

SAM Enhanced Comparison Report - 18_5

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

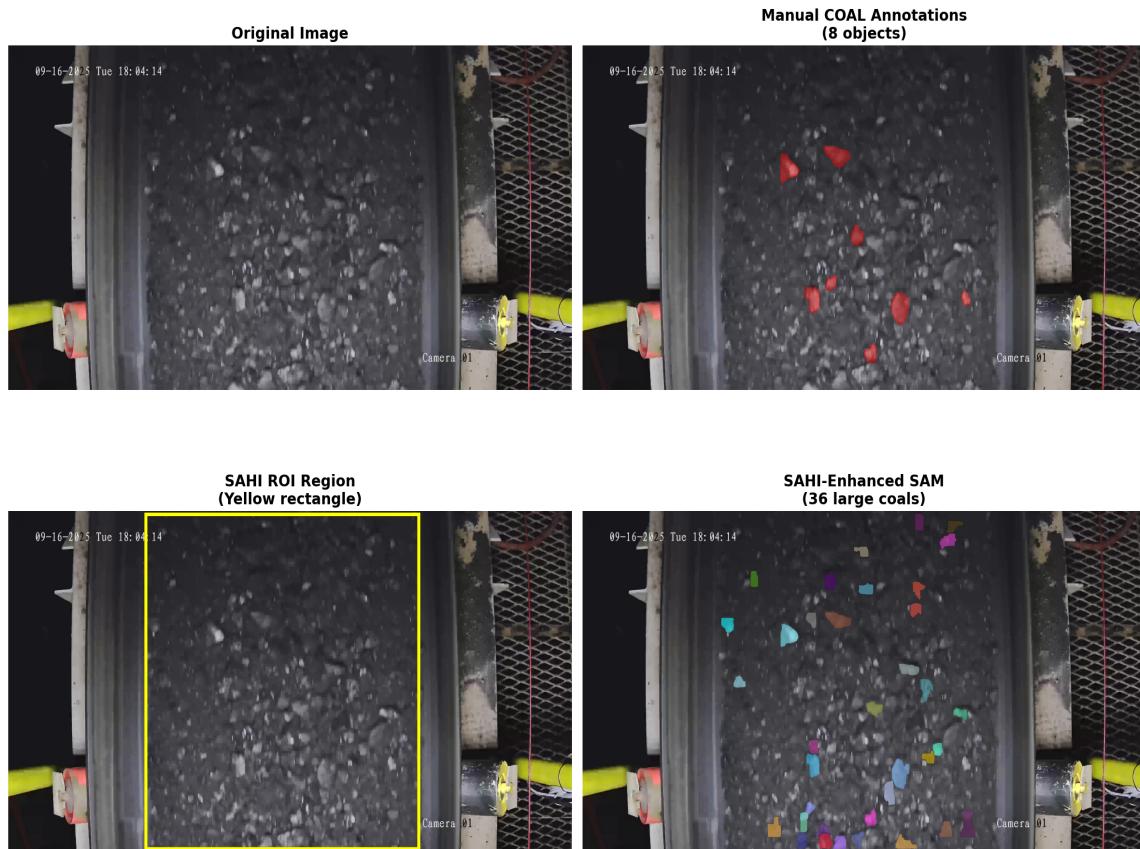
IOU Summary Statistics

Metric	Value	Definition
Total Images Processed	21	Number of images with valid IOU calculations
Mean IOU	0.607	Average Intersection over Union across all images
Max IOU	0.847	Highest IOU value achieved in any single match
Avg Manual Objects per Image	5.4	Average number of manually annotated COAL objects per image
Avg SAM Objects per Image	29.4	Average number of SAM-detected objects per image
Total Manual Objects	114	Total count of manually annotated COAL objects across all images
Total SAM Objects	617	Total count of SAM-detected objects across all images
Matched Manual Objects	84	Number of manual objects that have $\text{IOU} > 0.5$ with SAM objects
Matched SAM Objects	84	Number of SAM objects that have $\text{IOU} > 0.5$ with manual objects

Manual Match Rate	73.7%	Percentage of manual objects with IOU ≥ 0.5 (recall metric)
SAM Match Rate	13.6%	Percentage of SAM objects with IOU ≥ 0.5 (precision metric)

