

Appendix

ArchCAD-400k: A Large-Scale CAD Drawings Dataset and New Baseline for Panoptic Symbol Spotting

1 A More Information About the ArchCAD-400k

2 A.1 Detailed description of categorization

3 In Figure 1, we present some visual examples of content from each category. Engineering symbols
4 from different categories can share great similarity. For example, simple rectangles can represent
5 columns, holes, foundation, or furniture. Similarly, pairs of parallel lines might denote a pipeline,
6 beam, or wall. At the same time, some instances can be drawn in diverse forms. As illustrated in
7 Figure 1, there are at least six different ways to represent a door, and the appearance of stairs can vary
greatly in different scenarios.

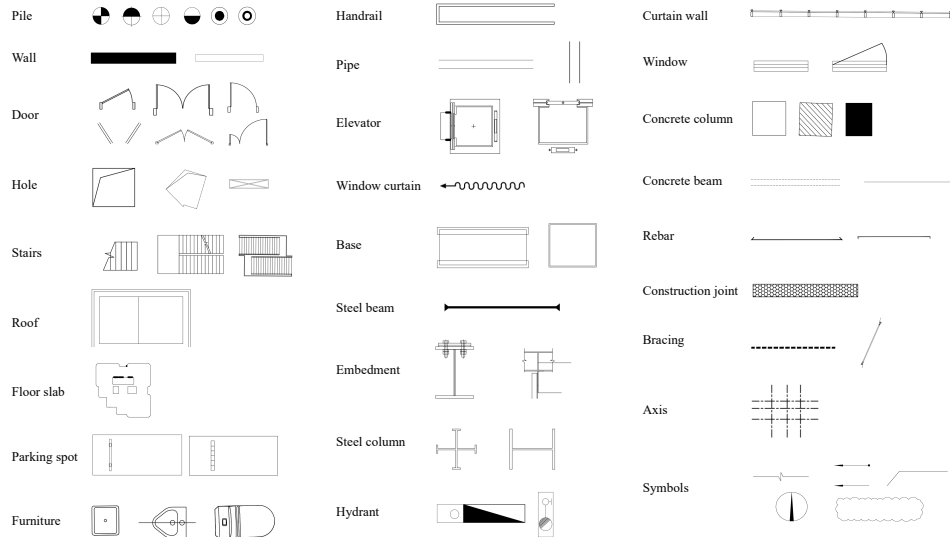


Figure 1: Visual examples of content in each category.

9 A.2 Additional information about the annotation pipeline

10 Our annotation pipeline adopts regex matching to map layer names to semantic classes. The layer
 11 names in standardized drawings have a hierarchical format like [Discipline]-[Category]-[Modifier].
 12 In Table 1, we list part of the standardized naming table for doors, walls, and stairs. Categories can
 be matched through the keyword in the table.

Table 1: Examples of correspondence between layer names and semantics

Semantic label	Standard layer specifications	Content description
Door	A-DOOR	The surface structure of the door.
	A-DOOR-FRAM	The internal steel frame supporting the door.
	A-DOOR-HEAD	The line indicating the position of the door beam.
	A-DOOR-ROLL	The layout or design of the fireproof roller shutter.

Wall	A-WALL-BLOK	Masonry block wall for structural stability.
	A-WALL-CONC	Concrete wall with high strength and fire resistance.
	A-WALL-STUD	Lightweight partition with stud framing and drywall.
	A-WALL-PRHT	Partial-height wall for spatial division.
	A-WALL-SCRN	Metal wall for electromagnetic shielding.
	A-WALL-FINI	Final surface treatment or cladding of a wall.
	A-WALL-INSU	Insulation layer for thermal or acoustic performance.
	A-WALL-TPTN	Partial-height wall for restroom privacy.
	A-WALL-EXPL	Reinforced wall to withstand blast pressures.
	S-WALL-LINE	The outline or framework of a wall in structural drawings.
Stairs	S-WALL-HATCH	Represents the filling or material pattern of a wall in structural drawings.

