

RADCON[®]
FORMULA #7

The background of the slide is a photograph of a construction site. It shows a concrete wall that has been treated with a red waterproofing membrane. The wall is set on a base of grey gravel. The sky above the wall is a clear, bright blue.

**DESIGN DETAILING for
Concrete Waterproofing**

Design Detailing – Contents

NOTE: Click on
item to go to that
page

- R1** Rooftop – Exposed
- R2** Rooftop – Insulated
- R3** Rooftop – Carpark
- R4** Rooftop – Landscaped
- RD1** Rooftop Details – Construction Joints
- RD2** Rooftop Details – Expansion Joints
- RD3** Rooftop Details – Penetrations
- RD4** Rooftop Details – Contraction Joints, Pour Strips and Plinths & Hobs

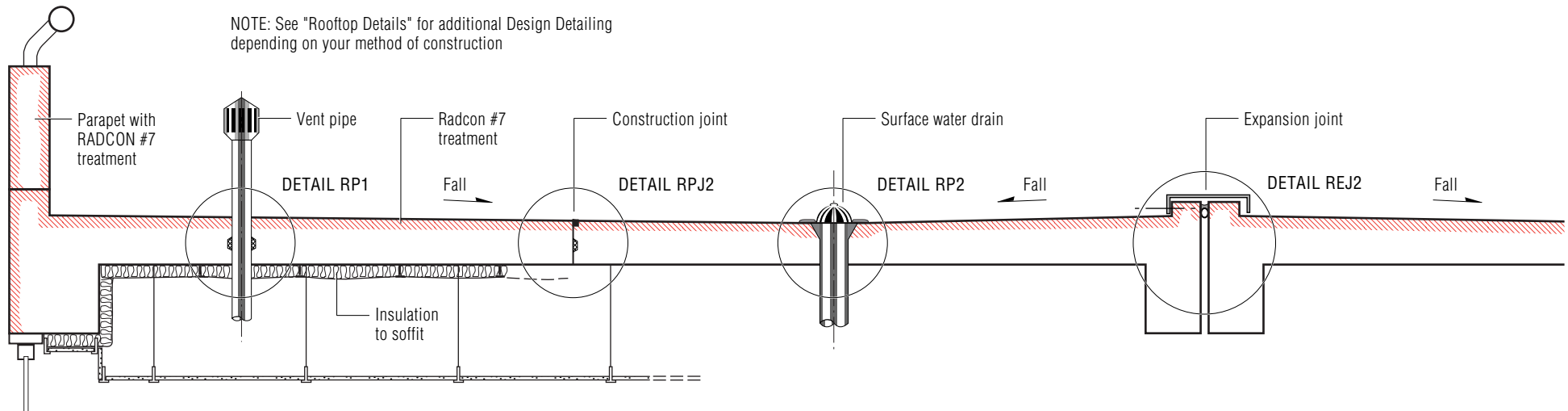
- P1** Parking Structure
- PD1** Parking Structure Details – Construction Joints, Expansion Joints and Kerbs & Hobs
- PD2** Parking Structure Details – Penetrations, Pour Strips and Contraction Joints

- B1** Bridge – Elevated Road and Rail

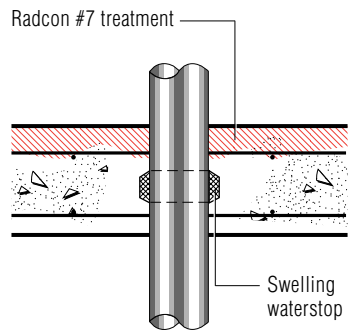
- T1** Tunnel – Cut-and-Cover

- W1** Water Holding Vessel – Suspended Swimming Pool
- W2** Water Holding Vessel – Elevated Water Tank
- WD1** Water Holding Vessel Details – Construction Joints
- WD2** Water Holding Vessel Details – Penetrations
- WD3** Water Holding Vessel Details – Contraction Joints and Miscellaneous

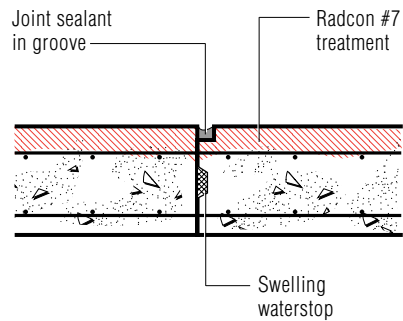
NOTE: See "Rooftop Details" for additional Design Detailing depending on your method of construction



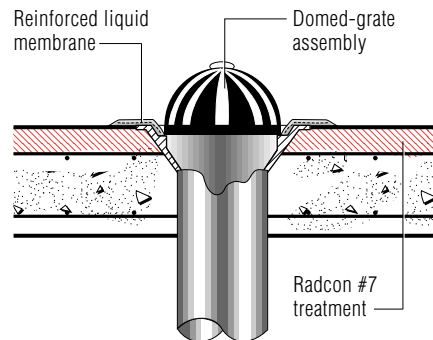
TYPICAL SECTION EXPOSED ROOFTOP



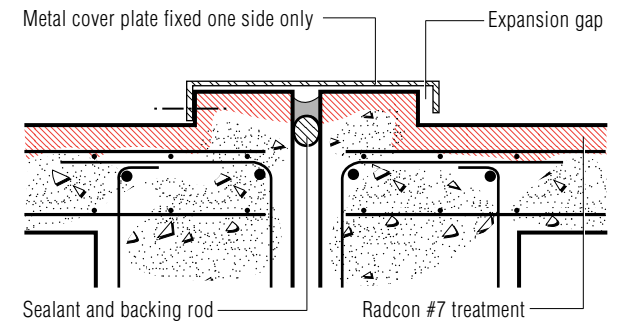
DETAIL RP1 PENETRATION



DETAIL RPJ2 CONSTRUCTION JOINT

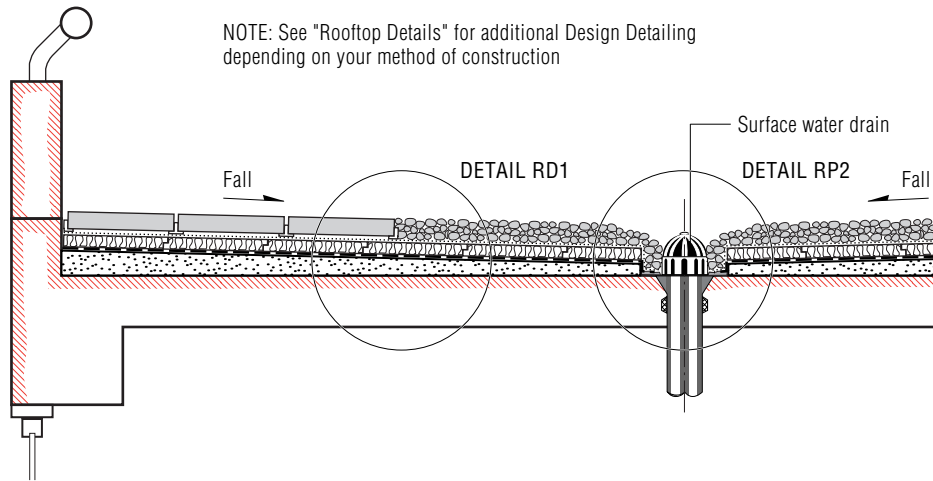


DETAIL RP2 PENETRATION

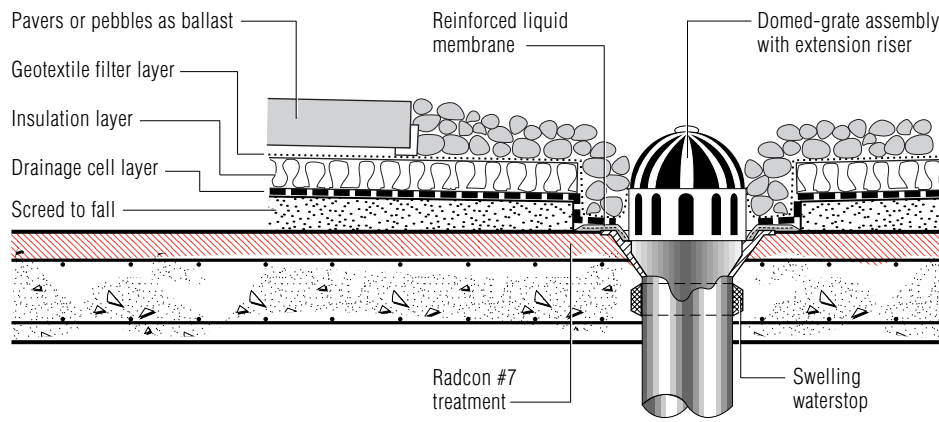
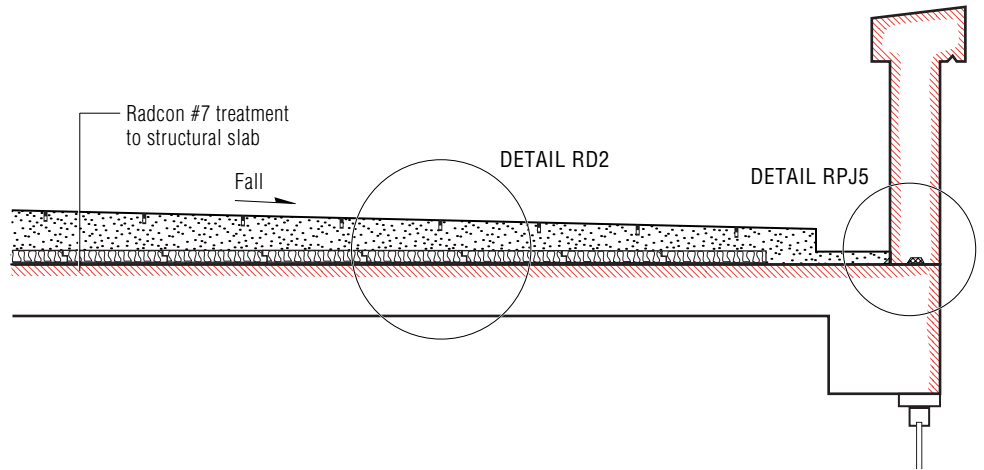


