



**InQuik**<sup>®</sup>  
BRIDGING SYSTEMS



# CATALOGUE

PCT/AU2016/050390, PCT/AU2017/051387





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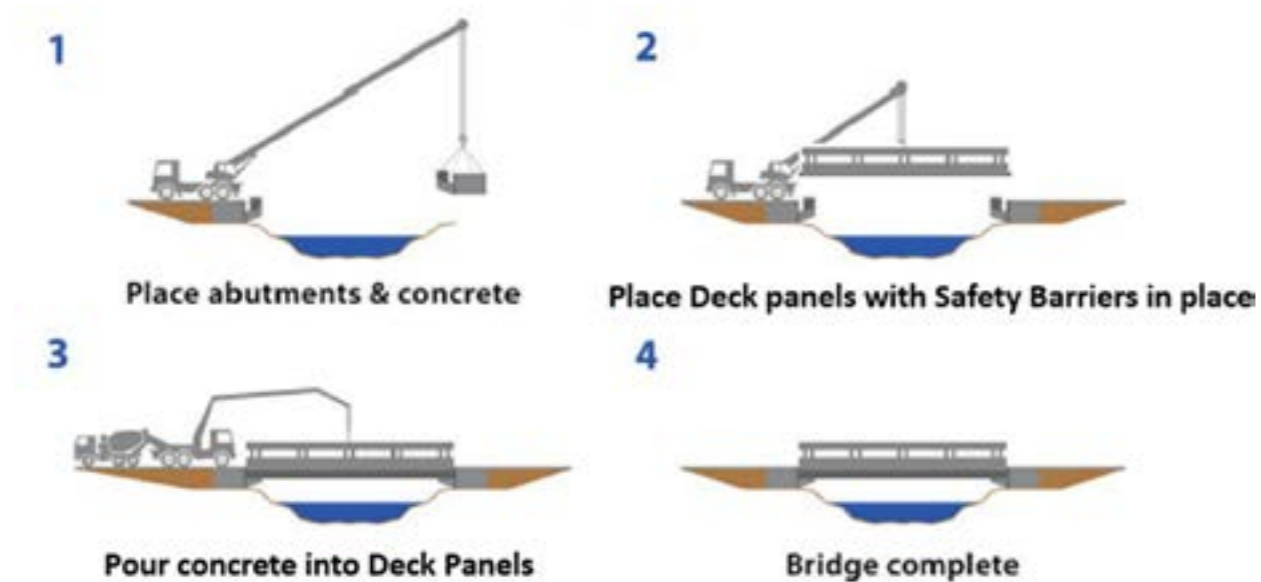
# The InQuik Bridge

# Bridge Range

The InQuik® bridge is a semi-modular system, where the integrated steel formwork and reinforcing components are prefabricated off-site, then completed when concrete is poured on-site to form a single homogeneous mass.

The bridge panels are self-supporting and the formwork is aesthetic and sacrificial, so beneath the steel form is a conventional in-situ poured reinforced concrete bridge, with all the benefits that provides. The InQuik product range includes abutments, wing walls, headstocks, blade piers and deck panels.

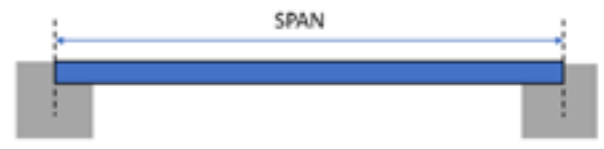
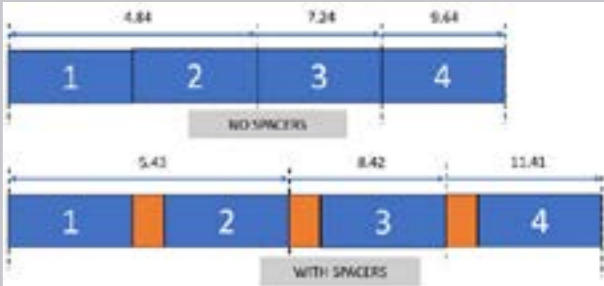
## Installation process for an InQuik bridge:



## Key Features

- No temporary formwork supports needed.
- Bridge construction occurs from above, with minimal need to work under the bridge, improving worker safety and reducing environmental impact.
- The semi-modular deck panels are placed side-by-side to give the desired bridge width, then concrete is poured to create a homogeneous slab.
- Can create multi-span bridge structures with pier/headstock components.
- The InQuik bridge structure is designed for a minimum 100-year service life.
- InQuik abutments, wing walls, headstocks and blade piers are constructed using a similar semi-modular method as the deck.
- Single span lengths range between 6.1-18.5m, with engineering certified by SMEC Australia Pty Ltd (SMEC) to the Australian Standards, AS5100 (2017) Bridge Design requirements.
- Reduced long-term maintenance requirements than precast through eliminating longitudinal deck joints, and the integral design also removes tie-downs and bearings.

## INQUIK BRIDGE RANGE

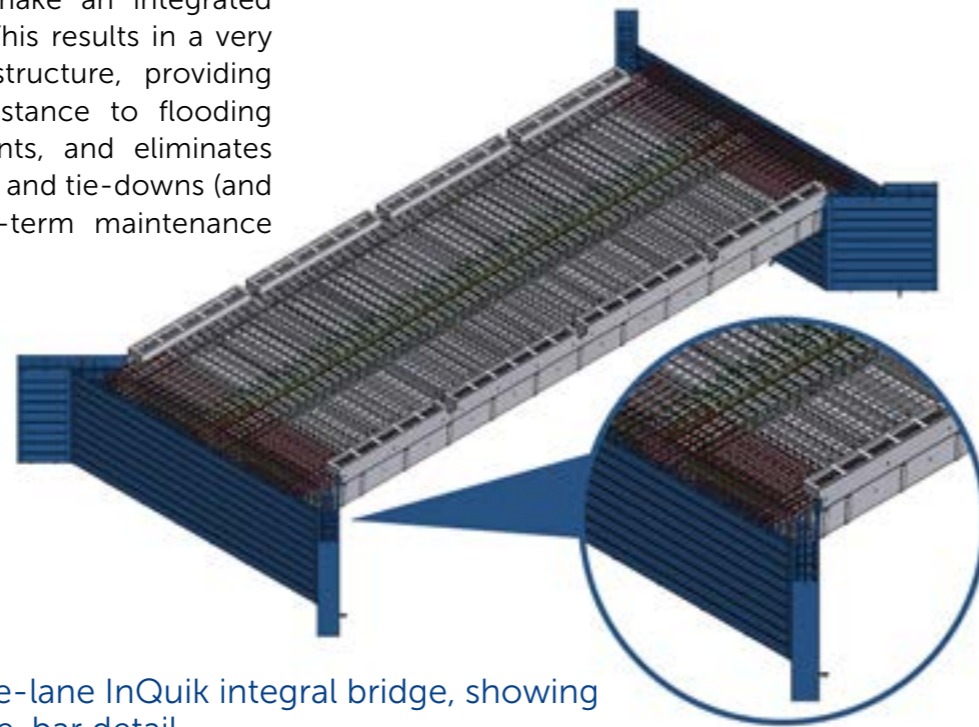
Product	CR370	HM32	IQ700	IQ1000	Explanatory Comments
Description	Culvert Replacement	Narrow Crossing	Standard 700-deep deck	Standard 1000-deep deck	
Span (metres)	6.4	6.1 9.1 12.1	6.1 9.1 12.1 13.7	16.1 18.5	As measured from centreline of 900mm abutment. 
Standard Width (metres)	4.84 (5.43 with spacer)	3.2	4.84 (5.43 with spacer)	4.84 (5.43 with spacer)	All standard InQuik deck panels are 2440mm wide (except H,32) and are placed side by side with 40mm overlap between the deck panels.  Extension spacers may be placed between the panels to increase the width by 550mm per join.
	7.24 (8.42 with spacers)		7.24 (8.42 with spacers)	7.24 (8.42 with spacers)	
	9.64 (11.41 with spacers)		9.64 (11.41 with spacers)	9.64 (11.41 with spacers)	
Load Ratings	SM1600	T44 (68t)	T44 (68t) or SM1600	T44 (68t) or SM1600	InQuik Offer bridge designs for SM1600 (AS5100:2017) and T44 (68 tonne, Austroads: 1992) load ratings.
Deck Depth (mm)	370	700	700	1020	See "Deck Dimensions" section below for more information.



