Sliicer.Com
The ADS RDII Analysis Tool

More Consistent Calculations

Sliicer is designed with Global Settings that allow the user to make several decisions upfront about how calculations will be made. Data are processed much like a computer program with identical logic being replicated for each event. Human intervention can occur, but all changes are traceable. There are at least 33 programming logic choices in Sliicer, not counting the choices of units for 10 parameters (Imperial and Metric). There are default entries for all programming choices, but they can be changed to achieve different results. For example a user can set the threshold rainfall for an event to qualify as a storm to be analyzed. The default is 0.5 inches, but for CSO work many engineers will specify 0.25 inches.

Human Viewing Speed Graphics

Many of the graphics in Sliicer are unique and all are extremely easy to produce. They are designed to present key information in way that can be readily understood. Some graphics are used only in the RDII business and will appear valueless to anyone who has not felt the "pain on the cheek". For example when one engineer saw the DDF and Worm Track tools for rainfall, she exclaimed that this tool alone was worth its cost. Examples of other graphics are included in the **Features** section in this document.

Repeats "What If" Analyses in a Flash

A fantastic life-saving feature of Sliicer is its ability to rapidly repeat the analysis multiple times while changing a single variable. Because all the key logic settings are saved, Sliicer's "Auto" button allows the entire study to be re-processed in seconds per site. For example if an engineer completed an entire study and discovered that one of the rain gauge files was incorrect and would produce incorrect Q to i relationships, the engineer merely replaces or corrects the rain file and hits the "Auto" button and the entire study is recalculated. The recalculation speed varies by duration of data and computer speed, but a typical 90-day study will be processed in under 4 seconds per monitor site. Sliicer recently processed 375 storm events in eight years of data from 8 flow meters and 27 rain gauges in under 5 minutes. This analysis also divided the data into 32 calendar quarters and produced dry day flow values (Weekdays and Weekends) and Q to i relationships for each quarter.

Training and Help

There is an easy-to-read Quick Start Guide to get first time users started on the practice databases. In addition to written instruction, Citrix has the ability to allow Regional Engineers and the Support Center to “shadow” users as they operate Sliicer.com. The person shadowing will see the screen and mouse of the user and can take control over the mouse at will and show the user what to do. As a matter of security, the customer must grant access his screen and the Regional Engineer can see only the user’s screen and nothing else on the user’s computer.

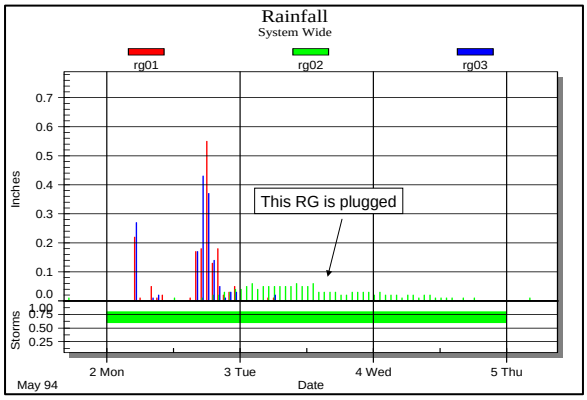
Of course customers who become users of Sliicer.com should receive training and obtain the 230-page Users Guide. Training will be tailored to the project needs and Sliicer features that should not be used will be disarmed. For example Sliicer has an automated RTK routine that solves for RTK values for each storm and this feature can be armed for SWMM modelers.

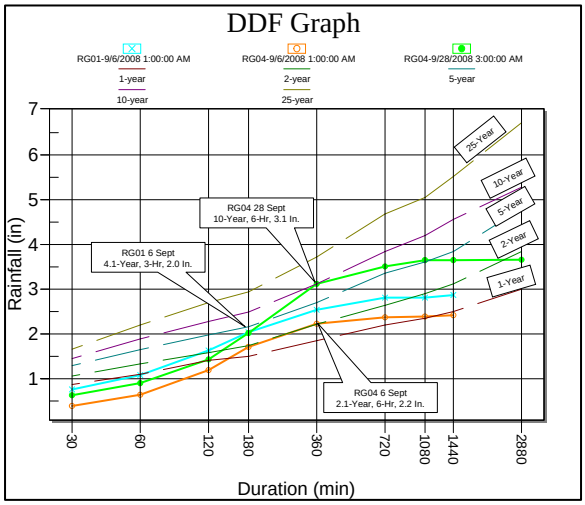
Data are stored in a Profile database, which is built on Access. Profile can import data in almost any data format including, .xls, .csv, and .txt. Sliicer reads data from Profile and builds a second Access data base with results and all project settings.

