MMC DRAWING SET · REV F

MULTI-MODAL CORRIDORS · HIGH-LEVEL SUMMARY SHEETS · 7 NOVEMBER 2026

MMC-DWG-001 · ATS COMPONENTS

01 Cutter head
02 Anchor latch + contingency
03 Caisson ring
04 Expansion packer
05 Tension tubular
06 Tension lock
07 Riser segment
08 Caisson head
09 Pylon cap
10 Centralisers + insert packer

MMC-DWG-002 · TOPSIDE MODELS

01 MMC-VC single-leg viaduct
02 MMC-VB two-deck viaduct (Phase 0)
03 MMC-VA five-level viaduct (Big Bertha)
04 MMC-TB standard transmission tower
05 MMC-TB Guyed
06 MMC-TA dual-tower portal
07 Across terrain: one tapered segment family

MMC-DWG-003 · CONSTRUCTION

00 Construction sequence
01–03 Dual drilling rig (rail)
04 Mobile drilling rig
05 Drilling from the viaduct
06 First spans from the ground
07–08 Level 1: steps 3–8
09 Steps 9–10
10–11 Level 2: steps 11–15

MMC-DWG-004 · CAISSON TYPES

01 Solid caisson ring
02 Segmented caisson ring
03 Castellated caisson ring
04 Flush caisson ring
(more types added as designed)

STATUS

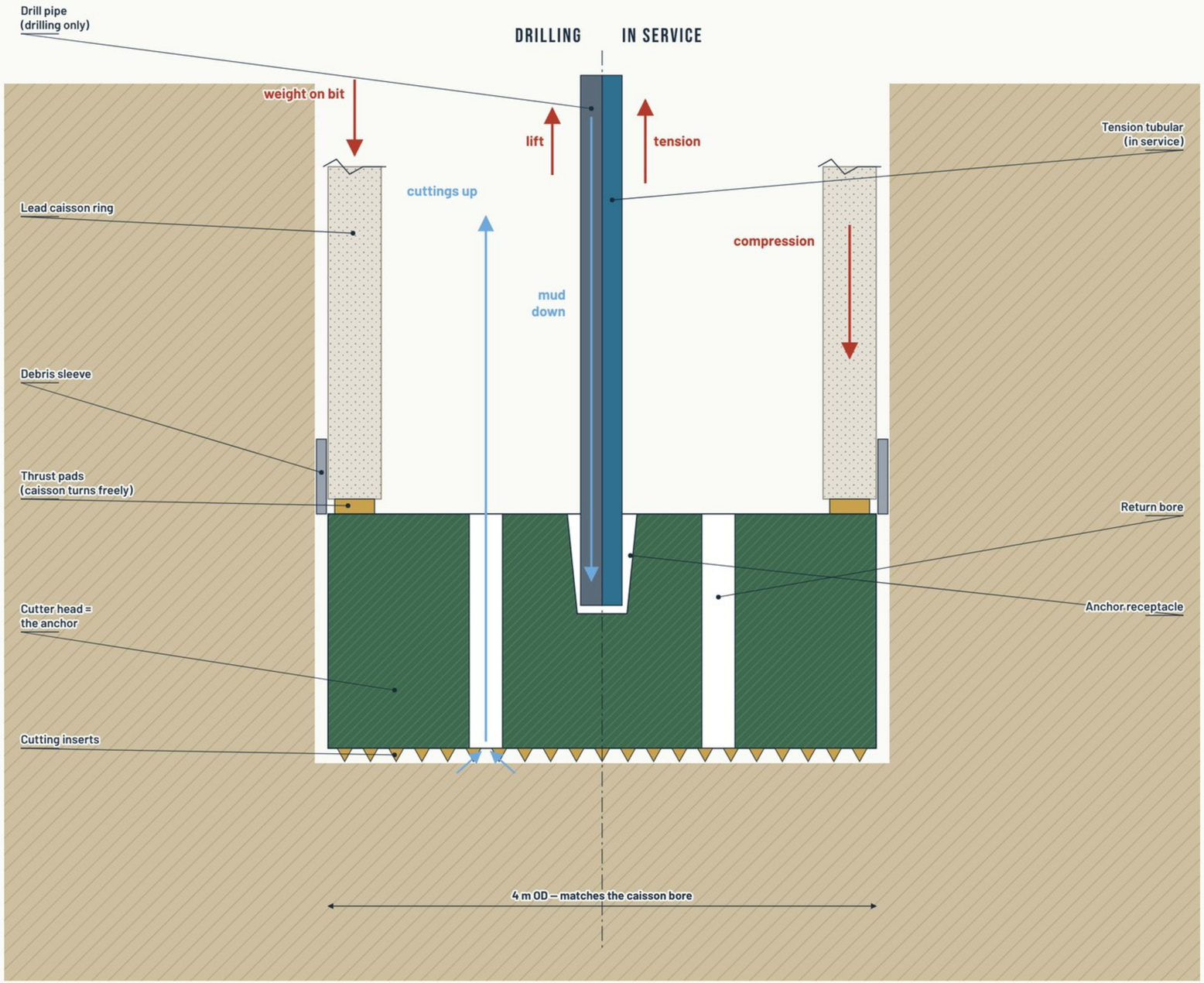
High-level summary sheets: what each part is and does. Not engineering detail.

Assumptions and site conflicts are listed in OPEN_ITEMS, not on the sheets.

Patents: P1 Foundation Core · P2 Integrated Foundation · P3 Drilling System · P4 Architectural Framework · P5 Viaduct Topside · P6 Pole and Tower · P7 Megafactory.

MMC-DWG-001-01 · CUTTER HEAD

ATS COMPONENT SHEET 1 · SUMMARY · HALF SECTION: DRILLING (LEFT) / IN SERVICE (RIGHT)



Precast concrete · Cutter head · Pads / inserts · Debris sleeve · Drill pipe · Tension tubular · Mud / cuttings · Loads

SUMMARY

CUTTER HEAD

- Drills the foundation bore at the base of the caisson.
- Stays in the ground as the anchor. It is sacrificial: one per foundation.
- The drill pipe drives it while drilling; the tension tubular latches into the same receptacle in service.
- Mud goes down the drill pipe; cuttings return through bores in the cutter head and up the caisson.
- The caisson bears on it through thrust pads, so the two turn independently.

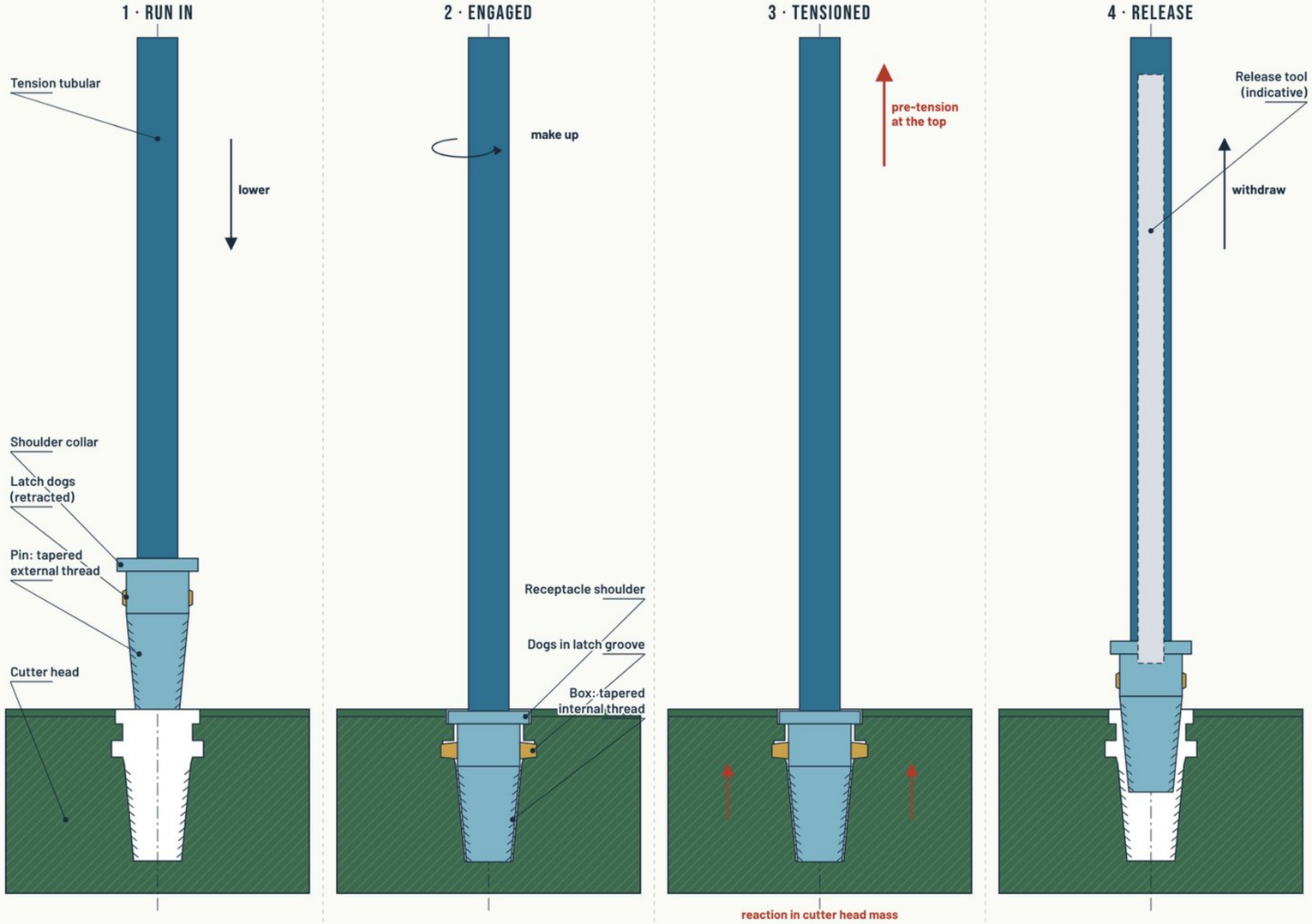
PATENTS P1 · P3

MULTI-MODAL CORRIDORS · MMC-DWG-001-01 · CUTTER HEAD

Schematic — not to scale unless dimensioned · Patents P1, P3
Rev B · 7 Nov 2026 · BB (Boh Brett) Murrell

MMC-DWG-001-02 · ANCHOR LATCH & RELEASE

ATS COMPONENT SHEET 2 · SUMMARY · FOUR STATES: RUN IN · ENGAGED · TENSIONED · RELEASE · PLUS CONTINGENCY ANCHOR



Dogs retracted. Lowered through the stack.

Pin in box, collar on shoulder, dogs sprung into the groove.

Load path: tubular → thread + dogs → cutter head (the anchor).

Release tool retracts the dogs; tubular pulled from the surface.

Tension tubular · Latch sub · Latch dogs / slips · Cutter head · Temporary tooling · Packer element · Loads / damage

SUMMARY

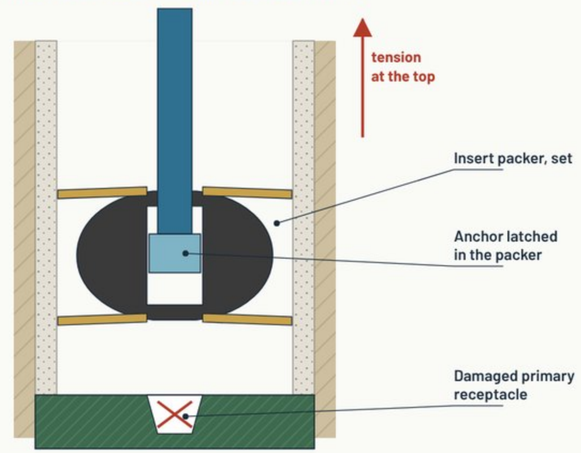
ANCHOR LATCH

- Joins the bottom of the tension tubular to the cutter head, which is the anchor.
- Run in from the surface after drilling; it seats on the shoulder and the dogs spring into the groove.
- Tension is applied at the top of the structure; the latch carries it into the cutter head.
- Uses the same receptacle as the drill pipe: one connection serves drilling, then service.
- Can be released and the tubular withdrawn from the top for inspection or replacement. Because it releases, the tubular can also be latched mid-construction where the design calls for it.
- Contingency (5): insert packer set above a damaged receptacle; the anchor latches inside it.

PATENTS P1 · P2

5 · CONTINGENCY ANCHOR

PRIMARY RECEPTACLE DAMAGED · SEE SHEET 001-10



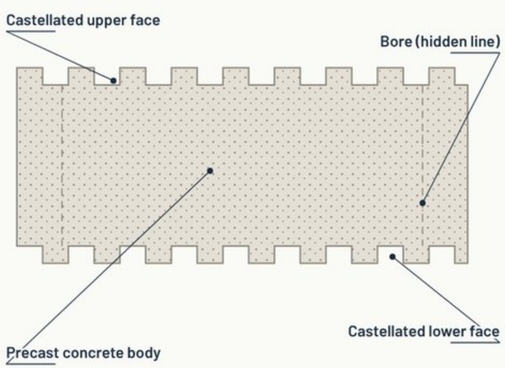
MULTI-MODAL CORRIDORS · MMC-DWG-001-02 · ANCHOR LATCH

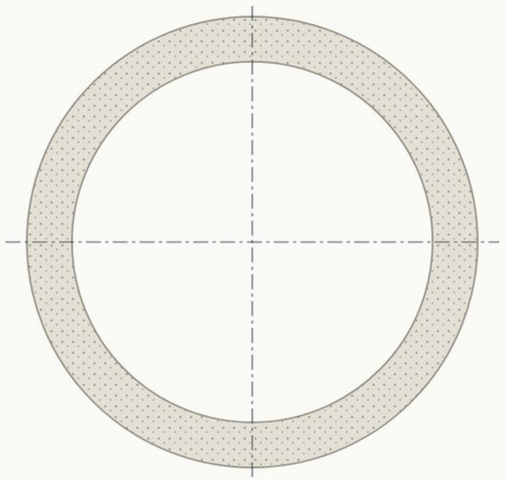
Schematic — not to scale unless dimensioned · Patents P1, P2
Rev C · 7 Nov 2026 · BB (Boh Brett) Murrell

MMC-DWG-001-03 · CAISSON RING

ATS COMPONENT SHEET 3 · SUMMARY · STANDARD RING · LEAD RING · RINGS IN THE BORE

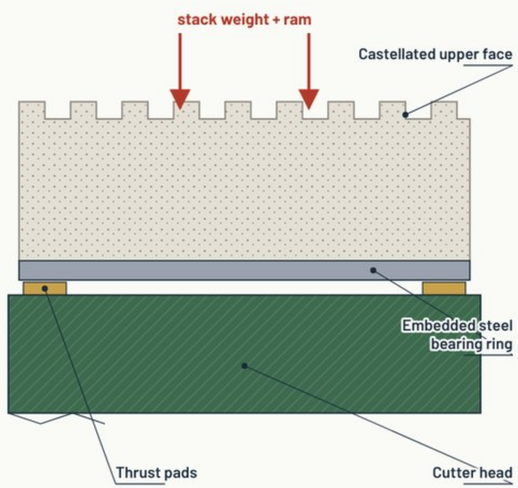
A · STANDARD RING





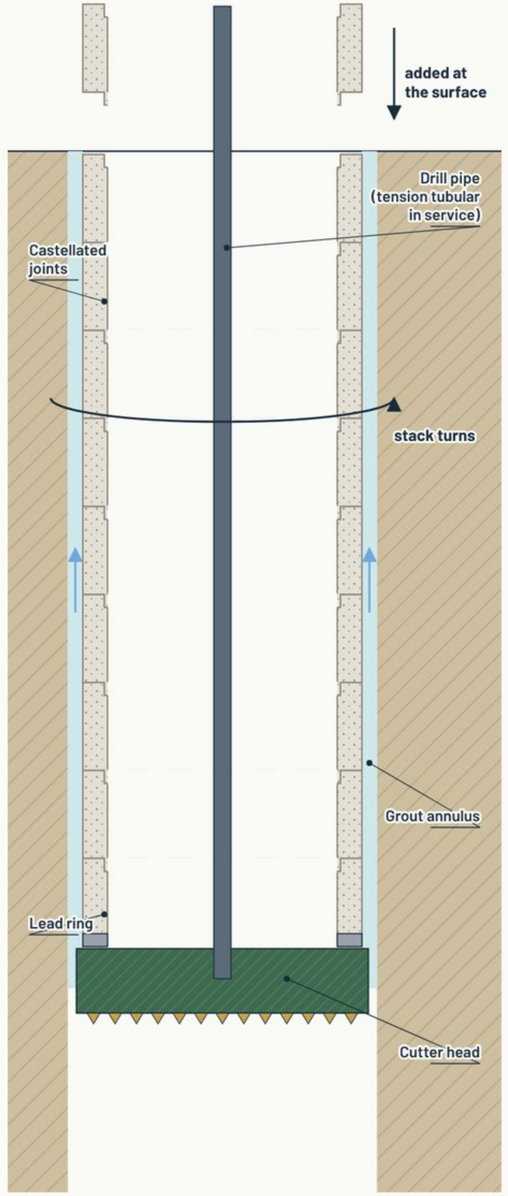
Plan: a hollow ring, one module repeated

B · LEAD RING



First ring in the stack. Its flat steel base bears on the cutter head, so the two turn independently.

C · IN THE BORE



SUMMARY

CAISSON RING

- Precast concrete ring, 4 m outside diameter. The foundation caisson is a stack of identical rings.
- Rings are added at the surface as the cutter head drills down; the stack follows the bore.
- Castellated faces lock ring to ring, so the whole stack can be turned to break ground friction as it advances.
- The lead ring has an embedded steel bearing ring and bears on the cutter head through the thrust pads.
- The annulus is grouted to lock the caisson in the ground. In service the stack is the sealed shell around the tension tubular.

PATENTS P1 · P2 · P7

Precast concrete · Steel bearing ring · Pads / inserts · Cutter head · Drill pipe · Grout · Loads

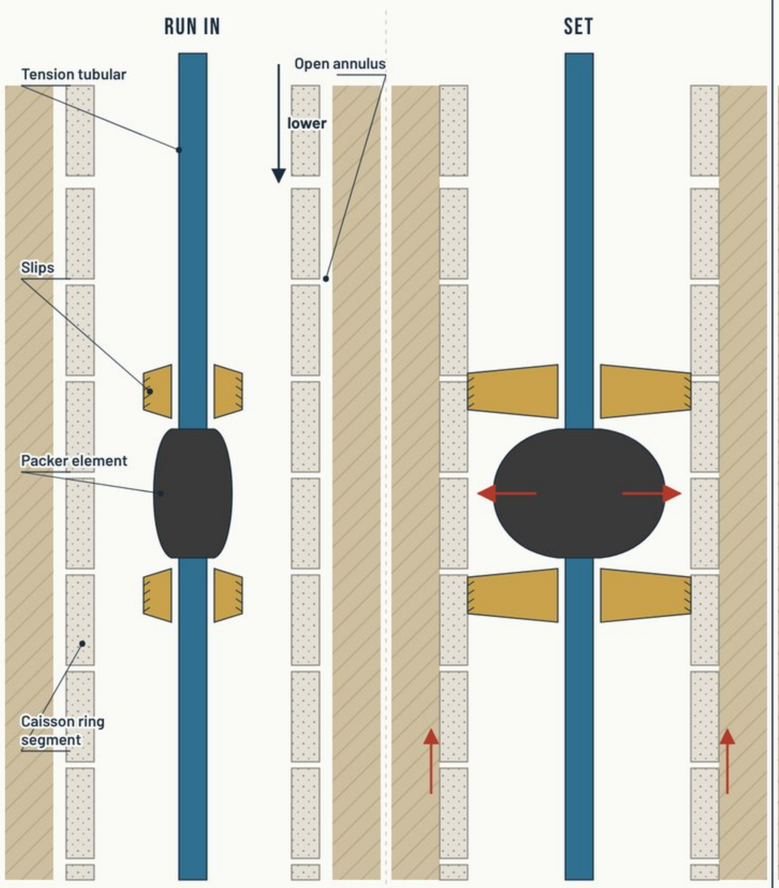
MULTI-MODAL CORRIDORS · MMC-DWG-001-03 · CAISSON RING

Schematic — not to scale unless dimensioned · Patents P1, P2, P7
Rev C · 7 Nov 2026 · BB (Boh Brett) Murrell

MMC-DWG-001-04 · EXPANSION PACKER

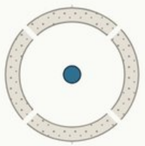
ATS COMPONENT SHEET 4 · SUMMARY · TWO VERSIONS: SEGMENTED-RING · SOLID-RING

A · SEGMENTED-RING VERSION



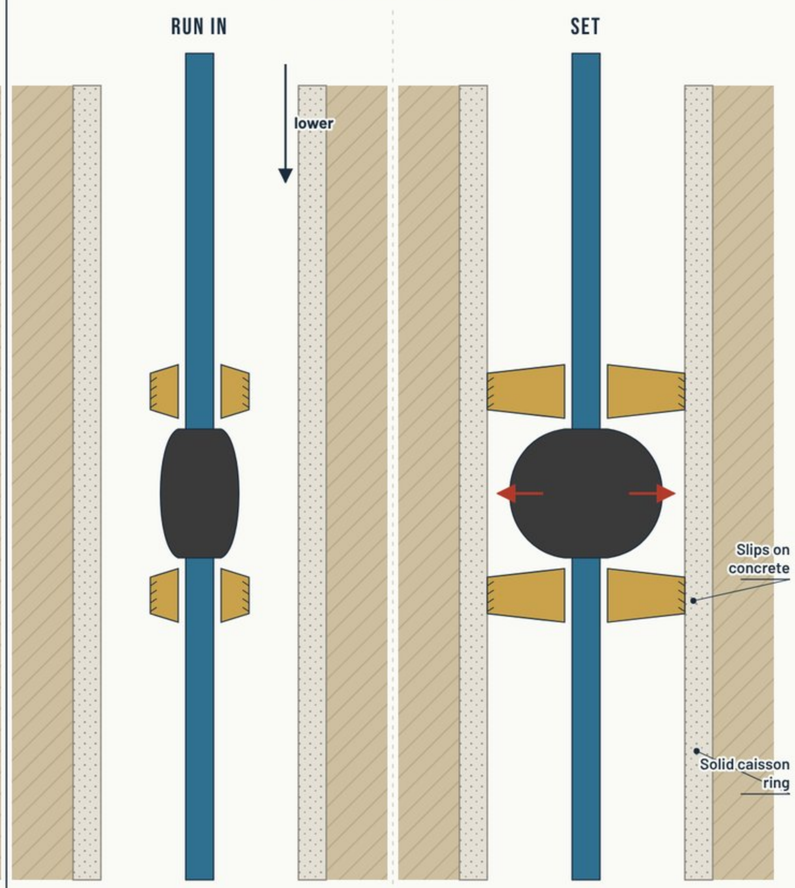
Segments sit inside the bore with an open annulus.

Packer drives the segments out against the bore wall: radial force becomes axial restraint.



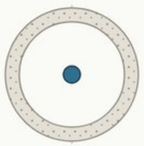
Plan: segmented ring

B · SOLID-RING VERSION



Lowered on the tubular to the chosen depth.

Slips grip the concrete face. Couples the tubular to the caisson at that depth.