## InQuik Integral Bridge

Though the InQuik system can be simply-supported on bearings, a major benefit of pouring the concrete fully on-site is that it allows the construction of a fully integral bridge, where the bridge deck and top of the abutments are cast at the same time to make an integrated concrete structure. This results in a very strong and stable structure, providing greater damage resistance to flooding and earthquake events, and eliminates the need for bearings and tie-downs (and the associated long-term maintenance requirements).

For an integral bridge, the formwork is removed from the abutment backwall rebate, and the end beams of the deck panels. On-site, additional tie-bars are placed to connect the decks and the abutments.



Design for a single-lane InQuik integral bridge, showing deck-abutment tie-bar detail.

## InQuik Integral Bridge Features & Benefits

FEATURES	BENEFITS
Pre-engineered, pre-certified, pre-fabricated	Simple and fast on-site installation
No bearings, tie-downs or joints	No long-term structural maintenance over 100-year design life
Pre-fabricated components with concrete poured on-site	Reduced WHS risk, reduced trades, reduced installation time on-site
Lightweight components	Reduced WHS risk, small local craneage, ease of transportation
No joints in structure	No joints to allow salt and water ingress
Self-supporting modular structure	No temporary supports required
Faster, simpler, safer with no maintenance	Reduced project costs & reduced 'whole of life' costs

## Deck Dimensions

All standard InQuik deck panels are 2440mm-wide, and are placed side-by-side with ~40mm overlap between the deck panels (eg: a bridge that is 2 panels wide would therefore be 4.84m in width). The top deck slab is 200mm deep, and the center deck formwork is stiffened by 40mm-deep corrugations.

The CR370 bridge (suitable for culvert replacements) has 6.4m-long deck panels with a total depth of 370mm.

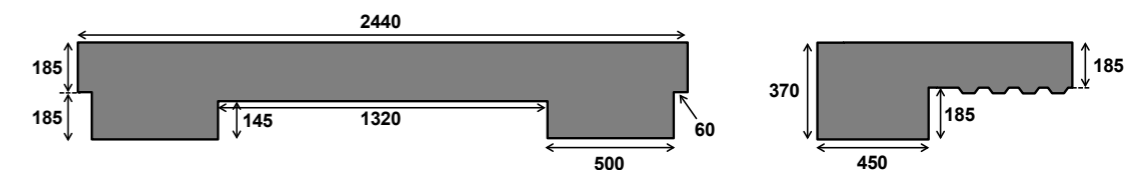
Deck panels for the HM32 bridge (used for narrow crossings) are 3200mm-wide and only need 1 panel. Spans are 6.1, 9.1 and 12.1m in length. These deck panels have a total depth of 700mm.

The 6.1-13.7m long standard IQ700 deck panels have a total depth of 700mm, while the 16.1 and 18.5m IQ1000 panels have a total depth of 1020mm.

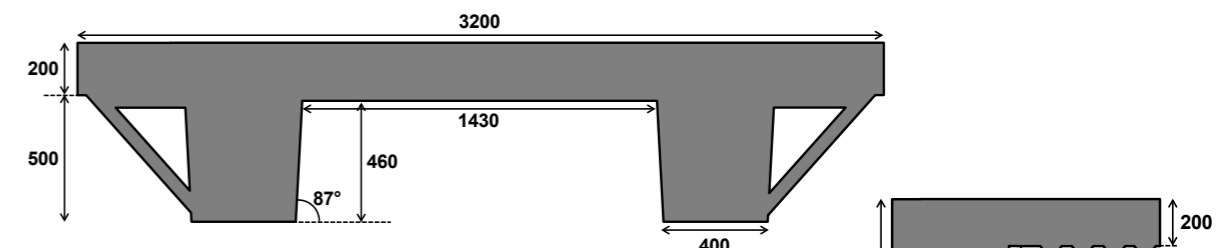
Note that the deck effective spans are defined from the centreline of the standard 900mm-wide abutments (thus, the clear span is 900mm less than the effective span). In all corrosion classification environments up to B1, InQuik bridges are designed to use 40 MPa concrete, except for the 13.7m deck panel, which needs 50 MPa concrete unless otherwise approved.

B2 classification environments require 50 MPa concrete for all spans.

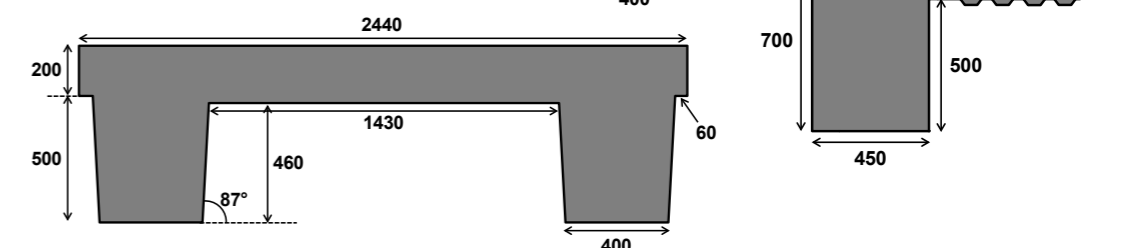
**CR370**  
6.4m



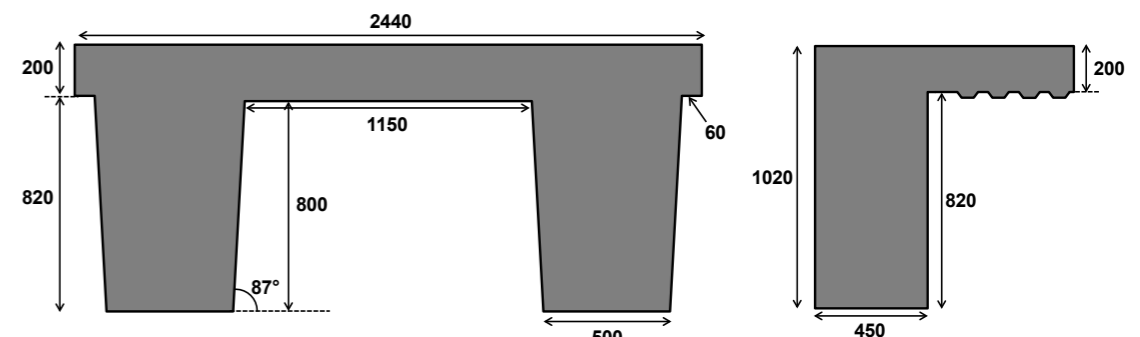
**HM32**  
6.1-12.1m



**IQ700**  
6.1-13.7m



**IQ1000**  
16.1-18.5m



Deck and girder cross-section

End beam cross-section





### IQ700 and IQ1000 Load Rating & Deck Spans

The InQuik deck panels have been designed to satisfy the load rating criteria for both T44/68t B-Double (Austroads, 1992), and SM1600 (AS5100, 2017) design codes.

