Dover High School and Career Technical Center

HIGH PERFORMANCE CHARRETTE

June 2, 2015

HMFH Architects, Inc.

Dover High School and Career Technical Center

- Laura Wernick FAIA, REFP, LEED AP—Project Director
- Tina Stanislaski AIA, LEED AP—Project Manager
- Bobby Williams AIA, LEED AP—Project Architect
- Chin Lin AIA, LEED AP—Architect for Sustainability

Consultants

- Carlos DeSousa PE—M/E/P Project Manager
- Keith Lane PE— M/E/P
- Erin Lambert PE—Civil Project Manager

HMFH Architects, Inc.

AGENDA

• **Introduction – Project Overview**	10 min
• **Public Comments**	20 min
• **Review of LEED Scorecard**	20 min
• **Focus Areas**	
Energy and Atmosphere Renewable Energy / PV Energy Efficiency Measures Utility Incentives	60 min
Indoor Environmental Quality	30 min
Water Efficiency	15 min
Sustainable Sites	20 min
• **Other Goals**	30 min
• **Next Steps**	5 min

PROJECT OVERVIEW

- **1,500 Students**
- **9th – 12th Grade**
- **Approx. 305,000 S.F.**
- **Full Rehabilitation - Addition/Renovation - New Construction**
- **Now in Feasibility Study**
- **Estimated Construction Start - Summer of 2016**
- **Occupancy in Fall of 2018**

PUBLIC COMMENT

LEED 2009 SCORECARD

SUSTAINABLE SITES — 24 Points

Yes	?	No			
Y			Prereq 1	Construction Activity Pollution Prevention	Required
Y			Prereq 2	Environmental Site Assessment	Required
1			Credit 1	Site Selection	1
		4	Credit 2	Development Density and Community Connectivity	4
1			Credit 3	Brownfield Redevelopment	1
		6	Credit 4.1	Alternative Transportation - Public Transportation Access	4
	1		Credit 4.2	Alternative Transportation - Bicycle Storage and Changing Rooms	1
2			Credit 4.3	Alternative Transportation - Low-Emitting and Fuel-Efficient Vehicles	2
2			Credit 4.4	Alternative Transportation - Parking Capacity	2
1			Credit 5.1	Site Development - Protect or Restore Habitat	1
1			Credit 5.2	Site Development - Maximize Open Space	1
1			Credit 6.1	Stormwater Design - Quantity Control	1
	1		Credit 6.2	Stormwater Design - Quality Control	1
		1	Credit 7.1	Heat Island Effect - Nonroof	1
1			Credit 7.2	Heat Island Effect - Roof	1
1			Credit 8	Light Pollution Reduction	1
1			Credit 9	Site Master Plan	1
1			Credit 10	Joint Use of Facilities	1

WATER EFFICIENCY — 11 Points

Yes	?	No			
3	3	4			
Y			Prereq 1	Water Use Reduction	Required
		4	Credit 1	Water Efficient Landscaping	2 to 4
				50% Reduction	2
				No Potable Water Use or Irrigation	4
	2		Credit 2	Innovative Wastewater Technologies	2
3			Credit 3	Water Use Reduction	2 to 4
				30% Reduction	2
				35% Reduction	3
				40% Reduction	4
	1		Credit 4	Process Water Use Reduction	1

ENERGY & ATMOSPHERE — 33 Points

Yes	?	No			
12	13				
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	Required
Y			Prereq 2	Minimum Energy Performance	Required
Y			Prereq 3	Fundamental Refrigerant Management	Required
9	2		Credit 1	Optimize Energy Performance	1 to 19
				Improve by 12% for New Buildings or 8% for Existing Building Renovations	1
				Improve by 14% for New Buildings or 10% for Existing Building Renovations	2
				Improve by 16% for New Buildings or 12% for Existing Building Renovations	3
				Improve by 18% for New Buildings or 14% for Existing Building Renovations	4
				Improve by 20% for New Buildings or 16% for Existing Building Renovations	5
				Improve by 22% for New Buildings or 18% for Existing Building Renovations	6
				Improve by 24% for New Buildings or 20% for Existing Building Renovations	7
				Improve by 26% for New Buildings or 22% for Existing Building Renovations	8
				Improve by 28% for New Buildings or 24% for Existing Building Renovations	9
				Improve by 30% for New Buildings or 26% for Existing Building Renovations	10
				Improve by 32% for New Buildings or 28% for Existing Building Renovations	11
				Improve by 34% for New Buildings or 30% for Existing Building Renovations	12
				Improve by 36% for New Buildings or 32% for Existing Building Renovations	13
				Improve by 38% for New Buildings or 34% for Existing Building Renovations	14
				Improve by 40% for New Buildings or 36% for Existing Building Renovations	15
				Improve by 42% for New Buildings or 38% for Existing Building Renovations	16
				Improve by 44% for New Buildings or 40% for Existing Building Renovations	17
				Improve by 46% for New Buildings or 42% for Existing Building Renovations	18
				Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19
	7		Credit 2	On-Site Renewable Energy	1 to 7
				1% Renewable Energy	1
				3% Renewable Energy	2
				5% Renewable Energy	3
				7% Renewable Energy	4
				9% Renewable Energy	5
				11% Renewable Energy	6
				13% Renewable Energy	7
2			Credit 3	Enhanced Commissioning	2
1			Credit 4	Enhanced Refrigerant Management	1
	2		Credit 5	Measurement and Verification	2
	2		Credit 6	Green Power	2

