

**Articulating Ecology:
Brownfield Remediation, Urban Agriculture and
Prospects for Community Revitalization**

by

Adam Krop

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CONTENTS

Abstract.....	iv
Definitions.....	v
Acknowledgements	vi
Chapter 1: Introduction	1
Brownfield Sites	2
Drosscapes	3
Urban Ecology Defined Through our Conception of Nature.....	4
Project Proposal.....	
Site.....	7
Site Decontamination.....	15
Alternative Remediation Methods.....	16
Program.....	21
Identifying Project Synergies.....	21
Urban Park.....	24
Mushroom Farm and Compost Facilities	25
Urban Agriculture	29
Mixed Commercial	29
Project Timeline	31
Chapter 2: Design.....	37
Shipping Containers	37
Materials.....	37
Grounds, Nodes, Paths, Program	41
Phase 1: Activation	43
Plans and Sections.....	55
Phase 2: Cycle of Remediation	64
Plans and Sections.....	73
Phase 3: Dissipation and Return to Fallow Landscape	79
Additional Project Representation	82

Chapter 3: Conclusion	84
Bibliography	86

ABSTRACT

2015 has been declared the International Year of Soils by the United Nations. This proclamation emphasizes the soil as a basis for life and culture, its importance for agriculture, and its fragility when threatened by sprawl, industry and contamination. This thesis explores the remediation and temporary reappropriation of urban contaminated sites into a community hub for urban agriculture.

A brownfield site in the dynamic and gentrifying neighbourhood on Gottingen St. in Halifax, NS is selected as an incubator for culture and community development. A phased and temporary caravan of architecture derived from phyto- and myco-remediation technologies drives a process that unfolds over 20 years. As the risks posed to human health by contaminated soil dissipates, so too does the architectural performance. A clean site and stronger community networks are the remnants that facilitate the next phase of development as the process begins anew on the next contaminated site.

DEFINITIONS

Articulate:

verb

1. express (an idea or feeling) fluently and coherently.
2. form a joint.

Origin

from Latin articulus 'small connecting part'

Ecology:

Noun

1. is the scientific analysis and study of interactions among organisms and their environment, such as the interactions organisms have with each other and with their abiotic environment.

Origin

from Greek: oikos, "house"; -logy, "study of"

Vacancy:

noun

1. empty or unoccupied place.
2. gap, opening, breach
3. Crystallography. an imperfection resulting from an unoccupied lattice position

Novelty:

Noun

1. a new or unfamiliar thing or experience

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To my parents Jozef and Elizabeth Krop; you always encouraged me to succeed at whatever I chose to put my mind to. Thank you.

CHAPTER 1: INTRODUCTION

The 68th General Assembly of the United Nations (UN) have declared that the year 2015 is “The international Year of Soils”! Soil is vital for our food, fiber and fuel supply, the support of biodiversity, provision of construction materials, regulation of climate and flooding and the cycling of nutrients.¹ It provides services that are vital to our life on Earth and literally supports the foundations that our cultures are built upon. The UN declaration draws attention to this vital non-renewable resource because of this ecological significance, its integral role in agriculture and its susceptibility to urban sprawl, deterioration and contamination from industrial processes.

The intensification of urban centres around the world presents many challenges to ensure a city’s long term ability to meet their residents needs while considering the impacts on future generations and the surrounding landscapes from which a city draws its resources. This has created a focus on the intensification of urban agriculture to bolster food security in local communities and decrease reliance on industrially produced food and fossil fuels . Food production strategies range from large private urban “industrial” operations to small community garden plots and planters. While both contribute to increasing food availability, community gardens have proven to cultivate networks, friendships, local economies and remain as the last outposts of the commons.² As such they largely exist on vacant and often contaminated land known (or unknown) as brownfields. These sites are sometimes available for decades, but always face a threat of gentrification and demolition for other revenue producing development.³

A contaminated site, reimagined as an urban park can become a hub for commer-

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1. Food and Agriculture Organization of the United Nations, *Information Material: Soil Functions*, last modified April 21, 2015, <http://www.fao.org/soils-2015/en/>.
 2. Karl Linn, “Reclaiming the Commons,” in *Sustainable Architecture White Papers*, ed. David E. Brown, Mindy Fox, Rickel Pelletier (Ann Arbor: University of Michigan Earth Pledge Foundation, 2000), 114.
 3. *Ibid.*, 115.

cial and community agricultural activities that facilitate remediation. A curative garden, mushroom farm hub and community commons of mixed commercial uses creates an intersection of programs that support the building of soils, community and urban ecological services. Exploration of the processes and material flows in phytoremediation and mycoremediation technologies generates an architectural language consisting of transportable shipping containers and retaining walls organized by a hierarchy of connecting paths across the site. Architecture has the potential to activate a site generating the community capacity for soil remediation and redevelopment.

Brownfield Sites

A brownfield is an abandoned or under used industrial or commercial site where redevelopment is complicated by real or perceived contamination.⁴

Contaminated urban sites are a condition of Northern, post-industrial economies where development of car focused sprawl contributed to shrinking urban centres. Both their existence and persistence signify the still unaddressed calls for urban and environmental stewardship from Rachel Carson's *Silent Spring* and Jane Jacob's *Death and Life of Great American Cities*.⁵ Brownfield sites are manufactured and intentional and contain both a toxic and spatial legacy locked in their soils and remnant architecture. Through direct contact, the water, air, and food grown in these soils contaminants become mobile and find pathways that continue to cause health complications for people, communities and the environment. The original conception of programs, processes and technology employed at a contaminated sites and the residual effects have been created by design methodologies rooted in conceptual and actual relationships between people and between people and nature.

In the 19th and 20th centuries, from Victorian housing to Haussmann's Paris, the importance of "health", "safety", and "welfare" gave authority to administrators and

4. Niall Kirkwood, *Manufactured Sites: Rethinking the Post-Industrial Landscape* (London: Spon Press, 2001), 4.

5. Deborah Gans and Claire Weisz, *Extreme Sites* (London: Architectural Design, 2004), 5.

urban design professionals to zone and manipulate human settlements.⁶ However, design has long prescribed policies, selected technologies and designed space that has woven toxic chemicals into the landscape.⁷ In the 21st Century, we understand the far reaching effect that environmental contaminants have on people, landscapes, and communities and yet brownfields continue to be generated and past frameworks for their remediation remain costly and complicated. However, “if the very act of developing renders a site brown” then, like their creation, any subsequent redevelopment and acts of decontamination can be seen as a “continuity of a city’s life and landscape.”⁸

Drosscapes

The spatial quality and the socio-political influences creating contaminated urban sites across North America have been identified by Alan Berger as “Drosscapes”, or wasted landscapes.⁹ Berger identifies 8 characteristics of Drosscapes,

One: Dross is understood as a natural component of every dynamically evolving city. As such it is an indicator of healthy urban growth.

Two: Drosscapes accumulate in the wake of socio- and spatio-economic processes of deindustrialization, post-Fordism, and technological innovation.

Three: Drosscapes require the designer to shift thinking from tacit and explicit knowledge (designer as sole expert and authority) to complex interactive and responsive processing (designer as collaborator and negotiator).

Four: The Designer does not rely on the client-consultant relationship or the contractual agreement to begin work. In many cases a client may not even exist but will need to be searched out and custom-fit in order to match the designer’s research discoveries. In this way the designer is the consummate spokesperson for the productive integration of waste landscape in the urban world.

Five: Drosscapes are interstitial. The designer integrates waste landscapes left over from any form or type of development.

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6. Kristina Hill, “Design and Planning as Healing Arts: The Broader Context of Health and Environment,” in *Ecology and Design Frameworks for Learning*, ed. Bart R. Johnson and Kristina Hill (Washington, DC: Island Press, 2002), 212.
 7. Sandra Steingraber, “Exquisite Communion: The Body, Landscape and Toxic Exposures,” in *Ecology and Design: Frameworks for Learning*, ed. Bart Johnson and Kristina Hill (Washington, DC: Island Press, 2002), 199.
 8. Gans and Weisz, *Extreme Sites*, 6.
 9. Alan Berger, *Drosscape: Wasting Land in Urban America* (New York: Princeton Architectural Press, 2006), 12.

Six: The adaptability and occupation of drosscapes depend upon qualities associated with decontamination, health, safety, and reprogramming. The designer must act, at times, as the conductor and at times the agent of these effects in order to slow down or speed them up.

Seven: Drosscapes may be unsightly. There is little concern for contextual precedence, and resources are scarce for the complete scenic amelioration of drosscapes that are located in the declining, neglected, and deindustrializing areas of cities.

Eight: Drosscapes may be visually pleasing. Wasteful landscapes are purposefully built within all types of new development located on the leading, peripheral edges of urbanization. The designer must decipher which types of "waste" may be productively reintegrated for higher social, cultural, and environmental benefits.¹⁰

Ironically, despite the contaminated soil, and on account of site vacancy, ecologists have found more diverse and resilient ecological environments producing greater urban ecological services on brownfields than in the planned urban landscapes surrounding them.¹¹ Berger identifies that these wasted landscapes become the platform for the study of urban ecology and a design practice that concurrently decontaminates a site during redevelopment. This means the final design process and form becomes integral to the reclamation of the land.¹²

Urban Ecology Defined Through Our Conception of Nature

Defining Nature and Ecology requires an inclusive examination of our relation to Nature over time. The traditional romantic concepts view Nature as the wild, unspoiled and primeval garden. The modern era separated self, nature and culture designating it to the realm of mechanistic and Newtonian science. There it becomes a reductionist extraction of parts and is spoken in terms of economics, resources, and stocks to be extracted, farmed, harvested and used.¹³ In the Postmodern era, the term ecology establishes Nature as a complex networked web of relationships. In this holistic systemic

10. Ibid., 1-8.

11. Peter Del Tredici, *Wild Urban Plants of the Northeast : A Field Guide* (Ithaca: Cornell University Press, 2010), 26.

12. Berger, *Drosscape: Wasting Land in Urban America*, 72.

13. Mark DeKay and Susanne Bennett, *Integral Sustainable Design: Transformative Perspectives* (London: Earthscan, 2011), 338.

view, our communities are interlocked with a larger bioregion that must be preserved to ensure the functioning upon which human society depends.¹⁴

The “Integral” conception of nature is an emerging view in ecological thinking that recognizes nature as a complex living system, both united and inseparable by our cultures’ “great matrix of perspectives”. It recognizes and builds on earlier perspectives, but puts greater value on examinations of truth that are more inclusive, comprehensive, insightful and generative than others.¹⁵ This matrix of relationships is a human made construction where Nature’s brilliance and/or earthly malaise is based in a world that we articulate.¹⁶

James Corner states, “the role of ecology in design goes beyond the object centered advocacy of nature’s ‘environment’ or culture’s ‘art’ and is instead toward the highly interactive processes in relationships that are life itself - life as both a specific and autonomous system of networks, forces, combinations, unfoldings, events and transformations”.¹⁷ In philosophy, systems theory, science, and art, emergence is conceived as a non-linear process whereby larger entities, patterns, and regularities arise through interactions among smaller or simpler entities that themselves do not exhibit such properties. An emergent entity still remains a fragment of, but inherent to a larger ecology.¹⁸ This is a humbling truth of existence, but also an empowering realization to the potential of the individual.

Therefore, a city is not like an ecosystem, but a city is an ecosystem. Similarly, a city is not a habitat for humans unless it actually provides the things individuals need.

14. Ibid., 340 .

15. Ibid., 341.

16. James Corner, “Ecology and Landscape as Agents of Creativity,” in *Projective Ecologies*, ed. Chris Reed, and Nina-Marie E. Lister (Cambridge, MA: Harvard University Graduate School of Design, 2014), 54.

17. Ibid., 60.

18. Rod Barnett, *Emergence in Landscape Architecture* (New York: Routledge, 2013), 49.

We acknowledged that cities should be sustainable habitats and we are increasingly designing the provisions for cities to provide their own food, generate energy, manage resources responsibly and act as a petri dish of cultural generation. Each site developed in a city should be required to act as an additional creation of a larger habitat and must be seen as part of a larger system of climate, landform, vegetation and water.¹⁹ This habitat is situated in an open landscape system where space is dynamic, flexible, relative and it is interactively nested in larger networks defined by form, function, field and flows between and across dynamic layers of the city.²⁰ Articulating the adaptive, responsive and emergent forces of ecological systems in the design of spaces could support the successional development of communities and invigorate life into cities. The interest in emergent theory for urbanism is a speculative investigation of how “natural systems continually and endlessly create novelty: new rhythms, new patterns, new processes; new species, new behaviors, new responses to new conditions.”²¹ As William McDonough postulates, an eco-effective architecture is architecture that serves as a healing act, upcycling and contributing to the environment.²²

Project Proposal

The inclusive definition of ecology and emergent systems thinking are the frameworks by which designers, regional planners and landscape ecologists are conceiving projects for larger ecological systems and landscapes that human habitats are a part of. This context reinforces the requirements of effectively designing for drosscapes.

In this light, What is the reciprocal relationship between architecture and drosscapes: How can architecture support the concurrent habitation of urban

19. Kirkwood, *Manufactured Sites*, 41.

20. Barnett, *Emergence in Landscape Architecture*, 47.

21. *Ibid.*, 47.

22. William McDonough, “Eco Effectiveness: A New Design Strategy,” in *Sustainable Architecture White Papers*, ed. David E. Brown, Mindy Fox, Rickel Pelletier (Ann Arbor: University of Michigan Earth Pledge Foundation, 2000), 4.

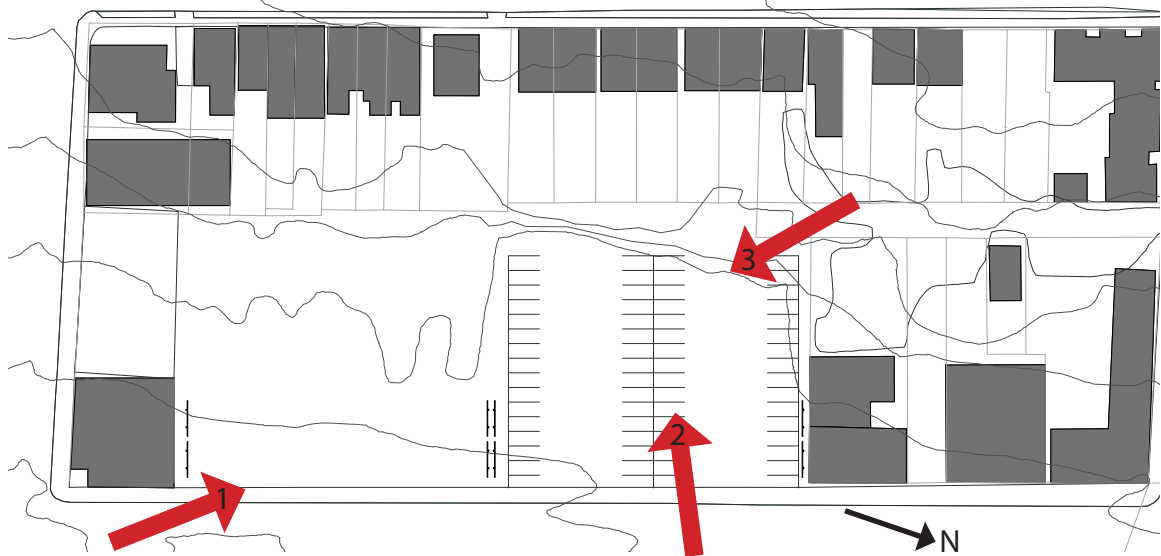
brownfield remediation sites, generating novelty, ecological services and community development?

Site

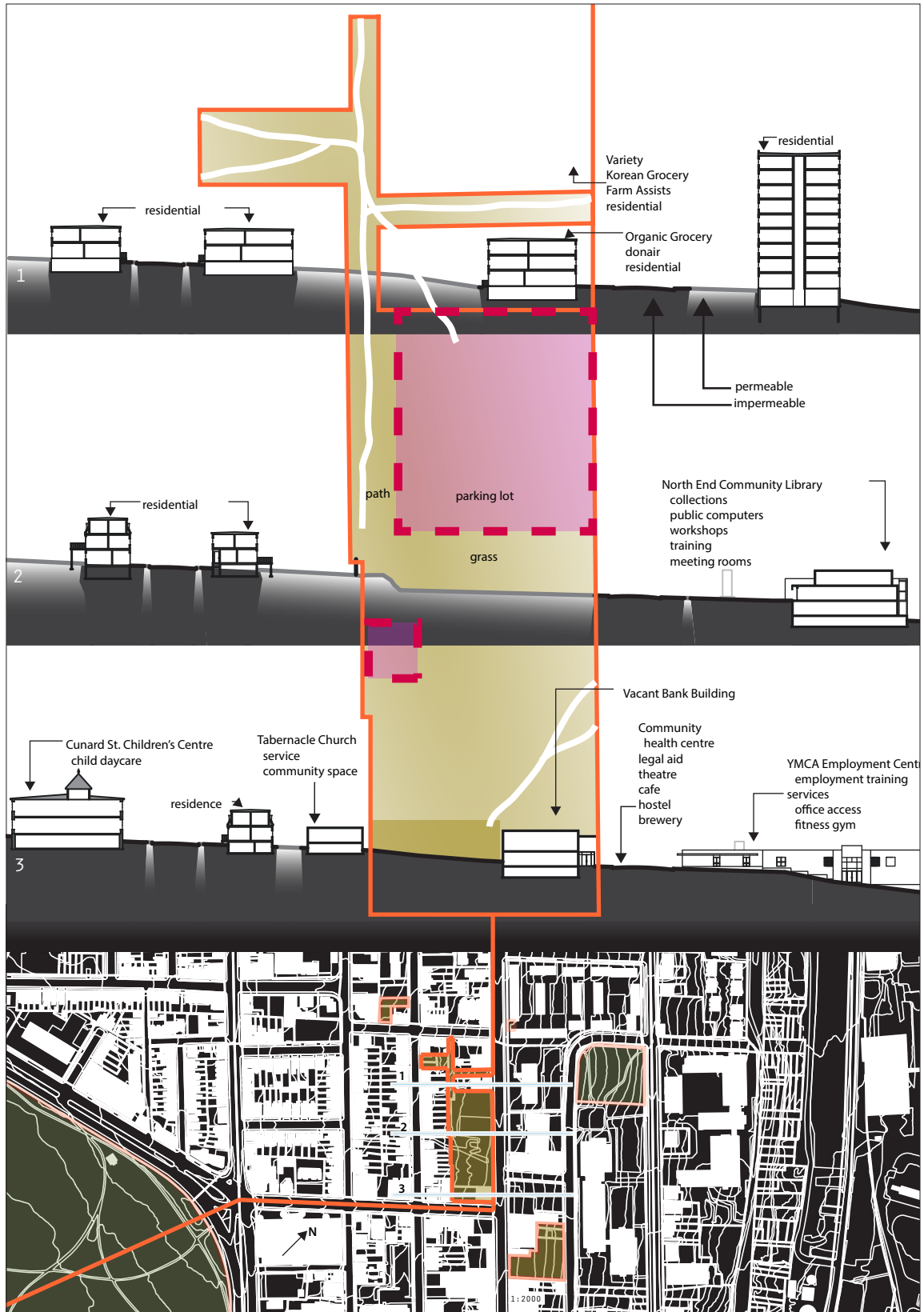
The Gottingen St. area South of the Macdonald Bridge was once a strong economic centre in Halifax, but has declined significantly since the 1950's. In the 1970's, Halifax's mandate for urban renewal placed the Uniacke Square housing project in the heart of the community. When the city forcibly demolished Africville, it relocated many of its residents to the Square. The community faces a number of social and economic challenges and as a result has been stigmatized with racism, violence and crime. Today the patchwork of redevelopment makes for an eclectic street front. Just south of the square the North End Community Library acts as an important node for the community as do many service oriented institutions on the street. Recently the Hope Blooms community group established a small community garden East of the site behind the library. Its establishment has generated a micro enterprise in salad dressing run by local



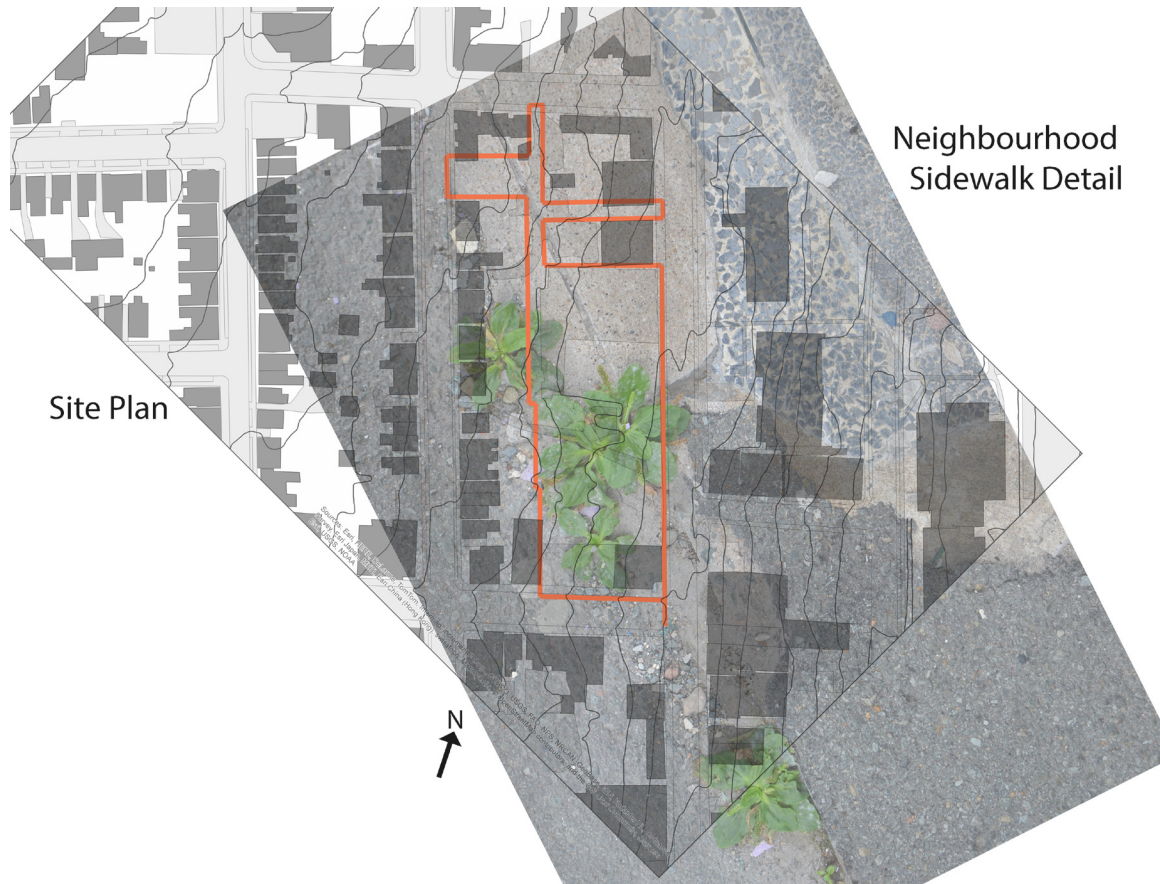
Comparison of historic Gottingen St. with its image today.



Three views of the existing site on Gottingen St. The first looking northeast at the vacant bank building. The second looking southeast at the parking lot. The third looking southwest over the same parking lot.



Three sections taken through the brownfield site with dashed pink areas showing the areas of contaminated soils.



Site plan juxtaposed against an existing sidewalk detail from Gottingen St.

youth and the garden itself is a safe and educational space for the community. The initiatives success has prompted the city to build a permanent greenhouse on that site. Other strong local networks have hosted pop-up markets, street festivals and food truck events in the area.

Across from the Library is a vacant site where a Sobey's Grocery Store was demolished over 30 years ago. The site has naturally occurring contamination from arsenic in addition to construction waste that has been buried on site. A now deteriorating parking lot was put on site, capping an area of petrochemicals based soil contamination. At the present time there is a lack of economic incentive for businesses to develop the site outright and previous attempts to establish housing developments have fallen through. The above figure identifies the project site overlaid with a detail of sidewalk from the neighbourhood. The sidewalk accurately depicts the surface porosity



Network of green spaces across the Halifax Peninsula comprised of highly managed parklands, naturalizing areas allowed to grow under natural forces and brownfield sites.

of the site and its condition is representative of the nature of the neighbourhood.

At the Scale of Halifax, the fabric of a city is made up of fragments of our changing relationship to nature over time. It includes the pastoral ideas of the Commons, the saved wilds and interconnected web of point pleasant park, the zoned contaminated sites of nature abused through industrialization and marginal sites left to naturalize also in areas contaminated by regular urban abuse. On a regional scale the emergent Urban landscape is being conceived of as a great matrix of perceptions made up of complex living ecosystems where nature, people, our processes, our productions and our health are inseparable. The Gottingen site of interest fits into this matrix and proposes the possibility of an urban greenspace where the interplay of these forces come together.

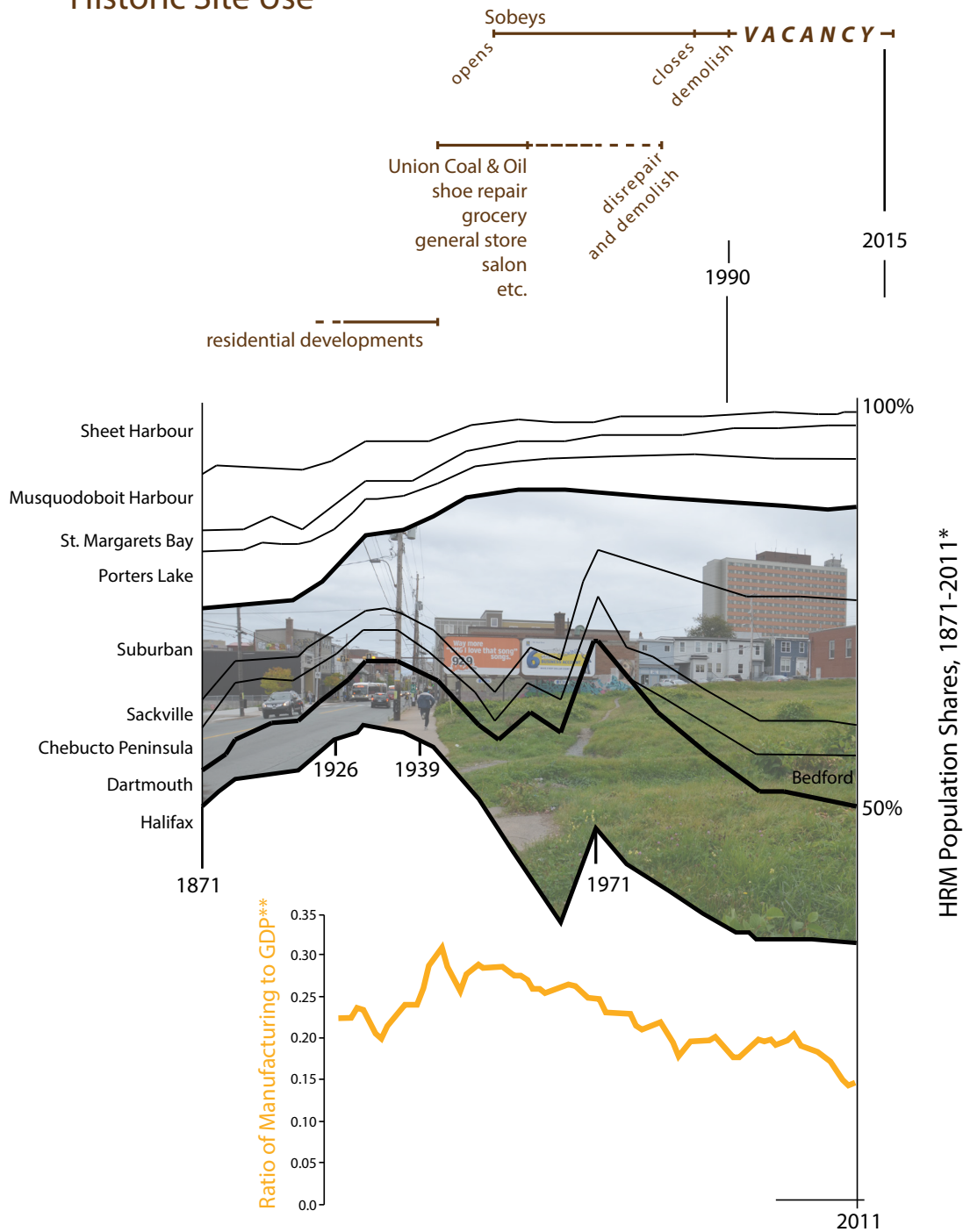
Vacant contaminated sites are a condition of disinvestment found in cities around the world. They are typically found in neighbourhoods with a high incidence of low income levels. Thrive! Nova Scotia, a government organization, has initiated an intention to address issues of health on a holistic and regional scale. The biggest determinants of this condition are healthy diverse ecosystems, income inequality, nutrition, active lifestyles, education and social capital.²³ Income is the single biggest determinant of individual health and the problem correlates to and is compounded by spatial proximity of brownfields. With these conditions, the Gottingen street site is framed as a drosscape using Alan Berger's notation of site analysis.

Ecologically speaking Gottingen St. is far from a conception of equilibrium, or what most people might consider a stable state of urban development. However, a system that is highly equilibrated has less ecological potential and less capacity for transformation.²⁴ The problem with many works of architecture is that they are conceived of, and placed in a community as the static object of a perceived climax community or

23. Trevor Hancock, "It Takes a Hael Community to Raise Healthy People: Working Together to Create Healthier Communities", presented at the Thrive! Conference, September 22, 2014, Halifax, Nova Scotia.

24. Christopher Hight, "Designing Ecologies," in *Projective Ecologies*, ed. Chris Reed and Nina-Marie E. Lister (Cambridge, MA: Harvard University Graduate School of Design, 2014), 100.

Historic Site Use



*Stantec. Quantifying the Costs and Benefits to HRM, Residents and the Environment of Alternate growth Scenarios. Halifax Regional Municipality, Nova Scotia, April 2013, pg.26.

