

Monmouth Regional High School

Heating & Ventilation (HV) – Heating Ventilation Air Conditioning (HVAC) – Plumbing Fixture (PF) – Lighting Control (LC) Systems Assessment

Monmouth Regional High School District



Gillan & Hartmann, Inc.

G&H No.: 2020-162

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CHECKLIST (SOURCE: ASHRAE GUIDELINES)



1 - EXECUTIVE SUMMARY

The Monmouth Regional High School District engaged the services of Fraytak Vesiz Hopkins Duthie (FVHD) and Gillan & Hartmann, Inc. (G&H), Engineering Consultant to FVHD, to perform an Engineering Assessment of the Heating and Ventilation (HV) – Heating Ventilation Air Conditioning (HVAC), Plumbing Fixtures (PF) and Lighting Control (LC) Systems which serve the Monmouth Regional High School facilities with specific focus upon ventilation – outside air (OA) provisions, method air filtration provisions, and HV/HVAC system operation maintenance and service (OM&S).

The assessment effort consisted of a review of, the facilities as-built drawings and documentation, OM&S documentation, OM&S procedures, and visual non-destructive observation of the HV, HVAC, PF, and LC Systems.

The Monmouth Regional High School mechanical systems include Heating Ventilation (HV) and Heating Ventilation and Air Conditioning (HVAC) systems. The HV and HVAC systems range in age from the original construction of the facilities through the present day. HV systems operate to provide comfort within the range of 70-95 deg. F. with relative humidity (RH) dependent upon ambient air conditions. The HVAC systems operate to provide comfort within the range of 72-78 deg. F. and relative humidity range of 45% to 65% RH.

In accordance with the applicable building codes ventilation – outside air (OA) for the facility is provided by means of natural and mechanical ventilation. The HV and HVAC systems include the filtration of air.

The HV and HVAC systems employ an automatic temperature control system to maintain comfort.

The Monmouth Regional High School District operates a comprehensive, contemporary OM&S Program with scheduled HV and HVAC system service including replacement of air filters in accordance with industry and equipment manufacturer's standard procedures and recommendations.

2 - EXISTING CONDITIONS REVIEW

2.1 HV AND HVAC VENTILATION/OA SYSTEMS

A. Natural and Mechanical Ventilation/OA:

The applicable building code permits natural ventilation and/or mechanical ventilation/OA. Operable windows and doors are considered natural ventilation/OA. Electric powered fan assisted ventilation air systems are considered mechanical ventilation.

Mechanical ventilation/OA is achieved through the use of OA inlets into the building with OA delivery through electrical powered fan assisted duct distribution system. The quantity of OA delivered throughout the facilities is determined by the applicable building code.



B. HV and HVAC System Air Filtration:

Air filtration efficiency is measured in terms of arrestance of particle size. The efficiency rating utilizes a minimum arrestance efficiency reporting value (MERV).

The air filtration efficiencies maintained at the Monmouth Regional High School facilities vary according to age, and HV and HVAC system design concept.

The assessment effort included a review of the facilities air filtration efficiency with the intent to increase the air filtration efficiency if possible.

C. Plumbing Fixtures

Plumbing Fixtures through the facilities are predominately manual non-hands-free manually controlled fixtures.

D. Lighting Control

Lighting control systems are predominately manually controlled.

3 - SUMMARY

3.1 RESULTS AND CONCLUSIONS

A. Results:

The results of the assessment are summarized in tabular spreadsheet format. The spreadsheet includes room name, room number, designation of the method of ventilation/outside air (OA), air filtration efficiency for each space contained in each facility. Refer to Appendix A.

Floor plans of the Monmouth Regional High School facility has been prepared. The floor plan include room number, and room name designation. Refer to Appendix B.

For guidance an HV and HVAC system OM&S Maintenance Checklist has been prepared. Refer to Appendix C.

B. Conclusions:

Ventilation/Outside Air (OA): With the exception of several storage and electrical rooms, OA is provided to all the occupied spaces within the Monmouth Regional High School facilities.

Air filtration efficiency (MERV): The capability of increasing the air filtration efficiency of air for Monmouth Regional High School facilities has been investigated. The HV and HVAC system which serve the facilities are designed to operate within the filter efficiency indicated in Appendix A. Increasing the air filtration efficiency is not recommended. The additional pressure drop created by the higher efficiency filtration will potentially cause the following:

1. Restriction and reduction of code required outside air.
2. Failure and damage to electrical systems including stress and overheating of electrical motors, electrical conductors, electrical circuits and circuit breakers.



3. Failure, damage and stress to refrigerant circuit components including compressors, condensers, evaporators, controls, capacitors, etc.
4. Potentially render HV and HVAC system maintenance and repair warranties void.

We suggest the District continue to maintain current air filtration efficiency in accordance with the District's OM&S Program.



