OFFICE OF COUNTY MAYOR GLENN JACOBS

Knox County Health Department • 140 Dameron Avenue, Knoxville, TN 37917-6413

Brian Rivera, P.E.
Division Director Air Quality
Knox County Health Department
140 Dameron Ave,
Knoxville, TN 37917-6413

March 9, 2021

Re:First Quarter Air Monitoring Audit

Dear Mr. Rivera:

On Feb 25, Mar 2-3 and Mar 9, 2021 internal quality assurance performance audits were performed on Air Quality's monitoring network. All of the monitors audited were within the acceptable range for critical criteria. The continuous monitors at Air Lab and Rule were outside the 1-min criteria for the clock, this was an updated criterion from the previous 5 min, based upon guidance that these monitors should follow the criteria outlined in 40 CFR part 50 appendix L. Additionally the collocated filter based monitor at Rule was also outside the 1- min. criteria for the clock.

Each physical location was inspected, and a site evaluation was performed. The site evaluations are included in this audit report. The siting criteria was in compliance. Spiderwebs were noted in the East Knox ozone shelter near the HVAC intake.

Logbooks need improvement on documentation. The Program Manager and operator was notified of the following logbook finding;

- There were missing entries in the Air Lab site logbook. There was however full documentation in the instrument logbooks.
- The T640 / T640x continuous monitor logbooks continue to have large amounts of blank spaces. Operator should X out blank spaces as soon as next entry is made.

The laboratory clean room was inspected. The filter preparation area was clean. The PM2.5 storage temperature log was reviewed. Storage temperatures have exceed 4.1 °C as well as less than 0°C when filters have been in storage. The Program Manager has been notified.

If there are any questions regarding this audit please email Rebecca.Larocque@knoxcounty.org or call 865-215-5941

Rebecca Larocque

Rebecca Larocque
Environmental Specialist
Knox County Health Department

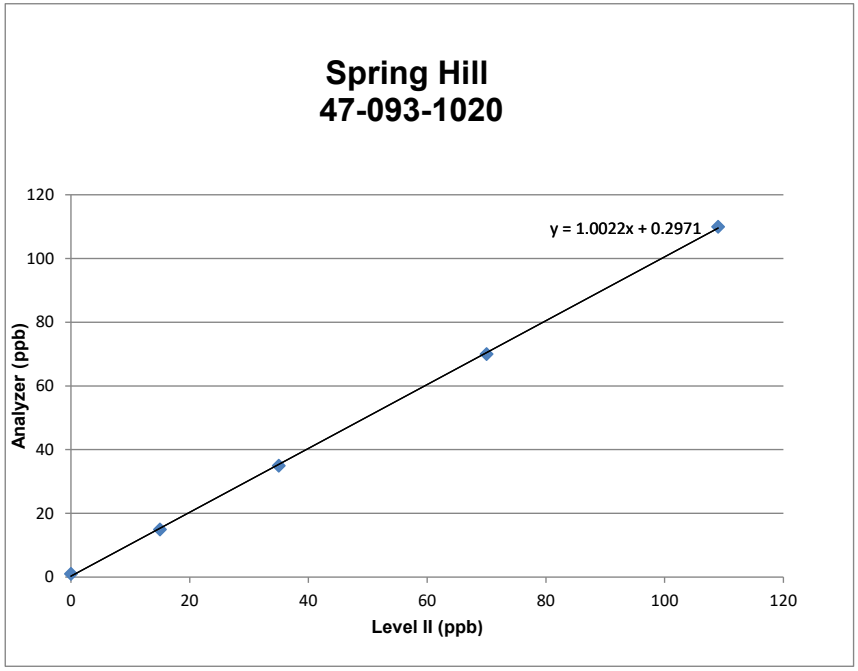
Ozone Audit Calculations

Date: 3/2/2021 Audit SN: 179
Site: Springhill Analyzer SN: 4005

Collection Time	Target	Analyzer	Audit Standard	Difference	% Difference
est	ppb	ppb	ppb	ppb	%
9:32:00 AM	**110**	109	110	-1.0	-0.91
9:42:00 AM	**70**	70	70	0.0	0.00
9:52:00 AM	**35**	35	35.0	0.0	0.00
10:02:00 AM	**15**	15	15.0	0.0	0.00
10:12:00 AM	**0**	0	1.0	-1.0	N/A

Slope **0.997609** **correlation** **0.999925**

Intercept **-0.29** **R2** **0.999851**



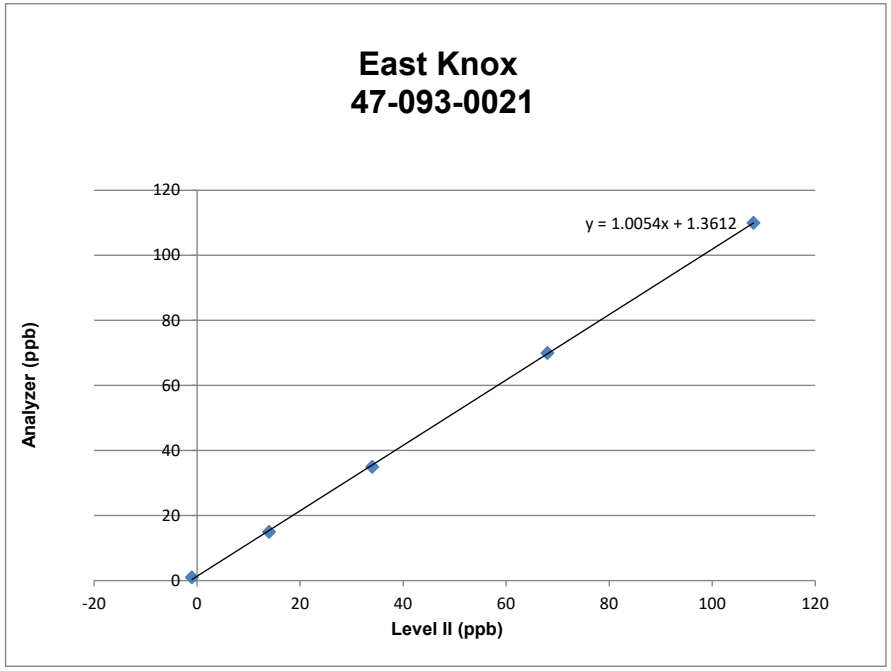
Notes: Fire Extinguisher not inspected since October

