Relief Frame

A non-degree-required thesis submitted to the
Master of Architecture Program
Department of Architecture

By Courtney Chalk

Advised by
Ines Martin Robles

Relief Frame proposes a deployable construction system designed to provide immediate, adaptive architectural responses to natural disasters across diverse climatic zones. This thesis explores a framework composed of standardized, reconfigurable elements that can be rapidly deployed and tailored to site-specific environmental conditions and community needs. By leveraging a single system that morphs based on regional climate demands—arid, continental, and tropical—the project foregrounds flexibility and resilience as core design principles in emergency architecture.

Three geographically and climatically distinct sites serve as test sites for this system: San Bernardino, California (wildfire-prone), Oklahoma City, Oklahoma (tornado-prone), and Little Havana in Miami, Florida (hurricane-prone). Each deployment scenario demonstrates how the same structural elements can be rearranged to support essential recovery function shelter, aid distribution, hygiene facilities, workspace, and administration—while responding to specific environmental, and social contexts.

Relief Frame addresses critical gaps in current disaster response protocols, which often prioritize temporary shelter without adequately considering long-term spatial needs, or local climate conditions. By offering a scalable and climate-responsive construction system, this project allows for solutions that are immediate yet adaptable, empowering communities to engage in their own recovery processes. This thesis critiques and builds upon existing modular and prefabricated disaster relief proposals, which frequently rely on rigid, one-size-fits-all solutions. While many prefabricated systems focus on speed and mass production, Relief Frame emphasizes flexibility, reusability, and contextual adaptation, demonstrating how a single system of parts can evolve into climate-specific configurations and foster not just survival, but dignity and functionality in post-disaster environments.

Over View

1. Natural Disasters & Current Policy

2. Architectural Precedent Analysis

3. My Proposal

    i. Construction Method

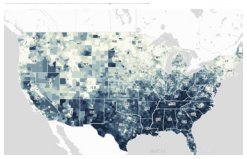
    ii. Test Sites

    iii. Narrative Walk Through

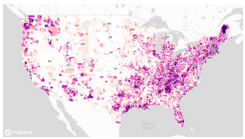
1. Natural Disaster & Current Policy

To understand the patterns of vulnerability and evaluate the effectiveness of existing emergency response frameworks, guiding the development of a more responsive and adaptive architectural solution.

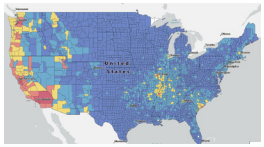
Vulnerability Mappings



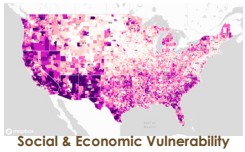
Climate Vulnerability



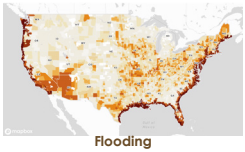
Drought



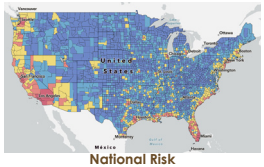
Earthquake



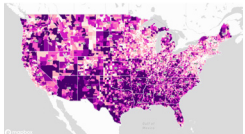
Social & Economic Vulnerability



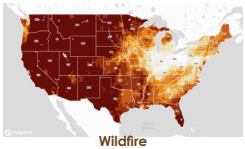
Flooding



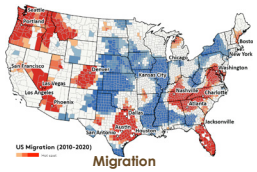
National Risk



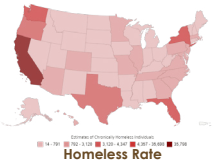
Food, Water, & Waste Management



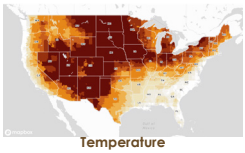
Wildfire



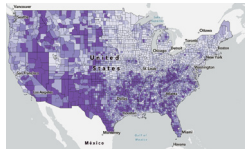
Migration



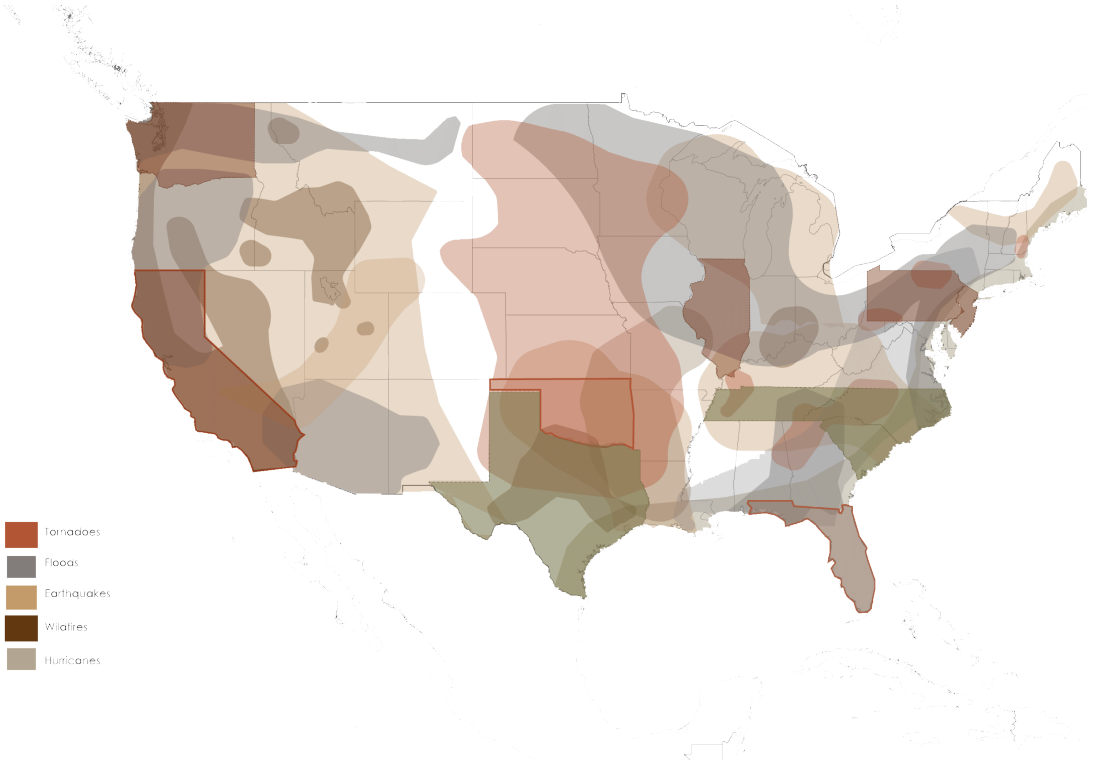
Homeless Rate



Temperature



Community Resilience



Over the last year, I've studied various types of natural disasters- their locations, frequencies, and displacement rates. Before selecting test sites, I wanted to understand which cities experience the high vulnerability.

Pre - Disaster (Mitigation & Preparedness)

Ongoing

- Community Members Prepare for disaster to occur

Disaster Strikes (Response Phase Begins)

Hours to Days

- FEMA activates the National Response Framework (NRF) and deploys response teams

Early Recovery (Response-Transition to Recovery)

Days to Weeks

- Recovery operations begin alongside response efforts (
- FEMA activates Recovery Support Functions (RSFs) based on the needs of the disaster-affected area.

Intermediate Recovery (Stabilization & Planning)

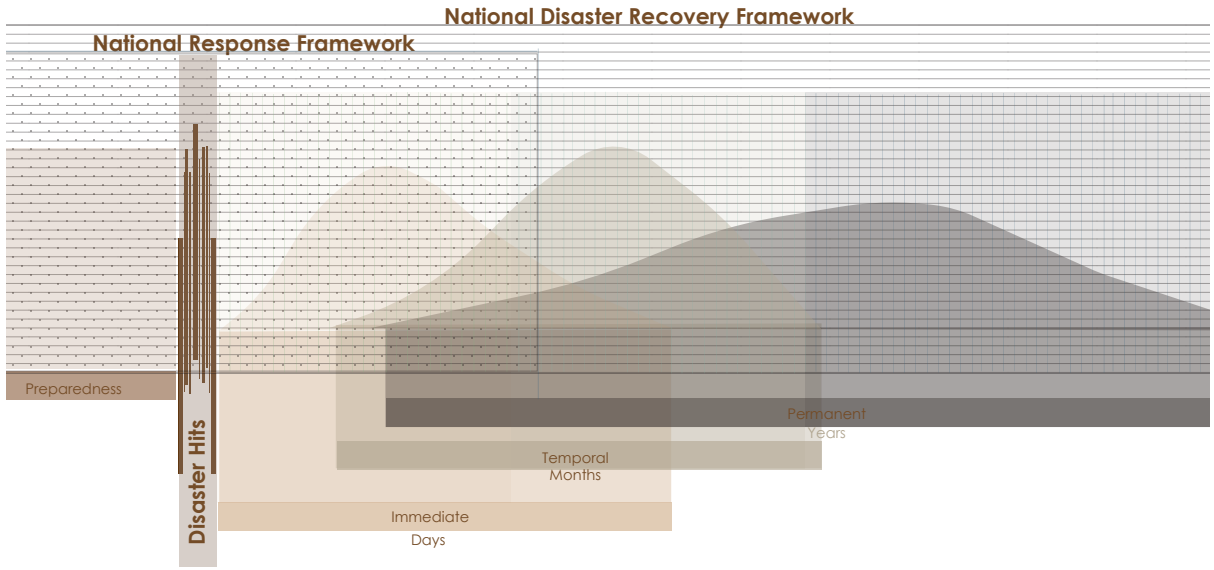
Weeks to Months

- FEMA assists in debris removal, infrastructure stabilization, and rebuilding efforts.
- FEMA reviews and distributes funds for housing, infrastructure, and mitigation.

Long-Term Recovery (Rebuilding & Resilience)

Months to Years

- Permanent housing solutions and infrastructure reconstruction continue.
- FEMA assists in economic recovery programs for businesses and employment.



This timeline outlines FEMA's typical response process. A key takeaway is that under the current system, individuals can be left without adequate shelter and aid for weeks or even months.

2018 California Wildfires

November 8, 2018: Fires Begin

- Camp Fire ignites in Butte County, fueled by strong winds and dry conditions
- Ultimately 85 people die, and over 18,000 structures are destroyed, making it the deadliest and most destructive wildfire in California history

Woolsey Fire starts in Los Angeles and Ventura counties, spreading quickly toward Malibu

- Three people die and 1,600+ structures burn
- Nearly 300,000 residents evacuate in Los Angeles and Ventura counties

November 9-10: Disaster Declarations & Early Aid

- **November 9**: California Governor Jerry Brown declares a state of emergency
- **November 10**:
  - President Trump approves a federal disaster declaration, activating FEMA
  - FEMA deploys Disaster Survivor Assistance Teams (DSATs) to assess damages

Mid-November 2018: FEMA Deploys Assistance

- **November 13-16: FEMA Teams Arrive**
  - FEMA begins setting up Disaster Recovery Centers (DRCs) in affected areas.
  - Thousands apply for Individual Assistance (IA), but many survivors:
  - Struggle to prove homeownership (many lived in mobile homes or inherited properties).
  - Face delays in getting funds, as FEMA requires extensive documentation.
  - Are denied aid due to unclear eligibility rules.
- **November 17-20: Temporary Shelters & Housing Issues**:
  - Thousands remain in makeshift tent cities in Walmart parking lots and church grounds.
  - FEMA offers temporary hotel stays (Transitional Sheltering Assistance, TSA) but many survivors are unaware of the program or cannot access it.
  - FEMA begins setting up mobile housing units (trailers), but demand far outstrips supply.

December 2018: Delays in Housing & Cleanup

- **Thousands remain without stable housing, living in tents or vehicles.**
- **FEMA debris removal process is slow, delaying rebuilding efforts.**
- **Undocumented immigrants are denied FEMA assistance**

January 2019: Long-Term Recovery Challenges

- **Formaldehyde concerns arise in FEMA trailers (similar to post-Katrina).**
- **FEMA cuts off hotel assistance for many survivors, forcing them into shelters or unstable living conditions.**
- **FEMA aid distribution is inconsistent, with some survivors receiving full assistance while others face denials or delays**

Long-Term Recovery (2019-2020): FEMA's Struggles

- **March-May 2019: FEMA Winds Down Emergency Operations**
  - Some survivors still wait for aid months after the fire.
  - FEMA continues to provide rental assistance, but many struggle to find available housing.
  - Mental health and PTSD crises emerge among survivors
- **Late 2019-2020: Recovery Slow for Many**
  - Many FEMA trailers sit unused, while survivors remain unhoused.
  - FEMA grants expire, leaving some without further support.
  - Debris cleanup takes years, slowing rebuilding efforts

Camp Fire:

Displacement: The Camp Fire destroyed approximately 14,000 homes, accounting for 14% of Butte County's housing supply, and displaced nearly 35,000 residents.

Temporary Housing: FEMA provided temporary housing for 684 displaced families in Butte County. FEMA

Woolsey Fire:

Destruction: The Woolsey Fire destroyed over 1,000 homes in Southern California.

Housing Arrangements Post-Wildfires:

Staying with Friends or Family: Following the 2017 Sonoma County fires, about 7% of households hosted someone temporarily in the subsequent year. Applying this data, researchers estimated that 21,482 individuals were living doubled-up, with nearly 40% attributing their situation to direct housing loss from the fire.

Other Accommodations: Displaced individuals sought various housing solutions, including hotels, motels, and rental properties. The sudden demand often led to increased rents in nearby communities. For instance, after the Camp Fire, the city of Chico experienced a surge in housing demand, resulting in higher rents and strained social services.

November 8, 2018: Fires Begin

Mid-November 2018: FEMA Deploys Assistance

- **November 17-20: Temporary Shelters & Housing Issues**:
  - Thousands remain in makeshift tent cities in Walmart parking lots and church grounds.

December 2018: Delays in Housing & Cleanup

- **Thousands remain without stable housing, living in tents or vehicles.**
- **FEMA debris removal process is slow, delaying rebuilding efforts.**
- **Undocumented immigrants are denied FEMA assistance**

January 2019: Long-Term Recovery Challenges

- **Formaldehyde concerns arise in FEMA trailers (similar to post-Katrina).**
- **FEMA cuts off hotel assistance for many survivors, forcing them into shelters or unstable living conditions.**
- **FEMA aid distribution is inconsistent, with some survivors receiving full assistance while others face denials or delays**

Late 2019-2020: Recovery Slow for Many

- Many FEMA trailers sit unused, while survivors remain unhoused.
- FEMA grants expire, leaving some without further support.

Hurricane Katrina

August 23-27, 2005 : Pre-Storm Preparations

- **August 23:** Tropical Depression 12 forms over the Bahamas.
- **August 24:** It strengthens into Hurricane Katrina
- **August 26:** The National Hurricane Center (NHC) warns of a Category 4+ storm impact on the Gulf Coast
- **August 27:** Louisiana Governor Kathleen Blanco declares a state of emergency. President George W. Bush signs federal emergency declaration, activating FEMA. However, FEMA does not pre-position enough supplies or personnel.

August 28–30, 2005: Landfall & Immediate Impact

- **August 28:** New Orleans Mayor Ray Nagin orders mandatory evacuation
- **August 29 (6:10 AM):** Katrina makes landfall as a Category 3 storm in Louisiana. Levees in New Orleans start to fail, leading to massive flooding
- **August30:**
  - 80% of New Orleans is underwater.
  - Thousands stranded at the Superdome and Convention Center, with no food, water, or medical aid.
  - FEMA Director Michael Brown claims the agency was unaware of the Convention Center crisis—a major failure in situational awareness.