Plan: solid ring

Precast concrete · Tension tubular · Slips · Packer element · Loads

SUMMARY

EXPANSION PACKER

- Two versions, both run in on the tension tubular. Slips and element expand outward when set.
- Segmented-ring version: drives the segments out against the bore wall; the radial force becomes axial restraint, locking the caisson before any grout.
- Solid-ring version: sets at a chosen depth, slips gripping the inside concrete face.
- It also acts as a centraliser for the tubular.
- Once the anchor is latched, it locks onto the tubular, coupling the caisson to the tension column and adding tensile strength.

PATENTS P1 · P2

MULTI-MODAL CORRIDORS · MMC-DWG-001-04 · EXPANSION PACKER

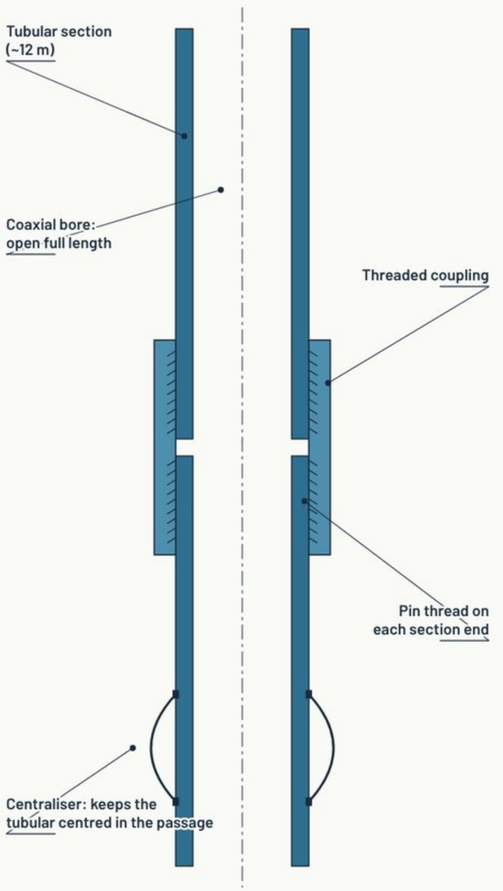
Schematic — not to scale unless dimensioned · Patents P1, P2

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MMC-DWG-001-05 · TENSION TUBULAR

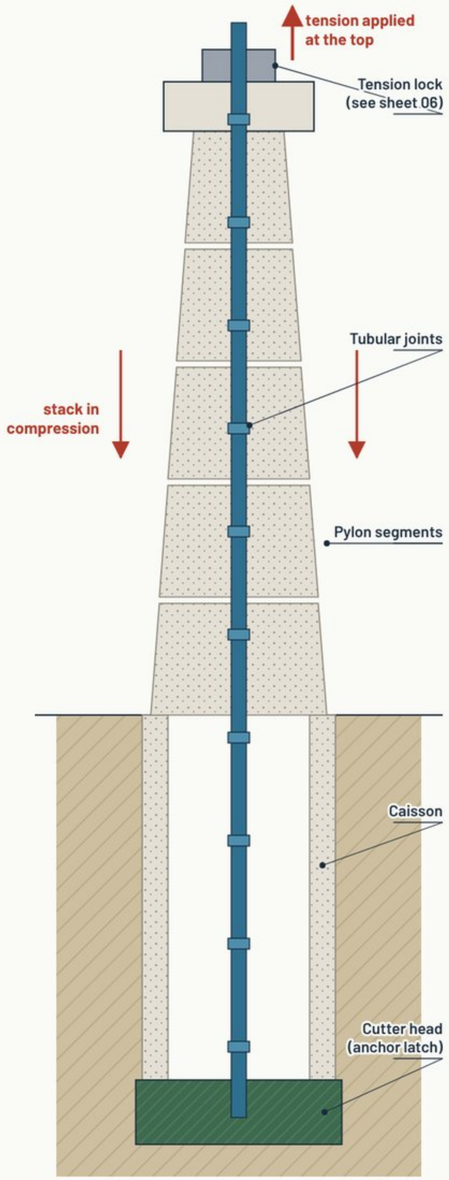
ATS COMPONENT SHEET 5 · SUMMARY · JOINT · STRING IN THE STRUCTURE · IN SERVICE

A · THREADED JOINT

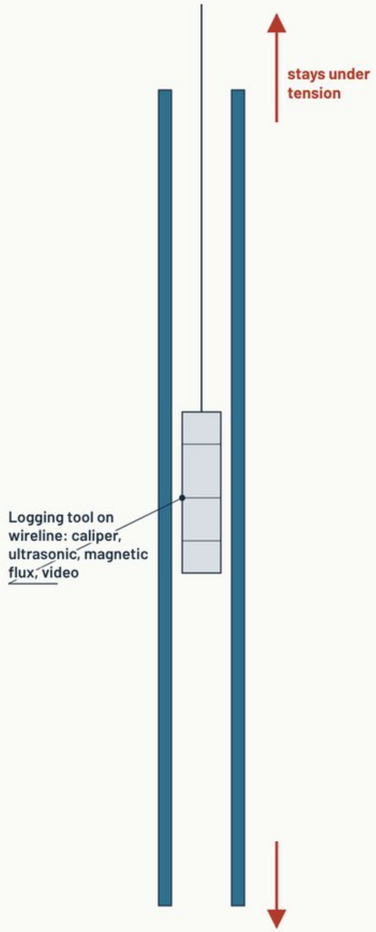


Oilfield-standard threaded connection; made up at the workover platform.

B · PYLON CAP TO CUTTER HEAD



C · IN SERVICE



Inspected in place while in service. Can be withdrawn at the pylon cap, inspected at the surface, re-run or replaced, and re-tensioned.

SUMMARY

TENSION TUBULAR

- A single steel tubular from the pylon cap to the cutter head, running in the coaxial passage of every pylon segment and the caisson.
- Made up from ~12 m sections of oilfield-standard casing, joined by threaded couplings and lowered through the stack.
- Latches into the cutter head at the bottom; tension is applied and locked at the pylon cap, putting the stack into compression.
- Centralisers keep it in the middle of the passage.
- Renewable: inspected in place, or withdrawn, re-tensioned or replaced over the 80+ year life.

PATENTS P4

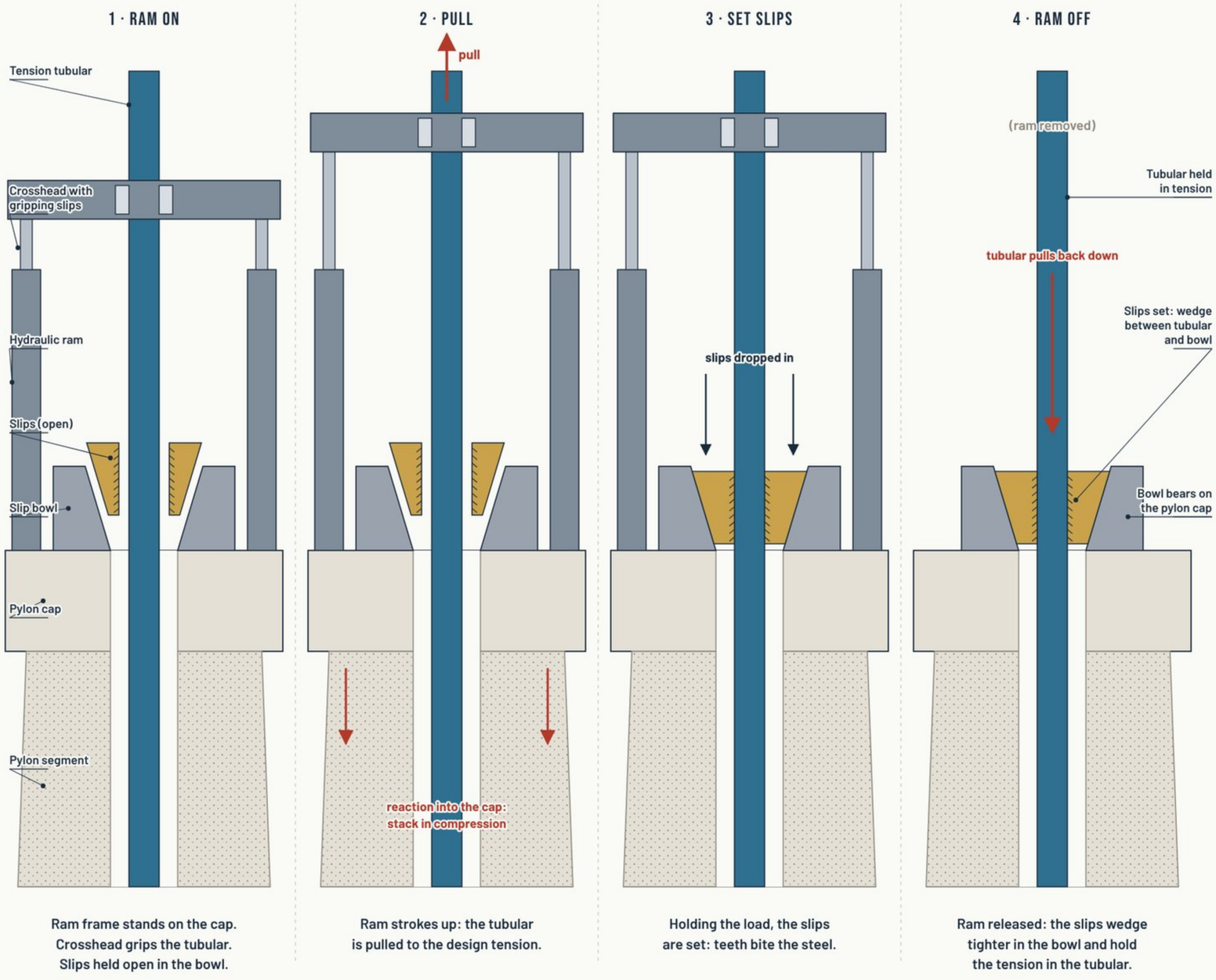
Tension tubular · Coupling · Precast concrete · Tension lock · Cutter head · Inspection tool · Loads

MULTI-MODAL CORRIDORS · MMC-DWG-001-05 · TENSION TUBULAR

Schematic — not to scale unless dimensioned · Patent P4
Rev B · 7 Nov 2026 · BB (Boh Brett) Murrell

MMC-DWG-001-06 · TENSION LOCK

ATS COMPONENT SHEET 6 · SUMMARY · AT THE PYLON CAP · FOUR STATES: RAM ON · PULL · SET SLIPS · RAM OFF



SUMMARY

TENSION LOCK

- Two parts at the pylon cap: a hydraulic ram that pulls the tubular, and a slip lock that holds it.
- The ram grips the tubular and pulls; its reaction bears on the pylon cap, putting the stack into compression.
- With the load held, wedge slips are set in a tapered bowl on the cap; their teeth bite the steel tubular.
- When the ram is released the tubular pulls back down, the slips wedge tighter, and the tension is locked in.
- The ram is removed. It is refitted to re-tension, or to lift the slips so the tubular can be withdrawn.

PATENTS P1 · P2

Tension tubular · Slips · Slip bowl · Hydraulic ram · Gripping slips (tool) · Precast concrete · Loads

MULTI-MODAL CORRIDORS · MMC-DWG-001-06 · TENSION LOCK

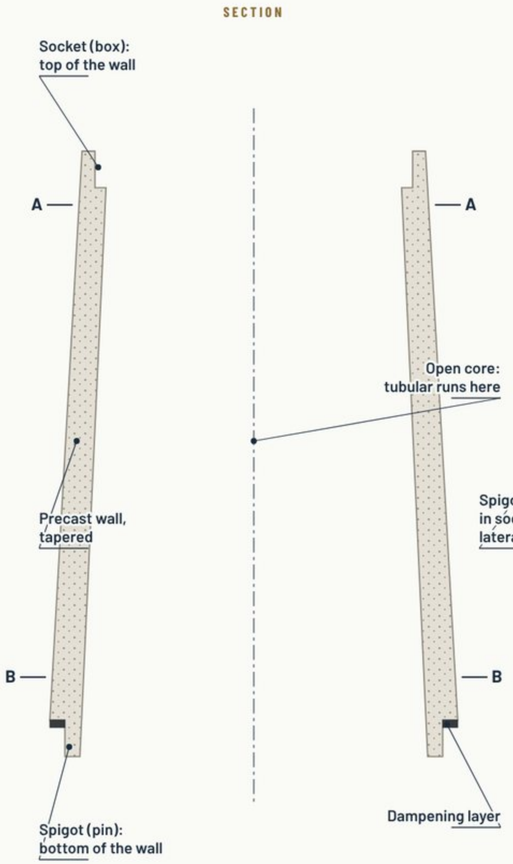
Schematic — not to scale unless dimensioned · Patents P1, P2
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MMC-DWG-001-07 · RISER SEGMENT

ATS COMPONENT SHEET 7 · SUMMARY · SEGMENT · PIN-AND-BOX JOINT · STACKED TAPER

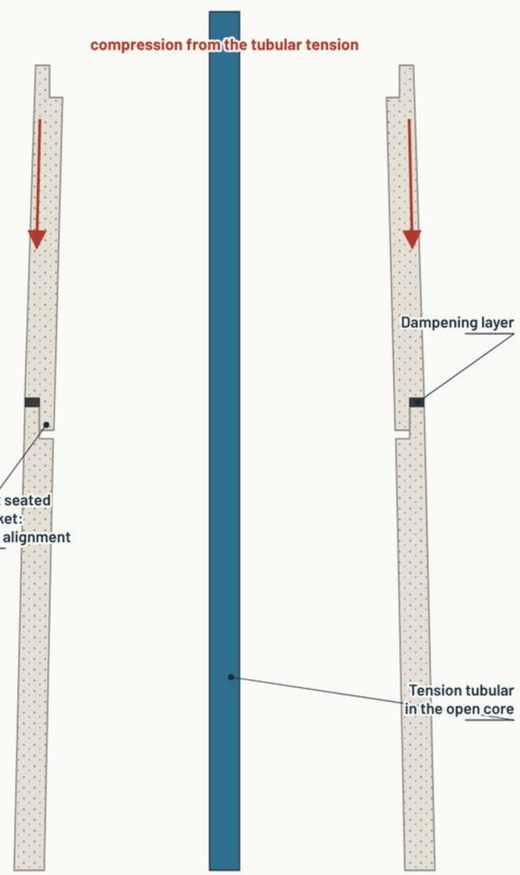
A · ONE SEGMENT

SECTION



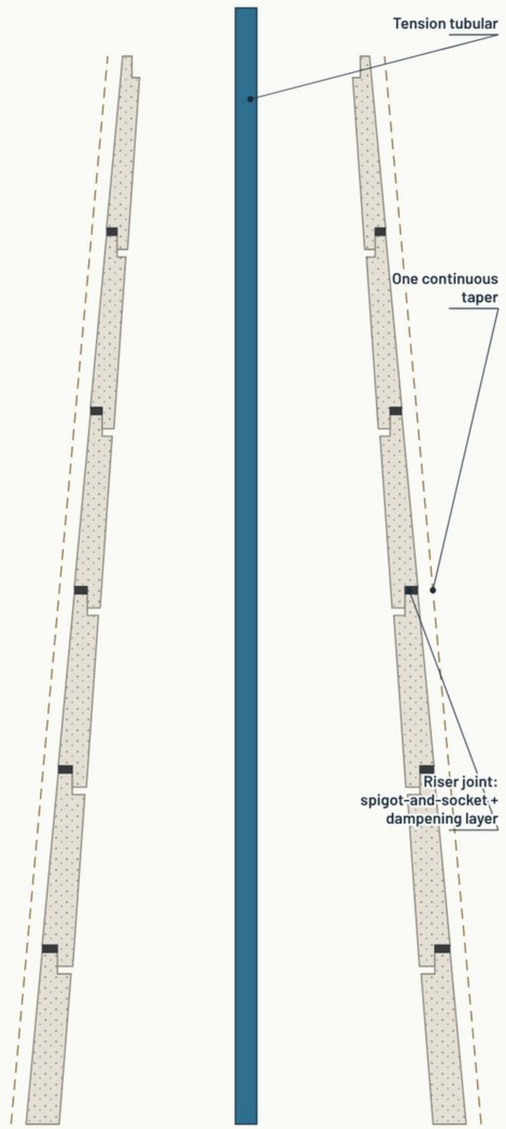
One module from the segment family; stacked dry to the height required.

B · PIN-AND-BOX JOINT

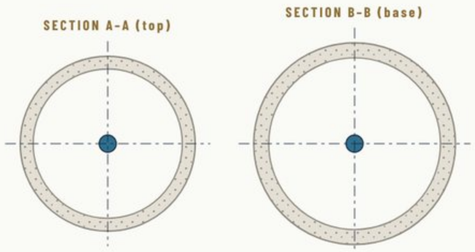


No bolts or welds: the tension holds the joint closed; the spigot aligns it.

C · STACKED: RISER JOINTS



Each segment's top matches the base of the one above, so the stack tapers.



Hollow ring section; tubular in the open core

Precast concrete · Dampening layer · Tension tubular · Loads

SUMMARY

RISER SEGMENT

- The pylon riser: hollow precast concrete, tapered (300 mm wall at the 4 m base). Segments stack dry to the height each pole or tower needs.
- Pin-and-box joints in the wall (spigot into socket) locate each segment on the one below, with a dampening layer at the joint.
- The tension tubular runs up the open core of every segment.
- The tensioned tubular compression-locks the stack into one structural unit: no bolts or welds.
- Each segment's top matches the base of the next, so the stacked segments form one continuous taper.

PATENTS P4

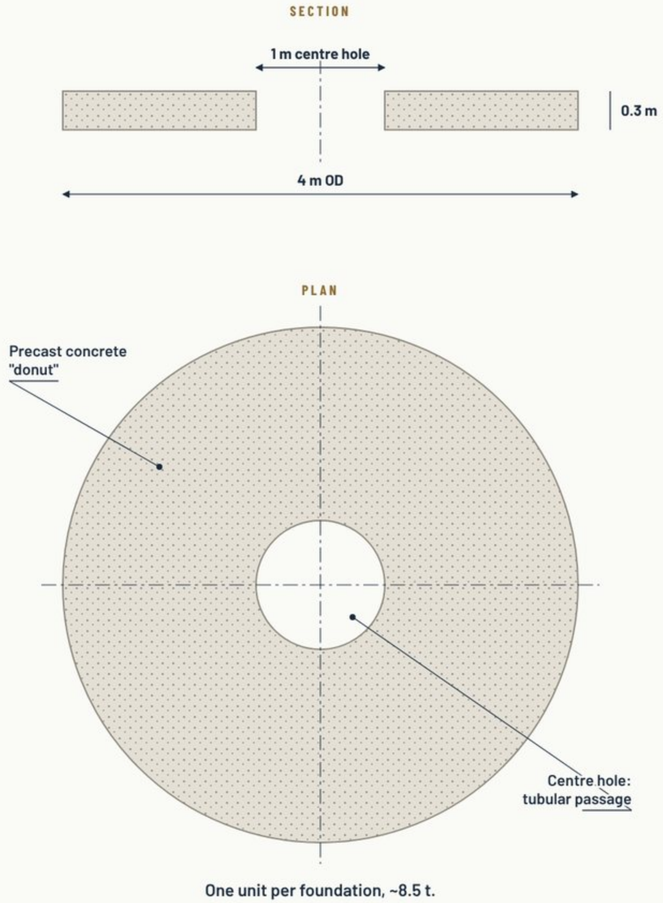
MULTI-MODAL CORRIDORS · MMC-DWG-001-07 · RISER SEGMENT

Schematic — not to scale unless dimensioned · Patent P4
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MMC-DWG-001-08 · CAISSON HEAD

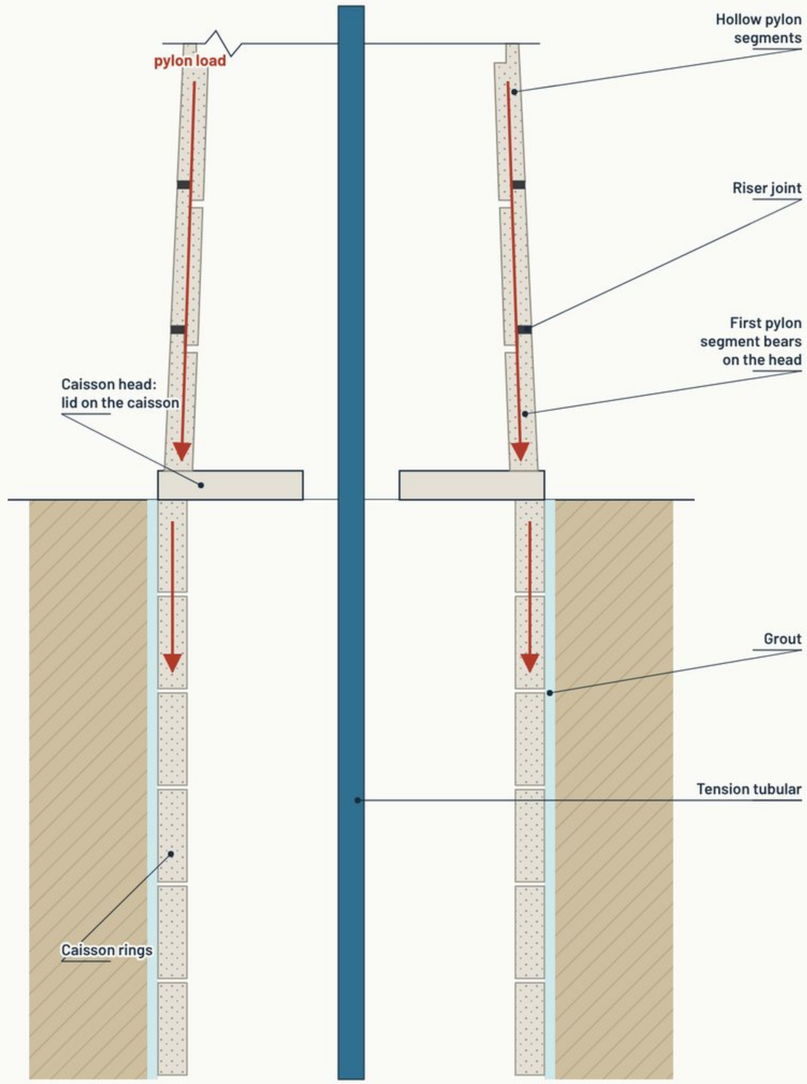
ATS COMPONENT SHEET 8 · SUMMARY · THE PART · IN PLACE ON THE CAISSON

A · THE PART



One unit per foundation, ~8.5 t.

B · IN PLACE



SUMMARY

CAISSON HEAD

- Precast concrete "donut": 4 m outside diameter, 1 m centre hole, 0.3 m thick.
- Sits as a lid on top of the caisson ring stack, at ground level.
- The first pylon segment bears on it; it spreads the pylon load into the caisson rings.
- The tension tubular passes through the centre hole, from the caisson into the pylon stack.
- One standard unit for every foundation, produced at Hub or Spoke plants.

