Appendix I: Void detection results in different threshold values

Confidence level: 0.45 and IoU: 0.5

Overall Performance Metrics

Metric	Value
TP	20
FP	22
FN	14
Precision	0.476
Recall	0.588
F1 Score	0.526
Average Precision (AP)	0.476

Confusion Matrix

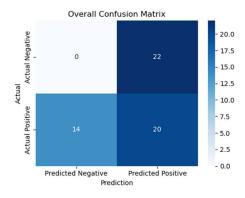


Image Name	Predicted Image	Avg IoU	Avg Confidence
018-1xx-red brick.png	that heart conset but on Proteines	0.571	0.671

	Final Result: Ground Stuth and Predictions		1
018-3xx-Red brick.png		0.690	0.853
018-4xx-Red brick.png	first fixed. Four him as Philosophia	0.616	0.690
018-8xx-Red brick.png	finitizati (man hin and namina)	0.842	0.663
023-4yy-Red brick.png		0.891	0.893
023-5yy-Red brick.png	Data Maria Sanah Sanah Sanah	0.978	0.894
023-6yy-Red brick.png	on the local has all hadden	0.873	0.913
026-6xx asphalt.png		0.557	0.916

043-1-xx- sand.png	First front Count Fulls at Predictors.	0.679	0.781
043-2-xx- sand.png	Final Result Ground Public and Resistance	0.830	0.927
043-3-xx- sand.png		0.692	0.927
047-6yy-sand.png		0.873	0.923
047-7yy-sand.png		0.854	0.923
047-8yy-sand.png	fact lead, that I was a Parallel	0.882	0.913
3_19_2025 101236 red brick yy_022-1.png	The found throat I have an American	0.736	0.892

3_19_2025 101236 red brick yy_022-2.png	Cast hand, throat I had not had had been a second or second	0.782	0.908
3_19_2025 101236 red brick yy_023-1.png	One bread transact has not interest.	0.874	0.914
3_19_2025 101236 red brick yy_023-3.png	from brand from all homes of mentions	0.628	0.889
3_19_2025 101236 red brick yy_023-7.png		0.627	0.899
3_19_2025 101236 red brick yy_023-8.png		0.793	0.904

Confidence level:0. 5 and IoU:0.5

Metric	Value
TP	20
FP	20
FN	14
Precision	0.500

Recall	0.588
F1 Score	0.541
Average Precision (AP)	0.500

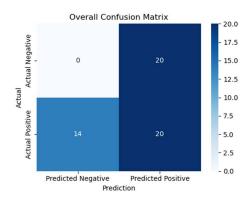


Image Name	Predicted Image	Avg IoU	Avg Confidence
018-1xx-red brick.png		0.571	0.671
018-3xx-Red brick.png		0.690	0.853
018-4xx-Red brick.png		0.616	0.690

	final Basels Conset Softs and Predictions	T	1
018-8xx-Red brick.png		0.842	0.663
023-4yy-Red brick.png	For fixed from the Administration of the Control of	0.891	0.893
023-5yy-Red brick.png	In that limit bit in Interest	0.978	0.894
023-6yy-Red brick.png		0.873	0.913
026-6xx asphalt.png	The found from the colors of t	0.557	0.916
043-1-xx- sand.png	four board. Growal both and Prestitions	0.679	0.781
043-2-xx- sand.png	ted front. Sould hold and helicities.	0.830	0.927

043-3-xx- sand.png		0.692	0.927
047-6yy-sand.png	Fore found Count I had not Presidence.	0.873	0.923
047-7yy-sand.png		0.854	0.923
047-8yy-sand.png		0.882	0.913
3_19_2025 101236 red brick yy_022-1.png		0.736	0.892
3_19_2025 101236 red brick yy_022-2.png	Call hand should be an Parliam	0.782	0.908
3_19_2025 101236 red brick yy_023-1.png	faul hauft fürsel beit auf Parktion	0.874	0.914

3_19_2025 101236 red brick yy_023-3.png	final found times had not not francism.	0.628	0.889
3_19_2025 101236 red brick yy_023-7.png	And though the street transmit	0.627	0.899
3_19_2025 101236 red brick yy_023-8.png		0.793	0.904

