



Academy Journal

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Universal Design for the Rural Environment

Abstract | **Article**

BBH Design was contracted by the U.S. Department of Health and Human Services to develop a prototype hospital for rural America.

The firm developed 25- and 15-bed versions of the prototype to assist rural hospitals at a time when most of them need replacement. The recent Critical Access Hospital (CAH) program makes hospitals economically viable, but assistance is still needed for major capital projects. The federal government provides this assistance through programs of the U.S. Departments of Housing and Urban Development and Agriculture.

Believing that the built environment assists the healing process, BBH designed the prototype as a Green Guide for Healthcare pilot project. The design acts as a health park, where building occupants and community residents participate in a restorative environment that not only encourages healing but also promotes health.

In addition, the prototype allows for initial programmatic flexibility while accommodating future changes. Modular design; extended floor-to-floor heights; and a spine containing circulation, electrical, and mechanical components make future expansion and convertibility possible. The modular systems also potentially allow decreased construction times and reduced construction costs.

The end result is a state-of-the-art healing environment built for today's needs and designed for tomorrow's changes.

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Building a new hospital in any location is a challenge, and this is especially true in rural America, which includes many remote communities with limited resources. In response, the federal government has initiated several programs to assist rural communities.



Rendering courtesy of BBH Design

Artist's rendering of the one-story Critical Access Hospital (CAH) prototype design



Rendering courtesy of BBH Design

Artist's rendering of the two-story CAH prototype design

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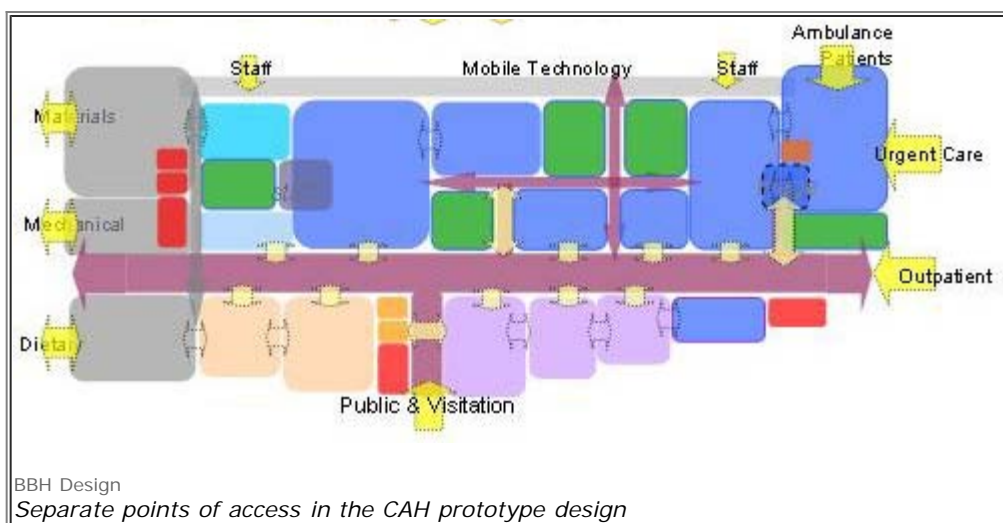
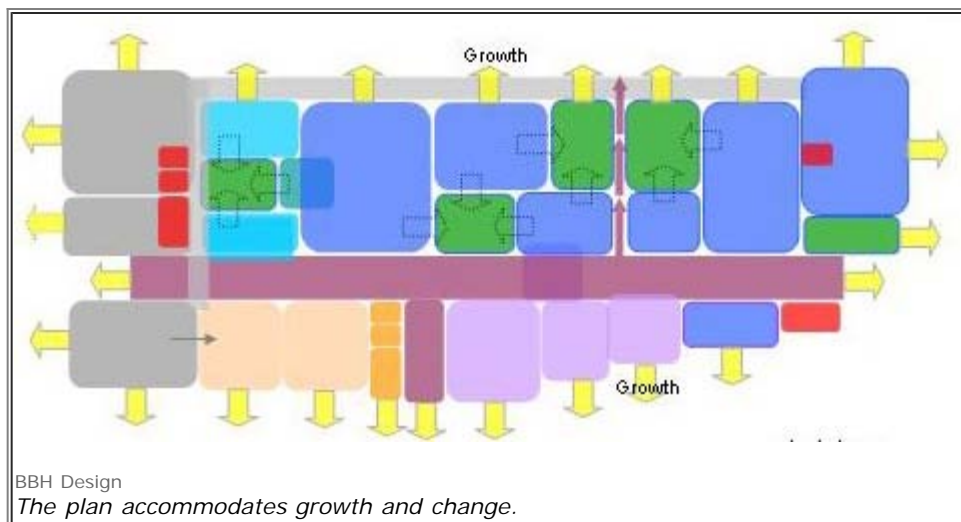
Medical Facility Planning 101: A Primer for Administrators and Others

