Mobile Retrospective: Shrinking the Digital Divide

David Bruce McLean

Bachelor of Arts in Architecture
University of California at Berkeley, 2000

Submitted to the Department of Architecture in Partial Fulfillment
of the Requirements of the Degree of

Master of Architecture

at the
Massachusetts Institute of Technology
February 2003

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Signature of Author _____
Department of Architecture
January 17, 2003

Certified by _____
Wellington Reiter
Associate Professor of the Practice of Architecture
Thesis Supervisor

Accepted by _____
Bill Hubbard, Jr.
Adjunct Associate Professor of Architecture
Chairman, Department Committee on Graduate Students

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Readers:

Ann M. Pendleton-Jullian
Associate Professor of Architecture
Massachusetts Institute of Technology

William Mitchell
Professor of Architecture and Media Arts and Sciences
Dean of the School of Architecture and Planning
Massachusetts Institute of Technology

Ceasar McDowell
Associate Professor of the Practice of Community Development
Director, Center for Reflective Community Practice
Massachusetts Institute of Technology

Jennifer Siegal
Associate Professor of Architecture
Woodbury University
Principal owner of Office of Mobile Design

# Mobile Retrospective:
# Shrinking the Digital Divide

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ABSTRACT

The concept of the digital divide is a condition in the urban context where informationalization via computer technology exacerbates a duality that consists of those who have access to information technologies, and those who do not. The resultant outcome is a marginalized community left behind – a polarized urban system socially, spatially, and technologically. Low-income communities become devalued, disadvantaged, and disempowered. Left behind is a community that is not computer literate, lacks skills to attain entry-level jobs, and lacking in resources and infrastructure to maintain a competitive computer competency.

Infrastructure that is needed goes beyond just computer software and hardware. More important is that of human infrastructure, which is needed as a constant, in order to instruct, mentor, and interact with the community on a daily basis. Moreover, physical space that can facilitate the potential of computer technologies cannot be overlooked. The areas of the city, which this thesis focuses on, are that of the extreme poor; the ghettos that are frequently neglected physically and financially. These are environments where the presence of fear, lack of trust, and danger are everyday psychological realities in which the young and the old must persevere. Space allotted for learning, safety, and interaction is a much-needed resource.

Shrinking the digital divide requires and understanding of the social theory that exists at the core of implementing high technologies within low-income communities. From an architectural standpoint, placing mobile architecture within its historical context, and present applications, became a necessity. The thesis attempts to shorten the present digital divide, and posits that an architectural solution designed through flexibility and adaptability, in addition to the integration with specific technologies and program, can initiate a community computer – where members become active producers rather than consumers. The architecture will be a resolution beyond providing infrastructure and access, but instead instilling within the community ownership, trust, and a street presence. Furthermore, the thesis promotes social interaction and a community history - two components that are deciding factors, and at the heart of, defining a community.

Thesis Supervisor: Wellington Reiter
Title: Associate Professor of the Practice of Architecture

The award selection committee; Bill Hubbard, Stanford Anderson, Nancy Jones, Mary Meagher, and Jane Gitlen, for honoring me with the Rosemary Danehy Grimshaw Award - established this year in memory of one of the MIT community's most vibrant and creative members: Rosemary Danehy Grimshaw (1943-1996). The award was given in recognition of a thesis proposal which best exemplified the spirit and character of this wonderful teacher; a spirit that explored the whole world in order to speak in the language of architecture, including the entire spectrum of human expression and experience. It is an honor to receive such an award, in the name of a much loved, and well-respected member of MIT Architecture. Thank you.

## *ACKNOWLEDGEMENTS*

Bill Mitchell and Ann Pendleton-Jullian for their motivation, provocation, and critical insight on the design project.

Duke Reiter for offering his immeasurable experience as a designer and person, and for caring enough about me as a designer to push me that much further.

Jennifer Siegal for allowing my shot in the dark to hit its target, and constantly reminding me to have fun.

Ceasar McDowell for relating to me, when I needed it most.

My parents, Purita Mendoza & Jose Ramos, for instilling within me the strength, love, and compassion needed to fulfill this journey – and to my entire Ramos family for your unconditional love, support, and encouragement.

My Big Bro, Larry Ramos, for truly believing in me when I did not believe in myself. I am a Samurai Warrior.

And especially my fiancé, Jennifer Hawkins, for being an inspiration in life and love, for giving me the strength to overcome any obstacle, and for always listening with her heart.

## *DEDICATION*

In loving memory of my father, Jose Vera Ramos.

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## *THE DIGITAL DIVIDE*

UNDERSTANDING THE INFORMATIONAL DUAL CITY
AND INITIATIVES FOR RESOLUTION

The urban context is in continual flux, which naturally is in accord with technological advancement. However, as the social and spatial divide deepens between the rich and the poor, therein exists an inherent problem of providing appropriate and adequate information technologies to low-income communities. Without sufficient computer infrastructure, it is becoming harder for those in these low-income communities, specifically the children, to fully utilize the potential of information technologies in our present computer oriented society. Whether competing for jobs, or exploring educational capabilities via the computer, not having computers in their daily built environment puts those in low-income

communities at a major disadvantage.

In *Dual City: Restructuring New York*, Manual Castells warns of an urban context where a polarization exists between those high-value making groups on one hand, and the devalued groups on the other, which leads to downgraded spaces, decayed and derelict urban areas, and introverted, socially segregated patterns within our environment. Although Castells admits the dual city metaphor can be misleading, and or rhetorical, it "nevertheless challenges us to explore the dimensions of growing inequality and explain the sources of the tendencies toward polarization" (11). Which leads to the informational city, and it's relation to this dualization. According to Castells, the informational city is a dual city, defined by "the combination of new information technologies and socioeconomic restructuring as a means of reshaping cities and regions, ushering new urban forms..."(Schon, 27). Furthermore, Castells concedes that new information technologies are not the cause of this duality, but only exacerbate the polarization, and heighten socio-spatial exclusion.

William Mitchell, in his book *E-topia*, concurs with this position on information technology as it relates to low-income communities, stating that due to the lack of information technologies in these communities and sparse integration, "urban areas could well continue to congeal into introverted, affluent, gated communities, intermixed with 'black holes' of disinvestment, neglect, and

poverty....particularly if, as the unrestrained logic of the market seems to suggest, low-income communities turn out to be the last to get digital telecommunications infrastructure and the skills to use it effectively" (81).

At the crux of the issue is that of labor skill mismatch. How can people that are born and raised in these communities, that lack computer skills to compete for jobs (not to mention the many who are not even computer literate) succeed in an era where computers drive everything around us? "Between 1979 and 1994, 27 million new jobs were created, 60 percent of which were in the technical and professional occupations, thus significantly upgrading the skill profile of the overall occupational structure... most regular jobs, however, now require some higher level of education, and college education is becoming a requirement for any decent paying job" (Schon, 32).

Education is an integral component in successfully incorporating computer infrastructure and instilling computer literacy to the youth in low-income communities. Moreover, the mismatch between the educational system, and manner of instruction with what is needed by students to compete in the labor market, continues to grow. Public schools in devalued spaces become instruments that reproduce social devaluation, unable to provide the necessary "know how", tools, and skills for the informational labor market, but instead "training grounds for survival in a world of social irrelevance" (32). Typically schools in low-income communities lack the appropriate infrastructure to house computers, as well as having inadequate space and rundown facilities. If computers are provided by the state or government, they are typically older computers, with out of date software and hardware components. Thus, the education and content still remain a step behind what typical middle class facilities offer. Moreover, individuals who have knowledge and training in the areas of computer teaching and instruction are lacking as well, adding to the mix of problems and obstacles of bringing computer literacy to the youth. In her paper titled, *Approaches to Community Computing: Bringing Technology to Low-income Groups*, Anne Beamish echoes the need for software and hardware infrastructure in low-income schools, and believes that not only will computer technology improve education, but will also give basic skills for students entering higher education and advancement within the workplace (356). Obviously, funding is a major obstacle. Wealthier school districts are much more likely to have computer technology incorporated into

their respective curriculums. However, according to Beamish, the lack of funding for software and hardware components is not the only issues in bridging this gap. "A report from the 1995 Office of Technology Assessment found that one of the biggest obstacles was the lack of teachers trained to use technology effectively in the classroom and to integrate it into the curriculum" (356).

What results is a perpetual, viscous cycle of poverty and lack of upward mobility. Children and young adults are faced with either taking dead-end, low skill, low paying jobs, or the temptation of a substantially lucrative "job" in selling drugs for "quick" money. Castells writes, "there are growing segments of semi-employed, in and out of the labor market, creating a potential danger for some individuals, particularly among the minority youth, to join the ranks of the criminal economy" (33). The mismatch in computer skills and job placement in the informational labor market continues this duality within the low-income inner city, and unfortunately affects the group within these communities that can have the most impact in shaping our future environments – the youth.

Children in low-income communities lack a voice, or should I say they lack proper direction for their voices and stories to be heard. In many instances these children lack creative outlets, whether at home or in the educational setting, due to insufficient tools, and or proper settings that foster learning and experimentation. A majority of households are single-parent households, where the daily struggles of unemployment and safety are at the forefront of life. The sense of social exclusion, of being confined and restricted to a way of life that they have seen their family continually struggle against, eventually becomes their own personal battle to overcome. Joseph Wresinski, leader of the Fourth World Movement, had the kids, born into this fourth world, in mind while developing this movement. In his book *Children of Our Time*, he describes the world from the ghetto, the slums, the low-quality housing bordering factories and dumping grounds, the homes squeezed between cemeteries and highways, and questions the rights given to these children who have been deprived of their childhood almost from the cradle. "But how many other children do we oblige to grow up in concrete blocks of housing where their games and laughter become a nuisance to be suppressed? What right to childhood do any children have? So many children grow up in crowded apartments where they are bound to share too early the preoccupations of their parents" (A.T.D., 16).

These children need a fair shake. They need hope that the harsh society that had been developed can change, and their respective communities can prosper. They need the belief that they are not forgotten, and they do have a chance to make their own situations better. They need safe havens where the fear and temptation of death and drugs can be temporarily put at ease, and need mentors in place to assist in an education to be applied in school and for prospective jobs. Fortunately, there have been steps in providing computer infrastructure that act as safe havens as well as computer training facilities, for these groups in need. And whether through social science, planning, or architecture, the objective of shrinking the digital divide is becoming more and more a reasonable goal. Solutions and strategies are in place.

As editors of a book, which emerged from a colloquium held by the Department of Urban Studies and Planning (DUSP) at the Massachusetts Institute of Technology, titled *High Technology and Low-income Communities*; Donald Schon, Bish Sanyal, and William Mitchell laid out a set of initiatives for using computers and electronic communications to benefit low-income urban communities:

1) to provide access to the new technologies in ways that enable low-income people to become active producers rather than passive users
2) to use the new technologies to improve the dialogue between public agencies and low income neighborhoods

3) to help low-income youth explore the entrepreneurial potential of information technologies
4) to develop approaches to education that take advantage of the educational capabilities of the computer
5) to promote the "community computer": applications of computers and communications technology that foster community development. (Schon, 371).

In addition, William Mitchell goes further to explore practical ways to attain access to the internet and digital information, with enough bandwidth for effective use in schools or at home. Mitchell explores all of the alternatives to the basic dial up modem connection, from ISDN to wireless access, and discusses how servers could act as resources in public schools (154). In general, low-income communities lack the "pipe" infrastructure for connection, which is not inexpensive, as opposed to corporations, universities, and other organizations who typically pay out of their own pockets to finance the high speed infrastructure. "The implications are obvious. Unless somebody is willing and able to make the infrastructure investments necessary to provide connectivity in a low income community, that community will remain without service" (156).

Getting connected is a practical issue that warrants serious consideration, and adds to the already difficult task of delivering computer technology to low-income communities. Yet, one must understand that simply giving access to computers is not enough. One could say that computers could be given to those in the community and the computers would be used appropriately per the users needs. Handing out laptop computers to everyone on the street would be the ideal, utopian solution, but unless the human component of instruction, and the direction to fully utilize the technology is set in place, the help would be for naught. What needs to transpire is the notion of community computing. Community computing, defined as "providing relevant and interesting content online for specific low-income groups with the intention of motivating them to use technology", has served as the basic and integral framework for a number of projects dealing with the internet and low-income communities (351).

In their paper *Social Empowerment through Community Networks*, Alan and Michelle Shaw question how we can use technology positively that may in some way affect people's day to day life, promote social interaction, and socially empowering low-income

communities by bringing them together. In questioning a new role for computers, they explore ways to use technology to assist people in becoming active producers rather than consumers. It is a concept of computer networking, where the computer acts as a vehicle to connect and familiarize people within their own neighborhoods. A concrete example of this would be a computer networking system that was developed in the MIT Media Laboratory and placed in a low-income housing development in Newark, New Jersey (322). The system was named MUSIC (Multi-User Sessions in Community ), that used text, graphics, digitized voice, and speech features to allow those in the community to interact on a local neighborhood infrastructure. "The MUSIC server for the network can be located just about anywhere; in neighborhood homes, churches, community centers, schools, and public spaces. The server turns a dedicated PC or MAC into an information resource that is connected to multiple telephone lines continually day and night. This server can give the callers access to a database developed by the local organization and neighborhood residents" (324). The system promotes a community activism, and naturally brings residents together and creates a community bond. The computer becomes a resource where all can share and have a voice.

In considering the value of the power of virtual communities, one cannot overlook or underestimate the power of place these communities create. Not only are these spaces safe virtually, but also provide safe zones for those on the streets. Whether the physical computer zones are community centers, or computer resources provided by activists on the street, the spaces provide a sense of intimacy, belonging, and being known. "For the severely disadvantaged, whose families are often broken and streets are dangerous, the virtual community first of all creates not a third place but a safe place" (341). These computer zones become safe havens where people could go without fear, and use the computer as a resource. The virtual world and physical world become blurred and are made permeable to each other.

One case in point for this situation would be the Computer Clubhouse in Boston, Massachusetts. The premise behind the community access center was that the youth and adults alike in inner city communities could use computers at little or no charge. Access was not enough, and schools were not enough for learning on the computer, hence the "Computer Clubhouse" would provide

tutors and mentors coupled with well-equipped computers and projects to enhance the learning process. The clubhouse became a place youth could go after school, providing an alternative to the violence and trouble on the streets. What made the program different from other clubhouses was that the instruction wasn't on the basic computer applications, but instead, focused on a goal "for participants to learn to express themselves fluently with new technology" (266). The students and adults became designers and creators, using leading edge software donated by MIT, and working on real world projects that would influence and instill within the youth skills and attributes beneficial for future, real-life situations. Four basic principles were practiced at the clubhouse in considering learning on the computers, and furthermore, social interaction among low-income residents.

1) Support Learning through Design Activities.
2) Help Youth Build on Their Own Interests
3) Cultivate "Emergent Community"
4) Create an Environment of Respect and Trust

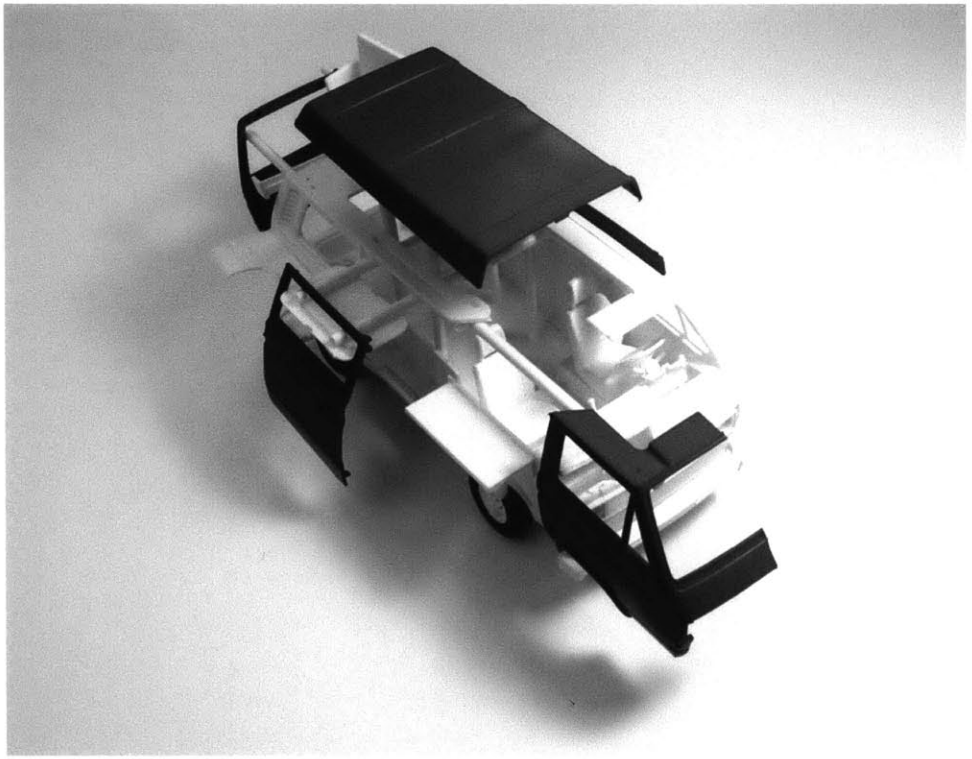
What is interesting of this last principle is that it is based on a knowledge of the streets where trust and respect are hard to come by, yet keys to survival. The clubhouse instills within those who use it values of trust and respect, whether it be trust to use the equipment, or respect for individuals and or technology. Expensive technology is made available to anyone who wants to use it, thus instilling a sense of responsibility and ownership (280). Staff at the clubhouse treats everyone as colleagues, giving genuine feedback, and freedom to explore all ideas without breathing down children's necks. The "Computer Clubhouse" concept hopes to spread to other low-income communities, and with it, the task of teaching people computer fluency, as well as new styles of interaction.

