New Locks

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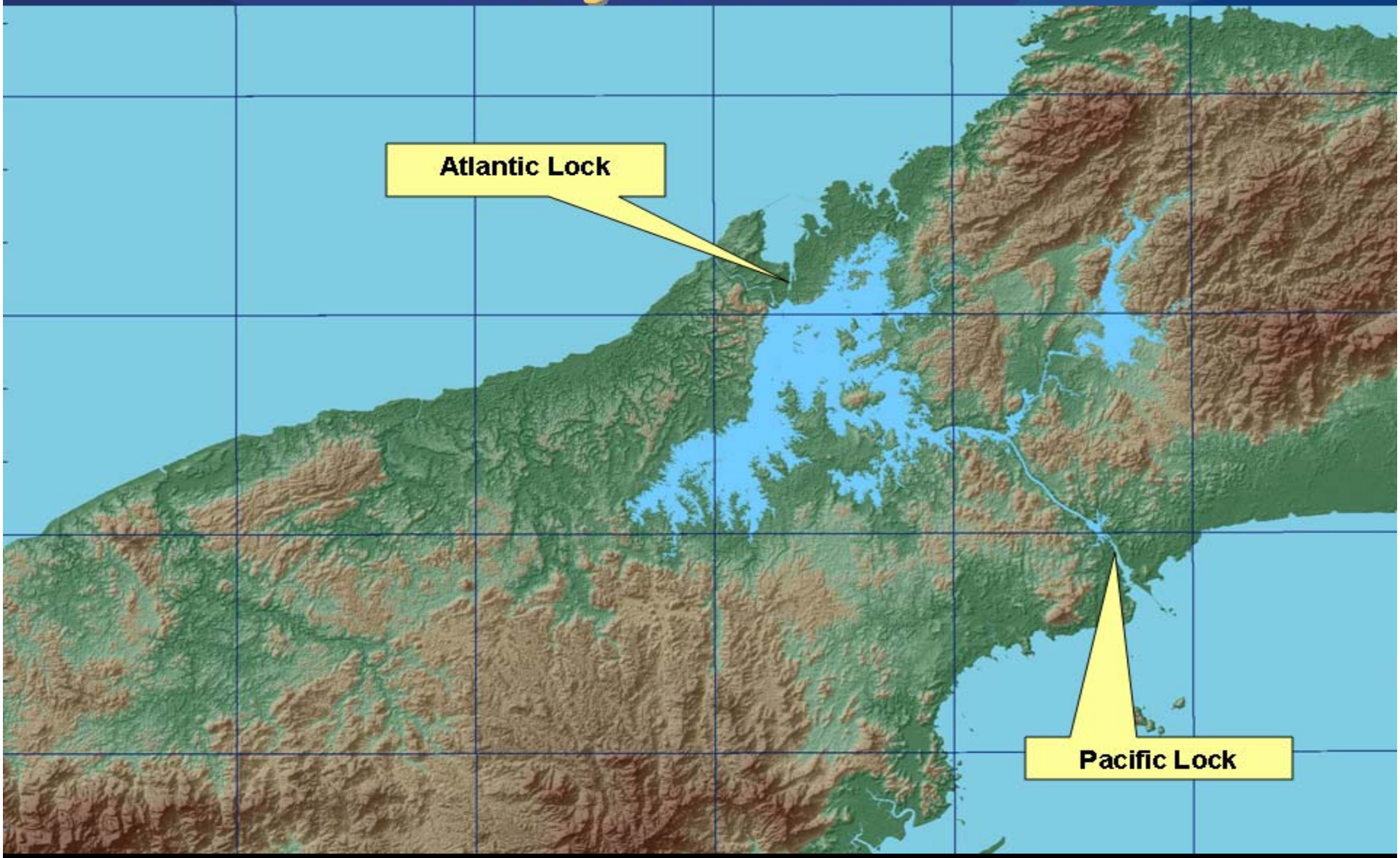
Agenda

- Project Location
- Configuration
- Conceptual Design
- Significant Quantities
- Lock Animation

Project Location



The Challenge

- Post Panamax Ship Transit between the Atlantic and the Pacific Oceans
- Maximize throughput (tonnage)
- Minimize water consumption
- Minimize saltwater intrusion
- Minimize maintenance
- Minimize outages

Lock Configuration
Conceptual Design

- 3 Lift Locks
- 3 Water Saving Basins per Lift
  - (60% water saving)
- Approach Walls at the Entrances
- Side port Filling and Emptying
- Rolling Gates
- Vessel Positioning with Tugs

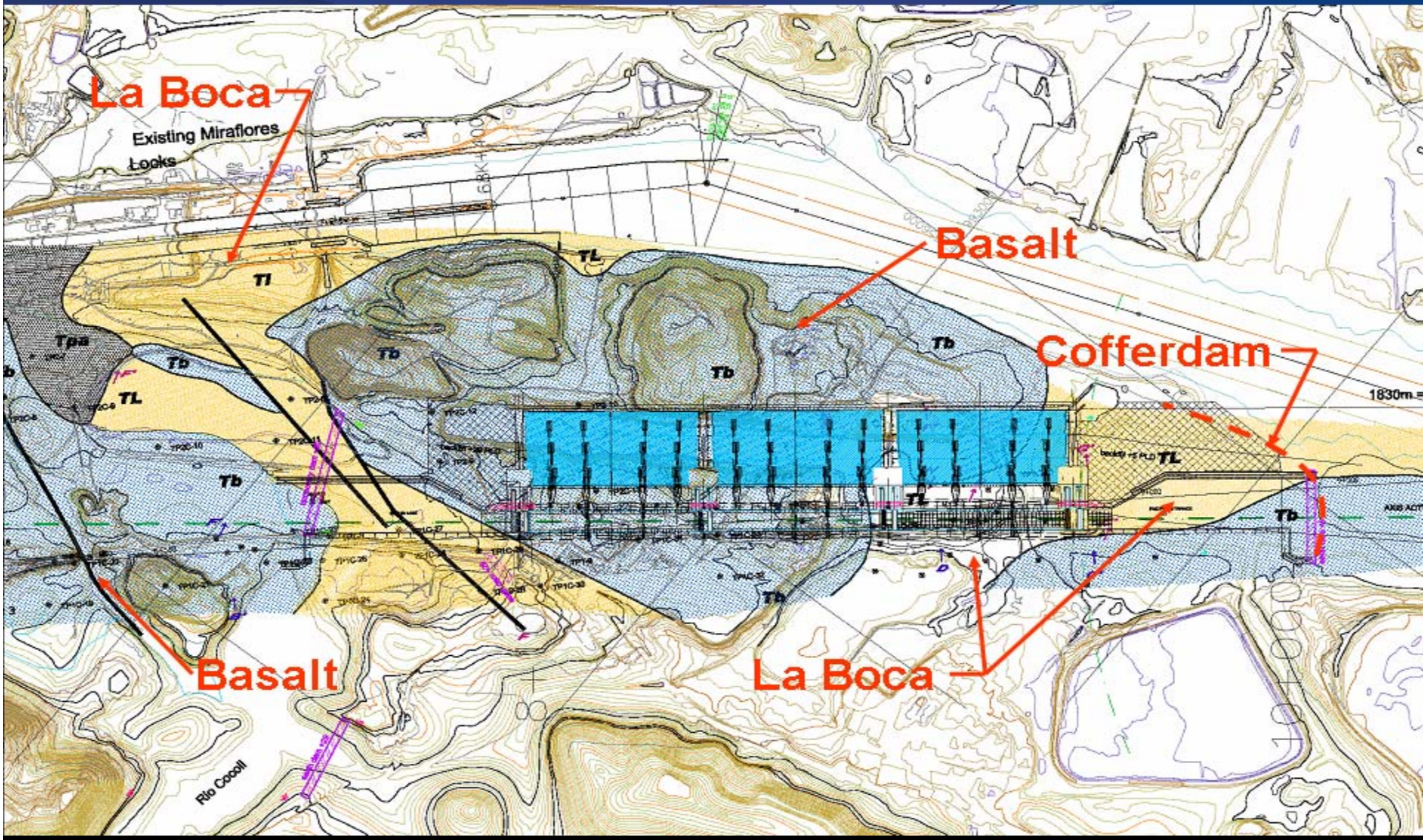
Lock Dimensions
(minimum requirements)

- Lock Width – 55m
- Length between inner gates – 427m
- Length between outer gates – 458m
- Minimum depth over sill – 18.3m
- Minimum freeboard – 1.52m