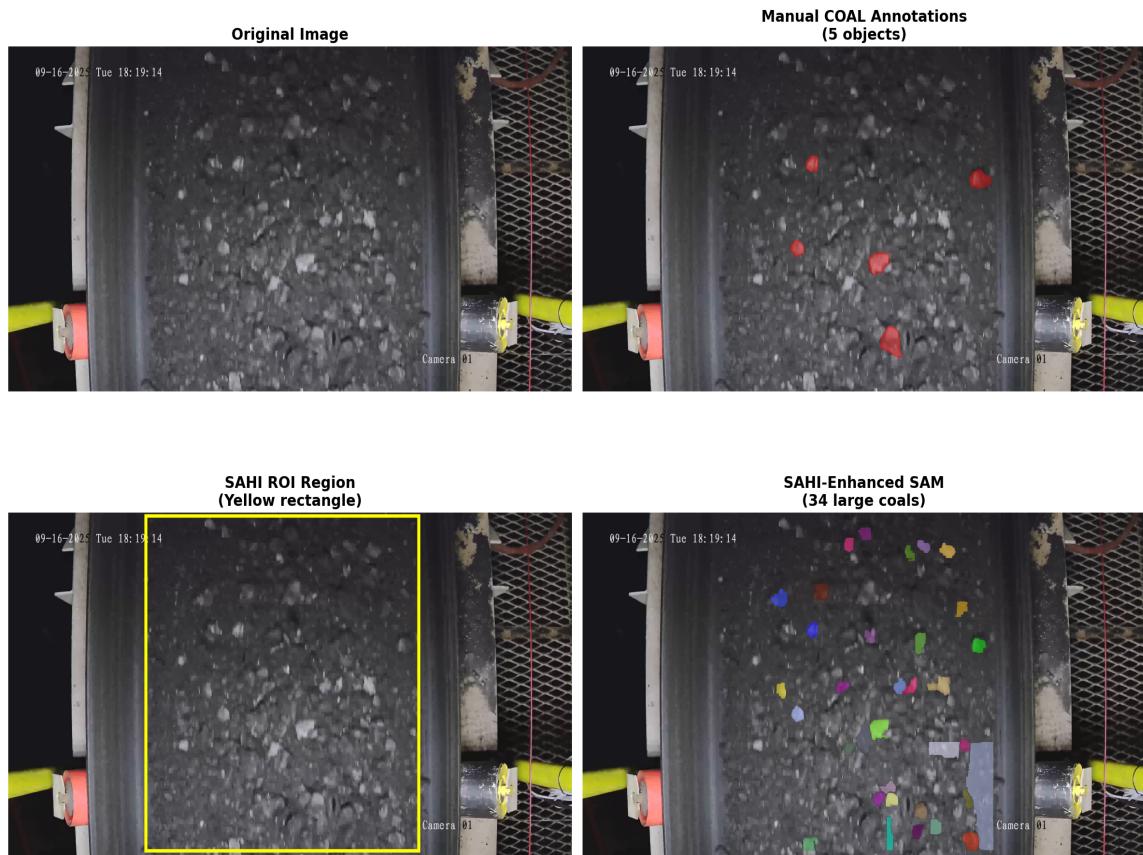
Detailed Results by Image

Image: D2_20250916180414_20250916182733_frame_0000



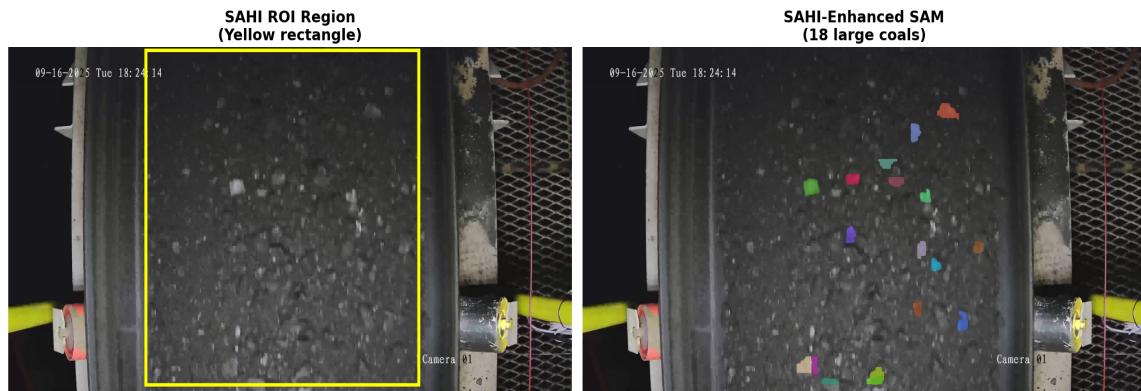
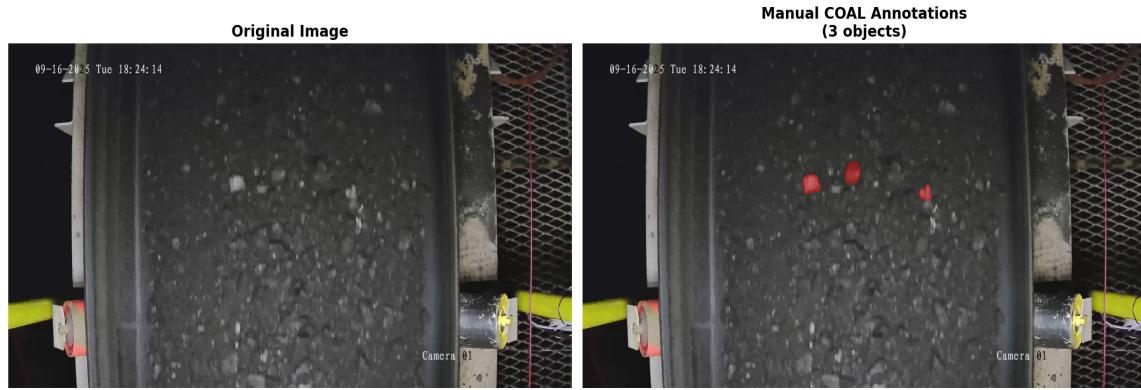
Metric	Value
Mean IOU	0.512
Max IOU	0.861
Manual Objects	8
SAM Objects	36
Matched Manual	5
Matched SAM	5

Image: D2_20250916180414_20250916182733_frame_0003



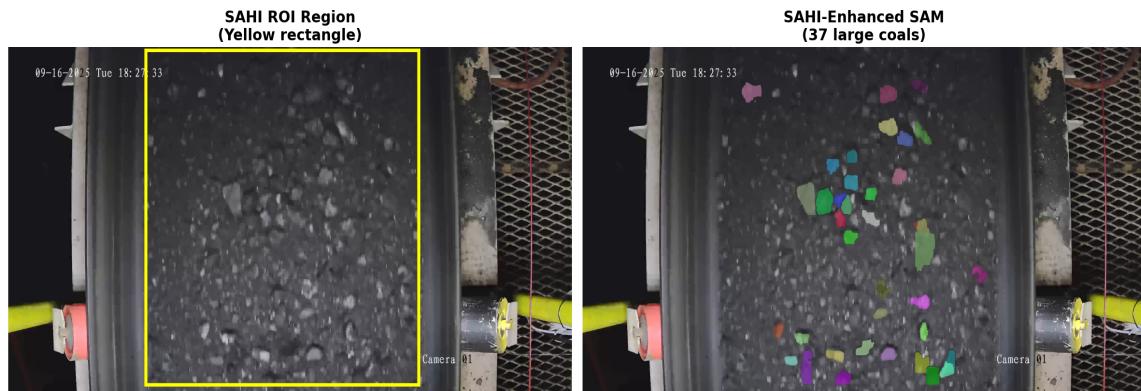
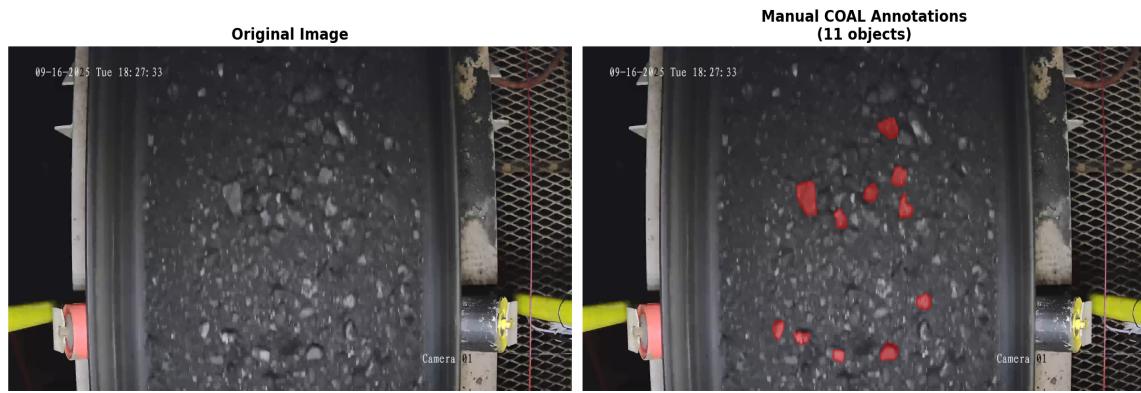
Metric	Value
Mean IOU	0.704
Max IOU	0.894
Manual Objects	5
SAM Objects	34
Matched Manual	4
Matched SAM	4

Image: D2_20250916180414_20250916182733_frame_0004



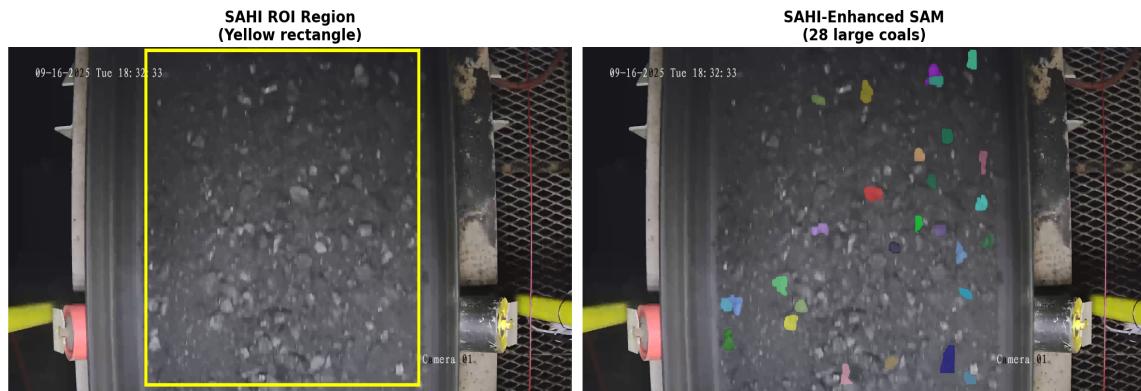
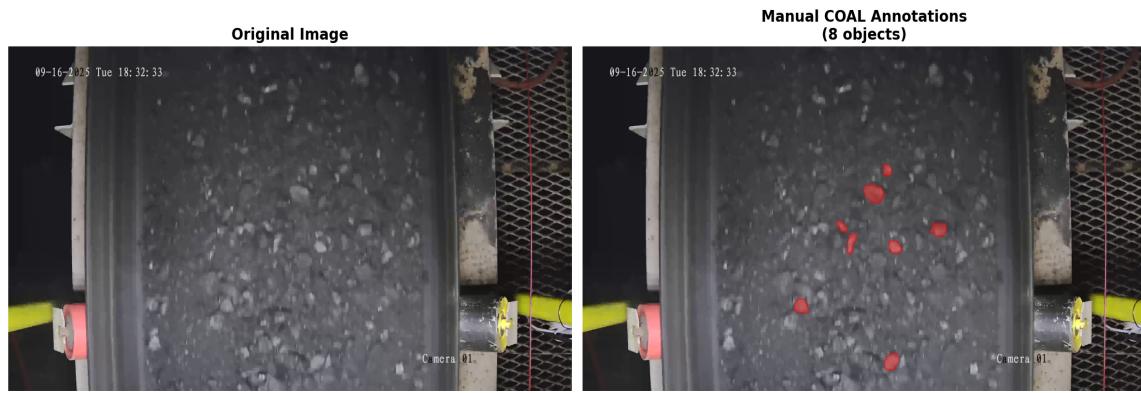
Metric	Value
Mean IOU	0.755
Max IOU	0.890
Manual Objects	3
SAM Objects	18
Matched Manual	3
Matched SAM	3

