INQUIK® BRIDGE

Reinforced Concrete Structure | Cast-In-Place

- AASHTO Bridge Design Compliant
- Pre-engineered Modular System
- Prefabricated for Rapid Installation

CMC

it's what's **inside** that counts

"We developed the InQuik bridge to keep communities connected, and we're so proud to be delivering robust and resilient bridges to regional areas across the country, which will serve the residents for the next 100 years or more."

Ben Mullaney,
CEO of InQuik

InQuik®
accelerated construction

Contents

***All measurements throughout the catalog are rounded to the nearest 1/4 inch for convenience.
For exact measurements, please see the construction manual and/or InQuik drawings.***

THE INQUIK® BRIDGE

+ INSTALLATION PROCESS

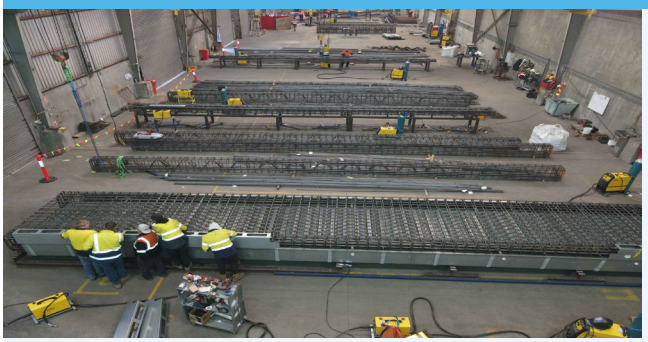
The InQuik Bridge is a modular solution for building reinforced concrete bridges.

The innovative system is pre-engineered, saving you time and money. InQuik bridges can be installed in less than a week, after the foundation is complete.

The system uses prefabricated components incorporating the reinforcing steel and formwork, without concrete. The lightweight modular components are easily lifted onto the foundation, spliced together and filled with concrete on-site.

*InQuik is a complete solution - **above grade!***

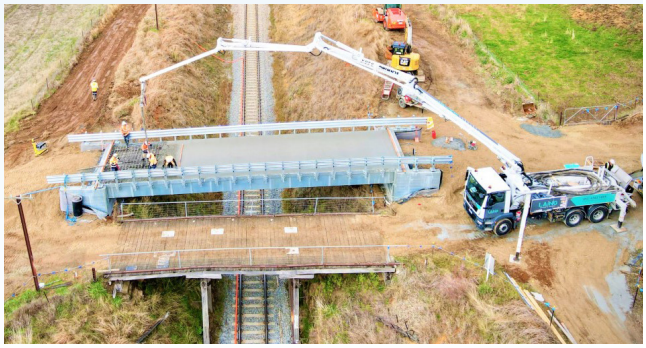
INSTALLATION PROCESS:



1. Modular components (abutments & superstructure) are **prefabricated off-site.**

2. Lift **InQuik abutments** onto foundation and place ready-mix concrete.

3. Lift **InQuik Superstructure Panels** onto abutments and connect splice bars.

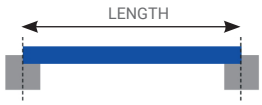
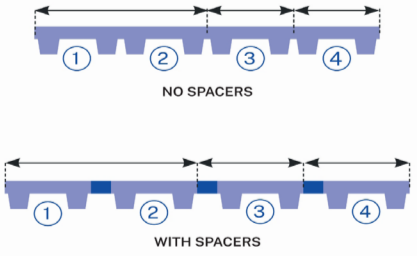


4. Place concrete to ***complete the bridge!***

INTRODUCTION

- The InQuik Bridge complies with the **AASHTO LRFD Bridge Design specifications 9th Edition**, and CMC is engaged with all state DOT's requirements so both Federal and State funding can be used to install an InQuik Bridge.
- The InQuik Bridge structure is designed for a minimum **75+ year service life.**
- InQuik abutments, wing walls, bent/pier caps, and superstructure are pre-engineered, modular components.
- Single-span lengths range between **21-61ft.**
- InQuik Bridges can either be simply-supported or an integral design, which **removes maintenance** with tie-downs or bearings.
- The structure is cast-in-place, which eliminates longitudinal joints like in pre-cast construction.
- Bridge construction occurs from above, with minimal need to work under the bridge, **improving worker safety** and **reducing environmental impact.**
- There is **no temporary bracing or falsework** required during construction which **reduces timelines and avoids working in waterways**.
- Can create multi-span bridge structures with pier/bent cap components. They can be semi-integral, fully integral, or simply-supported.
- You can install an InQuik structure in less than a week, which leads to significant **savings on construction costs.**

