

The First Optimum Performance Home™

universal design architecture part X

Gary Reber

Architectural Illustration By Ronald Devesa



synopsis

The home design not only provides for such lifestyle features to optimize independent living and physical and psychological health and well-being but also incorporates healthier green building materials and energy-saving approaches to achieve “zero-energy cost” home operation, water conservation and minimized environmental impact, as well as comprehensive electronic automated control features that enhance sustainable lifestyles.

Universal design supports the desire to “age-in-place” by creating homes that facilitate independence/self-reliance, as well as allow the homeowners to recover from illness or injury in the comfort of their own homes rather than in an impersonal institutional setting.

Universal design optimizes independent living, thus minimizing the negative impact and emotional stress that often comes with non-universal design homes.

Traditional homes are designed under the mistaken assumption that people never age or experience a disability.

Introduction

This is the tenth article in the series documenting the design and construction of the first Optimum Performance Home™. The project has been selected by the U.S. Green Building Council (USGBC) for inclusion in the national Leadership In Energy & Environmental Design (LEED®) for Homes pilot program, their new green build certification initiative, and the goal is Platinum certification.

The home will be built at The Sea Ranch, located in Sonoma County, along the Northern California coastline of the Pacific Ocean, approximately 110 miles north of San Francisco.

The showcase project is exemplary of the “Ultimate Home Design®” concept, which integrates age-friendly universal design with the best sustainable building practices, while exerting minimal impact on the natural environment. Universal design is the inclusive, non-discriminatory design of products, buildings, environments, and urban infrastructure, as well as information technologies that are accessible to and useable by (almost) all. With respect to home design, the idea is to design and build homes that have no physical barriers, thus sustaining people of all ages and all capabilities in a functional, comfortable, and aesthetic lifestyle.

A building science systems approach to home building is the cornerstone of the project, with emphasis on the relationship between the home’s components and the envelope they create. Also paramount is good stewardship—proper regard and respect for the rights of neighboring homeowners and the



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surrounding natural setting, and resource efficiency. The goal is to optimize occupant health, comfort, and safety; maximize energy efficiency and structural durability; and minimize environmental impact. In addition, the aim is toward providing a nurturing home environment to support independent living and sustainable lifestyles.

Part I of this case study series appeared in Issue 1, January/February 2006. The introductory article covered the project scope. Thereafter, each issue has contained a part of the continuing series by working through site planning and preparation; Low-Impact Development (LID); further refinements to the site plan and drainage design; The Sea Ranch Design Committee-approved architectural/structural and grading/drainage submittals with conditions that translated to clarifications on certain building components and material finishes; particular aspects of the home's mechanical plan; structural aspects of foundations, structural walls incorporating Insulating Concrete Forms (ICFs) and Structural Insulated Panels (SIPs), as well as roofing; the acoustical design of the dedicated Optimum Performance Home Theatre™ and rear-projection room; interior design approaches and materials; and kitchen, bath, and home fixtures.

A Final Approval letter for The Sea Ranch Association Construction Performance Permit was issued on October 11, 2006, which is required by Sonoma County prior to obtaining a county building permit.

The necessary work to secure the building permit, including further refinement of the structural and mechanical plans, has been completed. Final construction plans are now in the review process with the Sonoma County Building Department. Five permits have been issued: site plan, landscape plan, septic system, geothermal bore holes, and grading. Assuming no further delays, the issuance of permits, the commencement of construction, site grading, foundation, and mechanical infrastructure is

"The first Optimum Performance Home at The Sea Ranch is not only universally designed but it is also intended to be a smart home in meeting the personal requirements and needs of the author and his family."



The Sea Ranch, Sonoma County, California
Photo Courtesy Rozanne Rapozo (www.natureasisoet.com)

anticipated to start in late June or early July 2007.

In this issue, the focus will be on the universal design architectural features of the home. Also see in this issue the article entitled, "The Interior Design Process, Part I—Synthesizing Sustainability, Universal Design, and Technology" by the project's interior designer, Julie Stewart-Pollack.

Design Concept

As previously noted in this series, the home design integrates all of the concepts advocated in *Ultimate Home Design*. The goal is to demonstrate how today's products and building methods can make life safer, more comfortable, and more enjoyable. The science of optimum performance homes is about building structures that use less energy, are quieter and more comfortable, have fewer problems with material degradation, provide clean air and water, and do less damage to the environment. As an integrated and holistic design, the house will serve as a home for many people and in many phases of one's life.

The high-performance building systems that will be employed exceed what the building codes require, and are able to resist natural disasters more effectively than a code-minimum house. Greater home safety—and thus, homeowner peace of mind—is possible when building with stronger building materials and techniques. The Optimum Performance Home qualifies for the Fortified...For Safer Living® program of the Institute for Business & Home Safety (www.ibhs.org/business_protection). This program specifies construction, design, and landscaping guidelines to increase a new home's resistance to natural disaster.

The home will meet the guidelines and qualifications for the U.S. Department of Environmental Protection's ENERGY STAR®, the EPA's (Environmental Protection Agency) WaterSense®, and the American Lung Association® Health House® programs. As well, the home will meet the National Association of Home Builders' (NAHB) Model

Green Home Building Guidelines, the Sustainable Buildings Industry Council's (SBIC) *Green Building Guidelines*, and the "Green Points" program now being considered for adoption by Sonoma County and The Sea Ranch Association.

Furthermore, the home will be the subject of a case study analysis presentation before the Custom Residential Architects Network (CRAN), Full Spectrum Practice Convention of the American Institute of Architects (AIA) on October 20, 2007 in Chicago, Illinois.

The home is a case study of the California Energy Commission in terms of energy efficiency applications and a leading-edge water-saving plumbing plan.

Finally, the home is a national showcase for CEDIA (Custom Electronic Design and Installation Association), and is the subject of a series of articles on the design and installation of the electronic lifestyle components in the home.

Sustainable Lifestyle

As the American population becomes more diverse in household composition, baby-boomers, no matter what the makeup, will be the largest market for consumer goods and services, including new homes that will meet their needs for sustainability. In less than nine years, 70 to 80 million Americans will turn 65, while people age 65 and older already number 35 million. This means that within about nine years, over 100 million Americans will be senior citizens. But for those without the financial means, they will be relegated to conventional homes that do not meet their physical needs. According to a report issued by the Joint Center for Housing at Harvard University, 90 percent of all homeowners age 70 and older currently live in such homes. And the AARP, formerly the American Association of Retired Persons, reports that nearly

one-quarter of those 65 and older will have difficulty getting around within their homes in the next five years. The AARP Public Policy Institute also reports that as much as 80 percent of this group expects to work during what would normally be their retirement years.

The Optimum Performance Home at The Sea Ranch has been designed as a "forever home." The design fully supports "independent living" with a focus on a living and working environment that minimizes excessive tasks and stress. The essence of the home is to provide an environment to nurture its occupants, allowing them to be productive as long as possible. The home is designed to protect its occupants throughout their lives, especially during their golden years, thus minimizing the possibility of institutionalization.

The universal design elements, coupled with the biophilic design attributes of the home, respond to the deepest needs for physical and psychological

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health and well-being. The home will inspire and invigorate, reduce stress and mental fatigue, promote creativity and positive interactions, and even help heal. The "human-centered" design is intentionally "connected" to the natural environment surrounding The Sea Ranch, allowing its occupants to experience nature on a daily basis. Biophilic design attributes are elements and qualities of the physical environment that connect us to the physical, psychological, and cognitive benefits derived from direct experiences with nature. For an in-depth analysis of the biophilic attributes of the first Optimum Performance Home, please read "Biophilic Design" and "Biophilic Design Attributes," authored by Julie Stewart-Pollack in Issue 3 (May/June 2006) and Issue 4 (July/August 2006), respectively.