APPENDIX A - HV/HVAC, PF AND LC SYSTEM SUMMARY REVIEW

- Monmouth Regional High School Summary

Room Number	Room Name	HV/HVAC			Plumbing					Electrical - Lighting Control	
		Space Utilizes Natural Ventilation	Space Utilizes Mechanical Ventilation	Designed Filter MERV Rating (for mechanical ventilation only)	Hands-free water closet flushometers	Hands-free urinal flushometers	Hands-free lavatory faucets	Hands-free sink faucets	Hands-free water cooler/ drinking fountain	Manual Control (switches only)	Automatic Control with Manual Switches for Override
100	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
B101	Alt. Education	-	X	MERV 8	-	-	-	-	-	X	-
101B	Storage	-	X	MERV 8	-	-	-	-	-	X	-
101C	Storage	-	X	MERV 8	-	-	-	-	-	X	-
101D	Storage	-	X	MERV 8	-	-	-	-	-	X	-
101E	Office	-	X	MERV 8	-	-	-	-	-	X	-
B102	Special Ed.	-	X	MERV 8	-	-	-	-	-	X	-
B103	Art Room	-	X	MERV 8	-	-	-	-	-	X	-
B104	Special Ed.	-	X	MERV 8	-	-	-	-	-	X	-
B105	Interactive Television	-	X	MERV 8	-	-	-	-	-	X	-
B105A	Storage	-	X	MERV 8	-	-	-	-	-	X	-
B106	Special Ed.	-	X	MERV 8	-	-	-	-	-	X	-
B107	Graphic Communication	-	X	MERV 8	-	-	-	-	-	X	-
B107A	Dark Room	-	X	MERV 8	-	-	-	-	-	X	-
107B	Storage	-	X	MERV 8	-	-	-	-	-	X	-
B108	Special Ed.	-	X	MERV 8	-	-	-	-	-	X	-
B109	Photography	-	X	MERV 8	-	-	-	-	-	X	-
109A	Enlarger	-	X	MERV 8	-	-	-	-	-	X	-
109B	Storage	-	X	MERV 8	-	-	-	-	-	X	-
109C	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
109D	Storage	-	X	MERV 8	-	-	-	-	-	X	-
109E	Enlarger	-	X	MERV 8	-	-	-	-	-	X	-
B110	Storage	-	X	MERV 8	-	-	-	-	-	X	-
111	Lecture	-	X	MERV 8	-	-	-	-	-	X	-
B112	Conference	-	X	MERV 8	-	-	-	-	-	X	-
113	Girls Toilet	-	X	MERV 8	-	-	-	-	-	X	-
113A	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
B114	Reception	-	X	MERV 8	-	-	-	-	-	X	-
114A	Director Office	-	X	MERV 8	-	-	-	-	-	X	-
114B	CST Office	-	X	MERV 8	-	-	-	-	-	X	-
114C	CST Office	-	X	MERV 8	-	-	-	-	-	X	-
114D	CST Office	-	X	MERV 8	-	-	-	-	-	X	-
114E	CST Office	-	X	MERV 8	-	-	-	-	-	X	-
114F	CST Office	-	X	MERV 8	-	-	-	-	-	X	-
114G	CST Office	-	X	MERV 8	-	-	-	-	-	X	-
114H	CST Office	-	X	MERV 8	-	-	-	-	-	X	-
114J	Copy	-	X	MERV 8	-	-	-	-	-	X	-
114K	Storage	-	X	MERV 8	-	-	-	-	-	X	-
115	Janitor Closet	-	X	MERV 8	-	-	-	-	-	X	-
116	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
116A	Tech. Super.	-	X	MERV 8	-	-	-	-	-	X	-
116B	Special Ed. Office	-	X	MERV 8	-	-	-	-	-	X	-
117	Boys Toilet	-	X	MERV 8	-	-	-	-	-	X	-
117A	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
118	Electrical Room	-	X	MERV 8	-	-	-	-	-	X	-
200	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
E201	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
E202	Office	-	X	MERV 5	-	-	-	-	-	X	-
E203	Classroom	-	X	MERV 8	-	-	-	-	-	X	-

Room Number	Room Name	HV/HVAC			Plumbing					Electrical - Lighting Control	
		Space Utilizes Natural Ventilation	Space Utilizes Mechanical Ventilation	Designed Filter MERV Rating (for mechanical ventilation only)	Hands-free water closet flushometers	Hands-free urinal flushometers	Hands-free lavatory faucets	Hands-free sink faucets	Hands-free water cooler/ drinking fountain	Manual Control (switches only)	Automatic Control with Manual Switches for Override
E204	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
E205	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
E205A	Conference	-	X	MERV 8	-	-	-	-	-	X	-
E206	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
E207	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
207A	Prep Room	-	X	MERV 8	-	-	-	-	-	X	-
207B	Storage	-	X	MERV 8	-	-	-	-	-	X	-
E208	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
E209	Office	-	X	MERV 5	-	-	-	-	-	X	-
E210	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
E211	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
E213	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
215	Storage	-	X	MERV 5	-	-	-	-	-	X	-
300	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
G301	Superintendent	-	X	MERV 8	-	-	-	-	-	X	-
G302	Business Office	-	X	MERV 8	-	-	-	-	-	X	-
302B	Reception	-	X	MERV 8	-	-	-	-	-	X	-
G303	Special Ed. Office	-	X	MERV 8	-	-	-	-	-	X	-
G304	Conference	-	X	MERV 8	-	-	-	-	-	X	-
G305	Addendance Office	-	X	MERV 5	-	-	-	-	-	X	-
G305A	Office	-	X	MERV 5	-	-	-	-	-	X	-
G305B	Office	-	X	MERV 5	-	-	-	-	-	X	-
G306	Business Admin Office	-	X	MERV 5	-	-	-	-	-	X	-
306A	Secretary Office	-	X	MERV 5	-	-	-	-	-	X	-
G307	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
G308	Principal Office	-	X	MERV 5	-	-	-	-	-	X	-
308A	Office	-	X	MERV 5	-	-	-	-	-	X	-
G309	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
G310	Nurse	-	X	MERV 5	-	-	-	-	-	X	-
310A	Office	-	X	MERV 5	-	-	-	-	-	X	-
310B	Closet	-	X	MERV 5	-	-	-	-	-	X	-
310C	Toilet	-	X	MERV 5	-	-	-	-	-	X	-
310D	Waiting	-	X	MERV 5	-	-	-	-	-	X	-
311	Reception	-	X	MERV 5	-	-	-	-	-	X	-
311A	Closet	-	X	MERV 5	-	-	-	-	-	X	-
G312	School Store	-	X	MERV 5	-	-	-	-	-	X	-
313	Mens Toilet	-	X	MERV 8	-	-	-	-	-	X	-
G314	Principal Office Reception	-	X	MERV 5	-	-	-	-	-	X	-
G314A	Principal Office	-	X	MERV 5	-	-	-	-	-	X	-
315	Womens Toilet	-	X	MERV 8	-	-	-	-	-	X	-
G316	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
G318	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
G320	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
G322	Language Office	-	X	MERV 5	-	-	-	-	-	X	-
400A	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
400B	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
H401	Library	-	X	MERV 8	-	-	-	-	-	X	-
401A	Library Mezzanine	-	X	MERV 8	-	-	-	-	-	X	-
401B	Storage	-	X	MERV 8	-	-	-	-	-	X	-

