Featured Projects

SHELL CANADA AIRPORT STRIP, ATHABASCA SANDS, CANADA

The Challenge: Due to the presence of high groundwater table and low temperature, frost heave was a significant concern.

The Solution: RoaDrain™ RD-7, a high strength drainage geocomposite, was selected for its ability to support heavy loads and its long-term high drainage capacity. RoaDrain RD-7 was incorporated under the base course. The project was completed ahead of schedule and below budget.

ATHABASCA SANDS, CANADA

The Challenge: The roadway surface was observed shortly after the initial construction to be exhibiting signs of significant rutting and deformation and was immediately obvious as it removed water from the roadway, thus creating a safer road.

The Solution: The RoaDrain product was specified due to its ability to efficiently collect water and provide total coverage of the road section. It was determined that the collection capacity and high flow rate of RoaDrain would be sufficient to keep the base aggregates dry and that the compressive strength of RoaDrain would be sufficient for long term serviceability and short-term installation stresses.

SOUTHWEST PARKWAY, AUSTIN, TEXAS

The Challenge: The roadways in this area are prone to water intrusion. In the winter, the road tends to freeze causing a serious hazard.

The Solution: A six lane stretch of Southwest Parkway underwent a major redesign and reconstruction. A 3900 foot section in the middle of the problematic roadway was exposed to underground water that infiltrated its structural base course. This saturation contributed to premature failure of the pavement.

The Solution: The Roadway Drainage System was specified under the base course as a drainage conduit to channel the groundwater to a collection system. The RoaDrain product was proven to deliver a superior performance aspect to the reconstructed highway design section.

BODEGA HIGHWAY, SONOMA COUNTY, CALIFORNIA

The Challenge: A significant portion of the problematic roadway was exposed to underground water that infiltrated its structural base course. This saturation contributed to significant deformation and rutting of the roadway.

The Solution: The RoaDrain product was specified due to its ability to efficiently collect water and provide total coverage of the road section. It was determined that the collection capacity and high flow rate of RoaDrain would be sufficient to keep the base aggregates dry and that the compressive strength of RoaDrain would be sufficient to keep the base aggregates dry and that the compressive strength of RoaDrain would be sufficient for long term serviceability and short-term installation stresses.

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DRAINAGE SYSTEM THAT IS ENGINEERED TO:
ROADRAIN is an innovative subsurface installation and cost-effective alternative to open-graded base layers in the functions of drainage, longevity, ease of maintenance, and cost. The product features a tri-planar geonet core providing a flow rate up to five times greater than a typical open-graded base layer. The product features a geonet core with durable, non-woven geotextile filter fabric interlocked at the top and bottom sides. The result is a SSDL that maintains a flow void and performs as an open-graded base layer in the function of drainage longevity, ease of maintenance and cost.

ROADRAIN IS AN INNOVATIVE SUBDRAINS DRAINAGE SYSTEM THAT IS ENGINEERED TO:
Quickly remove sub-surface water
Provide an economical alternative to open-graded drainage aggregate
Produces a high in-pavement flow rate resulting in increased drainage time
Successfully controls moisture in a weak subgrade
Provide a void-maintaining structure
Provide excellent compressive stiffness that resists pavement deformation
Successfully control moisture in a weak subgrade
Provide a capillary break

DRAINAGE IS AVAILABLE IN DIFFERENT GRASSES
Roadrain is available in seven different grades that are designed to meet the specific needs of various applications:
- Roadrain, compacted and paved highways
- Under aggregate base course
- Driveway beneath PCC
- Caps with drainage (beneficial to frost-susceptible climates)
- RCC joint repair
- Embankments and levee drainage (beneficial to areas with high-water tables)
- Alternative to granular base drain elements
- Geosynthetic products
- Under concrete slabs
- Airport runways and taxiways
- Railway facilities
- Wherever aggregate drainage material is used

Engineered for Better Drainage
By providing excellent drainage, the Roadrain System is the solution that greatly extends the life of pavements and reduces maintenance costs. Early research showed the Roadrain System had potential under the base of AC pavements, as well as for concrete (PCC). Below are illustrations of these various pavements.