The home design not only provides for such lifestyle features to optimize independent living and physical and psychological health and well-being, but also incorporates healthier green building materials and energy-saving approaches to achieve "zero-energy cost" home operation, water conservation, and minimized environmental impact, as well as comprehensive electronic automated control features that enhance sustainable lifestyles. The home is designed to be accessible and usable by people of all ages and all abilities.

Universal Design Concept

The term "Universal Design," which is also referred to as "Accessible Design," "Inclusive Design," "Design For All," and "Age-

Friendly Design," was defined in 1993 by the late Ron Mace, an architect who spent most of his life in a wheelchair and who established what is now known as the Center for Universal Design at North Carolina State University. Mr. Mace explained universal design as: "An approach that incorporates products, as well as building features and elements, which, to the greatest extent possible, can be used by everyone." The idea behind universal design is to design and build homes that have no physical barriers, thus sustaining people of all ages and all capabilities in a functional, comfortable, and aesthetic lifestyle.

Universal design, however, is not yet the norm in residential architecture and interior design. Building codes are written and homes are built with the person of average capability in mind. Countertops, handrails, cabinets, appliances, and plumbing fixtures, and just about everything else, are installed according to specifications that meet an average person's physical stature and abilities. Thus, traditional homes are designed under the mistaken assumption that people never age or experience disabilities.

The Americans With Disabilities Act and the Fair Housing Act have subsequently raised public awareness of how not-so-average people have trouble living and functioning in average homes. While many people will first associate universal design with serving the needs of the disabled, think about the elderly and the day-to-day challenges they face living and functioning in the typical home. If you are one of our elderly readers, or a son or a daughter of elderly parents, you can relate to such challenges you or your parents face daily. Think about the so-called "baby-boomer" population who is now caring for their elderly parents, becoming well aware of the everyday problems encountered in the home. Anyone in that position can certainly relate to the sensible, practical, and functional approach to home design that can be achieved by incorporating universal design features.

The average household composition in the United States is becoming increasingly varied as our society becomes more diverse with households that include elderly relatives, caregivers, and unrelated adults. What also must be realized is that the American population is aging rapidly and people are living longer, with life expectancy now at 85 years for a majority of Americans. That means 20-plus healthy and productive years are awaiting a large segment of the population after they reach retirement age. Unfortunately, longer life expectancies also lead to a greater number of people with physical disabilities. Furthermore, increased longevity will touch every part of life, from work to career to health care and financial planning, changing family struc-

tures and transforming what it means to be both "old" and "young."

Universal design supports the desire to "age-in-place" by creating homes that facilitate independence/self-reliance, as well as allow the homeowners to recover from illness or injury in the comfort of their homes rather than in an impersonal institutional setting. And by designing flexibility into the home, it will be possible to prevent an elderly person's premature move to an institution simply due to their age or frailty.

The Optimum Performance Home is designed to incorporate functional live/work environments that nurture sustainable lifestyles and help people "age-in-place." With changing lifestyles in which more people work from home and increased home entertainment options, the EPA estimates that on average, Americans now spend 65 percent of their time at home. Applying a leading-edge universal design concept will ensure that the full range of human functional diversity is accommodated, as well as the future changes in how the household members perform their daily activities.

As noted, universal design is not simply for

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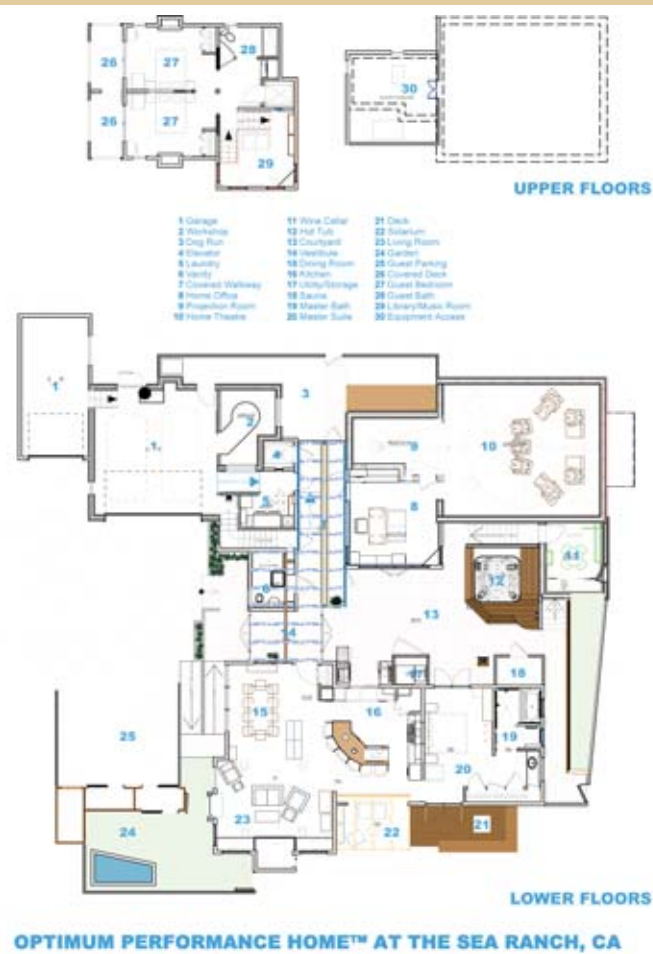


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size, strength, and mobility. The home is designed to eliminate unnecessary barriers in order to create a more inclusive design that values social inclusion by all.

The home is designed to support the homeowners' ability to perform better than would ordinarily be the case. Easy-to-reach storage and work-spaces designed to allow the occupants to work while seated is much more efficient and convenient than bending and stretching while standing.

Incorporating universal design features into homes increase their marketability and resale value since they can be sold to people of all ages and abilities. No one is excluded as a potential buyer because of unnecessary barriers and hazards.

While this home will be bigger and have more amenities than some of The Sea Ranch's existing homes, it is not among the largest homes nor will it be out of place on the site or within the immediate neighborhood. The design is site-specific and approved by The Sea Ranch Design Committee. The Design Committee worked with our team during the design stages to make refinements that are in accordance with The Sea Ranch design philosophy.

Universal Design Features

The Sea Ranch is a community not yet equipped with the range of amenities that provide services and opportunities for medical clinics, pharmacies, grocery stores, and public transportation. However, the nearby community of Gualala is located just across the Gualala River from the north end of The Sea Ranch, and does have such amenities and has become the service center for The Sea Ranch. Thus, Gualala is a source for services, such as home-delivered groceries, health clinics, house visits by health care workers, special transportation, house cleaning, and maintenance and repair—all services which are extremely helpful to elderly persons, people with disabilities, and people with busy careers. The Sea Ranch does offer the Lodge and its restaurant, with plans for the expansion of the Lodge, and the Two Fish Bakery. A proposed commercial district serving The Sea Ranch is in the planning stages. Abundant recreational opportunities are provided at The Sea Ranch, including swimming pools; saunas; walking, bicycling, and horse riding trails; picnic and common areas; the Gualala River; and Pacific Ocean tide pools and coves with beaches.

those who may use a wheelchair, have impaired vision, or have limited use of their arms or hands. Universal design homes are "barrier-free" and provide sustainable living for anyone—healthy or ill, short to tall, young to old, small to big—and everyone in between. Universal design optimizes independent living, thus minimizing the negative impact and emotional stress that often comes with non-universal design homes. People who are very different can enjoy universal design homes, and those homes will be there for all inhabitants, especially when their needs change. Universal design is really all about optimizing the supportive home environment.