Date: 3/4/2021 Audit SN: 179
Site: East Knox Analyzer SN: 4006

Collection Time	Target	Analyzer	Audit Standard	Difference	% Difference
est	ppb	ppb	ppb	ppb	%
9:31:00 AM	**110**	108	110	-2.0	-1.82
9:41:00 AM	**70**	68	70	-2.0	-2.86
9:51:00 AM	**35**	34	35.0	-1.0	-2.86
10:01:00 AM	**15**	14	15.0	-1.0	-6.67
10:11:00 AM	**0**	-1	1.0	-2.0	NA

Slope **0.994549** **correlation** **0.999937**

Intercept **-1.35** **R2** **0.999874**



Notes: - Shelter temp probe not working upon arrival, I removed cover, cleaned out bugs, secured connections and temps returned to normal. Verification performed after - back up indicates shelter temperature was in range during malfunction. Shelter has spiderwebs. Fire extinguisher not inspected since October

Reference device used for Audit: **SLP** Serial number : HL190706

Date of Certification: Jun-20

Date: 2/25/2021
Site: Rule Monitor Serial number: 20952

Thermo 2025

	units	System Value	Reference Value	Difference (S-R)	%	Acceptance Criteria
Time	hh:mm:ss	10:32:00 AM	10:33:04 AM	0:01:04		+/- 1 Min.
Filter T	°C	12.2	13.2	-1		+/- 2º C
Ambient T	°C	14	13.7	0.3		+/- 2º C
Pressure	mmHg	738	738	0		+/- 10 mmHg
Flow Rate	lpm	16.68	16.69	-0.01	-0.06%	+/- 4%

Notes: LC passed 7

Date: 2/25/2021
Site: Air Lab Monitor Serial number: 22576

Thermo 2025

	units	System Value	Reference Value	Difference (S-A)	%	Acceptance Criteria
Time	hh:mm:ss	11:36:31 AM	11:37:00 AM	0:00:29		+/- 1 Min.
Filter T	°C	18.2	18.2	0		+/- 2º C
Ambient T	°C	15.5	15.4	0.1		+/- 2º C
Pressure	mmHg	736	741	-5		+/- 10 mmHg
Flow Rate	lpm	16.7	16.91	-0.21	-1.24%	+/- 4%

Notes:LC passed 6

Date: 2/25/2021
Site: Air Lab Monitor Serial number: 192

T640 X

	Units	System	Reference	Difference	%	Criteria
Time	hh:mm:ss	11:46:49 AM	11:43:39 AM	0:03:10		+/- 1 Min.
Shelter T	°C	22	22	0		+/- 2º C
Amb T	°C	15.6	16.1	-0.5		+/- 2º C
Pressure	mmHg	737.7	740.4	-2.7		+/- 10mmHg
Total Flow	lpm	16.68	16.62	0.06	0.36%	+/- 4 %
MainFlow	lpm	4.86	4.85	0.01	0.21%	+/- 4 %

Notes:Lc Passed 0/0 - Site log not matching date entries of instrument book. Logger screen dirty not really readable

Date: 2/25/2021
Site: Rule Monitor Serial number: 675

T640

	Units	System	Reference	Difference	%	Criteria
Time	hh:mm:ss	10:46:41 AM	10:46:30 AM	0:00:11		+/- 1 Min.
Shelter T	°C	20.1	19.1	1		+/- 2º C
Amb T	°C	16.7	17.2	-0.5		+/- 2º C
Pressure	mmHg	735.4	737.6	-2.2		+/- 10mmHg
Flow Rate	lpm	4.94	4.95	-0.01	-0.20%	+/- 4 %

Notes:LC Passed 0/0, Logger not on, Started 10:39-11:00, large blank spaces in log book

Date: 3/2/2021
Site: Springhill Monitor Serial number: 910

T640

	Units	System	Reference	Difference	%	Criteria
Time	hh:mm:ss	10:41:20 AM	10:40:10 AM	0:01:10		+/- 1 Min.
Shelter T	°C	13	14	-1		+/- 2º C
Amb T	°C	5.8	6.2	-0.4		+/- 2º C
Pressure	mmHg	738.2	740	-1.8		+/- 10mmHg
Flow Rate	lpm	4.98	4.98	0	0.00%	+/- 4 %

Notes:LC passed 0/0 - No lock on instrument

Reference device used for Audit: **Hi Vol Cal**

Serial number : 96

Date of Certification: 4/7/2020

Date: 2/25/2021 Bar Press 740 mmHg
Monitor ID: P2875 Temp 12.3 °C
Site: Burnside Official

Qa CFM		
	Stag Press:	24.4 inH20
39.19	Pa:	45.5792 mmHg
	Po/Pa:	0.938406 unitless
39.16		
	Flow	1.113
39.24	(from table)	
39.24	%D:	0.27%
	{Flow- Qa/Qa}x 100	
39.22		
	% D Design	-1.77%
39.21	{Qa - 1.13/1.13}	
39.2		
39.16		
39.2		
39.26		
39.21 CFM		
1.110 m^3/min		

Date: 2/25/2021 Bar Press 740 mmHg
Monitor ID: P-4302 Temp 12.9 °C
Site: Burnside Collo

Qa CFM		
	Stag Press:	24 inH20
38.72	Pa:	44.832 mmHg
	Po/Pa:	0.939416 unitless
38.71		
	Flow	1.118
38.72	(from table)	
38.71	%D:	2.00%
	{Flow- Qa/Qa}x 100	
38.76		
	% D Design	-3.01%
38.72	{Qa - 1.13/1.13}	
38.76		
38.69		
38.65		
38.62		
38.71 CFM		
1.096 m^3/min		

Date: 2/25/2021 Bar Press 740 mmHg
Monitor ID: P-4304 Temp 14.5 °C
Site: Ameristeel

Qa CFM		
	Stag Press:	24.2 inH20
39.03	Pa:	45.2056 mmHg
	Po/Pa:	0.938911 unitless
39.07		
	Flow	1.131
39.18	(from table)	
39.19	%D:	2.08%
	{Flow- Qa/Qa}x 100	
39.19		
	% D Design	-1.95%
39.12	{Qa - 1.13/1.13}	
39.22		
39.12		
39.02		
39.14		
39.13 CFM		
1.108 m^3/min		

