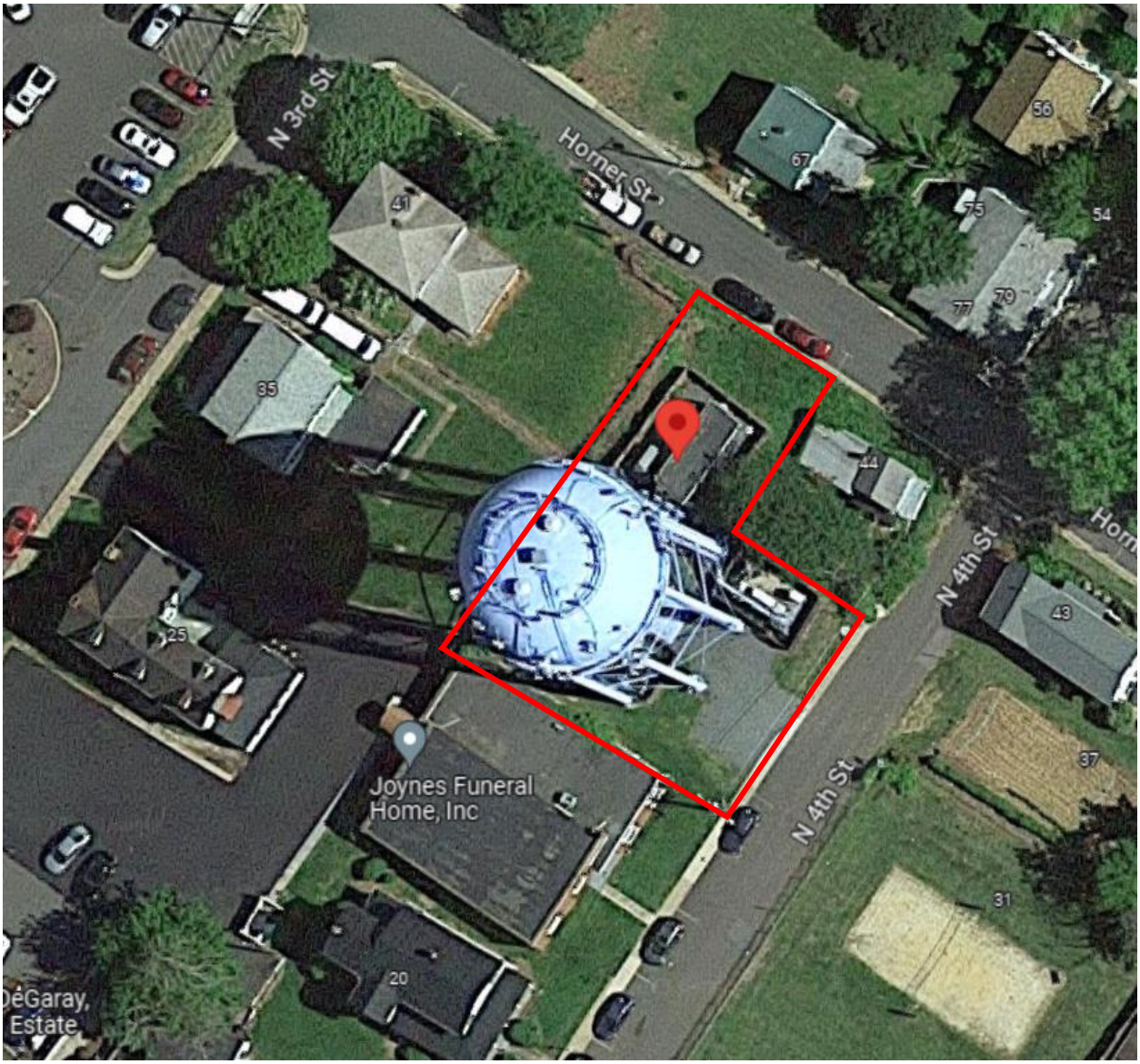
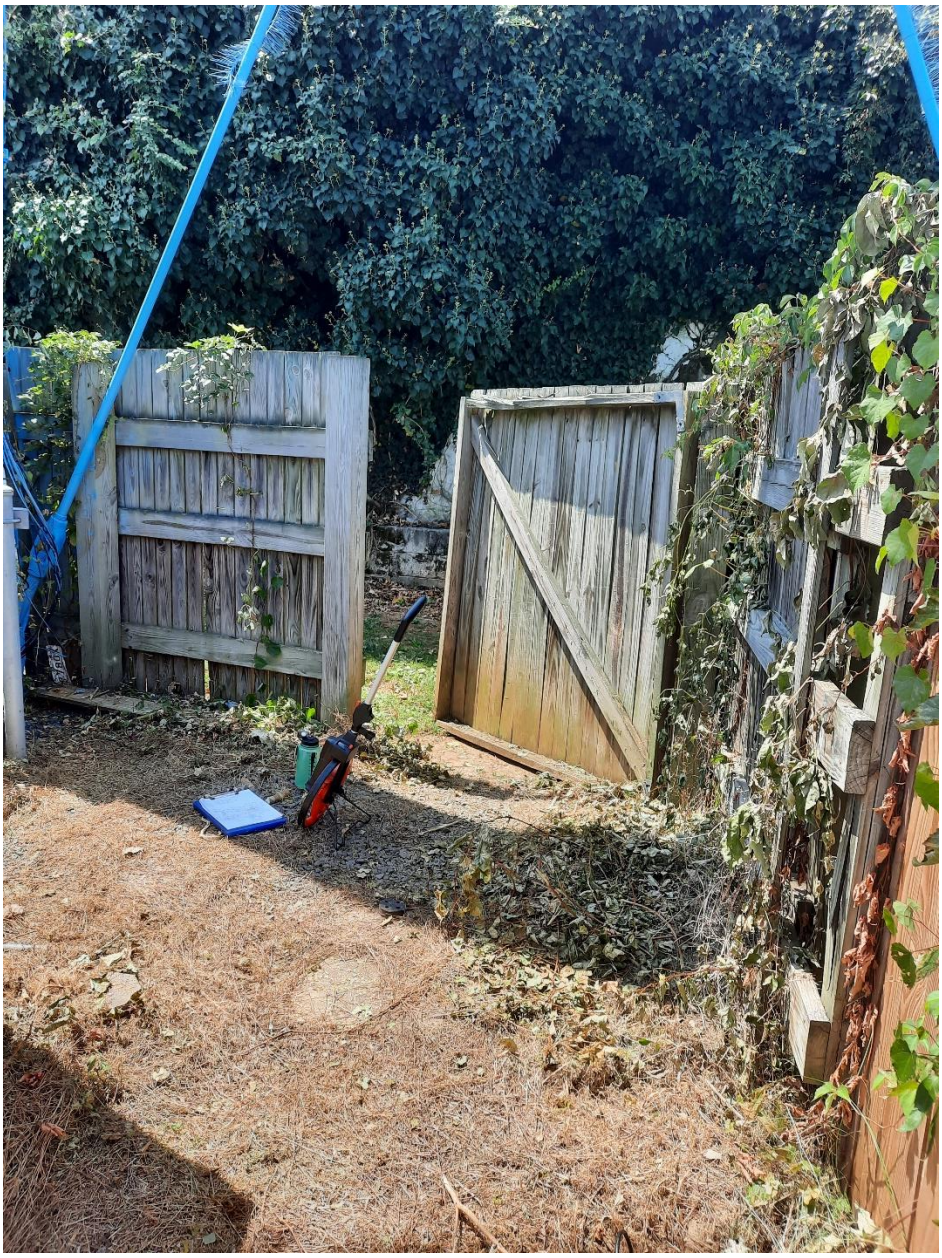
Attachment A – Photos and Plans

