bkm

National Institute of Standard and Technology
Gaithersburg, MD, Building 215
Cleanroom Re-Balance

(35% Submission)

December 6, 2019

BKM No. 19146.01

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Overview

The scope of this narrative was to document and evaluate the existing conditions air systems of the AML Building 215 at the National Institute of Standards and Technology (NIST) facility in Gaithersburg, Maryland. A 2018 report by AECOM, attached in Appendix Three, documented some of the air system airflows and deficiencies. After the existing conditions have been evaluated, recommendations are to be provided to correct existing deficiencies, replace system components and rebalance the cleanroom airflows to meet the current installed equipment's requirements. The area of discussion encompasses a majority of the existing Building AML 215 building. BKM was retained to perform a documentation of the existing conditions, analyze of the building airflow system and provide recommendations to correct the previously identified and evaluated deficiencies. This report includes recommendations as well as documentation for the following components of the air systems for Building 215:

- Removal and Replacement of the HEPA filters.
- Repair or Replacement of all variable air volume (VAV) terminal units.
- Replacement of all airflow measuring stations (AFM)
- Replacement of all magnehelic gauges
- Repair ductwork where required.
- Correct pathways for return air.
- Testing of air handling units (AHU) and exhaust fans.
- Calibration and verification of AFMs.
- Rebalance of the existing cleanroom
- Correction of airflows for lobby and exhaust systems.

This narrative describes the existing conditions of these items and provides general recommendations that will then be utilized as part of construction documents to allow for corrections to be implemented. Also, included in this narrative are a list of additional recommendations to allow for additional monitoring, preventative maintenance and energy savings opportunities.

The existing systems will continue to be analyzed to determine the existing airflows and changes from the original balancing and installed construction. As the existing systems are being identified, input from the facilities and research staff will be required to provide information for the current unknowns of the tools requiring exhaust. As part of this analysis it is assumed that all tools are currently connected to the appropriate exhaust system, which include; acid exhaust, solvent exhaust, hydride exhaust, gas cabinet exhaust, vacuum pump exhaust and general exhaust. Additional input from the NIST office of facilities and property management will be needed to determine if all air change rates and airflows should be re-balanced to the original design or if locations where airflows have been reduced are acceptable to maintain the cleanroom specifications. Upon receipt of the original balancing report or commissioning report, BKM can provide additional recommendations to assist in the final requirements for air change rates of the cleanroom and cleanroom support spaces.

Included in appendices of this narrative are documents to supplement the remediations for the existing building deficiencies and to begin to develop construction documents that will be used by a contractor to modify and rebalance the Building 215 air systems. Additionally, Appendix Two includes photos of existing conditions and installed equipment. Lastly, Appendix Three includes the 2018 AECOM report which describes the investigation of the deficiencies as well as a testing report of the current airflow measurements.

Existing Conditions

The Advanced Measurement Lab (AML) complex was constructed and completed in 2005, and consists of five buildings. Building 215 is the cleanroom facility within the AML complex and houses 1,800 square meters of cleanroom, including 750 square meters of Class 100 space. The cleanroom operates with a constant volume airflow with approximately 120 air changes for the Class 1000 spaces and 300 air changes per hour for the Class 100 areas. The cleanroom maintains pressure through the operation of two make-up air units (AHU-103, AHU-104) ducting make-up air to recirculating air handling units intended to provide pressurization for the cleanroom. The lab recirculating air handling units provide the air change rates to the cleanroom by a ducted supply to a plenum of supply high-efficiency particulate air devices. The return air then migrates through a perforated raised floor to the adjacent service galley and back to the plenum return of the recirculating air handling unit. Within the cleanroom there are three exhaust systems that exhaust various tools within the Class 100 space. The three cleanroom exhaust systems (acid, solvent & hydride) each have thirteen branch ducts with airflow monitoring stations and motor operated dampers which modulate to control the pressure within the corresponding system.

BKM is in the process of completing an investigation of the building HVAC systems to identify existing systems and their deficiencies as identified in the "preliminary survey report". As part of this investigation and building survey, subsequent construction documents will be produced to identify and correct the following known building deficiencies:

- *HEPA filters:* The existing HEPA filters are original to the building, and are experiencing increased pressure drops, which requires the associated recirculating AHU fans to operate at an increased fan speed and energy usage.
- *VAV terminals:* The existing VAV terminals associated with non-classified areas AHU-105, AHU-106 & AHU-107 have all had issues with reporting airflow to the building automation system (BAS) as indicated in the AECOM report.
- *Replace AFMs:* The existing Ebtron airflow measuring stations are reporting inaccurate measurements. In several locations the AFMs are not reporting to the local readout.
- *Replace magnehelic gauges:* The existing magnehelic gauges installed on EF-102 through EF-105 have incorrect operating ranges for the operating range of these fans. Magnehelic gauges installed within the cleanroom utilize incorrect operating ranges.
- *Repair ductwork as needed:* Undersized and modified ductwork has been identified on the exhaust system as new tools have been added to the exhaust systems. The lack of volume dampers within the existing exhaust system has also prevented the exhaust systems to be properly balanced upon the installation of a new tool in the cleanroom space.
- *Return Air Pathways*: Several locations were identified by the AECOM report as locations with limited return pathways. The lack of return air pathways has led to issues with space pressurization in the areas surrounding the Class 1000 space.
- *Testing of AHUs / EFs*: Testing of the existing exhaust system and air handling systems was completed by AECOM to compare measured conditions with the original balancing reports and current BAS reported data. It was noted that several of the recirculating systems are currently operating at lower fan speeds than their original operation. The recirculating air handling units that are operating at reduced flow rates supply air to the Class 1000 corridors or the gowning areas of the cleanroom space. It is appears based on the original design of the fans these units are capable of providing these spaces with approximately 120 air changes per hour, but have been reduced to approximately 75 air changes per hour. This may be due an energy conservation measure, in conjunction with the reduced air change rate meeting the requirements of the users and space classification. This reduction of airflow still needs to be confirmed with NIST and the cleanroom specifications.

- *Calibration & Verification of AFM*s: As previously stated under the "replace AFM" section, the existing airflow measuring stations are not reporting accurate measurements and are believed to be faulty or dirty.
- *Rebalance of Cleanroom*: The existing cleanroom has not been completely rebalanced in the past ten years to accommodate additional tools, which require exhaust, as they have been installed. This has pushed some of the exhaust systems beyond design capacity. Refer to Appendix One for drawings identifying the existing ductwork locations and schematics. As the investigation and analysis is completed these documents will be updated to identify all ductwork associated with the cleanroom systems and its design and previously measured airflows, which will be rebalanced under the conditions analysis.
- *Correct airflow in lobby and other exhaust systems*: The existing Building 215 air systems have not been fully rebalanced since changes have been made to several air systems. Due to changes within the hydride, solvent and acid exhaust systems the building's overall pressurization and system balance has shifted from the original design. Additional review of these systems will be required to identify systems that have reached or exceeded their original design capacity. Refer to Appendix One for drawings identifying the existing ductwork locations and schematics. As the investigation and analysis is completed these documents will be updated to identify all ductwork associated with the lobby and exhaust systems and its design and previously measured airflows, which will be rebalanced under the conditions analysis.

Conditions Analysis & Recommendations

For the basis of this narrative a portion of the cleanroom has been analyzed and reviewed, this area includes Room A102, A102-1 & A103-1 as well as the basement and penthouse. These documents can be found within Appendix One and will be further developed as approach and airflows are confirmed.

- *HEPA filters:* New HEPA terminal filters will be installed within the Class 100 and 1000 spaces to replace the existing original filters. The AHU HEPA filters in the recirculating and make-up air units are replaced under a normal preventative maintenance schedule and will be completed under regularly scheduled maintenance. The replacement of the filter will allow the associated recirculating AHU fans to operate at a reduced fan speed and reduce the overall fan energy usage. The quantity and locations of the existing HEPA devices are indicated in Appendix One, Drawing 215-M102.
- *VAV terminals:* It is currently unknown if the issue with the existing VAV terminals associated with AHU-105, AHU-106 & AHU-107 is due to faulty control terminals, or if there is a control issue between the VAV terminal and the building automation system (BAS) as indicated in the AECOM report. This item will require testing from a testing and balancing contractor in conjunction with the BAS operators to determine if the report issues are due to faulty controls or a communication error. If it is found that the existing Nailor VAV terminals controllers have begun to fail, it is recommended that these controllers are replaced or if funding is available the terminal units are replaced in kind. Equipment plans will continue to be developed to indicate air terminal units to be tested and schedules to indicate final balancing airflow values.
- *Replace AFMs:* The existing Ebtron airflow measuring stations may be reaching the end of their useful life of operation. The manufacturer has confirmed that the installed devices do not require calibration. The AECOM discrepancies are currently being reviewed by the manufacturer. It is recommended by the manufacturer that an installed probe is removed to identify if any substance build-up has accumulated on the sensors, that may be affecting the accuracy of these devices. It has also been recommended that sensor readouts are verified for correct settings based on their initial factory settings including their installed ductwork sizes. The installed Ebtron devices perform the airflow calculation through a process called thermal dispersion, rather than pitot tube measurement that would require regular calibration. The existing sensors could be removed, cleaned and verified for operation and accuracy or completely replaced as their expected life ranges from 10-15 years. It should be noted that the sensors are not expected to have their accuracy drift, but rather a failure of the sensor which will report a failure to the local readout. If it is deemed that the existing sensors have reached the end of their useful life the existing Ebtron devices and readouts will be replaced with new airflow measuring stations and local readout stations, which BKM ultimately recommends at this time due to the age of the current installation. As part of this replacement it is recommended that the existing thirteen branch dampers on the solvent, acid and hydride systems will be replaced with new pressure independent air valve, such as Accu-valve or Phoenix exhaust air terminals. The new exhaust valves will allow each branch ducts to operate off of pressure in the ductwork and modulate the damper to maintain flow if a tool is removed or shuts off due to intermittent use. The airflow measuring stations are indicated on the airflow schematic and will be located on a part plan view typical of Drawing 215-M201. This documentation will be duplicated for each set of recirculating air handling units.
- *Replace magnehelic gauges:* The existing magnehelic gauges installed on EF-102 through EF-105 and the cleanrooms should be replaced. The exhaust gauges will be installed with an appropriate operating range for each fan. The replacement magnehelic gauges installed within the cleanroom will utilize a -0.25" wc to +0.25" wc tolerance to indicate if the Class 100 space drops to a neutral or negative pressurization. It is recommended that all gauges are tied to the BAS for trending, monitoring and alert purposes. Refer to the Appendix One drawings for locations.
- *Repair ductwork as needed:* The installed exhaust ductwork is currently be analyzed to identify any locations of undersized ductwork that would require modification. The analysis of the exhaust systems may require some

input from the NIST OFM staff and researchers to establish correct flowrates from equipment that has not been balanced or may not have a set airflow requirement. It is recommended that each tool be installed with a volume damper, including replacing existing failing dampers, to create a uniform system that can be rebalanced as required when new equipment is installed within a lab. A recommended procedure for adding a tool to the exhaust system will be outlined to isolate the rebalance of the cleanroom air systems to the branch ductwork affected by a system modification. This procedure would be dependent on the scale of the modifications to the air systems. Recommendations for typical repair of failing joints or connections will be made as they are identified to ensure the safety of cleanroom operators and staff.

- *Return Air Pathways*: Due to a large quantity of air that is collected along Corridor CO-D-1 a wind tunnel effect is created in this area. A new above ceiling return air transfer will be installed to allow air to migrate back to AHU-113 & AHU-115 freely without entering Room D107. This will relieve air transfer across the door, allowing it to open and close freely. Room D107 is designated as a chemical change-out room. This space is recommended to be exhaust rather than allowing air to recirculate back to other adjacent spaces. The existing supply air within Room D107 supplies 120 air changes per hour, so ductwork modifications will be required to exhaust the air within Room D107 to the outdoors rather than allowing it to migrate to the return of AHU-113. These modifications can be found in Appendix One.
- *Testing of AHUs / EFs*: Further recommendations will be made as analysis of the existing exhaust systems and laboratory tool requirements. It is expected that several spot check locations will be completed to determine if an existing sensor or sensors are accurate or there is a reporting issue with the BAS. Equipment plans will continue to be developed to indicate equipment to be tested and schedules to indicate final balancing airflow values.
- *Calibration & Verification of AFM*s: As previously stated under the "replace AFM" section a testing balancing contractor will first verify that the existing Ebtron airflow stations are not accurately reading the airflow and will be replaced in kind as required. It is recommended that initial testing and investigation be completed prior to replacement to ensure that a newly installed device maintains its expected tolerance and longevity.
- *Rebalance of Cleanroom*: After the completion of full analysis of the cleanroom supply, return and exhaust systems along with any associated ductwork changes to accommodate current lab tool installations, the Building 215 air systems will be rebalanced to a provided airflow schematic to be provided as part of the final construction documents. The equipment to be included in this rebalance is as listed: AHU-101A through 101T, AHU-102A through 102D, AHU-103, AHU-104, AHU-108A, AHU-108B, AHU-109, AHU-110A, AHU-110B, AHU-111A through 111D, AHU-112, AHU-113, AHU-114, AHU-115, EF-101A, EF-101B, EF-102A, EF-102B, EF-105A, EF-105B & EF-114.
- *Correct airflow in lobby and other exhaust systems*: After the completion of full analysis of the Building 215 supply, return and exhaust systems along with any associated ductwork changes to accommodate as-built conditions, the Building 215 air systems will be rebalanced to a provided airflow schematic to be provided as part of the final construction documents. The equipment to be included in this rebalance is as listed: AHU-105, AHU-106, AHU-107, AHU-123, EF-103, EF-104, EF-106, EF-108, EF-109, EF-112, EF-122, EF-123, RF-105 & RF-107.

Other Recommendations

As a part of the review of the building system BKM believes there are additional modifications that could be considered for the improvement of the existing cleanroom and adjacent spaces operation.

- Ensure a consist preventative maintenance schedule is in place to replace the HEPA and carbon filters located in the recirculating and make-up air units.
- Install differential pressure sensors across a select number of cleanroom terminal HEPA filters to alert the BAS due to an increase in pressure drop across the filter, indicating the filters are loaded and requiring changing. This will allow for filter loading and fan energy to be monitored and trended.
- Install differential pressure sensors at the Class 100 doors to alert the BAS that a space has dropped below a specified pressure differential to prevent any potential transfer of dirt or dust that may damage the on-going research.
- It was noted that during the field investigation survey, that the cleanroom doors between the Class 1000 and viewing corridor are not gasketed. If these doors and other openings were sealed, it would ensure additional pressurization within the cleanroom, which would allow for an overall reduction in make-up air required. As 100% make-up air requires heating and cooling, a reduction in the usage of make-up air would provide a significant energy savings for the cleanroom operation.
- It is strongly recommended that commissioning services are provided after all modifications and re-balancing activities have been completed to verify that the air systems are indeed operating as the construction documents indicate.

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Appendix One – Drawings

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GAITHERSBURG, MD, BUILDING 215 CLEANROOM RE-BALANCE

INDEX

DESIGN	SHEET NO.	DESCRIPTION
X	215-G001	COVERSHEET
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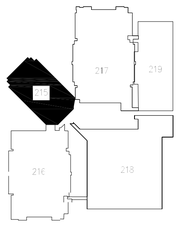
X	215-M102	L1-CLEANROOM-DUCTWORK-DEMOLITION
X	215-M103	L1 DISTRIBUTION-DUCTWORK-DEMOLITION
X	215-M104	L2 PENTHOUSE-DUCTWORK-DEMOLITION
X	215-M201	PART L2 PENTHOUSE-DUCTWORK -DEMOLITION
X	215-M301	PART CLEANROOM-AIRFLOW DIAGRAM-EXISTING
X	215-M401	L1 CLEANROOM-PRESSURIZATION

KEYPLAN



A/E STAMPS

MECHANICAL ENGINEER

ISSUE DATE: DECEMBER 2019

MARK	DESCRIPTION	DATE
1	35% SUBMISSION	12/06/2019

DESIGNED BY: J. METZLER
DRAWN BY: L. ABATE
CHECKED BY: B. COLLINS
SUBMITTED BY: X. XXXXXXX
SIZE: A1
ISSUE DATE: DECEMBER 2019
SOLICITATION NO.: SOLICITATION NO.
CONTRACT NO.: CONTRACT NO.

NIST
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GAITHERSBURG, MD, BUILDING 215
CLEANROOM REBALANCE
CLIN 0002
19W00139

COVERSHEET

SHEET ID
215-G001

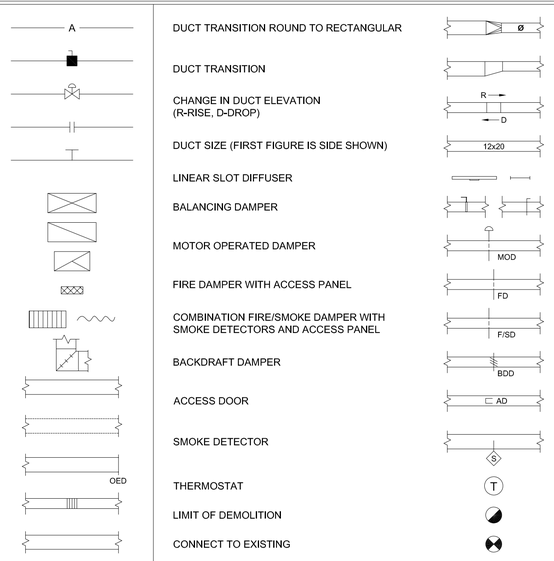
FILE NAME

BKM#19146.01

MECHANICAL GENERAL NOTES

1. THE MECHANICAL CONTRACT DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO INDICATE SCOPE AND THE GENERAL ARRANGEMENT OF THE SYSTEMS. WHERE APPLICABLE THE FOLLOWING NOTES SHALL APPLY TO ALL MECHANICAL (HVAC) SYSTEMS.
2. THOUGH SOME DUCTWORK OFFSETS AND TRANSITIONS ARE INDICATED, IT IS NOT THE INTENT OF THE DRAWINGS TO SHOW ALL OFFSETS AND TRANSITIONS REQUIRED. THE CONTRACTOR SHALL FULLY COORDINATE THE MECHANICAL WORK WITHIN ITSELF AND WITH THE WORK OF ALL OTHER TRADES TO PROVIDE COMPLETE AND OPERABLE SYSTEMS WITHOUT INTERFERENCES.
3. PROVIDE ACCESS PANELS WHERE REQUIRED FOR ADEQUATE ACCESS TO ALL CONCEALED EQUIPMENT, VALVES, DAMPERS AND CONTROLS.
4. ALL DUCT SIZES REFER TO INTERNAL FREE AREA.
5. ALL DUCTWORK SHALL BE CONSTRUCTED OF RIGID SHEET METAL UNLESS OTHERWISE NOTED.
6. COORDINATE DIFFUSER, REGISTER AND GRILLE LOCATIONS AND BORDER TYPES WITH EXISTING CEILING PLAN.
7. PATCH AND SEAL ALL REMAINING OPENINGS (NEW AND EXISTING) THROUGH FLOORS, CEILINGS, WALLS, AND ROOF RESULTING FROM DEMOLITION OR NEW WORK WITH MATERIALS AND FINISHES TO MATCH EXISTING CONSTRUCTION AND FIRE RATING.
8. AS AN INTEGRAL PART OF THESE DOCUMENTS, THE CONTRACTOR SHALL REFER TO THE SPECIFICATIONS FOR ADDITIONAL INFORMATION.
9. CONTRACTOR SHALL VISIT THE SITE AND VERIFY EXISTING CONDITIONS PRIOR TO THE BEGINNING OF ANY WORK. FAILURE TO VISIT THE SITE SHALL IN NO WAY RELIEVE THE CONTRACTOR FROM ANY RESPONSIBILITY.
10. CONTRACTOR SHALL USE CARE WHEN PERFORMING SELECTIVE DEMOLITION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO BUILDING FINISHES, EQUIPMENT, FURNITURE, STRUCTURE, AND MECHANICAL/ELECTRICAL SYSTEMS AND EQUIPMENT. SHOULD ANY DAMAGE OCCUR THE CONTRACTOR SHALL RESTORE DAMAGED AREA/ITEMS TO ORIGINAL CONDITION TO MEET THE OWNER'S SATISFACTION.
11. CONTRACTOR SHALL NOTIFY AND COORDINATE WITH THE OWNER ANY UTILITY OUTAGES. OWNER SHALL BE GIVEN A MINIMUM OF 72 HOURS NOTICE (THREE WORKING DAYS) FOR ANY OUTAGES.
12. HVAC SHALL BE MAINTAINED TO ALL AREAS OUTSIDE OF THE CURRENT PHASE OF THE RENOVATED AREA AT ALL TIMES. PROVIDE TEMPORARY CONNECTIONS AS REQUIRED TO COORDINATE OUTAGES WITH THE OWNER A MINIMUM OF 72 HOURS (THREE WORKING DAYS) IN ADVANCE.
13. DEMOLITION AND NEW WORK THAT WILL RESULT IN DOWN TIME OF SERVICES (HVAC, PLUMBING, LAB GASES, ETC.) SHALL BE PERFORMED AT PREMIUM TIME AS REQUIRED TO MINIMIZE DOWN TIME TO ADJACENT SPACES. COORDINATE ALL OUTAGES WITH OWNER.
14. SCHEDULE ALL WORK IN OCCUPIED SPACES WITH OWNER AT LEAST TWO (2) WEEKS PRIOR TO CONSTRUCTION.
15. CONTRACTOR SHALL TEST/BALANCE ALL AIR EQUIPMENT AND DEVICES INDICATED ON THE DOCUMENTS. AIR SYSTEM EQUIPMENT AND DEVICES SHALL INCLUDE, BUT NOT BE LIMITED TO: AIR HANDLING EQUIPMENT (AHU'S, ETC.), FANS, AIR VOLUME TERMINAL UNITS, AIR DEVICES, DUCT MOUNTED VOLUME DAMPERS, HOODS, ETC. BALANCE ALL EQUIPMENT AND DEVICES TO THE AIR/ INDICATED ON THE DOCUMENTS (WHERE FLOWS ARE NOT CLEARLY INDICATED, CONTACT THE A/E FOR CLARIFICATION).

MECHANICAL LEGEND



MECHANICAL ABBREVIATIONS

AIR CHANGES / HOUR	AC / HR	LENGTH	L
ABOVE FINISHED FLOOR	AFF	POUNDS	LBS
ADJUSTABLE FREQUENCY DRIVE	AFD	LOCKED ROTOR AMPS	LRA
AIR FLOW MONITOR	AFM	LIMITS PER SECOND	L / S
AIR HANDLING UNIT	AHU	LEAVING WATER TEMPERATURE	LWT
AIR PRESSURE DROP	APD	MAXIMUM	MAX
AUTOMATIC TEMPERATURE CONTROLS	ATC	MECHANICAL EQUIPMENT ROOM	MER
AIR TERMINAL UNIT	ATU	METERS	M
BUILDING AUTOMATION SYSTEM	BAS	METERS PER SECOND	M / S
BRAKE HORSEPOWER	BHP	MILLIMETERS	MM
CAPACITY	CAP	MINIMUM	MIN
CUBIC FEET PER MINUTE	CFM	NORMALLY CLOSED	NC
CONNECT TO EXISTING	CX	NOT IN CONTRACT	NIC
DRY BULB	DB	NORMALLY OPEN / NUMBER	NO
DESIGNATION	DESIG	OUTSIDE AIR	OA
DIAMETER	DIA	OPEN END DUCT	OED
DOWN	DN	PASCAL	PA
DIFFERENTIAL PRESSURE SENSOR	DPS	POUNDS PER SQUARE INCH	PSI
DRAWING(S)	DWG	PRESSURE	PRESS
EXHAUST AIR	EA	QUANTITY	QTY
EXHAUST AIR ACID	EAA	RETURN AIR	RA
EXHAUST AIR HYDRIDE	EAH	RETURN AIR FAN	RAF
EXHAUST AIR SOLVENT	EAS	RELATIVE HUMIDITY	RH
ENTERING AIR TEMPERATURE	EAT	REVOLUTIONS PER MINUTE	RPM
EXHAUST FAN	EF	REMOVE EXISTING	RX
ENERGY MANAGEMENT CONTROL SYSTEM	EMCS	SUPPLY AIR	SA
EXTERNAL STATIC PRESSURE	ESP	STATIC PRESSURE	SP
EXISTING TO REMAIN	ETR	TESTING AND BALANCING	TAB
FLEXIBLE CONNECTION	FC	TOTAL STATIC PRESSURE	TSP
FEET PER MINUTE	FPM	TYPICAL	TYP
FEET	FT	UNLESS OTHERWISE NOTED	UON
FACE VELOCITY	FV	VOLTS	V
HEIGHT	H	VARIABLE AIR VOLUME	VAV
HORSEPOWER	HP	VARIABLE FREQUENCY DRIVE	VFD
HERTZ	HZ	WIDTH	W
INCH(ES)	IN	WET BULB	WB
KILO PASCAL	KPA	WATER COLUMN	WC
KILOWATT	KW	WATER GAUGE	WG

NIST
OFPM Office of Facilities & Property Management

MARK	DESCRIPTION	DATE
1	35% SUBMISSION	12/06/2019

ISSUE DATE: DECEMBER 2019
SOLICITATION NO.: SOLICITATION NO.
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DESIGNED BY: X. XXXXXXX
DRAWN BY: X. XXXXXXX
CHECKED BY: X. XXXXXXX
SUBMITTED BY: X. XXXXXXX
SIZE: A1

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CLEANROOM REBALANCE
CLIN 0002
19W08139

MECHANICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES

SHEET ID
215-M001

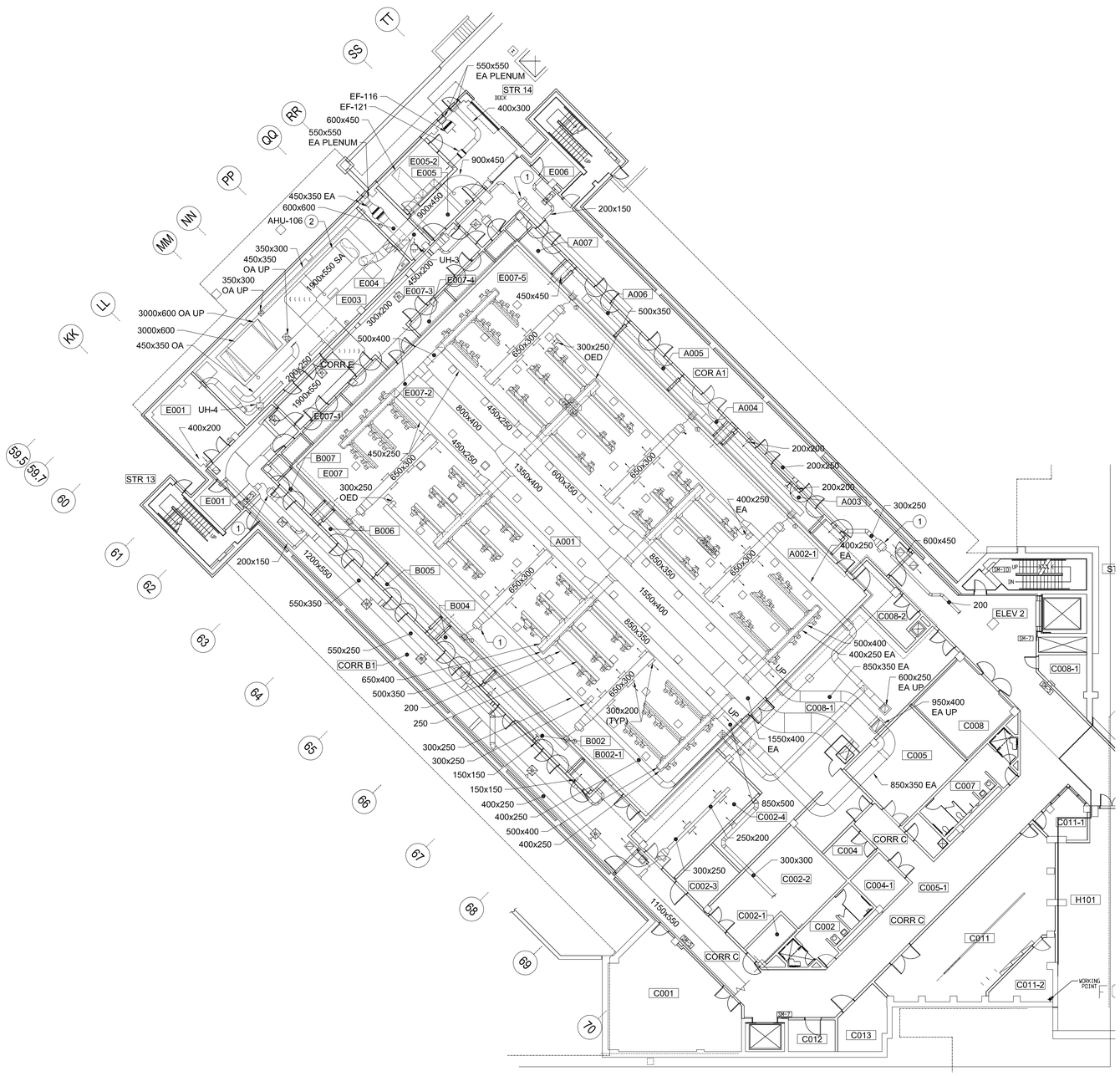
BKM#19146.01

GENERAL NOTES:

1. REFER TO 215-M0.01 FOR MECHANICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES.

DRAWING NOTES:

1. VERIFY OPERATION OF VARIABLE AIR VOLUME TERMINAL UNIT CONTROL PANEL AND DAMPER, TYPICAL OF 30.
2. PERFORM AS-FOUND TESTING OF AIR HANDLING UNIT AIRFLOW. REBALANCED TO SCHEDULED AIRFLOW.



1 LOWER LEVEL FLOOR PLAN - DUCTWORK - DEMOLITION

0 5 10m

KEYPLAN

NORTH

MARK	DESCRIPTION	DATE
1	35% SUBMISSION	12/06/2019

DESIGNED BY: J. METZLER
DRAWN BY: S. YURIDITSKIY
CHECKED BY: B. COLLINS
SUBMITTED BY: X. XXXXXXX
SIZE: A1

ISSUE DATE: DECEMBER 2019
SOLICITATION NO.: SOLICITATION NO.
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CLEANROOM REBALANCE
CLIN 0002
19W08139

LOWER LEVEL FLOOR PLAN
DUCTWORK
DEMOLITION

SHEET ID
215-M101

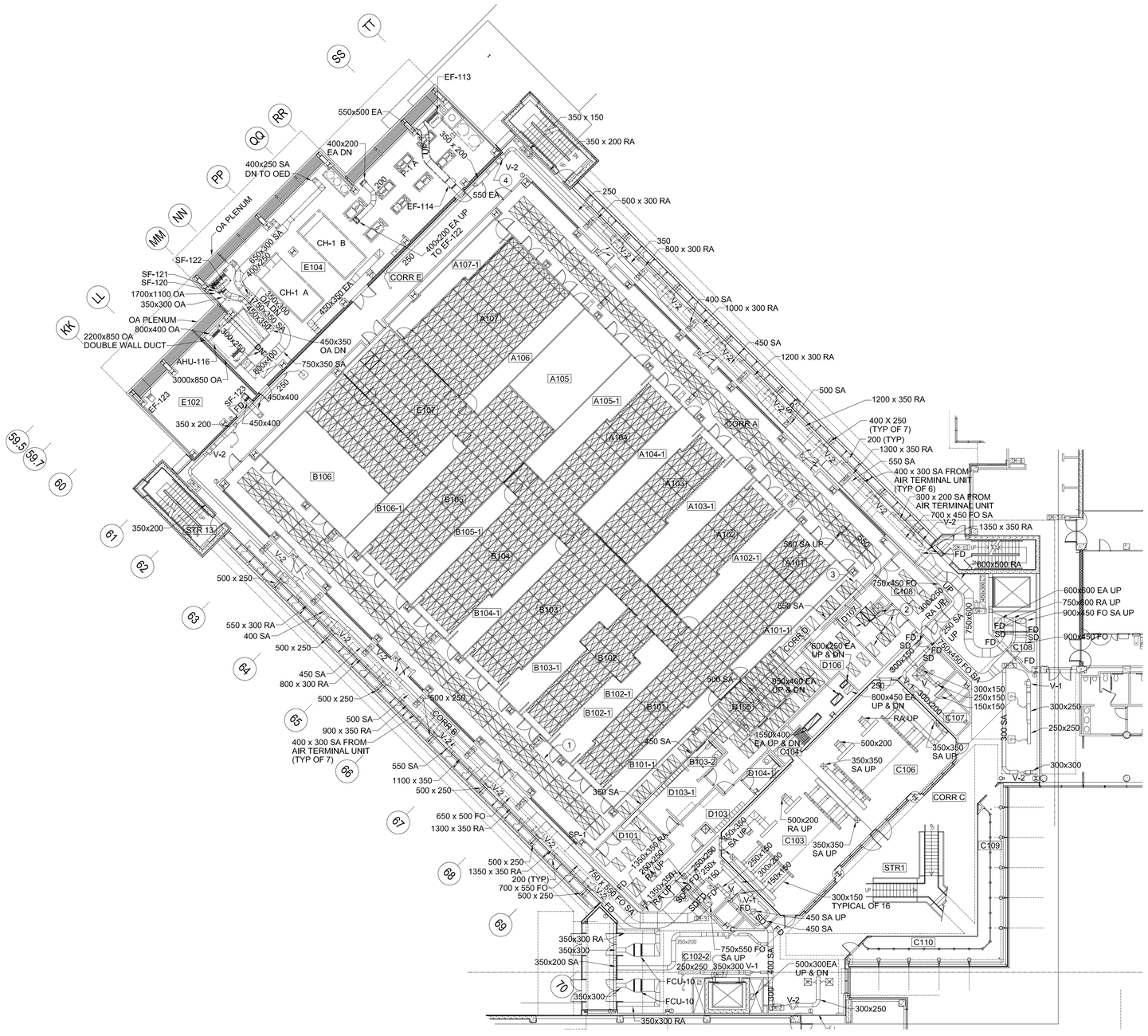
BKM#19146.01

GENERAL NOTES:

1. REFER TO 215-M001 FOR MECHANICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES.

DRAWING NOTES:

1. REPLACE EXISTING HEPA FILTER, TYPICAL.
2. REPLACE EXISTING RETURN AIR GRILLE WITH CEILING TILE PANEL TO MATCH EXISTING CEILING.
3. INSTALL NEW RETURN AIR TRANSFER GRILLE.
4. VERIFY OPERATION OF VARIABLE AIR VOLUME TERMINAL UNIT CONTROL PANEL AND DAMPER, TYPICAL OF 25.


EF-113
550x500 EA
400x200 EA DN
400x250 SA DN TO OED
OA PLENUM
SF-122
SF-121
SF-120
1700x1100 OA
350x300 OA
2200x850 OA DOUBLE WALL DUCT
800x400 OA
AHU-116
3000x850 OA
750x350 SA
450x350 OA DN
CH-1 B
CH-1 A
E104
CORR E
400x200 EA UP TO EF-122
A107-1
A107
A106
A105
A105-1
E107
A104
A104-1
A103
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B106
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B105
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B101
B101-1
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D103-1
D103
D101
CORR A
CORR B
CORR D
CORR C
STR 13
STR1
C102-2
C103
C104
C106
C107
C108
C109
C110
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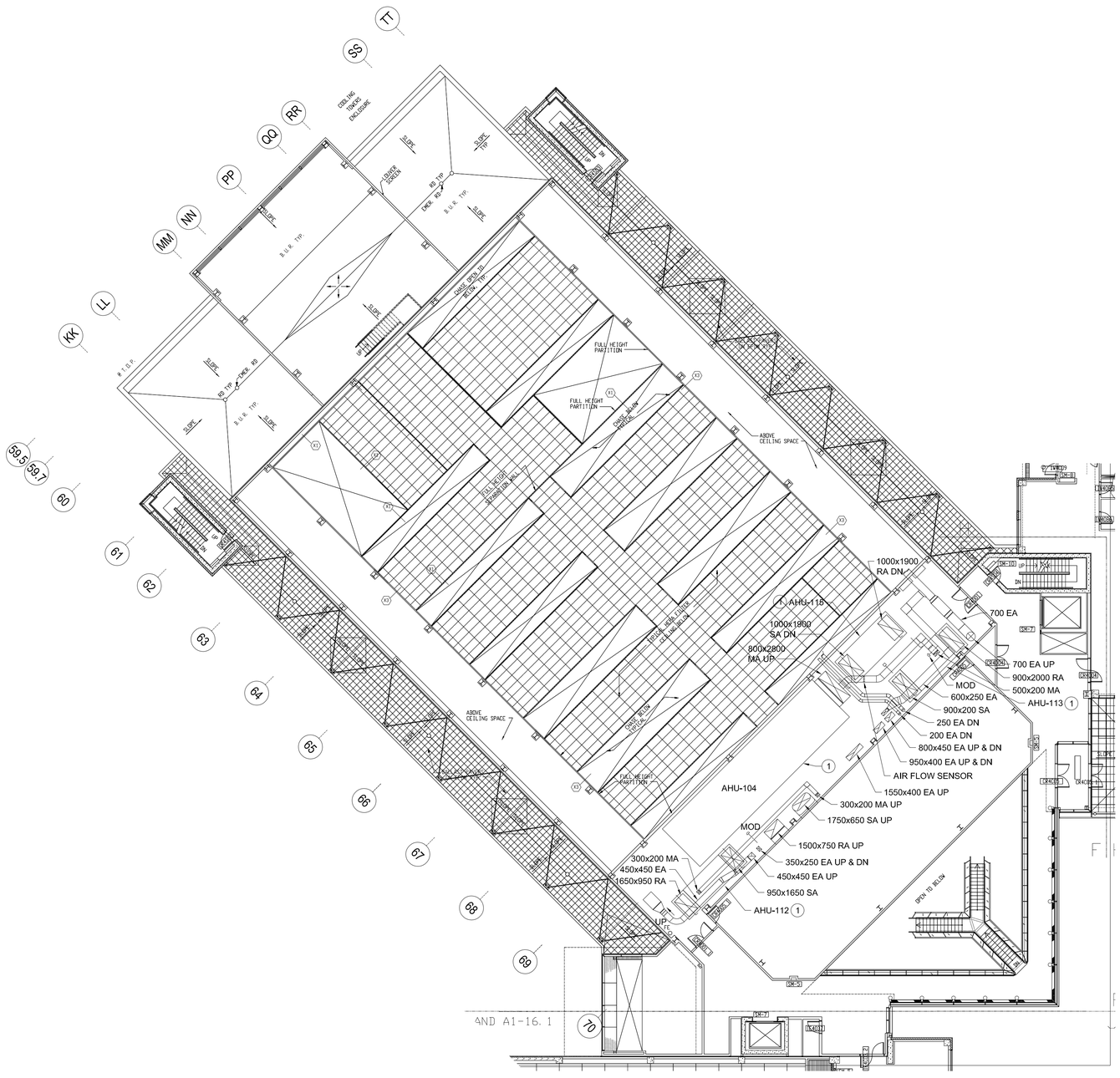
D107
FCU-10
V-1
V-2
V-2A
V-2B
SP-1
EF-123
FD
SD
350 x 150
350 x 200 RA
500 x 300 RA
800 x 300 RA
1000 x 300 RA
1200 x 300 RA
1200 x 350 RA
400 X 250 (TYP OF 7)
200 (TYP)
1300 x 350 RA
550 SA
400 x 300 SA FROM AIR TERMINAL UNIT (TYP OF 6)
300 x 200 SA FROM AIR TERMINAL UNIT
700 x 450 FO SA
1350 x 350 RA
800x500 RA
600x500 EA UP
750x600 RA UP
900x450 FO SA UP
900x450 FO
300x150 TYPICAL OF 16
450 SA UP
450 SA
500x300EA UP & DN
300x250
300x300
350x300 RA
350x300
350x200 SA
750x550 FO SA UP
250x250
350x300 V-1
500 x 250
550 x 300 RA
400 SA
450 SA
800 x 300 RA
900 x 350 RA
400 x 300 SA FROM AIR TERMINAL UNIT (TYP OF 7)
1100 x 350
650 x 500 FO
1300 x 350 RA
1350 x 350 RA
700 x 550 FO
550 SA UP
750x450 FO
600x250 EA UP & DN
950x400 EA UP & DN
800x450 EA UP & DN
1550x400 EA UP & DN
500x200
350x350 SA UP
500x200 RA UP
300x150
250x150
150x150
300x250
250x250
300x300
750x550 FO SA
1350x350 RA UP
250x200
250x150
300x150
150x150
350x350 SA UP
350x350 RA UP
350x200
350x300 SA
300 SA
400 SA
500 SA
350 SA
450 SA
250
350
400
500
550
750
1350
1350x350 RA UP
250x200 SA UP
250x150 SA UP
300x150 RA UP
150x150 SA UP
750x600
750x450 FO SA
300x150 RA UP
250 SA UP
300x200 RA UP
300x200 SA UP
250 SA UP
RA UP
SA UP
RA UP
SA UP
SA UP
RA UP
SA UP
SA UP
RA UP
S

GENERAL NOTES:

1. REFER TO 215-M0.01 FOR MECHANICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES.

DRAWING NOTES:

1. PERFORM AS-FOUND TESTING OF AIR HANDLING UNIT AIRFLOW. REBALANCE TO SCHEDULED AIRFLOW.



1 LEVEL 1 CLEAN DISTRIBUTION ROOM FLOOR PLAN - DUCTWORK - DEMOLITION

0 5 10m

KEYPLAN

NORTH

NIST OFPM

MARK	DESCRIPTION	DATE
1	35% SUBMISSION	12/06/2019

DESIGNED BY: J. METZLER
DRAWN BY: S. YURIDITSKIY
CHECKED BY: B. COLLINS
SUBMITTED BY: X. XXXXXXX
SIZE: A1

ISSUE DATE: DECEMBER 2019
SOLICITATION NO.: SOLICITATION NO.
CONTRACT NO.: CONTRACT NO.

NIST
OFPM
GAITHERSBURG, MD

BURDETTE, KOEHLER, MURPHY & ASSOCIATES, INC.
6300 BLAIR HILL LANE, SUITE 400
BALTIMORE, MARYLAND 21209

GAITHERSBURG, MD, BUILDING 215
CLEANROOM REBALANCE
CLIN 0002
19W08139

LEVEL 1 CLEAN ROOM DISTRIBUTION FLOOR PLAN
DUCTWORK
DEMOLITION

SHEET ID
215-M103

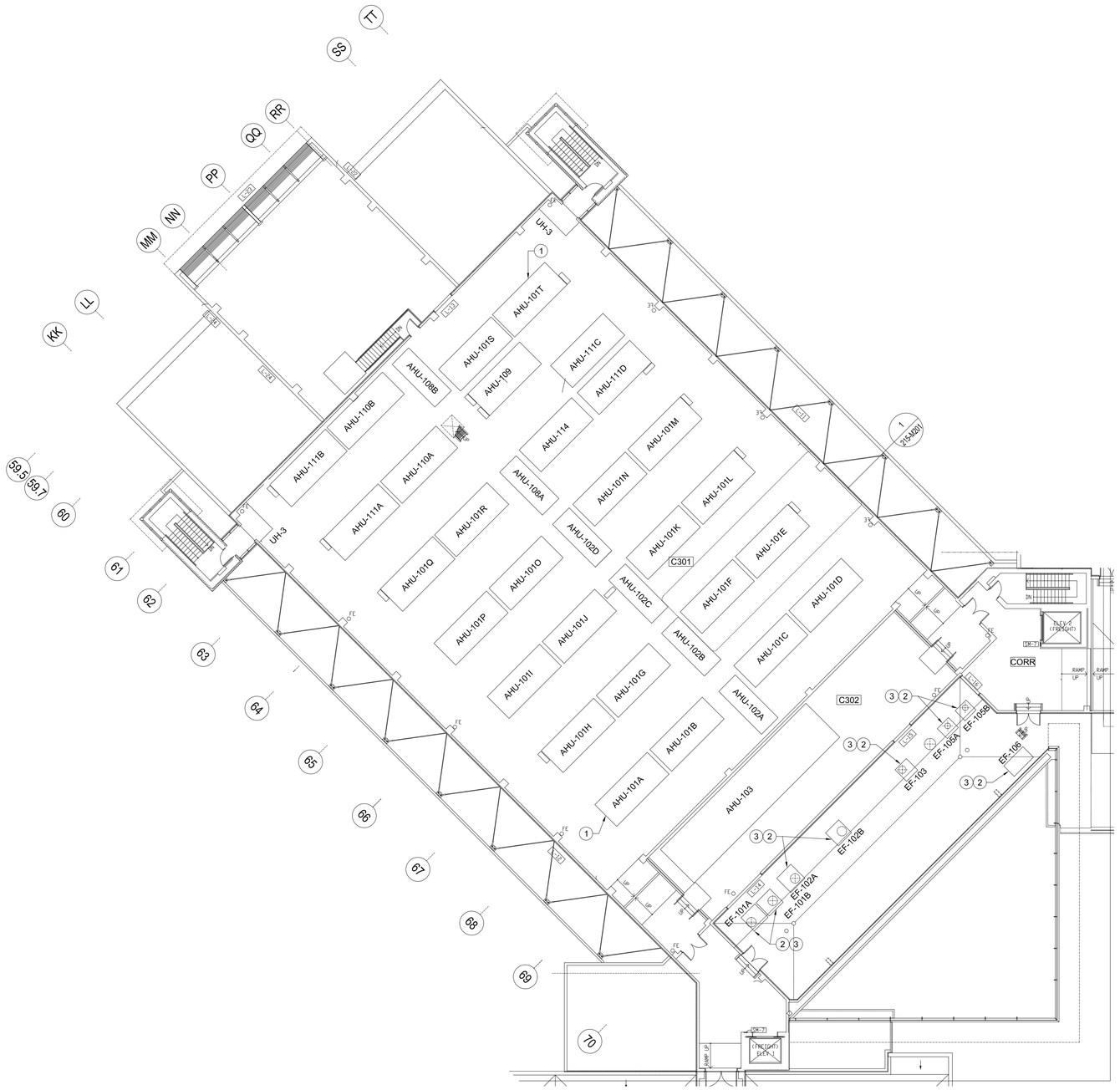
BKM#19146.01

GENERAL NOTES:

1. REFER TO 215-M001 FOR MECHANICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES.

DRAWING NOTES:

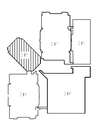
1. PERFORM AS-FOUND TESTING OF AIR HANDLING UNIT AIRFLOW. REBALANCE TO SCHEDULED AIRFLOW.
2. PERFORM AS-FOUND TESTING OF EXHAUST FAN AIRFLOW. REBALANCE TO SCHEDULED AIRFLOW.
3. REPLACE EXISTING MAGNEHELIC GAUGES.



1 LEVEL 2 PENTHOUSE FLOOR PLAN - DUCTWORK - EXISTING
SCALE: 1:200

0 5 10m

KEYPLAN



NORTH

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MARK	DESCRIPTION	DATE
1	35% SUBMISSION	12/06/2019

DESIGNED BY: J. METZLER
DRAWN BY: N. GLAUDEMANS
CHECKED BY: B. COLLINS
SUBMITTED BY: B. COLLINS
SIZE: A1
ISSUE DATE: DECEMBER 2019
SOLICITATION NO.: SOLICITATION NO.
CONTRACT NO.: CONTRACT NO.

