INFORMATION FOR ARCHITECTS

DISCLAIMER

The information contained in this document is intended for the use of suitably qualified and experienced architects and engineers and other building professionals. This information is not intended to replace design calculations or analysis normally associated with the design and specification of buildings and their components. Dincel Construction System Pty Ltd accepts no liability for any circumstances arising from the failure of a specifier or user of any part of Dincel Construction System to obtain appropriate professional advice about its use and installation or from failure to adhere to the requirements of appropriate Standards and Codes of Practice, and relevant Building Codes.

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PURPOSE

The purpose of this document is to show the building designers an ALTERNATIVE SUSTAINABLE SOLUTION which will also significantly satisfy issues such as COST, CONSTRUCTION TIME AND SAFETY in building construction.

(Download – 7 Green Star For Your Next Project)

SUMMARY

Good architectural design offers aesthetically pleasing adaptable, functional, energy and cost efficient building for our living or working environments.

The cost of a building consists of land cost, construction cost and operational cost, (i.e. lighting, heating and maintenance costs).

Australian developments are controlled by regulations such as floor/space ratio which determines the developable floor area. The architectural design then incorporates the principals of solar access and amenity.

The requirement of amenity may be satisfied by accommodating balconies for the building occupants on the face of the building receiving the sun for at least 2 to 4 hours of each day (e.g. bedroom side having balconies). However, the most important development criteria of current Australian regulations is to have solar access which requires the majority of living areas of residential apartments to face north (or east-west direction) to get the best sunlight during the day in winter, i.e. less heating energy as well as less electricity use for lighting.

The reader may refer to professionals such as architects or even many government internet sites which states that the solar orientation design is required for the purpose of energy efficiency. This requirement limits the living areas facing the south direction. Therefore, the solar access requirement restricts the development area, hence increases the land cost per unit basis.

Dincel Construction System offers to Design Architects the following sustainable, cost effective and maintenance free building solutions.

WHAT IS THE BENEFIT FOR AN ARCHITECT SPECIFYING DINCEL CONSTRUCTION SYSTEM (DCS)?

The objectives of any architectural consultancy business are:

1. Eliminate common architectural liabilities.
2. Ensure repeat business by achieving customer satisfaction.
3. Attract new business by the recommendation of existing customers.

- **BCA Compliance**

  Architects can specify DCS in confidence that DCS is in full compliance with the BCA. All required BCA certification compiled in this document are printable from our website for issue to the local authority.

- **Waterproofing Liability**

  The required waterproofing specifications for projects are normally specified by architects. The use of DCS eliminates waterproofing liabilities for architects. DCS is the only world's first waterproof structural wall as tested by the CSIRO – Australia (**Download** – Waterproof Walls)

  Refer website's photo gallery for many projects including Housing NSW which consists of basements below the permanent water table and water detention/retention tanks. (**Download** – Photo Gallery)

- **Wall Crackings Liability**

  Wall crackings are a big liability issue for the architect since they lead to many other problems. The crackings usually occur because of shrinkage/temperature and structural building movements. These crackings, building joints and porous building materials may cause significant waterproofing, damp, rot, condensation, mould and mildew problems. The architect may spend a significant amount of time and money to find that the root of the problem has nothing to do with his/her design and specifications. For example, the commonly available paint/render finishes are porous of nature. It is a common mistake by many architects to use a paint/render coating for surface protection of single skin façade walls. It is also difficult for buildings built by using clay/concrete brick masonry walls to comply with the latest Australian earthquake code. Refer to (**Download** – Earthquake Hazard Risk Prevention for Developers and Building Professionals)

  The earthquake video demonstrates Dincel's crack resistance even in the case of major earthquakes. (**Download** – Earthquake Video)

- **Potential Architectural Dimensional Errors**

  The potential for architectural dimensional errors are reduced or eliminated by having shop drawings that are normally associated with ordering – manufacturing and construction purposes of modular Dincel-Forms.

- **Flexibility and Adaptability**

  The following provides significant flexibility to an architectural design.

  - DCS offers straight, curved and slanted walls and significantly projecting cantilevered walls which allow creative architectural forms that normally cannot be achieved with conventional forms. The façade of exposed pre-finished walls can be built within 50mm increments. Internal walls that are covered with plasterboard finishes have no dimensional limitation. Unlimited options of external wall finishes are available. Refer to (**Download** – Finishes)

  - Residential buildings accommodate inter-tenancy walls which can be used as structural load bearing walls without the need of having columns.