DRAINAGE SURFACE
Roadrain does not penetrate the pavement surface. The road rain system rapidly removes water from the pavement. The Roadrain System provides excellent drainage as defined by AASHTO. 95% of the water is removed from the pavement structure within two hours.

DRAINAGE BENEATH PAVEMENT SURFACE
Installed under the base course, the Roadrain System shortens the drainage path, requiring less select base material. Drainage provided by the Roadrain System allows for an increased pavement life expectancy. See AC pavement and PCC pavement applications.

CAPILLARY BREAKS BENEATH FROST-SUSCEPTIBLE SOILS
The Roadrain Systems acts as a capillary break or layer below frost-susceptible soils to help maintain frost-free pavement.

Specifications for Roadrain 5 (RD-5) and Roadrain 7 (RD-7)

<table>
<thead>
<tr>
<th>Specification</th>
<th>RD-5</th>
<th>RD-7</th>
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<tbody>
<tr>
<td>Permeability</td>
<td>1,000 - 3,000</td>
<td>6 – 20</td>
</tr>
<tr>
<td>Flow Rate</td>
<td>1,000 – 3,000</td>
<td>6 – 20</td>
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</table>

Roadrain: 5, 7

Flow Rate (gpm/ft)

<table>
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<tr>
<th>Specimen</th>
<th>Permeability</th>
<th>Flow Rate</th>
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</thead>
<tbody>
<tr>
<td>RD-5</td>
<td>1,000 – 3,000</td>
<td>6 – 20</td>
</tr>
<tr>
<td>RD-7</td>
<td>600 – 1,000</td>
<td>6 – 20</td>
</tr>
</tbody>
</table>

For more information about the Roadrain System, please call 888-TENSAR-1 or e-mail info@tensarcorp.com. We are happy to supply you with additional system information, complete installation and design guidelines, product specifications, preliminary cost estimators, summaries of pertinent projects, and much more.

Experience You Can Rely On
Tensar is the leader for geosynthetic products created especially for roadway improvement. We have developed products and technologies that have been at the forefront of the geotechnical industry for nearly three decades. As a result, you can rely on our systems and design expertise. Our products are backed by the most thorough quality assurance programs in the industry. Tensar provides comprehensive design assistance for roadway projects.

For more information about the Roadrain System, please call 888-TENSAR-1 or visit www.tensarcorp.com/rroadrain.
RoaDrain™ Roadway Drainage System: Enhance Pavement Performance with Synthetic Aggregate

Water retention within a pavement layer is a primary cause of pavement failure. Without adequate underlying drainage, a pavement is set for a long, slow failure. When an underlying drainage system is not present, water collects in the subgrade, leading to soil saturation and washout, which can lead to pavement failure. Water also can migrate up through the pavement layers, causing damage to asphalt, aggregate or other base courses. Water flow through the subgrade can also lead to increased pavement maintenance costs.

The RoaDrain™ Roadway Drainage System from Tensar International Corporation (Tensar) is the engineered solution that consists of a synthetic subsurface drainage layer (SSDL) providing a flow path up to five times greater than a typical open graded base layer. The product features a tri-planar geonet core with durable, nonwoven geotextile filters laminated to the top and bottom sides. The result is a SSDL that maintains a flow void and outperforms open-graded base layers in the function of drainage, longevity, ease of installation and cost.

ROADRRAIN IS AN INNOVATIVE SUBGRADES DRAINAGE SYSTEM THAT IS ENGINEERED TO:

- Quickly remove subsurface water.
- Provide an economical alternative to open graded drainage aggregate.
- Produce high infiltration flow rates resulting in increased drainage rates.
- Successfully control moisture in a weak subgrade.
- Provide a void maintaining structure.
- Provide excellent compressive stiffness and strength that resists deformation.
- Prevent migration of fines through synthetic separation.
- Install quickly and effectively to reduce the construction schedule.
- Work with less processed structural fill for lower material cost.
- Allow for full installation prior to center line of the road due to 4” thickness installation.
- Provide a capillary break.