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BALTIMORE, MARYLAND 21209

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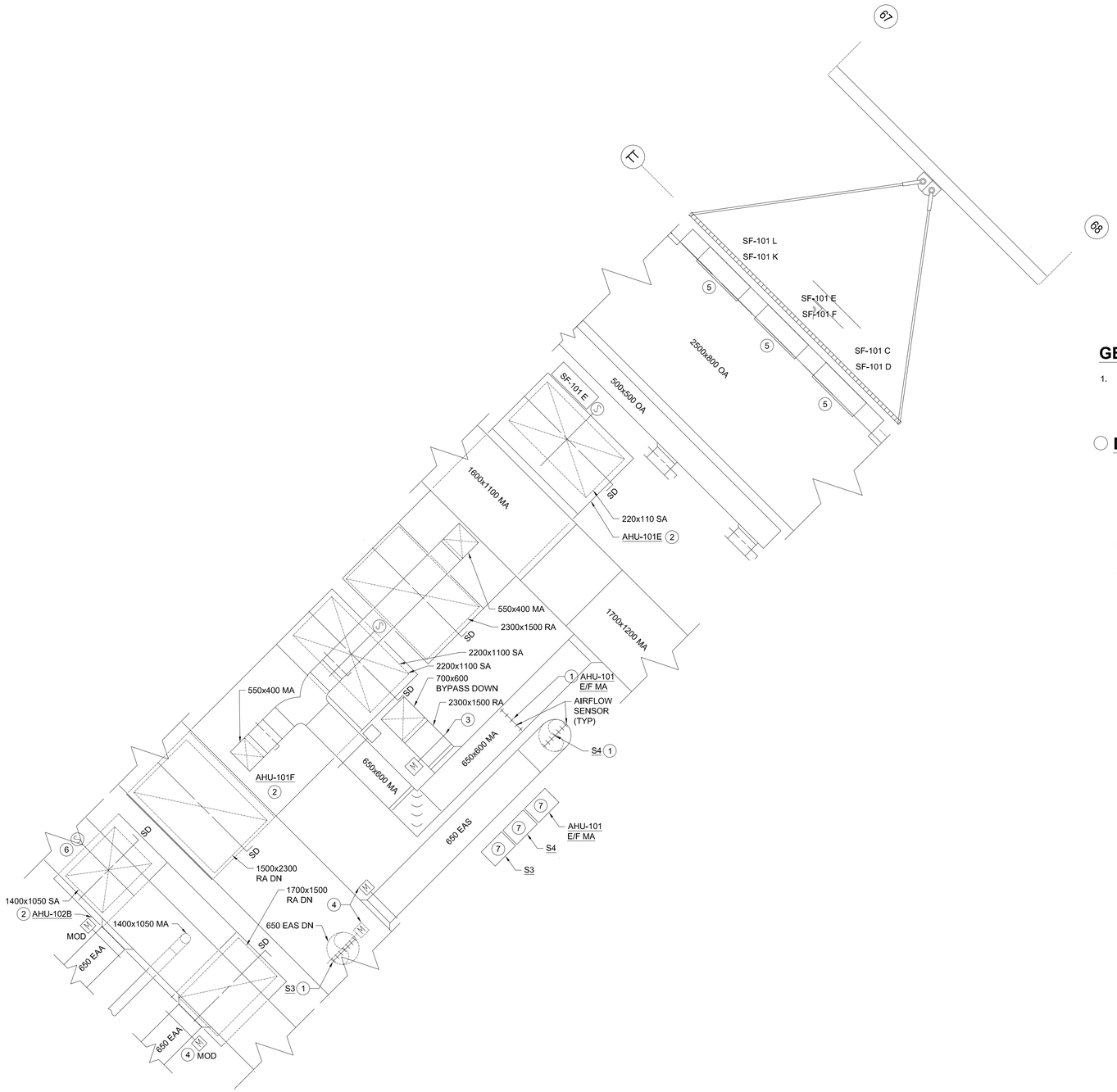
CLEANROOM REBALANCE
CLIN 0002
19W08139

LEVEL 2 PENTHOUSE FLOOR PLAN
DUCTWORK
EXISTING

SHEET ID
215-M104

BKM#19146.01



1 PART LEVEL 2 PENTHOUSE FLOOR PLAN - DUCTWORK - DEMOLITION

SCALE: 1:50

0 1 2m

GENERAL NOTES:

1. REFER TO 215-M0.01 FOR MECHANICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES.

DRAWING NOTES:

1. REMOVE EXISTING AIR FLOW MONITOR SENSOR (TYPICAL).
2. EXISTING TO REMAIN RECIRCULATING AIR HANDLING UNIT.
3. EXISTING TO REMAIN BYPASS DAMPER.
4. EXISTING MOTOR OPERATED DAMPER TO BE MODIFIED.
5. EXISTING TO REMAIN ADJUSTABLE FREQUENCY DRIVE SERVING SUPPLY FANS (TYPICAL).
6. EXISTING TO REMAIN SMOKE DETECTOR.
7. REMOVE EXISTING AIR FLOW MONITOR READOUT.

KEYPLAN

NORTH

MARK	DESCRIPTION	DATE
1	35% SUBMISSION	12/06/2019

ISSUE DATE: DECEMBER 2019
SOLICITATION NO.: SOLICITATION NO.
CONTRACT NO.: CONTRACT NO.

DESIGNED BY: J. METZLER
DRAWN BY: S. YURIDITSKIY
CHECKED BY: B. COLLINS
SUBMITTED BY: X. XXXXXXX
SIZE: A1

NIST
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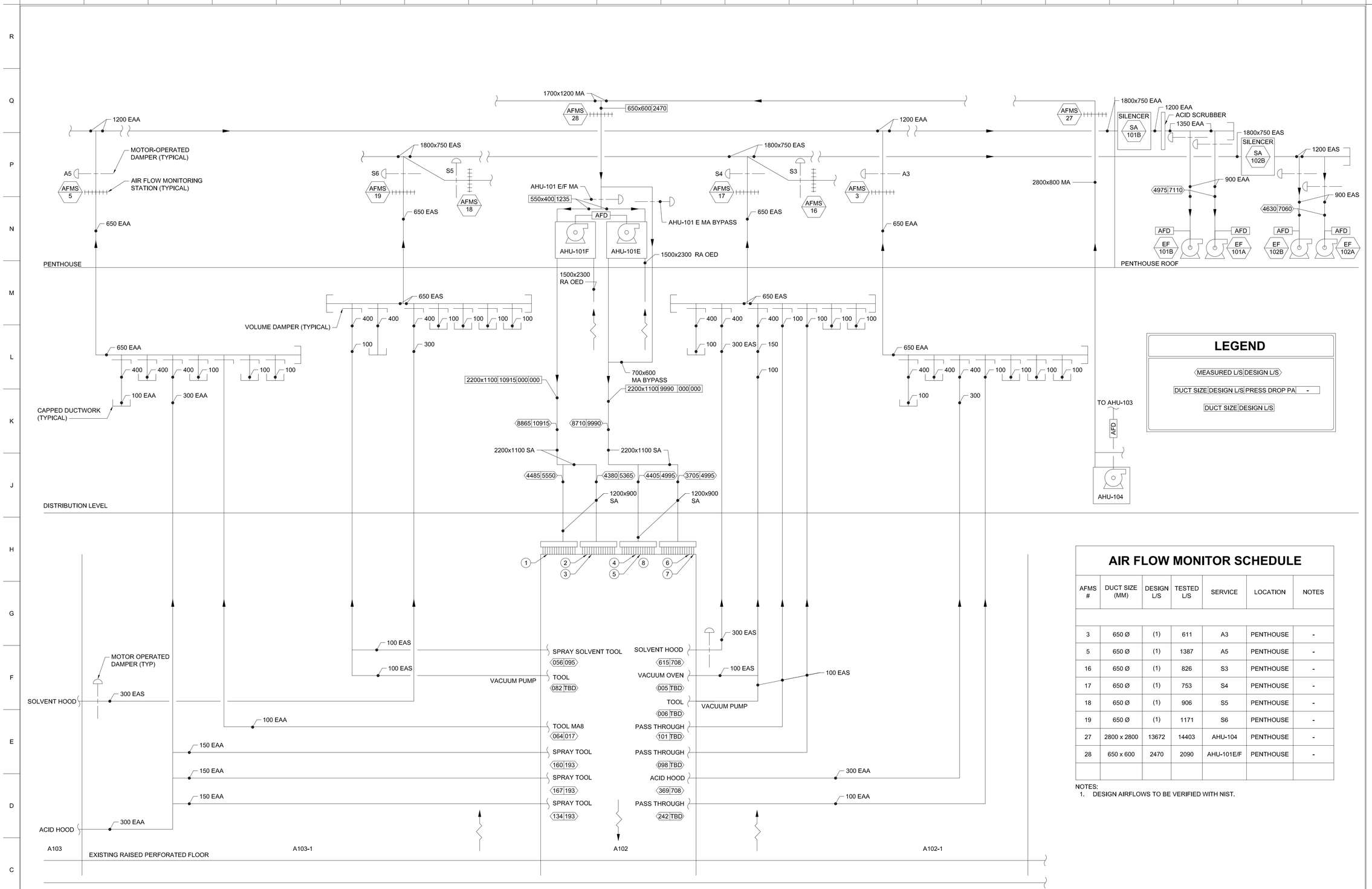
CLEANROOM REBALANCE
CLIN 0002
19W08139

PART LEVEL 2 PENTHOUSE FLOOR PLAN
DUCTWORK
DEMOLITION

SHEET ID
215-M201

BK\M#19146.01



AIR FLOW MONITOR SCHEDULE

AFMS #	DUCT SIZE (MM)	DESIGN L/S	TESTED L/S	SERVICE	LOCATION	NOTES
3	650 Ø	(1)	611	A3	PENTHOUSE	-
5	650 Ø	(1)	1387	A5	PENTHOUSE	-
16	650 Ø	(1)	826	S3	PENTHOUSE	-
17	650 Ø	(1)	753	S4	PENTHOUSE	-
18	650 Ø	(1)	906	S5	PENTHOUSE	-
19	650 Ø	(1)	1171	S6	PENTHOUSE	-
27	2800 x 2800	13672	14403	AHU-104	PENTHOUSE	-
28	650 x 600	2470	2090	AHU-101E/F	PENTHOUSE	-

NOTES:
1. DESIGN AIRFLOWS TO BE VERIFIED WITH NIST.

1 CLEANROOM AIRFLOW DIAGRAM - EXISTING - A102

NO SCALE

GENERAL NOTES:

1. REFER TO 215-M001 FOR MECHANICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES.
2. REFER TO DRAWING 215-M102 AND 215-M104 FOR PLAN VIEW.

DRAWING NOTES:

1. 300 MM SA NECK TO HEPA. 370 L/S. TYPICAL OF 15.
2. 300 MM SA NECK TO HEPA. 370 L/S. TYPICAL OF 14.
3. 200 MM SA NECK TO HEPA. 185 L/S.
4. 300 MM SA NECK TO HEPA. 370 L/S. TYPICAL OF 12.
5. 200 MM SA NECK TO HEPA. 185 L/S. TYPICAL OF 3.
6. 300 MM SA NECK TO HEPA. 370 L/S. TYPICAL OF 12.
7. 200 MM SA NECK TO HEPA. 185 L/S. TYPICAL OF 3.
8. AS-BUILT DRAWINGS SHOW 6 200 MM SA NEXK TO HEPA AT 185 L/S FROM AHU 101-E. TAB REPORT DOCUMENTS 5.

MARK	DESCRIPTION	DATE
1	35% SUBMISSION	12/06/2019

DESIGNED BY: X. XXXXXXX
DRAWN BY: X. XXXXXXX
CHECKED BY: X. XXXXXXX
SUBMITTED BY: X. XXXXXXX
SIZE: A1
ISSUE DATE: DECEMBER 2019
SOLICITATION NO.: SOLICITATION NO.
CONTRACT NO.: CONTRACT NO.

NIST OFPM GAITHERSBURG, MD

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6300 BLAIR HILL LANE, SUITE 400
BALTIMORE, MARYLAND 21209

GAITHERSBURG, MD, BUILDING 215
CLEANROOM REBALANCE
CLIN 0002
19W08139

CLEANROOM AIRFLOW DIAGRAM EXISTING

SHEET ID
215-M301

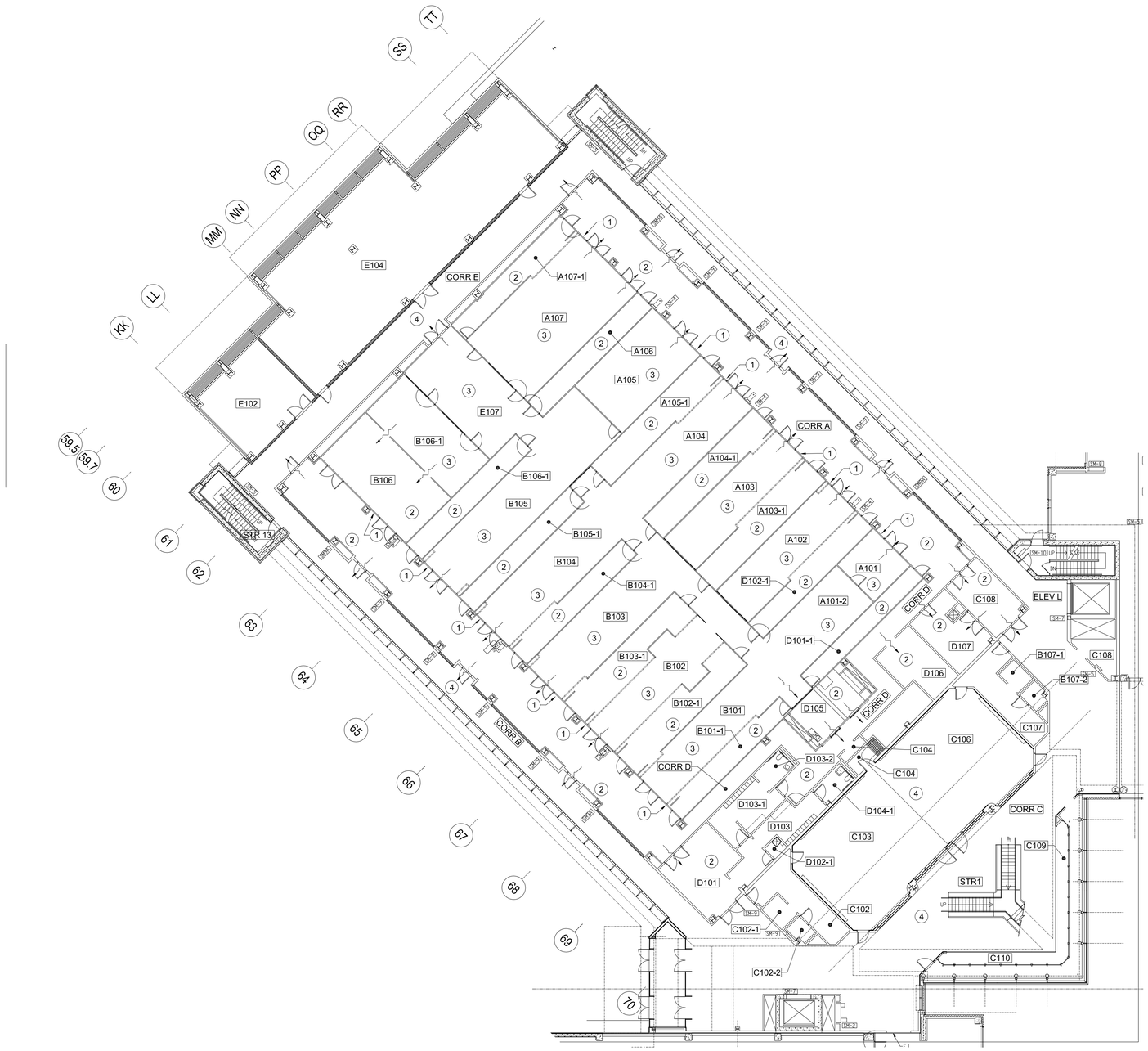
BKM#19146.01

GENERAL NOTES:

1. REFER TO M0.01 FOR MECHANICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES.

DRAWING NOTES:

1. REPLACE EXISTING MAGNETIC GAUGE WITH NEW MAGNETIC GAUGE WITH -0.25"WC TO +.25"WC OPERATING RANGE.
2. CLASS 1000 SPACE.
3. CLASS 100 SPACE.
4. UNCLASSIFIED SPACE.



1 LEVEL 1 CLEAN ROOM FLOOR PLAN - PRESSURIZATION

0 5 10m

KEYPLAN

NORTH

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OFPM
Office of Facilities & Property Management

MARK	DESCRIPTION	DATE
1	35% SUBMISSION	12/06/2019

DESIGNED BY: J. METZLER
DRAWN BY: N. GLAUDEMANS
CHECKED BY: B. COLLINS
SUBMITTED BY: B. COLLINS
SCALE:
SIZE: A1

ISSUE DATE: DECEMBER 2019
SOLICITATION NO.: SOLICITATION NO.
CONTRACT NO.: CONTRACT NO.

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OFPM
GAITHERSBURG, MD

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BALTIMORE, MARYLAND 21209

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CLEANROOM REBALANCE
CLIN 0002
19W08139

LEVEL 1 CLEAN ROOM FLOOR PLAN
PRESSURIZATION

SHEET ID
215-M401

BKM#19146.01

Appendix Two – Existing Photos

Typical Airflow Measuring Station Readouts, Penthouse

Typical Airflow Measuring Station in Exhaust Ductwork, Penthouse

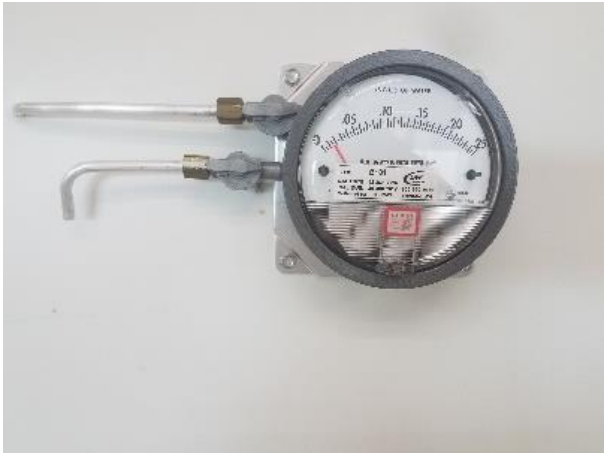
Duct Static Pressure Sensor, Penthouse

Exhaust Branch Motor Operated Damper, Penthouse

Perforated Raised Flooring, Cleanroom

HEPA Filter Device, Cleanroom

Variable Air Volume Terminal with Hot Water Reheat, Visitor Corridor



Magnehelic Gauge, Cleanroom Corridor

Cabinet Exhaust Branch Damper, Basement

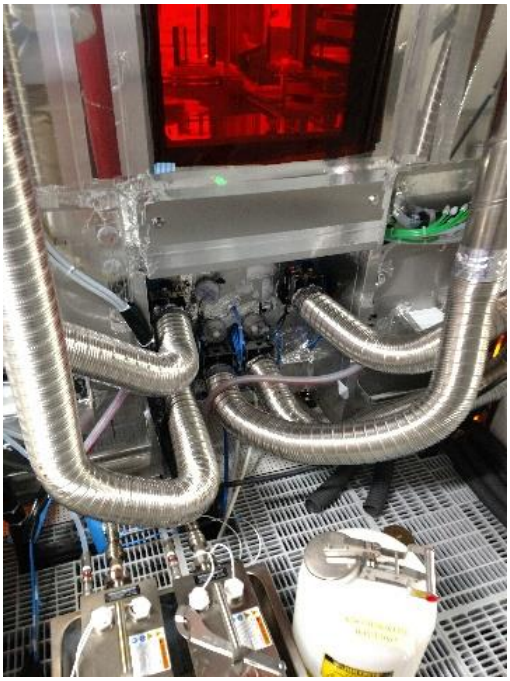
Gas Exhaust Cabinet, Basement

Hydride Exhaust and Supply Ductwork, Distribution Level

Tool Exhaust Connection, Service Corridor

Tool Exhaust Damper, Service Corridor

Tool Exhaust Connection, Service Corridor



Tool Exhaust Connection, Service Corridor

Unsealed Exhaust Duct Connection, Service Corridor

Cleanroom Recirculating Unit Return Plenum, Distribution Level

bkm

Appendix Three – AECOM Report

AECOM

APSI | CONSTRUCTION MANAGEMENT

Building 215 Rebalance Project CLIN 1 Report

Submitted to:

National Institute of Standards and Technology
c/o Robert Hellmuth
100 Bureau Drive
Gaithersburg, MD 20899

Drafted by:

Johnny Murray, CxA

AECOM

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III. Discovered HVAC Issues 004

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B. EBTRON Air Flow Monitor Verification Results 010

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III. FLOOR PLAN Appendix 269

CLIN 1 Test and Balance Project Report

Date of Activity:	February 2018 to present.					Report #	CLIN 1
	Document Examination		Site Observation	X			

To:	Robert Hellmuth
cc:	
Project:	Rebalance NIST Building 215
Subject:	CLIN 1 TAB Report
Ref. Doc:	Original TAB Report, Original Site Plans, and updated Site Plans.
Summary:	

CLIN 1 TAB Introductory Overview

The NIST Bldg. 215 CLIN 1 TAB effort by AECOM includes a complete readout of existing HVAC systems as-found with few system setpoint adjustments under normal operating conditions. The only system setpoint adjustments that were made involved the modulation of the VAV boxes to their maximum airflow setpoints through BAS airflow setpoint overrides. The VAV boxes associated with AHUs 105, 106, and 107 have modulating airflow setpoints (in most cases) which respond to associated space conditions under normal operation. This VAV equipment is located outside of the Clean Room envelope. The CLIN 1 TAB effort was for testing all AHUs and Exhaust Fans listed in the Statement of Work include all Bldg. 215 AHUs, Exhaust Fans (with a few exceptions), calibration verification of room and AHU and EF Magnehelic gauges and calibration verification of the EBTRON airflow monitoring stations (AFM), as well as, a summary of actual as-found pressurization relationships of most of the Bldg. 215 rooms to their adjacent rooms. The following is the report of our findings with commentary.

HVAC System Issues

1. Wind tunnel effect along corridor CO-D-1

   - Cause: Limited return air pathway for AHU 115 and AHU 113 due to lack of above ceiling transfer openings. The return air for these units moves through the corridor into adjacent corridor CO-A1-1.

   - Initial Recommendation: Add ceiling transfer grilles to Area CO-D-1. Install an above-ceiling transfer opening between CO-D-1 and D107 (Chem. Change-out).

2. D107 (Chem. Change-out): The doors to CO-D-1 and D108 are do not close automatically due to inward air pressure.

    - Cause: Limited return air pathway AHU 113 due to lack of above ceiling transfer openings. The path of least resistance for return air of this unit is through the two sets of doors serving D107.

    - Initial Recommendation: Add ceiling transfer grilles to Area CO-D-1. Install an above-ceiling transfer opening between CO-D-1 and D107 (Chem. Change-out).

    - Further Recommendation: D107 (Chem. Change-out) should be an exhaust only room. Seal all return air grilles to AHU 113 in this room. Further calculations for exhaust capacity and air changes for D107 will have to be developed. The exhaust duct from EF101 serving D107 is a 250 mm (10") duct which may have to be enlarged to a 300 MM (14") duct to provide enough exhaust air to meet D107 exhaust air quantity and air exchange rates for the room.

3. Chemical fumes are noted when the Fume Hood in A105 is utilized.

    - Cause: The Fume Hood is deficient on airflow.

    - Initial Recommendation: Limit usage of the hood to a minimum, if at all, until the following: Increase exhaust airflow setpoint for Solvent Damper # 12. Retest and Balance system. Setpoint increase calculation has not yet been developed.

    - Further Recommendation: Re-duct the fume hood in A105 to be served by an individual 400 mm tap off of the exhaust runout. Currently, the hood is served by an exhaust duct tap that also has 2 runouts serving tools that have critical airflows which alarm when not within a BAS monitored range.

Other HVAC System CLIN 1 Discovered Issues

1. AHU-115 serving D105 Gowning: Room D105 (Class 1000) is positively pressurized to both the adjacent CO-D-1 corridor and the Class 100 Room B101.

    - Cause: The supply air returns to the unit through two transfer grilles in D105 one of which is often blocked by gowns hung near the transfer grille. Further, since the AHU 115 return is not specifically ducted to D105, more air is being returned to the AHU than is being transferred back through the grilles causing excessive air pressure in D105 which overcomes the air pressure in B101 Class 100 area.

2. AHU-107: The BAS reports that the relief air damper position is 0.0% (closed). Actual conditions show the damper is open approx. 30%. The relief/return plenum is under positive pressure i.e. air is being relieved (exhausted) from the

plenum (building) where the BAS is not calling for this action.

- Initial Recommendation: Investigate and correct damper operation.The operation of the relief dampers does correspond to BAS Commands.

- The supply air EBTRON AFM and return air EBTRON AFM report radically different values to the BAS than what was tested. The Monitors need to be investigated, then repaired or replaced.

3. AHU-105:
   - The BAS reports that the relief air damper position is 0.0% (closed). Actual conditions show the damper is open 100%. The relief/return plenum is under negative pressure i.e. outside air is being introduced into the plenum (and building) where the BAS is not calling for this action. Initial Recommendation: Investigate and correct damper operation.

   - AHU-105: The Supply and Return Air AFM Local Ebtron Display are blank (not reporting). Highly inaccurate airflow values are being reported by the BAS. Initial Recommendation: Replace or repair and recommission these EBTRON AFMs.

4. The HEPA filter diffusers pressure drops were tested on the clean room AHU systems that could be operated with fan speeds at or near design airflow or originally tested conditions. The filters were tested by manufacturer recommended methods. See Table below for further information.

   - Initial Recommendation: Based on the manufacturers recommendations concerning pressure drop testing across the filter diffusers (indicating loading), age of the filters (16 yrs. old) and current test findings, planning for changing of the filters in the near future should be implemented.

5. <u>AHU-6 VAV system serving the SubFab</u>: The Sum total airflow of the VAVs served by AHU-106 are either reporting airflow rates that deviate far beyond the actual tested airflows. AECOM recommends that each of these VAVs be diagnosed for deficiencies via point to point checkout to determine the deviation cause. Several of these VAVs are not responding to BAS damper commands.

6. <u>General Notes on AHU 105, 106, and 107 VAV boxes</u>.

   - The majority of VAV boxes tested on these systems exhibited control issues mainly concerning the reporting of airflow volumes within an expected range. The BAS setpoints, VAV inlet sizes, controller hose connections, and original airflow correction factors were all found to be correct. A few airflow volume setpoints were found to be altered, but within a reasonable range.
   - The VAV summary included below has highlighted airflow values which indicate a problem with reporting accurate (within range) airflows by the BAS. AECOM could not determine whether it is a BAS problem or a VAV controller problem.

7. EF 105 Hydride Exhaust:

   - The original scheduled airflow quantity is 1715 L/s. The fan total was tested at 2390 L/s. The fan is mostly being used as a general exhaust above the ceiling in the return air plenum for the Clean Rooms and in the SubFab with the exception of serving the Furnaces in B106 and several VMBs in B106-1 and the SubFab. Initial recommendation: Cap the runouts that are not connected to a specific tool and reset the BAS (EBTRON) setpoint to 0 L/s. This will reduce power consumption and wear on the fans, as well as, improve positive pressurization to the Clean Room envelope.

   - The ducts from EF 105 serving B106-1 and B106 should be separately monitored and controlled by an EBTRON AFM dedicated to the respective ducts. Currently, one monitor is measuring 2 ducts of differing sizes.

8. EF 102 Solvent Exhaust: The original HVAC design for this system includes four (4) open ended 300 mm (12”) ducts installed at deck level high in return air plenum for the Clean Rooms. These open ended ducts are not specifically exhausting Solvent fumes and in effect are holes in the duct being used as general exhaust. Initial Recommendations: Cap off these ducts. This will reduce power consumption and wear on the fans, as well as, improve positive pressurization to the Clean Room envelope.

9. General Note on EFs 102 through 105:

   - The Magnehelics gauges installed for fan total static at the fans are under-ranged for the operation range of these EFs. The gauges are either pegged at their high limit or failed. The gauges need to be replaced with 0-1500 Pa ranged gauges.

10. AHU 102 A, B, C, and D: The fans for these AHU are operating at a reduced speed (by command) compared to the original TAB report. Initial Recommendation: Increase the commanded speed of the AHU back to at least the original TAB Report speed. The B101, B102, B103, and B104 Clean Room sector’s pressurization relationship to the surrounding Class 1000 B-side corridor will be at a higher level with increased speed. Currently this sector is < 0.15” positive to the Class 1000 B-side corridor.

11. General Note on AHU Fan Speeds:

    - With the exception of the VAV AHUs, AHUs 112,113, and 115, and AHU-111, the AHU systems should be verified to be operating at their original TAB Report VFD speeds. AECOM noted cases where the drives were operating at a lower speed the BAS command. A few cases were noted that the drive speed command from the BAS was lower than originally tested e.g. AHU 102 A, B, C, and D.

Date of Activity:	February 2018 to present.	Report #	CLIN 1

12. See the following table summaries for further information concerning original as-balanced setpoints for supply and exhaust systems, tested airflow values as compared to BAS reported values (EBTRON and VAV boxes), as well as, Magnehelic Gauge calibration validation, and TAB Report forms (filled-out) to date.

By:

Johnny Murray, AECOM **07-3-2018**

Signature Date

AECOM

AHU and EF TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEMS Bldg. 215 AHUs

SUMMARY: AHU DESIGN, ORIGINAL TAB VS CURRENT OPERATING POINTS TEST APPARATUS Micromanometer

AHU #	Design L/s	ORIGINAL	CURRENT	ORIGINAL	CURRENT							
		Test Total L/s		Operating Speed Hz		% CHANGE FROM Orig TAB						NOTES
101 A	9805	9877	9650	51	51.3	98%						
101 B	10545	10544	9744	49.8	51.3	92%						
101 C	12950	12740	10078	60	60	79%						
101 D	12950	12873	11833	60	60	92%						
101 E	9805	9830	8710	60	45.5	89%						1)
101 F	10915	10846	8864	49.2	45.5	82%						
101 G	11470	11586	10690	51	51.4	92%						
101 H	9250	9363	9074	51	51.4	97%						
101 I	12395	12466	6090	57	28.7	49%						1)
101 J	12950	12855	6344	57	28.7	49%						1)
101 K	10915	10856	10425	49.8	51.1	96%						
101 L	9805	9930	10246	49.8	51.1	103%						
101 M	10360	10445	8108	49.8	39.6	78%						1)
101 N	11100	11023	8647	49.8	39.6	78%						1)
101 O	12950	12813	11058	60	54.8	86%						1)
101 P	12210	11805	10588	60	54.8	90%						1)
101 Q	12580	12513	12295	57.6	60 (Byp)	98%						
101 R	12950	12835	12289	57.6	60 (Byp)	96%						
101 S	12950	12669	7245	60	37	57%						1)
101 T	11470	11487	6509	60	37	57%						1)
102 A	7770	7591	3806	60	33.9	50%						1)
102 B	7770	7591	3806	60	33.9	50%						1)
102 C	7770	7591	3806	60	33.9	50%						1)
102 D	7770	7592	3806	60	33.9	50%						1)
103	15199	15184	14806	51	50.8	98%						
104	13589	13672	14403	45	48.9	105%						
105	11565	11527	8147	58	36	71%						
106	14155	14494	16614	58	60 (Byp)	115%						
107	4190	4190	3521	55	37.5	84%						
108 A	9620	9501	8712	60	60	92%						
108 B	9620	9501	8713	60	60	92%						

REMARKS: 1) The AHU is operating at a notably different speed than reported in the Original TAB report.

TEST DATE: READINGS BY Johnny Murray

AECOM

AHU and EF TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEMS Bldg. 215 AHUs

SUMMARY AHU DESIGN, ORIGINAL TAB VS CURRENT OPERATING POINTS TEST APPARATUS Micromanometer

AHU #	Design L/s	ORIGINAL	CURRENT	ORIGINAL	CURRENT						% Dev from Design	NOTES
		Test Total L/s		Operating Speed Hz		% CHANGE FROM Orig TAB						
109	18500	18479	18878	57.5	59.1	102%						
110 A	14880	14648	16707	54	60	114%						1)
110 B	14880	14886	16239	54	60	109%						1)
111 A	15700	15687	5398	60	24.1	34%						1)
111 B	15700	15686	5397	60	24.1	34%						1)
111 C	15700	15676	5146	60	22.7	33%						1)
111 D	15700	15676	5145	60	22.7	33%						1)
112	8170	7121	5579	60	47.9	78%						1)
113	9305	9511	7330	60	42.2	77%						1)
114	9990	10034	9485	57	60	95%						
115	10800	9622	6960	60	47.4	72%						1)
SF 123	470	491	272	no VFD	no VFD	55%						
EXHAUST FANS								STPT SUMMATION				
EF 101A	7110		4976		59			13788			70%	2) 3)
EF 101B	7110		4975		52.2						70%	2) 3)
EF 102A	7060		4632		56.3			11249			66%	2)
EF 102B	7060		4631		52.2						66%	2)
EF 103	3750		2158		60						58%	
EF 104	6000		5145		60						86%	
EF105A	1715		1195		60						70%	2)
EF105B	1715		1195		60						70%	2)
EF 106	3700		2300	no VFD	no VFD			N/A			62%	
EF 108	370		335	no VFD	no VFD			N/A			91%	
EF 109	2320		2156	no VFD	no VFD			N/A			93%	
EF 112	400		0	no VFD	no VFD			N/A			0%	
EF 114	1760		1392	no VFD	no VFD			N/A			79%	
EF 122	440		483	no VFD	no VFD			N/A			110%	
EF 123	470		465	no VFD	no VFD			N/A			99%	

REMARKS: 1) The AHU is operating at a notably different speed than reported in the Original TAB report.

2) Both fans in operation. 3) Paired Fan is not operating at the same speed as reported by the VFD.

TEST DATE: READINGS BY Johnny Murray

AECOM

AHU EBTRON TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Makeup Supply Air / AHU-103

OUTLET MANUFACTURER N/A TEST APPARATUS Micromanometer / Pitot

UNIT SERVED	OUTLET				ORIGINAL	CURRENT	MEASURED	Calculated	EBTRON REPORT	BAS FLOW REPORT	NOTES
	NO.	TYPE	SIZE	AREA	AIRFLOW L/s Setpoint		VELOCITY M/s	AIRFLOW L/s			
AHU 101 A, B	1	OED	600 x 650	0.39	2470	2232	4.98	1942	5.77	2250	
AHU 101 G, H, AHU 102B	2	OED	600 x 650	0.39	2560	2250	4.92	1919	5.72	2230	
AHU 101 I, J	3	OED	600 x 650	0.39	2470	2470	5.62	2192	6.35	2476	
AHU 101 O, P, AHU 102D	4	OED	600 x 650	0.39	2560	2085	1.49	581	1.77	690	
AHU 101 Q, R	5	OED	600 x 650	0.39	2470	1300	1.9	741	3.40	1326	2)
AHU 111 A, B	6	OED	450 x 450	0.20	1080	100	0.44	88	0.55	110	
AHU 110 A, B, AHU 108 B	7	OED	1000 x 650	0.65	4135	6700	10.19	6624	12.20	7930	1)
AHU-112 MA	8	OED	300 x 200	0.06	N/G	300	4.43	266	5.00	300	
Total					17745	17437		14086		17312	
								0			

NOTES: 1) The damper is 100% open and not controlling to setpoint. 2) The EBTRON is >than 10% out of calibration indicating a need for investigation or repair.

TEST DATE: 2/14/18 READINGS BY Johnny Murray

AECOM

AHU EBTRON TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Makeup Supply Air / AHU-104

OUTLET MANUFACTURER N/A TEST APPARATUS Pitot Tube/ Micromanometer Traverse

UNIT SERVED	OUTLET			AREA	ORIGINAL	CURRENT	MEASURED	MEASURED	EBTRON REPORT	BAS REPORT	Notes
	NO.	TYPE	SIZE		AIRFLOW L/s		VELOCITY M/s	AIRFLOW L/s			
AHU 101 C, D, AHU 102A	1	OED	600 x 650	0.39	2560	2470	5.9	2301	6.20	2418	
AHU 101 E, F	2	OED	600 x 650	0.39	2470	2090	5.7	2223	5.40	2106	
AHU 101 K, L, AHU 102C	3	OED	600 x 650	0.39	2560	2085	5.77	2250	5.30	2067	
AHU 101 M, N	4	OED	600 x 650	0.39	2470	2500	6.89	2687	6.45	2515	
AHU 114 , AHU 108A	5	OED	600 x 700	0.42	1095	1400	2.2	924	3.50	1470	2)
AHU 111 C, D	6	OED	450 x 450	0.20	550	500	2.93	586	2.60	520	
AHU 101 S, T, AHU 109	7	OED	1000 x 650	0.65	4200	4000	5.28	3432	6.40	4160	
AHU-113 (NOTE 1)	8	OED	500 x 200	0.10	N/G	290	2.44	244	2.70	270	
TOTAL					15905	15335		14403		15526	
AHU 104 MECH RM TOTAL TRAVERSE			2800 x 800	2.24			5.3	11872	6.10	13664	
TOTAL											

: Note 1)

NOTES: 1) AHU 113 has 2 Ebtrons installed on its MAU duct. FIO 2) The EBTRON is >than 10% out of calibration indicating a need investigation or repair.

TEST DATE: 2/14/18 READINGS BY Johnny Murray

AECOM

AHU EBTRON TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Makeup Supply Air / AHU-107

OUTLET MANUFACTURER N/A TEST APPARATUS Pitot Tube/ Micromanometer Traverse

UNIT SERVED	OUTLET			AREA	ORIGINAL	MEASURED	MEASURED	EBTRON REPORT M/s	BAS REPORT	NOTES
	NO.	TYPE	SIZE		AIRFLOW L/s	AIRFLOW L/s	VELOCITY M/s			
AHU 107 Return Air		DUCT	1300 x 450	0.585		5400	9.23	4.40	2151	1)
AHU 107 Supply Air		DUCT	720 mm round	0.41		3520	8.65	5.71	2667	1)
AHU 105 Return Air		DUCT	960 x 960	0.92		7117	7.42	no report	20000	1)
AHU 105 Supply Air		DUCT	1120	0.99		8147	8.27	no report	20000	1)
AHU 108 B		DUCT	200	0.031		95	3.08	9.10	280	1)

NOTES: Note 1) NOTES: 1) The damper is 100% open and not controlling to setpoint. 2) The EBTRON is >than 10% out of calibration indicating a need for investigation or repair.

TEST DATE: 2/14/18 READINGS BY Johnny Murray

AECOM

EF 101 DAMPER EBTRON TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT EXHAUST RISER DISTRIBUTION / EF-101 ACID

CONTROL DAMPER PNEUMATICALLY CONTROLLED DAM TEST APPARATUS DIGITAL MANOMETER

RISER AND DAMPER NAME		SERVICE CHASE SERVED	SETPOINT	RISER SIZE	AREA	TEST L/s	BAS RPT L/s	TEST M/s	EBTRON M/s	BAS DMPR %	STATIC PRESSURE AT AFMS (Pa)	NOTES
ACID # 1		A101-1	220	650 mm	0.33	199	232	0.60	0.70	Note	60	Note 1)
ACID # 2		B101-1	948	650 mm	0.33	647	696	1.95	2.10	100	1748	Note 1)
ACID # 3		A102-1	1250	650 mm	0.33	611	686	1.84	2.07	100	1735	
ACID # 4		B102-1	2540	650 mm	0.33	1516	1589	4.57	4.79	100	1744	
ACID # 5		A103-1	1560	650 mm	0.33	1387	1559	4.18	4.70	49.9	535	
ACID # 6		B103-1	1160	650 mm	0.33	939	1161	2.83	3.50	48	393	
ACID # 7		A104-1	400	650 mm	0.33	445	411	1.34	1.24	45	170	
ACID # 8		B104-1	300	650 mm	0.33	328	285	0.99	0.86	38	383	
ACID # 9		A105-1	1520	650 mm	0.33	1155	1260	3.48	3.80	100	1082	
ACID # 10		B105-1	800	650 mm	0.33	780	766	2.35	2.31	42.2	330	
ACID # 11		A106-1	190	650 mm	0.33	275	215	0.83	0.65	25.4	574	
ACID # 12		B106-1	1800	650 mm	0.33	1343	1095	4.07	3.32	100	1577	
ACID # 13		A107	1100	650 mm	0.33	889	1181	2.68	3.56	34.2	327	
SUM TOTAL			13788			10514	11136					
TRAVERSE	TOTAL					9951	11457				1800	

NOTES: 1) The damper #1 is not controlling to setpoint.

TEST DATE: 2/13/2018 READINGS BY Johnny Murray

AECOM

EF 102 DAMPER EBTRON TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT EXH RISER DISTRIBUTION / EF-102 SOLVENT

CONTROL DAMPER PNEUMATICALLY CONTROLLED DAM TEST APPARATUS DIGITAL MANOMETER

RISER AND DAMPER NAME		SERVICE CHASE SERVED	BAS SETPOINT	RISER SIZE	AREA	TEST L/S	BAS RPT L/S	TEST M/S	EBTRON M/S	BAS DMPR %	STATIC PRESSURE AT AFMS (Pa)	NOTES
SOLVENT # 1		A101-1	90	650	0.33	0	112	0.29	0.34	20.4	1500	1
SOLVENT # 2		B101-1	797	650	0.33	1025	929	3.09	2.80	69.6	1570	
SOLVENT # 3		A102-1	900	650	0.33	826	935	2.49	2.82	31.9	44	
SOLVENT # 4		B102-1	930	650	0.33	753	895	2.27	2.70	30.8	225	
SOLVENT # 5		A103-1	1290	650	0.33	906	1101	2.73	3.32	43.4	120	
SOLVENT # 6		B103-1	1367	650	0.33	1171	1393	3.53	4.20	43.2	427	
SOLVENT # 7		A104-1	1020	650	0.33	703	875	2.12	2.64	47.2	693	
SOLVENT # 8		B104-1	1575	650	0.33	1380	1546	4.16	4.66	36.8	258	
SOLVENT # 9		A105-1	880	650	0.33	717	912	2.16	2.75	43.5	105	
SOLVENT # 10		B105-1	1550	650	0.33	1543	1462	4.65	4.43	40	414	
SOLVENT # 11		A106-1	0	650	0.33	73	13	0.22	0.04	20	9	
SOLVENT # 12		B106-1	150	650	0.33	375	182	1.13	0.55	33.3	1136	
SOLVENT # 13		A107	700	650	0.33	693	528	2.09	1.60	91.4	1486	
SUM TOTAL			11249			10165	10883					
TRAVERSE	TOTAL		9263									
BAS REPORT			11294									
BAS FLOW SETPT			7852									
FANS' SPEED			90%/ 54 Hz									

NOTES: 1) This damper is not controlling to setpoint.

TEST DATE: 2/12/2018 READINGS BY Johnny Murray

AECOM

VAV TERMINAL TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT VAVs / AHU-105

VAV MANUFACTURER NAILOR TEST APPARATUS Manometer + Flowhood

VAV ADDRESS		VAV			DESIGN / CURRENT	DESIGN / CURRENT	BAS	FINAL		AREA SERVED
		MODEL	Current Calib Factor	INLET SIZE SCHED/ BAS	STPT MINIMUM L/s	STPT MAXIMUM L/s	Flow Report	Vel Pressure/ Tested L/s		
46		D30RW	1.4	350	570 Note 3)	570	295 Note 1)	0.18	511	C0-C-1
47		D30RW	1.25	400	850 Note 3)	850	158	0.37	871	C0-C-1
48		D30RW	1.55	350	250	500/375	382	0.035	225	C106
49		D30RW	1.5	350	570 Note 3)	570	327	0.19	525	C0-C-1
50		D30RW	1.52	350	250	500 / 375	390	0.04	241	C106
51		D30RW	2.96	400	740 Note 3)	740	170	0.06	351	C0-C-1
18		D30RW	1.45	175/130	85	170	63	cone	152	C106
19		D30RW	1.45	125/130	0/ 240	140/240	67	cone	41	C107-1
44		D30RW	1.45	350	250	500 / 375	319	0.24	365	C103
45		D30RW	1.5	350	250	500 / 375	341	0.24	365	C103
43		D30RW	1.59	400	965 / 350	970 / 450	454	0.14	605	C0-C-1
42		D30RW	1.54	200	125	250	56	0.21	194	C0-C-2
41		D30RW	1.69	200 /250	175	350	305	0.11	319	C0-C-2
36		D30RW	1.45	175 / 120	0 / 200	115 / 300	117	cone	65	C102-1
37		D30RW	1.3	175 / 180	85 / 205	170 / 310	107	cone	104	C101
38		D30RW	1.8	200	280 Note 3)	280	182	0.23	430	LO-A-1
39		D30RW	1.18	300	210 / 480	420 / 520	447	cone	392	CO-C-1
49		D30RW	1.5	200 / 350	145 / 570 Note 3)	290 / 570	330	0.13	471	CO-C-1
35		D30RW	1.55	300	245 / 450	490	450	0.09	392	CO-B-1
34		D30RW	1.49	300	240 / 260	480 / 490	269	0.03	169	CO-B-1
33		D30RW	1.51	300	245 / 415	490	426	0.07	255	CO-B-1
32		D30RW	1.48	300	245	490	344	0.12	330	CO-B-1
31		D30RW	1.59	300	245	490	234	0.025	155	CO-B-1
30		D30RW	1.66	300	245 / 275	490	291	0.011	118	CO-B-1
29		D30RW	1.52	300	245	490	132	0.023	146	CO-B-1
28		D30RW	1.58	200 / 300	125	250	125	Cone	134	CO-E-1
40		D30RW	0	200	145	3277	0	cone	197	CO-C-1
TOTAL							6486		8123	Note 2)

Notes: 1) Highlighted Values indicate BAS reported airflow values versus tested airflow values which deviate beyond the range of calibration adjustment by flow calibration factors. 2) Total traverse = 8102 L / s 3) This terminal box is set up as a CAV (Constant Air Volume)

TEST DATE: 4/10/2018 READINGS BY Johnny Murray

AECOM

VAV TERMINAL TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT VAVs / AHU-106

VAV MANUFACTURER NAILOR TEST APPARATUS Manometer + Flowhood

ADDRESS	VAV			DESIGN / CURRENT	DESIGN/ CURRENT	BAS	FINAL	SERVING
	MODEL	Current k Factor	INLET SIZE Sched / BAS	MINIMUM L/s	MAXIMUM L/s	Flow Report	Tested L/s	
68	D30RW	1.72	175 / 180	180 Note 3)	180	24	156	E001 Note 2)
67	D30RW	1.4	125 / 100	17 /	35 /	0	51	E002
65	D30RW	1.45	400	930 / 350	930 / 750	236	1132	A001
66	D30RW	1.25	400	760 / 450	760 / 730	93	1067	CO-B1-0
63	D30RW	1.5	200	305 / 200	305 /	23	254	B006
61	D30RW	1.95	300	400 Note 3)	400	393	300	D002
60	D30RW	1.5	175	190 Note 3)	190	16	165	D001
59	D30RW	1.5	300	470 / 350	470	221	566	C001
58	D30RW	1.67	250	340 Note 3)	340	55	0	CO-C-0
57	D30RW	1.68	300	460 / 350	460	153	299	C0002-2
09	D3001	1.4	400	700 / 400	700	381	425	D004
10	D30RW	1.9	200	280 Note 3)	280	31	0	D005-1
13	D30RW		250	320 Note 3)	320	0	0	C008 note 1)
56	D30RW	1.8	125 / 120	80 Note 3)	80	49	35	C013
55	D30RW	1.1	350	610 / 350	610	64	578	C012
54	D30RW	1.4	400	965 Note 3)	965	319	885	C011
11	D30RW	1.15	125 / 120	60 / 70	60 / 100	14	78	C010
12	D30RW	1.18	250	320 Note 3)	320	21	0	CO-H-0
15	D30RW	1.4	125 / 120	80	80 / 100	7	78	C009
14	D30RW	1.2	300	300 Note 3)	300	91	469	C0-A1-0
08	D30RW	1.35	250	350 Note 3)	350	34	401	D004
07	D30RW	1.4	200	355 Note 3)	355	16	223	A006
03	D30RW	1.93	400	930 / 260	930 / 300	81	0	A008
02	D3001	1.35	125 / 120	17 / 140	35 / 200	137	118	E005-1
01	D30RW	1.27	300	440 Note 3)	440	27	552	E002
04	D30RW	1.39	400	760 / 350	760 / 750	394	1180	A001
05	D30RW	1.47	400	920 / 350	920 / 750	453	873	A001
06	D30RW	1.44	400	920 / 350	920 / 750	120	1205	A001
62	D30RW	1.42	400	930 / 350	930 / 720	130	1085	A001
64	D30RW	0.04	400	930 / 350	930 / 750	15	896	A001
72			400	500 Note 3)	500	488	500	A005-2
TOTAL						4086	13571	

NOTE: 1) There is an open outlet on this system that has no VAV controlling it in Data Room C008

2) Highlighted Values indicate BAS reported airflow values versus tested airflow values which deviate beyond the range of calibration adjustment by flow calibration factors. 3) This terminal box is set up as a CAV (Constant Air Volume)

TEST DATE: 02-27 thru 29-18 READINGS BY Johnny Murray

AECOM

VAV TERMINAL TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT VAVs / AHU-107

VAV MANUFACTURER NAILOR TEST APPARATUS Flowhood/RVA/manometer

VAV ADDRESS		VAV			DESIGN / CURRENT	DESIGN/ CURRENT	BAS	FINAL	SERVING
		MODEL	Current Calib Factor	INLET SIZE	MINIMUM L/s	MAXIMUM L/s	Flow Report	Tested L/s	
16		D30RW	1.29	200	145	290	273	261	CO-C-1 N
17		D30RW	1.8	250	175 / 195	350	350	320	CO-C-1 N
21		D30RW	1.4	300	205	410	404	350	CO-A-1
22		D30RW	1.35	300	205 / 260	410	48	125 Note 1)	CO-A-1
23		D30RW	1.42	300	205	410	362	311	CO-A-1
24		D30RW	1.38	300	212	425	404	350	CO-A-1
25		D30RW	1.4	300	205	410	389	259	CO-A-1
26		D30RW	1.31	300	205	410	328	306	CO-A-1
27		D30RW	1.41	200	125	250	149	105	CO-E-1
20		D30RW	1.4	180	100	205	205	130	CO-A-1
53		D30RW	1.27	250	250	290	259	282	C0-C-2
52		D30RW	1.62	200	unknown / 145	290	224	271	LO-B-2
TOTAL						4150	3395	2945	

NOTES: 1) Highlighted Values indicate BAS reported airflow values versus tested airflow values which deviate beyond the range of calibration adjustment by flow calibration factors.

