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FINAL REPORT

November 2016

TOWN OF
Dedham
MASSACHUSETTS

Town-Wide Flow Monitoring

5 Centennial Drive, Peabody, MA 01960 (HQ)
Tel: 978.532.1900

Town of Dedham, Massachusetts
Weston & Sampson Project No. 2160019.A

November 04, 2016

Jason L. Mammone, P.E.
Director of Engineering
Public Works Facility
55 River Street
Dedham, Massachusetts 02026

Re: Final Report – Town-Wide Flow Monitoring

Dear Mr. Mammone:

In accordance with our January 12, 2016 agreement, Weston & Sampson is pleased to submit our final report for the town-wide flow monitoring conducted in spring 2016. This project also included groundwater and rainfall monitoring, and limited flow isolation in subareas BB, and partial sections of II, LL, and MM.

This report presents our analysis of the flow metering results, provides estimates of peak infiltration/inflow (I/I) and total inflow volume and identifies areas that appear to contribute excessive I/I. The results of flow isolation are also provided. The Department of Environmental Protection (DEP) *Guidelines for Performing I/I Analyses and Sewer System Evaluation Survey* (DEP Guidelines) were used as a guide for the flow data analysis.

Area Description and Project Objectives

The Town of Dedham, Massachusetts is a residential community located southwest of Boston. Wastewater collected in the town drains east to the Boston line where it enters the Massachusetts Water Resources Authority (MWRA) interceptor. The flow is ultimately treated at the Deer Island Wastewater Treatment Plant. The town's wastewater collection system consists of approximately 96 miles of gravity sewer. A summary of the gravity sanitary sewer pipes is shown in Table 1.

For this analysis, 24 meter areas were delineated and utilized to divide the collection system. Figure 1 in Appendix A shows each sewer subarea, the limits of the wastewater collection system and locations of the flow meters. The flow schematic used in this project is shown as Figure 2 in Appendix A.

Groundwater Monitoring

According to the USGS groundwater gauge located in Norfolk, Massachusetts, groundwater levels during a majority of the monitoring period were slightly lower than the historical springtime averages. This may decrease the baseline infiltration flows during the analysis because less groundwater may be entering the sewer system through pipe and manhole defects. Please note that the USGS site is located outside of Dedham and the data only serves to indicate the general groundwater trends of the region, not the immediate study area.

There were also temporary groundwater gauges installed in manholes EE16, JJ1080 and VV30 to monitor groundwater levels in the study area. Manholes JJ1080 and VV30 had a much higher groundwater level than those recorded at the USGS site. In particular, manhole JJ1080 is located in an easement near a small stream in a wet area. Groundwater levels at this location were extremely high, within 2 vertical feet of the ground surface, throughout the monitoring period. The high groundwater levels measured at this site most likely do not illustrate conditions throughout the entire study area. Manhole EE16 had groundwater levels slightly higher than the USGS site throughout the study period. The wide range of groundwater conditions illustrate that the groundwater level is dependent on the topography and soil conditions at that site. Groundwater can vary dramatically within the town depending on the soil conditions at that particular sewer manhole. For individual groundwater gauges, levels were consistent throughout the study period, with the exception of levels recorded at sit EE16, which rose by approximately 1 vertical foot on May 1, 2016 to the end of the study period.

A summary of the groundwater levels is shown in Figure 3 in Appendix B.

Rainfall Monitoring
Hourly rainfall information was collected by a tipping-bucket rainfall gauge during the monitoring period. The gauge was installed at the Public Works Facility at 55 River Street. Rain gauges on Rustcraft Road and at Norwood Memorial Airport were compared to this data and showed much lower rainfall totals during the study period than those measured at 55 River Street (0.26 in. and 6.83 in. respectively as compared to 9.92 in. at 55 River Street). Due to these results and to the location of the gauges in respect to the meters, rainfall data was taken solely from the rain gauge at 55 River Street. Rainfall data was collected in fifteen-minute increments. The rainfall summary graph is shown in Figure 4 in Appendix C. 18 rainfall events occurred during the monitoring period and are summarized below.

<u>Rainfall Events</u>

Storm #	Start Date	Start Time	End Date	End Time	Duration (hrs)	Total Rainfall (inches)	Peak Intensity (in/hr)	Average Intensity (in/hr)
1	3/2/2016	0:50:00	3/2/2016	9:20:00	8.5	0.45	0.22	0.05
2	3/10/2016	14:10:00	3/10/2016	23:05:00	8.92	0.21	0.04	0.02
3	3/14/2016	13:00:00	3/15/2016	18:55:00	29.92	1.24	0.14	0.04
4	3/17/2016	0:50:00	3/17/2016	1:45:00	1	0.17	0.17	0.17
5	3/21/2016	11:15:00	3/21/2016	13:10:00	2	0.28	0.23	0.14
6	3/25/2016	8:55:00	3/25/2016	11:50:00	3	0.11	0.06	0.03
7	3/28/2016	7:05:00	3/28/2016	6:00:00	11	0.46	0.14	0.04
8	4/2/2016	8:25:00	4/2/2016	19:20:00	11	0.43	0.16	0.04
9	4/3/2016	2:20:00	4/3/2016	13:10:00	5.83	0.72	0.2	0.12
10	4/5/2016	11:30:00	4/5/2016	15:25:00	4	0.34	0.16	0.08
11	4/7/2016	10:10:00	4/7/2016	18:05:00	8	1.42	0.34	0.17
12	4/12/2016	9:25:00	4/12/2016	12:20:00	3	0.28	0.13	0.09
13	4/26/2016	9:45:00	4/26/2016	12:40:00	3	0.3	0.19	0.1
14	5/2/2016	10:10:00	5/2/2016	13:05:00	3	0.3	0.21	0.1
15	5/4/2016	16:35:00	5/4/2016	21:30:00	5	0.36	0.12	0.07
16	5/13/2016	18:20:00	5/14/2016	0:15:00	6	0.14	0.03	0.02
17	5/19/2016	22:10:00	5/19/2016	23:05:00	1	0.18	0.18	0.18
18	5/30/2016	3:45:00	5/30/2016	8:40:00	5	1.32	0.70	0.26

*Note: Rain events highlighted in blue were used in the analysis

The frequency of each storm can be determined by comparing it to the depth-duration-frequency (DDF) data for the region. The DDF data for the region has been compiled over the past several years, with curves developed that illustrate the rainfall depths for design storms ranging from a 2-month to a 100-year storm. This data can then be compared to the storm events that the town experienced during our monitoring period. According to the DDF Graphs, the town experienced two storms (Storm Event 11 and 18) that were approximately a two-month, 6-hour storm historically experienced in the area. The DDF Graphs for each storm event are shown in Appendix C.

Flow Monitoring

Flow monitoring was conducted to obtain current information regarding the sewer flows for use in quantifying I/I rates. A total of 24 flow meters were used in this analysis. Eight of the flow meters are permanent flow meters installed, calibrated and maintained by the MWRA. The MWRA maintains these flow meters for billing purposes for the Town of Dedham. Weston & Sampson retained the services of Flow Assessment Services to install, calibrate and maintain wastewater flow meters at the remaining sixteen locations. The 24 flow meters were used to measure flow from 25 of the 26 sewer subareas. Please note that some meters measured flow from multiple subareas. Due to multiple connections into the MWRA interceptor, no portion of sewer subarea BB was monitored. Flows were monitored and data was accumulated from February 27 through May 30, 2016. Raw data for the monitoring period is available to the town upon request.

Each flow meter recorded flow volume, depth and velocity in fifteen-minute intervals to calculate flow quantities. A meter was placed in a sewer pipe to measure flows from that area. Each meter was numbered according to the manhole in which it was installed. For example, flow meter AA5 was located in Manhole 5 in Subarea AA. The configuration of the flow meters is shown in Figure 1 in Appendix A. Some meter data includes flow from tributary meters, making it necessary to subtract data from upstream meter readings to obtain individual area data. A flow schematic is shown in Figure 2 in Appendix A.

The data for each meter was analyzed to determine the quality of the data. A hydrograph depicts the diurnal curve for an area. Hydrographs were plotted to examine flow meter performance, data trends, and response to wet weather events. Hydrographs display the changes in flow and total rainfall, recorded at each meter location. Hydrographs for each meter are included in Appendix D. Meter data was further evaluated for accuracy by analyzing the shape of the scatter graph produced by plotting depth in inches versus velocity in feet per second. Scatter graphs for data representing uniform flow conditions should display a direct relationship between depth and velocity – where an increase in velocity occurs with an increase in depth.

Multiple scatter graphs display some outlying data points that do not show a uniform flow pattern. The cause for this may have been some debris build-up downstream that was alleviated. The scatter graph for site ZZ400 had both drifting velocity and depth sensors while site GG20 had a drifting velocity sensor from 5/17 to 5/30. The rain event on 4/7 caused minor backwater and surcharge at site VV30, which also had an effect on upstream site TT50. This same rain event cause hydraulic hysteresis at site WW10, which indicates high inflow at this site. This questionable data was not used in our analysis. Scatter graphs are included in Appendix E.

Infiltration

Infiltration is extraneous groundwater that enters the sewer system through sources such as defective pipes, pipe joints and manhole walls. Analysis of flow data for infiltration consists of selecting the lowest flow reading that occurs during dry weather conditions between the hours of 12:00 a.m. and 6:00 a.m.

Nighttime flow represents a period of minimum sanitary flow, and therefore, has the highest percentage of flow attributed to infiltration.

Peak infiltration is defined as the average of the minimum flow rates (nighttime flow as described above) observed over a period of several dry days, during a period of high groundwater (i.e., during springtime). A “dry day” is defined as at least three days after a rain event. Metered flow from upstream areas was subtracted to obtain a peak infiltration rate for each area. Estimated peak infiltration rates for each area may be found in Table 2.

As shown in the table, an estimated 2,762,359 gpd of peak infiltration was calculated. MWRA estimated infiltration for the same period at a peak of 2.31 mgd for 2016 and 3.32 mgd for 2015, and an average for the metering period of 1.94 mgd and 1.92 mgd respectively. Looking at this information we can conclude that our estimates fall within an acceptable range for infiltration.

In order to compare the infiltration rates in different sized metered areas, a gallon per day per inch diameter of sewer mile (gpdim) value is calculated by dividing gallons per day of infiltration by inch-diameter miles of sewer. This value translates to approximately 3,746 gpdim over the town’s sewer system, not including the approximately 69,134 lf of sewers that were not metered as part of this analysis.

According to the DEP Guidelines for Performing I/I Analysis, areas exhibiting an infiltration rate equal to or greater than 4,000 gpdim are considered excessive. Using this guideline, infiltration is a town-wide problem. As shown in Table 2, 11 metered subareas are considered excessive. These 11 metered areas include sewer subareas EE, KK, OO, QQ, RR, SS, TT, VV and WW and portions of sewer subarea MM. Subarea KK was metered by 2 individual meters. Of these 11 areas, one meter showed extremely high infiltration rates: TT50, which metered sewer subarea TT, had a net peak infiltration rate of 9,466 gpdim. This value has lowered considerably from 2011 estimates of 13,768 gpdim, as was expected due to manhole and CIPP lining operations completed in subarea TT between 2011 and 2016.

As shown in Table 2, overall estimated infiltration has been reduced by approximately 345,000 gpd when compared to the results of the 2011 flow metering project. This is largely due to the town’s continued efforts to reduce I/I town-wide. This was not the case for every metered area however. Estimated infiltration rose by approximately 50,000 gpd in areas metered by MM160, OO10, WW10 and JJ1080, as well as by approximately 100,000 gpd in areas metered by QQ20 and JJ130. Differences in groundwater levels as well as pipe degradation could account for these discrepancies.

Inflow

Inflow is extraneous water that is discharged into the sanitary sewer system from sources such as catch basins, sump pumps, roof leaders, surface drains, holes in manhole covers and other direct or indirect inlets.

Rainfall data is collected throughout the monitoring period to identify storm events and rainfall intensity. The data is used to relate variations in sewer flow during rainfall events to rainfall intensity, total volume and duration per storm event for the purpose of identifying inflow and its components. Inflow is quantified by comparing metered flow during a rain event to flow metered during a dry-weather period during the same day group (weekday or weekend) and time. This is necessary to ensure that observed flow variations are caused by inflow rather than normal diurnal fluctuations.

Peak design storm inflow is determined by estimating the inflow volume produced from a one-year, six-hour storm event, also called a “design storm.” The design storm is the one-year, six-hour storm event with a peak intensity of 0.87 inches/hour.

During the monitoring period, Storm Events 1, 3, 5, 7, 9, 11 and 18 shown on page 2 of this report were used to quantify inflow. After reviewing each storm, its effect on the individual meters, as well as the status of the meter on that date, certain storms were removed from the analysis. The storms used for each meter are shown in Table 3. Wastewater flow during these storm events was compared to flow data during dry weather on a similar day of the week during the same time.

The flow meter data was analyzed to determine the inflow quantity corresponding to the seven storm events and to obtain several data points for use in developing a linear regression analysis. The linear regression analysis plots peak inflow versus peak rainfall intensity. The peak inflow values are plotted against the peak rainfall intensities for each storm and a best fit regression line is applied to the data points. The linear regression analysis is used to determine the peak design storm inflow relative to the rainfall intensity. Linear regression plots are attached in Appendix F.

The quantification of inflow includes some portion of rainfall induced or dependent infiltration, which is a direct result of stormwater percolation into the ground after significant rainfall events.

According to the DEP Guidelines, areas contributing at least 80% of the total inflow identified through monitoring are considered excessive. As shown on Table 3, peak design storm inflow from the linear regression analysis is approximately 7,261,716 gpd. Thirteen metered areas are considered excessive because they contribute approximately 80% of the total inflow identified. These 13 metered areas include sewer subareas EE, KK, NN, QQ, RR, SS TT, UU, WW, XX, YY, and partial sections of MM and JJ. The 13 excessive areas contribute approximately 6,001,086 gpd of peak design storm inflow.

Of the excessive areas, six [WW10 (subarea WW), TT50 (subarea TT), SS15 (subarea SS), JJ130 (subarea NN and portions of subarea JJ), KK60 (portion of subarea KK), and JJ570 (portion of subarea JJ)] showed extremely high peak design storm inflow rates. These six areas contribute approximately half (3,583,095 gpd) of the total peak design storm inflow.

In order to compare the inflow rates in different sized areas, a gallon per day per inch mile (gpdim) value is calculated by dividing gallons per day of inflow by inch-diameter miles of each metered area. This is useful information to determine the relative “concentration” of inflow across the sewer system. There is approximately 9,846 gpdim of peak design storm inflow in the project area as shown in Table 3. Four areas had very significant values when using this as a comparison. Metered areas KK60, KK180, TT50 and WW10 all had values over 18,000 gpdim. This was significantly higher than other metered areas.

The *total storm inflow* shows the impact of inflow that the storms have on each area by identifying the total inflow volume created by each storm. This analysis was conducted by determining a time period from the beginning of a storm event to the point after the storm where the flow data displays a decrease in extraneous I/I. This analysis provides data that includes direct inflow, delayed inflow, and rainfall induced infiltration as a result of the storms for each meter. These terms are defined below. This analysis is useful because it looks at actual estimated inflow rather than the typical theoretical peak design storm inflow rate predictions calculated in the previous section. Total event inflow volume includes:

> *Direct Inflow Volume* is the portion of total inflow generated from direct connections to the collection system such as catch basins, roof leaders, manhole covers, etc. These inflow sources

allow stormwater runoff to rapidly impact the collection system and produce an inflow hydrograph that sharply increases soon after the start of the storm, and decreases rapidly upon conclusion of the rainfall event. Direct Inflow Volume is shown in Table 3 as Total Storm Inflow Volume.

Delayed Inflow Volume is the portion of total inflow generated from indirect connections or connections producing inflow after a significant time delay from the beginning of a storm. Delayed inflow sources include sump pumps, foundation drains, indirect sewer/drain cross-connections, etc. Through the analysis of monitoring data, rainfall-induced infiltration cannot be distinguished from delayed inflow and, therefore, is included as part of delayed inflow by definition.

Rainfall Induced Infiltration is the short-term increase in infiltration which is the direct result of stormwater percolation into the ground and through collection system defects in pipes, joints, connections, or manhole walls which lie near or are readily reached from the ground surface.

The total inflow volumes accounted for during each storm period is comprised of the total volume in gallons of direct inflow, delayed inflow and rainfall-induced infiltration generated from a single storm event. The total inflow is the area between the storm event hydrograph and the dry weather hydrograph for each time period. WW10 had the largest net storm inflow volume of 341,311 gallons. This occurred during Storm Event 11. Total inflow volume measurements were calculated by comparing the difference between the average dry day metered flow and storm event metered flow and are included in Table 3.

Also shown in Table 3 are the estimated inflow results from 2011. Overall estimated peak design storm inflow was reduced by approximately 470,000 gpd. The difference in storm intensities and rainfall totals, as well as changes to the system including repairs and degradation contributed to a range of inflow values. JJ1080 experienced the largest drop in estimated inflow, being reduced by approximately 840,000 gpd, while SS15 had an increase of approximately 330,000 gpd.

Flow Isolation

Flow isolation is a means to measure infiltration rates in manhole-to-manhole reaches of sewers and is ideally performed during periods of high groundwater and minimum wastewater flow, such as the early morning hours of the spring season. Under the direction of Weston & Sampson, EST Associates performed flow isolation between the hours of 12:00 and 6:00 AM from April 19 through April 25, 2016. The flow isolation data collected by EST was used to obtain a baseline peak infiltration rate for the sections of sewer investigated under this phase of the project Areas of concern that could not be flow metered due to multiple connections to the MWRA system were flow isolated in order to quantify infiltration within subarea BB and partial sections of II, LL, MM.

Approximately 43,766 linear feet (lf) of 6-inch to 12-inch sewers were flow isolated. The flow isolation measured an approximate total of 114,539 gallons per day (gpd) of infiltration. A summary of the flow isolation results is presented in Table 4, *Flow Isolation Results*. The table also shows the concentration of infiltration in each line segment in gallons per day per inch-miles of sewers (gpdim).

Flow isolation could not be completed on approximately 529 lf of sewers due to lack of access or pipeline configurations. These Pipes are listed in Table 4 with a pipe material of “NO FI”.

Subarea BB, which was not metered in its entirety, measured an estimated 41,612 gpd of infiltration, corresponding to 2,860 gpdim. Areas in subarea II and LL showed estimated infiltration rates of 41,946 gpd (1,334 gpdim) and 18,381 gpd (1,136 gpdim) respectively, well below the estimated rate of 3,137 gpdim obtained from flow metering. Finally, flow isolated sections of subarea MM showed an infiltration rate of 12,600 gpd (2,345 gpdim), which was again well below the 5,840 gpdim found during flow metering.

Conclusions & Recommendations
Flow monitoring was performed from February 27 to May 30, 2016 in order to quantify the amount of I/I entering the Town of Dedham's sewer system. Approximately 86% of the town's sewer system was metered for this analysis. Approximately 69,134 lf of sewer in BB, II, JJ, LL, MM and ZZ was not metered because the Town of Dedham has a significant amount of connections directly to the MWRA interceptor, especially in the portions of the sewer subareas above. Therefore, it was not cost effective to include the unmetered areas into the monitoring program. 43,166 lf of these unmetered areas were flow isolated to quantify infiltration in the selected sewer segments.

