Seattle Daily Journal of Commerce

SCHOOL CONSTRUCTION

August 25, 2016

WHEN DOES RENOVATING A SCHOOL MEAN BRINGING IT 'UP TO CODE'?

Seismic improvements aren't always necessary, particularly for newer buildings or smaller projects. Still, deciding which upgrades to make can take some work.

BY CRAIG STAUFFER & BRET MADDOX
PCS STRUCTURAL SOLUTIONS

When undertaking the renovation of an existing educational facility, there are numerous questions that must be asked and answered.

This is the case for all of the major systems that make up the building: roofing and siding, mechanical and electrical systems, and, of course, the building structure. While it's often apparent that upgrades to these systems are needed, determining the scope of work necessary to achieve desired, or often mandated, seismic upgrades often takes a thorough investigation.

Depending on the age of the building, some systems may require more attention than others. For example, many buildings constructed in the past 20 years will not require significant structural improvements, except in response to reconfiguration of program spaces. This is due to the fact that modern building codes are much more comprehensive than older codes in accounting for the effects of earthquakes on buildings.

When older building codes were developed, the dynamic nature of seismic loading and its effect on structural systems was far less understood. As such, the magnitude of loads that could be generated by seismic events was typically underestimated. This is especially true in the Pacific Northwest, where susceptibility to large earthquakes was largely unknown until relatively recently.

In addition, older methods of construction lacked the durability and resiliency required of buildings constructed under current building codes.

A good example of this is in unreinforced masonry buildings. These structures accounted for the vast majority of the damage experienced in the Puget Sound region during the Nisqually earthquake in 2001. This damage was due to the brittle nature of the materials used in masonry wall construction.

Evaluating the structure

Addressing these deficiencies and those of other types of structural systems becomes the primary focus of the structural engineer during the early planning stages of any planned building renovation.

Generally, this process begins with an evaluation of the existing structure, which focuses on identifying the weak spots in the vertical and lateral load carrying systems. Assuming that the building has been functioning prior to the renovations, it is unlikely that this investigation will find significant deficiencies in the vertical load system. The lateral load resisting system then becomes the primary focus of these evaluations.

There are several tools that can be used to facilitate the structural evaluation, including standards developed by the Federal Emergency Management Agency and the American Society of Civil Engineers (ASCE).

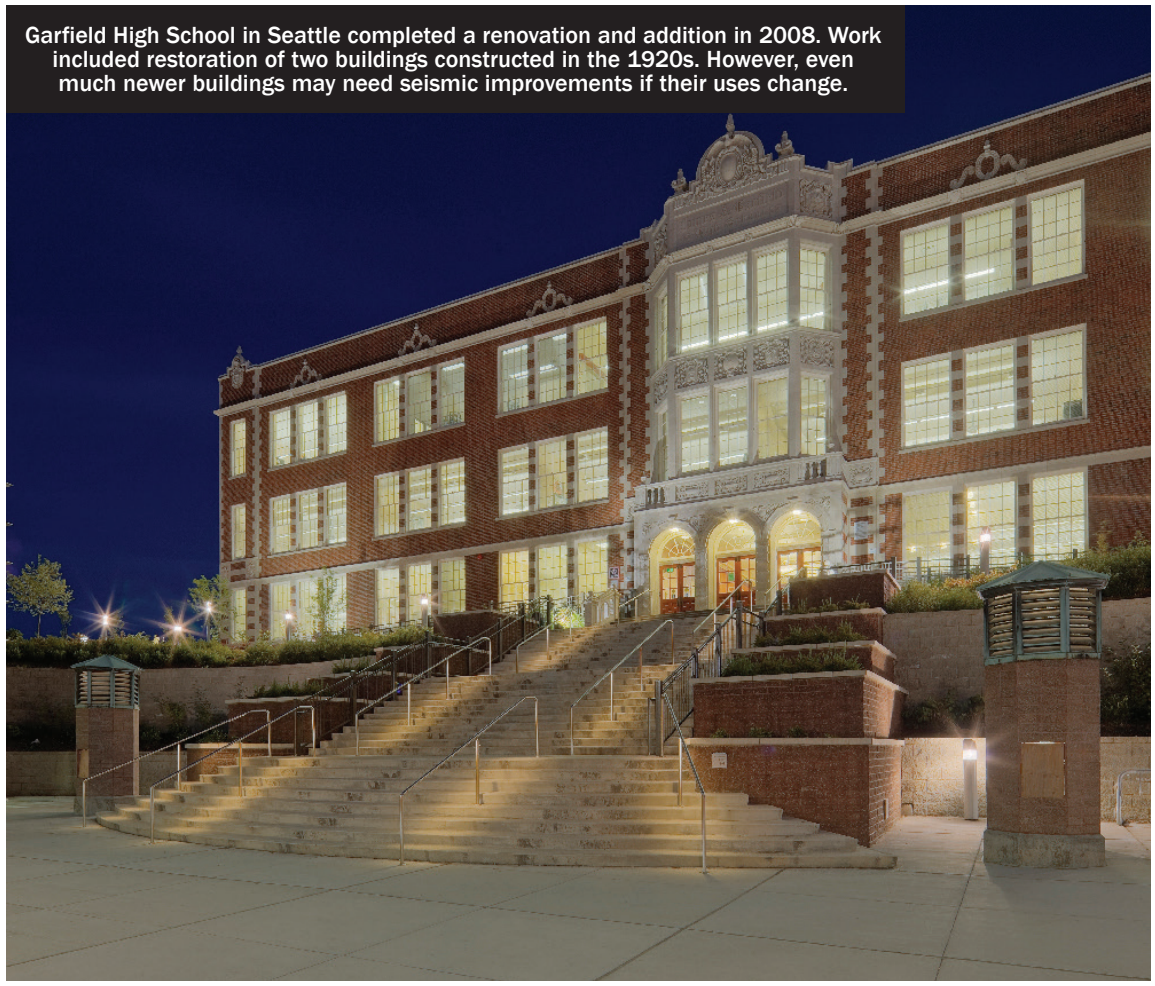
These standards are generally geared toward identifying portions of a building that have been problematic in similar buildings during past earthquakes. Once these deficiencies are identified, a plan of attack can be developed for improvements to the structure.

At this point in the process, it is generally prudent to begin dialogue with the local building department to establish what will be required as part of the planned renovations. Smaller-scale renovations can often be done without triggering seismic improvements, whereas more significant modifications will generally mandate upgrades that bring the building into compliance with the intent of current building code standards.

This often becomes a source of negotiation between the building official, the structural engineer, and the architect or building owner. During these negotiations, the idea of bringing the building "up to code" is weighed against those portions of the structure that will remain in place, but cannot be modified to be in strict compliance with building code provisions. Oftentimes, individual structural components that are not in compliance with code provisions can be supplemented with redundant structural elements that will maintain stability in a building that has experienced significant structural damage.

Again, unreinforced masonry buildings provide a good example of this scenario: New beams and columns can be provided adjacent to bearing walls to provide vertical support of floor and roof framing in the event that the walls are damaged to the extent of losing capacity.

These types of measures will help to significantly improve building occupants' safety during a seismic event, and will allow for safe exiting of a building after an event.



Garfield High School in Seattle completed a renovation and addition in 2008. Work included restoration of two buildings constructed in the 1920s. However, even much newer buildings may need seismic improvements if their uses change.

PHOTO BY DAN TYRPAK PHOTOGRAPHIC, COURTESY OF BLRB ARCHITECTS

Choosing the scope

For these types of situations, there is a separate set of code provisions geared specifically toward strengthening existing buildings.

The International Building Code (IBC) references two separate documents of this type. The first is the International Existing Building Code, which is published by the same group that is responsible for the IBC. The second is the ASCE 41 document, which is a standard that has been developed over the past few decades to address the needs for both evaluation and renovation of existing structures.

