

steel

SOUTHERN AFRICAN INSTITUTE  
OF STEEL CONSTRUCTION

Steel Awards 2023

MiTek<sup>®</sup>

**“Our Lady of Peace Cathedral”**  
*Notre-Dame de la Paix de N’Djamena Cathedral*



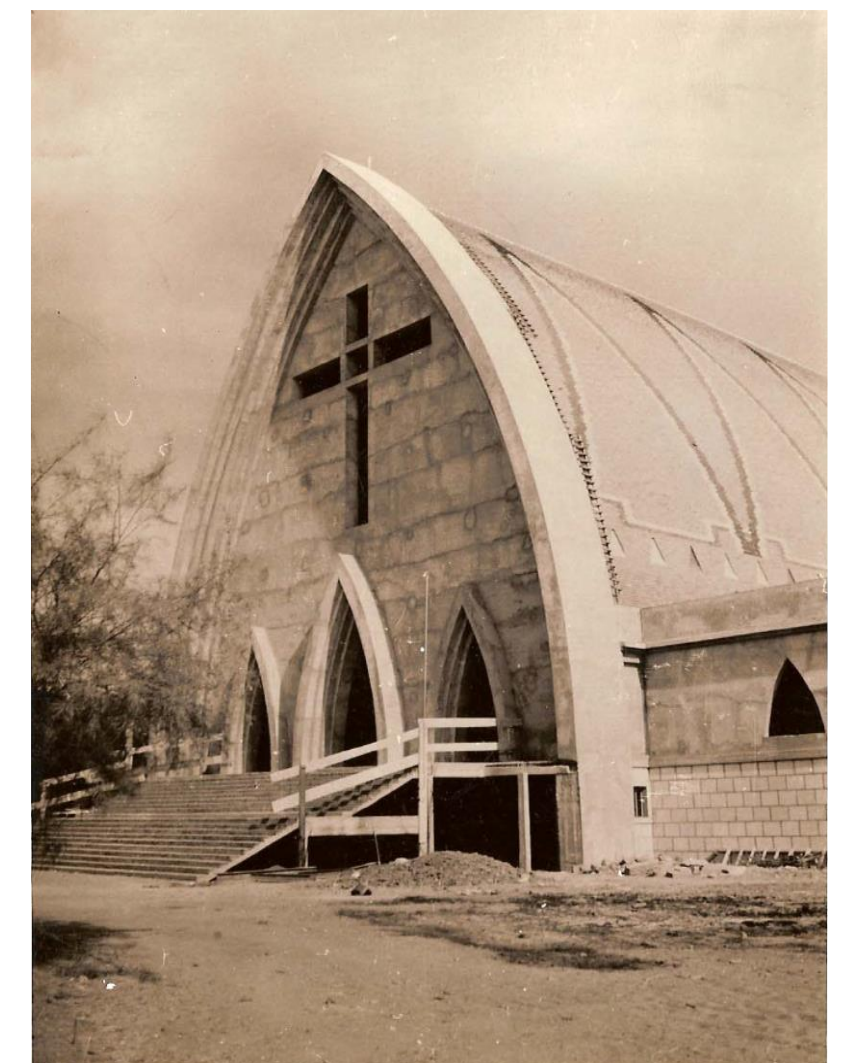
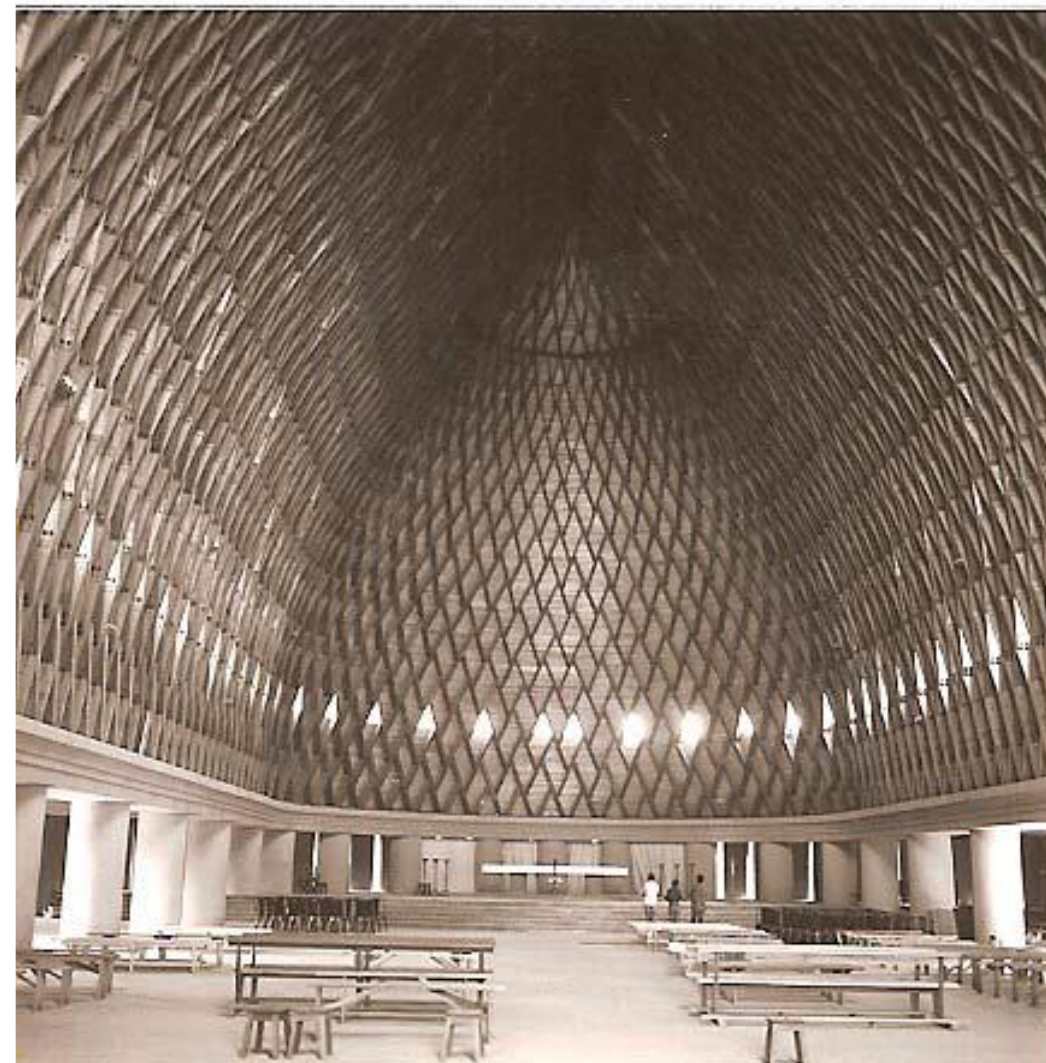
# THE PROJECT BRIEF

**CLIENT:** Catholic Church - Chad

**ARCHITECTS:** Groupement BEX

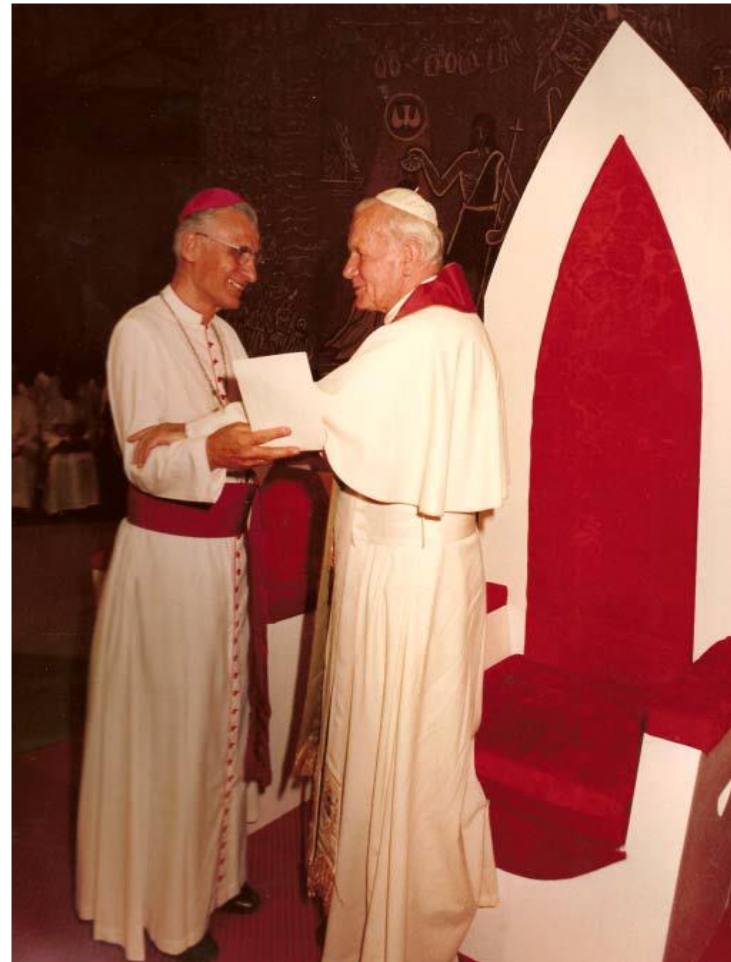
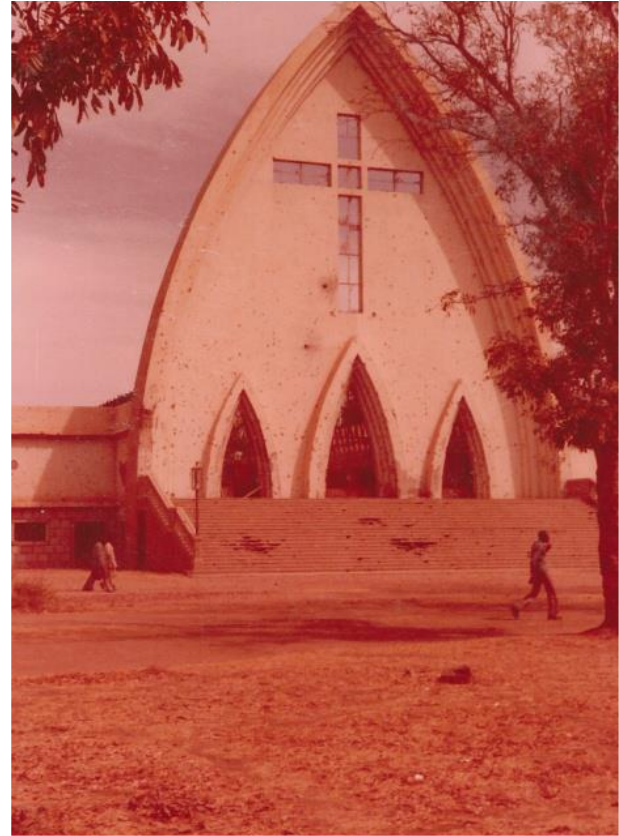
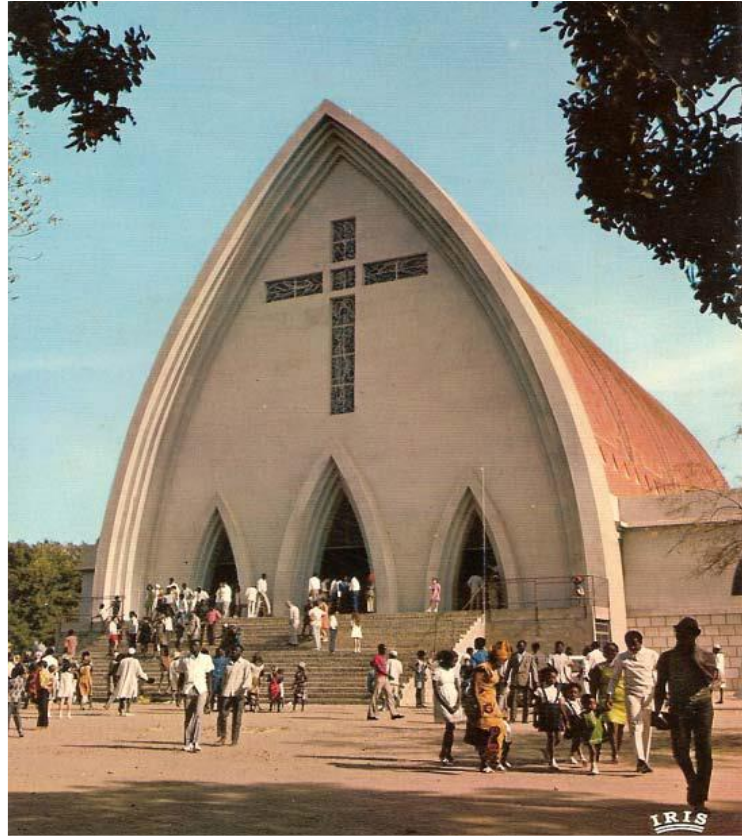
**MAIN CONTRACTOR:** Sotieri Construction





Source :  
Archives de la  
Cathédrale)



