



NETWORK OPERATOR PRESENTATION

Manhole condition assessment with AI

MACP™ condition coding and component measurement from the surface
— building the condition data behind your inflow & infiltration targets

Presented by Intermountain Sales, Inc. · Utility Tools for Today

HARDWARE



AI CODING SOFTWARE

Pallon



What we'll cover in 30 minutes

- 1 Why manholes, why now**
Inflow & infiltration reduction targets — and the data gap behind them
- 2 What manual assessment misses**
Real examples of defects that are missed, estimated, or graded inconsistently
- 3 Inspection technologies and the solution**
Four ways to inspect a manhole, and why RV-MAX 360 + Pallon
- 4 The economics**
Hardware and software pricing, full cost per manhole and payback
- 5 Integration and next steps**
How it fits your crews, inspection software and asset management — and how we start

30
minutes

including a live
walkthrough of coded
structures in the
platform

I&I targets need manhole data

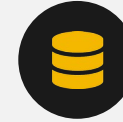
30–50%

Share of inflow & infiltration attributed to defects in or near manholes (EPA)



Regulatory pressure

Overflow and I&I reduction targets in permits, consent decrees and regional plans have to be met somewhere in the collection system.



Least condition data

Mainlines are routinely CCTV-inspected and coded. Manholes are usually the asset with the least consistent condition data.

Manholes are roughly a third to half of the I&I problem — and often the part with the least condition data.

Prioritizing manhole rehabilitation without consistent condition coding means guessing which structures to spend on first.

Source: EPA research on the manhole share of inflow & infiltration.

Mainlines are assessed. Manholes often are not.

Mainline sewers

- CCTV inspection already running with your crews or contractors
- Coded consistently to a recognized standard (PACP™)
- Condition grades feed rehabilitation and lining programs
- Defensible basis for capital prioritization

Manhole structures

- Often no formal manhole rehabilitation program
- Condition mostly recorded by eye, from the surface
- No consistent coding, so no comparison across years or crews
- No measured geometry for rehabilitation design

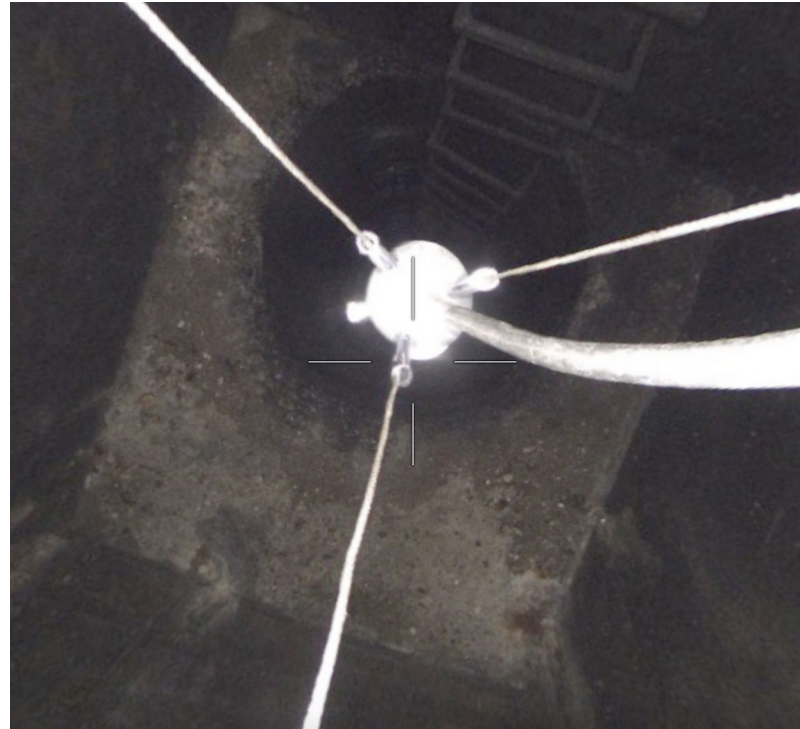
The consequence: a manhole rehabilitation program can be justified to regulators, budgeted, and defended to your council or board — but only once the structures are graded on evidence rather than impression.

A look from the surface is not an assessment



Looking down from the cover

The structure reads as sound. This is the view a surface inspection is graded from.



Looking back up from inside

Deterioration on the underside of the transition slab — invisible from above, and structurally relevant.



Graded from above,
this structure
passes.

Graded from inside,
it doesn't.

Pallon inspection imagery.

The defects that matter most are the hardest to see

Corroded reinforcement



● Why it is critical

Corroding steel loses cross-section. The wall is losing the strength that holds the structure up.