The 6.1-9.1m spans have the same design for both load ratings, and the 12.1-18.5m spans have a heavier reinforcing design for the SM1600 rating.

The simply-supported deck design is 0.3-0.5t heavier than the integral design.

SPAN (m)	LOAD RATING	MASS (INTEGRAL) (t)	APPROX. CONCRETE VOLUME (m <sup>3</sup> )
6.1	SM1600	2.1	6.1
9.1	SM1600	3.0	8.9
12.1	T44	3.9	11.7
	SM1600	4.4	
13.7	T44	5.3	13.2
	SM1600	5.8	
16.1	T44	8.6	23.3
	SM1600	9.4	
18.5	T44	9.8	26.6
	SM1600	10.8	

### Formwork Cladding Material

The deck formwork is a permanent fixture and remains in place, providing a protective barrier for the concrete against corrosive influences from the environment that can cause concrete degradation. There are three options for the deck formwork cladding: Weathering Steel, Magnelis®, and Stainless Steel, which each have different corrosion behaviour. The most suitable cladding component would be selected based on its corrosion performance in each bridges' specific environment. Other materials would require a special order.



#### BLUESCOPE REDCOR® WEATHERING STEEL

REDCOR® weathering steel is a high strength formwork cladding material that develops a stable oxide layer on the surface of the steel, known as the 'patina'. When used in the appropriate environment, the patina enhances the corrosion resistance of the steel compared to conventional uncoated steels, effectively 'weathering' the steel in a natural way. Once fully formed and weathered the appearance is usually dark brown to a purple colour that nicely blends with the environment. Weathering steel has been used since the 1930s in railway coal wagons, bridges, facades, and many architectural features such as sculptures and landscaping. When designed and detailed correctly, considering the environmental factors that govern its use, it has exhibited enhanced corrosion resistance. This means REDCOR® weathering steel formwork cladding may be used without the need for protective coating systems, significantly reducing both initial fabrication and ongoing lifetime maintenance costs.

#### MAGNELIS® (STANDARD FOR INQUIK)

Magnelis® is a proprietary product which is steel coated with an alloy of zinc, aluminium and magnesium. This coating has been shown to have far superior corrosion resistance properties to zinc galvanised steel, particularly in salty environments. Due to the high corrosion resistance, less material is needed to coat the steel, and it achieves a superior result. In a marine environment, the coating loses ~0.3 µm/year in thickness. Magnelis® is the only metallic coating product certified for use in a C5 environment.

#### STAINLESS STEEL

For bridge projects where aesthetics is important in the long-term, and/or the bridge is to be constructed in a highly corrosive environment (eg: tropical, industrial, etc.), stainless steel cladding can be used, which has extreme resistance to corrosion. For 316 grade stainless steel, the estimated time for pitting to penetrate 1 mm is 260 years in a marine environment (the steel cladding is 3mm thick), implying the formwork is likely to outlast the bridge structure.



## Kerb and Barrier Options

Standard InQuik bridges have a flat site or a castellated kerb. Standard kerb design is 150mm high, with a width of 200mm.

Custom designs requiring a wider kerb can be accommodated if required.

Appropriate fixings and connections for barriers can also be included in the deck design, with a standard barrier design available for side and top-mounted low performance barriers.

The InQuik system is certified for low, regular and medium performance barriers, and can accommodate a customised connection system as required.

Standard InQuik bridges include low performance Thrie-beam or regular performance TMR-style barrier

BARRIER STYLE	PERFORMANCE RATING	KERB FORMAT
Thrie-beam	Side-mounted or top-mounted Standard bridge guardrail	Flat side (no kerb)
TMR-style steel barrier	Regular performance	Castellated kerb (400mm wide)
RMS-style steel barrier	Regular performance	Castellated kerb (350mm wide)
Concrete	Regular performance	Flat side (no kerb)



## Bridge Abutment/ Wing Wall

The InQuik abutment length is determined by the width of the bridge.

The abutment height (to the deck shelf) is determined by the site conditions.

The size and type of foundation drives the pile openings in the abutment.

InQuik prefer to work with standard designs where possible to optimise design and manufacturing processes. However, bridges do have variable site-specific needs, and so we offer non-standard premium features as well. If a project requires any features or dimensions not listed below, we may be able to provide for them in the design as well.

PRODUCT	ABUTMENT
STANDARD FEATURES	<ul style="list-style-type: none"> <li>• Default height 1200mm (standard heights available 1200mm, 1800mm &amp; 2400mm), to the underside of the deck</li> <li>• Lengths are driven by the standard deck widths</li> <li>• Thickness 900mm or 1200mm (the size of the foundations and/or requirement for an approach slab will determine the required thickness)</li> </ul>
NON-STANDARD FEATURES	<ul style="list-style-type: none"> <li>• Crossfalls are typically built into the abutment shelf</li> <li>• One-way crossfall on a single lane bridge can be incorporated into the blinding layer</li> <li>• Non-standard abutment heights</li> </ul>
PRODUCT	WING WALLS
STANDARD FEATURES	<ul style="list-style-type: none"> <li>• Length: 2.7m</li> <li>• Height = abutment height + depth of deck panel</li> <li>• Angle: 45° or 90°</li> <li>• Square profile</li> <li>• Symmetrical layout</li> </ul>
NON-STANDARD FEATURES	<ul style="list-style-type: none"> <li>• 450mm wide (if needed for structural reasons)</li> <li>• Tapered profile</li> <li>• Non-symmetrical layout</li> </ul>
PRODUCT	FOUNDATIONS
STANDARD FEATURES	<ul style="list-style-type: none"> <li>• Driven steel piles (H-piles or Circular Hollow Sections) at 1.6m maximum spacings</li> <li>• Concrete piles (driven or bored) at 3.2m spacings</li> <li>• Mass pour or strip footing</li> </ul>
NON-STANDARD FEATURES	<ul style="list-style-type: none"> <li>• Pile spacings must be multiples of 1.6m due to the internal structure of the abutment</li> </ul>



## Abutment Options & Features

A standard InQuik abutment is 900mm-wide with a flat deck shelf. Certain projects may require a cross-fall, which depending on the width of the bridge and the size of the cross-fall, could be incorporated into the blinding layer (for a one-way crossfall), formed on-site by mounding up deck concrete (for crowned crossfall), or incorporated into the abutment shelf.