BRIDGE RANGE

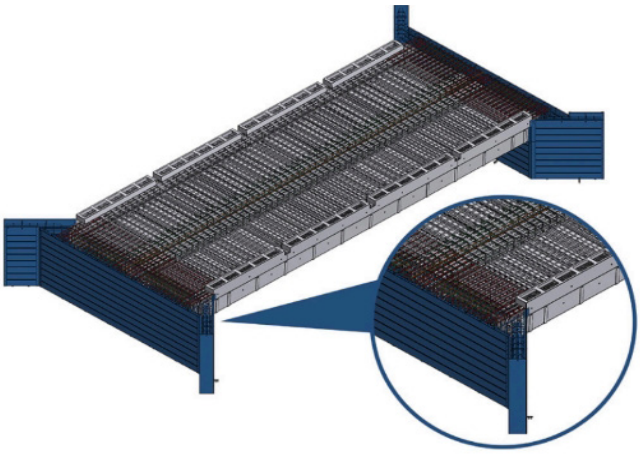
PRODUCT	IQ14	IQ27	IQ40	EXPLANATION
	Alternative for Culvert Replacements 18ft clear span			-
STANDARD LENGTH (FT)	21'	30' 40' 45'	53' 61'	As measured from the centerline of a 3ft wide abutment. 
STANDARD WIDTH (FT)	16' (17.5' with spacer) 24' (25.5' with spacers) 32' (33.5' with spacers)	16' (17.5' with spacer) 24' (25.5' with spacers) 32' (33.5' with spacers)	16' (17.5' with spacer) 24' (25.5' with spacers) 32' (33.5' with spacers)	All standard InQuik deck panels are 8ft wide and are placed side by side with ~ 2" overlap between the deck panels.  Extension spacers may be placed between the panels to increase the width by 18" per joint.
LOAD RATINGS	HL-93	HL-93	HL-93	InQuik offer bridge designs for HL-93 load ratings and special permit vehicles as required.
BEAM DEPTH	14"	27"	40"	Total depth is from underside of beam to top of deck wearing surface. See "Deck Dimensions" section over page for more information.

THE INTEGRAL BRIDGE

+ FEATURES & BENEFITS

The Integral Bridge

Though the InQuik system can be simply supported on bearings, a major benefit of pouring the concrete 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 durable structure, providing greater resilience to flooding and earthquake events. It also eliminates the need for bearings and tie-downs, as well as the associated long-term maintenance requirements that comes with them.



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

INQUIK FEATURES & BENEFITS	
Pre-engineered, pre-certified, pre-fabricated	→ Simple and fast on-site installation
No joints, bearings or tie-downs	→ No long-term structural maintenance over 75+ year design life
Pre-fabricated components with concrete poured on-site	→ Reduced OSHA risk, reduced trades, reduced installation time on-site
Lightweight components	→ Reduced OHSA and environmental risk, small local cranage, easy transportation
No joints in structure	→ No joints to allow salt and water ingress
Self-supporting modular structure	→ No temporary supports required
Faster, simpler, and safer with no maintenance	→ Reduced project costs and reduced 'whole-of-life' costs

SUPERSTRUCTURE / DECK PANELS

Standard InQuik superstructure panels are 8 ft. wide.

The panels are installed side-by-side to achieve your desired width (e.g. a bridge that is two panels wide would therefore be 16 ft. wide).

18" spacer plates are also available to install between panels, so bridge width can be fine-tuned further (e.g. a bridge that is two panels wide with one spacer would therefore be 17 1/2 ft. wide).

There is a 2" 'lip' on the formwork to connect the panels, and InQuik supplies the loose rebar to splice the panels together on-site, both transversally and longitudinally.

The deck slab is 8" deep, and the center deck formwork is stiffened by 1 1/2" deep corrugations.

The IQ14 bridge (ideal for culverts) has a total depth of 14" from the underside of the girder to the top of the deck, which is great for water afflux.

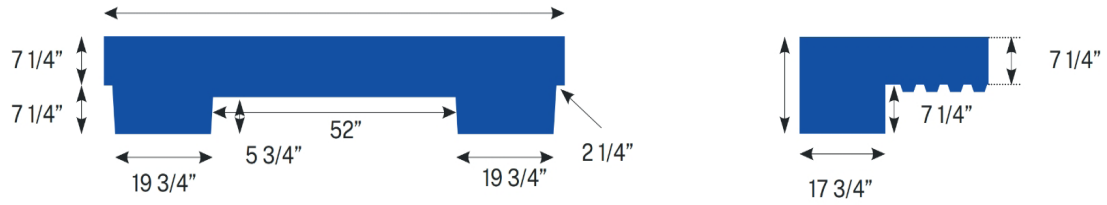
The standard IQ27 superstructure panels have a total depth of 27" while the IQ40 with lengths of 53 ft. and 61 ft. have a total depth of 40".