● Why it gets missed

Sound and corroding rebar look alike. From the surface or under a single lamp, it is recorded as merely visible, or not at all.

Missing wall



● Why it is critical

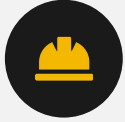
Material is gone from the wall itself. Soil and groundwater can enter, and the structure is at risk of collapse.

● Why it gets missed

From a distance it looks like surface spalling, so it is recorded as a minor defect and the structure drops down the priority list.

With RV-MAX 360 + Pallon, finding them does not depend on where someone happened to look: **the camera records every inch of the wall in 8MP 360° video, and Pallon's AI reviews the full recording for these defects.**

Four ways to inspect a manhole



Manned entry

An inspector climbs in, measures by tape and grades by eye.

+ Hands-on access to the structure

- Confined-space crew, permits and gas monitoring
- No record you can revisit later



Zoom pole camera

A camera on a pole, aimed and zoomed by the operator from the surface.

+ No entry, low equipment cost

- Records only what the operator points at
- Result depends on the operator



3D optical scanner

A multi-camera or laser probe lowered on a winch builds a 3D model.

+ Full coverage and dense geometry

- Specialist equipment and software to buy and run
- More to transport, process and maintain



RV-MAX 360

A 360° 8MP camera lowered on a pole or tripod records the whole structure in one pass.

+ Complete record in 1–3 min, one operator

+ Up to 80 manholes a day; coded and measured by Pallon

Price and performance compared

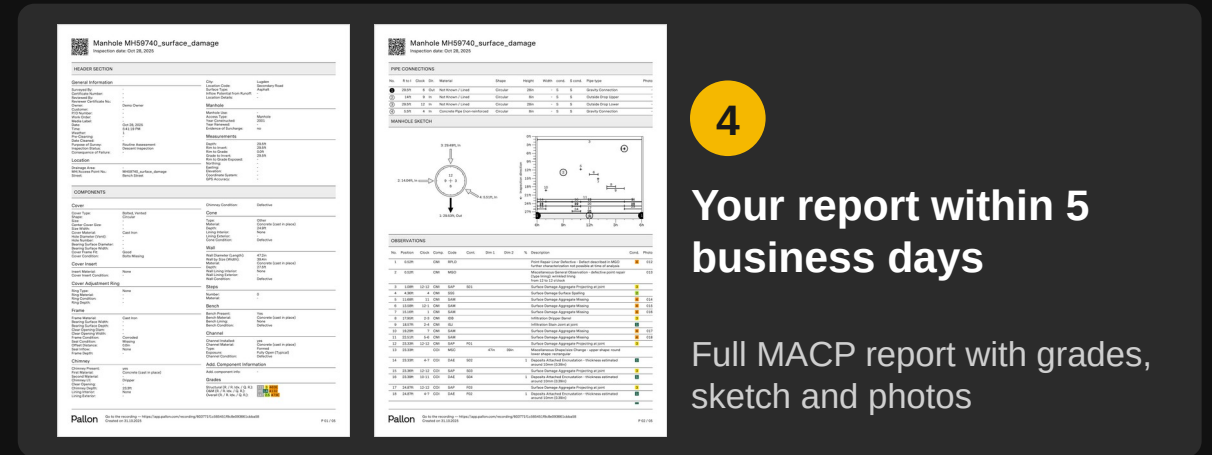
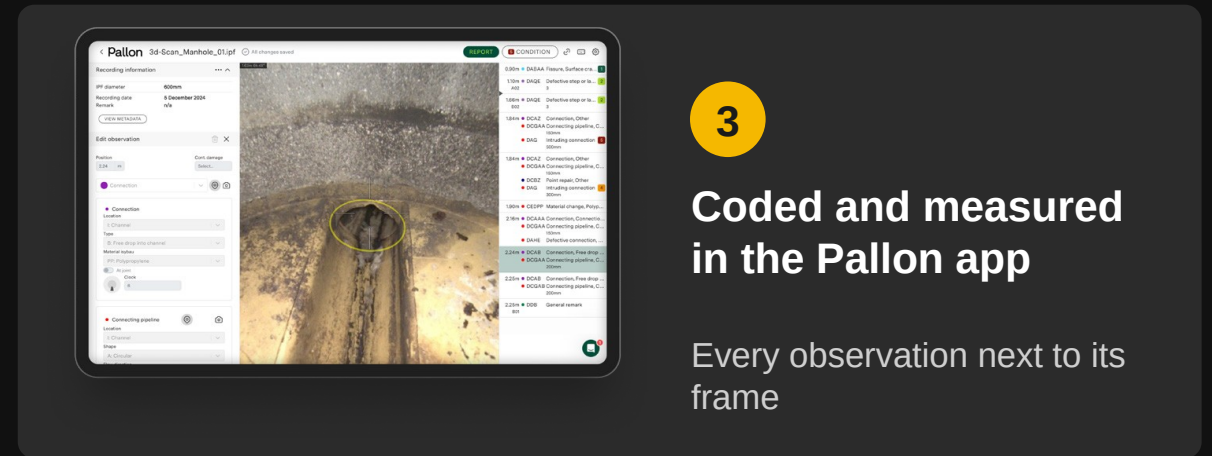
Criterion	Manned entry	Zoom pole camera	3D optical scanner	RV-MAX 360 + Pallon
No confined-space entry	✗ Entry required	✓ Yes	✓ Yes	✓ Yes
Full 360° record to revisit	✗ No	✗ Operator's view only	✓ Yes	✓ 8MP 360° video
Crew on site	2–3 trained staff	1–2	1–2	✓ 1 operator
Time per manhole on site	30–60 min	Operator-dependent	~2–5 min	✓ 1–3 min
Level 2 MACP measurements	Tape, by hand	Limited	From point cloud	✓ Pre-coded and measured
Deployment	Crew, tripod, gas monitor	Portable pole	Probe, winch, software	✓ 3 kg, 12-h battery
Hardware investment	Entry gear, gas monitor	Low	>\$100,000 system	✓ \$22,500–\$24,795 kit
Cost per manhole	✗ \$140 or more	✗ Crew + manual coding	✗ Crew + manual coding	✓ ~\$46–60 all-in

