



Integrated Design Process in the Built Environment

REDUCE WASTE AND EMISSIONS | INCREASE EFFICIENCY | SAVE COSTS

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Is the current disconnected and siloed approach to delivering construction projects creating the best outcomes?

Could better results be achieved if all key parties in the delivery of the project were working together from the start?

Use Integrated Design Process principles in your projects to achieve better outcomes.

What is Integrated Design Process?

Integrated Design Process (IDP) is a collaborative approach to design. It involves all relevant parties working together from the very beginning of a project.

It has three key principles:

- 1. Purposeful Collaboration from the Start:** Unlike traditional methods where each phase (design, construction, etc.) is handled separately and information is siloed, IDP involves all key parties (clients, architects, engineers, specialists and contractors) from the very beginning of the project. This early collaboration is based on agreed purpose and goals and driven by self-responsibility. It leads to more cohesive planning and execution. The project benefits from the collective intelligence and agreed goals.
- 2. Holistic View:** Instead of focusing on individual parts of the project, IDP looks at the whole. This helps create designs that are more efficient, sustainable and suited to the users' needs
- 3. Flexibility and Iteration:** Ideas and plans are constantly refined throughout the project, based on ongoing feedback from everyone involved.

How can IDP reduce waste in construction projects?

- 1. Efficient resource use:** Early and continuous collaboration leads to better planning and decision-making. This ensures better team decisions and more efficient resource use. It reduces the likelihood of material overuse and waste.
- 2. Early problem identification:** Because all stakeholders are involved from the start, potential issues can be identified and resolved early. This avoids costly and wasteful changes later in the project. Diverse and often conflicting elements of the building can be considered holistically and harmonised for overall success – performance, waste, functionality etc.
- 3. Optimised material selection:** With a holistic view, materials and methods are selected not just for their immediate purpose but for their overall impact on the project. This can lead to choosing more sustainable, durable materials, reducing waste over the building's lifecycle.
- 4. Reduced rework:** Continuous collaboration and feedback mean that designs are more likely to meet the client's needs and project requirements from the outset. This reduces the need for rework which is a significant source of waste in traditional construction processes.
- 5. Consideration of longer-term impacts:** Keeping everyone involved ensures all stages of the building's life are considered, from design, build, use and end of life.

Circular Economy Framework

This construction specific framework* is useful in bringing circular economy principles to life.

Build Nothing by refusing unnecessary new construction.

Build for Long Term Value increasing building utilisation and designing for longevity, adaptability, disassembly and re-use of materials at the outset.

Build Efficiently by refusing unnecessary components and increasing material efficiency.

Build with the Right Materials by reducing the use of virgin material, use of carbon intensive materials and designing out hazardous/pollutant materials.

*From ARUP and Ellen MacArthur Foundation

Steps to use IDP in construction projects

1. Select a manageable project segment

- Consider an area of the design or construction of the project, perhaps challenging or underperforming, and request support and focus to use these IDP principles. It could be a design phase, material selection, or a particular goal. This could include such things as Zero Energy Certification, zero waste to landfill or zero harm.

2. Assemble a diverse team

- Form a team consisting of relevant and appropriate parties (architects, engineers, specialist sub-contractors, users, clients). Ensure this team has diverse perspectives and the overall understanding of the project necessary for a holistic approach. If you are unsure who should take part, ask those you know who else should be included.
- Appoint someone to lead the process. They will facilitate, help define the challenge, plan meetings, workshops and when tasks need to be completed.

- Don't expect people to work for free. Be prepared to pay an hourly rate. This leads to savings and better results.

3. Design and deliver the first collaborative planning workshop

- Briefly introduce IDP and its principles. Build trust and shared goals (see Agenda below).

4. Define success - set clear objectives and performance goals

- This might be something like designing out all waste (materials, time, re-work). Create specific and measurable objectives.
- Decide what you want to monitor and measure (including waste designed out or avoided) to check your progress.