August 31–September 2, 2005: Delayed Federal Response

- **August 31:**
  - Looting and chaos break out in New Orleans.
  - Bush declares the disaster an "unacceptable situation" but FEMA's response remains slow.
  - FEMA turns away aid, including water trucks and personnel from other states
- **September 1:**
  - FEMA struggles with logistical failures, unable to deliver food and water fast enough.
  - Thousands still stranded in the city with little to no aid
  - New Orleans' police force is overwhelmed
- **September 2:**
  - Military convoys finally arrive with supplies, four days after landfall.
  - Evacuations begin at the Superdome and Convention Center, but many residents remain trapped

September 3–6, 2005: National Guard Mobilization & Mass Evacuations

- **September 3:**
  - 20,000 National Guard troops are deployed, bringing some order.
  - FEMA's response is heavily criticized for being slow, bureaucratic, and mismanaged
- **September 4-6:**
  - Full-scale evacuations begin for those remaining in New Orleans.
  - Bodies are still being discovered in flooded homes

Mid-September 2005: Recovery & FEMA's Failures Become Clear

- **FEMA's slow housing response leaves thousands in shelters for months**
- **Financial aid distribution is chaotic, with many applicants struggling with bureaucracy**
- **Criticism grows against Michael Brown, who resigns on Sept. 12 amid backlash**

Long-Term Issues (2006 & Beyond)

- **FEMA trailers provided temporary housing, but later studies found toxic formaldehyde levels in many of them**
- **Billions of dollars in aid were distributed, but much of it was delayed or mismanaged**
- **Recovery in New Orleans took years, with some neighborhoods never fully rebuilding**

Hurricane Katrina in 2005 led to the displacement of approximately 1.5 million people aged 16 and above from Louisiana, Mississippi, and Alabama.

The housing arrangements of these displaced individuals varied:

Mass Shelters:

As of October 6, 2005, about 60,000 people were residing in mass shelters.

Hotels and Motels:

Approximately 435,000 individuals were staying in hotels or motels during the same period.

Staying with Friends or Relatives:

An estimated 100,000 people sought refuge in hotels and motels in Texas, with additional unknown numbers staying with friends and relatives.

Other Accommodations:

Some evacuees found shelter in private homes, churches, and school auditoriums.

August 28–30, 2005: Landfall & Immediate Impact

- **August30:**
  - 80% of New Orleans is underwater.
  - Thousands stranded at the Superdome and Convention Center, with no food, water, or medical aid.

August 31–September 2, 2005: Delayed Federal Response

- **September 1:**
  - FEMA struggles with logistical failures, unable to deliver food and water fast enough
  - Thousands still stranded in the city with little to no aid
  - New Orleans' police force is overwhelmed

Mid-September 2005: Recovery & FEMA's Failures Become Clear

- **FEMA's slow housing response leaves thousands in shelters for months**
- **Financial aid distribution is chaotic, with many applicants struggling with bureaucracy**

Long-Term Issues (2006 & Beyond)

- **Billions of dollars in aid were distributed, but much of it was delayed or mismanaged**

2020 Hurricane Floyd

September 28,2022: Landfall & Immediate Response

- Hurricane Ian makes landfall as a Category 4 hurricane near Cayo Costa, Florida, bringing catastrophic winds, storm surges, and heavy rainfall
- FEMA pre-positioned personnel, equipment, and supplies in anticipation of the storm's impact

September 29, 2022: Search and Rescue Operations Initiated

- Federal and state Urban Search and Rescue (US&R) teams commence operations, conducting thousands of rescues and structural assessments in affected areas

September 30, 2022: Arrival of Additional Federal Support

- FEMA deploys over 4,000 federal responders to assist in emergency operations
- The agency coordinates the establishment of shelters, accommodating tens of thousands of displaced residents

October 1, 2022: Infrastructure Assessments and Power Restoration Efforts

- Assessments reveal significant damage to critical infrastructure, with approximately 98% of Lee County without power
- FEMA collaborates with local utilities and the U.S. Army Corps of Engineers to expedite power restoration, deploying generators to essential facilities

October 7, 2022: Health and Medical Services Stabilized

- FEMA's Disaster Medical Assistance Teams treat thousands of individuals, supporting hospital decompression and establishing mobile clinics in severely affected counties

October 13, 2022: Safety and Security Measures Implemented

- Federal and state search and rescue task forces conduct extensive operations, including human and animal interactions and structural assessments, to ensure community safety

October 17, 2022: Provision of Essential Commodities

- FEMA provides millions of liters of water, meals, tarps, blankets, and other essential commodities to support affected residents

October 23, 2022: Extension of NFIP Policy Renewal Grace Period

- The National Flood Insurance Program extends the grace period for policy renewals, allowing policyholders additional time to renew policies that were set to expire between August 25 and October 23, 2022

November 21, 2022: Extension of FEMA Assistance Application Deadli

- FEMA extends the deadline for residents in counties covered by Individual Assistance declarations to apply for federal disaster assistance, providing additional time for those affected to seek aid

September 28, 2023: One-Year Recovery Milestone

- Federal support for Hurricane Ian recovery reaches nearly $5.7 billion, encompassing grants to households, disaster loans, and funding for emergency response and infrastructure repair

September 2024: Two-Year Recovery Progress

- Two years post-landfall, FEMA reports significant progress in recovery efforts, including substantial funding allocated for emergency response, debris removal, and permanent infrastructure work

- **33,823 survivors sheltered in 262 shelters**
- **Individual Assistance**
- **911,000 valid registrations**
- **$1.04 billion approved for 383,081 households**
- **$680.5 million in Housing Assistance**
- **$357.7 million in Other Needs Assistance**
- **Operated 37 Disaster Recovery Centers (37 fixed, 20 mobile)**
- **138,000 visitors**
- **11 centers currently open**
- **Transitional Sheltering Assistance**
- **4,548 households in 26 counties served**
- **705 households currently staying in hotels**
- **3,843 households have checked out**

September 28,2022: Landfall & Immediate Response

October 1, 2022: Infrastructure Assessments and Power Restoration Efforts

- FEMA collaborates with local utilities and the U.S. Army Corps of Engineers to expedite power restoration, deploying generators to essential facilities

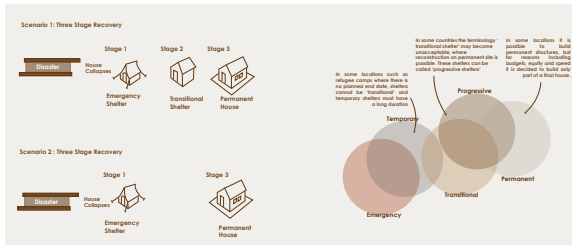
October 23, 2022: Extension of NFIP Policy Renewal Grace Period

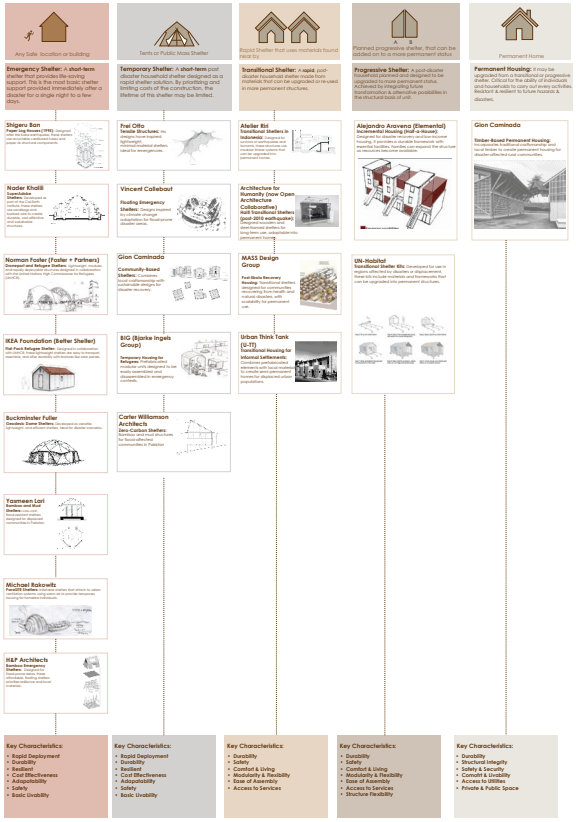
Many people were denied aid due to policy renewals date, this caused many individuals to be without adequate shelters for almost 4 months

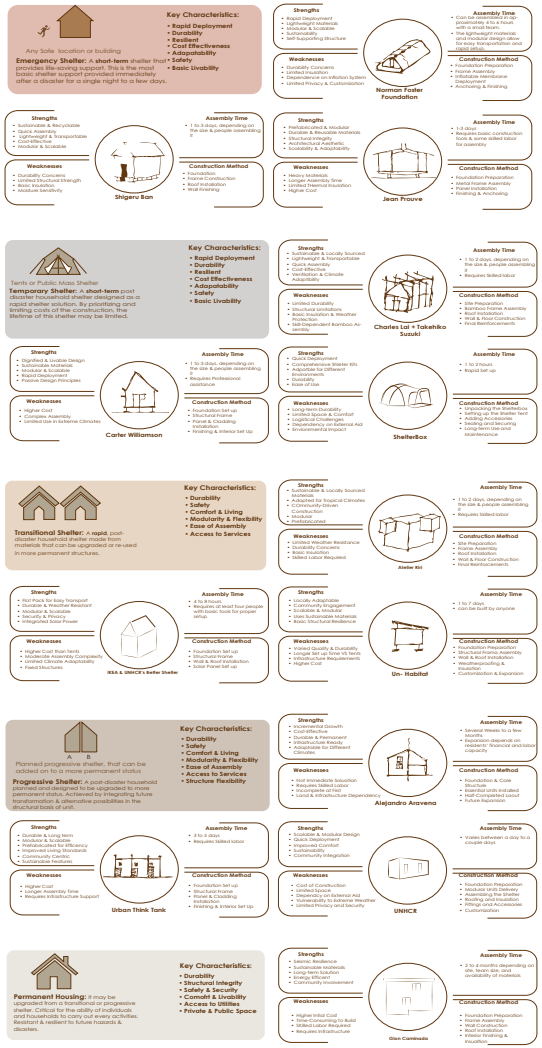
A day by day breakdown of three disasters: 2018 California Wildfires, 2005 Hurricane Katrina, and 2020 Hurricane Floyd. In red you can see the key shortcomings.

2.Architectural Precedent Analysis

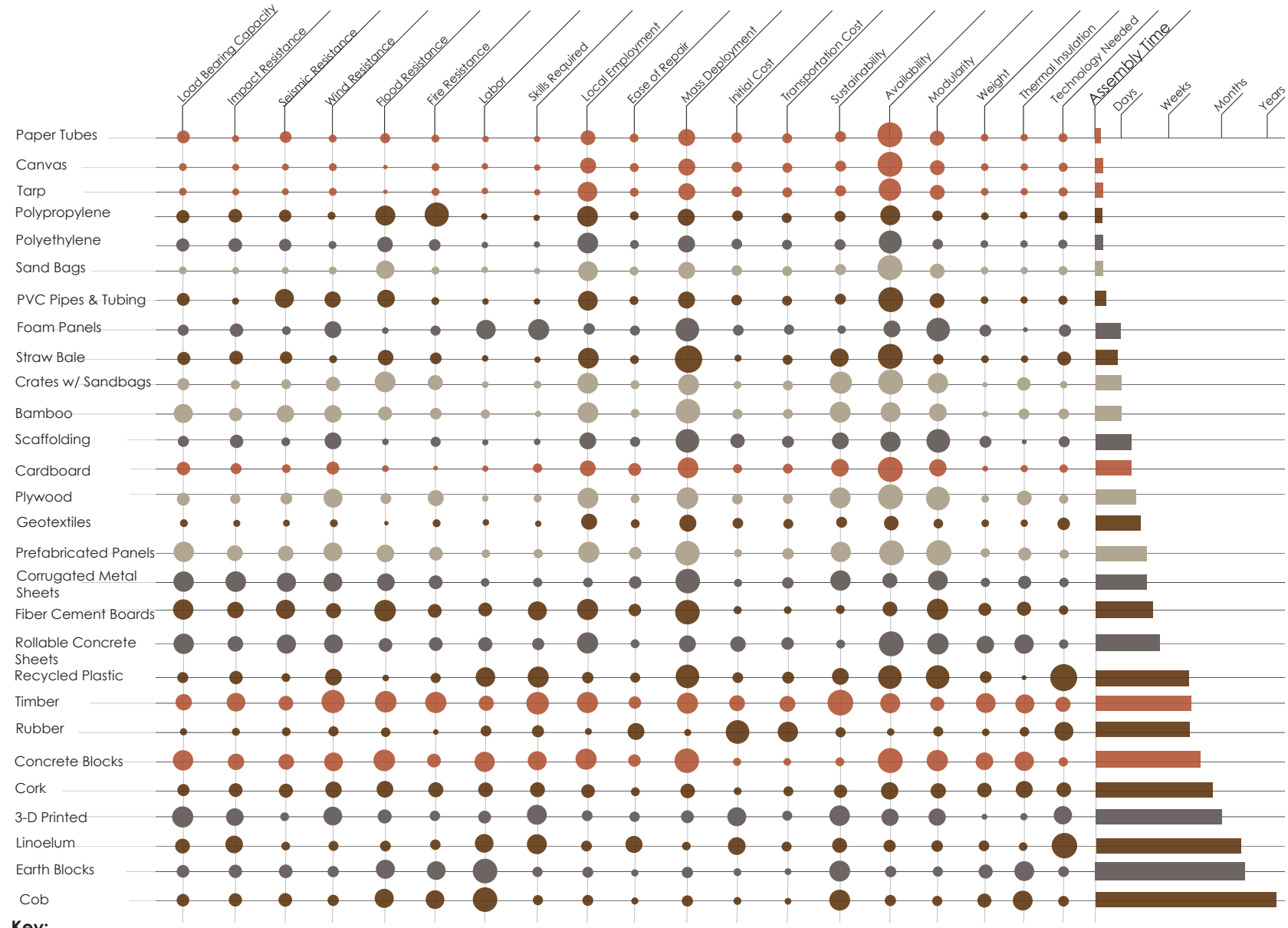
It was important to study previous disaster relief proposals to identify both successful strategies and recurring shortcomings, allowing the thesis to build on proven ideas while innovating more adaptable and site-responsive solutions.







These precedents have quick assembly times but fall short in thinking about growth and expansion as the family is readapting to normal life again.

