valmont 1545 Pidco Drive Plymouth, IN Phone: 574-936-4221 FAX:	Job: Quotation 334251-02		
	Project: V-33 x 300'		
	Client: Motorola Solutions	Drawn by: SKK	App'd:
	Code: TIA-222-G	Date: 04/06/17	Scale: NTS
	Path:		Dwg No. E-1

Figure 2-17: FS 106 Tower

2.16 Site Name: Parkland

Parkland is a new Broward County Radio site. In accordance with Solicitation R1422515P1 Appendix B- Addendum 2, the site will receive a new 24’ X 32’ precast shelter with a new DC Power System, generator and a new 300' self- supported tower

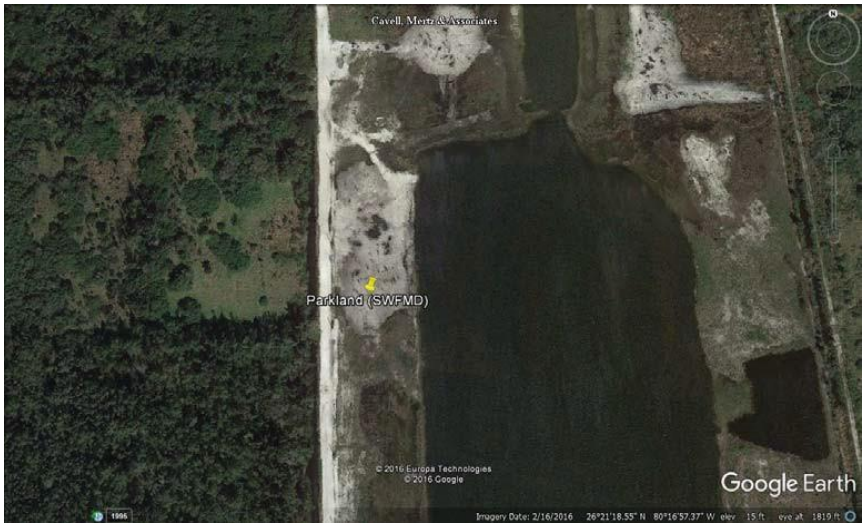


Figure 2-18: Parkland

Site Details:

Tower Work:

- Construct Drilled Pier tower foundations including excavation, rebar, and concrete
- Erect new 300’ self-supported tower.
- Supply and install grounding for the tower base.

Antenna and Transmission Line:

- Install five antennas for the RF system.
- Supply and install side arm(s) for all antenna and dish mounts.
- Install two tower-top amplifiers.
- Install 1/2-inch transmission line as required.
- Install 7/8-inch transmission line as required.
- Install 1-1/4-inch transmission line as required.
- Install 4 Microwave Dishes.
- Perform sweep tests on transmission lines.
- Install Elliptical waveguide as required.
- Perform alignment of each of the microwave paths to ensure that the microwave dishes are optimally positioned.
- Perform sweep tests on transmission lines.
- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

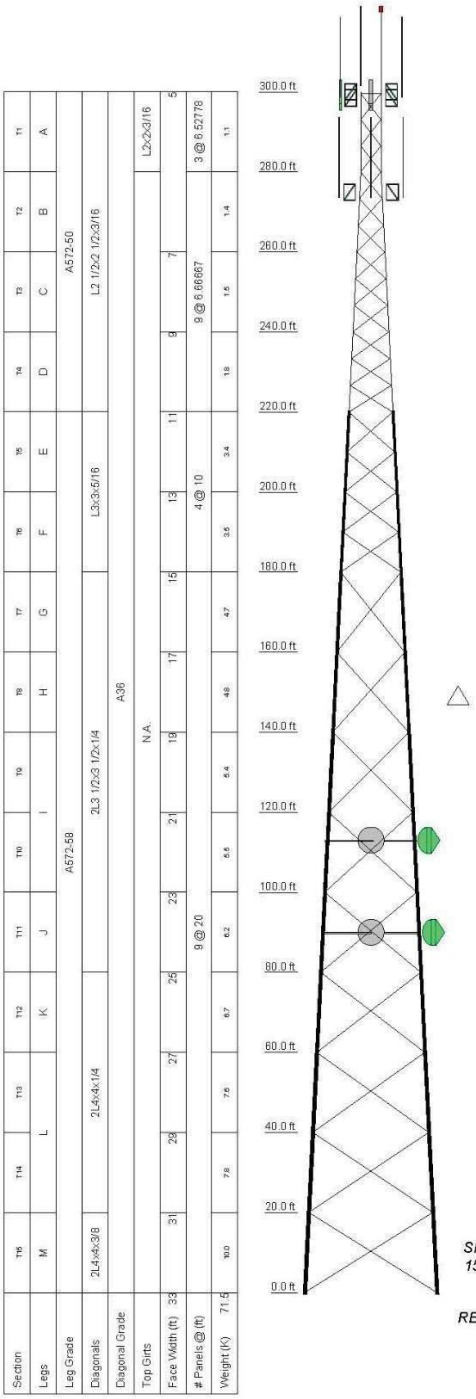
Compound Work:

- **Provide an asbestos survey and any necessary remediation, remove of the existing septic tank, demolish an existing onsite building (as designated by County), and provide final grading and sod replacement.**

Table 2-13: System and Site Improvements

SYSTEM				
Ground Elevation (Ft.)		17		
Site Acquisition		No		
Zoning		No		
A&E Services		Yes		
Latitude		Longitude		
26 21 17.8		80 16 59.2		
Site Owner				
Broward County				
New Tower Ht (Ft.)		New Tower Type		
300		Self-Supported		
SITE IMPROVEMENTS				
New Compound/Expansion Size				
Width (Ft).	Length (Ft.)	Clearing Type		
60	80	Light		
New Ice Bridge Length (Ft.)				
15				
New Shelter Type				
Custom pre-cast				
New Shelter Width (Ft.)		New Shelter Length (Ft.)		
24		32		
New Fuel Tank (Gal.)		New Fuel Tank (Type)		
500		Diesel		
New Generator (kW)		New Generator (Type)		
100 kw / 400 A		Outdoor		
New Electrical Circuits				
Amps/Volts	Type	Cable (Ft.)		
400-amp - 120-240-volt, single-phase	Underground	50		
New Antenna: RF	New Antenna: TTA	New MW Dish:		
5	2	4		
New RF Lines (Linear Ft.)[13]				
1/2-inch	7/8-inch	1-1/4-inch	1-5/8-inch	Wave Guide
660	660	915	N/A	630

[13] Or as required.



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
21' LRE with 7'-6" lightning rod (arm=11.5')	300	CC807-11	275
		6' Universal Side Arm (84" pipe)	275
Beacon	300	CC807-11	275
20' Beacon Extender	300	6' Universal Side Arm (84" pipe)	275
CC807-11	300	CC807-11	275
6' Universal Side Arm (84" pipe)	300	6' Universal Side Arm (84" pipe)	275
CC807-11	300	CC807-11 (50% future)	275
6' Universal Side Arm (84" pipe)	300	6' Universal Side Arm (84" pipe) (50% future)	275
Bird Technologies 428E-83I-01-T	300		
6' Pivot Side Arm (50" pipe)	300	CC807-11 (50% future)	275
Bird Technologies 428E-83I-01-T	300	6' Universal Side Arm (84" pipe) (50% future)	275
6' Pivot Side Arm (50" pipe)	300		
CC807-11 (50% future)	300	CC807-11 (50% future)	275
6' Universal Side Arm (84" pipe) (50% future)	300	6' Universal Side Arm (84" pipe) (50% future)	275
CC807-11 (50% future)	300	2-1/2" x 22' Sch. 40	113
6' Universal Side Arm (84" pipe) (50% future)	300	2-1/2" x 22' Sch. 40	113
		PAD6-59BC (w/ Radome Assumed)	113
Bird Technologies 428E-83I-01-T (50% future)	300	PAD6-59BC (w/ Radome Assumed) (50% future	113
6' Pivot Side Arm (50" pipe) (50% future)	300	3" x 24' Sch. 40	90
		PAD6-59BC (w/ Radome Assumed)	90
Bird Technologies 428E-83I-01-T (50% future)	300	3" x 24' Sch. 40	90
6' Pivot Side Arm (50" pipe) (50% future)	300	PAD6-59BC (w/ Radome Assumed) (50% future	90

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	P- 4.00"- 0.75" conn.-20' -C-Trans-8B-4B-(Pirod 226184)	H	#12ZG-58 -2.00" - 0.875" conn. (Pirod 195639)
		I	#12ZG-58 -2.25" - 0.875" conn. (Pirod 195960)
B	P- 5.00"- 0.75" conn.-Trans-20' -C-(Pirod 226200)	J	#12ZG-58 - 2.50" - 0.875" conn.-TR4-(Pirod 195962)
C	P- 5.00"- 0.75" conn.-20' -C-(Pirod 226192)		
D	P- 6.00"- 0.75" conn.-HBD-Trans-20' -C-(Pirod 229377)	K	#12ZG-58 - 2.50" - 0.875" conn. (Pirod 195964)
		L	#12ZG-58 - 2.75" - 0.875" conn. (Pirod 196299)
E	#12ZG-58 - 1.75" - 1.00" conn.-TR1-(Pirod 195213)	M	#12ZG-58 -3.00" - 0.875" conn. (Pirod 198521)
F	#12ZG-58 - 1.75" - 1.00" conn. (Pirod 195213)		

MATERIAL STRENGTH

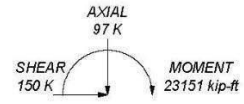
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A572-58	58 ksi	75 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower is located in Broward County, Florida.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 140 mph basic wind in accordance with the TIA-222-G Standard.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 99.5%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 842 K
UPLIFT: -731 K
SHEAR: 93 K



TORQUE 97 kip-ft
REACTIONS - 140 mph WIND

Valmont 1545 Pidco Drive Plymouth, IN Phone: 574-936-4221 FAX:	Job: *Quotation 334251-02*		
	Project: *V-33 x 300'*		
	Client: Motorola Solutions	Drawn by: SKK	App'd:
	Code: TIA-222-G	Date: 04/06/17	Scale: NTS
	Path:		Dwg No. E-1

2.17 Site Name: West Hollywood

West Hollywood is a new Broward County Radio site. In accordance with Solicitation R1422515P1 Appendix B-Addendum 2, the site will receive a new 24' X 32' precast shelter with a new DC Power System, generator and a new 300' self-supported tower.

Figure 2-19: West Hollywood

Site Details:

Additional Engineering / Zoning Support Services

- Zoning support for tower height variance and proximity to local housing
- Platform design to raise Shelter, Generator and its 500 Gal Diesel tank above flood plain

- Tower Work:
- Construct pier and pad type tower foundations including excavation, rebar, and concrete
- Erect new 300' self-supported tower.
- Supply and install grounding for the tower base.

Additional Compound Work:

- Erect a 6' high platform to raise the 24' X 32' communications shelter and the generator with its 500 gal diesel belly tank above the flood plain.
- **Develop and implement landscape design plan that includes arborist study, landscape plan, tree survey and tree mitigation plan.**
- **Provide all necessary work and services to comply with Wetland Mitigation Plan Requirement, including the application package, a project narrative, Uniform Mitigation Assessment Method (UMAM) documentation, and associated maps and figures. The narrative will include documentation of elimination and reduction of impacts, proposed mitigation, and cumulative impacts based on information provided by County.**

Antenna and Transmission Line:

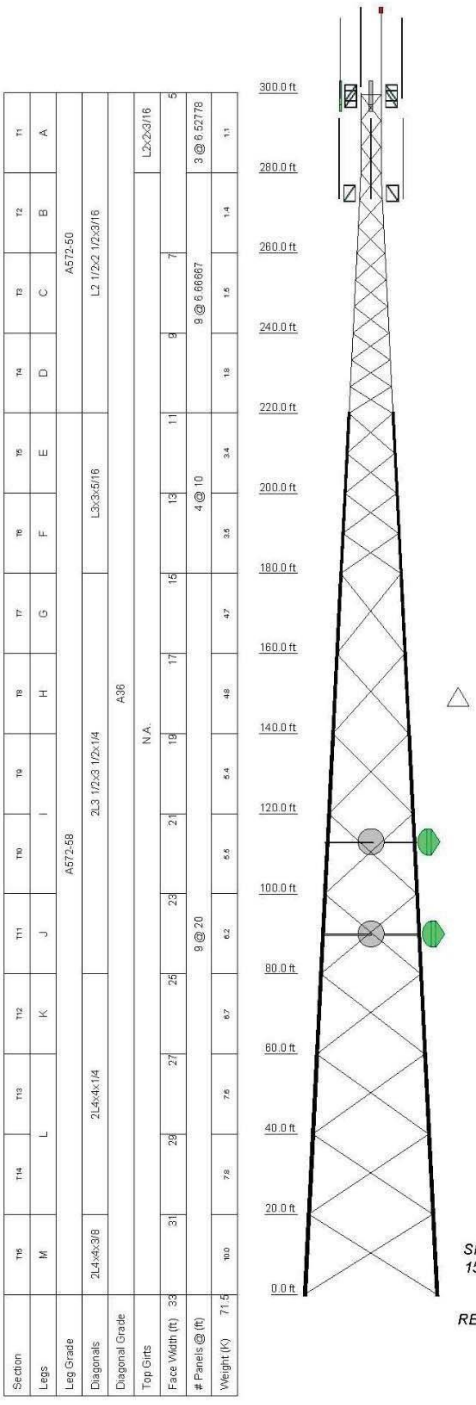
- Install five antennas for the RF system.
- Supply and install side arm(s) for all antenna and dish mounts.
- Install two tower-top amplifiers.
- Install 1/2-inch transmission line as required.
- Install 7/8-inch transmission line as required.

- Install 1-1/4-inch transmission line as required.
- Install two Microwave Dishes.
- Perform sweep tests on transmission lines.
- Install Elliptical waveguide as required.
- Perform alignment of each of the microwave paths to ensure that the microwave dishes are optimally positioned.
- Perform sweep tests on transmission lines.
- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

Table 2-14: System and Site Improvements

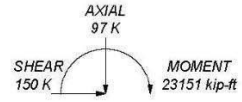
SYSTEM				
Ground Elevation (Ft.)		.5		
Site Acquisition		No		
Zoning		No		
A&E Services		Yes		
Latitude		Longitude		
26 03 37.2		80 12 00.0		
Site Owner				
Broward County				
New Tower Ht (Ft.)		New Tower Type		
300		Self-Supported		
SITE IMPROVEMENTS				
New Compound/Expansion Size				
Width (Ft).	Length (Ft.)	Clearing Type		
60	80	Light		
New Ice Bridge Length (Ft.)				
15				
New Shelter Type				
Custom pre-cast				
New Shelter Width (Ft.)		New Shelter Length (Ft.)		
24		32		
New Fuel Tank (Gal.)		New Fuel Tank (Type)		
500		Diesel		
New Generator (kW)		New Generator (Type)		
100		Outdoor		
New Electrical Circuits				
Amps/Volts	Type	Cable (Ft.)		
400-amp; 120/240-volt, single-phase		50		
New Antenna: RF	New Antenna: TTA	New MW Dish:		
5	2	2		
New RF Lines (Linear Ft.)[14]				
1/2-inch	7/8-inch	1-1/4-inch	1-5/8-inch	Wave Guide
660	660	915	N/A	335

[14] Or as required.



ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 842 K
UPLIFT: -731 K
SHEAR: 93 K



TORQUE 97 kip-ft
REACTIONS - 140 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
21' LRE with 7'-6" lightning rod (arm=11.5')	300	CC807-11	275
		6' Universal Side Arm (84" pipe)	275
Beacon	300	CC807-11	275
20' Beacon Extender	300	6' Universal Side Arm (84" pipe)	275
CC807-11	300	CC807-11	275
6' Universal Side Arm (84" pipe)	300	6' Universal Side Arm (84" pipe)	275
CC807-11	300	CC807-11 (50% future)	275
6' Universal Side Arm (84" pipe)	300	6' Universal Side Arm (84" pipe) (50% future)	275
Bird Technologies 428E-83I-01-T	300		
6' Pivot Side Arm (50" pipe)	300	CC807-11 (50% future)	275
Bird Technologies 428E-83I-01-T	300	6' Universal Side Arm (84" pipe) (50% future)	275
6' Pivot Side Arm (50" pipe)	300		
CC807-11 (50% future)	300	CC807-11 (50% future)	275
6' Universal Side Arm (84" pipe) (50% future)	300	6' Universal Side Arm (84" pipe) (50% future)	275
CC807-11 (50% future)	300	2-1/2" x 22' Sch. 40	113
6' Universal Side Arm (84" pipe) (50% future)	300	2-1/2" x 22' Sch. 40	113
		PAD6-59BC (w/ Radome Assumed)	113
Bird Technologies 428E-83I-01-T (50% future)	300	PAD6-59BC (w/ Radome Assumed) (50% future)	113
6' Pivot Side Arm (50" pipe) (50% future)	300	3" x 24' Sch. 40	90
		PAD6-59BC (w/ Radome Assumed)	90
Bird Technologies 428E-83I-01-T (50% future)	300	3" x 24' Sch. 40	90
		PAD6-59BC (w/ Radome Assumed) (50% future	90
6' Pivot Side Arm (50" pipe) (50% future)	300		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	P- 4.00"- 0.75" conn.-20' -C-Trans-6B-4B-(Pirod 226184)	H	#12ZG-58 -2.00" - 0.875" conn. (Pirod 195939)
		I	#12ZG-58 -2.25" - 0.875" conn. (Pirod 195960)
B	P- 5.00"- 0.75" conn.-Trans-20' -C-(Pirod 226200)	J	#12ZG-58 - 2.50" - 0.875" conn.-TR4-(Pirod 195962)
C	P- 5.00"- 0.75" conn.-20' -C-(Pirod 226192)		
D	P- 6.00"- 0.75" conn.-HBD-Trans-20' -C-(Pirod 229377)	K	#12ZG-58 - 2.50" - 0.875" conn. (Pirod 195964)
		L	#12ZG-58 - 2.75" - 0.875" conn. (Pirod 196299)
E	#12ZG-58 - 1.75" - 1.00" conn.-TR1-(Pirod 195213)	M	#12ZG-58 -3.00" - 0.875" conn. (Pirod 196521)
F	#12ZG-58 - 1.75" - 1.00" conn. (Pirod 195217)		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A572-58	58 ksi	75 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower is located in Broward County, Florida.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 140 mph basic wind in accordance with the TIA-222-G Standard.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 99.5%

Valmont 1545 Pidco Drive Plymouth, IN Phone: 574-936-4221 FAX:	Job: *Quotation 334251-02*		
	Project: *V-33 x 300'*		
	Client: Motorola Solutions	Drawn by: SKK	App'd:
	Code: TIA-222-G	Date: 04/06/17	Scale: NTS
	Path:		Dwg No. E-1

2.18 Site Name: Pompano Beach Club

Pompano Beach Club is a new Broward County Radio site. In accordance with Solicitation R1422515P1 Appendix B- Addendum 2,-

Figure 2-20: Pompano Beach Club

The 3rd floor equipment room will be used. The transmission line and wave guide will be transported to the roof via a cable ladder mounted on the west side of the building, then stuccoes and paint will be used to camouflage the cable ladder so that it blends in with the building view. Antennas and dishes will be mounted on the roof on top of existing roof mounted buildings. The existing building generator will be used, if possible.

