



ECO

Typical Defects in Elastomeric Expansion Joints

Bridge Expansion Joints

Expansion Joints may be defined as *“A device installed to provide a running surface, across the expansion gap and (usually) prevent the passage of water below deck level, while allowing changes in the size of the expansion gap to take place without damage”*

Movement (transverse, longitudinal, or rotational) can be result of:

- ✓ Change in temperature. causing expansion & contraction (horizontal movement)
- ✓ live loads. Cause sagging bending of the deck (rotation of the support)
- ✓ Creep & shrinkage. Cause hogging bending of the deck (rotation at the supports)
- ✓ Foundation settlement. Cause rotation & vertical movement.



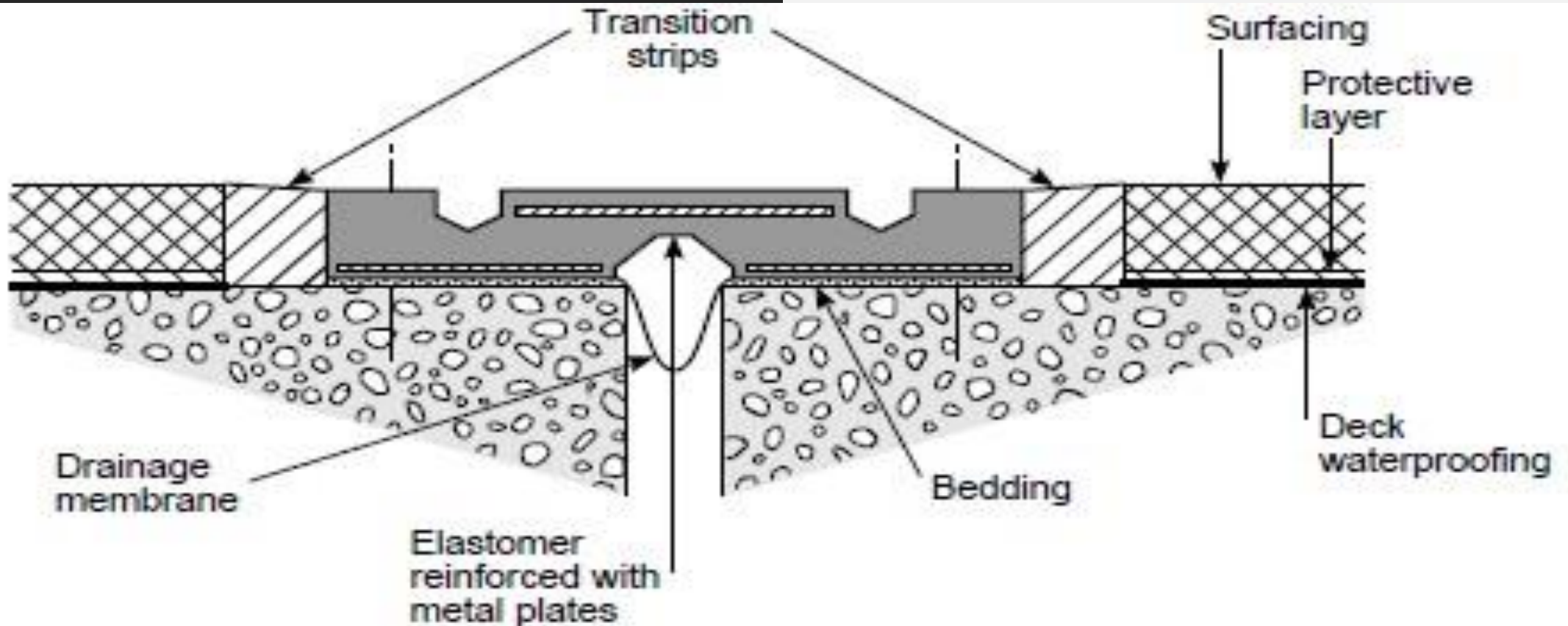
Major Design Requirements for Expansion Joints

- To withstand traffic loading.
 - To accommodate movements of the bridge without inducing unacceptable stresses in the joint or other parts of the structure.
 - To provide a good riding quality.
 - To maintain an acceptable level of skid resistance.
 - To avoid the generation of excessive noise or vibration from the passage of traffic.
 - Easy to inspect & maintain.
-



Elastomeric Expansion Joints

- The major component comprises of a elastomeric unit, reinforced by metal plates. It is secured to the deck concrete with fixing bolts, which are sealed with resin plugs. Transition strips provide a continuous running surface between the road surface and joint unit. They come in a variety of shapes and sizes, with varying movement ranges



Typical Defects in Elastomeric Expansion Joints

Breaking up or cracking of transition strips

- *This is generally caused by the transition strip becoming debonded, either from the surfacing or from the deck or abutment. Once debonded, the edge will be unsupported, and start to break up. This can happen to the transition strip and adjacent surfacing*
-