Peak infiltration for each area is presented in Table 2. An estimated 2,762,359 gpd of peak infiltration exists in the sewer system. Eleven metered areas exceeded the 4,000 gpdim threshold referenced in the DEP Guidelines as considered excessive. Of these 11 areas, metered area TT50 had significantly higher infiltration rates than the other 10 excessive areas. Metered area TT50 (subarea TT) had a peak infiltration value of 9,466 gpdim.

Peak design storm inflow rates were calculated for the project area. Peak design storm inflow rates for each area are presented in Table 3. Peak design storm inflow for a one-year, six-hour storm was approximately 7,261,716 gpd. According to the DEP Guidelines, inflow reduction programs are recommended for areas that contribute at least 80% of the total inflow. As shown in the table, 13 metered areas that include sewer subareas EE, KK, UU, QQ, RR, XX, YY, TT, NN, WW, SS, OO, and partial sections of MM and JJ contribute at least 80% of the total project area inflow, or 6,001,086 gpd.

Observed infiltration rates from flow isolation are presented in Table 4 and measured approximately 114,539 gpd of infiltration for the isolated areas in Subareas BB, II, LL and MM.

Weston & Sampson is aware that the Town of Dedham has taken a proactive approach to identifying and removing infiltration over the past five years. Using this town-wide flow monitoring report the Town of Dedham could prioritize each subarea and target the potential infiltration problem areas.

Inflow appears to be a concern throughout a majority of the town, according to this flow monitoring program. Weston & Sampson recommends the town continue to identify potential inflow sources throughout town through building inspections. By identifying inflow sources and creating an inventory the town will have a better idea as to the cause of the significant inflow volumes that appear to be entering the sewer system after heavy rainfall. The entire town has previously been smoke tested and it is our understanding that identified inflow sources have been removed.

Town-wide estimated infiltration has gone down by approximately 345,000 gpd and estimated peak design storm inflow has been reduced by 470,000 gpd. This can be attributed to changes in pipe condition due to degradation as well as rehabilitations completed between 2011 and 2016.

We recommend investigating each subarea as a whole. Therefore, if a portion of a subarea was monitored and experienced excessive I/I, we included the entire subarea for investigation in our recommendations below.

- Infiltration investigations including flow isolation, manhole inspections and television inspections of sewers should be conducted in subareas with excessive infiltration. Using the information provided in Table 2, the town could begin with the following subareas, in this order:
  - Subarea TT – 18,000 LF (Metered by TT50)
  - Subarea KK – 15,000 LF (Metered by KK60 & KK180)
  - Subarea MM – 14,400 LF (Metered by MM160)
  - Subarea RR – 19,300 LF (Metered by RR10)
  - Subarea QQ – 12,200 LF (Metered by QQ20)
  - Subarea SS – 31,000 LF (Metered by SS15)
  - Subarea VV – 13,800 LF (Metered by VV30)
  - Subarea OO – 25,900 LF (Metered by OO10)
  - Subarea WW – 21,700 LF (Metered by WW10)
  - Subarea EE – 14,400 LF (Metered by EE16)

- Inflow investigations including building inspections, smoke testing and dye testing should be conducted in subareas with excessive inflow. Using the information provided in Table 3, the town could begin with the following subareas, in this order:
  - Subarea WW – 21,700 LF (Metered by WW10)
  - Subarea TT – 18,000 LF (Metered by TT50)
  - Subarea SS – 31,000 LF (Metered by SS15)
  - Subarea JJ – 26,700 LF (Approximately 25,200 LF metered by JJ570 & JJ130)
  - Subarea KK – 15,000 (Metered by KK60 to KK180)

Based off of these results and a review of rehabilitations completed to date, an update to the town's annual program is in order and we are available to discuss options.

Depending on the town's priorities and available resources, Weston & Sampson can provide scope and costs for the above items upon request. We are available to meet with you at your earliest convenience to discuss this report and the town's options at your convenience. Please do not hesitate to contact Pat Cotton or me at (978) 532-1900 with any questions or comments you may have.

Very truly yours,

WESTON & SAMPSON

Donald G. Gallucci, P.E.
Vice President/Program Manager

cc: Nathan S. Buttermore, P.E., Infrastructure Engineer
Ronald I. Lawrence, Project Engineer

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TABLES

TABLE 1
SUMMARY OF TRIBUTARY AREAS TO METERS
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING

Flow Meter ID	Meter Manhole	Subarea	Length (LF)	Inch*Miles	Acres
DE-BO-1C	AA5	AA	17,181	28.24	59.16
TEMP2	CC10	DD	20,775	32.58	71.54
TEMP1	CC110	CC	11,072	17.11	38.12
TEMP3	EE16	EE	14,356	23.62	49.44
TEMP4	FF10	FF	21,712	34.28	74.76
TEMP7	GG20	GG	26,684	44.63	91.89
TEMP8	JJ1080	HH	29,687	48.59	105.57
DE-1C	JJ130	NN & Partial Section of JJ	21,135	42.77	72.78
TEMP5	JJ570	Partial Section of JJ	14,074	33.08	49.20
DE-8C	KK180	Partial Section of KK	6,291	9.51	21.66
DE-4C	KK60	Partial Section of KK	8,782	13.30	30.24
TEMP13	LL480	Partial Section of II & LL	13,958	20.69	48.06
DE-7C	MM160	Partial Section of MM	14,365	22.71	49.46
TEMP6	OO10	OO	25,913	52.95	89.23
TEMP9	PP10	PP	19,428	33.42	66.91
DE-2CR	QQ20	QQ	12,163	20.75	41.88
TEMP12	RR10	RR	19,281	29.57	66.39
TEMP10	SS15	SS	30,987	51.00	108.83
TEMP14	TT50	TT	18,053	28.33	62.17
TEMP11	UU10	UU	17,042	28.63	58.68
TEMP16	VV30	VV	13,804	24.16	47.54
DE-CT-1C	WW10	WW	21,677	37.78	74.65
TEMP15	YY10	XX & YY	32,453	51.17	111.75
DE-9C	ZZ400	Partial Section of ZZ	6,141	8.63	21.15
TOTALS			**437,014**	**737.51**	**1,511.07**

NOTES: Approximately 69,134 linear feet was not metered during this program. This includes sewer subarea BB and partial sections of sewer subareas II, JJ, LL, MM & ZZ.

TABLE 2
ESTIMATED INFILTRATION
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING

Meter	Total Length (LF)	Inch*Miles	2016 Net Peak Infiltration (gpd)	2016 Net Peak Infiltration (gpdim)	2011 Net Peak Infiltration (gpd)	2011 Net Peak Infiltration (gpdim)
TT50	18,053	28.33	268,124	9,466	390,000	13,768
KK60	8,782	13.30	91,769	6,898	87,368	6,567
MM160	14,365	22.71	132,615	5,840	90,000	3,963
RR10	19,281	29.57	158,579	5,362	176,842	5,980
QQ20	12,163	20.75	110,959	5,347	Negligible	Negligible
SS15	30,987	51.00	266,196	5,219	322,632	6,326
VV30	13,804	24.16	124,358	5,147	225,652	9,340
OO10	25,913	52.95	263,624	4,979	211,739	3,999
KK180	6,291	9.51	47,077	4,950	40,000	4,206
WW10	21,677	37.78	174,421	4,617	134,444	3,559
EE16	14,356	23.62	99,712	4,221	136,667	5,786
CC10	20,775	32.58	126,425	3,880	107,143	3,288
LL480	13,958	20.69	64,912	3,137	133,846	6,469
JJ130	21,135	42.77	133,068	3,111	Negligible	Negligible
JJ570	14,074	33.08	102,133	3,088	211,154	6,384
YY10	32,453	51.17	147,636	2,885	180,000	3,518
UU10	17,042	28.63	79,250	2,768	143,333	5,006
GG20	26,684	44.63	94,916	2,127	140,000	3,137
CC110	11,072	17.11	34,663	2,026	80,000	4,675
ZZ400	6,141	8.63	15,077	1,747	Negligible	Negligible
JJ1080	29,687	48.59	83,281	1,714	39,879	821
FF10	21,712	34.28	56,516	1,649	130,000	3,792
AA5	17,181	28.24	45,692	1,618	72,941	2,583
PP10	19,428	33.42	41,354	1,237	54,000	1,616
TOTALS	**437,014**	**737.51**	**2,762,359**	**3,746**	**3,107,641**	**4,214**

TABLE 3
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
ESTIMATED INFLOW

Meter Location (MH #)	Subarea	Length (lf) [2]	Inch-Miles [2]	Storm Date	Peak Intensity (in./hr.)	Rainfall (in.)	Total Storm Inflow (gpd) [1]	Regression Slope	2016 Estimated Peak Design Storm Inflow (gpd)	2016 Estimated Peak Design Storm Inflow (gpdim)	% of Total Design Storm Inflow	Cumulative % of Total Design Storm Inflow	2011 Estimated Peak Design Storm Inflow (gpd)	2011 Estimated Peak Design Storm Inflow (gpdim)
WW10	WW	21,677	37.78	3/2/2016	0.22	0.45	86,289	0.8234	716,358	18,962	9.86%	9.86%	590,000	15,617
				4/7/2016	0.34	1.42	341,311							
TT50	TT	18,053	28.33	3/2/2016	0.22	0.45	197,360	0.7791	677,817	23,929	9.33%	19.20%	573,678	20,253
				3/14/2016	0.14	1.24	129,482							
				4/3/2016	0.20	0.72	87,733							
				4/7/2016	0.34	1.42	279,760							
SS15	SS	30,987	51.00	3/2/2016	0.22	0.45	184,142	0.7785	677,295	13,279	9.33%	28.53%	349,740	6,857
				3/14/2016	0.14	1.24	101,632							
				4/7/2016	0.34	1.42	259,376							
JJ130	NN & Partial Sections of JJ	21,135	42.77	3/2/2016	0.22	0.45	219,524	0.6764	588,468	13,758	8.10%	36.63%	770,000	18,002
				3/14/2016	0.14	1.24	31,160							
				3/21/2016	0.23	0.28	46,530							
				4/7/2016	0.34	1.42	284,116							
KK60	Partial Section of KK	8,782	13.30	3/2/2016	0.22	0.45	84,956	0.5580	485,460	36,492	6.69%	43.31%	290,000	21,799
				3/14/2016	0.14	1.24	16,296							
				3/28/2016	0.14	0.46	91,642							
				4/7/2016	0.34	1.42	234,078							
JJ570	Partial Section of JJ	14,074	33.08	3/21/2016	0.23	0.28	125,044	0.5031	437,697	13,233	6.03%	49.34%	340,000	10,279
				4/3/2016	0.20	0.72	89,901							
RR10	RR	19,281	29.57	3/2/2016	0.22	0.45	141,845	0.4807	418,209	14,141	5.76%	55.10%	260,000	8,792
				3/14/2016	0.14	1.24	6,821							
				3/21/2016	0.23	0.28	72,429							
				4/7/2016	0.34	1.42	190,751							
MM160	Partial Section of MM	14,365	22.71	3/2/2016	0.22	0.45	106,247	0.4368	380,016	16,734	5.23%	60.33%	78,822	3,471
				4/7/2016	0.34	1.42	141,962							
EE16	EE	14,356	23.62	3/2/2016	0.22	0.45	111,001	0.4224	367,488	15,558	5.06%	65.40%	217,412	9,204
				3/14/2016	0.14	1.24	12,763							
				4/7/2016	0.34	1.42	151,043							
QQ20	QQ	12,163	20.75	4/3/2016	0.20	0.72	25,260	0.4038	351,306	16,930	4.84%	70.23%	270,000	13,012
				4/7/2016	0.34	1.42	169,934							
YY10	XX &YY	32,453	51.17	3/2/2016	0.22	0.45	89,482	0.3618	314,766	6,151	4.33%	74.57%	206,103	4,028
				3/14/2016	0.14	1.24	50,545							
				4/3/2016	0.20	0.72	61,572							
KK180	Partial Section of KK	6,291	9.51	3/2/2016	0.22	0.45	57,725	0.3608	313,896	33,005	4.32%	78.89%	108,315	11,389
				3/21/2016	0.23	0.28	4,556							
				4/7/2016	0.34	1.42	189,766							
UU10	UU	17,042	28.63	3/2/2016	0.22	0.45	70,197	0.3130	272,310	9,511	3.75%	82.64%	240,000	8,382
				3/14/2016	0.14	1.24	54,361							
				4/3/2016	0.20	0.72	53,735							
OO10	OO	25,913	52.95	3/2/2016	0.22	0.45	67,561	0.2252	195,924	3,700	2.70%	85.34%	380,000	7,176
				3/21/2016	0.23	0.28	34,547							
JJ1080	HH	29,687	48.59	3/2/2016	0.22	0.45	84,642	0.2217	192,879	3,970	2.66%	87.99%	1,035,096	21,304
				3/14/2016	0.14	1.24	18,619							
				3/21/2016	0.23	0.28	26,264							
				3/28/2016	0.14	0.46	11,222							
				4/3/2016	0.2	0.72	55,885							

Meter Location (MH #)	Subarea	Length (lf) [2]	Inch-Miles [2]	Storm Date	Peak Intensity (in./hr.)	Rainfall (in.)	Total Storm Inflow (gpd) [1]	Regression Slope	2016 Estimated Peak Design Storm Inflow (gpd)	2016 Estimated Peak Design Storm Inflow (gpdim)	% of Total Design Storm Inflow	Cumulative % of Total Design Storm Inflow	2011 Estimated Peak Design Storm Inflow (gpd)	2011 Estimated Peak Design Storm Inflow (gpdim)
PP10	PP	19,428	33.42	3/2/2016	0.22	0.45	80,059	0.2219	193,053	5,777	2.66%	90.65%	550,000	16,457
				4/7/2016	0.34	1.42	137,668							
				5/30/2016	0.70	1.32	115,302							
FF10	FF	21,712	34.28	3/2/2016	0.22	0.45	22,528	0.1781	154,947	4,520	2.13%	92.79%	210,000	6,126
				3/14/2016	0.14	1.24	5,512							
				3/28/2016	0.14	0.46	43,175							
				4/3/2016	0.20	0.72	37,680							
				4/7/2016	0.34	1.42	70,578							
LL480	Partial Section of II and LL	13,958	20.69	3/2/2016	0.22	0.45	41,584	0.1866	162,342	7,846	2.24%	95.02%	290,000	14,015
				3/14/2016	0.14	1.24	32,696							
				4/3/2016	0.20	0.72	44,101							
				4/7/2016	0.34	1.42	56,396							
GG20	GG	26,684	44.63	3/2/2016	0.22	0.45	48,161	0.1256	109,272	2,448	1.50%	96.53%	310,000	6,946
				3/14/2016	0.14	1.24	11,301							
				3/21/2016	0.23	0.28	11,521							
				3/28/2016	0.14	0.46	20,167							
VV30	VV	13,804	24.16	3/2/2016	0.22	0.45	58,307	0.1108	96,396	3,990	1.33%	97.85%	180,000	7,450
				3/21/2016	0.23	0.28	38,581							
				4/7/2016	0.34	1.42	6,869							
CC10	DD	20,775	32.58	3/14/2016	0.14	1.24	21,399	0.0900	78,300	2,403	1.08%	98.93%	240,000	7,366
				3/21/2016	0.23	0.28	24,359							
				5/30/2016	0.70	1.32	60,065							
CC110	CC	11,072	17.11	3/2/2016	0.22	0.45	32,355	0.0427	37,149	2,171	0.51%	99.44%	140,000	8,182
				3/14/2016	0.14	1.24	15,085							
				3/21/2016	0.23	0.28	5,441							
				3/28/2016	0.14	0.46	10,856							
				4/3/2016	0.2	0.72	32,080							
				5/30/2016	0.70	1.32	30,365							
AA5	AA	17,181	28.24	4/3/2016	0.20	0.72	2,560	0.0242	21,054	746	0.29%	99.73%	73,438	2,601
				4/7/2016	0.34	1.42	9,576							
ZZ400	Partial Section of ZZ	6,141	8.63	3/2/2016	0.22	0.45	6,211	0.0222	19,314	2,238	0.27%	100.00%	30,000	3,476
				3/14/2016	0.14	1.24	1,554							
				3/21/2016	0.23	0.28	4,778							
TOTALS		437,014	737.51						7,261,716	9,846	100.0%		7,732,604	10,485

NOTES: 1-Estimated Total Inflow Rate During Storm Event.
2-Total Length and Inch-Miles does not include BB and partial sections of II, JJ, LL, MM and ZZ
3-Nominal inflow denotes that inflow amounts are too low to accurately measure.

