



Petra Cast – Mahmoud Al Fayed
25 years in architectural
composites
'Why Not'



FSI – Blair Davies P.Eng.
20 years in Facades
'Go Find It'

Selfie



Objective: Demystify GFRC and UHPC; Provide Design Toolbox. 01

GFRC is spraying a mold. UHPC is poured. Both are 'cast'. Systems vary from standard to custom.

Two project Examples 02

Make it real right from the beginning.

Design process starts with collaboration 03

We manufacture directly from your design model. Collaboration is key.

GFRC process and Construction 04

Glass Fibre Reinforced Concrete is spraying a mold. Custom assembly.

UHPC process and Construction 05

UHPC is poured on tables, finishes, form liners. Custom or standard assembly.

Did we meet your expectations 06

Any other Q&A

Petra Systems – 25 years in architectural composites

GFRC

3-D Custom product using standard cement and glass fibers.

Integrated steel structure.

Shape and Precision.

UHPC

Ductal flat panel cladding with customizable surface, Reinforced with fibers.

3-5x compressive

very low water absorption

Excellent substitute for flat panel GFRC and FRC.

100+ Year lifecycle

Flat GFRC

Proprietary but well known cladding.

GFRC capacity without the 3-D shapes.

Fixed surface finishes, sizes and colors.

Precast

Cost efficient for large flat walls.

Brick and surface shapes. Limited 3-D.

Heavy; weight and GWP.

Limited high-performance solution.

Texture options include form liners, washes, staining, sandblasting, and aggregates. Unlimited colors.



[Petra Cast Inc](#)

[Façade Systems Inc.](#)



1ST Question

GFRC: Shaped?
Form → Molds →
Finishes → \$



UHPC: Flat?
Tables and surface
finishes* → \$

Your design



Ellie Condo, North York – Glass Fibre Reinforced Concrete



[Petra Cast Inc](http://www.petracast.com)



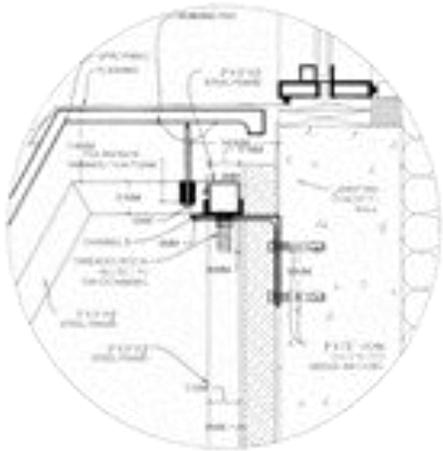
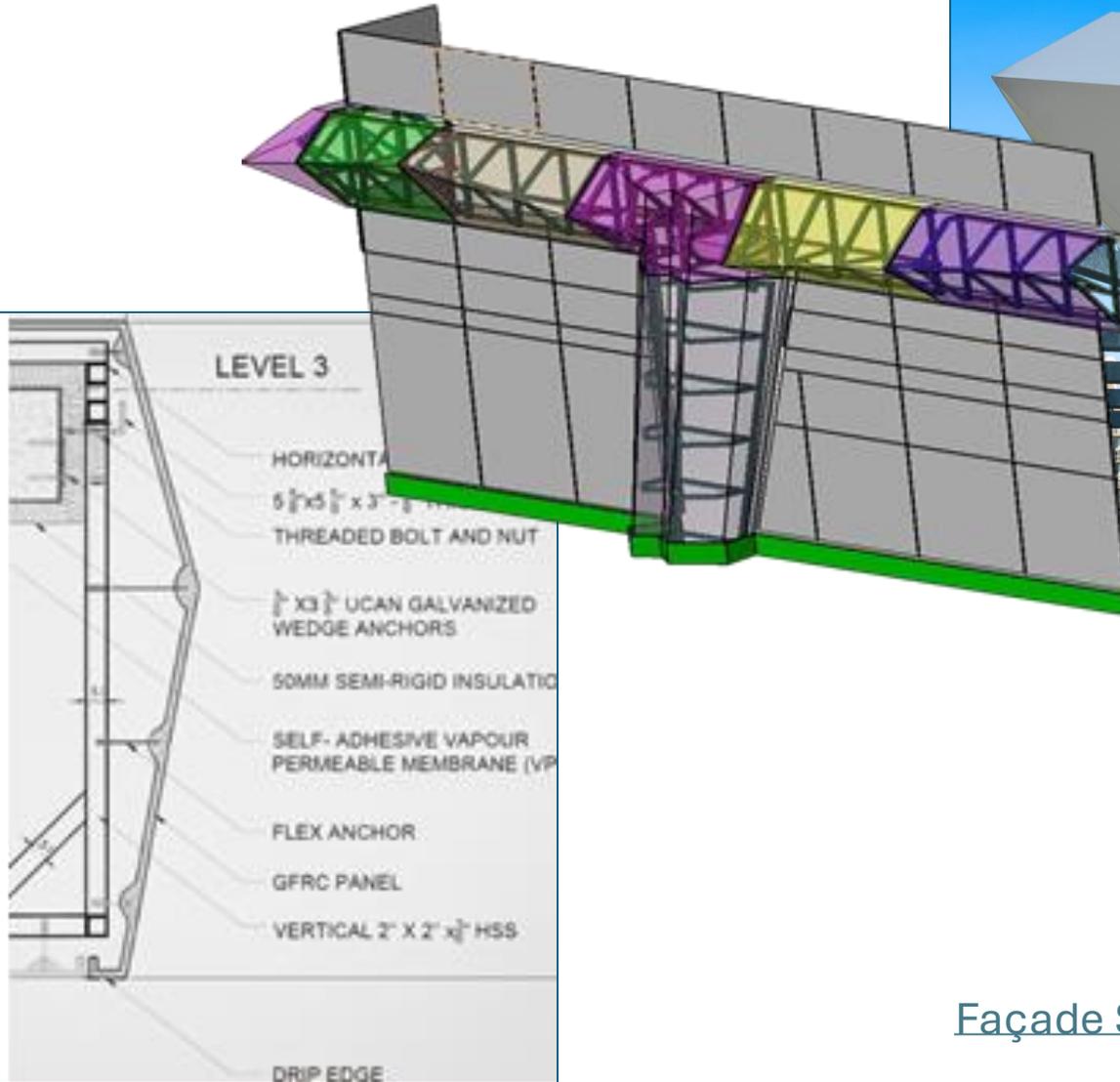
Ministry of Transit Quebec

- Industrial example
- Focus climatic resilience, not aesthetic finishes and shapes.



Fundamentally a design business

Collaboration is key



Glass Fibre Reinforced Concrete – from design to manufacturing to system: WE OWN IT.

