

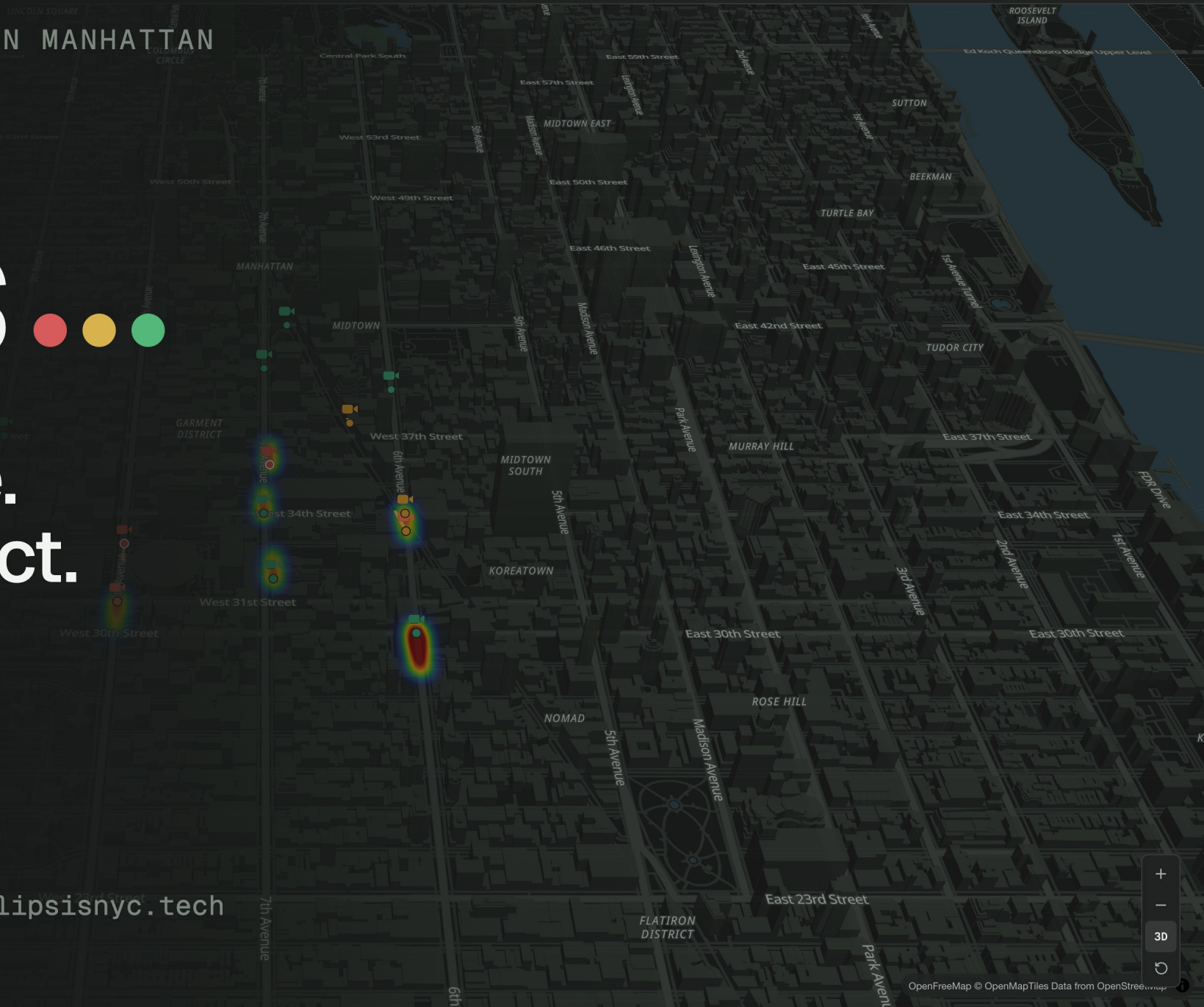
NYC TRAFFIC OPERATIONS · MIDTOWN MANHATTAN

ellipsis

Detect a blockage.
Measure the impact.
Test a response.

NYC DOT cameras → tracking → SUMO

Brian Maina · Alexandre Lugovoi · ellipsisnyc.tech



PROBLEM

CAM-7AV-036 · 7 Ave @ 36 St · 14:26:55 EDT

One blocked lane becomes a corridor problem.

Many feeds, few operators. A blockage gets noticed late.

double parked · 5:12



●
vehicle stops
0 s

●
dwell threshold
60 s

●
incident surfaces

DETECTION

A bounding box is not an incident.

