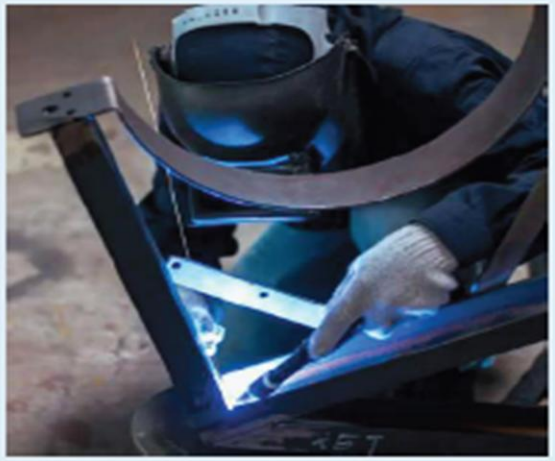
SOUTHERN ROCK
YOUR PARTNER IN PROJECTS



SOUTHERN ROCK
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COMPANY INTRODUCTION

SOUTHERN ROCK CONTRACTING EST. (SRC)

Southern Rock Contracting Est. (SRC) is an established industrial maintenance contractor with strong experience in executing high-risk works inside live operating plants, including:

Fabrication – Assembly & Coating
Site Installation, Shut down Works & Dismantling
Shutdown & Turnaround Activities
Piping Fabrication, Testing & Coating
Complete Project Material and Consumable Trading
Precision Machining, Turning & Milling.

Our Engineering services encompass design, detailing, reverse engineering, Controlled Dismantling and Demolition and technical consultancy, ensuring that every project is executed with precision and innovation.

PAST DEMOLITION PROJECTS

NO	REGION	NAME OF PROJECT	WORK TRADE	UNIT
1	KSA	MAADEN BAUXITE & ALUMINIUM CO (MBAC) RASAL KHAIR	DEMOLITION OF RESIDUE STORAGE AREA 3	REFINERY
2	KSA	SABIC - KEMYA	CEMENT LINED PIPE REPLACEMENT IN LLDPE PLANT	REFINERY
3	KSA	SAUDI ARABIAN MINING COMPANY (MAADEN)	GAP AND LPT CIVIL WORKS AND ERECTION WORKS	REFINERY
4	KSA	SAUDI WATER PARTNERSHIP COMPANY (SWPC) SHUQAIQ	SHUQAIQ 3 SEA WATER RESERVE	WATER TREATMENT PLANT
5	KSA	JUBAIL UNITED PETROCHEMICALS (JUPC)	DEMOLITION OF ETHLINE PLANT (UNIT 7-8)	PETRO CHEMICALS
6	KSA	KJO GLOBAL GAS AND NGL RECOVER HANDLING KAFJI	DEMOLITION OF EXISTING TANKS PLATFORM, FOUNDATION	REFINERY
7	KSA	SHOAIBA POWER AND DESALINATION PLANT - SAMSUNG ENGINEERING	DEMOLITION OF EXISTING HEAVY STEEL STRUCTURES	WATER DISTILLATION
8	KSA	AMERICAN AIR BASE	DEMOLITION OF REVETMENT MILITARY INSTALLATIONS	3 UNITS

CONTROLLED DEMOLITION of Damaged Nitrogen Receiver (T76-D-0041B)

BY

SOUTHERN ROCK GROUP

CURRENT CONDITION

- Top ~9 m missing Remaining 15 m leaning on pipe rack.
- Heavy deformation at 6 m height
- Steel confirmed brittle due to LN_2 exposure Objective:
- To dismantle and remove the vessel safely without affecting the pipe rack or nearby assets.