5. Learn as you go

- Encourage rich dialogue and reflections among all team members throughout the process, such that all the team understand the challenge and how they can contribute.
- The IDP lead can adapt and refine project plans based on this feedback.

6. Monitor and document the process

- Share and test proposals with the larger team, clients and anyone else involved. Include them in the design proposals once you've assessed their worth and worked them into your plans.
- Document stories of successes, challenges and lessons learned for future reference and continuous improvement.

7. Evaluate and reflect

- Consider how you did against your initial goals. Reflect on what was successful and areas for improvement, using this insight for future work.

8. Share knowledge and expand the use of this process

- Share the results, experiences and insights gained with the broader team or organisation.
- Use the knowledge acquired to expand the application of IDP principles to larger parts of the project or other projects.

Following these steps will normalise this way of working.

Start where feels appropriate but ensure the objectives provide 'stretch' for the team so the project becomes more than 'business as usual'.

Case study: Opito Bay bach

What: New 160m² Bach

Where: Opito Bay, Coromandel

Owner: Horst and Gemma Schosser

Architect: Miles Healey at Construkt Architects

Main contractor: Paul Young at Twin Solutions

Timeline: Consent granted early March 2024, broke ground 27 March. Scheduled for completion November 2024.

How IDP principles were used compared to standard practice:

Twin Solutions, as the main contractor, liaised with the architect from the early stage design. This approach influenced a number of material choices and design tweaks to assist the build project and reduce waste.

The clients were then involved along with the engineers, as the architects moved into the developed design stage, influencing the build methodology. On-going liaison between all parties resulted in the fine tuning of material choices and aspects such as water tanks, attic stairs and water pumps.

What benefits have been achieved by using IDP principles compared to a standard process?

The house site slopes away at the lower end so 15 cubic metres of hard fill was avoided, which would have had to be brought over from Whitianga, by using a Rib Raft floor system instead of a slab on grade.

The use of the Cleva Pod Rift Raft system also saved 24 cubic metres of polystyrene blocks being used in the flooring.

The building was closed in more quickly by the decision to use GIB Weatherline RAB. This kept the interior dry allowing work to carry on inside before the cladding was put on.

The windows were brought in line with the insulation to improve thermal performance via the use of APL Centrafix windows.

The doubling up of timber in the walls was reduced by swapping from 2 x 90mm studs to 140mm wide studs. This reduced thermal bridging and increased the amount of insulation in the wall.

“ Communication was natural and open from the start and builder Paul Young (Twin Solutions) was on board with our vision for the site – with a mutual respect for each other’s skill sets we were able to bounce ideas off each other and find solutions as consenting challenges and structural issues arose.

Being able to chat about how construction details come together on site taught me a few things, which influenced our detailing and material specification, ultimately producing a better outcome for our client.”

- Miles Healey, Construkt Architects.

Case study: Wharf 7

What: Wharf 7 Rebuild – design and build a longer, stronger and more resilient wharf

Where: Eastland Port in Gisborne / Tairāwhiti

Owner: Eastland Port

Main contractor: McConnell Dowell

Timeline: ECI August 2020, construction April 2022–August 2023

How IDP principles were used compared to standard practice:

Eastland Port chose an Early Contractor Involvement (ECI) contract process as the best way to achieve outcomes, such as reducing carbon emissions and value engineering. By engaging early and openly, ECI contracts have been found to be a good formula for developing creative construction solutions.

The team identified the high risks of the retaining wall design and a geotechnical assessment, and an independent driveability test confirmed that advice. At the tender stage of the ECI process McConnell Dowell provided a detailed estimate of an alternative deck on pile design that would reduce cost by 10% but required a complete redesign. The Port took a calculated risk and a new design was developed in six weeks compared to the usual 24 for construct only job.

What benefits have been achieved by using IDP principles compared to a standard process?

The biggest win was innovating to develop a design that reduced the cost, programme length, environmental impacts, and carbon footprint of the project.