Vicinity Map – Street View



Attachment A – Photos and Plans

Photos:



Plans:

DiSH Dual-band RU Technical Specifications

RU General Specification	
TRX Configuration	4T4R
Operating Frequency	N70 & n66 Frequencies (Dual-Band)
Instantaneous Bandwidth	n70: DL:25MHz, UL15MHz n66: DL 90MHz, UL 70MHz
Operation Bandwidth	n70: DL:25MHz, UL15MHz n66: DL 90MHz, UL 70MHz
CC BW	5/10/15/20 MHz
Capacity	N70:2Cr(5/10/15/20 MHz) + N66:2Cr (5/10/15/20 MHz) /N70 1Cr(5/10/15/20 MHz) + N66 3Cr (5/10/15/20 MHz)
Interface to DU	ORAN 7.2x / 10G optical IF
TX Specification	
Output Power per TX	n70: 20-40W per port n66: 40-60W per port **Total 80W per port**
ACLR	Compliant with 3GPP TS 38.104
Transmitter Spurious Emissions	Compliant with 3GPP TS 38.104
EVM	Compliant with 3GPP TS 38.104
RX Specification	
Noise Figure	2.5dB (normal condition 2.2dB)
Blocking Features	Compliant with 3GPP TS 38.104
Receiver spurious emissions	Compliant with 3GPP TS 38.104
Mechanical Specification	
Volume	30 L
Dimension	W:400mm, H: 380mm, D: 200mm
Antenna Connector Type	4.3-10 RF connector
External alarm port	1
Antenna Control Interface	AISG
Power Supply	DC -58~-36V
Power Consumption	Max: 1200W
Weight	29 kg
Environmental	
Humidity (Absolute humidity)	0.03 g/m3 ~30 g/m3
Operating Temperature	-40°C ~+55°C
IP Rating	IP65
Cooling	Passive
Mounting Options	
Pole	TBD
Wall	TBD