PATENTS P1 · P2 · P7

Precast concrete · Dampening layer · Tension tubular · Grout · Loads

MULTI-MODAL CORRIDORS · MMC-DWG-001-08 · CAISSON HEAD

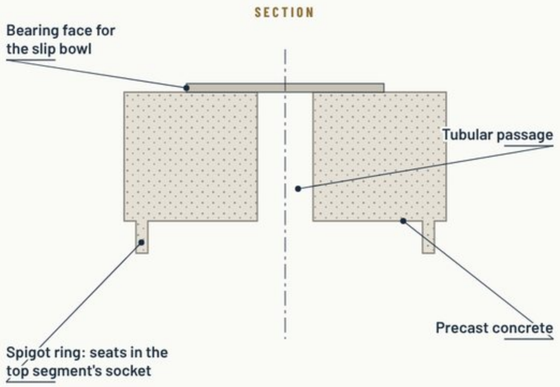
Schematic — not to scale unless dimensioned · Patents P1, P2, P7
Rev B · 7 Nov 2026 · BB (Boh Brett) Murrell

MMC-DWG-001-09 · PYLON CAP

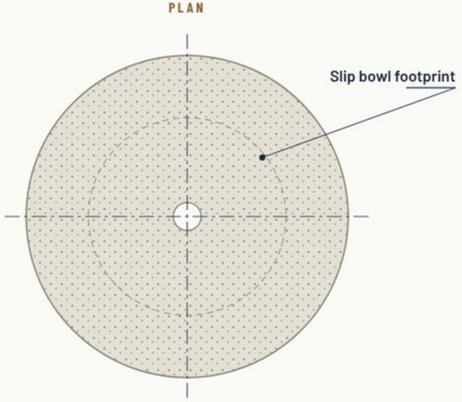
ATS COMPONENT SHEET 9 · SUMMARY · THE PART · ON TOP OF THE RISER STACK

A · THE PART

SECTION

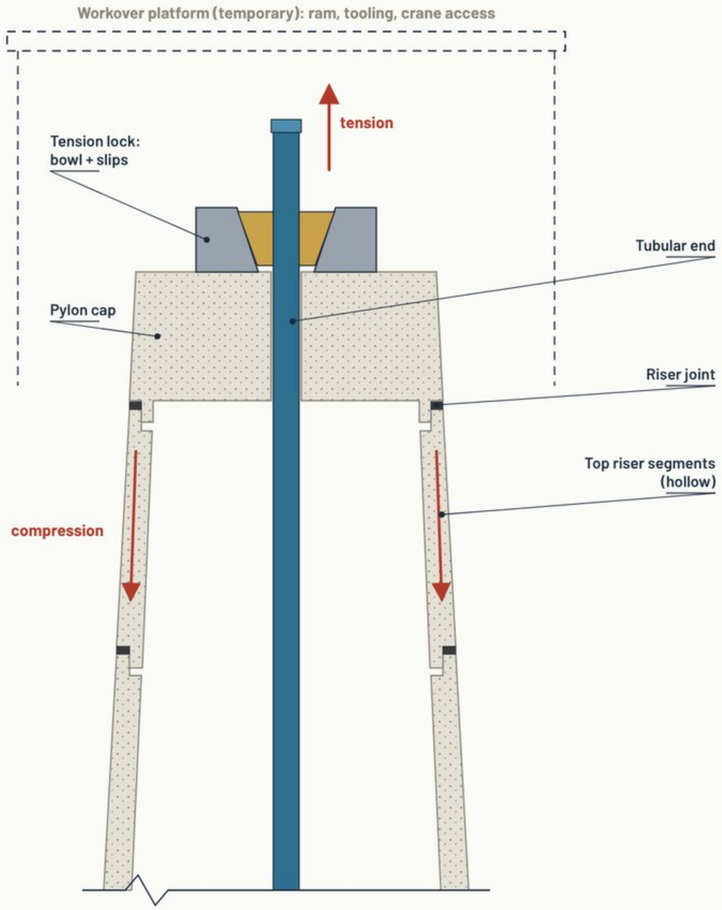


PLAN



Placed last on the dry-assembled stack.
~1.9 t (MMC-VB/VC module table).

B · ON TOP OF THE RISER STACK



SUMMARY

PYLON CAP

- Precast concrete cap, placed last on top of the riser stack.
- A solid lid on the hollow riser; a spigot ring seats in the top segment's socket.
- The tubular ends here. The tension lock's slip bowl sits on the cap, so the cap carries the tension into the stack as compression.
- Tensioning, re-tensioning and tubular withdrawal are all done at the cap, from a workover platform lifted to the top.
- Variants can carry top-mounted antennas.

PATENTS P2 · P4

Precast concrete · Dampening layer · Tension tubular · Slip bowl · Slips · Loads

MULTI-MODAL CORRIDORS · MMC-DWG-001-09 · PYLON CAP

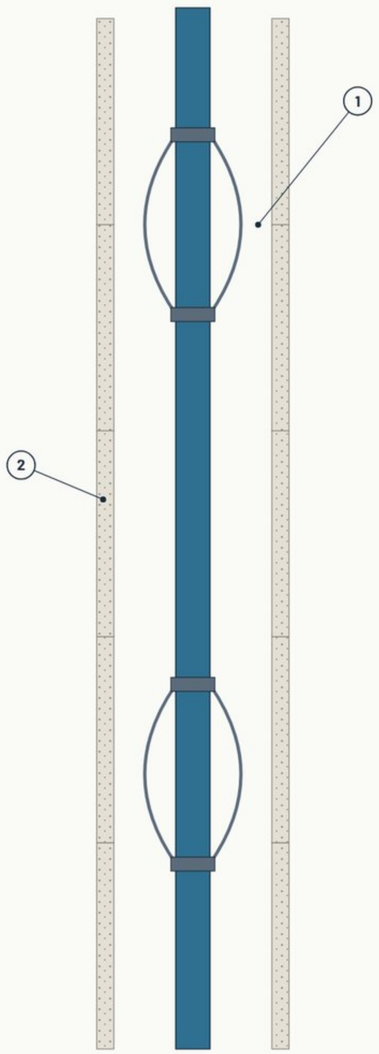
Schematic — not to scale unless dimensioned · Patents P2, P4
Rev B · 7 Nov 2026 · BB (Boh Brett) Murrell

MMC-DWG-001-10 · CENTRALISERS AND INSERT PACKER

ATS COMPONENT SHEET 10 · SUMMARY · CENTRALISER · ANCHOR CENTRALISER · INSERT PACKER (CONTINGENCY ANCHOR)

A · CENTRALISER

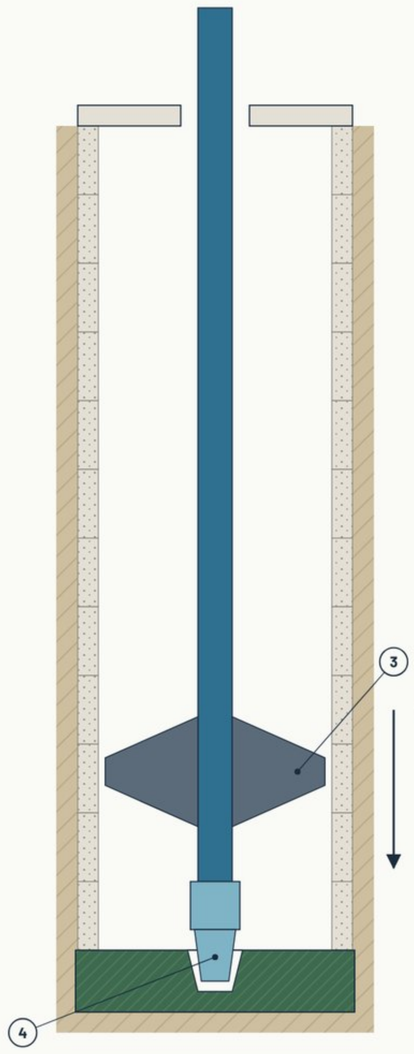
IN THE HOLLOW RISER



Bow springs keep the tubular centred while it is run in.

B · ANCHOR CENTRALISER

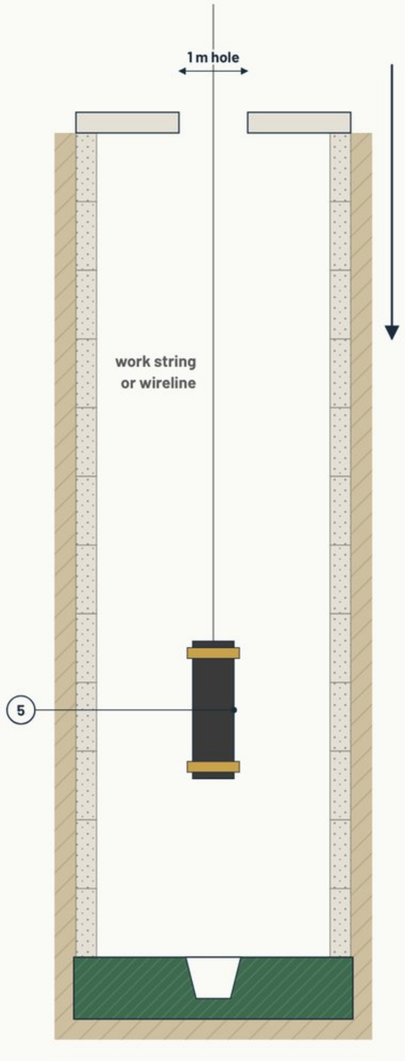
ABOVE THE ANCHOR LATCH



Rigid fins line the latch up with the receptacle below.

C · INSERT PACKER: RUN IN

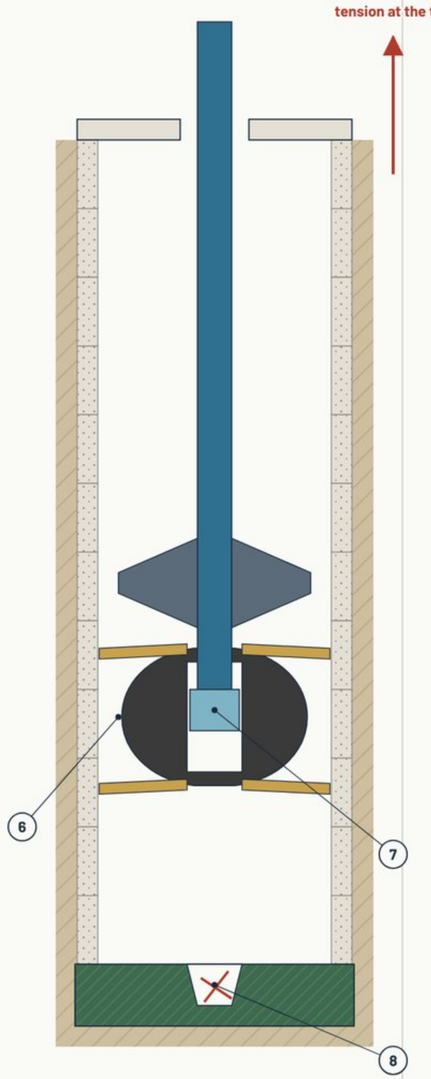
SMALL OD THROUGH THE TUBULAR HOLE



Passes the 1 m hole in the caisson head and the beam holes above.

D · SET: CONTINGENCY ANCHOR

PRIMARY RECEPTACLE DAMAGED



Large expansion grips the caisson; the anchor latches inside it.

Tension tubular · Anchor latch · Centraliser · Packer element · Slips · Precast concrete · Cutter head · Damage / tension

SUMMARY

CENTRALISERS AND INSERT PACKER

- Centraliser: bow springs clamped on the tubular keep it centred and off the walls while it is run in.
- Anchor centraliser: rigid fins just above the anchor latch line it up with the receptacle so it engages square.
- Insert packer: small outside diameter, so it runs through the tension-tubular hole; large expansion, so it grips the caisson wall when set. Run on a work string or wireline.
- Contingency anchor: if the primary receptacle in the cutter head is damaged, the insert packer is set above it and the tubular's anchor latches inside the packer. Tension is pulled from the top as normal.

PATENTS P1 · P2

CALLOUTS

1. Centraliser (bow spring)
2. Hollow riser
3. Anchor centraliser
4. Latch in the receptacle
5. Insert packer, run in
6. Insert packer, set
7. Anchor latched in the packer
8. Damaged primary receptacle

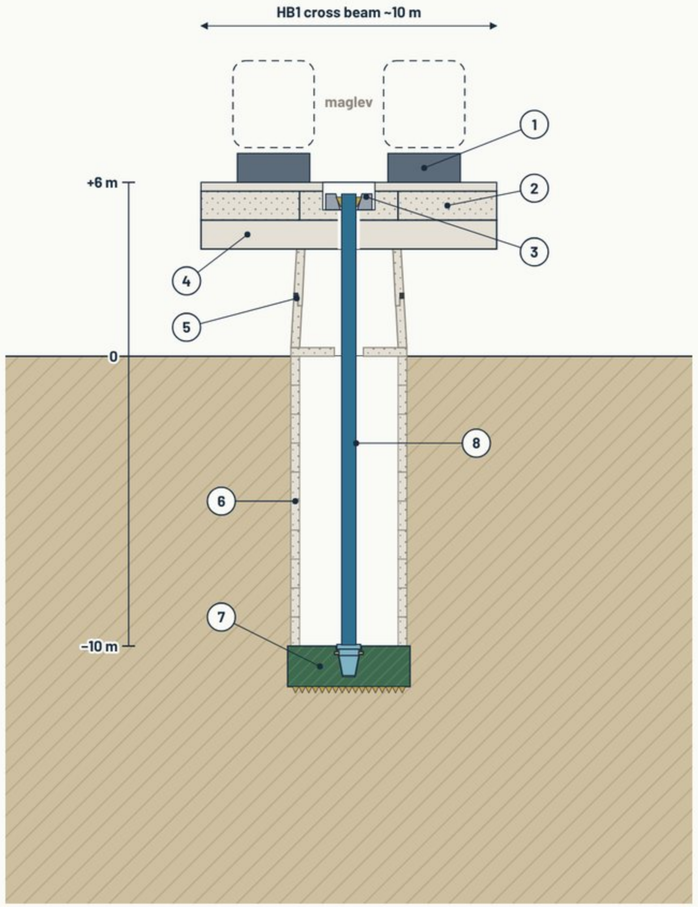
MULTI-MODAL CORRIDORS · MMC-DWG-001-10 · CENTRALISERS AND INSERT PACKER

Schematic — not to scale unless dimensioned · Patents P1, P2
Rev A · 7 Nov 2026 · BB (Boh Brett) Murrell

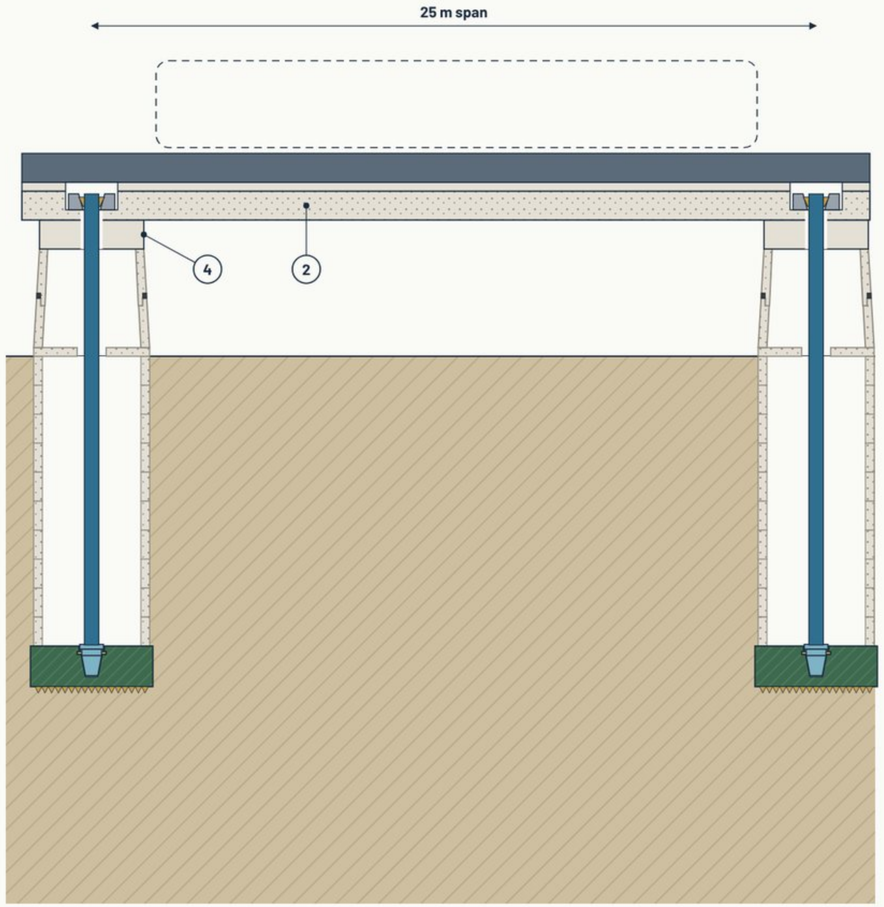
MMC-DWG-002-01 · MMC-VC VIADUCT

TOPSIDE SHEET 1 · SUMMARY · SINGLE LEG · SINGLE DECK (6 M STANDARD, 6–150 M+ BY TERRAIN)

A · CROSS-SECTION



B · SIDE ELEVATION (SAME SCALE)



Standard 6 m shown. The same riser segments stack to 20–70 m on ridges and 150 m+ at valleys.

SUMMARY

MMC-VC

- Single leg, single deck: the lightest viaduct in the MMC family. Standard deck height 6 m.
- One 4 m ATS caisson (~10 m deep). One tension tubular, latched in the cutter head and held by slips in a pocket in the centre longitudinal beam.
- The HB1 cross beam (~10 m) carries three longitudinal beams laid flush. The tubular passes through holes in the cross beam and the centre beam.
- Two maglev guideways sit either side of the centre pocket, clear of the tubular.
- The same riser segments stack from 6 m to 150 m+ to suit the terrain.
- The Newcastle–Sydney maglev (Phase 0-2) runs on MMC-VC.

PATENTS P5 (topside) · P1–P4 (foundation, stack)

CALLOUTS

1. Maglev guideways (2)
2. Longitudinal beams, 3 flush
3. Slips in centre beam pocket
4. HB1 cross beam
5. Riser (hollow)
6. ATS caisson, 4 m OD, ~10 m
7. Cutter head, tubular latched
8. Tension tubular

Precast concrete · Tension tubular · Slip bowl · Slips / inserts · Guideway · Cutter head

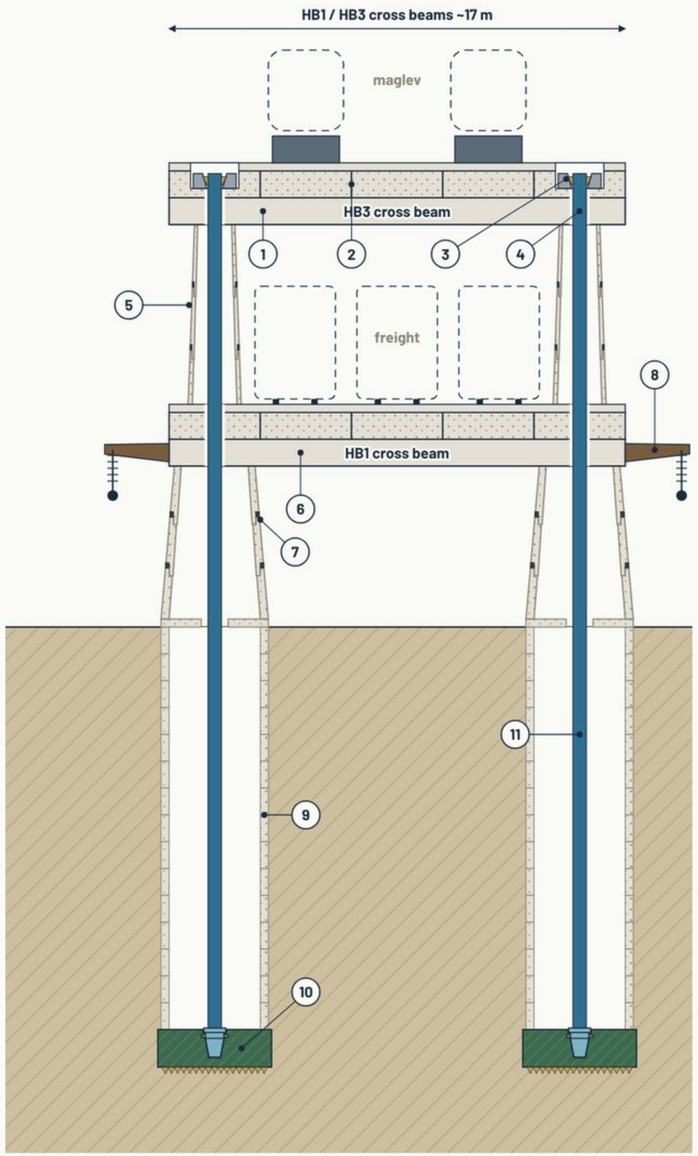
MULTI-MODAL CORRIDORS · MMC-DWG-002-01 · MMC-VC VIADUCT

Schematic — not to scale unless dimensioned · Patents P1–P5
Rev C · 7 Nov 2026 · BB (Boh Brett) Murrell

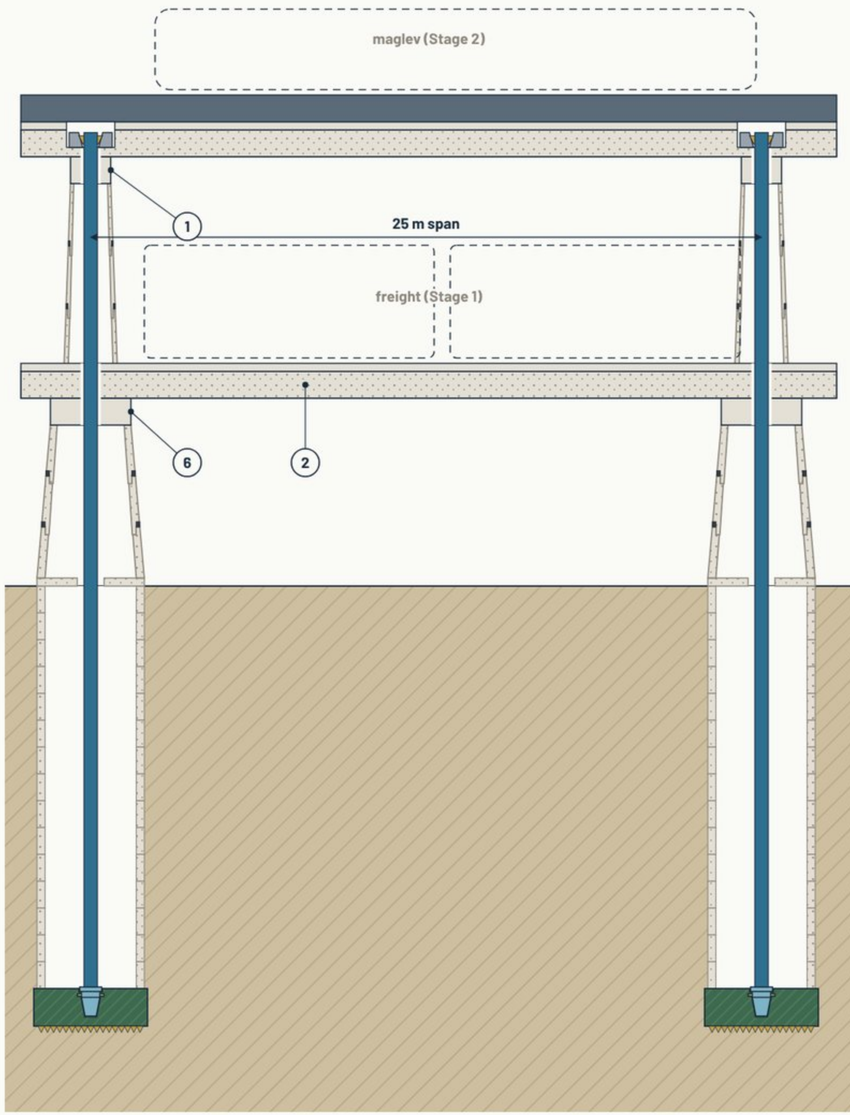
MMC-DWG-002-02 · MMC-VB VIADUCT

TOPSIDE SHEET 2 · SUMMARY · TWO LEGS · 6 M PYLON UNDER THE FREIGHT BEAMS · MAGLEV 17 M · PHASE 0 STANDARD

A · CROSS-SECTION



B · SIDE ELEVATION (SAME SCALE)



Near leg shown; the far leg stands 13.6 m behind it.