Features of Sliicer

Rainfall Analysis

- Allows user to view hyetographs of multiple rain gauges to spot poor data.
- Allows user to ignore a RG for selected days and automatically recalculates a new rainfall distribution from the remaining RGs.
- Allows for four geographic distribution methods, such as Inverse Distance Squared, and handles radar rainfall input.
- Generates Depth Duration Frequency (DDF) curves for the local area and plots individual storms as “Worm Tracks” to determine return frequencies of each storm and each rain gauge.
- The Maximum Return Frequency is determined for each rain gauge and for each storm as shown in the table below. The user can select the minimum duration for this analysis and the minimum duration of 60 minutes was selected for this table.

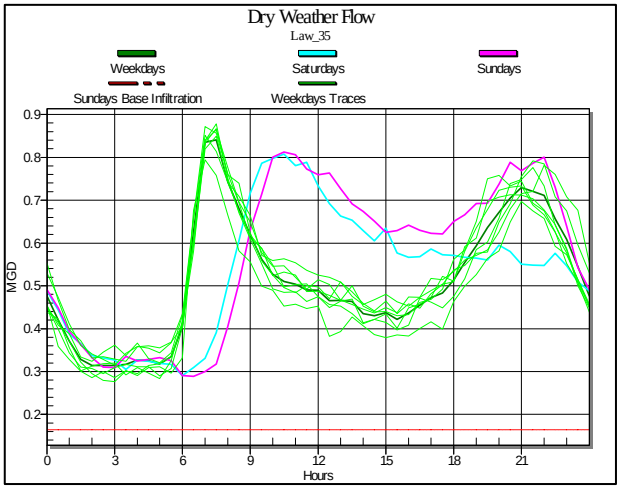




Storm	RGAN	RGBW	RGGF	RGKP	RGLH	RGOH
7/25/2011	0.3-mo;6-hr;0.1-in	0.1-mo;2-hr;0.0-in	1.1-mo;1-hr;0.3-in	0.6-mo;1-hr;0.2-in	10.2-mo;1-hr;1.1-in	0.3-mo;3-hr;0.1-in
8/6/2011	0.7-mo;2-hr;0.3-in	0.5-mo;1-hr;0.1-in	0.6-mo;1-hr;0.2-in	0.4-mo;2-hr;0.2-in	3.9-mo;2-hr;1.0-in	4.5-mo;1-hr;0.9-in
8/13/2011	11.4-mo;1-hr;1.2-in	0.5-mo;12-hr;0.3-in	3.4-mo;72-hr;2.2-in	4.6-mo;1-hr;0.9-in	7.3-mo;2-hr;1.2-in	4.3-mo;1-hr;0.8-in
8/21/2011	1.2-yr;1-hr;1.2-in	4.3-mo;1-hr;0.8-in	1.1-mo;1-hr;0.3-in	10.8-mo;1-hr;1.1-in	0.4-mo;1-hr;0.1-in	1.0-mo;1-hr;0.3-in
8/27/2011	11.7-yr;18-hr;4.7-in	30.0-yr;18-hr;6.0-in	4.8-mo;18-hr;1.8-in	29.3-yr;18-hr;6.0-in	7.1-yr;18-hr;4.2-in	16.6-yr;18-hr;5.1-in