DiSH Triple-band RU Technical Specifications

RU General Specification	
TRX Configuration	4T4R
Operating Frequency	n71 & n29 & n26 Frequencies (Triple-Band)
Instantaneous Bandwidth	n71: 35MHz n29: 11MHz n26: 7MHz
Operation Bandwidth	n71: 35MHz n29: 10MHz n26: 5MHz
CC BW	5/10/20 MHz
Capacity	n71:2Cr(5/10/20MHz) + NB-IOT (5/10MHz) n26:1Cr/NB-IOT (5MHz) n29:2Cr (5/10MHz)
Interface to DU	ORAN 7.2x / 10G optical IF
TX Specification	
Output Power per TX	n71: 30W per port n29: 40W per port n26: 10 W per port
ACLR	Compliant with 3GPP TS 38.104
Transmitter Spurious Emissions	Compliant with 3GPP TS 38.104
EVM	Compliant with 3GPP TS 38.104
RX Specification	
Noise Figure	2.5dB (normal condition 2.2dB)
Blocking Features	Compliant with 3GPP TS 38.104
Receiver spurious emissions	Compliant with 3GPP TS 38.104
Mechanical Specification	
Volume	35 L
Dimension	W:400mm, H: 380mm, D: 230mm
Antenna Connector Type	4.3-10 RF connector
External alarm port	1
Antenna Control Interface	AISG
Power Supply	DC -58~-36V
Power Consumption	Max: 1200W
Weight	34 kg
Environmental	
Humidity (Absolute humidity)	0.03 g/m3 ~ 30 g/m3
Operating Temperature	-40°C ~ +55°C
IP Rating	IP65
Cooling	Passive
Mounting Options	
Pole	TBD
Wall	TBD

JMA WIRELESS

MX08FRO665-21

NWAV™ X-Pol 8-Port Antenna

X-Pol 8-Port 6 ft 65° Fast Roll Off:

4 ports 617-894 MHz and 4 ports 1695-2200 MHz

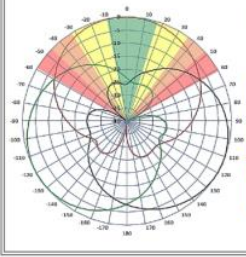
- Fast Roll Off (FRO™) azimuth beam pattern improves Intra- and Inter-cell SINR
- Excellent passive intermodulation (PIM) performance reduces harmful interference.
- Fully integrated (iRETs) with independent RET control for low and mid bands for ease of network optimization
- SON-Ready array spacing supports beamforming capabilities.
- High total power handling to maximize network efficiency
- Reduced tower loading for ease of site deployment

nwav

Fast Roll-Off antennas increase data throughput without compromising coverage

The horizontal beam produced by Fast Roll-Off (FRO) technology increases the Signal to Interference & Noise Ratio (SINR) by eliminating overlap between sectors .

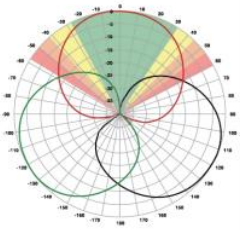
Non-FRO antenna



Large traditional antenna pattern overlap creates harmful interference.

JMA's FRO antenna pattern minimizes overlap, thereby minimizing interference.

JMA FRO antenna



LTE throughput	SINR	Speed (bps/Hz)	Speed increase	CQI
Excellent	>18	>4.5	333+%	8-10
Good	15-18	3.3-4.5	277%	6-7
Fair	10-15	2-3.3	160%	4-6
Poor	<10	<2	0%	1-3

The LTE radio automatically selects the best throughput based on measured SINR.

Electrical specification (minimum/maximum)	Ports 1, 2, 3, 4		Ports 5, 6, 7, 8		
Frequency bands, MHz	617-698	698-894	1695-1880	1850-1990	1920-2200
Polarization	± 45°		± 45°		
Gain over all tilts, max, dBi	13.6	14.8	18.5	18.3	18.8
Horizontal beamwidth (HBW), degrees[1]	68	62	62	62	64
Front-to-back ratio, co-polar power @180°, dB	>28	>29	>32	>31	>32
Vertical beamwidth (VBW), degrees[1]	14.2	12.5	5.4	5.2	4.9
Electrical downtilt (EDT) range, degrees	2-14		2-12		
First upper side lobe (USLS) suppression, dB[1]	≤-16.0	≤-16.5	≤-18.0	≤-18.0	≤-18.0
Minimum cross-polar isolation, port-to-port, dB[1]	25	25	25	25	25
Max VSWR / return loss, dB	1.5:1 / -14.0		1.5:1 / -14.0		
Max passive intermodulation (PIM), 2x20W carrier, dBc	-153		-153		
Max input power per any port, watts	300		250		
Total composite power all ports (1-8), watts[2]	1500				