01 DETECTED · 14:21:31

02 TRACKED · 14:22:13

03 CONFIRMED · 14:22:43



Persistence + lane context + dwell time turn a vehicle into an incident.

7 Ave @ 36 St · 26 Sep 2026 · our detector, tracker and event engine on the recording

ACTIVE INCIDENTS	13	<<
Critical 3	Review 8	All 13 Resolved 0
Sort: Severity		
CRITICAL 3		
8th Ave @ 33rd St	Double parked	11:35 Critical
7 Ave @ 36 St	Double parked	07:12 Critical
7 Ave @ 36 St	Double parked	07:12 Critical
CONFIRMED 2		
Broadway @ 6 Ave / 33 St	Blocking the box	00:47 Confirmed
8th Ave @ 31st St	Stopped in lane	01:44 Confirmed
NEEDS REVIEW 8		
Broadway @ 6 Ave / 33 St	Blocking the box	00:50 Needs review
Broadway @ 6 Ave / 33 St	Blocking the box	00:50 Needs review
Broadway @ 6 Ave / 33 St	Blocking the box	01:07 Needs review
Broadway @ 38 St	Double parked	



CRITICAL

Double parked vehicle

7 Ave @ 36 St

07:12

79% confidence

CAM-7AV-036 RECORDED

Recorded frame

2026-09-26 14:23:11



CAM-7AV-036 · From the recording, not the live feed

Incident note

A double-parked vehicle has been blocking the curb-adjacent lane at 7 Avenue and 36 Street for at least 417 seconds. The system recommends making the green signal at 7 Avenue and 37 Street 6.8 seconds shorter. In the simulation, this timing change reduces delay per vehicle from 124.4 seconds to 119.4 seconds and shortens the maximum queue from 9 vehicles to 8.

