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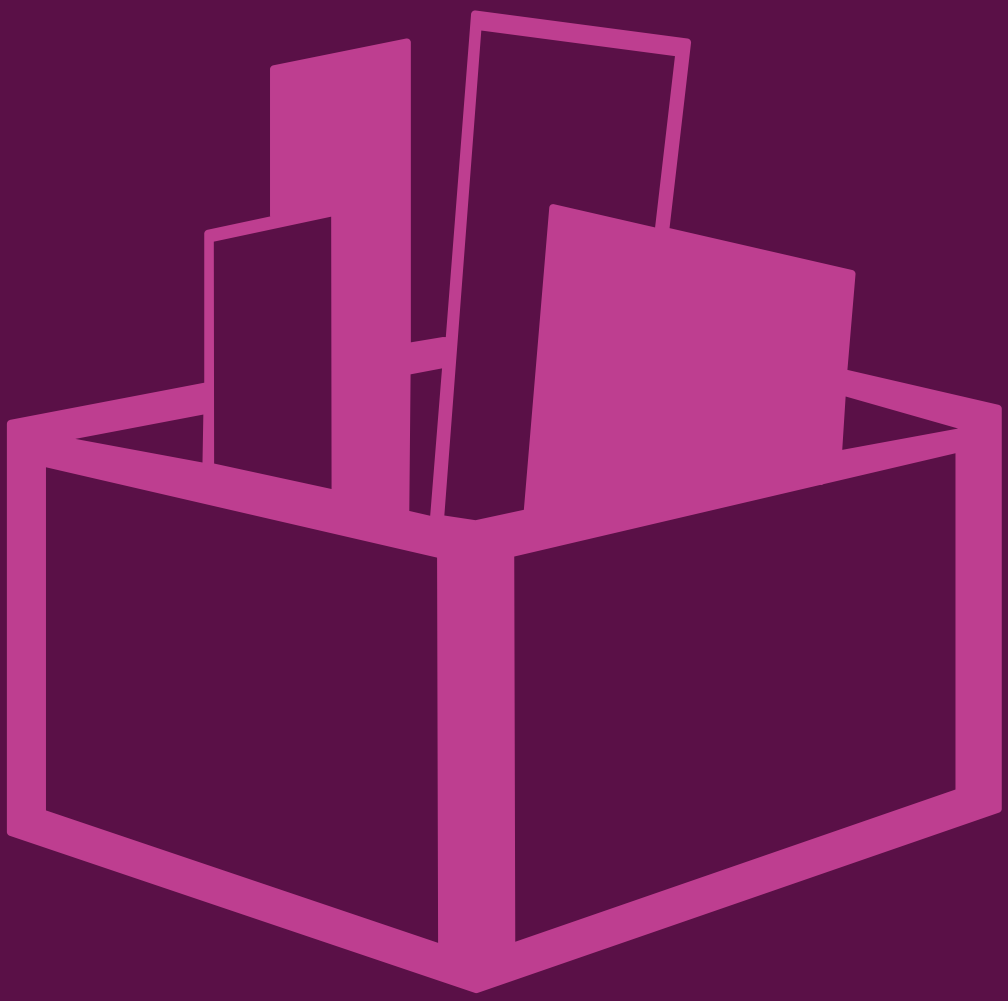
BCATS
BUILDING, CONSTRUCTION AND ALLIED TRADE SKILLS

Materials

Demonstrate knowledge of, select, and use materials for a Stage 3 BCATS project.



4 CREDITS

BCITO
He Hunga Hanga Mātou
building people

Te Pūkenga

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Introduction

This handbook will help guide you to develop knowledge of materials while doing your Building, Construction, and Allied Trades Skills (BCATS) project.

It will also help you decide which materials are best for your project and help you understand why different materials are used and how they're used in different ways.

You can improve your knowledge further by:

- talking to suppliers and employers about different materials
- reading information provided by manufacturers
- using the internet.

A successful BCATS student...

Knows:

- The right tools to use for a job
- The standard that is expected for a finished job
- The questions to ask to inform a job
- When to ask questions and when to give advice
- The skills needed to complete a Level 3 BCATS Project

Does:

- Turn up on time every day
- Follow instructions
- Follow Health and Safety procedures and show 'due care'
- Their work in a timely manner and to a high standard

Is:

- Honest and trustworthy
- A good timekeeper
- A team player
- Willing to learn
- Hardworking
- An outstanding representative of the school
- A confident communicator

Outcome

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Demonstrate knowledge of, select, and use materials for a Stage 3 BCATS project.

