

<i>Title:</i> D14 FIU Site Characterization: Summary	<i>Author:</i> Luo/Ayres/Loescher	<i>Date:</i> 09/23/2011
<i>NEON Doc. #:</i> NEON.DOC.011048		<i>Revision:</i> C

D14 FIU SITE CHARACTERIZATION: SUMMARY

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See Configuration Management System for approval history.

<i>Title:</i> D14 FIU Site Characterization: Summary	<i>Author:</i> Luo/Ayres/Loescher	<i>Date:</i> 09/23/2011
<i>NEON Doc. #:</i> NEON.DOC.011048		<i>Revision:</i> C

Change Record

REVISION	DATE	ECO #	DESCRIPTION OF CHANGE
A	10/25/2010	NEON.FIU.000259.CRE	Initial Release
B	10/12/2010	NEON.FIU.000278.CRE	UPDATES SEE CRE
C	09/23/2011	ECO-00279	Update to new document number's/template throughout document

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

TABLE OF CONTENTS

1 DESCRIPTION..... 3

 1.1 Purpose 3

 1.2 Scope..... 3

2 RELATED DOCUMENTS AND ACRONYMS..... 4

 2.1 Applicable Documents 4

 2.2 Reference Documents..... 4

 2.3 Acronyms 4

 2.4 Verb Convention 4

3 SANTA RITA EXPERIMENTAL RANGE (SRER) ADVANCE TOWER SITE..... 5

 3.1 Desired ecosystem 5

 3.2 Site Design and Tower Attributes 5

 3.3 Soil Attributes 8

 3.4 Information for ecosystem productivity plots. 9

 3.5 Issues and attentions 9

4 JORNADA, RELOCATABLE TOWER 1 11

 4.1 Desired ecosystem 11

 4.2 Site Design and Tower Attributes 11

 4.3 Soil Attributes 14

 4.4 Information for ecosystem productivity plots. 15

 4.5 Issues and attentions 15

5 PHOENIX/CAP LTER, RELOCATEABLE TOWER 2 16

6 APPENDIX A. FCC SUMMARY TABLES..... 24

LIST OF TABLES

Table 1. Ecosystem at Santa Rita Advanced tower site..... 5

Table 2. Ecosystem and site attributes for Santa Rita Advanced tower site..... 5

Table 3. Site design and tower attributes for Santa Rita Advanced site. 5

Table 4. Summary of soil array and soil pit information at Santa Rita. 0° represents true north and accounts for declination. 9

Table 5. Ecosystem at Jornada tower site. 11

Table 6. Ecosystem and site attributes for Jornada Relocatable site..... 11

Table 7. Site design and tower attributes for Jornada site..... 11

Table 8. Summary of soil array and soil pit information at Jornada. 0° represents true north and accounts for declination..... 15

<i>Title:</i> D14 FIU Site Characterization: Summary	<i>Author:</i> Luo/Ayres/Loescher	<i>Date:</i> 09/23/2011
<i>NEON Doc. #:</i> NEON.DOC.011048		<i>Revision:</i> C

Table 9. FCC Summary Table for FIU site components at D14 Santa Rita Core Site 24
Table 10. FCC Summary Table for FIU site components at D14 Jornada Relocatable site 1 26

LIST OF FIGURES

Figure 1. Generic diagram to demonstration the relationship between tower and instrument hut when boom facing west and instrument hut on the North towards the tower..... 7
Figure 2. Site layout for Santa Rita tower site. 8
Figure 3. Generic diagram to demonstration the relationship between tower and instrument hut when boom facing south and instrument hut on the north towards the tower..... 13
Figure 4. Site layout for Jornada Relocatable site. 14
Figure 5. Generic patterns for the boardwalk configuration..... 21
Figure 6. Conceptual diagram of Soil Array Patterns..... 23

<i>Title:</i> D14 FIU Site Characterization: Summary	<i>Author:</i> Luo/Ayres/Loescher	<i>Date:</i> 09/23/2011
<i>NEON Doc. #:</i> NEON.DOC.011048		<i>Revision:</i> C

1 DESCRIPTION

1.1 Purpose

The data summarized here is used to inform the site design activities for NEON project Teams, EHS (permitting), FCC, ENG and FSU. This document summarizes the FIU site characterization data collected, analyzed, and described in the FIU D14 Site Characterization: Supporting Data (AD[01]).

1.2 Scope

This document summarizes the FIU site characterization data for two D14 tower locations: Santa Rita site (Advanced) and Jornada (Relocatable 1). At the time of writing the Phoenix/CAP LTER site (Relocatable 2) was considered a soft site and is not included in this report. Issues and concerns for each site that need attention are also addressed in this document according to our best knowledge.

Disclaimer: all latitude and longitude points are subject to the tolerances of our measurement system, i.e., GPS

<i>Title:</i> D14 FIU Site Characterization: Summary	<i>Author:</i> Luo/Ayres/Loescher	<i>Date:</i> 09/23/2011
<i>NEON Doc. #:</i> NEON.DOC.011048		<i>Revision:</i> C

2 RELATED DOCUMENTS AND ACRONYMS

2.1 Applicable Documents

AD[01]	NEON.DOC.011047 _ FIU D14 Site Characterization Supporting Data.docx
AD[02]	NEON.DOC.011018 _ WID between FIU and FCC
AD[03]	NEON.DOC.011008 _ FIU Tower Science Requirements
AD[04]	NEON.DOC.011029 _ FIU Precipitation Collector Site Design Requirements

2.2 Reference Documents

RD[01]	NEON.DOC.000008	NEON Acronym List
RD[02]	NEON.DOC.000243	NEON Glossary of Terms
RD[03]		
RD[04]		

2.3 Acronyms

m.a.s.l.	Meters above sea level
m.a.g.l.	Meters above ground level

2.4 Verb Convention

"Shall" is used whenever a specification expresses a provision that is binding. The verbs "should" and "may" express non-mandatory provisions. "Will" is used to express a declaration of purpose on the part of the design activity.

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

3 SANTA RITA EXPERIMENTAL RANGE (SRER) ADVANCE TOWER SITE

3.1 Desired ecosystem

Table 1. Ecosystem at Santa Rita Advanced tower site.

Ecosystem Type	Management activity
Desert shrubland dominated by Creosote bush	None, natural ecosystem

Since at least 1904, Creosote bush (*Larrea*) has been the dominant species near the very northern boundary of the SRER. Total canopy cover at the Santa Rita Creosote tower site, which is similar to the NEON site, is 24% (14% *Larrea* and the other 10% a combination of annual grasses, annual herbaceous species, and cacti). Soil crusts are also prevalent throughout the site. The height of the average *Larrea* is 1.7 m, with an average of 24 stems about 10 mm in diameter.

Table 2. Ecosystem and site attributes for Santa Rita Advanced tower site.

Ecosystem attributes	Measure and units
Mean canopy height	2 m
Surface roughness ^a	0.4 m
Zero place displacement height ^a	1.5 m
Structural elements	Open shrubland, uniform
Time zone	Mountain time
Magnetic declination	10° 26' E changing by 0° 6' W/year

Note, ^a From field observation.

3.2 Site Design and Tower Attributes

The site layout is summarized in the table below. Assume the projected area of the tower is square. **Anemometer/temperature boom arm direction** is *from* the tower *toward* the prevailing wind direction or designated orientation. **Instrument hut orientation vector** is parallel to the long side of the instrument hut. **Instrument hut distance z** is the distance from the center of tower projection to the center of the instrument hut projection on the ground. The numbering of the **measurement levels** is that the lowest is level one, and each subsequent increase in height is numbered sequentially.

Table 3. Site design and tower attributes for Santa Rita Advanced site.

0° is true north with declination accounted for. Color of Instrument hut exterior shall be tan to best match the surrounding environment.