AI-written (Gemini) from the detection and simulation data only

Traffic impact

delay per vehicle

124.4s

Operator decision

No decision yet

Accept

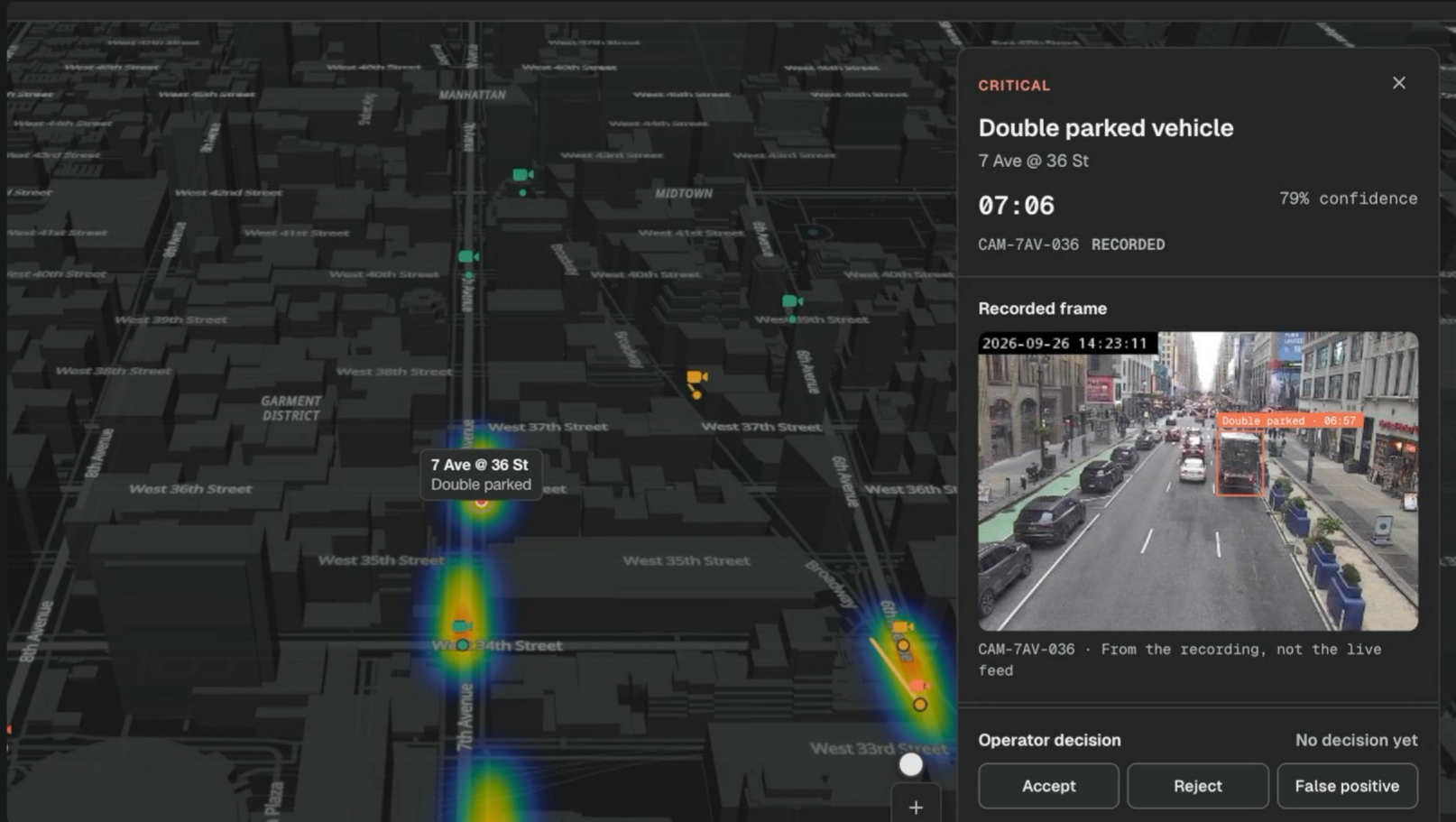
Reject

False positive

Compare in simulation >

DEMO

One incident, start to finish.



0:00

alert arrives, spoken aloud

0:10

evidence + incident note

0:20

compare in simulation

0:25

base vs sim: -5.0 s / vehicle

0:55

accepted, in simulation only



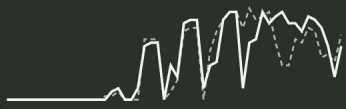
Try it yourself → <https://ellipsisnyc.tech>

scan to open the live site

← Back to incident

BASE VS SIM

Recommended is faster by 5.0s per vehicle



-- Default · 9 vehicles

— Recommended · 8 vehicles

Main map

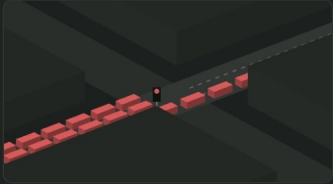
Base

Sim

SIGNAL TIMING SIMULATION

BASE

Current timing

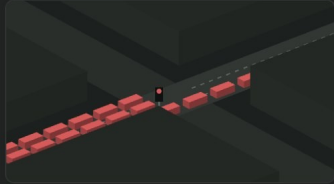


7 Ave @ 37 St · illustrative close-up

Average delay	124.4s
Queue	9 vehicles
Green phase	45s
Flow	Slowed

SIM

Signal timing update



7 Ave @ 37 St · illustrative close-up

Average delay	119.4s
Queue	8 vehicles
Green phase	45s → 38.2s -6.8s
Flow	Improved

SIMULATION

Test the response before recommending it.

5.0 s saved / vehicle4% lower delay1 fewer queued vehicle

SUMO · current vs candidate timing · 3 seeds · modeled, not observed traffic

HAND-TAGGED EVALUATION

Measured against hand-tagged footage.

ACTUAL BLOCKAGE

yesno

14

true positive

2

false alert

1

missed

—

not counted

alert

no alert

14 / 16

88% precision

14 / 15

93% recall

63 s

median time to alert

100%

incident type accuracy

15 tagged blockages · 9 cameras · small test set, not production-scale validation

Source · `scripts/evaluate.py` · `evaluation/ground_truth.yaml`

HOW WE BUILT IT ●●●

We built it like a real engineering project.

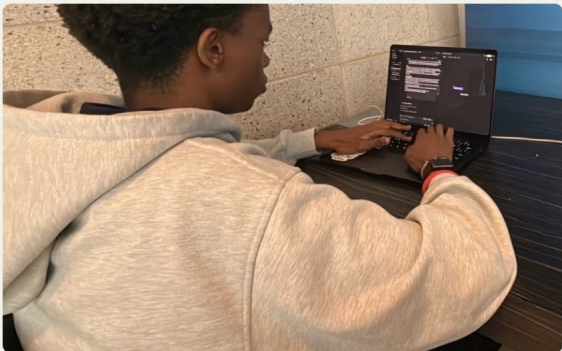
docs/plan.md · requirements

Goals, scope and non-goals

Scope is 10 to 20 intersections in one Midtown area, near Penn Station or Times Square, where cameras are dense and double parking is constant.