For the digital divide to shorten, the infrastructure must be put in place. This means the wiring, hardware, software, teachers, and vision. The technologies assisting the dual city can only ameliorate the deprivations afflicting the inner city poor. The solution for attacking this continual problem falls within the larger historical, cultural, and "socio-economic matrix that generated them" (147). By no means should the integration of computer technologies be seen as a "fix" to the social problems, however, it would be a giant leap in

the right direction. It is imperative for community improvement to be central and top priority in the process of designing these situations. This means removal of criminal activity in neighborhoods, beautification of homes and the surrounding environment, revitalization of a street presence, utilizing active residents for positive community representation and implementation of communal projects. The projection needs to be of real life, with an emphasis on re-orienting efforts more towards "jobs, education, and community..., which require mobilization of social and political resources" (35). More importantly, community organizations and resident participation are needed to influence and persuade local government partnerships with corporations, as well as assistance in social equity.

The responsibility also falls into the hands and minds of the designers of our future land and cityscapes. "For architects and urban designers, the complementary task is to create urban fabric that provides opportunities for social groups to intersect and overlap rather than remain isolated by distance or defended walls... (Mitchell, 82).

A bright orange electric cord dangles down from a second-floor apartment to a Volkswagen van parked by the sidewalk below. The van's open hatchback reveals an inexpensive PC computer to which the extension cord connects. In contrast to the bleak vacant lots and burnt-out buildings of the South Bronx neighborhood, the scene in the street is full of life. Children cluster around the van watching each other using the computer in turn. Others sit on blankets on the sidewalk, drawing, painting, and reading books. Parents watch from the apartment windows; others are involved with the children, helping or just supervising. Passers-by stop, look, and occasionally offer advice (Fanelli and Tardieu, 5).



This was the scene and mood Bruno Tardieu set in the experimental projects initiated in the streets of New York in mid-1980. The objective of the experiments was to

Street Library in Coney Island (Schon).

bring computers to low-income communities in order to share knowledge, assist in communication, and familiarize those within these communities with strategies to utilize computer technologies. Moreover, the experiment had an emphasis on bringing an interactive life to the streets, in the form of not only computers, but also reading, painting, telling stories, and developing art and science projects; a "street library". According to Tardieu, "The street is truly the center of community life in poor neighborhoods. In neighborhoods where nothing is organized for the children once school closes, the street is their only playground, and therefore the street library is a natural ground for the children" (Schon, 295).

These are streets that were specifically targeted by Tardieu to be of the worst conditions, and the environment of extreme poverty. The projects were in the tough neighborhoods of New York; East New York, Coney Island, and the Lower East Side of Manhattan. These were significant places, the poorest of the poor by any standards. "Fear and anxiety are common. Many cannot sleep...in the streets outside, the restlessness and anger that are present in all seasons frequently intensify under the stress of heat" (290). The street libraries became the safe haven in the streets that was desperately needed, and became resources in the hands of the community. It demonstrated that hope was in place for children and adults alike, and gave priority to learning and creativity. In an environment where the young and old are dealing with extreme conditions, and wordless suffering, residents would "suddenly mobilize

Tapori Databank (Schon).

Children trying Tapori Encyclopedia (Schon).

their energy for books, paints, and computers, create peace in the street, and dare again to express their hope...especially for the little ones" (290).

To fully understand this approach which was taken, we must look back towards Joseph Wresinski and the Fourth World Movement; specifically looking at it's values and founding ideas. Tardieu took many of the values and visions of the movement in defining the parameters of his experiment, with Joseph Wresinski's central focus on poverty and social exclusion existing at the heart. When computers initially began revolutionizing the way in which we lived, Wresinski insisted that the "poorest families be a part of this revolution, not to be left behind once again" (291). He asked of all the volunteers of the movement with backgrounds in science and computers, which included Tardieu, to begin thinking of ways to integrate these technologies into the social welfare. Wresinski was confident that the implementation of a project that introduced low-income communities to this information revolution, which revolved around knowledge and communication, would establish the dimensions to assist in the struggle against poverty.

Wresinski was born into poverty, and knows first hand the misery and exclusion experienced through its existence. He is also familiar with the desolation felt beyond poverty, "where people are seen as 'infra-human beings', experiencing a social death" (291). This marginalization and denial of human rights are experienced in all aspects of poverty, with education being further subjected to this

denial. The poorest of the poor are constantly told that their own children lack the tools to learn. They are told that their own personal experience and history, are harmful and of no substance, and should not be transmitted to their children. Unfortunately they begin believing it. Consequently, the poor remain constantly uprooted, mentally and physically, which results in a people denied of their own past, beliefs, experience, knowledge, and history (291). The key action against this front, and essential to fighting poverty would be knowledge itself, and the means to communicate and share this knowledge. It is a sharing of knowledge that must happen on a reciprocal level, where those in position to help, and those that constantly live in this condition, are constantly learning from one another to bring learning and peace to the streets.

One project, in particular, was the Tapori Encyclopedia. Initiated by Tardieu in 1985, the project provided all of the benefits of the original street library, but went further to help master knowledge by collecting stories from this specific community - storing the stories in a computer databank. Tardieu designed the software for the computer that made it simple for children to enter their stories and access other children's stories. What resulted was the encyclopedia needing the computer, and children needing one another in order for the project to be successful (300). Children and parents could look up entries, share information, and debate issues with people within their own community on a computer level, and even on a personal interactive level. The device provided the space for this social interaction and knowledge transfer, and furthermore made the computer a common good. The computer was utilized as a self-producing resource, instead of a commodity only to be consumed.

Not only were the residents gaining a fluency with the technology, children were able to make sense of the software to gain self-confidence and power to achieve. Sherry Turkle, author of the text *Commodity and Community in Personal Computing*, praises the work that Tardieu implemented within the community. Turkle states, "In Tardieu's work, the street corner computer gave children an opportunity to externalize the good things, the hopeful things that were within them. And as the larger community engaged with the computer, the community learned about itself through the traces people left in the machine" (339).

The computer in Tardieu's work was used as a medium for words to validate and re-affirm a community voice. The sense of

place and safety were heightened to this communal intervention, and the project also became a vehicle for those within the community to re-familiarize themselves with each other. This integration of community and computers worked on many levels, and can serve as a blueprint for future projects. Yet, it would be a significant task indeed for the message and voices from these projects to be heard throughout society. There are still many social and political obstacles to overcome. If powerful computers for knowledge and communication are fully utilized only by a select, advantaged group of our society, then the desire to shrink the gap will become a more formidable obstacle. "On the other hand, if those who design the structure of today's and tomorrow's world accept to confront their inventions, values, and visions with the poorest people in our societies...they will be able to reinvent them together – broader, deeper, more humane, more meaningful" (311).

In looking to provide mobile computer resources to low-income communities, one doesn't need to look far to find relevant precedents. Bookmobiles, which were ordinary trucks and buses converted to libraries, were employed in the early 1930's to provide books to disadvantaged groups. Areas targeted to utilize services of the bookmobile were rural areas, poverty stricken areas, and newly expanding suburbs. In all cases the need for books and facilities were greatly needed. The concept of the bookmobile was used nationwide and overseas, and is still used today, but with more up to date facilities. Just recently, "cyber-mobiles" were developed in many parts of the world, utilizing wireless technologies

VW assembly line (Bell).

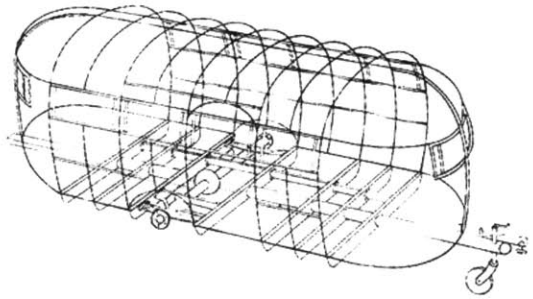
Mobile Magazines (Burkhart).

to add the Internet to the selection of library books.

The design of mobile computer resources has an abundance of precedents to draw from, mainly through the exploration of mobile architecture throughout history. Through practical paradigms, as well as mobile architectural discourse, one can develop a sense of the evolutionary process of mobility within architecture, in an attempt to place any respective design in its historical context. And, in looking at mobile architecture in relation to structural design and lifestyle, one cannot overlook "Mobile America" in the early 20th century.

From the early 1900's motor camping vehicles, to the ever-popular Airstream land yachts, mobile trailers carry an important part in American travel culture, history, and design. The Airstream, in particular, hit the road in the 1930's, turning heads with its sleek, streamlined design. Wartime forces shaped a market for these mobile trailers, and strayed away from its intended use for sportsmen and tourists; instead used as primary residences for approximately $65 a month (including food and utilities) (Burkhart, 34). The Airstream possessed the building blocks of self-contained living, consisting of all the utilities needed to live comfortably, i.e. electricity, running water, toilets, and a stove or range.

But what made the Airstream differentiate itself from the rest of the competition was its "clean-lined" design. With its reduced



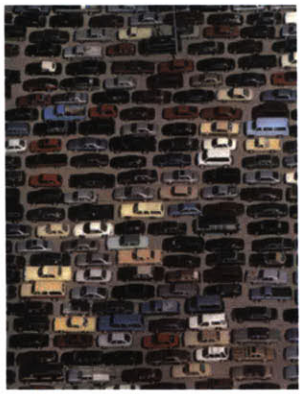
Chassis wireframe (Burkhart).

Chassis (Burkhart).

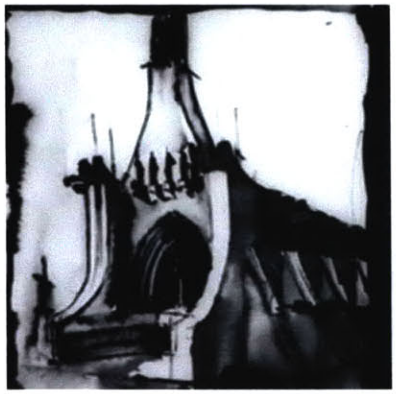
Airstream (Burkhart).

visual complexity, coupled with its wind resistant streamlining, the Airstream's shiny, riveted skin appealed to the masses. However, there was more to the design than just the formal accommodations for the average streamlined, cosmetic consumer at that time. An ideal formula of formal compactness that lended itself to static rigidity, combined with spherically shaped, lightweight materials, were essential, attractive attributes to the ever growing utilitarian consumer (53). The Airstream represented speed, beauty and power, and was like no other due to its innovative borrowing from the airplane industry. The design used two aluminum shells, one inside the other, which sandwiched insulation which was impervious to flame, water, vermin, or settling. "It is equivalent of a gore-tex lined jacket – cool in summer, warm in winter – ...the metal body expanding and contracting with the heat and cold in one homogeneous unit" (75). This use of aluminum attached to a reinforced frame allowed for a trailer that absorbed road vibrations without cracking or weakening. The result was a lightweight, wind resistant body bolted and riveted to a welded steel chassis that offered a solid utilitarian solution, while at the same time appealing to the aesthetic and luxury conscious consumer.

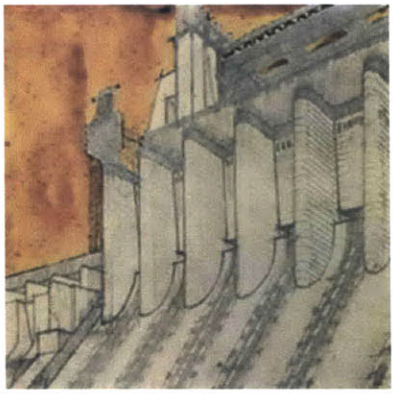
The automobile has in many ways, similar to that of the Airstream, tied into our psyche to become our closest companion, "one that we desire passionately, love faithfully and, when it's gone, remember with nostalgia" (Margolius, 5). Understandably, the automobile has had a tremendous impact on the way architects think, considering how the automobile industry and design has shaped the size



Traffic (Bell).



Sant' Elia (Caramel).

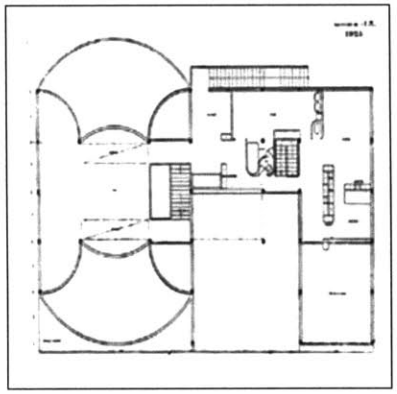


Sant' Elia Power Plant (Caramel).

and shape of our present cities. The automobile has arguably been the most dominant force for architectural change in the twentieth century, with prominent architects branching out from conventional construction to try a hand at automobile design. It poses a problem that is necessarily not site specific, and relatively exciting compared to the typical static dwelling. The automobile, representing speed, adventure, glamour, and an independent spirit, becomes a problem that many architects dream of resolving.

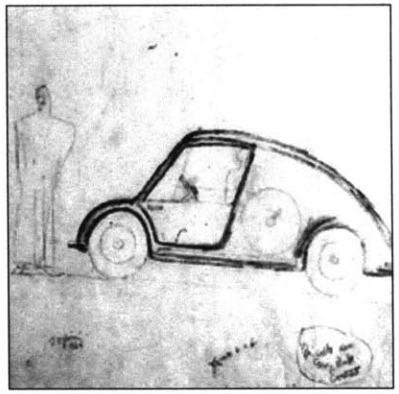
Italian Futurists marveled at the complexity, mechanics, and beauty of the automobile in motion, practicing art and architecture with dynamic motion at the turn of century. F.T. Marinetti declares in The Futurist Manifesto in 1909, "We declare that the splendor of the world has been enriched by a new beauty: the beauty of speed...a racing automobile with its bonnet adorned with great tubes like serpents with explosive breath...a roaring motor car which seems to run on machine gun fire, is more beautiful than the Victory of Samothrace" (Banham, 47-48). It was a manifesto that proclaimed that the futurists were witnesses to the dawning of a new age of power, dynamism, and excitement. This proclamation solidifies the perception of the car in many minds of driving and machine enthusiasts, which inevitably lent it to design considerations from designers across the board.

Le Corbusier was one of the architects whose work responded to the automobile both architecturally and urbanistically, and furthermore, responded to the mass production element of automobile design. He loved cars, with his own car, a 1925 10hp Voison,



Pavillion de L'Esprit Nouveau (Eliel).

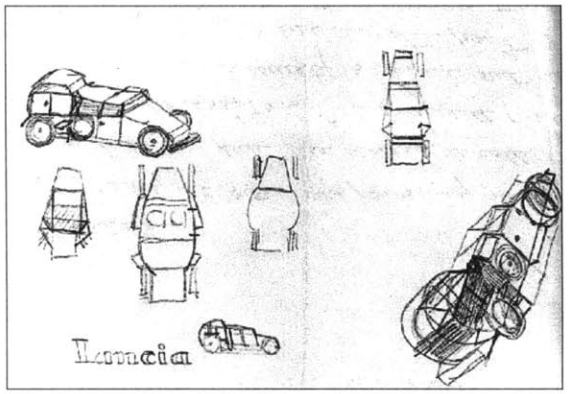
Plan Voison (Tzonis).



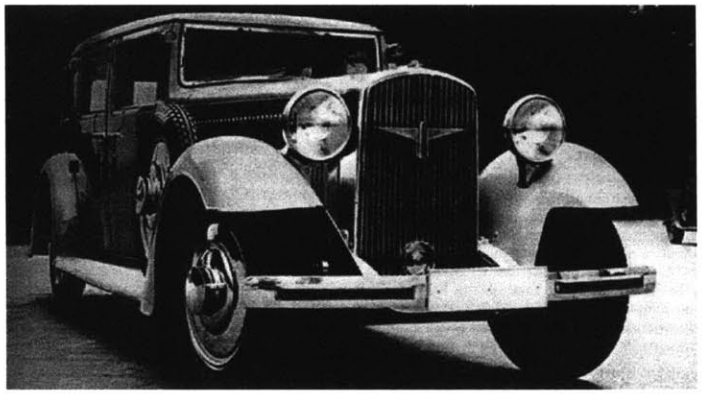
Voiture Minimum (Margolius).

providing a standard for his buildings. "Le Corbusier was one of a number of well-known architects who liked to pair the architecture of their houses with their favorite automobiles in order to illustrate the synthesis of architecture and automobile design, and to emphasize the close functional and aesthetic relationship between them" (Margolius, 8). In his design of the *Pavillion de L'Esprit Nouveau*, which was commissioned and built for the Exposition des Arts Decoratifs held in Paris in 1925, Le Corbusier constructed the design of standardized industrial elements, echoing the impacts of a mass produced automobile industry. "The Pavillion de L'Esprit Nouveau... constituted itself a document of standardization. All its furnishings were the product of industry and not of the decorators" (Eliel, 51).

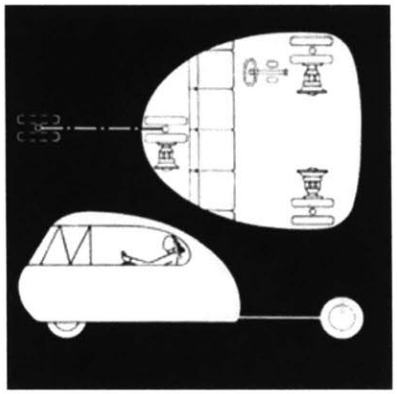
From an urban design perspective, Le Corbusier was quoted arguing that the "automobile destroyed the city, the automobile will save it" (Tzonis, 79). This position was expressed in his exhibit design for the Salon D'Automne, a strategy to redefine the contemporary city. Through theoretical diagrams for a *Contemporary City of Three Million People*, the concept of having 400,000 people inhabiting the city center within twenty-four 60-story-skyscrapers, coupled with green zones for pedestrians intermixed with automobile and train circulation, made for a city with increased density and speed (74). Later in his proposed re-design of Paris, known as *Plan Voison*, Le Corbusier proposed a strict separation of built volumes, green space, and highways, which created a new world where the street had "ceased to exist" and had been replaced with widely spaced, cross shaped, crystal towers. These translucent prisms contained roof




Adolf Loos sketches for Lancia (Margolius).



