ICRI 2015 Fall Convention

Modern Trends in the Repair Industry

Retrofit Subgrade Waterproofing – Options and Pitfalls

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Subgrade Waterproofing Retrofit

Performance-based waterproofing specifications may require a watertight subgrade interior space, but may not accurately represent the existing conditions.

The extent of material deterioration, changes in ground water conditions and other factors can drastically affect the scope of retrofit waterproofing repairs.

Subgrade Waterproofing Retrofit

Contractors – Be Proactive:

- Attend pre-construction meetings
- Carefully observe the existing conditions
- Ask questions

Ask Questions

- Have subgrade wall and slab condition surveys been performed?
- Is there site access to exterior of subgrade walls?
- Has the subgrade structural condition changed over time?
- Are there changes in the water table or other factors affecting subgrade water movement?
- Do the project specifications alone provide information adequate to develop and accurately estimate the work?

Basic Remediation Options

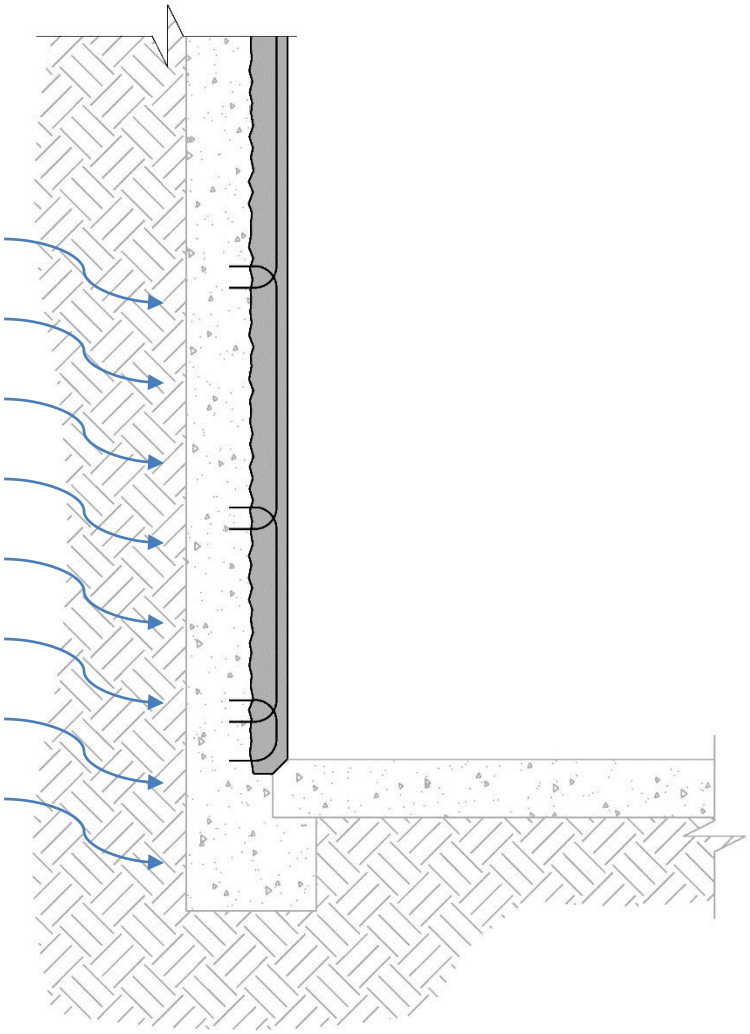
- If possible, reduce exterior hydrostatic pressure and groundwater flow at structure perimeter
  - Re-grade surrounding landscape features
  - Add groundwater drainage and sump system components

Basic Remediation Options

Interior (negative) side:

- Prepare substrates
- Apply interior (negative) side waterproofing materials
  - Cementitious coatings
  - Crystalline coatings
- Locate and seal actively leaking cracks and joints in subgrade walls and slabs
  - Crack injection grout
  - Hydraulic cement and patching compounds