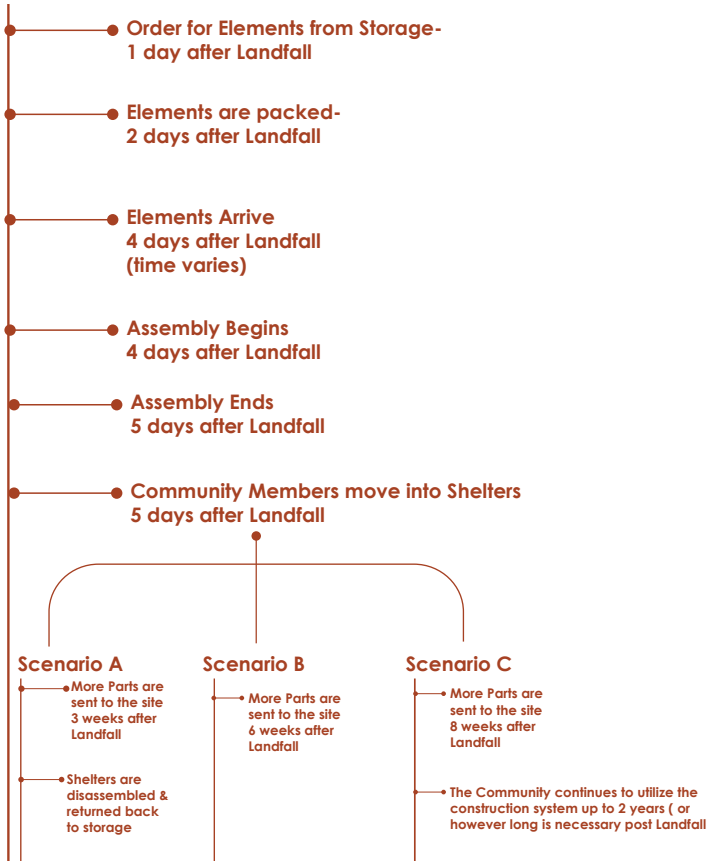


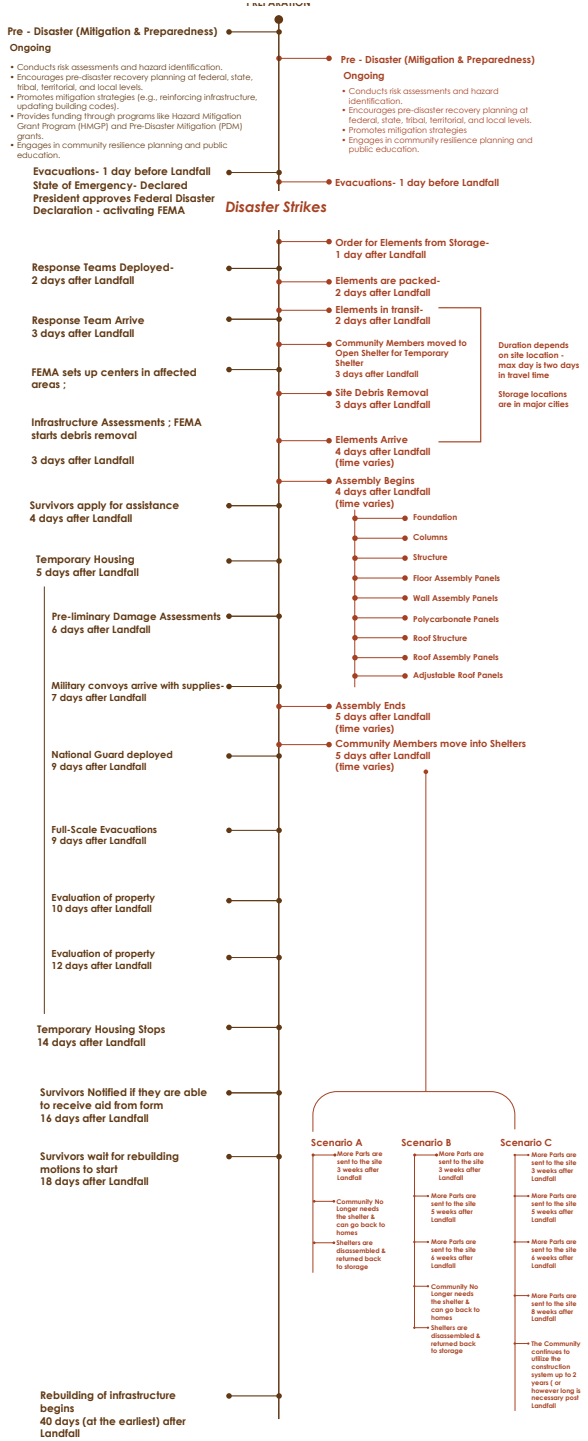
This chart focuses specifically on the materials used in those precedent projects. It helped me develop a material palette that would work well across different climates and be easy to deploy and assemble.

3. My Proposal

Relief **Frame is composed of standardized, reconfigurable parts that can be rapidly shipped, deployed, and customized to meet different environemntal and social needs.**

Disaster Strikes



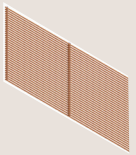


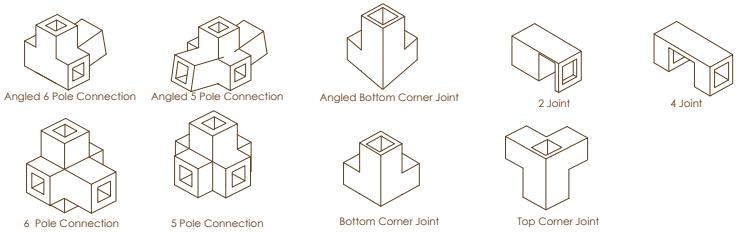
On the right, FEMA's current timeline is shown in brown. My proposed system is shown in red. On the left is a simplified version. When a disaster strikes, a call is placed and the elements are packed and shipped. Once on site, shelters can be assembled by residents within a day. There are three scenarios that follow:
Scenario A – the shelters are only needed briefly. They're disassembled and sent back. Scenario B – the community stays longer than 6 months, so more elements are shipped to expand the units.
Scenario C – the stay extends beyond two years. Additional components turn the shelter into a more permanent structure.

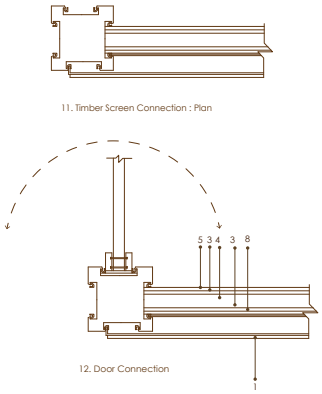
5. Construction Method

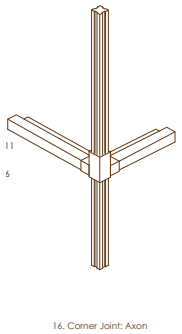
The system adapts to different climate demands - arid, continential, and tropical - making flexibility and resilience core principles of this emergency architecture.

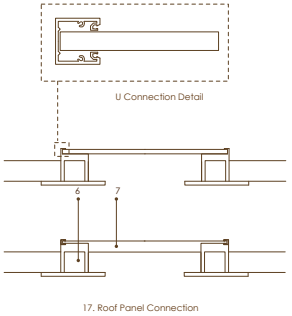
Kit of Elements

MATERIAL							
	GALVANIZED CAST IRON CONNECTIONS	SILICONE SEALANT	PRE-FABRICATED EXTERIOR PANELS	POLYCARBONATE	STEEL	POLYISOCYANURATE (PIR) PANELS	WOODEN SCREEN
JUSTIFICATION	PRE-FABRICATED CONNECTION PIECES	EASY TO APPLY; LIGHTWEIGHT ; LOW MAINTENANCE	LOW COST ; LIGHTWEIGHT; AVAILABLE	HIGH COST BUT DURABLE DURING TRANSPORTATION & CAN BE PRE-DRILLED	CAN BE PRE-FABIRCATED WITH CLIP IN CONNECTION POINTS ; LIGHTWEIGHT; DURABLE	R VALUE OF 6 TO 7 PER INCH ; GOOD IN HOT & COLD CLIMATE ; CAN BE PRE-DRILLED ; HIGH THERMAL & LIGHTWEIGHT	SIMPLE CONNECTION, GOOD FOR HUMID/ HOT CLIMATES- CAN ACT AS POROUS LAYER TO LET AIR IN ; LIGHTWEIGHT





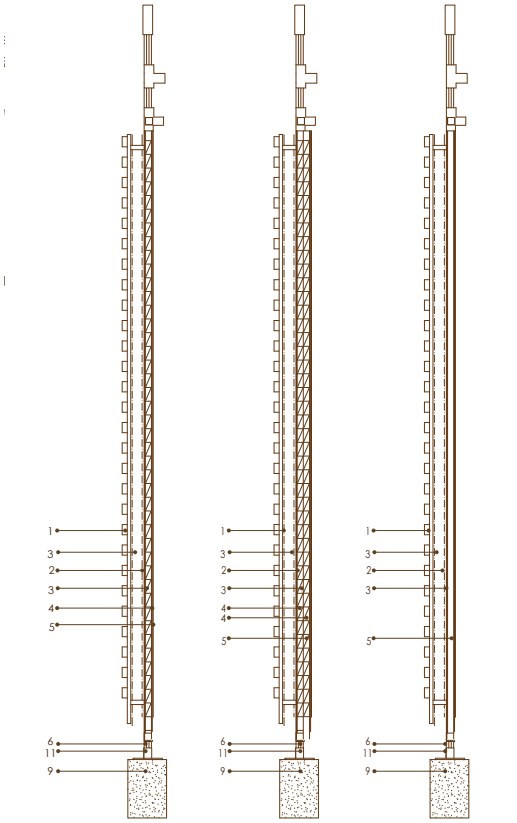




Here is the kit of parts: steel for the structure, iron joint connectors, polycarbonate panels, PIR insulation, prefabricated exterior cladding, and optional wooden screens, depending on climate. The structural system is based on scaffolding but has flat faces to allow for panels and this allows for fast assembly with standardized U-joint connections for the panels.

Climate Zone Chart

ZONE NUMBER	ZONE NAME	NATURAL DISASTER EXPOSURES	PASSIVE DESIGN TECHNIQUES	AMOUNT OF INSULATION	POROUS PANEL
1A & 1B	VERY HOT-HUMID (1A) DRY (1B)	Hurricanes, Flood	Cross Ventilation, Light Colored Roof, Water Catchment	No Insulation Panel Required	
2A & 2B	HOT-HUMID (2A) DRY (2B)	Hurricanes, Flood	Cross Ventilation, Light Colored Roof, Water Catchment	No Insulation Panel Required	
3A & 3B	WARM-HUMID (3A) DRY (3B)	Hurricanes, Flood, Wildfire, Tornadoes	Cross Ventilation, Sloped Roof, Light Colored Roof	Requires R-value of 5	No Porous Panel Required
3C	WARM-MARINE (3C)	Hurricanes, Flood, Earthquakes, Tornadoes	Raised Building, Sloped Roof	Requires R-value of 5	
4A & 4B	MIXED-HUMID (4A) DRY (4B)	Tornadoes, Flood	Sloped Roof, Water Catchment	Requires R-value of 10	No Porous Panel Required
4C	MIXED-MARINE (4C)	Tornadoes, Landslide, Flood, Earthquakes	Sloped Roof, Raised Building, Double Skin, Water Catchment	Requires R-value of 10	
5A, 5B, & 5C	COOL-HUMID (5A) DRY (5B) MARINE (5C)	Wildfire, Flood, Earthquakes, Tornadoes	Sloped Roof, Raised Building, Double Skin	Requires R-value of 10	
6A & 6B	COLD-HUMID (6A) DRY (6B)	Wildfire, Flood	Raised Building	Requires R-value of 10	No Porous Panel Required
7	VERY COLD	Flood, Tornadoes	Raised Building, Sloped Roof	Requires R-value of 15	No Porous Panel Required
8	SUBARCTIC	Flood	Raised Building, Water Catchment	Requires R-value of 15	No Porous Panel Required

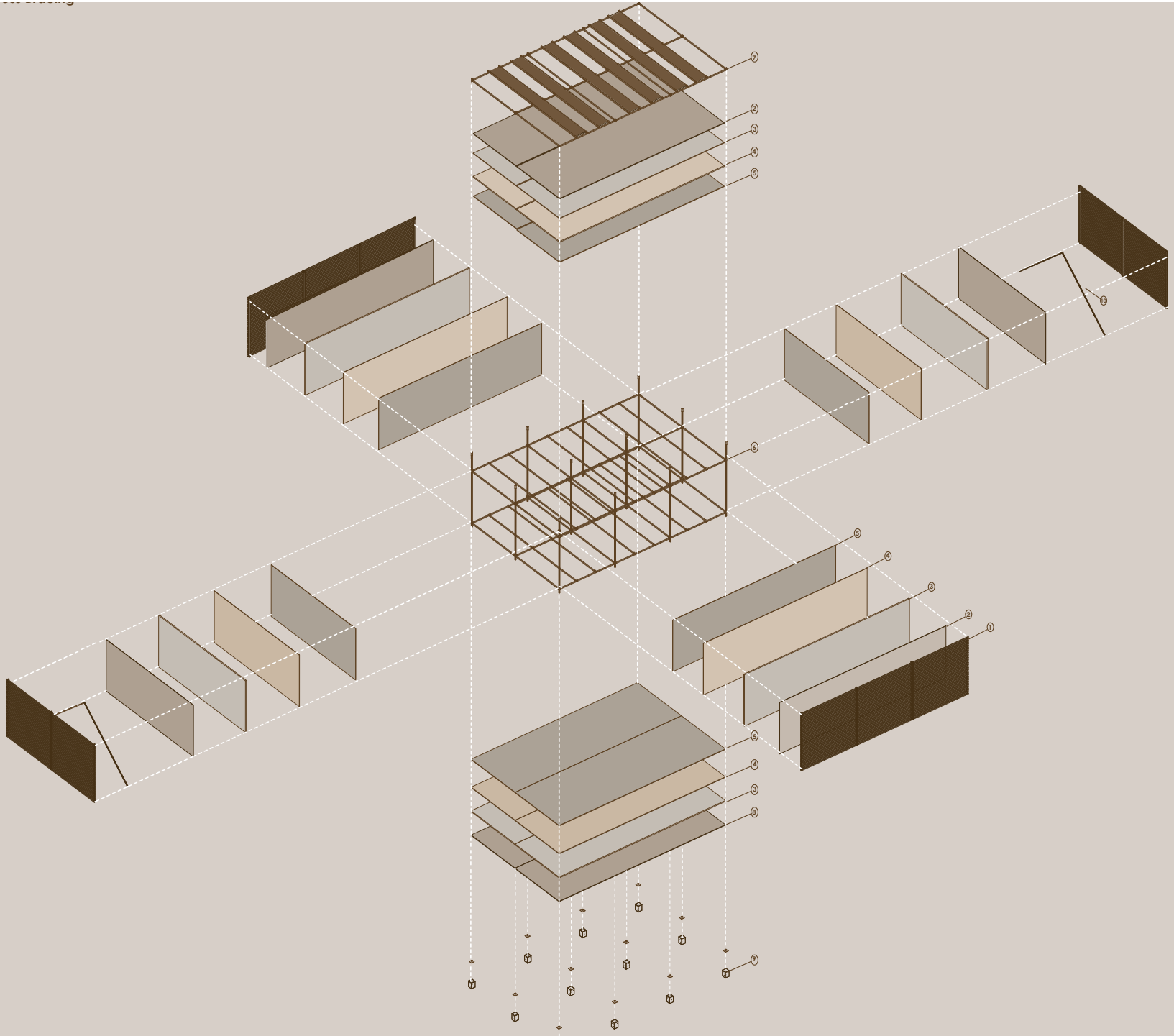


5. Climate Zone 3A-5C Wall Section

6. Climate Zone 6A-8 Wall Section

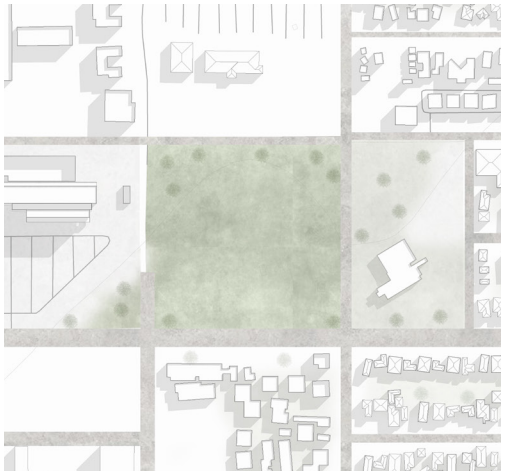
7. Climate Zone 1A-2B Wall Section

This diagram shows how insulation and a porous layer requirements change based on climate. For example, climate zone 7 requires more insulation than climate zone 1. This allows for site-specific customization without redesigning the whole system depending on the climate.



