DESIGN AND PROFILE GUIDE

Dowel Laminated Timber

THE ALL WOOD MASS TIMBER PANEL

StructureCraft
Timber Engineering & Construction

TABLE OF CONTENTS

About DLT	**5**
Why DLT?	**6-7**
Manufacturing	**8-9**
Installation	**10-11**
Panel Properties	**12-13**
Design Flexibility	**14-15**
Performance	**16-17**
DLT Profiles	**18-19**
Appearance & Grades	**20-21**
Span Tables	**22-27**
Typical Connection Details	**28-29**
About StructureCraft	**30**


museum
of surrey

DOWEL LAMINATED TIMBER

ABOUT

Dowel Laminated Timber (DLT) is a mass timber product that can be used for floor, wall, and roof structures. It is known as Dübelholz in Europe. These solid wood panels use hardwood dowels to friction fit pre-milled boards together on edge, creating a panel which is particularly efficient for horizontal spans and allows for much flexible architectural design.

DLT panels are the only all wood mass timber product – in concept, they involve no glue or nails. With no metal fasteners, DLT panels can be easily processed using CNC machinery, creating a high tolerance panel which can also contain pre-integrated acoustic materials, electrical conduit, and other service interfaces.

Unique to DLT as a mass timber product, a wide variety of profiles can be integrated inexpensively into the bottom surface of the panel. Each finger-jointed board goes through a molder, allowing a limitless range of different profiles to be explored and exposed in the bottom of a panel. An acoustic profile can be produced to achieve noise reduction objectives, while keeping the wood exposed and allowing for a range of surface finishes. Fibrous insulation is used inside an acoustic groove to absorb sound.

The concept of using hardwood dowels to connect softwood boards together was conceived in Switzerland in the 1990s.

Julius Natterer spearheaded the resurgence of NLT / brettstapel to Europe in the 1970's and 1980's, as he believed that this efficient method of construction could be used to make beautiful, low carbon, healthy buildings that are quick and easy to build. In the early 1990s, DLT / dubelholz was developed by a Swiss company. They saw this product as a superior product to NLT / brettstapel in every way – it used only wood, it was CNC machinable, and production of the panel was possible with automated machinery. They proceeded to create the first automated machinery line for DLT.

Several companies in Germany, Austria, and Switzerland adopted this idea and started manufacturing DLT commercially, using automated systems for drilling and inserting the dowels.

StructureCraft has brought this technology to the North American market with the world's largest automated DLT manufacturing line in our state of the art 50,000sqft facility in Abbotsford, BC.

WHY DLT?

ALL WOOD

- DLT is the only all wood mass timber product
- With no metal fasteners, DLT panels can be easily processed using CNC machinery and allow on site modifications

STRUCTURAL EFFICIENCY

- Greater structural efficiency for one-way spans than CLT – all wood fiber goes in the direction of the primary span
- Continuous laminations are created with certified structural finger joints which run over the full length of the panels
- Building with mass timber products like DLT results in a significantly lighter superstructure than concrete or steel. This reduces foundation sizes and cost, especially with difficult ground conditions, or in high seismic zones
- Single spans up to 60ft for roofs, 32ft for floors. Transverse (weak axis) spans up to 4ft are achievable with screw reinforcement, or greater with structural reinforcement
- DLT qualifies as a Heavy Timber element per US and Canadian building codes, and thus meets the fire rating requirements of Heavy Timber Buildings

PROFILE FLEXIBILITY

- A wide variety of surface profiles can be integrated inexpensively into the bottom surface of the panel
- An acoustic profile can achieve noise reduction objectives, while keeping the wood exposed
- Dimensionally accurate panel through panel planing and CNC machining
- Variety of sealer and stain coatings available to shop-apply at exposed side of panels

SITE EFFICIENCY

- Speed of Construction — 25,000 sqft floor plate erected in as little as a week due to coordinated prefabricated elements
- Large panels, up to 12′ wide x 60′ long
- Removes need for intumescent coatings and dropped ceilings - beautiful DLT panels can be exposed as a soffit
- Less on-site storage, and simplified transportation building components are transported as flat pack, with just-in-time deliveries
- Smaller crews, quieter site - reduced impact of construction on the surrounding area by removing wet trades and greatly reducing number of deliveries to site

PERFORMANCE & PRODUCT CERTIFICATION

- Similar to NLT, the structural design of each lamination in a DLT panel is covered by both the IBC and NBCC
- StructureCraft is currently in the process of finalizing ICC certification for DLT
- Mass timber panels have proven fire resistance. DLT has a particular advantage over CLT as all wood fibre is parallel to primary span, and unlike CLT there is not an abrupt loss in strength when char reaches a layer perpendicular to the span
- ASTM E119 / CAN/ULC S101 fire testing has been completed to demonstrate 2hr Fire Resistance Rating for a 2x6 DLT panel (including a spacing gap between panels)

ECONOMICALLY VIABLE

- DLT utilizes standard dimensional lumber which is more cost efficient to procure than lamstock
- Lower manufacturing costs due to high speed production and removal of need for gluing or nailing
- Less volume of material due to structural efficiency
- Reduction in labor required on site due to pre-manufacturing
- Reduced installation time with a 'kit of parts'

ENVIRONMENTAL SUSTAINABILITY

- An all-wood mass timber product
- Contains only trace amounts of glue due to finger-jointing the boards, if finger-jointed boards are used (panels >20ft long). Less than 1% of the glue used in CLT
- No other chemicals, VOCs, or metal nails
- Virtually no site waste, due to optimized offsite prefabrication
- Healthier indoor air quality with no off-gassing
- Wood fibre can be sourced from sustainably managed North American forests and locks in carbon dioxide, acting as a carbon sink
- ~3650lbs CO2 sequestered per ton, wood is the only renewable structural material
- StructureCraft fabrication and facilities are certified to carry PEFC and FSC® chain of custodies[1], helping achieve LEED and responsible forest management goals

VARIETY OF WOOD SPECIES

- DLT is made with a variety of wood species, including SPF, Douglas Fir, Hemlock, Sitka Spruce, and Western Red or Yellow Cedar

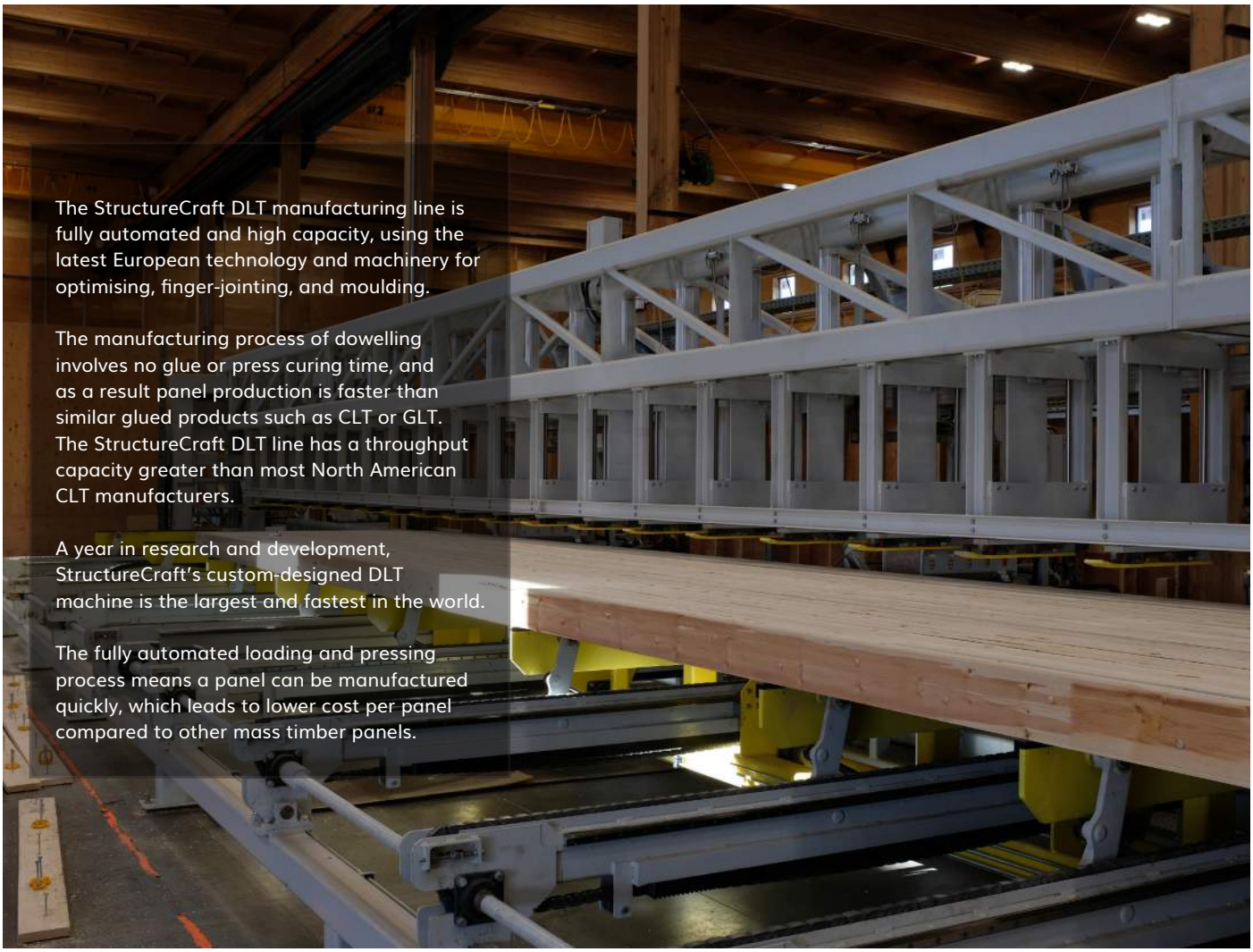
[1] PEFC License: BMT-PEFC-1617; FSC License: FSC-C081780