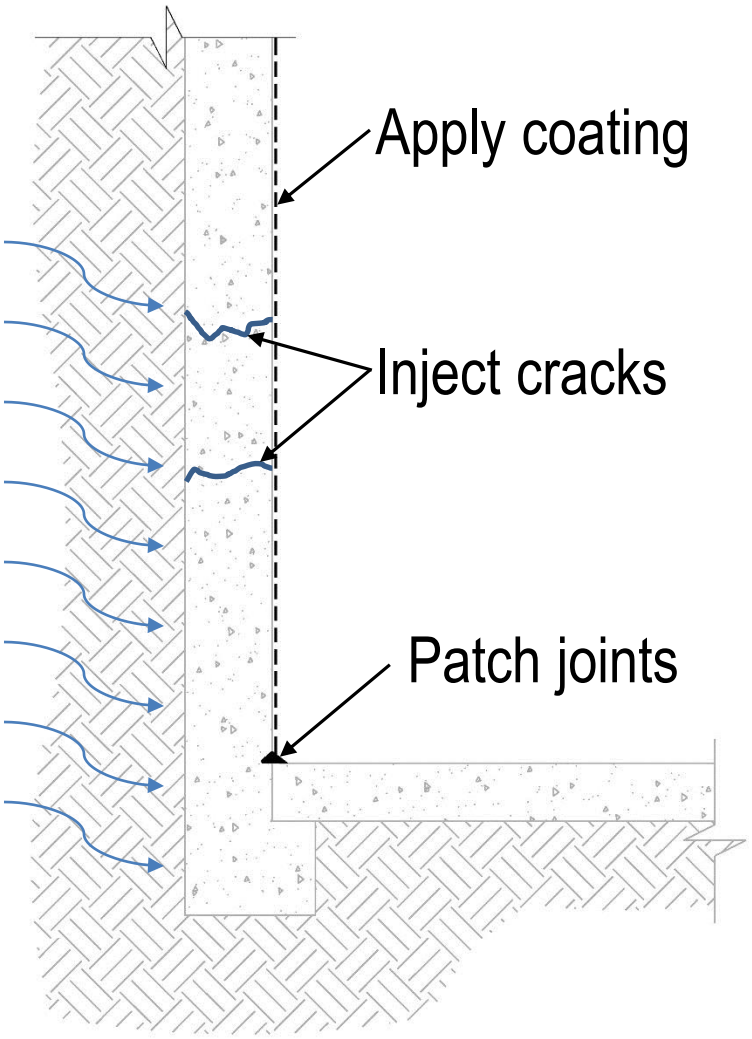
Interior (Negative) Side Repair



Where concrete substrate is unsound:

- Mechanically abrade and remove unsound material.
- Place reinforced formed concrete or shotcrete to provide a suitable substrate for waterproofing coating

Interior (Negative) Side Repair



Where concrete substrate is sound:

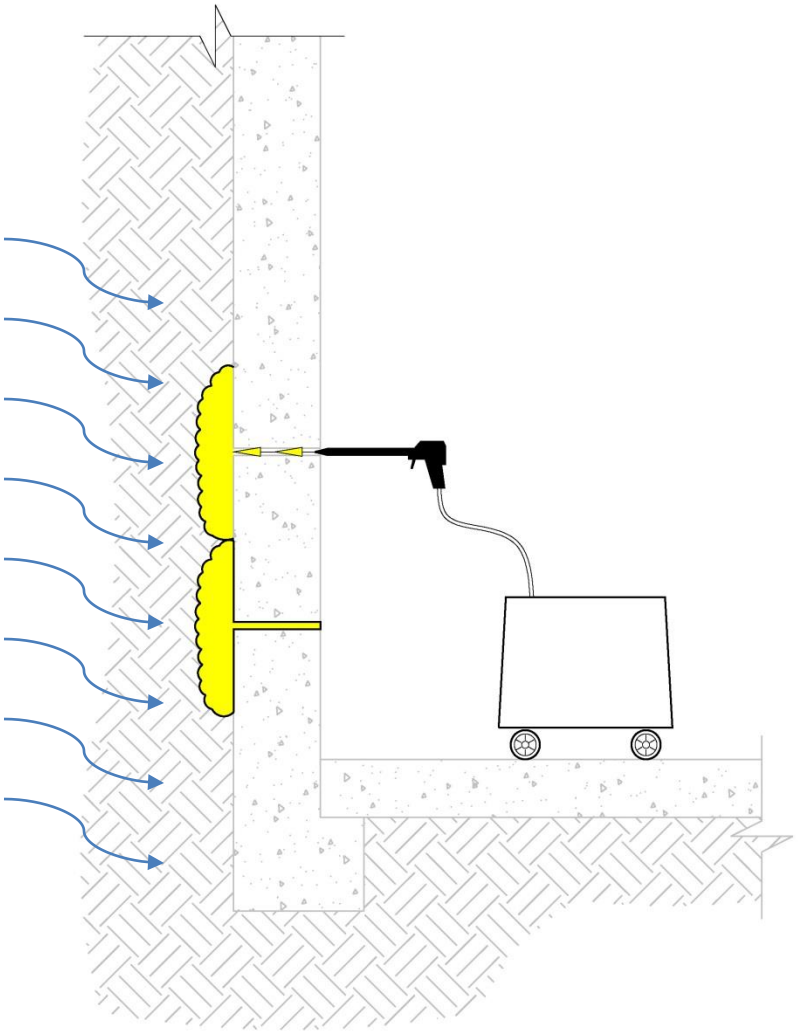
- Address all active leaks and joints using crack injection grout, hydraulic cement or other appropriate patching material.
- Apply cementitious, or crystalline coating material over properly prepared substrates

