

PRECAST INNOVATION IN WATER INFRASTRUCTURE



PRECAST CONCRETE SOLUTIONS IN RSA

- **Structural Systems**

- Reservoirs ranging between 3 – 60 Mega Liters
- Cape Province reservoirs as an example with precast elements
 - Penhill Reservoir
 - Contermanskloof 100 ML
 - Porterville Reservoir
- Water Towers 35 m high ranging between 1.5 – 5 Mega Liters
- Water/Sewerage Treatment Plants
- Stadium systems
- Bridges
- Security / Retaining wall
- Tilt-up Solutions
 - Warehouse Columns
 - Warehouse Walls
- Framed Structures for high rise buildings
- Residential Precast Hollow Core suspended slabs
- Marine Solutions
- Tailored precast concrete solutions

DIFFICULTIES IN INTRODUCING PRECAST STRUCTURAL SOLUTIONS

- **Precast Turnkey Construction Solutions Require**
 - Design
 - Manufacture
 - Transport
 - Construction
 - A Total Solution
- **To successfully implement**
 - Designs
 - Drawings
 - Services coordination
 - » Must be complete before construction
 - » Can't be done whilst under construction
- **Require input from**
 - Project Engineer
 - Mechanical Consultant
 - Main Contractor
 - Precast Specialist
- **Research and Development required before going to market, one hit wonders do not work**

Continuous Development - Water Towers example of R&D





Why use Pre-Cast Concrete Structure

- ❑ **Speed of construction:** Precast concrete element can be manufactured offsite while the construction site is prepared, example earthworks foundations etc.
 - ❑ 10 ML Reservoir Concrete Work – completed in four months
 - ❑ 30 ML Reservoir Concrete Work – completed in six months
- ❑ **Consistent quality:** Precast concrete elements are manufactured in a controlled factory environment, ensuring consistent quality and reliability.
- ❑ **Durability:** The use of high Strength concrete where emphasis can be placed on the durability of the concrete. Also reinforcing/prestressed strand cover.
- ❑ **The use of Pre-Tensioning –** Allows the use of higher strength concrete, reduced deflections, enhanced durability.

Reduced Cost of Construction

- ❑ **Time Savings on Project relates in Overhead/P&G Cost Saving**

- ❑ **For the Contractor**

- ❑ **For the Engineers**

- ❑ **For the Client**

- ❑ **The use of higher concrete strength and Pre-tensioning results in lower volumes of material being used. Example the concrete weight on a 30 Mega Liter reservoir wall and roof is reduced by 40 % with the use of Precast.**

- ❑ **Reduction and Elimination in Variation Orders**

- ❑ **Higher quality product at lower competitive rates**

- ❑ **Case Studies**

- ❑ **Stadiums a 25 % - 40 % reduction in Costs**

- ❑ **Reservoirs a 10 % - 30 % reduction in Costs**

- ❑ **Bridges a 10 - 50 % reduction in Costs depending on design and site requirement**

What would the advantages be to consider Precast

- ❑ **Sustainable Employment** – If precast is introduced as a construction method it can create sustainable employment instead of temporary employment per project.
- ❑ **Supporting Emerging Contractors** – Structural Designs on conventional construction methods are rarely simplified, however by using a precast specialist, portions of the build's complexity is reduced.
- ❑ **Faster Infrastructure expenditure** – The Speed of Construction also equates to faster infrastructure expenditure and completion of projects.
- ❑ **Easier project management of projects** – The reduced complexity of construction enables clients easier project management.
- ❑ **Durability** – The long terms durability of infrastructure with lower maintenance requirements.
- ❑ **Enhanced safety**: Precast elements are manufactured to exact specifications and quality standards, reducing the risk of accidents or failures during construction.

Lowering Carbon Footprint

- ❑ **Reduced material waste:** Precast concrete manufacturing processes can minimize material waste by using precise measurements and optimizing material usage,
 - ❑ The use of steel in tensile strength pre-tensioning.
 - ❑ Use of higher concrete strength.
 - ❑ Creating shapes not normally practical and cost effective onsite that is structurally more effective.
- ❑ **Energy-Efficient production:** Precast concrete plants often utilize energy-efficient technologies and practices, such as recycled materials and energy-efficient equipment, reducing energy consumption during production.
- ❑ **Longevity and durability:** Precast concrete structures have a longer lifespan and requires less maintenance compared to traditional construction methods, resulting in fewer materials used over time and lower carbon emissions associated with maintenance activities.
- ❑ **Sustainable sourcing:** Many precast concrete manufacturers prioritize sustainable sourcing of raw materials, such as using recycled aggregates and locally sourced materials. The use of a well graded mix design and example thereof.