The complete record of a scanner, at the speed and simplicity of a pole camera — and with Pallon, coded and measured without a coding specialist.

Sources: RV-MAX 360 — rinnovision.com and RinnoVision quote (April 2026); 3D scanner scan times — manufacturer material (IBAK, [Envirosight](http://Envirosight.com)). Other times and system prices: industry estimates. Costs per manhole: economics section (500–5,000 manholes a year).

THE SOLUTION AT A GLANCE

From the manhole to your report



Images: RinnoVision, Pallon.

Four steps, one simple field routine



1

Capture with RV-MAX 360

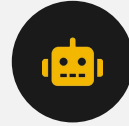
One operator, working from the surface. No confined-space entry. The field routine is shown below.



2

Automatic transfer

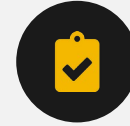
Video syncs from the RV-MAX to RinnoCloud and on to Pallon by itself. No manual upload, no moving files.



3

AI coding

Pallon codes every observation to MACP v7.0.9 and measures the structure from its own 3D reconstruction. No point cloud to buy.



4

Review and export

Report within 5 business days. Your reviewer checks each observation against its image, signs off and exports, for example to WinCan.

IN THE FIELD

1

Align the QR code with the outgoing pipe

2

Pick the lighting mode for the manhole size

3

Enter the header data

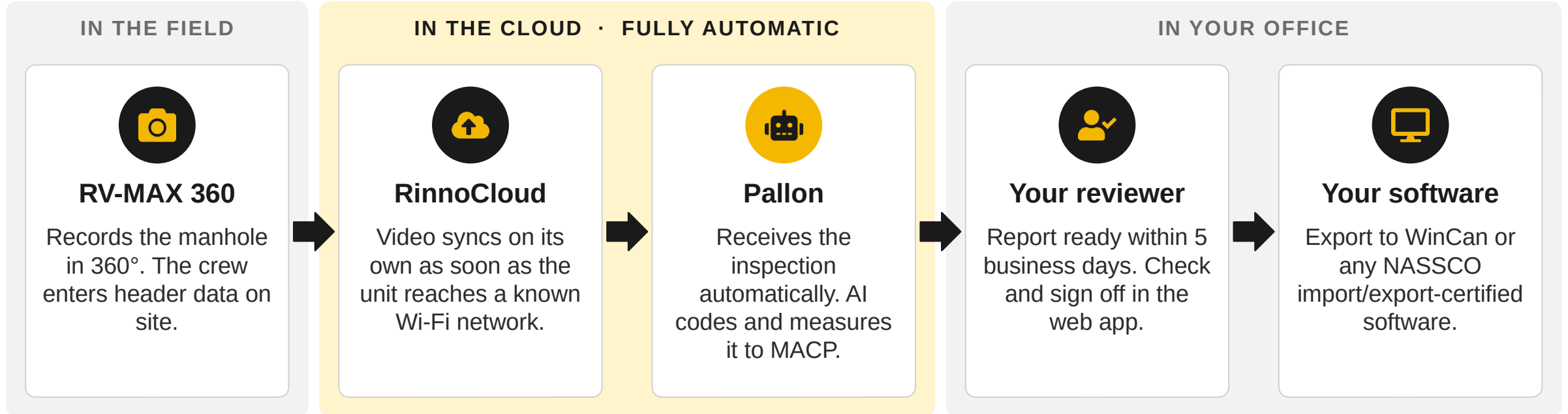
4

Start recording

5

Lower at under 10 ft/min

From the manhole to your software, automatically



No manual upload, no files on USB sticks, no re-keying: the inspection travels from the manhole to your inspection software on its own.