Room Number	Room Name	HV/HVAC			Plumbing					Electrical - Lighting Control	
		Space Utilizes Natural Ventilation	Space Utilizes Mechanical Ventilation	Designed Filter MERV Rating (for mechanical ventilation only)	Hands-free water closet flushometers	Hands-free urinal flushometers	Hands-free lavatory faucets	Hands-free sink faucets	Hands-free water cooler/ drinking fountain	Manual Control (switches only)	Automatic Control with Manual Switches for Override
401C	Media Specialist	-	X	MERV 8	-	-	-	-	-	X	-
H402	Choral Music	-	X	MERV 10	-	-	-	-	-	X	-
H403	Cafeteria	-	X	MERV 8	-	-	-	-	-	X	-
403A	Storage	-	X	MERV 8	-	-	-	-	-	X	-
H404	Choral Music	-	X	MERV 10	-	-	-	-	-	X	-
405	Reading	-	X	MERV 8	-	-	-	-	-	X	-
H406	Choral Music	-	X	MERV 10	-	-	-	-	-	X	-
407	Passage	-	X	MERV 8	-	-	-	-	-	X	-
H408	Office	-	X	MERV 10	-	-	-	-	-	X	-
409	Office	-	X	MERV 8	-	-	-	-	-	X	-
H410	Instrumental Music	-	X	MERV 8	-	-	-	-	-	X	-
410A	Practice	-	X	MERV 5	-	-	-	-	-	X	-
410B	Practice	-	X	MERV 5	-	-	-	-	-	X	-
410C	Storage & Repair	-	X	MERV 5	-	-	-	-	-	X	-
411	Conference	-	X	MERV 8	-	-	-	-	-	X	-
H412	Boys Toilet	-	X	MERV 8	X	X	X	-	-	X	-
413	Tech Office	-	X	MERV 8	-	-	-	-	-	X	-
H414	Girls Toilet	-	X	MERV 8	X	-	X	-	-	X	-
415	Mechanical Room	-	X	MERV 8	-	-	-	-	-	X	-
417	Work Room	-	X	MERV 8	-	-	-	-	-	X	-
418	Mens Toilet	-	X	None	-	-	-	-	-	X	-
419	Band/AV Storage	-	X	MERV 5	-	-	-	-	-	X	-
420	Womens Toilet	-	X	MERV 8	-	-	-	-	-	X	-
421	Boys Toilet	-	X	MERV 8	-	-	-	-	-	X	-
422	Corridor	-	X	MERV 10	-	-	-	-	-	X	-
422A	Office	-	X	MERV 10	-	-	-	-	-	X	-
422C	Practice	-	X	MERV 5	-	-	-	-	-	X	-
423	Janitor Closet	-	X	MERV 8	-	-	-	-	-	X	-
425	Girls Toilet	-	X	MERV 8	-	-	-	-	-	X	-
426	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
426A	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
426B	Boys Dressing	-	X	MERV 8	-	-	-	-	-	X	-
426C	Boys Toilet	-	X	MERV 8	-	-	-	-	-	X	-
426D	Girls Dressing	-	X	MERV 8	-	-	-	-	-	X	-
426E	Girls Toilet	-	X	MERV 8	-	-	-	-	-	X	-
427	Kitchen	-	X	MERV 8	-	-	-	-	-	X	-
427A	Dishwash	-	X	MERV 8	-	-	-	-	-	X	-
427B	Receiving	-	X	MERV 8	-	-	-	-	-	X	-
427C	Dry Storage	-	X	MERV 8	-	-	-	-	-	X	-
427D	Lockers	-	X	MERV 8	-	-	-	-	-	X	-
427E	Toilet	-	X	MERV 8	-	-	-	-	-	X	-
427F	Refrigerator/Freezer	-	-	-	-	-	-	-	-	X	-
427G	Office	-	X	MERV 8	-	-	-	-	-	X	-
427H	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
428	Auditorium	-	X	MERV 8	-	-	-	-	-	X	-
428A	Stage	-	X	MERV 8	-	-	-	-	-	X	-
428B	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
428C	Storage	-	X	MERV 8	-	-	-	-	-	X	-
428D	Scenery Alcove	-	X	MERV 8	-	-	-	-	-	X	-

