A thesis submitted to the Graduate Faculty of Virginia Polytechnic Institute and State University in partial fulfillment of the degree of Master of Architecture

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Thesis: Master of Architecture

Gregory B. Hunsaker

July 24, 1991
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An Aquarium for Norfolk, Virginia

By Gregory B. Hunsaker

A thesis submitted to the Graduate Faculty of Virginia Polytechnic Institute and State University in partial fulfillment of the degree of Master of Architecture

July 24, 1991
Alexandria, Virginia

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Context for a premise: Norfolk, Virginia, 1986

The original premise for the National Aquarium for the Waterfront, Norfolk, Virginia derived from the realization that a potentially dramatic portion of the city had been separated by a major highway.

As a young student of Engineering and Art, I had spent a year in this city, finding that there were few places to dwell. The scale of the streets was lost to the intervention of the highway, and the urban path gave way to meander without destination. I began to perceive zones in the city where I could find solace, take a meal, see Art or hear music; yet the only way to experience these places was to travel through the less hospitable ones. I also began to realize that the worst of the experiences were available in the newest parts of the city, and that neither the architecture, nor the spirit of the city, was being honored in the constructs of man.

The site in question was an inlet to a former freight yard with a boatbuilding school on a dock, flanked by two post-modern condominium buildings that effectively isolated it from the waterfront to the north and south. Featured amid the ruins of the tracks were various artifacts including a wheelhouse and a concrete molasses storage tank.

A tremendous richness was evident in the vernacular and utilitarian treatments of the waterways. Here was an understanding of the Earth’s oceans, her lifeblood: the power of the sea was apparent in the way man had built along her edges; there was inherent respect, an acknowledgment of her force majeure.

The opportunity to work within an urban environment met a long-standing desire to build upon the water’s edge. A desire for an environmental expose yielded a program that would celebrate the life of the sea against a backdrop of neglected waterfront. The primary axis was determined by the figurative procession to the sea, and consequently, was born a program with direction.

There came a moment when a method of working within a city became more clear, revealing a means to understanding and accepting the urban labyrinth with all of its complexities. The simplicity of an approach that would carve out places for humans amid structures that bespoke other ideals appears naïve in hindsight, yet it provided a point of departure from which to begin the project. This marked a milestone in my education: the point where I started to learn about urban form, its synthesis and integration.
Acknowledgements

I would like to thank the following individuals for their wisdom and guidance: Jaan Holt, Jim Ritter, Bill Brown, Greg Hunt, Hans Rott, Gene Egger, Olivio Ferrari, Joe Germana, Robert Graef, Bob Schubert, Bob Dunay, Joe Wheeler, Al Sarvis, Anthony and Joan Curtis, Palmer Smith, Susan Piedmont-Palladino, Wayne Hughes, John Anderson, Henry Hollander, Patrick Santerre, Tim Ferguson, Blaze Davies, Rudy Hunziker, Charlie Steger, Antoine Predock, Steve Small, Robert and Beverly Hunsaker, Chris Hunsaker, John Schippers, Frederique Marie-Vincent and those I may have temporarily forgotten.
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Zeitgeist and Paradigm

Academia generally couples the word “zeitgeist” with the word “paradigm.” Zeitgeist, literally, in English, means the spirit or ghost of the times. Whether the symbol is a way of thinking, speaking, or presenting an idea, the idea itself, or the context for the idea was subject to, and instrumental to, the definition of the zeitgeist. A horse-drawn wagon, a train ride, a poem, a speech, a war or a monumental development in Architecture (Queen Hatshepsut’s Temple, The Crystal Palace, The Eiffel Tower, The Seagram’s Building, Unity Temple) speaks of the voice of the time, its conflicts, accomplishments and insights.

Paradigmatically, oscillations of the design, fashion, literature, arts and science movements are speeding up: where these sweeping changes in thought cycles, and the application thereof would occur every fifty years in the 1800s, they are turning over at five-and ten-year intervals today. As the rate of paradigm shifts increases, their individual characters diffuse and become difficult to differentiate.