From your inspection software, condition data flows on into your asset management system as it does today.

Capture: RinnoVision RV-MAX 360



350+

RV-MAX units sold

1–3 min

per manhole

1 operator

working from the
surface

0

confined-space entries



8MP 360° HD video

Full structure in one pass, saved as MP4



HD live feed

Live view while recording



IP68, drop-tested

Waterproof, dustproof, field-ready



Six light modes

Powerful 360° lighting for clean video



GPS geotagging

Every inspection located automatically



Pole and tripod

30-ft pole and 165-ft reel tripod

RinnoCloud Automatic file transfer on known Wi-Fi, remote 360° viewing, geotagging and fleet tracking, optional 3D point clouds.

Coding: Pallon AI condition assessment

300+

defect types and subclasses detected

10×

faster condition assessment

0

manual defect coding: you review and sign off

250+

utilities, engineers and contractors as customers



Detection

A deep neural network trained on millions of data points detects observations according to the coding standard (MACP for manholes, PACP for mainlines).



Quantification

Neural networks and 3D vision quantify observations where applicable: height and width, intrusion length, cross-section and diameter change.



Localization

3D vision determines longitudinal and circumferential position, and separates individual from continuous observations with millimeter precision.

Pallon is NASSCO PACP Certified Software (Version 8, Import and Export), listed on [NASSCO.org](https://www.nassco.org). The certification covers PACP data import and export; NASSCO does not certify Automated Defect Recognition (ADR) components. Figures: Pallon product information, pallon.com.

WHAT YOU GET

A complete MACP report for every manhole

Manhole MH59740_surface_damage
Inspection date: Oct 28, 2025

HEADER SECTION

General Information

City: Lugden
Location Code: Secondary Road
Surface Type: Asphalt
Inflow Potential from Runoff: -
Location Details: -

Manhole

Owner: Demo Owner
Customer: -
P/O Number: -
Work Order: -
Media Label: -
Date: Oct 28, 2025
Time: 5:11:18 PM
Weather: 1
Pre-Cleaning: -
Date Cleaned: -
Purpose of Survey: Routine Assessment
Inspection Status: Descent Inspection
Consequence of Failure: -

Measurements

Depth: 29.5ft
Rim to Invert: 29.5ft
Rim to Grade: 0.0ft
Grade to Invert: 29.5ft
Rim to Grade Exposed: -
Nothing: -
Easting: -
Coordinate System: -
GPS Accuracy: -

Location

Drainage Area: -
MH/Access Point No.: MH59740_surface_damage
Street: Bench Street

COMPONENTS

Cover

Cover Type: Bolted, Vented
Shape: Circular
Size: -
Center Cover Size: -
Size Width: -
Cover Material: Cast Iron
Hole Diameter (Vent): -
Hole Number: -
Bearing Surface Diameter: -
Bearing Surface Width: -
Cover Frame Fit: Good
Bolt Missing: -

Chimney Condition: Defective

Cone

Type: Other
Material: Concrete (cast in place)
Depth: 24.9ft
Lining Interior: None
Lining Exterior: Defective

Wall

Wall Diameter (Length): 47.2in
Wall by Size (Width): 39.4in
Material: Concrete (cast in place)
Depth: 27.5ft
Wall Lining Interior: None
Wall Lining Exterior: Defective

Steps

Number: 0
Material: -

Bench

Bench Present: Yes
Bench Material: Concrete (cast in place)
Bench Lining: None
Bench Condition: Defective

Channel

Channel Installed: yes
Channel Material: Concrete (cast in place)
Type: Formed
Exposure: Fully Open (Typical)
Channel Condition: Defective

Add Component Information

Add component info: -

Grades

Structural (R / R Ldx / Q R3)
OSM (R / R Ldx / Q R3)
Overall (R / R Ldx / Q R3)

