

# SAM Enhanced Comparison Report - 15\_18

## IOU Metrics Definitions

**IOU (Intersection over Union):** Measures overlap quality between two objects.

- IOU = 1.0 = Perfect match (100% overlap)
- IOU = 0.5 = Good match (50% overlap)
- IOU = 0.0 = No overlap

**Match Criteria:** Objects are considered "matched" if  $\text{IOU} \geq 0.5$

**Manual Match Rate (Recall):** How many manual objects SAM successfully found

- High rate = SAM finds most of your manual annotations
- Low rate = SAM misses many objects you can see

**SAM Match Rate (Precision):** How many SAM detections are valid

- High rate = Most SAM detections are correct
- Low rate = SAM has many false positives

**Mean IOU:** Average overlap quality when matches occur

- High mean IOU = Accurate segmentation boundaries
- Low mean IOU = Poor boundary alignment even when objects match

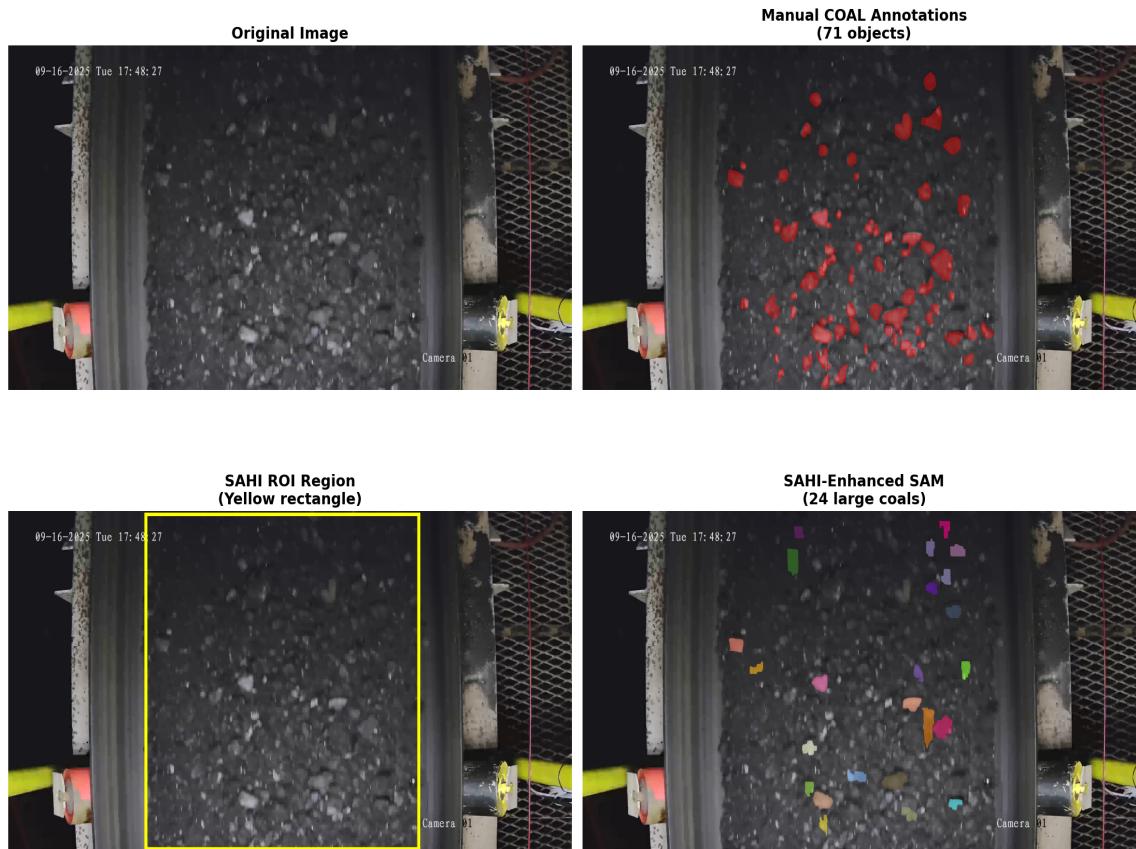
## IOU Summary Statistics

Metric	Value	Definition
Total Images Processed	9	Number of images with valid IOU calculations
Mean IOU	0.232	Average Intersection over Union across all images
Max IOU	0.401	Highest IOU value achieved in any single match
Avg Manual Objects per Image	52.1	Average number of manually annotated COAL objects per image
Avg SAM Objects per Image	34.0	Average number of SAM-detected objects per image
Total Manual Objects	469	Total count of manually annotated COAL objects across all images
Total SAM Objects	306	Total count of SAM-detected objects across all images
Matched Manual Objects	135	Number of manual objects that have $\text{IOU} > 0.5$ with SAM objects
Matched SAM Objects	136	Number of SAM objects that have $\text{IOU} > 0.5$ with manual objects