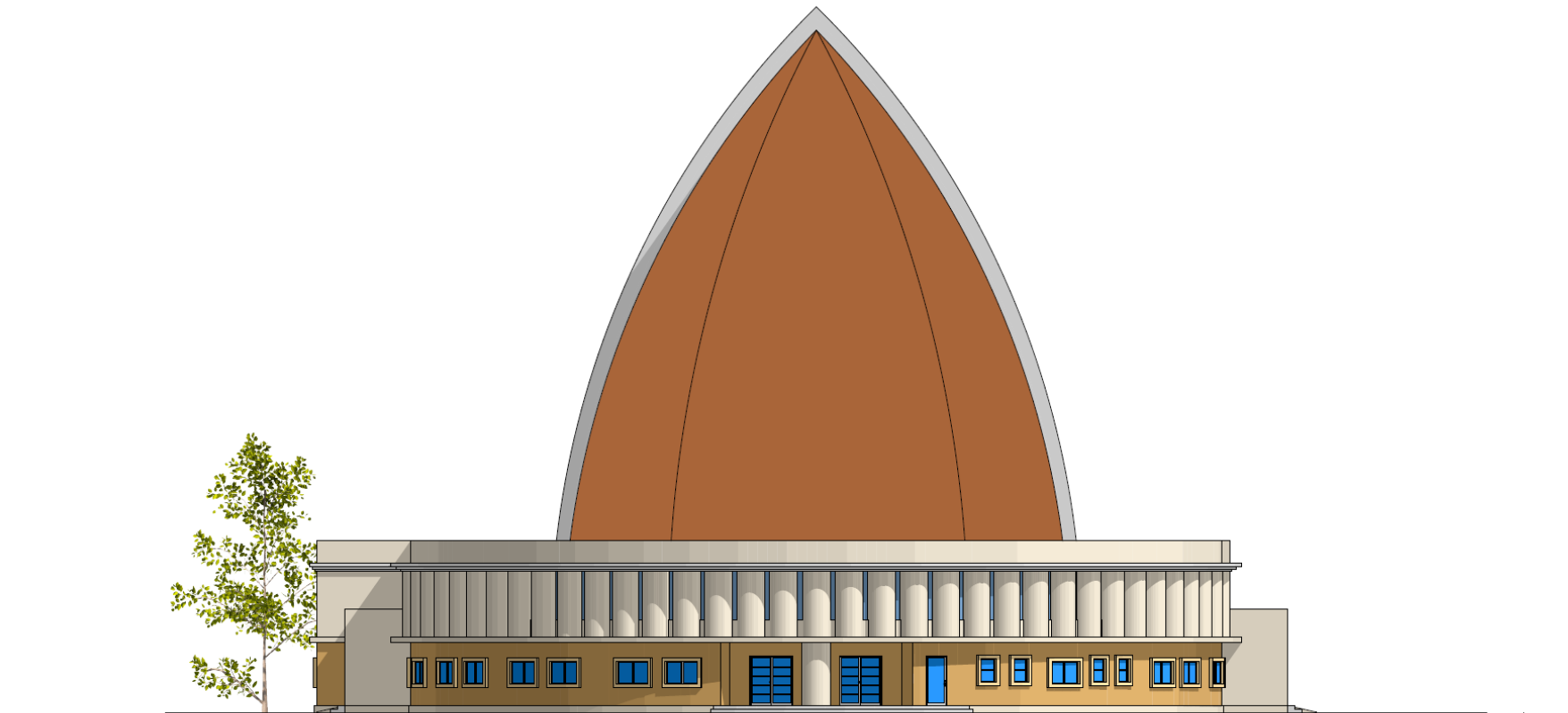
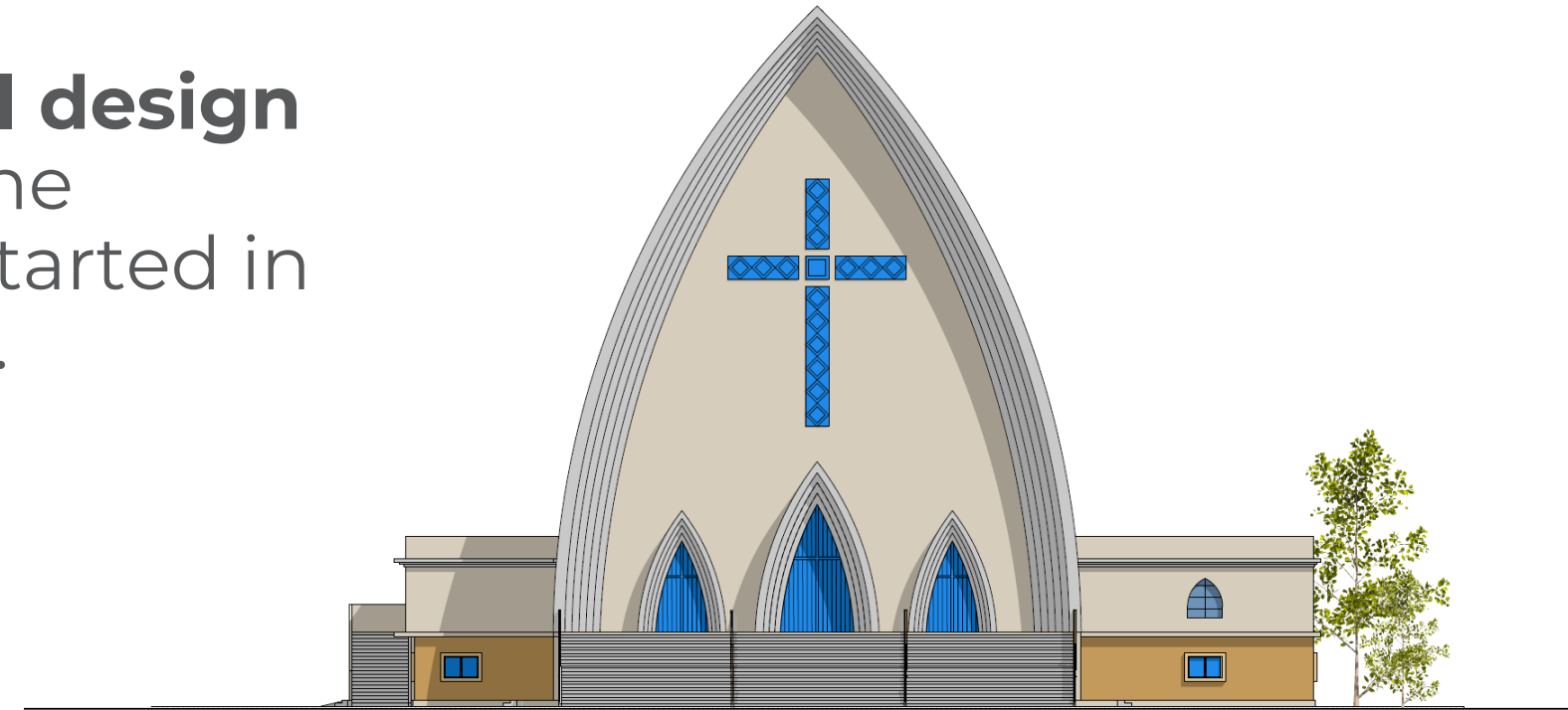
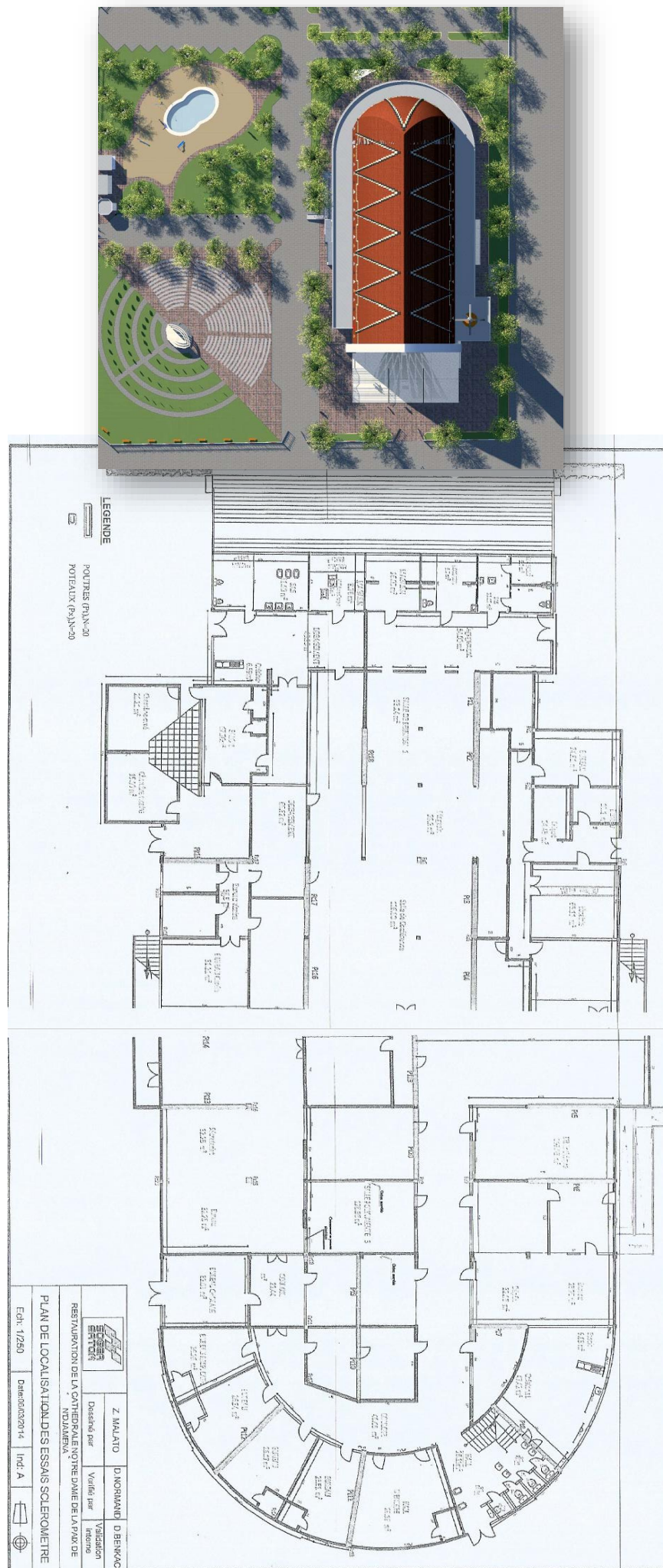


(Source : Archives de l'Evêché).



# Architects Models

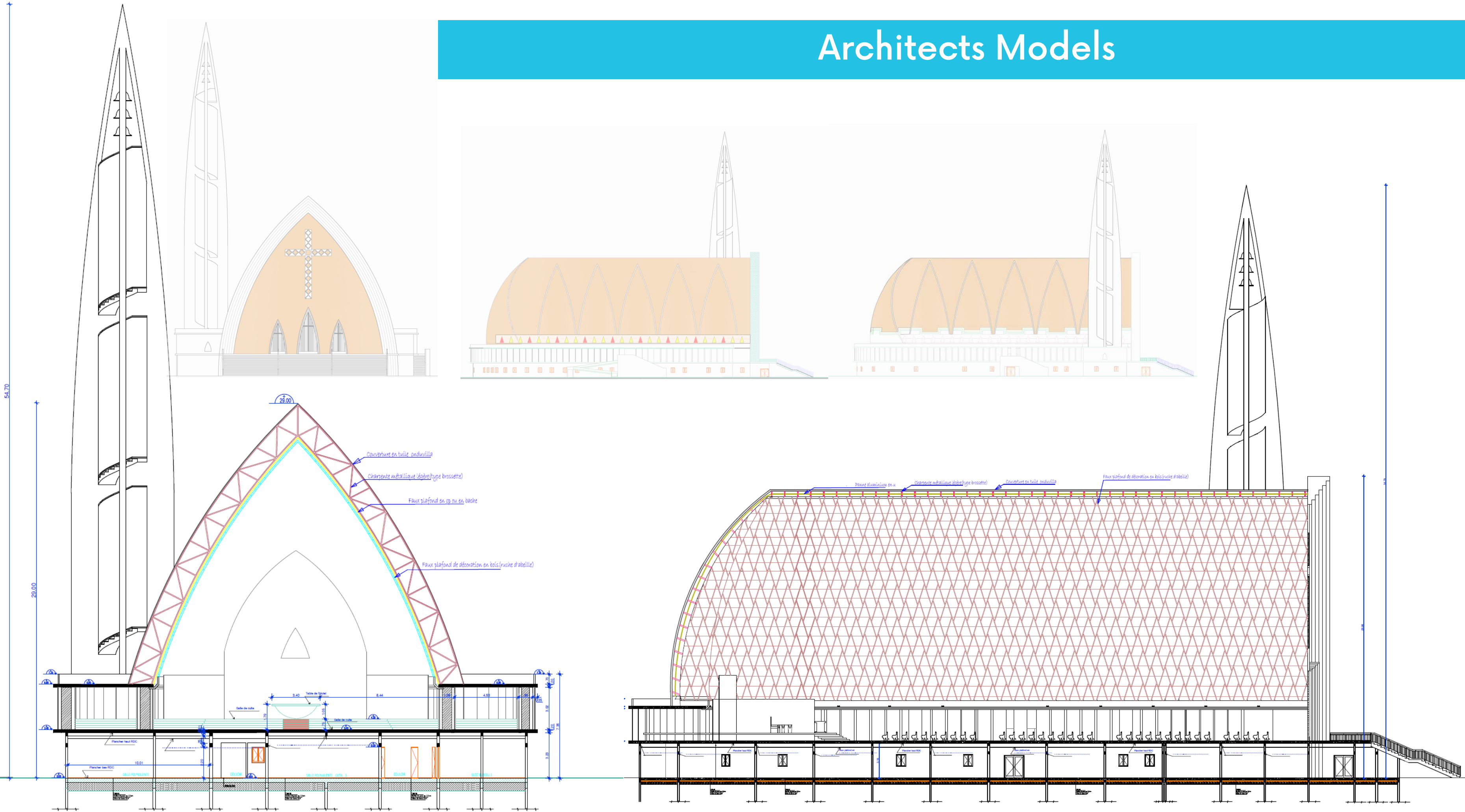
**Conceptual design**  
to restore the  
Cathedral started in  
March 2014.