Precast concrete · Tension tubular · Slip bowl · Slips / inserts · Guideway · HVDC arm · Cutter head

SUMMARY

MMC-VB

- The Phase 0 corridor standard: two legs at the outer edges, two decks. The freight beams sit on a 6 m pylon; maglev at 17 m.
- Two 4 m ATS caissons per pylon (~15 m deep). One tension tubular per leg, latched in the cutter head and held by tension slips set in a pocket in the upper longitudinal beam, clear of the maglev deck.
- At each deck a cross beam (HB1, HB3) carries five longitudinal beams laid flush across the full width. The legs sit under the outer beams (1 and 5); the tubulars pass through holes in those beams, which helps with the dampening, and the tension clamps the beams into the pylon.
- HB1 carries three freight tracks between the legs, and the HVDC arms; HB3 carries the maglev deck.
- The same structure carries gas, hydrogen, water, sovereign fibre and a hyperloop reservation.
- Built in two stages: freight first, then maglev added above the running freight line.
- Melbourne–Brisbane Phase 0 (2,400 km) and the Hunter spur are built to MMC-VB.

PATENTS P5 (topside) · P1–P4 (foundation, stack)

CALLOUTS

1. HB3 maglev cross beam
2. Longitudinal beams, 5 per deck
3. Slips in upper beam pocket
4. Tubular through beam holes
5. P3/P4 upper risers
6. HB1 freight cross beam
7. P1/P2 lower risers
8. HVDC arm (indicative)
9. ATS caisson, 4 m OD, ~15 m
10. Cutter head, tubular latched
11. Tension tubular

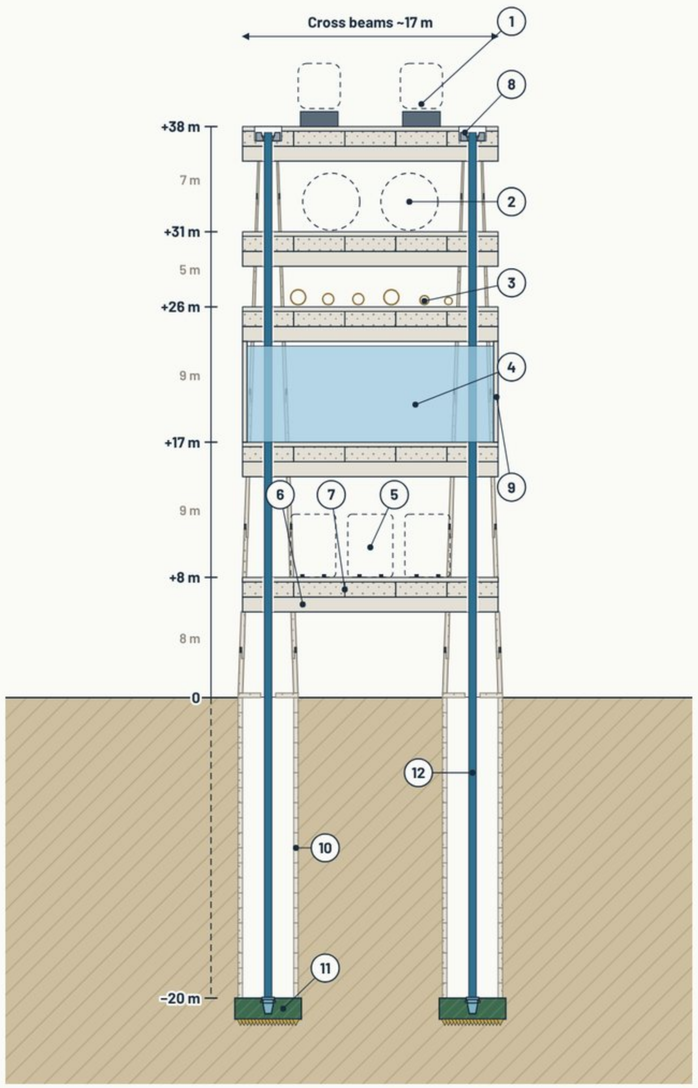
MULTI-MODAL CORRIDORS · MMC-DWG-002-02 · MMC-VB VIADUCT

Schematic — not to scale unless dimensioned · Patents P1–P5
Rev B · 7 Nov 2026 · BB (Boh Brett) Murrell

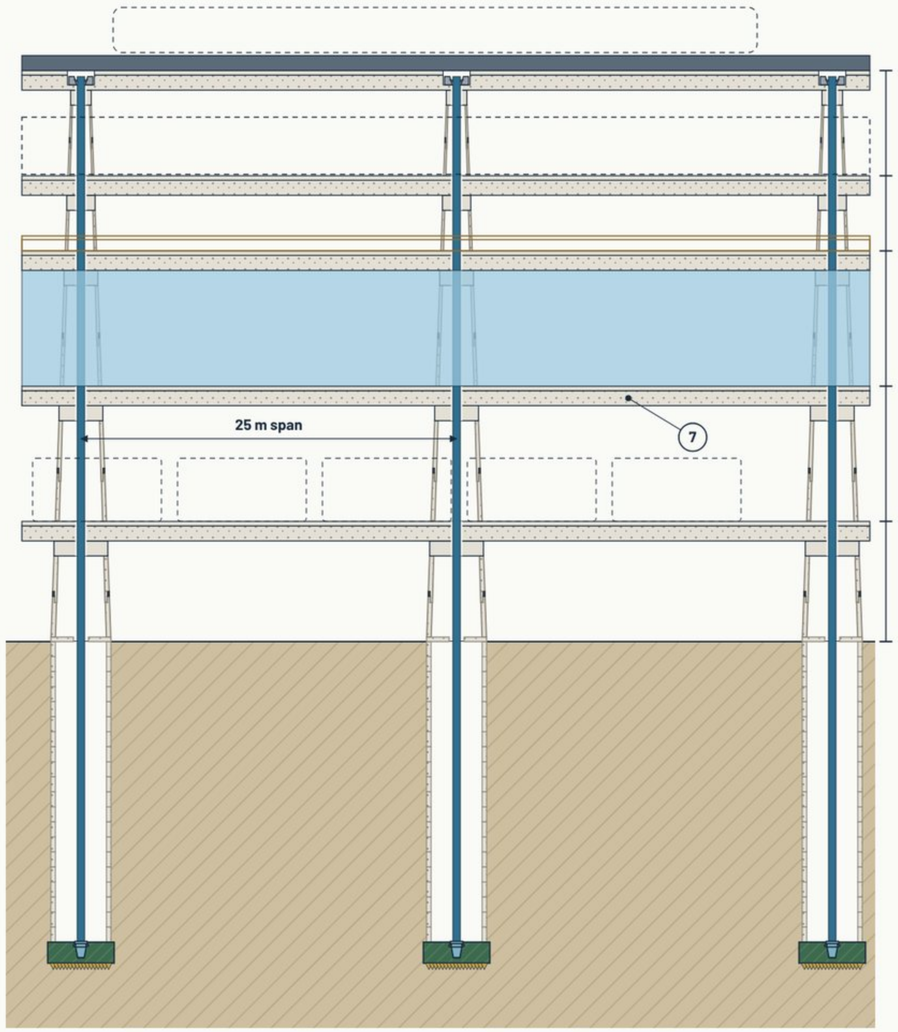
MMC-DWG-002-03 · MMC-VA VIADUCT

TOPSIDE SHEET 3 · SUMMARY · TWO LEGS · FIVE LEVELS: FREIGHT 8 · AQUEDUCT 17 · SERVICES 26 · HYPERLOOP 31 · MAGLEV 38 M

A · CROSS-SECTION



B · SIDE ELEVATION (SAME SCALE)



Near leg shown; the far leg stands 13.6 m behind it.

Precast concrete · Tension tubular · Water · Pipelines · Guideway · Slip bowl · Cutter head

SUMMARY

MMC-VA

- The continental standard: two legs at the outer edges, five levels. Freight 8 m, aqueduct 17 m, services 26 m, hyperloop reservation 31 m, maglev 38 m.
- Two 4 m ATS caissons per pylon (~20 m deep). One tubular per leg, from the cutter head to slips set in the top (maglev) beam.
- Every level has a cross beam (HB1–HB5) carrying five flush longitudinal beams. The tubular passes through holes in the outer beams at every level.
- The risers taper from 4 m at the base to 1.2 m at the top, from the same segment family as MMC-VB and VC.
- The aqueduct chute fills the full width and height of its bay; the water load is the governing design case (site: ~4,250 t per span).
- Phase 1–3 continental corridors are built to MMC-VA.

PATENTS P5 (topside) · P1–P4 (foundation, stack)

CALLOUTS

1. Maglev deck, slips in top beam
2. Hyperloop reservation (31 m)
3. Services: pipelines (26 m)
4. Aqueduct chute, full width and height
5. Freight, 3 tracks (8 m)
6. Cross beam, one per level
7. Longitudinal beams, 5 per level
8. Tension slips, top beam pocket
9. Risers, 4 m to 1.2 m taper
10. ATS caisson, 4 m OD, ~20 m
11. Cutter head, tubular latched
12. Tubular through every level

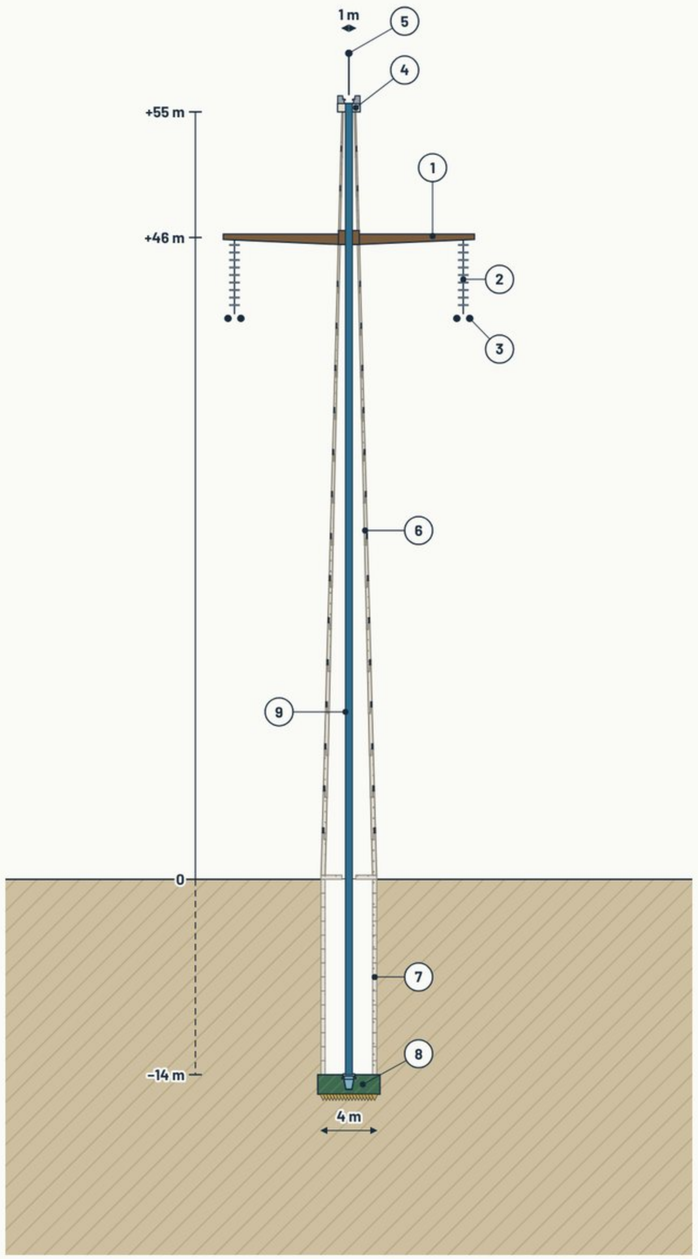
MULTI-MODAL CORRIDORS · MMC-DWG-002-03 · MMC-VA VIADUCT

Schematic — not to scale unless dimensioned · Patents P1–P5
Rev B · 7 Nov 2026 · BB (Boh Brett) Murrell

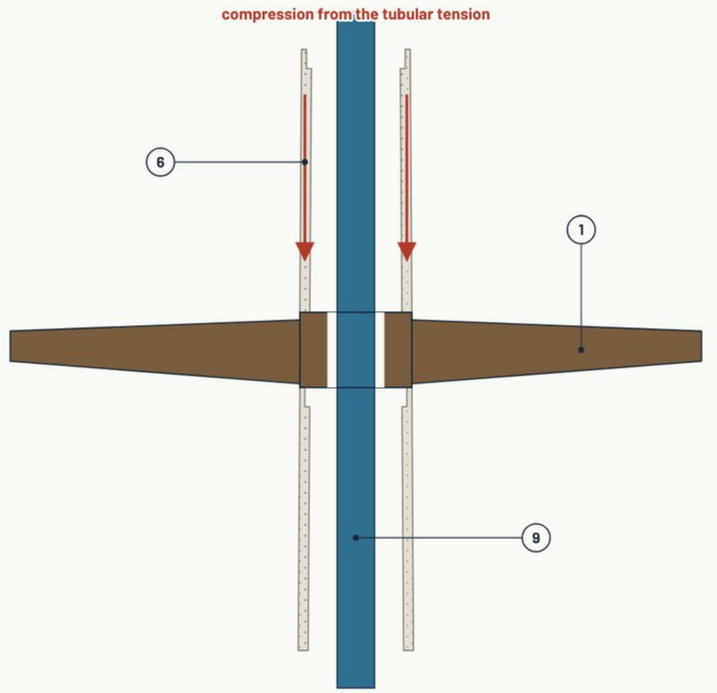
MMC-DWG-002-04 · MMC-TB TRANSMISSION

TOPSIDE SHEET 4 · SUMMARY · SINGLE-LEG STANDARD TOWER · 4 M BASE TO 1 M TOP · ±500 KV HVDC SHOWN

A · TOWER ELEVATION



B · CROSS-ARM JOINT (ENLARGED)



The hub is clamped between two riser segments.
No bolts or welds; the tubular passes through the hub.

SUMMARY

MMC-TB

- The standard single-pylon transmission tower: about 80% of the network, 22 kV to ±500 kV HVDC.
- Hollow precast riser, 4 m base to 1 m top, 300 mm to 100 mm wall, typically 50–60 m high.
- One 4 m ATS caisson (8–18 m by geology) and one 20" tension tubular, latched in the cutter head and locked at the pylon cap.
- Cross-arms are captured at riser joints, clamped between segments by the tubular tension.
- Built in 1–2 days per tower with a single crane day.

PATENTS P6 (pole and tower) · P1–P4 (foundation, stack)

CALLOUTS

1. Cross-arm, hub captured
2. Insulator string
3. Conductor bundle
4. Pylon cap + tension lock
5. Earth wire peak
6. Hollow riser, 4 m to 1 m
7. ATS caisson, 4 m OD
8. Cutter head, tubular latched
9. 20" tension tubular

Precast concrete · Tension tubular · Cross-arm · Insulators · Slip bowl · Cutter head · Loads

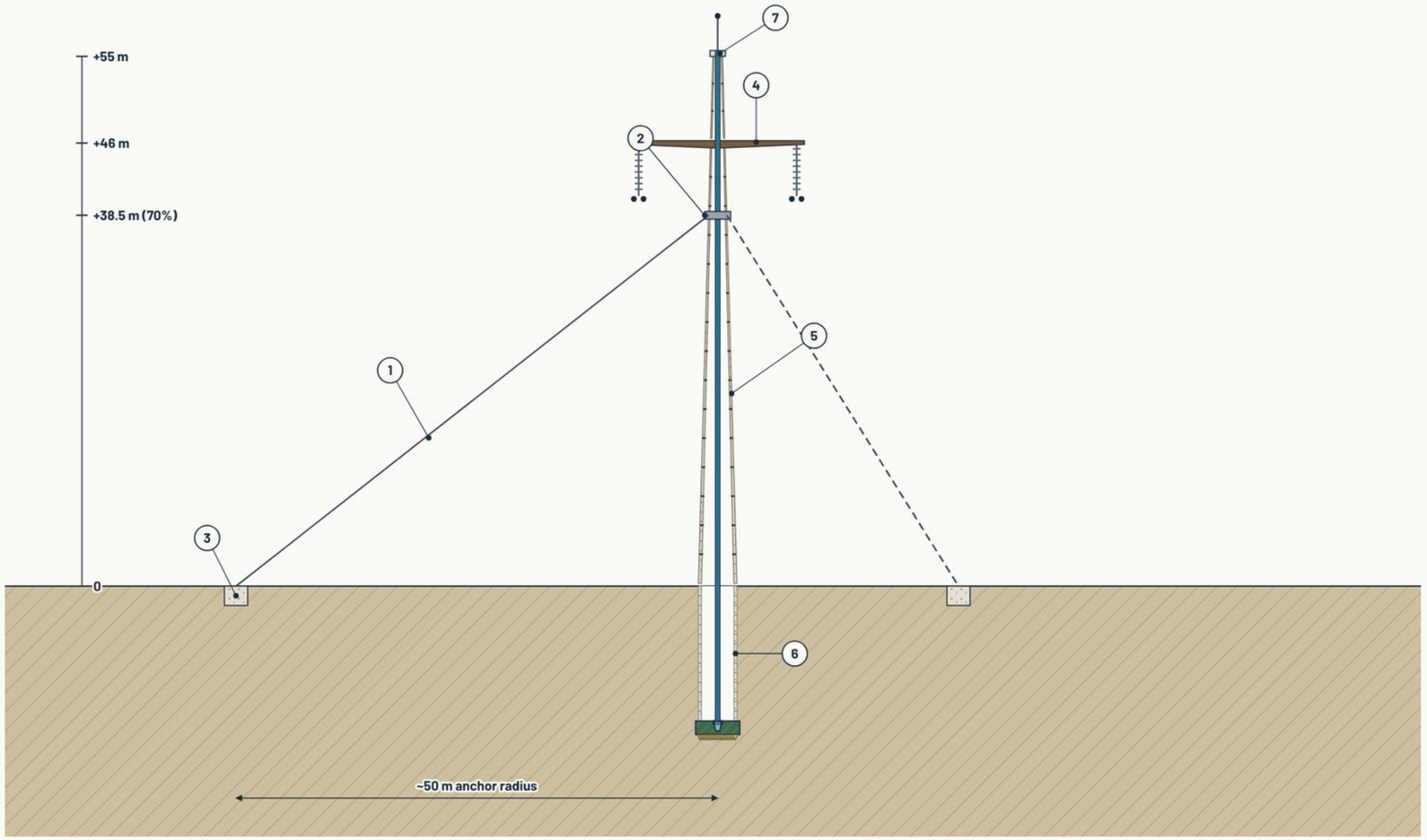
MULTI-MODAL CORRIDORS · MMC-DWG-002-04 · MMC-TB TRANSMISSION

Schematic — not to scale unless dimensioned · Patents P1–P4, P6
Rev B · 7 Nov 2026 · BB (Boh Brett) Murrell

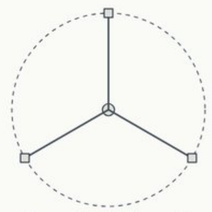
MMC-DWG-002-05 · MMC-TB GUYED

TOPSIDE SHEET 5 · SUMMARY · STANDARD MMC-TB TOWER + 3 GUY WIRES AT 70% HEIGHT · ANCHORS AT ~50 M RADIUS

A · ELEVATION



B · PLAN



3 guys at 120° (4 also used)

SUMMARY

MMC-TB GUYED

- The standard MMC-TB tower, plus three (or four) guy wires from about 70% of its height to ground anchors about 50 m out.
- The guys take 60–80% of the lateral conductor load straight to ground, cutting the base bending moment by about 70%.
- The tubular tension needed drops to about 40% of the bare tower, so the standard 20" tubular covers ±500 kV HVDC strain.
- Needs a 50 m easement at the tower only, not along the corridor. For remote and outback corridors, mining and farm land.