Attribute	lat	long	degree	meters	notes
Airshed area			110° to 135° (major), 200° to 270° (secondary)		Clockwise from first angle

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

Tower location	31.91068, -110.83549	--	--	same site, new coordinates
Instrument hut	31.91082°, -110.83543°			
Instrument hut orientation vector	--	--	120° - 300°	
Instrument hut distance z	--	--	--	18
Anemometer/Temperature boom orientation	--	--	200°	--
DFIR	31.91107, -110.83500			
Height of the measurement levels				
Level 1			0.25	m.a.g.l.
Level 2			1.8	m.a.g.l.
Level 3			4.0	m.a.g.l.
Level 4			8.0	m.a.g.l.
Tower Height			8.0	m.a.g.l.

See AD 03 for technical requirement to determine the boom height for the bottom most measurement level.

Eddy covariance, sonic wind and air temperature **boom arms** orientation toward the SW will be best to capture signals from all major wind directions. **Radiation boom arms** should always be facing south to avoid any shadowing effects from the tower structure.

DFIR (Double Fenced International Reference) will be used for bulk precipitation collection. Coordinates are 31.91107, -110.83500, which is ~65 m on north east to tower and outside the major and secondary airshed. **Wet deposition collector** will collocate at the top of the tower. See AD 04 for further information and requirements for bulk precipitation collection and wet deposition collection.

Boardwalks. Ultimately, the decision to use a boardwalk will be, in part, based on owner’s preferences. There are strong science requirements that minimize site disturbance to the surrounding area, which will be difficult to manage over a 30-y period. Traffic control is key to minimizing the site disturbance. Confining foot traffic to boardwalks minimizes site impact; this is particularly true in places where wear caused by foot traffic becomes noticeable and grows. For example, in places with snow part of the year, worn footpaths tend to have low places that collect water, or places where the snow pack becomes uneven causing personnel to walk farther and farther around the sides of the original path, causing the path to grow in width. This is a very common phenomenon. Here, FIU assumes that all conduits will be either buried, or placed inside the boardwalk such that it does not extend beyond the 36” (0.914 m). wide footprint. The boardwalk to access the tower is not on any side that has a boom.

Specific Boardwalks at this site:

- All walkways in this Location shall be gravel, same width as standard boardwalk. This is because boardwalks cause enhanced risk to technicians because they create safe haven for rattlesnakes.
- Gravel walkway is from the access dirt road to instrument hut, pending landowner decision
- Gravel walkway from the instrument hut to the tower to intersect on north face of the tower
- Gravel walkway to soil array.
- No Gravel walkway from the soil array gravel walkway to the individual soil plots

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

- Gravel walkway needed at DFIR site

The relative locations between tower, instrument hut and boardwalk can be found in the Figure below:

**Option 7, anemometer boom facing (generic) West
with Instrument Hut towards the North**

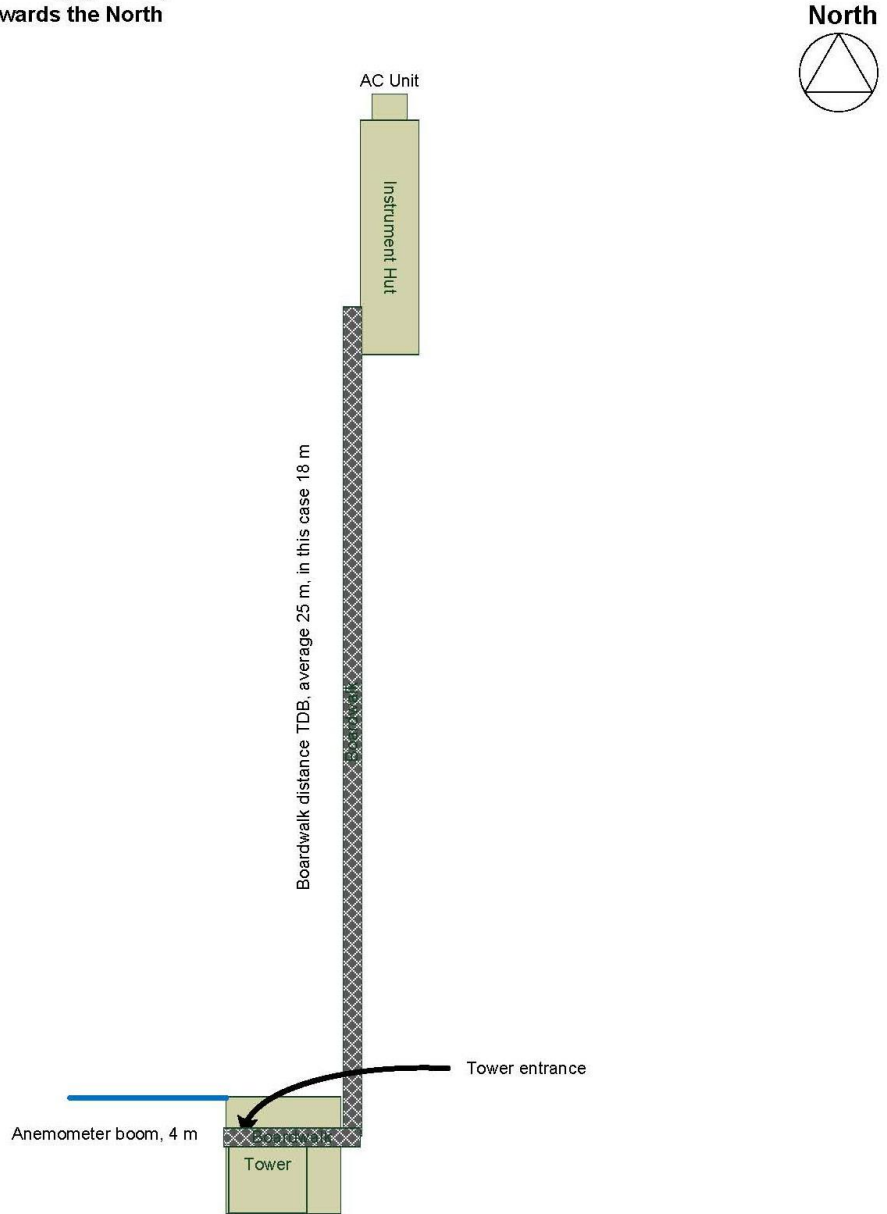


Figure 1. Generic diagram to demonstration the relationship between tower and instrument hut when boom facing west and instrument hut on the North towards the tower.

This is just a generic diagram. The actual layout of boardwalk (or path if no boardwalk required) and instrument hut position will be the joint responsibility of FCC and FIU. At this site, the boom angle will

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

be 200 degrees, instrument hut will be on the northeast towards the tower, the distance between instrument hut and tower is ~18 m. The instrument hut vector will be SE-NW (120° - 300°, longwise).