StructureCraft DLT is manufactured inside our 50,000sqft facility in Abbotsford, British Columbia.

DLT Manufacturing Process

After carefully grading the lumber, it is structurally finger-jointed, run through a molder, and laminated into large panels of DLT. Each panel is machined and checked to tight quality control standards, then sheathing is pre-installed, and exposed faces are finished. Panels are stacked on trucks in installation sequence and shipped to site for just-in-time delivery.

Over the last several years, StructureCraft has engineered and built over 1 million sqft of mass timber buildings. Clients appreciate the simplicity, quality, aesthetics and economics of mass timber, and DLT as a new product which contributes significantly to efficient floor and roof systems.



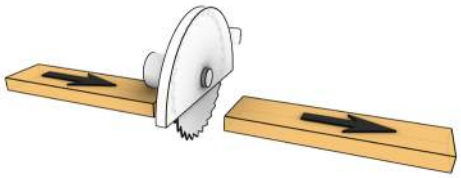
The StructureCraft DLT manufacturing line is fully automated and high capacity, using the latest European technology and machinery for optimising, finger-jointing, and moulding.

The manufacturing process of dowelling involves no glue or press curing time, and as a result panel production is faster than similar glued products such as CLT or GLT. The StructureCraft DLT line has a throughput capacity greater than most North American CLT manufacturers.

A year in research and development, StructureCraft's custom-designed DLT machine is the largest and fastest in the world.

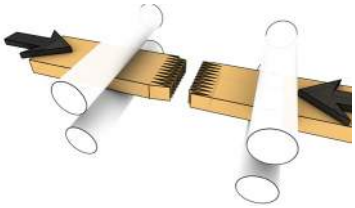
The fully automated loading and pressing process means a panel can be manufactured quickly, which leads to lower cost per panel compared to other mass timber panels.

PANEL PROCESSING



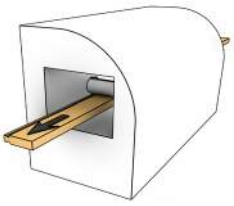
STAGE 1: OPTIMISING SAW

Visual defects are marked and automatically cut out as necessary in the Optisaw



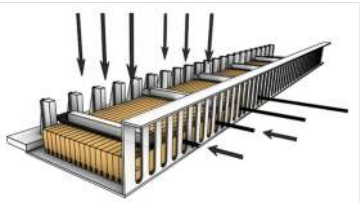
STAGE 2: FINGER-JOINTER

Boards up to 6" x 12" in cross section are structurally finger-jointed, creating continuous lamellas up to 60ft long



STAGE 3: PROFILE MOULDER

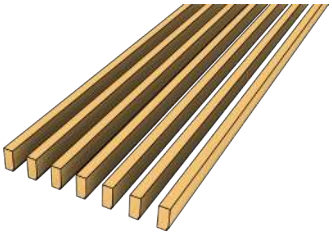
Each lamella is run through a moulder, ensuring exact board thickness and applying the many different profile options to the bottom of the board



STAGE 4: DLT PRESS

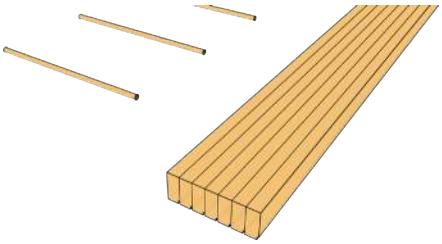
Lamellas are automatically fed into the DLT press, where 10 tons of pressure are applied both vertically and horizontally on the panel. Hardwood dowels are hydraulically pressed into tight-fit holes drilled sideways through the panel

DOWELLING PROCESS



STEP 1: BOARDS PRESSED

The first package of lamellas is automatically fed into the DLT machine and then hydraulically pressed vertically and horizontally to ensure a flat panel, and remove any gaps between boards

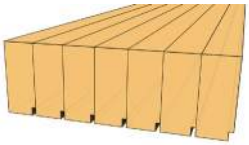


STEP 2: HOLES DRILLED

A drilling aggregate drills 3/4" diameter holes into the wide face of the lamellas with a custom-designed drill bit

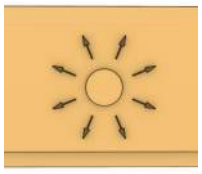
STEP 3: DOWELS INSERTED

The 3/4" diameter hardwood dowels are hydraulically pressed into the hole



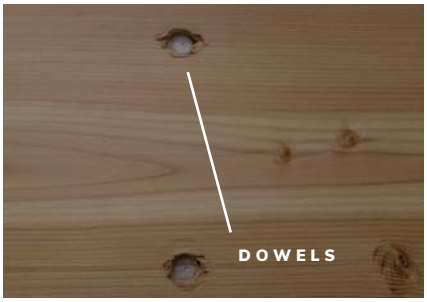
STEP 4: PROCESS REPEAT

Additional packages of lamellas are pushed into the DLT press and dowelled into the previous packages until a full width panel is created



STEP 5: MOISTURE EQUILIBRIUM

As the drier dowel comes into moisture equilibrium with the surrounding lumber, it expands, creating a tight friction fit between the two materials



INSTALLATION

The prefabricated DLT panel is a product designed for efficient erection. Through the integrated process of design and fabrication, an optimal panel layout is established. From the factory, panels are loaded in sequence to avoid sorting on site. Lifting screws are pre-installed at the factory into all panels, allowing efficient hoisting on site. Panels are typically connected to the supporting structure below using specialty timber screws, and the joints between panels are stitched with sheathing infill strips.

As required, StructureCraft can send installation crews to erect DLT panels and the supporting structure. Large panel sizes, only limited by transportation, **enables erection speeds of 1500 sf/hour or more**. Typical panel sizes are between 8′ x 20′ and 10′ x 60′.

PANEL PROPERTIES

PANEL DIMENSIONS	**LENGTH**	Up to 60.5′
	WIDTH	Up to 12′ in any increment
	PANEL THICKNESS (incl. 1/2" SHEATHING)	4", 6", 7 3/4", 9 3/4", 11 3/4", 12 1/4"
	LAMINATION THICKNESS	1-1/2" or 3" typical. 4"or wider available on request
SPECIES & GRADES	**SPECIES**	SPF, Douglas Fir, Hem-Fir, other species available
	STRUCTURAL GRADES	Sel Str, No. 2 & Btr, 2400f-2.0E MSR (D. Fir), 2100f-1.8E MSR (SPF)
	APPEARANCE GRADES	Premium, Select, Standard, Industrial
	DIAPHRAGM SHEATHING	Typically 7/16" or 15/32" OSB, or 1/2" Douglas Fir Plywood
PANEL TOLERANCES	+/- 1/8" width, +/- 1/4" length, +/- 1/16" depth (at time of manufacture)	
MOISTURE CONTENT	15%-19% at time of manufacture (Kiln Dried)	
R-VALUE	1.25 hr-ft^2-F / Btu (0.22m^2 K/W) (per 1" of DLT)	
SPECIFIC HEAT CAPACITY	0.38 Btu/lb-F (1.6KJ / Kg-K) @63^{o}F and 12% MC	
ACOUSTIC RATING	**Raw:** 2x6 DLT achieves STC 38 and IIC 33 (ASTM E90 and E492 test results) **STC>50 and IIC>50** can be achieved & have been test with concrete topping & acoustic mat **NRC of 0.70** achieved with acoustic DLT profile	
FIRE PERFORMANCE	Meets heavy timber criteria, has been tested to achieve 2hr Fire Resistance Rating (FRR) with 2x6 DLT. Higher ratings are achievable with thicker panels.	
PENETRATIONS / OPENINGS	Up to 12" rect/dia without additional reinforcement, larger possible with screw reinforcement	
TRANSVERSE CANTILEVERS, 2-WAY SPANS	Up to 2′ weak-axis cantilevers (or 4′ spans) are possible with screw reinforcement, longer possible with additional reinforcement	