Both of these documents provide guidance for both the building official and engineer in determining the scope of improvements that will be needed to bring the building up to code.

Once the structural scope is defined, along with the scope of the other design disciplines, cost estimates are made to determine the costs of the anticipated renovation work. These costs are weighed carefully with various other considerations to determine the feasibility of renovations versus replacement with new construction.

Some considerations include the ease or difficulty of fitting new educational programming into an existing building shell, how and where new mechanical and electrical systems will be incorporated, and whether the building has historical significance to the community. Additionally, sustainability goals are evaluated, with the understanding that retaining an older building and breathing new life into it is in itself an act of sustainability.

Planning the execution of renovations and deciding whether there will be a need for phased construction or if the entire facility can be made available for renovation work is also a critical piece of the puzzle in determining if the building can be feasibly renovated.

Once the details of the questions outlined above begin to fall into place, the designs for the renovated building can begin in earnest with an eye to the goal of providing future generations with a modern learning environment while retaining and refreshing an aged community asset.

Craig Stauffer is the managing principal of the Seattle office of PCS Structural Solutions, and Bret Maddox is an associate principal in the Tacoma office. PCS Structural Solutions is a single-discipline structural engineering firm based in Tacoma and Seattle.

NEW MOUNT SI HIGH WILL SIT ATOP 4,800 STONE COLUMNS

Poor soils forced designers to get creative. The 3-foot-diameter columns will filter groundwater drainage and protect against earthquakes.

BY BORIS SRDAR & MATT RUMBAUGH

NAC ARCHITECTURE

From its early beginnings as a small farming community, the Snoqualmie Valley has been home to continued entrepreneurial growth.

Starting with a boom in logging operations to funding and building their own railroad followed by opening the second all-electric lumber mill in the nation, the residents of the Snoqualmie Valley have established a closely connected community that values progress and is founded on innovation.

It comes as no surprise that the Snoqualmie Valley School District also maintains a commitment to continual improvement. Their focus on developing and sustaining great teaching in every school not only prepares students for college and their career, but fosters innovation and an entrepreneurial spirit.

So when it came time for the district to rebuild and expand Mount Si High School to accommodate their growing student population, it was this philosophy that drove their vision. They wanted a new facility that supported the long-term educational needs in the valley and celebrated their rich history of innovation and progress. And they needed to partner with an experienced design team to do it.

Community input

NAC Architecture and the Snoqualmie Valley School District began their initial feasibility evaluation for the project in 2013. The team collaboratively engaged in various studies, preliminary planning and early schematics until 2015, when they embarked on a comprehensive conceptual design for the new school.

Guided by well-known educational planner Frank Locker, more than 30 committed teachers, students, parents and district administrators came together to apply the district's vision to reality while accommodating emerging trends in teaching and learning.

The district also confirmed their design philosophy and vision by using the platform Thoughtexchange to gather input from thousands of interested stakeholders. The result? A forward-thinking design that supports educational, emotional and social needs of each student while serving as an icon for the industrial progress of the valley.

Half-size site

The new high school combines a series of small learning communities with centrally located shared spaces that encourage interaction. A progressive, STEM-based environment will give students an interdisciplinary, project-based experience as they prepare for college.

Mount Si High is scheduled to begin construction next spring. The school will serve 2,300 students.

IMAGE COURTESY OF NAC ARCHITECTURE

The original school maintained a separate building for ninth graders to provide an easier transition into high school. This has been extremely well received by students, teachers and parents, and the new school will also have a separate building for freshmen.

Once complete, the school will accommodate 2,300 students in a 355,000-square-foot facility on a 34-acre site. That's half the size of a typical campus for this large of a school.

On top of that, the site is located in a floodway, across the street from a wetland, and down the road from the Snoqualmie River. Needless to say, extremely poor soil conditions are present.

Because the project will be placing a large facility in such a confined space, a unique solution was necessary to address the site's compact buildable area.

The resulting design features three stories of academic programming elevated above one level of partially below-grade parking, maximizing the usable space within tight site constraints. This also created the opportunity for a large open plaza above a portion of the parking level to provide an outdoor gathering place with sweeping views of the Cascades.

Additionally, this design requires less construction time than previously anticipated.

The new facility will be built adjacent to the existing school footprint rather than on top of it, allowing use of the original building for the majority of construction. The five-year phased schedule was reduced to about three since there was no need to coordinate demolition with new construction while school was in session.

Not only is this a significant time and cost saving for the district, but it creates the least amount of disruption to Mount Si students and staff.

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INSIDE

ON THE COVER

The grand opening for Clark College's $40 million STEM building in Vancouver is scheduled for Oct. 3. LSW Architects is the designer and Skanska is the general contractor.

PHOTO BY MAX MIKHAYLENKO/VARIABLE VISUALS, COURTESY OF LSW ARCHITECTS

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HOW TO DESIGN A SCHOOL RESTROOM THAT WORKS FOR EVERYONE

It's not just transgender students who want privacy. Some schools are replacing "gang-style" restrooms with gender-inclusive restrooms that have fully enclosed toilet rooms and shared sink areas.

JOANN HINDMARSH WILCOX & KURT HAAPALA

MAHLUM ARCHITECTS

Recent laws, federal directives and high-profile news stories are shining a light on the day-to-day challenges transgender citizens face with using public restroom facilities, and raising questions about civil rights protections and fundamental issues of basic human dignity.

This debate has considerable impact on physical environments across the education spectrum. How do the various toilet or shower needs of building users — be they elementary school, high school or university students, faculty or staff, parents or the public — be met with both dignity and fairness?

While the transgender movement (a phrase that actually encompasses the full LGBTQ community) may be illuminating the issue, toilet privacy affects a much broader group. Each person — whether transgender students and staff or the many non-transgender people who have toilet needs they do not wish to make public — deserves to take care of his, her or their most private human needs without questions from others.

This concept — enhancing equity through privacy — is a basic human right that primary, secondary and higher education institutions can uphold through thoughtful design solutions when retrofitting or building new facilities.

Cost fears

When equitable toilet design in the United States was standardized via the Americans with Disabilities Act (ADA) 1990, accessible toilet designs typically resulted in an individual (single occupant) room. In some cases, families with young children or adult caregivers were accommodated with family-style bathrooms.

In Washington and Oregon, additional statutes protect equal access to all genders, but for school districts with limited budgets, established facilities and deep-rooted social practices, relinquishing the traditional bathroom model is daunting.

Until recently, restroom design had almost become an afterthought for architects. Rows of stalls opposite rows of wash basins were designated only for males or for females. Such designs involved predictable plumbing, mechanical exhaust, and fixture costs.

Alternative design strategies that provide adequate numbers of individual toilet rooms can exponentially increase costs through additional plumbing, ductwork, square footage and ADA compliance, as well as invalidate some USGBC LEED points.

Colleges and universities may more easily implement equitable bathroom designs than K-12 school districts because users are older, more diverse, spread across many buildings, and tend toward critical thinking and open-mindedness. With their 24/7 occupancy, residence halls tend toward more equitable toilets and showers, but fear remains that enhanced design solutions will escalate costs, consume space, and drive up room rates.

Toilets and showers in residence halls have traditionally been grouped by gender per floor or per community, but this limits a campus's flexibility to fill empty bedrooms. Suite-style bathrooms serving smaller clusters of students potentially mitigate gender-segregated restrooms, but can cost more.

Even as schools, colleges and universities plan for more equitable restroom design, building codes have not yet caught up. Most jurisdictions determine required restrooms by calculating a ratio of women to men for typical occupancy. Some localities have altered the ratios, but the results are similar.