Confidence level:0.6 and IoU:0.5

Overall Performance Metrics

Metric	Value
TP	20
FP	18
FN	14
Precision	0.526
Recall	0.588
F1 Score	0.556
Average Precision (AP)	0.526

Confusion Matrix

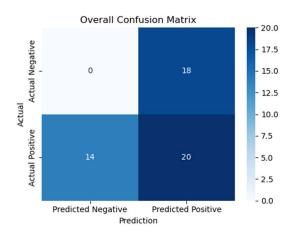


Image Name	Predicted Image	Avg IoU	Avg Confidence
018-1xx-red brick.png	And head three the deliberation	0.571	0.671
018-3xx-Red brick.png	For Mount Stand Political Poli	0.690	0.853
018-4xx-Red brick.png		0.616	0.690
018-8xx-Red brick.png		0.842	0.663

023-4yy-Red brick.png	For Result Total Ad Patients	0.891	0.893
023-5yy-Red brick.png	Fire front, found had and Pressure.	0.978	0.894
023-6yy-Red brick.png	ins head found bits and heatings	0.873	0.913
026-6xx asphalt.png		0.557	0.916
043-1-xx- sand.png		0.679	0.781
043-2-xx- sand.png	first front, limit half and haddens.	0.830	0.927
043-3-xx- sand.png	feet fresh down but out freshions	0.692	0.927

047-6yy-sand.png	four four Count Total on Practices	0.873	0.923
047-7yy-sand.png	One least found have at President	0.854	0.923
047-8yy-sand.png		0.882	0.913
3_19_2025 101236 red brick yy_022-1.png		0.736	0.892
3_19_2025 101236 red brick yy_022-2.png		0.782	0.908
3_19_2025 101236 red brick yy_023-1.png	fast hand formal bulb and Practices	0.874	0.914
3_19_2025 101236 red brick yy_023-3.png	final found found butter of Practicions	0.628	0.889

3_19_2025 101236 red brick yy_023-7.png	0.627	0.899
3_19_2025 101236 red brick yy_023-8.png	0.793	0.904

Confidence level:0.7 and IoU:0.5

Overall Performance Metrics

Metric	Value
TP	17
FP	16
FN	17
Precision	0.515
Recall	0.500
F1 Score	0.507
Average Precision (AP)	0.515

Confusion Matrix

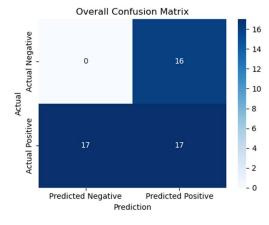


Image Name	Predicted Image	Avg IoU	Avg Confidence
018-3xx-Red brick.png	Note Stand (should him and headants)	0.690	0.853
023-4yy-Red brick.png	to less from the second	0.891	0.893
023-5yy-Red brick.png		0.978	0.894
023-6yy-Red brick.png		0.873	0.913
026-6xx asphalt.png	Frair Road, Count Make and Pendinson.	0.557	0.916
043-1-xx- sand.png	not lead count has at heistons.	0.679	0.781

043-2-xx- sand.png	first found Grand Publisher.	0.830	0.927
043-3-xx- sand.png		0.692	0.927
047-6yy-sand.png	the head those with an investment	0.873	0.923
047-7yy-sand.png	fine least, triming local president	0.854	0.923
047-8yy-sand.png		0.882	0.913
3_19_2025 101236 red brick yy_022-1.png	fast least times but and hastine.	0.736	0.892
3_19_2025 101236 red brick yy_022-2.png	fast heads stoned but and Positions	0.782	0.908

3_19_2025 101236 red brick yy_023-1.png	final heads from all Productions	0.874	0.914
3_19_2025 101236 red brick yy_023-3.png		0.628	0.889
3_19_2025 101236 red brick yy_023-7.png		0.627	0.899
3_19_2025 101236 red brick yy_023-8.png		0.793	0.904

Confidence level:0.75 and IoU:0.55

Metric	Value
TP	16
FP	10
FN	18
Precision	0.615
Recall	0.471
F1 Score	0.533
Average Precision (AP)	0.615