DLT SIZE	DEPTH (in) incl. 1/2" SHEATHING	WEIGHT (psf)
2x4, 3x4, 4x4	4"	10
2x6, 3x6, 4x6	6"	15
2x8, 3x8, 4x8	7 3/4"	19.5
2x10, 3x10, 4x10	9 3/4"	24.5
2x12, 3x12, 4x12	11 3/4"	29.5
Max thickness: 12-1/4"	12 3/4"	32

GRADE		E (Ksi)	F_b (Ksi)
SPF	#2&btr	1400	0.875
	Sel Str	1500	1.300
	1950f-1.7E	1700	1.950
	2100f-1.8E	1800	2.100
D Fir	#2&btr	1600	0.850
	Sel Str	1900	1.350
	2400f-2.0E	2000	2.400

NOTES

1. Material values are shown for SPF or DFir
2. Section properties are not shown but can be easily calculated
3. Please contact StructureCraft Engineering for special criteria or to receive fire and acoustic test reports

DLT PANEL SHEAR RESISTANCE (ASD)	
SHEATHING THICKNESS (IN)	MAX Vr (KIP/FT)
3/8"	1.3
1/2"	2.0
5/8"	2.0
3/4"	2.3
7/8"	2.5
1"	3.4

NOTES

1. Shear values shown are maximum and depend on fastener spacing. Multiple fastener rows can be used to achieve high shear capacities as the diaphragm is fully blocked
2. DLT panels may be joined together on-site using plywood or OSB infill strips
3. When designing for lateral loads, engineer must account for all effects, including the need for boundary elements, drag straps and related connections, etc.

FLOOR PANELS

With the addition of an acoustic mat and concrete topping on site, the DLT floor panel can achieve good thermal and acoustic properties while maintaining the visual warmth of timber from below. For long-spans, floor panels can be made structurally composite with a concrete topping using inclined screws or other composite connectors.

FLAT ROOF OR SOFFIT

Constructed from dimensional lumber on edge, flat panel DLT incorporates simplicity and the warmth of wood into an economical solution for short and long span roof systems. Roofing can be pre-applied to the panels inside the fabrication shop to provide permanent weather protection. The DLT panel can be used in all weather conditions as a soffit. Combined with high quality factory applied finish treatments, the exterior system becomes a robust, easy to maintain product with great visual appeal.

FLUTED ROOF OR FLOOR

An alternating pattern of dimensional lumber is used to create a fluted aesthetic to the soffit of the DLT panels. This flexible design can accommodate both patterned fluting and random fluting. Acoustic insulation can be added into the resulting voids to improve the acoustic performance of the ceiling. Fluted DLT can also be used to conceal services or sprinkler pipes within the voids.

TWO-WAY SPANS & CANTILEVERS

Two-way spans or transverse cantilevers are achievable with the use of reinforcement screws, and for longer spans with the use of strong-backs atop the panels. Multiple layers of plywood atop the panels can also be used to create two-way spanning action.

WALL PANELS

DLT wall panels are fabricated in a similar method as floor and roof panels. If left exposed to view, more refined finishes are possible, including planed or sanded surfaces.

The panels can be used as both structural bearing and shear walls. If used for bearing only, they do not require sheathing to either side and can be left exposed on both sides. If used as shear walls with plywood or OSB sheathing on one side, design is simple using the standard shear wall formulations in CSA O86 or AWC SDPWS.

Contact StructureCraft Engineering for wall bearing capacities.

CORE AND SHAFT PANELS

In addition to being used in floors and roofs, mass timber panels can be used as structural bearing or shear walls, as well as 2hr rated timber elevator and stair shafts. The prefabricated panels offer quicker erection of cores compared to concrete and steel construction. Tall wall panels can be erected quickly and accurately on site.

FIRE RESISTANCE

In heavy timber construction, there is sufficient mass of wood such that a char layer will form in a fire, insulating the remaining wood from heat penetration. Classified as heavy timber, DLT has been tested to achieve fire resistance ratings of up to 2 hours or more.

BUILDING ENVELOPE

Thermal performance of DLT is similar to other mass timber products. Using caulking between each lamination, building envelope transitions between interior roof and exterior soffit can be achieved.

ACOUSTIC TRANSMISSION

Timber is not a dense material, so enhanced sound transmission performance is often needed for floor panels, and can be achieved using concrete topping and acoustic mat or with raised floor above or dropped ceiling below.

ACOUSTIC ABSORPTION

DLT can be economically made of lamellas which are pre-milled with flutes to allow for insertion of concealed sound absorbing material, resulting in NRC values of 0.70.

WEATHER PROTECTION

Weather protection during construction is an important consideration in installation of a mass timber building.

Several options are available to protect the panels from water during construction. For roof panels, membranes (torch-on or peel'n'stick) can be pre-applied in shop. StructureCraft typically installs a membrane or Zip system OSB on all DLT panels in the shop to act temporary weather protection during shipping and construction.

STRUCTURAL PERFORMANCE

The structural design of each lamination is covered by both the IBC/NDS and NBCC/O86 applicable grading rules. As each structurally finger-jointed board spans between structural supports, the dowels do not serve a significant structural purpose, but hold the boards together as a panel.

StructureCraft is currently in the process of finalising ICC certification for DLT.

Timber-Concrete Composite (TCC) is a technology which focuses on optimizing performance and material requirements by engineering a structural connection between timber and concrete components. Structural efficiency is gained by creating composite action between the two materials. This hybridization enables designers to reduce cross sections, increase spans, and streamline structures in pursuit of sustainable architecture.

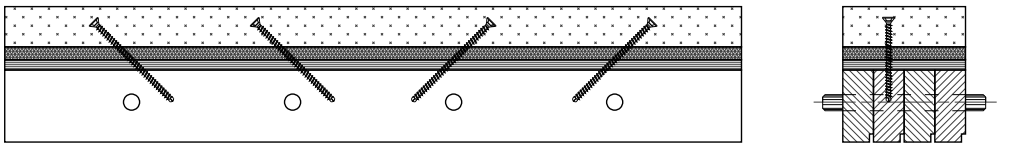
As with other panelised products, we have taken a comprehensive approach which encourages the integration of electrical and mechanical systems into structural panels with architecturally exposed timber and concrete. These panels reduce the proportion of the carbon-intensive concrete components by allowing timber to carry the load.

Typically TCC panels are used when there are longer floor panel spans (>20 ft), where floor build-up height is to be minimised, or when there are stringent requirements for floor stiffness or vibration performance.

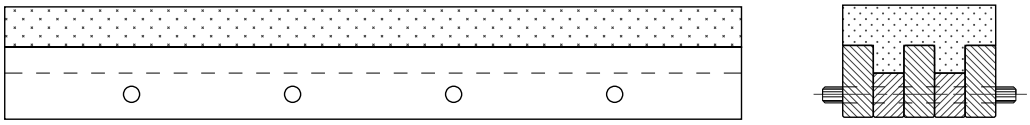
COMPOSITE CONNECTOR CHOICE

There are many options for creating structural composite action between a DLT panel and the concrete topping, through any acoustic mat or insulation separating the two materials. The principles behind three common methods have been illustrated here. Robust design methodologies for each of these methods have been developed in Europe and have been put into use in many buildings over the past 10-15 years. StructureCraft has conducted full-scale stiffness and vibration testing of several different composite systems and can provide timber engineering services to design these systems.

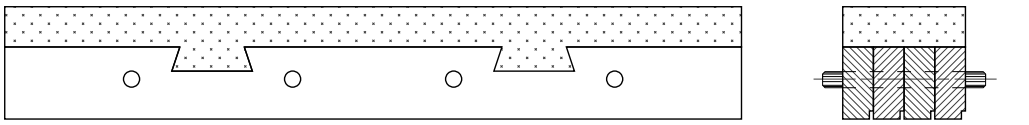
COMPOSITE
with plywood
sheathing &
Acoustic Mat



COMPOSITE
Fluted



COMPOSITE
Notched



DLT PROFILES

PROFILE MOULDING

Each of the boards in a DLT panel are run through our profile moulder, allowing custom profiles to be integrated into the bottom of the panel.