1
1



Molds



REFINING

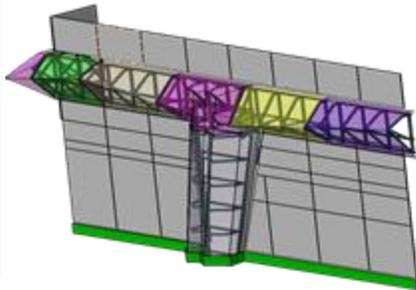


YOU



Construction

DESIGN



YOU



SPRAYING

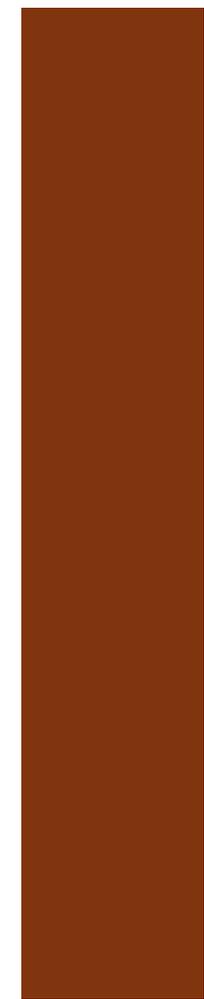
Frame & Attachment



Glass Fibre Reinforced Concrete



1
2



Glass Fibre Reinforced Concrete



1
3

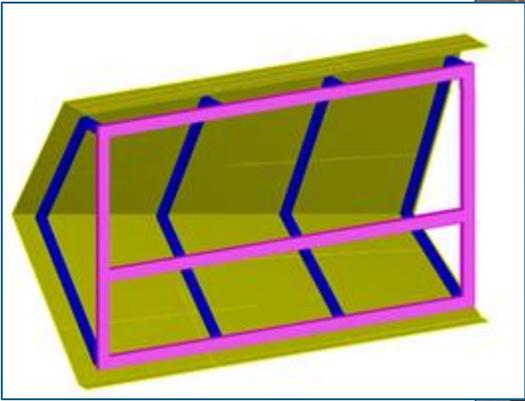


Glass Fibre Reinforced Concrete

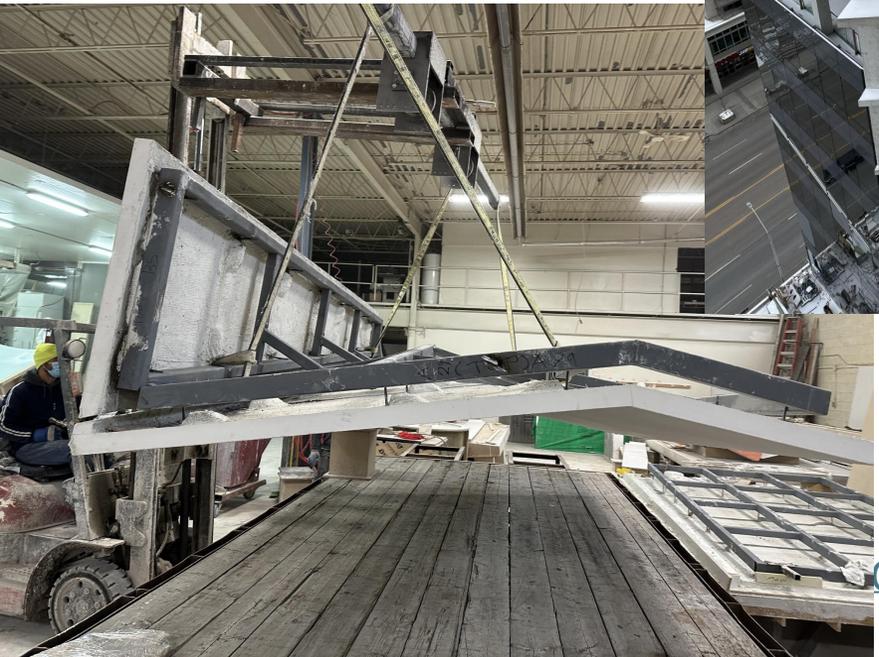


1
4





Construction; modular panels installed quickly and precisely



Full size shots in appendices

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From Infrastructure to UHPC Facade

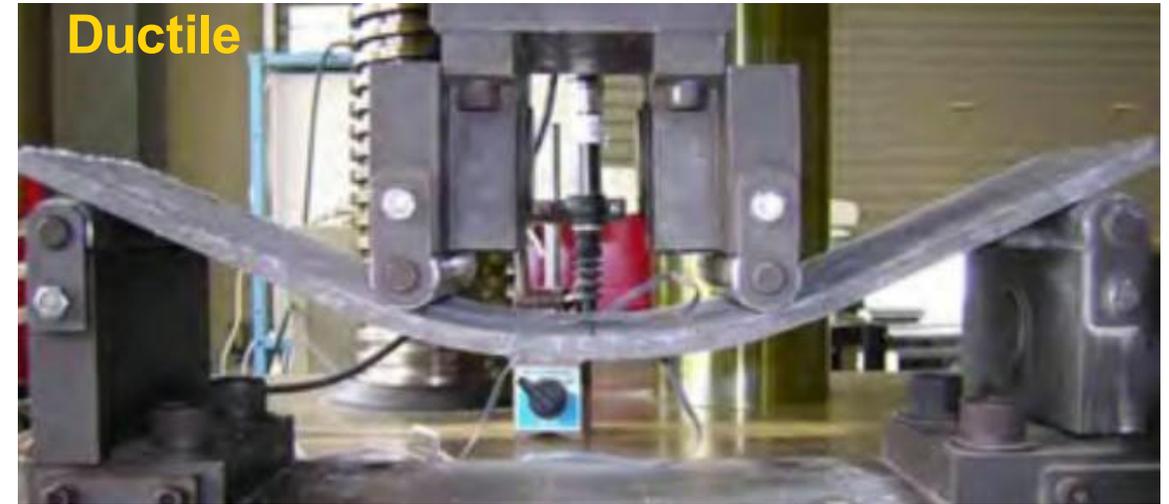


DUCTAL | Fundamental Characteristics

- 100 year lifecycle expected minimum
- Uniformly reinforced with PVA or Steel fibres.
- 128MPa compressive strength – 3-5x other cement-based products.
- Excellent Energy Absorption and Tensile Strength
- Extremely low water absorption (%) and depth of infiltration (<10mm)



