


Appendix A: CHD Exam Blueprint

	Complexity Level and Number of Items			
	Recall	Application	Analysis	TOTALS
1. SYSTEM DESIGN	8	24	8	40
A. Size supply, return, and exhaust ducts.				
B. Prepare HVAC zoning plans and sensor locations in accordance with building design.				
C. Prepare control sequences and schematics.				
D. Design ductwork and piping including shaft and ceiling space requirements.				
E. Differentiate and design HVAC system types (e.g., variable air volume, VRF, radiant, thermal storage, underfloor systems, perimeter and process systems).				
F. Design HVAC flow diagrams.				
G. Design duct and fluid systems to minimize pressure loss and resultant power requirements.				
H. Select HVAC system based on calculations (e.g., AHUs, fans, pumps, chillers, cooling towers).				
I. Design proper air diffusion and devices following codes and standards.				
J. Develop a detailed HVAC design based on the approved preliminary building design concept and site information.				
K. Prepare HVAC schematics, plan drawings, elevation views, section views, and installation details.				
L. Select diffusers and grilles to meet thermal comfort and ventilation needs and coordinate with architectural plans (e.g., ceiling grid, under floor systems, sidewalls, architectural specialties, transfers).				
M. Evaluate proposed building design concept modifications for HVAC implications.				
N. Integrate new system technologies into HVAC design (e.g., VRF, ECM motor control, integrated automation).				
O. Research and confirm capacities of existing equipment and obtain shop drawings of existing equipment (e.g., air handling systems, chillers, cooling towers).				
P. Prepare HVAC demolition drawings of the equipment and systems that must be moved or relocated to accomplish retrofit.				
Q. Recommend system design options to minimize machine or system down time (e.g., N+1, 2N, fan array, direct drive fans, VRF).				
R. Recommend system configurations to facilitate future maintenance (e.g., system access, coil pull space, motor replacement, safety concerns).				
S. Design for balancing air and fluid systems (e.g., balancing dampers, balance valves, self-balancing control valves).				
T. Prepare ductwork and piping flow diagrams to convey the design intent (e.g., primary/secondary systems, pumping and isolation systems, duct loops, exhaust risers with sub-ducts).				



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	8	24	8	40
U. Design piping and ductwork layout based on calculated sizing and required routing.				
V. Select expansion tanks.				
W. Select major airside units.				
X. Size major heating plant components.				
Y. Design leak detection systems.				
Z. Select major cooling plant components:				
1. fans.				
2. coils				
3. piping.				
4. pumps.				
2. DESIGN CALCULATIONS	6	6	18	30
A. Calculate HVAC system requirements (e.g., water flows, airflows, pump heads, suction heads, expansion compensation).				
B. Assist in the preparation of project estimates for comparative system selection (e.g., installed cost, operating cost, space limitations, water availability, power requirements).				
C. Calculate all piping and ductwork sizing based on flow rates received from the project engineer and adapted in size and route to comply with the existing physical constraints.				
D. Adjust thermal load or HVAC requirement estimates based on modifications to building.				
E. Calculate head loss through the critical path.				
F. Calculate heat loads for each assigned space in the building.				
G. Calculate the building load heat loss and gain.				
H. Calculate external static and total pressures for air distribution units and specify in the equipment schedule.				
I. Calculate ventilation rate requirements by space use, thermal comfort parameters, and air quality per applicable codes and standards.				
J. Design piping system to account for various fluid properties (e.g., freeze protection, fluid expansion compensation, fluid density, transfer capacity).				



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		Recall	Application	Analysis	TOTALS
3. PROCEDURAL		4	6	0	10
A.	Analyze buildings, building designs or HVAC plans for compliance with applicable codes, standards and regulations.				
B.	Apply Building Information Modeling (BIM) standards throughout drawing production.				
C.	Review shop drawings and equipment submittals for compliance with contract documents.				
D.	Interpret design documents during bidding/tender and construction phases.				
E.	Review and comply with HVAC codes and standards.				
F.	Verify and document as-built field conditions for existing structures.				
G.	Verify and document as-built field conditions for projects in construction.				
H.	Perform periodic field investigations to (e.g., punch-lists, quality control, shop drawings).				
I.	Perform review of Request For Information (RFI) and incorporate into bidding/tender documents.				
J.	Prepare HVAC documentation for building permit application and coordinate with Authority Having Jurisdiction (AHJ).				
K.	Incorporate field "as-built" documents into final documents.				
4. COORDINATION		8	12	0	20
A.	Assist in the development of the Basis of Design.				
B.	Review HVAC drawings with Commissioning Authority.				
C.	Coordinate space requirements for HVAC equipment placement with other design team members.				
D.	Modify the HVAC design documents concept based on the outcome of the design team reviews.				
E.	Coordinate system expansion compensation design with structural engineer and piping vendor (e.g., thrust blocks, expansion joints, anchor points).				
F.	Analyze architectural plans, sections, and elevations for use in HVAC design.				
G.	Comply with client specifications and performance requirements to determine mechanical designs.				
H.	Collaborate in the development of HVAC systems and design parameters.				
I.	Review architectural life safety plan relative to mechanical plan and apply fire and smoke damper requirements.				
J.	Coordinate with life and safety engineer to design the smoke management and ventilation system per fire code and regulation.				
K.	Coordinate with other design team members during each design phase (e.g., architects, structural designers, plumbing designers, electrical designers).				



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				TOTALS
	Recall	Application	Analysis	
L. Coordinate HVAC implications for the building electrical loads and electrical space mechanical requirements with electrical design team members.				
M. Coordinate with structural engineer for HVAC requirements (e.g., duct and piping runs, anchorage, seismic bracing, sound isolation, support requirements, vibration).				
N. Coordinate with project design and construction schedules.				
O. Coordinate electrical requirements for HVAC equipment.				
P. Coordinate requirements of HVAC system for domestic water and waste with plumbing designer.				
Q. Coordinate with acoustical engineer for selection of ventilation equipment including sizing of ventilation distribution and air handling equipment to meet designated sound pressure levels.				
R. Coordinate with energy modeler for HVAC system input.				
S. Coordinate site piping and utility requirements with civil engineer.				
T. Coordinate with vendors to prepare equipment schedules.				
U. Review drawings and identify potential obstructions that may impact the HVAC system (e.g., structural, fire proofing, lighting, sprinklers, walls).				
Totals	26	48	26	100

11-13-18