

# Odyssey Elementary School

2015 James D. MacConnell Award Submission





Odyssey Elementary is an educationally innovative school built around the theme,

“ BODIES IN MOTION:  
THE ANIMAL KINGDOM ”

The school champions the importance of healthy, active lifestyles and helps students understand their place in nature. **It is a net-zero facility** that has successfully become the greenest, most energy-efficient public school in the state of Utah. Odyssey is on-track to earn **a LEED Gold Certification**. Utterly unique in its design, it accommodates any learning modality the teachers wish to implement.

There are four learning wings at Odyssey – groups of classrooms called “habitats” – red, orange, blue and green. Each habitat corresponds to one of the thematic motions of the school (fly, run, swim, and jump), and

includes 8 classrooms, a central collaboration area, teacher prep and storage areas, and toilet room facilities. The organization of students into habitats reduces anonymity and encourages collaboration. Classrooms are designed with a 16-foot-wide roll-up glass door, allowing them to combine with the collaboration space or other classrooms. Every classroom door light bears the image of an animal that performs the motion of the house (a kangaroo rat, a shark, etc.). Critical to the success of the project is the totally unique furnishing package of mobile chairs, tables, stools, ottomans and modular soft seating that students move at a moment’s notice to accommodate different learning scenarios.

The landscaping also represents the ways creatures move with plant materials and sculptural concrete. On the north side, footfall patterns show up in concrete textures and benches. In the courtyard, the idea of flight or swimming and the swirling vortices created by beating wings or fins are represented with benches and planter forms. On the south side, jumping is represented using

benches indicating a springing motion. The building is carefully oriented to best take advantage of daylighting.

Building spaces are multi-use for efficiency. The dining area is integrated into the circulation. Large glass doors between the dining area and the multipurpose room lift for use as an auditorium. There are no computer labs because technology is integrated into all learning spaces.

The walls and hallways of the building are peppered with inspirational quotes, encouraging students and patrons alike to do their best and make a difference in the world. Portals that open into the habitats include intriguing signage regarding the animals that run, jump, swim and fly. Images of athletic activities serve to further inspire students.





“Cool now I like going  
to school. Fun!”

– student comments from post  
occupancy survey



The Learning courtyard, where the ideas of flight or swimming and the swirling vortices created by beating wings or fins are represented with benches and planter forms. Children love to play on the raised planters. Sunshades on the south facing windows are photovoltaic panels.



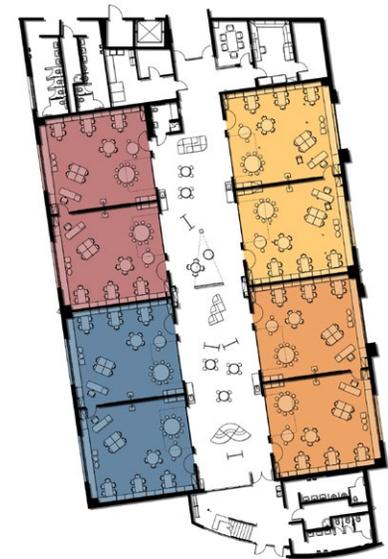
Little students have their own play area with exciting playtoys and safe sofffall tiles, located adjacent to their habitat.



The overall goals of Odyssey Elementary were developed over a period of 24 months, utilizing a series of meetings and involving a wide variety of stakeholders interested in exploring ideas for a completely new kind of elementary school. The results of numerous surveys were also important in the goal development. The facility program describes a building framework that will encourage the design of a building that will enhance learning of the digital natives of the 21st century.

### OVERALL GOALS & OUTCOMES

1. The facility will accommodate approximately 900 students, (K-6), separated into 4 groups, each group comprised of students of various grade level combinations.



## OVERALL GOALS & OUTCOMES

2. Project-based learning will be accommodated through the use of large flexible daylit classroom spaces adjoining large central collaboration spaces.



### main level

- |    |                    |
|----|--------------------|
| 1  | administration     |
| 2  | multi-purpose      |
| 3  | kitchen            |
| 4  | dining             |
| 5  | mechanical         |
| 6  | teacher prep       |
| 7  | classroom          |
| 8  | collaboration area |
| 9  | work room          |
| 10 | media center       |





upper level

- 5 mechanical
- 6 teacher prep
- 7 classroom
- 8 collaboration area
- 9 work room
- 10 media center



JUMP



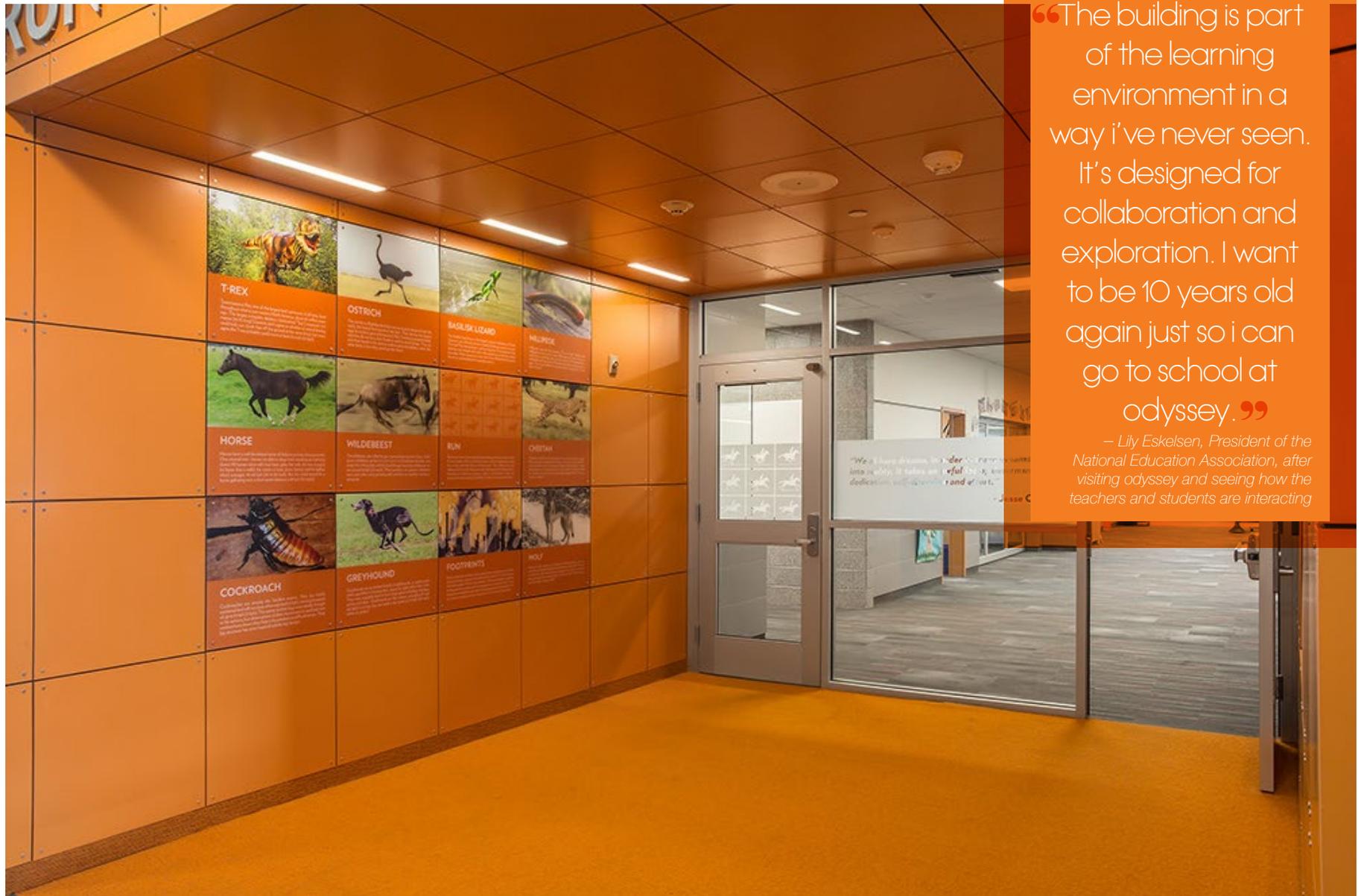
FLY

“ I like that we can open and close the garage doors when we need to. I also like the white board tables, and the white board cabinets. I also like that the chairs can move.”

– student comments from post occupancy survey



3. The facility will be designed to allow for easy and readily accessible technology – all occupants will utilize personal computing devices.



“The building is part of the learning environment in a way I’ve never seen. It’s designed for collaboration and exploration. I want to be 10 years old again just so I can go to school at odyssey.”

— Lily Eskelsen, President of the National Education Association, after visiting odyssey and seeing how the teachers and students are interacting

4. The school will be designed as a “destination”. Theming/branding to attract young people, create interest and generate curiosity in our students will be a central design goal, integral to the architecture. Signage presents ‘fun facts’ about animals on one side of the entry portals while video monitors on the opposite side play live “zoo cams” or any other digital feed.

“I like how we have  
different seating  
arrangements

everyday.”

– student comments from post  
occupancy survey



5. Furniture selection will be a part of the building design. Furnishings must be comfortable, inviting, and selected to encourage learning. Furniture must be easily moveable and reconfigurable in order to allow for multiple varied activities.

