JUMBO BLOCK ENGINEERING SUITE

JUMBO BLOCK Plan

User Manual · Version 9.1.0

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1. Overview

JUMBO BLOCK Plan is the pre-planning tool of the JUMBO BLOCK Engineering Suite. It translates a hydrologically required retention volume — typically taken over from HYDRO — or a given installation size into a concrete modular system layout: block raster, floor, side and cover plates, weights, excavation volume, and SABA joint lengths.

The program runs entirely locally in the browser as a single HTML file. There is no cloud connection, no server, and no user account. The results serve technical pre-planning; a project-specific structural verification (in STATIC) remains required, and costs are not calculated online.

PLAN is one of several standalone tools in the suite (including HYDRO, STATIC, BUDGET, TEMP, Project). All tools can share a common project file (project.dbm) when needed.

2. Getting Started

When plan.html is opened for the first time, the “Planning by target volume” mode is active, all fields are pre-filled with technical default values (target volume 0 m³, floor plate thickness 25 cm, side plate thickness 12 cm, cover plate thickness 25 cm, SABA mode “infiltration without bonding”, plate concrete class C40/50), and every input automatically triggers a recalculation.

There is no persistent storage in the browser. The current working state exists only in the memory of the open page until it is deliberately saved as a project.dbm file via “Export” (chapter 3). Reloading the page discards unsaved input.

The typical workflow: export a project.dbm with the determined retention volume from HYDRO, import that file into PLAN, review the proposed default layout and refine it via manual adjustment if needed (chapter 7), then export again as project.dbm — for further use in STATIC, BUDGET or TEMP.

3. Import / Export (project.dbm)

The project.dbm is the suite's shared data format. PLAN can read both a file exported from HYDRO (containing hydrological results) and a file previously exported by PLAN itself (containing a complete installation layout).

“Import” opens the file selection dialog. If the file contains hydrological result fields from HYDRO, the target volume is taken over automatically (preferring the planned storage volume from HYDRO, otherwise the calculated retention volume), the planning mode is set to “target volume”, and — if a planned module count was present in HYDRO — the block count is preset to “manual adjustment” with that value. A summary note (date, postal code, return period, duration, rainfall depth, effective area, source, retention volume) is automatically appended to the “Project description” field.

If the file already contains a complete PLAN result (planInput_/planResult_ fields from an earlier PLAN export), all planning inputs are instead faithfully restored — mode, target volume or installation size, all manual overrides, plate thicknesses, sealing mode, plate concrete class.

“Export” calculates an updated SHA-256 hash over the entire stored dataset and downloads the file named YYYYMMDD_HHMMSS_project.dbm. Since the project.dbm is a shared format used by several suite tools, PLAN writes only its own fields (project information plus all planning inputs and results) and leaves fields already present from other tools unchanged.

The hash status notice and the import status notice each show the current processing state: no file imported yet, project.dbm imported successfully, file invalid or unprocessable, or project.dbm created successfully.

4. Project Information

Captures project name, organisation/municipality/office, contact person, project location, email, phone, and a free-text project description. All entries are purely for documentation in the report and export and do not enter into any calculation. When importing a HYDRO file, project name and location are taken over automatically if present in the import file.

5. Planning Mode: Target Volume or Installation Size

Two switchable tabs determine how the layout is derived:

- Planning by target volume: from an entered target volume (m³), PLAN calculates the required minimum block count and automatically proposes as compact (near-square) a default raster as possible (chapter 6).
- Planning by installation size: from an entered installation length and width (m), the raster is derived directly — only complete 2.5 m grid steps are considered; any remainder below a full module is not accounted for.

Both modes use the same technical standard basis: module size 2.5 × 2.5 × 2.5 m, net volume 13.9 m³ per module.

6. Automatic Pre-Planning and Raster Optimisation

In “target volume” mode, the required block count is calculated as follows:

```
Required modules = rounded up (target volume / 13.9)
```

From this block count, PLAN automatically searches for the least elongated rectangular raster: for every possible raster width, the matching length is chosen so that at least the required block count is reached; the raster with the smallest difference between length and width and the smallest surplus of additional (unused) module slots is preferred. The actually realised module raster can therefore end up slightly larger than strictly necessary.