Room Number	Room Name	HV/HVAC			Plumbing					Electrical - Lighting Control	
		Space Utilizes Natural Ventilation	Space Utilizes Mechanical Ventilation	Designed Filter MERV Rating (for mechanical ventilation only)	Hands-free water closet flushometers	Hands-free urinal flushometers	Hands-free lavatory faucets	Hands-free sink faucets	Hands-free water cooler/ drinking fountain	Manual Control (switches only)	Automatic Control with Manual Switches for Override
428E	Fire Pump Room	-	X	MERV 8	-	-	-	-	-	X	-
428F	Vestibule	X	-	-	-	-	-	-	-	X	-
428G	Electrical Room	-	X	MERV 8	-	-	-	-	-	X	-
428H	Platform	-	X	MERV 8	-	-	-	-	-	X	-
428J	Storage	-	X	MERV 8	-	-	-	-	-	X	-
428K	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
428L	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
428M	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
428N	Fan Room	-	X	MERV 8	-	-	-	-	-	X	-
429	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
430	Control Room	-	X	MERV 8	-	-	-	-	-	X	-
430A	Sound	-	X	MERV 8	-	-	-	-	-	X	-
430B	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
430C	Videos	-	X	MERV 8	-	-	-	-	-	X	-
500	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
D501	BOE Meeting Room	-	X	MERV 8	-	-	-	-	-	X	-
501A	Kitchen	-	X	MERV 8	-	-	-	-	-	X	-
501B	Storage	-	X	MERV 8	-	-	-	-	-	X	-
D503	Faculty Dining	-	X	MERV 8	-	-	-	-	-	X	-
503A	Office	-	X	MERV 8	-	-	-	-	-	X	-
503B	Storage	-	X	MERV 8	-	-	-	-	-	X	-
D504	SGI	-	X	MERV 8	-	-	-	-	-	X	-
D505	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D506	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D507	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D508	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D509	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D510	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D511	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D512	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D513	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D514	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D515	Teacher Work	-	X	MERV 8	-	-	-	-	-	X	-
D516	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D517	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D518	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D519	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D520	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D521	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D522	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D523	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D524	Teacher Work	-	X	MERV 8	-	-	-	-	-	X	-
D525	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
D526	SGI	-	X	MERV 8	-	-	-	-	-	X	-
D527	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
528	Faculty Toilet	-	X	MERV 8	-	-	-	-	-	X	-
D529	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
530	Janitor Closet	-	X	MERV 8	-	-	-	-	-	X	-
532	Faculty Toilet	-	X	MERV 8	-	-	-	-	-	X	-

Room Number	Room Name	HV/HVAC			Plumbing					Electrical - Lighting Control	
		Space Utilizes Natural Ventilation	Space Utilizes Mechanical Ventilation	Designed Filter MERV Rating (for mechanical ventilation only)	Hands-free water closet flushometers	Hands-free urinal flushometers	Hands-free lavatory faucets	Hands-free sink faucets	Hands-free water cooler/ drinking fountain	Manual Control (switches only)	Automatic Control with Manual Switches for Override
534	Janitor Closet	-	X	MERV 8	-	-	-	-	-	X	-
541	Boys Toilet	-	X	MERV 8	-	-	-	-	-	X	-
543	Janitor Closet	-	X	MERV 8	-	-	-	-	-	X	-
545	Girls Toilet	-	X	MERV 8	-	-	-	-	-	X	-
600	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
A601	Guidance	-	X	MERV 8	-	-	-	-	-	X	-
601A	Office	-	X	MERV 8	-	-	-	-	-	X	-
601B	Passage	-	-	-	-	-	-	-	-	X	-
601C	Vault	-	-	-	-	-	-	-	-	X	-
601D	Work Room	-	X	MERV 5	-	-	-	-	-	X	-
601E	Office	-	X	MERV 5	-	-	-	-	-	X	-
601F	Office	-	X	MERV 5	-	-	-	-	-	X	-
601G	Office	-	X	MERV 5	-	-	-	-	-	X	-
601H	Conference	-	X	MERV 5	-	-	-	-	-	X	-
A602	Office	-	X	MERV 5	-	-	-	-	-	X	-
A603	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
A604	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
A605	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
A606	Teachers Room	-	X	MERV 8	-	-	-	-	-	X	-
A607	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
A608	Home Economics	-	X	MERV 8	-	-	-	-	-	X	-
609	Main Office	-	X	MERV 5	-	-	-	-	-	X	-
609A	S.R.O. Office	-	X	MERV 5	-	-	-	-	-	X	-
609B	Work Room	-	X	MERV 5	-	-	-	-	-	X	-
A610	Home Economics	-	X	MERV 8	-	-	-	-	-	X	-
A611	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
A612	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
A613	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
A614	Faculty Office	-	X	MERV 5	-	-	-	-	-	X	-
A615	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
616	Janitor Closet	-	X	MERV 8	-	-	-	-	-	X	-
617	Secure Vestibule	-	X	MERV 5	-	-	-	-	-	X	-
618	Womens Toilet	-	X	MERV 8	-	-	-	-	-	X	-
618A	Rest Room	-	X	MERV 8	-	-	-	-	-	X	-
620	Mens Toilet	-	X	MERV 8	-	-	-	-	-	X	-
620A	Rest Room	-	X	MERV 8	-	-	-	-	-	X	-
622	Wash Alcove	-	X	MERV 8	-	-	-	-	-	X	-
622A	Girls Toilet	-	X	MERV 8	-	-	-	-	-	X	-
624	Janitor Closet	-	X	MERV 8	-	-	-	-	-	X	-
626	Wash Alcove	-	X	MERV 8	-	-	-	-	-	X	-
626A	Boys Toilet	-	X	MERV 8	-	-	-	-	-	X	-
628	Storage	-	X	MERV 5	-	-	-	-	-	X	-
700A	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
700B	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
701	Boiler Room	-	X	MERV 8	-	-	-	-	-	X	-
701B	Transformer	-	-	-	-	-	-	-	-	X	-
F702	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
F704	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
704A	Prep Room	-	X	MERV 8	-	-	-	-	-	X	-