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The federal programs are geared toward making the hospitals financially viable and providing them with opportunities to replace their outdated facilities. With this in mind, the Department of Health and Human Services (DHHS) Health Resources & Services Administration (HRSA) awarded BBH Design of Research Triangle Park, N.C., a contract to develop a prototype design for a hospital that can serve any rural community in the nation. The result is an economical, highly flexible, and state-of-the-art Critical Access Hospital (CAH) that is environmentally sensitive and designed to respond to the ever-changing technology, regulatory, consumer driven needs of the rural hospital.

The prototype is based on an all-private universal patient room concept that enables conversion of acute patient rooms to intensive-care, critical-care, isolation, or LDRP rooms. Nursing units can accommodate 25 beds (due to current CAH requirements), yet, as with all elements of the prototype, the system allows for adaptation either for fewer beds or for expansion (beyond the 25-bed limit) without major disruption of existing operations.



The clinical service area of the prototype is designed to enable incremental growth and change while reducing disruption to adjoining functions. Clinical service areas are generally unencumbered of fixed building elements (e.g. mechanical rooms,

stairs, elevators, and other elements) that often limit expansion options. Mechanical systems and structural systems enable both horizontal and vertical growth of patient beds as well as clinical, administrative, and support services.



Renderings courtesy of BBH Design
Interior rendering of CAH central spine



Another view of CAH central spine

This prototype, as developed, complements the federal program's effort in establishing the CAH program to improve rural hospitals' operational performance, which, in turn, enables delivery of state-of-the-art healthcare services to rural America. Operating for many years with limited resources has left most rural hospitals with little or no capital to draw upon to renovate or replace their older facilities. While the CAH prototype demonstrates how to build an affordable hospital, the hospitals find themselves with low credit ratings and few willing lenders. The federal program enables the rural hospitals to receive higher Medicaid and Medicare reimbursement, and this has given most of the CAH hospitals a positive financial balance sheet although they still have capital issues.