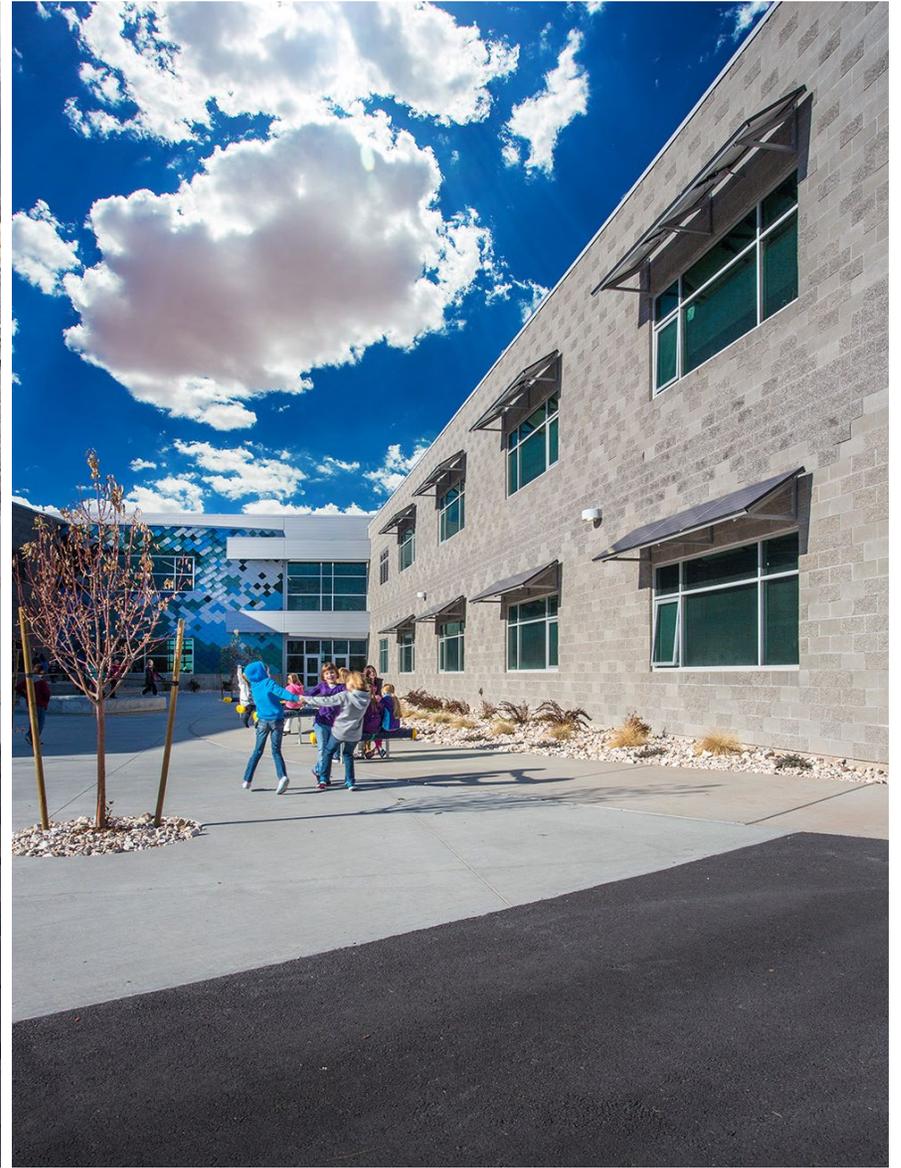


“I really like all the colors that they put in, they’re not too bright and not too dull. I also like the tiles on the outside of the school.”  
– student comments from post occupancy survey

6. Outdoor learning will be accommodated through the design of the outdoor space, specifically; outdoor courtyard(s) must be designed to facilitate learning activities.



7. The building will be designed to minimize site constraints, allowing for a flexible entry point location and creating safe and clear entry into the facility.



8. The school must be beautiful, durable, and energy efficient. Net Zero energy usage and LEED Gold certification are desirable.

“I feel that is very different and I really like it. I hope in the future more schools will be built like this.”

— student comments from post occupancy survey

gle. - Wilma Rudolph



9. The building will engage the community, accommodate after school events, and serve as a hub for the neighborhood.

## 03 PROJECT SCOPE

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Odyssey is a new school accommodating 900 students, grades Kindergarten through 6, on a 12 acre site. The school is designed to be utilized as a year round facility if the need arises. Part of the project scope was LEED Certification and Net-zero energy use, (the project is on track for LEED Gold). Also included in the scope was project branding to engage the students, and furniture design that would enhance project based learning.

Site acres:	12
Area:	84,760 sf
Student capacity:	900
Grades served:	Kindergarten – 6
Date occupied:	August 2014
Total Project Budget:	\$18,000,000
Construction Cost:	\$15,709,080

## SUMMARY OF STATE'S GUIDELINES

### Utah State Office of Education per Student Suggested Space Criteria

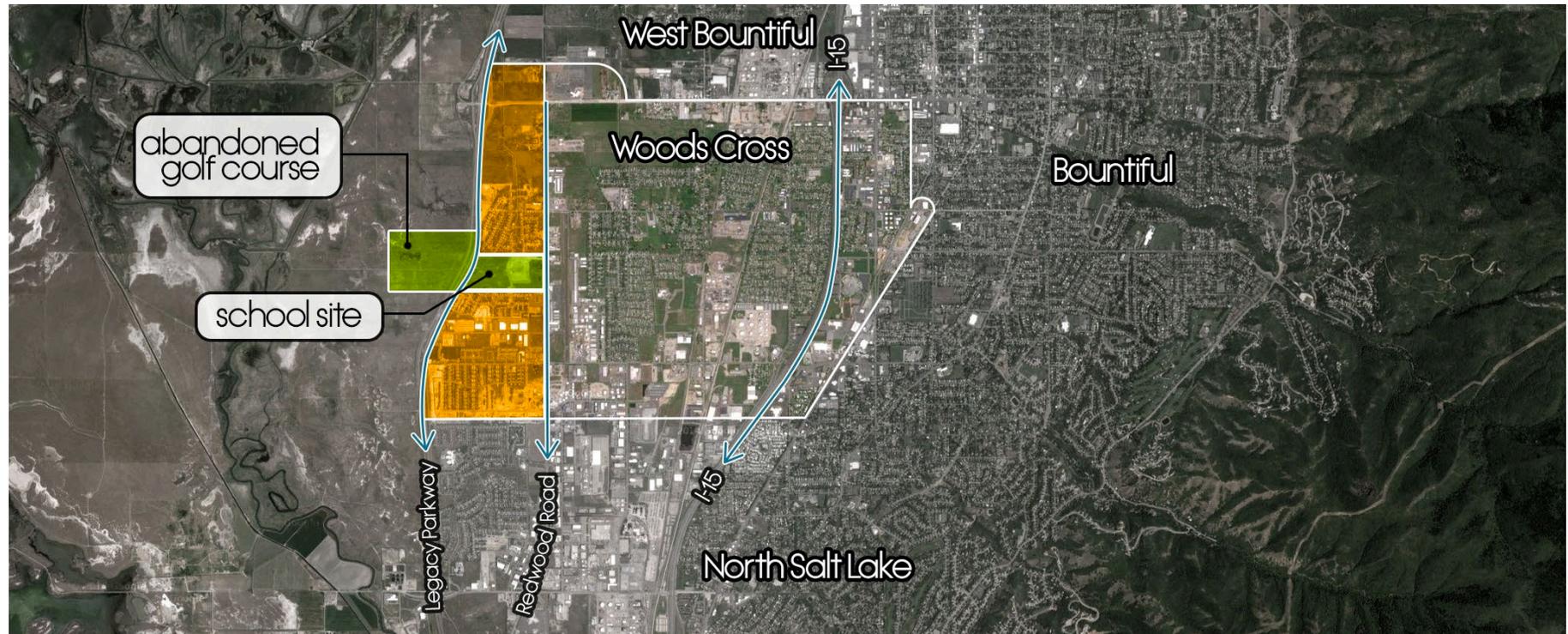
For purposes of this table, Gross Square Feet Area is defined as the sum of the area on each floor 1 feet from the exterior walls. It includes all rooms, corridors and storage areas, etc.

Level	Square Feet Per Student	Number of Students	Total Gross Square Feet Area
Elementary	72	600 or more	43,200+
	73	550	40,150
	74	500	37,000
	75	450	33,750
	76	400 or less	30,400-
Middle/ Intermediate/ Jr. High	115	1,500 or more	172,500+
	116	1,410	163,560
	117	1,320	154,440
	118	1,230	145,140
	119	1,140	135,660
	120	1,050	126,000
	121	960	116,160
	122	870	106,400
	123	780	95,940
	124	690	85,560
	125	600 or less	75,000-

Level	Square Feet Per Student	Number of Students	Total Gross Square Feet Area
Senior High	145	1,500 or more	217,500+
	146	1,452	211,992
	147	1,405	206,535
	148	1,358	200,984
	149	1,311	195,339
	150	1,263	189,450
	151	1,216	183,616
	152	1,168	177,536
	153	1,121	171,513
	154	1,074	165,396
	155	1,026	159,030
	156	979	152,724
	157	932	146,324
	158	884	139,672
	159	837	133,083
	160	789	126,240
161	742	119,462	
162	695	112,590	
163	647	105,461	
164	600 or less	98,400-	

Note:  
The Utah State Board of Education is currently revising this document. A more concise document reflecting today's school age populations and state requirements will be completed by Fall of 2009.