Notes: Fire extinguishers checked monthly

Speciation Audit Calculations

Reference device used for Audit: **SLP**

Serial number : HL190706

Date of Certification: Jun-20

Leak Test

	Pass	Fail
URG 3000	93	
SASS Channel 1	0	
SASS Channel 2	0	

Pressure {Ambient}

	System	Reference	Difference
URG 3000N	737.9	740.2	-2.30
SASS	743	740	3.00

Flow Rate

	System	Reference	% Difference
URG 3000N	21.98	21.36	2.90%
SASS channel 1	6.6	6.6	0.00%
SASS Channel 2	6.7	6.6	1.52%

Temperature

	System	Reference	Difference
URG 3000N Ambient	5.6	6.8	-1.20
SASS ambient	6.3	5.6	0.70
SASS filter channel 1	6.5	6.5	0.00
SASSfilter Channel 2	5.9	5.9	0.00

KNOX COUNTY TENNESSEE
HEALTH DEPARTMENT

Siting Evaluation Form

Site Name: Air Lab
AQSNo: 47-093-1013
Coordinate 35.980756, -83.925802

Date: 3/9/2021
Site Address: 939 Stewart St
Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height [1]	Flow (hi or Low)	Separation from samplers [1]	Pass/Fail	Distance to Road [1]	Pass/Fail
$PM_{2.5}$ FRM	Middle	4.6	Low	1.7	Pass	15.3	Pass
$PM_{2.5/\ 10}$ Continous	Middle	4.9	Low			15.8	Pass

				Tree	
Obstruction type [2]	Obst. Height [1]	Obst. Distance [1,2]	Pass/Fail	Dripline [1]	Pass/ Fail
Closest Tree €	15	25	Pass	17.5	Pass

[1] All Measurements in meters

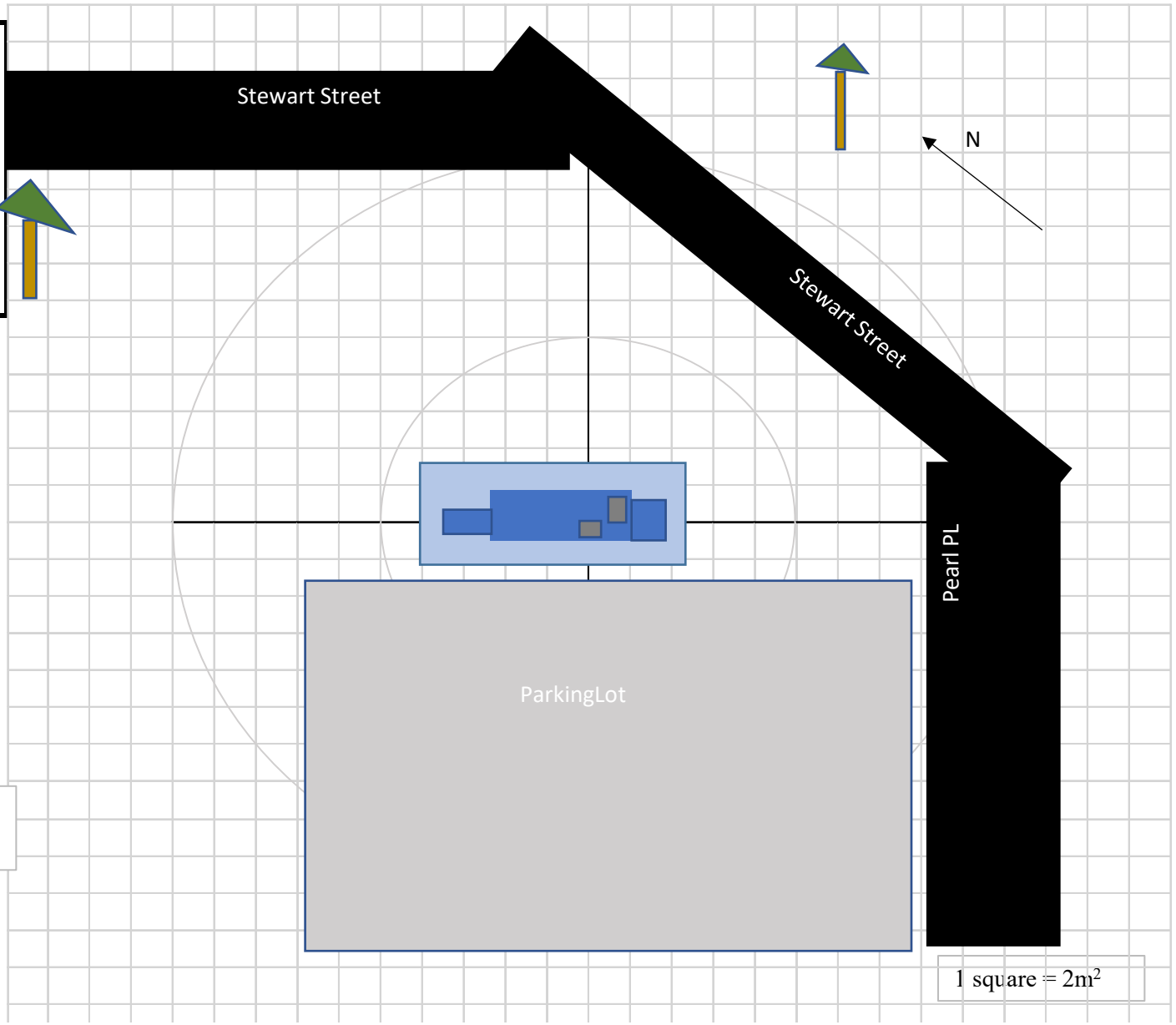
[2] Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume
Obstruction Distance must be ≥ 2* (Obst height - probe height)
Tree Dripline must be >10 m away, prefer >20m
Horizontal and vertical disance on rooftop 1m for $O_{3/}$ gases - 2m for all others
Unrestricted air flow must be ≥ 270 °

Site Drawing

Estimated Degree of Unrestricted Air Flow: 360°

Indicate:
North
Shelter
Probe Postions
Nearby trees
Roadways
Buildings
Other Obstuctions
Source if Appicable



Primary Wind Direction : 220° SSW

Photos facing out from monitor to cardinal direction

North

South

East

West

Photos from cardinal direction facing in towards monitor

North

South

East

West


Cullen Pl
Stewart St
English Ave
Silver Pl
Alexander St
Pearl Pl
301
305
313
321
312
924
922
920
923
918
939
1005
0
50
Feet
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KNOX COUNTY TENNESSEE
HEALTH DEPARTMENT