DETAIL REJ2 EXPANSION JOINT

NOTE: See "Rooftop Details" for additional Design Detailing depending on your method of construction

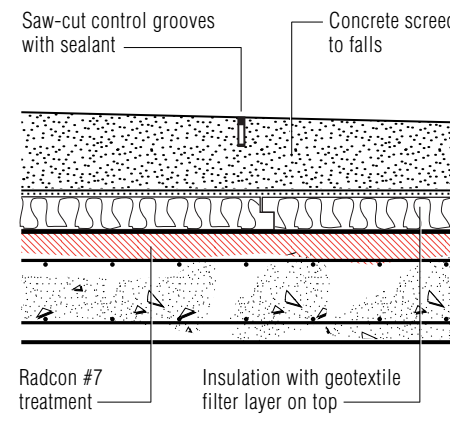


TYPICAL SECTION INSULATED ROOFTOP

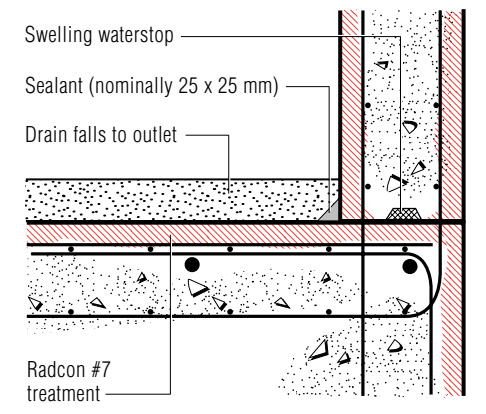


DETAIL RD1 INVERTED ROOF

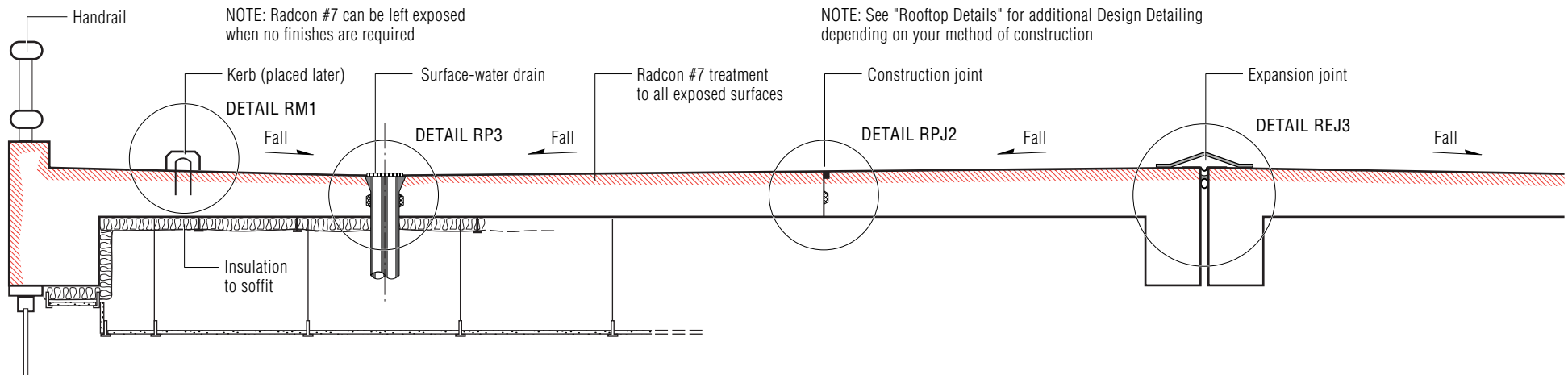
DETAIL RP2 PENETRATION



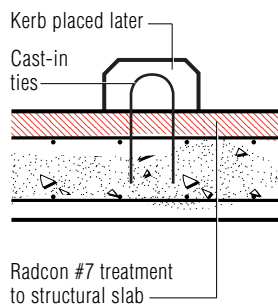
DETAIL RD2 BUILT-UP ROOF



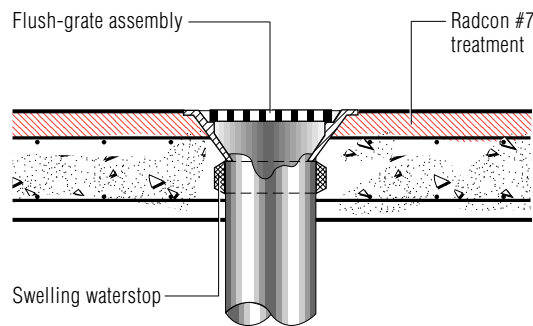
DETAIL RPJ5 CONSTRUCTION JOINT



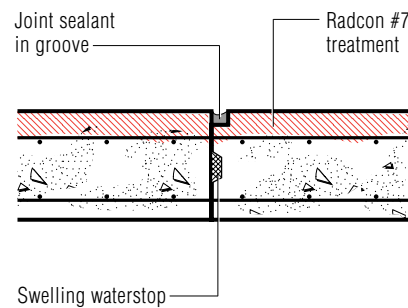
TYPICAL SECTION ROOFTOP CARPARK



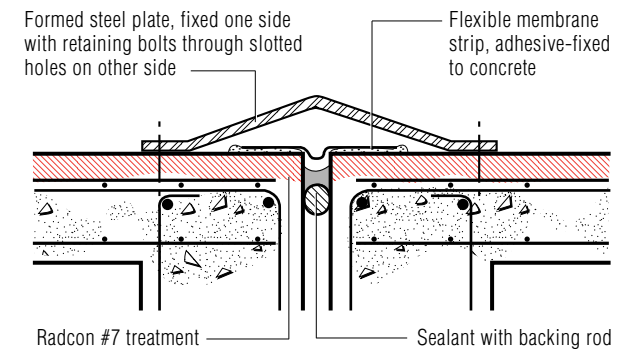
DETAIL RM1 KERB



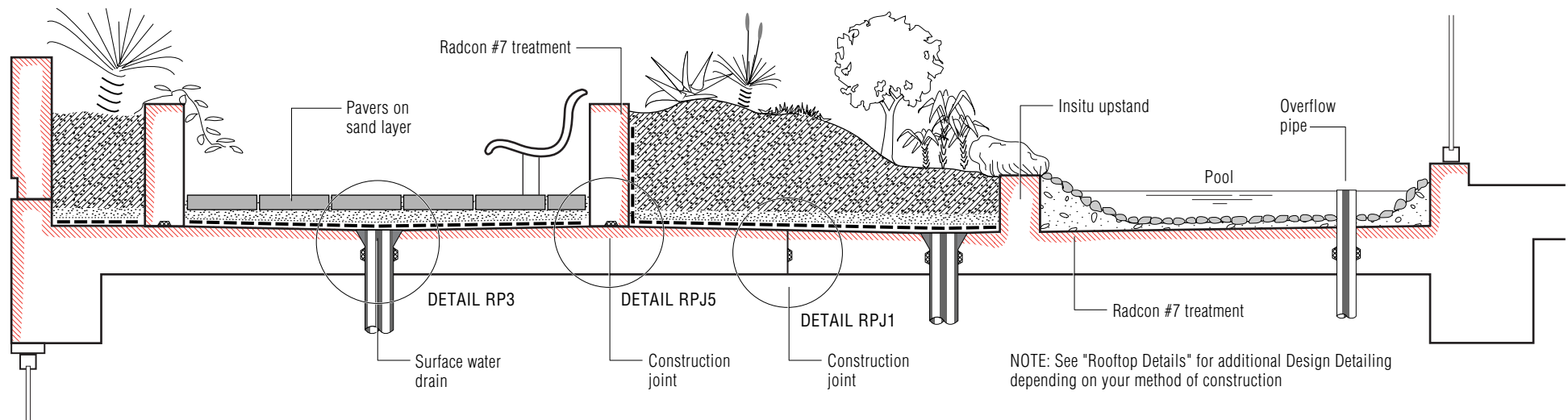
DETAIL RP3 PENETRATION



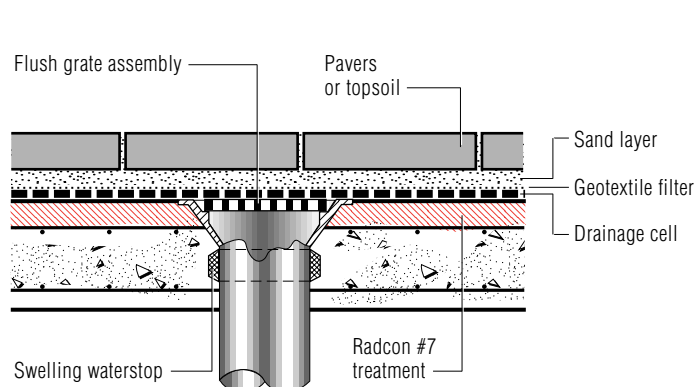
DETAIL RPJ2 CONSTRUCTION JOINT



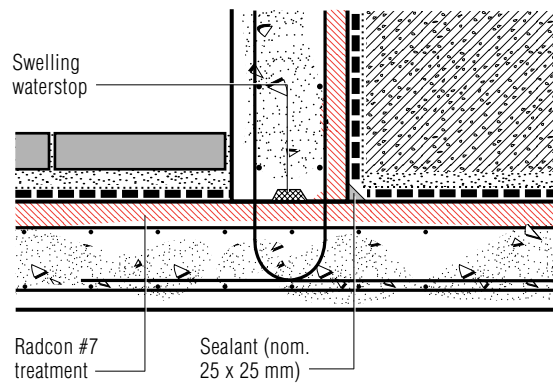
DETAIL REJ3 EXPANSION JOINT



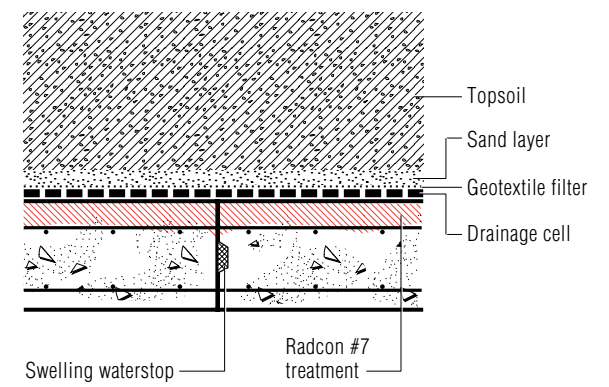
TYPICAL SECTION ROOFTOP LANDSCAPING



DETAIL RP3 PENETRATION



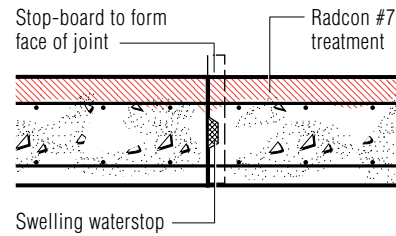
DETAIL RPJ5 CONSTRUCTION JOINT



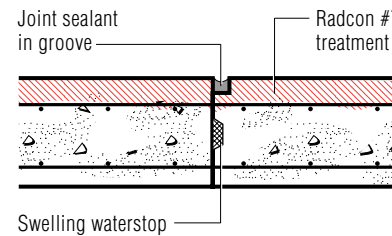
DETAIL RPJ1 CONSTRUCTION JOINT

CONSTRUCTION JOINTS

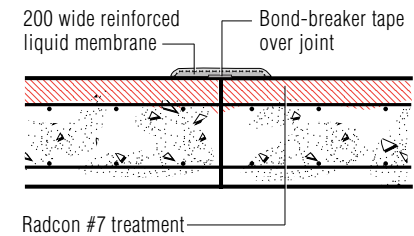
- Formed between adjacent concrete pours
- Aim is to produce a well-bonded, watertight joint between the hardened concrete and the freshly-placed concrete so it acts monolithically
- Generally all the reinforcement should continue across the joint
- A temporary stop-board should be used to form the face of the joint and should be subsequently roughened before placing the adjacent pour



DETAIL RPJ1 CONSTRUCTION JOINT



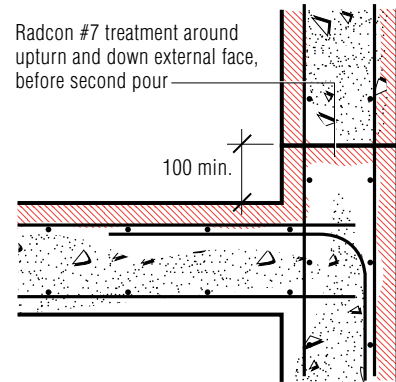
DETAIL RPJ2 CONSTRUCTION JOINT



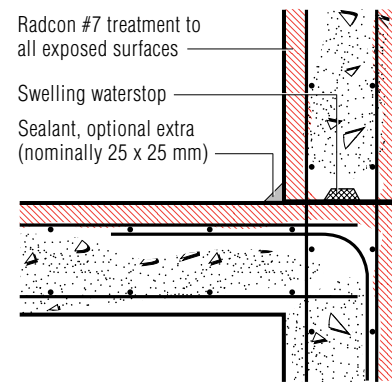
DETAIL RPJ3 CONSTRUCTION JOINT

NOTES ON APPLICATIONS

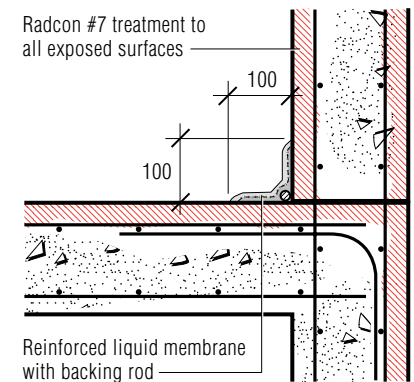
- RPJ1** Standard construction joint with good watertightness. Suitable for most rooftop and carpark applications
- RPJ2** As per RPJ1, but used when extra watertightness is required
- RPJ3** Unplanned construction joint detail. Suitable for general rooftops but not high-traffic areas, such as car parks