Microscopic view



Bending strength test

Formliner, to Pour, to Panel

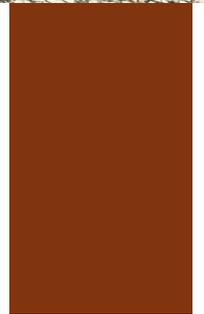
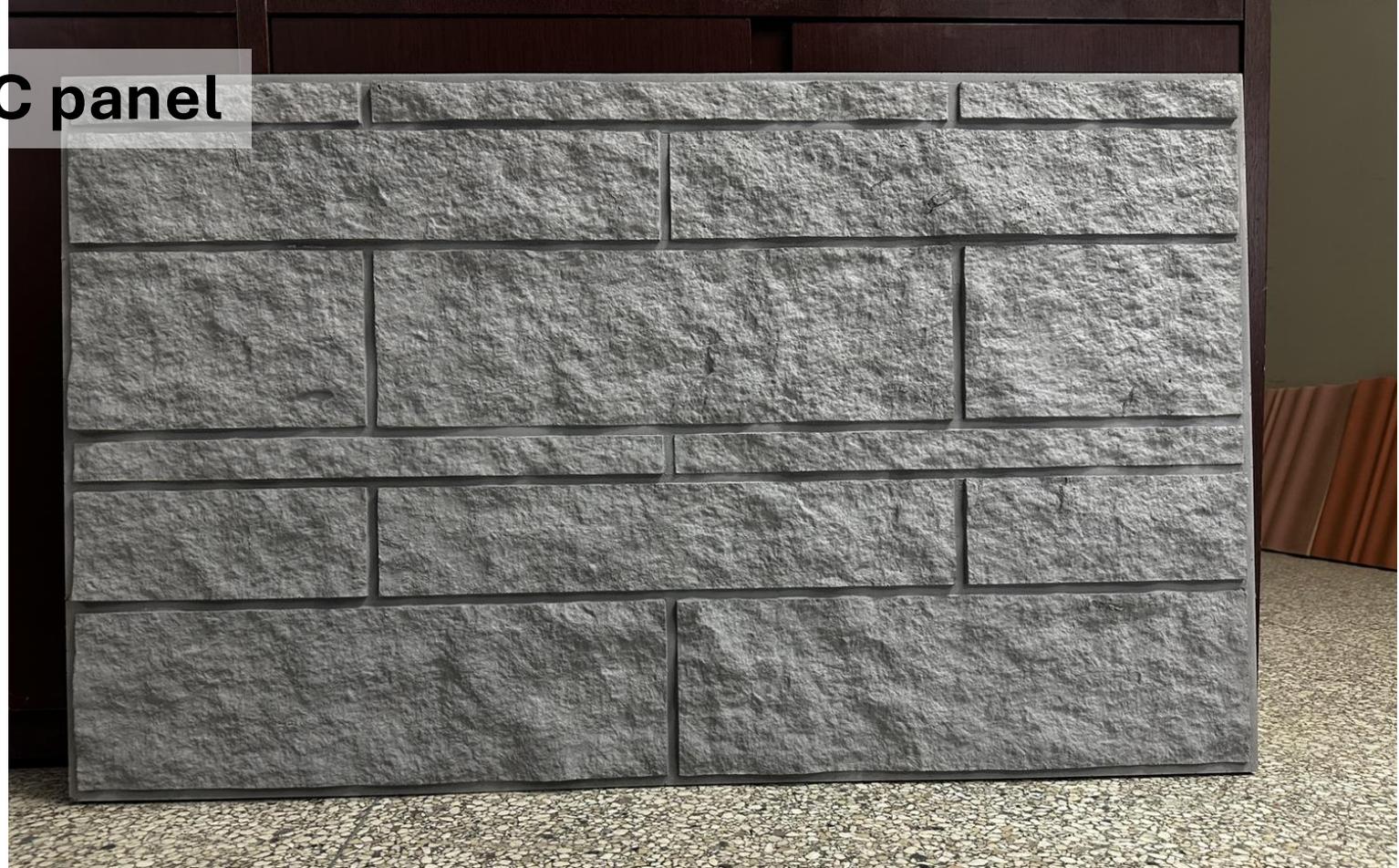


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Pattern, to form liner to UHPC panel



UHPC industry standard v Proprietary flat GFRC night and day, similar pricing.

2
2

UHPC

Ductal flat panel cladding
with customizable surface
and shape.

Reinforced with fibers.

Industry Standard with
custom sizes.

3-5x compressive

very low water absorption

100+ Year lifecycle

Texture options include form liners, washes, staining,
sandblasting, and aggregates. Unlimited colors.

Flat GFRC

**Proprietary but well
known cladding.**

GFRC capacity without
the 3-D shapes.

High water absorption.

Fixed surface finishes,
sizes and colors.

Fixed sizes.

Fibre Cement

Cost leader, very popular.

Different technology

Very weak comparatively

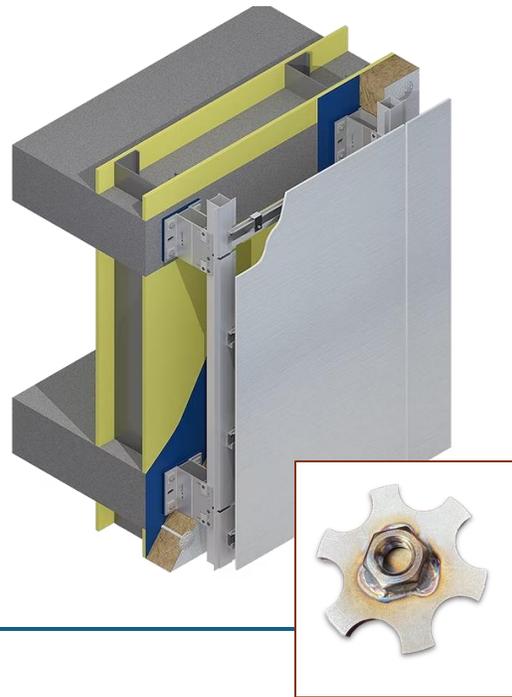
High water absorption

Fixed panel sizes, colours. Flat
textures.

UHPC is cladding – attachments are similar



Exposed Fasteners



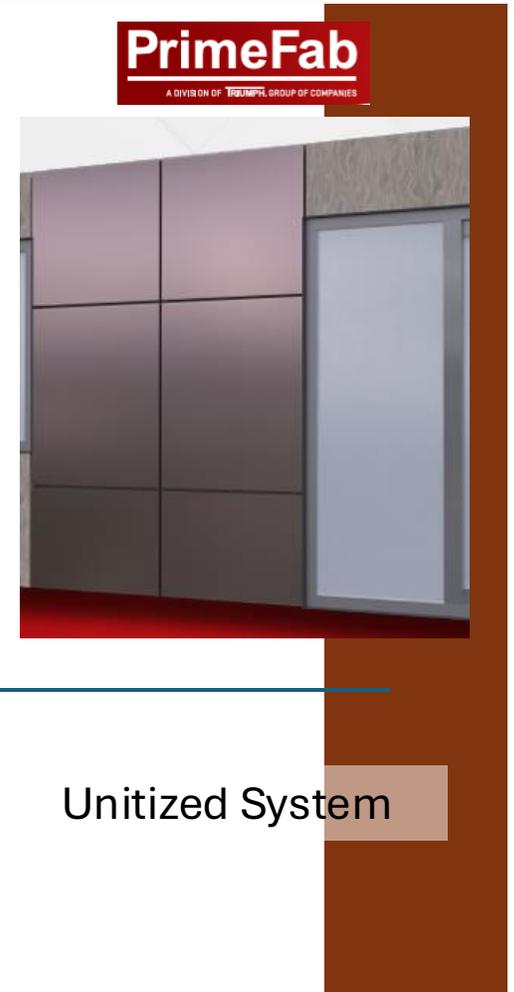
Concealed Fasteners with embedded anchors (no Keil)

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Kerf System – concealed system

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Unitized System

Project List – built, won, specified, under construction, targets.