Basic Remediation Options

Exterior (positive) side:

- Install exterior (positive) side waterproofing materials
  - Excavate at subgrade walls to allow installation of liquid or sheet-applied waterproofing materials and drainage provisions
  - Inject waterproofing grout through subgrade walls

Exterior (Positive) Side Repair



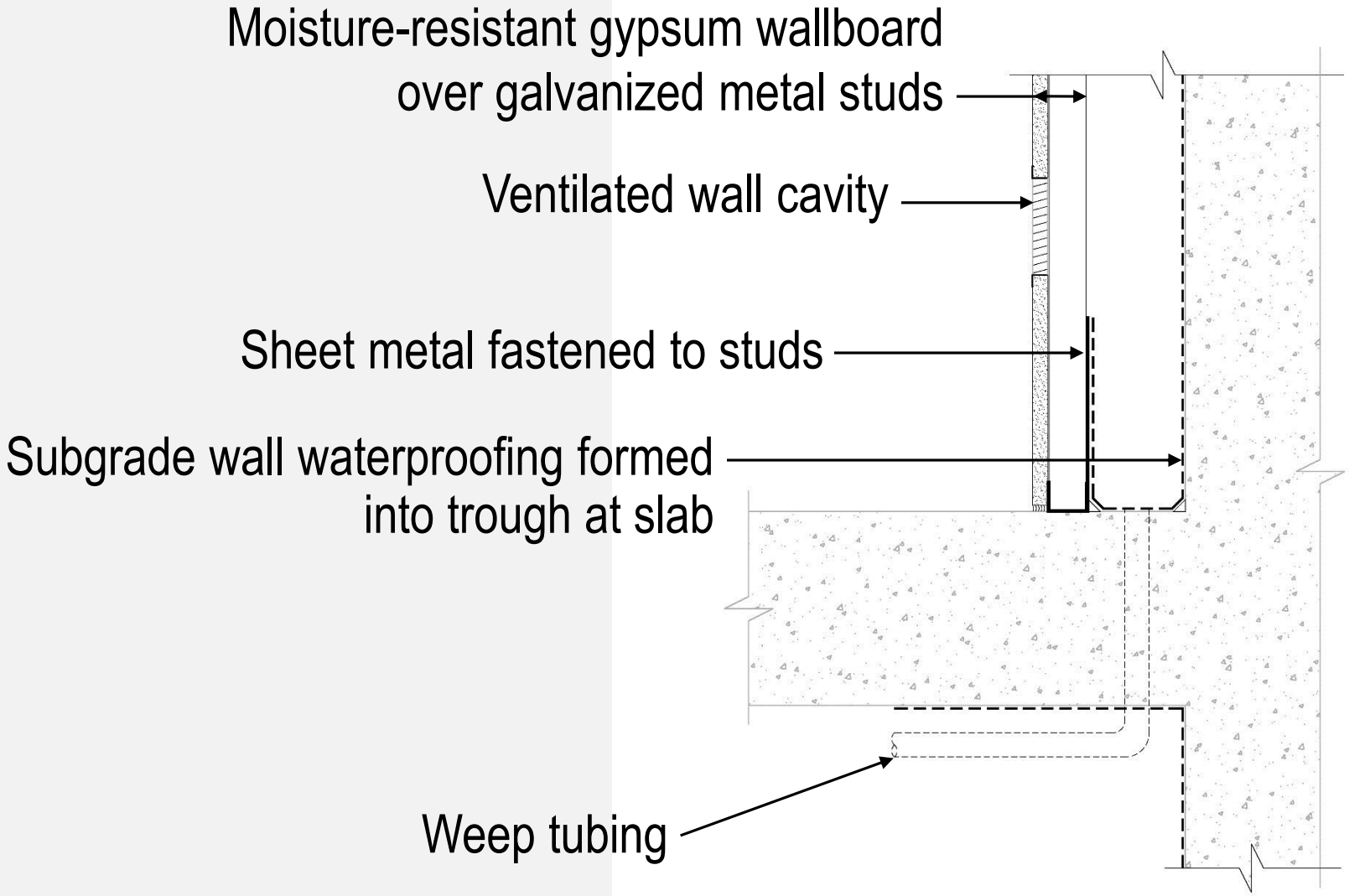
- Inject waterproofing grout through subgrade walls to fill voids and block water entry paths into the wall
- Relies on trial-and error to target infiltration sources and can simply displace groundwater to adjacent ungrouted wall areas