Dry Day Analysis

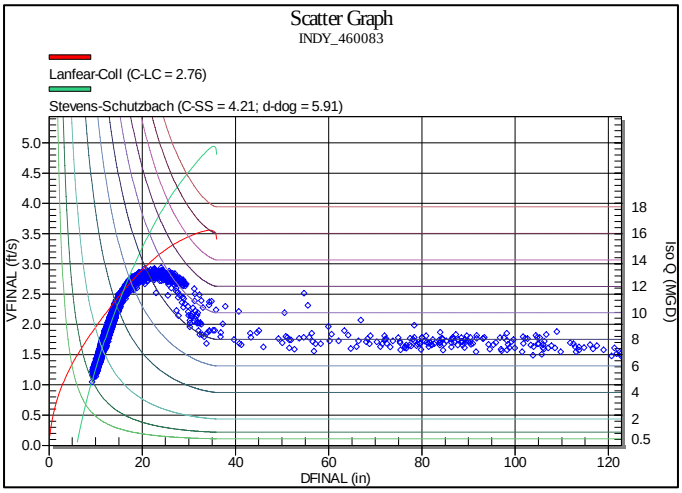
- Automatically finds dry days, but still allows full user override based on inspection of results.
- Allows user to group days of week into day groups based on similar flow patterns (e.g. Weekdays & Weekends). Any combination of days is possible and this hydrograph looks at Weekdays, Saturdays and Sundays.



- User can handles holidays, football games and other special days.
- Displays peak, minimum, and average flow, and diurnal curves for each day group.
- Offers four methods for estimating Base Infiltration (BI).
- Produces tabular results for each day group for all Dry Day Flows including a normalized value of Waste Water Production (WWP) per length of sewer (LF). This value will remain relatively constant for each type of land use and is a good indicator that metering is proper.

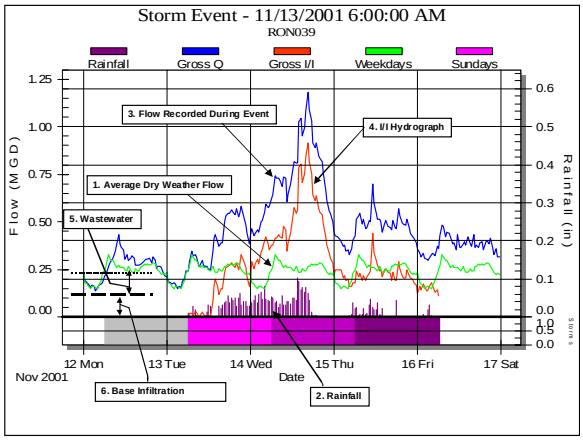
DayGroup	Gross Peak	Gross Min	Gross Avg	Gross WWP	Gross BI	WWP/LF	WWMethod
Weekdays	0.841	0.314	0.513	0.377	0.135	5.472	WW=(A-M)/x%
Saturdays	0.808	0.29	0.533	0.334	0.199	3.14	Stevens/Schutzbach
Sundays	0.812	0.289	0.572	0.408	0.164	4.445	Stevens/Schutzbach

Scattergraph Analysis



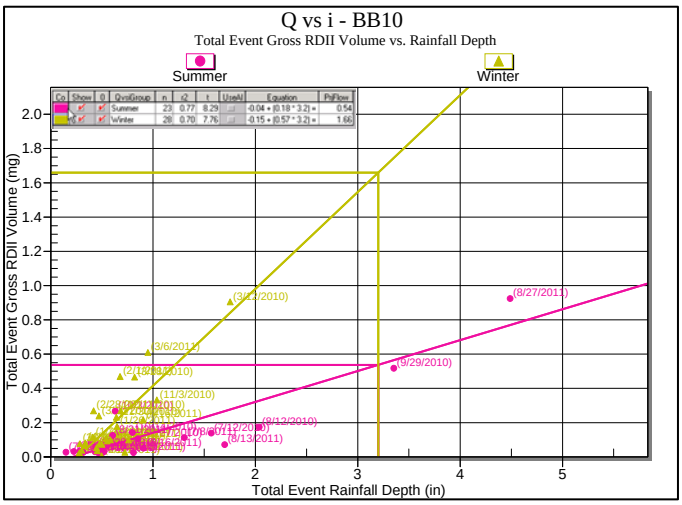
- Plots depth-velocity scattergraphs with entities on either X- or Y-Axes.
- Lanfear-Coll (Manning) pipe curve predicts depth-velocity relationship in ideal hydraulic conditions.
- Stevens-Schutzbach pipe curve predicts depth-velocity relationship in presence of a Dead Dog.
- Optional Iso-Q lines and Iso-Froude lines for determining rate of flow, determining pipe capacity and spotting hydraulic jumps or standing waves.
- Animated plotting reveals timing of hydraulic changes and coloring selected time periods tracks changes over time such as silt build up.