PROFILE OPTIONS

Some examples of aesthetic and acoustic profiles we offer are shown below. Each of the profiles are parametric - for example chamfers, roundovers, or kerfs are available in any size, radius, or depth. The acoustic profiles are able to develop Noise Reduction Coefficients of up to 0.70.

Typically laminations are nominal 2x width, with 3x and 4x dimensions available.

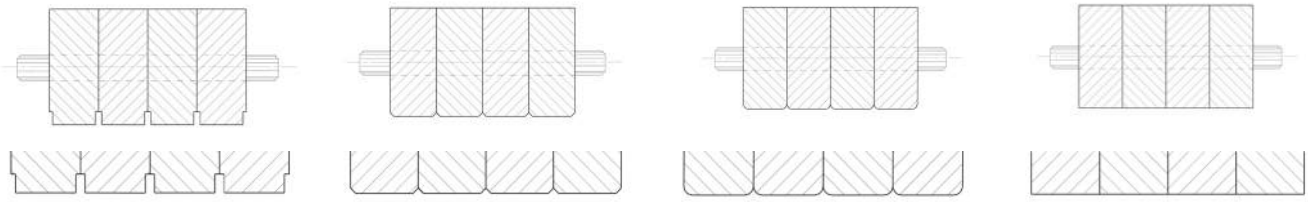
NEW PROFILES

Developing a new profile is a simple process and can be done on a project specific basis. Profiles are fully customizable to suit the particular performance and aesthetic requirements of each project.

STANDARD DLT PROFILES

These standard profiles give the designer a variety of aesthetic options at no extra cost. Variations of these can be easily incorporated.

Depth available: 2x4 to 2x12, 3x4 to 3x12, 4x4 to 4x12. Max depth = 12 1/4" without sheathing



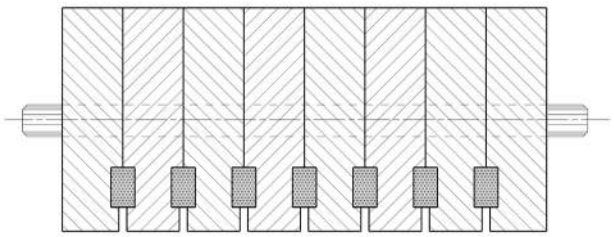
KERF EDGE | CHAMFER EDGE | EASED EDGE | SQUARE EDGE

ACOUSTIC DLT PROFILES

The Acoustic Square profile incorporates a groove into the sides of each board which is acoustically engineered to trap sound waves. This groove is filled with non-combustible, fibrous insulation strips which act as an absorbing material to shorten the reverberation time and create a higher acoustic performance inside rooms.

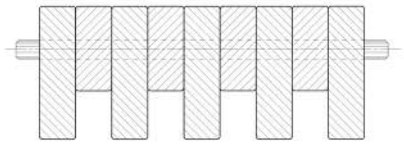
It is available in nominal 6" through 12" panel depths, using lamination thicknesses from 1-1/2" to 4", with a range of wood species and grades. This profile has been independently tested to an NRC (noise reduction coefficient) value of 0.70. Test reports including performance across the frequency spectrum are available upon request.

Depths available: 6" to 12"

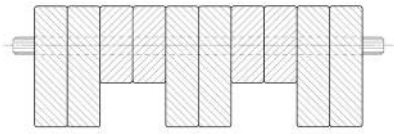


ACOUSTIC SQUARE (NRC=0.70)

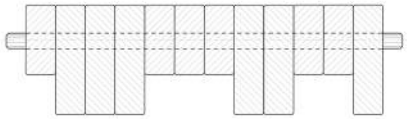
Panel layups using boards of different depths or thicknesses are possible with DLT. Fluted patterns create an interesting aesthetic if exposed, as well as having a structural performance which is between that of the two lamination depths. Random patterns are more labor intensive to create but are possible.



SINGLE FLUTE

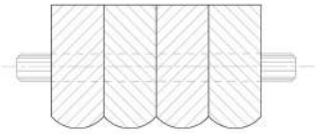


DOUBLE FLUTED
(any variation can be customized)

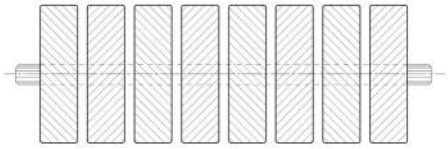


RANDOM FLUTED

SAWTOOTH



BULLNOSE

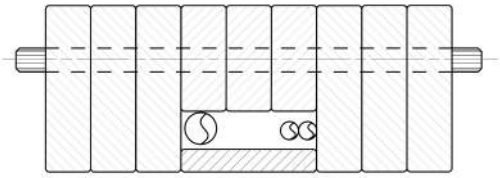


GAPPED

Service integration inside DLT panels is possible through several different methods:

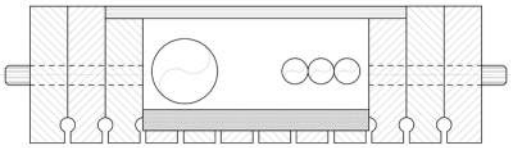
ROUTING FOR SERVICE RUNS

The DLT panel is created flat and then milled to suit the service runs. Services can be left exposed, or smaller infill boards can be added after the services have been run to cover them up. Services can be run perpendicular to panel within the gaps between panel ends.



FLUTED SERVICE RUNS

If service routs are pre-planned, flutes can be left in certain locations to provide routing for wiring and piping. These can be left exposed, or covered with acoustic treatment or boards after service installation.



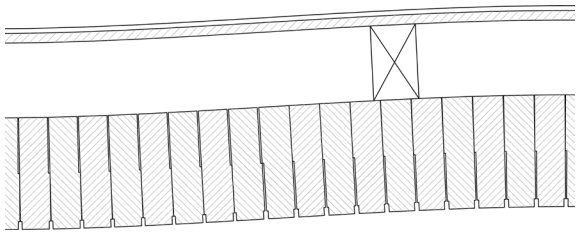
SERVICE CHANNELS

DLT panels can be placed with gaps between them to allow the creation of larger service channels. These channels can be left accessible from above, and can be covered from below with permanent infill panels. Alternatively the channels can be made accessible from below with removable infill panels, and permanently closed in from above.

CURVED PANELS

DLT panels can be curved perpendicular to the primary span direction. This is achieved using a unique moulded profile which allows the panel to be manufactured flat but curved into place during installation. Radii larger than 10 ft are achievable.

More dramatically curved and warped panels are also possible using NLT, which we have done for several projects.



DLT APPEARANCE GRADES

Our optimizing saw automatically cuts out defects, and allows us to grade our lumber to a very high aesthetic standard if so required. Our fabrication team can produce a variety of visually appealing products with varying profiles, geometries, and finish treatments for both indoor and outdoor applications. Routed profiles can provide a variety of high quality finishes for wall or ceiling panels.

GRADES	1. PREMIUM	2. SELECT	3. STANDARD	4. INDUSTRIAL
COMMON APPLICATION	Residential, Hotels, Feature Walls	Residential, Libraries, Schools, Museums, Offices	Offices	Non-visual, high ceilings
SPECIES	SPF, Dfir (other species available)			
COATINGS	Upon request, a penetrating clear sealer and tinted top coatings can be shop-applied to exposed side of panel. Our team focuses on working with designers to determine the best coating system for durability and ease of maintenance.			
WANE	Width ≤ 1/4" Length ≤2' No bark	Width ≤ 3/8" w/o bark, Length ≤5' w/ bark, Length ≤2' Max 1 every 5 boards	Width ≤ 1/2" w/o bark, Length ≤ 10' w/ bark, Length ≤ 7' Max 1 every 4 boards	Permitted
KNOTS	No open Knots Tight Knot Permitted	Open Smooth ≤3/4" Dia Open Jagged ≤1/2" Dia Tight Knot Permitted	Permitted	Permitted
BLUE STAIN	Max 1 every 10 boards; up to 10% surface area; No dark/black coloring	Max 1 every 7 boards; up to 15% surface area; No dark/black coloring	Max 1 every 5 boards; up to 20% surface area; no dark/black coloring	Permitted
CHECKS IN STRAND EDGE	Non-permitted	Width ≤1/16" Length ≤12"	Width ≤1/16" Length ≤ 24"	Permitted
CHARACTERISTICS DISTRIBUTION	Distributed	Distributed	Some distribution	No re-distribution required
PANEL SURFACE	Deviation on board-to-board elevation <= 1/8".		Deviation on board-to-board elevation <= 1/4".	Deviation permitted.
UNNATURAL BLEMISHES	Except for Type 4 (Industrial), the underside of the DLT panel shall be free of "unnatural" characteristics, eg. black marks, scuffs, damage, glue, etc. Such blemishes shall be sanded/required as needed.			
CHARACTER OF WOOD	All wood, as a natural material, will exhibit characteristics such as knots/holes, wane, grain, checks, coloration, etc. The intent of the above appearance grading is to provide a degree of predictability/ limitation to these characteristics. However, some variations in the visual appearance will be apparent			

*Please contact us for samples and pictures of the appearance grades, species variations and coatings options.