The first Optimum Performance Home at The Sea Ranch is not only universally designed but it is also intended to be a smart home in meeting the personal requirements and needs of the author and his family. The home may not look much different from standard homes, but it is much easier to live in than the homes to which most of us are accustomed. The idea was to adopt design features that make the home environmentally optimized, safe, and comfortable for everyone, young or old, whether they have a disability or not. And, as well, to use innovative design techniques that offer visual appeal and increase the appreciation value and the "curb appeal" for the home.

Flexibility was the goal, accommodating people who differ in height,

Additionally there is an 18-hole Scottish-style golf course.

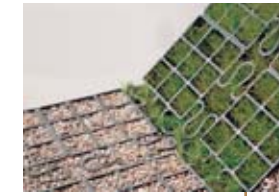
Within this incredibly beautiful and wonderful setting, the first Optimum Performance Home will incorporate the following universal design features:

- **Pavements:** The grounds surrounding the immediate building compound footprint will use pervious surfaces for the driveway, guest parking, and exterior walk-around pathway. Netpave 50, a Netlon Turf Systems product of Rehbein Environmental Solutions, Inc., will be used as the surface system to provide automobile and rolling access to the garages while allowing ground water to nourish the property's trees and plants. Netpave 50 is manufactured from 100 percent recycled polyethylene to provide an attractive, easy-to-use, durable solution for permeable parking and access routes. The resulting surfaces comply with the American With Disabilities Act guidelines, all while enhancing the environment.

Netpave 50 units are 2 inches thick and are connected by a rapid-fastening system (lugs and slots). These unique flexible elements can be easily installed on irregular surfaces and gradients. Netpave 50 in the permeable high load-bearing driveway and guest parking areas at the front of the home will be filled with gravel, and the cellular structure will retain the stone and prevent loss or displacement. The Netpave 50 system will also be used to reinforce the paths around the home and grounds to support wheelchairs, walkers, canes, and strollers, in keeping with the attention to accessibility that is a focus of the overall home design.

The home's front fenced-in garden and pond area will be fully assessable using Netpave 50 and feature raised planting beds.

- **Zero-Step Entries:** No one will need to use steps or stairs to enter the home, navigate around the home, or enjoy the courtyard, porch, decks, or a



Rehbein Environmental Solutions, Inc.

- Netpave 50 is manufactured from 100 percent recycled polyethylene to provide an attractive easy-to-use, durable solution for permeable parking and access routes.



Kingsley-Bate®

- Kingsley-Bate® solid teak two-person glider chair featured on front porch.

walk outside to the garden, ponds, and stream. Everyone will be able to get out of a car and into the home without running into any barriers or thresholds. The design supports full "visitability," with no restriction to social interaction due to physical barriers, thus allowing people of all abilities to freely interact and socialize in the home. Safety hazards are virtually eliminated, especially benefiting older people trying to negotiate level changes outside and within the home.

- **Entry Steps/Ramp:** At the front of the home there will be a wide three-step entrance with treads 11 inches deep and alternate wide ramp walkway entrance to the front porch and glass-enclosed vestibule. The ramp is hidden in the design. The ramp will have a gradual sloping 1:20 ratio. This feature will facilitate easy access from the driveway, garages, and guest parking. The ground from the drive-



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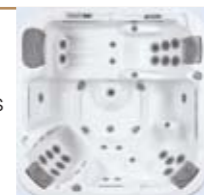
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• A Dimension One Spas® Chairman II spa will be featured in the courtyard area. The D1 Chairman II is an ultimate performance and comfort spa that is renowned for energy-efficiency and reliability.



AMX®

• The AMX® whole-home automation control system will manage and control all lighting and other electronic devices. Homeowners can access their residence remotely over the Internet to communicate directly with their AMX technology.



Leviton® Vizia-RF & Acenti™ Home Control System

• Leviton® designs their products to be universal design-friendly and to make a home safer, more accessible, and more enjoyable for all occupants. Among the architectural-grade products are scene-capable switches, dimmers, plug-in serial and appliance interface modules, scene-capable plug-in lamp-dimming modules, four scene controllers, four zone controllers, IR and RF handheld remote controllers, and plug-in RS-232 interface modules for use with automation systems, and instant on motion activated light control modules.



Monster® IlluminEssence™ Lighting System Products

• Also featured is Monster®'s IlluminEssence™ Lighting System Products. The partnership between Leviton and Monster ensures the ultimate reliability in whole-home lighting systems, and makes it possible to intricately control lighting throughout the entire home.



way will gradually slope up toward the front entrance. The slate surface in front of the vestibule entry doors gently slopes away from them, so that water will not enter the home. This is the design with respect to all surfaces in front of exterior doors. The entry porch will provide ample maneuvering space on which will sit a Kingsley-Bate solid teak two-person glider chair, which allows one to sit down or drop off items.

• **Entrance:** The sheltered vestibule entrance will provide

arriving/departing occupants and guests protection from environmental elements. A convenient fold-down shelf near the front entrance vestibule can be used to set packages and items. The shelf will be recessed into the wall when not in use. The French door entrance can provide a 5-foot opening for deliveries of furniture or for children in strollers when fully opened. There will be a receptacle for UPS and FedEx deliveries as well. The drain-lined threshold will be flush, eliminating a tripping step or edge bump.

• **Primary And Secondary Spaces:** The three-building compound is designed with core spaces that are separated from those that are not needed or used on an everyday basis. These secondary spaces are visually defined and differentiated from the primary homeowners' realm. The separation will be facilitated through the design of the vestibule walkway to create privacy between primary and secondary areas. The design of the guest bedrooms, their foyer and food preparation alcove, and associated library/home theatre/surround music room could provide living quarters for a live-in caregiver. The guest bedrooms will share a pocket door, which, when open, will join the two rooms to create a more grandeur space. The pocket door will have locks on both sides. This feature will also be applied to the divider separating the guest bedroom decks. Private entrance access to the home office and secondary guest areas is designed to provide access without entering the zone of the homeowners.

• **Private Outdoor Spaces:** The primary and secondary spaces will have their own private outdoor spaces, with the courtyard serving as the central outdoor entertainment area.

• **Courtyard:** The courtyard will feature universal design elements including a 36-inch-wide glass insert door to the non-threshold entrance of the Finnleo® sauna, a seating height Dimension One Spas® Chairman II spa for easier accessibility, and gradual and wide ramp access from the courtyard to the Netpave 50 exterior walkways and pond. The courtyard also will feature a raised planting bed area located on the earth roof over the underground wine cellar. The raised planting beds will allow seating alongside and allow care of plants without back strain or knee pain.

• **Equipment Room:** The equipment room that houses the WaterFurnace geothermal and TrendSetter solar hot water equipment and Uponor

radiant heating manifolds (see Issue 5, September/October 2006), is designed with a north-facing full-wall swing-out door for convenient access to the equipment for repairs or replacement.

• **Security/Safety:** Motion detectors on the exterior entry light fixtures add safety at night.