MATERIALS & RESOURCES — 13 Points

Yes	?	No			
5	4	4			
Y			Prereq 1	Storage and Collection of Recyclables	Required
1	1		Credit 1.1	Building Reuse - Maintain Existing Walls, Floors and Roof	1 to 2
				Reuse 75%	1
				Reuse 95%	2
	1		Credit 1.2	Building Reuse - Maintain Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2
				50% Recycled or Salvaged	1
				75% Recycled or Salvaged	2
		2	Credit 3	Materials Reuse	1 to 2
				5% Reuse	1
				10% Reuse	2
1	1		Credit 4	Recycled Content	1 to 2
				10% of Content	1
				20% of Content	2
1	1		Credit 5	Regional Materials	1 to 2
				10% of Materials	1
				20% of Materials	2
		1	Credit 6	Rapidly Renewable Materials	1
1			Credit 7	Certified Wood	1

INDOOR ENVIROMENTAL QUALITY — 19 Points

Yes	?	No			
16	3				
Y			Prereq 1	Minimum Indoor Air Quality Performance	Required
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
Y			Prereq 3	Minimum Acoustical Performance	Required
1			Credit 1	Outdoor Air Delivery Monitoring	1
1			Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction Indoor Air Quality Management Plan - During Construction	1
1			Credit 3.2	Construction Indoor Air Quality Management Plan - Before Occupancy	1
4			Credit 4	Low-Emitting Materials	Up to 4
				4.1 - Adhesives & Sealants	1
				4.2 - Paints & Coatings	1
				4.3 - Flooring Systems	1
				4.4 - Composite Wood & Agrifiber Products	1
				4.5 - Furniture & Furnishings	1
				4.6 - Ceiling & Wall Systems	1
1			Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems - Lighting	1
1			Credit 6.2	Controllability of Systems - Thermal Comfort	1
1			Credit 7.1	Thermal Comfort - Design	1
	1		Credit 7.2	Thermal Comfort - Verification	1
2	1		Credit 8.1	Daylight and Views	1 to 3
				75% of classrooms	1
				90% of classrooms	2
				75% of other spaces	2 to 3
1			Credit 8.2	Daylight and Views - Views	1
	1		Credit 9	Enhanced Acoustical Performance	1
1			Credit 10	Mold Prevention	1

INNOVATION IN DESIGN — 6 Points

Yes	?	No			
3	3				
2	2		Credit 1	Innovation in Design	1 to 4
				Innovation or Exemplary Performance- Enhanced Cx Envelope EAc3	1
				Innovation or Exemplary Performance- 95% FSC MRc6	1
				Innovation or Exemplary Performance- Stormwater SS6.1/6.2	1
				Innovation Joint Use of Facilities SSc10	1
1			Credit 2	LEED® Accredited Professional	1
	1		Credit 3	School as a Teaching Tool	1

REGIONAL PRIORITY — 4 Points

Yes	?	No			
1	3				
1	3		Credit 1	Regional Priority	1 to 4
				Regionally Defined Credit Achieved- Brownfield Redevelopment SSc2	1
				Regionally Defined Credit Achieved- Stormwater Quanity SS c6.1	1
				Regionally Defined Credit Achieved- Innovative Wastewater Tech WE c2	1
				Regionally Defined Credit Achieved- On Site Renewables EAc2	1

Yes	?	No		
53	31	17	PROJECT TOTALS (Certification Estimates)	110 Points

Certified: 40-49 points Silver: 50-59 points Gold: 60-79 points Platinum: 80+ points

GOALS

- **What is important to Dover?**
- **What should be included in the project?**
- **What are the priorities?**
- **Aim to speak about Goals, NOT Measures or Options**
  - **Renewable Energy or Reduce Greenhouse Gas Emissions are Goals**
  - **Photovoltaics is an Option**

HIGH PERFORMANCE GOALS:
ENERGY AND ATMOSPHERE

Yes	?	No			
12	13		ENERGY & ATMOSPHERE		33 Points
Y			Prereq 1	**Fundamental Commissioning of Building Energy Systems**	**Required**
Y			Prereq 2	**Minimum Energy Performance**	**Required**
Y			Prereq 3	**Fundamental Refrigerant Management**	**Required**
9	2		Credit 1	**Optimize Energy Performance**	**1 to 19**
				Improve by 12% for New Buildings or 8% for Existing Building Renovations	1
				Improve by 14% for New Buildings or 10% for Existing Building Renovations	2
				Improve by 16% for New Buildings or 12% for Existing Building Renovations	3
				Improve by 18% for New Buildings or 14% for Existing Building Renovations	4
				Improve by 20% for New Buildings or 16% for Existing Building Renovations	5
				Improve by 22% for New Buildings or 18% for Existing Building Renovations	6
				Improve by 24% for New Buildings or 20% for Existing Building Renovations	7
				Improve by 26% for New Buildings or 22% for Existing Building Renovations	8
				Improve by 28% for New Buildings or 24% for Existing Building Renovations	9
				Improve by 30% for New Buildings or 26% for Existing Building Renovations	10
				Improve by 32% for New Buildings or 28% for Existing Building Renovations	11
				Improve by 34% for New Buildings or 30% for Existing Building Renovations	12
				Improve by 36% for New Buildings or 32% for Existing Building Renovations	13
				Improve by 38% for New Buildings or 34% for Existing Building Renovations	14
				Improve by 40% for New Buildings or 36% for Existing Building Renovations	15
				Improve by 42% for New Buildings or 38% for Existing Building Renovations	16
				Improve by 44% for New Buildings or 40% for Existing Building Renovations	17
				Improve by 46% for New Buildings or 42% for Existing Building Renovations	18
				Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19
	7		Credit 2	**On-Site Renewable Energy**	**1 to 7**
				1% Renewable Energy	1
				3% Renewable Energy	2
				5% Renewable Energy	3
				7% Renewable Energy	4
				9% Renewable Energy	5
				11% Renewable Energy	6
				13% Renewable Energy	7
2			Credit 3	**Enhanced Commissioning**	**2**
1			Credit 4	**Enhanced Refrigerant Management**	**1**
	2		Credit 5	**Measurement and Verification**	**2**
	2		Credit 6	**Green Power**	**2**