## O4 COMMUNITY ENGAGEMENT PROCESS



### SITE PLANNING

Woods Cross is 1 of 15 cities in Davis County, Utah. Davis School District serves the entire county. For years the city had a stable population, 6,000 to date, but it is growing now. The reason is that raw land is becoming scarce in Davis County. Most residential development was to the east along the I-15 corridor. Industrial/warehousing development was to the west along Redwood Road, a major north-south artery. Six years ago, the Legacy Parkway, another freeway, was completed along the west edge of Woods Cross City. The land between Redwood Road and Legacy Parkway filled up rapidly with single family starter

homes and apartment buildings. Davis School District needed to meet the growth with new schools.

The school district approached the city to help find the correct site. This collaboration led to an abandoned golf course that had been purchased by Utah Department of Transportation for the Legacy Parkway right-of-way. The remaining acreage was much too large for just the school site, so the school district master planned the land with the city to allow the acreage around the school to be developed into additional housing. Working with the city, Davis School District pioneered the development of streets and utilities to access the

preferred school parcel from Redwood Road.

Local residents living north and south of the abandoned golf course were invited to city meetings to discuss connecting new streets to their existing neighborhoods.

The school site is adjacent to a wild-life preserve, so special care was taken to ensure that area was left undisturbed. The goal is that the school, with its leadership in sustainability and energy conservation, will serve as a catalyst to an alternative form of development.



## BUILDING DESIGN

During the Blue-Sky meetings, community members were added to the stakeholders list and engaged in the conversations that developed the program and conceptual design. Issues regarding a 2 story vs 1 story school, school safety, transportation (student drop off), parking, playground supervision, etc. were discussed. Various designs were presented, vetted and developed further. Interior theming was an important part of the school environment. The community members had input on the final graphic images representing “bodies in motion”.



## SCHOOL NAMING

Davis School District always engages the community in naming their schools.

A public meeting was held where the architect presented the theme of the new elementary school. The attendees suggested 22 names for the new school, which were narrowed down to 3 choices. These 3 were sent out to the entire community which then voted. Odyssey Elementary was selected as the name of the school, a reference to a “journey” —to a new way to teach and learn, a path to sustainability and the future, and the growth of the individual students as they grow.



“I only chose “emotional” because I think that the quotes, pictures, environmental plaques, and video stream allow us to think about our life and connection to the world. It’s a good emotion/ intense feeling, not a bad one.”

— comment from post occupancy survey

## OPEN HOUSE

Two days before school began an open house was held. Over 900 people showed up. Vicki Corwin, the principal of the school gave a presentation showing off her wonderful school. Hughes Construction, the general contractor brought animals to represent the 4 "habitats".



The "Run Habitat" had a pony,



the "Fly Habitat" was represented by a Macaw,



the "Jump Habitat" presented poison dart frogs (under glass of course), and



the "Swim Habitat" held an alligator!



“I’m always so excited to come to school and see all of the nice places that the school has.”

– comment from post occupancy survey



Students were sent on a digital scavenger hunt to watch videos about the different sustainable and design features.

welcome to odyssey	construction recycling	classroom design	building design
			
<a href="http://youtu.be/2E3YkuCiykA">http://youtu.be/2E3YkuCiykA</a>	<a href="http://youtu.be/0mDZkiDAFF8">http://youtu.be/0mDZkiDAFF8</a>	<a href="http://youtu.be/Cl.gKADS2mew">http://youtu.be/Cl.gKADS2mew</a>	<a href="http://youtu.be/YH-zzkAxOng">http://youtu.be/YH-zzkAxOng</a>
planning	site design	landscape	energy
			
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photovoltaics	mechanical	mechanical ventilation	
			
<a href="http://youtu.be/0fTLpNH9k4c">http://youtu.be/0fTLpNH9k4c</a>	<a href="http://youtu.be/1JvKv6JWLJg">http://youtu.be/1JvKv6JWLJg</a>	<a href="http://youtu.be/gLekrewktw">http://youtu.be/gLekrewktw</a>	

\*NOTE: Please do not watch these videos to the conclusion, which shows the name of the architectural firm.

## 05 EDUCATIONAL ENVIRONMENT



Odyssey was designed to bolster the educational pedagogy of the District; using small learning communities focusing on a project based curriculum. Each “habitat” includes 8 learning spaces and a central collaboration space. That goal translated into large collaboration spaces that are fully accessible to the learning spaces using 16-foot wide glass roll-up doors. These doors provide the instructor flexibility in instruction. They can expand their classroom into the collaboration space by opening the door. They can keep the door closed and still supervise a small group working in the collaboration space. Multiple teachers can collaborate across the collaboration space by opening multiple doors. Pairs of classrooms are connected by a door as

well. The floor plan’s dedication to parity provides the administration the flexibility to reconfigure grade levels into mini-academies, allowing for far easier cross-grade collaboration than in previously built schools.

Inside the learning spaces, full height cabinets are whiteboard surfaced, serving as impromptu sketching and writing surfaces for students as they work together. Teachers on the planning committee agreed that the sinks normally found in the classroom could be relocated to the collaboration space, allowing the functional size of the classroom to expand. Similarly, all millwork is a more easily utilized 18” depth, returning useable square footage to the learning spaces.

Furniture selected directly fosters a project based curriculum. It is all durable, yet light and on casters, so is easily reconfigurable to accommodate a variety of teaching methods. Students change seating types during the day, choosing between chairs, stools that encourage wiggling, soft ottomans and reconfigurable couches, standing at tables with an easy height adjustment, or of course the carpeted floor. Many of the tables incorporate a white board top that students utilize during their work, table tops which can be flipped up and stacked out of the way during activities that need more open space.

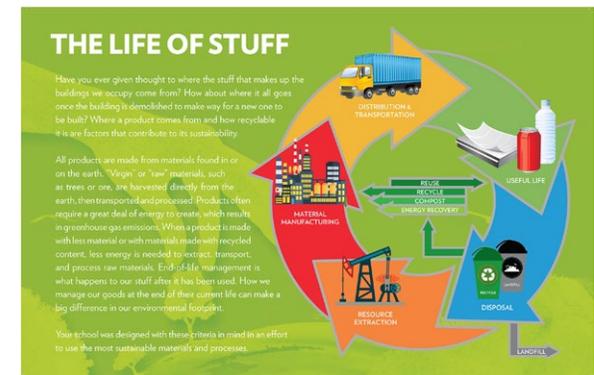
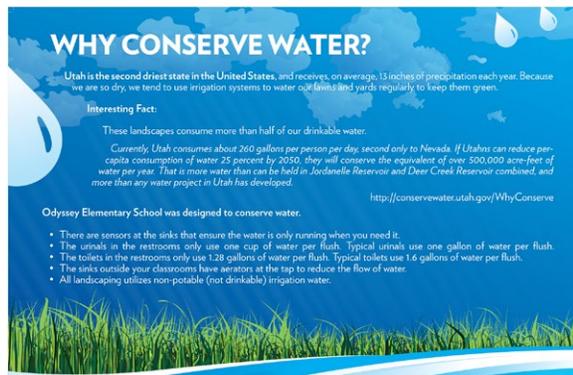


The dining “room” was designed as an open commons for the students, to provide a space that can be used for more than just dining. The multipurpose room features large glass overhead doors that allow expansion into the commons for a performance. This design allows both spaces to be more visible and available throughout the day and after for collaboration and community activities. The platform at the multipurpose room can be closed off using a folding sound partition, and features a large window to create a pleasant learning space for the students’ music program.

“The classroom window is always open and always gives us natural light, and our pull up door is open almost all of the time.”

— student comments from post occupancy survey





## SUSTAINABILITY

Sustainability and energy efficiency were important goals from the outset. It was also decided that the building should incorporate the latest findings in educational research, providing teachers with the pedagogical tools necessary to give children the best education possible. The project team recognized that the building itself is an educational tool and designed it to provide large, flexible classroom spaces with furnishings that can be rearranged to accommodate various learning modalities.