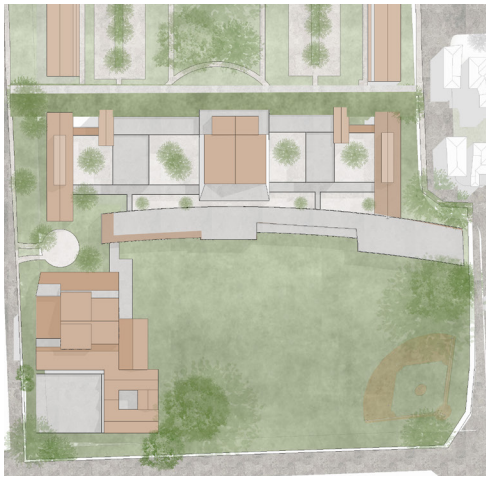
ii. Test Sites

Each deployment scenario demonstrates how the same structural elements can be rearranged to support essential recovery function shelter, aid distribution, hygiene facilities, workspace, and administration—while responding to regional climate and community needs.



San Bernardino, California

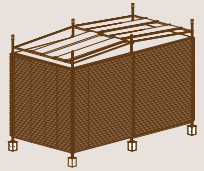
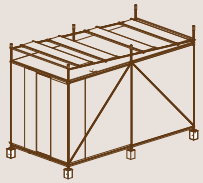
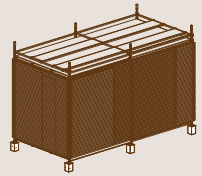
Oklahoma City, Oklahoma

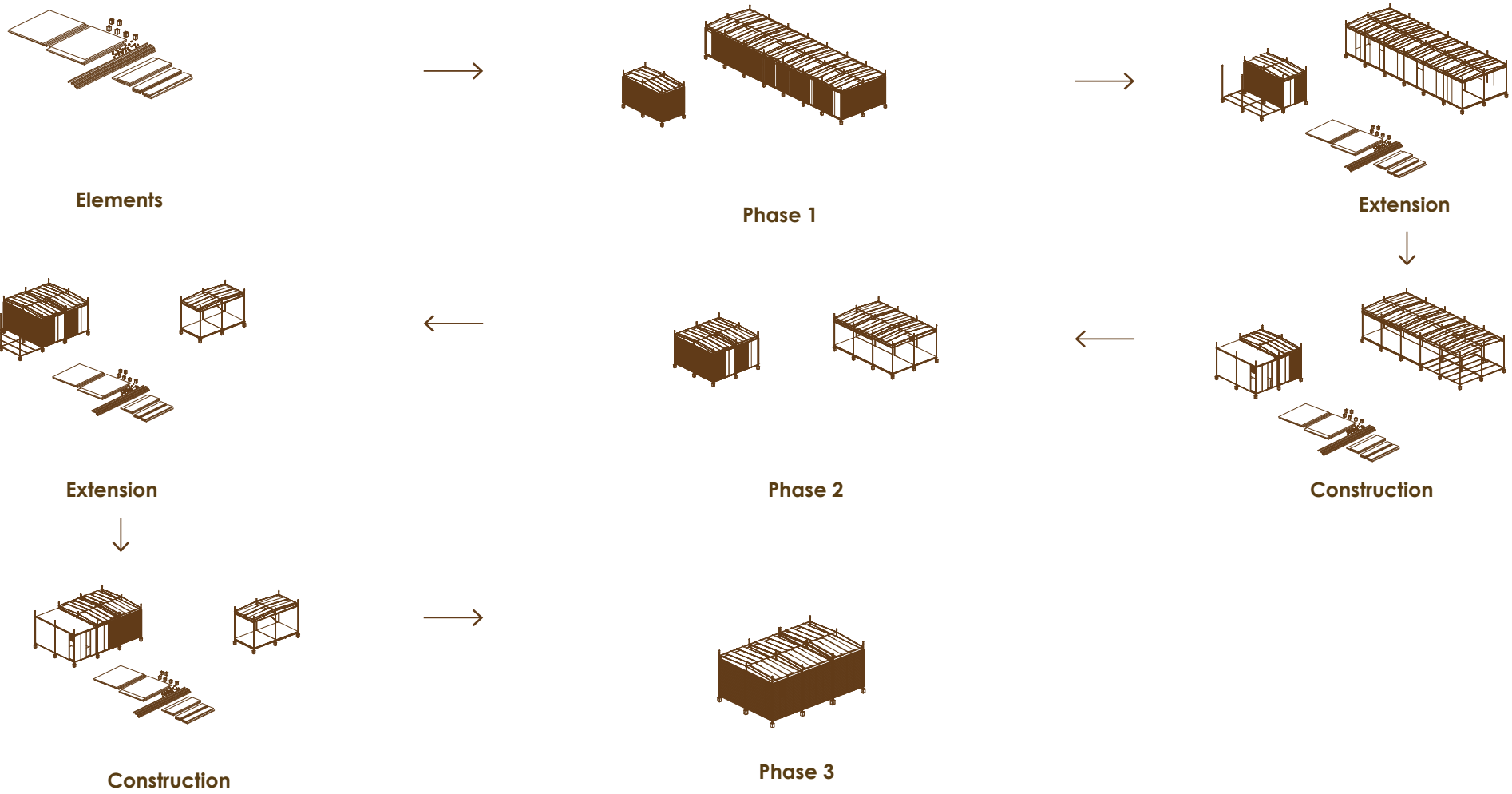


Little Havana, Miami, Florida

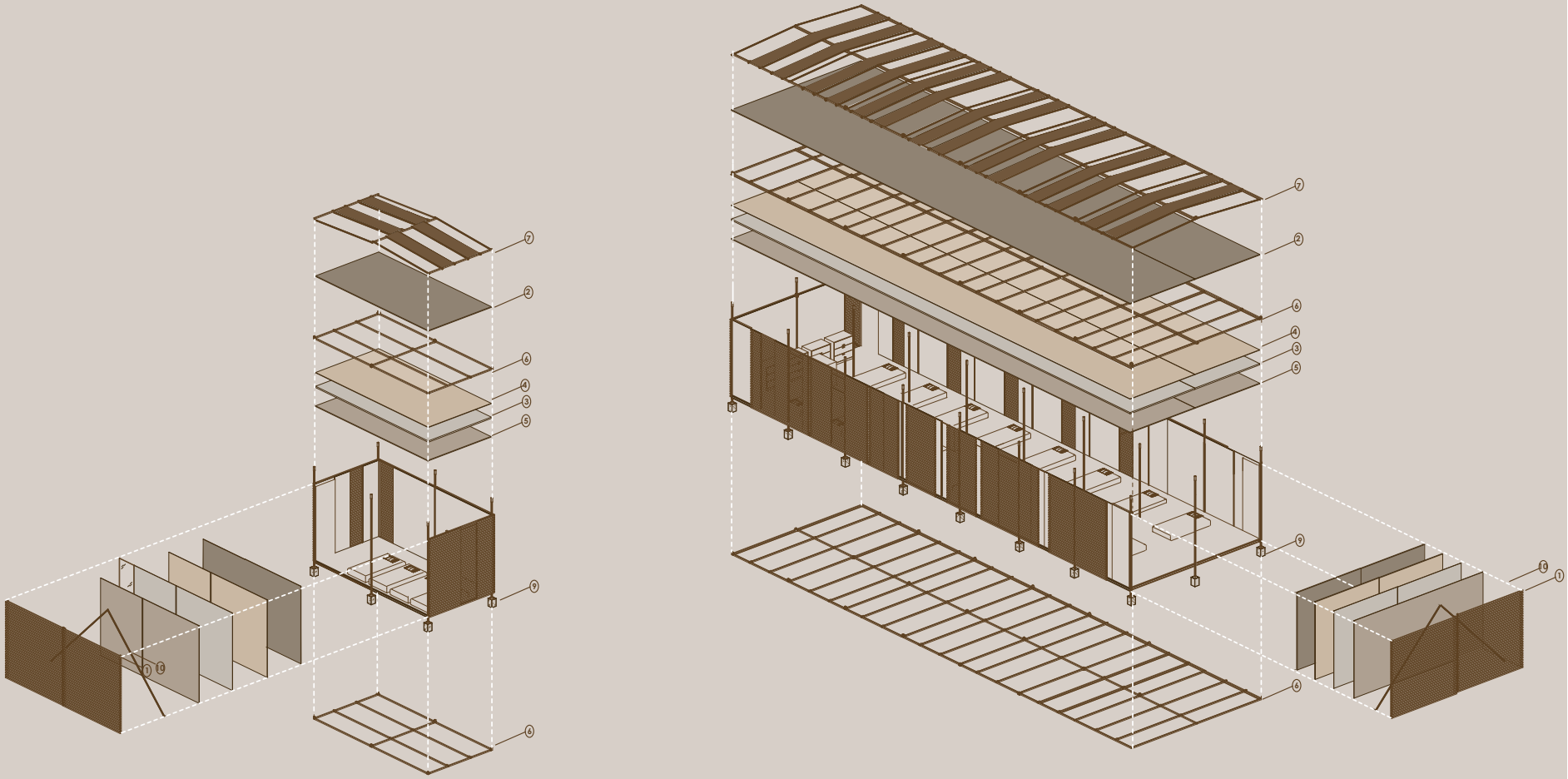
Each deployment scenario shows how the same structural elements can be configured to serve essential recovery functions—shelter, hygiene, workspace, aid distribution, and administration—while responding to regional climate and community needs.

Site Adaptations

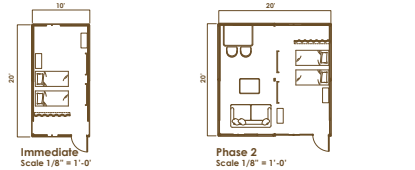
TEST SITE LOCATION	SURROUNDING CONTEXT	ADAPTATIONS	
SAN BERNARDINO, CALIFORNIA		PITCHED ROOF	
OKLAHOMA CITY, OKLAHOMA		LOW SLOPE ROOF / ANGLED FOR WINDS ONE STORY	
LITTLE HAVANA, MIAMI, FLORIDA		SCREEN/ POROUS PANEL OPEN AIR	



This diagram illustrates how parts can be disassembled and extended over time. It shows the evolving nature of the system as the community's needs grow.

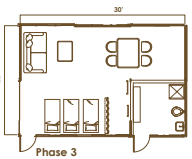


Each deployment scenario demonstrates how the same structural elements can be rearranged to support essential recovery function shelter, aid distribution, hygiene facilities, workspace, and administration—while responding to regional climate and community needs.

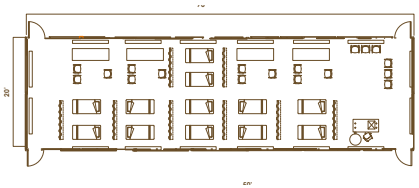


Immediate
Scale 1/8" = 1'-0"

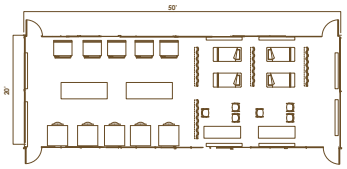
Phase 2
Scale 1/8" = 1'-0"



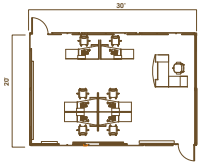
Phase 3
Scale 1/8" = 1'-0"



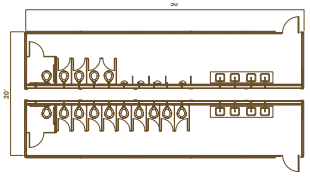
Aid : Phase1
Scale 1/8" = 1'-0"



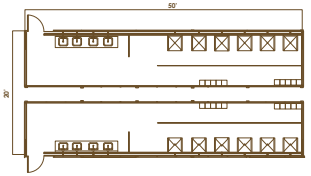
Aid : Phase 2
Scale 1/8" = 1'-0"

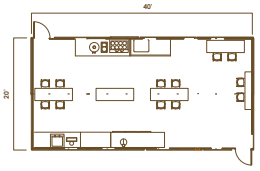


Office
Scale 1/8" = 1'-0"

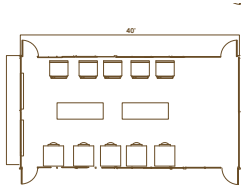


Restroom & Shower
Scale 1/8" = 1'-0"

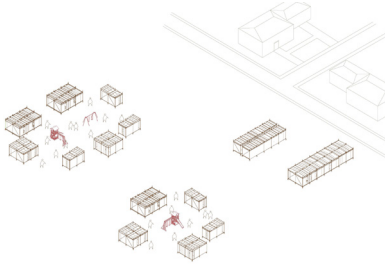




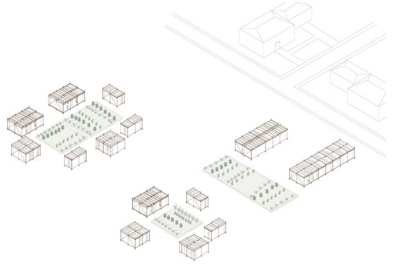
Community
Scale 1/8" = 1'-0"



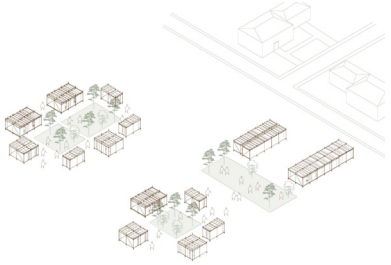
Aid : Phase 3
Scale 1/8" = 1'-0"



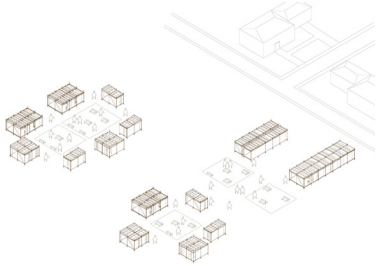
Playground



Garden



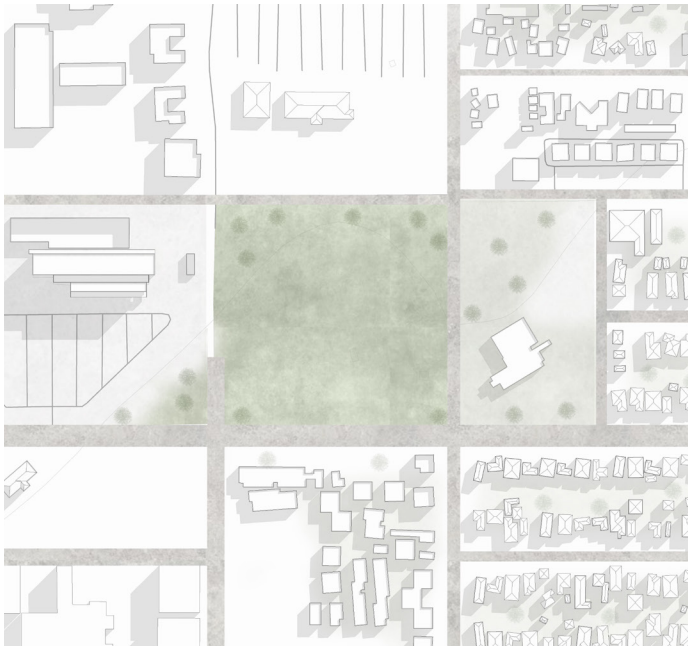
Green Space

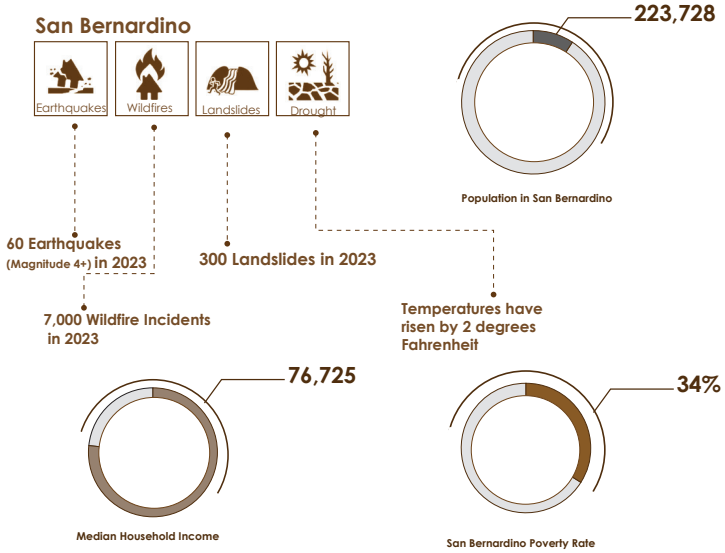


Park

These same components can be rearranged to create other essential spaces—administration, aid distribution, hygiene facilities, and communal zones. The diagrams to the right highlight how in-between spaces—gardens, seating areas, and green zones—emerge from the cluster layout.