PROJET DE RESTAURATION DE LA CATHEDRALE NOTRE DAME DE LA PAIX DE N'DJAMENA	FACADE SUD	Numéro 04	Date Juillet 2018	Echelle 1:125	Dessiné par: FREEMAN N.	<b>GROUPEMENT BEX</b> Contacts: 63877241/66246880/ 66365675
	<b>DOSSIER ARCHITECTURAL</b>					

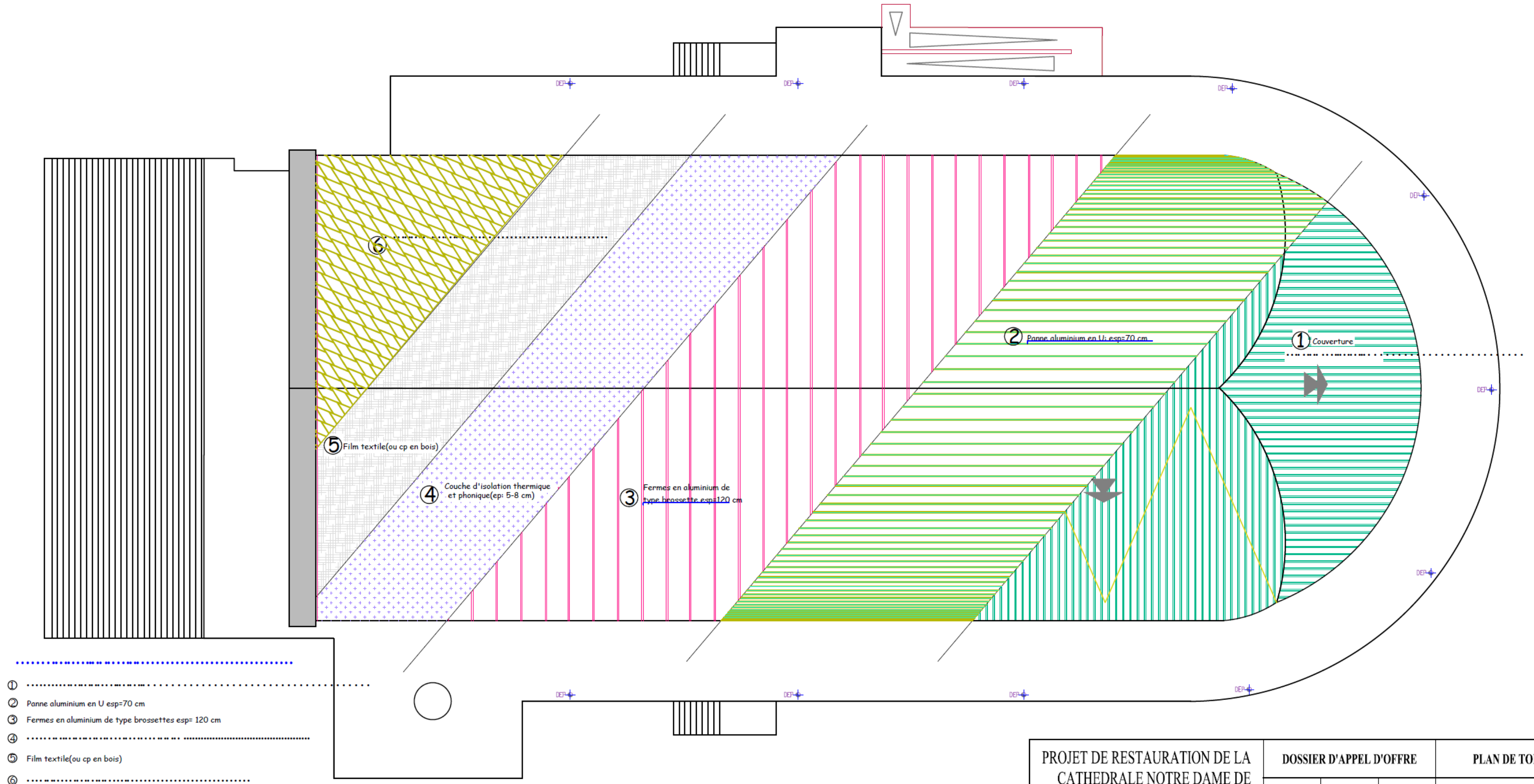


# Architects Models





# Architects Models



PROJET DE RESTAURATION DE LA  
CATHEDRALE NOTRE DAME DE  
LA PAIX DE N'DJAMENA

DOSSIER D'APPEL D'OFFRE

PLAN DE TOITURE

N°

Ech : 1/250 Sept. 2012



# THE PROJECT OVERVIEW





# PROJECT OVERVIEW

## STRUCTURAL STEELWORK

Project Completed: Before December 2022

Steelwork Completed: June 2022

Tonnage: 120 Tonnage

Profiles used: **MiTek<sup>®</sup>**  
**ULTRA-SPAN<sup>®</sup>**





# PROJECT OVERVIEW

## STRUCTURAL STEELWORK

Structural Engineer: MiTek Industries

Steelwork Contractor: MaxSpan Roofing

Steel Detailer: MiTek Industries

Steel Merchant/s: Non





# STRUCTURAL FRAMING

**STRUCTURAL ENGINEER:** MiTek Industries

**STEELWORK CONTRACTOR:** MaxSpan Roofing

**STEEL DETAILER:** MiTek Industries



# STRUCTURAL STEELWORK AT DIFFERENT STAGES





# STRUCTURAL STEELWORK AT DIFFERENT STAGES





# STRUCTURAL STEELWORK AT DIFFERENT STAGES





# STRUCTURAL STEELWORK AT DIFFERENT STAGES



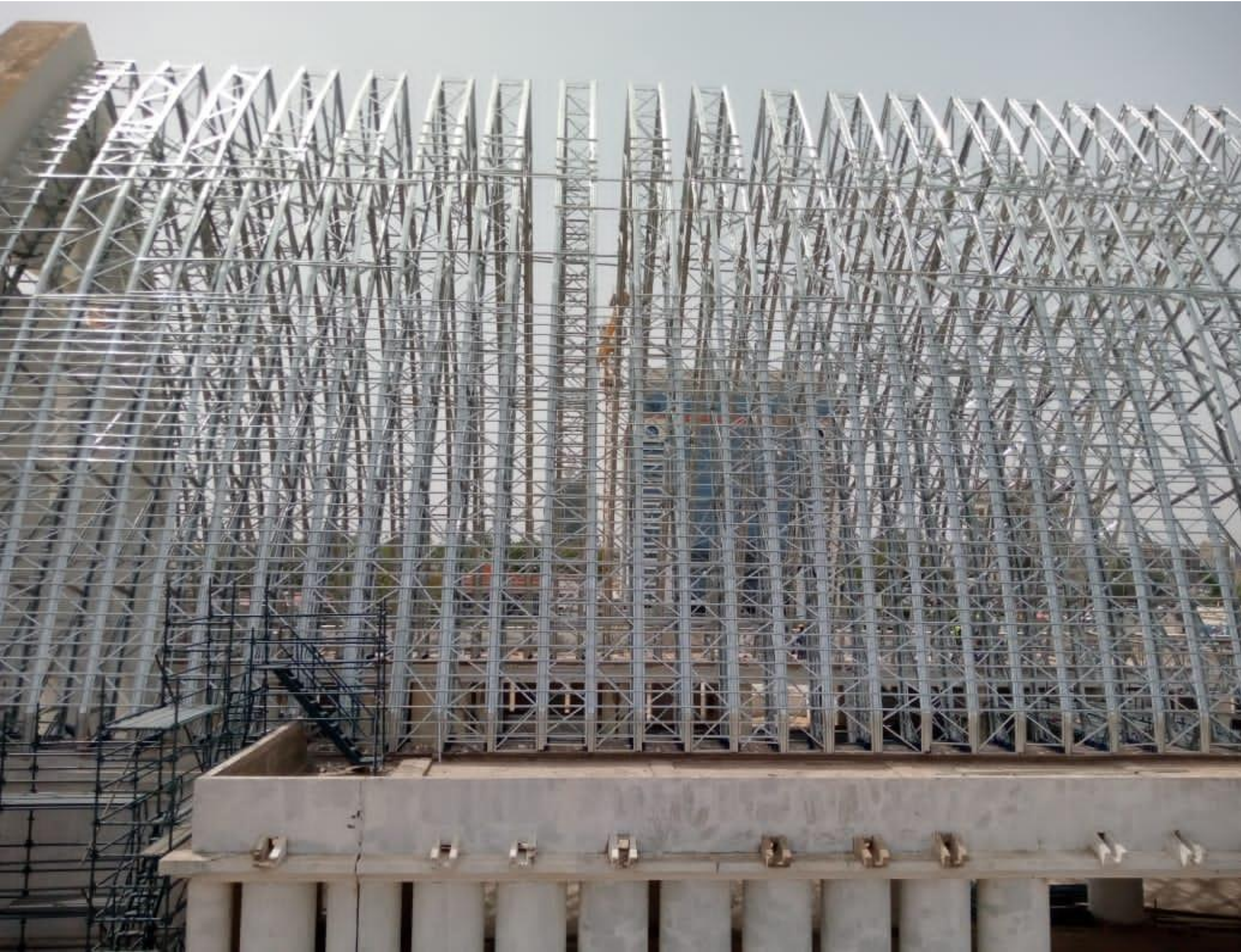


# STRUCTURAL STEELWORK AT DIFFERENT STAGES





# STRUCTURAL STEELWORK AT DIFFERENT STAGES





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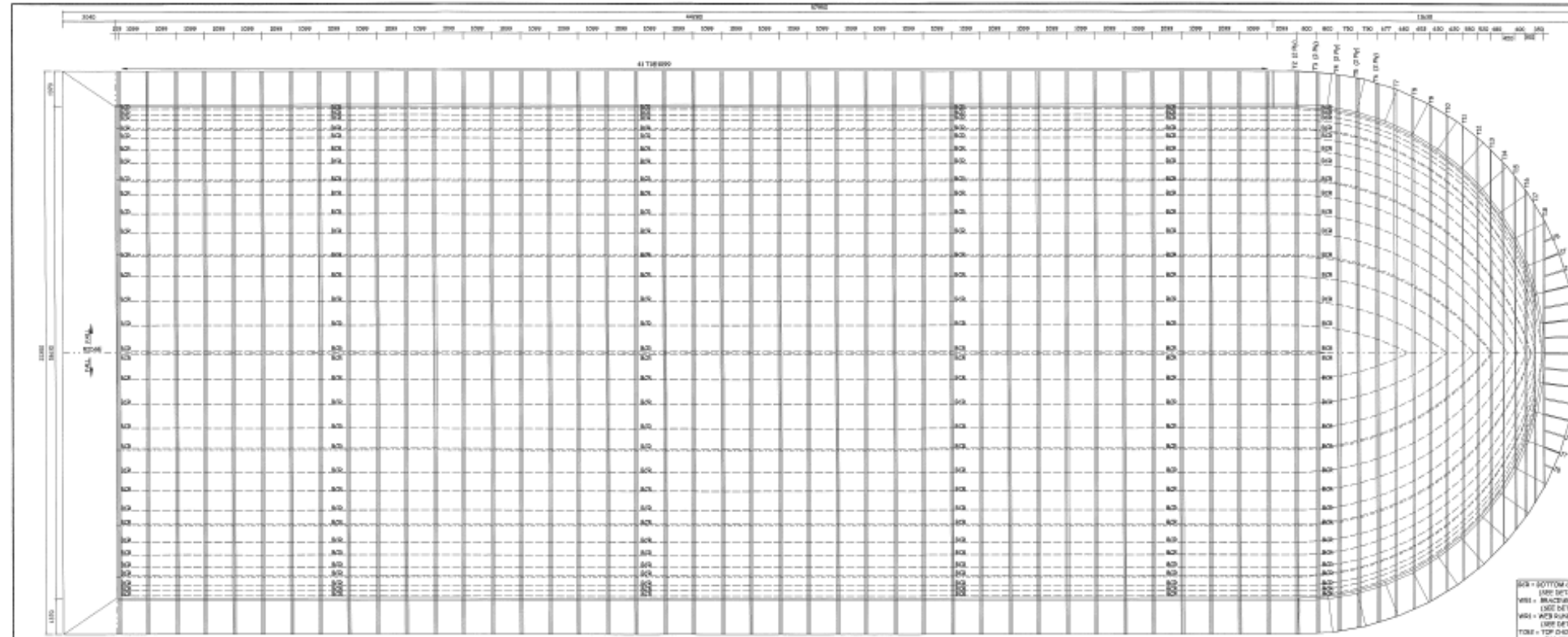
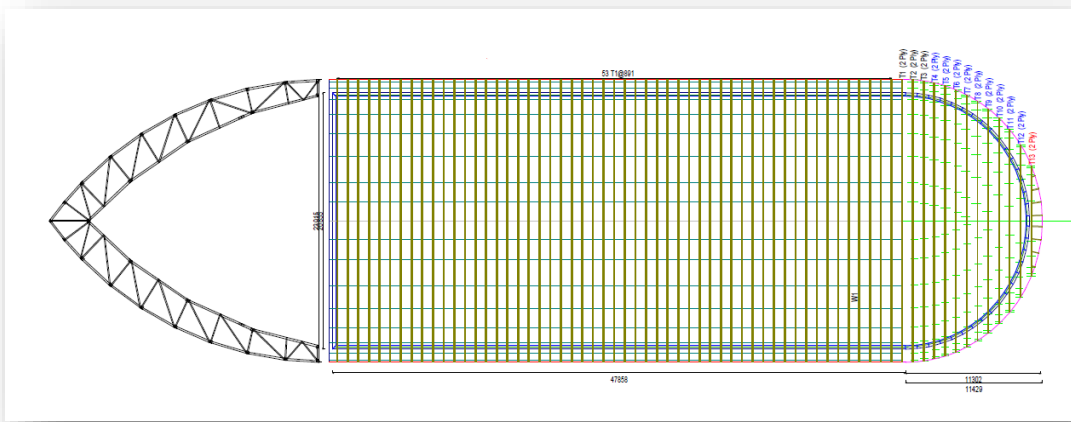
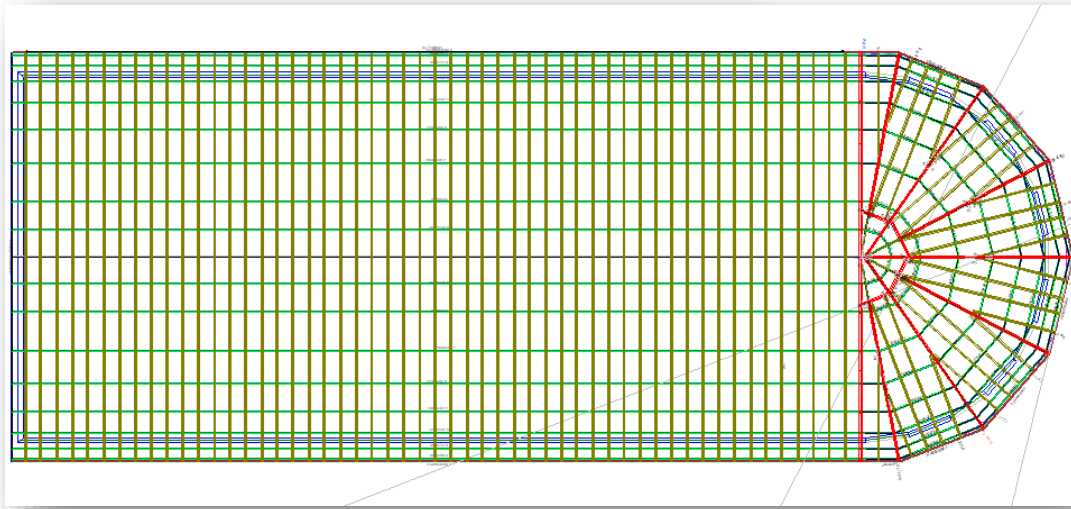
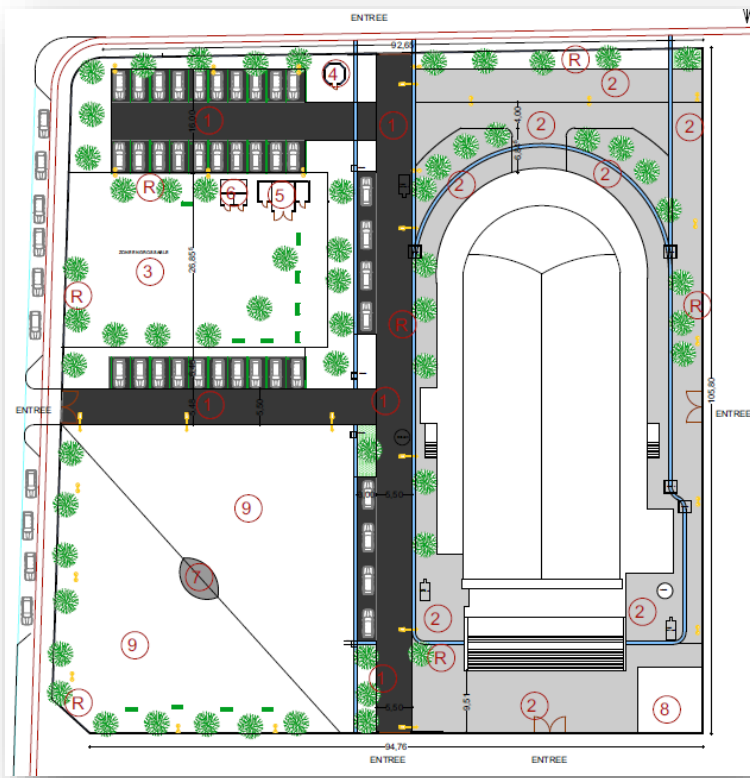


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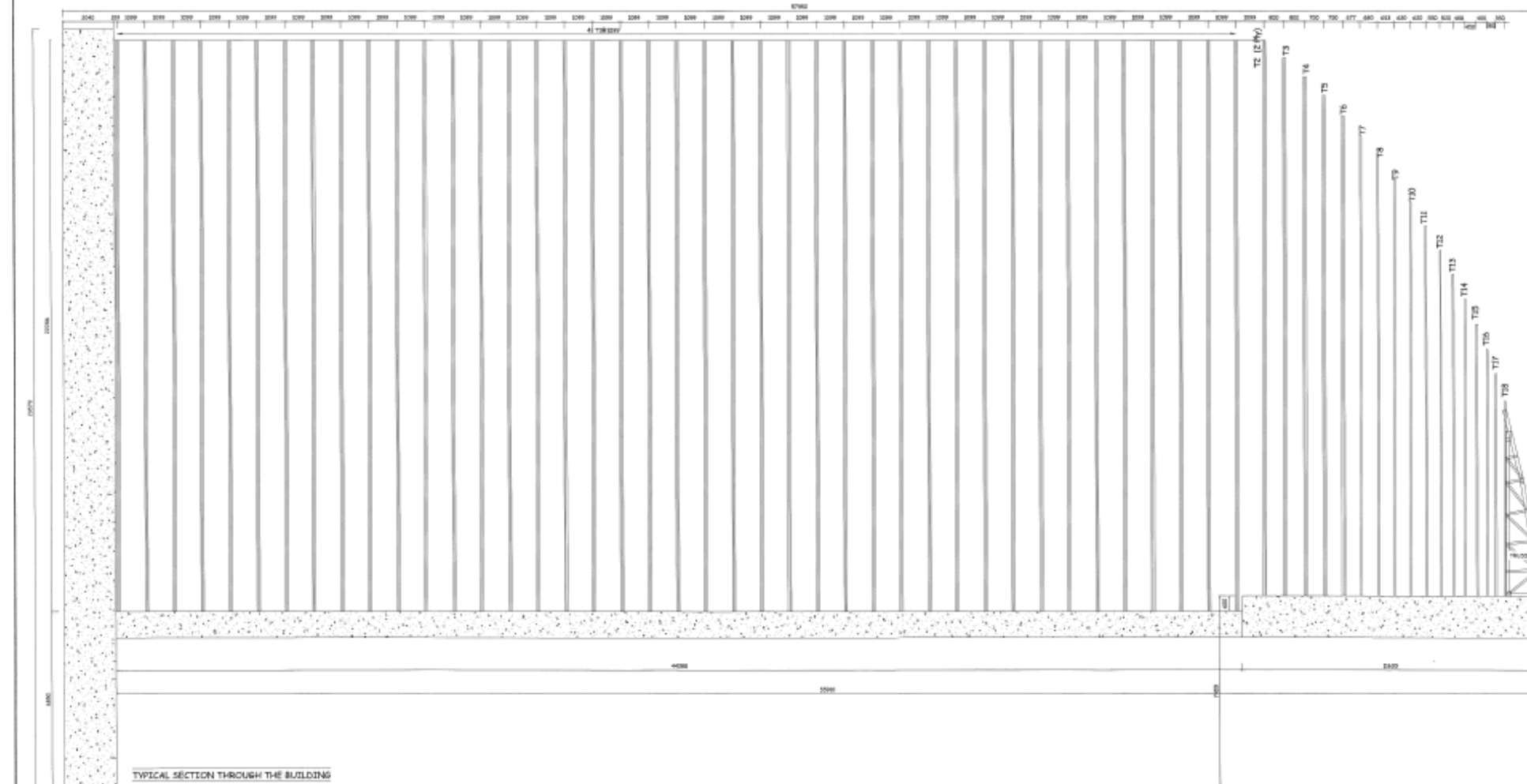




# MiTek Drawings



BOTTOM CHORD RUNNER LAYOUT (SPACED AT 1400mm CENTRES MAX.)



**GENERAL NOTES**

- The structural steel design and fabrication details shown on these drawings are in accordance with SANS 10162, The Structural Steel Code of Practice, and in accordance with SANS 10127 "Light Steel Frame Structures".
- MiTek Industries S.A. (Pty) Ltd cannot accept responsibility for any deviations from these specifications which occur during erection, unless called upon to supervise the erection, storage, handling, erection and bracing shall be in accordance with the details shown on these drawings.
- These drawings are to be read in conjunction with all relevant Architect/Consulting Engineer's details.
- These drawings have been checked in compliance with the ISO 9005 Quality Procedures Manual.

**MATERIALS**

- All material used shall be subjected to normal maintenance. Material used within 10mm of the coast must be protected from rust by minimising airflow. It is recommended that all areas and coverings to be coated in this area, refer to "SANS 117".
- All timber brackets to be treated in accordance with SANS 3005.
- The specified grade of steel shall be strictly adhered to.
- All metal shavings (swarf) must be removed from the structure.
- All connections to be with screws as specified. Fabrication/Erection - Use 12x30 Tilt Screws - 4-Flux Ethane-Free (S.D.S).
- No dissimilar metals (eg. copper pipes or fittings) must be in contact with, or connected to, the galvanneal steel.
