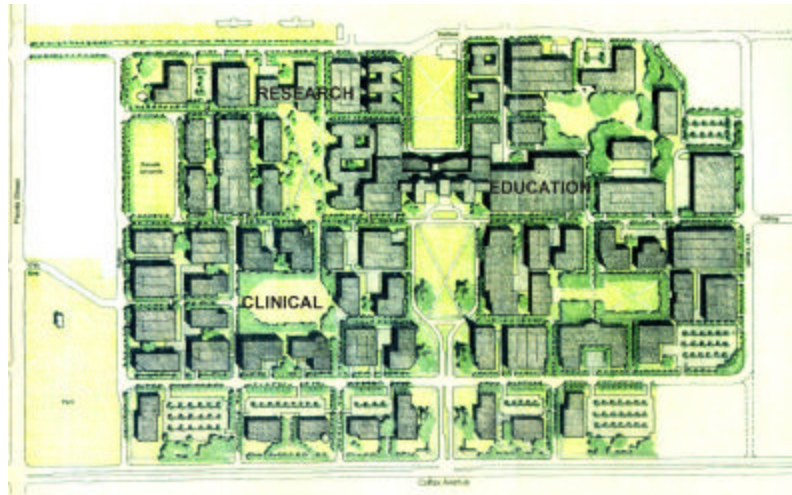


## Introduction

The proposed Anschutz Outpatient Pavilion (AOP) is located at the former Fitzsimons Army Medical Center in Aurora, Colo. The AOP is part of the University of Colorado Health Sciences Center (UCHSC) and University of Colorado Hospital (UCH) master plan to develop 217 acres of the Fitzsimons campus into overlapping zones representing the hospital's clinical care, education, and research mission. The design of the AOP is focused on the ambulatory patient and is the first major construction project on the campus (refer to Photo 1–Site Plan).

The AOP is a freestanding seven-story building of approximately 476,000 GSF with a construction cost of \$79.2 million and total project cost of \$110 million. A shared public entrance lobby, forming the Anschutz Centers for Advanced Medicine, will connect the Anschutz Outpatient Pavilion to the first and second floors of the adjacent Anschutz Cancer Pavilion (ACP). The AOP is designed to accommodate a future inpatient facility connected at the lower two floors of the west elevation (see Photo 2–First Floor Plan).



Related medical clinics in the AOP are designed as practice cluster modules and are adjacent to one another to share staff, support services, and treatment areas. This adjacency also allows for easy expansion of clinic space if warranted by increased patient volume. The design of the clinical areas concentrates staff and support areas in the center of the floor and places public corridors and waiting areas along the exterior walls. This design provides easier way finding and allows building occupants to enjoy a scenic view of the Denver skyline, the Rocky Mountains to the west, and the central plains to the east.

In less than five months the design/build (D/B) team designed and began construction of the AOP with completion slated for December 2000. This is currently one of the largest health-care projects in the country using the **design/build** process.

This case study presents the owner and design/builder's perspective on:

- Why use design/build
- The design/build team selection process
- The vision of an ideal patient experience
- Innovations in the design/build process
- Lessons learned along the way

# **DESIGN/BUILD IN HEALTH CARE**

**The Anschutz Outpatient Pavilion  
University of Colorado Hospital  
A Case Study**

**Rob Davidson, AIA  
Principal–H+L Architecture**

**Antonio B. Ruiz  
Vice President of Operations–University of Colorado Hospital**

**Charlie Graft  
Vice President–Gerald H. Phipps, Inc.**

**Mike Krueger  
Project Director–McCarthy**

**Denver, Colorado**

*Phipps|McCarthy* a joint venture

**H+L HDR**

## DESIGN/BUILD AND TEAM SELECTION

Like many health-care organizations in the country, UCH continues to experience annual increases in its outpatient services. Unfortunately, the majority of the hospital's outpatient services/clinics are located within the inpatient facility. This creates the following major problems for outpatients visiting UCH:

- Outpatient services are not centrally located within the inpatient facility.
- Way finding is difficult for outpatients who need to visit more than one service or diagnostic area.
- Parking is limited and inconvenient for outpatients.
- Additional space is not available within the current inpatient facility to allow for the expansion of outpatient services.