Typical Defects in Elastomeric Expansion Joints

Missing bolt cover

- *The cover can be flicked out/removed by traffic, leaving the bolts underneath exposed. Corrosion of the bolts will lead to premature bolt failures*



Typical Defects in Elastomeric Expansion Joints

Loose bolts

- *This will lead to movement of the units, detected either through noise or visible under vehicles. This will lead to further bolts becoming loose.*



Typical Defects in Elastomeric Expansion Joints

Bolt failures causing joint to lift

- *Sufficient bolt failures will cause the joint to move under traffic. This will lead to impact damage to the deck below the joint.*



Typical Defects in Elastomeric Expansion Joints

Debris in grooves

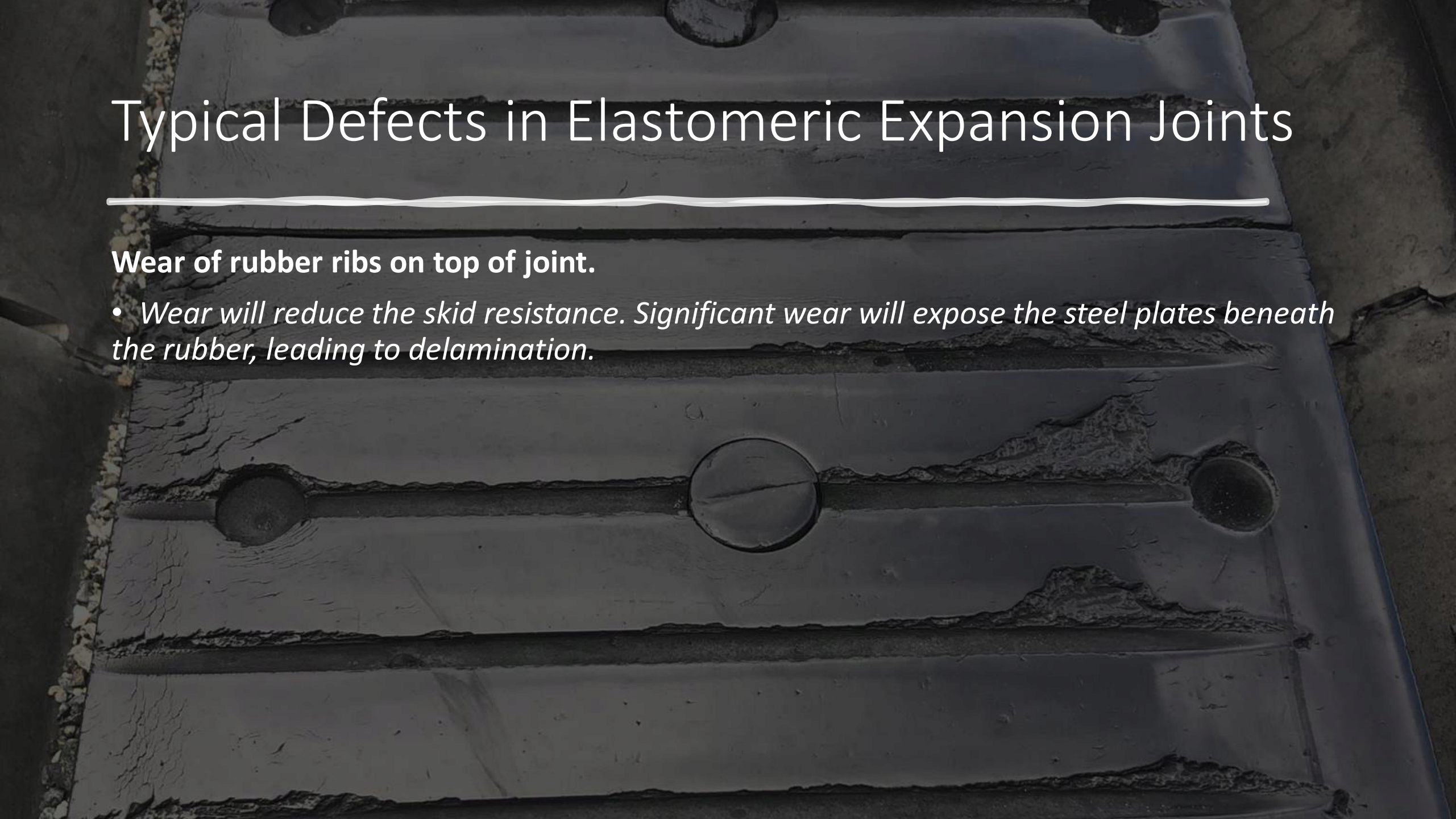
- *Debris in grooves will restrict movement and under vehicle pressure will wear the rubber.*



Typical Defects in Elastomeric Expansion Joints

Wear of rubber ribs on top of joint.