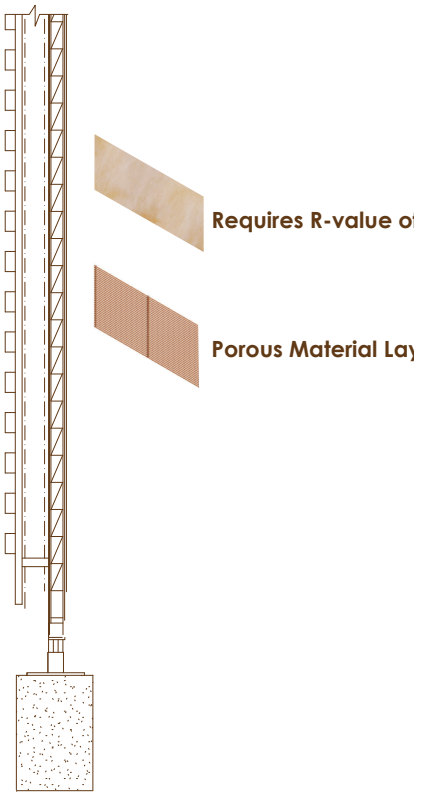
San Bernardino, California

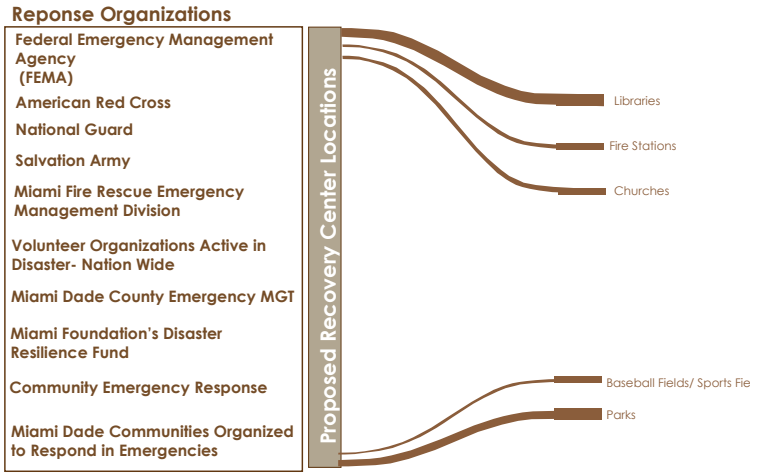




5. Design Implications
Priority on Cooling and Shading

Water Conservation is Important (due to drought-prone area)





1. Climate Zone Designation
Zone: 3

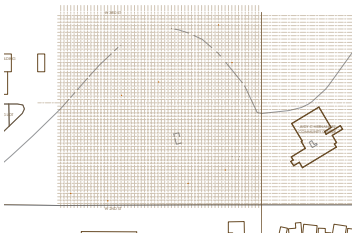
Subzone: B (Dry)

2. Temperature and Seasonal Characteristics
High Summer Temperatures: Frequently exceeds 90°F (32°C); can reach 100°F+ (38°C+)

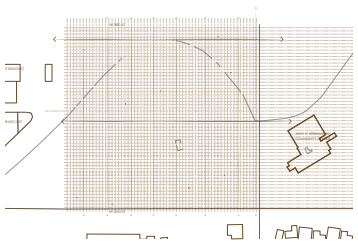
Mild Winters: Average lows rarely fall below 40°F (4°C)

Annual Temperature Range: ~35°F to 105°F (2°C to 40°C)

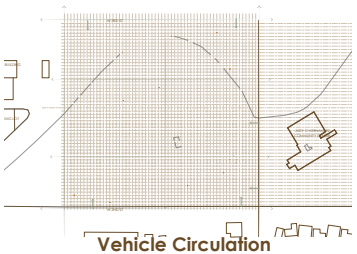
This site uses an open field at Miami Senior High School—a Red Cross-certified open shelter. Meaning, When homes are destroyed or inaccessible, this is where people seek refuge.



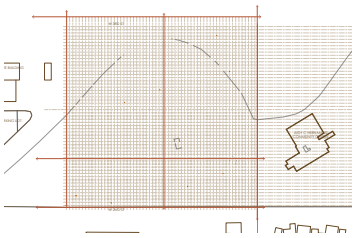
Existing



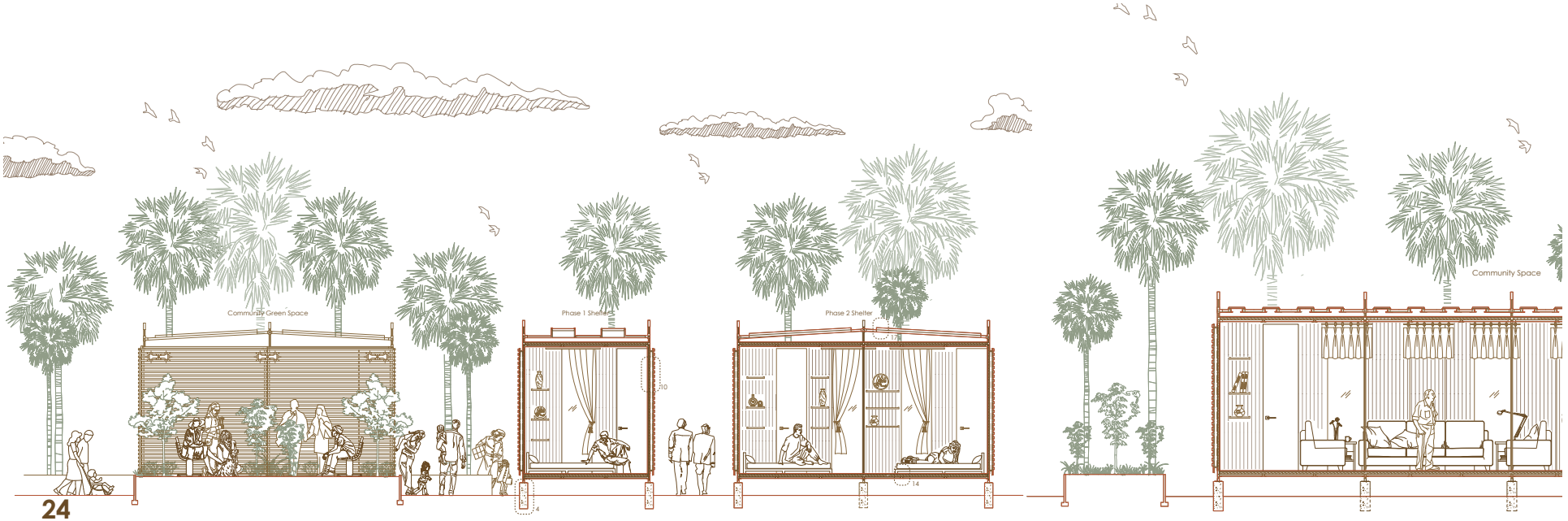
Pedestrian Circulation

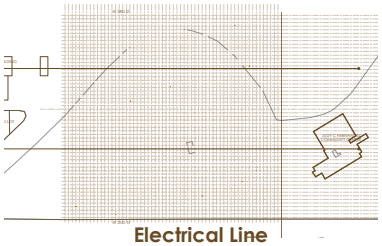


Vehicle Circulation

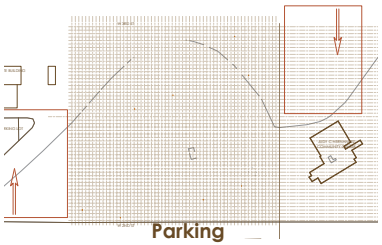


Main Axis

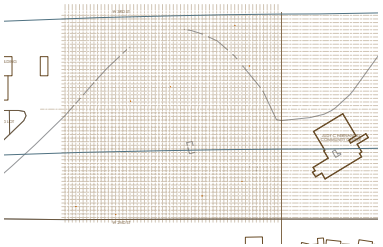




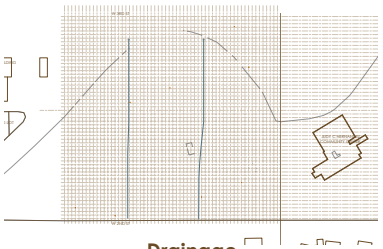
Electrical Line



Parking



Water Line

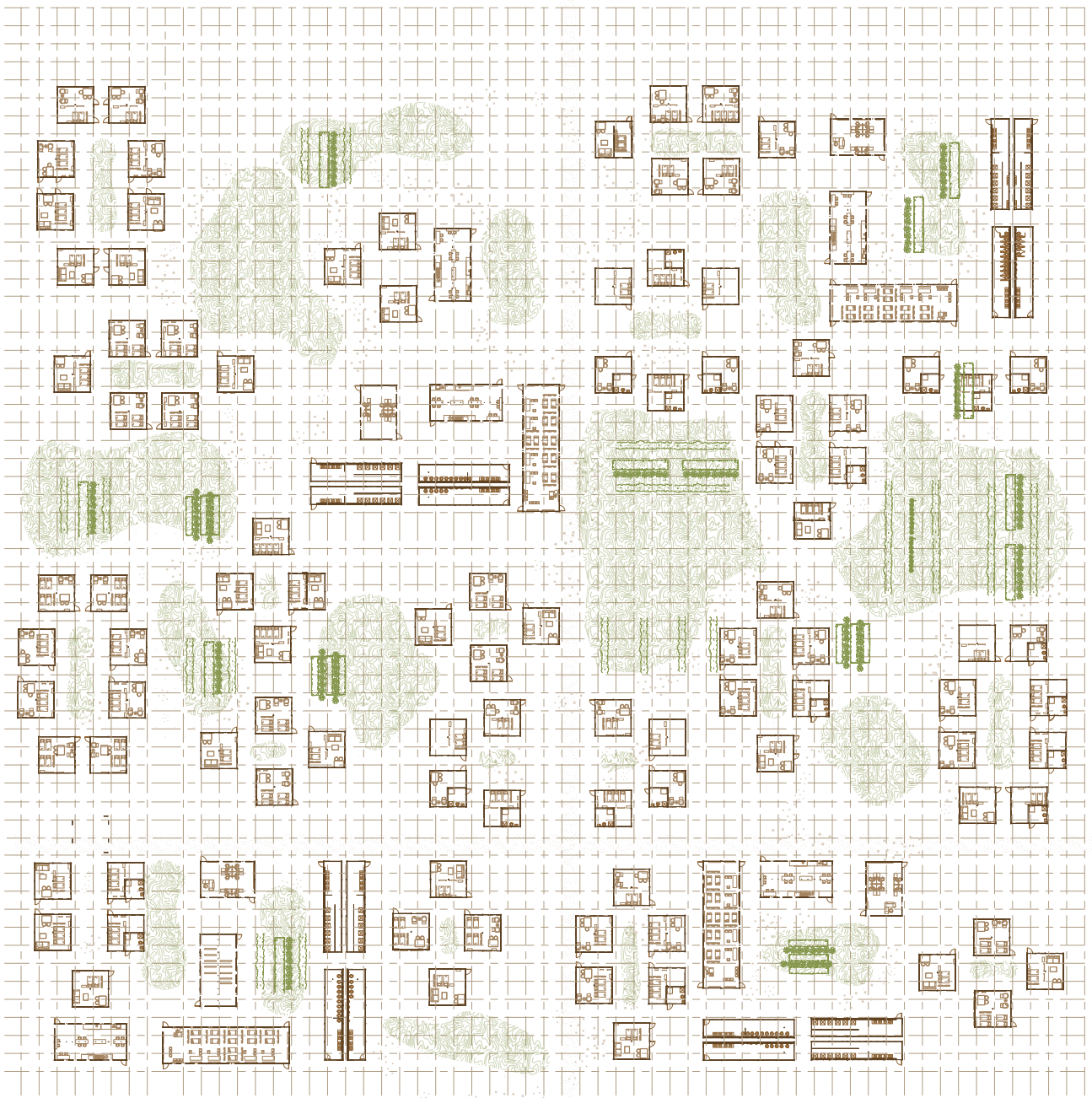


Drainage


W 3RD ST
W 2ND ST

Phase 1—the immediate response. Once the kits arrive, community members begin building their shelters using the initial shipment of parts.

W 3RD ST

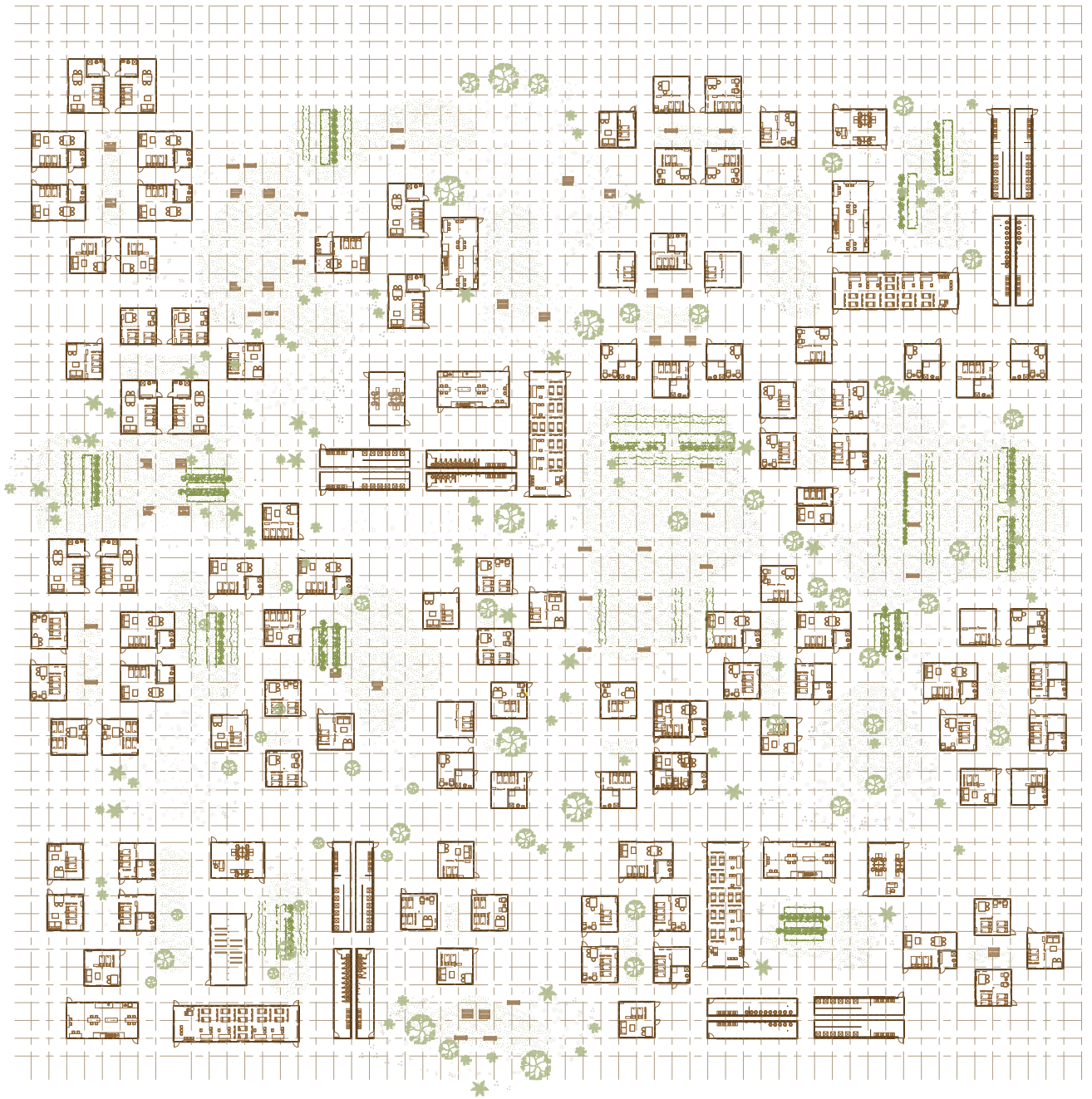


W 2ND ST

Phase 2 represents an expansion, typically after six months, when families need more space or amenities.

