CASE HISTORY

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REINFORCED SOIL WALL FOR BRIDGE APPROACH AND RECONSTRUCTION OF ROB 39A AT GONDAL RAILWAY PORTION, GUJARAT

GONDAL, GUJARAT, INDIA

Reinforced Soil Wall using Panel Facia & Techstrap Reinforcement

Client:	Products used:
KEVAL CONSTRUCTION	TECHSTRAP POLYMERIC STRIP
Main contractor:	Quantity supplied:
SANJAY CONSTRUCTION	72473 rm
Manufacturer & Supplier:	Year of construction:
TECHFAB (INDIA) INDUSTRIES LTD.	NOV 2019 - OCT 2020

Problem:

The project scope included reconstruction of ROB in the prime area of Gondal (Gujarat), wherein the alignment of old ROB was in skew. Considering the city congestion and adjoining private lands, alternate alignments were not an option. For the current structure, maximum height of retaining wall was evaluated to be approximately 11m.

With due consideration to limited right of way; minimizing land acquisition; poor ground conditions; economy and speed of construction, the consultant has recommended to adopt reinforced soil structure for the approached of ROB in the current project.

Solution:

Pursuing the detailed geotechnical investigations and the site conditions, it was decided to adopt the reinforced soil wall with panel facia and TechStrap as reinforcement compared to other alternatives such as RCC retaining walls / gabion gravity walls etc. Following are some of the advantages of adopting reinforced soil walls with panel facia and techstrap reinforcement:

- Simple and rapid construction procedures and do not require heavy machinary / equipment
- Construction space requirements shall be minimal in front of the structure.
- Pore-water pressure will not be developed.
- Its flexibile in nature which can to absorb deformations.
- Deep foundation were not required as less pressures will be exerted on the foundation soil.
- Cost effective and aesthetically pleasing compared to other alternatives.

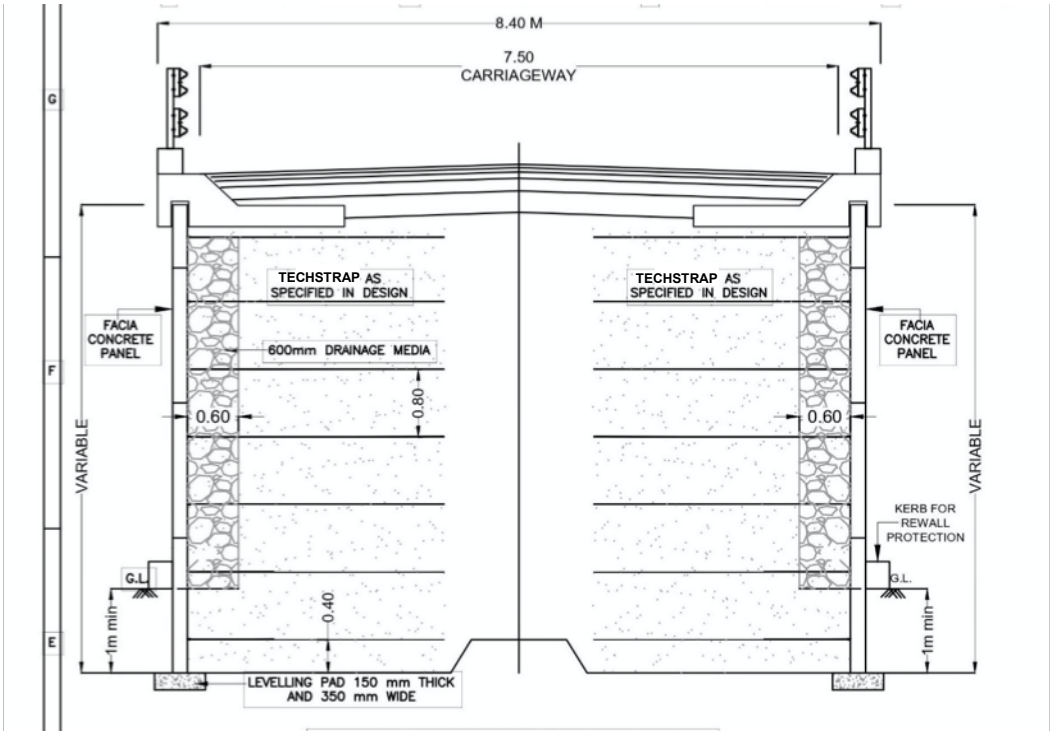
What is TechStrap Polymeric Strip reinforcement?

TechStrap are geosynthetic straps (polymeric strips/straps with a flat webbing like structure) specifically engineered for the reinforcement of soils and other fills in the construction of reinforced soil or mechanically stabilised earth structures. TechStrap Polymeric strips comprises a core of closely packed and tensioned high tenacity polyester filament yarn tendons encased in a tough and flexible sheath of linear low density polyethylene.