To meet ADA requirements, one larger, more private stall is included per floor or area. To save costs or preserve a sense of cleanliness, this usually doubles as the staff bathroom, a transgender accommodation, or is locked for approved users only. However, such policies connote these restrooms as "separate" or "different" especially among young students just learning to navigate social customs and are keen to fit in with their peers.

Within this multi-layered context, Mahlum has developed solutions with several clients to design toilets, showers and restroom facilities that meet the needs of transgender and non-transgender people alike, affording enhanced function and privacy.

Alternative solutions

Mercer Island School District wanted their kindergarteners to be accommodated throughout the new Northwood Elementary School. To meet this desired flexibility and maximize restroom equity, the design team placed individual toilet rooms across from classrooms in many places on each floor, rather than include singular toilet banks at the end of halls.

Since the district intends to keep them unlocked and available to all students, the solution offers toilet equity while boosting program flexibility, reducing time lost to toilet transitions, decreasing opportunities for bullying, and increasing feelings of inclusion.

For the renovation and expansion of the historic Grant High School in the Portland Public School District, Mahlum's design solution will go even further.

In 2013, Grant had 10 students who openly identified as transgender, according to school administrators. Since one of the top reasons transgender students drop out is because they feel uncomfortable or unsafe going to the bathroom at school, administrators prioritized toilet equity in their existing facility.

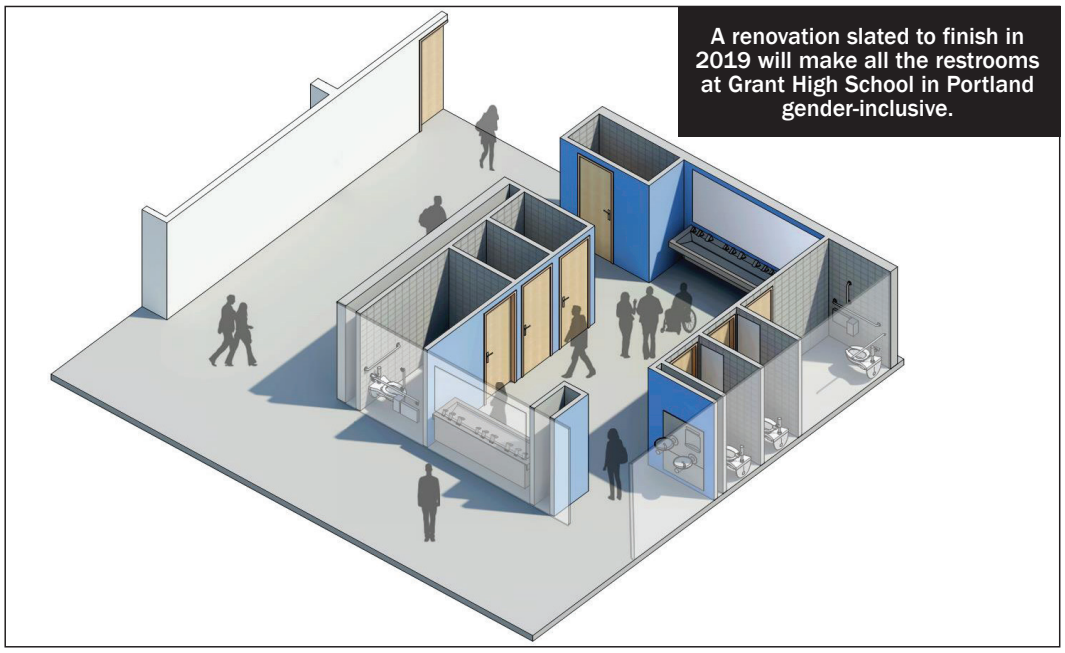
Four student bathrooms and two staff bathrooms — all individual rooms — were designated as gender-inclusive. As a result of their popularity with all students, providing equitable toilet facilities with enhanced privacy for all 1,700 students became an essential directive in Mahlum's redesign of Grant, which began in 2015.

In the team's solution, all existing "gang-style" bathrooms will disappear — replaced by individual toilet rooms with full doors open to a shared space for wash basins and drinking fountains. Two ways in and out eliminate the feeling of going into a "dead-end" room, increasing safety and security. Use by staff and students will further enhance safety.

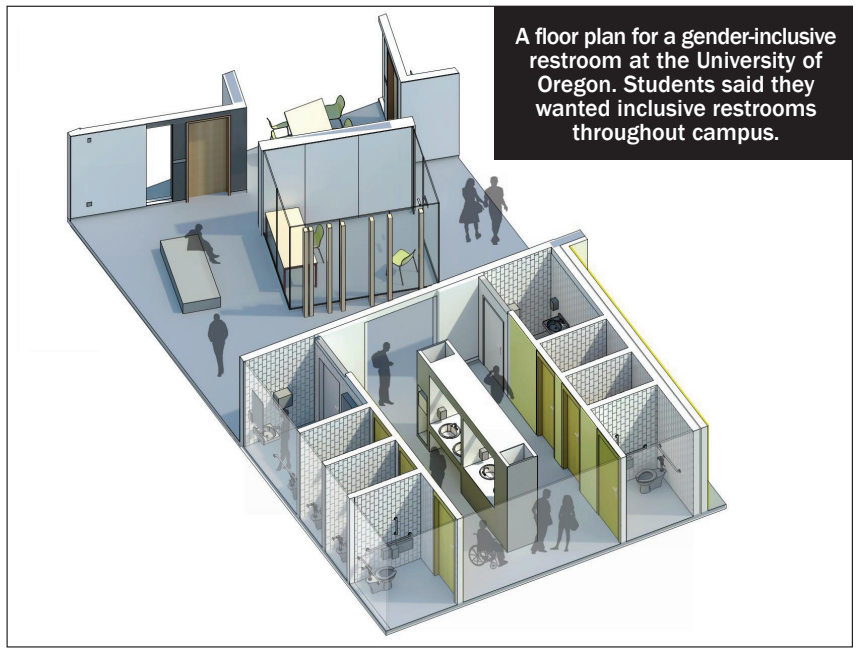
Signed with a simple pictorial representation of a toilet, not the ubiquitous "his" (pants), "hers" (skirt), or "their" (both), the toilet room is open for use by all. When the renovation is complete in 2019, Grant High School will become the first in the district — and one of the few in the nation — to house 100 percent inclusive bathrooms.

Shower rooms

Sackett Hall, a 1960s-era residence hall at Oregon State University, has been a workhorse facility for University Housing and Dining Services (UHDS), providing students with smaller-scale communities of 16 students per floor. Only one gang-style restroom and shower facility served each floor, so UHDS could assign



A renovation slated to finish in 2019 will make all the restrooms at Grant High School in Portland gender-inclusive.



A floor plan for a gender-inclusive restroom at the University of Oregon. Students said they wanted inclusive restrooms throughout campus.

IMAGES COURTESY OF MAHLUM ARCHITECTS

each floor to either males or females.

Mahlum worked with UHDS to reconfigure the restrooms to enhance privacy and ADA access. The new spaces incorporate toilet rooms built with real walls, shower rooms complete with benches and changing areas, and lockable door hardware.

"This solution not only allowed us to create more inclusive spaces and broaden access, but we were also able to maintain strong community culture, especially for our first-year communities," says Patrick Robinson, associate director of Facilities Maintenance & Construction for UHDS at Oregon State University.

"The restrooms have been broadly well received and the design is currently used to inform our approach as we work to modernize and retrofit our legacy facilities."

For a new residence hall currently under construction at University of Oregon, student listening sessions revealed a strong desire for gender-inclusive living units with private bathrooms, as well as visible equity and inclusion in ground-level public restrooms and common areas. As a result, 100 percent private toilet rooms and community lavatories are provided for all study, maker/hacker and academic spaces, as well as community kitchens.

