

# **RSW CONSTRUCTION METHODOLOGY WITH PANEL**

## **EXCAVATION AND FOUNDATION PREPARATION:**

- Excavate the site to the alignment, width and depth as shown in the approved construction drawings.
- The trench for the leveling pad should be excavated to the correct depth and width. In the reinforced soil zone the ground should be excavated to a depth of 200mm (minimum) below the first layer of Geogrids.
- Any unsuitable soils if present should be removed and replaced by compacted fill as directed by the Engineer. Similarly any pits, depressions etc. should be filled by compacted fill of approved quality.

## **FOUNDATION LEVELLING PADS:**

- Mark the centerline of the leveling pad on the bottom of the trench. The centerline shall be fixed with required offset to ensure final batter for the facing panels.
- Fix side forms for the leveling pad.
- Pour concrete, compact using needle vibrators screed to the correct level and finish using wooden floats to a flat and smooth finish with a tolerance of  $\pm 3\text{mm}$ .
- Cure for a minimum period of 48 hours prior to the commencement of panel placement.

## **ERECTION OF FIRST COURSE OF PANELS:**

- Mark a chalk line on the leveling pad to coincide with front face of the bottom most panels.
- Position the first full height panel on the leveling pad with its front face aligned along the chalk line (At each position, panels with the appropriate arrangement of connector bar as per the approved drawing has to be used). Set the panel to the correct inward batter (to compensate for outward rotation of panels caused by fill placement and compaction) by inserting the hardwood wedges below the base of the panels. The required batter will depend on type of fill, type of compaction equipment, degree of compaction, length of reinforcement strips etc. Normally a batter of 20 to 30mm per meter may be adequate, but this could be varied based on observation of panel movements. Install bracings (use 100mm x 50mm timbers or steel props) for the panel.
- Place a half height panel , next to full height panel with its face flush with the chalk line such that width of the vertical joint is 20mm. Set the panel to the required batter.
- Continue the sequence till all the panels in first row are placed. Fix the clamps loosely. Check alignment of the panels by sighting along the panel face and adjust the panels to obtain a true line if required. Check the horizontal level of the panels using a spirit level. If required insert shims at the base to correctly level the panels. Tighten clamps and bracings.
- Install geotextile filter strips for vertical joints. Geotextile strips should have a minimum width of 200mm and should be fixed to the panels using suitable adhesive in such a way that it will not be displaced during fill placement and compaction.

## PLACEMENT AND COMPACTION OF FILL UP TO FIRST LAYER OF GEOGRIDS:

- Fill material satisfying project requirements shall only be used.
- Place and compact backfill in lifts up to the first layer of Geogrid reinforcement. Leveling and compaction of the fill should be carried out generally in a direction parallel to the facing.
- No plant or equipment with a weight exceeding 1000 Kg. should be allowed to operate within 1.5m from the facing.
- Compaction of the fill should be carried out using appropriate equipment, which will not induce excessive loads on the panels and at the same time achieves the required compaction. Towards this the following equipments are recommended for different zones:
- Within 300mm of the facing, the fill/drainage material should be compacted by a light-weight plate compactor or by hand tamping.
- Beyond 300mm and within 1.5m from the facing the fill should be compacted using a walk behind vibratory roller with a total weight less than 1500 Kg.
- Beyond a distance of 1.5m from the facing, the fill should be compacted using a 8 - 10 T smooth drum vibratory roller.
- Fill should be placed and compacted in lifts. Thickness of lift should be consistent with the compaction equipment used and the degree of compaction to be achieved. If necessary sprinkle water to bring the water content close to the OMC.
- The dry density of the compacted fill must be at least equal to the following minimum requirements:
- The fill (except in the following case) shall be compacted to 95% of the maximum laboratory density measured as per IS 2720 (Part 8).
- Fill within 0.5 m depth below the road crust should be compacted to 97% of maximum laboratory density.