Walter Gropius: Adler Standard 8 (Margolius).



Buckminister Fuller (James).

gardens and raised ramps with pedestrian walkways, along with automobiles servicing this city. "Le Corbusier imagined the city to have 'clear and pure air', to be free of noise, and to provide the inhabitants with the spectacle of cars 'crossing Paris at lightning speed' leaving during the night 'luminous tracks'...like the tails of meteors" (80). The position of having the car save the city was highly controversial at that time, but nevertheless, did not change his impression of the machine as a symbol and expression of human endeavor.

Le Corbusier attempted his first car design, the Voiture Minimum, in 1928. He went about the design for the rear-engined car similar to the conventional architectural process; plan first, elevations, then a series of perspectives (Margolius, 57). The design was eventually submitted for the Societe des Ingenieurs de l'Automobile (SIA) competition in 1935, with his cousin Pierre Jeanneret. Other architects who have attempted this synthesis of architectural and automobile design include the likes of Joseph Maria Olbrich, Frank Lloyd Wright, Adolf Loos, Walter Gropius, and Richard Buckminister Fuller (Margolius, 33-77).

Alison and Peter Smithson, whose New Brutalism took a hostile stance against the "New Empiricism/Humanism" in the early 1950's, worked under a dictum where materials spoke for themselves, and where the "truth to materials" was an essential component to their design movement (Banham, 123). The movement responded to social issues of that day, which did not leave out issues raised by the automobile. The Smithson's had a love affair with the Citroen DS, and Alison took this love further to create *AS in DS*, a seminal

Alison Smithson *AS in DS* (Bell).

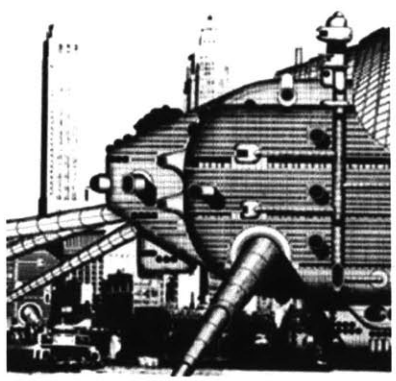
Machine architecture (McCarter).

Chernikhov (McCarter).

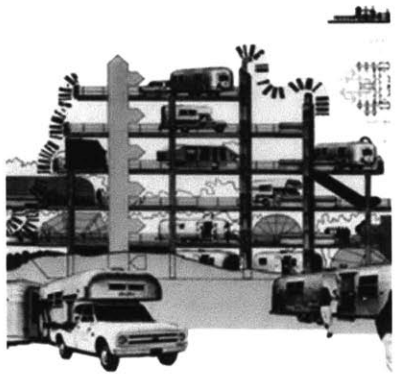
book which paid homage to the design of the car, as well as noting the psychological effects the car had on the passenger in relation to the outside environment. "AS in DS charted the couple's frequent travels from London to Wiltshire, a journey captured through fleeting glimpses, sketches, and photography" (Bell, 63).

The investigations and inquiry within the automobile and mass production industry has led to further questions of mobility, spawning architects to give interest in areas of dynamism such as flexibility, portability, and adaptability. Architecture capable of ready change became a notion revisited by architects past and present, representing a specialized art dealing with dynamic and active structures at many scales. In this day and age, it is becoming ever important to be flexible, and to be surrounded by adjustable environments. Moreover, it is becoming increasingly easier for flexible living to be realized with the latest information and technological advancements. Mobile solutions in architecture are becoming more than just a last resort solution, but having a "performance advantage...compared to the standard, static building solution" (Siegal, 014).

The concept of flexibility through mobility was first investigated for furniture pieces during the post revolutionary Russia, designed with constructivist ideas – parallel to the large housing developments in the 1920's and 30's. The task by the Russian Constructivists was to create a socially new form of dwelling, as part of establishing a socialist way of life (Vasallo, 105). The idea was to transform



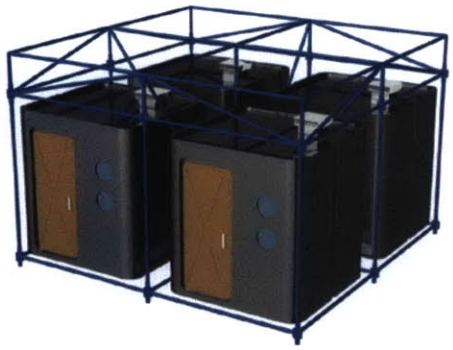
Walking City (Cook).



Plug-In City, Archigram (Cook).

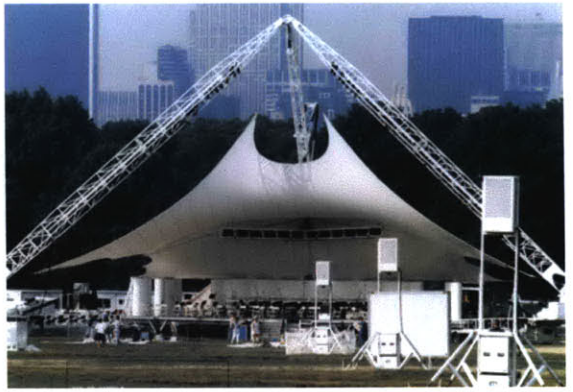
the way of life trough the resident's self-administration, and creating a new form that could accommodate a transitional type of dwelling. Moveable and folding panels were used to allow for the oscillation of large and small space, and constant re-arrangement of equipment and utilities (106).

Urban agitators through the 1960's such as Archigram, fueled the imaginations and sentiments for nomadism and mobile architecture. Projects such as Peter Cook's Plug-In City, Dennis Crompton's Computer City, and Ron Herron's Walking City, recognized the need for "multifunctioning and infinitely reprogrammable body, detachable auxiliary units, and telescopic legs" in the attempt to stir contemporary theory and social commentary at that time (Siegal, 023). Instant cities were developed, bringing together mobile trailers, inflatables, lightweight structures, and scaffolding in a circus like manner, creating an ephemeral context that would be present one day, and relocated the next. Instigated by Cook, expendability within architecture from a consumer standpoint, became a central focus in Archigram's work. The concept of "expendabilia" and its social acceptance stemmed from it being a product of consumer society, and efficiency within design. Cook states, "Our collective mental blockage occurs between the land of the small scale consumer product, and the objects which make up the environment. Perhaps it will not be until such things as housing, amenity-place and workplace become recognized as consumer products that can be bought 'off the peg'- with all that this implies in terms of expendability (foremost),



Portable Skyscraper, FTL Happold (Lupton).

FTL Happold (Lupton).

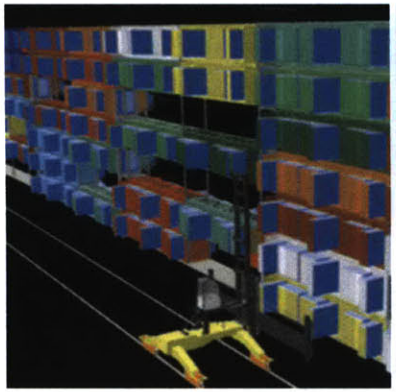


Carlos Moseley Music Pavilion (Siegal).

industrialization, up-to-dateness, consumer choice, and basic product-design – that we can begin to make an environment that is really part of a developing human culture" (Banham, 169). Expendability in the face of change is best exemplified in Archigram's notorious project Plug-In City, where an enormous, long-term mega structure, which contained essential services, into which were plugged shorter term modules for a variety of needs; "a planned obsolescence" (170). Archigram's vision of expendability, ephemeral structures, and component habitation, offered a rich exploration within architectural practice and discourse, paving the way for future architects to question the way future spaces and cities are developed.

A growing number of contemporary architects are exploring these issues of portable and expendable architecture, especially facing an increased concern in sustainability and the environment. FTL Happold, a design and engineering services firm, places an emphasis within their design of lightweight, deployable structures, and flexible interiors. The approach of design merges lighting, form, structure, and the environment to reach their goal to integrate architecture, engineering, and environmental design into a "unified discipline of building design" (Siegal, 053). Projects include the Pier 6 Concert Pavilion in Baltimore and AT&T Global Olympic Village in Atlanta.

Another sustainable approach towards portability exists in the adaptive reuse of ISO shipping containers. A number of


MDU (Siegal).

Cement mixer, LOT/EK (Bell).

E-Hive, Doug Jackson (Siegal).

iMobile, OMD (Siegal).

architects have explored this solution which allows for a multi-functional, land and sea, building block alternative to designing from scratch (017). LOT/EK, an architectural studio based in New York, reuses everything from old cement mixers to gasoline storage tanks. In the project MDU, (Mobile Dwelling Unit), a shipping container is converted into a living quarters with extruded sub volumes that can be pushed in for travel, and pushed out to expand the floor area. Similar to Archigram's Plug-In city, the units can be "plugged" into a mega structure, using a sliding crane, which contains all the utilities and systems needed. Doug Jackson of LARGE, proposes an entire community – "e-hive" – consisting of modified individual shipping containers. The containers are all inter-linked digitally and physically, creating a flexible living condition with indoor and outdoor community spaces (064).

The Office of Mobile Design, founded by Jennifer Siegal, focuses on developing an architecture that can be demountable and mobile. The firm's design philosophy is an attempt to find non-standard solutions to unconventional and unique problems – that occurs at the intersection of portablility and sustainability (109). OMD has designed solutions for mobile kiosks, as well as mobile eco-labs, and even a mobile "on-line portal" for accessing the world wide web. The project *iMobile* brings six individual work pods on the bed of an Isuzu truck, providing a complete computer set up to either bring the "on-line" shopping experience directly to the consumer, or to provide computer access to neighborhoods in need (119).

Maison Valise (Richardson).

TimeZone (Richardson).

TimeZone, an architectural practice out of Paris, France, seeks to change the face of existing cities by introducing mobile, ephemeral, solutions to the built urban environment. TimeZone designs by the maxim that less is more, and in designing their 'Maison Valise' Housing Unit, this maxim holds true. By designing a solution to housing in a compact, utilitarian, temporary structures, they attempt to resolve the difference between the static, rigid, monumental qualities of present cities with the essential transient nature of human population (Richardson, 200). TimeZone creates a unit that adapts to the ever-changing individual and family requirements for living, which forces interaction through the notion of living on the street, and experiments with lightweight and durable construction to accommodate the rigors within an urban context.

One successful deployable solution to an urban reconstruction problem came from the design of Renzo Piano. For the preservation and restoration of a historically evolved town center in Otranto, Italy, Piano designed a mobile "laboratory" in an attempt to renovate the center. The mobile laboratory, developed with the help of UNESCO, housed a double container that could be transported on an ordinary truck. The container then could be configured in variable positions through folding planes. A tent roof, stretched over the laboratory, protected the installation from the weather elements (Piano, 38). However, the solution went beyond providing architectural space, but served as a didactic tool to illustrate ways in which members of the town, with the help of new technologies and materials,

Mobile Laboratory; Otranto, Italy (Piano).

could gently renovate and preserve their neighborhood at a low cost. "The main point was to make them understand that they could do this living in their houses during construction, thus avoiding a loss of contact with their surroundings" (38). The project has been one of a few promising forms of "urban reorganization" that allows for the prolonged life of town centers.

Mobile architecture is a solution for ephemeral problems in today's environment, which is constantly evolving and changing within a dynamic context. "With the recent advances in communications, building materials, and construction technology, mobile architecture provides new possibilities for enabling the activities associated with the sophisticated community of individuals who make up the world today" (Siegal, 015). Architecture is evolving to an awareness that the solution of mobile architecture is not employed only due to it being the only solution, but seen as a flexible, democratic, and advantageous solution appropriate for a myriad of problems existing today.

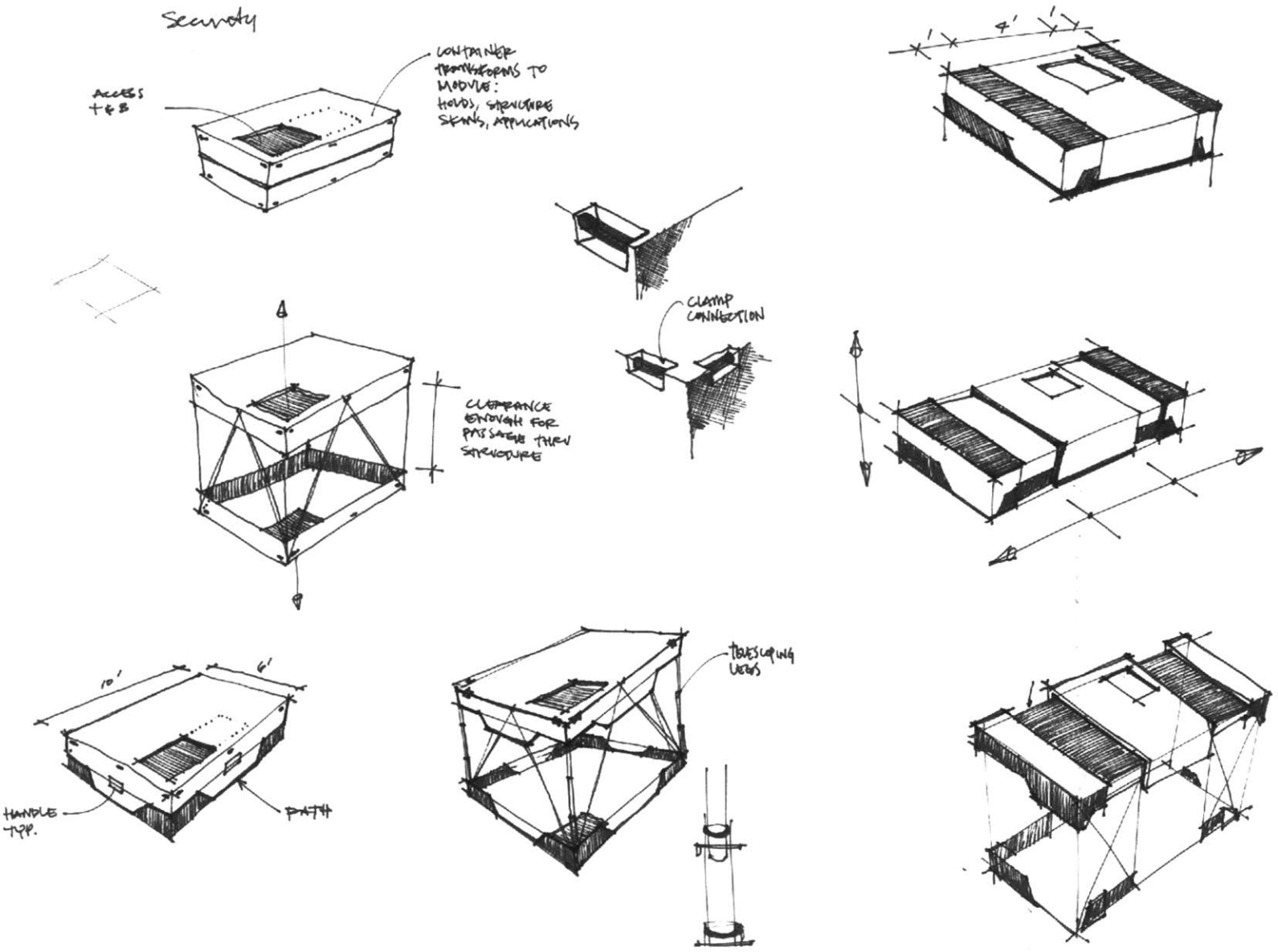
The design process of the mobile computer resource had few set parameters. A decision was made to not have one specific site, but to design within a general site condition of a severely low-income community. Generally, this ideal site would spawn issues of security and appropriation. The parameters which were set were that the unit was to provide the entire, appropriate infrastructure needed for these communities, (i.e. software, hardware, facilities, mentors), to provide a "safe haven" atmosphere within the streets, as well as being portable.

Conceptually, the design strategy was to create a system where the mobile units would centralize within

a school premises to serve as much needed, electronic classrooms, then satellite out into the community to become an after school, computer activity. Of course, over the summer, the units would be used freely by the community as per their respective needs.

Concerns were raised during content and concept reviews of the issues of appropriation and ownership, which primarily dealt with the psyche of members within these low-income communities. The assumption was that if a project were an outside intervention coming into the community, top-down instead of from bottom-up, the community would naturally reject it. The ideal solution would be a grass-roots project where people within the community were responsible for the success and utilization of the unit. This responsibility would instill a sense of investment, thus providing ownership, while at the same time initiating a social interaction.

The design solution was architecture as container. The container would hold the necessary components to erect the module, allowing for an ease of construction and portability. The primary structure was borrowed from scaffolding systems, with lateral cross bracing and telescoping legs. The chassis of the top and bottom of the unit allowed for storage space as well as space for information technologies. To make the unit light enough to carry, and easy enough to be assembled by a group of 2-3 persons, the structural chassis and skin were designed of a lightweight aluminum. While compressed (closed), the design was easily stackable, with as much as nine units capable of being carried on a standard flatbed truck.