GFRC

- Specified Ontario Line – pedestrian tunnels
- Ellie Condo.
- Turning Stone Casino
- London Casino
- Old Kingston Mosque
- Browns bay Canteen
- Belmont House
- Yonge and Birch
- 120 Sherbourne
- Portage Place Redevelopment
- MDH Calgary

UHPC

- Ministry of Transport Quebec
- Waha Hospital
- Waha LTC
- Lead Car Honda, NJ
- 444 Logan TCH
- 300 Dufferin
- Any other UHPC
 - WNYCC
- Any GFRC flat panel
 - Sir Robert Peel
 - Vancouver Aquatic
 - Ottawa Innovation Ctr
 - Square One YMCA

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Did we meet your expectations 06

Any other Q&A

What does local manufacturing mean.

- **Tight design collaboration, in your office, experimentation, prototyping, colour matching, small and full size mockups.**
- **Construction process**
 - **6-8 week** delivery after shop drawing approval. **We feed the site.**
 - Week to get a new panel.
 - Visit anytime.
 - Site services like measurement.
 - Imagine
 - **A truck with an A-Frame of panels shows up with minimal packaging, ready to be hoisted into the location of the building.**
 - **\$10-15k a shipment, pay as you go – essential cashflow keeps costs down. Alternative is \$100k+ for containers.**
 - **Panels made to suit so waste minimal.**

Thank you

Bring us in at the idea stage

Higher res- **No!**

Appendices

Spot open 😊

ACTON OSTRY ARCHITECTS INC

DIALOG®

KIRKOR
ARCHITECTS AND PLANNERS

Moriyama Teshima | ARCHITECTS

Kasian

MJMA
ARCHITECTURE & DESIGN

65
WZMH

MontgomerySisam

aA

MARTIN
SIMMONS
SWEERS

LGA architectural
partners

We value architecture in exploration, design, and construction with the leading firms.

PETRA
ARCHITECTURAL MOLDED COMPOSITES

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We are growing our firm with the leaders in facade construction, both traditional and prefabrication



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GFRC System to Construction

Ellie Condo

Panel assembly in shop – note weight



Full size shots in appendices



System accommodated varying slab edge placement



Petra Cast



View of corner from above



Petra



Attachment detail before weather proofing system.



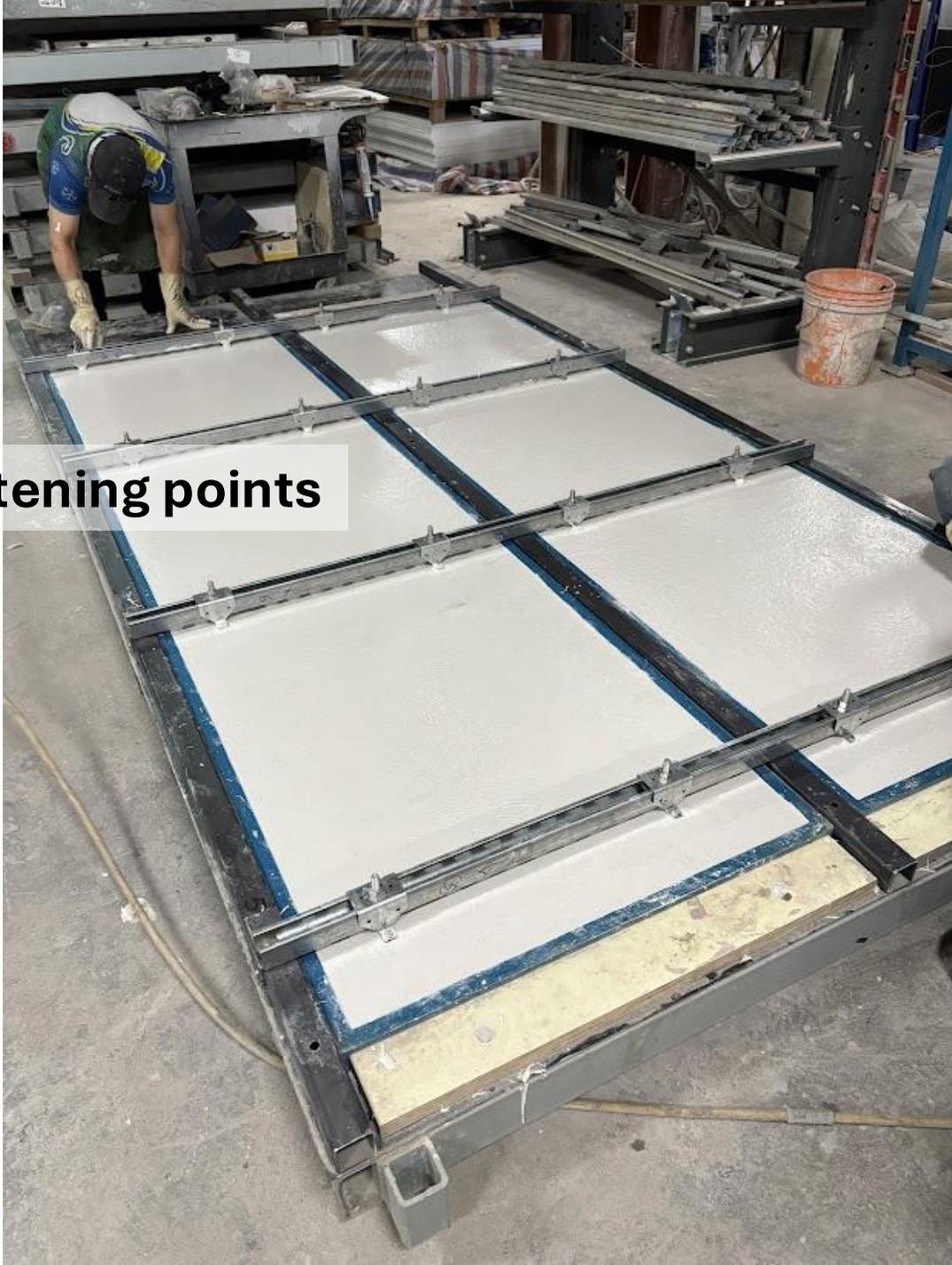
UHPC Panel, formliner, pour with inbedded attachments, finished product