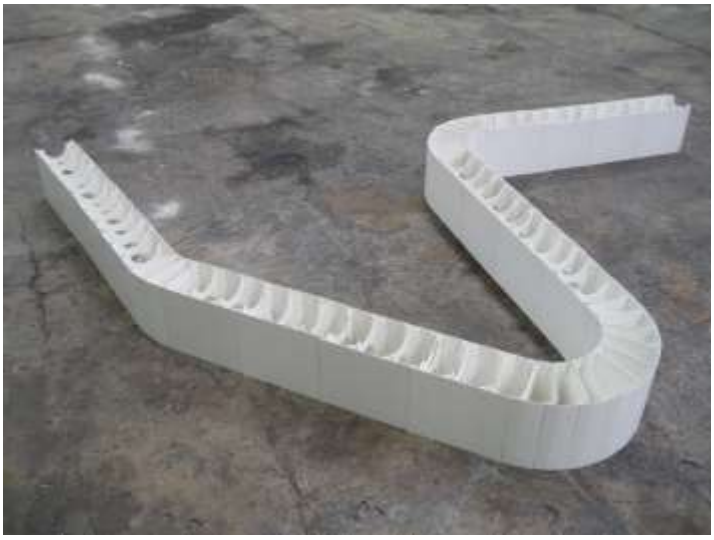
  - Architect does not need to coordinate carparking column layout with the load bearing structural wall system of above.

  - Ultimate flexibility is achieved if there is no need for solar access for living areas facing north – refer following Item No: 4.

See below samples of photos demonstrating curved walls.





- **Customer Satisfaction**

  Customer satisfaction is achieved by providing functional and aesthetically appealing building architectural design resulting with maximum cost efficiency.

The regularity of the building structure is an absolute necessity in multi-storey buildings commencing from two storeys because of, firstly, structural integrity and cost and secondly, services costs particularly for plumbing and acoustic issues. Therefore, inter-tenancy walls and wet areas should be kept at the top of each other to achieve this basic principle.

The architect's client who is the developer will always try to achieve more numbers of apartment units within the allowable building envelope. However, the effort of the architect especially in multi-level buildings could easily be wasted if the construction cost overrides the gain achieved by creating additional numbers of apartment units. The architectural design not incorporating the abovementioned regularity results with excessive additional structural construction cost which most often makes the project unfeasible. After all, the money for construction has to be spent first before selling the end product.

In fact, departing from the regularity principle will also make the architectural planning and services coordination unnecessarily complicated.

The following recommendations will achieve the most cost effective construction with the assistance of DCS.

1. Cross Ventilation

The building authorities' requirements for cross ventilation lend itself to party walls being parallel to each other between adjacent units. The purpose is to create a wind tunnel which will assist in cooling (less energy) and condensation related problems.

Ensure all party walls at each floor level are placed at the top of each other.

2. Safer, Faster DCS Achieves Cost And Energy Efficiency Advantages

The parallel party walls being load bearing and resting at the top of each other in multi-level construction is the best suitable system for DCS. This type of structural form at each floor level offers the following advantages:

(i) Building with DCS achieves 43% cost efficiency at each floor level.

(**Download** – Costing Analysis)

(ii) Speed of construction at each floor level:

(**Download** – FAQ, Answer No: 3 – Faster/General)

(**Download** – FAQ, Answer No: 21 – System Advantage/Construction)

