

Optimizing the Learning Environment



Adams 12 Five Star Schools

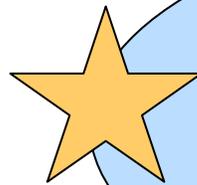
"Together - educating the whole child..."

Planning & Design for High Performance Schools



David Besel, AIA/PE
Facilities Planning & Design Manager

Schools are designed for Kids



The design of schools should be a physical response to human needs!

Kids learn by ...

**seeing, hearing, touching, smelling
and tasting.**

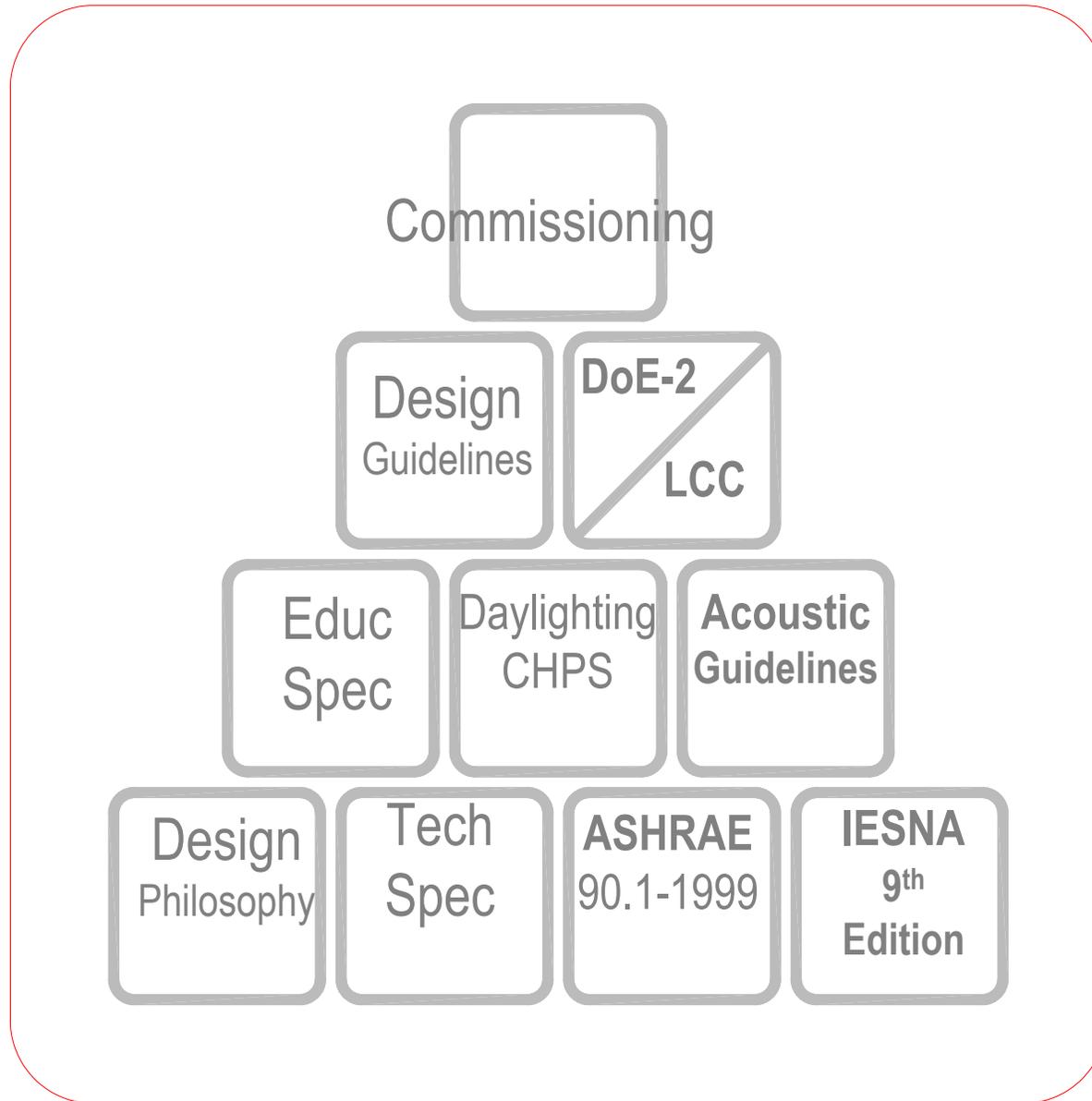
Planning & Design Process

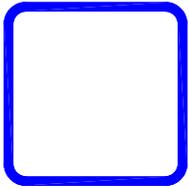
The design of each new school should bring us one step closer to a truly “high performance school”.



Design
Philosophy

Planning & Design Process

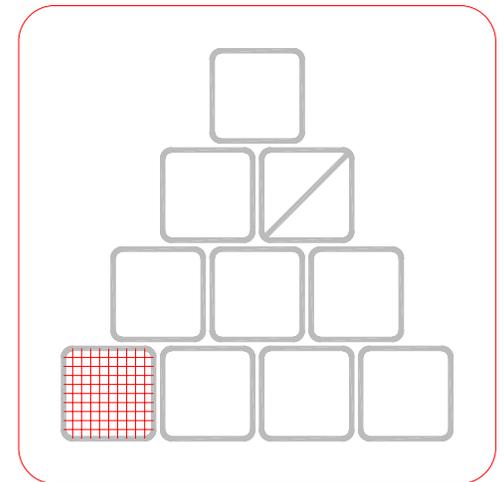


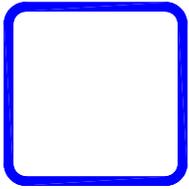


Design Philosophy

District facilities should...

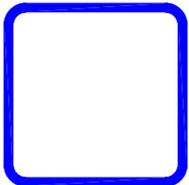