Odyssey Elementary will be the first LEED Gold public school in the state and the first Net Zero school in Utah. The goal of Net Zero came out of the intense planning process between the School District administrators, their energy team, and the design team. The mechanical system represents the duality of both simplicity and complexity. It is composed of components that many school districts would be familiar with; geothermal heating, two stage evaporative cooling, water-to-water heat pumps, thermal displacement ventilation, and a gas boiler. But the complexity comes from the way the system is configured and the

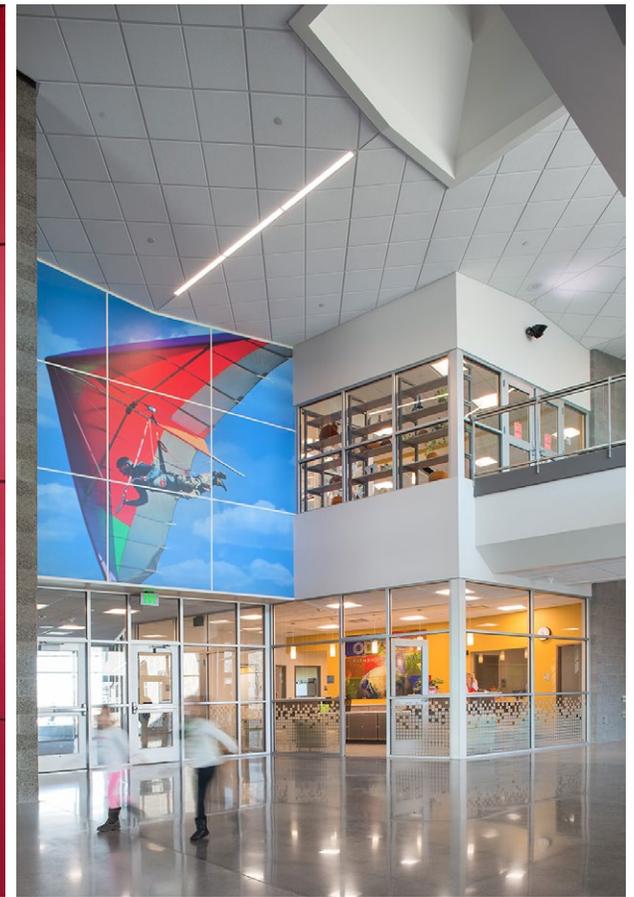
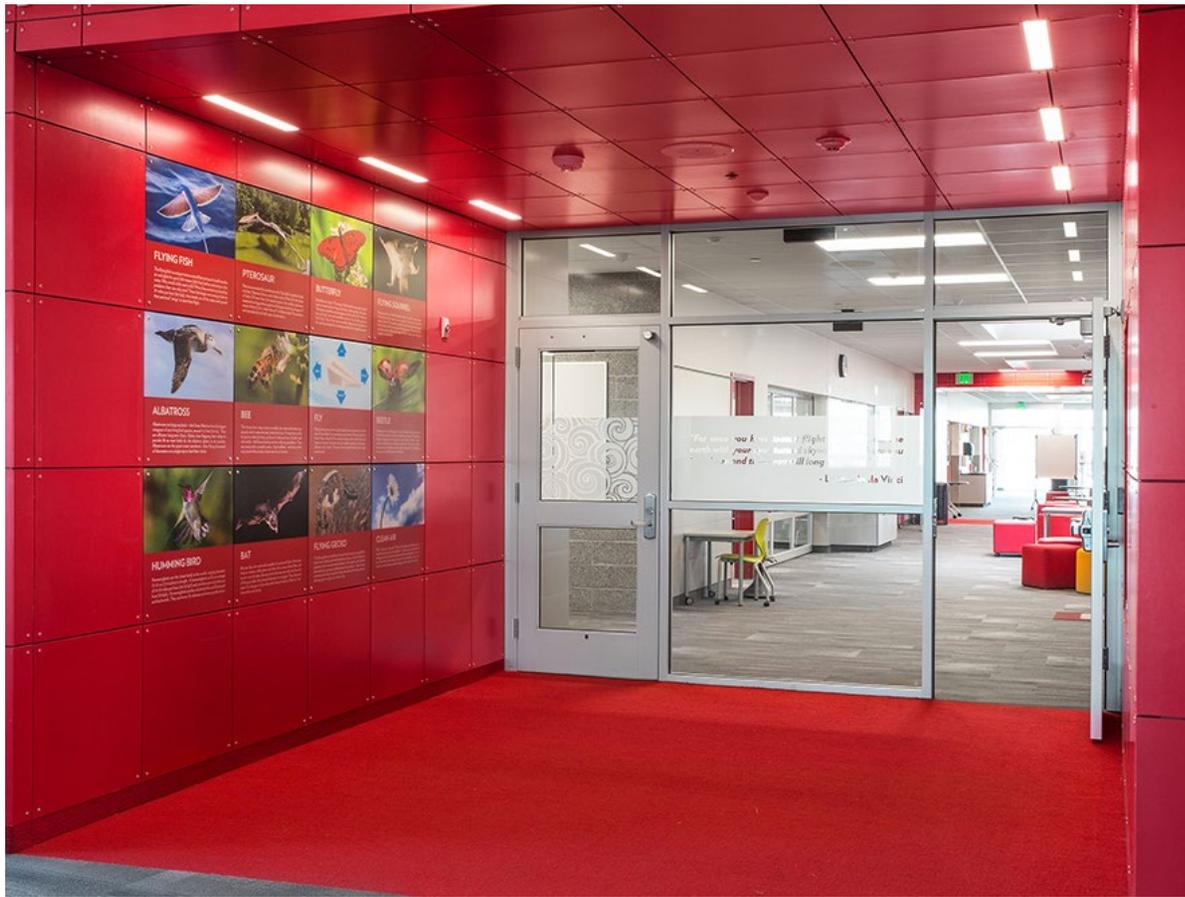
automation utilized to make the system run optimally. The system is designed to use the smallest amount of electrical energy possible, (with a modeled EUI of 17.6), which is fully offset by the 1200 photovoltaic panels on the roof. Additionally, solar panels double as sunshades over the windows on the south sides of the building. The lighting in the building is 100% LED, and utilizes daylight harvesting, and a user friendly controls system. The building will use far less energy than any other school in the state.

The building has an energy dashboard, (networked for use by teachers in the classroom), for children to interact with, learning about their school's energy use. Students can see the exchange of heat between the earth and the building as well as what energy each area in the building is using - and how much! Building signage highlights the sustainable features of the building, water conservation, improved indoor air quality, high efficiency envelope, innovative mechanical system, alternate transportation accommodations, and recycling (both construction and for the occupants) for

teachers and students. Branding of the building fosters a strong connection to the animal kingdom and nature, encouraging a life-long commitment to the natural world.

The building's sustainability took a lot of thought and effort. During the building's construction, over two million pounds of materials went to recycling facilities to be repurposed into other products. Odyssey benefits from a tight and efficient building envelope to prevent air leakage, further reducing the work of the mechanical systems. A significant part of this envelope consists of superb masonry work, laid in a pattern to evoke the idea of Motion.

Utah is a high desert – water conservation is extremely important here. At Odyssey, turf is only placed where there are playfields. Other exterior areas are decorated with native and adapted plant material that reduces the amount of water needed. Water use is controlled based on evapotranspiration, which senses moisture and weather variation.



## BRANDING

The fully integrated branding of Odyssey Elementary School is very unique. Early in the planning process, the District along with the design team decided that “Bodies in Motion; the Animal Kingdom” would be the theme of the school and would be used to inform the overall design, the aesthetics, the wayfinding, and the educational signage in the building. The classrooms are organized into “habitats” named for four different types of movement animals use; run, jump, swim, and

fly. Portals that open into the habitats include intriguing, educational signage highlighting some animals that use the type of movement specific to the habitat. Those animals are then used to identify the individual classrooms, fostering a sense of identity and belonging among the students.

The branding was used to inform the exterior design of the school as well. The idea of movement was

expressed through use of an undulating color pattern in the metal tiles which were selected to bring to mind fish scales. The masonry pattern was also designed to evoke a feeling of movement. Each courtyard and exterior teaching space references one of the habitats, with swirling benches for Swim and Fly, linear plantings for Run and spring-like benches for Jump.

# BODIES IN MOTION

## THE ANIMAL KINGDOM

Have you ever watched birds in the sky and wondered how they fly? Or seen a horse running and wondered if all four feet leave the ground at the same time.

Every creature large and small moves in some way; some run on the ground, others fly in the sky while still others swim in the ocean. Even plants and trees can move with the wind! The design for Odyssey Elementary School took inspiration from different types of movement, incorporating that inspiration into the design of both the building and the landscaping.

Each of the different landscape areas shown in the diagram to the right was designed around a different type of movement that animals use; run, swim, fly and jump. In those areas you will find signs with fun information about that type of movement.



## ALTERNATIVE TRANSPORTATION

Cars and trucks burn gasoline, a non-renewable fossil fuel, which contributes to air pollution. Choosing a more sustainable mode of transportation to get from one place to another can greatly reduce the negative environmental impacts of travel.

Here are some ways you can lessen the effects of burning fossil fuels.

- Carpool with other people
- Take fewer trips in cars
- Use a less polluting vehicle like a smaller car or an electric car
- Ride the bus or walk to school

The transportation sector is a major source of greenhouse gas emissions (GHGs) in the United States. An estimated 30 percent of national GHGs are directly attributable to transportation—and in some regions the proportion is even higher. Transportation is also the fastest-growing source of GHGs in the U.S., accounting for 47 percent of the net increase in total U.S. emissions since 1990.

(Source: www.epa.gov)

It may come as news to some, but every school bus on the road eliminates approximately 36 cars. For every bus you keep on the road, that's 36 fewer cars clogging the morning commute and 36 fewer cars polluting the atmosphere.

Odyssey's parking lots provide the minimum necessary parking, with preferred parking for low-emitting and fuel efficient vehicles and carpool vehicles.

Your school was designed to include bike racks to encourage everyone to ride their bicycle to school. Can you think of any other ways you can get to school that would be better for the environment?



