NETWORK TOWERS

Equipment, Tools and Task List for Installation	
Check	**Tower:**
	Campbell Scientific equipment order list – all parts
	Welded 4 ft rebar stakes for guy wires (x 3) **See supplemental info**
	Welded 4 ft rebar stakes for tower base plate (x4) - **See supplemental info**
	Flexible aluminium conduit for lower anemometer (3/8" inch couduit x 8 ft length)
	T-post for rain gauge (6 ft)
	T-post for solar panel (spare) (6 ft)
	Support for Rain Gauge wire (5.5 ft) and Sensit wire (3.5 ft) of 1/2" conduit
	Wire to hold rain guage and sensit sensor wires to conduit
	Conduit for rain gauge mounting on T-post (3 x 1 ft lengths of ½ inch)
	1-1/16" to 2" Hose clamps for rain gauge to T-post mounting (x2)
	Spare Bolts, washers, lock washers and hex nuts for tower/ base plate mounting (3/8" Hex Nut, 3/8" Flat Washer, 3/8" x 2-1/2" Bolt- Base Plate, 3/8" x 2" Bolt-Tower)
	Check enclosure pack came with 4 "U" bolts to fasten enclosure to tower
	Check enclosure pack came with two 1-1/2" x 1/2" reducers (Campbell has only been sending 1 with the enclosure pack). Contact them and they will send another.
	Hose clamps for sensor wires to mast and crossarms (x40) [1-1/16" to 2" size]
	Hose clamps for sensit ((x 2) 1-13/16" to 2-3/4", (x 2) 1/2" to 1-1/8")
	1-13/16" to 2-3/4" hose clamps for tower (x 10)
	Sensit Mount (**see supplemental info**)
	Camera
	Camera Enclosure w/ Bracket, (x 3) 1-1/16"-2" Hose Clamps
	Camera Batteries w/charger
	Camera Lock- Python Master Lock with 3/8" x 6' Cable
	Lock for Enclosure
	Shackels (1/2" x 3) to attach guy tensioners to stakes (easy to detach guys from stakes)
	MWACs:
	MWAC fins (x27)
	MWAC conduit – 6ft lengths (x27)
	Conduit connectors (x27)
	Flat Washers (3/4" SAE x 27, 7/8" x 27)
	MWAC bottles (x108 + replacement set x108)
	Pin Flags (x27)
	Scrap wood for hammering in MWAC masts (Prevent damange)

Equipment, Tools for Concreting	
Check	**Tower:**
	Cement (depends on foundation size and fence posts holes)Quickcrete Quantity Caluclator
	Spirit levels (x2)
	Frame/ Jig for mounting tower base plate in cement
	Wire to fasten baseplate to jig (flexible aluminum wire)
	Water tank (enough for cement and cleanup)
	Shovels and Sharpe shooter

	Cement Trowels for working cement
	Cement mixer
	2" x 12" x 3' Pieces of wood (x 2) to prevent collapse of foundation hole edges when dumping concrete
	Wheel barrows (x2)

Equipment, Tools and Task List for Installation	
Check	**Tools**
	Drill, spare battery and bit set
	Hack saw
	T-post driver and T-post puller
	Rubber mallet
	Mini Sledge Hammer
	Sledge Hammer
	Wrench set and ratchet wrench [sizes 3/8", 7/16", 1/2", 9/16"]
	Socket set
	5/16” driver for hose clamps
	Phillips screw drivers
	Flat head screw drivers
	Crescent/adjustable wrench
	Pipe cutter + spare blade
	Needle nose pliers (x2)
	Fencing pliers (x2)
	Diagonal pliers
	Lineman's Pliers
	Vice grips (x2)
	Wire cutters
	Electrical wire cutters/strippers
	Post level (spirit level)
	Standard (spirit) level (3')
	Campbell wiring screw drivers – Phillips and flat head
	Utility knife
	Tape measure – 8 m
	Marker pens
	Gloves
	Loppers
	Shovels (x2)
	Sharp Shooter
	Wheel Barrows (x 1-2)
	5 Gal. Buckets (x 2)
	Mechanics magnet
	File - for deburring tower hardware and inside vertical sections
	Duct tape
	Electrical tape
	Cable ties
	Lubricant (WD40 or similar)