** The Decline of Manufacturing in Canada - 1926-2011. Worthwhile Canadian Initiative May 21, 2012. http://worthwhile.typepad.com/worthwhile_canadian_initi/2012/05/the-decline-of-manufacturing-in-canada-1926-2011-dutch-disease.html

Project site framed as a drosscape depicting historic site uses with the relationship between declines in manufacturing to spatial distribution of Halifax Regional Municipality population

condition. American architect Eugene Tsui, has commented that the great monumental architecture of the past can be an excellent example of ideas, geometry, technologies etc. However, at the heart of many of these achievements is a “great” civilization or aristocratic few acting as an oppressive force against other people, civilizations or the environment.²⁵

OMA partner Reinier de Graaf has used the economic theory of Thomas Piketty as a lense to observe the demolition of public housing blocks from previous decades in the “age of great public democracies”. His position is that architecture in the 21st century has largely become an instrument of capital and wealth generation abandoning egalitarian ideals and opportunity for social mobility.²⁶ This observation is pertinent to realizing the need for creative and entrepreneurial methods of achieving public architecture. Additionally, it sheds light on the difficulty that private social housing proposals for the site have had in order to meet the requirements of conventional financial institutions.

With todays real estate markets teetering on a knives edge between low interest rates and valuation bubbles; land, real estate and architecture is increasingly out of reach for the average citizen. Extending words and practice of hope Architect Shigeru Ban who is known for his work in paper and cardboard, as well as disaster and emergency shelters has expressed another view on equilibrium. He says,

In todays architecture practice, I think the conventionally defined ‘universality of architecture’, by which I mean material permanence of the building, is not important. Having observed the excesses of Japan’s bubble economy, in fact I feel nothing can be permanent. Asked about the durability of paper, I often say that paper can survive for many years. During the bubble economy period, in order to make money, Japanese Property developers destroyed and rebuilt overnight the reinforced concrete buildings, which were previously thought to be ‘permanent’ or ‘universal’. If a building is not loved by people it will not survive, whether it is made of a strong material or weak material. The Paper Church, a temporary building I designed for the Kobe Earthquake victims in 1995, has now become a ‘permanent’ building because it is loved by its users. I think the con-

25. Eugene Tsui, “Eugene Tsui: Radical Architect”, *Red Pharmacist*, last modified April 1, 2008, <https://www.youtube.com/watch?v=ouVNmvdG8Ao>

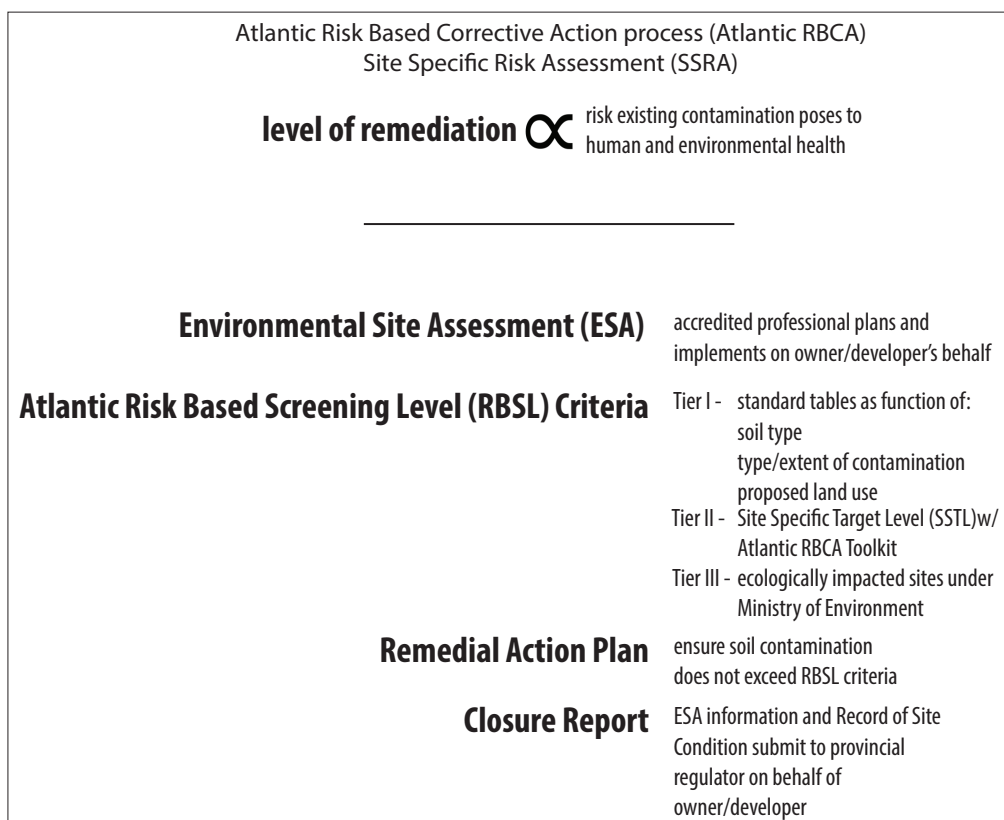
26. Reinier de Graaf, “Architecture is Now a Tool of Capital, Complicit in a Purpose Antithetical to its Social Mission”, *The Architectural Review Online*, April 2015, <http://www.architectural-review.com/essays/architecture-is-now-a-tool-of-capital-complicit-in-a-purpose-antithetical-to-its-social-mission/8681564.article>.

cept of the universality of architecture and the criteria are changing.²⁷

What we should strive for is architecture that weaves into the various urban ecologies to allow for the diversity that mature ecologies create. Mature ecologies are more stable because of interwoven activities that create a robust responsiveness more resilient to disturbance .

Site Decontamination

The Atlantic Risk Based Corrective Action (RBCA) process is a standardized framework set up to undertake a Site Specific Risk Assessment (SSRA) of contaminated sites. The process uses scientifically derived standards and determines a level of remediation



Summary of the standardized and streamlined Atlantic RBCA for conducting an SSRA (adapted from *Brownfield Redevelopment for Housing: Case Studies*, 2006, CMHC.)

27. Alvar Aalto, Juhani Pallasmaa, Tomoko Sato, and Shigeru Ban, *Alvar Aalto: Through the Eyes of Shigeru Ban* (London: Black Dog Publishing, 2007), 74.

that is proportional to the risk contamination poses to human and environmental health. Sixty percent of Canada's contaminated sites contain hydrocarbons, and 80-90% of petroleum impacted sites are small. Recognizing the importance of managing these sites and their complicated nature, the framework allows developers/owners to use the SSRA methodology rather than starting the process from first principles. However, the usual remediation action is a "dig and dump" method which simply transfers the contaminated problem to a new location for future generations to deal with or the employment of expensive soil washing technology.²⁸

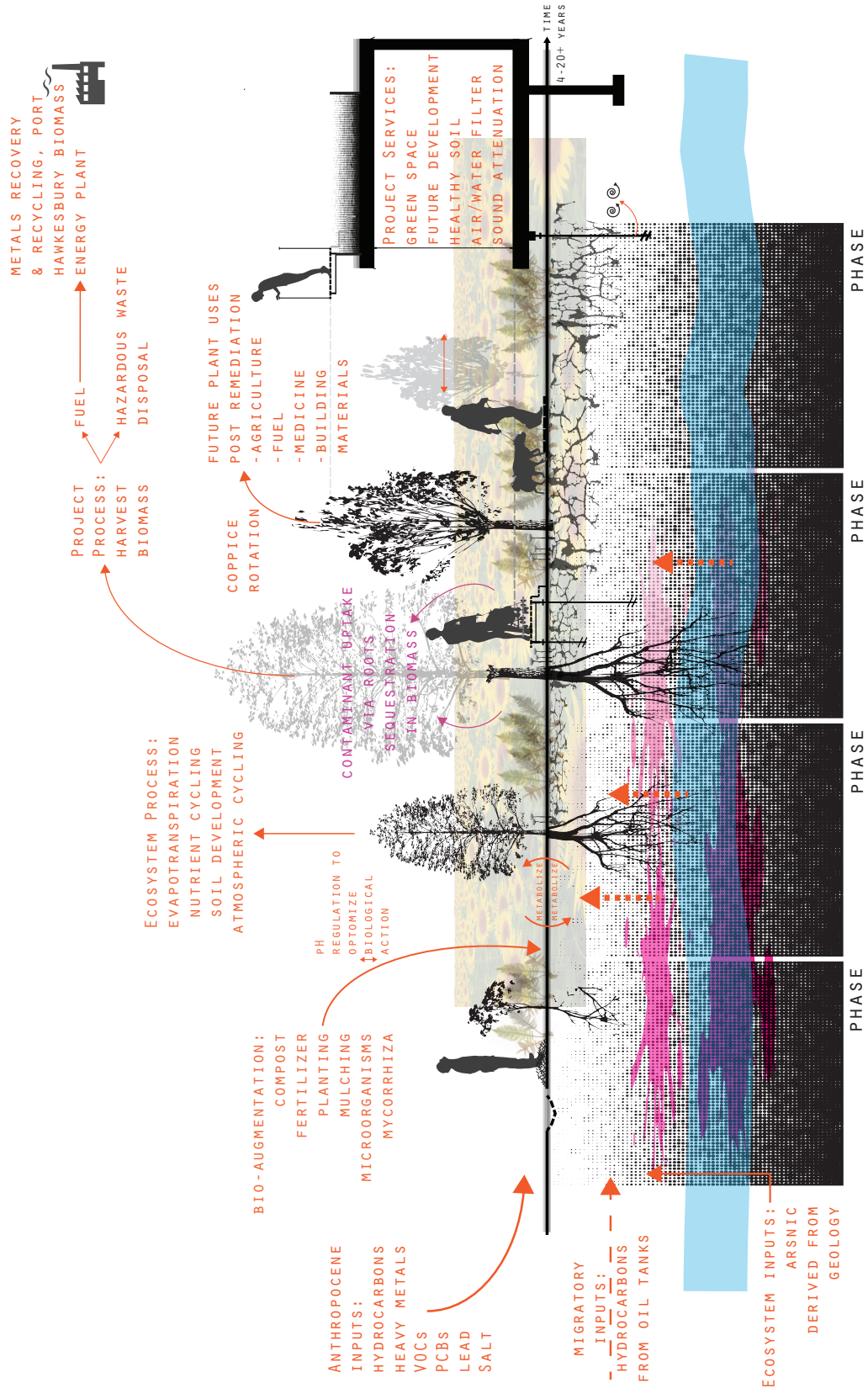
Alternative Remediation Methods

An alternative and low cost method of site remediation is the employment of plants, fungi and microbes known as phytoremediation, mycoremediation and bioremediation respectively. Given time, the managed organisms either metabolize or bioaccumulate toxins into their cells where they can then be harvested to remove the toxins from site. The organisms either render the substances inert, or can be burned for energy production. Nova Scotia Power operates a biomass power generation plant in Port Hawkesbury that could be used, provided scrubbers are installed in the stacks, to concentrate contamination. Or the material could be burned at other industrial facilities that already have stacks to manage the release of heavy metals or hydrocarbons.

Brownfield phyto/myco/bio-remediation is inherently a process driven by environmental ecology, but is made possible by the social and political ecologies that find value in a particular contaminated site. These sites are in a continual state of becoming and the events that have generated them should be considered natural to the site. The method of remodeling a brownfield site is a question of how we gather and direct the new events that will play a role in its up-cycling and reuse.²⁹ As a remediation process unfolds over time, creating opportunities that increase the environmental,

28. CMHC, *Brownfield Redevelopment for Housing: Case Studies*, last modified 2006, <http://www.cmhc.ca/en/inpr/su/sucopl/upload/Brownfield-Redevelopment-for-Housing-in-Canada-Case-Studies-Atlantic-Risk-Based-Corrective-Action-Program-RBCA.pdf>.

29. Barnett, *Emergence in Landscape Architecture*, 43.



Process of biological remediation of a site using plants, mushrooms and other biological means to clean soils and establish program over time

social and economic productivity of the site can help drive the remediation of the site and revitalization of the community it is nested in.

Interaction with Contaminated Sites

Contamination on sites can cause severe health complications mainly from long term exposure and the bioaccumulating of toxins in Humans. Workers interacting with contaminated soils and remediating organisms need to employ simple precautions such as protective clothing, boots, masks and gloves which should be removed and cleaned prior to entering dwellings. No plants on contaminated lands should be ingested and their spread through the dropping of leaves should be contained.³⁰ However, there is no harm in observing such spaces and walking amongst them. To manage this, paths with adequate separation should be provided and simple strategies of including steps, curbs, change of grade or the gradation of plant heights in proximity to a path could be used.

Phytoremediation

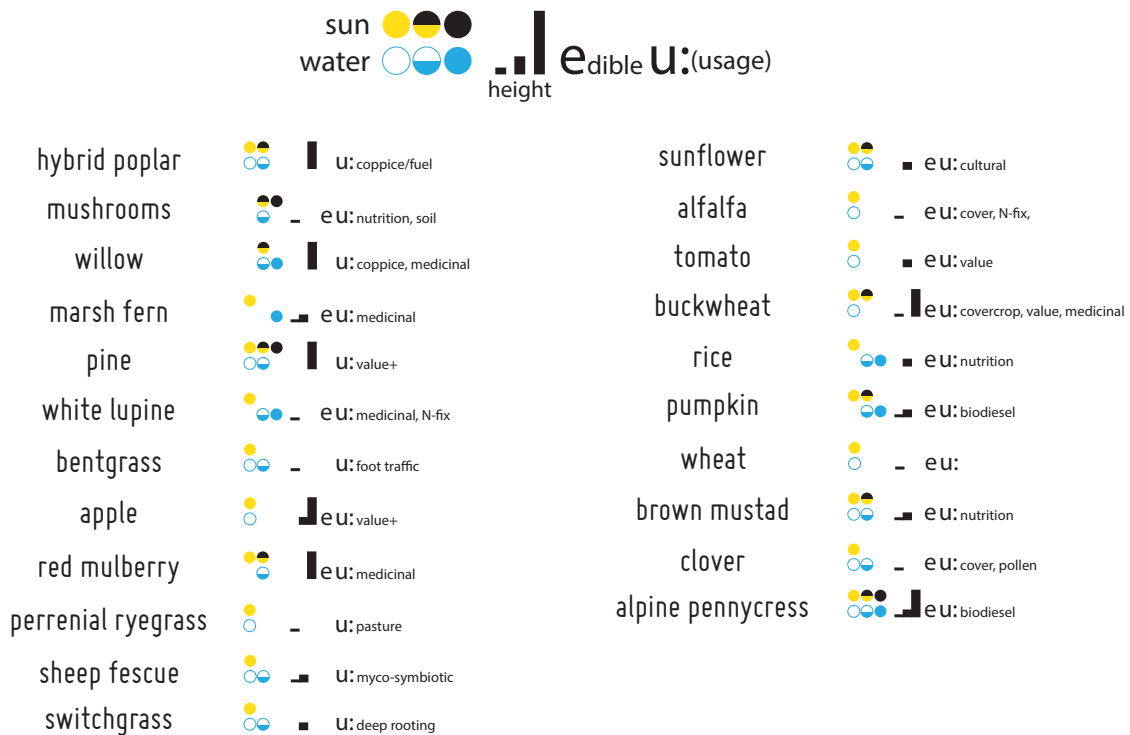
Phytoremediation is a proven and effective technology for the remediation of brownfield sites. Through their regular growth cycle, plants have the capability to extract and sequester or transform pollutants to clean up contaminated site soils and water. This includes pollution from heavy metals, pesticides, chlorinated solvents, polychlorinated biphenyls (PCBs), explosives, radionuclides and petroleum hydrocarbons.³¹ The following figure lists a number of remediating plants and their characteristics suitable for Nova Scotia. The RBCA includes the provision of having a baseline study completed for any site. From here a site requires a thorough assessment of soil conditions and analysis of what soil amendments are necessary to create healthy soil where optimal conditions for phytoremediation action can take place. Once planting is undertaken, careful monitoring is required and contaminated plant biomass must be harvested

30. Leila Darwish, *Earth Repair: A Grassroots Guide to healing Toxic and Damaged Landscapes* (Gabriole Island, BC: New Society Publishers, 2013), 30-31.

31. *Ibid.*, 69.

regularly ensuring bioaccumulated materials do not return to the site or translocate to others. Regular soil testing must be completed to mark progress and to determine

Effective Phytoremediation Plants

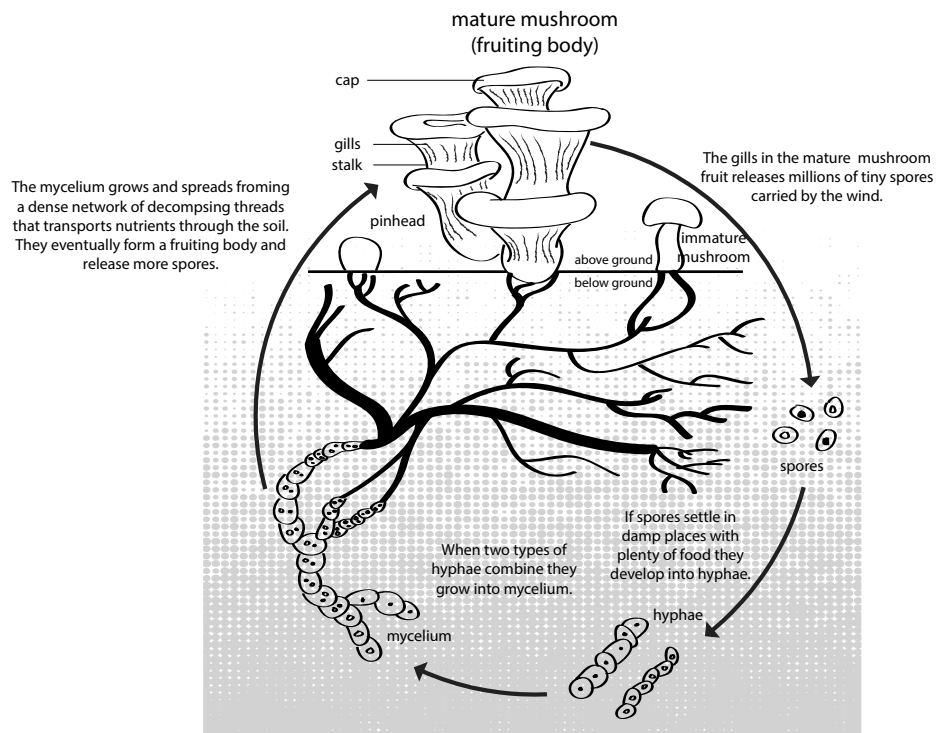


Remediation plants and their characteristics suitable for Nova Scotia.

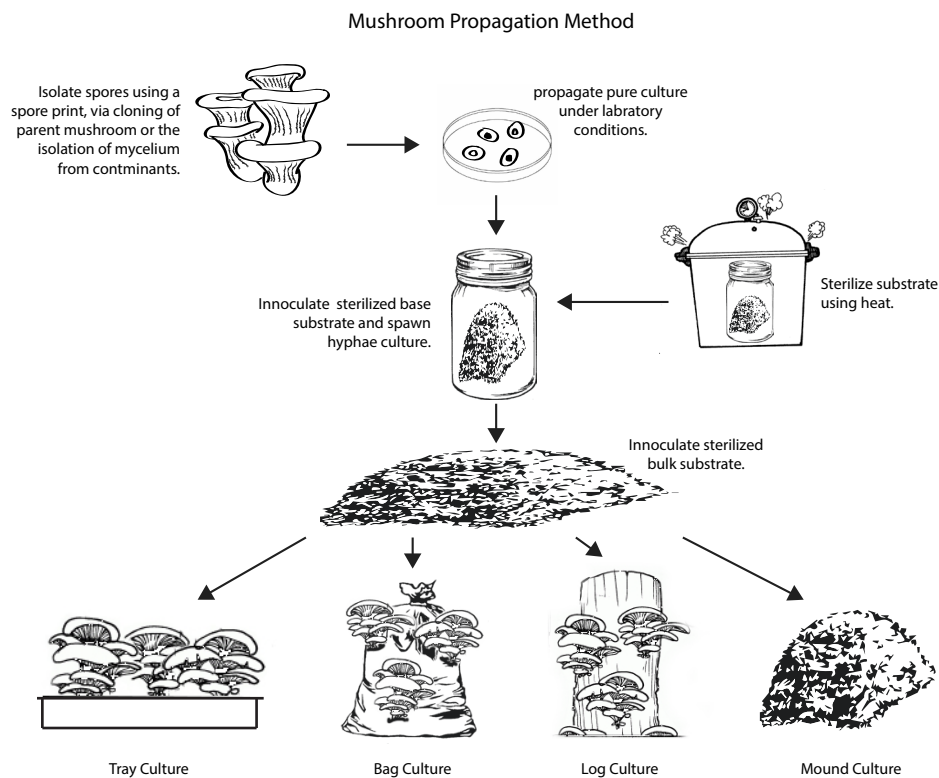
when contamination levels have decreased below the acceptable threshold that poses any risk to humans or the surrounding environment.

Mycoremediation

Mycoremediation is the utilization of fungi to metabolize petrochemical based pollution out of soils. Mushrooms are the fruits of large subsurface fungi organisms that form vast mats of interconnected fibrous tissue called mycelium. Fungi are inherently decomposers that drive 90% of nutrient cycling in the environment turning dead organisms into nutrients and making them bio-available to plant roots through vast symbiotic networks. Common commercially produced gourmet edible mushroom varieties such as Oyster, shiitake and portobello mushrooms are found to be excellent



The mushroom life cycle.



An overview of mushroom cultivation techniques.

soil remediators.³² Because petrochemical based pollution such as gasoline, pesticides, chemical dyes, dioxins, PAHs and PCBs are derived from crude oil that was once plant material, mushrooms are able to breakdown the chemical compounds into inert substances. Additionally, the compost created from commercial mushroom production is a valuable soil amendment that builds soil structure, improves water retention, regulates pH and generates biodiversity; all of which support healthy plant growth.³³

Mushrooms can be employed in site remediation in a number of ways. Once a spore culture is isolated and propagated under laboratory conditions, it can be inoculated into a successively large amounts of organic food material substrate such as grains, straw, paper, cardboard, wood chips, coffee grounds, spent brewers grain and gypsum board and allowed to spawn. This material can then be directly applied and mixed into soils, used in sheets of cardboard as mulch, contained in burlap backs as “bunker spawn”, or applied as wood chip paths that then allow the mycelium to spread into site soil consuming everything in their path. Bunker spawn is also placed in the path of contaminated run off, intercepting and filtering the flow of water before it enters other streams.³⁴

Program

Identifying Project Synergies

With entrepreneurial spirit! This project will be made possible through the establishment of a public/private and community partnership. It will enact a lease agreement for the duration of the 20 year remediation project. The programmatic elements will be constructed and composed in the spirit of transient and temporary architecture allowing for flexibility and temporality. The site is conceived as an urban park of spectacle

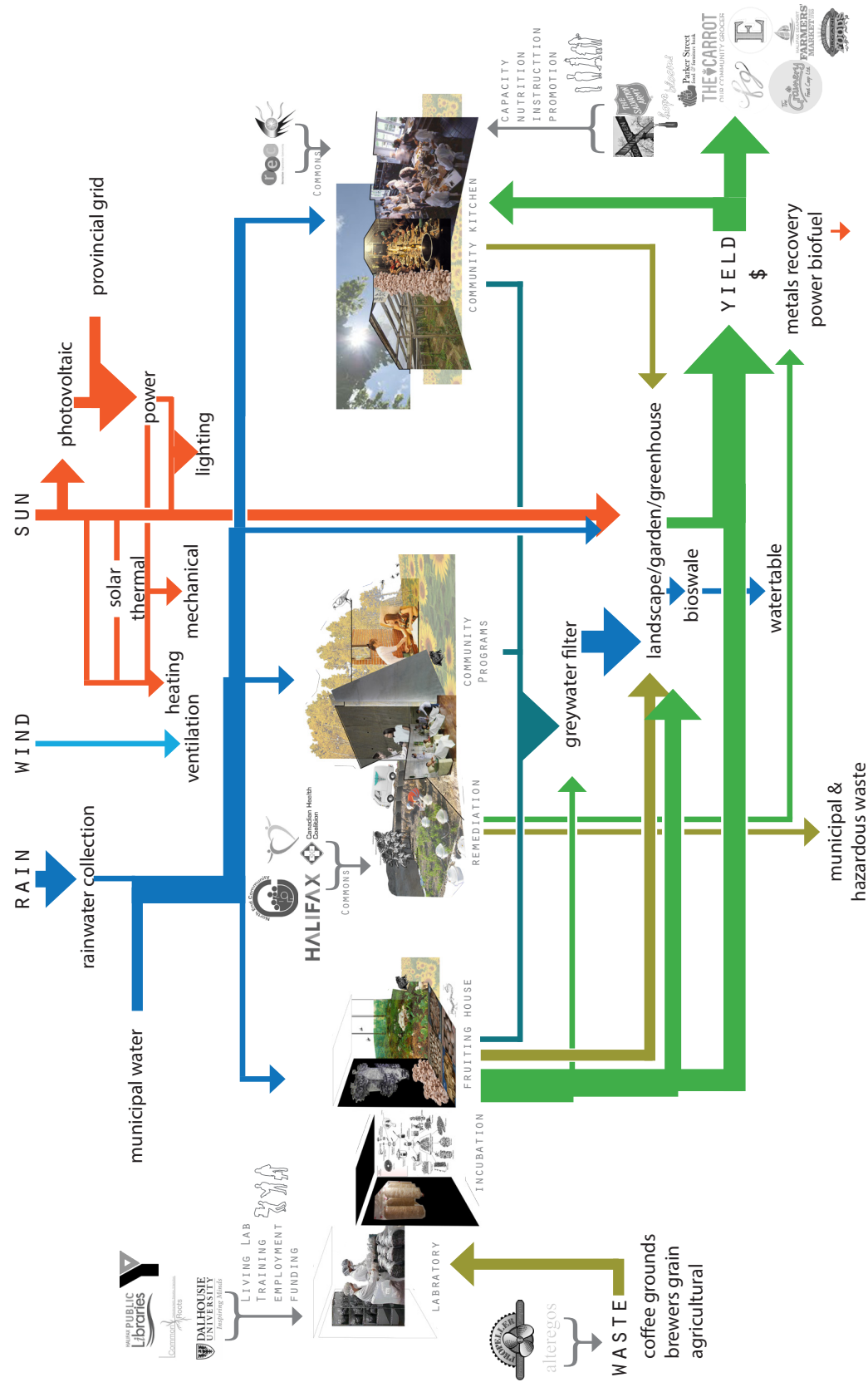
32. Ibid., 124.

33. Ibid., 127.

34. Ibid., 149.



Existing community groups that could be activated through an innovative program to build community capacity.



Mapping of program and community synergies.

and activity hinged on the relationship between a commercial mushroom farm and opportunities for community gardening and urban agriculture. The need for temporary programmatic elements that are flexible enough to work with the remediation project facilitates additional opportunities to introduce facilities for other commercial micro-enterprises, small studio space and facilities to support the sharing economy.

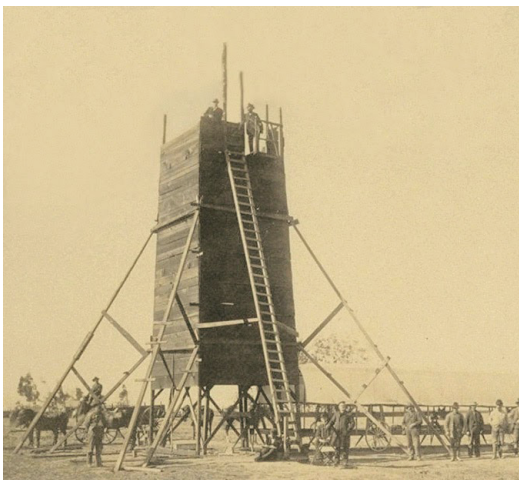
A number of community businesses and organizations have been identified as potential actors/directors as the project plays out. They would be taking lead and supporting roles throughout the stages of the project, lending their experience and expertise in exchange for research and business opportunities.

Urban Park

The Urban park will be made up of two primary elements; viewing tower, and curative garden.

Viewing Tower

In 1881, Surveyors in Yolo County California constructed a mobile “wagon” structure, pulled by horses, that acted as both viewing tower (12’ x 12’ base and 36’



Two historical photographs of the mobile survey apparatus, the “Yolo Buggy”, 2014; Bldg Blog.

tall when vertical) and dining pavilion/field shelter (when horizontal). The “Yolo Buggy” was a geopolitical laboratory used for measuring the American landscape; placing invisible points and lines in its wake. Its prime directive was to establish property lines and subsequently methods of taxation, but the methodology of establishing these lines have consequences far into the future as they crisscross landscapes and slice through ecological communities with interconnected functions and services. It formed the basis for what James Corner later observed in his seminal book, “Taking Measure Across the American Landscape”, depicting how people have formed landscapes according to measure, rule, fit and faith.³⁵ A new viewing pavilion erected on site acts as an opportunity for the public to survey the landscape of their community and witness the new ecologies and forms taking shape.

Curative Garden

The zones of remediation become heavily planted with trees and plants effective at bio-accumulation and metabolism of contaminants. Paths placed throughout the plantings allow the public to wander through the gardens in a controlled way and gives others access to monitor and manage the remediation process. Due to the requirement to regularly harvest and dispose of plants bioaccumulating toxic substances, a dynamic and changing landscape is created allowing paths to translocate and create varying perspectives of the process through time. A lighting scheme and art installations will demarcate key points along the paths and give additional interest to the landscape.

Mushroom Farm and Compost Facilities

The mushroom operation will act as an infrastructural hub affording private and public spaces to all programs at the center of this urban park. Its primary role is to generate fungi and compost for the remediation project and additional high value edible mushrooms for revenue generation. It also creates a small industry in the community,

35. James Corner, and Alex S. MacLean, *Taking Measures Across the American Landscape*, (New Haven: Yale University Press, 1996), 7.

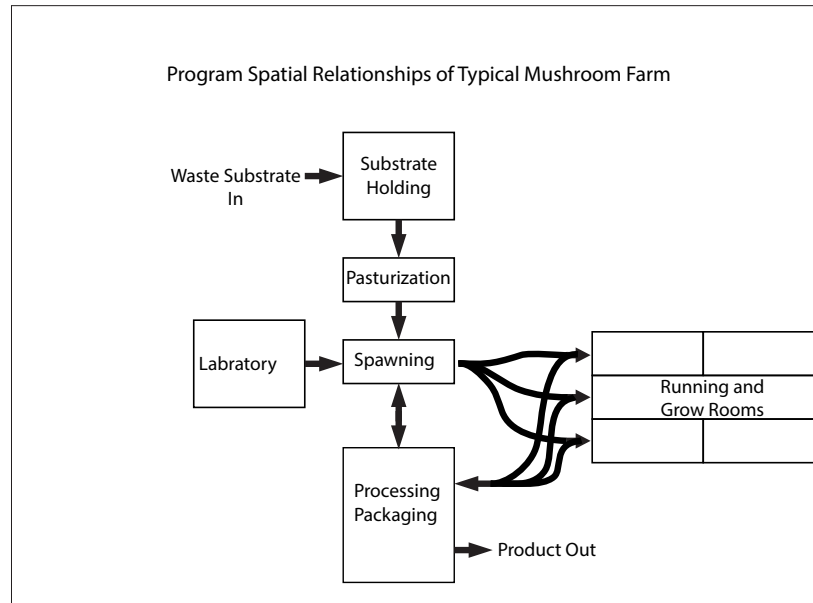


Diagram of programmatic spatial relationship between different operations comprising a typical mushroom farm.