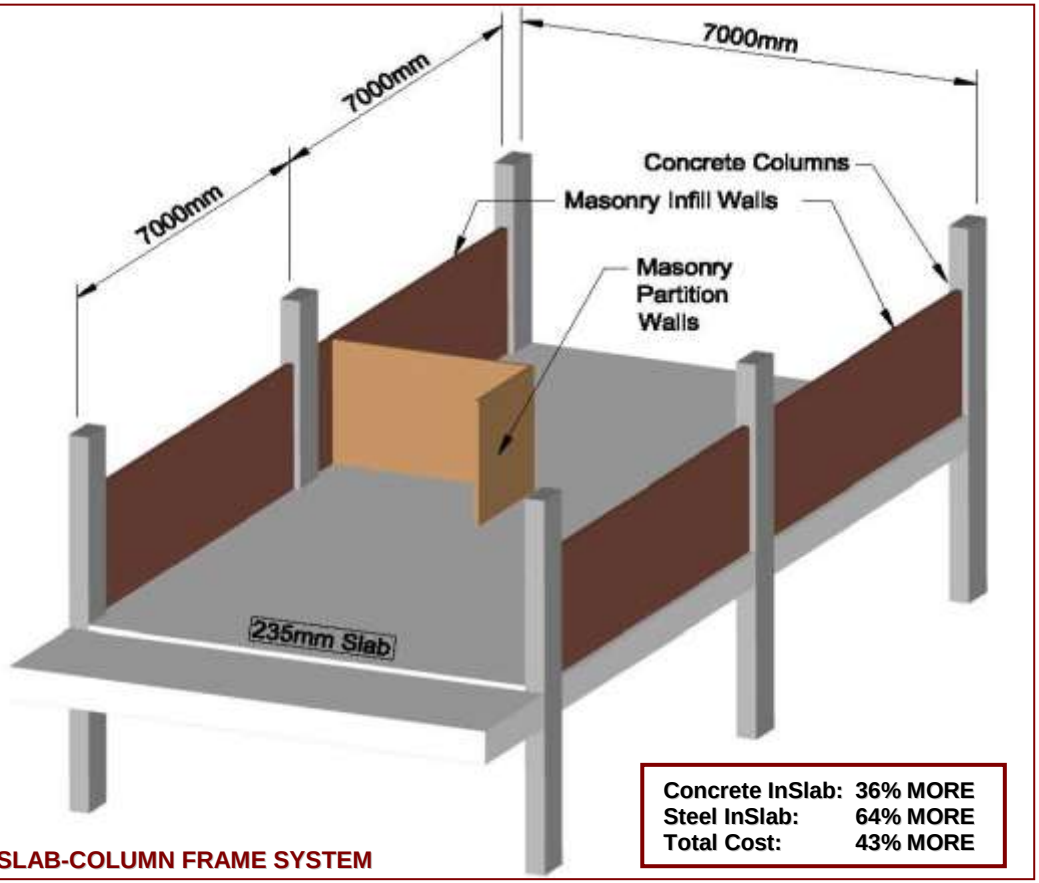
(iii) Why DCS is safer

(**Download** – FAQ, Answer No: 4 – Safer/General)

(iv) Building with DCS achieves embodied energy and carbon dioxide savings well beyond any comparison.

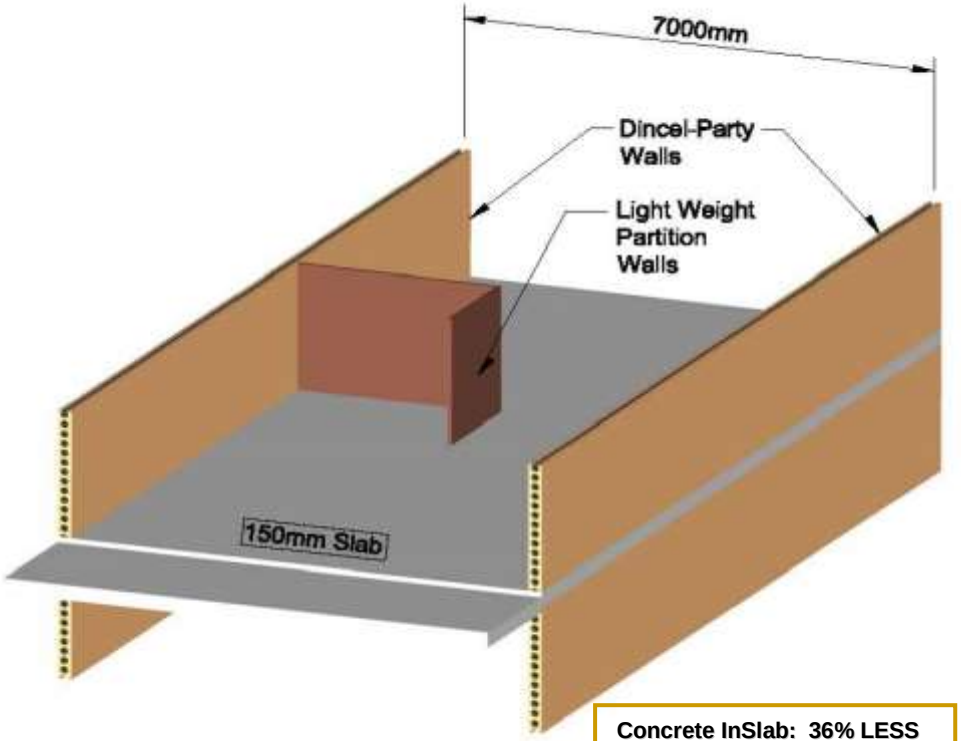
(**Download** – Part 1 - Energy Efficiency – Embodied Energy)