KEY CHALLENGES

- Brittle / glass-like steel behavior
- 30-ton leaning structure
- Stored energy at bent section
- Proximity to pipe rack & Vessel A
- Risk of shrapnel and sudden collapse
- Unknown residual LN_2 pockets

HAZARD IDENTIFICATION & CONTROLS

MAJOR HAZARDS

- Brittle fracture
- Stored energy release
- Structural collapse
- Steam explosion during hot work
- Flying fragments

CONTROLS

- 30 m exclusion zone
- Hydraulic shear (primary method)
- Sandbag stabilization
- Cold tapping & O_2 monitoring
- Excavator Lexan windshield
- Crane slack-tension support

SAFETY ZONES & PPE

EXCLUSION ZONES:

- 30 m radius during cutting
- 60 m × 40 m barricaded demolition area

PPE Requirements:

- Full PPE + face shield
- FR clothing
- Polycarbonate windshield cab
- Long-distance tag lines
- No personnel under suspended load

ATMOSPHERIC SAFETY

COLD TAP VERIFICATION:

- 5 mm holes at 0 m & 6 m
- Confirm no pressure / LN_2 release
- O_2 > 19.5% before work

PURPOSE:

- Prevent sudden nitrogen discharge and confirm no trapped cold pockets.

Site Preparation & Stabilization

- Remove loose debris using telehandler
- Protect ground using sand cushioning
- Install temporary supports
- Ensure 360° barricade
- Engineering survey for trapped energy
- Confirm mechanical & electrical isolation