Manual Match Rate	28.8%	Percentage of manual objects with IOU $\geq 0.5$ (recall metric)
SAM Match Rate	44.4%	Percentage of SAM objects with IOU $\geq 0.5$ (precision metric)

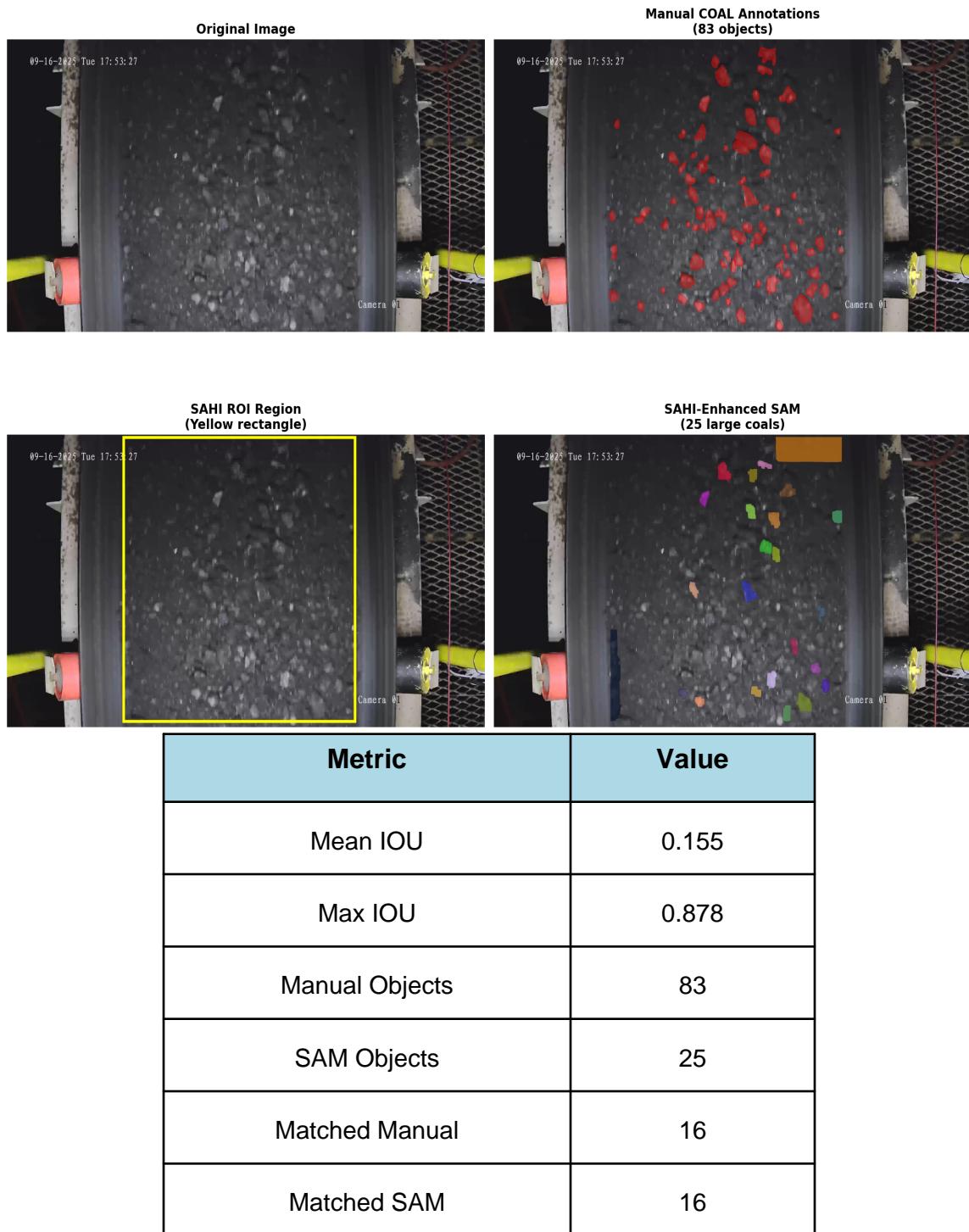