Security
ACCESS T&B
CONTAINER TRANSFORMS TO MODULE: HOUSE, SERVICING SEATS, APPLICATIONS
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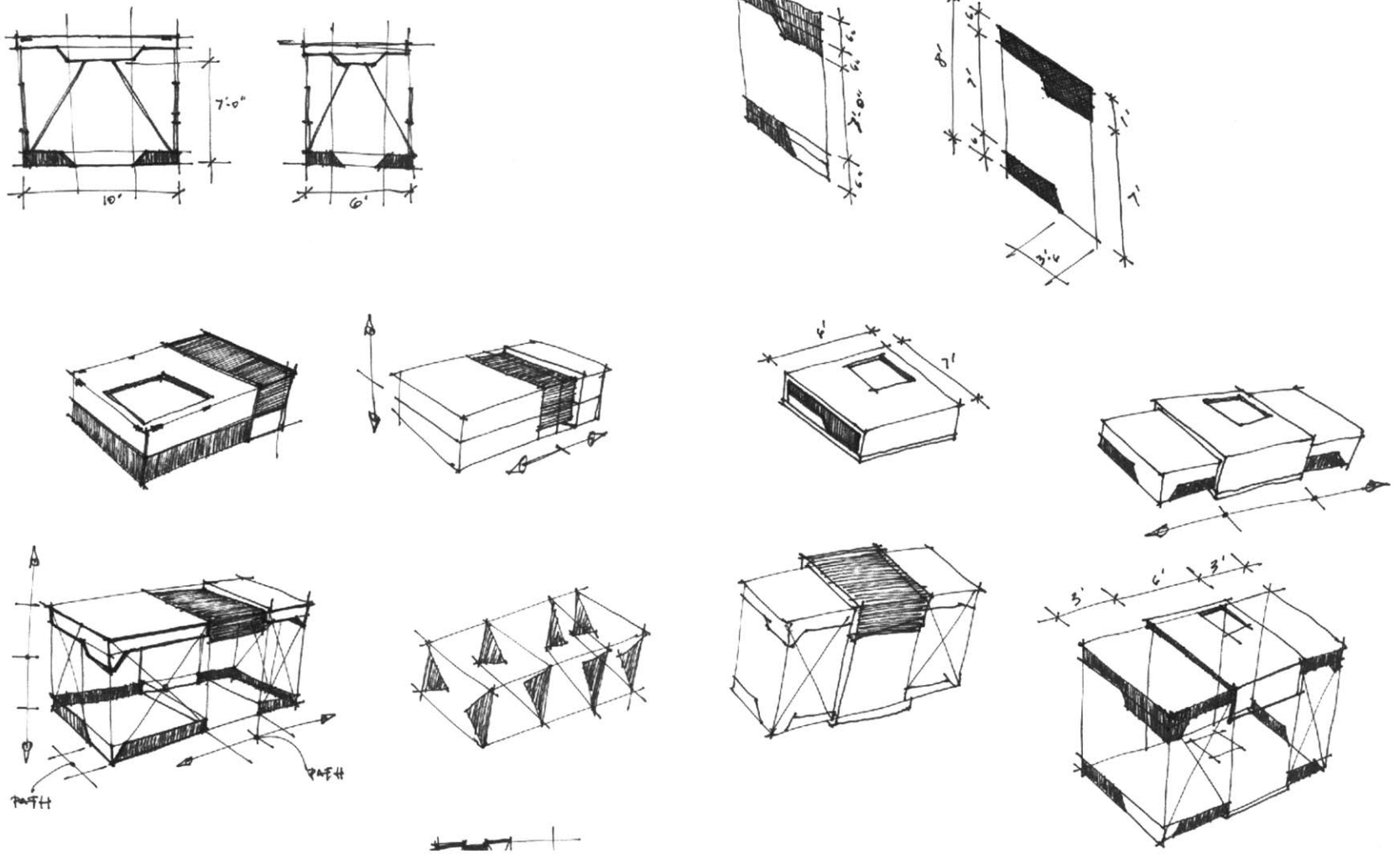
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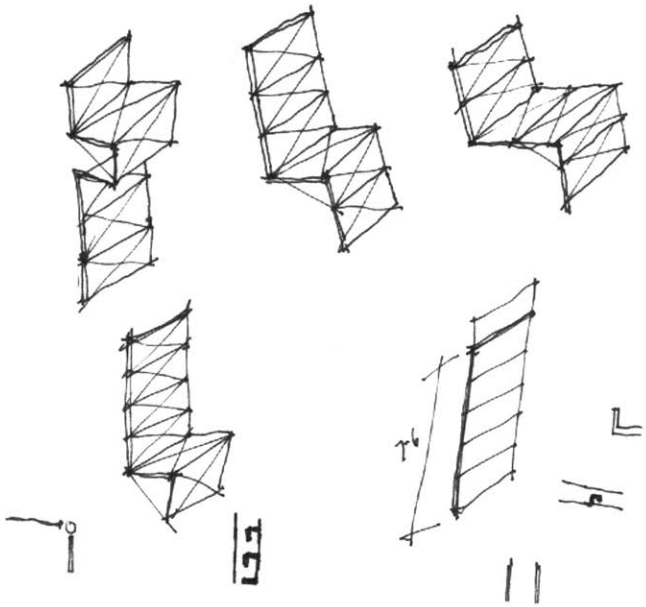

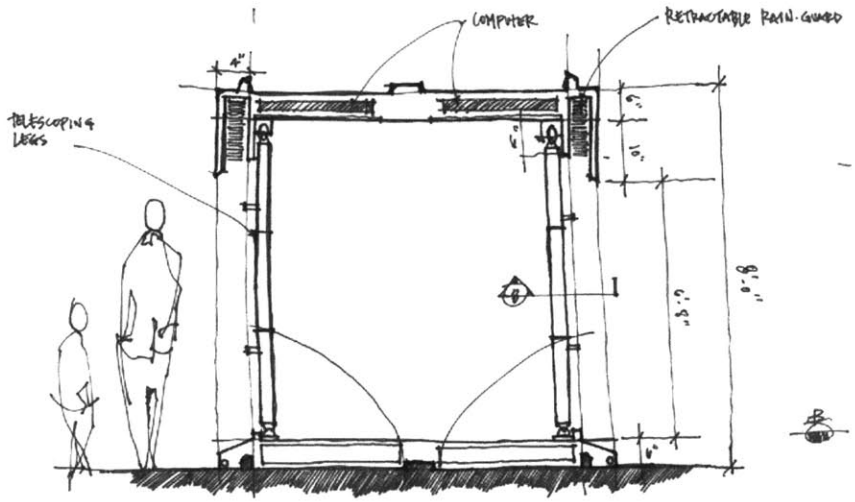
COMPUTER
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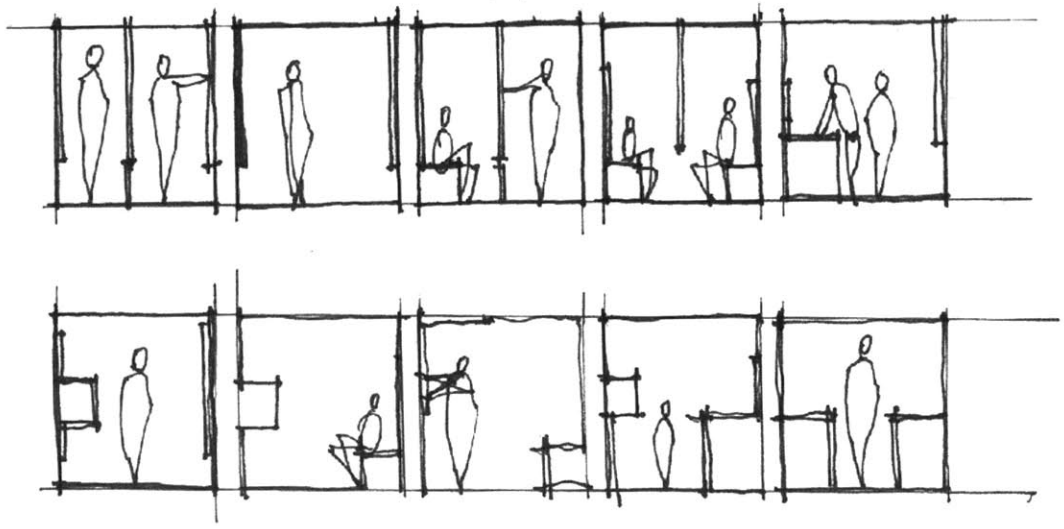
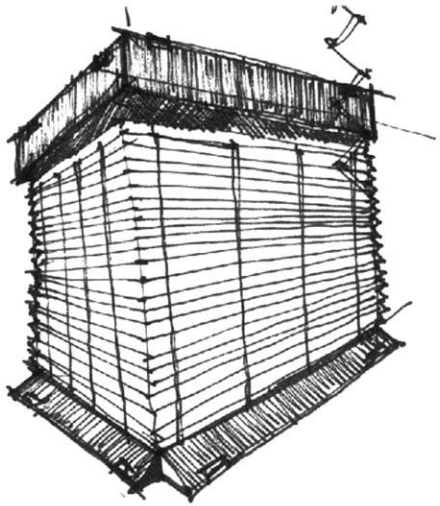
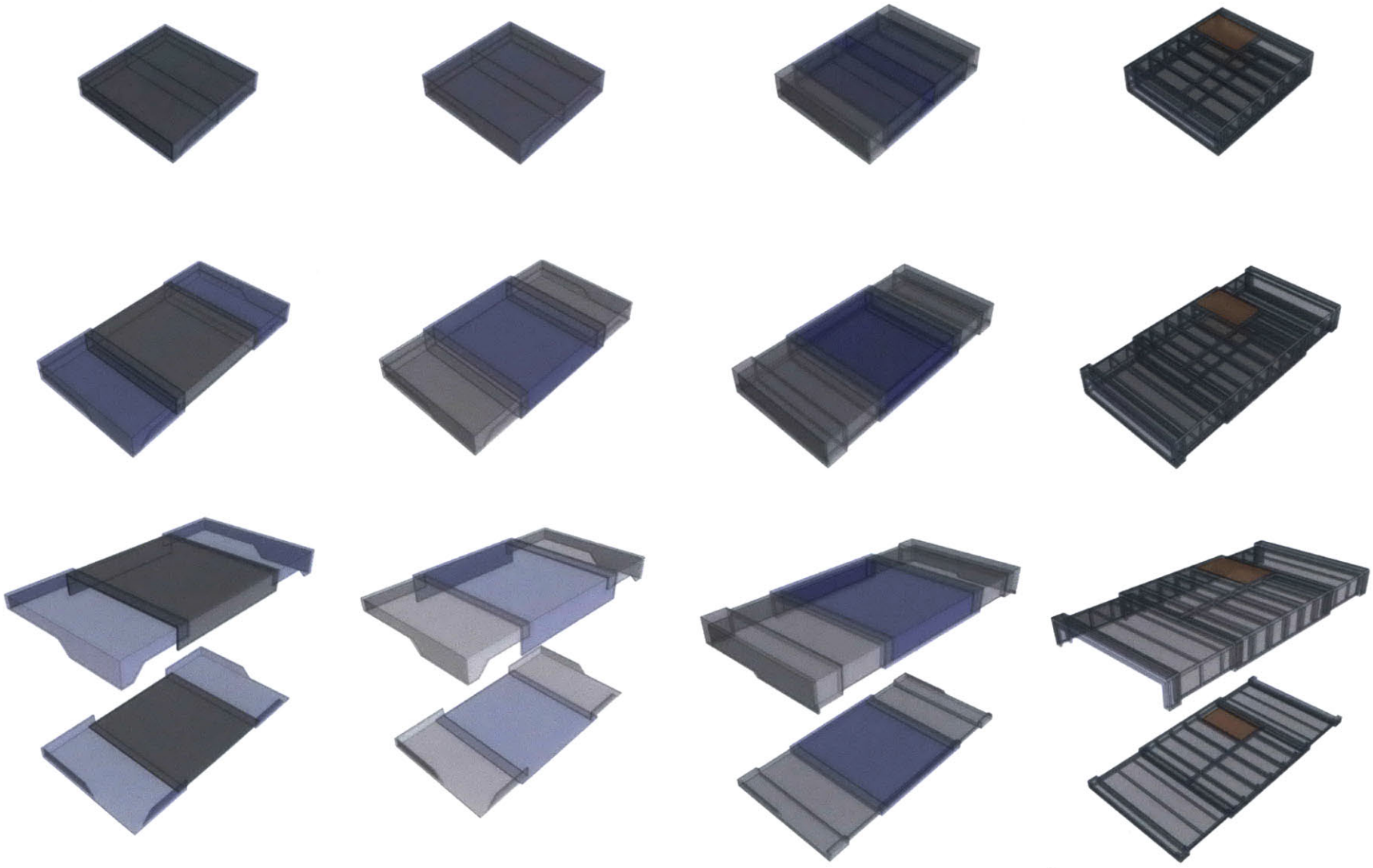


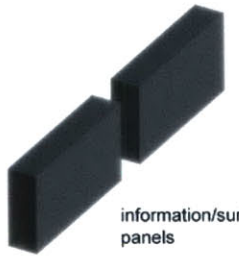




panel frame

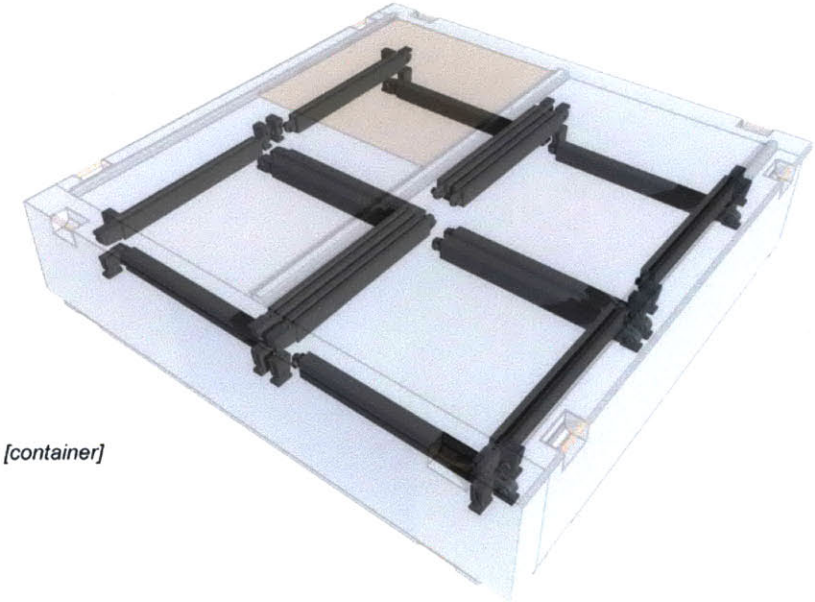
panel structure

panel bracing



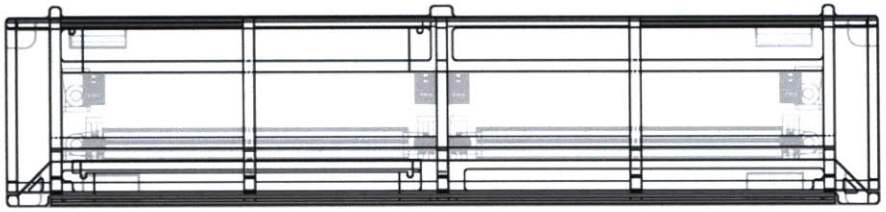
information/surface panels

module bracing

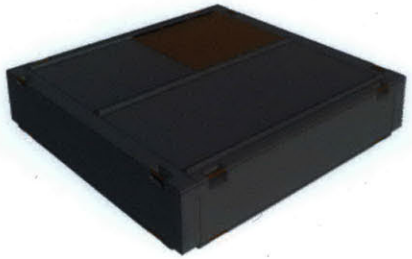


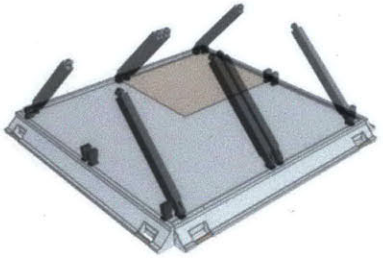
module *[container]*

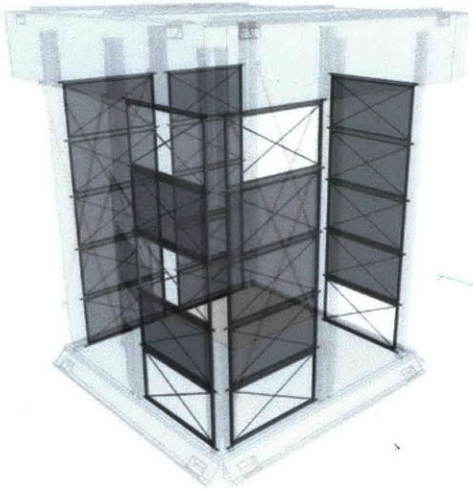
bracing connectors

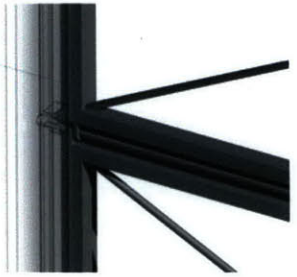


ladder





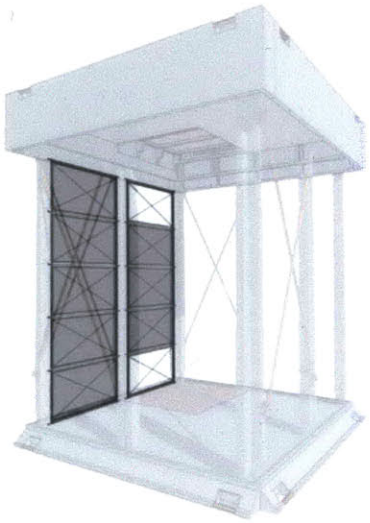


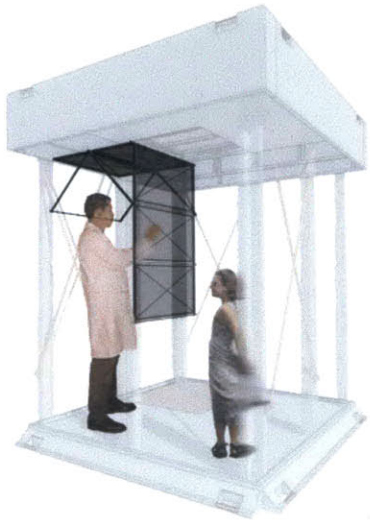


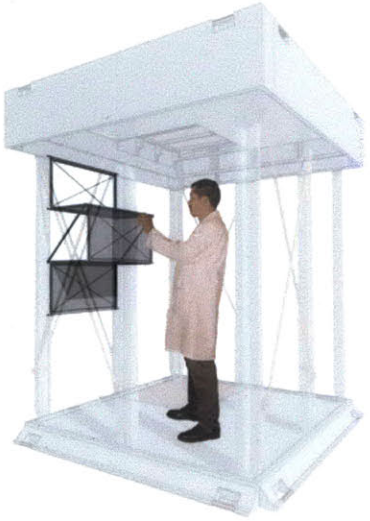
An open-ended system approach became the focus for the interior design. The concept was a form system, which structured the way in which the interior space was coordinated, utilized, and configured. By designing a paneling system, which could be altered to a number of prescribed positions, people using the unit could either assemble the system to be a wall, chair, table, or shelf. Furthermore, the system allowed for the choice of different levels of transparency within the panel, additionally providing the possibility of having panels that could display electronic information. The end result became a system where walls could either divide or blur spaces, or even become an interactive surface for individual or group use.

