



Shaping a Circular Sustainable Future

Module 10

Deconstruction as an Element of a Building Life

Circular Economy in the Construction Industry



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Summery



Within this module trainees will see deconstruction as a continuation of a building's life cycle. They will delve into different elements within the deconstruction phase such as Pre-demolition surveys, Urban mining and Designing for deconstruction. They will see the value in deconstruction and relate this to Multi-functional Green Roofs Facades and Interior Elements.



Objectives/Learning Outcomes



- 14 – Extract and reuse parts from end-of-life roofs, façades, or interior elements for use in new buildings
- 18 – Collect products and materials for reuse or recycling in roofs, façades or interior elements from the construction industry
- 59 – Compile demolition specifications for multifunctional green roofs, façades, and interior elements and provide them at final commissioning of the building
- 77 - Conduct post occupancy survey and analysis for building with multifunctional green roof, façades, or interior element



Content



- Pre-demolition survey
- Circular Deconstruction
- Urban mining
- Application for Multi-functional Green Roofs Facades and Interior Elements



Pre-demolition survey



Presentation



Pre-demolition survey

When a building is to be demolished the (non-domestic) client (usually the property owner) has a duty to provide pre-demolition information to the designer and contractor. This will involve a pre-demolition investigation and survey.

Before any work commences, a full site investigation must be made by a competent person to determine the hazards and associated risks which may affect the demolition team and members of the community who may pass close to the demolition site.



Source:<https://www.totaldemolition.co.uk/pre-demolition-survey/>

The Purpose of Pre-demolition survey

The main purpose of a pre demolition survey is to -

- Map the services on site
- Determine if there are any hazardous materials on site
- Carry out a soil and foundations survey



Source-<https://www.sumoservices.com/blog/2018/10/1/are-you-willing-to-hit-buried-utilities>



Source:<https://www.totaldemolition.co.uk/pre-demolition-survey/>

Building Demolition Process

1



Survey the building

2



Remove hazardous materials

3



Prepare the
demolition plan

4



Implement safety measures

SafetyCulture



Source: <https://safetyculture.com/topics/building-demolition/>

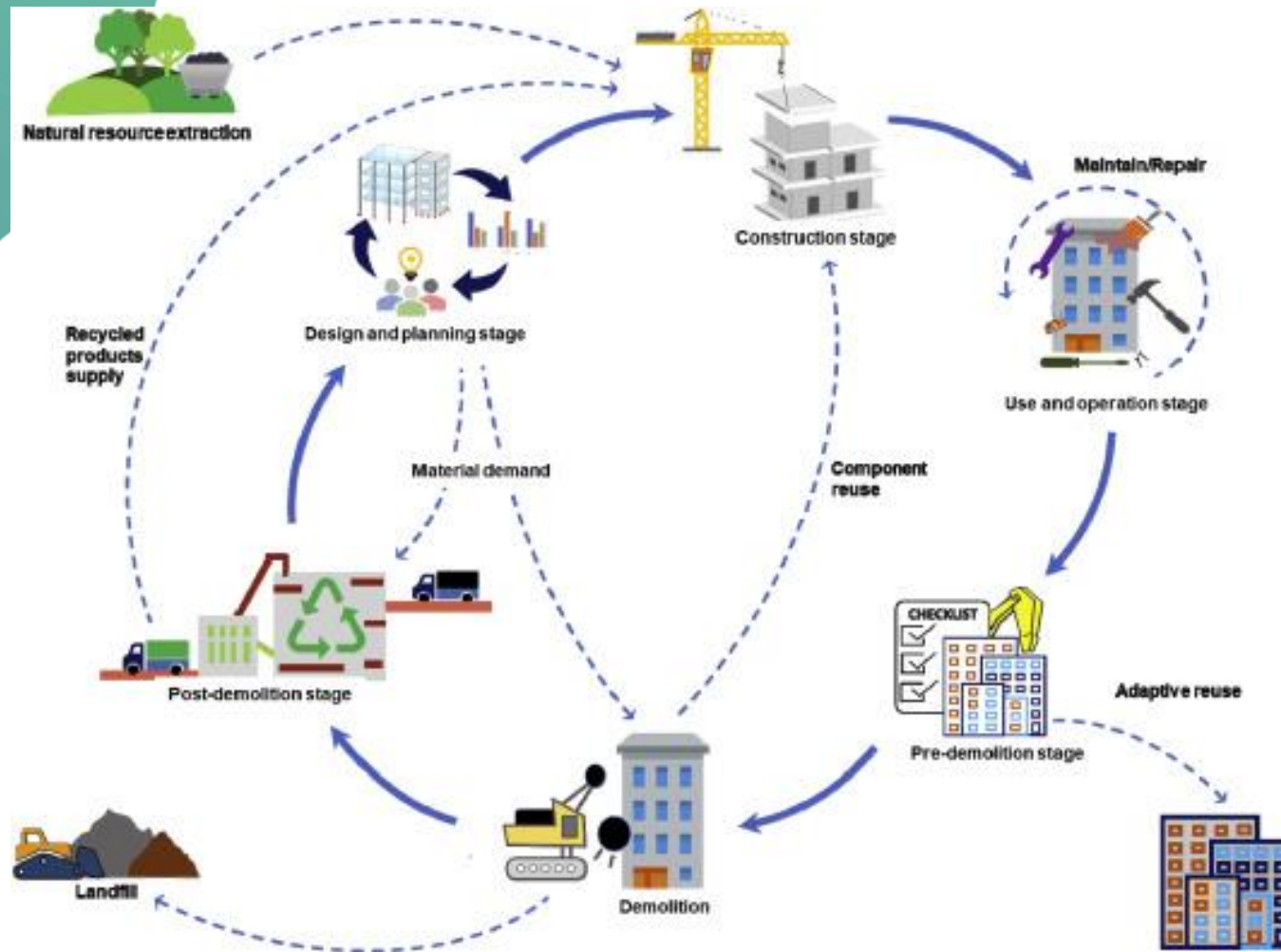
Pre-demolition survey for Circular Economy



