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Firstly I would like to thank my supervisor, Chris McDonald for his broad knowledge and understanding of architecture and the public realm.

Thank you to my classmates for constant enjoyment this year, and the last four.

Finally to my family for their constant support and my older sister Kimmy for her encouragement.
As global markets, big box retail and online outlets increasingly dominate the consumption domain, activity and street life of traditional suburban centres suffer. Social engagement is key to a high quality public realm. As social and community based functions, are stripped away from traditional centres, re-introducing production space to compensate for the loss of other functions from the street can offer an opportunity for public space regeneration.

Through design this thesis explores how the factory, focused on a new industry based on a cleaner, small-scale, digital and flexible manufacturing processes, can programatically reassert its relevance in the urban context of cities today. The research tests how architecture can enhance new production spaces and future factories so they contribute to a high quality public realm in suburban centres.

A systematic approach to the research begins with a Literature Review, establishing criteria for high quality public space and to assess the findings of the research. A Precedent Case Study then informs a series of New Production Space Types which are used to generate generic strategies for Design Exploration.

The case study is sited in Newtown, an old inner-city suburban centre undergoing retail decline. The design exploration includes Urban Design Frameworks and a more detailed investigation of three retail based sites.

The Urban Design intervention limits the level of resolved design solutions for each site, however design exploration at different scaled sites proves production space can provide a level of regeneration to the public realm in relation to the location of the development within the centre.

Regeneration was achieved by maximising visibility and proximity between production processes and established public space, at times suggesting a merging of the two realms.

The range of redundant retail sites on offer meant that the spatial requirements of New Production could be readily accommodated.

Exploration through vertical separation of material/components and architectural treatment of street frontages is likely to incur additional cost in relation to conventional production environments.
Fig 1.02. Digital robotic production
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CHAPTER 1.0 INTRODUCTION

1.1 RESEARCH QUESTION

1.2 ISSUE

1.3 SOLUTION

1.4 RESEARCH OBJECTIVE

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1.6 CASE STUDY
1.1 RESEARCH QUESTION:

How can the re-introduction of industrial production space to suburban centres regenerate and diversify the public realm?
1.2 ISSUE: DECLINING PUBLIC REALM

Streetscapes of suburban centres traditionally provided a diverse variety of activities and business such as production, consumption and trade. These activities took place side by side on city streets, creating a vibrant monopoly within the public realm (fig 1.03).

Urban Designer and Architect Jan Gehl suggests a majority of the 20th century city planning has focused on functional efficiency in conjunction with the automobile and improvements towards public health (Gehl, 41). Land zoning, density controls and an expectation for almost unlimited personal mobility have caused the spheres of production, consumption and residence to become increasingly isolated from each other. Manufacturing industries were pushed out of inner city suburbs due to pollution and cheaper land/labour elsewhere, while technology and office development transitioned work away from the immediate public realm of the streetscape.

Sociologist Richard Sennett argues the result of this process is a decline of activity within the public realm through a loss of physical and visual human contact with work. Neighbourhood centres have been left to rely heavily on the activities of shopping and consumption for social engagement and the vitality of the public realm (Sennett and Bason, 5).

Small retail businesses make an important contribution to the public realm of older suburban centres (Gomez, Iskov and Samanski, 35). Specialty shops and their owners are enthusiastic supporters of social engagement and place based community identity.

The transformation of consumption and shopping behaviour over the past 50 years however has weakened this social structure and threatens to damage the place-based identity of neighbourhood centres (fig 1.04).

The development of online shopping and big-box retail have caused further decline in traditional “high street” shopping. This poses another threat to the vitality of suburban centres.

![Fig 1.03. Traditional 14th century streetscape promoting a variety of public functions and activity.](https://www.thinglink.com/scene/620387738331381762)

![Fig 1.04. Existing 21st century streetscape of a declining suburban centre, promoting a less vibrant public realm.](https://www.thinglink.com/scene/620387738331381762)
1.3 SOLUTION: URBAN PRODUCTION

The separation of work and production from inner city centres has contributed to a decline of vibrant public space. This decline has prompted growing concern by health organisations, Psychologists and Government Bodies, over the mental state and wellbeing of the public realm (Chapman, Sennett, WHO np).

Production space has recently been re-introduced into the public realm of cities through the form of urban agriculture and food production. This phenomenon has been widely accepted and developed at different scales through residential/community projects, roof top gardens and hydroponics within advanced high rise building structures (fig 6).

Technological advancement in digital manufacturing processes since the 20th century provide further opportunity for new work environments to emerge within the public realm.

The mitigation of pollution, health, danger and noise defects associated with traditional industrial manufacturing activity now create a more attractive industry. The emergence of new small-scale manufacturing systems, advanced communications and ‘on demand’ material and product supply’s have reduced the need for bulk storage and inventory, providing an opportunity to re-introduce a smaller scaled manufacturing space back into urban environments.

With a focus on small-scale localised production, activation of public space and architectural intervention, this new form of digital manufacturing could be implemented as a gentrification and regeneration strategy for the public realm.

Fig 1. 05. Urban agriculture intervention promoting community development of redundant spaces.

Fig 1. 06. Vertical urban Agriculture promoting localised production.

Fig 1. 07. Combination of traditional manual labour and digital manufacturing process.

Fig 1. 08. Customizable, 3D printing robotic arm.
1.4 RESEARCH OBJECTIVE:

The purpose of this thesis research is to explore the re-introduction of production space to suburban centres as a strategy for developing a high quality public realm and mitigating the effects of retail decline.

To this end the thesis aims to assess the urban and architectural implications of re-introducing production facilities and optimising their relationship with the public realm.

The conceptual framework diagram illustrates the effects of retail decline on public street scape activity, and value of re-introducing production space to centres:

- **Early 20th C.** (Fig 1.09) Consumption space presents a major public streetscape activity while production space remains private.

- **Late 20th/21st C.** (Fig 1.10) A shrinkage of consumption space as a public streetscape activity through the development of more convenient forms of consumption throughout the 20th and 21st c. Production space still remains private.

- **21st C.** (Fig 1.11) Opportunity to increase public streetscape activity by introducing production space as a social and economic function to public realm.

1.5 METHODOLOGY:

This thesis follows a design based research process (Fig 12, page 7).

The Introduction outlines the research topic and solution, which is further explored through the literature review.

Design Assessment Criteria emerge from the Literature Review, outlining requirements for the development of high quality public space and new production spaces. Criteria are also used to help define projects for the Precedent Study in Chapter 3 and evaluate design tests later in the research.

Projects from the Precedent Study will also be analyzed to discover design strategies for later experimental design phase. The assessment criteria and design strategies are separated within two categories:

1. High quality public realm
2. New production space

The research topic will then be explored in Design Phase 1 (fig 12, page 7) through the development of ‘New Production Space Types’. These ‘Types’ are the product of design strategies identified earlier in the precedent study of the research. New Production spaces will be tested within the Design Case Study at both an urban and architectural scale.
The urban scale is explored in Design Phase 3 through a series of Urban Design Framework options. The integration of production space ‘Types’ into the public realm is tested under two major design options illustrated in (fig 12, page 7).

Option 1:
Strengthen the existing public realm.

Option 2:
Re-development of a new production based public realm.

These frameworks are evaluated in terms of their ability to strengthen and sustain the public realm.

Detailed design of initial framework explorations, informed by Assessment Criteria analysis, will define a Final Framework Design. This Framework is then developed into an Urban Master Plan in Design Phase 4 (fig 12, page 8).

Selected sites within the Master Plan are further developed at different architectural scales in Design Phase 5 and 6 to test the relationship between ‘New Production Space Types’ and the public realm.

1.6 CASE STUDY: NEWTOWN

Established in the late 1800’s, the suburb of Newtown once provided a diverse range of manufacturing and consumption functions. Over the past decade, like many other old suburban centres in New Zealand, the suburb has been stripped of the majority of manufacturing businesses leaving the public realm reliant on consumption activities.

The heritage centre of Newtown, lined with traditional high street retail, inhabits a successful variety of hospitality and performance businesses. These functions give Newtown its name and recognition as a creative, unique place. There has been however a noticeable decline in successful retail and consumption business, leaving an abundance of vacant and rundown sites throughout the suburb’s centre. As small scale retail declines, the quality of public space within the centre suffers.

Fig 1.12. Late 18th century streetscape in Newtown emphasizing a vibrant suburban centre, in contrast to the existing 21st century streetscape highly vehicle dominated streetscape.
RESEARCH PROCESS:

Phase A: 
Literature Review

Assessment Criteria

Phase B: 
Precedent study

Urban Design Strategies

Architecture Design Strategies

DESIGN PROCESS:

Design Phase 1:
New Production Space Types

Vertical Factory

Event Space

Innovation Floor

Hybrid

Design Phase 2:
Case Study Analysis

Fig 12

Fig 1.13.
Option 1:

Option 2:

Design Phase 3: Urban Design Framework Options W

Design Phase 4: Developed Urban Masterplan

Design Phase 5: Architectural Site Selection

Design Phase 6: Architectural Design Exploration
CHAPTER 2.0 LITERATURE REVIEW

The literature review presents the issue of declining high quality public space in urban environments. The chapter analyzes examples of urban change in city planning and explores the impact of good urban design on the public realm.

The concept of high amenity, mixed use spaces are presented as a solution to achieve both socially and economically vibrant public spaces. A brief discovery into the transformation of production based industries into safer, smaller-scale and sustainable activities focuses the research on production spaces. The re-introduction of production space to cities, with a focus on new digital manufacturing processes, is explored and presented as a regeneration strategy for the development of high quality public spaces.

The literature is analysed and used to develop a set of assessment criteria for evaluating public space. These criteria inform the precedent study and later provide a basis for assessing design experiments.

Fig 2.01. Suburban centre vacant of high street shopping and pedestrian traffic.

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2.1 CONTINUED IMPORTANCE OF THE PUBLIC REALM:

The terms ‘public’ and ‘public realm’ are described by scholars today in terms of cultural constructs and their relationship to the built environment of modern cities.

Landscape Associate Professor Jeffrey Hou and Social Theorist Iris Marion Young define the public realm as “a collection of public spaces within cities...for a diverse range of cultural, social, political and economic exchanges to arise and converge” (Hou, 2), (Young, 3). Over the past 100 years the public realm has gradually been stripped of many external public functions and activities and heavily dominated by vehicle infrastructure, becoming increasingly reliant on consumption space for vitality and human exchange.

Political geographer Mitchell Don states that “…in a world defined by private property it becomes increasing hard to create a public realm which is inclusive and engages with a variety of cultures and societies” (Don, 34). This statement suggests two ideas, privatization and the conflict this has had on the diversity of activity within the public realm.

Don’s idea of continued architectural privatization of the public realm refers to the development of safe and easily accessible consumption spaces such as shopping malls and big box retail sectors. These developments have gradually threatened the survival of existing small scale local retail business.

Retail and small business activities contribute diverse social and economic exchange and used to provide a sense of place-based identity within suburban centres. However, as the transition to different systems of consumption have progressed into the 21st century, traditional retail models no longer provide a reliable source of social engagement within suburban centres.

Although traditional ‘high street’ retail may be suffering, consumption space is still integrated into other parts of the built environment. Sennet refers to this integration as “…taking consumption to the consumer...” (Sennet,9). These consumption spaces occur within service-based functions such as petrol stations, airports, railway stations and hospitals etc. This further migration of retailing away from traditional ‘high street’ shopping has stripped suburban retail centres of remaining vitality.

Social elements of the public realm should be considered important to ensure a well balanced variety of activities are accessible to the public. With an evident privatisation of public space in modern urbanism, and a decline in traditional retail and small business functions, alternative functions should be re-introduced to increase the vitality of the public realm.

Fig 2.02. Yan Gehl Human Contact diagram
Urban designer Yan Gehl has studied the importance and quality of life provided by the public realm of urban environments since the 1970’s. Gehl argues that personal wellbeing, both physical and mental, relies upon 3 key elements:

- Nutrition
- Exercise
- Human contact.

On this last point human contact can be more broadly associated with social engagement and a sense of belonging and identity, both of which depend on the condition of the public realm (Gehl, 17).

The public realm should therefore produce opportunities for social engagement associated with the daily activities we encounter within public space. These opportunities come in the form of “...see and hear contacts...” (Gehl, 17). These ‘contacts’ can be experienced at different levels of intensity (see fig 13).

Gehl’s research and observations suggest that people and human activity are the most prominent sources of interest and the prime subjects of attention within cities. Developing this idea, Gehl argues that “Life in and between buildings... ranks as more essential and more relevant than the spaces and buildings themselves” (Gehl, 31). Gehl suggests that even the most simple forms of contact experienced at a low intensity such as the ‘sees and hears’ appear to offer more rewarding experiences to people than other attractions within public spaces.

Gehl suggests the most effective way then to design cities with a high quality public realm for people is through a process of:

1. Identifying life, through people and activity,
2. Providing adequate open space is available for the range of activities
3. Creating a built environment which supports these open spaces (fig 14).

City planning of the past 50 years has progressively been orientated towards vehicle accessibility, reducing slow moving and pedestrian oriented urban space, limiting opportunity for human contact experiences. Fig 15 illustrates a recommended threshold for “human scale” engagement between buildings and surrounding open space (Gehl, 24).

Gehl’s understanding of the public realm through scale, open space, people and activity provide a conceptual basis that good urban design can provide a response to the need for on-going healthy public space.

Fig 2.03. Human Contact Intensity Diagram, Yan Gehl, illustrating how different levels of contact can be experienced within the public streetscape.

