

WHAT TO DO WHEN RELIABLE AS-BUILT DRAWINGS DO NOT EXIST?

Guía Diagnóstica
GD-022

Technical guidance for reconstructing the installed configuration when final drawings do not exist, are incomplete, or no longer represent the actual facility

DO NOT START BY REDRAWING. START BY DETERMINING WHAT YOU NEED TO KNOW TO MAKE SAFE DECISIONS.

When reliable as-builts do not exist, the institution may know the design intent and still not know with sufficient certainty how the infrastructure was finally installed, what changed afterward, or what hidden dependencies exist today.

Why we developed it

Existing laboratories commonly rely on design drawings as if they were as-builts, even though field changes were never incorporated, equipment was replaced, controls were reconfigured, penetrations were added, and utility routes were altered without corresponding document updates.

The problem is not merely documentary. A technical intervention can affect a system, barrier, or service that is not correctly represented in the available documents.

What this guide is intended to do

Help reconstruct a sufficiently reliable representation of the installed configuration to support maintenance, change, commissioning, verification, failure response, and lifecycle management.

The goal is not to produce a visually complete drawing. It is to distinguish what is verified, documented, inferred, unverified, and unknown, and to determine what must be confirmed before action is taken.

PRACTICAL USE

Proceed in sequence: define the decision that must be supported → gather available sources → compare documents with field conditions → classify confidence level → prioritize critical functions → verify relevant routes, connections, and interfaces → reconstruct functional relationships → incorporate the new information into document control.

Not having as-builts does not mean knowing nothing. It means making explicit what part of the knowledge is demonstrated and what part remains a hypothesis.

01

DEFINE

02

TRACE

03

VERIFY

04

CONTROL

HOW THIS GUIDE MAY BE USED – AND WHAT IT DOES NOT AUTHORIZE

This guide is a general diagnostic-orientation tool. It is designed to structure questions, organize evidence, and identify when the installed configuration requires specific verification.

Acceptable use

It may be used to:

- evaluate the reliability of existing documentation;
- identify discrepancies between drawings and field conditions;
- prioritize systems requiring verification;
- prepare multidisciplinary surveys;
- define what information should be retained after an intervention;
- structure a documentation-recovery strategy.

It does not constitute

This guide does not constitute an as-built survey, design, specification, contractual drawing, validated BIM model, engineering report, or authorization to intervene in critical systems.

Applicable technical basis

The content should be interpreted together with the risk assessment, Basis of Design, commissioning documentation, available drawings, O&M manuals, maintenance records, change control, regulatory requirements, and the actual physical condition.

Competent personnel

Verification of routes, connections, interfaces, and critical functions should be performed or reviewed by personnel competent in the systems involved and with safe access to the relevant areas.

Responsibility

BioLab Solutions assumes no responsibility for decisions made solely on the basis of this guide without site-specific verification and competent professional review.

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01

Define what “no as-builts” actually means

Not all documentation gaps are the same, and they do not require the same response.

Documentation condition	Actual problem
No final drawings exist	Only design, tender, or construction documents remain; the installed configuration must be reconstructed.
Partial drawings exist	Some disciplines, areas, or modifications were never incorporated.
Drawings exist but were never verified	The institution does not know whether they accurately represent what was installed.
Drawings exist but are obsolete	The facility changed after handover and the documents did not follow those changes.
Documents conflict	Different versions, shop drawings, redlines, or manuals describe incompatible configurations.
BIM exists but there is no validation evidence	The model may be detailed and still describe intent rather than reality.

The diagnostic question is not simply “Do we have drawings?” It is whether the institution can trust that the documents sufficiently represent the configuration that actually supports containment.

The difference between absence, obsolescence, contradiction, and lack of verification should remain visible because each leads to a different strategy.

THE PROBLEM MAY BE MISSING DOCUMENTATION, LOSS OF TRACEABILITY, OR A DIFFERENCE BETWEEN DOCUMENT AND REALITY.