O:\Dedham MA\2160019 - Town-Wide Flow Metering 2016\Report\[App F - Linear Regression Analysis OFFSET FLOW TIMES (W EXTRA STORMS no outliers).xlsx]Table 3

TABLE 4
FLOW ISOLATION RESULTS
TOWN-WIDE FLOW MONITORING
TOWN OF DEDHAM, MASSACHUSETTS

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter (in.)	Pipe Length (lf)	GPD	GPDIM
CLAY BANK ROAD	BB	011	BB	010	VC	10	183	720	2,077
JENNEY LANE ESMT	BB	020	BB	010	NO FI	8	260		
JENNEY LANE ESMT	BB	030	BB	020	DI	8	153	0	0
JENNEY LANE	BB	035	BB	030	VC	8	229	360	1,038
JENNEY LANE	BB	040	BB	030	VC	8	248	0	0
JENNEY LANE	BB	050	BB	040	DI	8	234	0	0
JENNEY LANE ESMT	BB	060	BB	050	DI	8	256	0	0
JENNEY LANE ESMT	BB	070	BB	060	DI	8	258	0	0
JENNEY LANE ESMT	BB	075	BB	070	PVC	6	98	0	0
CLAY BANK ROAD	BB	080	BB	011	VC	10	226	3,360	7,850
CLAY BANK ROAD	BB	090	BB	080	VC	10	113	4,368	20,410
CLAY BANK ROAD	BB	100	BB	090	VC	10	113	1,440	6,728
NEEDHAM STREET	BB	110	BB	100	VC	10	170	4,368	13,566
NEEDHAM STREET	BB	130	BB	110	VC	8	301	2,880	6,315
NEEDHAM STREET	BB	140	BB	130	VC	8	125	0	0
NEEDHAM STREET	BB	150	BB	140	VC	8	208	0	0
PINE STREET	BB	160	BB	150	VC	8	205	0	0
PINE STREET	BB	170	BB	160	VC	8	160	0	0
NEEDHAM STREET	BB	190	BB	150	VC	8	159	0	0
NEEDHAM STREET	BB	200	BB	190	VC	8	182	2,880	10,444
NEEDHAM STREET	BB	210	BB	200	VC	8	248	0	0
ROSEMARY ROAD	BB	220	BB	110	VC	10	283	15,030	28,042
ROSEMARY ROAD	BB	230	BB	220	VC	10	232	1,440	3,277
ROSEMARY ROAD	BB	240	BB	230	VC	8	177	0	0

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter (in.)	Pipe Length (lf)	GPD	GPDIM
ROSEMARY ROAD	BB	250	BB	240	VC	8	201	0	0
ROSEMARY ROAD	BB	260	BB	250	VC	8	147	0	0
ROSEMARY ROAD	BB	270	BB	260	VC	8	211	216	676
ROSEMARY ROAD	BB	280	BB	270	VC	8	70	0	0
ROSEMARY ROAD	BB	290	BB	280	VC	8	74	0	0
ROSEMARY ROAD	BB	300	BB	290	VC	8	325	0	0
ROSEMARY ROAD	BB	310	BB	300	VC	8	299	0	0
ROSEMARY ROAD	BB	320	BB	310	VC	8	258	0	0
ROSEMARY ROAD	BB	330	BB	320	VC	8	125	0	0
VIVE ROCK STREET	BB	340	BB	330	VC	8	226	0	0
VIVE ROCK STREET	BB	350	BB	340	VC	8	228	0	0
VIVE ROCK STREET	BB	360	BB	350	VC	8	179	0	0
CUNNINGHAM ROAD	BB	370	BB	220	VC	8	317	0	0
CUNNINGHAM ROAD	BB	380	BB	370	VC	6	100	0	0
LYNCH AVENUE	BB	390	BB	230	VC	8	72	0	0
LYNCH AVENUE	BB	400	BB	390	VC	8	349	360	681
LYNCH AVENUE	BB	410	BB	400	VC	8	204	0	0
CUNNINGHAM ROAD	BB	430	BB	260	VC	8	200	0	0
CUNNINGHAM ROAD	BB	440	BB	430	VC	8	252	0	0
CUNNINGHAM ROAD	BB	450	BB	440	VC	8	250	0	0
CUNNINGHAM ROAD	BB	460	BB	450	VC	8	110	0	0
CLAY BANK ROAD ESMT	BB	470	BB	090	VC	6	406	4,190	9,082
SUBAREA BB TOTAL LENGTH OF PIPE ATTEMPTED							9,424	41,612	2,860
SUBAREA BB LENGTH OF PIPE FLOW ISOLATED							9,164		

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter (in.)	Pipe Length (lf)	GPD	GPDIM
MAVERICK STREET	II	310	II	320	VC	8	213	0	0
MAVERICK STREET	II	320	II	330	VC	8	49	0	0
MAVERICK STREET	II	330	II	350	VC	8	167	0	0
EVERGREEN WAY	II	340	II	330	PVC	8	199	0	0
MAVERICK STREET	II	350	II	360	VC	8	232	0	0
MAVERICK STREET	II	370	II	310	VC	8	339	0	0
MAVERICK STREET	II	380	II	370	VC	8	60	0	0
CURVE STREET	II	390	II	380	VC	8	204	0	0
CURVE STREET	II	400	II	390	VC	8	192	0	0
CURVE STREET	II	410	II	400	VC	8	236	360	1,007
CURVE STREET	II	410 (STUB)	II	410	VC	8	61	0	0
CURVE STREET	II	430	II	420	VC	8	150	0	0
CURVE STREET	II	440	II	430	VC	8	138	360	1,722
CURVE STREET	II	450	II	440	VC	8	226	144	421
CURVE STREET	II	460	II	450	VC	8	261	360	910
CURVE STREET	II	470	II	460	VC	8	130	144	731
CURVE STREET	II	470 (STUB)	II	470	VC	8	51	0	0
WASHINGTON STREET	II	480	II	420	VC	8	81	0	0
LOWER EAST STREET	II	510	II	490	VC	8	90	0	0
LOWER EAST STREET	II	520	II	510	VC	8	46	0	0
LOWER EAST STREET	II	550	II	520	VC	8	149	360	1,595
LOWER EAST STREET	II	560	II	550	VC	8	62	0	0
LOWER EAST STREET	II	570	II	560	VC	8	312	720	1,523
LOWER EAST STREET	II	580	II	570	VC	8	156	360	1,523
LOWER EAST STREET	II	590	II	580	VC	8	67	0	0
LOWER EAST STREET	II	600	II	590	VC	8	173	0	0
LOWER EAST STREET	II	610	II	600	VC	8	169	0	0
SUMMER STREET	II	620	II	570	VC	8	206	144	461
WILLIS STREET	II	630	II	590	VC	8	276	0	0

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter (in.)	Pipe Length (lf)	GPD	GPDIM
BONAD ROAD	II	690	II	610	VC	8	159	0	0
BONAD ROAD	II	700	II	690	VC	8	93	0	0
BONAD ROAD	II	710	II	700	VC	8	191	0	0
WINTER STREET	II	720	II	700	VC	8	213	2,880	8,924
WASHINGTON STREET	II	730	II	480	VC	8	270	0	0
WASHINGTON STREET	II	735	II	730	VC	8	264	360	900
WASHINGTON STREET	II	740	II	735	VC	8	276	0	0
WASHINGTON STREET	II	741	II	740	VC	8	269	0	0
WASHINGTON STREET	II	750	II	420	VC	8	246	0	0
WASHINGTON STREET	II	760	II	750	VC	8	230	0	0
WASHINGTON STREET	II	770	II	760	VC	8	231	0	0
WASHINGTON STREET	II	780	II	770	VC	8	232	0	0
OAK STREET	II	790	II	780	VC	8	223	0	0
OAK STREET	II	800	II	790	VC	8	207	2,880	9,183
OAK STREET	II	810	II	800	VC	8	202	144	470
OAK STREET	II	820	II	810	VC	8	184	0	0
OAK STREET	II	830	II	820	VC	8	185	0	0
SCHILLER ROAD	II	840	II	800	VC	8	176	0	0
SCHILLER ROAD	II	850	II	840	VC	8	195	360	1,218
SCHILLER ROAD	II	860	II	850	VC	8	190	0	0
SCHILLER ROAD	II	870	II	860	VC	8	164	0	0
RIDGE AVENUE	II	880	II	790	VC	8	204	0	0
RIDGE AVENUE	II	890	II	880	VC	8	240	0	0
RIDGE AVENUE	II	900	II	890	VC	8	165	0	0
COLUMBIA TERRACE	II	910	II	440	VC	8	216	360	1,100
COLUMBIA TERRACE	II	920	II	910	VC	8	82	0	0
COLUMBIA TERRACE	II	930	II	920	VC	8	105	360	2,263
OAK STREET	II	940	II	470	VC	8	119	0	0
OAK STREET	II	960	II	940	VC	8	195	0	0

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter (in.)	Pipe Length (lf)	GPD	GPDIM
OAK STREET	II	960	II	950	VC	8	188	0	0
OAK STREET	II	970	II	960	VC	8	149	0	0
LILAC LANE	II	980	II	940	VC	8	197	144	482
HITCHINS DRIVE	II	990	II	410	VC	8	293	360	811
HITCHINS DRIVE	II	1000	II	990	VC	8	74	0	0
HARVEY DRIVE	II	1010	II	400	VC	8	176	5,082	19,058
EASTBROOK ROAD ESMT	II	1160	II	500	VC	8	156	0	0
EASTBROOK ROAD ESMT	II	1170	II	1160	VC	8	87	0	0
INCINERATOR ROAD ESMT	II	1180	II	1170	VC	10	112	360	1,697
INCINERATOR ROAD ESMT	II	1185	II	1180	VC	10	255	2,160	4,472
INCINERATOR ROAD ESMT	II	1190	II	1170	VC	8	50	0	0
WASHINGTON STREET ESMT	II	1195	II	1185	VC	8	30	0	0
WASHINGTON STREET ESMT	II	1205	II	1195	PVC	8	64	0	0
INCINERATOR ROAD ESMT	II	1210	II	1185	VC	10	135	720	2,816
WASHINGTON STREET ESMT	II	1215	II	1205	PVC	8	104	0	0
WASHINGTON STREET ESMT	II	1225	II	1215	PVC	8	225	0	0
WASHINGTON STREET ESMT	II	1230	II	1225	PVC	8	203	0	0
WASHINGTON STREET ESMT	II	1240	II	1230	VC	8	237	0	0
WASHINGTON STREET ESMT	II	1250	II	1240	VC	8	168	0	0
EASTBROOK ROAD	II	1255	II	1190	VC	8	85	0	0
EASTBROOK ROAD	II	1260	II	1255	VC	8	117	0	0
EASTBROOK ROAD	II	1270	II	1260	VC	8	109	0	0
WASHINGTON STREET	II	1280	II	1270	VC	8	196	0	0
WASHINGTON STREET	II	1290	II	1280	VC	8	194	360	1,225
WASHINGTON STREET	II	1290	II	1300	VC	8	284	1,440	3,346
WASHINGTON STREET	II	1300	II	1310	VC	8	165	1,440	5,760
WASHINGTON STREET	II	1310	II	1250	VC	8	25	0	0
WASHINGTON STREET	II	1320	II	1250	VC	8	121	0	0
EAST STREET ESMT	II	1340	II	1320	VC	8	267	1,080	2,670

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter (in.)	Pipe Length (lf)	GPD	GPDIM
EAST STREET	II	1350	II	1340	VC	8	177	1,080	4,027
EAST STREET	II	1360	II	1350	VC	8	174	1,080	4,097
DEMETRA TERRACE	II	1370	II	1350	VC	8	50	0	0
DEMETRA TERRACE	II	1380	II	1370	VC	8	92	144	1,033
BROOKDALE AVENUE	II	1390	II	1340	VC	8	27	0	0
BROOKDALE AVENUE	II	1410	II	1390	VC	8	163	0	0
BROOKDALE AVENUE	II	1420	II	1410	VC	8	190	0	0
BROOKDALE AVENUE	II	1430	II	1420	VC	8	160	0	0
EAST STREET	II	1435	II	1340	PVC	8	137	0	0
EAST STREET	II	1440	II	1435	PVC	8	136	0	0
EAST STREET	II	1450	II	1440	VC	8	231	360	1,029
EAST STREET	II	1460	II	1460 T	PVC	8	29	360	8,193
SCHILLER ROAD	II	1470	II	800	VC	8	113	0	0
INCINERATOR ROAD ESMT	II	1525	II	1210	VC	10	10	720	38,016
INCINERATOR ROAD ESMT	II	1530	II	1525	VC	10	10	720	38,016
INCINERATOR ROAD ESMT	II	1533	II	1530	VC	8	209	0	0
INCINERATOR ROAD ESMT	II	1535	II	1530	VC	8	143	0	0
INCINERATOR ROAD ESMT	II	1540	II	1535	VC	8	78	0	0
INCINERATOR ROAD ESMT	II	1545 GT	II	1545	PVC	8	252	1,800	4,714
INCINERATOR ROAD ESMT	II	1545	II	1540	VC	8	175	1,800	6,789
INCINERATOR ROAD ESMT	II	1550	II	1545	PVC	8	153	1,800	7,765
INCINERATOR ROAD ESMT	II	1555	II	1550	DI	6	78	1,800	20,308
INCINERATOR ROAD ESMT	II	1560	II	1535	VC	8	180	0	0
INCINERATOR ROAD ESMT	II	1570	II	1560	PVC	6	284	0	0
INCINERATOR ROAD ESMT	II	1575	II	1533	VC	8	242	2,880	7,855
INCINERATOR ROAD ESMT	II	1580	II	1575	VC	8	155	0	0
INCINERATOR ROAD ESMT	II	1585	II	1570	PVC	8	136	0	0
INCINERATOR ROAD ESMT	II	1590	II	1585	PVC	8	302	360	787
INCINERATOR ROAD ESMT	II	1595	II	1590	PVC	8	216	0	0

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter (in.)	Pipe Length (lf)	GPD	GPDIM
INCINERATOR ROAD ESMT	II	1600	II	1595	PVC	8	146	0	0
LOWER EAST STREET ESMT	II	1615	II	500	PVC	8	385	3,240	5,554
LOWER EAST STREET ESMT	II	1620	II	1615	PVC	8	160	0	0
INCINERATOR ROAD ESMT	II	1630	II	1625	PVC	8	73	0	0
INCINERATOR ROAD ESMT	II	1635	II	1630	PVC	8	281	0	0
INCINERATOR ROAD ESMT	II	1640	II	1635	PVC	8	313	360	759
INCINERATOR ROAD ESMT	II	1645	II	1640	PVC	8	7	0	0
INCINERATOR ROAD ESMT	II	1650	II	1645	PVC	8	86	0	0
INCINERATOR ROAD ESMT	II	1660	II	1650	PVC	8	77	0	0
SUBAREA II TOTAL LENGTH OF PIPE ATTEMPTED							20,717	41,946	1,334
SUBAREA II LENGTH OF PIPE FLOW ISOLATED							20,717		

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter (in.)	Pipe Length (lf)	GPD	GPDIM
COLBURN STREET	KK	010	LL	430	PVC	8	233	0	0
EMMETT AVENUE	KK	170	LL	360	VC	8	165	0	0
SAWMILL LANE	LL	020	LL	010	VC	8	30	0	0
OAKLAND STREET	LL	030	LL	010	VC	8	262	0	0
OAKLAND STREET	LL	040	LL	030	VC	8	152	0	0
OAKLAND STREET	LL	050	LL	040	VC	8	183	360	1,298
OAKLAND STREET	LL	060	LL	050	VC	8	204	720	2,329
OAKLAND STREET	LL	070	LL	060	VC	8	166	720	2,863
OAKLAND STREET	LL	080	LL	070	VC	8	294	0	0
OAKLAND STREET	LL	090	LL	080	VC	8	222	0	0
LEWIS FARM ROAD	LL	100	LL	090	VC	8	95	0	0
LEWIS FARM ROAD	LL	110	LL	100	VC	8	139	0	0
LEWIS FARM ROAD	LL	110 (STUB)	LL	110	VC	6	76	360	4,168
SHERWOOD STREET	LL	120	LL	130	VC	8	22	0	0
SHERWOOD STREET	LL	130	LL	140	VC	8	271	144	351
ALLENSPACKER LANE	LL	140	LL	070	VC	8	193	0	0
SHERWOOD STREET	LL	145	LL	140	VC	8	221	0	0
SHERWOOD STREET	LL	150	LL	145	VC	8	183	0	0
SHERWOOD STREET	LL	160	LL	150	VC	8	109	1,440	8,719
SHERWOOD STREET	LL	170	LL	160	VC	8	69	0	0
SHERWOOD STREET	LL	180	LL	170	VC	8	127	0	0
STORMY HILL	LL	190	LL	180	VC	8	38	0	0
STORMY HILL	LL	200	LL	190	VC	8	62	0	0
BIRCH STREET ESMT	LL	210	LL	180	VC	8	96	0	0
BIRCH STREET ESMT	LL	220	LL	223	VC	8	246	0	0
BIRCH STREET ESMT	LL	223	LL	210	VC	8	164	6,387	25,704
CLEVELAND STREET	LL	225	LL	220	VC	8	131	0	0
CLEVELAND STREET	LL	230	LL	220	VC	8	209	0	0
BIRCH STREET	LL	240	LL	230	VC	8	173	0	0

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter (in.)	Pipe Length (lf)	GPD	GPDIM
BIRCH STREET	LL	250	LL	240	VC	8	167	0	0
BIRCH STREET	LL	260	LL	250	VC	8	224	0	0
BIRCH STREET	LL	270	LL	260	VC	8	142	0	0
BIRCH STREET	LL	275	LL	270	VC	8	161	0	0
LEONARD STREET	LL	280	LL	250	VC	8	171	144	556
LEONARD STREET	LL	290	LL	250	VC	8	240	0	0
LEONARD STREET	LL	300	LL	290	VC	8	110	0	0
CLEVELAND STREET	LL	310	LL	230	VC	8	241	360	986
FLEMING STREET	LL	312	LL	310	VC	8	229	0	0
CLEVELAND STREET	LL	320	LL	310	VC	8	111	0	0
ALICE WAY	LL	330	LL	160	PVC	8	208	0	0
EMMETT AVENUE	LL	350	LL	020	VC	8	325	5,082	10,320
EMMETT AVENUE	LL	355	LL	350	VC	8	342	360	695
ODYSSEY LANE	LL	357	LL	355	PVC	8	127	0	0
ODYSSEY LANE	LL	359	LL	357	PVC	8	240	0	0
EMMETT AVENUE	LL	360	LL	355	VC	8	22	0	0
BUSSEY STREET ESMT	LL	370	LL	367	VC	8	457	0	0
BUSSEY STREET ESMT	LL	380	LL	370	VC	6	143	0	0
AIELLO DRIVE	LL	390	LL	380	PVC	6	29	0	0
AIELLO DRIVE	LL	400	LL	390	PVC	6	255	360	1,242
BUSSEY STREET	LL	410	LL	380	VC	6	178	360	1,780
COLBURN STREET	LL	440	LL	430	PVC	8	140	0	0
COLBURN STREET	LL	450	LL	440	PVC	8	100	0	0
VETERANS ROAD	LL	800	LL	795	VC	8	91	0	0
VETERANS ROAD	LL	810	LL	800	VC	8	230	144	413
VETERANS ROAD	LL	815	LL	810	VC	8	92	0	0
VETERANS ROAD	LL	820	LL	815	VC	8	94	0	0
VETERANS ROAD	LL	830	LL	800	VC	8	376	0	0
VETERANS ROAD	LL	840	LL	800	VC	8	172	0	0

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter (in.)	Pipe Length (lf)	GPD	GPDIM
VETERANS ROAD	LL	850	LL	840	VC	8	66	0	0
VETERANS ROAD	LL	860	LL	840	VC	8	219	0	0
VETERANS ROAD	LL	870	LL	860	VC	8	242	360	982
SAWMILL LANE	MM	010	LL	010	CI	12	244	1,080	1,948
SUBAREA LL TOTAL LENGTH OF PIPE ATTEMPTED							10,723	18,381	1,136
SUBAREA LL LENGTH OF PIPE FLOW ISOLATED							10,723		

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter (in.)	Pipe Length (lf)	GPD	GPDIM
SAWMILL LANE	MM	020	MM	010	VC	12	28	0	0
SAWMILL LANE	MM	030	MM	020	NO FI	12	269		
MILTON STREET	MM	040	MM	030	VC	12	61	0	0
HIGH STREET	MM	050	MM	040	VC	8	271	2,880	7,014
HIGH STREET	MM	060	MM	050	VC	8	90	0	0
HIGH STREET	MM	070	MM	060	LINED	8	125	2,880	15,206
HIGH STREET	MM	080	MM	070	LINED	8	219	2,880	8,679
HIGH STREET	MM	090	MM	080	VC	8	295	2,880	6,443
HILL AVENUE	MM	100	MM	080	VC	8	112	0	0
HILL AVENUE	MM	110	MM	100	VC	8	109	0	0
HILL AVENUE	MM	110 (STUB)	MM	110	VC	8	172	0	0
MILTON STREET	MM	120	MM	040	VC	12	166	0	0
MILTON STREET	MM	130	MM	120	VC	8	139	0	0
MILTON STREET	MM	140	MM	130	VC	6	203	0	0
BASSEY STREET	MM	270	MM	030	VC	8	200	0	0
BASSEY STREET	MM	280	MM	207	VC	8	207	0	0
BASSEY STREET	MM	290	MM	280	VC	8	190	0	0
CHAUNCY STREET	MM	300	MM	290	VC	8	194	1,080	3,674
CHAUNCY STREET	MM	310	MM	300	VC	6	153	0	0
CHAUNCY STREET	MM	320	MM	310	VC	6	84	0	0
WATERVIEW PLACE	MM	330	MM	300	VC	6	144	0	0
SUBAREA MM TOTAL LENGTH OF PIPE ATTEMPTED							3,431	12,600	2,345
SUBAREA MM LENGTH OF PIPE FLOW ISOLATED							3,162		

TOTALS FOR ALL FLOW ISOLATED AREAS			
TOTAL LENGTH OF PIPE ATTEMPTED	44,295	114,539	1,696
TOTAL LENGTH OF PIPE FLOW ISOLATED	43,766		

APPENDIX A

Flow Meter ID	Meter Manhole	Subarea	Length (LF)	Inch*Miles	Acres
DE-BO-1C	AA5	AA	17,181	28.24	59.16
TEMP2	CC10	DD	20,775	32.58	71.54
TEMP1	CC110	CC	11,072	17.11	38.12
TEMP3	EE16	EE	14,356	23.62	49.44
TEMP4	FF10	FF	21,712	34.28	74.76
TEMP7	GG20	GG	26,684	44.63	91.89
TEMP8	JJ1080	HH	29,687	48.59	105.57
DE-1C	JJ130	NN & Partial Section of JJ	21,135	42.77	72.78
TEMP5	JJ570	Partial Section of JJ	14,074	33.08	49.20
DE-8C	KK180	Partial Section of KK	6,291	9.51	21.66
DE-4C	KK60	Partial Section of KK	8,782	13.30	30.24
TEMP13	LL480	Partial Section of II & LL	13,958	20.69	48.06
DE-7C	MM160	Partial Section of MM	14,365	22.71	49.46
TEMP6	OO10	OO	25,913	52.95	89.23
TEMP9	PP10	PP	19,428	33.42	66.91
DE-2CR	QQ20	QQ	12,163	20.75	41.88
TEMP12	RR10	RR	19,281	29.57	66.39
TEMP10	SS15	SS	30,987	51.00	108.83
TEMP14	TT50	TT	18,053	28.33	62.17
TEMP11	UU10	UU	17,042	28.63	58.68
TEMP16	VV30	VV	13,804	24.16	47.54
DE-CT-1C	WW10	WW	21,677	37.78	74.65
TEMP15	YY10	XX & YY	32,453	51.17	111.75
DE-9C	ZZ400	Partial Section of ZZ	6,141	8.63	21.15

NOTES: Approximately 69,134 linear feet was not metered during this program. This includes sewer subarea BB and partial sections of sewer subareas II, JJ, LL, MM & ZZ.