ROADRRAIN IS AVAILABLE IN DIFFERENT GRADES SUITABLE TO FIT A VARIETY OF APPLICATIONS:

- RoaDrain, parking lots and paved walkways
- Underground aggregate base course
- Locking bentonite CFC
- Capillary break (beneficial to frost-prone climates)
- RCC joint repair
- Embankments and side drainages (beneficial in areas with a high water table)
- Alternative to gravel-based drain systems
- Densestone pads
- Under colored solids
- Airport runways and taxiways
- Railway facilities
- Immediate aggregate drainage material is used

Exceeds AASHTO, (50% of the water is removed from the pavement. The RoaDrain System provides excellent drainage as defined by AASHTO. 50% of the water is removed from the pavement structure within two hours.)

DRAINAGE BENEATH-PAVEMENT SURFACE

Placed directly beneath the pavement surface, the RoaDrain System rapidly removes water from the pavement. The RoaDrain System provides excellent drainage as defined by AASHTO. 50% of the water is removed from the pavement structure within two hours.

DRAINAGE BENEATH BASE COURSE

Installed under the base course, the RoaDrain System directs the drainage path from the compacted base material into a filter sock, resulting in excellent drainage. Drainage provided by the RoaDrain System allows for an increase in the pavement fatigue life. The RoaDrain System can also be placed under the base course or under Portland Cement Concrete (PCC). Below are illustrations of these various placements.

Roadrain™ System acts as a capillary break in the base and is designed to remove water from subgrade soils to help eliminate frost heave.

Engineered for Better Drainage

By providing excellent drainage, the RoaDrain System is the solution that greatly reduces the life of pavements and reduces maintenance costs. Easily retrofitted, the RoaDrain System can be placed under the base course or under Portland Cement Concrete (PCC). Below are illustrations of these various placements.

Roadrain™ System acts as a capillary break in the base and is designed to remove water from subgrade soils to help eliminate frost heave.

Built for Proven Performance

The RoaDrain product is a synthetic subflow drainage layer (SSDL) comprised of a tri-planar structure with inherently loaded/non-woven textiles on each side.

- Nonwoven geotextile offers separation and filtration
- No plain grey core ensures a void-maintaining structure with high compressive strength

Specifications for Roadrain 5 (RD-5) and Roadrain 7 (RD-7)

<table>
<thead>
<tr>
<th>Property</th>
<th>Roadrain 5</th>
<th>Roadrain 7</th>
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</thead>
<tbody>
<tr>
<td>Roll Size</td>
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<td>12.75’ (20’) x 4’ (1.25m x 1.25m)</td>
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<tr>
<td>Weight</td>
<td>1,095 lbs/1,270 lbs (496 kg/575 kg)</td>
<td>1,095 lbs/1,270 lbs (496 kg/575 kg)</td>
</tr>
<tr>
<td>Permeability</td>
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<td>1,100 (455)</td>
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<tr>
<td>Permeability (drainage condition)</td>
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<td>1,000 (400)</td>
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<tr>
<td>Penetration, sec</td>
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<tr>
<td>Flow Rate, Schedule D (5% slope)</td>
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<td>90</td>
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<tr>
<td>Flow Rate, Schedule E (5% slope)</td>
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<td>20</td>
</tr>
<tr>
<td>Flow Rate, Schedule F (5% slope)</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Flow Rate, Schedule G (4% slope below grade)</td>
<td>6</td>
<td>10</td>
</tr>
</tbody>
</table>