BUILDING ENVELOPE

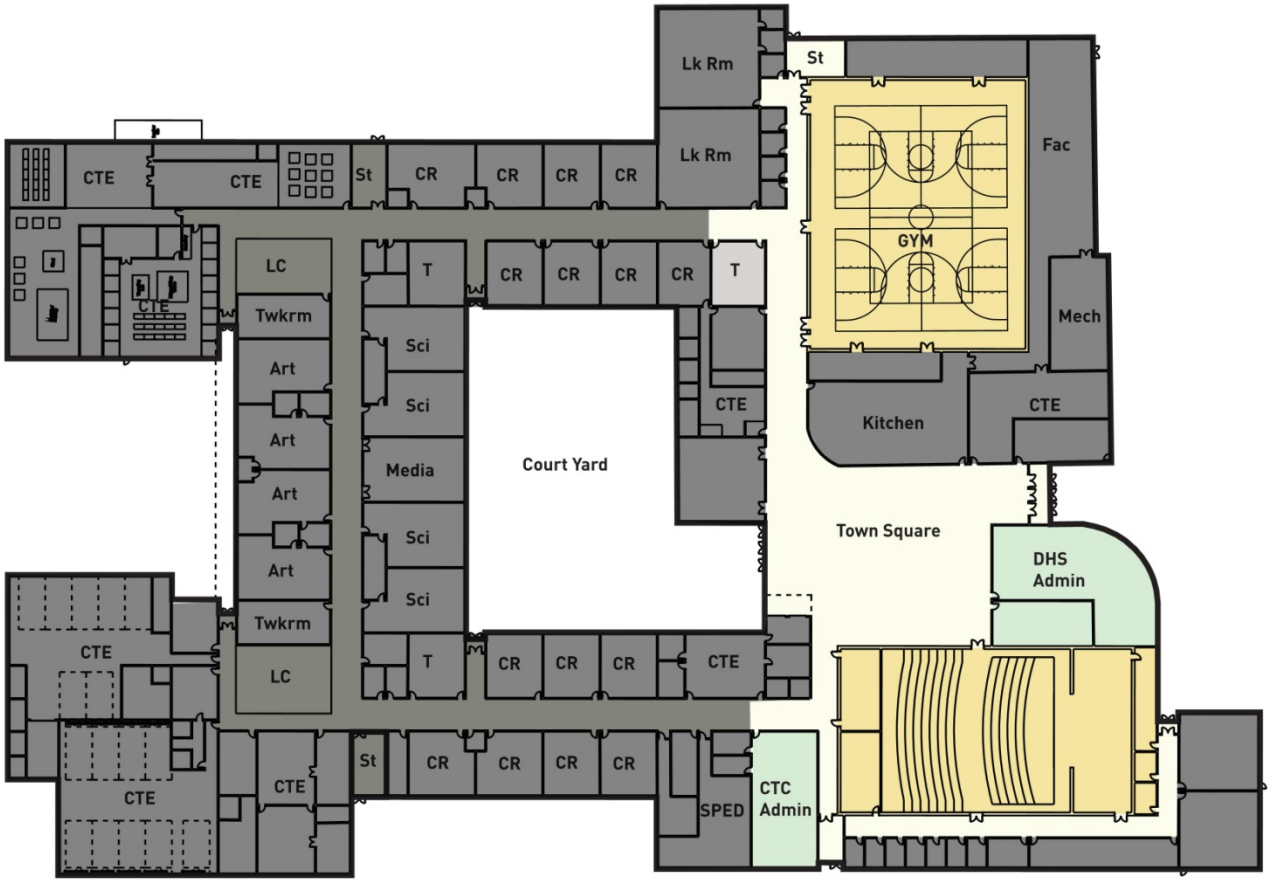
- **Roof: R 30**
- **Wall: R 16.09**
- **Window: U 0.3**
- **Window area: 25% +/-**