Basic Remediation Options

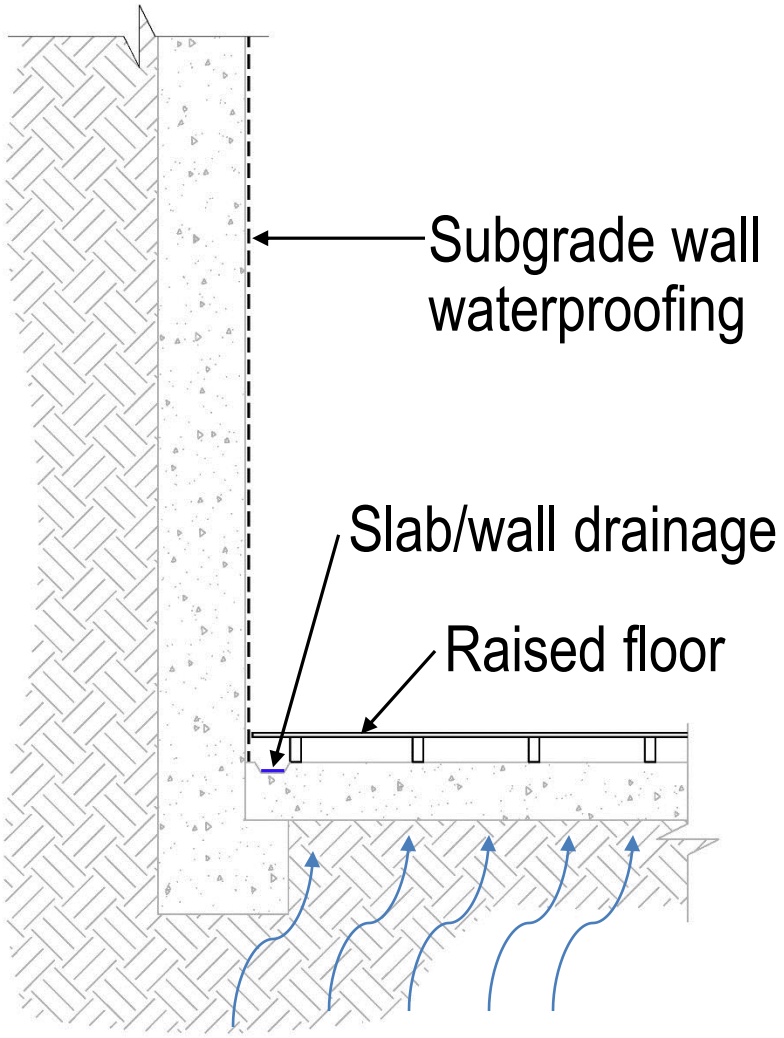
Construct features to contain and control infiltrated water:

- Raised floors above subgrade slabs
- Interior walls separated from subgrade foundation walls with cavity space incorporating water collection and drainage provisions
- Humidity control / air circulation provisions for wall cavities