Fig 2.04. Life Between Buildings diagram, Yan Gehl, illustrating a process for designing a high quality public realm.
2.3 CITY PLANNING/PUBLIC ZONING

Ideologies from the renaissance and functionalist eras of the 18th and 19th century provide foundations for the development of modern cities. Architect Yan Gehl argues that these ideologies have pulled away from the medieval, organic city which develops slowly with a natural regard for the quality of the public realm (fig 15).

Replacing medieval organic growth, formalism from the renaissance era, and functionalism of the 19th and 20th centuries, employed a focus on the geometric aesthetic of the city scape, and advances in medical knowledge and transportation efficiency (fig 17).

Although the ideals of health and functionality were recognised as an alternative away from unhealthy industry and over populated residential fabric, the introduction of land zoning, transport infrastructure, and multi-storey construction paid no attention to social environments (fig 17). It was not recognised that buildings themselves had a direct impact on the quality of the public realm (Gehl, 46).

The functional and technical city planning approach allowed greater accessibility and communication, reducing the desired need for a diverse, close-knit social, industrial and economic urban fabric. The development of land zoning principles and transportation have caused a separation of activities especially production and consumption. Production industry and factories left cities due to pollution issues and cheaper land/labour elsewhere (fig 16).

Development of global trade removed the process of production from our daily lives. This has reduced the variety of daily activities within the public realm of centres leaving it increasingly reliant on shopping.

Over the past 100 years technological advancements in communication and computation have created a new modern work environment. The majority of physical work from the production industry was replaced by office work within high density buildings, which have little if any interaction with the public realm.

The fulfilment of social and creative desires therefore has to occur through a different range of outlets, such as consumption or entertainment services (Gehl, 52). This statement reinforces the idea that social engagement within cities has become heavily dependant on consumption activities over the past decade.

The re-introduction of production space to the public realm of urban centres offers another opportunity for social and economic activity.
2.4 THREATS TO RETAIL

Through 19th and 20th century city development, the primary occupation of cities changed from industrial production work to virtual, office based work and consumption. Office work has transitioned away from the public street level through multi-storey building construction and urban densification, leaving consumption space as the major outlet for social engagement within the public realm as the street.

New outlets for consumption such as big-box retail sectors and shopping malls have created substitute public shopping spaces through a privatised internal public realm, which philosopher Benjamin R. Barber argues have turned the somewhat “…complex, multifunctional public space into a one-dimensional venue for consumption” (Barber, 203).

Urban Theorist Mike Davis suggests the transformation of public space to “...new mega-centres and supermalls have supplanted traditional streets and disciplined their spontaneity” (Davis, 155). Davis argues this has had negative effects on traditional suburban retail which now struggles to maintain and compete with the consumer market.

The Brent Cross was one of the first shopping centre developments to be built, in Britain in 1979. More recently it has been joined by larger scaled shopping centres such as Merry Hill, Meadow Hall and Lakeside. Daniel Miller accuses these centres of destroying the “…Old English High Street, wreaking the environment and replacing freely accessible public spaces with sanitised and tightly patrolled private space, shopping centres…” (Miller, viii). The fall of retail from the external public realm and the decline in vibrant, interactive streets have caused concern amongst contemporary Architects, Urban Designers, Psychologists, Philosophers and many more. The conventional accessibility to drive and park freely, along with the financial success of shopping centres, has encourage their constant development through to the 21st century.

The rapid development of technology and international globalization throughout the 21st century has created an entirely new form of consumption through a ‘virtual’ realm. Recent examples consist of catalogue/online shopping and progressive research into delivery drone transportation, now threaten the stability of existing physical realms of consumption.

Although technology has helped to connect people and expand businesses, it has somewhat loosened the importance of connectivity between people and place, having the potential to further weaken opportunities of engagement within the public realm.

Fig 2.08. Brent Cross shopping mall, a masterpiece of 20th century retail design, now struggles to compete with online retail 30 years later.

Fig 2.09. and Fig 2.10. Online shopping and efficient delivery systems have reduced the need for retail as a convenient consumption mechanism.
PRODUCTION SPACE

The Literature Review now focuses on the re-introduction of production space to cities as a regeneration strategy for the development of a high quality public realm.
2.5 REGENERATION: MIXED USE

During the last quarter of the 21st century, there was a move away from modern land use zoning. In nodal locations mono-functional typology zoning was replaced by the concept of mixed-use typology development. This substitution has become so widespread that the mixed-use model now dictates conventional practice for today’s designers and developers.

Some of the first mixed-use developments were introduced during the late 17th and early 18th centuries (see fig.). Although industry has been considered unhealthy and undesirable since the mid-18th century, there are examples of British industrial neighbourhoods, which successfully integrate industrial production, housing and a healthy high quality public realm.

David Dale’s Cotton Mills (River Clyde, 1800) The Cadbury Brothers Cocoa and chocolate factory (Bournville, 1879) and William Lever’s Port Sunlight soap factory (Warrington, 1888) were all designed to improve the environment and contribution to the welfare of workers. These objectives were only partly altruistic however, since the model villages were meant to increase productivity and deliver a stable, contented work force.

As mixed use development has become common practice, and with the growing concern of a diminishing quality of life within the public realm of old suburban centers, there is a new interest in regeneration strategies that re-integrate work as part of the public realm in order to create more diverse and interactive public places.

The re-integration of food and agriculture production space into urban centers is an increasingly popular topic for research and discussion especially in America and the U.K (ref). There is evidence to show the continued importance of production space within cities, through its contribution to social regeneration and economic and environmental sustainability (ref).

The introduction of artisan food production has also become a feature of gentrification and regeneration. The merging of consumption and production spaces presents a new and engaging experience to the public realm through the spectacle and interaction with the production process.
2.6 URBAN MANUFACTURING

Issues previously associated with industrial manufacturing such as noise, danger and pollution have been mitigated through technological advancements throughout the 21st century (Fern, 20). Mitigation has arguably occurred to such an extent that the manufacturing industry is now arguably no more troublesome than supermarket and hospitality industries.

Architectural historian Nina Rappaport outlines a new ‘manufacturing paradigm’ with a focus on localized, small-scale, digital production and customization (Rappaport, 236). Rappaport predicts that as the employment rate of traditional unskilled workers continues to decrease, due to the development of robotics, a new form of work associated with making and creating, rather than monotonous labour, shall emerge. The shrinkage and flexibility of new digital manufacturing machinery can promote a change in scale from globalized mass production to small-scale localized urban production, contributing to a diverse, social and economically engaging public realm.

Rappaport’s research focuses on 3 key ideas for introducing manufacturing space into cities.

1. Small-scale Localized Production

Small-scale localized production promotes sustainability and innovation through increased small business development, shortened supply chains, reduced transport emissions and energy consumption, increased economic employment opportunity (Rappaport, 435). New manufacturing systems are also used as research and prototyping mechanisms for companies, combining production and research spaces (Ref precedent research future factory).

Rappaport also suggests the clustering of production spaces, with the implementation of new energy recycling technology, as an ‘urban industrial symbiosis’ to develop sustainable and resilient cities (Rappaport, 453). This development of an urban ecological system focuses on transforming waste energy and material from factories and re-using to support local business and residential areas (fig 24).

2. Vertical Factory

The spatial vertical factory typology has been analyzed and recommended by Rappaport as an efficient solution for re-introducing the capacity of factories into cities to conserve land and cost (Rappaport, 437). Examples are later shown in, Chapter 3 outlining precedents from the past and new strategies for re-introducing factories into cities.
Experience and Human engagement (contributes diversity to public realm)

The focus of the research is to diversify functions and increase activity within the public realm. Rappaport suggests a key concept for the future factory must focus on transparency and shared space between public and private realms (Rappaport, 438). This contrasts with the majority of industrial work places of the 18th and early 19th century where people had little choice but to work in undesirable industrial conditions.

Potentially the production process can contribute to the public realm by providing;

1. **ENGAGEMENT**: Increase diversity and activity in the public street, including ‘hybrids’ which merge consumption and production spaces, and promote the spectacle of production (fig 26).

2. **EXPERIENCE**: Enhances the value placed on the worker and craft through more immediate relationship between producer and consumer (fig 27).

3. **HI-TEC**: Small-scale, clean manufacturing processes with flexible outputs and extreme customization which integrates the consumer with the production process (fig 28).

4. **WORKER EQUITY**: Exposes unethical labour and manufacturing practice, promoting ethical labour.

The re-introduction of manufacturing space to the public realm faces the issues of available uncontested urban land space and the potential for reduced efficiency within manufacturing and distribution processes, that must serve a high quality public realm.

Provision of centrally located production space within cities however is heavily contested by the growing demand for housing and the restriction of land zoning principles associated with proximity of industry and residential areas (The industrious city, 16).

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Fig 2.14. Examples of new digital manufacturing companies integrating within the urban environment with shared amenity and infrastructure to increase vitality and diversity within the public realm.

Fig 2.15. Small-scale, energy efficient robotic manufacturing technology.

Fig 2.16. ENGAGEMENT: Hybrid production/consumption Earphone factory ‘Normal’, New York.

Fig 2.17. EXPERIENCE: VW Transparent automotive factory, Dresden.

Fig 2.18. HI-TEC: 3D printed aluminium electric motorbikes by AP Works.
2.7 ASSESSMENT CRITERIA:

A list of criteria for the development of a high quality public realm and the re-introduction of a new production space within urban centres have developed from the literature review.

The criteria are set into two separate categories to help inform the selection of precedents and ensure they respond to the issues of both a declining public realm at an urban scale, and the importance of architectural treatment to the new production space in order to enhance the streetscape and public realm.

HIGH QUALITY PUBLIC REALM:

DIVERSITY:
Opportunity for a variety of social, cultural and economic exchange.

LEGIBILITY:
Strengthen connectivity for all demographics to access activities and amenities within the existing public realm.

PEDESTRIAN ORIENTATION:
Provide sensory and climatic experience through both destination and spontaneous spaces.

VISUAL AESTHETIC:
Built environment should express visual interest at multiple scales from the public streetscape.

HUMAN SCALE:
Built environment should respond to public space to provide opportunity for planned and unplanned human contact.

SAFETY:
Protection against traffic, climatic and negative sensory experiences.

LOCAL IDENTITY:
Build community and provide a sense of place based identity for people.

NEW PRODUCTION SPACE:

REGENERATION:
Strengthen, not detract from, redundant sites within the existing public realm.

PUBLIC ENGAGEMENT:
Provide opportunity for visual and physical public contact, exposing manufacturing process, authenticity of product and worker equity.

EFFICIENCY:
Manufacturing processes must function efficiently and safely within close proximity of public space.

CULTURE/CONTEXT:
Production space must consider local character and aesthetic context.

SUSTAINABILITY:
Design concepts mitigate pollution and energy waste from production and associated distribution, through integration with existing amenities and infrastructure systems.

FEASIBILITY:
The extent to which production space develops from a 'decorated shed' to a piece of bespoke architecture.
2.8 LITERATURE REVIEW SUMMARY:

The literature review has outlined a number of issues associated with the declining public realm. Regeneration strategies such as mixed-use development now include the re-introduction of production space into the public realm. Urban food and agriculture production are widely accepted, and now a new movement for manufacturing is emerging.

Key ideas for re-introducing production space to cities provide a conceptual framework for further research design:

1. Small-scale Localized Production
2. Vertical Factory
3. Human Engagement and Experience

Changes to the nature of manufacturing processes provide an opportunity to merge private realms of production with public urban realms of consumption, streetscapes and open pedestrian spaces. The development of assessment criteria have also provided a basis to measure the success of new production facilities and their contribution to public space.

The emergence of modern digital production space can thrive off urbanism. The future factory doesn’t replace existing industrial complexes, but marks a new territory between scales of enterprise, manufacturing and economies. This new production based territory has the potential to reassert itself in the city, contributing to more diverse and vibrant public realm.
CHAPTER 3.0 PRECEDENT STUDY

This chapter explores the importance of architecture when production spaces successfully contribute to a high quality public realm. The chapter presents a variety of old and new precedents, demonstrating how architecture can enhance quality and experience to public space.

The study assesses the success of each precedent and its contribution to public space with a focus on street activation, programatic organisation and manufacturing and distribution systems.

The chapter introduces precedents and defines specific design strategies through diagramatic sketches and written descriptions. These strategies along with the Assessment Criteria will be used to develop a set of ‘New Production Space Types’ which will help to inform the design chapters later in the research.

STRUCTURE

3.1 REGENERATION THROUGH PRODUCTION SPACE
3.2 MODERN FACTORY
3.3 CONTEMPORARY FACTORY
3.4 FUTURE FACTORY
3.5 DISTRIBUTION AND SERVICING INFRASTRUCTURE
3.6 DESIGN STRATEGY SUMMARY DIAGRAM
3.7 NEW PRODUCTION SPACE TYPES
3.8 CHAPTER_3 SUMMARY
3.1 URBAN REGENERATION THROUGH PRODUCTION SPACE

GOLDEN WORKSHOP, BY MODULORBEAT AMBITIOUS URBANIST PLANNERS. 2012

This temporary urban intervention aims to promote local artisan craft and design through a pavilion workshop. The element of curiosity and spectacle of work have been enhanced through a symmetrical cross-form plan which draws inward looking views to the production spaces along each corridor. The installation adds diversity to the traditional square's functionality as a public space.

CONTRIBUTION TO THE PUBLIC REALM:

- DIVERSITY: Increased public space activity/performance
- ENGAGEMENT: Provides visual interaction
- VISUAL AESTHETIC: Controlled view shafts into production space create suspense and curiosity.
- HUMAN SCALE: Design responds to ground level pedestrian traffic.
- SAFETY: The production space is protected from the public realm through glass.
- LOCAL IDENTITY: Provides a physical performance and re-introduction of traditional craft/design to the public realm.