BUILDING USE SCHEDULE

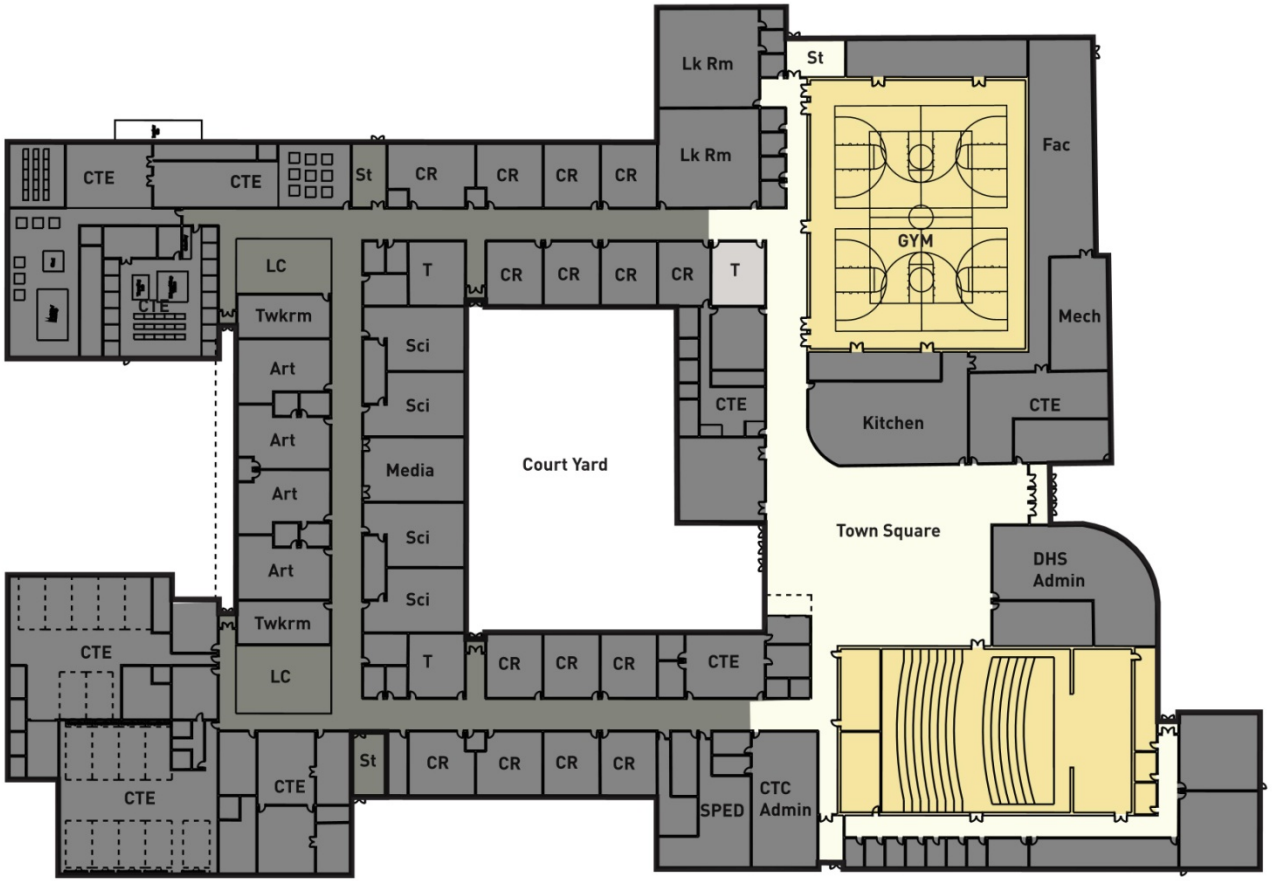
- **Normal School Day**
- **Vacation Weeks**
- **Weekends**
- **Summer Schedule / Summer School?**
- **Times of Partial Occupancy? Use Zones?**