• **Lighting Design:** The universal lighting design was developed by graduate students at the Lighting Research Center (LRC) at the Rensselaer Polytechnic Institute (RPI) in Troy, New York (see Issue 8, March/April 2007). The whole-home design provides focused light where it is needed to help people see better as well as help people with poor vision. Under-cabinet lighting in selected task areas will light up the area and provide a warm atmosphere. Floor lamps and night-lights will be positioned to direct light where needed. A set of amber LED pathway lights leading people from the bed to the restroom will activate upon getting out of bed at night. As well, the Kohler® bidet toilet seats (K-4709 C3™-200) feature a soft blue glow in the dark to help people find the toilet at night. Occupancy sensors, which combine hands-free switching with energy savings, will be installed in areas such as bathrooms, closets, and garages. Occupancy sensors turn lights on when a person enters the room and off when they leave. They do it automatically and even when people forget to turn off the light.

The stairway to the second floor will function as a lighted art gallery. All outdoor walkways and outdoor areas will have modest light levels using down-facing lights to adhere to the zero-light pollution policy of The Sea Ranch—no light directed upward. There will be an AMX® whole-home electronic automation management and control system. With the AMX technology, all lighting can be electronically programmed to turn on automatically and according to a particular ambiance. Leviton® and Monster® IlluminEssence™ light switches will feature large rocker controls, which are easier to turn on and off. There will even be applications in the home that use photo luminescent materials, thus providing a low-level glow that can be used to mark paths.

• **Lighting Controls:** All lighting controls, mounted 40 inches from the floor, will be free of in-built structure blocks.

• **Electrical:** All electrical outlets and computer terminals will be positioned on walls and on the front of cabinets for better access and to make it

easier for people with limited reach capability. They will be positioned between 15 and 27 inches off the floor, with some 30 to 44 inches from the floor.

• **Electronic Controls:** The home will be electronically smart to conserve energy. One of the safety features will be that of smoke detectors, whether battery or electrically powered, when triggered, selectively turn on lights to show escape routes. Likewise the Uponor fire sprinkler system will be wired to provide this feature. Remote control operation of lighting and all electronics will be facilitated throughout the home via Z-Wave® and AMX electronic automation. Motion sensors will activate the system to automatically heat the water at the master bathroom suite faucet and faucets in the two guest bathrooms. The Carriage House garage doors will be remotely operated by Z-Wave-facilitated Wayne-Dalton HomeSettings prodrives™ (see Issue 9, May/June 2007) And the VELUX skylights throughout the home also will be remotely operated (see Issue 8, March/April 2007).

• **Emergency Monitoring:** Monitoring cameras will be placed strategically and inconspicuously throughout the home to look in on any person in distress. Remote monitoring of the home's interior and exterior spaces will be facilitated via the Internet.

• **Open Plan:** The open-plan layout of the main residence is designed to enhance maneuverability and communication.

• **Ambience:** With floor space being quite efficient, it will also be very functional and, combined with the cathedral ceilings, it will create a comfortable feeling of space.

• **Barrier-Free:** The three-building compound is designed to be barrier-free with one-story living for the homeowners; the guest bedrooms are on a second floor, and this upper section provides for universal design features with both a wide stairway and elevator access. If needed, this second floor could provide flexible living space for an elderly parent or a live-in caregiver (now covered by several long-term care insurance plans). The latter can result in significant savings from deferred institutional living.

• **Flush Thresholds:** All thresholds throughout the home will be flush with the floor to make it easy for people to get through a doorway or passageway. They will also keep people from tripping and facilitate easy wheelchair maneuvering.

• **Contrast Color:** Good contrast will be provided between transition areas, such as around doorways. Contrasting paint colors between walls and doorjamb will be applied with horizontal and vertical illuminated delineation at night to provide a helpful cue for anyone who has a hard time focusing clearly. Amber LEDs that are photosensor and motion controlled will be used. Transition points throughout the home will be delineated to aid in orientation and help prevent trips and falls.

• **Glazing:** Insulated, solar-gain-reducing glass-enclosed hallways will be 8 feet wide in the vestibule walkway connector, and the main walkways will be 5 feet wide throughout the home, allowing easy movement from room to room.

• **Floor Materials:** All floorings will be non-slip surfaces to help people stay on their feet. Flooring will consist of Evergreen Slate and Bedrosians® slate, Kährs® Oak hardwood, Natural Cork®, Earth Weave

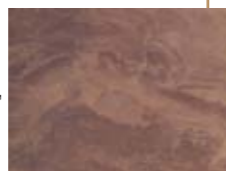
Wayne-Dalton® prodrive™ Garage Door Opener

- A Wayne-Dalton® HomeSettings prodrive™ garage door opener is specified for the two-car and single-boat garage doors by Carriage House Doors. This ceiling-mounted drive is quiet and reliable. It features Z-Wave™ operability that is integrated into the whole-house wireless automation network.



Bedrosians® Natural Stone Slate Flooring

- Bedrosians® natural slab Autumn Gold slate flooring will be the selected flooring for the entrance, vestibule and walkway connector, interior walkway, solarium, kitchen, and courtyard.



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- Kährs® is one of the oldest manufacturers of hardwood flooring with a 150-year history. In addition to the Kährs flooring Woodloc® system used in selected rooms of the home, the stairs will be Kährs Oak constructed and meet all world formaldehyde emissions regulations.



Natural Cork®

- A Natural Cork® 100 percent high-density floating cork floor will enhance the ambiance of the wine cellar. The Santiago style is treated with five coats of UV-cured acrylic finish, which contains no volatile organic compounds (VOC).



Carpet Mills Broadloom Bio-Floor wool carpeting, and EarthSource Forest Products FSC (Forest Stewardship Council)-certified Ipé decking. The Earth Weave Carpet is a flat Berber weave that allows level transition where it meets the wood and slate flooring. This feature also is designed to reduce tripping hazards.

- **Windows:** Pella® windows throughout the home's living spaces will be low to the floor to allow viewing of the outside by children, pets, and seated adults. Lower windowsills also will expedite emergency egress.

- **Fireplace:** There will be pass-through access for firewood into the hearth area of the Delta fireplace by RSF Wood-Burning Fireplaces (see Issue 9, May/June 2007). This will allow easy handling of firewood

from the front fenced-in garden firewood storage area for burning in the Delta fireplace. The hearth will be positioned at an accessible height.

- **Garage Ramp:** A 36-inch-wide gradual sloping ramp will be provided from the interior of the garage to the glass-enclosed walkway with Luxrail™ underlit handrails on both sides of the ramp. This garage ramp will facilitate grocery unloading, especially with use of a grocery handcart, while a hand truck can be used for large items. The ramp also will aid wheelchair or stroller/baby carriage use. While wheelchair users need ramps to get in and out of buildings, ramps can also assist other people regardless of age or strength. The half-height wall with window into the workshop is designed for use as a temporary standing-height shelf for packages in addition to providing safety. The top of the ramp levels off to provide a wide entrance space to the laundry room. A bench seat will be provided, which allows one to drop off groceries and other items, or to sit down.

- **Stairs:** The set of stairs leading to the guest bedrooms, bathroom, and library/home theatre/surround music room will feature treads 11 inches deep so that one's entire foot can rest on the stair. The treads will be 36 inches wide. Stair risers will have a height of 7 inches. The Kährs Oak hardwood stairs will have a visual differentiation at the nose of each stair to help visually guide climbing or descending the stairs more safely. The interior staircase will be well lit on both walls and above the floor at each landing, and have two short runs to reduce injuries from falls. The staircase is in close proximity to the Otis® Gen2 elevator off the vestibule walkway, and is centrally located within the home and near the entrance.