- RPJ4** Cast in-situ hob raising construction joint above waterproofing level. Used at parapets, stairwells, plant rooms or similar
- RPJ5** Horizontal construction joint where no in-situ hob is provided. Used to simplify edge formwork
- RPJ6** As per RPJ5, as well as for unplanned construction joints



DETAIL RPJ4 CONSTRUCTION JOINT



DETAIL RPJ5 CONSTRUCTION JOINT



DETAIL RPJ6 CONSTRUCTION JOINT

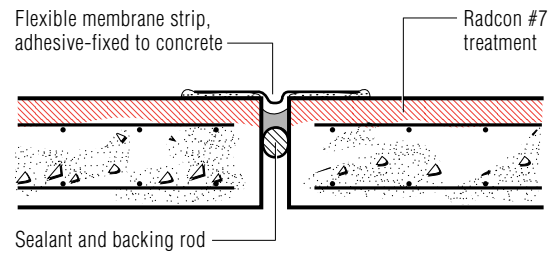
NOTE: If modifying any Design Details shown here, please confirm with your local RADCON #7 representative to ensure the watertightness is not compromised

EXPANSION JOINTS

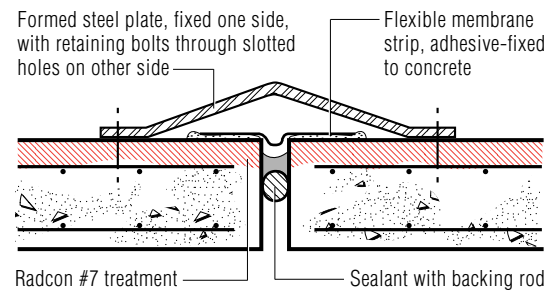
- Used to divide a structure into separate independent units
- Aim is to allow for relative movements between units due to expansion, contraction, differential foundation settlements or applied loads
- Expansion joints should allow relative movement in all directions and are usually formed using filler strips of the required thickness between abutting cast-in-situ concrete elements

NOTES ON APPLICATIONS

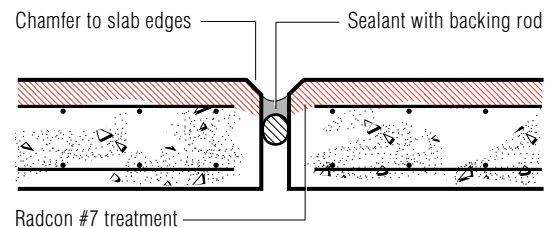
- REJ1** Simple expansion joint for non-trafficable areas such as exposed rooftops and insulated rooftops
- REJ2** More thorough expansion joint than REJ1. For rooftops subject to maintenance traffic only. Hobs must be cast in-situ
- REJ3** Expansion joint suitable for rooftop carparks
- REJ4** Same as REJ3
- REJ5** Simple expansion joint for low-risk situations
- REJ6** Simple expansion joint for insulated rooftops



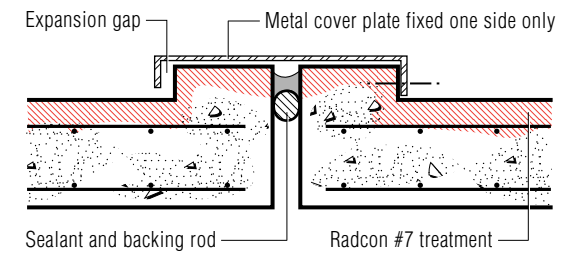
DETAIL REJ1 EXPANSION JOINT



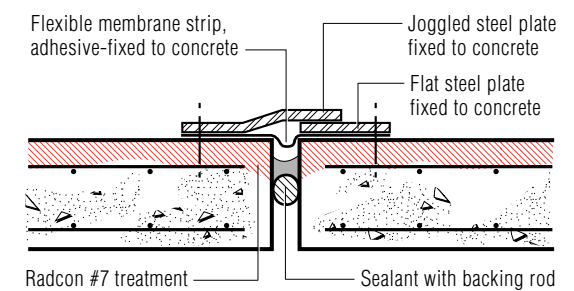
DETAIL REJ3 EXPANSION JOINT



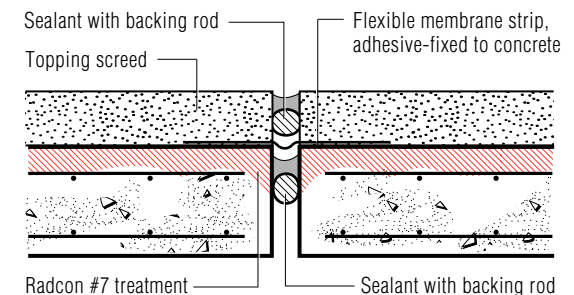
DETAIL REJ5 EXPANSION JOINT



DETAIL REJ2 EXPANSION JOINT



DETAIL REJ4 EXPANSION JOINT



DETAIL REJ6 EXPANSION JOINT

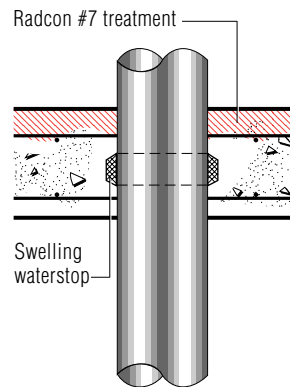
NOTE: If modifying any Design Details shown here, please confirm with your local RADCON #7 representative to ensure the watertightness is not compromised