FIGURE 1

TOWN OF DEDHAM, MASSACHUSETTS
SANITARY SEWER SYSTEM

TOWN-WIDE FLOW METERING MAP

NOVEMBER, 2016 SCALE: NOTED

Weston & Sampson

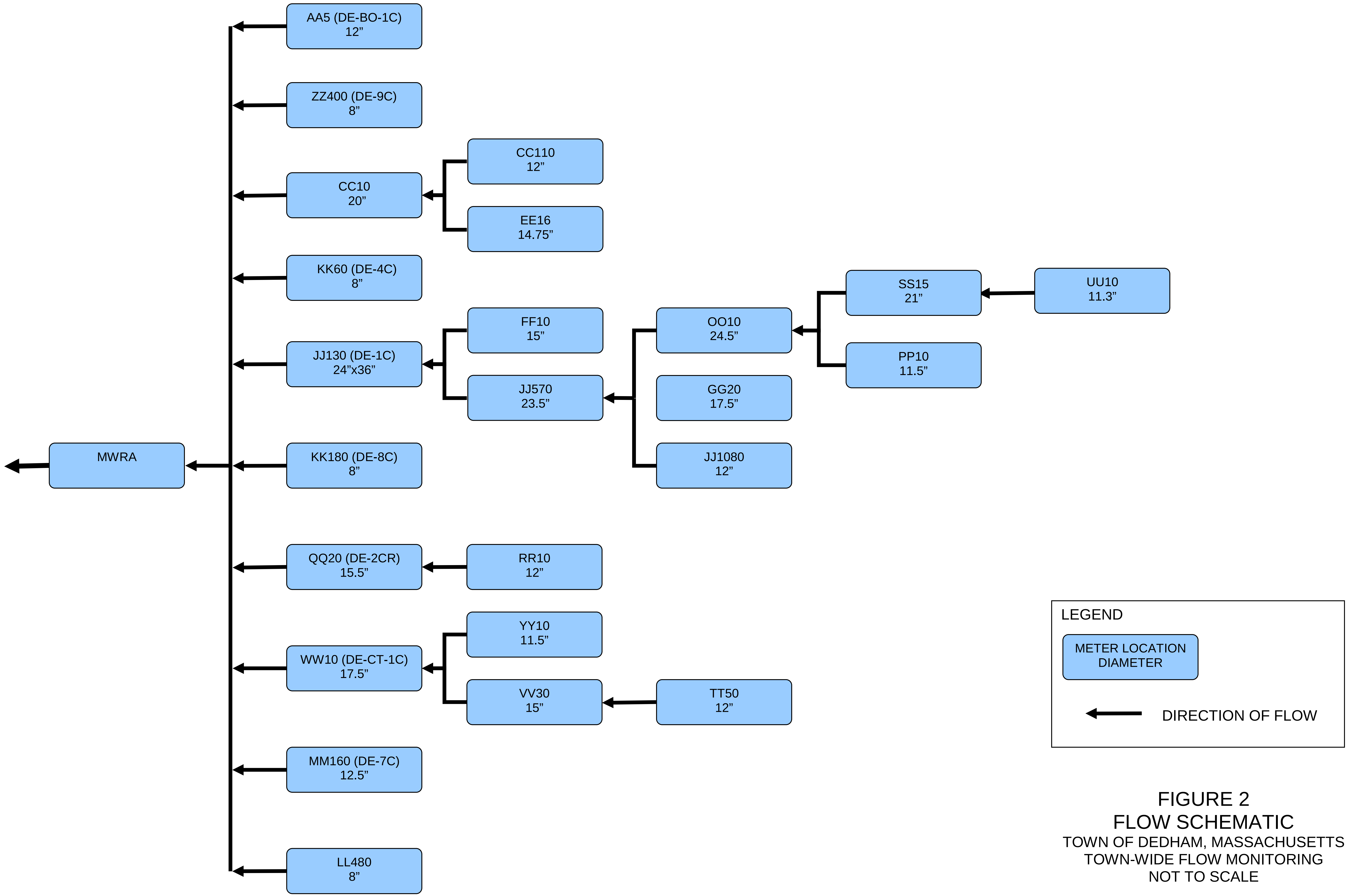
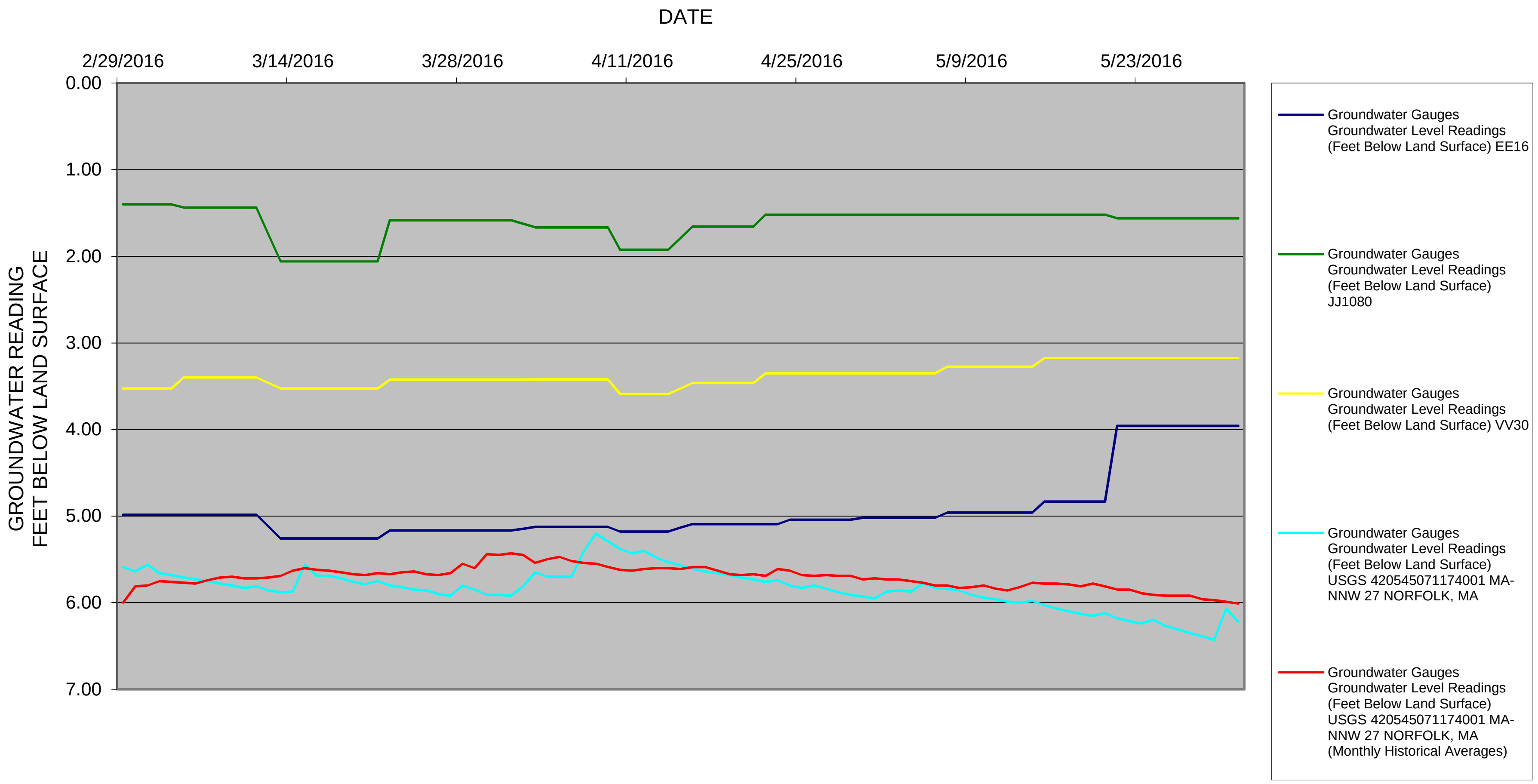


FIGURE 2
FLOW SCHEMATIC
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
NOT TO SCALE

APPENDIX B

FIGURE 3 – GROUNDWATER READINGS

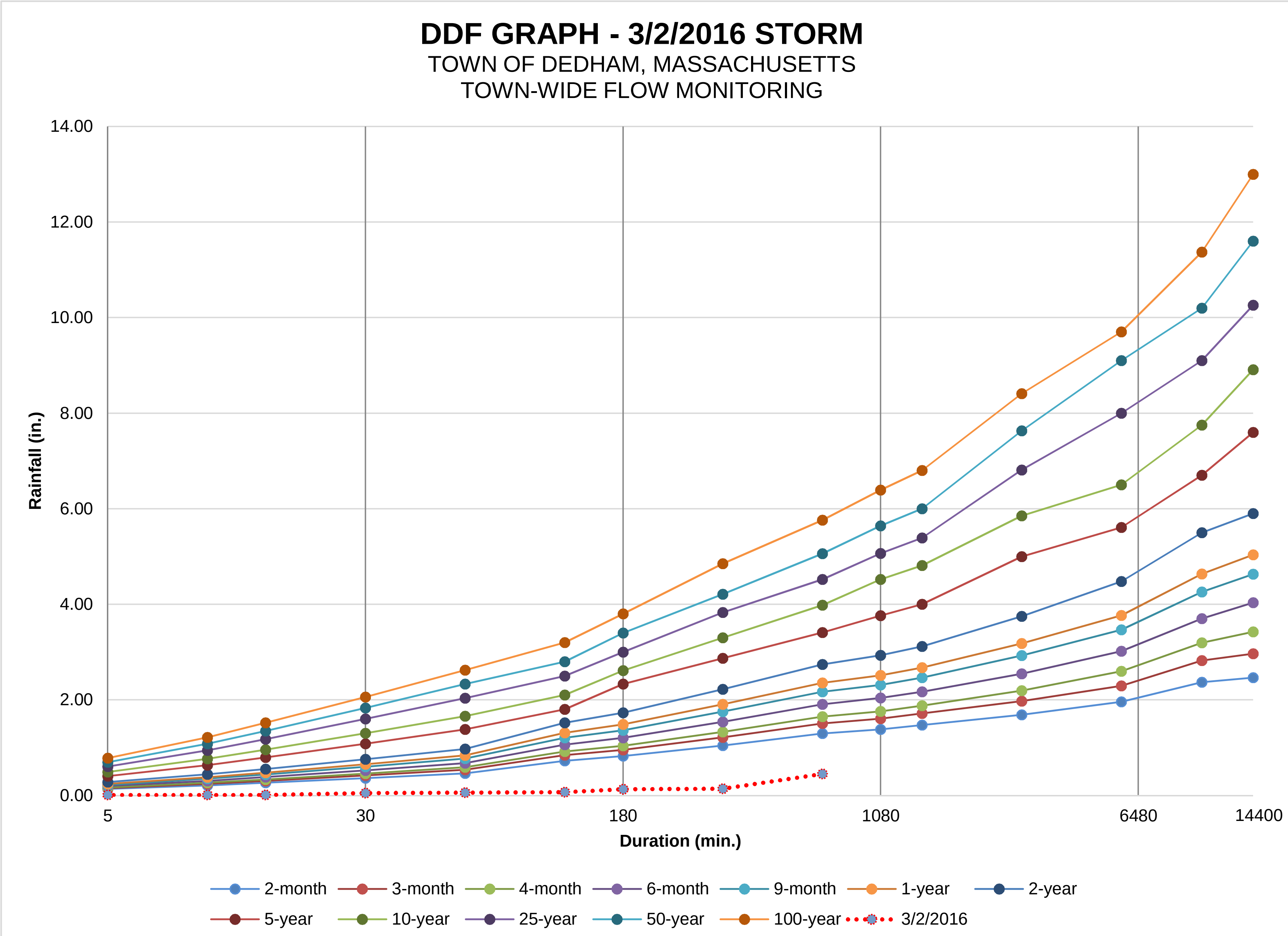
FIGURE 3
GROUNDWATER READINGS
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING



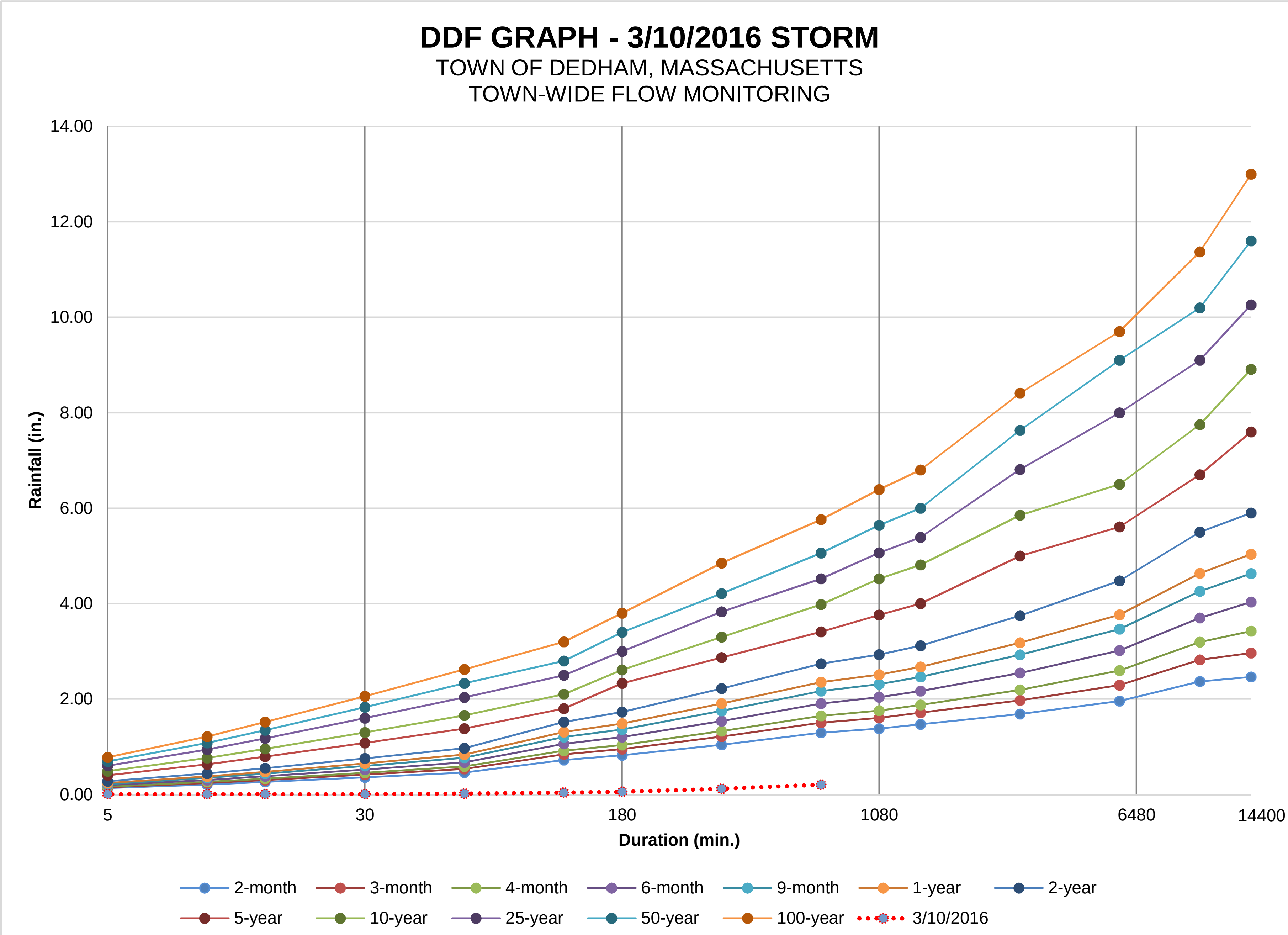
APPENDIX C

DDF GRAPHS

FIGURE 4 – RAINFALL SUMMARY



DDF GRAPH - 3/2/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
10-year
25-year
50-year
100-year
3/2/2016