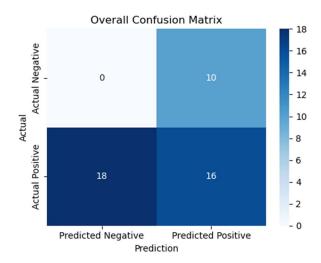


Image Name	Predicted Image	Avg IoU	Avg Confidence
018-3xx-Red brick.png	ine house, timed how an inestimate	0.690	0.853
023-4yy-Red brick.png	in band family band harmonic	0.891	0.893
023-5yy-Red brick.png		0.978	0.894
023-6yy-Red brick.png	last hand street has a fraction.	0.873	0.913

026-6xx asphalt.png	First finant from the American	0.557	0.916
043-2-xx- sand.png	final heart Great Part of Partition	0.830	0.927
043-3-xx- sand.png		0.692	0.927
047-6yy-sand.png		0.873	0.923
047-7yy-sand.png		0.854	0.923
047-8yy-sand.png	fact lead, that I was a Parallel	0.882	0.913
3_19_2025 101236 red brick yy_022-1.png	Total leads that a Principle	0.736	0.892

3_19_2025 101236 red brick yy_022-2.png	final house from an Province	0.782	0.908
3_19_2025 101236 red brick yy_023-1.png	Fine found from an extraction.	0.874	0.914
3_19_2025 101236 red brick yy_023-3.png	And though the extractions	0.628	0.889
3_19_2025 101236 red brick yy_023-7.png		0.627	0.899
3_19_2025 101236 red brick yy_023-8.png		0.793	0.904

Confidence level: 0.85 and IoU: 0.55

Metric	Value
TP	16
FP	6
FN	18
Precision	0.727

Recall	0.471
F1 Score	0.571
Average Precision (AP)	0.727

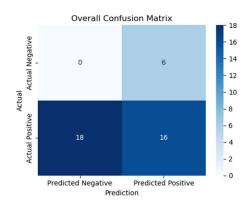


Image Name	Predicted Image	Avg IoU	Avg Confidence
018-3xx-Red	final facual factor for the final decisions.	0.690	0.853
brick.png			
023-4yy-Red	final Bould Ground Truth and Predictions	0.891	0.893
brick.png			
023-5yy-Red	Final Basult Crossel Nuth and Prelictions	0.978	0.894
brick.png			

	Final Result Cround Truth and Predictions		
023-6yy-Red brick.png		0.873	0.913
026-6xx asphalt.png	fore front Count Tole and Presistors	0.557	0.916
043-2-xx- sand.png	that found that all heatings	0.830	0.927
043-3-xx- sand.png	for hair time by a harmon	0.692	0.927
047-6yy-sand.png	that have the anti-motion	0.873	0.923
047-7yy-sand.png	find found circulal half and Presidence	0.854	0.923
047-8yy-sand.png	feet freed Good helt and Publishers	0.882	0.913

3_19_2025 101236 red brick yy_022-1.png	Find Install State of Personal Part of the State of Personal Part of Person	0.736	0.892
3_19_2025 101236 red brick yy_022-2.png	final found found half and foundations	0.782	0.908
3_19_2025 101236 red brick yy_023-1.png	fact least times I visual Production	0.874	0.914
3_19_2025 101236 red brick yy_023-3.png		0.628	0.889
3_19_2025 101236 red brick yy_023-7.png	Contract Visit of Parisins	0.627	0.899
3_19_2025 101236 red brick yy_023-8.png	for front time that at Parlime	0.793	0.904

Confidence level:0.9 and IoU:0.6

Metric	Value
TP	9
FP	4
FN	25
Precision	0.692
Recall	0.265
F1 Score	0.383
Average Precision (AP)	0.692

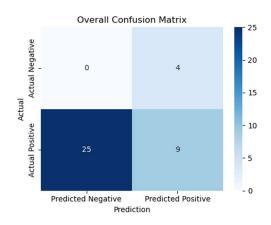


Image Name	Predicted Image	Avg IoU	Avg Confidence
023-6yy-Red brick.png		0.873	0.913
043-2-xx- sand.png	Seal Result Grand Trick and Resistance	0.830	0.927