	A-STRS-TREA	Stepping surface and vertical connector in stair construction.
	A-STRS-ESCL	Mechanical moving stairs for vertical transportation between floors.
	A-STRS-HRAL	Safety rails along stair edges for fall prevention.
...	S-STRS-LINE	Outline representing stair geometry in structural drawings.

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14 **A.3 Additional examples of ArchCAD-400k**

15 An example of well-labeled large architectural drawings exists in the main text. We further show two
16 labeled drawings in our dataset in Figure 2. Each of them covers an area over 8000 m², with various
types of components.

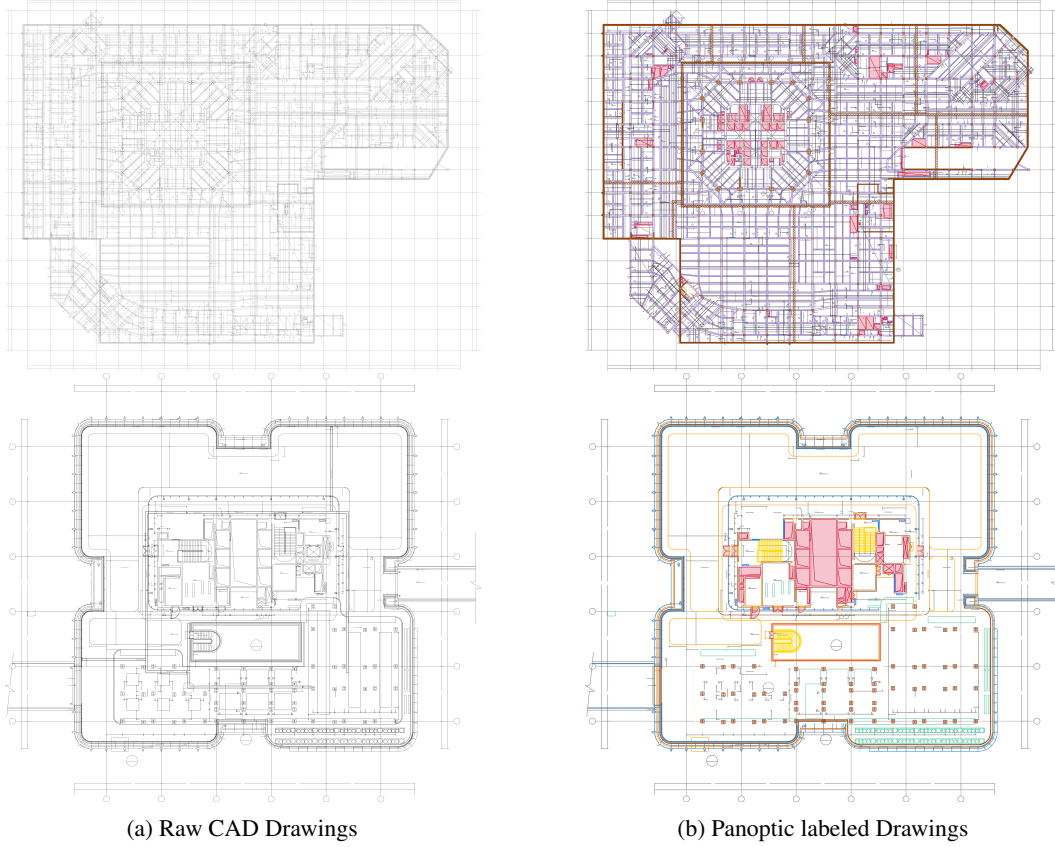


Figure 2: Additional example of the annotated drawings.