29 Phase 2

W 3RD ST



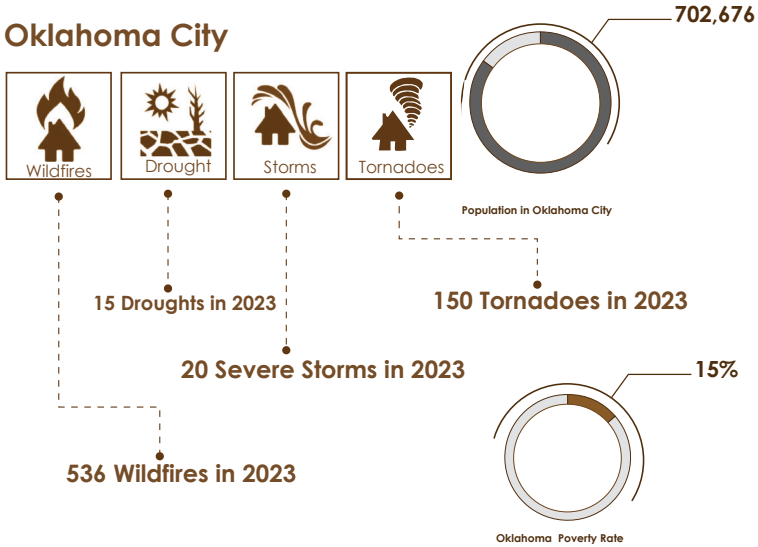
W 2ND ST

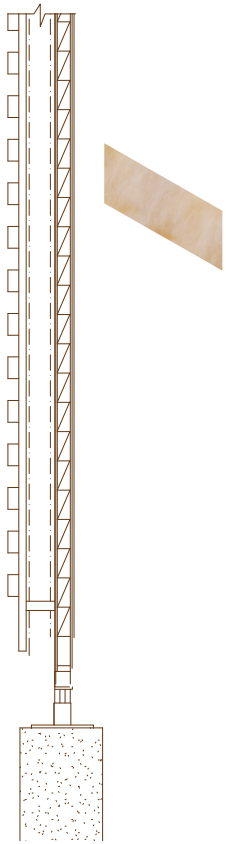
Phase 3 reflects long-term adaptation. After a year, the shelter transforms further to accommodate permanent or semi-permanent use.

Phase 3

Oklahoma City, Oklahoma

Oklahoma City

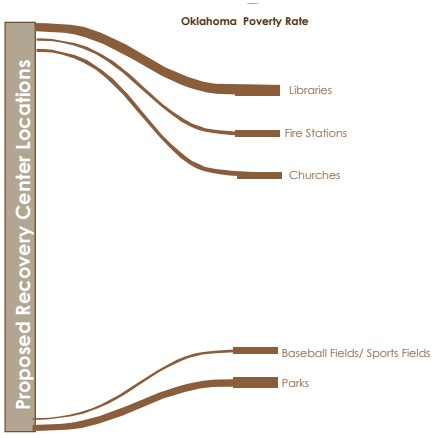


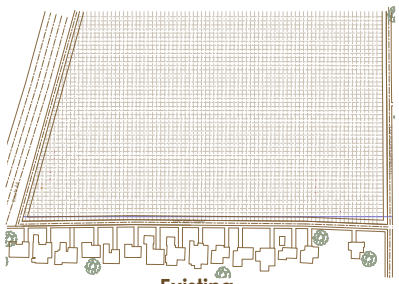


Requires R-value of 5

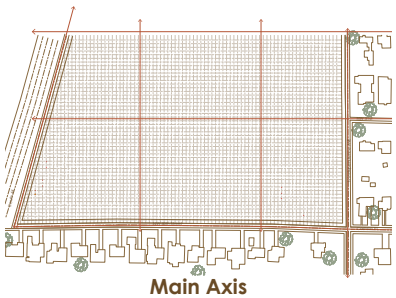
Reponse Organizations

- Federal Emergency Management Agency (FEMA)
- American Red Cross
- National Guard
- Salvation Army
- Miami Fire Rescue Emergency Management Division
- Volunteer Organizations Active in Disaster- Nation Wide
- Miami Dade County Emergency MGT
- Miami Foundation's Disaster Resilience Fund
- Community Emergency Response
- Miami Dade Communities Organized to Respond in Emergencies

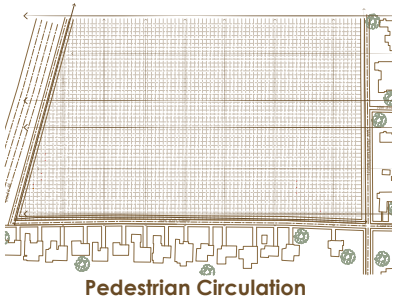




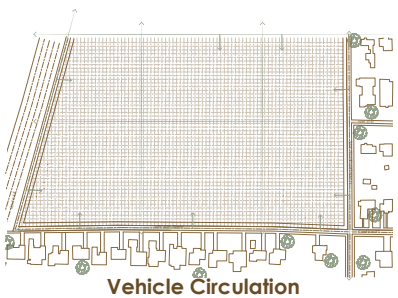
Existing



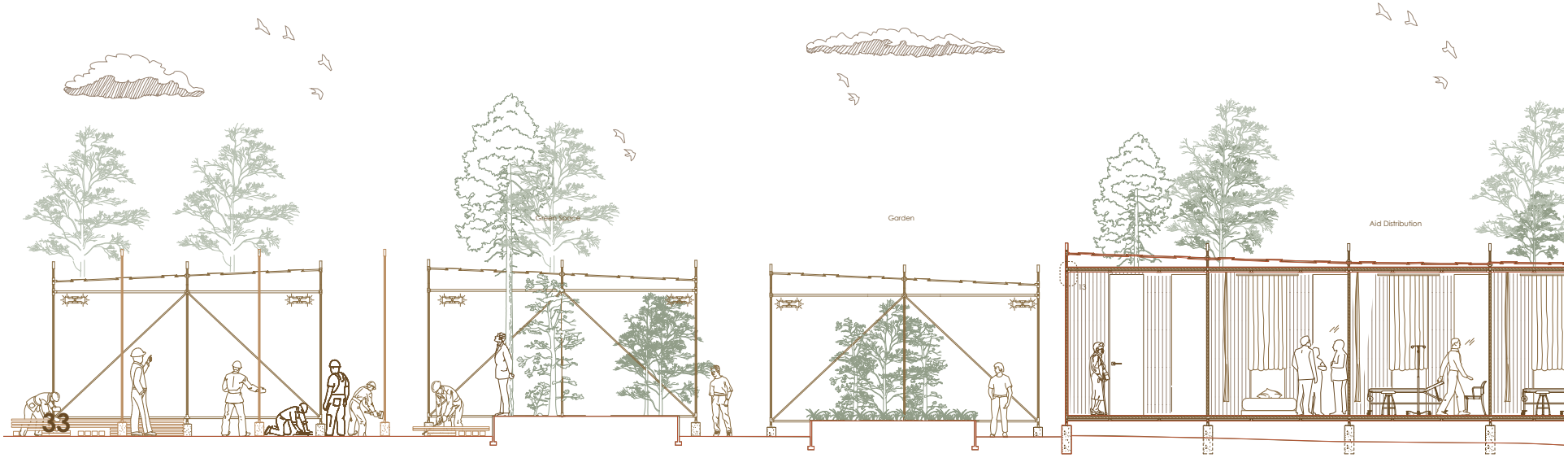
Main Axis

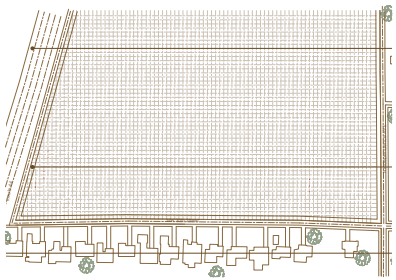


Pedestrian Circulation

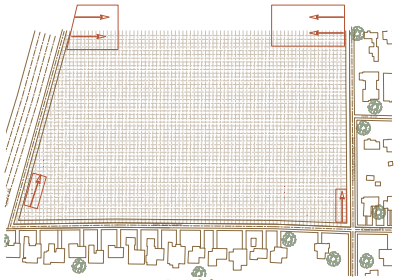


Vehicle Circulation

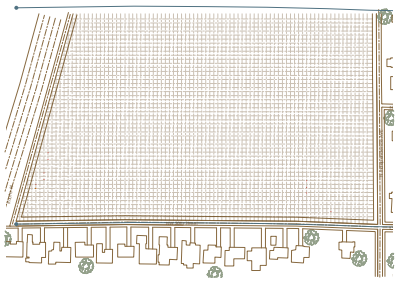




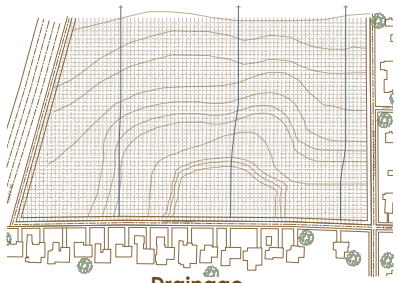
Electrical Line



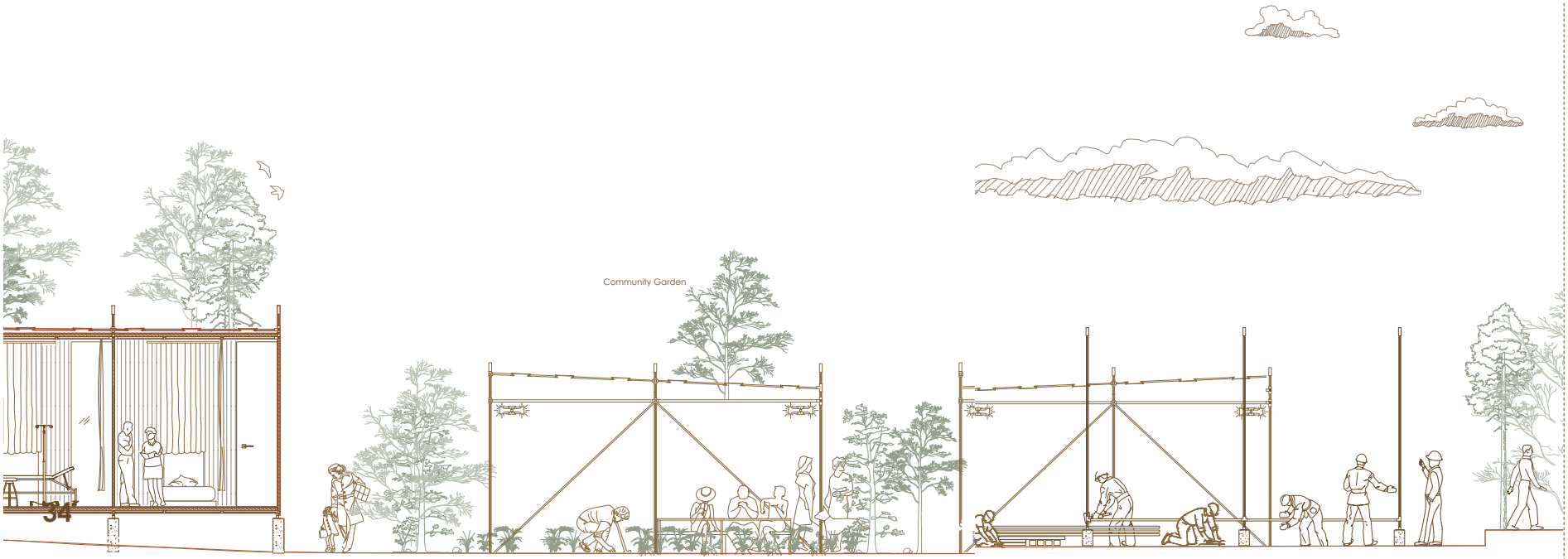
Parking



Water Line



Drainage




NW 30th Street

Phase 1—the immediate response. Once the kits arrive, community members begin building their shelters using the initial shipment of parts.

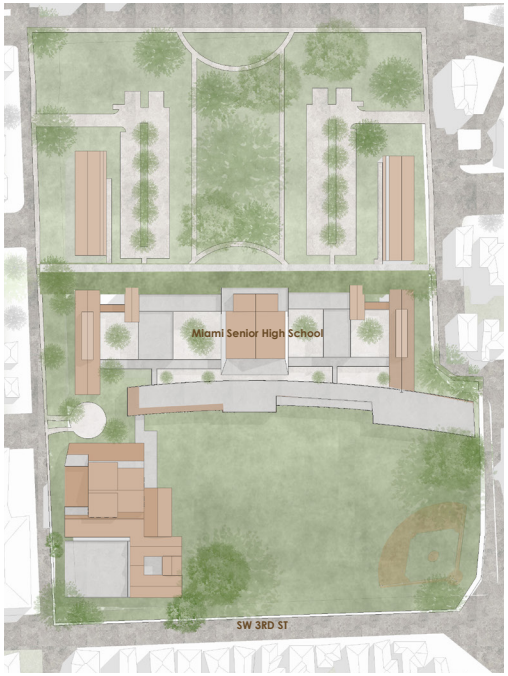

NW 30th Street

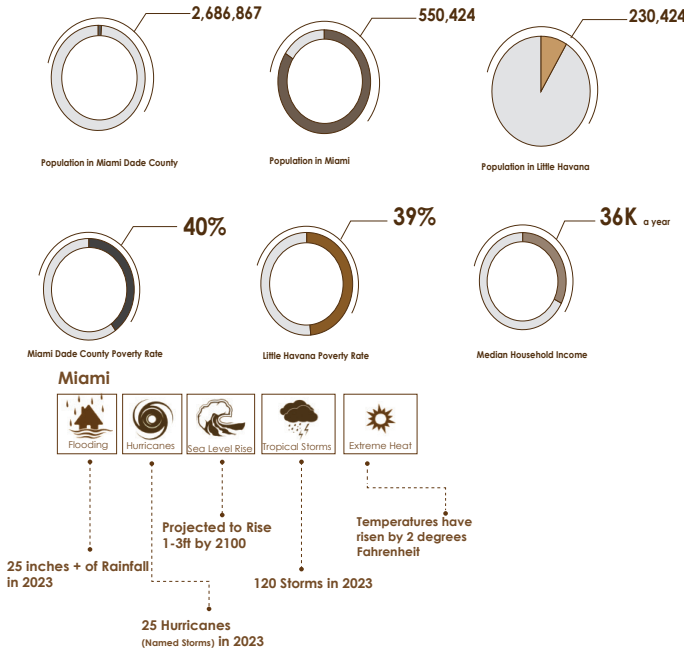
Phase 2 represents an expansion, typically after six months, when families need more space or amenities.

Phase 2


NW 30th Street

Phase 3 reflects long-term adaptation. After a year, the shelter transforms further to accommodate permanent or semi-permanent use.