Chimney

Chimney Present: yes
First Material: Concrete (cast in place)
Second Material: Driveway
Chimney (L): -
Clear Opening: 23.3in
Chimney Depth: -
Lining Interior: None
Lining Exterior: -

Pallion Go to the recording -> <https://app.pallion.com/recording/6037711c5854519bde093681cbb48>
Created on 31.10.2025 P 01 / 08

Manhole MH59740_surface_damage
Inspection date: Oct 28, 2025

PIPE CONNECTIONS

No.	R to I	Clock	Dir.	Material	Shape	Height	Width	cond.	S cond.	Pipe type	Photo
1	29.5ft	6	Out	Not Known / Lined	Circular	28in	-	S	S	Gravity Connection	-
2	14ft	9	In	Not Known / Lined	Circular	8in	-	S	S	Outside Drop Upper	-
3	29.5ft	12	In	Not Known / Lined	Circular	28in	-	S	S	Outside Drop Lower	-
4	5.6ft	4	In	Concrete Pipe (non-reinforced)	Circular	8in	-	S	S	Gravity Connection	-

MANHOLE SKETCH

3: 29.49ft, In
2: 14.04ft, In
1: 29.53ft, Out
4: 5.51ft, In

OBSERVATIONS

No.	Position	Clock	Comp.	Code	Cont.	Dim 1	Dim 2	%	Description	Cond.	Photo
1	0.52ft	-	CMI	RPLD	-	-	-	-	Point Repair Liner Defective - Defect described in MGO further characterization not possible at time of analysis	012	012
2	0.52ft	-	CMI	MGO	-	-	-	-	Miscellaneous General Observation - defective point repair (Type Inlay) - voided lining from 12 to 12 o'clock	013	013
3	1.09ft	12-12	CMI	SAP	501	-	-	-	Surface Damage Aggregate Projecting at joint	014	014
4	4.36ft	4	CMI	SSS	-	-	-	-	Surface Damage Surface Spalling	015	015
5	11.68ft	11	CMI	SAM	-	-	-	-	Surface Damage Aggregate Missing	016	016
6	11.58ft	12-1	CMI	SAM	-	-	-	-	Surface Damage Aggregate Missing	017	017
7	15.10ft	1	CMI	SAM	-	-	-	-	Surface Damage Aggregate Missing	018	018
8	17.59ft	2-3	CMI	IDB	-	-	-	-	Infiltration Dropper Barrel	019	019
9	18.57ft	2-4	CMI	ISJ	-	-	-	-	Infiltration Stain Joint at joint	020	020
10	19.29ft	7	CMI	SAM	-	-	-	-	Surface Damage Aggregate Missing	021	021
11	22.51ft	5-6	CMI	SAM	-	-	-	-	Surface Damage Aggregate Missing	022	022
12	23.33ft	12-12	CMI	SAP	F01	-	-	-	Surface Damage Aggregate Projecting at joint	023	023
13	23.33ft	-	COI	MSC	-	47in	38in	-	Miscellaneous Shape/size Change - upper shape: round lower shape: rectangular	024	024
14	23.33ft	4-7	COI	DAE	502	-	-	-	1 Deposits Attached Encrustation - thickness estimated around 10mm (0.39in)	025	025
15	23.36ft	12-12	COI	SAP	503	-	-	-	Surface Damage Aggregate Projecting at joint	026	026
16	23.39ft	10-11	COI	DAE	504	-	-	-	1 Deposits Attached Encrustation - thickness estimated around 10mm (0.39in)	027	027
17	24.67ft	12-12	COI	SAP	F03	-	-	-	Surface Damage Aggregate Projecting at joint	028	028
18	24.67ft	4-7	COI	DAE	F02	-	-	-	1 Deposits Attached Encrustation - thickness estimated around 10mm (0.39in)	029	029

Pallion Go to the recording -> <https://app.pallion.com/recording/6037711c5854519bde093681cbb48>
Created on 31.10.2025 P 02 / 08

-  **Header and components**
Cover, frame, chimney, cone, wall, bench, channel
-  **Pipe connections and sketch**
Depth, clock position, size and material
-  **Every observation coded**
Code, position, clock and grade, with a photo
-  **Structural, O&M and overall grades**
Ratings, index and quick rating, calculated
-  **Link to the full recording**
Check any code against its 360° frame

Thousands of manholes analyzed every week

Hundreds of engineers use Pallon every day

What it delivers for each customer



NETWORK OPERATORS

Manage manholes with confidence

- Objective, consistent condition grades to prioritize critical structures
- All inspection data in one place, accessible to your whole team
- Reports within 5 business days, so you act sooner and cut failure risk