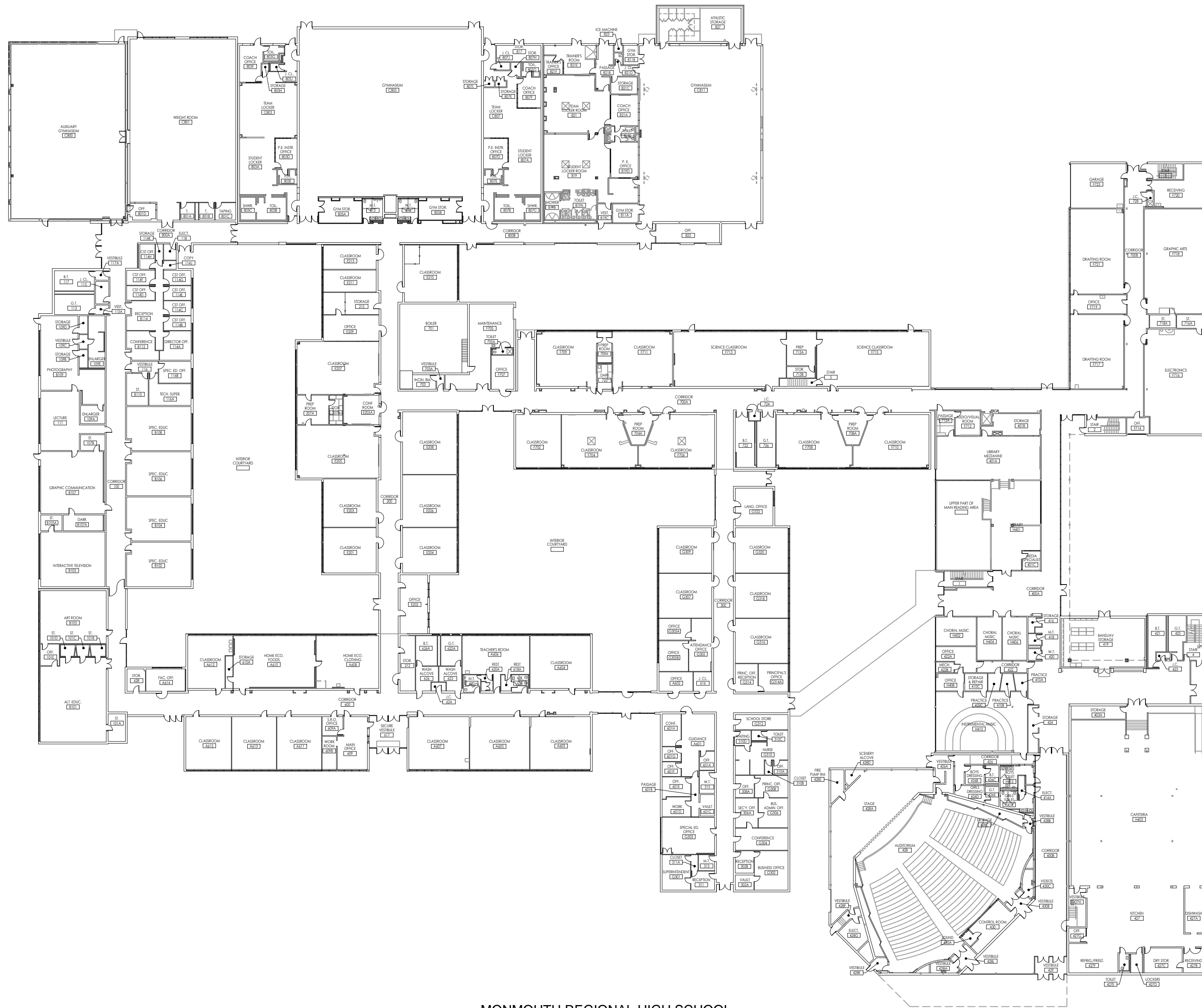
Room Number	Room Name	HV/HVAC			Plumbing					Electrical - Lighting Control	
		Space Utilizes Natural Ventilation	Space Utilizes Mechanical Ventilation	Designed Filter MERV Rating (for mechanical ventilation only)	Hands-free water closet flushometers	Hands-free urinal flushometers	Hands-free lavatory faucets	Hands-free sink faucets	Hands-free water cooler/ drinking fountain	Manual Control (switches only)	Automatic Control with Manual Switches for Override
F705	Maintenance	X		-	-	-	-	-	-	X	-
705A	Toilet	-	X	None	-	-	-	-	-	X	-
F706	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
F707	Office	-	X	MERV 5	-	-	-	-	-	X	-
F708	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
708A	Prep Room	-	X	MERV 8	-	-	-	-	-	X	-
F709	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
709A	Prep Room	-	X	MERV 8	-	-	-	-	-	X	-
F710	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
F711	Classroom	-	X	MERV 8	-	-	-	-	-	X	-
F712	Audio/Visual Room	-	X	MERV 8	-	-	-	-	-	X	-
712A	Passage	-	X	MERV 8	-	-	-	-	-	X	-
F713	Science Classroom	-	X	MERV 8	-	-	-	-	-	X	-
713A	Prep Room	-	X	MERV 8	-	-	-	-	-	X	-
713B	Storage	-	X	MERV 8	-	-	-	-	-	X	-
F714	Office	-	X	MERV 5	-	-	-	-	-	X	-
F715	Science Classroom	-	X	MERV 8	-	-	-	-	-	X	-
F716	Electronics	-	X	MERV 8	-	-	-	-	-	X	-
716A	Storage	X	-	-	-	-	-	-	-	X	-
F717	Drafting Room	-	X	MERV 8	-	-	-	-	-	X	-
F718	Graphic Arts	-	X	MERV 8	-	-	-	-	-	X	-
718A	Storage	-	X	MERV 5	-	-	-	-	-	X	-
F719	Office	-	X	MERV 5	-	-	-	-	-	X	-
F720	Receiving	X	-	-	-	-	-	-	-	X	-
F721	Drafting Room	-	X	MERV 8	-	-	-	-	-	X	-
722	Boys Toilet	-	X	None	-	-	-	-	-	X	-
F723	Garage	X	-	-	-	-	-	-	-	X	-
724	Janitor Closet	-	X	None	-	-	-	-	-	X	-
725	Dark Room	-	X	None	-	-	-	-	-	X	-
726	Girls Toilet	-	X	None	-	-	-	-	-	X	-
728	Janitor Closet	-	X	None	-	-	-	-	-	X	-
800A	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
800B	Corridor	-	X	MERV 8	-	-	-	-	-	X	-
C800	Auxiliary Gymnasium	-	X	MERV 8	-	-	-	-	-	X	-
C801	Weight Room	-	X	MERV 8	-	-	-	-	-	X	-
801A	Toilet	-	X	MERV 8	-	-	-	-	-	X	-
801B	Toilet	-	X	MERV 8	-	-	-	-	-	X	-
801C	Taping	-	X	MERV 5	-	-	-	-	-	X	-
801D	Office	-	X	MERV 8	-	-	-	-	-	X	-
C803	Team Locker	-	X	MERV 8	-	-	-	-	-	X	-
803A	Student Locker	-	X	MERV 8	-	-	-	-	-	X	-
803B	Toilet	-	X	MERV 8	X	X	X	-	-	X	-
803C	Shower	-	X	MERV 8	-	-	-	-	-	X	-
803D	P.E. Office	-	X	MERV 8	-	-	-	-	-	X	-
803E	Toilet	-	X	MERV 8	X	-	X	-	-	X	-
803F	Coach Office	-	X	MERV 8	-	-	-	-	-	X	-
803G	Toilet	-	X	MERV 8	X	-	X	-	-	X	-
803J	Janitor Closet	-	X	MERV 8	-	-	-	-	-	X	-
C805	Gymnasium	-	X	MERV 8	-	-	-	-	-	X	-