Case Study - Precast Reservoir Walls and Roof



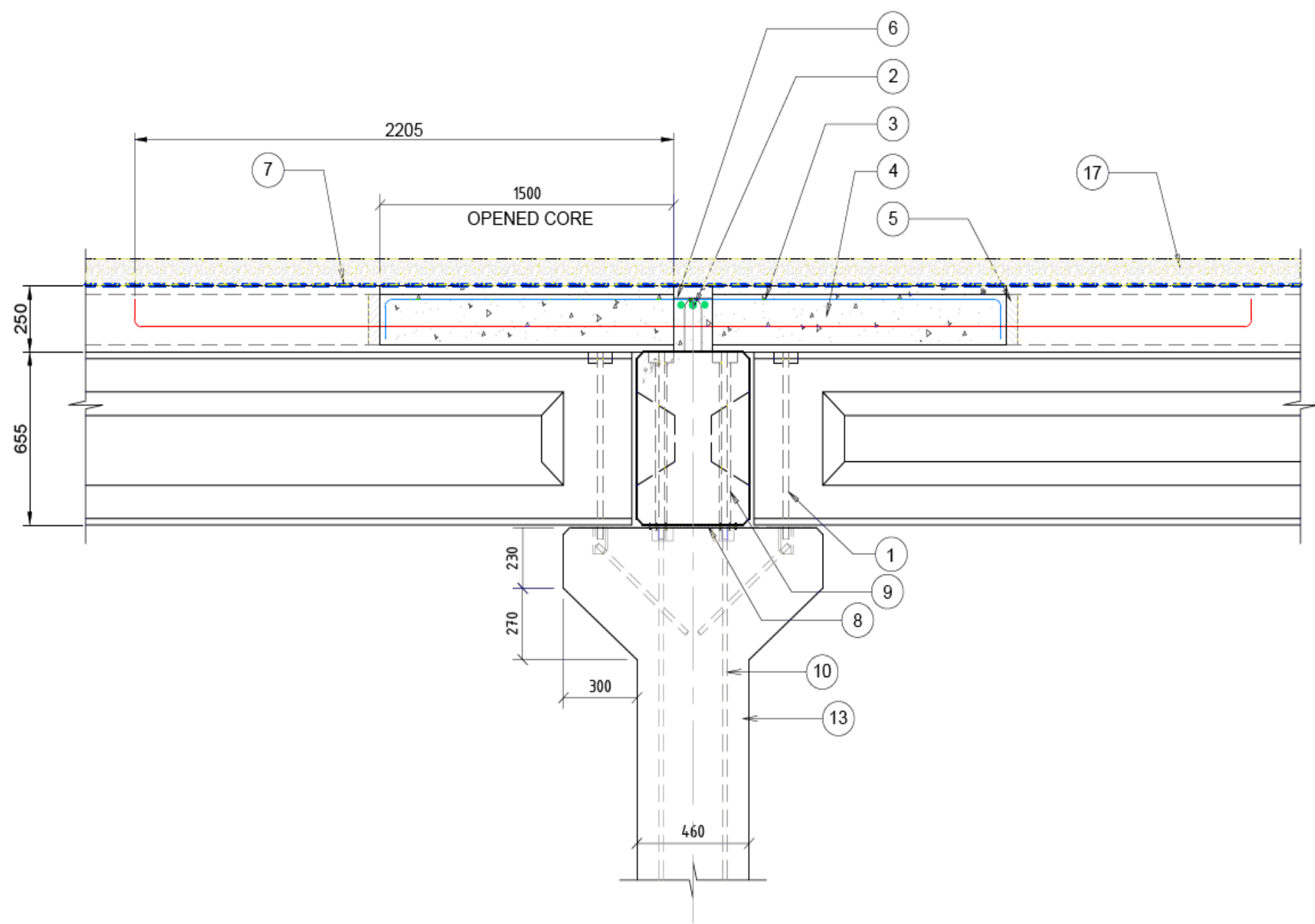
RESERVOIR ROOF SYSTEM



Typical Column to Base/Footing connection

25ML DIEPSLOOT RESERVOIR





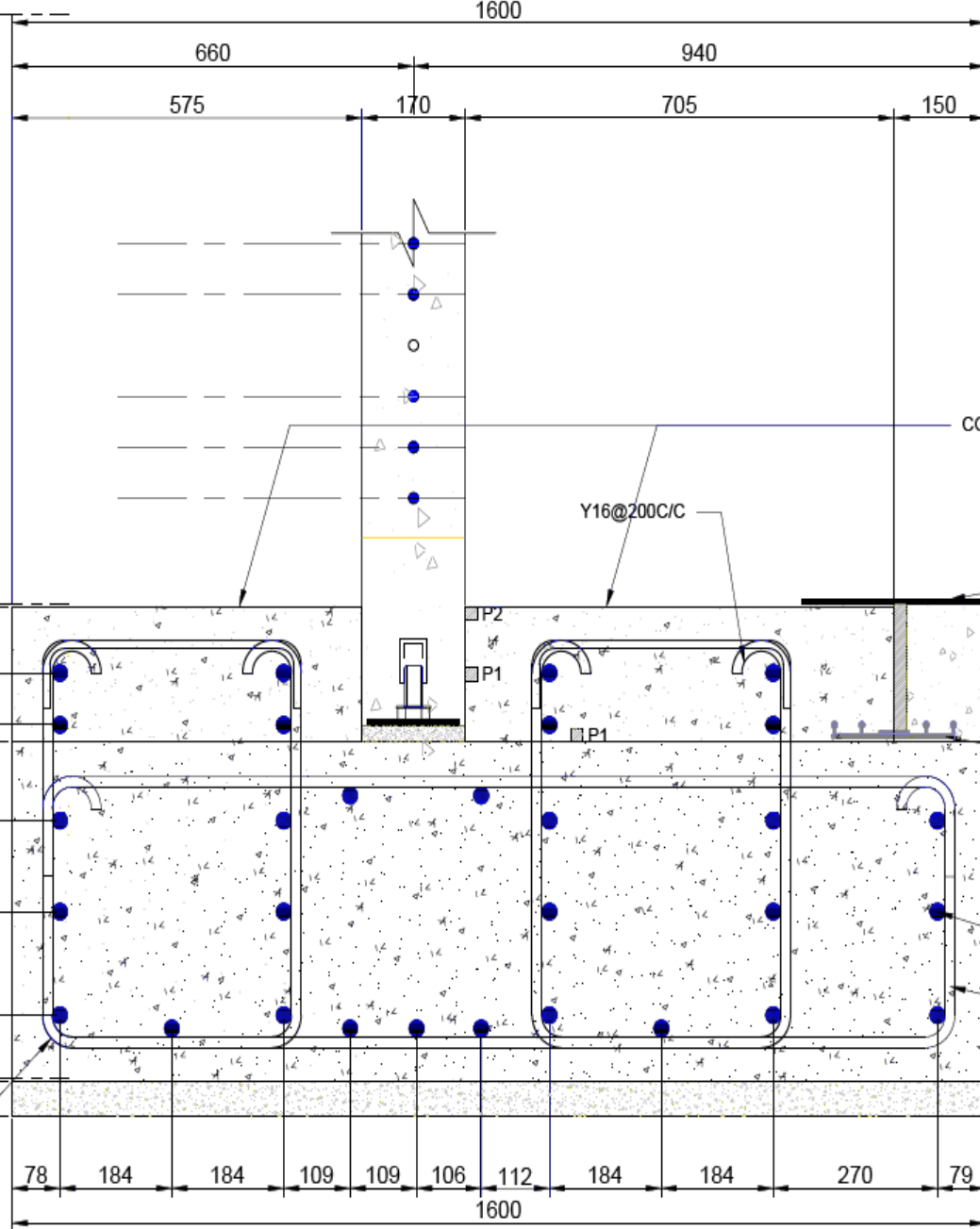




RESERVOIR WALL SYSTEM







CONCRETE KICKER CAST AFTER POST-TENSIONING OF WALL - C35