STRATEGY ANALYSIS:

1. BIG OPENING
- Provides a transparent focus point between public/external and private/internal space.
CERAMICS MARKET, OSAKA, JAPAN BY TONOMA ARCHITECTS. 2010

The project focuses on public space through the revitalization of a redundant market alleyway. Combines the functions of production and consumption space, adding economic and social exchange to the streetscape.

CONTRIBUTION TO THE PUBLIC REALM:
- DIVERSITY: Increased street scape through small business activity/performance.
- ENGAGEMENT: Provides visual and physical engagement.
- REGENERATION: Re-purposes a redundant alley way site
- VISUAL AESTHETIC: Provides a spectacle at alternative levels
- HUMAN SCALE: Design responds to ground level pedestrian traffic.
- LOCAL IDENTITY: Retains local and cultural activity of ceramic craft

STRATEGY ANALYSIS:

1. HERITAGE RETENTION
   - Revitalises redundant site, adding character and local identity.

2. PEDESTRIAN OPEN SPACE
   - Provides opportunity for human contact (see Gehl diagram, Fig 2.04-Page 12).
LEED STREET, WELLINGTON, NZ BY WELLINGTON CITY COUNCIL. 2012

Located in the central city, a 1960s shoe factory has been the focus of an urban alleyway redevelopment. Residential and vehicle infrastructure is provided, however, a clustering of artisan food production based businesses have largely contributed to the success of the laneway and the public space. The production and preparation space of food products is exposed to the laneway, creating a spectacle of the work process and increasing contact with the public.

CONTRIBUTION TO THE PUBLIC REALM:
- DIVERSITY: Increased public space through small business activity/performance.
- ENGAGEMENT: Provides visual and physical interaction between public and business.
- VISUAL AESTHETIC: Variety of view shafts through glass facades, controlled windows and raised split levels.
- HUMAN SCALE: Design responds to ground level pedestrian traffic.
- SAFETY: Still a form of hazard through shared vehical and pedestrian zones.
- LOCAL IDENTITY: Increases value and provides authenticity of product.

STRATEGY ANALYSIS:
1. HERITAGE RETENTION
2. PEDESTRIAN OPEN SPACE
3. FACADE TRANSPARENCY
   - Provides transparency between internal workspace and external public space.
4. SHARED PEDESTRIAN/VEHICLE OPEN SPACE
   - Maximises use of transport infrastructure and increases opportunity for human contact through developed landscape/hardscape.
LEED STREET, SMALL BUSINESS ARTISAN FOOD DISTRICT MAP.
THE STEEL YARD, KMGD, MORRIS BEACON DESIGN + EA ENGINEERING. 2010

A reclaimed urban industrial site, which now offers education and workspace for industrial arts and small scale manufacturing. The sites regeneration comes through retrofitted buildings and flexible landscape/hardscape spaces. In addition the site also acts as part of a greater movement of transforming redundant industry into public parks and recreation spaces.

CONTRIBUTION TO THE PUBLIC REALM:

- DIVERSITY: Increased active public space through social, economic and community activity.
- REGENERATION: Re-purposes a redundant steel yard.
- ENGAGEMENT: Provides visual and physical interaction for communities
- VISUAL AESTHETIC: Natural and industry character.
- HUMAN SCALE: Design responds to ground level pedestrian traffic.
- SAFETY: Dangers associated with shared pedestrian/vehicle design
- LOCAL IDENTITY: Provides a local mixed-use community space.

1. HERITAGE RETENTION
2. SHARED PEDESTRIAN AND VEHICLE OPEN SPACE

Fig 3.06.

Fig 3.07.
3.2 MODERN FACTORY 19th C.

19th century urban factory designs, aimed at integration with urban infrastructure and the public realm through spectacle and transparency. Concepts also explore possibilities for vertical programmatic assembly lines to save energy and building footprint.
VERTICAL GREENHOUSE, DICKSON DESPOMMIER. 1996

An original attempt of urban agricultural production, through vertical hydroponics gardening. Dickson Despommiers design in 1996 aimed to expose concepts of localised food production while presenting a spectacle to the public streetscape.

CONTRIBUTION TO THE PUBLIC REALM:

- DIVERSITY: Increased streetscape activity through a spectacle.
- ENGAGEMENT: Provides visual engagement
- VISUAL AESTHETIC: Provides a spectacle up close and medium distance.
- HUMAN SCALE: Design responds to ground level pedestrian traffic.

DESIGN STRATEGY ANALYSIS:

1. FACADE TRANSPARENCY

   - Reduced building footprint, maximised production space and provides visual presence at multiple scales

2. VERTICAL ORGANISATION

   - Provides streetscape diversity, increasing public activity.

3. STREET EDGE LOCATION

   - Provides streetscape diversity, increasing public activity.
NEW YORK TIME PRINTING PLANT  
POLSHEK and PARTNERS, QUEENS, NEW YORK. 1997

The factory is set on a major highway, orientated towards vehicle rather than pedestrian traffic. Its location has been utilised as an advertising opportunity, increasing the need for architectural innovation. Rather than spend time and money on the form of the building, the designers focused on exposing the spectacular vertical mono rails and machinery of the production lines within a single big opening orientated towards the highway. The large openings also fill the production floor with sunlight, enhancing conditions for workers.

CONTRIBUTION TO THE PUBLIC REALM:
- DIVERSITY: Presents a spectacle of activity rather than an empty horizontal plane
- ENGAGEMENT: Provides visual contact.
- REGENERATION: Contributes to a more interesting streetscape
- VISUAL AESTHETIC: Provides a spectacle at high speed from a distance.
- HUMAN SCALE: Design responds to vehicle traffic from a highway.

DESIGN STRATEGY ANALYSIS:
1. BIG OPENING
2. VERTICAL ORGANISATION
3. STREET EDGE LOCATION
AUTOMATIC VERTICAL COTTON MILL, BUCK MINISTER FULLER. 1952

Although this factory design was never built, its concept provides a useful example of programmatic innovation. Centered around a central core mast the factory spans 7 levels up and is held together by a geodesic dome shell. The central core provides access for raw material to each level where one process is completed, and transported to the level below. The core holds all operating systems, air ducts, water, elevators etc.

The concept design allows a large scale factory to be re-located closer to the city, reducing transportation for both material supply and workers.

CONTRIBUTION TO THE PUBLIC REALM:

- DIVERSITY: Increases diversity and functionality of streetscape.

- ENGAGEMENT: Provides visual and physical engagement.

- VISUAL AESTHETIC: Provides a spectacle at alternative levels and distances

- HUMAN SCALE: Design responds to pedestrian or vehicle traffic from a distance

DESIGN STRATEGY ANALYSIS:

1. FACADE TRANSPARENCY
2. VERTICAL ORGANISATION
3. EXPOSED BACK DOOR
   - Exposes material input/distribution activity to the public.
4. VERTICAL PRODUCTION SYSTEMS
   - Building is designed around a single company’s product with an efficient
3.3 CONTEMPORARY FACTORY 20th/21st C.

20th century urban factory designs, begin to explore the concept of product transparency. This includes both the exposure of the production process to the clients, and worker conditions. The exposure highlights authenticity and worker equity in an attempt to enhance the products value and experience of consumption.
VW TRANSPARENT FACTORY, DRESDEN
BY DR. GUNTER HENN. 2002

The VW factory has brought the manufacturing process to the consumer, through the concepts of product customization and exhibition. The programatic planning of the interior accommodates both production and public exhibition space. The exposure of work to the public increases the authenticity and value of the worker and his part in the production process.

The vertical component of the factory’s assembly has allowed a dense and compact space where a variety of production activity is visible from both inside and outside the factory.

CONTRIBUTION TO THE PUBLIC REALM:

- DIVERSITY: Provides a mixed use work/public function.

- ENGAGEMENT: Provides visual and physical engagement.

- VISUAL AESTHETIC: Provides a spectacle close up and far away.

- HUMAN SCALE: Design responds to ground level pedestrian and distant vehicle traffic.

- LOCAL IDENTITY: Provides authenticity and worker equity for the local product.

DESIGN STRATEGY ANALYSIS:

1. FACADE TRANSPARENCY
2. VERTICAL ORGANISATION
3. VERTICAL PRODUCTION SYSTEM
4. PRODUCTION SPACE TRANSPARENCY
   - Visual or physical contact between client/customer and worker/producer
FACTORY BY ALONSO BALAGUERY AND ARQUITECTOS. 2008

This new production space makes a contemporary form of a traditional factory shed. The interior layout focuses on exhibition space through controlled view shafts in the facade. The perforated facade lights up at night illuminating activity inside while retaining privacy.

Transport infrastructure is underground with primary access to work spaces through a central core. This provides a public open landscape between the buildings facade and the street, activating the public realm.

CONTRIBUTION TO THE PUBLIC REALM:
- DIVERSITY: Increased street scape activity
- ENGAGEMENT: Provides visual and physical engagement.
- REGENERATION: Re-purposes a vacant site with a visual function
- VISUAL AESTHETIC: Provides a spectacle from a distance
- HUMAN SCALE: Design responds to ground level pedestrian and vehicle traffic.

DESIGN STRATEGY ANALYSIS:

1. VERTICAL ORGANISATION

2. PERFORATED FACADE TRANSPARENCY AND OPENINGS
   - Facade provides elements of internal private activity to the external public space, contributing to a more vibrant streetscape.

3. UNDERGROUND INFRASTRUCTURE
   - Prioritises public pedestrian landscape around the building as an alternative to less engaging carparks, increasing contact between factory and the public realm.
Both Normal and Unmade companies have hybridized manufacturing processes with retail space. Normal have created a niche where 3D printed, customizable headphones can be fitted and purchased from within the production space, right on the inner city street edge. Unmade have also duplicated this process with digitally modified cnc fabric machines, producing customized clothing garments. Both projects contribute to the public realm by adding functionality and increasing human contact on the streetspace.

CONTRIBUTION TO THE PUBLIC REALM:

- DIVERSITY: Increased street scape through small business activity/performance.
- ENGAGEMENT: Provides visual and physical consumer engagement.
- REGENERATION: Re-purposes declining retail space
- VISUAL AESTHETIC: Provides a spectacle from the street and inside.
- HUMAN SCALE: Design responds to ground level pedestrian traffic.
- LOCAL IDENTITY: Adds authentication

DESIGN STRATEGY ANALYSIS:

1. FACADE TRANSPARENCY
2. STREET EDGE LOCATION
3. PRODUCTION SPACE TRANSPARENCY
4. HYBRIDIZATION
   - Focus on mixed use functionality, and maximised footprint use. Increases diversity and opportunity for human contact at a social and economic level. Strategy could also be tested through verticality
UNMADE CLOTHING, NEW YORK.
2010

Fig 3. 24.

Fig 3. 25.

Fig 3. 26.

Fig 3. 27.
3.4 FUTURE FACTORIES:

The future factory precedents show themes of flexibility, sustainability and public engagement through customisation, authenticity and spectacle. The future factory considers re-integration to cities for potential smaller-scale local markets. This smaller scale, hi-tech manufacturing allows for multiple companies to merge both product research and prototyping within factory space.
FUTURE FACTORY BY HENN ARCHITECTS. 2010

The ‘Future Factory’ is an attempt at addressing future needs for factories in the 21st century. Areas of specialty design include, clean green production and waste, connectivity and distribution with local economies and infrastructure while also providing a flexible and adaptive factory floor to accommodate both production and research development work.

CONTRIBUTION TO THE PUBLIC REALM:

- DIVERSITY: Increased streetscape activity
- ENGAGEMENT: Provides local job opportunity and education facilities.
- VISUAL AESTHETIC: Production spaces are only transparent from within the building, not from the streetscape
- HUMAN SCALE: Engages with ground level pedestrian occupation.
- SAFETY: Danger through shared public/work space
- LOCAL IDENTITY: Authentication of local products
- SUSTAINABILITY: Integrates renewable energy systems and connects with existing transport infrastructure

DESIGN STRATEGY ANALYSIS:

1. FACADE TRANSPARENCY
2. PRODUCTION SPACE TRANSPARENCY
3. SUSTAINABLE FUNCTIONALITY
   - Considers integrated energy consumption and efficiency building systems.
4. SHARED PRODUCTION AND INFRASTRUCTURE SYSTEMS
   - Integrated production systems inter-connect between manufacturing modules for maximised use. Also integrates material/product distribution systems with existing public transport infrastructure.
5. FLEXIBLE OPEN FLOOR MANUFACTURING MODULES
   - Provides space for multiple companies to operate and collaborate for production or research.
YMBA MICRO-FACTORY, STUDENT PROJECT
HARRY WEI. 2013

With a focus on small scale digital manufacturing, the Micro-Factory project demonstrates how vertical organisation can be used to re-introduce production space to city centres. Located within an existing urban perimeter block, the factory uses one primary lift core to transport material and products from each level to the distribution point at street level.

CONTRIBUTION TO THE PUBLIC REALM:

- DIVERSITY: Regenerates activity into redundant production sites

- ENGAGEMENT: Provides local job opportunity, doesn’t address issue of public streetscape decline.

- VISUAL AESTHETIC + HUMAN SCALE: Presents a built icon from a distance but production spaces aren’t transparent from urban streetscape.

- SAFETY: Increases potential hazards and traffic on the river.

- LOCAL IDENTITY: Authentication of local products

DESIGN STRATEGY ANALYSIS:

1. FACADE TRANSPARENCY
2. VERTICAL ORGANISATION
3. STREET EDGE LOCATION
4. SHARED PRODUCTION SYSTEMS AND INFRASTRUCTURE
5. FLEXIBLE OPEN FLOOR MANUFACTURING MODULES
MADE IN NEW YORK, VERTICAL FACTORY COMPETITION BY STUART BEATTIE. 2014

The project focuses on a resilience strategy for New York as population increases and more demand is put on import produce from overseas. The project realises the concepts of localised production for both a shortened/demand supply chain and the increase of both job and innovation opportunities.