This serves to assist in illustrating the dynamics of making architecture in the 21st century. In the ever-changing environment that is causing the staccato rate at which artistic postures deviate or derive, the language of form has become ill-defined at best, random at worst. The advances of computer applications in architecture have further eroded the potential definition of limits, simultaneously increasing the rate at which tasks are processed and decreasing the degree to which they are considered. A new palette of form has become available, yet the rationale behind its application is slipping away.

There are very interesting things occurring in architecture today. The urban labyrinth has become, in many instances, a cohesive necklace that showcases an array of gems. Some of the best work is coming out of competitions designed to rework major European centers. In many instances an architectural infrastructure is designed, and the competitors work within the framework. Fundamentally this is a temporal intervention.

As the avant-garde is always eventually consumed by the status-quo, so will the zeitgeist continue its transmogrification. The contemporaneous essence of the word will by necessity follow form follow fashion, exemplifying the antithesis of timelessness. A sense of new becomes a design objective, despite time’s continuance. Jimi Hendrix and Andy Warhol never imagined they would wind up vending products on television, and architecture, and its position within society and the environment, will never be the same.

The larger picture reveals the greatest perspective: to consider that the precepts guiding the ancient Maya, Greeks or Anasazi in the placement of Architecture would become environmental guidelines two or three millennia later is to realize that the nature of beauty and truth will ultimately transcend movements and paradigms. Despite the remedial overtones delineating the emergence of an environmental conscience today, their beginnings are evident in the dawn of civilization.
Thesis Premise

The creation of a place of refuge amid chaos. To create a place that answers the question, "why are we here?".

The definition of a place between the sacred and the profane.

The complexity of the city will foster an oasis: the serenity of order.

In acknowledgement of complexity, simplify.

After all, architecture is the theatre wherein the drama of life unfolds.

The city will enter the building, and the building will never turn its back on the city. The sea will enter the city through the building, as the city will enter the sea... Neither is static. This is life of the highest order. Memory and anticipation will part to yield a performance of the present.

This proposal is an effort to reintroduce a human-friendly scale to an urban edge, embracing the life of the water bodies, and giving direction, identity, and thus purpose (to the human, the city and the sea) through architectural celebration.

The site determined a set of environmental and planning issues asking for resolution through architectural intervention. The decision to make an aquarium derived from the questions asked by the existing conditions.

An initial subtractive formal treatment of the site (to bring the river inward during high tide) and the reconciliation of this with an additive formal language of the building became a point of departure. The synthesis of form was to be organized as a linear progression through a series of experiences delineating a walk from land to sea.
The materials palette employed in the National Aquarium for Norfolk, Virginia derived from vernacular utility buildings. The use of concrete cylinders along the waterfront was common after World War II in the construction of boatbuilding factories, railroad wheelhouses and water treatment plants. The selective application of marble to the floor surfaces was a delineation of the zones of experience progressing from dry land to the sea.

The synthesis of the Deep Sea Tank also has vernacular precedent in agricultural settings: silos that were designed to withstand hydrostatic loading of grain and silage.

The steel frames utilized for the windows and plenum structures are similar to the ones commonly found in factory and warehouse windows. The truss effect achieved by the long-span plenum designs (and to an extent the hoods used for humidity mitigation) continues to be a leitmotif of shipbuilding architecture, prevalent along the Virginia coast.

The treatment of the concrete bespeaks the action of the tidal river, with the articulations ending above the high tide line as though the columns had been wiped clean by the action of the sea. The stepping concrete evident in the cylindrical tanks is a utilitarian response to the internal stresses posed by the massive amounts of water they hold. The steel retention rings on the round concrete tanks were both an homage to silos and a means by which to introduce glazing at the viewing areas.

The application of primary red to color the windows and frames was intended to create contrast with the grey of the concrete surfaces as well as the deeper blues and indigos of the river approaching the sea at its horizon.
Designing architecture is not specifically a problem-solving activity. However it is a poor solution that fails to solve shortcomings inherent in the existing conditions.

