Statement of Qualifications

Pacific Hall Basement and First Floor Laboratories

Submitted to

University of Oregon

Office of Campus Design and Construction

Submitted by

CH2M SM

21 October 2015

Table of Contents

Industrial and Advanced Technology
CH2M
2020 SW 4th Avenue, Suite 300
Portland, Oregon 97201
O: +1 503 235 5000
F: +1 503 736 2000
www.ch2m.com

October 21, 2015

Mr. Fred Tepfer
Campus Planning, Design, and Construction
University of Oregon
Eugene, Oregon

ftepfer@uoregon.edu

Dear Fred,

CH2M HILL Engineers, Inc. (CH2M) is pleased to provide our qualifications for design services based on your Request for Qualification (RFQ) dated September 29, 2015 and RFQ Addendum 1 dated September 30, 2015.

Our multidiscipline team of CH2M architects and engineers have worked together repeatedly on projects of similar size and scale and we welcome this opportunity to bring our experience and our capabilities to bear on this laboratory renovation project. Based on the RFQ, our previous experience working with you and as a result of our touring the facilities we believe we fully understand and appreciate your needs and priorities. We look forward to engaging the users and stakeholders to better understand and capture their inputs, their needs, and their desires. We look forward to achieving the goals and results you have set for this project:

- Breathing new life into Pacific Hall & Onyx Building spaces by leveraging their existing spatial and systems attributes to create 21st century laboratory and office spaces.
- Encouraging collaboration, facilitating fruitful interactions and inspiring research, by creating revitalized, open, accessible, flexible and attractive Lab and Offices spaces in support of the faculty, their assistants and students.
- Providing thoughtful sustainable solutions in all aspects of the design by identifying and selecting strategic opportunities for sustainable approaches and products, with a focus on maximizing systems and equipment performance
- Sound results working in the Construction Management/General Contractor (CM/GC)delivery model to meet project budgets, attain measurable sustainable improvements and, ultimately, provide the Lab and office functionality and character of space satisfactory to the research stakeholders.

We appreciate the opportunity to submit our qualifications to support you on this project. If you have any questions or require additional information, please feel free to contact me at 503.872.4788 or by email at nathan.corser@ch2m.com.

Sincere regards,

Nathan Clark Corser
Design Principal

Applying design skills to meet your goals

CH2M was founded in Oregon in 1946, and has maintained the culture of our founders; do good work and support our clients. The Portland office brings a depth of laboratory, retrofit and renovation experience that will support this project in its objectives.

Demonstrating our team's capabilities

Our design teams work in a solutions based environment that is especially beneficial for the design of adaptive reuse projects. We develop solutions that support occupant's interactions, promote research and learning, improve efficiencies and "future proofs" solutions with an eye for future uses.

Breathing new life into existing buildings

Today's buildings–with their emphasis on performance, integrated systems, sustainable design, and flexibility–require an integrated team of architects and engineers to support facility adaptive reuses, especially of buildings built in the period that Pacific Hall and Onyx Bridge were. By thoughtfully addressing the interface between people and technology, we deliver responsive, high performance research buildings. Over the last five years alone, CH2M architects and engineers have designed over a 1,000,000 ft^2 of research spaces, much of which was renovated research and development spaces for higher learning institutions.

Inspiring research

CH2M has supported and inspired research across a spectrum of higher education and private industry clients in Oregon, across the U.S., and around the world by being both a good listener and by bringing our broad experience to bear on the particular projects at hand. What we have seen and learned is that the qualities that define inspiring research environments, both in and out of the higher education community, are becoming more alike as researchers, graduate, and post graduate students do research across multiple academic and corporate real and virtual entities. The kinds of research spaces that attract and retain the best students, faculty, and grant funding all share the qualities of ease of communication and collaboration, as well as the capability to adapt to change.

Enhancing sustainability

CH2M, as a founding member of the U.S. Green Building Council, designs for minimal environmental impact and energy efficient operations. With over 50 LEED® accredited staff members, we have completed over 200 LEED® certified facilities, 50 of which were university research facilities. CH2M applies a holistic design and engineered systems approach along with technical expertise to turn university sustainability goals and guidelines into reality. By integrating sustainability principles into each step of the project, we help researchers and facilities managers develop creative ways to solve complex challenges, maximize value, and benefit university communities for the long term.

Creative results with long term benefits

The greatest value CH2M provides is our commitment to a stakeholder centered process which has repeatedly resulted in attractive people centered research environments. Flexible, adaptable research laboratory spaces that encourage and inspire collaboration need not be costly. Indeed, nearly all projects referenced in this Statement Of Qualifications (SOQ) have measurable creative results, whether it is the value of commercialization generated by the under budget ONAMI_ Microproducts Breakthrough Institute (ONAMI_MBI) laboratories project or the fact that Portland State University (PSU) has cut substantially its long term energy costs at the Science Research and Teaching Centre (SRTC) building as a result of determining the best value for strategic systems upgrades. Whether remediating and revitalizing blighted neighborhoods and cities, designing buildings and infrastructure, developing carbon management plans, identifying new sources of clean water, or developing creative ways to manage natural resources, CH2M applies integrated technical solutions to solve the world's most complex challenges.