PENETRATIONS

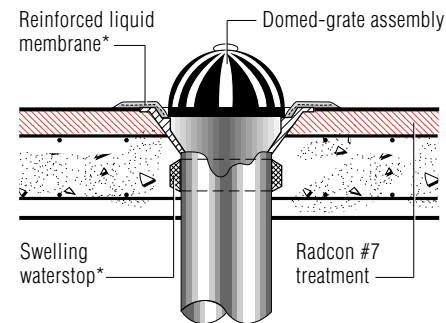
- Penetrations are required where services pass through slabs
- Aim is to ensure a waterproof joint is achieved between the slab and the penetration
- Penetrations are usually cast in-situ, or added later through cored holes

NOTES ON APPLICATIONS

- RP1** Standard treatment of cast in-situ penetrations to rooftops
- RP2** Cast in-situ fulgo outlet penetration with options
- RP3** Same as RP2. Suitable for trafficable environment
- RP4** Treatment for smaller-diameter penetrations previously cast-in
- RP5** Treatment of larger-diameter penetrations previously cast-in, as well as those requiring a higher level of waterproofing protection
- RP6** Treatment of penetrations added after the concrete pour, through cored holes

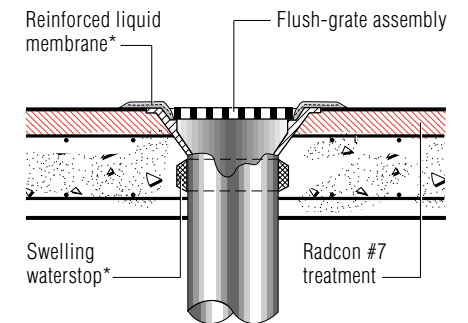


DETAIL RP1 PENETRATION



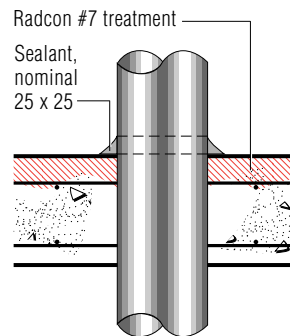
* Generally one or the other is sufficient. For extra watertightness, both may be used

DETAIL RP2 PENETRATION

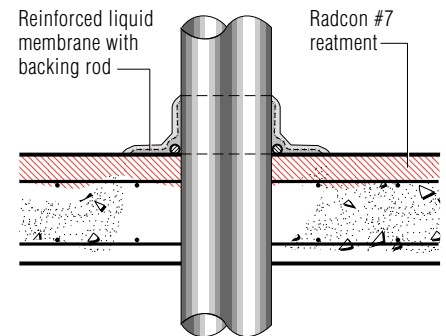


* Generally one or the other is sufficient. For extra watertightness, both may be used

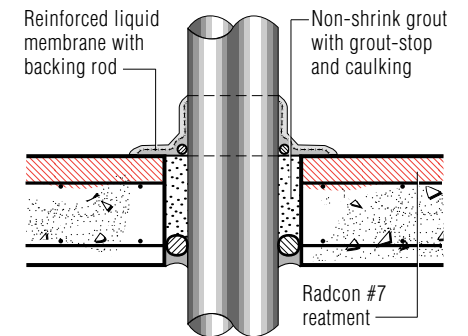
DETAIL RP3 PENETRATION



DETAIL RP4 PENETRATION



DETAIL RP5 PENETRATION

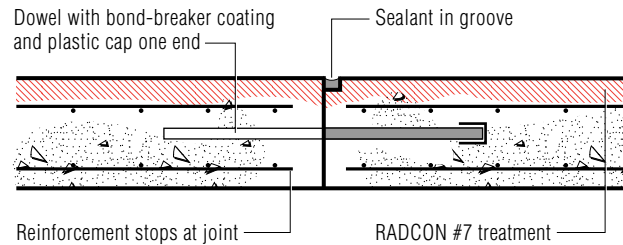


DETAIL RP6 PENETRATION

NOTE: If modifying any Design Details shown here, please confirm with your local RADCON #7 representative to ensure the watertightness is not compromised

CONTRACTION JOINTS

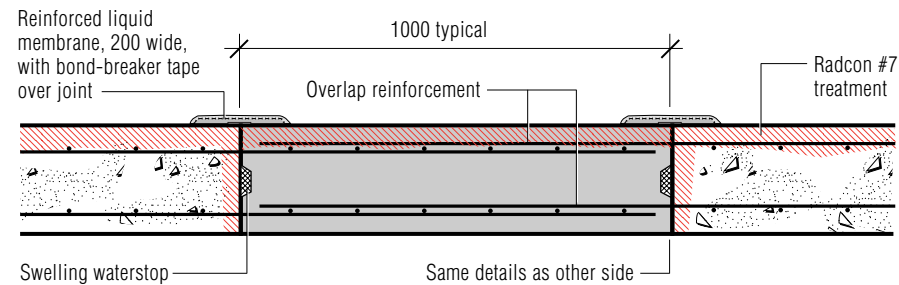
- Purpose-made plane of weakness in a concrete section
- Aim is to ensure that cracking due to shrinkage and temperature contraction will occur along predetermined lines
- Generally reinforcement should not continue across the joint. For shear transfer across the joint, dowels may be used with one half coated to prevent bond



DETAIL RCJ1 CONTRACTION JOINT

POUR STRIPS

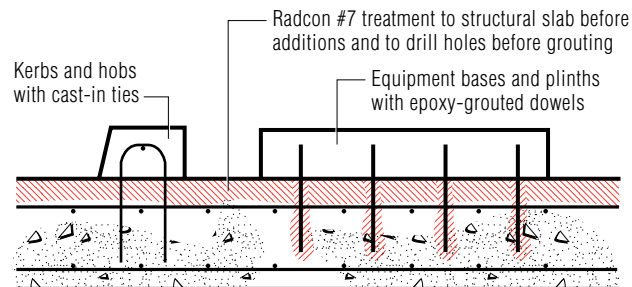
- 'Pour strips' are temporary gaps which are left open for a certain time to allow the concrete on each side to shrink, thus minimising induced tensile stresses
- Aim is to produce a watertight, homogeneous infill with full structural continuity
- The main reinforcement should be overlapped in the region of the pour strip which is typically one metre wide



DETAIL RPS1 POUR STRIP

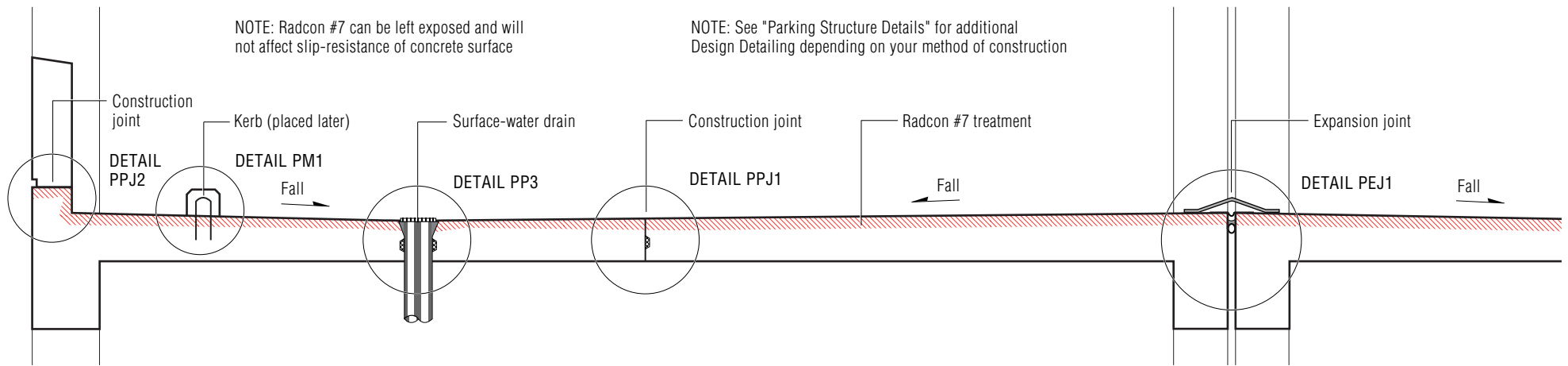
PLINTHS AND HOBBS

- Plinths and hobs are normally added later to act as plant and equipment supports, or traffic devices in car parks
- Dowels used to tie plinths and hobs to the structural slab must be set in place with suitable epoxy adhesive. Radcon #7 treatment should be applied to drilled dowel holes before epoxy grouting

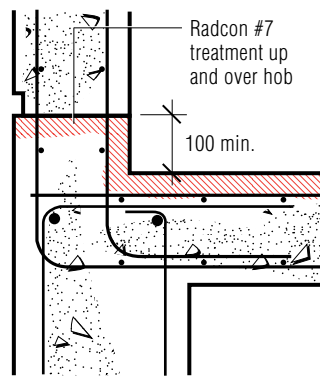


DETAIL RM1 ADDITIONS TO STRUCTURAL SLABS

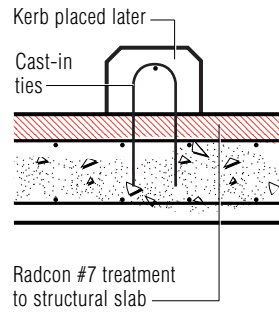
NOTE: If modifying any Design Details shown here, please confirm with your local RADCON #7 representative to ensure the watertightness is not compromised