The new design removed the need for 85,000t of hardfill (saving 2543t CO₂e*) reduced the number of piles by 50% and the amount of steel required overall by 70% (saving 3450t of steel and avoiding 9961t CO₂e*). Sustainability initiatives implemented during the design and construction stages saved a total of 13,692t CO₂e*.


Other benefits included:

- 2,833 fewer truck movements through the city. This reduction and changing to a drill and drive methodology resulted in significantly less commercial risk.
- Increased seismic resilience, improved operational longevity.
- Minimised seabed disturbance, avoiding impacting rua koura (crayfish puerulus) breeding grounds identified as a key concern by mana whenua.
- Reduced the noise and vibration for neighbours.

The team were empowered to innovate throughout the project. Realising the carbon savings of the new deck on pile design was only the start. Other ways to reuse, reduce and recycle included:

1. The in-house temporary works team came up with designs that reused available steel saving the procurement of 3695t of new steel and reducing carbon emissions.
2. Approximately 4250t of the old wharf deck was cut and craned away to the Port's storage yard so it can be reused on a future project.
3. 4000t of waste concrete was crushed as reused in a new staging area at another Port yard site.
4. Custom site protection was created using old timber from the wharf and waste concrete blocks. After the project was complete the extra waste concrete blocks the main contractor had sourced stayed at the Port to be reused. The old logs were then recycled to generate positive broader social outcomes. A local forestry company cut the logs into discs, and a loader from the site was used by the local fishing club to load it onto trailers. The 'firewood' helped raise money for a new incubator for the local hospital.

* CO₂e means carbon dioxide and equivalent greenhouse gas emissions such as methane. Figures were calculated using the emissions factors from the Ministry for the Environment, [Measuring Emissions: 2022 detailed guide](#).



“Taking the time to collaborate has led to a project which has had minimal issues and will result in all the outcomes that were important to Eastland being achieved.”

- Marty Bayley, GM of Infrastructure & Development at Eastland Port.

“The ECI process is the best way to involve contractors in a project when there’s the most scope for innovation, and they can realise as many value engineering opportunities and possible.”

- Mike Bonnette, Project Manager, McConnell Dowell.

Case study: WM Head Office

What: WM 9100m² purpose-built mixed-use facility accommodating corporate and operational activities

Where: 11 Springs Road, East Tāmaki, Auckland

Owner: Industre Property (Stride Property Ltd / JP Morgan joint venture)

Architect: Jasmax – Office + Hub
Eclipse – Industrial + Workshops

Jasmax Integrated Design Process was curated and facilitated by Jerome Partington

Engineer: Cosgroves – Services, Engineering and Green Star Accredited Professional

Main contractor: Haydn & Rollett Construction

Timeline: Staff moved in December 2019

How IDP principles were used compared to a standard practice:

A series of three all-team workshops were facilitated during Concept and the end of the Preliminary Stages with small focus workshops between. This allowed WM to share its core values and purpose, critical H&S, sustainability aspirations, brand and staff equality as drivers to align the team.

The focus sessions were used to rapidly explore multiple options, guided by WM values, around materials, waste, energy, water, staff wellbeing,

workplace design, leasing and financials to make ‘optimal’ team decisions. So at this early design stage, everybody was responsible for success and able to focus on excellent project plus workplace outcomes: quality indoor health, daylight and Red List free materials, significant water and energy efficiency all compliant with Green Star and Net Zero Energy.

What benefits have been achieved by using IDP principles compared to a standard process?

The team experience and feedback was positive, the developer and tenant WM became integral to the design process, the consultants were highly motivated, the ‘big wins’ cost less than little ones and the process was definitely more enjoyable. Whole-of-life value was compared against op-ex costs, which ensured this ‘optimal’ design survived value management process.

IDP contributed to the WM HQ being recognised in the Property Council Awards:

- 2020 Supreme Award
- 2020 Green Building Property Award (Best in Category)
- 2020 Industrial Property Awards (Best in Category)
- 2020 Commercial Office Property Award (Excellence)
- 5 Green Star Design and As Built rating (April 2022)

“This project was about collaboration in action, and the Integrated Design Process was used to develop a design that enabled the full potential for the end user to be realised. This is a very powerful process but not used enough in Aotearoa.”