The architectural solution proposes multi-storied vertical factory spaces, which are linked to river ports in a wider localised distribution system. The three towers provide a variety of different production spaces varying from large scale to smaller scale manufacturing at each level, with shared delivery and distribution shafts for materials and produce.

CONTRIBUTION TO THE PUBLIC REALM:

- DIVERSITY: Regenerates activity into redundant production sites

- ENGAGEMENT: Provides local job opportunity, doesn’t address issue of public streetscape decline.

- VISUAL AESTHETIC + HUMAN SCALE: Presents a built icon from a distance but production spaces aren’t transparent from urban streetscape.

- SAFETY: Increases potential hazards and traffic on the river.

- LOCAL IDENTITY: Authentication of local products

DESIGN STRATEGY ANALYSIS:

1. VERTICAL ORGANISATION

2. SHARED PRODUCTION SYSTEMS AND INFRASTRUCTURE

3. FLEXIBLE OPEN FLOOR
TALLIN ESTONIA, RETROFIT URBAN MANUFACTURING. LJUDMILLA GEORGIJEVA

The project looks to improve existing production and consumption systems by reducing energy and resources. Focus is on a decentralised production system which regenerates existing urban industrial sites and connects into existing rail infrastructure to potential production and consumption sites throughout the region.

The program consists of contemporary manufacturing technology. The design offers a recycling plant which breaks down scrap plastics and metals to be re-used through advanced robotic 3D printing technology. Learning centres and public demonstration platform integrate the project with the existing public realm.

CONTRIBUTION TO THE PUBLIC REALM:
- DIVERSITY: Increased public space activity within a redundant site.
- ENGAGEMENT: Provides learning environment, of both visual and physical contact. Also promotes recycling and creativity.
- VISUAL AESTHETIC: Traditional facade remains the same
- HUMAN SCALE: Engages with ground level pedestrian traffic
- SAFETY: The production space is programatically designed separately to the public
- LOCAL IDENTITY: Retains heritage building stock and character.

DESIGN STRATEGY ANALYSIS:
1. HERITAGE RETENTION
2. PRODUCTION SPACE TRANSPARENCY
3. SHARED PRODUCTION AND INFRASTRUCTURE SYSTEMS
4. HYBRIDIZATION
3.5 INFRASTRUCTURE SYSTEMS:

The future urban factory has followed themes of individual small-scale production, or multiple small-scale productions interconnected by shared infrastructure systems. The precedent study now explores these infrastructure systems and their impact to both the architecture and urban context of the public realm.
DISTRIBUTION AND SERVICING INFRASTRUCTURE:

Single story factories generally required large footprints and cheap land for production space, however the invention of high speed elevators and gravity chutes in the late 1800’s encouraged the development of multi-storied factories.

The further development of robust elevators in the 1930’s, combined with innovative rotation platforms, allowed full sized trucks to load and unload materials at each building level, providing the equivalent accessibility and efficiency of a ground level street space (Ref, Rappaport).

DESIGN STRATEGY ANALYSIS:

1. VERTICAL ORGANISATION

2. STREET EDGE LOCATION

3. SHARED PRODUCTION AND INFRASTRUCTURE SYSTEMS

4. FLEXIBLE OPEN FLOOR MANUFACTURING MODULES

Fig. 1860’s Otis steam powered elevator
Fig. 1930’s Spiral gravity chute
Fig. 1940’s Cory and Cory Starret-Lehigh elevator
Fig. Nina Rappaport’s vertical factory organization diagram
Fig. Nina Rappaport’s vertical energy consumption and recycling diagram
The two different strategies Urban (page 47) and Architectural design (page 48) present key design strategies analyzed from the precedent study. These strategies have been categorised at both urban and architectural scales to show how precedent projects have enhanced the relationship between production facilities and public space.

**URBAN DESIGN STRATEGIES:**

1. HERITAGE RETENTION
2. PEDESTRIAN OPEN SPACE
3. SHARED PEDESTRIAN AND VEHICLE OPEN SPACE
4. UNDERGROUND INFRASTRUCTURE
5. HYBRIDIZATION
6. STREET EDGE LOCATION
The purpose of the research is to explore how production space can contribute to a more engaging and vibrant public realm. The analysis of precedents has helped to explore and define architectural strategies for re-introducing production to cities, and connecting internal public and external private spaces.

These strategies concentrate on:

1. Open Pedestrian Space
2. Streetscape Interaction
3. Facade Transparency
4. Production Space Transparency
5. Distribution/Servicing Infrastructure

Throughout the study there is still a lack of examples where factories are designed to integrate with the public street scape. The retail hybrid examples do this and help to enhance the customer experience, however this is only suitable for individual micro-scale production companies. Therefore the research will need to push these strategies further and test the capacity of production within city regions, before it begins to detract from the public realm.
3.7 NEW PRODUCTION SPACE TYPES

The list of design strategies identified within the precedent study summary diagram (page, 47) are further developed into spatial forms of ‘New Production Space Types’. These ‘Types’ are to be later used for re-introducing production space at both an urban and architectural scale to suburban centres.

The ‘Types’ explore different spatial solutions for new urban factories. These structures also address criteria from Gehls ‘human scale’ diagram (fig, page 12) to ensure the relationship between production facility and public spaces is considered and valued.

A list of four production ‘Types’ are further developed in the chapter:

1. VERTICAL FACTORY
2. EVENT SPACE
3. INNOVATION FLOOR
4. HYBRID
Traditional manufacturing processes required large machinery and manual labour. New digital manufacturing processes require smaller customizable machinery with less manual labour.

The ‘on demand’, customizable nature of this new manufacturing industry also reduces the need for excess material and product storage.

The vertical factory offers an efficient solution for re-introducing production space to centres and contributing to public space through:

- Reduced building footprint
- Increased streetscape diversity
- Increased urban density around centre
- Increased localized production and job opportunity.

- Provides spatial solution for mass-produced, flexible, small scale manufacturing

District Plan height and context regulations would need to be considered and potentially negotiated in response to the reduced building footprint, to

1. VERTICAL FACTORY

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<th>URBAN DESIGN STRATEGIES:</th>
<th>ARCHITECTURAL DESIGN STRATEGIES:</th>
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<td>2. PEDESTRIAN OPEN SPACE</td>
<td>2. FACADE TRANSPARENCY</td>
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<td>5. HYBRIDIZATION</td>
<td>3. PRODUCTION SPACE TRANSPARENCY</td>
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<td>6. STREET EDGE LOCATION</td>
<td>4. VERTICAL ORGANISATION</td>
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<td>7. FLEXIBLE OPEN FLOOR MANUFACTURING MODULES</td>
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Urban Open Space Diagram

Preliminary Urban Production Space

Fig 3. 45. Urban Open Space Diagram
Fig 3. 46. Preliminary visualization of Production facilities operating in relationship to the public realm.
2. EVENT SPACE

The Event Space has a primary urban design function with focus on exposing the production process within multipurpose public open spaces. These open spaces are generally shared pedestrian and vehicle zones, maximising the opportunity for human contact.

The spaces are designed as an ‘industrial park’ where the spectacle of production is exposed to the public. These spaces can also be used for community, social and economic activity.

**URBAN DESIGN STRATEGIES:**

1. PEDESTRIAN OPEN SPACE
2. SHARED PEDESTRIAN/VEHICLE OPEN SPACE
3. UNDERGROUND INFRASTRUCTURE
4. HERITAGE RETENTION
5. STREET EDGE LOCATION

**ARCHITECTURAL DESIGN STRATEGIES:**

3. PRODUCTION SPACE TRANSPARENCY
6. EXPOSED BACK DOOR
7. SHARED PRODUCTION AND INFRASTRUCTURE SYSTEMS

Fig 3. 47 Urban Open Space Diagram

Fig 3. 48 Preliminary visualization of Production facilities operating in relationship to the public realm.

Urban Open Space Diagram

Preliminary Urban Production Space

Fig 3. 47

Fig 3. 48
As manufacturing processes continue to shift from manual labour to hi-tech robotics, the role of traditional factory workers will change to one of creating and making. The innovation floor promotes a space where a new type of work can occur, merging traditional craft with digital technology.

The innovation floor provides flexible spaces for small scale manufacturing, research, start-up businesses and education. The innovation floor operates within close proximity to the public street and ground level. This increases opportunities for human scale engagement at an intimate level (fig 3.50), creating a series of public open space within 1m -5m of the production spaces.

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<th>URBAN DESIGN STRATEGIES:</th>
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<td>1. PEDESTRIAN OPEN SPACE</td>
<td>1. BIG OPENING</td>
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<td>8. FLEXIBLE OPEN FLOOR MANUFACTURING MODULES</td>
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Fig 3.49 Urban Open Space Diagram

Fig 3.50 Preliminary visualization of Production facilities operating in relationship to the public realm.
The idea of hybridization encourages a further mixed use development to increase density, diversity and land value through social and economic activity. The shift to smaller and greener manufacturing technologies and communication systems make the concept of merging production space with urban public space a viable option.

Public space may come in the form of open landscape, consumption space or infrastructure. The merging of functions reduces energy consumption of supply chains through reduced transportation and increases local job employment, enhancing local identity and community development.

**URBAN DESIGN STRATEGIES:**
1. PEDESTRIAN OPEN SPACE
2. SHARED PEDESTRIAN/VEHICLE OPEN SPACE
3. HERITAGE RETENTION
4. STREET EDGE LOCATION

**ARCHITECTURAL DESIGN STRATEGIES:**
1. BIG OPENING
2. FACADE TRANSPARENCY
3. PRODUCTION SPACE TRANSPARENCY
4. VERTICAL ORGANISATION
6. EXPOSED BACK DOOR
7. SHARED PRODUCTION AND INFRASTRUCTURE SYSTEMS
8. FLEXIBLE OPEN FLOOR

Fig 3.51 Urban Open Space Diagram

Fig 3.52 Preliminary visualization of Production facilities operating in relationship to the public realm.
3.8 CHAPTER_3 SUMMARY:

The production space typologies provide a variety of different options at different scales for integrating production space into the public realm. The typology strategies can be used as individual tools, applied in clusters or combined to re-introduce production space into urban centres. The typologies address a level of engagement with the street edge and public open space in order to contribute towards a more diverse and active public realm.

These typologies will be used later in chapter_7 for urban framework design iterations in response to the case studies context. Selected typologies will then be developed further in chapter_8 to explore in more detail the relationship of the new production spaces and the existing public realm.
Chapter 4 analyses the site and context of the Design Case Study. The analysis will help to inform Urban Design Framework development and site specific locations for the architectural design experiments later in the research.

CHAPTER 4.0 CASE STUDY CONTEXT

CONTENT:

4.1 CONTEXT

4.2 CASE STUDY

4.3 SITE ANALYSIS
4.1 CONTEXT

WELLINGTON (NZ):

Over the past century the majority of production based industrial sites have transitioned from central city zones to locations within the wider city region. This has left the majority of centres reliant on retail and consumption space for public activity.

**MAP KEY:**
- Central City
- Wider Regional Centres
- Production Space
- Retail Centres
PRODUCTION AND SUBURBAN CENTRES:

Zonning principles, health regulations and cheaper land have contributed to the decentralisation of production space from the city centre (fig 4.02 and 4.03, page 58 and 59).

Existing centralized production spaces are often located within close proximity to suburban centres, however they lack any major contribution to high quality public space (fig 4.04 and fig 4.05, page 60).

NEWTOWN:

The suburb of Newtown was selected due to its condensed, heavily populated urban footprint, struggling retail sector and location near the city centre.
4.2 CASE STUDY

SUBURB:

Newtown is a residential suburb with two major transit corridors running through its centre, connecting outer suburbs to the city centre (fig 4.06, page 61). These transit corridors also make up the majority of the suburb’s central public realm.

The suburb’s central public realm as shown in (fig 4.07, page 60) is heavily dominated by consumption space, with pockets production/labour based space scattered on the fringes of the inner centre.
SUBURBAN CENTRE:

Newtown’s southern section of the central public zone has been selected for the Design Case Study. The zone covers the connection point for transit routes from outer suburb’s to the city centre, part of Newtown’s heritage zone and a variety of both vibrant and diminishing consumption based functions such as, traditonal high street retail, redundant petrol stations and a decling mixed-use supermarket/retail complex.
4.3 SITE ANALYSIS

PUBLIC SPACE:

Consumption Space diagram (fig 4.08, page 63) shows that the majority of public activities within Newtown’s centre are consumption based, while any active production/labour spaces are located on secondary side streets. Public Space diagram (fig 4.09, page 64) shows additional civic functions located within the center such as churches, libraries and community centres. However, with the exception of the library, their contribution to the centres public domain is limited and detached due to their location on the fringes of the centre.

This reinforces the idea that the majority of public space within the suburbs centre is heavily dominated by consumption activity.
ADDITIONAL CIVIC PUBLIC SPACE

KEY:

Public Consumption Space

PUBLIC COMMUNITY:
1. Library
2. Community Centre
3. Church

OPEN CIVIC SPACE:
4. Public Park
5. Urban Hardscape and Seating
Urban Landscape
Street Planting
SITE ANALYSIS cont.

TRANSIT / PEDESTRIAN ACCESSIBILITY:

The transit routes are heavily dominated by public transport and private vehicle infrastructure, leaving little pedestrian public space other than pathways (fig 4.10, page 65).