- **Handrails:** io Lighting's Luxrail underlit handrails will be provided on both sides of the interior staircase and to the wide sloped walkway ramp to the garage—and exterior staircases down to the below-ground wine cellar. The handrails will extend beyond the bottom step for stability.

- **Elevator:** An energy-efficient and stylish Otis Gen2 residential elevator will provide lift service to the second-floor. The elevator will provide access to the guest bedrooms and library/home theatre/surround music room for people who cannot, or don't want to, use the stairs. The new forward technology, developed by the Otis Elevator Company, is environmentally-friendly and has Otis' unsurpassed reliability and a smooth quiet ride. This

new state-of-the-art "green" model reduces energy usage, creating a savings for homeowners. This new Otis model will be released to market in 2008.

- **Clearance:** All interior doorways will be at least 36 inches wide for easier access and a more spacious feel. Accessible routes will be provided throughout the home, including around three sides of the beds in the bedrooms. The hallways will be able to accommodate a range of ambulatory devices to make it easier to move big items in and out of the home and to let wheelchairs or walkers pass through.

- **Pocket Doors:** The home is designed with extensive use of Holzkraft® Custom Wood sliding pocket doors, which disappear inside the walls. Johnson Hardware®'s Model 2000 superior-quality, structurally strong pocket door hardware and frames will be used to assure long-term durability. The Model 2000 Pocket Door Frame can hold an impressive 300 pounds of door weight and can accommodate a door panel depth of 1-3/4 or 1-3/8 inches, with sizes for doors up to 5 feet wide by 9 feet high. Pocket doors provide more space, especially in small rooms. The door openings will be 42 inches wide to allow for a 6-inch-wide portion of the door to be always exposed, resulting in a clear 36-inch-wide fully open pathway in and out of rooms. On each side of the 6-inch-wide portion a solid bronze cast handcrafted large "D" handle by Rocky Mountain Hardware will be mounted. The entry pocket doors to the two guest bathrooms will feature full-height mirrors.

- **Hardware:** All door handles by Rocky Mountain Hardware will be levers, or "D" designs, to provide easy door opening while holding keys, bags, or children. Lever door handles make opening doors easier when you are carrying groceries or children, and reduce the stress on joints in the fingers and wrists. The Leviton and Monster IlluminEssence light switches and AMX whole-home controls are designed for people with poor hand strength and poor vision. In fact, the handle and control designs are better designed than knobs or standard switches, and they make it easier for everyone to operate.

- **Laundry Room:** The ENERGY STAR®-qualified Whirlpool® Duet® HT® (High-Temperature) Fabric Care Family front-loader washer and dryer feature large waterdrop-shaped doors for easier loading of bulky items. Both the washer and dryer sit atop 15.5-inch drawer pedestals, an ergonomic

Earth Weave Carpet Mills, Inc.



- Broadloom Bio-Floor sustainable carpet is made with 100 percent undyed naturally pigmented wool fibers and yarn with no synthetic glues, no moth proofing, and no stain protections or chemicals of any type, which assures that the carpet will not affect indoor air quality through off-gassing of volatile organic compounds (VOC).

EarthSource Forest Products Ipé Decking



- EarthSource Forest Products FSC (Forest Stewardship Council)-certified Ipé decking will be used for the master bedroom suite deck and the guest bedroom decks. Ipé is perhaps the hardest wood available and is extremely durable and ideal for outdoor decking applications.

Pella® Windows And Doors



- Pella Windows and Doors have been known for quality craftsmanship and innovation. Their EnduraClad® Plus and Seacoast Exterior Paint finishes ensure superior weatherability and longer lasting protection against chalking, fading, corroding, and exposure to the sun's UV rays. Pella quality extends to natural wood-framed interiors, which can be painted or stained to match a home's interior décor.

Luxrail™ Underlit Handrails



- io Lighting' Luxrail™ underlit handrails facilitate added safety while maneuvering stairs.

Otis® Gen2 Residential Elevator



- Gen2's new forward technology, developed by the Otis® Elevator Company, is environmentally friendly and has Otis' unsurpassed reliability and a smooth quiet ride. This new state-of-the-art "green" model reduces energy usage.

Holzkraft® Custom Wood Doors



- Holzkraft® custom stain-grade wood doors will be used throughout the interior of the Optimum Performance Home and as the entry door to the wine cellar. Stile and rail construction methods produce crisp, clean lines that are architecturally correct.

Johnson Hardware®

- Johnson Hardware®'s Model 2000 superior-quality, structurally strong pocket door hardware and frames will be used with Holzkraft Custom Wood doors to assure long-term durability.



Rocky Mountain Hardware

- Rocky Mountain Hardware is specified for all of the exterior Pella® Designer Series® doors, and specified for all interior Holzkraft® wood doors and the wine cellar door. Handcrafted for exceptional beauty and durability, each Rocky Mountain piece is cast in solid bronze and is available in a diverse palette of rich patina finishes.



Whirlpool® Duet® HT® Washer And Dryer And Fabric Freshener

- The Whirlpool® Duet® HT® (High Temperature) Fabric Care Family front-loader washer and dryer will handle the heavy-duty laundry chores. A Fabric Freshener will remove odors and relax wrinkles without chemicals or detergents.



Iron-A-Way® Universal Design Ironing Station

- The laundry will be equipped with an Iron-A-Way® Universal Design hideaway ironing station (Model AL-42). This professionally designed center will adapt to everyone in the household and exemplifies the possible changing needs of the homeowner over the course of a lifetime.



solution to help reduce bending, stooping, and arching. Both the washer and dryer will be topped with an uninterrupted 5-foot-wide scratch- and chemical-resistant matted work surface to provide convenient counter space for sorting and folding up to four loads at once. A Whirlpool laundry tower features a convenient retractable hanging rod for an at-hand drying solution for freshly washed items or clothes right out of the dryer. Two drawers accommodate wholesale-size detergent bottles and boxes, along with other small items such as stain sticks, dryer sheets, and cleaning supplies. Also provided is a pullout supply tray to store everything from bleach pens to pocket change.

Also featured is an Iron-A-Way® Universal Design hideaway ironing station (AL-42). This professionally designed center will adapt to everyone in the household—comfortably meeting the needs of the person

who prefers to stand while ironing or one who will be seated.

There will be a bench in the laundry room, which will allow a person, even one using a wheelchair, to easily put laundry into the front-loading washer, and take it out and put it into the dryer.

In order to prevent flooding of the laundry floor in case washer hoses break, there will be a drain.

- **Bathrooms:** All bathroom and shower spaces will be constructed with non-slip tile surfaces and equipped with floor drains.

- **Showers:** All showers will have hand-held shower fixtures with flexible extensions and adjustable rods, and overhead lighting.

- **Grab Bars:** Special blocking in all the bathrooms provide for flexible grab bar installation in the final phase of construction. Architecturally and aesthetically designed 500-pound support textured grab bars will be positioned around toilets, tubs, and showers. Amber LEDs will light below selected grab bars to provide sufficient light for navigating at night, but not too much to startle a person from sleep. Custom fitted grab bars will be positioned along selected kitchen countertop areas.

- **Bathroom Telephones:** Telephones will be placed within reach of the toilets, tubs, and showers.

- **Toilets:** All Kohler® toilets throughout the home will be the Comfort Height™ style with Kohler bidet elongated toilet seats elevated 17 to 18 inches off the floor for easier seat entry/exit. Thus, seats will be about 2 inches higher than the standard toilet fixture.