A DC power system will be installed into the 3rd floor equipment room.

Any services or work necessary to be performed at this site to achieve the specifications of the System and meet the other requirements of the Agreement shall be completed by Motorola as part of the scope of services hereunder.

Site Details

Site Engineering:

- Perform National Environmental Policy Act (NEPA) Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 Code of Federal Regulations (CFR) Chapter one, subsection 1.1307 that may be potentially impacted by the construction activity.
- Provide a structural engineering analysis for antenna support structure, to support the antenna system
- Provided a structural analysis for the equipment room floor support for the new DC Power System
- Provided a structural analysis for the cable ladder attachment to the outside west wall

Antenna and Transmission Line:

- Install five antennas for the RF system.
- Supply and install side arm(s) for all antenna and dish mounts.
- Install two tower top amplifiers.
- Install 1/2-inch transmission line as required.
- Install 7/8-inch transmission line as required.
- Install two Microwave Dishes.
- Install Elliptical waveguide as required.
- Perform alignment of each of the microwave paths to ensure that the microwave dishes are optimally positioned.

- Perform sweep tests on transmission lines.
- Supply and install one ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

Existing Facility Improvement Work:

- Fabricate concrete platform to support the new DC Power System batteries.
- Upgrade site grounding to the latest revision of R56
- Provide all necessary equipment and services necessary to fully cutover users from the old system to the new system
- Upgrade equipment and supporting systems to optimal conditions, including the following:
  - Ensure roof is in good condition and free of leaks
  - Repair any damaged flooring or siding to equipment room
  - Seal equipment room to prevent pest entry
  - Service all HVAC units and upgrade and/or replace as necessary to ensure proper cooling of equipment
- **X-ray building exterior wall to determine routing of the transmission lines along exterior of building and through a load bearing column.**

Table 2-15: System and Site Improvements

SYSTEM				
Ground Elevation (Ft.)	10			
Site Acquisition	No			
Zoning	No			
A&E Services	Yes			
Latitude	Longitude			
26 05 48.0	80 06 26.0			
Site Owner				
Pompano Beach Club South Tower				
Existing Tower Ht (Ft.)	Existing Tower Type			
260	Roof Top			
SITE IMPROVEMENTS				
New Compound/Expansion Size				
Width (Ft).	Length (Ft.)	Clearing Type		
N/A	N/A	N/A		
New Ice Bridge Length (Ft.)				
N/A				
New Shelter Type				
3rd floor equipment room buildout				
New Shelter Width (Ft.)	New Shelter Length (Ft.)			
N/A	N/A			
New Fuel Tank (Gal.)	New Fuel Tank (Type)			
N/A	N/A			
New Generator /Transfer Switch	New Generator (Type)			
N/A	N/A			
New Electrical Circuits				
Amps/Volts	Type	Cable (Ft.)		
N/A	N/A	N/A		
New Antenna: RF	New Antenna: TTA	New MW Dish:		
5	2	2		
New RF Lines (Linear Ft.)[15]				
1/2-inch	7/8-inch	1-1/4-inch	1-5/8-inch	Wave Guide
400	800	1200	N/A	800

[15] Or as required.

2.19 Site Name: EMS

EMS is an existing Broward County Radio site. In accordance with Solicitation R1422515P1 Appendix B-Addendum 2, the existing 24' X 32' shelter, tower and generator will be used. A new DC power system will be provided. The existing UPS will be decommissioned and removed. A remote generator connector and manual transfer switch will be added to this site. In addition, an FM200 Fire suppression system will be added to this site. **The existing Tower foundation will be evaluated to ensure that the foundation can support the required Antenna loading per the tower structural analysis.**

Figure 2-21: EMS

Site Details:

Site Engineering:

- Perform National Environmental Policy Act (NEPA) Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 Code of Federal Regulations (CFR) Chapter 1, subsection 1.1307 that may be potentially impacted by the construction activity.
- Provide a structural engineering analysis for antenna support structure, to support the antenna system.
- **Provide a foundation engineering analysis for foundation to support the antenna support structure.**
- Provide tower climbing and tower mapping services to collect information about structural members and existing equipment.
- Decommission antennas, feed lines, and equipment associated with the "backup" system for the existing system.
- **Provide an appraisal of the value of current shelter to properly address permit costs.**

Antenna and Transmission Line:

- Install three antennas for the RF system.
- Supply and install side arm(s) for all antenna and dish mounts.
- Install one tower-top amplifiers.
- Install 1/2-inch transmission line as required.
- Install 7/8-inch transmission line as required.
- Install 1-1/4-inch transmission line as required.
- Install three Microwave Dishes.
- Perform sweep tests on transmission lines.
- Install Elliptical waveguide as required.
- Perform alignment of each of the microwave paths to ensure that the microwave dishes are optimally positioned.
- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition

Table 2-16: System and Site Improvement

SYSTEM				
Ground Elevation (Ft.)			10	
Site Acquisition			No	
Zoning			No	
A&E Services			Yes	
Latitude			Longitude	
26 09 14.4			80 10 38.3	
Site Owner				
Broward County, FL				
Existing Tower Ht (Ft.)			Existing Tower Type	
400			Guyed tower	
SITE IMPROVEMENTS				
New Compound/Expansion Size				
Width (Ft).	Length (Ft.)		Clearing Type	
N/A	N/A		N/A	
New Ice Bridge Length (Ft.)				
N/A				
New Shelter Type				
N/A				
New Shelter Width (Ft.)			New Shelter Length (Ft.)	
N/A			N/A	
New Fuel Tank (Gal.)			New Fuel Tank (Type)	
N/A			N/A	
New Generator (kW)			New Generator (Type)	
N/A			N/A	
New Electrical Circuits				
Amps/Volts	Type		Cable (Ft.)	
N/A	N/A		N/A	
New Antenna: RF	New Antenna: TTA		New MW Dish:	
3	1		3	
New RF Lines (Linear Ft.)[16]				
1/2-inch	7/8-inch	1-1/4-inch	1-5/8-inch	Wave Guide
450	450	900	N/A	1500

[16] Or as required.

SECTION 3 RESPONSIBILITIES AND ASSUMPTIONS

The following description of responsibilities and assumptions is provided to clarify the parties' respective responsibilities. In the event of a conflict between anything set forth herein and the Specifications or the Final Acceptance Criteria, the Specifications and the Final Acceptance Criteria shall govern the responsibilities of Provider and the requirements for Final Acceptance.

3.1 Motorola Solutions Responsibilities

Motorola shall be responsible for the following:

3.1.1 Site Engineering for New Sites

- Prepare site construction drawings showing the layout of various new and existing site components.
- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).
- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.
- Prepare a site exhibit and sketch of the site to communicate to the property owner of the lease space and planned development at the particular site location.
- Prepare record drawings of the site showing the as-built information.
- Perform construction staking around the site to establish reference points for proposed construction.
- 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 construction activity. This does not include the additional field investigations to document site conditions if it is determined that the 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 construction.
- Conduct soil boring tests at tower locations and prepare geotechnical report of soil conditions at the location of tower foundations.
- Conduct construction inspection of foundation steel prior to pour, materials testing of concrete and field density tests of backfill to ensure quality construction.
- Check tower erection for plumbness, linearity and alignment after installation.
- Perform inspection of the site and the work performed by the Contractor to document that the site is built in accordance with the "Site Plans" and document any deviations or violations.
- Prepare, submit and track application for local permit fees (zoning, electrical, building, etc.), prepare FAA filings, and procure information necessary for filing.
- **Run modifications to the frequency plan for additional intermodulation interference studies.**
- Any other required site preparation activities identified in the specifications or not immediately identified as a Broward County responsibility.

3.1.2 Site Preparation for New Sites

- Obtain the permits such as electrical, building, and construction permits, and coordinate any inspections with local authorities that may be needed to complete site development work.
- **Where required, provide the services of a Special Inspector, as per requirement of municipality.**
- Provide mobilization costs for the construction crews.
- Perform light clearing of brush, grubbing, and disposal of vegetation and shrub growth in the site compound area.
- Grade the site compound and 10-foot path around it to provide a level, solid, undisturbed surface for installation of site components.
- Supply and install gravel surfacing to a depth of six inches, including herbicide treatment and geotextile fabric installation within the fenced in site compound area, and a three-foot path around it.
- Provide silt fence around the compound to control soil erosion.
- Supply and install eight-foot-high chain-link fencing with gate around the shelter compound.
- Perform site touch-up (fertilize, seed, and straw) disturbed areas not covered with gravel after completion of construction work.
- Secure power connection to the site, associated permitting and installation of a meter and disconnect within 50 feet of the shelter location. County will assist with interacting with the applicable utilities to the extent reasonably requested by Motorola, but all services shall be provided at no cost to County. Demarcation points shall be as determined by the applicable utilities.
- Any other required site preparation activities identified in the specifications or not immediately identified as a Broward County responsibility.

3.1.3 Site Component Installation for New Sites (New shelter sites are Channel 2, Deerfield, Tamarac, West Lake Park, FS 106, West Hollywood, Parkland, Miramar, Davie, Coconut Creek, Core and Markham Park)

- Construct one reinforced concrete foundation necessary for a 24-foot X 32-foot shelter (all new shelters shall be 24 x 32 except for Miramar which will be 12 X 32.
- Supply and install one prefabricated 24-foot X 32-foot shelter as specified in Section 5.3 Shelters, except Miramar that will be 12-foot X 32-foot. (Note: Motorola Solutions agrees with the county in that falling ice impacting the roof of the shelters will not be an issue. However, Motorola Solutions has chosen to exceed the roof loading in order to comply with the intent of the shelter specs (5.3 Shelters, F. Roof, F). As such, Motorola Solutions has increased the roof load by 50% to 150 psf.).
- Supply and install 500 gallon diesel belly fuel tanks, and attach to the 100KW Generac generators (except for the Deerfield site).
- Supply and install fuel tank monitors on the tanks to monitor low fuel in tanks and run alarm wiring to the building located within 50 feet of the tank.
- Supply and install one single-phase meter pedestal (see individual sites for amperage) and

hook-up for electrical service by the local utility.

- Provide all trenching, conduit, and cabling necessary for underground hook-up of power to the shelter from nearby utility termination located within 50 cable feet of the shelter.
- Supply and install a perimeter grounding system around the compound, shelter and tower (where applicable). The ground system is to tie to the fence and all new metal structures within the compound to meet current Motorola Solutions' R56 standards.
- Conduct one three-point ground resistance test of the site.
- Supply and install one freestanding 24-inch-wide cable/ice bridge from the tower to the shelter.
- Any other required site preparation activities identified in the specifications or not immediately identified as a Broward County responsibility.

3.1.4 Motorola Responsibilities for Existing Sites

- Upgrading existing site grounding systems to the latest revisions of R56, including internal shelter grounding, external shelter grounding, tower grounding, and subterranean grounding
- Reinforce flooring as necessary to support the DC power system
- Evaluate heating and cooling for existing HVAC systems and provide any enhancements necessary
- Evaluate floor loading and upgrade floors if necessary to accommodate the weight of the equipment, including the DC plant
- Ensure a sufficient number of entry ports, and add additional ports if necessary
- Add additional support facilities for the proposed radio network, including but not limited to cable ladders, ice bridge, ground bus bars, etc.
- All applicable environmental and permitting (NEPA, SHPO, building permits, etc.)
- Provide any facility upgrades necessary to support the cutover, including temporary shelters, entry ports, ice bridge, cable ladders, etc.
- Decommission old antennas and feedlines at the conclusion of the project
- Reconfigure site power distribution system for DC
- Upgrade site electrical system in order to comply with NFPA 70, Article 708
- Provide a site structural analysis for each site
- Perform tower mapping to validate existing antenna systems and heights for use in the structural analysis
- Motorola will provide electrical upgrades, with respect to breaker panels and circuit breakers in order to accommodate the new DC power system for the new radio system.
- Perform electrical and heat loading to determine the full impact at each site, and provide the necessary remediation, if required.
- Upgrade shelter and supporting systems to optimal conditions, including the following:
    - Ensure roof is in good condition and free of leaks
    - Repair any damaged flooring or siding to building
    - Seal building to prevent pest entry
    - Service all HVAC units and upgrade or, if necessary to ensure proper cooling of equipment, replace. (County may elect to replace as part of Optional Services, if the HVAC units are not required to be replaced to ensure proper cooling of equipment.)

- Any other required site preparation activities identified in the specifications or not immediately identified as a Broward County responsibility.

3.1.5 Additional Requirements for all Sites (unless otherwise stated)

- Ensure a fully functioning automatic fire suppression system exists at all sites which is fully compliant with NFPA and all other applicable codes.
- **Nokia Routers Replacement: Remove Coriant routers and replace with Nokia routers and add also add 4 additional routers in order to accommodate ATT connections at the Coconut Creek Dispatch, Sunrise Dispatch, Pembroke Pines Dispatch and Motorola Hosted Master Site. The addition will also include a Nokia Fault Management server which will monitor the health of the network. This addition will better allow Broward County to utilize other networks such as FireNet and ATT to route and prioritize traffic.**
- **Receive System Module Additional for Receive (RX) Monitoring: Install and configure the Receive System Module at all Broward County Radio Frequency (RF) Sites. These modules will allow field personnel to monitor the performance of the Receive Antenna System as well as alarm and log events that are outside normal operating parameters.**
- **Combiner Test Ports: Install and configure combiner test ports at all Sites. The sample port kit is added to the RF Combining System between the isolator and the isolator load and have a female connector for the sample port. The sample ports allow field personnel to hot tune the combiner during operation which greatly reduces site downtime during service windows.**
- **Ensure all new shelters have two (2) port entries. Added second waveguide entry port to shelters: Alligator Alley, Deerfield, Tamarac, Parkland, West Hollywood, West Lake Park.**
- **Develop and implement landscape plan for Hollywood-West, Tamarac, Davie, and West Lake Park, and additional Sites as necessary, including tree surveys, an arborist study, and landscape plan as well as the determination and implementation of a tree mitigation plan. This plan also includes meeting and working with permitting agencies as required.**
- **Provide a landscape contingency plan for remaining future sites. Includes tree surveys, an arborist study and landscape plan as well as the determination of a tree mitigation plan. This plan also includes meeting and working with permitting agencies, as required.**

Broward County Responsibilities

County shall be responsible for the following:

3.1.6 Broward County Responsibilities for Existing Sites

- Pay for the usage costs of power, leased lines, and generator fueling both during the construction/installation effort and on an ongoing basis.
- Pay for application fees, taxes, and recurring payments for ownership of the property.
- Maintain existing access roads in order to provide clear and stable entry to the site for heavy-duty vehicles and cranes. Sufficient space must be available at the site for these vehicles to maneuver under their own power, without assistance from other equipment.
- Arrange for space on the structure for installation of new antennas at the heights on

designated existing antenna-mounting structures. The towers will meet all applicable EIA/TIA-222 G structural, foundation, ice, wind, and twist and sway requirements.
- Provide any previously procured and currently available as-built structural and foundation drawings of the structure and site location(s) along with geotechnical report(s) if available solely for Motorola reference in conjunction with Motorola Solutions' obligation to conduct a structural analysis and tower mapping at each site.
- Allow use of existing support facilities for the antenna cables (cable ladder, entry ports) from the antenna to the equipment room.

3.1.7 Broward County Responsibilities for New Sites

- Review site design drawings within thirty calendar days of submission by Motorola Solutions or its subcontractor(s). Should a re-submission be required, the Broward County shall review and approve the re-submitted plans within seven calendar days from the date of submittal.
- Pay for application fees, taxes, and recurring payments for ownership of the property.
- Provide personnel to observe construction progress and testing of site equipment according to the schedule provided by Motorola Solutions.
- Provide a right of entry letter from the site owner for Motorola Solutions to conduct field investigations.

3.1.8 Broward County Responsibilities for All Sites

- All recurring and non-recurring utility costs including, but not limited to, generator fuel (except first fill), electrical, and Telco, will be borne by Broward County or site owner.

3.2 Assumptions

The following assumptions were utilized by Provider in estimating the schedule and work required, and are stated here solely for clarification purposes. Failure of any assumption stated in this Section 3.3 shall not diminish or alleviate any obligation of Provider or modify the scope of services or the cost to County of the services required under this Agreement, unless expressly approved by the County in writing.

3.2.1 Assumptions for Existing Sites

- No prevailing wage, certified payroll, or mandatory minority workers are required for this work, other than to the extent expressly set forth in the Agreement.
- All site work is assumed to be done during normal business hours as dictated by time zone (Monday thru Friday, 7:30 a.m. to 5:00 p.m.).

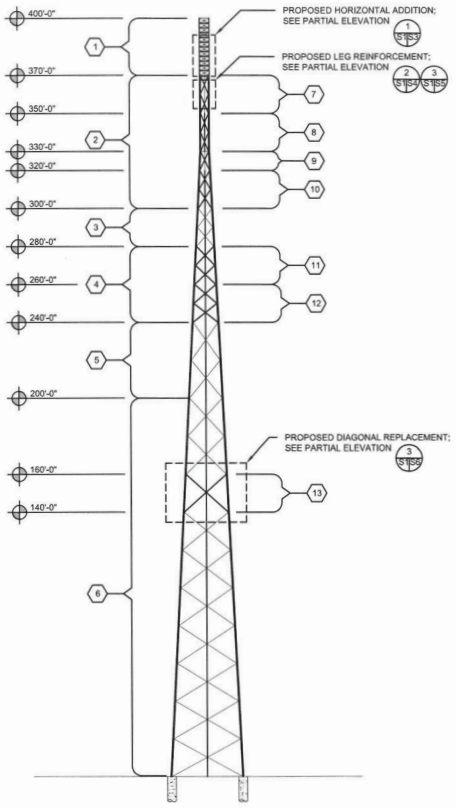
3.2.2 Assumptions for New Sites

- All site work is assumed to be done during normal business hours as dictated by time zone (Monday thru Friday, 7:30 a.m. to 5:00 p.m.).
- Site will have adequate electrical service for the new shelter and tower. Utility transformer, transformer upgrades, line, or pole extensions have not been included.
- Hazardous materials are not present at the work location prior to commencement of work by Motorola. Testing and removal of pre-existing hazardous materials found during site

investigations, construction or equipment installation will be the responsibility of the Broward County.