Future development for this section of the centre will need to consider efficiency and safety of new production spaces in relation to existing traffic infrastructure. Accessibility to the region through private and public transport is efficient along the main streets (fig 4.11, page 65).
SUMMARY:

Weaknesses:

The existing centre is heavily dominated by consumption activity, with additional civic functions and open space providing little contribution to the central public realm. Research from the Literature Review exposed the issue of declining suburban small businesses and traditional ‘high street’ retail, and dominance of transit infrastructure over pedestrian space. These issues are evident within the selected Design Case Study of Newtown.

Opportunities:

An increase of diverse and publically engaging functions within the center is necessary for re-generation. Riddiford Street and parts of Constable Street, make up the majority of public streetscape and should be developed in order to strengthen existing public space of the centre.

Side streets adjacent to Riddiford and Constable Street offer protected and less congested space, away from existing transit routes, for future development. These spaces however are currently unoccupied by public functions and set further away from public transport. This would stretch the public centre rather than strengthen it and potentially create a contest against existing public functions on Riddiford and parts of Constable Streets.

Directions for development:

Existing density and district plan regulations for suburban centres permit extensive highrise development. This therefore encourages urban and architectural designs to engage within close proximity to existing public space at street level rather than develop a new and elevated public realm above ground level.

Development of the existing Riddiford and Constable Street will be the primary focus of the design phase, while adjacent side street areas could be supportive of future planning development once existing central areas are strengthened.
Chapter 5 combines site and context analysis from the Case Study and design strategies from the New Production Space Types, established earlier in the Chapter 3 (page ), to produce a series of Urban Design Framework options for re-introducing new production space to the Newtown’s suburban Centre.

Framework options test two strategies:

1. Potential for strengthening the existing public realm within the centre.

2. Potential for re-development and a new public realm.

These options are analysed in relation to the public realm Assessment Criteria developed from the Literature Review in Chapter 2 (page ), to explore how new production space can contribute to high quality public space.

Fig. Newtown’s existing public realm, redundant Riddiford street retail
5.0 URBAN DESIGN FRAMEWORKS

Each framework option explores different possibilities for integrating new production space into the public realm. The urban design focuses on two major attributes.

**Attribute A:** Production space Efficiency and Functionality;

- Considers transport and servicing infrastructure and material input/output access of each production space.

**Attribute B:** Re-generation of high quality public space;

- Considers enhancing connections and legibility between existing public functions, and relationship between production facilities and public space.

Various New Production Space Types contribute to six different framework options, which are developed under two basic public realm strategies:

1. Strengthening The Existing Realm (fig)
2. Developing A New Public Realm (fig)

Fig. Newtown's existing public realm area.

Fig. Area for potential development of a new public realm.

Fig. New Production Space Types diagram, ref Chapter 3
NEW PRODUCTION SPACE TYPES:

1. VERTICAL FACTORY

2. EVENT SPACE

3. INNOVATION FLOOR

4. HYBRID
5.01 STRENGTHENING EXISTING PUBLIC REALM

Urban Design Frameworks 1-3 focus on strengthening the existing public realm by integrating new production spaces within selected parts of the existing fabric of Riddiford and Constable Street.

1. RIDDIFORD HERITAGE CORRIDOR
2. INDUSTRIAL PLAZA
3. PRODUCTION GATEWAYS
1. RIDDIFORD HERITAGE CORRIDOR

**HIGH QUALITY PUBLIC REALM**
- **DIVERSITY**: Adds economic/social activity to Riddiford’s public streetscape
- **LEGIBILITY**: Located on primary public street
- **OPEN SPACE**: Expands public pedestrian space off Riddiford Street.
- **VISUAL AESTHETIC**: Increases public engagement through buildings on Riddiford’s public streetscape
- **HUMAN CONTACT**: Increase opportunity for human engagement on streetscape
- **SAFETY**: Potential to increase congestion and transport danger

**NEW PRODUCTION SPACE**
- **REGENERATION**: Increases activity within the existing public realm
- **PUBLIC INTERACTION**: Manufacturing processes are integrated with the Riddiford’s public streetscape
- **LOCAL CONTEXT**: Production space can enhance heritage zone and small business culture
- **SUSTAINABILITY**: Integrates existing transport infrastructure to save space and resources.

**FINDINGS:**

Strengthening the existing Riddiford Street edge provides immediate regeneration to the centre’s public realm through increased diversity and pedestrian open space. Development would be limited by available sites, cost (refurbishment of existing buildings) and issues with production transport functionality and public safety due to proximity with existing transit routes.
HIGH QUALITY PUBLIC REALM

- **DIVERSITY:** Adds economic/social activity to Riddiford’s public streetscape
- **LEGIBILITY:** Primary public streetscape location
- **OPEN SPACE:** Increases public pedestrian space near Riddiford Street
- **VISUAL AESTHIC:** Increases public engagement through buildings on Riddiford’s public streetscape
- **HUMAN CONTACT:** Increase opportunity for human engagement on streetscape
- **SAFETY:** Creates pedestrian public space away from Riddiford and Constable Street transit routes. Potential conflict with production transit and public pedestrian space.

NEW PRODUCTION SPACE

- **REGENERATION:** Increases activity within the existing public realm
- **PUBLIC INTERACTION:** Manufacturing processes are integrated with the Riddiford’s public streetscape
- **LOCAL CONTEXT:** Can enhance heritage zone, with focus on localized business culture
- **SUSTAINABILITY:** Minimal integration with existing infrastructure systems other than supermarket carpark

FINDINGS:

Replacing a large declining public function directly on Riddiford Streets edge, provides immediate regeneration to the public realm. Retains the street edge, increases diversity and creates a centralised protected pedestrian open space. Issues will involve potential safety and functionality conflict with production transportation and pedestrian open space.
3. PRODUCTION GATEWAYS

HIGH QUALITY PUBLIC REALM

✓ DIVERSITY: Adds economic/social activity to Riddiford’s public streetscape
✓ LEGIBILITY: Partial public streetscape location, on the edges of centre.
✓ HUMAN CONTACT: Increase opportunity for human engagement at different scales (close up/distance) from the public streetscape
✓ VISUAL AESTHIC: Increases public engagement through buildings on Riddiford’s public streetscape
✓ SAFETY: Creates pedestrian public space away from Riddiford and Constable Street transit routes.

NEW PRODUCTION SPACE

✓ REGENERATION: Increases activity on the edges of the existing public realm, and regenerates redundant sites.
✓ PUBLIC INTERACTION: Manufacturing processes are visually integrated with transit on the Riddiford Street and partially with the pedestrian streetscape
✓ LOCAL CONTEXT: No response to heritage zone, only localized business culture
✓ SUSTAINABILITY: Partially integrates with existing transport infrastructure near Riddiford Street.

FINDINGS:

Development on the fringes of the existing public realm helps to define the suburb’s identity through conceptual ‘entrances’ to the centre. Increases activity and interaction at different scales from both protected pedestrian spaces and transit. Production spaces can also operate efficiently with little disruption from traffic congestion and pedestrian danger within the centre. Development on the fringe however has potential to detract public activity from the central businesses on Riddiford Street.
5.02 DEVELOPING A NEW PUBLIC REALM

Urban Design frameworks 4-6 all focus on expanding the existing public realm through the development of new production space zones within close proximity to the centre’s existing built and open public spaces.

4. PRODUCTION AVENUE
5. INDUSTRIAL GARDEN
6. PRODUCTION LANEWAY NETWORK

EXISTING CIVIC BUILDINGS KEY:

- Library
- Community Centre
- Cafe/Coffee Roastery
- Bar/Restaurant
- Butchery
- Bakery
- Vegetable Store
- Fast Food
- Church
- Supermarket

URBAN DESIGN FRAMEWORK KEY:

- Existing Buildings
- Existing Civic Buildings
- New Production Space
- Primary Public Streets
- Enhanced Public Open Space
- Enhanced Pedestrian Route
- Public Pedestrian Entrance
- Enhanced Production Servicing Open Space
- Production Transport Route
- New Production Sites
4. PRODUCTION AVENUE

HIGH QUALITY PUBLIC REALM

✓ DIVERSITY: Adds economic/social activity, but detracts from existing public realm
✓ LEGIBILITY: Detached location away from the Riddiford's public streetscape.
✓ VISUAL AESTHETIC: Increases public engagement through buildings once located on Production Avenue
✓ HUMAN CONTACT: Increases opportunity for human engagement at different scales once located on Production Avenue
✓ SAFETY: Creates pedestrian public space away from Riddiford's transit routes. Potential conflict with production transit and public pedestrian space.

NEW PRODUCTION SPACE

✓ REGENERATION: Increases activity within a redundant streetscape, however detracts activity away from existing public realm
✓ PUBLIC INTERACTION: Manufacturing processes are integrated along Production Avenue have minimal interaction with Riddiford’s streetscape
✓ LOCAL CONTEXT: Can enhance heritage zone and small business culture
✓ SUSTAINABILITY: Integrates with existing transport infrastructure to save space and resources.

FINDINGS:

Development focuses on a production based realm, away from traffic and pedestrian congestion from the existing public domain on Riddiford Street. Its location is centred on a side street parallel to Constable Street with entrances off less congested side streets Normanby and Daniell Street. The Production Avenue focuses on a shared pedestrian/vehicle open space streetscape to value public habitation. Development has potential to detract from the existing centralised public domain on Riddiford Street.


5. INDUSTRIAL GARDEN

HIGH QUALITY PUBLIC REALM

✓ DIVERSITY: Adds economic/social activity, but detracts from existing public realm
✓ LEGIBILITY: Partial connections to both Riddiford’s and Constable’s public streetscapes
✓ VISUAL AESTHIC: Increases public engagement through buildings at multiple entrances and different scales.
✓ HUMAN CONTACT: Increases opportunity for human engagement at different scales through multiple entrances from existing public realm
✓ SAFETY: Pedestrian open space away from major transit routes. Potential conflict with production transit and public space.

NEW PRODUCTION SPACE

✓ REGENERATION: Revitalises a declining streetscape and sites, however detracts activity away from existing public realm
✓ PUBLIC INTERACTION: Manufacturing processes are integrated along Production Avenue have some interaction with Riddiford’s streetscape
✓ LOCAL CONTEXT: Can enhance heritage, but focuses on local business culture
✓ SUSTAINABLILITY: Partially integrates with existing transport infrastructure

FINDINGS:

The Industrial Garden aims to re-define a new central public open space, integrated with new production spaces. A similar streetscape development as the Production Avenue is used, with an additional public pedestrian connection through the urban block to Constable Street to connect existing civic functions. Although protected open space creates a good public realm with physical and visual connections to production spaces, the focus on a new public central zone away from the existing centre can cause further decline to the Riddiford Street’s public domain.
FINDINGS:

A similar streetscape development as the Production Avenue is used, with a focus on shared pedestrian/vehicle transit routes, and adjacent transport drop off zones along the avenue. New production and pedestrian orientated open spaces are merged into the urban block to replace declining and redundant sites and increase connectivity between existing civic functions. There is potential for detraction from existing businesses on Riddiford Street, however new development is not as dominant as the previous two designs.
5.2 FINAL URBAN DESIGN FRAMEWORK

Framework Design Options 1-6 have been analysed by the Assessment Criteria to determine the best solutions for re-integrating new production space to the the centre, while contributing towards public space. Elements from five out of six different frameworks have been selected;

**Option 1:** Strengthen Existing Realm
- Designs 1, 2 and 3 (fig -)

**Option 2:** New Realm Development
- Designs 4 and 6 (fig -)

The most successful elements from each framework have been merged together to create a Final Framework Design for the centre (fig, page).

The Production Plaza (framework 2.) and elements from the Riddiford Heritage Corridor and Production Gateway (framework 1 and 3) focus development along the Riddifrod Street and integrate with existing service and transportation infrastructure. This increases diversity of public functions, immediately strengthening the existing public realm and re-generating declining consumption and alternative redundant spaces within the centre.

Designs from Option 2. prove to negatively detract attention and development away from the existing realm. The Industrial Garden (framework 5) focuses solely on a centralised new development away from the primary streets and transit routes, therefore it has been dropped from the Final Framework. The Production Avenue and Laneway Production Network (framework 4 and 6) have been included due to their consideration for expansion and legibility with Riddiford and Constable Streets. Once the existing centre is restored, expansion to side streets and connections between existing functions within the centre will become a priority.
5.3 URBAN DESIGN MASTERPLAN

The consolidated Masterplan presents a strategy for re-introducing production space into the suburb’s centre over a phase of 20 years. The plan considers immediate development close to the suburb’s centre to strengthen the existing primary public streetscape. The re-development focuses on sites of existing and declining consumption spaces. Gradually the development plan expands to the edge of the centre to consider future expansion.

The phased plan uses a variety of New Production Space Types in different sites in order to achieve maximum benefit to the public realm. The objective of the production spaces are to add social and economic diversity to strengthen the existing realm.

PHASE 1

Strengthen Existing Realm:

0-5 Years

Development along Riddiford Street, retaining redundant heritage building character and declining consumption space.

PHASE 2

Develop New Realm:

5-10 Years

Development expands within close proximity to Riddiford and Constable Street, increasing legibility between existing public amenities.

PHASE 3

Expand Developed Realm:

10-20 Years

Development to the edge of the centre’s public domain to sites of declining consumption. This creates a perimeter and conceptual entrance to the suburb’s central public realm.
5.4 ARCHITECTURE SITE SELECTION

Three sites within the developed Masterplan are selected to test the research at an architectural scale. Each site is located along Riddiford Street, and provides an opportunity to test New Production Space Types and design strategies at different scales and locations within the existing public domain.
SITE DESCRIPTION

Site A:

Located within the central public domain of Riddiford Street, Site A consists of a redundant heritage building and a vacant open space site.