COMPARISON BETWEEN DINCEL AND SLAB-COLUMN FRAME SYSTEM



SLAB-COLUMN FRAME SYSTEM

Concrete InSlab:	36% MORE
Steel InSlab:	64% MORE
Total Cost:	43% MORE



DINCEL CONSTRUCTION SYSTEM

Concrete InSlab:	36% LESS
Steel InSlab:	64% LESS
Total Cost:	43% LESS

BUILDING WITH DINCEL CONSTRUCTION SYSTEM
MEANS EVERY THIRD FLOOR IS

FREE ! ! !

3. Elimination Of Transfer Level Results In 75% Cheaper Transfer Slab Cost

The most significant structural costs occur at the first residential level above the carparking level (or commercial level) which is called the transfer level.

It becomes rather difficult for the architect to marry the structural columns of carparking (or commercial) levels to residential levels' structural load carrying walls/columns which creates the transfer level, hence significant cost.

For example, the overall thickness of a transfer slab will be 350mm thick for post tensioned slab and 450mm thick for in-situ reinforced concrete carrying a four storey residential building having carparking columns placed at every second bay (i.e. 5.4m or 6m centres). The same transfer slab thicknesses will be 450mm and 600mm respectively for six or seven residential levels above the transfer level with 6m supporting column centres. The thickness of the transfer slab will increase depending on the supporting column spacings and increasing number of floors.

The transfer slabs will require a significant amount of post tensioning and reinforcing steel bars. The elimination or a significant reduction of a transfer structure by DCS can further increase by 75% cost efficiency at the transfer level alone. **This significant cost saving often makes the development feasible to proceed.**

The only way to achieve this cost saving is by utilising Dincel-Walls as deep beams to eliminate or reduce transfer slabs. However, the elimination or reduction of a transfer slab cannot be achieved if the parallel party walls are not oriented in the right angle direction to the carparking aisle.

The following Figure 1 offers significant flexibility to the architect where the structural column locations of the carparking do not need to correlate to residential levels.

- The structural efficiency principles shown in Figure 2 achieve up to 50% cost reduction in overall structural cost in comparison to conventional building methodologies. (**Download** – Costing Analysis)