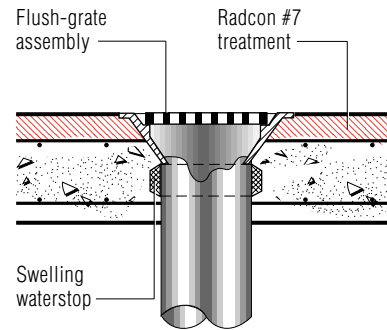
TYPICAL SECTION *PARKING STRUCTURE*



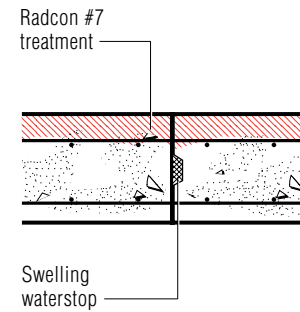
DETAIL PPJ2
CONSTRUCTION JOINT



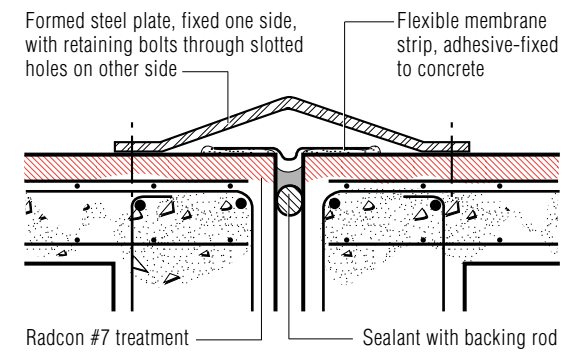
DETAIL PM1
KERB



DETAIL PP3
PENETRATION



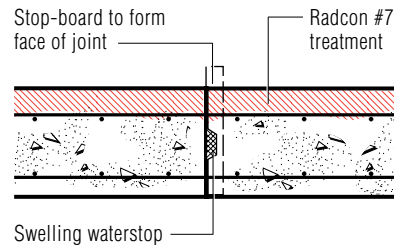
DETAIL PPJ1
CONSTRUCTION JOINT



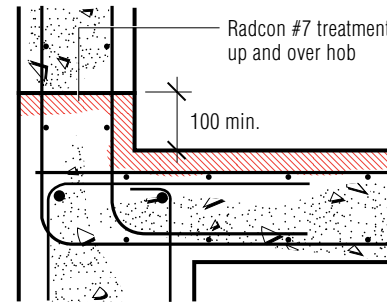
DETAIL PEJ1
EXPANSION JOINT

CONSTRUCTION JOINTS

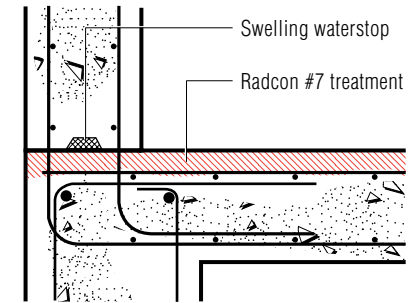
- Formed between adjacent concrete pours
- Aim is to produce a well-bonded, watertight joint between the hardened concrete and the freshly-placed concrete so it acts monolithically
- Generally all the reinforcement should continue across the joint
- A temporary stop-board should be used to form the face of the joint and should be subsequently roughened before placing the adjacent pour



DETAIL PPJ1 CONSTRUCTION JOINT



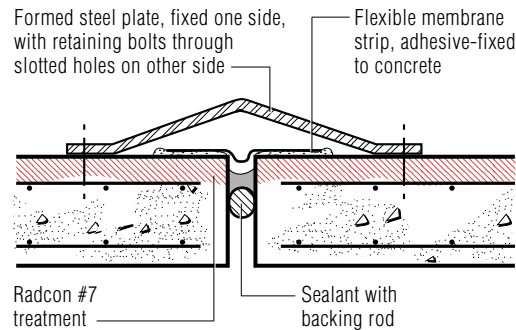
DETAIL PPJ2 CONSTRUCTION JOINT



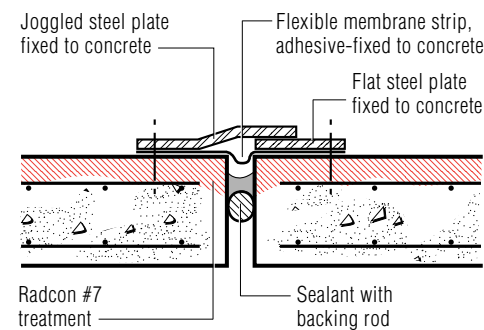
DETAIL PPJ3 CONSTRUCTION JOINT

EXPANSION JOINTS

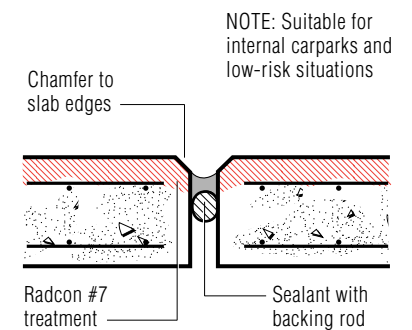
- Used to divide a structure into separate independent units
- Aim is to allow for relative movements between units due to expansion, contraction, differential foundation settlements or applied loads
- Expansion joints should allow relative movement in all directions and are usually formed using filler strips of the required thickness between abutting cast-in-situ concrete elements



DETAIL PEJ1 EXPANSION JOINT



DETAIL PEJ2 EXPANSION JOINT

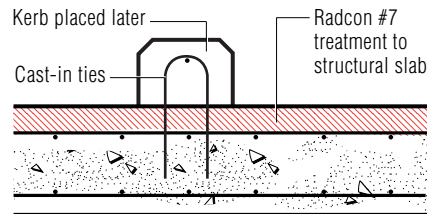


DETAIL PEJ3 EXPANSION JOINT

NOTE: Suitable for internal carpark and low-risk situations

KERBS AND HOBBS

- Kerbs and hobs are usually added to the structural slab later, to which they are anchored by cast-in ties

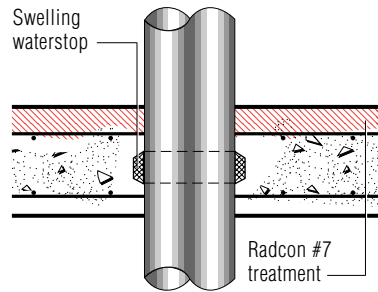


DETAIL PM1 KERB

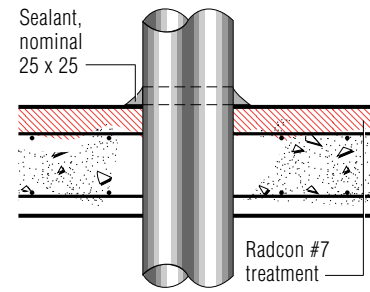
NOTE: If modifying any Design Details shown here, please confirm with your local RADCON #7 representative to ensure the watertightness is not compromised

PENETRATIONS

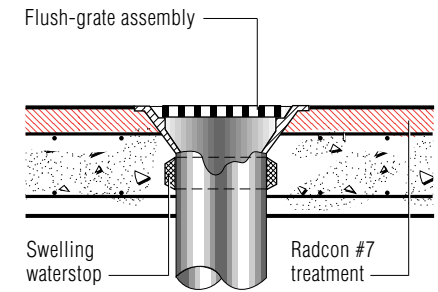
- Penetrations are required where services pass through slabs
- Aim is to ensure a waterproof joint is achieved between the slab and the penetration
- Penetrations are usually cast in-situ with suitable waterproofing details or added later through cored holes (see Detail RP6 on Roof Detail Sheet RD3)



DETAIL PP1 PENETRATION



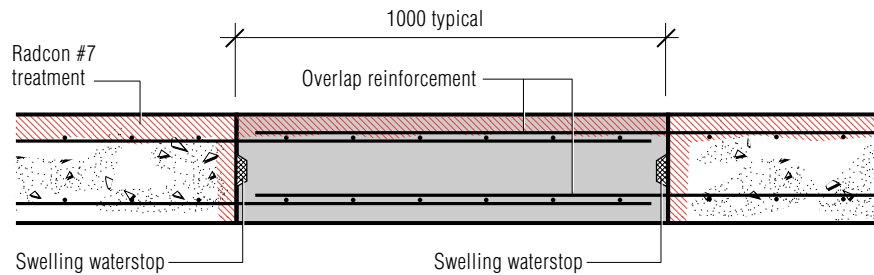
DETAIL PP2 PENETRATION



DETAIL PP3 PENETRATION

POUR STRIPS

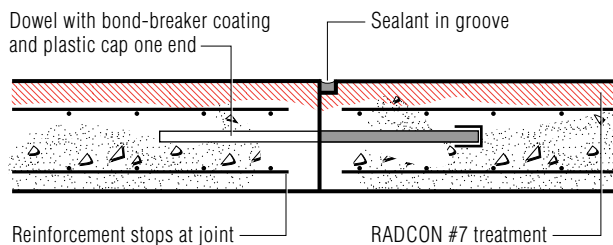
- 'Pour strips' are temporary gaps which are left open for a certain time to allow the concrete on each side to shrink, thus minimising induced tensile stresses
- Aim is to produce a watertight, homogeneous infill with full structural continuity
- The main reinforcement should be overlapped in the region of the pour strip which is typically one metre wide