Storm-by-Storm RDII Analysis



- User-controlled criteria automatically identifies storm events
- Displays individual graph of each storm event.
- Subtracts correct day group to calculate I/I.
- Allows user to compensate for elevated flows preceding a storm.
- Divides the storm into three periods, and calculates the volume and peak I/I for each – a total of 44 separate values.
- Data Tables can easily be ‘joined’ to GIS data to create maps of RDII results.
- Calculates and displays Gross Q, Gross I/I and Net I/I for each event.

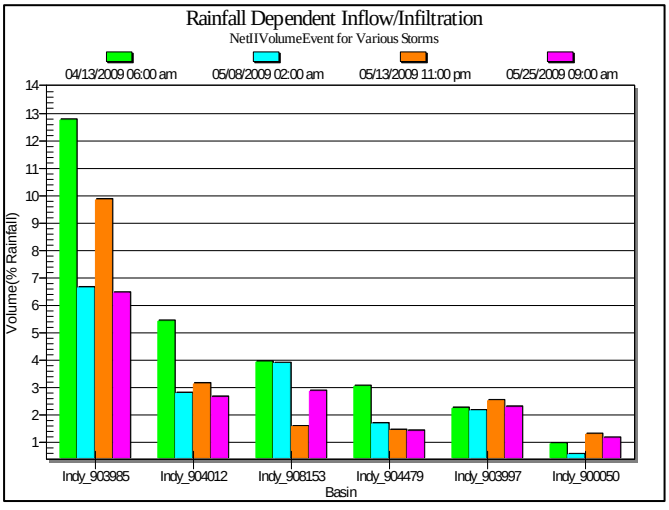
- **Q-vs.- i Relationships**
- Generates four types of Q vs. i diagrams – Peak, Volume to Time-of-Peak and Volume (24 & 72-hour) methods.



- Generates Regression lines in both linear and log formats.
- Storms can be grouped by several variables including Duration of Storm, Season and Pre- and Post-Rehabilitation Regimes. This graphic displays the Q vs. i relationship for Summer storms and Winter storms.
- Projects RDII peak and volume for design storms based on regression line. This graphic displays the projected volume of RDII from a 5-year, 24-hour storm of 3.2 inches for Summer (0.54 mg) and Winter (1.66 mg) seasons.