1. Climate Zone Designation
Zone: 1

2. Temperature and Seasonal Characteristics
Minimal Seasonal Variation: Warm to hot year-round

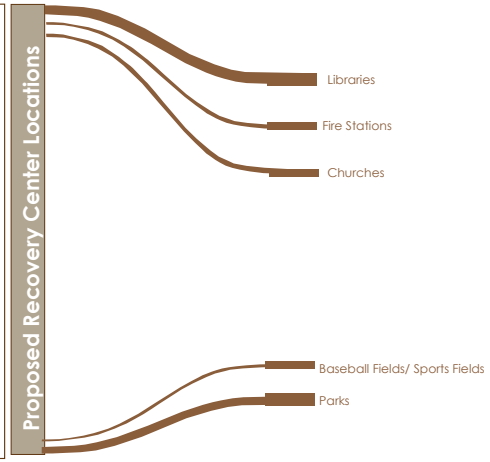
3. Humidity and Precipitation
High Humidity Year-Round: Often exceeds 70–80% relative humidity

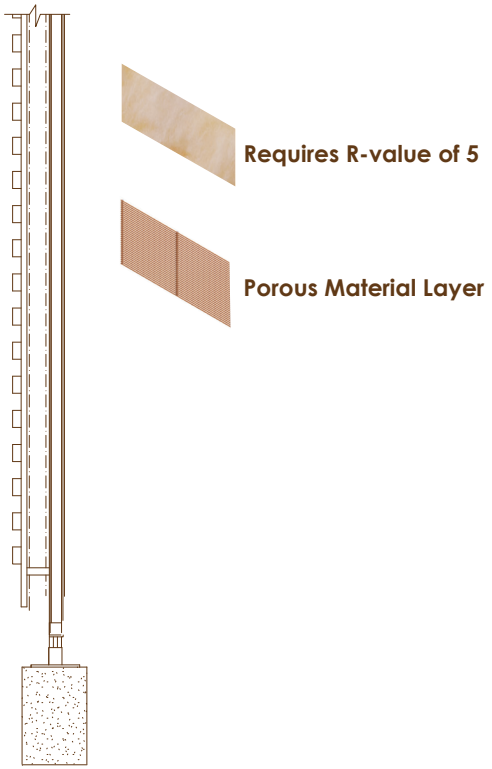
Annual Rainfall: ~61 inches (1,550 mm)

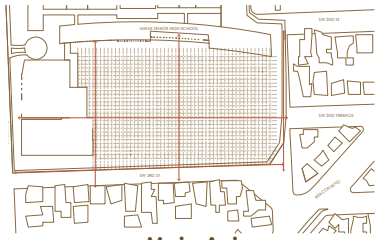
Rainy Season: May to October (frequent thunderstorms)

Reponse Organizations

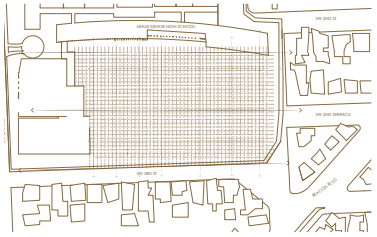
- Federal Emergency Management Agency (FEMA)
- American Red Cross
- National Guard
- Salvation Army
- Miami Fire Rescue Emergency Management Division
- Volunteer Organizations Active in Disaster- Nation Wide
- Miami Dade County Emergency MGT
- Miami Foundation's Disaster Resilience Fund
- Community Emergency Response
- Miami Dade Communities Organized to Respond in Emergencies



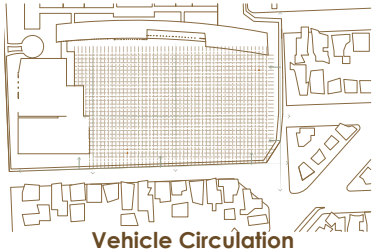




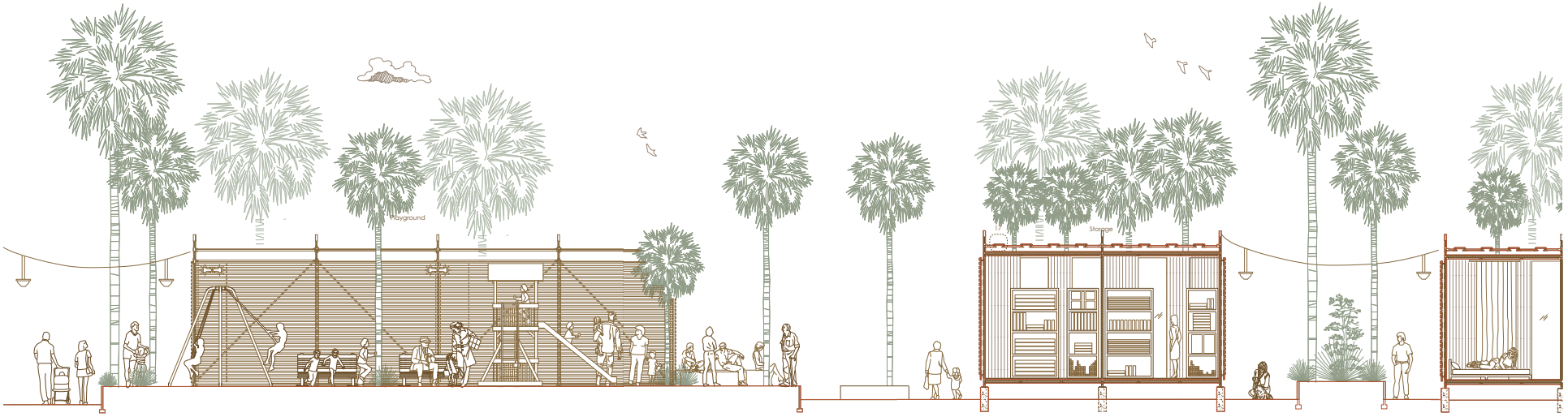
Main Axis

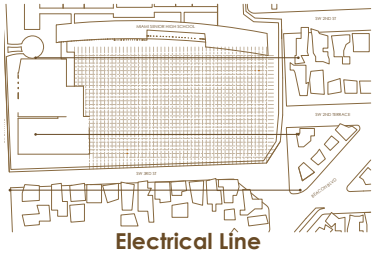


Pedestrian Circulation

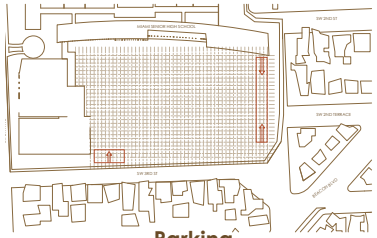


Vehicle Circulation

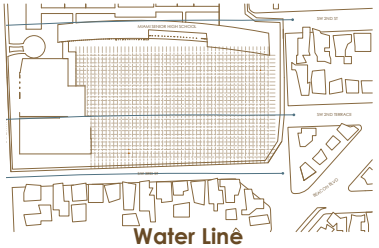




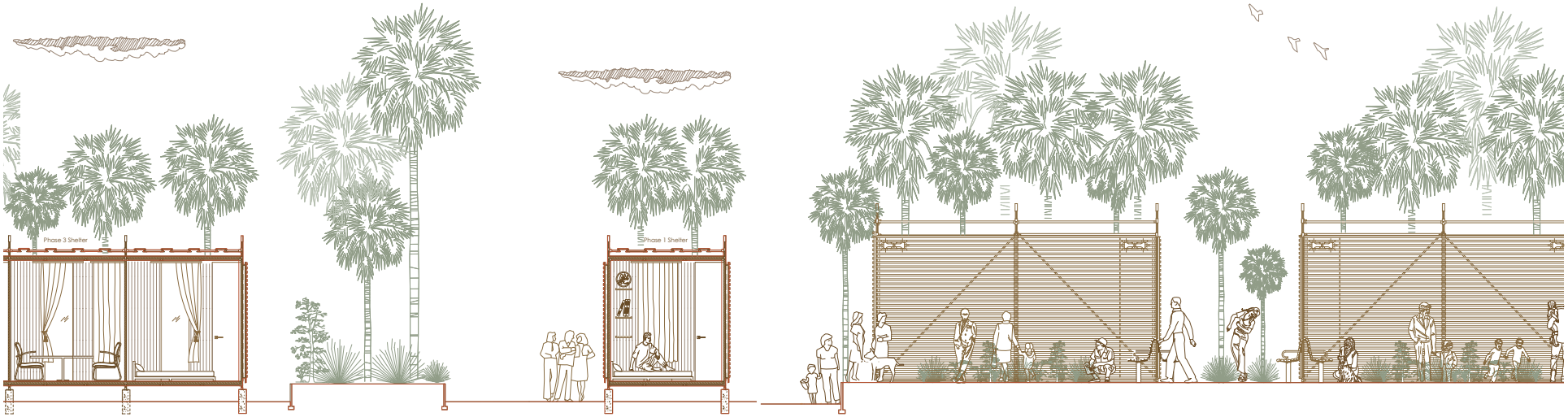
Electrical Line

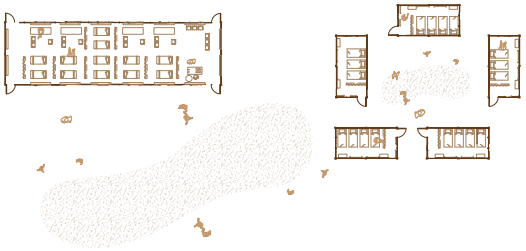


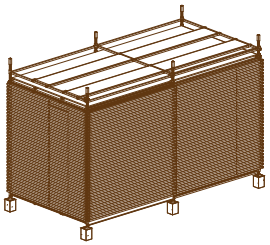
Parking



Water Line

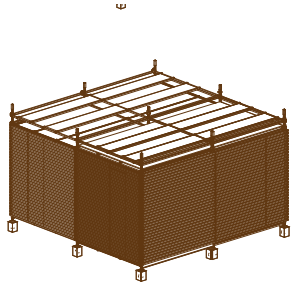


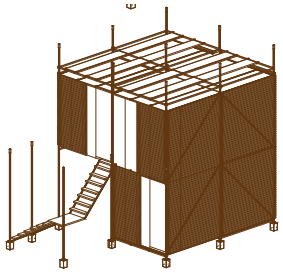





MIAMI SENIOR HIGH SCHOOL
SW 3RD ST

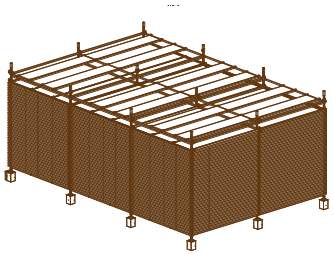
Phase 1—the immediate response. Once the kits arrive, community members begin building their shelters using the initial shipment of parts.

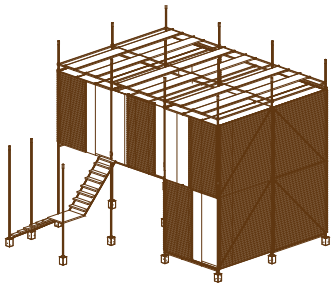





MIAMI SENIOR HIGH SCHOOL
SW 3RD ST

Phase 2 represents an expansion, typically after six months, when families need more space or amenities.






MIAMI SENIOR HIGH SCHOOL
SW 3RD ST

Phase 3 reflects long-term adaptation. After a year, the shelter transforms further to accommodate permanent or semi-permanent use.

50 **Public Park : Little Havana, Miami, Florida**
A community park: one of the spaces that support healing and reconnection.

51 Aid Distribution : Little Havana, Miami, Florida
Aid Distribution hub: where people come to seek aid and help.

4. Narrative Walk Through

Let's imagine a scenario.....

IN A WORLD WITH NATURAL DISASTERS INCREASING YEARLY, THE NEED FOR A DEPLOYABLE CONSTRUCTION SYSTEM IS IN HIGH DEMAND

SYSTEM IS INCREASING....

HERE IS HOW IT WOULD WORK.....

A HURRICANE IS FORMING OUTSIDE FLORIDA

Weather Forecast: A week in advance or 10 days before storm comes to land

PREPARATION

Community Members start to prep their homes for the storm : 5 days before

Hurricane Preparation Checklist

Stay Informed:

- Monitor weather updates via NOAA, local news, or weather apps.
- Know your evacuation zone and local emergency routes
- Create an Emergency Plan:
- Set a family communication plan and evacuation route.
- Designate a meeting location if separated.
- Plan for pets (shelters may not accept them)

Assemble an Emergency Supply Kit:

- Water (1 gallon per person per day for at least 3 days)
- Non-perishable food (3+ days' supply
- Flashlights, extra batteries
- First-aid kit and medicationsPortable phone chargers or power bank
- Cash (ATMs may not work after storms)
- Important documents in waterproof container

Secure the Home:

- Install hurricane shutters or board up windows with plywood.
- Bring in outdoor furniture, grills, trash cans, and decorations.
- Reinforce garage doors if necessary.
- Trim trees and clear gutters.

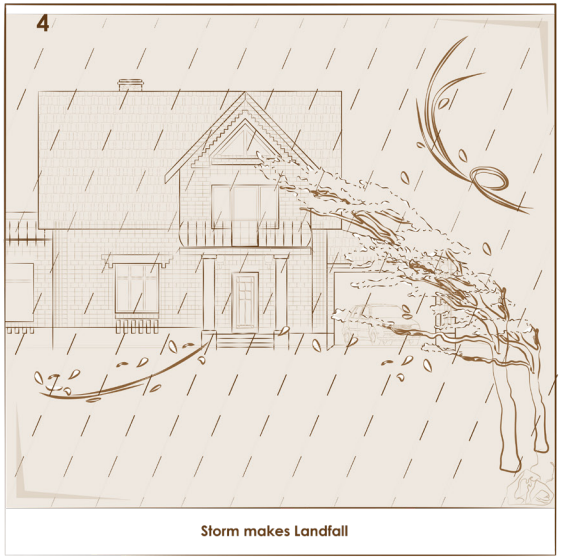
Fuel Up:

- Fill gas tanks in vehicles.
- Fill propane tanks if you rely on gas for cooking.
- Back Up Power:
- Charge all electronics and power banks.
- Prepare a generator if available; test it beforehand.

Community Members start to prep for the storm: 4 days before storm

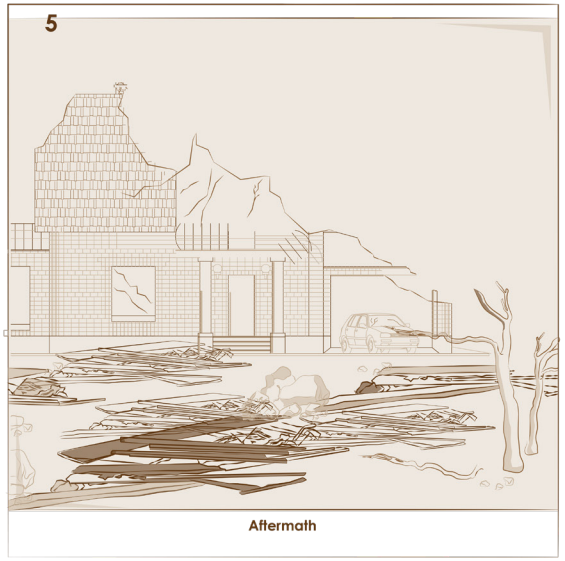
Now let's imagine a scenario: A Category 4 hurricane is approaching Florida. It's all over the news. People prepare—clearing yards, buying supplies, and evacuating.