DDF GRAPH - 3/10/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
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1-year
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5-year
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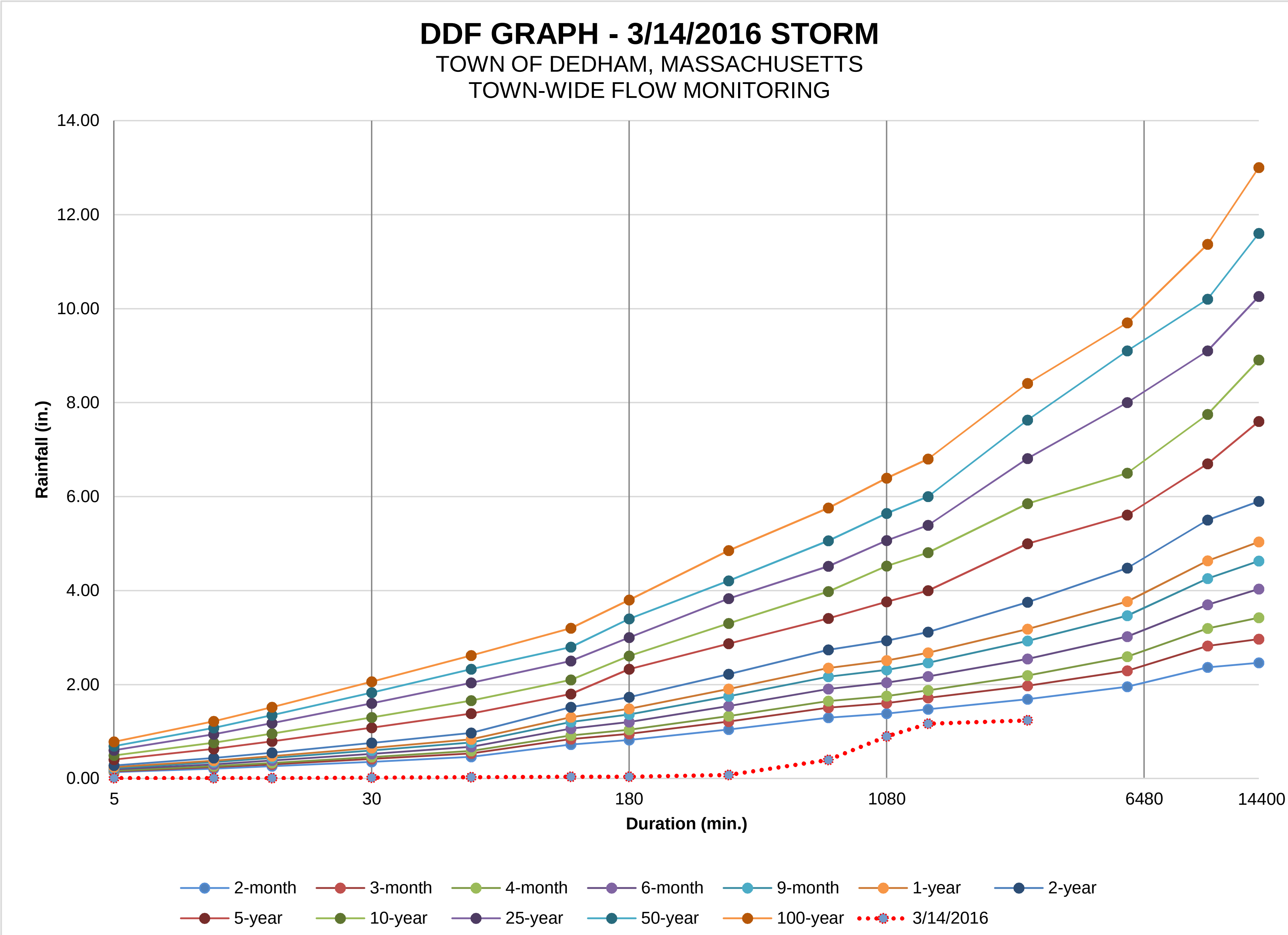
25-year
50-year
100-year
3/10/2016


DDF GRAPH - 3/14/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
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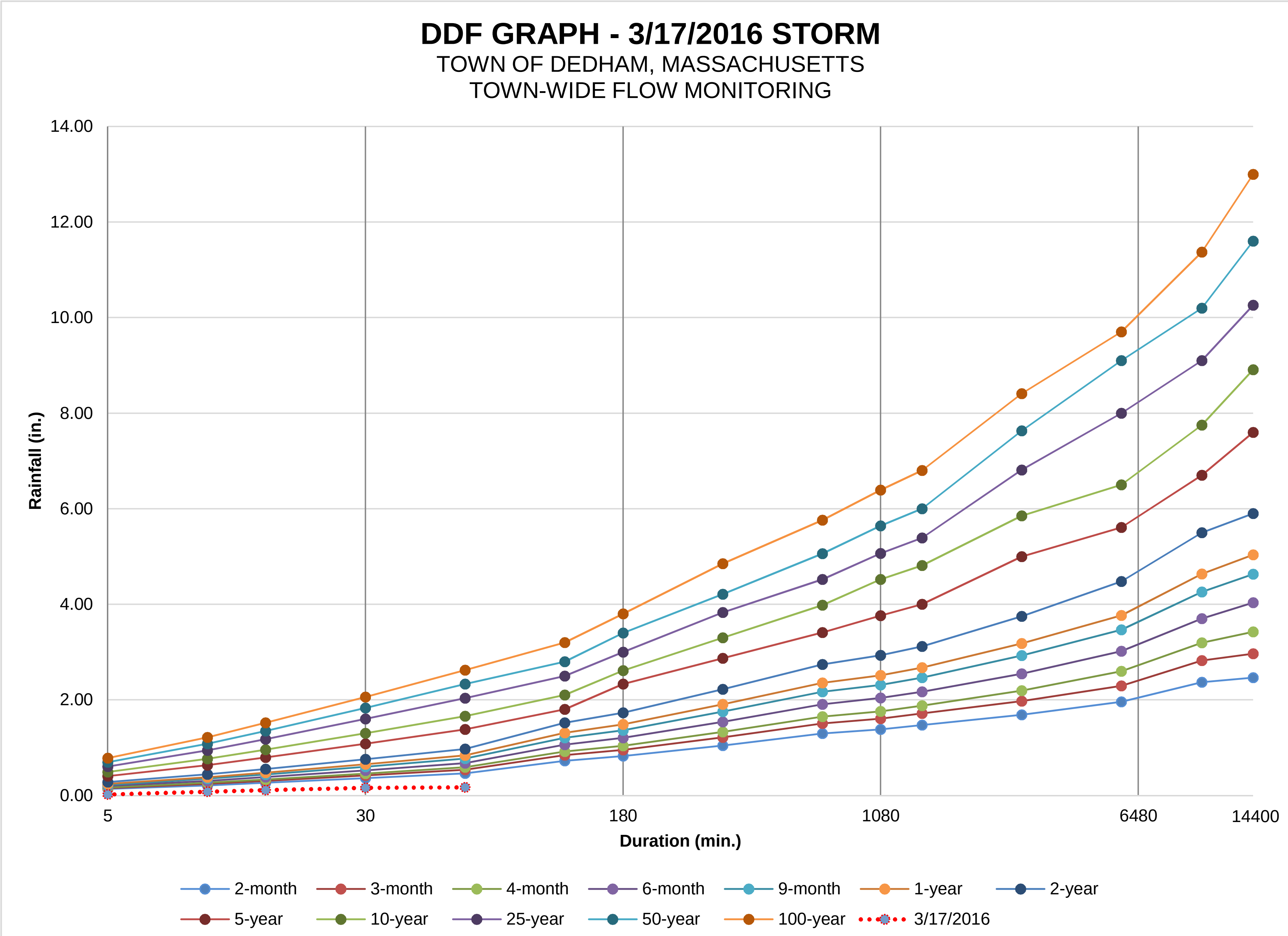
50-year
100-year
3/14/2016


DDF GRAPH - 3/17/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
10-year
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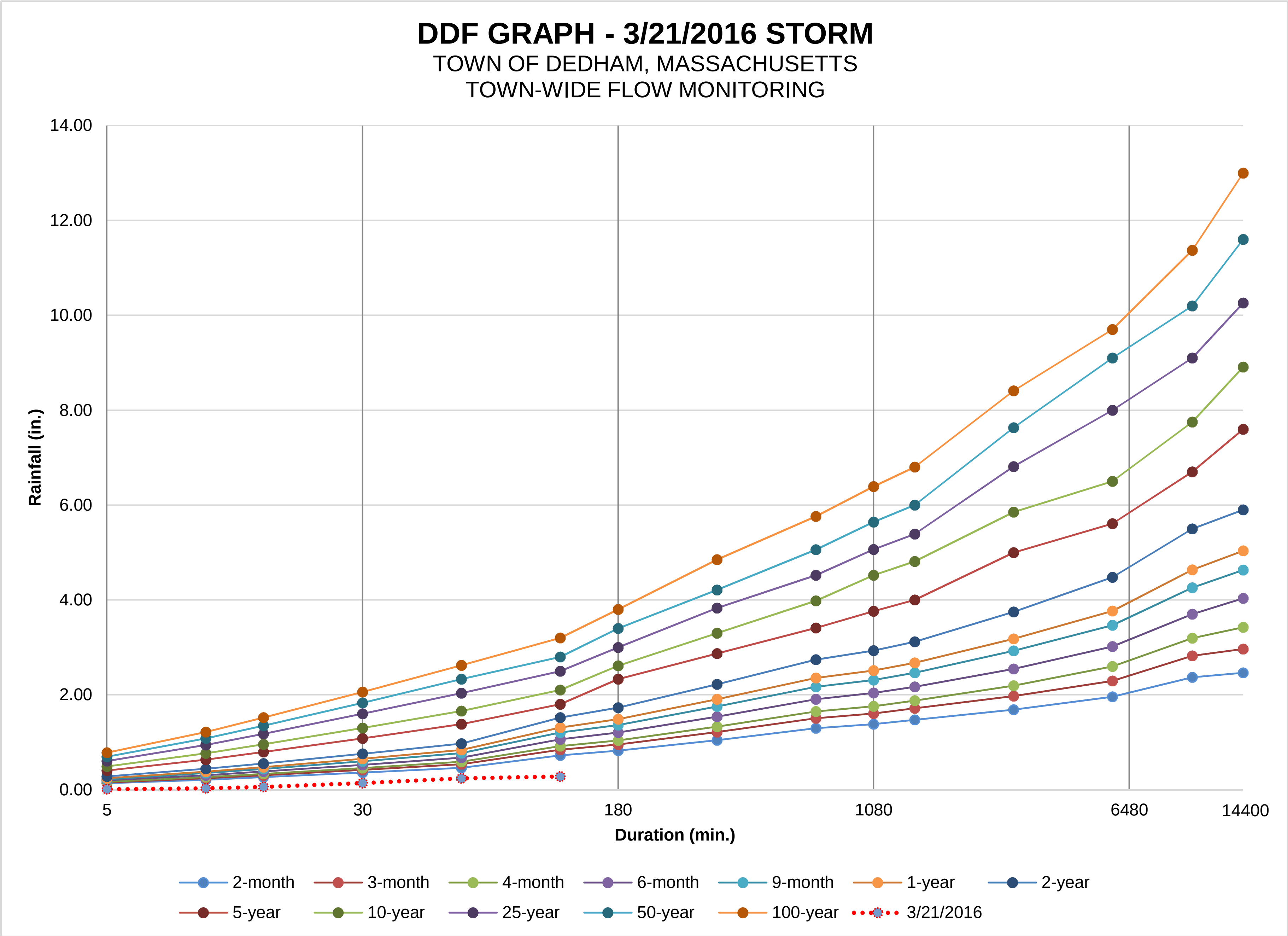
50-year
100-year
3/17/2016


DDF GRAPH - 3/21/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
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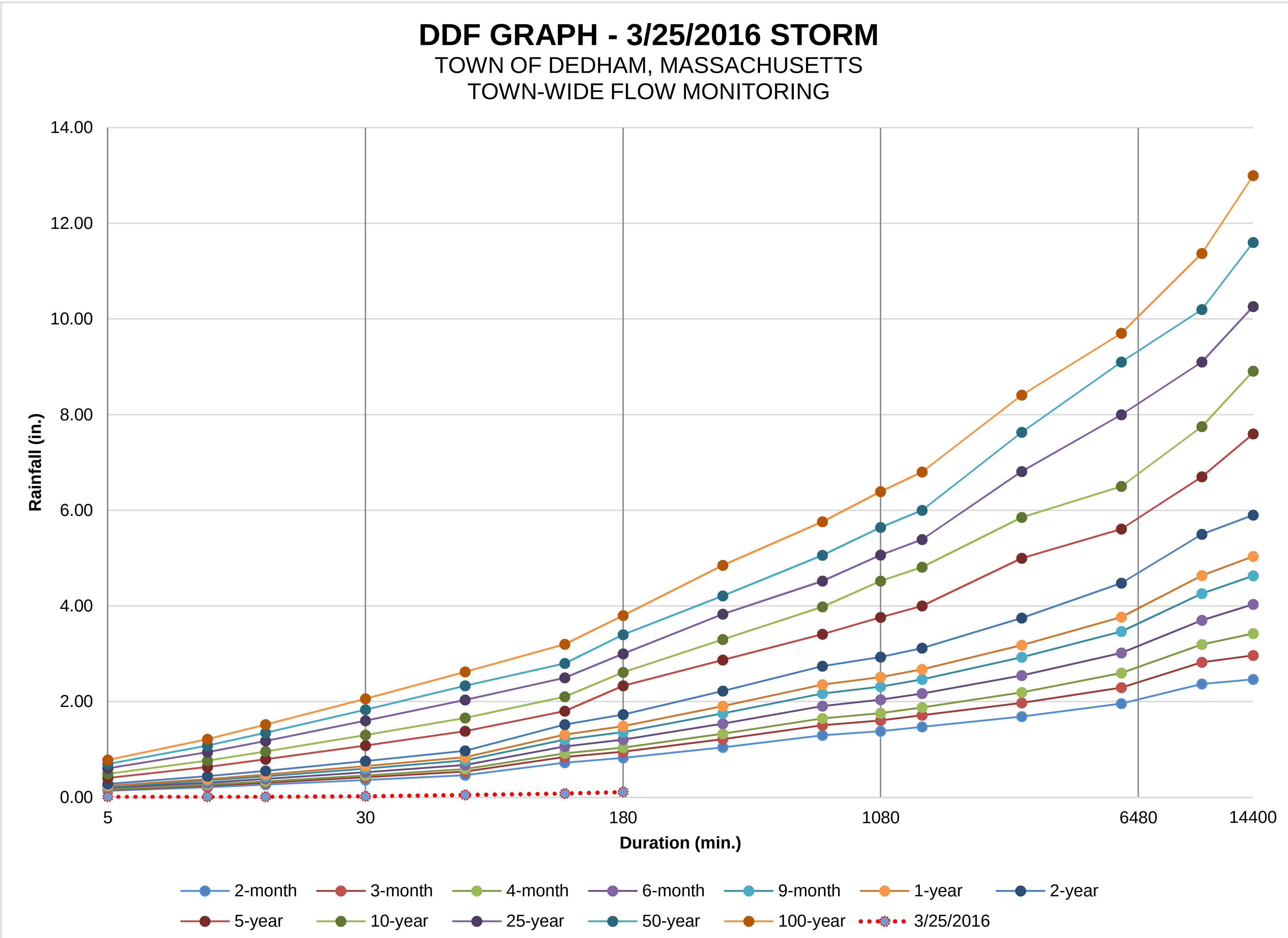
50-year
100-year
3/21/2016


DDF GRAPH - 3/25/2016 STORM
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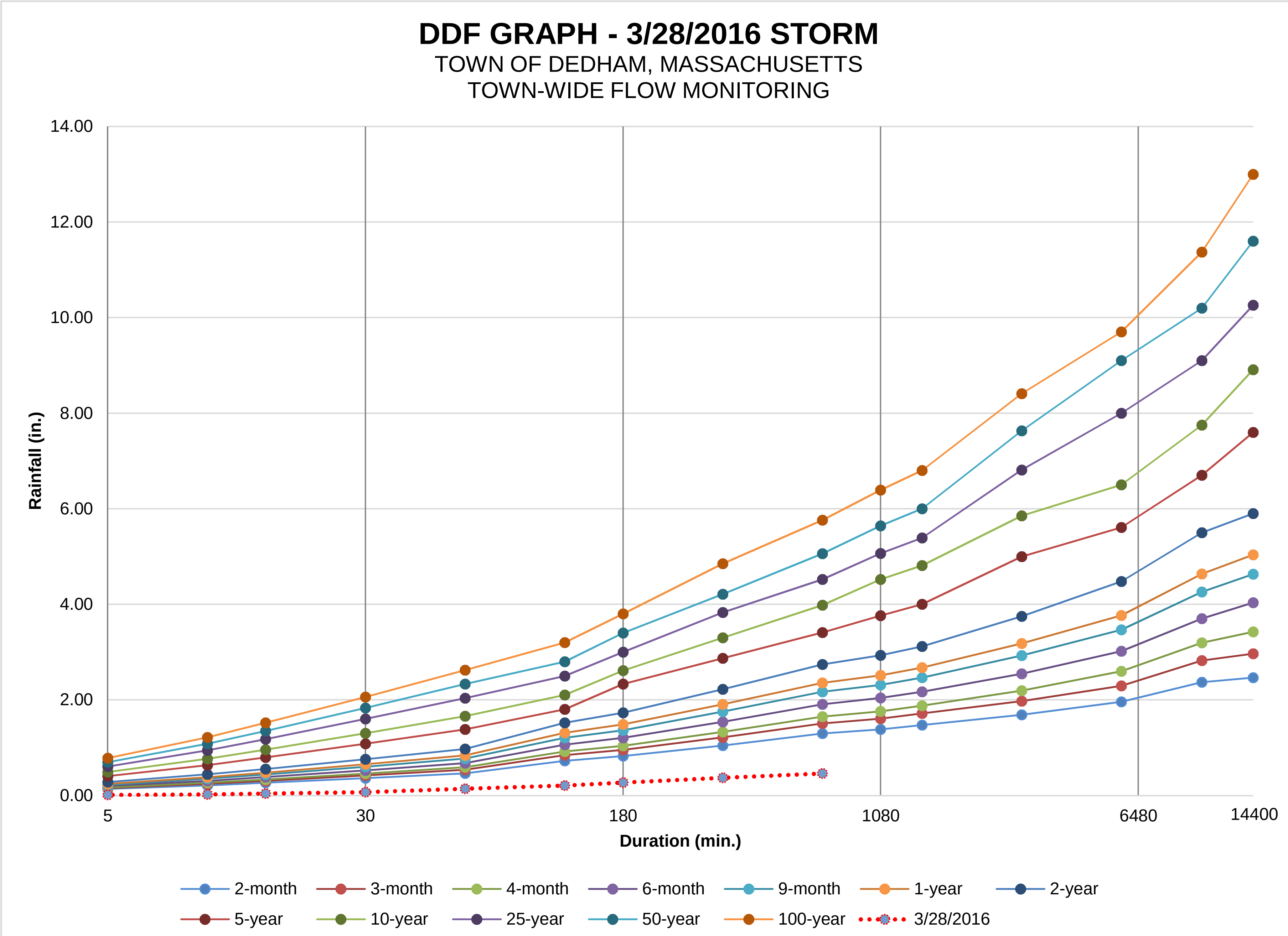
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
10-year
25-year
50-year
100-year
3/25/2016