[1] Typical value over frequency and tilt

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JMA WIRELESS

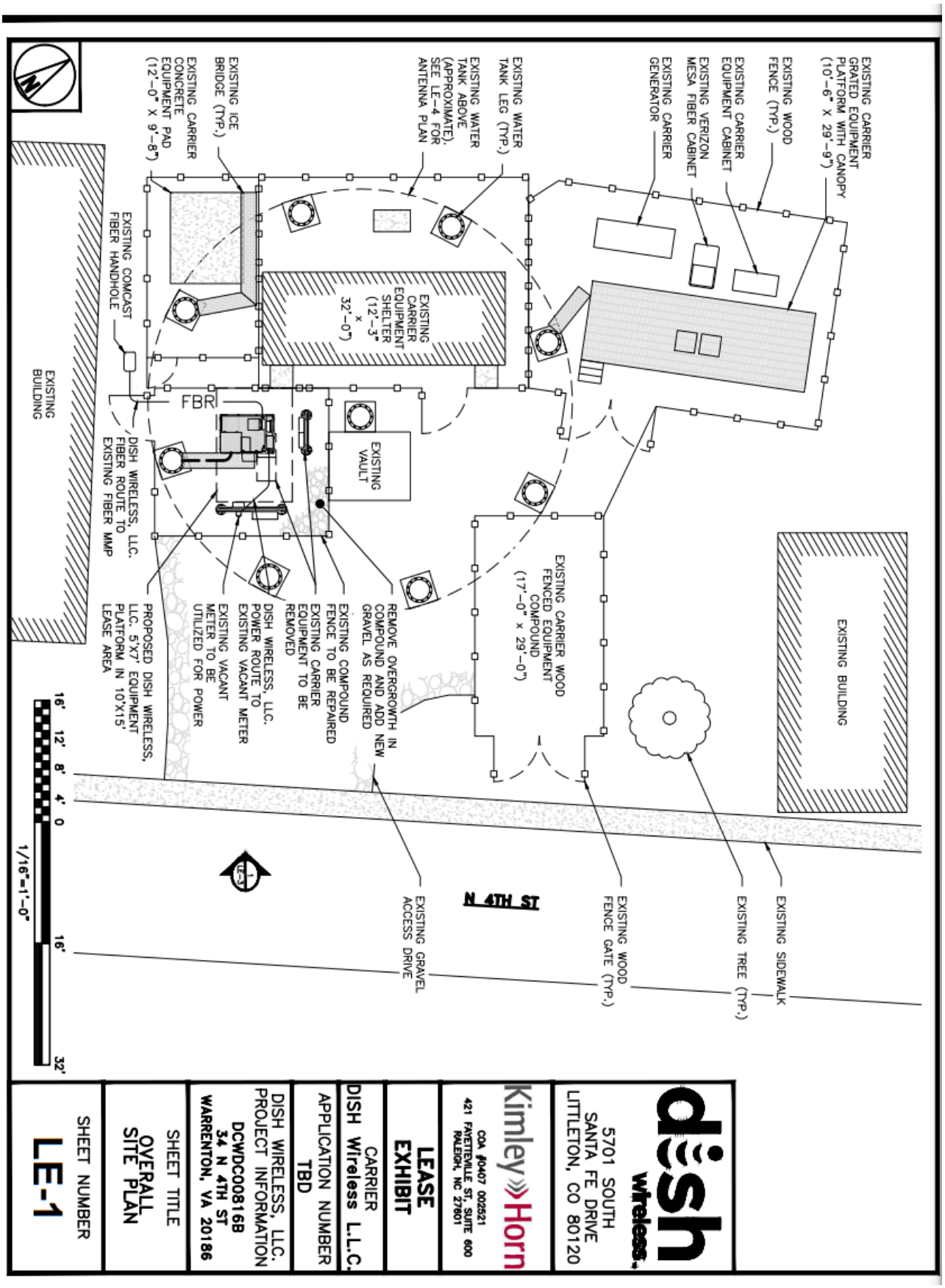
MX08FRO665-21

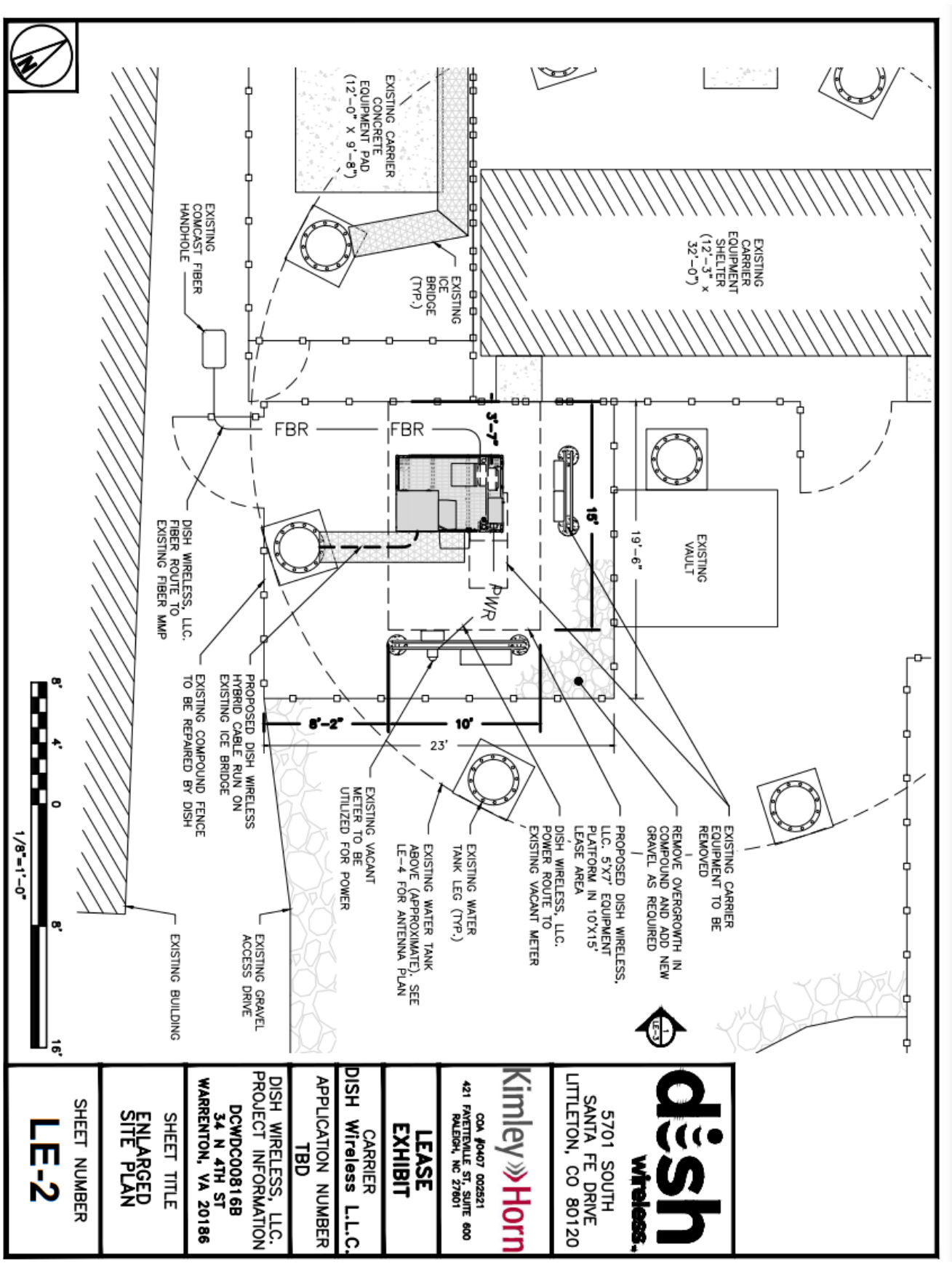
NWAV™ X-Pol 8-Port Antenna

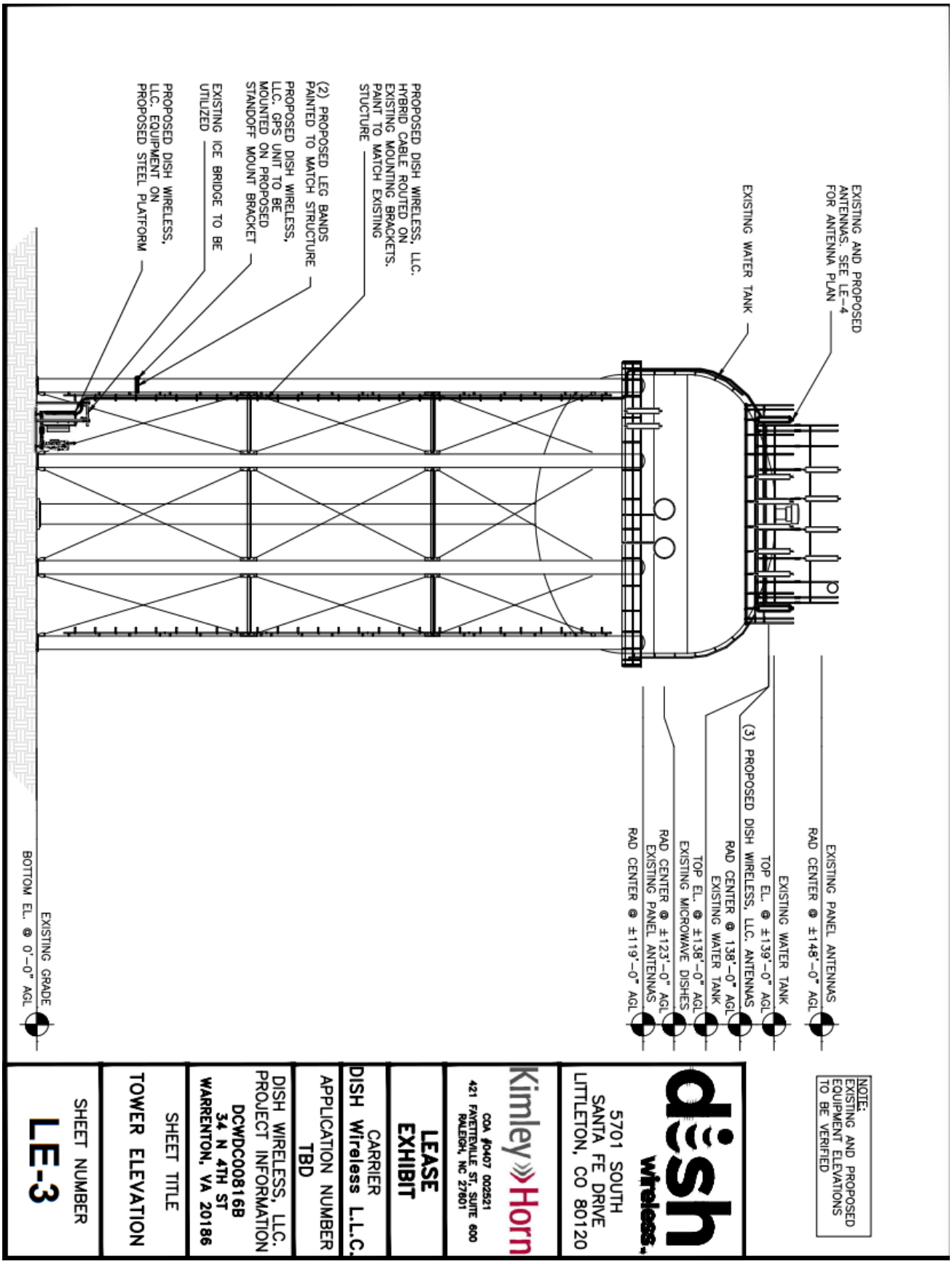
[2] Power rated up to +55 °C