Separate design intent from installed configuration

A document may be technically correct for its original purpose and still be inadequate as an as-built.

"It is the latest drawing we found."

The most recent date does not demonstrate that the document incorporated field changes or later modifications.

"It is marked IFC."

Issued for Construction establishes the basis for construction; it does not demonstrate how the work was finally installed.

"The contractor delivered it at closeout."

Chronological handover does not demonstrate field validation or correspondence with the final condition.

"The BIM model is complete."

Graphic detail does not demonstrate that the content was verified against the facility.

"The system has operated for years."

Apparent operation does not validate concealed routes, penetrations, connections, isolation points, or shared dependencies.

"Maintenance knows how it is configured."

Tacit knowledge can be valuable, but it does not replace a controlled record that survives personnel changes.

Principle: treat design documents as evidence of intent until the installed condition has been confirmed within the relevant scope.

Define why the configuration needs to be reconstructed

The required level of detail depends on the decision the institution needs to make.

Need	Information that usually matters
Maintenance	Equipment, access, isolation points, power supplies, drains, sequences, and critical dependencies.
Renovation	Routes, penetrations, concealed services, containment boundaries, actual connections, and available capacity.
Commissioning / verification	Functional configuration, measurement points, served equipment, control logic, and system interfaces.
Failure response	Which system supports which function, what redundancy truly exists, and which shared dependencies may fail together.
Change control	What part of the configuration must be updated after each modification and what evidence demonstrates the change.
Documentation recovery	What information should become the master record and what uncertainty should remain explicitly identified.

Not everything requires the same level of detail

A limited intervention may require deep verification of one area or system without requiring reconstruction of the entire building.

Risk determines priority

Routes and dependencies that support critical containment functions should be treated with greater rigor than elements with no comparable functional impact.

THE OBJECTIVE IS NOT TO DRAW EVERYTHING. IT IS TO RECOVER THE INFORMATION NEEDED TO MAKE DEFENSIBLE DECISIONS.

Reconstruct from multiple sources before going to the field

The installed configuration often leaves traces in documents created for very different purposes.

Design

- IFC drawings
- specifications
- Basis of Design
- diagrams
- sequences

Construction

- shop drawings
- RFIs
- redlines
- submittals
- photographs

Handover

- commissioning
- TAB
- O&M
- equipment lists
- punch list

Controls

- BMS graphics
- point lists
- logic
- backups
- alarms

Maintenance

- work orders
- replacements
- labels
- isolations
- repairs

Operation

- SOPs
- service routes
- staff knowledge
- incidents
- changes in use

Look for convergence

A shop drawing may show a route, the BMS may associate a sensor with a piece of equipment, a construction photograph may confirm a penetration, and a later work order may document a modification. No single source necessarily demonstrates the current condition, but several sources can build a strong hypothesis for verification.

Arrive in the field with specific questions that can be confirmed or rejected.

Classify confidence before consolidating the new record

A reconstructed drawing can appear complete while mixing facts, inferences, and gaps.

Category	How it should be interpreted
Field verified	Observed, measured, or directly traced within the defined scope.
Documented	Supported by an identifiable source but not physically confirmed.
Inferred	A reasonable conclusion based on several converging sources without direct observation.
Unverified	Plausible information that still requires confirmation.
Unknown	The available evidence does not support a defensible conclusion.

The category should travel with the data

If a route was inferred and later incorporated into the drawing with no mark, the next person may interpret it as verified. The process will have created false certainty.

Uncertainty can be useful

Identifying a route as unverified allows a future inspection to be planned, a maintenance opening to be used, or a restriction to be imposed before intervention.

DOCUMENTED UNCERTAINTY IS MORE USEFUL THAN PRECISION THAT WAS NEVER DEMONSTRATED.

Prioritize the configuration that supports containment

When the scope is large, begin with systems whose incorrect interpretation could have the greatest consequence.