043-3-xx- sand.png	Find front State of Pediatrics	0.692	0.927
047-6yy-sand.png	For four Count Poly or Polyson	0.873	0.923
047-7yy-sand.png		0.854	0.923
047-8yy-sand.png	Control See of Resident	0.882	0.913
3_19_2025 101236 red brick yy_022-2.png		0.782	0.908
3_19_2025 101236 red brick yy_023-1.png	Test heads formed belt and Presidents	0.874	0.914
3_19_2025 101236 red brick yy_023-8.png	Cast least Visual Political	0.793	0.904

Appendix II: Void detection results in different pavements in 0.5 IoU and 0.6 confidence level

Asphalt:

Overall Performance Metrics

Metric	Value
TP	1
FP	2
FN	1
Precision	0.333
Recall	0.500
F1 Score	0.400
Average Precision (AP)	0.333

Confusion Matrix

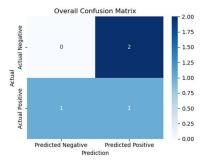


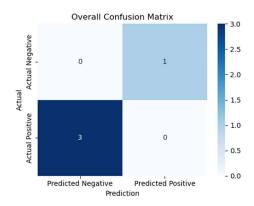
Image Name	Predicted Image	Avg IoU	Avg Confidence
026-6xx	Final Basel Crowd huth and Predictors	0.557	0.916
asphalt.png			

concrete:

Overall Performance Metrics

Metric	Value
TP	0
FP	1
FN	3
Precision	0.000
Recall	0.000
F1 Score	0
Average Precision (AP)	0.000

Confusion Matrix



Red brick

Overall Performance Metrics

Metric	Value
TP	13
FP	16
FN	10
Precision	0.448
Recall	0.565
F1 Score	0.500
Average Precision (AP)	0.448

Confusion Matrix

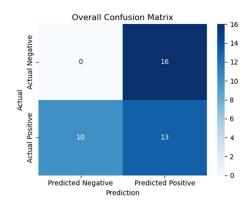


Image Name	Predicted Image	Avg IoU	Avg Confidence
018-1xx-red	final heart: Grand Duth and Predictors	0.571	0.671
brick.png			

	Final Result Ground Truth and Predictions	T	
018-3xx-Red brick.png		0.690	0.853
018-4xx-Red brick.png	For board, front from an heating	0.616	0.690
018-8xx-Red brick.png		0.842	0.663
023-4yy-Red brick.png		0.891	0.893
023-5yy-Red brick.png	The bank stand had not had not been seen as the seen a	0.978	0.894
023-6yy-Red brick.png	ration from the advantage	0.873	0.913
3_19_2025 101236 red brick yy_022-1.png		0.736	0.892

3_19_2025 101236 red brick yy_022-2.png	final finant form of Federation	0.782	0.908
3_19_2025 101236 red brick yy_023-1.png		0.874	0.914
3_19_2025 101236 red brick yy_023-3.png		0.628	0.889
3_19_2025 101236 red brick yy_023-7.png		0.627	0.899
3_19_2025 101236 red brick yy_023-8.png		0.793	0.904

sand brick

Metric	Value
TP	6
FP	0
FN	0
Precision	1.000
Recall	1.000

F1 Score	1.000
Average Precision (AP)	1.000

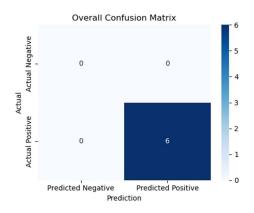


Image Name	Predicted Image	Avg IoU	Avg Confidence
043-1-xx- sand.png		0.679	0.781
043-2-xx- sand.png	Table and those by an el-habitor	0.830	0.927
043-3-xx- sand.png		0.692	0.927

047-6yy-sand.png	Total found found from Parkinson	0.873	0.923
047-7yy-sand.png		0.854	0.923
047-8yy-sand.png		0.882	0.913

Appendix III: YOLOv12 Model training performance