The best part of a stair tends to be that aspect of the stair that is not a stair; be it a bench, a window, a balcony, or an idiosyncrasy of the stair that is not a necessary stair quality. The consideration of a place to step out of the stream of circulation creates opportunities for the stair to answer needs other than the movement from point A up to point B.

This consideration of problems as opportunities, coupled with the potential to expand an object’s essence into that of something other than the nature of the thing in itself is where truly enlightened design transpires. As the act of celebration becomes a significant event within the rhythms of normal life, the act of doing a mundane task become better by the quality of the design of the objects it involves.

Imposition of limits is another means of creating language amid randomness, which ultimately creates an environment wherein a person understands his surroundings. The richness of experience is embellished by defining these limits that cause one to perceive simplicity amid the confusion of society at large.

This applies to Architecture at any number of scales: in limiting the selection of materials or the formal language as a point of departure, in deciding that a certain element will only meet other elements in a certain way, or that no paths will end without continuity, a language is born. The honest construct reveals the process from which it has come, and the better examples of this speak of how they were designed.

Another virtue in design aptitude is to understand where nothing is better than something. At times, no connection is preferable to a cumbersome one.
The quest for knowledge runs like a river through the rise and fall of Western Civilization. The fundamental quotient is curiosity, the spark of all learning.

Inspiration ripples the stream as thoughts glance among the rocks of precedent and context. Sources of inspiration manifest themselves in myriad possibilities, bringing the fruit of the search to bear directly upon the ability to apply the inspiration, and the form it takes.

Education

The path of education is not conducive to a linear diagram. As we are but the sum of our experiences, milestones occur and reappear, often in differing circumstances. It is the ability to recognize these milestones and respond differently that marks the accomplishments of education.

Discovery

In any creative process there comes a moment of illumination, a dawning awareness of understanding. From this moment the work develops an identity, an autonomous existence or viability of its own. From this moment of exaltation the work will support or refute itself if one listens to its voice.

The Voice of the Work

The most beautiful experience we can know is the unknown.

- Albert Einstein

As any work develops its personality, it begins to demonstrate its potential for development of the idea. The difficulty lies in forcing or manipulating the design into something foreign to its nature. With the emergence of a character any given work will reveal what it would like to be. The inherent nature of this voice bespeaks subtlety and nuance, never neglecting its true nature.
A National Aquarium for Norfolk, Virginia

Site

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<thead>
<tr>
<th>Topology</th>
<th>Typology</th>
<th>Morphology</th>
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<tbody>
<tr>
<td>The city of Norfolk, Va. has known a military existence since its establishment as a port of call. The growth of its perimeters being controlled by the boundaries of ocean and rivers, it first expanded to its edges, then began to develop with renewed interest toward its interior.</td>
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<td>The original occupants of this area were the Choctaw Indian tribe, as well as passing Cherokee, Powhatan and southern Iroquois. As the noble nomadic nature of these people was not to affect their environment, the architectural topology was impermanent, and altered with the occupation of the European settlers.</td>
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<td>A military and mercantile port emerged in the eighteenth century, with its characteristic utility structures: docks, warehouses, shipyards, opening an epoch of a mid-Atlantic naval base. A residential neighborhood began to develop in the nineteenth century, housing wealthy merchants and the families of naval officers. The edges of the rivers began to fill with industry, to support the needs of the burgeoning city, in addition to those of the military. Intermediate zones defined themselves as market, service, and housing districts.</td>
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<td>With the interactions of the civil war, and the development of trade along the James, Lafayette and Elizabeth rivers, the city sought to present its image: protector of the Chesapeake Bay, purveyor of mercantile products, showcasing culture such as theatre, sports and art. The architecture of the inner sections became metropolitan as the fringes developed into industrial ports.</td>
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<td>With the post-war return of troops, rapid development marched on in the residential neighborhoods. Waste treatment facilities began to appear along the waterways, and Architecture grew in three dimensions, giving the city’s edges an industrial quality, one considered undesirable from the interior.</td>
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<td>With the coming of the 1980s, Norfolk realized that its inner sections were not appealing to the metropolitan occupants, and several warehouse and railroad areas were razed to provide sites for high-visibility high-rise motels and office buildings. The post-modern movement painted its transient facades onto semi-temporary structures, and the human scale fell by the wayside. A public park was developed adjacent to a large multi-use mall, and the central roads were widened to accommodate the new tourist interest. This further slighted the pedestrian experience, though once inside the ring of highways there was new vigor to be found amid the renewed architecture, if little cohesion.</td>
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Results: The Projects
1. ENTRY AND ANTEROOM
2. INFIRMARY AND RESEARCH LABORATORY
3. GALLERY OF MOVEABLE TANKS
4. WALKWAYS, LEVEL 2
5. DEEP SEA TANKS
6. VIEWING AREA
7. AIR AND HUMIDITY PLENUM