## Detailed Results by Image

*Image: D2\_20250916173826\_20250916180414\_frame\_0002*

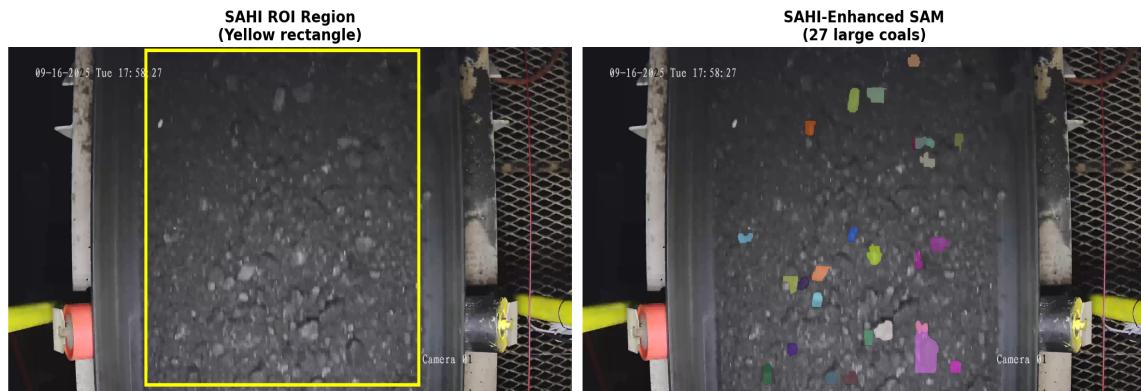
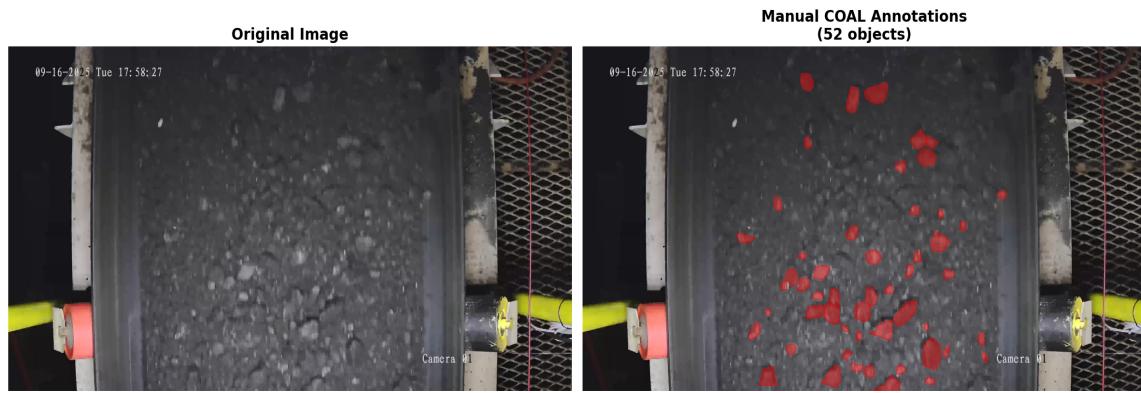


Metric	Value
Mean IOU	0.144
Max IOU	0.849
Manual Objects	71
SAM Objects	24
Matched Manual	13
Matched SAM	13