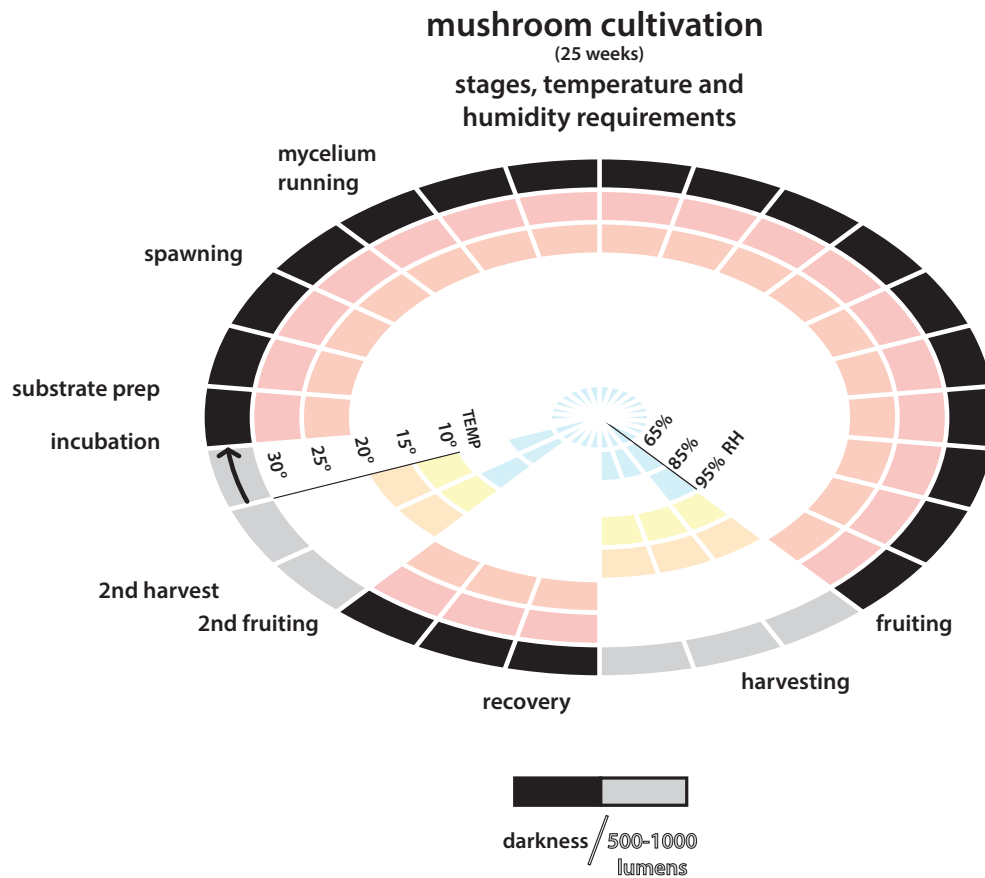


Diagram of mushroom growing stages, highlighting temperature and humidity needs at each stage over a 25 week cycle.



Images showing workers “spawning” pasteurized substrate with mycelium, 2015; Mississippi Natural Products. Similar bags in the “running” room as mycelium grow and spread through the substrate, 2011; Shroomery. View of fruiting bags sprouting oyster mushrooms ready for harvest, 2007; Shroomery.



Mushroom farms are found in a range of sizes from this small single room fruiting room/retail outlet designed for Seattle by Olsen-Kundig Architects, 2012; Citylab7. The large scale industrial operation at right, 2012; Envirothink.



View of a typical soil and compost storage yard, 2015; O2 Compost.



Two views of compost making processes. On the Left is a contained open furrow with tracks that allows a machine to travel along and turn the compost, 2015; Weiku. On the right are two completely contained composters that regulate heat and humidity, taking organic wastes in one end and depositing ready soil on the other, 2015; Hotrot Organic Solutions.

requiring the help of managers, lab technicians, farm workers and retail sales staff.

The farm becomes an “eco-industrial” development, what Mary Schlarb calls an industry that also cultivates ecology, economy and community.³⁶ Organic wastes such as coffee grounds, brewery waste, cellulose such as paper and cardboard and recycled gypsum board (available readily in the local area) become the raw materials or growing substrate for the mushroom operation. In turn the mushrooms grown for consumption can be sold back to many of the same businesses providing the raw materials, as well as at market, to restaurants and an on-site food “truck” serving up the freshest mushrooms in the city. This network of commercial enterprises bolsters local economic capacity to share cost advantages, grow and sustain itself.³⁷

The farm also generates mushroom spawn used on the remediation site that is applied as biodegradable vector paths made of myco-infused saw dust. The generation of mushroom compost can be done with an intensity that creates new urban soil for both urban agriculture and enrichment of the remediation zone. Adding large amounts of compost to the curative garden will create an undulating topography, interest and

36. Mary Schlarb, “Eco-Industrial Developments,” in *Sustainable Architecture White Papers*, ed. David E. Brown, Mindy Fox, Rickel Pelletier (Ann Arbor: University of Michigan Earth Pledge Foundation, 2000), 105.

37. *Ibid.*, 106.

potential for stratified landscape layers encouraging biodiversity.

Urban Agriculture

As stated earlier, there is both a great need for and benefit derived by community gardens and they play an important role in supporting the sustainability and food security of urban populations. The Common Roots community garden and farm is the most successful case study in Halifax. In addition to a number of community plots they operate volunteer run market gardens with dedicated plots supporting local food banks and shelter programs. However, despite the gardens success, it is currently on a 5 year lease term and will be required to move locations at the end of its term³⁸. This is a regular condition of many gardens and their temporary establishment on Gottingen St. would work for the duration of the remediation project.

Urban farms are basic in their needs. Most require only space, access to water, a place to store tools and of course, fertile compost as a growing medium. However, additional elements desired by urban gardeners include greenhouses, gathering pavilions, performance spaces, harvest preparation areas and community kitchens. Greenhouses could simultaneously be used to propagate phytoremediating plants and edible plants for the gardens. For people interacting in the remediation spaces, a safety station containing protective clothing and wash stations and even showers are important. The compost generated by the mushroom farm supports both the remediation project and the supply of compost needed for community gardens across the city.

Mixed Commercial

Additional space gives the opportunity for start up businesses to rent small

38. Partners for Care, "Our Roots", accessed October 23, 2014, http://partnersforcare.ca/urban_farm/our-roots-about-us.

container sized spaces, generating additional revenue to fund the project.

Sharing Economy

From Uber, to Air B&B to various car sharing programs and co-operatives; the sharing economy has proven its significance in providing services to modern urban life. New enterprises such as the Halifax Tool Share successfully funded a Kick-starter campaign to acquire a space and many other “maker spaces”, design collectives, and shared studio spaces and temporary rentable office spaces are popping up in cities everywhere. They provide affordable alternatives to the modern conventional modes of consumerism and the accumulation of goods seldom used.

In a similar spirit, community or alternative currencies, such as LETS (Local Exchange Trading System) have been in action in various cities around the world and at least in North America since the 1970's. They are formalized exchange or bartering systems based on hours of service or goods exchanged operated at local scales as alternatives to national monetary systems. They encourage local consumption and economy, and have been useful in stimulating local economies and revitalizing communities. The “Toreke” in Belgium is a similar currency used by local governments to leverage social capital. Generating Toreke “dollars” can be as simple as putting a “no flyers” sticker on a ones mail box because this decreases the amount of waste needing to be processed by the city. Acts such as collecting garbage, planting boulevards or other community services also earn Torekes and these can be exchanged for other services or space in community garden plots.³⁹ A local remediation project could similarly be driven by a community effort if there were a LETS incentive system exchanging garden space for sweat equity employed in the planting, harvesting and management of remediation sites.

Commercial

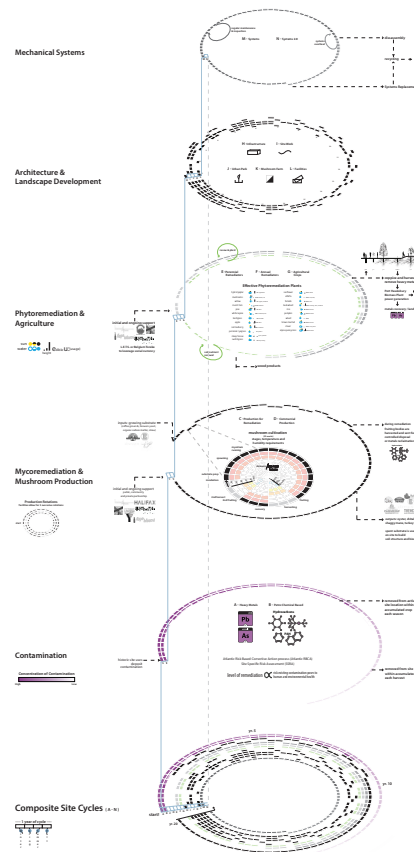
Additional space is made available as rentals for food services such as a gourmet mushroom bar, beer garden, retail, and studio spaces, based out of small 20' and 40'

39. Paul Kennedy, “Why Money Isn’t Everything”, *Ideas*, CBC, May 12, 2015.

shipping container modules.

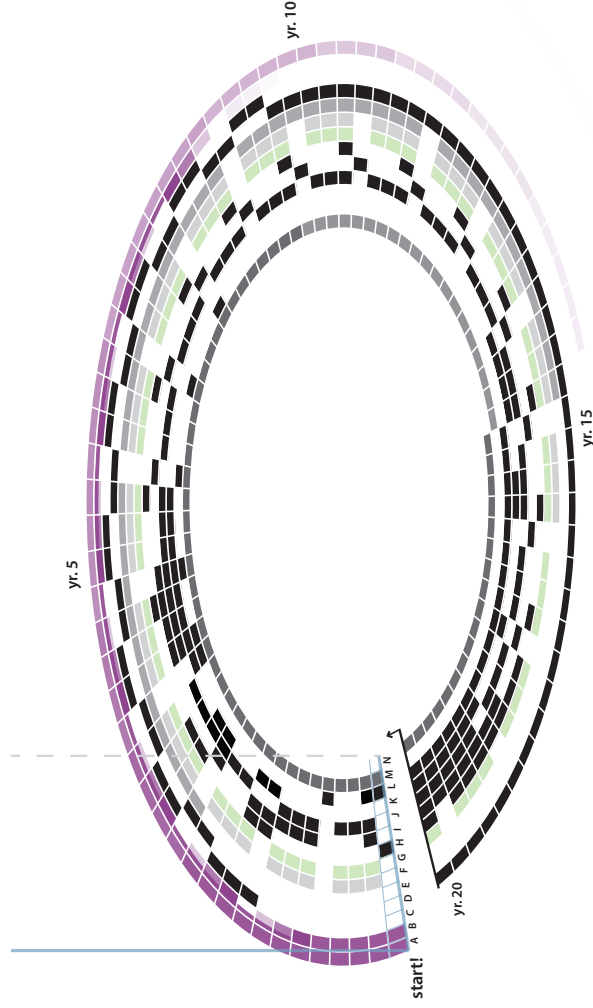
Project Timeline

Based on the programmatic requirements, transient nature of the architecture and processes involved in decontamination, mushroom production and planting cycles, a timeline is developed. The overall timeline requires the flexibility inherent in dynamic non-linear systems. The rate of decontamination using plants is highly dependant on weather, soils, plant species and other conditions and therefore requires a flexible window of opportunity, rather than a hard project timeline. Similarly, the project allows for mixed commercial space available to fill out the street front. The specific tenant is undetermined, but will draw a certain demographic, culture, etc. to the project that also cannot be fully accounted for.

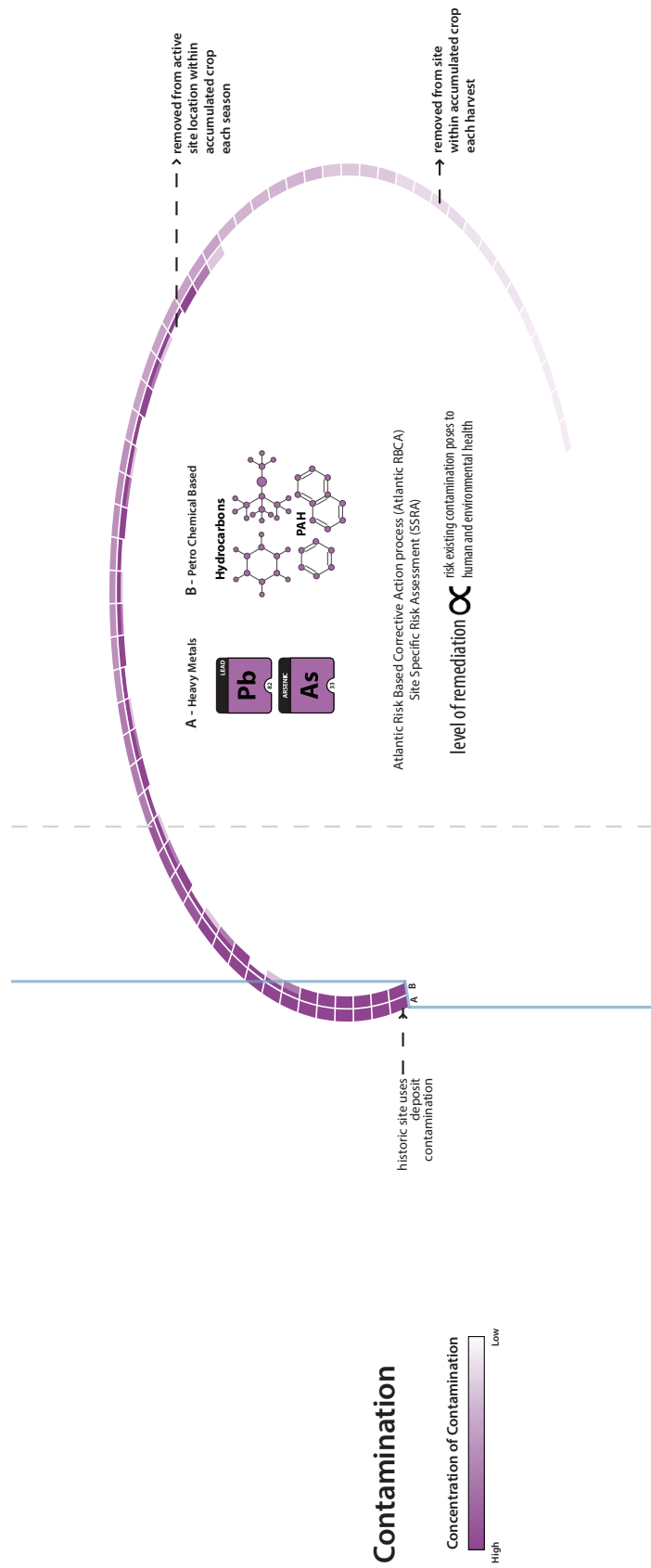


Overall project timeline represented as a collection of nested, non-linear cycles. See following figures for greater detail.

Composite Site Cycles (A-N)



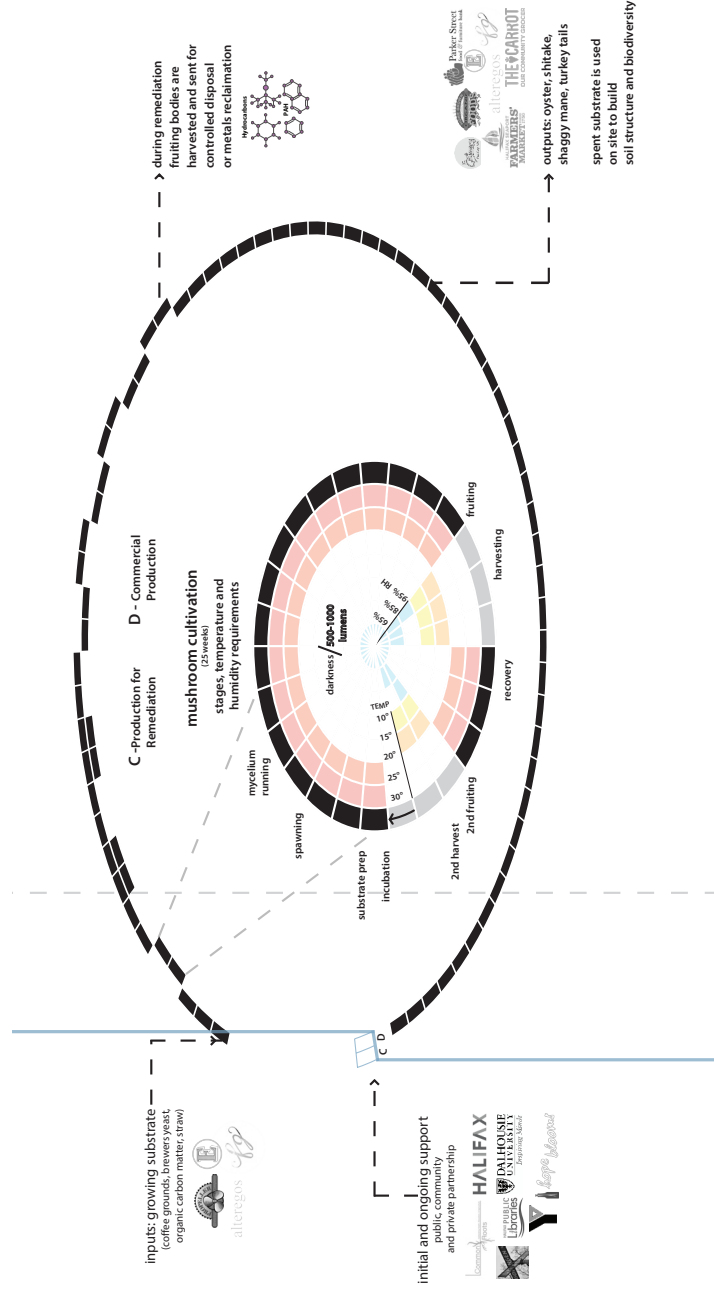
Composite collection of five cycles pertinent to site remediation for an estimated 20 year process. Each bar representing 1 season and 4 bars equal to 1 year.



Representation of the concentration of soil contamination of heavy metals and hydrocarbon based pollution over time.

Mycoremediation & Mushroom Production

Production Rotations facilities allow for 3 successive rotations



Mushroom production for commercial use and myco-remediation over 20 years identifying sub cycle of mushroom production over 25 weeks, the inputs obtained from community sources and outputs of edible mushroom types, compost, and contaminated mushroom fruits requiring proper disposal.

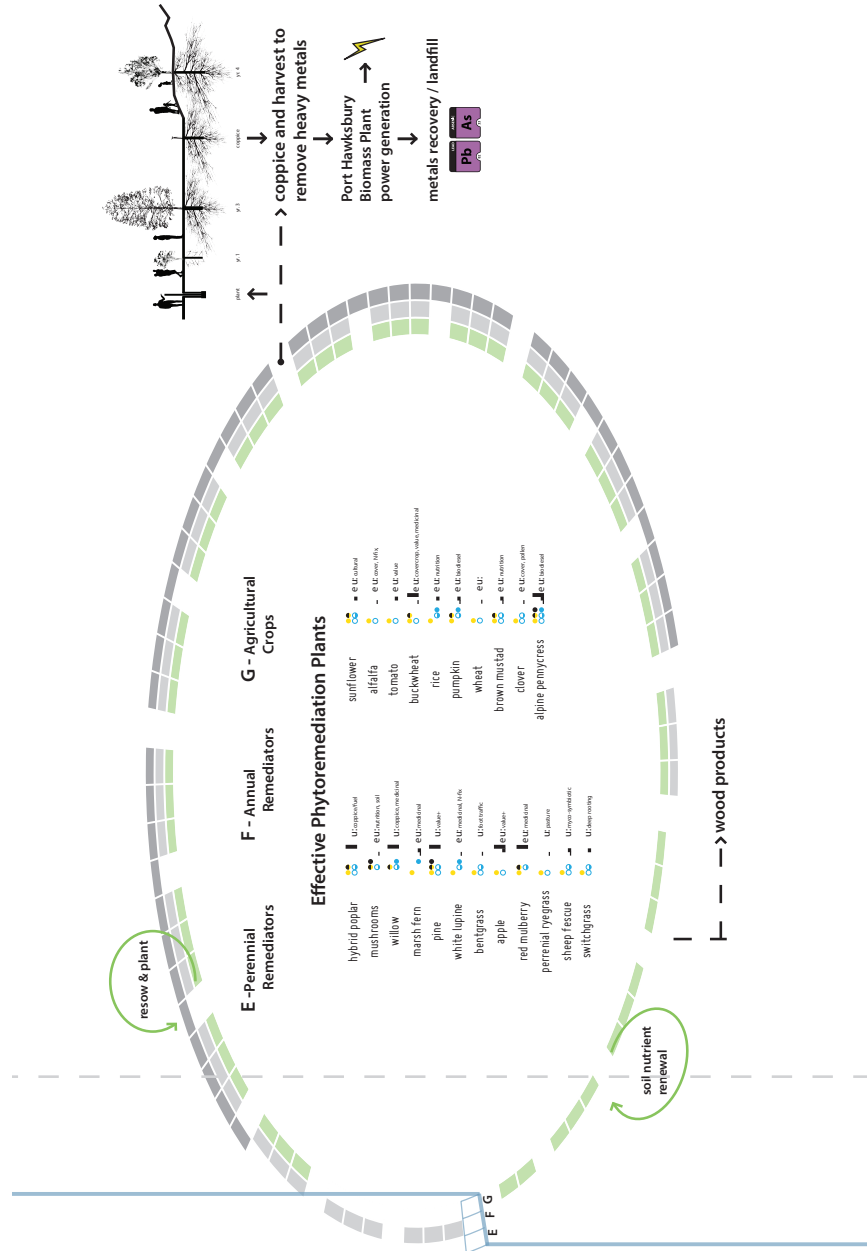
Phytoremediation & Agriculture



initial and ongoing support

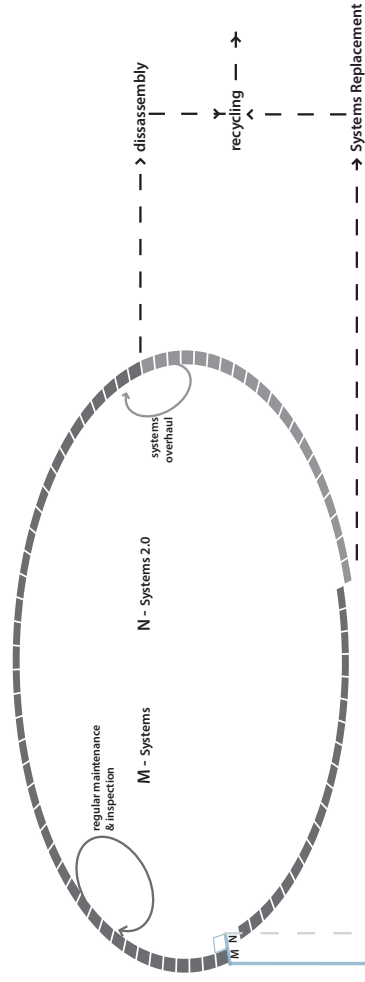


L.E.T.S. or Belgium Toreke
to leverage social currency

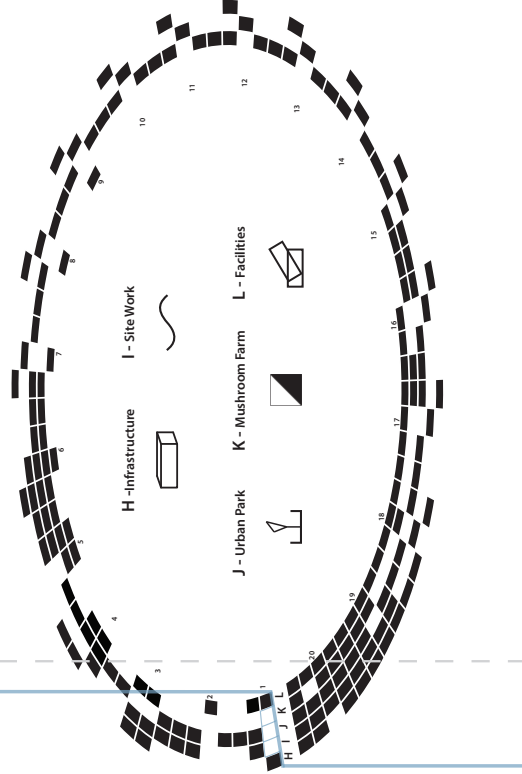


Phyto-remediation and agriculture planting cycles identifying potential remediation plants.

Mechanical Systems



Architecture & Landscape Development



Architectural and Landscape development timeline accounting for activity of different programmatic development. Mechanical systems time-line represents a typical maintenance and refurbishment schedule which coincides with the temporality of the project and retooling of modular units once removed from the site.

CHAPTER 2: DESIGN

The successive planting and harvesting of plants and trees on the site for the remediation process, timed with incremental site development, help develop a community narrative that relates to the emergence of the architectural plan and community ownership over time. In this way the site is not created as the idea of a pastoral landscape or urban park, but an ongoing managed landscape with continual community involvement where the successive creation of new spaces for new programs are built into the ongoing site remediation.

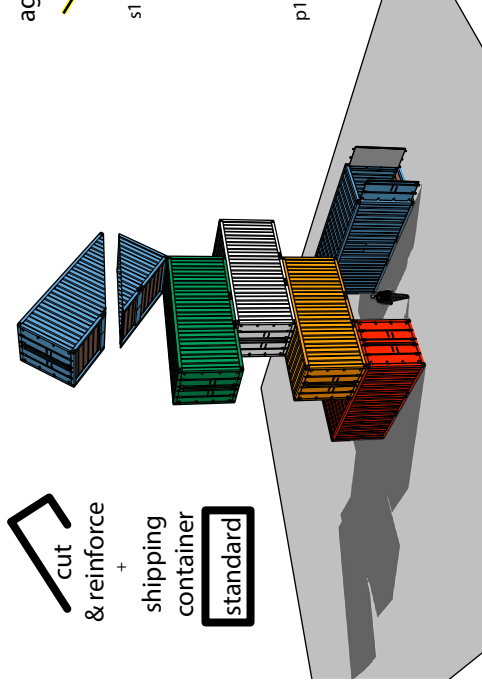
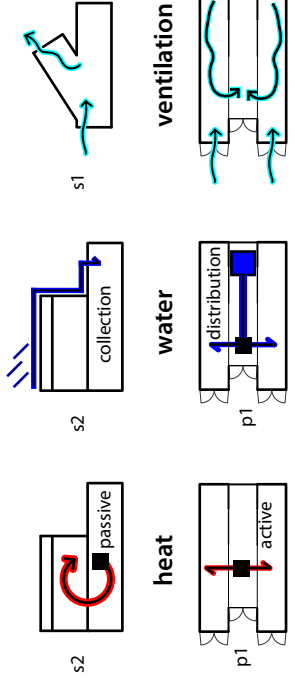
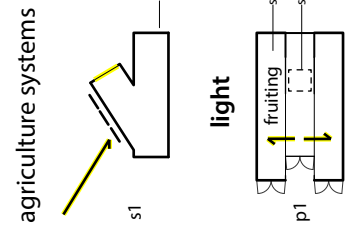
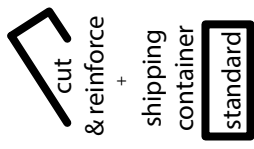
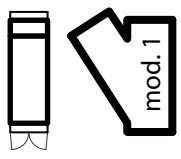
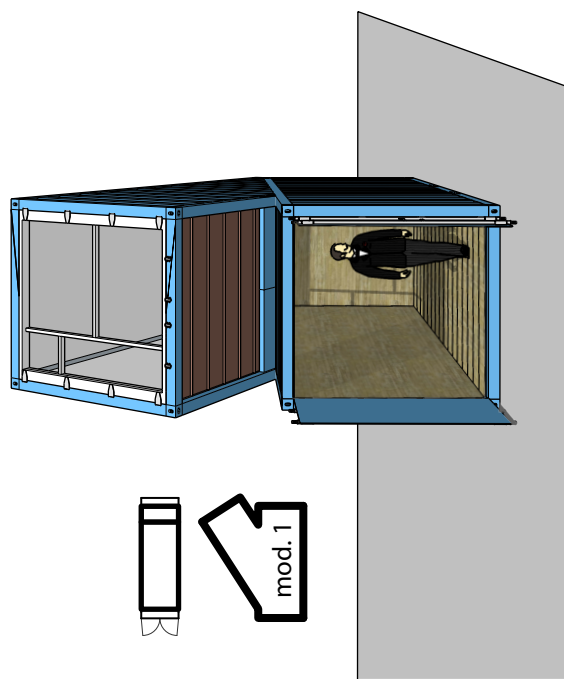
An integral approach to sustainable ecological design must have the capacity to speak to the individual, the community, employ appropriate technology and reconcile its place within our society's complex living systems. It points to the transcendental opportunities of being immersed in nature composed as a whole and design interventions should attempt to create moments of this connection to the whole.