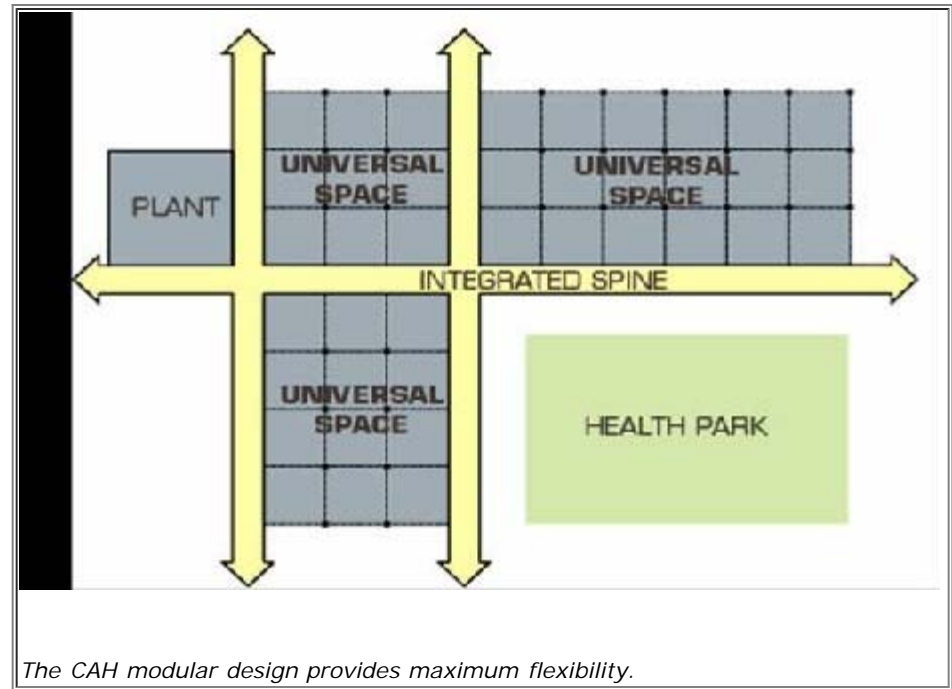
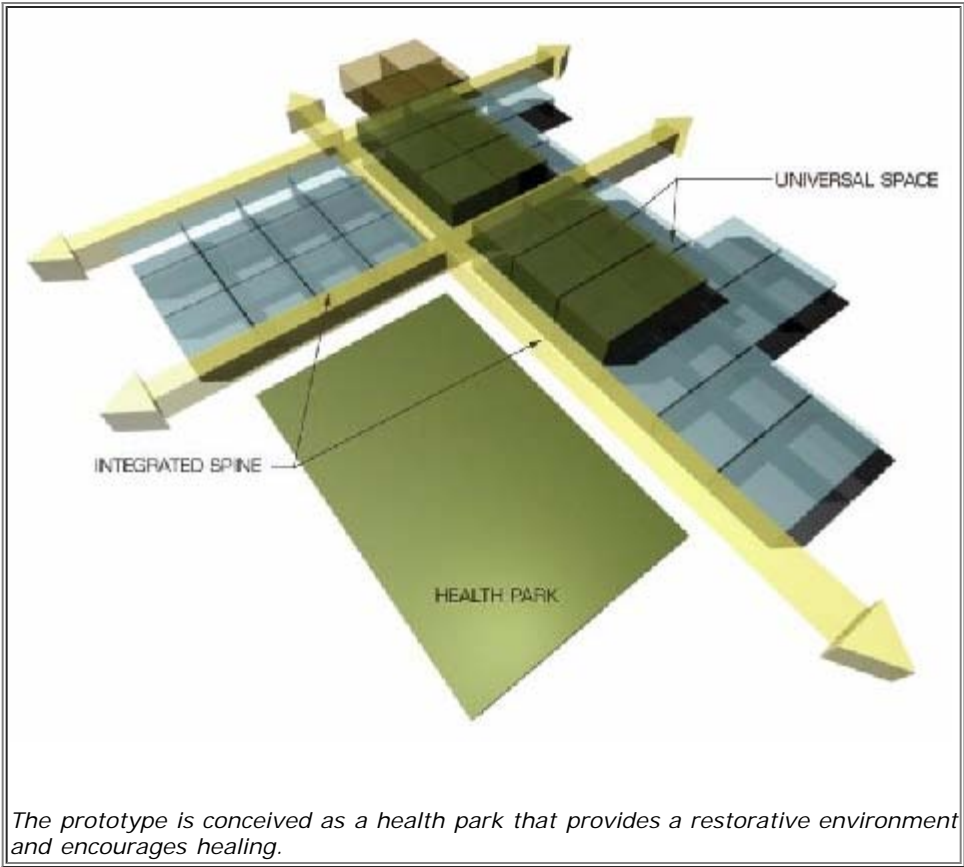
In addition to the DHHS program, federal agencies including the U.S. Departments of Housing and Urban Development (HUD) and Agriculture (USDA) envision that the CAH replacement project will open discussions on how their financial programs could further help to build hospitals. Support comes in the form of the HUD Section 242 program, through federal loan guarantees that provide a mechanism for financing replacement facilities, and USDA low-interest loans for rural community infrastructure projects. Both of these programs have existed for many years and currently are viewed as forces for improving the health of rural America.

In September 2004 BBH Design won the prototype contract, administered by the HRSA Division of Engineering Services in New York City. HRSA has engineering and architectural staff who are experts in healthcare project management and provide this service to HUD. Funding for the prototype project was provided by the HRSA Rural Health Policy Office and HUD.