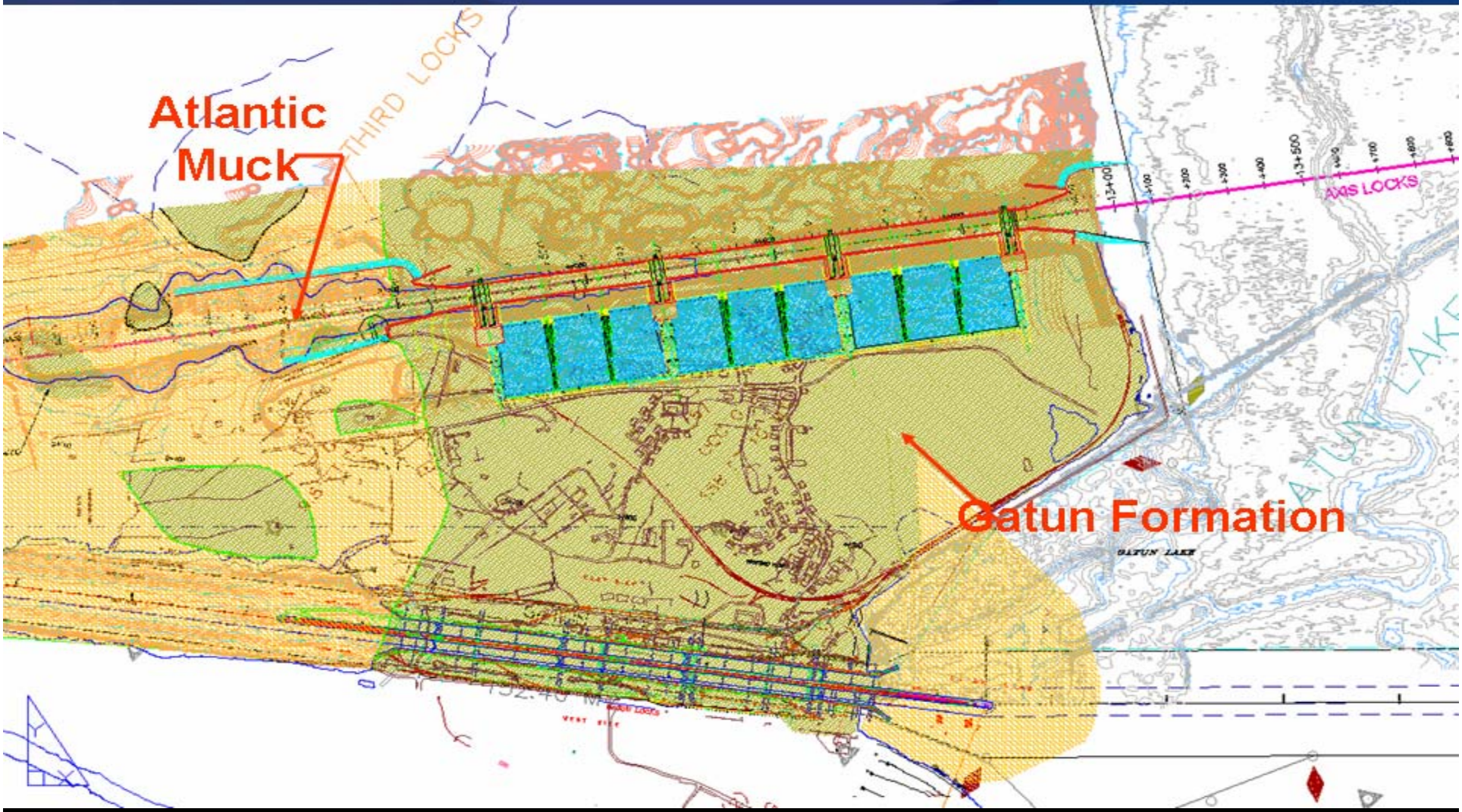

Pacific

Atlantic

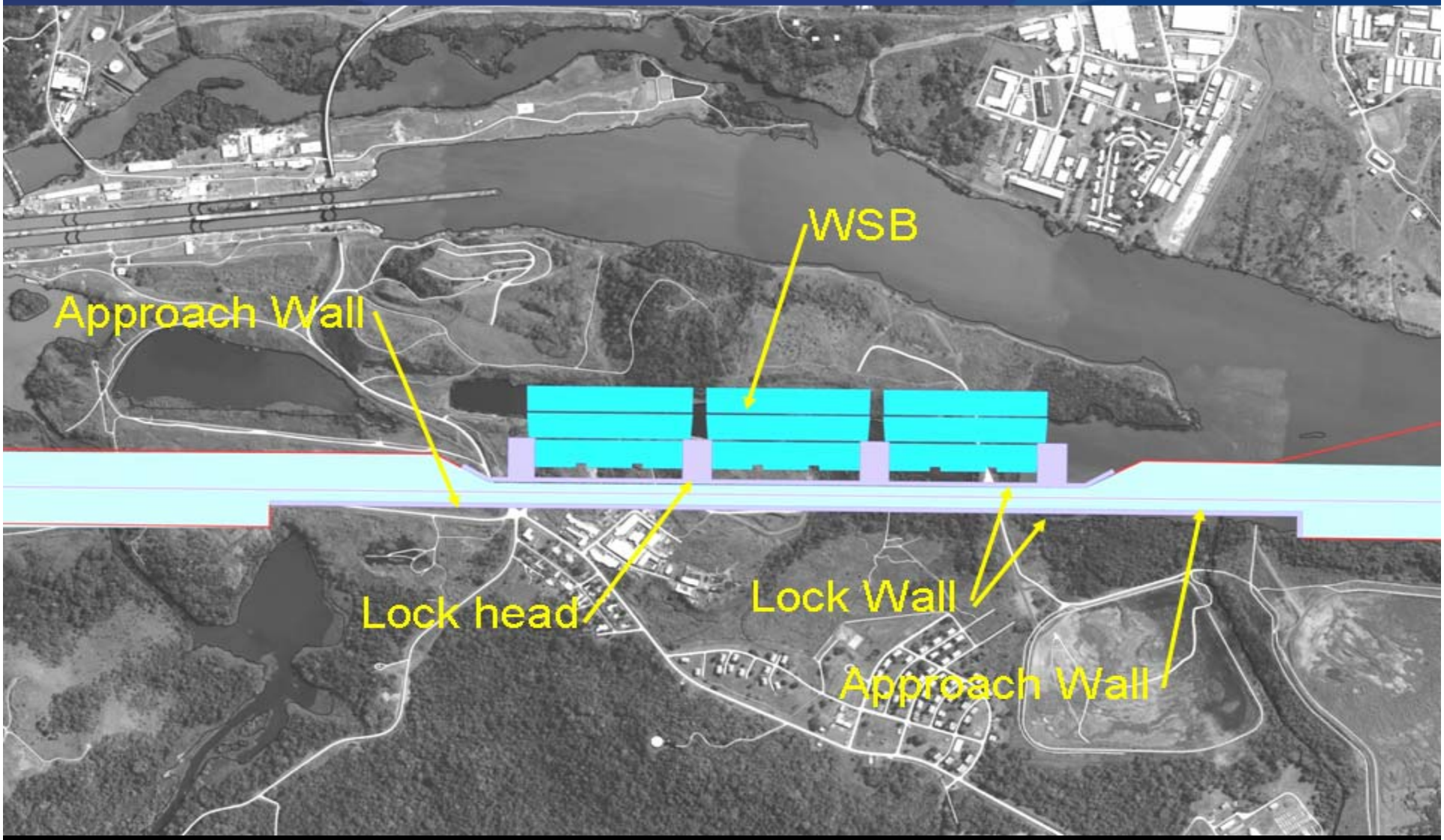
Pacific Lock - Conceptual Design



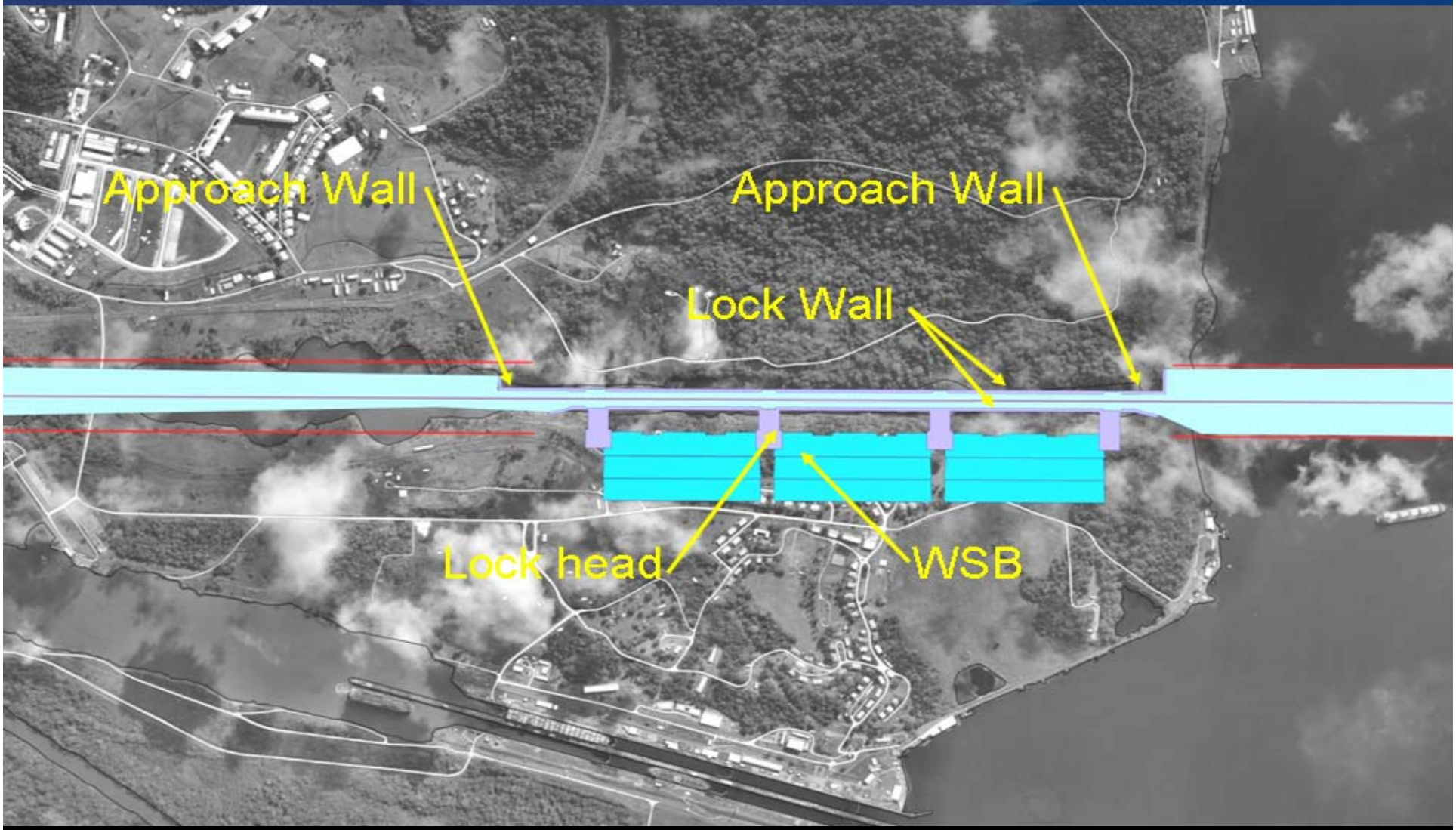
Atlantic Lock – Conceptual Design



Pacific – Conceptual Design

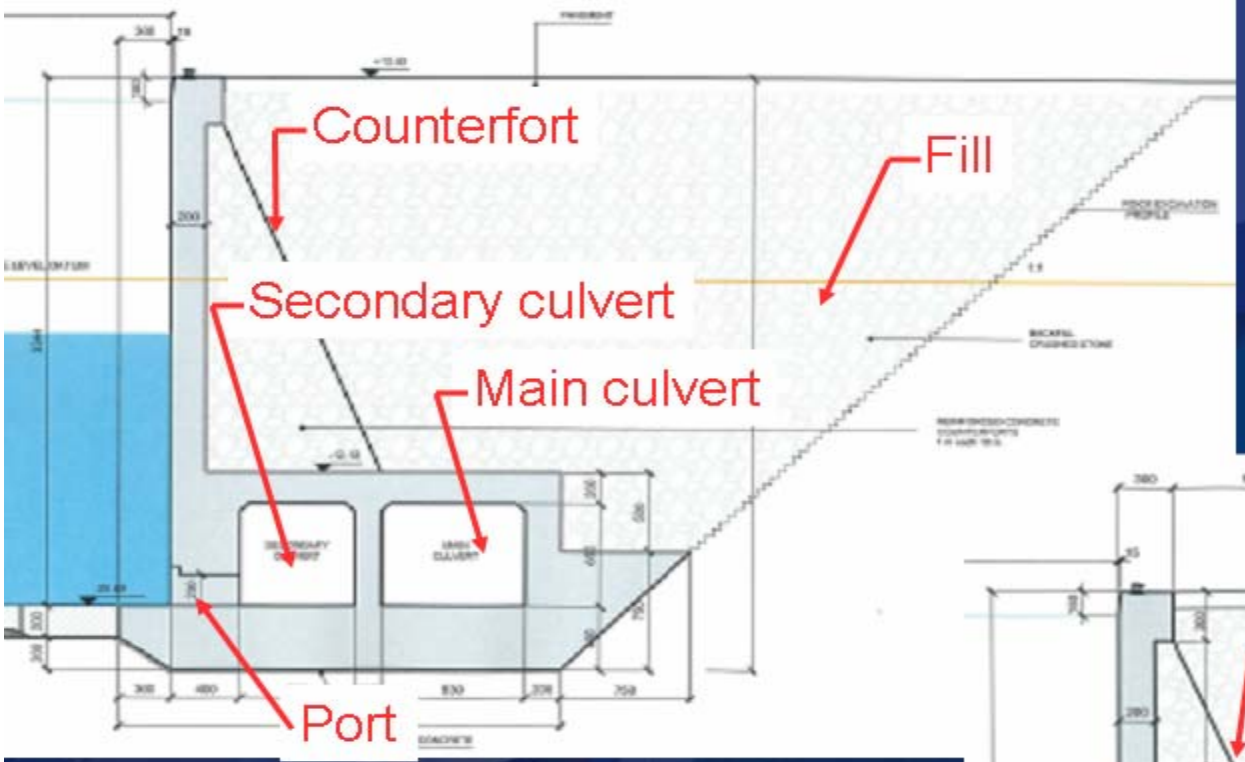


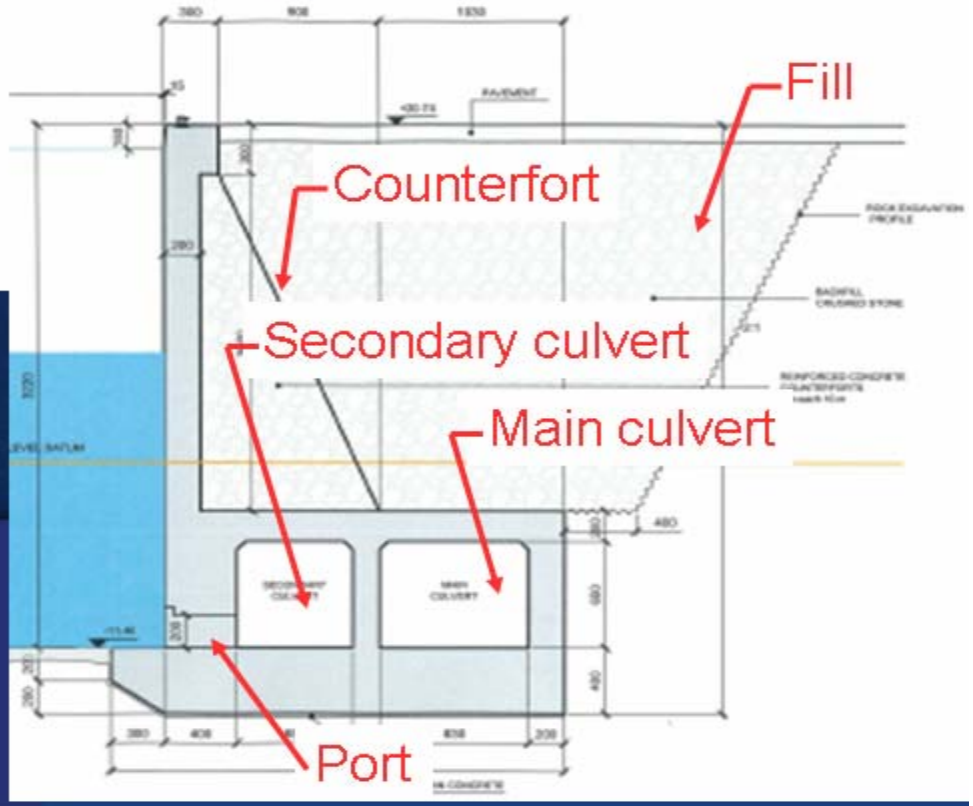
Atlantic – Conceptual Design

