

rjc **Engineers**

Unbonded Post-Tensioned Structures Exposed to Flooding



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Presentation Overview

- Post-Tensioned Assessment
 - Moisture Ingress Sources
 - Testing Methods
- Calgary Flood
- Affected Buildings

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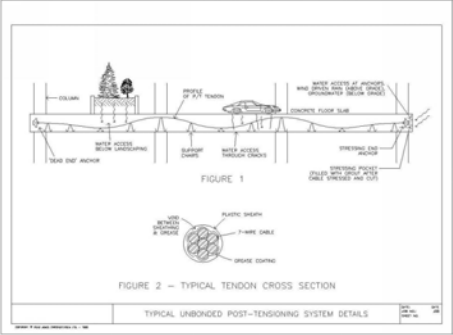


FIGURE 1

FIGURE 2 – TYPICAL TENDON CROSS SECTION

TYPICAL UNBONDED POST-TENSIONING SYSTEM DETAILS

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Structures Containing Unbonded Post-Tensioned Strands

- Different from conventionally reinforced concrete structures
 - Evidence of Corrosion Commonly Hidden
 - Methods of Evaluation Differ
 - Selective Sampling and Interpretation

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Sources of Moisture In PT System

- Original Construction
 - Storage & Transportation
 - Precipitation during construction
- When Building Is In Service
 - Roof
 - Plaza areas (main floor & upper floors)
 - Failures in building envelope
 - Parking levels
 - Below grade – groundwater access

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Discontinuities In Strand Sheathing



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Damage To Sheathing During Construction



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Damage To Sheathing During Construction



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Construction Moisture Precipitation on Slab Before Exterior Cladding Installed



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Exposed Anchor Pockets



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Plaza Levels



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Parking Structure Slabs



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Moisture From Plumbing Leaks & Floods



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Investigation Methods

- Visual Review
- Waterproofing Assessment
- PT Inspection Recesses
- Strand Extraction/Inspection
- Sheathing Humidity Testing



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Standard Inspection Recesses

- 250 – 300 mm length
- Visual Observations
- Grease / Moisture Sampling
- Tension Testing with Screwdriver



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Inspection Recesses



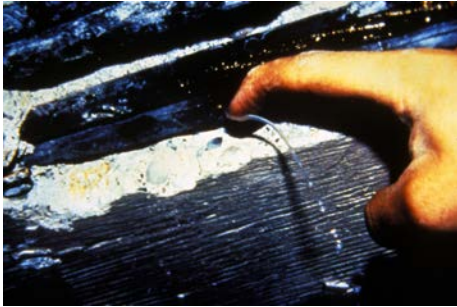
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Penetration Testing



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Moisture In Strand Sheathing



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Moisture In Grease (Emulsified)



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Corrosion of Wires

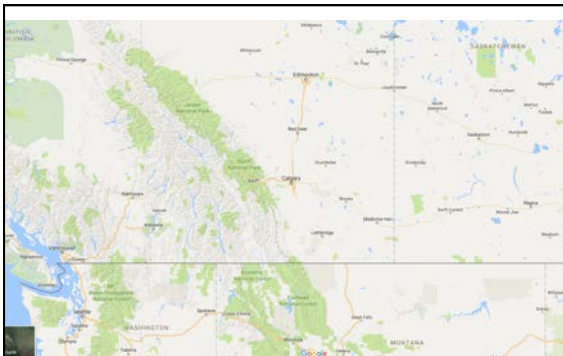


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June 19, 2013 Calgary Flood



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