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101-A

LOCATION MER 215

DATE 3/9/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW (H.P.)	14.92 (20)
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	9805	9650
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		390
Motor Amps - Average		34
Motor RPM	767	
VFD Hertz		51.4

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-28
Fan Suction S.P		-115
Fan/Unit Discharge S.P		353
Total Fan Static S.P	622 (2.5")	468
External Static S.P		381

TEST DATE 4/10/2018

READINGS BY Johnny Murray

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101A
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101A (Pascals)				
Unit Suct		Fan Suct		Discharge
-28	C Filter C	-115	Fan	353

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101 A

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 101	1	HFD	1200 x 300	185	185	0.65	185	100%
B 101	2	HFD	1200 x 600	370	382	0.67	382	103%
B 101	3	HFD	1200 x 600	370	342	0.60	342	92%
B 101	4	HFD	1200 x 600	370	314	0.55	314	85%
B 101	5	HFD	1200 x 600	370	314	0.55	314	85%
B 101	6	HFD	1200 x 600	370	353	0.62	353	96%
B 101	7	HFD	1200 x 300	185	174	0.61	174	94%
B 101	8	HFD	1200 x 600	370	371	0.65	371	100%
B 101	9	HFD	1200 x 600	370	382	0.67	382	103%
B 101	10	HFD	1200 x 600	370	393	0.69	393	106%
B 101	11	HFD	1200 x 600	370	348	0.61	348	94%
B 101	12	HFD	1200 x 600	370	388	0.68	388	105%
B 101	13	HFD	1200 x 300	185	191	0.67	191	103%
B 101	14	HFD	1200 x 600	370	325	0.57	325	88%
B 101	15	HFD	1200 x 600	370	314	0.55	314	85%
B 101	16	HFD	1200 x 600	370	353	0.62	353	96%
B 101	17	HFD	1200 x 600	370	371	0.65	371	100%
B 101	18	HFD	1200 x 600	370	359	0.63	359	97%
B 101	19	HFD	1200 x 300	185	197	0.69	197	106%
B 101	20	HFD	1200 x 600	370	371	0.65	371	100%
B 101	21	HFD	1200 x 600	370	382	0.67	382	103%
B 101	22	HFD	1200 x 600	370	382	0.67	382	103%
B 101	23	HFD	1200 x 600	370	393	0.69	393	106%
B 101	24	HFD	1200 x 300	185	197	0.69	197	106%
B 101	25	HFD	1200 x 300	185	185	0.65	185	100%
B 101	26	HFD	1200 x 600	370	371	0.65	371	100%
B 101	27	HFD	1200 x 600	370	376	0.66	376	102%
B 101	28	HFD	1200 x 600	370	371	0.65	371	100%
B 101	29	HFD	1200 x 600	370	388	0.68	388	105%
B 101	30	HFD	1200 x 300	185	182	0.64	182	99%
TOTAL				9805	9650		9650	

REMARKS: The AHU is operating at 51.3 hz as reported by the VFD

TEST DATE: 03/09/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE UNIT AHU 101-B

LOCATION Bldg. 215 PENTHOUSE MER DATE 3/9/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW (H.P.)	14.92 (20)
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/S (CFM)	10730	9744
Return Air L/S		
Outside Air L/S		
Fan RPM		
Motor Volts		390
Motor Amps - Average		34
Motor RPM	767	
VFD Hertz		51.4

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-17
Fan Suction S.P		-116
Fan/Unit Discharge S.P		313
Total Fan Static S.P		429
External Static S.P		330
Out. Air Damp. Position		

TEST DATE 4/10/2018 READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101B
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101B (Pascals)				
Unit Suct		Fan Suct		Discharge
-17	C Filter C	-116	Fan	313

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101B

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 101	1	HFD	1200 x 600	370	319	0.56	319	86%
B 101	2	HFD	1200 x 600	370	331	0.58	331	89%
B 101	3	HFD	1200 x 600	370	331	0.58	331	89%
B 101	4	HFD	1200 x 600	370	325	0.57	325	88%
B 101	5	HFD	1200 x 600	370	359	0.63	359	97%
B 101	6	HFD	1200 x 600	370	342	0.60	342	92%
B 101	7	HFD	1200 x 600	370	302	0.53	302	82%
B 101	8	HFD	1200 x 600	370	331	0.58	331	89%
B 101	9	HFD	1200 x 600	370	331	0.58	331	89%
B 101	10	HFD	1200 x 600	370	331	0.58	331	89%
B 101	11	HFD	1200 x 600	370	325	0.57	325	88%
B 101	12	HFD	1200 x 600	370	353	0.62	353	96%
B 101	13	HFD	1200 x 300	185	188	0.66	188	102%
B 101	14	HFD	1200 x 600	370	302	0.53	302	82%
B 101	15	HFD	1200 x 600	370	319	0.56	319	86%
B 101	16	HFD	1200 x 600	370	325	0.57	325	88%
B 101	17	HFD	1200 x 600	370	342	0.60	342	92%
B 101	18	HFD	1200 x 600	370	353	0.62	353	96%
B 101	19	HFD	1200 x 300	185	180	0.63	180	97%
B 101	20	HFD	1200 x 600	370	359	0.63	359	97%
B 101	21	HFD	1200 x 600	370	325	0.57	325	88%
B 101	22	HFD	1200 x 600	370	342	0.60	342	92%
B 101	23	HFD	1200 x 600	370	342	0.60	342	92%
B 101	24	HFD	1200 x 600	370	353	0.62	353	96%
B 101	25	HFD	1200 x 600	370	342	0.60	342	92%
B 101	26	HFD	1200 x 600	370	359	0.63	359	97%
B 101	27	HFD	1200 x 600	370	331	0.58	331	89%
B 101	28	HFD	1200 x 600	370	348	0.61	348	94%
B 101	29	HFD	1200 x 600	370	314	0.55	314	85%
B 101	30	HFD	1200 x 600	370	342	0.60	342	92%
TOTAL				10730	9744		9744	

REMARKS: The AHU is operating at 51.3 hz as reported by the VFD

TEST DATE: 03/09/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE UNIT AHU 101-C

LOCATION MER 215 DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	
Filters - No./Size	

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	11100	10078
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		450
Motor Amps - Average		41.6
Motor RPM	767	
VFD Hertz		60

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-54
Fan Suction S.P		-171
Fan/Unit Discharge S.P		274
Total Fan Static S.P		445
External Static S.P		328

TEST DATE _____ READINGS BY _____

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101C
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101C (Pascals)				
Unit Suct		Fan Suct		Discharge
-54	C Filter C	-171	Fan	274

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101C

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A101	1	HFD	1200 x 600	370	331	0.58	331	89%
A101	2	HFD	1200 x 600	370	336	0.59	336	91%
A101	3	HFD	1200 x 600	370	291	0.51	291	79%
A101	4	HFD	1200 x 600	370	325	0.57	325	88%
A101	5	HFD	1200 x 600	370	308	0.54	308	83%
A101	6	HFD	1200 x 600	370	319	0.56	319	86%
A101	7	HFD	1200 x 600	370	365	0.64	365	99%
A101	8	HFD	1200 x 600	370	445	0.78	445	120%
A101	9	HFD	1200 x 600	370	325	0.57	325	88%
A101	10	HFD	1200 x 600	370	359	0.63	359	97%
A101	11	HFD	1200 x 600	370	314	0.55	314	85%
A101	12	HFD	1200 x 600	370	365	0.64	365	99%
A101	13	HFD	1200 x 600	370	325	0.57	325	88%
A101	14	HFD	1200 x 600	370	314	0.55	314	85%
A101	15	HFD	1200 x 600	370	302	0.53	302	82%
A101	16	HFD	1200 x 600	370	331	0.58	331	89%
A101	17	HFD	1200 x 600	370	376	0.66	376	102%
A101	18	HFD	1200 x 600	370	342	0.60	342	92%
A101	19	HFD	1200 x 600	370	342	0.60	342	92%
A101	20	HFD	1200 x 600	370	331	0.58	331	89%
A101	21	HFD	1200 x 600	370	331	0.58	331	89%
A101	22	HFD	1200 x 600	370	314	0.55	314	85%
A101	23	HFD	1200 x 600	370	331	0.58	331	89%
A101	24	HFD	1200 x 600	370	308	0.54	308	83%
A101	25	HFD	1200 x 600	370	331	0.58	331	89%
A101	26	HFD	1200 x 600	370	342	0.60	342	92%
A101	27	HFD	1200 x 600	370	353	0.62	353	96%
A101	28	HFD	1200 x 600	370	336	0.59	336	91%
A101	29	HFD	1200 x 600	370	376	0.66	376	102%
A101	30	HFD	1200 x 600	370	314	0.55	314	85%
				11100	10078		10078	

REMARKS: Continued on next page.

TEST DATE: 03/08/18 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101C

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
CR3L16	31	HFD	1200 x 600	370	348	0.61	348	94%
CR3L16	32	HFD	1200 x 600	370	348	0.61	348	94%
CR3L16	33	HFD	1200 x 600	370	388	0.68	388	105%
CR3L16	34	HFD	1200 x 600	370	319	0.56	319	86%
CR3L16	35	HFD	1200 x 600	370	336	0.59	336	91%
TOTAL				12950	11816		11816	

REMARKS: AHU 101 C operating at 60 hz as reported by the VFD

TEST DATE: 03/08/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE UNIT AHU 101D

LOCATION Bldg. 215 PENTHOUSE MER DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW (H.P.)	14.92 (20)
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	12950	11833
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		450
Motor Amps - Average		41.6
Motor RPM	767	
VFD Hertz		60

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-91
Fan Suction S.P		-203
Fan/Unit Discharge S.P		406
Total Fan Static S.P	622 (2.5")	609
External Static S.P		497

TEST DATE 4/10/2018 READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101D
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101D (Pascals)				
Unit Suct		Fan Suct		Discharge
-91	C Filter C	-203	Fan	406

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT SUPPLY AIR / AHU-101D

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	Velocity	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A101	1	HFD	1200 x 600	370	365	0.64	365	99%
A101	2	HFD	1200 x 600	370	342	0.60	342	92%
A101	3	HFD	1200 x 600	370	331	0.58	331	89%
A101	4	HFD	1200 x 600	370	348	0.61	348	94%
A101	5	HFD	1200 x 600	370	325	0.57	325	88%
A101	6	HFD	1200 x 600	370	365	0.64	365	99%
A101	7	HFD	1200 x 600	370	365	0.64	365	99%
A101	8	HFD	1200 x 600	370	342	0.60	342	92%
A101	9	HFD	1200 x 600	370	348	0.61	348	94%
A101	10	HFD	1200 x 600	370	331	0.58	331	89%
A101	11	HFD	1200 x 600	370	302	0.53	302	82%
A101	12	HFD	1200 x 600	370	251	0.44	251	68%
A101	13	HFD	1200 x 600	370	342	0.60	342	92%
A101	14	HFD	1200 x 600	370	336	0.59	336	91%
A101	15	HFD	1200 x 600	370	353	0.62	353	96%
A101	16	HFD	1200 x 600	370	359	0.63	359	97%
A101	17	HFD	1200 x 600	370	314	0.55	314	85%
A101	18	HFD	1200 x 600	370	319	0.56	319	86%
A101	19	HFD	1200 x 600	370	353	0.62	353	96%
A101	20	HFD	1200 x 600	370	342	0.60	342	92%
A101	21	HFD	1200 x 600	370	353	0.62	353	96%
A101	22	HFD	1200 x 600	370	325	0.57	325	88%
A101	23	HFD	1200 x 600	370	336	0.59	336	91%
A101	24	HFD	1200 x 600	370	348	0.61	348	94%
A101	25	HFD	1200 x 600	370	371	0.65	371	100%
A101	26	HFD	1200 x 600	370	348	0.61	348	94%
A101	27	HFD	1200 x 600	370	319	0.56	319	86%
A101	28	HFD	1200 x 600	370	353	0.62	353	96%
A101	29	HFD	1200 x 600	370	331	0.58	331	89%
A101	30	HFD	1200 x 600	370	291	0.51	291	79%
					10106		10106	

REMARKS: Continued on next page.

TEST DATE: 03/08/18 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AHU-101D

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M /s	AIRFLOW L/s	
A101	31	HFD	1200 x 600	370	342	0.60	342	92%
A101	32	HFD	1200 x 600	370	382	0.67	382	103%
A101	33	HFD	1200 x 600	370	348	0.61	348	94%
A101	34	HFD	1200 x 600	370	342	0.60	342	92%
A101	35	HFD	1200 x 600	370	314	0.55	314	85%
							1727	
TOTAL				12950	11833		11833	

REMARKS: AHU 101D operating at 60 hz (reported by drive display).

TEST DATE: 03/08/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101-E

LOCATION Bldg. 215 PENTHOUSE MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	9805	8710
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		330
Motor Amps - Average		28.8
Motor RPM	767	
VFD Hertz		43.5

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-27
Fan Suction S.P		-84
Fan/Unit Discharge S.P		322
Total Fan Static S.P	622 (2.5")	406
External Static S.P		349

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101E
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101E (Pascals)				
Unit Suct		Fan Suct		Discharge
-27	C Filter C	-84	Fan	322

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT SUPPLY AIR / AHU-101E

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A102	1	HFD	1200 x 300	185	151	0.53	151	82%
A102	2	HFD	1200 x 600	370	336	0.59	336	91%
A102	3	HFD	1200 x 600	370	331	0.58	331	89%
A102	4	HFD	1200 x 600	370	319	0.56	319	86%
A102	5	HFD	1200 x 600	370	325	0.57	325	88%
A102	6	HFD	1200 x 300	185	131	0.46	131	71%
A102	7	HFD	1200 x 600	370	302	0.53	302	82%
A102	8	HFD	1200 x 600	370	291	0.51	291	79%
A102	9	HFD	1200 x 600	370	325	0.57	325	88%
A102	10	HFD	1200 x 600	370	336	0.59	336	91%
A102	11	HFD	1200 x 600	370	353	0.62	353	96%
A102	12	HFD	1200 x 300	185	171	0.60	171	92%
A102	13	HFD	1200 x 600	370	302	0.53	302	82%
A102	14	HFD	1200 x 600	370	314	0.55	314	85%
A102	15	HFD	1200 x 600	370	319	0.56	319	86%
A102	16	HFD	1200 x 600	370	353	0.62	353	96%
A102	17	HFD	1200 x 600	370	336	0.59	336	91%
A102	18	HFD	1200 x 300	185	177	0.62	177	96%
A102	19	HFD	1200 x 600	370	296	0.52	296	80%
A102	20	HFD	1200 x 600	370	371	0.65	371	100%
A102	21	HFD	1200 x 600	370	348	0.61	348	94%
A102	22	HFD	1200 x 600	370	382	0.67	382	103%
A102	23	HFD	1200 x 600	370	314	0.55	314	85%
A102	24	HFD	1200 x 300	185	174	0.61	174	94%
A102	25	HFD	1200 x 600	370	291	0.51	291	79%
A102	26	HFD	1200 x 600	370	319	0.56	319	86%
A102	27	HFD	1200 x 600	370	365	0.64	365	99%
A102	28	HFD	1200 x 600	370	348	0.61	348	94%
A102	29	HFD	1200 x 600	370	331	0.58	331	89%
TOTAL				9805	8710		8710	

REMARKS: AHU 101 E is operating at 45.5 hz as reported by the VFD

TEST DATE: 3/8/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101F

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	10915	8864
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		330
Motor Amps - Average		28.8
Motor RPM	767	
VFD Hertz		43.5

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-16
Fan Suction S.P		-83
Fan/Unit Discharge S.P		251
Total Fan Static S.P	622 (2.5")	334
External Static S.P		267

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101F
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101F (Pascals)				
Unit Suct		Fan Suct		Discharge
-16	C Filter / C	-83	Fan	251

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT SUPPLY AIR / AHU-101F

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A102	1	HFD	1200 x 300	185	148	0.52	148	80%
A102	2	HFD	1200 x 600	370	291	0.51	291	79%
A102	3	HFD	1200 x 600	370	285	0.50	285	77%
A102	4	HFD	1200 x 600	370	325	0.57	325	88%
A102	5	HFD	1200 x 600	370	325	0.57	325	88%
A102	6	HFD	1200 x 600	370	342	0.60	342	92%
A102	7	HFD	1200 x 600	370	319	0.56	319	86%
A102	8	HFD	1200 x 600	370	302	0.53	302	82%
A102	9	HFD	1200 x 600	370	274	0.48	274	74%
A102	10	HFD	1200 x 600	370	285	0.50	285	77%
A102	11	HFD	1200 x 600	370	314	0.55	314	85%
A102	12	HFD	1200 x 600	370	302	0.53	302	82%
A102	13	HFD	1200 x 600	370	285	0.50	285	77%
A102	14	HFD	1200 x 600	370	291	0.51	291	79%
A102	15	HFD	1200 x 600	370	291	0.51	291	79%
A102	16	HFD	1200 x 600	370	279	0.49	279	75%
A102	17	HFD	1200 x 600	370	331	0.58	331	89%
A102	18	HFD	1200 x 600	370	308	0.54	308	83%
A102	19	HFD	1200 x 600	370	268	0.47	268	72%
A102	20	HFD	1200 x 600	370	325	0.57	325	88%
A102	21	HFD	1200 x 600	370	291	0.51	291	79%
A102	22	HFD	1200 x 600	370	302	0.53	302	82%
A102	23	HFD	1200 x 600	370	319	0.56	319	86%
A102	24	HFD	1200 x 600	370	302	0.53	302	82%
A102	25	HFD	1200 x 600	370	279	0.49	279	75%
A102	26	HFD	1200 x 600	370	285	0.50	285	77%
A102	27	HFD	1200 x 600	370	291	0.51	291	79%
A102	28	HFD	1200 x 600	370	285	0.50	285	77%
A102	29	HFD	1200 x 600	370	302	0.53	302	82%
A102	30	HFD	1200 x 600	370	319	0.56	319	86%
TOTAL				10915	8864		8864	

REMARKS: AHU 101 F is operating at 45.5 hz as reported by the VFD.

TEST DATE: 03/08/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101G

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	11840	10690
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		390
Motor Amps - Average		34.3
Motor RPM	767	
VFD Hertz		51.3

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-25
Fan Suction S.P		-137
Fan/Unit Discharge S.P		306
Total Fan Static S.P	622 (2.5")	443
External Static S.P		331

TEST DATE 4/10/2018

READINGS BY Johnny Murray

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101G
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101G (Pascals)				
Unit Suct		Fan Suct		Discharge
-25	C Filter C	-137	Fan	306

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101G

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 102	1	HFD	1200 x 300	185	182	0.64	182	99%
B 102	2	HFD	1200 x 600	370	371	0.65	371	100%
B 102	3	HFD	1200 x 600	370	296	0.52	296	80%
B 102	4	HFD	1200 x 600	370	348	0.61	348	94%
B 102	5	HFD	1200 x 600	370	365	0.64	365	99%
B 102	6	HFD	1200 x 300	185	157	0.55	157	85%
B 102	7	HFD	1200 x 300	185	191	0.67	191	103%
B 102	8	HFD	1200 x 600	370	336	0.59	336	91%
B 102	9	HFD	1200 x 600	370	325	0.57	325	88%
B 102	10	HFD	1200 x 600	370	314	0.55	314	85%
B 102	11	HFD	1200 x 600	370	382	0.67	382	103%
B 102	12	HFD	1200 x 300	185	174	0.61	174	94%
B 102	13	HFD	1200 x 600	370	319	0.56	319	86%
B 102	14	HFD	1200 x 600	370	314	0.55	314	85%
B 102	15	HFD	1200 x 600	370	319	0.56	319	86%
B 102	16	HFD	1200 x 600	370	308	0.54	308	83%
B 102	17	HFD	1200 x 600	370	331	0.58	331	89%
B 102	18	HFD	1200 x 600	370	319	0.56	319	86%
B 102	19	HFD	1200 x 600	370	353	0.62	353	96%
B 102	20	HFD	1200 x 600	370	314	0.55	314	85%
B 102	21	HFD	1200 x 600	370	336	0.59	336	91%
B 102	22	HFD	1200 x 600	370	296	0.52	296	80%
B 102	23	HFD	1200 x 600	370	359	0.63	359	97%
B 102	24	HFD	1200 x 600	370	371	0.65	371	100%
B 102	25	HFD	1200 x 600	370	388	0.68	388	105%
B 102	26	HFD	1200 x 600	370	353	0.62	353	96%
B 102	27	HFD	1200 x 600	370	331	0.58	331	89%
B 102	28	HFD	1200 x 600	370	393	0.69	393	106%
B 102	29	HFD	1200 x 600	370	319	0.56	319	86%
B 102	30	HFD	1200 x 600	370	302	0.53	302	82%
TOTAL				10360	9465		9465	

REMARKS: The AHU is operating at 51.4 hz as reported by the VFD

TEST DATE: 03/09/18 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101G

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 102	31	HFD	1200 x 600	370	319	0.56	319	86%
B 102	32	HFD	1200 x 600	370	291	0.51	291	79%
B 102	33	HFD	1200 x 600	370	325	0.57	325	88%
B 102	34	HFD	1200 x 600	370	291	0.51	291	79%
TOTAL				11840	10690		10690	

REMARKS: The AHU is operating at 51.4 hz as reported by the VFD

TEST DATE: 03/09/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101H

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	9250	9074
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		390
Motor Amps - Average		34.3
Motor RPM	767	
VFD Hertz		51.3

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-18
Fan Suction S.P		-109
Fan/Unit Discharge S.P		347
Total Fan Static S.P	622 (2.5")	456
External Static S.P		365

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101H
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101H (Pascals)				
Unit Suct		Fan Suct		Discharge
-18	C Filter / C	-109	Fan	347

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101H

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 102	1	HFD	1200 x 300	185	194	0.68	194	105%
B 102	2	HFD	1200 x 600	370	399	0.70	399	108%
B 102	3	HFD	1200 x 600	370	382	0.67	382	103%
B 102	4	HFD	1200 x 600	370	371	0.65	371	100%
B 102	5	HFD	1200 x 600	370	365	0.64	365	99%
B 102	6	HFD	1200 x 300	185	174	0.61	174	94%
B 102	7	HFD	1200 x 300	185	200	0.70	200	108%
B 102	8	HFD	1200 x 600	370	399	0.70	399	108%
B 102	9	HFD	1200 x 600	370	348	0.61	348	94%
B 102	10	HFD	1200 x 600	370	393	0.69	393	106%
B 102	11	HFD	1200 x 600	370	359	0.63	359	97%
B 102	12	HFD	1200 x 300	185	182	0.64	182	99%
B 102	13	HFD	1200 x 300	185	194	0.68	194	105%
B 102	14	HFD	1200 x 600	370	348	0.61	348	94%
B 102	15	HFD	1200 x 600	370	342	0.60	342	92%
B 102	16	HFD	1200 x 600	370	365	0.64	365	99%
B 102	17	HFD	1200 x 600	370	336	0.59	336	91%
B 102	18	HFD	1200 x 300	185	177	0.62	177	96%
B 102	19	HFD	1200 x 300	185	194	0.68	194	105%
B 102	20	HFD	1200 x 600	370	359	0.63	359	97%
B 102	21	HFD	1200 x 600	370	314	0.55	314	85%
B 102	22	HFD	1200 x 600	370	319	0.56	319	86%
B 102	23	HFD	1200 x 600	370	325	0.57	325	88%
B 102	24	HFD	1200 x 300	185	165	0.58	165	89%
B 102	25	HFD	1200 x 300	185	182	0.64	182	99%
B 102	26	HFD	1200 x 600	370	393	0.69	393	106%
B 102	27	HFD	1200 x 600	370	376	0.66	376	102%
B 102	28	HFD	1200 x 600	370	382	0.67	382	103%
B 102	29	HFD	1200 x 600	370	348	0.61	348	94%
B 102	30	HFD	1200 x 300	185	191	0.67	191	103%
TOTAL				9250	9074		9074	98%

REMARKS: The AHU is operating at 51.4 hz as reported by the VFD

TEST DATE: 03/09/18 READINGS BY Johnny Murray

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101I

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	12395	6090
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		204
Motor Amps - Average		23.1
Motor RPM	767	
VFD Hertz		27.1

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-12
Fan Suction S.P		-20
Fan/Unit Discharge S.P		159
Total Fan Static S.P	622 (2.5")	179
External Static S.P		171

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101I
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101I (Pascals)				
Unit Suct		Fan Suct		Discharge
-12	C Filter / C	-20	Fan	159

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101I

OUTLET MANUFACTURER Camfil Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 103	1	HFD	1200 x 600	370	171	0.30	171	46%
B 103	2	HFD	1200 x 600	370	182	0.32	182	49%
B 103	3	HFD	1200 x 600	370	154	0.27	154	42%
B 103	4	HFD	1200 x 600	370	188	0.33	188	51%
B 103	5	HFD	1200 x 600	370	188	0.33	188	51%
B 103	6	HFD	1200 x 600	370	177	0.31	177	48%
B 103	7	HFD	1200 x 600	370	160	0.28	160	43%
B 103	8	HFD	1200 x 600	370	205	0.36	205	55%
B 103	9	HFD	1200 x 600	370	177	0.31	177	48%
B 103	10	HFD	1200 x 600	370	177	0.31	177	48%
B 103	11	HFD	1200 x 600	370	182	0.32	182	49%
B 103	12	HFD	1200 x 600	370	211	0.37	211	57%
B 103	13	HFD	1200 x 600	370	120	0.21	120	32%
B 103	14	HFD	1200 x 600	370	211	0.37	211	57%
B 103	15	HFD	1200 x 600	370	165	0.29	165	45%
B 103	16	HFD	1200 x 600	370	148	0.26	148	40%
B 103	17	HFD	1200 x 600	370	182	0.32	182	49%
B 103	18	HFD	1200 x 600	370	160	0.28	160	43%
B 103	19	HFD	1200 x 600	370	188	0.33	188	51%
B 103	20	HFD	1200 x 600	370	165	0.29	165	45%
B 103	21	HFD	1200 x 600	370	165	0.29	165	45%
B 103	22	HFD	1200 x 600	370	188	0.33	188	51%
B 103	23	HFD	1200 x 600	370	194	0.34	194	52%
B 103	24	HFD	1200 x 600	370	182	0.32	182	49%
B 103	25	HFD	1200 x 600	370	222	0.39	222	60%
B 103	26	HFD	1200 x 600	370	188	0.33	188	51%
B 103	27	HFD	1200 x 600	370	160	0.28	160	43%
B 103	28	HFD	1200 x 600	185	171	0.30	171	92%
B 103	29	HFD	1200 x 600	185	154	0.27	154	83%
B 103	30	HFD	1200 x 600	370	211	0.37	211	57%

REMARKS: Continued on next page. The unit is operating at 28.7 hz as reported by the VFD.

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101I

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B103	31	HFD	1200 x 600	370	171	0.30	171	46%
B103	32	HFD	1200 x 600	370	148	0.26	148	40%
B103	33	HFD	1200 x 600	370	182	0.32	182	49%
B103	34	HFD	1200 x 600	370	165	0.29	165	45%
B103	35	HFD	1200 x 300	185	77	0.27	77	42%
TOTAL				12395	6090		6090	

REMARKS:

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101J

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	12950	6344
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		204
Motor Amps - Average		23.1
Motor RPM	767	
VFD Hertz		27.1

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-13
Fan Suction S.P		-18
Fan/Unit Discharge S.P		116
Total Fan Static S.P	622 (2.5")	134
External Static S.P		129

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101J
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101J (Pascals)				
Unit Suct		Fan Suct		Discharge
-13	C Filter / C	-18	Fan	116

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101J

OUTLET MANUFACTURER Camfil Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/S	AIRFLOW L/S	M/s	AIRFLOW L/S	
B 103	1	HFD	1200 x 600	370	165	0.29	165	45%
B 103	2	HFD	1200 x 600	370	160	0.28	160	43%
B 103	3	HFD	1200 x 600	370	165	0.29	165	45%
B 103	4	HFD	1200 x 600	370	154	0.27	154	42%
B 103	5	HFD	1200 x 600	370	182	0.32	182	49%
B 103	6	HFD	1200 x 600	370	160	0.28	160	43%
B 103	7	HFD	1200 x 600	370	148	0.26	148	40%
B 103	8	HFD	1200 x 600	370	148	0.26	148	40%
B 103	9	HFD	1200 x 600	370	171	0.30	171	46%
B 103	10	HFD	1200 x 600	370	177	0.31	177	48%
B 103	11	HFD	1200 x 600	370	228	0.40	228	62%
B 103	12	HFD	1200 x 600	370	245	0.43	245	66%
B 103	13	HFD	1200 x 600	370	160	0.28	160	43%
B 103	14	HFD	1200 x 600	370	182	0.32	182	49%
B 103	15	HFD	1200 x 600	370	165	0.29	165	45%
B 103	16	HFD	1200 x 600	370	154	0.27	154	42%
B 103	17	HFD	1200 x 600	370	205	0.36	205	55%
B 103	18	HFD	1200 x 600	370	251	0.44	251	68%
B 103	19	HFD	1200 x 600	370	228	0.40	228	62%
B 103	20	HFD	1200 x 600	370	205	0.36	205	55%
B 103	21	HFD	1200 x 600	370	177	0.31	177	48%
B 103	22	HFD	1200 x 600	370	177	0.31	177	48%
B 103	23	HFD	1200 x 600	370	200	0.35	200	54%
B 103	24	HFD	1200 x 600	370	194	0.34	194	52%
B 103	25	HFD	1200 x 600	370	171	0.30	171	46%
B 103	26	HFD	1200 x 600	370	251	0.44	251	68%
B 103	27	HFD	1200 x 600	370	165	0.29	165	45%
B 103	28	HFD	1200 x 600	370	165	0.29	165	45%
B 103	29	HFD	1200 x 600	370	131	0.23	131	35%
B 103	30	HFD	1200 x 600	370	205	0.36	205	55%

REMARKS: Continued on next page.

TEST DATE: 3/8/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101J

OUTLET MANUFACTURER Camfil Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/S	AIRFLOW L/S	M/s	AIRFLOW L/S	
B 103	31	HFD	1200 x 600	370	148	0.26	148	40%
B 103	32	HFD	1200 x 600	370	194	0.34	194	52%
B 103	33	HFD	1200 x 600	370	211	0.37	211	57%
B 103	34	HFD	1200 x 600	370	160	0.28	160	43%
B 103	35	HFD	1200 x 600	370	143	0.25	143	39%
TOTAL				12950	6344		6344	

REMARKS: Unit operating at 28.7 hz.

TEST DATE: 3/8/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101K

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	10915	10425
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		388
Motor Amps - Average		35
Motor RPM	767	
VFD Hertz		51.1

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-33
Fan Suction S.P		-117
Fan/Unit Discharge S.P		338
Total Fan Static S.P		455
External Static S.P		371

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101K
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101K (Pascals)				
Unit Suct		Fan Suct		Discharge
-33	C / Filter / C	-117	Fan	338

AECOM

AIR OUTLET TEST REPORT (FLOW HOOD)

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101K

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A 103	1	HFD	1200 x 300	185	200	0.70	200	108%
A 103	2	HFD	1200 x 600	370	325	0.57	325	88%
A 103	3	HFD	1200 x 600	370	348	0.61	348	94%
A 103	4	HFD	1200 x 600	370	371	0.65	371	100%
A 103	5	HFD	1200 x 600	370	331	0.58	331	89%
A 103	6	HFD	1200 x 600	370	376	0.66	376	102%
A 103	7	HFD	1200 x 600	370	405	0.71	405	109%
A 103	8	HFD	1200 x 600	370	348	0.61	348	94%
A 103	9	HFD	1200 x 600	370	359	0.63	359	97%
A 103	10	HFD	1200 x 600	370	319	0.56	319	86%
A 103	11	HFD	1200 x 600	370	325	0.57	325	88%
A 103	12	HFD	1200 x 600	370	388	0.68	388	105%
A 103	13	HFD	1200 x 600	370	388	0.68	388	105%
A 103	14	HFD	1200 x 600	370	359	0.63	359	97%
A 103	15	HFD	1200 x 600	370	296	0.52	296	80%
A 103	16	HFD	1200 x 600	370	302	0.53	302	82%
A 103	17	HFD	1200 x 600	370	314	0.55	314	85%
A 103	18	HFD	1200 x 600	370	336	0.59	336	91%
A 103	19	HFD	1200 x 600	370	445	0.78	445	120%
A 103	20	HFD	1200 x 600	370	302	0.53	302	82%
A 103	21	HFD	1200 x 600	370	388	0.68	388	105%
A 103	22	HFD	1200 x 600	370	319	0.56	319	86%
A 103	23	HFD	1200 x 600	370	445	0.78	445	120%
A 103	24	HFD	1200 x 600	370	365	0.64	365	99%
A 103	25	HFD	1200 x 600	370	331	0.58	331	89%
A 103	26	HFD	1200 x 600	370	331	0.58	331	89%
A 103	27	HFD	1200 x 600	370	382	0.67	382	103%
A 103	28	HFD	1200 x 600	370	376	0.66	376	102%
A 103	29	HFD	1200 x 600	370	353	0.62	353	96%
A 103	30	HFD	1200 x 600	370	302	0.53	302	82%
TOTAL				10915	10425		10425	

REMARKS: The AHU is operating at 51.1 hz as reported by the VFD

TEST DATE: 03/08/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101L

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	10915	10246
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		388
Motor Amps - Average		35
Motor RPM	767	
VFD Hertz		51.1

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-20
Fan Suction S.P		-80
Fan/Unit Discharge S.P		526
Total Fan Static S.P	622 (2.5")	606
External Static S.P		546

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101L
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101L (Pascals)				
Unit Suct		Fan Suct		Discharge
-20	C / Filter / C	-80	Fan	526

AECOM

AIR OUTLET TEST REPORT (FLOW HOOD)

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101L

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A 103	1	HFD	1200 x 300	185	185	0.65	185	100%
A 103	2	HFD	1200 x 600	370	325	0.57	325	88%
A 103	3	HFD	1200 x 600	370	348	0.61	348	94%
A 103	4	HFD	1200 x 600	370	371	0.65	371	100%
A 103	5	HFD	1200 x 600	370	331	0.58	331	89%
A 103	6	HFD	1200 x 600	370	376	0.66	376	102%
A 103	7	HFD	1200 x 600	370	348	0.61	348	94%
A 103	8	HFD	1200 x 600	370	353	0.62	353	96%
A 103	9	HFD	1200 x 600	370	359	0.63	359	97%
A 103	10	HFD	1200 x 600	370	319	0.56	319	86%
A 103	11	HFD	1200 x 600	370	325	0.57	325	88%
A 103	12	HFD	1200 x 600	370	388	0.68	388	105%
A 103	13	HFD	1200 x 600	370	388	0.68	388	105%
A 103	14	HFD	1200 x 600	370	359	0.63	359	97%
A 103	15	HFD	1200 x 600	370	296	0.52	296	80%
A 103	16	HFD	1200 x 600	370	302	0.53	302	82%
A 103	17	HFD	1200 x 600	370	314	0.55	314	85%
A 103	18	HFD	1200 x 600	370	336	0.59	336	91%
A 103	19	HFD	1200 x 600	370	388	0.68	388	105%
A 103	20	HFD	1200 x 600	370	302	0.53	302	82%
A 103	21	HFD	1200 x 600	370	388	0.68	388	105%
A 103	22	HFD	1200 x 600	370	319	0.56	319	86%
A 103	23	HFD	1200 x 600	370	388	0.68	388	105%
A 103	24	HFD	1200 x 600	370	365	0.64	365	99%
A 103	25	HFD	1200 x 600	370	331	0.58	331	89%
A 103	26	HFD	1200 x 600	370	331	0.58	331	89%
A 103	27	HFD	1200 x 600	370	382	0.67	382	103%
A 103	28	HFD	1200 x 600	370	376	0.66	376	102%
A 103	29	HFD	1200 x 600	370	353	0.62	353	96%
A 103	30	HFD	1200 x 600	370	302	0.53	302	82%
TOTAL				10915	10246		10246	94%

REMARKS: The AHU is operating at 51.1 hz as reported by the VFD

TEST DATE: 03/08/18 READINGS BY Johnny Murray

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101M

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	10360	8108
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		293
Motor Amps - Average		26.5
Motor RPM	767	
VFD Hertz		38.6

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-1
Fan Suction S.P		-57
Fan/Unit Discharge S.P		234
Total Fan Static S.P	622 (2.5")	291
External Static S.P		235

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101M
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101M (Pascals)				
Unit Suct		Fan Suct		Discharge
-1	C Filter / C	-57	Fan	234

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101M

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A 104	1	HFD	1200 x 600	370	245	0.43	245	66%
A 104	2	HFD	1200 x 600	370	234	0.41	234	63%
A 104	3	HFD	1200 x 600	370	291	0.51	291	79%
A 104	4	HFD	1200 x 600	370	257	0.45	257	69%
A 104	5	HFD	1200 x 600	370	245	0.43	245	66%
A 104	6	HFD	1200 x 300	185	131	0.46	131	71%
A 104	7	HFD	1200 x 600	370	279	0.49	279	75%
A 104	8	HFD	1200 x 600	370	291	0.51	291	79%
A 104	9	HFD	1200 x 600	370	314	0.55	314	85%
A 104	10	HFD	1200 x 600	370	302	0.53	302	82%
A 104	11	HFD	1200 x 600	370	308	0.54	308	83%
A 104	12	HFD	1200 x 300	185	151	0.53	151	82%
A 104	13	HFD	1200 x 600	370	262	0.46	262	71%
A 104	14	HFD	1200 x 600	370	308	0.54	308	83%
A 104	15	HFD	1200 x 600	370	302	0.53	302	82%
A 104	16	HFD	1200 x 600	370	296	0.52	296	80%
A 104	17	HFD	1200 x 600	370	268	0.47	268	72%
A 104	18	HFD	1200 x 300	185	157	0.55	157	85%
A 104	19	HFD	1200 x 600	370	314	0.55	314	85%
A 104	20	HFD	1200 x 600	370	279	0.49	279	75%
A 104	21	HFD	1200 x 600	370	302	0.53	302	82%
A 104	22	HFD	1200 x 600	370	331	0.58	331	89%
A 104	23	HFD	1200 x 600	370	268	0.47	268	72%
A 104	24	HFD	1200 x 300	185	162	0.57	162	88%
A 104	25	HFD	1200 x 600	370	302	0.53	302	82%
A 104	26	HFD	1200 x 600	370	308	0.54	308	83%
A 104	27	HFD	1200 x 600	370	314	0.55	314	85%
A 104	28	HFD	1200 x 600	370	314	0.55	314	85%
A 104	29	HFD	1200 x 600	370	285	0.50	285	77%
A 104	30	HFD	1200 x 600	370	291	0.51	291	79%
TOTAL				10360	8108		8108	

REMARKS: The AHU is operating at 39.6 hz as reported by the VFD

TEST DATE: 03/08/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101N

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	11100	8647
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		293
Motor Amps - Average		26.5
Motor RPM	767	
VFD Hertz		38.6

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-5
Fan Suction S.P		-67
Fan/Unit Discharge S.P		220
Total Fan Static S.P	622 (2.5")	287
External Static S.P		225

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101N
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101N (Pascals)				
Unit Suct		Fan Suct		Discharge
-5	C Filter / C	-67	Fan	220

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101N

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A 104	1	HFD	1200 x 600	370	331	0.58	331	89%
A 104	2	HFD	1200 x 600	370	331	0.58	331	89%
A 104	3	HFD	1200 x 600	370	291	0.51	291	79%
A 104	4	HFD	1200 x 600	370	308	0.54	308	83%
A 104	5	HFD	1200 x 600	370	325	0.57	325	88%
A 104	6	HFD	1200 x 600	370	319	0.56	319	86%
A 104	7	HFD	1200 x 600	370	331	0.58	331	89%
A 104	8	HFD	1200 x 600	370	274	0.48	274	74%
A 104	9	HFD	1200 x 600	370	279	0.49	279	75%
A 104	10	HFD	1200 x 600	370	274	0.48	274	74%
A 104	11	HFD	1200 x 600	370	274	0.48	274	74%
A 104	12	HFD	1200 x 600	370	291	0.51	291	79%
A 104	13	HFD	1200 x 600	370	268	0.47	268	72%
A 104	14	HFD	1200 x 600	370	296	0.52	296	80%
A 104	15	HFD	1200 x 600	370	291	0.51	291	79%
A 104	16	HFD	1200 x 600	370	274	0.48	274	74%
A 104	17	HFD	1200 x 600	370	268	0.47	268	72%
A 104	18	HFD	1200 x 600	370	268	0.47	268	72%
A 104	19	HFD	1200 x 600	370	285	0.50	285	77%
A 104	20	HFD	1200 x 600	370	245	0.43	245	66%
A 104	21	HFD	1200 x 600	370	222	0.39	222	60%
A 104	22	HFD	1200 x 600	370	308	0.54	308	83%
A 104	23	HFD	1200 x 600	370	325	0.57	325	88%
A 104	24	HFD	1200 x 600	370	285	0.50	285	77%
A 104	25	HFD	1200 x 600	370	285	0.50	285	77%
A 104	26	HFD	1200 x 600	370	279	0.49	279	75%
A 104	27	HFD	1200 x 600	370	245	0.43	245	66%
A 104	28	HFD	1200 x 600	370	274	0.48	274	74%
A 104	29	HFD	1200 x 600	370	319	0.56	319	86%
A 104	30	HFD	1200 x 600	370	285	0.50	285	77%
TOTAL				11100	8647		8647	78%

REMARKS: The AHU is operating at 39.6 hz as reported by the VFD

TEST DATE: 03/08/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101O

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	12950	11058
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		416
Motor Amps - Average		36.9
Motor RPM	767	
VFD Hertz		54.8

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-60
Fan Suction S.P		-166
Fan/Unit Discharge S.P		315
Total Fan Static S.P	622 (2.5")	481
External Static S.P		375

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101O
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101O (Pascals)				
Unit Suct		Fan Suct		Discharge
-60	C Filter / C	-166	Fan	315

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101O

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 104	1	HFD	1200 x 600	370	314	0.55	314	85%
B 104	2	HFD	1200 x 600	370	314	0.55	314	85%
B 104	3	HFD	1200 x 600	370	291	0.51	291	79%
B 104	4	HFD	1200 x 600	370	291	0.51	291	79%
B 104	5	HFD	1200 x 600	370	302	0.53	302	82%
B 104	6	HFD	1200 x 600	370	308	0.54	308	83%
B 104	7	HFD	1200 x 600	370	331	0.58	331	89%
B 104	8	HFD	1200 x 600	370	296	0.52	296	80%
B 104	9	HFD	1200 x 600	370	325	0.57	325	88%
B 104	10	HFD	1200 x 600	370	331	0.58	331	89%
B 104	11	HFD	1200 x 600	370	319	0.56	319	86%
B 104	12	HFD	1200 x 600	370	336	0.59	336	91%
B 104	13	HFD	1200 x 600	370	314	0.55	314	85%
B 104	14	HFD	1200 x 600	370	331	0.58	331	89%
B 104	15	HFD	1200 x 600	370	302	0.53	302	82%
B 104	16	HFD	1200 x 600	370	336	0.59	336	91%
B 104	17	HFD	1200 x 600	370	291	0.51	291	79%
B 104	18	HFD	1200 x 600	370	331	0.58	331	89%
B 104	19	HFD	1200 x 600	370	336	0.59	336	91%
B 104	20	HFD	1200 x 600	370	302	0.53	302	82%
B 104	21	HFD	1200 x 600	370	291	0.51	291	79%
B 104	22	HFD	1200 x 600	370	359	0.63	359	97%
B 104	23	HFD	1200 x 600	370	296	0.52	296	80%
B 104	24	HFD	1200 x 600	370	302	0.53	302	82%
B 104	25	HFD	1200 x 600	370	291	0.51	291	79%
B 104	26	HFD	1200 x 600	370	336	0.59	336	91%
B 104	27	HFD	1200 x 600	370	308	0.54	308	83%
B 104	28	HFD	1200 x 600	370	319	0.56	319	86%
B 104	29	HFD	1200 x 600	370	319	0.56	319	86%
B 104	30	HFD	1200 x 600	370	308	0.54	308	83%
TOTAL								

REMARKS: Continued on the next page.

TEST DATE: 03/16/18 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101O

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 105	31	HFD	1200 x 600	370	308	0.54	308	83%
B 105	32	HFD	1200 x 600	370	336	0.59	336	91%
B 105	33	HFD	1200 x 600	370	319	0.56	319	86%
B 105	34	HFD	1200 x 600	370	325	0.57	325	88%
B 105	35	HFD	1200 x 600	370	342	0.60	342	92%
TOTAL				12950	11058		11058	

REMARKS: The AHU is operating at 54.8 hz as reported by the VFD

TEST DATE: 03/16/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101P

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	12025	10588
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		416
Motor Amps - Average		36.9
Motor RPM	767	
VFD Hertz		54.8

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-55
Fan Suction S.P		-148
Fan/Unit Discharge S.P		463
Total Fan Static S.P	622 (2.5")	611
External Static S.P		518

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101P
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101P (Pascals)				
Unit Suct		Fan Suct		Discharge
-55	C Filter / C	-148	Fan	463

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101P

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 104	1	HFD	1150 x 600	370	334	0.61	334	90%
B 104	2	HFD	1200 x 600	370	331	0.58	331	89%
B 104	3	HFD	1200 x 600	370	319	0.56	319	86%
B 104	4	HFD	1200 x 600	370	308	0.54	308	83%
B 104	5	HFD	1200 x 600	370	308	0.54	308	83%
B 104	6	HFD	1200 x 600	370	291	0.51	291	79%
B 104	7	HFD	1200 x 600	370	336	0.59	336	91%
B 104	8	HFD	1200 x 300	185	171	0.60	171	92%
B 104	9	HFD	1200 x 600	370	314	0.55	314	85%
B 104	10	HFD	1200 x 600	370	325	0.57	325	88%
B 104	11	HFD	1200 x 600	370	336	0.59	336	91%
B 104	12	HFD	1200 x 600	370	348	0.61	348	94%
B 104	13	HFD	1200 x 600	370	342	0.60	342	92%
B 104	14	HFD	1200 x 600	370	359	0.63	359	97%
B 104	15	HFD	1200 x 300	185	182	0.64	182	99%
B 104	16	HFD	1200 x 600	370	308	0.54	308	83%
B 104	17	HFD	1200 x 600	370	296	0.52	296	80%
B 104	18	HFD	1200 x 600	370	359	0.63	359	97%
B 104	19	HFD	1200 x 600	370	353	0.62	353	96%
B 104	20	HFD	1200 x 600	370	291	0.51	291	79%
B 104	21	HFD	1200 x 600	370	342	0.60	342	92%
B 104	22	HFD	1200 x 300	185	154	0.54	154	83%
B 104	23	HFD	1200 x 600	370	296	0.52	296	80%
B 104	24	HFD	1200 x 600	370	308	0.54	308	83%
B 104	25	HFD	1200 x 600	370	336	0.59	336	91%
B 104	26	HFD	1200 x 600	370	319	0.56	319	86%
B 104	27	HFD	1200 x 600	370	319	0.56	319	86%
B 104	28	HFD	1200 x 600	370	365	0.64	365	99%
B 104	29	HFD	300 x 600	185	171	1.20	171	92%
B 104	30	HFD	1200 x 600	370	365	0.64	365	99%

REMARKS: The AHU is operating at 54.8 hz as reported by the VFD

Continued on the next page.

TEST DATE: 03/16/18 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101P

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 104	31	HFD	1200 x 600	370	291	0.51	291	79%
B 104	32	HFD	1200 x 600	370	325	0.57	325	88%
B 104	33	HFD	1200 x 600	370	291	0.51	291	79%
B 104	34	HFD	1200 x 600	370	319	0.56	319	86%
B 104	35	HFD	600 x 600	185	177	0.62	177	96%
TOTAL				12025	10588		10588	88%

REMARKS: The AHU is operating at 54.8 hz as reported by the VFD

TEST DATE: 03/16/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101-Q

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	12950	12295
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		N/A
Motor Amps - Average		N/A
Motor RPM	767	
VFD Hertz		N/A
		Unit operating in bypass

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-22
Fan Suction S.P		-193
Fan/Unit Discharge S.P		378
Total Fan Static S.P	622 (2.5")	571
External Static S.P		400

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101Q
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101Q (Pascals)				
Unit Suct		Fan Suct		Discharge
-22	C Filter / C	-193	Fan	378

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101Q

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 105	1	HFD	1200 x 600	370	388	0.68	388	105%
B 105	2	HFD	1200 x 600	370	342	0.60	342	92%
B 105	3	HFD	1200 x 600	370	331	0.58	331	89%
B 105	4	HFD	1200 x 600	370	393	0.69	393	106%
B 105	5	HFD	1200 x 600	370	353	0.62	353	96%
B 105	6	HFD	1200 x 600	370	348	0.61	348	94%
B 105	7	HFD	1200 x 600	370	365	0.64	365	99%
B 105	8	HFD	1200 x 600	370	353	0.62	353	96%
B 105	9	HFD	1200 x 600	370	365	0.64	365	99%
B 105	10	HFD	1200 x 600	370	353	0.62	353	96%
B 105	11	HFD	1200 x 600	370	319	0.56	319	86%
B 105	12	HFD	1200 x 600	370	342	0.60	342	92%
B 105	13	HFD	1200 x 600	370	325	0.57	325	88%
B 105	14	HFD	1200 x 600	370	393	0.69	393	106%
B 105	15	HFD	1200 x 600	370	410	0.72	410	111%
B 105	16	HFD	1200 x 600	370	342	0.60	342	92%
B 105	17	HFD	1200 x 600	370	348	0.61	348	94%
B 105	18	HFD	1200 x 600	370	371	0.65	371	100%
B 105	19	HFD	1200 x 600	370	359	0.63	359	97%
B 105	20	HFD	1200 x 600	370	331	0.58	331	89%
B 105	21	HFD	1200 x 600	370	331	0.58	331	89%
B 105	22	HFD	1200 x 600	370	393	0.69	393	106%
B 105	23	HFD	1200 x 600	370	359	0.63	359	97%
B 105	24	HFD	1200 x 600	370	331	0.58	331	89%
B 105	25	HFD	1200 x 600	370	319	0.56	319	86%
B 105	26	HFD	1200 x 600	370	382	0.67	382	103%
B 105	27	HFD	1200 x 600	370	319	0.56	319	86%
B 105	28	HFD	1200 x 600	370	365	0.64	365	99%
B 105	29	HFD	1200 x 600	370	353	0.62	353	96%
B 105	30	HFD	1200 x 600	370	348	0.61	348	94%
TOTAL								

REMARKS: The unit is operating in the VFD Bypass mode full speed 60 hz as reported by VFD

Continued on the next page.