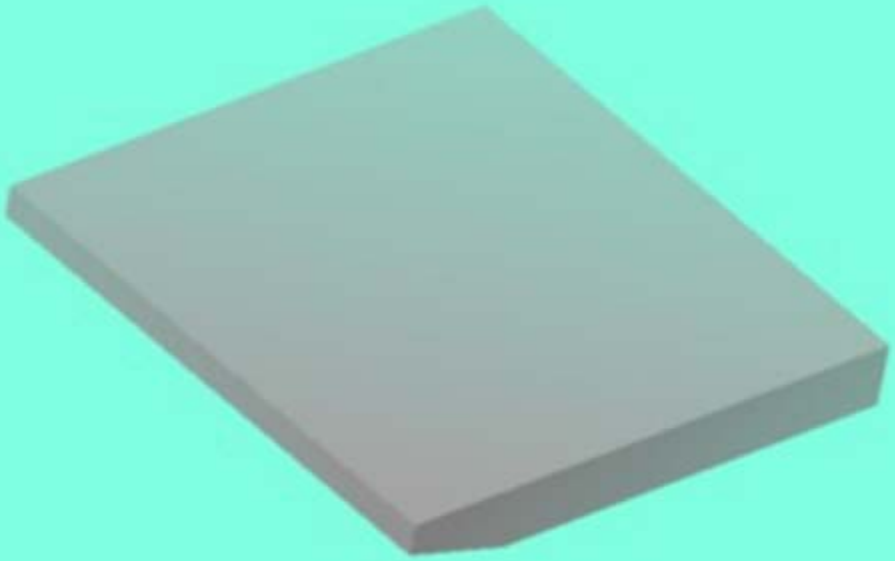


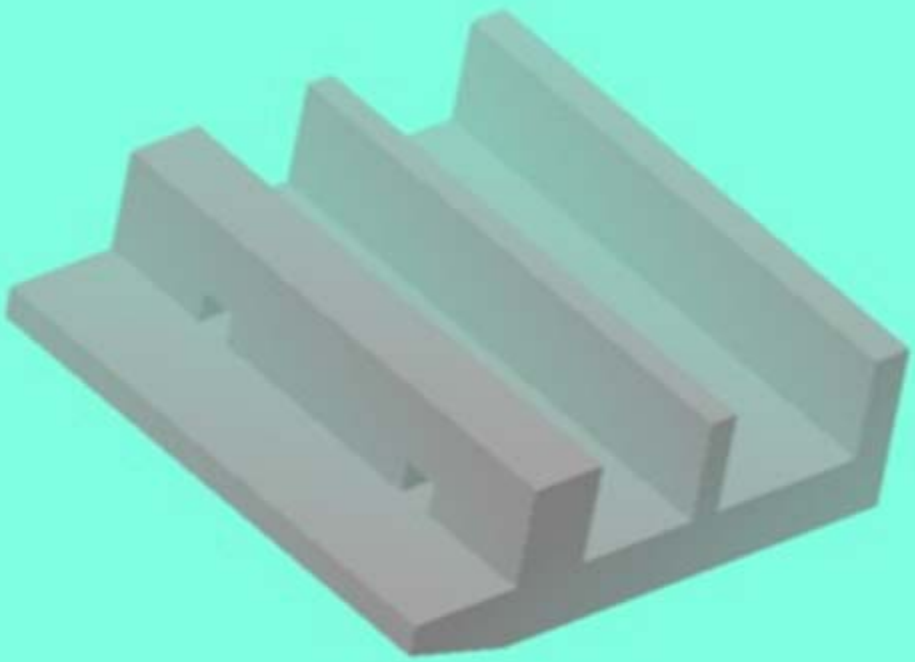
Filling/Emptying
Conceptual Design

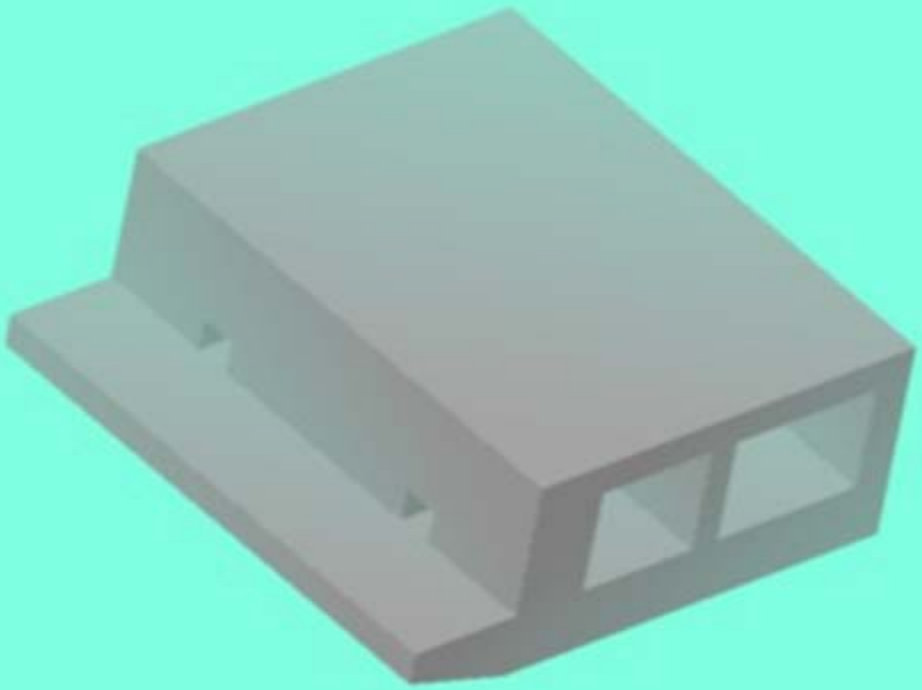
Lock Walls
Conceptual Design

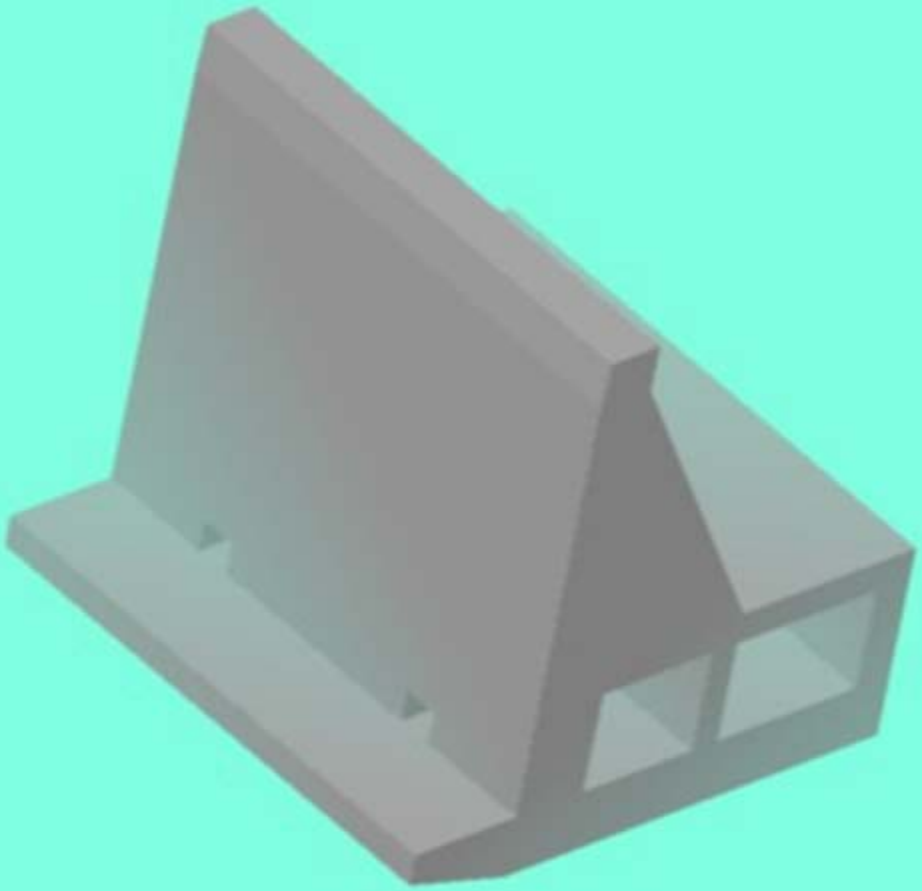




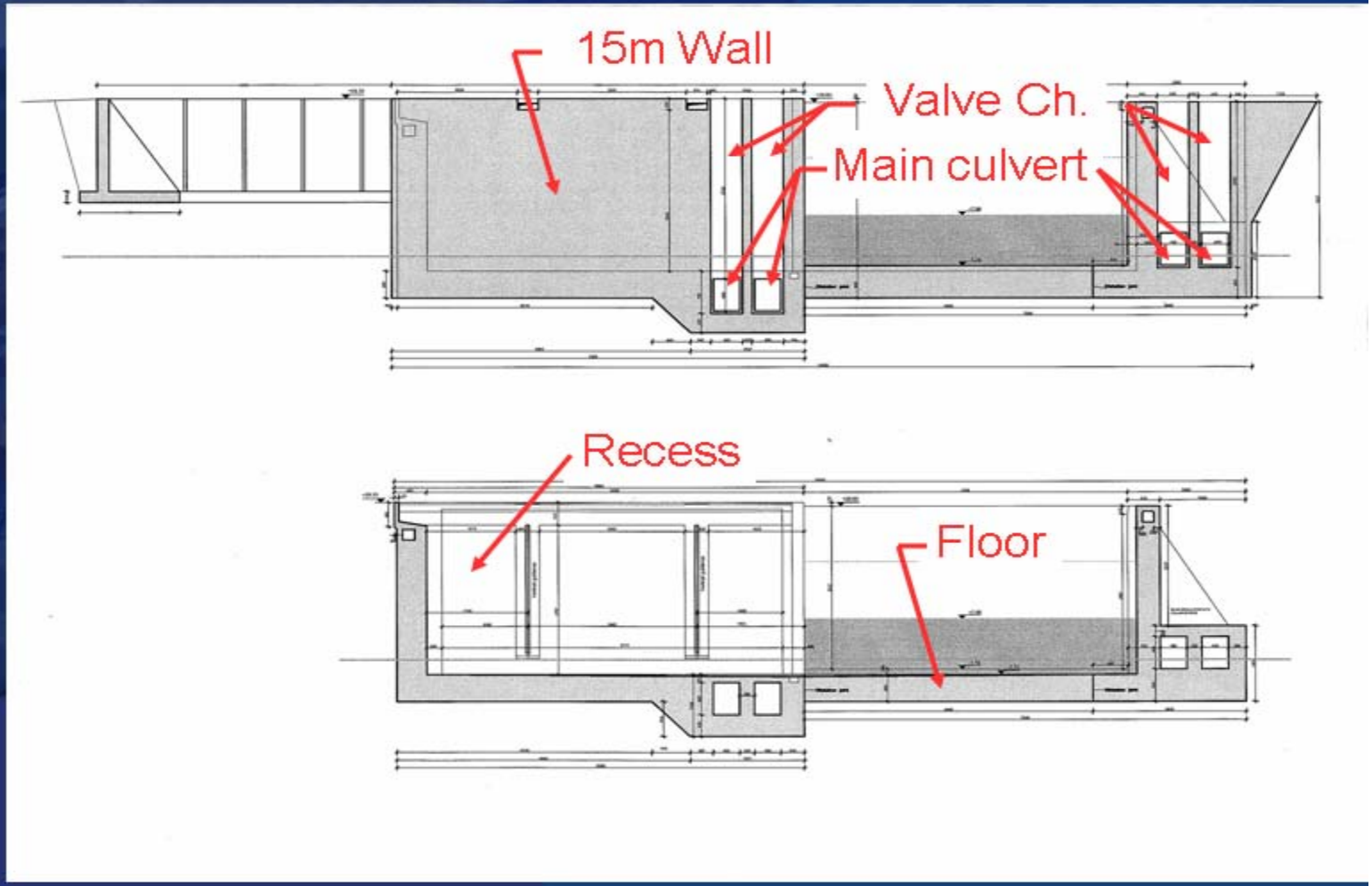


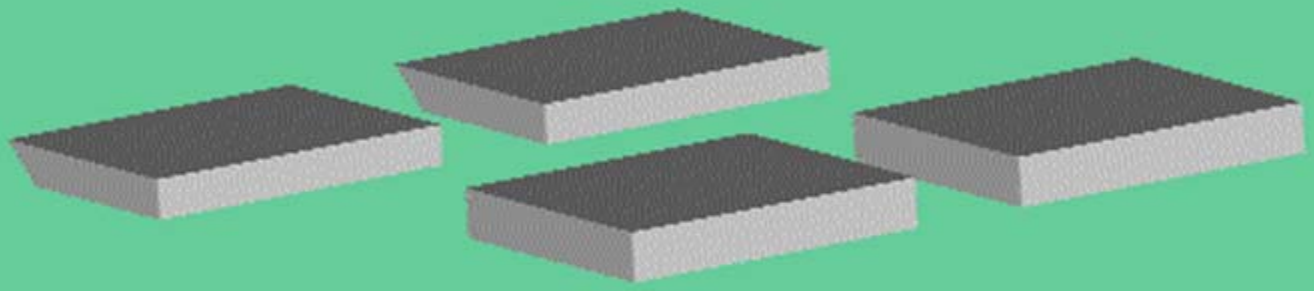