BUILDING SECTION FACING SOUTH
A National Aquarium for Norfolk, Virginia

The aquarium is entered from street level by ascending a series of stepped terraces. Entering the domed element on the end of the axis one is in a large gallery of moveable orthogonal modular tanks of fish and sea animals. An arching crane runs around the inside of the lip of the dome, just under a bank of clerestory windows that provide diffuse light. The crane is used to reposition the tanks into various configurations.

Descending the stairs opposite the entry, one passes through the first of several intersections with the Acequia, a circular channel for the rising tide of the river. Hence the level of the tide is revealed and marks the experience, both in relation to the tide itself and the passage of time. Passing through the anteroom, a visitor finds himself amid a square of four columns, part of an array of columns that seems to go on endlessly.

This is the entrance to the main body of the aquarium. Advancing reveals a symmetry of plan, encountering the first of two large cylindrical tanks with viewing ports around their circumference, opening to large, two-story viewing glass facing the center promenade. Moving forward one finds himself again in a four-square of columns and a cross axis becomes apparent. At the ends of these transverse axes are stairs that split around a central larger column. Here the rhythm of the columns changes, with the columns no longer square, but twice as long as wide, as well as grouped more densely together in conveyance of the stair.

Ascending the stair, which is symmetrical about the cross axis, it splits and wraps around the outside of itself, making a large landing with a balcony at mid-height between the floors overlooking the amphitheater to the North and the Flood Zone from the Southern stair. The balcony also overlooks the other side of the large tanks, where the latter are each flanked and articulated by three-story
A National Aquarium for Norfolk, Virginia

water exchange towers, used to replace and release exhausted water. The Flood Zone stair balcony also looks out over the grid where exhausted water is purified by running through plants before being returned to the river. Resuming the walk up the stair one is immediately caused to deviate from the obvious path by a railing around a central well that is open to the floor below. Here the air plena are apparent, answering the questions asked by seeing the hoods over the tanks. The plena run parallel to the primary axis, penetrating the roof in such a way as to also serve as linear skylights. At the ends of the building the plena return down to the lower floor where the humidity extracted from the tanks by the hoods is condensed into pools (Summer), or in reverse (Winter), carrying humidity from the pools and distributing it over the tanks.

Walking to the perimeter of the upper floor reveals a perspective of the whole complex with viewing balconies articulated from the perimeter railing. Given the breadth of the open wells to the floor below, the walkways seem narrow and intimate as they cross by the large tank viewing ports, which, ending just a few feet above the floor, provide a view of their entire interior. A common path to use would ascend the North Stair and descend the southern one, fixing firmly a memory of the symmetrical layout and asymmetrical siting of the building.

Returning to the lower level from the center of the main building a ramp beckons toward (and under) the river’s edge. Passing between walls that turn to form benches one descends first to an anteroom where, once again, the level of the river tide is made obvious, both through articulations and glazing in the masonry courses of the walls, and in a pyramidal skylight (sealight) that intersects the Acequia. Beyond the anteroom the light dims and the walls come to define
1. Anteroom, Entry to Infirmary
2. Elevated Walkway
3. Control Room
4. Research Tanks
5. Infirmary Tanks
6. Holding Tanks
7. Acequia Loggia
8. Lower Level Viewing Area
9. Stairs Up
10. Ramp Entry and Benches
11. Large Mammal Tanks
12. Air Plenums and Condensation Pools
13. Ramp
14. Anteroom with Sealight
15. Undersea Viewing Area
16. Deep Sea Tank
17. River

LOWER LEVEL FLOOR PLAN
corners, stepping out from the path and forming a hemicycle around a narrower concrete cylinder. An eerie light emanates from the large square portholes on the sides of the cylinder, and it becomes apparent that the hemicycle is a glazed underwater structure where the gradient light qualities show the depth of the river water. Turning back to the Deep Sea tank portholes, as the eyes adjust, one begins to see the clear invertebrates that occupy the ocean depths, illuminated in infrared light at the lowest level of the DeepSea Tank.