Room Number	Room Name	HV/HVAC			Plumbing					Electrical - Lighting Control	
		Space Utilizes Natural Ventilation	Space Utilizes Mechanical Ventilation	Designed Filter MERV Rating (for mechanical ventilation only)	Hands-free water closet flushometers	Hands-free urinal flushometers	Hands-free lavatory faucets	Hands-free sink faucets	Hands-free water cooler/ drinking fountain	Manual Control (switches only)	Automatic Control with Manual Switches for Override
805A	Gym Storage	-	X	MERV 8	-	-	-	-	-	X	-
805B	Gym Storage	-	X	MERV 8	-	-	-	-	-	X	-
C807	Team Locker	-	X	MERV 8	-	-	-	-	-	X	-
807A	Student Locker	-	X	MERV 8	-	-	-	-	-	X	-
807B	Toilet	-	X	MERV 8	X	X	X	-	-	X	-
807C	Shower	-	X	MERV 8	-	-	-	-	-	X	-
807D	P.E. Office	-	X	MERV 8	-	-	-	-	-	X	-
807E	Toilet	-	X	MERV 8	X	-	X	-	-	X	-
807F	Coach Office	-	X	MERV 8	-	-	-	-	-	X	-
807G	Toilet	-	X	MERV 8	X	-	X	-	-	X	-
807H	Storage	-	X	MERV 8	-	-	-	-	-	X	-
807J	Janitor Closet	-	X	MERV 8	-	-	-	-	-	X	-
807K	Storage	-	X	MERV 8	-	-	-	-	-	X	-
807L	Storage	-	X	MERV 8	-	-	-	-	-	X	-
C811	Gymnasium	-	X	MERV 8	-	-	-	-	-	X	-
811B	Gym Storage	-	X	MERV 8	-	-	-	-	-	X	-
813	Mens Toilet	-	X	MERV 8	X	X	X	-	-	X	-
815	Womens Toilet	-	X	MERV 8	X	-	X	-	-	X	-
817	Storage	-	X	MERV 8	-	-	-	-	-	X	-
819	Student Locker	-	X	MERV 8	-	-	-	-	-	X	-
819A	Toilet	-	X	MERV 8	X	-	X	-	-	X	-
819B	Shower	-	X	MERV 8	-	-	-	-	-	X	-
819C	Vestibule	-	X	MERV 8	-	-	-	-	-	X	-
819D	P.E. Office	-	X	MERV 8	-	-	-	-	-	X	-
819E	Toilet	-	X	MERV 8	X	-	X	-	-	X	-
821	Team Locker	-	X	MERV 8	-	-	-	-	-	X	-
821A	Coach Office	-	X	MERV 8	-	-	-	-	-	X	-
821B	Passage	-	X	MERV 8	-	-	-	-	-	X	-
821C	Storage	-	X	MERV 8	-	-	-	-	-	X	-
821D	Janitor Closet	-	X	MERV 8	-	-	-	-	-	X	-
821E	Trainer Room	-	X	MERV 8	-	-	-	-	-	X	-
821F	Trainer Office	-	X	MERV 8	-	-	-	-	-	X	-
823	Ice Machine	-	X	MERV 8	-	-	-	-	-	X	-
825	Office	X	-	-	-	-	-	-	-	X	-
827	Athletic Storage	-	X	MERV 7	-	-	-	-	-	X	-
1	Stair	X	-	-	-	-	-	-	-	X	-
2	Stair	X	-	-	-	-	-	-	-	X	-
3	Stair	X	-	-	-	-	-	-	-	X	-
4	Stair	X	-	-	-	-	-	-	-	X	-