SPECIES

Any wood species recognised in North American grading rules can be used in DLT. Some examples of species are shown below - but many more options are possible.

Because each of the boards in a DLT panel spans itself between supports, the structural performance of a DLT panel is very simple - like a group of floor joists placed side-by-side. This means the structural values recognised for wood species in CSA O86 or NDS 2018 can be used to design DLT panels, and there is no need for product-specific testing.

TREATED LUMBER

FRT treated lumber can be used in DLT panels.

EXTERNAL USE

Unlike glued mass timber products, DLT is recognised as a mass timber product which can be used in exterior exposure. Finger joints in the boards are certified exterior finger-joints.
This means DLT can be used for exterior decks, balconies, and canopies.

RECLAIMED WOOD

Other wood sources, including project-specific wood sourcing is possible.

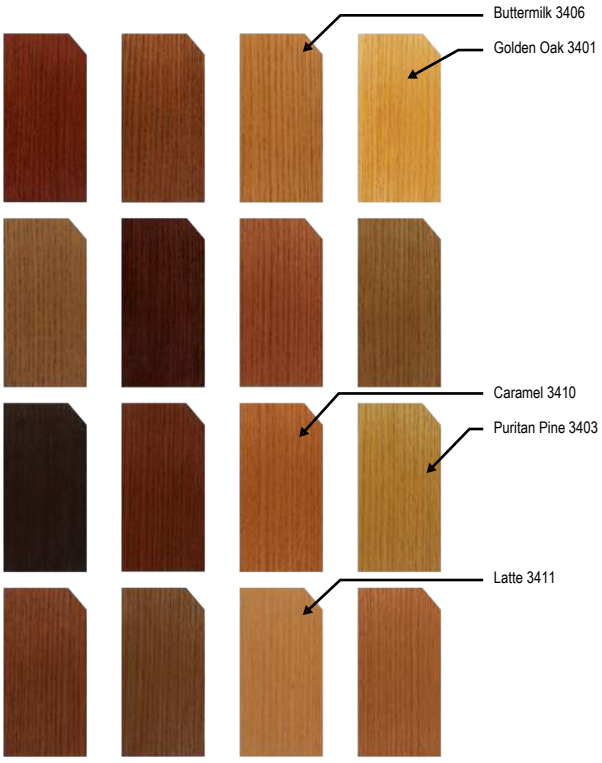
RESPONSIBILITY AND CERTIFICATION

StructureCraft is FSC® and PEFC certified, and can carry this chain of custody for DLT panels in your project. As DLT is all wood, there are no VOCs and the sequestered carbon is highest of any mass timber product.

COATINGS AND FINISHES

A variety of coatings are possible on the exposed faces of DLT panels.

We have worked extensively with coating manufacturers to develop a standard sealer and range of finish options which are durable for exterior exposure, and show well on the interior.



SPF DLT ROOF SPAN DESIGN GUIDE**

Span (ft)	SLS Roof Snow Load (psf)																			
	Single Span / #2 & btr					Single Span / MSR / Sel Str					Double Span* / #2 & btr					Double Span* / MSR / Sel Str				
	20	30	40	55	100	20	30	40	55	100	20	30	40	55	100	20	30	40	55	100
8	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
9	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
10	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
11	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
12	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
13	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
14	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
15	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x4
16	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6
17	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6
18	2x4	2x6	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x4	2x6
19	2x6	2x6	2x6	2x6	2x6	2x4	2x6	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x4	2x6	2x6
20	2x6	2x6	2x6	2x6	2x6	2x4	2x6	2x6	2x6	2x6	2x4	2x6	2x6	2x6	2x6	2x4	2x4	2x4	2x6	2x6
22	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x4	2x6	2x6	2x6	2x6
24	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x6
26	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8
28	2x6	2x8	2x8	2x8	2x10	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x6	2x6	2x8
30	2x8	2x8	2x8	2x8	2x10	2x6	2x8	2x8	2x8	2x10	2x6	2x8	2x8	2x8	2x10	2x6	2x6	2x6	2x8	2x8
32	2x8	2x8	2x8	2x10	2x10	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x10	2x6	2x6	2x8	2x8	2x8
34	2x8	2x10	2x10	2x10	2x12	2x8	2x8	2x8	2x10	2x10	2x8	2x8	2x8	2x10	2x10	2x6	2x8	2x8	2x8	2x10
36	2x10	2x10	2x10	2x10	2x12	2x8	2x8	2x10	2x10	2x10										
38	2x10	2x10	2x10	2x12	2x12	2x8	2x10	2x10	2x10	2x12										
40	2x10	2x10	2x10	2x12		2x10	2x10	2x10	2x10	2x12										
42	2x10	2x10	2x12	2x12		2x10	2x10	2x10	2x12	2x12										
44	2x10	2x12	2x12	2x12		2x10	2x10	2x12	2x12											
46	2x12	2x12	2x12			2x10	2x10	2x12	2x12											
48	2x12	2x12				2x10	2x12	2x12	2x12		Max. Panel Length = 60 ft					Max. Panel Length = 60 ft				
50	2x12	2x12				2x12	2x12	2x12												
52	2x12					2x12	2x12	2x12												
54						2x12	2x12													
56						2x12														
58																				
60																				

NOTES

1. Tabulated values determined in accordance with NDS 2018 for SPF/DFir. Longer spans achievable with other grades / species.
2. The following factors were used for calculations: C_D=1.15, C_M=1.0, C_t=1.0, C_r=1.15
3. Spans are measured from centerlines of supports.
4. Includes maximum 10psf super-imposed dead load.
5. *For double span values, span lengths must be within +/-10%. For other conditions contact StructureCraft Engineering.
6. Tabulated values only valid when manufactured by StructureCraft
7. Satisfies L/180 deflection criteria under 0.5 Dead Load and 1.0 Snow Load.
8. **Design Guides are provided for the purposes of preliminary design only. Contact StructureCraft Engineering for intermediate span values or further assistance.
9. Tabulated values shown for nominal 2" wide laminations are also applicable to wider laminations (3", 4")

SPF DLT FLOOR SPAN DESIGN GUIDE**

Span (ft)	Floor Live Load (psf)																			
	Single Span / #2 & btr										Single Span / MSR / Sel Str									
	No Concrete Topping					2" Concrete Topping					No Concrete Topping					2" Concrete Topping				
	40	50	70	100	150	40	50	70	100	150	40	50	70	100	150	40	50	70	100	150
10	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x6
11	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6
12	2x4	2x4	2x6	2x6	2x6	2x4	2x6	2x6	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x6	2x6	2x6
13	2x4	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6
14	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x4	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
15	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
16	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8
17	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8
18	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x6	2x8	2x8
19	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x10	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x8	2x8	2x8
20	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x10	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x8	2x8	2x8
22	2x8	2x8	2x8	2x10	2x10	2x8	2x8	2x8	2x10	2x10	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x10
24	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x12	2x8	2x8	2x8	2x10	2x10	2x8	2x8	2x8	2x10	2x10
26	2x10	2x10	2x10	2x10	2x12	2x10	2x10	2x10	2x10	2x12	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x12
28	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x10	2x10	2x10	2x10	2x12	2x10	2x10	2x10	2x10	2x12
30	2x12	2x12	2x12	2x12		2x12	2x12	2x12	2x12		2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12
32											2x12	2x12	2x12	2x12		2x12	2x12	2x12	2x12	
	Double Span* / #2 & btr										Double Span* / MSR / Sel Str									
10	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
11	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
12	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6
13	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x6	2x6
14	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6
15	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
16	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
17	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
18	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8
19	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8
20	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x8	2x8
22	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8
24	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x10
26	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10
28	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10
30	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12
32											2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12