- All truss to truss connections as per details specified.
- Barren / Plain connections as specified.
- Truss to building structure connections as specified.

**LOADING**

- Any deviation from the loads specified below must be approved by MiTek Industries S.A.(Pty) Ltd.

TOP CHORD	DESCRIPTION	WIND LOADS	DESCRIPTION
LI	SANS 10162	6.25 - 0.5	FUNDAIMENTAL WIND SPEED (m/s)
DL	SHEETING	0.30	RETURN PERIOD YEARS
BL	SLAB		TERRAIN CATEGORY
OL	CLIMAT	0.14	STORMWIND CATEGORY

OTHER:

- SEE ATTACHED PLANS FOR OTHER LOADS

**FABRICATION**

- All fabrication details are to be in accordance with standard MiTek specifications.
- It is the prime manufacturer's responsibility to ensure that the trusses are fabricated strictly in accordance with the design details shown on these drawings.

**STORAGE**

- Adequate storage and protection facilities shall be provided so that any form of damage to the roofing materials before manufacture and erection can be prevented.

**ERECTION AND BRACING**

- It is the responsibility of the erector to ensure that temporary erection bracing is installed to hold the trusses true and plumb and in safe condition until permanent truss bracing and bridging is fully erected in place to form a structurally sound roof framing system. All permanent bracing shall be in accordance with the details shown on these drawings. All components must be permanently fastened before the application of any loads.
- Trusses are to be supported until bearing points indicated on the drawing. NAL MiTek Industries S.A. (Pty) Ltd are only responsible for the design of the steel roof structure. It is the responsibility of the Erection/Developer /Architect/Main Contractor to ensure the structural adequacy of the supporting superstructure as MiTek Industries S.A. (Pty) Ltd takes no responsibility for the design thereof, U.D.S.
- The standard method of construction is that all supports use 25 x 1.0mm galvanneal loop brackets, embedded seven courses into slab, or cast into 200mm into concrete beams, wrapped over the trusses and fast with 3 No. 12 x 20 tilt screws U.D.S., or as provided by the registered professional engineer responsible for the overall structure.
- Purlins and battens are to be screwed at each connection as shown in the details.
- Where there will be no directly fixed ceiling material, installation of roof covering, provide 0.5 flat section longitudinal runners on the 50 beams at max. 2000mm c/c U.D.S. Similar runners at 1800mm c/c are required at all corners and U.D.S. These runners are to be fixed and braced before fixing the roof covering. Where the ceiling boarding is fixed directly to the truss beams, the required runners may be omitted, provided that boarding or temporary runners are fixed at 1800 c/c max. before the roof is covered.
- This roof structure shall be inspected by a professional engineer or other approved registered competent person in accordance with the requirements of the National Building Regulations.
- This roof should be erected by an erector deemed competent by MiTek Industries S.A.(Pty) Ltd to erect Ultra-Span trusses and similar materials.
- Roof filling to be built up before loading the roof structure. Alternatively install vertical bracing.