The concrete can be screeded by hand or machine.

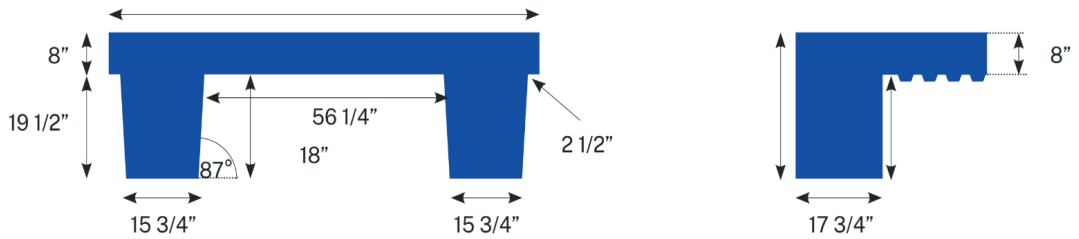
The concrete can be the wearing surface, or up to a 4" asphalt overlay can be added to the structure.

DIMENSIONS

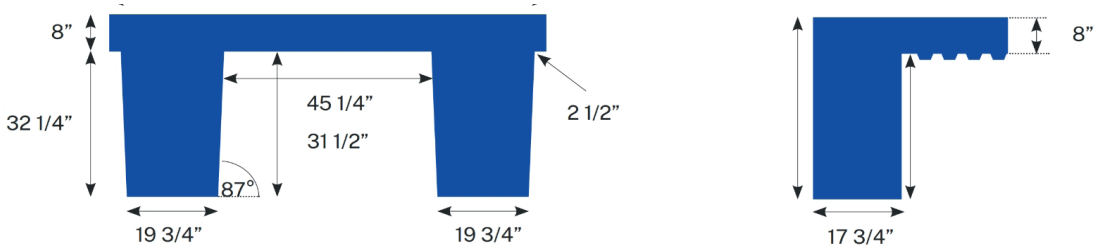
IQ14
21ft



IQ27
30-45ft



IQ40
53-61ft



SUPERSTRUCTURE / DECK PANELS

The InQuik deck panels have been designed to satisfy the load rating criteria for HL-93 (AASHTO LFRD 9th Edition) bridge design specifications. Special permit loads and increased capacity can be accommodated if required.

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

Please see the chart below for the integral mass and approximate concrete volume with each span.

SPAN (FT)	LOAD RATING	INTEGRAL MASS (T)	APPROX. CONCRETE VOLUME (YD^3)
21	HL-93	2.3	8.0
30	HL-93	3.3	11.6
40	HL-93	4.2	15.3
45	HL-93	5.8	17.3
52 1/2	HL-93	9.4	30.5
60 3/4	HL-93	10.8	34.8

FORMWORK CLADDING MATERIAL

The beam formwork is not structural, so it can be removed or stay-in-place. If left in place, it will provide a protective barrier for the concrete against corrosive influences from the environment that can cause degradation. The steel formwork is only 1/8" thick and accentuates vibration during concrete placement, ensuring higher quality concrete when compared to using wood formwork.

There are three options for the beam formwork cladding: ZAM, Weathering Steel and Stainless Steel, which each have different corrosion behavior.

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.

ZAM

ZAM is a proprietary product which is steel coated with an alloy of zinc, aluminum and magnesium. This coating has been shown to have far superior corrosion resistance properties to zinc galvanized 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. ZAM is the metallic coating product certified for use in a C5 environment.

WEATHERING STEEL

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 a dark brown to purple color that nicely blends with the environment. Weathering steel has been used since the 1930's 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 our weathering steel formwork cladding may be used without the need for protective coating systems, significantly reducing both initial fabrication and ongoing lifetime maintenance costs.

STAINLESS STEEL

For bridge projects where aesthetics are important in the long-term, and/or the bridge is to be constructed in a highly corrosive environment (i.e. 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 1mm is 260 years in a marine environment (the steel cladding is 3mm thick), implying the formwork is likely to outlast the bridge structure.

CURB & BARRIER OPTIONS

Standard bridges have a flat side (no curb) or a castellated curb. Standard curb design is 6" high, with a width of 8".

Custom designs requiring a different curb can be accommodated if required. For multi-span bridges, the positive camber in the deck panel can result in a humped curb appearance, so we recommend installing a precast curb for multi-span bridges instead of the prefabricated InQuik curb.

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 customized connection system as required.

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

InQuik will work through design to ensure rails and barriers comply with state DOT requirements.