- The schedule is based on a maximum of 30 days will be required for obtaining approved building permits from time of submission. Motorola is responsible for obtaining building permits, and will not hold the County responsible for delays in the permitting process.
- Based on Motorola Solutions' assessments during site walks, no improvements are required for concrete trucks, drill rigs, shelter delivery, and crane access. Therefore, Motorola will be responsible for these upgrades if the determination made during the site walks was incorrect.
- Subsurface conditions for tower design are based on Presumptive Sand soil parameters, as defined by EIA/TIA-222-G. Motorola will be responsible for any additional work or materials if this assumption is incorrect.
- The new tower locations will pass the FAA hazard study, zoning, FCC, and environmental permitting. To the extent any failure is due to design, construction, or any work undertaken by Motorola under this Agreement, Motorola will be responsible for rectifying any failures.
- Tower and foundation sizing is based on the tower loading requirements as a result of the RF Antenna System design and the Microwave Antenna System design (i.e., dish sizes and locations obtained from paper path studies). If as a result of NEPA studies, any jurisdictional authority should determine that a communications facility "may have a significant environmental impact," the environmental impact studies or field testing and evaluation related to such determination have not been included. A waiver to zoning requirements like setbacks, tower height limitations, etc. required by the Final Design can be obtained.
- The soil resistivity at the site is sufficient to achieve resistance of ten ohms or less.
- Communications site grounding will be designed and installed per Motorola Solutions' Standards and Guidelines for Communications Sites (R56). Motorola will be responsible for any additional work or materials if this assumption is incorrect.
- Underground utilities are not present in the construction area, and as such no relocation will be required.
- Spoils from the tower foundations can and will be transported to a proper facility away from the site by Motorola.

Attachment B (Excerpted)



1 S-1 **ELEVATION VIEW**
SCALE: 1" = 50'-0"

THIS DRAWING NOT SUITABLE FOR SCALING

TOWER MODIFICATION SCHEDULE

NO.	MODIFICATION DESCRIPTION	BOTTOM ELEVATION (FT.)	TOP ELEVATION (FT.)
1	PROPOSED 1 ½" SOLID ROD HORIZONTAL ADDITION	370	400
2	PROPOSED (2)- 1 ¾" SOLID ROD LEG REINFORCEMENT	300	370
3	PROPOSED (2)- 2" SOLID ROD LEG REINFORCEMENT	280	300
4	PROPOSED (2)- 2 ¼" SOLID ROD LEG REINFORCEMENT	240	280
5	PROPOSED (2)- 2 ½" SOLID ROD LEG REINFORCEMENT	200	240
6	PROPOSED (2)- 3" SOLID ROD LEG REINFORCEMENT	0	200
7	PROPOSED L3½x3½x½ GRADE A36 DIAGONAL REPLACEMENT	350	370
8	PROPOSED L4x4x¾ GRADE A36 DIAGONAL REPLACEMENT	330	350
9	PROPOSED L3x3x5/16 GRADE A36 DIAGONAL REPLACEMENT	320	330
10	PROPOSED L3x3x¼ GRADE A36 DIAGONAL REPLACEMENT	300	320
11	PROPOSED L3½x3½x¼ GRADE A36 DIAGONAL REPLACEMENT	260	280
12	PROPOSED L4x4x¼ GRADE A36 DIAGONAL REPLACEMENT	240	260
13	PROPOSED 2L4x4x¼ GRADE A36 DIAGONAL REPLACEMENT	140	160

NOTE:
CONTRACTOR SHALL REPLACE ALL PREVIOUSLY TORQUED FASTENERS OR INSTALLATION HARDWARE ASSOCIATED WITH THE PROPOSED MEMBERS WITH LIKE KIND. (I.E. BOLTS, NUTS, WASHERS, ETC.)

NOTE:
ALL MODIFICATIONS ARE ASSUMED TO BE MADE ON EMPTY TOWER. THIS MEANS THAT THE CONTRACTOR IS RESPONSIBLE TO MAKE PROVISIONS TO SUPPORT OR WORK AROUND EXISTING ANTENNAS AND TRANSMISSION LINES. MODIFICATIONS MUST BE CONTINUOUS THROUGH ALL AREAS SHOWN.

ERIC SCOTT KOHL LICENSE No. 56545 STATE OF FLORIDA PROFESSIONAL ENGINEER 4/11/19

REVISIONS

NO.	DATE	DESCRIPTION	BY
0	4/11/19	90% SUBMITTAL	DK

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES
KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 763-8214

MOTOROLA SOLUTIONS
2000 W. SUNRISE BLVD
FORT LAUDERDALE, FL 33311

COCONUT CREEK
COCONUT CREEK
5100 WEST LAKEVIEW,
BOCA RATON, FL 33433

ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

SCALE: AS NOTED
DATE: 04/11/19
KCI JOB NUMBER: 0119xxxxx

SHEET TITLE
ELEVATION VIEW

SHEET
S-1

DESIGN LOADING

LOADING CASE	CODE	WIND SPEED AND ICE LOADING
1	2017 FLORIDA BUILDING CODE AND ANSI/TIA-222-G FOR BROWARD COUNTY, FLORIDA	180 MPH (ULTIMATE 3 SECOND GUST), NO ICE *139 MPH (NOMINAL 3 SECOND GUST), NO ICE

EXISTING & PROPOSED APPURTENANCES (INTERIM LOADING)

NUMBER	ELEVATION	CARRIER	MOUNT	ANTENNA INFORMATION	TRANSMISSION LINES
1	398'	BROWARD COUNTY	SIDE ARMS	(2)- SC412HFLDF ANTENNAS (2)- SE4192-SWBP2LDF ANTENNAS	(2)- 7/8" (2)- 1 1/4"
2	395'	BROWARD COUNTY	LEGS	(2)- 428E83I10T TTAS	(2)- 1/2"
3	370'	BROWARD COUNTY	SIDE ARMS	(1)- CC807-11 ANTENNA (1)- SC412HFLDF ANTENNA (1)- SE4192-SWBP2LDF ANTENNA	(2)- 1 1/4" (1)- 7/8"
4	355'	BROWARD COUNTY	SIDE ARMS	(4)- BCR80013 ANTENNAS	(4)- 1 1/4"
5	353'	COCONUT CREEK	SIDE ARM	(1)- BCD80010 ANTENNA	(1)- 1 1/4"
6	353'	BROWARD COUNTY	SIDE ARM	(1)- SC381-HL-PIM ANTENNA	(1)- 7/8"
7	340'	BROWARD COUNTY	SIDE ARMS	(2)- SC389-HF3LDF ANTENNA	(2)- 7/8"
8	333'	BROWARD COUNTY	SIDE ARM	(1)- DB420 ANTENNA	(1)- 7/8"
9	325'	BROWARD COUNTY	LEG	(1)- 428E83I01T TTA	(1)- 1/2"
10	310'	BROWARD COUNTY	SIDE ARMS	(2)- CC450-09 ANTENNAS	(2)- 7/8"
11	300'	BROWARD COUNTY	SIDE ARM	(1)- ANT450FN ANTENNA	(1)- 7/8"
12	300'	BROWARD COUNTY	LEG	(4)- PMP450i	(4)- CAT5
13	298'	CORAL SPRINGS	SIDE ARM	(1)- BCD80010 ANTENNA W/ TTA	(1)- 7/8" (1)- 1/2"
14	231'	CORAL SPRINGS	SIDE ARMS	(2)- BCR80013 ANTENNAS	(2)- 5/8"
15	190'	BROWARD COUNTY	LEG	(1)- PAD6-59B MICROWAVE	(1)- EW63
16	180'	BROWARD COUNTY	LEG	(1)- HP3-11 MICROWAVE	(1)- CAT6
17	165'	BROWARD COUNTY	LEG	(1)- PAD6-59B MICROWAVE	(1)- EW63
18	160'	BROWARD COUNTY	LEG	(1)- HP3-11 MICROWAVE (1)- SB4-W60C MICROWAVE	(1)- CAT6 (1)- EW63
19	155'	BROWARD COUNTY	LEG	(1)- PAD8-59A MICROWAVE	(1)- EW63
20	145'	BROWARD COUNTY	LEG	(1)- D8E-3 MICROWAVE W/ RADOME	(1)- EW63
21	135'	COCONUT CREEK	LEG	(1)- 6-FT HP MICROWAVE	(1)- EW63
22	110'	COCONUT CREEK	LEG	(1)- 6-FT HP MICROWAVE	(1)- EW63
23	98'	BROWARD COUNTY	LEG	(1)- 1-FT X 1-FT ANTENNA	(1)- 1/4"

EXISTING & PROPOSED APPURTENANCES (FINAL LOADING)

NUMBER	ELEVATION	CARRIER	MOUNT	ANTENNA INFORMATION	TRANSMISSION LINES
1	398'	BROWARD COUNTY	SIDE ARMS	(2)- SC412HFLDF ANTENNAS (2)- CC807-11 ANTENNAS	(2)- 7/8" (2)- 1 1/4"
2	395'	BROWARD COUNTY	LEGS	(2)- 428E83I10T TTAS	(2)- 1/2"
3	370'	BROWARD COUNTY	SIDE ARMS	(3)- CC807-11 ANTENNAS (1)- SC412HFLDF ANTENNA	(3)- 1 1/4" (1)- 7/8"
4	353'	COCONUT CREEK	SIDE ARM	(1)- BCD80010 ANTENNA	(1)- 1 1/4"
5	353'	BROWARD COUNTY	SIDE ARM	(1)- SC381-HL-PIM ANTENNA	(1)- 7/8"
6	340'	BROWARD COUNTY	SIDE ARMS	(2)- SC389-HF3LDF ANTENNA	(2)- 7/8"
7	333'	BROWARD COUNTY	SIDE ARM	(1)- DB420 ANTENNA	(1)- 7/8"
8	325'	BROWARD COUNTY	LEG	(1)- 428E83I01T TTA	(1)- 1/2"
9	310'	BROWARD COUNTY	SIDE ARMS	(2)- CC450-09 ANTENNAS	(2)- 7/8"
10	300'	BROWARD COUNTY	SIDE ARM	(1)- ANT450FN ANTENNA	(1)- 7/8"
11	300'	BROWARD COUNTY	LEG	(4)- PMP450i	(4)- CAT5
12	298'	CORAL SPRINGS	SIDE ARM	(1)- BCD80010 ANTENNA W/ TTA	(1)- 7/8" (1)- 1/2"
13	231'	CORAL SPRINGS	SIDE ARMS	(2)- BCR80013 ANTENNAS	(2)- 5/8"
14	190'	BROWARD COUNTY	LEG	(1)- PAD6-59B MICROWAVE	(1)- EW63
15	180'	BROWARD COUNTY	LEG	(1)- HP3-11 MICROWAVE	(1)- CAT6
16	165'	BROWARD COUNTY	LEG	(1)- PAD6-59B MICROWAVE	(1)- EW63
17	160'	BROWARD COUNTY	LEG	(1)- HP3-11 MICROWAVE (1)- SB4-W60C MICROWAVE	(1)- CAT6 (1)- EW63
18	155'	BROWARD COUNTY	LEG	(1)- PAD8-59A MICROWAVE	(1)- EW63
19	135'	COCONUT CREEK	LEG	(1)- 6-FT HP MICROWAVE	(1)- EW63
20	110'	COCONUT CREEK	LEG	(1)- 6-FT HP MICROWAVE	(1)- EW63
21	98'	BROWARD COUNTY	LEG	(1)- 1-FT X 1-FT ANTENNA	(1)- 1/4"

ERIC SCOTT KOHL
LICENSE
No. 56545
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
4/11/19

NO.	DATE	REVISIONS	BY:
0	3/25/19	90% SUBMITTAL	DK

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES
KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 783-9214

MOTOROLA SOLUTIONS
8000 W. SUNRISE BLVD
PLANTATION, FL 333222

COCONUT CREEK

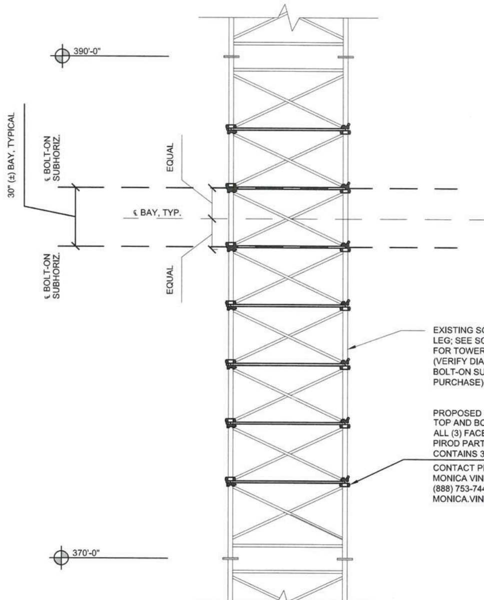
COCONUT CREEK
5150 REGENCY LAKE DRIVE,
BOCA RATON, FL 33433

ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

SCALE: AS NOTED
DATE: 04/11/19
KCI JOB NUMBER: 0119xxxxx

SHEET TITLE
DETAILS

SHEET
S-2



EXISTING SOLID ROD TOWER LEG; SEE SCHEDULE ON S-3 FOR TOWER LEG DIAMETER. (VERIFY DIAMETER BEFORE BOLT-ON SUBHORIZONTAL PURCHASE)

PROPOSED 1½"Ø SR HORIZONTAL AT TOP AND BOTTOM OF BAY, ALL (3) FACES
PIROD PART NO. 802892
CONTAINS 3 BRACES & HARDWARE

CONTACT PIROD PARTS DEPARTMENT
MONICA VINK
(888) 753-7446 EXT. 5318
MONICA.VINK@VALMONT.COM

1 | S1 | S3 — PARTIAL ELEVATION

SCALE: 1" = 1'-0"

TOWER SCHEDULE		
ELEVATION	LEGS	PROPOSED HORIZONTAL
370'-390'	2" Ø SR	1½" Ø SR
390'-400'	1¾" Ø SR	1½" Ø SR

THIS DRAWING NOT SUITABLE FOR SCALING

ERIC SCOTT KOHL
LICENSE
No. 56545
STATE OF FLORIDA
PROFESSIONAL ENGINEER
4.11.19

NO.	DATE	REVISIONS	BY:
0	3/25/19	90% SUBMITTAL	DK

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES

KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 783-9214

MOTOROLA SOLUTIONS
8000 W. SUNRISE BLVD
PLANTATION, FL 33322

COCONUT CREEK

COCONUT CREEK
5150 REGENCY LAKE DRIVE,
BOCA RATON, FL 33433

ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

SCALE: AS NOTED
DATE: 04/11/19
KCI JOB NUMBER: 0119xxxxx

SHEET TITLE
DETAILS

SHEET
S-3

BOLT TIGHTENING PROCEDURE

1. TIGHTENING CONNECTION BOLTS BY AISC - "TURN OF THE NUT" METHOD, USING THE CHART BELOW.

   BOLT LENGTHS UP TO AND INCLUDING FOUR DIAMETER:

3/8" BOLTS UP TO AND INCLUDING 1.5" LENGTH	+1/3 TURN BEYOND SNUG POINT
1/2" BOLTS UP TO AND INCLUDING 2.0" LENGTH	+1/3 TURN BEYOND SNUG POINT
5/8" BOLTS UP TO AND INCLUDING 2.5" LENGTH	+1/3 TURN BEYOND SNUG POINT
3/4" BOLTS UP TO AND INCLUDING 3.0" LENGTH	+1/3 TURN BEYOND SNUG POINT
7/8" BOLTS UP TO AND INCLUDING 3.5" LENGTH	+1/3 TURN BEYOND SNUG POINT
1" BOLTS UP TO AND INCLUDING 4.0" LENGTH	+1/3 TURN BEYOND SNUG POINT

   BOLT LENGTHS OVER FOUR DIAMETER BUT NOT EXCEEDING EIGHT DIAMETER:

3/8" BOLTS 1.75" TO 3.0" LENGTH	+1/2 TURN BEYOND SNUG POINT
1/2" BOLTS 2.25" TO 4.0" LENGTH	+1/2 TURN BEYOND SNUG POINT
5/8" BOLTS 2.75" TO 5.0" LENGTH	+1/2 TURN BEYOND SNUG POINT
3/4" BOLTS 3.25" TO 6.0" LENGTH	+1/2 TURN BEYOND SNUG POINT
7/8" BOLTS 3.75" TO 7.0" LENGTH	+1/2 TURN BEYOND SNUG POINT
1" BOLTS 4.25" TO 8.0" LENGTH	+1/2 TURN BEYOND SNUG POINT

2. CONNECTION BOLTS SUBJECT TO DIRECT TENSION SHALL BE INSTALLED AND TIGHTENED AS PER SECTION 8.2.1 OF THE AISC SPECIFICTAION FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS, LOCATED IN THE AISC MANUYAL OF STEEL CONSTRUCTION. THE INSTALLATION PROCEDURE IS PARAPHRASED AS FOLLOWS:

3. FASTENERS SHALL BE INSTALLED IN PROPERLY ALIGNED HOLES AND TIGHTENED BY ONE OF THE METHODS DESCRIBED IN SUBSECTION 8.2.1 THROUGH 8.2.4.

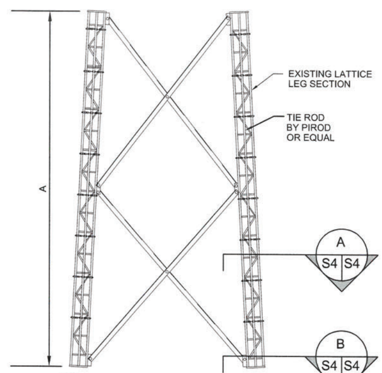
   8.2.1 "TURN-OF-THE-BOLT" TIGHTENING

   BOLTS SHALL BE INSTALLED IN ALL HOLES OF THE CONNECTION AND BROUGHT TO A SNUG TIGHT CONDITION AS DEFINED IN SECTIN 8.1, UNTIL ALL THE BOLTS ARE SIMULTANEOUSLY SNUG TIGHT AND THE CONNECTION IS FULLY COMPACTED. FOLLOWING THIS INITIAL OPERATION, ALL BOLTS IN THE CONNECTION SHALL BE TIGHTENED FURTHER BY THE APPLICABLE AMOUNT OF ROTATION SPECIFIED ABOVE. DURING THE TIGHTENING OPERATION THERE SHALL BE NO ROTATION OF THE PART NOT TURNED BY THE WRENCH. TIGHTENING SHALL PROGRESS SYSTEMATICALLY FROM THE MOST RIGID PART OF THE JOINT IN A MANNER THAT WILL MINIMIZE RELAXATION OF PREVIOUSLY PRETENSIONED BOLTS.

4. ALL OTHER BOLTED CONNECTIONS SHALL BE BROUGHT TO A SNUG TIGHT CONDITION AS DEFINED IN SECTION 8.1 OF THE SPECIFICATION.

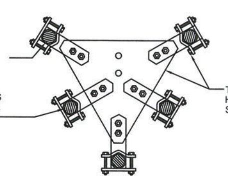
TOWER SCHEDULE

ELEVATION	LEGS	PROPOSED REINFORCEMENT	"A" LENGTH
0'-80'	4" Ø SR	3" Ø SR	20'
80'-140'	3½" Ø SR	3" Ø SR	20'
140'-200'	3" Ø SR	3" Ø SR	20'
200'-240'	2½" Ø SR	2½" Ø SR	20'
240'-280'	2¼" Ø SR	2¼" Ø SR	20'
280'-300'	2" Ø SR	2" Ø SR	20'
300'-330'	1¾" Ø SR	1¾" Ø SR	20' & 10'
330'-370'	1½" Ø SR	1¾" Ø SR	20'



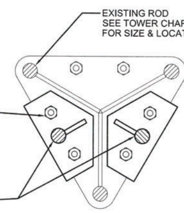
2 S1 S4 PARTIAL ELEVATION

NO SCALE



A S4 S4 A S5 S4 SECTION

NO SCALE

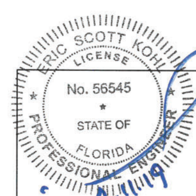


B S4 S4 SECTION

NO SCALE

NOTE:
ALL PART NO.'S REFER TO PIROD INC. OR EQUAL
VERIFY ALL PART NO.'S

NOTE:
TYPICAL SECTION VIEW OF LEG FLANGES FOR ELEVATIONS 260'-370'.