PATENTS P6 (pole and tower) · P1–P4 (foundation, stack)

CALLOUTS

1. Guy wire
2. Guy collar at 70% height
3. Ground anchor (indicative)
4. Cross-arm, hub captured
5. Hollow riser, 4 m to 1 m
6. ATS caisson + cutter head
7. Pylon cap + tension lock

Precast concrete · Tension tubular · Guy wire · Guy collar · Cross-arm · Cutter head

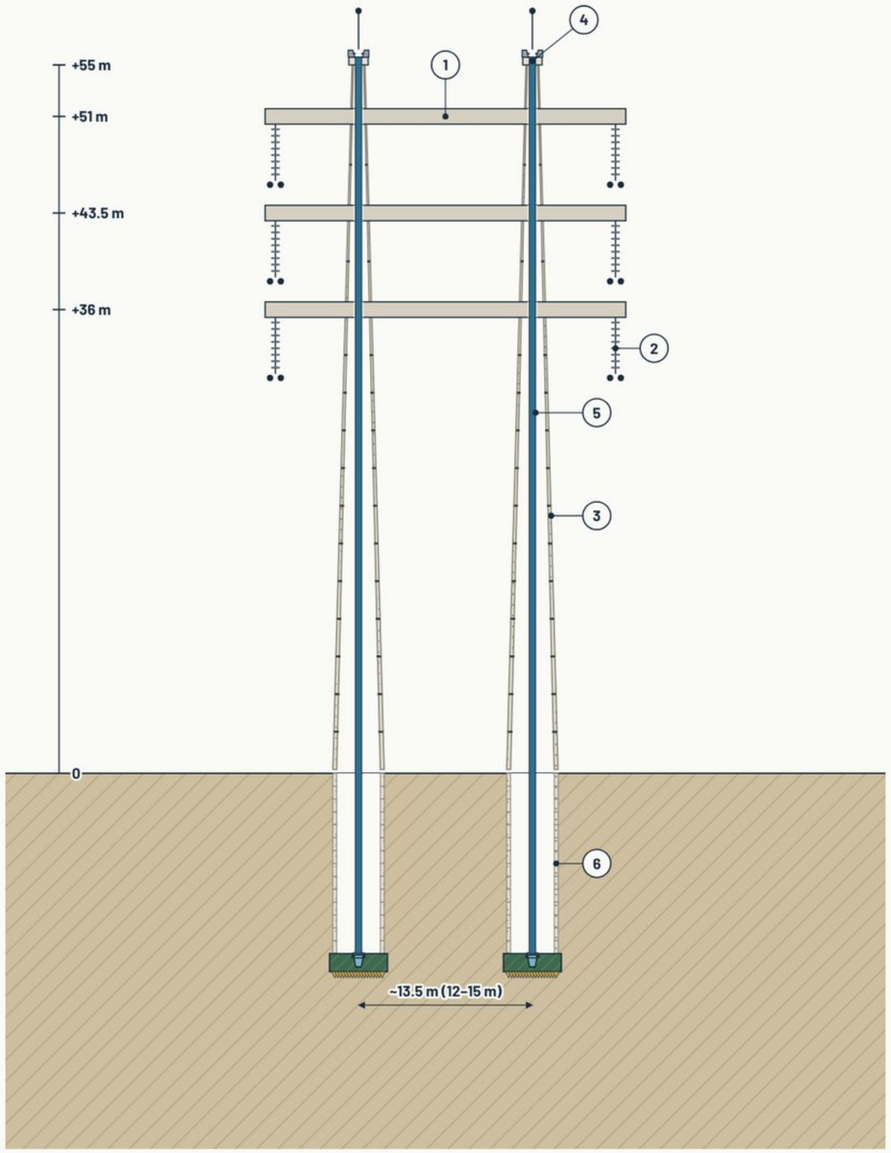
MULTI-MODAL CORRIDORS · MMC-DWG-002-05 · MMC-TB GUYED

Schematic — not to scale unless dimensioned · Patents P1–P4, P6
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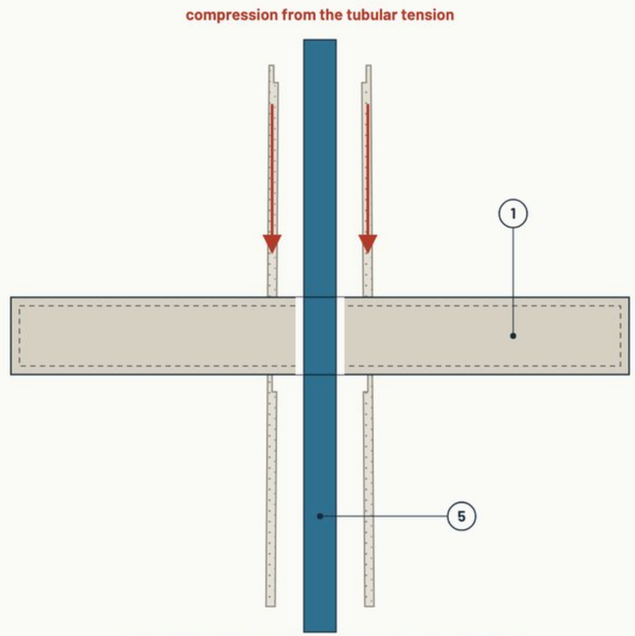
MMC-DWG-002-06 · MMC-TA PORTAL

TOPSIDE SHEET 6 · SUMMARY · DUAL-TOWER PORTAL · TWO STANDARD PYLONS ~13.5 M APART · THREE CAPTURED CROSS-BEAMS

A · PORTAL ELEVATION



B · CROSS-BEAM THROUGH A PYLON



Each cross-beam is clamped between riser segments in both pylons; the tubulars pass through holes in it.

SUMMARY

MMC-TA

- Two standard MMC pylons about 12–15 m apart, coupled by three cross-beams captured through both stacks.
- Each cross-beam carries one circuit or bipole. Concrete box girder preferred; steel or hybrid for high loads.
- Each pylon keeps its own 4 m ATS caisson and single 20" tubular, the same SKU as MMC-TB.
- The portal shares lateral and longitudinal loads, cutting the tubular tension per pylon to about 20% of a single tower.
- For strain towers, river crossings and heavy conductors, 330 kV AC up to ±1100 kV UHVDC (three-bipole strain needs guys).

PATENTS P6 (pole and tower) · P1–P4 (foundation, stack)

CALLOUTS

1. Cross-beam (box girder), x3
2. Insulator + conductor bundle
3. Standard pylon, 4 m to 1 m
4. Pylon cap + tension lock
5. 20" tubular through the beams
6. ATS caisson + cutter head

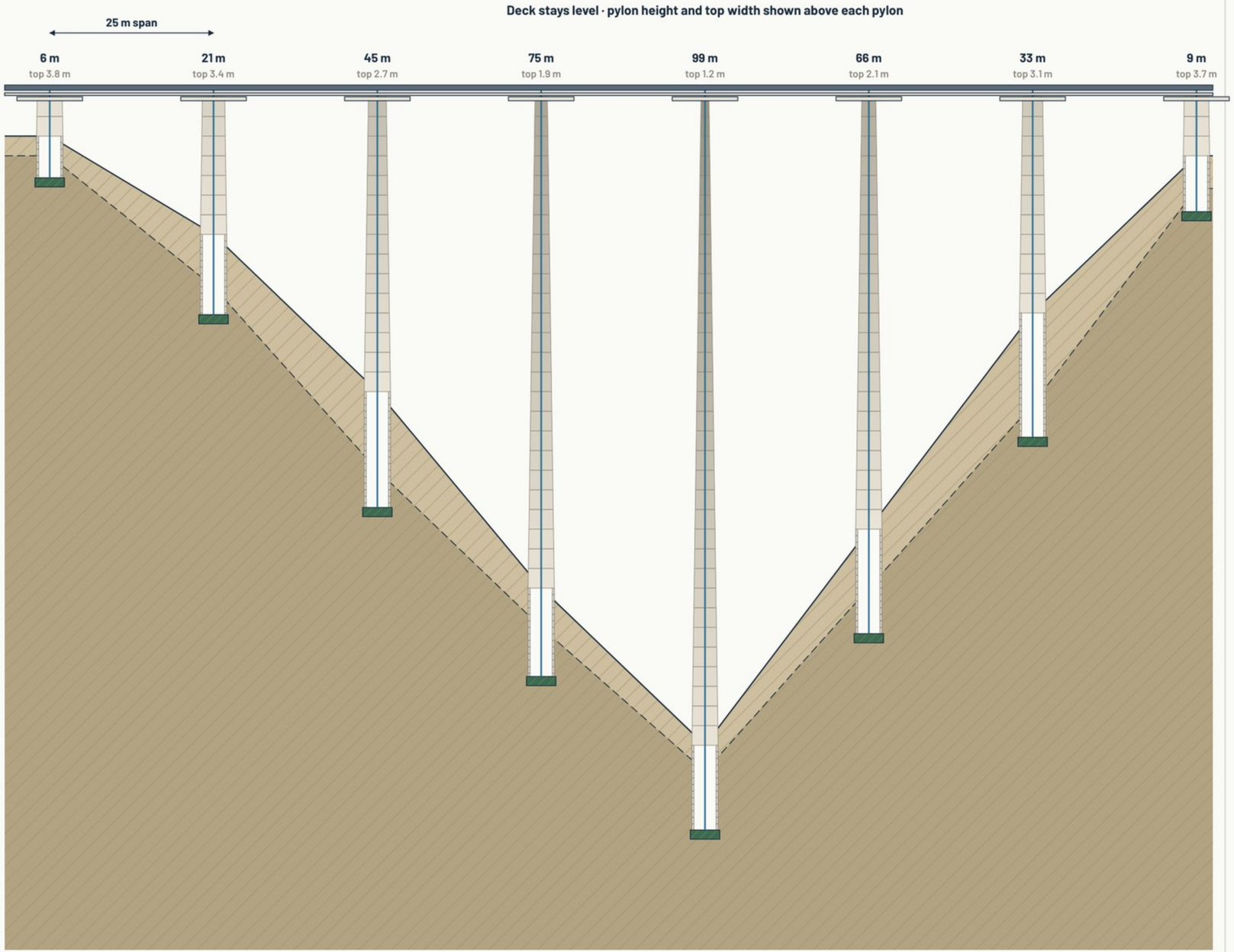
Precast concrete · Cross-beam · Tension tubular · Insulators · Slip bowl · Cutter head · Loads

MULTI-MODAL CORRIDORS · MMC-DWG-002-06 · MMC-TA PORTAL

Schematic — not to scale unless dimensioned · Patents P1–P4, P6
Rev B · 7 Nov 2026 · BB (Boh Brett) Murrell

MMC-DWG-002-07 · ACROSS TERRAIN

TOPSIDE SHEET 7 · SUMMARY · MMC-VC ON 25 M SPANS · ONE TAPERED SEGMENT FAMILY · EVERY PYLON STARTS AT 4 M ON THE 4 M BORE



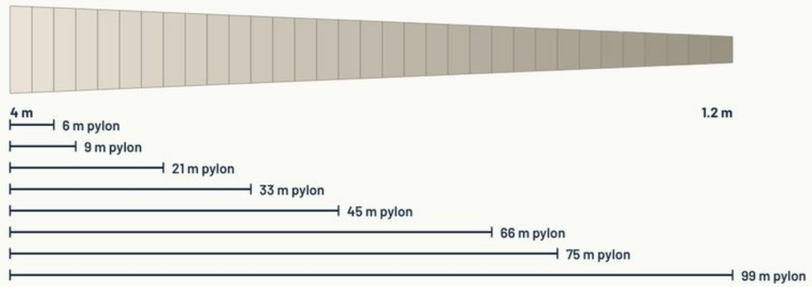
SUMMARY

ACROSS TERRAIN

- One tapered segment family: 33 segments, 3 m each, 4 m diameter at the base to 1.2 m at the top.
- Every pylon starts at 4 m on the 4 m caisson bore and takes segments in order up the cone until it reaches the deck.
- Short pylons stop low on the cone and have a wide top; tall pylons run up the cone and finish narrow. The cap beam seats on whatever top width results.
- The deck stays level; the ground decides how many segments each pylon uses: 2 at 6 m, 33 at 99 m.
- Caisson depth varies with the soil and rock and with the load above: each drills through the soil and sockets into rock, deeper under taller pylons.

PATENTS P4 (segments) · P5 (topside)

THE CONE: SEGMENT 1 (BASE) TO 33 (TOP)



Each pylon uses the cone from the base up to its height.

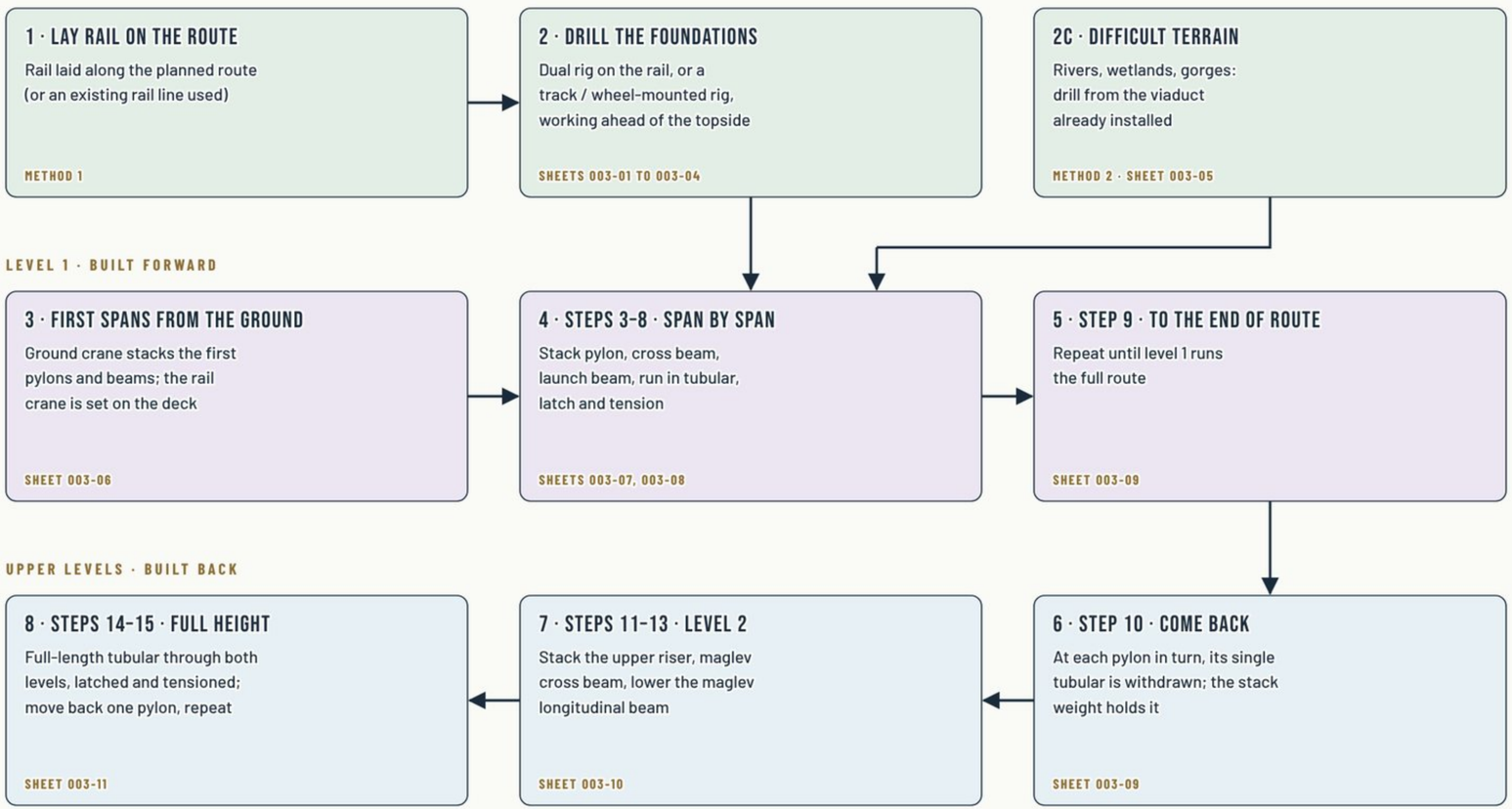
Segment 1 (base die) · Segment 17 · Segment 33 (top die) · Tension tubular · Guideway · Rock (dashed: top of rock) · Cutter head

MULTI-MODAL CORRIDORS · MMC-DWG-002-07 · ACROSS TERRAIN

Schematic — not to scale unless dimensioned · Patents P4, P5
Rev B · 7 Nov 2026 · BB (Boh Brett) Murrell

MMC-DWG-003-00 · CONSTRUCTION SEQUENCE

CONSTRUCTION SHEET 0 · OVERVIEW · FOUNDATION TEAM AHEAD, TOPSIDE TEAM BEHIND · LEVEL 1 FORWARD, UPPER LEVELS BACK



MMC-VB shown: freight level 8 m, maglev level 17 m. The same sequence extends to more levels for MMC-VA.

SUMMARY

CONSTRUCTION SEQUENCE

- Two teams: the foundation team drills ahead; the topside team builds behind it.
- Foundations are drilled from rail laid on the route (dual rig) or by a track / wheel-mounted rig. Over difficult terrain they are drilled from the viaduct already built.
- The first spans are built from the ground; then the rail crane builds level 1 forward from the deck.
- When level 1 runs the route, the crane comes back and builds the upper levels pylon by pylon, finishing each with a full-length tubular.

PATENTS P1–P5

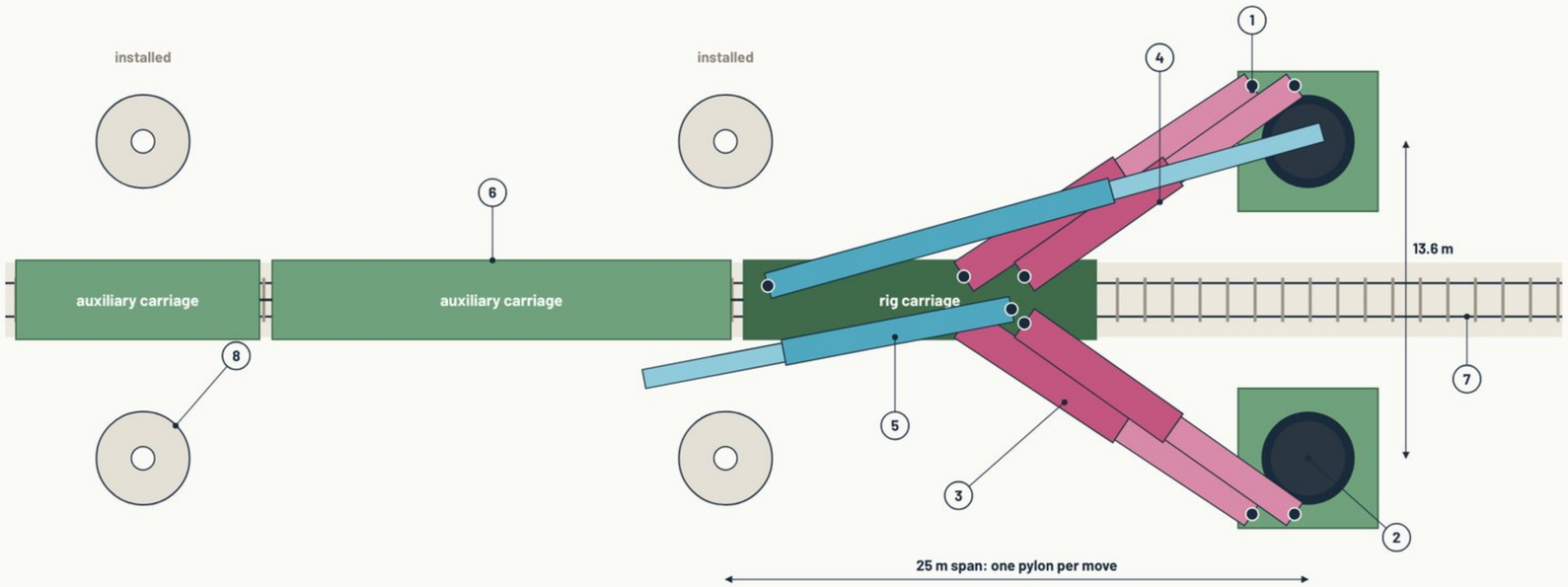
Foundations · Level 1, forward · Upper levels, back

MULTI-MODAL CORRIDORS · MMC-DWG-003-00 · CONSTRUCTION SEQUENCE

Schematic — not to scale unless dimensioned · Patents P1–P5
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MMC-DWG-003-01 · DUAL DRILLING FOUNDATION SYSTEM

CONSTRUCTION SHEET 1 · SUMMARY · TOP VIEW · RIG ON THE EXISTING RAIL DRILLS BOTH LEGS OF A PYLON AT ONCE



Direction of travel

Rig, carriages, derricks · Lever arms · Cranes · Installed caisson · Caisson being drilled

SUMMARY

DUAL DRILLING RIG

- Method 1: runs on an existing rail line, or on rail laid along the planned route, and drills both foundations of a dual-leg pylon at the same time.
- Two derricks are held out either side of the line on lever arms. Each has its own top drive, drill pipe, caisson ram and cutter head.
- The lever arms are parallel pairs, so the derricks stay square to the corridor as they reach out to the leg positions.
- Telescopic cranes feed caisson rings forward to the derricks and lift from the carriages behind.
- When both caissons are down, the rig moves forward one 25 m span to the next pylon.

PATENTS P3 (Foundation Drilling System)

CALLOUTS

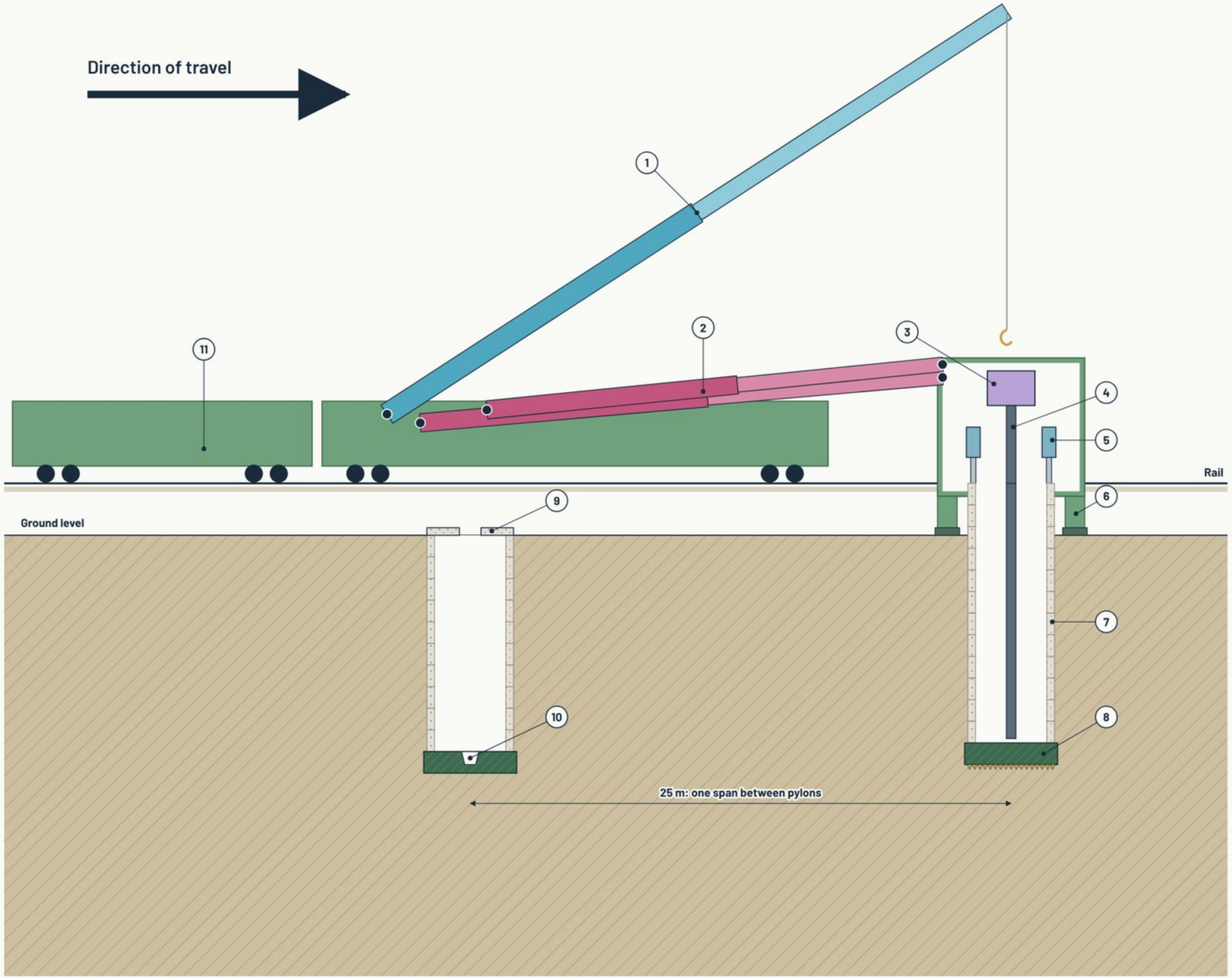
1. Derrick, one per leg
2. Caisson being drilled
3. Lever arms (parallel pairs)
4. Telescopic crane
5. Rig carriage on the rail
6. Auxiliary carriages
7. Existing rail line
8. Installed caisson

MULTI-MODAL CORRIDORS · MMC-DWG-003-01 · DUAL DRILLING RIG · TOP VIEW

Schematic — not to scale unless dimensioned · Patent P3
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MMC-DWG-003-02 · DUAL DRILLING RIG: SIDE PROFILE

CONSTRUCTION SHEET 2 · SUMMARY · SIDE PROFILE THROUGH THE BORE · DRILLING THE NEXT PYLON, INSTALLED CAISSON BEHIND



SUMMARY

DUAL DRILLING RIG: SIDE

- Method 1: the rig carriages run on an existing rail line or on rail laid along the planned route. Lever arms reach forward and set the derrick over the next bore.
- In the derrick: the top drive turns the drill pipe and cutter head; the caisson rams on the hydraulic legs push the caisson rings down behind it.
- The crane on the rig carriage lifts caisson rings and pipe into the derrick.
- Behind the rig, the finished caisson has its caisson head on top and the cutter head left at depth as the anchor, with the receptacle ready for the tubular.