TEST DATE: 03/16/18 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101Q

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 105	31	HFD	1200 x 600	370	319	0.56	319	86%
B 105	32	HFD	1200 x 600	370	291	0.51	291	79%
B 105	33	HFD	1200 x 600	370	365	0.64	365	99%
B 105	34	HFD	1200 x 600	370	336	0.59	336	91%
B 105	35	HFD	1200 x 600	370	353	0.62	353	96%
				12950	12295		12295	

REMARKS: The AHU is operating at 60 hz in Bypass mode as reported by the VFD

TEST DATE: 03/16/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101-R

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	12950	12289
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		N/A
Motor Amps - Average		N/A
Motor RPM	767	
VFD Hertz		N/A
		Unit is operating in bypass

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-56
Fan Suction S.P		-195
Fan/Unit Discharge S.P		367
Total Fan Static S.P	622 (2.5")	562
External Static S.P		423

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101R
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101R (Pascals)				
Unit Suct		Fan Suct		Discharge
-56	C Filter C	-195	Fan	367

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101R

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 105	1	HFD	1200 x 600	370	359	0.63	359	97%
B 105	2	HFD	1200 x 600	370	365	0.64	365	99%
B 105	3	HFD	1200 x 600	370	382	0.67	382	103%
B 105	4	HFD	1200 x 600	370	319	0.56	319	86%
B 105	5	HFD	1200 x 600	370	365	0.64	365	99%
B 105	6	HFD	1200 x 600	370	348	0.61	348	94%
B 105	7	HFD	1200 x 600	370	336	0.59	336	91%
B 105	8	HFD	1200 x 600	370	399	0.70	399	108%
B 105	9	HFD	1200 x 600	370	371	0.65	371	100%
B 105	10	HFD	1200 x 600	370	359	0.63	359	97%
B 105	11	HFD	1200 x 600	370	342	0.60	342	92%
B 105	12	HFD	1200 x 600	370	325	0.57	325	88%
B 105	13	HFD	1200 x 600	370	342	0.60	342	92%
B 105	14	HFD	1200 x 600	370	365	0.64	365	99%
B 105	15	HFD	1200 x 600	370	302	0.53	302	82%
B 105	16	HFD	1200 x 600	370	331	0.58	331	89%
B 105	17	HFD	1200 x 600	370	319	0.56	319	86%
B 105	18	HFD	1200 x 600	370	325	0.57	325	88%
B 105	19	HFD	1200 x 600	370	376	0.66	376	102%
B 105	20	HFD	1200 x 600	370	342	0.60	342	92%
B 105	21	HFD	1200 x 600	370	342	0.60	342	92%
B 105	22	HFD	1200 x 600	370	382	0.67	382	103%
B 105	23	HFD	1200 x 600	370	348	0.61	348	94%
B 105	24	HFD	1200 x 600	370	348	0.61	348	94%
B 105	25	HFD	1200 x 600	370	353	0.62	353	96%
B 105	26	HFD	1200 x 600	370	382	0.67	382	103%
B 105	27	HFD	1200 x 600	370	382	0.67	382	103%
B 105	28	HFD	1200 x 600	370	388	0.68	388	105%
B 105	29	HFD	1200 x 600	370	336	0.59	336	91%
B 105	30	HFD	1200 x 600	370	325	0.57	325	88%
TOTAL								

REMARKS: The AHU is operating at 60 hz in Bypass mode as reported by the VFD

Continued on the next page.

TEST DATE: 03/16/18 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101R

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B 105	31	HFD	1200 x 600	370	365	0.64	365	99%
B 105	32	HFD	1200 x 600	370	348	0.61	348	94%
B 105	33	HFD	1200 x 600	370	331	0.58	331	89%
B 105	34	HFD	1200 x 600	370	319	0.56	319	86%
B 105	35	HFD	1200 x 600	370	371	0.65	371	100%
TOTAL				12950	12289		12289	95%

REMARKS: The AHU is operating at 60 hz in Bypass mode as reported by the VFD

TEST DATE: 03/16/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101-S

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	12950	7245
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		281
Motor Amps - Average		24.9
Motor RPM	767	
VFD Hertz		37.1

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-3
Fan Suction S.P		-55
Fan/Unit Discharge S.P		174
Total Fan Static S.P	622 (2.5")	229
External Static S.P		177

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-101S
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-101S (Pascals)				
Unit Suct		Fan Suct		Discharge
-3	C Filter / C	-55	Fan	174

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101S

OUTLET MANUFACTURER CAMFIL-FARR TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A106	1	HFD	1200 x 600	370	211	0.37	211	57%
A106	2	HFD	1200 x 600	370	194	0.34	194	52%
A106	3	HFD	1200 x 600	370	200	0.35	200	54%
A106	4	HFD	1200 x 600	370	200	0.35	200	54%
A106	5	HFD	1200 x 600	370	245	0.43	245	66%
A106	6	HFD	1200 x 600	370	217	0.38	217	59%
A106	7	HFD	1200 x 600	370	171	0.30	171	46%
A106	8	HFD	1200 x 600	370	177	0.31	177	48%
A106	9	HFD	1200 x 600	370	211	0.37	211	57%
A106	10	HFD	1200 x 600	370	222	0.39	222	60%
A106	11	HFD	1200 x 600	370	211	0.37	211	57%
A106	12	HFD	1200 x 600	370	171	0.30	171	46%
A106	13	HFD	1200 x 600	370	222	0.39	222	60%
A106	14	HFD	1200 x 600	370	222	0.39	222	60%
A106	15	HFD	1200 x 600	370	194	0.34	194	52%
A106	16	HFD	1200 x 600	370	222	0.39	222	60%
A106	17	HFD	1200 x 600	370	211	0.37	211	57%
A106	18	HFD	1200 x 600	370	160	0.28	160	43%
A106	19	HFD	1200 x 600	370	211	0.37	211	57%
A106	20	HFD	1200 x 600	370	200	0.35	200	54%
A106	21	HFD	1200 x 600	370	239	0.42	239	65%
A106	22	HFD	1200 x 600	370	120	0.21	120	32%
A106	23	HFD	1200 x 600	370	182	0.32	182	49%
A106	24	HFD	1200 x 600	370	160	0.28	160	43%
A106	25	HFD	1200 x 600	370	228	0.40	228	62%
A106	26	HFD	1200 x 600	370	257	0.45	257	69%
A106	27	HFD	1200 x 600	370	251	0.44	251	68%
A106	28	HFD	1200 x 600	370	268	0.47	268	72%
A106	29	HFD	1200 x 600	370	257	0.45	257	69%
A106	30	HFD	1200 x 600	370	234	0.41	234	63%

REMARKS: Continued on next page. The AHU is operating at 37 Hz. as reported by the VFD

Continued on the next page.

TEST DATE: 3/13/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101S

OUTLET MANUFACTURER CAMFIL-FARR TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A106	31	HFD	1200 x 600	370	251	0.44	251	68%
A106	32	HFD	1200 x 600	370	160	0.28	160	43%
A106	33	HFD	1200 x 600	370	194	0.34	194	52%
A106	34	HFD	1200 x 600	370	182	0.32	182	49%
A106	35	HFD	1200 x 600	370	194	0.34	194	52%
				12950	7245		7245	56%

REMARKS: The AHU is operating at 37 Hz. as reported by the VFD

TEST DATE: 3/13/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU 101-T

LOCATION MER 215

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.92
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	27.1 / 1.15
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	11470	6509
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		281
Motor Amps - Average		24.9
Motor RPM	767	
VFD Hertz		37.1

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-3
Fan Suction S.P		-51
Fan/Unit Discharge S.P		245
Total Fan Static S.P	622 (2.5")	296
External Static S.P		248

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT NIST Building 215 Rebalance SYSTEM AHU-101T

LOCATION Bldg 215 MER DATE 4/10/2018

AHU-101T (Pascals)				
Unit Suct		Fan Suct		Discharge
-3	C Filter C	-51	Fan	245

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-101T

OUTLET MANUFACTURER CAMFIL-FARR TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A106	1	HFD	1200 x 600	370	177	0.31	177	48%
A106	2	HFD	1200 x 600	370	137	0.24	137	37%
A106	3	HFD	1200 x 600	370	194	0.34	194	52%
A106	4	HFD	1200 x 600	370	200	0.35	200	54%
A106	5	HFD	1200 x 600	370	222	0.39	222	60%
A106	6	HFD	1200 x 600	370	245	0.43	245	66%
A106	7	HFD	1200 x 600	370	205	0.36	205	55%
A106	8	HFD	1200 x 600	370	217	0.38	217	59%
A106	9	HFD	1200 x 600	370	234	0.41	234	63%
A106	10	HFD	1200 x 600	370	245	0.43	245	66%
A106	11	HFD	1200 x 600	370	154	0.27	154	42%
A106	12	HFD	1200 x 600	370	234	0.41	234	63%
A106	13	HFD	1200 x 600	370	165	0.29	165	45%
A106	14	HFD	1200 x 600	370	200	0.35	200	54%
A106	15	HFD	1200 x 600	370	239	0.42	239	65%
A106	16	HFD	1200 x 600	370	222	0.39	222	60%
A106	17	HFD	1200 x 600	370	228	0.40	228	62%
A106	18	HFD	1200 x 600	370	211	0.37	211	57%
A106	19	HFD	1200 x 600	370	257	0.45	257	69%
A106	20	HFD	1200 x 600	370	171	0.30	171	46%
A106	21	HFD	1200 x 600	370	194	0.34	194	52%
A106	22	HFD	1200 x 600	370	262	0.46	262	71%
A106	23	HFD	1200 x 600	370	177	0.31	177	48%
A106	24	HFD	1200 x 600	370	171	0.30	171	46%
A106	25	HFD	1200 x 600	370	257	0.45	257	69%
A106	26	HFD	1200 x 600	370	188	0.33	188	51%
A106	27	HFD	1200 x 600	370	222	0.39	222	60%
A106	28	HFD	1200 x 600	370	245	0.43	245	66%
A106	29	HFD	1200 x 600	370	200	0.35	200	54%
A106	30	HFD	1200 x 600	370	217	0.38	217	59%
A106	31	HFD	1200 x 600	370	222	0.39	222	60%
TOTAL				11470	6509		6509	57%

REMARKS: The AHU is operating at 37 Hz. as reported by the VFD

TEST DATE: 3/13/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-102A

LOCATION Building 215 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 351
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	11
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	20.5/
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	7770	3806
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		253
Motor Amps - Average		33 Note 1)
Motor RPM		
VFD Hertz		33.5

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-6
Fan Suction S.P		-48
Fan/Unit Discharge S.P		118
Total Fan Static S.P		166
External Static S.P		124

Notes: 1) This amperage reading is a summation of the 4 AHUs Motors' combined, taken from the common VFD serving AHU 102 A, B, C, D.

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT NIST Building 215 Rebalance SYSTEM AHU-102A

LOCATION Bldg 215 MER DATE 4/10/2018

AHU-102A (Pascals)				
Unit Suct		Fan Suct		Discharge
-6	C / Filter / C	-48	Fan	118

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-102B

LOCATION Building 215 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 351
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	11
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	20.5/
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	7770	3806
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		253
Motor Amps - Average		33 Note 1)
Motor RPM		
VFD Hertz		33.5

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-8
Fan Suction S.P		-56
Fan/Unit Discharge S.P		130
Total Fan Static S.P		186
External Static S.P		138
Ret. Air Damp. Position		
Out. Air Damp. Position		

Notes: 1) This amperage reading is a summation of the 4 AHUs Motors' combined, taken from the common VFD serving AHU 102 A, B, C, D.

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT NIST Building 215 Rebalance SYSTEM AHU-102B

LOCATION Bldg 215 MER DATE 4/10/2018

AHU-102B (Pascals)				
Unit Suct		Fan Suct		Discharge
-8	C Filter C	-56	Fan	130

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-102C

LOCATION Building 215 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 351
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	11
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	20.5/
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	7770	3806
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		253
Motor Amps - Average		33 Note 1)
Motor RPM		
VFD Hertz		33.5

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-14
Fan Suction S.P		-60
Fan/Unit Discharge S.P		130
Total Fan Static S.P		190
External Static S.P		144
Ret. Air Damp. Position		
Out. Air Damp. Position		

Notes: 1) This amperage reading is a summation of the 4 AHUs Motors' combined, taken from the common VFD serving AHU 102 A, B, C, D.

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-102C
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-102C (Pascals)				
Unit Suct		Fan Suct		Discharge
-14	C Filter C	-60	Fan	130

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-102D

LOCATION Building 215 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 351
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	Direct Drive
Fan Sheave Diam/Bore	Direct Drive
No. Belt/size	Direct Drive
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	11
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	20.5/
CFLA	
BHP	
Make/Type Motor Sheave	Direct Drive
Motor Sheave Diam/Bore	Direct Drive
Motor Sheave Oper. Diam	Direct Drive
Motor/Fan Sheave c to c	Direct Drive

TEST DATA	DESIGN	ACTUAL
Total L/s	7770	3806
Return Air L/s		
Outside Air L/s		
Fan RPM		
Motor Volts		253
Motor Amps - Average		33 Note 1)
Motor RPM		
VFD Hertz		33.5

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-8
Fan Suction S.P		-61
Fan/Unit Discharge S.P		134
Total Fan Static S.P		195
External Static S.P		142
Ret. Air Damp. Position		
Out. Air Damp. Position		

Notes: 1) This amperage reading is a summation of the 4 AHUs Motors' combined, taken from the common VFD serving AHU 102 A, B, C, D.

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-102D
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-102D (Pascals)				
Unit Suct		Fan Suct		Discharge
-8	C Filter C	-61	Fan	134

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-102 A, B, C, D

OUTLET MANUFACTURER Camfil Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B101 through B104	1	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	2	HFD	1200 x 600	370	200	0.35	200	54%
B101 through B104	3	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	4	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	5	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	6	HFD	1200 x 600	370	160	0.28	160	43%
B101 through B104	7	HFD	1200 x 600	370	171	0.30	171	46%
B101 through B104	8	HFD	1200 x 600	370	177	0.31	177	48%
B101 through B104	9	HFD	1200 x 600	370	171	0.30	171	46%
B101 through B104	10	HFD	1200 x 600	370	171	0.30	171	46%
B101 through B104	11	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	12	HFD	1200 x 600	370	171	0.30	171	46%
B101 through B104	13	HFD	1200 x 600	370	131	0.23	131	35%
B101 through B104	14	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	15	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	16	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	17	HFD	1200 x 600	370	200	0.35	200	54%
B101 through B104	18	HFD	1200 x 600	370	165	0.29	165	45%
B101 through B104	19	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	20	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	21	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	22	HFD	1200 x 600	370	177	0.31	177	48%
B101 through B104	23	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	24	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	25	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	26	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	27	HFD	1200 x 600	370	171	0.30	171	46%
B101 through B104	28	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	29	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	30	HFD	1200 x 600	370	200	0.35	200	54%

REMARKS: Continued on next page.

TEST DATE: 3/8/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-102 A, B, C, D

OUTLET MANUFACTURER Camfil Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B101 through B104	31	HFD	1200 x 600	370	177	0.31	177	48%
B101 through B104	32	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	33	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	34	HFD	1200 x 600	370	200	0.35	200	54%
B101 through B104	35	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	36	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	37	HFD	1200 x 600	370	171	0.30	171	46%
B101 through B104	38	HFD	1200 x 600	370	171	0.30	171	46%
B101 through B104	39	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	40	HFD	1200 x 600	370	200	0.35	200	54%
B101 through B104	41	HFD	1200 x 600	370	200	0.35	200	54%
B101 through B104	42	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	43	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	44	HFD	1200 x 600	370	211	0.37	211	57%
B101 through B104	45	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	46	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	47	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	48	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	49	HFD	1200 x 600	370	200	0.35	200	54%
B101 through B104	50	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	51	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	52	HFD	1200 x 600	370	217	0.38	217	59%
B101 through B104	53	HFD	1200 x 600	370	177	0.31	177	48%
B101 through B104	54	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	55	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	56	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	57	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	58	HFD	1200 x 600	370	148	0.26	148	40%
B101 through B104	59	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	60	HFD	1200 x 600	370	177	0.31	177	48%

REMARKS: Continued on next page.

TEST DATE: 3/8/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-102 A, B, C, D

OUTLET MANUFACTURER Camfil Farr TEST APPARATUS Velocity Grid + Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B101 through B104	61	HFD	1200 x 600	370	177	0.31	177	48%
B101 through B104	62	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	63	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	64	HFD	1200 x 600	370	171	0.30	171	46%
B101 through B104	65	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	66	HFD	1200 x 600	370	200	0.35	200	54%
B101 through B104	67	HFD	1200 x 600	370	177	0.31	177	48%
B101 through B104	68	HFD	1200 x 600	370	165	0.29	165	45%
B101 through B104	69	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	70	HFD	1200 x 600	370	182	0.32	182	49%
B101 through B104	71	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	72	HFD	1200 x 600	370	137	0.24	137	37%
B101 through B104	73	HFD	1200 x 600	370	194	0.34	194	52%
B101 through B104	74	HFD	1200 x 600	370	165	0.29	165	45%
B101 through B104	75	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	76	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	77	HFD	1200 x 600	370	114	0.20	114	31%
B101 through B104	78	HFD	1200 x 600	370	160	0.28	160	43%
B101 through B104	79	HFD	1200 x 600	370	154	0.27	154	42%
B101 through B104	80	HFD	1200 x 600	370	188	0.33	188	51%
B101 through B104	81	HFD	1200 x 600	370	171	0.30	171	46%
B101 through B104	82	HFD	1200 x 600	370	165	0.29	165	45%
B101 through B104	83	HFD	1200 x 600	370	148	0.26	148	40%
B101 through B104	84	HFD	1200 x 600	370	143	0.25	143	39%
TOTAL				31080	15225		15225	49%

REMARKS:

TEST DATE: 3/8/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-103

LOCATION Building 215 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 330
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	
Fan Sheave Diam/Bore	5V118XE4 x 2 15/16
No. Belt/size	(5) 5VX750
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	74.6
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	116.0/
CFLA	
BHP	
Make/Type Motor Sheave	
Motor Sheave Diam/Bore	5V118XE4 x 2 15/16
Motor/Fan Sheave c to c	19.5"

TEST DATA	DESIGN	ACTUAL
Σ of EBTRON Ducts L/s	17437	14086
Σ of AHU inlets L/s	17925	12934
Fan RPM		
Motor Volts		407
Motor Amps - Average		68
Motor RPM		
VFD Hertz		53.6

TEST DATA	DESIGN	ACTUAL
Total S.P.		1384
External S.P.		499
For Static Pressure Profile		
Refer to the Following Data		
Sheet		

TEST DATE

READINGS BY JOHNNY MURRAY

AECOM

AHU STATIC PRESSURE PROFILE DATA

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-103
LOCATION	Bldg 215 MER	DATE	4/10/2018

	UNIT SUCTION	Notes
	-144	1)
	INITIAL FILTERS	
	-278	
	PREHEATING COIL	
	-301	
	COOLING COIL	
	-465	
	GLYCOL HEATING COIL	
	-451	
	FAN	
	933	
	SOUND ATTENUATOR	
	932	
	CHILLER HEAT RECOVERY COIL	
	914	
	INITIAL FINAL FILTER	
	804	
	FINAL HEPA FILTER	
	355	
	UNIT DISCHARGE	

AIRFLOW

Notes: 1) Unit Measurements are in Pascals.

AECOM

MAKE-UP AIR BRANCH DUCT TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Makeup Supply Air / AHU-103

OUTLET MANUFACTURER N/A TEST APPARATUS Micromanometer / Pitot

UNIT SERVED	OUTLET				ORIGINAL	CURRENT	MEASURED	Calculated	EBTRON REPORT	BAS FLOW REPORT
	NO.	TYPE	SIZE	AREA	AIRFLOW STPT L/s		VELOCITY M/s	AIRFLOW L/s		
AHU 101 A, B	1	OED	600 x 650	0.39	2470	2232	4.98	1942	5.77	2250
AHU 101 G, H, AHU 102B	2	OED	600 x 650	0.39	2560	2250	4.92	1919	5.72	2230
AHU 101 I, J	3	OED	600 x 650	0.39	2470	2470	5.62	2192	6.35	2476
AHU 101 O, P, AHU 102D	4	OED	600 x 650	0.39	2560	2085	1.49	581	1.77	690
AHU 101 Q, R	5	OED	600 x 650	0.39	2470	1300	1.9	741	3.40	1326
AHU 111 A, B	6	OED	450 x 450	0.20	1080	100	0.44	88	0.55	110
AHU 110 A, B, AHU 108 B	7	OED	1000 x 650	0.65	4135	6700	10.19	6624	12.20	7930
AHU-112 MA	8	OED	300 x 200	0.06	N/G	300	4.43	266	5.00	300
Total					17745	17437		14086		17312
								0		

REMARKS:

TEST DATE: 2/14/18 READINGS BY Johnny Murray

AECOM

MAU BRANCH OUTLET TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Makeup Supply Air / AHU-103

OUTLET MANUFACTURER N/A TEST APPARATUS Pitot tube + Micromanometer

UNIT SERVED	OUTLET			DESIGN	VELOCITY			MEASURED	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	M/s	AREA	Ebtron	AIRFLOW L/s	
AHU-112	1	OED	300 X 200	300	4.98	0.06	5.77	265	88%
AHU-101 A	2	OED	550 X 400	1235	6.45	0.22	5.7	1419	115%
AHU-101 B	3	OED	550 X 400	1235	4.69	0.22	5.7	1032	84%
AHU-101 G	4	OED	550 X 400	1235	3.56	0.22	5.8	783	63%
AHU-101 H	5	OED	550 X 400	1235	4.61	0.22	5.8	1014	82%
AHU-101 I	6	OED	550 X 400	1235	4.8	0.22	6.3	1056	86%
AHU-101 J	7	OED	550 X 400	1235	5.31	0.22	6.3	1168	95%
AHU-101 P	8	OED	550 X 400	1235	0.56	0.22	1.9	123	10%
AHU-101 O	9	OED	550 X 400	1235	2.24	0.22	1.9	493	40%
AHU-101 Q	10	OED	550 X 400	1175	2.56	0.22	3.3	563	48%
AHU-101 R	11	OED	550 X 400	1175	2.71	0.22	3.3	596	51%
AHU-111 B	12	OED	300 X 400	540	0.75	0.12	0.54	90	17%
AHU-111 A	13	OED	300 X 400	540	0	0.12	0.54	0	0%
AHU-110 A	14	OED	600 x 600	2020	Note 1)	0.36	12.1	1743	86%
AHU-110 B	15	OED	600 x 600	2020	6.38	0.36	12.1	2297	114%
AHU-102 B	16	OED	200	90	3.08	0.031	5.8	95	106%
AHU-102 D	17	OED	200	90	3.24	0.031	1.9	100	112%
AHU-108 B	18	OED	200	95	3.08	0.031	local 9.1	95	101%
TOTAL				17925				12934	72%

NOTES: 1) This value was extrapolated from the total branch traverse due to a lack of an acceptable individual traverse location.

TEST DATE: 2/21/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-104

LOCATION Bldg. 215 2nd Level MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	330
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	
Fan Sheave Diam/Bore	5V125 x 2 15/16
No. Belt/size	(4) 5VX800
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	55.95
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	90.0/
CFLA	
BHP	
Make/Type Motor Sheave	
Motor Sheave Diam/Bore	5V113 x 2 3/8
Motor Sheave Oper. Diam	
Motor/Fan Sheave c to c	21.5"

TEST DATA	DESIGN	ACTUAL
Σ of EBTRON Ducts L/s	15335	14403
Σ of AHU inlets L/s	15980	13163
Fan RPM		
Motor Volts		373
Motor Amps - Average		57.2
Motor RPM		
VFD Hertz		48.9

TEST DATA	DESIGN	ACTUAL
Total Fan S.P.		1381
External Unit S.P.		503
For Static Pressure Profile		
Refer to the Following Data		
Sheet		

TEST DATE 2/20/2018

READINGS BY JOHNNY MURRAY

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-104
LOCATION	Bldg 215 MER	DATE	4/10/2018

	UNIT SUCTION	Notes
	-216	1)
	INITIAL FILTERS	
	-311	
	PREHEATING COIL	
	-302	
	COOLING COIL	
	-460	
	GLYCOL HEATING COIL	
	-509	
	FAN	
	778	
	SOUND ATTENUATOR	
	777	
	CHILLER HEAT RECOVERY COIL	
	771.6	
	INITIAL FINAL FILTER	
	666	
	FINAL HEPA FILTER	
	287	
	UNIT DISCHARGE	

AIRFLOW

Notes	1) Measurement units are in pascals

AECOM

AIR OUTLET TEST REPORT (FLOW HOOD)

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Makeup Supply Air / AHU-104

OUTLET MANUFACTURER N/A TEST APPARATUS Pitot Tube/ Micromanometer Traverse

UNIT SERVED	OUTLET			DESIGN	VELOCITY			MEASURED	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	M/s	AREA	EBTRON	AIRFLOW L/s	
AHU-101 C	1	OED	550 X 400	1235	NOTE 1)	0.22	6.3	1177	95%
AHU-101 D	2	OED	550 X 400	1235	4.78	0.22	6.3	1052	85%
AHU-102 A	3	OED	200	90	2.32	0.031	6.3	72	80%
AHU-101 F	4	OED	550 X 400	1235	NOTE 1)	0.22	5.4	1253	101%
AHU-101 E	5	OED	550 X 400	1235	4.04	0.22	5.4	889	72%
AHU-102 C	6	OED	200	90	1.49	0.031	5.2	46	51%
AHU-101 K	7	OED	550 X 400	1235	NOTE 1)	0.22	5.2	1395	113%
AHU-101L	8	OED	550 X 400	1235	3.68	0.22	5.2	810	66%
AHU-101 N	9	OED	550 X 400	1235	NOTE 1)	0.22	6.4	1328	108%
AHU-101 M	10	OED	550 X 400	1235	5.65	0.22	6.4	1243	101%
AHU-108 A	11	OED	200	95	2.72	0.031	3.4	84	89%
AHU-114	12	OED	500 X 400	1000	3.1	0.2	3.3	620	62%
AHU-111 D	13	OED	300 X 400	540	NOTE 1)	0.12	2.5	282	52%
AHU-111 C	14	OED	300 X 400	540	2.13	0.12	2.5	256	47%
AHU-101 T	15	OED	550 X 400	1235	3.6	0.22	6.5	792	64%
AHU-101 S	16	OED	550 X 400	1235	2.5	0.22	6.5	550	45%
AHU-109	17	OED	700 x 450	1000	6.57	0.2	6.5	1314	131%
TOTAL				15980				13163	82%

NOTES: 1) This value was extrapolated from the total branch traverse due to a lack of an acceptable individual traverse location.

TEST DATE: 2/20/2018 READINGS BY Johnny Murray

AECOM

MAU BRANCH OUTLET TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Makeup Supply Air / AHU-104

OUTLET MANUFACTURER N/A TEST APPARATUS Pitot Tube/ Micromanometer Traverse

UNIT SERVED	OUTLET			AREA	ORIGINAL	CURRENT	MEASURED	MEASURED	EBTRON REPORT	BAS REPORT
	NO.	TYPE	SIZE		AIRFLOW STPT L/s		VELOCITY M/s	AIRFLOW L/s		
AHU 101 C, D, AHU 102A	1	OED	600 x 650	0.39	2560	2470	5.9	2301	6.20	2418
AHU 101 E, F	2	OED	600 x 650	0.39	2470	2090	5.7	2223	5.40	2106
AHU 101 K, L, AHU 102C	3	OED	600 x 650	0.39	2560	2085	5.77	2250	5.30	2067
AHU 101 M, N	4	OED	600 x 650	0.39	2470	2500	6.89	2687	6.45	2515
AHU 114 , AHU 108A	5	OED	600 x 700	0.42	1095	1400	2.2	924	3.50	1470
AHU 111 C, D	6	OED	450 x 450	0.20	550	500	2.93	586	2.60	520
AHU 101 S, T, AHU 109	7	OED	1000 x 650	0.65	4200	4000	5.28	3432	6.40	4160
AHU-113 (NOTE 1)	8	OED	500 x 200	0.10	N/G	290	2.44	244	2.70	270
TOTAL					15905	15335		14403		15526
AHU 104 MECH RM TOTAL TRAVERSE			2800 x 800	2.24			5.3	11872	6.10	13664

REMARKS: Note 1) AHU 113 has 2 Ebtrons installed on its MAU duct. FIO

TEST DATE: 2/14/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-105

LOCATION Bldg 216 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	BAF-DW 270
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	
Fan Sheave Diam/Bore	5V9.75x 2 11/16
No. Belt/size	(3) 5VX630
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	45
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	73.6/1.15
CFLA	
BHP	
Make/Type Motor Sheave	
Motor Sheave Diam/Bore	3 5V11.3 x 2 3/8
Motor Sheave Oper. Diam	
Motor/Fan Sheave c to c	15

TEST DATA	DESIGN	ACTUAL
Total L/s	11565	8147
Return Air L/s		7114
Outside Air L/s		1033
Fan RPM		
Motor Volts		275
Motor Amps - Average		29.8
Motor RPM		
VFD Hertz		36

TEST DATA	DESIGN	ACTUAL
Total S.P.		755
External S.P.		490
For Static Pressure Profile		
Refer to the Following Data		
Sheet		

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-105
LOCATION	Bldg 216 MER	DATE	4/10/2018

	RETURN DUCT	NOTE
	-512	
	RETURN FAN	
RELIEF DAMPER	-37	1)
	RETURN AIR DAMPER	
OA/ECON	-110	
	INITIAL FILTERS	
	-215	
	GLYCOL PREHEATING COIL	
	243	
	COOLING COIL	
	-344	
	FAN	
	SOUND ATTENUATOR	
	411	
	HEATING COIL	
	FINAL FILTER	
	380	
	UNIT DISCHARGE	

AIRFLOW

NOTES 1) Damper is not fully closed when BAS is calling for damper to be fully closed.

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT: NIST Building 215 Rebalance | SYSTEM/UNIT: AHU-105

LOCATION/ZONE: Bldg 216 MER | SERVICE: Total Supply Air

DUCT		DESIGN		ACTUAL	
S.P.	255	SL/s		SL/s	
Air Temp	17.5	L/s	11565	L/s	8147
Size	1120 mm round duct	FPM		FPM	8.27
Area	0.99				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	7.72		6.83		7.43		6.85						
	2	8.46		7.79		7.95		7.77						
	3	8.47		8.24		8.55		8.23						
	4	9.07		8.66		8.77		8.50						
	5	9.22		9.09		8.74		9.17						
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		42.94	0	40.61	0	41.44	0	40.52	0					

REMARKS: Drive Speed= 38.3 Hz 33.8 amps reported by VFD

TEST DATE: 4/10/2018 READINGS BY:

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST Building 215 Rebalance

UNIT RF-105

LOCATION Bldg 216 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	
Model No.	
Serial Number	
Type/Size	
Arr./Class	
Fan Discharge	
Make/Type Fan Sheave	
Fan Sheave Diam/Bore	5B 7.4 SF x 2 5/16
No. Belt/size	(5) A48

MOTOR INFORMATION	
Make/Frame	GE
KW	11.19
Volts/Phase/Hertz	460/3/
F.L. Amps/S.F.	17.6/1.15
CFLA	
BHP	
Make/Type Motor Sheave	
Motor Sheave Diam/Bore	5B5.0 SD x 1 5/8
Motor Sheave Oper. Diam	
Motor/Fan Sheave c to c	16

TEST DATA	DESIGN	ACTUAL
Total L/S		7114
Fan RPM		
Motor Volts		453.8
Motor Amps - Average		11
Motor RPM		
VFD Hertz		60

TEST DATA	DESIGN	ACTUAL
Suction S.P		512
Discharge S.P		-37
Total S.P.		475

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT NIST REBALANCE BLDG. 215 SYSTEM/UNIT AHU-105

LOCATION/ZONE PENTHOUSE MECH ROOM BLDG. 216 SERVICE Total Return Air

DUCT		DESIGN		ACTUAL	
S.P.	-350	SL/s		SL/s	
Air Temp	22.5	L/s	7140	L/s	7114
Size	960 x 960	M/s		M/s	7.72
Area	0.92				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	7.45	7.58	6.30	6.59	7.55	6.29							
	2	8.04	8.36	7.55	8.32	8.09	7.49							
	3	8.82	8.44	8.06	8.06	8.11	7.18							
	4	8.13	8.62	8.45	8.47	8.07	7.06							
	5	7.55	8.66	8.04	7.95	8.45	6.55							
	6	7.99	6.93	7.65	7.71	6.79	6.72							
	7													
	8													
	9													
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		47.98	48.59	46.05	47.1	47.06	41.29							

REMARKS: Drive Speed 60 Hz. 11.0 amps 461 Volts EBTRON not reporting at display , BAS reporting airflow that is not accurate

TEST DATE 4/10/2018 READINGS BY Johnny Murray

AECOM

VAV TERMINAL TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT VAVs / AHU-105

VAV MANUFACTURER NAILOR TEST APPARATUS Manometer + Flowhood

VAV ADDRESS		VAV			DESIGN / CURRENT	DESIGN / CURRENT	BAS	FINAL		AREA SERVED
		MODEL	Current Calib Factor	INLET SIZE SCHED/ BAS	STPT MINIMUM L/s	STPT MAXIMUM L/s	Flow Report	Vel Pressure/ Tested L/s		
46		D30RW	1.4	350	570	570	295 Note 1)	0.18	511	C0-C-1
47		D30RW	1.25	400	850	850	158	0.37	871	C0-C-1
48		D30RW	1.55	350	250	500/375	382	0.035	225	C106
49		D30RW	1.5	350	570	570	327	0.19	525	C0-C-1
50		D30RW	1.52	350	250	500 / 375	390	0.04	241	C106
51		D30RW	2.96	400	740	740	170	0.06	351	C0-C-1
18		D30RW	1.45	175/130	85	170	63	cone	152	C106
19		D30RW	1.45	125/130	0/ 240	140/240	67	cone	41	C107-1
44		D30RW	1.45	350	250	500 / 375	319	0.24	365	C103
45		D30RW	1.5	350	250	500 / 375	341	0.24	365	C103
43		D30RW	1.59	400	965 / 350	970 / 450	454	0.14	605	C0-C-1
42		D30RW	1.54	200	125	250	56	0.21	194	C0-C-2
41		D30RW	1.69	200 /250	175	350	305	0.11	319	C0-C-2
36		D30RW	1.45	175 / 120	0 / 200	115 / 300	117	cone	65	C102-1
37		D30RW	1.3	175 / 180	85 / 205	170 / 310	107	cone	104	C101
38		D30RW	1.8	200	280	280	182	0.23	430	LO-A-1
39		D30RW	1.18	300	210 / 480	420 / 520	447	cone	392	CO-C-1
49		D30RW	1.5	200 / 350	145 / 570	290 / 570	330	0.13	471	CO-C-1
35		D30RW	1.55	300	245 / 450	490	450	0.09	392	CO-B-1
34		D30RW	1.49	300	240 / 260	480 / 490	269	0.03	169	CO-B-1
33		D30RW	1.51	300	245 / 415	490	426	0.07	255	CO-B-1
32		D30RW	1.48	300	245	490	344	0.12	330	CO-B-1
31		D30RW	1.59	300	245	490	234	0.025	155	CO-B-1
30		D30RW	1.66	300	245 / 275	490	291	0.011	118	CO-B-1
29		D30RW	1.52	300	245	490	132	0.023	146	CO-B-1
28		D30RW	1.58	200 / 300	125	250	125	Cone	134	CO-E-1
40		D30RW	0	200	145	3277	0	cone	197	CO-C-1
TOTAL							6486		8123	Note 2)

Notes: 1) Highlighted Values indicate BAS reported airflow values versus tested airflow values which deviate beyond the range of calibration adjustment by flow calibration factors. 2) Total traverse = 8102 L / s

TEST DATE: 4/10/2018 READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AIR TERMINAL DISTRIBUTION / AHU-105

VAV MANUFACTURER NAILOR TEST APPARATUS Flowhood/ RVA/ Manometer

ROOM #	ADD	VAV			DESIGN	PRELIMINARY		FINAL	NOTES
		ID #	TYPE	OUTLET SIZE	L/S	L/S		MAXIMUM L/S	
C0-C-1	46	1	WD	400 x 400	120				
C0-C-1		2	WD	400 x 400	190				
C0-C-1		3	WD	400 x 400	260				
				TOTAL	570	519		519	
C0-C-1	47	1	WD	400 x 400	425				
C0-C-1		2	WD	400 x 400	425				
				TOTAL	850	825		825	
C106	48	1	LD	3600	500				
				TOTAL	500	217		217	
C0-C-1	49	1	WD	400 x 400	260				
C0-C-1		2	WD	400 x 400	190				
C0-C-1		3	WD	400 x 400	120				
TOTAL				TOTAL	570	525		525	
C106	50	1	LD	3600	500				
				TOTAL	500	236		236	
C0-C-1	51	1	WD	400 x 400	120				
C0-C-1		2	WD	400 x 400	200				
C0-C-1		3	WD	400 x 400	420				
				TOTAL	740	778		778	
C106	18	1	CD	600 x 600	70	46		46	
C106		2	CD	600 x 600	70	49		49	
C106		3	CD	150 x 150	30	57		57	
				TOTAL	170	152		152	
C107-1	19	1	SR	300 x 150	140	41		41	
				TOTAL	140	41		41	

NOTES:

TEST DATE: 4/10/2018 READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AIR TERMINAL DISTRIBUTION / AHU-105

VAV MANUFACTURER NAILOR TEST APPARATUS Manometer + Flowhood

ROOM #	ADD	VAV ID #	VAV TYPE	VAV OUTLET SIZE	DESIGN L/S	PRELIMINARY L/S		FINAL MAXIMUM L/S	NOTES
C103	44	1	LD	3600	500				
				TOTAL	500	365		365	
C103	45	1	LD	3600	500				
				TOTAL	500	188		188	
C0-C-1	43	1	WD-1	3600	120				
C0-C-1		2	WD-1	3600	425				
C0-C-1		3	WD-1	3600	425				
				TOTAL	970	605		605	
C0-C-2	42	1	CD	600 x 600	125	129		129	
C0-C-2		2	CD	600 x 600	125	111		111	
TOTAL				TOTAL	250	240		240	
C0-C-2	41	1	CD	600 x 600	150	141		141	
C0-C-2		2	CD	600 x 600	200	178		178	
TOTAL				TOTAL	350	319		319	
C102-1	36	1	SR	200 x 150	115	65		65	
				TOTAL	115	65		65	
C101	37	1	CD	600 x 600	70				
C101		2	CD	600 x 600	70				
C101		3	SR	150 x 150	30				
				TOTAL	170	104		104	
LO-A-1	38	1	LD	1370	280				
				TOTAL	280	430		430	

NOTES:

TEST DATE: 4/10/2018 READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AIR TERMINAL DISTRIBUTION / AHU-105

VAV MANUFACTURER NAILOR TEST APPARATUS Manometer + Flowhood

ROOM #	ADD	VAV ID #	VAV TYPE	VAV OUTLET SIZE	DESIGN L/S	PRELIMINARY L/S		FINAL MAXIMUM L/S	NOTES
CO-C-1	39	1	CD	600 x 600	140				
CO-C-1		2	CD	600 x 600	140	0		0	
CO-C-1		3	CD	600 x 600	140				
TOTAL					210/420	392		392	
CO-C-1	49	1	WD	3600	260				
CO-C-1		1	WD	3600	190				
CO-C-1		3	WD	3600	120				
TOTAL				TOTAL	570/570	392		392	
CO-B-1	35	1	LD	3660	490				
CO-B-1	35	2	LD	3660	490				
TOTAL					245/490	392		392	
CO-B-1	34	1	LD	3600	480				
CO-B-1		2	LD	1830	235				
TOTAL					240/480	169		169	
CO-B-1	33	1	LD	3660	490				
TOTAL				TOTAL	245/490	255		255	
CO-B-1	32	1	LD	3660	490				
TOTAL					245/490	330		330	
	31	1	LD	3660	490				
TOTAL					245/490	155		155	
CO-B-1	30	1	LD	3660	490				
TOTAL					245/490	118		118	
CO-B-1	29	1	LD	3660	490				
TOTAL					245/490	146		146	

NOTES:

TEST DATE: 4/10/2018 READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AIR TERMINAL DISTRIBUTION / AHU-105

VAV MANUFACTURER NAILOR TEST APPARATUS Manometer + Flowhood

ROOM #	ADD	VAV			DESIGN	PRELIMINARY		FINAL	NOTES
		ID #	TYPE	OUTLET SIZE	L/S	L/S		MAXIMUM L/S	
CO-E-1	28	1	CD	600 x 600	125	64		64	
CO-E-1		2	CD	600 x 600	125	70		70	
TOTAL					125/250	134		134	
CO-C-1	40	1	CD	600 x 600	140	104		104	
CO-C-1		2	CD	600 x 600	150	93		93	
TOTAL					290	197		197	
								3293	

NOTES:

TEST DATE: 4/10/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-106

LOCATION Bldg 215 Lower Level MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	BAF-DW 300
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	
Fan Sheave Diam/Bore	5V9.0 x 2 11/16
No. Belt/size	(5) 5VX670
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	55.5
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	90.0/
CFLA	
BHP	
Make/Type Motor Sheave	
Motor Sheave Diam/Bore	5V9.25 x 2 3/8
Motor Sheave Oper. Diam	
Motor/Fan Sheave c to c	19"

TEST DATA	DESIGN	ACTUAL
Total L/S	14155	16614
Fan RPM		
Motor Volts		444
Motor Amps - Average		59
Motor RPM		
VFD Hertz		59.9

TEST DATA	DESIGN	ACTUAL
Total S.P.		N/A
External S.P.		697
For Static Pressure Profile		
Refer to the Following Data		
Sheet		

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-106
LOCATION	Bldg 215 MER	DATE	4/10/2018

	UNIT SUCTION	
	-176	
	INITIAL FILTERS	
	-312	
	PREHEATING COIL	
	-344	
	COOLING COIL	
	-616	
	GLYCOL HEATING COIL	
	N/A	
	FAN	
	572	
	SOUND ATTENUATOR	
	566	
	CHILLER HEAT RECOVERY COIL	
	N/A	
	INITIAL FINAL FILTER	
	N/A	
	FINAL HEPA FILTER	
	521	
	UNIT DISCHARGE	

AIRFLOW

DIRECTION

Test values are reported in Pascals (Pa)

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT: NIST BUILDING 215 REBALANCE

SYSTEM/UNIT: AHU-106 Total Air

LOCATION/ZONE: E003

SERVICE: AHU-6 Outside Air Total Unit Cfm

DUCT		DESIGN		ACTUAL	
S.P.	-128	SL/S		SL/S	
Air Temp	25	L/S	14170	L/S	16614
Size	3000 x 600	FPM		FPM	9.23
Area	1.80				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	8.56	9.12	9.78	10.14	9.93	9.08	10.23	9.31	7.24	8.41	8.94	7.71	
	2	8.9	9.03	9.98	10.03	10.17	10.18	10.12	9.73	6.94	9.42	9.74	9.46	
	3	9.11	9.25	9.9	9.75	10.05	9.83	10.23	9.87	7.3	10.26	9.7	10.37	
	4	7.44	8.77	9.16	9.78	9.08	9.14	9.56	9.42	8.02	8.99	8.83	10.36	
	5													
	6	10.52	7.7	8.87	8.51	8.27								
	7	9.79	8.78	9.38	9.09	8.36								
	8	9.93	9.47	10.11	9.15	8.47								
	9	9.9	9.69	9.52	8.56	8.07								
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		74.15	71.81	76.7	75.01	72.4	38.23	40.14	38.33					

REMARKS:

TEST DATE

READINGS BY: Johnny Murray

AECOM

VAV TERMINAL TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT VAVs / AHU-106

VAV MANUFACTURER NAILOR TEST APPARATUS Manometer + Flowhood

ADDRESS	VAV			DESIGN / CURRENT	DESIGN/ CURRENT	BAS	FINAL	SERVING
	MODEL	Current k Factor	INLET SIZE Sched / BAS	MINIMUM L/s	MAXIMUM L/s	Flow Report	Tested L/s	
68	D30RW	1.72	175 / 180	180	180	24	156	E001 Note 2)
67	D30RW	1.4	125 / 100	17 /	35 /	0	51	E002
65	D30RW	1.45	400	930 / 350	930 / 750	236	1132	A001
66	D30RW	1.25	400	760 / 450	760 / 730	93	1067	CO-B1-0
63	D30RW	1.5	200	305 / 200	305 /	23	254	B006
61	D30RW	1.95	300	400	400	393	300	D002
60	D30RW	1.5	175	190	190	16	165	D001
59	D30RW	1.5	300	470 / 350	470	221	566	C001
58	D30RW	1.67	250	340	340	55	0	CO-C-0
57	D30RW	1.68	300	460 / 350	460	153	299	C0002-2
09	D3001	1.4	400	700 / 400	700	381	425	D004
10	D30RW	1.9	200	280	280	31	0	D005-1
13	D30RW		250	320	320	0	0	C008 note 1)
56	D30RW	1.8	125 / 120	80	80	49	35	C013
55	D30RW	1.1	350	610 / 350	610	64	578	C012
54	D30RW	1.4	400	965	965	319	885	C011
11	D30RW	1.15	125 / 120	60 / 70	60 / 100	14	78	C010
12	D30RW	1.18	250	320	320	21	0	CO-H-0
15	D30RW	1.4	125 / 120	80	80 / 100	7	78	C009
14	D30RW	1.2	300	300	300	91	469	C0-A1-0
08	D30RW	1.35	250	350	350	34	401	D004
07	D30RW	1.4	200	355	355	16	223	A006
03	D30RW	1.93	400	930 / 260	930 / 300	81	0	A008
02	D3001	1.35	125 / 120	17 / 140	35 / 200	137	118	E005-1
01	D30RW	1.27	300	440	440	27	552	E002
04	D30RW	1.39	400	760 / 350	760 / 750	394	1180	A001
05	D30RW	1.47	400	920 / 350	920 / 750	453	873	A001
06	D30RW	1.44	400	920 / 350	920 / 750	120	1205	A001
62	D30RW	1.42	400	930 / 350	930 / 720	130	1085	A001
64	D30RW	0.04	400	930 / 350	930 / 750	15	896	A001
72			400	500	500	488	500	A005-2
TOTAL						4086	13571	

NOTE: 1) There is an open outlet on this system that has no VAV controlling it in Data Room C008

2) Highlighted Values indicate BAS reported airflow values versus tested airflow values which deviate beyond the range of calibration adjustment by flow calibration factors.

TEST DATE: 02-27 thru 29-18 READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AIR TERMINAL DISTRIBUTION / AHU-106

VAV MANUFACTURER NAILOR TEST APPARATUS Flowhood/RVA/manometer

		VAV			DESIGN			PRELIMINARY	FINAL	NOTES
ROOM #	ADD	ID #	TYPE	OUTLET SIZE	L/S	ak	Vel m/s	L/S	MAXIMUM L/S	
E001	68	1	CD		90	C		73		
		2	CD		90	C		83		
Total					180			156	156	
E002	67	1	SR	200 x 100	35			51		
Total					17/35			51	51	
A001	65	1	SR	300 x 200	155					
A001		2	SR	300 x 200	155					
A001		3	SR	300 x 200	155					
A001		4	SR	300 x 200	155					
A001		5	SR	300 x 200	155					
A001		6	SR	300 x 200	155					
Total					930			1132	1132	
CO-B1-0	66	1	SR	600 x 600	140	C		175	175	
CO-B1-0		2	SR	150 x 150	60	20	2.00	40	40	
CO-B1-0		3	SR	600 x 600	140	C		162	162	
CO-B1-0		4	SR	600 x 600	140	C		230	230	
CO-B1-0		5	SR	600 x 600	140	C		221	221	
CO-B1-0		6	SR	600 x 600	140	C		239	239	
Total					760			1067	1067	
B006	63	1	SR	200 x 200	135	26	3.8	99	99	
B006		2	SR	200 x 200	135	26	4.2	109	109	
B006		3	SR	150 x 150	35	20	2.3	46	46	
Total					305			254	254	
D002	61	1	SR	300 x 150	100					
D002		2	SR	300 x 150	100					
D002		3	SR	300 x 150	100					
D002		4	SR	300 x 150	100					
Total					400			300	300	

NOTES:

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AIR TERMINAL DISTRIBUTION / AHU-106

VAV MANUFACTURER NAILOR TEST APPARATUS Flowhood/RVA/manometer

ROOM #	VAV	VAV ID #	VAV TYPE	VAV OUTLET SIZE	DESIGN L/S	ak	Vel m/s	PRELIMINARY L/S	FINAL MAXIMUM L/S	NOTES
D01	60	1	SR	250 x 200	190	29	5.7	165	165	
Total					190			165	165	
C001	59	1	SR	250 x 150	120					
C001		2	SR	250 x 150	120					
C001		3	SR	250 x 150	120					
C001		4	SR	250 x 150	110					
Total					470			566	566	
CO-C-0	58	1	CD	600 x 600	170					1)
CO-C-0		2	CD	600 x 600	170					
Total					340			0	0	
C001	57	1	SR	250 x 150	110					
C001		2	SR	250 x 150	120					
C001		3	SR	250 x 150	120					
C001		4	SR	150 x 150	50					
C001		5	CD	150 x 150	60					
Total					460			566	566	
D004	09	1	SR	450 x 300	350					
D004		2	SR	450 x 300	350					
Total					700			425	425	
								0	0	
D005-1	10	1	SR	150 x 150	140					2)
D005-1		2	SR	150 x 150	140					
Total					280					
C008	13	1	SR	200 x 150	80					3)
C008		2	SR	200 x 150	80					
C008		3	SR	200 x 150	80					
C008		4	SR	200 x 150	80			0	0	
Total					320					

NOTES: 1) Damper closed; unresponsive. 2) VAV 10 is capped off on its discharge duct and is not used. 3) No VAV installed for this op duct serving DATA Room C008.