Control Incidental Water Intrusion



Control Incidental Water Intrusion

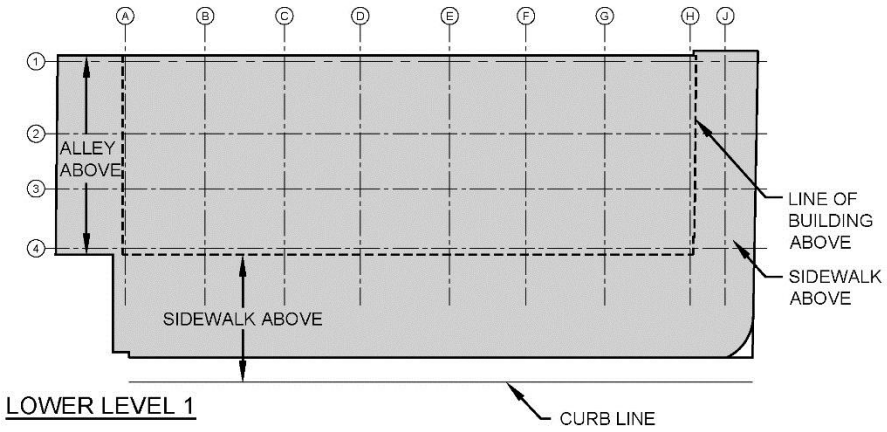


At sensitive locations with slab seepage issues, construction of a raised floor platform and slab surface drainage provisions may be necessary to control infiltrated water.