**Image: D2\_20250916173826\_20250916180414\_frame\_0003**

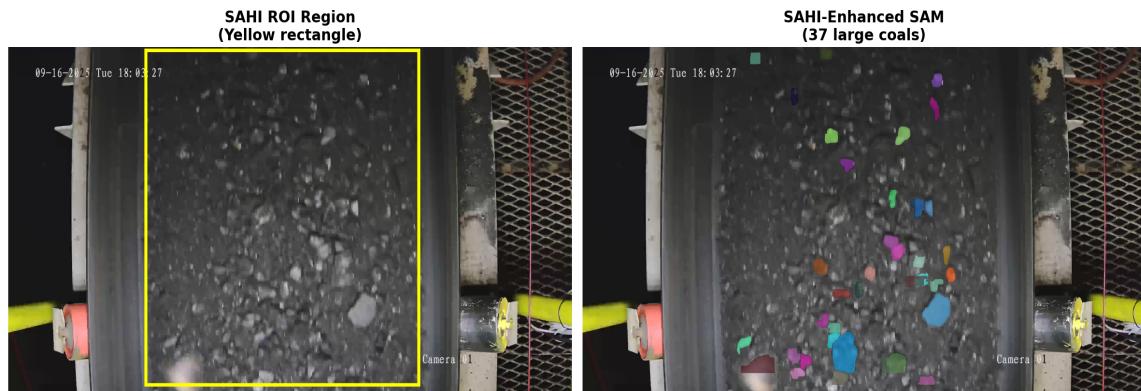
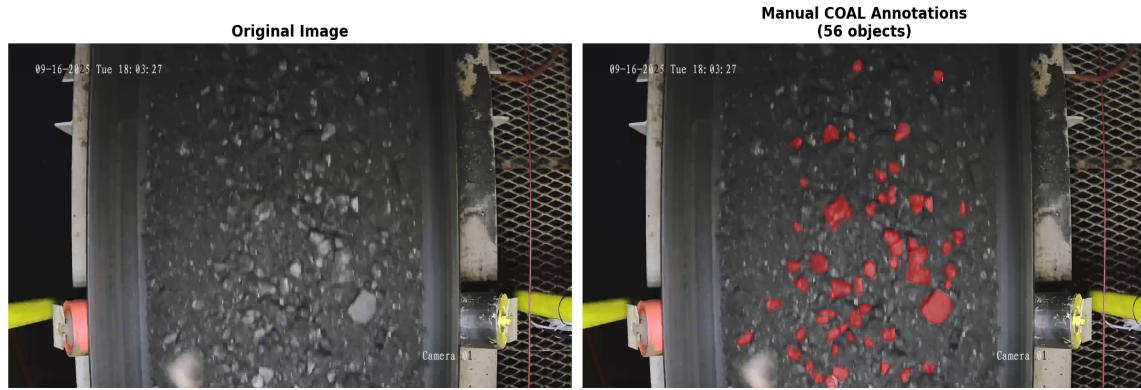


**Image: D2\_20250916173826\_20250916180414\_frame\_0004**



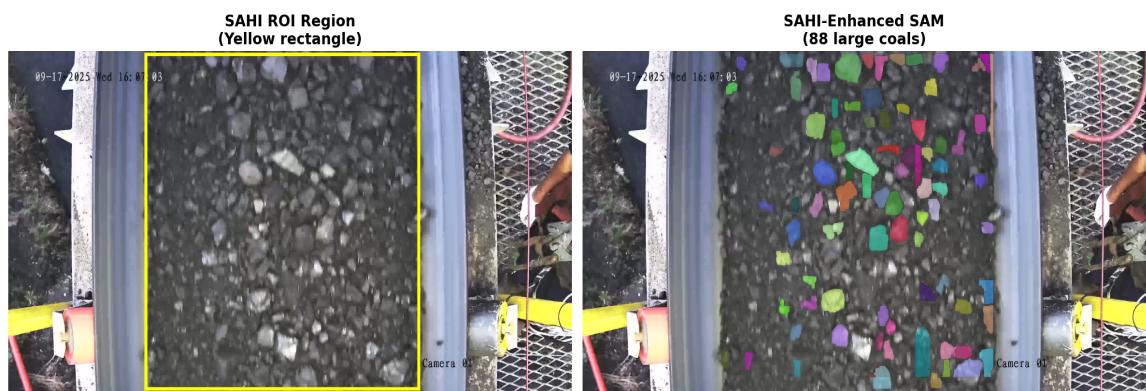
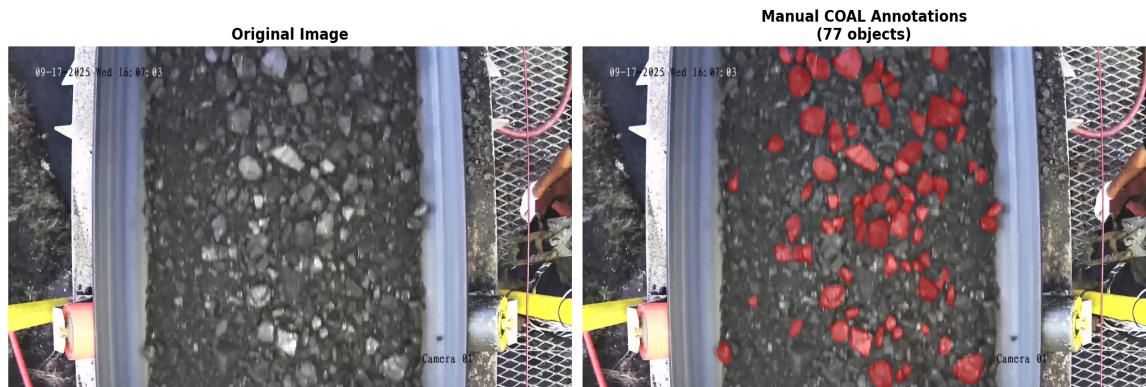
Metric	Value
Mean IOU	0.229
Max IOU	0.838
Manual Objects	52
SAM Objects	27
Matched Manual	15
Matched SAM	15