**IF IN DOUBT - ASK!**

The dimensions shown on these drawings are for design purposes only. The truss manufacturer must verify the dimensions and the number of trusses required prior to fabrication.

Significant dimensional variations must be brought to the attention of MiTek Industries S.A. (Pty) Ltd, to enable the adequacy of the design to be rechecked.

MiTek Industries S.A. (Pty) Ltd are not responsible for the result of any variations caused by the contractor or site.

No trusses are to be cut or modified without the prior consent of MiTek Industries S.A. (Pty) Ltd.

This drawing and the copyright therein is the sole intellectual property of MiTek Industries S.A. (Pty) Ltd and may only be used by a licensed MiTek subcontractor, unless the prior written authorisation by MiTek Industries S.A. (Pty) Ltd has been obtained.

**Important! (All cases)**

Steel sizes, screw quantities & dimensions shown on MiTek working drawings supersede those shown on fabrication printouts.

Engineering e-mail address: [mideng@mitek.co.za](mailto:mideng@mitek.co.za)

These drawings have been created in AutoCAD format. Drawings can be viewed in the .dwg and .dwg file.

DRAWING NO.	SHEET	REV.
G1192017	2 OF 22	0

**SOTIERI & PARTNERS**

**Cathédrale Chad**

**ROOF LAYOUT & BRACING DETAILS**

DESIGNED BY	DRAWN	CHECKED	APPROVED BY	DATE
J.L. MURPHY	JACD	JACD	JACD	24/10/17

**MiTek**

**ULTRA-SPAN**

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MiTek Durban: 20 Wood Road, Newmarket, Durban. Tel: 031 200 4200, Fax: 031 200 4201, Email: info@mitek.co.za

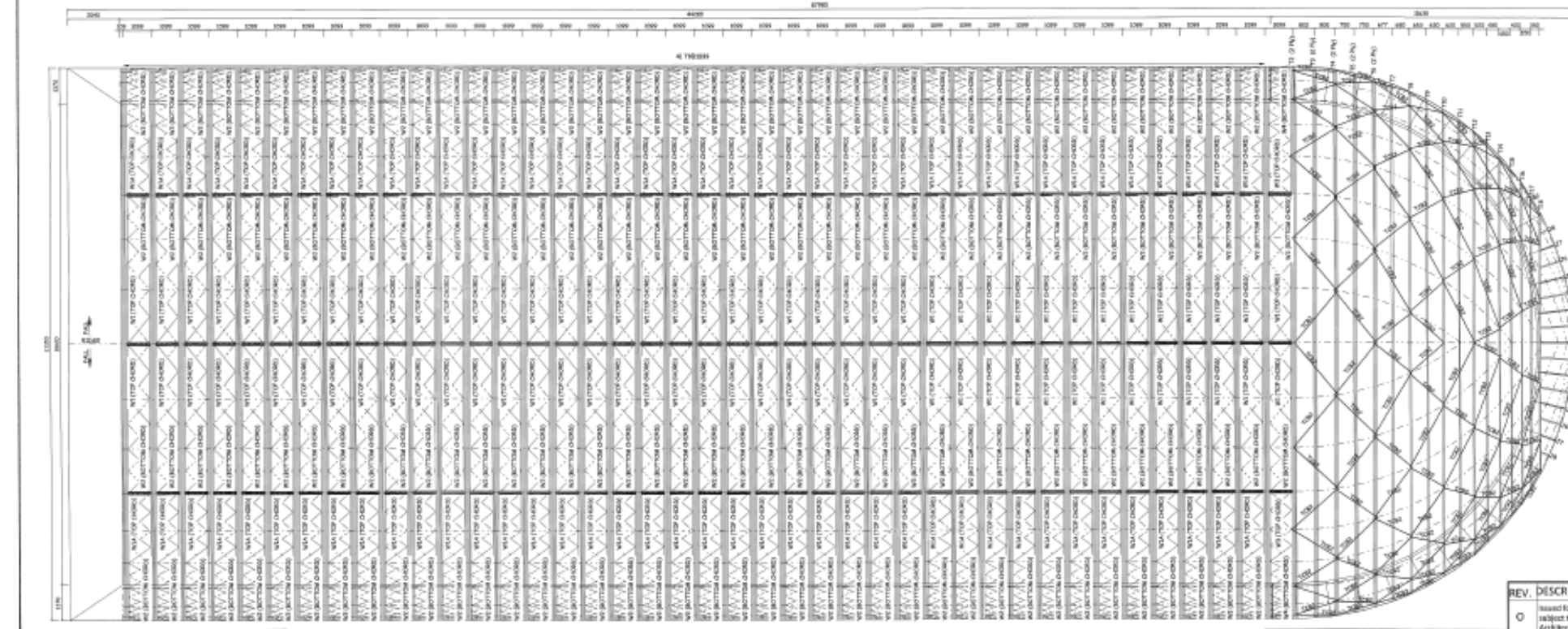
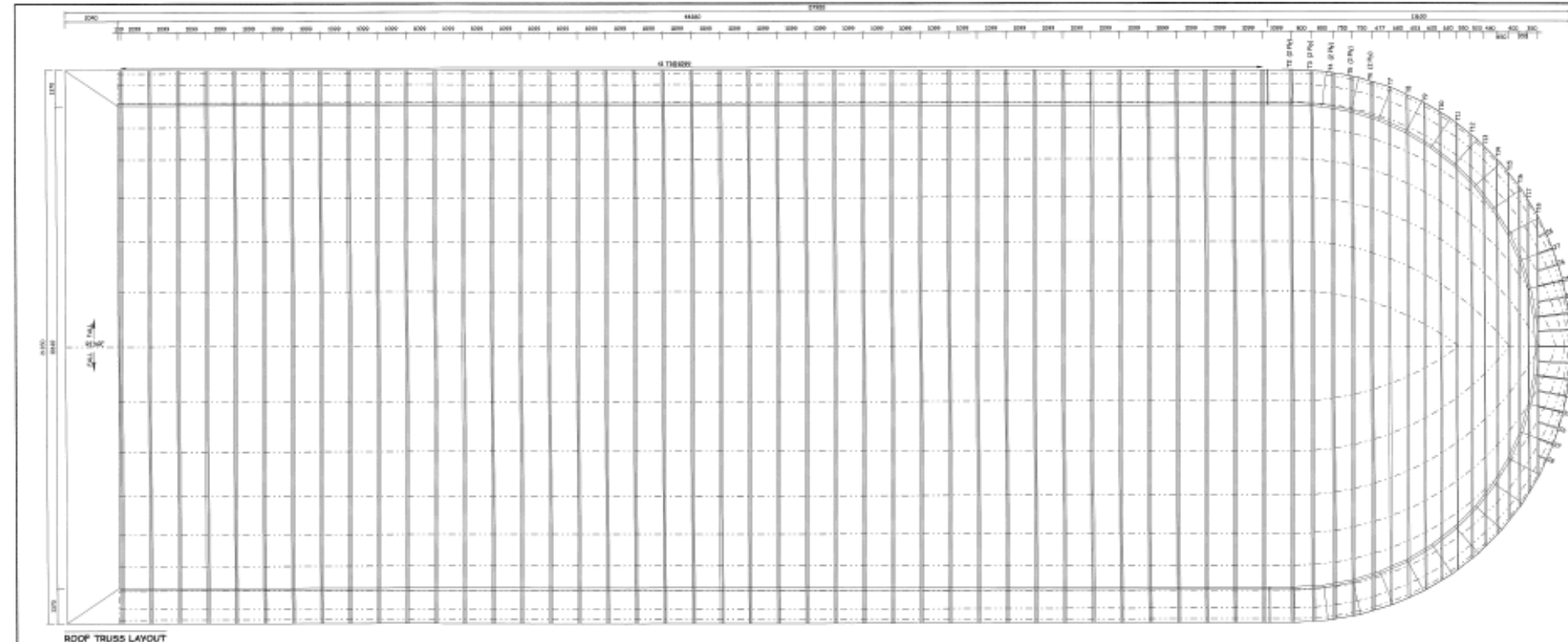
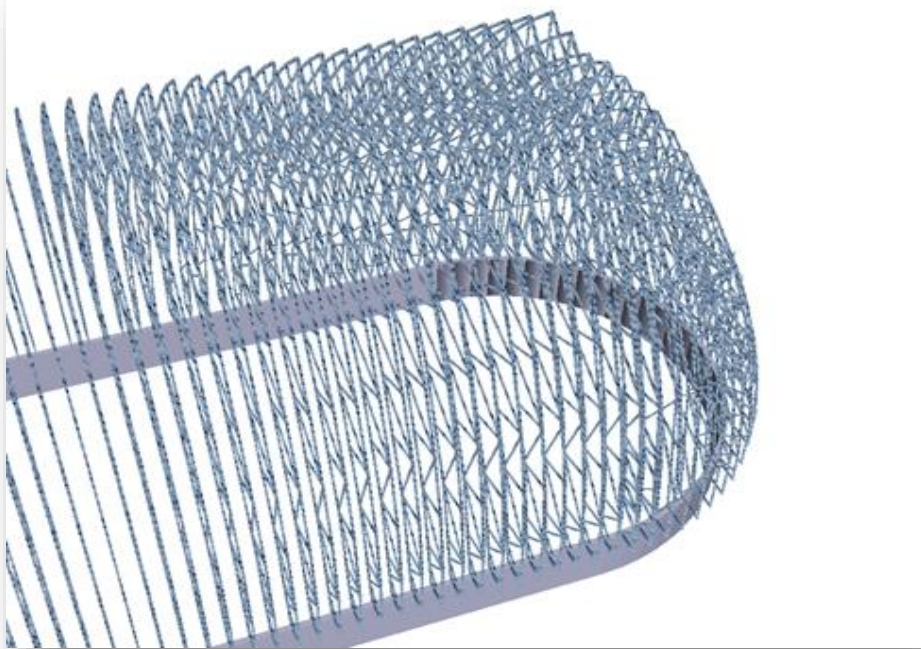
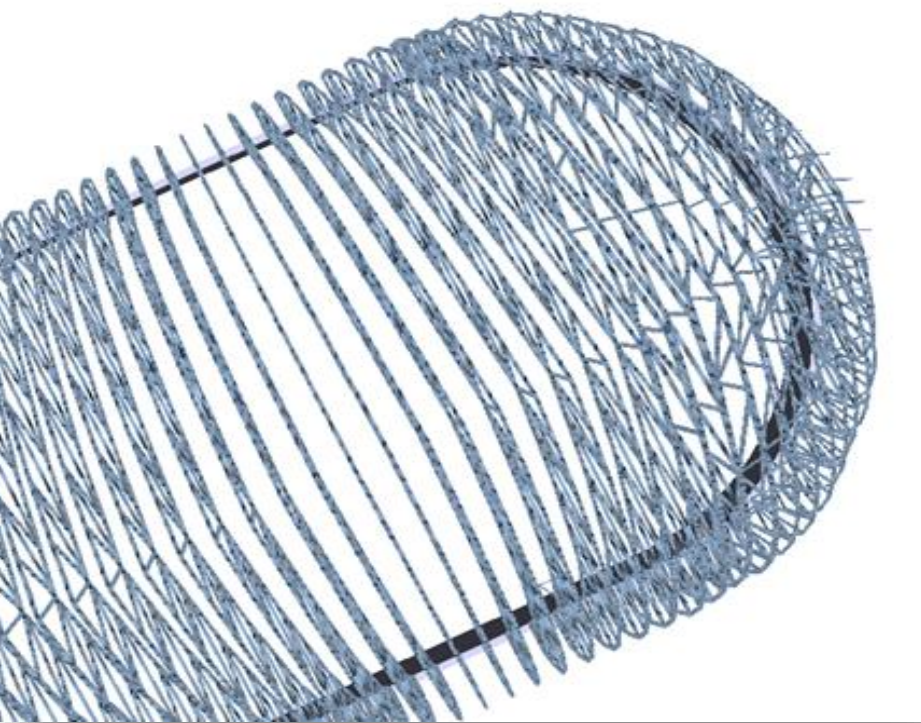
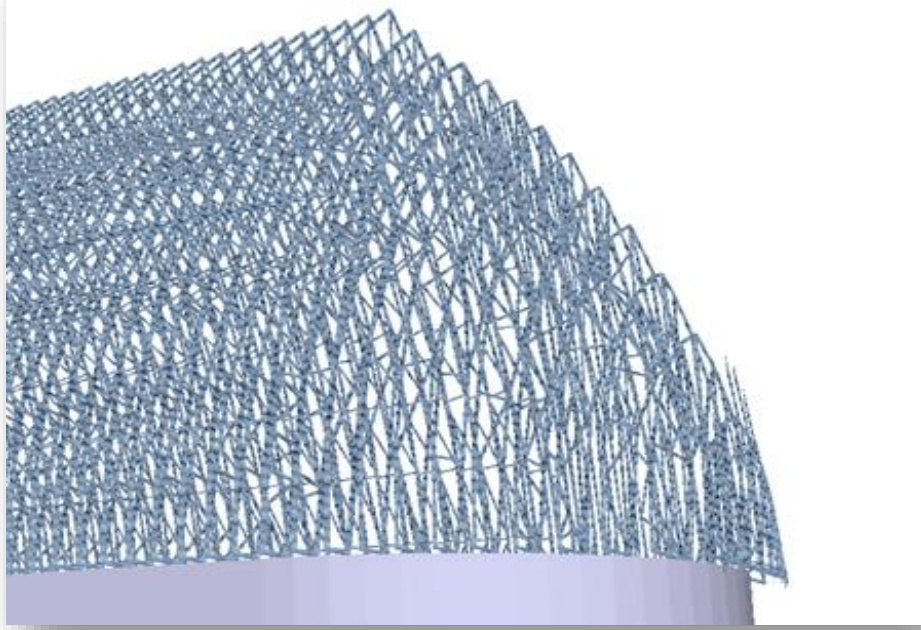
MiTek Port Elizabeth: 14 Willem Road, Scarborough, Port Elizabeth. Tel: 041 300 2244, Fax: 041 300 4115, Email: info@mitek.co.za