Advantages of TechStrap Polymeric Strip

- High tensile strength and modulus
- Low creep
- High resistance to weathering, installation damage
- High resistance to chemical and biological resistance
- Efficient and economic design
- Easy and fast construction
- Excellent frictional interaction with fill
- Efficient, strong and durable connection with pre-cast concrete discrete panels
- Excellent performance and durability

Proposed typical cross section drawing for variable height is as given below:



Typical Cross Section of ROB structure

Based on height of RS wall and structural fill soil conditions, strength of Polymeric strip and length of reinforcement was designed.

Installation Method

EXCAVATION AND FOUNDATION PREPARATION

- The site was excavated to the width and depth as per the approved construction drawings. The trench for the leveling pad was excavated to the correct depth and width.
- Any pits, depressions etc. were filled by compacted granular fill of approved quality. Roller was passed over the excavated ground for even finish and requirements of bearing capacity and density was checked as per the design requirements before proceeding with further construction.

FOUNDATION LEVELING PADS

- The centerline of the leveling pad was marked on the base of the trench.
- Side forms were fixed for the leveling pad.
- After pouring concrete and completion of curing period, forms were removed.

ERECTION OF FIRST COURSE OF PANELS

- Chalk line was marked on the leveling pad to coincide with front face of the bottom most panels.
- The first full height panel was positioned on the leveling pad with its front face aligned along the chalk line. The panel was set to the correct inward batter (1°) by inserting the hardwood wedges below the base of the panels.
- Bracings were installed for the panel.
- The sequence was continued till all the panels in first row are placed. The clamps were fixed loosely.
- Vertical construction joint were provided wherever concrete and foundation soil intersects.
- For vertical construction joints; cut panels were used at junction, top to bottom, to avoid differential settlement.
- Geotextile filter straps were installed for vertical joints.

PLACEMENT AND COMPACTION OF FILL UP TO FIRST LAYER OF TECHSTRAP

- Fill material satisfying project requirements (as per design consideration and fill material mentioned in this methodology) was used.
- Backfill was placed and compacted in lifts up to the first layer of TechStrap reinforcement. The deposition, spreading, leveling and compaction of the fill was carried out in a direction parallel to the facing
- Compaction of the fill was carried out using appropriate equipment, which will not induce excessive loads on the panels and at the same time achieves the required compaction. (as mentioned in drawing)
- Fill was placed and compacted in lifts. Thickness of lift (not more than 200mm) was consistent with the compaction equipment used and the degree of compaction to be achieved. If necessary, water was sprinkled to bring the water content close to the optimum moisture content.
- The dry density of the compacted fill was checked as per codes.

Erection of RCC Facia Panel in Progress

Installation of top layer TechStrap Polymeric Strip

INSTALLATION OF FIRST LAYER OF TECHSTRAP REINFORCEMENT

- The required length of reinforcement was marked on Techstrap as per drawings and the rear anchors which comprised of J hooks and connector rods were fixed as per design provided. The rear anchor arrangement consist of 2 No.'s of J hooks (as specified) fixed at 150mm gap, a rod (as specified) shall be passed and fixed between the hooks.
- The rear anchor arrangement was used temporary till backfill was placed and compacted over the TechStraps.
- TechStrap of required type and length was positioned, as shown on RS Wall L-section drawings.
- The rear end of the TechStrap was fixed by looping at rear anchor proving 2m overlap, the open end was fixed by placing small heaps of fill and using steel clamps/ U pins (depth of U pins 200mm minimum) in tensile strength direction.
- TechStrap was passed through the connector looping around the bar inside and continued laying back towards rear end and return towards the adjacent connector, repeat these steps till TechStraps are laid over the required area.
- TechStraps was pulled and fixed ensuring that TechStrap was reasonably tight and free from wrinkles and folds. Loop the final length of TechStrap around rear anchor with 2m overlap and the open end was fixed using steel clamps/ U pins.
- Panels were placed and compacted fill up to the top of first row of Panels.

ERECTION OF SUBSEQUENT COURSES OF PANELS, FILLING AND INSTALLING TECHSTRAP REINFORCEMENT

- Cycle of backfilling and compacting in lifts, placing Techstraps, and setting panels was repeated until design height was reached.
- Drainage layer was placed as mentioned in the drawing.

COPING BEAM

- At the top of the upper most panels, a cast in-situ coping beam was provided to achieve the required longitudinal profile.

Coping beam installation completed

Completed longitudinal road profile

Completed Reinforced Soil Wall with Panel Facia and TechStrap Reinforcement

Conclusion:

The project was successfully completed in October 2020.

For further details kindly contact :

TechFab India Industries Ltd.
711/712, Embassy Centre, Nariman Point, Mumbai – 400021
Tel: + 91- 22 - 2287 6224 / 6225 Fax: + 91- 22 - 2287 6218
E: info@techfabindia.com
W: www.techfabindia.com