If an approach slab is required, a 300mm-wide pocket is incorporated into the abutment, so that the approach slab can be placed on top. For integral bridges this increases the abutment thickness to 1200mm.



## Wing Wall Options & Features

Where a barrier is required to attach to a guardrail, 45 degree wing walls are recommended practice. If a 90 degree wing wall is required, barriers will need to be customised to align with the wing walls.

## Foundations

The InQuik abutments are suitable for all major bridge foundation types. The best foundation for a particular bridge will depend on site-specific conditions (consult your engineer), and the foundation type affects the abutment design parameters:

- Driven steel H-piles have a maximum spacing of 1.6m.
- Bored or precast concrete piles, and screw piles, have a maximum spacing of 3.2m.

The standard InQuik abutment height starts at 1.2m and increases in 0.4m increments (1.6m, 2.0m & 2.4m). If a height is greater than this is required, a thicker blinding slab can be used. Higher abutments can be made as a custom design.





# Multi-Span Bridges & Structures

# InQuik HM32 Bridge

In addition to single-span bridges, the InQuik system can be used for multi-span bridges, wharves, jetties, elevated roads and rail crossings. InQuik has developed its own headstock and bladepier designs, which are similar in construction to the abutment design.

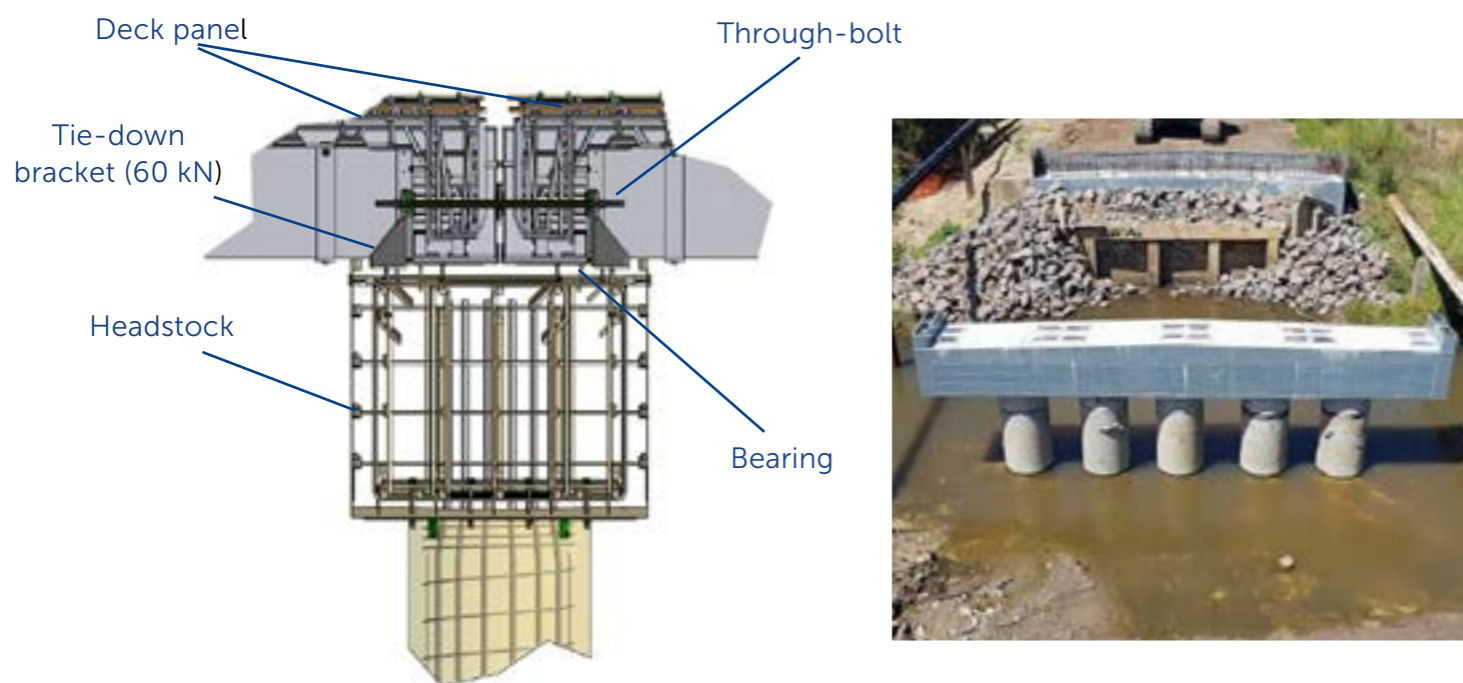
Currently, InQuik headstocks and bladepiers have a simply supported articulation with the deck panels on top. As such, they require bearings and tie-downs between the intermediate support and the deck panels.

A fully integral InQuik headstock/bladepier design is currently in development.

HEADSTOCK DIMENSIONS	FOUNDATIONS
1.0m (H) x 1.2m (W)	<ul style="list-style-type: none"> <li>Common foundation types include bored concrete piles and driven steel piles (UC or CHS)</li> <li>Pile collars can be used to support the headstock on an embedded concrete pile if required</li> </ul>

For multi-span bridges, the decks can be tied down to the headstocks using brackets. Elastomeric strip bearings are generally used for the headstock shelf, as well as buffer bearings for the downstream side of the bridge. Through-bolts to tie together adjacent spans are also typically used to help transfer loads between the spans.

All simply supported decks have a 100mm gap under the end beam, so that a jack may be used to lift the deck for bearing replacement in the future.



Cross-section of an InQuik headstock, showing possible deck connection detail

The InQuik HM32 bridge has been specifically developed to provide a cost-effective bridge for private and remote crossings. The bridge has a fully integral design to minimise long-term maintenance needs. It is 3.2m wide, and comes in 6.1, 9.1 and 12.1m spans. The bridge is rated for a load of up to 68 tonnes, and the depth of the deck panels is 700mm.

To save cost, the abutments can be supplied without cladding (as reinforcing cages only). The abutment formwork would then be constructed on-site and removed once the bridge concrete has cured.