Monitoring behavior

Individual toilet stalls can provoke lingering behavioral concerns for administrators, who desire ways to passively monitor behavior. However, truly universal restrooms, where staff use the same facilities as students, permit more effective passive monitoring. Boys and girls are not left alone — instead they interact with each other and with adults with less segregation — a dynamic that often occurs at home and is commonplace outside the U.S.

Using the toilet is one of humanity's most essential needs. It is also one of our most private acts, with the power to affect self-esteem, health and security. Creating inclusive toilets in schools and universities makes sense for everyone for every reason because the long-term value is so much greater than meeting the needs of a few individuals.

As we struggle with understanding what communities need and how to meet federal regulations, we must quickly find a design vocabulary, inclusive iconography and code guidelines that reflect best practices. And most of all, we must place equity and human dignity at the center of these conversations.

JoAnn Hindmarsh Wilcox is an associate principal at Mahlum Architects and a lead designer for its K-12 studio. Kurt Haapala is a partner at Mahlum and an industry leader in the planning and design of student life and housing facilities.

SCHOOL PROJECTS IN REMOTE ALASKAN VILLAGES FACE TALL HURDLES

Since construction sites are completely off the road system, building materials must be delivered by barge. If materials don't make it in the summer before the rivers start to freeze, construction can be delayed an entire year.

Schools in rural Alaska face some of the harshest conditions on earth: below-zero temperatures, wind, snow, driving rain and melting permafrost.

And these villages, home for many Alaska natives, are so remote that there are no roads to the communities. Even planning the delivery of construction materials is a massive undertaking.

BY DALE SMYTHE
STANTEC

Designing these facilities takes a unique approach suited for their unique settings. The addition of a K-12 school is traditionally the largest, most expensive and most important building in the village.

When it comes to designing these schools, multiple factors are considered, including schedule, community involvement, the building's foundation, energy costs and sustainability. The schools must last 30 to 50 years in an inhospitable environment. Every decision is critical to meeting that goal.

A shipping challenge

A successful project starts with the right schedule.

Since the villages, which typically have 200 to 900 residents, are completely off the road system, all building materials are barged to the construction site. Frequently, barges are loaded in Seattle and shipped directly to the community.

Everything from trusses and toilets to siding and screws must be transported in the short summer shipping window. Once the rivers begin to freeze in September, deliveries end. If the materials aren't in the village, it could delay construction for an entire year.

In Koliganek (population 209), a recent low-snow winter left the Nushagak River level too low to get the oceangoing barge to the site. The building materials sat 60 miles away. To keep construction on track, all materials were transferred to smaller boats that ran up and down the river for three weeks. Mother Nature complicated the project, but a creative solution allowed construction to proceed unhindered.

The village heart

In urban settings, there are frequently multiple schools and other large government and commercial buildings. In rural Alaska, the school is the main facility. It may be one of just a few nonresidential buildings in the village.

All students in grades kindergarten through 12 attend classes at the school. But the building is much more than a center for education, it is the heart of the community.

A village school is home to weddings, funerals and potlatches. Village elders teach traditional life skills to younger generations. And the community gathers at the school for social events and meetings.

Meeting with community members helps designers create a school that is not only technically, but culturally, appropriate. For example, in Quinhagak (population 699), a 30,000-square-foot addition to the school includes a new gymnasium. The old gym was renovated into a multi-cultural room. Instead of simply covering up the high ceilings, the design makes use of the space and incorporates features that mimic traditional native Alaskan dwellings with a smoke hole.

Weathering climate change

Soil conditions vary widely across Alaska. In some areas, traditional fill is almost nonexistent. In others, global warming is melting permafrost, creating ground that is constantly shifting.

Of five recent major school projects in western Alaska designed by Stantec, only one is built on a traditional slab foundation. Close collaboration between architects, civil and geotechnical engineers is essential for the schools to be on solid footing.

In Kwethluk (population 753), the entire village is at risk of flooding from the Kuskokwim River and its tributaries. To protect the new 45,500-square-foot school, the school is designed to sit on driven piles that put the first floor nearly 11 feet above ground. Discussions with community residents helped influence the final design to keep the school high and dry.

Climate change is directly affecting many of Alaska's coastal villages. Design decisions are being made with climate change and resiliency in mind.

The K-12 school in Quinhagak underwent a renovation and 30,000-square-foot addition.

The renovated ceiling mimics a smoke hole common in some traditional Alaska native dwellings.

PHOTOS COURTESY OF STANTEC

In the village of Kwigillingok (population 321), the new school is built on a thermopile foundation, a passive system that requires no energy use and protects the permafrost. The thermopiles transfer winter temperatures deep into the soil, freezing the ground around them. The frozen ground keeps the building foundation solid even as summer temperatures rise and some of the icy soil melts. The following winter the process starts again.

Using thermopiles turns the typical Alaska construction schedule on its end. To function properly, the thermopiles were installed mid-winter. Once the ground was fully frozen, the contractors started to build the 16,000-square-foot school addition.

While we don't know how the climate will have changed in 50 years, as designers we are creating resilient schools now.

Elevator vs. fuel costs

Most people cringe when they

see increasing gasoline prices. Imagine if you were budgeting to provide heat, hot water and electricity for a school. And you could expect fuel oil to cost $7 to $8 a gallon, three times what it currently costs in Seattle.

Decisions made during the design phase can help minimize those costs.

For example, in Kwethluk, the design team and the Lower Kuskokwim School District focused on a multi-story design instead of a traditional single-story school that is common in most villages. A second floor requires an ADA-compliant elevator, which added $70,000 to the construction price tag. However, the added expense of the elevator is offset by fuel savings over the life of the school — potentially $700,000 or more.

Focus on function

Sustainability is a common design consideration for all new projects.

In rural Alaska, "sustainable" isn't simply a focus on LEED credits, it's critical to the everyday function of the building. While green-building principles are often applied to the design, day-to-day functionality in harsh conditions is paramount. Currently, rainwater harvesting and heat recovery are two sustainable methods being implemented in the villages.

Kwigillingok is on the western coast of Alaska, on the banks of the Kwigillingok River and surrounded by marshes. Despite all the nearby water, there was no water utility service to the old school.

The old school pulled water from ponds near the site, but the quality and availability was unreliable. The new school includes full water and wastewater treatment facilities.

Additionally, rainwater is collected off 6,000 square feet of specially coated metal roofing. It is stored in a 500-gallon cistern inside the building where it is partially filtered prior to joining the school's treatment system.

In New Stuyahok (population 529), the new school was built in 2007, but just recently a secondary project was completed that will help reduce the school's heating bill. The project, 12 years in the planning, uses heat recovery from the community's diesel-fueled electric generators to heat the school.