Key team personnel

The CH2M project team proposed was selected for their expertise in the specific challenges of the Pacific Hall and Onyx Bridge project. They share previous extensive experience working together on similar research projects for higher education and private industry clients. These team members will serve as your primary points of contact and engagement.

Nathan Corser, Design Principal & Lab Planner

As Design Principal, Nathan will lead the design of this project. Nathan brings over 25 years of experience in the design and construction of both higher education and private industry research laboratories. He has been a featured speaker and author on sustainable design and stakeholder engagement techniques. He has worked with this project team many times. Nathan either led or played an advisory role in all the reference projects that are a part of this SOQ.

Teresa Sears, Project Manager

Teresa will manage and direct the team to meet project objectives. Teresa has over 23 years of experience as a Project Manager on a range of high performance buildings and laboratory projects. She has worked repeatedly with this team and excels in working with clients and leading multidisciplinary teams on projects with tight budgets and complex, phased renovations.

Michael Lindstrom, Project Architect

Michael will provide design and programming support. Michael has 10 years of experience involved with research, laboratory, and higher education projects including working with Nathan on PSU Science Building 2 and the Nebraska Center for Virology (NCV).

Mike Dragon, Lead Engineer

Mike will provide mechanical design and renovation expertise. Mike has over 23 years of experience in mechanical design. He has repeatedly worked with Nathan, Michael and Teresa on multiple laboratory renovations and expansions, research facilities, and office space conversions.

Bringing our experience to bear

Demonstrating our specific experience

CH2M has designed and completed multiple laboratory renovation projects similar in type and scale to this project. As a part of this SOQ we have included several specific and relevant university projects demonstrating CH2M and this specific team's experience with projects just like yours.

"The department now has facilities for computational modeling, optical microscopy, bacterial and cell culture, aerosol science and surface science that match or exceed those of any other chemical engineering department in the country."

- Andrew Gellman,
Lord Professor of Chemical
Engineering, Carnegie Mellon

21st century laboratories

We work across a wide spectrum of scientific research types. But, whether as part of a higher learning environment, a governmental agency or in private industry, all researchers desire the space and a functionality that can meet their needs and ambitions. In our experience, 21st century labs are generally more successful at solving the economically unseen or uncelebrated challenges such as energy saving and flexible and adaptable infrastructure systems. Additionally, the most successful new laboratories, and those that are pleasing researchers and their students most, are those that can meet the need and desire to be more integrated with the "virtual" research and researchers around their building, across their respective campus, and around the globe.

Supporting collaboration

Creating collaborative and shared work areas, depending upon the specific university research culture and the disposition of the researchers involved, can prove to be especially rewarding and sometimes a bit challenging. "Collaboration" and "sharing" can sound like "impingement" and "disruption" to some researchers. This can be especially true when a researcher transitions from an "isolated" environment (as is the case here) to a new/shared work environment. How, where, and why we might look to create opportunities for collaboration, both physical and virtual, for this group of researchers will be carried out in an open

and transparent design process. Larger contiguous laboratory spaces, shared support and storage areas, are, in the broad strokes, the kinds of fundamental approaches we would expect to pursue. However, how we will apply these approaches, adjacencies, and connections will be determined as a group.

Design for flexibility

In our experience, designing for flexibility does not necessarily translate to simply creating large uninterrupted laboratory spaces, using mobile casework and engineering elaborate umbilical distribution systems. This is especially true in laboratory renovation projects. Less is often more. "Flexibility" is also not synonymous with indeterminate or "open ended". For CH2M, providing flexibility for researchers has often corresponded to determining, with the specific researchers, what the impediments for their research are and, perhaps equally, sharing what we know from our previous work. Employing our multidisciplined, spatial, and volumetric design processes (elaborated upon further in this SOQ) we will work with the stakeholders to identify key "anchors" (whether equipment or performance criteria) to help set the boundaries within which flexibility can and will be achieved for current and future users.

Lean approaches

Whether using the CM/GC model or a more traditional Design/Bid/Build model we always employ lean design and construction approaches to use (often limited) resources as effectively as possible. CH2M is a provider of both design and engineering services as well as CM/GC and program management services, We have recently demonstrated these services at the Oregon State Hospital in Salem. Our design culture accommodates CM/GC projects frequently on tight schedules and with limited funds. Because we design with management and construction intertwined, we seek opportunities to leverage available assets during a renovation. We prepare, through thorough space and systems assessments, a true accounting of the strengths, weaknesses, opportunities and threats, (SWOT) to present all the choices that are available to the team from a cost, schedule, constructability and performance perspective.