- Simon Wilson, RDT Pacific Director and Chair of the New Zealand Green Building Council Green Star Advisory Committee.

Case study: 26 Aroha Road

What: Multi-Unit residential development to offer long-term, quality rentals in a sustainable, low-carbon building

Where: 26 Aroha Road, Sandringham, Auckland

Owner: Blair and Jules MacKinnon

Architect: Jasmax

Engineer: Ecubed

Main contractor: Vivian Construction

Timeline: Occupancy from 2020

How IDP principles were used compared to standard practice:

Two workshops were held at the outset of the project to share values, grow the team and develop the concept. The first one developed the project vision. The second one brought all the consultants together to ensure the vision was owned by all.

The vision centred on the client's desire to create homes and community that addressed climate change and comfort, that people would want to rent and live in.

26 Aroha Road seeks to provide a high-quality rental experience typically reserved for owner occupiers. Furthermore, the design is a vehicle to build a cohesive

community of residents with shared facilities taking up around 30% of the building.

The owners felt a building designed to help people reduce their environmental footprint in their apartments, with more shared space, facilities and neighbourly contact, would be something current and future generations would want.

The client's strongly held future vision and the new model of living together with the value being created ensured the ongoing integration of the design to achieve success.

“It’s the small things at 26 Aroha that makes this place a wonderful living environment. With shared communal space such as the roof terrace and vege gardens, it’s hard to imagine that a renter could have access to so much. It’s great to live somewhere where everyone is involved in making this a success and invested in the vision.”

— Ama & Jacob, residents.

What benefits have been achieved by using IDP principles compared to a standard process?

The overall success of the building is demonstrated simply by the fact that people love the community and enjoy living there. They also enjoy the benefit of total monthly occupancy costs being 50% less than typical multi-unit development.

26 Aroha Road easily achieved a NZGBC 10 Homestar Rating (October 2021).



Case study: Housing Delivery System

What: Housing Delivery System – Kāinga Ora

The Housing Delivery System (HDS) is a new way of planning and building houses by Kāinga Ora to deliver quality homes faster and at a lower cost.

How IDP principles were used compared to standard practice:

- A key feature of the HDS is the co-location on all design disciplines required for project delivery in a single team (mini business unit), who all work together from the same physical office.
- Early engagement between the HDS design team, build partners and their subcontractors on all projects has been central to the success of the HDS.
- Early build partner and subcontractor input at initial bulk and location meetings ensured design was optimised for efficiency and buildability. This reduced re-work both during the design phase, and the potential on-site issues.

- Builder feedback was then incorporated in the Design Library so that builder feedback regarding opportunities for optimisation of plans could be incorporated into future developments.
- The continuous improvement helps to further reduce waste and re-work.

What benefits have been achieved by using IDP principles compared to a standard process?

Average construction times have reduced from 253 days to around 100 days for HDS projects. One build partner completed 3 x 1 bedroom units within 59 days using the system.

The pre-construction (design phase) has reduced by 94% from 17 months to 6 weeks (523 days to 30 days).



Case study: The Deco Hall

What: The Deco Hall – Developed Design

Where: Ōtepoti, Dunedin

Owner: Ōtepoti Futures Trust

Architect: ahha

How IDP principles were used compared to standard practice:

ahha designed a contemporary fit-for-purpose community facility and social infrastructure inhabiting an existing heritage listed Art Deco building.

ahha used a coordinated, collective and democratic approach, which incorporated central and local government, the community and the private sector.

Work with community stakeholders helped to refine and reinforce key objectives set out by the buildings historic custodians. Working alongside built environment professionals set out limitations for the project from development intensity through to heritage sensitivity. This discovery work informed studies into building use and, in turn, architectural redevelopment studies. Alongside these studies, costing models were developed for both the redevelopment phase and the operational phase of the building's life to assess its financial viability.