DETAIL PPS1 POUR STRIP

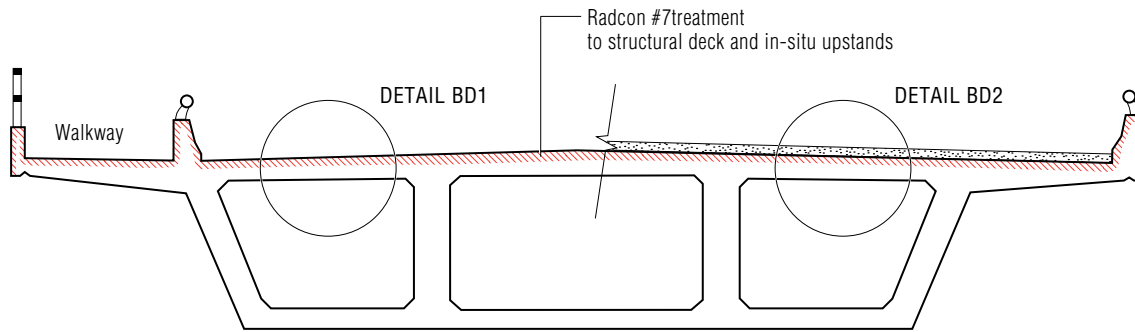
CONTRACTION JOINTS

- Purpose-made plane of weakness in a concrete section
- Aim is to ensure that cracking due to shrinkage and temperature contraction will occur along predetermined lines
- Generally reinforcement should not continue across the joint. For shear transfer across the joint, dowels may be used with one half coated to prevent bond

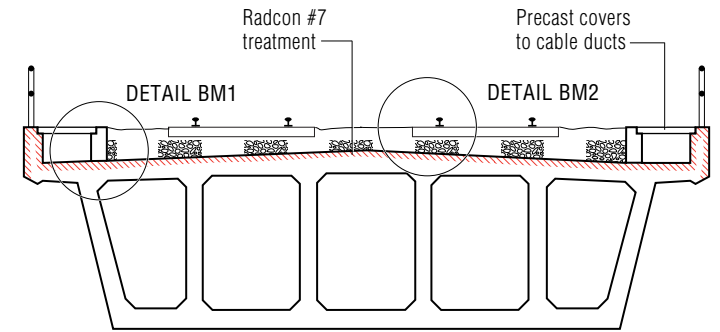


DETAIL PCJ1 CONTRACTION JOINT

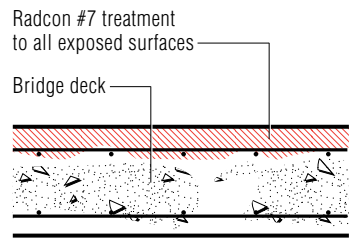
NOTE: If modifying any Design Details shown here, please confirm with your local RADCON #7 representative to ensure the watertightness is not compromised



TYPICAL SECTION ROADWAY BRIDGE

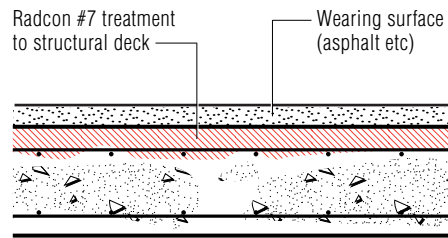


TYPICAL SECTION RAILWAY BRIDGE



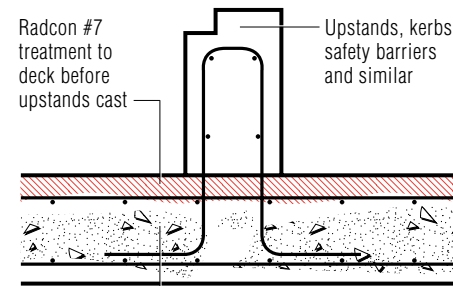
NOTE: Radcon #7 does not affect slip resistance of concrete surface

DETAIL BD1 DECK EXPOSED



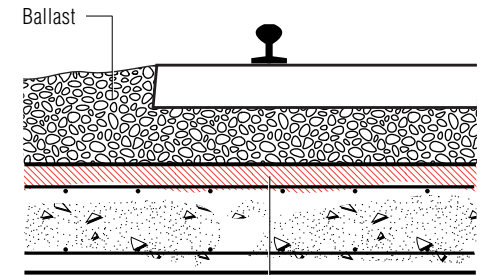
NOTE: Radcon #7 does not affect bond between concrete and wearing surface