Outcome 1 - Demonstrate knowledge of a broad range of materials used for a Stage 3 BCATS project

1.1	Materials are described in terms of their purpose and function for a Stage 3 BCATS project.
1.2	Materials are identified and described in terms of their physical properties.
1.3	The methods and reasons for using different types of materials are explained in accordance with specifications and workplace practice.
1.4	The health and safety procedures when using different types of materials are described in accordance with specifications and workplace practice.

Outcome 2 - Select and use materials for a Stage 3 BCATS project

2.1	Material requirements for a Stage 3 BCATS project are confirmed in accordance with the BCATS project documentation.
2.2	Materials are selected and the selection is justified.
2.3	Selected materials are used safely to meet the Stage 3 BCATS project requirements.

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Assessment evidence and judgement

You need to collect evidence as you do your project. Some of this will come from the project documentation you develop and use. You can also record how and why materials are used in your student work diary.

To achieve this standard, you need to prove you:

- have selected a minimum of 4 different materiel types. This may include adhesives, coatings, timber, steel, sheet materials, glass, masonry, hardware.
- know the purpose of each material used
- know the materials' physical properties
- can explain why the selected materials are better for your project than other similar materials, according to their specifications and workplace practice. This could include explaining why you chose a grade of timber or type of paint, or how exposure to the elements influences fixings and hardware, type of paint, etc)
- can describe and show how to minimise harm to yourself and others when using the materials
- can use the materials correctly.

Your teacher (or employer if you are doing Gateway) will need to confirm they have observed you using the selected materials safely.

If your teacher (or employer) has told you what materials are needed for your Stage 3 BCATS project, you still need to know and show that you can select the correct materials. You will also need to find out why they chose a particular grade or type of material over another.

One place to start your research could be BRANZ. BRANZ is an independent building materials research and testing organisation with a lot of information about different materials and how to use them. www.branz.co.nz

Why you need to know about the materials you choose

Material selection is an important part of any project and will contribute greatly to the design, function, performance and aesthetics (look).

In the construction industries there are many criteria for choosing materials for projects. Some criteria are required by law due to earthquake risk or weather resistance. Others are able to be selected according to personal preference, such as aesthetics or budget.

Some of the materials you'll use will be ones that you're already familiar with and have used a lot, while others might be new to you or unique to your project. You'll need to research, ask questions, do costings and maybe even carry out tests. Make sure you keep records of your research.

Accurate research will help you select materials so that the end product look good and function properly. It will also help develop your understanding of materials' different properties and health and safety requirements, how material will perform in different conditions, and the best options for meeting project requirements within budget.

Research could be undertaken through the internet, conversation with a teacher or supplier, reading Safety and Product Data Sheets, and talking to others in the industry.

Safety Data Sheets and Product Data Sheets provide important information about materials, including hazards, how to use and store them, and what to do if they get on you, your clothes or the environment.

You should build and use your knowledge of materials while you're working on your project.

When choosing materials think about

- → **what** you're making,
- → **why** you're making it,
- → **who** will use it,
- → **where** it will end up once it's finished,
- → **how much** it will cost and
- → **what** it will need to withstand.