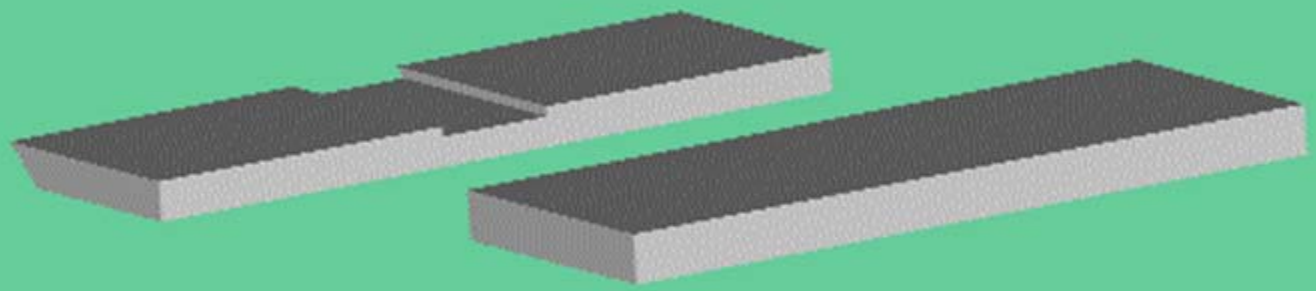


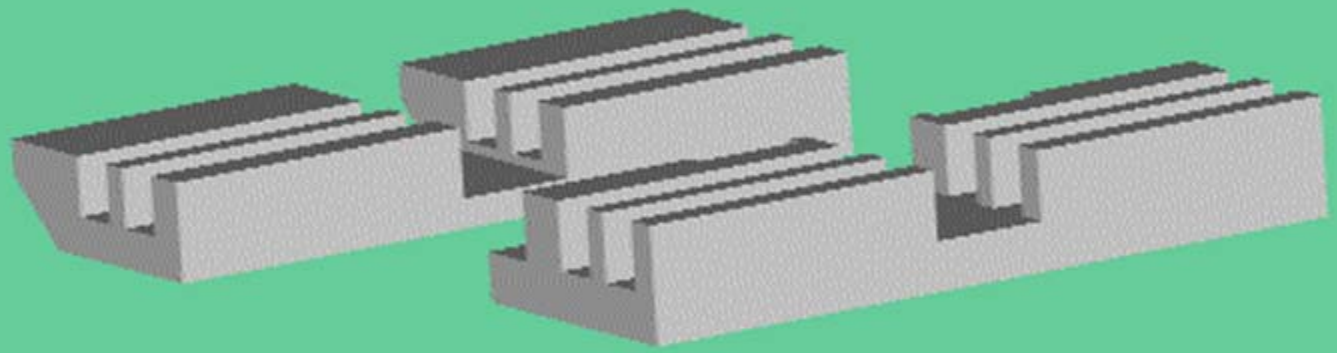


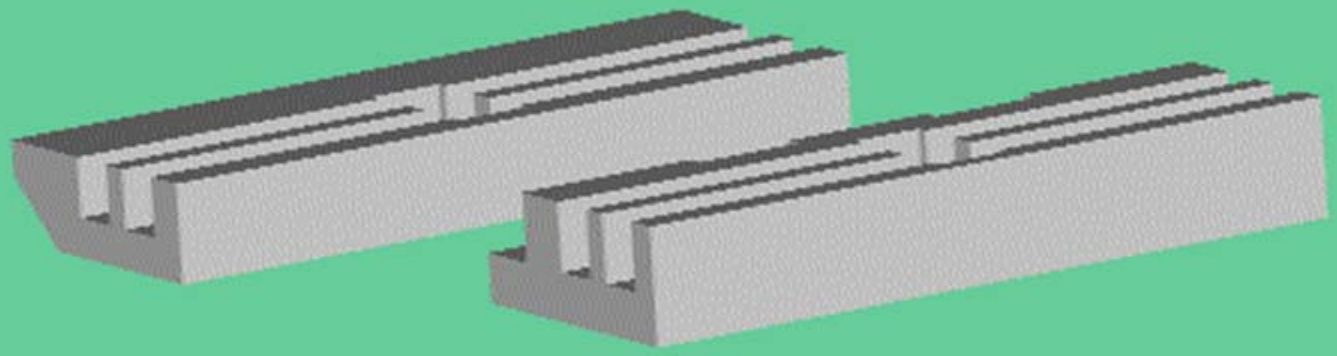
Gate Lockhead

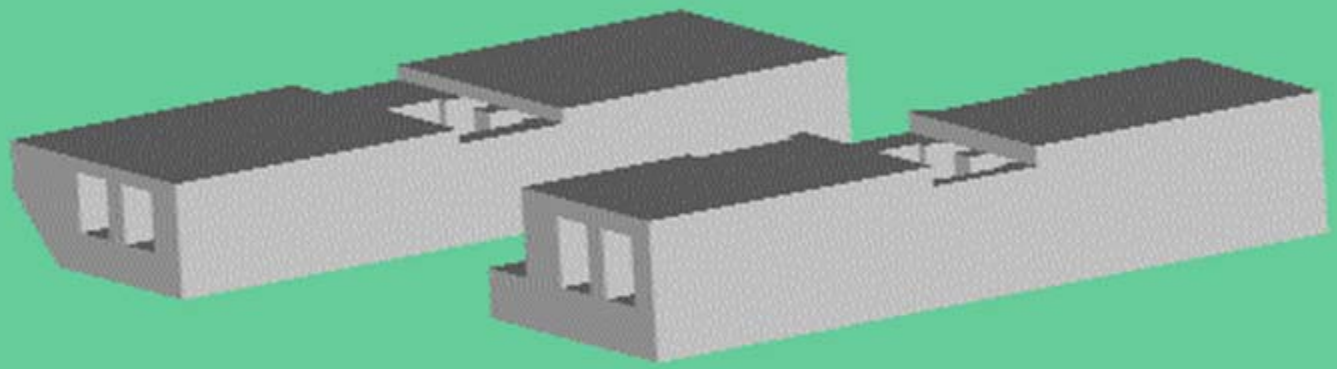


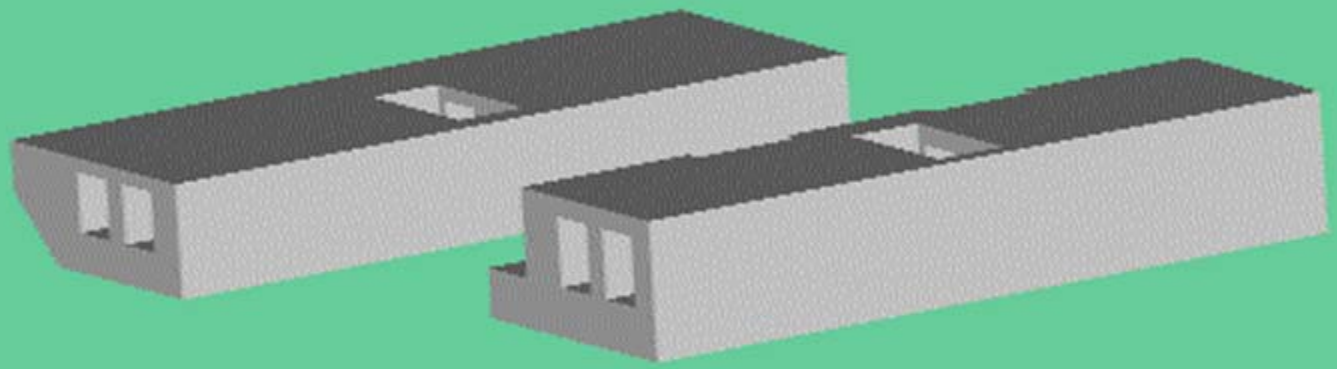


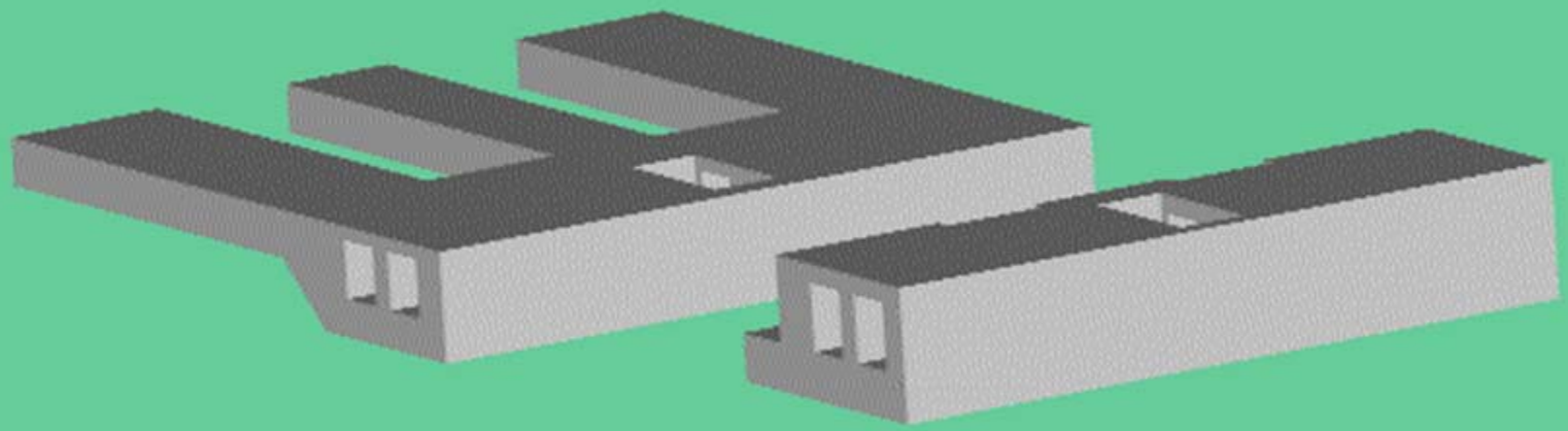


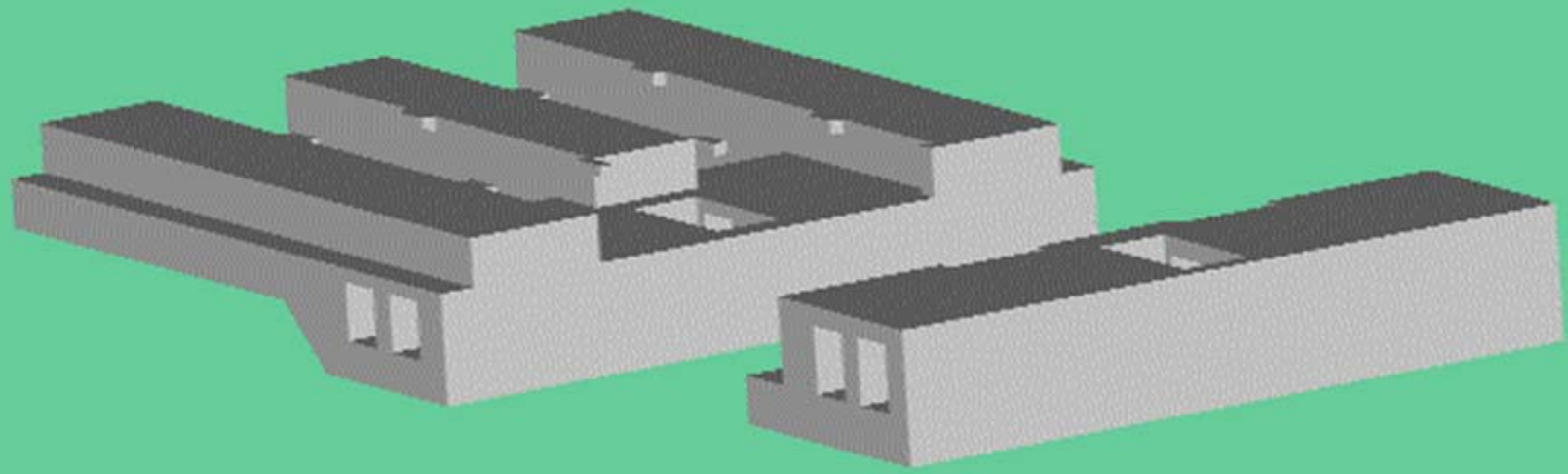


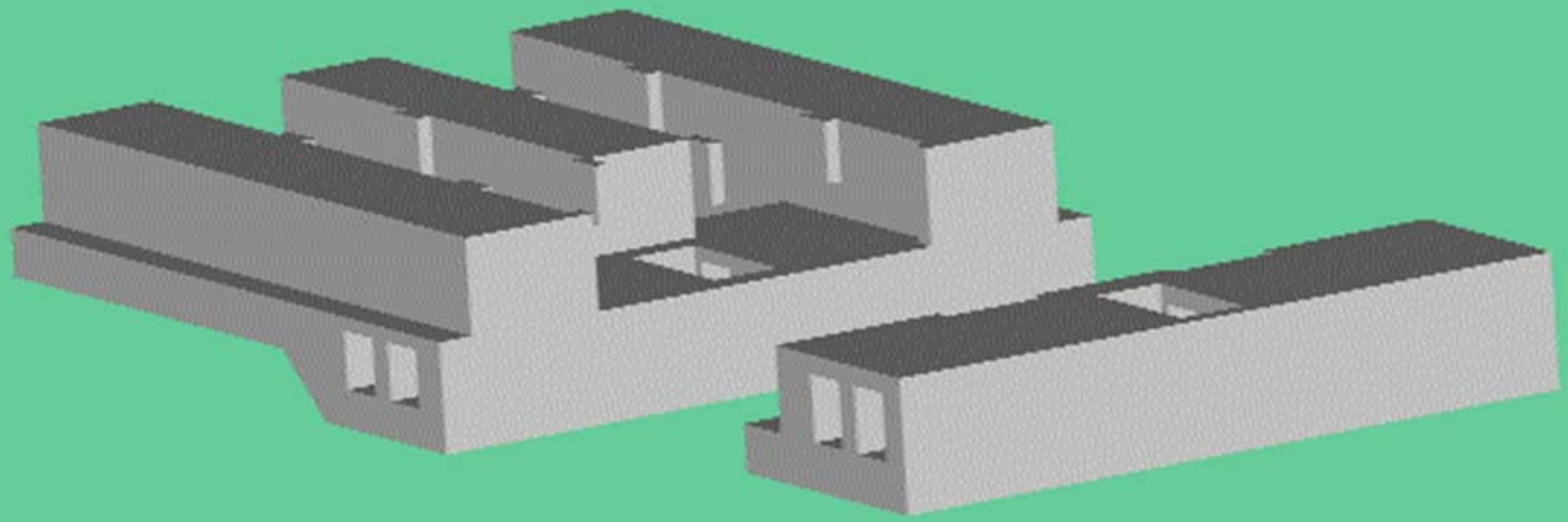


