

*" OUR ENGINEERS HAVE  
WORKED ON OVER **ONE  
BILLION DOLLARS** WORTH  
OF **HERITAGE** AND  
**ADAPTIVE RE-USE**  
PROJECTS "*

Adaptive Re-Use and  
Heritage Engineering  
Capability Brochure

## THE BROWN FIELD SITE

Often referred to as “brown field sites”, developments which involve alteration or extension to existing buildings pose unique risks and complexities to the potential property developer.

Determining the financial viability of your development is a difficult task with “green field sites”. Issues such as rising costs of construction materials and labour as well as rising interest rates means that the profit margin on developments have become more and more at risk. As a result, property developers are finding themselves getting squeezed from both ends financially.

Introducing additional uncertainties for brown field sites adds further complexities and risk which intensifies this “squeeze”. This is because potential development constraints of brown field sites can influence not only the complexity of construction and therefore costs, but also constrain the yield on a value per square meter basis.

## HOW WE CAN HELP

Our engineers have worked on over one billion dollars worth of existing brown fields developments both with and without heritage overlay. This wealth of experience places us in a unique position to assist our clients in navigating the complexities and uncertainties associated with brown field sites.

We leverage this experience and expertise for our clients in order to assist them in making critical commercial decisions when it comes to developing their brownfields site.

The costs associated with the structural component of your development can account for between 30% and 40% of the project budget and can often be the deciding factor in determining if your project will financially “stack up”.

Understanding the development potential for your brownfields site can allow you to progress with confidence, or equally as important, understand when a development may not be financially viable to allow you to explore alternative options. Our engineering team can provide the necessary key information to help remove the unknowns associated with developing within the brown-fields environment.



## OUR UNIQUE SOLUTION

During the due diligence and preliminary phases of your project, we make use of our brown field project experience and knowledge on historic construction techniques as well as historic building material strength characteristics we hold in our data library. This allows us to provide you with a preliminary understanding of your existing structures capacity and potential future capacity.

As your project progresses through to concept phase, we assist in on-site testing to verify your structures as-built characteristics. We partner with trusted sub-consultants who specialise in both destructive and non-destructive structural testing to existing buildings. This is a process we manage wholistically and allows the property owner to gain a good level of understanding on the structural characteristics of their building, to safeguard the financial position of the development.

At detailed design stage, we take this data which has been collected for your structure and incorporate it into our rapid engineering design tools. This allows us to maximise efficiency from the structural design and reduce overall construction costs for your project.



*Used the QR code to see one of our rapid building design tools in action*

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## “ CHANGING THE PARADIGM OF STRUCTURAL ENGINEERING ”

## SHEER FORCE ENGINEERING

### WHO WE ARE

Sheer Force Engineering thrive in tackling Engineering's biggest challenges. We specialise in Structural Engineering design solutions to cater for adaptive re-use of existing buildings and heritage preservation. Large enough to service projects of significant scale, yet small enough to retain dedication and quality service for our customers, we strive for customer satisfaction.

### SERVICES

- Structural Engineering Design
- Civil Engineering
- Forensic Engineering
- Existing Structure Assessment
- Heritage Stakeholder Engagement
- Non-Destructive Structural Testing
- Reinforcement Scanning
- Concrete sampling and testing
- Seismic Strengthening
- Heritage Façade Retention
- Structural Rehabilitation
- Building Extensions

### WHY CHOOSE US

Projects associated with structures of heritage significance pose unique challenges to developers and Architects alike.

The heritage approval process can result in lengthy delays to your delivery programme and cause significant cost increases to your project

Construction materials and building techniques have evolved countless times over the last century making it difficult to determine your structures strength and adequacy to support additional loads or satisfy present day code requirements

Sheer Force Engineering has a breadth of experience which allows you to progress your project with peace of mind. Implementing initiatives such as hiding structural interventions in plane sight and actively participating in Heritage Victoria stakeholder engagement sessions, we ensure elegant solutions and processes to speed up your heritage approval process.

Our library of historic building material strengths and characteristics also ensures you maximise safety and yield on your building extension.

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## ADAPTIVE RE-USE

### REDUCE/RE-USE/RECYCLE

Now, more than ever, the global community is becoming increasingly aware of the environmental impacts of our day-to-day choices. From our travel choices to our clothing choices and even our eating choices, the decisions we make can influence the carbon footprint we leave behind for generations to come.

Perhaps the largest contributor to our carbon footprint; the built environment accounts for a significant portion of environment impacts and carbon emissions. This, coupled with the rising costs of construction materials due to post-pandemic inflation has driven a revolution in the reuse and re-purposing of existing building stock

- But where does one begin?
- Can I convert my office building to an apartment building?
- How many additional levels can I construct on my existing building?
- What are the cost and compliance considerations I need to factor into the commercial feasibility of my adaptive re-use development?