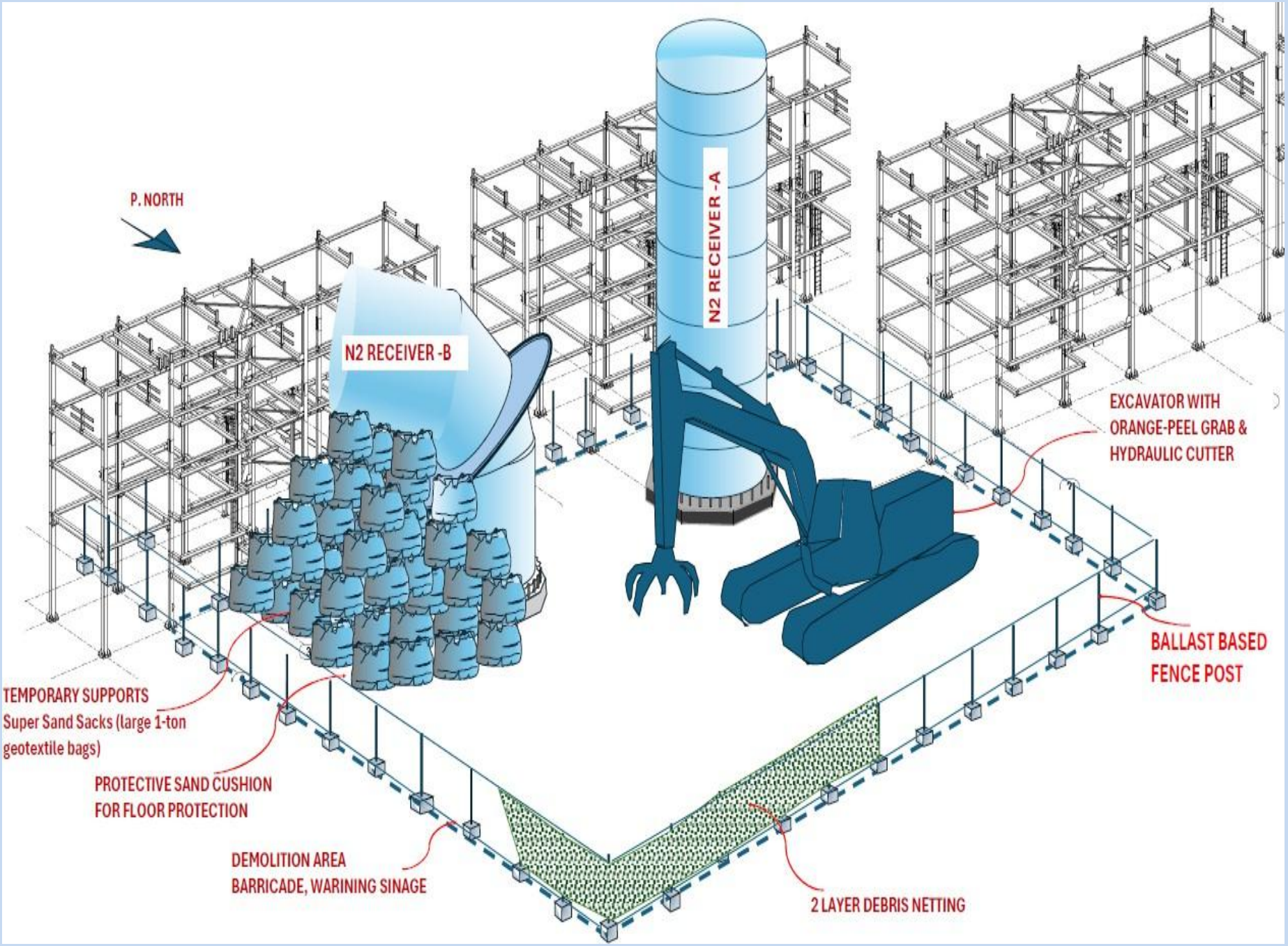
SANDBAG STABILIZATION SYSTEM

PURPOSE:

- Support vessel weight
- Absorb brittle fracture energy
- Protect pipe rack

SYSTEM:

- 275+ Jumbo sandbags
- 5–6 m high pyramid
- Hand-packed small bags to fill gaps
- Curved cradle matching shell diameter


P. NORTH
N2 RECEIVER -A
N2 RECEIVER -B
EXCAVATOR WITH
ORANGE-PEEL GRAB &
HYDRAULIC CUTTER
BALLAST BASED
FENCE POST
TEMPORARY SUPPORTS
Super Sand Sacks (large 1-ton
geotextile bags)
PROTECTIVE SAND CUSHION
FOR FLOOR PROTECTION
DEMOLITION AREA
BARRICADE, WARINING SINAGE
2 LAYER DEBRIS NETTING

PRE-DEMOLITION VERIFICATION

- Cold tap test
- O_2 monitoring >19.5%
- Strike test demonstration (brittleness)
- Team risk briefing
- Confirm no vibration transfer to pipe rack

DISMANTLING STRATEGY

PRIMARY METHOD:

- **Excavator-mounted hydraulic shear**
- **Vertical "banana peel" cuts**
- **Stress-relief stripping**

SUPPORT METHOD:

- **100T crane with 10–15% slack tension Sandbag energy absorption**
- **No manual intervention close to the vessel**