<b>DECK SPANS</b>	<ul style="list-style-type: none"> <li>6.1m</li> <li>9.1m</li> <li>12.1m</li> </ul>
<b>WIDTH</b>	<ul style="list-style-type: none"> <li>3.2m</li> </ul>
<b>ABUTMENT HEIGHT</b>	<ul style="list-style-type: none"> <li>1.2m standard only</li> </ul>
<b>ABUTMENT FORMWORK</b>	<ul style="list-style-type: none"> <li>Reinforcing cage only</li> <li>With full cladding</li> </ul>
<b>WING WALLS</b>	<ul style="list-style-type: none"> <li>Wing walls optional</li> <li>Length: 2.7m</li> <li>Angle to abutment: 45° or 90°</li> </ul>

HM32 SPAN (m)	MASS (t)	APPROX. CONCRETE VOLUME (m <sup>3</sup> )
6.1	2.5	6.8
9.1	3.8	10.1
12.1	5.9	13.5





# InQuik CR370 Bridge

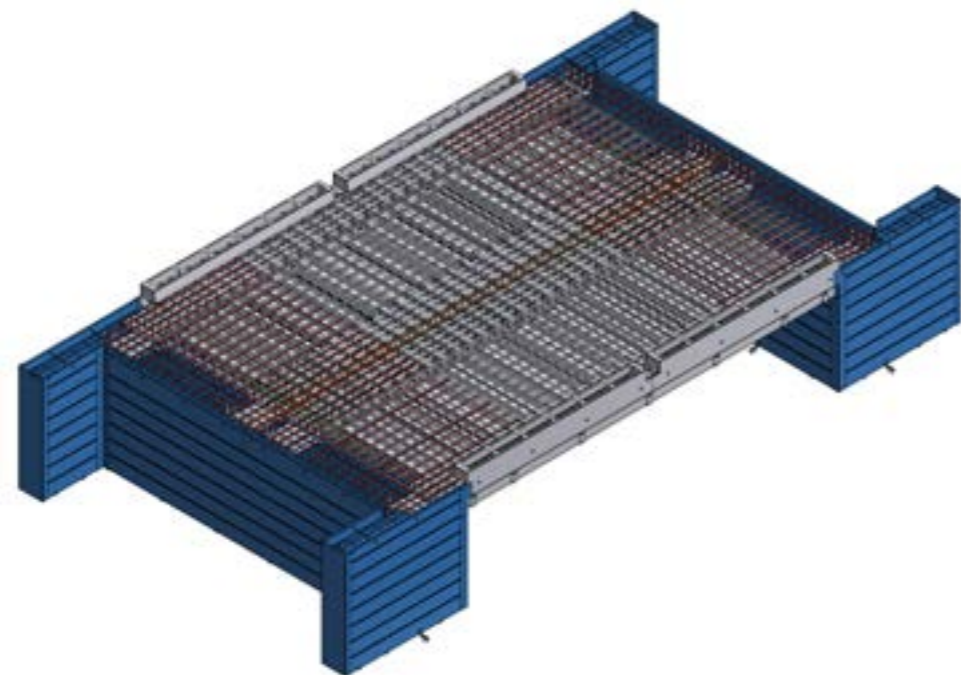
# Custom Design Features

The InQuik CR370 bridge has been developed to address the need to replace culverts and small bridges by local councils, farmers and primary producers.

This short-span bridge product has been specifically designed with a 370mm deep deck profile for ease of water afflux, and is available in a 6.4m span with the same bridge widths as the IQ700 design.

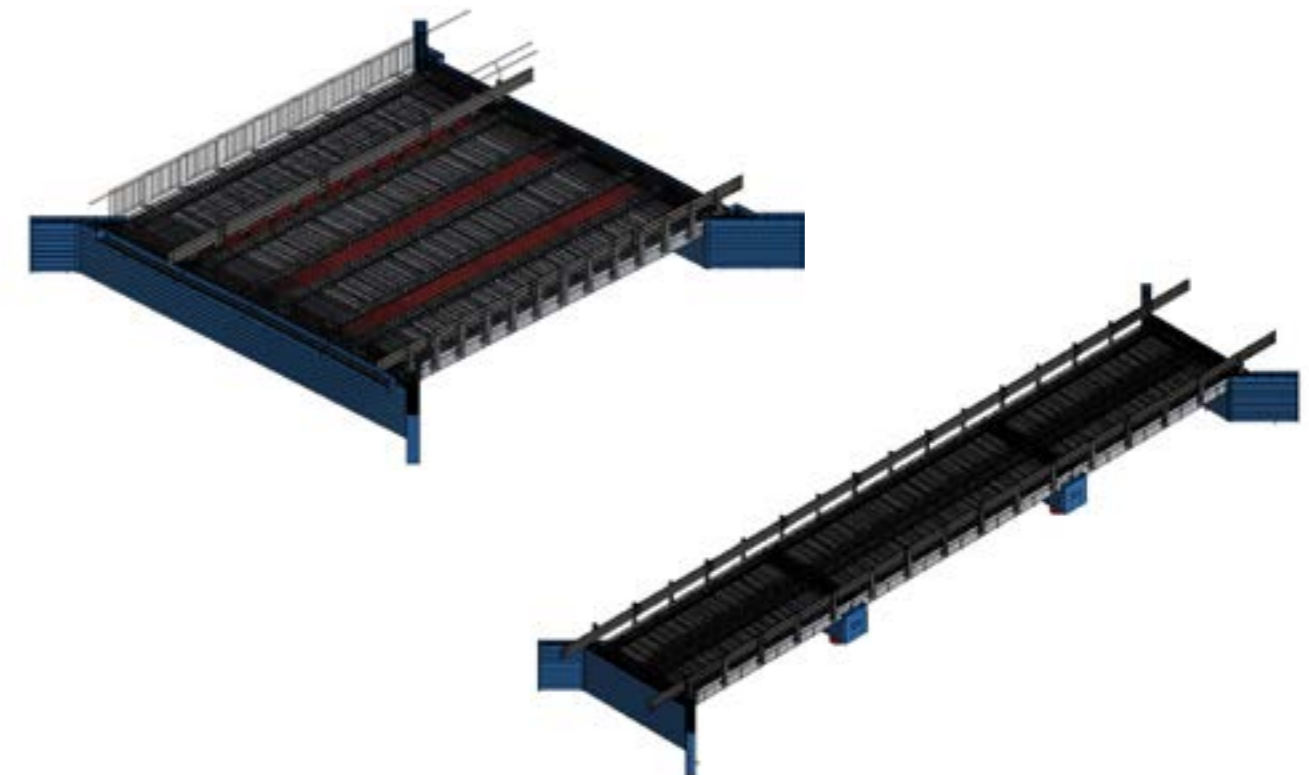
The CR370 has a fully integral design, and is load rated to SM1600.

<b>DECK SPAN</b>	<ul style="list-style-type: none"> <li>• 6.4m</li> </ul>
<b>WIDTH</b>	<ul style="list-style-type: none"> <li>• As per standard IQ700 bridges</li> </ul>
<b>ABUTMENT HEIGHT</b>	<ul style="list-style-type: none"> <li>• Standard 1.2m</li> <li>• 1.8m &amp; 2.4m options</li> </ul>
<b>WING WALLS</b>	<ul style="list-style-type: none"> <li>• Wing walls optional</li> <li>• Length: 2.7m</li> <li>• Angle to abutment: 45° or 90°</li> </ul>
<b>BARRIERS</b>	<ul style="list-style-type: none"> <li>• Side-mounted low performance barrier (optional)</li> </ul>



In addition to the standard InQuik bridge components, we can also provide custom design features at additional cost.