## SUSTAINABLE SITES

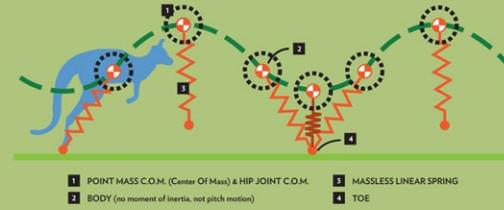
Sustainability and environmental impact held a high priority during design of the site. Different elements presented various challenges which needed to be addressed to infuse sustainability into the project.

- 1 Utilization of reflective materials on the building to reduce heat absorption. Did you know that cities and urban areas are warmer than adjacent open spaces? This is because we use a lot of dark building and paving materials that store heat. This is called the "urban heat-island effect." The roof on Odyssey is white, which reflects light instead of absorbing it. On the site, concrete was used in place of asphalt to reduce heat absorption, wherever it was feasible.
- 2 Integration of educational components. Odyssey Elementary School has been designed as a teaching tool to help everyone who visits understand more about the benefits of sustainable design. Signs explaining how Odyssey helps our environment are everywhere in your school!
- 3 Enhanced safety for pedestrian and bicycle traffic. The site includes safe pedestrian and bike paths to ensure you can walk or ride to school without having to cross cars and buses dropping off students.
- 4 Reserved parking for carpool, low emitting & fuel efficient vehicles. Preferred and reserved parking has been provided to encourage carpooling and lower-emission vehicles.
- 5 Native plant species in landscape. Local, native and drought tolerant plants have been planted throughout the landscape to contribute to reduced water consumption and to provide a beautiful and engaging learning landscape.



## JUMP HIGH LIKE A KANGAROO

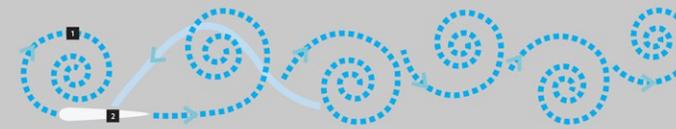
Have you ever noticed that you bend your knees right before you jump? It's like coiling up a spring right before letting it go. When you bend your knees, you're turning your body into a spring, preparing it to jump high into the air. The spring is released as you fly through the air and coils back up again when you land on the ground. Animals like the kangaroo make excellent jumpers. This picture diagram shows how their strong legs spring them through the air.



The walls and planters in this courtyard are coiled up like springs, pushing the sidewalk from side to side. They represent how you and kangaroos jump through the air. What are some other great animal jumpers; bunnies, grasshoppers, frogs? Can you hop all the way down the path?



## FLY FAR LIKE A BIRD...

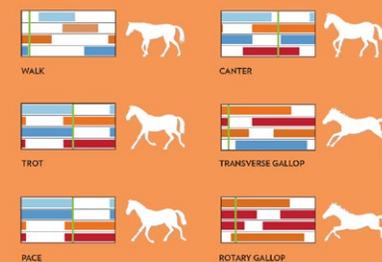


As a bird flaps its wings, the air begins to swirl behind it. When the wing goes up, the air swirls in one direction and as the wing goes down, the air swirls in the opposite direction. Fish make the same motion with their fins and tail as they swim through the water. This concept is known as swirling vortices. Can you see the swirling vortices in this courtyard? Look at how the walls create the center of four swirling vortices, each one spinning in the opposite direction. You can create swirling vortices too! When you wave your hand through a bath full of water you will see the water swirl behind it, just like a bird flying through the air or a fish swimming through the water.

## SWIM LIKE A FISH

## RUN FAST LIKE A HORSE

A footfall pattern is a graph that shows the order in which your feet touch the ground as you walk or run. Animals with four feet have many types of footfall patterns that can change depending on how fast they're moving. This graph shows the way a horse's footfall pattern changes with six different gaits, or patterns of movement. The blue bars show the legs that are touching the ground and the red/orange bars show the legs that are moving through the air.



Footfall patterns were used to design the groups of plants along this walkway. The plants in this bed represent a "pace" pattern.

The plants in the bed behind you represent a "walk" pattern. Each linear group of plants represents one foot of a four-legged animal, such as a horse, touching the ground. You can make your own footfall patterns with your footprints by walking on sand or snow. Can you make different patterns by walking or running? Give it a try!



## TECHNOLOGY

In addition to being the most energy efficient and greenest school in state, Odyssey is also one of the most technologically advanced as well. During the planning process, the need for a full integration of technology was highlighted as a need by the panel of teachers and administrators. Each learning space, in addition to the collaborative and public spaces, features an interactive short throw projector for the teachers and students to use. Ample charging areas were required

in the learning spaces because each one has its own mobile bank of ipads. The design of the millwork in the learning spaces provided connections for small portable projects or interactive monitors to facilitate student-to-student collaboration and interaction.

The school wanted the flexibility to consider all areas of their building as learning spaces, and as such, interactive projection, power and wireless connections

are accessible from every area of the school, providing teachers total flexibility. The sustainable features are displayed in the student Commons through an interactive kiosk, for students to monitor their usage against the generation of the PV array on the roof, but that information is also provided wirelessly throughout the school so teachers can integrate that information into their curriculum.

## 07 RESULTS OF THE PROCESS & PROJECT

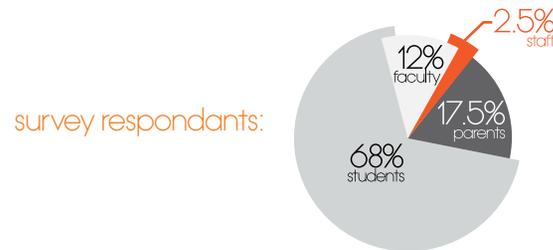
Throughout the process of this project, the design team has utilized a series of surveys to gather input.

Discussions during the Conceptualization Meeting made it clear that it would be critical to include a broader cross section of teachers and staff than could be accommodated in the formal programming meetings. In order to accomplish this, a questionnaire was developed, utilizing "Survey Monkey", an on-line survey program.

The Davis School District e-mailed a request and a link to the survey to all 59 elementary schools in the District asking for their teachers' participation. Over 600 teachers filled out the on-line multiple choice survey, and over 200 wrote responses to the "open-ended comments" question, giving the design team extremely valuable input.

For the furniture selection phase of the project, the design team developed an on-line survey for teachers and students to provide input prior to using the new furniture for 5 weeks and then after the 5 weeks had elapsed. Three existing schools in the District were provided with a classroom of the test furniture, which was utilized by two sets of teachers within each building. The team analyzed the results of the surveys, and adjusted the types and quantities of the furniture to be ordered for Odyssey.

Finally, in mid March 2015, a Post Occupancy survey was launched on Survey Monkey. The survey tailors questions to students 3rd grade and above, staff, faculty and parents. As of this submittal, 271 people have filled out the online survey:



Selected data is bulleted below:

In response to the question "In your opinion, what factors are primarily responsible for the success of your child's academic performance and learning?"

-  46% of parents responded that the classroom and building design played a role
-  Over 83% of responding faculty and students agreed that the layout of the school and classrooms makes it easy to work in groups, while over 86% felt that the layout of the school and classroom makes learning more fun.
-  More than 82% of respondents were satisfied with the outdoor play area and the courtyard.
-  82% of responding faculty agreed that the layout of the school and classroom encourages student-teacher interaction.



Over 78% of teachers who responded were satisfied or very satisfied with the design of the building in helping them to provide quality learning experiences for their students.



Almost 88% of responding students and faculty agree that the classroom furniture is easy to move, and over 56% change the classroom layout and furniture locations weekly or oftener.



61% of all classrooms open the large roll-up door weekly or oftener.



85% of respondents are satisfied with the amount of natural daylight in their classroom.



65% of the responders felt that the "habitats" help students feel part of the school community.



86% of respondents found the "habitat" displays well designed, organized, and interesting (i.e., quotes, facts, animals, actions, colors, etc.).



Over 82% of those responding agreed that it is easy to find your way around school (i.e., such as finding a room you have never been to before).



84% felt safe while inside the school and on school grounds.



Over 87% of all those responding to the survey were satisfied with the building overall.

**Q67** Based on your impressions of the school, how would you describe the overall appearance and visual quality of the building? (Please select all that apply)

Answered: 230 Skipped: 41



**Q14** In your opinion, what factors are primarily responsible for the success of your child's academic performance and learning? (Please select all that apply)

Answered: 45 Skipped: 226



Answer Choices	Responses
Parental involvement	31
My child's ability	44
Teacher instruction	18
School programs	21
School administrators	21
Classroom and building design	41
<b>Total Respondents: 45</b>	
Other (please specify)	
There are no responses.	

**Q1** What is your role at the school?

Answered: 271 Skipped: 0



#	Responses
1	preschool
2	Foxboro
3	Foxboro
4	Foxboro
5	Foxboro
6	Washington Elementary (Preschool)
7	Foxboro
8	Foxboro
9	Park Lane Elem
10	
11	
12	
13	Fox
14	foxbo
15	foxbor
16	Foxboro
17	nene
18	n/a
19	Foxboro
20	Foxboro Elem
21	Morgan Elem
22	Woods Cross El
23	Preschool program
24	Foxboro
25	Foxboro
26	Woods Cross Elem
27	Foxborow
28	Foxboro Elementary
29	Woods Cross Elementary
30	Woods Cross
31	Woods Cross Elementary
32	Foxboro
	Woods Cross Elementary

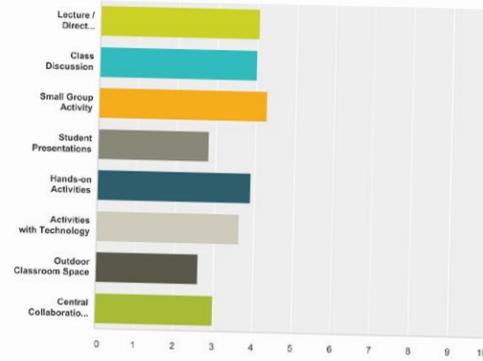
**Q2** What school did your child attend last year?

