SSP GEOCELL

RECONSTRUCTION OF MUD LAKE DAM

1. Originally built as an earthen dam using horse drawn scrapers and steam shovels more than 100 years ago, the old Mud Lake dam no longer met the safety standards of the State of Nevada. The project engineers choose to develop a design for a new rock filled dam as the most economical solution. In traditional designs, an expensive reinforced concrete face is required to protect the rock core zone. However, the combination of a composite liner and a three inch deep, concrete filled crest anchored tendon geocellular confinement system could perform the same function at a much reduced cost. A key factor which made this solution a success is the unique tendon anchoring system which enables designers to economically solve problems of this kind.
2. While the composite liner system was being placed (placement is underway in the background) the geocell panels were prefabricated into lengths of up to 114 feet using assembly beds which were established for this purpose. The crews performed the precision work of threading and securing the restraint clips in this controlled flat environment, precluding the need to work on the steep face. Later, the fully assembled sections were quickly deployed on the face of the dam and secured without intensive labor requirements. The prefabrication technique proved to be an efficient means of holding installation costs to a minimum. Tendons were threaded into the drilled geocell sections and then the restraint clips were placed in accord with design requirements. After the geocell panels were opened to the specified length, the outer edges were stretched onto the perimeter stakes of the assembly bed so the preassembled panels on the assembly beds matched the dimensions they would have when deployed over the liner.

1. View of reservoir from crest of old dam

2. Geocell assembly bed

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3. Liner Placement

4. Liner Placement

3. The liner was placed over the geotextile underlayer using two large excavators, one working on top of the dam and one below. Working together with a support crew, approximately 90,000 square feet of liner was placed in just two days.

4. Close up of the liner installation on the crest of the new dam shows the crest anchor trench on the far left. After the composite liner was installed, a deadman anchor consisting of a steel pipe was placed down the full length of this trench. Tendons were tied to the steel pipe prior to placement of a concrete cover over the pipe. The geocell panels were then suspended from the anchoring system in the trench above, securing them against sliding on the liner and dam face they protect.

   Prior to infill with concrete, the preassembled lengths of geocell sections were taken from stockpiles in the pre fab yard and tied off to the crest anchor pipe at the top of the dam. Since the lengths of geocell sections had been prefabricated, the installation process consisted of simply securing the lengths of geocell sections to the tendons originating in the anchor trench above and then stapling them together so the system would hold its dimensions until concrete infill was placed.

5. Note the line of cured concrete visible on the top zone of the dam face. The lighter concrete was placed at the top of the slope on day one and the darker concrete areas show the placement zones for the second pour as the crews worked from top to bottom, a standard practice. On day one, the chutes of concrete trucks delivering materials to the site were used to place concrete for the first pour. For the second pour, a pump was used to place all of the concrete. Using this procedure, a total of more than 500 cubic yards of concrete were placed by the contractor in just two working days.

Finishers placed the concrete designed with a 3/8" pea gravel aggregate. Key to rapid placement is the ease which with workers can move on the geocell and the accurate placement of concrete made possible by the geocell flexible forming system that can accommodate tendons, restraint clips and enable the placement of wet concrete materials on a steep slope on top of a liner with no requirement for stakes. Slopes as steep as 1H:1V are routinely handled by various configurations of the geocellular confinement system.

Concrete finishers minimized labor by using the geocells as an accurate guide for concrete placement. The GC30V3 cell sizes selected for use on this project were small enough to guide the screeding action of concrete rakes, yet large enough to walk in.

In summary, this unique application of the geocellular confinement system perfectly illustrates the value of utilizing a custom system that features rapid installation, experienced technical and engineering support and special design features that can save owners and their contractors serious time and money.

5. Concrete Placement with Pump

6. Concrete Placement with Pump

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