Thus the progression of spaces that constitute the aquarium is complete, and the visitor returns from the dark undersea area into the anteroom, rising with the ramp to greater light and comfort.

After passing through the main building once again, the path splits to create twin stairs around the entrance to the laboratory and infirmary. The striping of the inner circle reflects the layering of time and the tides, cutting back to create an entrance under the overhang of the viewing balcony above, in the gallery. The outer wall of the stairs, also curving, is of the pure white of the exterior of the dome, which reflects and dissipates the light from the windows above.
Structure and the Ruin

Architectural ruins convey not only a configuration enduring in time, but also a hierarchy of structure, mass and proportion. The site relationships of an historical work are often subject to the changes that transform the landscape over time. An aspect of the elegance of the Roman Aqueduct, and its ability to transcend not only time, but meaning was a primary design inspiration for the Aquarium.

Also apparent in the ruin is the way of thinking, a delineation of the technology and methodology prevalent when the ruin was built. The integrity of the Architecture endures while the less permanent aspects of the settlement may be lost to the erosive nature of time’s passage.

The structures applied to the designs here were selected in terms of their endurance over time: to ultimately create an elegant ruin. The determination of proportions, shapes and materials of the structure was based on the consideration of their relative permanence as well as on their anchoring of the Architecture in the present. In essence the Architecture was first considered as it would seem two millennia in the future, before being transposed to the present.

The structure of the Aquarium is an exoskeletal series of concrete beams and columns, ultimately apparent as architectural elements organizing space and establishing the rhythm and proportion of the building’s visual language. The mass of the aquarium tanks carves out a place within this framework to shape the space, its sequence and finally the experience.

The materials selected for the glazing, cladding, roofing and conveyance systems are relatively impermanent in comparison to the primary structural framework, designed to peel away with the passage of time to reveal a dignified ruin.

This application of structure as a guiding element of the Architecture through time is a position that is empirical in the projects presented herein.

Results: The Projects
1. Walkway
2. Acequia
3. Water Exchange Tower
4. Air Plenum
5. Humidity Hood
6. Catwalk
7. Large Mammal Tanks
8. Walkway to Infirmary
9. Amphitheater
10. Walkway
1. Walkway
2. Amphitheater
3. Aconia
4. Stage
5. Stair Hall
6. Catwalks
7. Air Plenums
8. Viewing Balconies
9. Lower Viewing Area
10. Flood Zone
11. Street
The Carriage House program derives from the 17th- and 18th-century archetype that predated the garage. It is a support structure for a small farm in Northern Fauquier County, Virginia that was designed in 1988 in the Studio of Greg Hunt with visiting Professor John Stevenson. The functions include: an area for farm equipment storage, a woodworking shop and a second floor apartment/office space.

A pet project since 1978, it had its first incarnation as a round Quaker barn with a large geodesic skylight. Through sketch development it became a truncated square in plan, transforming over the years into a form of squares within squares. The obvious topological precedent is a bank barn, with the first floor levels contained by the grade, which descends to floor level at the entrances.

The roof pitches mimic the existing house on the site, which features a cascading shed roof language that comes to a simple gable at its uppermost point. The terracing of the entrance area and parking court were used as a device to integrate the building with the main house using a system of retaining walls that correspond to the primary axis (40 degrees east of south) and reconcile with the Mercator projection.

The master plan for the complex also introduces a pergola within a stone retaining wall, behind the two buildings, visually integrating the two structures while providing for future expansion into wheelchair accessibility between the buildings.