Waha Hospital with



Formliner





Pour and inset fastening points

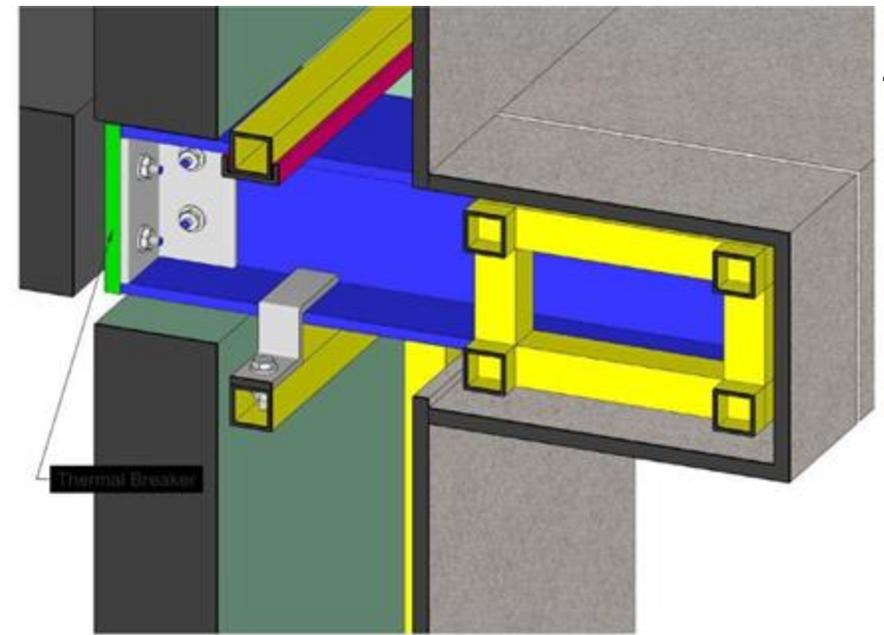
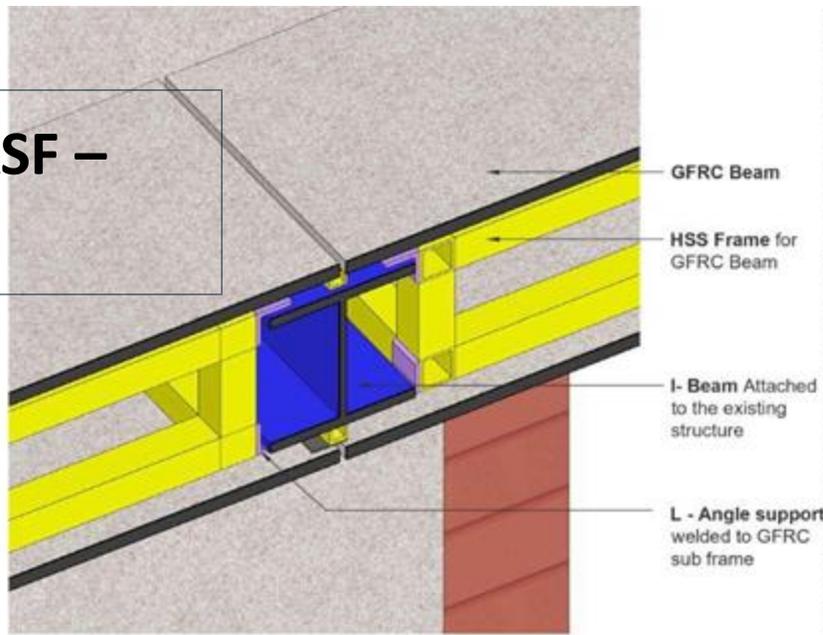


Architect Vision

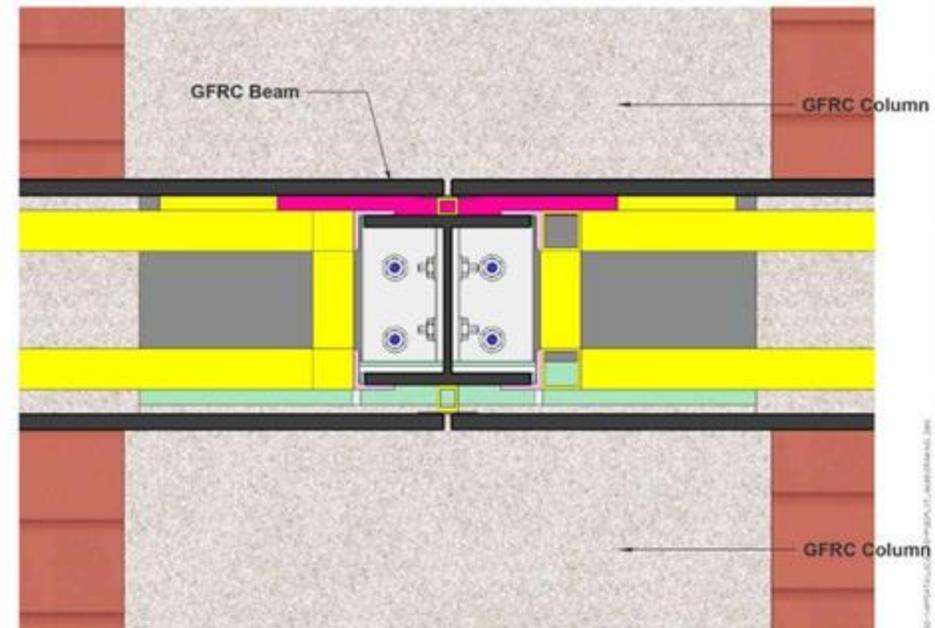
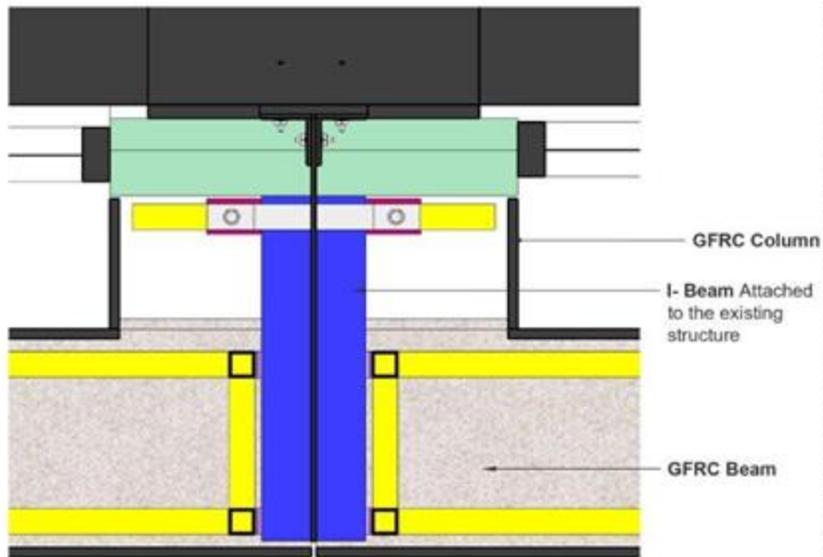


- GFRG Beam supported by a (Structural Section) subframe
- HSS frame is connected to the existing structure
- L-Angle supports welded to additional bracing and supports
- Use of thermal breakers to connection points.
- Bolted connections used for support for ease of assembly
- GFRG Columns vertically aligned

Connection design is KSF – we own it.