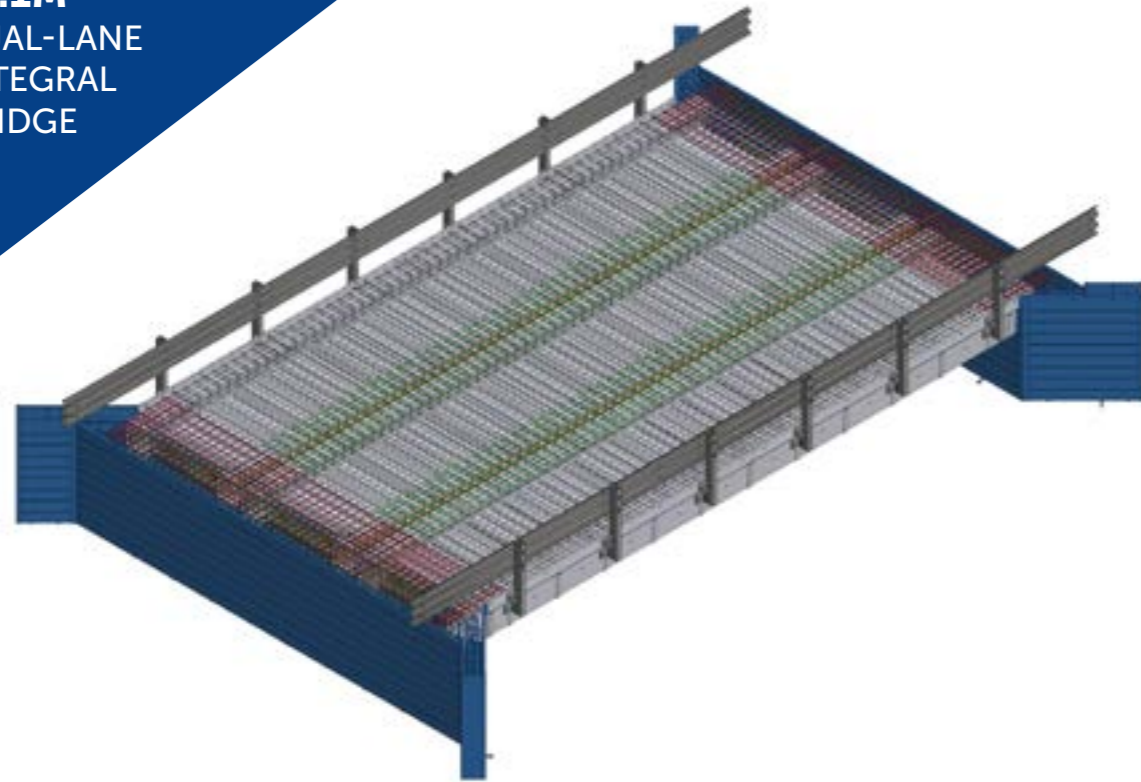
<b>ABUTMENT HEIGHTS</b>	<ul style="list-style-type: none"> <li>• Abutments higher than 2.4m may be possible, but require project specific engineering verification</li> </ul>
<b>WING WALLS</b>	<ul style="list-style-type: none"> <li>• Custom wing wall arrangements may be possible, but require project specific engineering</li> </ul>
<b>MULTI-SPAN HEADSTOCK</b>	<ul style="list-style-type: none"> <li>• If crossfall is required it can be designed into the headstock. It will sit flat on the piles.</li> </ul>
<b>BARRIER DESIGN</b>	<ul style="list-style-type: none"> <li>• We can incorporate non-standard barrier designs, according to site requirements. The InQuik system is suitable for up to medium performance barriers, but unusual barrier designs may require engineering verification</li> </ul>
<b>DECK SLOPE</b>	<ul style="list-style-type: none"> <li>• For wider bridges and larger crossfalls, one-way or crowned crossfalls may be incorporated into abutment shelf</li> </ul>
<b>SERVICES</b>	<ul style="list-style-type: none"> <li>• Service brackets can be incorporated underneath the bridge for simply-supported designs only.</li> <li>• For integral bridges, services can be mounted on a bracket at the side of the bridge</li> </ul>





# Sample Orders

**12.1M**  
DUAL-LANE  
INTEGRAL  
BRIDGE



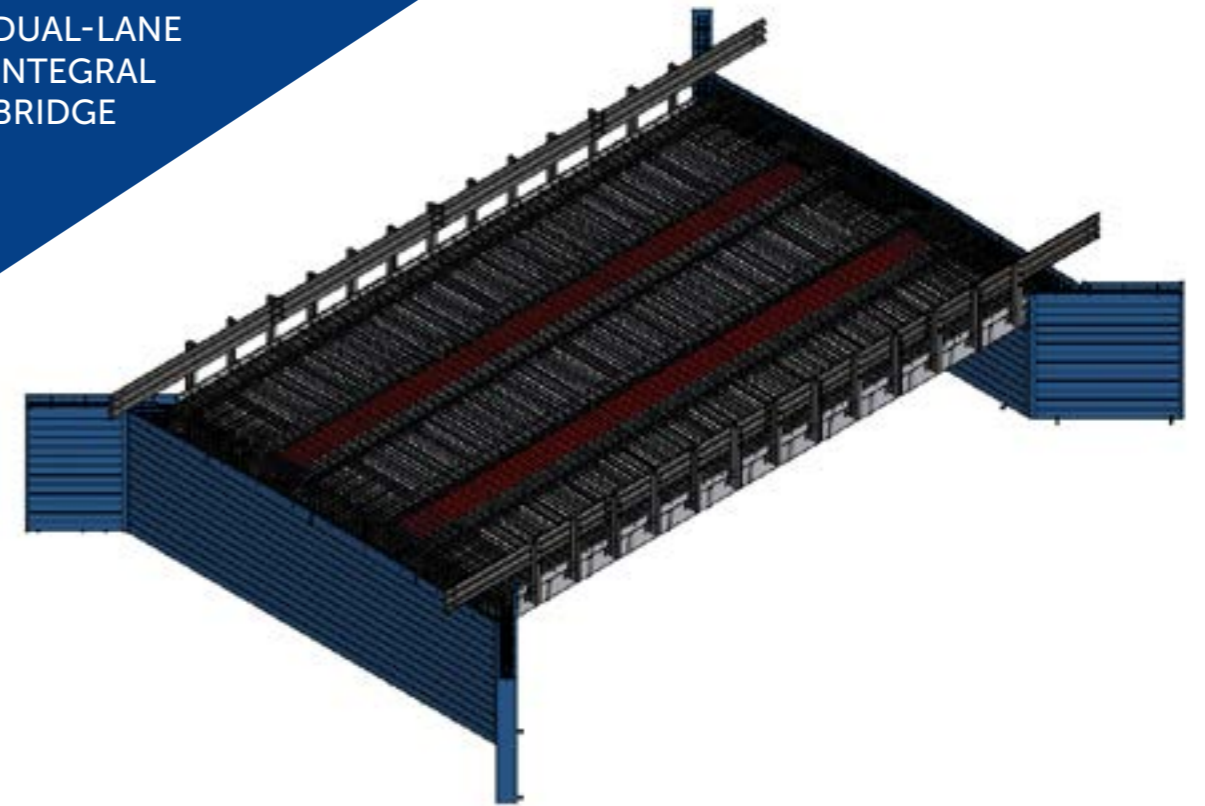
3-panel, dual-lane bridge with side-mounted barrier

This single-span bridge has a SM1600 load rating, and uses 3 x 2.44m-wide deck panels to give a total deck width of 7.2m. The abutment is 1.2m high with a 0.7m backwall rebate. This bridge has side-mounted barrier posts attached to a Thrie-beam guardrail.