Siting Evaluation Form

Site Name: Ameristeel
AQSNo: 47-093-0023
Coordinates: 35.98102, -83.9544

Date: 3/9/2021
Site Address: 1526 New York Ave
Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height [1]	Flow (hi or Low)	Separation from samplers [1]	Pass/Fail	Distance to Road [1]	Pass/Fail
Lead	Microscale	4.8	Hi	N/A		12.8	Pass

				Tree	
Obstruction type [2]	Obst. Height [1]	Obst. Distance [1,2]	Pass/Fail	Dripline [1]	Pass/ Fail
Small trees NNE	4.9	12.4	Pass	11	Pass
Large Tree SW	15.8	34.4	Pass	>20	Pass

[1] All Measurements in meters

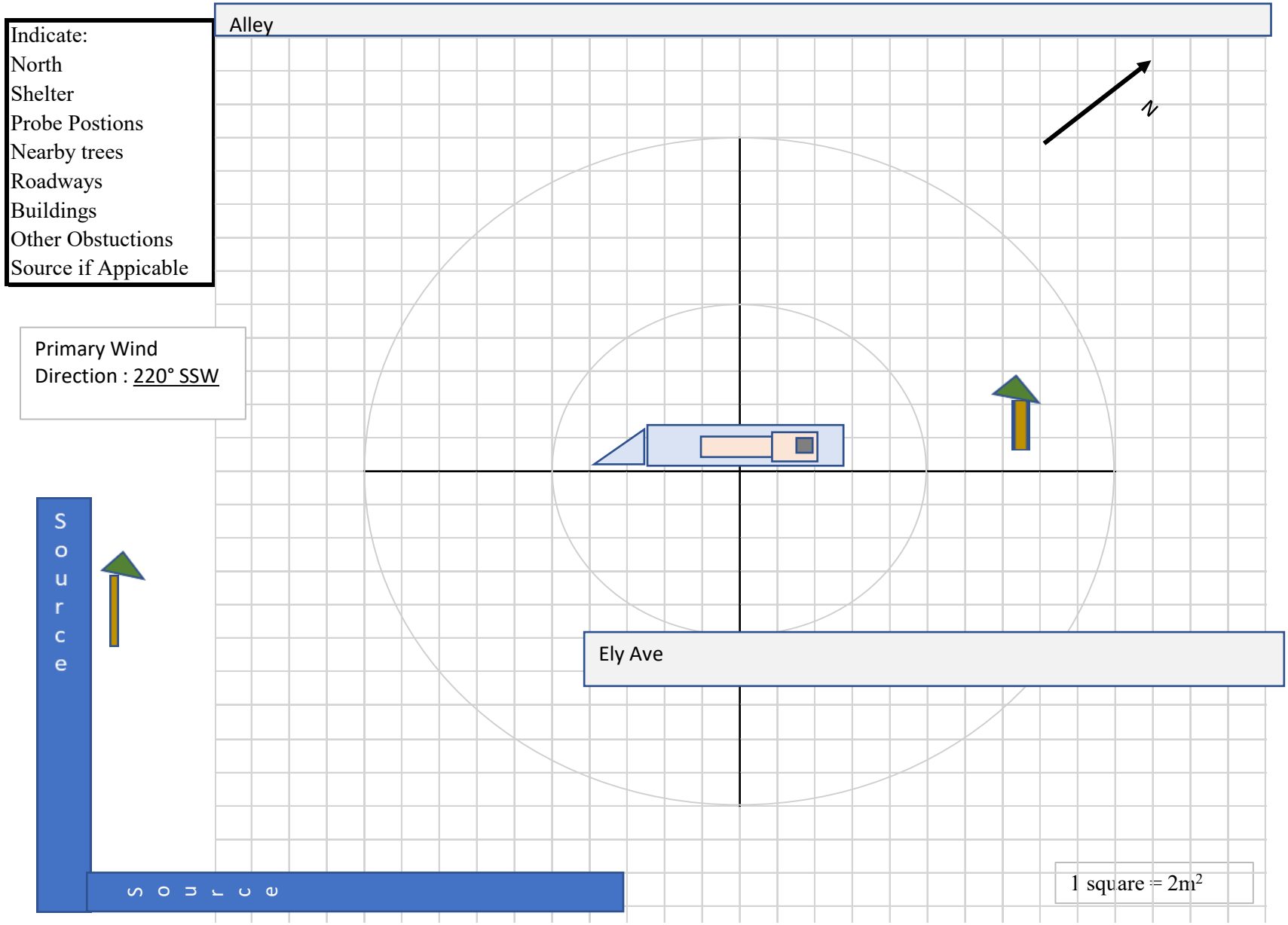
[2] Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume
Obstruction Distance must be ≥ 2* (Obst height - probe height)
Tree Dripline must be >10 m away, prefer >20m
Horizontal and vertical disance on rooftop 1m for $O_{3/}$ gases - 2m for all others
Unrestricted air flow must be ≥ 270 °

Site Drawing

Estimated Degree of Unrestricted Air Flow: 360°

Indicate:
North
Shelter
Probe Postions
Nearby trees
Roadways
Buildings
Other Obstuctions
Source if Appicable



Photos facing out from monitor to cardinal direction

North

South

East

West

Photos from cardinal direction facing in towards monitor

North

South

East

West


2D
Google
Google Camera : 327 m 35°58'51"N 83°57'15"W 284 m 100%

KNOX COUNTY TENNESSEE
HEALTH DEPARTMENT

Siting Evaluation Form

Site Name: Burnside

AQSNo: 47-093-0027

Coordinate 35.98306, -83.9523

Date: 3/9/2021

Site Address: 2522 Burnside St, 37921

Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height [1]	Flow (hi or Low)	Separation from samplers [1]	Pass/Fail	Distance to Road [1]	Pass/Fail
Lead - Official	Neighborhood	2M	Hi	2.56M	Pass	24.0M	Pass
Lead Collocated	Neighborhood	2M	Hi	2.56M	Pass	23.8M	Pass

				Tree	
Obstruction type [2]	Obst. Height [1]	Obst. Distance [1,2]	Pass/Fail	Dripline [1]	Pass/ Fail
Tree SW quadrent	20	18		10.5	Pass
Firehouse	6.2	26.2	Pass		

[1] All Measurements in meters

[2] Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume

Obstruction Distance must be ≥ 2* (Obst height - probe height)