Image: D2_20250916182733_20250916184749_frame_0000



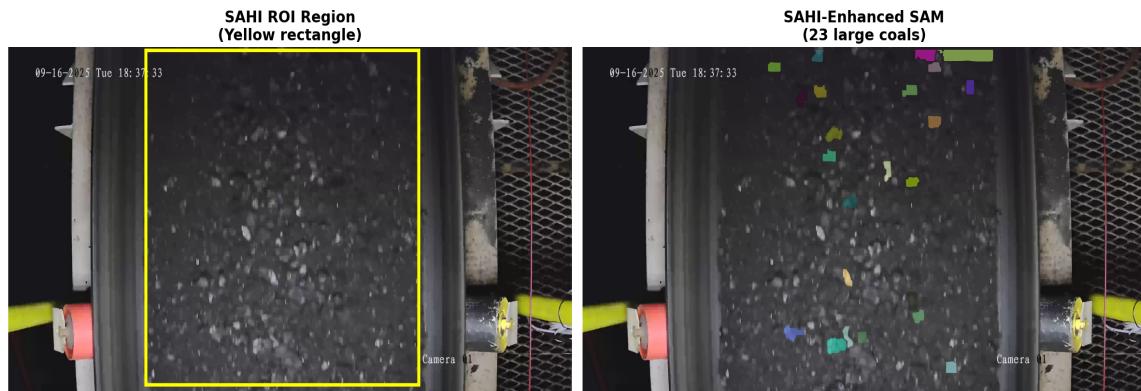
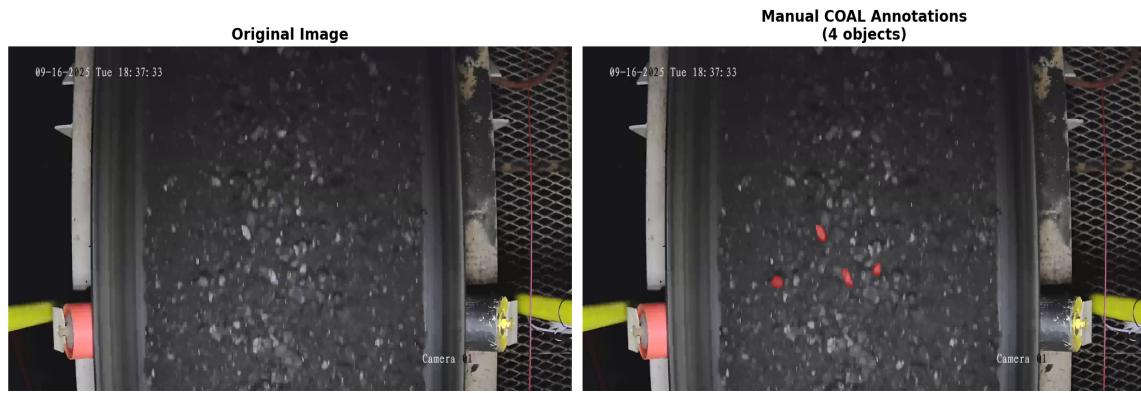
Metric	Value
Mean IOU	0.682
Max IOU	0.862
Manual Objects	11
SAM Objects	37
Matched Manual	10
Matched SAM	10

Image: D2_20250916182733_20250916184749_frame_0001



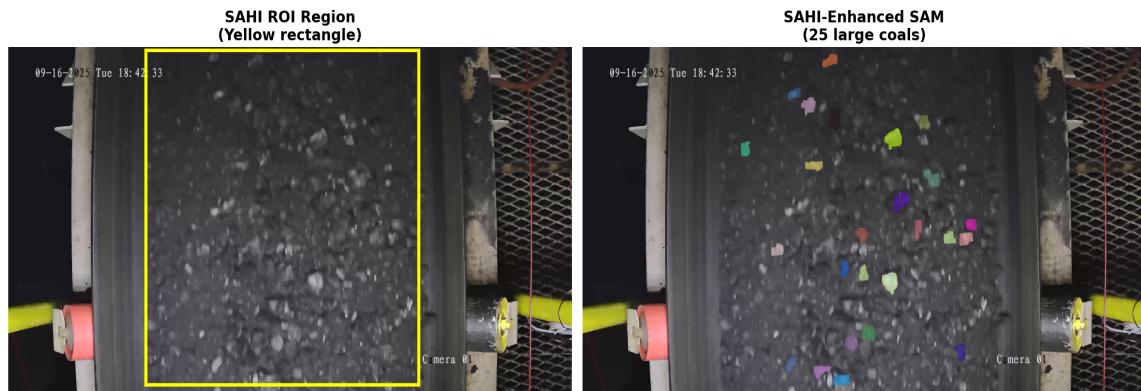
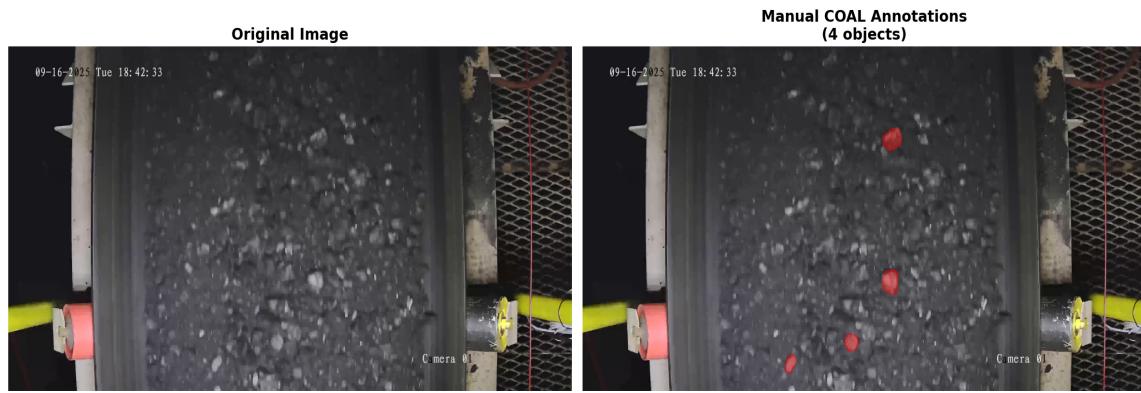
Metric	Value
Mean IOU	0.476
Max IOU	0.809
Manual Objects	8
SAM Objects	28
Matched Manual	5
Matched SAM	5

Image: D2_20250916182733_20250916184749_frame_0002



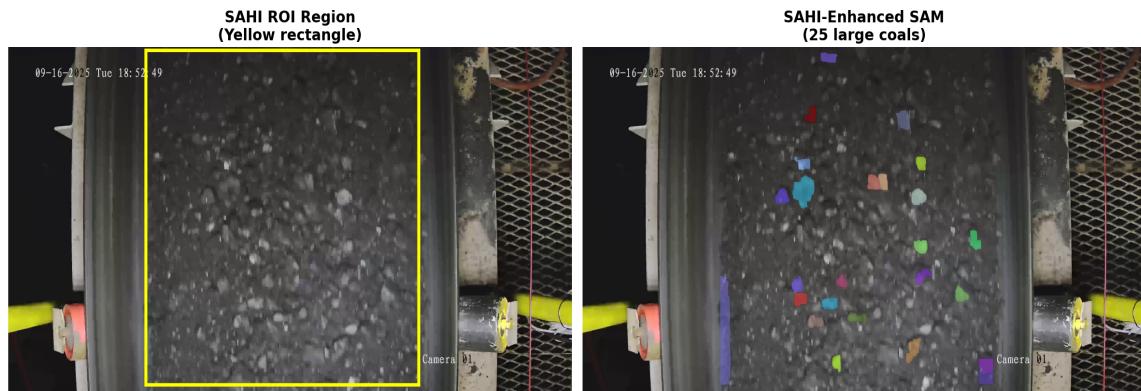
Metric	Value
Mean IOU	0.224
Max IOU	0.896
Manual Objects	4
SAM Objects	23
Matched Manual	1
Matched SAM	1

