

STAGE-2 (BENCHING)

0 3.125 6.25m

R6.130 EXCAVATED

① HEADING

6.130 6.130

SPL

R12.260 EXCAVATED

R1.500 (TYP.)

RX 250 EXCAVATED

② BENCHING

0.50

③ INVERT

6.130 12.260 EXCAVATED

6.630 (HEADING)

1.50

2.64 (BENCHING)

1.61 (INVERT)

10.880 (EXCAVATED)

Technical drawing of a circular tunnel cross-section. The drawing includes the following details:

- Scale:** (RMR ≤ 20) with a scale bar from 0 to 6.25m.
- Dimensions:**
 - Overall diameter: 12.260m (EXCAVATED).
 - Internal diameter: 10.880m (EXCAVATED).
 - Wall thickness: 6.30m (EXCAVATED).
 - Heading height: 6.630m (EXCAVATED).
 - Benching height: 2.64m (EXCAVATED).
 - Invert height: 1.61m (EXCAVATED).
 - Radius: R6.130 (EXCAVATED).
 - Angle: 120°.
 - Offset: 0.25 (TYP.).
 - Offset: 0.50.
- Materials and Construction:**
 - PIPE ROOFING, $\varnothing 89$ mm (OUTER DIAMETER), 6.30mm WALL THICKNESS, 6.0m LONG, YIELD STRENGTH 310 Mpa BOTH WAYS.
 - FULLY GROUTED ROCK BOLT 310 Mpa BOTH WAYS.
 - FULLY GROUTED @ 400mm c/c (CIRCUMFERENTIAL SPACING) OR EQUIVALENT SYSTEM.
 - 50mm THK. SFRS (M25).
 - LATTICE GIRDER @ 0.50m c/c.
 - 200mm THK. SFRS (M25) (ENCASING LATTICE GIRDER).
 - 250mm THK. SFRS (M25) (ENCASING LATTICE GIRDER).
- Other Labels:** SPL.

(STAGE-2 BENCHING EXCAVATION)

0 3.125 6.25m

250mm THK. SFRS (ENCASING LATTICE GIRDER)
Ø25mm, 6.0m LONG @ 1.0m c/c
FULLY GROUTED ROCK BOLT
310 Mpa BOTH WAYS

PIPE ROOFING, Ø89mm (OUTER DIAMETER)
6.30mm WALL THICKNESS, 6.0m LONG,
YIELD STRENGTH 310 Mpa BOTH WAYS
FULLY GROUTED @ 400mm c/c
(CIRCUMFERENTIAL SPACING)
OR EQUIVALENT SYSTEM

LATTICE GIRDER
@ 0.5m c/c

50 TO 100mm THK. SFRS
(M25) (AS PER SITE
CONDITION)

250mm THK. SFRS
(M25)

LATTICE GIRDER
@ 0.5m c/c

50 TO 100mm THK. SFRS
(M25) (AS PER SITE
CONDITION)

25.0 MIN. DIST. BENCHING
MAX. DIST. NO LIMIT

250mm THK. SFRS (M25)
(ENCASING LATTICE GIRDER)


5.00' 0.114 4.00 (OVERLAP) 6.00 6.00 6.00 1.00 (TYP.) 5.00 LAG

A 005 ① HEADING HEADING 6.630 (HEADING) 10.880 (EXCAVATED) 2.64 (BENCHING) 1.61 (INVERT) VARIES

1. EXECUTION OF ROOF UMBRELLA (FULLY GROUTED PIPES 310Mpa BOTHWAYS) IN THE CORRECT POSITION BEFORE HEADING EXCAVATION. AT EACH FACE 50mm TO 100mm THICK (AS PER SITE CONDITION) SFRS SHALL BE PLACED AFTER EACH EXCAVATION CYCLE (750mm TO 1000mm). THE GROUTED PIPE SHALL BE DONE BY EXCAVATION AND CONCRETING OF ONE PIPE AT A TIME AND ONLY AFTER THAT THE NEXT PIPE, WHICH IS AWAY FROM THE EARLIER PIPE SHALL BE EXECUTED. NO TWO PIPES SHALL BE EXECUTED AT A TIME.
2. AFTER EXCAVATION OF EACH STAGE, 50mm THICK SFRS SHALL BE APPLIED ALL ALONG THE EXCAVATED SURFACE.
3. THEN, THE LATTICE GIRDER SHALL BE INSTALLED IN POSITION AS SHOWN IN THE DRAWING. THE 200mm THICK SFRS SHALL BE APPLIED ENCASING THE LATTICE GIRDER IN TWO LAYERS (100mm + 100mm). 250mm THICK SFRS SHALL ALSO BE PLACED ON THE FLOOR AFTER EACH STAGE OF EXCAVATION.
4. Ø25, ROCK BOLTS, FULLY GROUTED, 6.0m LONG @ 1.5m c/c, SHALL BE INSTALLED IN CROWN AND WALL AS PER EXCAVATION STAGES SHOWN IN DRAWINGS. GROUTING OF ROCK BOLTS SHALL BE CARRIED OUT SIMULTANEOUSLY DURING DRILLING OF BOLTS ITSELF.
5. BACKFILL CONCRETE OR SFRS SHALL BE PLACED AS PER DRAWINGS.
6. STAGE 1 EXCAVATION AND SUPPORT (FOR EACH CYCLE i.e. 750 TO 1000mm) SHALL BE CARRIED OUT TILL 15.0m LENGTH.
7. THE HEADING EXCAVATION SHALL BE CARRIED OUT IN ONE STEP. THIS STAGE 1 HEADING SHALL BE CARRIED OUT WITH EXCAVATION & SUPPORT (FOR EACH CYCLE i.e. 750 TO 1000mm) FOR 6.0m LENGTH AND THEN BENCHING EXCAVATION AND SUPPORT (FOR EACH CYCLE i.e. 1500 TO 2000mm) SHALL BE CARRIED OUT FOR 4.0m LENGTH FOR STAGE 2. THEN AGAIN STAGE 1 SHALL BE FURTHER PROGRESSED BY 6.0m AND THEN FOLLOWED BY 6.0m EXCAVATION AND SUPPORT OF STAGE 2 (BENCHING) FOLLOWING THE SIMILAR CYCLE DEFINED ABOVE AND SO ON TILL FINAL EXCAVATION IS ACHIEVED.