Pre-Demolition surveys can be utilised for the circular economy by not only mapping out the the three areas identified above but also looking at the materials within the building.

Fittings furniture and appliances are often removed prior to the demolition process, however, other materials such as concrete, timber and steel can all be reused within the construction sector.





Source: <https://www.sciencedirect.com/science/article/abs/pii/S036013232200645X>



Circular Deconstruction



Circular Deconstruction



Circular Demolition is the demolition, dismantling, disassembly and removal of materials that are released becoming available again for high-value reuse in other projects. This makes circular demolition a vital link in the circular economy.



Source:<https://www.metabolic.nl/publications/circular-demolition/>

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The Importance of Circular Demolition



Out of the 6,000,000 tons of materials released in the Netherlands in 2014 through demolition of residential and non-residential buildings, the majority was recycled (88%).

However, this material is mostly reused in a low-value form, such as filling under buildings or in civil and hydraulic engineering projects.

Only 0.2% was in fact reused at product-level. Low value recycling means that the value accrued during original manufacturing and assembly is lost.



Source: <https://www.metabolic.nl/publications/circular-demolition/>

High-grade products with high-recycled content

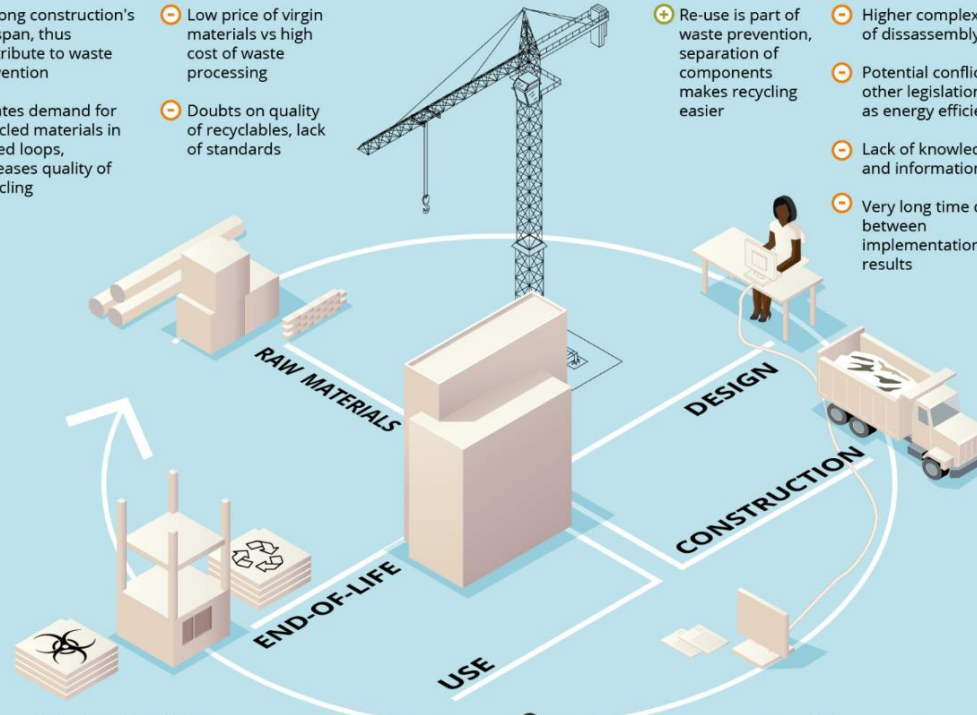
Materials with high durability used in structural elements