Building 500 – Fitzsimons Army Medical Center



The UCH administration had been planning a new outpatient facility near its current campus. Unfortunately they encountered opposition from its neighbors and Denver County administration. It was during this period of opposition that the former Fitzsimons Army Medical Center became available to UCHSC and UCH. The administration immediately seized upon the opportunity. They soon realized, however, that many months of planning and design to construct the new outpatient facility near the current campus would be lost. The building

location on the Fitzsimons campus was not as restrictive and allowed for an improved design. Therefore, the hospital's project team got the formidable task of redesigning and constructing the new facility *within the original project schedule*.

This scheduling challenge prompted UCH administration to consider delivery methods other than the traditional owner/architect/contractor construction process. An evaluation of the design/build option led to meetings with several design/build firms. These meetings focused on the scheduling advantages of a design/build project and were followed by site visits to facilities built using design/build. UCH decided to proceed with a design/build contract for the AOP.

A request for proposals ran in the local newspapers. The primary areas of evaluation during the selection process—the evaluation of written responses and a structured interview—included:

- Prior design/build experience
- Prior experience with UCH
- Ability to meet the proposed project schedule
- Estimated project construction cost
- Estimated fees.

The selected contractor on the design/build team is **Phipps/McCarthy**, which had significant previous experience as a joint venture for the University of Colorado Hospital Critical Care Towers. The architectural component of the team, **H+L/HDR**, formed a joint venture for this project. The two firms of H+L Architecture and HDR, Inc. came to the AOP project with past experience working together and past relationships built between owners of the firms.

HDR brought Ramesh Loharikar to the architectural team, a designer on the University of Chicago Center for Advanced Medicine, which UCH referenced as the “type of building envisioned” as their new outpatient facility; Julian Jones to fill the role of clinical designer; and Craig Ellis as project manager.

H+L brought to the table Rob Davidson, principal-in-charge with a significant history with the University of Colorado Hospital and the team assigned from the hospital. Rich Wolfe filled the role of building designer from H+L, Mark Williams as project manager.

In general, HDR was programmed to lead the clinical design and H+L was responsible for core and shell design. This decision was to facilitate the entire design and construction process because:

- Each firm is responsible for a product from beginning to end instead of one firm creating a design and handing it over to another for preparation of construction documents. Continuity in decision making, meeting attendance, problem solving, etc. belong to one firm for its area of responsibility.
- UCH requested record drawings produced in AutoCAD format. HDR works in Intergraph and H+L works in AutoCAD. This assignment of responsibilities minimized translation of drawing data and associated issues.

The interview took place on October 26, 1998 led by:

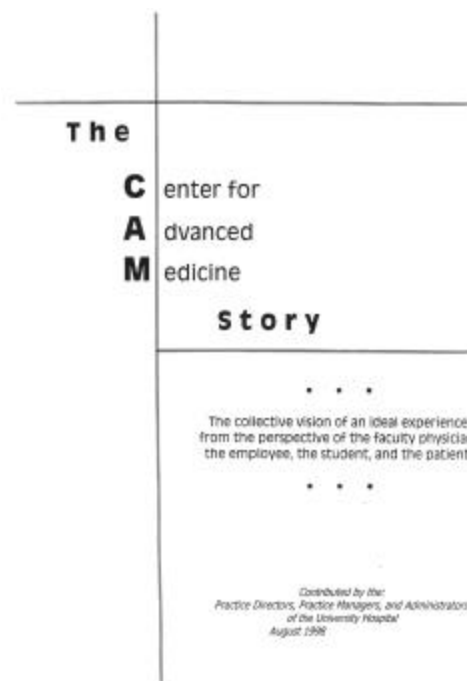
- Rob Davidson–H+L Architecture
- Doug Wignall–HDR Architecture
- Charlie Graft–Gerald H. Phipps, Inc.
- Bill Schuttler, Sue Stewart–McCarthy

Once the interview process was completed a recommendation was made to the UCH Board of Directors to enter into a design/build contract with the team of Phipps/McCarthy/H+L/HDR.