THIS DRAWING NOT SUITABLE FOR SCALING

REVISIONS			
NO.	DATE		BY:
0	3/25/19	90% SUBMITTAL	DK

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES

KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 783-9214

MOTOROLA SOLUTIONS
8000 W. SUNRISE BLVD
PLANTATION, FL 333222

COCONUT CREEK

COCONUT CREEK
5150 REGENCY LAKE DRIVE,
BOCA RATON, FL 33433

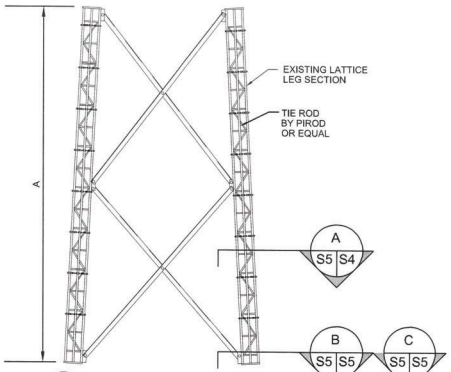
ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

SCALE: AS NOTED
DATE: 04/11/19
KCI JOB NUMBER: 0119xxxxx

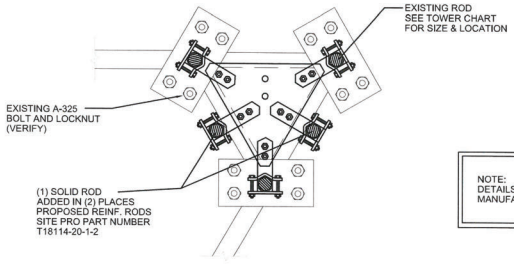
SHEET TITLE
DETAILS

SHEET
S-4

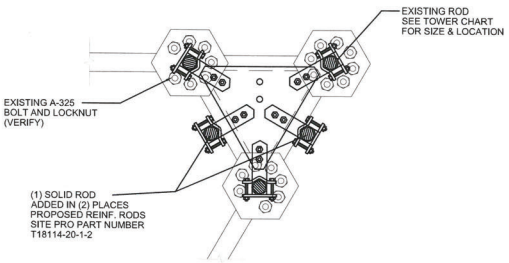
TOWER SCHEDULE			
ELEVATION	LEGS	PROPOSED REINFORCEMENT	"A" LENGTH
0'-80'	4" Ø SR	3" Ø SR	20'
80'-140'	3½" Ø SR	3" Ø SR	20'
140'-200'	3" Ø SR	3" Ø SR	20'
200'-240'	2½" Ø SR	2½" Ø SR	20'
240'-280'	2¼" Ø SR	2¼" Ø SR	20'
280'-300'	2" Ø SR	2" Ø SR	20'
300'-330'	1¾" Ø SR	1¾" Ø SR	20' & 10'
330'-370'	1½" Ø SR	1½" Ø SR	20'



3 / S1 S5 PARTIAL ELEVATION
NO SCALE



NOTE:
DETAILS MAY VARY SLIGHTLY FROM MANUFACTURER PROVIDED PARTS.



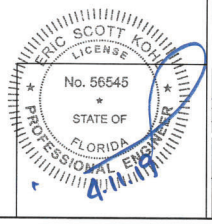
B / S5 S5 SECTION
NO SCALE

NOTE:
TYPICAL SECTION VIEW OF LEG FLANGE FOR ELEVATIONS 140'-240'.

NOTE:
ALL PART NO.'S REFER TO PIROD INC. OR EQUAL
VERIFY ALL PART NO.'S

B / S4 S4 SECTION
NO SCALE

NOTE:
TYPICAL SECTION VIEW OF LEG FLANGE FOR ELEVATIONS 20'-120'.



THIS DRAWING NOT SUITABLE FOR SCALING

REVISIONS

NO.	DATE		BY
A	02/5/19	90% SUBMITTAL	DK

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 783-9214

MOTOROLA SOLUTIONS

COCONUT CREEK

2000 W. SUNRISE BLVD
FT. LAUDERDALE, FL 33311

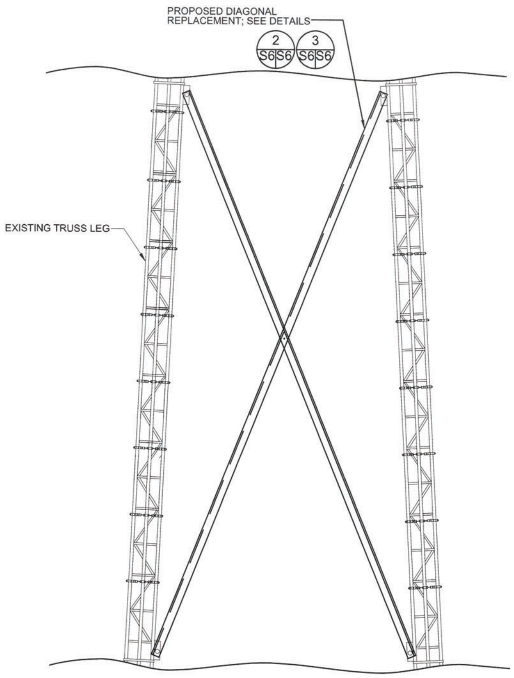
COCONUT CREEK
5180 RIVERWALK LAKE DRIVE,
COCONUT CREEK, FL 33063

ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

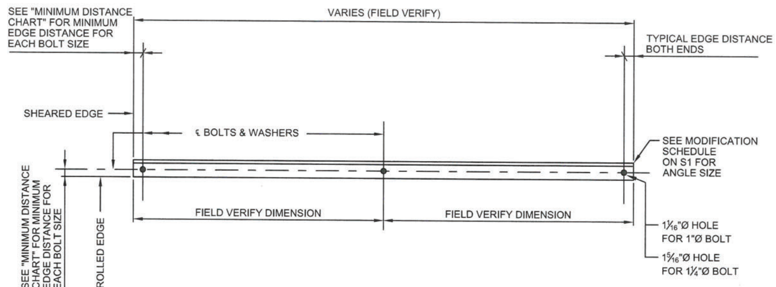
SCALE: AS NOTED
DATE: 04/11/19
KCI JOB NUMBER: 0119xxxxx

SHEET TITLE
DETAILS

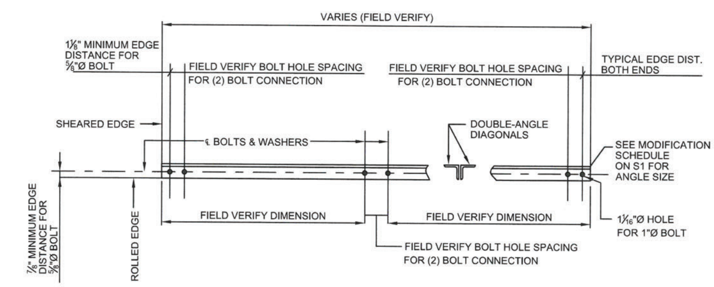
SHEET
S-5



4 S1 S6 PARTIAL ELEVATION
NO SCALE



2 S6 S6 PROPOSED SINGLE BOLT DIAGONAL DETAIL
NOT TO SCALE



3 S6 S6 PROPOSED TWO BOLT DIAGONAL DETAIL
NOT TO SCALE

EXISTING DIAGONAL BOLT SCHEDULE	
ELEVATION	BOLT DIAMETER
0'-240'	(2)- 1"Ø
240'-300'	(1)- 1¼"Ø
300'-370'	(1)- 1"Ø

(*) MINIMUM DISTANCE CHART		
NOMINAL BOLT SIZE (DIA.)	CL HOLE TO EDGE DISTANCE SHEARED EDGE	CL HOLE TO EDGE DISTANCE ROLLED EDGE
1"Ø	1¾"	1¼"
1¼"Ø	2¼"	1½"

THIS DRAWING NOT SUITABLE FOR SCALING

ERIC SCOTT KOHL LICENSE No. 56545 STATE OF FLORIDA PROFESSIONAL ENGINEER
4.11.19

NO.	DATE	REVISIONS	BY:
0	3/25/19	90% SUBMITTAL	DK

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES
KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 783-9214

MOTOROLA SOLUTIONS
8000 W. SUNRISE BLVD
PLANTATION, FL 333222

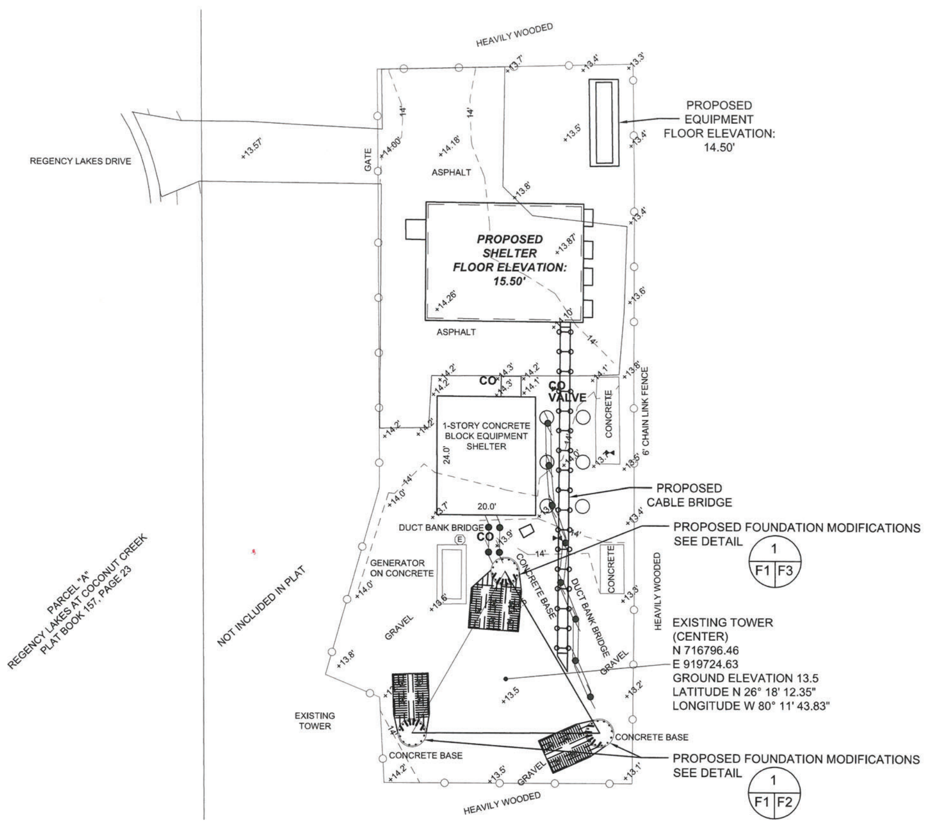
COCONUT CREEK
COCONUT CREEK
5150 REGENCY LAKE DRIVE,
BOCA RATON, FL 33433

ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

SCALE: AS NOTED
DATE: 04/11/19
KCI JOB NUMBER: 0119xxxxx

SHEET TITLE
DETAILS

SHEET
S-6



SECTION 7, TOWNSHIP 48 SOUTH, RANGE 42 EAST, BROWARD COUNTY, FLORIDA

PLAN VIEW
SCALE: AS NOTED

N

20' 0' 10' 20'
FOR 24"x36" DRAWINGS GRAPHIC SCALE: 1" = 10'
FOR 11"x17" DRAWINGS GRAPHIC SCALE: 1" = 20'

SITE OVERVIEW FROM AMEC, FOSTER, WHEELER CONSTRUCTION DRAWINGS, DATED 5/16/28.

THIS DRAWING NOT SUITABLE FOR SCALING

ERIC SCOTT KOHL LICENSE No. 56545 STATE OF FLORIDA PROFESSIONAL ENGINEER
4.11.19

NO.	DATE	REVISIONS	BY:
0	3/21/19	90% SUBMITTAL	DK

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES
KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 783-9214

MOTOROLA SOLUTIONS
8000 W. SUNRISE BLVD
PLANTATION, FL 33322

COCONUT CREEK
5150 REGENCY LAKE DRIVE,
BOCA RATON, FL 33433

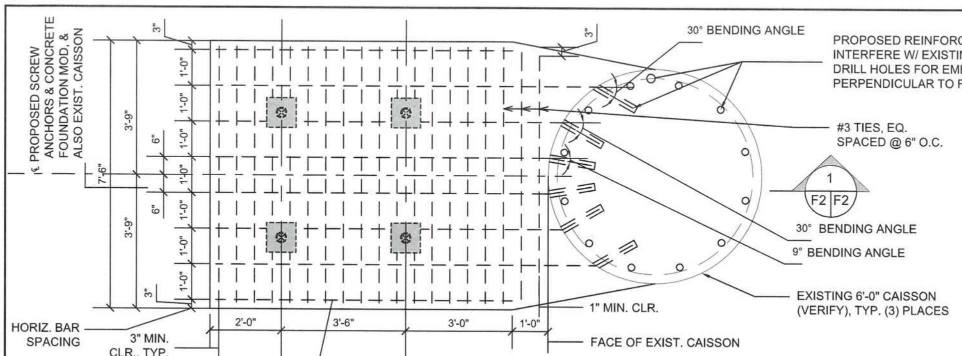
ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

THIS DRAWING IS THE PROPERTY OF THE SURVEYOR/ENGINEER AND MAY NOT BE USED OR REPRODUCED WITHOUT HIS/HER EXPRESSED WRITTEN PERMISSION

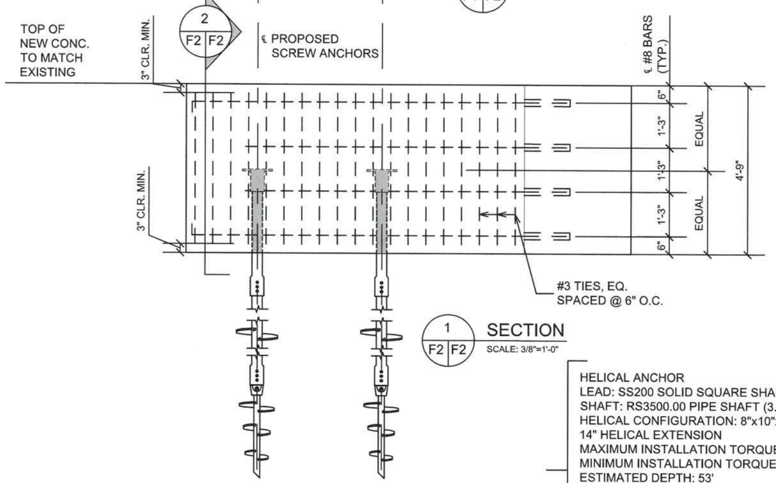
SCALE: AS NOTED
DATE: 04/11/19
KCI JOB NUMBER: 0119xxxxx

SHEET TITLE
FOUNDATION DETAILS

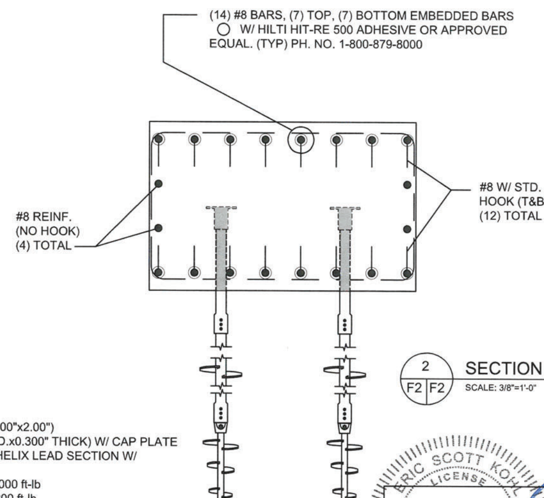
SHEET
F-1



1 F1 F2 PLAN VIEW
SCALE: 3/8"=1'-0"



1 F2 F2 SECTION
SCALE: 3/8"=1'-0"



2 F2 F2 SECTION
SCALE: 3/8"=1'-0"

HELICAL ANCHOR
LEAD: SS200 SOLID SQUARE SHAFT (2.00"x2.00")
SHAFT: RS3500.00 PIPE SHAFT (3.5" O.D.x0.300" THICK) W/ CAP PLATE
HELICAL CONFIGURATION: 8"x10"x12" HELIX LEAD SECTION W/ 14" HELICAL EXTENSION
MAXIMUM INSTALLATION TORQUE--13,000 ft-lb
MINIMUM INSTALLATION TORQUE--11,200 ft-lb
ESTIMATED DEPTH: 53'
MINIMUM ULTIMATE COMPRESSION CAPACITY: 100 KIPS
MINIMUM WORKING COMPRESSION CAPACITY: 50 KIPS
MINIMUM ULTIMATE TENSION CAPACITY: 100 KIPS
MINIMUM WORKING TENSION CAPACITY: 50 KIPS

CONTACT MICHAEL BROWN @ FOUNDATION TECHNOLOGIES, INC.
PH. NO. 678-407-4640

THIS DRAWING NOT SUITABLE FOR SCALING

ERIC SCOTT KOHL
LICENSE
No. 56545
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
4.11.19

NO.	DATE	REVISIONS	BY
0	3/21/19	90% SUBMITTAL	DK

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES
KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 783-9214