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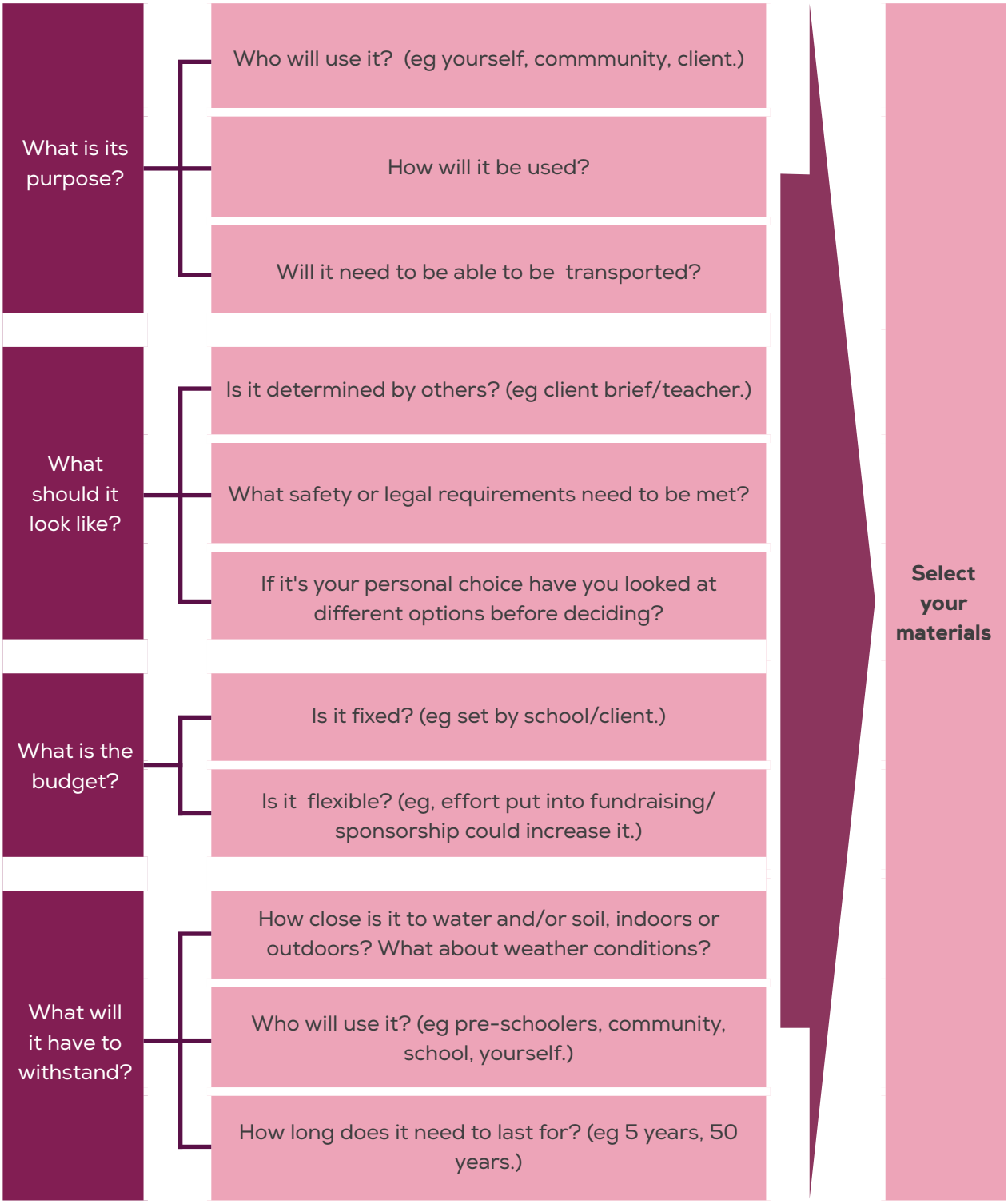
Material selection in a BCATS environment

The choices you make when selecting materials will affect everything, from the overall look and usability of the project, to the way it holds up to time and the elements.

Most selection criteria are due to the design specifications of your project. For example, you wouldn't necessarily use the same timber for non-structural work as you would for structural, the same paint to prime old wood as new, or the same fastenings near the sea as inland.

Choosing materials

Questions to ask yourself when choosing materials



4 Costing materials for your project

Cost is important to think about when you're choosing materials for any project.

Good tradespeople will always look for the best price for a product because keeping costs down makes good business sense.

When you're working to a budget, it's tempting to choose the cheapest material for the job. **But cheapest is only best when you're comparing two products that have the same properties and perform in the same way.** You need to compare 'like with like'.

It's important to know the difference between cheap and cost-effective.

The example below shows four variations of plywood available from one merchant.

(Source: www.bunnings.co.nz on 21 December 2017. Current prices may differ from those above. Our thanks to Bunnings for permission to include this screenshot.)