PATENTS P3 (Foundation Drilling System) · P1, P2

CALLOUTS

1. Crane (telescopic) with hook
2. Lever arms (telescopic)
3. Top drive
4. Drill pipe
5. Caisson ram
6. Derrick hydraulic legs
7. Caisson rings, following down
8. Cutter head drilling
9. Caisson head (installed)
10. Anchor receptacle in the cutter head
11. Rig and auxiliary carriages

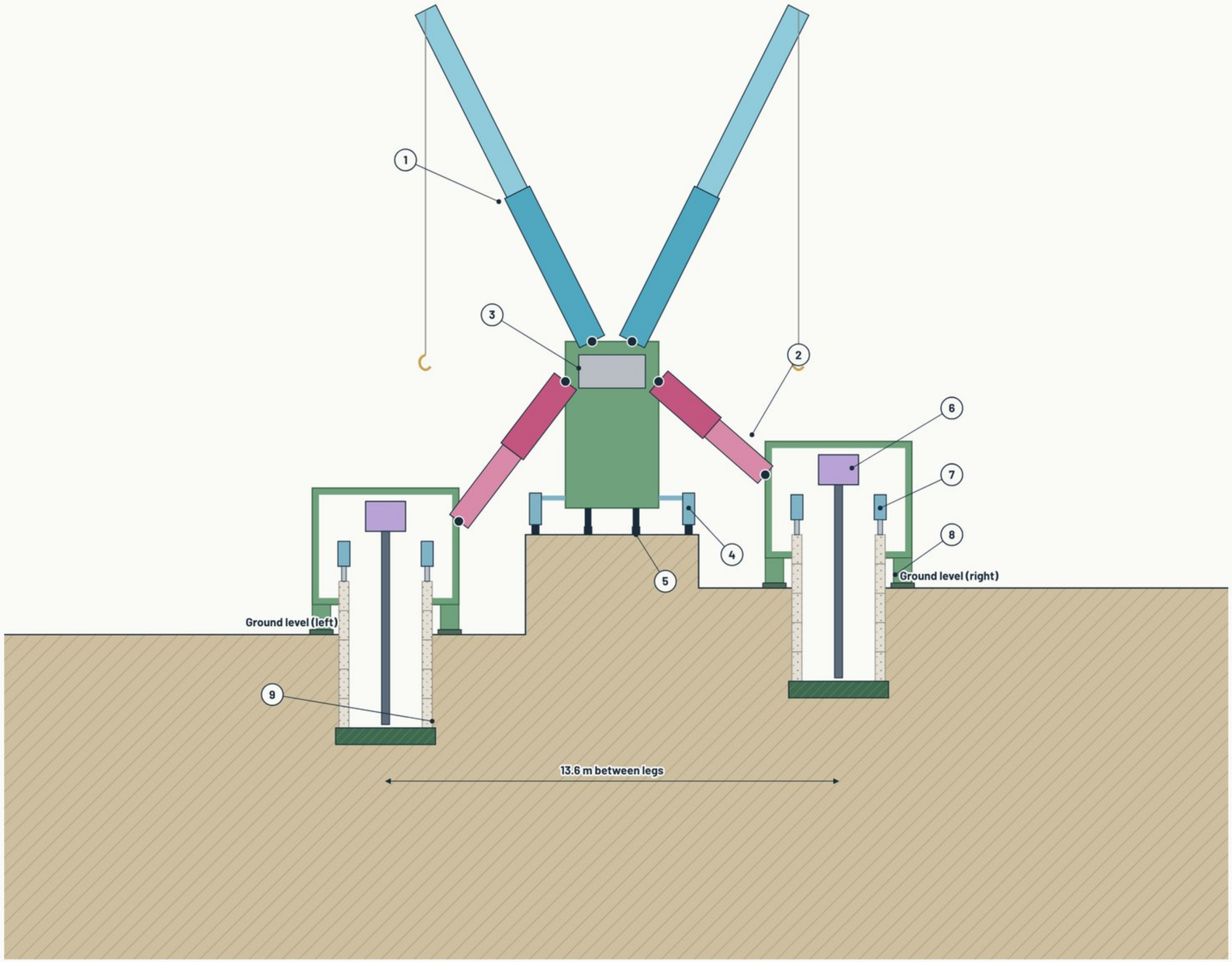
Rig, carriages, derrick · Lever arms · Crane · Top drive · Drill pipe · Caisson rams · Caisson · Cutter head

MULTI-MODAL CORRIDORS · MMC-DWG-003-02 · DUAL DRILLING RIG · SIDE PROFILE

Schematic — not to scale unless dimensioned · Patents P1–P3
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MMC-DWG-003-03 · DUAL DRILLING RIG: REAR VIEW

CONSTRUCTION SHEET 3 · SUMMARY · LOOKING ALONG THE RAIL · LEVER ARMS SET EACH DERRICK TO ITS OWN GROUND LEVEL



SUMMARY

DUAL DRILLING RIG: REAR

- Method 1, looking along the rail (existing, or laid on the planned route). The rig body stands on the rail with outriggers set down on the formation while drilling.
- A lever arm on each side reaches out to a derrick over each leg position, 13.6 m apart.
- The arms are variable height: each derrick sets down on its own ground level, so the rig drills across uneven ground, cuttings and embankments.
- Two cranes, one over each derrick, feed caisson rings and pipe.

PATENTS P3 (Foundation Drilling System)

CALLOUTS

1. Cranes, one per derrick
2. Lever arm (variable height)
3. Rig body
4. Outriggers
5. Rail
6. Top drive
7. Caisson ram
8. Derrick hydraulic legs
9. Cutter head drilling

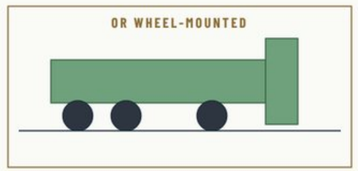
Rig and derricks · Lever arms · Cranes · Outriggers / rams · Top drive · Drill pipe · Caisson · Cutter head

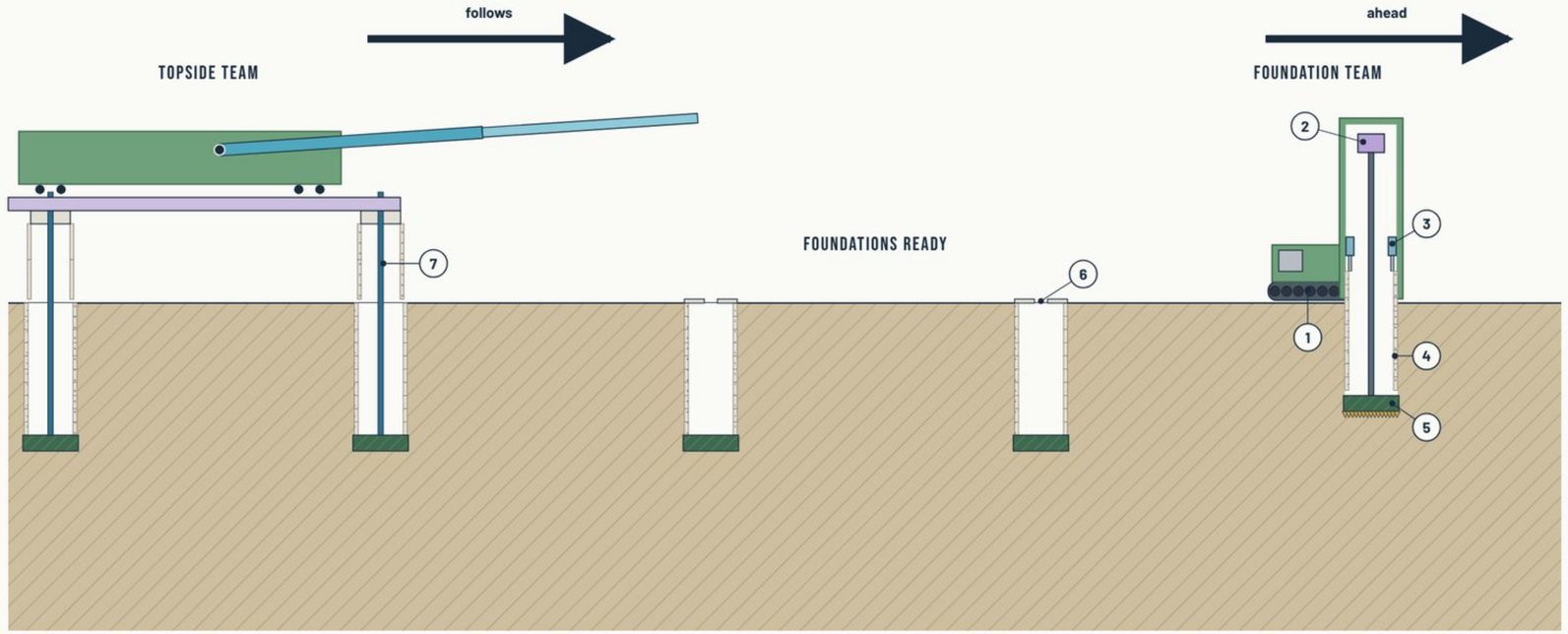
MULTI-MODAL CORRIDORS · MMC-DWG-003-03 · DUAL DRILLING RIG · REAR VIEW

Schematic — not to scale unless dimensioned · Patent P3
Rev A · 7 Nov 2026 · BB (Boh Brett) Murrell

MMC-DWG-003-04 · MOBILE DRILLING RIG

CONSTRUCTION SHEET 4 · STEP 2 · TRACK- OR WHEEL-MOUNTED RIG · THE FOUNDATION TEAM WORKS AHEAD OF THE TOPSIDE TEAM





Rig / carriages · Tracks · Top drive · Drill pipe · Caisson · Longitudinal beam · Tension tubular · Cutter head

SUMMARY

MOBILE DRILLING RIG

- A third way to drill the foundations: a self-contained rig on tracks or wheels, independent of the rail line.
- The foundation team works ahead of the topside team, drilling and setting caissons along the route.
- Each foundation is left ready, caisson head on top and cutter head at depth, for the topside team to stack on.
- Same derrick as the rail rig: top drive turns the drill pipe and cutter head; caisson rams push the rings down behind it.

PATENTS P3 (Foundation Drilling System) · P1, P2

CALLOUTS

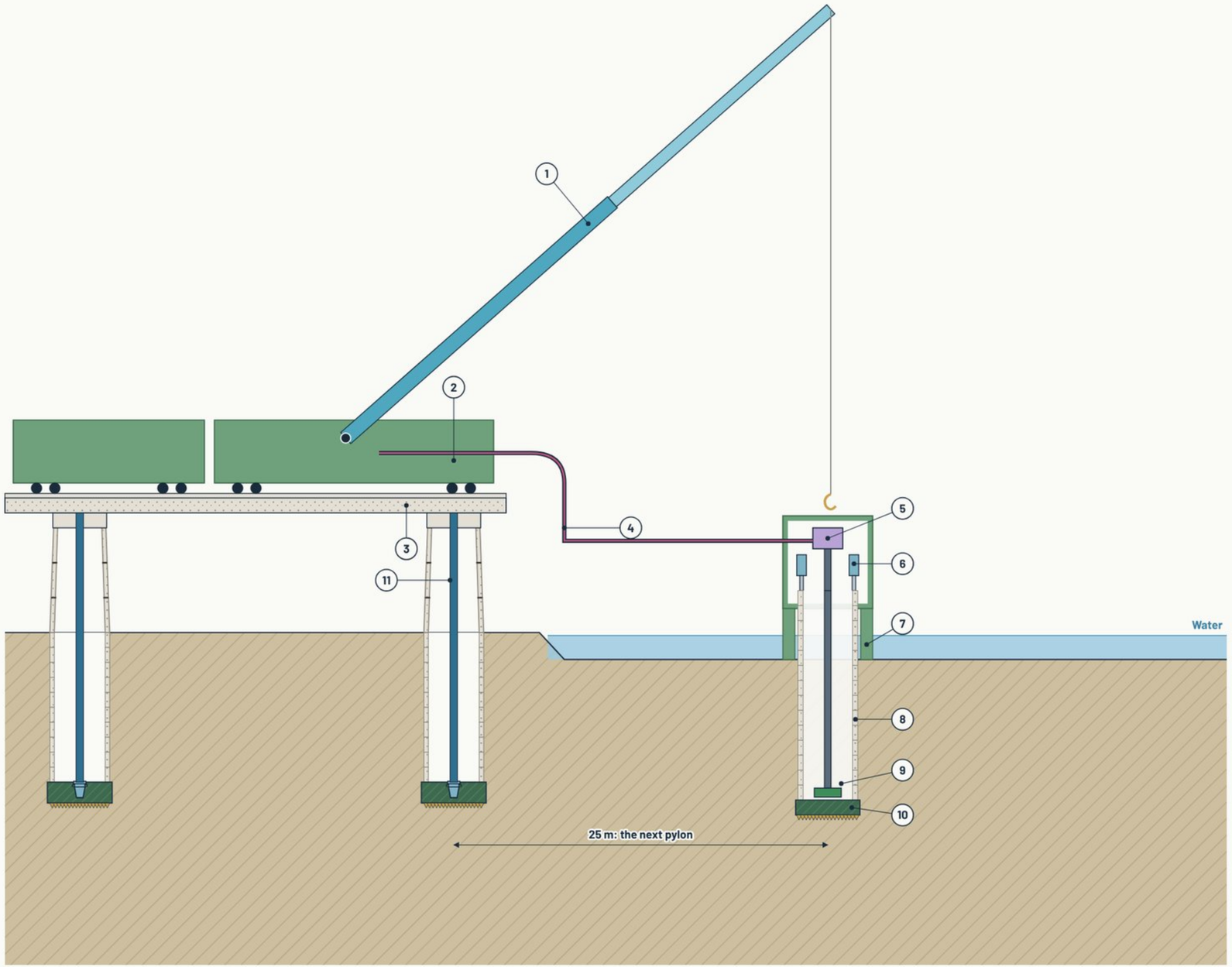
1. Tracked carrier
2. Top drive
3. Caisson ram
4. Caisson rings
5. Cutter head drilling
6. Foundation ready
7. Topside built behind

MULTI-MODAL CORRIDORS · MMC-DWG-003-04 · MOBILE DRILLING RIG

Schematic — not to scale unless dimensioned · Patents P1–P3
Rev A · 7 Nov 2026 · BB (Boh Brett) Murrell

MMC-DWG-003-05 · DRILLING FROM THE VIADUCT

CONSTRUCTION SHEET 5 · STEP 2C · RAIL CRANE ON THE COMPLETED VIADUCT DRILLS AND INSTALLS THE NEXT FOUNDATION · OVER WATER



Carriages, derrick · Crane · Umbilical · Top drive · Downhole motor · Drill pipe · Water · Cutter head

SUMMARY

STEP 2C: FROM THE VIADUCT

- Method 2, for difficult terrain such as rivers, wetlands and gorges: the rail crane works forward along the viaduct already installed.
- The crane carriage runs on the finished deck and lowers a derrick onto the bed at the next pylon position, 25 m ahead.
- An umbilical from the carriage carries power and hydraulics to the derrick.
- The derrick drills the caisson in place: top drive and downhole motor turn the cutter head; the caisson rams push the rings down behind it.
- When the caisson is in, the next pylon and deck span are built and the crane moves forward on them.

PATENTS P3 (Foundation Drilling System) · P1, P2

CALLOUTS

1. Rail crane (telescopic)
2. Crane carriages on the deck
3. Completed deck and beams
4. Umbilical: power + hydraulics
5. Top drive
6. Caisson ram
7. Derrick hydraulic legs
8. Caisson rings
9. Downhole motor
10. Cutter head drilling
11. Completed pylon + tubular

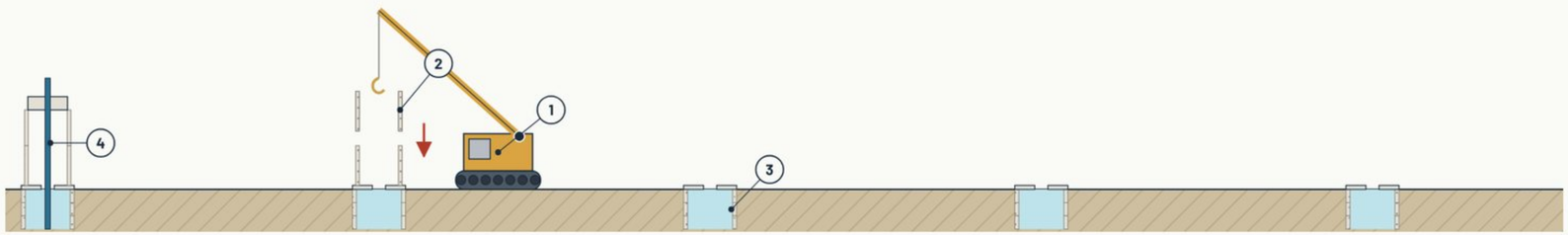
MULTI-MODAL CORRIDORS · MMC-DWG-003-05 · DRILLING FROM THE VIADUCT

Schematic — not to scale unless dimensioned · Patents P1–P3
Rev A · 7 Nov 2026 · BB (Boh Brett) Murrell

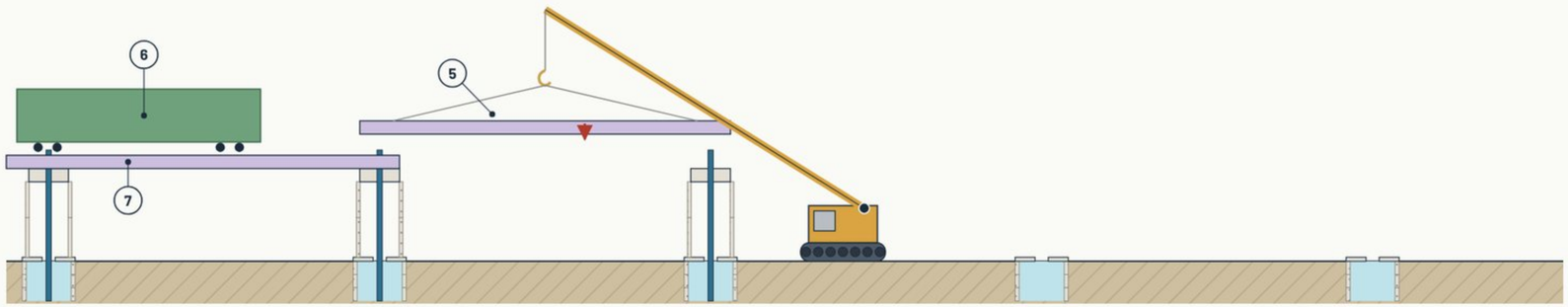
MMC-DWG-003-06 · FIRST SPANS FROM THE GROUND

CONSTRUCTION SHEET 6 · STARTING THE TOPSIDE · A GROUND CRANE BUILDS THE FIRST SPANS, THEN THE RAIL CRANE TAKES OVER ON THE DECK

A · GROUND CRANE STACKS THE FIRST PYLONS



B · GROUND CRANE SETS THE FIRST BEAMS; THE RAIL CRANE IS LIFTED ONTO THE DECK



Ground crane · Tracks · Rail crane carriage · Precast concrete · Longitudinal beam · Caisson · Tension tubular

SUMMARY

FIRST SPANS

- The topside has to start somewhere: the first few spans are built from the ground.
- A ground crane (tracked) stacks the first pylons on the caissons and sets the first cross beams and longitudinal beams.
- The first pylons are tensioned in the usual way (steps 7–8).
- Once a few spans are complete, the rail crane carriages are lifted onto the deck and take over, building forward from the deck (steps 3–10).

PATENTS P4 (stack) · P5 (topside)

CALLOUTS

1. Ground crane (tracked)
2. Riser segment on the hook
3. Caissons drilled ahead
4. First pylon, tensioned
5. First longitudinal beams
6. Rail crane set on the deck
7. First span complete

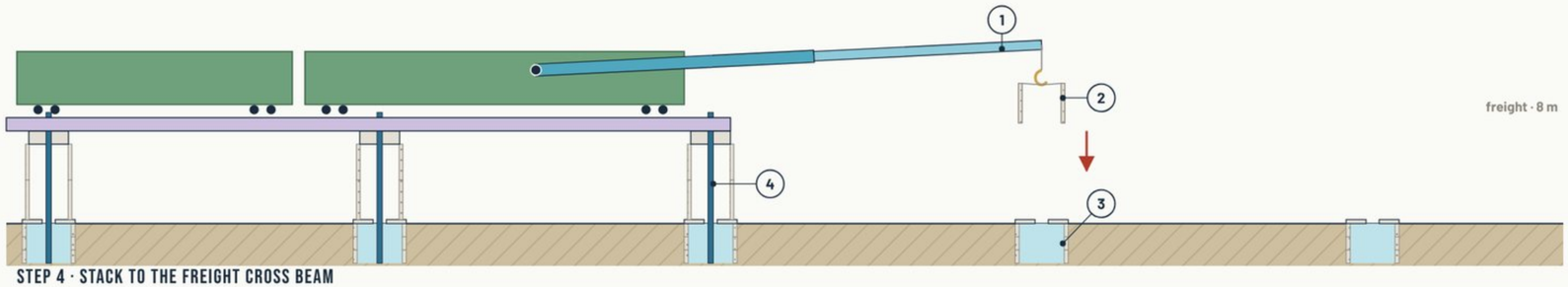
MULTI-MODAL CORRIDORS · MMC-DWG-003-06 · FIRST SPANS FROM THE GROUND

Schematic — not to scale unless dimensioned · Patents P4, P5
Rev A · 7 Nov 2026 · BB (Boh Brett) Murrell

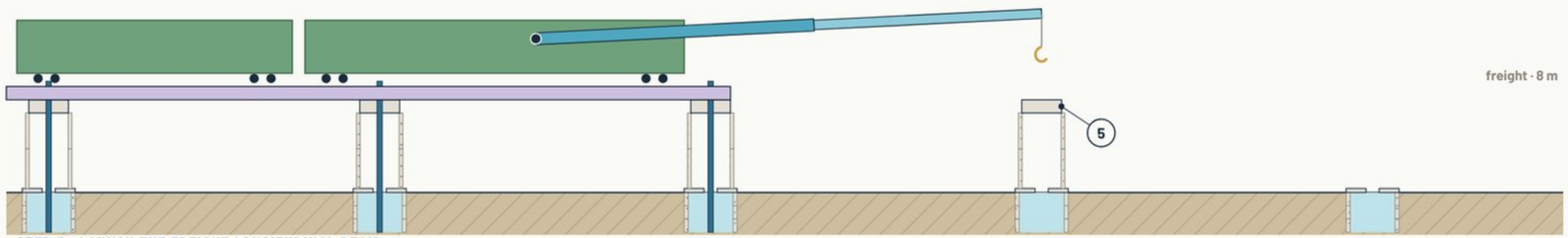
MMC-DWG-003-07 · BUILD LEVEL 1: STEPS 3–5

CONSTRUCTION SHEET 7 · STEPS 3–5 · RAIL CRANE ON THE FREIGHT DECK BUILDS THE NEXT PYLON AND SPAN · MMC-VB LEVELS

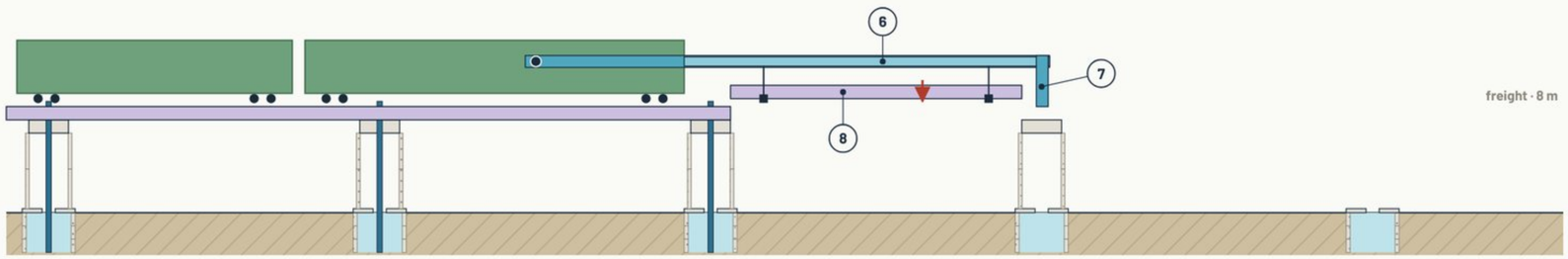
STEP 3 · LIFT THE RISER SEGMENTS ONTO THE CAISSON



STEP 4 · STACK TO THE FREIGHT CROSS BEAM



STEP 5 · LAUNCH THE FREIGHT LONGITUDINAL BEAM



Carriages · Rail crane · Precast concrete · Longitudinal beam · Caisson · Tension tubular · Movement / tension

SUMMARY

STEPS 3–5

- The crane works from the finished freight deck; the foundation (caisson + cutter head) is already in, drilled ahead by the foundation team.
- Step 3: lower riser segments are lifted from the carriages onto the caisson head.
- Step 4: the pylon is stacked to 6 m and the freight cross beam placed.
- Step 5: the boom works as a launching beam, tip leg on the new cross beam, and lowers the longitudinal beam across the 25 m span.