HDR provided the mechanical/electrical/plumbing schematic and conceptual systems design. A request for proposals then went out for design/build mechanical, electrical, and plumbing subcontractors to complete the design and construct the project. The following firms were selected based on RFP requirements including similar experience, ability to meet schedule, fees, and experience with the D/B team:

- Sachs/Sturgeon–St. Louis, Denver
- Murphy Mechanical–Denver, St. Louis

Structural engineering was provided by HDR. And Vanir Construction Management Inc. was selected as the owner’s representative to UCH.



## **VISION FOR THE BUILDING AND THE CAMPUS**

UCH developed a vision for its move to the Fitzsimons campus that included:

- Being a world-class health-care resource
- Recognition for its clinical excellence
- Recognition for its amazing service with an emphasis on eliminating patient waiting time
- Maintaining a solid economic base.

With these elements in mind, the UCH Ambulatory Services Department published a collective vision of the ideal experience from the perspective of the patient, the faculty physician, the employee, and the medical student. This vision described the ideal situation from the time a patient calls for an outpatient appointment through the time he or she receives a statement for the services or notification that the insurer has covered the services. The design features addressed in this document include, but are not limited to:

- Exterior signage that is easy to read and follow
- Ample and conveniently located parking that directs one to the building entry; patients receive a higher priority for parking than the physicians and staff
- Interior signage and design features that make way finding easy
- The use of as much natural light as possible
- Similar services located adjacent to one another
- Data and telecommunication connectivity in all waiting areas
- Patient-friendly and inviting interior design
- A building designed to support an electronic medical record system and PACS
- Flexibility of clinic space

- Full-service diagnostic and support areas
- Ability for future expansion
- Inviting exterior landscaping and seating areas.

This document was given to the design/build team and played a very important role throughout all stages of space programming and building design. It was also used to ensure all pertinent design elements were included in the final construction documents.

The Fitzsimons campus plan calls for a major transformation from an active Army hospital base to a premier health-sciences center campus. Characteristics include but are not limited to:

- Patient/visitor/employee-friendly campus
- Pedestrian-friendly campus
- Ample green space and water features
- Controlled architectural design
- Native-Colorado building materials
- A full service campus for patients/visitors/employees.

Because it is the largest component of the first major construction project at Fitzsimons, the design of the AOP will play an important role in the development of design standards for the entire Fitzsimons campus. Particular emphasis is placed on the exterior design of all buildings on the campus and is regulated by a team of architects (the Design Review Board) appointed by the president of the University of Colorado. The DRB is made up of five architects and one landscape architect.

## **DESIGN**

The client provided an office for the design/build team. The following activities were developed at this office:



team recorded their comments. One layout was selected and used throughout the Anschutz Outpatient Pavilion. (Shown inset.)

- Site Office (shown inset): The design/build team proposed to UCH that the team be housed in the administrative offices of the hospital *full-time* during the course of design. The University of Colorado Hospital provided the team with conference room access and enough workspace for 18 people over 5 months. HDR and McCarthy relocated approximately 10 people from Omaha, Boise, and St. Louis for this effort. H+L and Phipps provided the balance of the design/build team members. Hospital administrators were located two floors above and frequently visited the design office to review the team's progress. This office included a full-time receptionist and employees from each firm. **Decision making was expedited and often took only hours instead of days.** Phipps/McCarthy provided constructability input, cost estimating, and schedule/budget input. Design strategy was developed and models were reviewed prior to presenting to the campus Design Review Board (see photo 2). A combination of traditional cardboard models and 3D animations using 3D Studio were used and reviewed with UCH providing options for many elements of the design, such as entry and food court areas.
- Mock-ups: Exam room layouts including cabinets, sinks, charting desks, patients, and other equipment were laid out as an extension of the office at the client site. Physicians and nursing staff reviewed three alternate layouts while the design

- A slide presentation showing concepts for interior and exterior design was presented to the medical staff for feedback and to guide the design/build team during schematic design.



- Clinical Modules: Related medical clinics were designed as practice cluster modules. Office and exam spaces were sized to be interchangeable allowing flexibility for future changes. Clinical floors provided public corridors and waiting areas along the exterior walls to assist in way finding and provide access to the views of mountains and prairies for the patients. (See photos 3 and 4.)