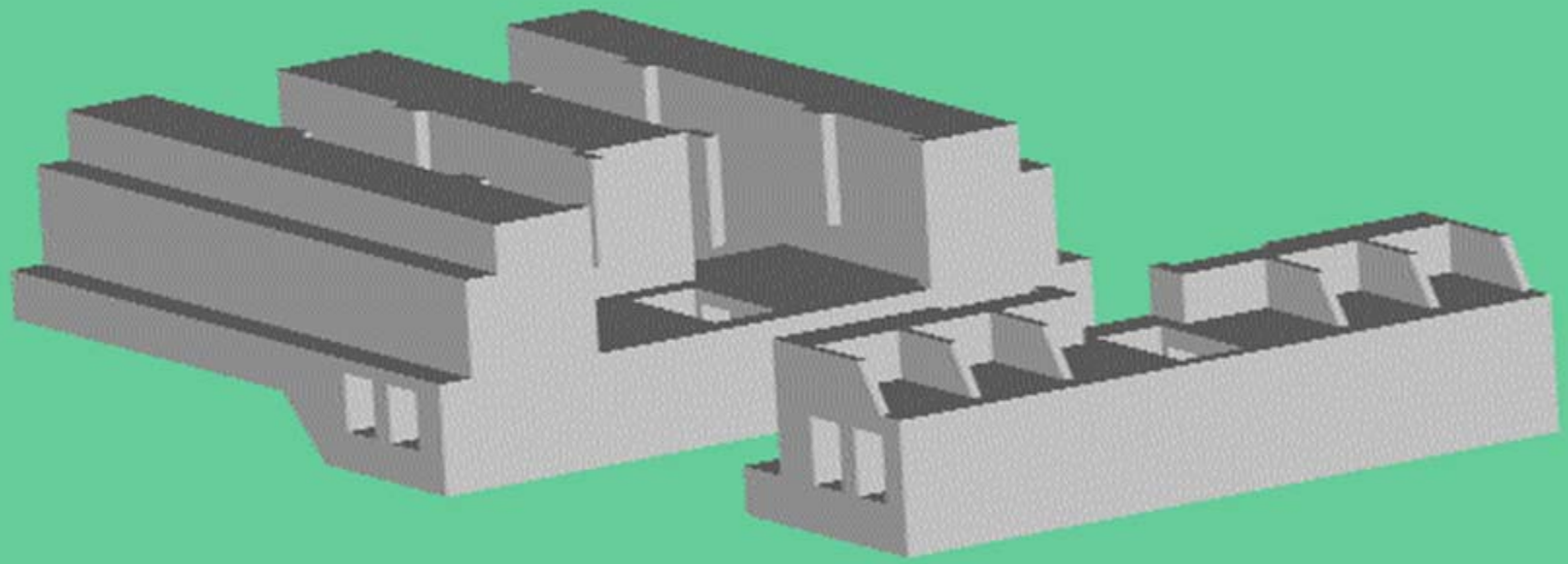


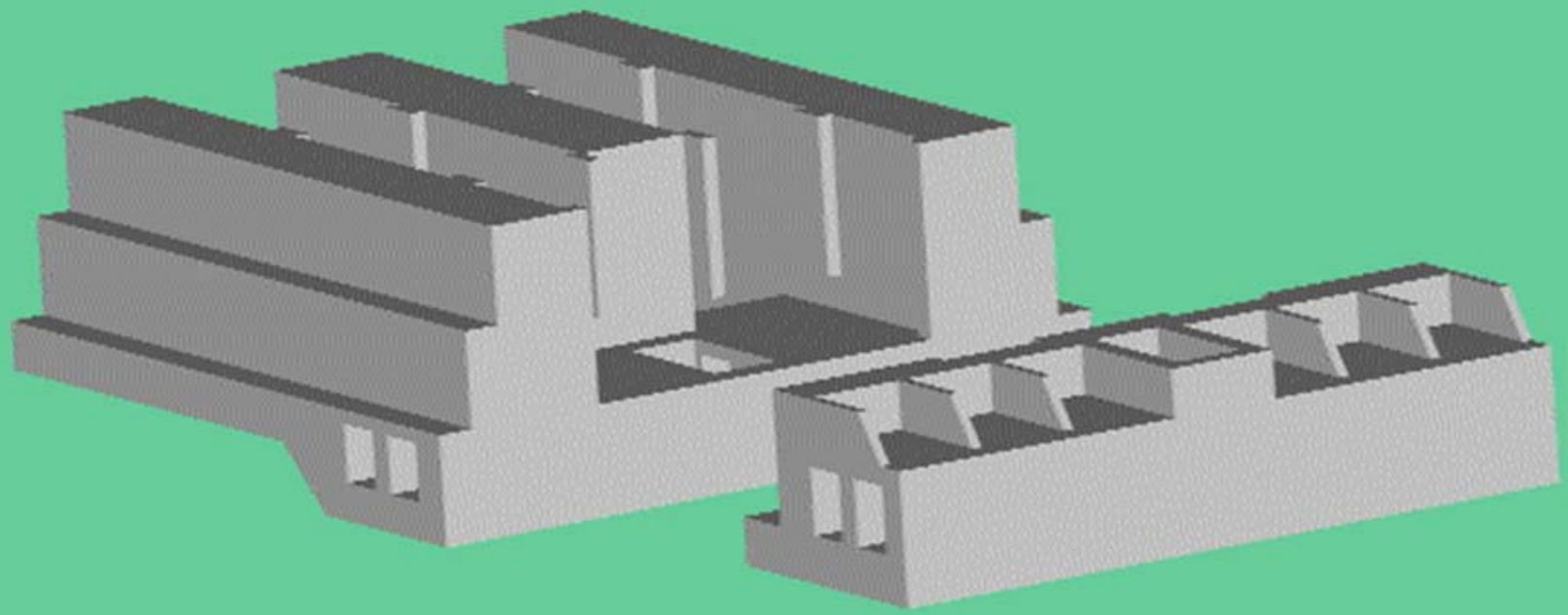


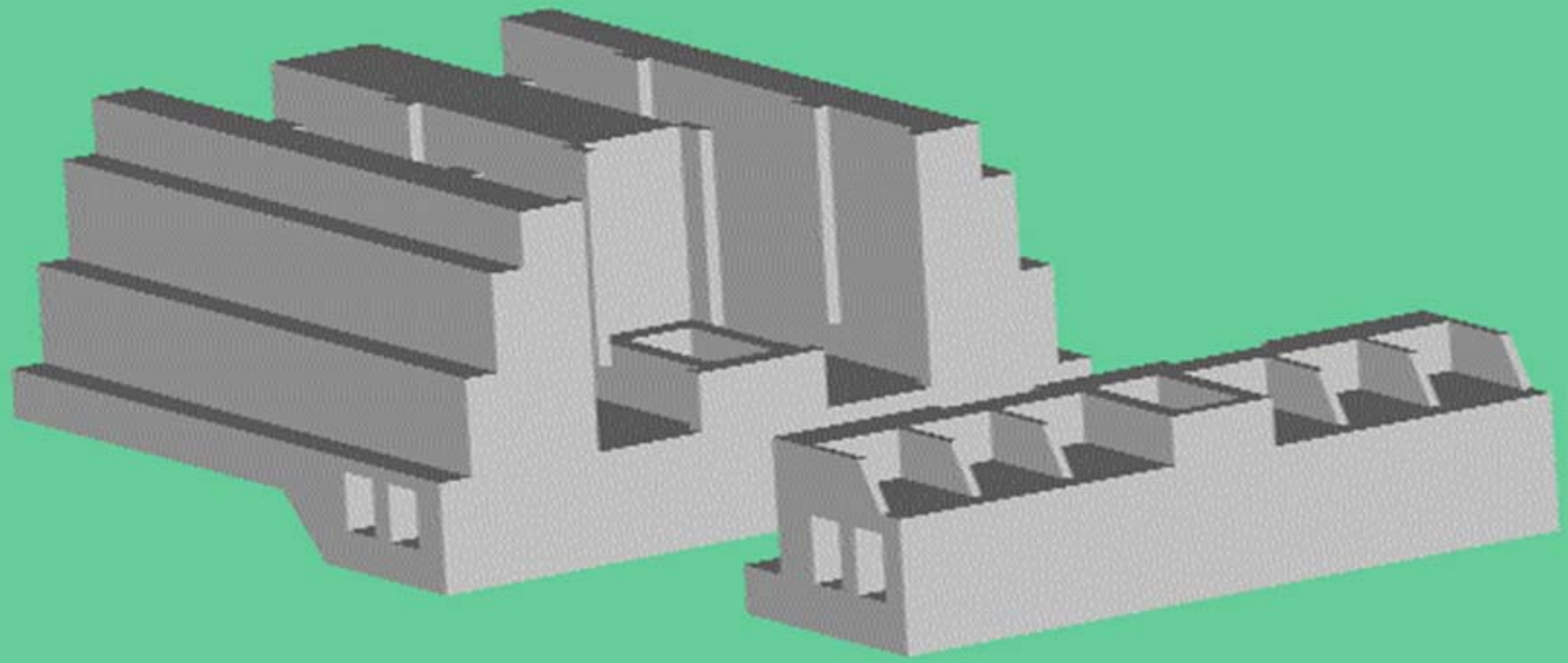


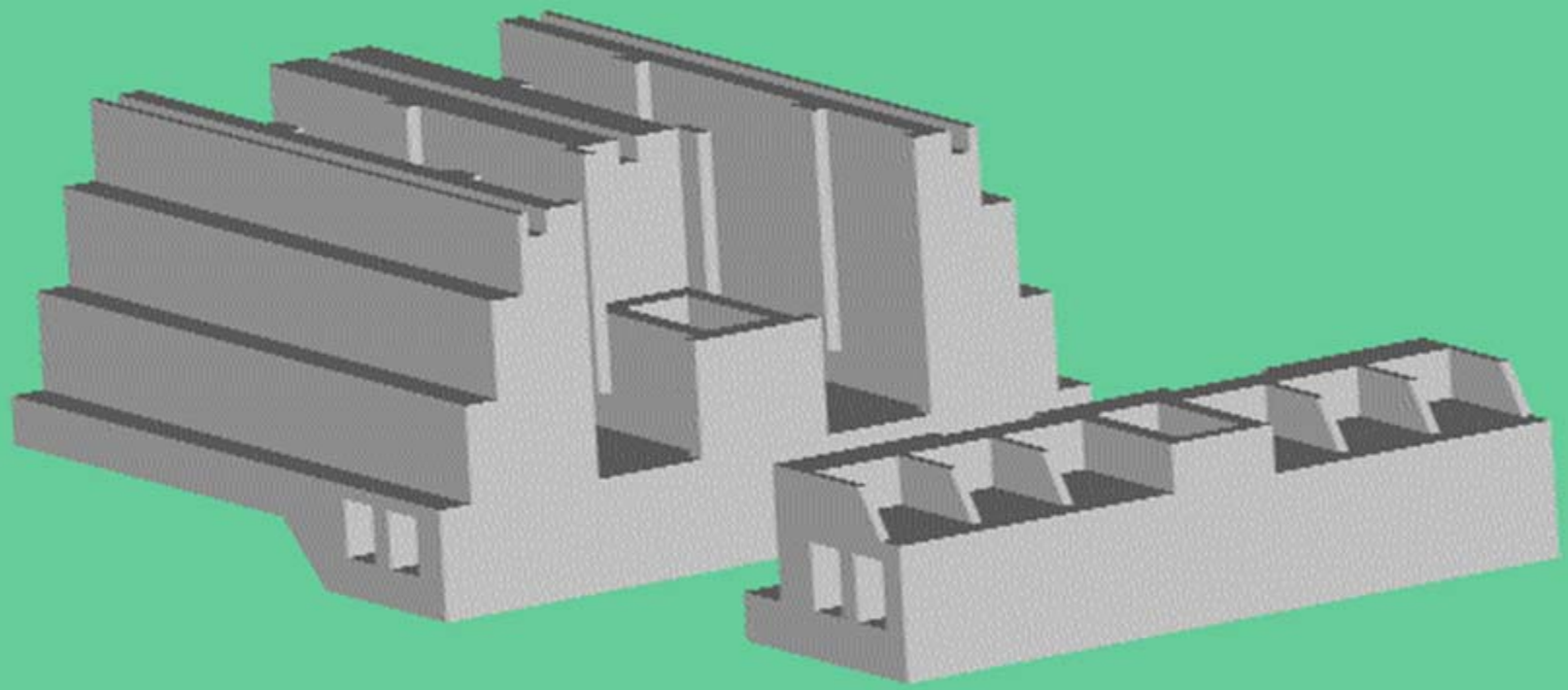


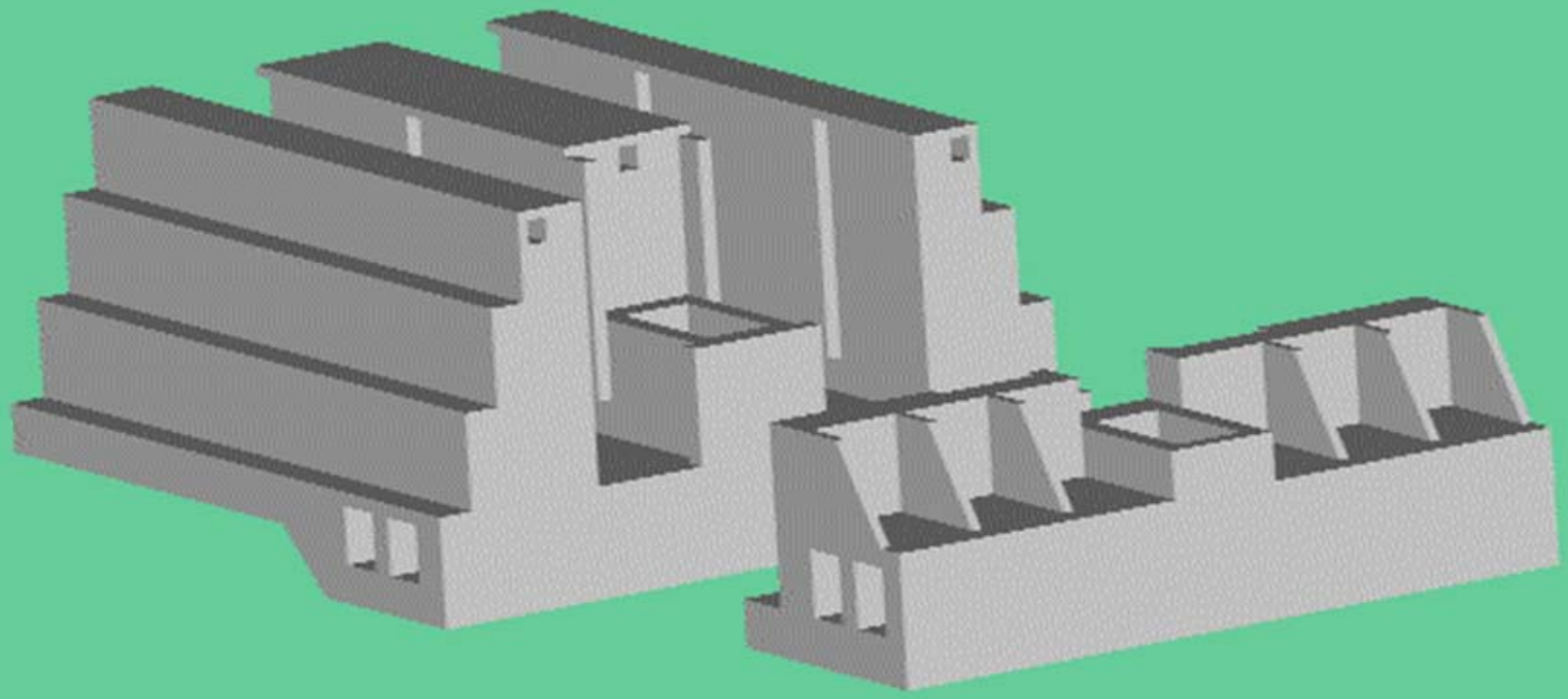


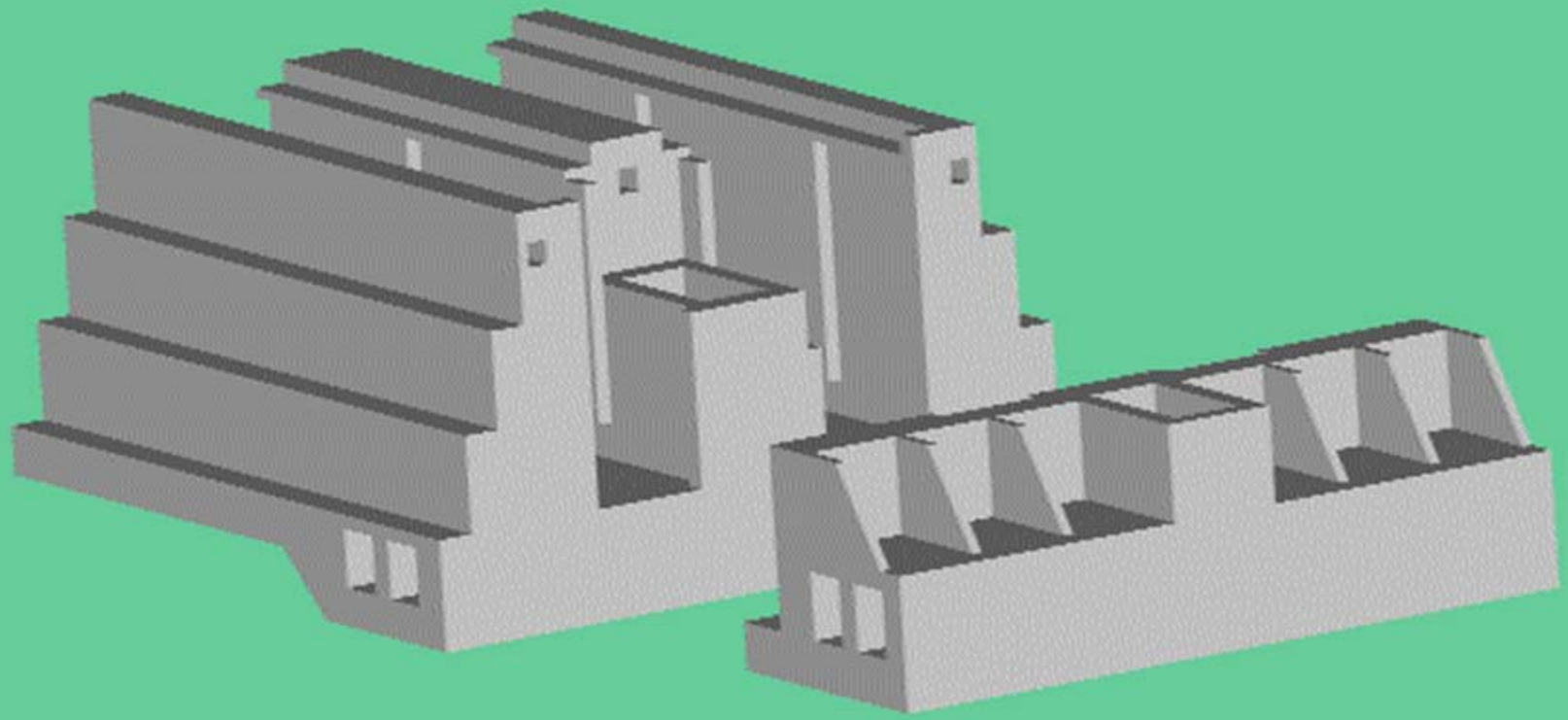


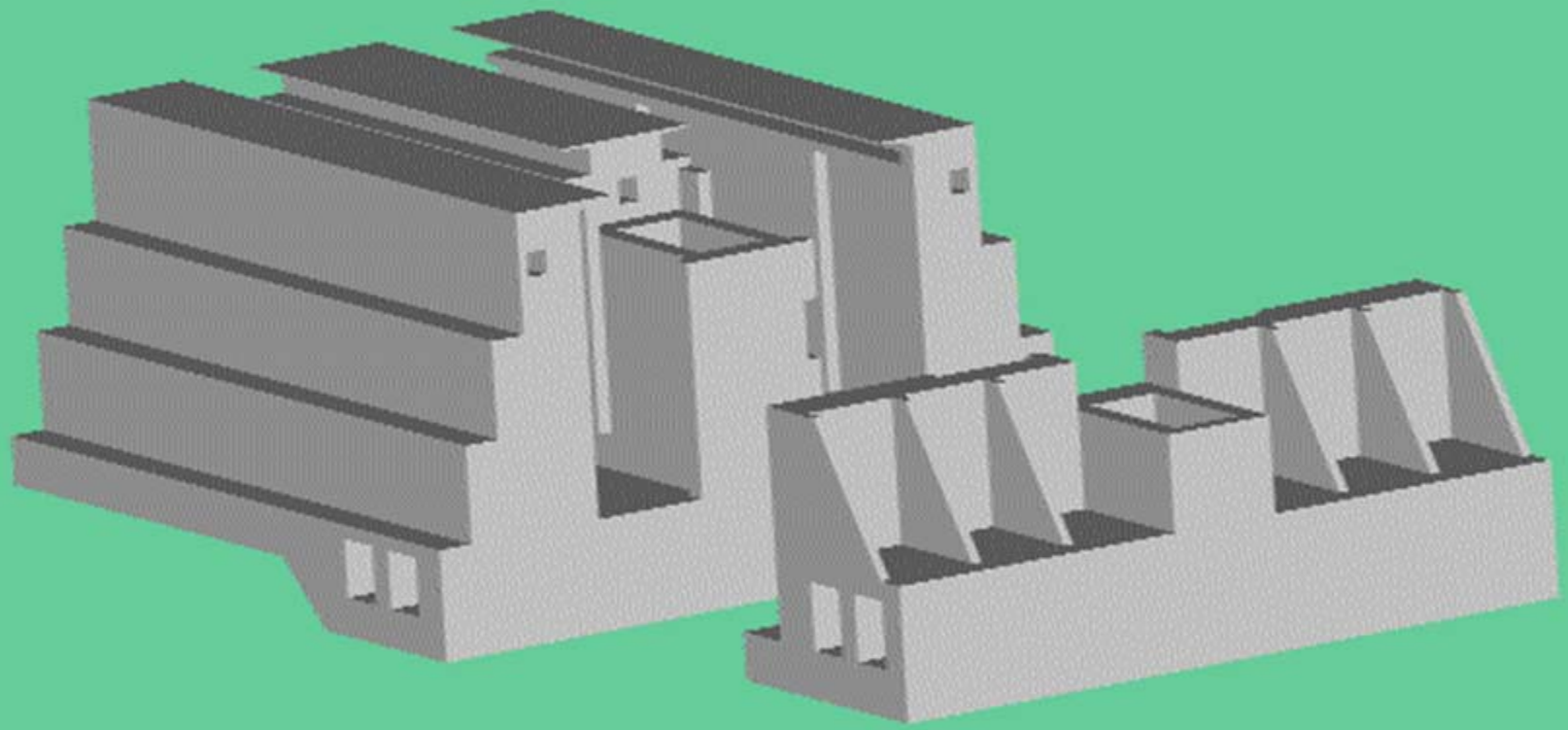


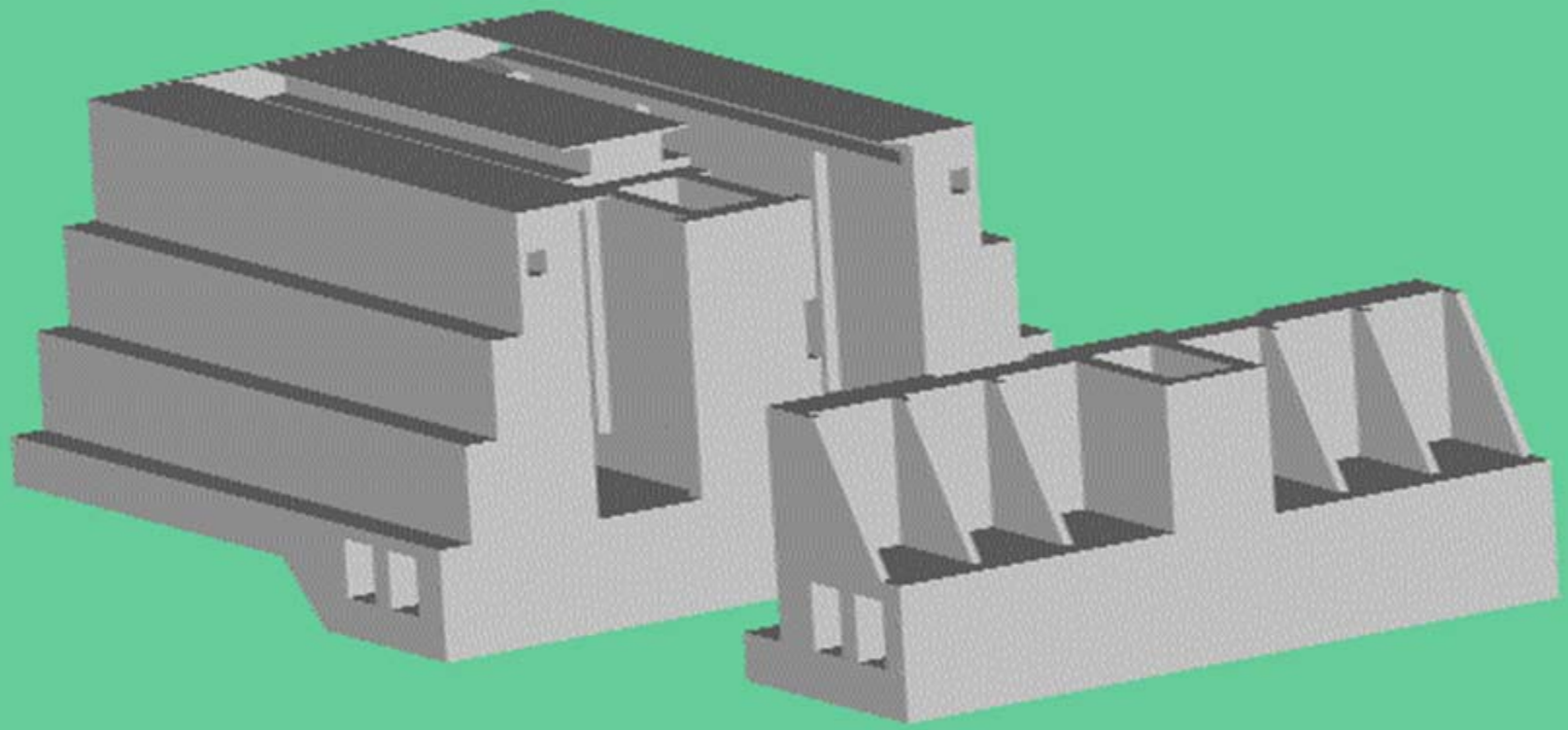