DDF GRAPH - 3/28/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Rainfall (in.)
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
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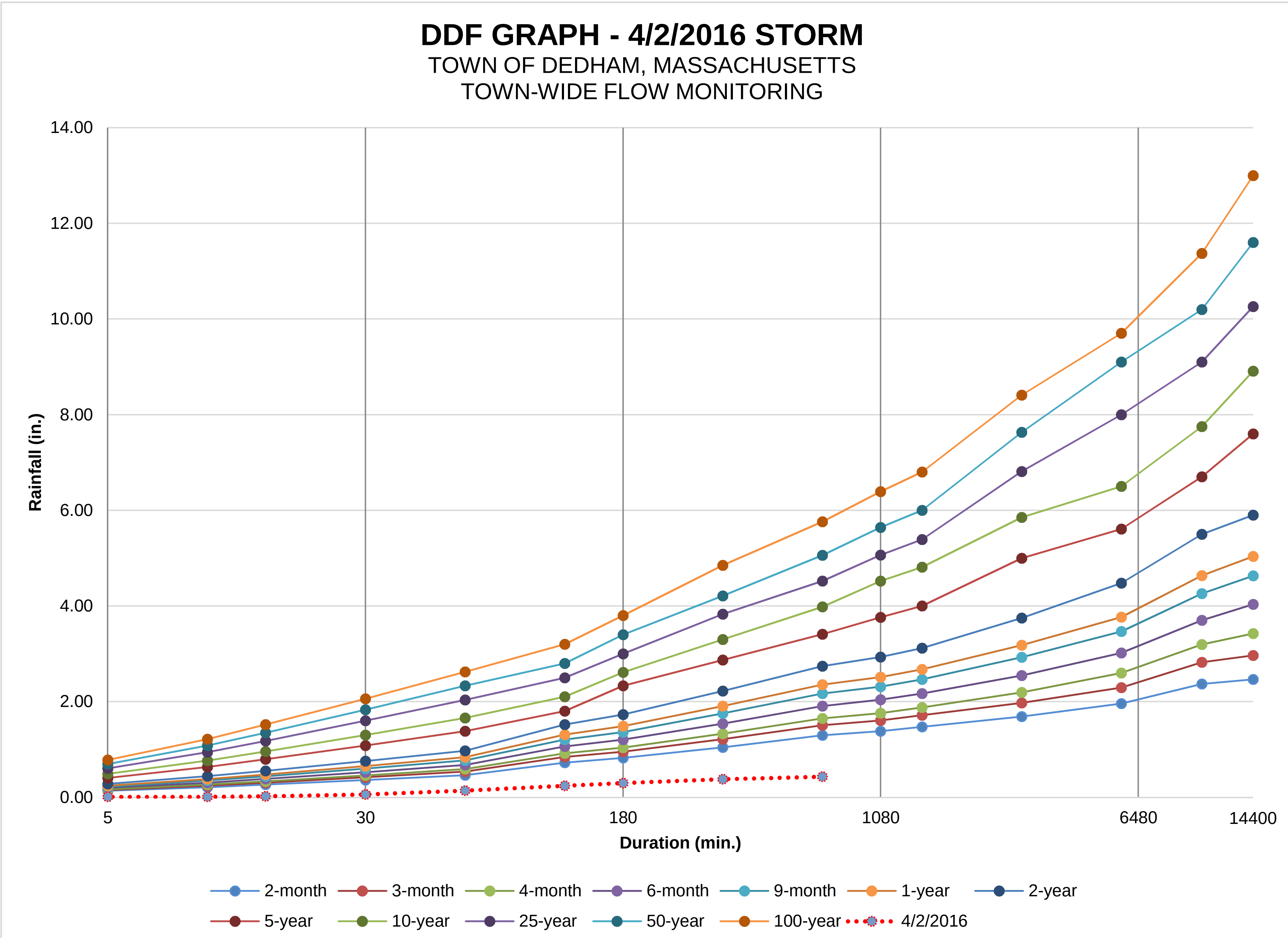
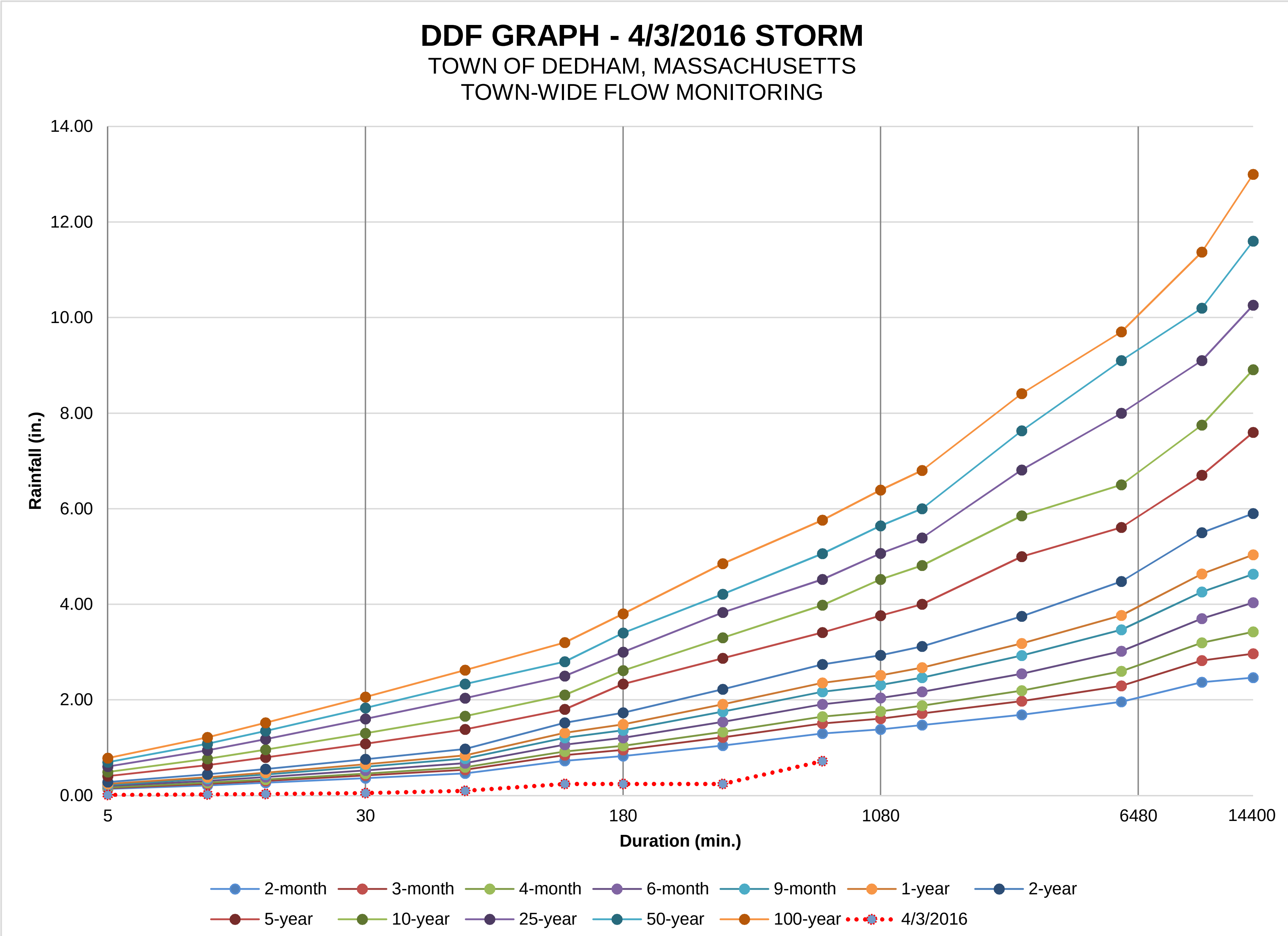
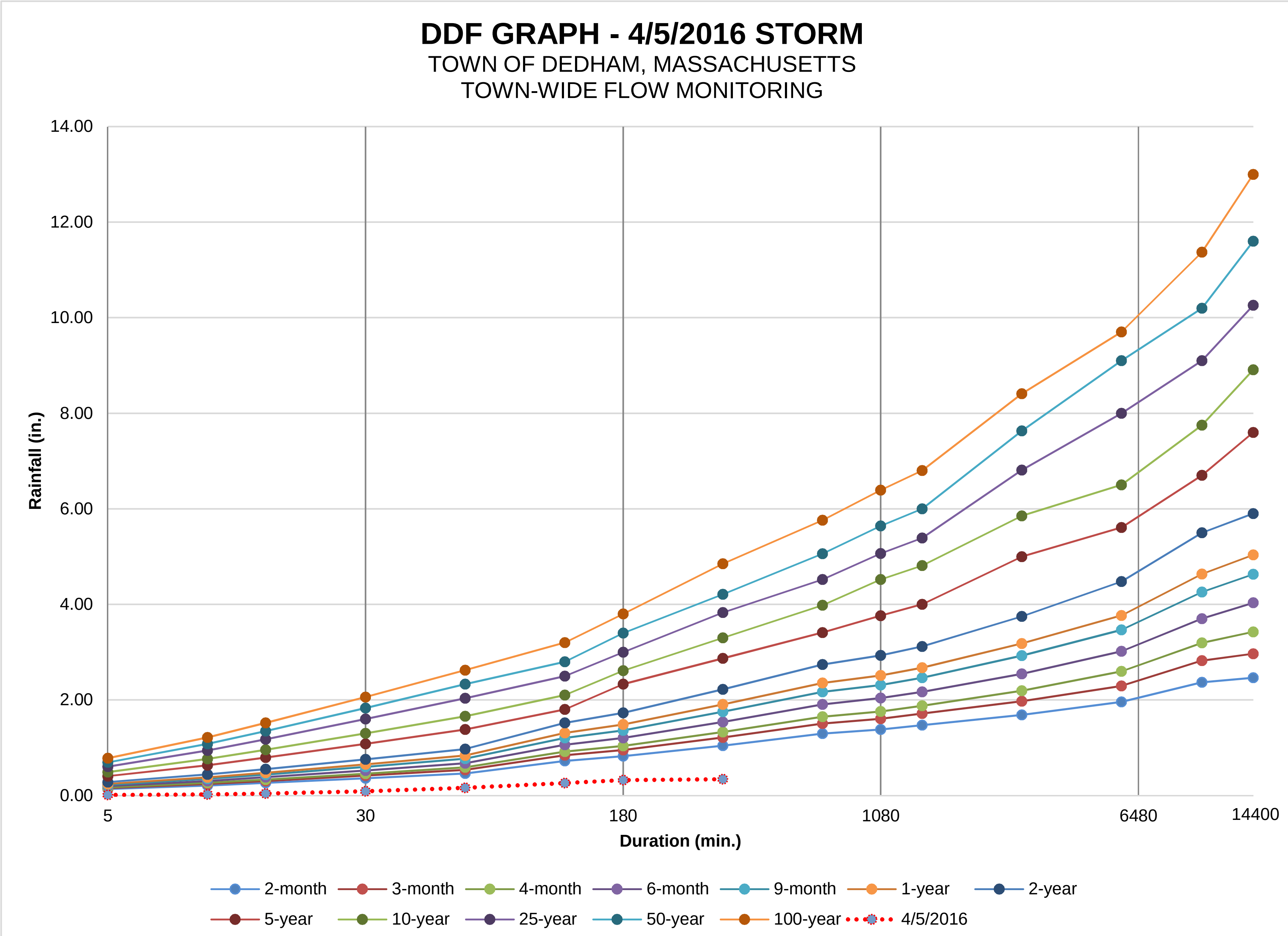
50-year
100-year
3/28/2016


DDF GRAPH - 4/2/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
10-year
25-year
50-year
100-year
4/2/2016


DDF GRAPH - 4/3/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
10-year
25-year
50-year
100-year
4/3/2016


DDF GRAPH - 4/5/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
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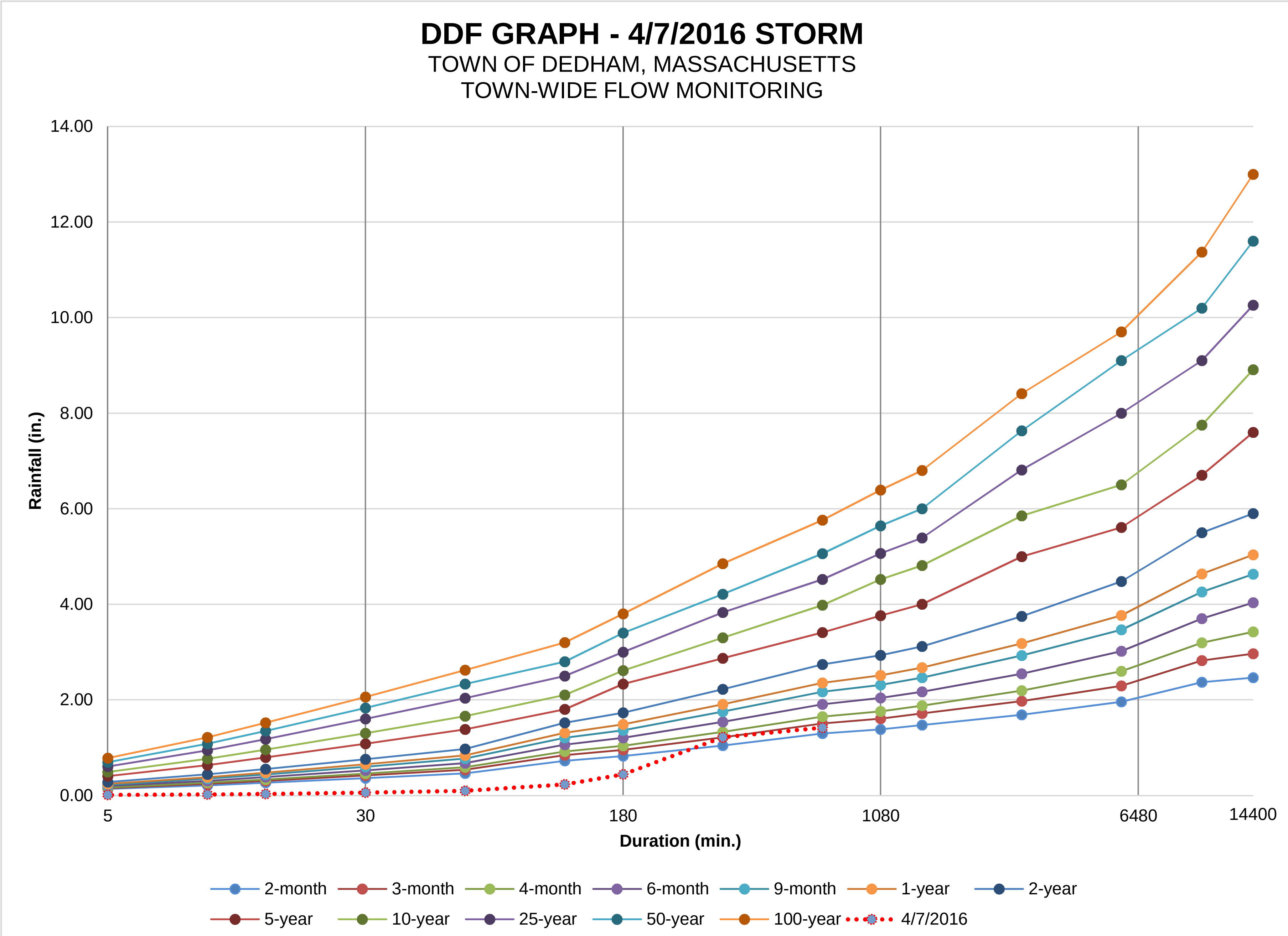
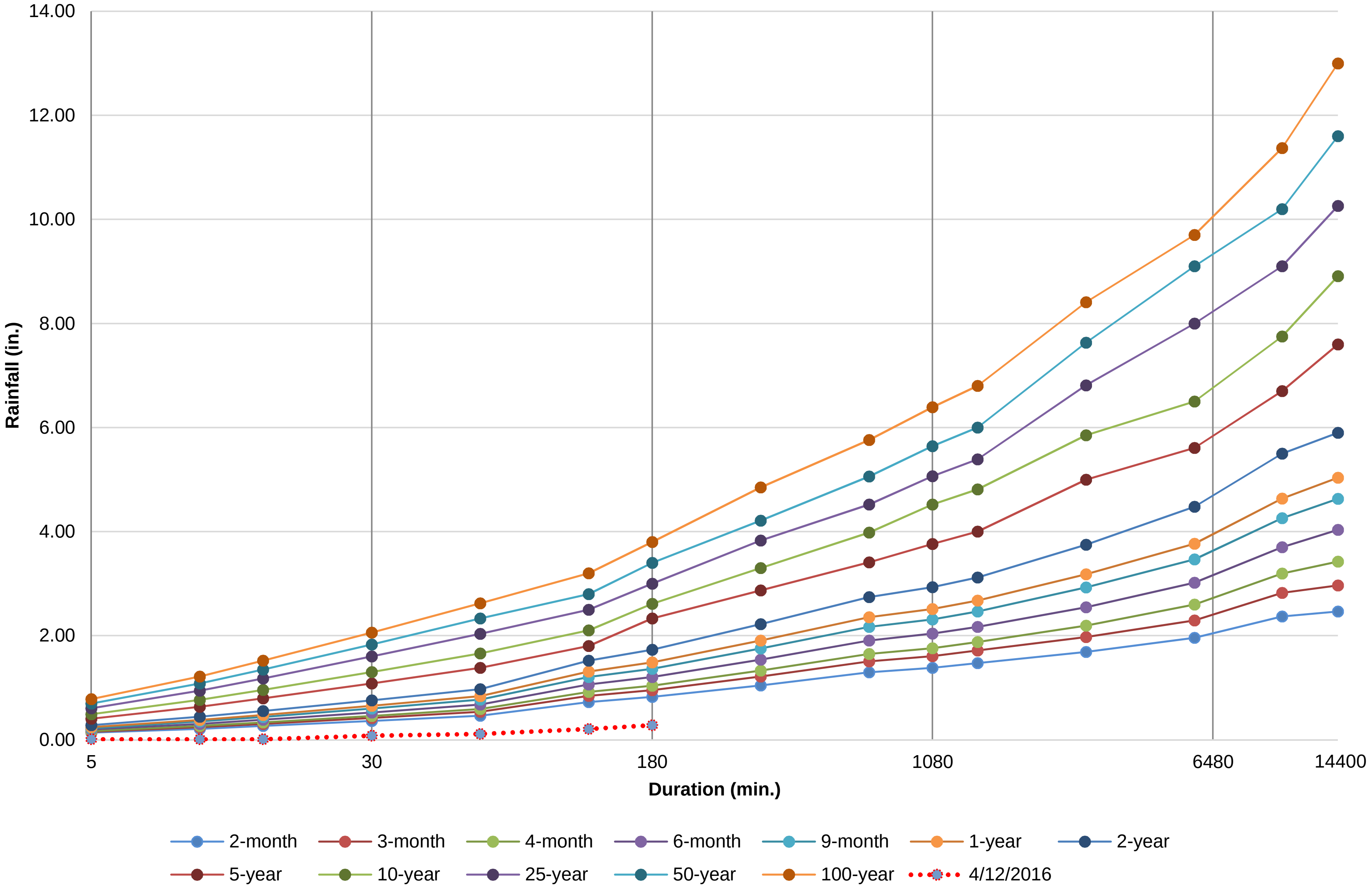
50-year
100-year
4/5/2016