Image: D2_20250916182733_20250916184749_frame_0003



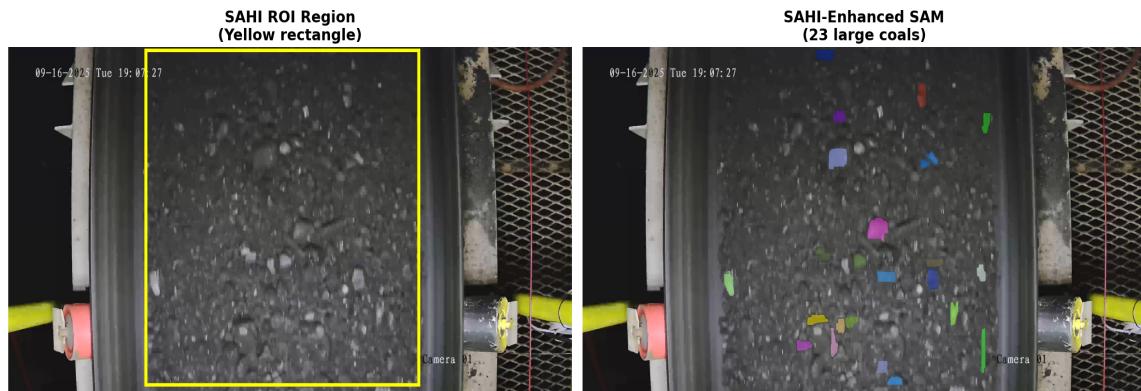
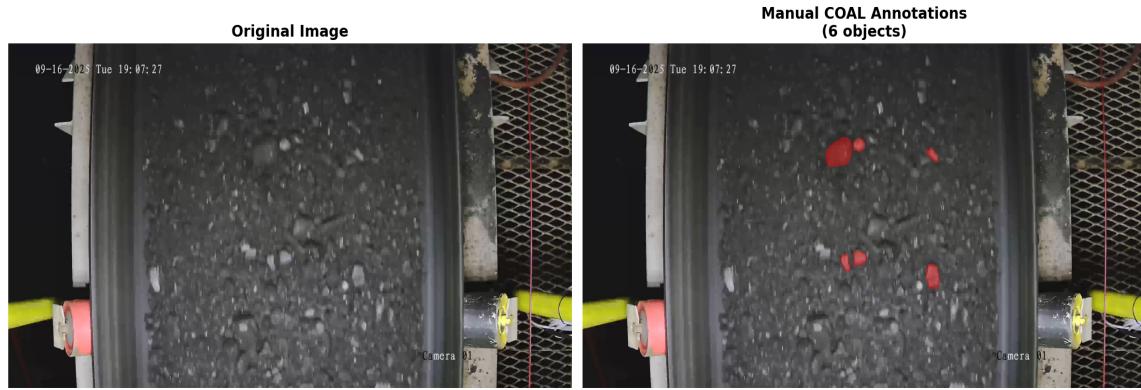
Metric	Value
Mean IOU	0.797
Max IOU	0.871
Manual Objects	4
SAM Objects	25
Matched Manual	4
Matched SAM	4

Image: D2_20250916184749_20250916190727_frame_0001



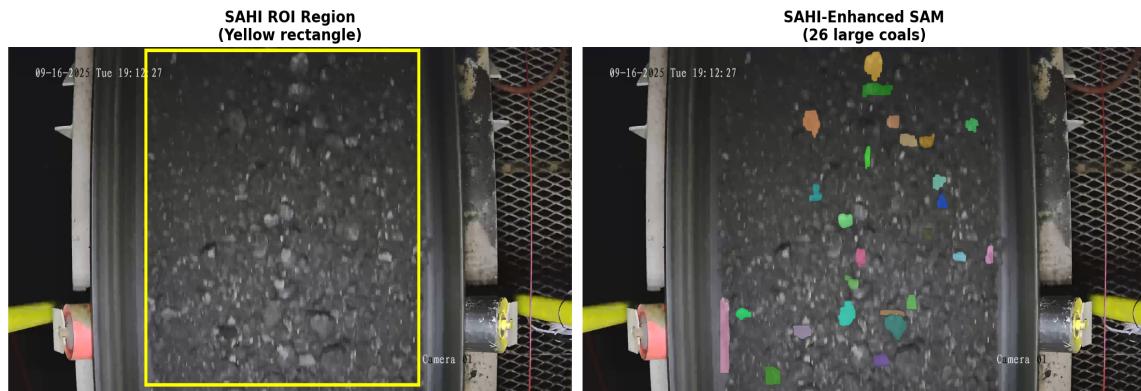
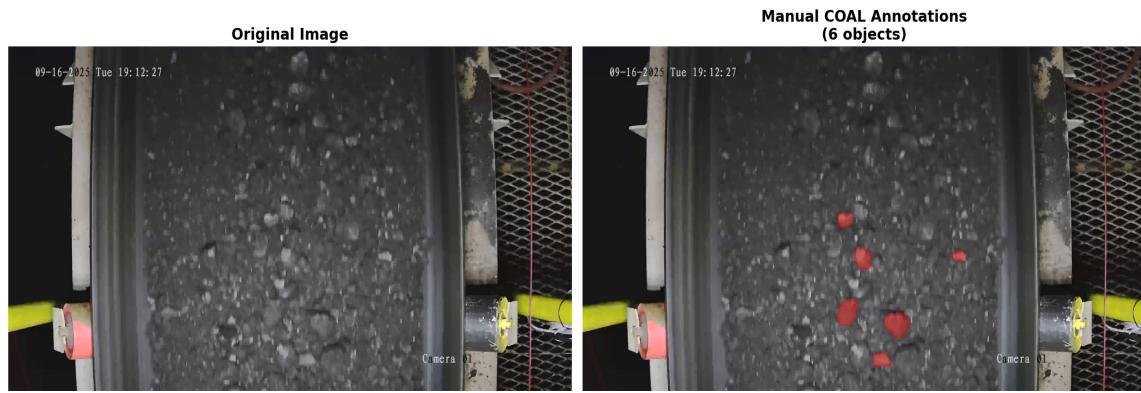
Metric	Value
Mean IOU	0.541
Max IOU	0.874
Manual Objects	6
SAM Objects	25
Matched Manual	4
Matched SAM	4

Image: D2_20250916190727_20250916192924_frame_0000



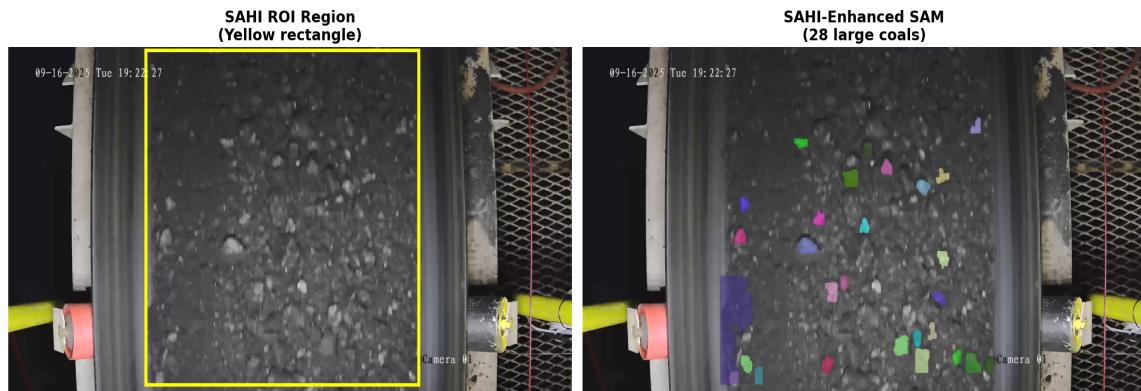
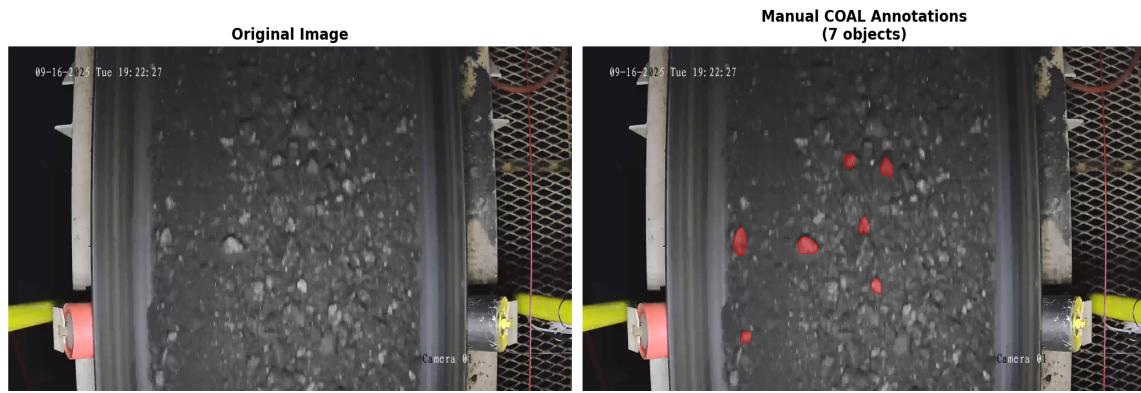
Metric	Value
Mean IOU	0.469
Max IOU	0.883
Manual Objects	6
SAM Objects	23
Matched Manual	3
Matched SAM	3