Photo 1. Lifting Arrangement for Panels



Photo 2. Placement of First Layer of Geogrids

## **INSTALLATION OF FIRST LAYER OF GEOGRID REINFORCEMENT:**

- Position geogrid of the required type and length (with additional 1 m for anchorage at the connection with panel or in two layers) as shown on drawings with the longitudinal direction perpendicular to wall face. Adjacent rolls of geogrid should be butting each other.
- Fold the front end of the Geogrid back by 1 m or full length as per the detail given in the drawings. Align the front edge of the Geogrid with rear face of the panels. If required transverse ribs along the tie rods may be cut.
- Insert connector bar through the tie rods and between the two legs of the Geogrids. Fix the rear end of the Geogrid by placing small heaps of fill and using u pins.
- Pull the other (front) end of the Geogrids and fix ensuring that Geogrid is reasonably tight and free from wrinkles and folds. Check and ensure that the anchorage length is at least 1m.

## **PLACING AND COMPACTING FILL UP TO THE TOP OF FIRST ROW OF SF- PANELS:**

- Place and compact fill up to the top of first row of panels, in 150mm to 200mm layer thickness with desired degree of compaction.

## **ERECTION OF SUBSEQUENT COURSES OF PANELS, FILLING AND INSTALLING GEOGRID REINFORCEMENT:**

- Erect second and subsequent courses of panels to the correct alignment and required batter. Fix bearing pads on horizontal bedding joints. Fix geotextile filter strips behind horizontal and vertical joints. Ensure uniform joint width of 20mm.
- Check for the alignment of walls at regular intervals.
- For each course of panels, remove the wedges after three courses have been erected. At any point of time more than three levels of wooden wedges should not be allowed. Otherwise it may become difficult to remove them later on.
- Before the wall reaches half its total height or 5m (which ever is less) fill up the foundation trench in front of the wall with approved material.
- The top most rows of panels may be required to be of varying height to achieve the required profile at the top.
- Place and compact fill in lifts. Compaction of each lift must be checked before subsequent lifts can be placed on it. At the end of each day slope the surface of the fill away from the facing to drain away surface runoff.
- Install Geogrid reinforcement at each level as per the drawing.
- The placement and compaction of fill should be carried out so that all layers of Geogrids are fixed at the appropriate levels (as per respective L - Section Drawings) on top of the compacted fill. The deposition spreading, leveling and compaction of the fill should be carried out generally in a direction parallel to the facing and should be executed in stages to alternate with the erection of facing panels and fixing of Geogrid reinforcement.
- At each reinforcement level, the fill should be placed and compacted to the level of the connection. Fill placement methods near the facing shall ensure that no voids exist directly below the Tie-rods and Geogrids reinforcement.



Photo 3. Connection Details



Photo 4. GeoTextile at Panel Joints



Photo 5. Spreading and Compacting the Reinforced Fill

### **PLACEMENT OF DRAINAGE SYSTEM:**

- The drainage fill shall be placed in the same manner as the reinforced and retained earth fill. During the placement and compaction of the drainage material, care must be taken to ensure that there is no contamination with undesirable materials.
- The drainage fill should be brought up at the same rate as the adjoining reinforced fill material. Graded granular filter shall be provided behind the drainage bay for purpose of filtration.
- Perforated outlet pipes shall be installed at 6m interval along the length of the wall. At the inner end of the pipes slotted caps shall be provided to prevent the entry of drainage fill into the pipe.

The pressure resistance capacity should be minimum 4 kg/sq.cm. The diameter of hole should be minimum 6 to 8mm.

- The triangular minimum distance between holes should be 25mm & maximum 40mm. Longitudinal pipe of 150mm diameter wrapped with geotextile shall be provided at ground level.
- At top of the wall, either V-notch, drain along with down take pipe at every 10 to 20m interval shall be provided.

**COPING BEAM:**

- At the top of the upper most panels, provide a cast in-situ coping beam to achieve the required longitudinal profile. On the topmost segmental unit, erect form work and cast coping beam to the level as shown in construction drawings.
- Reinforcement and other details are as per the drawings. Minimum 25mm of gap shall be ensured while placing crash barrier over the coping beam, to avoid the load transfer over the wall. This gap shall be filled with compressible fill (Thermo coal).

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