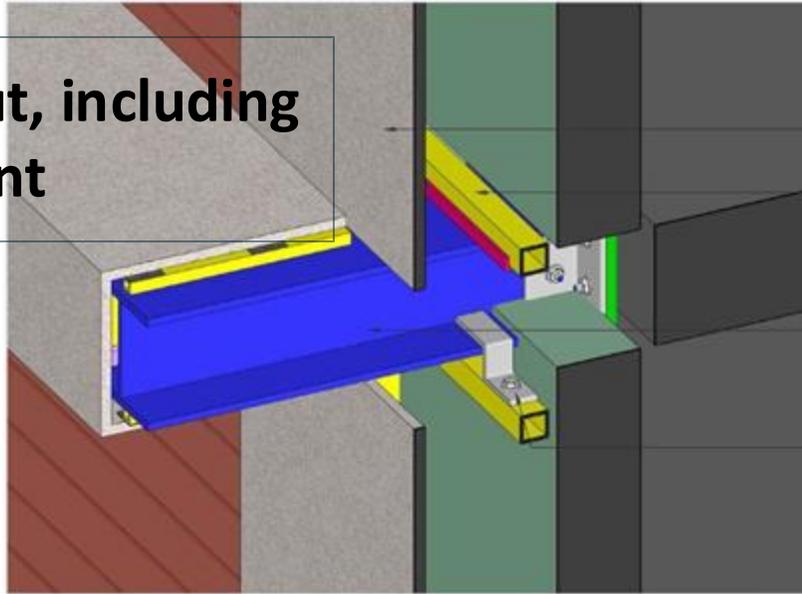
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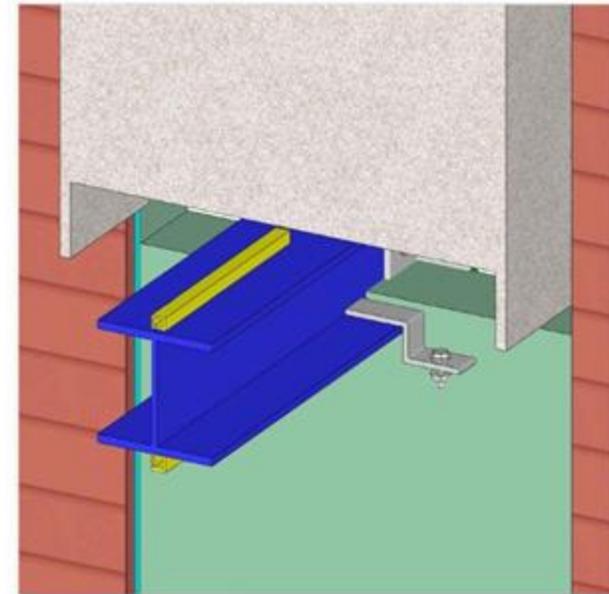
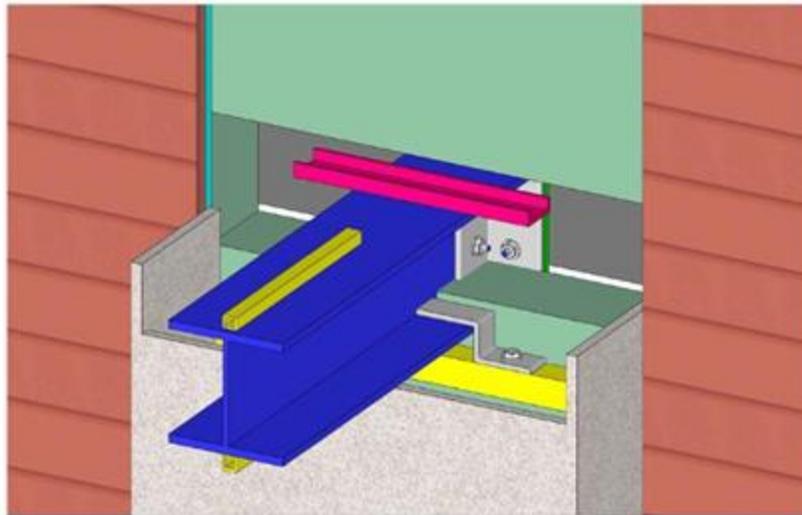
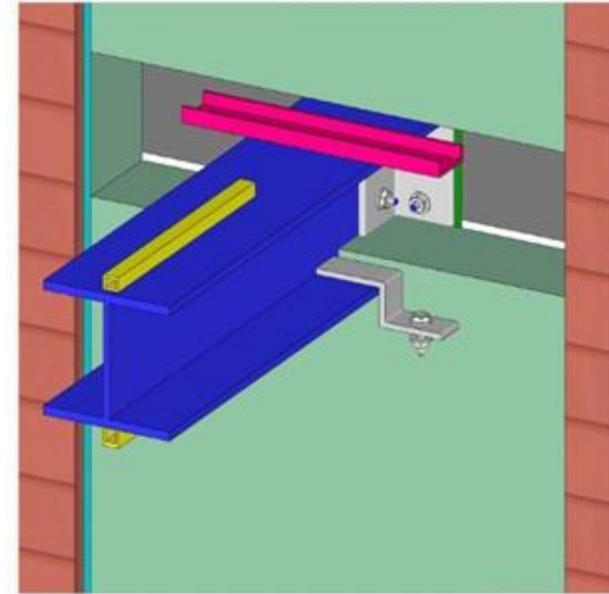
- GFRc Beam supported by an internal HSS (Hollow Structural Section) subframe.
- HSS frame is connected to an I-Beam that is anchored to the existing structure.
- L-Angle supports welded to the GFRc subframe provide additional bracing and support.
- Use of thermal breakers to minimize thermal bridging at connection points.
- Bolted connections used for securing HSS frame to steel support for ease of assembly.
- GFRc Columns vertically align and interface with