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18 B More ablations and evaluations

19 B.1 Additional ablation studies on DPSS

20 To demonstrate the effectiveness of the proposed DPSS, we conducted ablation studies focusing
21 on different encoding strategies. Specifically, we evaluated the impact of using only the primitive
22 encoder, only the image encoder, and the combination of both, as shown in Table 2 (Lines 1–3). The
23 integration of both the image encoder and the primitive encoder yields a 1.3% improvement in PQ
24 compared to using the primitive encoder alone, and a 2.1% gain over using only the image encoder.
25 These results highlight the complementary nature of the two encoding branches. Furthermore, we
26 investigated the role of the adaptive fusion module by replacing it with a simple concatenation strategy
27 for combining image and primitive features, as shown in Table 2 (Lines 3–4). The results show
28 that incorporating our adaptive fusion leads to a significant 3.2% increase in PQ, underscoring its
effectiveness in enhancing feature integration.

Table 2: Ablation experiments on FloorPlanCAD

Primitive Encoder	Image Encoder	Adaptive Fusion	PQ	RQ	SQ
✓			81.7	90.1	90.6
	✓		80.9	89.4	90.6
✓	✓		83.0	90.1	92.1
✓	✓	✓	86.2	93.0	92.6

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30 B.2 Additional Quantitative Evaluations

31 We present the detailed experimental results of various methods on the ArchCAD-400k, including the
 32 panoptic quality (PQ) for each category as well as the mean IoU (Intersection over Union) for each
 33 category. The IoU for each category is obtained by calculating the intersection over union between
 34 the predicted panoptic segmentation masks and the ground truth masks. Different methods excel
 35 at handling different types of objects, DPSS achieves higher PQ and IoU metrics. For the current
 36 spotting results, there is still significant room for improvement.

Table 3: Quantitative results for panoptic symbol spotting of each category on ArchCAD-400k

class	DPSS		CADTransformer [1]		SymPoint [2]		SymPointV2 [3]	
	IoU	PQ	IoU	PQ	IoU	PQ	IoU	PQ
symbol	84.4	89.8	62.4	70.7	76.4	80.9	74.2	79.3
axis	90.8	85.4	23.2	32.9	58.3	56.2	71.8	83.7
door	64.4	75.9	53.2	64.9	63.9	75.6	82.6	79.1
floor slab	40.8	85.6	14.4	80.3	20.9	82.8	47.7	69.4
elevator	45.6	77.6	26.5	63.9	54.6	73.3	28.0	69.2
stairs	60.4	65.4	35.3	45.2	41.3	55.4	43.7	78.0
furniture	72.5	88.7	66.5	73.3	63.2	83.9	43.4	54.0
hole	61.1	70.2	32.1	40.0	59.6	53.8	50.2	60.7
window	47.8	57.2	52.4	55.0	64.7	68.4	57.8	70.8
curtain wall	65.9	83.7	48.8	61.4	50.3	72.6	33.9	39.1
wall	73.4	75.6	39.1	45.9	52.7	57.7	42.3	70.7
concrete column	65.8	83.6	59.5	66.8	64.4	71.6	63.9	69.8
steel column	48.6	80.3	50.7	71.8	52.9	82.8	51.1	79.2
concrete beam	81.8	81.7	43.8	45.0	61.5	62.1	48.3	77.9
steel beam	79.1	73.0	19.7	34.9	47.5	52.2	71.5	77.4
parking spot	66.8	73.2	57.9	76.9	46.0	79.3	72.1	69.0
roof	3.5	28.7	3.7	39.1	5.7	50.1	55.6	76.1
base	85.0	90.3	65.8	75.2	71.2	83.1	16.3	21.3
bracing	19.6	33.8	7.8	20.0	20.2	23.2	67.6	81.1
rebar	72.7	93.1	39.4	69.4	56.5	81.1	53.5	75.9
equipment	37.2	45.8	1.0	7.0	30.8	31.8	28.4	29.1
handrail	73.6	65.9	31.2	31.0	40.2	42.7	70.3	85.8
pipe	44.4	48.3	32.9	34.4	51.7	41.7	52.5	42.4
window curtain	50.4	80.3	58.6	72.1	49.2	67.7	46.3	47.5
construction joint	0.0	5.3	0.0	0.3	2.5	4.8	4.1	3.7
embedment	0.0	0.0	0.0	0.0	0.0	0.0	1.2	2.8
hydrant	70.7	71.7	68.6	64.5	74.1	69.4	49.5	34.0
overall	70.6	67.04	47.6	49.1	60.5	59.1	60.0	60.8

37 **B.3 Additional Qualitative Evaluations**

38 Qualitative results on FloorPlanCAD [1] are shown in Figure 3, DPSS performs better despite the
noise of the filler graphics and overlaps between instances.