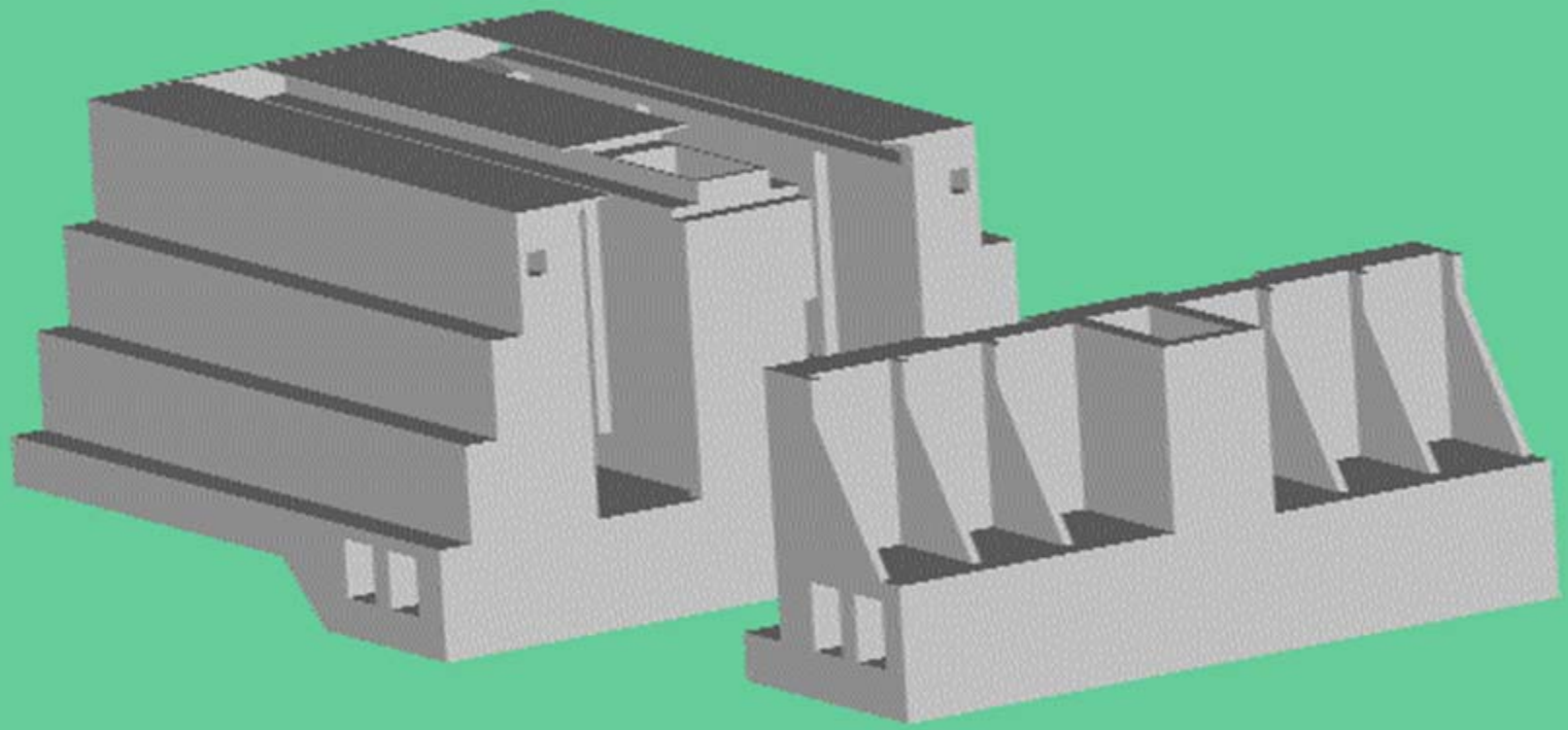


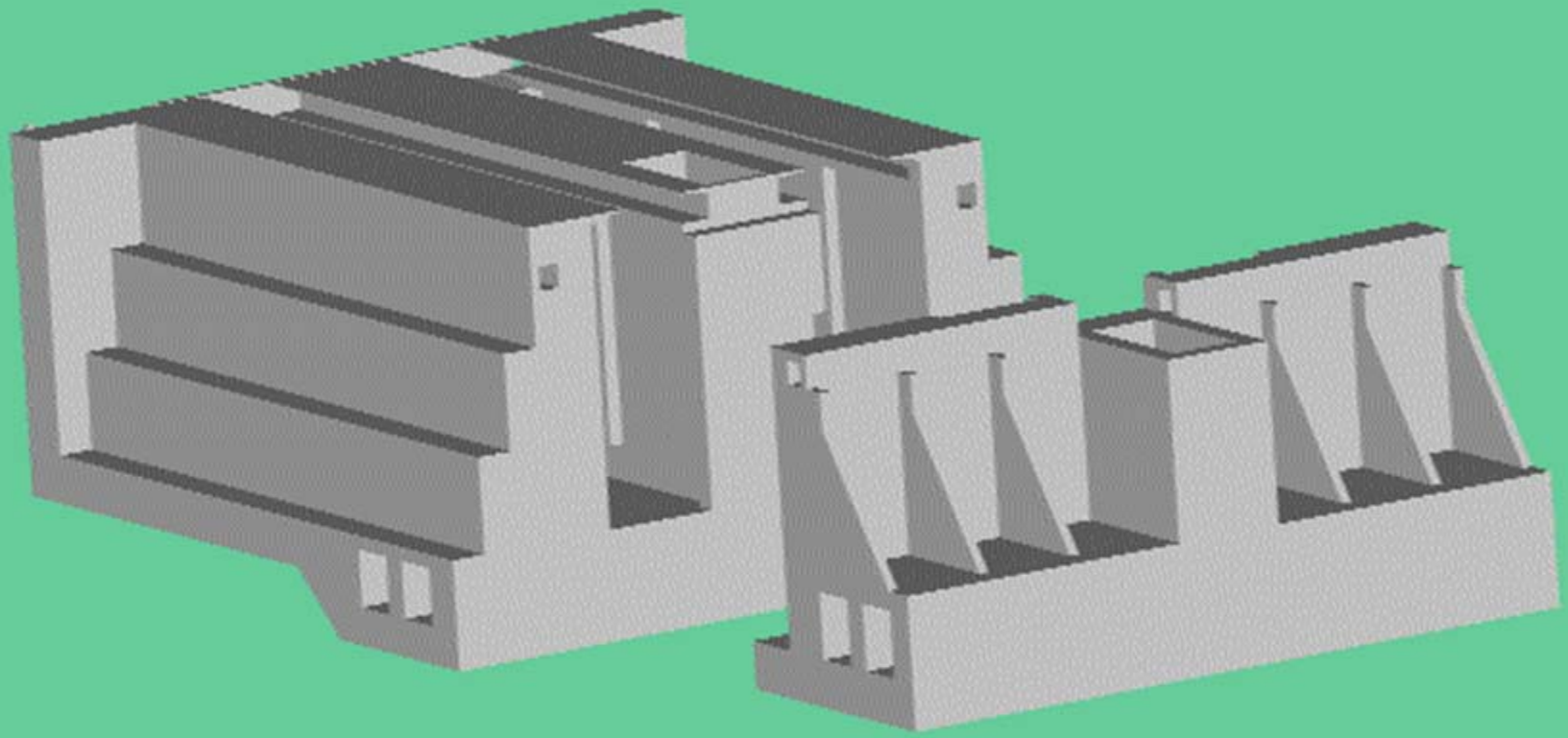


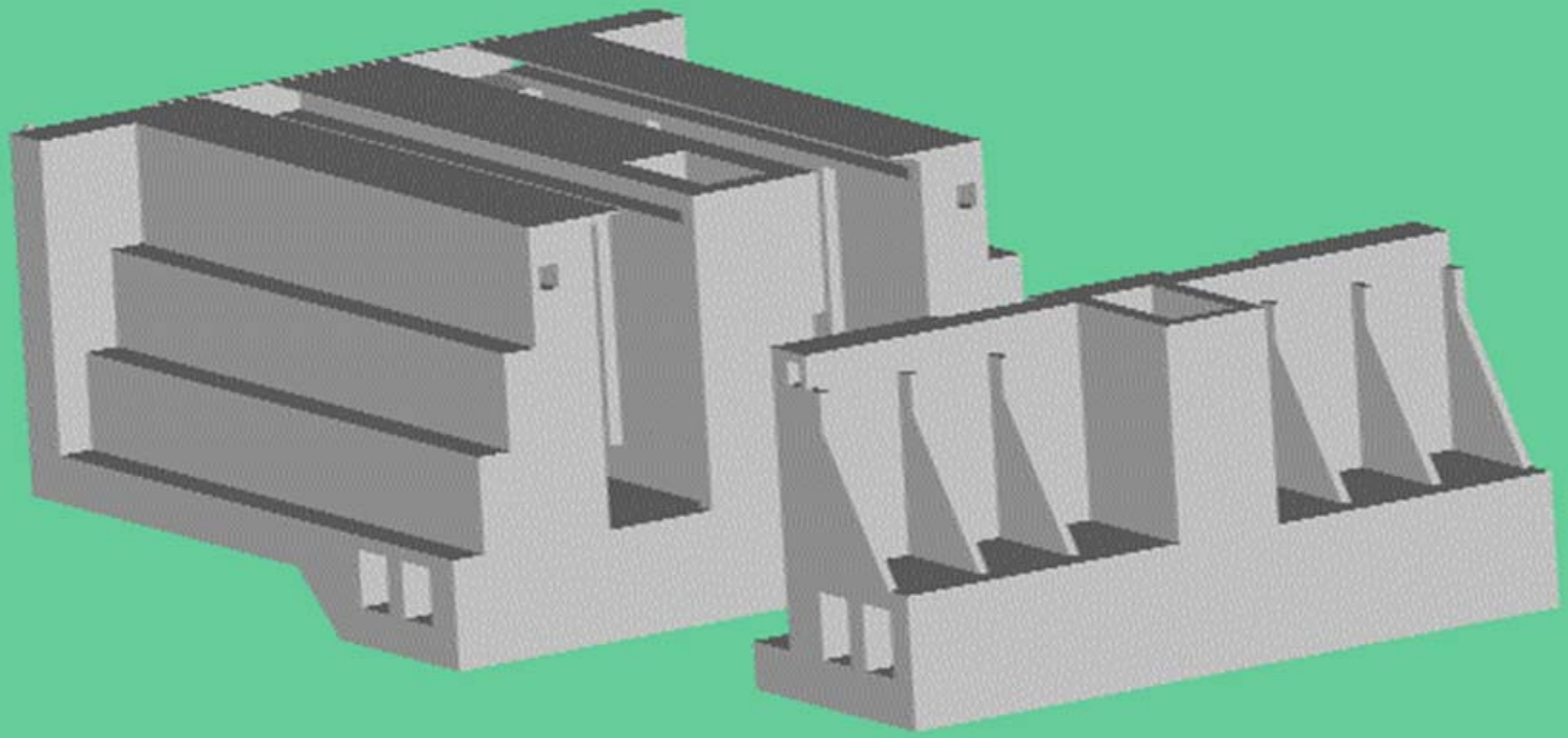


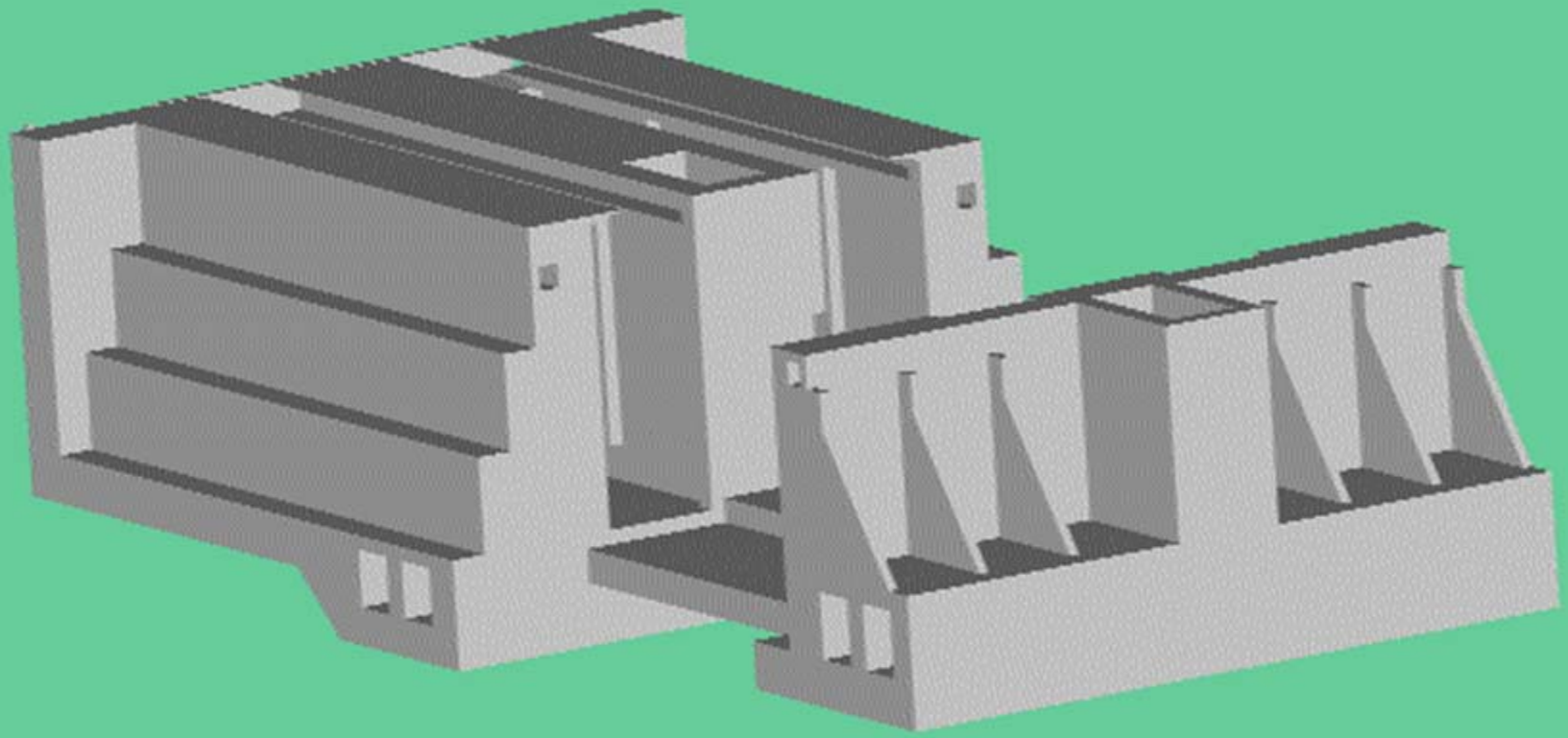


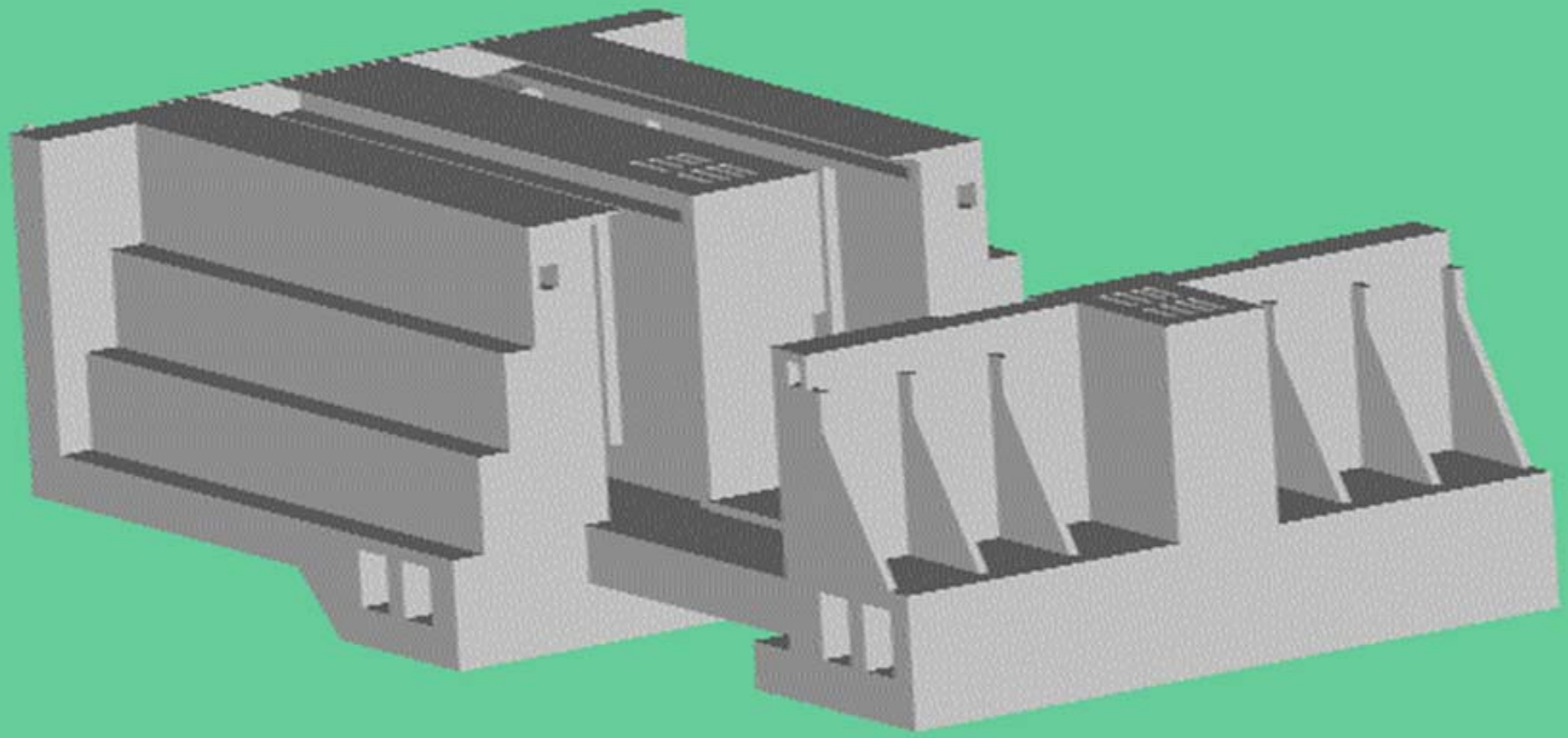


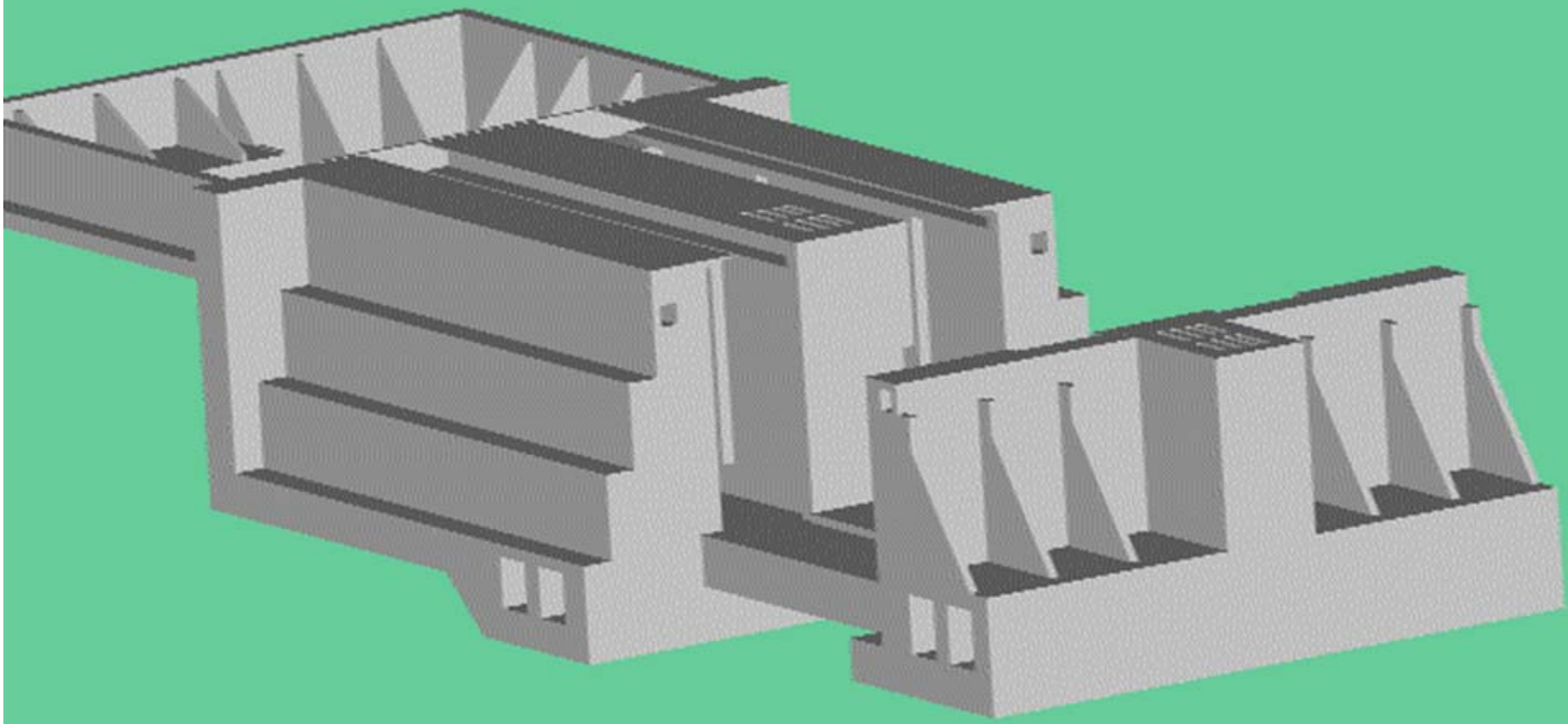


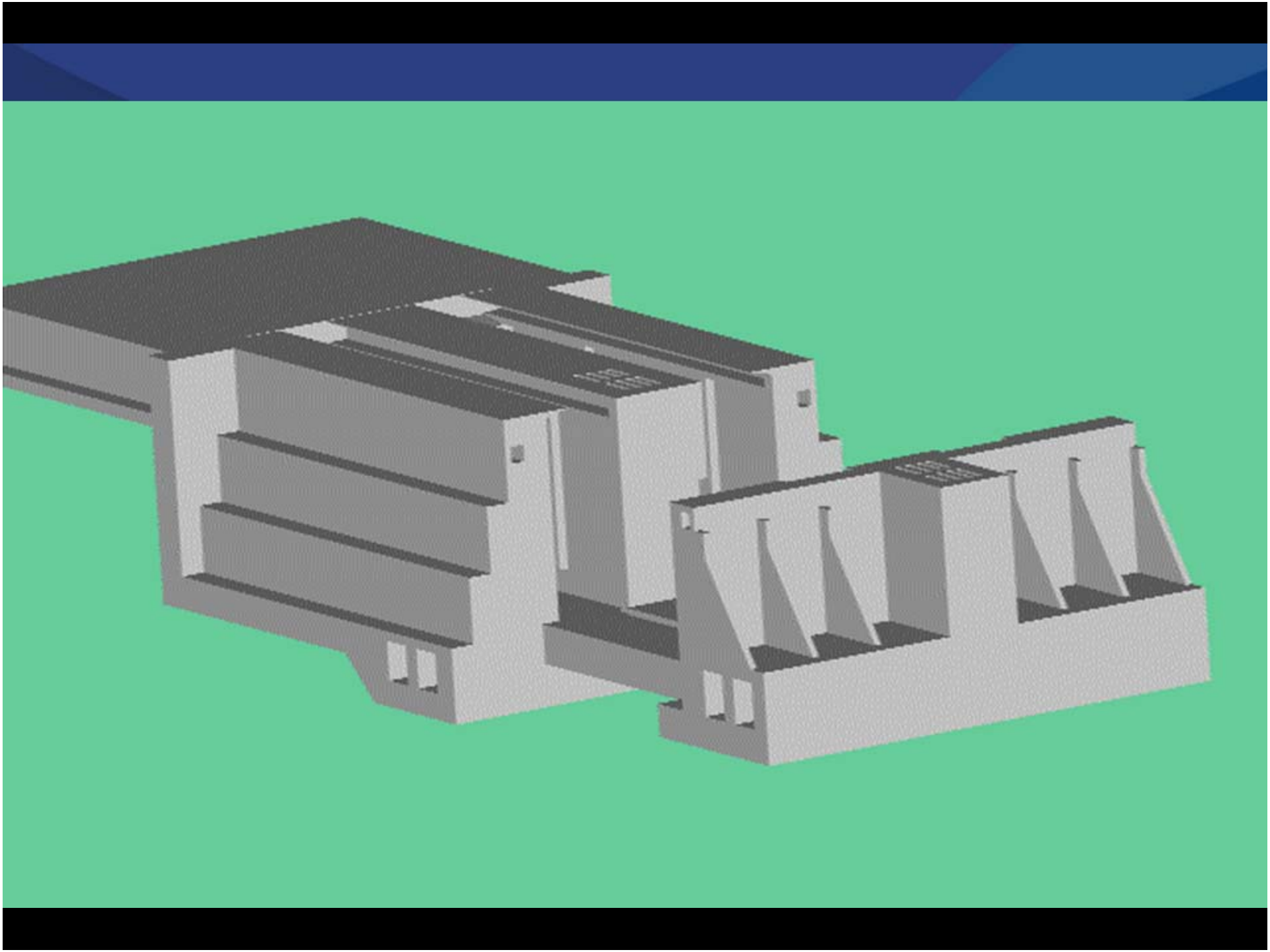




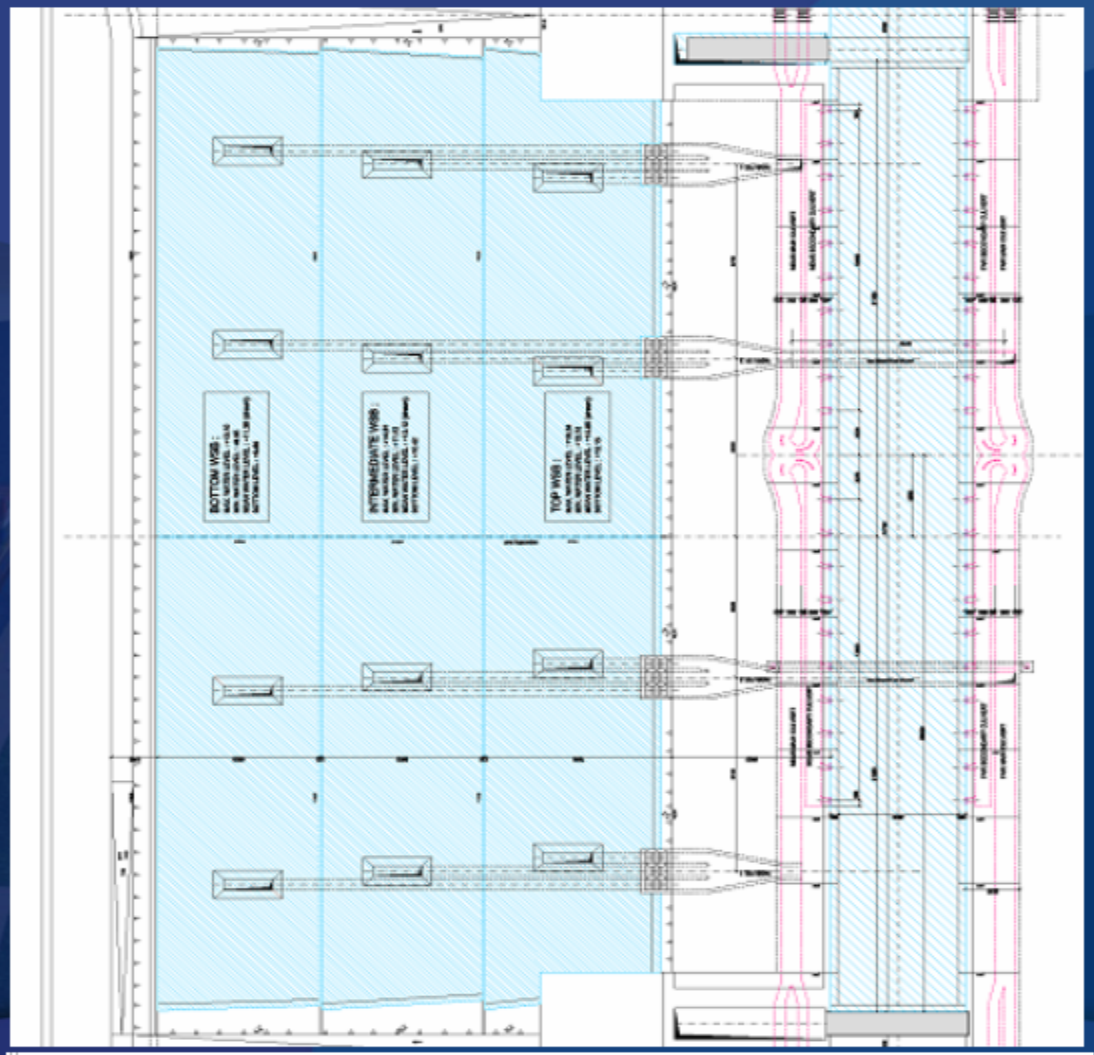