*Image: D2\_20250916173826\_20250916180414\_frame\_0005*



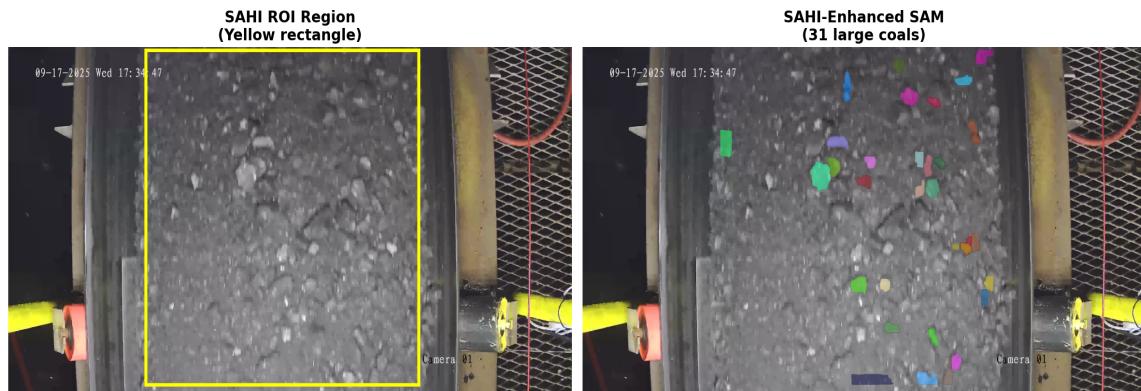
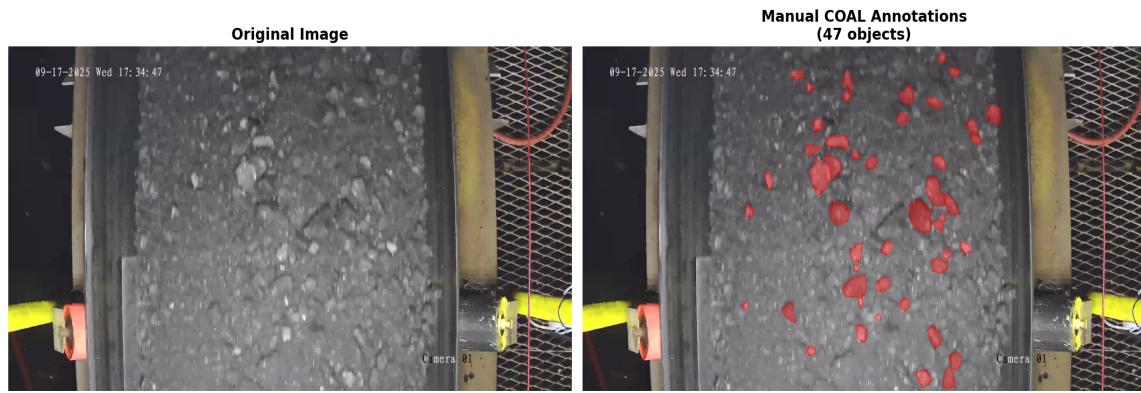
Metric	Value
Mean IOU	0.257
Max IOU	0.863
Manual Objects	56
SAM Objects	37
Matched Manual	17
Matched SAM	17