ENGINEERING FIRMS

Design more rehabilitations

- Consistent coding from one source instead of changing providers
- Complete, accurate defect data: time goes into design, not QA
- One source of truth instead of chasing data from many parties



INSPECTION CONTRACTORS

More manholes, same team

- Manholes arrive pre-coded and measured: your staff review and sign off
- Capacity no longer limited by the number of experienced coders
- Fewer rework loops with engineers; works with your existing cameras



REHABILITATION COMPANIES

Bid and design on measured data

- Quantified defects (intrusion length, diameter change) for accurate quantities
- Image-backed condition record to scope work before mobilizing
- Consistent network data points to the next projects

Sources: pallon.com — [Network operators](#) · [Engineering firms](#) · [Inspection companies](#). Rehabilitation companies: based on Pallon's measurement capabilities (see the software slide).

SEE IT ON YOUR DATA

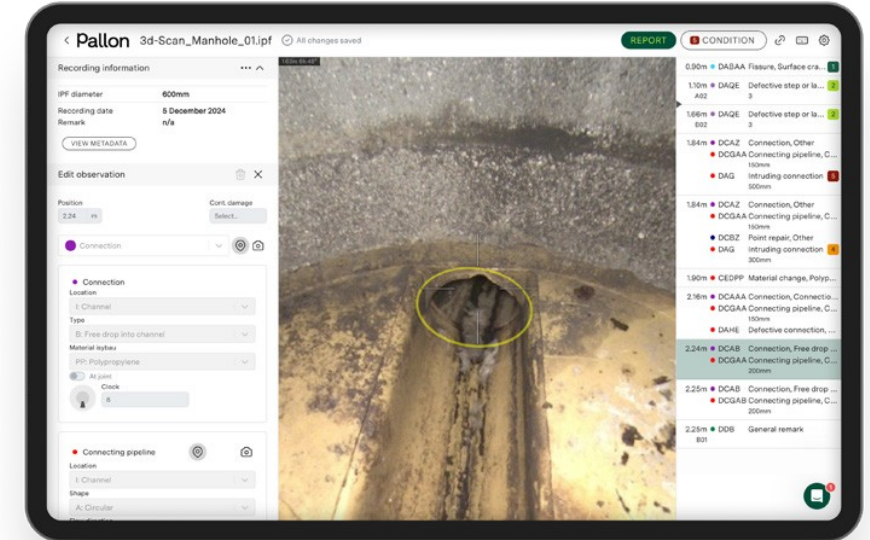
See it on your own manholes

The fastest way to judge AI coding is on structures you know. Intermountain demos the RV-MAX 360 on your manholes, Pallon codes up to 5 of them free of charge, and we walk through the results with your team.

app.pallon.com

Live walkthrough of coded structures

- Every coded observation sits next to the frame it came from
- Structure measured from Pallon's own 3D reconstruction
- Export to NASSCO import/export-certified software, such as WinCan



The Pallon app: a coded manhole, every observation next to its frame.

What it costs: hardware and software

RINNOVISION RV-MAX 360

One-time hardware purchase

Kit with 30-ft extendable pole	\$22,500
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Kit with 165-ft reel tripod	\$23,610
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Kit with pole and tripod (recommended)	\$24,795
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Includes all accessories, tablet, rugged transport case, training and RinnoCloud access. Plus shipping.

