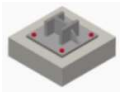
REF-A24

STRUT WALER BRACKET CONNECTION TO D-WALL

PROJECT	Chennai Metro Rail Limited (CMRL) Phase 2 Package TU02
LOCATION	Chennai, India
CLIENT	Chennai Metro Rail Limited
DESIGNER	Larsen & Toubro
INSTALLATION	2022

CHENNAI METRO RAIL LIMITED

Application	**Strut Waler bracket**
Design std.	**EN 1992-4**
Hardware	**Hilti RE 500-V4 + AM (8.8)**
Software	**Calculations based on Design Loads**
Services	**On-site testing, meetings at designer's office**



LOAD/ CONDITIONS **Static**

CHALLENGES

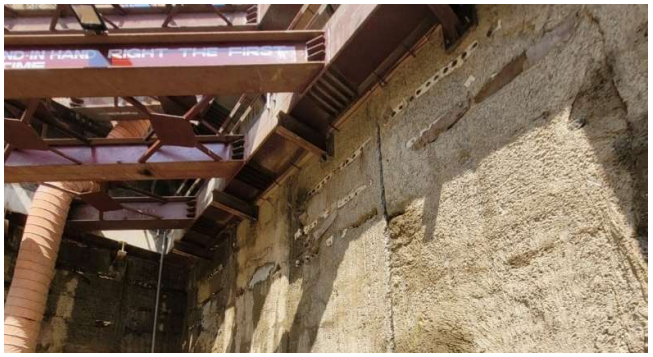
- Seepage of water during drilling at jobsite
- Approval needed for the Water-Filled holes condition for the chemical anchor while recommending it for the anchor design.
- Understanding the evolution criteria of anchors

HILTI TOTAL SOLUTION

- ✓ Selection of pre-qualified and approved anchors for Water-Filled holes condition as per ETA-20/0541
- ✓ On-site testing done as per Annex B8 of ETA-20/0541
- ✓ Submitted design reports as per approval document

PROJECT HIGHLIGHT **Performing on-site testing of Chemical Anchor in Water-Filled Holes**

APPLICATION AND REQUIREMENT



Application Details: Strut Waler Bracket Supporting on D-Wall connection

The Waler bracket is fixed on D-Wall to support Waler Beams which will be holding the D-Wall from tilting or collapsing while allowing the work to continue below. These brackets were fixed on D-wall using Post-Installed Anchors and while drilling, there was seepage of water into the drilled hole. So post-installed anchoring solution which will be able to resist water-filled holes conditions and is able to withhold the resistance without fail was needed.

Ease of installation

The installation should be easier & faster at site without any hindrance. Hilti offered post-installed bonded anchors which satisfied both the water-filled conditions and quick installation.

APPROACH TOWARDS SOLUTION

On-site testing arrangement

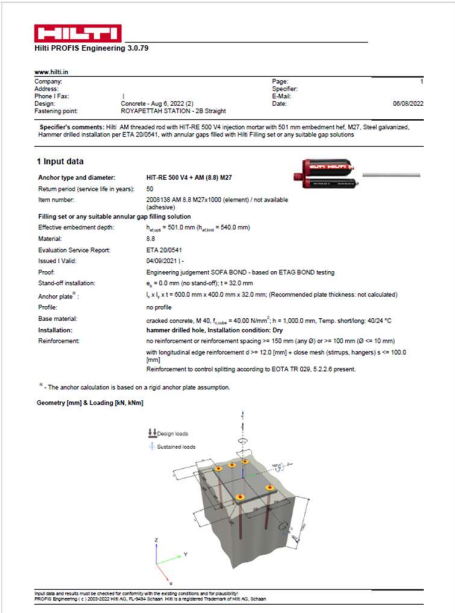
The selected anchors were approved by ETA-20/0541 but in order to validate the installation quality at jobsite, the testing of the post-installed anchor was performed by Hilti Team on site. The evaluation report along with the relevant ETA approval documents for the anchors were submitted after testing. The approach by Hilti from initial stage helped to build reliability of the designer & quality team in terms of complying the criteria for checking the performance of anchors in water-filled holes at jobsite.

Post-installed anchors and other tools

- Post-installed bonded anchor- **RE 500 V4 + AM (8.8) of dia. M27** was used.
- Installation was done using Hilti drilling machine **TE-2**.

THE FINAL OUTCOME

The finished waler brackets


Hilti PROFIS Engineering 3.0.79

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Company: Page: 1
Address: Specifier:
Phone I Fax: E-Mail:
Design: Concrete - Aug 6, 2022 (2) Date: 06/08/2022
Fastening point: ROYAPETTAH STATION - 2B Straight

Specifier's comments: Hilti AM threaded rod with HIT-RE 500 V4 injection mortar with 501 mm embedment hef, M27, Steel galvanized, Hammer drilled installation per ETA 20/0541, with annular gaps filled with Hilti Filling set or any suitable gap solutions

1 Input data

Anchor type and diameter: HIT-RE 500 V4 + AM (8.8) M27
Return period (service life in years): 50
Item number: 2006138 AM 8.8 M27x1000 (element) / not available (adhesive)
Filling set or any suitable annular gap filling solution
Effective embedment depth: $h_{ef,act}$ = 501.0 mm (h_{nom} = 540.0 mm)
Material: 8.8
Evaluation Service Report: ETA 20/0541
Issued I Valid: 04/09/2021 I -
Proof: Engineering judgement SOFA BOND - based on ETAG BOND testing
Stand-off installation: e_b = 0.0 mm (no stand-off); t = 32.0 mm
Anchor plate*: l_x x l_y x t = 600.0 mm x 400.0 mm x 32.0 mm; (Recommended plate thickness: not calculated)
Profile: no profile
Base material: cracked concrete, M 40, $f_{c,cube}$ = 40.00 N/mm²; h = 1,000.0 mm, Temp. short/long: 40/24 °C
Installation: hammer drilled hole, Installation condition: Dry
Reinforcement: no reinforcement or reinforcement spacing >= 150 mm (any Ø) or >= 100 mm (Ø <= 10 mm)
with longitudinal edge reinforcement d >= 12.0 [mm] + close mesh (stirrups, hangers) s <= 100.0 [mm]
Reinforcement to control splitting according to EOTA TR 029, 5.2.2.6 present.

* - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [mm] & Loading [kN, kNm]

Design loads
Sustained loads