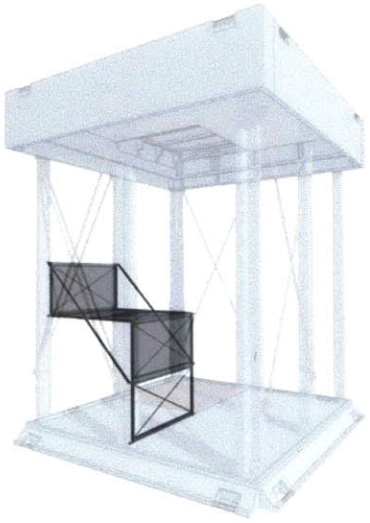
The solution was modular in an attempt to allow for the easy stacking of units, horizontally, vertically, or configured in any other stacked combination to produce a number of forms, (i.e. courtyard, u-form, l-form, clusters, double-stacked, etc.). Groups of these units permitted spatial, social, and computer interconnectivity. The design of the handles served as points for clamp connection to allow for secure stacking, and openings on the top and bottom planes allowed for vertical circulation. A weatherproofing membrane was also accommodated within the top chassis to prevent damage to the interior systems.

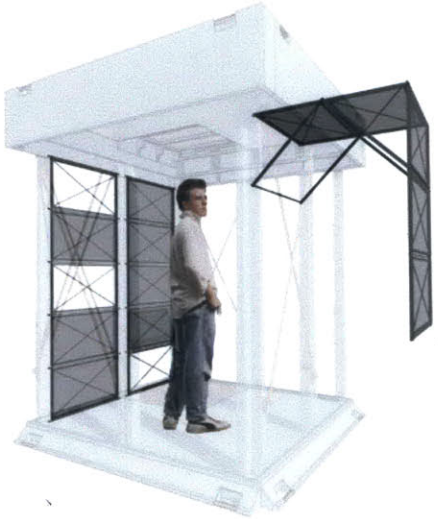
This open-ended, modular unit resolved many design issues on multiple levels, and would essentially create a "barn-raising" experience within a community. However, the design was not sufficiently flexible, an attribute needed for effective communal use. Having only a limited number of positions for the interior systems, the solution became too prescribed. Many other important issues of designing a mobile unit within a ghetto context were not resolved. Obvious utilitarian issues such as electricity, storage, workspace, and information technology strategies were not addressed, in addition to an appropriate resolution to the issue of security and possible vandalism.

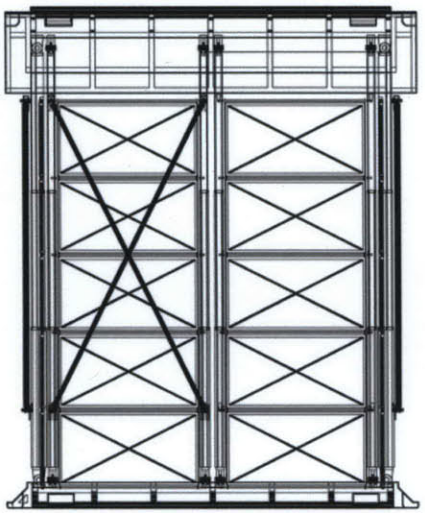


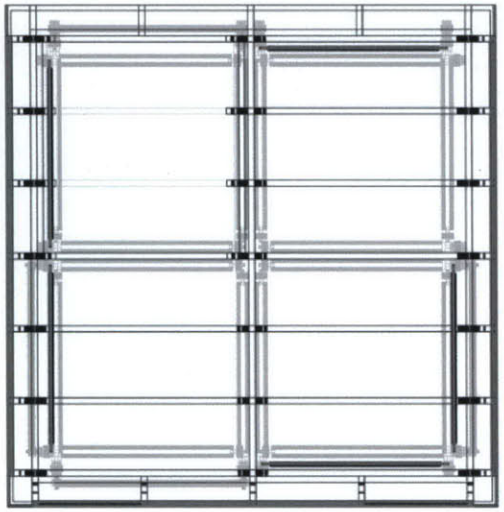


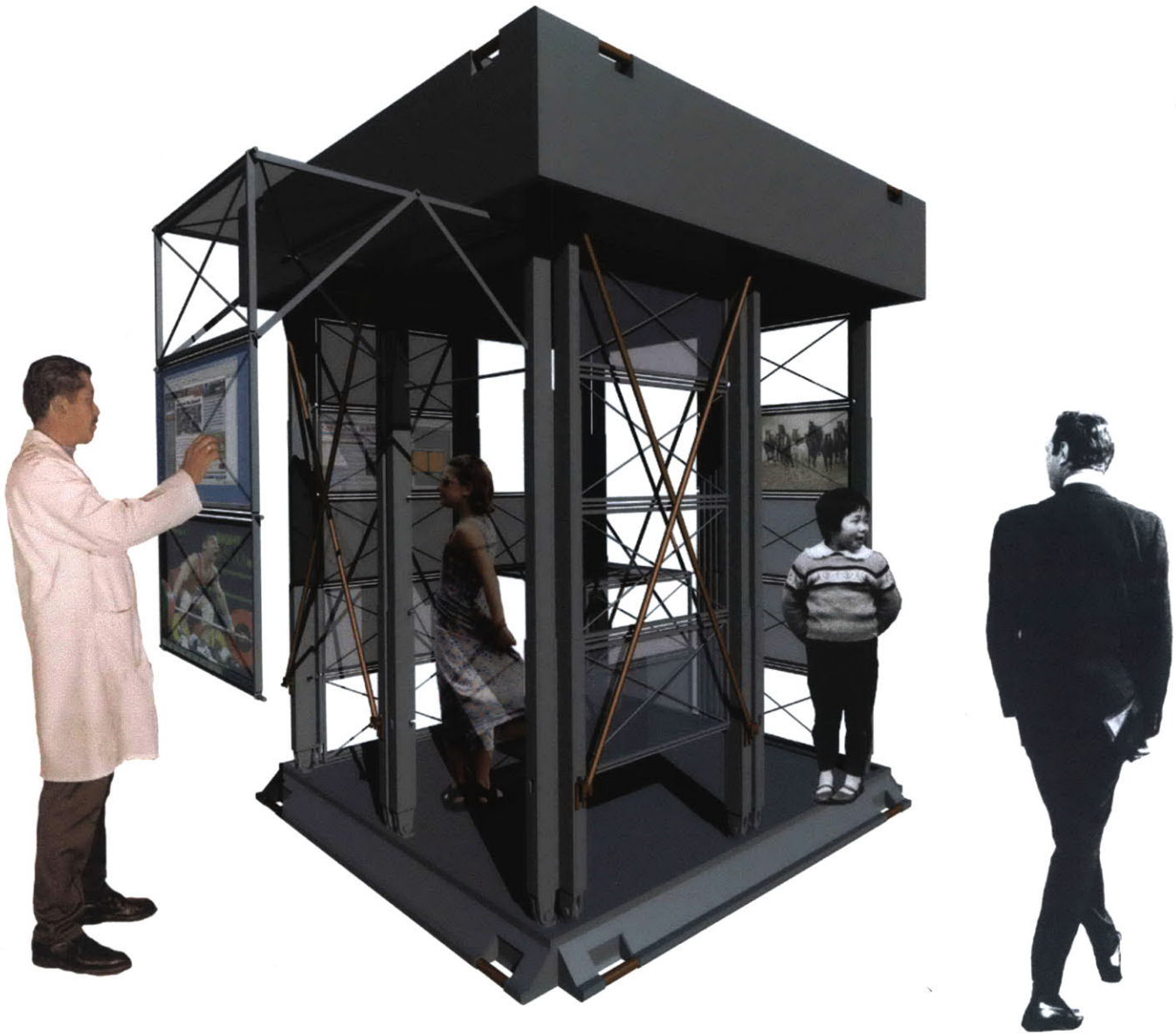


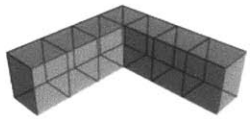


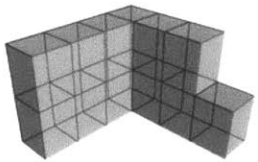


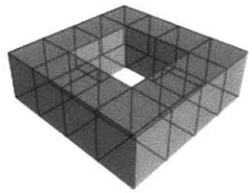


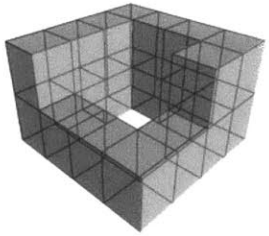


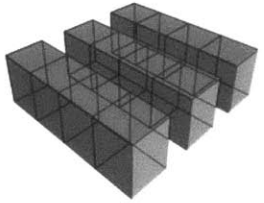


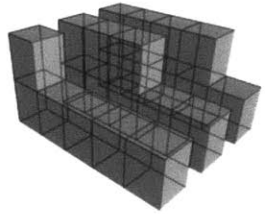


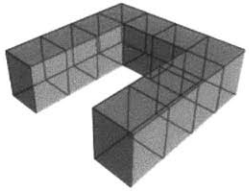


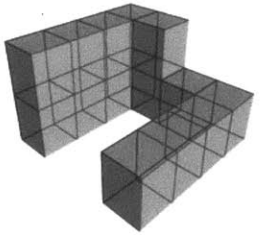


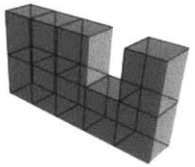


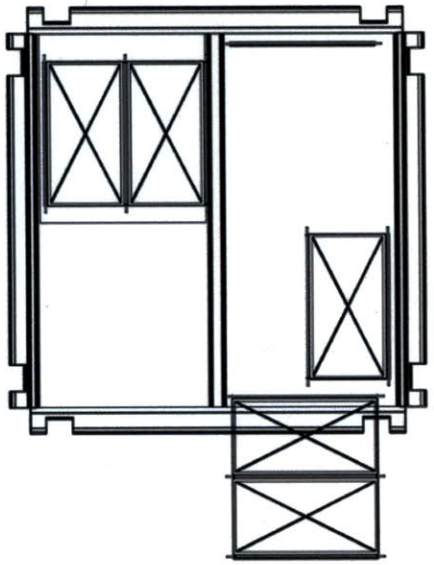


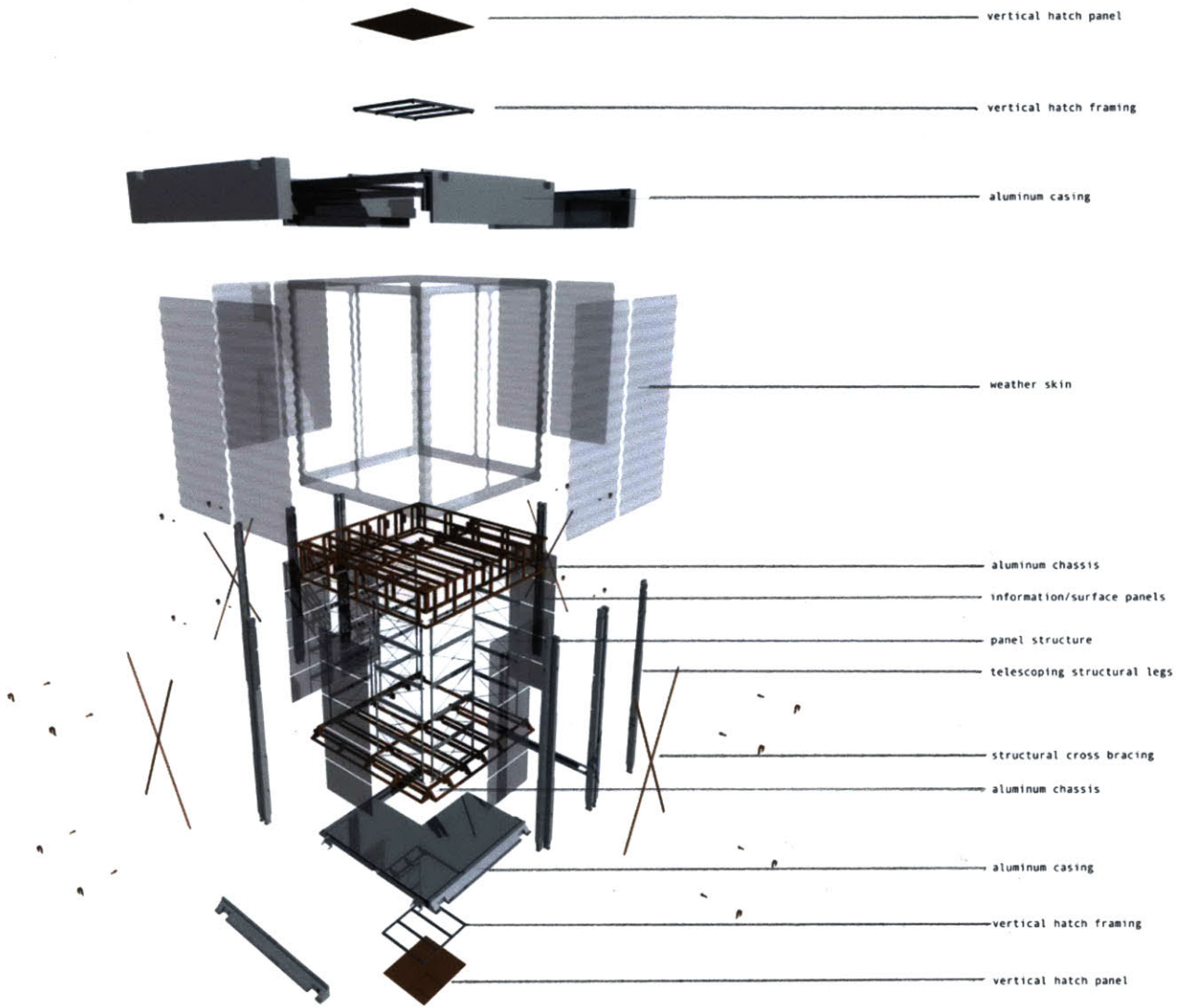











vertical hatch panel
vertical hatch framing
aluminum casing
weather skin
aluminum chassis
information/surface panels
panel structure
telescoping structural legs
structural cross bracing
aluminum chassis
aluminum casing
vertical hatch framing
vertical hatch panel

## CULTURAL SYNTHESIS

*IMPLEMENTING A SOCIAL PROGRAM TO PROMOTE INTERACTION - THROUGH DIGITAL ,MOBILE, AND INTROSPECTIVE MEASURES*

Investigations of the social and mobile precedents provided a solid foundation of historical and design philosophies, in which I could draw from to set the design parameters for this particular project. Combining the contexts of the socio-technical and cultural contexts, with that of the architectural history of mobile design, resulted in a rich mixture of social awareness and design sensitivity that serves as the anchor for the thesis.

The concept for the final design picked up where Bruno Tardiu's Tapori Encyclopedia left off; introducing computer technologies to low-income communities through storytelling, but with more sophisticated technologies. Digital storytelling would not only familiarize

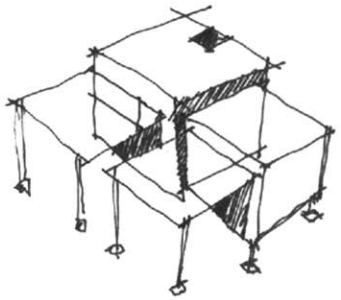
those within the communities with the computer interface, but also connect and familiarize community members with each other. The premise of this project centered on the youth, similar to Tardieu's projects within the New York communities. Stories would be collected from a digital camera, and then stored within the unit's own computer database. The stored information could then be downloaded to other users within the unit, or to other units in adjacent communities.

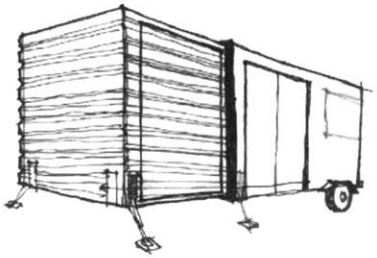
The units would remain mobile, designed atop a standard trailer bed, to allow for easy transportation. Mobility became a solution to the increasing need of non-permanent computer structures in low-income communities. With the lack of computer facilities, and the need for these resources to exist in many locations within the community, a mobile solution made the most sense. Whether in a community center parking lot, or in front of a church, the mobile resource would attempt to reach everyone. Similar to earlier schemes, the set program would have units congregate to provide electronic classrooms for local schools, and then decentralize to reach out within the community.