- out-live the tenure of faculty and staff.**
- accommodate various instructional plans, learning styles, and changing technology.**
- maximize flexibility for future use.**
- accommodate joint-use of facilities.**
- comply with educational specifications to provide district-wide equity.**
- be designed, constructed, operated and maintained to have a useful life of 50 years, or more.**





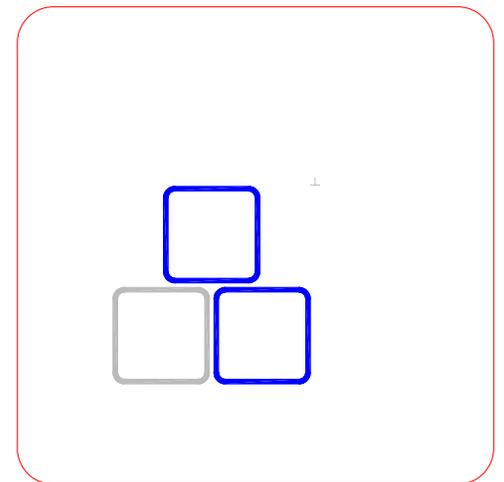
Educational Specifications

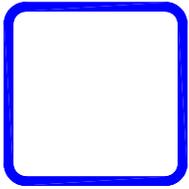
- Roadmap for the design of new schools**
- Yardstick to measure existing schools**
- Template defining building standards to establish equity district-wide**



Technical Specifications

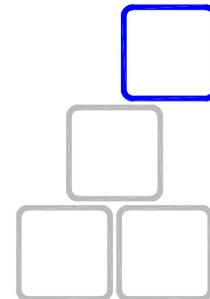
- Define uniform and consistent quality standards**
- Assure district-wide compatibility**
- Minimize inventory**
- Maximize durability and maintainability**