Image: D2_20250916190727_20250916192924_frame_0001



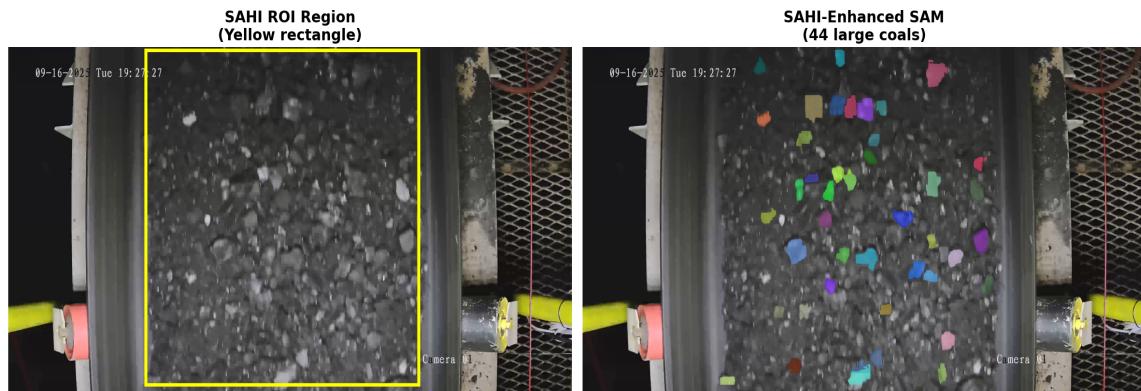
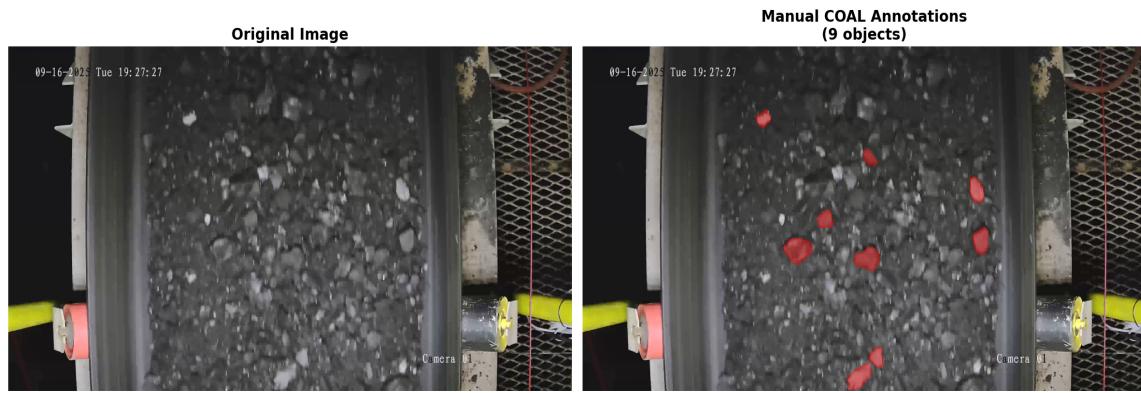
Metric	Value
Mean IOU	0.804
Max IOU	0.907
Manual Objects	6
SAM Objects	26
Matched Manual	6
Matched SAM	6

Image: D2_20250916190727_20250916192924_frame_0003



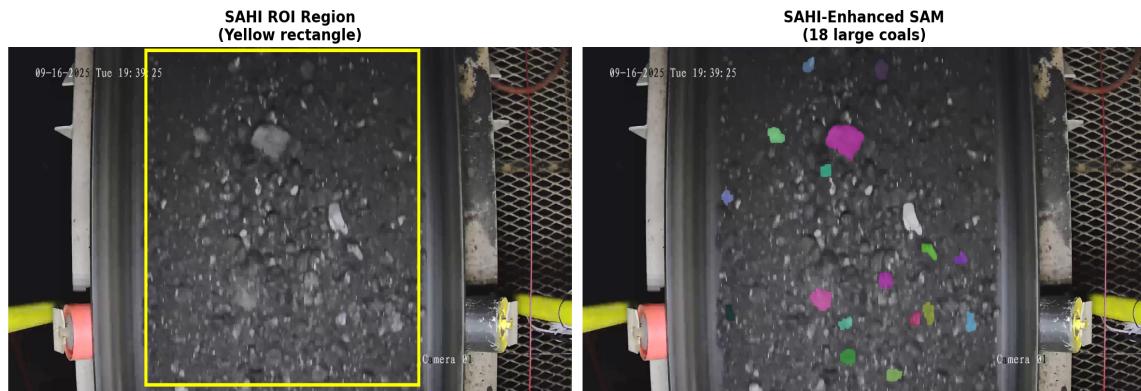
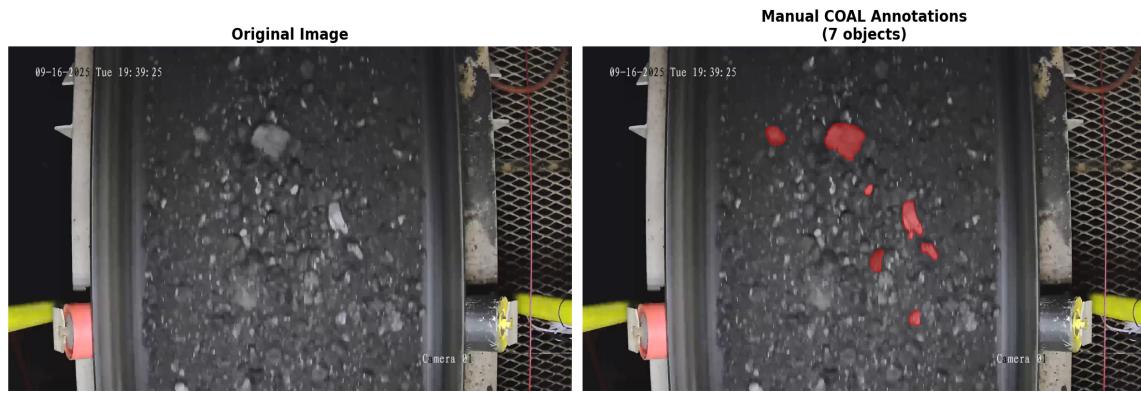
Metric	Value
Mean IOU	0.448
Max IOU	0.915
Manual Objects	7
SAM Objects	28
Matched Manual	4
Matched SAM	4