NOTES

1. Tabulated values determined in accordance with NDS 2018 for SPF/DFir. Longer spans achievable with other grades / species.
2. The following factors were used for calculations: C_D=1.15, C_M=1.0, C_t=1.0, C_r=1.15
3. Spans are measured from centerlines of supports.
4. Includes maximum 20psf super-imposed dead load.
5. *For double span values, span lengths must be within +/-10%. For other conditions contact StructureCraft Engineering.
6. Tabulated values only valid when manufactured by StructureCraft.
7. Satisfies vibration criteria published in AISC DG 11, and also L/240 deflection criteria under 0.5 Dead Load and 1.0 Live Load. Maximum deflection is limited to 2 in. for long spans
8. **Design Guides are provided for the purposes of preliminary design only. Contact StructureCraft Engineering for intermediate span values or for further assistance.
9. Tabulated values shown for nominal 2" wide laminations are also applicable to wider laminations (3", 4")

D.FIR DLT ROOF SPAN DESIGN GUIDE**

Span (ft)	SLS Roof Snow Load (psf)																			
	Single Span / #2 & btr					Single Span / MSR / Sel Str					Double Span* / #2 & btr					Double Span* / MSR / Sel Str				
	20	30	40	55	100	20	30	40	55	100	20	30	40	55	100	20	30	40	55	100
8	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
9	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
10	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
11	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
12	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
13	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
14	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
15	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
16	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x4
17	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6
18	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x4	2x6
19	2x4	2x6	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x4	2x6
20	2x6	2x6	2x6	2x6	2x6	2x4	2x6	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x4	2x6	2x6
22	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6
24	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x6
26	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8
28	2x6	2x8	2x8	2x8	2x10	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x6	2x6	2x8
30	2x8	2x8	2x8	2x8	2x10	2x6	2x8	2x8	2x8	2x10	2x6	2x6	2x8	2x8	2x10	2x6	2x6	2x6	2x8	2x8
32	2x8	2x8	2x8	2x10	2x10	2x8	2x8	2x8	2x8	2x10	2x6	2x8	2x8	2x8	2x10	2x6	2x6	2x8	2x8	2x8
34	2x8	2x8	2x10	2x10	2x10	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x10	2x6	2x8	2x8	2x8	2x10
36	2x8	2x10	2x10	2x10	2x12	2x8	2x8	2x8	2x10	2x10										
38	2x10	2x10	2x10	2x10	2x12	2x8	2x8	2x10	2x10	2x12										
40	2x10	2x10	2x10	2x12	2x12	2x8	2x10	2x10	2x10	2x12										
42	2x10	2x10	2x10	2x12		2x10	2x10	2x10	2x10	2x12										
44	2x10	2x10	2x12	2x12		2x10	2x10	2x10	2x12	2x12										
46	2x10	2x12	2x12	2x12		2x10	2x10	2x12	2x12											
48	2x12	2x12	2x12			2x10	2x12	2x12	2x12											
50	2x12	2x12	2x12			2x10	2x12	2x12	2x12											
52	2x12	2x12				2x12	2x12	2x12												
54	2x12					2x12	2x12	2x12												
56						2x12	2x12													
58						2x12														
60																				

Max. Panel Length = 60 ft

Max. Panel Length = 60 ft

NOTES

1. Tabulated values determined in accordance with NDS 2018 for SPF/DFir. Longer spans achievable with other grades / species.
2. The following factors were used for calculations: C_D=1.15, C_M=1.0, C_t=1.0, C_r=1.15
3. Spans are measured from centerlines of supports.
4. Includes maximum 10psf super-imposed dead load.
5. *For double span values, span lengths must be within +/-10%. For other conditions contact StructureCraft Engineering.
6. Tabulated values only valid when manufactured by StructureCraft
7. Satisfies L/180 deflection criteria under 0.5 Dead Load and 1.0 Snow Load.
8. **Design Guides are provided for the purposes of preliminary design only. Contact StructureCraft Engineering for intermediate span values or further assistance.
9. Tabulated values shown for nominal 2" wide laminations are also applicable to wider laminations (3", 4")

Span (ft)	Floor Live Load (psf)																			
	Single Span / #2 & btr										Single Span / MSR / Sel Str									
	No Concrete Topping					2" Concrete Topping					No Concrete Topping					2" Concrete Topping				
	40	50	70	100	150	40	50	70	100	150	40	50	70	100	150	40	50	70	100	150
10	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
11	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6
12	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x6	2x6
13	2x4	2x4	2x6	2x6	2x6	2x4	2x6	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6
14	2x4	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
15	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
16	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x8
17	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8
18	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x8	2x8
19	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x8	2x8	2x8
20	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x10	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x8	2x8	2x8
22	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x10	2x10	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x10
24	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x8	2x8	2x8	2x10	2x10	2x8	2x8	2x8	2x10	2x10
26	2x10	2x10	2x10	2x10	2x12	2x10	2x10	2x10	2x10	2x12	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10
28	2x10	2x10	2x10	2x10	2x12	2x12	2x12	2x12	2x12	2x12	2x10	2x10	2x10	2x10	2x12	2x10	2x10	2x10	2x10	2x12
30	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12		2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12
32	2x12	2x12	2x12	2x12		2x12	2x12	2x12	2x12		2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	
34											2x12	2x12	2x12	2x12						
	Double Span* / #2 & btr										Double Span* / MSR / Sel Str									
10	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
11	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4	2x4
12	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x6	2x6	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x4	2x6
13	2x4	2x4	2x6	2x6	2x6	2x4	2x6	2x6	2x6	2x6	2x4	2x4	2x4	2x4	2x6	2x4	2x4	2x4	2x6	2x6
14	2x4	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x4	2x4	2x4	2x6	2x6	2x4	2x4	2x6	2x6	2x6
15	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x8	2x4	2x4	2x6	2x6	2x6	2x4	2x6	2x6	2x6	2x6
16	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
17	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6
18	2x6	2x6	2x6	2x8	2x8	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x6	2x8
19	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x8	2x8	2x8	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x6	2x8
20	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x10	2x6	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x8	2x8
22	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x10	2x10	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8
24	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x8	2x8	2x8	2x8	2x10	2x8	2x8	2x8	2x8	2x10
26	2x10	2x10	2x10	2x10	2x12	2x10	2x10	2x10	2x10	2x12	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10
28	2x10	2x10	2x10	2x10	2x12	2x12	2x12	2x12	2x12	2x12	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10	2x10
30	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12		2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12
32	2x12	2x12	2x12	2x12		2x12	2x12	2x12	2x12		2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12	2x12
34											2x12	2x12	2x12	2x12	2x12					

NOTES

1. Tabulated values determined in accordance with NDS 2018 for SPF/DFir. Longer spans achievable with other grades / species.
2. The following factors were used for calculations: C_D=1.15, C_M=1.0, C_t=1.0, C_r=1.15
3. Spans are measured from centerlines of supports.
4. Includes maximum 20psf super-imposed dead load.
5. *For double span values, span lengths must be within +/-10%. For other conditions contact StructureCraft Engineering.
6. Tabulated values only valid when manufactured by StructureCraft.
7. Satisfies vibration criteria published in AISC DG 11, and also L/240 deflection criteria under 0.5 Dead Load and 1.0 Live Load. Maximum deflection is limited to 2 in. for long spans
8. **Design Guides are provided for the purposes of preliminary design only. Contact StructureCraft Engineering for intermediate span values or for further assistance.
9. Tabulated values shown for nominal 2" wide laminations are also applicable to wider laminations (3", 4")

DLT Series	SPF - DLT Wall Panel Axial Capacity									
	2x4 3.5" #2&btr	**2x4** 3.5" 2100f-1.8E	**2x6** 5.5" #2&btr	**2x6** 5.5" 2100f-1.8E	**2x8** 7.25" #2&btr	**2x8** 7.25" 1950f-1.7E	**2x10** 9.25" #2&btr	**2x10** 9.25" Sel Str	**2x12** 11.25" #2&btr	**2x12** 11.25" Sel Str
H (ft)	**P_r (kip/ft)**									
6	37	62	84	142	117	195	151	190	183	230
8	23	37	67	112	103	169	139	174	171	215
10	14	22	51	83	87	141	126	157	160	200
12	9	14	38	61	72	115	112	138	148	184
14	6	9	28	45	58	92	98	120	135	167
16			21	33	47	73	84	102	122	150
18			15	25	37	57	71	86	108	133
20			12	19	30	45	60	72	96	116
22			9	15	24	36	51	60	84	101
24			7	11	19	29	43	51	73	88
26			6	9	16	24	36	42	64	76
28					13	20	30	36	56	66
30					11	16	26	30	48	57
32					9	14	22	26	42	50
34					8	11	19	22	37	43

