

SEWER MONITORING SERIES

CIVIL ENGINEERING FIRMS

# Building a Sewer Flow Monitoring Practice: From \$890K Engagement to \$4.1M Follow-On Work

How a Regional Civil Engineering Firm Created a Sustainable Market Differentiator

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*"The monitoring program was the engagement. The follow-on work was the business model."*

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## Abstract

### DIRECT ANSWER — How do civil engineering firms build a profitable sewer flow monitoring practice?

Civil engineering firms build profitable monitoring practices by treating monitoring as a core technical competency that positions the firm as the incumbent analyst for all downstream design work. The firm that collects, analyzes, and interprets monitoring data owns the analytical narrative — they understand the system better than any competitor, and are the most credible author of resulting capital improvement recommendations. In technical consulting markets, this creates a durable competitive advantage.

This case study documents how Meridian Infrastructure Engineers, LLC — a 47-person regional civil engineering firm — built an in-house flow monitoring practice over 18 months and generated \$4.1 million in follow-on design and construction administration work from three initial monitoring contracts totaling \$890,000. The practice required approximately \$375,000 in investment and achieved 10.6x return within 36 months. Four new client acquisitions from referrals followed within 24 months of completing the first three programs.



## Background

### Why Do Engineering Firms Subcontract Flow Monitoring — and Why Should They Stop?

The historical practice of subcontracting monitoring to specialty firms assumed monitoring is a subspecialty requiring specialized equipment that a general civil engineering firm need not maintain. The logic was straightforward: avoid capital investment, avoid training costs, and focus on higher-margin design work. This logic contains a structural flaw: the firm that analyzes the monitoring data is positioned to recommend the rehabilitation program. When a firm subcontracts monitoring, the specialty firm develops the deepest technical understanding of the client's system — and is then positioned to expand into design services.

#### THE STRATEGIC INSIGHT

In technical consulting markets, the analyst is the most trusted advisor. The firm that characterizes the RDII, calibrates the hydraulic model, and explains the system's behavior to the client controls the technical narrative. When that narrative is "your system needs \$10M in rehabilitation — here is specifically what, where, and why," the firm that wrote it is the most qualified designer of the resulting

program. The monitoring program is not a precursor to the engineering work — it is the beginning of it.

## Methodology

### How Did Meridian Structure the Practice Build-Out?

Component	Investment	Details	Strategic Rationale
Equipment Inventory	\$312,000	24 AV monitoring units, 8 rain gauges, telemetry hardware, data loggers, calibration equipment	Ownership is economically superior to rental when annual deployment exceeds ~200 meter-months
Technical Training	\$28,000	2 staff engineers: 40-hr monitoring certification. 1 senior engineer: advanced RDII/SSOAP training	In-house expertise creates defensible technical authority; certification demonstrates competence to clients
Software Platform	\$28,000/yr	Cloud-based flow/rainfall data management with GIS integration and automated QA/QC flagging	Platform quality directly impacts deliverable quality and enables remote monitoring efficiency
QA/QC Protocol	~180 staff hrs	Site selection methodology, analysis workflow, reporting templates, QA/QC checklist	Documented, repeatable methodology is the key differentiator in competitive proposals

### What Analytical Methodology Was Standardized Across All Three Clients?

- Step 1 — Data cleaning: Automated QC screening flagged anomalies; manual review approved all data used in RDII analysis
- Step 2 — DWF characterization: Diurnal patterns established across minimum 14 days dry-weather data per location
- Step 3 — Event selection: Minimum criteria applied uniformly — >0.25" rainfall, 48-hr antecedent dry period, complete hydrograph capture
- Step 4 — RTK estimation: Non-linear least-squares fitting using EPA SSOAP Toolbox; Nash-Sutcliffe Efficiency >0.70 required
- Step 5 — RDII density mapping: GIS-based maps of RDII volume per contributing acre — the primary CIP prioritization metric
- Step 6 — Reporting: Standardized template with executive summary for non-technical audiences; full technical appendices for regulatory review

# Results

## What Were the Financial Outcomes Across the Three Client Programs?

**Figure 1 — Engineering Firm: Monitoring to Follow-On Work Revenue Pipeline  
Case Study 3: Meridian Infrastructure Engineers**