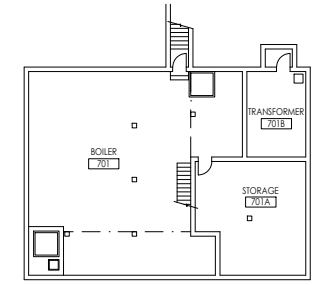


APPENDIX B - BUILDING FLOOR PLANS

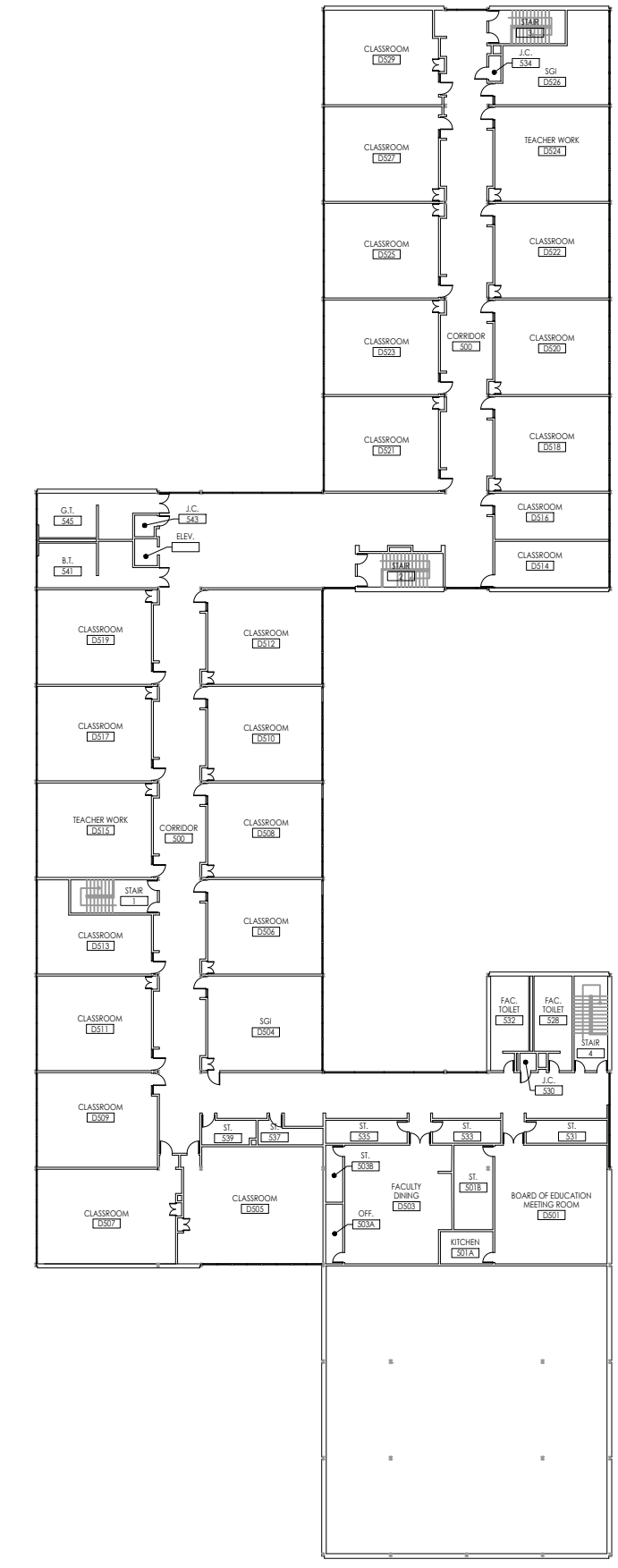
- Monmouth Regional High School Floor Plan



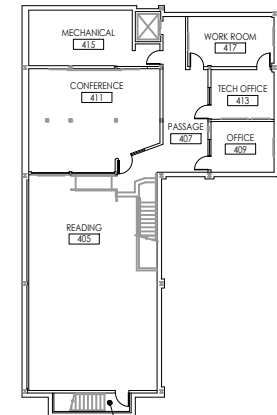
**MONMOUTH REGIONAL HIGH SCHOOL -
MAIN LEVEL PLAN**



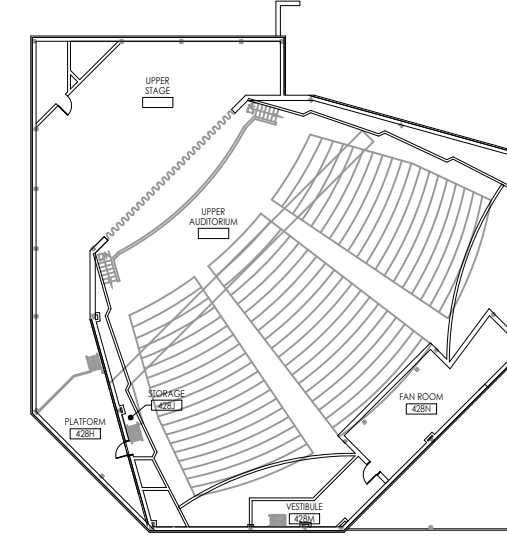
**BOILER ROOM -
LOWER LEVEL PLAN**



SECOND FLOOR PLAN



**LIBRARY - LOWER
LEVEL PLAN**



**PERFORMING ARTS CENTER -
UPPER LEVEL PLAN**



APPENDIX C - HV/HVAC SYSTEM OPERATIONS MAINTENANCE AND SERVICE (OM&S) CHECKLIST (SOURCE: ASHRAE GUIDELINES)