- *Wear will reduce the skid resistance. Significant wear will expose the steel plates beneath the rubber, leading to delamination.*



Typical Defects in Elastomeric Expansion Joints

Delamination of elastomer/ metal plate interface

- *Heavy wear and tears in the elastomer will result in delamination, exposing the steel plate over significant areas of the joint. The metal is smooth, and so skid resistance will be limited. The exposed metal plate may also lift up, causing an obstruction in the carriageway.*



Typical Defects in Elastomeric Expansion Joints

Leakage

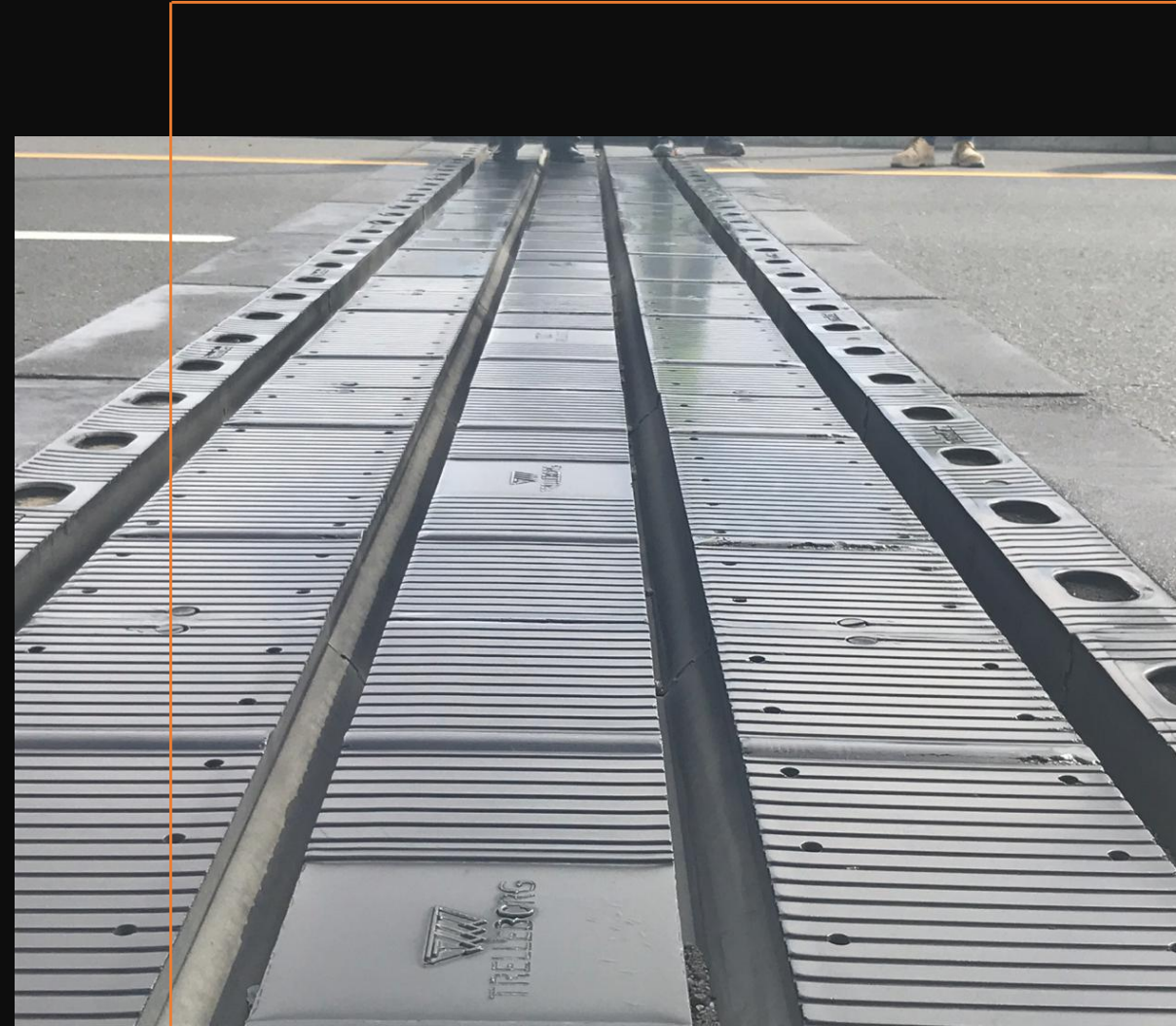
- *This could be caused by any of the defects above, or failure of the drainage membrane. The effects could be damage to the carriageway either side of the joint, or early deterioration of the bridge structure*
-



Condition of Elastomeric Expansion Joints

Sound

- *All joint components are in good condition, with no visible signs of defects. There are no cracks or tears visible.*