Renovating existing buildings

Most research buildings built in the last century are constrained in several fundamental ways; typically they have limited floor to floor heights and end of life mechanical, electrical and process (MEP) systems that are under performing or are noncompliant with current code or performance requirements. Pacific Hall and Onyx Bridge present familiar conditions but appear to be more malleable than typically seen. Pacific Hall and Onyx Bridge are clearly sufficient to accommodate both this project's scope and to allow for future proofing for the next generation's use. Our goal will be to intentionally and judiciously make changes to the existing spaces and systems, leveraging as much as possible the positive attributes evident in the current conditions. We will be equally vigilant, as we were at PSU, Carnegie Mellon, ONAMI_MBI, and multiple other lab environments, to come up with a mutually acceptable plan and approach that minimizes and mitigates disruptions to nearby and adjacent necessary functions, personnel and research.

"Our new facilities are modern, bright attractive and LEED certified. In addition to being practical and user friendly, the renovated space features a number of interesting elements. For example, there is a showcase lab for microscopy that is completely visible to passers by in the main corridor through Doherty Hall. This eye catching space is designed to raise awareness of our Department on campus and attract more students to the materials science and engineering field."

-Gregory Rohrer, Department Head

50percent less conditioned air than before upgrade

Size: 250,000 ft² Renovation
8,000 ft² Addition

Cost: $45.3M

Completed: 2012

Location: Portland, Oregon

On Time On Budget: Yes

Reference: Mark Fujii, Capital Construction Project Manager, 503.725.4968

Key Personnel Who Worked on this Project and their Roles:

Nathan Corser: Design Principal

Michael Lindstrom: Project Architect

Portland State University (PSU) Science Building 2 (SB2): Science Research and Teaching Center (SRTC), (LEED Silver)

Relevance to UO Pacific Hall Laboratory Project

At the heart of PSU's urban campus in Portland, Oregon is Science Building 2 (SB2). CH2M provided complete design and engineering services for this major upgrade and addition. Originally constructed in 1971, the building was badly outdated and needed significant upgrades to meet City and State building codes and to accommodate PSU's growth. This building now serves as the flagship for its' new SRTC. At roughly 250,000 GSF, the renovated four story SB2 houses faculty offices, biology, chemistry environmental science, and physics departments' research and teaching laboratories and student commons. CH2M's Design to Budget process produced $1M in savings for PSU. The money was able to fund multiple additional laboratory modules, renovations and other improvements to shared spaces.

Modernization of the building included major structural, mechanical and electrical infrastructure upgrades, a new hazardous materials loading and storage area, new laboratory and student areas, as well as functional and appearance improvements to multiple existing laboratories. Researchers attest to strengthened interdisciplinary connections with the alignment of leading programs in environmental science, pharmaceuticals, and nanotechnology.

Sustainability

The SB2 project employed multiple means and methods to achieve PSU's own and LEED established sustainability goals and metrics. The SB2 building meets the State mandated energy conservation and State Energy Efficiency Design (SEED) requirements and ultimately achieved LEED Gold certification. Energy savings was an important goal for PSU and, among the sustainable features employed, were leading edge low flow fume hoods and variable frequency drive fans for energy efficiency. Innovative new exhaust systems were able to cut requirements for conditioned air by over 50percent resulting in significant energy savings.

Carnegie Melon University (CMU) – Doherty Hall Laboratory Renovation

Relevance to UO Pacific Hall Laboratory Project

CH2M provided all the design and engineering services for the renovation of these older laboratory spaces within the 1908 Doherty Hall on the CMU campus. The project included renovating laboratories and classroom space to enable delivery of a modern and evolving materials engineering curriculum, enhancing laboratory safety, and supporting student recruitment. The project also provided office space for doctoral and post doctoral students that fosters collaboration. The renovation created modern research labs over several stories for complimentary department research areas. To support the project goals, existing equipment, not originally anticipated a part of the scope of this project, had to be relocated as did an existing adjoining classroom. This project epitomizes CH2M approach to taking a longer and broader view of a project to best meet all requirements. Spaces and features that were located inconveniently and fragmented the existing laboratory space were modified to provide larger, more modern general purpose research environments.

Renovating existing buildings

This project combined an environmentally sensitive laser laboratory with an intensive chemistry laboratory. The design solution involved separating the laser and chemistry laboratories to allow the two radically different airflow schemes to coexist. A new design for a classroom space provided a wider spread, stepped seating, acoustical treatments, and the current University standard audio visual component system capable of distant (virtual) learning. The amount of space eventually created within the original confines doubled seating from 65 to 135 students. The laboratories maximize opportunities for interdisciplinary collaboration by taking five isolated research groups and combining them into fewer, larger, shared open laboratories for both experimental and computational research. Space for students and equipment is shared among the various research groups. This model eliminates walls and corridors; stimulating and facilitating collaboration, improving space flexibility, and improving safety.