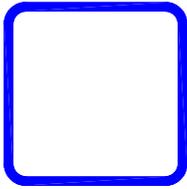




High Performance Design Guidelines

- ❑ Comply with Acoustical Guidelines in all instructional spaces, as modified by the District.**
- ❑ Daylighting should be the primary source of light in at least 75% of all instructional spaces.**
- ❑ Limit energy consumption to 1.0 watts/SF electric lighting only - Integrate electric lighting + daylighting to reduce to 0.5 watts/SF.**
- ❑ Limit average annual energy consumption to 60,000 Btu/SF/Yr.**
- ❑ Utilize computer modeling and Life Cycle Cost Analysis to estimate building performance.**





Acoustics

- Young children,
- Children with hearing loss, (up to 20% of the school population)
- Children learning a second language, and
- Children listening in reverberant rooms...

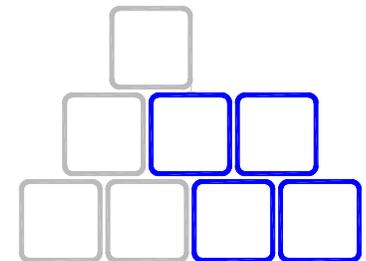
require a higher signal-to-noise ratio in order to understand the **spoken message**. --Acoustical Society of America

Comply with ANSI/ASA S12.60-2002 Classroom Acoustics – as amended by the District

__ dBA + 15 dBA = __ dBA < 70 dBA

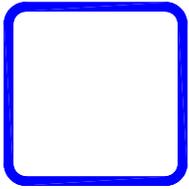
If the normal speaking voice = 50 to 55 dBA

then, the noise level < 35 to 40 dBA



Adams 12 Five Star Schools

"Together - educating the whole child..."



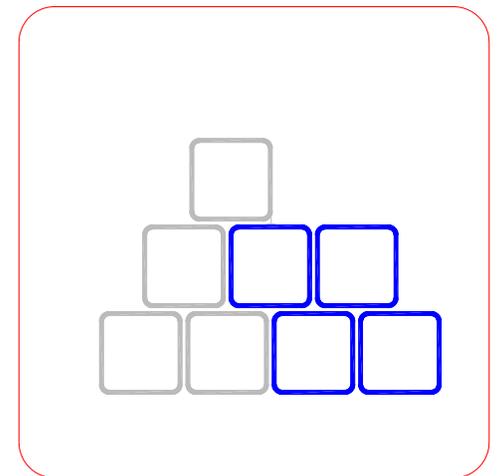
Daylighting

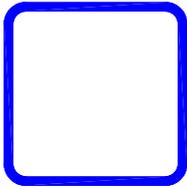
“We found that students with the **most daylighting** in their classrooms progressed 20% faster on math tests and 26% on reading tests in one year than those with the least.”

--Heschong Mahone Group, submitted to Pacific Gas and Electric

Daylighting should be the primary source of light in at least 75% of all instructional spaces.

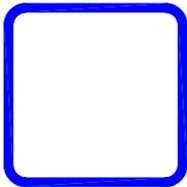
- Orient the building to maximize daylighting options
- Provide uniform distribution with minimum glare
- Minimize direct-beam sunlight penetration and control its impact
- Size glazing to optimize daylighting
- Reference Guidelines for Daylighting – CHPS Best Practices Manual - 2002





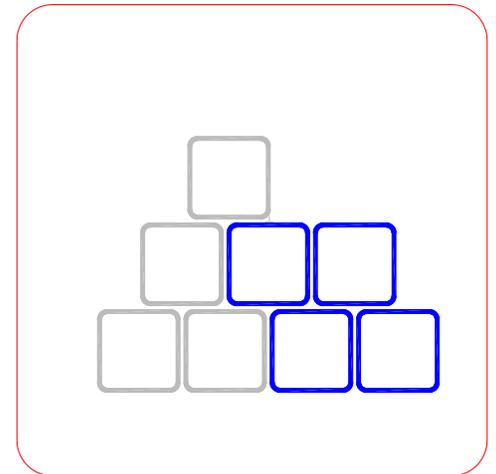
HVAC Design Criteria

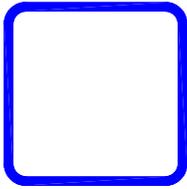
- Based on ASHRAE/IES Standard 90.1-1999
- Provide the option for cooling with outdoor air (economizer cycle)
- Systems and equipment should be “right-sized” without additional “safety factors”, based on the District’s specified design criteria