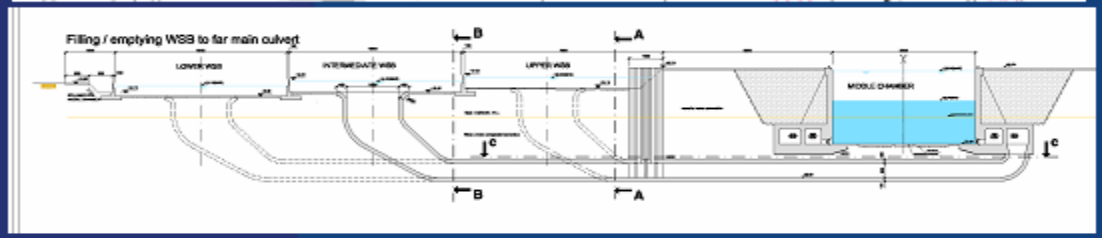






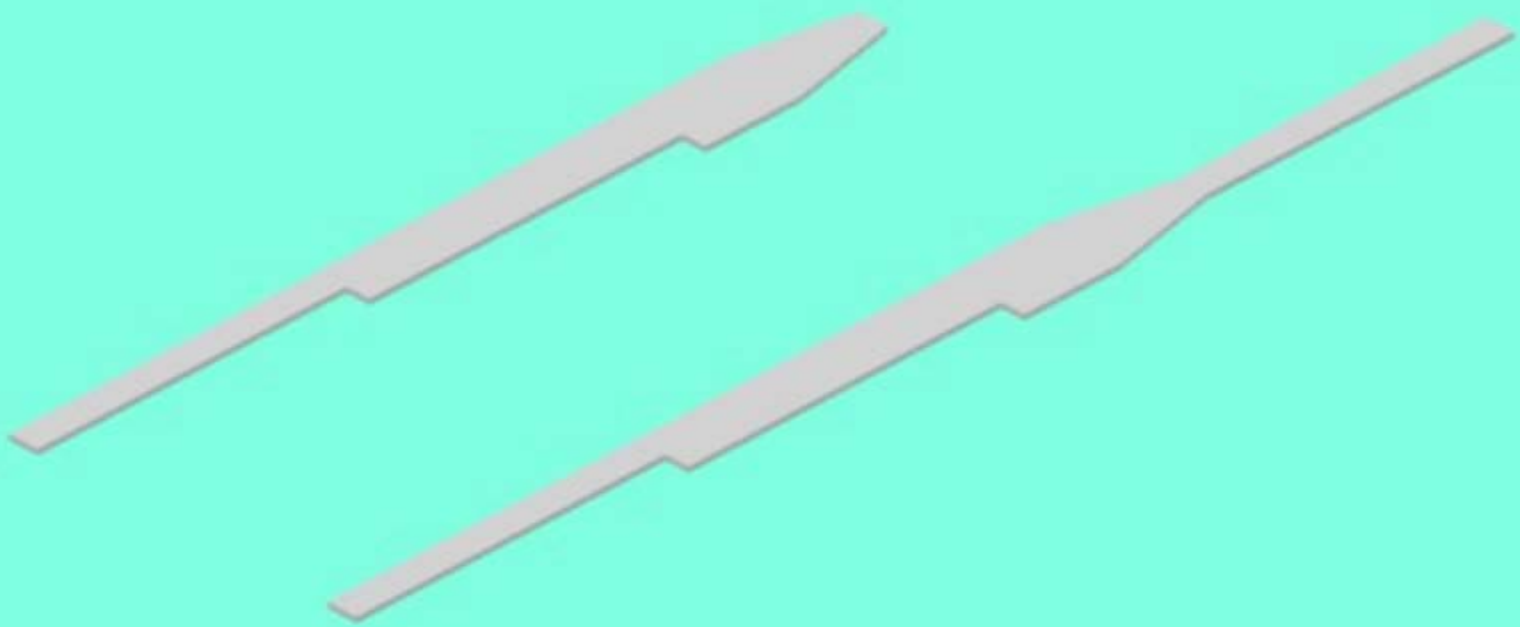
Water Saving Basins

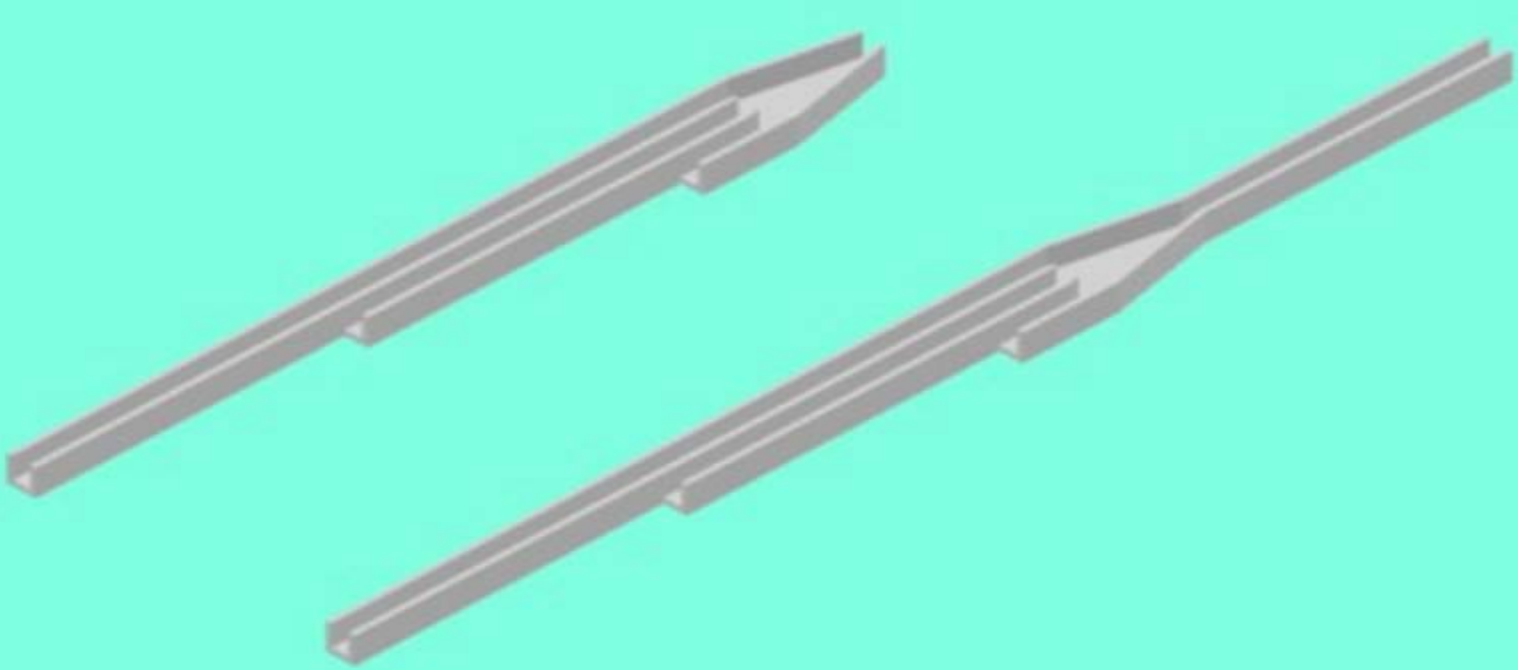


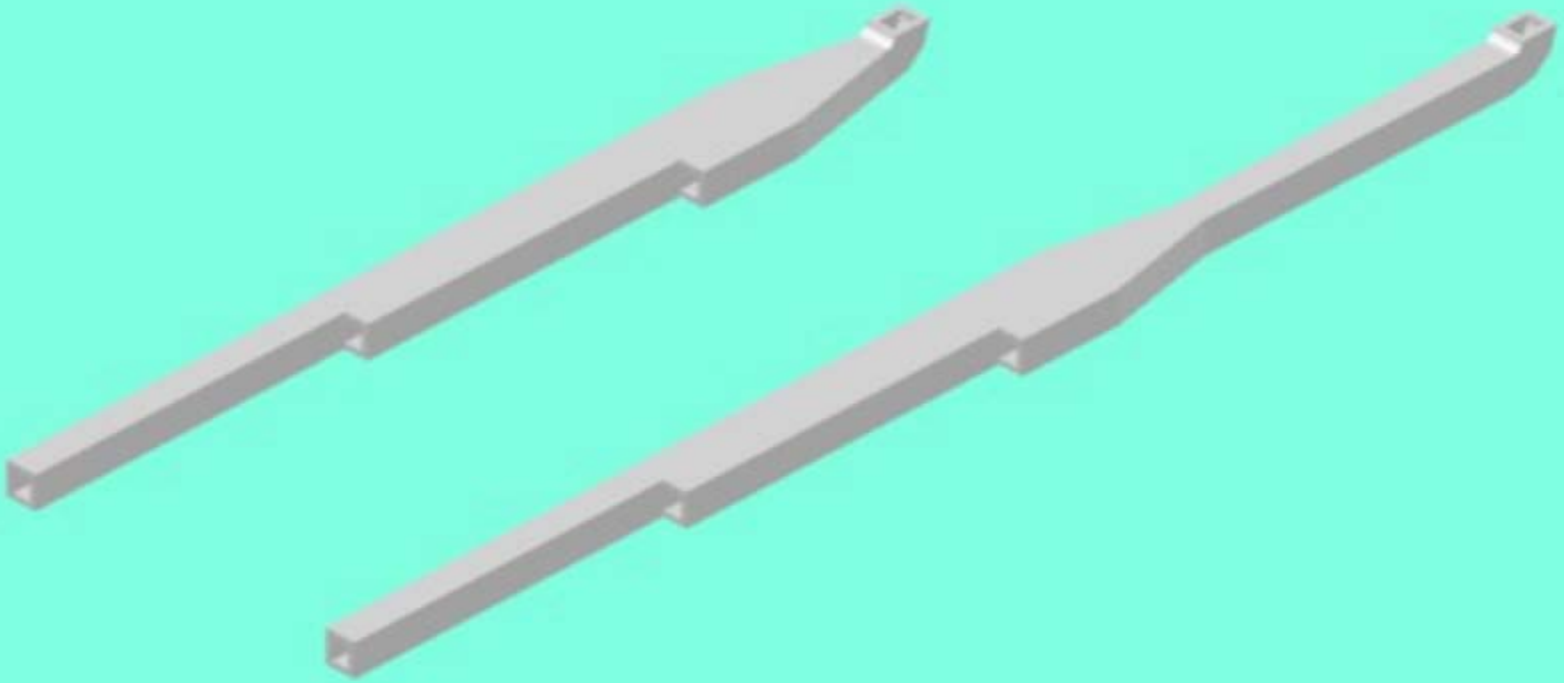


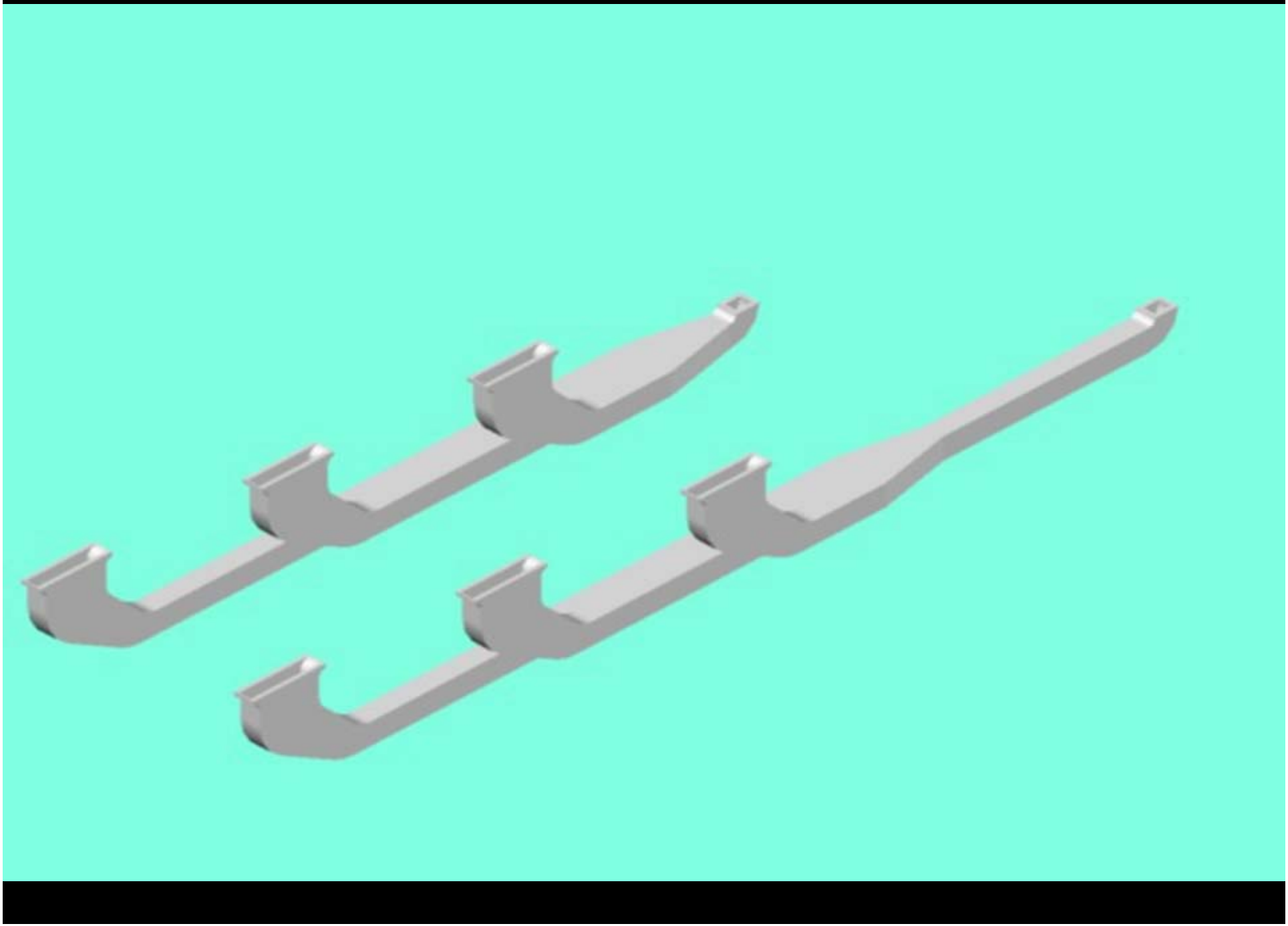
Water Saving Basins

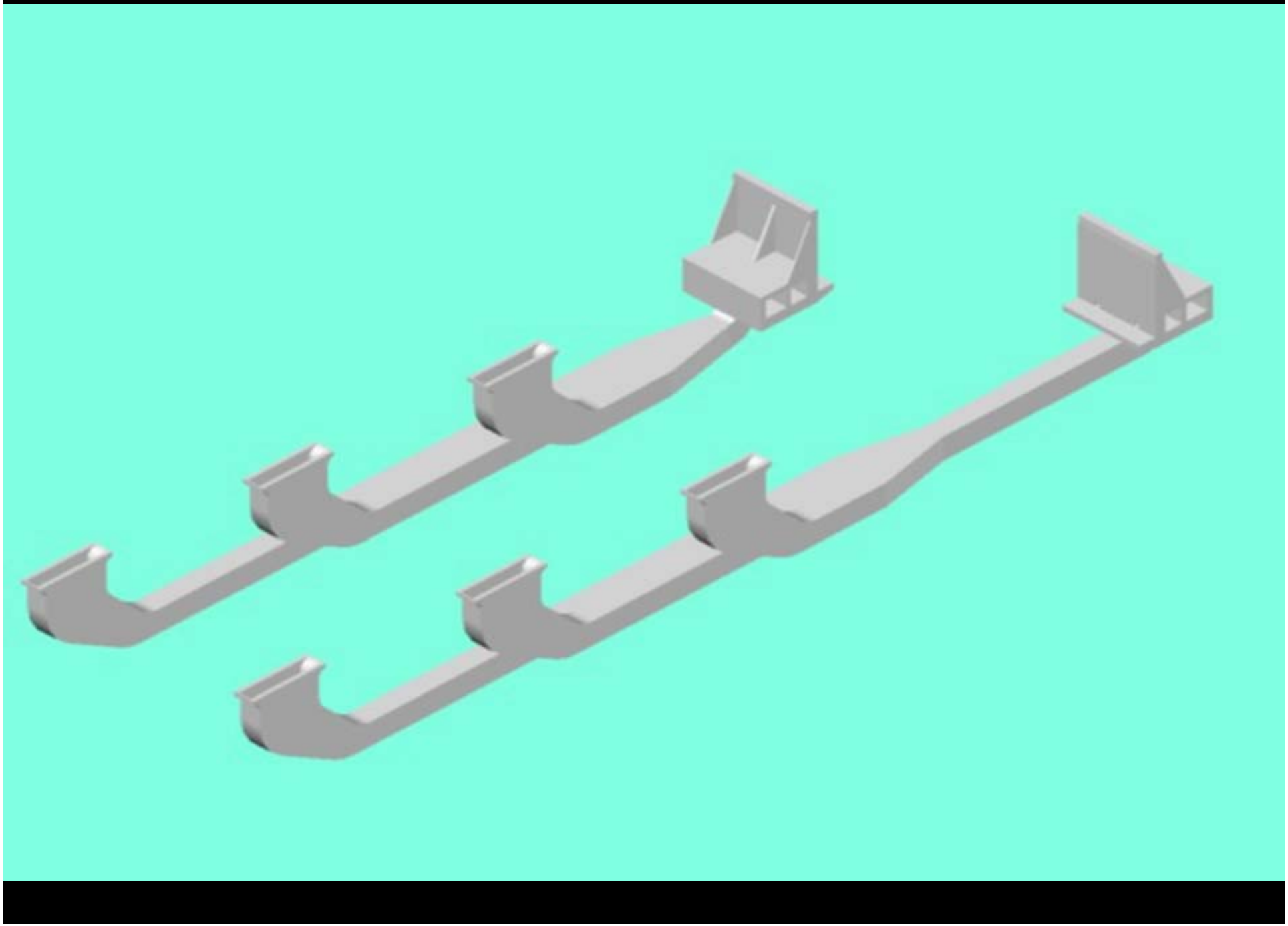
Water saving basins used in Germany help reduce water usage