Concept developed in a single 3.5 hour meeting with users as active participants

Size: 11,000 ft^2 Renovation

Cost: $1M

Completed: 2009

Location: Pittsburgh, Pennsylvania

On Time On Budget: Yes

Reference: Ralph Morgan, Associate Vice Provost, Campus Design and Facility Development, 412.268.6156

Key Personnel Who Worked on this Project and their Roles:

Nathan Corser: Design Principal/Senior Reviewer

Recognized by SSTI* as a national model for research facilities

Size: 88,000 ft^2 Total
27,000 ft^2 Renovation

Cost: $9.5M

Completed: 2010

Location: Corvallis, Oregon

On Time On Budget: Yes

Reference: Skip Rung, President & Executive Director, ONAMI, 541.231.4883

Key Personnel Who Worked on this Project and their Roles:

Nathan Corser: Design Principal

Michael Dragon: MEP Lead

Oregon State University – ONAMI_MBI

Relevance to UO Pacific Hall Laboratory Project

ONAMI_MBI is an award winning signature research center, housing the Microproducts Breakthrough Institute (MBI) at a facility in Corvallis, Oregon. The goal of this facility was to support ONAMI by creating spaces that could aid in the acceleration of research and commercialization of materials science and related device and system technologies. Faced with the challenge of transforming a warehouse into high performance space with a relatively modest budget of $9.5M, the ONAMI concept exemplifies prevailing trends in advanced research to leverage more research capability with lower capital investment, and to more aggressively integrate university and private industry partnerships for technology commercialization to generate a return on research investment. Multiple flexible laboratory modules were constructed within the available space. Oregon State University (OSU) occupied 22,000 ft^2 of laboratory and office space of the total 80,000 ft^2 possible . This successful renovation hinged on the addition of well planned, energy efficient and expandable laboratory HVAC and exhaust, process piping, expanded electrical service, laboratory sanitary waste system, energy efficient lighting upgrade and other infrastructure improvements

Design that supports collaborative science

CH2M's design established a stimulating shared research work environment by providing a mix of open and closed office space options, closed and shared laboratories, as well as shared equipment and spaces for fabrication, demonstration, and pilot line testing. Throughout the facility, spaces were designed to support both planned and unplanned collaboration through the strategic introduction of amenities spaces. Examples include placement of breakout areas with whiteboards and soft seating near offices and laboratories, siting of lounge spaces with working tables and soft seating at major circulation intersections, and design of a new break area with seating and whiteboards to foster casual communication in a centralized location.

* State Science and Technology Institute

University of Pittsburgh – Facility Assessment and 21st Century Lab Upgrades. Pittsburgh, Pennsylvania

CH2M provided the facility assessment, master planning, and renovation of more than 20 outdated research facilities (from 30 to 100 years old) encompassing more than 2.5M ft^2 at the Oakland campus in Pittsburgh. CH2M has provided design services for the renovation of multiple lab spaces across the campus. Among the more recently completed of these projects is the Life Science Complex, a 330,000 ft^2 complex that CH2M design and engineering services, following the Master Plan 'Road Map', developed previously with the university. Using 3D modeling CH2M orchestrated and led design workshops with key stakeholders to generate 'what if' scenarios and provide tailored solutions to maintain and enhance the historic character of the buildings.

University of Vermont – Geochemistry Laboratory. Burlington. Vermont

This lab renovation project in a 1950's era campus research building included upgrades and repairs of an existing geochemistry laboratory specializing in Cosmogenic Nuclide research. Among the special requirements was creating a cleanroom environment free of boron contamination. The laboratory is used for GeoChemical research investigating boron residuals and the effects of the solar radiation in the ground. The boron free environment provided a design challenge in excess of a typical (already complicated) renovation since traditional construction materials for fire proofing, cleaning, thermal insulation, and gypsum wallboard contain levels of boron far exceeding the parts per million (ppm) level that is significant to the research.

Oregon Department of Environmental Quality (DEQ) Oregon State Public Health Laboratory (OSPHL) (LEED Silver). Hillsboro, Oregon

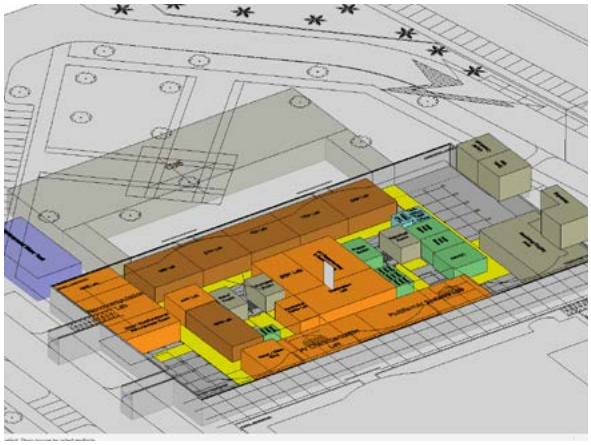
CH2M helped the Oregon DEQ adapt this single story, tilt up, spec built, commercial office building to accommodate approximately 86,000 ft^2 of research and testing laboratories and offices. DEQ's lab is an all hazards facility used primarily for testing air and water samples from around the state. Key design criteria followed the SEED program, bringing daylight into the building core using skylights and interior relites, improving energy performance and the work environment. Flexible use zones were created throughout the building core and organized along major paths of travel to allow departments to adapt the spaces to their own unique use.