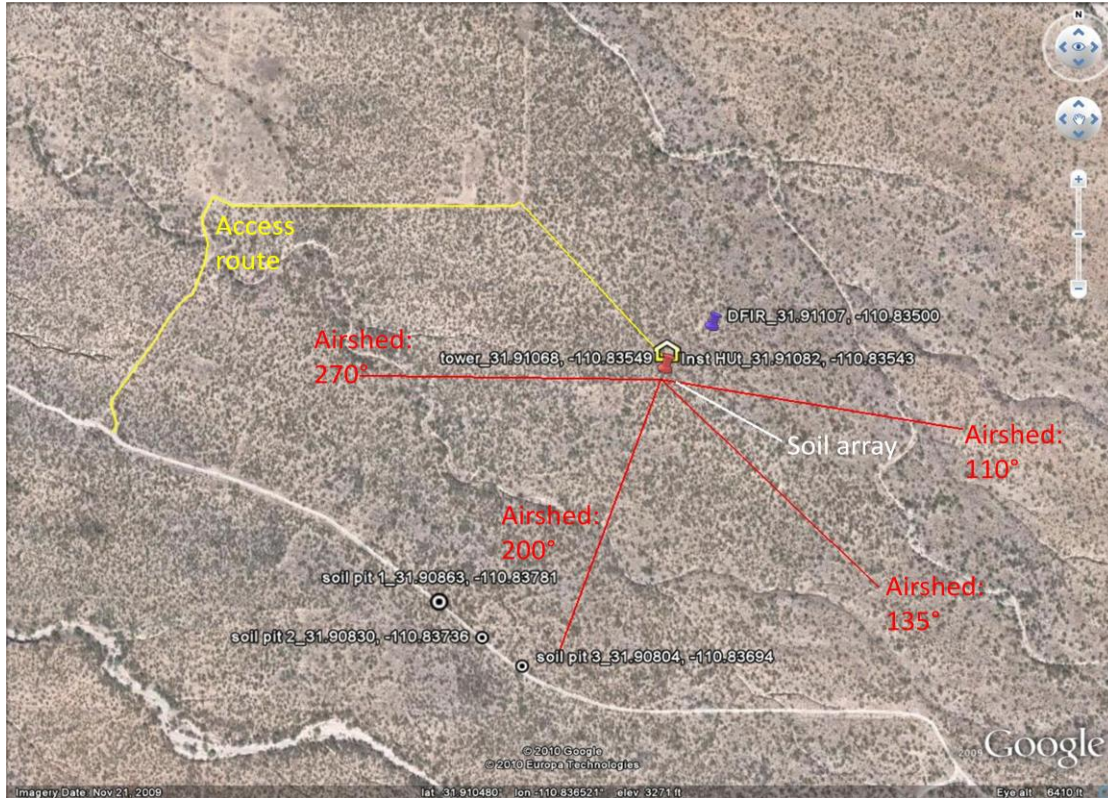


Figure 2. Site layout for Santa Rita tower site.

i) Tower location is presented (red pin), ii) red lines indicate the airshed boundaries. Vectors from 110° to 135° (major airshed, clockwise from 110°) and from 200° to 270° (secondary airshed, clockwise from 200°) are the airshed areas that would have quality wind data without causing flow distortions, respectively. iii) Yellow line is the suggested access road to instrument hut. iv) Purple pin is the DFIR location.

3.3 Soil Attributes

The soil array vector is *from* the soil plot closest to the tower *toward* the farthest soil plot. The exact location of each soil plot will be chosen by an FIU team member during site construction to avoid placing a soil plot at an unrepresentative location (e.g., rock outcrop, drainage channel, large tree, etc).

Dominant soil series at the site: Anthony soils, very gravelly variants. The taxonomy of this soil is shown below:

Order: Entisols

Suborder: Fluvents

Great group: Torrifuvents

Subgroup: Typic Torrifuvents

Family: Coarse-loamy, mixed, superactive, calcareous, thermic Typic Torrifuvents

Series: Anthony soils, very gravelly variants

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

Table 4. Summary of soil array and soil pit information at Santa Rita. 0° represents true north and accounts for declination.

Soil plot dimensions	5 m x 5 m
Soil array pattern	B
Distance between soil plots: x	25 m
Distance from tower to closest soil plot: y	16 m
Latitude and longitude of 1 st soil plot OR direction from tower	31.91065°, -110.83533°
Direction of soil array	120°
Latitude and longitude of FIU soil pit 1	31.90863, -110.83781 (primary location)
Latitude and longitude of FIU soil pit 2	31.90830, -110.83736 (alternate 1)
Latitude and longitude of FIU soil pit 3	31.90804, -110.83694 (alternate 2)
Dominant soil type	Anthony soils, very gravelly variants
Expected soil depth	>2 m
Depth to water table	>2 m

Expected depth of soil horizons	Expected measurement depths*
0-0.05 m (Gravelly sandy loam)	0.03 m
0.05-0.41 m (Fine sandy loam)	0.23 m
0.41-1.52 m (Very gravelly fine sandy loam)	0.97 m

* Actual soil measurement depths will be determined based on measured soil horizon depths at the NEON FIU soil pit and may differ substantially from those shown here.

3.4 Information for ecosystem productivity plots.

The tower at Santa Rita Advanced site has been positioned to optimize the collection of the air/wind signals both temporally and spatially over the desired ecosystem (Creosote shrubland). Tower airshed areas are from 110° to 135° (major airshed, clockwise from 110°) and from 200° to 270° (secondary airshed, clockwise from 200°) throughout the year, and 90% signals for flux measurements are in a distance of 500 m from tower, and 80% within 400 m. We suggest FSU Ecosystem Productivity plots be placed within the boundaries of 110° to 135° (major airshed, clockwise from 110°) and 200° to 270° (secondary airshed, clockwise from 200°) from tower.

3.5 Issues and attentions

Santa Rita core site was originally chosen by Drs. H. Loescher and M. Keller with the strong support of the Domain scientists. To avoid the errors induced from the conversion from the northing and easting coordinates to decimal degrees, FIU team found the tower location marker (a pile of rocks) and retook the GPS reading. The coordinates change from 31.91071502, -110.8354889 to 31.91068, -110.83549.

An existing AmeriFlux tower located on the SE from NEON tower site is ~460 m away, which is outside 80% flux fetch area of NEON tower, thus not a concern. Rodents chewing wires is common at this site. All cables and wires need good protection. There are no regulations about boardwalk at this site,

<i>Title:</i> D14 FIU Site Characterization: Summary	<i>Author:</i> Luo/Ayres/Loescher	<i>Date:</i> 09/23/2011
<i>NEON Doc. #:</i> NEON.DOC.011048		<i>Revision:</i> C

preference is gravel walkway. Local contacts worry that boardwalk may provide shady spots for rattle snakes, thus may induce more risks for field crew, and suggest no boardwalk at this site, or if boardwalk is applied here, it should be on ground level. Dirt road around the tower site can be accessed by public. Vandalism, security and shooting targets are concerns if tower and instrument hut can be seen from road. Access road should be gated and locked.

A comb with dense teeth was suggested by local contacts as the best safety tool to pull out the fragile cactus spines.

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

4 JORNADA, RELOCATABLE TOWER 1

4.1 Desired ecosystem

Table 5. Ecosystem at Jornada tower site.

Ecosystem Type	Management activity
Desert grassland	Grazing

The site is a desert grassland, which was typical of the region prior to extensive shrub invasion, primarily creosotebush (*Larrea tridentata*) and honey mesquite (*Prosopis glandulosa*). Dominant plants are black grama grass (mean height ~ 40 cm), mixed with Mesquite shrub (mean height ~ 1.3 m) and Yucca (mean height ~ 2 m). Although grass is the dominant plant type at this site, Yucca and Mesquite shrub have large influence on the surface roughness with regard to aerodynamics at this site. Therefore, yucca canopy height will be used when designing the tower at this site.

Table 6. Ecosystem and site attributes for Jornada Relocatable site.

Ecosystem attributes	Measure and units
Grass Mean canopy height	0.4 m
Grass Surface roughness ^a	0.06 m
Grass Zero place displacement height ^a	0.2 m
Yucca Mean canopy height ^b	2.0 m
Structural elements	Desert grassland, open, homogenous
Time zone	Mountain time
Magnetic declination	9° 7' E changing by 0° 6' W/year

Note,

^a From field survey.

^b Although grass is the dominant ecosystem type at this site, Yucca and Mesquite shrub have large influence on the surface roughness with regarding to aerodynamics at this site. Therefore, yucca canopy height will be used when design the tower at this site.

4.2 Site Design and Tower Attributes

The site layout is summarized in the table below. Assume the projected area of the tower is square. **Anemometer/temperature boom arm direction** is *from* the tower *toward* the prevailing wind direction or designated orientation. **Instrument hut orientation vector** is parallel to the long side of the instrument hut. **Instrument hut distance z** is the distance from the center of tower projection to the center of the instrument hut projection on the ground. The numbering of the **measurement levels** is that the lowest is level one, and each subsequent increase in height is numbered sequentially.

Table 7. Site design and tower attributes for Jornada site

0° is true north with declination accounted for. Color of Instrument hut exterior shall be tan to best match the surrounding environment.