Note: All galvanized components such as barrier posts and thrie-beams must be stored correctly when they are received on site, to prevent the formation of white rust. They need to be kept dry and clean, and positioned to allow any water that accumulates to run off.

BARRIER STYLES	PERFORMANCE RATING
Thrie Beam	Low performance Side-mounted or top-mounted
TMR-style steel barrier	Regular performance
RMS-style steel barrier	Regular performance
Concrete	Regular performance

STANDARD VS. NON-STANDARD

InQuik prefers to work with standard designs when possible to optimize the design and manufacturing processes, which saves time and money delivering projects. However, bridges do have variable site specific needs, so we offer non-standard 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 on a case-by-case basis.

- 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.

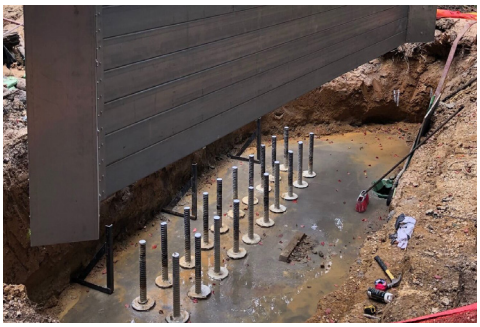
STANDARD FEATURES	NON-STANDARD FEATURES
ABUTMENTS	
- Default height 3'-11" (and incrementally increases up in 8" increments) to the underside of the deck. - Lengths are driven by the standard deck widths. - Thickness 3ft or 4ft (the size of foundations and/or requirement for an approach slab will determine the required thickness) - Flat abutment shelf	- Non-standard abutment heights - Crossfalls are typically built into the abutment shelf - One-way crossfall on a single-lane bridge can be incorporated into the blinding layer
WING WALLS	
- Length: 9ft - Width: 14" - Height = abutment height + depth of deck panel - Angle: 45 or 90 degrees - Square profile - Symmetrical layout	- 18" wide (if needed for structural reasons) - Tapered profile - Non-symmetrical layout
FOUNDATIONS	
- Driven steel piles (H-piles or Circular Hollow Sections) at 5'-3" maximum spacings - Concrete piles (driven or bored) at 10'-6" maximum spacings - Mass pour or strip footing	- Pile spacings must be multiples of 5'-3" due to the internal structure of the abutment

ABUTMENTS, WING WALLS, & FOUNDATIONS

Abutment Options & Features

A standard InQuik abutment is 3ft wide with a flat deck shelf. If an approach slab is required, a 1ft wide pocket is incorporated into the abutment, so the approach slab can be placed on top.

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 cross-fall), formed on-site by mounding up the deck concrete (for crowned cross-fall), or incorporated into the abutment shelf.



Wing Wall Options & Features

Where a barrier is required, 45 degree wing walls are recommended where possible. If a 90 degree wing wall is required, barriers will need to be customized 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 5'-3"
- Bored or precast concrete piles and screw piles have a maximum spacing of 10'-6"

The standard InQuik abutment height starts at 3'-11" and increases in 8" increments. If a height greater than this is required, a thicker binding slab can be used.

Higher abutments can be made as a custom design, but will be delivered in vertical sections due to transport height limitations.

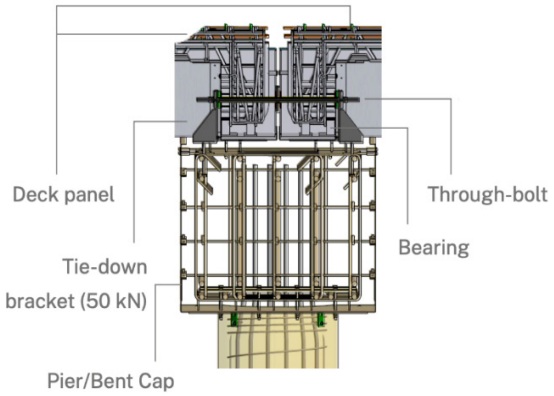
MULTI-SPAN BRIDGES

PIER/BENT CAP DIMENSIONS
3'-3" (H) X 4' (W)

Foundations:

- Common foundation types include bored concrete piles and driven steel piles (UC or CHS).

- Pile collars can be used to support the headstock on an embedded concrete pile if required.



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 pier and bent cap designs, which are similar in construction to the abutment design.