DETAIL BD2 DECK WITH WEARING SURFACE



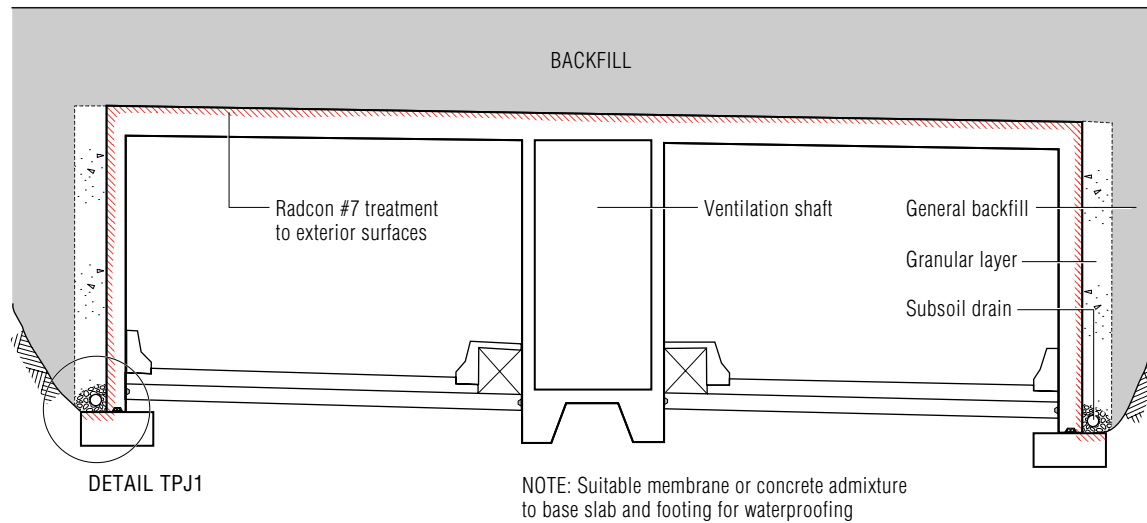
Bridge deck

DETAIL BM1 UPSTANDS CAST LATER

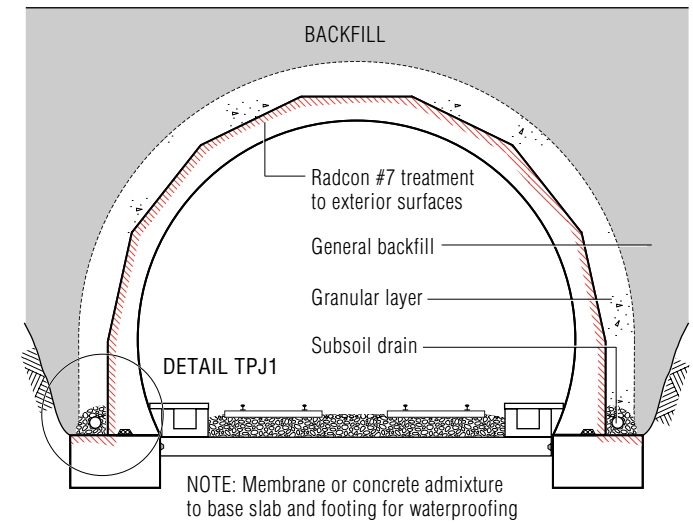


NOTE: Radcon #7 will not be damaged by ballast

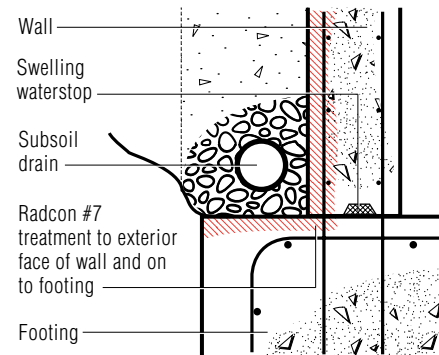
DETAIL BM2 BALLAST OVERLAY



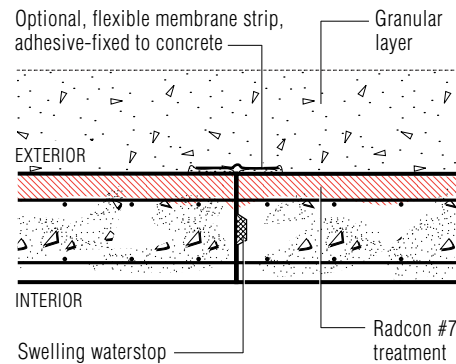
TYPICAL SECTION ROADWAY TUNNEL



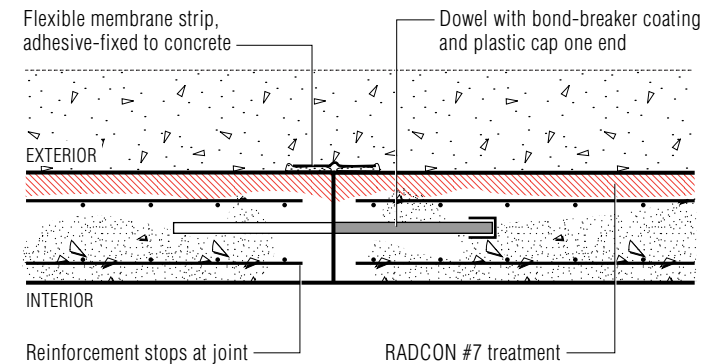
TYPICAL SECTION RAILWAY TUNNEL



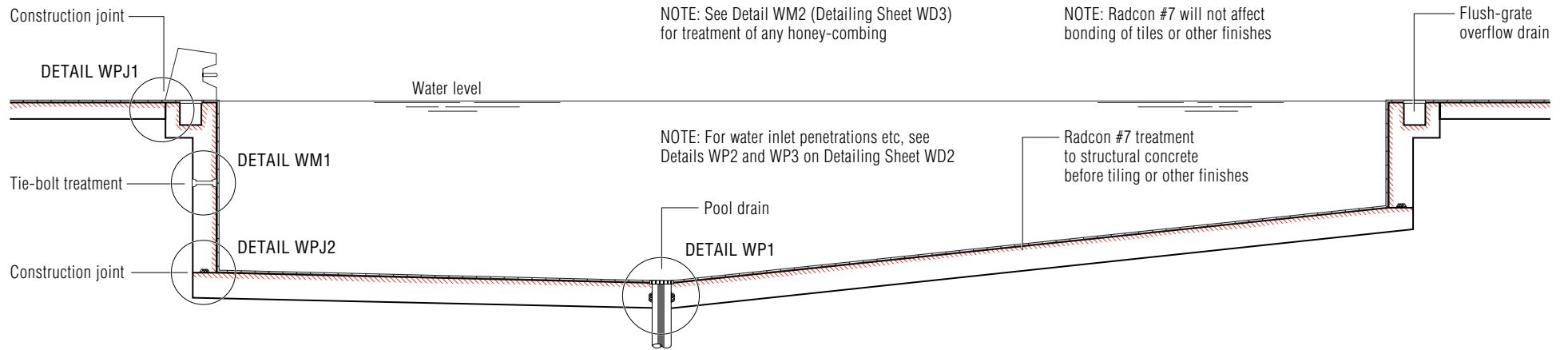
DETAIL TPJ1 CONSTRUCTION JOINT



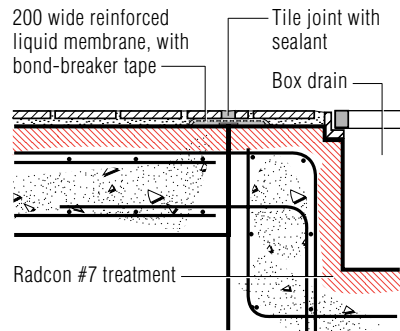
DETAIL TPJ2 CONSTRUCTION JOINT



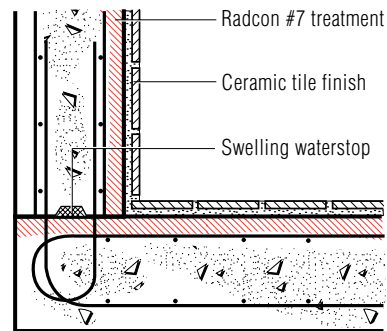
DETAIL TCJ1 CONTRACTION JOINT



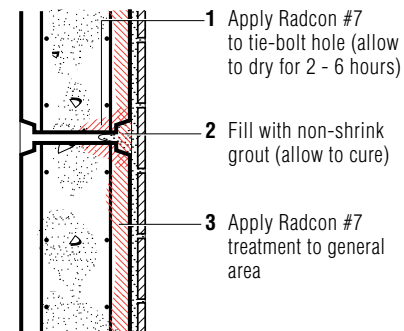
TYPICAL SECTION *SUSPENDED SWIMMING POOL*