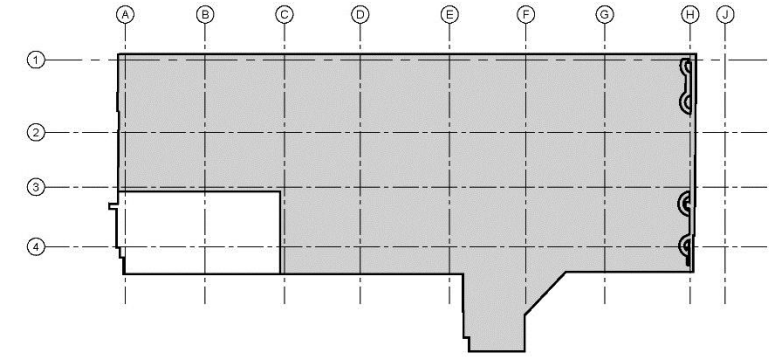
Case Study – Chicago

- 85 year-old high-rise bank building renovated into a modern hotel

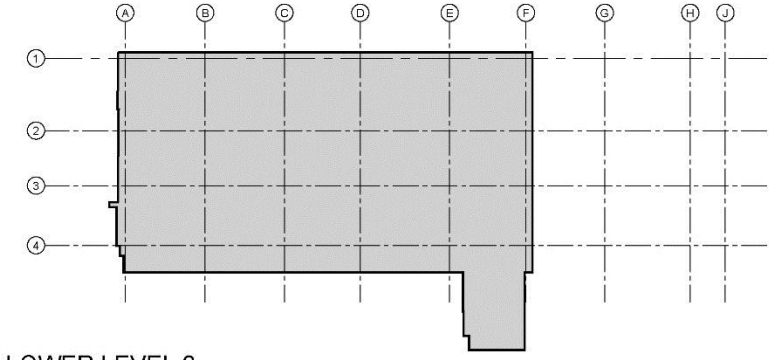
Lower Level Plans



LOWER LEVEL 1



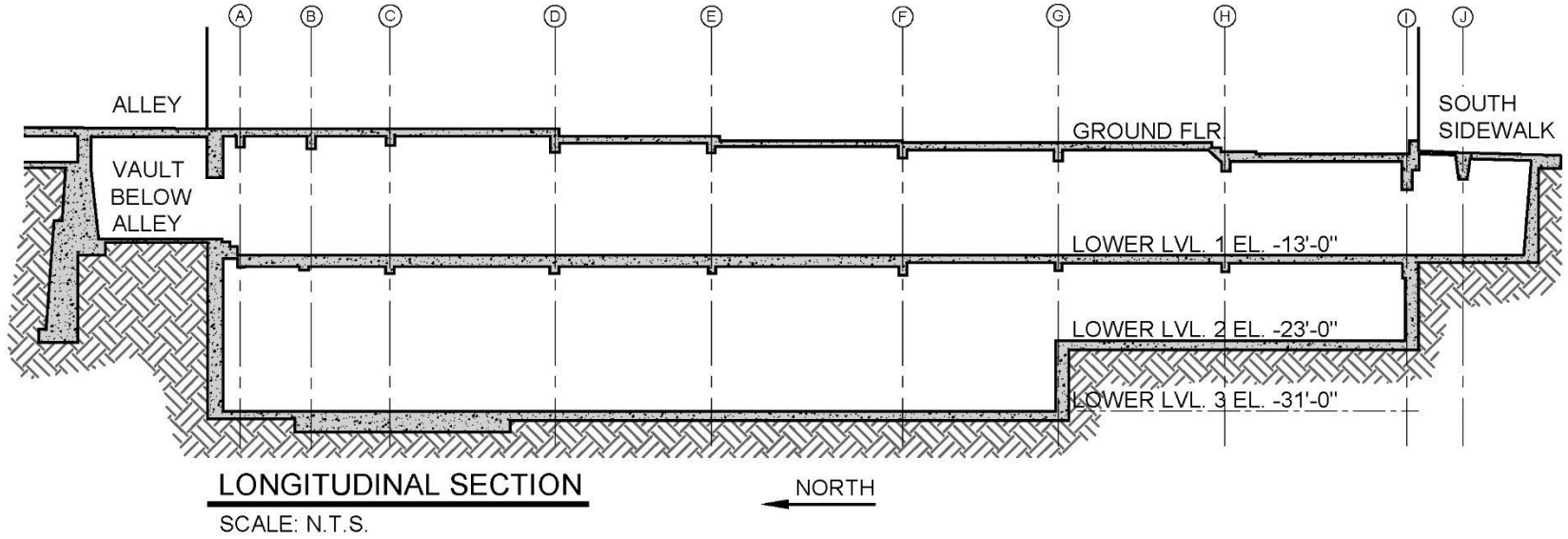
LOWER LEVEL 2

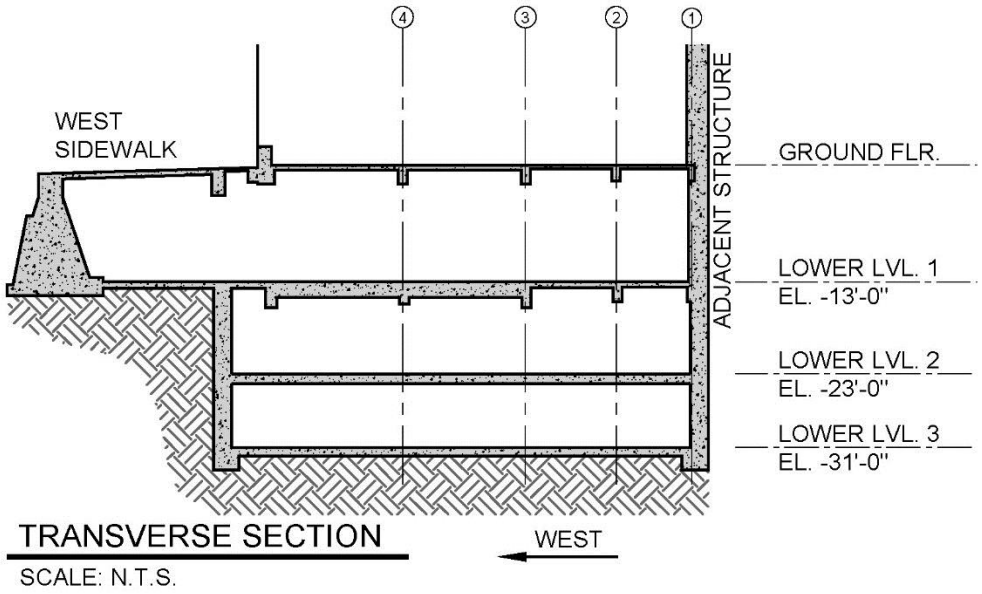


LOWER LEVEL 3

- The design called for critical back-of-house operations and some customer service facilities to be located within existing basement space.