Image: D2_20250916190727_20250916192924_frame_0004



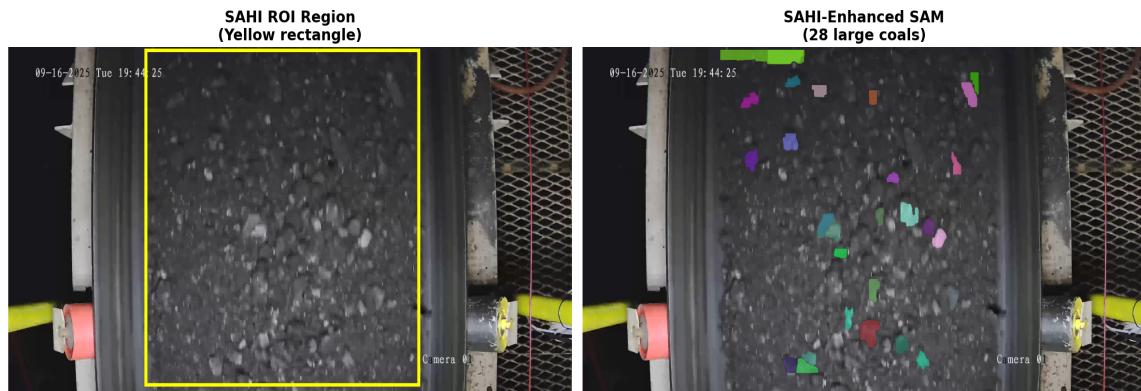
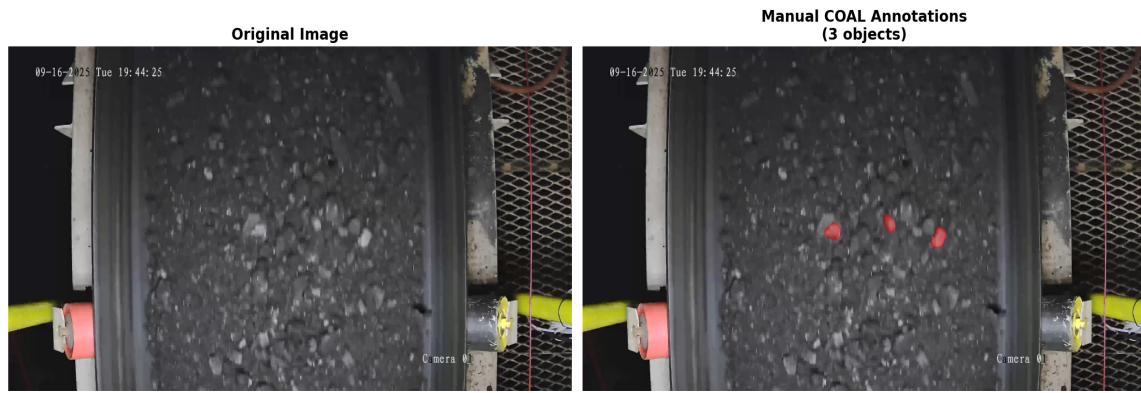
Metric	Value
Mean IOU	0.804
Max IOU	0.870
Manual Objects	9
SAM Objects	44
Matched Manual	9
Matched SAM	9

Image: D2_20250916192924_20250916194832_frame_0002



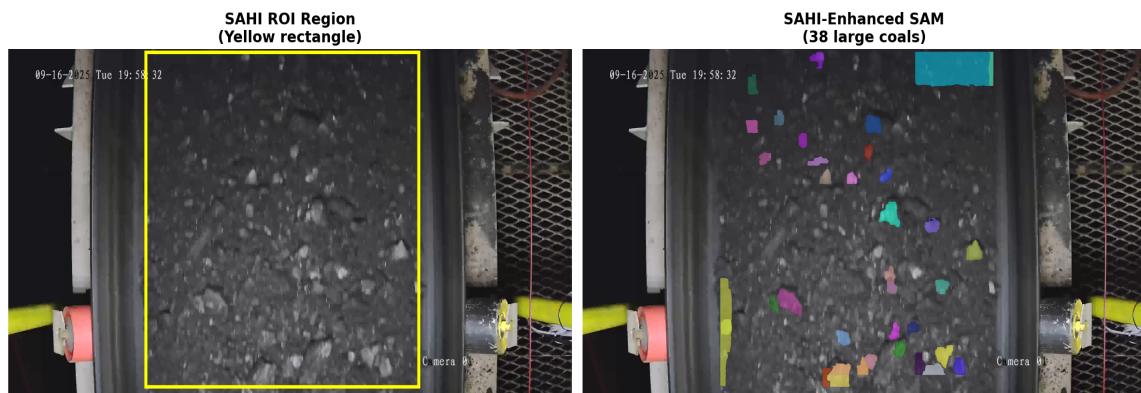
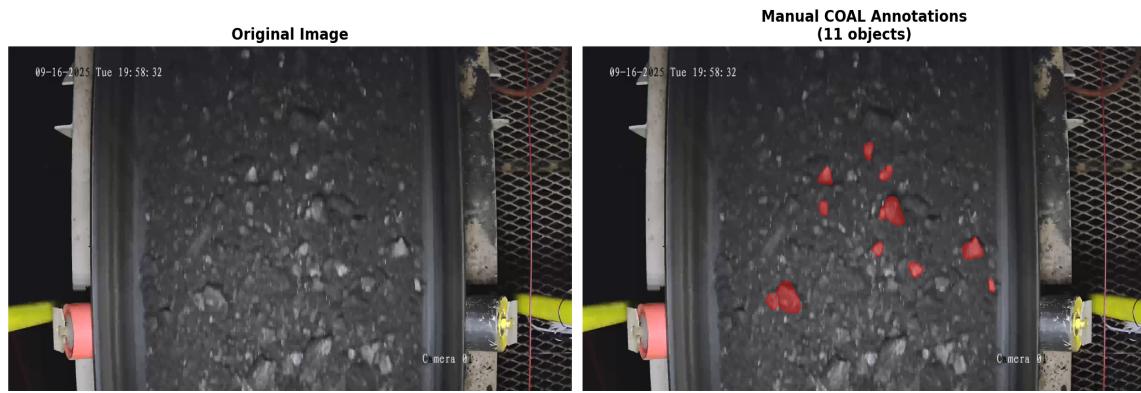
Metric	Value
Mean IOU	0.595
Max IOU	0.891
Manual Objects	7
SAM Objects	18
Matched Manual	5
Matched SAM	5

Image: D2_20250916192924_20250916194832_frame_0003



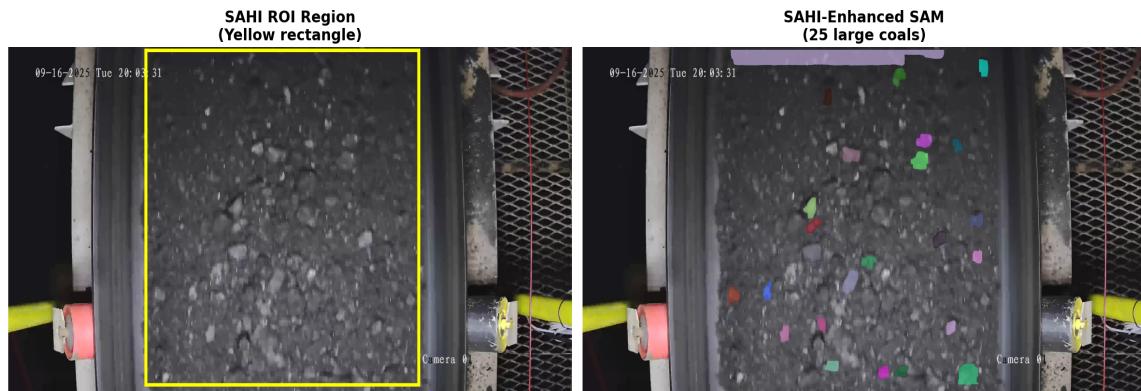
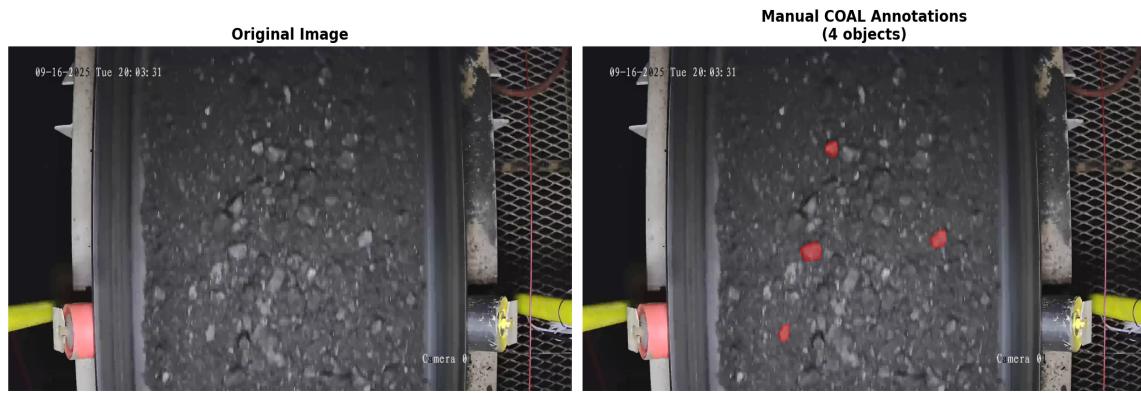
Metric	Value
Mean IOU	0.426
Max IOU	0.880
Manual Objects	3
SAM Objects	28
Matched Manual	1
Matched SAM	1