We can assist you navigate these questions and devise elegant and efficient structural solutions to assist you in making important decisions on your project right through from feasibility to construction.

Using our state of the art analysis tools coupled with our knowledge on historic construction techniques and building material characteristics, we can ensure your development is safe, code compliant and maximises yield and returns on your investment.



### AN END-TO-END STRUCTURAL SERVICE

When modifying, strengthening or extending an existing structure, a thorough understanding of the existing structural characteristics is key to understanding your projects feasibility.

We collaborate with our trusted consultants and sub-contractors to streamline the process of testing and gathering information on your existing building. Services we coordinate and manage directly for our clients include:

- Non destructive testing
- Reinforcement scanning
- Timber Grading
- Concrete core sampling
- Integrity testing
- Materials Testing

By managing this process for our clients, we can streamline the design and feasibility process. This also ensures that the right data and information is obtained for your building when managed by the Principal Structural Engineer.

## HERITAGE ENGINEERING

### PRESERVING HISTORY

Melbourne has a rich architectural history enviable the world over. Regulatory bodies such as Heritage Victoria strive to preserve this rich history.

If your development site holds a heritage overlay, this can pose risks from an approvals and commercial point of view. Conversely, it can also allow the opportunity for you to produce a truly unique product.

From a safety and BCA compliance perspective, understanding your heritage structure is key to unlocking maximum potential for your development. We call upon our breadth of experience in historic structures and construction techniques to allow a thorough understanding on your structures development potential.

Design standards, building materials and construction techniques change with the evolution of research and understanding in these topics over time. We have an extensive library of past design standards, materials specifications and period specific structural documentation that allows us to determine your existing heritage structures load rating capacity.

This allows our clients to make informed commercial decisions with respect to their developments.

### ACTIVE INVOLVEMENT IN STAKEHOLDER ENGAGEMENT

We play an active role in stakeholder engagement with respect to heritage approvals, not a passive role.

Whether its discussions with local council or bodies such as Heritage Victoria, we believe that stakeholder engagement is a consultant teams responsibility not left solely to the heritage consultant or architect.

Our key individuals have been successful in assisting to achieve critical Heritage Victoria approvals for developments such as the Queen Victoria Market where the structural component of the project plays a significant role in the overall heritage fabric and story of the building.

# OUR APPROACH

## 1. FEASIBILITY

Arguably the most critical phase of your project. Critical questions during this period are:

- Is this project financially viable
- If heritage sensitivities exist, are heritage approvals likely to prevent the project from going ahead

On both of these counts, we can help. We can provide input and advice on critical elements such as demolition logistics, construction methodology and likely structural framing alternatives which suits your specific project sites constraints.

## 2. CONCEPT

Ongoing engagement with Heritage Victoria may be required. We play an active role in these engagement sessions where the structural solution plays a significant part in the heritage outcome. We believe that HV engagement is a consultant teams responsibility not left solely to the heritage consultant or architect.

For projects both with or without heritage overlay, we employ our rapid design analysis tools in order to road test and compare various structural solutions allowing you to chose the most efficient solution for your project.

## PROJECT LIFECYCLE

## 3. DETAILED DESIGN

Accurate coordination across each design discipline is key to the success of your project. We actively coordinate in the 3D environment. We use this environment to actively coordinate and collaborate with the wider consultant team. This ensures that your project is set-up for success when construction commences. We also ensure the most efficient structural solution for your project while maintaining strict code compliance. This is important considering that 30-40% (or more) of your project construction costs may be associated with the structural component of the design.

## 4. CONSTRUCTION

We provide construction phase services including periodic site inspections and ongoing coordination with the wider consultant team and your chosen contractor.

This is the final stage of the process to ensure that safety and design intent is maintained through the construction period, ensuring that you are left with an outcome which holds true to the original project vision.



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## KEY INDIVIDUAL PROJECT EXPERIENCE

# QUEEN VICTORIA MARKET RENEWAL PROJECT

## DESCRIPTION

The existing national and state heritage-listed open-air sheds at the Queen Victoria Market were constructed in circa 1880's. Structural upgrades, strengthening and maintenance were required to the over 140-year-old "heritage sheds" to achieve current-day BCA compliance and protect the longevity and heritage of these landmark structures.

The brief was clear; allow the market to operate for future generations to come while preserving the story and fabric of the market precinct, this required hiding structural interventions in plain sight...



## CHALLENGES and OUTCOMES

- Multiple and complex stakeholder engagement
- Significant heritage sensitivities
- Critical public and tourism infrastructure
- Location of an historical first nations burial site
- Proposed works needed to pose minimal disruption to market operation

Through effective design and stakeholder management the ultimate outcome was achieved; structural renewal without obvious signs of intervention.

This was achieved through active involvement in the stakeholder engagement process with Heritage Victoria and using cutting edge structural analysis techniques.