Tree Dripline must be >10 m away, prefer >20m

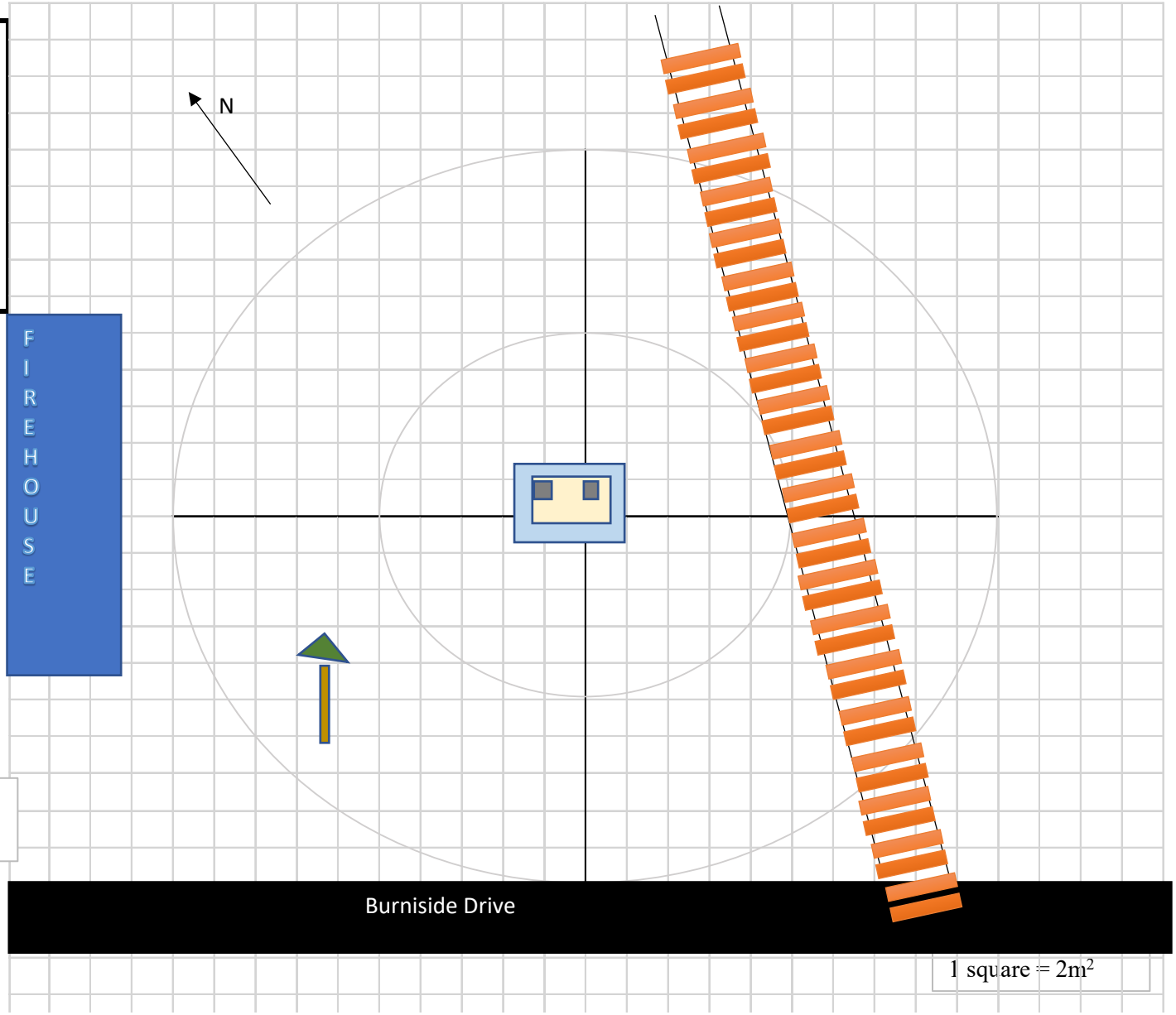
Horizontal and vertical disance on rooftop 1m for O_3 gases - 2m for all others

Unrestricted air flow must be ≥ 270 °

Site Drawing

Estimated Degree of Unrestricted Air Flow: 270°

Indicate:
North
Shelter
Probe Postions
Nearby trees
Roadways
Buildings
Other Obstuctions
Source if Appicable



Primary Wind Direction : 220° SSW

Photos facing out from monitor to cardinal direction

North

South

East

West

Photos from cardinal direction facing in towards monitor

North

South

East

West


Google
2D
Google Camera 349 m 35°58'58"N 83°57'07"W 286 m 100%

KNOX COUNTY TENNESSEE
HEALTH DEPARTMENT

Siting Evaluation Form

Site Name: East Knox
AQSNo: 47-093-0021
Coordinate 36.0855,-83.7649

Date: 3/9/2021
Site Address: 9315 Rutledge Pike
Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height [1]	Flow (hi or Low)	Separation from samplers [1]	Pass/Fail	Distance to Road [1]	Pass/Fail
Ozone	Urban	4	Low	n/a		180	Pass

				Tree	
Obstruction type [2]	Obst. Height [1]	Obst. Distance [1,2]	Pass/Fail	Dripline [1]	Pass/ Fail
Pine West	18.2	34.4	Pass	>20	Pass
Tallest Pine WSW	18.6	31	Pass	>20	Pass
Smaller closer brush	6	15	Pass	13	Pass
This site should be monitored for tree growth carefully, keep smaller brush maintained					