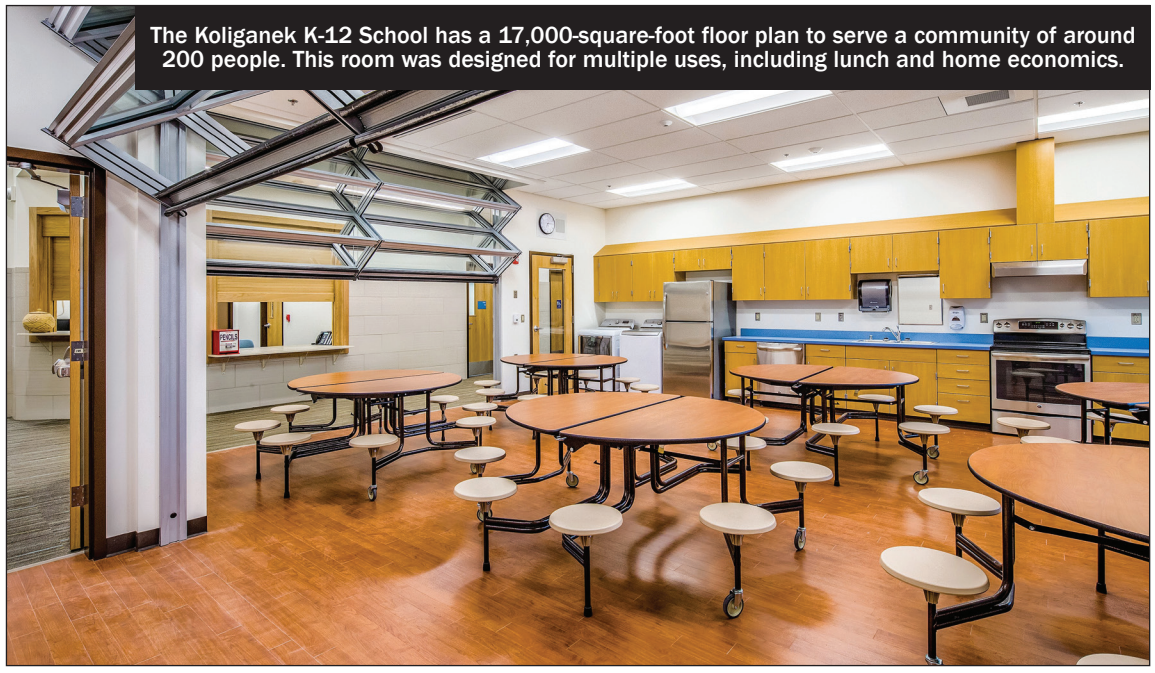
The new school and the community generator locations were intentionally selected years ago during concept planning. Waste heat from the generators' cooling system is piped underground and connected via heat exchangers to the school's heating system. When the system comes online this year, school officials anticipate saving $50,000 to $60,000 annually at current fuel prices.

Educators are tasked with the formidable challenge of teaching the next generation. As designers, we are challenged to help create the best physical environment for education. When that environment is in rugged, rural Alaska it takes a unique approach for a most unique land!

Dale Smythe is a lifelong Alaskan and a senior architect at Stantec. He is the project manager on all of the school projects mentioned.

Building materials for this school had be transferred from a barge to smaller boats, then transported another 60 miles to the site.

The Koliganek K-12 School has a 17,000-square-foot floor plan to serve a community of around 200 people. This room was designed for multiple uses, including lunch and home economics.



MOUNT SI HIGH

CONTINUED FROM PAGE 3

Stone columns

Addressing the poor soil conditions also required research and creativity. The soils are prone to liquefaction and will need to support the multistory school structure.

A series of studies were conducted, including hydrology, wetland, archeological, historical and hazardous materials evaluations. It was determined the best way to support the building was to install a series of "stone columns" — more than 4,800 of them — to reinforce the ground beneath the school.

The compact crushed rock columns are 3 feet in diameter and will penetrate 51 feet beneath the foundation of the building. The columns will filter groundwater drainage and provide protection against seismic activity. This system is being installed in advance of construction to ensure the site is ready to build in the spring of 2017.

The new Mount Si High's design has already been recognized as a comprehensive response to a complex puzzle of challenges. Due to these complexities, a number of phased civil projects are being done ahead of time to prepare the site for construction.

Demolition of existing residential buildings and playfields is complete, a contractor will soon be getting the site pad-ready, and the stone column system is currently out for bid.

All this early preparation work will guarantee that the site is pad-ready when it goes out to bid to general contractors in January.

The Mount Si High School replacement project was born out of an engaged school community that wanted a first-class, 21st-century educational experience for their students, and is being driven by the Snoqualmie Valley School Board's vision to become the best school district in Washington.

With Superintendent Joel Aune's desire to make that happen and a passionate design and project team that supports this goal, the new Mount Si High will truly embody what the Snoqualmie Valley community is known for: forward-thinking, innovation, and progress. And it is a forerunner for a growing trend in K-12 facility design, where creative uses of much smaller sites than what we have typically seen will be paramount for sustainable development.

Boris Srdar and Matt Rumbaugh are principals at NAC Architecture. NAC Architecture is an award-winning design firm with offices in Seattle, Spokane and Los Angeles.

LYNDEN ELEMENTARY: FROM CONCEPT TO COMPLETION IN 22 MONTHS FLAT

Cooperation from local decision-makers helped the design team stick to a fast-track schedule.

BY DENNIS ERWOOD & STEVE LEE
STUDIO MENG STRAZZARA

Fisher Elementary broke ground last month in Lynden. The 66,000-square-foot school is slated to open in September 2017.

IMAGE COURTESY OF STUDIO MENG STRAZZARA

Students in the northwestern corner of Washington will begin their academic year in September 2017 in a brand new school completed an entire year earlier than expected.

The facility will complete construction just 22 months after the design began. That's much less than a typical project of its kind.

The current Fisher Elementary School is a 550-student facility located just 5 miles from the Canadian border in the town of Lynden. The new school will be constructed around the existing one and will be 20,000 square feet larger to support the growing community.

The new school will include 28 classrooms spread across two floors, shared learning and project areas as well as a library, commons and administration offices. The building has been designed to Washington Sustainable Schools Protocol standards and will have a variety of energy-efficient strategies. Its new placement on the site highlights views to an existing greenbelt.

Delivering construction docu-

22 MONTHS — PAGE 15

LEARNING CENTER IN TACOMA PARK WILL SERVE STUDENTS AND THE COMMUNITY

Tacoma Public Schools is working with Metro Parks Tacoma and Point Defiance Zoo and Aquarium on a shared building for classes, workshops, conferences and more.

For most communities, school buildings are the largest public investment.

Paradoxically, schools are usually designed apart from the broader social fabric of the communities they serve. What would happen if the rich cultural, natural and recreational assets of our communities were leveraged in creating learning environments? The answer can be found in Tacoma.

BY MICHAEL MCGAVOCK
MCGRANAHAN ARCHITECTS

Tacoma Public Schools has three innovative high schools formed around community partnerships.

Tacoma School of the Arts was established in former warehouse buildings located downtown to share resources with the local museums, arts organizations and higher education institutions.

The new IDEA school — centered on industrial design, engineering and arts — starts this fall in a former elementary school situated to revitalize a neighborhood through partnerships with innovative and creative small businesses.

The Science and Math Institute is the first of these schools to have a building designed for it from the ground up.

New kind of building

Tacoma Public Schools established the Science and Math Institute (SAMI) within Tacoma's Point Defiance Park with 702-acres of old growth forest, steep-bank waterfront and an acclaimed research-oriented zoo and aquarium.

The 30,000-square-foot Environmental Learning Center is scheduled to open in fall 2017.

IMAGE BY MCGRANAHAN ARCHITECTS

Since 2009, 450 high school students and teachers have utilized existing facilities in the park, 14 portables and the abundant ecological habitats surrounding them. The park and zoo provide students with an immersive, naturalized environment for project-based learning.

When the opportunity came to lay down permanent roots for SAMI, the school district sought to make a new kind of school building: the Environmental Learning Center. When completed, the center will support its partnerships with Metro Parks

TACOMA — PAGE 16

CLARK COLLEGE CREATING A REGIONAL HUB FOR STEM

The $40 million project answers a call from local employers for more science and engineering graduates.

Students attending Clark College in Vancouver this fall will have access to a new science, technology, engineering and math (STEM) building.

The $40 million, 70,000-square-foot building houses biology, chemistry, engineering, physics and geology programs. The building also features a drop tower for lab experiments, and a six-table cadaver lab for human anatomy observation.

The 70,000-square-foot building has 30 classrooms and science labs for biology, chemistry, engineering, physics and geology programs.