Client:  CITY OF MELBOURNE

Heritage:  trethowan  
ARCHITECTURE  
INTERIORS  
HERITAGE

Architect:  NHArchitecture

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## KEY INDIVIDUAL PROJECT EXPERIENCE

### EQUITY CHAMBERS

#### DESCRIPTION

Equity Chambers at 472 Bourke Street, was constructed in circa 1930-1931 designed by architects Oakley & Parkes.

Originally constructed to cater for office use and safe room storage, the development involved a total change in use to a luxury hotel offering operated by Hilton Hotels.

Other key elements to the site include a 6 level rooftop extension to the existing building and part demolition to the rear of the site to cater for a new 17-storey tower.

#### CHALLENGES and OUTCOMES

The key structural challenge for this project was determining the additional load carrying capacity of the existing structure and allowing maximum development potential and usable space.

The solution was a unique hybrid structural steel floor system for the proposed additional 6-level roof top extension. This substantially reduced the structural weight of the new floors thus allowing for maximum height of development for the client.

Client:



Heritage:



Architect:



*"Quentin's innovative, flexible and collaborative design approach ensured we achieved a cost effective, buildable solution that accommodated all of the competing demands of the hotel brief. " – Development Manager M&L Hospitality*

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## KEY INDIVIDUAL PROJECT EXPERIENCE

### 2 RIVERSIDE QUAY - PWC

#### DESCRIPTION

2 Riverside Quay began its life as an 8 storey car park located in South Bank. The new development works introduced a new 12-level vertical expansion to the existing structure. Maximum height was achieved through introduction of a high-performance thin post-tensioned slab to the new office floors. A fully revitalised façade design was implemented to tie the new office development visually to the ageing 8-level car park. The project began with a rigorous existing structure investigation which included core sampling and reinforcement scanning

#### CHALLENGES and OUTCOMES

Key structural challenges with this development involved achieving full compliance to current standards for seismic design as well as maximising the yield of the building in order to make the project financially viable. This was achieved through an innovative approach of introducing two new core structures on the western and eastern edges of the existing building. These core structures also catered for the new developments vertical transport and service riser needs. NLA was maximised through adoption of a high-performance thin post-tensioned slab which allowed the maximum number of new floors to be constructed and be safely supported by the existing structure.

Client:



Architect:



*"Without a doubt, Quentin has the most exceptional approach to resolving complex design with a calm, structured and collaborative approach" – Brian Donovan Senior Project Manager Mirvac*

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### FESTIVAL HALL

#### DESCRIPTION

Due diligence study, with Cox Architecture, for a potential purchaser of the historic Festival Hall Structure.

Originally constructed in circa 1913, the venue hosted Gymnastics and Wrestling during the Melbourne 1956 Olympic games and world class music acts such as the Beatles and AC/DC.

The Heritage Council of Victoria listed Festival Hall as a place of cultural heritage significance in 2018. This heritage overlay restricts potential development as the heritage fabric of the structure largely needs to be retained



#### CHALLENGES and OUTCOMES

The client required answers fast. During the short due diligence process to purchase the site, the client required a detailed understanding of the existing structure and its ability to support their proposed live event rigging loads. The solution was rapid prototyping of structural options and a detailed assessment of the existing building to allow the client to make an informed commercial decision regarding its future development potential during their due diligence process.



Client:



Architect:



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## KEY INDIVIDUAL PROJECT EXPERIENCE

### JACK DYER GRANDSTAND

#### DESCRIPTION

Project undertaken directly for Richmond Football club to assist them in better understanding their precincts development potential. The engagement began with a detailed assessment on the existing condition of the as-built structure followed by a prescriptive report on strengthening and remedial measures that were required in order to bring the grandstand up to current BCA standards (including a full seismic and wind assessment). The grandstand possesses a heritage overlay which further complicates the aspirations for Richmond FC developing their site.



#### CHALLENGES and OUTCOMES

Richmond Football Club required a good level of understanding regarding what load the existing grandstand structure could support as well as its compliance with current design standards in order to help them finalise their training facilities master planning. This was made complex without the aid of existing structural documentation

The solution was a meticulous data collection process to the existing building which included inspecting the tiered seating structure, collecting structural member data and timber grading.



Client:



Architect:



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### NORTHCOTE PRIMARY SCHOOL

#### DESCRIPTION

A direct engagement by the principal contractor to perform temporary works engineering. Originally opened in 1874, Northcote Primary School contains heritage buildings of significant age. Temporary engineering advice involved propping design and needling design and staging advice to facilitate demolition of internal load-bearing walls and enlargement to existing façade openings to cater for the proposed new classroom layouts

#### CHALLENGES and OUTCOMES

The propping solution was made challenging by poor soil conditions and the presence of an aged timber and joist floor structure. This prompted an innovative approach to the needling and propping design. The solution was a counterbalanced needling system which harnessed the existing brick walls and their foundations for propping support which prevented the need to prop down to the aged timber floor or poor ground soil.



Client:



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