MOTOROLA SOLUTIONS
8000 W. SUNRISE BLVD
PLANTATION, FL 33322

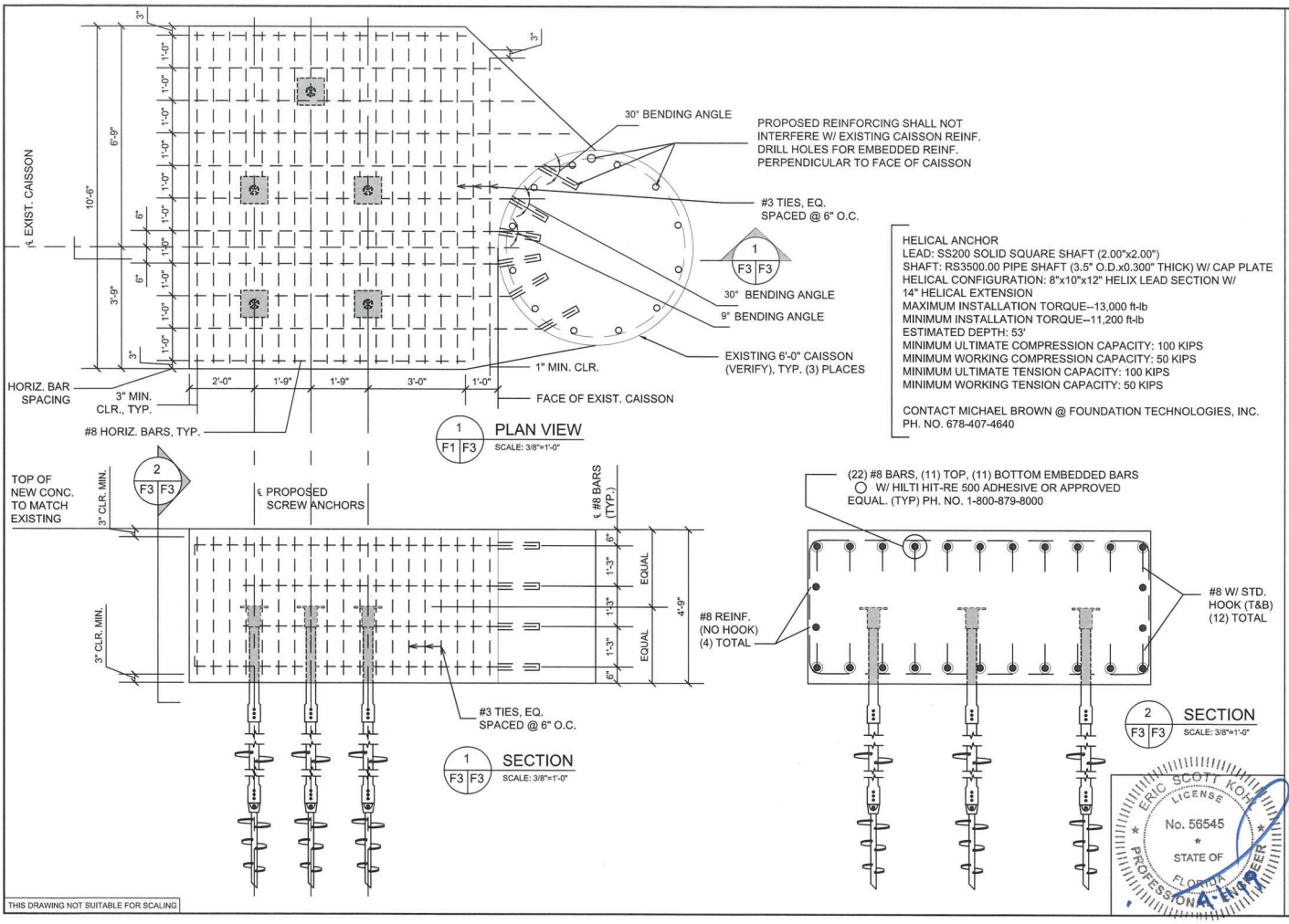
COCONUT CREEK
COCONUT CREEK
5150 REGENCY LAKE DRIVE,
BOCA RATON, FL 33433

ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

SCALE: AS NOTED
DATE: 04/11/19
KCI JOB NUMBER: 0119xxxxx

SHEET TITLE
FOUNDATION DETAILS

SHEET
F-2



THIS DRAWING NOT SUITABLE FOR SCALING

REVISIONS

NO.	DATE	BY:
0	3/25/19	90% SUBMITTAL

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES
KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 783-9214

MOTOROLA SOLUTIONS
2000 W. SUNRISE BLVD
FORT LAUDERDALE, FL 33311

COCONUT CREEK

COCONUT CREEK
5101 NW 40TH AVENUE,
BOCA RATON, FL 33431

ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

SCALE: AS NOTED
DATE: 04/11/19
KCI JOB NUMBER: 0119xxxxx

SHEET TITLE
FOUNDATION DETAILS

SHEET
F-3

ERIC SCOTT KOHL
LICENSE
No. 56545
STATE OF FLORIDA
PROFESSIONAL ENGINEER
4-11-19

GENERAL NOTES:

ALL REFERENCES TO OWNER HEREIN SHALL BE CONSTRUED TO MEAN BROWARD COUNTY OR THEIR DESIGNATED REPRESENTATIVE.

SUBSURFACE EXPLORATION REPORT FROM PROFESSIONAL ENGINEERING AND INSPECTION COMPANY, INC., DATED 15 NOVEMBER 1991 AND GEOPHYSICAL REPORT FROM EGSCI.

ALL CONSTRUCTION SHALL BE INSTALLED UNDER THE FULL TIME SUPERVISION OF A QUALIFIED ENGINEER, KNOWLEDGEABLE, AND EXPERIENCED WITH THE PROPOSED FOUNDATION TYPE. FOUNDATION LOADS ARE BASED ON CRITERIA SET FORTH BY TIA/EIA-222-G 'STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.' FOUNDATIONS WITH MODIFICATIONS ARE DESIGNED FOR THE FOLLOWING UNFACTORED LOADS. TOTAL:

COMPRESSION (PER LEG) - 1907 KIPS
UPLIFT (PER LEG) - 1670 KIPS
SHEAR - 197 KIPS

CONCRETE SHALL BE PLACED AGAINST UNDISTURBED SOIL EXCEPT FOR TOP OF PIER.

ALL WORK PRESENTED ON THESE DRAWINGS MUST BE COMPLETED BY THE CONTRACTOR UNLESS NOTED OTHERWISE. THE CONTRACTOR MUST HAVE CONSIDERABLE EXPERIENCE IN PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED HEREIN. BY ACCEPTANCE OF THIS ASSIGNMENT, THE CONTRACTOR IS ATTESTING THAT HE DOES HAVE SUFFICIENT EXPERIENCE AND ABILITY, THAT HE IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED AND THAT HE IS PROPERLY LICENSED AND PROPERLY REGISTERED TO DO THIS WORK IN THE STATE IN WHICH IT IS TO BE PERFORMED.

UNLESS SHOWN OR NOTED OTHERWISE ON THE CONTRACT DRAWINGS OR IN THE SPECIFICATIONS, THE FOLLOWING NOTES SHALL APPLY TO THE MATERIALS LISTED HERINAFTER, AND TO THE PROCEDURES TO BE USED ON THIS PROJECT.

ALL HARDWARE ASSEMBLY MANUFACTURER'S INSTRUCTIONS SHALL BE FOLLOWED EXACTLY AND SHALL SUPERCEDE ANY CONFLICTING NOTES ENCLOSED HEREIN.

IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE THE CONSTRUCTION SEQUENCE TO INSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION AND/OR FIELD MODIFICATIONS.

ALL DIMENSIONS, ELEVATIONS, AND EXISTING CONDITIONS SHOWN ON THE DRAWINGS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO BEGINNING ANY MATERIALS ORDERING, FABRICATION OR CONSTRUCTION WORK ON THIS PROJECT. ANY DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER AND THE OWNER'S ENGINEER. THE DISCREPANCIES MUST BE RESOLVED BEFORE THE CONTRACTOR IS TO PROCEED WITH THE WORK. THE CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTION OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES.

ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF THE MATERIALS AND EQUIPMENT BEING SUBSTITUTED.

ALL BACKFILL SHALL BE THOROUGHLY COMPACTED TO A MINIMUM OF 95% MODIFIED PROCTOR DENSITY.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE FOR INSURING THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK.

THE CONCRETE MIX DESIGN SHALL BE IN ACCORDANCE WITH THE LATEST PROVISIONS OF ACI, AND SHALL BE DESIGNED FOR THE SPECIFIED LOADS IN A FREEZE-THAW CONDITION AND SHALL HAVE A 28 DAY COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING SHALL BE DEFORMED BARS OF THE SIZES SHOWN, CONFORMING TO THE REQUIREMENTS OF ASTM A615 GRADE 60, DETAILED IN ACCORDANCE WITH THE LATEST EDITION OF ACI 315.

REINFORCING CAGES SHALL BE BRACED TO RETAIN PROPER DIMENSIONS DURING HANDLING AND THROUGHOUT PLACEMENT OF CONCRETE.

WELDING IS PROHIBITED ON REINFORCING STEEL AND EMBEDMENTS.

MINIMUM CONCRETE COVER FOR REINFORCEMENT SHALL BE 3 INCHES UNLESS OTHERWISE NOTED. APPROVED SPACERS SHALL BE USED TO INSURE A 3 INCH MINIMUM COVER ON REINFORCEMENT.

CONCRETE COVER FROM TOP OF FOUNDATION TO ENDS OF VERTICAL REINFORCEMENT SHALL NOT EXCEED 3 INCHES NOR BE LESS THAN 2 INCHES.

MAXIMUM SIZE OF AGGREGATE SHALL NOT EXCEED SIZE SUITABLE FOR INSTALLATION METHOD UTILIZED OR ONE-THIRD CLEAR DISTANCE BEHIND OR BETWEEN REINFORCING.

CONCRETE SHALL BE PLACED IN A MANNER THAT WILL PREVENT SEGREGATION OF CONCRETE MATERIALS AND OTHER OCCURRENCES WHICH MAY DECREASE THE STRENGTH OR DURABILITY OF THE FOUNDATION.

EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED ¾" x ¾" MINIMUM.

CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

FOUNDATION AND ANCHOR TOLERANCES:

CONCRETE DIMENSIONS-PLUS OR MINUS 1".

DEPTH OF FOUNDATION - PLUS 3 INCHES OR MINUS 0".

DRILLED FOUNDATION OUT OF PLUMB - 1.0 DEGREE.

REINFORCING STEEL PLACEMENT - PER A.C.I. 301.

PROJECTION OF EMBEDMENTS - PLUS OR MINUS ⅛"

VERTICAL EMBEDMENTS OUT OF PLUMB -½ DEGREE.

MAXIMUM DISTANCE FROM CENTERLINE OF ANCHOR BOLTS TO CENTERLINE OF FOUNDATION - OF PIER DIAMETER UP TO A MAXIMUM OF 2".

ANCHOR BOLT CIRCLE DIAMETER - PLUS OR MINUS 1/16" .

AFTER ANCHOR BOLTS ARE INSTALLED AND CONCRETE HAS TAKEN ITS INITIAL SET, ANCHOR BOLTS MUST NOT BE MOVED, BENT OR REALIGNED IN ANY MANNER. A NUT LOCKING DEVICE MUST BE INSTALLED ON ALL ANCHOR BOLTS.

NOTE TO CONTRACTOR:

VERIFY LOCATION OF EXISTING ELECTRICAL, UNDERGROUND UTILITIES, AND TOWER GROUNDING RING BEFORE CONSTRUCTION

ERIC SCOTT KOHL
LICENSE
No. 56545
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
4.11.19

REVISIONS

NO.	DATE		BY:
0	12/17/19	90% SUBMITTAL	DK

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES
KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 783-9214

MOTOROLA SOLUTIONS
2000 W. SUNRISE BLVD.
FORT LAUDERDALE, FL 33311

COCONUT CREEK
COCONUT CREEK
5180 RECREATION LANE DRIVE,
COCONUT CREEK, FL 33063

ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

SCALE: AS NOTED
DATE: 04/11/19
KCI JOB NUMBER: 0119xxxxx

SHEET TITLE
FOUNDATION NOTES

SHEET
F-4

STRUCTURAL ANALYSIS REPORT

COCONUT CREEK SITE

400’ SELF-SUPPORTED TOWER

BROWARD COUNTY, FLORIDA

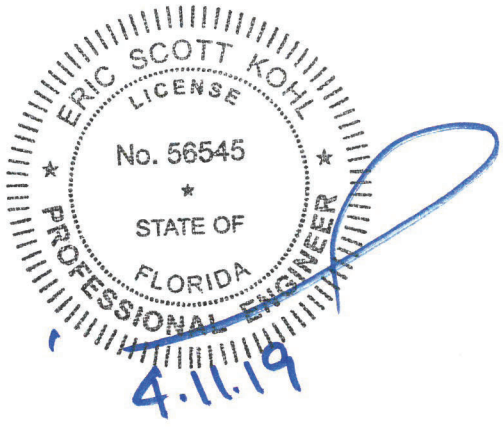
Prepared for:
Motorola Solutions

Representing:
BROWARD COUNTY

April 11, 2019
KCI J.O.: 0119XXX

4505 Falls of Neuse Road, Suite 400
Raleigh, North Carolina 27609
(919) 783-9214

TABLE OF CONTENTS

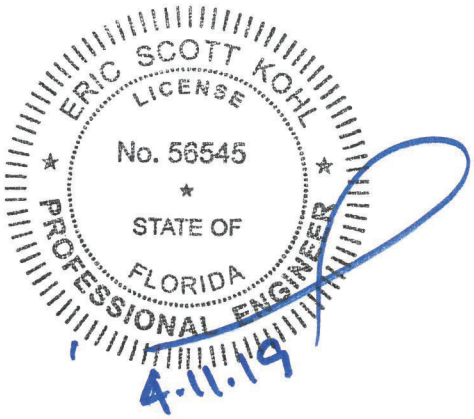


EXECUTIVE SUMMARY

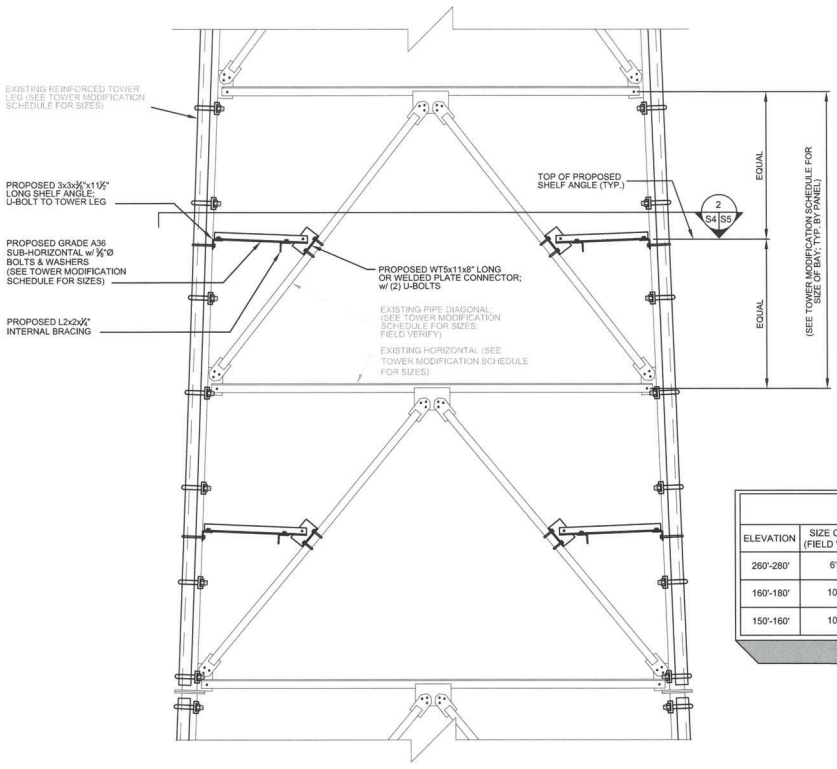
KCI Technologies, Inc. has completed a rigorous structural analysis of the Coconut Creek Tower. Broward County is proposing to alter the appurtenance configuration of the tower.

KCI studied two loading options with a single loading case each. The first loading option consisted of the interim loading condition where many of the antennas are doubled up during transition and the second loading option was for the final loading. The single loading case consisted of the existing and proposed appurtenances with a 180-mph wind speed (ultimate 3-second gust) with no ice and an Exposure Category C, Topographic Category 1, and Risk Category IV per the 2017 Florida Building Code for Broward County, Florida. This analysis assumes that the proposed transmission lines for the P25 antennas shall be placed on the new waveguide ladder in a stacked configuration and those for the Firenet shall be placed in openings on the existing waveguide ladders.

The results of this analysis indicate that some of the structural components of the tower will exceed the nominal loads established by the ANSI/TIA-222-G standard for the proposed appurtenance configuration at the specified loadings. Modifications as contained briefly will alleviate these overloads.



The purpose of this report is to assess the impact of adding antennas and transmission lines to the existing structure, including whether or not structural modifications are required. Any modifications recommended herein are conceptual only. This is not a construction document. This report may not be suitable for bidding and definitely is not a substitute for complete and properly engineered plans/specifications required to accomplish any recommended modifications. KCI Technologies, Inc. assumes no liability for use of this report for any other purpose than that for which it was intended.



1 S1 S4 PARTIAL ELEVATION
NOT TO SCALE

TOWER MODIFICATION SCHEDULE					
ELEVATION	SIZE OF BAY (FIELD VERIFY)	EXISTING LEG	EXISTING DIAGONAL	EXISTING HORIZONTAL (TOP OF PANEL)	PROPOSED SUBHORIZONTAL
260'-280'	6'-8"	2½" SCH 80 w/ L3x3x¼	2" SCH 40	1½" SCH 40	L2x2x¼
160'-180'	10'-0"	6" SCH 80 w/ L4x4x½	3" SCH 40	2½" SCH 40	L2x2x¼
150'-160'	10'-0"	6" SCH 80 w/ L4x4x½	3" SCH 40	2½" SCH 40 w/ L3½x3½x¼	L2x2x¼

ERIC SCOTT KOHL LICENSE No. 56545 STATE OF FLORIDA PROFESSIONAL ENGINEER
2.28.19

THIS DRAWING NOT SUITABLE FOR SCALING

REVISIONS

NO.	DATE	DESCRIPTION	BY:
1	2/28/19	90% SUBMITTAL	DK

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 783-9214

MOTOROLA SOLUTIONS

8000 W. SUNRISE BLVD
PLANTATION, FL 33322

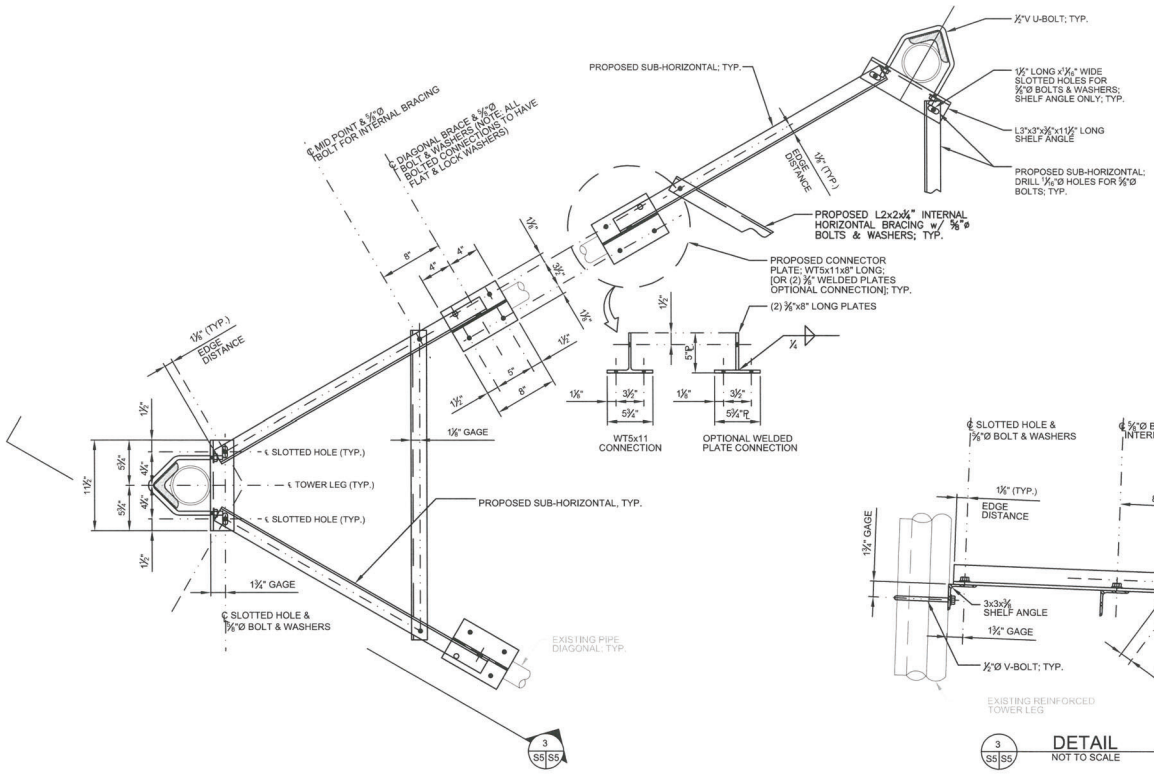
CORE
CORE TOWER
1725 NW 31ST AVE
FORT LAUDERDALE, FL 33311

ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

SCALE: AS NOTED
DATE: 02/28/19
KCI JOB NUMBER: 0119xxxxx

SHEET TITLE:
DETAILS

SHEET
S-4



2 S4 S5 SECTION
NOT TO SCALE

3 S5 S5 DETAIL
NOT TO SCALE

THIS DRAWING NOT SUITABLE FOR SCALING

ERIC SCOTT KOHL LICENSE No. 56545 STATE OF FLORIDA PROFESSIONAL ENGINEER
2.28.19

REVISIONS			
NO.	DATE		BY:
1	2/28/19	90% SUBMITTAL	DK

DRAWN BY: DK
CHECKED BY: ESK
APPROVED BY:

KCI TECHNOLOGIES
KCI TECHNOLOGIES, INC.
4505 FALLS OF NEUSE RD.
SUITE 400
RALEIGH, NC 27609
(919) 783-9214

MOTOROLA SOLUTIONS
8000 W. SUNRISE BLVD
PLANTATION, FL 33322

CORE
CORE TOWER
1735 NW 31ST AVE
FORT LAUDERDALE, FL 33311

ENGINEER:
ERIC S. KOHL, PE
FL LICENSE NO. 56545

SCALE: AS NOTED
DATE: 02/28/19
KCI JOB NUMBER: **0119xxxxx**

SHEET TITLE
DETAILS

SHEET
S-5

STRUCTURAL ANALYSIS REPORT

CORE SITE

300’ SELF-SUPPORTED TOWER

BROWARD COUNTY, FLORIDA

Prepared for:
KIRMS COMMUNICATIONS

Representing:
BROWARD COUNTY
115 S. Andrews
Fort Lauderdale, FL 33501

February 28, 2019
KCI J.O.: 011901412B

4505 Falls of Neuse Road, Suite 400
Raleigh, North Carolina 27609-5210
(919) 783-9214

Florida License EB0004898
Eric S. Kohl, FL License No. 56545

TABLE OF CONTENTS

EXECUTIVE SUMMARY

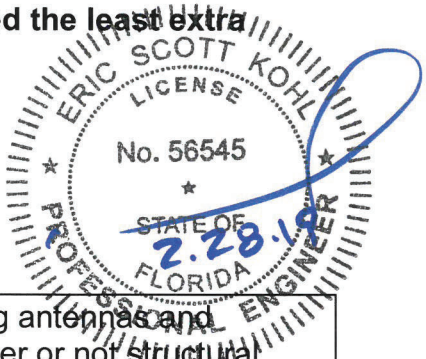
KCI Technologies, Inc. has completed a rigorous structural analysis of the Core Tower. Broward County is proposing to alter the appurtenance configuration of the tower.

KCI studied three loading options with a single loading case each. The first loading option consisted of the temporary loading condition where many of the antennas are doubled up during transition and a few are relocated temporarily. The second loading case was for the interim loading condition where many of the antennas are doubled up during transition. The third loading case was for the final loading option. The single loading case consisted of the existing and proposed appurtenances with a 180-mph wind speed (ultimate 3-second gust) with no ice and an Exposure Category C, Topographic Category 1, and Risk Category III per the 2017 Florida Building Code for Broward County, Florida. This analysis assumes that the proposed transmission lines shall be mounted on the existing waveguide ladders.

The results of this analysis indicate that with modifications, none of the structural components of the tower will exceed the nominal loads established by the ANSI/TIA-222-G standard for the proposed appurtenance configuration at the specified loadings. Modifications as contained briefly will alleviate these overloads.

This analysis assumes that modifications as described in KCI modification drawings, job no. 02157427A, dated 6 February 2015, have been satisfactorily installed.

Kirms Communication provided a recent tower mapping that included the as-built tower modifications for this analysis. Some of the as-built tower modifications in the mapping did not match the modification drawings and post construction inspection completed by KCI in 2004. Where there are discrepancies, KCI used the modifications that provided the least extra capacity in the final results for this report.



The purpose of this report is to assess the impact of adding antennas and transmission lines to the existing structure, including whether or not structural modifications are required. Any modifications recommended herein are conceptual only. This is not a construction document. This report may not be suitable for bidding and definitely is not a substitute for complete and properly engineered plans/specifications required to accomplish any recommended modifications. KCI Technologies, Inc. assumes no liability for use of this report for any other purpose than that for which it was intended.

Engineering, Geophysics & Geosciences

1455 Lincoln Parkway, Suite 500
Atlanta, Georgia 30346
Phone: (770) 379-8590
Fax: (770) 379-8594
www.egsci.com

March 7, 2019

EGSci Project #: 19-1041870

GEOTECHNICAL INVESTIGATION FOR AN EXISTING TOWER SITE

Project: Existing Tower Site – Davie

Location: Davie, Florida

Prepared for:

KCI
4505 Falls of Neuse Road
Suite 400
Raleigh, NC 27609

Prepared by:

EGSci Consulting Inc.
1455 Lincoln Parkway
Suite 500
Atlanta, GA 30346

EGSci
consulting inc
Engineering, Geophysics & Geosciences

1455 Lincoln Parkway, Suite 500
Atlanta, Georgia 30346
Phone: (770) 379-8590
Fax: (770) 379-8594
www.egsci.com

March 7, 2019 *EGSci Project #: 19-1041870*

KCI
4505 Falls of Neuse Road
Suite 400
Raleigh, NC 27609

Re: Geotechnical Investigation
Site: Davie
4501 SW 142nd Ave.
Davie, FL 33330
Latitude: N26.065556
Longitude: W80.338333

Type of Tower: 300-foot Self-Support

EGSci Consulting Inc. (EGSci) is pleased to submit to KCI this letter report summarizing our limited geotechnical investigation of a telecommunication site (referenced herein as project site) in Broward County, Florida. The objective of the investigation was to conduct a subsurface exploration at the project site to characterize and evaluate the subsurface conditions in support of the tower foundation analysis.

PROJECT AND SITE DESCRIPTION

The project site is located at 4501 SW 142nd Avenue in Davie, Broward County, Florida. The project site consists of an existing 300-foot self-support tower and ancillary tower equipment and structures. Figure 1 shows the project site location, as indicated on the U.S. Geological Survey's (USGS) 1994 Cooper City, Florida 7.5-minute topographic quadrangle map.

GEOTECHNICAL INVESTIGATION

The geotechnical investigation was conducted on February 25, 2019 and consisted of one soil test boring located in the general vicinity of the existing communications tower. The boring was positioned in the field based on accessibility and the location of existing infrastructure at the project site.

The soil test boring (B-1) was advanced using a CME 45 drill rig to a termination depth of 70 feet below ground surface (BGS). Groundwater conditions were observed in the borehole during drilling. Soil samples were collected and transported to EGSci's facility for further examination and are discarded thirty days after completion of fieldwork. The approximate soil boring location is shown on Figure 1, and the soil boring log is attached to this report.

Field and Laboratory Procedures

Standard Penetration Test (SPT) Boring: The SPT boring was performed in accordance with the American Society for Testing and Materials (ASTM) Standard D1586: Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils. This sampling technique involves driving a split spoon (split-barrel) sampler into the soil using a 140-pound hammer, free falling 30 inches. The number of hammer blows required to drive the sampler one foot (after an initial seating of six inches) is termed the N-value or penetration resistance. The penetration resistance provides a general indication of soil density and/or consistency. The boring was advanced using mud rotary techniques. A manual safety hammer was utilized for the Standard Penetration Tests at the project site.

Soil Classification: The samples retrieved from the auger cuttings and split spoon sampler were visually examined and classified in general accordance with the guidelines of ASTM D2487: Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

Subsurface Conditions

The subsurface conditions encountered in the boring drilled at the project site are shown in detail on the boring log attached to this report. Soil boundaries indicated have been inferred from the results of non-continuous sampling and observations of drilling resistance, which can typically represent transitions from one soil type to another, rather than exact planes of stratigraphic change. The conditions summarized in a boring log are location-specific and conditions may differ beyond the boring location.

Groundwater was encountered at a depth of 9 feet BGS during drilling. However, seasonal precipitation may affect the groundwater levels at the project site. A groundwater monitoring program would be required to establish long-term groundwater conditions at the project site, which is beyond the scope of this investigation.

Regional Geology

According to the USGS digital geologic map of the State of Florida, the geology of the project site area is characterized by the Pleistocene Miami Limestone. This geology is generally described as orangish gray to white, sandy, oolitic limestone with scattered fossils and/or orangish gray to white, fossiliferous, sandy limestone with beds of quartz sand.

GEOTECHNICAL ANALYSIS AND RECOMMENDATIONS

The geotechnical design parameters presented below are to assist in analyzing the existing foundation system. These design values are based on in-situ conditions observed in the soil test borings and evaluation of subsurface samples. The following sections present our general design and construction recommendations.

Tower Foundation

Based on the geotechnical investigation performed by EGSci, a generalized subsurface profile was developed for the conditions encountered at the project site. The recommended geotechnical design parameters for the existing drilled shaft foundations are presented in Table 1. *The foundation should be analyzed in accordance with the applicable codes.*

Table 1: Recommended Soil Parameters for the Drilled Shaft Tower Foundations (B-1)

Depth		Material Type For Analysis Purposes	Angle of Internal Friction	Total Unit Weight	Buoyant Unit Weight	Undrained Shear Strength	Coefficient of Passive Pressure	Ultimate Skin Friction for Drilled Shafts	Net Ultimate Bearing Resistance
From (feet)	To (feet)		(Degrees)	(pcf)	(pcf)	(psf)		(psf)	(psf)
0	3	Cohesionless	30	115	-	-	3.0	-	-
3	5	Cohesionless	30	115	-	-	3.0	310	-
5	9	Cohesionless	38	125	-	-	4.2	1,690	-
9	18	Cohesionless	38	125	62.6	-	4.2	2,130	-
18	23	Cohesionless	39	125	62.6	-	4.4	2,355	25,000
23	28	Cohesionless	40	130	67.6	-	4.6	2,500	25,000
28	33	Cohesionless	40	130	67.6	-	4.6	2,500	25,000
33	38	Cohesionless	35	125	62.6	-	3.7	1,710	24,000
38	43	Cohesionless	35	125	62.6	-	3.7	1,675	24,000
43	48	Cohesionless	35	125	62.6	-	3.7	1,780	19,000
48	53	Cohesionless	34	120	57.6	-	3.5	1,620	16,000
53	58	Cohesionless	32	115	52.6	-	3.3	1,600	16,000
58	63	Cohesionless	32	115	52.6	-	3.3	1,475	15,000
63	68	Cohesionless	32	115	52.6	-	3.3	1,645	12,000
68	70	Cohesionless	31	110	47.6	-	3.1	1,460	12,000

[1] Skin friction for depths above 3 feet BGS should be neglected.

[2] Nominal skin friction and bearing resistance values are provided above; the appropriate reduction factors should be applied per applicable design code.

Frost Depth

The regional design frost depth at the project site is 0 inches, which is based on values from the Naval Facilities Engineering Command Soil Mechanics Design Manual (NAVFAC DM 7.01), as reported by the Telecommunications Industry Association Structural Standard for Antenna Supporting Structures and Antennas (ANSI/TIA-222-G).

Seismic Site Class

Based on the subsurface data encountered in our boring, the International Building Code (IBC) Seismic Site Class is Site Class D. The Seismic Site Class is based on average properties of subsurface materials to a depth of 100 feet BGS. Because soil test borings to 100 feet were not performed at this site, it is necessary to estimate the Seismic Site Class based on the boring performed and the regional geology.

Construction Inspection

In general, foundation recommendations contained in this report are contingent upon inspection by a geotechnical engineer or experienced designated inspector at the time of construction on a full-time basis. Inspections should include observations for compliance with recommendations and/or testing (e.g. in-place density tests), as required. Based on the field observations of the geotechnical engineer or inspector, additional recommendations may be required.

QUALIFICATION OF RECOMMENDATIONS

This report is for the exclusive use of KCI and the designers of the project described herein and is applicable to this project. The conclusions and recommendations have been prepared by the generally accepted standards of Geotechnical Engineering practice in the State of Florida practicing under similar conditions subject to the time limits, and financial and physical constraints applicable to the services. No other warranty is expressed or implied. EGSci is not responsible for the conclusions, opinions and recommendations of others. Any re-use of this document, particularly by third parties, without our express written permission is solely at their own risk.

Environmental services and/or concerns were not included in our scope of work and have not been addressed in this report.

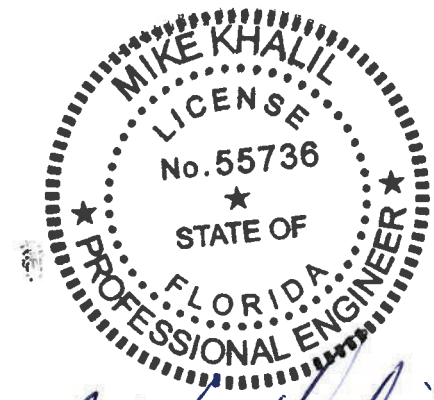
The analysis and recommendations presented in this report are based on the data obtained from the soil borings, exploration and testing program performed at the location shown in Figure 1 and past experience. Soil conditions may differ beyond those at the boring location and are not reflected in this report. If variations in soil conditions become apparent during excavation, the recommendations and conclusions presented herein may need to be re-evaluated based on on-site observations. We recommend that the contractor notify EGSci as soon as possible regarding variations in soil conditions from those presented herein.

If the design or location of the structure presented herein changes, the recommendations and conclusions presented in this report will not be valid. EGSci must review the changes and modify or approve the recommendations and conclusions.

EGSci Consulting Inc. appreciates the opportunity to work with KCI on this project. If you have any questions or require additional information regarding this report, please do not hesitate to contact us.

Very truly yours,

EGSci Consulting Inc.

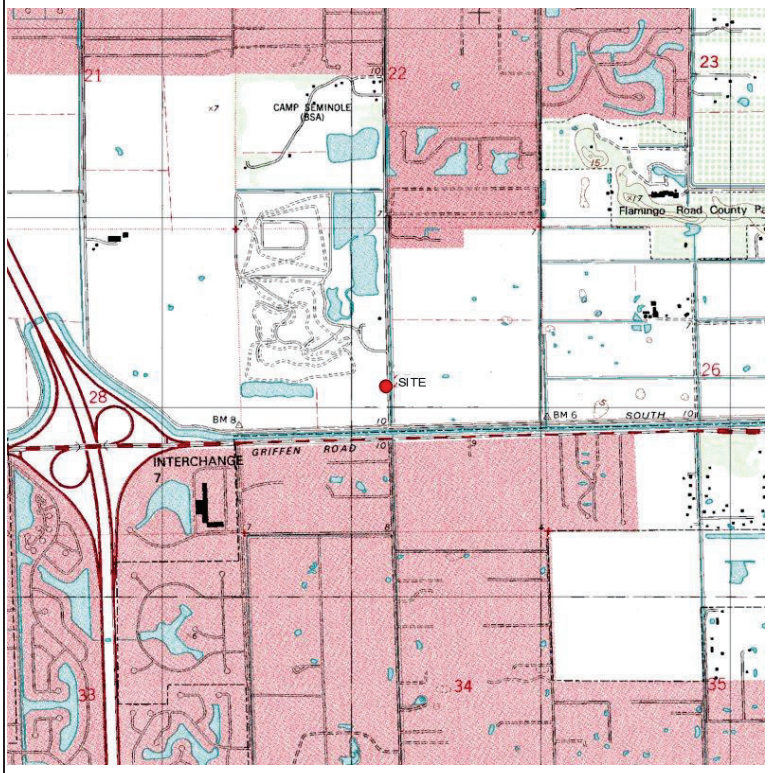


3/7/2019

Shelly Keary, M.Sc.
Project Geotechnical Engineer

Mike Khalil, M.Sc., P.E. (FL #55736)
Principal Engineer

Attachments
Site Figures
Key to Soil Classification
Log of Boring



Source: USGS Topographic Map
Cooper City, Florida; Year: 1994
Scale: Not to Scale

Source: Google Earth Imagery
Scale: Not to Scale
Approximate Boring Location

CONSULTANT

EGSci consulting inc
1455 Lincoln Parkway – Suite 500
Atlanta, GA 30346

CLIENT

KCI
4505 Falls of Neuse Road – Suite 400
Raleigh, NC 27609

Geotechnical Investigation

FIGURE 1

SITE: Davie

Site Location Map and Boring Location Plan

Engineering, Geophysics & Geosciences

1455 Lincoln Parkway, Suite 500
Atlanta, Georgia 30346
Phone: (770) 379-8590
Fax: (770) 379-8594
www.egsci.com

NON-DESTRUCTIVE TESTING INVESTIGATION FOR UNKNOWN FOUNDATIONS OF AN EXISTING TOWER SITE

Project: Existing Tower Site Davie

Location: Davie, Florida

EGSci Project #19.1041870

Prepared For:

KCI Technologies Inc.
4505 Falls of Neuse Road
Suite 400
Raleigh, NC 27609

Prepared By:

EGSci Consulting Inc
1455 Lincoln Parkway
Suite 500
Atlanta, GA 30346

March 6, 2019

EGSci consulting inc
Engineering, Geophysics & Geosciences

1455 Lincoln Parkway, Suite 500
Atlanta, Georgia 30346
Phone: (770) 379-8590
Fax: (770) 379-8594
www.egsci.com

March 6, 2019

Re: Non-Destructive Testing Investigation for Unknown Foundations

Davie
4501 SW 142nd Avenue
Davie, FL 33330
Latitude: N26.06520
Longitude: W80.33867
ASR #1041870

Type of Tower: Self-Support

EGSci Consulting Inc EGSci) is pleased to submit to KCI Technologies Inc. (KCI), this letter report summarizing our investigation of the tower foundation element for the existing tower site Davie located in Davie, Florida (Site).

SCOPE OF SERVICES

As requested by KCI, the objective of this foundation investigation was to utilize non-destructive testing (NDT) methods, physical measurement of the exposed portion of the tower foundation element, limited excavation, and sub-surface probing to determine the following:

- Approximate dimensions of the tower foundations.
- Approximate metal reinforcement (rebar) content of the tower foundations where applicable).

This letter report is provided to summarize the results of the investigation. Results presented in this report are resultant from interpreted field data and EGSci's past experience with similar projects.

RESULTS

The following is a summary of the schematic figures used to present the interpreted results of this investigation:

Figure 1 – General layout and orientation of the tower.
Figure 2 – Interpreted dimensions of the tower foundation elements.
Figure 3 – Approximate rebar content of the tower foundation elements, as determined from interpreted NDT data.