Shipping Containers

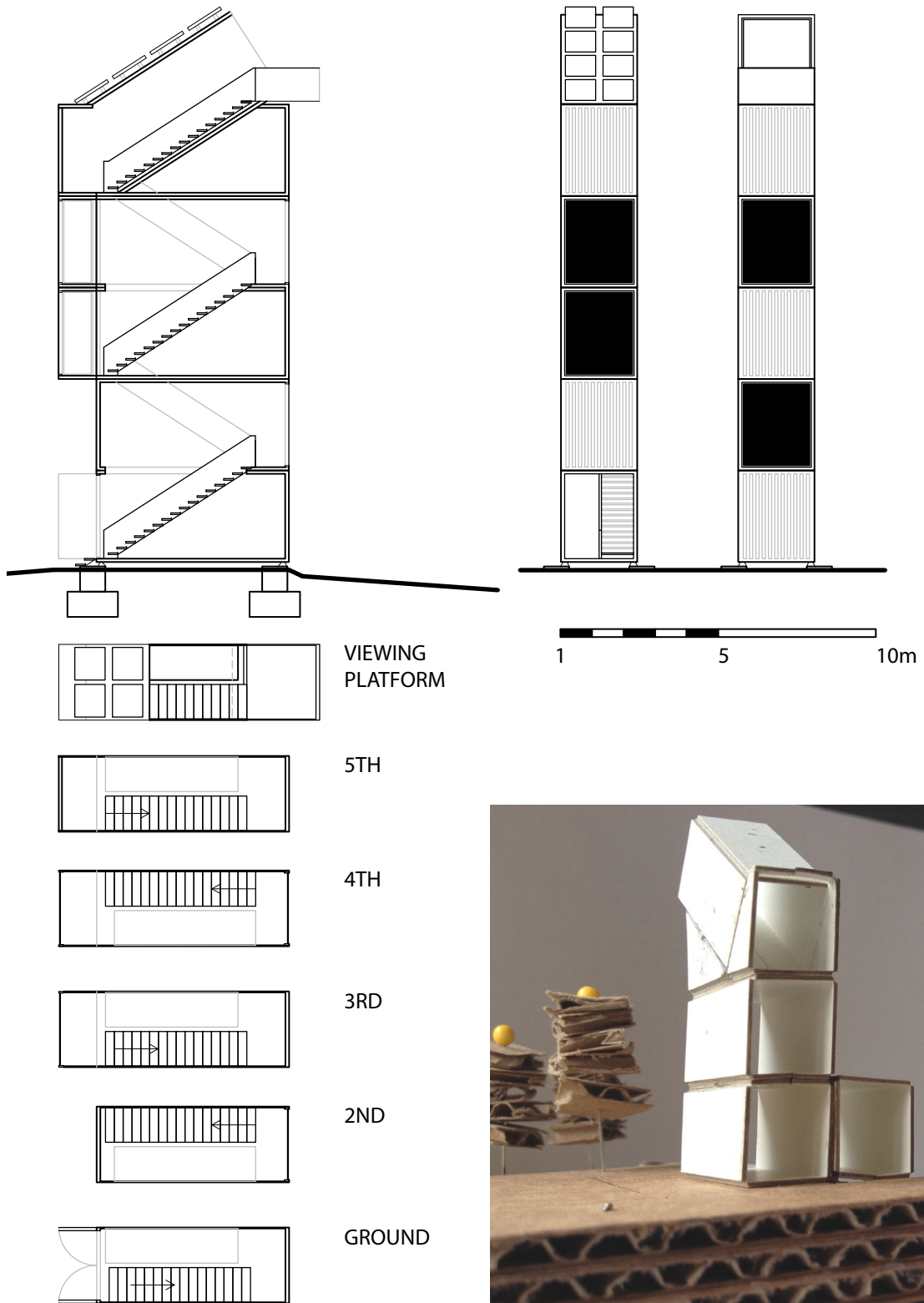
Standard 9'6" high shipping containers were identified as the most suitable modular vessel to arrange the program for the remediation project. They are robust, long lived, and readily available in the port city of Halifax, Nova Scotia. Together with a usual rectilinear arrangement of containers, one specific module is created for the access of both people and light. The module is used for the creation of the Yolo 2.0 and other access stairs, as a means of creating a better lit space for artist studios, and combined with mushroom grow houses to house mechanical equipment and filter in natural light for fruiting cycles. Details of the Yolo 2.0 show where additional containers and stairs can be added or removed for the desired height required.

Materials

Taking a cue from industrial compost facilities, soil management and retaining



Outline of the three basic uses of the modified container module used as Yolo 2.0, artist studio and for mushroom growing.



Yolo 2.0 viewing tower depicted as 5 stories in drawing and 3 stories in model.

walls, the project makes use of large interlocking and prefabricated concrete blocks. The simple use of long lived and short lived materials easily assembled and disassembled forms a basis for the further development of wooded decks and paths and assemblies integrated with the containers.

A sample wall panel was developed using 1" angle iron that could be bolted to finish the interior of the containers. It is proposed that an earthen plaster applied over metal lath and cardboard material could be developed as a wall "board" over insulation. The assembly gives a warm finish to the metal containers, and when removed becomes easily decomposable.



Examples of concrete interconnecting "Legioblock" used for retaining walls and structures, 2015; Legioblock.



Material details of park bench and proposed wall panel used to develop detailing.

Grounds, Nodes, Paths, Program

The site plan is organized on three grounds. The Curative garden encompasses the contaminated zone, the Hub and mushroom farm occupy a central portion and the remainder of the site dedicated to community gardens, public access and existing laneways and sidewalks.

Paths created have a functional and organizing role. Siphon channels form the primary paths through the curative garden. These have the dual function of drawing leachate off of the contaminated site through perforated piping and creating a linear hardscape path for people to access the area. Made of interlocking blocks the paths can be built up over time into walls that accommodate additional soil and compost produced by the mushroom farm. These walls act as a scaffold from which to cantilever the tertiary connecting paths.

The Permeable Concourse forms the secondary paths made of permeable pavers that allow for grass growth. These transition along existing sidewalks and laneways and bellow ground carry services and conduit for collecting leachate from the primary siphon channels.

Interim connecting paths are wood deck paths used as auxiliary paths widening the primary siphon channels through the curative garden. Within the Hub building, a similar surface is used to bridge over container metal surfaces, and to connect between and act as thresholds for different programmatic elements.

As mentioned, the restorative trails are made of mushroom inoculated saw dust and are variable. They are used within the curative garden to allow further access for the public to walk among the remediating plants and trees. As they biodegrade, they can be re-laid, creating new variations and connecting different elements of the curative garden.

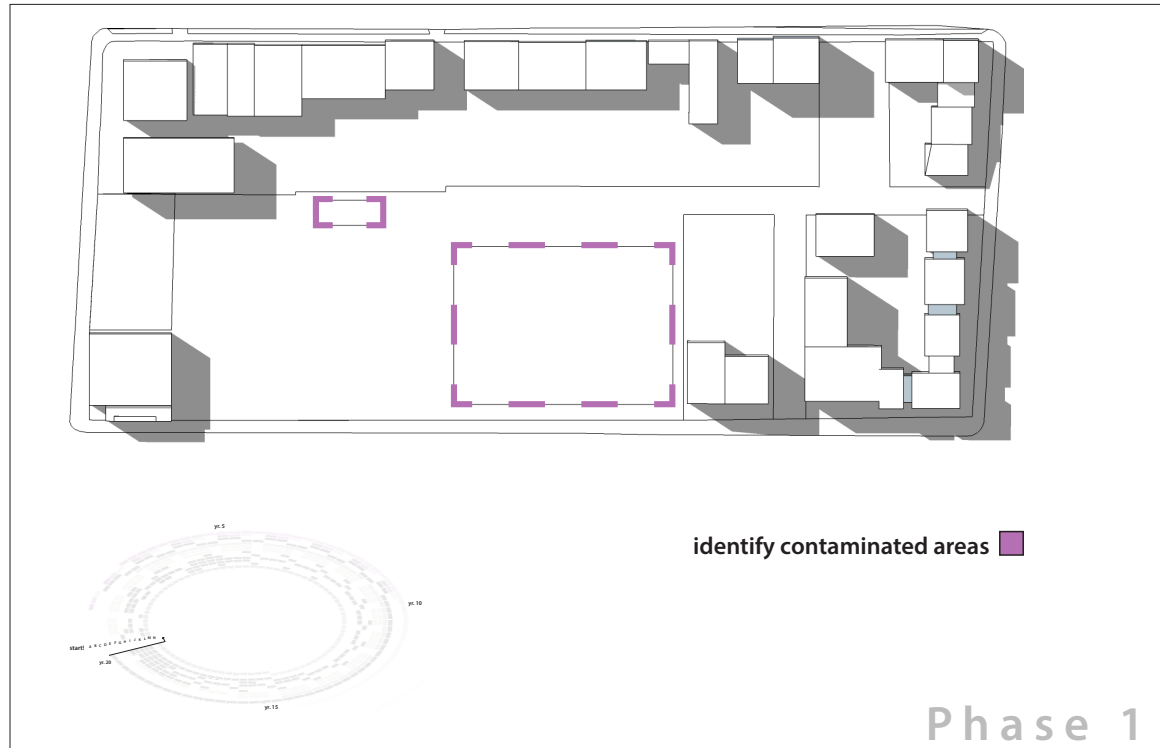


Project organization using grounds, nodes, paths and program.

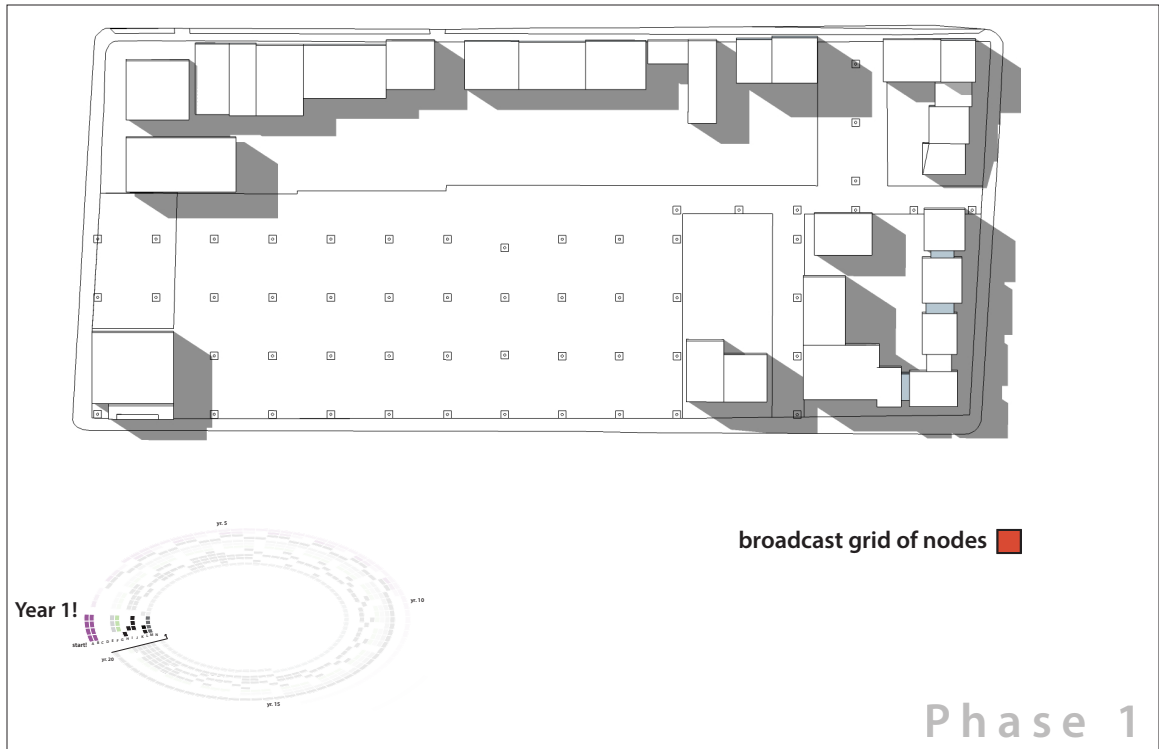
Phase 1: Activation

The project is initiated by literally laying an organizing grid of nodes across the site. The grid, based on the length of a 40' shipping container becomes a unit of measure for the layout of programmatic spaces and invariably the establishment of moments and junctions across the site. Like the Parc de La Villette, the nodes act as visual markers unifying the site, but with the intention that the life and culture of the program is played out between these nodes. On Gottingen St. we use balloons that celebrate the initiation of the project.

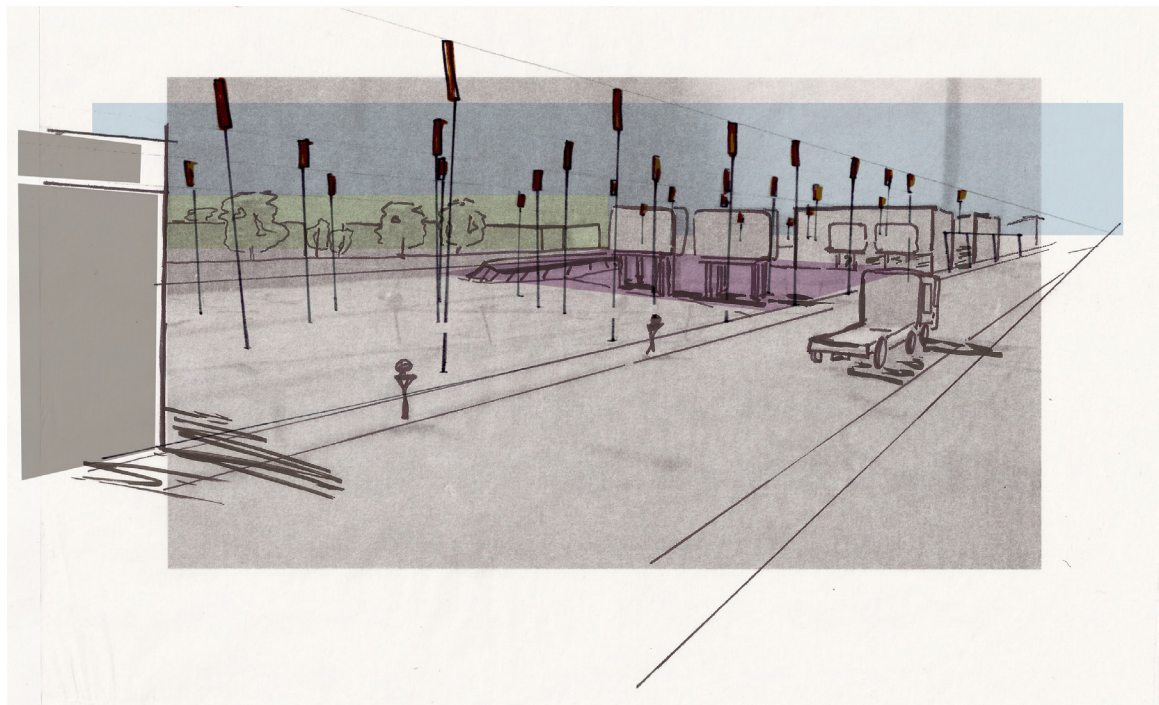
Phase 1 progresses with the initiation of the remediation efforts, community gardens, and supporting program. A series of retaining walls are laid to structure the site, manage the topography, isolate contaminated areas and act as infrastructure for building development. By year 9, the establishment of the fully operational Hub allows the project to enter phase 2.



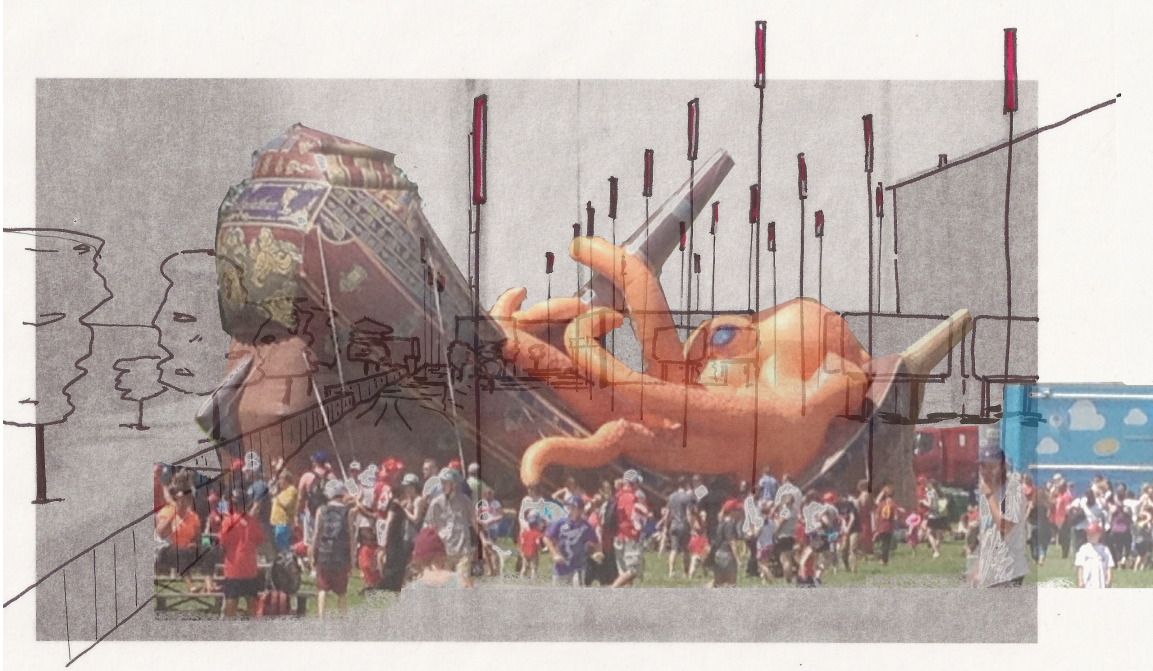
In phase one, the the areas of contamination are identified and an action plan designed.



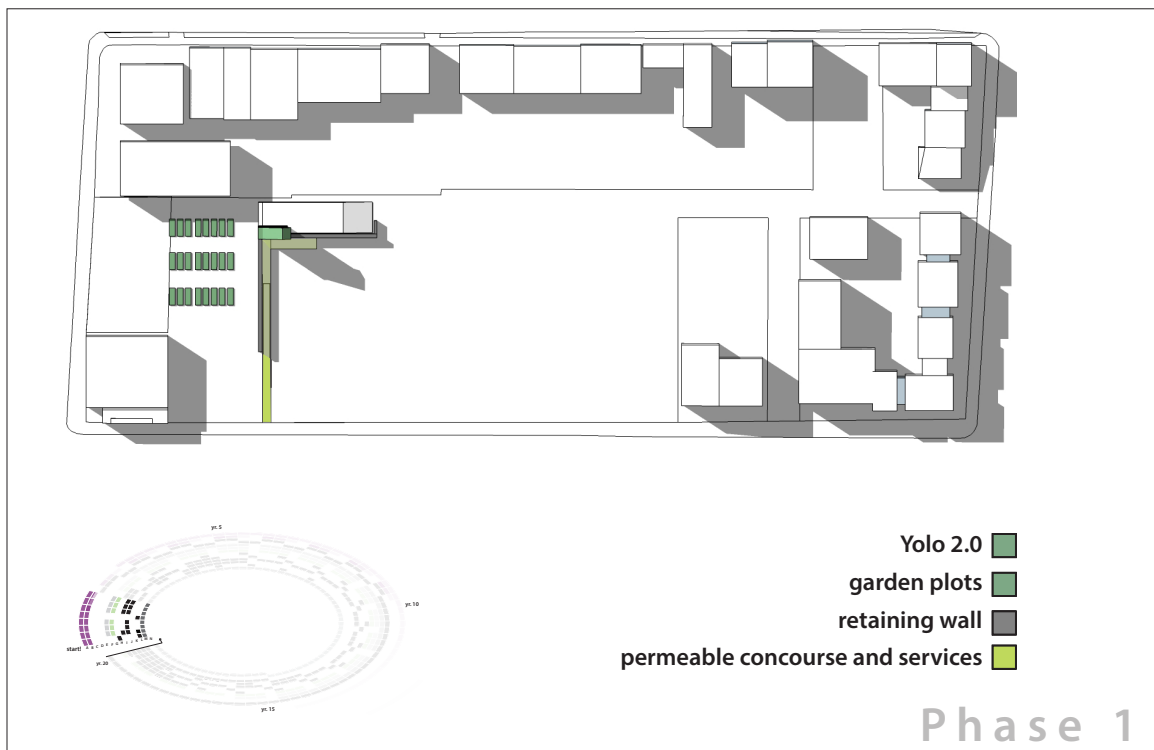
In year 1, nodes are broadcast across the site to mark its initiation



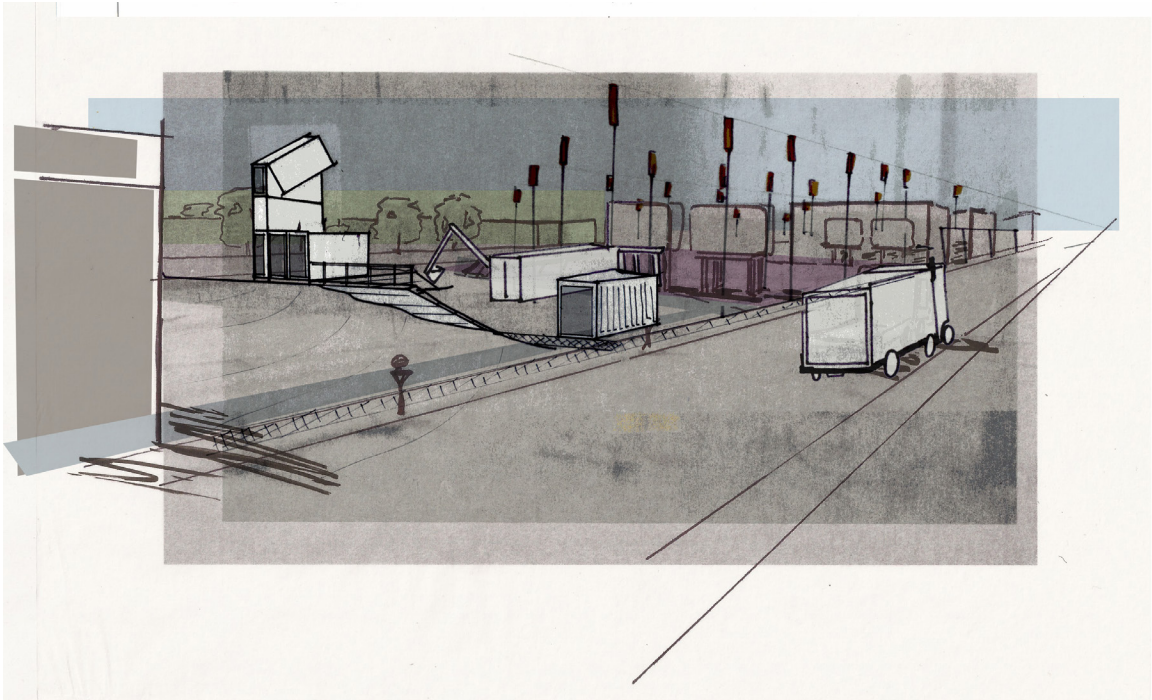
A sketch of the view North along Gottingen St.



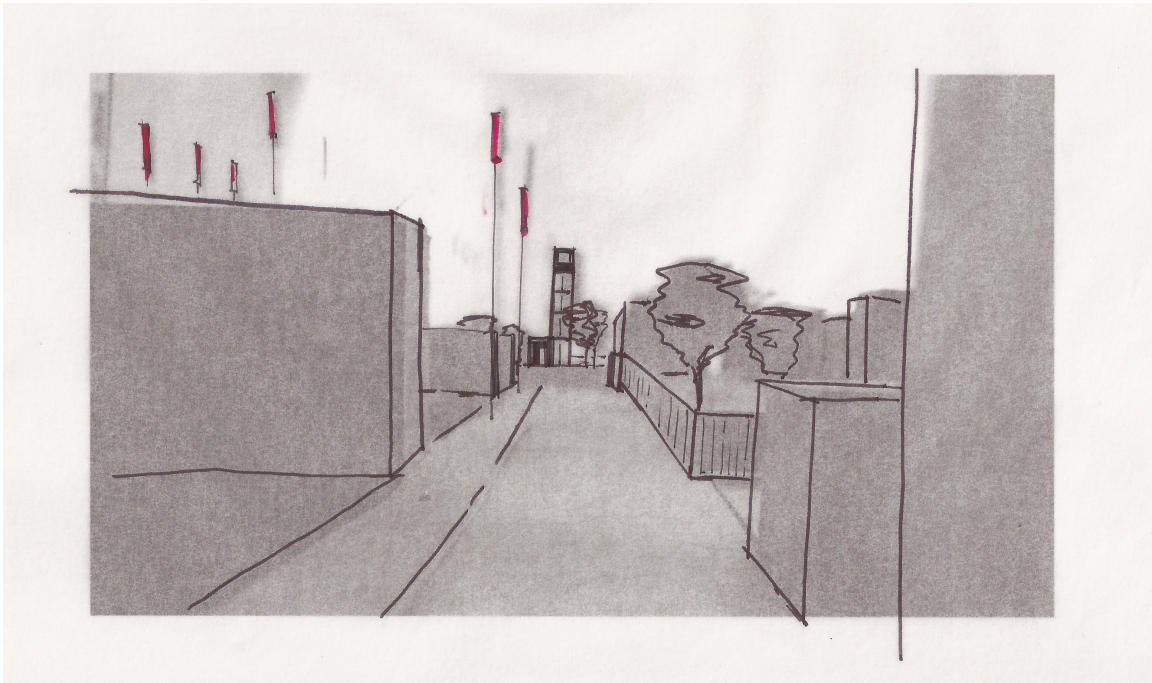
In this time opportunity for fun and different uses of the site is created. Here a pop-up play structure is depicted gathering the community for an afternoon to imagine some of the coming possibilities and experience the temporary nature of the events to come.



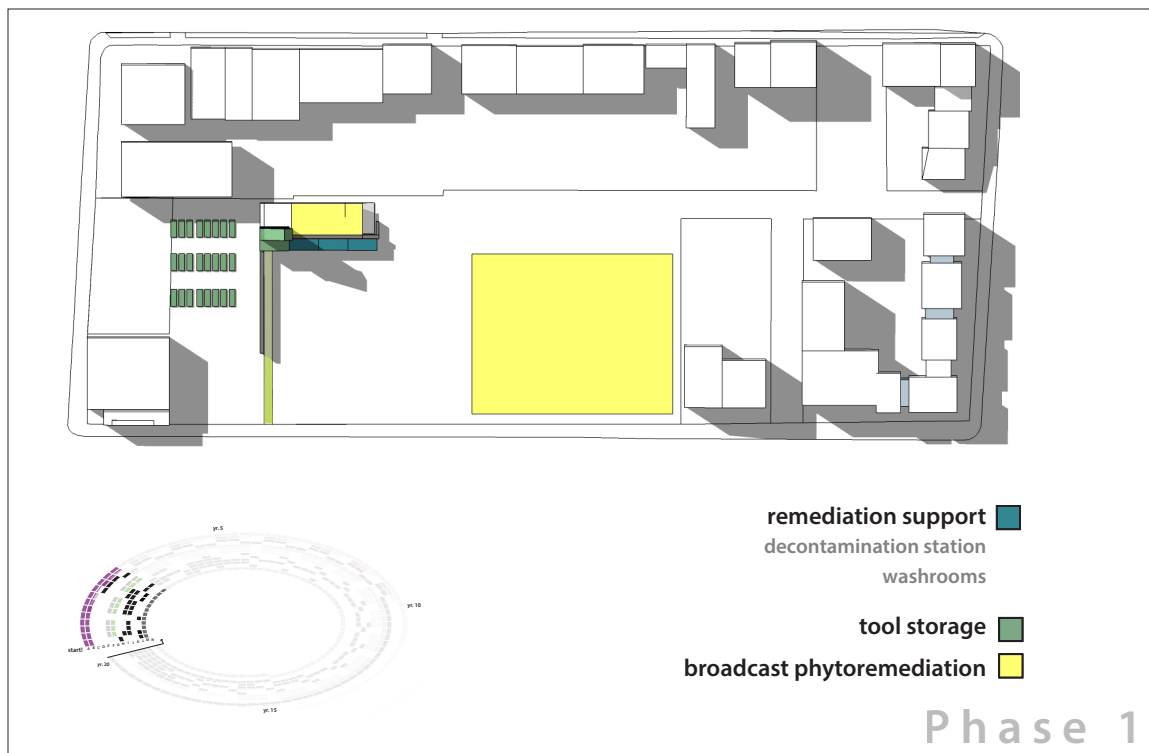
Year 2 sees a retaining wall separating one area of contamination and a permeable concourse bringing services needed for the future Hub once established. The Yolo 2.0 is also delivered to the site and community garden plots establish public site use.



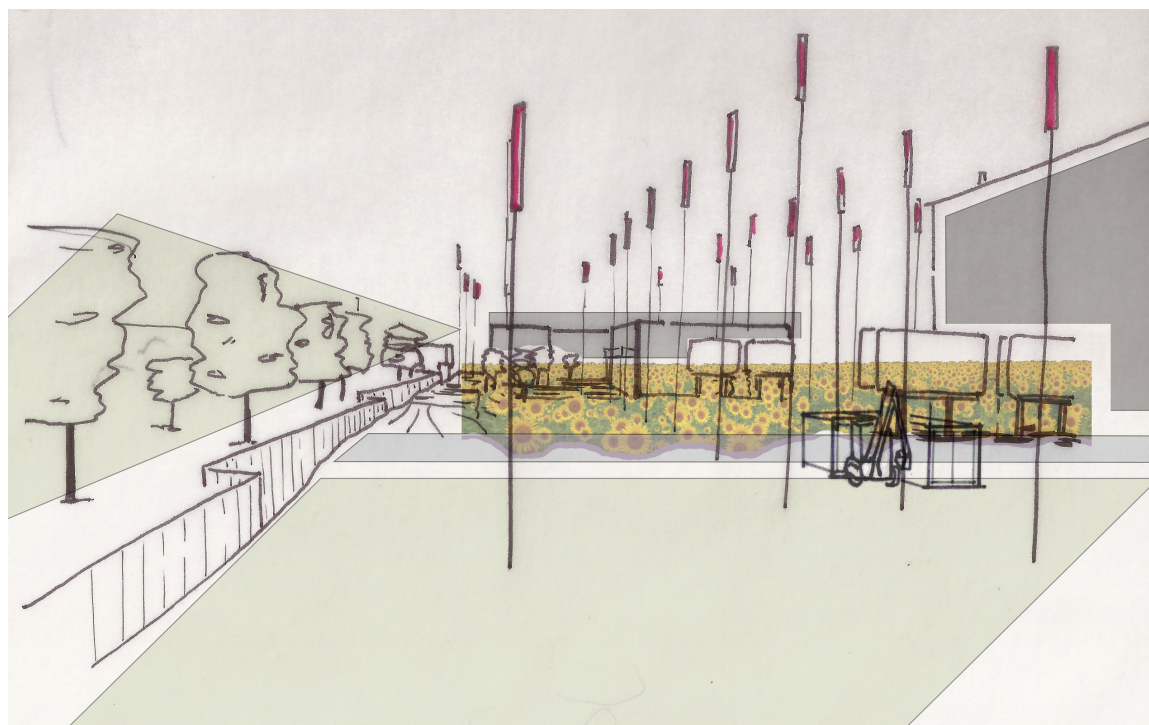
View on Gottingen St with the Yolo 2.0 set on site with additional containers for storage and construction work.