University of Oregon – ONAMI. Eugene, Oregon

CH2M performed a site programming study for the University of Oregon's ONAMI Building, a nanoscience facility housing world class microscopy labs with better then NIST "A" vibration characteristics and superb thermal stability. The ONAMI project consists of a 25,000 ft^2 ft^2 basement built under the open space between Huestis Hall and Deschutes Hall, with an additional above ground component. The facility was conceived as a centerpiece of a statewide initiative to create a nationally recognized Center of Excellence in cutting edge fields such as advanced materials, microsystems engineering, biotechnology, and nanotechnology in a synergistic environment fostering student, faculty and technology partnerships in a highly synergistic best in class research center environment.

University of Nebraska – Center for Virology. Lincoln, Nebraska

CH2M led this 21st century laboratory project for this emerging research institution through all phases of design; from National Institutes of Health (NIH) grant proposals and alumni fundraising to multiphased construction supervision. This research and development (R&D) laboratory facility, funded and built in two phases, was created to provide BSL -2 and BSL-3 laboratory suites in support of interdisciplinary viral research. As the types of viruses to be studied included AIDS and Ebola, their accessibility and handling were of particular concern for both the University and for the Federal funding agencies. Providing both a secure and university campus atmosphere for this new facility was of utmost importance to students and researchers alike.



Information Technology Industry Development Agency (ITIDA) – Egypt Nanotechnology Center (EGNC). Cairo, Egypt

CH2M was selected to design the EGNC in Cairo to be located within a recently constructed building on the extended Cairo University campus with an initial fit up scope of approximately 100,600 ft^2. The project includes multiple wet and dry labs, a cleanroom, offices and administration spaces and central utility plant. Several sustainable strategies were employed including an energy recovery process made possible from concentrated photovoltaics for desalination. Computational modeling and simulation services were provided to both facilitate and shorten the programming and conceptual design time by 25percent.

Meeting and exceeding standards

Demonstrating how we meet standards

CH2M has deep experience working throughout the state of Oregon. We work on the campuses of peer higher learning institutions designing buildings and renovating research facilities in the context of those respective institution's standards and frameworks. In addition, we simultaneously meet and exceed the requirements of local, regional and state governing authorities.

Pushing the sustainable design envelope

CH2M has passionately pursued many sustainability measures consistent with the thirteen patterns of University of Oregon's Sustainability Development Plan. CH2M's has the in house ability to validate energy performance and airflow strategies that provides our clients with the assurance that sustainability measures are being considered. We employ many design tools and we understand in the intricacies of government mandates, industry standards, and incentive programs that often make or break sustainability decisions. Our integrated design approach develops a system wide solution that incorporates all building components to achieve the highest energy efficiency and reduction in resource use. We have been able to document long term energy savings for our clients by designing facilities that continue to return value over the life of the building.

"I would like to thank the team for its truly 'above and beyond' effort! It has been a wonderful experience to work with such a talented and committed group of people.

You are a remarkable world class bunch."

- Provost, Oregon Health & Science University

SEED/LEED

The Pacific Laboratory project will need to meet SEED standards, meaning that it needs to be 20percent more efficient than a baseline Oregon Energy Code building. CH2M's recent experience with the State of Oregon DEQ /Pacific Hall Laboratory (PHL) will prove useful for the ISC2 facility. The DEQ/PHL energy analysis investigated means of balancing SEED requirements with the energy needs of analytical laboratories with high lighting and mechanical loads. The complexity of the facility requires close coordination between the architect/design engineers and the energy analysts, as well as frequent communication with the Oregon Department of Energy. In compliance with the State of Oregon Sustainable Facility Standards and Guidelines, ISC2 will meet or exceed USGBC's LEED Silver status. CH2M's designs have achieved or anticipate a minimum of LEED Silver certifications for PSU, OSU, Clemson University, and other private clients.

CH2M engineers have invented numerous pollution reducing and energy saving pieces of equipment. We created the OptiMAH makeup air handler, which reduces energy costs by up to 25percent. Our team has recently been involved in research projects with material suppliers, product manufacturers, and clients seeking to advance the practice of sustainable design. The results include new building envelope and curtainwall technologies.