Foundation Length

NDT data collected for total caisson length was generally of poor quality and difficult to process and interpret due to the following:

- Presence of multiple events at various depths in the interpreted NDT data.
- Inconsistent NDT signal characteristics between data collection locations.
- Interpreted NDT events were relatively low amplitude.
- Interpreted NDT signal was relatively 'noisy' possibly due to background noise, sub-surface conditions adjacent to the foundations, and/or internal conditions of the foundations.

Due to these factors, there are multiple interpretable events in the NDT data that could be related to the bottom of the caisson. Interpreted events in the NDT data indicate multiple possible approximate total caisson lengths including 21, 28, 31 and 65 feet. Due to this fact, it is recommended that an additional investigation be performed to better determine the total caisson length.

Recommendation

If additional information concerning total foundation length is required, the following options are available:

- **Parallel Seismic Investigation** – This NDT methodology requires that a cased boring be installed within 10 feet of the foundation to be tested and to a depth of at least 10 feet past the maximum anticipated depth of the foundation. This type of testing has the potential to directly measure the concrete velocity and provide a more precise measurement of the foundation length. Given the current layout of the Site, it is anticipated that the Northeast and West foundations are accessible for parallel seismic testing.
- **Concrete Coring** – The total length of the caisson may be determined by advancing a small diameter core along the total length of the caisson.

Please see Appendix A for photos of the site and the exposed portion of the tower foundation elements. See the following section entitled 'Limitations of the Report' for important information regarding the nature of the information provided in this report.

LIMITATIONS OF THE REPORT

The results as presented in this report are based on the interpretation of collected field data and EGSci s experience. EGSci's services are conducted in a manner consistent with that level of care and skill ordinarily exercised by other members of the NDT community currently practicing under similar conditions subject to the time limits, and financial and physical constraints applicable to the services. Due to the nature of NDT, EGSci cannot guarantee the results of any measurements or dimensions that are not physically measured. The purpose of this investigation is to determine the approximate dimensions and rebar content of the existing tower

foundation element(s). The results and interpretations contained in this report are professional opinions. No other representation, expressed or implied, is included or intended. EGSci assumes no liability for any measurements or dimensions that are not physically confirmed or assumptions that are made assuming standard engineering/construction practices.

NDT methods may not detect all targets and interfaces of interest. It is also possible that the interpreted NDT data may reveal subsurface targets or interfaces that without intrusive sampling prior to data interpretation may have been misinterpreted.

The rebar content of the foundation element(s) presented in this report are interpreted from NDT data and measuring the dimensions of the portion of the foundation element(s) located above ground surface. Physical measurements of a foundation element taken above ground surface (i.e. shaft diameter) may not be representative of the foundation dimensions below ground surface. NDT provides data along individual transects or at individual points and does not represent possible variations in the dimensions/rebar content of a foundation element that occur in areas not encountered with these methods during the investigation.

In the case that multiple layers of rebar are present in a tower foundation element, the rebar content data presented in this report will only reflect the shallowest layer of rebar from the surface where the NDT data was collected.

The data presented in this report should be used by a qualified engineer along with available tower and geotechnical information to determine if the interpreted information for the foundation element(s) are reasonable given all factors.

EGSci will not be responsible for any claims, damages, or liability associated with any other party's interpretations of the data or reuse of the data in this report without our express written authorization.

We appreciate the opportunity to work with you on this project. Please e-mail us if you require additional information at information@egsci.com.

Sincerely,
EGSci Consulting Inc

Andrew Johnson
Staff Engineer

Shane Hickman, M.Sc.
Senior Geophysicist

Attachments
Figure 1 – Site Map
Figure 2 – Interpreted Dimensions of the Tower Foundation Elements
Figure 3 – Interpreted Results for Rebar Content of the Tower Foundation Elements
Appendix A – Site Photos
Appendix B – Report Limitations

STRUCTURAL ANALYSIS REPORT

DAVIE SITE

300' SELF-SUPPORTED TOWER

BROWARD COUNTY, FLORIDA

Prepared for:
KIRMS COMMUNICATIONS

Representing:

BROWARD COUNTY
115 S. Andrews Ave
Fort Lauderdale, FL 33301

April 26, 2019
KCI J.O.: 011901412B

4505 Falls of Neuse Road, Suite 400
Raleigh, North Carolina 27609
(919) 783-9214

Florida License EB0004898
Eric S. Kohl, FL License No. 56545

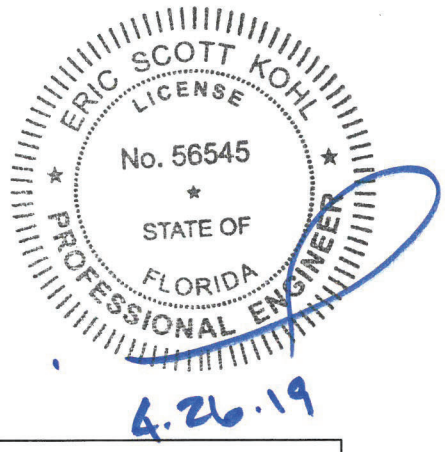
TABLE OF CONTENTS

EXECUTIVE SUMMARY

KCI Technologies, Inc. has completed a rigorous structural analysis of the Davie Tower. Broward County is proposing to alter the appurtenance configuration of the tower.

KCI studied two loading options with a single loading case each. The first loading option consisted of the interim loading condition where many of the antennas are doubled up during transition and the second loading case was for the final loading. The single loading case consisted of the existing and proposed appurtenances with a 180-mph wind speed (ultimate 3-second gust) with no ice and an Exposure Category C, Topographic Category 1, and Risk Category III per the 2017 Florida Building Code for Broward County, Florida. This analysis assumes that the proposed transmission lines shall be mounted on the existing waveguide ladders. Proposed lines for the P25 antennas shall be divided evenly between the two new waveguide ladders on the South tower face in a stacked configuration two deep and those for the Firenet shall be placed in openings on the existing waveguide ladders.

The results of this analysis indicate that with modifications, none of the structural components of the tower will exceed the nominal loads established by the ANSI/TIA-222-G standard for the proposed appurtenance configuration at the specified loadings. Modifications as contained briefly will alleviate these overloads.



The purpose of this report is to assess the impact of adding antennas and transmission lines to the existing structure, including whether or not structural modifications are required. Any modifications recommended herein are conceptual only. This is not a construction document. This report may not be suitable for bidding and definitely is not a substitute for complete and properly engineered plans/specifications required to accomplish any recommended modifications. KCI Technologies, Inc. assumes no liability for use of this report for any other purpose than that for which it was intended.

A. PURPOSE/BACKGROUND

Pursuant to the request of Mr. Harry Kirms of Kirms Communications representing Broward County, KCI Technologies, Inc. was retained to conduct a structural analysis of the Davie Tower. Broward County is proposing to alter appurtenances to the tower. Broward County provided the following information:

- Proposed appurtenances V25, dated 31 January 2019.
- Field Information by Kirms Communications dated 7 December 2018.

Note: KCI did not visit the site for this analysis. KCI had completed a tower mapping for a previous analysis.

B. CONDITIONS INVESTIGATED

This 300-ft self-supported tower was designed and manufactured by Pirod, Inc. KCI was unable to obtain the design drawings.

The tower is located at 4501 SW 142nd Ave, Davie, Broward County, Florida.

KCI analyzed the tower using tnxTower software by Tower Numerics, Inc.

KCI examined two loading cases with a single loading option each including the existing and proposed appurtenances. This option included the following case:

Loading Case	Code	Wind Speed and Ice Loading
1	2017 Florida Building Code for Broward County, Florida	180 mph (ultimate 3 second gust), No ice *139 mph (nominal 3 second gust), No Ice

*- Conversion based on 2017 Florida Building Code, Section 1609.1.1 Determination of wind loads, Exception 5.

STRUCTURAL ANALYSIS REPORT

MIRAMAR SITE

300' SELF-SUPPORTED TOWER

BROWARD COUNTY, FLORIDA

Prepared for:

KIRMS COMMUNICATIONS

Representing:

BROWARD COUNTY
115 S. Andrews
Fort Lauderdale, Florida 33501

April 23, 2019
KCI J.O.: 011901412D

4505 Falls of Neuse Road, Suite 400
Raleigh, North Carolina 27609
(919) 783-9214

Florida License EB0004898
Eric S. Kohl, FL License No. 56545

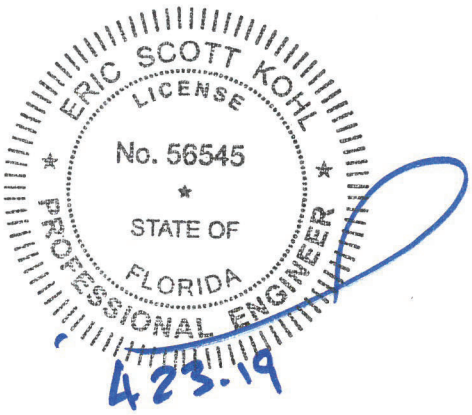
TABLE OF CONTENTS

EXECUTIVE SUMMARY

KCI Technologies, Inc. has completed a rigorous structural analysis of the Miramar Tower. Broward County is proposing to alter the appurtenance configuration of the tower.

KCI studied a single loading case, which consisted of two loading options. The first loading option consisted of the interim loading condition where many of the antennas are doubled up during transition and the second loading case was for the final loading. The single loading case consisted of the existing and proposed appurtenances with a 180-mph wind speed (ultimate 3-second gust) with no ice and an Exposure Category C, Topographic Category 1, and Risk Category IV per the 2017 Florida Building Code for Broward County, Florida. This analysis assumes that the proposed transmission lines shall be mounted on a new waveguide ladder on the South tower face in a back-back configuration such that only half of the new lines are exposed to wind loading.

The results of this analysis indicate that with modifications, none of the structural components of the tower will exceed the nominal loads established by the ANSI/TIA-222-G standard for the proposed appurtenance configuration at the specified loadings. Modifications as contained briefly herein will alleviate the overloads.



The purpose of this report is to assess the impact of adding antennas and transmission lines to the existing structure, including whether or not structural modifications are required. Any modifications recommended herein are conceptual only. This is not a construction document. This report may not be suitable for bidding and definitely is not a substitute for complete and properly engineered plans/specifications required to accomplish any recommended modifications. KCI Technologies, Inc. assumes no liability for use of this report for any other purpose than that for which it was intended.

A. PURPOSE / BACKGROUND

Pursuant to the request of Mr. Harry Kirms of Kirms Communications representing Broward County, KCI Technologies, Inc. was retained to conduct a structural analysis of the Miramar Tower. Broward County is proposing to alter the appurtenance configuration of the tower. Kirms Communications provided the following information:

- E-mail with proposed appurtenances dated 29 January 2019.
- Kirms Communication Tower mapping drawings with existing appurtenance loading and existing tower modifications, dated 11 December 2018.
- Proposed appurtenances (via Google Docs) downloaded 6 March 2019.

For previous analyses KCI obtained the following:

- Pirod Tower plans, dated 4/7/2002, A117882.
- Geotechnical report by Tierra, project number 6511-10-076, dated 15 March 2010.

Note: For a previous analysis KCI performed a site visit to gather structural and existing appurtenance information and to determine the general condition of the tower.

B. CONDITIONS INVESTIGATED

This 300-ft self-supported tower was designed and manufactured by Pirod, Inc.

The tower is located at 14401 SW 55th Street, Miramar, Broward County, Florida.

KCI analyzed the self-supported tower using tnxTower by Tower Numerics Inc.

KCI examined a single loading case including the existing, proposed and future appurtenances.

Loading Case	Code	Wind Speed and Ice Loading
1	ANSI/TIA-222-G & 2017 Florida Building Code for Broward County, Florida	180 mph (ultimate 3 second gust), No ice *139 mph (nominal 3 second gust), No ice

*- Wind speed per Section 1620.2 of the 2017 Florida Building Code, as required by the Exception of Section 1601.1.

Existing/Proposed Appurtenances (Interim Loading Condition):

Number	Elevation	Carrier	Mount	Antenna Information	Transmission Lines
1	298'	Broward County	4-ft Side Arm	(1)- CC450-09 Omni antenna	(1)- 7/8"
2	298'	Broward County	6-ft Side Arms	(2)- DS7C13PPYU-D Directional antennas	(2)- 7/8"
3	298'	Broward County	2-ft Side Arms	(4)- PMP-450i antennas (Firenet)	(4)- CAT 5e
4	298'	Broward County	Leg	(2)- 428E83I0T TTAs	(2)- 1/2"
5	293'	Broward County	6-ft Side Arms	(3)- DS7C13PPYU-D Directional antennas	(3)- 1 1/4"
6	278'	Broward County	6-ft Side Arms	(2)- BMR12 Omni antennas*	(2)- 7/8"
7	275'	Broward County	Leg	(2)- TTAs *	(2)- 1/2"
8	273'	Broward County	Side Arms	(4)- BCR80013 Omni antennas	(4)- 1 1/4"
9	260'	Broward County	4-ft Side Arms	(3)- CC450-09 Omni antennas	(3)- 7/8"
10	250'	Miramar	Side Arm	(1)- BCR80013 Omni antenna	(1)- 1 1/4"
11	180'	Broward County	Pipe	(1)- HP4-11 Microwave antenna w/ ODU	(1)- CAT 6
12	165'	Broward County	Pipe	(1)- PAD8-W59A Microwave antenna	(1)- EW63
13	160'	Broward County	Pipe	(1)- HP4-11 Microwave antenna w/ ODU	(1)- CAT 6
14	160'	Broward County	Pipe	(1)- PAD8-W59A Microwave antenna	(1)- EW63
15	155'	Broward County	Pipe	(1)- 8-ft Dish antenna w/ radome	(1)- EW63
16	151'	Miramar	Side Arm	(1)- DB589-Y antenna	(1)- 7/8"
17	135'	Broward County	Pipe	(1)- 8-ft Dish antenna w/ radome	(1)- EW63
18	110'	T-Mobile	Sector	(9)- Panel antennas w/ TMAs and Support Equipment	(12)- 7/8" (3)- 1.584" Hybrid & (3)- 9/16"
19	80'	Broward County	Side arm	(1)- Omni antenna	(1)- 1/2"

*- Relocated Omni antennas and TTAs

Existing/Proposed Appurtenances (Final Loading Condition):

Number	Elevation	Carrier	Mount	Antenna Information	Transmission Lines
1	298'	Broward County	4-ft Side Arm	(1)- CC450-09 Omni antenna	(1)- 7/8"
2	298'	Broward County	6-ft Side Arms	(2)- DS7C13PPYU-D Directional antennas	(2)- 7/8"
3	298'	Broward County	2-ft Side Arms	(4)- PMP-450i antennas (Firenet)	(4)- CAT 5e
4	298'	Broward County	Leg	(2)- 428E83I0T TTAs	(2)- 1/2"
5	293'	Broward County	6-ft Side Arms	(3)- DS7C13PPYU-D Directional antennas	(3)- 1 1/4"
6	273'	Miramar	Side Arm	(1)- BCR80013 Omni antennas	(1)- 7/8"
7	260'	Broward County	4-ft Side Arms	(3)- CC450-09 Omni antennas	(3)- 7/8"
8	250'	Miramar	Side Arm	(1)- BCR80013 Omni antenna	(1)- 1 1/4"
9	180'	Broward County	Pipe	(1)- HP4-11 Microwave antenna w/ ODU	(1)- CAT 6
10	165'	Broward County	Pipe	(1)- PAD8-W59A Microwave antenna	(1)- EW63
11	160'	Broward County	Pipe	(1)- HP4-11 Microwave antenna w/ ODU	(1)- CAT 6
12	160'	Broward County	Pipe	(1)- PAD8-W59A Microwave antenna	(1)- EW63
13	151'	Miramar	Side Arm	(1)- DB589-Y antenna	(1)- 7/8"
14	110'	T-Mobile	Sector	(9)- Panel antennas w/ TMAs and Support Equipment	(12)- 7/8" (3)- 1.584" Hybrid & (3)- 9/16"
15	80'	Broward County	Side arm	(1)- Omni antenna	(1)- 1/2"

C. APPLICABLE CODES AND PROVISIONS OF ANALYSIS

KCI utilized the following codes and criteria to conduct the structural analysis:

Standard	Title	Date
ANSI/TIA-222-G-2005	Structural Standard for Antenna Supporting Structures and Antennas	August 2005
ANSI/TIA-222-G-1-2007	Structural Standard for Antenna Supporting Structures and Antennas – Addendum 1	April 2007
ANSI/TIA-222-G-2-2009	Structural Standard for Antenna Supporting Structures and Antennas – Addendum 2	December 2009

Nominal Strengths used to evaluate the integrity of the structure were also in accordance with the above standard.

The following assumptions were made in the analysis:

1. The tower has been erected and maintained according to the manufacturer's plans and specifications.
2. The structural integrity of the tower has not been compromised.
3. All connections and fasteners are in accordance with AISC LRFD specifications.
4. The proposed transmission lines shall be mounted on a new waveguide ladder on the South tower face in a back-back configuration such that only half of the new lines are exposed to wind loading.
5. All information provided by Kirms Communication and Broward County is accurate and correct.

D. RESULTS

The results of this analysis indicate that with modifications, none of the structural components of the tower will exceed the nominal loads established by the ANSI/TIA-222-G standard for the proposed appurtenance configuration at the specified loadings. Modifications as contained briefly herein will alleviate the overloads.

Results Summary (Interim Loading Condition):

Item	Results	Elevation	% Capacity (Maximum)	Modifications
Legs	Overloaded	270-ft to 290-ft 120-ft to 140-ft 0-ft to 40-ft	120.2	See below
Diagonal Bracing	Overloaded	220-ft to 270-ft 160-ft to 180-ft 80-ft to 120-ft 0-ft to 20-ft	116.7	See below
Horizontal Bracing	O.K.	All	90.8	None
Leg Bolts	Overloaded	0-ft to 40-ft	114.7	See below
Diagonal Bolts	Overloaded	220-ft to 270-ft	116.7	See below

Horizontal Bolts	-	-	-	-
Anchor Bolts	O.K.	0-ft	84.2	None
Foundation	Overloaded	-	140.6	See below

*- Based on information from the Geotechnical Report by Tierra and the Pirod Foundation Plans.

Results Summary (Final Loading Condition):

Item	Results	Elevation	% Capacity (Maximum)	Modifications
Legs	Overloaded	270-ft to 290-ft 0-ft to 20-ft	111.9	See below
Diagonal Bracing	Overloaded	220-ft to 270-ft 0-ft to 20-ft	109.2	See below
Horizontal Bracing	O.K.	All	96.5	None
Leg Bolts	Overloaded	0-ft to 20-ft	101.7	See below
Diagonal Bolts	Overloaded	220-ft to 270-ft	109.2	See below
Horizontal Bolts	-	-	-	-
Anchor Bolts	O.K.	0-ft	74.9	None
Foundation	Overloaded	-	127.4	See below

*- Based on information from the Geotechnical Report by Tierra and the Pirod Foundation Plans.