Goals

- Detect three kinds of stopped vehicle from live camera stills: double parked, stopped in a travel lane (breakdown, loading, pickup or drop-off), and stopped inside the intersection box.
- Raise an alert within 60 to 120 seconds of a vehicle stopping, with the frame, location, duration and reason.
- Recommend a signal timing change for affected intersections, approved by a human operator.
- Show in SUMO that the recommendation lowers average delay versus the default fixed plan.



Brian Maina · cameras, SUMO, dashboard

All issues					New issue			
Issue state: closed Stage sort: created-asc								
Open	0	Closed	24	Author ▾ Labels ▾ Projects ▾ Milestones ▾ Assignees ▾ ⌵ Oldest ▾				
Stage 0 · Setup								
#1	by Alexlgvcode was closed 1d ago · Stage 0 · Setup...			1				
Stage 1 · feat/mock-fixtures								
#2	by Alexlgvcode was closed 20h ago · Stage 1 · Mock...			1				
Stage 1 · feat/camera-list								
#3	by Alexlgvcode was closed 20h ago · Stage 1 · Mock...			1				
Stage 2 · feat/api								
#4	by Alexlgvcode was closed 19h ago · Stage 2 · API...			1				
Stage 2 · feat/frame-poller								
#5	by Alexlgvcode was closed 18h ago · Stage 2 · API...			2				
Stage 3 · feat/detector								
#6	by Alexlgvcode was closed 18h ago · Stage 3 · Detec...			1				
Stage 3 · feat/ellipsis-dashboard								
#7	by Alexlgvcode was closed 12h ago · Stage 3 · Detec...			2				
Stage 4 · feat/tracker								
#8	by Alexlgvcode was closed 18h ago · Stage 4 · Track...			1	1			
Stage 4 · feat/sumo-network								
#9	by Alexlgvcode was closed 14h ago · Stage 4 · Track...			1				
Stage 5 · feat/lane-masks								
#10	by Alexlgvcode was closed 17h ago · Stage 5 · Lane...			1				
Stage 5 · feat/sim-scenario								
#11	by Alexlgvcode was closed 14h ago · Stage 5 · Lane...			1				
Stage 6 · feat/event-engine								



Alexandre Lugovoi · detection, tracking, lane rules, evaluation

— #7 dashboard · Brian

— #8 tracker · Alex

— #10 lane masks · Alex

— #11 sim scenario · Brian

35 issues · requirements → issues → parallel build → integration → evaluation → UI

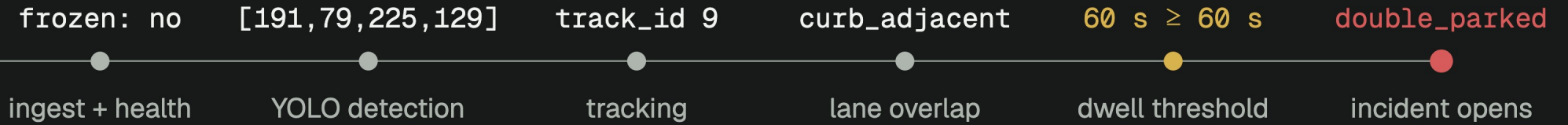
**It flags.
It checks.
A person decides.**



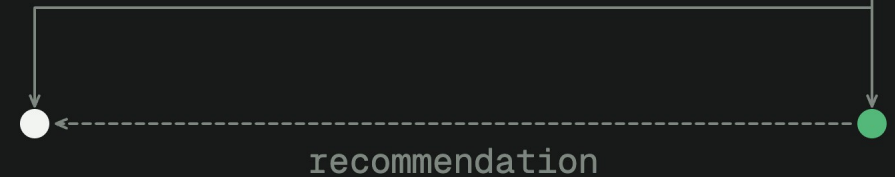
From camera feed to operator decision.