"This elegant contemporary work demonstrates that the requirements of a complex scientific research program can be used to create a building that also succeeds at place making that enriches its surrounding context. The skillful interplay of materials and forms that create a sense of human scale also make the building welcome among its smaller neighbors.."

- AIA Jury Member comment regarding CH2M award winning laboratory design

Selected sustainable design tools

Eco-charrette: An eco-charrette, focusing on the sustainable design strategies for the project, allows the entire team, including research staff, to become sustainable design advocates for the project.

Airflow Modeling with Computational Fluid Dynamics (CFO): CFD is a 3D airflow modeling tool that simulates flow, heat transfer, chemical transport, and associated phenomena on the interior and exterior of a building. Airflow modeling is used to determine how building geometry and site layout in a campus setting affect dilution of exhaust, reducing the risk of harmful contaminants to adjacent facilities. Indoor air quality can also be evaluated, testing fume hood capture and space pressurization to improve the safety of individual lab areas within open, flexible suites. CFD is capable of validating natural ventilation schemes and is a critical step in true sustainability.

Energy Efficiency Measures (EEM): Using an electronic model of the chosen baseline mechanical system, we investigate and assess EEM's using capital cost and simple payback as metrics. We also investigate energy efficiency strategies such as the use of office and classroom relief air for laboratory makeup air, integration of laboratory motion detectors for night time HVAC system control, fan wall systems to eliminate sound trap pressure loss and horsepower, and heat recovery chillers to transfer equipment cooling energy to domestic water heating.

Designing within a Framework

Working within an existing campus

We have designed multiple research focused buildings within the framework of university campus plans including the conceptual planning for ONAMI at the University of Oregon. From stand alone buildings like the Nebraska Center for Virology (NCV) at the University of Nebraska to the laboratory upgrade projects at Portland State University (PSU) we know how to achieve the most rigorous technical (Labs 21) standards within over arching campus frameworks. We know the challenges of making change within an already operating scientific research complex and that the retrofitting of existing building systems must remain sensitive and responsive to the governing campus design goals and criteria.

Approaches and processes ensuring results

Demonstrating experience with the processes

CH2M's reputation for listening, involving stakeholders, and working in an open and transparent manner on highly complex public and private industry projects is well established both here in Oregon and around world. It is precisely because of our history working with often fast track, cost conscious, energy efficient, multi stakeholder types of projects that we necessarily created and have adhered to tried and true processes, methods and approaches to ensure successful outcomes.

Design is about beauty, not to be confused with luxury. We are passionate in pursuing beauty and believe it is essential to improving the quality of work, education, and life.

Creating designs with users

Design is a team sport. To enable effective collaboration we will use real time 3D computer modeling in meetings with University stakeholders to create and study multiple alternative solutions and generate new ideas. We have found that this process stimulates stakeholders to be active participants in developing the design at all stages in a project. Our integrated design team of architects and engineers understands how to effectively work across discipline lines to engage each other in investigating and integrating sound and economical solutions.

Design is a pragmatic art. At each iterative step in the developing design our goal is to first refine and fully understand your needs, and then translate these into robust solutions. Experiential delight and technical sophistication are not mutually exclusive concepts. As the 16th century Italian architect Alberti observed, design is the art of transforming necessities into virtues.

Design is about beauty, not to be confused with luxury. We are passionate in pursuing beauty and believe it is essential to improving the quality of work, education, and life. Research laboratories are expensive spaces to build, retrofit and fit out but we know that high performance and equally delightful human centered environments can be achieved within a limited budget.

Using focused design charrettes and specialized techniques such as Rapid Prototyping, we work together to refine the best ideas into a solution that fulfills project goals and reflects the unique vision of each client.

Maximizing communication

Good communication is the key to a successful design process. Working from dedicated multidiscipline team studios, we explore options with our clients in an atmosphere of trust and respect. Using focused design charrettes and specialized techniques such as Rapid Prototyping, we work together to refine the best ideas into a solution that fulfills project goals and reflects the unique vision of each client.

Our approach to collaborative design is embodied in our Rapid Prototyping based process called Collaborative Design using Digital Modeling (CD/DM). CD/DM is our unique approach for developing many different ideas very early in the process and using those alternative ideas to inform the design. Project stakeholders become active participants in the design process.

Minimizing disruption

Avoiding disruptions of ongoing research in Pacific Hall and Onyx Bridge will be the key focus of our efforts. We will incorporate and work with UO's academic and activities calendar as a basis for establishing a master schedule with you and the CM/GC. With all team member's inputs and a thorough vetting of change/move timelines, staging mobilization and the typically myriad other effected parties and activities, we will seek always to minimize impacts to the campus and ensure maximum beneficial use of the building during construction.