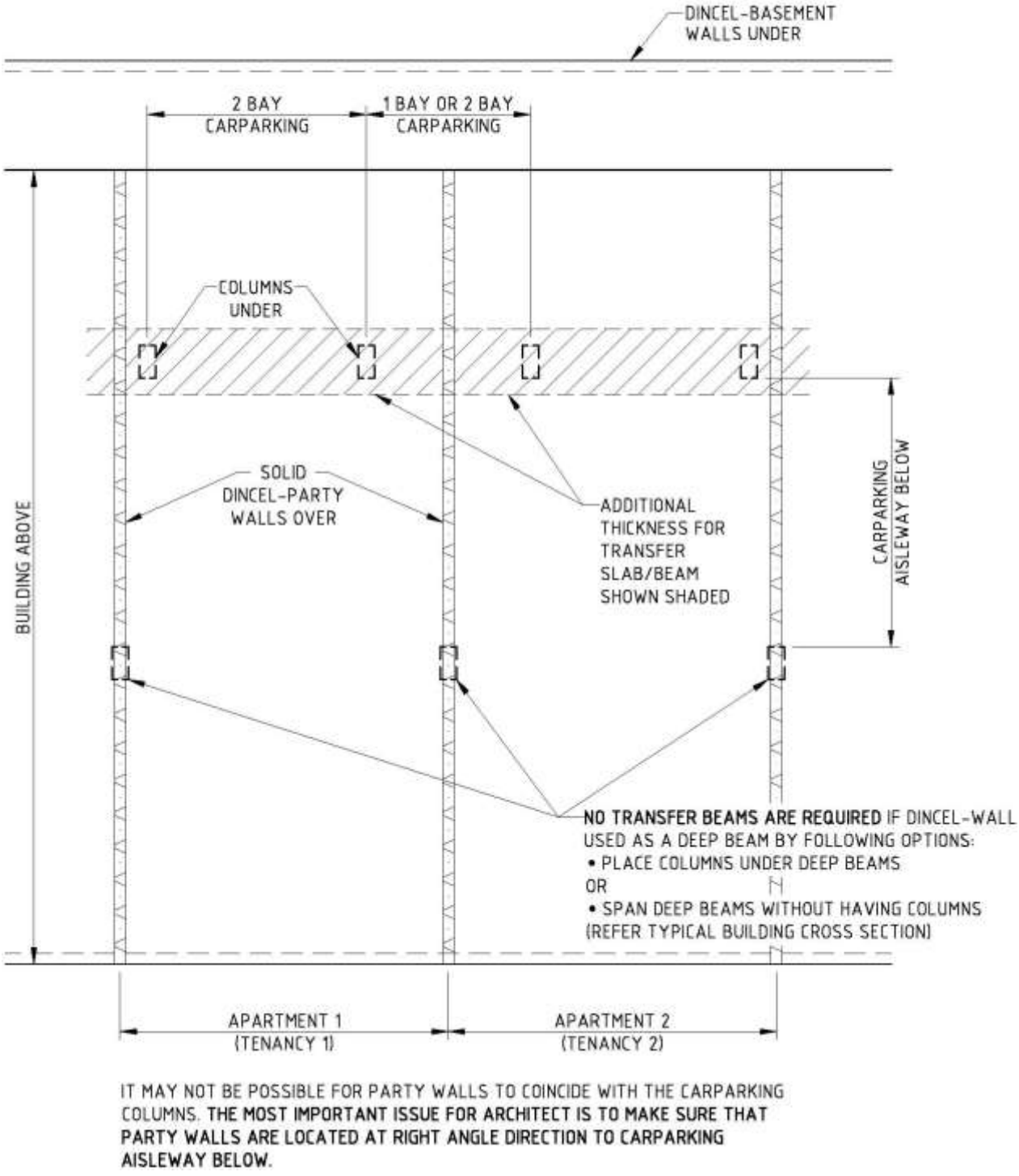
- The construction time can be reduced by a minimum of 30%.

- Significant embodied energy savings can be achieved. (**Download** – Part 1 - Energy Efficiency – Embodied Energy)

- The safest structural form against an earthquake can only be achieved by adopting the above principles (**Download** – Earthquake Hazard Risk Prevention for Developers and Building Professionals).

  The methodology of having concrete load bearing party walls is commonly recommended and adopted in all earthquake prone countries. The difference is that DCS is faster and cheaper to build.