BUILDING USE NORMAL SCHOOL DAY

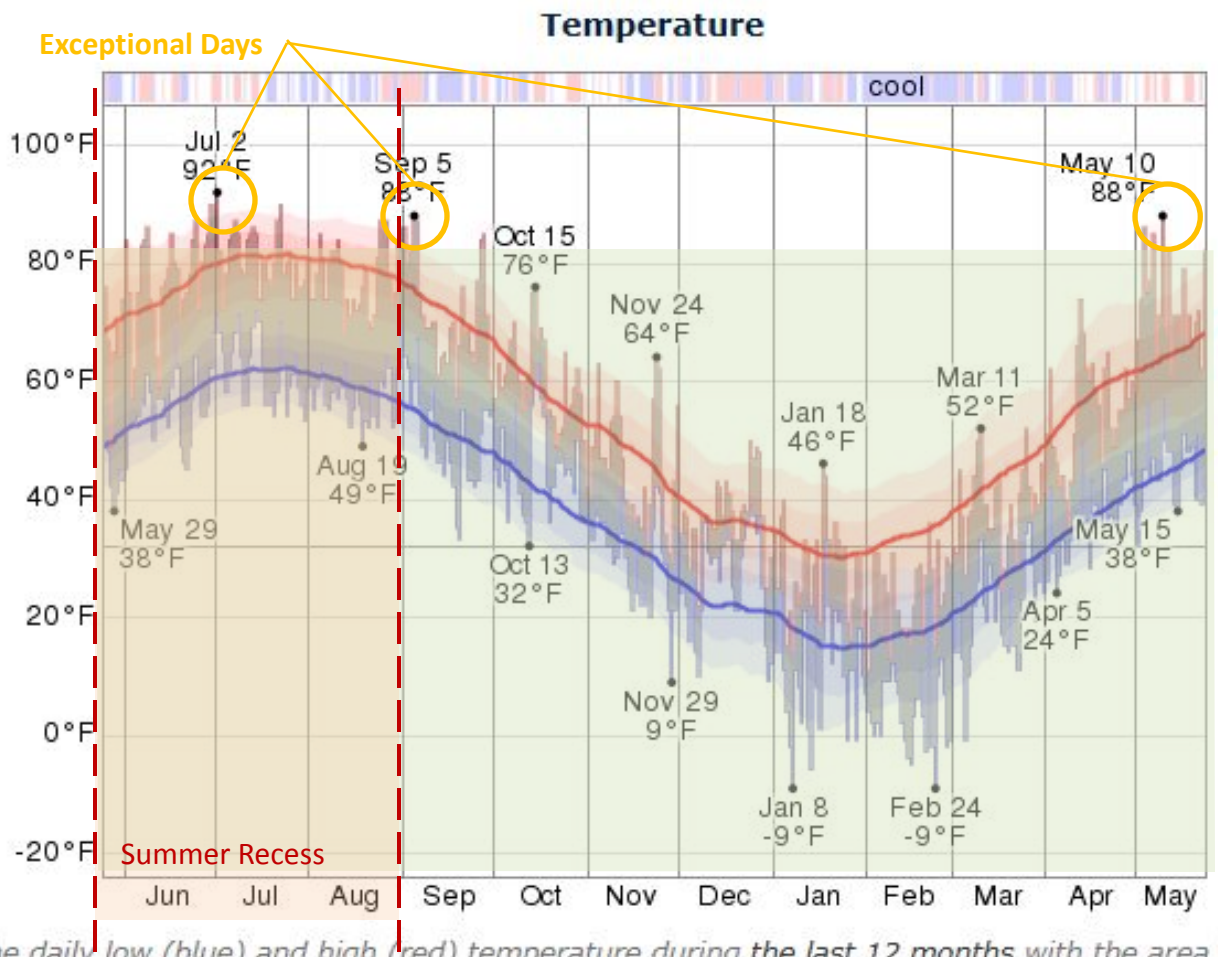
BUILDING USE AFTER HOURS



BUILDING USE VACATION/ SUMMER

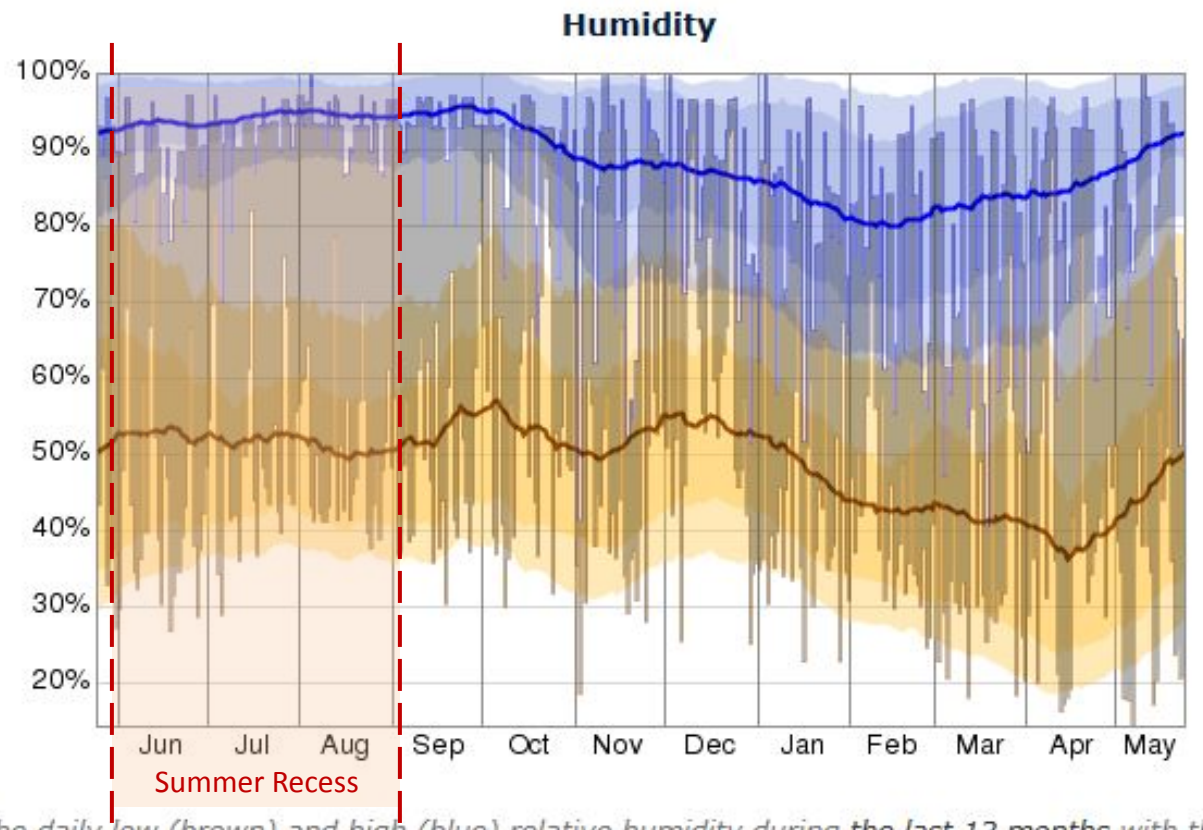


LOCATION: Dover, NH



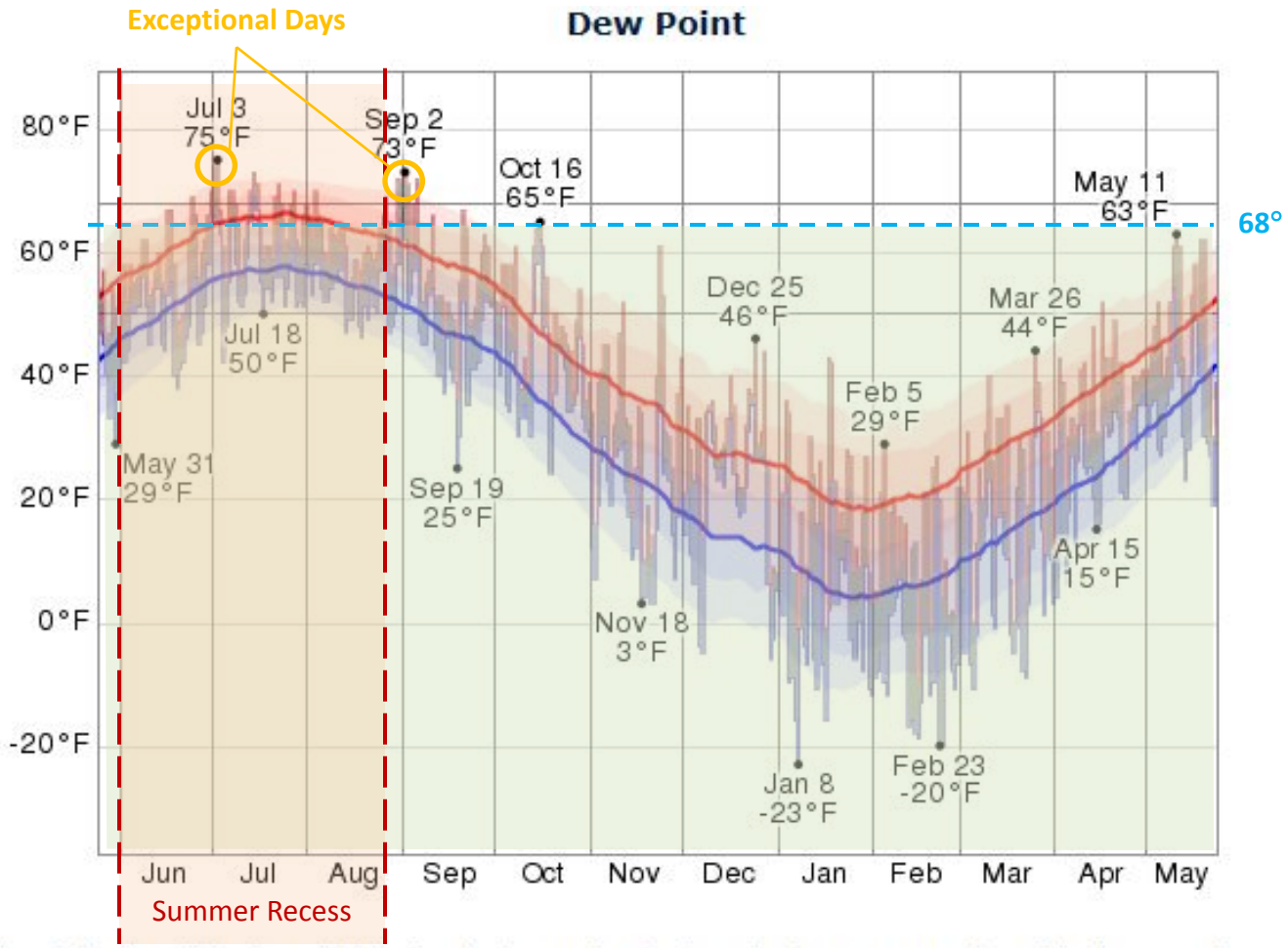
*The daily low (blue) and high (red) temperature during **the last 12 months** with the area between them shaded gray and superimposed over the corresponding averages (thick lines), and with percentile bands (inner band from 25th to 75th percentile, outer band from 10th to 90th