

RoaDrain™ Subsurface Capillary Break Layer – Interstate Highway 494, MN

Project Name: 1-494 Lane Additions

Location: Bloomington, MN

Owner/Engineer: MnDOT

Date: 2003 and 2004

Contractor: C.S. McCROSSAN



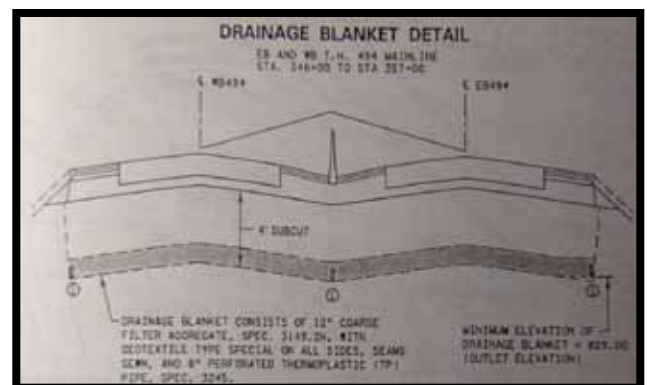
Looking West from Hwy 169 overpass during construction reveals the extraordinary high water table in this location

Plans were drawn in 2002 to increase from 2 to 3 traffic lanes in each direction, on an area of Interstate 494 southwest of Minneapolis. The project called for construction of the east bound lanes in 2003 while routing traffic onto the west bound lanes. The process was reversed in 2004 for construction of the west bound lanes.

The elevation of I-494 dips considerably for some distance providing required clearance under Hwy 169 placing the surface of the roadway just a few feet above the surrounding water table. This area was not only prone to frequent flooding but also in need of frequent repair.

The 1993 AASHTO Guide for Design of Pavement Structures indicates strength reductions ranging from 30% to 50% associate to various layers of a pavement section. In cold climates where base and sub-base soils are left to long periods of freezing temperatures, ice lenses can build up as a result of capillary rise from water sources well below the pavement section. The buildup of ice lenses becomes extremely detrimental during the spring time thaw as excessive moisture is released into the pavement section.

In recognition of these conditions in this stretch of I-494, designers were careful to include a drainage blanket at the bottom of the sub excavation, prior to the placement of select granular sub-base. The drainage blanket, constructed of a 12" layer of open graded coarse filter aggregate wrapped in an 8oz nonwoven geotextile, would be connected to perforated pipes to carry away excess moisture. It would also serve to prevent the formation of ice lenses resulting from capillary rise.



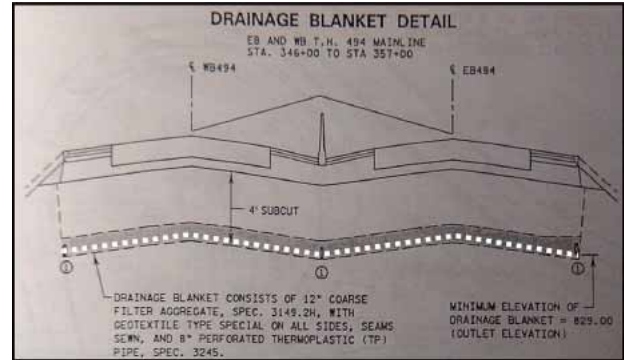
RoaDrain™ was paced at the same elevation of the intended drainage blanket. Additional borrow was used to make up for the difference in thickness.

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The Synthetic Aggregate Solution

It is believed the drainage blanket would have functioned as intended once constructed. The challenge however was in the construction and the cost associated with doing so. Even in an area of plentiful aggregates, the proper aggregate was difficult to source. The stage construction as well as concerns of stability of the rock all added to the challenges faced by the general contractor that were reflected in the overall cost. Through a local representative, the general contractor became aware of RoaDrain and immediately recognized the potential advantages. The solution to typical problems associated with roadway drainage is RoaDrain™. By providing “EXCELLENT” drainage, RoaDrain™ will greatly extend the service life of roads and reduce maintenance costs. RoaDrain™ is a synthetic subsurface drainage layer (SSDL) that provides a flow rate up to 5 times greater than a typical open graded base layer. Durable nonwoven geotextile filters are laminated to the top and bottom of a void maintaining, triplanar geonet core. The result is a sub-surface drainage layer that out performs natural stone in performance, longevity, ease of installation and cost. The void-maintaining triplanar core prevents the top and bottom geotextile filters from ever touching, forming an effective capillary break.

With the assistance of the manufacturer, the general contractor was able to submit a value engineering proposal to MnDOT engineers for approval of RoaDrain to replace the designed drainage blanket. The proposal included calculations detailing the equivalent performance as well as a significant reduction in cost, nearly \$100,000 for an area less than 20,000sy. Construction started as scheduled and was completed faster than originally estimated. The project is considered a complete success and more RoaDrain is planned for future projects.



RoaDrain™ was placed at the same elevation of the intended drainage blanket. Additional borrow was used to make up for the difference in thickness.



RoaDrain™ panels being deployed