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AIR TERMINAL DISTRIBUTION / AHU-106

VAV MANUFACTURER NAILOR TEST APPARATUS Flowhood/RVA/manometer

ROOM #	VAV	VAV ID #	VAV TYPE	VAV OUTLET SIZE	DESIGN L/S	ak	Vel m/s	PRELIMINARY L/S	FINAL MAXIMUM L/S	NOTES
C013	56	1	SR	150 x 150	80	c				
Total					80	c		35	35	
C012	55	1	SR	250 x 150	120	0.02	4.90	98	98	
C012		2	CD	600 x 600	120			118	118	
C012		3	CD	600 x 600	130			134	134	
C012		4	CD	600 x 600	120			120	120	
C012		5	SR	150 x 150	50	0.012	3.40	40.8	40.8	
C012		6	CD	600 x 600	70			67	67	
Total					610			578	578	
C011	54	1	CD	600 x 600	135			136	136	add 54
C011		2	CD	600 x 600	135			138	138	
C011		3	CD	600 x 600	135			137	137	
C011		4	OED	100	25			capped	capped	
C011		5	SR	250 x 250	120	0.02	4.00	83	83	
C011		6	CD	600 x 600	135			129	129	
C011		7	CD	600 x 600	135			130	130	
C011		8	CD	600 x 600	135			132	132	
Total					955			885	885	
CR2015	11	1	CD	600 x 600	60			78	78	
Total				TOTAL	60			78	78	
C0-H-0	12	1	CD	600 x 600	160			0	0	1)
C0-H-0		2	CD	600 x 600	160			0	0	
Total					320			0	0	
C009	15	1	SR	150 x 150	80			78	78	
Total					80			78	78	
A005-2	72	1	SR	300 x 300	500			500	500	

NOTES: 1) VAV Damper Closed and unresponsive to BAS commands

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AIR TERMINAL DISTRIBUTION / AHU-106

VAV MANUFACTURER NAILOR TEST APPARATUS Flowhood/RVA/manometer

ROOM #	VAV	VAV ID #	VAV TYPE	VAV OUTLET SIZE	DESIGN L/S	ak	Vel m/s	PRELIMINARY L/S	FINAL MAXIMUM L/S	NOTES
CO-A1-0	14	1	CD	600 x 600	150	c		228	228	
CO-A1-0		2	CD	600 x 600	150	c		241	241	
Total					300			469	469	
D004	8	1	SR	750 x 150	350			401	401	
Total					350			401	401	
A005	7	1		200 x 200	N/G					
A004		2		200 x 200	N/G					
A003		3		150 x 150	N/G					
A002		4		150 x 150	N/G					
Total								223	223	
A008	03	1	SR	150 x 150	60			0	0	1)
CO-A1-0		2	CD	600 x 600	350			0	0	
CO-A1-0		3	CD	600 x 600	350			0	0	
Total					760			0	0	
CR2048	02	1	SR	200 x 150	35			118	118	
Total					17/35			118	118	
CO-E-0	01	1	CD	600 x 600	110			199		
CO-E-0		2	CD	600 x 600	110			209		
CO-E-0		3	CD	600 x 600	110			144		
CO-E-0		4	CD	600 x 600	110			0		Not Installed/ Deleted
Total					440			552	0	Change setpoint
A001	04	1	SR	300 x 200	155					
A001		2	SR	300 x 200	155					
A001		3	SR	300 x 200	155					
A001		4	SR	300 x 200	155					
A001		5	SR	300 x 200	155					
A001		6	SR	300 x 200	155					
Total					930			1180	1180	

NOTES: 1) Damper closed; unresponsive to BAS commands.

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AIR TERMINAL DISTRIBUTION / AHU-106

VAV MANUFACTURER NAILOR TEST APPARATUS Flowhood/RVA/manometer

ROOM #	VAV	VAV ID #	VAV TYPE	VAV OUTLET SIZE	DESIGN L/S	ak	Vel m/s	PRELIMINARY L/S	FINAL MAXIMUM L/S	NOTES
A001	05	1	SR	300 x 200	155					
A001		2	SR	300 x 200	155					
A001		3	SR	300 x 200	155					
A001		4	SR	300 x 200	155					
A001		5	SR	300 x 200	155					
A001		6	SR	300 x 200	155					
Total					930			873	873	1)
A001	06	1	SR	300 x 200	155					
A001		2	SR	300 x 200	155					
A001		3	SR	300 x 200	155					
A001		4	SR	300 x 200	155					
A001		5	SR	300 x 200	155					
A001		6	SR	300 x 200	155					
Total					930			1205	1205	1)
A001	62	1	SR	300 x 200	155					
A001		2	SR	300 x 200	155					
A001		3	SR	300 x 200	155					
A001		4	SR	300 x 200	155					
A001		5	SR	300 x 200	155					
A001		6	SR	300 x 200	155					
Total					930			1085	1085	1)
A001	64	1	SR	300 x 200	155					
A001		2	SR	300 x 200	155					
A001		3	SR	300 x 200	155					
A001		4	SR	300 x 200	155					
A001		5	SR	300 x 200	155					
A001		6	SR	300 x 200	155					
Total					930			896	896	1)

NOTES: 1) Current BAS setpoint is 750 l/s

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-107

LOCATION Bldg. 217 Penthouse MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	BAF-DW 182
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	
Fan Sheave Diam/Bore	7.35
No. Belt/size	3 BP-69
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	15
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	90.0/
CFLA	
BHP/ RPM	/ 3600
Make/Type Motor Sheave	
Motor Sheave Diam/Bore	5.95
Motor Sheave Oper. Diam	
Motor/Fan Sheave c to c	25.5

TEST DATA	DESIGN	ACTUAL
Total L/S	4190	3521
Return Air L/S		
Outside Air L/S		
Fan RPM		
Motor Volts		285.8
Motor Amps - Average		11.4
Motor RPM		
VFD Hertz		37.5

TEST DATA	DESIGN	ACTUAL
Total S.P.		933
External S.P.		659
For Static Pressure Profile		
Refer to the Following Data		
Sheet		

TEST DATE

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-107
LOCATION	Bldg 217 Penthouse MER	DATE	4/10/2018

	RETURN DUCT	NOTE
	-380	
	RETURN FAN	
RELIEF DAMPER	15.6	1)
	RETURN AIR DAMPER	
OA/ECON	-161	
	INITIAL FILTERS	
	304	
	GLYCOL PREHEATING COIL	
	-347	
	COOLING COIL	
	-355	
	FAN	
	SOUND ATTENUATOR	
	578	
	HEATING COIL	
	FINAL FILTER	
	498	
	UNIT DISCHARGE	

AIRFLOW

NOTES 1) Damper is not fully closed when BAS is calling for damper to be fully closed.

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-107
LOCATION	Bldg 217 Penthouse MER	DATE	4/10/2018

DUCT		DESIGN		ACTUAL	
S.P.	355 pa	SL/S		SL/S	
Air Temp	9.8 C	L/S	4190	L/S	3521 / BAS rpt: 2667
Size	720 mm round	FPM		MPS	8.65 / Ebtron reads: 5.71
Area	0.41				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	9.13	9.26	9.50	9.24	9.06								
	2	8.83	9.38	9.50	9.62	9.45								
	3	6.24	6.42	6.03	6.25	6.88								
	4	9.02	9.69	9.79	9.71	9.91								
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		33.22	34.75	34.82	34.82	35.3	0	0	0					

REMARKS:

TEST DATE _____ READINGS BY JOHNNY MURRAY

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST Building 215 Rebalance

UNIT RF-107

LOCATION Bldg. 217 Penthouse MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	BAF-DW 182
Serial Number	
Type/Size	
Arr./Class	
Fan Discharge	
Make/Type Fan Sheave	
Fan Sheave Diam/Bore	
No. Belt/size	

MOTOR INFORMATION	
Make/Frame	
KW	
Volts/Phase/Hertz	
F.L. Amps/S.F.	
CFLA	
BHP	
Make/Type Motor Sheave	
Motor Sheave Diam/Bore	
Motor Sheave Oper. Diam	
Motor/Fan Sheave c to c	

TEST DATA	DESIGN	ACTUAL
Total L/S		5399
Fan RPM		
Motor Volts		445
Motor Amps - Average		6.8
VFD Hertz		58.8

TEST DATA	DESIGN	ACTUAL
Suction S.P		-380
Discharge S.P		15.6
Total fan S.P.		
		395.6
For Static Pressure Profile		
Refer to the Static Profile		
Data Sheet		

TEST DATE _____

READINGS BY _____

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT: NIST Building 215 Rebalance

SYSTEM/UNIT: AHU 107 Return Air

LOCATION/ZONE: Bldg. 217 MER

SERVICE: Level 1 North VAVs

DUCT		DESIGN		ACTUAL	
S.P.	322	SL/s		SL/s	
Air Temp	22.05	L/s		L/s	5399 BAS rpt: 2151
Size	1300 x 450	M /s		M /s	9.23 Ebtron reads: 4.4
Area	0.585				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	10.15	10.03	9.45	10.11	9.93	9.14	9.24	10.77					
	2	9.15	9.51	8.22	9.83	8.22	8.55	9.02	9.33					
	3	9.36	8.36	7.66	8.95	9.43	9.23	8.18	9.64					
	4													
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		28.66	27.9	25.33	28.89	27.58	26.92	26.44	29.74					

REMARKS: RA Fan speed = 60 HZ

TEST DATE: 04/12/18

READINGS BY: Johnny Murray

AECOM

VAV TERMINAL TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT VAVs / AHU-107

VAV MANUFACTURER NAILOR TEST APPARATUS Flowhood/RVA/manometer

VAV ADDRESS		VAV			DESIGN / CURRENT	DESIGN/ CURRENT	BAS	FINAL	SERVING
		MODEL	Current Calib Factor	INLET SIZE	MINIMUM L/s	MAXIMUM L/s	Flow Report	Tested L/s	
16		D30RW	1.29	200	145	290	273	261	CO-C-1 N
17		D30RW	1.8	250	175 / 195	350	350	320	CO-C-1 N
21		D30RW	1.4	300	205	410	404	350	CO-A-1
22		D30RW	1.35	300	205 / 260	410	48	125 Note 1)	CO-A-1
23		D30RW	1.42	300	205	410	362	311	CO-A-1
24		D30RW	1.38	300	212	425	404	350	CO-A-1
25		D30RW	1.4	300	205	410	389	259	CO-A-1
26		D30RW	1.31	300	205	410	328	306	CO-A-1
27		D30RW	1.41	200	125	250	149	105	CO-E-1
20		D30RW	1.4	180	100	205	205	130	CO-A-1
53		D30RW	1.27	250	250	290	259	282	C0-C-2
52		D30RW	1.62	200	unknown / 145	290	224	271	LO-B-2
TOTAL						4150	3395	2945	

NOTES: 1) Highlighted Values indicate BAS reported airflow values versus tested airflow values which deviate beyond the range of calibration adjustment by flow calibration factors.

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AIR TERMINAL DISTRIBUTION / AHU-107

VAV MANUFACTURER NAILOR TEST APPARATUS Flowhood/ RVA / Manometer

ROOM #	VAV	VAV ID #	VAV TYPE	VAV OUTLET SIZE	DESIGN L/S	PRELIMINARY L/S		FINAL MAXIMUM L/S	NOTES
C0-C-2	53	1	CD-2	600 x 600	330	282		282	
				TOTAL	115/330	282		282	
LO-B-2	52	1	LD-3	1800	150				
LO-B-2		2	LD-3	1800	140				
				TOTAL	145 / 290	271		271	
CO-C-1 N	16	1	LD-3	CD-2	140				
CO-C-1 N		2	LD-3	CD-2	150				
add 16				TOTAL	145 / 290	261		261	
CO-C-1 N	17	1	LD-2	1200	175				
CO-C-1 N		2	LD-2	1200	175				
				TOTAL	175 /350	320		320	
CR3C03	20	1	LD-3	1800	205				
CR3C03		2	LD-3	1800	205				
				TOTAL	205 / 410	130		130	
CO-A-1	21	1	LD-3	1800	205				
CO-A-1		2	LD-3	1800	205				
				TOTAL	205 / 410	350		350	
CO-A-1	22	1	LD-3	1800	205				
CO-A-1		2	LD-3	1800	205				
				TOTAL	205 / 410	125		125	
CO-A-1	23	1	LD-3	1800	205				
CO-A-1		2	LD-3	1800	205				
				TOTAL	205 / 410	311		311	

NOTES:

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT AIR TERMINAL DISTRIBUTION / AHU-107

VAV MANUFACTURER NAILOR TEST APPARATUS Flowhood/ RVA / Manometer

ROOM #	VAV	VAV ID #	VAV TYPE	VAV OUTLET SIZE	DESIGN L/S	PRELIMINARY L/S		FINAL MAXIMUM L/S	NOTES
CO-A-1	24	1	LD-3	1800	205				
CO-A-1		2	LD-3	1800	220				
				TOTAL	212 / 425	350		350	
CO-A-1	25	1	LD-3	1800	205				
CO-A-1		2	LD-3	1800	205				
				TOTAL	205 / 410	259		259	
CO-A-1	26	1	LD-3	1800	205				
CO-A-1		2	LD-3	1800	205				
				TOTAL	205 / 410	306		306	
CO-E-1	27	1	CD-2	600 x 600	125			113	
CO-E-1		2	CD-2	600 x 600	125			109	
				TOTAL	125 / 250	0		222	

NOTES:

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

VAV TERMINAL AIR DISTRIBUTION

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT RETURN AIR DISTRIBUTION / AHU-107

VAV MANUFACTURER NAILOR TEST APPARATUS

ROOM #	VAV			DESIGN	PRELIMINARY		FINAL	NOTES
	ID #	TYPE	INLET SIZE	L/S	L/S		L/S	
CO-C-1	1	R-2	450/300	640	457		457	
CO-A-1	2	LDR-1	1800/250	380	302		302	
CO-A-1	3	LDR-1	1800/250	380	221		221	
CO-A-1	4	LDR-1	1800/250	380	222		222	
CO-A-1	5	LDR-1	1800/250	380	190		190	
CO-A-1	6	LDR-1	1800/250	380	170		170	
CO-A-1	7	LDR-1	1800/250	380	160		160	
CO-A-1	8	LDR-1	1800/250	380	150		150	
CO-A-1	9	LDR-1	1800/250	400	111		111	
CO-C1-3	10	R-2	500/250	330	413		413	
Total				4030	2396		2396	

NOTES:

TEST DATE: READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-108A

LOCATION Bldg. 215 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 351
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.91
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	24.2/1.15
CFLA	
BHP/RPM	/1175
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	9620	8712
Return Air L/S	9525	
Outside Air L/S	95	84
Fan RPM	1175	
Motor Volts		450
Motor Amps - Average		38.8
Motor RPM		
VFD Hertz		60

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		
Fan Suction S.P		
Fan/Unit Discharge S.P		407
Total Fan Static S.P		
External Static S.P		

TEST DATE 4/10/2018

READINGS BY Johnny Murray

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-108A
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-108A
Discharge
407

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-108B

LOCATION Bldg. 215 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 351
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	14.91
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	24.2/
CFLA	
BHP/RPM	/1175
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	9620	8713
Return Air L/S	9525	
Outside Air L/S	95	95
Fan RPM	1175	
Motor Volts		450
Motor Amps - Average		38.8
Motor RPM		
VFD Hertz		60

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		
Fan Suction S.P		
Fan/Unit Discharge S.P		378
Total Fan Static S.P		
External Static S.P		

TEST DATE 4/10/2018

READINGS BY Johnny Murray

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-108B
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-108B
Discharge
378

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-108 A, B

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B105	1	HFD	1200 x 600	370	319	0.56	319	86%
B105	2	HFD	1200 x 600	370	365	0.64	365	99%
B105	3	HFD	1200 x 600	370	348	0.61	348	94%
B105	4	HFD	1200 x 600	370	291	0.51	291	79%
B105	5	HFD	1200 x 600	370	308	0.54	308	83%
B105	6	HFD	1200 x 600	370	319	0.56	319	86%
B105	7	HFD	1200 x 600	370	348	0.61	348	94%
B105	8	HFD	1200 x 600	370	359	0.63	359	97%
B105	9	HFD	1200 x 600	370	342	0.60	342	92%
B105	10	HFD	1200 x 600	370	365	0.64	365	99%
B105	11	HFD	1200 x 600	370	359	0.63	359	97%
B105	12	HFD	1200 x 600	370	314	0.55	314	85%
B105	13	HFD	1200 x 600	370	302	0.53	302	82%
B105	14	HFD	1200 x 600	370	331	0.58	331	89%
B105	15	HFD	1200 x 600	370	319	0.56	319	86%
B105	16	HFD	1200 x 600	370	319	0.56	319	86%
B105	17	HFD	1200 x 600	370	342	0.60	342	92%
B105	18	HFD	1200 x 600	370	353	0.62	353	96%
B105	19	HFD	1200 x 600	370	353	0.62	353	96%
B105	20	HFD	1200 x 600	370	325	0.57	325	88%
B107	21	HFD	1200 x 600	370	325	0.57	325	88%
B107	22	HFD	1200 x 600	370	325	0.57	325	88%
B107	23	HFD	1200 x 600	370	268	0.47	268	72%
B107	24	HFD	1200 x 600	370	353	0.62	353	96%
B107	25	HFD	1200 x 600	370	331	0.58	331	89%
B107	26	HFD	1200 x 600	370	308	0.54	308	83%
B107	27	HFD	1200 x 600	370	376	0.66	376	102%
B107	28	HFD	1200 x 600	370	382	0.67	382	103%
B107	29	HFD	1200 x 600	370	382	0.67	382	103%
B107	30	HFD	1200 x 600	370	319	0.56	319	86%

REMARKS: Continued on next page.

TEST DATE: 3/8/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-108 A, B

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B107	31	HFD	1200 x 600	370	319	0.56	319	86%
B107	32	HFD	1200 x 600	370	274	0.48	274	74%
B107	33	HFD	1200 x 600	370	376	0.66	376	102%
B107	34	HFD	1200 x 600	370	336	0.59	336	91%
B107	35	HFD	1200 x 600	370	302	0.53	302	82%
B107	36	HFD	1200 x 600	370	314	0.55	314	85%
B107	37	HFD	1200 x 600	370	388	0.68	388	105%
B107	38	HFD	1200 x 600	370	388	0.68	388	105%
B107	39	HFD	1200 x 600	370	376	0.66	376	102%
B107	40	HFD	1200 x 600	370	336	0.59	336	91%
B107	41	HFD	1200 x 600	370	296	0.52	296	80%
B107	42	HFD	1200 x 600	370	325	0.57	325	88%
B107	43	HFD	1200 x 600	370	353	0.62	353	96%
B107	44	HFD	1200 x 600	370	308	0.54	308	83%
B107	45	HFD	1200 x 600	370	336	0.59	336	91%
B107	46	HFD	1200 x 600	370	359	0.63	359	97%
B107	47	HFD	1200 x 600	370	342	0.60	342	92%
B107	48	HFD	1200 x 600	370	342	0.60	342	92%
B107	49	HFD	1200 x 600	370	359	0.63	359	97%
B107	50	HFD	1200 x 600	370	285	0.50	285	77%
B107	51	HFD	1200 x 600	370	336	0.59	336	91%
B107	52	HFD	1200 x 600	370	325	0.57	325	88%
			TOTAL	19240	17425		17425	91%

REMARKS: Unit Operating at 60 hz.

TEST DATE: 3/8/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-109

LOCATION Bldg. 215 PENTHOUSE MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 491
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	22.4
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	39.2/
CFLA	
BHP/RPM	/880
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	18500	18878
Return Air L/S	16650	
Outside Air L/S	1850	1314
Fan RPM	880	
Motor Volts		447
Motor Amps - Average		37.3
Motor RPM		
VFD Hertz		59.1

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-82
Fan Suction S.P		-226
Fan/Unit Discharge S.P		395
Total Fan Static S.P		621
External Static S.P		477

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-109
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-109 (Pascals)				
Unit Suct		Fan Suct		Discharge
-82	C Filter / C	-226	Fan	395

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-109

OUTLET MANUFACTURER Camfil- Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A106	1	HFD	1200 x 600	370	393	0.69	393	106%
A106	2	HFD	1200 x 600	370	410	0.72	410	111%
A106	3	HFD	1200 x 600	370	359	0.63	359	97%
A106	4	HFD	1200 x 600	370	353	0.62	353	96%
A106	5	HFD	1200 x 600	370	376	0.66	376	102%
A106	6	HFD	1200 x 600	370	399	0.70	399	108%
A106	7	HFD	1200 x 600	370	410	0.72	410	111%
A106	8	HFD	1200 x 600	370	331	0.58	331	89%
A106	9	HFD	1200 x 600	370	348	0.61	348	94%
A106	10	HFD	1200 x 600	370	371	0.65	371	100%
A106	11	HFD	1200 x 600	370	410	0.72	410	111%
A106	12	HFD	1200 x 600	370	445	0.78	445	120%
A106	13	HFD	1200 x 600	370	325	0.57	325	88%
A106	14	HFD	1200 x 600	370	388	0.68	388	105%
A106	15	HFD	1200 x 600	370	296	0.52	296	80%
A106	16	HFD	1200 x 600	370	382	0.67	382	103%
A106	17	HFD	1200 x 600	370	405	0.71	405	109%
A106	18	HFD	1200 x 600	370	382	0.67	382	103%
A106	19	HFD	1200 x 600	370	348	0.61	348	94%
A106	20	HFD	1200 x 600	370	399	0.70	399	108%
A106	21	HFD	1200 x 600	370	405	0.71	405	109%
A106	22	HFD	1200 x 600	370	439	0.77	439	119%
A106	23	HFD	1200 x 600	370	428	0.75	428	116%
A106	24	HFD	1200 x 600	370	399	0.70	399	108%
A106	25	HFD	1200 x 600	370	302	0.53	302	82%
A106	26	HFD	1200 x 600	370	382	0.67	382	103%
A106	27	HFD	1200 x 600	370	348	0.61	348	94%

REMARKS: The AHU is operating at 60 Hz, as reported by the VFD.

Continued on next page.

TEST DATE: 3/13/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-109

OUTLET MANUFACTURER Camfil- Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A106	28	HFD	1200 x 600	370	405	0.71	405	109%
A106	29	HFD	1200 x 600	370	314	0.55	314	85%
A106	30	HFD	1200 x 600	370	319	0.56	319	86%
A106	31	HFD	1200 x 600	370	405	0.71	405	109%
A106	32	HFD	1200 x 600	370	428	0.75	428	116%
A106	33	HFD	1200 x 600	370	342	0.60	342	92%
A106	34	HFD	1200 x 600	370	410	0.72	410	111%
A106	35	HFD	1200 x 600	370	393	0.69	393	106%
A106	36	HFD	1200 x 600	370	399	0.70	399	108%
A106	37	HFD	1200 x 600	370	405	0.71	405	109%
A106	38	HFD	1200 x 600	370	376	0.66	376	102%
A106	39	HFD	1200 x 600	370	342	0.60	342	92%
A106	40	HFD	1200 x 600	370	302	0.53	302	82%
A106	41	HFD	1200 x 600	370	376	0.66	376	102%
A106	42	HFD	1200 x 600	370	399	0.70	399	108%
A106	43	HFD	1200 x 600	370	388	0.68	388	105%
A106	44	HFD	1200 x 600	370	416	0.73	416	112%
A106	45	HFD	1200 x 600	370	376	0.66	376	102%
A106	46	HFD	1200 x 600	370	359	0.63	359	97%
A106	47	HFD	1200 x 600	370	359	0.63	359	97%
A106	48	HFD	1200 x 600	370	371	0.65	371	100%
A106	49	HFD	1200 x 600	370	410	0.72	410	111%
A106	50	HFD	1200 x 600	370	353	0.62	353	96%
				18500	18878	Unit Total	18878	102%

REMARKS: The AHU is operating at 60 Hz, as reported by the VFD.

TEST DATE: 3/13/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-110A

LOCATION Bldg. 215 PENTHOUSE MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	18.5
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	34.2/1.15
CFLA	
BHP/RPM	/880
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	14880	16707
Return Air L/S	12860	
Outside Air L/S	2020	1743
Fan RPM		
Motor Volts		460
Motor Amps - Average		32
Motor RPM		
VFD Hertz		60

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-85
Fan Suction S.P		-197
Fan/Unit Discharge S.P		226
Total Fan Static S.P		423
External Static S.P		311

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-110A
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-110A(Pascals)				
Unit Suct		Fan Suct		Discharge
-85	C Filter C	-197	Fan	226

AIRFLOW

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-110A

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B107	1	HFD	1200 x 600	310	296	0.52	296	96%
B107	2	HFD	1200 x 600	310	336	0.59	336	108%
B107	3	HFD	1200 x 600	310	314	0.55	314	101%
B107	4	HFD	1200 x 600	310	359	0.63	359	116%
B107	5	HFD	1200 x 600	310	348	0.61	348	112%
B107	6	HFD	1200 x 600	310	376	0.66	376	121%
B107	7	HFD	1200 x 600	310	353	0.62	353	114%
B107	8	HFD	1200 x 600	310	308	0.54	308	99%
B107	9	HFD	1200 x 600	310	325	0.57	325	105%
B107	10	HFD	1200 x 600	310	285	0.50	285	92%
B107	11	HFD	1200 x 600	310	342	0.60	342	110%
B107	12	HFD	1200 x 600	310	393	0.69	393	127%
B107	13	HFD	1200 x 600	310	359	0.63	359	116%
B107	14	HFD	1200 x 600	310	393	0.69	393	127%
B107	15	HFD	1200 x 600	310	376	0.66	376	121%
B107	16	HFD	1200 x 600	310	348	0.61	348	112%
B107 / B106-2	17	HFD	1200 x 600	310	314	0.55	314	101%
B107 / B106-2	18	HFD	1200 x 600	310	382	0.67	382	123%
B107 / B106-2	19	HFD	1200 x 600	310	331	0.58	331	107%
B107 / B106-2	20	HFD	1200 x 600	310	348	0.61	348	112%
B107 / B106-2	21	HFD	1200 x 600	310	405	0.71	405	131%
B107 / B106-2	22	HFD	1200 x 600	310	371	0.65	371	120%
B107 / B106-2	23	HFD	1200 x 600	310	285	0.50	285	92%
B107 / B106-2	24	HFD	1200 x 600	310	325	0.57	325	105%
B106-2	25	HFD	1200 x 600	310	348	0.61	348	112%
B106-2	26	HFD	1200 x 600	310	388	0.68	388	125%
B106-2	27	HFD	1200 x 600	310	416	0.73	416	134%
B106-2	28	HFD	1200 x 600	310	302	0.53	302	97%
B106-2	29	HFD	1200 x 600	310	308	0.54	308	99%
B106-2	30	HFD	1200 x 600	310	308	0.54	308	99%
							10340	

REMARKS: Continued on next page.

TEST DATE: 3/12/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-110A

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
B106-2	31	HFD	1200 x 600	310	336	0.59	336	108%
B106-2	32	HFD	1200 x 600	310	331	0.58	331	107%
B106-2	33	HFD	1200 x 600	310	348	0.61	348	112%
B106-2	34	HFD	1200 x 600	310	359	0.63	359	116%
B106-2	35	HFD	1200 x 600	310	319	0.56	319	103%
B106-2	36	HFD	1200 x 600	310	325	0.57	325	105%
B106-2	37	HFD	1200 x 600	310	285	0.50	285	92%
B106-2	38	HFD	1200 x 600	310	353	0.62	353	114%
B106-2	39	HFD	1200 x 600	310	376	0.66	376	121%
B106-2	40	HFD	1200 x 600	310	348	0.61	348	112%
B106-2	41	HFD	1200 x 600	310	388	0.68	388	125%
B106-2	42	HFD	1200 x 600	310	365	0.64	365	118%
B106-2	43	HFD	1200 x 600	310	371	0.65	371	120%
B106-2	44	HFD	1200 x 600	310	359	0.63	359	116%
B106-2	45	HFD	1200 x 600	310	422	0.74	422	136%
B106-2	46	HFD	1200 x 600	310	325	0.57	325	105%
B106-2	47	HFD	1200 x 600	310	388	0.68	388	125%
B106-2	48	HFD	1200 x 600	310	371	0.65	371	120%
							6367	
				14880			16707	

REMARKS: Continued on next page.

TEST DATE: 3/12/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-110B

LOCATION Bldg. 215 PENTHOUSE MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	18.5
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	34.2/1.15
CFLA	
BHP/RPM	/880
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	14880	16239
Return Air L/S	12860	
Outside Air L/S	2020	2297
Fan RPM	881	
Motor Volts		460
Motor Amps - Average		64
Motor RPM		
VFD Hertz		60

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-80
Fan Suction S.P		-248
Fan/Unit Discharge S.P		231
Total Fan Static S.P		479
External Static S.P		311

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-110B
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-110B (Pascals)				
Unit Suct		Fan Suct		Discharge
-80	C / Filter / C	-248	Fan	231

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-110B

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/S	AIRFLOW L/S	M/s	AIRFLOW L/S	
B107	1	HFD	1200 x 600	310	308	0.54	308	99%
B107	2	HFD	1200 x 600	310	336	0.59	336	108%
B107	3	HFD	1200 x 600	310	285	0.50	285	92%
B107	4	HFD	1200 x 600	310	331	0.58	331	107%
B107	5	HFD	1200 x 600	310	285	0.50	285	92%
B107	6	HFD	1200 x 600	310	439	0.77	439	142%
B107	7	HFD	1200 x 600	310	319	0.56	319	103%
B107	8	HFD	1200 x 600	310	291	0.51	291	94%
B107	9	HFD	1200 x 600	310	331	0.58	331	107%
B107	10	HFD	1200 x 600	310	314	0.55	314	101%
B107	11	HFD	1200 x 600	310	302	0.53	302	97%
B107	12	HFD	1200 x 600	310	314	0.55	314	101%
B107	13	HFD	1200 x 600	310	410	0.72	410	132%
B107	14	HFD	1200 x 600	310	405	0.71	405	131%
B107	15	HFD	1200 x 600	310	382	0.67	382	123%
B107	16	HFD	1200 x 600	310	388	0.68	388	125%
B107 / B106-2	17	HFD	1200 x 600	310	331	0.58	331	107%
B107 / B106-2	18	HFD	1200 x 600	310	382	0.67	382	123%
B107 / B106-2	19	HFD	1200 x 600	310	348	0.61	348	112%
B107 / B106-2	20	HFD	1200 x 600	310	348	0.61	348	112%
B107 / B106-2	21	HFD	1200 x 600	310	296	0.52	296	96%
B107 / B106-2	22	HFD	1200 x 600	310	376	0.66	376	121%
B107 / B106-2	23	HFD	1200 x 600	310	393	0.69	393	127%
B107 / B106-2	24	HFD	1200 x 600	310	336	0.59	336	108%
B106-2	25	HFD	1200 x 600	310	353	0.62	353	114%
B106-2	26	HFD	1200 x 600	310	319	0.56	319	103%
B106-2	27	HFD	1200 x 600	310	302	0.53	302	97%
B106-2	28	HFD	1200 x 600	310	285	0.50	285	92%
B106-2	29	HFD	1200 x 600	310	268	0.47	268	86%
B106-2	30	HFD	1200 x 600	310	393	0.69	393	127%

REMARKS: Continued on next page

TEST DATE: 3/12/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-110B

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/S	AIRFLOW L/S	M/s	AIRFLOW L/S	
B106-2	31	HFD	1200 x 600	310	314	0.55	314	101%
B106-2	32	HFD	1200 x 600	310	319	0.56	319	103%
B106-2	33	HFD	1200 x 600	310	365	0.64	365	118%
B106-2	34	HFD	1200 x 600	310	314	0.55	314	101%
B106-2	35	HFD	1200 x 600	310	314	0.55	314	101%
B106-2	36	HFD	1200 x 600	310	342	0.60	342	110%
B106-2	37	HFD	1200 x 600	310	314	0.55	314	101%
B106-2	38	HFD	1200 x 600	310	388	0.68	388	125%
B106-2	39	HFD	1200 x 600	310	353	0.62	353	114%
B106-2	40	HFD	1200 x 600	310	302	0.53	302	97%
B106-2	41	HFD	1200 x 600	310	325	0.57	325	105%
B106-2	42	HFD	1200 x 600	310	308	0.54	308	99%
B106-2	43	HFD	1200 x 600	310	371	0.65	371	120%
B106-2	44	HFD	1200 x 600	310	348	0.61	348	112%
B106-2	45	HFD	1200 x 600	310	325	0.57	325	105%
B106-2	46	HFD	1200 x 600	310	376	0.66	376	121%
B106-2	47	HFD	1200 x 600	310	348	0.61	348	112%
B106-2	48	HFD	1200 x 600	310	348	0.61	348	112%
				14880	16239		16239	

REMARKS:

TEST DATE: 3/12/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-111A

LOCATION Bldg 215 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	18.5
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	
CFLA	
BHP/RPM	/880
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	15700	5398
Return Air L/S	15160	
Outside Air L/S	776	44
Fan RPM	880	
Motor Volts		182
Motor Amps - Average		28.9
Motor RPM		
VFD Hertz		24.1

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-16
Fan Suction S.P		-42
Fan/Unit Discharge S.P		85
Total Fan Static S.P		127
External Static S.P		101

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-111A
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-111A (Pascals)				
Unit Suct		Fan Suct		Discharge
-16	C Filter C	-42	Fan	85

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-111B

LOCATION Bldg. 215 PENTHOUSE MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	
Filters - No./Size	

MOTOR INFORMATION	
Make/Frame	G.E.
KW	18.5
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	
CFLA	
BHP/RPM	/880
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	15700	5397
Return Air L/S	15160	
Outside Air L/S	776	44
Fan RPM	880	
Motor Volts		182
Motor Amps - Average		28.9
Motor RPM		
VFD Hertz		24.1

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-14
Fan Suction S.P		-40
Fan/Unit Discharge S.P		93
Total Fan Static S.P		133
External Static S.P		107

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT NIST Building 215 Rebalance SYSTEM AHU-111B

LOCATION Bldg 215 MER DATE 4/10/2018

AHU-111B (Pascals)				
Unit Suct		Fan Suct		Discharge
-14	C Filter C	-40	Fan	93

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-111 A,B

OUTLET MANUFACTURER Camfill Farr TEST APPARATUS Velgrid / Manometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
CO-B-1	1	HFD	1200 x 600	375	125	0.22	125	33%
CO-B-1	2	HFD	1200 x 600	375	126	0.22	126	34%
CO-B-1	3	HFD	1200 x 600	375	127	0.22	127	34%
CO-B-1	4	HFD	1200 x 600	375	122	0.21	122	33%
CO-B-1	5	HFD	1200 x 600	375	129	0.23	129	34%
CO-B-1	6	HFD	1200 x 600	375	122	0.21	122	33%
CO-B-1	7	HFD	1200 x 600	375	118	0.21	118	31%
CO-B-1	8	HFD	1200 x 600	375	127	0.22	127	34%
CO-B-1	9	HFD	1200 x 600	375	129	0.23	129	34%
CO-B-1	10	HFD	1200 x 600	375	123	0.22	123	33%
CO-B-1	11	HFD	1200 x 600	375	125	0.22	125	33%
CO-B-1	12	HFD	1200 x 600	375	130	0.23	130	35%
CO-B-1	13	HFD	1200 x 600	375	128	0.22	128	34%
CO-B-1	14	HFD	1200 x 600	375	128	0.22	128	34%
CO-B-1	15	HFD	1200 x 600	375	124	0.22	124	33%
CO-B-1	16	HFD	1200 x 600	375	127	0.22	127	34%
CO-B-1	17	HFD	1200 x 600	375	115	0.20	115	31%
CO-B-1	18	HFD	1200 x 600	375	131	0.23	131	35%
CO-B-1	19	HFD	1200 x 600	375	128	0.22	128	34%
CO-B-1	20	HFD	1200 x 600	375	129	0.23	129	34%
CO-B-1	21	HFD	1200 x 600	375	124	0.22	124	33%
CO-B-1	22	HFD	1200 x 600	375	129	0.23	129	34%
CO-B-1	23	HFD	1200 x 600	375	126	0.22	126	34%
CO-B-1	24	HFD	1200 x 600	375	127	0.22	127	34%
CO-B-1	25	HFD	1200 x 600	375	125	0.22	125	33%
CO-B-1	26	HFD	1200 x 600	375	129	0.23	129	34%
CO-B-1	27	HFD	1200 x 600	375	128	0.22	128	34%
CO-B-1	28	HFD	1200 x 600	375	135	0.24	135	36%
CO-B-1	29	HFD	1200 x 600	375	130	0.23	130	35%
CO-B-1	30	HFD	1200 x 600	375	132	0.23	132	35%

REMARKS: Continued on next page.

TEST DATE: 3/6/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-111 A,B

OUTLET MANUFACTURER Camfill Farr TEST APPARATUS Velgrid / Manometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
CO-B-1	31	HFD	1200 x 600	375	129	0.23	129	34%
CO-B-1	32	HFD	1200 x 600	375	129	0.23	129	34%
CO-B-1	33	HFD	1200 x 600	375	130	0.23	130	35%
CO-B-1	34	HFD	1200 x 600	375	131	0.23	131	35%
CO-B-1	35	HFD	1200 x 600	375	135	0.24	135	36%
CO-B-1	36	HFD	1200 x 600	375	134	0.24	134	36%
CO-B-1	37	HFD	1200 x 600	375	128	0.22	128	34%
CO-B-1	38	HFD	1200 x 600	375	128	0.22	128	34%
CO-B-1	39	HFD	1200 x 600	375	125	0.22	125	33%
CO-B-1	40	HFD	1200 x 600	375	127	0.22	127	34%
CO-B-1	41	HFD	1200 x 600	375	129	0.23	129	34%
CO-B-1	42	HFD	1200 x 600	375	130	0.23	130	35%
CO-B-1	43	HFD	1200 x 600	375	128	0.22	128	34%
CO-B-1	44	HFD	1200 x 600	375	130	0.23	130	35%
CO-B-1	45	HFD	1200 x 600	375	132	0.23	132	35%
CO-B-1	46	HFD	1200 x 600	375	127	0.22	127	34%
CO-B-1	47	HFD	1200 x 600	375	124	0.22	124	33%
CO-B-1	48	HFD	1200 x 600	375	130	0.23	130	35%
CO-B-1	49	HFD	1200 x 600	375	124	0.22	124	33%
CO-B-1	50	HFD	1200 x 600	375	133	0.23	133	35%
CO-B-1	51	HFD	1200 x 600	375	133	0.23	133	35%
CO-B-1	52	HFD	1200 x 600	375	134	0.24	134	36%
CO-B-1	53	HFD	1200 x 600	375	128	0.22	128	34%
CO-B-1	54	HFD	1200 x 600	375	126	0.22	126	34%
CO-B-1	55	HFD	1200 x 600	375	124	0.22	124	33%
CO-B-1	56	HFD	1200 x 600	375	132	0.23	132	35%
CO-B-1	57	HFD	1200 x 600	375	136	0.24	136	36%
CO-B-1	58	HFD	1200 x 600	375	129	0.23	129	34%
CO-B-1	59	HFD	1200 x 600	375	133	0.23	133	35%
CO-B-1	60	HFD	1200 x 600	375	134	0.24	134	36%

REMARKS: Continued on next page.

TEST DATE: 3/6/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-111 A, B

OUTLET MANUFACTURER Camfill Farr TEST APPARATUS Flowhood

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
CO-B-1	61	HFD	1200 x 600	375	125	0.22	125	33%
CO-B-1	62	HFD	1200 x 600	375	125	0.22	125	33%
CO-B-1	63	HFD	1200 x 600	375	128	0.22	128	34%
CO-B-1	64	HFD	1200 x 600	375	131	0.23	131	35%
CO-B-1	65	HFD	1200 x 600	375	128	0.22	128	34%
CO-B-1	66	HFD	1200 x 600	375	129	0.23	129	34%
CO-B-1	67	HFD	1200 x 600	375	126	0.22	126	34%
CO-B-1	68	HFD	1200 x 600	375	126	0.22	126	34%
CO-B-1	69	HFD	1200 x 600	375	127	0.22	127	34%
CO-B-1	70	HFD	1200 x 600	375	134	0.24	134	36%
CO-B-1	71	HFD	1200 x 600	375	131	0.23	131	35%
CO-B-1	72	HFD	1200 x 600	375	130	0.23	130	35%
CO-B-1	73	HFD	1200 x 600	375	125	0.22	125	33%
CO-B-1	74	HFD	1200 x 600	375	124	0.22	124	33%
CO-B-1	75	HFD	1200 x 600	375	124	0.22	124	33%
CO-B-1	76	HFD	1200 x 600	375	128	0.22	128	34%
CO-B-1	77	HFD	1200 x 600	375	133	0.23	133	35%
CO-B-1	78	HFD	1200 x 600	375	133	0.23	133	35%
CO-B-1	79	HFD	1200 x 600	375	130	0.23	130	35%
CO-B-1	80	HFD	1200 x 600	375	134	0.24	134	36%
CO-B-1	81	HFD	1200 x 600	375	138	0.24	138	37%
CO-B-1	82	HFD	1200 x 600	375	134	0.24	134	36%
CO-B-1	83	HFD	1200 x 600	375	134	0.24	134	36%
CO-B-1	84	HFD	1200 x 600	375	129	0.23	129	34%
			TOTAL	31500	10795		10795	34%

REMARKS: AHU-111 A,B was operating at 24.1 hertz. The Ebtron makeup air flowstation reported 0.56 m/s

TEST DATE: 3/6/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-111C

LOCATION Bldg. 215 PENTHOUSE MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	18.5
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	34.2/1.15
CFLA	
BHP/RPM	/880
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	15700	5146
Return Air L/S	15160	
Outside Air L/S	776	
Fan RPM	880	
Motor Volts		168
Motor Amps - Average		28.8
Motor RPM		
VFD Hertz		22.2

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-11
Fan Suction S.P		-40
Fan/Unit Discharge S.P		80
Total Fan Static S.P		120
External Static S.P		91

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-111C
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-111C (Pascals)				
Unit Suct		Fan Suct		Discharge
-11	C Filter / C	-40	Fan	80

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-111D

LOCATION Bldg. 215 PENTHOUSE MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 441
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	18.5
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	34.2/1.15
CFLA	
BHP/RPM	/880
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	15700	5145
Return Air L/S	15160	
Outside Air L/S	776	
Fan RPM	880	
Motor Volts		168
Motor Amps - Average		28.8
Motor RPM		
VFD Hertz		22.2

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-13
Fan Suction S.P		-35
Fan/Unit Discharge S.P		48
Total Fan Static S.P		83
External Static S.P		61

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-111D
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-111D (Pascals)				
Unit Suct		Fan Suct		Discharge
-13	C Filter C	-35	Fan	48

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-111 C, D

OUTLET MANUFACTURER Camfill Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
CO-A1-1	1	HFD	1200 x 600	375	132	0.23	132	35%
CO-A1-1	2	HFD	1200 x 600	375	121	0.21	121	32%
CO-A1-1	3	HFD	1200 x 600	375	128	0.22	128	34%
CO-A1-1	4	HFD	1200 x 600	375	110	0.19	110	29%
CO-A1-1	5	HFD	1200 x 600	375	124	0.22	124	33%
CO-A1-1	6	HFD	1200 x 600	375	127	0.22	127	34%
CO-A1-1	7	HFD	1200 x 600	375	127	0.22	127	34%
CO-A1-1	8	HFD	1200 x 600	375	131	0.23	131	35%
CO-A1-1	9	HFD	1200 x 600	375	125	0.22	125	33%
CO-A1-1	10	HFD	1200 x 600	375	126	0.22	126	34%
CO-A1-1	11	HFD	1200 x 600	375	129	0.23	129	34%
CO-A1-1	12	HFD	1200 x 600	375	123	0.22	123	33%
CO-A1-1	13	HFD	1200 x 600	375	132	0.23	132	35%
CO-A1-1	14	HFD	1200 x 600	375	124	0.22	124	33%
CO-A1-1	15	HFD	1200 x 600	375	120	0.21	120	32%
CO-A1-1	16	HFD	1200 x 600	375	122	0.21	122	33%
CO-A1-1	17	HFD	1200 x 600	375	125	0.22	125	33%
CO-A1-1	18	HFD	1200 x 600	375	134	0.24	134	36%
CO-A1-1	19	HFD	1200 x 600	375	122	0.21	122	33%
CO-A1-1	20	HFD	1200 x 600	375	124	0.22	124	33%
CO-A1-1	21	HFD	1200 x 600	375	127	0.22	127	34%
CO-A1-1	22	HFD	1200 x 600	375	122	0.21	122	33%
CO-A1-1	23	HFD	1200 x 600	375	114	0.20	114	30%
CO-A1-1	24	HFD	1200 x 600	375	123	0.22	123	33%
CO-A1-1	25	HFD	1200 x 600	375	115	0.20	115	31%
CO-A1-1	26	HFD	1200 x 600	375	131	0.23	131	35%
CO-A1-1	27	HFD	1200 x 600	375	114	0.20	114	30%
CO-A1-1	28	HFD	1200 x 600	375	122	0.21	122	33%
CO-A1-1	29	HFD	1200 x 600	375	113	0.20	113	30%
CO-A1-1	30	HFD	1200 x 600	375	119	0.21	119	32%

REMARKS: Continued on next page.

TEST DATE: 3/6/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-111 C,D

OUTLET MANUFACTURER Camfill Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
CO-A1-1	31	HFD	1200 x 600	375	109	0.19	109	29%
CO-A1-1	32	HFD	1200 x 600	375	115	0.20	115	31%
CO-A1-1	33	HFD	1200 x 600	375	119	0.21	119	32%
CO-A1-1	34	HFD	1200 x 600	375	122	0.21	122	33%
CO-A1-1	35	HFD	1200 x 600	375	126	0.22	126	34%
CO-A1-1	36	HFD	1200 x 600	375	125	0.22	125	33%
CO-A1-1	37	HFD	1200 x 600	375	115	0.20	115	31%
CO-A1-1	38	HFD	1200 x 600	375	118	0.21	118	31%
CO-A1-1	39	HFD	1200 x 600	375	119	0.21	119	32%
CO-A1-1	40	HFD	1200 x 600	375	129	0.23	129	34%
CO-A1-1	41	HFD	1200 x 600	375	124	0.22	124	33%
CO-A1-1	42	HFD	1200 x 600	375	128	0.22	128	34%
CO-A1-1	43	HFD	1200 x 600	375	124	0.22	124	33%
CO-A1-1	44	HFD	1200 x 600	375	126	0.22	126	34%
CO-A1-1	45	HFD	1200 x 600	375	125	0.22	125	33%
CO-A1-1	46	HFD	1200 x 600	375	119	0.21	119	32%
CO-A1-1	47	HFD	1200 x 600	375	123	0.22	123	33%
CO-A1-1	48	HFD	1200 x 600	375	129	0.23	129	34%
CO-A1-1	49	HFD	1200 x 600	375	123	0.22	123	33%
CO-A1-1	50	HFD	1200 x 600	375	124	0.22	124	33%
CO-A1-1	51	HFD	1200 x 600	375	118	0.21	118	31%
CO-A1-1	52	HFD	1200 x 600	375	119	0.21	119	32%
CO-A1-1	53	HFD	1200 x 600	375	121	0.21	121	32%
CO-A1-1	54	HFD	1200 x 600	375	127	0.22	127	34%
CO-A1-1	55	HFD	1200 x 600	375	123	0.22	123	33%
CO-A1-1	56	HFD	1200 x 600	375	125	0.22	125	33%
CO-A1-1	57	HFD	1200 x 600	375	114	0.20	114	30%
CO-A1-1	58	HFD	1200 x 600	375	123	0.22	123	33%
CO-A1-1	59	HFD	1200 x 600	375	124	0.22	124	33%
CO-A1-1	60	HFD	1200 x 600	375	120	0.21	120	32%

REMARKS: Continued on next page.