Lighting Design Criteria

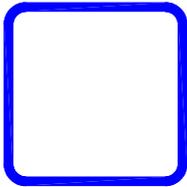
- In addition to the IESNA Lighting Handbook, comply with ASHRAE/IES Standard 90.1-1999
- Limit energy consumption to 1.0 watts/SF with electric lighting only
- Integrate electric lighting + daylighting to reduce to 0.5 watts/SF.





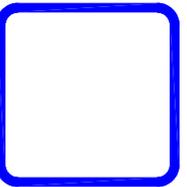
Life Cycle Cost Analysis

- Design for effective and efficient operation and maintenance
- Optimize the use of natural resources
- Specify energy efficient materials, systems, and equipment
- Make decisions based on Life Cycle Cost analysis



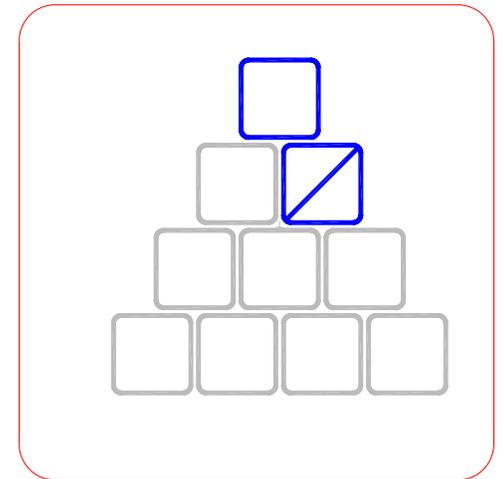
Estimated Building Performance

- Utilize modeling software including DoE-2 during schematic design, design development, and construction document review



Commissioning

- Building systems and components should comply with construction documents, and operate the way they were designed.



High Performance Design

A high performance school is...

- healthy
- thermally, visually, and acoustically comfortable
- energy efficient ...
- easy to maintain and operate
- commissioned ...



The Collaborative for High
Performance Schools,

**Best Practices Manual – 2002
Edition**

Projects:

The design of each new school should bring us one step closer to a truly “high performance school”.



Projects:



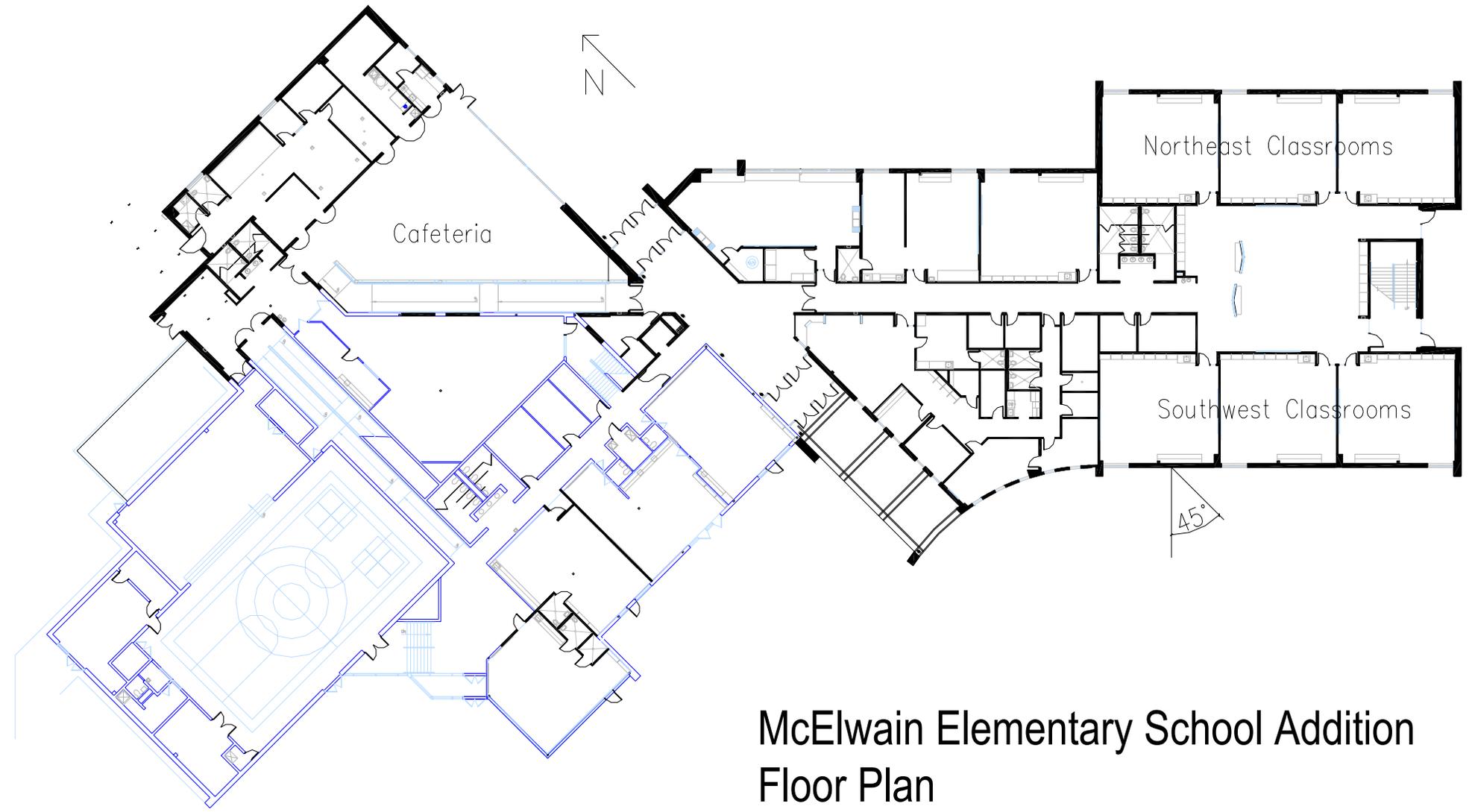
Middle School #9 - Shadow Ridge





Prairie Hills
Elementary
School





McElwain Elementary School Addition
Floor Plan



Computer modeling of classroom daylighting
McElwain Elementary School

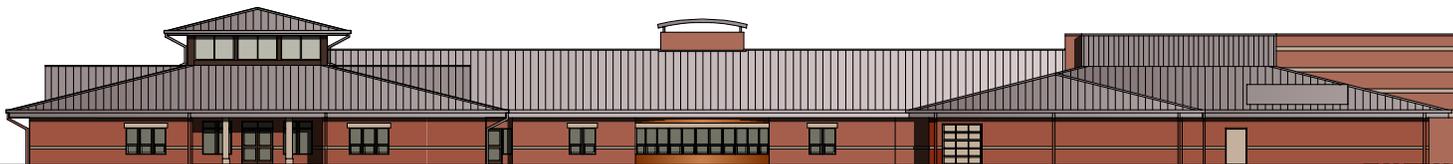




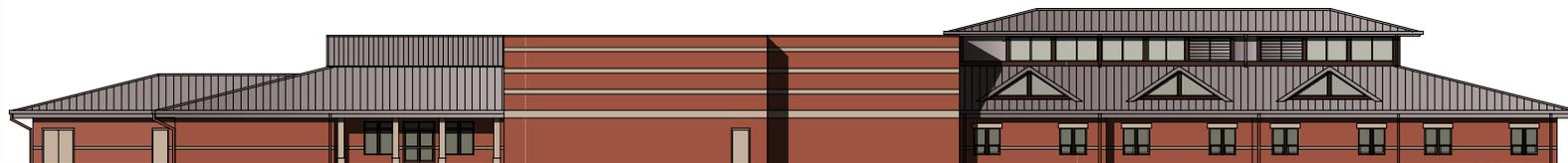
EAST ELEVATION



NORTH ELEVATION



WEST ELEVATION



SOUTH ELEVATION

Elementary School #30
Adams 12 Five Star Schools
Elevations

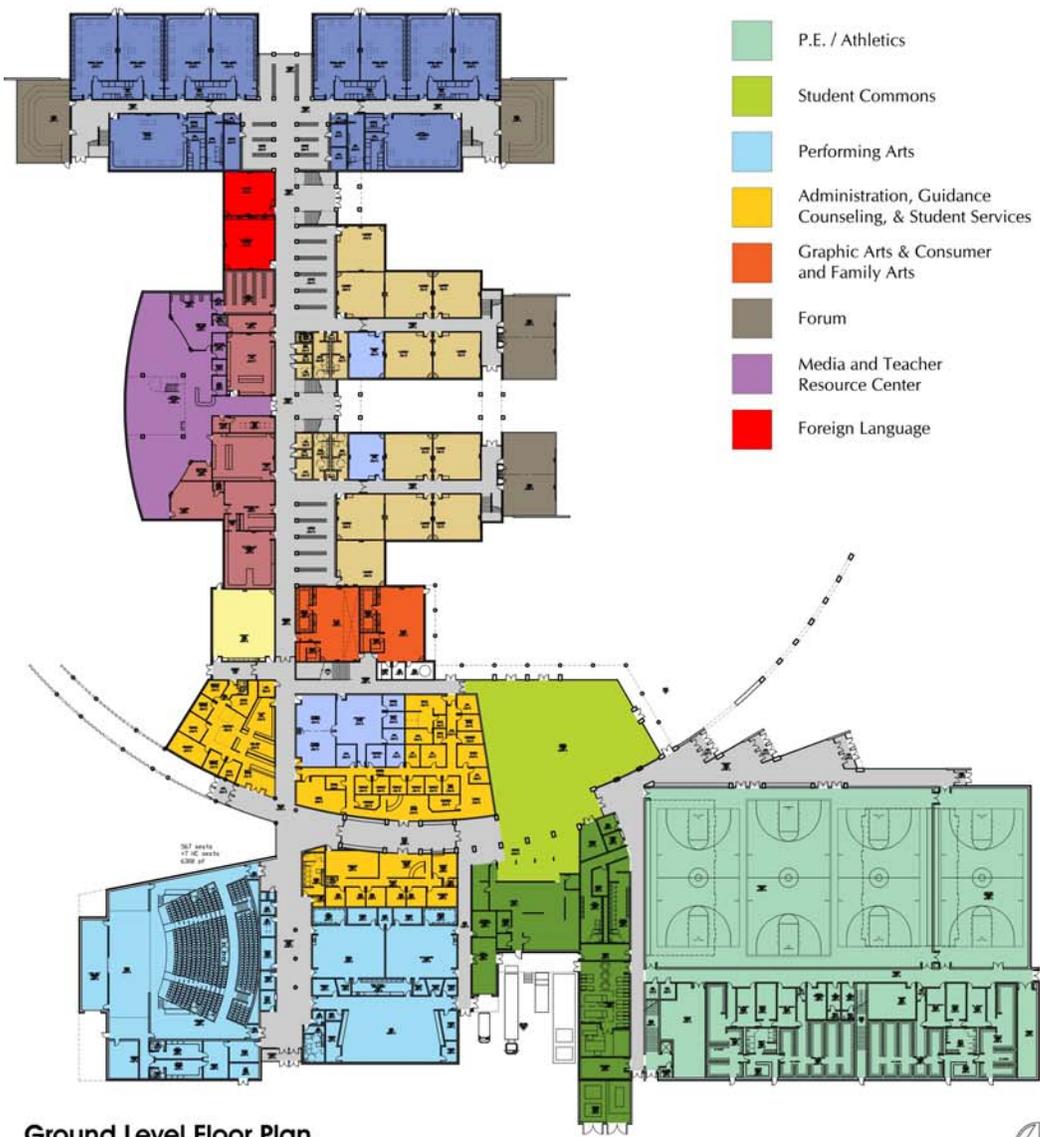