[1] All Measurements in meters

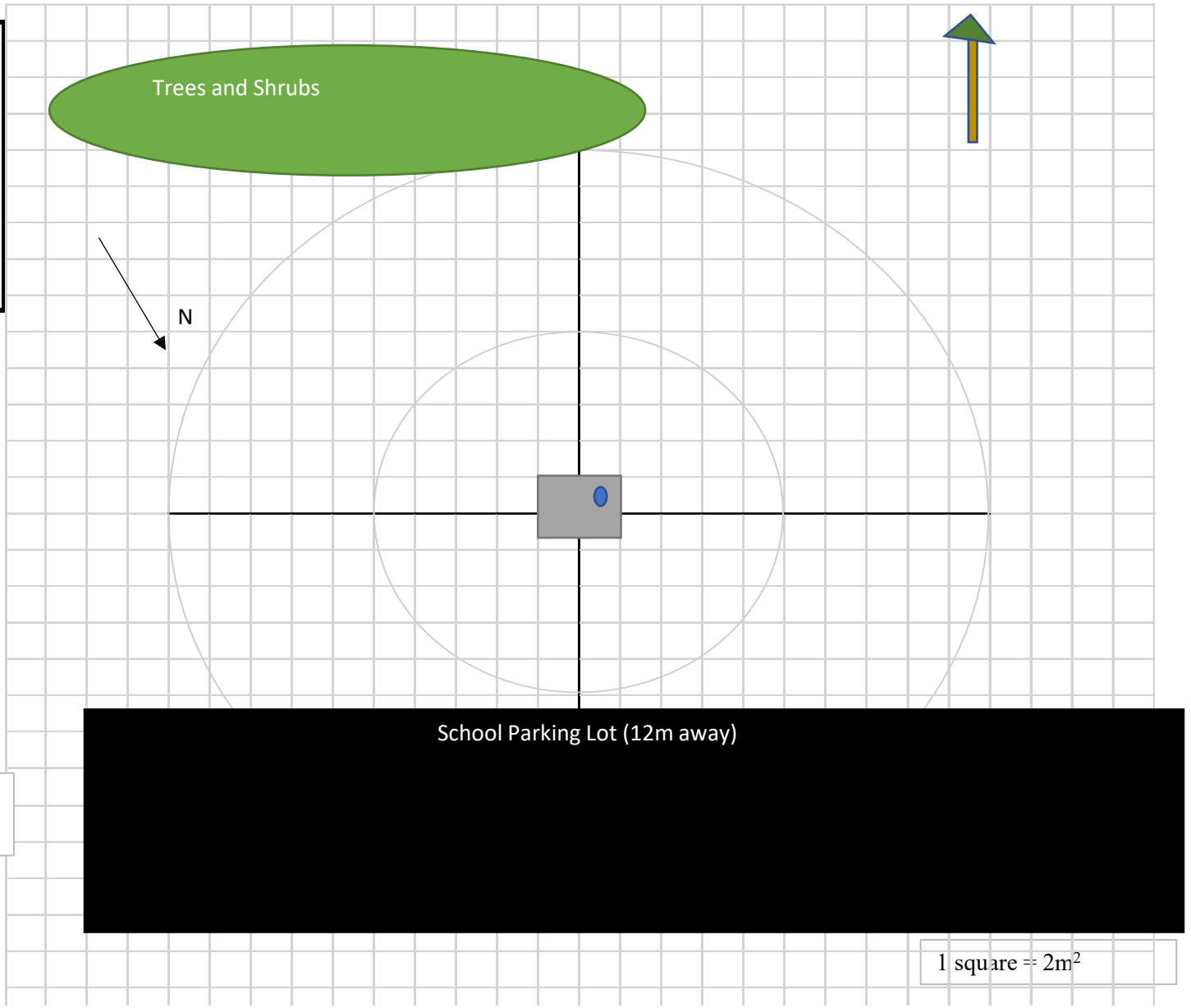
[2] Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume
Obstruction Distance must be ≥ 2* (Obst height - probe height)
Tree Dripline must be >10 m away, prefer >20m
Horizontal and vertical disance on rooftop 1m for $O_{3/}$ gases - 2m for all others
Unrestricted air flow must be ≥ 270 °

Site Drawing

Estimated Degree of Unrestricted Air Flow: 310

Indicate:
North
Shelter
Probe Postions
Nearby trees
Roadways
Buildings
Other Obstuctions
Source if Appicable



Primary Wind Direction : 220° SSW

Photos facing out from monitor to cardinal direction

North

South

East

West

Photos from cardinal direction facing in towards monitor

North

South

East

West


Google
2D
Google Camera : 345 m 36°05'07"N 83°45'52"W 302 m 96%

KNOX COUNTY TENNESSEE HEALTH DEPARTMENT

Siting Evaluation Form

Site Name: Rule

Date: 3/9/2021

AQSNo: 47-093-1017

Site Address: 1613 vermont Ave

Coordinate 35.97773, -83.9504

Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height [1]	Flow (hi or Low)	Separation from samplers [1]	Pass/Fail	Distance to Road [1]	Pass/Fail
$PM_{2.5}$	Neighborhood	2.2	Low	n/a		>42M	Pass
$PM_{2.5}$ continuous	Neighborhood	2.36	Low	3.5	Pass	> 42 M	Pass

* height increased on 11/2 to meet 2M high and 1M from top of shelter

				Tree	
Obstruction type [2]	Obst. Height [1]	Obst. Distance [1,2]	Pass/Fail	Dripline [1]	Pass/ Fail
WaterTower	23.4M	65.2M	Pass		
Tallest tree W	9.2M	32M	Pass	>20M	Pass

[1] All Measurements in meters

[2] Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume

Obstruction Distance must be ≥ 2* (Obst height - probe height)