MiTek Johannesburg: 14 Willem Road, Scarborough, Johannesburg. Tel: 011 300 2244, Fax: 011 300 4115, Email: info@mitek.co.za

MiTek Pretoria: 14 Willem Road, Scarborough, Pretoria. Tel: 011 300 2244, Fax: 011 300 4115, Email: info@mitek.co.za



# MiTek Drawings



- DRAWING LIST**
- G1192017 SHT 1: ROOF AND STIFFENER FRAME LAYOUT
  - G1192017 SHT 2: BOTTOM CHORD RUNNER LAYOUT AND TYPICAL SECTION
  - G1192017 SHT 3: TRUSS T1 AND BRACING DETAILS
  - G1192017 SHT 4: TRUSS T2 AND BRACING DETAILS
  - G1192017 SHT 5: TRUSS T3 AND BRACING DETAILS
  - G1192017 SHT 6: TRUSS T4 AND BRACING DETAILS
  - G1192017 SHT 7: TRUSS T5 AND BRACING DETAILS
  - G1192017 SHT 8: TRUSS T6 AND BRACING DETAILS
  - G1192017 SHT 9: TRUSS T7 AND BRACING DETAILS
  - G1192017 SHT 10: TRUSS T8 AND BRACING DETAILS
  - G1192017 SHT 11: TRUSS T9 AND BRACING DETAILS

- DRAWING LIST**
- G1192017 SHT 12: TRUSS T10 AND BRACING DETAILS
  - G1192017 SHT 13: TRUSS T11 & T12 AND BRACING DETAILS
  - G1192017 SHT 14: TRUSS T13 & T14 AND BRACING DETAILS
  - G1192017 SHT 15: TRUSS T15, T16, T17 & T18 AND BRACING DETAILS
  - G1192017 SHT 16: TRUSS T1 TO T8 AND BRACING DETAILS
  - G1192017 SHT 17: STIFFENER FRAMES W1, W1A, W2, W3, & W4
  - G1192017 SHT 18: SUPPORT FRAME DETAILS
  - G1192017 SHT 19: BRACING DETAILS
  - G1192017 SHT 20: BRACING DETAILS
  - G1192017 SHT 21: SPECIAL BRACKET DETAIL 2-PLY TRUSSES
  - G1192017 SHT 22: SPECIAL BRACKET DETAIL 1-PLY TRUSSES

BCR = BOTTOM CHORD RUNNERS  
(SEE DETAIL BCR)  
WBI = BRACING  
(SEE DETAIL WBI)  
WRI = WEB RUNNERS  
(SEE DETAIL WBI)  
TCB2 = TOP CHORD BRACING WITH SPEEDBRACE  
FOR TILED ROOFS (SEE DETAIL TCB2)

**IF IN DOUBT - ASK!**

The dimensions shown on these drawings are for design purposes only. The truss manufacturer must verify the dimensions and the number of trusses required prior to fabrication.

Significant dimensional variations must be brought to the attention of MiTek Industries S.A. (Pty) Ltd. to enable the adequacy of the design to be re-checked.

MiTek Industries S.A. (Pty) Ltd are not responsible for the result of any variations caused by the contractor or client.

No trusses are to be cut or modified without the prior consent of MiTek Industries S.A. (Pty) Ltd.

**GENERAL NOTES**

- The structural steel design and fabrication details shown on these drawings are in accordance with SANS 10162, "The Structural use of Steelwork" and in accordance with SANS 557 "Light Steel Frame Building".
- MiTek Industries S.A. (Pty) Ltd cannot accept responsibility for any deviations from these specifications which could affect erection, unless called upon to approve the erection. Storage, handling, erection and bracing shall be in accordance with the work details shown on these drawings.
- These drawings are to read in conjunction with all relevant architect's/Consulting Engineer's details.
- These drawings have been checked in compliance with the ISO 9001 Quality Procedures Manual.

**MATERIALS**

- All material used shall be subjected to normal maintenance. Material used within 30mm of the steel must be protected from moisture by maintaining airflow. It is recommended that all axes and overhangs to be coated in this area. Refer to "SANS 557".
- All timber spacers to be treated in accordance with SANS 30005.
- The specified grades of steel shall be strictly adhered to.
- All metal shavings (swarf) must be removed from the structure.
- All connections to be with screws as specified. (Prestabond/Precon - use 24x23 T40 screws - 4 to 6mm Offset/void Spaced (U.G. 5))
- No dissimilar metals (eg. copper pipes or fittings) must be in contact with, or connected to, the galvanneal steel.
- All truss to truss connections as per detail specified.
- Welded / Purge connections as specified.
- Truss to building structure connections as specified.

**LOADING**

- Any deviation from the loads specified below must be approved by MiTek Industries S.A. (Pty) Ltd.

NO	DESCRIPTION	VALUE	UNIT
TOP CHORD	U.L. SANS 10162	0.25 - 0.5	KN/m
DL	DEAD LOAD	0.30	KN/m
BOTTOM CHORD	U.L. SANS	0.14	KN/m
DL	DEAD LOAD	0.14	KN/m

**FABRICATION**

- All fabrication details are to be in accordance with standard MiTek specifications.
- It is the truss manufacturer's responsibility to ensure that the trusses are fabricated strictly in accordance with the design details shown on these drawings.

**STORAGE**

- Adequate storage and protection facilities shall be provided so that any form of damage to the roofing materials before manufacture and erection can be prevented.

**DIRECTION AND BRACING**

- It is the responsibility of the contractor to ensure that temporary erection bracing is installed to hold the trusses true and steady and to take care of and permanent truss bracing (including a fully screened or clad steel truss) is installed and roof framing system. All permanent bracing shall be in accordance with the details as shown on these drawings. All components must be permanently braced before the application of any loads.
- Trusses are to be supported only at bearing points indicated on the drawing. MiTek Industries S.A. (Pty) Ltd are only responsible for the design of the steel roof structure. It is the responsibility of the Truss Designer (Architect/ Main Contractor) to ensure the structural adequacy of the supporting substructure as MiTek Industries South Africa (Pty) Ltd takes no responsibility for the design thereof, U.G.S.
- The standard method of construction is that at all supports use 25 x 1.0mm galvanneal hoop iron straps, embedded across concrete slab, or cast into 300mm deep concrete beams, embedded over the trusses and fixed with 8 No. 12 x 30mm screws U.G.S., or as provided by the registered professional engineer responsible for the overall structure.
- Purges and bolters are to be secured at each connection as shown in the details.
- Where there will be no directly fixed ceiling material, installation of roof covering, provide 6.5 hot section longitudinal runners on the side beams at max. 3400mm c/c U.G.S. Similar such runners at 3800mm c/c are required at all other ends, U.G.S. These runners are to be fixed and braced before being the roof covering. Where the ceiling bracing is fixed directly to the side beams, the required runners may be omitted, provided that bracing or temporary runners are fixed at 1800 c/c max. before the roof is covered.
- The roof structure must be inspected by a professional engineer or other approved registered competent person in accordance with the requirements of the National Building Regulations.
- This roof should be erected by an erector deemed competent by MiTek Industries S.A. (Pty) Ltd to erect Ultra-Span trusses and verify materials.
- Beams falling to be built up before loading the roof structure. Allowably checked vertical steel bracing.

**NOTES**

Important! (All cases)  
Steel sizes, screw quantities & dimensions shown on MiTek working drawings supersede those shown on fabrication printouts.

Engineering e-mail address: [mtdeng@mitek.co.za](mailto:mtdeng@mitek.co.za)

These drawings have been created by CAD software. If for use, drawings can be converted to DWG, DXF and AutoCAD.

DRAWING NO. G1192017 SHEET 1 OF 22 REV. 0

**SOTERI & PARTNERS**  
Cathédrale Chad

**ROOF LAYOUT & BRACING DETAILS**

REV.	DESCRIPTION	REV BY	DATE	DESIGNED	CHECKED	APPROVED
1	Issued for Fabrication	JACO	10/12/17	JACO	JACO	Mtdeng
2	Subject to Engineer's/Architect approval	JACO	10/12/17	JACO	JACO	Mtdeng

**MiTek**  
**ULTRA-SPAN**

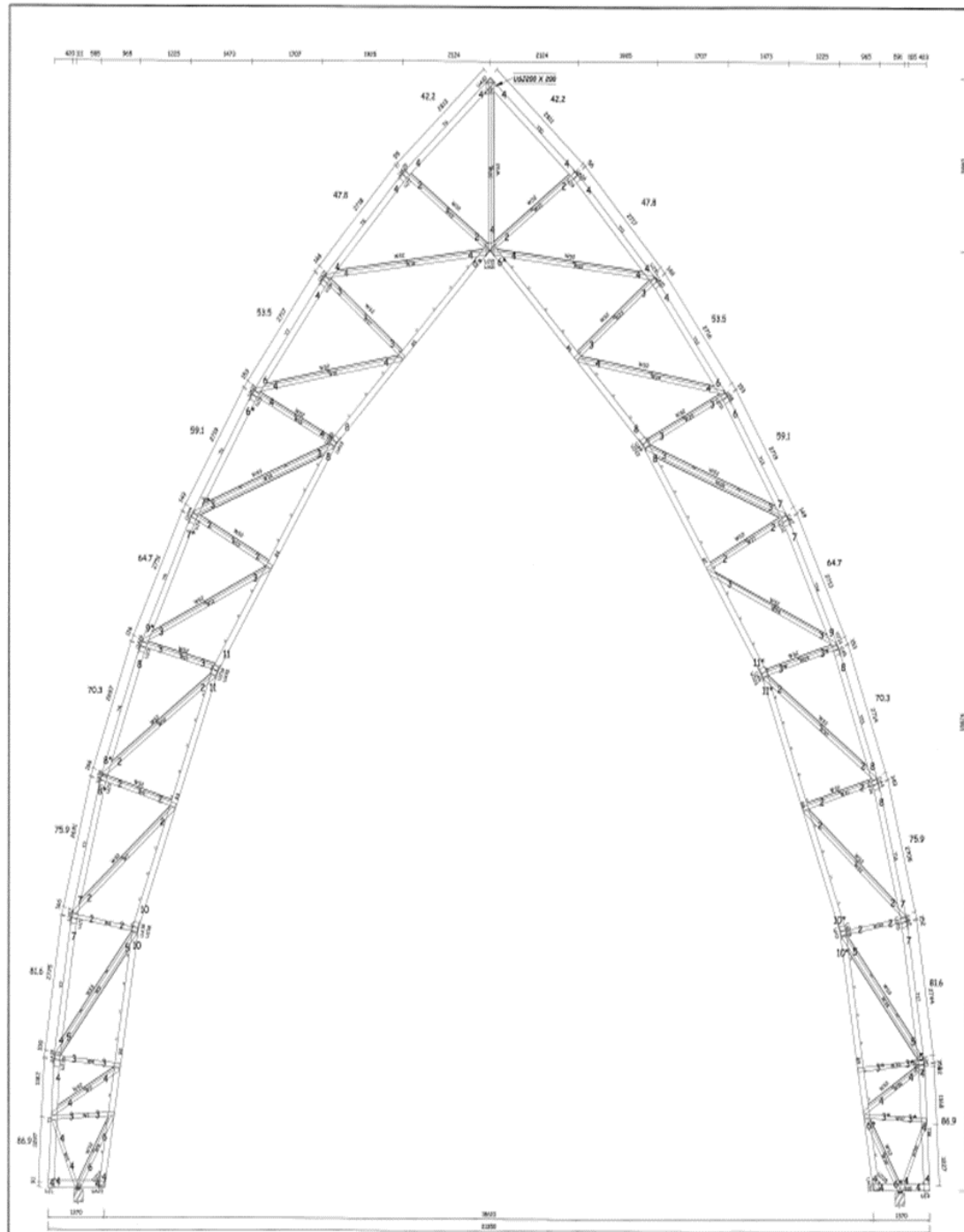
MiTek Industries S.A. (Pty) Ltd  
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Fax: (021) 905-0294  
E-mail: [info@mitek.co.za](mailto:info@mitek.co.za)



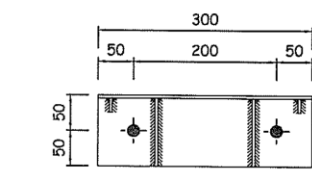
# MiTek Drawings



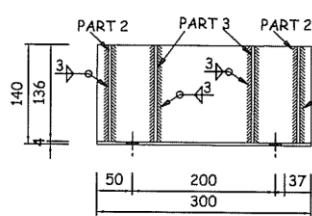
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# MiTek Drawings - Connections



