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.
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.

“Cool now I like going to school. Fun!”
– student comments from post occupancy survey
Little students have their own play area with exciting playtoys and safe softfall 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
3. The facility will be designed to allow for easy and readily accessible technology – all occupants will utilize personal computing devices.

“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
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.

““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.
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.
6. Outdoor learning will be accommodated through the design of the outdoor space, specifically; outdoor courtyard(s) must be designed to facilitate learning 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
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.
9. The building will engage the community, accommodate after school events, and serve as a hub for the neighborhood.

“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
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
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.

### Summary of State’s Guidelines

Utah State Office of Education per Student Suggested Space Criteria

<table>
<thead>
<tr>
<th>Level</th>
<th>Square Feet Per Student</th>
<th>Number of Students</th>
<th>Total Gross Square Feet Area</th>
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<tr>
<td><strong>Elementary</strong></td>
<td></td>
<td></td>
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<tr>
<td>72</td>
<td>600 or more</td>
<td>43,200+</td>
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<td>600 or less</td>
<td>98,400-</td>
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**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.
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!
Students were sent on a digital scavenger hunt to watch videos about the different sustainable and design features.

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

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

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 moment 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 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**

Here are some tips on how to be more active and healthier.

1. **Fly Like a Bird**
   - Use a bicycle or a scooter.
   - Walk or jog instead of driving.
   - Use stairs instead of elevators or escalators.

2. **Jump Like a Kangaroo**
   - Jumping rope or doing hopscotch.
   - Incorporating jumping exercises into your daily routine.

3. **Run Like a Horse**
   - Jogging or running for at least 30 minutes a day.
   - Incorporating sprinting exercises into your daily routine.

4. **Swim Like a Fish**
   - Swimming or doing water aerobics.
   - Incorporating water-based exercises into your daily routine.

5. **Sustain Environmental Impact**
   - Reduce, reuse, and recycle.
   - Use environmentally friendly products.
   - Plant trees and shrubs.

**ALTERNATIVE TRANSPORTATION**

Cars and trucks have gasoline, a non-renewable fuel, which contributes to air pollution. Choosing a more sustainable mode of transportation can help reduce our carbon footprint and contribute to a healthier environment.

Here are some ways you can reduce the effects of burning fossil fuels:

- **Carpool with other people**
- **Use fewer trips to school**
- **Use a bike or a scooter**
- **Use the bus or walk to school**

The transportation sector is a major source of greenhouse gas emissions (GHG) in the United States. An estimated 25 percent of national GHG are directly attributable to transportation, and in some regions the proportion is even higher. Transportation is also the principal source of CO2 in the U.S., accounting for 80 percent of the net increase in road CO2 emissions since 1990.

It may seem like a small step, but every choice we make can affect the environment. Choose wisely to ensure a healthier future for all.

**SUSTAINABLE SITES**

Sustainability and environmental impact are highly valued in the design of the site. Different elements present unique challenges which need to be addressed to ensure sustainability into the project.

- **Utilization of sustainable materials**
- **Incorporation of green roofs**
- **Use of renewable energy sources**
- **Reducing water consumption**
- **Efficient waste management systems**
- **Enhanced coordination and collaboration**
- **Use of native plant species**
- **Installation of rainwater harvesting systems**
- **Energy-efficient lighting systems**
- **Use of solar panels and wind turbines**

**JUMP HIGH LIKE A KANGAROO**

Have you ever noticed how you land on your feet before you jump? It’s like setting up a spring right before taking off. When you walk or jog, you’re actually using your body’s natural ability to bounce. To improve your jumping abilities, try these exercises.