PHASE III: CUTTING SEQUENCE

STEP 1 —

- Crane Pre-Positioning
- Wire ropes only
- Slack-tension mode

STEP 2 —

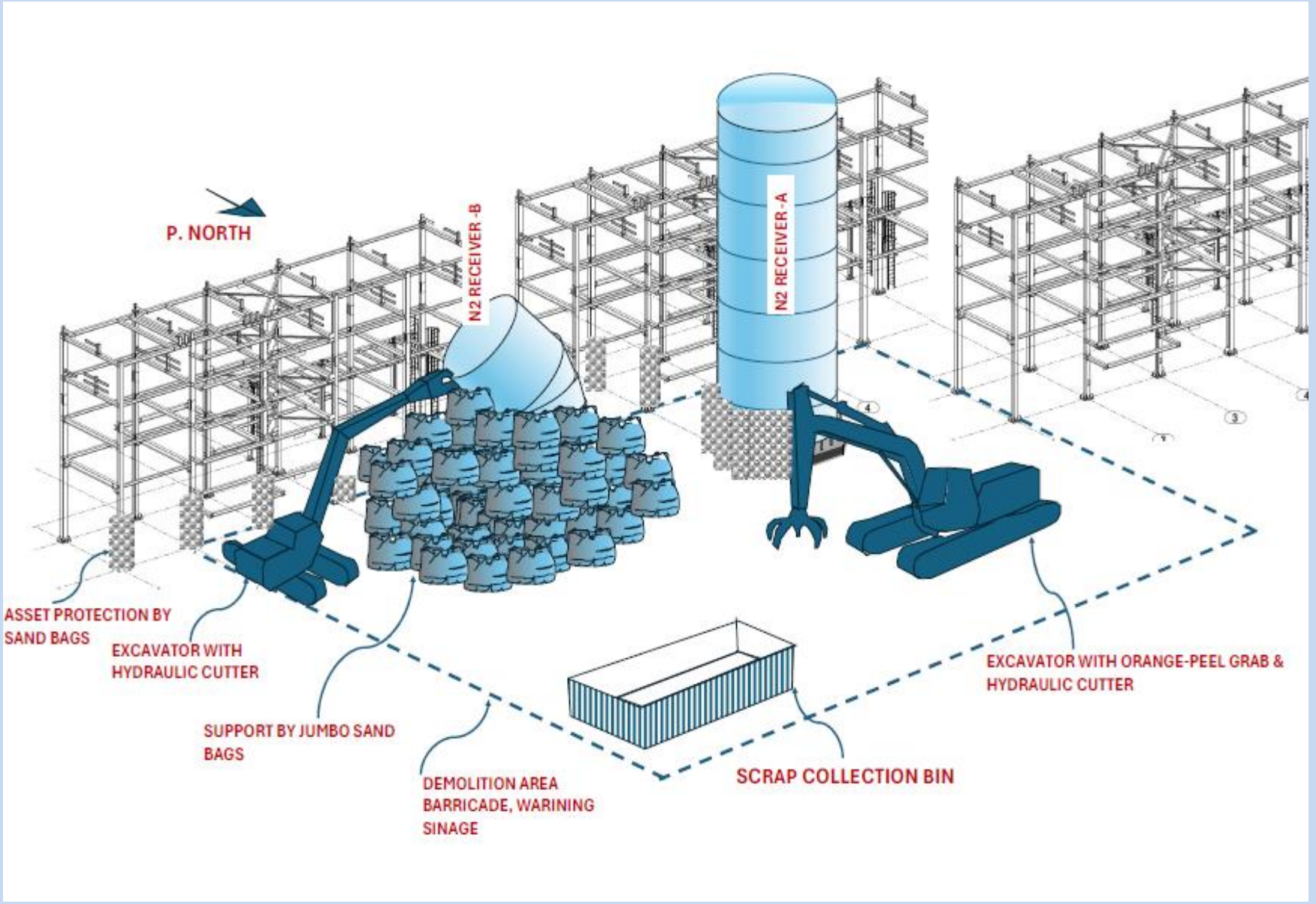
- Banana Peeling
- Vertical cuts
- Long strips remove hoop strength

STEP 3 —

- Upper Section Removal
- Remove top 5 m first
- Crane lowers strips to safe area

CUTTING THE 6M BENT SECTION

- Most critical stage
- Top weight already removed
- Controlled cut above sandbag saddle
- Sandbags absorb drop
- Crane prevents roll-over
- Controlled redirection away from pipe rack


P. NORTH
N2 RECEIVER -B
N2 RECEIVER -A
ASSET PROTECTION BY SAND BAGS
EXCAVATOR WITH HYDRAULIC CUTTER
SUPPORT BY JUMBO SAND BAGS
DEMOLITION AREA BARRICADE, WARINING SINAGE
SCRAP COLLECTION BIN
EXCAVATOR WITH ORANGE-PEEL GRAB & HYDRAULIC CUTTER