PHOTO BY MAX MIKHAYLENKO/VARIABLE VISUALS, COURTESY OF LSW ARCHITECTS

Employer demand

Invention and discovery are engines that drive U.S. competitiveness, quality of life and national security. These engines, in turn, are driven by the scientific and technological advances made possible by the STEM workforce.

BY CASEY WYCKOFF
LSW ARCHITECTS

The Clark College STEM building will serve as a regional hub for STEM education, deepening the future talent pool for STEM occupations.

Washington state's STEM job growth is No. 1 in the nation, and local employers are demanding a larger number of skilled graduates in the areas of STEM. The STEM building is supporting the workforce need by improving the educational offerings at Clark College and by increasing collaboration among programs previously dispersed throughout the Clark College campus. Serving as a destination for the community and K-12 field trips, the facility will build public awareness of STEM education and careers, making the exploration of STEM frontiers an engaging experience.

The building houses 30 classrooms and science labs, and features a technology computer lab, indoor/outdoor study spaces, offices and support areas. The facility will have a daytime capacity of close to 1,000 full-time-equivalent students.

Key design concepts

LSW Architects introduced a number of key design concepts into its design of the STEM building, including abundant natural light, transparency into learning spaces, display and interactivity, and acoustically appropriate environments throughout. Here's a look at these concepts in greater detail:

• **Light and outdoor access:** Research proves that quality lighting, specifically daylighting, has positive impacts on student learning and work performance. The STEM building maximizes the neurological, physical and energy savings aspects of daylighting while minimizing any detrimental aspects such as unwanted heat and glare.

A rooftop plaza and an outdoor classroom provide alternative learning and studying venues in an outdoor setting.

• **Views:** Transparency into learning spaces allows for views of teaching and learning activities, generating additional interest in STEM programs of study. The increase of educational transparency between programs also helps to create a true cross-disciplinary atmosphere.

• **Display and interactivity:** Designed for use as an educational tool, the building design exposes the science and technology inherent in the infrastructure and support systems. The spaces within and around the building encourage student and faculty interaction and the free exchange of ideas and concepts in STEM.

One such space is the Collaboratorium, a group workspace that students can use for projects and to build experiments. A machining room adjacent to the Collaboratorium further enables students to test their designs.

Another thoughtful design feature is rain gardens that flank the main entry, meant to show students how stormwater infiltrates into the ground.

• **Sound:** Successful acoustics are vital to the learning process. Areas of circulation benefit from the energy and sound of activity, while learning spaces need to enhance the spoken word and encourage focus. Additional care was given to dedicated and informal learning areas to create acoustically appropriate environments.

• **Movement:** The building encourages healthy movement of its occupants with easily located stairs, encouraging their use and reserving the elevator for those requiring the accessibility.

Accommodations increase bike and mass transit usage on the campus. Bike racks and lockers rest under cover in secure, centrally located areas.

Green features

The STEM building will host more than just educational activities. A rooftop plaza provides study space for students as well as a beautiful venue for events. The flexible main lobby can expand into an adjacent digital lounge and classrooms to

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‘DARK,’ ‘MAZE-LIKE’ STUDENT UNION GETS A BIG MAKEOVER

Construction begins this fall to renovate Eastern Washington University’s confusing Pence Union Building.

Called one of the 20 “most appalling excuses for architecture on college campuses” by MSNBC, the Pence Union Building at Eastern Washington University has been described by students as “dark,” “confusing” and “maze-like,” and well in need of an upgrade.

BY ANTHONY GIANOPOULOS
PERKINS+WILL

The Seattle and Boston offices of Perkins+Will set out to transform the aged and irrelevant student union into a state-of-the-art, light-filled and amenity-rich space, creating a home away from home for students at EWU.

The Pence Union Building (PUB) redesign uses the existing footprint of the original 120,000-square-foot building, built in 1968. The renovation focuses on the areas of highest need and maximum benefit as identified by the students themselves, including safety, sustainability, wayfinding and a well-lit open floor plan.

A plaza and expansive glass entry will welcome students.

IMAGES BY STUDIO 216

Contemporary redesign

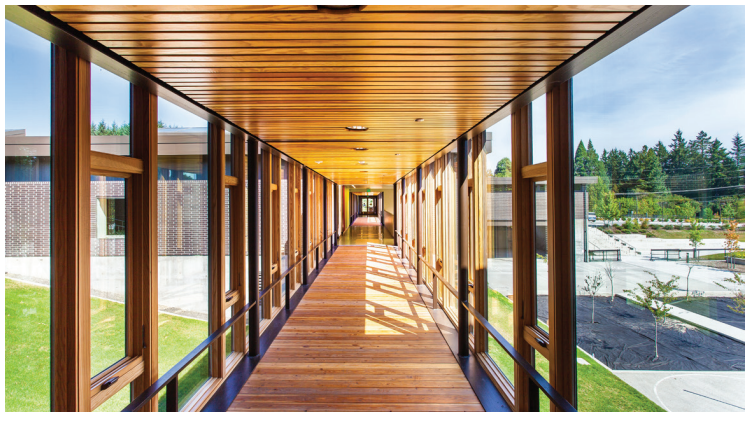
The PUB’s original architecture was based on trends from prevailing student union models of its time, with cast concrete and brick walls, small windows and discrete, private areas to accommodate small groups of students.

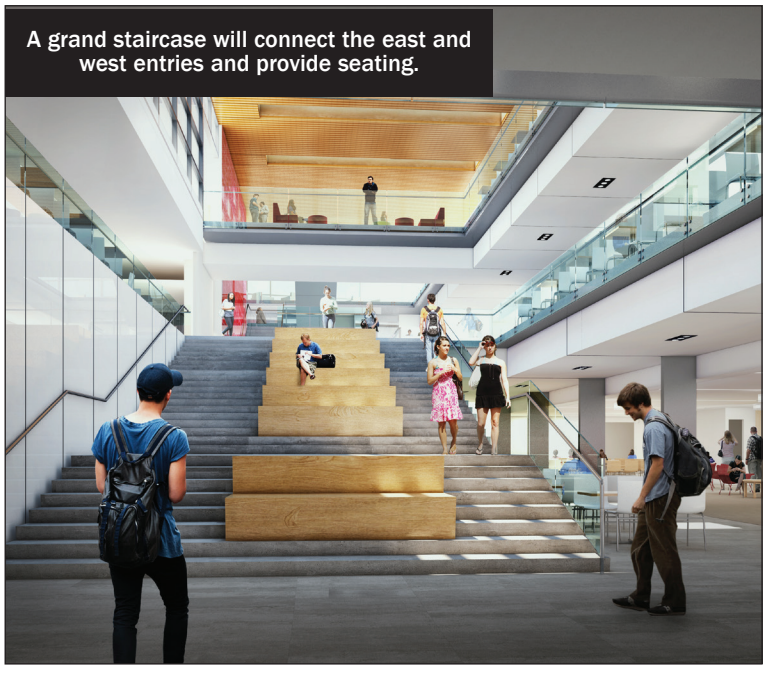
The redesign turns the 1968 approach on its heels and creates an easy-to-navigate, open-concept layout that is infused with natural light and supports a rich array of spaces in which students can interact, work, eat, study, lounge and socialize. Just a few highlights of the new PUB design include:

- A spacious and natural light-filled atrium with central staircases that provide wide, safe steps for a range of seating options and plenty of outlets for laptops and electronics.
- A modernized multipurpose room with a small stage, sound equipment and acoustical fixtures for music performances and speaking engagements.
- New Associated Students of Eastern Washington University offices with open workspaces and areas for collaboration.
- Student club suites, student conference rooms and other student services that are visible from the central atrium to encourage students to connect and engage with one another.
- A computer lab/lounge and media mini-lab supporting student printing, computer and audiovisual needs.
- A new green roof with an artistic array of local, drought-resistant plants and shrubs.
- A game room with pool, foosball, pingpong and plug-and-play video gaming stations.
- An open market with grab-and-go groceries and healthy food options.
- A spacious dining area that wraps the atrium with a variety of eating and lounge seating options.