TEST DATE: 3/6/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-111 C,D

OUTLET MANUFACTURER Camfill-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
CO-A1-1	61	HFD	1200 x 600	375	119	0.21	119	32%
CO-A1-1	62	HFD	1200 x 600	375	120	0.21	120	32%
CO-A1-1	63	HFD	1200 x 600	375	118	0.21	118	31%
CO-A1-1	64	HFD	1200 x 600	375	119	0.21	119	32%
CO-A1-1	65	HFD	1200 x 600	375	123	0.22	123	33%
CO-A1-1	66	HFD	1200 x 600	375	118	0.21	118	31%
CO-A1-1	67	HFD	1200 x 600	375	119	0.21	119	32%
CO-A1-1	68	HFD	1200 x 600	375	122	0.21	122	33%
CO-A1-1	69	HFD	1200 x 600	375	123	0.22	123	33%
CO-A1-1	70	HFD	1200 x 600	375	121	0.21	121	32%
CO-A1-1	71	HFD	1200 x 600	375	122	0.21	122	33%
CO-A1-1	72	HFD	1200 x 600	375	123	0.22	123	33%
CO-A1-1	73	HFD	1200 x 600	375	123	0.22	123	33%
CO-A1-1	74	HFD	1200 x 600	375	122	0.21	122	33%
CO-A1-1	75	HFD	1200 x 600	375	122	0.21	122	33%
CO-A1-1	76	HFD	1200 x 600	375	125	0.22	125	33%
CO-A1-1	77	HFD	1200 x 600	375	121	0.21	121	32%
CO-A1-1	78	HFD	1200 x 600	375	129	0.23	129	34%
CO-A1-1	79	HFD	1200 x 600	375	125	0.22	125	33%
CO-A1-1	80	HFD	1200 x 600	375	127	0.22	127	34%
CO-A1-1	81	HFD	1200 x 600	375	119	0.21	119	32%
CO-A1-1	82	HFD	1200 x 600	375	115	0.20	115	31%
CO-A1-1	83	HFD	1200 x 600	375	124	0.22	124	33%
CO-A1-1	84	HFD	1200 x 600	375	123	0.22	123	33%
			TOTAL	31500	10281		10281	33%

REMARKS:

TEST DATE: 3/6/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-112

LOCATION Bldg. 215 C201 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 391
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	11
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	20.5/1.15
CFLA	
BHP/RPM	/880
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	9690	5579
Return Air L/S		
Outside Air L/S	300	266
Fan RPM		
Motor Volts		360.9
Motor Amps - Average		9.9
Motor RPM		
VFD Hertz		47.9

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-72.2
Fan Suction S.P		-149
Fan/Unit Discharge S.P		208
Total Fan Static S.P		357
External Static S.P		280

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-112
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-112 (Pascals)				
Unit Suct		Fan Suct		Discharge
-72.18	C Filter C	-148.6	Fan	208.1

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-112

OUTLET MANUFACTURER Camfil- Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
D101	1	HFD	1200 x 600	375	275	0.48	275	73%
D101	2	HFD	1200 x 600	375	244	0.43	244	65%
D101	3	HFD	1200 x 600	375	255	0.45	255	68%
D101	4	HFD	1200 x 600	375	247	0.43	247	66%
D101	5	HFD	1200 x 600	375	260	0.46	260	69%
D101	6	HFD	1200 x 600	375	243	0.43	243	65%
CO-D-1	7	HFD	1200 x 600	370	220	0.39	220	59%
CO-D-1	8	HFD	1200 x 600	370	275	0.48	275	74%
CO-D-1	9	HFD	1200 x 600	370	240	0.42	240	65%
CO-D-1	10	HFD	1200 x 600	370	272	0.48	272	74%
CO-D-1	11	HFD	1200 x 600	370	265	0.46	265	72%
CO-D-1	12	HFD	1200 x 600	370	238	0.42	238	64%
CO-D-1	13	HFD	1200 x 600	370	260	0.46	260	70%
CO-D-1	14	HFD	1200 x 600	370	261	0.46	261	71%
CO-D-1	15	HFD	1200 x 600	370	248	0.44	248	67%
CO-D-1	16	HFD	1200 x 600	370	233	0.41	233	63%
CO-D-1	17	HFD	1200 x 600	370	252	0.44	252	68%
CO-D-1	18	HFD	1200 x 600	370	271	0.48	271	73%
CO-D-1	19	HFD	1200 x 600	370	263	0.46	263	71%
CO-D-1	20	HFD	1200 x 600	370	272	0.48	272	74%
CO-D-1	21	HFD	1200 x 600	370	245	0.43	245	66%
CO-D-1	22	HFD	1200 x 600	370	240	0.42	240	65%
			TOTAL	8170	5579		5579	68%

REMARKS:

TEST DATE: 4/10/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-113

LOCATION Bldg. 215 C201 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 391
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	11
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	20.5/1.15
CFLA	
BHP/RPM	/880
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	9690	7370
Return Air L/S		
Outside Air L/S	290	244
Fan RPM	1175	
Motor Volts		319
Motor Amps - Average		10
Motor RPM		
VFD Hertz		42.2

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-73
Fan Suction S.P		-121
Fan/Unit Discharge S.P		160
Total Fan Static S.P		281
External Static S.P		233

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-113
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-113 (Pascals)				
Unit Suct		Fan Suct		Discharge
-73.34	C Filter C	-121	Fan	159.8

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-113

OUTLET MANUFACTURER Camfil- Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
CO-D-1	1	HFD	1200 x 600	380	312	0.55	312	82%
CO-D-1	2	HFD	1200 x 600	380	300	0.53	300	79%
CO-D-1	3	HFD	1200 x 600	380	290	0.51	290	76%
CO-D-1	4	HFD	1200 x 600	380	315	0.55	315	83%
CO-D-1	5	HFD	1200 x 600	380	306	0.54	306	81%
CO-D-1	6	HFD	1200 x 600	380	315	0.55	315	83%
CO-D-1	7	HFD	1200 x 600	380	310	0.54	310	82%
CO-D-1	8	HFD	1200 x 600	380	299	0.52	299	79%
CO-D-1	9	HFD	1200 x 600	380	297	0.52	297	78%
CO-D-1	10	HFD	1200 x 600	380	299	0.52	299	79%
CO-D-1	11	HFD	1200 x 600	380	307	0.54	307	81%
CO-D-1	12	HFD	1200 x 600	380	309	0.54	309	81%
D106	13	HFD	1200 x 600	400	315	0.55	315	79%
D106	14	HFD	1200 x 600	400	317	0.56	317	79%
D106	15	HFD	1200 x 600	400	315	0.55	315	79%
D106	16	HFD	1200 x 600	400	322	0.56	322	81%
D107	17	HFD	1200 x 600	385	329	0.58	329	85%
D107	18	HFD	1200 x 600	385	283	0.50	283	74%
D107	19	HFD	1200 x 600	385	290	0.51	290	75%
D107	20	HFD	1200 x 600	385	294	0.52	294	76%
D108	21	HFD	1200 x 600	400	304	0.53	304	76%
D108	22	HFD	1200 x 600	400	317	0.56	317	79%
D108	23	HFD	1200 x 600	400	315	0.55	315	79%
D108	24	HFD	1200 x 600	400	310	0.54	310	78%
				9300	7370		7370	79%

REMARKS:

TEST DATE: 3/28/2018 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-114

LOCATION Bldg. 215 PENTHOUSE MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 391
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	11
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	20.5/1.15
CFLA	
BHP/RPM	/880
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	10360	9485
Return Air L/S		
Outside Air L/S		620
Fan RPM		
Motor Volts		455
Motor Amps - Average		15
Motor RPM		
VFD Hertz		60

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-30
Fan Suction S.P		-131
Fan/Unit Discharge S.P		330
Total Fan Static S.P		431
External Static S.P		360

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-114
LOCATION	Bldg 215 MER	DATE	4/10/2018

AHU-114 (Pascals)				
Unit Suct		Fan Suct		Discharge
-30	C Filter C	-131	Fan	330

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-114

OUTLET MANUFACTURER Camfil-Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
A 105	1	HFD	1200 x 600	370	319	0.56	319	86%
A 105	2	HFD	1200 x 600	370	302	0.53	302	82%
A 105	3	HFD	1200 x 600	370	319	0.56	319	86%
A 105	4	HFD	1200 x 600	370	325	0.57	325	88%
A 105	5	HFD	1200 x 600	370	336	0.59	336	91%
A 105	6	HFD	1200 x 600	370	285	0.50	285	77%
A 105	7	HFD	1200 x 600	370	319	0.56	319	86%
A 105	8	HFD	1200 x 600	370	336	0.59	336	91%
A 105	9	HFD	1200 x 600	370	325	0.57	325	88%
A 105	10	HFD	1200 x 600	370	325	0.57	325	88%
A 105	11	HFD	1200 x 600	370	319	0.56	319	86%
A 105	12	HFD	1200 x 600	370	382	0.67	382	103%
A 105	13	HFD	1200 x 600	370	291	0.51	291	79%
A 105	14	HFD	1200 x 600	370	308	0.54	308	83%
A 105	15	HFD	1200 x 600	370	359	0.63	359	97%
A 105	16	HFD	1200 x 600	370	296	0.52	296	80%
A 105	17	HFD	1200 x 600	370	285	0.50	285	77%
A 105	18	HFD	1200 x 600	370	319	0.56	319	86%
A 105	19	HFD	1200 x 600	370	319	0.56	319	86%
A 105	20	HFD	1200 x 600	370	490	0.86	490	132%
A 105	21	HFD	1200 x 600	370	348	0.61	348	94%
A 105	22	HFD	1200 x 600	370	336	0.59	336	91%
A 105	23	HFD	1200 x 600	370	319	0.56	319	86%
A 105	24	HFD	1200 x 600	370	428	0.75	428	116%
A 105	25	HFD	1200 x 600	370	439	0.77	439	119%
A 105	26	HFD	1200 x 600	370	399	0.70	399	108%
A 105	27	HFD	1200 x 600	370	342	0.60	342	92%
A 105	28	HFD	1200 x 600	370	314	0.55	314	85%
TOTAL				10360			9485	

REMARKS: The AHU is operating at 60 hz as reported by the VFD

TEST DATE: 03/13/18 READINGS BY Johnny Murray

AECOM

AIR APPARATUS TEST REPORT

PROJECT NIST BUILDING 215 REBALANCE

UNIT AHU-115

LOCATION Bldg. 215 C201 MER

DATE 4/10/2018

UNIT INFORMATION	
Make	Buffalo
Model No.	APF 391
Serial Number	
Type/Size	
Arr./Class	
Supply Fan Discharge	
Make/Type Fan Sheave	DIRECT DRIVE
Fan Sheave Diam/Bore	DIRECT DRIVE
No. Belt/size	DIRECT DRIVE
Filters - Type	See Filter Summary Sheet
Filters - No./Size	See Filter Summary Sheet

MOTOR INFORMATION	
Make/Frame	G.E.
KW	11
Volts/Phase/Hertz	460 /3/
F.L. Amps/S.F.	20.5/1.15
CFLA	
BHP/RPM	/880
Make/Type Motor Sheave	DIRECT DRIVE
Motor Sheave Diam/Bore	DIRECT DRIVE
Motor Sheave Oper. Diam	DIRECT DRIVE
Motor/Fan Sheave c to c	DIRECT DRIVE

TEST DATA	DESIGN	ACTUAL
Total L/S	10800	6960
Return Air L/S	10800	6960
Outside Air L/S	0	
Fan RPM	1175	
Motor Volts		358
Motor Amps - Average		12.1
Motor RPM		
VFD Hertz		47.3

TEST DATA	DESIGN	ACTUAL
Unit Suction S.P		-172
Fan Suction S.P		-229
Fan/Unit Discharge S.P		183
Total Fan Static S.P		412
External Static S.P		355

TEST DATE 4/10/2018

READINGS BY Johnny Murray

AECOM

STATIC PROFILE

PROJECT	NIST Building 215 Rebalance	SYSTEM	AHU-115
LOCATION	Bldg 215 Penthouse	DATE	4/10/2018

AHU-115 (Pascals)				
Unit Suct		Fan Suct		Discharge
-172.7	C Filter C	-229	Fan	183.2

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT Supply Air / AHU-115

OUTLET MANUFACTURER Camfil- Farr TEST APPARATUS Velgrid / Flowhood/ Micromanometer

AREA SERVED	OUTLET			DESIGN	PRELIMINARY	VELOCITY	FINAL	PERCENT OF DESIGN
	NO.	TYPE	SIZE	AIRFLOW L/s	AIRFLOW L/s	M/s	AIRFLOW L/s	
Gowning								
D105	1	HFD	1200 x 600	400	279	0.49	279	70%
D105	2	HFD	1200 x 600	400	314	0.55	314	78%
D105	3	HFD	1200 x 600	400	234	0.41	234	58%
D105	4	HFD	1200 x 600	400	234	0.41	234	58%
D105	5	HFD	1200 x 600	400	262	0.46	262	66%
D105	6	HFD	1200 x 600	400	222	0.39	222	56%
D105	7	HFD	1200 x 600	400	234	0.41	234	58%
D105	8	HFD	1200 x 600	400	268	0.47	268	67%
D105	9	HFD	1200 x 600	400	245	0.43	245	61%
D105	10	HFD	1200 x 600	400	257	0.45	257	64%
D105	11	HFD	1200 x 600	400	239	0.42	239	60%
D105	12	HFD	1200 x 600	400	262	0.46	262	66%
D105	13	HFD	1200 x 600	400	251	0.44	251	63%
D105	14	HFD	1200 x 600	400	296	0.52	296	74%
D105	15	HFD	1200 x 600	400	251	0.44	251	63%
D105	16	HFD	1200 x 600	400	257	0.45	257	64%
D105	17	HFD	1200 x 600	400	268	0.47	268	67%
D105	18	HFD	1200 x 600	400	268	0.47	268	67%
D105	19	HFD	1200 x 600	400	205	0.36	205	51%
D105	20	HFD	1200 x 600	400	268	0.47	268	67%
D105	21	HFD	1200 x 600	400	251	0.44	251	63%
D105	22	HFD	1200 x 600	400	279	0.49	279	70%
D105	23	HFD	1200 x 600	400	251	0.44	251	63%
D105	24	HFD	1200 x 600	400	279	0.49	279	70%
D105	25	HFD	1200 x 600	400	274	0.48	274	68%
D105	26	HFD	1200 x 600	400	308	0.54	308	77%
D105	27	HFD	1200 x 600	400	205	0.36	205	51%
Total				10800	6960		6960	64%

Notes:

TEST DATE: 3/13/2018 READINGS BY Johnny Murray

AECOM

FAN TEST REPORT

PROJECT NIST Bldg 215 Rebalance

SF-123 FAN DATA	
Location	E102
Service	Transfers air from CO-E1-1 into E102
Manufacturer	Loren Cook
Model Number	DB-10
Serial Number	
Motor Make/Frame	
Motor KW /RPM	1/4 h.p.
Volts/Phase/Hertz	115 / 1 / 60
F.L. Amps/S.F.	
Motor Sheave Diam./Bore	
Fan Sheave Make	N/A
Fan Sheave Diam./Bore	
No. Belts/Make/Size	1/ /
Sheave c to c Distance / Open Turns	/ Fixed

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/s	470	272	272
Fan RPM		N/A	
Total S.P.			
SUCTION S.P.			
DISCHARGE S.P.			
K.W.		N/A	
Voltage		N/A	
Amperage		N/A	

REMARKS: 1) The inlet grille has an opposed blade damper that is partially closed and needs to be fully opened to diminish the airflow restriction.

TEST DATE 06-14-2018 READINGS BY Chris Cowan

AECOM

AIR INLET TEST REPORT

PROJECT: NIST Bldg 215 Rebalance

SYSTEM: Supply Fan SF123

SERVICE: Transfers air from CO-E1-1 into E102

TEST APPARATUS: FLOW HOOD

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		REMARKS
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
E102	1	EG	300 x 300	C		470		272				272	1)

REMARKS: 1) The inlet grille has an opposed blade damper that is partially closed and needs to be fully opened to diminish the airflow restriction.

Noted in Issues Log.

TEST DATE: 06-14-2018

READINGS BY: Chris Cowan

AECOM

FAN TEST REPORT

PROJECT NIST Building 215 Rebalance

EF-101A FAN DATA	
Location	MER
Service	ACID
Manufacturer	COOK
Model Number	270CA-SWSI
Serial Number	
Motor Make/Frame	BALDOR
Motor KW /RPM	37.2 / 1775
Volts/Phase/Hertz	460 / 3 /
F.L. Amps/S.F.	57.0 / 1.15
Motor Sheave Diam./Bore	14.5 OD X 2 1/8
Fan Sheave Make	
Fan Sheave Diam./Bore	11.5 OD X 2/ 3/16
No. Belts/Make/Size	3 B-88
Sheave c to c Distance / Open Turns	26 / FIXED

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/S	7100	4976	
Fan RPM			
Total S.P.			
SUCTION S.P.		-2195	
DISCHARGE S.P.			
K.W.			
Voltage		431	
Amperage T1/T2/T3		42	
Drive Speed		59.43 Hz	

REMARKS:

TEST DATE 2/13/2018 READINGS BY Johnny Murray

AECOM

FAN TEST REPORT

PROJECT NIST Building 215 Rebalance

EF-101B FAN DATA	
Location	MER
Service	ACID
Manufacturer	COOK
Model Number	270CA-SWSI
Serial Number	
Motor Make/Frame	BALDOR
Motor KW /RPM	37.2 / 1775
Volts/Phase/Hertz	460 / 3 /
F.L. Amps/S.F.	57.0 / 1.15
Motor Sheave Diam./Bore	14.5 OD X 2 1/8
Fan Sheave Make	
Fan Sheave Diam./Bore	11.5 OD X 2/ 3/16
No. Belts/Make/Size	3 B-88
Sheave c to c Distance / Open Turns	26 / FIXED

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/S	7100	4975	
Fan RPM			
Total S.P.			
SUCTION S.P.		-2373	
DISCHARGE S.P.			
K.W.			
Voltage		395	
Amperage T1/T2/T3		29.4	
Drive Speed		52.2 Hz	

REMARKS:

TEST DATE 2/13/2018 READINGS BY Johnny Murray

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT: NIST Building 215 Rebalance | SYSTEM/UNIT: EF101 A+B

LOCATION/ZONE: Bldg. 215 ROOF | SERVICE: ACID EXHAUST

DUCT		DESIGN		ACTUAL	
S.P.	1800	SL/s		SL/s	
Air Temp	21.2	L/s	8865	L/s	9951
Size	1800 x 750 MM	M/s	7.207	M/s	8.10
Area	1.23				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	7.37	8.54	8.51	8.37	7.88	7.65	7.56	5.42					
	2	7.91	8.40	8.17	7.68	8.21	7.69	7.95	7.17					
	3	8.21	8.38	8.24	8.13	7.41	8.39	8.10	8.27					
	4	8.22	8.46	9.22	9.18	7.01	9.40	9.38	8.80					
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		31.71	33.78	34.14	33.36	30.51	33.13	32.99	29.66					

REMARKS: Sum 259.28 2 fans at 60 Hz

TEST DATE: 2/13/2018 | READINGS BY: JOHNNY MURRAY

AECOM

EF 101 DAMPER EBTRON TEST SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT EXHAUST RISER DISTRIBUTION / EF-101 ACID

CONTROL DAMPER PNEUMATICALLY CONTROLLED DAM TEST APPARATUS DIGITAL MANOMETER

RISER AND DAMPER NAME		SERVICE CHASE SERVED	SETPOINT	RISER SIZE	AREA	TEST L/s	BAS RPT L/s	TEST M/s	EBTRON M/s	BAS DMPR %	STATIC PRESSURE AT AFMS (Pa)	NOTES
ACID # 1		A101-1	220	650 mm	0.33	199	232	0.60	0.70	Note	60	Note 1)
ACID # 2		B101-1	948	650 mm	0.33	647	696	1.95	2.10	100	1748	Note 1)
ACID # 3		A102-1	1250	650 mm	0.33	611	686	1.84	2.07	100	1735	
ACID # 4		B102-1	2540	650 mm	0.33	1516	1589	4.57	4.79	100	1744	
ACID # 5		A103-1	1560	650 mm	0.33	1387	1559	4.18	4.70	49.9	535	
ACID # 6		B103-1	1160	650 mm	0.33	939	1161	2.83	3.50	48	393	
ACID # 7		A104-1	400	650 mm	0.33	445	411	1.34	1.24	45	170	
ACID # 8		B104-1	300	650 mm	0.33	328	285	0.99	0.86	38	383	
ACID # 9		A105-1	1520	650 mm	0.33	1155	1260	3.48	3.80	100	1082	
ACID # 10		B105-1	800	650 mm	0.33	780	766	2.35	2.31	42.2	330	
ACID # 11		A106-1	190	650 mm	0.33	275	215	0.83	0.65	25.4	574	
ACID # 12		B106-1	1800	650 mm	0.33	1343	1095	4.07	3.32	100	1577	
ACID # 13		A107	1100	650 mm	0.33	889	1181	2.68	3.56	34.2	327	
SUM TOTAL			13788			10514	11136					
TRAVERSE	TOTAL					9951	11457				1800	

NOTES: 1) The damper #1 is not controlling to setpoint.

TEST DATE: 2/13/2018 READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #1 EF 101

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #1

Bldg. 215 CR Exhaust Inlets A101-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

TAP #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #3	Room D107	10	0.54542	50	0.254	27.2708	12.8704					10"/ 3	D107	1)
BAS STPT									220					
BAS Report									232					
Riser Trav						199								
Dampr Position									-					1)
	Branch Main Taps		#1	#2	#3	#4	#5	#6	#7	#8				
			16"	16"	10"	16"	4"	4"	4"	4"				
	Class 100 side		O	O	O	O	o	o	o	o			Class 1000 side	

NOTES: EF-101 Acid Damper # 1 1) The damper #1 is not controlling to setpoint.

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #3 EF 101

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #3 — Bldg. 215 CR Exhaust Inlets A102-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #3	FUME HOOD A102 Base and Developer	12"	0.785			782	369	1500	708			16" / 3	A102	1) 2) 4)
TAP #4	Pass Thru Cab	8"	0.35	1463	7.43204	512	242			-0.26	-64.7	4" / 4	A102	3)
Damper #3 TOTAL						1294	611							
BAS STPT									1250					
BAS Report							686							
Riser Trav							611							
Dampr Position	BAS Reports 100%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				Note 2)
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-101 Acid Damper # 3

Note 1) The airflow volume was calculated by subtractingTap #4 Volume from the Total Branch traverse in the Mech Room.

2) 47.8% low 3) YELLOW HIGHLIGHT Verify or recommend design airflow volume.

4) Hood branch duct volume damper may be partially closed causing restricted airflow.

TEST DATE: READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #5 EF 101

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #5

Bldg. 215 CR Exhaust Inlets A103-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #3	SSEC RCA	5.5	0.16499	2061	10.4699	340	160	410	193	-1.27	-316	16" / 3	A102	
	SSEC PIRANHA 2	5.5	0.16499	2143	10.8864	354	167	410	193	-1.06	-263.8	16" / 3	A102	
	SSEC PIRANHA 1	5.5	0.16499	1723	8.75284	284	134	410	193	-1.17	-291.1	16" / 3	A102	
	Fume Hood	12	0.7854	2372	12.0498	1863	879	1500	708	-1.2	-298.6	16" / 3	A103	
Tap#5	Tool MA8	4	0.08727	1552	7.88416	135	64	35	17	-1.6	-398.1	4" / 5	A102	
Total						2976	1405		1305					
BAS STPT									1560					
BAS Report							1559							
Riser Trav							1387							
Dampr Position	BAS Reports 49.9%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-101 Acid Damper # 5

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #7 EF 101

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #7

Bldg. 215 CR Exhaust Inlets A104-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	Mask Bench	10"	0.545	1252	6.36016	682	322	1000	472	-0.35	-87.09	16" / 1	A103	
TAP #2	Tool :	4	0.08727	65	0.3302	6	3	50	24					
	Tool :	4	0.08727	35	0.1778	3	1	100	47	-1.06	-263.8	16" / 3	A103	
	Tool :	4	0.08727	146	0.74168	13	6	50	24	-1.17	-291.1	16" / 3	A102	
	Tool : VacPmp + Tool	4	0.08727	0	0	0	0	50	24	-1.2	-298.6	16" / 3	A103	
	Tool : MA 6	4	0.08727	0	0	0	0		0					
	Tool : VAC PUMP	4	0.08727	71	0.36068	6	3	7						
Total						710	335							
BAS STPT									400					
BAS Report							411							
Riser Trav							445							
Dampr Position	BAS Reports 45%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-101 Acid Damper # 7

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #9 EF 101

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #9

Bldg. 215 CR Exhaust Inlets A105-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	Tool:	4	0.08727	143	0.72644	12	6			0.02	4.9768	16 / 1	A105	1)
	Tool:	4	0.08727	318	1.61544	28	13			-0.04	-9.954	16 / 1	A105	1)
	Tool:	4	0.08727	220	1.1176	19	9			0.002	0.4977	16 / 1	A105	1)
	Tool: Media Storage and Tank System 3	4	0.08727	465	2.3622	41	19			-1.08	-268.7	16 / 1	A105-1	1)
TAP #2	ACID HOOD	14	1.06902	1250	6.35	1336	631	1500	708	0.72	179.16	16 / 2	A105	
TAP #4	Caustic Developer Storage Cabinet	8	0.34907	1060	5.3848	370	175			-0.14	-34.84	4 / 4	A104	1)
TAP #5	Acid Only Storage Cabinet	8	0.34907	1150	5.842	401	189			-0.2		4 / 5	A104	1)
Total						2208	1029							
BAS STPT									1520					
BAS Report							1260							
Riser Trav							1155							
Dampr Position	BAS Reports 100%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-101 Acid Damper # 9 1) YELLOW HIGHLIGHT Design airflow volumes need to be determined.

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #11 EF 101

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #11

Bldg. 215 CR Exhaust Inlets A106-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	Tool:	5.75	0.18033	412	2.09296	74	35			-2.4	-597.2	16 / 1	A105	1)
	Tool: Oxford	4	0.08727	158	0.80264	14	7			-0.004	-0.995	16 / 1	A106-1	1)
	Tool: Vac Pump	4	0.08727	301	1.52908	26	12			-2.3	-572.3	16 / 1	A106-1	1)
	Tool:	4	0.08727	200	1.016	17	8				0	16 / 1	A106	1)
	OED	4	0.11	300	1.524	33	16				0	16 / 1	A106	
TAP #2	Tool:	4	0.08727	221	1.12268	19	9	1500	708	-2.6	-647	16 / 1	A106-1	
	Tool: Oxford	4	0.08727	164	0.83312	14	7			-0.04	-9.954	16 / 1	A106-1	
	OED	4	0.11	315	1.6002	35	16				0	16 / 1	A106	
	Tool + Vac Pump	4	0.08727	156	0.79248	14	6			-1.7	-423	16 / 1	A106-1	
Total						247	116							
BAS STPT									190					
BAS Report							215							
Riser Trav							275							
Dampr Position	BAS Reports 25.4%													
	Branch Main Taps		#1	#2										
			16"	16"										
	Class 100 side		O	O									Class 1000 side	

NOTES: EF-101 Acid Damper # 11 1) YELLOW HIGHLIGHT Design airflow volumes need to be determined.

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #13 EF 101

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #13 — Bldg. 215 CR Exhaust Inlets A107

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	Acid StoCab in A107	4"	0.08727	214	1.08712	19	9			-1.46	-363.3	16 / 1	A107	
TAP #3	Fume Hood in A106	14	1.06902	1469	7.46252	1570	741	1500	708	-1.4	-348.4	16 / 3	A106	
TAP #4														
	PassThru StoCab in A106	4	0.08727	2024	10.2819	177	83			-1.4	-348.4	16 / 3	A106	
	PassThru StoCab in A106	4	0.08727	1802	9.15416	157	74			-0.91	-226.4	4 / 4	A106	
Total						1923	908							
BAS STPT									1100					
BAS Report							1181							
Riser Trav							889							
Dampr Position	BAS Reports 34.2%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6					
			16"	16"	16"		4"	4"	4"					
	Class 100 side		O	O	O		o	o	o				Class 1000 side	

NOTES: EF-101 Acid Damper # 13 1) YELLOW HIGHLIGHT Design airflow volumes need to be determined.

TEST DATE: READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #2 EF 101

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #2 — Bldg. 215 CR Exhaust Inlets B101-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	SPINRINSEDRYER	4	0.08727	999	5.07492	87	41	7	3	-5.7	-1418	16" / 1	B101	
TAP #3	Fume Hood in B101					1284	606	1500	708			16 / 3	A106	1)
TOTAL						1371	647	1507	711					
BAS STPT									948					
BAS Report							696							
Riser Trav							647							
Dampr Position														2)
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-101 Acid Damper # 2 1) Fume Hood Volume was calculated by subtracting the 1st inlet from the total branch traverse in the mechanical room. 2) The damper is not steadily controlling.

TEST DATE: READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #4 EF 101

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #4 — Bldg. 215 CR Exhaust Inlets B102-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	FUME HOOD B101	12"	0.785	621	3.15468	487	230	1000	472	-0.26	-64.7	16" / 1	B101	
		12"	0.785	604	3.06832	474	224	1000	472	-0.27	-67.19	16" / 1	B101	
SUBTOTAL						962	454	2000	944					4)
	HF Vape etch in B102	6"	0.196	781	3.96748	153	72	600	283	-0.13	-32.35	16" / 1	B102	
	HF Vape etch VAC Pmp	2"		0	0	5	2	50	24		0	16" / 1	B102	3)
TAP #1 Total						1120	528	2650	1251					
TAP #2	FUME HOOD B101	9.5"	0.49	779	3.95732	382	180	750	354	-0.26	-64.7	16" / 2	B101	
		9.5"	0.49	741	3.76428	363	171	750	354	-0.27	-67.19	16" / 1	B101	
TAP #2 Total						745	352	1500	708					4)
									0					
TAP #3	FUME HOOD B102	14"	1.07			1348	636	2000	944	-0.36			B102	1) 5)
Damper #4 TOTAL						3212	1516	6150	2902					2)
BAS STPT									2540					
BAS Report							1589							
Riser Trav							1516							
Dampr Position	BAS Reports 100%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				Note 2)
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-101 Acid Damper # 4

Note 1) The airflow volume was calculated by subtracting the Fume Hood Volume from the Total Branch traverse in the Mech Room.

Note 2) 47.8% low

3) Extrapolated Value Trav 1 minus Trav 2 4) YELLOW HIGHLIGHT: Verify that design quantities are correct ; QUANTITIES may be swapped

5) Extrapolated 1516 total trav minus 880 (tap 1 and tap 2)= 636 L/s 6) 47.8% low

TEST DATE: READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
EF 101 Damper #6

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #6 — Bldg. 215 CR Exhaust Inlets B103-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	FUME HOOD B102	12"	0.785	956	4.85648	750	354	1000	472	-0.62	-154.3	16" / 1	B102	
		12"	0.785	924	4.69392	725	342	1000	472	-0.59	-146.8	16" / 1	B102	
TAP #1 Total						1476	697	2000	944					2)
TAP #2	SRD	2"	0.0122	1585	8.0518	19	9	7	3	-0.057	-14.18	16" / 2	B102	
TAP #2 Total						19	9	7	3					
									0					
TAP #3	OED above Tool Storage Cab	8	0.35	1362	6.91896	477	225	451	213	-0.36	-89.58	16" / 3	B103-1	1) 2)
TAP #7	PASS Thru Sto Cab	8	0.35	591	3.00228	207	98			-0.06	-14.93	4" /7	B103	
Damper #6 TOTAL						2178	1028	2458	1160					3)
BAS STPT									1160					
BAS Report							1161							
Riser Trav							939							
Dampr Position	BAS Reports 48%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

REMARKS: EF-101 Acid Damper # 6

Note 1) YELLOW HIGHLIGHT assumed: 1160 minus 947 (tap 1 and 2)= 225 L/s

2) YELLOW HIGHLIGHT: Verify that design quantitiy is correct

3) 11% low

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
EF 101 Damper #8

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #8 — Bldg. 215 CR Exhaust Inlets B104-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1														
	VAC PUMP	5.5	0.164	208	1.05664	34	16	50	24	-1.25	-311	16" / 1	B105	
		4	0.09	120	0.6096	11	5	50	24	-1.21	-301.1	16" / 1	B105	
TAP #1 Total						45	21	100	47					
TAP #4	PASS Thru Sto Cab	8	0.35	891	4.52628	312	147			-0.05	-12.44	4" / 4	B105	1)
TAP #5	PASS Thru Sto Cab	8	0.35	988	5.01904	346	163			-0.1	-24.88	4" / 4	B105	1)
									0					
Damper #68TOTAL						747	353							
BAS STPT									300					
BAS Report							285							
Riser Trav							328							
Dampr Position	BAS Reports 38%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

REMARKS: EF-101 Acid Damper # 8

Note 1) Pass through storage cabinets design quantity has yet to be determined.

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
EF 101 Damper #10

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #10 — Bldg. 215 CR Exhaust Inlets B105-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1														
	Tool Name	4"	0.09	1465	7.4422	132	62	50	24	-0.9	-224	16" / 1	B105	
	VAC Pump	4"	0.09	100	0.508	9	4	50	24	-1.3	-323.5	16" / 1	B105	
	VMB 7	6"	0.196	970	4.9276	190	90	165	78	-1.4	-348.4	16" / 1	B105-1	
	VMB 16	6"	0.196	911	4.62788	179	84	165	78	-1.6	-398.1	16" / 1	B105-1	
	VMB 11	6"	0.196	1146	5.82168	225	106	165	78	-1.2	-298.6	16" / 1	B105-1	
	VAC Pump	4"	0.09	65	0.3302	6	3	50	24	-1.18	-293.6	16" / 1	B105	
	Etcher Cab Exh	4"	0.09	1369	6.95452	123	58	59	28	-0.98	-243.9	16" / 1	B105	
TAP #1 TOTAL						863	407	704	332					1)
TAP #2	Ebeam #1	6"	0.196	137	0.69596	27	13	50	24	-1.8	-447.9	16" / 2	B105-1	
TAP #4	Ebeam # 2	4"	0.09	244	1.23952	22	10	50	24	-1.3	-323.5	4" / 4	B105-1	
									0					
TAP #5	STPS Etcher	4"	0.09	1551	7.87908	140	66	50	24	-0.7	-174.2	4" / 5	B105-1	
TAP #6	Paralene Coater	4"	0.09	1551	7.87908	140	66	50	24	-0.7	-174.2	4" / 6	B105-1	
Damper #10 TOTAL						1191	562	904	428					1)
BAS STPT									800					
BAS Report							766							
Riser Trav							780							1)
Dampr Position	BAS Reports 42.2%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-101 Acid Damper # 10 1) There is a missing cap on the Bottom of Tap #1 which may account for the notable difference in the summation of the inlets versus the total traverse.

TEST DATE: READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
EF 101 Damper #12

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #12

Bldg. 215 CR Exhaust Inlets B106-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1														
	VMB 8	6"	0.196	837	4.25196	164	77	350	165	-0.84	-209	16" / 1	B106-1	1)
	RIE #2 GAS BOX	4"	0.09	2456	12.4765	221	104	50	24	-2.8	-696.8	16" / 1	B105	
	RTA (NEW)	8"	0.35	511	2.59588	179	84		0	-3.1	-771.4	16" / 1	B106	1)
	RTA GAS BOX	3"	0.05	1069	5.43052	53	25		0	-3.1	-771.4	16" / 1	106-1	1)
	RIE #2 VAC PMP	6"	0.196	100	0.508	20	9	50	24	-4.7	-1170	16" / 1	B105	
	XEF #2 VAC PUMP	4"	0.09	244	1.23952	22	10	50	24	-4.8	-1194	16" / 1	B105	
	XEF-2 TOOL GAS CAB	4"	0.09	348	1.76784	31	15	50	24	-4.7	-1170	16" / 1	B105	
	XEF2 Chamber Exh	4"	0.09	2797	14.2088	252	119	59	28	-4.5	-1120	16" / 1	B105	
TAP #1 TOTAL						942	445							
TAP #3	VMB-6 Sul Hex.	6"	0.196	764	3.88112	150	71	350	165	-4.7	-1170	16" / 3	B106-1	
	VMB-3	6"	0.196	965	4.9022	189	89	350	165	-4.7	-1170	16" / 3	B106-1	
	Capped Runout											16" / 3		
	VMB-2	6"	0.196	1024	5.20192	201	95	550	260	-4.8	-1194	16" / 3	B106-1	
	VMB-1	6"	0.196	818	4.15544	160	76	350	24	-4.8	-1194	16" / 3	B106-1	
TAP #3 TOTAL						700	330							
TAP #4	Etcher Cab Gas Box	4"	0.09	2247	11.4148	202	95	50	24	-2.1	-522.6	4" / 4	B105	
TAP #5	VacPmp RIE #1	4"	0.09	286	1.45288	26	12	50	24	-4.3	-1070	4" / 5	B105	
TAP #6	RTA Old	4"	0.09	219	1.11252	20	9	50	24	-0.035	-8.709	4" / 6	B105	
TAP #7		4"	0.09	374	1.89992	34	16	50	24	-5.164	-1285	4" / 7	B105	
Damper #12 TOTAL						1923	908							
BAS STPT									1800					
BAS Report							1095							
Riser Trav							1343							
Dampr Position	BAS Reports 100%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-101 Acid Damper # 12 1) YELLOW HIGHLIGHT Verify Design airflow quantity.

2) There is a missing cap on the Bottom of Tap #2 and Tap #3 which may account for the notable difference in the summation of the inlets versus the total traverse.

TEST DATE: _____

READINGS BY Johnny Murray

AECOM

FAN TEST REPORT

PROJECT NIST Building 215 Rebalance

EF-102A FAN DATA	
Location	MER
Service	SOLVENT
Manufacturer	COOK
Model Number	300CA-SWSI
Serial Number	
Motor Make/Frame	BALDOR
Motor KW /RPM	17.0 / 1725
Volts/Phase/Hertz	460 / 3 /
F.L. Amps/S.F.	36.0 / 1.15
Motor Sheave Diam./Bore	12.5 OD X 1 7/8
Fan Sheave Make	
Fan Sheave Diam./Bore	14.5 OD X 2 7/16
No. Belts/Make/Size	2 BX 150
Sheave c to c Distance / Open Turns	56 / FIXED

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/S	7060	4632	
Fan RPM			
Total S.P.	1803		
SUCTION S.P.		-1732	
DISCHARGE S.P.			
K.W.			
Voltage		428	
Amperage T1/T2/T3		26.5	
Drive Speed		56.3 Hz	

REMARKS:

TEST DATE: 2/12/2018 READINGS BY Johnny Murray

AECOM

FAN TEST REPORT

PROJECT NIST Building 215 Rebalance

EF-102B FAN DATA	
Location	MER
Service	SOLVENT
Manufacturer	COOK
Model Number	300CA-SWSI
Serial Number	
Motor Make/Frame	BALDOR
Motor KW /RPM	17.0 / 1725
Volts/Phase/Hertz	460 / 3 /
F.L. Amps/S.F.	36.0 / 1.15
Motor Sheave Diam./Bore	12.5 OD X 1 7/8
Fan Sheave Make	
Fan Sheave Diam./Bore	14.5 OD X 2 7/16
No. Belts/Make/Size	2 B150
Sheave c to c Distance / Open Turns	56 / FIXED

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/s	7060		
Fan RPM			
Total S.P.	1803		
SUCTION S.P.		-1771	
DISCHARGE S.P.			
K.W.			
Voltage		417	
Amperage T1/T2/T3		22.4	
Drive Speed		55 Hz	

REMARKS:

TEST DATE 2/13/2018 READINGS BY Johnny Murray

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT: NIST BUILDING 215 REBALANCE
SYSTEM/UNIT: EF-102 A and B
LOCATION/ZONE: Bldg. 215 Roof
SERVICE: SOLVENT EXHAUST

DUCT		DESIGN		ACTUAL	
S.P.	-1600	SL/s		SL/s	
Air Temp	21.2	L/s	10596	L/s	9263
Size	1800 x 750 MM	M/s		M/s	7.54
Area	1.23				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	6.43	7.53	7.16	7.58	7.13	6.46	7.14	6.62					
	2	7.91	7.73	7.62	8.02	8.22	7.50	7.41	7.44					
	3	8.14	8.24	8.26	8.41	8.16	8.03	7.55	7.04					
	4	7.86	7.84	7.54	7.14	7.66	8.06	6.46	6.96					
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		30.34	31.34	30.58	31.15	31.17	30.05	28.56	28.06					

REMARKS:

TEST DATE: 2/13/2018
READINGS BY: Johnny Murray

AECOM

EXHAUST RISER SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT EXH RISER DISTRIBUTION / EF-102 SOLVENT

CONTROL DAMPER PNEUMATICALLY CONTROLLED DAM TEST APPARATUS DIGITAL MANOMETER

RISER AND DAMPER NAME		SERVICE CHASE SERVED	BAS SETPOINT	RISER SIZE	AREA	TEST L/S	BAS RPT L/S	TEST M/S	EBTRON M/S	BAS DMPR %	STATIC PRESSURE AT AFMS (Pa)	NOTES
SOLVENT # 1		A101-1	90	650	0.33	0	112	0.29	0.34	20.4	1500	1
SOLVENT # 2		B101-1	797	650	0.33	1025	929	3.09	2.80	69.6	1570	
SOLVENT # 3		B102-1	900	650	0.33	826	935	2.49	2.82	31.9	44	
SOLVENT # 4		A102-1	930	650	0.33	753	895	2.27	2.70	30.8	225	
SOLVENT # 5		B103-1	1290	650	0.33	906	1101	2.73	3.32	43.4	120	
SOLVENT # 6		A103-1	1367	650	0.33	1171	1393	3.53	4.20	43.2	427	
SOLVENT # 7		B104-1	1020	650	0.33	703	875	2.12	2.64	47.2	693	
SOLVENT # 8		A104-1	1575	650	0.33	1380	1546	4.16	4.66	36.8	258	
SOLVENT # 9		B105-1	880	650	0.33	717	912	2.16	2.75	43.5	105	
SOLVENT # 10		A105-1	1550	650	0.33	1543	1462	4.65	4.43	40	414	
SOLVENT # 11		B106-1	0	650	0.33	73	13	0.22	0.04	20	9	
SOLVENT # 12		A106-1	150	650	0.33	375	182	1.13	0.55	33.3	1136	
SOLVENT # 13		A107	700	650	0.33	693	528	2.09	1.60	91.4	1486	
SUM TOTAL			11249			10165	10883					
TRAVERSE	TOTAL		9263									
BAS REPORT			11294									
BAS FLOW SETPT			7852									
FANS' SPEED			90%/ 54 Hz									

NOTES: 1) This damper is not controlling to setpoint.

TEST DATE: 2/12/2018 READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #1 EF 102

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #1

Bldg. 215 CR Exhaust Inlets A101-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

TAP #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #3	Room D107	8	0.35	0	0	0	0					8"/ 3	D107	1)
BAS STPT									90					
BAS Report							112							
Riser Trav							-96							
Dampr Position	BAS Reports 20.4%								-					1)
	Branch Main Taps		#1	#2	#3	#4	#5	#6	#7					
			16"	16"	8"	16"	4"	4"	4"	4"				
	Class 100 side		O	O	o	O	o	o	o	o			Class 1000 side	

NOTES: EF-102 Solvent Damper # 1 1) The damper #1 is not controlling to setpoint.

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #4 EF 102

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #4

Bldg. 215 CR Exhaust Inlets A102-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

TAP #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #3	Vacuum Pump	4	0.08727	152	0.77216	13	6			1.004	250	16" / 3	A102-1	
	TOOL	4	0.08727	121	0.61468	11	5			-1.01	-251	16" / 3	A102	
TAP #2	Fume Hood	12	0.7854	1660	8.4328	1304	615	1500		-0.73	-182	16" / 2	A102	
TAP #4	Solvent Storage Cab.	8	0.34907	616	3.12928	215	101			-0.28	-70	4" / 4	A102	
TAP #5	Bases + Dev Sto. Cab.	8	0.34907	596	3.02768	208	98			-0.28	-70	4" / 5	A102	
						1751	826							
BAS STPT									930					
BAS Report							895							
Riser Trav							753							
Dampr Position	BAS Reports 30.8%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-102 Solvent Damper # 4 1) YELLOW HIGHLIGHT: Determine design quantities

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
EF 102 Damper #6

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #6

Bldg. 215 CR Exhaust Inlets A103-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	Tool	4	0.08727	1996	10.1397	174	82	200	94	-0.38	-94.56	16" / 1	103-1	
	Tool	4	0.08727	1366	6.93928	119	56	200	94	-0.38	-94.56	16" / 1	102	
TAP #3	Fume hood	12	0.7854	3456	17.5565	2714	1281	1500	708	-1.4	-348.4	16" / 3	103	
Total						3008	1419	1900	897					
BAS STPT									1367					
BAS Report							1393							
Riser Trav							1171							
Dampr Position	BAS Reports 43.2%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

REMARKS: EF-102 Solvent Damper # 6

Note 1)

2) YELLOW HIGHLIGHT: Verify that design quantitiy is correct

3)

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
EF 102 Damper #8

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #8

Bldg. 215 CR Exhaust Inlets A104-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

TAP #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	Tool Adjacent to Mask Bench	10	0.54542	874	4.43992	477	225	1000	472	-1.4	-348.4	16 / 1	A103	
TAP #12	A104 Fume Hood 2 N duc	12	0.7854	1014	5.15112	796	376	750	354	-1.3	-323.5	16 / 2	A104	
	A104 Fume Hood 2 S duc	12	0.7854	1108	5.62864	870	411	750	354	-1.38	-343.4	16 / 2	A104	
Subtotal						1667	787	1500	708					
TAP #3	A104 Fume Bench 1 N duc	10	0.54542	1157	5.87756	631	298	1000	472	-1.36	-338.4	16 / 3	A104	
	A104 Fume Bench 1 S duc	10	0.54542	1405	7.1374	766	362	1000	472	-1.36	-338.4	16 / 3	A104	
						1397	659	2000	944					
TOTAL						3541	1671	4500	2124					
BAS STPT									1575					
BAS Report							1546							
Riser Trav							1380							
Dampr Position	BAS Reports 36.8%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

REMARKS: EF-102 Solvent Damper # 8

Note 1) Pass through storage cabinets design quantity has yet to be determined.

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
EF 102 Damper #10

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #10 — Bldg. 215 CR Exhaust Inlets A105-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	1) Media Sto Tank Sys 2) Media Sto Tank Sys 3) Resist Cabinet	4	0.08727	1605	8.1534	140	66	200	94	-0.62	-154.3	16 / 1	A105-1	
TAP #3														
1	Suss Spray Coater	4	0.08727	257	1.30556	22	11	42-63		-0.05	-12.44	12 / 3	A105	
2	Suss Spray Coater	4	0.08727	593	3.01244	52	24	42-63		-0.6	-149.3	12 / 3	A105	
3	Suss Spray Coater	4	0.08727	516	2.62128	45	21	30		-0.52	-129.4	12 / 3	A105	
4	Suss Spray Coater	4	0.08727	520	2.6416	45	21	100		-0.4	-99.54	12 / 3	A105	
5	Suss Spray Coater	4	0.08727	591	3.00228	52	24	42-63		-0.39	-97.05	12 / 3	A105	
SUBTOTAL						216	102	319	151					
TAP #4	Fume Hood in A105		0	0	0	1678	792	1500	708			16 / 4	A105	1)
TAP #5	Fume Hood in A104	12	0.7854	1471	7.47268	1155	545	1500	708	-0.34	-84.61	16 / 5	A104	
TAP #6	Solvent Only Storage Cabinet	8	0.34907	139	0.70612	49	23			-0.015	-3.733	4 / 6	A105	
Damper #10 TOTAL						3238	1528	3519	1661					
BAS STPT									1550					
BAS Report							1462							
Riser Trav							1543							
Dampr Position	BAS Reports 40%													
	Branch Main Taps		#1	#2	#3	#4	#5	#6	#7	#8	#9			
			16"	12"	12"	16"	16"	4"	4"	4"	4"			
	Class 100 side		O	O	O	O	O	o	o	o	o		Class 1000 side	

NOTES: EF-102 Solvent Damper # 10 1) Extrapolated from Damper Branch Traverse minus the other individual inlets summation.

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
EF 102 Damper #12

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #12

Bldg. 215 CR Exhaust Inlets A106-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1														
TAP #1	Stepper?	5.75	0.18033	127	0.64516	23	11			0.04	9.9536	16 / 1		1)
TAP #1	Stepper?	5.75	0.18033	279	1.41732	50	24			0.03	7.4652	16 / 1		1)
TAP #1	Spinner Fume Hood	14	1.06902	142	0.72136	152	72	1500		0.02	4.9768	16 / 1		2)
TAP #2	Tool: Oxford	4	0.08727	49	0.24892	4	2			-0.01	-2.488	16 / 2		1)
	OED	4	0.08727	210	1.0668	18	9				0	16 / 2		1)
	Vac Pump + Tool	4	0.08727	147	0.74676	13	6			-0.04	-9.954	16 / 2		1)
	Tool minus Vac Pump	3	0.04909	238	1.20904	12	6			-0.02	-4.977	16 / 2		1)
	Liquid Nitrogen Caniste	2.5	0.03409	0	0	0	0				0	16 / 2		1)
TOTAL						272	128							
BAS STPT									150					
BAS Report							182							
Riser Trav							375							
Dampr Position	BAS Reports 33.3%													
	Branch Main Taps		#1	#2										
			16"	16"										
	Class 100 side		O	O									Class 1000 side	

NOTES: EF-102 Solvent Damper # 12 1) YELLOW HIGHLIGHT Verify Design airflow quantity.