DISASTER STRIKES



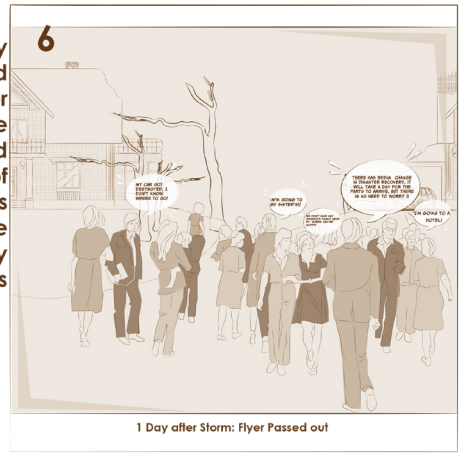
Storm makes Landfall

1 DAY AFTER DISASTER

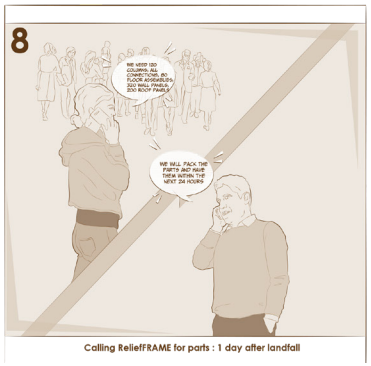


Aftermath

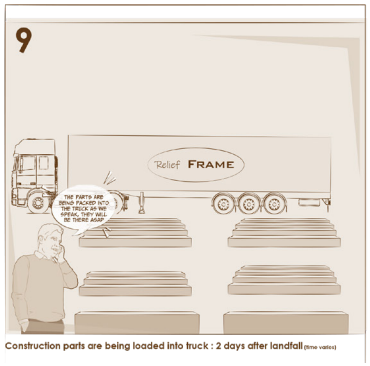
A City Official/ Red Cross Member comes to the neighborhood with piles of flyers to pass out to the community members



1 Day after Storm: Flyer Passed out



Calling ReliefFRAME for parts : 1 day after landfall



Construction parts are being loaded into truck : 2 days after landfall (time varies)

Storage Company loads the elements in the truck & provides guidelines for the members to follow:

1. Unpack & Inspect the Kit
Open the kit carefully and verify all components using the included checklist.

Report any missing or damaged parts to the aid station or local coordinator immediately.

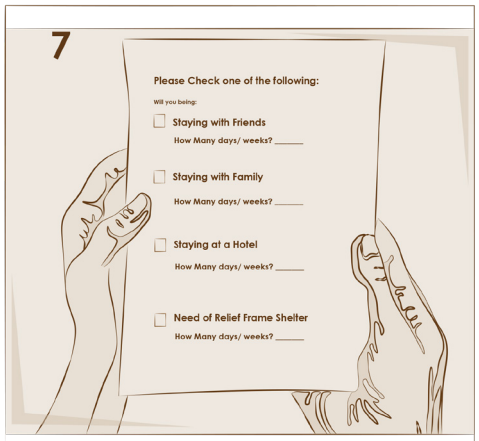
Keep packaging materials for reuse or disposal after setup.

2. Choose a Safe Assembly Location

3. Organize and Prepare
Group parts by type (e.g., structural frame, fabric panels, anchors).

Work in teams or pairs for efficiency and safety.

4. Follow the Assembly Instructions Carefully

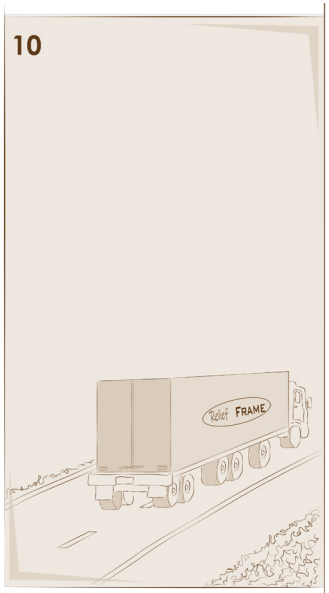


Form to fill out - to figure out community needs: 1 day after storm

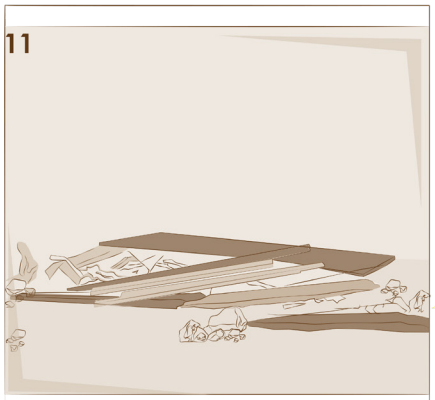
Seven days later, the storm hits. The damage is catastrophic. People are disoriented and unsure where to go. They gather together, to find red cross volunteers passing out a flyer. The flyer reads: “How many are in your household? Do you have anywhere to stay? Are you staying with family or friends? Will you be requesting a Relief Frame?

3 DAYS AFER DISASTER

DELIVERY OF PARTS



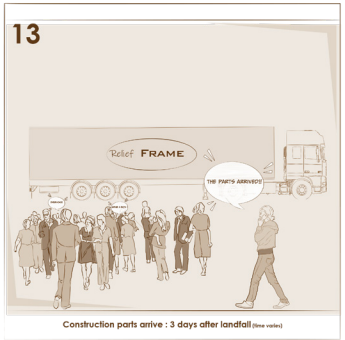
Trucks Driving to Community : 2 days after landfall (time varies)



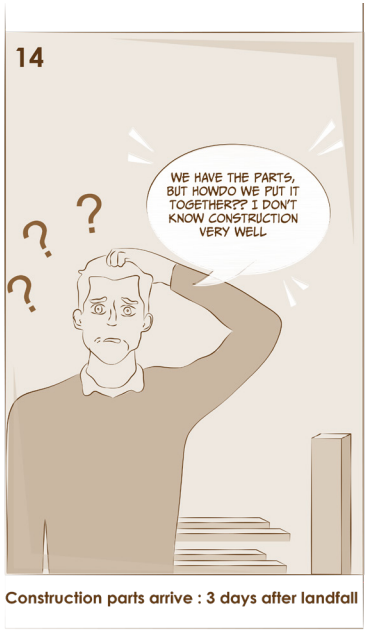
Debris Removal: 2 days after Landfall (time varies)

Community Members line up to get parts : 3 days after landfall (time varies)

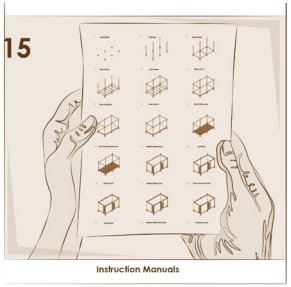
In the wake of disaster, community members have begun the vital work of clearing debris from affected areas—including their home plots, shared open shelters, and available open land. With shovels, gloves, and determination, they are transforming damaged, cluttered spaces into safe, usable ground for shelter, recovery, and rebuilding. This collective effort not only restores physical order but also reignites a sense of ownership, resilience, and hope in the aftermath of crisis.



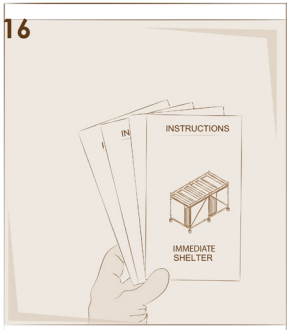
Construction parts arrive : 3 days after landfall (time varies)



Construction parts arrive : 3 days after landfall



Instruction Manuals

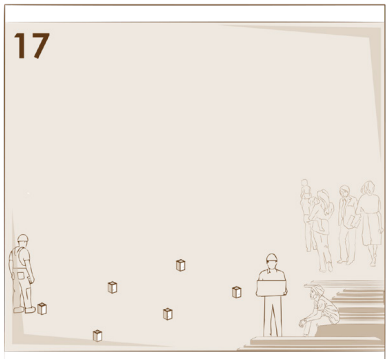


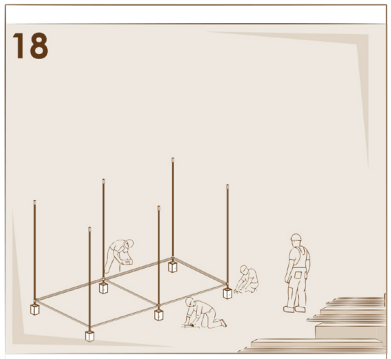
Instruction Manuals

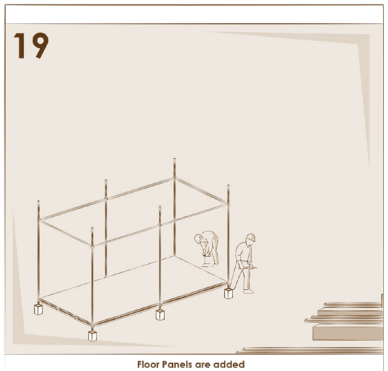
The numbers are totaled and a red cross volunteer calls the number on the flyer. Within 12 hours, the Relief Frame kits are on their way .Children, neighbors, and elders unpack and build the shelters together.

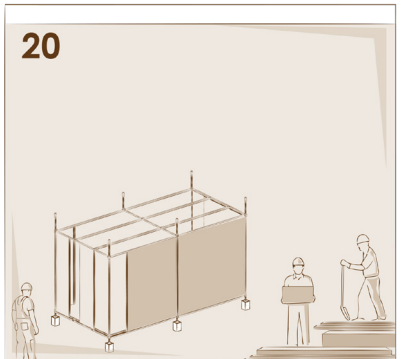
4 DAYS AFTER DISASTER

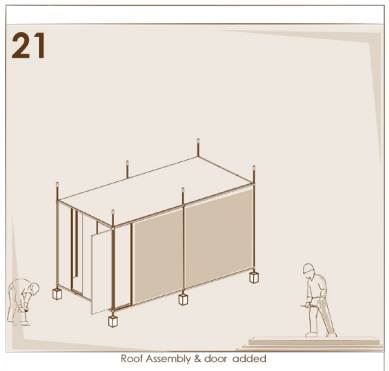
CONSTRUCTION

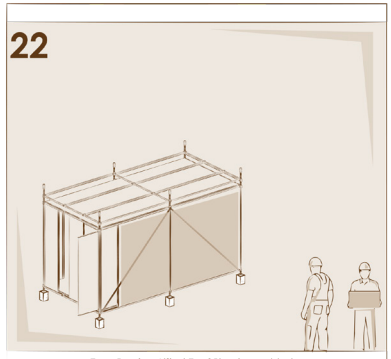


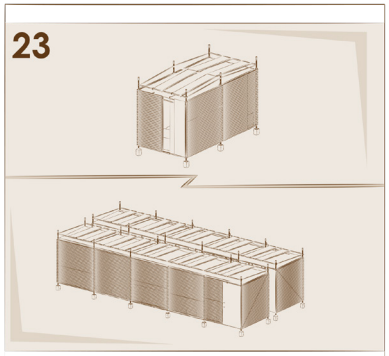








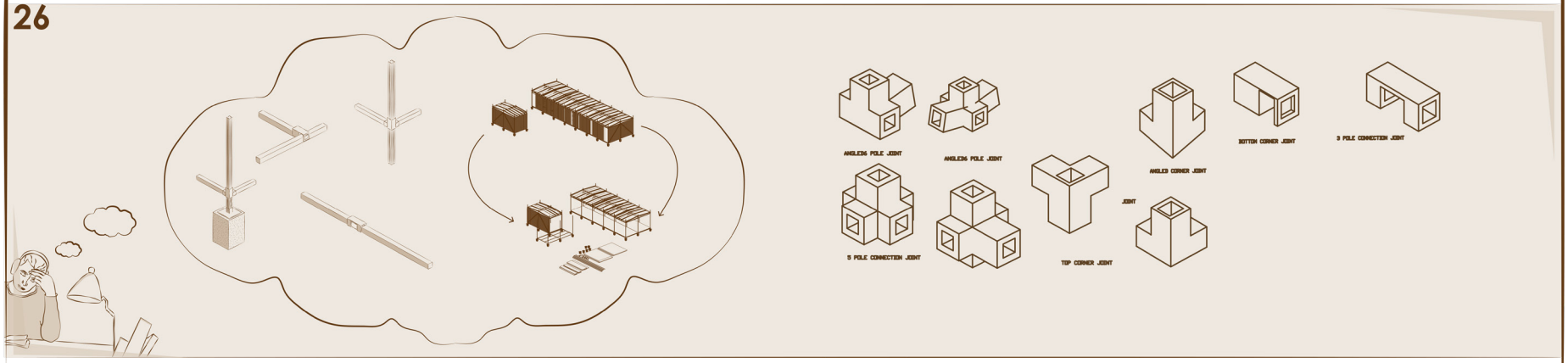




These aren't just stopgap shelters—they're designed to last at least six months, and often remain in place for over two years.

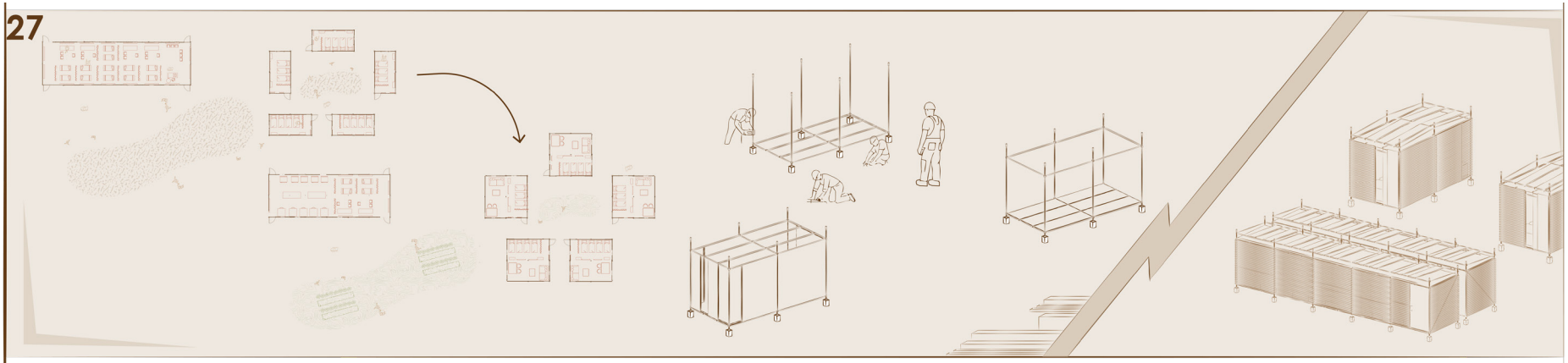
CONNECTION DETAILS

26



The Connections are based on scaffolding, allowing for disassembly OR incremental growth over time

27



Community Members are able to disassemble the shelters or continue to grow their shelters as their needs continue to grow as they are recovering from the disaster

They can be disassembled, reused, and upgraded with new systems like plumbing, solar panels, and composting toilets.

Relief Frame imagines a future where architecture doesn't just respond—it enables communities to rebuild stronger. This thesis reimagines disaster relief not as a temporary fix, but as an opportunity for dignified, adaptive, and community-centered design. It offers a deployable construction system that responds to both climate and evolving human needs—challenging traditional emergency architecture and emphasizing that resilience isn't only about survival. It's about restoring agency, rebuilding futures, and reshaping the way we care for one another during crisis.

Bibliography

Ban, Shigeru. Humanitarian architecture: Shigeru Ban. New York: Aspen Art Press and D.A.P./Distributed Art Publishers, 2015.

Clouette, Benedict, Marlisa Wise and Ebook Central - Academic Complete. Forms of Aid: Architectures of Humanitarian Space. Boston: Birkhäuser, 2017.

Datamonitor (Firm). Construction Materials In the United States. New York, NY: Datamonitor.

Illston, J. M. and P. L. J. Domone. Construction Materials: Their Nature and Behavior. 3rd ed. London: Spon Press, 2001.

Kikano, Faten, and Liliane Hobeica. Enhancing disaster preparedness: From Humanitarian Architecture to Community Resilience. Edited by A. Nuno Martins and Mahmood Fayazi. Amsterdam: Elsevier, 2021.

Ramroth, William G. Planning for Disaster: How Natural and Man-made Disasters Shape the Built Environment. New York: Kaplan Pub, 2007.

Smith, Gavin. Planning for post-disaster recovery: A review of the United States Disaster Assistance Framework. Fairfax, Va: Public Entity Risk Institute, 2011.

Zwitter, Andrej and Ebook Central - Academic Complete. Humanitarian Intelligence: A Practitioner's Guide to Crisis Analysis and Project Design. Lanham, Maryland: Rowman & Littlefield, 2016.