1.1 DESCRIPTION OF WORK

a) Furnish all labour, materials, tools and equipment, and perform all operations necessary for the repair of leaking concrete expansion joints using hydrophobic, water-activated polyurethane injection resin.

b) Remove all foreign material from expansion joint to expose interior concrete surfaces and flush with water to remove any debris.

c) Drill and flush 3/8" injection holes, install 3/8" plastic packers and prepare for subsequent injection of polyurethane resin.

d) Soak appropriate lengths and diameters of open-cell backer rod in liquid polyurethane resin and install to provide barriers at top and bottom of expansion joint, while creating a cavity along the interior of the expansion joint.

e) Apply temporary fabric strips and wooden formwork along top and bottom of expansion joint to confine polyurethane resin during installation.

f) Inject hydrophobic, water-activated polyurethane resin to fill remaining portion of concrete expansion joint until a water-tight seal has been constructed.

g) Upon completion of the work, remove all temporary formwork and injection-related materials from the work area, and remove all debris from the site.

1.2 QUALITY CONTROL

a) Polyurethane injection resins shall be installed in accordance with supplier’s instructions and as indicated on the Contract Drawings.

b) The applicator shall have a minimum of 3 years of experience performing similar work and be authorized by the supplier for performing polyurethane resin injection of the nature specified.

2.1 POLYURETHANE INJECTION RESIN

Polyurethane injection resins for repairing concrete expansion joints shall conform with the following specification:

- one-component, water-activated type
- flexible foam end product
- hydrophobic
- solvent-free and non-flammable
- fast-acting with variable curing rate
- cured product shall not shrink
- MDI-based polyurethane prepolymer with accelerator
- suitable for cold temperature use above 0°C
- viscosity - 600 cps at 20°C

Acceptable product meeting this specification is:

MULTIURETHANES FLEXIBLE RESIN

2.2 OPEN CELL BACKER ROD

Open cell backer rod for repairing concrete expansion joints shall conform with the following specification:

- fabricated, round, open cell polyurethane foam
- uncompressed density: 2 - 3 lbs/ft³
- compression deflection: 1 psi @ 25%
- elongation: 130%
- tensile strength: 15 lbs minimum

Acceptable product meeting this specification is:

INDUSTRIAL THERMO POLYMERS LIMITED - TUNDRA FOAM
TECHNICAL INFORMATION

Typical Specification: Expansion Joint Injection

2.3 OTHER REQUIREMENTS

a) All materials shall be delivered to the site in undamaged, unopened containers bearing the supplier’s original labels.

b) WHMIS labels on all containers shall conform with applicable regulations, including English and French risk phrases, proper chemical name, shipping class, packing group and UN number.

c) MSDS for all materials shall conform with applicable regulations.

d) No materials shall be used which are manufactured from or contain toluene diisocyanate (TDI), toluene, acetone or methyl ethyl ketone.

e) No materials shall be used which are flammable or which display shipping Class 3 red warning labels.

3.3 SITE SERVICES

Except as otherwise specified, supply electric power, compressed-air and water required for the purposes of undertaking the work. All construction debris and empty containers are to be removed from the site by the contractor and disposed of in accordance with applicable regulations.

3.4 REMOVING FOREIGN MATERIAL

Remove all foreign material from the expansion joint and clean the interior substrate surfaces prior to performing polyurethane injection work.

3.5 DRILLING INJECTION HOLES

Drill 3/8” injection holes at an angle of 60° to intersect at the mid-point of the expansion joint being injected. Drill hole spacing shall not exceed 300 mm under any condition. Drill holes shall be flushed with copious quantities of water to remove dust and drilling debris prior to installing the injection packers.

3.6 INSTALLING INJECTION PACKERS

Install 3/8” plastic injection packers, complete with metal fittings, in accordance with supplier’s instructions.

3.7 FLUSHING EXPANSION JOINT PRIOR TO INJECTION

Flush expansion joint with water prior to proceeding with installation of sealing materials. If acid flushing is required, use only multiurethane crack flushing agent diluted to a 5% solution in water and flush with copious quantities of water following acid injection.

3.1 SCHEDULING OF THE WORK

Expansion joint repairs shall be undertaken during cool weather when the expansion joint is at the maximum opening, so as to enable the repair material to remain in compression at all times; otherwise, allow for repeat visits to reinject the expansion joint at a time when the maximum expansion joint opening condition exists.

3.2 WORKPLACE SAFETY

Supply workmen with appropriate safety equipment for performing high-pressure injection of polyurethane resins and associated tasks. Supply safety devices, traffic control barriers, drop sheets and other items to protect the site, other contents and other personnel from contact with the contractor’s materials or equipment.
3.8 INSTALLING BARRIER MATERIALS

Spray the expansion joint with water to create a uniformly wet substrate in all areas. Soak open-cell backer rod of appropriate length and diameter (1.5 x actual joint width) in the pre-mixed polyurethane resin until the backer rod has been fully saturated. Install soaked backer rod internally along both the top and the bottom of the expansion joint and allow sufficient time for the liquid resin to cure into a tack-free, hydrophobic foam barrier.

3.9 INSTALLING TEMPORARY FORMWORK

Securely install damp fabric strips and external wooden formwork along both the top and bottom of the expansion joint to confine the previously installed backer rod barriers during the polyurethane injection operation.

3.10 INJECTION EQUIPMENT

Use an electrically-operated airless piston pump, modified specifically for polyurethane resin injection. The pump shall be equipped with gravity feed suction containers. It shall feature an adjustable pressure limit switch to control the maximum pump output pressure and to provide automatic on/off pump operation. A multiple grout header shall be used to control the flow of polyurethane resin and shall include a 0 - 3000 psi pressure gauge, flow control valves and a bypass - pressure relief valve.

3.11 MIXING & HANDLING OF INJECTION RESINS

Follow recommended guidelines as per product data sheets. Measure all materials using graduated containers and in appropriate quantities to suit site requirements.

3.12 INJECTION OF POLYURETHANE RESINS

Follow recommended guidelines as per supplier’s product data sheets and technical literature. Start by using a low accelerator dosage (such as 2.5%) and adjust according to site conditions such that a slow curing rate is achieved. Inject small quantities of water (2.5% of anticipated resin volume) at various locations along the expansion joint to facilitate proper reaction of the polyurethane resin. Avoid the use of excessive injection pressures. Inject sufficient polyurethane resin at various locations to uniformly fill the bottom half of the cavity created within the expansion joint before the commencement of the foam-rising action.

As determined by site conditions, adjust the accelerator dosage, length of expansion joint being treated and quantity of liquid resin being injected to enable the required quantity of liquid polyurethane resin to be injected prior to the commencement of the foam-rising action.

Continue the injection of liquid polyurethane resin during the foam-rising and curing phases to create a high-density, flexible, hydrophobic, polyurethane compression gasket with a micro-cellular foam texture.

Precede all resin injections by the addition of small quantities of water (2.5% of anticipated resin volume) at appropriate locations and time intervals, until a permanent water-tight barrier has been created along the expansion joint being treated.

3.13 SUPPLIER’S TECHNICAL SPECIALIST

A technical specialist representing the product supplier shall visit the site as required to examine site specific conditions and to make recommendations regarding material selection, injection equipment and application techniques.