The Yolo has a presence on site and a monumentality. Through it, the community can inhabit the sky and watch the unfolding of the remediation project below.



In year 3, the support for remediation efforts and community gardens is established. The large parking lot is removed and the contaminated areas are planted with sunflowers to initiate the remediation, stabilize the soils from erosion and add beauty to the neighbourhood. Signage would be required to inform the community of potential hazards and temporary fencing re-

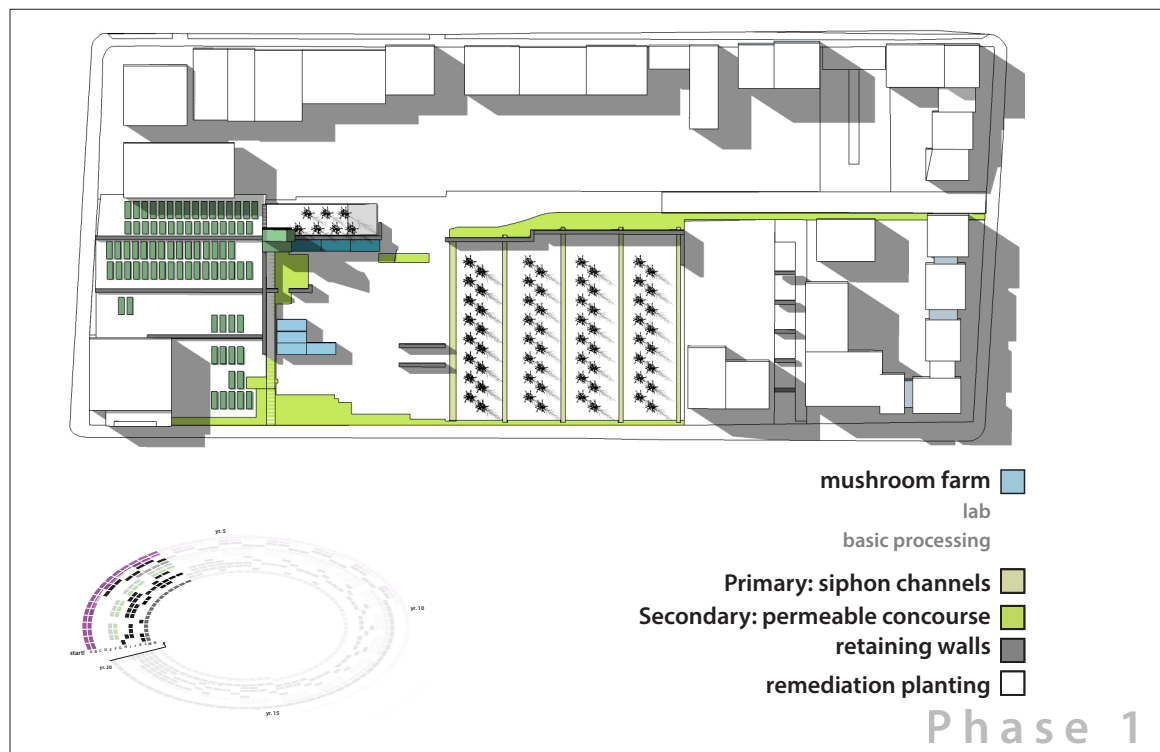


A view of the sunflower field planted as the initial remediation effort.

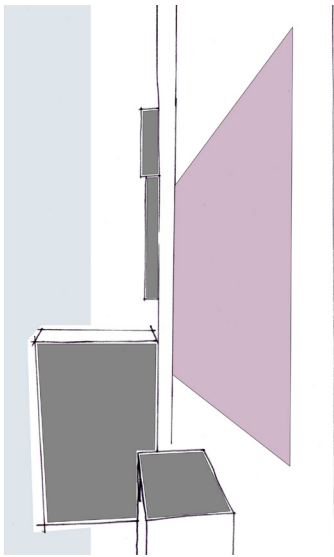
The phased program development was inspired by the work of Alejandro Arvena in Chile. At Quinta Monroy, the inhabited infrastructure forms the basis for further infill development as owners have the capacity to renovate and expand.



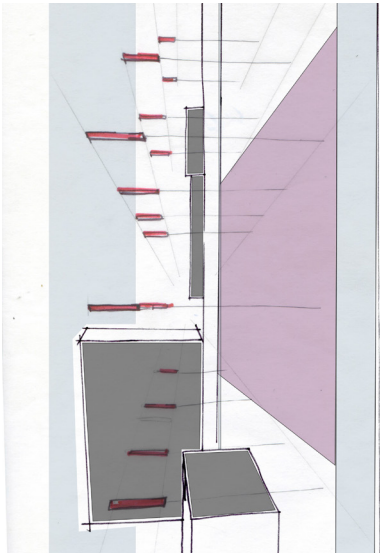
Quinta Monroy is a 93 unit housing complex completed in 2004 by design firm Elemental in Iquique, Chile, 2008; Dezeen Magazine.



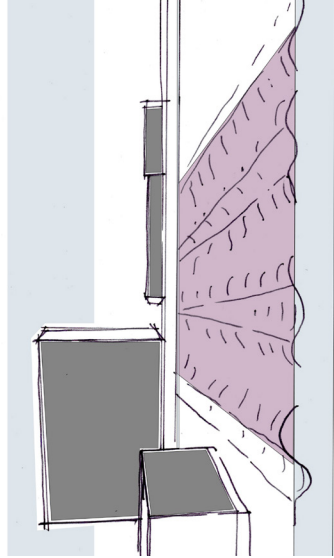
Year 4 expands the permeable public concourse and community gardens through the “commons”. The mushroom farm is established with a laboratory and space for preparation and processing. The West side of the remediation zone is demarcated with a retaining wall and the primary siphon channels are placed with water diverted to a storage tank placed below the vacant bank building on the Southeast corner.



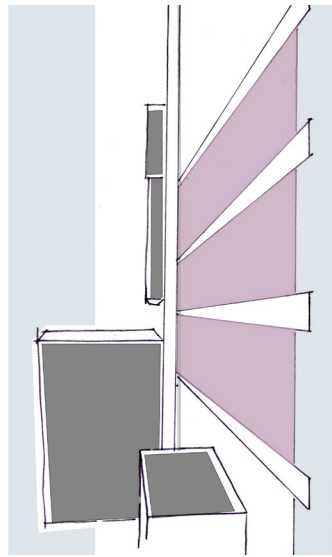
1. base site



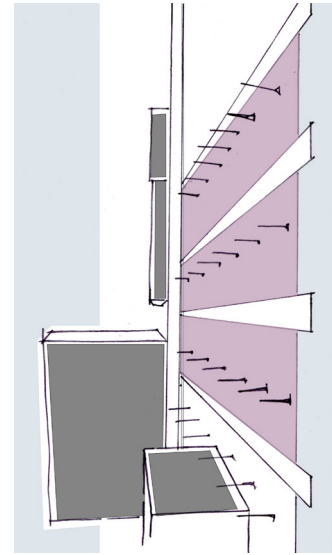
2. site activation



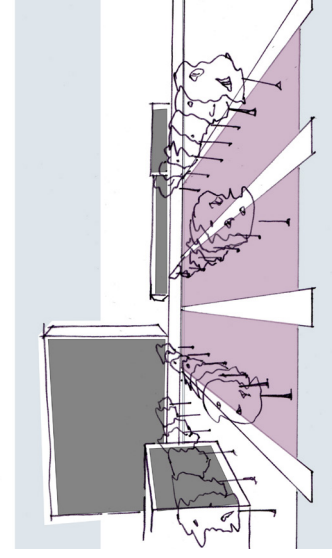
3. removal of parking lot and trenching



4. laying the siphon channels

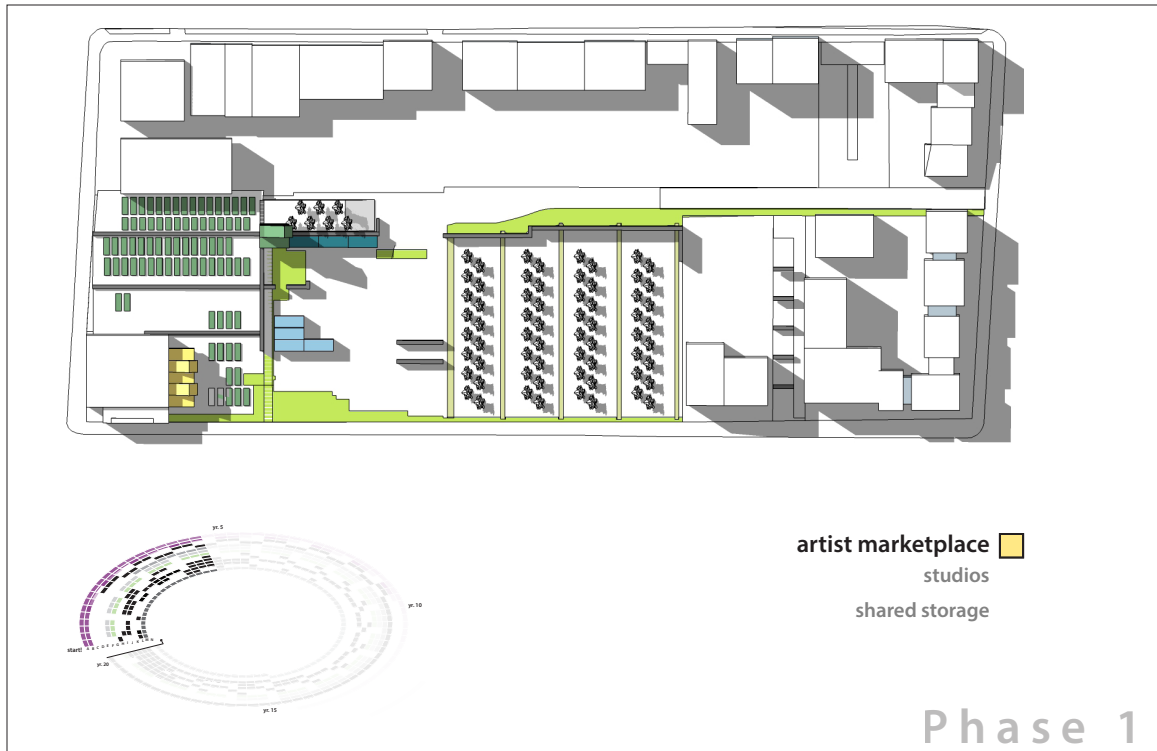


5. planting hybrid poplar shoots

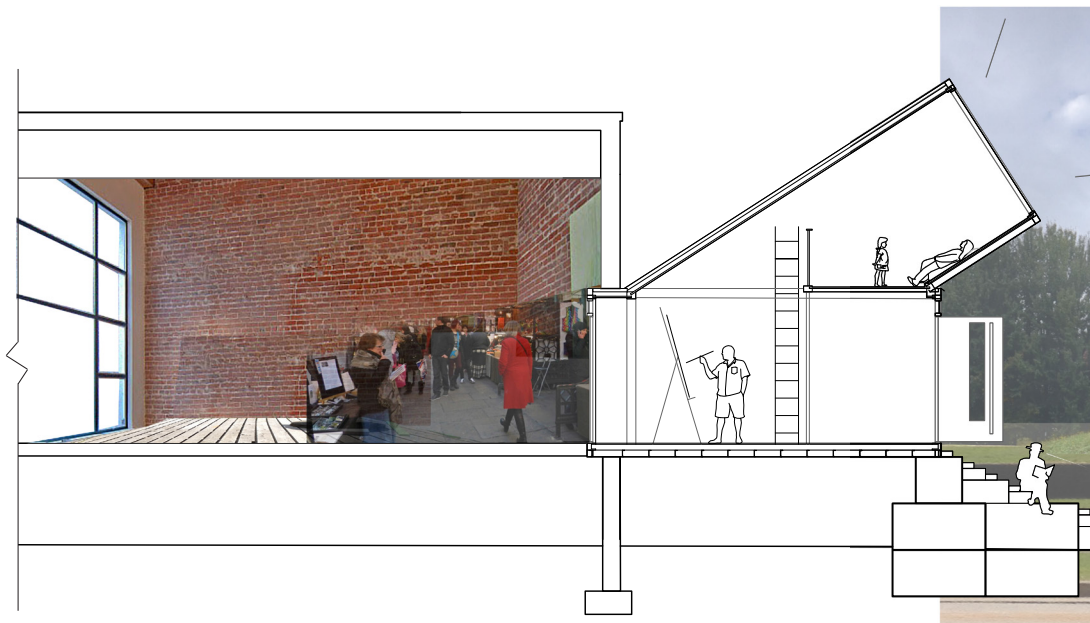


6. Poplar growth until first harvest

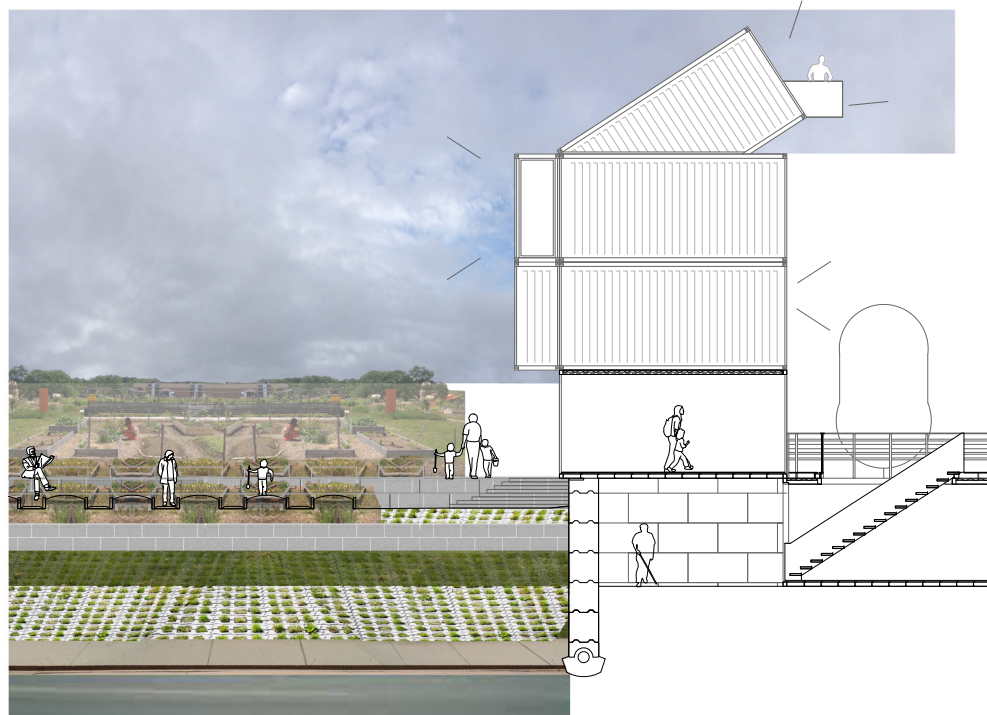
Sequence of establishing the siphon channels through the remediation zone. Once the channels are dug and laid, remediating hybrid poplars are planted through the site, allowing their roots to take hold and begin the sequestration of heavy metals into the plant tissue.



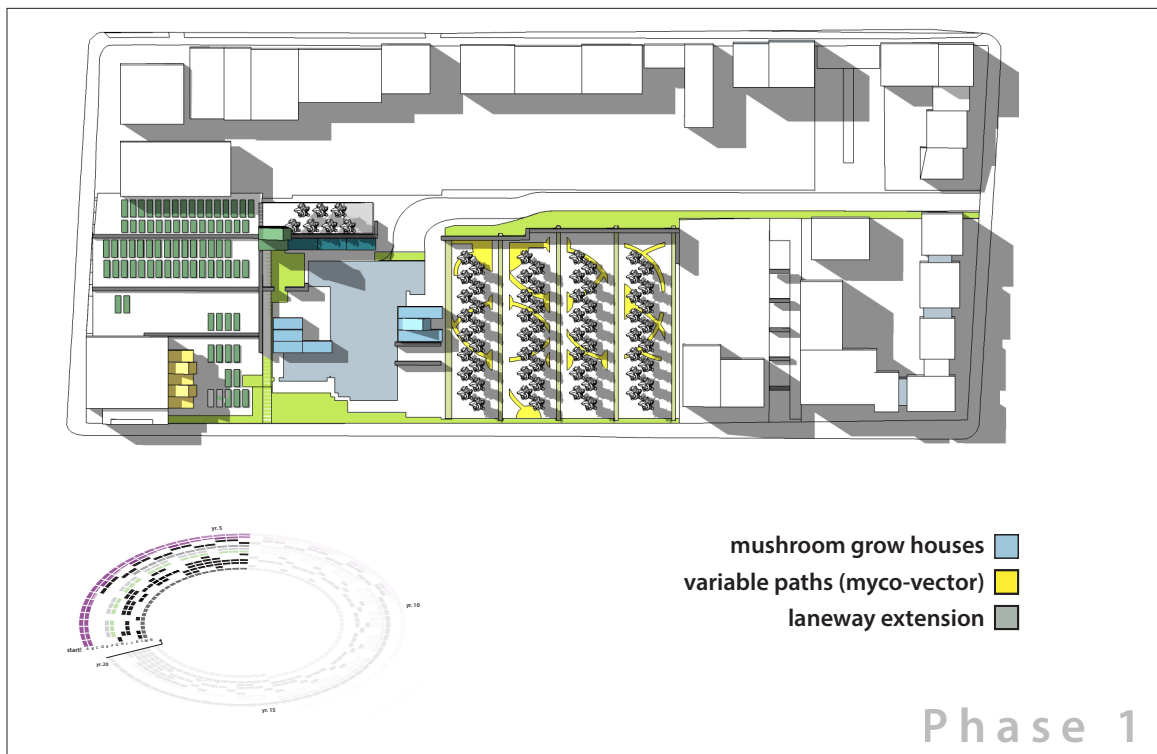
In Year 5 the vacant bank building is renovated and injected with the artist studio modules and additional containers for storage to be rented by sharing organizations. The building is used as an artists market and event space adding a strong anchor to the corner of the site and generat-



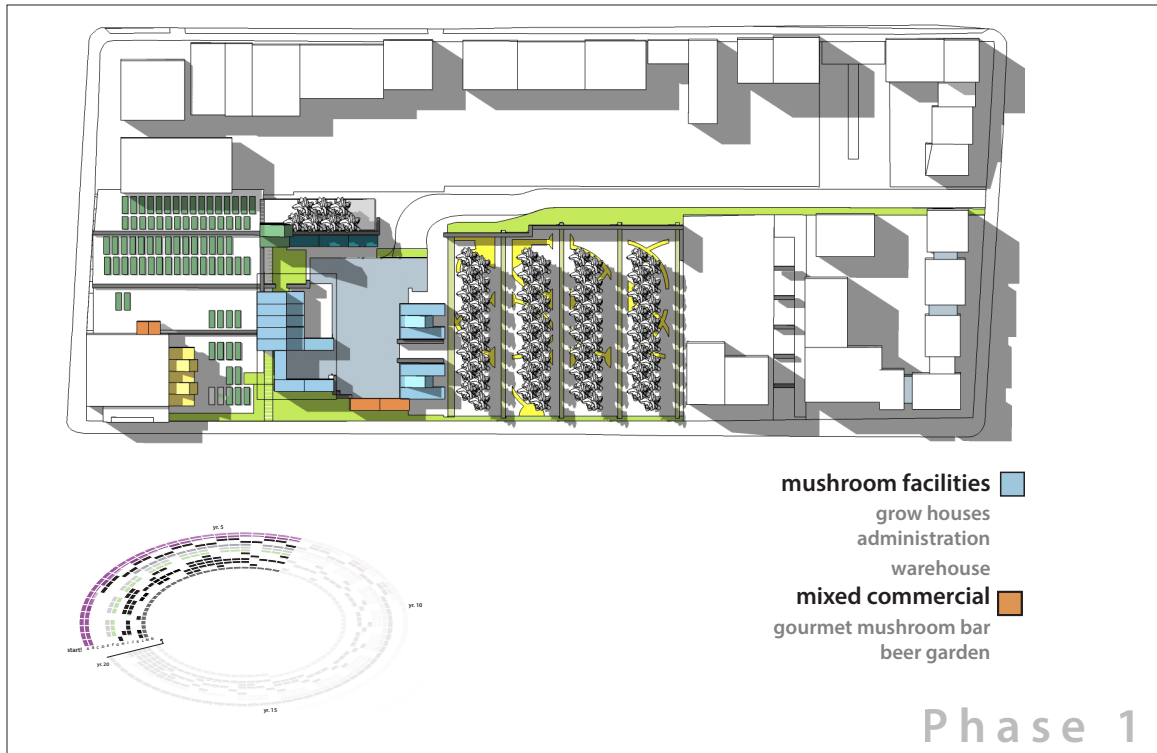
Section through the existing bank building with attached artist studio.



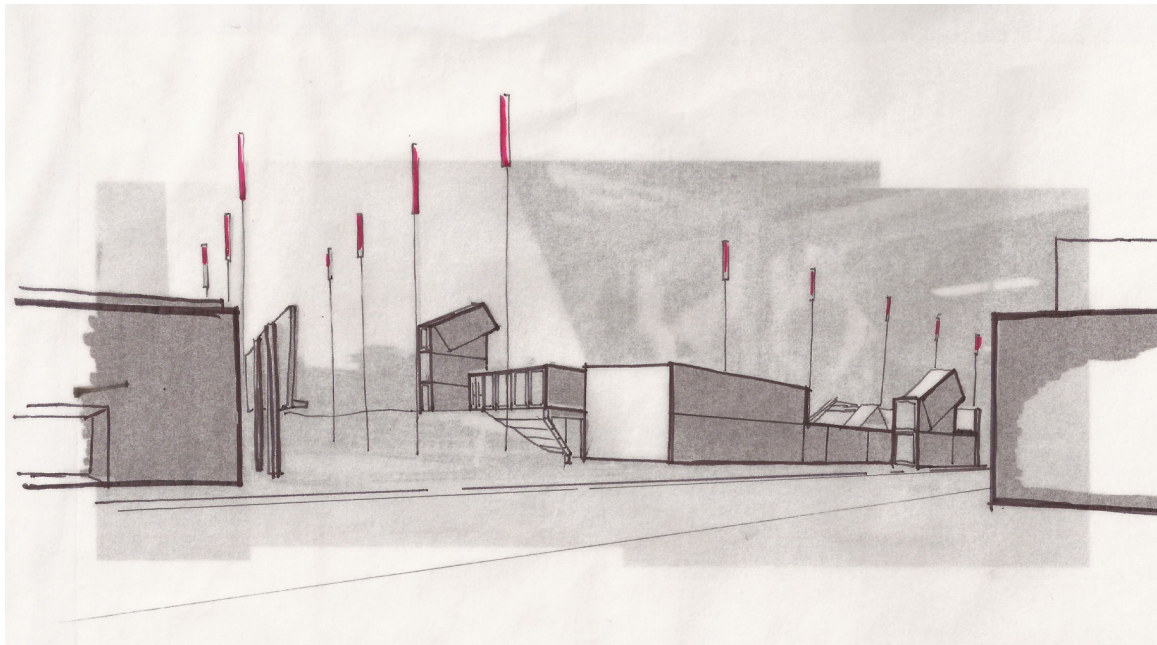
A view of the terraced landscape from Gottingen St. supporting the community garden plots.



Year 6 activities expand the Garrish laneway to the centre of the site and creates a yard for the mushroom farm and Hub. Mushroom grow houses are located to the site allowing for increased production and opportunity to lay the variable paths through the curative garden.



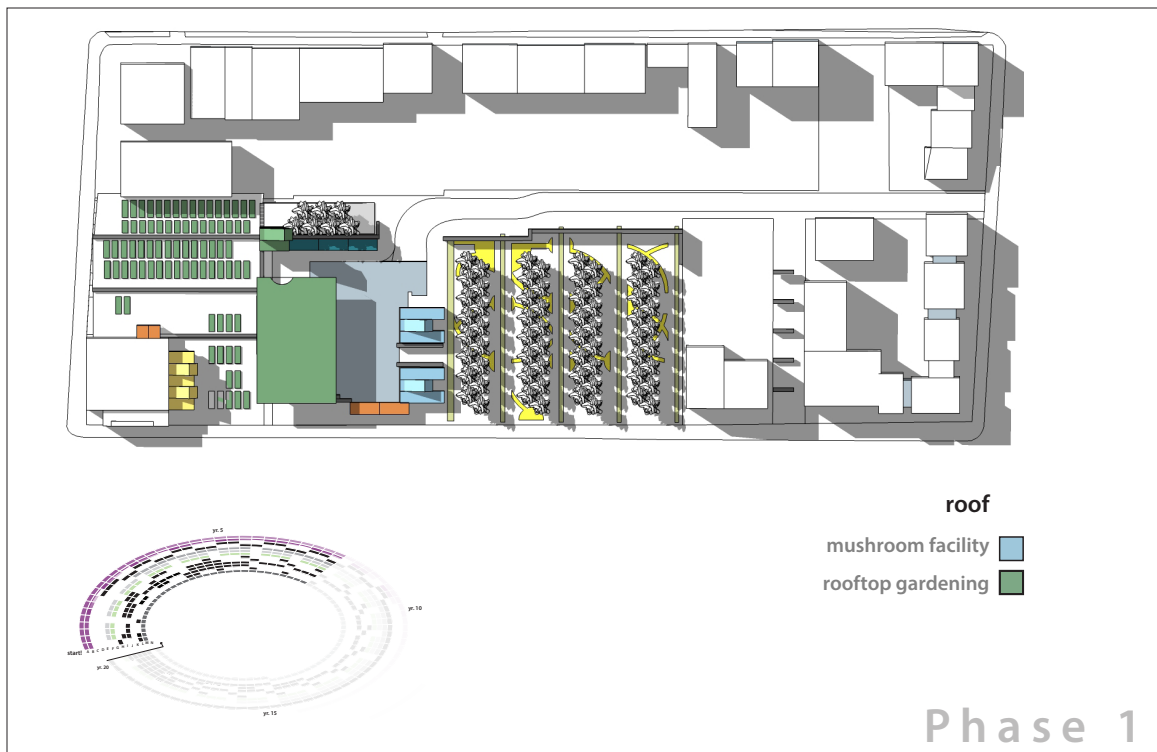
Year 7 to 8 sees the full expansion of the mushroom farm and additional mixed commercial spaces complete the public street front of the facility.



A view of the established Hub along Gottingen St.



Promenade created along the first retaining wall now enclosed by the Hub. It is conceived as a dark space inhabiting the ground, leading to an open courtyard and entrance to the mushroom farm. It creates the opportunity to observe the changing light in the day. A translucent polycarbonate wall panel reveals the activities of the mushroom lab and further illuminates the



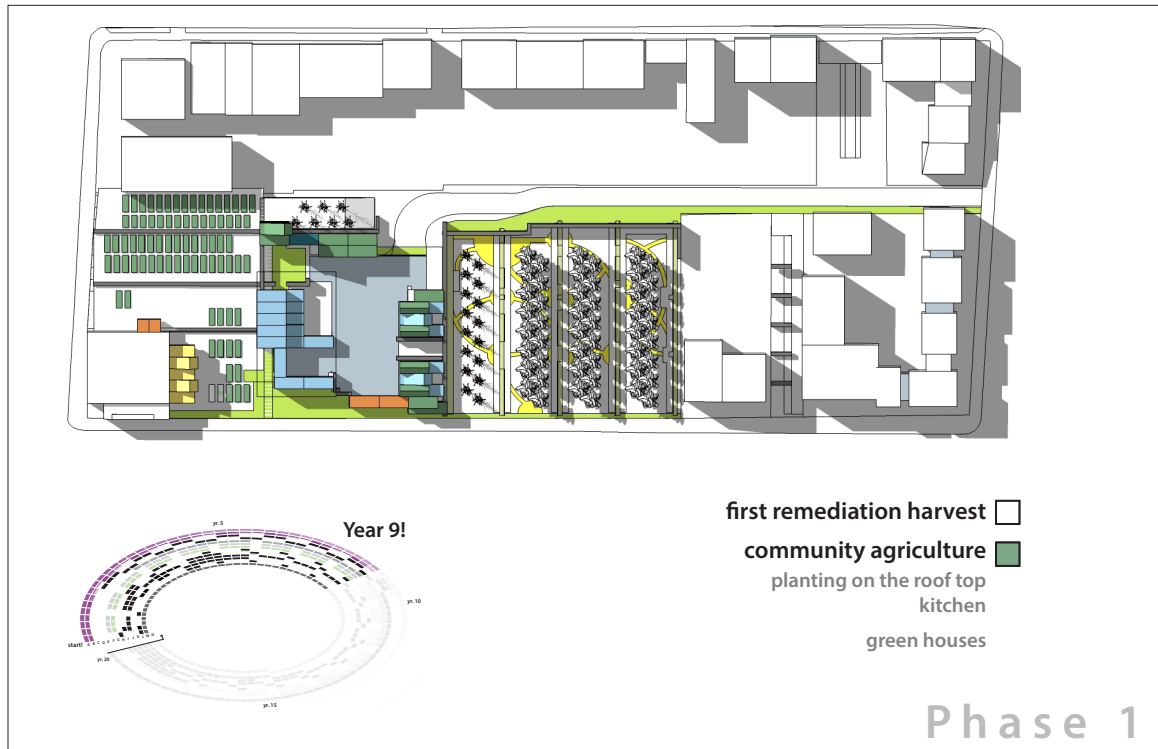
A large roof of glulam timber is designed as a brise-soleil spanning beyond the enclosed interior of the hub and providing additional growing space on the intensive green roof top.



Roof model details showing plan view of exposed structure and interior perspective view of exposed roof structure.



Exterior perspective of the Hub at the main Gottingen St. entrance, showing brise-soleil roof structure covering representations of containers below



At year 9, a community kitchen and greenhouses are placed on site.



A second promenade is created from the community garden to the community kitchen past the Yolo 2.0. Public passages and stairways are designed with illuminated polycarbonate panels, creating beacons and safety in the evening.