*Image: D2\_20250917155705\_20250917162522\_frame\_0002*



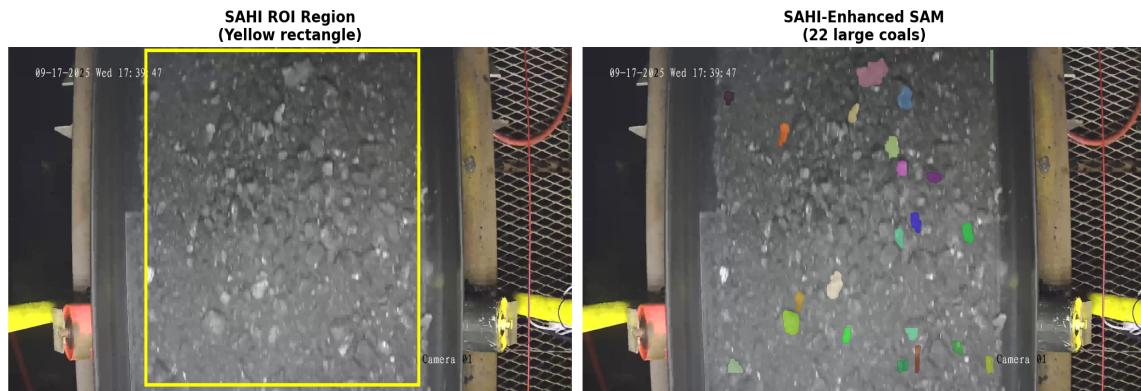
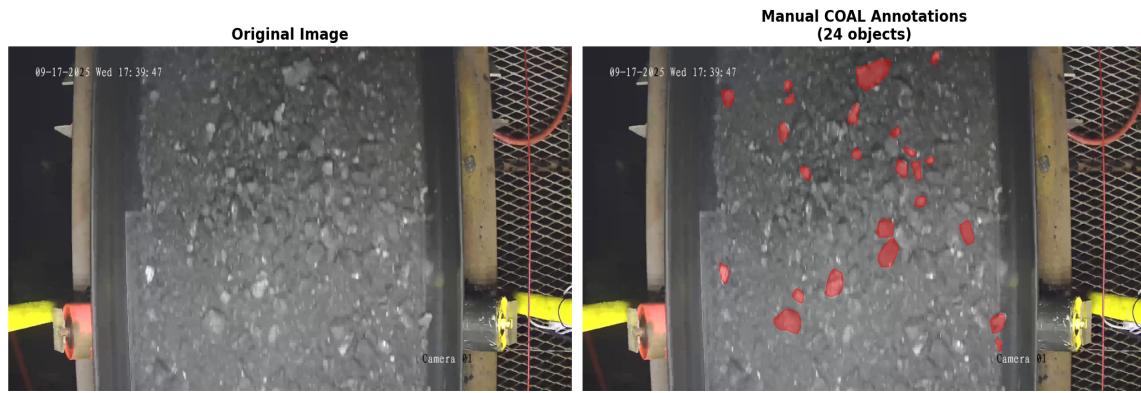
Metric	Value
Mean IOU	0.401
Max IOU	0.892
Manual Objects	77
SAM Objects	88
Matched Manual	36
Matched SAM	36

*Image: D2\_20250917172948\_20250917174619\_frame\_0001*



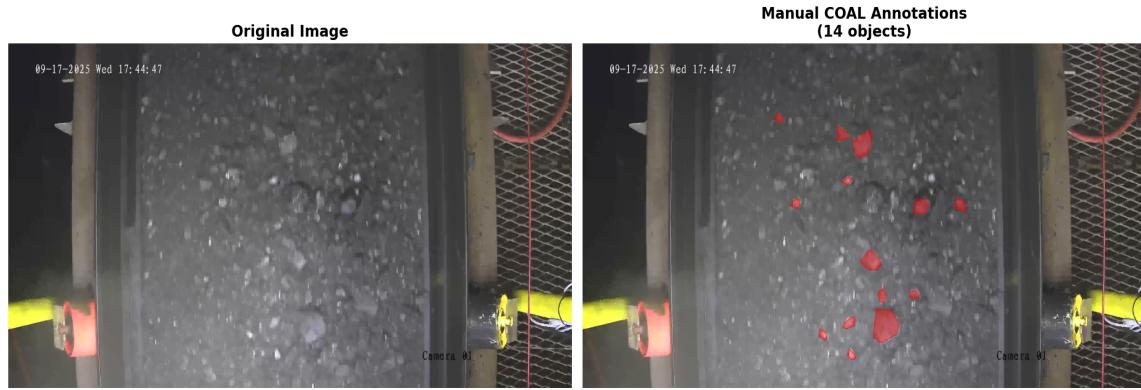
Metric	Value
Mean IOU	0.248
Max IOU	0.862
Manual Objects	47
SAM Objects	31
Matched Manual	15
Matched SAM	16