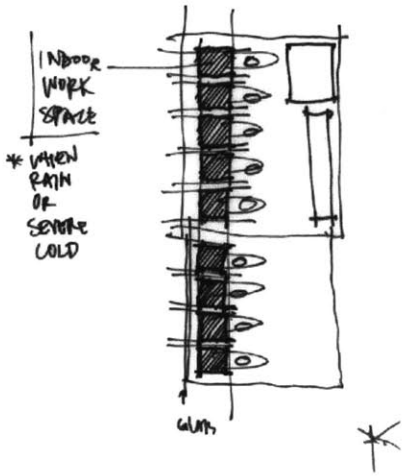
The project's surrounding context of extreme poverty and rough environments became a design challenge to resolve. Designing within the physical context, with assumptions of surrounding violence and vandalism, highly influenced the direction of the design and its function. Incidentally, the psychological context of the project made for additional impacts. Issues arising from both of these contexts included the following;

1. Concern for security of the unit itself as well as its equipment.
2. Designing a space that created a safe presence.
3. Consideration of ways to initiate ownership and investment within the community.
4. Explorations of how architecture could promote social interaction on the streets.

Architecturally, the design responded to these issues and concerns by not only a physical and material palette, but from an introspective look at my personal history of growing up in a low-income home and community.



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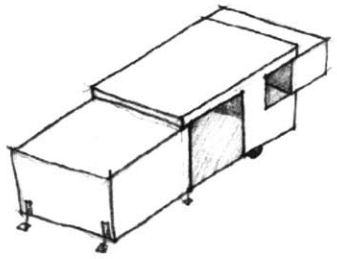

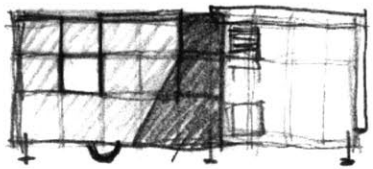

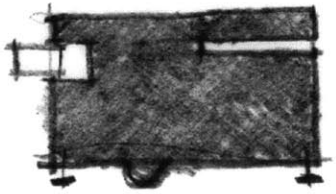

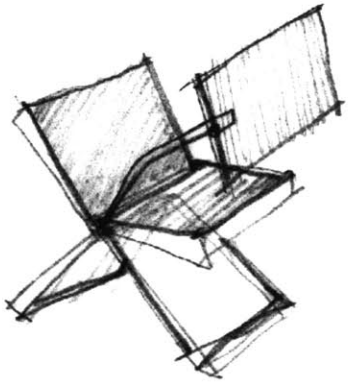

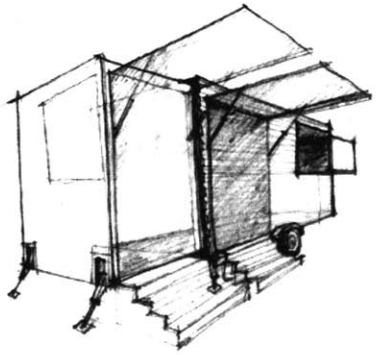

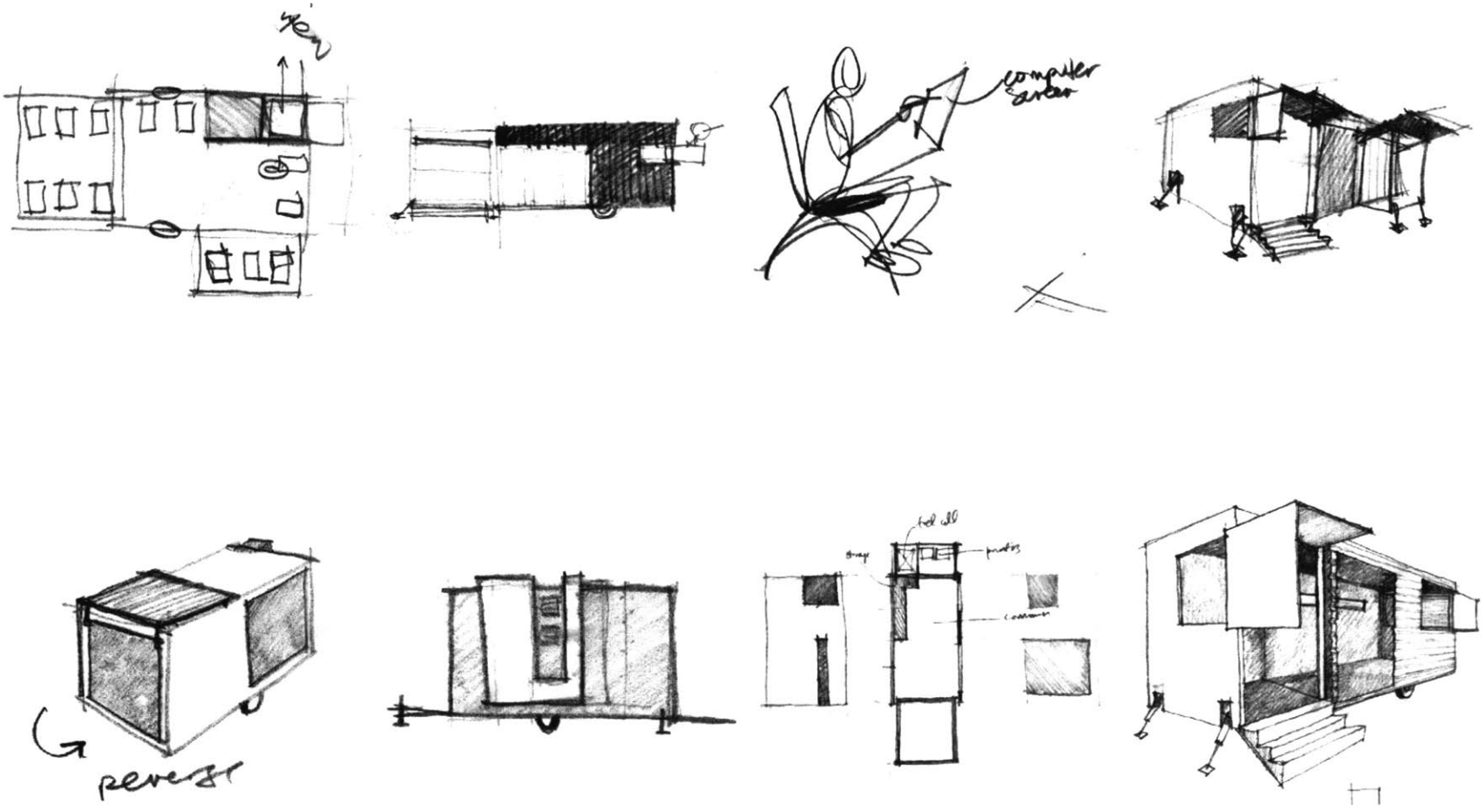
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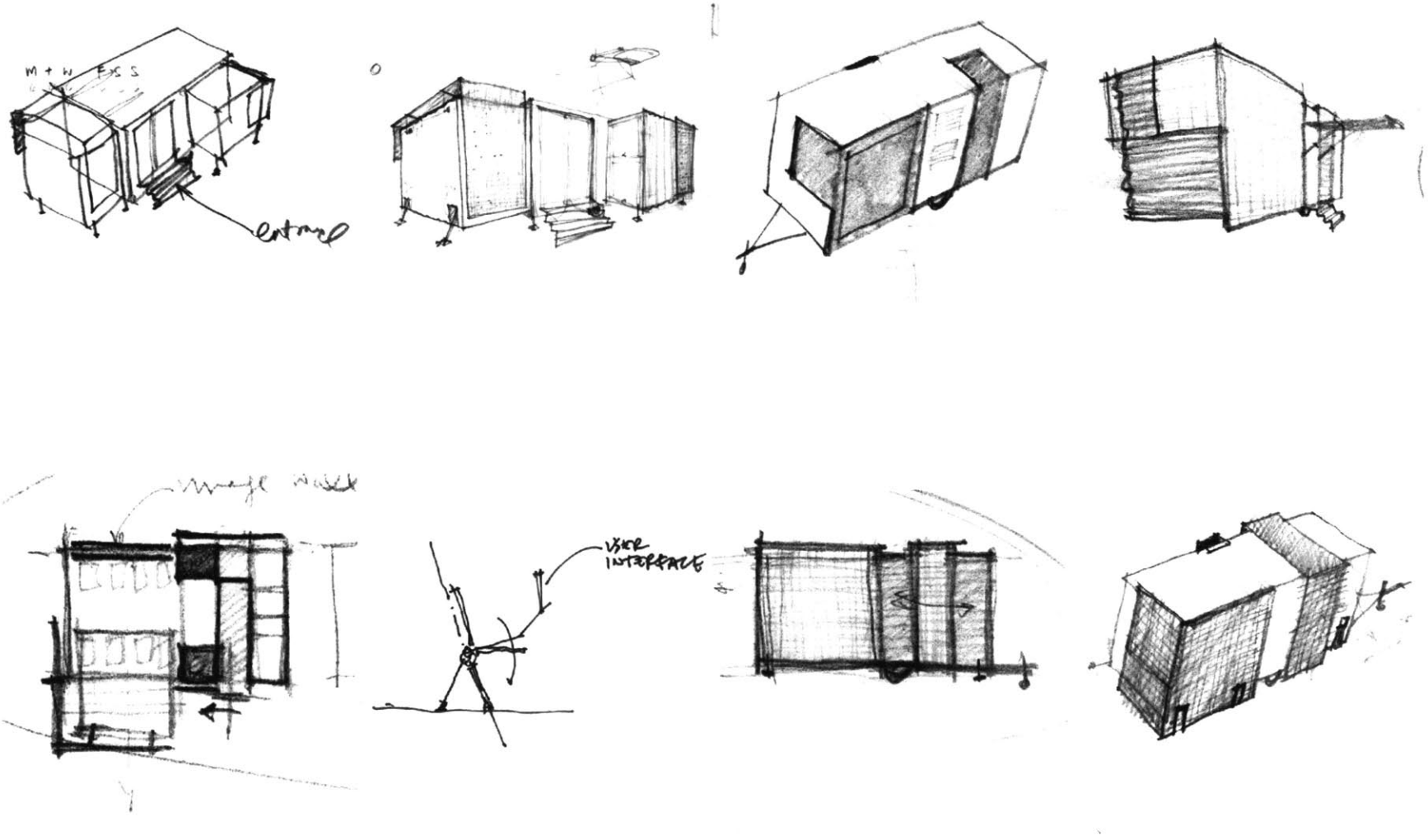
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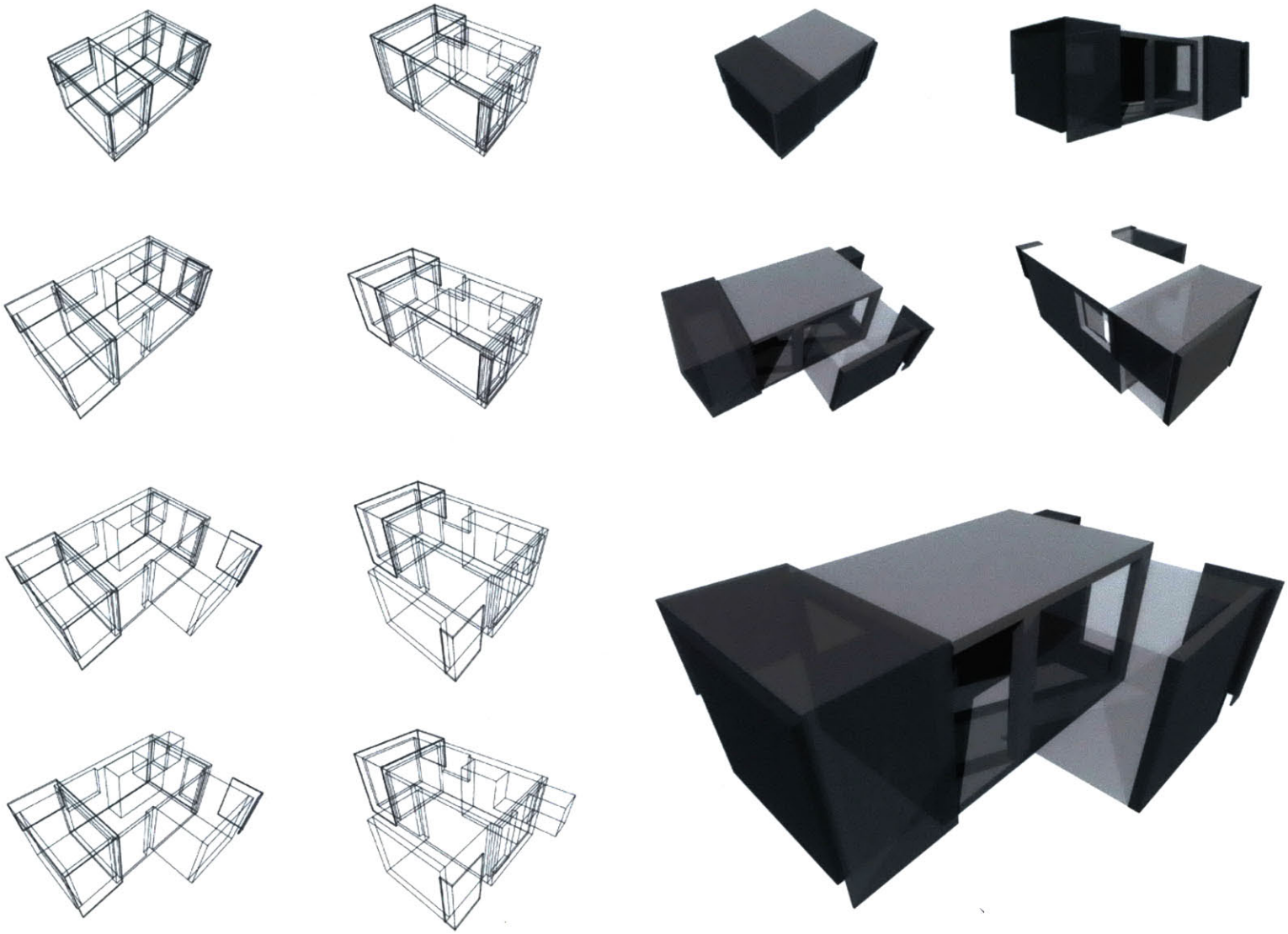
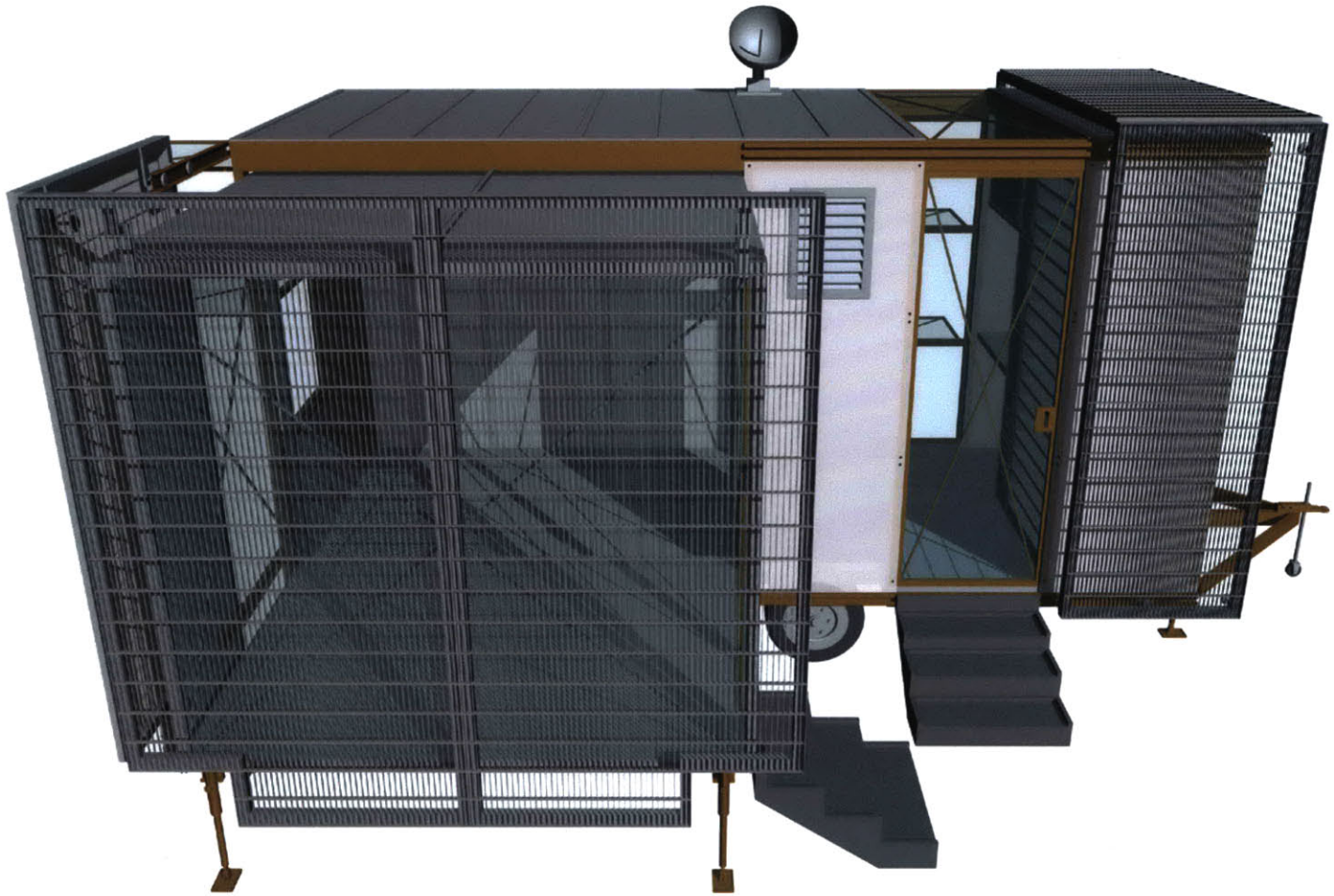
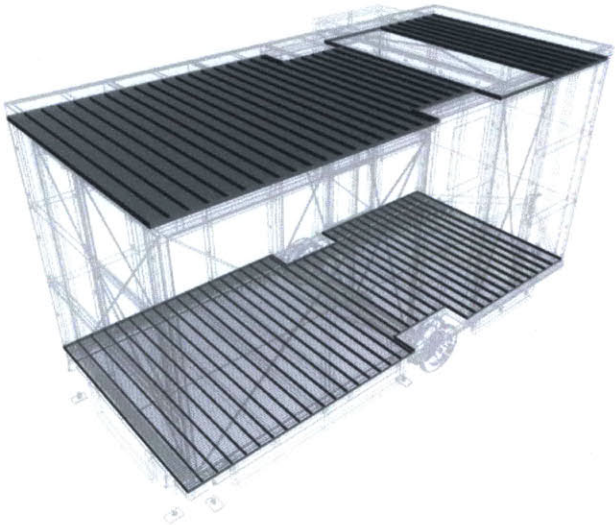
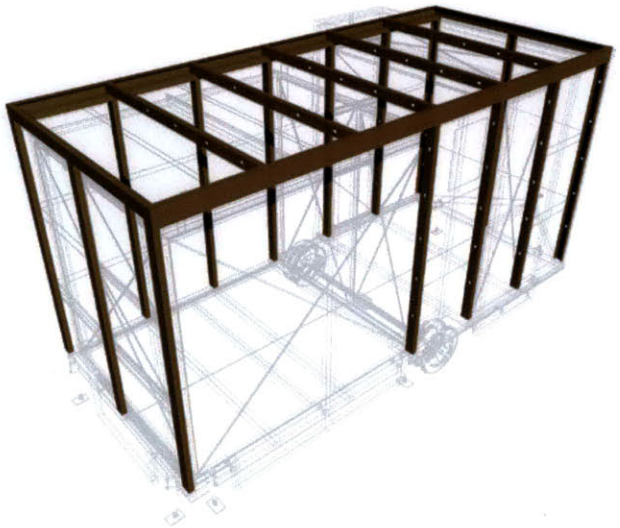
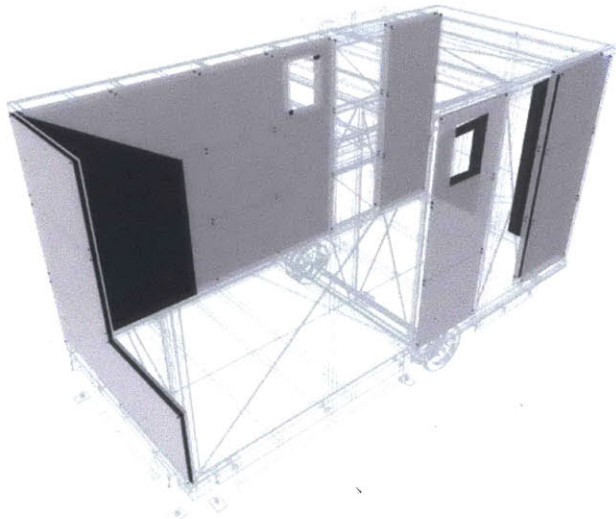
USER INTERFACE