Plans and Sections

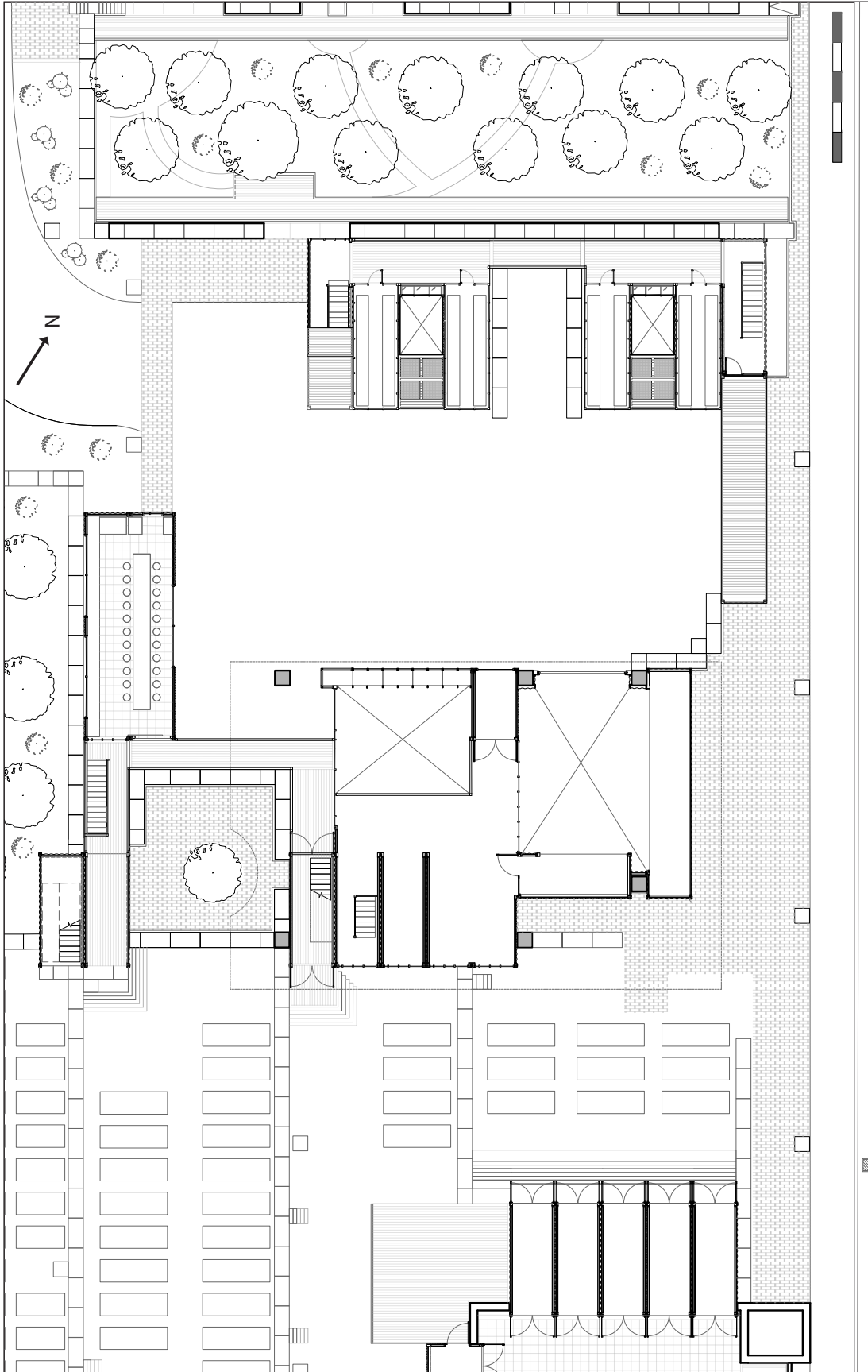
At the end of year 9 the Hub is fully developed and allowed to operate for the remainder of the remediation process. The following figures represent the detailed drawings showing the formal arrangement, configuration, assembly and articulation of the site and Hub at that time.



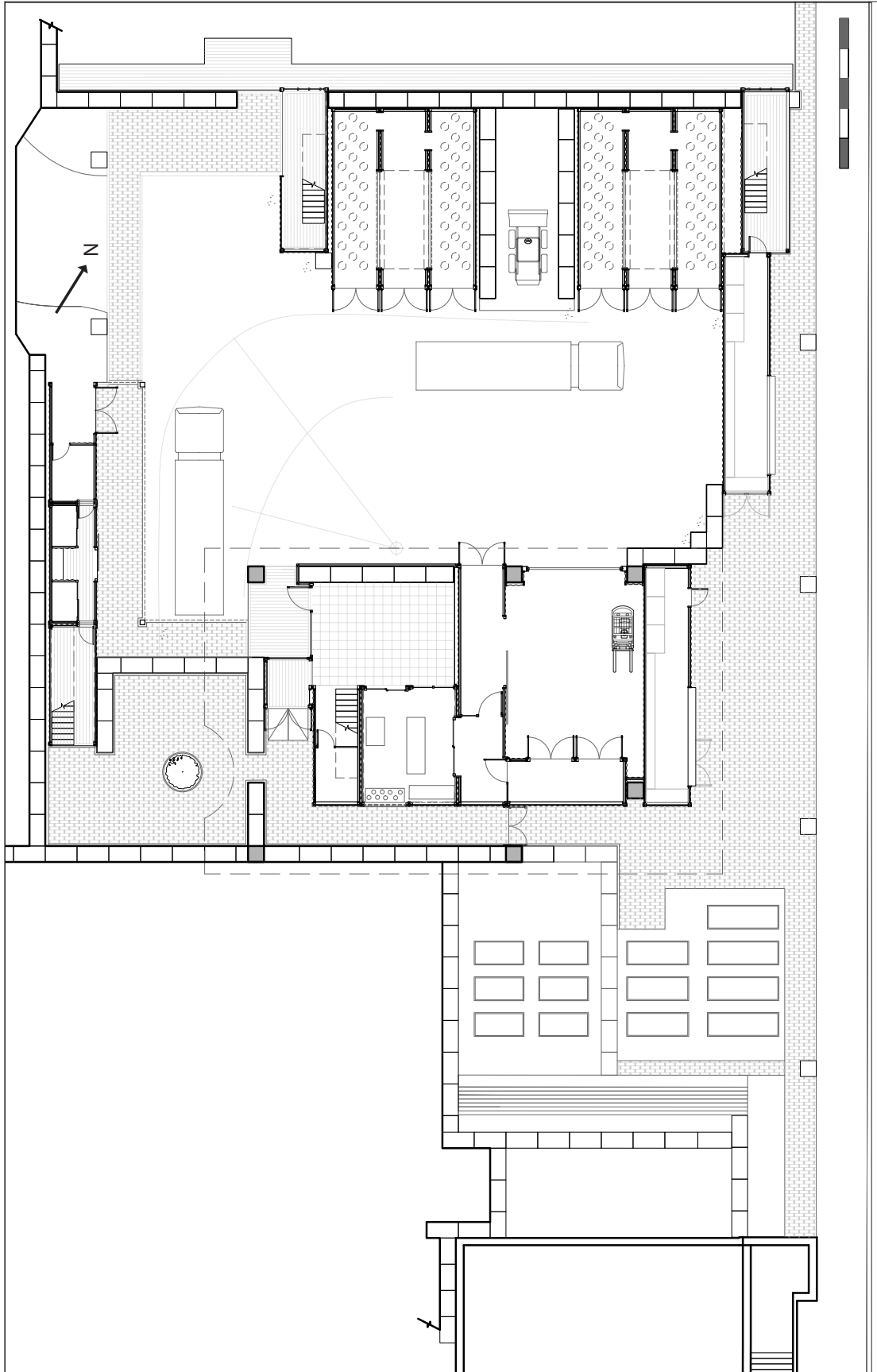
Working model of the site used to develop the scheme and generate early plans, and perspective sketches.



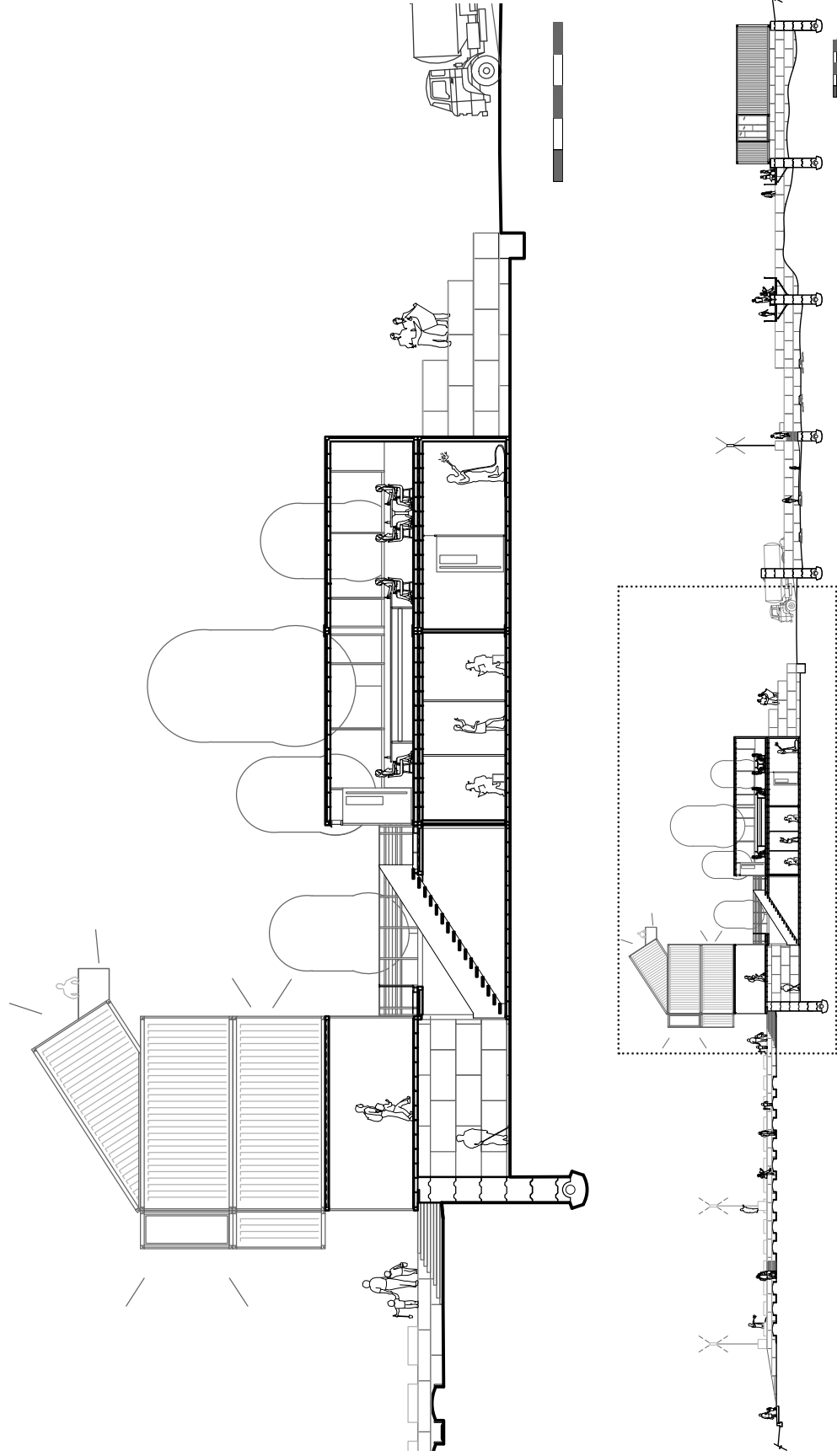
Site section of the site cut through the second level of the Hub.



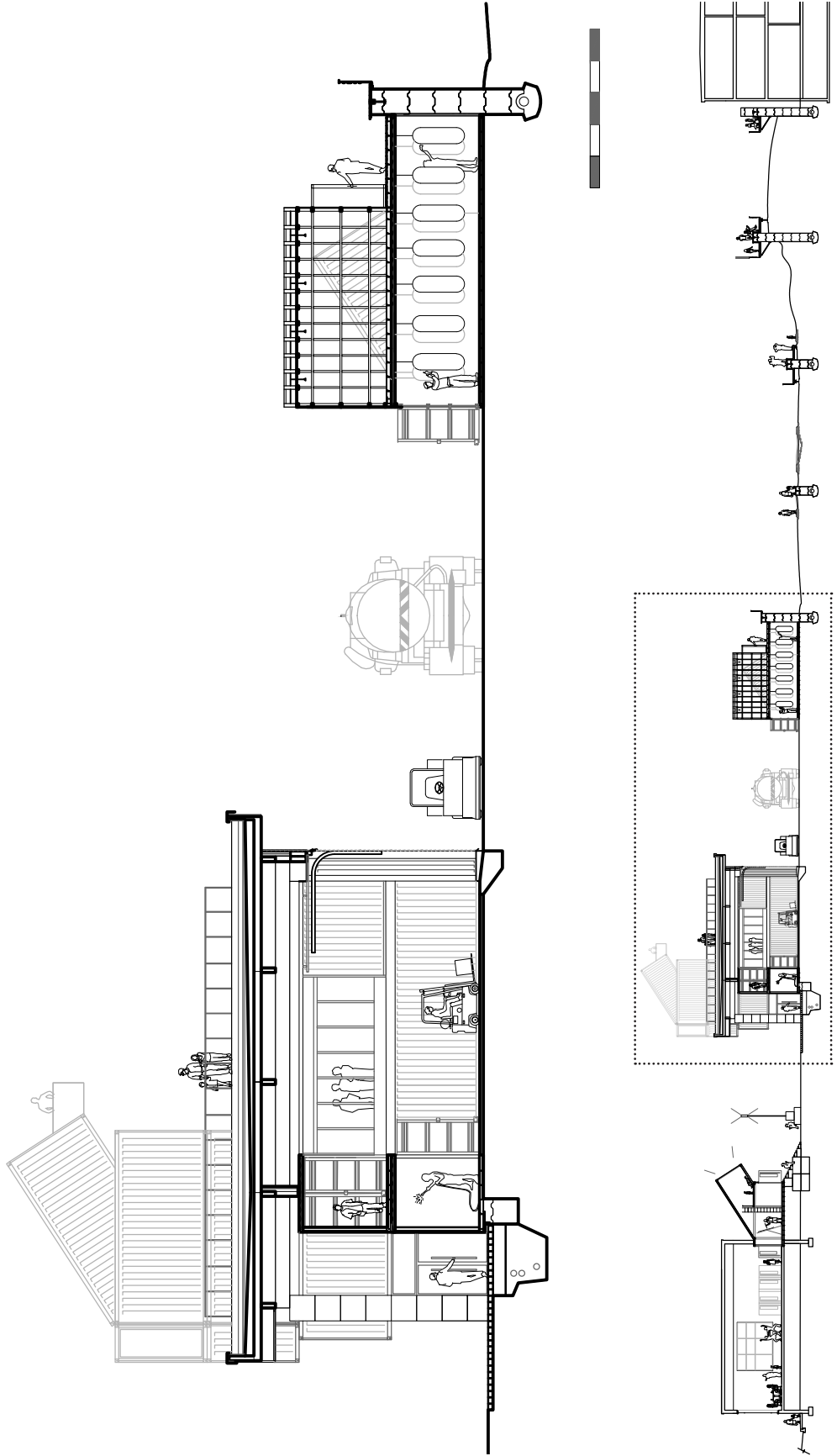
Plan section through second level of the Hub.



Plan section through the first level of the Hub.



North-South section 1 through site showing the second promenade, community kitchen and remediation support facilities below the kitchen.

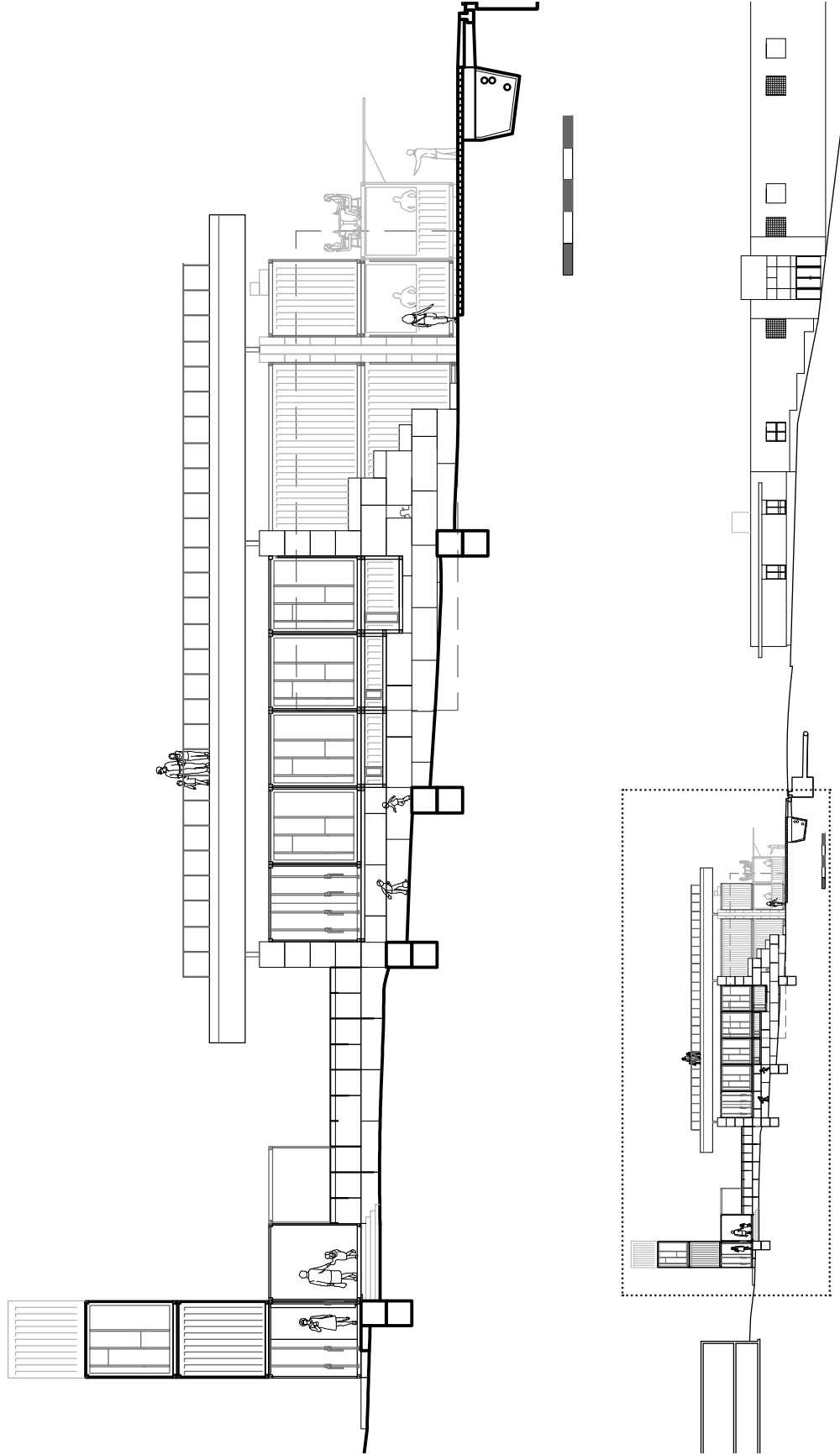


North-South section 2 through site showing working rooms and warehouse space of the mushroom farm and grow houses across the yard.

S6
0 5m



Similar section showing atmospheric qualities of the community garden and artists market space.



East-West Section 3 through the community garden commons showing an elevation of the Hub and Yolo 2.0.

Phase 2: Cycle of Remediation

In phase 2, the action of the remediation effort is allowed to play out. The gardens are continually planted and harvested in a cyclical evolution. The primary siphon channels are built up with additional blocks to accommodate the changing curative garden and addition of compost and soil. The garden takes on a quality inspired by Aldo Van Eyck's Sonsbeek Pavillion. Auxillary wooden connecting paths expand the channel paths laterally and openings in the wall create opportunities for repose, gathering, and views across the gardens to other paths.

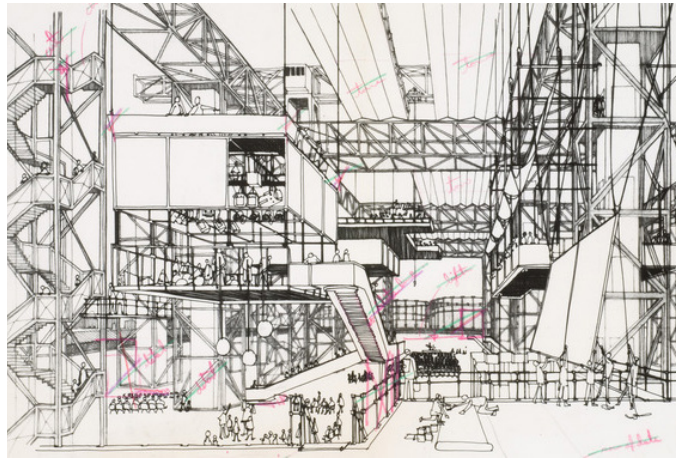
To address other brownfield sites in the network of landscapes, small "spore" pavilions in the same architectural language are placed on other sites in the city. These are supported by the main hub and can undertake less intensive site remediation. These places become localized markets or drop off locations for Community Shared Agriculture (CSA) programs connecting the city to the rural surroundings.

Additional mixed commercial space is added to the street front allowing passage into the garden. After the harvest of trees through one garden section, the walls are built up to a height of two storeys where placing a 40' container spanning two walls is comfortable to pass under. These 40' containers are adapted as temporary "drop-in" galleries that are craned into place for a short period of time and accessed by a stair

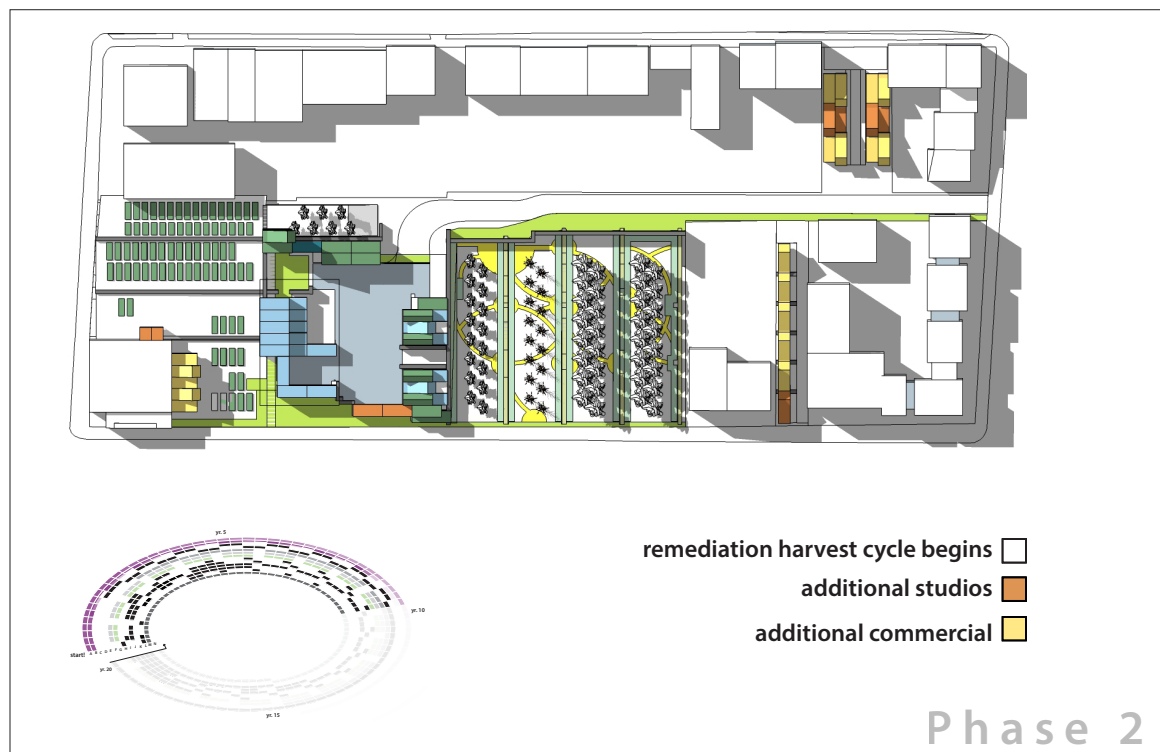


Sonsbeek Pavillion, Sonsbeek Park, Arnhem, Netherlands, 1966. The temporary pavillion was composed of 6 walls 4m high with semi circular punctuations creating spaces for the sculpture gallery, 2013; Socks-Studio.

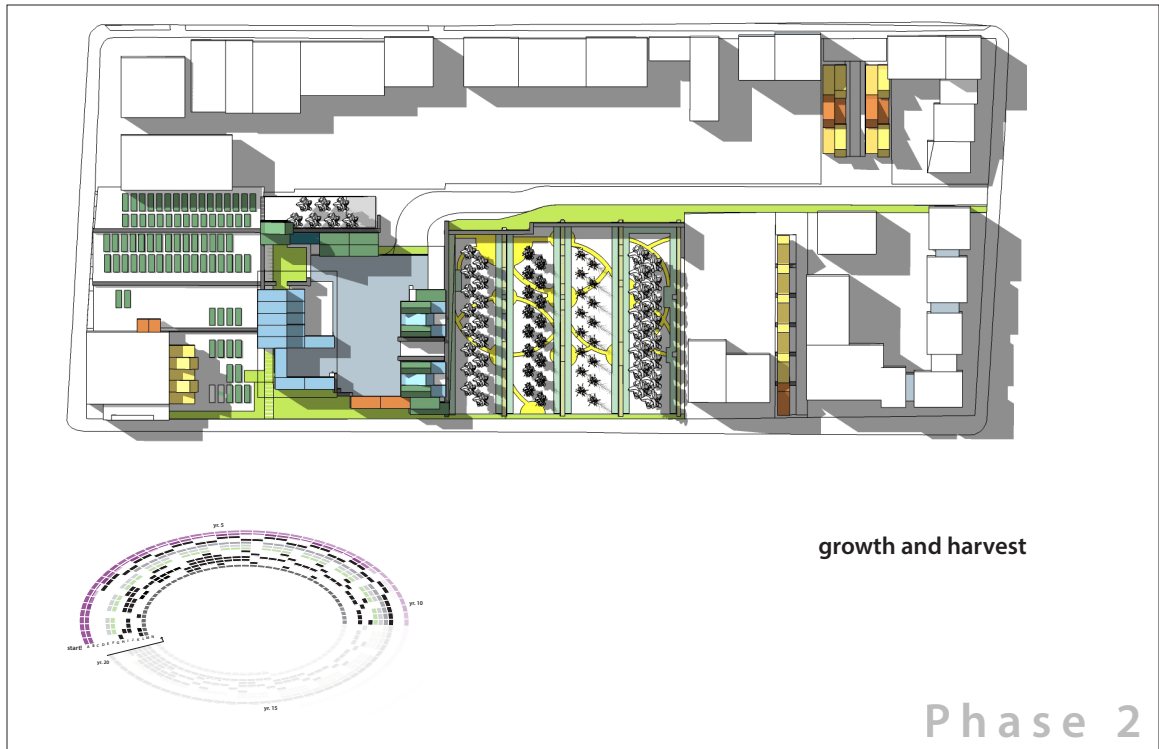
module and elevated connecting paths. The gallery among the tree canopy is then removed after a short while and moved to a newly harvested section of the garden, or trucked away and retooled with a new exhibit. This flexible urban play space evokes the projects of Cedric Price in the 1960's that exemplified a time based and anticipatory architecture of a transformable machine.



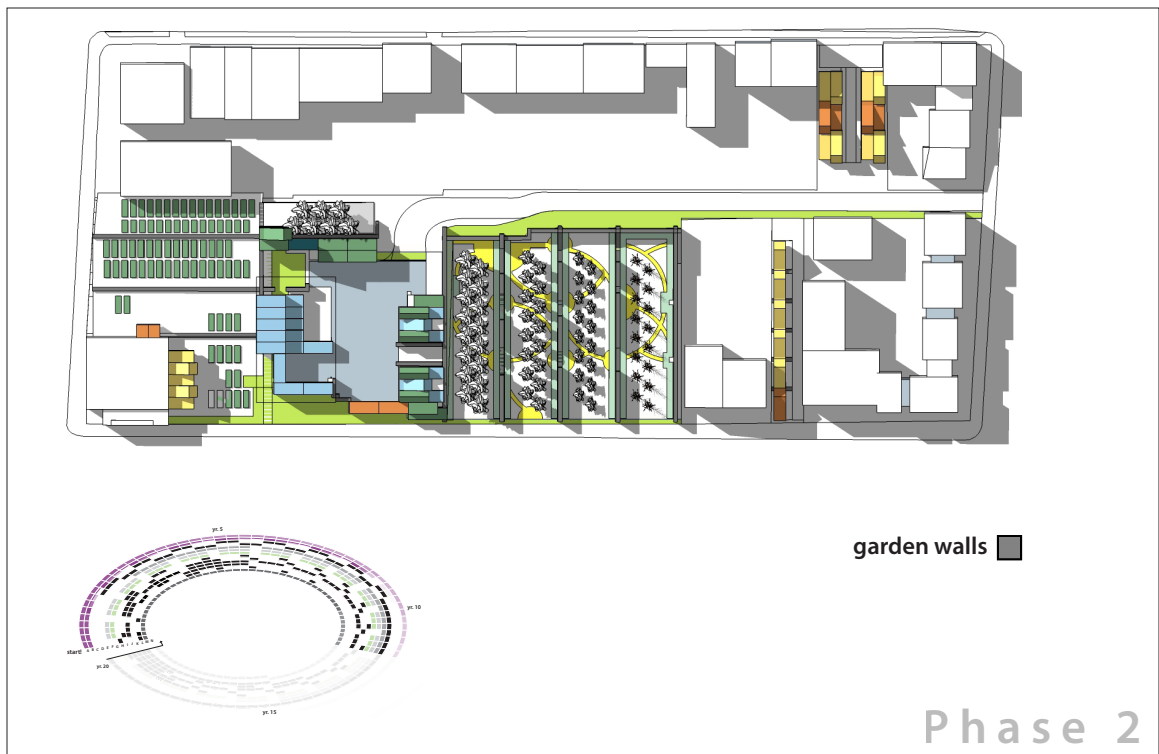
Fun Palace was a project conceived by Cedric Price in 1962 as a transformable urban play space, 2015; Canadian Centre for Architecture.