The material selection derives from the existing house, with painted metal roofs, vertical wood shiplap siding and retaining walls. In lieu of stucco over masonry, the Carriage House utilizes poured concrete (with exposed pour holes) for its foundation and retaining walls as well as a poured concrete network of beams on columns. The articulation of the fenestration, as well as the detailing manifest a point of departure from the design of the original house, as does the introduction of a second floor greenhouse, cantilevered over the lower bay on concrete beams.
The building is entered through a pedestrian entrance flanked by an eye-level planter to the left, and a lower, linear planter to the right. Inside the lower bay (equipment storage), the ceiling is dropped below the roof with the cantilever beams bearing the greenhouse above. Turning left and ascending a stair of four risers, the structure of columns and beams becomes evident, as the band of horizontal windows directs you to the stair to the upper floor at the right, a subtractive shape cascading from a concrete wall that bespeaks a carved cube.

To the left is the upper bay, an extension of the woodworking shop with racks for materials storage. Ascending the lower flight of the stairs a split landing is provided with a central step that corresponds to the sill where the horizontal band of windows turns vertical, rising up the stair wall above the flanking hipped shed roof to become a skylight over the stair. Crossing the central dividing step the stair material changes to a wood structure, suspended from the beams framing the roof. The floor curves back to receive the stair and create a volume for the light from the continuous bank of windows. It follows the contour of a curving concrete beam that attains this shift from a major structural axis to a minor one. The beam is articulated with impressions of the remains of materials used to make the study models in the design process, which were employed to line the formwork for the concrete pour, bringing the process onto the final product.

Entering the second floor, the roof is timber-framed with the wood flooring pattern celebrating the incidence of the columns. To the right is a kitchenette, with the cabinets following the curving contour of the beam. To the left is a freestanding fireplace, astride the columns that hold the stair in the lower entrance area. The fireplace serves to divide the main room from the greenhouse, with entrances on each side, and the fireplace opens into the greenhouse as well as the main room. The greenhouse juts out of the roof over the lower first floor bay, reflecting the first floor greenhouse designed for the main house. From this vantage point the entire settlement becomes apparent, and the individual pieces present the design as a whole.
Projects: The Carriage House
“Eulogy for the Rainforest” is an ongoing design sequence dedicated towards boycotting the unethical wood products harvest procedures that are the industry standard in the Amazon and other river valleys. As these are some of the most beautiful materials available in the twentieth century, and as they are rapidly becoming scarce, there is an excellent chance that a number of the designs may never be realized. There is a dawning awareness about these issues however, and one of the things the American Institute of Architects is doing involves advocating a certification process that verifies materials are being grown on a sustained-yield basis. I maintain hope that the ruthless slash-and-burn tactics that are so prevalent today will be redirected towards a conscientious, preservation-oriented harvesting and planting strategy, and that someday the series will be complete.

The design approach taken was a celebration of these materials, such as pau d’arco, purple heart, wenge, teak and ebony, and a presentation of them through juxtaposition with a number of domestic hardwoods, such as maple, black walnut, cherry, birch and oak. The design mission involved conservative applications of the rainforest hardwoods, giving them unique structural responsibilities, and creating geometric patterns in the connections that read as colorful inlays.

To date these are not considered prototypes, or production pieces, for obvious reasons; they each embody a unique object, tediously reverent in both design and construction: they presently reflect a requiem of silence.
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All photographs, drawings and sketches by author.
Vita

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Date of Birth: 5 May, 1961
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Education:
- Master of Architecture, Virginia Polytechnic and State University 2007
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- Student Work, WAAC Building Museum 1991
- Competition Packet WIMSAF 1990
- Exhibit WIMSAF Union Station 1992
- Printmaking Exhibition Cowgill Hall Blacksburg, Virginia 1986

Professional Experience:
- Chairman, Design Committee Partnership for Warrenton Foundation 2004-present
- Designer, Hunsaker Design 2003-present
- Project Manager HSNIA 1998-2003
- Designer RTCC Artificial Climbing Walls 1993-1995
- Graduate Teaching Assistant VPISU 1990