For more information about the RoaDrain™ System, please call 800-TENSAR or visit www.tensarcorp.com. And, we provide comprehensive design assistance for every Tensar system.
ROADRAIN IS AN INNOVATIVE SUBSURFACE base layers in the functions of drainage, longevity, ease of laminated to the top and bottom sides. The result is a SSDL open-graded base layer. The product features a tri-planar International Corporation (Tensar) is the engineered solution the migration of fines from the subgrade. When an a pavement section is likely to fail prematurely. When an Water retention within a pavement layer is a primary cause challenges with the migration of fines from the subgrade. The RoaDrain™ Roadway Drainage System from Tensar chases with the migration of fines from the subgrade. The RoaDrain System rapidly removes water from the pavement. The RoaDrain System provides excellent drainage as defined by AASHTO. 50% of the water is removed from the pavement structure within ten hours.

DRAINAGE BENEATH PAVEMENT SURFACE
Included under the base course, the RoaDrain System directs the drainage path by creating an impermeable sub-base material. Drains are graded by the RoaDrain System allows for an increase in the slope of the pavement system through modification of the design system to PCC and asphalt pavement applications.

DRAINAGE BENEATH BASE COURSE
Included under the base course, the RoaDrain System directs the drainage path by creating an impermeable sub-base material. Drains are graded by the RoaDrain System allows for an increase in the slope of the pavement system through modification of the design system to PCC and asphalt pavement applications.

CAPILLARY BREAKS BENEATH FROST-SUSCEPTIBLE SOILS
The RoaDrain System acts as a capillary break in three ways. The upper six inches from subgrade soils to help prevent frost heave.

Engineered for Better Drainage

By providing excellent drainage, the RoaDrain™ System is the solution that greatly extends the life of pavements and reduces maintenance costs. Easily installed, the RoaDrain System can be installed under the base or the sub-base of the pavement system. The RoaDrain System is ideal for high-volume traffic in frost and non-frost climates. Below are instructions of these various pavements:

- Roadway, parking lots and paved walkways
- Under aggregate base course
- Directly beneath PCC
- Capillary break (beneficial to frost susceptible sites)
- PVC joint separator
- Embankments and side slope drainage (beneficial in areas with a high water table)
- Alternative to granular drain basins
- Granular drains
- Under culverts, bridge
drainage areas
- Airport runways and taxiways
- Railway facilities
- Wherever aggregate drainage material is used in
  non-woven geotextile bonding nonwoven geotextile filters on both sides.

Road drain due to 45º channel orientation. AASHTO, (50% of the water is removed to help eliminate frost-heave. The RoaDrain System rapidly removes water provides excellent drainage as defined by AASHTO. 50% of the water is removed from the pavement structure within ten hours.

DRAINAGE BENEATH PAVEMENT SURFACE
Included under the base course, the RoaDrain System directs the drainage path by creating an impermeable sub-base material. Drains are graded by the RoaDrain System allows for an increase in the slope of the pavement system through modification of the design system to PCC and asphalt pavement applications.

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Featured Projects

SHELL CANADA AIRPORT STRIP, ATHABASCIA, SAMS, CANADA

The Challenge: The airport strip was built on top of problematic, silty soil. Due to the presence of a high groundwater table and low temperature, frost heave was a significant concern.

The Solution: The RoaDrain™ RD-7, a high strength drainage system, was specified under the base course as a drainage conduit to channel the groundwater to a collection system. The RoaDrain solution has proven to deliver a valuable performance aspect to the reconstructed highway design section.

HIGHWAY 35 ROAD RECONSTRUCTION, SOUTHWEST PARKWAY, AUSTIN, TEXAS

The Challenge: Significant deformation and rutting of the roadway subgrade was observed shortly after the initial construction of this roadway section. Limited excavation revealed that underground springs caused water to pond on the subgrade and roadbase materials, thereby compromising the structural integrity of the roadway.