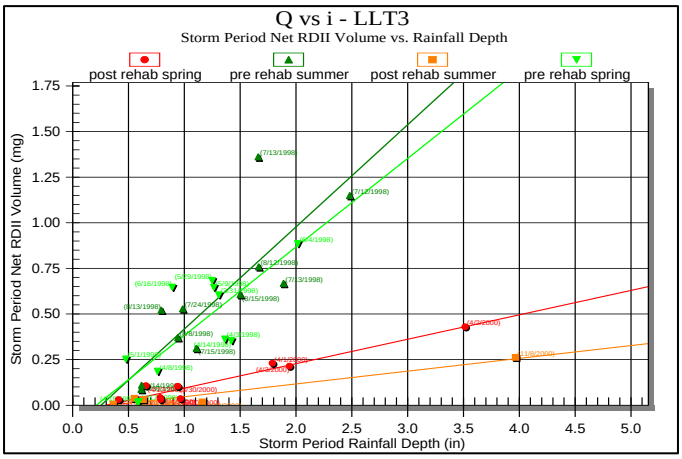
Normalized RDII Results

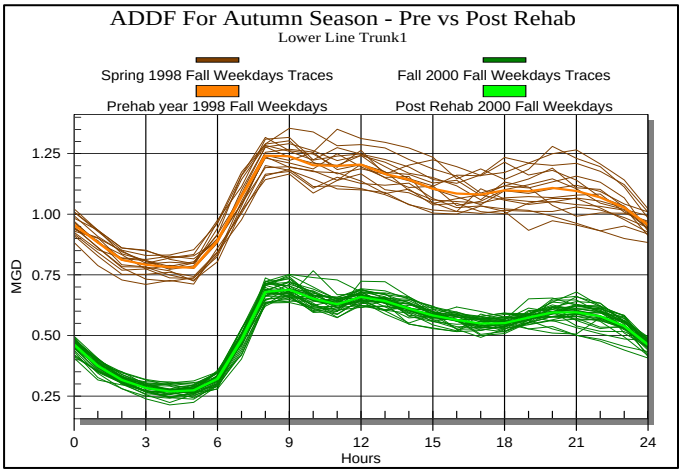
- Ranks basins by any of the 44 separate I/I parameters Sliicer calculates.
- Compare one I/I parameter for different storms, -or-
- Compare different I/I parameters for the same storm.
- Normalize by rainfall to account for unequal distribution over the study area.
- Normalize by four measures of basin size: Area, Length of Sewers, Inch-Diameter-Miles and Percent rainfall.



Pre- and Post-Rehabilitation Analysis

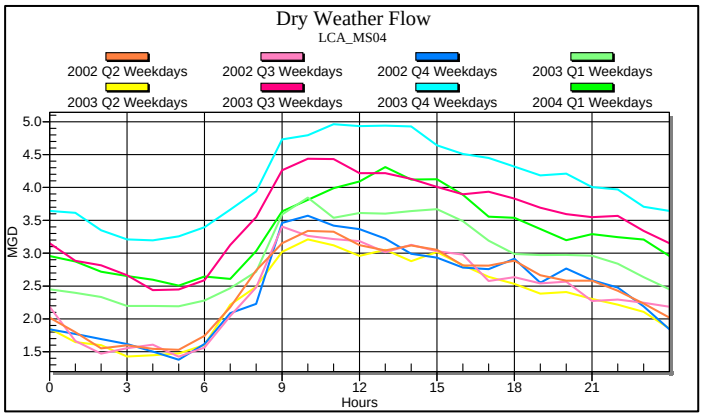
- Generates multiple Q to i relationships (regression lines) through data collected during both the pre-rehabilitation and post-rehabilitation flow measurement periods.
- Q to i relationships can be further separated into seasons (compare only Spring rain responses for before and after rehabilitation).
- Each regression line can be used to generate a prediction of peak flow or volume for various design storms.
- Pre- and Post-rehabilitation Dry day hydrographs can be generated.
- Base Infiltration (BI) rates can be estimated for both Pre- and Post-rehabilitation periods.