- User Group Meetings: User groups made up of representatives from the medical staff met in week-long sessions with the design/build team in the conferences rooms of the design/build, client site office. (Refer to inset photo.)
- Partnering: Formal partnering sessions began in March 1999 facilitated by Ralph Lassiter with HDR. The first session included a “vision setting” introduction by Dennis Brimhall, CEO of the University of Colorado Hospital. Approximately 30 representatives from all parties attended and the session culminated with the signing of a pledge to follow the Partnering Agreement. In a consensus-building session, UCH’s Tony Ruiz used all of his “voting dots” on one item—“complete project by October 4, 2000.” Follow-up sessions have occurred quarterly and continue through construction.
- Quality Control: Coordination review sessions with mechanical, electrical, plumbing, structural, and architectural representatives occurred once in Denver and once in Omaha. Drawings were pinned up and overlaid with other disciplines and reviewed sheet by sheet.

The uniqueness of being able to pull a design firm, owner team, and the CM/GC together was a major feat in itself. Working side by side set the tone for a diverse team.

The result of putting this team together is evident in the fast pace and flexibility the owner procured in this process. We must not forget that the design team mobilized in February 1999. This project was slated to be a 265,000 SF building with a budget of \$65 million. Through the team process we were able to work closely with the owner and create a tremendous amount of flexibility in programming. The construction team mobilized onsite in May 1999. During the previous months the owner chose to increase the building square footage to 476,000 and add a floor. The design/build team accomplished this through close coordination.

### **Build:**

Groundbreaking: The groundbreaking at the Fitzsimons campus took place on June 23, 1999. Everyone wore “CAM Do It” buttons. (CAM = Center for Advanced Medicine.)

Contract: The University of Colorado Hospital wrote The Owner/Design/Build contract with assistance from an attorney specializing in design/build consulting. This process included 16 hours of conference calls among all four firms in their respective cities.

- Owner Carried Insurance Program: UCH elected to use an owner-carried insurance program to provide coverage for multiple projects under one policy. The policy covers the adjacent cancer center and site development for both buildings.
- Final costs were continually estimated and negotiated between April 1999 and October 1999 to develop a GMP.
- GMP was revised to a lump sum of \$79.2 million.

On-Site Staff: A trailer compound was set up on the construction site to house the project management staff, which included:

- Six full-time project management employees from Phipps
- Two full-time project management employees, who relocated to Denver from McCarthy's office in St. Louis
- One full-time architect from H+L
- One full-time architect, relocated to Denver from HDR's office in Omaha
- One full-time receptionist/secretary.

DB/O Meetings: Weekly design/build-owner (DBO) construction meetings were set up at the trailer conference room. The project managers from McCarthy and HDR were required to attend at least once a month. H+L and GHP attended every meeting.

Partnering Follow-Up: Sessions were scheduled every other month to assure continuous focus on project goals and maintain team relationships. These sessions were hosted by a different member of the team—McCarthy, Gerald H. Phipps, H+L, HDR, Vanir, and UCH. UCH and the design/build members rotated dinner-hosting duties every six months.

Anschutz Donation: In December 1999, Phil Anschutz donated \$25 million to the Centers for Advanced Medicine. This donation revised the name of the AOP from Center for Advanced Medicine (CAM) to the Anschutz Outpatient Pavilion. The following is an excerpt from the *Rocky Mountain News*.

“Business tycoon Phil Anschutz on Monday gave \$25 Million to help build cancer-research and outpatient-care clinics at the University of Colorado's new Fitzsimons campus.

State officials believe it is the largest single gift in Colorado's history. It is

2½ times larger than any single gift ever made to CU.

“It's wonderful,” CU President John Buechner said. “It boosts us in a way that it is unbelievable.” (Staff Writer, Bill Scanlon)

Refer to photo 5.

Mock-ups: Continually focused on patients and staff, the D/B team developed mock-ups of repetitive highly technical rooms, such as operating rooms. They are in place during construction after the drywall is installed and utilities and equipment located. Staff review and comment on the design prior to final installation.

Topping Out: The Topping-out Party on December 16, 1999 included installation of a steel beam signed by the team members.

## **DESIGN/BUILD IN HEALTH CARE (PROS & CONS)**

### Owner's Perspective

#### Pros:

- The contract is with one entity as a full-service team.
- Accountability is better managed.
- Questions are answered more quickly.
- Project cost estimates are quicker.
- Team relationships spark innovation and efficiency.
- Risk management is improved as requests for change orders are reduced.
- Improved schedule allows UCH to start operating sooner, producing a revenue stream.