percentile). The bar at the top of the graph is red where both the daily high and low are above average, blue where they are both below average, and white otherwise.*

LOCATION: Dover, NH



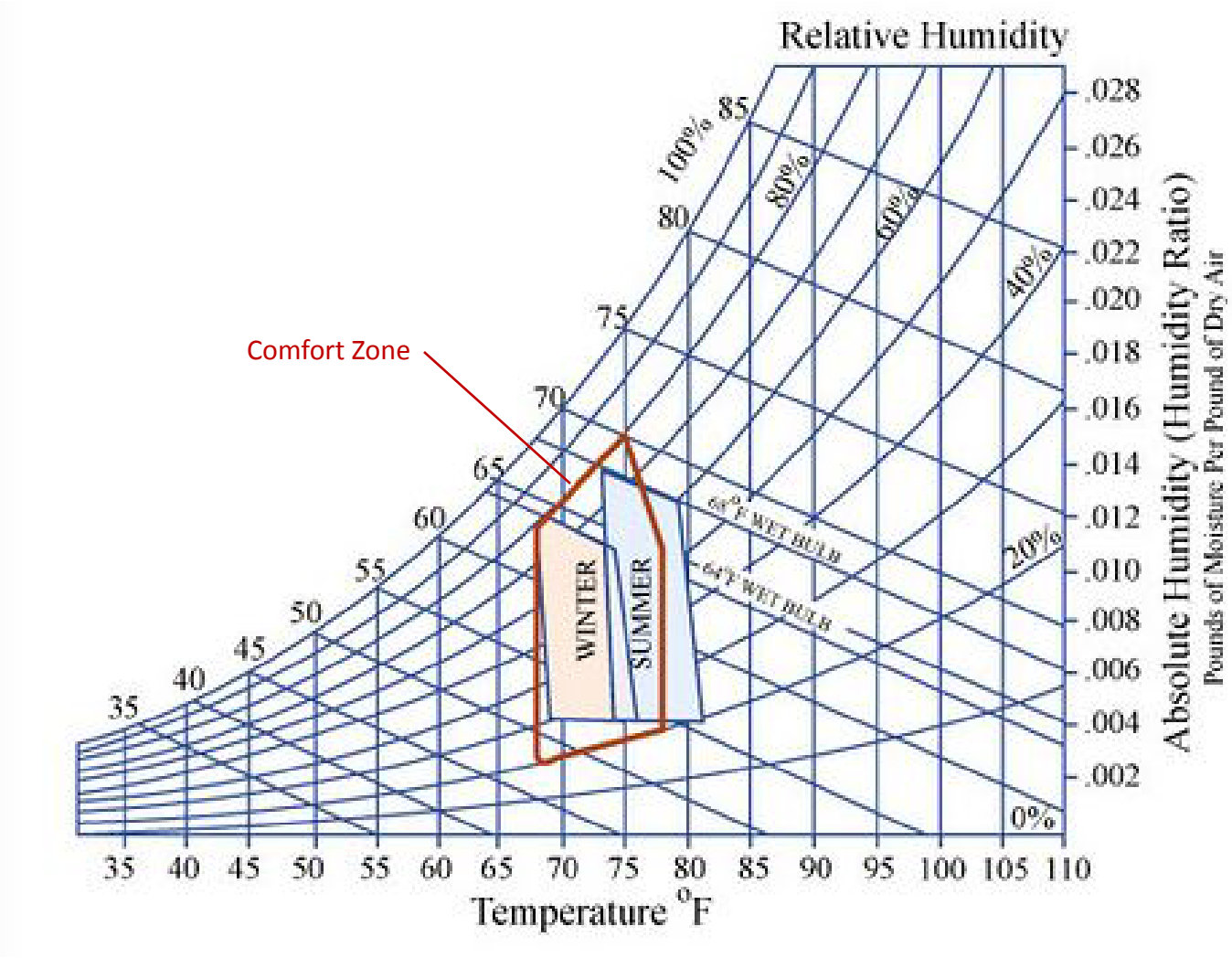
*The daily low (brown) and high (blue) relative humidity during **the last 12 months** with the area between them shaded gray and superimposed over the corresponding averages (thick lines), and with percentile bands (inner band from 25th to 75th percentile, outer band from 10th to 90th percentile).*