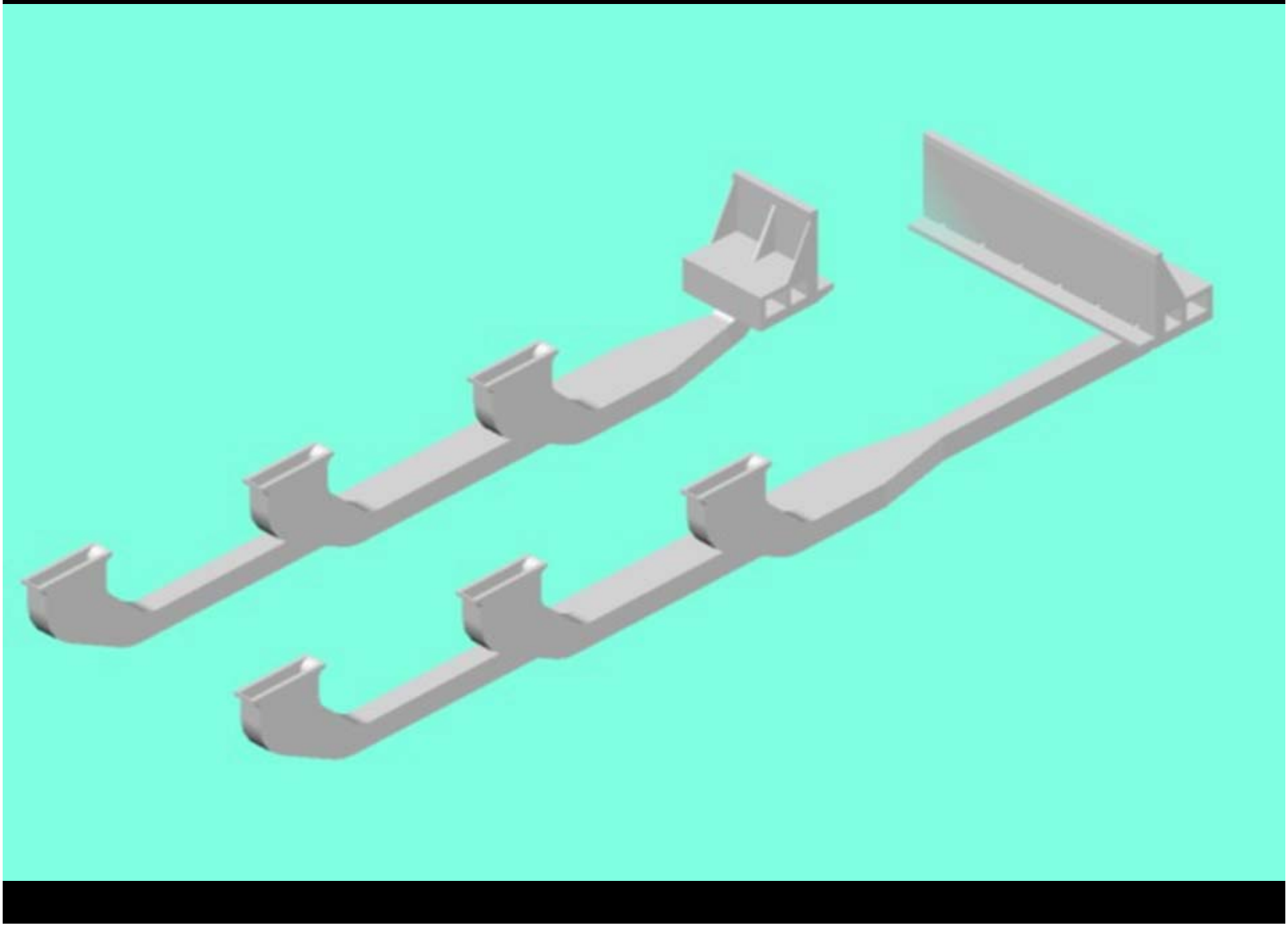


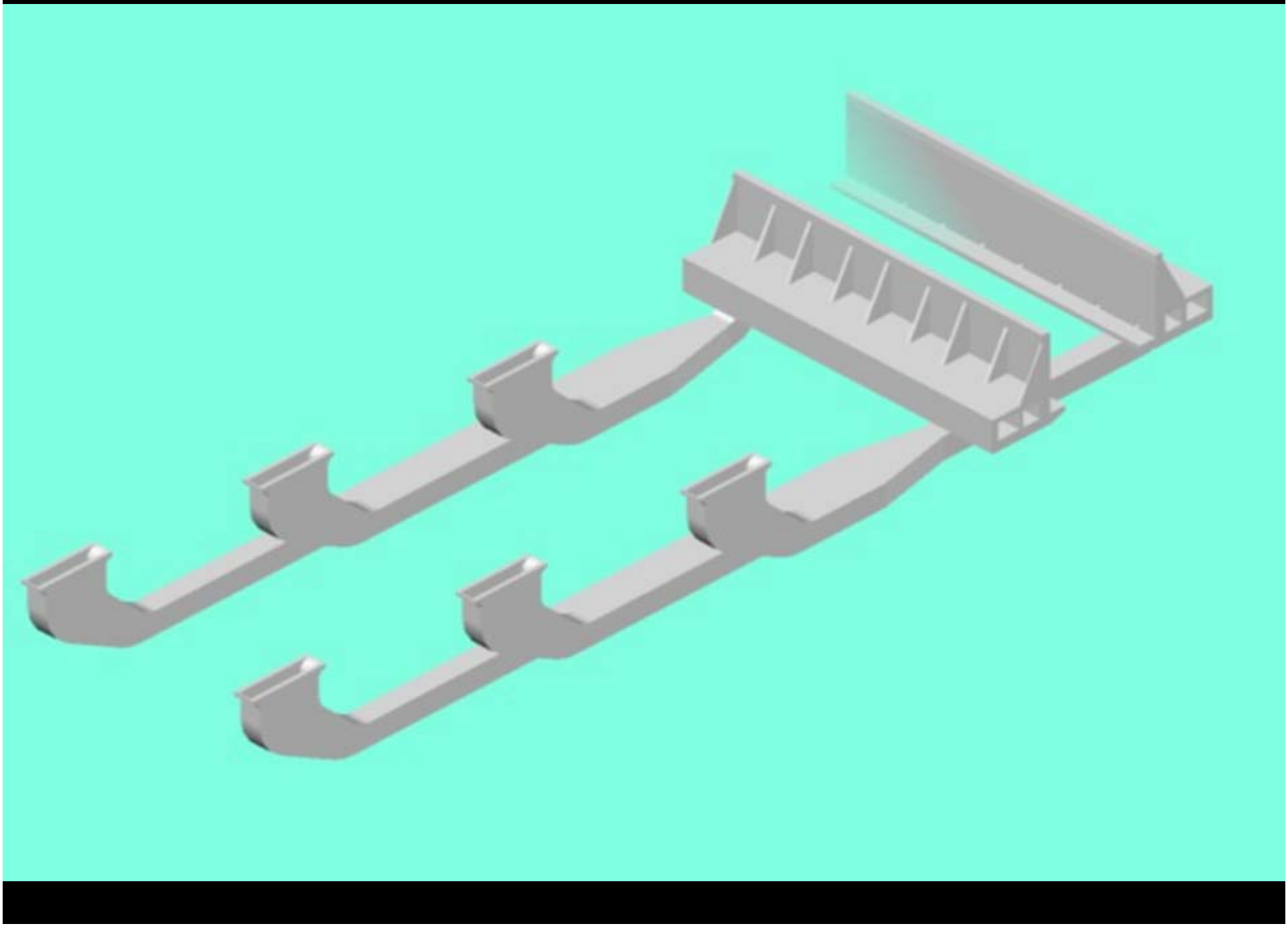


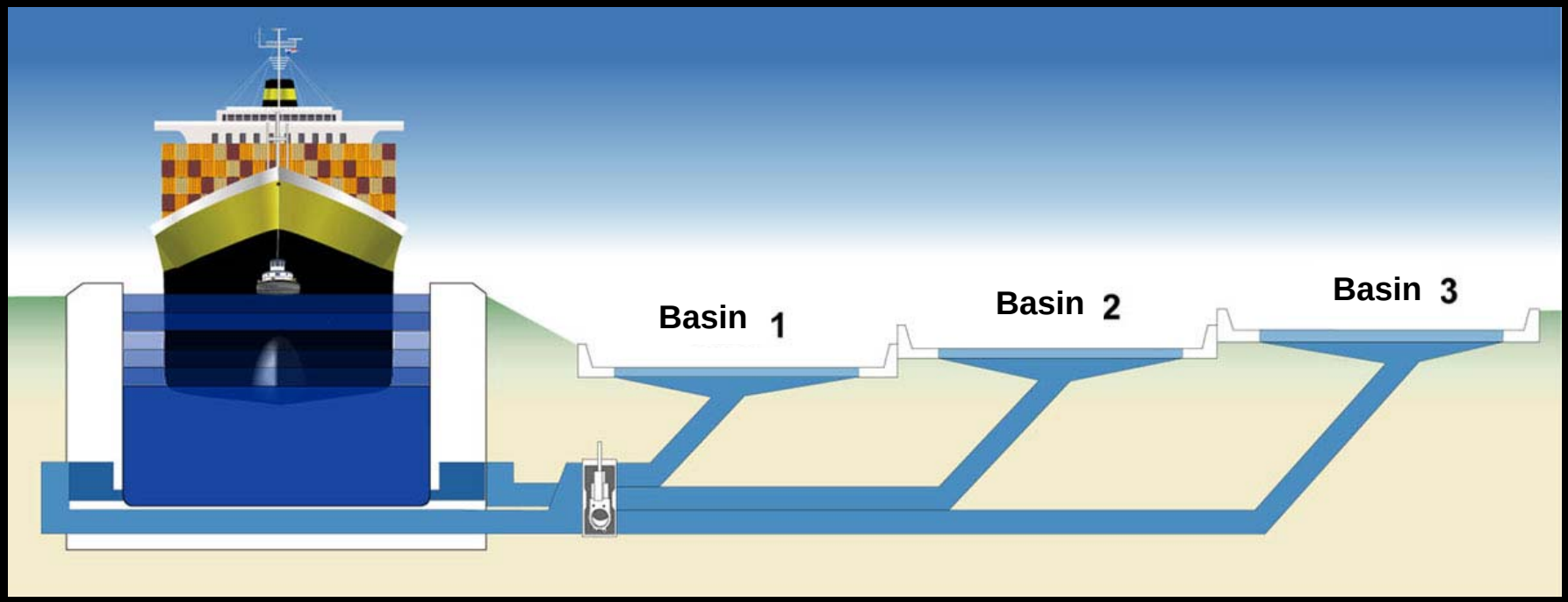











Basin 1
Basin 2
Basin 3


Gates and Valves

Gates

Berendrecht Lock
Antwerp, Belgium

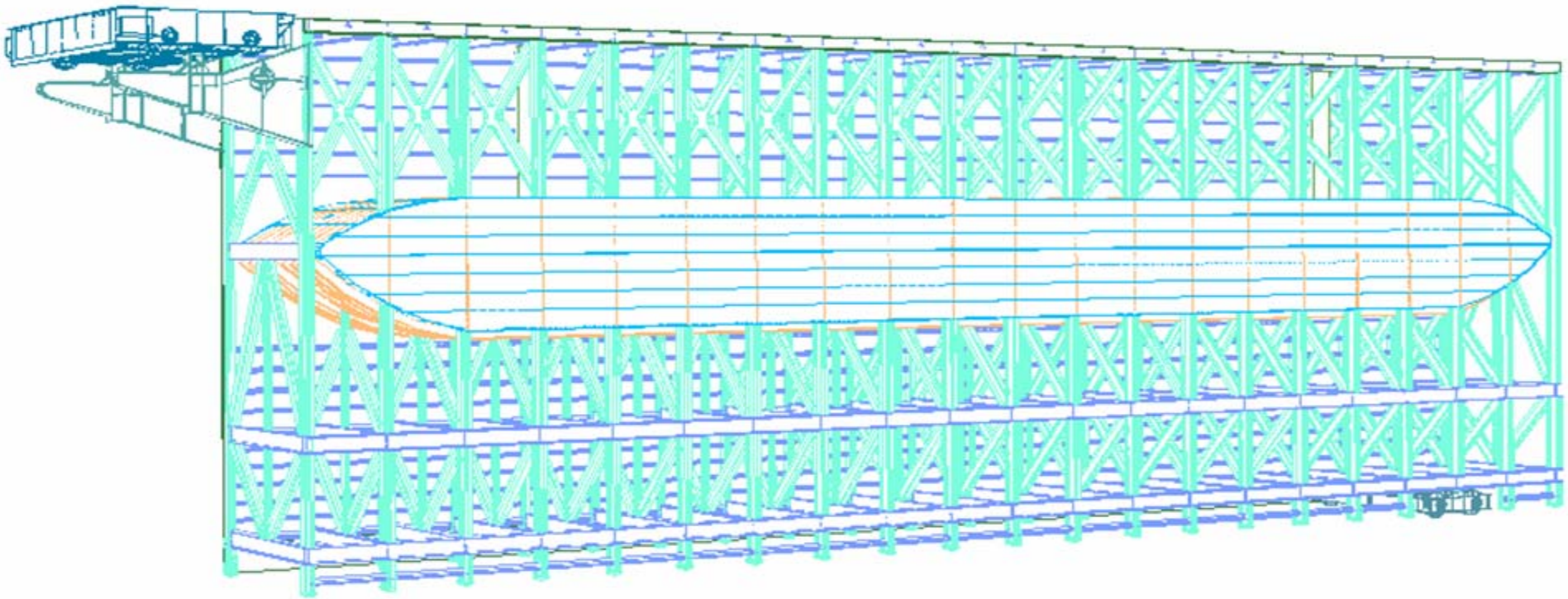
Gate in Recess

Gate Installation

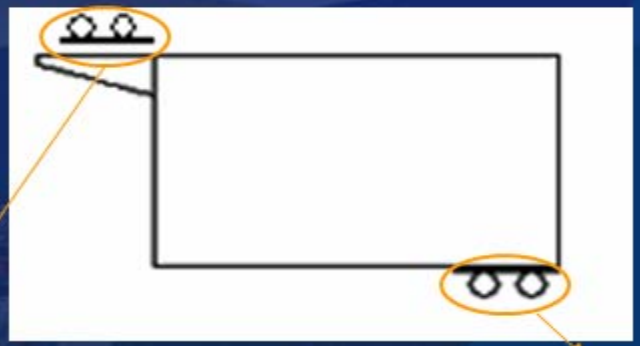
Gate Installation

Gate Installation

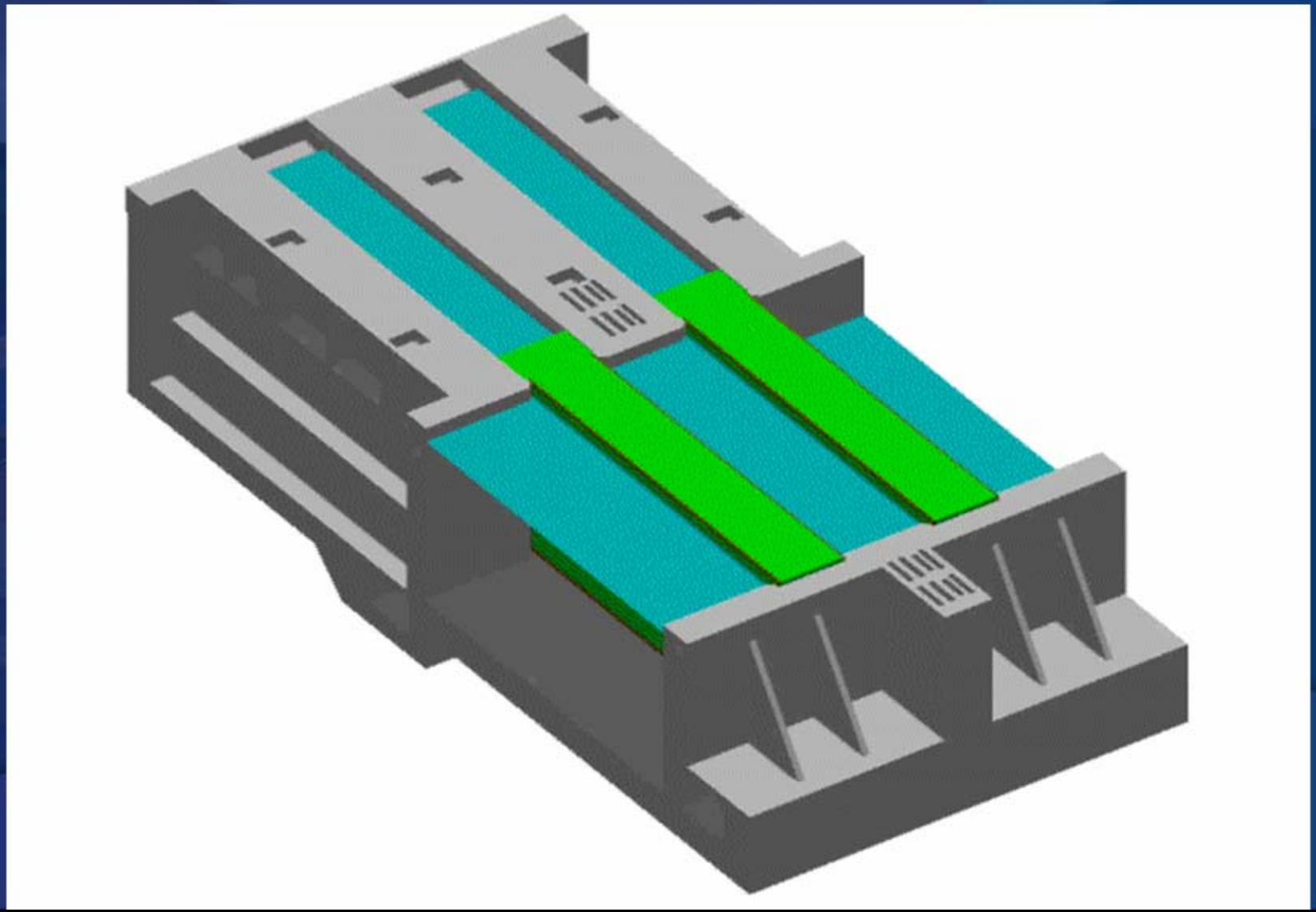
Gate model
(Conceptual Design)



Rolling gate supports
Conceptual Design



Gate Operation



Valves
(Conceptual Design)

Valves

Valve Stem

Valve Body

Valves

Embedments in Concrete

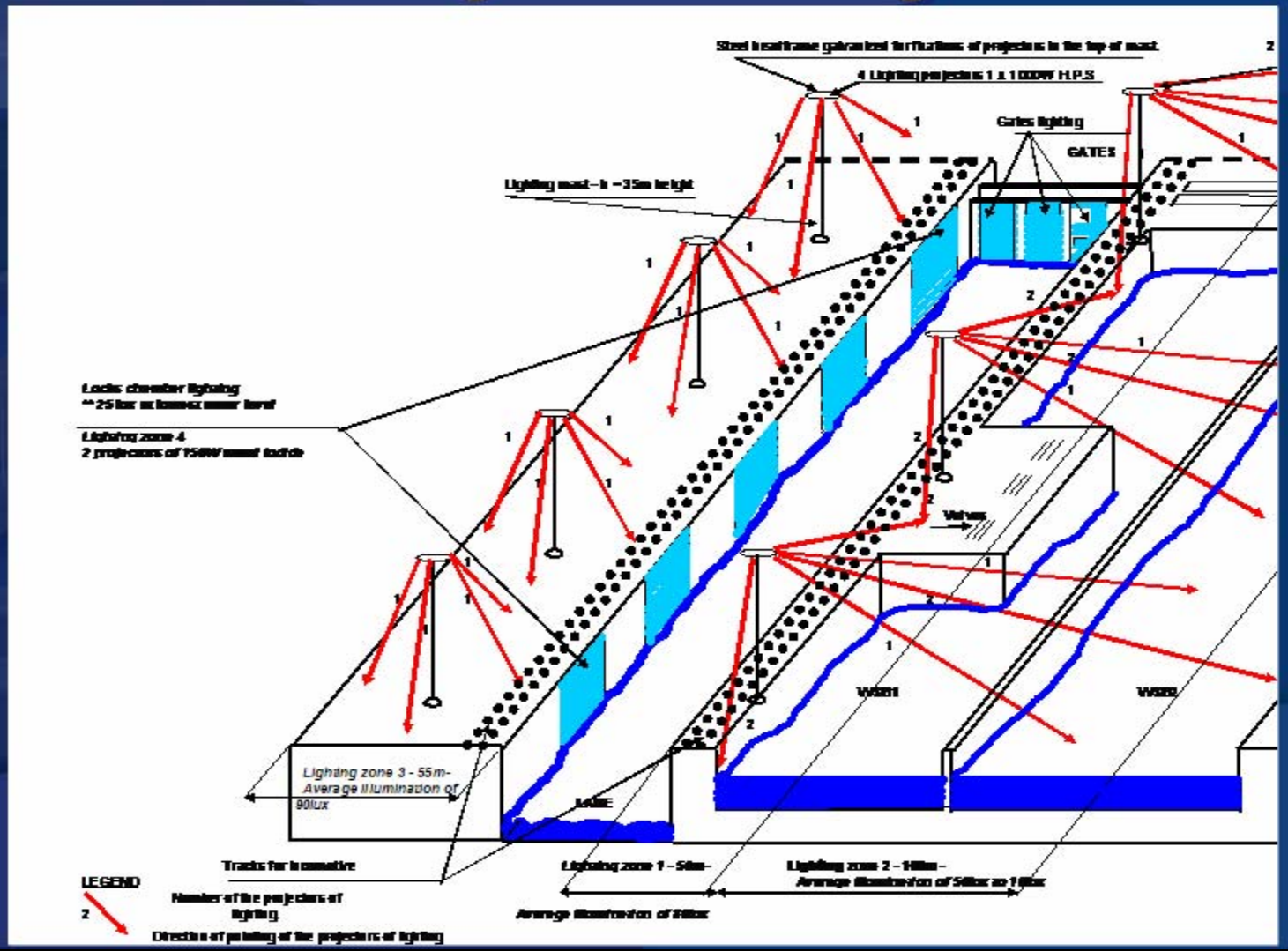
Electrical System (each lock site)

- Primary Distribution System
  - Two 12,000 volt, 60Hz loops
  - Each loop fed by independent feeders from nearby substation and can supply the total electrical requirement
- Back up generator can supply total electrical requirement

Electrical Requirements

- Electricity supplied by less than 600volt, 60Hz systems connected to the distribution loops for:
  - Lighting
  - Operating equipment for gates and valves
  - Miscellaneous: A/C for buildings, Sump pumps, air compressors, fire fighting equipment

Lighting
Conceptual Design



Buildings – each lock
Conceptual Design

- Main Control Building
- Emergency Generator Buildings
- Transformer Rooms
- Gates Technical Buildings
- Culvert Technical Buildings
- WSB Technical Buildings
- Maintenance Buildings
- Storage Buildings

Appurtenances – each lock
Conceptual Design

- Fire protection system
- Waste water treatment plant
- Elevators to underground crossings
- Bollards
- Fenders
- Station markers, telephones, loudspeakers
- Security fence and controlled access points
- Roads and parking lots


Quantities

Approximate Quantities
Civil Work
Conceptual Design

(thousands)

Material	Pacific	Atlantic	Total
Excavation (m3)	12,000	18,000	30,000
Reinforced Concrete (m3)	1,750	1,680	3,430
RCC (m3)	260	330	590
Reinforcing bars (ton)	130	130	260
Cement (ton)	540	520	1,060
*Processed Material (m3)	7,800	5,600	13,400

*Processed material includes fill and aggregate

Approximate Quantities Electromechanical

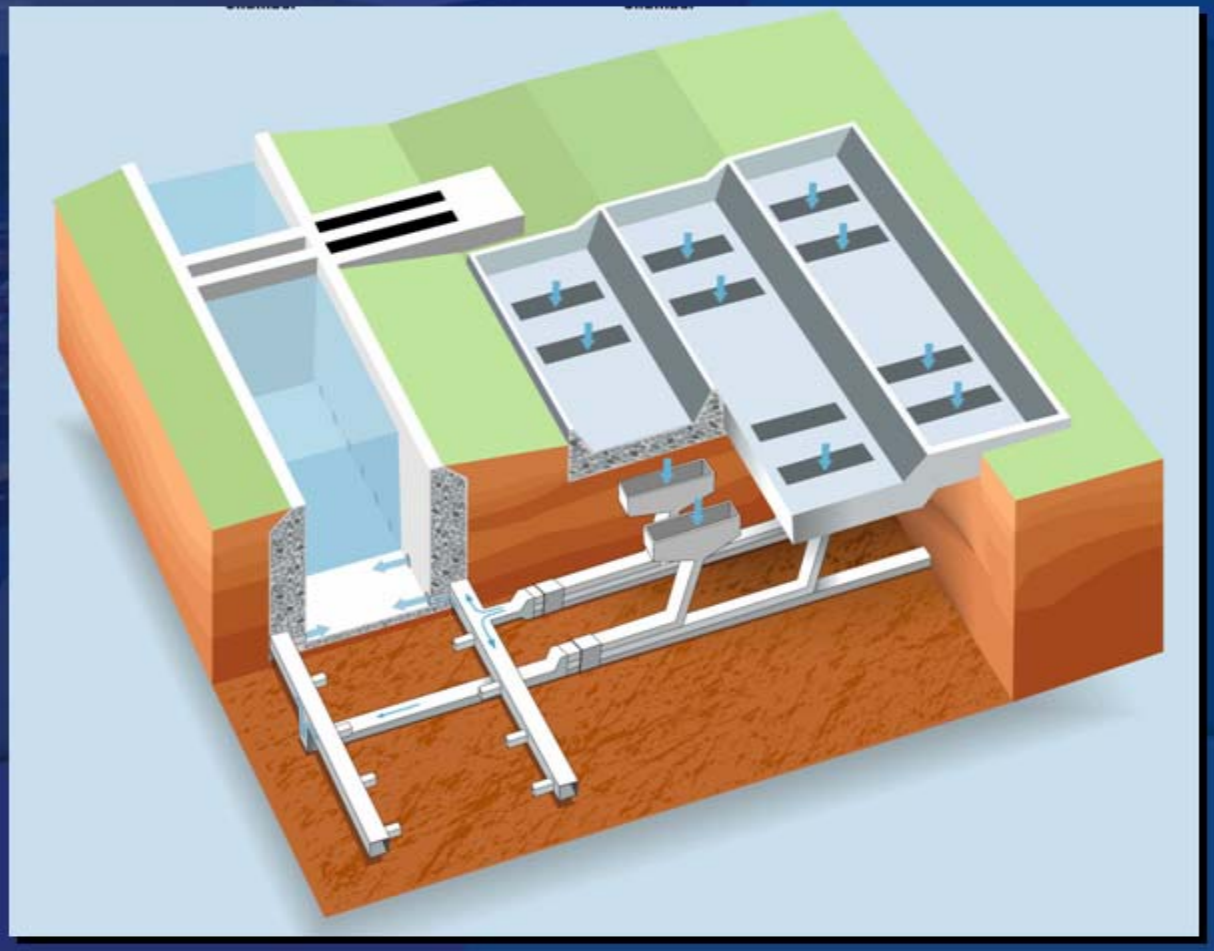
Conceptual Design

Equipment	Quantity (per lock)	Atlantic (ton)	Pacific (ton)	Total (ton)
Valves	52	3,300	3,800	7,100
Bulkheads	24	2,800	3,000	5,800
Gates	8	20,000	21,000	41,000
Total		26,100	27,800	53,900

Conceptual Design


ACP
Thank You !

Filling/Emptying
Concept Design



Studies

- 1939 Design
- 1993 Study (Panama-Japan-USA)
- 1998 Start of Present Studies
  - Water Supply
  - Vessel Positioning
  - Alignment
  - Alternatives for moving ships
  - Saltwater intrusion
  - Lock Concepts