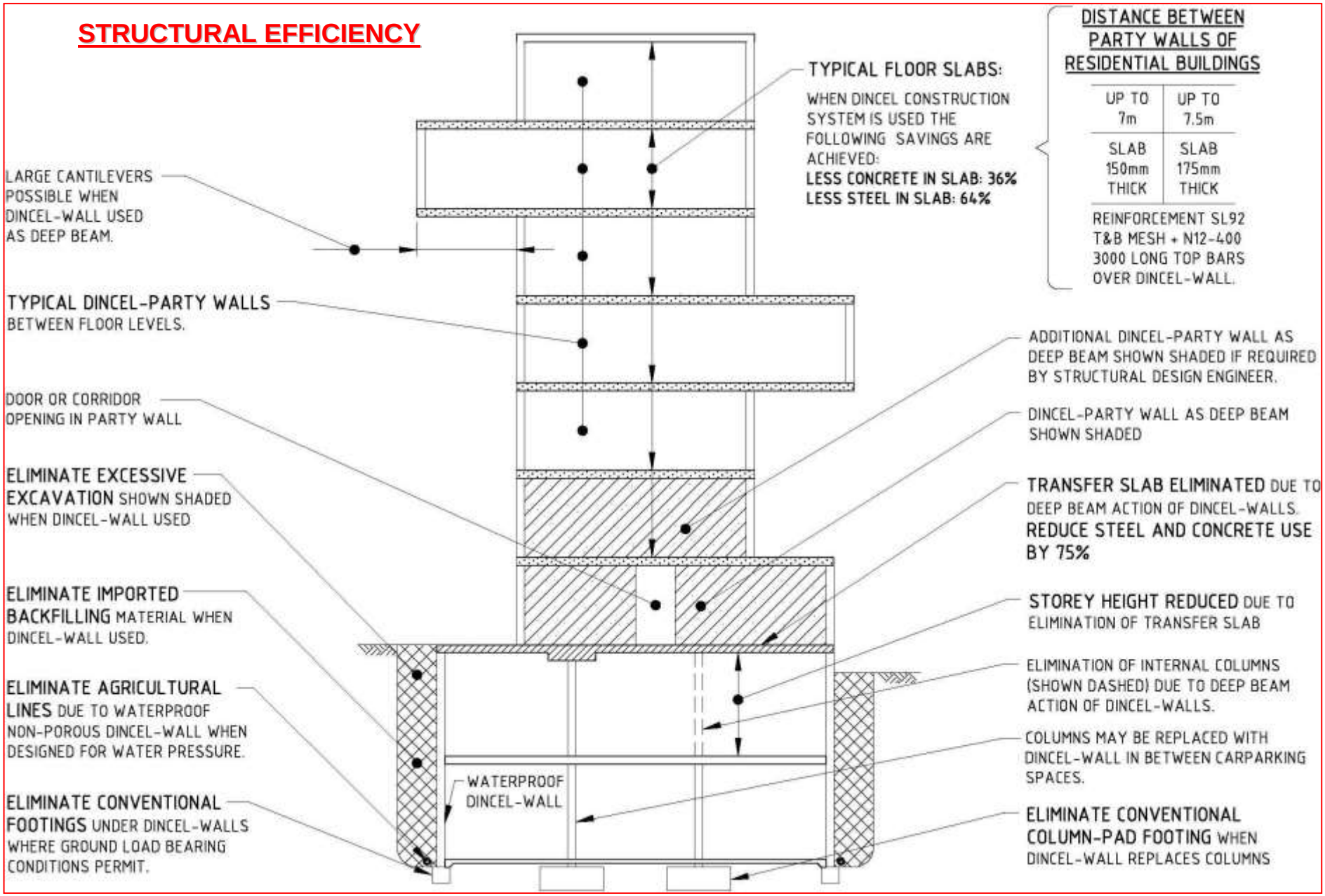
PLAN SHOWS PARTY WALLS ARE LOCATED AT RIGHT ANGLES TO CARPARKING AISLE WAY



IT MAY NOT BE POSSIBLE FOR PARTY WALLS TO COINCIDE WITH THE CARPARKING COLUMNS. **THE MOST IMPORTANT ISSUE FOR ARCHITECT IS TO MAKE SURE THAT PARTY WALLS ARE LOCATED AT RIGHT ANGLE DIRECTION TO CARPARKING AISLEWAY BELOW.**

FIGURE 1

STRUCTURAL EFFICIENCY



TYPICAL BUILDING CROSS SECTION

FIGURE 2

4. No Need To Have Solar Access Requirement With DCS in Apartments and Multi-unit Housing

Alternative solution on how to best utilise the development land.

Achieving good solar access for dwellings in higher density developments (especially in the case of apartments exceeding 3 – 4 storeys in height) is a much greater challenge when compared to low density developments.

Usually higher density sites will have limited solar orientation opportunities. The overshadowing from neighbouring buildings and the like overshadowing from dwellings with the actual development is greatly increased.