In “installation size” mode this optimisation is skipped: length and width are rounded down directly to whole 2.5 m steps and multiplied.

```
Raster length = rounded down (installation length / 2.5)
Raster width = rounded down (installation width / 2.5)
Modules = raster length × raster width
```

In both modes the real installation size results from raster length/width × 2.5 m. The “Automatic pre-planning” card shows the layout type (standard layout, or special layout as soon as any manual override is active), raster, real installation size and module count, plus a summary with net storage volume, gross excavation volume, estimated side plate count for the standard layout, and the selected plate concrete class.

7. Manual Adjustment / Special Layout

For each of the four component groups (block count, floor plates, side plates, cover plates), PLAN displays the automatically calculated value as a read-only field. The corresponding “manual adjustment” toggle allows a custom value to be entered instead, overriding the automatic value. As soon as at least one of these overrides is active, the layout type switches from “standard layout” to “special layout”.

If the block count is manually overridden in target-volume mode, PLAN automatically searches for a new optimal raster for the new block count (same logic as chapter 6). Manually entered floor and cover plate counts are additionally capped automatically at the current block count.

Floor plate thickness, cover plate thickness (with a dropdown from 10 to 100 cm, or a free entry via “Custom cover plate thickness”), and side plate width/thickness can each be set independently. If a plate thickness is set to 0, the corresponding plate count is automatically set to 0 — the plate is entirely omitted from calculation and report.

The “Symmetric construction” option automatically sets the floor plate thickness equal to the selected cover plate thickness and locks the floor plate thickness field while the option is active.

The side plate length is calculated automatically from floor plate thickness, module height (2.5 m) and cover plate thickness, minus a clearance correction:

$$\text{Side plate length} = \text{floor plate thickness} + 2.5\ \text{m} + \text{cover plate thickness} - (\text{clearance correction} / 100)$$

A layout note field allows a free-text note on special geometry or particularities; it is purely documentary.

8. SABA Sealing Mode and Joint Logic

The SABA sealing mode determines the joint length to apply per block connection and per floor/side plate:

- Standard sealing: 12 m per block connection, 8 m per floor and side plate.
- Infiltration with bonding: 2 m per block connection, 2 m per floor and side plate.
- Infiltration without bonding (default): 0 m per block connection, 0 m per floor and side plate.

The cover plate joint uses the same fixed factor of 8 m per plate in all three modes — the selected sealing mode has no effect on the cover plate joint. The “Seal cover plates” toggle switches the cover plate joint fully on or off (when disabled, its joint length is set to 0 m regardless of the sealing mode).

The number of block connections is derived automatically from the raster:

$$\text{Block connections} = (\text{raster length} - 1) \times \text{raster width} + \text{raster length} \times (\text{raster width} - 1)$$

The total joint length is the sum of block connection, floor, side and (if enabled) cover plate joints, with a flat 15% reserve added on top. The result appears in the “SABA joint sealing” table in the Results section (chapter 11), with individual line items, total length, reserve, and total including reserve.

9. Plate Concrete Class and Theoretical Reference Values

For floor, side and cover plates, a choice between concrete classes C40/50 and C80/95 is available. The JUMBO BLOCK module itself is independently and fixedly defined at concrete class C40/50 with vertical columns of 25 × 25 cm.

The “Theoretical reference values” table shows, for both concrete classes, a purely calculated material reference figure under pure compressive load, based on the reference cross-section of the plate (2.49 m edge length) or the module column (0.0625 m²):

$$\text{Reference value (kN)} = (\text{fck [MPa]} \times \text{reference cross-section [mm}^2\text{]}) / 1000$$

The module column reference value is shown only for the concrete class actually used in the module (C40/50); for C80/95 a dash is shown, since that class does not apply to the module column. A clearly visible footnote states: this is a theoretical reference value, not a structural verification.

10. Installation Layout

Shows the calculated raster graphically as a rectangular grid, along with the key figures Blocks, Capacity (storage volume) and Area (footprint), plus raster, module count and real size. This view updates immediately with every recalculation and provides a quick visual check of the proposed or manually adjusted layout.

11. Results

Shows five summary figures first: net storage volume, gross excavation volume, total module weight, total installation weight (modules plus floor, side and cover plates) and — only in target-volume mode — the difference to the target volume (in installation-size mode, 0 is shown here, since no target volume is present):

```
Net storage volume = modules × 13.9 m³
Gross excavation volume = modules × 15.625 m³
Total module weight = modules × 4.205 t
Total installation weight = total module weight + (floor + side + cover plate weight) / 1000
```

A detailed component table lists count, single and total volume, and single and total weight for modules, floor plate, side plate and cover plate (plate weight = volume × 2350 kg/m³ concrete density). Directly below follows the “SABA joint sealing” table from chapter 8.