	 J-Ply Plywood Struct H3.2 2400x1200 12mm $62.74	 Timber Structural Plywood 12mm Treated 2400x1200 DD H3.2 $53.74	 2400 x 1200mm 17mm Structural H3.2 CD J-Ply Plywood $87.65	 2400 x 1200mm 17mm Structural H3.2 DD J-Ply Plywood $86.65
Model Name	12mm CD Ply 2.4m H3.2	12mm DD Ply 2.4m H3.2	2400x1200 Structural 17mm H3.2 CD J-Ply Plywood	2400x1200 Structural 17mm H3.2 DD J-Ply Plywood
Model Number	12CDF812002.4H3.2	12DDF812002.4H3.2	17CDF812002.4H3.2	17DDF812002.4H3.2
Material	Plywood	Plywood	Radiata Pine	Radiata Pine
Colour	-	-	Natural	-
Product Dimensions (mm)	W:1200 H:12 L:2400	W:1200 H:12 L:2400	W:1200 H:17 L:2400	W:1200 H:17 L:2400
Package Dimensions (mm)	W:1200 H:610 L:2400	W:1200 H:610 L:2400	W:1200 H:614 L:2400	W:1200 H:614 L:2400
Weight	871.65kg	871.65kg	878kg	878kg
Features	New Zealand Made Independently certified to ASNZS2269 Strong and durable Flat Panels Sourced from Sustainable radiata pine forests	New Zealand Made Independently certified to ASNZS2269 Strong and durable Flat Panels Sourced from Sustainable radiata pine forests	Manufactured in New Zealand from New Zealand grown timber FSC certified. Assurance that the plywood is produced from renewable and well managed forests. Meets Australian and New Zealand standard: AS/NZS 2269.0:2012. CCA treated for exterior or wet area use, 150mm above ground contact. Easy to cut and fix with normal woodworking tools	Manufactured in New Zealand from New Zealand grown timber FSC certified. Assurance that the plywood is produced from renewable and well managed forests. Meets Australian and New Zealand standard: AS/NZS 2269.0:2012. CCA treated for exterior or wet area use, 150mm above ground contact. Easy to cut and fix with normal woodworking tools
Common Uses	general construction, under butanol decks	farm building cladding, kennels, lining sheds	Underlay for water proof decks, general construction and flooring in wet areas	Exterior floors, vehicle decks, boxes and bins
Maintenance	Paint and seal or stain	-	-	-
Structural Grade	F8	F8	F8	F8
Timber Species	Radiata Pine	Radiata Pine	Radiata Pine	Radiata Pine
Treatment Type	CCA H3.2	CCA H3.2	CCA H3.2	CCA H3.2

If you were basing your decisions entirely on the price of the material, you might be tempted to choose the $53.74 option, which is almost $34 cheaper than the most expensive option.

However, you need to use your knowledge of materials, their uses, their durability and their function to decide which is best. The cheapest could be perfect for one project but the worst option for another.

How trade professionals choose materials

All building materials sold in New Zealand must meet minimum industry requirements. To help make an informed choice you can use the selection criteria that industry professionals use to choose their materials.

There are a number of key factors industry professionals consider when selecting materials.

1. **Performance requirements.** Will the material perform the way it needs to in its intended environment?
2. **Environmental impact.** What is the environmental impact of choosing, using, living with, and disposing of the material?
3. **Availability.** Is the material in stock? If not, how long will it take to deliver?
4. **Workability.** Will the material chosen be easy to work with?
5. **Aesthetics.** Will the material chosen have the right 'look' for the project?
6. **Cost.** Are the materials within budget?

Performance requirements

- Regulatory requirements. Materials must meet any legal requirements.
- Health and safety. Materials should minimise risk to people both during construction and over the lifespan of the completed product.
- Structural capability. Where relevant, materials should be selected for their ability to support the loads over the completed product's lifespan.
- Durability. Durable materials reduce maintenance and replacement requirements.
- Maintenance requirements. Unless the design specifies otherwise, materials should be easy to maintain or need little maintenance.
- Moisture resistance. Materials should be selected either on their natural moisture resistance or their ability to be fully protected from moisture.
- Thermal performance. Good thermal performance reduces energy demand.
- Sound insulation. Where relevant, materials should be selected to contribute to sound insulation.
- Fire performance. Ignitability, surface spread of flame, fire loading, and fire resistance and stability must be considered.

Environmental impact

- Energy and resource use. Consider the total energy used in the extraction, production, transportation and construction of a the material.
- By-products and emissions. Materials can be selected based on the processes used in their production and destruction.
- Recycling and reuse. Materials can be selected based on whether they can be reused or recycled.
- Source. Materials can be selected based on how far they have to travel, keeping transport costs and emissions to a minimum.

Availability

- Local availability or, if not available, delivery lead-times need to be considered.

Workability

- Ease of construction and installation is an important consideration. You don't want to make it harder than it has to be!
- Adaptability. Materials can be selected based on their range of uses, future use and/or reuse of the materials.

Aesthetics

- The design should specify the materials that will meet the visual requirements of a project. Depending on who the project is for (eg client or self), personal preference for how it should look could allow flexibility for final choices.

Cost

- Initial purchase cost will always be a consideration but life cycle costs, maintenance, replacement, demolition and disposal costs should also be considered.

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