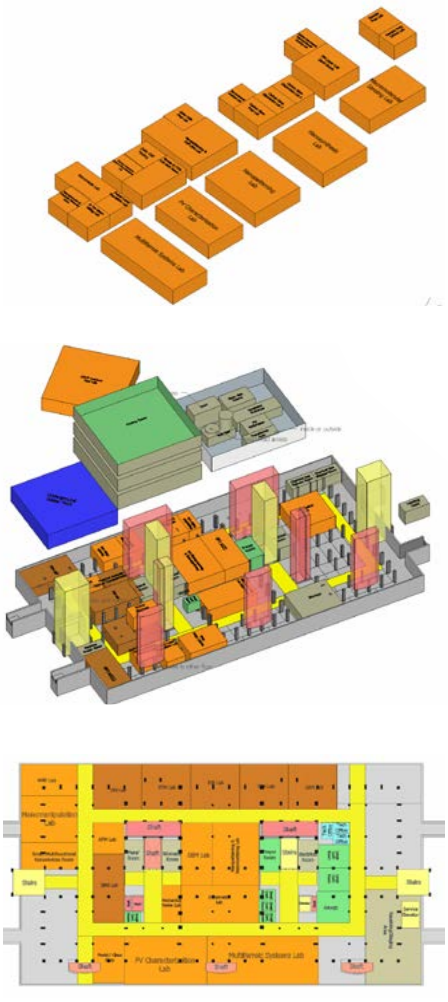
We know from experience that campus renovation work demands agile and flexible scheduling that allows the team to react to new information, whether from program changes or discoveries in the field. Our scheduling approach will illuminate potential scenarios, anticipate unforeseen conditions, identify long lead materials, and help UO make the best choices. We will establish early, proactive collaboration with the CM/GC to facilitate this process.

Managing for success

CH2M uses lean design principals and processes in every project in which it is engaged. We propose to use CH2M's exclusive RBpD approach in support of this laboratory project. RBpD is designed to reduce guess work, redundant work, and out of sequence work by collaboratively making a graphic map of individual commitments in regular intervals throughout design. This mapping is reviewed daily and commitments are refined as work progresses and conditions change.

Work is based solely on what are defined as our Owners "Conditions of Satisfaction" (COS); in other words, by what metrics will this project's success be measured when, at completion, the Project Partners can agree that the outcome met the team's criteria and expectations.

Consistent planning and communication helps the right work get done at the right time. Individual team members make commitments to provide exactly what is needed by the others and understand the complex web of commitments necessary to complete a design. In laboratory projects such as this one we know that "big room" coordination meetings allow disciplines to hash out conflicts and find synergies. Daily check ins track commitment progress and allow management to allocate additional resources. We plan together, we work together, and we adjust together. All disciplines participate in this process, ideally with the owner.



Above: graphic conceptualizations inform the laboratory development process.

Integrated project delivery

Although traditional methods of designer, constructor and trades working independently have dominated the industry for decades, inherent inefficiencies exist that make it impossible to respond adequately to today's building owners. Building owners like UO need increasingly more complex research spaces to be designed and built (typically) more quickly, costeffectively, sustainably and with higher quality than ever before.

As described elsewhere throughout this SOQ we have long been employing an integrated approach and embrace a collaborative delivery system that facilitates better communication, reduces/shares risk, increases value, and provides a positive experience for project owners. Our methodology allows us to respond more nimbly; to more deeply integrate delivery, design and cost management; and to connect more closely to each client's culture, values and requirements.

We've had many university clients and research stakeholders who have come to a project with sometimes competing priorities and who desire active participation in their projects. We listen actively to their desires and concerns, and incorporate them into our design process. This approach builds a unified, high performance, integrated delivery team at the beginning of the project. These sessions enable the team to determine rapidly how the project can be built within available funds, and to then design to an agreed upon target cost. The following are critical elements of that process:

- Set a clear vision and create a plan to achieve that vision. This means agreeing to desired outcomes, and developing clear strategies to achieve them
- Communicate the plan, promoting transparency of challenges and a collaborative approach to solutions
- Intervene, organize, monitor, and report. Include stakeholders in decision making, and continuously concentrate on adding value
- Foster teamwork by facing critical issues together—openly discussing status, challenges, and failures—and collaborating on joint initiatives

CH2M has successfully employed collaborative design sessions for over a decade on all sizes of projects. Our roles on these projects have included both design and construction as well as design only. In each case we have facilitated the role of integration leader, providing leadership support, and coaching in lean design and construction collaborative practices.