- + Prolong construction's life span, thus contribute to waste prevention
- + Creates demand for recycled materials in closed loops, increases quality of recycling
- Low price of virgin materials vs high cost of waste processing
- Doubts on quality of recyclables, lack of standards

Design for disassembly

Design construction products so they are easy to separate into components that can be reused, reassembled, reconfigured, recycled

- + Re-use is part of waste prevention, separation of components makes recycling easier
- Higher complexity of disassembly
- Potential conflict with other legislation such as energy efficiency
- Lack of knowledge and information
- Very long time delay between implementation and results



Selective demolition

Remove hazardous materials and increase source separation into high-value, pure material fractions

- + Increase quantity and quality of recycling
- More time consuming and potentially more costly demolition
- Lack of traceability (limited information on waste material origin and quality)
- Complexity of buildings and construction materials

Extension of construction service life

Renovate, improve maintenance, upgrade, repair and adapt constructions

- + Implementation of waste prevention
- + Avoidance of new construction and related environmental impacts
- Energy inefficient buildings also extend their life span
- Risk from the presence of inferior materials in buildings and degradation of structural building elements
- High labour costs
- Changes in architectural preferences

Material passports

Sets of data describing defined characteristics of materials and components in building products

- + Facilitates source separation of end-of-life materials, increases recycling quality and closed loops
- Information and data management for long time periods
- Costs of data gathering and storage



Obstacles to Circular Demolition

The use of secondary materials is still insufficient for a number of reasons.

- The demand for secondary materials is still relatively limited
- The price of circular building materials is often higher than their linear alternatives
- The physical facilities for storage and reprocessing are not always adequate
- The quantity and quality of materials from demolition projects offered for reuse are still unsatisfactory.



Source: <https://www.archdaily.com/943293/giving-demolished-building-materials-a-new-life-through-recycling>

Source: <https://www.metabolic.nl/publications/circular-demolition/>



Obstacles to Circular Demolition



In addition, there is still a lack of incentives or obligations for circular demolition, resulting in a market that has not yet fully embraced circular demolition. Take practical obstacles:

- There is no time devoted to planning for inventories and disassembly,
- and opportunities for repurposing materials are not yet clear enough for many demolition workers and builders.