1. **Point Pivots and Elbow Hops**
2. **Roll Over Elbow Hops**
3. **Body Roll Over Elbow Hops**
4. **Knee Roll Over Elbow Hops**

**FLY FAR LIKE A BIRD**

As a bird flies, the air begins to move behind it. When the wings go up, the air swirls in one direction and as the wings go down, the air swirls in the opposite direction. Fish make the same movements with their fins and tails as they swim through the water. This concept is known as swirling vortices. Can you see where swirling vortices interact in this country? Look at how the water creates the center of four swirling vortices, each one spinning in the opposite direction. You can sense swirling vortices too! When you swim through the water, where the fluid is moving, you can feel the swirling vortices too.
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.
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?”

- 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 60% felt 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.

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

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.
### PROJECT TIMELINE

**2009**

- **January**: Kick-off meeting
- **April**: Architect interview 1 (13 Aug – 01 Sep)
- **May**: Architect interview 2 (23 Sep – 02 Oct)
- **June**: Blue sky meeting (11 & 11 Mar)
- **September**: Conceptualization meeting (29 Apr)

**2010**

- **January**: Pre-design/concept phase
- **February**: Project on hold due to lack of funding
- **March**: Pre-design/concept phase
- **April**: Schematic design
- **May**: Programming/conceptual design
- **June**: Workshop with selected teacher group (10 June)
- **July**: Workshop 17 May
- **August**: Presentation of program to blue sky committee
- **September**: Workshop 10 June
- **October**: Presentation to school board
- **November**: Presentation to board
- **December**: Theming workshop with superintendency

**2011**

- **January**: Programming/conceptual design
- **February**: Schematic design
- **March**: Workshop with technology staff (17 May)
- **April**: Presentation of program to blue sky committee
- **May**: Workshop 10 June
- **June**: Presentation to school board
- **July**: Theming workshop with superintendency
- **August**: Workshop with selected teacher group (10 June)
- **September**: Presentation to board
- **October**: Presentation to board
- **November**: Presentation to board
- **December**: Theming workshop with superintendency

**2012**

- **January**: Public relations meeting to discuss media releases
- **February**: Themeing workshop with superintendency
- **March**: Workshop with technology staff (19 Jan)
- **April**: “The ultimate classroom” workshop with teachers/admin/students (9 Feb)
- **May**: Presentation to school board
- **June**: Presentation to board
- **July**: Presentation to board
- **August**: Theming workshop with superintendency

07 RESULTS OF THE PROCESS & PROJECT | 29
- **2013**
  - **JAN**
  - **FEB**
  - **MAR**
  - **APR**
  - **MAY**
  - **JUN**
  - **JUL**
  - **AUG**
  - **SEP**
  - **OCT**
  - **NOV**
  - **DEC**

  - Ground breaking

- **2014**
  - **JAN**
  - **FEB**
  - **MAR**
  - **APR**
  - **MAY**
  - **JUN**
  - **JUL**
  - **AUG**
  - **SEP**
  - **OCT**
  - **NOV**
  - **DEC**

  - Presentation to new principal
  - Name selected “Odyssey” 29 Jan
  - 3 classrooms were fitted out with test furniture
  - School naming presentation 3 Jan
  - Public open house 15 Aug
  - Presentation to new teachers 15 Aug
  - School opened 25 Aug

- **2015**
  - **JAN**
  - **FEB**
  - **MAR**
  - **APR**
  - **MAY**
  - **JUN**
  - **JUL**
  - **AUG**
  - **SEP**
  - **OCT**
  - **NOV**
  - **DEC**

  - Utah Chapter CEFPI meeting at Odyssey discussing net zero energy schools 27 Mar
  - Post occupancy Survey Monkey sent to students, staff, faculty & parents 15 Mar
  - “Our Net Zero School” presentation to students 27 Feb
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.
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.

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.

**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 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.

EA 6: 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 7: 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 8: Enhanced Commissioning
To begin the commissioning process early in the design process and execute additional activities after systems performance verification is completed.
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

Odyssey Elementary School Program
Post Occupancy Evaluation
Articles written about Odyssey Elementary School
APPENDIX 01

Odyssey Elementary School Program
APPENDIX O2

Post Occupancy Evaluation