Answered: 43 Skipped: 228

#	Responses	Date
1	preschool	4/2/2015 12:58 PM
2	Foxboro	4/2/2015 11:25 AM
3	Foxboro	3/30/2015 3:24
4	Foxboro	
5	Foxboro	
6	Washington Elementary (Preschool)	
7	Foxboro	
8	Foxboro	
9	Park Lane Elem	
10		
11		
12		
13	Fox	
14	foxbo	
15	foxbor	
16	Foxboro	
17	nene	
18	n/a	
19	Foxboro	
20	Foxboro Elem	
21	Morgan Elem	
22	Woods Cross El	
23	Preschool program	
24	Foxboro	
25	Foxboro	
26	Woods Cross Elem	
27	Foxborow	
28	Foxboro Elementary	
29	Woods Cross Elementary	
30	Woods Cross	
31	Woods Cross Elementary	
32	Foxboro	
	Woods Cross Elementary	

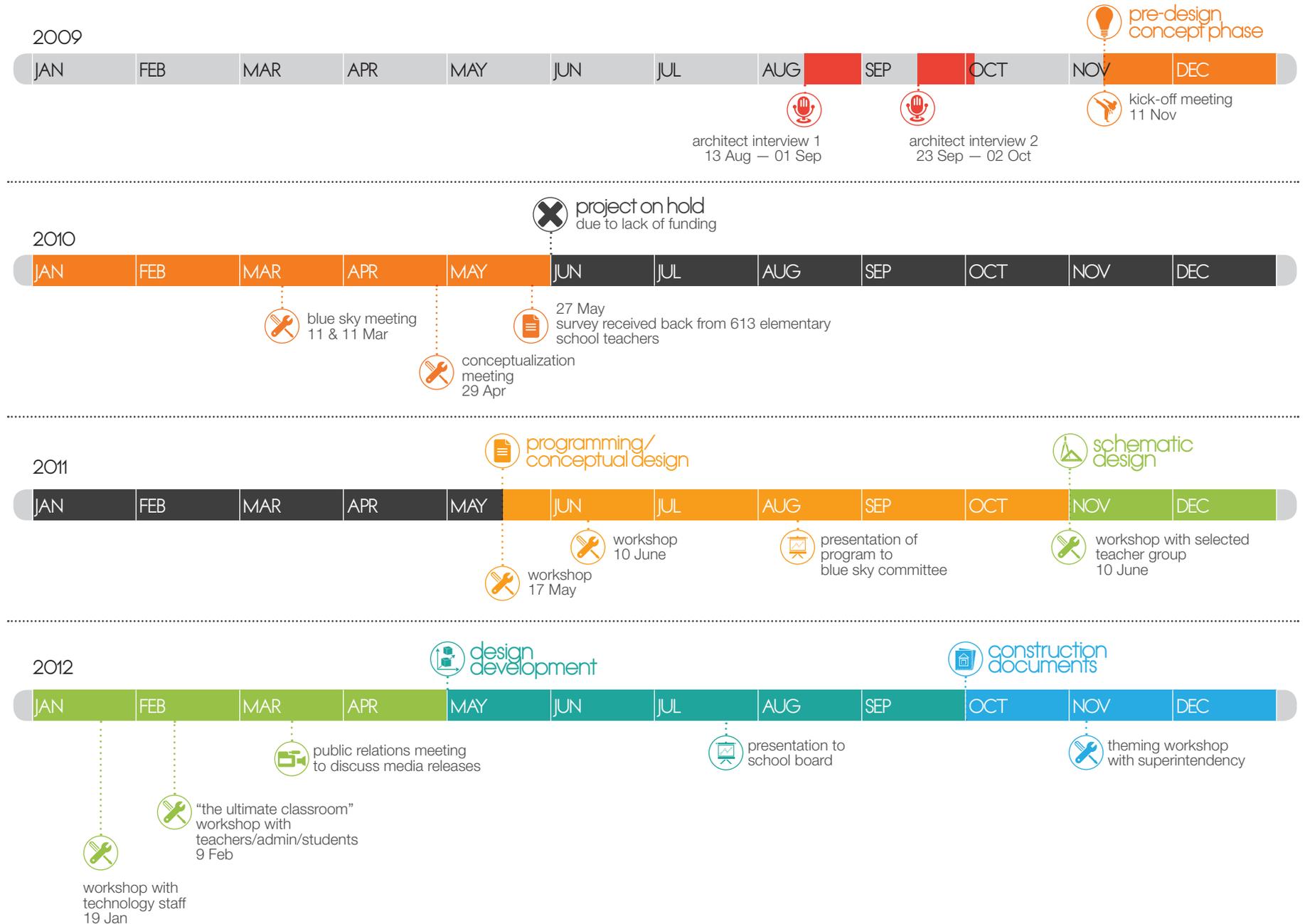
**Q33** How often do you use each of the following instructional techniques?

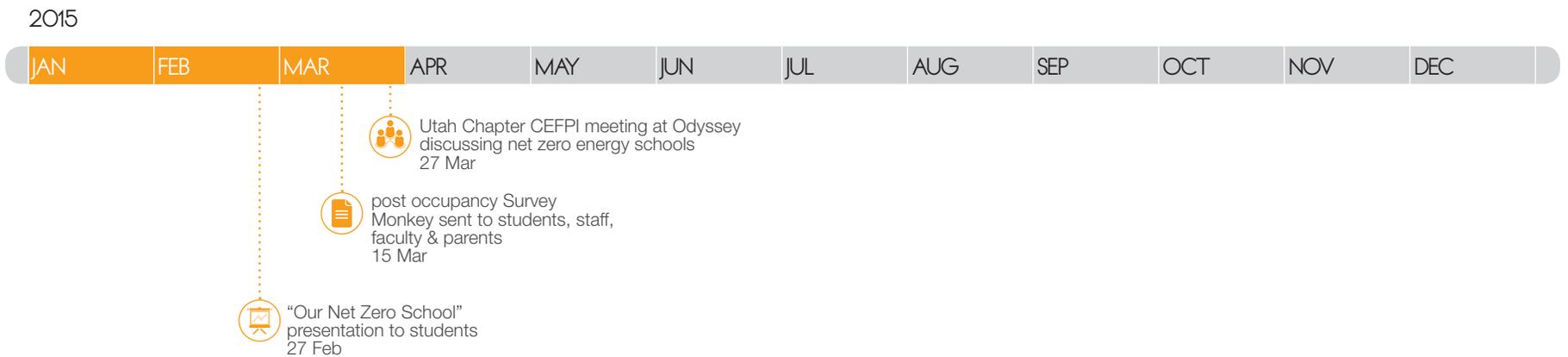
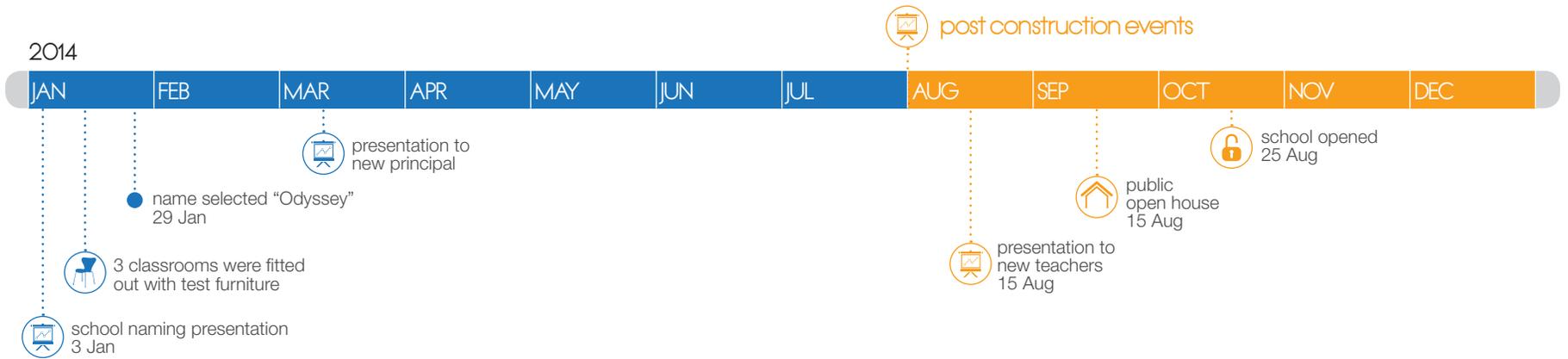
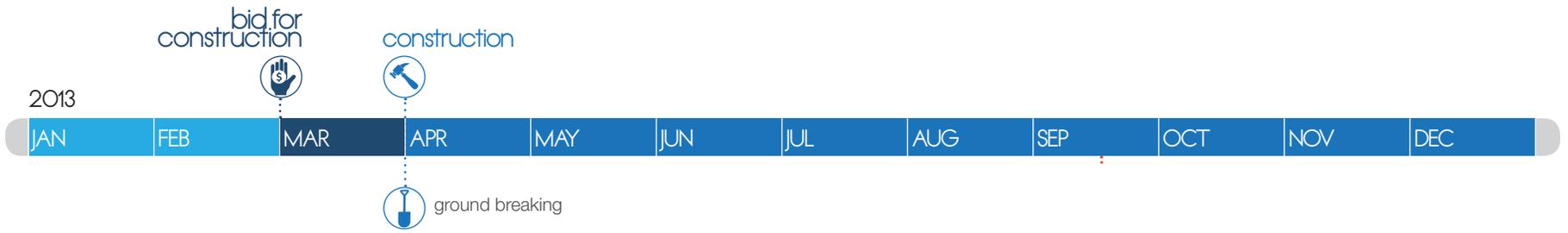
Answered: 23 Skipped: 248