LOCATION: Dover, NH



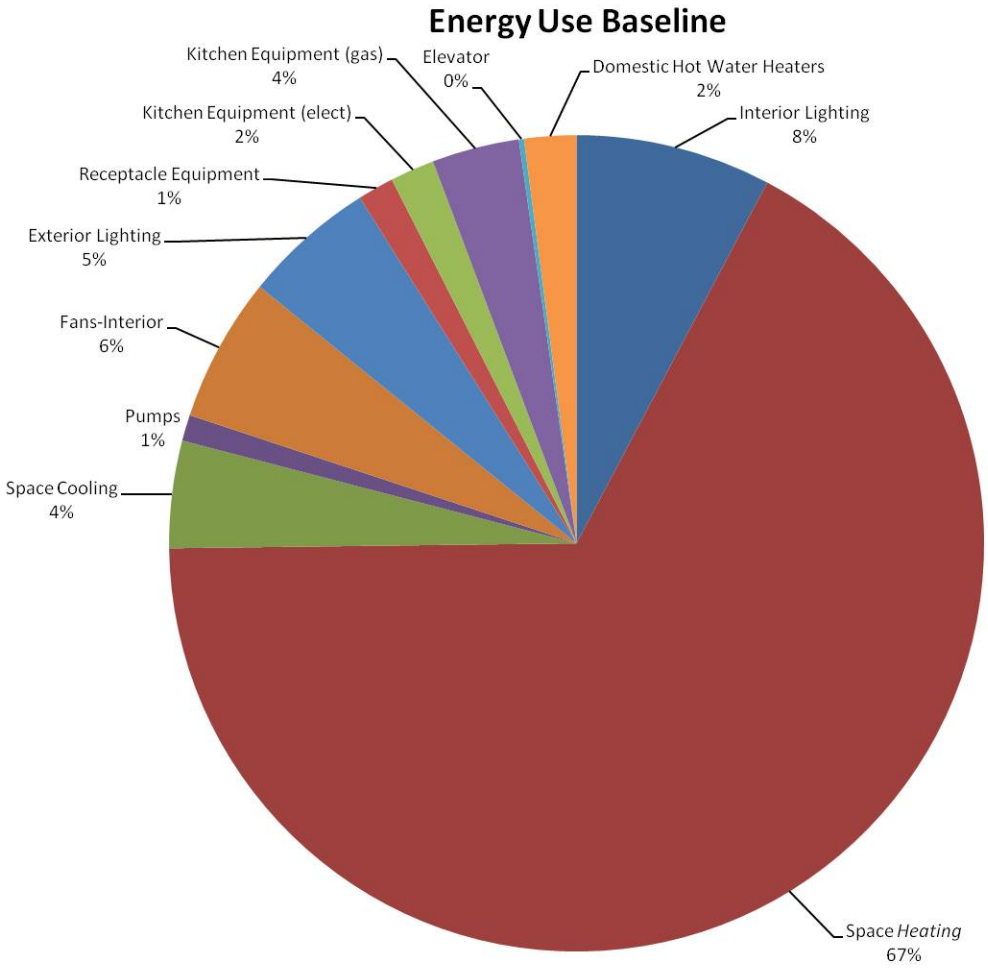
The daily low (blue) and high (red) dew point during the last 12 months with the area between them shaded gray and superimposed over the corresponding averages (thick lines), and with percentile bands (inner band from 25th to 75th percentile, outer band from 10th to 90th percentile).

EXPECTATION FOR HUMAN COMFORT

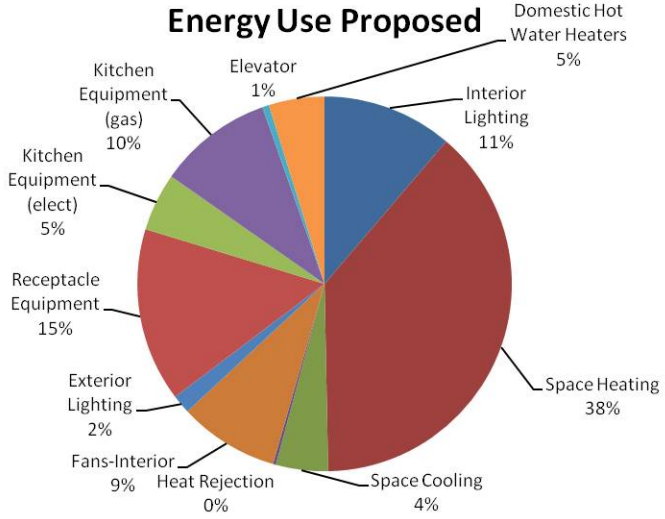


WHERE IS THE ENERGY USED?

(Example from Pell Elementary School in Newport, R.I.)



Total Energy Use: 10,437,407 kBTU



Total Energy Use: 3,655,633 kBTU

PAYBACK ANALYSIS

(Example from Pell Elementary School in Newport, R.I.)