*Image: D2\_20250917172948\_20250917174619\_frame\_0002*



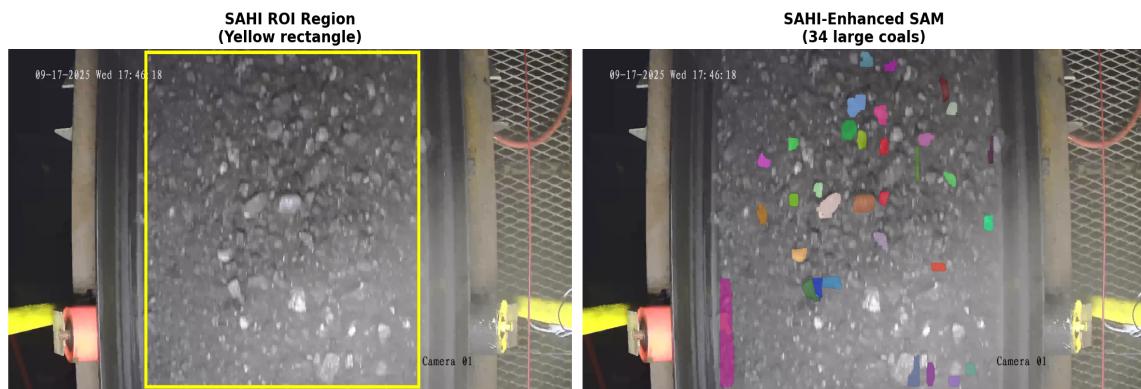
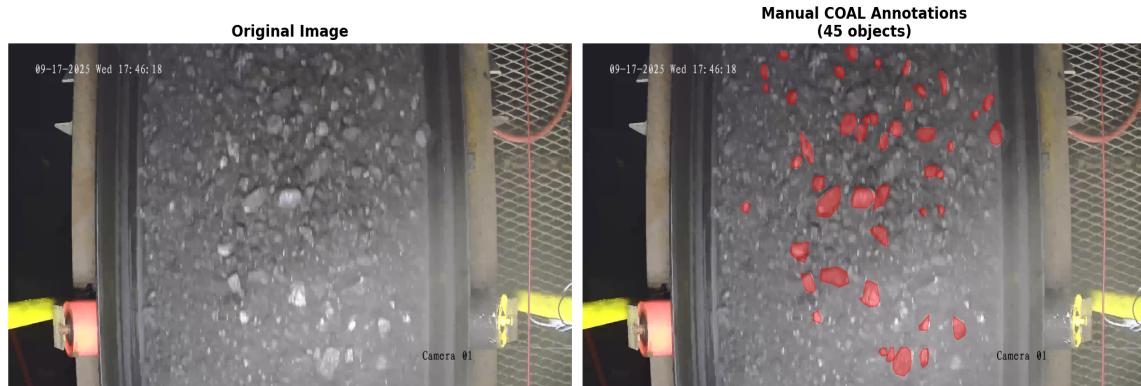
Metric	Value
Mean IOU	0.265
Max IOU	0.816
Manual Objects	24
SAM Objects	22
Matched Manual	8
Matched SAM	8

*Image: D2\_20250917172948\_20250917174619\_frame\_0003*



Metric	Value
Mean IOU	0.182
Max IOU	0.730
Manual Objects	14
SAM Objects	18
Matched Manual	3
Matched SAM	3

*Image: D2\_20250917174619\_20250917181530\_frame\_0000*



Metric	Value
Mean IOU	0.202
Max IOU	0.820
Manual Objects	45
SAM Objects	34
Matched Manual	12
Matched SAM	12