Attribute	lat	long	degree	meters	notes
Airshed			110° to 280°		Clockwise from first

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

			(major) and 310° to 10°		angle
Tower location	32.59068,	-106.84254	--	--	Same site, new coordinates
Instrument hut	32.59075,	-106.84275			
Instrument hut orientation vector	--	--	40°-220°		
Instrument hut distance z	--	--	--	20	
Anemometer/Temperature boom orientation	--	--	220°	--	
Height of the measurement levels					
Level 1				0.2	m.a.g.l.
Level 2				1.3	m.a.g.l.
Level 3				4.0	m.a.g.l.
Level 4				8.0	m.a.g.l.
Tower Height				8.0	m.a.g.l.

See AD 03 for technical requirement to determine the boom height for the bottom most measurement level.

Eddy covariance, sonic wind and air temperature **boom arms** orientation toward the southwest will be best to capture signals from all major wind directions. **Radiation boom arms** should always be facing south to avoid any shadowing effects from the tower structure.

Boardwalks. Ultimately, the decision to use a boardwalk will be, in part, based on owner's preferences. There are strong science requirements that minimize site disturbance to the surrounding area, which will be difficult to manage over a 30-y period. Traffic control is key to minimizing the site disturbance. Confining foot traffic to boardwalks minimizes site impact; this is particularly true in places where wear caused by foot traffic becomes noticeable and grows. For example, in places with snow part of the year, worn footpaths tend to have low places that collect water, or places where the snow pack becomes uneven causing personnel to walk farther and farther around the sides of the original path, causing the path to grow in width. This is a very common phenomenon. Here FIU assumes that all conduits will be either buried, or placed inside the boardwalk such that it does not extend beyond the 36' wide footprint. While the final design is not yet known, there are some general criteria that can be outlined. We assume that the boardwalk width is 36" (0.914 m). Material is not known, but must be fire proof, and in some locations the site is seasonally flooded and inundated with water. Boardwalks may also provide a scratching structure for grazing animals that in turn, would wear and unduly impact the site. Site by site evaluations must be done.

Specific boardwalks at the Jornada site

- All walkways in this Location shall be gravel, same width as standard boardwalk. This is because boardwalks cause enhanced risk to technicians because they create safe haven for rattlesnakes.
- Gravel walkway is from the access dirt road to instrument hut, pending landowner decision
- Gravel walkway from the instrument hut to the tower to intersect on north face of the tower
- Gravel walkway to soil array.
- No Gravel walkway from the soil array gravel walkway to the individual soil plots

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

The relative locations between tower, instrument hut and boardwalk can be found in the diagram below:

Option 8, anemometer boom facing (generic) South
with Instrument Hut towards the North

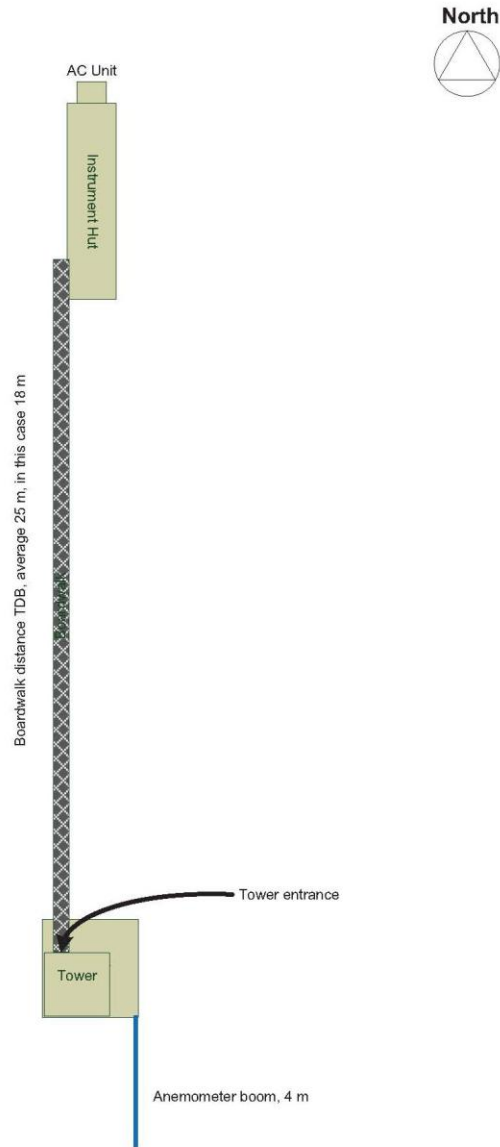


Figure 3. Generic diagram to demonstration the relationship between tower and instrument hut when boom facing south and instrument hut on the north towards the tower.

This is just a generic diagram. The actual design of boardwalk (or path if no boardwalk required) and instrument hut position will be the responsibility of FCC following FIU's guidelines. At this site, the boom angle will be 220°. Instrument hut will be on the northwest towards the tower, boardwalk or walking path may need a dogleg to access tower on north (pending Site Plan Review). The distance between instrument hut and tower is ~20 m. The instrument hut vector will be NE-SW (40°-220°).

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

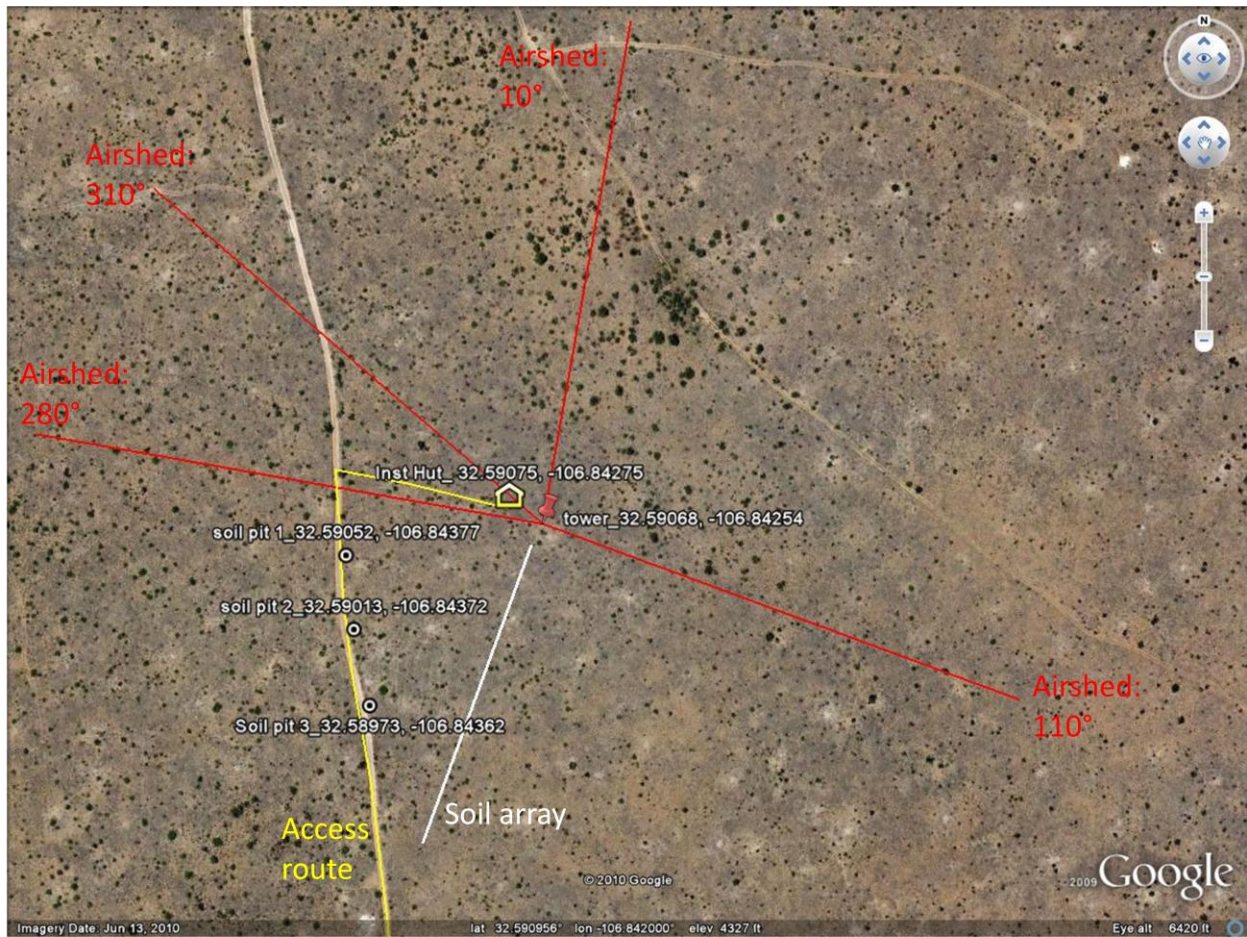


Figure 4. Site layout for Jornada Relocatable site.