Image: D2_20250916194832_20250916200914_frame_0002



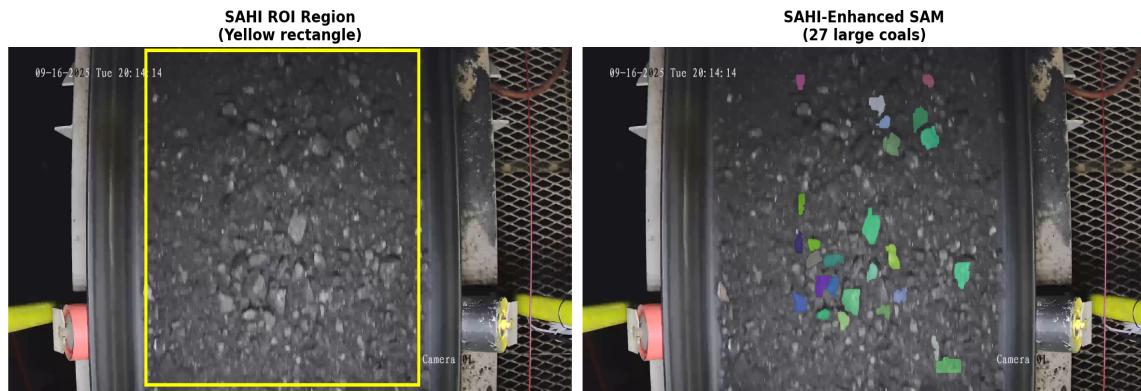
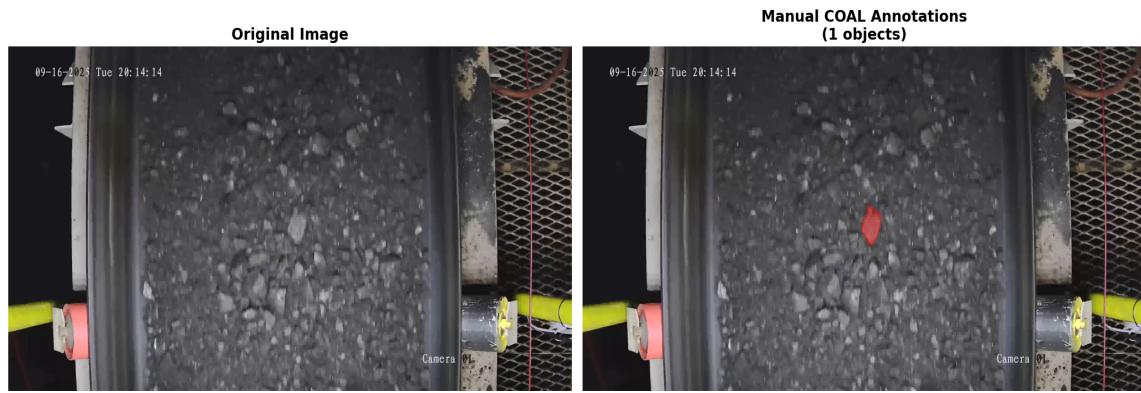
Metric	Value
Mean IOU	0.482
Max IOU	0.877
Manual Objects	11
SAM Objects	38
Matched Manual	7
Matched SAM	7

Image: D2_20250916194832_20250916200914_frame_0003



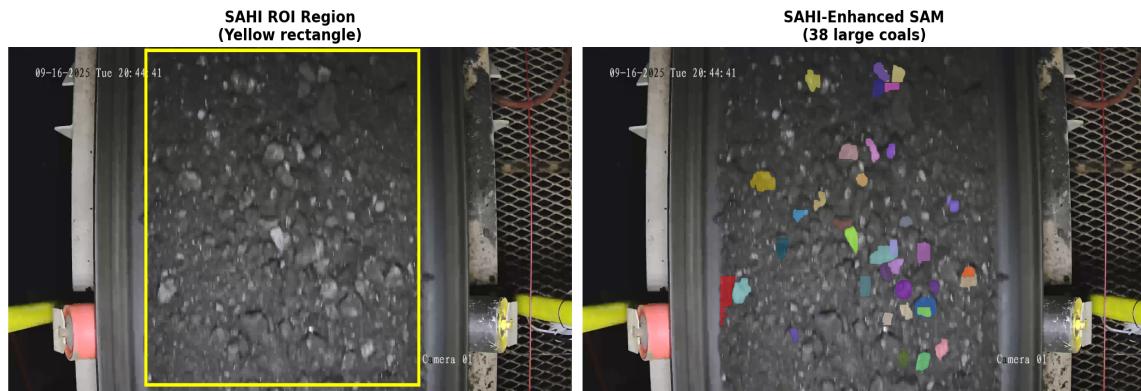
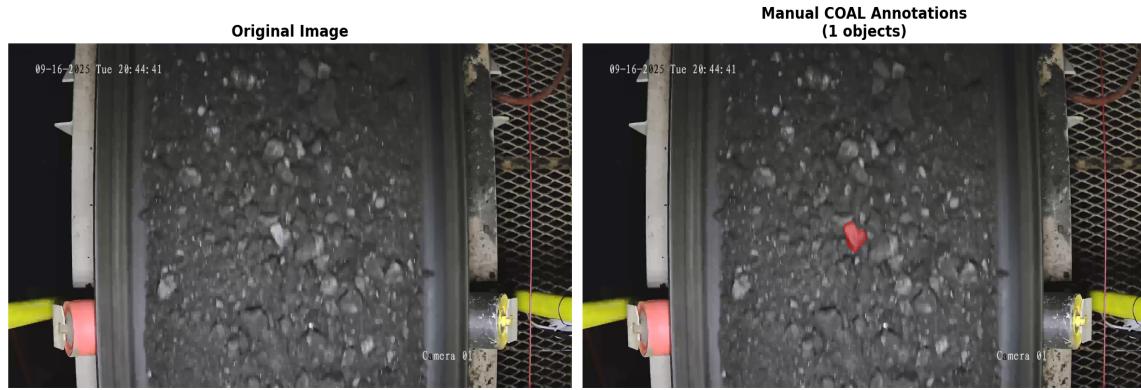
Metric	Value
Mean IOU	0.623
Max IOU	0.844
Manual Objects	4
SAM Objects	25
Matched Manual	3
Matched SAM	3

Image: D2_20250916200914_20250916202941_frame_0001



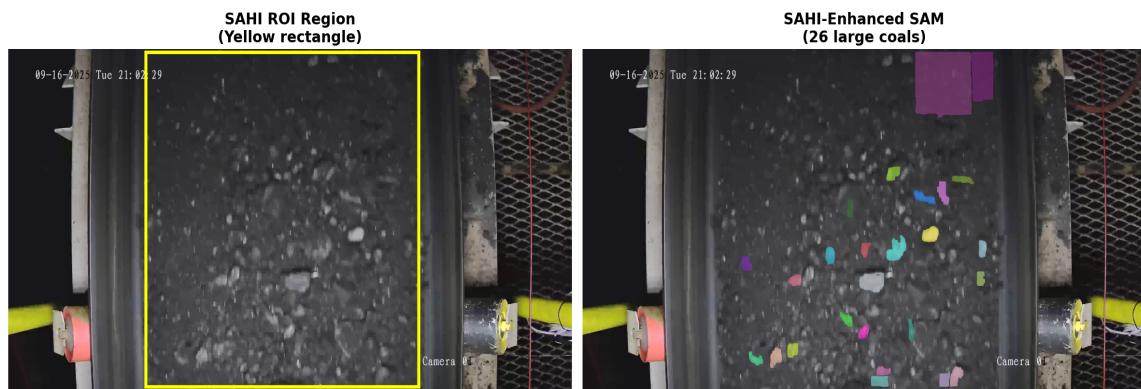
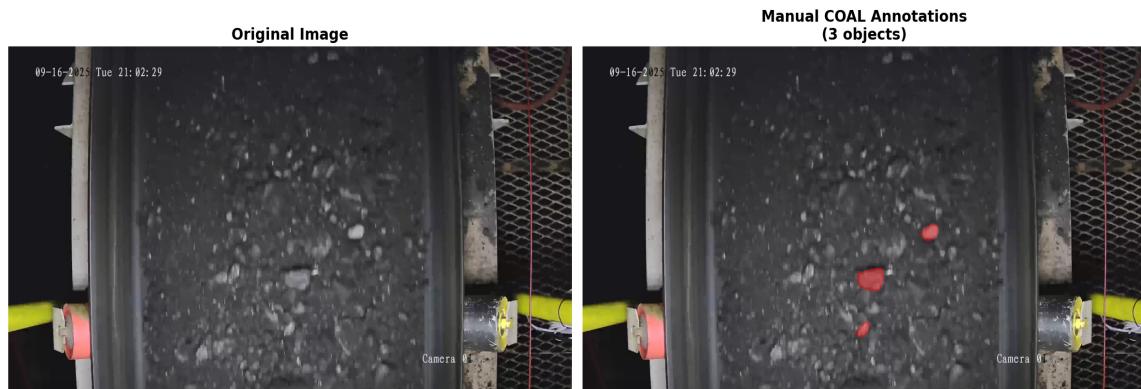
Metric	Value
Mean IOU	0.847
Max IOU	0.847
Manual Objects	1
SAM Objects	27
Matched Manual	1
Matched SAM	1