- **Wheelchair Bathroom Access:** All bathroom spaces are designed for use by a disabled person or a person uneasy on their feet. Additional floor space with a 5-foot turning space allows maneuverability. Anti-scald Kohler single-lever faucets can be operated with a single hand or elbow.

- **Linen Storage:** Large linen Cope Closet Concepts ventilated hardwood shelves of various heights will provide convenient storage space.

- **Bathroom Mirrors:** Mirrors will be set on the backsplash of each vanity and pedestal lavatory to provide perfect reflection when sitting or standing.

- **Master Bedroom Bath:** The master bedroom suite's bathroom will feature a roomy walk-in/roll-in/curbless shower and Kohler Escale® BubbleMessage™ bath (K-11343-GCR) with a flat ledge bench where one can sit and easily slide over into the tub. A Kohler Symbol™ Roman bath filler and full-spray hand-held showering units (K-

18486-4 CP/K-18492-CP) will provide optimum flexibility and accessibility while showering or bathing.

The Master Bedroom Kohler Escale Bathroom Suite vanity (K-18598-F29) and makeup vanity (K-18597-F29) will be 32 inches off the floor with knee space beneath, should one want to sit up against the basin or makeup vanity while performing beauty and cleaning routines, or reverse seating for washing one's hair. A Kohler Symbol (K-19480-4-CP) single-lever handle will control hot and cold water.

- **Guest Vanity:** The main floor guest vestibule vanity bathroom will feature Kohler's Wellworth® pedestal lavatory (K-2293) for universal access. A Kohler Fairfax® single-control lavatory faucet (K-12183-CP) will complement the Wellworth lavatory. An ADA-compliant one-piece Sterling®/Kohler OC-S-63 Series 6206 (62060103) roll-in shower module will also be featured with integrated L-shaped designer grab bars and fold-up seat to accommodate family members or guests with special needs, or just for convenience. The low-profile threshold provides for easy wheelchair access.

- **Second-Floor Guest Bath:** The second-floor guest bathroom will feature a universal design Sterling Accord™ barrier-free whirlpool and bath module with integral Kohler showerhead (76141110-LH) and L-shaped designer grab bars. A Kohler Devonshire® pedestal lavatory (K02288/K-2294-4) and Devonshire wide-spread lavatory faucet with lever handles (K-393-4) will accommodate the universal basin needs of guests, including those in a wheelchair.

- **Mobile Bath Cabinets:** Base cabinets in the bathrooms will be on locking casters so that they can be rolled away if needed.

- **Closets:** Closets will feature future-proof adjustable shelves to accommodate the reach capabilities of different occupants and thus, are adaptable to changing needs. Fine, handcrafted ventilated hardwood shelving by Cope Closet Concepts will be used in the bedrooms and the kitchen pantry. Häfele® pull-down wardrobe lifts will be featured in the bedroom closets. Automatic closet and pantry lighting will be featured throughout.

- **Closet Shelving:** Multiple height closet shelves and rods will be positioned to increase usable storage space. Holzkraft closet doors will be mirrored on both sides to enhance spaciousness and provide enhanced dressing.

- **Kitchen Cabinets:** The bottom shelves of wall-



Kohler® Highline™ Pressure Lite™ Toilet

- The Kohler® Highline™ Pressure Lite™ (K-3519-T) 1.1 gpf two-piece toilet features an elongated bowl with a generous water surface and a Comfort Height™ design providing standard, chair-height seating, which complies with ADA height requirements.



Kohler® C3™-200 Bidet Toilet Seat

- A Kohler® elongated toilet seat with bidet functionality and in-line heater (K-4709 C3™-200) will be fitted to the Highline™ Pressure Lite™ toilet (K-3519-T). C3 toilet seats use the naturally soothing quality of water as a refreshing, hygienic alternative to toilet tissue, and offer cleanliness, comfort, and convenience for all users.



Kohler® Escale® BubbleMassage™ Bath

- The bath featured in the master bedroom suite will be a Kohler® Escale® BubbleMassage™ bath with chromatherapy (K-11343-GCR).

Kohler® Symbol® Bath Filler & Shower Assemblies



- A Kohler® Symbol® Roman bath filler, hand-shower, and rise tubes in polished chrome (K-18486-4 CP/K-18492-CP) will complement the Escala® BubbleMassage™ Bath.
- The shower installation will feature two Kohler® Symbol® Rite-Temp™ valve trims (K-T18489-4 CP/K-306-KS-NA) and two

Symbol 5-1/2-inch diameter single-function showerheads (K-18493-CP), plus an overhead, oversized Vivacia Rain showerhead (K-10121-CP/K-7396-CP) will be fitted to the shower ceiling.



Kohler® Escale™ Bathroom Suite

- The Kohler® Escale™ Suite 48-inch vanity with cutout in Engineered Wenge (K-18598-F29) and Escale vanity top/basin in white (K-19034-1-0) with Escale mirrors in Engineered Wenge (K-18595-F29) will be the centerpiece of this bathroom. A Kohler Symbol™ single-control faucet in polished chrome (K-19480-4-CP) will complement the organic design elements of this beautiful and aesthetic suite of bathroom fixtures. Also featured is an Escale makeup vanity (K-18597-F29) and a bench in Engineered Wenge (K-18596-F29).

mounted kitchen cabinets will be 48 inches from the floor to allow better reach access. That amounts to 15 inches above the rounded corner Silestone® countertops and 14 inches between countertop and bottom of kitchen cabinets. Cabinets and cupboards will be equipped with Rev-A-Shelf® sliding drawers to reduce the amount of or need for

Kohler® Wellworth® Pedestal Lavatory & Fairfax® Faucet

- A coordinated white Kohler® Wellworth® Pedestal Lavatory (K-2293) and Fairfax® single-control lavatory faucet (K-12183-CP) will complement the Wellworth toilet.



Sterling®/Kohler® OC-S-63 Series Roll-In Shower Module

- Made from solid Vikrell material for strength, durability, and lasting beauty, the Sterling® module is designed with a low-profile threshold for easy wheelchair access. The ADA-compliant roll-in shower meets the home's universal design and adaptability design requirements.



Sterling® Accord™ Barrier-Free Bathing Module

- A universal design Sterling® Accord™ barrier-free whirlpool and bath module in white with integral Kohler showerhead (76141110-LH) and diverter bath spout (K-389-CP) will be featured in the guest bathroom.



Kohler® Devonshire® Pedestal & Centerset Faucet

- A Devonshire® pedestal (K-2288) and 27-inch pedestal lavatory in white (K-2294-4) also will be featured. The lavatory will be fitted with a Devonshire wide-spread lavatory faucet with lever handles (K-393-4).



Cope Closet Concepts

- Closets will feature fine, handcrafted, ventilated hardwood shelving and cabinetry by Cope Closet Concepts. The company crafts closet systems that have the warm richness and luxurious grain of 100 percent hardwood shelving, while providing efficient space organization.



Häfele®

- Häfele® pull-down wardrobe lifts will be featured in the bedroom closets. Häfele Bio-Fix™ pull-down shelf mechanisms will be installed in selected upper kitchen cabinets to allow easy pull-down access to items stored on top shelves.



reaching and bending. Häfele Bio-Fix™ pull-down shelf mechanisms will be installed in selected upper kitchen cabinets to allow easy pull-down access to items stored on top shelves. A spacious floor-to-ceiling accessible pantry will provide easy access to pantry-stored food and portable kitchen appliances. The Cope Closet Concepts ventilated hardwood shelves will be deep and adjustable.