i) new tower location is presented (red pin), ii) red lines indicate the airshed boundaries. Vectors 110° to 280° (clockwise from 110°, major airshed) and from 310° to 10° (clockwise from 310°, secondary airshed) that would have quality wind data without causing flow distortions, respectively. iii) Yellow line is the suggested access road to instrument hut.

4.3 Soil Attributes

The soil array vector is **from** the soil plot closest to the tower **toward** the farthest soil plot. The exact location of each soil plot will be chosen by an FIU team member during site construction to avoid placing a soil plot at an unrepresentative location (e.g., rock outcrop, drainage channel, large tree, etc).

Dominant soil series at the site: Onite-Pajarito association. The taxonomy of this soil is shown below:

Order: Aridisols

Suborder: Argids-Cambids

Great group: Calciargids-Haplocambids

Subgroup: Typic Calciargids-Typic Haplocambids

Family: Coarse-loamy, mixed, superactive, thermic Typic Calciargids-Coarse-loamy, mixed, superactive, thermic Typic Haplocambids

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

Series: Onite-Pajarito association

Table 8. Summary of soil array and soil pit information at Jornada. 0° represents true north and accounts for declination.

Soil plot dimensions	5 m x 5 m
Soil array pattern	B
Distance between soil plots: x	40 m
Distance from tower to closest soil plot: y	14 m
Latitude and longitude of 1 st soil plot OR direction from tower	32.59057, -106.84261
Direction of soil array	200°
Latitude and longitude of FIU soil pit 1	32.59052, -106.84377 (primary location)
Latitude and longitude of FIU soil pit 2	32.59013, -106.84372 (alternate 1)
Latitude and longitude of FIU soil pit 3	32.58973, -106.84362 (alternate 2)
Dominant soil type	Onite-Pajarito association
Expected soil depth	>2 m
Depth to water table	>2 m
Expected depth of soil horizons	Expected measurement depths*
0-0.13 m (Loamy sand)	0.07 m
0.13-0.46 m (Sandy loam)	0.30 m
0.46-1.52 m (Loamy sand)	0.99 m

*Actual soil measurement depths will be determined based on measured soil horizon depths at the NEON FIU soil pit and may differ substantially from those shown here.

4.4 Information for ecosystem productivity plots.

The tower at this site has been positioned to optimize the collection of the air/wind signals both temporally and spatially over the desired ecosystem (hardwood forest). Airshed at this site is from 110° to 280° (clockwise from 110°, major airshed) and from 310° to 10° (clockwise from 310°, secondary airshed), and 90% signals for flux measurements are within a distance of 500 m from tower during daytime, and 80% within 250 m. We suggest FSU Ecosystem Productivity plots to be placed within the major airshed boundaries of 110° to 280° (clockwise from 110°) and 310° to 10° (clockwise from 310°) from tower.

4.5 Issues and attentions

The candidate tower location on EHS' list was 32.58988°, -106.842631°. Based on local contact Dr Albert Rango's suggestion and FIU site visit, the tower location was microsited to 32.59068, -106.84254 to give longer and adequate flux fetch area on the same side of the access dirt road. No preference and regulations about boardwalks. NEON can determine to have it or not. But rattle snakes concerns would be similar to Santa Rita site. Power is very far away. Dr Rango mentioned that solar panel power was once discussed at this site. We assume it will be FCC's responsibility to solve the power problem.

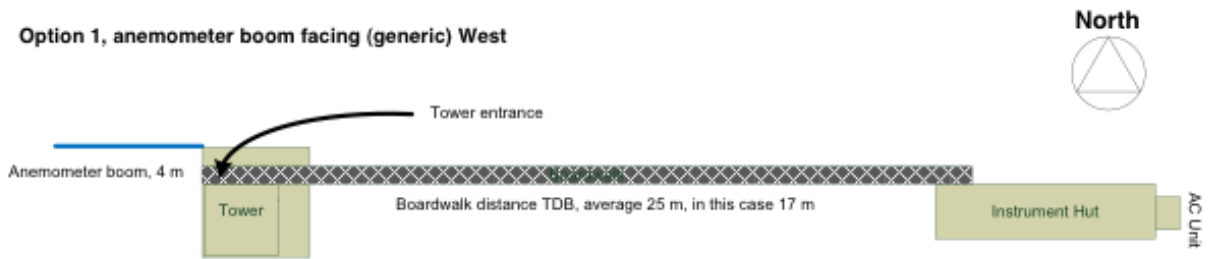
<i>Title:</i> D14 FIU Site Characterization: Summary	<i>Author:</i> Luo/Ayres/Loescher	<i>Date:</i> 09/23/2011
<i>NEON Doc. #:</i> NEON.DOC.011048		<i>Revision:</i> C

5 PHOENIX/CAP LTER, RELOCATEABLE TOWER 2

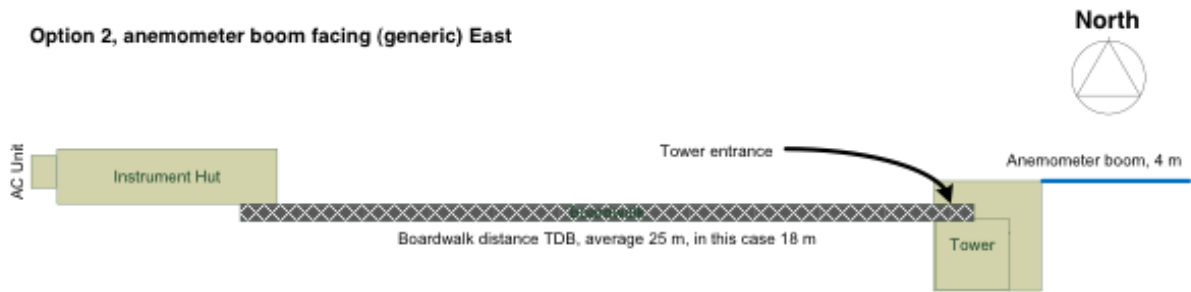
This site is currently a “soft” site, so a FIU site characterization was not conducted.