QTY	InQuik Components	Total Mass (t)	Concrete (m <sup>3</sup> )
3	12.1m Magnelis IQ700 SM1600-rated deck panel (2.44 x 12.1m)	14.2	30.5
2	Double-lane abutment (7.2x1.2m)	3.6	21.8
1	Side-mounted barrier posts and Thrie-beam guardrail	1.1	
1	Deck-abutment integration tie-bar set	1.2	

**TOTAL: 20.1 52.3**

**13.7M**  
DUAL-LANE  
INTEGRAL  
BRIDGE



3-panel, dual-lane bridge with side-mounted barrier

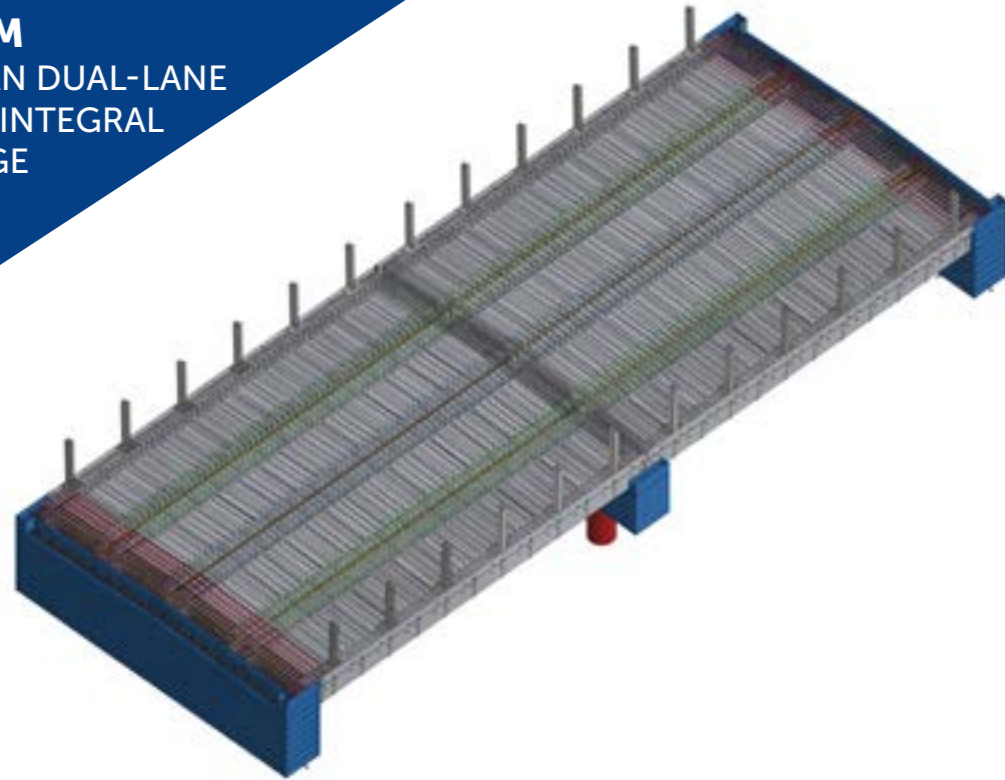
This single-span bridge has an SM1600 load rating, and uses 3 x 2.44m-wide deck panels with 2 x 550mm in-fill spacer sections between the panels, giving a total deck width of 8.42m. The abutment is 1.8m high with a 0.7m backwall rebate, and the wing walls are 2.5m high (to the height of the deck), 2.7m long and angled at 45° to the abutments. The foundations are H-piles. This bridge has side-mounted barrier posts attached to a Thrie-beam guardrail.

QTY	InQuik Components	Total Mass (t)	Concrete (m <sup>3</sup> )
3	13.7m Magnelis IQ700 SM1600-rated deck panel (2.44 x 13.7m)	17.4	} 38.3
2	0.55x13.7m in-fill tray section with reinforcing bars	1.0	
2	Double-lane abutment (8.42x1.8m) + 45° wing wall (2.7m) set	8.1	47.6
1	Deck-abutment integration tie-bar set	1.9	

**TOTAL: 28.4 85.9**



**24.2M**  
2-SPAN DUAL-LANE  
SEMI-INTEGRAL  
BRIDGE



Multi-span dual-lane semi-integral bridge with steel regular performance barrier

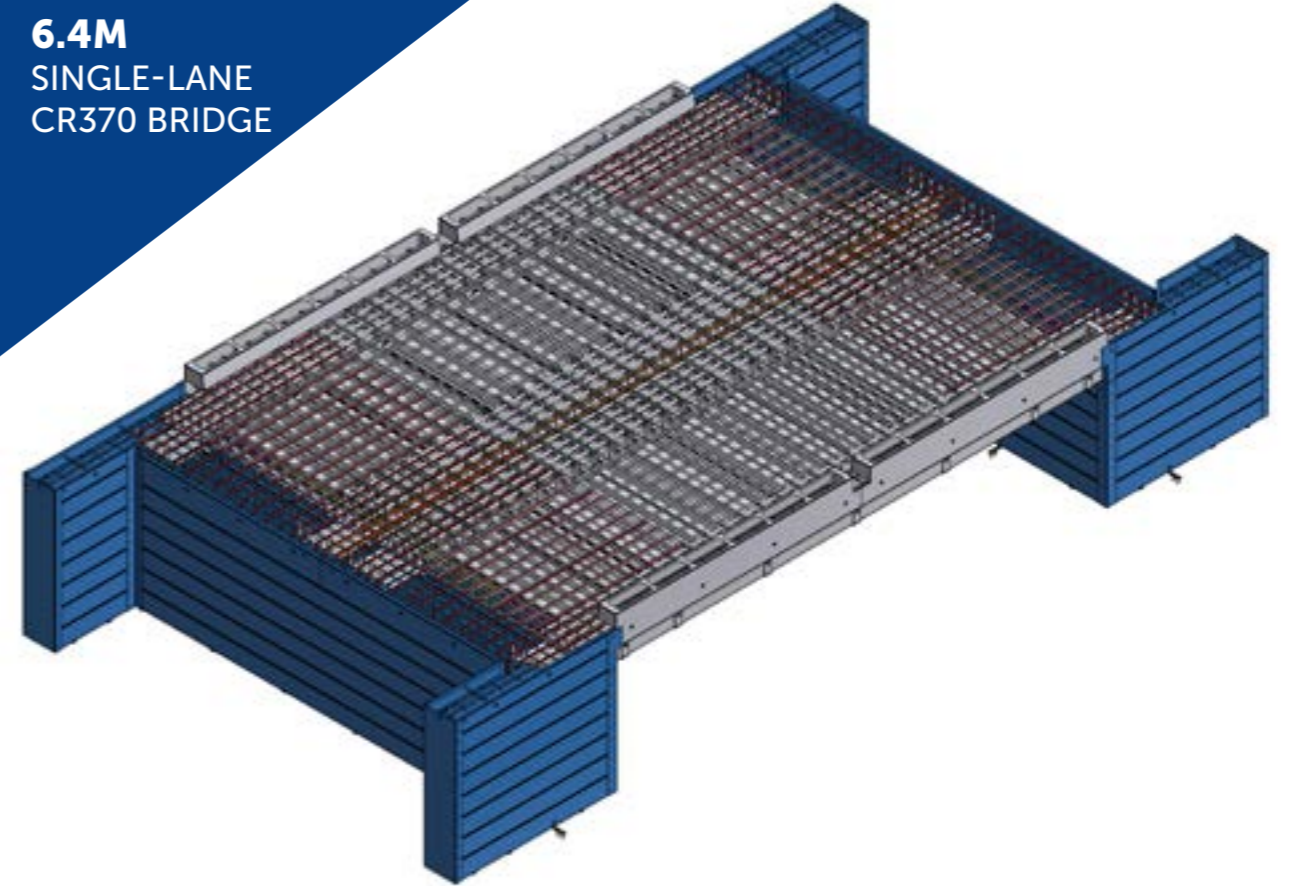
This dual-lane, 2-span bridge has a SM1600 load rating and is 24.2m long. Each span uses 4 x 2.44m-wide deck panels with 1 x 140mm in-fill spacer sections between the centre panels, giving a total deck width of 9.90m. The integral abutments are 1.2m high, with an approach slab pocket in the backwall. The deck is simply supported over the headstocks using elastomeric bearing strips. This bridge has a regular performance steel barrier, and the foundations are H-piles with concrete collars.