#### Cons:



- At times the owner must respond more quickly than he or she would like.
- There can be a perception that the owner is now “one” against the architect/contractor team.
- Owners must rely on themselves or others to complete detailed reviews of design documents, pay applications, etc. This may require the services of an owner’s representative.

From the owner’s perspective, design/build provided an option to meet very tight schedule constraints imposed on the project. The approach provided a sole source of accountability and encouraged a team approach that also expedited delivery of the project. As an owner, UCH would seriously consider the design/build approach again on future health-care projects.

#### Architect’s Perspective

##### Pros:

- The client-site office was very positive, allowing the owner to participate actively and be an integral part of the team.
- The design team had to meet a very tight schedule in order to meet the construction schedule. Preconstruction estimating was very important.
- Relations between the builder and architect are less adversarial. The team attitude prevails.
- Partnering is positive.
- The likelihood of litigation is reduced.
- Strong relationships must be developed and maintained between the owner and design/build team. These relationships are very important to the outcome of the project.
- Cost management is improved with the design/build approach.

##### Cons:

- Decisions made by the architect that affect cost and quality have to balance

between the owner’s expectations and the quality allowed by the contract amount. Long-term relationships with the owner help the design/build team to maintain balance. Owners cannot always clearly define their expectations of quality in a manner the design/build team can quantify.

- On-site architects are not used to working directly with the builder on a daily basis. It is a major change from the traditional role.

From the architect’s perspective, design/build is a viable project delivery method even for complex health-care projects. Key ingredients for success are the selection of a design/build team with significant health-care experience and strong past working relationships between the owner-designers and builders. In the past, health-care projects with technical features have not used design/build as much as other industrial-type projects. Final judgment will come after this project is completed, but all indications are that this project approach can produce accelerated delivery and promote a team attitude with sole-source accountability.

#### Contractor’s Perspective:

##### Pros:

- Speed of delivery—beginning of design to start of construction in less than five months.
- Improved team relationship—design/build brings a better understanding of each team member’s responsibilities.
- Having the design team and build team in one office was beneficial during design and construction.
- Design/build allowed flexibility in reviewing different scenarios in program square footage and facilitated quick decisions.
- Design/build team promoted greater coordination among disciplines.

- Full-time site representation by the architect provides a quick turnaround to resolving job-site questions.
- Cost savings result with builders having earlier knowledge of the architect's design.

Cons:

- Architects and builders think differently and have different priorities. Architects are primarily problem solvers and review design parameters from an aesthetic view. Builders are preoccupied with costs and schedule.

The biggest single impact to the project of using the design/build approach was the speed of delivery. On January 1, 1999, the program was not finalized and no floor plan or sketch of the building had been attempted. By May 1999 the basement excavation was under way and the structural steel was ordered. This is incredibly fast for a unique building of this size. Although a lot of the credit for this achievement should go to individual members of the design team, the owner, architect, or contractor separately would not have had the confidence to proceed at this pace if the project were not design/build.

Another major advantage of the design/build process was the creation of a team atmosphere toward problem solving. Inevitably situations arise where various team members disagree on whose responsibility a certain problem should be. Very quickly we could pull together and realize that we must solve the problem as a team. This team includes not only architect and contractor, but also major trade subcontractors, which was a significant advantage to this project.

One aspect of the design/build approach that is both unique and effective is having

the design team and the contractor working together in the same location. Having the design/build team in the owner's office during the design stage was certainly a major factor in achieving getting the project started rapidly. Likewise, having members of the design team on site to see problems firsthand and available to communicate in person rather than at a remote location has proven to be a very effective method of maintaining schedule and reducing costs.