Less fortress-like

Food service was not part of





A grand staircase will connect the east and west entries and provide seating.

the original facility in 1968, so in 1994 a second building was added to provide dining options for students. But while the two buildings were joined and the entrance to the union was reconfigured, no significant renovations were made. The result was a mishmash of two buildings from different architectural eras coming together with little aesthetic unity inside or out.

Perkins+Will decided to use this mishmash as an advantage, both in the creative approach to the redesign and as a cost-saving strategy for the client.

The design keeps the floors and walls of the two buildings intact and essentially "cuts a hole" in the middle of both, filling the space with a huge atrium. This allowed for more than 50 percent of the structure to be saved, bringing the cost per square foot down from more than $350 per square foot (for comparable student unions) to $250 per square foot.

In addition to saving the client money, the design of the atrium is intended to break up the fortress-like effect of the existing building and infuse it with natural light.

New staircase

Located at the epicenter of a high-traffic area, the newly redesigned PUB also addresses pedestrian safety concerns via a highly visible front door at both ends of the building.

A new staircase serves as a gateway for students passing from the academic end of campus to the residential halls on the other side. Welcoming, pedestrian-friendly plazas feature outdoor seating locations for meeting friends or enjoying a quick meal. Visitors will have sight lines through the building to the wide array of activities and programs inside.

The redesigned commuter lounge offers a comfortable, fun space for students to hang out, study and wait for the bus. It has overstuffed chairs for lounging, individual tables for plug-in computer stations and a large coffee bar that allows students to grab a beverage or quick snack. This lounge will also provide a much-needed late night venue for food and recreation.

With construction of the redesigned PUB kicking off this fall, it is slated for completion in spring 2018 when it will open its modern-day doors to students at EWU.

Anthony Gianopoulos is principal and director of operations with the Seattle office of global design and architecture firm Perkins+Will.

This main corridor will get lots of daylight, opening up the building and connecting student activities on different floors.

TAHOMA SCHOOL DISTRICT RESPONDS QUICKLY TO SURGING ENROLLMENT

Construction of the state's largest high school is underway, and contractors are upgrading four other schools in just 53 days.

Population growth and aging school infrastructure has created a K-12 school construction boom. The Puget Sound Regional Council reported that our regional population reached 3,985,040 people in April — a 2.2 percent increase over the past year.

BY DAN CURTISS
SKANSKA USA BUILDING

The region's schools are already overburdened, and population growth means more students filling classrooms. So school districts are taking control of the issue and getting creative.

Maple Valley's Tahoma School District is handling an influx of students particularly well through strategic phasing of new construction and renovations.

Exponential growth

The Tahoma School District, formed in 1943 by consolidating several rural school districts, is undergoing its largest expansion and reorganization.

The district is now building Tahoma High School, which will house 2,400 students and have the most square footage of any high school in the state: 312,300 square feet.

Two other Tahoma High Schools have come before this one. The first Tahoma High opened in 1927 as "TaHoMa" High School. It cost $109,776 and was funded through a special taxing district approved by voters in the Taylor, Hobart and Maple Valley school districts.

Students chose the name, using the first two letters of each school district that voted to create the high school. The name was later modified to drop the capitalization of "H" and "M" and was applied to the new school district.

The second Tahoma High opened in 1974, and the original high school was converted to a junior high. It currently operates as a middle school.

Both buildings will continue to serve students when the new THS opens. The 1927 building becomes Tahoma Elementary School, and the 1974 building transforms to Maple View Middle School.

The area has grown exponentially since then. With the construction of the new Tahoma High School, the Tahoma School District had the opportunity to repurpose four other schools to accommodate growth and long-term goals.

However, timing was key: The contractor would only be able to work on the schools during summer break, and staff needed the schools ready for the new students in time for the big shuffle in fall 2017.

The school district took the opportunity to renovate all four schools — 400,000 square feet overall — in 53 days.

Countdown to construction

The Tahoma School District put the project out to bid in late December 2015, reviewed bids and held interviews the first week of January 2016.

Tahoma awarded the projects that same week. Working within a short timeline, Skanska used January through June to develop a two-phased approach.

Given the nature of renovations, Skanska and BCRA partnered to develop a list of existing conditions to study to reduce the risk of unforeseen conditions during construction. BCRA phased their design to support Skanska's expedited procurement.

4 schools, 53 days

With the end of the school year came the beginning of construction. In June, Skanska launched the first phase of work, which means finishing as many renovation features as they can before school starts again in September.

The success of this project relies on unique partnerships and solid communication between Skanska and Tahoma School District staff, the school board, BCRA and the design team.

With the condensed timeline and coordination that needs to happen in the blink of an eye, Skanska project staff has created a solid communication system with the school board members. In addition, the school board has been granted the ability to make decisions without a formal board meeting, which has expedited the process to accommodate the timeline.

Here are the upgrades taking place at each school:

Tahoma Junior High

Tahoma Junior High will become Summit Trail Middle School, and crews will build security upgrades to manage incoming and outgoing traffic.

Tahoma Middle School

Tahoma Middle School will become Tahoma Elementary School. Changes include:

- Renovating the administration building to accommodate security upgrades
- Converting onsite buildings into a kindergarten with a new restroom
- Adjusting kindergarten classroom configurations to create a communal atmosphere with interconnecting doors
- Seismic upgrades for the gymnasium
- Converting a football field into a covered play area with playground equipment

Tahoma High School

Tahoma High School will become Maple View Middle School, and upgrades include:

- Renovating school entrances to accommodate security upgrades
- Adding a restroom
- Converting part of a parking area to a passenger-vehicle drop off zone

Cedar River Middle School

Cedar River Middle School will become Cedar River Elementary

Cedar River Middle School is being converted to an elementary. The work shown here is for the main entrance.

Walls are starting to go up for a new play shed at Tahoma Middle School.

PHOTOS COURTESY OF THE TAHOMA SCHOOL DISTRICT

School. Changes will include:

• Renovating the administration offices to accommodate security upgrades

• Converting fields into a covered play area with playground equipment

• Replacing all existing flooring

• Adding fresh paint on all of the common walls

• Building a concrete art piece to place in the courtyard to make it more welcoming

• Adding additional staff parking, pads for future portables, drainage and retention ponds

Finishing touches will be added in the summer of 2017, but until then Skanska will discontinue construction while school is in session.

When all is said and done, students will be moved into the new Tahoma High School and into four schools with new names and significant upgrades. With the condensed timeline and coordination that needs to happen quickly, Skanska project staff created a solid communication system with the school district. In addition, the school district is using a general contractor/construction manager process that has expedited the process to accommodate the timeline.

Finishing attributes slated for completion next summer include the decommissioning of the onsite portable buildings, landscaping, drainage features and rain gardens.

Dan Curtiss is a senior project manager who has worked in the K-12 GC/CM market sector for 12 of his 20 years with Skanska.

An entrance to the commons at Tahoma High School. The main classroom wing is on the right.

CLARK COLLEGE

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create a large multipurpose space for functions and exhibits when needed.

The project team was committed to building stronger communities through a commitment to sustainability. The STEM building is expected to receive LEED silver certification in part because of the following:

• **Recycled waste:** 97.5 percent of construction waste was recycled.

• **Brownfield redevelopment:** The new building replaces an antiquated building that had outlived its useful life, and contributes to improved environmental quality by addressing asbestos contamination in the soil, which was removed from site for remediation prior to construction.