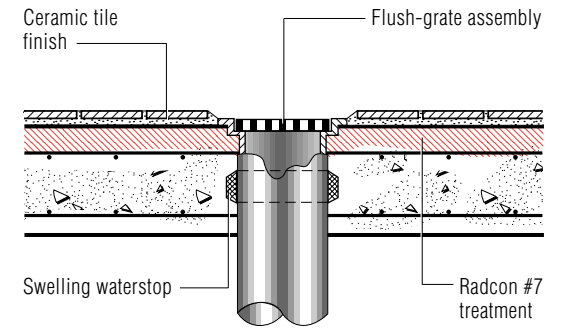
DETAIL WPJ1 *CONSTRUCTION JOINT*



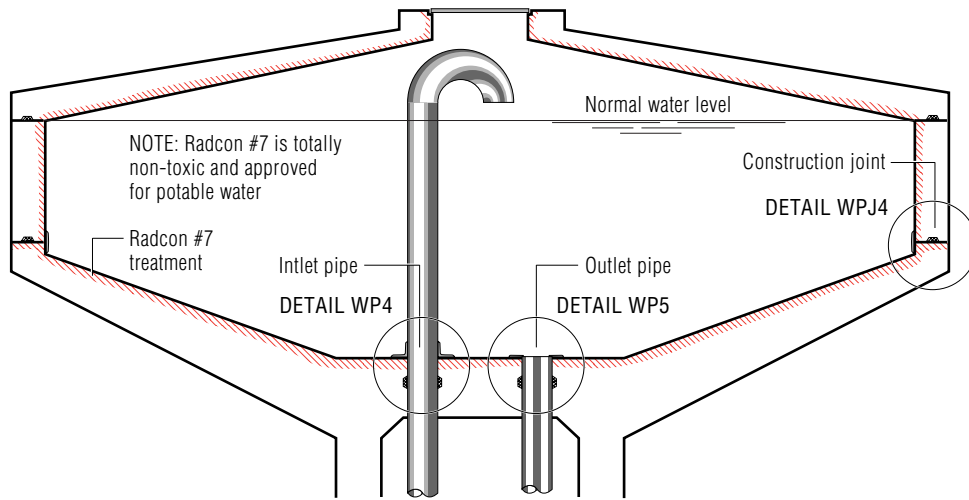
DETAIL WPJ2 *CONSTRUCTION JOINT*



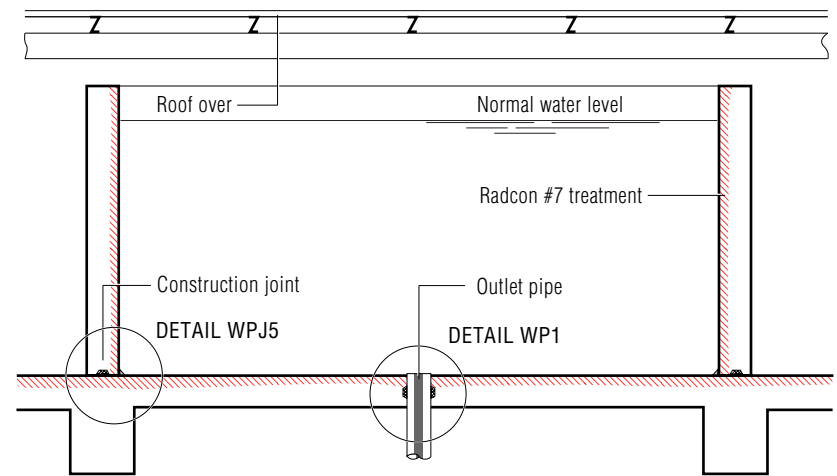
DETAIL WM1 *TIE-BOLT TREATMENT*



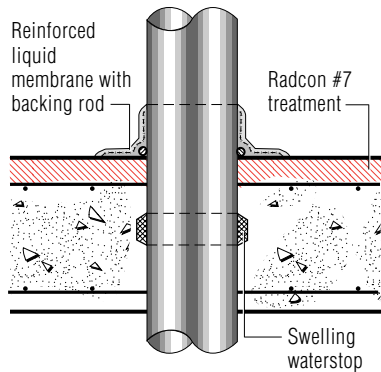
DETAIL WP1 *PENETRATION*



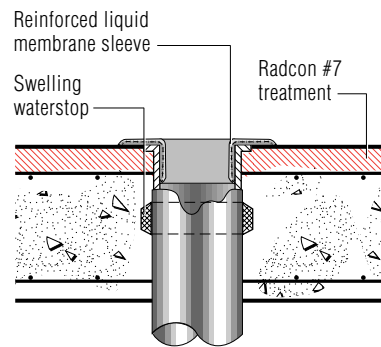
TYPICAL SECTION ELEVATED WATER TOWER



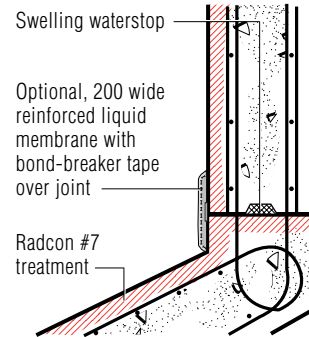
TYPICAL SECTION ELEVATED SPRINKLER TANK



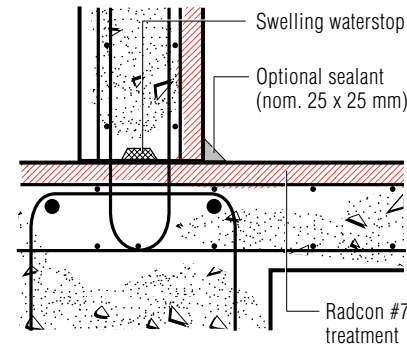
DETAIL WP4
 PENETRATION



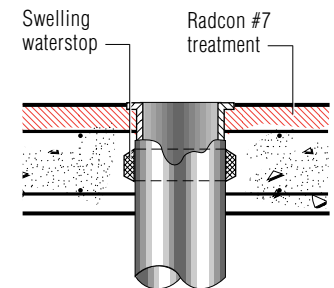
DETAIL WP5
 PENETRATION



DETAIL WPJ4
 CONSTRUCTION JOINT



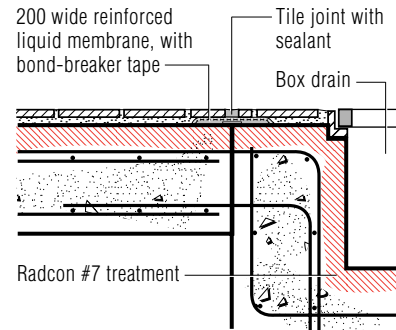
DETAIL WPJ6
 CONSTRUCTION JOINT



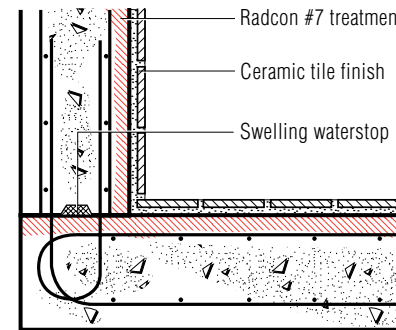
DETAIL WP1
 PENETRATION

CONSTRUCTION JOINTS

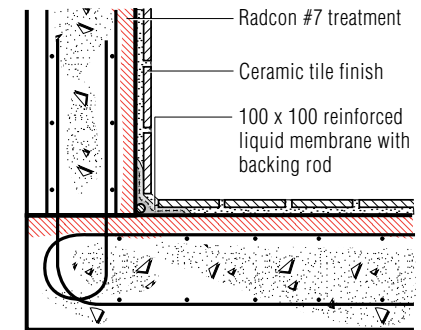
- Formed between adjacent concrete pours
- Aim is to produce a well-bonded, watertight joint between the hardened concrete and the freshly-placed concrete so it acts monolithically
- Generally all the reinforcement should continue across the joint
- A temporary stop-board should be used to form the face of the joint and should be subsequently roughened before placing the adjacent pour



DETAIL WPJ1 CONSTRUCTION JOINT



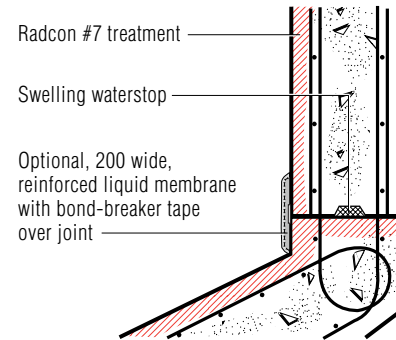
DETAIL WPJ2 CONSTRUCTION JOINT



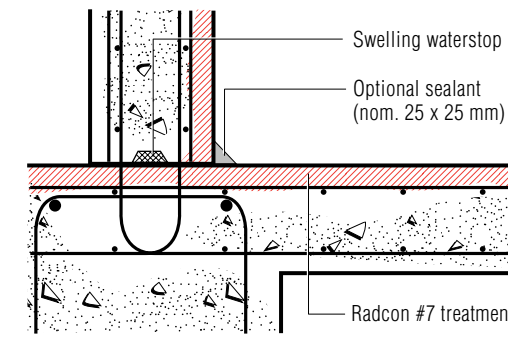
DETAIL WPJ3 CONSTRUCTION JOINT

NOTES ON APPLICATIONS

- WPJ1** Construction joint suitable for surrounding pavements of a suspended swimming pool
- WPJ2** Standard construction joint for swimming pools
- WPJ3** Alternative construction joint for swimming pools, as well as for unplanned joints
- WPJ4** Heavy-duty construction joint suitable for large water-retaining structures
- WPJ5** Construction joint where extra protection required, such as rooftop sprinkler tanks, etc



DETAIL WPJ4 CONSTRUCTION JOINT



DETAIL WPJ5 CONSTRUCTION JOINT

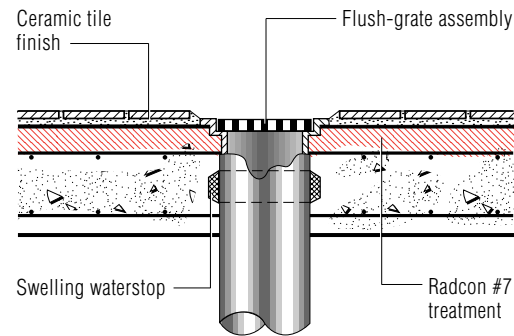
NOTE: If modifying any Design Details shown here, please confirm with your local RADCON #7 representative to ensure the watertightness is not compromised

PENETRATIONS

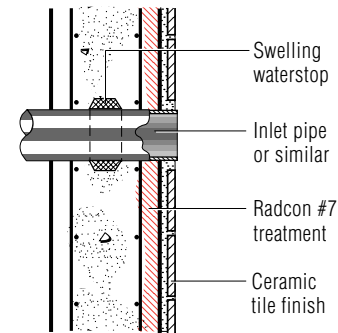
- Penetrations are required where services pass through structural concrete
- Aim is to ensure a waterproof joint is achieved between the concrete and the penetration
- Penetrations are usually cast in-situ with suitable waterproofing details

NOTES ON APPLICATIONS

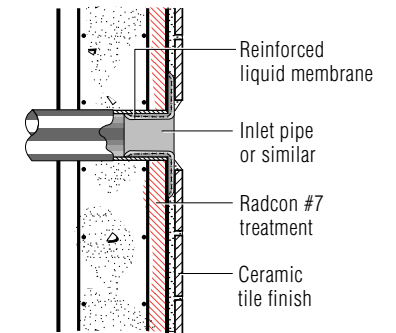
- WP1** Standard outlet pipe detail for pools and other water-holding vessels
- WP2** Inlet pipe, overflow pipe or similar, for pools and other water-holding vessels
- WP3** Alternative to WP2, where no waterstop utilised
- WP4** Heavy-duty inlet pipe where differential movements are possible, such as large water-retaining structures
- WP5** Heavy-duty outlet pipe where differential movements are possible, such as large water-retaining structures



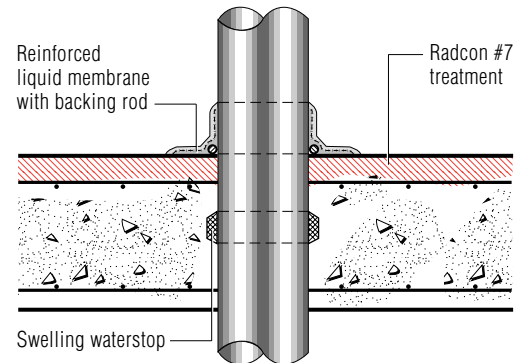
DETAIL WP1 PENETRATION



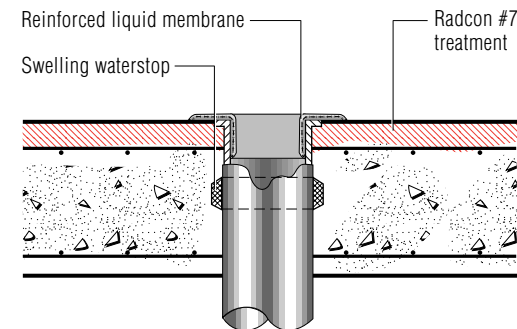
DETAIL WP2 PENETRATION



DETAIL WP3 PENETRATION



DETAIL WP4 PENETRATION

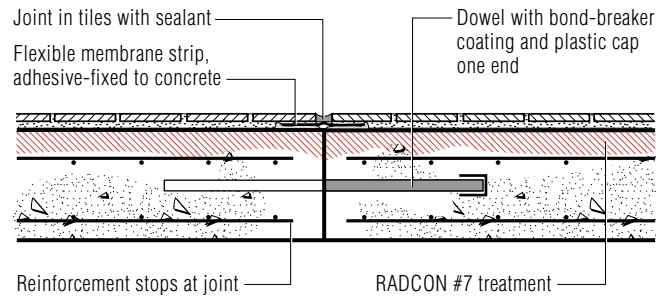


DETAIL WP5 PENETRATION

NOTE: If modifying any Design Details shown here, please confirm with your local RADCON #7 representative to ensure the watertightness is not compromised

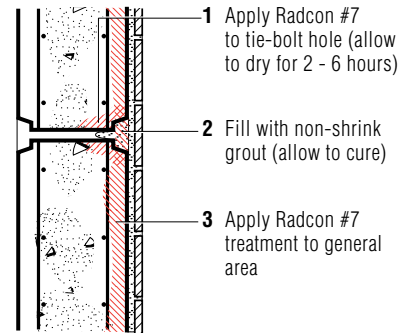
CONTRACTION JOINTS

- Purpose-made plane of weakness in a concrete section
- Aim is to ensure that cracking due to shrinkage and temperature contraction will occur along predetermined lines
- Generally reinforcement should not continue across the joint. For shear transfer across the joint, dowels may be used with one half coated to prevent bond

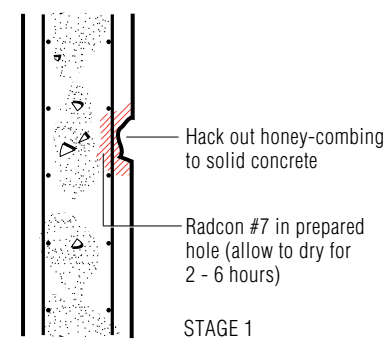


DETAIL WCJ1 CONTRACTION JOINT

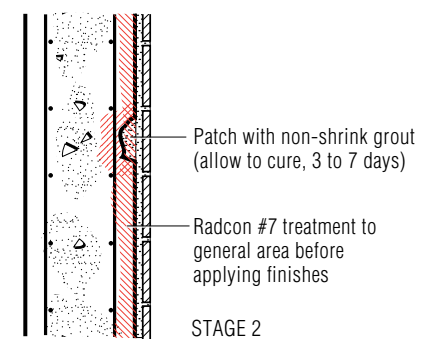
MISCELLANEOUS



DETAIL WM1 TIE-BOLT TREATMENT



DETAIL WM2 HONEY-COMBING TREATMENT



NOTE: If modifying any Design Details shown here, please confirm with your local RADCON #7 representative to ensure the watertightness is not compromised