Site B:

Located within close proximity to the central public domain of Riddiford Street, Site B consists of an existing supermarket and declining retail arcade on a large site spreading the width of the urban block.

Development here contributes to Riddiford’s public street scape and the potential for future expansion of the Production Avenue and Production Laneway Network along Newtown Avenue, on the Masterplan.

Site C:

Located on Riddiford St at the fringe of the suburb’s centre, Site C consists of a redundant petrol station on medium sized open site with little surrounding buildings.
Selected sites for New Production Space design exploration
Chapter 5 has tested the research through a process of Urban Design Framework options and the development of a Masterplan. Each Framework design was analysed by the Assessment Criteria to determine a suitable option for developing new production spaces within suburban centres. The integration must consider both the efficiency of production processes and transportation infrastructure, and value the development of public pedestrian open space.

Development of new production space to the existing public realm along Riddiford Street proved to be the most successful option for immediate re-generation, while development of a new production based public realm would suit future expansion of public space once the centre was strengthened and stable.

A combination of options were merged to form a Final Framework Design, which was then developed into a Masterplan for future development. Three sites (Site A, B and C) located on the Masterplan have now been selected to further test the research at an architectural scale, and investigate in more detail the relationship between new production space and it's contribution to a high quality public realm.
CHAPTER 6.0 ARCHITECTURAL DESIGN EXPLORATION

Sites A, B and C from the Urban Masterplan are used to explore the impact of New Production Spaces on the public realm at three different scales. Design strategies derived from New Production Space Types (Chapter 3, page 49) are used to aid the design development of each site.

A series of strategies were explored at a small scale on Site A to develop a set of generic strategies which can be applied, at a larger scale, to Sites B and C. These secondary designs focused on how programatic planning and massing to larger scale sites can still enhance public space, rather detailed design.

Throughout the Design Exploration concepts and solutions are evaluated on in relation to the Assessment Criteria (Chapter 2, page 19) to evaluate how architectural intervention can enhance the production space's contribution to the public realm.

STRUCTURE:

6.10 SITE A DESIGN
6.11 - Design Solution
6.12 - Design Strategy Development
6.13 - Site A Design Reflection (Exegesis)

6.20 SITE B DESIGN
6.21 - Design Exploration
6.22 - Design Solution Development
6.23 - Design Solution
6.24 - Site B Design Reflection (Exegesis)

6.30 SITE C DESIGN
6.31 - Design Exploration
6.32 - Design Solution Development
6.33 - Design Solution
6.34 - Site C Design Reflection (Exegesis)
SITE_A

REDUNDANT RETAIL STORE AND VACANT OPEN SPACE
Site A has the smallest footprint, with a redundant heritage structure and adjacent vacant site. Development is influenced from multiple New Production Space Types, focusing on Hybrid Space (fig 6.01) and Event Space (fig 6.02). These Types are suitable for the small-scale, condensed site located on Riddiford Street within the suburb’s centre.

This production space design enhances the existing public realm by maximising street level contact between the manufacturing process and public consumers/on-lookers.

**PROCESS:**
Design strategies from the Event Space and Hybrid Space Types (Chapter 3, page 51 and 53) were used to aid the site’s development and identify which strategies were the most effective at maximising the buildings contribution to Riddiford’s public Streetscape.

Design Strategies Used:
- Pedestrian Open Space
- Heritage Retention
- Street Edge Location
- Big Opening
- Production Space Transparency
- Vertical Organisation
- Exposed Back Door
- Shared Production and Infrastructure Systems

**BUILDING PROGRAM:**
The design focuses on an individual manufacturing company creating customizable, digital 3D printed Aluminium E-Motorbikes. Production includes both robotic and manual manufacturing processes.

The design focuses on integrating, and potentially merging, human and robotic workers with members of the public as consumers and on-lookers.

**MANUFACTURING PROCESS:**
1. Digital Design
2. Robotic 3D Printed Metal Solution
3. Assembly/Customization of components
4. Electric Motor Bike Product
6.11 DESIGN SOLUTION

Site Plan Key:
- Public Access
- Service Access

Factory Plan Key:
1. Manufacturing Space
2. Transportation Gantry
3. Retail Show Room
4. Office Space
5. Heritage Facade
6. Streetfront Lattice Facade
7. Enhanced Urban Pedestrian Space
SITE AXO

EXPLODED PROGRAM AXO

KEY:

PRODUCTION FLOWS:
- Input Material
- Output Product

CONSUMPTION FLOWS:
- Public Circulation

1. Stacked Manufacturing Module
2. Transportation Gantry
3. Retail Show Room
4. Office Space
5. Heritage Facade
6. Streetfront Lattice Facade
7. Enhanced Urban
8. Existing Gable Roof
9. New lattice Roof

Existing Gable Roof
New lattice Roof
6.12 DESIGN STRATEGY DEVELOPMENT

DESIGN STRATEGIES USED:

The design reflection illustrates how selected strategies have been used and tested to maximise the buildings contribution to the public realm.

HERITAGE RETENTION

Integrating Old facade (regenerates existing shop front) with new facade which expresses new factory space. Production gantry is a common element connecting both.

CONCEPT_1
- Separate production and consumption spaces at street level.

CONCEPT_2
- Split level production space, providing visibility of manufacturing activity from consumption space at street level. Physical spaces still separated.

CONCEPT_3
- Interwoven production and public space.

HYBRID
Close proximity of production and consumption space functions.
HERITAGE RETENTION

Concentrated facade openings to connect internal production with the streetscape.

-Internal open space and lighting

-Internal split level opening increasing manufacturing visibility

-Streets level transparency

-Existing rhythm/symmetry are considered with the ‘big opening’ strategy.

Maximis contact between production and public space through internal spatial planning, and street facade design.

-Interweaving of production and consumption flows. Issue: Safety/legibility.

- Raised production transport infrastructure moves material/product from back to the front of building, reducing issue public safety.

-Public access through internal circuit of buildings centre. Physical contact to consumption space, visual contact to production spaces.

Facade considers surrounding heritage aesthetic and materiality.
**GENERIC STRATEGIES:**

- HERITAGE RETENTION
- HYBRID + VERTICAL ORGANISATION
- BIG OPENING
- VISIBLE BACK DOOR + PRODUCTION SPACE TRANSPARENCY

**DESIGN STRATEGIES APPLICATION:**

- Considered rhythm of building transparency and massing within existing urban context.

- Variation and hierarchy of production and consumption space.

- Void within building and facades to increase visibility from public streetscape, through production space, to the rear servicing and transportation bays.

- Raised gantry increases visibility of production material from public consumption and streetscape.

**DIAGRAMATIC EXPLANATION:**

- STREET ELEVATION
- SECTION A-A'
- SECTION B-B'
100

HIGH QUALITY PUBLIC REALM

- **DIVERSITY:** The immediate location on Riddiford Street and transparency of the hybrid production facilities through facades and internal public space, adds economic/social activity to the centre.

- **LEGIBILITY:** Increases pedestrian connectivity within the centre by regenerating a redundant gap in the building fabric along Riddiford Street.

- **VISUAL AESTHETIC:** Increases public engagement by exposing production activity at different scales from the public streetscape through the buildings lattice facade and ‘big openings’.

- **HUMAN CONTACT:** Increases opportunity for human engagement through multiple pedestrian entrances from public streetscape.

- **SAFETY:** Separation of production transport and consumption space.

NEW PRODUCTION SPACE

- **REGENERATION:** Revitalises a redundant site and contributes a new building which interacts with the immediate public streetscape.

- **PUBLIC INTERACTION:** Manufacturing processes and streetscape are integrated physically (with internal consumption space) and visually (with external open space) through ‘big openings’ and internal voids within the building.

- **LOCAL CONTEXT:** Enhances heritage through a contemporary aesthetic, and encourages local business culture through hybrid facilities and transparent manufacturing process.

- **SUSTAINABILITY:** Production transportation access integrates with existing service lanes.

6.13 SITE A DESIGN REFLECTION

The small-scale production space on Site_A was successful in strengthening gaps of declining building fabric and consumption space along the compact street edge of the suburbs centre. The design provides place-based identity by providing space for small business development, retaining urban character and increasing streetscape diversity through hybrid functionality of production and public consumption space.

The focus of the Design Exploration was to test a series of design strategies (page, 99) to enhance the production facilities contribution to the public realm through active facade, massing and internal configuration. These Strategies will be re-used and applied to the larger scaled developments on Site’s B and C to create a quicker and more iterative design process.

The design provides an effective infill solution for strengthening compact streetscapes, however the design is limited to an individual, small-scale manufacturing space. This limits the potential for production space to regenerate larger scale sites within the centre.
SITE_B
SUPERMARKET AND DECLINING RETAIL ARCADE
6.20 SITE_B DESIGN EXPLORATION

Site B has the largest footprint, with a declining retail arcade and supermarket. Development is influenced from multiple New Production Space Types, focusing on the Innovation Floor (fig 6.04) and Event Space (fig 6.05). These Types are suitable for the large, open site located on Riddiford Street within close proximity to the suburb's centre.

This production space aims to re-create the experience of the old arcade/supermarket, retaining a conceptual image as a part of the suburb's activity 'centre'. The production space will also respond to public space of both Riddiford Street and Newtown Avenue in consideration to the Urban Masterplan objectives (fig 5.14, page 83).

PROCESS:
The design exploration involves accommodate a variation of different production spaces on a large site. The focus of architectural intervention is on programatic spatial planning and building massing for production and public spaces. The Design strategies derived from design exploration on Site A (page) were used to aid development of the building masses and creative a more efficient iterative process for concept designs.

The Design Exploration of four concepts is presented first, followed by the Design Exploration Development, Design Solution and a Design Reflection.

PROGRAM:
The design focuses on a conceptual ‘Innovation Hub’ where the building provides space for different companies and public functions. Both Manual and robotic manufacturing processes can merge with public consumption and learning spaces.

Production space dimensions are sourced from precedent projects ‘Future Factory’ (page, 40) and ‘Urban Manufacturing Hub’ (page, 43)

Three different manufacturing spaces have been combined throughout Site B:

1. Hybrid Space:
Merging production + public consumption spaces, based on Site_A design (page 91),

2. Vertical Production Module:
Manufacturing process are stacked vertically to reduce footprint and increase diversity of production within the facility. Based on Site_A production module design (page 93 and 94).

3. Learning/Research Centre:
Contains flexible open floor modules for research, prototyping and teaching spaces. Based on examples from the ‘Future factory’ precedent (page, 40)

PRODUCTION SPACES:
1. Hybrid
2. Vertical Production Module
3. Learning/Research Centre
STRATEGIES:

- Courtyard provides Pedestrian Open Space and extends public realm from Riddiford Street deep into the site towards the learning centre.

- Courtyard also provides an optional use as a community Event Space.

- Big Openings on the streetfront facades increase Production Space Transparency from within the facility to the public streetscape of Riddiford Street.

- Exposed Back Door is achieved along the length of the site through a raised gantry system bringing material form the loading bay to production spaces. This creates a spectacle from within the site and also frees up ground level space for public pedestrian movement.
ASSESSMENT CRITERIA:

PUBLIC REALM

- **DIVERSITY:** Provides Pedestrian Open Space within the depths of the site, and Big Openings along the street edge to allow public engagement with production facilities.

- **LEGIBILITY:** Strengthens pedestrian connection with Riddiford Street by creating an active streetfront through both built form and public open space.

- **VISUAL AESTHETIC:** The building’s transparent sections and modular compositions expose internal production spaces, activating the frontages of Riddiford and Newtown Avenue.

- **HUMAN CONTACT:** Increases opportunity for human engagement through multiple entrances from public streetscape.

- **SAFETY:** Pedestrian Open Space is protected by fully integrated production systems and dedicated transport infrastructure.

NEW PRODUCTION SPACE

- **REGENERATION:** Revitalises a declining consumption space, through the development of New Production Spaces.

- **PUBLIC INTERACTION:** Internal manufacturing processes are visually exposed to the external public streetscape through Big Openings on the streetfront. The public open space courtyard also draws people into the site towards the education and hybrid spaces, creating a pedestrian orientated gathering space for social/economic activity.

- **LOCAL CONTEXT:** Design considers surrounding building heights but no response to heritage character other than timber facade treatment. Courtyard encourages community identity through an Event Space gathering area.

- **SUSTAINABILITY:** Utilises existing carpark and supermarket loading bay infrastructure.
STRATEGIES:

- Pedestrian open space through Lane extending off Riddiford Street to draw public realm into the depths of the site
- Exposed back door through raised production gantry systems on the street edge
- Production space transparency by internal lane passing through hybrid production spaces.
ASSESSMENT CRITERIA

PUBLIC REALM

✓ DIVERSITY:
  Adds economic/social activity to Riddiford Street by extending a Pedestrian Open Space lane directly to the public learning centre, passing production and hybrid facilities.

✓ LEGIBILITY:
  Open space lane creates a clear connection between the public streetscape and learning centre, drawing people into the depths of the site.

✓ VISUAL AESTHIC:
  Raised gantry and transparent facade activates Riddiford Street, however no hierarchy of different production space.

✓ HUMAN CONTACT:
  Increased opportunity for visual human engagement with different function of the production process along the open lane, away from transit on Riddiford Street.

✓ SAFETY:
  Public space is drawn down the middle of the site along the lane, away from production systems and existing transit on Riddiford Street.

PRODUCTION SPACE

✓ REGENERATION:
  Replicates elements of the existing retail arcade drawing public space into the site, but with more activation on the Riddiford Street edge. The design also activates Newtown Avenue through the raised gantry.