NOTES

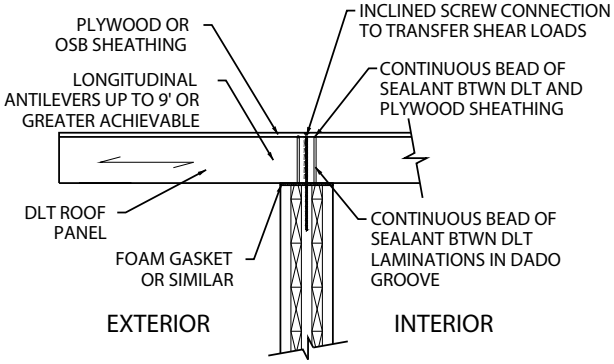
1. Tabulated values determined according to NDS 2018 for SPF / DFir.
2. The following factors were used for calculations: C_D=0.90, C_M=1.0, C_t=1.0
3. Tabulated values only valid when manufactured by StructureCraft
4. Design Guides are provided for the purposes of preliminary design only. Contact StructureCraft Engineering for other span values or grades, or for further assistance
5. Tabulated values shown for nominal 2" wide laminations are also applicable to wider laminations (3", 4")

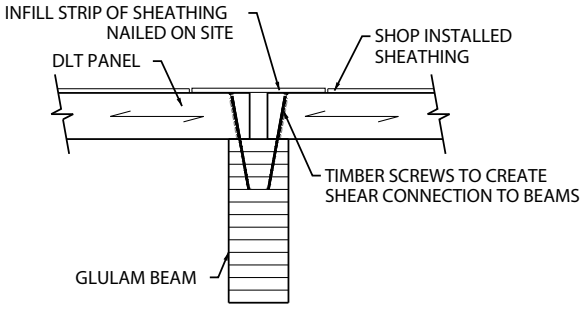
DLT Series	DFir - DLT Wall Panel Axial Capacity									
	2x4 3.5" #2&btr	**2x4** 3.5" 2400f-2.0E	**2x6** 5.5" #2&btr	**2x6** 5.5" 2400f-2.0E	**2x8** 7.25" #2&btr	**2x8** 7.25" Sel Str	**2x10** 9.25" #2&btr	**2x10** 9.25" Sel Str	**2x12** 11.25" #2&btr	**2x12** 11.25" Sel Str
L(ft)	P_r (kip/ft)									
6	43	67	100	152	141	190	183	248	222	300
8	26	40	78	120	123	163	168	225	208	280
10	15	25	58	91	103	135	150	200	193	259
12	10	16	42	67	84	108	132	175	177	236
14	6	10	31	49	67	85	114	149	160	212
16			23	36	53	67	97	126	143	188
18			17	27	42	52	82	105	126	165
20			13	21	33	41	68	87	111	143
22			10	16	26	33	57	72	96	124
24			8	13	21	26	48	60	83	106
26			6	10	17	21	40	50	72	91
28					14	18	34	42	62	79
30					12	15	28	35	54	68
32					10	12	24	30	47	58
34					8	10	21	25	41	51

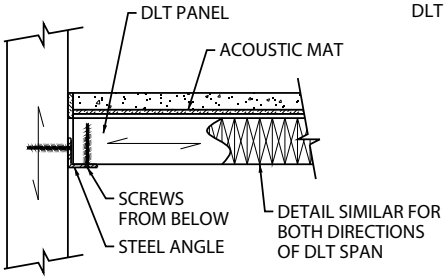
NOTES

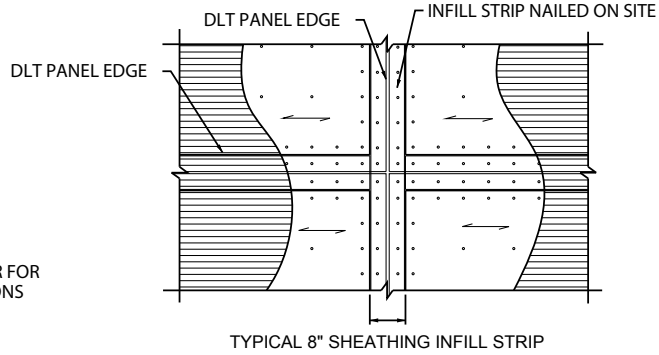
1. Tabulated values determined according to NDS 2018 for SPF / DFir.
2. The following factors were used for calculations: C_D=0.90, C_M=1.0, C_t=1.0
3. Tabulated values only valid when manufactured by StructureCraft
4. 4. Design Guides are provided for the purposes of preliminary design only. Contact StructureCraft Engineering for other span values or grades, or for further assistance
5. Tabulated values shown for nominal 2" wide laminations are also applicable to wider laminations (3", 4")