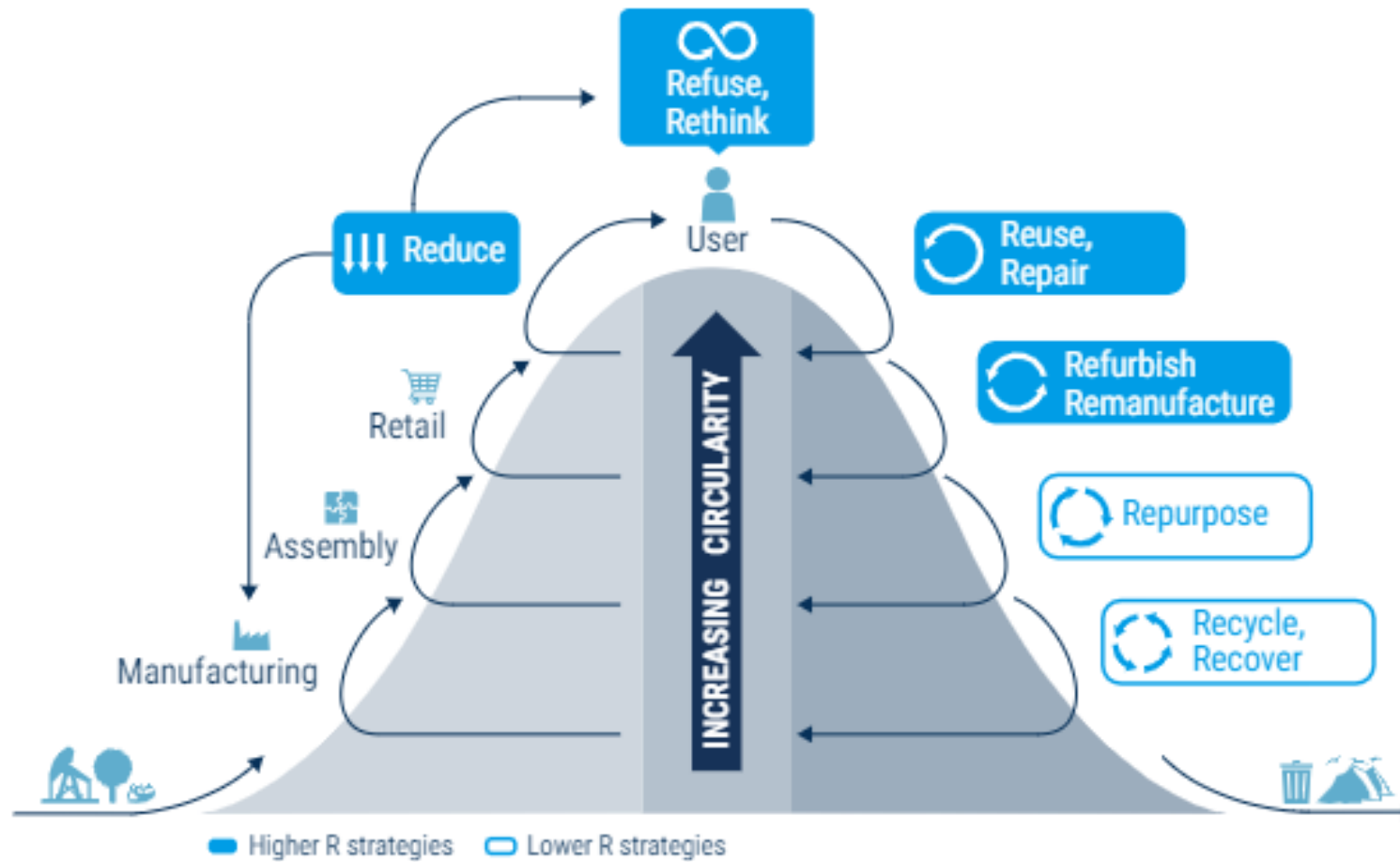
It is vital to promote the demand for secondary materials from demolition in order to combat these issues.

Further, you have to align your reuse process with the deconstruction process. If material becomes available too soon you will have to store these materials. That often happens mostly outside, where they deteriorate.



Source: <https://www.metabolic.nl/publications/circular-demolition/>

Figure 1: Adapted from 'Circle Economy - Master Circular Business with the Value Hill (2016).³



Source: <https://www.metabolic.nl/publications/circular-demolition/>

Circular Demolition Process in 5 Steps



- The timely signaling of demolition projects and making details about them available;
- Making an inventory of products and materials;
- Valuing and prioritizing inventoried products and materials
- Offering and repurposing
- Disassembly of the products and materials



Source: <https://www.metabolic.nl/publications/circular-demolition/>

Urban mining



Presentation



What does urban mining mean?



Urban mining is the process of reclaiming raw materials from waste products sent to landfill. On a conceptual level, it looks towards the waste generated by cities and urban environments as a valuable resource, using anthropogenic stocks rather than geological to meet the demands of manufacturing.



Source-
<https://www.malbaproject.com/post/urban-mining-the-future-of-material-sourcing>



Source:<https://www.rts.com/blog/what-is-urban-mining/#:~:text=Urban%20mining%20is%20the%20process,meet%20the%20demands%20of%20manufacturing.>

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What does urban mining mean?