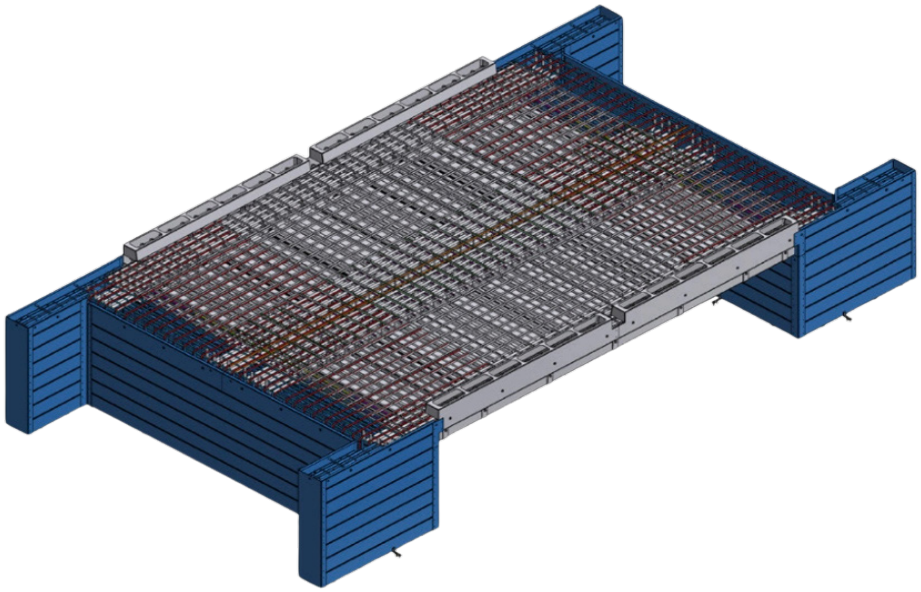
InQuik pier/bent caps can be designed with either a simply supported articulation (all spans) or a fully integral connection (21 - 45ft spans).

For multi-span simply supported bridges, the decks can be tied down to the pier/bent caps using brackets. Elastometric strip bearings are generally used for the pier/bent cap shelf, as well as the 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 4-inch gap under the end beam, so that a jack may be used to lift the deck for bearing replacement in the future.

For the multi-span integral pier/bent cap design, rebar connectors are positioned between the pier cap and deck panels, and then tied into place before the concrete for the deck panels is poured, providing a linkage and load transfer path once the concrete is poured and cured.

INQUIK IQ-14 BRIDGE



Deck Span	21ft
Width	As per IQ27 bridges
Abutment Height	Standard 3'-11" increasing in 8" increments
Wing Walls	Wing walls optional | Length: 9ft | Angle to abutment: 45" or 90 °
Barriers	Side-mounted TL2 - TL3 barrier (optional)

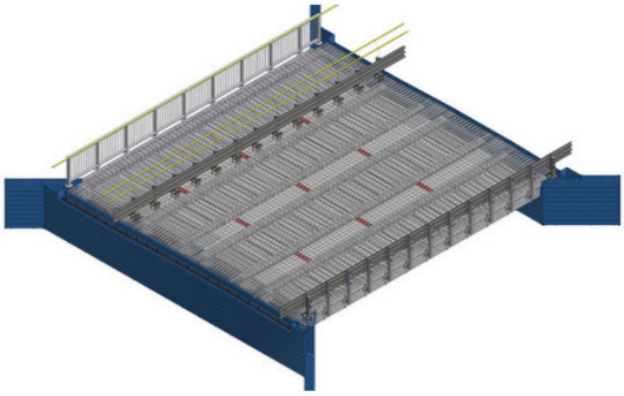
The InQuik IQ14 bridge has been developed to address the need to replace culverts and small bridges by municipalities and land owners.

This short-span bridge product has been specifically designed with a 14-inch deep deck profile for ease of water efflux, and is available in a 21-foot span with the same bridge widths as the IQ27 design. The IQ14 has a fully integral design, and is load rated to HL-93. The clear span is 18', so it's shorter than the FHWA standard 20' clear-span bridge classification that requires biennial inspections.

CUSTOM DESIGN FEATURES

In addition to the standard InQuik Bridge components, we can also provide custom design features.