Tree Dripline must be >10 m away, prefer >20m

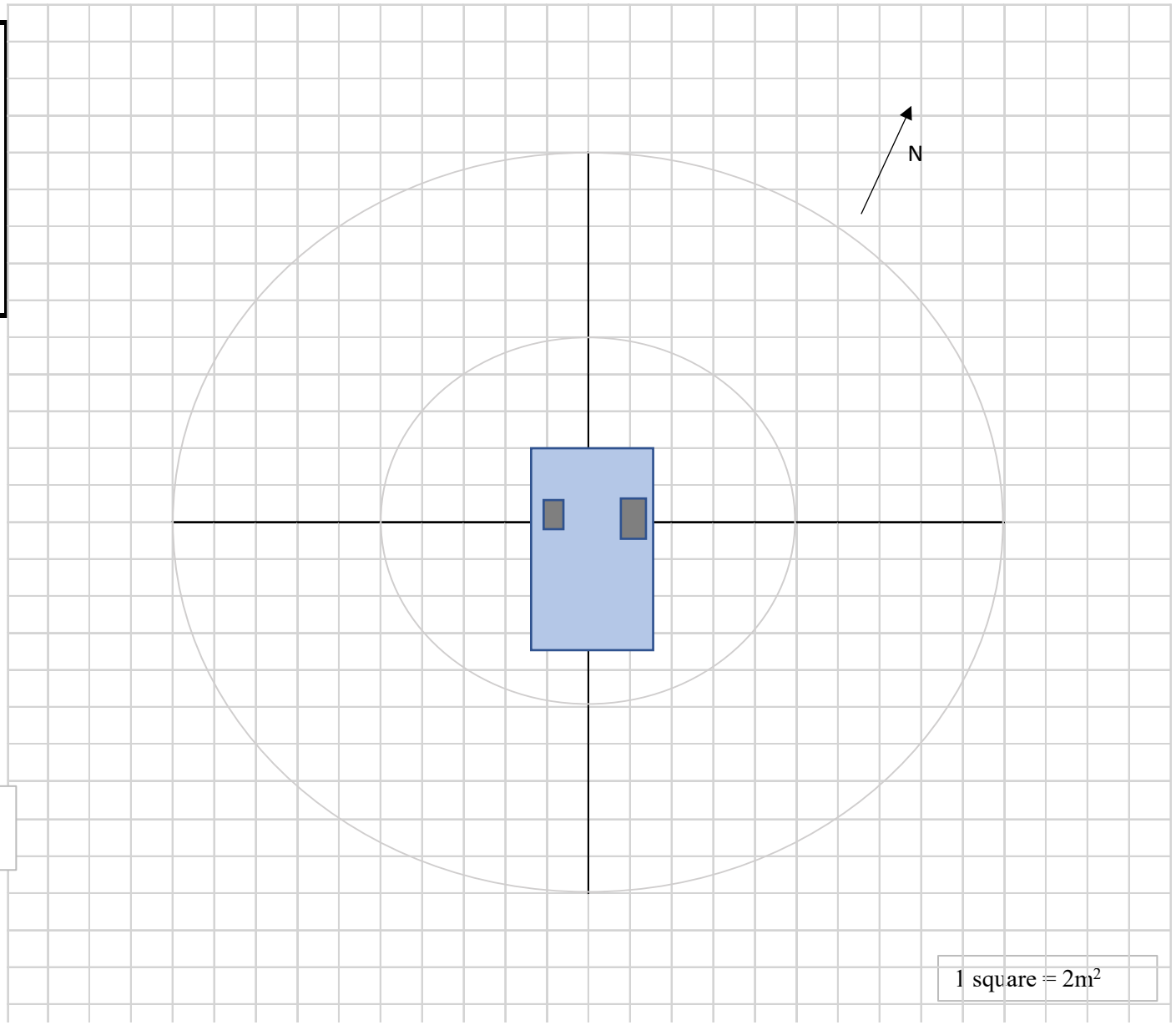
Horizontal and vertical disance on rooftop 1m for $O_{3/}$ gases - 2m for all others

Unrestricted air flow must be ≥ 270 °

Site Drawing

Estimated Degree of Unrestricted Air Flow: 360°

Indicate:
North
Shelter
Probe Postions
Nearby trees
Roadways
Buildings
Other Obstuctions
Source if Appicable



Primary Wind Direction : 220° SSW

Photos facing out from monitor to cardinal direction

North

South

East

West

Photos from cardinal direction facing in towards monitor

North

South

East

West

KNOX COUNTY TENNESSEE HEALTH DEPARTMENT

Siting Evaluation Form

Site Name: Springhill

Date: 3/9/2021

AQSNo: 47-093-1020

Site Address: 4711 Mildred Drive

Coordinate 36.0114, -83.8739

Inspected by: Rebecca Larocque

Pollutant	Scale	Probe Height [1]	Flow (hi or Low)	Separation from samplers [1]	Pass/Fail	Distance to Road [1]	Pass/Fail
Ozone	Neighborhood	4.3	Low	2.1	Pass	36.2	Pass
PM2.5	Neighborhood	5.1	Low	1.2	Pass	37.8	Pass
URG Speciation	Neighborhood	4.6	Low	1.2	Pass	36.2	Pass
SASS speciation	Neighborhood	4.4	Low	1.5	Pass	36.2	Pass

				Tree	
Obstruction type [2]	Obst. Height [1]	Obst. Distance [1,2]	Pass/Fail	Dripline [1]	Pass/ Fail
Tree NE	16.4	24.6	Pass	19	Pass
Tallest Pine E	21.6	28		19.4	Pass
small brush line				16.4	Pass

[1] All Measurements in meters

[2] Including vertical and horizontal separation from walls &/or parapets if applicable

Collocated Samplers must be within 4 m of each other and at least 2 m apart for hi vol, at least 1 m for low volume

Obstruction Distance must be ≥ 2* (Obst height - probe height)