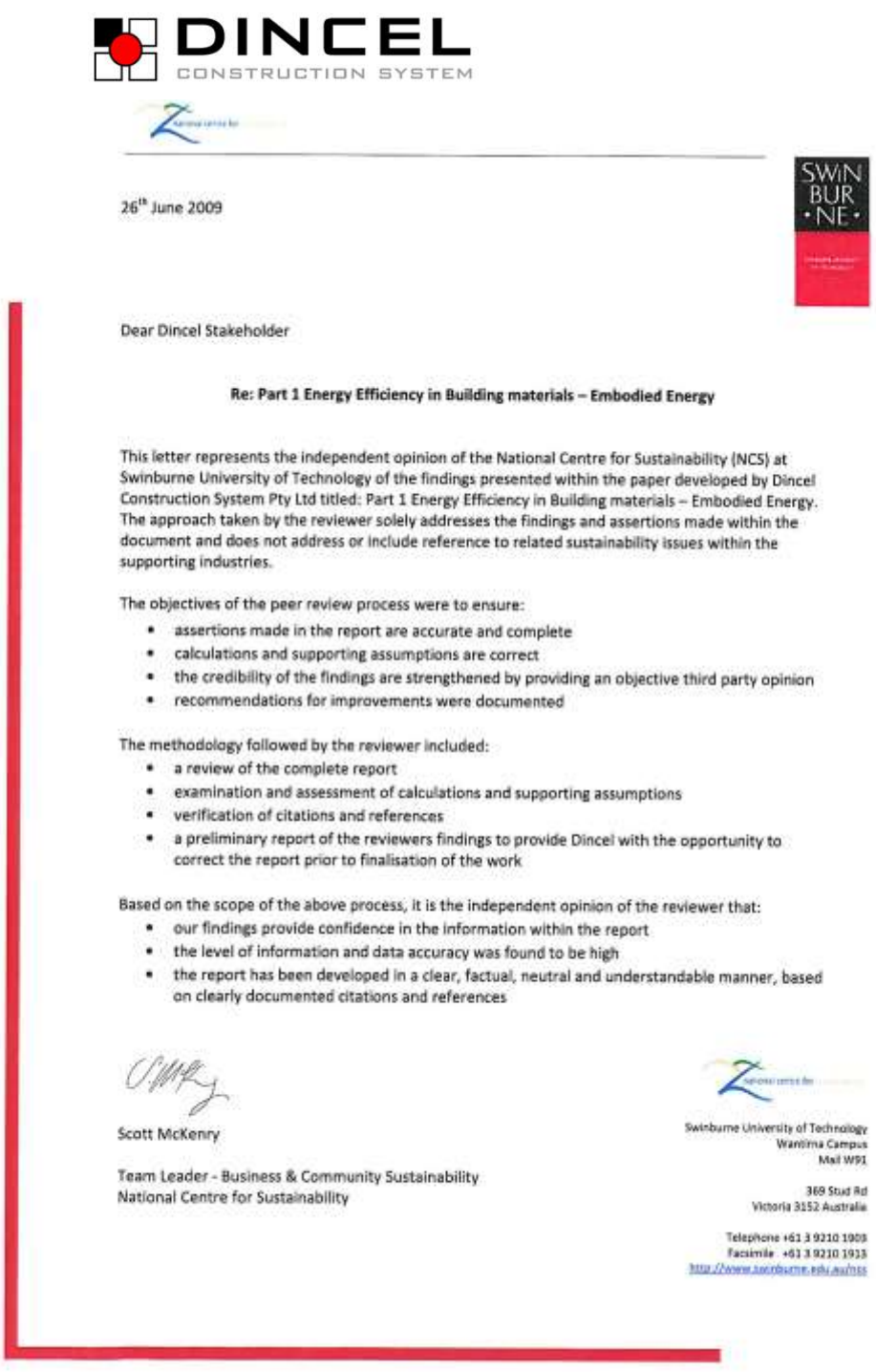
The development sites having multiple apartment blocks sacrifice from their building heights and the distance between the blocks are increased to handle the overshadowing issue. These factors often result in the loss of significant development yield.

The other problem is that solar access orientation principles clashes with other sustainability initiatives, e.g. natural drainage paths that do not correspond with solar orientation requirements may impact on urban water management systems.

The planet's population is increasing rapidly. The urban consolidation, hence high density dwellings are now a fact of life. (**Download** – Dincel Solution for Housing Affordability). Our future is heading towards apartment living of about 15 storey buildings. Our reality is that we do not have the luxury of wasting our lands. We therefore have to develop alternative or additional solutions to reduce the need for solar access orientation for the purposes of energy efficiency (i.e. less lighting and less heating energy) in high density developments.

Since the building authority's purpose is to achieve the energy efficiency for lighting and heating criteria, the embodied energy saving (DCS saves the equivalent of 89 years of heating and cooling energy) offered by DCS (Download – Part 1 - Energy Efficiency – Embodied Energy) is significantly more than if the living quarters do not have north facing (for southern hemisphere) at all. This way, living areas can be re-oriented in all directions or 50% in both north and south directions.