	Channel Locks
	Other Tools
	GPS – Trimble with MWAC positions and data tables for recording
	Compass
	Site map with MWACs labelled
	Wiring diagram
	Laptop computer
	USB-Serial cable with driver installed on computer
	Data logger program

Equipment, Tools and Task List for Installation	
Check	**Fence Construction Tools (If Needed)**
	Barb Wire (Heavy Duty)
	Smooth Wire (Heavy Duty) Misc Use
	T-Posts
	Pipes for Corners
	Corner Caps
	Concrete
	Fencing clips
	Fencing Pliers
	Fence stretcher or come along
	Fence Stays
	Wire Grip with chain and caribeaner
	5' Rebar for Gate

Equipment, Tools and Task List for Installation	
Check	**Task List – Preparation**
	Install washers on base plate before concreting
	All Campbell sensors tested and wires labelled
	Cross-arms assembled and hex nuts fixed with tape (for transport)
	U bolts and hose clamps tested for size on the tower
	Guy Wire Stakes welded
	Guy Wires cut to length and crimpped with hardware
	Tower base plate stakes welded (see supplemental info)
	Tower base plate bolts tested for fit
	Tower assembled and adjusted to fit (filing and drilling may be required)
	Heights for sensors marked onto tower **with base plate attached**
	Lower anemometer wire threaded through flexible aluminum conduit
	Using a file, grind off inner lip of enclosure reducer plug so that antenna wire fitting will slide through
	½" conduit for rain gauge and sensit wires cut to size
	Adjust angle of solar panel based on site location (Refer to solar panel manual)
	MWAC fins stamped with marker labels
	Site layout established in ArcGIS and loaded into Trimble
	Data tables established and loaded into Trimble

	Logger program and wiring prepared
	Verizon Modem Activated and provisioned
	Site location to establish equipment layout
	Mounting tower base – cement or pegs only
Field potocols and data sheets	
Check	**Task List – Preparation**
	MWAC data recording sheet
	Management record recording sheet
	Soil survey sampling locations in GPS
	LPI data recording sheets (x3 per survey)
	Gap and height recording sheets
	DIMA database set up for site
	Overview of DIMA data entry and data sending protocol
	Protocol for servicing time-lapse camera

Field site survey equipment	
Check	**Equipment List**
	GPS for transect positioning
	Compass
	3 x 100 m field tapes
	PVC Stringing Pole
	Vegetation height stick
	LPI Pins
	Rebar stakes for marking transect end points (for rangeland sites)
	Field data recording sheets
	Tablet with DIMA (battery and charger) or Data Sheets w/ Clipboards
	Camera for transect photos
	Dry Erase Board/Photo Board with marker for transect end photos
	Pole for transect ends
	Chain Pins (10)
	Ruler for veg heights
	Tape measure for soil ridge roughness height/spacing measurement
	Soil Scoop (x2)
	Paper Bags
	Gallon Ziplock Bags
	USDA Plant List for survery location/ state

Manuals and software	
Check	**Manual List**
	LoggerNet software (Campbell Scientific)

	Ace Manager software Installed https://www.campbellsci.com/19_1_768
	Cellular Modem (Raven XTV) activated on Verizon network (instructions/details in manual?)
	Raven XTV CDMA Sierra Wireless Celluar Modem Manual https://s.campbellsci.com/documents/us/manuals/ravenxtv.pdf
	Raven CDMA **PPP** Template 115200: https://www.campbellsci.com/downloads?sb=raven&c=9999
	Tower Manual: https://s.campbellsci.com/documents/us/manuals/ut30.pdf
	Wind Erosion Network manual