This bridge had side-mounted brackets supporting services.

QTY	InQuik Components	Total Mass (t)	Concrete (m <sup>3</sup> )
8	12.1m Magnelis IQ700 semi-integral SM1600-rated deck panel (2.44 x 12.1m)	39.4	140.8
4	12.1m Magnelis IQ700 bearing-supported SM1600-rated deck panel (2.44 x 12.1m)	20.1	
2	Integral abutment (9.9x1.2m) with approach slab pocket	6.6	23.4
2	Bearing headstock (10.4 x 1.2 x 1.2m)	9.4	16.0
16	Elastomeric bearings strips (2.4m-long)		
1	Deck-abutment integration tie-bar set	3.0	
1	Assembly components (through-bolts, fasteners, etc)		

**TOTAL: 78.5 180.2**

**6.4M**  
SINGLE-LANE  
CR370 BRIDGE



6.4m-span single-lane CR370 bridge with castellated kerb

This single-lane, 6.4-span bridge has a SM1600 load rating, with 2 x 2.44m-wide deck panels that give a total deck width of 4.8m. The abutment is 1.2m high with a 0.37m backwall rebate, and the wing walls are 1.57m high (to the height of the deck), 1.8m long and angled at 90° to the abutments. The deck has castellated kerbs.

QTY	InQuik Components	Total Mass (t)	Concrete (m <sup>3</sup> )
2	12.1m Magnelis IQ700 semi-integral SM1600-rated deck panel (2.44 x 12.1m)	2.6	7.6
2	Integral abutment (4.8x1.2m) + 90° wing wall (1.8m) set	3.0	15.7
1	Deck-abutment integration tie-bar set	0.5	

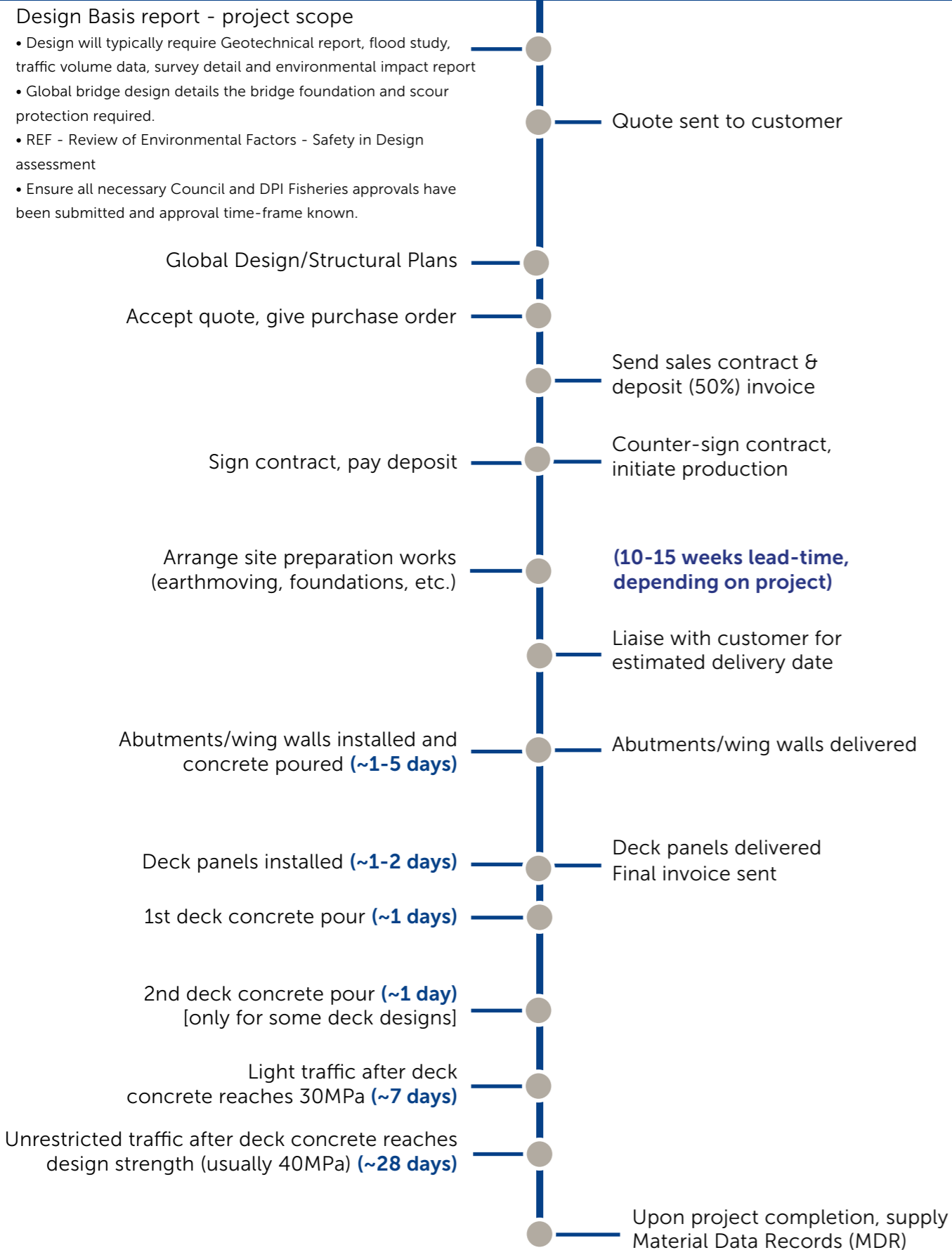
**TOTAL: 6.1 23.3**



# InQuik Bridge Timeline

## Customer

## InQuik







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