GFRc Beam Details

From Slab Edge out, including slab casted element



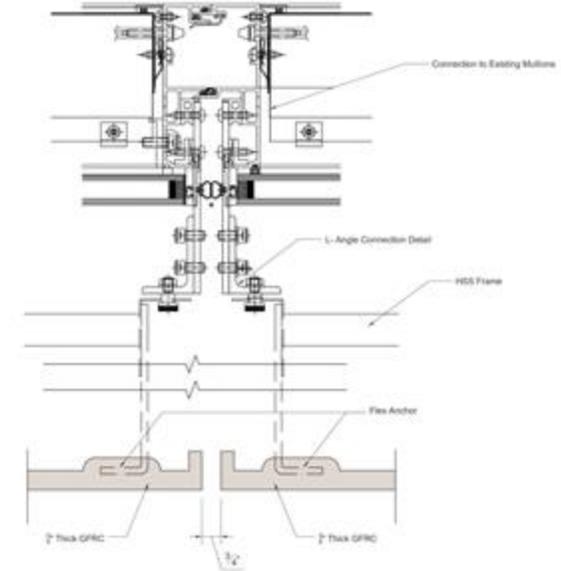
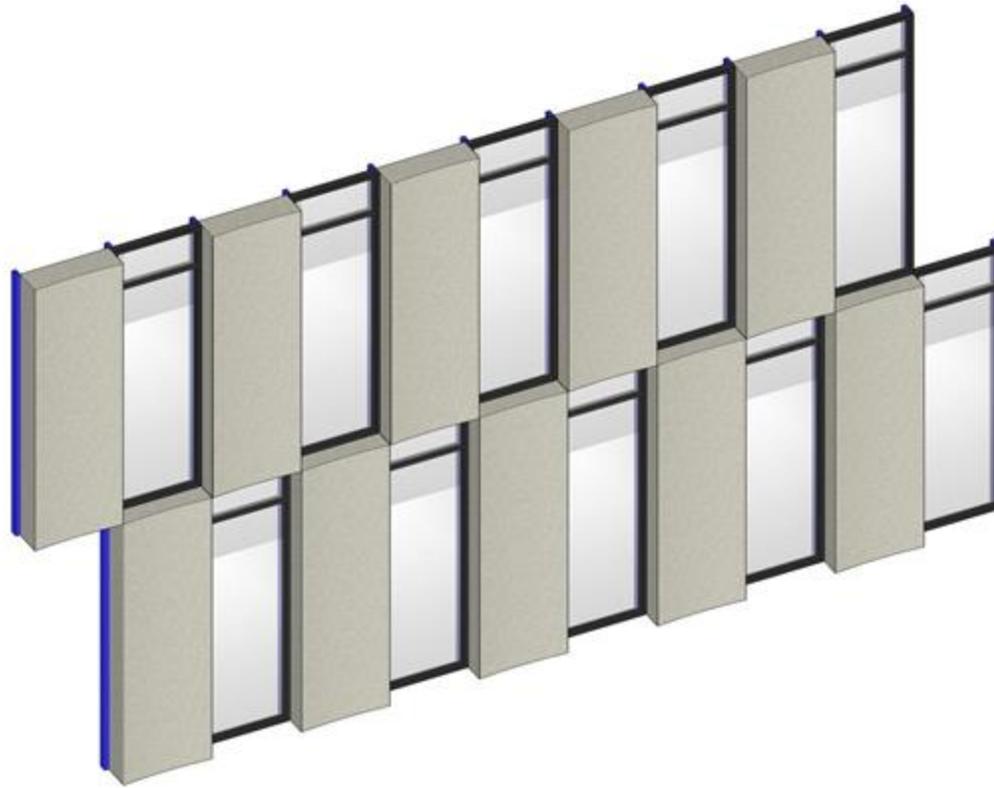
- GFRc Column
- HSS Frame for GFRc Column
- I-Beam Attached to the existing structure
- Clip Support attached to GFRc sub frame



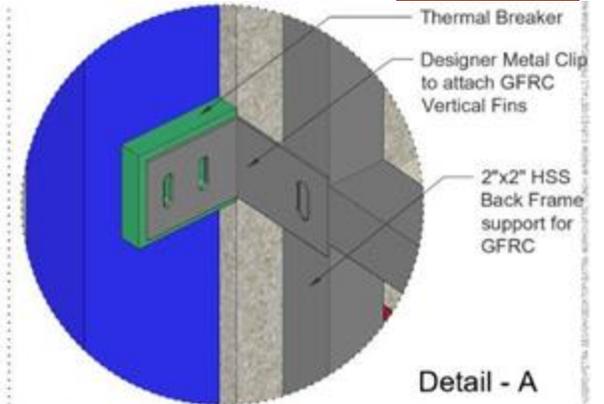
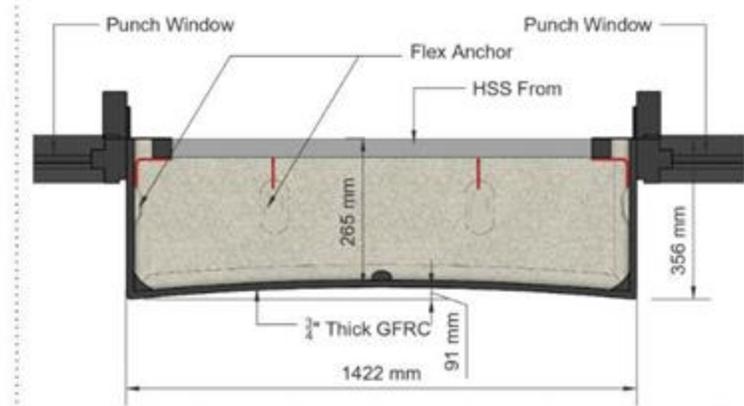
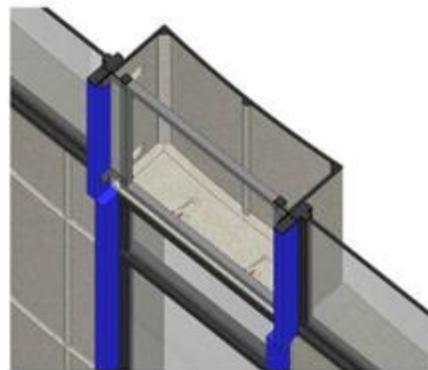
GFRc Column Attachment Details

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Curtain wall design with GFRC PUNCH WINDOW DETAIL



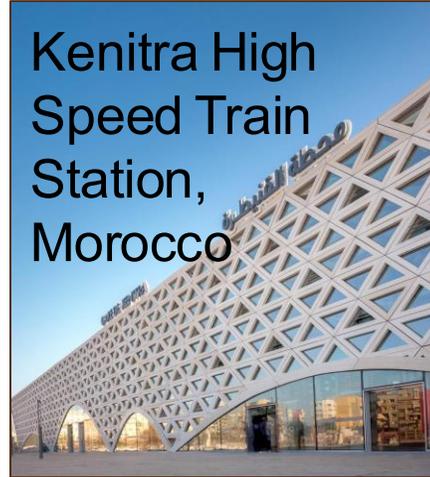
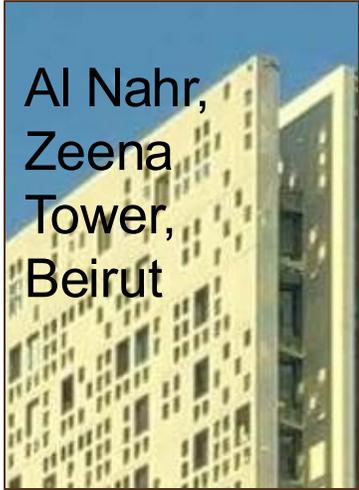
- 3/4" thick GFRC panels used for exterior punch window cladding.
- Panels are supported by a 2"x2" HSS back frame.
- Flex anchors connect GFRC panels to the HSS subframe.
- Designer metal clips are used to attach vertical GFRC fins.
- GFRC stiffeners provide additional rigidity.
- Thermal breakers included to reduce thermal bridging at connections.
- Installed in between mullions (by others) and aligned with punch window openings.