• **Reduced water use:** Low-flow and sensor-activated plumbing fixtures were selected to achieve a 30 percent reduction in water usage over a standard building.

• **Enhanced commissioning:** Done to ensure the building systems are functioning as designed.

• **Responsible material use:** 50 percent of the wood used on the project was certified by the Forest Stewardship Council.

• **VOC:** Interior finishes were selected meet stringent guidelines for VOC content.

Funding for the project came through the state, but when a 15 percent budget cut hit the project, philanthropic partners of the Clark College Foundation stepped in and contributed the remaining $1.9 million to complete the project.

The official grand opening for the new STEM building will be Oct. 3.

Casey Wyckoff is president of LSW Architects in Vancouver. His professional career focuses on using architecture to support the community.

22 MONTHS

CONTINUED FROM PAGE 9

ments for the 66,000-square-foot facility in seven months is the result of a well-thought-out and executed project plan, a strong and supportive team of experts and stakeholders, and a commitment to designing efficient schools.

A new option

At the start of the project, the Lynden School District was planning to replace its middle school first, after which the elementary students would be moved into the old middle school while the new elementary school was constructed.

Our team presented a new option: Build the new elementary school on the existing school's site. After careful evaluation of the existing site plan, coupled with our experience working on already-occupied sites, the district accepted this change of approach.

The result will allow the development of the middle and elementary schools autonomously, save money on escalation and moving costs, and help deliver the new facility sooner. It also means that students will not have to endure the disruption of moving.

The district used the saved money to fund an additional 4,000 square feet for a large gymnasium for use by both the school and the surrounding community.

Fast-track decisions

For a fast-tracked project like this to work, it's imperative that key decision-makers respond quickly and cohesively. For this project, key stakeholders were brought together to make real-time decisions. This included having the district's participation in regularly scheduled design meetings and focusing on maximizing their time to decide on solutions.

Because of the cooperative effort between the Lynden School District superintendent and the Fisher Elementary principal, the design team was able to put the project out to bid in June, only seven months after concept design began. The project bid under budget at $233 per square foot.

To further fast-track efforts, design ideas, plans and processes were shared with the city and local jurisdictions early and proactively to aid in response times and minimize the wait time that comes from multiple revisions.

Also crucial to helping the design team making decisions quickly and keeping the project moving forward was the use of building-information modeling in communication with the district. Weekly coordination meetings brought the team together to check for inconsistencies in the model and to keep the entire team on the same page through design changes.

Local design partner

Going beyond the tools and processes outlined in the project plan, the project's success was due in large part to the partnership between Seattle-based Studio Meng Strazzara and Bellingham-based Zervas Architects.

Both firms brought to the project an expertise in school design and construction and each firm's strengths and assets were leveraged for maximum efficiency. Studio Meng Strazzara and Zervas collaborated throughout the design process then facilitated the creation of the construction documents, which required fast turnaround.

The project is now under construction, with Zervas Architects managing construction administration, as the firm's nearby location allows them fast access to the site to address any needs and provide regular updates to the team.

More efficient design

In conjunction with a detailed project plan and strong team, we focused on designing for efficiencies. After touring several newer schools and speaking with the teachers and administrators within those schools, we focused on which spaces were most successful and how best to integrate them within our design.

While the original educational specifications did not include shared learning spaces, our team worked to streamline support and custodial spaces, and by doing so was able to provide the needed square footage to accommodate the new shared areas.

Six flexible learning spaces were incorporated within classroom groupings, as well as a project space adjacent to the library. The project space allows for further breakout for the teachers, and will also be utilized by the librarian for additional curriculum.

Green design

As part of the effort to design and construct the school in just 22 months, the team focused on using resources and expertise available in the area.

Wood framing allowed for a faster construction schedule, and was an important part of the design to create a more natural aesthetic that matches the site and surrounding area. Not only is it more cost effective, but local labor has experience constructing buildings with wood, reducing subcontractors brought in from outside of the area and saving time.

Passive sustainable methods, including the building's orientation, clerestory windows, operable windows and displacement ventilation, will provide a well-lit and healthy environment for learning, and all flooring and paint finished are low-VOC. The common areas and cafeteria are oriented to take advantage of the greenbelt located behind the school, and provide a visual connection to nature that the existing building is lacking.

Colacurcio Brothers Construction Co. broke ground in July and the school is scheduled to open for classes in September 2017.

Principal Dennis Erwood and Director Steve Lee lead the education studio at the Seattle-based architecture and design firm Studio Meng Strazzara.

TACOMA

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Tacoma and Point Defiance Zoo and Aquarium, and bring benefits to the whole community.

Community input

With the intent of making the new facility both a school and community amenity, a fresh collaborative planning approach needed to be created to bring a diverse set of stakeholders into the design process. The unique pedagogical values defining SAMI's curriculum and supporting activities include "empathy, community, thinking and balance."

To bind these modalities to indoor/outdoor settings, the team conducted "scenario mapping" workshops, which involved engaging students, teachers, zoo educators, curatorial staff, community partners and local artists. Over 100 scenarios described daily life, special events and particular activities that strengthen each student's personal sense of community as well the greater perspective of the Tacoma community.

As envisioned in the scenario mapping exercises, the new Environmental Learning Center will hold citizen scientist workshops, artist exhibitions, business conferences, health fairs, social functions and fundraisers, and partnerships with institutes and universities. The zoo will have interpretive exhibits and the park district will provide environmental orienteering and studio workshops.

Among the many ideas and aspirations, one thing was clear: The shared use of community assets and the partnerships that are formed create powerful learning experiences for students, teachers and community alike.

Teachers, students, staff and volunteers all have a common mission of interpreting the valuable assets of the park and zoo environment for deeper knowledge and greater empathy. Students are part of a larger mission and their schoolwork will create a broader awareness and understanding by the community at large.

A tool for learning

The new $11.5 million Environmental Learning Center will be located in the park where the zoo and forest meet.

Students will have a unique opportunity to engage with experts and passionate volunteers. The zoo's research and community outreach staff will be co-located with teachers in a collaborative planning area. Community volunteers working in the zoo will have a central workshop for their activities alongside the other workshops in the building. There will also be a nature preschool that serves students from all the pre-K-5 schools in the district.

The 30,000-square-foot center will open in fall 2017 and include eight workshops for discourse, design, experimentation and fabrication. In each workshop, there will be secure storage for school supplies and projects in order to make the entire educational facility open for public use after school hours.

A directive from the visioning process was to make the place feel "not precious" so that students and the community are empowered to use the building as a tool in their exploratory learning. All of the walls will be sheathed with plywood to invite project activities, display of ideas, research, art, 3-D projects or experiments for small or large group brainstorming and presentation. There will be visual connections to the outdoors from every interior space to see the forest, zoo and waterfront in the distance.

At the heart of the school a large communal setting will connect all the workshops. This area will double as a community meeting space, a place for conferences and retreats. The communal space will connect directly to the zoo, an outdoor deck and a bridge that transports students to the forest trails, making the building just one part of the whole learning ecosystem of the park.

Shared assets

The cultural, natural and recreational — as well as professional and commercial — assets of our communities are rich resources to be leveraged. Schools can be a catalyst for partnerships that connect these resources in the service of the community broadly and the school itself.

Tacoma Public Schools is demonstrating that if these assets are leveraged to engage and serve our communities more broadly along with our kids, fostering a greater sense of ownership by the community and rich relationships with teachers and students, it makes them more impactful and successful as schools.

If we start to think of our school buildings as being assets on a community-wide scale, connected to and embedded within the community and not apart from it, then we will truly transform what school buildings can be and thereby what school itself can be.

Michael McGavock is the principal for Learning Environments at McGranahan Architects, leading the engagement, inquiry and planning of meaningful places for learning.