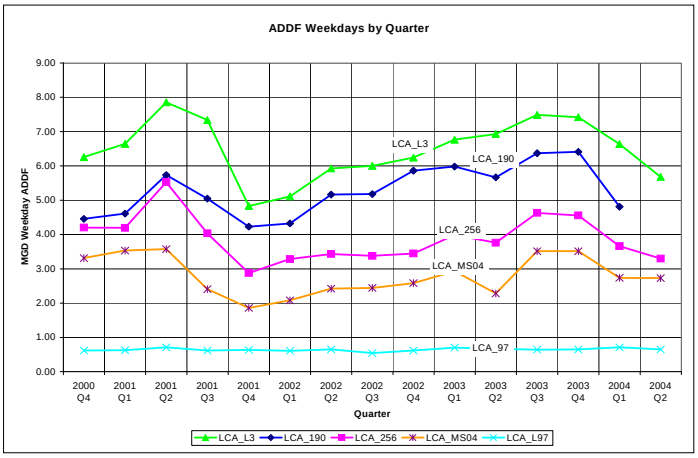


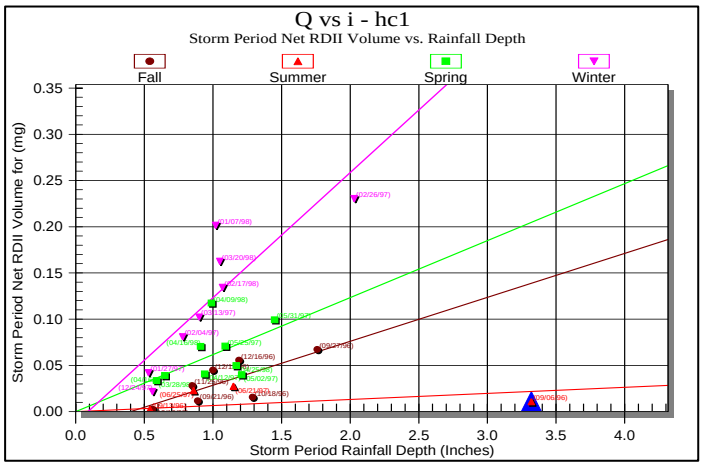


Long Term Analysis

- Dry day hydrographs can be compared by season and year to spot changes in sewer usage or level of Base Infiltration.
- Plotting the seasonal ADDF of the entire network over time allows a manager to view changes and trends over a long period of time. In this example a brewery closed in the fall of 2001 and growth in the nearby industrial park contributed addition flow through 2003.
- Many managers determine wet weather performance by comparing coarse measurements such as total rainfall for a month vs. total flow treated at the WWTP for the month. A graph of Q vs. i relationships is a much more precise storm-by-storm measurement that can be displayed by season and year.



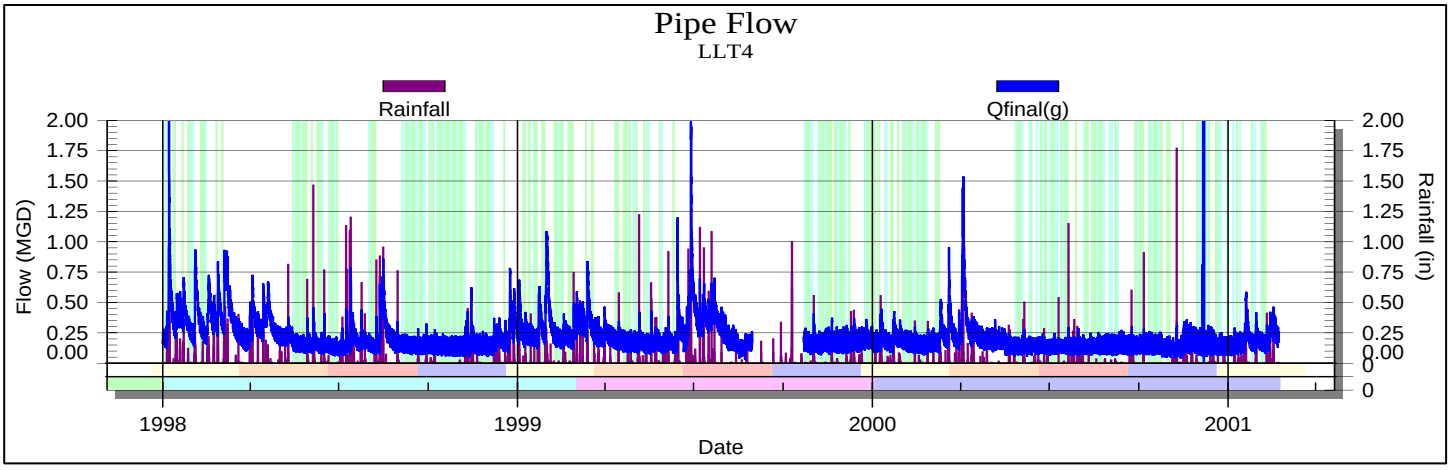




Graphing Possibilities are almost Unlimited

There are more possible combinations for graphing data than a human should be exposed to. It has often been observed that no two engineers will conduct an analysis or produce graphics the same way and Sliicer offers wide flexibility in the types of graphics that can be produced. The Catalog of Deliverables attempts to capture some of that flexibility. The flexibility is needed to answer the sorts of questions engineers face. As an example the two figures on the next page show the vast array of plotting choices available in just the Dry Day Table for a complex long-term project with rehabilitation.

Given the three-year set of data shown below from a basin that has undergone some rehabilitation, an engineer might be asked to compare the average dry weekday and base infiltration between the winters of 1999 and 2001. This question might take an hour or more to answer with spreadsheet technology, but only seconds with Sliicer.



Exporting and Printing

- File Export to Models – Dry Day Hydrograph, Storm Hydrograph, Rain Hyetograph.
- Nearly every graphic in this document can be printed in batch mode.

The four boxes checked with red and green produce the simple graph that answers the simple question. The actual Average Dry Day Flows for each period are circled in the table.