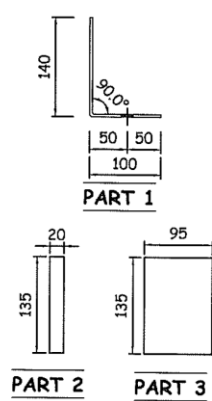
PLAN VIEW



ELEVATION

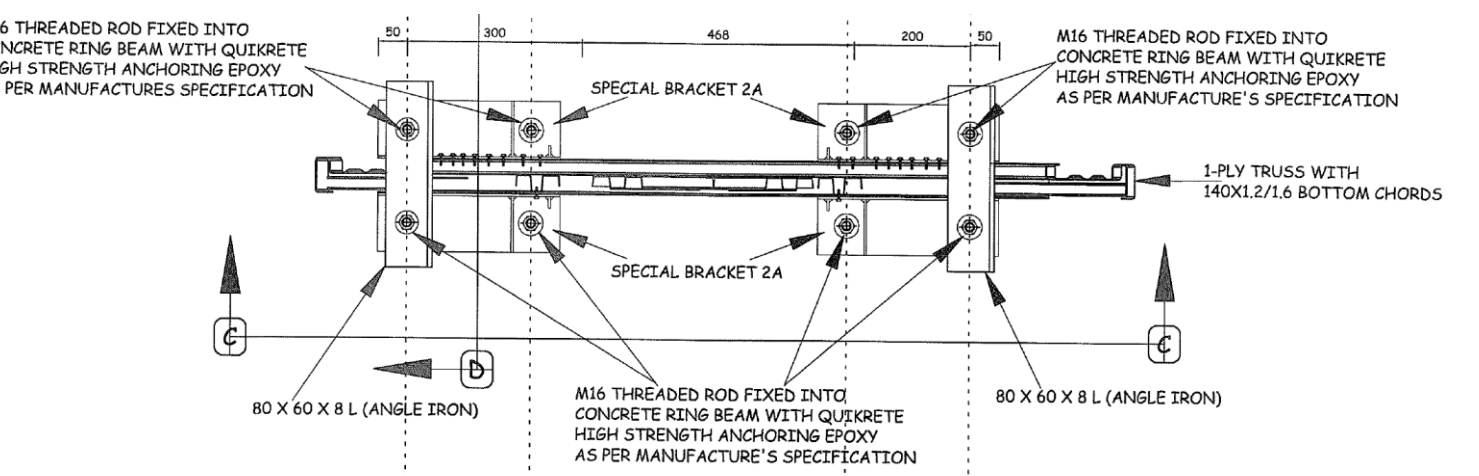
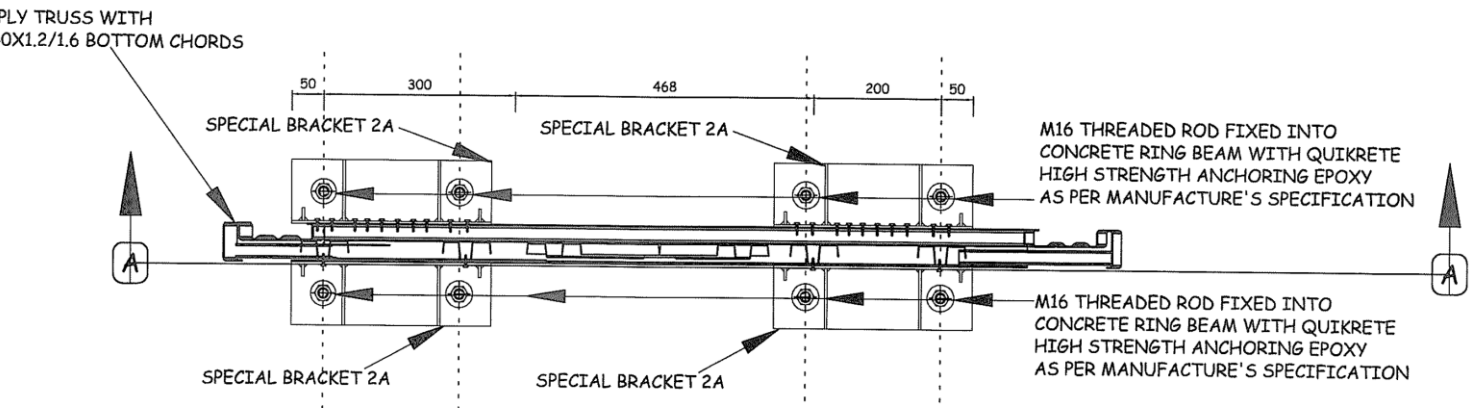
## SPECIAL BRACKET 2

MATERIAL:  
 STEEL : COMMERCIAL QUALITY  
 MILD STEEL  
 THICKNESS : 4 mm  
 HOLE DIAMETERS: 17Ø  
 NOTE :-  
 TOLERANCE ON ALL DIMENSIONS  
 TO BE  $\pm 1.0\text{mm}$

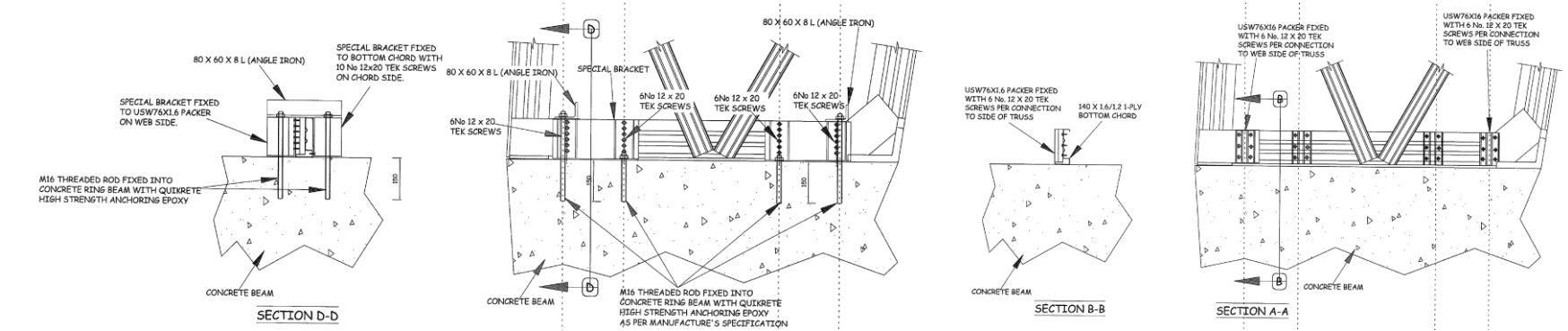


## SPECIAL BRACKET 2A

(128 - OFF)



COMPLETED PLAN VIEW



M16 THREADED ROD FIXED INTO CONCRETE RING BEAM WITH QUIKRETE HIGH STRENGTH ANCHORING EPOXY AS PER MANUFACTURE'S SPECIFICATION

80 X 60 X 8 L (ANGLE IRON)

SPECIAL BRACKET 2 TO BE POSITIONED AS CLOSE TO THE JOINT AS POSSIBLE

M16 THREADED ROD FIXED INTO CONCRETE RING BEAM WITH QUIKRETE HIGH STRENGTH ANCHORING EPOXY AS PER MANUFACTURE'S SPECIFICATION

80 X 60 X 8 L (ANGLE IRON)

SPECIAL BRACKET 2 TO BE POSITIONED AS CLOSE TO THE JOINT AS POSSIBLE

M16 THREADED ROD FIXED INTO CONCRETE RING BEAM WITH QUIKRETE HIGH STRENGTH ANCHORING EPOXY AS PER MANUFACTURE'S SPECIFICATION