2) Notably deficient on air flow. Recommend that

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #13 EF 102

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #13 — Bldg. 215 CR Exhaust Inlets A107

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	Vac Pump + Solv Sto Cab	4	0.08727	561	2.84988	49	23							1)
	OED in A106	4	0.08727	318	1.61544	28	13							1)
TAP #5	PassThru StoCab in A106	4	0.08727	4739	24.0741	414	195							1)
Total						490	231							
BAS STPT									700					
BAS Report							528							
Riser Trav							693							
Dampr Position	BAS Reports 91.4%													
	Branch Main Taps		#1	#2	#3		#4	#5		#1A				2)
			16"	16"	16"		4"	4"		12"				
	Class 100 side		O	O	O		o	o		O			Class 1000 side	

NOTES: EF-102 Solvent Damper # 13 1) YELLOW HIGHLIGHT Design airflow volumes need to be determined.

Note 2) This Solvent runout #1A is installed on the Branch Main near the deck and is virtually inaccessible.

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #2 EF 102

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #2 — Bldg. 215 CR Exhaust Inlets B101-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #2	Fume Hood in B101	26	3.68702			2172	1025	1500	708				B101	
BAS STPT									797					
BAS Report							929							
Riser Trav							1025							
Dampr Position	BAS Reports 69.6%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-102 Solvent Damper # 2 1) Fume Hood Volume was calculated by subtracting the 1st inlet from the total branch traverse in the mechanical room. 2) The damper is not steadily controlling.

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #3 EF 102

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #3 — Bldg. 215 CR Exhaust Inlets B102-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #3	B102 Fume Hood 2 N duc	9.5	0.49224	621	3.15468	306	144	1000	472	-0.16	-39.81	16 / 3	B102	
	B102 Fume Hood 2 S duc	9.5	0.49224	609	3.09372	300	141	1000	472	-0.17	-42.3	16 / 3	B102	
Subtotal						605	286	2000	944					
TAP #1A	OED	12	0.785			1144	540	1038	490			12" / 1A	RA Plenum	1) 2)
Total						1749	826	3038	1434					
BAS STPT									900					
BAS Report							935							
Riser Trav							826							
Dampr Position	BAS Reports 31.9%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7	# 1A			2)
			16"	16"	16"		4"	4"	4"	4"	12"			
	Class 100 side		O	O	O		o	o	o	o	O		Class 1000 side	

NOTES: EF-102 Solvent Damper # 3 1) Air Volume was calculated by subtracting the 1st inlet from the total branch traverse in the mechanical room. 2) This Solvent runout is installed on the Branch Main near the deck and is virtually inaccessible.

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #5 EF 102

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #5

Bldg. 215 CR Exhaust Inlets B103-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #3	Gen Chem Hood					1615	762	2000	944				B102	1)
TAP#4	Pass Thru Cab	8	0.35	405	2.0574	141	67			-0.02		4"/4	B103	2)
TAP#5	Pass Thru Cab	8	0.35	471	2.39268	164	77							
Total						1920	906							
BAS STPT									1290					
BAS Report							1101							
Riser Trav							906							
Dampr Position	BAS Reports 43.4%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-102 Solvent Damper # 5 1) Air Volume calculated by subtracting Pass Thru Cabinets volumes from the Main Traverse in the m mechanical room. 2) YELLOW HIGHLIGHT: design volume has not yet been established.

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #7 EF 102

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #7

Bldg. 215 CR Exhaust Inlets B104-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #3	Solvent Bench	12	0.7854	1845	9.3726	1449	684	1500	708	-0.48	-119.4	16" / 3	B105	
					0									
TAP #5		8	0.34907	1368	6.94944	478	225			-0.13	-32.35	4" / 5	B105	
						1927	909							
BAS STPT									1020					
BAS Report							875							
Riser Trav							703							
Dampr Position	BAS Reports 47.2%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7				
			16"	16"	16"		4"	4"	4"	4"				
	Class 100 side		O	O	O		o	o	o	o			Class 1000 side	

NOTES: EF-102 Solvent Damper # 7 1)YELLOW HIGHLIGHT: design volume has not yet been established.

TEST DATE:

READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #9 EF 102

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #9

Bldg. 215 CR Exhaust Inlets B105-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	VMB 12	8	0.35	575	2.921	201	95			0.02	4.9768	16 / 1	A105	3)
TAP #1A	OED	12	0.785			1144	622	1038	490			12" / 1A	RA Plenum	1) 2)
BAS STPT									880					
BAS Report							912							
Riser Trav							717							
Dampr Position	BAS Reports 43.5%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7	# 1A			
			16"	16"	16"		4"	4"	4"	4"	12"			
	Class 100 side		O	O	O		o	o	o	o	O		Class 1000 side	

NOTES: EF-102 Solvent Damper # 9 1) Air Volume was calculated by subtracting the 1st inlet from the total branch traverse in the mechanical room. 2) This Solvent runout is installed on the Branch Main near the deck, exhausts plenum air and is virtually inaccessible.
3) YELLOW HIGHLIGHT Design airflow volumes are not yet determined.

TEST DATE: READINGS BY Johnny Murray

AECOM

Bldg. 215 CR Exhaust Inlets
Damper #11 EF 102

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215

SYSTEMS: Damper #11 — Bldg. 215 CR Exhaust Inlets B106-1

SUMMARY Exhaust Inlet Flows Sorted by Service Chase, Tool and Room

TEST APPARATUS Micromanometer

Fan / Damper #	Tool Name	Inlet Size	Free Area	FPM	M/s	CFM	L/s	Dsgn Vol. CFM	Dsgn Vol. L/s	Static Pres. W.g.	Static Pres. Pa	Damp. Tap size / #	Exh from Room	Note
TAP #1	No Equipment or Tools connected to the Taps on this Exhaust Runout # 11 on EF-102													
BAS STPT									0					
BAS Report							13							
Riser Trav							73							
Dampr Position	BAS Reports 20%													
	Branch Main Taps		#1	#2	#3		#4	#5	#6	#7	1A			
			16"	16"	16"		4"	4"	4"	4"	12"			
	Class 100 side		O	O	O		o	o	o	o	O		Class 1000 side	

NOTES: EF-102 Solvent Damper # 11

TEST DATE: _____ READINGS BY Johnny Murray

AECOM

FAN TEST REPORT

PROJECT NIST Bldg 215 Rebalance

EF-103 FAN DATA	
Location	ROOF 215
Service	VACUUM PUMP
Manufacturer	COOK
Model Number	245CA-SWSI
Serial Number	
Motor Make/Frame	BALDOR
Motor KW /RPM	7.46 / 1725
Volts/Phase/Hertz	460 / 3 /
F.L. Amps/S.F.	12.5 / 1.0
Motor Sheave Diam./Bore	2MA9.2 x H 1 3/16
Fan Sheave Make	
Fan Sheave Diam./Bore	2TB110 x Q1 15/16
No. Belts/Make/Size	2 A59
Sheave c to c Distance / Open Turns	14.5 / FIXED

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/s	3750	2158	
Fan RPM			
Total S.P.	933	1111	
SUCTION S.P.		-1081	
DISCHARGE S.P.		30	
K.W.			
Voltage		454	
Amperage T1/T2/T3		8.5	
Drive Speed		60 Hz	

REMARKS:

TEST DATE: 2/12/2018 READINGS BY Johnny Murray

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT	NIST Building 215 Rebalance	SYSTEM/UNIT	EF-103
LOCATION/ZONE	ROOF Bldg. 215	SERVICE	VAC PUMP

DUCT		DESIGN		ACTUAL	
S.P.	1080	SL/s		SL/s	
Air Temp		L/s	3750	L/s	2158
Size	950 x 400	M/s		M/s	5.68
Area	0.38				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	4.42	5.44	5.35	5.60	6.05	6.28	5.68	5.12	4.98	5.04			
	2	5.08	5.95	6.12	6.22	5.93	5.98	5.97	5.91	5.88	6.03			
	3	4.87	5.59	6.08	6.23	6.01	5.77	5.67	5.90	5.84	5.36			
	4													
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		14.37	16.98	17.55	18.05	17.99	18.03	17.32	16.93					

REMARKS:

TEST DATE	2/15/2018	READINGS BY	JM

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM Vacuum Pump EXHAUST EF 103

INLET MANUFACTURER N/A TEST APPARATUS Pitot tube /RVA

AREA SERVED	INLET				DESIGN		PRELIMINARY M/S				FINAL		Remarks
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL w/ RVA	FLOW			VEL	FLOW	
SubFab													
	1	OED	90⌖	3.875			0.23	0.89					1,2
	2	OED	90⌖	3.875			capped	0.00					3
	3	OED	90⌖	3.875			capped	0.00					3
	4	OED	90⌖	3.875			0.51	1.98					1,2
	5	OED	90⌖	3.875			capped	0.00					3
	6	OED	90⌖	3.875			capped	0.00					3
	7	OED	90⌖	3.875			1.62	6.28					1,2
	8	OED	90⌖	3.875			capped	0.00					3
	9	OED	90⌖	3.875			capped	0.00					3
	10	SAG	335/485	0.034			1.8	0.06					1,2
	11	OED	90⌖	3.875			6.1	23.64					1,2
	12	OED	90⌖	3.875			2.2	8.53					1,2
	13	OED	90⌖	3.875			1.53	5.93					1,2
VMB-19	14	OED	150⌖					83.00					Tool
	15	OED	90⌖	3.875			0.57	2.21					1,2
Vac Pump #1	16	OED	50⌖										Tool, 5
Gas Cabinet	17	OED											4,5
VMB-18	18	OED						88.00					Tool
	19	OED	90⌖	3.875			2.11	8.18					1,2
								228.68					continued

REMARKS: 1) Manual Damper Fully closed 2) Fully closed damper by handle is not fully closed by damper blade and is bypassing air.

3) The inlet has a sheet metal cap installed. 4) Cabinet not designated or named 5) Duct Connection to Cabinet not sealed

TEST DATE 2/27/2018 READINGS BY Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM Vacuum Pump EXHAUST EF 103

INLET MANUFACTURER N/A TEST APPARATUS Pitot tube and Manometer

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		Remarks
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
SubFab													
Vac Pump #2	20	Duct	90⌖	3.875									Tool, 5
	21	OED	90⌖	3.875			1.76	6.82					1,2
	22	OED	90⌖	3.875			5.4	20.93					1,2
	23	OED	90⌖	3.875			0.2	0.78					
	24	OED	90⌖	3.875			2.2	8.53					
	25	OED	90⌖	3.875			2.07	8.02					
	26	OED	90⌖	3.875			4.7	18.21					
	27	OED	90⌖	3.875			1.26	4.88					
	28	OED	90⌖	3.875			2.8	10.85					
	29	OED	90⌖	3.875			1.48	5.74					
S.DOC	30	Duct											Tool, 4, 5
S.DOC	31	Duct											Tool, 4, 5
								84.75					
													continued

REMARKS: 1) Manual Damper Fully closed 2) Fully closed damper by handle is not fully closed by damper blade and is bypassing air.

3) The inlet has a sheet metal cap installed. 4) Silane Dynamic Oxidation Chamber Gas Abatement 5) Direct Cabinet Connection, No test port available

TEST DATE 2/27/2018 READINGS BY Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance

SYSTEM Vacuum Pump EXHAUST EF 103

INLET MANUFACTURER N/A

TEST APPARATUS Pitot tube and Manometer

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		Notes
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
SubFab													
	32	OED	90⌖	3.875			0.00	0.00					1, 2
	33	OED	90⌖	3.875			10.00	38.75					1, 2
	34	OED	90⌖	3.875			0.00	0.00					1, 2
	35	OED	90⌖	3.875			2.10	8.14					1, 2
	36	OED	90⌖	3.875			0.60	2.33					1, 2
	37	OED	90⌖	3.875			2.00	7.75					1, 2
	38	OED	90⌖	3.875			3.80	14.73					1, 2
	39	OED	90⌖	3.875			2.55	9.88					1, 2
	40	OED	90⌖	3.875			4.30	16.66					1, 2
	41	OED	90⌖	3.875			0.00	0.00					1, 2
	42	OED	90⌖	3.875			4.50	17.44					1, 2
	43	OED	90⌖	3.875			1.80	6.98					1, 2
CM-2	43A												Tool, 5)
TM-1	43B												Tool
PM-1	43C												Tool
	45	OED	90⌖	3.875			0.00	0.00					1, 2
	46	OED	90⌖	3.875			1.06	4.11					1, 2
	47	OED	90⌖	3.875			1.91	7.40					1, 2
	48	OED	90⌖	3.875			2.05	7.94					1, 2
PM-2	48A												Tool
	48B												Tool
								142.10					Continued

REMARKS: 1) Manual Damper Fully closed 2) Fully closed damper by handle is not fully closed by damper blade and is bypassing air.

3) The inlet has a sheet metal cap installed. 4) 5) Direct Cabinet Connection, No test port available

TEST DATE 2/27/2018 READINGS BY Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance

SYSTEM Vacuum Pump EXHAUST EF 103

INLET MANUFACTURER N/A

TEST APPARATUS Pitot tube and Manometer

AREA SERVED	INLET				DESIGN		PRELIMINARY		PRELIMINARY		FINAL		Remarks
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL M/s	FLOW	FPM	CFM	VEL	FLOW	
SubFab													
	49	OED	90⌖	3.875			1.53	5.93					1, 2
	50	OED	90⌖	3.875			1.17	4.53					1, 2
	51	OED	90⌖	3.875			20.00	77.50					1, 2
	52	OED	90⌖	3.875			19.80	76.73					1, 2
	53	OED	90⌖	3.875			0.14	0.54					1, 2
	54	OED	90⌖	3.875			0.00	0.00					1, 2
	55	OED	90⌖	3.875			1.33	5.15					1, 2
	56	OED	90⌖	3.875			2.30	8.91					1, 2
	57	OED	90⌖	3.875			1.71	6.63					1, 2
	58	OED	90⌖	3.875			2.14	8.29					1, 2
VMB-14	59	OED	90⌖				8.41	96	1450	203			Tool
VMB-16	60	OED	90⌖				7.5806	86	1307	183			Tool
	61	OED	90⌖	3.875			0.51	1.98					1, 2
	62	OED	90⌖	3.875			1.60	6.20					1, 2
HH-10	63	OED	90⌖					40					Tool
HH-12	64	OED	90⌖					30					Tool
								454.55					

Continued

REMARKS: 1) Manual Damper Fully closed 2) Fully closed damper by handle is not fully closed by damper blade and is bypassing air.

3) The inlet has a sheet metal cap installed. 4) 5) Direct Cabinet Connection, No test port available

TEST DATE 2/27/2018 READINGS BY Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance

SYSTEM Vacuum Pump EXHAUST EF 103

INLET MANUFACTURER N/A

TEST APPARATUS Pitot tube and Manometer

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		Remarks
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
SubFab													
	65	OED	90⌖	3.875			2.64	10.23					1, 2
	66	OED	90⌖	3.875			0.54	2.09					1, 2
	67	OED	90⌖	3.875			0.00	0.00					1, 2
	68	OED	90⌖	3.875			1.62	6.28					1, 2
	69	OED	90⌖	3.875			2.00	7.75					1, 2
	70	OED	90⌖	3.875			3.40	13.18					1, 2
TGM	70A	DUCT	25⌖				-						Tool, 4, 5
	71	OED	90⌖	3.875			0.17	0.66					1, 2
	72	OED	90⌖	3.875			5.00	19.38					1, 2
	73	OED	90⌖	3.875			1.78	6.90					1, 2
TGM	73A	DUCT	25⌖				-						Tool, 4, 5
								66.46					

REMARKS: 1) Manual Damper Fully closed 2) Fully closed damper by handle is not fully closed by damper blade and is bypassing air.

3) The inlet has a sheet metal cap installed. 4) Toxic Gas Monitor 5) No Test Port Available

TEST DATE 2/27/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM VACUUM PUMP EXHAUST EF 103

INLET MANUFACTURER _____ TEST APPARATUS RVA / Micromanometer

TOOL SERVED	INLET				DESIGN		PRELIMINARY M/s		Preliminary FPM		FINAL		Notes
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW	FPM	CFM	VEL	FLOW	
VMB-19	14			19.7			7.25	83	1250	175			Mag Gauge =2"
VAC PUMP 1	16						0	0		0			No Available test port
STO CAB	17						0	0		0			No Available test port
VMB 18	18			19.7			7.714	88	1330	186			
VAC PUMP 2	20						0	0		0			No Available test port
s.doc tool	30						0	0		0			No Available test port
s.doc tool	31						0	0		0			No Available test port
VAC PUMP 3	49a						0	0		0			No Available test port
VAC PUMP 4	49b						0	0		0			No Available test port
VAC PUMP 5	49c						0	0		0			No Available test port
VMB-14	54			19.7			8.41	96	1450	203			mag gauge pegged
VMB-16	60			19.7			7.5806	86	1307	183			mag gauge pegged
HH-10	63												
	1						1.247	14	215	30			Mag Gauge =1.08"
	2						1.2064	14	208	29			
	3						1.0498	12	181	25			
Total							0	40		85			

REMARKS:

TEST DATE _____ READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM VACUUM PUMP EXHAUST EF 103

INLET MANUFACTURER _____ TEST APPARATUS _____

TOOL SERVED	INLET				DESIGN		PRELIMINARY		Preliminary FPM		FINAL		PERCENT OF DESIGN
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW	FPM	CFM	VEL	FLOW	
HH-12	64												
	1						0.6902	8	119	17			Mag Gauge =2"
	2						0.986	11	170	24			
	3						0.9164	10	158	22			
Total								30		63			

REMARKS:

TEST DATE _____ READINGS BY Johnny Murray

AECOM

FAN TEST REPORT

PROJECT NIST Bldg 215 Rebalance

EF-104 FAN DATA	
Location	MER 215
Service	GAS CAB
Manufacturer	COOK
Model Number	330CA-SWSI
Serial Number	
Motor Make/Frame	BALDOR
Motor KW /RPM	7.46 / 1725
Volts/Phase/Hertz	460 / 3 /
F.L. Amps/S.F.	12.5 / 1.0
Motor Sheave Diam./Bore	2B44 x SK 1 3/8
Fan Sheave Make	
Fan Sheave Diam./Bore	2 B 86 x SK 2 3/16
No. Belts/Make/Size	2 BX77
Sheave c to c Distance / Open Turns	9.1 /

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/s	6000		
Fan RPM			
Total S.P.	647	692	
SUCTION S.P.		-609	
DISCHARGE S.P.		83	
K.W.			
Voltage		454	
Amperage T1/T2/T3		9.3	
Drive Speed		60 Hz	

REMARKS:

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT	NIST Building 215 Rebalance	SYSTEM/UNIT	EF-104
LOCATION/ZONE	ROOF Bldg. 215	SERVICE	GAS CAB

DUCT		DESIGN		ACTUAL	
S.P.	586	SL/s		SL/s	
Air Temp		L/s	6000	L/s	5145
Size	1550 x 400	M/s		M/s	8.30
Area	0.62				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	9.47	9.14	8.90	8.37	7.11	7.64	8.02	8.48	8.72	7.21			
	2	8.57	9.30	8.67	6.87	7.81	8.74	9.06	9.31	9.35	8.82			
	3	8.49	7.54	7.96	7.35	7.96	8.77	8.55	7.94	7.23	7.61			
	4													
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		26.53	25.98	25.53	22.59	22.88	25.15	25.63	25.73					

REMARKS:

TEST DATE	2/15/2018	READINGS BY	Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM GAS CABINET EXHAUST EF 104

INLET MANUFACTURER N/A TEST APPARATUS Pitot tube and Manometer

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		PERCENT OF DESIGN
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
SubFab													
	1	OED	140⌖	12.1		N/G	2.10	25					
	2	OED	140⌖	12.1		N/G	2.10	25					
	3	OED	140⌖	12.1		N/G	2.30	28					
	4	OED	140⌖	12.1		N/G	2.00	24					
	5	OED	140⌖	12.1		N/G	2.10	25					
	6	OED	140⌖	12.1		N/G	2.20	27					
	7	OED	140⌖	12.1		N/G	2.20	27					
	8	OED	140⌖	12.1		N/G	2.20	27					
	9	OED	140⌖	12.1		N/G	2.10	25					
								0					
	10	OED	140⌖	12.1		N/G	1.60	19					
	11	OED	140⌖	12.1		N/G	0.00	0					
	12	OED	140⌖	12.1		N/G	6.10	74					
	13	OED	140⌖	12.1		N/G	7.60	92					
	14	OED	140⌖	12.1		N/G	9.90	120					
	15	OED	140⌖	12.1		N/G	11.20	136					
tool	16	OED	140⌖	12.1		N/G							
	17	OED	140⌖	12.1		N/G	6.40	77					
	18	OED	140⌖	12.1		N/G	10.10	122					
	19	EAG	640/380			N/G	0.00	0					

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CONTINUED

REMARKS:

TEST DATE 2/27/2018 READINGS BY Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM GAS CABINET EXHAUST EF 104

INLET MANUFACTURER N/A TEST APPARATUS Pitot tube and Manometer

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		PERCENT OF DESIGN
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
SubFab													
	20	OED	140⌖	12.1		N/G	4.00	48					
	21	OED	140⌖	12.1		N/G	3.90	47					
	22	OED	140⌖	12.1		N/G	4.20	51					
	23	OED	140⌖	12.1		N/G	3.80	46					
	24	OED	140⌖	12.1		N/G	4.10	50					
	25	OED	140⌖	12.1		N/G	2.10	25					
	26	OED	140⌖	12.1		N/G	3.80	46					
	27	OED	140⌖	12.1		N/G	3.50	42					
	28	OED	140⌖	12.1		N/G	3.60	44					
	29	OED	140⌖	12.1		N/G	2.80	34					
	30	OED	140⌖	12.1		N/G	3.50	42					
	31	OED	140⌖	12.1		N/G	2.70	33					
HH-4	32	OED		15.6		N/G		64					Tool
	33	OED	140⌖	12.1		N/G	4.80	58					
	34	OED	140⌖	12.1		N/G	1.60	19					
HH-2	35	OED		15.6		N/G		124					Tool
VMB-5	36					N/G		58					Tool
	37	OED	140⌖	12.1		N/G	0.00	0					
	38	OED	140⌖	12.1		N/G	0.00	0					
	39	OED	140⌖	12.1		N/G	0.00	0					
	40	OED	140⌖	12.1		N/G	0.11	1					

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CONTINUED

REMARKS:

TEST DATE 2/27/2018 READINGS BY Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM GAS CABINET EXHAUST EF 104

INLET MANUFACTURER N/A TEST APPARATUS Pitot tube and Manometer

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		PERCENT OF DESIGN
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
SubFab													
HH-6	41	OED	140⌖			N/G		111					
	42	OED	140⌖	12.1		N/G	8.00	97					
HH-7	43	OED	140⌖			N/G		116					
	44	OED	140⌖	12.1		N/G	1.00	12					
	45	OED	140⌖	12.1		N/G	1.00	12					
VMB-17	46	OED	140⌖			N/G		55					Tool
VMB-15	47	OED	140⌖			N/G		34					Tool
	48	OED	140⌖	12.1		N/G	0.30	4					
	49	OED	140⌖	12.1		N/G	0.20	2					
HH-11	50	OED	140⌖			N/G		39					Tool
HH-13	51	OED	140⌖			N/G		24					Tool
	52	OED	140⌖	12.1		N/G	0.20	2					
	53	OED	140⌖	12.1		N/G	0.00	0					
	54	OED	140⌖	12.1		N/G	20.00	242					
	55	OED	140⌖	12.1		N/G	19.00	230					
								0					
	56	OED	140⌖	12.1		N/G	0.00	0					
	57	OED	140⌖	12.1		N/G	0.40	5					
	58	OED	140⌖	12.1		N/G	10.50	127					
	59	OED	140⌖	12.1		N/G	5.40	65					
	60	OED	140⌖	12.1		N/G	20.00	242					

CONTINUED

REMARKS:

TEST DATE 2/27/2018 READINGS BY Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM GAS CABINET EXHAUST EF 104

INLET MANUFACTURER N/A TEST APPARATUS Pitot tube and Manometer

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		PERCENT OF DESIGN
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
SubFab													
	61	OED	140⌖	12.1		N/G	14.50	175					
	62	OED	140⌖	12.1		N/G	0.30	4					
HH-8	63	OED	140⌖			N/G		63					TOOL
	64	OED	140⌖	12.1		N/G	6.50	79					
	65	OED	140⌖	12.1		N/G	15.40	186					
	66	OED	140⌖	12.1		N/G	14.00	169					
	67	OED	140⌖	12.1		N/G	16.00	194					
	68	OED	140⌖	12.1		N/G	15.00	182					
	69	OED	140⌖	12.1		N/G	16.00	194					
	70	OED	140⌖	12.1		N/G	13.90	168					
	71	OED	140⌖	12.1		N/G	15.80	191					
	72	OED	140⌖	12.1		N/G	12.20	148					
	73	OED	140⌖	12.1		N/G	16.00	194					
Total													

CONTINUED

REMARKS:

TEST DATE 2/27/2018 READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM GAS CABINET EXHAUST EF 104

INLET MANUFACTURER _____ TEST APPARATUS Manometer

TOOL SERVED	INLET				DESIGN		PRELIMINARY		Preliminary FPM		FINAL		PERCENT OF DESIGN
	NO.	TYPE	SIZE	AK	VEL	FLOW	FACE VEL	FLOW	FPM	CFM	VEL	FLOW	
	16												
HH-2	35												
	1			0.11		N/G	2.2098	20	381	42			Mag Gauge =1.05"
	2			0.11		N/G	2.262	20	390	43			
	3			0.11		N/G	1.9836	18	342	38			
	4			0.11		N/G	2.0068	18	346	38			
	5			0.11		N/G	2.4418	22	421	46			
Total								98		207			
HH-4	32												
	1			0.11		N/G	1.8096	16	312	34			Mag Gauge =1.2"
	2			0.11		N/G	1.8676	17	322	35			
	3			0.11		N/G	1.9198	17	331	36			
Total								50		106			
VMB-5	36			0.11		N/G	5.133	46	885	97			Mag Gauge =.90"
											pg ttl	410	

REMARKS:

TEST DATE _____ READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM GAS CABINET EXHAUST EF 104

INLET MANUFACTURER _____ TEST APPARATUS _____

TOOL SERVED	INLET				DESIGN		PRELIMINARY		Preliminary FPM		FINAL		Notes
	NO.	TYPE	SIZE	AK	VEL	FLOW	FACE VEL	FLOW	FPM	CFM	VEL	FLOW	
HH-6	41												Mag Gauge =1.05"
	1			0.11			2.0358	18	351	39			
	2			0.11			2.1112	19	364	40			
	3			0.11			1.8676	17	322	35			
	4			0.11			1.856	17	320	35			
	5			0.11			1.8966	17	327	36			
Total								87		185			
HH-7	43												Mag Gauge =1.15"
	1			0.11			2.059	18	355	39			
	2			0.11			1.9604	18	338	37			
	3			0.11			2.2098	20	381	42			
	4			0.11			1.798	16	310	34			
	5			0.11			2.1344	19	368	40			
Total								91		193			
VMB 17	46			0.11			4.814	43	830	91			Mag Gauge =0.95"
VMB 15	47			0.11			2.9638	27	511	56			Mag Gauge =0.9"
								248	Page total	525			

REMARKS:

TEST DATE _____ READINGS BY Johnny Murray

AECOM

AIR OUTLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM GAS CABINET EXHAUST EF 104

INLET MANUFACTURER _____ TEST APPARATUS Pitot Tube and Manometer

TOOL SERVED	INLET				DESIGN		PRELIMINARY		Preliminary		FINAL		Notes
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW	FPM	CFM	VEL	FLOW	
HH-11	50												Mag Gauge =0.98"
	1						0.1046	9	164	18			
	2						0.1557	13	244	27			
	3						0.1117	9	175	19			
Total								30		64			
HH-13	51												
	1						0.037	3	58	6			Mag Gauge =1.3"
	2						0.1085	9	170	19			
	3						0.09	7	141	16			
Total								19		41			
HH-8	63												
	1						0.2144	17	336	37			Mag Gauge =1.3"
	2						0.2112	17	331	36			
	3						0.1021	8	160	18			
	4						0.0325	3	51	6			
	5						0.0504	4	79	9			
Total								50		105			
									pg ttl				

REMARKS:

TEST DATE _____ READINGS BY Johnny Murray

AECOM

EXHAUST FAN TEST REPORT

PROJECT NIST Building 215 Rebalance

EF-105A FAN DATA	
Location	MER
Service	ROOF, HYDRIDE
Manufacturer	COOK
Model Number	180CA-SWSI
Serial Number	-
Motor Make/Frame	BALDOR
Motor KW /RPM	3.73 / 1750
Volts/Phase/Hertz	460 / 3 /
F.L. Amps/S.F.	6.5 / 1.15
Motor Sheave Diam./Bore	1VP50 x 1 1/8
Fan Sheave Make	N/A
Fan Sheave Diam./Bore	2TB40 x P1 11/16
No. Belts/Make/Size	2 AX31
Sheave c to c Distance / Open Turns	N/A

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/S	1715	1195	
Fan RPM		N/A	
Total S.P.		N/A	
SUCTION S.P.		-941	
DISCHARGE S.P.		N/A	
K.W.			
Voltage		452	
Amperage T1/T2/T3		4.3 (from VFD)	

REMARKS: EF 105 Fans A and B are operating in parallel.

AECOM

FAN TEST REPORT

PROJECT NIST Building 215 Rebalance

EF-105A FAN DATA	
Location	MER
Service	ROOF, HYDRIDE
Manufacturer	COOK
Model Number	180CA-SWSI
Serial Number	N/A
Motor Make/Frame	BALDOR
Motor KW /RPM	3.73 / 1750
Volts/Phase/Hertz	460 / 3 /
F.L. Amps/S.F.	6.5 / 1.15
Motor Sheave Diam./Bore	1VP50 x 1 1/8
Fan Sheave Make	N/A
Fan Sheave Diam./Bore	2TB40 x P1 11/16
No. Belts/Make/Size	2 AX31
Sheave c to c Distance / Open Turns	N/A

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/S	1715	1195	
Fan RPM		N/A	
Total S.P.		N/A	
SUCTION S.P.		-931	
DISCHARGE S.P.		N/A	
K.W.			
Voltage		460	
Amperage T1/T2/T3		4.3 (from VFD)	

REMARKS:

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT: NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEM/UNIT: EF-105 A and B

LOCATION/ZONE: ROOF Bldg. 215 SERVICE: HYDRIDE EXHAUST

DUCT		DESIGN		ACTUAL	
S.P.	-885	SL/S		SL/S	
Air Temp	21	L/S	3430	L/S	2390
Size	700	FPM		FPM	6.29
Area	0.38				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	5.78	6.78	6.84	5.03									
	2	5.68	6.74	7.43	5.60									
	3	5.73	6.80	7.73	6.54									
	4	5.71	6.16	7.40	6.18									
	5	5.17	6.40	6.49	5.60									
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		28.07	32.88	35.89	28.95									

REMARKS: Trav in PH Mech Room

TEST DATE: 2/15/2018 READINGS BY: JM

AECOM

AIR INLET TEST REPORT

PROJECT NIST REBALANCE Building 215 SYSTEM HYDRIDE EXHAUST EF 105A,B

TEST APPARATUS Micromanometer

AREA SERVED	INLET				BAS Stpt		PRELIMINARY				FINAL		Remarks
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL fpm	M/s	CFM	L/s	VEL	FLOW	
SubFab													
	1	EAG	300/250	0.7			170	56	119	56			1, 2
SubFab HH-5	2a	OED	300 / 75	0.14			312	20	43	20			6
	2b	OED	300 / 75	0.14			278	18	39	18			6
	2c	OED	300 / 75	0.14			342	23	48	23			6
Total	2	OED	300 / 75			HH-5 Total			130	61			
	3	EAG	300/250	0.7			245	81	172	81			1, 2
	4	EAG	300/250	0.7			175	58	123	58			1, 2
	5	EAG	300/250	0.7			238	79	167	79			1, 2
								335	710	335			
							FPM	M/s	CFM	L/s			
Level 1	1	OED	250	0.0491		235	552	3.2	333	157			4
	2	OED	300	0.0707		235	810	4.7	704	332			4
	3	OED	250	0.0491		0	250	1.45	151	71			4,5
	4	OED	250	0.0491		235	816	4.73	492	232			4
	5	OED	250	0.0491		180	238	1.38	144	68			4
B106-1	6	DUCT	300	0.0707		75	345	2	300	141			3
B106	7	DUCT	400	0.1257		N/A	1366	7.92	2109	995			3
									4231	1997			
						Sum Total			4941	2332			
						Total Traverse=			5064	2390			

REMARKS: 1) Manual Damper Fully closed 2) Fully closed damper by handle is not fully closed by damper blade and is bypassing air. 3) These 2 branch ducts are flow monitored by one (1) EBTRON monitor. The EBTRON is averaging the air velocity from 2 different size round duct runouts. Another EBTRON needs to be added. 4) OED ducted to above ceiling AHU 101 (A through T) return plenum 5) Appears to be capped at OED in Return Plenum.

6) The HH-5 inlets at floor level have duct buildup on their inlet screens that needs to be cleaned.

TEST DATE 3/27/2018 READINGS BY Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST REBALANCE Building 215 SYSTEM HYDRIDE EXHAUST EF 105A,B

TEST APPARATUS Micromanometer

AREA SERVED	INLET				BAS Stpt		PRELIMINARY				FINAL		Remarks
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL fpm	M/s	CFM	L/s	VEL	FLOW	
HH-5	2a	OED	300 / 75	0.14			312		43	20			6
	2b	OED	300 / 75	0.14			278		39	18			6
	2c	OED	300 / 75	0.14			342		48	23			6
						HH-5 Total			130	61			
B106-1													
VMB-9	1	OED	150	0.11			591		65	31			
VMB-4	2	OED	150	0.11			748		82	39			
						Branch Total							
					#6	Branch Traverse				141			
B106													
VMB Ph/Nitro		OED	150	0.11			340		37	18			
Furnace #1		Duct	8"	0.35			802		281	132			
Gam Ex Pr		Duct	6"	0.196			2190		429	203			
Furnace #2		Duct	8"	0.35			770		270	127			
Gam Ex Pr		Duct	6"	0.196			2558		501	237			
Drytek Vac Pmp		Duct	6"	0.196			1111		218	103			

REMARKS: 1) Manual Damper Fully closed 2) Fully closed damper by handle is not fully closed by damper blade and is bypassing air. 3) These 2 branch ducts are flow monitored by one (1) EBTRON monitor. The EBTRON is averaging the air velocity from 2 different size round duct runouts. Another EBTRON needs to be added. 4) OED ducted to above ceiling AHU 101 (A through T) return plenum 5) Appears to be capped at OED in Return Plenum.

6) The HH-5 inlets at floor level have duct buildup on their inlet screens that needs to be cleaned.

TEST DATE 3/27/2018 READINGS BY Johnny Murray

AECOM

FAN TEST REPORT

PROJECT NIST Bldg 215 Rebalance

EF-106 FAN DATA	
Location	MER 215
Service	GAS CAB
Manufacturer	COOK
Model Number	365CA-SWSI
Serial Number	
Motor Make/Frame	BALDOR
Motor KW /RPM	1.12 / 1740
Volts/Phase/Hertz	460 / 3 /
F.L. Amps/S.F.	2.1 / 1.15
Motor Sheave Diam./Bore	3.0 od x 7/8
Fan Sheave Make	
Fan Sheave Diam./Bore	9.5 od x 2 3/16
No. Belts/Make/Size	2 AX92
Sheave c to c Distance / Open Turns	36 /

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/S	3700		
Fan RPM			
Total S.P.			
SUCTION S.P.			
DISCHARGE S.P.			
K.W.			
Voltage			
Amperage T1/T2/T3			

REMARKS:

TEST DATE 2/15/2018 READINGS BY Johnny Murray

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT NIST BUILDING 215 REBALANCE SYSTEM/UNIT ROOF EF-106

LOCATION/ZONE SERVICE

DUCT		DESIGN		ACTUAL	
S.P.	90	SL/S		SL/S	
Air Temp		M/S		M/S	4.80
Size	750 x 750	L/S	3700	L/S	2700
Area	0.56				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	5.37	6.53	5.69	4.45	1.49								
	2	5.42	6.36	5.10	3.31	2.25								
	3	6.39	6.25	4.58	3.13	2.44								
	4	6.19	6.25	5.84	4.28	2.82								
	5	5.80	5.26	5.26	5.12	4.66								
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
VELOCITY SUB-TOTALS		29.17	30.65	26.47	20.29	13.66	0	0	0					

REMARKS: TRAV on Roof upstream of fan

TEST DATE 2/15/2018 READINGS BY Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM EXHAUST EF 106

INLET MANUFACTURER _____ TEST APPARATUS _____

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		PERCENT OF DESIGN
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
CR4501	1	OED	400x400			620							
CR4501	2	OED	400x400			620							
CR4501	3	OED	400x400			620							
CR4501	4	OED	400x400			620							
CR4501	5	OED	400x400			620							
CR4501	6	OED	400x400			620							

REMARKS:

TEST DATE _____ READINGS BY _____

AECOM

FAN TEST REPORT

PROJECT NIST Bldg 215 Rebalance

EF-108 FAN DATA	
Location	MER Bldg 215 Penthouse
Service	CR5001
Manufacturer	COOK
Model Number	120C1C
Serial Number	
Motor Make/Frame	EMERSON
Motor KW /RPM	.37 / 1725
Volts/Phase/Hertz	115 / 1 /
F.L. Amps/S.F.	7.8 / 1.25
Motor Sheave Diam./Bore	VL34 x 1/2
Fan Sheave Make	
Fan Sheave Diam./Bore	3.5 O.D. x 2 7/16
No. Belts/Make/Size	A42
Sheave c to c Distance / Open Turns	5 / 1.5

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/S	370	335	
Fan RPM		1436	
Total S.P.			
SUCTION S.P.			
DISCHARGE S.P.			
K.W.			
Voltage		200	
Amperage		1.5	
Drive Speed		60 Hz	

REMARKS:

TEST DATE 2/15/2018 READINGS BY Johnny Murray

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT NIST Building 215 Rebalance SYSTEM/UNIT ROOF EF-108

LOCATION/ZONE SERVICE

DUCT		DESIGN		ACTUAL	
S.P.	90	SL/S		SL/S	
Air Temp		L/S	370	L/S	335
Size	350 x 250	FPM		FPM	3.83
Area	0.0875				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	4.34	4.04	3.67	3.68									
	2	4.23	4.04	3.78	3.43									
	3	4.26	3.73	3.80	3.46									
	4	4.08	3.34	3.62	3.71									
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		16.91	15.15	14.87	14.28	0	0	0	0					

REMARKS:

TEST DATE 2/15/2018 READINGS BY JM

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM EXHAUST EF 108

INLET MANUFACTURER _____ TEST APPARATUS Flow Hood

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		Comment
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
Closet	1	ER	150 x 150	C		30		20				20	
Men Half-Gown	2	ER	150 x 150	C		130		20				20	1)
Mens RR	3	ER	150 x 150	C		40		30				30	
Women Half-Gown	4	ER	150 x 150	C		130		98				98	
Womens RR	5	ER	150 x 150	C		40		50				50	
TOTAL						370		218				218	

Comments: 1) Inlet covered with lint, obstructing airflow.

TEST DATE 2/15/2018 READINGS BY Johnny Murray

AECOM

FAN TEST REPORT

PROJECT NIST Bldg 215 Rebalance

EF-109 FAN DATA	
Location	C005-1
Service	Lower Level General Exhaust
Manufacturer	COOK
Model Number	245C1C
Serial Number	0834-1
Motor Make/Frame	BALDOR
Motor KW /RPM	1.12 / 1740
Volts/Phase/Hertz	460 / 3 / 60
F.L. Amps/S.F.	2.1 /
Motor Sheave Diam./Bore	VL34 x 1/2
Fan Sheave Make	N/A
Fan Sheave Diam./Bore	3.25 O.D. x 7/8
No. Belts/Make/Size	A68
Sheave c to c Distance / Open Turns	29 / 5

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/s	2345	2156	
Fan RPM	834	740	
Total S.P.		1.17"	
SUCTION S.P.		-0.83"	
DISCHARGE S.P.		+0.34"	
K.W.		1.17	
Voltage		464	
Amperage		1.9	

REMARKS:

TEST DATE 6/14/2019 READINGS BY Chris Cowan

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT _____ SYSTEM/UNIT EF-109

LOCATION/ZONE C005-1 SERVICE Lower Level General Exhaust

DUCT		DESIGN		ACTUAL	
S.P.	+18	SL/S		SL/S	
Air Temp	22	L/S	2320	L/S	2156
Size	800 x 450	FPM	N/G	FPM	5.99
Area	0.36				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	5.18	6.01	5.95										
	2	5.92	6.68	6.54										
	3	5.94	6.13	6.53										
	4	5.45	6.17	6.58										
	5	5.44	6.26	5.48										
	6	5.64	5.78	6.22										
	7													
	8													
	9													
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		33.57	37.03	37.3	0	0	0	0	0					

REMARKS:

TEST DATE 2/15/2018 READINGS BY JOHNNY MURRAY

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM EXHAUST EF 109

General Exhaust Lower Level TEST APPARATUS FLOWHOOD AND ROTATING VANE ANEMOMETER

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		Remarks
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
B Mens Toil CO7	1	R-3	150 X 150	C	-	25		21					1)
B Mens Toil CO7	2	R-3	450 X 200	C	-	175		132					1)
CO5	3	R-3	150 X 150	0.0169	-	70	1.7	28					1)
CO4-1	4	R-3	250 X 150	C	-	110	0	0					2)
CO4	5	R-3	300 X 150	0.03705	-	120	5.5	163					
C002	6	R-1	150 X 150		-	50		191					
C002	7	R-3	150 X 150		-	25		37					
C010	8	R-3	250 X 150		-	60		33					
C011	9	R-2	N/G		-	575		500					
C012	10	R-4	300 X 200	0.052	-	120		240					
C011-1	11	R-4	250 X 150	0.022	-	120	5	110					
C011-1	12	OED	100		-	0		0					Capped
C011	13	R-2	N/G	C	-	575		265					1)
CO-H-O	14	OED	250X150		-	80		68					
C008	15	G-5	350X100		-	160		147					
Bead Blast	16	R-4	250X150		-	120		85					
						2385		2020					
Total Traverse								2156					

REMARKS: 1) The inlet grille is loaded with lint and needs to be cleaned 2) inlet blocked with cardboard

TEST DATE 2/15/2018 READINGS BY Johnny Murray

AECOM

FAN TEST REPORT

PROJECT NIST Bldg 215 Rebalance

EF-112 FAN DATA	
Location	
Service	CR5C01
Manufacturer	COOK
Model Number	120C1C
Serial Number	
Motor Make/Frame	EMERSON
Motor KW /RPM	.37 / 1725
Volts/Phase/Hertz	115 / 1 /
F.L. Amps/S.F.	7.8 / 1.25
Motor Sheave Diam./Bore	VL34 x 1/2
Fan Sheave Make	
Fan Sheave Diam./Bore	3.0 O.D. x 7/16
No. Belts/Make/Size	A40
Sheave c to c Distance / Open Turns	16 29 / 0

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/S	400		
Fan RPM	1614	1750	
Total S.P.			
SUCTION S.P.			
DISCHARGE S.P.			
K.W.			
Voltage			
Amperage			

REMARKS:

AECOM

RECTANGULAR DUCT TRAVERSE REPORT

PROJECT: NIST Building 215 Rebalance
SYSTEM/UNIT: ROOF EF-112
LOCATION/ZONE:
SERVICE:

DUCT		DESIGN		ACTUAL	
S.P.	265	SL/S		SL/S	
Air Temp		L/S	400	L/S	31
Size	200 x 500	M/S		M/S	0.31
Area	0.10				

DISTANCE FROM BOTTOM	POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	0.96	0.39	0.22	-0.39									
	2	0.80	0.25	0.00	0.20									
	3													
	4													
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
DISTANCE FROM DUCT EDGE														
VELOCITY SUB-TOTALS		1.76	0.64	0.22	-0.19	0	0	0	0					

REMARKS: Apparent blockage from below

TEST DATE: 2/15/2018
READINGS BY: Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM EXHAUST EF 112

INLET MANUFACTURER N/A TEST APPARATUS ANEMOMETER

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		PERCENT OF DESIGN
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
lower level	1	ER	400 x 300	0.06		200		0					
lower level	2	ER	400 x 300	0.06		200		0					
					TOTAL	400							

REMARKS:

TEST DATE _____ READINGS BY JOHNNY MURRAY

AECOM

FAN TEST REPORT

PROJECT NIST Bldg 215 Rebalance

EF-114 FAN DATA	
Location	
Service	CR5C01
Manufacturer	COOK
Model Number	225C1C
Serial Number	
Motor Make/Frame	BALDOR
Motor KW /RPM	1.12 / 1740
Volts/Phase/Hertz	460 / 3 /
F.L. Amps/S.F.	2.1/ 1.15
Motor Sheave Diam./Bore	3.25 O.D. x 7/16
Fan Sheave Make	
Fan Sheave Diam./Bore	6.0" O.D. x 1 1/2"
No. Belts/Make/Size	AX62
Sheave c to c Distance / Open Turns	28" / 0

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/S	1760		1392
Fan RPM	983		
Total S.P.	303		
SUCTION S.P.			
DISCHARGE S.P.			
K.W.			
Voltage			
Amperage			

REMARKS:

TEST DATE _____ READINGS BY Johnny Murray

AECOM

AIR INLET TEST REPORT

PROJECT NIST Bldg 215 Rebalance SYSTEM EXHAUST EF 114

INLET MANUFACTURER N/A TEST APPARATUS PITOT/ MANOMETER

AREA SERVED	INLET				DESIGN		PRELIMINARY				FINAL		PERCENT OF DESIGN
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL	FLOW			VEL	FLOW	
CO-B1-1	1	OED	300 x 200	0.06	3.67	220	0.10	6.0			0.10	6.0	
CO-B1-1	2	OED	300 x 200	0.06	3.67	220	0.35	21.0			0.35	21.0	
CO-B1-1	3	OED	300 x 200	0.06	3.67	220	0.70	42.0			0.70	42.0	
CO-B1-1	4	OED	300 x 200	0.06	3.67	220	0.65	39.0			0.65	39.0	
CO-A1-1	5	OED	300 x 200	0.06	3.67	220	6.20	372.0			6.20	372.0	
CO-A1-1	6	OED	300 x 200	0.06	3.67	220	5.30	318.0			5.30	318.0	
CO-A1-1	7	OED	300 x 200	0.06	3.67	220	4.90	294.0			4.90	294.0	
CO-A1-1	8	OED	300 x 200	0.06	3.67	220	5.00	300.0			5.00	300.0	
						1760		1392.0				1392.0	

REMARKS:

TEST DATE READINGS BY Johnny Murray

AECOM

FAN TEST REPORT

PROJECT NIST Bldg 215 Rebalance

EF-122 FAN DATA Silane Exhaust	
Location	Roof West
Service	A005-2
Manufacturer	Loren Cook
Model Number	120CAS 1200 A SWSI
Serial Number	1438813603-00/0000701
Motor Make/Frame	
Motor KW /RPM	2 h.p. / 3450
Volts/Phase/Hertz	460
F.L. Amps/S.F.	
Motor Sheave Diam./Bore	
Fan Sheave Make	
Fan Sheave Diam./Bore	
No. Belts/Make/Size	
Sheave c to c Distance / Open Turns	300 MM /

TEST DATA	DESIGN	PRELIMINARY	FINAL
L/S	440	483	
Fan RPM			
Total S.P.			
SUCTION S.P.			
DISCHARGE S.P.			
K.W.		N / A	
Voltage		N / A	
Amperage		N / A	

REMARKS:

TEST DATE 6/14/2018 READINGS BY Chris Cowan

AECOM

AIR INLET TEST REPORT

PROJECT NIST REBALANCE Building 215 SYSTEM SILANE EXHAUST EF 122

TEST APPARATUS RVA

AREA SERVED	INLET				Design		PRELIMINARY				FINAL		Remarks
	NO.	TYPE	SIZE	AK	VEL	FLOW	VEL fpm	M/s	CFM	Mag Gauge ON CABINET	VEL	FLOW	
SubFab													
A005-2													
Gas Bunker													
HH-1B	1		100/75	0.14			850	56	119	1.4"			
	2		100/75	0.14			870	57	122				
HH-1A	3		100/75	0.14			750	50	105	1.5"			
	4		100/75	0.14			720	48	101				
HH-9B	5		100/75	0.14			460	30	64	1.45"			
	6		100/75	0.14			450	30	63				
HH-9A	7		100/75	0.14			545	36	76	1.4"			
	8		100/75	0.14			500	33	70				
HH-3	9		100/75	0.14			433	29	61	0.78"			
	10		100/75	0.14			425	28	60				
	11		100/75	0.14			421	28	59				
PYPHORIC													
	12		250/75	0.14			79	5	11	0.3"			
	13		250/75	0.14			51	3	7				
	14		250/75	0.14			141	9	20				
	15		250/75	0.14			100	7	14				
	16		250/75	0.14			73	5	10				
	17		250/75	0.14			190	13	27				
	18		250/75	0.14			200	13	28				
	19		250/25	0.14			45	3	6				
			TOTAL					483	1022				