The foundation and framework was contracted in March/April 1999. Foundation work began in late May and structural steel was scheduled to start on July 19, 1999. As we progressed with the foundation, the final square footage was still not resolved. Since there was potential for the building square footage to increase, the foundations were designed to accommodate this increased capacity at a minimal cost to the owner. The structural steel package was released with the design criteria of a 476,000 SF building. At this time the foundation work progressed at a rapid pace and the decision on whether or not we were going to increase the square footage of the building was still pending. This decision alone had a major impact on finalizing the mill order for the structural steel. By working as a team and with close coordination and communication between each other we were able to meet the first of many milestones for this project. The foundation work was completed in July 1999 and the structural steel erection started on July 21, 1999. This in itself was a major event. We were able to hold off placing our final mill orders until October 1999 to allow the owner the flexibility to finalize the necessary program space for the project. The next and most critical milestone date was to complete the structural steel erection by December 15, 1999. Structural steel erection was completed on schedule. The overall project is currently proceeding on schedule. It's incredible what we can do when we can work as a team. (Refer to photos 7 and 8.)

## Lessons Learned

- The **office at the client site** was a good idea. It saved a lot of time. The owner had more opportunity to participate in the project and could see how much effort it takes to design a building. Decisions were made more quickly and response time was improved.
- **Cost estimating needs to be integrated as soon as possible** in the process. Preconstruction estimating is paramount to a tight schedule. A **full time** estimator would be helpful at design sessions at the client site.
- The owner needs to obtain buy-in and **approval of the program** prior to the start of design.
- Establishing a project **vision** was positive **for faculty, physicians, employees, students, and patients**. It helps convey to the design/build team the concept and vision from the beginning.
- Involve more **comprehensive equipment planning** at an earlier stage.
- Architects may prefer some type of **joint venture** relationship with the builders. The owner is accustomed to the architect as their agent, not as a sub to a general contractor. However, the architect does not want the responsibility of job safety or “ways, means, and methods of construction” liability so the joint venture would not be an equal partnership.
- Promote **team building between architect and builder**. The architectural and construction staffs are not used to working so closely together and need to develop more comprehensive relationships.
- A **Guaranteed Maximum Price/Lump Sum Agreement** should be obtained much sooner.
- The negotiation of an **owner/design-build contract** and designer/builder agreement should be completed earlier in the project.
- **Models and 3D graphics** were very beneficial in presenting to the campus Design Review Board (DRB), obtaining understanding for the owner, and selling the project to potential donors.
- **Design/build reduces redundant activities** between A/E and construction services.
- Division of **drawing production with single-firm responsibility** for each drawing significantly reduces confusion.
- **Full-size mock-ups** of repetitive rooms save time and money.
- **Benchmarking tours** of similar buildings allows designers to see through the user eyes.
- **Partnering** process facilitates team approach. Faculty/staff feel excitement about the project and help improve morale to move.
- **Long-term relationships** among owner, designer, and builder are key to successfully providing a balance of cost and quality.

## **Project Team**

### University of Colorado Hospital

Tony Ruiz—Vice President Operations  
Julia Fitzpatrick—Director Facilities Management  
Barbara Calhoon—Director Ambulatory Services

### HDR, Inc.

Doug Wignall—Executive Committee  
Ramesh Loharikar  
Julian Jones—Project Manager  
Craig Ellis  
Rich Klepper

### H+L Architecture

Rob Davidson—Principal-in-Charge  
Mark Williams—Project Manager  
Rich Wolfe—Project Designer  
Bill Dilatush  
Jeff Ambrose—Site Planning/Development

### Gerald H. Phipps, Inc.

Charlie Graft—Project Executive  
Gary Constant—Preconstruction Manager  
Kurt Klanderud—Project Estimator  
Jerry Willis—Project Manager

### McCarthy

James Lafata—Project Executive  
Michael Krueger—Project Director  
Susan Stewart—Project Estimator  
Bill Schuttler—Senior Project Manager

### Additional Services

Interior Design—Gallun Snow Associates LLC  
Civil Engineering—S.A. Miro, Inc.  
Land Planning—Civitas, Inc.  
Structural Engineering—HDR Engineering, Inc.  
Mechanical Engineering—Murphy Company  
Electrical Engineering—Sachs/Sturgeon Electric

*The Academy Journal* is published by the AIA Academy of Architecture for Health (AAH). The Journal is the official publication of the AAH and explores subjects of interest to AIA-AAH members and to others involved in the fields of healthcare architecture, planning, design and construction. [www.aia.org/aah](http://www.aia.org/aah)

This article originally appeared in *The Academy Journal*, published by the AIA Academy of Architecture for Healthcare (Volume 3 – October 2000).