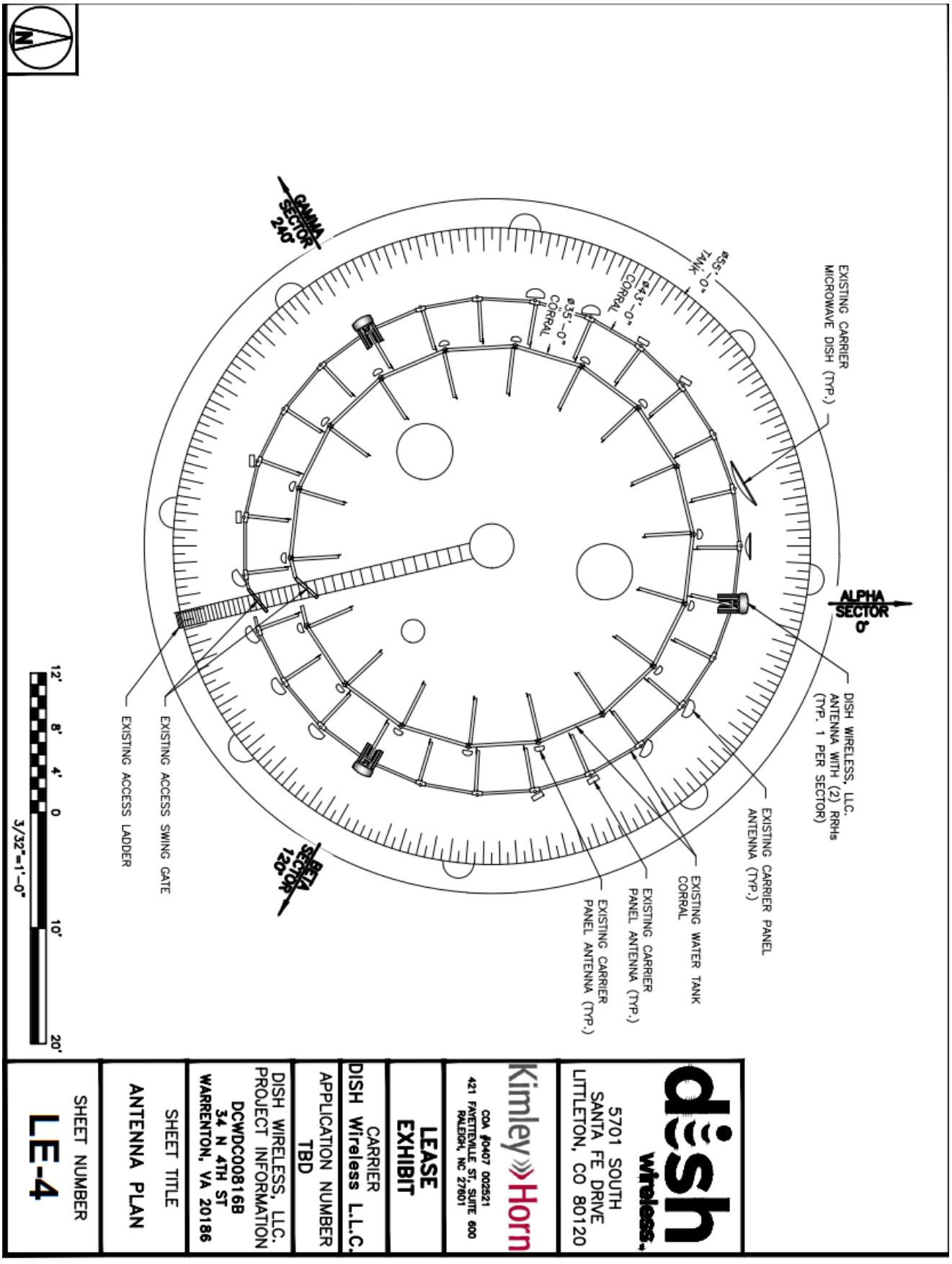
Electrical specification (minimum/maximum)	Ports 1, 2, 3, 4		Ports 5, 6, 7, 8		
Frequency bands, MHz	617-698	698-894	1695-1880	1850-1990	1920-2200
Average gain over all tilts, dBi (Gain Tolerance)	13.0±0.6	14.2±0.6	18.1±0.4	17.9±0.4	18.3±0.5
Horizontal beamwidth tolerance (HBW), degrees[1]	±5	±6.5	±5.0	±3.5	±3.5
Vertical beamwidth tolerance (VBW), degrees	±0.5	±0.5	±0.3	±0.3	±0.3
Front-to-back ratio, co-polar power @180°± 30°, dB	>27	>25	>25	>27	>26
X-Pol discrimination (CPR) at boresight, dB	>22	>20	20	>21	>22
First upper side lobe (USLS) suppression boresight to 20°, dB[1]	≤-16	≤-15	≤-16	≤-16	≤-16