✓ PUBLIC INTERACTION:
  Internal manufacturing processes are visually exposed to the external public streetscape through Transparent Facades on Riddiford Street. The public lane clearly draws people into the site towards the education and Hybrid Spaces, creating a pedestrian orientated gathering space for social and economic activity.

✓ LOCAL CONTEXT:
  Design reflects surrounding building heights but no heritage character. Buildings facilities all connect to the central lane, encouraging local small business through both production and consumption spaces.

✓ SUSTAINABILITY:
  Utilises existing carpark and supermarket loading bay infrastructure.

PUBLIC SPACE

Riddiford St.
Elevation:
SRATEGIES:

- Big Opening through multiple pedestrian lanes extending off Riddiford Street

- Pedestrian Open Space is achieved through multiple lanes and courtyard space.

- Production Space Transparency along internal pedestrian lanes and active streetfront facades on Riddiford Street.
ASSESSMENT CRITERIA:

PUBLIC REALM

- **DIVERSITY:**
  Lanes extending off Riddiford Street and transparent street front production spaces add economic/social activity to the public streetscape.

- **LEGIBILITY:**
  Multiple lanes connecting Riddiford Street to the smaller courtyard within the site, potentially making public orientation difficult.

- **VISUAL AESTHETIC:**
  The building responds to Riddiford Street through a variety of open lanes and enclosed but transparent production spaces.

- **HUMAN CONTACT:**
  Increased opportunity for human engagement through multiple entrances from public streetscape. However different lanes can compete with each other, dividing and diluting foot traffic.

- **SAFETY:**
  Public pedestrian space overlaps production infrastructure systems and access, causing potential conflict.

NEW PRODUCTION SPACE

- **REGENERATION:**
  Variety of open spaces and transparent facades on the street front activate Riddiford Street.

- **PUBLIC INTERACTION:**
  Internal manufacturing processes are visually exposed to the external public streetscape. The public open space courtyard also draws people into the site towards the education and hybrid spaces, creating a pedestrian oriented gathering space.

- **LOCAL CONTEXT:**
  The design contributes little to local building character, encourages local business culture and community through production and public lanes.

- **SUSTAINABILITY:**
  Partially integrates with existing carpark and supermarket distribution infrastructure.
Site_B
CONCEPT_4 DEVELOPMENT

SRATEGIES:

- Excavated site on Newtown Avenue street edge and transparent facade treatment, increases visibility of vertical module.

- Big opening through pedestrian open space to one side the site, exposing the vertical modules from Riddiford Street.

- Enhanced pedestrian open space along Newtown Avenue to activate street and allow future masterplan expansion.

- Exposed back door (raised gantry on street edge)

Section:

Section Developed:

1.

2.
ASSESSMENT CRITERIA:

PUBLIC REALM

✅ DIVERSITY:
Lanes extending off Riddiford Street and transparent street front production spaces add economic/social activity to the public street.

✅ LEGIBILITY:
Enhances access to Newtown Avenue off Riddiford Street, but does not offer a clear entrance into the site.

✅ VISUAL AESTHETIC:
The building responds to Riddiford Street through a variety of open lanes and enclosed but transparent production spaces.

✅ HUMAN CONTACT:
Increases opportunity for human engagement through multiple entrances from public street. However different lanes can compete with each other.

✅ SAFETY:
Public pedestrian space is protected from fully integrated production systems and dedicated

NEW PRODUCTION SPACE

✅ REGENERATION:
Variety of open spaces and transparent facades on the street front activate Riddiford Street.

✅ PUBLIC INTERACTION:
Internal manufacturing processes are visually exposed to the external public streetscape. The public open space courtyard also draws people into the site towards the education and hybrid spaces, creating a pedestrian orientated gathering space.

✅ LOCAL CONTEXT:
The design does little to local building character.

✅ SUSTAINABILITY:
Partially integrates with existing carpark and supermarket distribution infrastructure.
**Concept_1 Reflection**

-Large open space in the centre for public gathering, and alternative use for an Event Space. Also helps to draw the public into the site from Riddiford Street.

-Good variety and hierarchy of transparent and enclosed production modules around the perimeter of the site to activate external street edges.

**Concept_2 Reflection**

-Large open space lane creates a clear entrance however people have a long way to walk, so hard to draw people into the depths of the site from Riddiford Street.

-Creates potential redundant cul-de-sac space at the end of the site.

**Concept_3 Reflection**

-Open Ended modular construction, helps to create an interactive street edge with a variety of built and open spaces.

-Bring people into the depth of such a larger site can be challenging.

-Multiple entrances can be confusing.

**Concept_4 Reflection**

-Set back from the street edge provides shelter and open pedestrian gathering space, however does not contribute to the existing urban built street edge.

-Bringing people into the depth of the site through off set paths can be challenging.
Riddiford St. Treatment

- Internal Big Opening
- External Big Opening
- Open Space courtyard
- Internal Void
- Verticle Production Module
- Variety of production spaces through facade
Factory Plan Key:
1. Hybrid Production Space
2. Vertical Production Space
3. Learning/Research Centre
4. Public Courtyard/Event Space
5. Production Gantry/Public Causeway
6. Enhanced Urban Pedestrian Space
7. Loading Bay
8. Storage
6.24 SITE B DESIGN REFLECTION

A generic solution for the large site was achieved focusing on integrating the spatial arrangement and massing of multiple production and public spaces on the site, rather than detailed design, due to the scope of the research.

Initial design concepts, informed by strategies developed from site A, explored various options for breaking up the site through pedestrian lanes and open spaces.

- The use of modular compositions and transparent sections around the perimeter of the site helped to activate existing street frontages by creating a diverse range of production spaces for public viewing from the street.

- The courtyard provided a large open public space in the centre of the site, offering easy access off the Riddiford Street and connecting public space with the various production spaces.

- The raised gantry and excavated internal void on the northern side separated production hazards from the public ground level helped to increase the visibility of manufacturing processes from the street.

In summary production space diversity in size, composition and visibility from the street, along with pedestrian open areas with good legibility to existing primary public spaces, are key features for developing large scale sites.
SITE_C
REDUNDANT PETROL STATION

A.

B.

C.
Site has a large footprint, occupying a redundant petrol station. Development is influenced from multiple New Production Space Types, focusing on the Vertical Factory (fig 6.06) and Event Space (fig 6.07). Due to its location away from the low-rise and condensed suburban centre, the site not only responds to immediate public space at street level, but engages visually with distant, fast moving transit and slower more proximate pedestrian open spaces. For this reason Site C pushes the concepts of the Verticle Factory and Event Space.

**PROCESS:**

Due to the relatively isolated location on the fringe of the suburb's centre, and with reduced pedestrian foot traffic passing the site, the design focuses on massing and spatial planning to enhance the visual relationship between the production spaces and the public street.

Design exploration into Vertical Organisation of production spaces will test the success of maximising height and the visibility to enhance the public realm. Generic design strategies derived earlier from Site A and the understanding of diverse compositions and transparency to enhance the buildings relationship with the public realm.

**PROGRAM:**

The design exploration again involves a large site to accommodate a variation of production and public spaces. The feasibility of the research topic requires the accommodation of both large and small scale manufacturing, to ensure localised production is feasible. Exploration pushes:

1. **Vertical Production Modules**
2. **Learning/Research Centre**

In addition the design contributes a sense of place-based identity as a ‘conceptual gateway’ to the suburb’s centre.

The site is also a redundant petrol station which will need the additional excavation work to remove existing tank pits and remediate the site (fig 6.08). For this reason development engages with underground infrastructure systems to utilise the excavated space.
VERTICAL PROGRAM:

The design focuses on the concept of vertical production systems for multiple companies, to operate within one facility using shared production spaces, Hybrid Space (production+consumption) and a public education centre.

The factory’s program accommodates future digital manufacturing systems (see Literature Review, page 17), which contribute to localized, small-scale mass production.

The vertical factory model is designed to manufacture an individual product, however each tower may be used by a different company.

Manufacturing works through a central vertical circulation system, where material is taken to the top the dedicated tower and processed downwards on successive levels. The final product is then tested at ground level and distributed through underground infrastructure systems to dedicated transport.
VERTICAL FACTORY
GENERIC CONDITION:

- Underground Infrastructure provides a degree of separation between public and production space, creating safer Pedestrian Open Space at ground level.

- Exposed Back Door and Production Space Transparency are achieved through facade treatment and increased visibility/spectacle of tall, individual Vertical Factory structure, at multiple distances from the street.

- Shared Production and Infrastructure Systems allow a condensed vertical assembly structures, reducing building footprint and increasing Pedestrian Open Space.

STRATEGIES:
STRATEGIES:

- Clustering multiple vertical facilities with Shared Production Infrastructure Systems on the site to increase manufacturing capacity while creating Open Public Space at ground level.

- Open Space at the base of the clustered Vertical Factories can be used for urban greenspace, seating and native planting to reduce public association of production space as dangerous and unhealthy places.
ASSESSMENT CRITERIA

PUBLIC REALM

✓ DIVERSITY:
  Integrated Production Systems and manufacturing processes through Transparent Facades contributes a visual spectacle to the public realm.

✓ LEGIBILITY:
  Creates a 'conceptual gateway' marking an entrance into the suburb's central public domain.

✓ VISUAL AESTHETIC:
  The transparency of material transportation and manufacturing towers provide a spectacle to the streetscape, however the strong vertical building form is slightly out of the existing urban context.

✓ HUMAN CONTACT:
  Manual Production processes are located towards the base of the Vertical Factories, however there is limited close up contact between workers and public space.

✓ SAFETY:
  With Underground Infrastructure and Integrated Production Systems confined within the facility, public space is physically separated from production activity.

NEW PRODUCTION SPACE

✓ REGENERATION:
  Revitalises a redundant petrol station with a factory encouraging localised production and contributing a vertical spectacle of manufacturing processes to the public streetscape.

✓ PUBLIC INTERACTION:
  Vertical Tower provides a visual spectacle at different scales and distances from the street, catering to both pedestrians and motorists.

✓ LOCAL CONTEXT:
  Encourages Localised Production, however does not contribute to local building character.

✓ SUSTAINABILITY:
  Re-develops a polluted site with a function that encourages both small and large scale localised production and resilient urban environments.
STRATEGIES:

- Clustering multiple vertical facilities with Shared Production Infrastructure Systems on the site to increase manufacturing capacity while creating Open Public Space at ground level.

- Underground Infrastructure + clustered towers at one of site provides safer Pedestrian Open
ASSESSMENT CRITERIA

PUBLIC REALM

✓ DIVERSITY:
Similar to Concept_1 the design contributes visual aesthetic to the public streetscape, but also adds Pedestrian Open Space for public gathering and events.

✓ LEGIBILITY:
Creates a ‘conceptual gateway’ for the centre while also creating a Large pedestrian open space, enhancing public connection between Riddiford St. to future production space developments on Gordon Pl.

✓ VISUAL AESTHETIC:
Tower presents similar aesthetic as Concept_1 however is less dominant on site due to clustering at one end. Focuses visual attention on a singular mass.

✓ HUMAN CONTACT:
The learning centre and open space between the Vertical Factory cluster provide more suitable public gathering spaces than Concept_1.

✓ SAFETY:
Similar to Concept_1 production and public spaces are physically separated.

NEW PRODUCTION SPACE

✓ REGENERATION:
Similar to Concept_1 but also contributes an open public gathering or Event Space.

✓ PUBLIC INTERACTION:
Vertical Tower provides a visual spectacle at different distances from the streetscape, catering to both pedestrian and transit.

✓ LOCAL CONTEXT:
Encourages Localised Production, however doesn’t contribute to local building character or urban context, however is slightly less dominant than Concept_2.

✓ SUSTAINABILITY:
Re-developes redundant site of consumption with localised production and public space. Less capacity for production space, but more for public space than Concept_2.

Contribution to Riddiford Streetscape:
STRATEGIES:

- Big Opening is used on the solid mass to break up the form and activate the street edge.

- Pedestrian Open Space at the end of the site, sets the building back from Riddiford St. creating a less dominant expression. The open space however is at the south end of the structure and may be too big to activate under the shadow if the large factory.
ASSESSMENT CRITERIA

HIGH QUALITY PUBLIC REALM

✔️ DIVERSITY: Contributes a similar visual spectacle to the public streetscape through Vertical Factory as Concept_1 and 2, along with a physical learning centre on the ground level.

✔️ LEGIBILITY: Design creates the ‘conceptual gateway’ while also extending the existing built streetscape along Riddiford Street, helping to improve connectivity towards the suburbs centre.

✔️ VISUAL AESTHETIC: Presents a similar aesthetic as Concepts_1 and 2 however rhythm of complex Vertical Factories and separate solid mass grounds the design within the local urban context.

✔️ HUMAN CONTACT: More opportunity for engagement at street level and through the Pedestrian Open space on the end of the site, with the internal production spaces and learning centre.

✔️ SAFETY: Although there is a level of interweaving and close proximity between production and public space on ground level of the building, the Vertical Factory systems separate the spaces reducing conflict.

NEW PRODUCTION SPACE

✔️ REGENERATION: Similar to Concept_1 and 2 but contributes a smaller open public gathering space.

✔️ PUBLIC INTERACTION: Vertical Tower provides a visual spectacle at different distances from the streetscape, while the open space and learning centre running through the centre of the building creates opportunities for pedestrian contact.

✔️ LOCAL CONTEXT: Encourages Localised Production, and connects better to the existing urban context and built street edge. The solid form is set back from Riddiford St with the lighter Vertical Factories creating a less dominant form than Concept_1.

✔️ SUSTAINABILITY: Re-developes redundant site of consumption with localised production and public space.

