



Substructure Lessons Learned Checklist: Retention & GW

Substructure Lessons Learned Checklist with interactive checklist, commentable fields, and export as PDF/Excel. Capture retention performance, groundwater behavior, and improvements without blame, secured by QR code.

Project:
Date:
Filled by:

Project & Context Data	
1	Identify project, site coordinates (WGS84), excavation depth, and retention type using GNSS and as-built drawings; acceptance: coordinates within ± 0.5 m, depth matches as-built; attach site plan PDF and a site board photo.
2	Record substructure work dates and phase (e.g., Stage 2 excavation) by reviewing daily diaries; acceptance: ISO 8601 dates, shift times, and weather noted; attach scanned diary pages and supervisor initials.
3	Summarize soil stratigraphy and groundwater design assumptions from the geotechnical report; acceptance: cite document title, revision, and page; upload excerpt and one annotated borehole log photo.

Retention Performance	
4	Log maximum wall deflection from inclinometer data; method: import CSV and plot; acceptance: peak lateral movement stated in mm with date/time; include instrument ID and calibration certificate (< 12 months).
5	Record crack mapping on shotcrete/reinforced concrete using a 1 m grid survey; acceptance: crack widths measured by gauge (± 0.1 mm), lengths, and locations; upload annotated photos and grid sketch.
6	Capture anchor/tieback performance versus design; method: review stressing records; acceptance: lock-off loads in kN with $\pm 10\%$ comparison to target; attach charts, jack/gauge serial numbers, and calibration references.
7	Note soil or wall face ravelling events; method: daily report review; acceptance: chainage/metre location, estimated volume (m ³), stabilization method used; upload before/after photos and foreman acknowledgement.

Groundwater Behavior	
8	Record groundwater head levels from vibrating wire piezometers; method: calibrated readout; acceptance: head relative to excavation base (m), UTC timestamp, instrument ID; attach trend plot and calibration certificate (< 12 months).
9	Measure inflow rates during each excavation stage; method: inline flowmeter or timed pumpdown; acceptance: L/s with $\pm 5\%$ accuracy, rainfall in prior 24 h (mm) recorded; upload meter photo and data export.
10	Document dewatering system uptime and alarms; method: BMS/logger export; acceptance: uptime percentage, alarm count, mean response time (min), and root-cause note; attach dashboard screenshot.
11	Record water turbidity in discharge; method: calibrated nephelometer; acceptance: NTU values, sample time/location, and calibration check; attach sample photo; flag if above trigger per approved project specifications and authority requirements.

Interface & Adjacent Impacts	
12	Survey adjacent settlement markers; method: digital level; acceptance: vertical movement in mm, loop closure within ± 1.0 mm over 30 m; upload levelling circuit sheet and marker photos.
13	Note utility impacts near retention; method: utility owner reports; acceptance: distance to wall (m), protective measures installed, permit/notification numbers; include location photos and owner acknowledgement.
14	Document water ingress at joints or penetrations during peak inflow; method: timed observation; acceptance: mapped locations, flow estimate (L/min), temporary sealing used; attach before/after photos and observation log.

Improvement Suggestions & Actions	
15	Identify recurring causes using neutral categories (design, method, sequencing, monitoring); method: facilitated 5-Whys; acceptance: no names or blame, clear cause chain; upload workshop notes and facilitator signature.
16	Propose retention performance improvements; method: SMART action template; acceptance: action owner, due date (ISO 8601), expected deflection change (mm), reference to product data or detail sketch.
17	Recommend groundwater control enhancements; method: hydraulic check; acceptance: target head reduction (m), pump or wellpoint capacity (L/s), monitoring triggers; attach calculation sheet.
18	Capture temporary works or sequencing refinements; method: lookback review; acceptance: revised task order, expected schedule/cost impact with basis, risk notes; attach schedule fragment.
19	Validate improvements via pilot; method: A/B field trial; acceptance: pre/post measurements (mm, L/s), crew feedback notes, decision to scale; include photo set and short memo.

Documentation & Sign-Off	
20	Compile the final lessons learned report; method: standardized template; acceptance: executive summary ≤ 300 words, references, appendix index, version control; upload signed PDF.
21	Distribute to stakeholders; method: common data environment; acceptance: distribution list with roles, dates sent, recipients' acknowledgements; upload transmittal record and CDE link.
22	Capture approvals; method: digital signatures; acceptance: project manager and superintendent sign-off, QR-authenticated record generated, archive location URL recorded.

Comments:

Filled by:

Signature:

Introduction	How to use this checklist
<p>Substructure Lessons Learned Checklist provides a structured way to capture retention performance, groundwater behavior, and practical improvement suggestions without blame analysis. This post-construction review tool supports foundation substructure teams working with earth-retention systems, deep excavations, and dewatering performance. It focuses on facts: instrument readings, photos, dates, locations, and outcomes versus expectations. The scope includes retaining walls and support-of-excavation systems, groundwater head and inflow observations, adjacent movement effects, and the conversion of observations into clear, owner-assigned actions. It excludes personnel attribution, contractual liability narratives, and fault-finding. By emphasizing calibrated instrumentation, consistent units (SI), and verifiable evidence, the checklist helps avoid recurring issues such as excessive wall deflection, unexpected inflows, turbidity exceedances, and settlement near property lines. The outcome is a repeatable knowledge record that improves design criteria, sequencing, monitoring plans, and contingency measures on the next job. Start in interactive mode to tick items, add comments, and export as PDF/Excel via secure QR authentication.</p>	<ol style="list-style-type: none"> 1. Preparation: Gather as-builts, geotechnical reports, monitoring exports (CSV), calibration certificates, and daily diaries. Bring GNSS, digital level, crack gauge, calibrated flowmeter, nephelometer, PPE, and a tablet with online access to the checklist. 2. Using the Interactive Checklist: Start interactive mode, select the project, and walk through grouped items. Tick completed entries, add factual comments, and attach photos, plots, or files. Keep SI units and ISO 8601 timestamps consistent. 3. Evidence and Quality: Import instrument data directly, verify calibration dates, and geotag photos. Ensure measurements meet listed tolerances before proceeding. Use neutral language focused on conditions, not personnel or fault. 4. Export and Share: When complete, export to PDF/Excel for stakeholders. The system embeds a QR code for verification and links to source files in the common data environment. 5. Sign-Off and Archive: Collect digital signatures from the project manager and superintendent. Distribute the report, log acknowledgements, and archive with QR-authenticated record location for future reference.