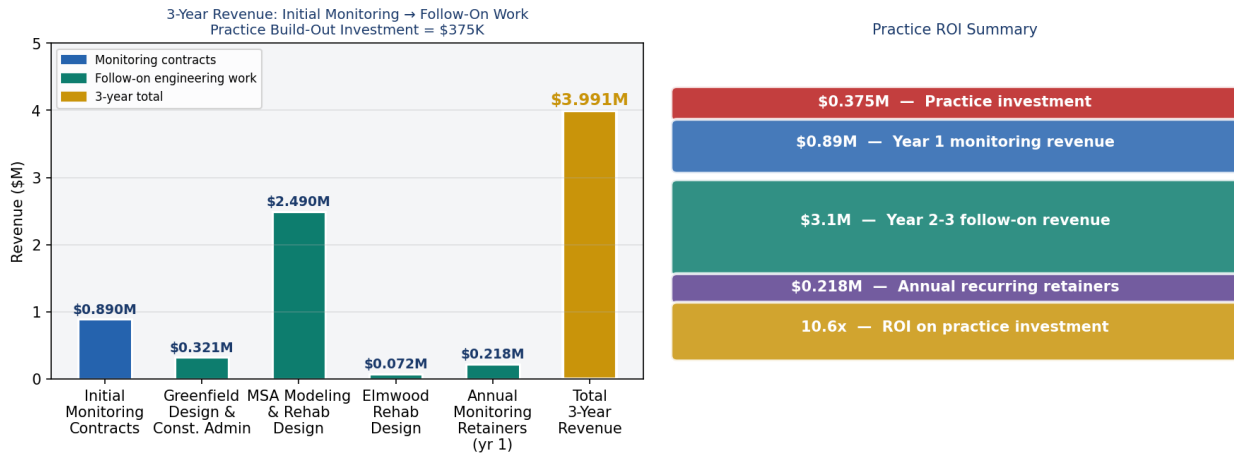


Figure 1 — Left: 3-year revenue waterfall from initial monitoring contracts through follow-on design work. Right: Practice ROI pyramid showing 10.6x return on \$375K investment within 36 months.

Client	Monitoring Contract	Key Finding	Follow-On Work Generated
City of Greenfield (pop. 67,000)	\$280K	42 illegal storm cross-connections in historic downtown — fast inflow dominant	\$321K design + construction admin + \$45K/yr monitoring retainer
Metro Sewer Authority — Western Basin	\$380K	Quantified SSO volumes (3 sites overestimated, 4 underestimated) — redirected priority spending	\$2.49M hydraulic modeling update + rehab design
Township of Elmwood (pop. 22,000)	\$230K	Pump station complaints entirely wet-weather driven in 2 sewersheds; pump expansion not needed	\$72K CIPP + controls design

### EQUIPMENT OWNERSHIP ANALYSIS

Meridian's financial modeling showed that equipment ownership becomes economically superior to rental when annual deployment exceeds approximately 200 meter-months. With three concurrent clients deploying an average of 18 meters each, Year 1 deployment exceeded 380 meter-months — well above break-even. The \$312,000 equipment investment generated approximately \$180,000 in avoided rental costs in Year 1 alone.

# Engineering Significance

## COMPETITIVE MOAT: DATA CREATES INCUMBENCY

In municipal infrastructure consulting, the monitoring firm has a structural advantage in follow-on competition. When Meridian's RDII characterization identifies specific defects in specific sewersheds and recommends specific rehabilitation technologies — the firm that wrote those recommendations is the most qualified designer of the resulting program. Competitors cannot replicate this knowledge advantage without undertaking their own monitoring campaign. This incumbency is both technical and relational.

## Conclusion

The Meridian case study provides a replicable template for engineering firms seeking durable competitive positioning in the municipal wastewater infrastructure market. The \$375,000 practice build-out investment generated \$4.1 million in identifiable follow-on work within 36 months and established the firm as a recognized regional authority on collection system RDII characterization — positioning that generated four additional client acquisitions through referrals alone.

Engineering firms should evaluate sewer monitoring not as a commodity service but as a strategic capability that creates technical authority, client incumbency, and a follow-on work pipeline. The monitoring program is the most effective business development tool in the municipal infrastructure market — because it produces the data that drives every subsequent engineering decision.

## Frequently Asked Questions

### Q: When does it make sense for an engineering firm to own flow monitoring equipment rather than renting it?

Equipment ownership becomes economically superior to rental when annual deployment exceeds approximately 200 meter-months (e.g., 20 meters deployed for 10 months per year). At this utilization level, capital cost is typically recovered within 18–24 months through avoided rental costs. Additional benefits: equipment availability when needed, institutional calibration knowledge, and rapid deployment capability for emergency response situations.

### Q: How does RDII analysis create follow-on engineering work?

RDII analysis identifies specific, spatially resolved rehabilitation needs: which sewersheds have the highest RDII density, which RDII component dominates in each, and which rehabilitation technologies produce the greatest RDII reduction per dollar. These findings directly require engineering design: CIPP lining specifications, manhole rehabilitation designs, private property I/I programs, cross-connection enforcement plans. The firm that conducted the RDII analysis is the best-qualified designer of these programs.

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