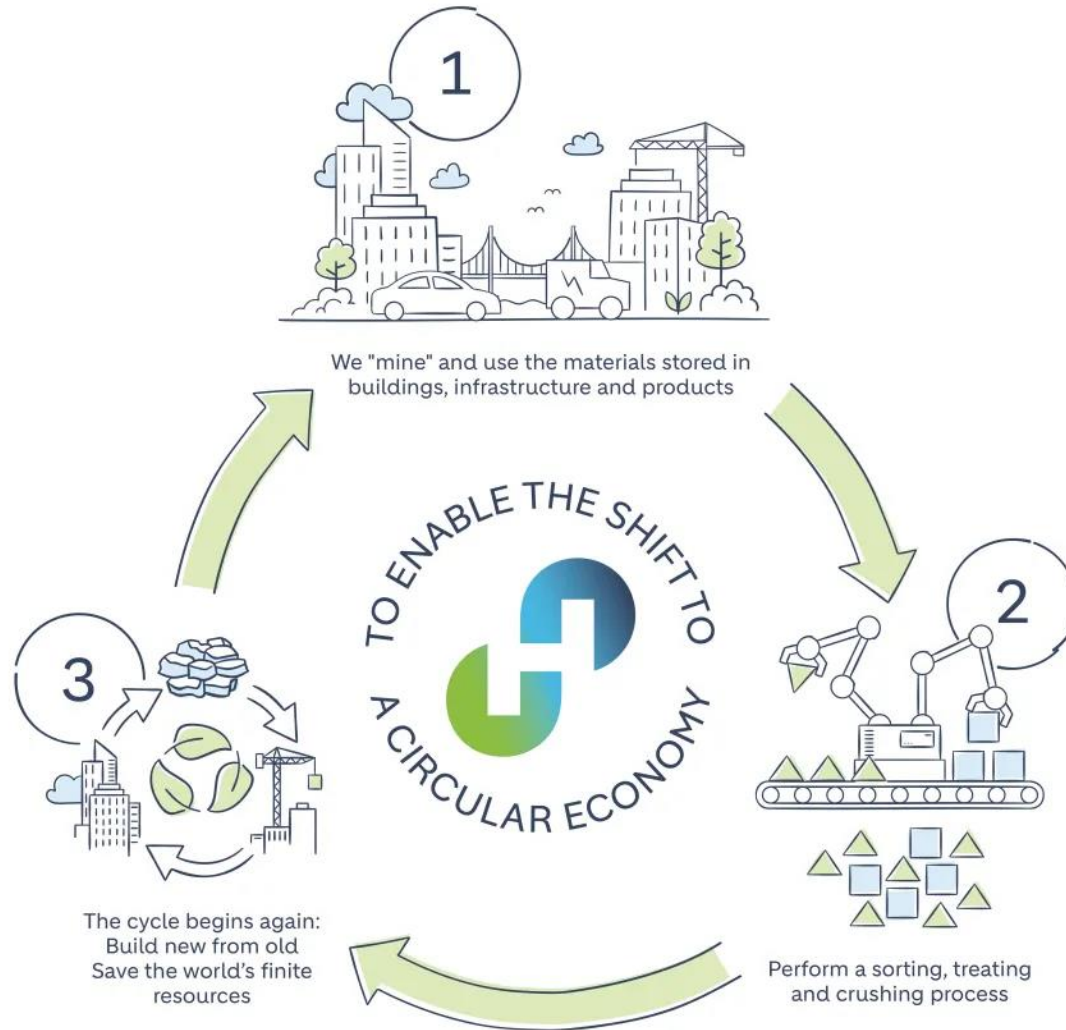
It commonly refers to the recovery of metals from e-waste but has been used more generally for the recovery and monetization of any materials from any waste stream, including:

- **Construction and Demolition Waste:** the recovery of wood, paper, card, rubber, metals, and more.
- **Municipal Solid Waste:** General recovery which could include everything from redirecting metals and plastics to commercial composting for resale.
- **Tires:** Specifically, the recovery of rubber and metal from tires and other rubber products.



Source: <https://www.rts.com/blog/what-is-urban-mining/#:~:text=Urban%20mining%20is%20the%20process,meet%20the%20demands%20of%20manufacturing.>

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This shows one example of how circular deconstruction may be carried out.

It must be ensured that regained materials do not end up in forgotten storage hubs. It is often better to align earlier with design and build processes where material will be needed, and coordinate in time.