PALLON AI CODING

Pay per coded manhole

Level 2 MACP coding, per manhole	\$29.95
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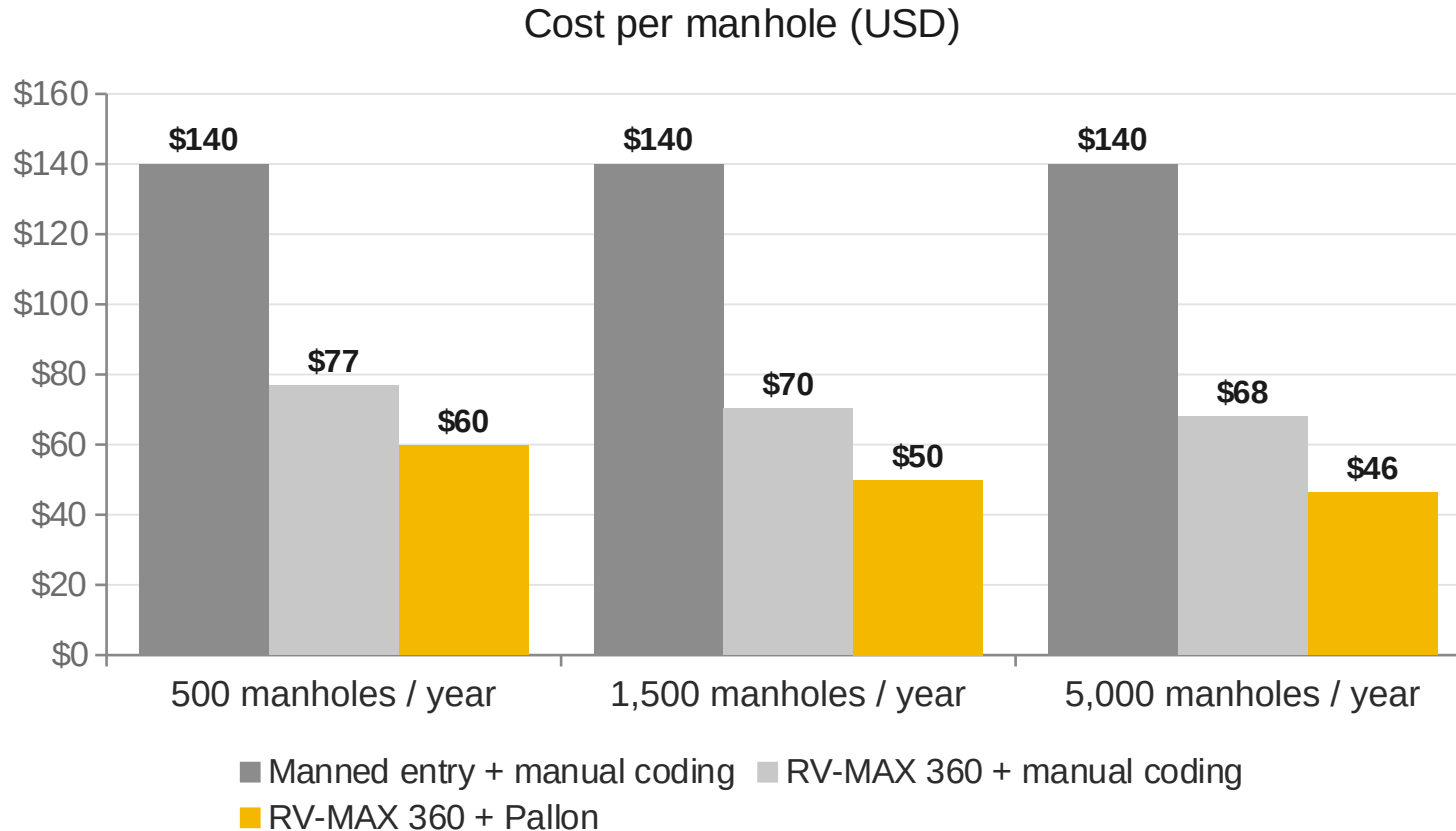
At 10,000 manholes per year	\$19.95
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Annual platform fee	\$2,450
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Every manhole comes back coded and measured within 5 business days, ready for your reviewer to sign off. No point cloud to buy.

All prices in USD, excluding shipping and taxes. RinnoVision list prices as quoted in April 2026; Pallon list pricing. Order both directly from Intermountain Sales; confirm current pricing in your formal quote.

Cost per manhole, all-in, by annual volume



SAVING PER YEAR VS. MANNED

500 / yr	\$40,116
1,500 / yr	\$135,166
5,000 / yr	\$467,841

HARDWARE PAYBACK

500 / yr	~7 months
1,500 / yr	~2 months
5,000 / yr	~3 weeks

Illustrative model: 45 min manual coding, 5 min review in every workflow, RV-MAX kit written off over 5 years. Breakdown on the next two slides.

Full cost background per manhole

Cost per manhole	Manned entry + manual	RV-MAX 360 + manual	RV-MAX 360 + Pallon
Field inspection on site	\$90.00 (2 × 45 min)	\$10.00 (10 min)	\$10.00 (10 min)
RV-MAX 360 kit, 5-year write-off *	—	\$9.92 / \$3.31 / \$0.99	\$9.92 / \$3.31 / \$0.99
Manual MACP Level 2 coding	\$45.00 (45 min+)	\$45.00 (45 min+)	—
Point cloud for measurements	—	\$7.00	—
Pallon coding and measuring	—	—	\$29.95 (0 min)
Pallon platform fee *	—	—	\$4.90 / \$1.63 / \$0.49
Review and sign-off	\$5.00 (5 min)	\$5.00 (5 min)	\$5.00 (5 min)
Total per manhole at 500 / year	\$140.00	\$76.92	\$59.77
Total per manhole at 1,500 / year	\$140.00	\$70.31	\$49.89
Total per manhole at 5,000 / year	\$140.00	\$67.99	\$46.43
Staff time per manhole	2 h 20 min or more	1 h or more	15 min

* At 500 / 1,500 / 5,000 manholes a year. At 1,500 manholes a year, staff time drops from 3,500+ to 375 hours.