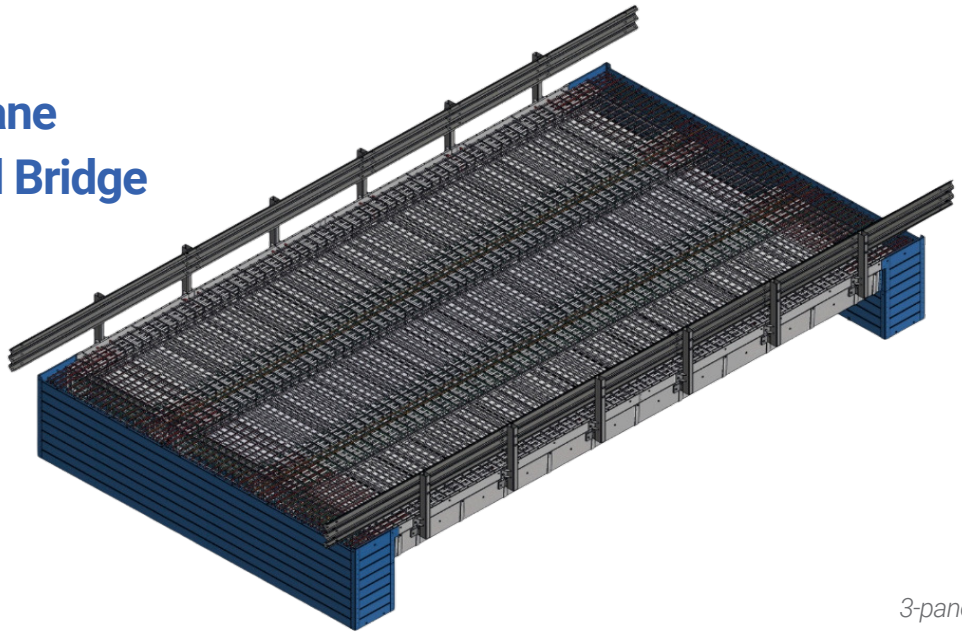
ABUTMENT HEIGHTS	Abutments higher than 8ft may be possible, but require project specific engineering verification.
WING WALLS	Custom wing wall arrangements may be possible, but require project specific engineering.
MULTI-SPAN HEADSTOCK	If crossfall is required it can be designed into the pier/bent cap. It will sit flat on the piles.
BARRIER	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 de-
DECK SLOPE	For wider bridges and larger crossfalls, one-way or crowned crossfalls may be incorporated into the abutment shelf.
SERVICES	Service brackets can be incorporated underneath the bridge for simply-supported designs only. For integral bridges, services can be mounted on a bracket at the side of the bridge.



SAMPLE ORDER

40FT DUAL-LANE INTEGRAL

40ft Dual-Lane Integral Bridge



3-panel bridge with side-mounted barrier

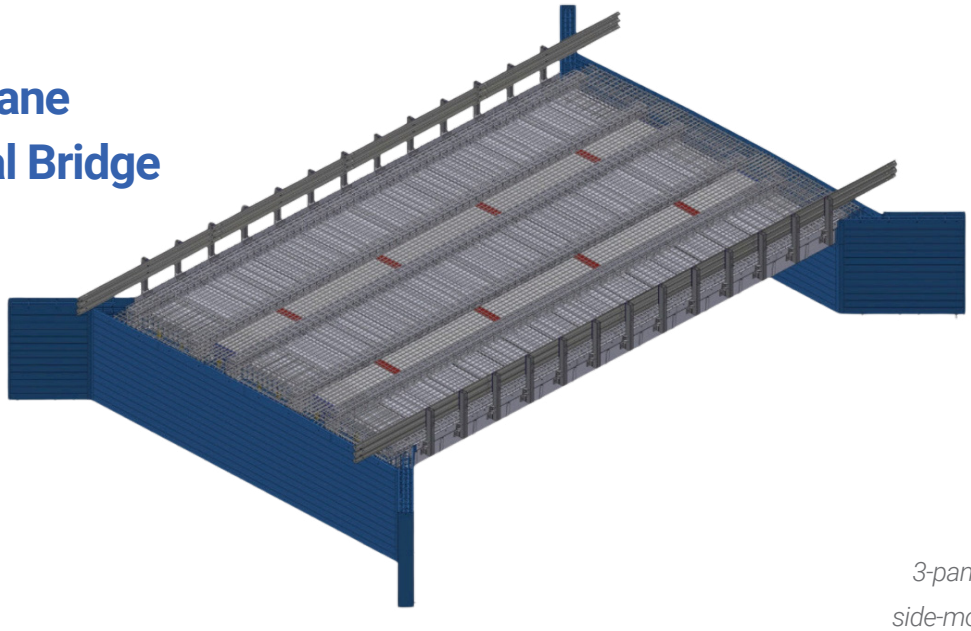
This single span bridge has an HL-93 load rating and uses 3 x 8ft-wide deck panels to give a total deck width of 24ft. The abutment is 3'-11" high with a 27 1/2" pocket for the approach slab. This bridge has side-mounted barrier posts attached to a thrie-beam guardrail.