Lower Level Cross Sections





Case Study

Project Specifications:

- Polymer Modified Cement Waterproofing

    A. *Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.*
    B. *Proceed with application only after unsatisfactory conditions have been corrected.*
    C. *Notify Architect in writing of active leaks or defects that would affect system performance.*

Coating and Crack Injection in Progress

Water Intrusion Through Coated Walls

Water Intrusion Through Coated Walls

Water Intrusion at Wall Penetrations

Water Intrusion at Wall Penetrations

Coating Placed Over Active Leaks

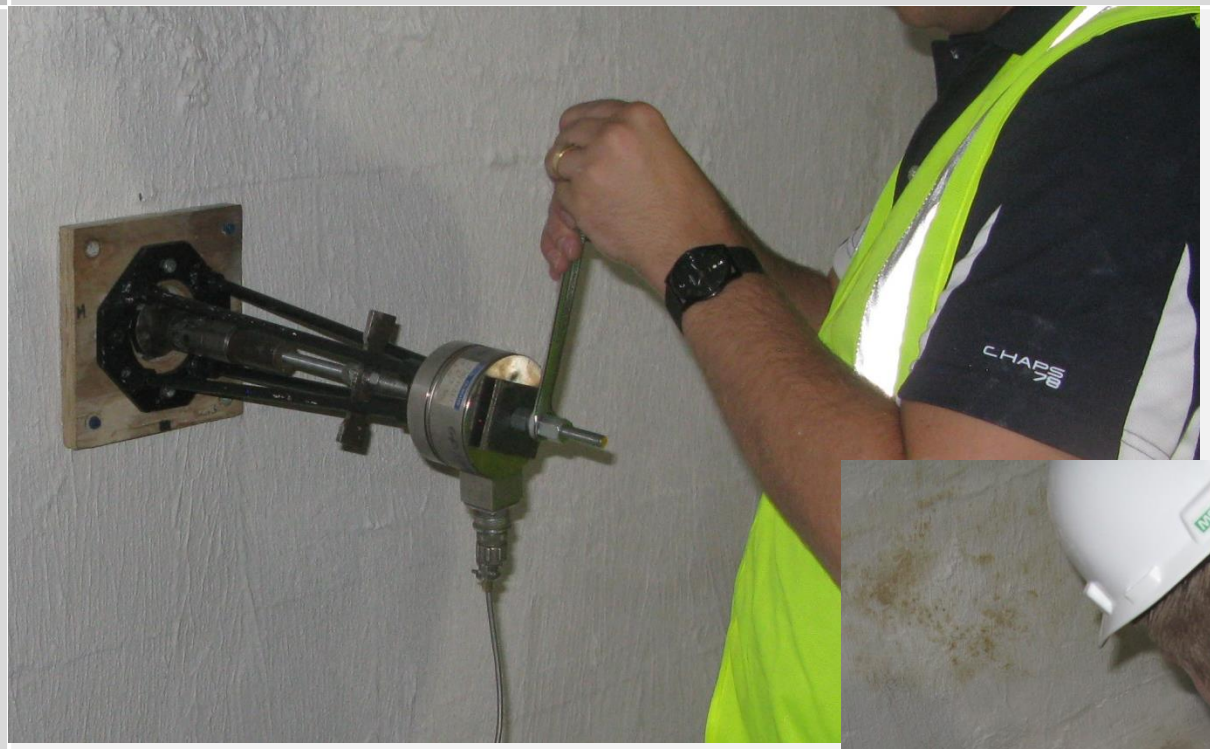
Leakage From Slab Above

Coating Placed Over Corroded Steel Plate

Seepage Through Coating

Cove Installation at Wall/Slab Joint

Bond Strength Testing of Wall Coating



Contaminated Substrate Surface Under Coating

Failure at Previous Coatings

Failure Plane Within Substrate

Substrate Deterioration Under Coating

Subgrade Waterproofing Retrofit

Be aware of performance-based waterproofing specifications for a watertight subgrade interior space.

Fully understand the “as-is” condition of the existing substrate structure.

The scope of retrofit subgrade waterproofing repairs can be drastically affected by:

- The extent of concrete deterioration
- Changes in ground water conditions
- Numerous other factors

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