<p>Title: D14 FIU Site Characterization: Summary</p>	<p>Author: Luo/Ayres/Loescher</p>	<p>Date: 09/23/2011</p>
<p>NEON Doc. #: NEON.DOC.011048</p>		<p>Revision: C</p>

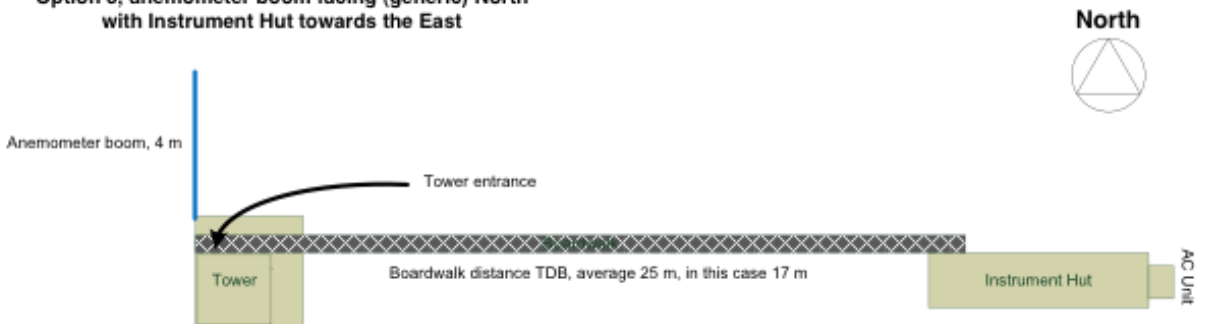
Option 1, anemometer boom facing (generic) West



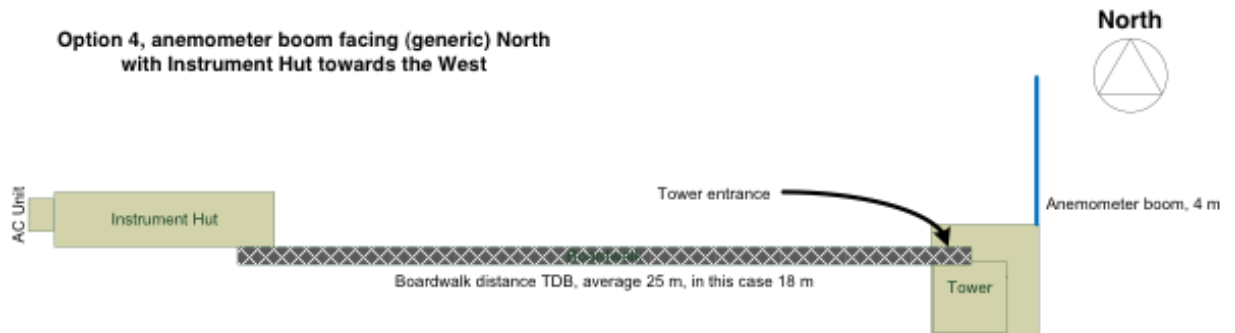
Option 2, anemometer boom facing (generic) East



Option 3, anemometer boom facing (generic) North with Instrument Hut towards the East

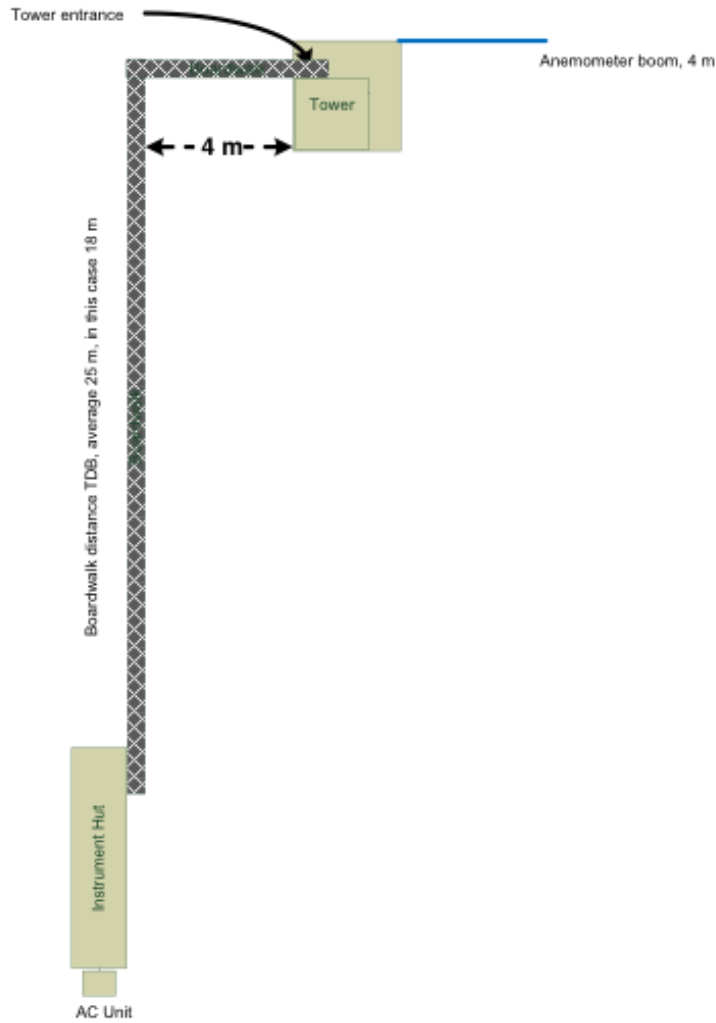


Option 4, anemometer boom facing (generic) North with Instrument Hut towards the West



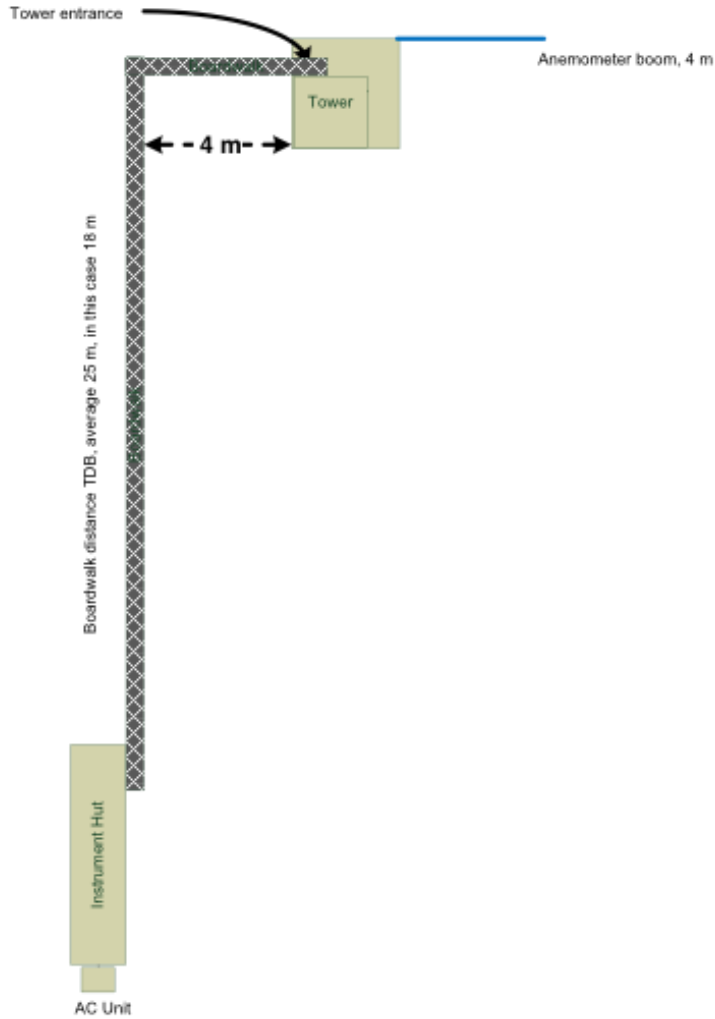
Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