The results of this analysis indicate that with modifications, none of the structural components of the tower will exceed the nominal loads established by the ANSI/TIA-222-G standard for the proposed appurtenance configuration at the specified loadings.

Results Summary (Interim Loading Condition) After Modifications Installed:

Item	Results	Elevation	% Capacity (Maximum)	Modifications
Legs	O.K.	All	98.1	See below
Diagonal Bracing	O.K.	All	96.2	See below
Horizontal Bracing	O.K.	All	71.5	None
Leg Bolts	O.K.	All	98.1	See below
Diagonal Bolts	O.K.	All	75.0	None
Horizontal Bolts	-	-	-	-
Anchor Bolts	O.K.	0-ft	85.7	None
Foundation	Overloaded	-	143.7	See below

*- Based on information from the Geotechnical Report by Tierra and the Pirod Foundation Plans.

Results Summary (Final Loading Condition) After Modifications Installed:

Item	Results	Elevation	% Capacity (Maximum)	Modifications
Legs	O.K.	All	89.4	See below
Diagonal Bracing	O.K.	All	85.6	See below
Horizontal Bracing	O.K.	All	65.4	None

Leg Bolts	O.K.	All	85.4	See below
Diagonal Bolts	O.K.	All	65.6	None
Horizontal Bolts	-	-	-	-
Anchor Bolts	O.K.	0-ft	75.1	None
Foundation	O.K.	All	128.7	See below

*- Based on information from the Geotechnical Report by Tierra and the Pirod Foundation Plans.

E. RECOMMENDATIONS

The results of this analysis indicate that with modifications, none of the structural components of the tower will exceed the nominal loads established by the ANSI/TIA-222-G standard for the proposed appurtenance configuration at the specified loadings. Modifications include the following:

1. Reinforce the legs from 20-ft to 40-ft, 100-ft to 140-ft, 180-ft to 220-ft, 240-ft to 260-ft, and 270-ft to 290-ft with bolt on bracing reinforcement.
2. Reinforce the diagonal bracing and diagonal bolts by replacing diagonals with larger size angles and/or bolts.
3. Reinforce the foundation by adding helical anchors with a grade beam attached to existing foundations.

This analysis assumes that the proposed transmission lines shall be mounted on a new waveguide ladder on the South tower face in a back-back configuration such that only half of the new lines are exposed to wind loading.

Schedule 10 - Broward County 700MHz System Project Schedule

ID	Task Mode	Task Name	Duration	Start	Finish	Actual Finish
1		**Broward County 700 MHz P25 System Project Schedule**	**730 days?**	**Mon 6/5/17**	**Wed 4/22/20**	**NA**
2		**Contract**	**10 days**	**Mon 6/5/17**	**Fri 6/16/17**	**Fri 6/16/17**
5		**Contract Design Review**	**52 days**	**Mon 6/19/17**	**Wed 8/30/17**	**Wed 8/30/17**
14		**Order Processing**	**58 days**	**Thu 8/31/17**	**Tue 11/21/17**	**Tue 11/21/17**
20		**Microwave Manufacturing**	**83 days**	**Thu 8/31/17**	**Tue 1/2/18**	**Tue 1/2/18**
23		**CCSi FNE System Staging**	**15 days**	**Wed 11/22/17**	**Thu 12/14/17**	**Thu 12/14/17**
28		**Ship FNE Equipment to Approved Warehouse in Broward County**	**199.5 days**	**Fri 12/15/17**	**Tue 9/25/18**	**Tue 9/25/18**
32		**Aviat Microwave Staging**	**188.5 days**	**Wed 1/3/18**	**Mon 9/24/18**	**Mon 9/24/18**
41		**Engineering**	**693 days**	**Mon 6/5/17**	**Mon 3/2/20**	**NA**
146		Additional Task not in original Schedule	397 days	Mon 6/5/17	Wed 12/26/18	NA
150		**DISPATCH CENTER INSTALLATIONS**	**47 days**	**Tue 4/30/19**	**Mon 7/8/19**	**NA**
204		**Remote Sites**	**595.5 days**	**Mon 6/5/17**	**Wed 10/9/19**	**NA**
205		**EMS SITE DEVELOPMENT ETES**	**428 days**	**Mon 8/28/17**	**Mon 5/6/19**	**NA**
246		Site Civil Work Substantial Completion	0 days	Mon 4/22/19	Mon 5/6/19	NA
247		**DAVIE SITE DEVELOPMENT Master ETNS**	**432 days**	**Mon 8/28/17**	**Fri 5/10/19**	**NA**
326		Site Civil Work Substantial Completion	0 days	Fri 6/7/19	Fri 6/7/19	NA
327		**POINTS OF AMERICA SITE DEVELOPMENT**	**462.5 days**	**Mon 8/28/17**	**Tue 6/25/19**	**NA**
368		Site Civil Work Substantial Completion	2 days	Fri 6/7/19	Tue 6/11/19	NA
369		**PLAYA SITE DEVELOPMENT**	**444 days**	**Mon 8/28/17**	**Wed 5/29/19**	**NA**
408		Site Civil Work Substantial Completion	2 days	Fri 6/7/19	Tue 6/11/19	NA
409		**COCONUT CREEK SITE DEVELOPMENT ETNS**	**476 days**	**Mon 8/28/17**	**Mon 7/15/19**	**NA**
480		Site Civil Work Substantial Completion	0 days	Wed 4/17/19	Wed 5/1/19	NA
481		**MIRAMAR SITE DEVELOPMENT ETNS**	**431 days**	**Mon 8/28/17**	**Thu 5/9/19**	**NA**
556		Site Civil Work Substantial Completion	4 days	Fri 6/7/19	Thu 6/13/19	NA
557		**CORE SITE DEVELOPMENT ETNS**	**434 days**	**Mon 8/28/17**	**Tue 5/14/19**	**NA**

ID	Task Mode	Task Name	Duration	Start	Finish	Actual Finish
630		Site Civil Work Substantial Completion	0 days	Thu 5/2/19	Thu 5/2/19	NA
631		**MARKHAM PARK SITE DEVELOPMENT ETNS**	**425 days**	**Mon 8/28/17**	**Wed 5/1/19**	**NA**
703		Site Civil Work Substantial Completion	0 days	Thu 4/18/19	Wed 5/1/19	NA
704		**FS106 SITE DEVELOPMENT NTNS**	**519 days**	**Mon 6/5/17**	**Thu 6/20/19**	**NA**
800		Site Civil Work Substantial Completion	0 days	Wed 5/29/19	Wed 5/29/19	NA
801		**Channel 2**	**519 days**	**Mon 8/28/17**	**Fri 9/13/19**	**NA**
802		SITE ENGINEERING	16 days	Mon 8/28/17	Tue 9/19/17	Tue 9/19/17
803		Site visit with AMEC FW	2 days	Mon 8/28/17	Tue 8/29/17	Tue 8/29/17
804		Prepare site sketch/site layout	9 days	Wed 8/30/17	Tue 9/12/17	Tue 9/12/17
805		Broward County Review and approval of site sketch	5 days	Wed 9/13/17	Tue 9/19/17	Tue 9/19/17
806		PERMITTING DOCUMENTATION AND FINAL DRAWINGS	448.5 days	Mon 8/28/17	Wed 6/5/19	NA
807		Site Survey and mapping	7 days	Mon 8/28/17	Wed 9/6/17	Wed 9/6/17
808		FAA application (7460-1) and approval	40 days	Thu 9/7/17	Wed 11/1/17	Wed 11/1/17
809		Review Shelter Drawings based on Port Entry Orientation	2 days	Wed 9/20/17	Thu 9/21/17	Thu 9/21/17
810		Prepared Construction Drawings of new site	25 days	Wed 9/20/17	Tue 10/24/17	Tue 10/24/17
811		Construction Drawings Review and Approval	134 days	Wed 10/25/17	Tue 5/8/18	Tue 5/8/18
812		Microwave Path Study & report	10 days	Thu 9/7/17	Wed 9/20/17	Wed 9/20/17
813		Tower Design and drawings	15 days	Thu 9/21/17	Wed 10/11/17	Wed 10/11/17
814		Site Agreement Approved by Site Owner	144 days	Thu 10/12/17	Wed 5/9/18	Wed 5/9/18
815		Broward County Site Release/Construction NTP to Motorola	1 day	Wed 3/6/19	Wed 3/6/19	Wed 3/6/19
816		Geotechnical testing and report	15 days	Fri 5/11/18	Fri 6/1/18	Fri 6/1/18
817		Tower Foundation Design	5 days	Mon 6/4/18	Fri 6/8/18	Fri 6/8/18
818		Place Order for New Shelter	1 day	Wed 3/6/19	Wed 3/6/19	Wed 3/6/19
819		Shelter Manufacturing	0 days	Fri 11/30/18	Fri 11/30/18	Fri 11/30/18
820		Manufacture New Shelter	45 days	Thu 3/7/19	Mon 6/3/19	NA

ID	Task Mode	Task Name	Duration	Start	Finish	Actual Finish
821		Ship Shelter to Site	2 days	Mon 6/3/19	Wed 6/5/19	NA
822		Order DC Power Systems	2 days	Fri 5/11/18	Mon 5/14/18	Mon 5/14/18
823		Receive Rectifier Rack at Project Warehouse	40 days	Mon 3/4/19	Fri 4/26/19	Fri 4/26/19
824		Construction Permits	59 days	Thu 3/7/19	Wed 5/29/19	NA
825		Prepare and Submit Permit Package	11 days	Thu 3/7/19	Thu 3/21/19	Thu 3/21/19
826		Permit Review and Approval Process	20 days	Fri 3/22/19	Wed 5/29/19	NA
827		Construction Permits Approved and Received	0 days	Wed 5/29/19	Wed 5/29/19	NA
828		CONSTRUCTION PHASE	40 days	Thu 4/11/19	Fri 6/7/19	NA
829		Move current Ch2 4.1 site to IC site location	0 days	Thu 4/11/19	Thu 4/11/19	Thu 4/11/19
830		Mobilization	1 day	Thu 5/30/19	Thu 5/30/19	NA
831		Locate existing utilities	1 day	Fri 5/31/19	Fri 5/31/19	NA
832		Light clearing and grubbing	1 day	Mon 6/3/19	Mon 6/3/19	NA
833		Remove old MDFR Shelter	4 days	Tue 6/4/19	Fri 6/7/19	NA
834		Compound grading and silt fencing	4 days	Thu 5/30/19	Tue 6/4/19	NA
835		Construction Staking	1 day	Wed 6/5/19	Wed 6/5/19	NA
836		SITE COMPONENTS INSTALLATION	43 days	Thu 6/6/19	Tue 8/6/19	NA
837		Excavate, form and rebar shelter foundations	3 days	Thu 6/6/19	Mon 6/10/19	NA
838		Excavate, form and rebar generator foundations	2 days	Tue 6/11/19	Wed 6/12/19	NA
839		Foundation inspection, concrete pour and testing	2 days	Thu 6/13/19	Fri 6/14/19	NA
840		Receive Shelter On Site	1 day	Mon 6/17/19	Mon 6/17/19	NA
841		Offload and Install equipment shelter	5 days	Tue 6/18/19	Mon 6/24/19	NA
842		Trench and Install underground power conduits	3 days	Tue 6/25/19	Thu 6/27/19	NA
843		Trench and install grounding	3 days	Fri 6/28/19	Tue 7/2/19	NA
844		Grounding Inspection	0.5 days	Wed 7/3/19	Wed 7/3/19	NA

ID	Task Mode	Task Name	Duration	Start	Finish	Actual Finish
845		Conduit inspection and backfill	0.5 days	Wed 7/3/19	Wed 7/3/19	NA
846		Offload and Install generator	2 days	Fri 7/5/19	Mon 7/8/19	NA
847		Pick up meter panel and Install meter board	2 days	Fri 6/28/19	Mon 7/1/19	NA
848		Utility hookup to the site by Electric Co.	15 days	Wed 7/17/19	Tue 8/6/19	NA
849		Cabling and hook up power system to shelter, ATS, generator	5 days	Tue 7/9/19	Mon 7/15/19	NA
850		Building/Electrical inspection	1 day	Tue 7/16/19	Tue 7/16/19	NA
851		Install ice bridge from shelter to the tower	3 days	Wed 7/3/19	Mon 7/8/19	NA
852		EXISTING FACILITY IMPROVEMENTS	0.5 days	Wed 7/17/19	Wed 7/17/19	NA
853		Deliver DC Rectifier Rack to Ch2 Site	0.5 days	Wed 7/17/19	Wed 7/17/19	NA
854		Antenna and Line Installation	7 days	Tue 9/3/19	Wed 9/11/19	NA
855		Ship antennas, line and accessories to the site	1 day	Tue 9/3/19	Tue 9/3/19	NA
856		Install antennas, microwave dishes and lines	6 days	Wed 9/4/19	Wed 9/11/19	NA
857		SITE EQUIPMENT INSTALLATION	18 days	Wed 8/7/19	Fri 8/30/19	NA
858		Ship equipment to site	1 day	Wed 8/7/19	Wed 8/7/19	NA
859		Microwave equipment installation	2 days	Thu 8/8/19	Fri 8/9/19	NA
860		FNE Equipment installation	10 days	Thu 8/8/19	Wed 8/21/19	NA
861		FNE Equipment program & configure	5 days	Thu 8/22/19	Wed 8/28/19	NA
862		Site Equipment test and baseline	2 days	Thu 8/29/19	Fri 8/30/19	NA
863		SITE RESTORATION	48 days	Tue 7/9/19	Fri 9/13/19	NA
864		Finish Grade and gravel compound	2 days	Thu 9/12/19	Fri 9/13/19	NA
865		Fencing of tower compound	3 days	Tue 7/9/19	Thu 7/11/19	NA
866		Complete grounding connections	2 days	Fri 7/12/19	Mon 7/15/19	NA
867		Site touchup and restoration	2 days	Tue 7/16/19	Wed 7/17/19	NA
868		FINAL TESTING	36 days	Wed 7/17/19	Thu 9/5/19	NA

ID	Task Mode	Task Name	Duration	Start	Finish	Actual Finish
869		Order & Battery Strings Received at Ch2 Site	30 days	Wed 7/17/19	Tue 8/27/19	NA
870		Install DC Power System	3 days	Wed 8/28/19	Fri 8/30/19	NA
871		AC connections to DC Power System	2 days	Tue 9/3/19	Wed 9/4/19	NA
872		DC Power System Startup and Test	1 day	Thu 9/5/19	Thu 9/5/19	NA
873		Generator Startup and Test	1 day	Mon 8/12/19	Mon 8/12/19	NA
874		Test Fire Suppression System	1 day	Wed 8/7/19	Wed 8/7/19	NA
875		Site Civil Work Substantial Completion	0 days	Wed 8/7/19	Wed 8/7/19	NA
876		**DEERFIELD SITE DEVELOPMENT NTNS**	**484 days**	**Mon 8/28/17**	**Thu 7/25/19**	**NA**
972		Site Civil Work Substantial Completion	0 days	Fri 7/5/19	Fri 7/5/19	NA
973		**POMPANO BEACH CLUB SITE DEVELOPMENT**	**497 days**	**Mon 8/28/17**	**Tue 8/13/19**	**NA**
1021		Site Civil Work Substantial Completion	0 days	Thu 8/8/19	Thu 8/8/19	NA
1022		**WEST LAKE PARK SITE DEVELOPMENT NTNS**	**536.5 days**	**Mon 8/28/17**	**Wed 10/9/19**	**NA**
1110		**WEST HOLLYWOOD SITE DEVELOPMENT NTNS**	**518.5 days**	**Mon 8/28/17**	**Fri 9/13/19**	**NA**
1207		**PARKLAND SITE DEVELOPMENT NTNS**	**200 days**	**Mon 10/29/18**	**Thu 8/15/19**	**NA**
1304		**TAMARAC SITE DEVELOPMENT NTNS**	**273.5 days**	**Wed 8/15/18**	**Fri 9/13/19**	**NA**
1391		Site Civil Work Substantial Completion	0 days	Tue 4/30/19	Tue 4/30/19	NA
1392		**P25 DISPATCH CENTER CONNECTIVITY**	**38 days**	**Tue 4/2/19**	**Thu 5/23/19**	**NA**
1403		**P25 DISPATCH CENTER CONNECTIVITY**	**38 days**	**Tue 4/2/19**	**Thu 5/23/19**	**NA**
1414		**Microwave Commissioning**	**124.5 days**	**Wed 5/1/19**	**Fri 10/25/19**	**NA**
1415		**Microwave Commissioning (1st Wave)**	**16 days**	**Thu 5/30/19**	**Thu 6/20/19**	**NA**
1422		**Microwave Commissioning (2nd Wave)**	**18 days**	**Fri 9/13/19**	**Wed 10/9/19**	**NA**
1432		**Microwave Commissioning (Coconut Creek)**	**124.5 days**	**Wed 5/1/19**	**Fri 10/25/19**	**NA**
1437		All Microwave Hops Commissioned	0 days	Fri 10/25/19	Fri 10/25/19	NA
1438		**MOBILE COMMUNICATIONS TRAILER**	**40 days**	**Wed 5/1/19**	**Wed 6/26/19**	**NA**
1439		Antenna Installation Design	20 days	Wed 5/1/19	Wed 5/29/19	NA

ID	Task Mode	Task Name	Duration	Start	Finish	Actual Finish
1440		Equipment Installation Design	20 days	Thu 5/30/19	Wed 6/26/19	NA
1441		Ship equipment to trailer	1 day	Wed 5/1/19	Wed 5/1/19	NA
1442		FNE Equipment installation	10 days	Thu 5/2/19	Wed 5/15/19	NA
1443		FNE Equipment program & configure	5 days	Thu 5/16/19	Wed 5/22/19	NA
1444		Trailer Equipment test and baseline	5 days	Thu 5/23/19	Thu 5/30/19	NA
1445		Broward County Site Audit	7 days	Fri 5/31/19	Mon 6/10/19	NA
1446		Broward County Trailer Approved	0 days	Mon 6/10/19	Mon 6/10/19	NA
1447		**SYSTEM OPTIMIZATION**	**105.5 days**	**Wed 5/29/19**	**Fri 10/25/19**	**NA**
1448		Master Site, Prime Site and Remote Sites Optimizatio	10 days	Wed 10/9/19	Wed 10/23/19	NA
1449		Optimization of Dispatch Consoles	5 days	Wed 5/29/19	Tue 6/4/19	NA
1450		System Ready for ATP and CATP Testing	0 days	Fri 10/25/19	Fri 10/25/19	NA
1451		**ACCEPTANCE TESTING**	**145 days?**	**Mon 6/3/19**	**Mon 12/30/19**	**NA**
1452		**System ATP's**	**145 days?**	**Mon 6/3/19**	**Mon 12/30/19**	**NA**
1473		**TECHNICAL TRAINING CLASS**	**20 days**	**Wed 12/4/19**	**Mon 1/6/20**	**NA**
1475		**CUTOVER**	**38 days**	**Thu 1/2/20**	**Sat 2/22/20**	**NA**
1476		Cutover Public Safety Users	37 days	**Thu 1/2/20**	Sat 2/22/20	NA
1477		**FINALIZE**	**687 days**	**Mon 6/5/17**	**Sat 2/22/20**	**NA**