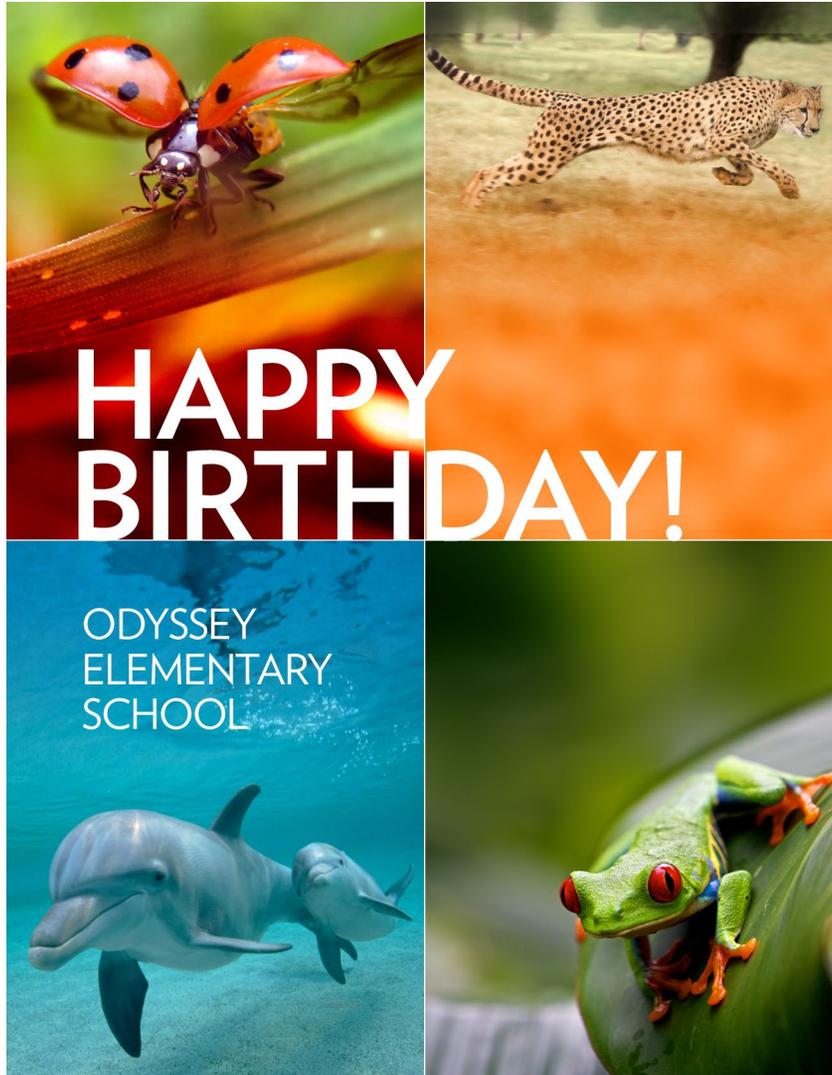


	Almost never	Once in a while	Sometimes	Frequently	Almost all the time	N/A	Total	Weighted Average
Lecture / Direct Instruction	0.00% 0	4.55% 1	13.64% 3	50.00% 11	27.27% 6	4.55% 1	22	4.05
Class Discussion	0.00% 0	4.35% 1	8.70% 2	65.22% 15	17.39% 4	4.35% 1	23	4.00
Small Group Activity	0.00% 0	0.00% 0	8.70% 2	52.17% 12	34.78% 8	4.35% 1	23	4.27
Student Presentations	17.39% 4	8.70% 2	43.48% 10	17.39% 4	4.35% 1	8.70% 2	23	2.81
Hands-on Activities	0.00% 0	4.35% 1	26.09% 6	38.13% 9	26.09% 6	4.35% 1	23	3.91
Activities with Technology	9.52% 2	0.00% 0	28.57% 6	28.57% 6	23.81% 5	9.52% 2	21	3.63
Outdoor Classroom Space	21.74% 5	13.04% 3	34.78% 8	21.74% 5	0.00% 0	8.70% 2	23	2.62
Central Collaboration Space	17.39% 4	13.04% 3	26.09% 6	21.74% 5	13.04% 3	8.70% 2	23	3.00

# PROJECT TIMELINE







The design team provided many graphic materials to the school, including a themed birthday card that the principal requested, which she sends to all students with a personal note.

## O8 SUSTAINABLE DESIGN

Odyssey Elementary School is the first Net Zero school and the most efficient and sustainable school in the state of Utah.

Odyssey Elementary School is designed to provide healthy environments for students and teachers. Ample daylight, healthy materials and effective ventilation all contribute toward the ongoing health and wellbeing of the occupants. The building lighting and mechanical systems also have enhanced controls to allow each learning space to be adjusted to meet the unique class needs. Each classroom also has an operable window to allow direct access to fresh air when the weather is nice.

### ENERGY EFFICIENCY

Davis School District is the state-wide leader in energy efficient facilities for K-12 schools. The District's ongoing efforts have resulted in an overall energy consumption that has remained constant over the last 13 years, while adding 840,000 square feet of new building area within the district. This effort to improve efficiency and reduce resource consumption while improving the learning environment led to the design and construction of Odyssey.

In late 2009, VCBO Architecture was selected to design a new series of prototype elementary schools for Davis School District. Based on the previous efficiency efforts as well as decades of building system improvements, the project team was able to set an energy consumption goal of 18 kBtu per square foot per year. This energy consumption level is below the typical target of 25 kBtu per square foot per year of most zero energy buildings. With a constant desire to improve the building performance, the team set their sights on designing and constructing a net zero school.

“ I think it's cool that Odyssey is the greenest school in Utah, and possibly the country or planet! ”

— comments from post occupancy review

### GETTING TO NET ZERO

In addition to the incredible learning spaces, the new prototype incorporates a variety of high performing systems, all working in tandem to reduce the upfront construction costs as well as the ongoing operational costs of the building. The building envelope has three inches of continuous insulation as well as a continuous air and moisture barrier to ensure reduced air infiltration and thermal gains and losses through the exterior walls. This reduces the required size of the mechanical and ventilation systems while improving the comfort of the students and teachers. Strategically placed windows also allow ample daylight to enter the learning and working environments. Balancing the daylight with glare reduction as well as thermal heat gain reduction was a priority, leading to the integration of solar photovoltaics used as sun shades on the south faces of the building.

The lighting is all LED with a sophisticated control system that allows for integrated daylight sensors, vacancy sensors and multiple lighting levels in all spaces, and the district maintains strict lighting schedules and timers

to reduce energy consumption. The teachers now have a variety of lighting level options and the District has the ability to track energy utilization used by the lighting system.

The mechanical systems consists of layers of efficiency strategies to achieve optimal performance. The ventilation air is delivered using thermal displacement ventilation, which supplies lower velocity, more temperate air near the floor, reducing energy used to power fans as well as energy to heat and cool the ventilation air. The delivery of air near the floor also improves student and teacher health and comfort. A ground-source geothermal system is then used to heat the building. This heat-exchange system uses electricity to extract heat from the earth and transfer it to the ventilation air in the school. When ground temperatures are low enough, the geothermal loop is piped directly to the fan units to achieve “free cooling” early in the season. Coupled with a two-stage evaporative cooling system that uses water to cool the ventilation air, Odyssey has some of the most resource efficient systems available.

Based on the strategies noted above, the predicted electricity consumption of the building is just over 16 kBtu per square foot per year. This is below the targeted 23 at the beginning of the design process. The renewable energy system selected for the school is a roof-based ballasted solar photovoltaic system. The scale of the roof and effort to reduce roof-mounted equipment allows for the installation of a 320,100 kW solar array, anticipated to generate approximately 17 kBtu per square foot per year.

Demand charge cost reduction is another key consideration for Davis School District, as their electricity rate is based on the peak demand for the building. A key concern with a ground-source heat pump system is

the amount of electricity needed to bring the building to temperature in the winter. To counter-act this increased cost that occurs in the winter, an efficient gas boiler was added to the project to cap the demand charge at a pre-determined level. This boiler, although adding to the resource utilization and upfront cost of the project, will reduce operational costs over the life of the building. This boiler, in addition to the reduced mechanical demand, contributes to a building that will cost half as much to run on an annual basis, compared to a typical school of a comparable size.