Condition of Elastomeric Expansion Joints

Initiation of cracking or tearing of components

- *Cracks or tears are visible. They are hairline and will require careful inspection to detect.*



Condition of Elastomeric Expansion Joints

Crack/tear <20% of width of component

- *Cracks and tears are easily visible, but the joint is still able to function.*
 - this unit is in Project R842/2 (Junction 22, Bridge 4 – Abutment 1) . Although the joint is functioning properly, but the manufacturer will supply 13 units to RTA and determine the cause of this.
-



Condition of Elastomeric Expansion Joints

Crack/tear >20% by <50% of width of component

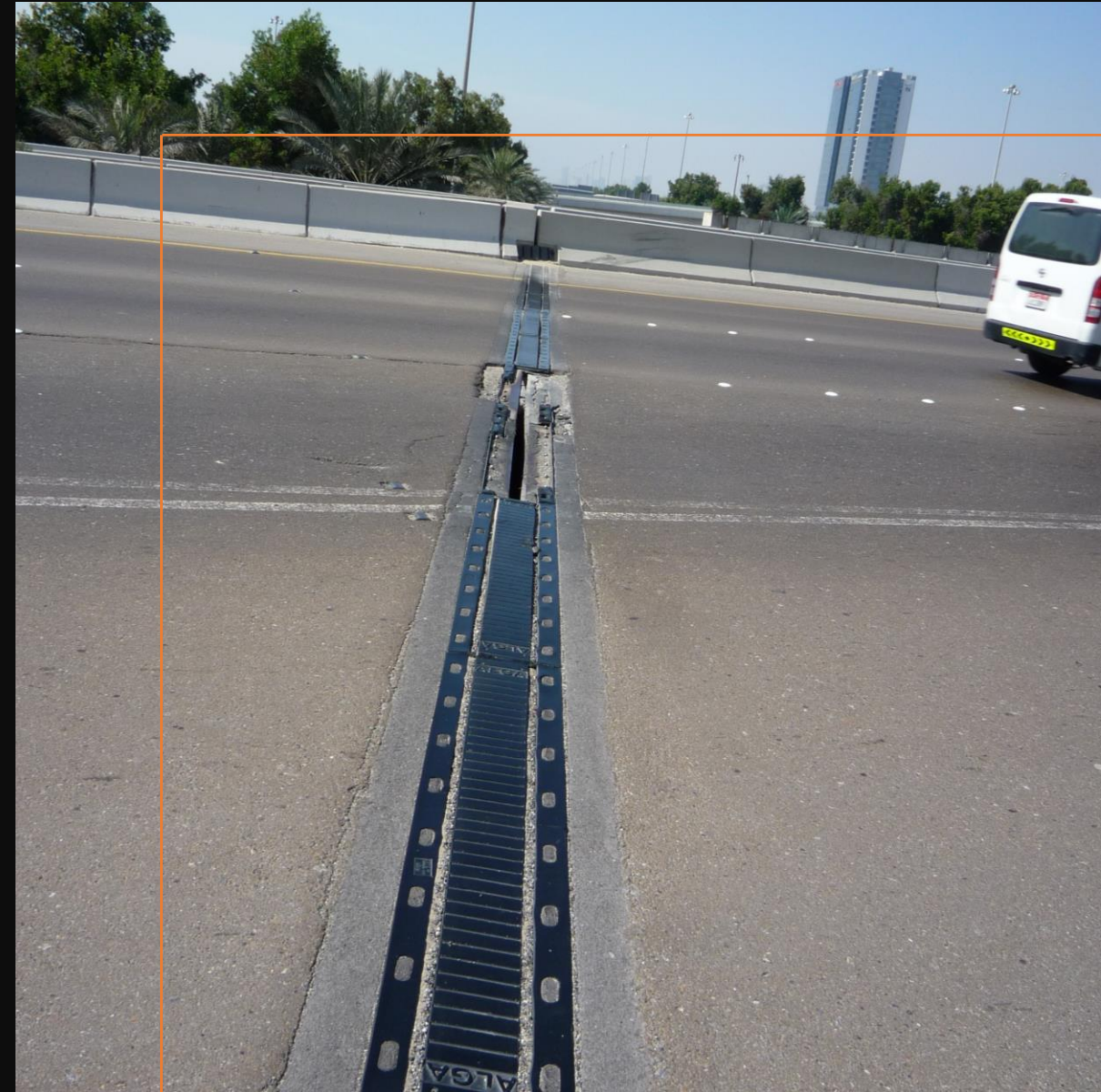
- *Cracks and tears are significant, but there remains some limited functionality. The steel in the plates is exposed. Complete failure can be expected shortly.*



Condition of Elastomeric Expansion Joints

Failure of expansion joint component

- *A component of the joint has completely failed. Part of it has detached or is missing. A steel plate is loose or missing.*





ECO