	INQUIK COMPONENTS	TOTAL MASS (t)	CONCRETE (YD^3)
3	40ft ZAM IQ27 HL-93 rated deck panel (8 x 40ft)	14.2	39.9
2	Double lane abutment (24 x 4ft)	3.6	28.5
1	Side-mounted barrier posts and thrie-beam guardrail	1.1	-
1	Deck abutment integration tie-bar set	1.2	-
	TOTAL	**20.1**	**68.4**

SAMPLE ORDER

45FT DUAL-LANE INTEGRAL

45ft Dual-Lane Integral Bridge



3-panel bridge with side-mounted barrier

This single span bridge has an HL-93 load rating and uses 3 x 8' wide deck panels with 2 x 18" spacer sections between the panels, giving a total deck width of 27'-6".

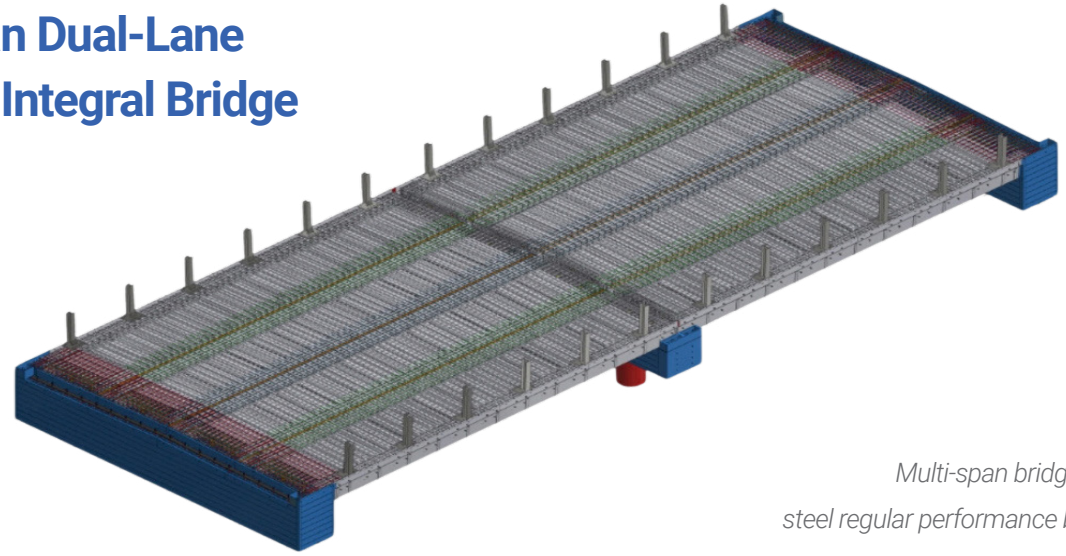
The abutment is 6' high with a 27'-6" pocket for the approach slab, and the wing walls are 8'-3" high (to the height of the deck), 8'-11" long and angled at 45 degrees to the abutments. The foundations are H-piles. This bridge has side-mounted barrier posts attached to a thrie-beam guardrail.

	INQUIK COMPONENTS	TOTAL MASS (t)	CONCRETE (YD^3)
3	40ft ZAM IQ27 HL-93 rated deck panel (8 x 40ft)	14.2	39.9
2	Double lane abutment (24 x 4ft)	3.6	28.5
1	Side-mounted barrier posts and thrie-beam guardrail	1.1	-
1	Deck abutment integration tie-bar set	1.2	-
	TOTAL	**20.1**	**68.4**

SAMPLE ORDER

80FT 2-SPAN DUAL-LANE SEMI-INTEGRAL

80ft
2-Span Dual-Lane
Semi-Integral Bridge



Multi-span bridge with steel regular performance barrier

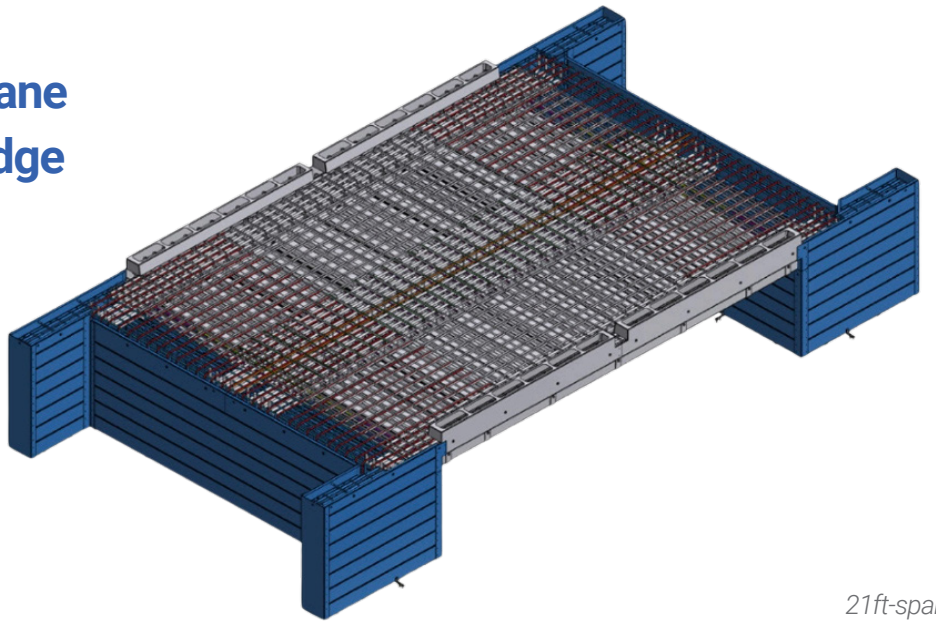
This dual-lane, 2-span bridge has an HL-93 load rating and is 80' long. Each span uses 4 x 8'-wide deck panels with 1 x 5'-1/2" fill spacer sections between the center panels, giving a total deck width of 32'-6". The integral abutments are 3'-11" high, with an approach slab pocket in the backwall. The 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. It also had side-mounted brackets supporting services.