PATENTS P1, P2 (anchor, tubular) · P4 (stack) · P5 (topside)

CALLOUTS

1. Rail crane
2. Riser segment on the hook
3. Caisson, drilled ahead
4. Completed pylon + tubular
5. Freight cross beam
6. Launching boom
7. Tip leg on the cross beam
8. Longitudinal beam lowering

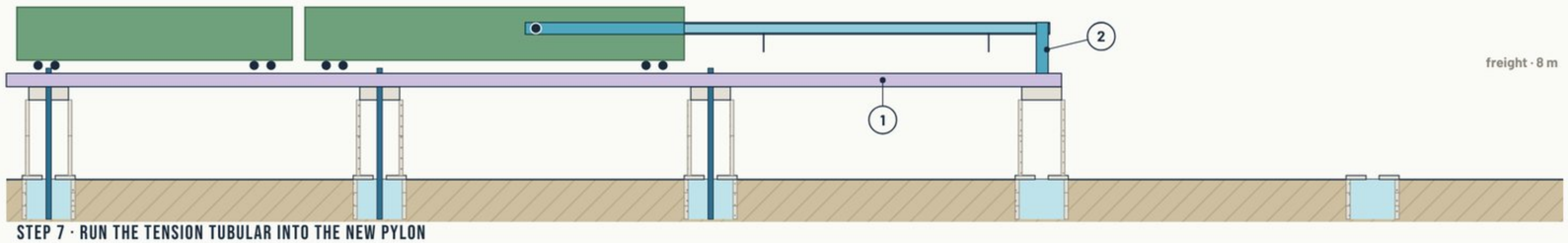
MULTI-MODAL CORRIDORS · MMC-DWG-003-07 · BUILD LEVEL 1: STEPS 3–5

Schematic — not to scale unless dimensioned · Patents P1, P2, P4, P5
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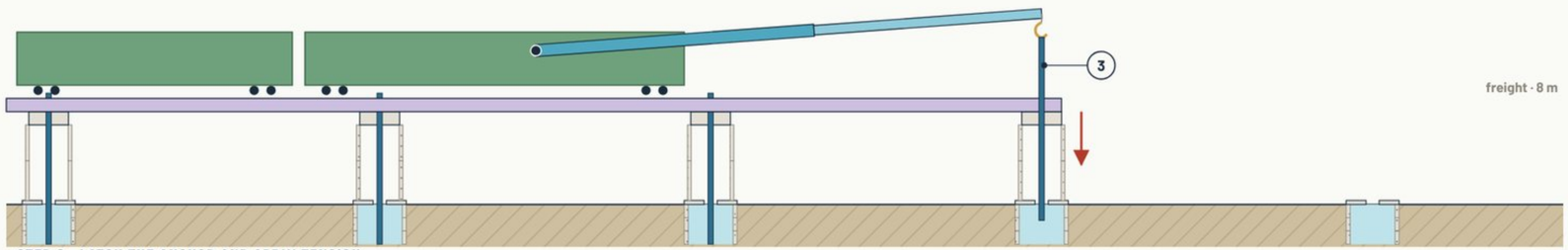
MMC-DWG-003-08 · BUILD LEVEL 1: STEPS 6–8

CONSTRUCTION SHEET 8 · STEPS 6–8 · BEAM SET · TUBULAR RUN IN, LATCHED AND TENSIONED · MMC-VB LEVELS

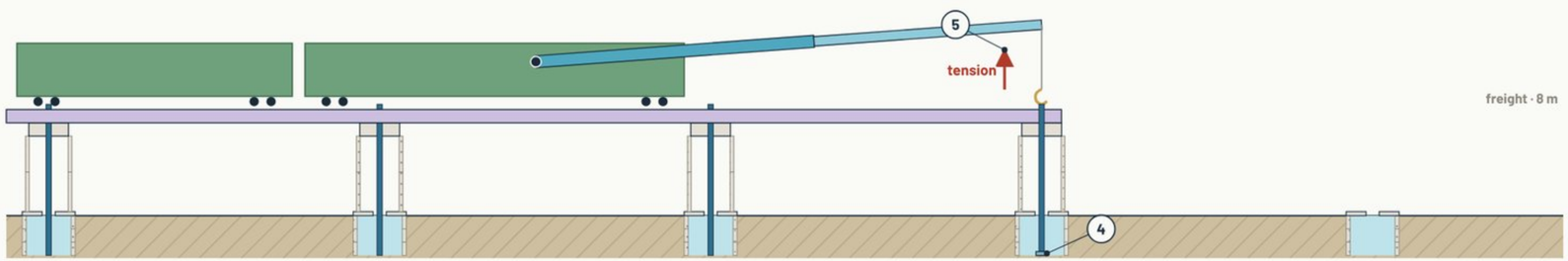
STEP 6 · LONGITUDINAL BEAM SET ON THE NEW CROSS BEAM



STEP 7 · RUN THE TENSION TUBULAR INTO THE NEW PYLON



STEP 8 · LATCH THE ANCHOR AND APPLY TENSION



Carriages · Rail crane · Precast concrete · Longitudinal beam · Caisson · Tension tubular · Movement / tension

SUMMARY

STEPS 6–8

- Step 6: the longitudinal beam is set on the new cross beam; the span is complete.
- Step 7: the crane runs the tension tubular down the hollow pylon and caisson.
- Step 8: the tubular latches into the cutter head and is tensioned at the top, clamping the stack and beams together.
- The crane moves forward onto the new span.

PATENTS P1, P2 (anchor, tubular) · P4 (stack) · P5 (topside)

CALLOUTS

1. New longitudinal beam
2. Launching boom, tip leg
3. Tubular on the hook
4. Latched in the cutter head
5. Tension at the top

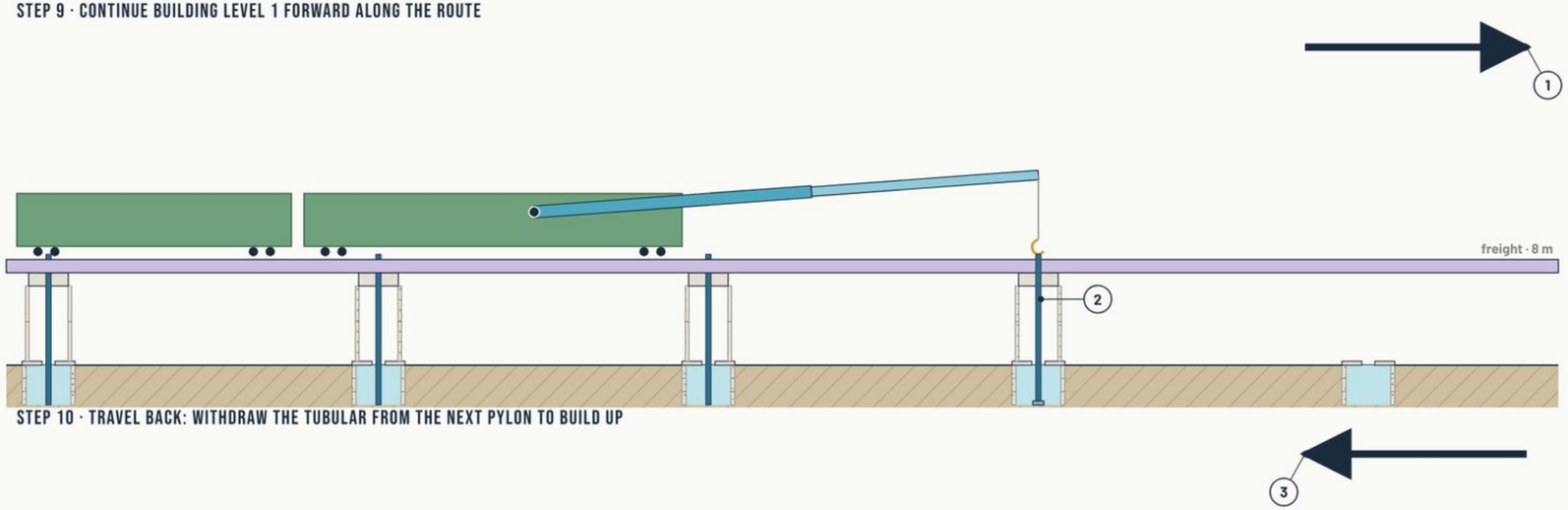
MULTI-MODAL CORRIDORS · MMC-DWG-003-08 · BUILD LEVEL 1: STEPS 6–8

Schematic — not to scale unless dimensioned · Patents P1, P2, P4, P5
Rev B · 7 Nov 2026 · BB (Boh Brett) Murrell

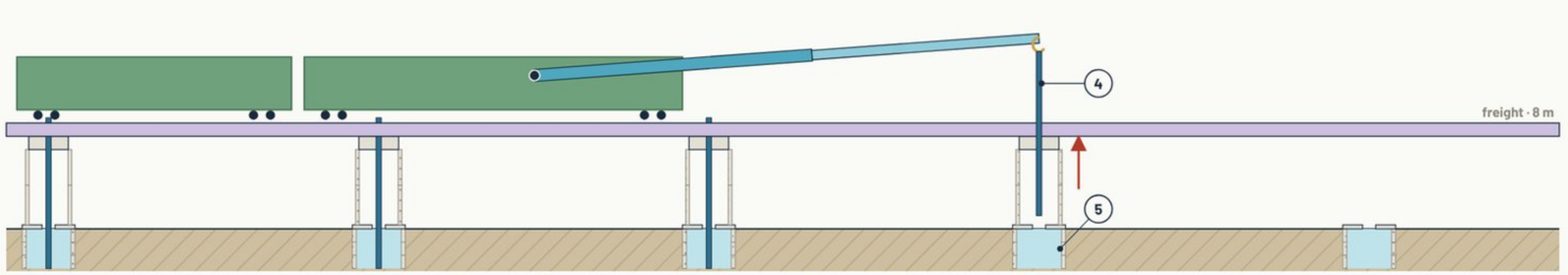
MMC-DWG-003-09 · LEVEL 1 COMPLETE: STEPS 9–10

CONSTRUCTION SHEET 9 · STEPS 9–10 · LEVEL 1 RUNS THE FULL ROUTE, THEN THE CRANE COMES BACK · MMC-VB LEVELS

STEP 9 · CONTINUE BUILDING LEVEL 1 FORWARD ALONG THE ROUTE



STEP 10 · TRAVEL BACK: WITHDRAW THE TUBULAR FROM THE NEXT PYLON TO BUILD UP



SUMMARY

STEPS 9–10

- Step 9: the crane repeats steps 3–8, span by span, until level 1 runs the full route.
- Step 10: the crane comes back. At the pylon to be built up, its single tubular is withdrawn so the upper riser can be stacked.
- Only that one tubular is out; the stack's own weight holds it, and every other pylon stays tensioned.

PATENTS P1, P2 (anchor, tubular) · P4 (stack) · P5 (topside)

CALLOUTS

1. Travel forward
2. Tubular installed, tensioned
3. Travel back
4. Tubular withdrawn
5. Caisson, tubular out

Carriages · Rail crane · Precast concrete · Longitudinal beam · Caisson · Tension tubular · Movement / tension

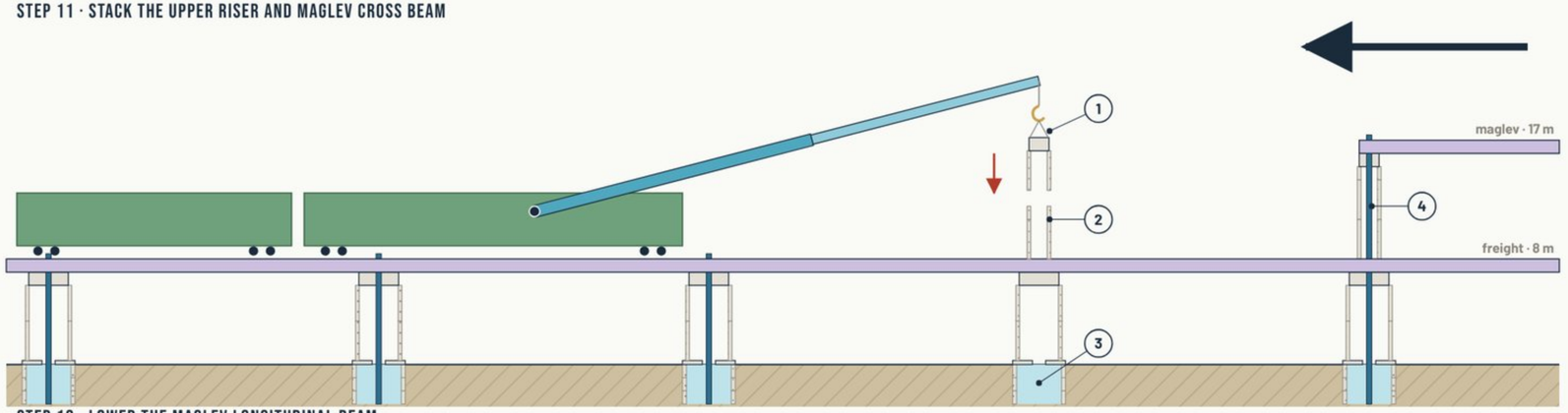
MULTI-MODAL CORRIDORS · MMC-DWG-003-09 · LEVEL 1 COMPLETE: STEPS 9–10

Schematic — not to scale unless dimensioned · Patents P1, P2, P4, P5
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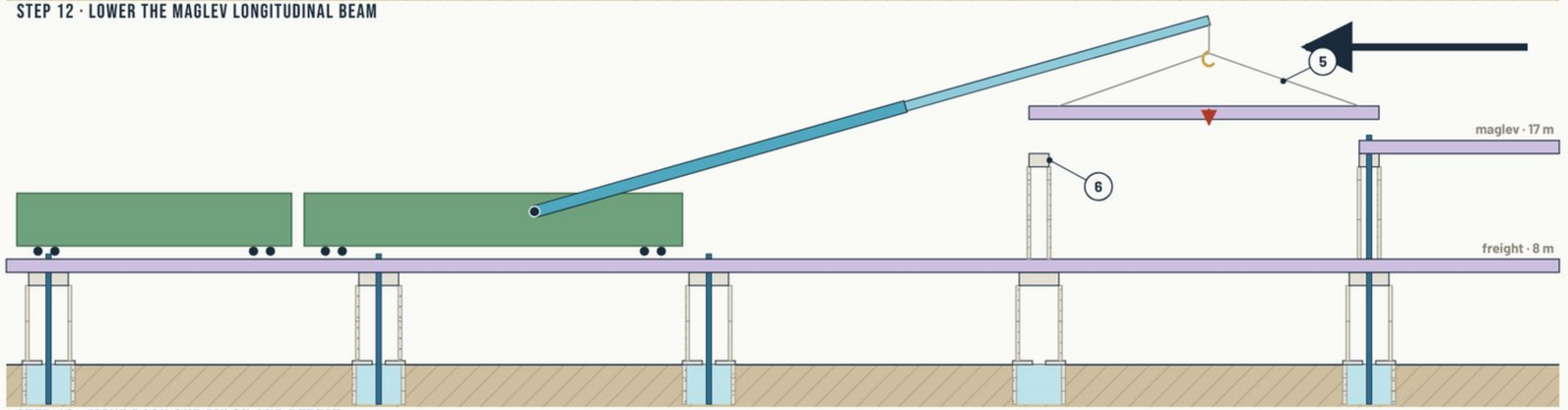
MMC-DWG-003-10 · BUILD LEVEL 2: STEPS 11–13

CONSTRUCTION SHEET 10 · STEPS 11–13 · WORKING BACK ALONG THE FREIGHT DECK · MMC-VB LEVELS

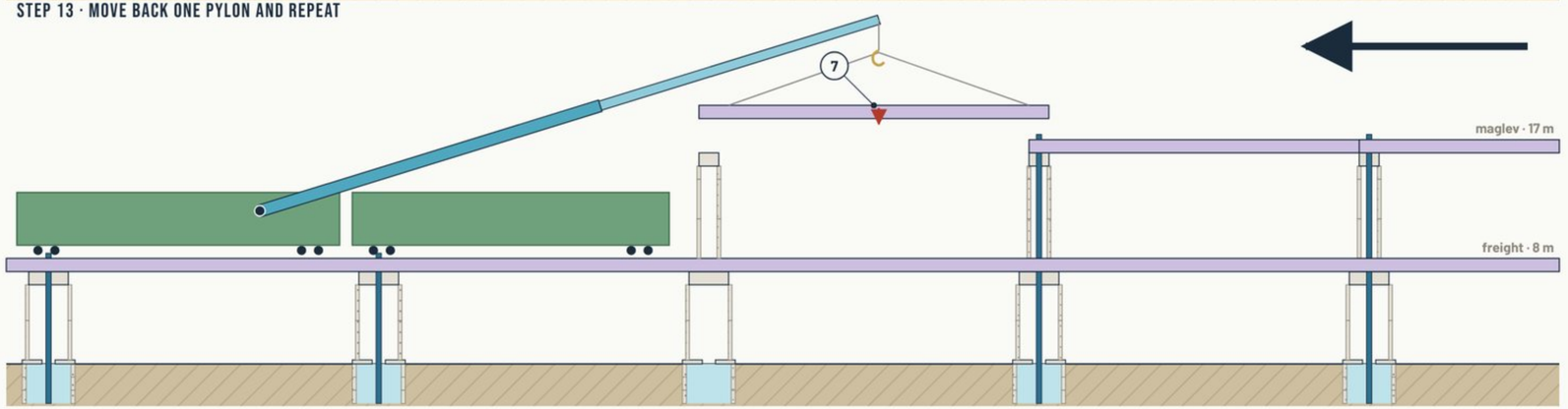
STEP 11 · STACK THE UPPER RISER AND MAGLEV CROSS BEAM



STEP 12 · LOWER THE MAGLEV LONGITUDINAL BEAM



STEP 13 · MOVE BACK ONE PYLON AND REPEAT



SUMMARY

STEPS 11–13

- Step 11: upper riser segments are stacked on the freight beams to 15 m, then the maglev cross beam.
- Step 12: the maglev longitudinal beam is lowered on a spreader onto the cross beams.
- Step 13: the crane moves back one pylon and repeats.

PATENTS P1, P2 (anchor, tubular) · P4 (stack) · P5 (topside)

CALLOUTS

1. Top segment + cross beam
2. Upper riser
3. Tubular out (this pylon only)
4. Completed full-height pylon
5. Spreader bridle
6. Maglev cross beam
7. Next maglev beam

Carriages · Rail crane · Precast concrete · Longitudinal beam · Caisson · Tension tubular · Movement / tension

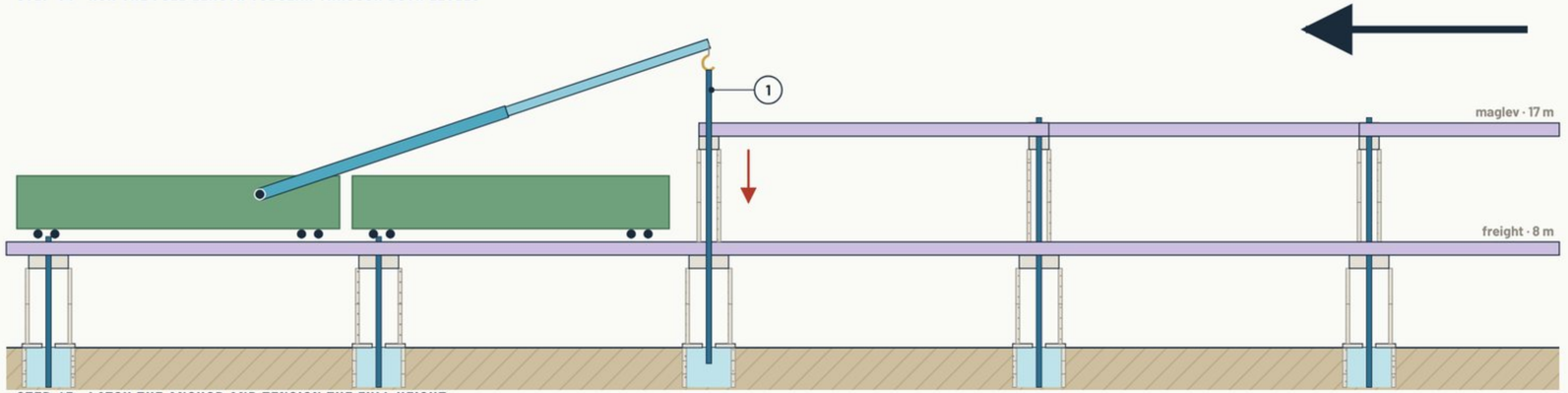
MULTI-MODAL CORRIDORS · MMC-DWG-003-10 · BUILD LEVEL 2: STEPS 11–13

Schematic — not to scale unless dimensioned · Patents P1, P2, P4, P5
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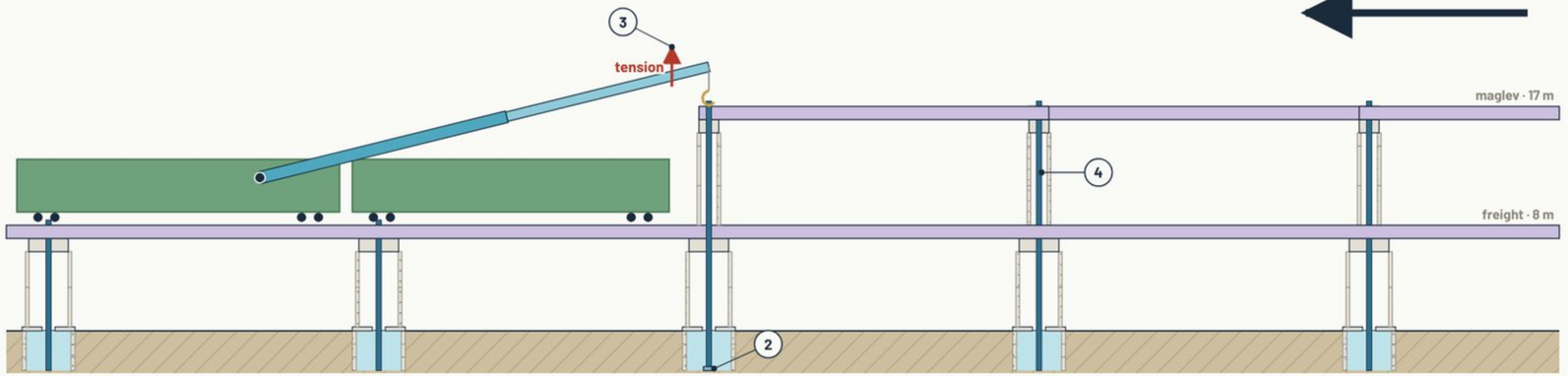
MMC-DWG-003-11 · BUILD LEVEL 2: STEPS 14–15

CONSTRUCTION SHEET 11 · STEPS 14–15 · FULL-LENGTH TUBULAR, LATCHED AND TENSIONED · MMC-VB LEVELS

STEP 14 · RUN THE FULL-LENGTH TUBULAR THROUGH BOTH LEVELS



STEP 15 · LATCH THE ANCHOR AND TENSION THE FULL HEIGHT



Carriages · Rail crane · Precast concrete · Longitudinal beam · Caisson · Tension tubular · Movement / tension

SUMMARY

STEPS 14–15

- Step 14: the crane runs the full-length tubular down through both levels and the caisson.
- Step 15: it latches into the cutter head and is tensioned at the top, clamping both levels into one structure.
- The crane moves back one pylon and repeats steps 10–15 until level 2 is complete.