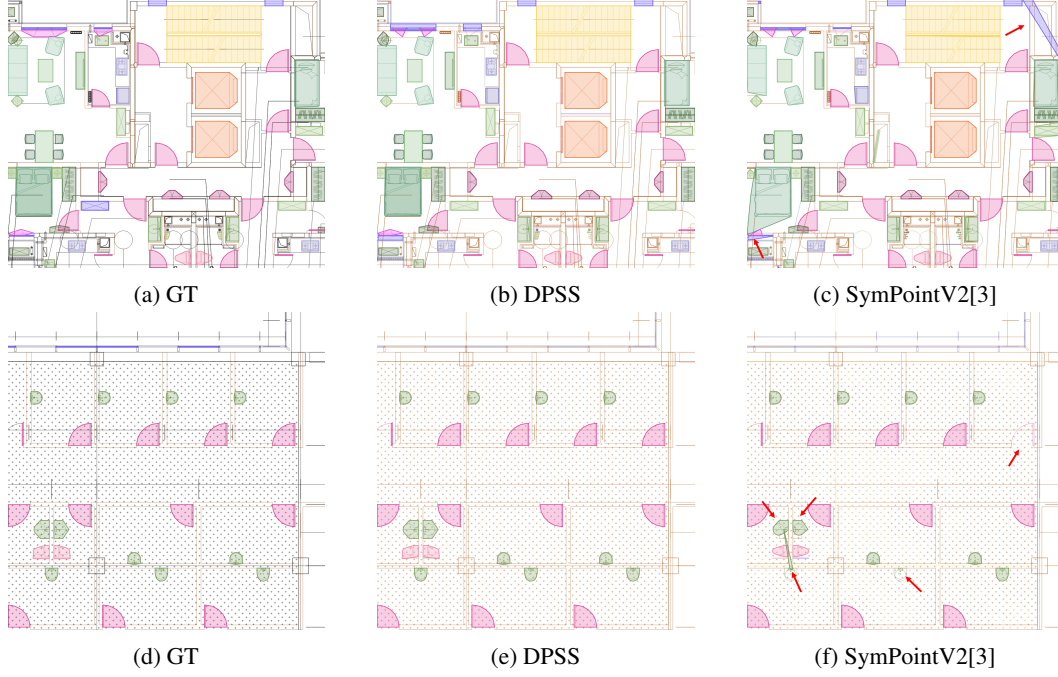


Figure 3: Additional qualitative comparison between DPSS and SymPointV2 on ArchCAD-400k. (a) and (d): Panoptic annotations. (b) and (e): Results from DPSS. (c) and (f): Results from SymPointV2.

40 C Limitations and Future Work

41 Although the proposed DPSS demonstrates strong performance on the panoptic symbol spotting task,
42 some limitations remain. Notably, the current approach cannot process an entire vector drawing in a
43 single pass, which leads to high computational overhead. With the availability of the ArchCAD-400k
44 dataset, more complex and comprehensive research questions related to panoptic symbol spotting
45 and the analysis of engineering line drawings can be explored. For example, future directions include
46 the pre-trained models tailored for CAD vector graphics, and efficient inference strategies to handle
47 large scale real-world drawings.

48 References

- 49 [1] Zhiwen Fan, Lingjie Zhu, Honghua Li, Xiaohao Chen, Siyu Zhu, and Ping Tan. Floorplancad: A
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53 symbol spotting via point-based representation. *arXiv preprint arXiv:2401.10556*, 2024.
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