Superior Energy Efficiency Measures for Newport Elementary School
(To Provide Energy Savings Greater Than 40% Better Than Code, Assuming Current Design is 30% Better Than Code)

Item #	Description of Energy Efficient Design	Capacity	Cost Add (Note 1)	Approximate Expected % Savings (Note 2)	Simple Payback (Years)	Remarks
1	Lighting	Change from 0.75 w/s.f. (Base Design) to 0.6 w/s.f. (Superior Efficiency)	$53,550	4.7%	8.9	There are rebates for LED lighting likely to reduce payback to 3 years
2	Photovoltaics	30 kW	$150,000	5.0%	24.8	Cost Estimate based on $5/watt
3	Photovoltaics (Superior Design)	60 kW	$270,000	11.0%	20.3	Cost Estimate based on $4.5/watt
4	Photovoltaics (Net Zero Design)	450 kW	$1,800,000	100.0%	14.9	Cost Estimate based on $4/watt, Net Zero Building Option (Note 3,4)
5	Geothermal (Partial Building)	Change from 40 ton chiller to 40 ton geothermal system	$174,514	13.0%	6.9	Serves Media Center and Administration Areas
6	Geothermal (Entire Building)	Increase from 40 ton to 120 ton geothermal system	$369,852	5.0%	61.3	-
7	Superior Wall	Wall Insulation R-32	$81,396	1.8%	37.4	Base Design: Wall Insulation R-24.5
8	Superior Roof	Roof Insulation R-40	$91,392	2.2%	34.4	Base Design: Roof Insulation R-30

Note 1: Additional costs per PM&C cost estimate with the exception of Item #'s 2, 3, and 4 which were by Garcia Galuska DeSousa and are reflective of recent projects. All costs include a 19% general contractor mark-up.
Note 2: Approximate energy savings of each item are not necessarily additive. For example; an improved envelope will result in decreased cooling/heating loads which in turn would reduce the cooling/heating savings seen for a geothermal system.
Note 3: Requires entire building geothermal system is selected to provide a Net Zero Building Option.
Note 4: Payback does not include possible SREC reimbursment from state or federal government.

HIGH PERFORMANCE GOALS:
INDOOR ENVIRONMENTAL QUALITY

Yes	?	No			
16	3		**INDOOR ENVIROMENTAL QUALITY**		**19 Points**
Y			Prereq 1	**Minimum Indoor Air Quality Performance**	**Required**
Y			Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	**Required**
Y			Prereq 3	**Minimum Acoustical Performance**	**Required**
1			Credit 1	**Outdoor Air Delivery Monitoring**	**1**
1			Credit 2	**Increased Ventilation**	**1**
1			Credit 3.1	**Construction Indoor Air Quality Management Plan -** During Construction	**1**
1			Credit 3.2	**Construction Indoor Air Quality Management Plan -** Before Occupancy	**1**
4			Credit 4	**Low-Emitting Materials**	**Up to 4**
				4.1 - Adhesives & Sealants	1
				4.2 - Paints & Coatings	1
				4.3 - Flooring Systems	1
				4.4 - Composite Wood & Agrifiber Products	1
				4.5 - Furniture & Furnishings	1
				4.6 - Ceiling & Wall Systems	1
1			Credit 5	**Indoor Chemical and Pollutant Source Control**	**1**
1			Credit 6.1	**Controllability of Systems -** Lighting	**1**
1			Credit 6.2	**Controllability of Systems -** Thermal Comfort	**1**
1			Credit 7.1	**Thermal Comfort -** Design	**1**
	1		Credit 7.2	**Thermal Comfort -** Verification	**1**
2	1		Credit 8.1	**Daylight and Views**	**1 to 3**
				75% of classrooms	1
				90% of classrooms	2
				75% of other spaces	2 to 3
1			Credit 8.2	**Daylight and Views -** Views	**1**
	1		Credit 9	**Enhanced Acoustical Performance**	**1**
1			Credit 10	**Mold Prevention**	**1**

HIGH PERFORMANCE GOALS:
WATER EFFICIENCY

Yes	?	No			
3	3	4	**WATER EFFICIENCY**		**11 Points**
Y			Prereq 1	**Water Use Reduction**	**Required**
		4	Credit 1	**Water Efficient Landscaping**	**2 to 4**
				50% Reduction	2
				No Potable Water Use or Irrigation	4
	2		Credit 2	**Innovative Wastewater Technologies**	**2**
3			Credit 3	**Water Use Reduction**	**2 to 4**
				30% Reduction	2
				35% Reduction	3
				40% Reduction	4
	1		Credit 4	**Process Water Use Reduction**	**1**

HIGH PERFORMANCE GOALS:
SUSTAINABLE SITES

Yes	?	No			
13	2	9	SUSTAINABLE SITES		24 Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
Y			Prereq 2	**Environmental Site Assessment**	Required
1			Credit 1	**Site Selection**	1
		4	Credit 2	**Development Density and Community Connectivity**	4
1			Credit 3	**Brownfield Redevelopment**	1
		4	Credit 4.1	**Alternative Transportation** - Public Transportation Access	4
	1		Credit 4.2	**Alternative Transportation** - Bicycle Storage and Changing Rooms	1
2			Credit 4.3	**Alternative Transportation** - Low-Emitting and Fuel-Efficient Vehicles	2
2			Credit 4.4	**Alternative Transportation** - Parking Capacity	2
1			Credit 5.1	**Site Development** - Protect or Restore Habitat	1
1			Credit 5.2	**Site Development** - Maximize Open Space	1
1			Credit 6.1	**Stormwater Design** - Quantity Control	1
	1		Credit 6.2	**Stormwater Design** - Quality Control	1
		1	Credit 7.1	**Heat Island Effect** - Nonroof	1
1			Credit 7.2	**Heat Island Effect** - Roof	1
1			Credit 8	**Light Pollution Reduction**	1
1			Credit 9	**Site Master Plan**	1
1			Credit 10	**Joint Use of Facilities**	1

AERIAL SITE PLAN

OTHER GOALS

NEXT STEPS