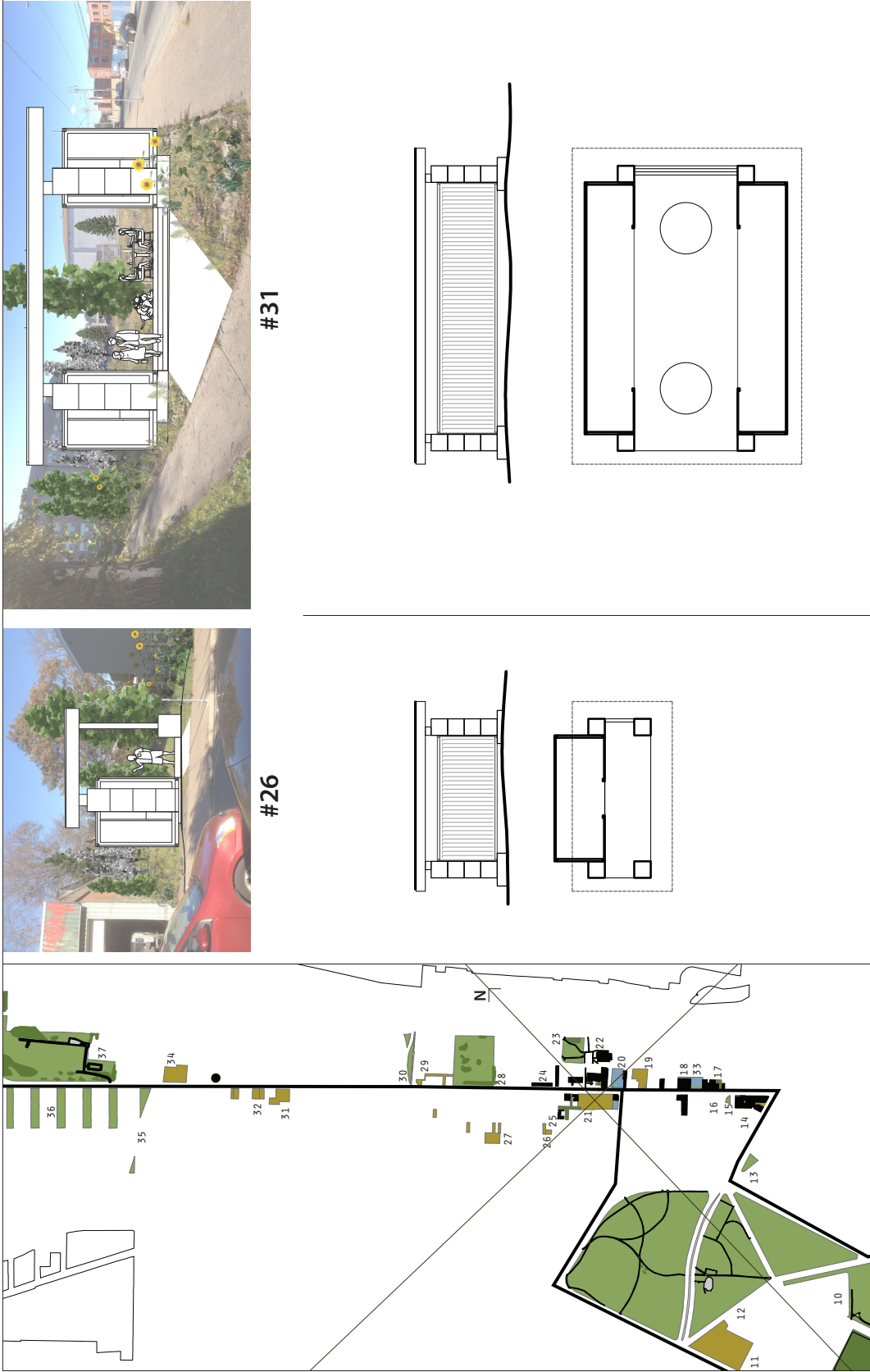
The regular remediation cycle begins with successive plantings and harvestings. Adjacent lots are populated with additional studios drawing life from the street and up the narrow lanes to Garrish lane.



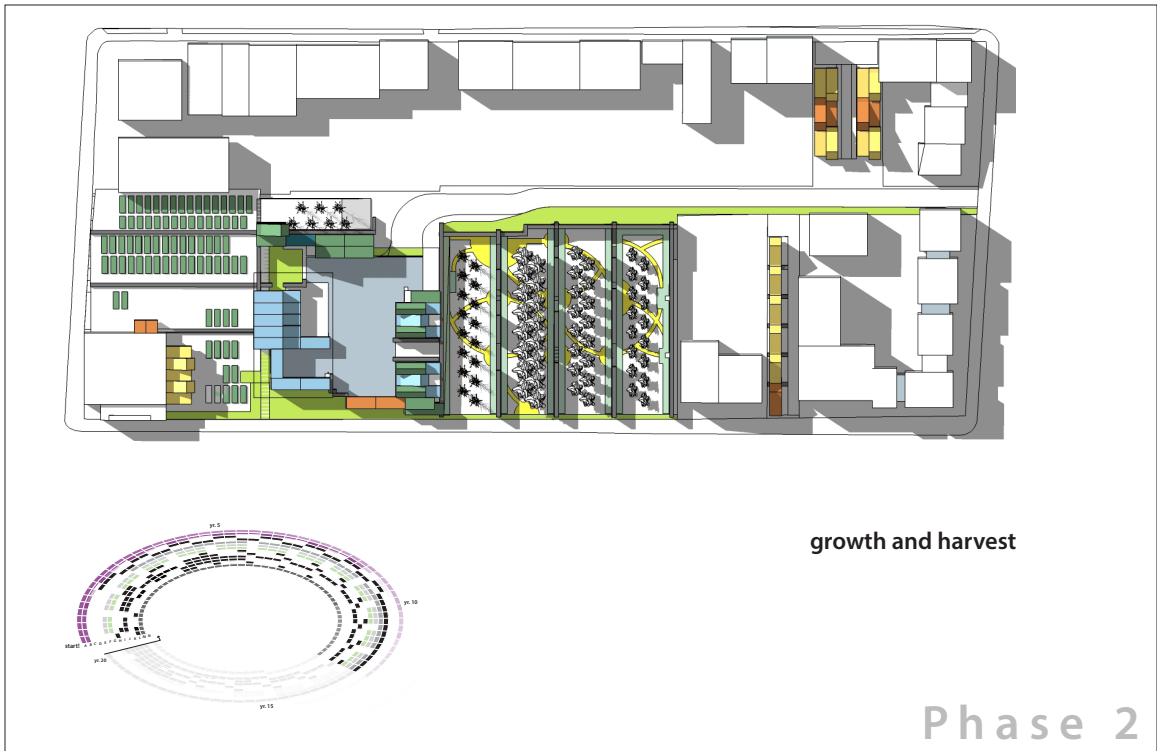
The regular remediation cycle continues.



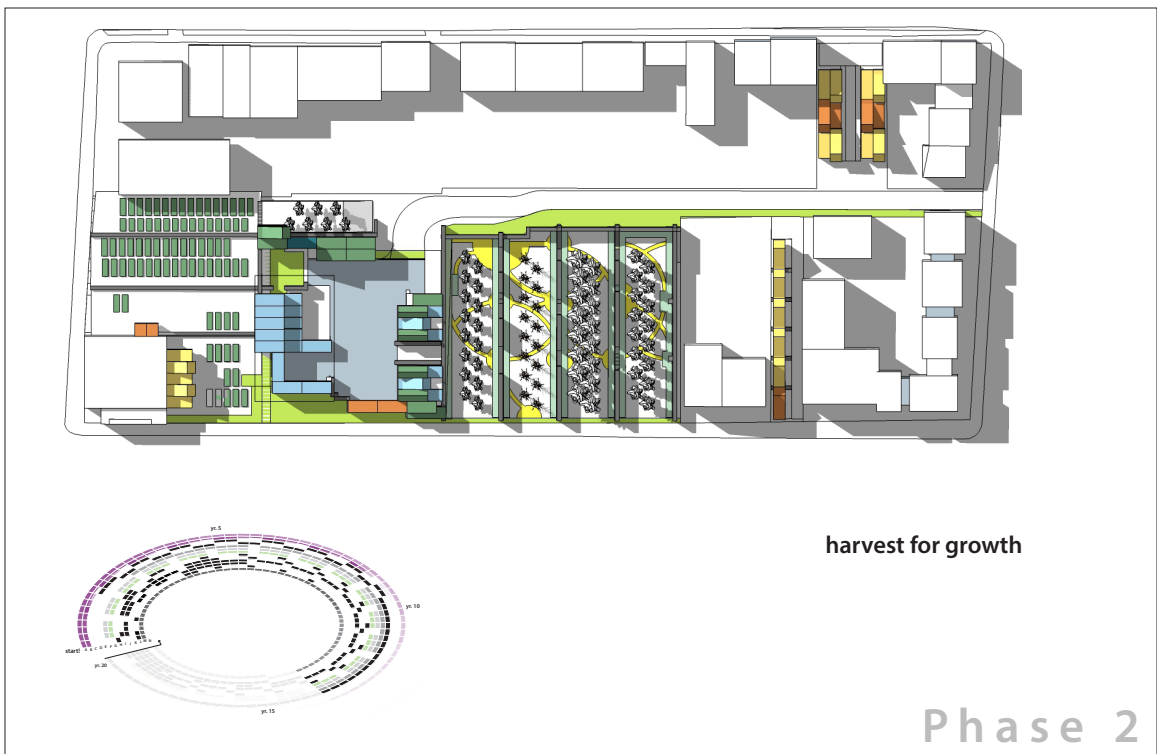
As soil is added to the curative garden its form changes and additional blocks are added to contain the soil and create new elevated paths using connective wooden additions.



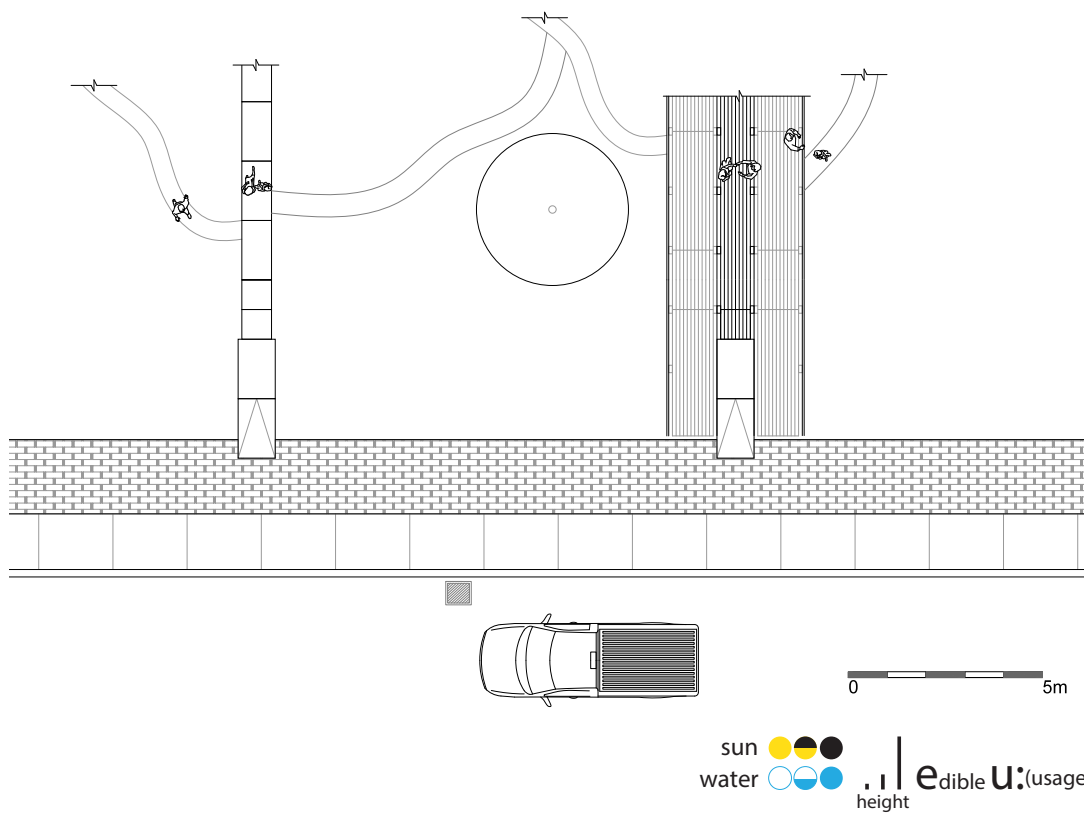
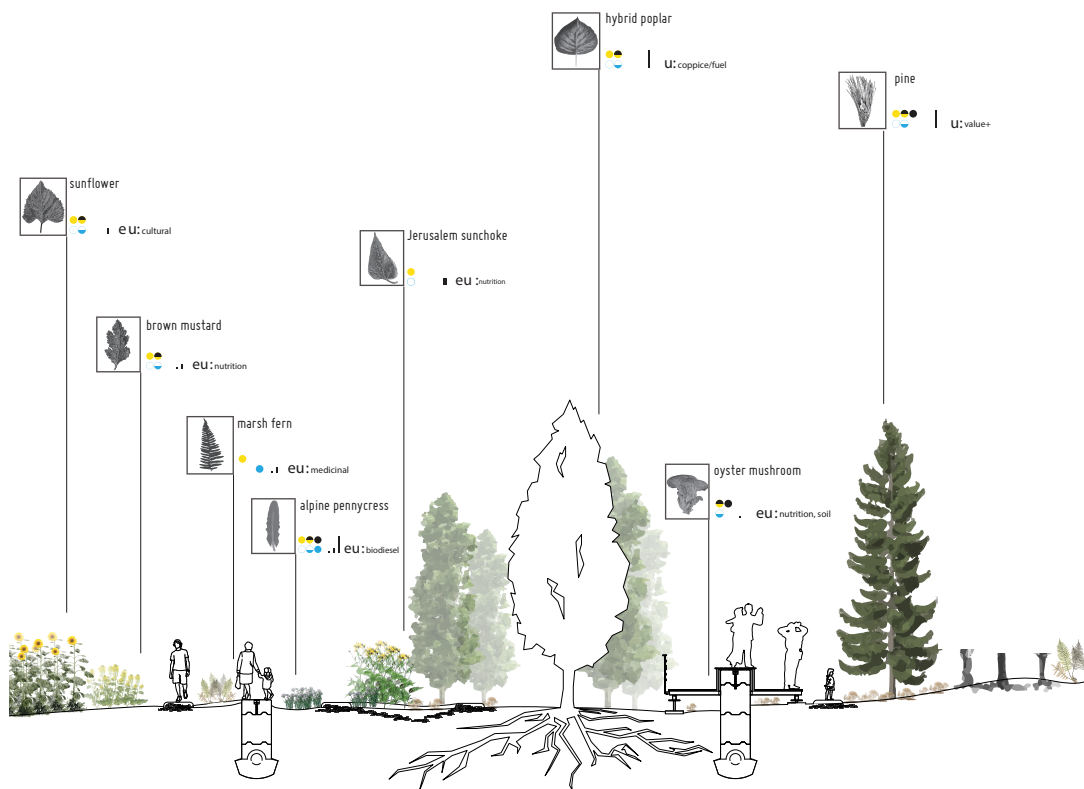
Two scales of remediation pavilions that can be located on smaller brownfield sites undertaking less intensive site remediation and creating localized market spaces.



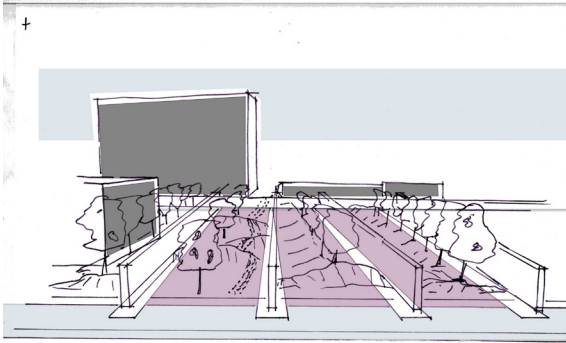
The regular remediation cycle continues.



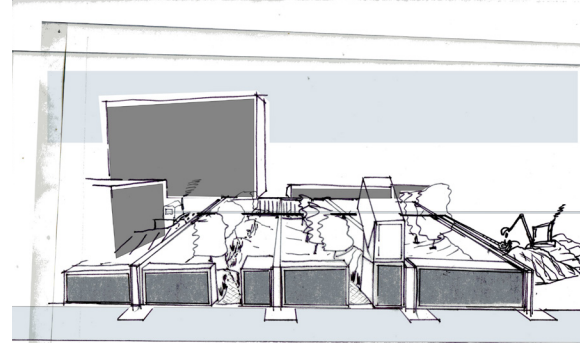
Plants and mushrooms are regularly harvested to remove contaminants from the site.



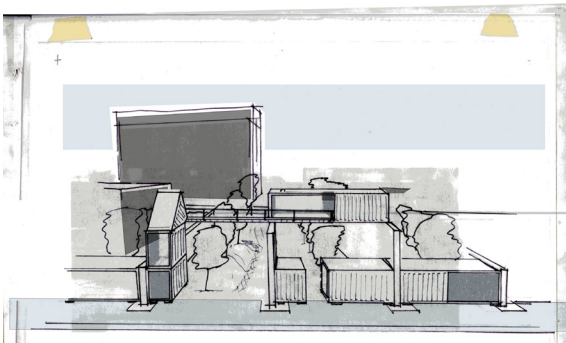
Plan and section through the curative garden showing hierarchy of paths and planting strategy.



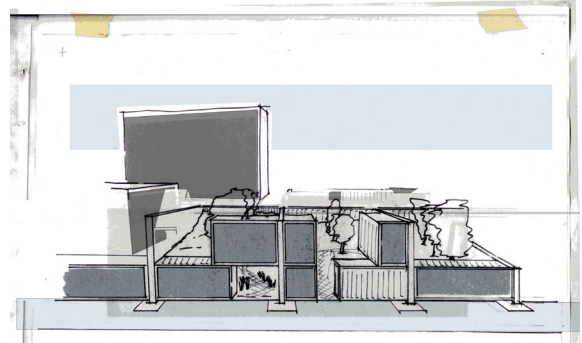
1. walls are built up



2. mixed commercial added

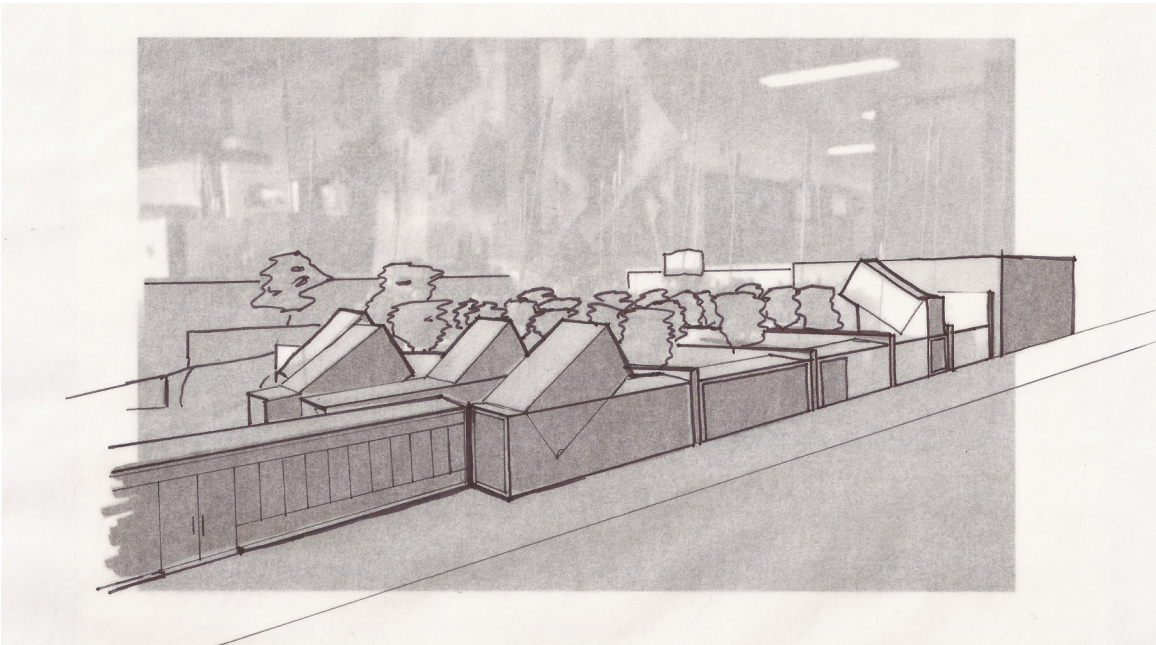


3. "drop-in" gallery



4. addition of more program

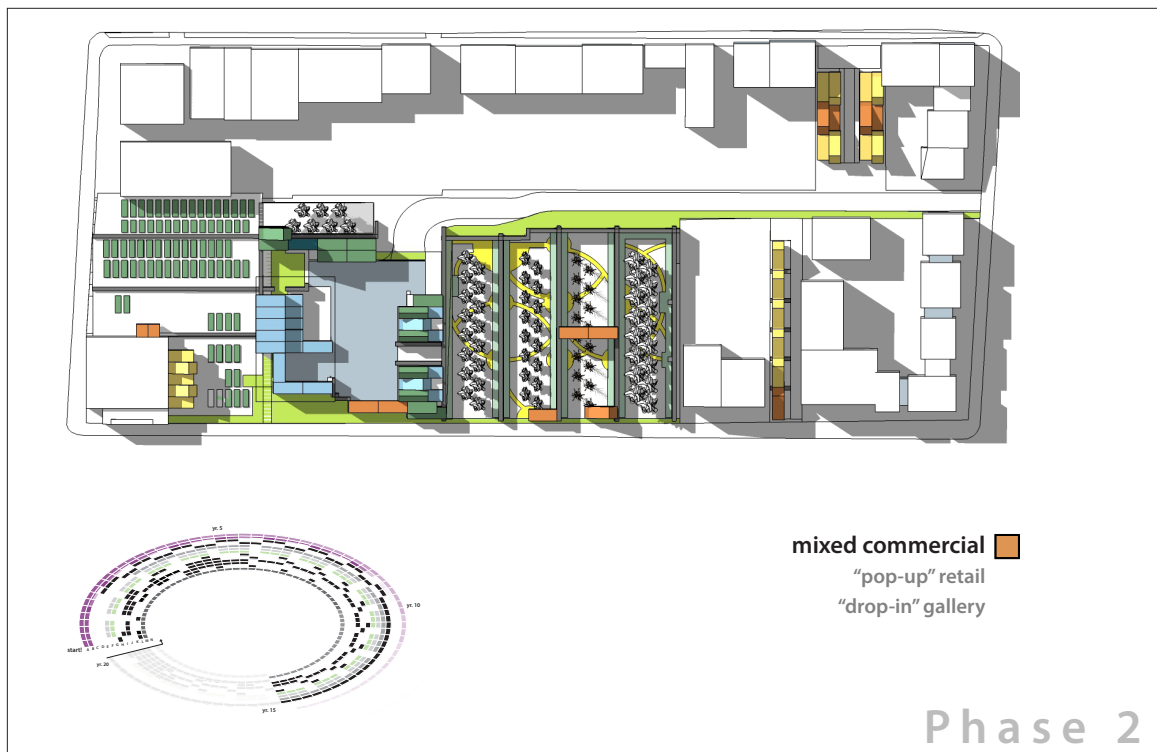
Sequence depicting the changing curative garden as soil is added, walls are built up and programmatic elements are added



View from across Gottingen St. of a later stage garden and retail spaces.



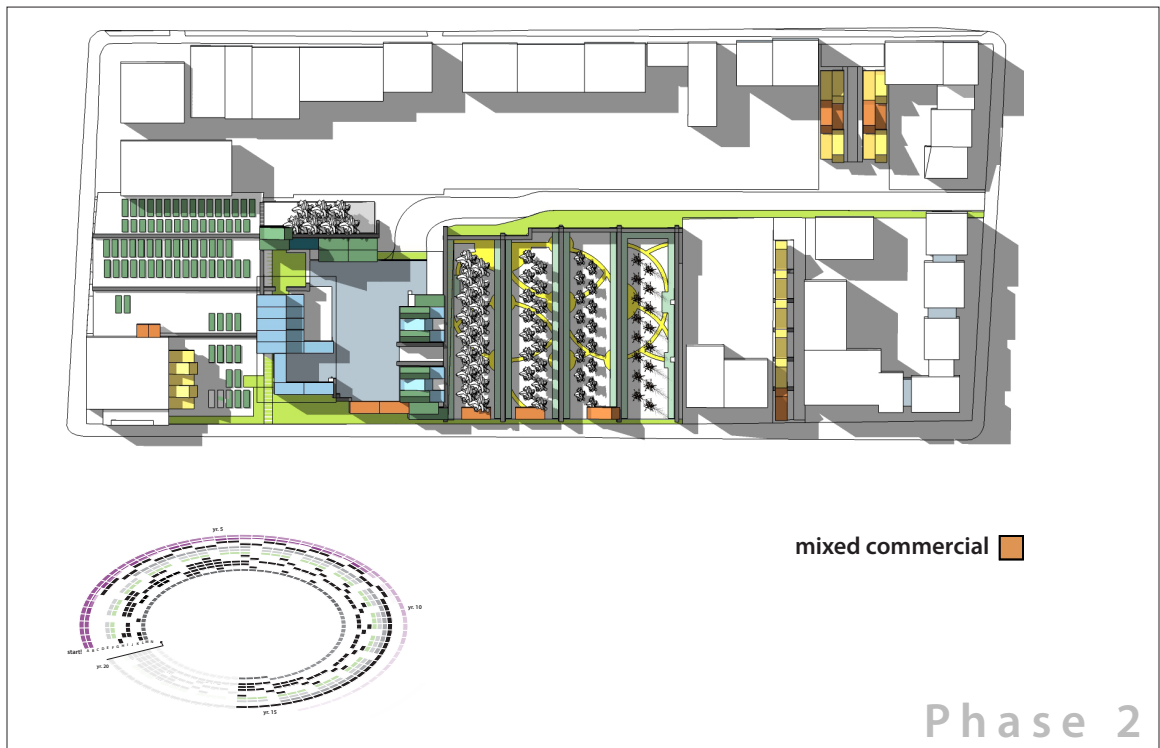
Development of curative garden mixed commercial spaces as both program and retaining wall along Gottingen St.



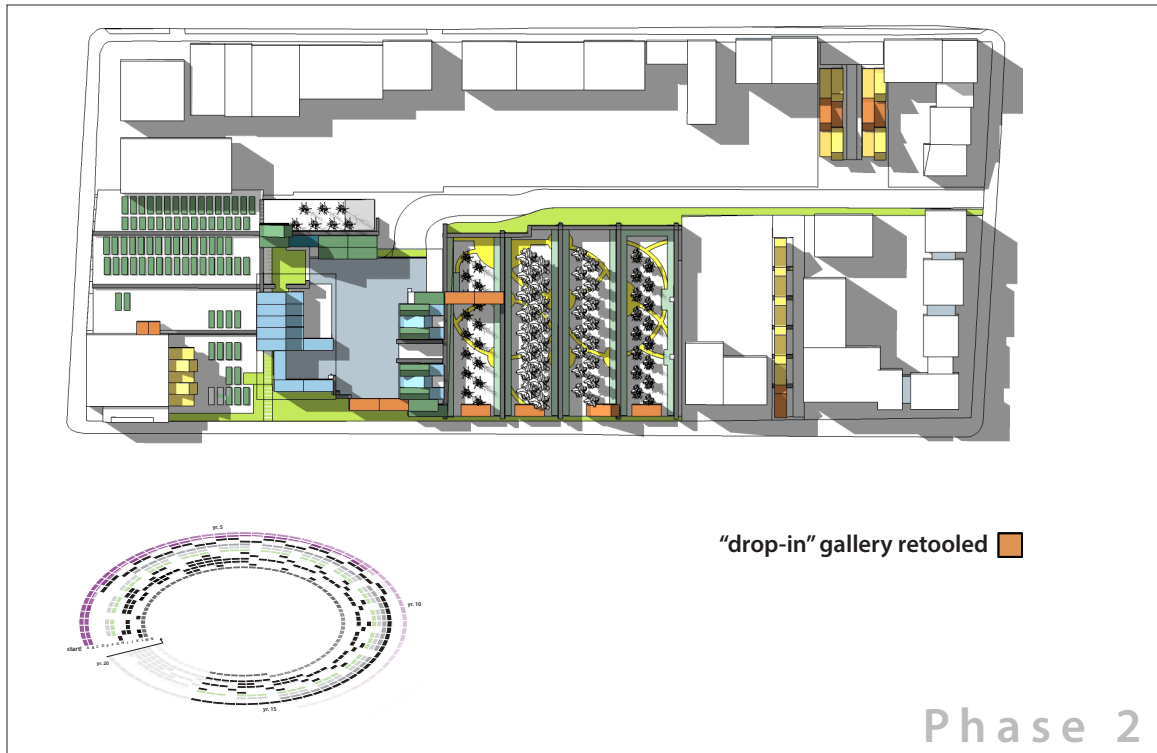
Containers housing mixed commercial spaces such as small retail shops or food "trucks" are placed along the street front, with opportunity for "drop-in" galleries on top of the walls.



Two 40' containers placed as a temporary gallery across 3 sections of wall with walking paths below.