In February 2005 the federal government (HRSA, HUD, and USDA) enthusiastically approved the CAH prototype, primarily because of its design flexibility to meet current and future changes in healthcare delivery and consumer demand.

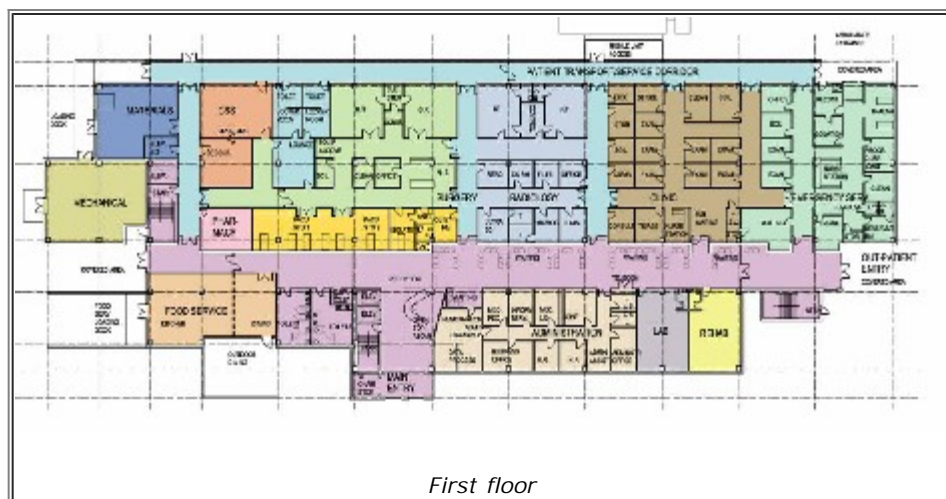
*Believing that the built environment can be an asset in the healing process, the prototype was developed as a **Green Guide for Health***

Care™ pilot project. It is conceived as a health park where the building occupants and community participate in a restorative environment that not only encourages healing but also promotes the health of the population. Green Guide for Health Care is an extension of the **Leadership in Energy and Environmental Design (LEED®)** **Green Building Rating System™** with consideration for ICRA (Infection Control Risk Assessment) requirements.



The design approach for maximum flexibility entailed the use of

modular design, including modular mechanical and electrical systems housed in a central spine, a universal space approach with high floor-to-floor heights allowing for ease of converting internal space to other potential uses, universal room models, and provisions for future expansion and convertibility. The use of modular techniques and systems will allow for shorter construction times, whether for packages of complete clinical suites or semimoveable components. This will also reduce construction cost, allowing more funding to go toward equipment purchases.



Projected costs for the CAHs in America are shown in the table below. The costs below are escalated by 4 percent per year to the year 2007.

Prototype	Beds	Square Feet	Construction Cost	Equipment Cost*	Project Cost
2-story scheme	25	60,745	\$13.75 M	\$5.58 M	\$21.4 M
1-story scheme	25	62,530	\$12.78 M	\$5.58 M	\$20.28 M
2-story scheme	15	53,145	\$12.04 M	\$5.58 M	\$19.43 M
1-story scheme	15	54,345	\$11.16 M	\$5.58 M	\$18.42 M

**Equipment costs are based on partial reuse of existing hospital equipment.*



Two-story site plan for CAH prototype



One-story site plan for CAH prototype

The CAH prototype document is a decision-making tool for rural hospital leaders to estimate program space requirements and costs associated with a replacement facility project. BBH Design believes a project of this magnitude should be considered as a major economic advantage for the local rural economy and encourages the hospital to consider a process that combines national perspective, insight,

knowledge, and expertise with qualified local and regional resources to provide a practice-ready facility to serve a community for the next 50 years.

For more information on the federal study for a prototype Critical Access Hospital, contact Lee Buckner, AIA, MHA, MBA, partner at BBH Design, Research Triangle Park, N.C., by e-mail at lbuckner@bbh-design.com or by calling 919-460-6700. Article coauthor Dan Hightower, AIA, programmer at BBH Design, can be reached at the same number or by e-mail at dhightower@bbh-design.com. BBH partner Richard T. Beale, AIA, ACHA, can be reached at rbeale@bbh-design.com.

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