CAM-7AV-036



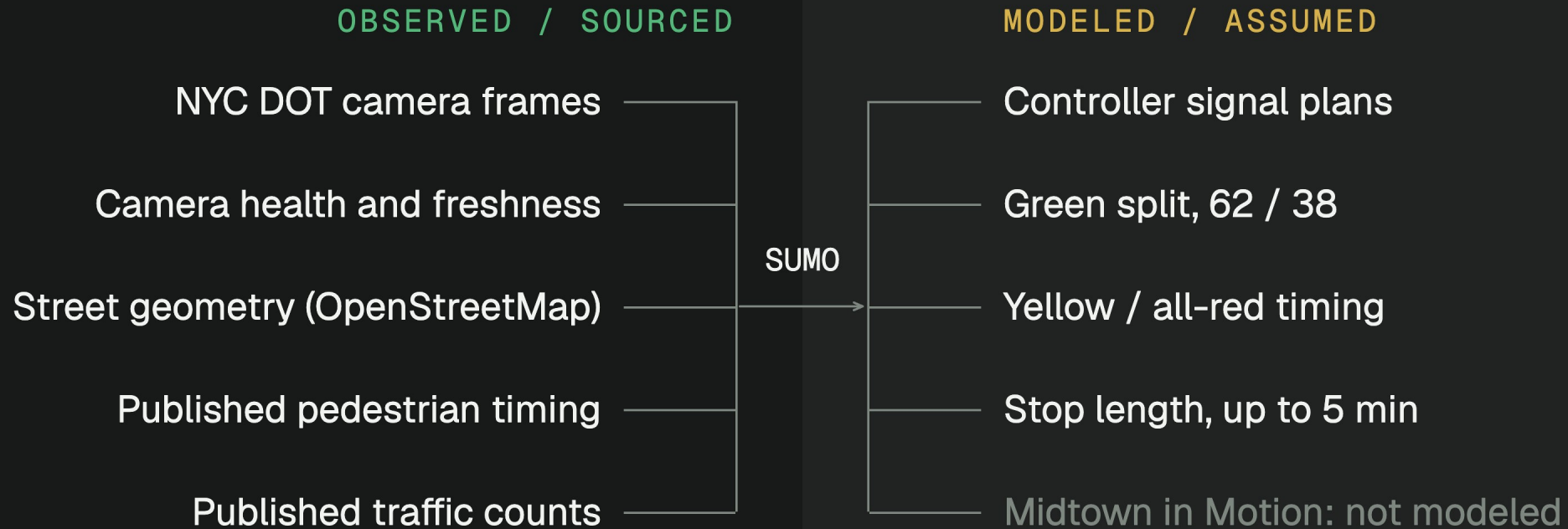
Detection is only the first step. Persistence, lane geometry and dwell time decide whether a vehicle becomes an incident.



accept · reject · false positive
operator decides

124.4 → 119.4 s
SUMO: current vs 3 retimings

What is observed. What is modeled.



Simulation is decision support. A person still decides.

Signal-timing assumptions.

NYC's controller plans aren't public, so the model runs a pre-timed plan built from published sources.

Parameter	Value	Status
Cycle	90 s, pre-timed	Verified: 15 Penn FEIS + 9 of 10 cameras
Leading pedestrian interval	7 s where listed	Verified: NYC Open Data
Barnes dance, 7 Ave @ 32 St	24 s	Verified: NYC Open Data
Yellow / all-red	3 s / 2 s	Assumed: ITE practice, 25 mph
Avenue / street green split	62% / 38%	Assumed: checked vs FEIS counts
Midtown in Motion	adaptive	Not modeled

Current limits, and what's next.

NOW

Day + dusk test set

9 hand-masked cameras

Modeled signal plans

Human approval

NEXT

Night + bad-weather validation

Assisted lane calibration

Controller timing data

Human approval stays

The last row is deliberate: a person approving every change is a safety choice, not a gap to close.

APPENDIX E

What it's built with.

CAMERA

httpx poller
Pillow feed-health checks

DETECTION

Ultralytics YOLO11s
agnostic NMS

TRACKING

IoU tracker
stationary streaks

LANE STATE

hand-drawn masks
events/rules.yaml

BACKEND

FastAPI · WebSocket
SQLModel + SQLite

EVALUATION

scripts/evaluate.py
evaluation/ground_truth.yaml

FRONTEND

React 19 · MapLibre GL
Vite · Geist

SIMULATION

SUMO · TraCI · sumolib
OSM → netconvert

INCIDENT NOTES

Gemini or Claude

Per-camera results.

Camera	Alerts	Real	False	Missed
6 Ave @ 34 St	1	1	0	0
7 Ave @ 32 St	1	1	0	0
7 Ave @ 36 St	3	3	0	0
8th Ave @ 31st St	3	3	0	0
8th Ave @ 33rd St	3	1	2	0
Broadway @ 38 St	1	1	0	1
Broadway @ 6 Ave / 33 St	4	4	0	0
6 Ave @ 30 St · 7 Ave @ 34 St	0	0	0	0

MISSED

gt_008 · tow truck stopped in the right lane, Broadway @ 38 St

FALSE ALERTS

Both at 8th Ave @ 33rd St

EXCLUDING BUS LANE, POLICE,
MOVED CAMERA

86% precision (12 / 14)

92% recall (12 / 13)