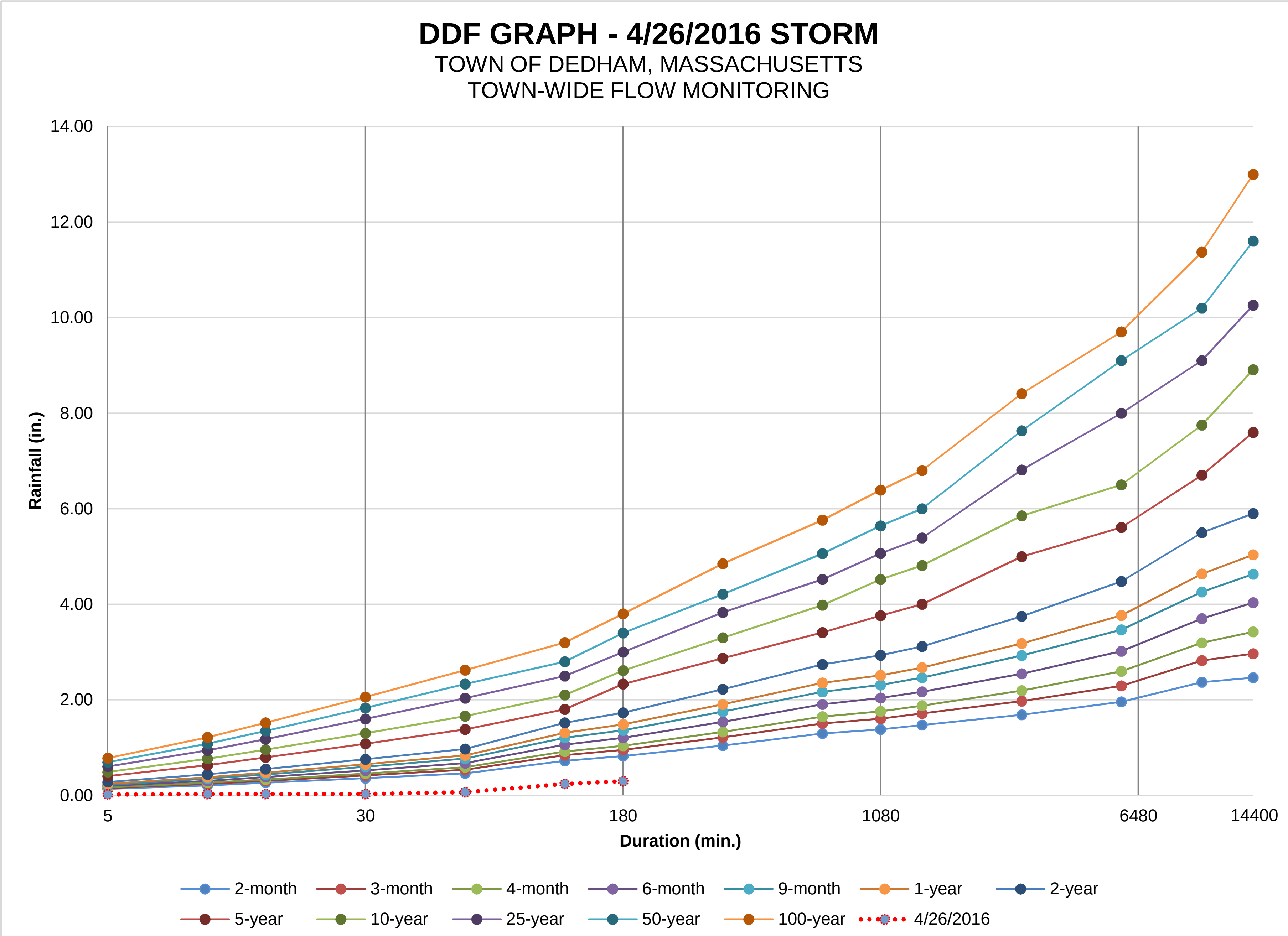


DDF GRAPH - 4/7/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
10-year
25-year
50-year
100-year
4/7/2016

DDF GRAPH - 4/12/2016 STORM

TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING

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TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
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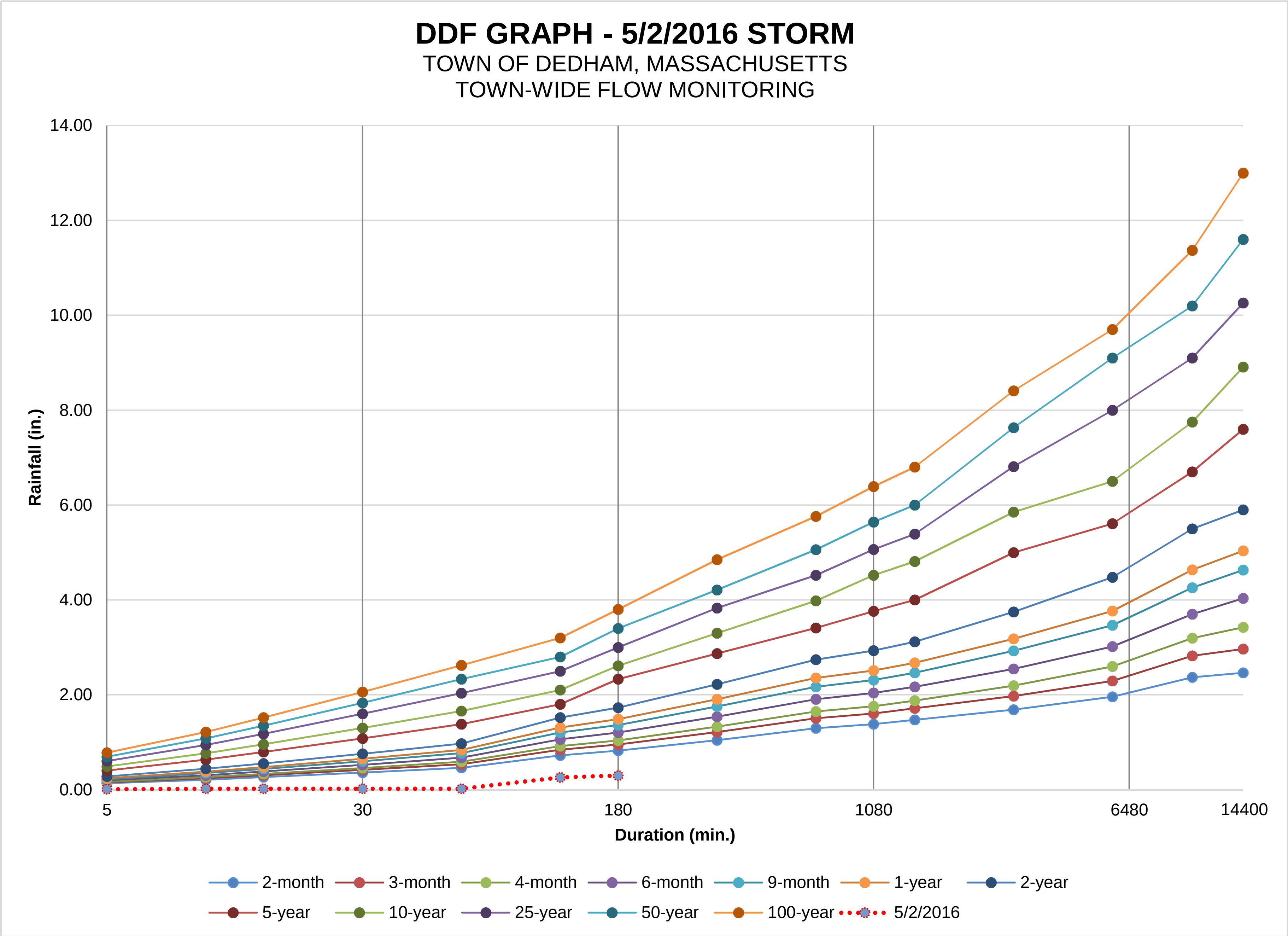
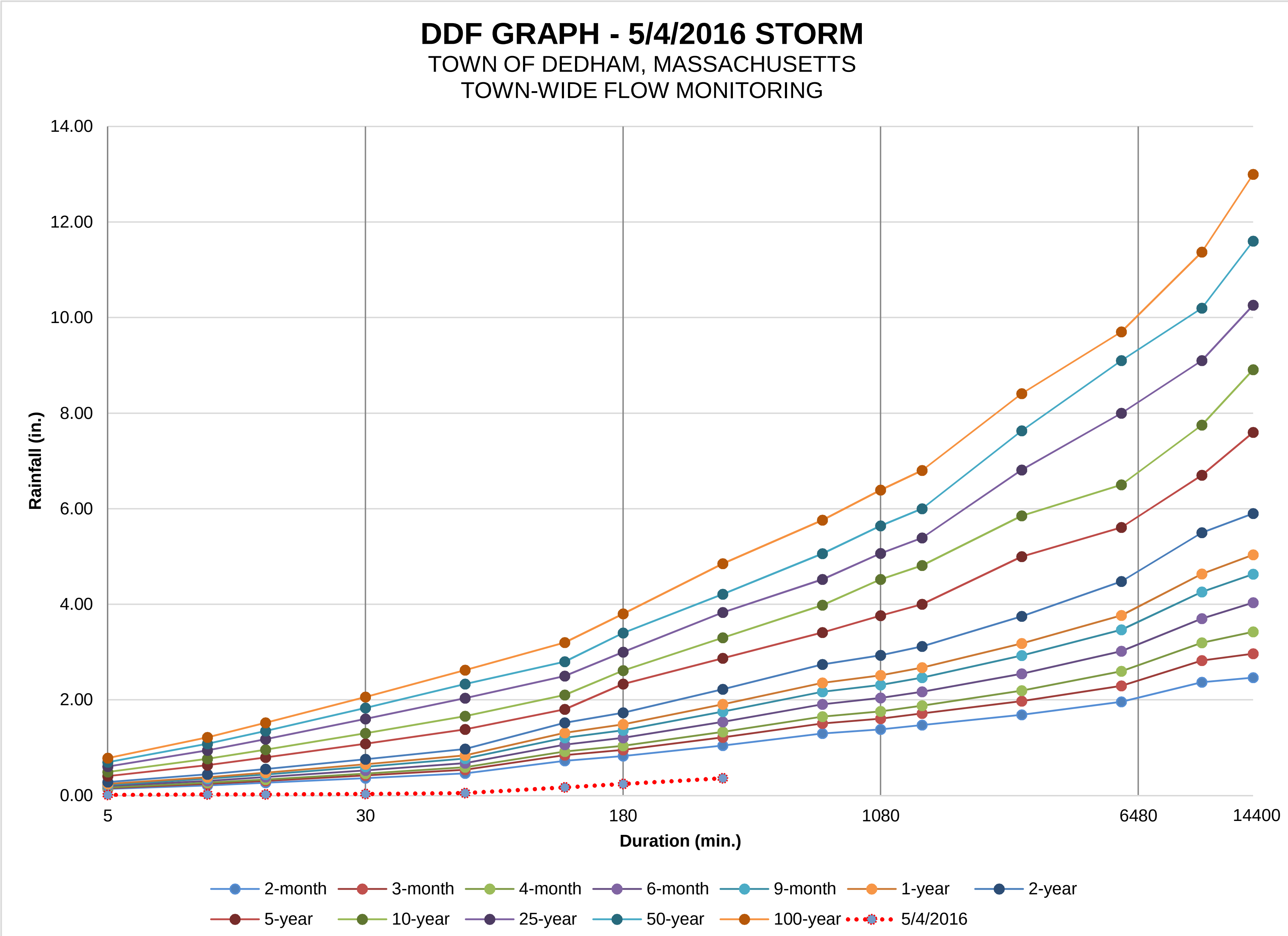
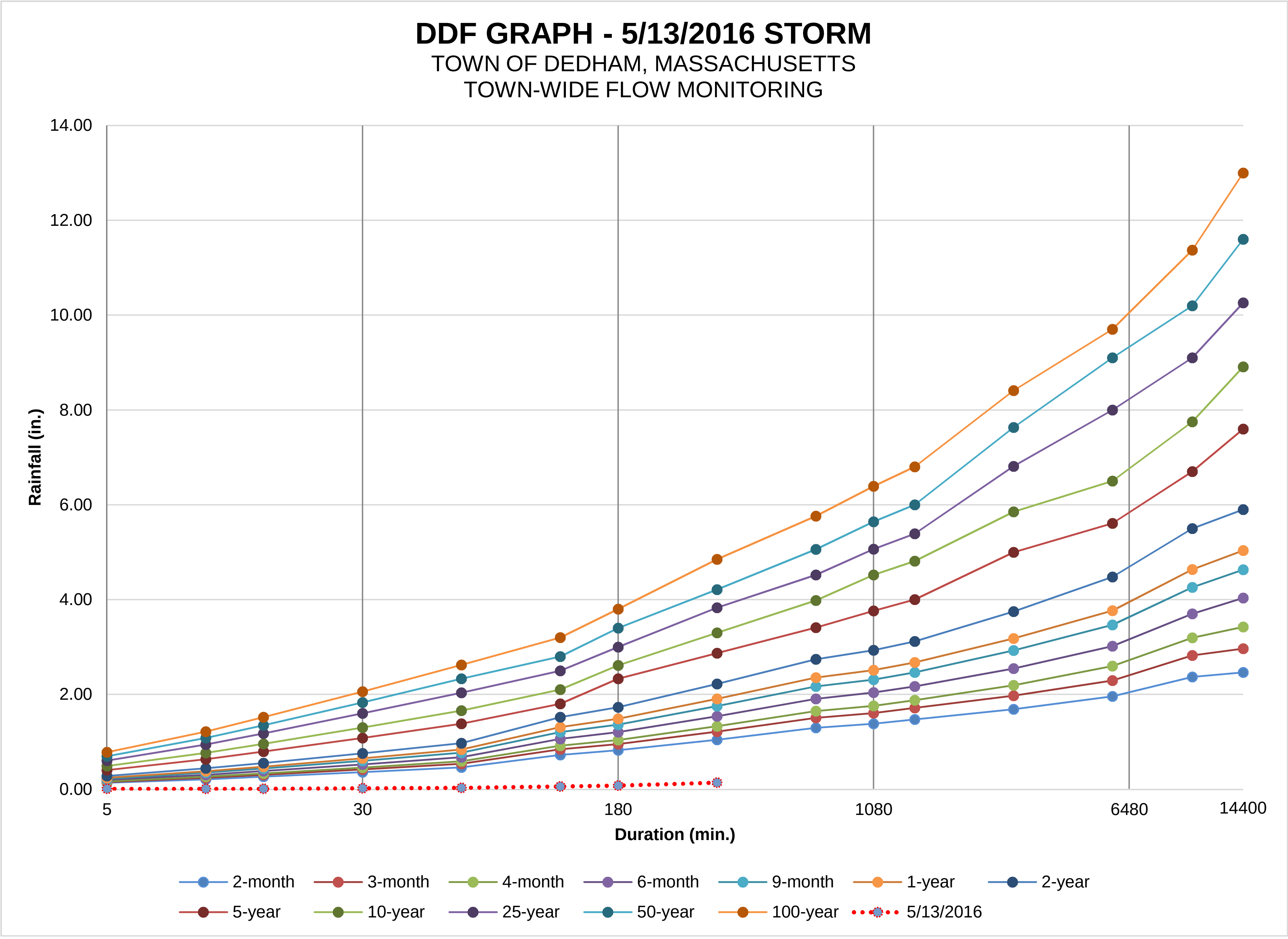
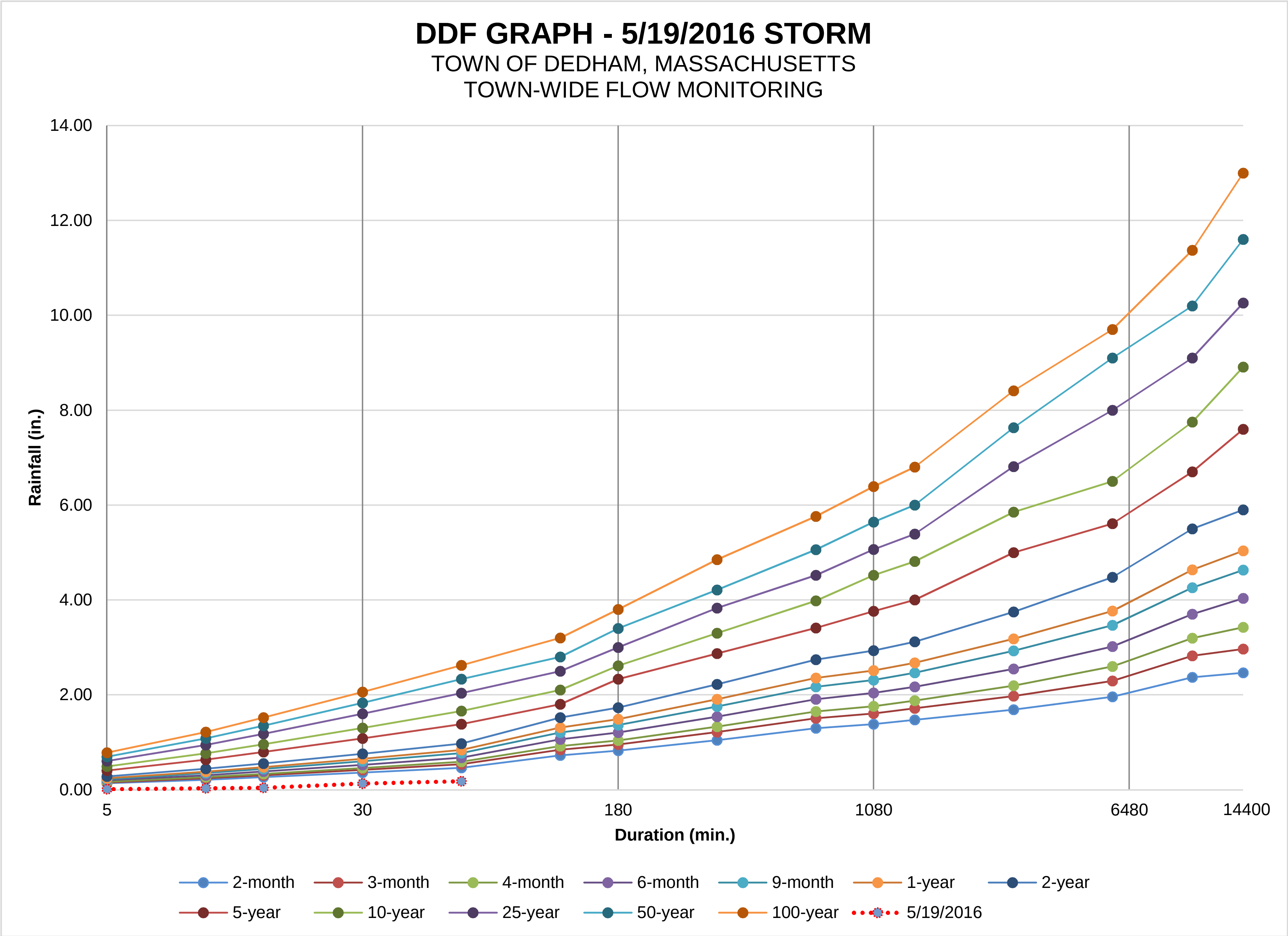
50-year
100-year
4/26/2016