Tree Dripline must be >10 m away, prefer >20m

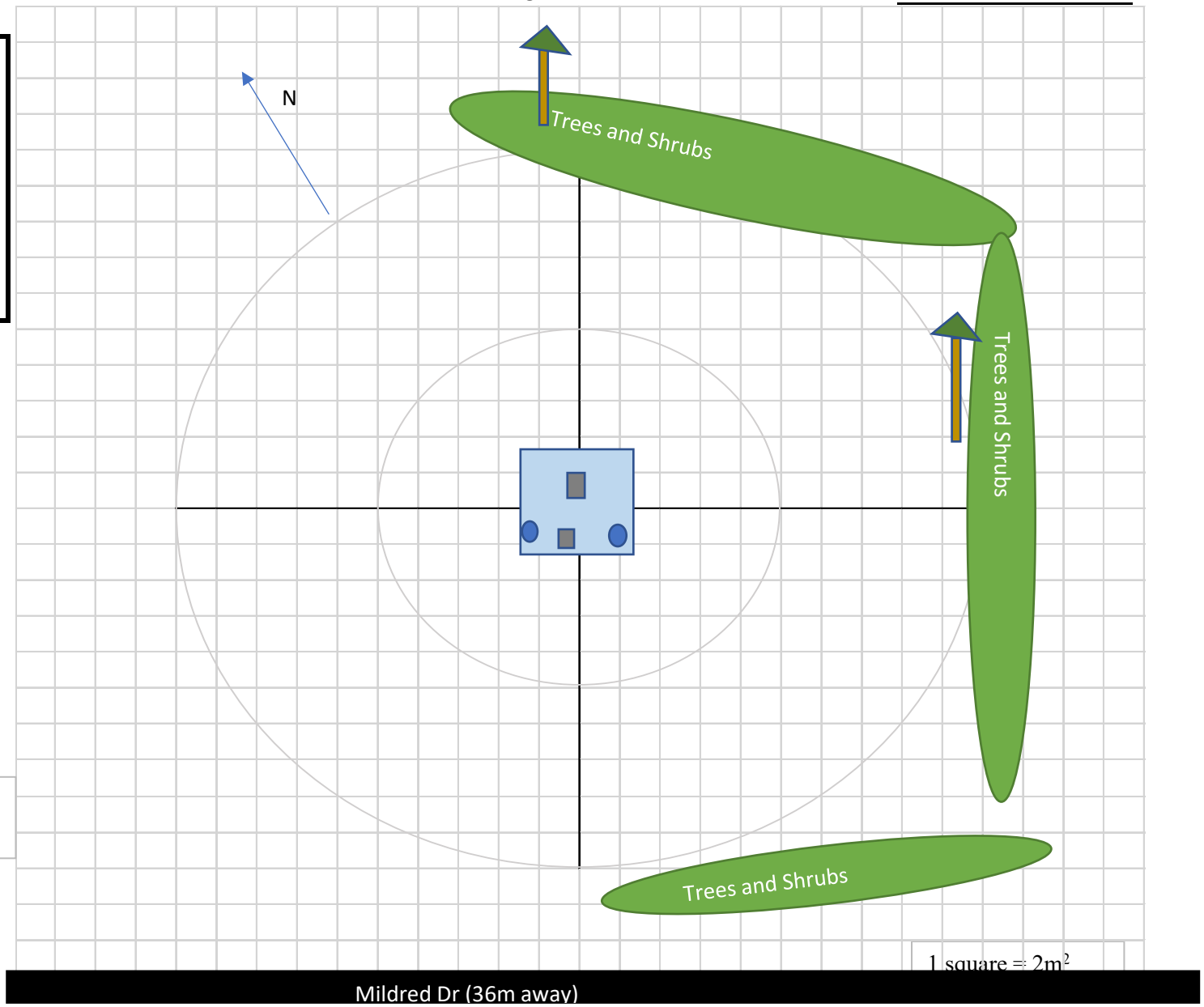
Horizontal and vertical disance on rooftop 1m for $O_{3/}$ gases - 2m for all others

Unrestricted air flow must be ≥ 270 °

Site Drawing

Estimated Degree of Unrestricted Air Flow: 330°

Indicate:
North
Shelter
Probe Postions
Nearby trees
Roadways
Buildings
Other Obstuctions
Source if Appicable



Primary Wind Direction : 220° SSW

Photos facing out from monitor to cardinal direction

North

South

East

West

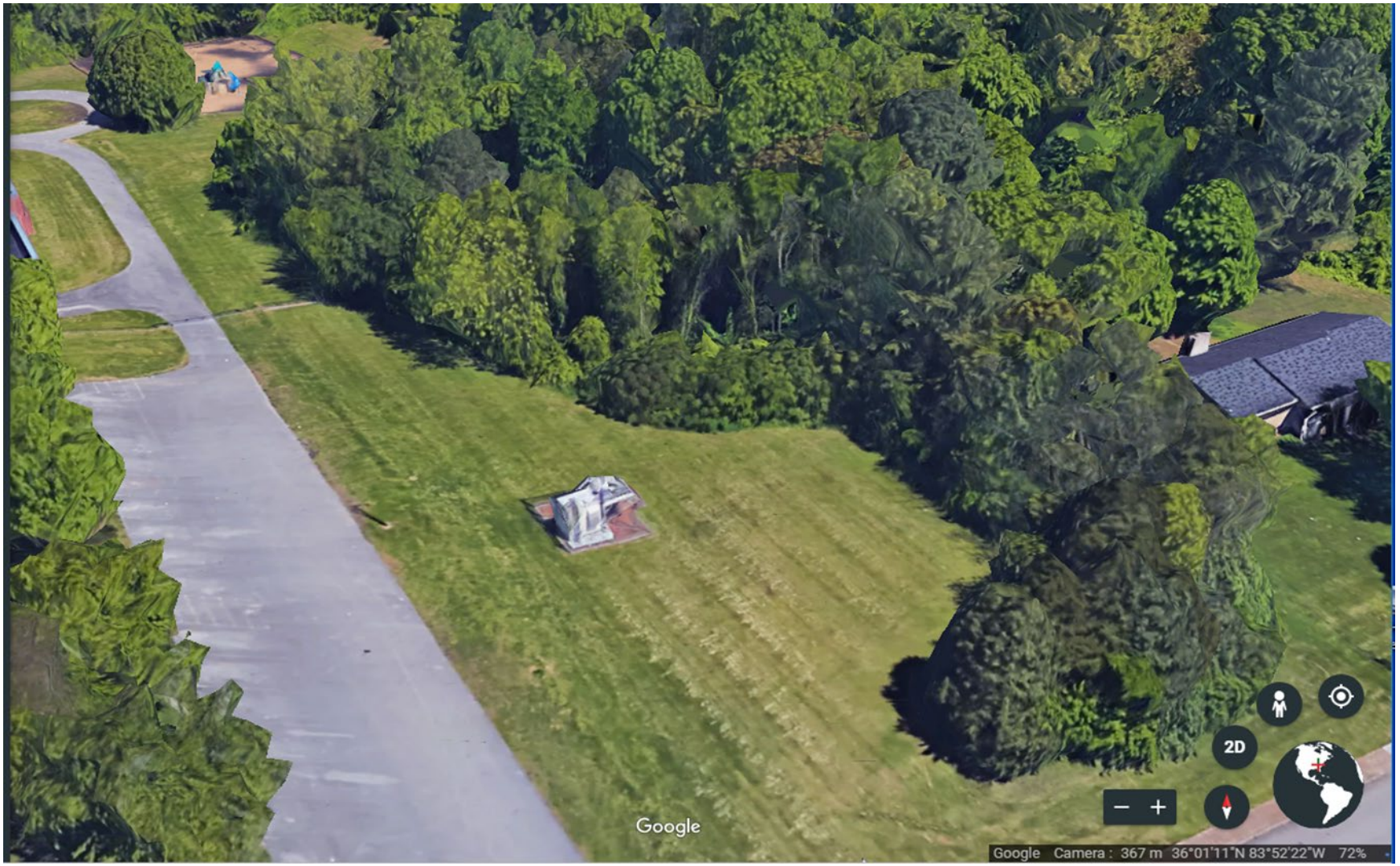
Photos from cardinal direction facing in towards monitor

North

South

East

West


Google
2D
Google Camera : 367 m 36°01'11"N 83°52'22"W 72%