REMARKS:

TEST DATE 6/14/2018 READINGS BY JOHNNY MURRAY / CHRIS COWAN

AECOM

Magnehelic Static Calibration SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEMS Bldg. 215 AHUs

SUMMARY Equipment Tested While Fan is De-energized TEST APPARATUS Micromanometer

AHU #	Equip Name	Meter	Gauge	Meter	Gauge	Meter	Gauge	Low Range Dev	Mid Range Dev	High Range Dev				Gauge Range
		Low Range		Mid Range		High Range								
AHU-101A														
Filter PD		89	100	250	250	405	400	11.0%	0%	-1.25%				0-500Pa
Fan TSP		0.48	0.5	1.5	1.5	2.55	2.5	4.0%	0%	-2.00%				0-3KPa
AHU-101B														
Filter PD		84	100	230	250	389	400	16.0%	8%	2.75%				0-500Pa
Fan TSP		1	0.5	2.05	1.5	3.1	2.5	-100.0%	-37%	-24.00%				0-3KPa
AHU-101C														
Filter PD		N/A	100	N/A	250	N/A	400	N/A	N/A	N/A				0-500Pa
Fan TSP		0.51	0.5	1.57	1.5	2.57	2.5	-2.0%	-5%	-2.80%				0-3KPa
AHU-101D														
Filter PD		90	100	236	250	388	400	10.0%	6%	3.00%				0-500Pa
Fan TSP		0.5	0.5	1.48	1.5	2.51	2.5	0.0%	1%	-0.40%				0-3KPa
AHU-101E														
Filter PD		94	100	252	250	395	400	6.0%	-1%	1.25%				0-500Pa
Fan TSP		0.56	0.5	1.55	1.5	2.57	2.5	-12.0%	-3%	-2.80%				0-3KPa
AHU-101F														
Filter PD		91	100	249	250	395	400	9.0%	0%	1.25%				0-500Pa
Fan TSP		0.48	0.5	1.52	1.5	2.56	2.5	4.0%	-1%	-2.40%				0-3KPa
AHU-101G														
Filter PD		92	100	255	250	398	400	8.0%	-2%	0.50%				0-500Pa
Fan TSP		0.48	0.5	1.5	1.5	2.53	2.5	4.0%	0%	-1.20%				0-3KPa
AHU-101H														
Filter PD		86	100	242	250	399	400	14.0%	3%	0.25%				0-500Pa
Fan TSP		0.55	0.5	1.56	1.5	2.57	2.5	-10.0%	-4%	-2.80%				0-3KPa
AHU-101I														
Filter PD		N/A	100	N/A	250	N/A	400	N/A	N/A	N/A				0-500Pa
Fan TSP		0.49	0.5	1.47	1.5	2.51	2.5	2.0%	2%	-0.40%				0-3KPa
AHU-101J														
Filter PD		84	100	233	250	388	400	16.0%	7%	3.00%				0-500Pa
Fan TSP		0.512	0.5	1.52	1.5	2.59	2.5	-2.4%	-1%	-3.60%				0-3KPa
AHU-101K														
Filter PD		101	100	264	250	410	400	-1.0%	-6%	-2.50%				0-500Pa
Fan TSP		0.49	0.5	1.53	1.5	2.55	2.5	2.0%	-2%	-2.00%				0-3KPa
AHU-101L														
Filter PD		90	100	251	250	395	400	10.0%	0%	1.25%				0-500Pa
Fan TSP		0.55	0.5	1.63	1.5	2.63	2.5	-10.0%	-9%	-5.20%				0-3KPa

REMARKS: AHU-101C & AHU-101I Filter PD could not build pressure

TEST DATE: 4/10/18 READINGS BY Johnny Murray / Dan Galginaitis

AECOM

Magnehelic Static Calibration SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEMS Bldg. 215 AHUs

SUMMARY Equipment Tested While Fan is De-energized TEST APPARATUS Micromanometer

AHU #	Equip Name	Meter	Gauge	Meter	Gauge	Meter	Gauge	Low Range Dev	Mid Range Dev	High Range Dev			Gauge Range
		Low Range		Mid Range		High Range							
AHU-101M													
Filter PD		100	100	257	250	406	400	0.0%	-3%	-1.50%			0-500Pa
Fan TSP		0.54	0.5	1.54	1.5	2.54	2.5	-8.0%	-3%	-1.60%			0-3KPa
AHU-101N													
Filter PD		93	100	241	250	391	400	7.0%	4%	2.25%			0-500Pa
Fan TSP		0.49	0.5	1.55	1.5	2.56	2.5	2.0%	-3%	-2.40%			0-3KPa
AHU-101O													
Filter PD		96.8	100	254	250	413	400	3.2%	-2%	-3.25%			0-500Pa
Fan TSP		0.51	0.5	1.56	1.5	2.54	2.5	-2.0%	-4%	-1.60%			0-3KPa
AHU-101P													
Filter PD		94.5	100	243	250	381	400	5.5%	3%	4.75%			0-500Pa
Fan TSP		0.5	0.5	1.53	1.5	2.52	2.5	0.0%	-2%	-0.80%			0-3KPa
AHU-101Q													
Filter PD		96.5	100	260	250	394	400	3.5%	-4%	1.50%			0-500Pa
Fan TSP		N/A	0.5	N/A	1.5	N/A	2.5	N/A	N/A	N/A			0-3KPa
AHU-101R													
Filter PD		98.6	100	241	250	393	400	1.4%	4%	1.75%			0-500Pa
Fan TSP		0.53	0.5	1.58	1.5	2.63	2.5	-6.0%	-5%	-5.20%			0-3KPa
AHU-101S													
Filter PD		102	100	255	250	399	400	-2.0%	-2%	0.25%			0-500Pa
Fan TSP		0.48	0.5	1.56	1.5	2.6	2.5	4.0%	-4%	-4.00%			0-3KPa
AHU-101T													
Filter PD		97	100	260.7	250	396	400	3.0%	-4%	1.00%			0-500Pa
Fan TSP		0.47	0.5	1.54	1.5	2.56	2.5	6.0%	-3%	-2.40%			0-3KPa
AHU-102A													
Filter PD		92	100	246	250	391	400	8.0%	2%	2.25%			0-500Pa
Fan TSP		0.52	0.5	1.52	1.5	2.55	2.5	-4.0%	-1%	-2.00%			0-3KPa
AHU-102B													
Filter PD		98	100	243	250	392	400	2.0%	3%	2.00%			0-500Pa
Fan TSP		0.54	0.5	1.56	1.5	2.6	2.5	-8.0%	-4%	-4.00%			0-3KPa
AHU-102C													
Filter PD		97	100	258	250	406	400	3.0%	-3%	-1.50%			0-500Pa
Fan TSP		0.49	0.5	1.45	1.5	2.52	2.5	2.0%	3%	-0.80%			0-3KPa
AHU-102D													
Filter PD		N	100	N	250	N	400	N/A	N/A	N/A			0-500Pa
Fan TSP		0.48	0.5	1.52	1.5	2.6	2.5	4.0%	-1%	-4.00%			0-3KPa

REMARKS: AHU-101Q Fan TSP could not hold pressure, filter DP is leaking air
AHU-102D Filter PD won't hold pressure

TEST DATE: 4/10/18 READINGS BY Johnny Murray / Dan Galginaitis

AECOM

Magnehelic Static Calibration SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEMS Bldg. 215 AHUs

SUMMARY Equipment Tested While Fan is De-energized TEST APPARATUS Micromanometer

AHU #	Equip Name	Meter	Gauge	Meter	Gauge	Meter	Gauge	Low Range Dev	Mid Range Dev	High Range Dev				Gauge Range
		Low Range		Mid Range		High Range								
AHU-103														
Pre-Filter		76	95	216	230	396	400	20.00%	6.09%	1.00%				
Fan TSP		1	1	2.01	2	3.52	3.5	0.00%	-0.50%	-0.57%				
Carbon Filter		46	50	124	125	198	200	8.00%	0.80%	1.00%				
Final HEPA		73	100	223	250	390	400	27.00%	10.80%	2.50%				
Disch Static		0.29	0.3	0.71	0.7	1.3	1.3	3.33%	-1.43%	0.00%				
AHU-104														
Pre-Filter		97	100	200	200	402	400	3.00%	0.00%	-0.50%				
Fan TSP		0.97	1	2.04	2	3.57	3.5	3.00%	-2.00%	-2.00%				
Carbon Filter		44	50	122	125	197	200	12.00%	2.40%	1.50%				
Final HEPA		155	150	260	250	467	450	-3.33%	-4.00%	-3.78%				
Disch Static		0.304	0.3	0.812	0.8	1.33	1.3	-1.33%	-1.50%	-2.31%				
AHU-105														
Filter PD														0-500Pa
Fan TSP														0-3KPa
														0-500Pa
														0-3KPa
AHU-106														
Filter PD		152	150	257	250	406	400	-1.33%	-2.80%	-1.50%				0-500Pa
Fan TSP		1.05	1	2.49	2.5	3.49	3.5	-5.00%	0.40%	0.29%				0-3KPa
Final Filter		94	100	292	300	459	450	6.00%	2.67%	-2.00%				
Disch Static		0.34	0.3	0.74	0.8	0.99	1	-13.33%	7.50%	1.00%				0-500Pa
														0-3KPa
AHU-107														
Filter PD														0-3KPa
Fan TSP														
														0-500Pa
														0-3KPa
EF-118		101	100	256	250	468	450	-1.00%	-2.40%	-4.00%				
EF-122			pegged	at 500										
EF-114		103	100	267	250	429	400	-3.00%	-6.80%	-7.25%				

REMARKS: AHU-104 Pre-filter leaks pressure and Fan TSP has a kroen shut-off

TEST DATE: 4/10/18 READINGS BY Johnny Murray / Dan Galginaitis

AECOM

Magnehelic Static Calibration SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEMS Bldg. 215 AHUs

SUMMARY Equipment Tested While Fan is De-energized TEST APPARATUS Micromanometer

AHU #	Equip Name	Meter	Gauge	Meter	Gauge	Meter	Gauge	Low Range Dev	Mid Range Dev	High Range Dev				Gauge Range
		Low Range		Mid Range		High Range								
AHU-108A														
Filter PD		---	100	---	250	---	400							0-500Pa
Fan TSP		0.54	0.5	1.61	1.5	2.63	2.5	-8.00%	-7.33%	-5.20%				0-3KPa
AHU-108B														
Filter PD		96	100	263	250	419	400	4.00%	-5.20%	-4.75%				0-500Pa
Fan TSP		0.55	0.5	1.5	1.5	2.6	2.5	-10.00%	0.00%	-4.00%				0-3KPa
AHU-109														
Filter PD		100	100	250	250	404	400	0.00%	0.00%	-1.00%				0-500Pa
Fan TSP		0.44	0.5	1.46	1.5	2.54	2.5	12.00%	2.67%	-1.60%				0-3KPa
AHU-110A														
Filter PD		104	100	254	250	409	400	-4.00%	-1.60%	-2.25%				0-500Pa
Fan TSP		0.5	0.5	1.55	1.5	2.54	2.5	0.00%	-3.33%	-1.60%				0-3KPa
AHU-110B														
Filter PD		101	100	248	250	395	400	-1.00%	0.80%	1.25%				0-500Pa
Fan TSP		0.52	0.5	1.52	1.5	2.56	2.5	-4.00%	-1.33%	-2.40%				0-3KPa
AHU-111A														
Filter PD		105	100	250	250	397	400	-5.00%	0.00%	0.75%				0-500Pa
Fan TSP		0.49	0.5	1.55	1.5	2.54	2.5	2.00%	-3.33%	-1.60%				0-3KPa
AHU-111B														
Filter PD		96	100	242	250	398	400	4.00%	3.20%	0.50%				0-500Pa
Fan TSP		0.46	0.5	1.49	1.5	2.47	2.5	8.00%	0.67%	1.20%				0-3KPa
AHU-111C														
Filter PD		95	100	250	250	398	400	5.00%	0.00%	0.50%				0-500Pa
Fan TSP		0.45	0.5	1.53	1.5	2.55	2.5	10.00%	-2.00%	-2.00%				0-3KPa
AHU-111D														
Filter PD		99	100	244	250	398	400	1.00%	2.40%	0.50%				0-500Pa
Fan TSP		0.45	0.5	1.53	1.5	2.55	2.5	10.00%	-2.00%	-2.00%				0-3KPa
AHU-112														
Filter PD		96	100	240	250	393	400	4.00%	4.00%	1.75%				0-500Pa
Fan TSP		0.5	0.5	1.6	1.5	2.6	2.5	0.00%	-6.67%	-4.00%				0-3KPa
AHU-113														
Filter PD		104	100	251	250	400	400	-4.00%	-0.40%	0.00%				0-500Pa
Fan TSP		0.45	0.5	1.53	1.5	2.5	2.5	10.00%	-2.00%	0.00%				0-3KPa
AHU-114														
Filter PD		97	100	246	250	410	400	3.00%	1.60%	-2.50%				0-500Pa
Fan TSP		0.52	0.5	1.5	1.5	2.54	2.5	-4.00%	0.00%	-1.60%				0-3KPa

REMARKS: AHU-108A - filter DP won't zero out no matter the position of the screw & sensor won't hold pressure
AHU-112: Fan TSP Mag Gauge is leaking and wont hold pressure

TEST DATE: 4/10/2018 READINGS BY Johnny Murray / Dan Galginaitis

AECOM

Magnehelic Static Calibration SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEMS Bldg. 215 AHUs

SUMMARY Equipment Tested While Fan is De-energized TEST APPARATUS Micromanometer

AHU #	Date Tested	Meter	Gauge	Meter	Gauge	Meter	Gauge	Low Range Dev	Mid Range Dev	High Range Dev				Gauge Range
		Low Range		Mid Range		High Range								
AHU-115														
Filter PD		104	100	251	250	400	400	-4.00%	-0.40%	0.00%				0-500Pa
Fan TSP		0.47	0.5	1.48	1.5	2.4	2.5	6.00%	1.33%	4.00%				0-3KPa
EF 101A		NOTE: Mag Gauge does not hold pressure during calibration test.												
Fan TSP		0.501	0.5	1.52	1.5	2.95	3	-0.20%	-1.33%	1.67%				0-4.4KPa
EF 101B		NOTE: Mag Gauge does not hold pressure during calibration test.												
Fan TSP		0.503	0.5	1.55	1.5	2.98	3	-0.60%	-3.33%	0.67%				0-4.4KPa
EF 102A		NOTE: Failed at pegged position												
Fan TSP														0-500Pa
EF 102B														
Fan TSP		91	100	250	250	387	400	9.00%	0.00%	3.25%				0-500Pa
EF 103		NOTE: Failed at pegged position												
Fan TSP														0-500Pa
EF 104		NOTE: Failed at pegged position												
Fan TSP														0-500Pa
EF 105A		NOTE: Failed at pegged position												
Fan TSP														0-500Pa
EF 105B		NOTE: Failed at pegged position												
Fan TSP														0-500Pa
EF 106														
Fan TSP														
EF 108														
Fan TSP		101	100	255	250	408	400	-1.00%	-2.00%	-2.00%				0-500Pa
EF 109														
Fan TSP														
EF 110														
Fan TSP														
EF 111														
Fan TSP														
EF 112														
Fan TSP														

TEST DATE: 4/10/18 READINGS BY Johnny Murray / Chris Cowan

AECOM

Magnehelic Static Calibration SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 SYSTEMS Bldg. 215 AHUs

SUMMARY Clean Room Magnehelics Referencing Class 1000 Corridor Areas TEST APPARATUS Micromanometer

Magnehelics ranges and measurements are given in inches of water column.

Room Served	Date Tested	Meter	Gauge	Meter	Gauge	Meter	Gauge	Low Range Dev	Mid Range Dev	High Range Dev	As Found Operating Normally	Note	Gauge Range
		Low Range		Mid Range		High Range							
A101	5/22/2018	0.045	0.050	0.119	0.120	0.220	0.220	10.00%	0.83%	0.00%	0.055	1)	0-0.25"
A102	5/22/2018	0.055	0.050	0.129	0.120	0.227	0.220	-10.00%	-7.50%	-3.18%	0.02		0-0.25"
A103	5/22/2018	0.048	0.050	0.123	0.120	0.228	0.220	4.00%	-2.50%	-3.64%	.02-.04		0-0.25"
A104	5/22/2018	0.047	0.050	0.124	0.120	0.232	0.220	6.00%	-3.33%	-5.45%	0.025	2)	0-0.25"
A105	5/22/2018	0.052	0.050	0.126	0.120	0.227	0.220	-4.00%	-5.00%	-3.18%	0-0.23		0-0.25"
A106	5/22/2018	0.046	0.050	0.128	0.120	0.228	0.220	8.00%	-6.67%	-3.64%	0.055		0-0.25"
B101	5/22/2018	0.046	0.050	0.122	0.120	0.231	0.220	8.00%	-1.67%	-5.00%	0.015		0-0.25"
B102	5/22/2018	0.049	0.050	0.129	0.120	0.231	0.220	2.00%	-7.50%	-5.00%	0	2)	0-0.25"
B103	5/22/2018	0.043	0.050	0.115	0.120	0.220	0.220	14.00%	4.17%	0.00%	0		0-0.25"
B104	5/22/2018	0.043	0.050	0.116	0.120	0.224	0.220	14.00%	3.33%	-1.82%	0		0-0.25"
B105	5/22/2018	0.051	0.050	0.129	0.120	0.236	0.220	-2.00%	-7.50%	-7.27%	0.04		0-0.25"
B106	5/22/2018	0.042	0.050	0.118	0.120	0.222	0.220	16.00%	1.67%	-0.91%	0	2)	0-0.25"

NOTES:

1) FIO: The view of the Magnehelic gauge is blocked by a cabinet.

2) The Magnehelic does not hold pressure when under static pressure load. The gauge needle slowly moves toward zero when constant pressure is appl

TEST DATE: 5/22/2018 READINGS BY Johnny Murray

AECOM

AHU CEILING HEPA FILTER SAMPLE PRESSURE DROP Report

Date of Activity:	April 2018 through May 31, 2018					Report #	1
	Document Examination		Site Observation	X			

To:	
cc:	
Project:	Rebalance NIST Building 215
Subject:	Building 215 HEPA Filters installed in the Class 100 and Class 1000 Clean Rooms
Ref. Doc:	
Summary:	HEPA Filter Diffuser Pressure Drop Observation Report

Installed HEPA Filters for the Class 100 and Class 1000 Areas in Nist Building 215:

Manufacturer: Camfil- Farr

Camfil- Farr P/N: 5053828

Description #: D5-22.37-46.00-N-30-00-1D-3294

Target Pressure Drop at Design Airflow: 0.33" W.G.

Target Pressure Drop at Design Airflow: 0.35" W.G.

Date Code: 0230132

Factory Test Date: 10/25/2002

AHU	Diffuser #	Pressure Drop In. W.G.	Diffuser #	Pressure Drop In. W.G.
101A	8	0.696	28	0.680
101B	10	0.610	22	0.620
101C	13	0.522	27	0.550
101D	4	0.640	26	0.640
101E	2	0.530	15	0.560
101F	18	0.560	24	0.560
101G	9	0.700	23	0.680
101H	10	0.780	28	0.650
101K	7	0.590	22	0.590
101L	3	0.500	8	0.550
101O	16	0.650	27	0.680
101P	9	0.640	18	0.670
101Q	17	0.650	34	0.620
101R	11	0.680	33	0.570
108A	2	0.560	25	0.600
108B	14	0.590	27	0.610
109	8	0.670	16	0.680
110A	3	0.590	72	0.680
111A	4	0.620	12	0.650

Date of Activity:	April 2018 through May 31, 2018	Report #	1

111B	**22**	**0.600**	**28**	**0.650**
113	**4**	**0.710**	**12**	**0.680**
114	**1**	**0.610**	**14**	**0.590**
115	**7**	**0.54**	**17**	**0.50**

By:

Johnny Murray, AECOM **05-15-2018**

Date

AECOM

AHU AIR FILTER SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 Bldg. 215 AHUs

SUMMARY AHU FILTER:SIZE / TYPE / QUANTITY / PLACEMENT

AHU #	SIZE MM	Size In.	TYPE	QTY.	Placement
101 A thru T	600/600	24/24	pleat.	12	pre
	600/300	24/12	pleat.	4	pre
102 A thru D	600/600	24/24	pleat.	6	pre
	600/300	24/12	pleat.	3	pre
103	600/600	24/24	pleat.	20	pre
	600/600	24/24	cart.	20	pre
	600/600	24/24	HEPA	15	final
104	600/600	24/24	pleat.	20	pre
	600/600	24/24	cart.	20	pre
	600/600	24/24	HEPA	15	final
105	600/600	24/24	pleat.	12	pre
	600/300	24/12	pleat.	3	pre
	600/600	24/24	cart.	12	pre
	600/300	24/12	cart.	3	pre
	600/600	24/24	HEPA	12	final
	600/300	24/12	HEPA	3	final
106	600/600	24/24	pleat.	20	pre
	600/600	24/24	cart.	20	pre
	600/600	24/24	HEPA	20	final
107	600/600	24/24	pleat.	6	pre
	600/300	24/12	pleat.	4	pre
	600/600	24/24	cart.	6	pre
	600/300	24/12	cart.	4	pre
	600/600	24/24	HEPA	6	final
	600/300	24/12	HEPA	4	final

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AECOM

AHU AIR FILTER SUMMARY

PROJECT NIST- REBALANCE AIRFLOWS IN BUILDING 215 Bldg. 215 AHUs

SUMMARY AHU FILTER:SIZE / TYPE / QUANTITY / PLACEMENT

AHU #	SIZE MM	Size In.	TYPE	QTY.	Placement
108 A and B	600/600	24/24	pleat.	6	pre
	600/300	24/12	pleat.	3	pre
109	600/600	24/24	pleat.	15	pre
	600/300	24/12	pleat.	5	pre
110 A and B	600/600	24/24	pleat.	15	pre
	600/300	24/12	pleat.	5	pre
111 A thru D	600/600	24/24	pleat.	15	pre
	600/300	24/12	pleat.	5	pre
112	600/600	24/24	pleat.	6	pre
	600/300	24/12	pleat.	3	pre
113	600/600	24/24	pleat.	9	pre
	600/300	24/12	pleat.	3	pre
114	600/600	24/24	pleat.	9	pre
	600/300	24/12	pleat.	6	pre
115	600/600	24/24	pleat.	9	pre
	600/300	24/12	pleat.	6	pre

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AECOM

Air Pressure Relationship TEST REPORT

PROJECT NIST Bldg 215 Rebalance

SYSTEM Lower Level

TEST APPARATUS Micomanometer

Area or Room #	to	Area or Room #	Diff Press In. w.g.	Diff Press Pa	NOTE
CO-C-0		EL-1-0	0.07	18.40	
CO-C-0		C002-2	0.00	-0.41	
CO-C-0		D002	-0.02	-4.77	
CO-C-0		C002	0.04	9.20	
CO-C-0		C011	0.01	2.12	
CO-C-0		C007	0.01	3.29	
CO-A1-0		EL-2-0	0.08	19.64	
CO-A1-0		ST-1A-0	0.05	13.27	
CO-A1-0		C008	-0.08	-20.12	
CO-A1-0		D004	0.00	-0.77	
CO-A1-0		D008	0.00	-0.33	
CO-A1-0		A001	0.00	0.68	
CO-A1-0		ST-14-0	0.11	27.63	
CO-A1-0		A005	0.02	4.51	
A005		A005-2	0.05	12.08	
A005		EXIT TO OUT	0.10	25.36	
CO-E-0		E003	0.02	5.26	
CO-E-0		AOO1	0.01	2.48	
CO-B1-0		ST-13-0	0.08	20.41	
CO-B1-0		A001	0.00	1.14	

Area or Room #	to	Area or Room #	Diff Press In. w.g.	Diff Press Pa	NOTE

Comments:

TEST DATE 6/12/2018

READINGS BY Johnny Murray

AECOM

Air Pressure Relationship
TEST REPORT

PROJECT: NIST Bldg 215 Rebalance

SYSTEM: 1st Level

TEST APPARATUS: Micomanometer

Area or Room #	to	Area or Room #	Diff Press In. w.g.	Diff Press Pa	NOTE
C109	to	BLDG 217 N DD	-0.100	-25	
C109	to	BLDG 217 E DD	-0.040	-10	
CO-C-1	to	ST-1A-1	-0.040	-10	
CO-A-1	to	ST-14-1	-0.005	-1	
CO-E-1	to	E104	0.010	2	
CO-E-1	to	B107	-0.175	-44	
CO-E-1	to	CO-A1-1	-0.076	-19	
CO-C-1	to	D108	-0.050	-12	
CO-C-1	to	BLDG 216 E DD	0.000	0	
CO-C-1	to	D101	-0.034	-8	
CO-C-1	to	LO-A-1	-0.008	-2	
LO-A-1	to	OUTDOORS	0.009	2	
D101	to	CO-B1-1	-0.058	-14	
D101	to	D102	0.038	9	
D102	to	D102-3	0.001	0	
D102	to	D102-2	-0.004	-1	
D102	to	D102-1	0.016	4	
D102-2	to	D104	0.003	1	
D102-2	to	C104	-0.088	-22	
C104	to	D102-3	0.096	24	
D102-3	to	D103	0.010	2	
C104	to	Gown D105	-0.127	-32	
Gown D105	to	Class 1000 B101	0.121	30	1)
CO-D-1	to	D106	0.112	28	
CO-D-1	to	D107	0.160	40	
CO-A1-1	to	D108	0.030	7	
D108	to	D107	0.124	31	
CO-A1-1	to	A101-1	0.007	2	
CO-A1-1	to	A101	-0.053	-13	

Area or Room #	to	Area or Room #	Diff Press In. w.g.	Diff Press Pa	NOTE
CO-A1-1	to	A102-1	0.010	2	
CO-A1-1	to	A102	-0.036	-9	
CO-A1-1	to	A103-1	0.010	2	
CO-A1-1	to	A103	-0.030	-7	
CO-A1-1	to	A104-1	0.002	0	2)
CO-A1-1	to	A104	0.023	6	
CO-A1-1	to	A105-1	0.002	0	
CO-A1-1	to	A105	-0.034	-8	
CO-A1-1	to	A106-1	0.014	3	
CO-A1-1	to	A106	-0.600	-149	
CO-A1-1	to	A107	0.027	7	
A107	to	A106	-0.078	-19	
A106-1	to	A106	-0.730	-182	
A106-1	to	A105	-0.040	-10	
A106-1	to	B106	-0.110	-27	
A105-1	to	A105	-0.030	-7	
A105-1	to	B104	-0.020	-5	
A104-1	to	A104	-0.027	-7	
A104-1	to	A103	n/a		
A104-1	to	B103	-0.034	-8	
A103-1	to	A103	-0.300	-75	
A103-1	to	A102	0.032	8	
A103-1	to	B102	-0.021	-5	
A102-1	to	A102	-0.027	-7	
A102-1	to	A101	-0.054	-13	
A102-1	to	B101	-0.260	-65	
A101-1	to	B101	-0.024	-6	
A101-1	to	A101	N/A		
CO-B1-1	to	B101-1	0.010	2	

NOTE: 1) Gown D105 should be negatively pressurized in relation to the Class 1000 Area

2) door to service chase does not fully close automatically due to out-of-square frame

TEST DATE: 6/12/2018

READINGS BY: Johnny Murray

AECOM

Air Pressure Relationship
TEST REPORT

PROJECT NIST Bldg 215 Rebalance

SYSTEM 1st Level

TEST APPARATUS Micomanometer

Area or Room #	to	Area or Room #	Diff Press In. w.g.	Diff Press Pa	NOTE
CO-B1-1		B101	-0.004	-1	
CO-B1-1		B102-1	0.02	5	
CO-B1-1		B102	-0.005	-1	
CO-B1-1		B103-1	0.022	5	
CO-B1-1		B103	-0.024	-6	
CO-B1-1		B104-1	0.022	5	
CO-B1-1		B104	-0.007	-2	
CO-B1-1		B105-1	0.023	6	
CO-B1-1		B105	-0.075	-19	
CO-B1-1		B106-1	0.03	7	
CO-B1-1		B106	0.002	0	
B106		B106-2	-0.0857	-21	
B06-1		B105	-0.1138	-28	
B06-1		B106-2	-0.11	-27	
B06-1		B107	-0.08	-20	
B105-1		B105	-0.1	-25	
B105-1		B104	-0.02	-5	
B104-1		B104	-0.024	-6	
B104-1		B103	-0.022	-5	
B103-1		B102	-0.024	-6	
B103-1		B103	-0.022	-5	
B102-1		B102	-0.023	-6	
B102-1		B101	-0.022	-5	
B101-1		B101	-0.023	-6	

Area or Room #	to	Area or Room #	Diff Press In. w.g.	Diff Press Pa	NOTE
B101		A101	-0.034	-8	
B102		A102	-0.002	0	
B103		A103	-0.012	-3	
B104		A104	-0.005	-1	
B104		B105	-0.077	-19	
B105		A105	0.064	16	
B107		A106	0.034	8	
B107		B106-2	0.004	1	

Comments:

TEST DATE 6/12/2018

READINGS BY Johnny Murray

AECOM

Air Pressure Relationship TEST REPORT

PROJECT NIST Bldg 215 Rebalance

SYSTEM 2nd Level

TEST APPARATUS Micomanometer

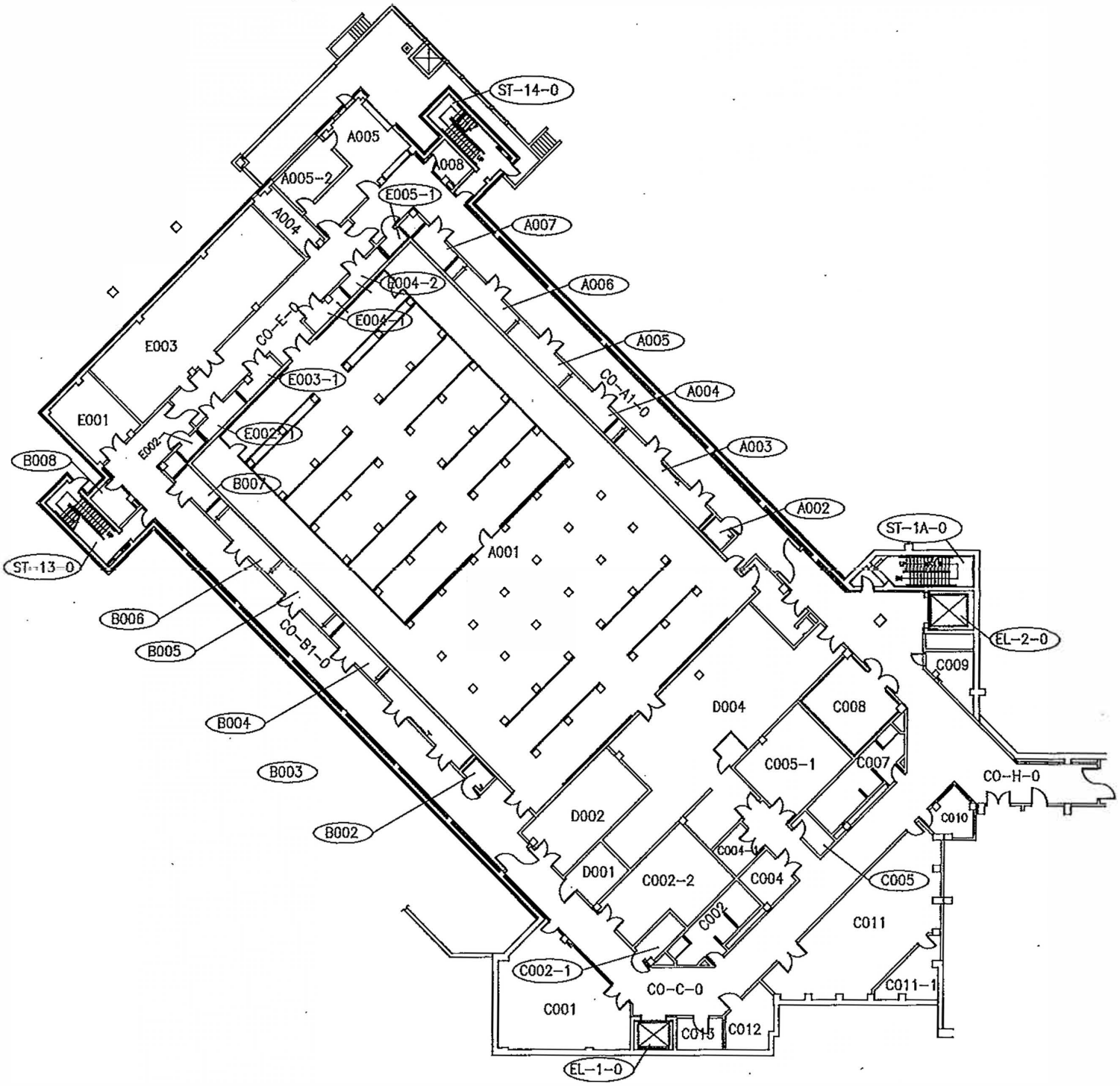
Area or Room #	to	Area or Room #	Diff Press In. w.g.	Diff Press Pa	NOTE
CO-C-2		Bldg 217	-0.07	-17	
CO-C-2		ST-A1-2	-0.04	-10	
CO-C-2		EL-2-2	-0.005	-1	
CO-C-2		LO-B-2	-0.01	-2	
CO-C-2		BLDG 216	-0.001	0	
CO-C-2		EL-1-2	-0.002	0	
CO-C-2		C201	-0.008	-2	
LO-B-2		EXIT OUT	0.04	10	

Area or Room #	to	Area or Room #	Diff Press In. w.g.	Diff Press Pa	NOTE

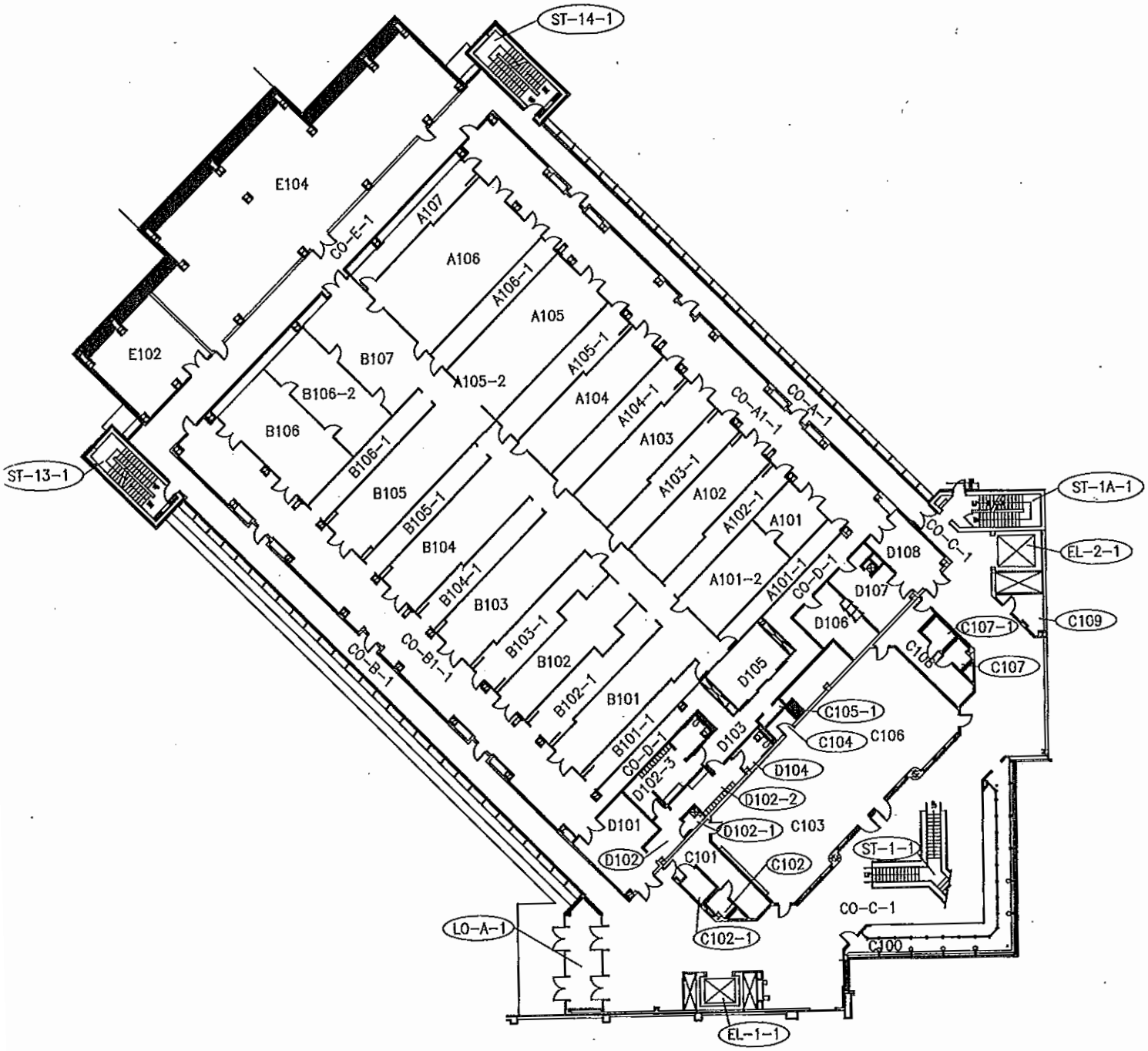
Comments:

TEST DATE 6/12/2018

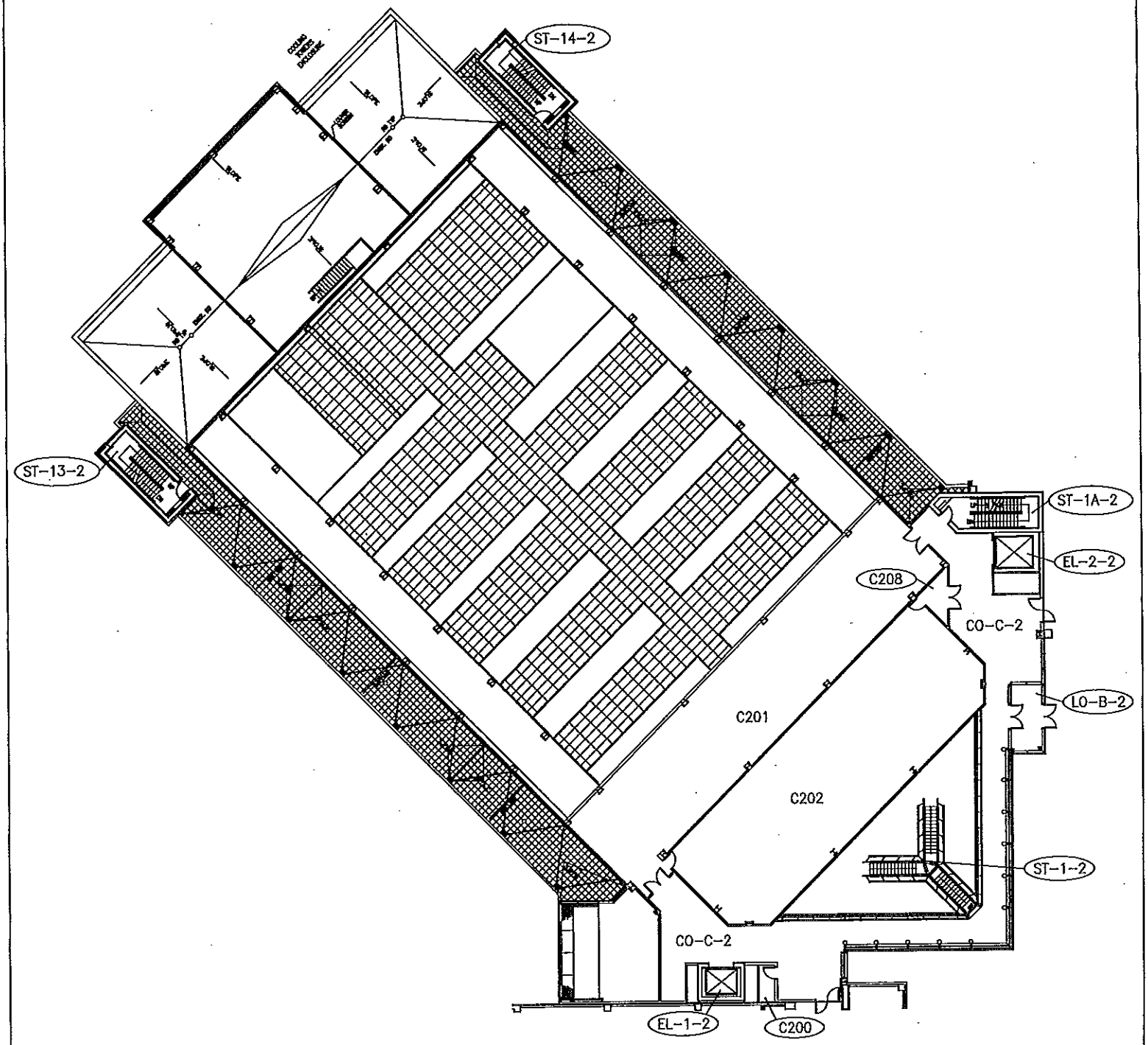
READINGS BY Johnny Murray



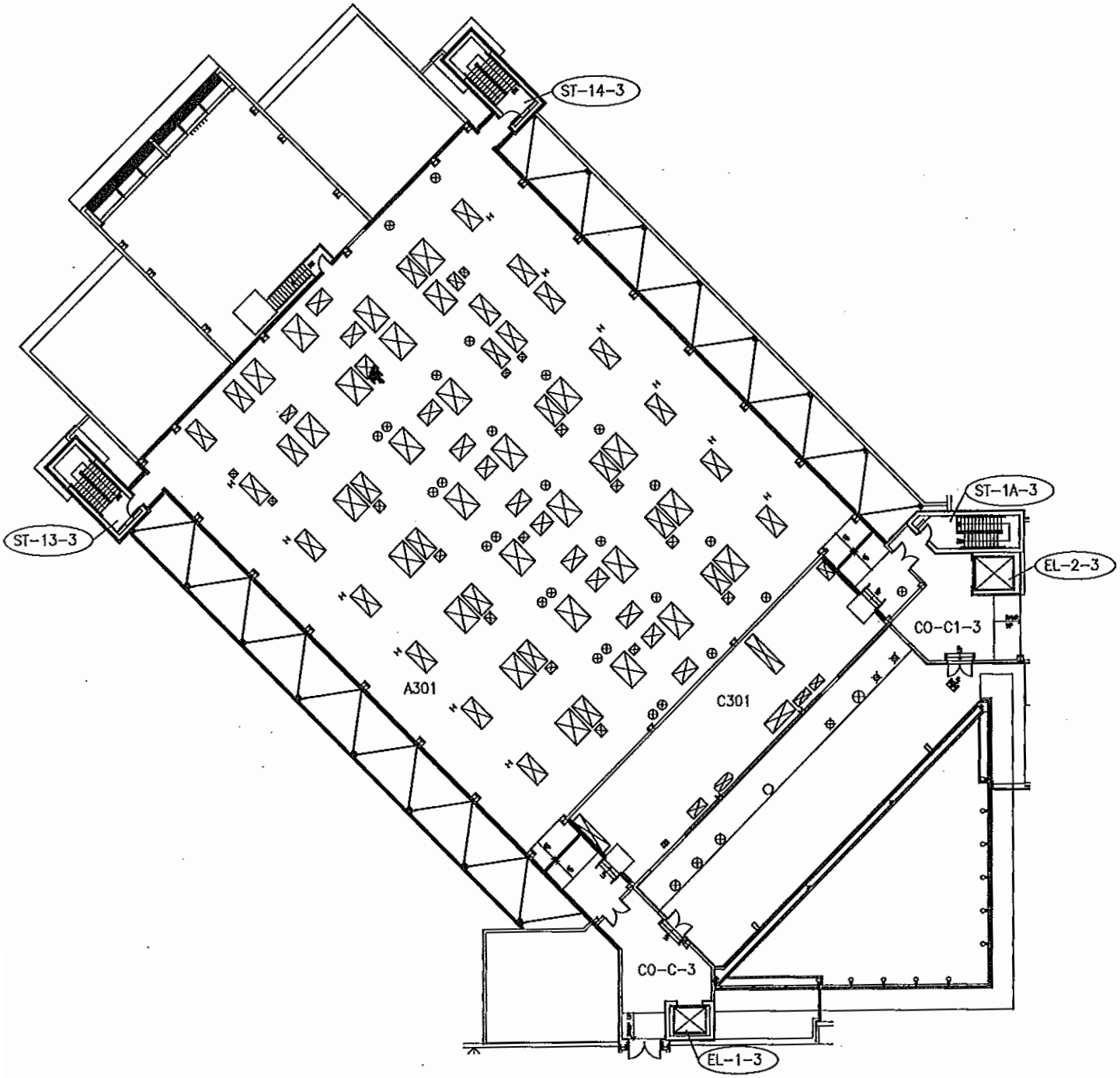
BUILDING 215 – NANOFABRICATION FACILITY
LOWER LEVEL – BASEMENT FLOOR



BUILDING 215 – NANOFABRICATION FACILITY
FIRST FLOOR

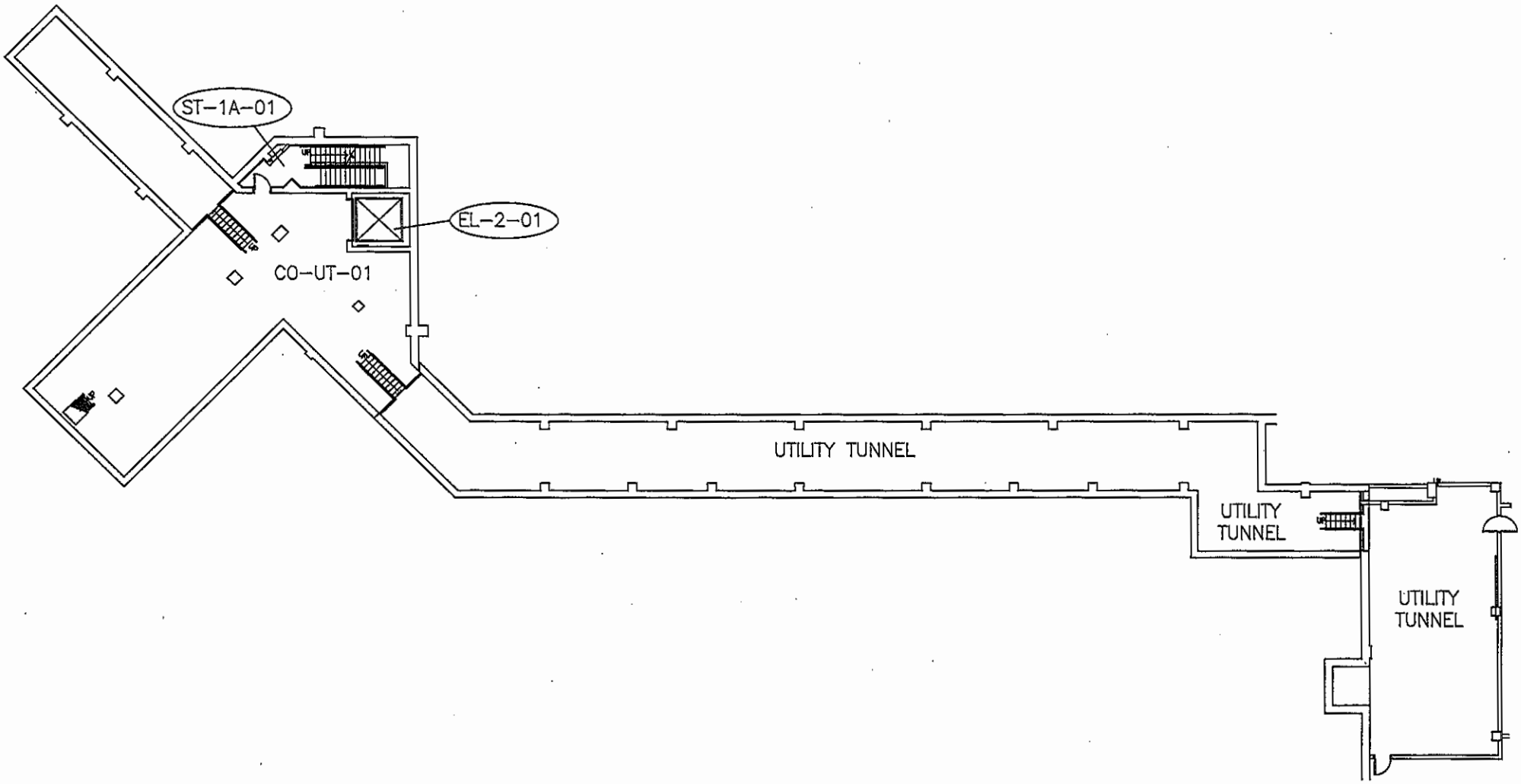


BUILDING 215 – AML NANOFABRICATION BUILDING
SECOND FLOOR



BUILDING 215 – NANOFABRICATION FACILITY
PENTHOUSE – LEVEL TWO

215–P



BUILDING 215 – NANOFABRICATION FACILITY
SUB-BASEMENT LEVEL-UTILITY TUNNEL

215-UT