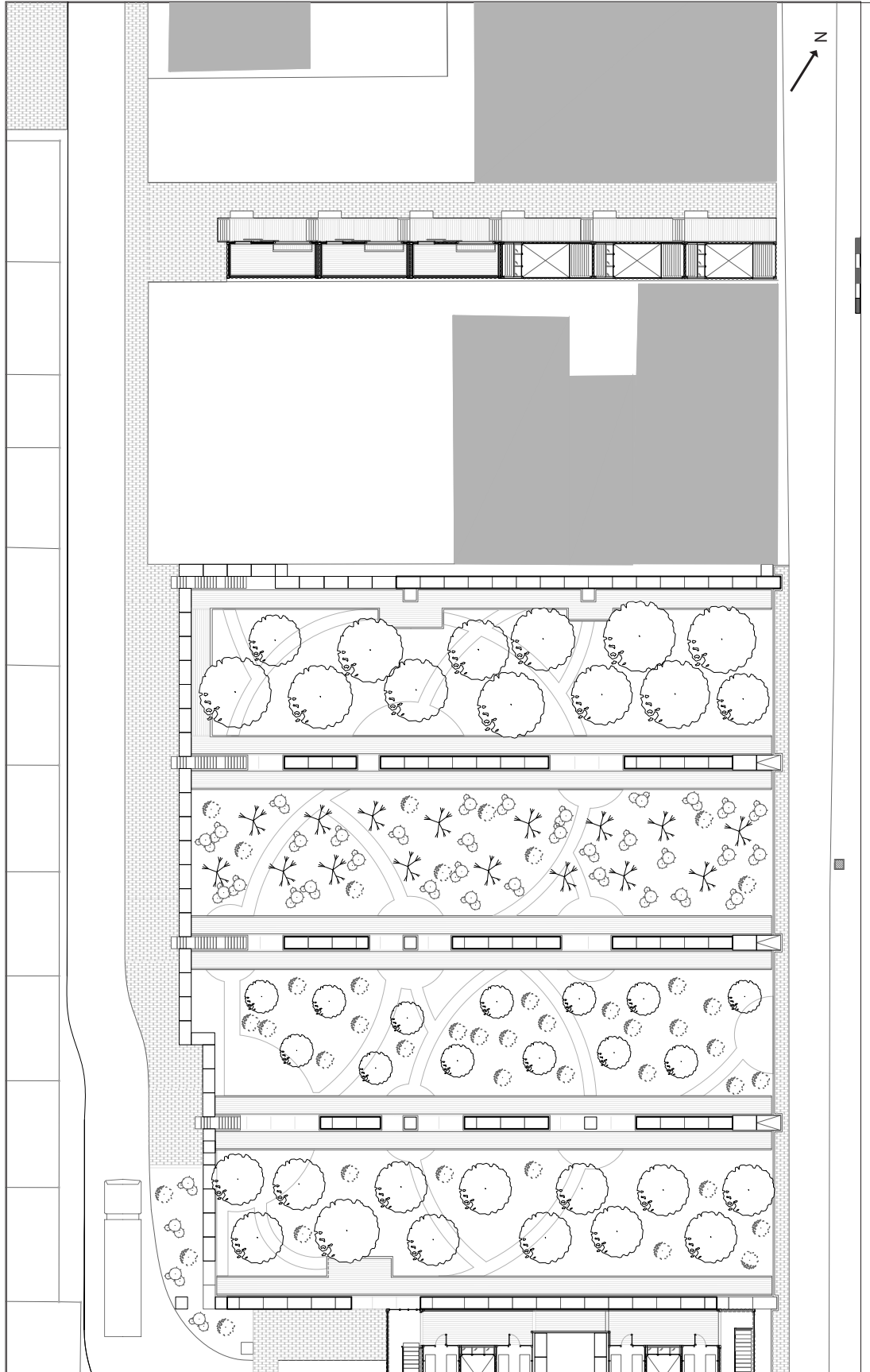
"Drop-in" gallery is removed to be remodelled and fit with a new exhibit.



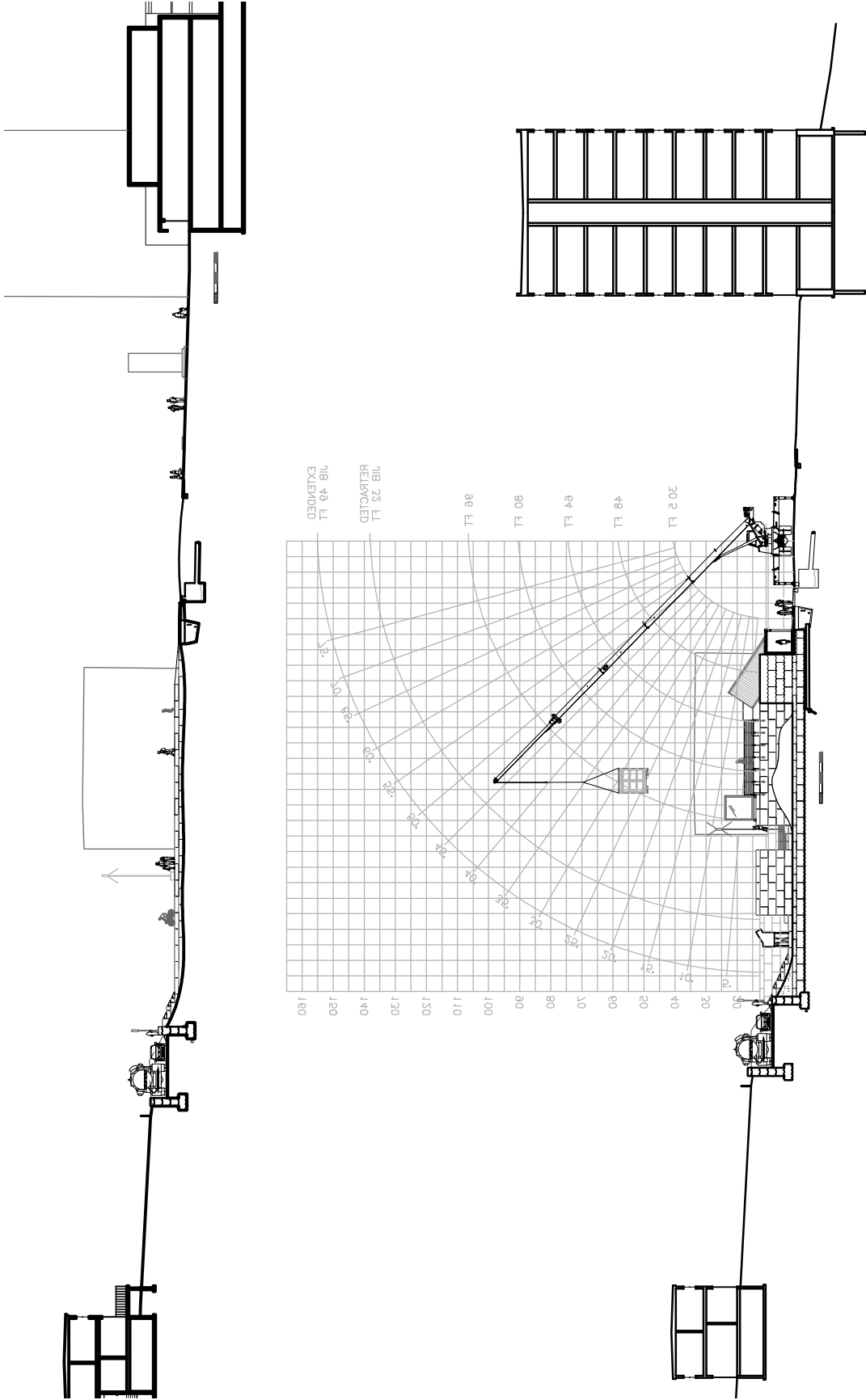
"Drop-in" gallery is retooled and placed over a new section of the curative garden.

Plans and Sections

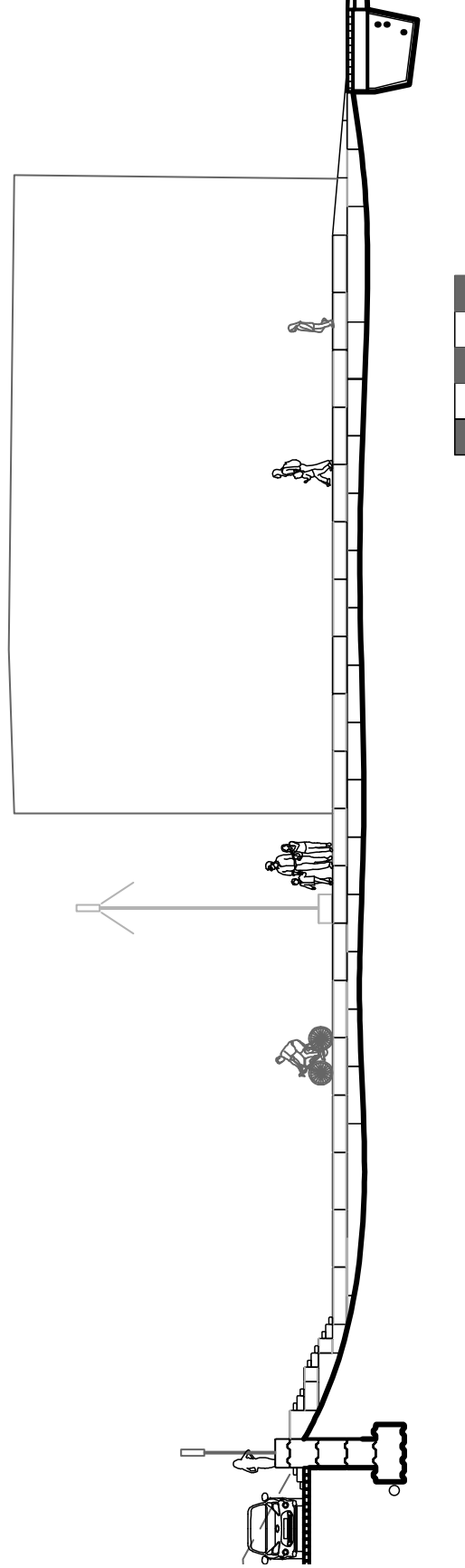
Phase 2 continues for another 9 years and potentially longer depending on the effectiveness of remediation efforts. The following figures represent the detailed drawings showing the formal arrangement, configuration, assembly and articulation of the curative garden spaces at different points in time.



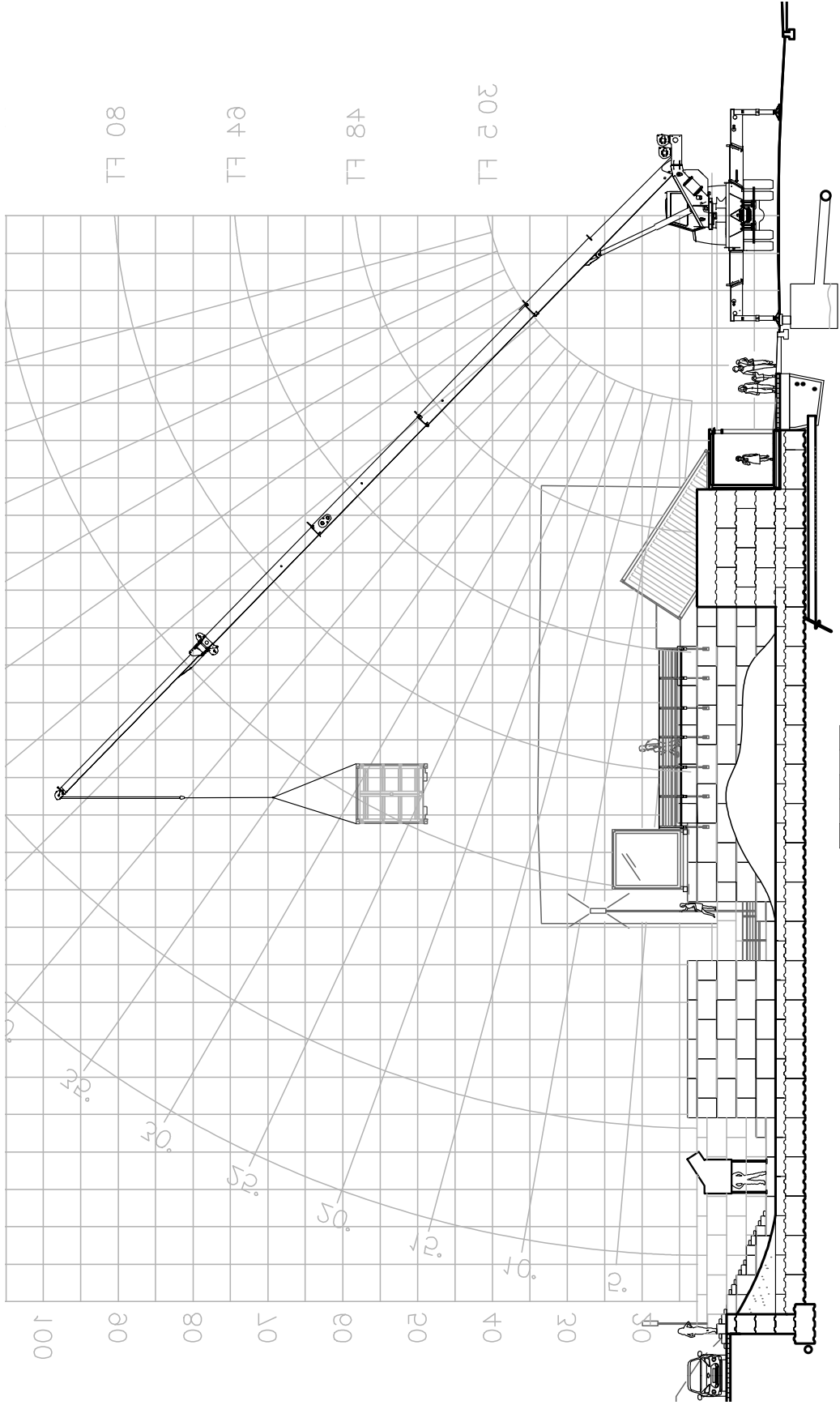
Site plan focused on the Curative Garden.



Two Sections cut East-West through the site of the curative garden. The upper section 4 shows an earlier development in phase 1, while the lower section 5 shows a late phase 2 development. Both are subsequently enlarged.



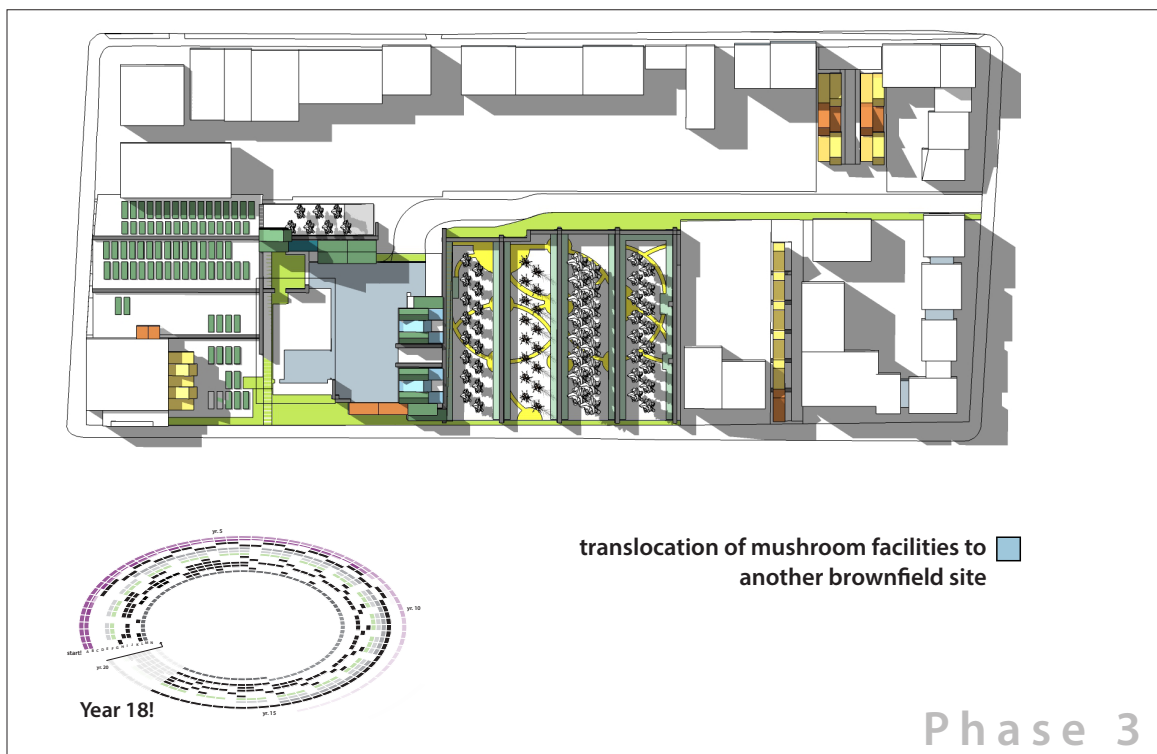
East-West section 4 through curative garden showing basic paths along the primary siphon channels.



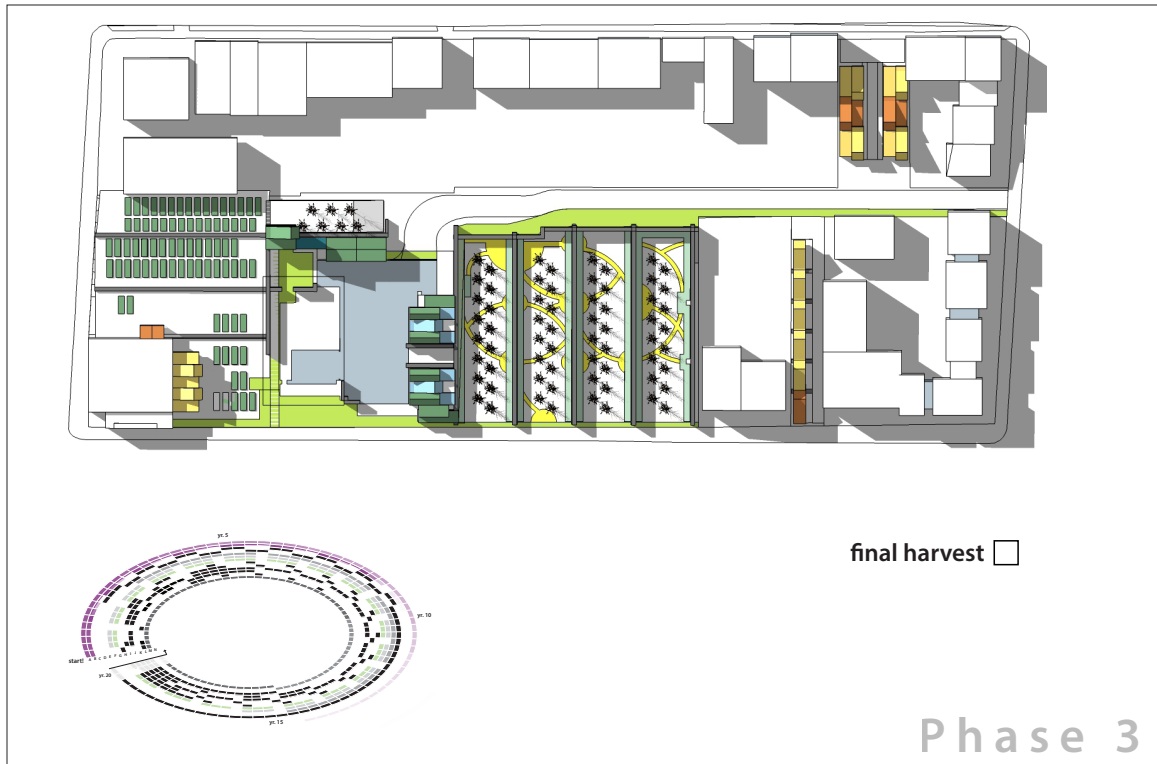
East-West section 5 through curative garden showing late stage phase 2 development

Phase 3: Dissipation and Return to Fallow Landscape

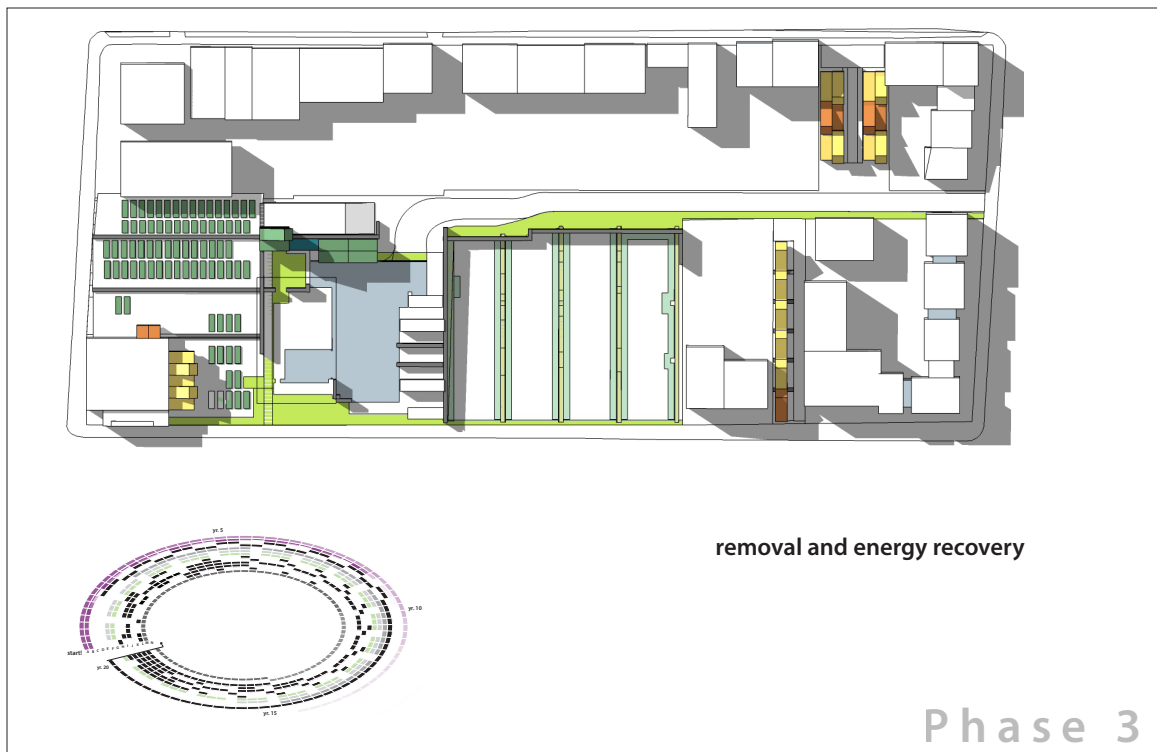
In the final phase of the project the landscape is remediated. The temporary site lease ends and the architecture dissipates, moving off site to be upgraded and moved to another brownfield location. The final harvests of the curative gardens are undertaken and the last plant material is sent to the biomass facility for disposal. New community metabolisms will need to be established or put towards similar ongoing projects. The built up soils are made available to new urban agriculture initiatives or used on the site conceived in a new manner. Potentially, some of the commercial space remains, establishing linear avenues up into the site and connecting to Gerrish Lane. The retaining walls that formed the landscape can also remain forming a solid basis for future development at a spacing and dimension that fits the existing surrounding developments. These can of course also be removed and the blocks reused in other industrial facilities. At this future time there will be further advances in city supported urban agriculture, and the knowledge and networks established will contribute to new programs.



Mushroom farm facilities are dismantled and moved to a new location.



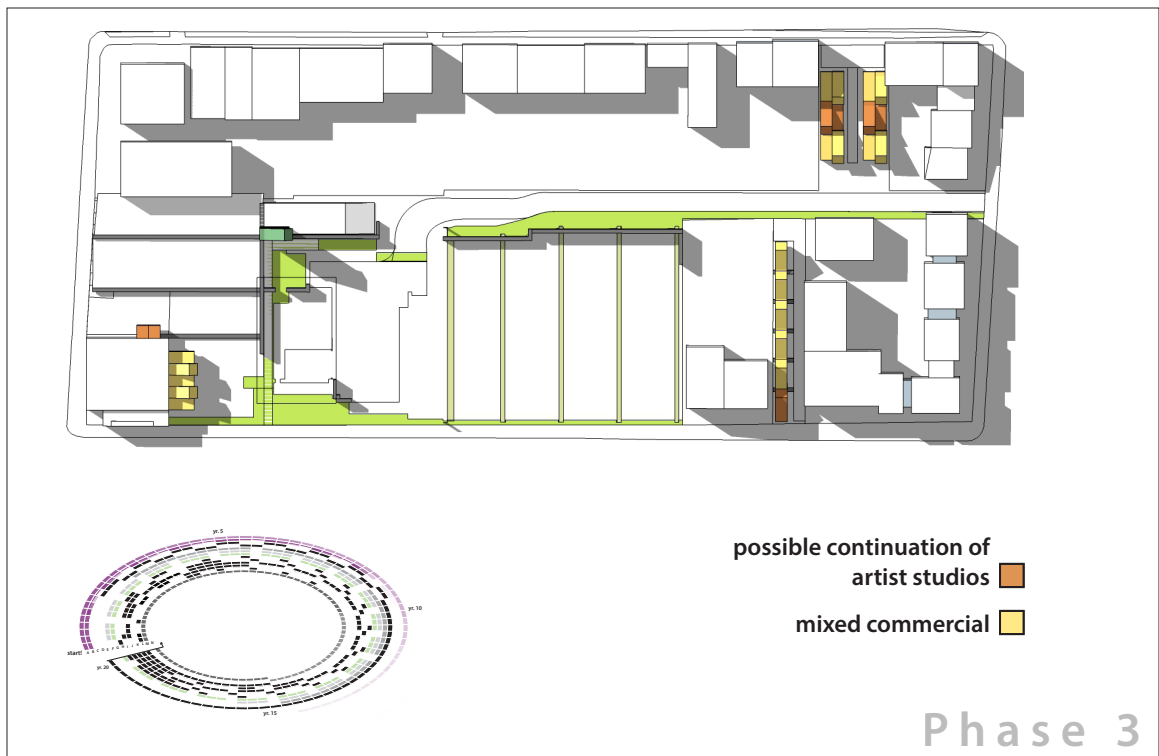
All remediating plant material is harvested to remove the last of the contaminated material from the site.



Gardens are cleared and superfluous walls and paths are dismantled to be used in other projects or recycled.



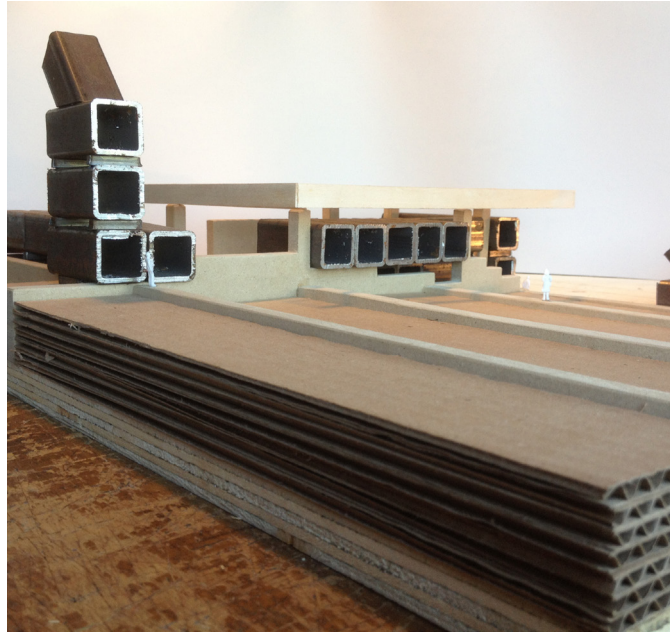
Further clearing of site.



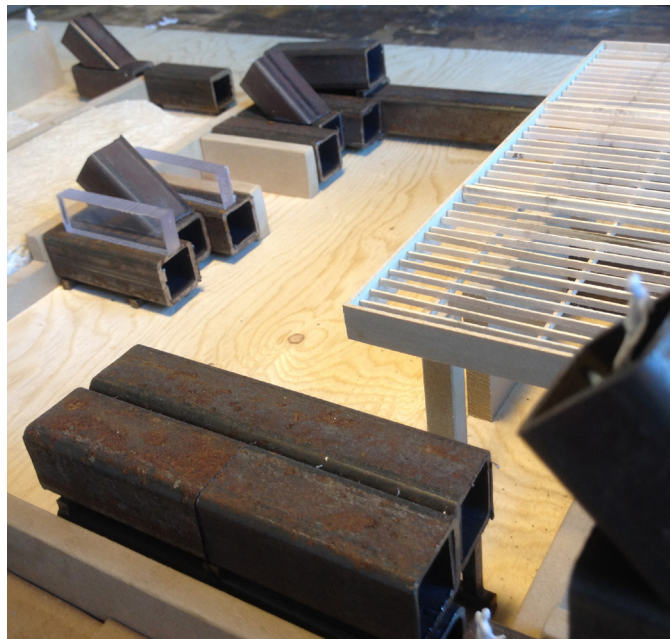
Some remnants of the project can remain, but will be negotiated between the community, present owners and plans for further development of the site.

Additional Project Representation

A diagrammatic model was produced representing the fully functional Hub. Select images of the model are seen below.



View from Cunard St. looking at the Yolo 2.0 and Hub



View from the Yolo 2.0 overlooking the mushroom farm yard, fruiting houses and curative garden beyond.



View along Gottingen St. looking West.

CHAPTER 3: CONCLUSION

Model was used as a schematic and design development device. It was a useful visualization tool but had limitations in speed and graphic output. Improved photo studio conditions would have eased the process, along with a fixed rig to take consistent photographs. Eventually the need to switch to drawings exclusively negated the usefulness of the sketch model to produce consistent finished work.

A number of critiques of the architectural outcomes can be made. The use of heavy blocks and containers creates an industrial aesthetic. This was intentional as an expression of the antithesis to the industries that are usually responsible for contaminated landscapes. The challenge was to compose these materials in a way suitable to an urban neighbourhood at a person scale. The “heavy” architecture is also juxtaposed with the desire for organic gardens and a central use of mushrooms, which creates opportunity for a more biophyllic architecture. Instead simple devices articulating containers hovering on the ground, and an exposed structure roof with many ribs/joists was utilized, rather than an overt reflection of nature or biomorphism. The design of the curative garden was emphasized as a means of creating urban moments in “natural” settings as well as other moments for quiet and observance of the day. There are currently major advances in the literal growth of new construction materials using mycelium. These are being developed for insulation and building blocks. Others have successfully 3-D printed a mycelium infused substrate, allowing mushrooms to fuse a final product together. Insulation molded to the irregular interior surface of containers could prove to be very effective and ultimately biodegradable. There are a number of additional material studies that could further this exploration.

At an urban scale, the chosen site (like many similar sites) exist in gentrifying neighbourhoods. Further study could anticipate the changing surrounding conditions further. This project leaves the remnant retaining walls at a spacing similar to the neighbouring lots, but a projection of future developments could help in visualizing a future city and the infrastructural requirements that it may need. This becomes

an exercise in speculation, where as this project attempted to initiate a remediation process that could start today, or 20 years ago, when the site first became vacant. The curative gardens could be expanded to other areas of the site and neighbourhood creating greater unification on a whole. Further development of the “spore” pavilions could illustrate this on a city scale.

There is also opportunity to use the design device of the nodes to also create something more lasting. For example, if the nodes were planted tree saplings, they would be mature trees at the conclusion of the remediation project. Or perhaps a larger piece of infrastructure that supports ecological services and part of a speculative future development or mega structure. The final removal of the curative garden is a bitter-sweet event. There is the potential to successively plant other gardens or orchards as the project winds down, leaving another temporary planting that has more urban use in the interim.

The most pertinent opportunity explored in this project is the ongoing consideration of how we place our human settlements in the landscape. To consider, what an urban landscape is, how it does or does not differ from any other rural, or industrial development and the opportunity for architecture to embrace and support diverse urban ecologies. This is an endeavour that is as much about creating the synergies needed for efficient use of our resources as it is in creating the networks of people, businesses, conscious consumers and communities that will continue to develop our culture and habitats.

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