Mechanical specifications	
Dimensions height/width/depth, inches (mm)	72.0/ 20.0/ 8.0 (1828.8/ 508.0/ 203.2)
Shipping dimensions length/width/height, inches (mm)	77.3/ 23.8/ 14.5 (1963.42/ 605/ 368)
No. of RF input ports, connector type, and location	8 x 4.3-10 female, bottom
RF connector torque	96 lbf·in (10.85 N·m or 8 lbf·ft)
Net antenna weight, lb (kg)	64.5 (29.3)
Shipping weight, lb (kg)	104 (47.2)
Antenna mounting and downtilt kit included with antenna	91900318
Net weight of the mounting and downtilt kit, lb (kg)	18 (8.2)
Range of mechanical up/down tilt	-2° to 12°
Rated wind survival speed, mph (km/h)	150 (241)
Frontal and lateral wind loading @ 150 km/h, lbf (N)	108.1 (480.9), 20.5 (91.2)
Effective projected area @ 150 km/h (EPA), frontal, sq ft	4.9


EXISTING CARRIER GRATED EQUIPMENT PLATFORM WITH CANOPY (10'-6" X 29'-9")
EXISTING WOOD FENCE (TYP.)
EXISTING CARRIER EQUIPMENT CABINET
EXISTING VERIZON MESA FIBER CABINET
EXISTING CARRIER GENERATOR
EXISTING WATER TANK LEG (TYP.)
EXISTING WATER TANK ABOVE (APPROXIMATE). SEE LE-4 FOR ANTENNA PLAN
EXISTING ICE BRIDGE (TYP.)
EXISTING CARRIER CONCRETE EQUIPMENT PAD (12'-0" X 9'-8")
EXISTING CARRIER EQUIPMENT SHELTER (12'-3" x 32'-0")
EXISTING COMCAST FIBER HANDHOLE
EXISTING BUILDING
FBR
EXISTING VAULT
DISH WIRELESS, LLC. FIBER ROUTE TO EXISTING FIBER MMP
PROPOSED DISH WIRELESS, LLC. 5'X7' EQUIPMENT PLATFORM IN 10'X15' LEASE AREA
DISH WIRELESS, LLC. POWER ROUTE TO EXISTING VACANT METER
EXISTING VACANT METER TO BE UTILIZED FOR POWER
EXISTING COMPOUND FENCE TO BE REPAIRED
EXISTING CARRIER EQUIPMENT TO BE REMOVED
REMOVE OVERGROWTH IN COMPOUND AND ADD NEW GRAVEL AS REQUIRED
EXISTING CARRIER WOOD FENCED EQUIPMENT COMPOUND (17'-0" x 29'-0")
EXISTING BUILDING
EXISTING SIDEWALK
EXISTING TREE (TYP.)
EXISTING WOOD FENCE GATE (TYP.)
EXISTING GRAVEL ACCESS DRIVE
N 4TH ST
16' 12' 8' 4' 0 16' 32'
1/16"=1'-0"
dish wireless.
5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120
Kimley»Horn
COA #0407 002521
421 FAYETTEVILLE ST, SUITE 600
RALEIGH, NC 27601
LEASE EXHIBIT
CARRIER
DISH Wireless L.L.C.
APPLICATION NUMBER
TBD
DISH WIRELESS, LLC.
PROJECT INFORMATION
DCWDC00816B
34 N 4TH ST
WARRENTON, VA 20186
SHEET TITLE
OVERALL SITE PLAN
SHEET NUMBER
LE-1


