HVAC DESIGN BRIEF

The Downtowner, Lake Geneva, WI

- Desapex Engineering Consultants

Architecture by :
Open Designs, Madison

HVAC System by :
Desapex, Bengaluru

THE DOWNTOWNER -OVERVIEW

- The Downtowner is a vacation house in Lake Geneva, WI, USA.
- Buildings has a Basement, 1st and 2nd floors.
- 1st and 2nd are occupiable with Bedrooms/Dining rooms.
- Basement floor is dedicated for services.

WEATHER CONDITIONS

- Lake Geneva is extremely cold during winters & moderately warm during summers.
- Due to unavailability of weather data for Lake Geneva, weather data of Kenosha is considered.

KENOSHA RGNL, WI, USA WMO#: **726505**

Lat: **42.60N** Long: **87.94W** Elev: **745** StdP: **14.3** Time Zone: **-6 (NAC)** Period: **97-10** WBAN: **4845**

Annual Heating and Humidification Design Conditions

	Coldest Month	Heating DB		Humidification DP/MCDB and HR						Coldest month WS/MCDB				MCWS/PCWD to 99.6% DB	
				99.6%			99%			0.4%		1%			
		99.6%	99%	DP	HR	MCDB	DP	HR	MCDB	WS	MCDB	WS	MCDB	MCWS	PCWD
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)
(1)	1	-1.7	2.8	-10.8	3.2	-1.2	-6.2	4.0	4.9	27.0	25.5	24.8	27.9	9.8	280

Annual Cooling, Dehumidification, and Enthalpy Design Conditions

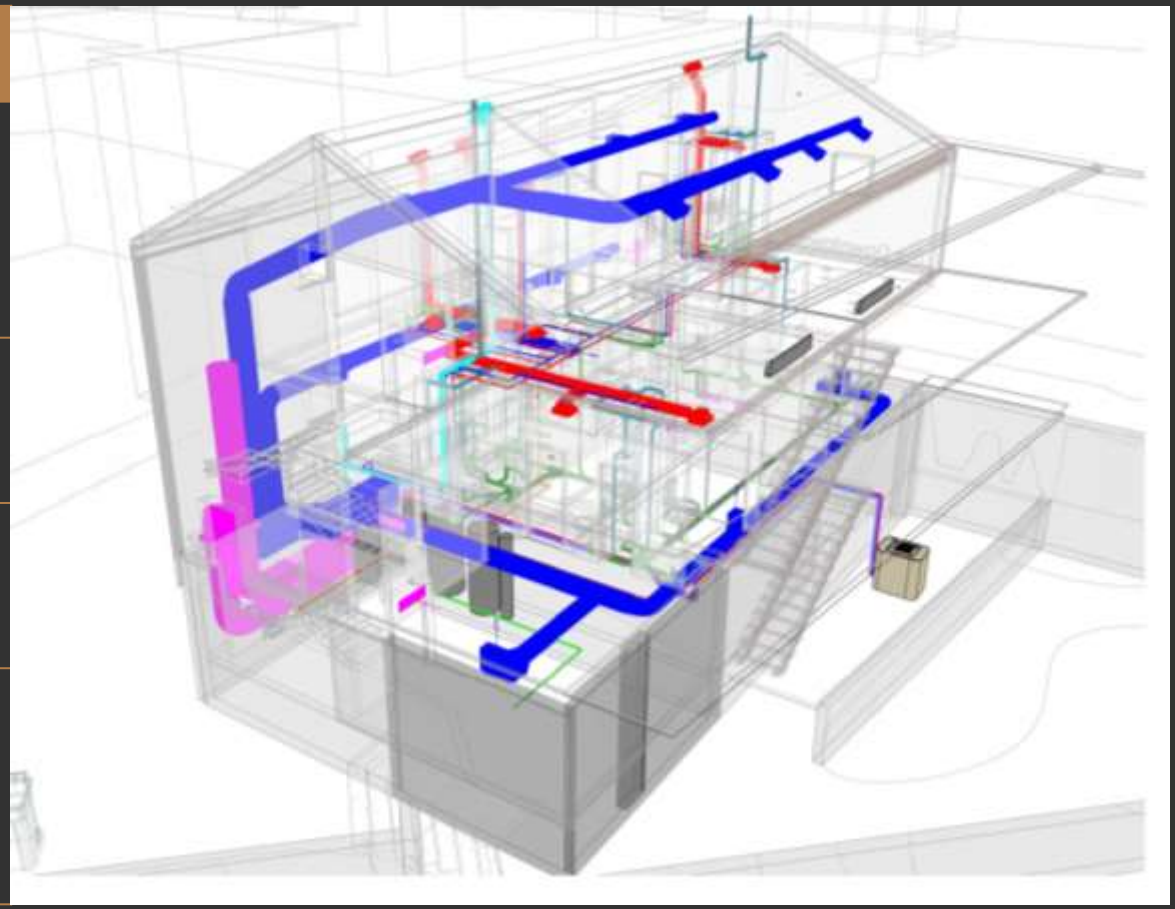
	Hottest Month	Hottest Month DB Range	Cooling DB/MCWB						Evaporation WB/MCDB						MCWS/PCWD to 0.4% DB	
			0.4%		1%		2%		0.4%		1%		2%			
			DB	MCWB	DB	MCWB	DB	MCWB	WB	MCDB	WB	MCDB	WB	MCDB	MCWS	PCWD
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
(2)	7	20.1	89.9	74.7	87.0	73.3	83.7	71.8	76.9	86.3	75.1	83.5	73.4	81.0	12.7	230

SYSTEM DESIGN TARGET

- Safety, Comfort and Energy are the guiding principles for our system design..
- Meet the comfort condition during winter by heating (70 F)
- During Summer to meet comfort condition by cooling (75 F & 50% RH).
- Reduce the energy consumption of HVAC system without compromise on comfort.
- Reduce noise generated by HVAC components.
- Select value engineered system to reduce project cost.

SYSTEM SUMMARY

System	Capacity	Type of equipment
Heating	70,000 Btu/hr	Gas fired furnace with 1900 CFM flowrate & 1.2" WC ESP
Cooling	60,000 Btu/hr	Variable speed system - 5TR capacity
Toilet Ventilation	50 CFM & 0.25" WC	fan with EC motor ceiling/wall mounting
Air distribution System	Duct supply & free/ducted return	Supply Air & Return air grills with damper.



HVAC CONTROL PHILOSOPHY

- Furnace/cooling system airflow rate controlling via manufacturer supplied thermostat.
- Furnace blower shall be suitable for variable flow operation to reduce energy consumption.
- The condensing unit is having variable speed compressor to reduce energy during cooling operations.
- To facilitate air balancing all supply & return air grilles are with dampers.
- Toilet ventilation fan operation to be interlocked with toilet/bathroom lighting switch to reduce energy.

CHECKLISTS

- Ensure that service clearance for furnace and outdoor unit (condensing unit) is available.
- Insulate refrigerant pipes and evaporator coil casing.
- Clean the filters periodically as suggested by manufacturer to ensure clean air to rooms.
- Air balancing of supply & return air system is must to ensure design air flow rate to each rooms.
- Ensure proper sealing for envelop components (wall, windows, Doors) to avoid extra load on heating/cooling system.
- Manufacturer operation & service guidelines to be followed at all times.

DESIGN REFERENCES

- ASHRAE Standard 62.1, 90.1 & 55.
- ASHRAE Fundamentals 2013
- ASHRAE Applications 2011
- ASHRAE Systems & Equipment 2015
- International Mechanical Code 2015
- Wisconsin SPS 363 & 364.