QTY	INQUIK COMPONENTS	TOTAL MASS (t)	CONCRETE (YD^3)
8	40ft ZAM IQ27 semi-integral HL-93 rated deck panel (8 x 40ft)	20	61.5
2	Integral abutment (32'-6" x 3'-11") with approach slab pocket	6.2	33.4
1	Bearing bent cap (32' - 6" x 4' x 4')	4.6	16.1
16	Elastomeric bearing strips (7' - 10" long)	-	-
1	Deck abutment integration tie-bar set	3.0	-
1	Assembly components (through-bolts, fasteners, etc.)	-	-
TOTAL		**34**	**111.0**

SAMPLE ORDER

21FT SINGLE-LANE IQ14

21ft Single-Lane IQ14 Bridge



21ft-span IQ14 bridge with castellated curb

This single lane, 21'-span bridge has an HL-93 load rating with 2 x 8'-wide deck panels, that give a total deck width of 15'-9". The abutment is 4ft high with a 14 1/2" pocket for the approach slab, and the wing walls are 5'-2" high (to the height of the deck), 6ft long and angled 90 ° to the abutments. The deck has castellated curbs.

QTY	INQUIK COMPONENTS	TOTAL MASS (t)	CONCRETE (YD^3)
2	21ft ZAM IQ14 integral HL-93 rated deck panel (8 x 21ft)	2.8	24.9
2	Integral abutment (15'-9" x 4') + 90 ° wing wall (5'-11") set	3.3	51.5
1	Deck - abutment integration tie-bar set	0.6	-
	TOTAL	**6.7**	**76.4**

TYPICAL TIMELINE

CUSTOMER:	INQUIK:
Design Basis Report - Project Scope *Design will typically require Geo-technical report, flood study, traffic volume data, survey detail and environmental impact report. Global bridge design details the bridge foundation and scour protection required REF - Review of Environmental Factors - Safety in Design assessment. Ensure all necessary County/DOT approvals have been submitted and approval time frame unknown.*	
	Quote sent to customer
Global Design/Structural Plans	
Accept quote, give purchase order	
	Send sales contract and deposit
	Countersign contract, initiate production
Sign contract, pay deposit	
Arrange site preparation works (earthmoving, foundations, etc.)	
	Liaise with customer for estimated delivery date
	Abutments & wing walls delivered
Abutments/wing walls installed and concrete poured	
	Deck panels delivered & Final invoice sent
Deck panels installed	
1st deck concrete pour	
2nd deck concrete pour (only for some deck designs)	
Light traffic after deck concrete reaches 3.5 KSI *(~7 days)*	
Unrestricted traffic after deck concrete reaches design strength (usually 5 KSI) *(~28 days after concrete pour)*	
	Upon project completion, supply certificate of compliance

InQuik®

InQuik bridges have exceptional resilience to impacts caused by sever weather events, and require minimum to no structural maintenance over its 75+ year design life. We provide environmentally friendly long-lasting solutions for communities, and enable the use of local labor, equipment, and materials.

For more information, contact CMC Bridge Systems,
the authorized provider of InQuik® Bridges in the United States.

Website: cmc.com/bridgesystems

Phone: 866.249.9661

Email: bridgesystems@cmc.com

Address: 6565 N. MacArthur Blvd, Irving, TX 75039

it's what's **inside** that counts

CMC Bridge Systems is the authorized provider of InQuik® Bridges in the United States. You'll find CMC products strengthening and reinforcing the infrastructure nearly everywhere on the planet. To serve this global market, CMC maintains facilities across the United States, Europe and Asia. InQuik® is a licensed trademark of InQuik USA Pty Ltd. **cmc.com**