Operating Maintenance & Service

Startup Checklist for HVAC Systems (As Applicable to the Facilities):

- **Filtration in all mechanical equipment:**
 - Verify filters are installed correctly.
 - Develop standards for frequency of filter replacement and type of filters to be utilized.
 - Select filtration levels (MERV ratings) that are maximized for equipment capabilities, assure the pressure drop is less than the fans capability.
- Demand-Controlled Ventilation (DCV) systems using Carbon Dioxide (CO2) sensors are installed, operate systems to maintain maximum CO2 concentrations of 800-1,000 Parts Per Million (ppm) in occupied spaces:**
- Perform initial air flush of all spaces prior to occupants re-entering building:**
 - Mechanical systems should operate in occupied mode for minimum period of one week prior to students returning (may be completed at same time as teachers start returning to building) while assuring the outside air dampers are open.

Cleaning and Air Flush: Daily

- Daily flush prior to occupancy: Mechanical Systems should be operated in occupied mode (including normal or peak outside air rate introduced to each space) for minimum period of 2 hours prior to occupants re-entering building.
- Cleaning:
 - All areas that have been occupied after previous cleaning efforts should be re-cleaned.
 - All restrooms should be thoroughly cleaned.
 - All food preparation areas should be thoroughly cleaned.
 - Any spaces not previously cleaned should have all accessible surfaces properly cleaned.

Boilers: Monthly

- For systems with Steam Boilers, develop a schedule that provides minimum supervision on-site.
- Perform chemical testing of system water. Verify water treatment target levels are being maintained.
- For systems using fuel oil:
 - Check fuel pump for proper operation.
 - Inspect fuel filter; clean and verify proper operation.
- For systems using natural gas:
 - Check gas pressure, gas valve operation, and combustion fan operation.
 - Check for evidence of leakage of fuel supply, heat transfer fluid, and flue gas.
- Verify proper operation of safety devices per manufacturer's recommendations.

Chilled Water, Hot Water and Condenser Water Systems: Monthly

- Perform chemical testing of system water. Verify water treatment target levels are being maintained.
- Check the control system and devices for evidence of improper operation.
- Verify control valves operate properly.
- Check variable-frequency drives for proper operation.

Air Cooled Chillers: Monthly

- Check the refrigerant system for evidence of leaks.
- Check and clean fan blades and fan housing.
- Check coil fins and check for damage.
- Check for proper evaporator fluid flow and for fluid leaks.

Water Cooled Chillers: Monthly

- Check the refrigerant system for evidence of leaks.
- Check for proper evaporator and condenser fluid flow and for fluid leaks.
- Check compressor oil level and/or pressure on refrigerant systems having oil level and/or pressure measurement means.

Cooling Towers and Evaporative-Cooled Devices Monthly

- Perform chemical testing of system water. Verify water treatment target levels are being maintained.
- Check chemical injector device for proper operation.
- Check conductivity and other sensors for proper readings.
- Check the control system and devices for evidence of improper operation.
- Check variable frequency drive for proper operation.
- Check for proper condenser water flow and for leaks.
- Check for proper damper operation.
- Inspect pumps and associated electrical components for leaks and normal operation.
- Verify control valves operate properly.

Steam Distribution Systems: Monthly

- Perform chemical testing of system condensate and feed water.
- Check piping for leaks.
- Check steam traps and condensate return units for proper operation.
- Check safety devices per manufacturer's recommendations.
- Verify control valves operate properly.

HVAC Water Distribution Systems: Monthly

- Perform chemical testing of system water. Verify water treatment target levels are being maintained.
- Check for proper fluid flow and for fluid leaks. If necessary, vent air from system high points and verify backflow preventers and pressure regulating valves on makeup water lines are functioning properly.
- Check expansion tanks and bladder type compression tanks have not become waterlogged.
- Verify control valves operate properly.

Pumps: Annually

- Inspect pumps and associated electrical components for proper operation.
- Check variable-frequency drive for proper operation.
- Check the control system and devices for evidence of improper operation.

Air Handling Units: Monthly

- Check for particulate accumulation on filters, replace filter as needed.
- Check P-trap on drain pan.
- Check the control system and devices for evidence of improper operation.
- Check variable-frequency drive for proper operation.
- Check drain pans for cleanliness and proper slope.
- Verify control dampers operate properly.
- Confirm AHU is bringing in outdoor air and removing exhaust air as intended.
- Verify filters are installed correctly.
- Follow filter replacement policy.
- Review condition of cooling coils in air handling equipment.

Roof Top Units: Monthly

- Check for particulate accumulation on outside air intake screens and filters. Replace filter as needed.
- Check P-trap.
- Check drain pans for cleanliness and proper slope.
- Check the control system and devices for evidence of improper operation.
- Check variable frequency drive for proper operation.
- Check refrigerant system for leaks.
- Check for evidence of leaks on gas heat section heat-exchanger surfaces.
- For fans with belt drives, inspect belts and adjust as necessary.
- Verify control dampers operate properly.

Unitary and Single Zone Equipment (For example: Wall Hung Units, Unit Ventilators, Mini-Splits, Packaged Terminal Air Conditioners, Water-Source Heat Pumps, Fan Coil Units): Monthly

- Check for particulate accumulation on filters, replace filter as needed.
- Check P-trap.
- Check drain pans for cleanliness and proper slope.
- Check the control system and devices for evidence of improper operation.
- Verify control dampers operate properly.