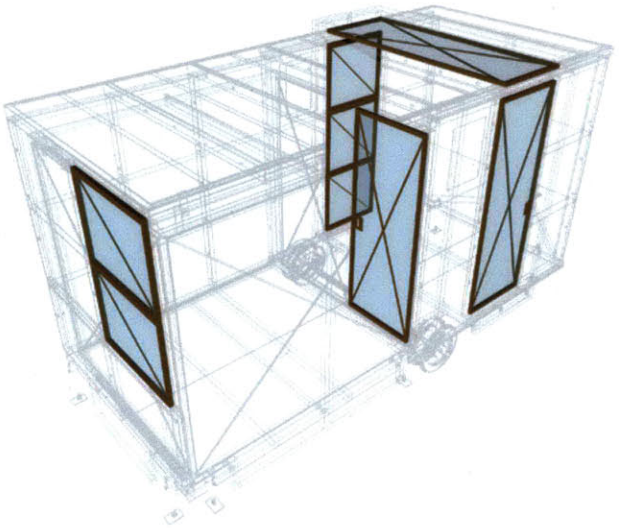


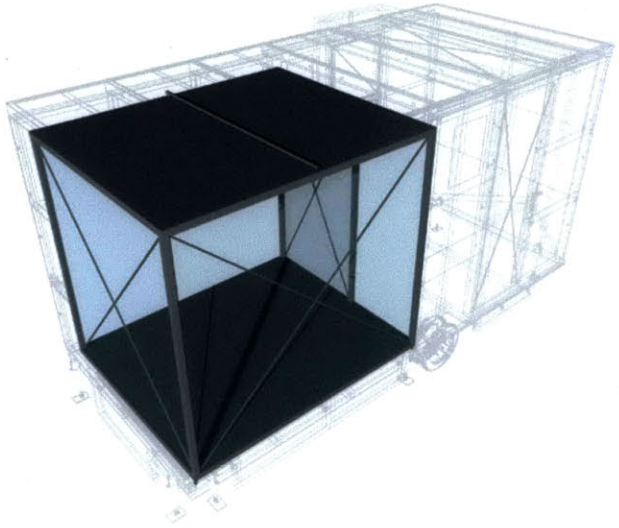


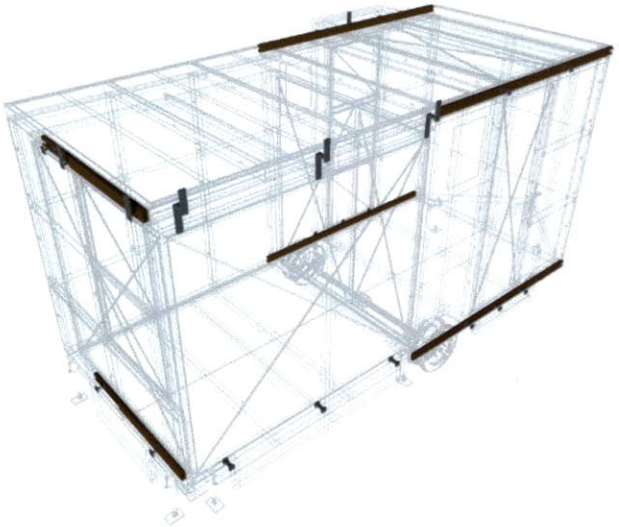


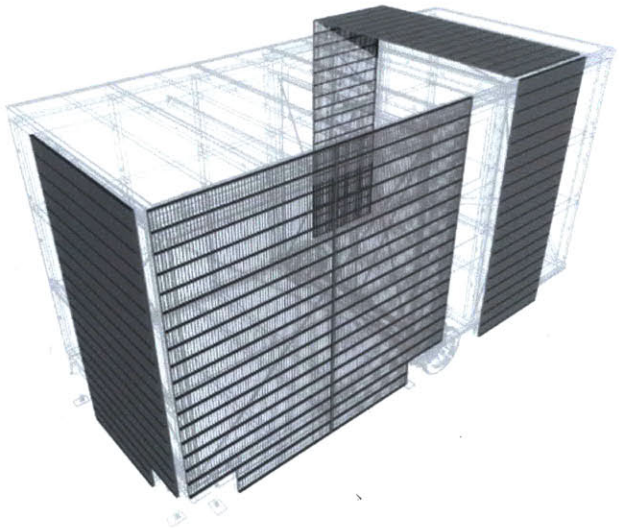


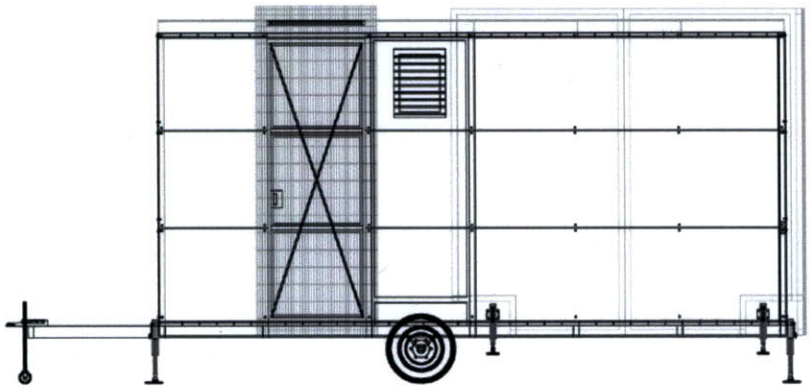


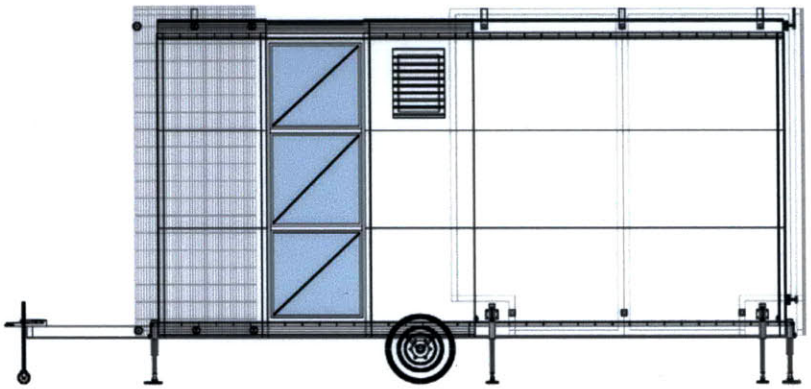


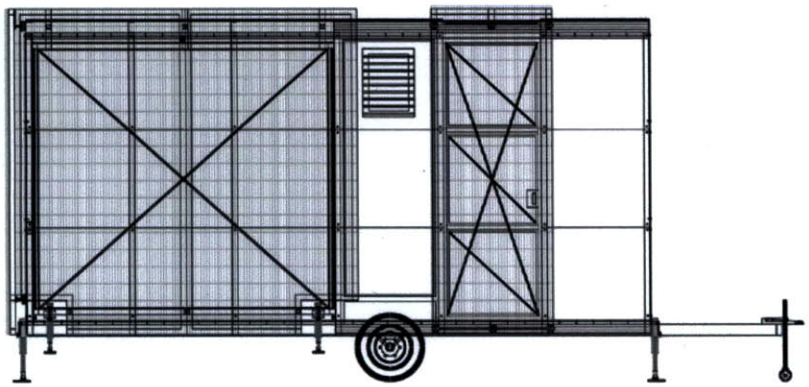


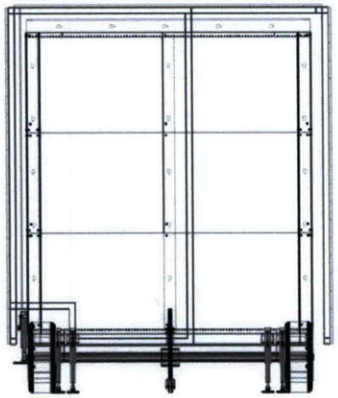


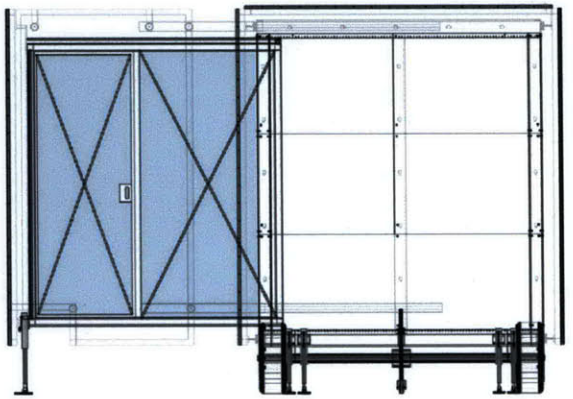


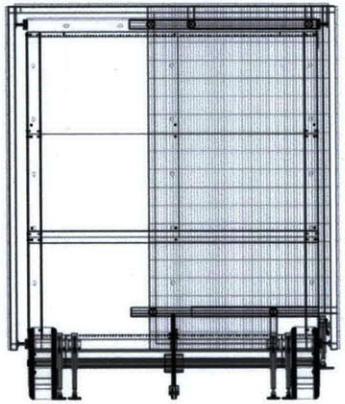


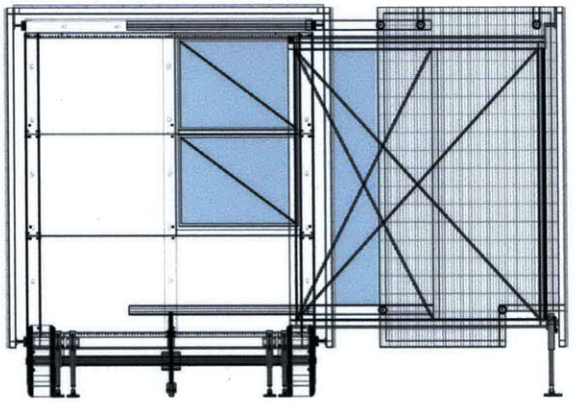












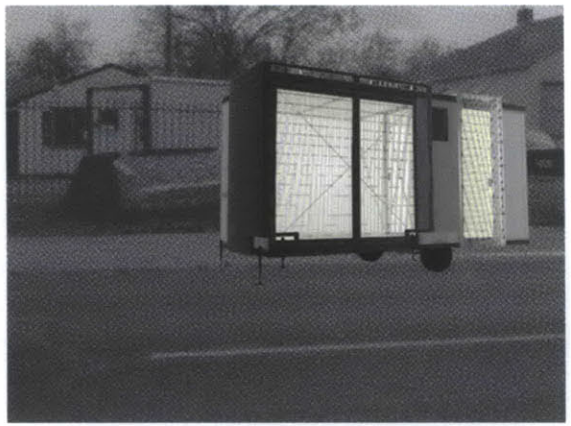
Industrial steel-grated panels were used to resolve the issues of security and vandalism, serving as protective screens over the glass openings. A shift of the panels along tracks allowed for access within the unit, and unobstructed views through windows. The panels combine a harsh, defensive feel for the unit while not in use, with a well-balanced level of transparency while in use. Essentially a translucent box with a steel-rated exo-skeleton, the unit provides a defensive measure, while maintaining a pleasing transparent, aesthetic presence. Depending on your vantage point, one either views strands of metal, or may view directly into the unit.

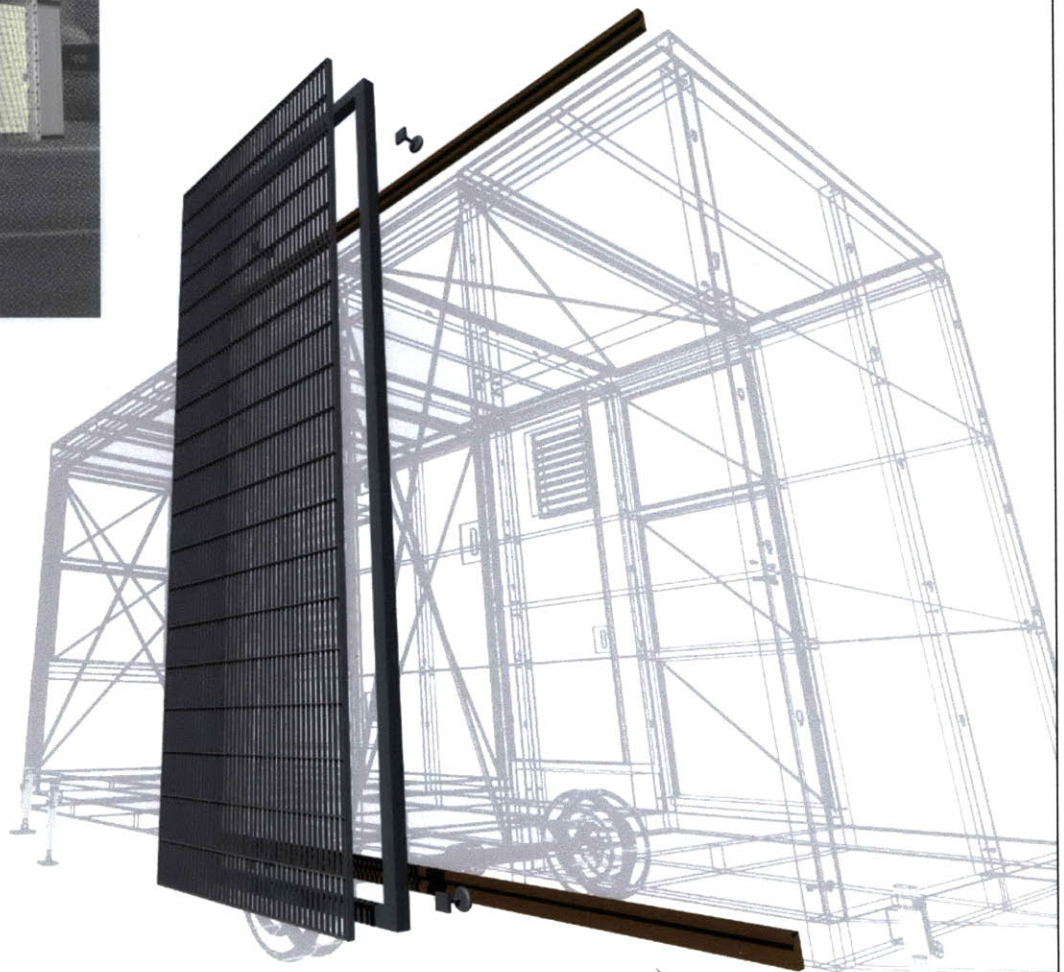
The structural frame of the unit is of standard lightweight, steel studs that allows for any wiring to be easily accommodated. Translucent, fiberglass panels sandwich the studs, and coupled with the steel grate, transforms the unit into a glowing box – a lantern in essence. This glow becomes a beacon for safety, a symbol of hope.

