

Wall definition QR code

Specification



Computer-readable representation of a single wall in a larger structure (e.g., a building).

Motivation

Allows simple means of transferring single wall definition data between systems, e.g. from a BIM model to the bricklaying robot system. The source of the data could also be a basic building drawing which is converted to those representations during the preparation phase of the construction.

Format

Textual format that supports versioning, future extensions (adding new fields), and simple multi-value fields.

Representation

QR code provides a simple and ubiquitous graphical representation of the textual format. It is easily readable on the construction site using a camera on the tablet that is used to control the bricklaying robot.

It's important to have the QR code sufficiently large to be easily readable and it's also convenient when there are no more than let's say 3 such QR codes on an A4 page so that you can read them by a camera without the need to cover those that you don't want to read.

Textual format details

Example:

```
WBW*1.0*WID:4140*HEI:2501*OP:750-750-1000-1250*OP:2500-750-1000-1250
```

The code starts with a header containing the prefix WBW and version 1.0 separated by an asterisk. After that, there are individual data fields in key:value format, separated from each other by an asterisk. Some fields could be present multiple times if the semantics of that particular field allows it. The value of the field could contain multiple distinct parts (sub-values) separated by a minus character or by a plus character for optional sub-values.

We strongly suggest using only alphanumeric characters (0-9, uppercase letters A-Z, space, characters \$%*+-./: ... see https://en.wikipedia.org/wiki/QR_code#Storage), so that an alphanumeric internal data format is used when generating a QR code. When using other characters, a binary internal data format will be used, resulting in a more detailed QR code, which is more difficult to read.

We also suggest generating a QR code with M redundancy level (15% ... see https://en.wikipedia.org/wiki/QR_code#Error_correction).

Key	Required	N-times	Type	Default	Description
C	no	no	string		customer ID (should contain any unique identifier of the customer, meaning an entity that will receive telemetry data from the bricklaying robots) (would be used in telemetry reporting)
S	no	no	string		site ID (should contain any unique identifier of the construction site in the scope of the customer) (would be used in telemetry reporting)
W	no	no	string	generated GUID	wall ID (should contain any unique identifier of the wall in the scope of the construction site) (would be used in telemetry reporting) (internal always globally unique wall ID for telemetry reporting will be derived from the customer ID, site ID, and wall ID, if all of them are specified; otherwise a generated GUID would be used, different for each loading of the QR code)
DESC	no	no	string		wall description (storey, location, other info)
M	no	no	string		material ID (internal code for material that should be used for the wall) (if you don't know or have the right material code, use the DESC field to describe the material and the operator will select it manually when loading the wall via the QR code)
WID	yes	no	int		width [mm]
HEI	yes	no	int		height [mm]
CUTS	no	no	bool as 1/0	1	use brick cuts (should be 1 for production walls)
STO	no	no	bool as 1/0	0	start with overlap for 1 or with a brick for 0 (should be 0 most of the time)
SST	no	no	bool as 1/0	0	start with stairs (stepped stairs on the left side of the wall)
EST	no	no	bool as 1/0	0	end with stairs (stepped stairs at the right side of the wall)

Key	Required	N-times	Type	Default	Description
OP	no	yes	multi-value 4x integer		opening (e.g., window, door), contains 4 integer sub-values separated by a minus character: - horizontal distance from the start of the wall (which is on the left) to the left side of the opening [mm] - vertical distance from the bottom of the wall to the bottom of the opening [mm] - opening width [mm] - opening height [mm] for multiple openings just use the field multiple times

More examples

WBW*1.0*C:CZ12345678*S:2024-001-ABC*W:A42DDD73-5D51-4E93-9B50-672576FB8A72*DES:1NP,
NORTH SHELL WALL, LEFT

PART*M:PTH30RR*WID:5140*HEI:2501*CUTS:1*STO:0*OP:2000-0-750-2250*OP:3625-1500-500-500

Graphical example



Resulting wall plan