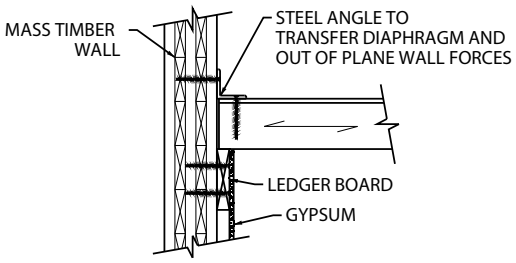
TYPICAL CONNECTION DETAILS

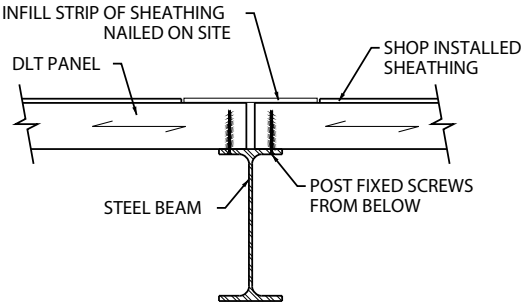


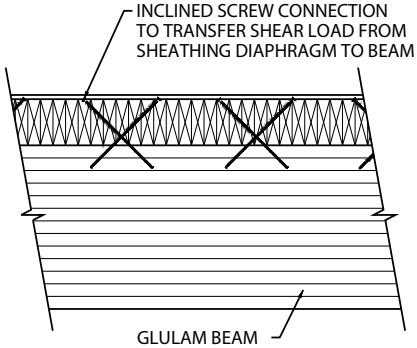


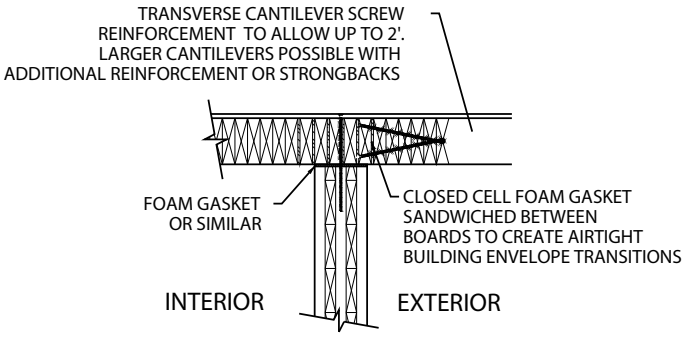


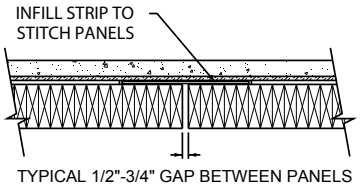


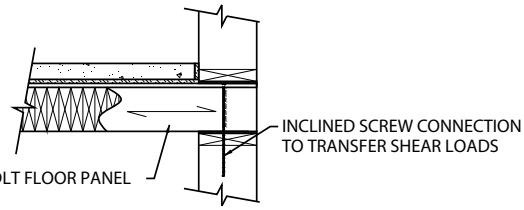


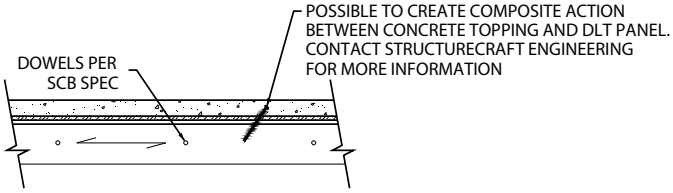




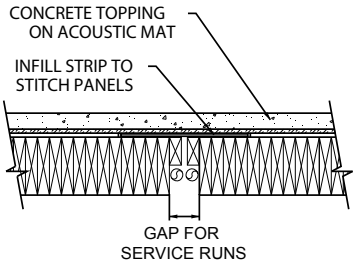


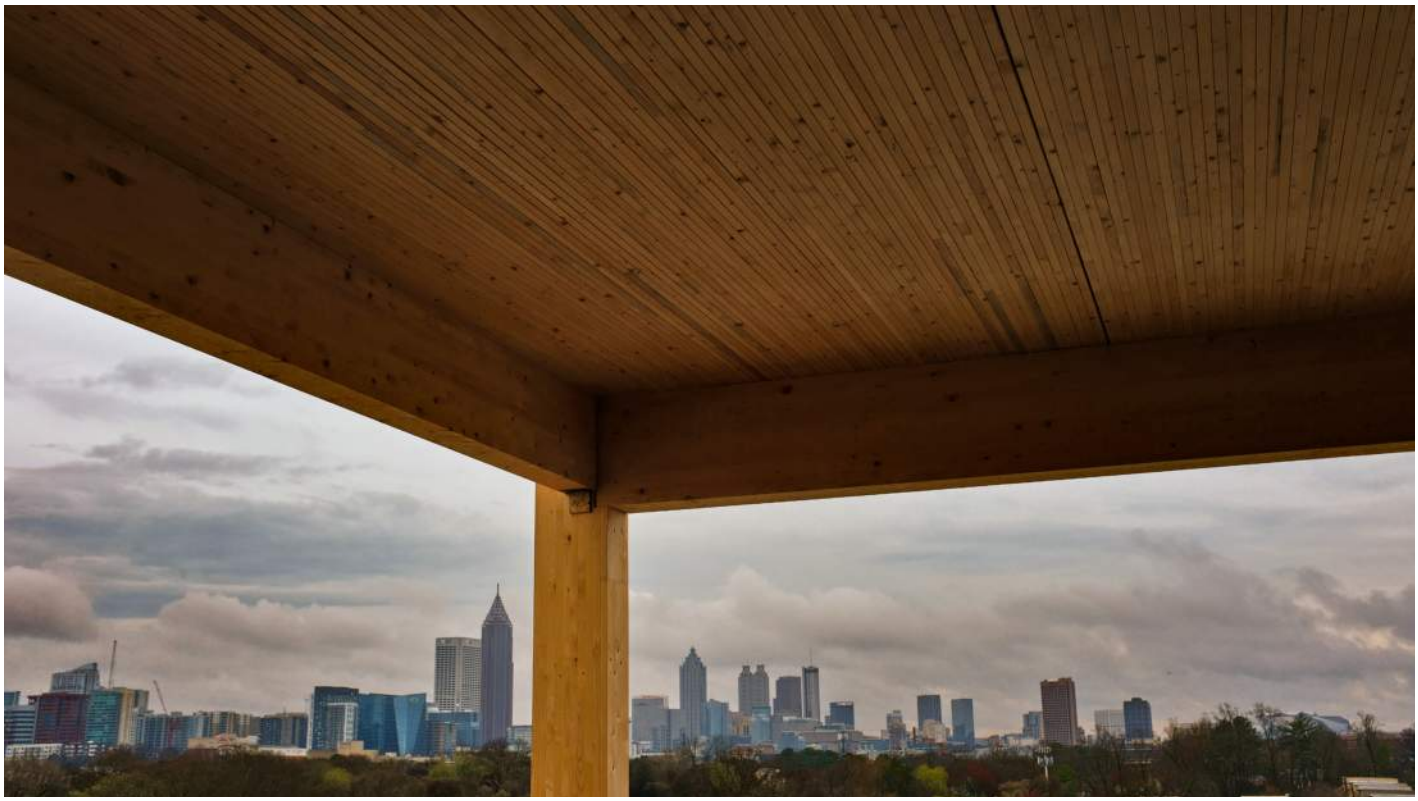






TYPICAL FLOOR BUILD-UP
CONCRETE TOPPING
(RIGID INSULATION IF REQUIRED)
ACOUSTIC MAT
1/2" SHEATHING
2 x4, 2x6, 2x8, 2x10, or 2x12 DLT PANELS





StructureCraft engineers and builds efficient, beautiful and well-detailed timber structures for architects, owners, developers, and general contractors.

DELIVERY METHODS

ENGINEER BUILD

With more than 40 years of experience in design, we take full responsibility for the structural engineering on a project. Our vertically integrated approach means our team is involved from concept right through to 3D modelling, fabrication and erection. Because our turnkey services are all in-house, we are able to utilize this experience to provide an early fixed price, giving certainty to the scope of work. We then work with the architect and owner to create the finely detailed structures we are well known for.

DESIGN-ASSIST

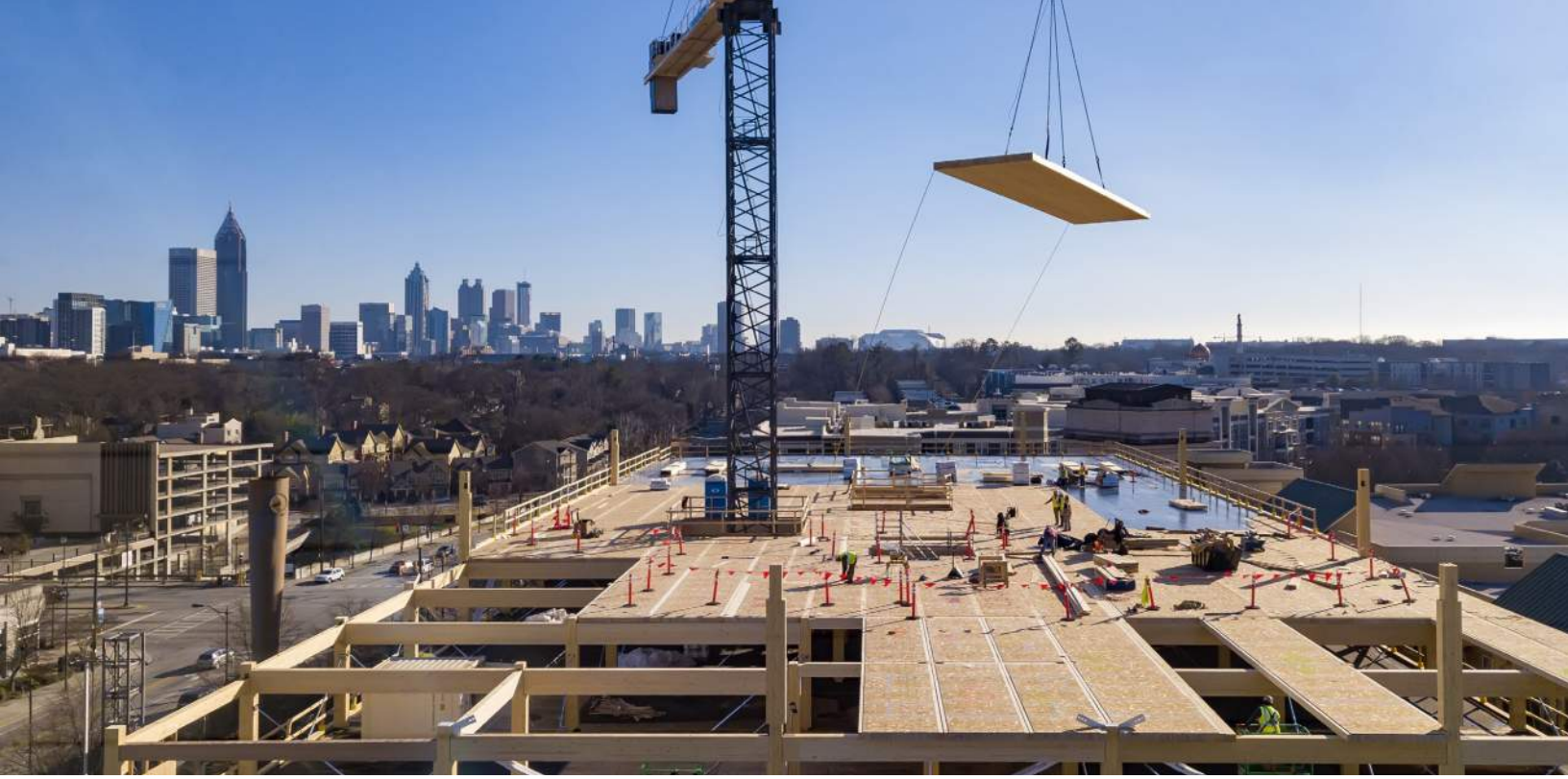
We come alongside early with the consultant team of architects and base building engineers. We offer our expertise in timber detailing and knowledge of fabrication and erection costs to the design team, working together towards a buildable, cost-efficient, yet expressively detailed structure. This would lead to a supply and install contract often as early as the Design Development stage.

DLT SUPPLY

DowelLam™ by StructureCraft is the first all wood mass timber panel in North America, providing architects, engineers, and developers greater versatility in designing with mass timber. StructureCraft can supply DLT panels to the builder for installation, opening more possibilities of using wood in construction.

NATIONAL ARTS CENTRE

BANFF PEDESTRIAN FOOTBRIDGE



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