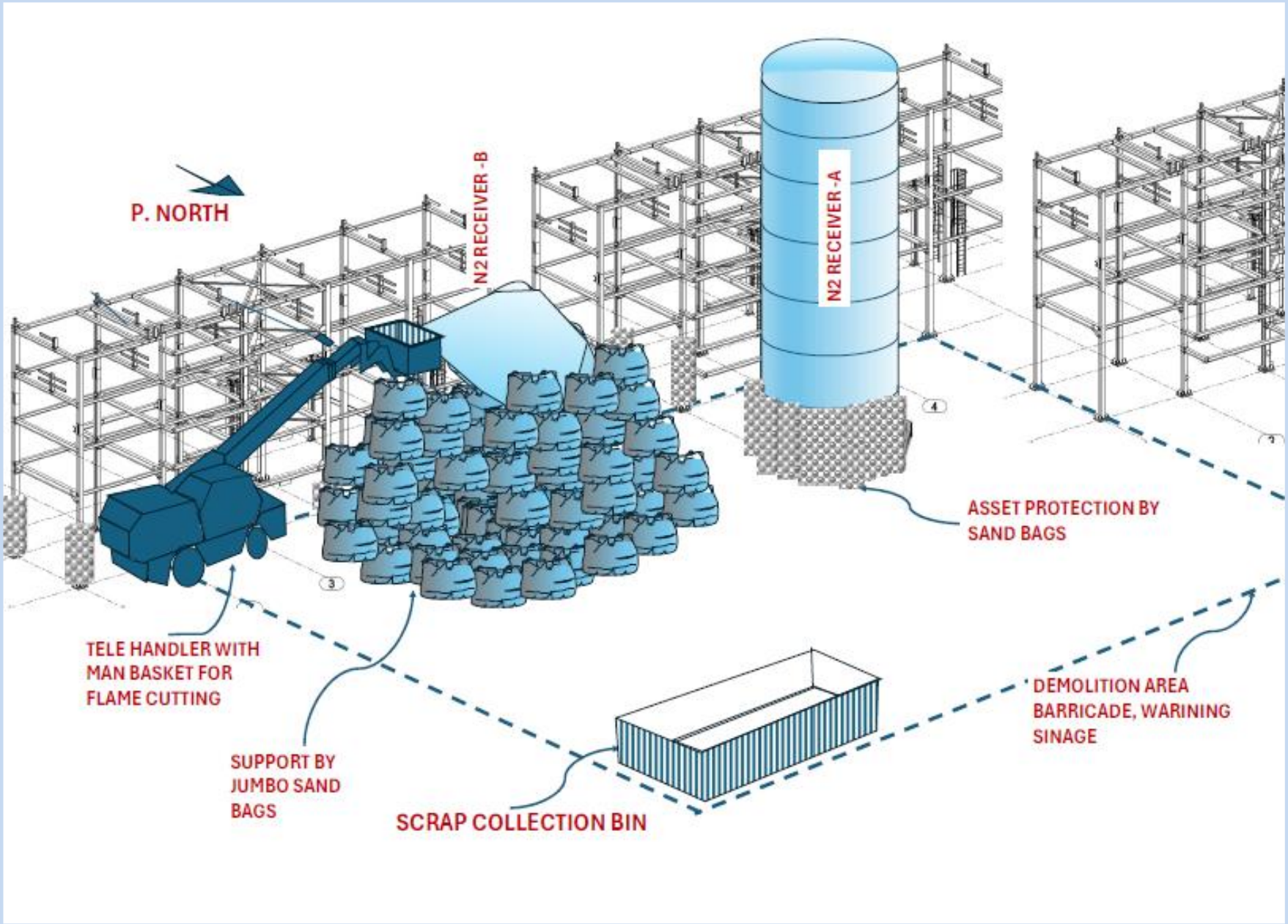
CONTINGENCY

Hot Work Plan B (If Shear Fails)

- Conditions for Hot Work: Only when shear cannot penetrate

Plan

- Preheat to 100–150°C
- Stitch cutting (30 cm cut / 20 cm bridge)
- Long torches (1.5–2 m)
- Fire blankets on sandbags
- Fire watch mandatory


P. NORTH
N2 RECEIVER -B
N2 RECEIVER -A
ASSET PROTECTION BY SAND BAGS
TELE HANDLER WITH MAN BASKET FOR FLAME CUTTING
SUPPORT BY JUMBO SAND BAGS
SCRAP COLLECTION BIN
DEMOLITION AREA BARRICADE, WARINING SINAGE

VESSEL A PROTECTION PLAN

Why Protection Is Required:

- Vessel A already damaged
- 12 m from demolition site

Protection Measures:

- Rubber blasting mats
- Jumbo sandbag vertical buffer
- Dedicated proximity spotter
- No equipment parking in 12-m zone
- Tail swing monitored

VIBRATION & CRACK MONITORING

- Restrictions on heavy shearing force
- If vibration impacts pipe rack → switch to stitch cutting
- Crack growth monitoring on Vessel A
  Immediate stop if new cracks observed