Contribution to Riddiford Streetscape:
STRATEGIES:

-Solid mass merges building into the built urban context, while transparent bays on ground level reduce the dominance from the street

-Big Opening extends around the site to engage more with Riddiford Street

-Public open space concentrated in one area of the site
ASSESSMENT CRITERIA

HIGH QUALITY PUBLIC REALM

✓ DIVERSITY:
  The simple and complex compositions suggest a variety of different uses for each space.

✓ LEGIBILITY:
  Building contributes to extending the existing built urban context of Riddiford St. towards the centre.

✓ VISUAL AESTHIC:
  The simple singular large element balances out the complexity and repetition of the vertical frames.

✓ HUMAN CONTACT:
  Engages with people at street level and increases activity of the area by providing local jobs.

✓ SAFETY:
  Vertical organisation and basement infrastructure separate conflict on the pedestrian ground level.

NEW PRODUCTION SPACE

✓ REGENERATION:
  Provides visual spectacle Pedestrian Open Space is easier to activate with no alcoves into the site off Riddiford Street.

✓ PUBLIC INTERACTION:
  Visible activity and pedestrian space extending from the street into the site.

✓ LOCAL CONTEXT:
  The solid form ground the building within the urban street edge, while the light towers activate the street edge.

✓ SUSTAINABILITY:
  Variety of different sized production spaces to increase manufacturing and encourage localized production.

Contribution to Riddiford Streetscape:
**Concept_1 Reflection**

- Light vertical structures maximise the visibility of production activity at different distances from the public street, engaging with both slow pedestrian and fast moving vehical traffic.

- Vertical organisation reduces the building footprint, providing more pedestrian space at ground level,

- Light structures don't appear to connect with massing of existing building context.

**Concept_2 Reflection**

- Pedestrian Open Space breaks up the site, providing a focused point on towers at one section of the site.

- Large vacant area extends off the established street edge and could be used for public gathering.

**Concept_3 Reflection**

- The solid form helps to ground the design into the urban context, while the setback of the solid form reduces the dominance of the structure on site.

- More Pedestrian Open space, but is less desirable in the buildings shadow

**Concept_4 Reflection**

- Overall building composition fits the urban street context while maximising the use of different scale production spaces to engage with the public visually and physically.

- Pedestrian Open Space enhances physical interaction between the existing public street and the learning centre.

- Solid mass ‘floats’ with transparent bays on ground level increasing activation at pedestrian street

- Set back increases attractive pedestrian open space, and reduces dominance of mass, while lighter
6.33 SITE C DESIGN SOLUTION

Site Plan Key:

- Public Access
- Service Access
- Site B

Factory Plan Key:

1. Vertical Production Space
2. Learning/Research Centre
3. Enhanced Urban Pedestrian Space
4. Loading Bay
The design solution contributes to the public realm through maximised visibility of transparent production spaces at different distances from the street, and a pedestrian Open Space expanding off existing public space providing access to the learning centre. Existing and new strategies helped to enhance the buildings relationship with the street.

- Vertical Factory reduced building footprint and maximised visibility of production activity from the street.

- Big Opening increased variety of visible production spaces.

- Underground Infrastructure Systems separated public and production circulation, increasing ground level public space.

The final solution provided a convincing architectural composition within surrounding context and created an interesting balance between solid and light structures. The balance of simple solid forms at the back and lighter complex forms on the street edge reduced the dominance of the building on the site and grounded it within the existing urban context.

The vertical organisation and contrast of built forms increased the variety of different production spaces visible at different levels form the streetscape, however the lighter vertical factories fail to provide shelter along the pedestrian street edge.

Overall the design could be developed further through more extensive facade treatment to consider the surround context etc.

**ASSESSMENT CRITERIA**

**HIGH QUALITY PUBLIC REALM**

- **DIVERSITY:** The simple and complex compositions suggest a variety of different uses for each space.

- **LEGIBILITY:** Massing extends existing public street edge of Riddiford Street towards the centre.

- **VISUAL AESTHETIC:** The simple singular large element balances out the complexity and repetition of the lighter vertical frames.

- **HUMAN CONTACT:** The public open space extends from the existing street into the learning centre, where production and public circulations interweave vertically, increasing contact between different spaces.

- **SAFETY:** Vertical and underground development separate production and public circulation.

**NEW PRODUCTION SPACE**

- **REGENERATION:** Similar to that of Concepts_1, 2 and 3, however the Pedestrian Open Space is easier to activate with no alcoves into the site off Riddiford Street.

- **PUBLIC INTERACTION:** Building provides a variety of different visual production spaces while also providing a potential multi-use public event space on the end of the site extending into the learning centre function.

- **LOCAL CONTEXT:** Grounded solid form contributing to the existing urban street edge, while transparent towers maximise visibility to fast moving motorists.

- **SUSTAINABILITY:** Variety of larger production spaces increased capacity and feasibility of localised production.
7.0 CONCLUSION

The conclusion begins with a brief Design Reflection Summary of research, highlighting key design strategies used in both the urban and architectural scales and evaluating the design's success in relation to the Assessment Criteria set out at the beginning of the research.

The conclusion then sets out to reflect upon how successful the research was in addressing the issue of changing manufacturing processes and declining public space quality in suburban centres.
7.10 Design Reflection
SUMMARY: (Exegesis)

Urban Design:

Urban Design Criteria were used to identify locations for development, to maximise the production space’s contribution to the suburb’s existing public realm.

Design Strategies developed from the precedent studies were categorised into New Production Space Types:

- Vertical Factory
- Innovation Floor
- Event Space
- Hybrid

These ‘Types’ provided an effective toolkit for Urban Design Frameworks, providing solutions for site specific development which would benefit existing functions and public amenities within the suburb’s centre. The variation of public activities associated with these ‘Types’ helped to define where areas of development should occur in relation to building density and pedestrian foot traffic.

Key Findings:

The development of new production based zones, proved to be an effective strategy for production efficiency through shared infrastructure, and clear legibility of production functionality, however development of this nature generally occurs on the fringe of the suburb’s centre in less dense and populated areas. This form of development can compete and detract activity from the centre, failing to regenerate the established public domain.
ARCHITECTURAL DESIGN:

Massing models below illustrate the three sites and their relationship with the public space.

**SITE A: Detailed Design**

**SITE B: Massing and Spatial Configurations**

**SITE C: Speculative Design on Visual Presence**

KEY FINDINGS:

- Small Scale development explored generic design strategies (page, 99) which enhance production facilities’ contribution to public space. These strategies achieved a high level of contribution to the public street by increasing visibility of manufacturing processes and merging the physical realms of production and consumption.

- Large scaled development combined the use of generic strategies with additional massing and spatial planning strategies involving modular and transparent building street front treatment and expansion of pedestrian open space into the site from the existing public street. In both cases, key objectives improved definition and activation of the established public street and a new open space courtyard.

- More isolated sites away from compact, low rise central areas can focus on contributing to the public realm through maximising the visual spectacle of production activity, and the means for enhancing place-based identity through urban land marks.

Informed by previously developed strategies and observations of massing and planning on larger sites, the design solution achieves engagement at ground level with existing public space, and at different distances from the street. The larger site again relied heavily on diverse massing compositions and transparency through lighter structures to create a less dominant and more engaging building.
RESEARCH ISSUE:

Public streetscapes of suburban centres traditionally provided a variety of social, economic and cultural functions, forming a highly diverse and active public realm. Over the past century suburban centres have been stripped of diverse civic functions, becoming heavily reliant on consumption activities to retain the vitality of the public realm.

OBJECTIVE:

The objective of the research was to investigate how architectural design can assist the re-introduction of production space to suburban centres and in doing so enhance the public realm.

The importance of architecture was explored through both an urban design and architectural scale, to gather a wide understanding of the relationship between New Production Spaces and their contribution to increasing diversity and social engagement within the public realm.

CONSTRAINTS/DRIVERS OF DESIGN:

Industrial production spaces are generally considered large, dangerous, noisy and unhealthy places, confined within simple warehouse or shed like structures. This form of building lacks any real contribution to public space or local identity.

The scope of the research was explored through urban design framework iterations and architectural design concepts to consider their transformative effect on the public realm, however limitations to the research involved;

Zoning Principles:

The research does not focus on solving issues of City Planning Regulations, but engages with the changes to manufacturing processes which have mitigated previous issues of conflict with public space, making the re-introduction of production space a more probable idea.

Feasibility + scale of design solutions:

The practicality and feasibility of local production, meant that re-introducing production space must consider a variety of small and large scale manufacturing processes. Declining sites of consumption space within the suburban centre also varied in scale, reflecting the need for production space to contribute to the public realm through both small and large sites.

The variation in scale of potential production spaces how refined the design/s would be at both urban and architectural scales.

Context:

When regenerating an area through new development, design should also consider place-based identity and local urban character. The low rise, and compact nature of the site meant variations to the organisation of manufacturing processes needed to be addressed.

Practicality and efficiency:

The functionality associated with production spaces and transportation systems operating within close proximity to public space, to the extent of merging both spheres.

DESIGN PROCESS:

Research through the Literature Review provided a base criteria for a high quality public realm. These criteria focused heavily on the importance of human engagement within the public realm and established a focus for the Design Explorations. Precedent Production Spaces were therefore assessed on how they regenerate urban areas and existing public spaces.

Precedent Future Factories focused on accommodating flexible digital manufacturing processes to encourage local business, production, and education facilities, acting as a strategy to increase social and economic activity within the areas. The spatial organisation of Precedent Vertical Factories and multi-use production spaces also provided strategies to increase diversity and public occupation on large sites.

Development of New Production Types identified Design Strategies which enhanced production spaces contribution to the public realm at both an urban and architectural scale.

Exploration of architectural design strategies at sites of different scales and proximity to the suburb’s central public domain, pushed the research further.

The design exploration process changed after the reflection of the first design solution. The first solution measured the success of design strategies on a small site with an individual manufacturing space. Strategies enhanced visibility and human contact through merging public and production spaces. These strategies were then re-used on quick concept design explorations for larger sites to create a more efficient process.

This change in design process created a quicker method for designing on large sites, considering the Urban context, however reduced the level of detail in the final design solutions. The contribution of architectural explorations at multiple scales helped to prove the practicality and feasibility of the research topic.
ARCHITECTURAL FINDINGS:

-Site Availability

The dimensions of available retail sites appeared to suit the requirements of new production spaces, also increasing the range of potential sites for development. This was due to the variety and scale of redundant retail sites and the flexible small-scale nature of new manufacturing processes.

-Open Space:

New public open space (in relation to urban design criteria) helped to aid the organisation and integration of public and production space through new streets, lanes and courtyards. This worked effectively on larger sites, reducing the complexity of the site and providing multi-use public gathering and event areas within close proximity to production spaces.

A consequence of this however was an extension of the public realm, rather than focusing on strengthening existing public spaces. The benefits of new production based activity therefore dispersed throughout the centre, rather than working exclusively within the public street. This reduced the potential for shared amenities and infrastructure between sites.

-Scale of Production Space:

Small-scale production spaces provide effective infill solutions, strengthening gaps of declining building fabric along compact central streetscapes. Architectural strategies developed from the precedent study enhanced the building designs contribution to the public realm by increasing opportunities for visual and physical engagement of manufacturing and public space.

This development contributes place-based identity to the public realm through heritage retention, increased streetscape diversity by providing hybrid functionality (merging production and public consumption spaces). This solution strengthens existing public space, however only caters for boutique small-scale manufacturing.

-Production on larger scale sites can also enhance the public realm. This can be achieved through modular compositions and transparent sections of the buildings street frontages, diverse massing and integrated pedestrian open spaces. Larger scaled development makes the practicality of localised production more efficient.

Through visual architectonics, it was relatively easy to give the frontages of new production spaces a degree of composition and complexity that complemented heritage retail facades. This increases the range of sites within the local context for development, however it also increases the cost of new production spaces in relation to conventional production environments.

-Safety:

Issues of public safety often led to vertical separation between ground level public spaces and production material components. The developed gantries and basements added architectural spectacle but potentially added additional costs in relation to conventional production environments.

-POTENTIAL PROBLEMS:

- Due to the emphasis on urban design, the architectural solutions did not fully resolve the aesthetic of detailed facades, materiality and local character. Less emphasis on detailed design caused a consequent loss of certainty in the design solutions.

-The Urban Frameworks integrate proposed production sites and infrastructure with existing transportation routes, however these plans do not account for the potential population rise and congestion of existing public transport routes.

- The un-refined treatment of vertical factories and solid building forms may detract from the local urban context, however this could be remedied through further site specific development of façade design and materiality with future projects.
ARCHITECTURAL RESOLUTION:

This thesis argues that architecture plays an important role in the re-introduction of production space as a regeneration strategy for suburban centres. Architecture considers urban context through public space, the built environment and local character, all of which differ slightly for every centre.

Spatial planning and organisation of the vertical factory, open space courtyard and hybrid all explore and attempt to enhance the relationship between production activity and public space while ensuring the efficiency and safety of both functions. Well-designed building forms and urban planning can enhance public open space and pedestrian streetscapes.

IMPORTANCE AND FUTURE RESEARCH:

The exploration of a newly emerging concept of localised production, and the extent to which the research investigated at an urban and architectural scale limited the resolution of final solutions.

The findings from the research of this urban project are generic, without providing a heavily resolved design solution for each site. However it has set up a series of frameworks and strategies which consider the implications of New Production Spaces operating within close proximity to the public realm and how to enhance this relationship through architecture.

Architectural solutions attempt to establish a base for how New Production Spaces can contribute to the public realm, outlining the proximity of merging production and public spaces within a suburban context. These architectural solutions could be further developed through more specific building façade and interior space designs to enhance the buildings contribution to the public realm.

The research can be applied, and expanded, as a base strategy to assist future regeneration projects, for strengthening the public realm of suburban centres.
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