Using an integrated approach allowed for broad participation and collaboration surrounding a central purpose. All the stakeholders involved in the project met during the design of the plans and specifications to develop optimum and balanced solutions.

On this project, ahha moved beyond the architectural role and facilitated project funding, democratic ownership structures, community participation and design, in the creation of a contemporary fit-for-purpose community facility and a social infrastructure for Ōtepoti Dunedin.

What benefits have been achieved by using IDP principles compared to a standard process?

- ahha worked with the community to understand its needs and concerns. This sped up decision making through collective agreement and helped with community buy in.
- Working between the community and professional stakeholders meant that a balanced design direction and viable financial threshold to the project were agreed upon quickly.
- Working alongside government agencies and territorial authorities early identified funding opportunities and alignment. It also provided a fast track through resource consenting with a two week timeline and a refund to the processing deposit.

- The contemporary updates or additions to the building are designed in a way that respects and complements the existing architecture. They are deliberately positioned so as not to interfere with or dominate the original forms of the building that are visible from the street. This maintains the aesthetic integrity and historical value of the building while allowing for modern enhancements.
- The design outcomes aligned with the previous owners ambitions for sale of their asset, and this was rewarded through the donation of the property to a newly formed trust for Ōtepoti Dunedin.

“Using an integrated approach allowed for broad participation and collaboration surrounding a central purpose. All the stakeholders involved in the project met during the design of the plans and specifications to develop optimum and balanced solutions.”

— Campbell McNeill, Director, ahha.

Agenda for IDP Planning Workshop

1. Welcome and introduction (10 minutes)

- **Objectives:** Outline the purpose and expectations of the workshop e.g. designing out all waste by using IDP principles.
- **Activities:**
 - ◇ Brief introduction and welcome by the facilitator.
 - ◇ Quick round of introductions among participants.
 - ◇ Outline of the workshop's purpose and agenda.

2. Introduction to IDP principles (15 minutes)

- **Objectives:** Provide foundational knowledge of IDP.
- **Activities:**
 - ◇ Concise presentation on key IDP principles, emphasising collaboration, sustainability and waste reduction.

- ◇ Brief discussion on the waste reduction benefits of IDP in construction projects.

3. Presentation of the selected project segment (20 minutes)

- **Objectives:** Introduce the project aspect for IDP application.
- **Activities:**
 - ◇ Detailed presentation of the selected project segment, focusing on specific challenges and opportunities.

4. Collaborative planning session (1 hour)

- **Objectives:** Apply IDP principles to the chosen project segment.
- **Activities:**
 - ◇ Group brainstorming session to integrate IDP principles into the project segment.
 - ◇ Discussion and development of a collaborative plan, involving all aspects such as design, sustainability and resource efficiency.
 - ◇ Ensure active participation from all members to incorporate diverse insights and ideas.

5. Development of an action plan (30 minutes)

- **Objectives:** Formulate a practical and actionable plan.
- **Activities:**
 - ◇ Synthesise ideas from the brainstorming session into a structured action plan.
 - ◇ Define roles, responsibilities, timelines and follow up procedures.

6. Wrap-up, feedback and next steps (10 minutes)

- **Objectives:** Conclude the workshop, gather feedback and outline future actions.
- **Activities:**
 - ◇ Summary of the workshop's outcomes and the formulated action plan.
 - ◇ Quick feedback session to evaluate the workshop and identify improvement areas.
 - ◇ Discuss the next steps for implementing the plan in the project.

Useful resources:

ARUP. [Circular Buildings Toolkit](#).

Commerce Commission New Zealand. (2019). [The Commerce Act: Product Stewardship Schemes](#).

[Circular Economy Directory](#).

Sustainable Business Network & Construction Sector Accord. (2024). [Getting on the same page: A shared language for a circular construction sector](#).

Sustainable Business Network & Construction Sector Accord. (2024). Breaking the Waste Cycle: A guide to product stewardship in construction.

Sustainable Business Network & Construction Sector Accord. (2024). [Industry-led Implementation Plan for Circular Construction](#).

3R. (2023). [Product Stewardship](#).

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