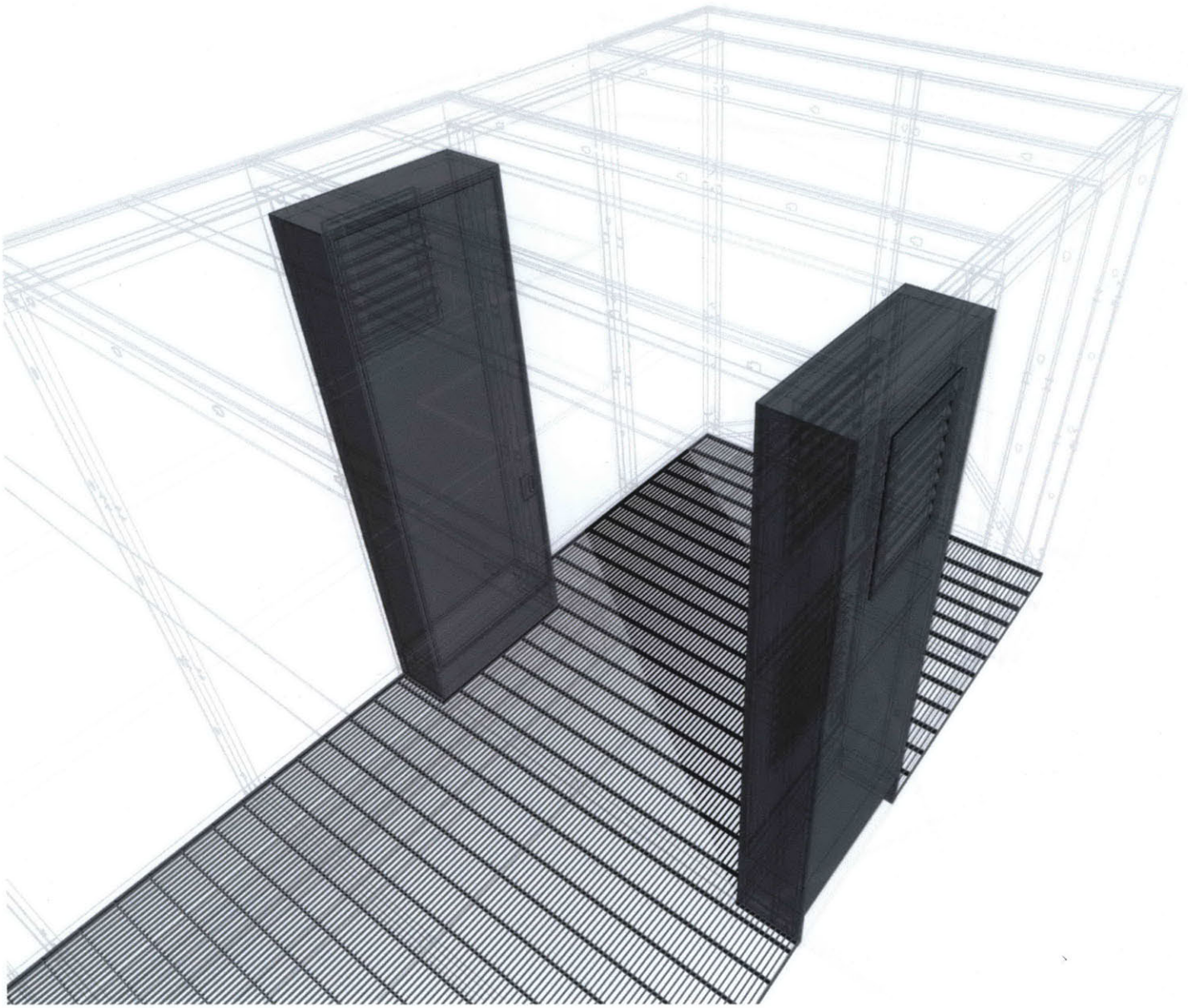
The steel-grated panels used as vertical façades, also flow into the interior of the unit, serving as the floor and ceiling panels. The durable panels would make it easy to upkeep and handle everyday rigors of use. Once enveloped within this steel mesh, three zones are distinctly designated by a shift in volume, and a band of light resulting from another shift. One zone is doubled in size by a box volume extruding from the unit, which creates a more communal, interactive zone. This zone would be used for either group work, or as a small, conventional, classroom setting.

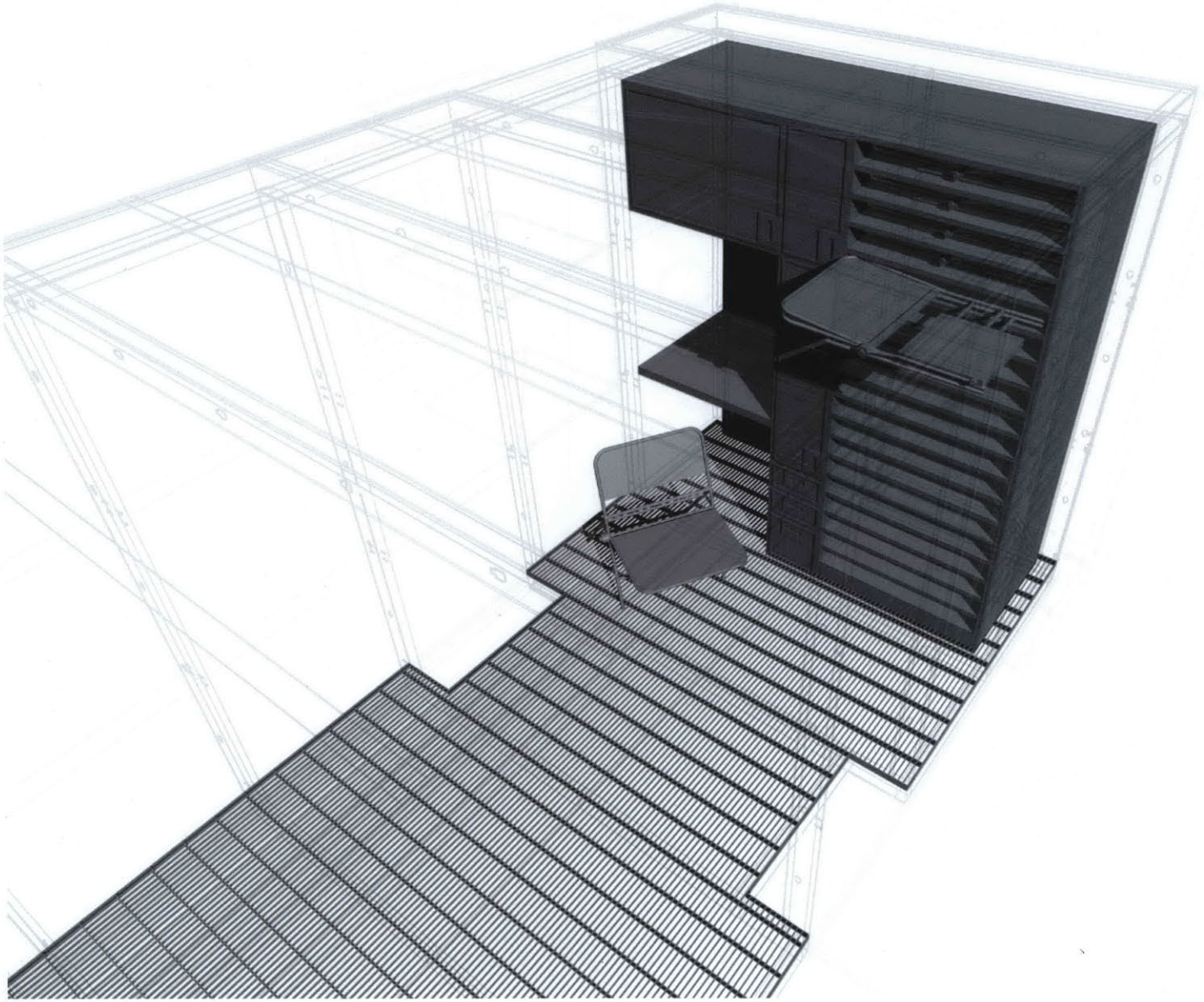
The second zone houses the two system cores, providing standard electricity and HVAC to the unit. The electricity would be generated by fuel cells, providing power for the lighting, HVAC, and computer equipment.

The third zone provides space for work and storage. A desk and storage drawers provide sufficient space for a single person to work, and also for storage of technical equipment such as printers, batteries, office supplies, etc. Space is also provided for the storage of eighteen chairs, which have attached computer technologies. The removable chair becomes the device that conceptually breaks the box, and turns the mobile unit into a mother ship carrying multiple units.

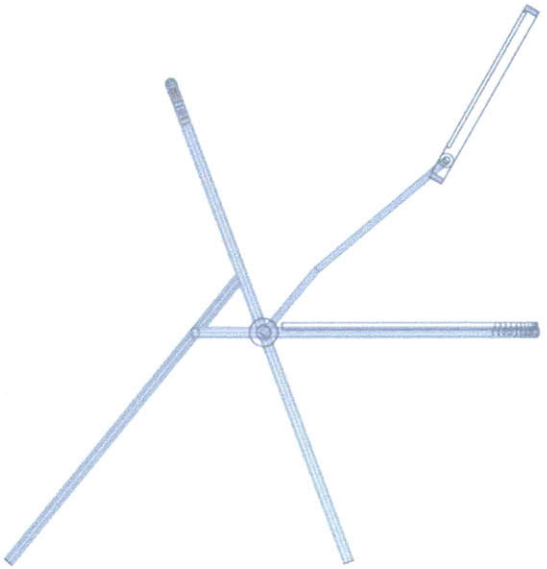


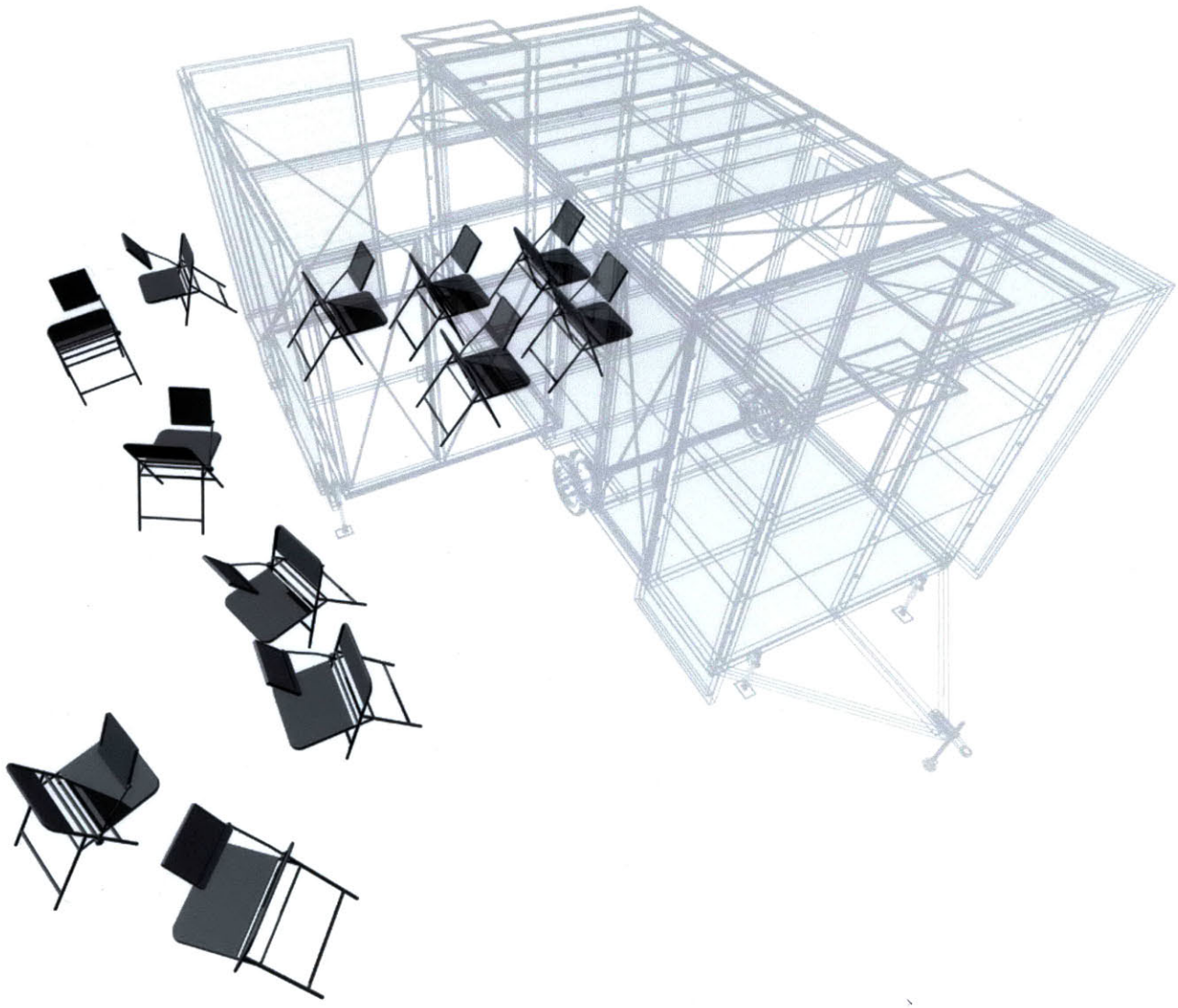






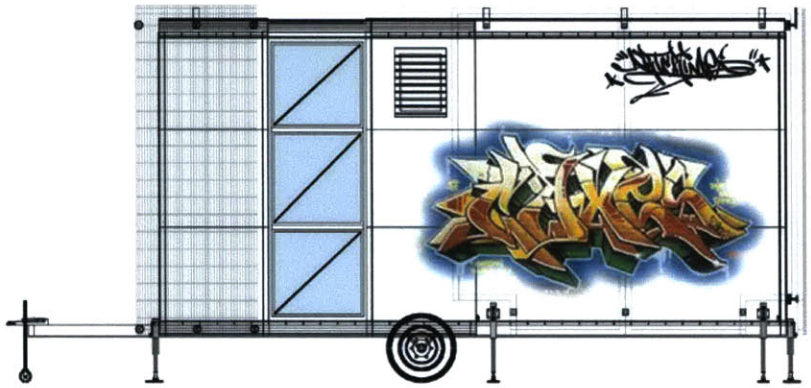
Aesthetically, the chair is your ordinary, fold-up, metal chair. The concept of the "chair" came from the need to provide a sense of ownership of this intervening unit. By having a chair with an attached LCD computer component, users of the project are able to create their own space, and bring these chairs to their respective comfort zones. Of course, the users would have to stay within a defined radius to receive wireless internet connection, but ultimately, the control of the architect to determine space and use is relinquished. The freedom for kids to take and use these "chairs" also instills a level of trust and responsibility within the users – attributes valuable in positive, communal living. Moreover, the removable chairs destroy the internalized focus of the design, literally allowing the activity and technology to spill out onto the streets. Thus, the unit creates a presence on the street, promoting a social interaction that can possibly become a "safe haven" for all.

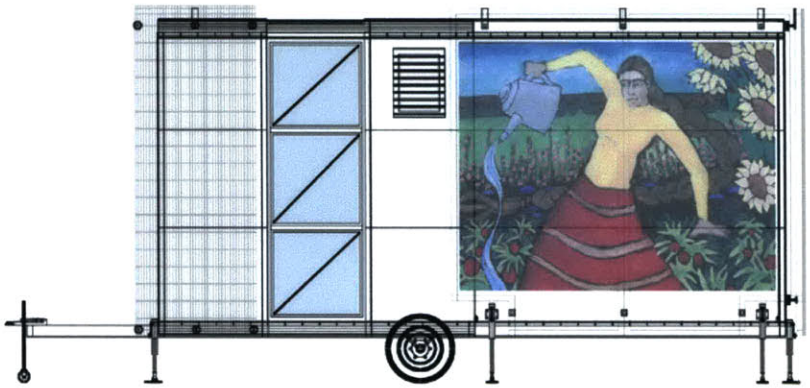




Personally growing up in the ghetto, trust was hard to come by - even at home. When the streets raise you, it is only through God's will that you keep your nose out of trouble. After school activities are generally not legal, and when legitimate activities are initiated, they become more of a means to keep kids out of trouble, than an instrument to really impact the kids on an educational level. I grew up on the streets, and this personal history found its way into my design on many different levels. The raw aesthetic of steel, shifting to allow access became a metaphor to my mind, and the defensive mechanisms it set up in order to maintain. The ordinary, standard elements chosen for the design (i.e. trailer, studs, fold-up chair) began to symbolize my frustration with how this unit looked stylistically and aesthetically. The design aesthetic became so ordinary - that the project in itself became a statement - architecture is not style. Architecture is not form. Architecture is, simply, constructed solutions for people to utilize.

I made a conscious decision to allow for an introspective exploration for this thesis. It was not an easy decision. It's not everyday that you open your heart and disclose your personal history to a panel of jurors, especially on a project of this importance. But that is what the project evolved into - a project from the heart. I feel confident that bringing my personal history into the project gave insight and compassion to the project, and to myself as a designer.





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# *CONCLUSIONS*

Information technologies cannot fix our inner city problems – but implementation of innovative policies may ameliorate some issues in this worsening situation. Low-income communities lack computer skills, and need better education and training in this ever-popular and growing field, just to stay competitive for entry-level jobs. Computers are reshaping the way the world works, and allowing teachers to rethink ways in which our children can learn via the computer. Access and infrastructure need to be a universal right.

Architecture is the design and construction of our built environment, providing utilitarian solutions to our fundamental and most complex needs. Solutions for minimizing this digital divide, and providing the necessary infrastructure to low-income communities, are prevalent themes within architecture and planning. There are many solutions underway, and many already implemented that have helped this situation tremendously. Yet, these are short-term solutions, for in our near future information technologies will more than likely be affordable to all. Until then, design solutions from architecture, planning, social science and engineering, need to be employed. If not, we as a society are turning our backs on a section of our population, producing a community of marginalized, disadvantaged people.

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