A highlighted technical notice states: the results serve technical pre-planning, special geometries can be adjusted manually, a project-specific structural verification remains required, and costs are not calculated online.

12. Project Summary and Assessment

A condensed summary of installed modules, total storage volume, installed area and — only in target-volume mode — coverage (total storage volume relative to target volume, in %):

```
Coverage = (net storage volume / target volume) × 100
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From 105% coverage or more, the assessment “The planned JUMBO BLOCK installation fully covers the target volume, based on the calculation.” is shown; below that, “The planned JUMBO BLOCK installation is very close to the target volume. An additional reserve should be reviewed.” In installation-size mode (no target volume present), a neutral notice is shown instead, stating that the figures merely describe the current installation configuration.

13. Print / PDF / Inquiry

The “Print / PDF” button opens a standalone, cleanly formatted report in a new window (bilingual, according to the current interface language), containing project information, planning mode, the complete installation layout, component and joint tables, theoretical reference values, and document information including input and result hashes.

Before the report is generated, a full recalculation is performed automatically. Below the print button is a note to send the planning to mail@jumboblock.de; the project data entered above appears in the print/PDF view.

14. Reset Planning

The “Reset planning” button fully reloads the page. This resets all inputs to the technical factory settings (see chapter 2), and any previously imported data state is lost unless it was exported beforehand. Unlike in HYDRO, there is no field-by-field reset without reloading the page.

15. Language (German/English)

Language switching is handled via the suite's global menu (menue.js) above the tool. PLAN fully switches all labels, notices, info content and the print report between German and English without altering any input values.

16. Data Integrity (SHA-256)

Every exported project.dbm file contains a SHA-256 hash over the entire sorted dataset (excluding the hash fields themselves) — the same procedure as in HYDRO. On import, this hash is checked automatically; the hash status notice shows the current verification state.

The print report (chapter 13) additionally contains a separate input hash and result hash, documenting the state of the planning inputs and the calculated results at the time the report was created.

17. Info Buttons (Contextual Help)

Nearly every input field has a small **ℹ** button next to it. Clicking it opens an overlay window with a precise technical explanation of that specific field — including what it means, whether and how it is calculated automatically, and what effect it has on other tools in the suite (e.g. on the subsequent structural design in STATIC).

The overlay can be closed by clicking outside the window, via the close button, or with the Escape key.

18. Limitations, Notes and Best Practices

- PLAN does not replace structural verification: all results are technical pre-planning; structural design is performed independently in STATIC.
- Costs are not calculated in PLAN; cost estimation happens in BUDGET, based on the installation layout produced here.
- The automatic raster optimisation (chapter 6) targets as square a layout as possible with minimal module surplus — for sites with strongly deviating geometry, manual adjustment (chapter 7) or installation-size mode is usually more appropriate.
- The cover plate joint is always calculated with the same factor (8 m per plate) regardless of the selected SABA sealing mode, as long as “Seal cover plates” is enabled — only the block connection and floor/side plate joints follow the selected mode.
- The theoretical reference values of the plate concrete classes (chapter 9) are purely material reference figures under compressive load, not a structural verification.
- “Reset planning” fully reloads the page — exporting beforehand is recommended if the current state should be preserved.
- Without persistent browser storage, unsaved input is lost when the page is closed or reloaded.

19. Quick Reference of Icons and Buttons

Icon / Button	Meaning
ℹ Info	Opens the technical explanation for the respective field
Import	Reads in a project.dbm file (from HYDRO or PLAN) and checks its hash
Export	Saves the current state as a project.dbm file and recalculates the hash
Planning by target volume	Layout is calculated from an entered retention volume
Planning by installation size	Layout is calculated directly from length and width
manual adjustment	Overrides the automatically calculated value with a custom entry
Symmetric construction	Sets the floor plate thickness automatically equal to the cover plate thickness
Print / PDF	Opens the complete planning report in a new window
Reset planning	Reloads the page and resets all inputs
🔒 Hash status	Current SHA-256 verification status of the project.dbm