DETAILED EXECUTION STEPS

Step 1: Stabilization & sandbag positioning

Step 2: Remove loose sections

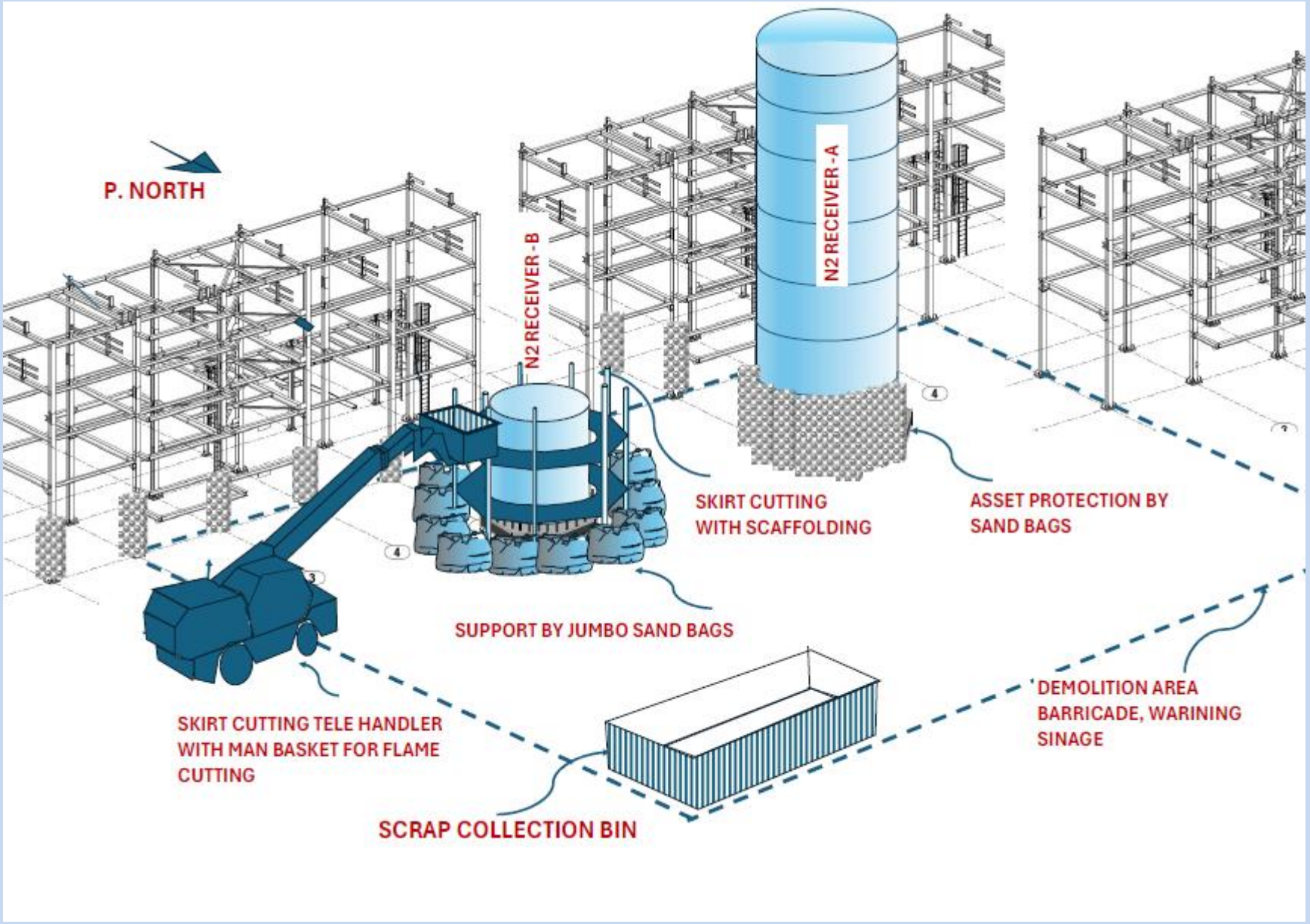
Step 3: Controlled removal of leaning upper section