- **Kitchen Appliances:** Kitchen appliances will be installed to optimize reach and function capability in the kitchen, alcove nooks, and outdoor courtyard. KitchenAid Architect Series II appliances all feature ergonomically designed front-mounted knobs and push-button electronic controls, plus extra deep handles for easy gripping, even while wearing an oven mitt. Appliance edges are beveled and seamless for safety and ease of cleaning. The Wolf Range Company low-profile Japanese Teppan-Yaki-style 36-inch-wide stainless steel griddle also features large ergonomically designed front-mounted knobs.

A natural gas/propane cooktop is preferable because one can easily see what burners are on and their intensity, thus minimizing the potential for hand burns. Electric cooktops have the disadvantage of having to read electronic control settings to determine heat levels, especially on induction cooktops. Furthermore, electric cooktops have their controls on top instead of on the front, which provides easier control, especially for someone seated.

- **Ovens:** Cooktops and ovens will be positioned for functionality and easy accessibility. The controls will sit at the front of the two cooktops, one a KitchenAid® professional style Architect Series® freestanding 36-inch-wide stainless steel Dual Fuel convection range with Steam Assist (KDRP767RSS) oven and the other a Wolf Range Company professional 36-inch-wide stainless steel griddle (AGM36).

- **Microwave Oven:** The KitchenAid Architect Series II 30-inch-wide built-in microwave combination oven will be mounted with visually large front push-button controls at no higher than 48 inches above the floor. A KitchenAid Architect Series II 30-inch-wide warming drawer (KEWS105S) will be built-in just below the microwave combination oven.

- **Dishwasher:** The front button-controlled KitchenAid Architect Series II ENERGY STAR-qualified 24-inch-wide dishwasher (KUDU03ST) will be raised 9 inches off the floor to make loading and

unloading the dishwasher easier.

- **Refrigerator:** The shelves of the large 48-inch-wide built-in side-by-side KitchenAid Architect Series II refrigerator (KSSC48QT) will slide in and out, and the refrigerator will feature door-accessible Sylvan Source (M-600) ultra-pure drinking water and ice dispenser (see Issue 9, May/June 2007).

- **Kitchen Sink:** The Kohler Verity® (K-3086) 33-inch-wide stainless steel under-counter apron-front farmhouse kitchen sink has a compartment depth of 8 inches. A removable under-sink storage cabinet, with locking casters, will provide knee space under the sink if needed. This movable cabinet will feature a cutting board top, which can facilitate a number of food preparation functions. A Kohler Avatar (K-6350-VS) kitchen faucet, featuring an ergonomically designed protruding single-control front lever handle and pullout sprayhead will be mounted 17 inches back from the front of the sink apron for easy access reach. Even the plumbing for the kitchen sink is off-set to accommodate ease of accessibility for people in a seated position (see Issue 9, May/June 2007).

- **Countertops:** Kitchen countertops fabricated with Silestone Quartz Gemstone will feature pullout cutting boards and will be designed so that everyone in the family, no matter what limitations they may have, has a workspace that optimally fits them. The multi-height kitchen counter system will provide a variety of countertop heights to match different people's preferences as well as different types of kitchen tasks. Thus, when everyone wants to help with dinner, grandchildren, children, and guests feel comfortable assisting. Most countertops will be 35 inches from the floor with one at 30 inches from the floor, and will be fitted with grab bars. The lower countertop will have a rollout cabinet and cart and when removed will provide enough knee space under the counter to pull up a chair or wheelchair. At the bottom of the counter cabinets will be 9-inch-high indented toe-kick areas. The wall-mounted oven will be positioned at a height so that when the oven door is open, it will line up with the countertop for ease of taking baked items out of the oven and then putting them on the counter.

- **Kitchen Island:** The kitchen island countertop will also be 35 inches high. A KitchenAid Architect Series II 27-inch-wide built-in double-drawer refrigerator (KDDC27TTS) and a Series II 24-inch-wide



Rev-A-Shelf®

- Rev-A-Shelf® sliding pull-out drawers and shelves will be fitted to cabinets and cupboards to reduce the amount of or need for reaching and bending.

KitchenAid® Architect® Series II Kitchen Appliances

- KitchenAid® Architect® Series II ovens, microwave ovens, warming drawer, refrigeration, dishwasher, and kitchen hoods will be featured in the main residence kitchen, guest bedroom nook, home office nook, and outdoor courtyard kitchen. These appliances are designed for universal ease of operation.



Silestone® Leather™ Countertops

- The food preparation countertops throughout the Optimum Performance Home in the kitchen, guest bedroom alcove, home office, wine cellar, and outdoor courtyard will be Silestone® Tigris Sand Leather™ Quartz by Cosentino.



built-in wine cellar (KUWS24RS) with 46-bottle capacity and dual-temperature zones will be featured. Next to the Wolf Range Company griddle will be a Kohler Undertone™ small rounded under-counter 5-1/2-inch-deep kitchen sink (K-3338) equipped with a Kohler Avatar® single-control kitchen faucet with pullout sprayhead (K-6350-VS). The sink and faucet will be positioned for easy reach (see Issue 9, May/June 2007).

The non-glossy Silestone Tigris Sand Leather™ countertop finish is non-reflective to prevent glare created by light sources.

A minimum of 5 feet of clear space between built-in kitchen appliances and the island countertop edges will allow maximum maneuverability access to the spacious kitchen interior, as well as adequate circulation for party socializing.

Wolf Range Company Griddle

- A low-profile Japanese Teppan-Yaki-style 36-inch-wide stainless steel griddle (AGM36) made by the Wolf Range Company will be a feature of the kitchen. The 1-inch-thick polished steel griddle plate provides infinite heat control per 12 inches of width. The griddle will be used for exhibition cooking when entertaining guests.



UltraGlas®

- A custom-designed UltraGlas® architectural counter will be integrated into the kitchen island and serve as the eating surface for the counter space below the Wolf Range Company Japanese Teppan-Yaki-style griddle.



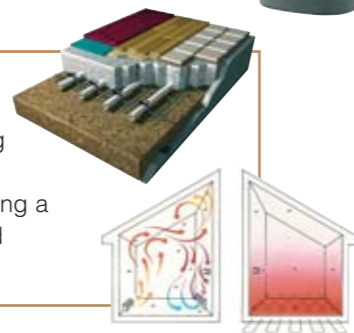
NuTone® Central Vacuum System

- A NuTone® Central Vacuum System will be featured in the home to help maintain healthy interior air quality. NuTone's central vacuum power units feature a space-saving sleek oval-shape design, internal sound suppression system, and a status light on the hose handle and power unit, which indicates when the VX™ unit's bag or canister is full and needs emptying.



Uponor® Radiant Floors

- Warm water circulates under the floors throughout the Optimum Performance Home using Uponor's durable, flexible, and resilient crosslinked polyethylene AQUAPEX tubing, providing a comfortable, even heat without stirring up dust and pollutants.



Opposite the kitchen along the island countertop will be a counter to accommodate up to six seated guests for casual dining and viewing of the exhibition cooking performed on the Wolf Range Company professional low-profile Japanese Teppan-Yaki-style griddle. The eating surface will be fabricated by UltraGlas® and located 29 inches off the Bedrosians slate floor. The decorative and functional thick kiln-formed embossed glass counter and backslash will follow the contour of the island from end to end. This seating arrangement is fully universal design compliant.

Underneath the island countertop facing the counter seating area will be cabinets with Rev-A-Shelf rollout shelving to make it easier to maneuver large and infrequently used items in and out as well as stored dishes.