EXISTING CARRIER EQUIPMENT SHELTER (12'-3" x 32'-0")
EXISTING CARRIER CONCRETE EQUIPMENT PAD (12'-0" X 9'-8")
EXISTING ICE BRIDGE (TYP.)
EXISTING COMCAST FIBER HANDHOLE
FBR
FBR
3'-7"
15'
19'-6"
EXISTING VAULT
PWR
6'-2"
10'
23'
DISH WIRELESS, LLC. FIBER ROUTE TO EXISTING FIBER MMP
PROPOSED DISH WIRELESS HYBRID CABLE RUN ON EXISTING ICE BRIDGE
EXISTING COMPOUND FENCE TO BE REPAIRED BY DISH
EXISTING VACANT METER TO BE UTILIZED FOR POWER
EXISTING WATER TANK ABOVE (APPROXIMATE). SEE LE-4 FOR ANTENNA PLAN
EXISTING WATER TANK LEG (TYP.)
DISH WIRELESS, LLC. POWER ROUTE TO EXISTING VACANT METER
PROPOSED DISH WIRELESS, LLC. 5'X7' EQUIPMENT PLATFORM IN 10'X15' LEASE AREA
REMOVE OVERGROWTH IN COMPOUND AND ADD NEW GRAVEL AS REQUIRED
EXISTING CARRIER EQUIPMENT TO BE REMOVED
EXISTING GRAVEL ACCESS DRIVE
EXISTING BUILDING
8' 4' 0 8' 16'
1/8"=1'-0"
dish wireless.
5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120
Kimley»Horn
COA #0407 002521
421 FAYETTEVILLE ST, SUITE 600
RALEIGH, NC 27601
LEASE EXHIBIT
CARRIER
DISH Wireless L.L.C.
APPLICATION NUMBER
TBD
DISH WIRELESS, LLC.
PROJECT INFORMATION
DCWDC00816B
34 N 4TH ST
WARRENTON, VA 20186
SHEET TITLE
ENLARGED SITE PLAN
SHEET NUMBER
LE-2


EXISTING AND PROPOSED ANTENNAS, SEE LE-4 FOR ANTENNA PLAN
EXISTING WATER TANK
PROPOSED DISH WIRELESS, LLC. HYBRID CABLE ROUTED ON EXISTING MOUNTING BRACKETS. PAINT TO MATCH EXISTING STUCTURE
(2) PROPOSED LEG BANDS PAINTED TO MATCH STRUCTURE
PROPOSED DISH WIRELESS, LLC. GPS UNIT TO BE MOUNTED ON PROPOSED STANDOFF MOUNT BRACKET
EXISTING ICE BRIDGE TO BE UTILIZED
PROPOSED DISH WIRELESS, LLC. EQUIPMENT ON PROPOSED STEEL PLATFORM
EXISTING PANEL ANTENNAS
RAD CENTER @ ±148'-0" AGL
EXISTING WATER TANK
TOP EL. @ ±139'-0" AGL
(3) PROPOSED DISH WIRELESS, LLC. ANTENNAS
RAD CENTER @ 138'-0" AGL
EXISTING WATER TANK
TOP EL. @ ±138'-0" AGL
EXISTING MICROWAVE DISHES
RAD CENTER @ ±123'-0" AGL
EXISTING PANEL ANTENNAS
RAD CENTER @ ±119'-0" AGL
EXISTING GRADE
BOTTOM EL. @ 0'-0" AGL
NOTE: EXISTING AND PROPOSED EQUIPMENT ELEVATIONS TO BE VERIFIED
dish wireless.
5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120
Kimley»Horn
COA #C0407 002521
421 FAYETTEVILLE ST, SUITE 600
RALEIGH, NC 27601
LEASE EXHIBIT
CARRIER
DISH Wireless L.L.C.
APPLICATION NUMBER
TBD
DISH WIRELESS, LLC.
PROJECT INFORMATION
DCWDC00816B
34 N 4TH ST
WARRENTON, VA 20186
SHEET TITLE
TOWER ELEVATION
SHEET NUMBER
LE-3


EXISTING CARRIER MICROWAVE DISH (TYP.)
DISH WIRELESS, LLC. ANTENNA WITH (2) RRHs (TYP. 1 PER SECTOR)
EXISTING CARRIER PANEL ANTENNA (TYP.)
EXISTING WATER TANK CORRAL
EXISTING CARRIER PANEL ANTENNA (TYP.)
EXISTING CARRIER PANEL ANTENNA (TYP.)
ALPHA SECTOR 0°
BETA SECTOR 120°
GAMMA SECTOR 240°
Ø55'-0" TANK
Ø47'-0" CORRAL
Ø35'-0" CORRAL
EXISTING ACCESS SWING GATE
EXISTING ACCESS LADDER
12' 8' 4' 0 10' 20'
3/32"=1'-0"
dish wireless.
5701 SOUTH SANTA FE DRIVE
LITTLETON, CO 80120
Kimley»Horn
COA #0407 002521
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LEASE EXHIBIT
CARRIER
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APPLICATION NUMBER
TBD
DISH WIRELESS, LLC.
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DCWDC00816B
34 N 4TH ST
WARRENTON, VA 20186
SHEET TITLE
ANTENNA PLAN
SHEET NUMBER
LE-4

Attachment A – Photos and Plans