Ventilation

- which system serves each space;
- supply and exhaust routes;
- isolation dampers;
- filters and housings;
- redundancy and bypasses.

Controls

- sensors and physical points;
- controllers;
- sequences;
- interlocks;
- alarms and communication.

Physical boundary

- actual boundaries;
- penetrations;
- doors;
- floor-wall-ceiling interfaces;
- seals and transfer devices.

Critical utilities

- normal and emergency power;
- UPS;
- steam, gases, vacuum, or compressed air;
- drains;
- process or chilled water.

Do not stop at locating components. Also identify what function depends on them, what areas could be affected if they are isolated, and what shared dependencies could compromise several functions at once.

RECONSTRUCT WHAT IS CONNECTED TO WHAT – AND WHAT DEPENDS ON THAT CONNECTION

Relationship	Why it matters
Fan → served zones	Helps anticipate which spaces lose function during isolation, failure, or maintenance.
Sensor → physical point → controller	Prevents interpretation of a BMS value without knowing what actual condition is being measured or controlled.
Equipment → electrical panel → emergency source	Shows whether the function truly remains available during transfer or failure.
Redundancy → shared dependency	Two “redundant” devices may share power, ductwork, control, or another component that forms a single point of failure.
Penetration → crossed boundary	Supports evaluation of implications for maintenance, sealing, modification, or decontamination.
Valve / damper → isolation function	Supports maintenance planning without assuming that local isolation leaves other critical functions unaffected.

An operational as-built should explain relationships, not only geometry. A drawing that shows where a duct runs but not which rooms it serves, what damper isolates it, or what fan moves it may be insufficient for a maintenance decision.

CONFIGURATION IS GEOMETRY + FUNCTION + DEPENDENCIES.

07

Verify concealed routes without turning the survey into a new risk

What cannot be seen directly should not be assumed simply because a drawing shows it.

Verification may require a combination of observation, physical identification, control data, non-destructive methods, selective inspection, or use of legitimate interventions.

Before opening or intervening

- review containment and operational risks;
- identify energized or pressurized services;
- determine whether the area forms part of a critical barrier;
- confirm decontamination requirements;
- define temporary controls;
- coordinate permits, isolation, and restoration;
- determine how findings will be documented.

Avoid

- opening ceilings or walls indiscriminately;
- removing seals or penetrations without control;
- intervening in ductwork or housings without understanding their condition;
- de-energizing equipment simply to “trace a route” without prior analysis;
- assuming that partial inspection confirms the entire path.

The need to identify a route does not remove the safety conditions required to investigate it.

NOT ALL “BAD AS-BUILTS” REPRESENT THE SAME PROBLEM

Scenario A · IFC drawing with no redlines

The design appears complete, but there are no records of field changes. Use it as an initial hypothesis, not as confirmed representation of the facility.

Scenario B · Good as-built, ten years of changes

The original document was correct at closeout, but maintenance and renovation altered equipment and routes. The problem is obsolescence, not initial absence.

Scenario C · Detailed BIM, conflicting field condition

The model shows a high level of detail, but selective inspection reveals differences. Graphic detail should not be confused with reliability.

Scenario D · Concealed system, converging evidence

A shop drawing, construction photograph, and BMS describe the same route, but it cannot be observed directly. It may be recorded as documented/inferred, not as field verified.

The objective is to assign the correct treatment to each type of uncertainty. The response may be to confirm, limit, investigate, update, or keep explicitly identified as unknown.

HOW MUCH CAN THE AVAILABLE INFORMATION ACTUALLY SUPPORT?

Condition	Implication
Drawing + field verification	May be treated as verified configuration within the scope actually observed.
Drawing + converging indirect evidence	May be used with an explicit note that the route or connection was not observed directly.
Conflicting documents	The discrepancy should be resolved or retained as uncertainty; it should not be hidden when the drawing is consolidated.
BMS graphic only	May show logical association, but does not necessarily demonstrate physical routing or actual connection.
Staff memory only	May guide investigation but should not be elevated to verified status.
Concealed element without sufficient evidence	Should remain identified as unverified or unknown.
Detailed model with no validation traceability	Should be treated as unconfirmed documentation regardless of its graphic quality.