Image: D2_20250916202941_20250916205228_frame_0003



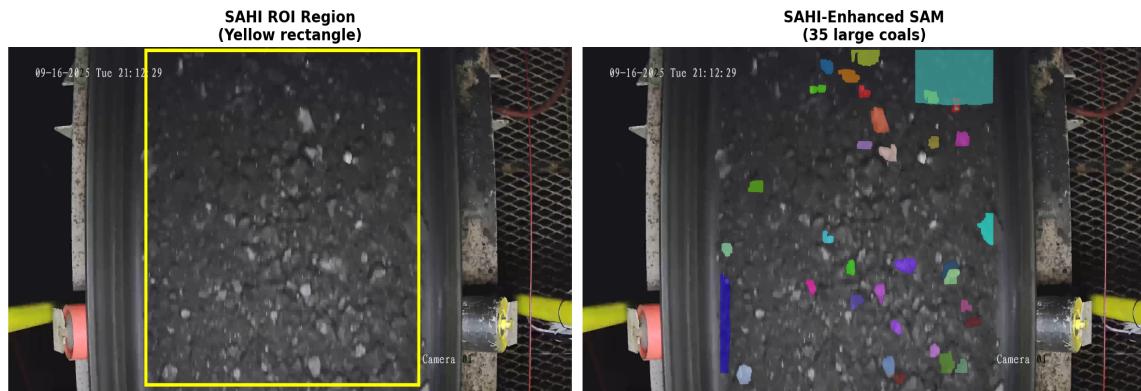
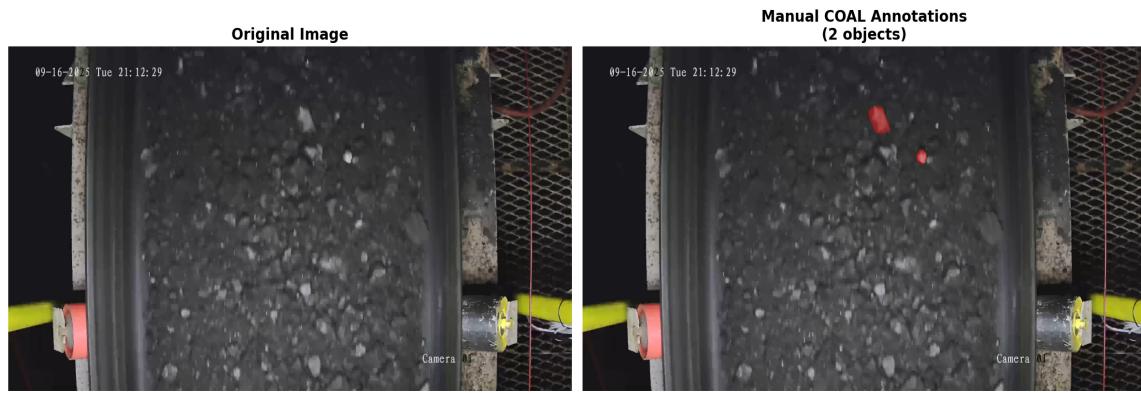
Metric	Value
Mean IOU	0.556
Max IOU	0.556
Manual Objects	1
SAM Objects	38
Matched Manual	1
Matched SAM	1

Image: D2_20250916205228_20250916211339_frame_0002



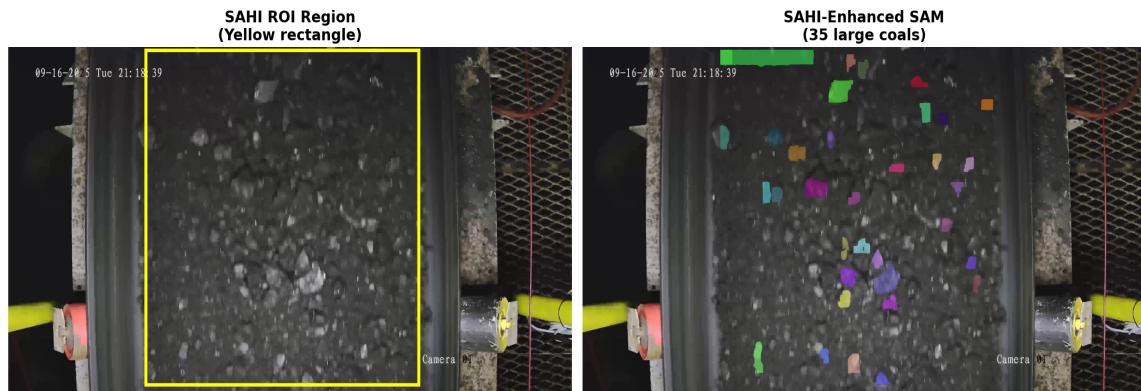
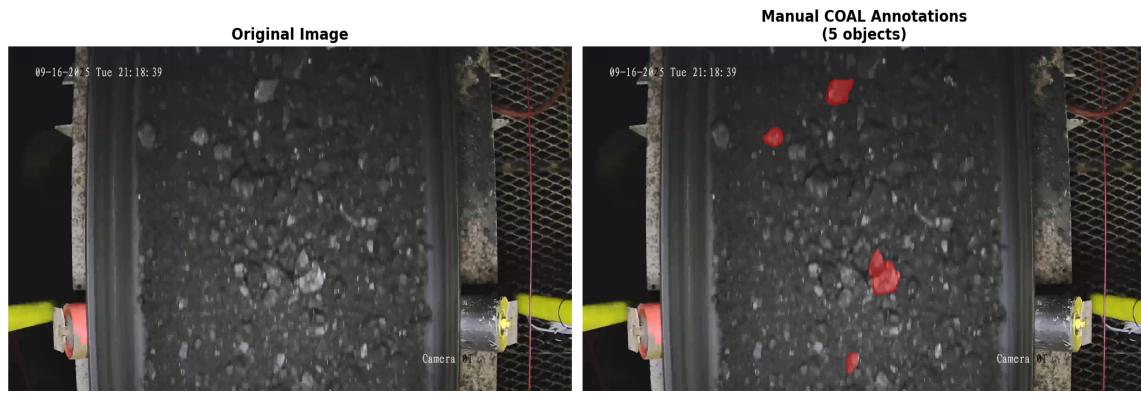
Metric	Value
Mean IOU	0.846
Max IOU	0.863
Manual Objects	3
SAM Objects	26
Matched Manual	3
Matched SAM	3

Image: D2_20250916205228_20250916211339_frame_0004



Metric	Value
Mean IOU	0.437
Max IOU	0.873
Manual Objects	2
SAM Objects	35
Matched Manual	1
Matched SAM	1

Image: D2_20250916211339_20250916213528_frame_0001



Metric	Value
Mean IOU	0.717
Max IOU	0.873
Manual Objects	5
SAM Objects	35
Matched Manual	4
Matched SAM	4