1-PLY ULTRA-SPAN TRUSS



# FABRICATION

STEELWORK CONTRACTOR: MaxSpan Roofing

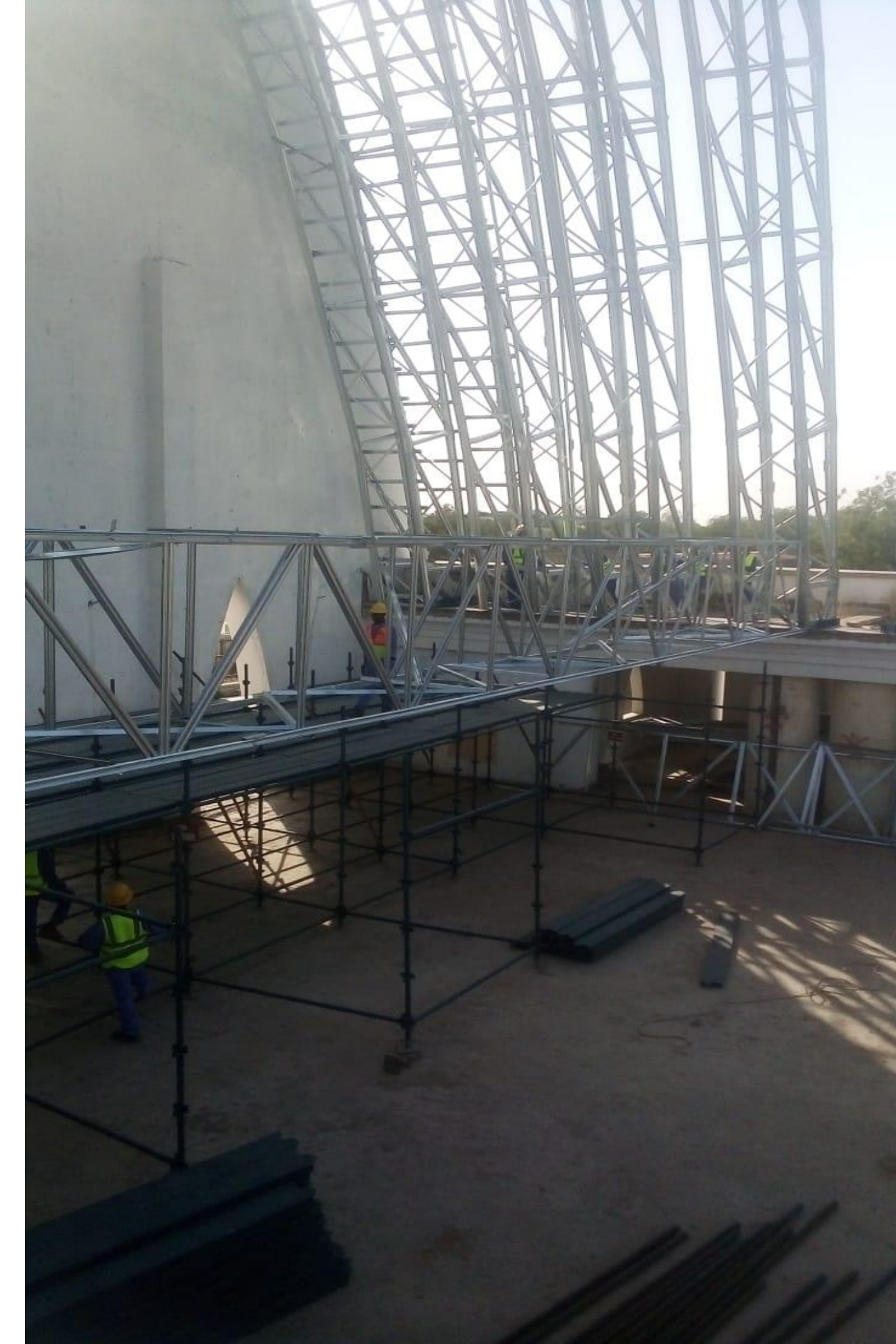


# On-Site Fabrication





## On-Site Fabrication – Temporary Bracing



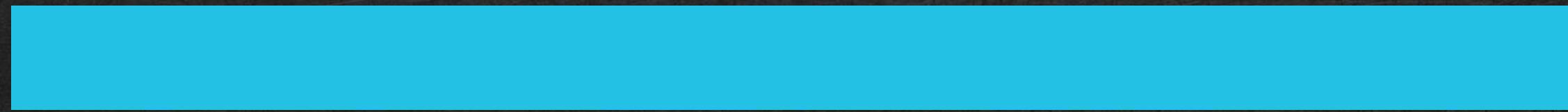


# On-Site Fabrication



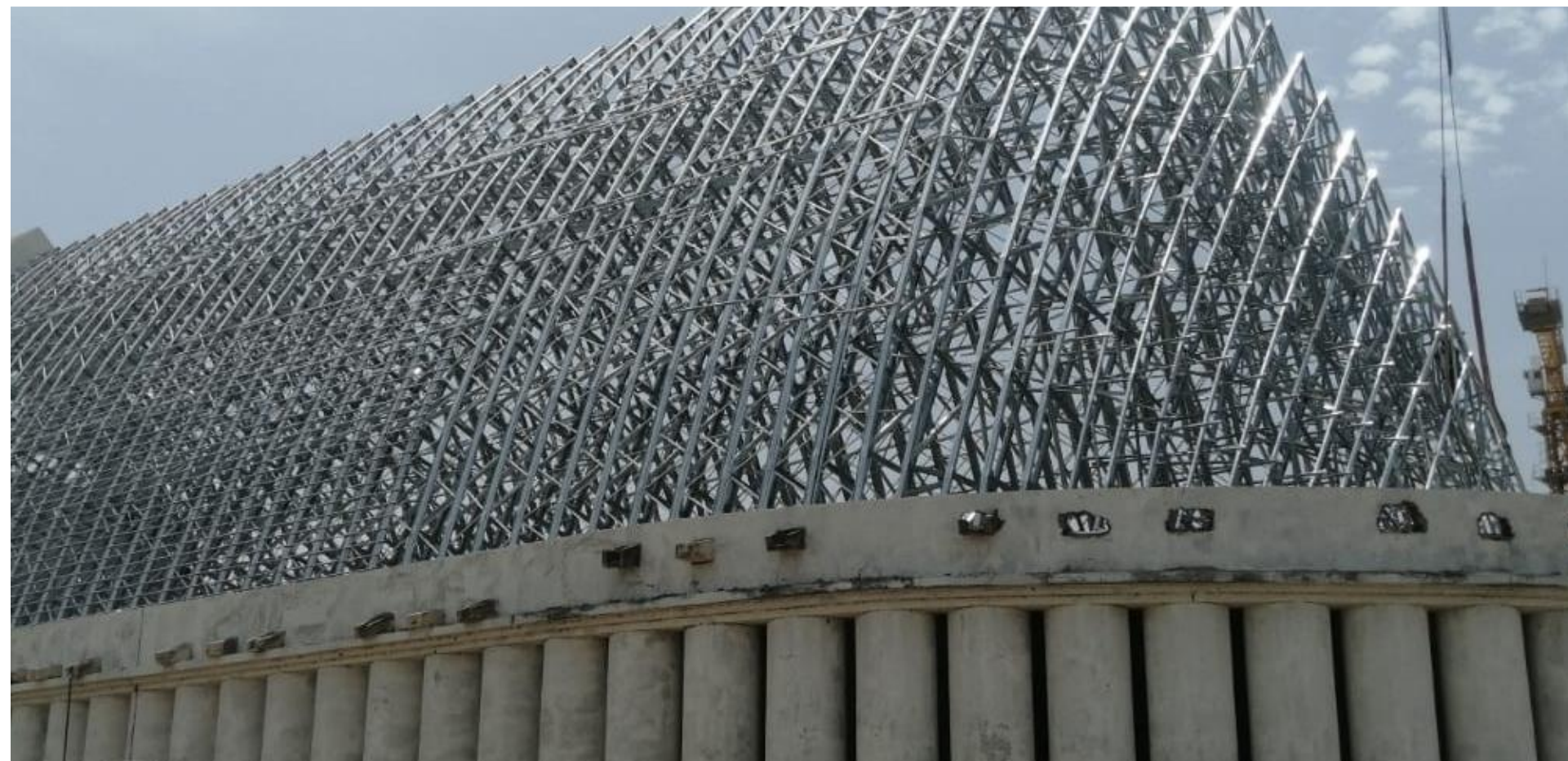
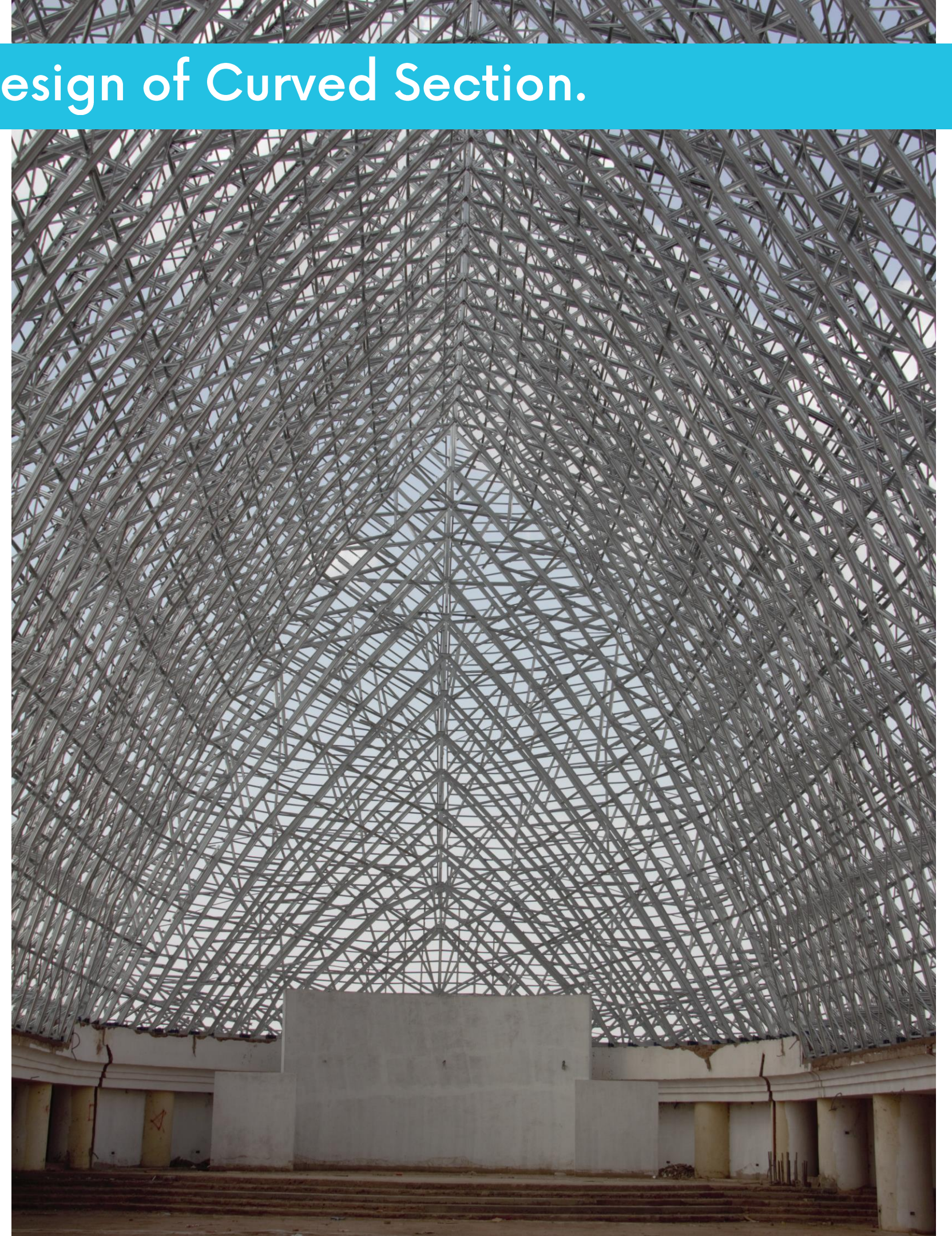


# CHALLENGES AND SOLUTIONS





# Design of Curved Section.





# Challenges

## Design:

- Addressed wind load considerations through the implementation of a specialised Shell Structure design solution.
- Employed unique brackets to securely anchor the Light Weight Steel Structure to the concrete, addressing the distinct requirements of the project.

## Fabrication:

- The remote project location mandated on-site fabrication, with Ultra-Span's precision cut-to-length capability proving to be the ideal solution.

## Location:

- Overcame logistical challenges due to the absence of nearby ports and limited road infrastructure suitable for container transport.
- Executed a complex transportation route, shipping via Spain to Cameroon and subsequently traversing challenging road conditions to reach N'Djamena, Chad.
- Successfully navigated through a period of political instability in Chad during the project's execution.



# THE BENEFITS OF STEEL IN THIS APPLICATION





# MiTek<sup>®</sup> ULTRA-SPAN<sup>®</sup>

- Overall project Cost Saving compared to alternative solutions.
- Achieved cost savings on shipping and transportation.
- Mitigated the point load impact on foundations and ring-beams.
- Streamlined on-site installation and fabrication processes.
- Reduced waste generation.
- Exhibited exceptional durability and longevity.
- Ensured non-combustible properties for enhanced safety.
- Showcased the versatility of Ultra-Span.
- Demonstrated commitment to environmental sustainability by ensuring 100% recyclability of steel at the end of its life.

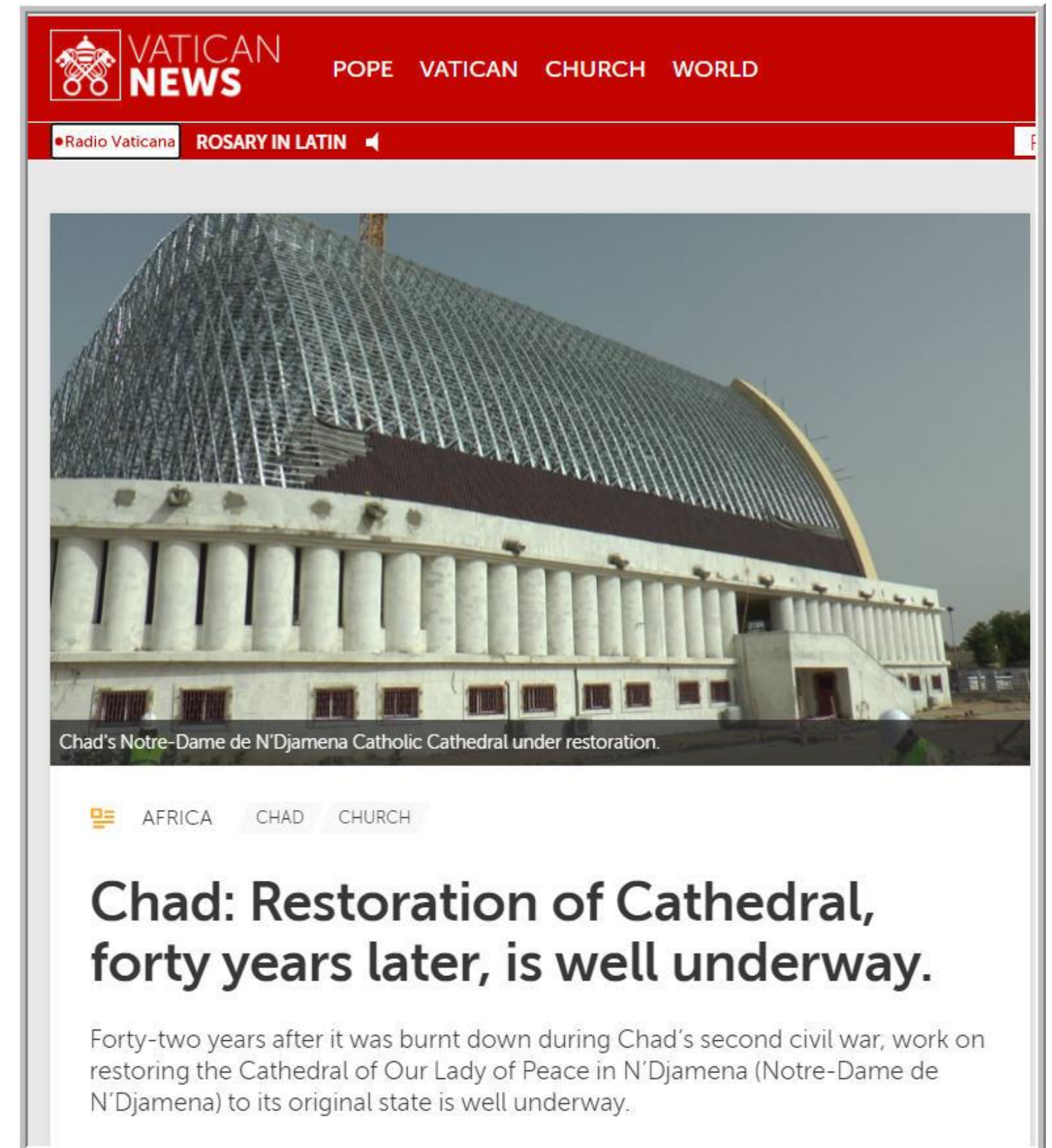


**WHAT WE'RE PROUD OF**





- Employed innovative design techniques leveraging Ultra-Span technology to address intricate structural design complexities.
- Demonstrated a creative and dependable problem-solving methodology to effectively address on-site challenges.
- Leveraged Ultra-Span's exceptional capability to excel beyond conventional parameters, particularly in the realm of light steel solutions.
- Takes pride in the international media recognition received, notably in Vatican News.



The image is a screenshot of a news article from Vatican News. At the top, there is a red navigation bar with the Vatican News logo and the text "POPE VATICAN CHURCH WORLD". Below this, a secondary bar contains "Radio Vaticana" and "ROSARY IN LATIN" with a speaker icon. The main content area features a large photograph of the Notre-Dame de N'Djamena Catholic Cathedral in Chad, showing its distinctive white facade with a series of columns and a large, curved, ribbed roof structure. Below the photo is a caption: "Chad's Notre-Dame de N'Djamena Catholic Cathedral under restoration." Underneath the caption are three category tags: "AFRICA", "CHAD", and "CHURCH". The article title is "Chad: Restoration of Cathedral, forty years later, is well underway." The introductory text reads: "Forty-two years after it was burnt down during Chad's second civil war, work on restoring the Cathedral of Our Lady of Peace in N'Djamena (Notre-Dame de N'Djamena) to its original state is well underway."