Assumptions, and how the result moves

Assumption	Value
Manholes per year	500 / 1,500 / 5,000
Labor rate, loaded (truck + operator)	\$60.00 / h
Manned entry: crew × time on site	2 people × 45 min
RV-MAX 360: crew × time on site	1 person × 10 min
RV-MAX 360 kit, written off over	\$24,795, 5 years
Manual coding per manhole	30 / 45 / 60 min
Point cloud (manual coding only)	\$7.00
Pallon coding / platform fee	\$29.95 / \$2,450 a year
Review and sign-off, all workflows	5 min

Illustrative model — we rebuild it with your own volume, crew and labor rate.

Annual cost and saving vs. manned entry

Per year	Manned	RV-MAX + Pallon	Saving
500	\$70,000	\$29,884	\$40,116
1,500	\$210,000	\$74,834	\$135,166
5,000	\$700,000	\$232,159	\$467,841

Saving vs. owning an RV-MAX and coding manually

Coding	500 / yr	1,500 / yr	5,000 / yr
30 min	\$1,075	\$8,125	\$32,800
45 min	\$8,575	\$30,625	\$107,800
60 min	\$16,075	\$53,125	\$182,800

It has to fit the systems you already run



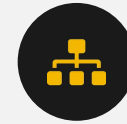
Your crews

Manhole capture with the RV-MAX 360 is added to existing CCTV routes — no confined-space entry, no additional crew.



Inspection software

Pallon exports to NASSCO import/export-certified inspection software, such as WinCan, or to a report or spreadsheet.



Asset management

Condition grades and observations land in your asset management system as structured data, not as PDFs to re-key.

To be straight about it: there is no native plug-in between Pallon and every asset management system. The typical route runs Pallon → your inspection software (e.g., WinCan) → your asset management system. If you would rather see that path demonstrated than described, we can walk through an export with your own data.

“We have tried AI on inspections before, and it did not hold up.”

A fair objection. Four things that should decide this instead of our claims:

1 Every observation is auditable

Each code sits next to the frame it came from. Your inspector confirms or overrides it — the AI proposes, it does not sign off.

2 Accuracy measured on your assets

Intermountain demos on your manholes and Pallon codes up to 5 free. Judge the output against your own team's coding.

3 The same test on your mainlines

Send us a set of your CCTV runs and we will code them to PACP, so your team can check pipe output the same way.

4 You set the accuracy bar

Agree the standard with us and review our output against your own coding — as an ongoing check, not a one-off acceptance test.

Being clear about where the limits are



Standing water

The camera cannot see below the waterline. In a flooded structure, the survey stops at the water level and is recorded as abandoned.



Structure size

Built for structures up to about 10–15 ft in diameter. Beyond that, lighting and image resolution are not enough for reliable coding.



Capture quality

Results depend on a clean capture: an aligned QR code, the right lighting mode and a steady descent. Training covers all three.



Your people sign off

Your crew enters header data and cover/frame measurements on site. Your certified reviewer checks and signs off every manhole.

What the ROI model does not count



Consistent data over time

The same defect gets the same code regardless of who inspected it or when — which is what makes trend analysis possible.



Engineering-ready export

Report and spreadsheet output that goes straight into assessment, removing a second round of data handling.



A visual condition record

Every grade is backed by imagery you can revisit — useful for design, for contractors, and for defending a budget request.



Fleet visibility in the field

With RinnoCloud, supervisors livestream from any RV-MAX 360, track units on a live map and update configurations remotely.

From a demo to a running program

- 1 Book a demo**
Intermountain brings the RV-MAX 360 to your manholes.
- 2 Up to 5 manholes coded free**
Pallon codes them; we walk through the results with your team.
- 3 Confirm volume and economics**
Your annual manhole count and loaded labor rate, in your own cost model.
- 4 Order from Intermountain Sales**
RV-MAX 360 kit and Pallon codings, ordered directly from Intermountain Sales.
- 5 First production batch, then mainlines**
Crews capture on scheduled routes; coded output goes to your inspectors. Extend to PACP when it suits you.

What we are asking for today

A demo date on your manholes

Up to 5 coded free, so your team judges the output on assets it knows.

Thank you

Questions — and a demo on your own manholes, with up to 5 coded free.

Intermountain Sales, Inc.

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www.intermtnsales.com



HARDWARE



AI CODING SOFTWARE

Pallon