Step 4: Peeling of main shell courses

Step 5: Skirt demolition

Step 6: Base ring removal

Step 7: Scrap segregation & cleanup


P. NORTH
N2 RECEIVER - B
N2 RECEIVER - A
SKIRT CUTTING
WITH SCAFFOLDING
ASSET PROTECTION BY
SAND BAGS
SUPPORT BY JUMBO SAND BAGS
SKIRT CUTTING TELE HANDLER
WITH MAN BASKET FOR FLAME
CUTTING
DEMOLITION AREA
BARRICADE, WARINING
SINAGE
SCRAP COLLECTION BIN

EQUIPMENT PLAN

- Excavator with hydraulic shear & grab
- 100T mobile crane
- Manlift
- Telehandler
- Forklifts
- Cutting set (oxy-acetylene)
- Fire safety equipment
- Flatbed trucks & skip containers

MANPOWER PLAN

- Project Manager
- Structural Engineer
- HSE Officer
- Crane operator
- Excavator operator
- Riggers (Level 1 & 2)
- Fire watch
- Scaffolders (as required)
- Helpers
- Shifts:12hr/ Day + 12hr Night Duration: 2–3 weeks

HSE MANAGEMENT

- No man-entry into collapse zone
- No welding lifting lugs
- Minimum hot work
- Continuous monitoring for shifts & cracking
- PTW compliance
- Emergency response readiness

QUALITY ASSURANCE

- Inspection after each cut
- Record brittle behavior
- Ensure compliance with Method Statement
- Scrap quantity tracking
- Daily checklists & supervisor sign-off

ENVIRONMENTAL PROTECTION

- Water spray for dust
- Noise control
- Proper waste segregation
- No contamination to surrounding area

CLIENT Q&A SUMMARY

1. Why sandbags instead of steel supports?

Sandbags absorb impact, distribute load, and prevent brittle cracking. Steel supports create dangerous point-loads.

2. Why treat the vessel as brittle after collapse?

LN_2 exposure permanently damages steel grain structure. The brittleness remains even at ambient temperature.

3. Why use hydraulic shear instead of torch cutting?

Cold cutting avoids thermal shock, keeps operator at a distance, and prevents sudden fracture.

CLIENT Q&A SUMMARY

4. How is the pipe rack protected?

Weight reduction + sandbag buffer + controlled cutting direction away from the rack.

5. Any nitrogen trapped?

Cold tap at 0m and 6m confirms safe O_2 (>19.5%) and releases pockets before work.

6. What if the vessel suddenly shatters?

Exclusion zone, sandbag pyramid, and excavator Lexan shielding control the risk.

CLIENT Q&A SUMMARY

7. Why is the crane used in slack-tension only?

To catch movement without pulling on brittle steel, avoiding collapse.

8. Why vertical "banana peel" cuts?

They release internal stress slowly and prevent explosive shell failure.

9. How is Vessel A protected?

Rubber shields + sandbag barrier + no equipment entering the 12 m high-risk corridor.

CLIENT Q&A SUMMARY

10. What prevents sympathetic damage to nearby equipment?
Controlled cutting direction, sand cushion, debris shielding, and strict proximity control.

11. Why minimal hot work?
Heat can trigger thermal cracking. Used only if shear fails.

12. How long will the demolition take?
Approx. 2–3 weeks, depending on debris and weather.

13. What is the biggest risk?
Brittle fracture and stored energy at the 6 m bend.

14. How is that risk controlled?
Stress-relief cuts, sandbag cradle, slack crane tension, exclusion zone.

CLIENT Q&A SUMMARY

15. Why no man-entry?

The vessel is unstable; internal collapse risk is high.

16. Why use telehandler for sandbags?

Safer placement, no manual handling near risk zone.

17. Why debris netting and plywood shielding?

To catch small shrapnel and protect adjacent assets.

CLIENT Q&A SUMMARY

18. Why not use scaffolding for support?

Steel supports can puncture brittle steel and trigger cracking.

19. Why stitch-cutting during hot work?

Prevents sudden drop—only small sections release at a time.

20. What ensures quality compliance?

Daily inspections, cut verification, and adherence to Aramco JSA/PTW.

CONCLUSION

- This demolition plan:
- Ensures full personnel safety
- Protects pipe rack & Vessel A
- Uses engineered controls
- Minimizes hot work
- Complies with Aramco standards
- Provides safe, efficient 2–3-week execution