PATENTS P1, P2 (anchor, tubular) · P4 (stack) · P5 (topside)

CALLOUTS

1. Full-length tubular
2. Latched in the cutter head
3. Tension at the top
4. Completed full-height pylon

MULTI-MODAL CORRIDORS · MMC-DWG-003-11 · BUILD LEVEL 2: STEPS 14–15

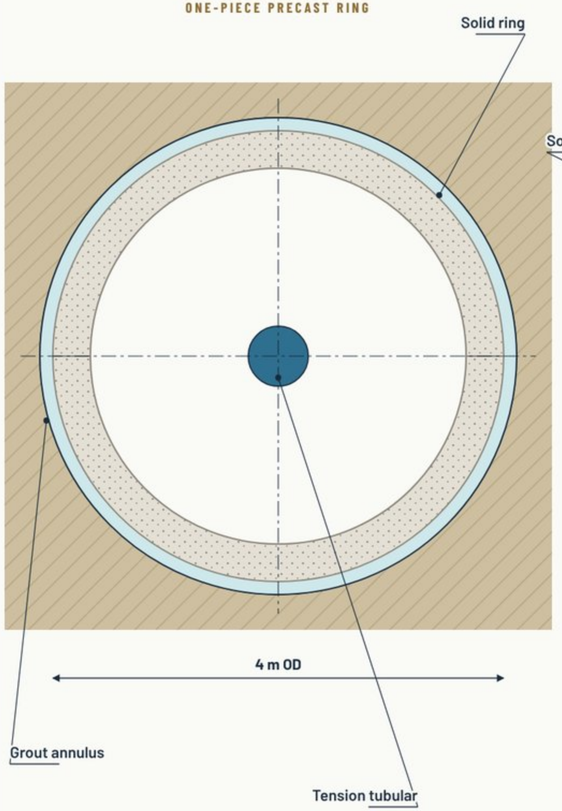
Schematic — not to scale unless dimensioned · Patents P1, P2, P4, P5
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MMC-DWG-004-01 · SOLID CAISSON RING

CAISSON TYPES · SHEET 1 · SUMMARY · ONE-PIECE RING · SOLID-RING PACKER · COUPLED TO THE TUBULAR

A · PLAN

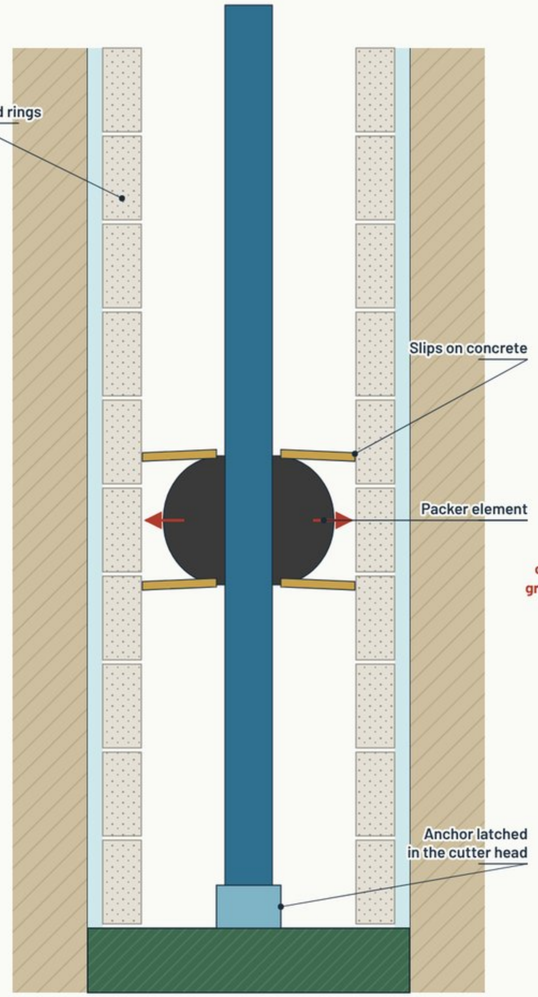
ONE-PIECE PRECAST RING



No joints around the ring:
the bore is a sealed shell.

B · PACKER SET INSIDE

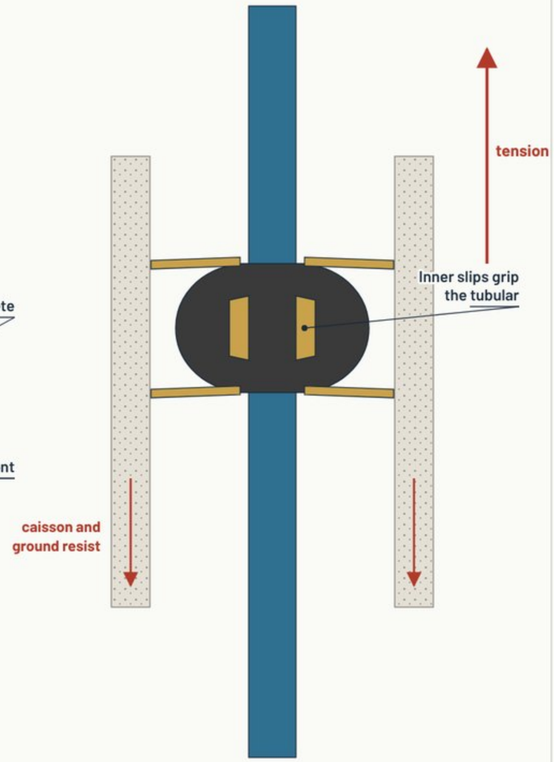
SLIPS GRIP THE CONCRETE FACE



Set at a chosen depth;
radial force onto the inside face.

C · COUPLED

PACKER LOCKS ONTO THE TUBULAR



With the anchor latched, the packer
ties the caisson to the tension
column: added tensile strength.

SUMMARY

SOLID CAISSON RING

- One-piece precast concrete ring, 4 m outside diameter; the standard caisson.
- The stack follows the cutter head down the bore and the annulus is grouted (see sheet 001-03).
- A solid-ring expansion packer can be set at a chosen depth, its slips gripping the inside concrete face.
- Once the anchor is latched, the packer locks onto the tubular, coupling the caisson to the tension column.
- Further caisson types are added to this set as they are designed.

PATENTS P1 · P2 · P7

Precast concrete · Grout · Tension tubular · Anchor latch · Packer element · Slips · Cutter head · Loads

MULTI-MODAL CORRIDORS · MMC-DWG-004-01 · SOLID CAISSON RING

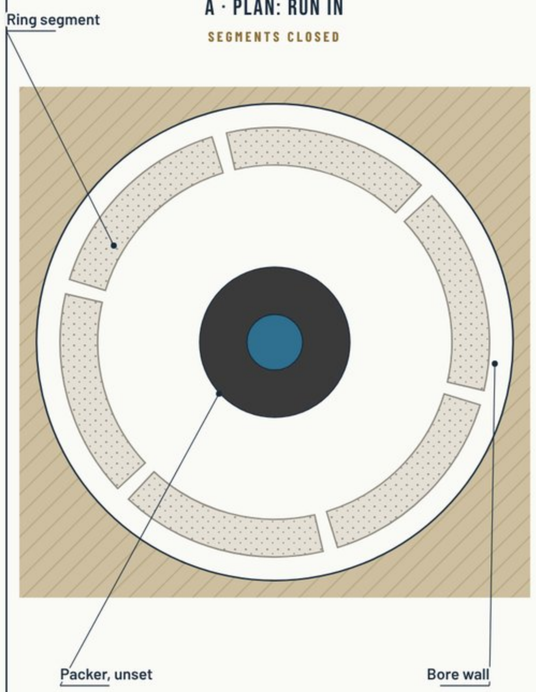
Schematic — not to scale unless dimensioned · Patents P1, P2, P7
Rev A · 7 Nov 2026 · BB (Boh Brett) Murrell

MMC-DWG-004-02 · SEGMENTED CAISSON RING

CAISSON TYPES · SHEET 2 · SUMMARY · RING IN SEGMENTS · DRIVEN OUT BY THE PACKER · RADIAL FORCE TO AXIAL RESTRAINT

A · PLAN: RUN IN

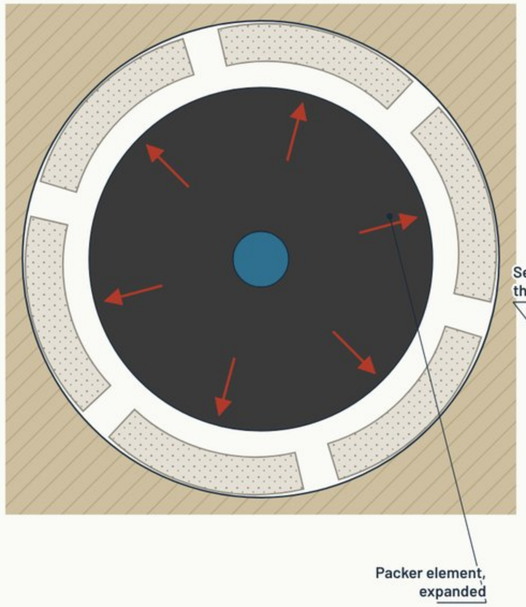
SEGMENTS CLOSED



Gap between ring and bore wall.

B · PLAN: PACKER SET

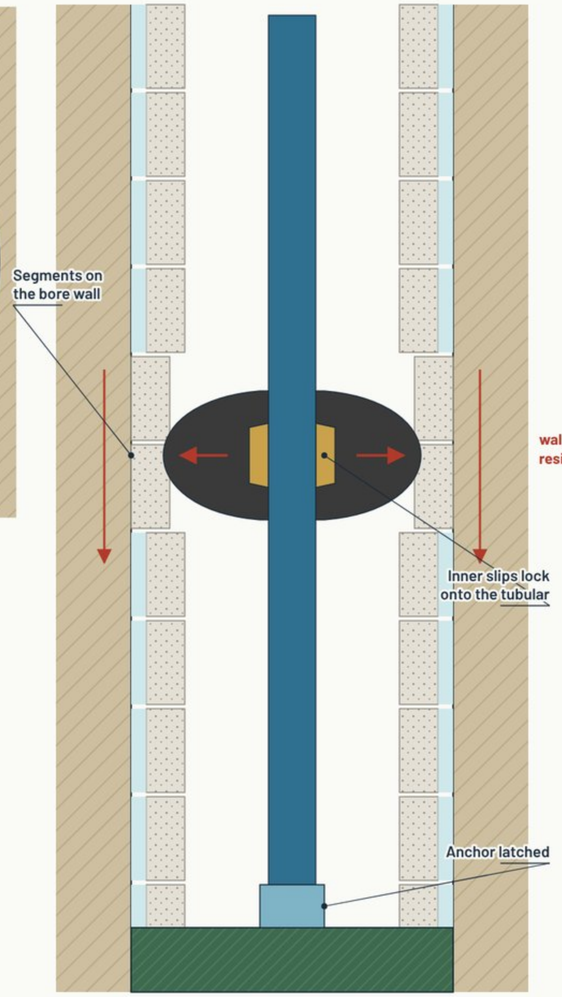
SEGMENTS DRIVEN OUT



Joints open; segments bear hard on the bore wall.

C · SECTION

RADIAL FORCE TO AXIAL RESTRAINT



Locks the caisson before any grout; can couple it to the tension column.

Precast concrete · Grout · Tension tubular · Anchor latch · Packer element · Slips · Cutter head · Loads

SUMMARY

SEGMENTED CAISSON RING

- Precast ring made in segments, 4 m outside diameter, for foundations that need extra load transfer at depth.
- Run in closed. A segmented-ring expansion packer set at that depth drives the segments outward against the bore wall.
- The radial force becomes axial restraint through friction on the wall, locking the caisson before any grout is placed.
- Once the anchor is latched, the packer can also lock onto the tubular, coupling the caisson to the tension column.
- Six segments per ring. Joint detail between segments not yet set.

PATENTS P1 · P2 · P7

MULTI-MODAL CORRIDORS · MMC-DWG-004-02 · SEGMENTED CAISSON RING

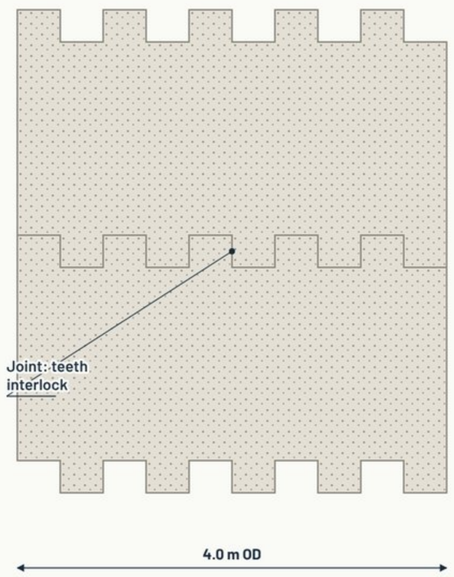
Schematic — not to scale unless dimensioned · Patents P1, P2, P7
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MMC-DWG-004-03 · CASTELLATED CAISSON RING

CAISSON TYPES · SHEET 3 · SUMMARY · DOG-CLUTCH FACES · TOOTH DETAIL · TORQUE THROUGH THE STACK

A · TWO RINGS ENGAGED

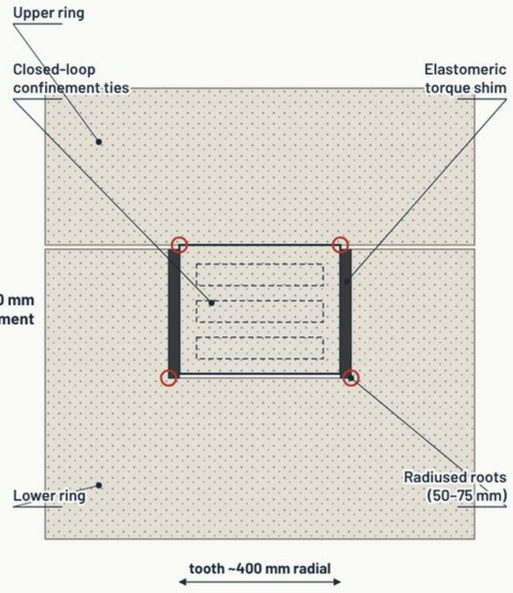
ELEVATION · 1.8 M RINGS · 4 M OD



Upper ring teeth sit in the gaps of the ring below: a dog clutch.

B · TOOTH DETAIL

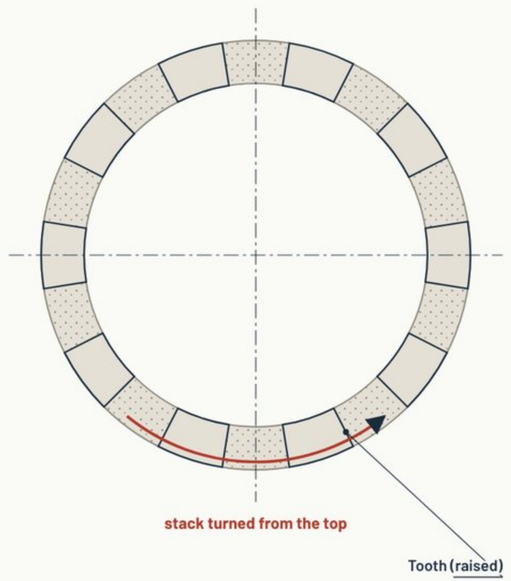
ONE TOOTH IN ITS SOCKET



Zero-draft vertical faces: no cam-out under torque.

C · PLAN OF A RING FACE

10 TEETH AT 36°



Torque passes ring to ring through the teeth.

Precast concrete · Torque shim · Roots / torque

SUMMARY

CASTELLATED CAISSON RING

- Precast ring, 4.0 m OD, 1.8 m tall, with integral concrete teeth on its top and bottom faces.
- Adjacent rings interlock as a dog clutch, so the stack can be turned from the top to break skin friction as it follows the cutter head down.
- Teeth: 8–12 per face, 10 typical at 36°; about 400 mm wide and 300 mm deep.
- Detailing: radiused roots, elastomeric torque shims, zero-draft faces, closed-loop confinement ties.
- The lead ring has a flat bearing base on the cutter head (no teeth there). Figures from Memo 13.
- Either face type goes on a solid or a segmented ring (004-01, 004-02).

PATENTS P1 · P2 · P7

MULTI-MODAL CORRIDORS · MMC-DWG-004-03 · CASTELLATED CAISSON RING

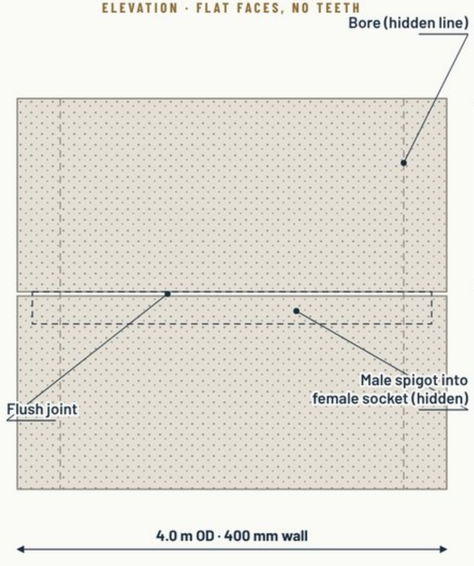
Schematic — not to scale unless dimensioned · Patents P1, P2, P7 · Memo 13
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MMC-DWG-004-04 · FLUSH CAISSON RING

CAISSON TYPES · SHEET 4 · SUMMARY · FLAT FACES · NO ROTATION · SIMPLE INSTALLS

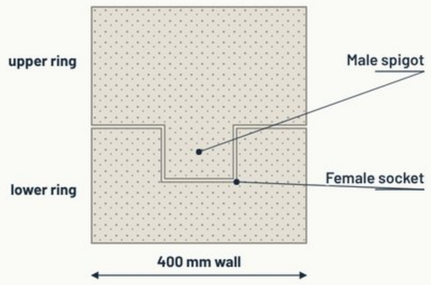
A · TWO RINGS STACKED

ELEVATION · FLAT FACES, NO TEETH



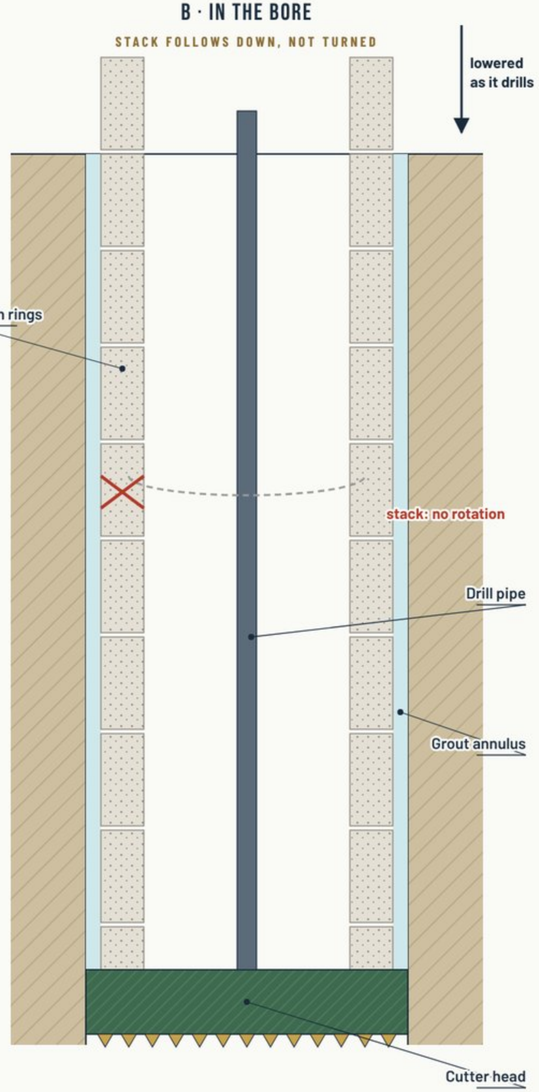
Flush faces, located male to female.
No teeth, so no torque across the joint.

Joint detail: section through the wall



B · IN THE BORE

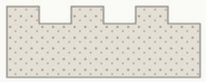
STACK FOLLOWS DOWN, NOT TURNED



C · WHICH RING

JOINT FACE TYPES

Castellated (004-03)



Teeth on both faces
Stack can be turned
to break skin friction

Flush (004-04)



Flat faces, male to female
Stack is not turned
Simple installs where
no rotation is needed

Precast concrete · Grout · Drill pipe · Cutter head · Cutters · No rotation

SUMMARY

FLUSH CAISSON RING

- Precast ring, 4.0 m OD, 1.8 m tall, 400 mm wall, with flat top and bottom faces: no teeth.
- For simple installs where no rotation is needed: the stack follows the cutter head down without being turned.
- No torque passes ring to ring.
- Rings locate male to female: a spigot on one face fits a socket in the next.
- Either face type goes on a solid or a segmented ring (004-01, 004-02).

PATENTS P1 · P2 · P7

MULTI-MODAL CORRIDORS · MMC-DWG-004-04 · FLUSH CAISSON RING

Schematic — not to scale unless dimensioned · Patents P1, P2, P7
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