The direct impact of this will be significantly more development potential at any given multi-storey development site if solar access is not controlling the architectural building's orientation design criteria. This will achieve even more embodied energy savings utilising the DCS design principles which will result in the **energy efficiency generated by solar access being insignificant in comparison to the embodied energy saving achieved by adopting DCS design principles.** The most effective design can only be achieved by locating the living quarters in all directions, and following the structural principles as explained in this document.



26th June 2009

Dear Dincel Stakeholder

Re: Part 1 Energy Efficiency in Building materials – Embodied Energy

This letter represents the independent opinion of the National Centre for Sustainability (NCS) at Swinburne University of Technology of the findings presented within the paper developed by Dincel Construction System Pty Ltd titled: Part 1 Energy Efficiency in Building materials – Embodied Energy. The approach taken by the reviewer solely addresses the findings and assertions made within the document and does not address or include reference to related sustainability issues within the supporting industries.

The objectives of the peer review process were to ensure:

- assertions made in the report are accurate and complete
- calculations and supporting assumptions are correct
- the credibility of the findings are strengthened by providing an objective third party opinion
- recommendations for improvements were documented

The methodology followed by the reviewer included:

- a review of the complete report
- examination and assessment of calculations and supporting assumptions
- verification of citations and references
- a preliminary report of the reviewers findings to provide Dincel with the opportunity to correct the report prior to finalisation of the work

Based on the scope of the above process, it is the independent opinion of the reviewer that:

- our findings provide confidence in the information within the report
- the level of information and data accuracy was found to be high
- the report has been developed in a clear, factual, neutral and understandable manner, based on clearly documented citations and references

Scott McKenry

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LAND COST

The embodied energy savings by Dincel Construction System offers 89 years of equivalent heating and cooling energy.

This means that buildings can be orientated in 50% south and 50% north direction.

This achieves:

MORE DEVELOPMENT YIELD AT ANY DEVELOPMENT SITE

CONCLUDING REMARKS

1. Floor slabs carried by load bearing Dincel-Wall will always result in cost effective construction (i.e. less concrete and steel in floor slabs) in comparison to floor slabs having the column-slab structural solution.

2. All or partial transfer level cost can be eliminated if Dincel-Walls are used at party walls as deep beams. (Refer Figure 2). However, this will only be possible if Dincel-Deep Beams are placed in the right angle direction to the carparking aisle way below the first residential floor level. (Refer Figure 1).

3. The reason for a solar orientation design with a building facing the northern winter sun (for southern hemisphere) is to reduce the heating energy use in living areas.

   The structural solution utilising load bearing Dincel-Walls alone without even considering the transfer level savings offers the equivalent of 89 years of heating and cooling energy when compared to conventional column-slab systems having masonry infill walls. (**Download** – Part 1 – Energy Efficiency, Embodied Energy)

   Therefore, the energy savings offered by Dincel Construction System can be traded off for building living areas facing the southern direction. The optimum solution will then be achieved when 50% of buildings face the southern direction and 50% face the northern direction (or alternatively eastern and western facings). This solution will therefore eliminate any land wastage; hence the ultimate goal for the purpose of sustainability will be achieved. (**Download** – Sustainability for the Construction Industry) for further information.

   We do not wish to dismiss the aesthetic and energy value of solar access, but merely to provide greater technical and planning flexibility.

The following information is provided for architects' use:

☐ Construction Manual – available upon request.

This is a comprehensive manual which covers all required architectural detailing.

☐ (**Download** – 7 Green Star – For Your Next Project)

☐ (**Download** – Sustainability for the Construction Industry)

☐ (**Download** – Building Code of Australia Compliance)

☐ (**Download** – Waterproof Walls)

☐ (**Download** – Costing Analysis)

☐ (**Download** – Earthquake Hazard Risk Prevention for Developers and Building Professionals)

☐ (**Download** – Part 1 – Energy Efficiency, Embodied Energy) and (**Download** – Part 2 – Energy Efficiency for Building Operational Use)

☐ (**Download** – Indoor Air Quality, Condensation, Mould and Mildew)

☐ (**Download** – Dincel Solution for Housing Affordability)