Mosque – Scarborough
Retrofit, walls, dome and column covers



More on UHPC – global projects



Developed for infrastructure – Excellent for Facade

 **LAFARGE** Largest global cement producer

- **ductal**
- developed for infrastructure; bridges, tunnels, ocean barriers. Behaviours of strength / weight and volume of material, extremely low water absorption, flexibility in manufacturing forms and shapes and high design freedom.
- Exactly the attributes needed for facades.
- [Petracast](#) is particularly suited for manufacturing of UHPC panels, as recognized by Lafarge.

Let's learn why



DUCTAL | Long Term Durability

Water absorption and extreme environment testing US Army Corp of Engineers

- Chloride profiles revealed penetration to a **depth of only +/- 10 mm.**
- Electrochemical corrosion of steel fibres* effects at a cover depth of only 25 mm following 20 years.
- **No concrete failure.**



Treat Island, Maine. Extreme Climate



Comprehensive
and extended
testing process.

DUCTAL | Projects |

Rotman School of Management, Toronto

The architect's design criteria was ambitious because the university, preferred a long span façade panel (up to 5.5 m.) that was thin and lightweight with a hard, durable exterior wall surface that would endure for a long time--with little to no visible signs of wear from elemental impacts.



[Petra Cast Inc.](#) **ductal**

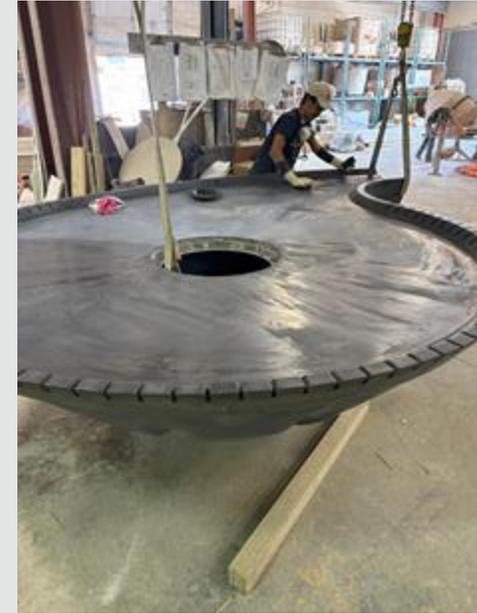
[Façade Systems Inc.](#)



Cool stuff – water festure Mirvish Place



→On site image



→Factory Image

PUBLIC SPACE REVITALIZATION



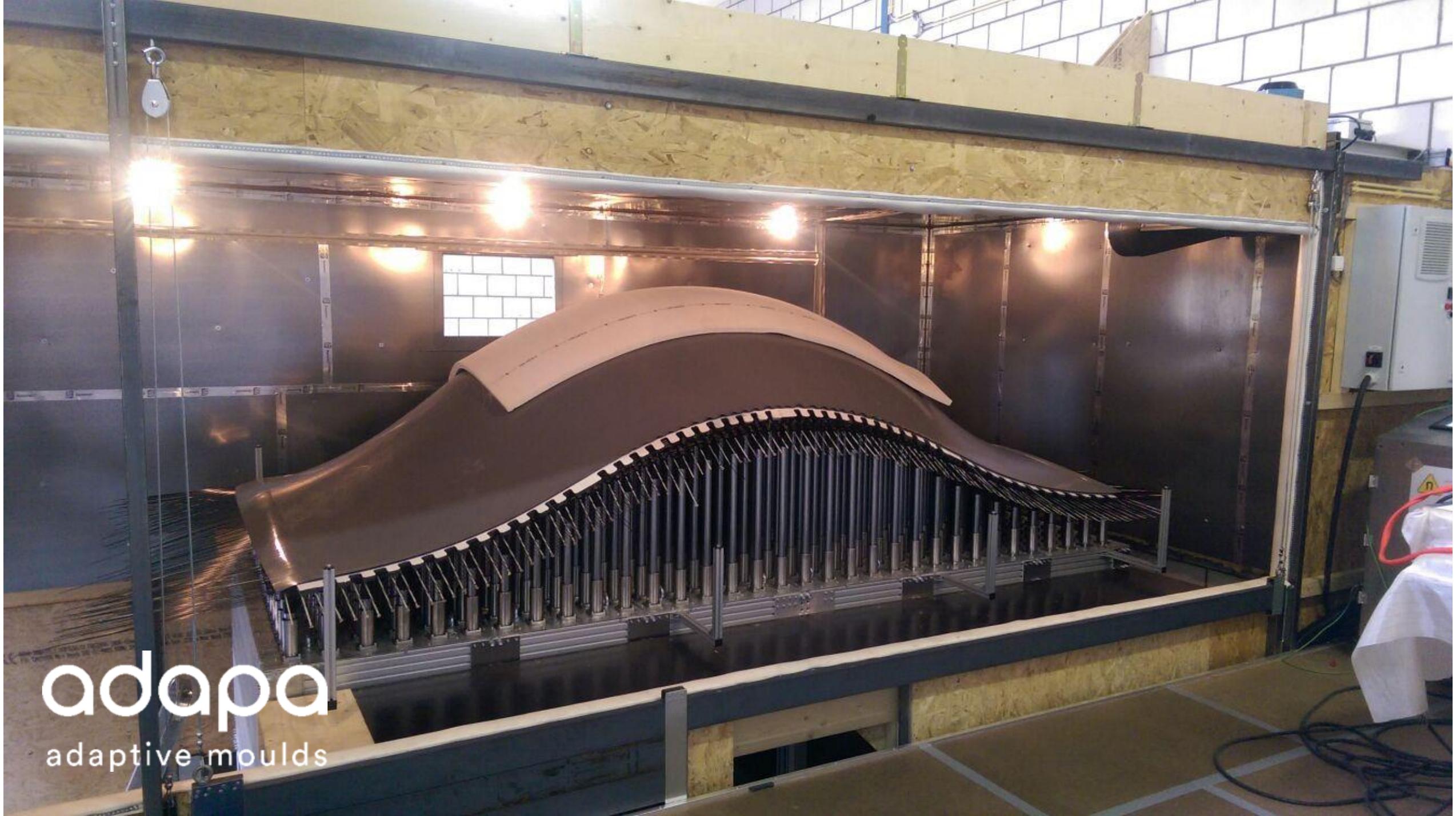


Brick Faced - GFRC

Note very light lifting harness

Traditional Brick in GFRC





adapa
adaptive moulds