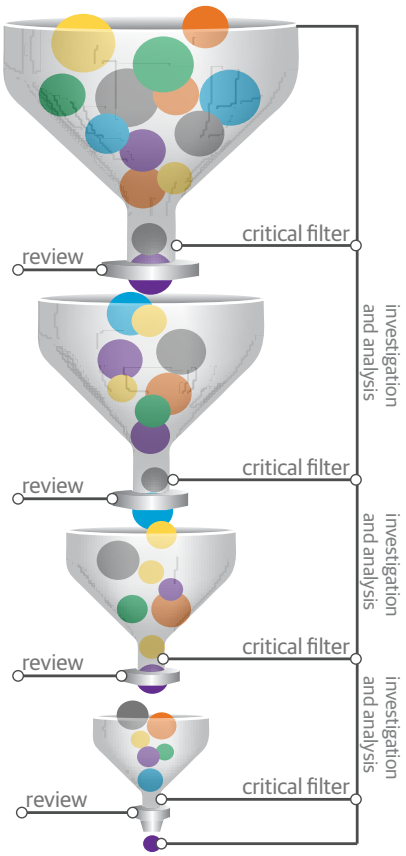
Results include:

- Lower project costs– with numerous examples of cost reductions of 30percent or more
- Better cost certainty– and available much sooner; change order rates sharply reduced – including one retrofit delivered with $0 in changes to the owner
- Significant schedule improvements are available – 30percent and greater reductions from benchmarks are common.
- More engaged, satisfied participants
- RFI reductions of 90 to 100percent

Cost management during design typically includes detailed estimates at major milestones during the process. This approach has often allowed thousands of hours of work to occur between milestones resulting in cost issues being identified too late leading to rework or backtrack to get back on budget. We use the traditional approach and enhance it by conducting weekly line item budget updates. By integrating estimating into the design process, we can track design development impacts to project budget in real time, identifying trends and mitigating wasted effort.

"The approach utilized that included numerous packages describing alternative system solutions provided us with great flexibility in pricing the final construction contract to be within our budget. We have been very satisfied with the design services provided by CH2M."

- Mark Fuji, Portland State University



Above: The distillation of many ideas results in a refined concept.

Meeting the challenge

"Having an integrated design team with outstanding engineering expertise to couple with the architectural design team was crucial to the success of this project and [CH2M] is one of the few companies that we know capable of providing this degree of integration."

- Dr. Joseph Kolis, Professor of Chemistry, Liaison to the VP of Research, Clemson University

Nathan and his team have met the challenge of creating collaborative, affordable, flexible, adaptable and sustainable laboratories on multiple occasions in a variety of existing conditions. We have met the challenge of designing and completing the construction of these kinds of laboratory, office and support spaces and their integral infrastructure by consistently **employing the same key personnel, applying lessons learned from our previous projects** and utilizing tried and true means and methods that have repeatedly resulted in high performance spaces that meet and exceed the expectations of both faculty and facility personnel alike.

The key reason we achieve measurable success for university laboratory users, and why we can and will meet this challenge, is that, with you, we will establish the measures of success. As described elsewhere in this SOQ we will set what we have called the CoS. We know that by establishing and agreeing to success criteria at the onset, ensures all stakeholders will be able to measure success at the end. Continuously validating the criteria throughout the design and construction process, leads to a project that meets "CoS". We will use **Lean processes inclusive of jointly establishing the "CoS"** to meet your needs, goals and expectations for today and, perhaps more importantly, the future.

We believe that our unique multi discipline design and engineering team framework will meet this project's challenges by providing the most cost effective, attractive and sustainable results. We will evaluate the existing conditions, make recommendations, and pursue solutions through the holistic prism that is our compact and unified team of architects and engineers. In our approach, we draw upon the equal and always compelling contributions of our CH2M mechanical, electrical, plumbing and process engineers. As necessary and appropriate, we will also use other CH2M subject matter experts (SMEs). These experts could include our environmental engineers (asbestos abatement), our code compliance experts (bringing a 1950's building up to current code), or our dedicated Director of Sustainability (truly sustainable actions, not just a LEED checklist). Our team and these resources reside together in our Portland office. We will meet this project's challenge by **providing the value inherent in employing our multidiscipline and SME team approach**.

We will create together an inspiring and attractive laboratory and office environment that promotes opportunities for interactions and supports the goal of encouraging cross disciplines collaborative research. Site, facility and culturally specific we will work with you and the stakeholders to ascertain what of the current Pacific Hall and Onyx building spaces can best promote these goals. What of the adjoining research spaces, patterns of faculty and student circulation, orientation and angle of the sun at exterior exposures can inform and drive solutions to meet your "CoS"? We will find out together. Our experience with similar projects is that often the most responsive design solutions are the least intrusive or complicated ones. We will build upon and refine the current infrastructure systems and allow easy "plug in" or changes/moves. For example, we will place high performance hoods (as may be required) in locations that both facilitate maximum shared use and least obstruction for future lab layouts. We will bring solutions for the age old challenge of providing sufficient storage through some combination of space allocation and protocols. We will meet the challenge by providing cost effective, flexible and adaptable laboratory environments by drawing upon experience in previous projects, but, ultimately, by looking to the stakeholders and project conditions to drive an **appropriate and site specific** tailored solution for the researchers in this location.