## A MILESTONE

This project is a tremendous milestone for Davis School District and for Utah. It demonstrates that an institutional scale building can achieve on-site net zero electricity consumption within a set and standard budget. Odyssey Elementary School is the first in a series of prototype schools that will work toward net zero energy use, demonstrating that the triple bottom line of environmental consciousness, economic responsibility and social equity are not only feasible, but inherently beneficial.

The project is on track for LEED Gold certification, and has incorporated the following sustainable design and construction practices based on LEED for Schools 2009:

## SUSTAINABLE SITES

-  prerequisite
-  credit

### SS 1: Construction Activity Pollution Prevention

To reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.

### SS 2: Environmental Site Assessment

To ensure that the site is assessed for environmental contamination and if contaminated, that the environmental contamination has been remediated to protect children's health.

### SS 1: Site Selection

To avoid the development of inappropriate sites and reduce the environmental impact from the location of a building on a site.

### SS 4.2: Alternative Transportation - Bicycle Storage and Changing Rooms

To reduce pollution and land development impacts from automobile use.

### SS 4.3: Alternative Transportation - Low-Emitting and Fuel-Efficient Vehicles

To reduce pollution and land development impacts from automobile use.

### SS 4.4: Alternative Transportation - Parking Capacity

To reduce pollution and land development impacts from automobile use.

### SS 5.2: Site Development - Maximize Open Space

To promote biodiversity by providing a high ratio of open space to development footprint.



### SS 6.1: Stormwater Design - Quantity Control

To limit disruption of natural hydrology by reducing impervious cover, increasing on site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants.

### SS 6.2: Stormwater Design - Quality Control

To limit disruption and pollution of natural water flows by managing stormwater runoff.

### SS 7.2: Heat Island Effect - Roof

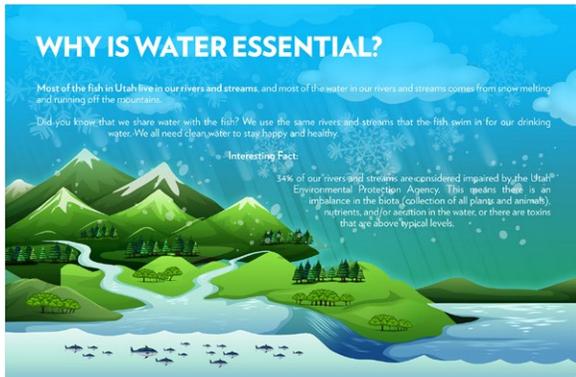
To reduce heat islands to minimize impacts on microclimates and human and wildlife habitats.

### SS 8: Light Pollution Reduction

To minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction and reduce development impact from lighting on nocturnal environments.

### SS 9: Site Master Plan

To ensure that the environment site issues included in the initial development of the site and project are continued throughout the future development caused by changes in programs or demography.



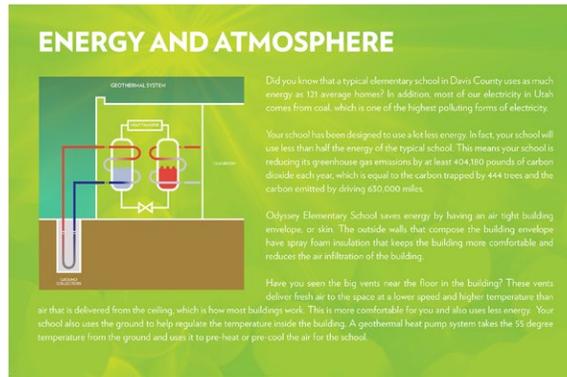
## WATER EFFICIENCY

### ! WE 1: Water Use Reduction

To increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

### ✓ WE 3: Water Use Reduction

To further increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.



## ENERGY AND ATMOSPHERE

### ! EA 1: Fundamental Commissioning of Building Energy Systems

To verify that the project's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design and construction documents.

Benefits of commissioning include reduced water use, lower operating costs, reduced contractor callbacks, better building documentation, improved occupant productivity and verification that the systems perform in accordance with the owner's project requirements.

### ! EA 2: Minimum Energy Performance

To establish the minimum level of energy efficiency for the proposed building and systems to reduce environmental and economic impacts associated with excessive energy use.

### ! EA 3: Fundamental Refrigerant Management

To reduce stratospheric ozone depletion.

### ✓ EA 1: Optimize Energy Performance

To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

### ✓ EA 2: Onsite Renewable Energy

To encourage and recognize increasing levels of onsite renewable energy self supply to reduce environmental and economic impacts associated with fossil fuel energy use.

### ✓ EA 3: Enhanced Commissioning

To begin the commissioning process early in the design process and execute additional activities after systems performance verification is completed.

### ✓ EA 4: Enhanced Refrigerant Management

To reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to climate change.

### ✓ EA 5: Measurement and Verification

To provide for the ongoing accountability of building energy consumption over time.



## MATERIALS AND RESOURCES

### ! MR 1: Storage and Collection of Recyclables

To facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

### ✓ MR 2: Construction Waste Management

To divert construction and demolition debris from disposal in landfills and incineration facilities. Redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites.

### ✓ MR 4: Recycled Content

To increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

### ✓ MR 5: Regional Materials

To increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

## INDOOR ENVIRONMENTAL QUALITY

### ! IEQ 1: Minimum Indoor Air Quality Performance

To establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and wellbeing of the occupants.

### ! IEQ 2: Environmental Tobacco Smoke (ETS) Control

To prevent or minimize exposure of building occupants, indoor surfaces and ventilation air distribution systems to environmental tobacco smoke (ETS).

### ! IEQ 3: Minimum Acoustical Performance

To provide classrooms that are quiet so that teachers can speak to the class without straining their voices and students can effectively communicate with each other and the teacher.

### ✓ IEQ 1: Outdoor Air Delivery Monitoring

To provide capacity for ventilation system monitoring to help promote occupant comfort and wellbeing.

### ✓ IEQ 3.1: Construction Indoor Air Quality Management Plan - During Construction

To reduce indoor air quality (IAQ) problems resulting from construction or renovation and promote the

comfort and wellbeing of construction workers and building occupants

### ✓ IEQ 3.2: Construction Indoor Air Quality Management Plan - Before Occupancy

To reduce indoor air quality (IAQ) problems resulting from construction or renovation to promote the comfort and wellbeing of construction workers and building occupants.

### ✓ IEQ 4.1: Low-Emitting Materials - Adhesives and Sealants

To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and wellbeing of installers and occupants.

### ✓ IEQ 4.2: Low-Emitting Materials - Paints and Coatings

To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and wellbeing of installers and occupants.

### ✓ IEQ 4.3: Low-Emitting Materials - Flooring Systems

To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and wellbeing of installers and occupants.



✓ IEQ 4.4: Low-Emitting Materials - Composite Wood and Agrifiber Products

To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and wellbeing of installers and occupants.

✓ IEQ 5: Indoor Chemical and Pollutant Source Control

To minimize building occupant exposure to potentially hazardous particulates and chemical pollutants.

✓ IEQ 6.1: Controllability of Systems - Lighting

To provide a high level of lighting system control by individual occupants or groups in multi-occupant spaces (e.g., classrooms and conference areas) and promote their productivity, comfort and wellbeing.

✓ IEQ 6.2: Controllability of Systems - Thermal Comfort

To provide a high level of thermal comfort system control by individual occupants or groups in multi-occupant spaces (e.g., classrooms or conference areas) and promote their productivity, comfort and wellbeing.

✓ IEQ 7.1: Thermal Comfort - Design

To provide a comfortable thermal environment that promotes occupant productivity and wellbeing.

✓ IEQ 7.2: Thermal Comfort - Verification

To provide for the assessment of building occupant thermal comfort over time.

✓ IEQ 8.2: Daylight and Views - Views

To provide building occupants a connection to the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.



### INNOVATION IN DESIGN

- ✓ ID 1.1: Innovation in Design - Education Program  
To inform students, staff and visitors of the sustainable design and construction efforts to create a healthier, more efficient school.
- ✓ ID 1.2: Innovation in Design - Green Cleaning Program
- ✓ ID 1.3: Innovation in Design - Exemplary Energy Performance
- ✓ ID 1.4: Innovation in Design - No Mercury Lighting  
To reduce the hazardous materials in the building by using all LED lighting systems, and not bringing mercury into the building.
- ✓ ID 2: LEED Accredited Professional  
To support and encourage the design integration

required by LEED to streamline the application and certification process.

- ✓ ID 3: The School as a Teaching Tool  
To integrate the sustainable features of a school facility with the school's educational mission.

### REGIONAL PRIORITY

- ✓ RP 1.1: Regional Priority  
To provide an incentive for the achievement of credits that address geographically specific environmental priorities.
- ✓ RP 1.2: Regional Priority  
To provide an incentive for the achievement of credits that address geographically specific environmental priorities.

## APPENDICES

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Odyssey Elementary School Program

Post Occupancy Evaluation

Articles written about Odyssey Elementary School

## APPENDIX 01

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Odyssey Elementary School Program

## APPENDIX O2

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Post Occupancy Evaluation