Christiansen, Reece & Partners, PC





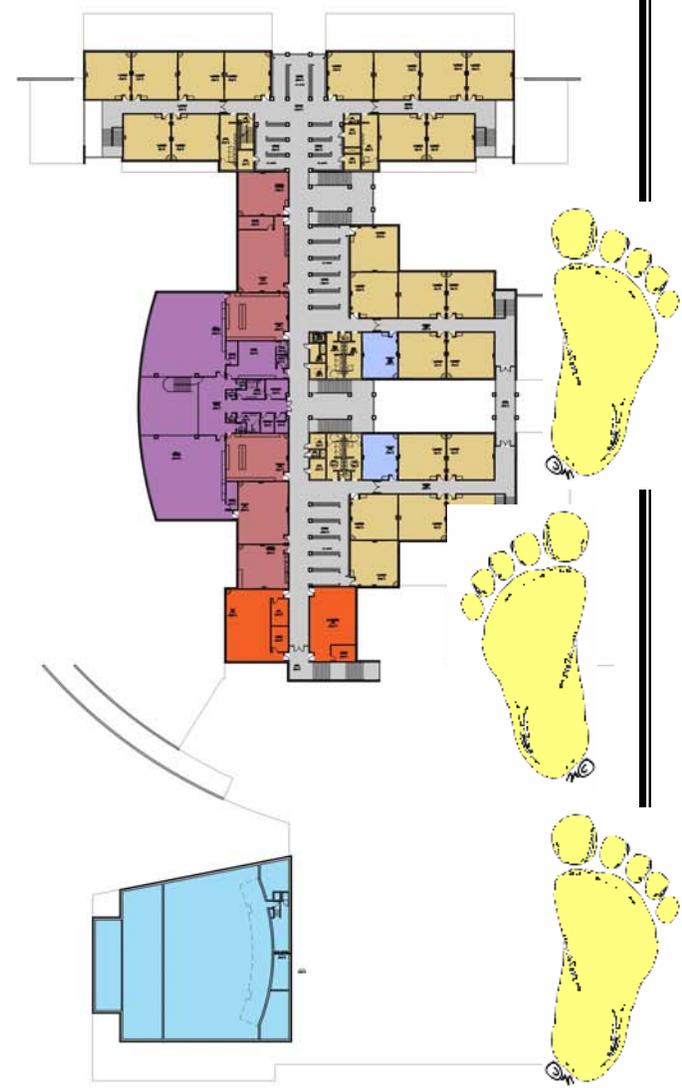
Computer modeling of classroom daylighting
Elementary School #30 - Prototype





Ground Level Floor Plan
Scale - 1" = 32'-0"

- | | |
|---|--|
|  P.E. / Athletics |  Business, Technology, & Media Arts |
|  Student Commons |  Generic Classrooms |
|  Performing Arts |  Community Room |
|  Administration, Guidance Counseling, & Student Services |  Special Education |
|  Graphic Arts & Consumer and Family Arts |  Science Department |
|  Forum |  Kitchen and Service Area |
|  Media and Teacher Resource Center |  Circulation |
|  Foreign Language | |



Upper Level Floor Plan
Scale - 1" = 32'-0"



Average Annual Energy Use

School Type	District Average	Constructed 1990-99	New Schools (projected)
	Kbtuh/SF/Yr		
Elementary	88	100	53
Middle	89	74	65
High	74	81	tbd
All schools	84	85	

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Facilities Planning & Design Manager