EXCAVATION SEQUENCE IN THIS DWG. SHALL BE MANDATORY FOLLOWED.

1. ALL DIMENSIONS & LEVELS ARE IN METRES EXCEPT SHOWN OTHERWISE.
2. THE EXCAVATION CYCLE OF 750mm TO 1000mm SHALL BE CONSIDERED AS PER SITE CONDITIONS IN EACH STAGE FOR EXCAVATION AND SUPPORT SYSTEM. ONLY AFTER SUPPORTING THIS STRETCH (750mm TO 1000mm) IN EACH STAGE, THE NEXT CYCLE OF EXCAVATION SHALL BE CARRIED OUT.
3. THE FULLY GROUTED ROCK BOLTS IN THE CROWN SHALL BE PLACED IN SUCH A WAY THAT THEY PASS THROUGH BETWEEN TWO PIPES (ROOF UMBRELLA) AND, IF REQUIRED TO MAINTAIN THIS, THE MINOR ADJUSTMENT CAN BE MADE AT SITE.
4. THE YIELD STRENGTH OF FULLY GROUTED ROCK BOLTS IS 24.50 TONNE AND DESIGN CAPACITY IS 19.0 TONNE.
5. THE GRADE OF SFRS SHALL BE M25.
6. THE FULLY GROUTED PIPES (ROOF UMBRELLA 310 Mpa BOTH WAYS) SHALL BE DONE BY EXCAVATION AND CONCRETING OF ONE PIPE AT A TIME AND ONLY AFTER THAT THE NEXT PIPE, WHICH IS AWAY FROM THE EARLIER PIPE SHALL BE EXECUTED. NO TWO PIPES SHALL BE EXECUTED AT A TIME.
7. FOR DETAILS OF LATTICE GIRDER REFER DWG. NO. HEC-AIPPL/NHIDCL/KB/TUN/10.
8. FACE BOLTING AND SHOTCRETE SHALL BE CARRIED OUT IN CLASS IV AND V, WHEREVER REQUIRED.
9. FOREPOLING SHALL BE CARRIED OUT IN CLASS IV, WHEREVER REQUIRED TO AVOID OVER BREAK AT CROWN.
10. THE NUT OF THE GROUTED BOLT SHALL BE TIGHTENED 12 HRS AFTER INSTALLATION TO ACHIEVE A FORCE AT THE ANCHOR PLATE OF APPROXIMATE 20 KN. THIS FORCE SHALL BE APPLIED BY CALIBRATED TORQUE WRENCH

					Project Title	This drawing is the property of AGNITIO INFRASTRUCTURE PROJECTS PVT LTD and must not be passed on to any person or body not authorised by us to receive it nor be copied or otherwise made use of either in full or in part by such person or body without our prior permission in writing.	Client	Drawing Title: TUNNEL EXCAVATION & SUPPORT CLASS V (SHEET 2 OF 2)			CONSULTANT
					Consultancy Services for carrying out Feasibility Study, Preparation of Detailed Project Report (DPR) and providing pre-construction services in respect of 4 Laning of Kohima Bypass connecting NH-39 (New NH-02), NH-150 (New NH-02), NH-61 (New NH-29) and NH-39 (New NH-02) on Engineering, Procurement and Construction (EPC) mode in the state of Nagaland	Original Size: A2		Drawing No.: HEC-AIPPL/NHIDCL/KB/TUN/9		Sheet : OF 45	HIGHWAY ENGINEERING CONSULTANT IN ASSOCIATION WITH AGNITIO INFRASTRUCTURE PROJECTS PVT LTD
					Path -	Scale :— NTS					
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