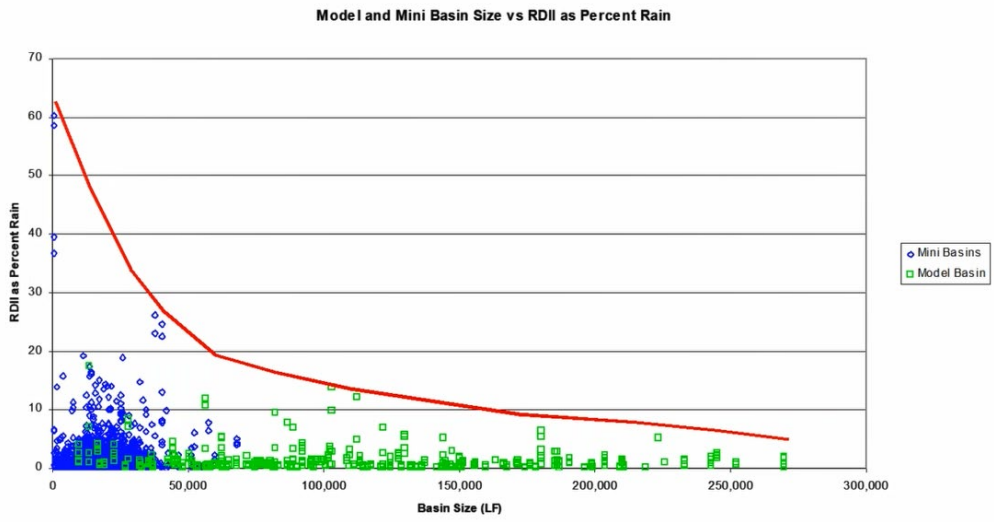
Learn How Proper Sizing of Basin Capacity Enables Significantly More Effective and Accurate I/I Analysis

Understanding the key relationships between basin sizes selected for monitoring within a given area and the resultant accuracy of Infiltration and Inflow (I/I) analysis has become a critical factor for implementing cost-effective management of I/I.

Size Matters

While it may seem intuitive after digging a bit deeper into these relationships, agencies have not typically understood how important basin size can be for getting accurate results. For example, many agencies simply start out with hydraulic modeling by placing their monitoring points based on node locations, perceived "hot-spots", previous spill events, etc. For example, the graph below shows such an approach, where the agency divided up the overall sewer shed into a variety of basin sizes, ranging from small mini-basins to huge basins of more than 250,000 LF.

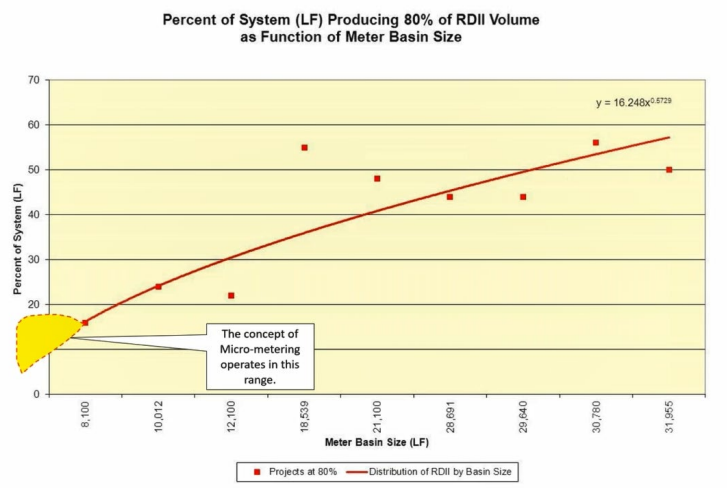
The Y-axis shows Rainfall Dependent I/I (RDII) as a percent of rain entering the sewer system. As can be seen, the smaller basin sizes, typically under 20,000 LF, show much more pronounced spikes in RDII levels.



This is an indication that basin size matters for designing an effective I/I management program.

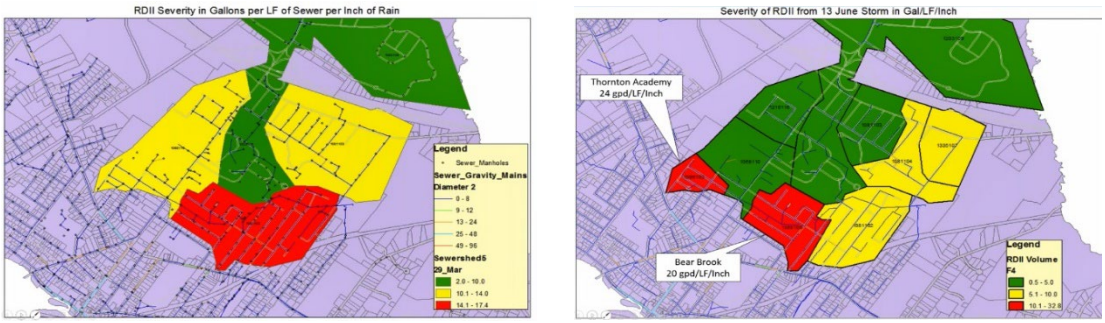
How the 80 / 20 Rule Applies to Basin Size Selection

Taking the analysis a step further, we can also apply the well-known 80/20 statistical rule. As shown in the next graph, this project purposely used a variety of different basin sizes, ranging from 8,000 LF on the low end up to 32,000 LF on the high end. The Y-axis represents percent of the system required to identify 80% of the I&I. As can be seen, in the larger basins, 80% of the I&I was spread across 50% or more of the basin. In contrast, with the smaller basins, 80% of the I&I could be associated within 20-25% of the basin. This concept of "micro metering" represents much better granularity for analysis of exactly where I&I is occurring within the basin.



How Micro-Metering Improves Cost-Effectiveness and Accuracy

Using the principles described above, many forward-looking agencies have been adopting the micro-metering concept to improve both the accuracy of I/I targeting and the overall economic efficiency of the sewer management system. As shown below, RDII severity is mapped into areas with Green for low severity, Yellow for marginal and Red for high. The graph on left shows results for phase 1, with a moderate number of meters while the graph on the right shows results using more meters that creates smaller basin sizes.



As can be readily seen, the size and location of the Red areas shifted significantly, with increased meter density providing more measurement site granularly to reveal exactly where the I/I is most severe. This enables agencies to target inspections and corrective actions where they are most needed. Moreover, it improves asset planning for CIP projects.

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