The Solution: The RoaDrain product was specified due to its ability to efficiently collect water and provide total coverage of the road section. It was determined that the collection capacity and high flow rate of RoaDrain would be sufficient to keep the base aggregates dry, and that the compressive strength of RoaDrain would be sufficient for long term serviceability and short term installation stresses.

BODGÁ HIGHWAY, SONOMA COUNTY, CALIFORNIA

The Challenge: The problemmatic clay roadway, a six lane stretch of Southwest Parkway, was exposed to underground water that infiltrated its structural base course. This saturation contributed to premature failure of the pavement.

The Solution: The RoaDrain Roadway Drainage System was specified under the base course as a drainage conduit to channel groundwater to a collection system. The RoaDrain product was proven to deliver a valuable performance aspect to the reconstructed highway design section.

BODEGA HIGHWAY, SONOMA COUNTY, CALIFORNIA

The Challenge: A six lane stretch of Southwest Parkway underwent a major redesign and reconstruction. A 3900 foot section in the middle of the problematic roadway was exposed to underground water that infiltrated its structural base course. This saturation contributed to premature failure of the pavement.

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ATHABASCA SANDS, CANADA

The Challenge: A 4000 foot section of the Alberton Highway in Canadas. The roadbed in this area are prone to water intrusion. In the winter, the road was too be frozen caused a serious hazard.

The Solution: The RoaDrain product was specified under the base course as a drainage conduit to channel the groundwater to a collection system. The RoaDrain solution has proven to deliver a valuable performance aspect to the reconstructed highway design section.

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2500 Northwinds Parkway, Suite 500
Alpharetta, Georgia 30022
800-TENSAR-1
tensarcorp.com
Featured Projects

**SHELL CANADA AIRPORT STRIP, \(\text{Athabasca Sands, Canada}\)**

*The Challenge:* The airport ramp was built on top of problematic silty soil. Due to the presence of a high groundwater table and low temperature, frost heave was a significant concern.

*The Solution:* RoaDrain® RD-7, a high strength drainage geocomposite with tri-planar structure, was selected for its ability to support heavy loads and its long-term high drainage capacity. The RoaDrain RD-7 benefited in extending drainage and removing water from the pavement structure while providing excellent compressive strength. RoaDrain RD-7 also provided a capillary break and separation between the subgrade and base course. The project was completed ahead of schedule and below budget.

**ATHABASCA SANDS, CANADA**

The roadway surface was observed shortly after the initial construction of this roadway section. Limited excavation revealed that underground springs and perched water lenses were immediately obvious as it removed water from the roadway, thus creating a safer road.

**HIGHWAY 35 ROAD RECONSTRUCTION, **

**BODEGA HIGHWAY, \(\text{Sonoma County, California}\)**

The roadway was exposed to underground water that infiltrated its road base materials, thereby compromising the structural integrity of the roadway.

The Solution: The Sonoma County Public Works Department elected to use the engineered solution of RoaDrain. The RoaDrain layer between the aggregate base and the subgrade soils provided an excellent drainage path. It also provided separation and strength to the pavement section. The RoaDrain product effectively removed the capillary break and separation between the subgrade and base course. The project was completed ahead of schedule and below budget.

**SOUTHWEST PARKWAY, \(\text{Austin, Texas}\)**

The airport strip was built on top of problematic silty soils. Due to the presence of a high groundwater table and low temperatures, frost heave was a significant concern.

**FROST HEAVE**

The Challenge: Recent highway design sections in the area were prone to water intrusion. In the winter, the road tends to freeze causing a serious hazard.

**The Solution:** RoaDrain™ RD-7, a high strength drainage geocomposite with tri-planar structure, was selected for its ability to effectively collect water and provide total drainage of the road section. It was determined that the collection capacity and high flow rate of RoaDrain would be sufficient to keep the base aggregates dry, and that the compressive strength of RoaDrain would be sufficient for long term serviceability and short term installation stresses.

**ROADWAY DRAINAGE SYSTEM**

SYSTEM OVERVIEW