**Option 5, anemometer boom facing (generic) East
with Instrument Hut towards the South**



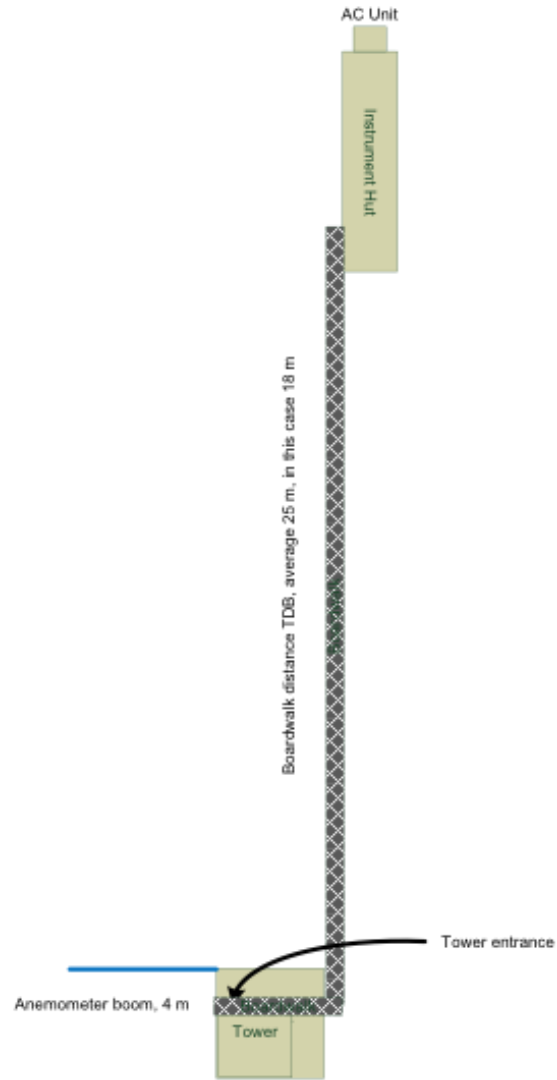
Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

**Option 6, anemometer boom facing (generic) East
with Instrument Hut towards the South West**



Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

**Option 7, anemometer boom facing (generic) West
with Instrument Hut towards the North**



Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

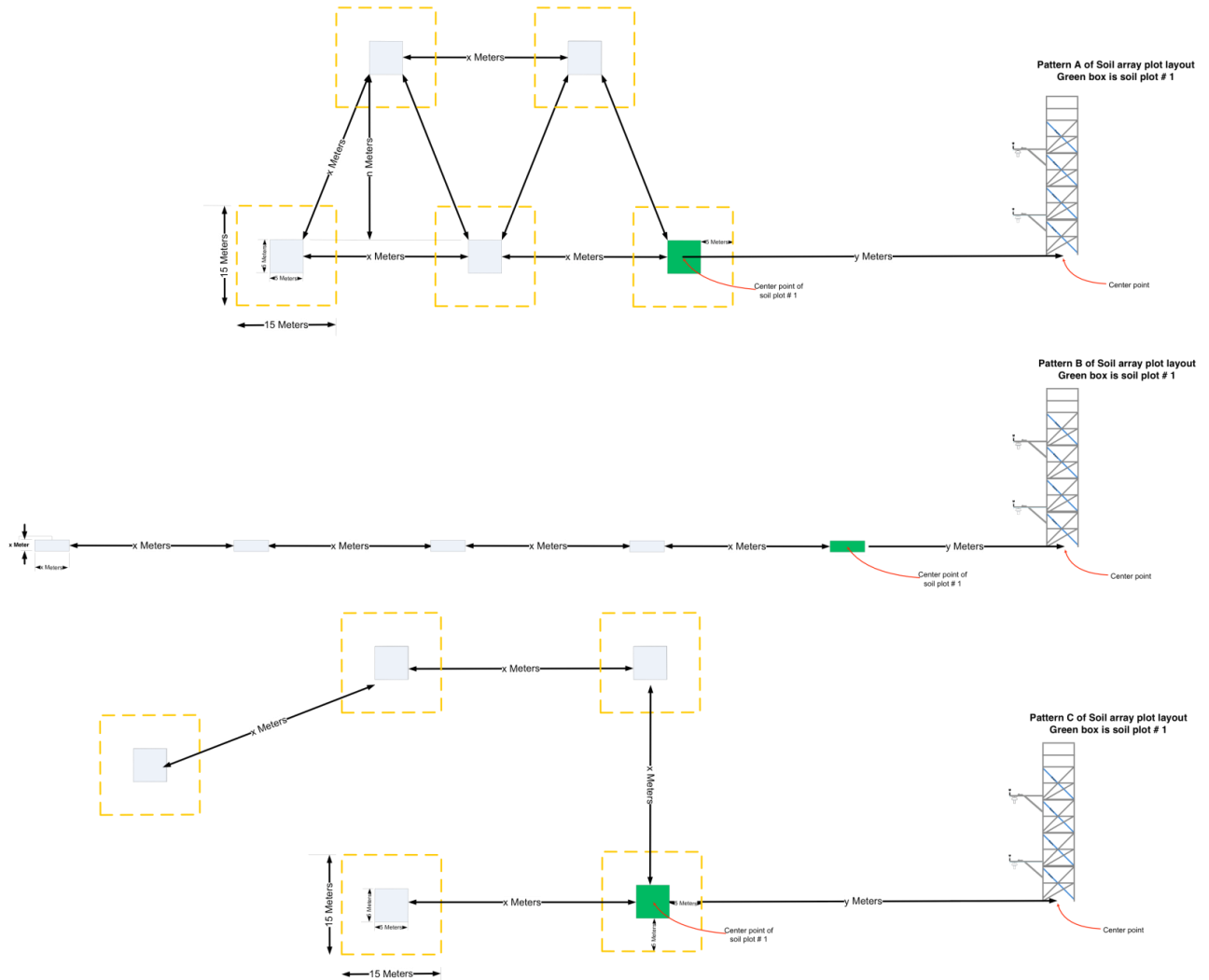
**Option 8, anemometer boom facing (generic) South
with Instrument Hut towards the North**



Figure 5. Generic patterns for the boardwalk configuration

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

These generic configurations are from the instrument hut to the tower based on 5 generic scenarios. The five options are based on anemometer boom orientation and the leeward side of the tower where the instrument hut is located. The tower entrance is always on the North side of the tower. Exact tower and instrument hut location and orientation will be specified at each location and presented in the site characterization document.



Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

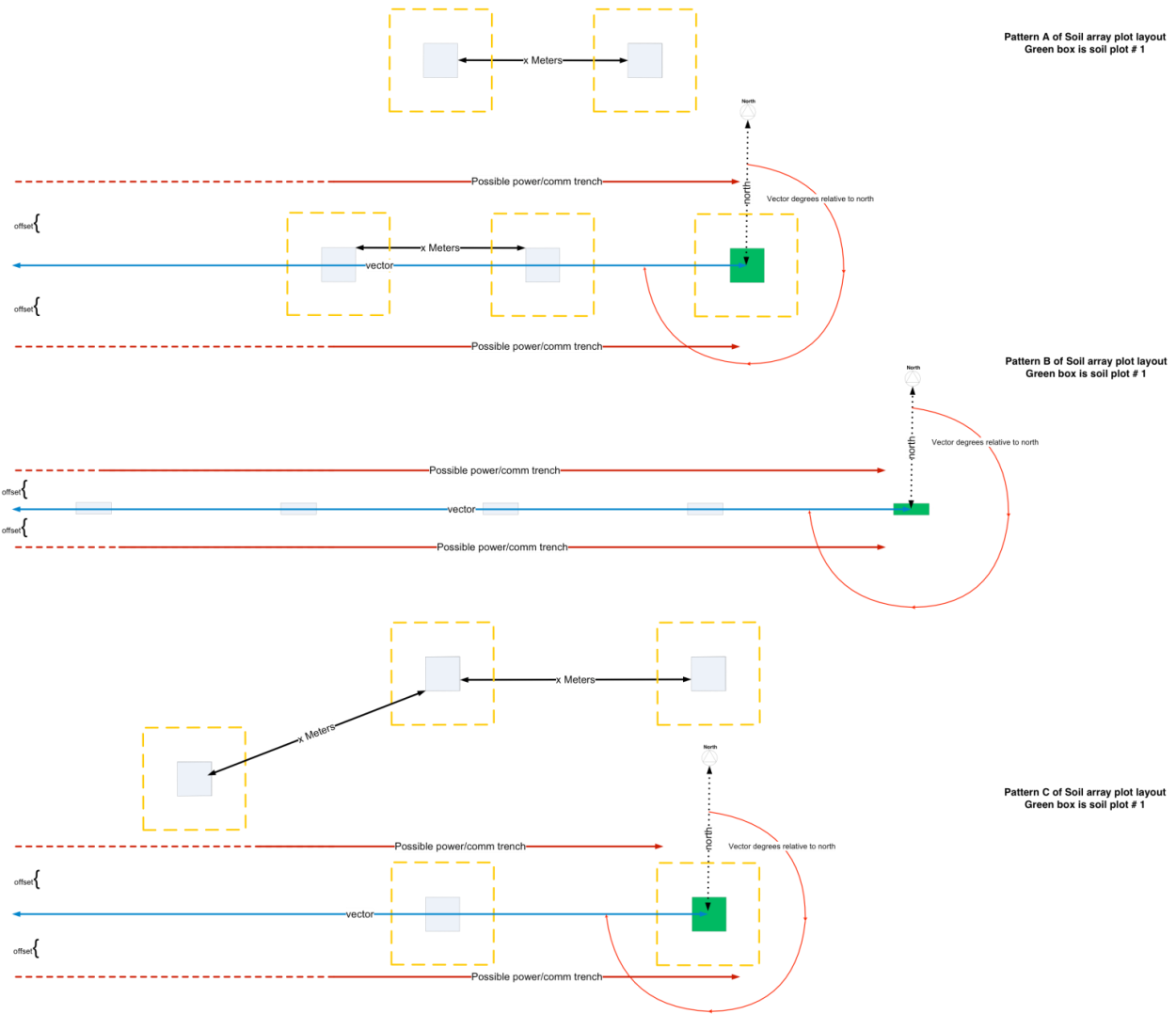


Figure 6. Conceptual diagram of Soil Array Patterns

Outlines the orientation for the soil array and instrument hut from the center point of the tower. The x, y, z distances are i) the distance between soil plots, ii) distance between the tower centerpoint and the closest edge of soil plot, and iii) the distance between the tower centerpoint and the closest edge of the instrument hut, respectively. The yellow outline around each soil plot is the 5 m perimeter keep out zone.

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

6 APPENDIX A. FCC SUMMARY TABLES

Table 9. FCC Summary Table for FIU site components at D14 Santa Rita Core Site

Site Component				units
Tower location	31.91068	-110.83549		Lat, Long, in degrees
Tower height ^f	8			meters
Tower guying	None			yes/none, notes
Instrument Hut location	31.91082°	-110.83543°		Lat, Long, in degrees
IH orientation ^a	120° - 300°			vector
boom orientation ^b	200°			degrees
distance from center of tower to IH center		18	option 7	distance (m), option #
how the Bwalk intersects the tower access	Gravel walkway intersects the north-side of the tower from the North.			description
how the Boardwalk intersects the tower access	Gravel walkway from IH to the north side of tower			description
Air shed vector(s) ^c	110° to 134° (major)	200° to 270° (secondary)		Vector, clock wise from first angle
Boardwalk from AP to IH	yes, from dirt road to IH	(see Figure 2), needs gravel pathway		yes/none, notes
Boardwalk to soil array	yes	needs gravel pathway		yes/none, notes
Boardwalk needed to DFIR	yes	needs gravel pathway though		yes/none, notes
Power and Communication line	10 m from edge of plot to the centerline of the power/comms line	whichever side is easiest, line above ground		offset, notes
DFIR location	31.91107°	-110.83500°		Lat, Long in degrees, notes
DFIR power supply	30 amp AC power from tower			description
Soil plot 1 st location	31.91065°	-110.83533°		Lat, Long in degrees (center point)
Soil plot distance between plots (x)	25 m			meters
Soil array pattern and vector ^d	B	120°		A, B, or C, vector
Soil plot dimensions	5 m x 5 m			L x W (meters)
Soil profile pit primary	31.90863,	-110.83781	>2 m	Lat, Long, and expected depth
Soil profile pit alternative 1	31.90830,	-110.83736	>2 m	Lat, Long, and expected depth
Soil profile pit alternative 2	31.90804,	-110.83694	>2 m	Lat, Long, and expected depth

<i>Title:</i> D14 FIU Site Characterization: Summary	<i>Author:</i> Luo/Ayres/Loescher	<i>Date:</i> 09/23/2011
<i>NEON Doc. #:</i> NEON.DOC.011048		<i>Revision:</i> C

Fencing needs	none	none	none	IH, Soil Arrays, Guy anchors
Presence of large grazing animals	No, cattle are in nearby experimental plots. May need fencing in future around lowest boom.			description
Site management*	Grazing			description
Any additional site specific information	Open Creosote shrubland, uniform, mean canopy height ~ 2 m			description
Magnetic declination	10° 26' E changing by 0° 6' W/year			At time of site visit

Title: D14 FIU Site Characterization: Summary	Author: Luo/Ayres/Loescher	Date: 09/23/2011
NEON Doc. #: NEON.DOC.011048		Revision: C

Table 10. FCC Summary Table for FIU site components at D14 Jornada Relocatable site 1

Site Component				units
Tower location	32.59068,	-106.84254		Lat, Long in degrees
Tower height ^f	8			meters
Tower guying	none			yes/none, notes
Instrument Hut location	32.59075,	-106.84275		Lat, Long in degrees
IH orientation ^a	40°-220°			vector
boom orientation ^b	220°			degrees
distance from center of tower to IH center		20	Option 8	vector, distance (m), option #
how the Bwalk intersects the tower access	Gravel path intersects the north-side of the tower from the North.			description
how the Bwalk intersects the tower access	IH on the northwest to tower. dogleg may be used pending Site Layout Diagrams.			description
Air shed vector(s) ^c	110° to 280° (major) and 310° to 10° (secondary)	Clockwise from first angle		vector, notes
Boardwalk from AP to IH	yes	(Figure 4), needs gravel pathway		yes/none, notes
Boardwalk to soil array	yes	needs gravel pathway		yes/none, notes
Boardwalk needed to DFIR	no DFIR			yes/none
DFIR location	none			Lat, Long
Power and Communication line	10 m from edge of plot to the centerline of the power/comms line	whichever side is easiest ^e , line above ground		offset, notes
DFIR power supply	na.			description
Soil plot 1 st location	32.59057,	-106.84261		Lat, Long (center point)
Soil plot distance between plots (x)	40 m			meters
Soil array pattern and vector ^d	B	200°		A, B, or C, vector
Soil plot dimensions	5 m x 5 m			L x W (meters)
Soil profile pit primary	32.59052,	-106.84377	>2 m	Lat, Long, and expected depth
Soil profile pit alternative 1	32.59013,	-106.84372	>2 m	Lat, Long, and expected depth
Soil profile pit alternative 2	32.58973,	-106.84362	>2 m	Lat, Long, and expected depth
Fencing needs	none	none	none	IH, Soil Arrays, Guy anchors

<i>Title:</i> D14 FIU Site Characterization: Summary	<i>Author:</i> Luo/Ayres/Loescher	<i>Date:</i> 09/23/2011
<i>NEON Doc. #:</i> NEON.DOC.011048		<i>Revision:</i> C

Presence of large grazing animals	Yes, presence of cattle, very light grazing. May need fencing in future around lowest boom.	description
Site management*	Grazing	description
Any additional site specific information	Open desert grassland, uniform, ~ 0.4 m tall, mixed with Mesquite and Yucca, height ~ 2 m	description
Magnetic declination	9° 7' E changing by 0° 6' W/year	At time of site visit

Notes;

^aparallel to the long side of the IH

^bFrom tower point to this direction

^cClockwise from first angle, recommend reviewing FIU site characterization summary report

^dFrom 1st plot toward other plots if pattern B, from 1st plot toward nearest neighbor (see diagram of the patterns)

^esee Appendix A. Options for Soil Array, second figure.

^fTower Height is for FIU requirements; actual tower height will increase toward the next section height, indicates that the top measurement location is equal to level 4, and the tower top shall be taller based on the sections of tower.

IH = instrument hut

AP = auxillary portal

*burn information that may affect boardwalk, IH, or tower infrastructure, or other management activities