Why is Urban Mining Useful



1. The age of cheap, abundant raw materials is over
2. Raw material recuperation from e-waste can be done increasingly cost-efficiently
3. In cities all over the world there are still millions of appliances waiting to be recovered
4. For some rare metals, urban mining is gradually becoming the *only* source
5. Urban mining avoids a substantial amount of pernicious effects on human beings and the environment
6. Classic mining alone cannot meet the rising demand for electrical and electronic appliances
7. The business community *and* investors are jumping on board the urban mining train



Source: <https://www.recupel.be/en/blog/7-reasons-why-urban-mining-is-overtaking-classical-mining/>

Application for Multi-functional Green Roofs Facades and Interior Elements



Walk the Line - The Scarcity and Creativity Studio - Ritoque, Chile

This project is located in Ritoque, Chile, in the site of the Open City, run by the Corporación Amereida and the School of Architecture and Design of the Catholic University of Valparaiso, which for fifty years has been constructing a town which now houses many of the school's staff and contains a church, cemetery and many public spaces and facilities.



Source: <https://www.archdaily.com/779712/walk-the-line-the-scarcity-and-creativity-studio>

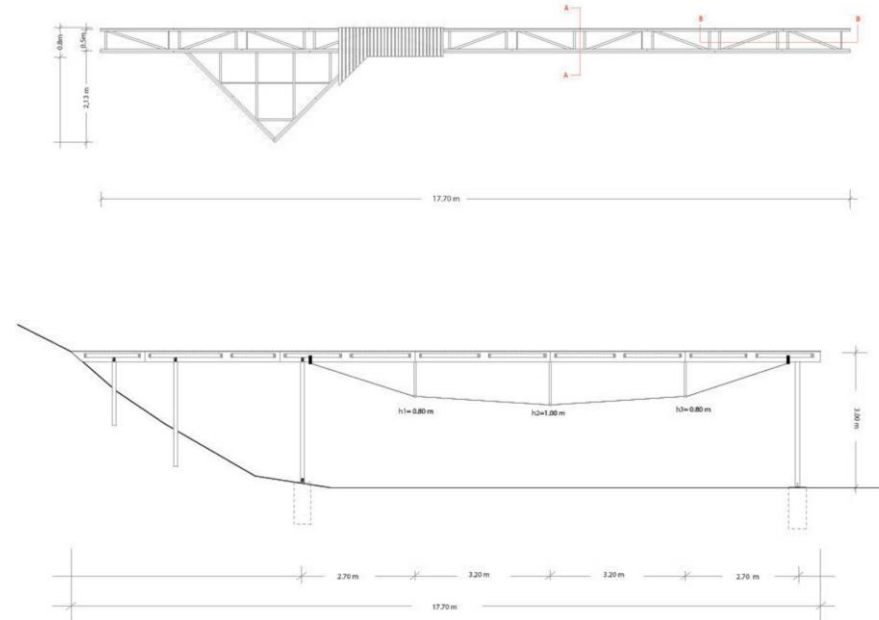


Source: <http://scs.aho.no/walk%20the%20line.htm>

Walk the Line - The Scarcity and Creativity Studio - Ritoque, Chile



Walk the Line departed from a study of Le Corbusier's 'house for an artisan' and consists of a small room in which to sleep and work and an elevated gangway for observation of the Pacific ocean and the nearby nature reserve.



Source: <https://architizer.com/projects/walk-the-line/>



Source: <http://scs.aho.no/walk%20the%20line.htm>

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The Opportunity

The reason I selected this building as the example for deconstruction is due to the fact that this building would be relatively easy to identify in terms of what can be saved and reused from this building.

Take a few minutes to note down what can be reused and repurposed from this project.



Source: <http://scs.aho.no/walk%20the%20line.htm>

QUIZ/ASSIGNMENT/ACTIVITY



Assessment / Exam



EXTRA READING/STUDY



Activity



EXTRA READING/STUDY



For Further Case Studies and Training Material Please Follow the Link Below

https://docs.google.com/spreadsheets/d/1DTte4Ph8pQ4IKzYGFt2_S-d1Z_Rmd9-i/edit?usp=sharing&oid=112148808974461842163&rtpof=true&sd=true



EXTRA READING/STUDY

Embodied Carbon

<https://www.igbc.ie/what-is-embodied-carbon/>





<https://busgocircular.eu/>



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<https://www.youtube.com/channel/UCXu4Rjs5WDXBE-yqda5kt5A>



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Colophon

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