• Guest Bath And Home Office Alcoves:

The compact kitchen/refreshment nooks in the guest bedroom and home office alcoves are designed with the same attention to ideal countertop height with optimized faucet sink and microwave reachability.

• Healthier Living:

The home's exterior will be tightly constructed to optimize the quality of the interior environment and protect infants, asthmatics, seniors, and other at-risk segments from common airborne pollutants, such as dust, pollen, and pet dander, and toxic, allergenic, and hazardous contaminants. Natural air changes, supplemented by mechanical means, will be facilitated with the location of the Pella windows and doors to allow cross-ventilation. The design provides proper ventilation, air mixing, and pollutant dilution throughout the home without compromising heating, cooling, or energy-efficiency solutions in the home, or the phenomenal quietness of the home. The all-green-built home will emphasize the use of natural materials and non-toxic finishes in its interior construction and will be less likely to

become contaminated by Volatile Organic Compounds (VOCs).

A NuTone central vacuum system will remove 100 percent of the contacted dirt and allergens from the living areas to a collection receptacle at the base of the motor located in the garage. No air will be blown into the rooms to stir up dust because the system's motor is outside the living areas (see Issue 9, May/June 2007).

The home will also be mold, insect, and fire resistant throughout. According to the U.S. Environmental Protection Agency, molds produce allergens, (substances that can cause allergic reactions), irritants, and, in some cases, potentially toxic substances (mycotoxins). The smoke alarms and Uponor fire sprinkler system will be integrated into the home's electronic control of lighting and sound to optimize inhabitant safety.

An Uponor zoned radiant floor-heating system will turn the entire first and second floors into primary, low-temperature heat sources that deliver radiant energy evenly across each room to its occupants and surrounding objects, but not the ambient air, resulting in a significantly healthier interior environment.

The design approach described in this article can make any home future-proof and adaptable to a family's changing needs while providing added value. It epitomizes the idea of building a home for life.

For more information on universal design, please visit the Center for Universal Design's Web site at www.design.ncsu.edu/cud and read back and future issues of *Ultimate Home Design*.

Next

This continuing series of articles will focus on particular design elements, as well as each stage of construction, the design approach taken, the technologies and building systems, and further, the materials used to create the first Optimum Performance Home. **UHD**

The Author

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several fields includes an undergraduate, graduate, and postgraduate university education in architecture, community planning, and economic development planning. For years he was a consultant on community and economic development planning. For the past 15 years he has been an editor and publisher of magazines in the consumer electronics and architectural fields. Gary can be reached at 951 676 4914 or gary@ultimatehomedesign.com.

Product Information

- AMX Corporation, 3000 Research Drive, Richardson, Texas 75082, 800 222 0193, www.amx.com
- Bedrosians, 4285 North Golden State Boulevard, Fresno, California 93722, 559 275 5000, www.bedrosians.com
- Broan-NuTone, 926 West State Street, Hartford, Wisconsin 53027, 800 548 0790, www.nutone.com
- Carriage House Door, 1421 Richards Boulevard, Sacramento, California 95814, 916 375 0575, www.carriagedoor.com
- Cope Closet Concepts, 1117 South Big A Road, Toccoa, Georgia 30577, 800 809 2423, www.copeclosetconcepts.com
- Cosella-Dörken Products, Inc., 4655 Delta Way, Ontario, Canada L0R 1B4, 905 563 3255, www.cosella-dorken.com
- Cosentino North America/Silestone, 13124 Trinity Drive, Stafford, Texas 77477, 281 494 7277, www.cosentinousa.com
- Dimension One Spas, 2611 Business Park Drive, Vista, California 92081, 800 345 7727, www.d1spas.com
- EarthSource Forestry Products, 1618 28th Street, Oakland, California 9460, 510 208 7257, www.earathsourcewood.com
- EverGreen Slate Company, Inc., 68 East Potter Avenue, Granville, New York 12832, 518 642 2530, www.evergreenslate.com
- Finnleo Sauna & Steam, 575 East Cokato Street, Cokato, Minnesota 55321, 800 346 6536, www.finnleo.com
- Häfele America Company, 3901 Cheyenne Drive, Archdale, North Carolina 27263, 336 434 2322, www.hafele.com/us
- Holzkraft Industries, LLC, 28206 Commercial Avenue, Barinton, Illinois 60010, 847 381 7670, www.holzkraft.com
- io Lighting, 370 Corporate Woods Parkway, Vernon Hills, Illinois 60061-3107, 847 735 7000, www.ioighting.com
- Iron-A-Way, 220 West Jackson, Morton, Illinois 61550-1588, 309 266 7232, www.ironaway.com
- Kähns, 940 Centre Circle, Suite 1000, Altamonte Springs, Florida 32714, 407 260 9910, www.kahrs.com
- Kingsley-Bate, Ltd., 7200 Gateway Court, Manassas, Virginia 20109, 703 361 7000, www.kingsleybate.com
- Kohler Company, 444 Highland Drive, Kohler, Wisconsin 53044, 920 457 4441, www.kohler.com
- LE Johnson Products, Inc./Johnson Hardware, 2100 Sterling Avenue, Elkhart, Indiana 46516, 800 837 5664, www.johnsonhardware.com
- Leviton, 2222-222nd Street SE, Bothell, Washington 98021, 800 877 0190, www.levit.com
- Monster Cable, 455 Valley Drive, Brisbane, California 94005, 415 840 2000, www.monstercable.com
- Natural Cork, 150 Connector 3, Dalton, Georgia 30720, 800 250 6690, www.naturalcork.com
- Otis Elevator Company, 10 Farm Springs Road, Farmington Connecticut 06032, 860 676.6000, www.otiselevator.com
- Pella Corporation, 102 Main Street, Pella, Iowa 50219, 641 621 1000, www.pella.com
- Rev-A-Shelf (RAS), 2409 Plantside Drive, Jeffersonton, Kentucky 40299, 800 626 1126, www.rev-a-shelf.com
- Rocky Mountain Hardware, 1030 Airport Way, P.O. Box 4108, Hailey, Idaho 83333, 888 788 2013, www.rockymountainhardware.com
- RSF Fireplaces/Industrial Chimney Company, 400 J-F Kennedy, St. Jerome, Quebec J7Y 4B7 Canada, 450 565 6336, www.icc-rsf.com
- TrendSetter Industries, Inc., 818 Broadway, Eureka, California 95501, 800 492 9276, www.trendsetterindustries.com
- UltraGlas, Inc., 9200 Gazette Avenue, Chatsworth, California 91311, 800 777 2332, www.ultraglass.com
- Uponor North America, 5925 148th Street West, Apple Valley, Minnesota 55124, 800 321 4739, www.uponor-usa.com
- VELUX America, Inc., 104 Ben Casey Drive, Fort Mill, South Carolina 29708, 888 838 3589, www.VELUX.com
- WaterFurnace International, Inc., 9000 Conservation Way, Fort Wayne, Indiana 46809, 800 222 5667, www.waterfurnace.com
- Wayne-Dalton Corporation, 4400 River Green Parkway, Suite 220B, Duluth, Georgia 30096, 678 417 0115, www.wayne-dalton.com
- Whirlpool Corporation/KitchenAid, 2000 M-63 North MD 3201, Benton Harbor, Michigan 49022, 800 253 3977, www.whirlpool.com
- Wolf Range Company, 10405 Westlake Drive, Charlotte, North Carolina, 28273, 800 366 9653, www.wolfrange.com

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