The confidence level should travel with the information. If it disappears when a field note is transferred into the final drawing, the document may create false equivalence between observed and inferred information.

08

Turn the reconstruction into a traceable technical record

The resulting document should explain what it contains, where it came from, and how confident the institution can be in it.

Include minimum metadata

- survey or update date;
- areas and systems covered;
- document sources used;
- personnel who performed or reviewed verification;
- confirmation methods;
- access or inspection limitations;
- unverified elements;
- document version and status.

Make uncertainty visible

- confidence legends or categories;
- pending field notes;
- inferred routes;
- concealed elements;
- open discrepancies;
- areas outside the scope.

A reconstructed document should allow another professional to understand what was actually verified without depending on the memory of the person who prepared it.

A RELIABLE RECORD EXPLAINS ITS PROVENANCE AND ITS LIMITS.

USE LEGITIMATE INTERVENTIONS TO RECOVER INFORMATION THAT IS NORMALLY CONCEALED

Maintenance, repair, renovation, and post-change commissioning can become controlled opportunities to improve the quality of the record.

When an area is legitimately opened

- photograph before closing;
- record labels and equipment;
- confirm visible routes;
- record useful dimensions or references;
- compare with the existing drawing;
- record discrepancies;
- update the master document.

Connect every change with documentation

- work order;
- change control;
- RFI or field change;
- redline;
- post-change testing;
- as-built update;
- document closeout.

Documentation recovery can become a continuous practice rather than an isolated project that later becomes obsolete again.

The value of the new as-built depends on the next modification no longer occurring outside the document-control system.

CAN WE RECONSTRUCT A RELIABLE AS-BUILT CONFIGURATION?

01

Is it clear what decision or intervention the information must support?

No → first define the use and required level of detail.

Yes → continue.

02

Have design, construction, handover, controls, maintenance, and operational sources been gathered?

No → gather evidence before beginning the survey.

Yes → continue.

03

Does the documentation match the installed condition at critical points?

No → record discrepancies and prioritize verification.

Yes → continue.

04

Can critical routes, connections, interfaces, and dependencies be established with sufficient confidence?

No → keep the information classified as unverified or unknown and define further investigation.

Yes → continue.

05

Does the resulting record preserve provenance, confidence level, and limitations?

No → the reconstruction may still create false certainty.

Yes → incorporate it into document control.

The outcome may be an as-built verified within a limited scope, a reconstructed record with uncertainties, a need for additional survey work, or a condition that should remain explicitly identified as unknown.

CAN WE TRUST THE DOCUMENTED CONFIGURATION?

- ☐ Define what decision requires the information.
- ☐ Separate design, existing documentation, and installed condition.
- ☐ Gather IFC drawings, shop drawings, RFIs, redlines, commissioning, O&M, and maintenance records.
- ☐ Classify each item as verified, documented, inferred, unverified, or unknown.
- ☐ Prioritize ventilation, controls, boundaries, and critical utilities.
- ☐ Reconstruct functional relationships, not only geometry.
- ☐ Verify routes and interfaces using proportionate and safe methods.
- ☐ Keep discrepancies open where the evidence is insufficient.
- ☐ Record provenance, scope, date, and confidence level.
- ☐ Integrate the resulting document into change control.

Technical-use note: this checklist does not replace a professional survey where the scope, risk, or intervention requires detailed field verification.

Technical Notes

Consult the current BioLab Technical Notes collection for material on documentation, commissioning, maintenance, change control, HVAC, and containment boundaries.

[Explore Technical Notes](#)

Related resources

GD-021 · What to do when there is no reliable reference state? addresses reconstruction of the operating condition when historical evidence is insufficient.

[Explore BioLab resources](#)

DOCUMENT → FIELD → CONFIGURATION → CONTROL