WATERPROOFING BANDAGE BY MAIN CONTRACTOR

P1=PENETRON PENEBAR
P2=POLYSULPHIDE JOINT SEALER

200mm THICK CONCRETE FLOOR BY MAIN CONTRACTOR

REARGUARD WATER BAR BY MAIN CONTRACTOR

SUBSOIL DRAINAGE PIPE

NO-FINES CONCRETE AS BY MAIN CONTRACTOR PER ENGINEERS DESIGN

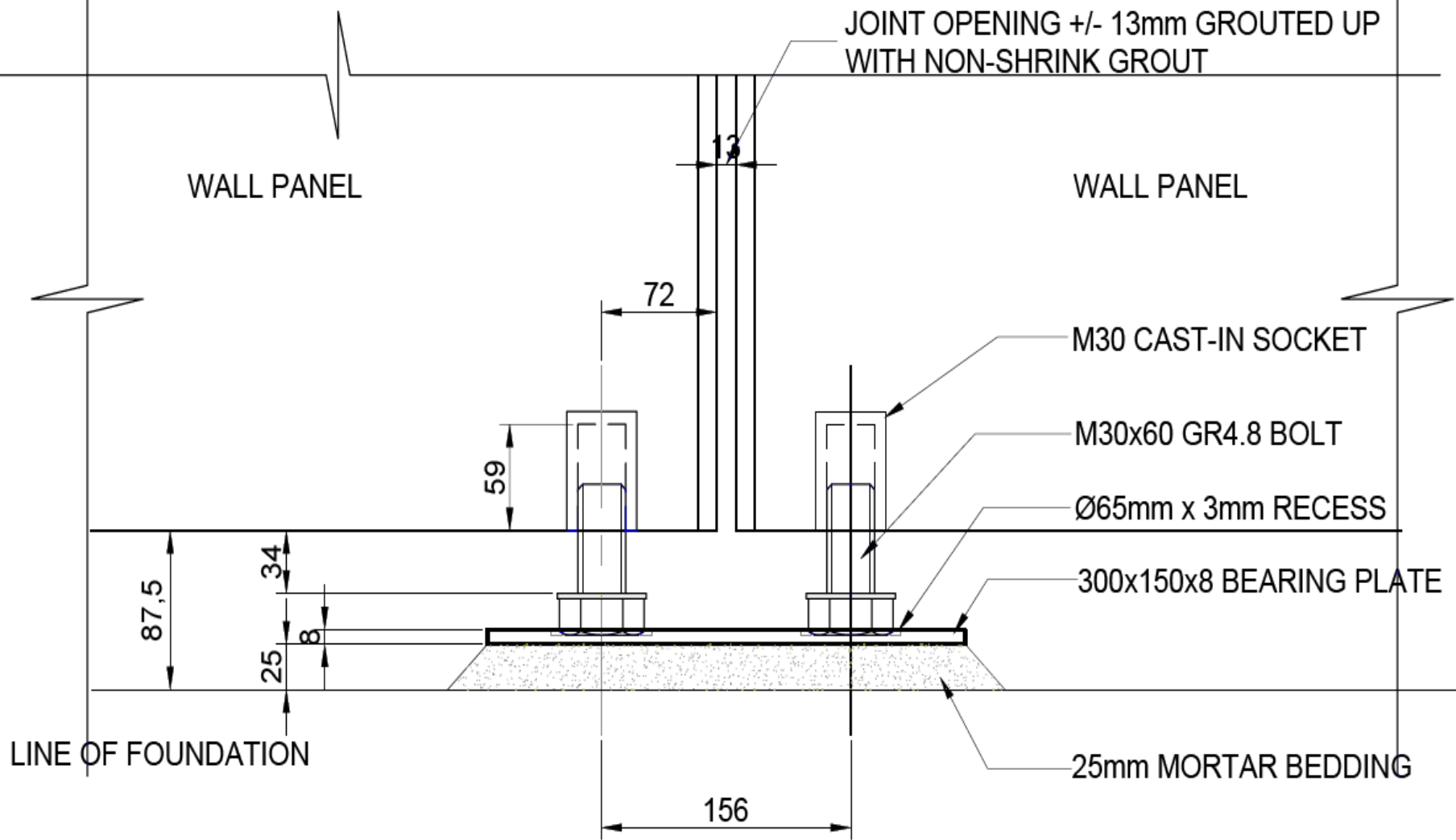
30Y25 REINFORCEMENT BARS
Y16@200C/C

WALL FOUNDATION BY MAIN CONTRACTOR
CONCRETE STRENGTH AS PER ENGINEERS DESIGN

BLINDING LAYER

SECTION G-G



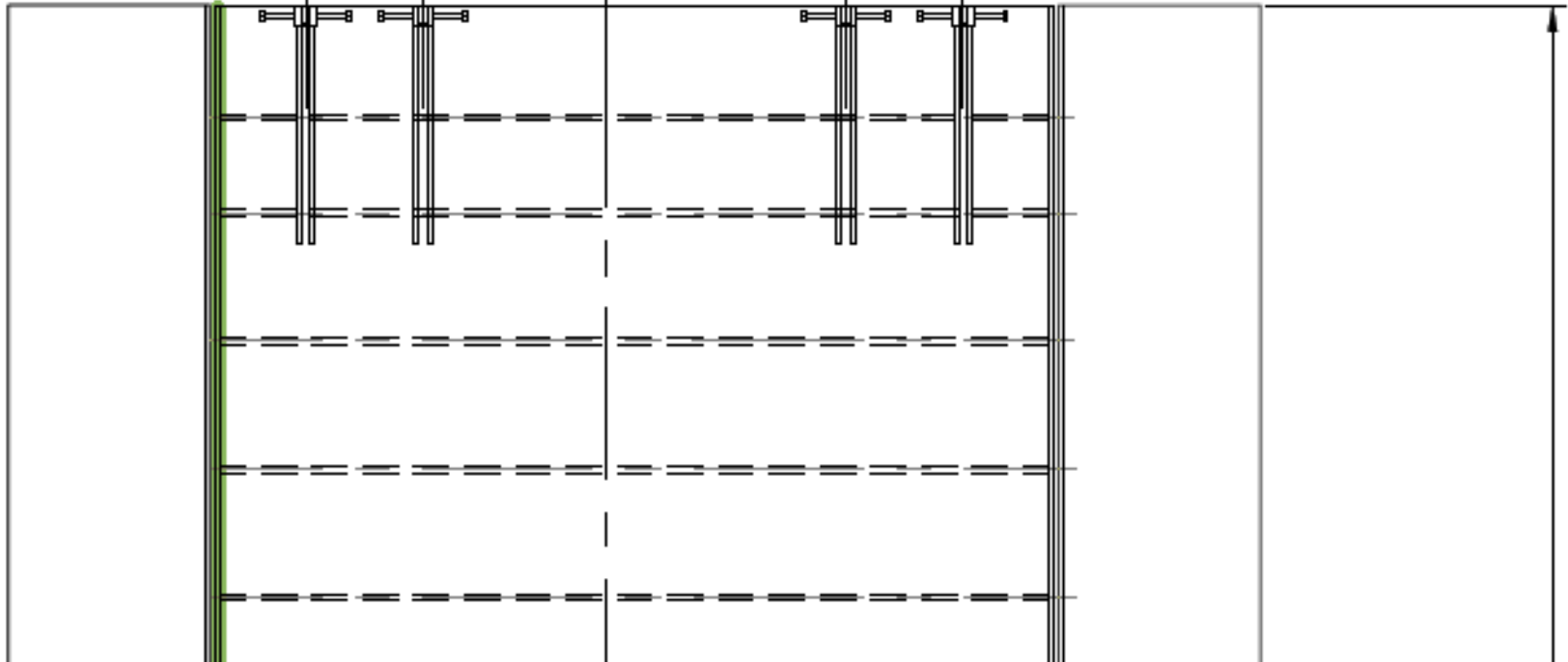


ADJUSTMENT MECHANISM





F
103









1,5 mm
key lock



11 mm
key lock



12,5 mm
key lock



14 mm
key lock



15,5 mm
key lock



17 mm key
lock



18,5 mm
key lock



20 mm
key lock















CORESTRUC PHIL LTD

Construction of Concrete Pre-Cast Structures

25ML PAM BRINK RESERVOIR



THANK YOU

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