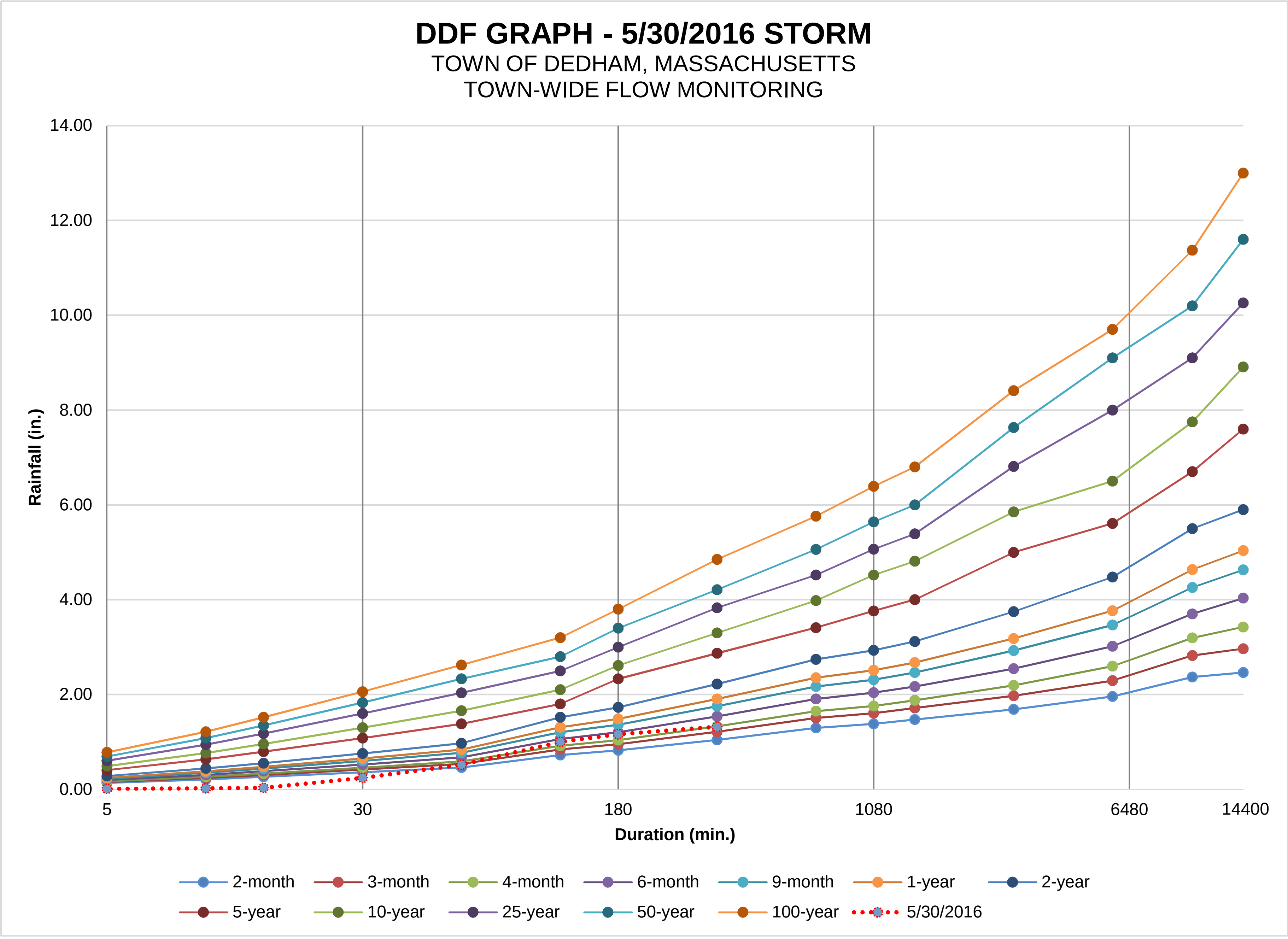


DDF GRAPH - 5/2/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
10-year
25-year
50-year
100-year
5/2/2016


DDF GRAPH - 5/4/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
10-year
25-year
50-year
100-year
5/4/2016


DDF GRAPH - 5/13/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
10-year
25-year
50-year
100-year
5/13/2016


DDF GRAPH - 5/19/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
10-year
25-year
50-year
100-year
5/19/2016


DDF GRAPH - 5/30/2016 STORM
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
Rainfall (in.)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5
30
180
1080
6480
14400
Duration (min.)
2-month
3-month
4-month
6-month
9-month
1-year
2-year
5-year
10-year
25-year
50-year
100-year
5/30/2016

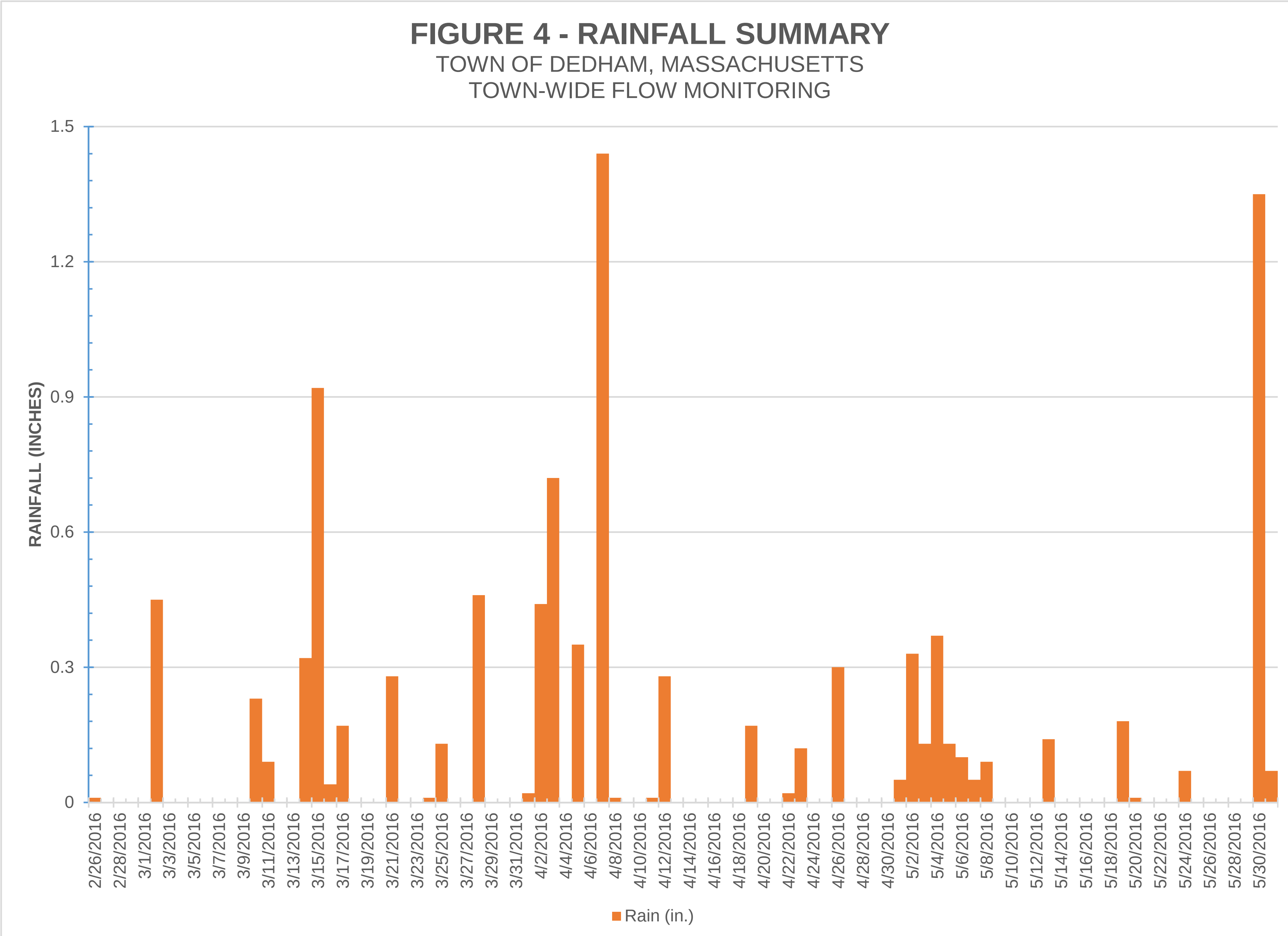
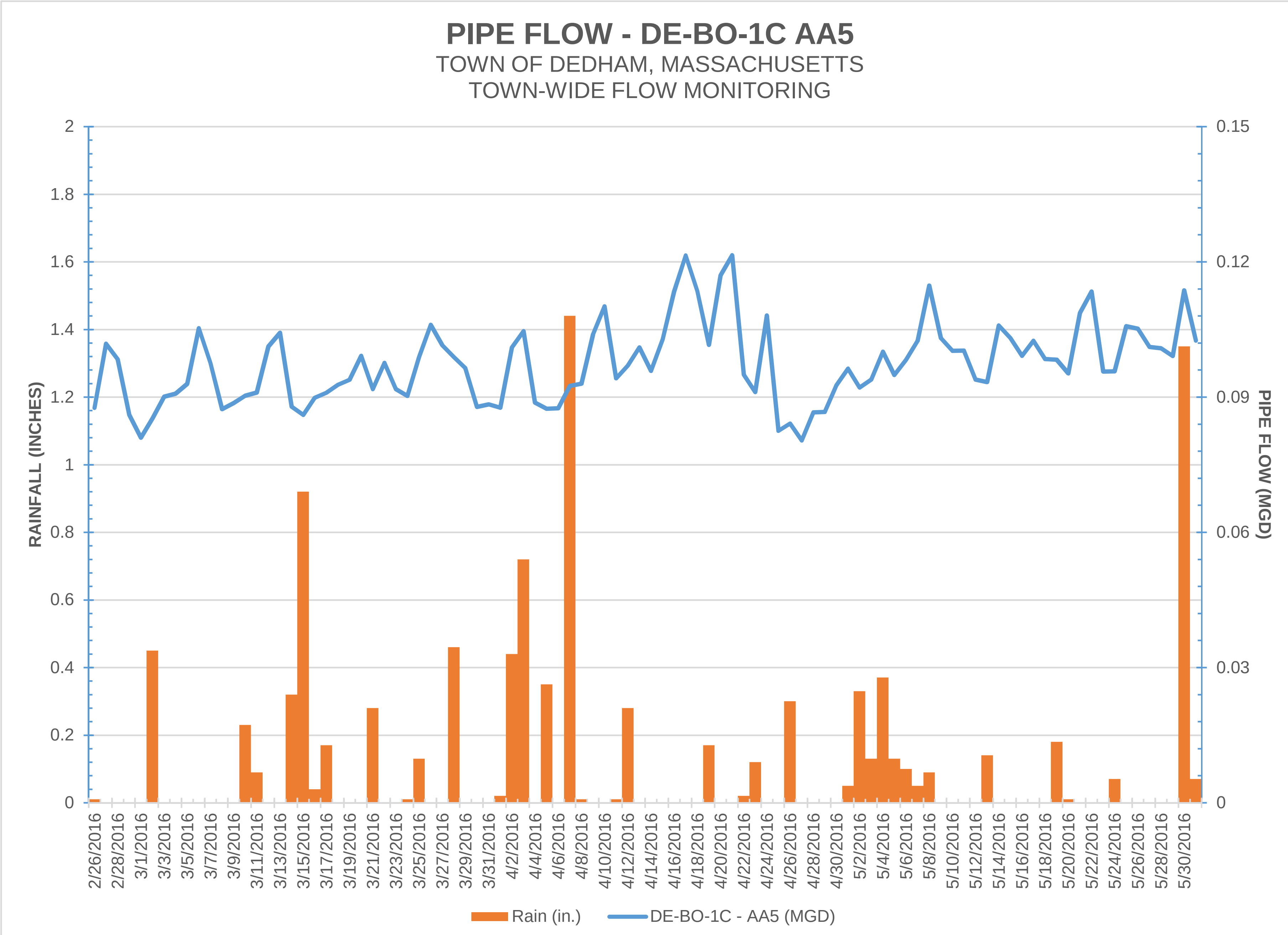
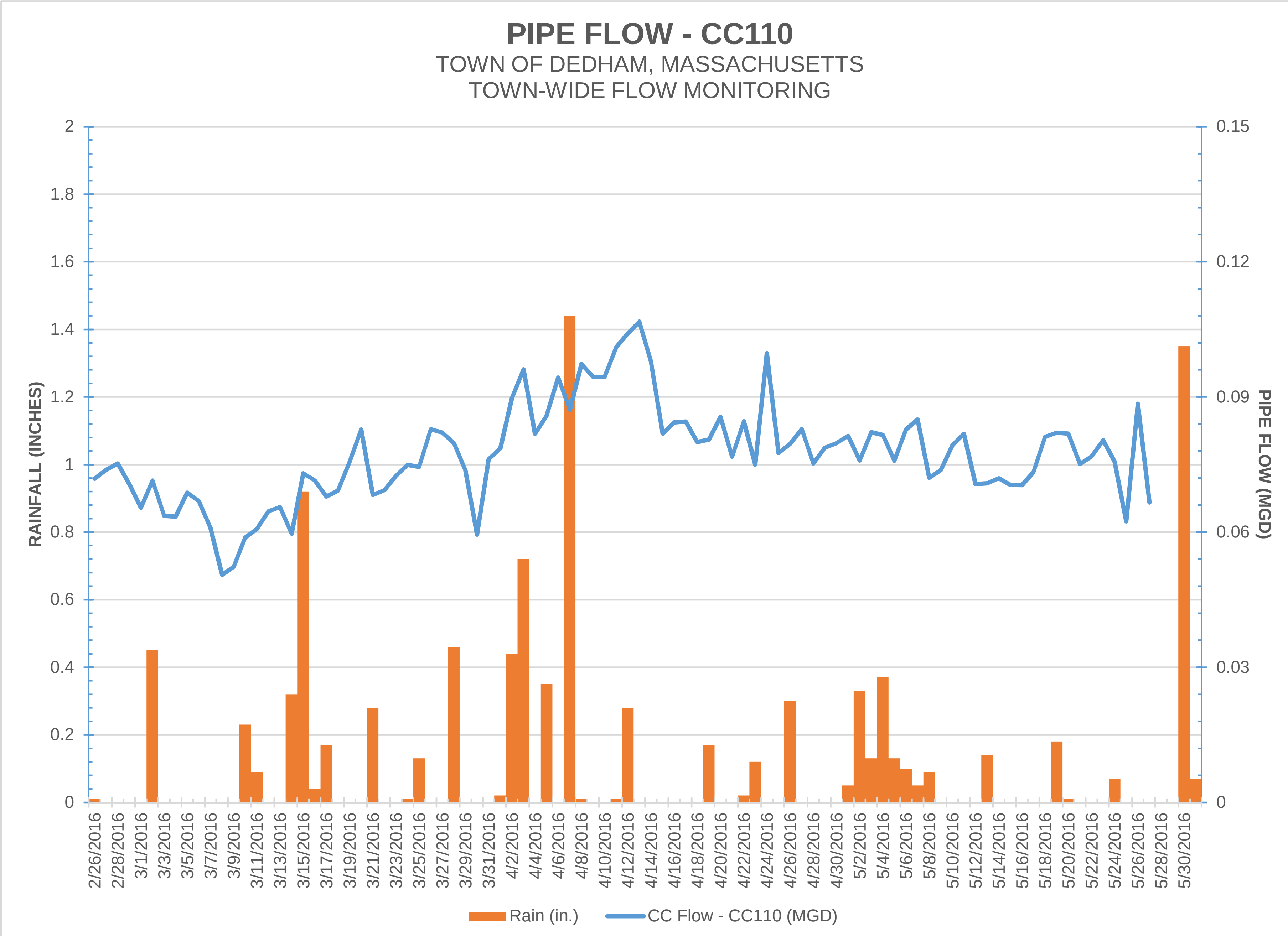


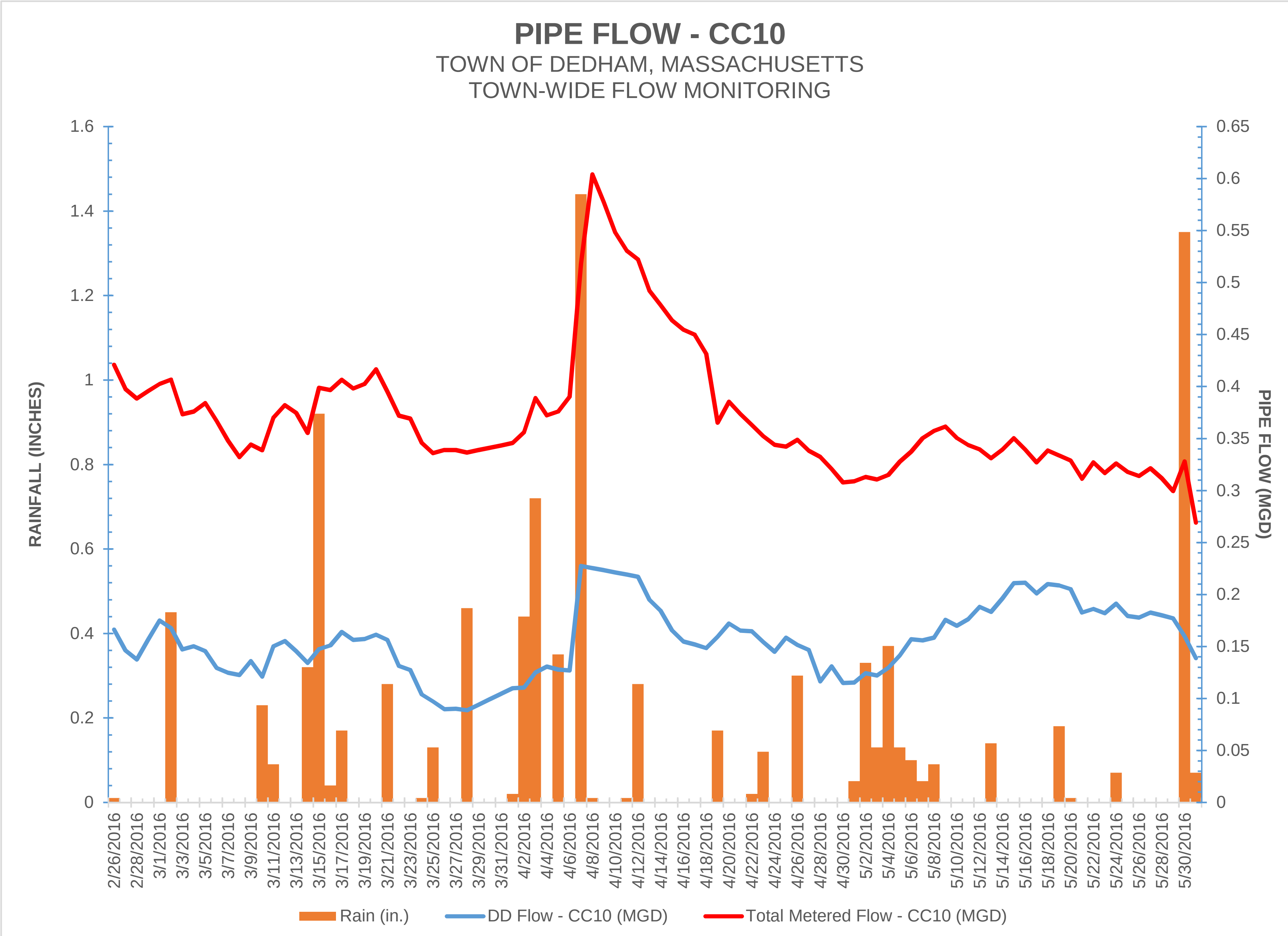
FIGURE 4 - RAINFALL SUMMARY
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
1.5
1.2
0.9
0.6
0.3
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)

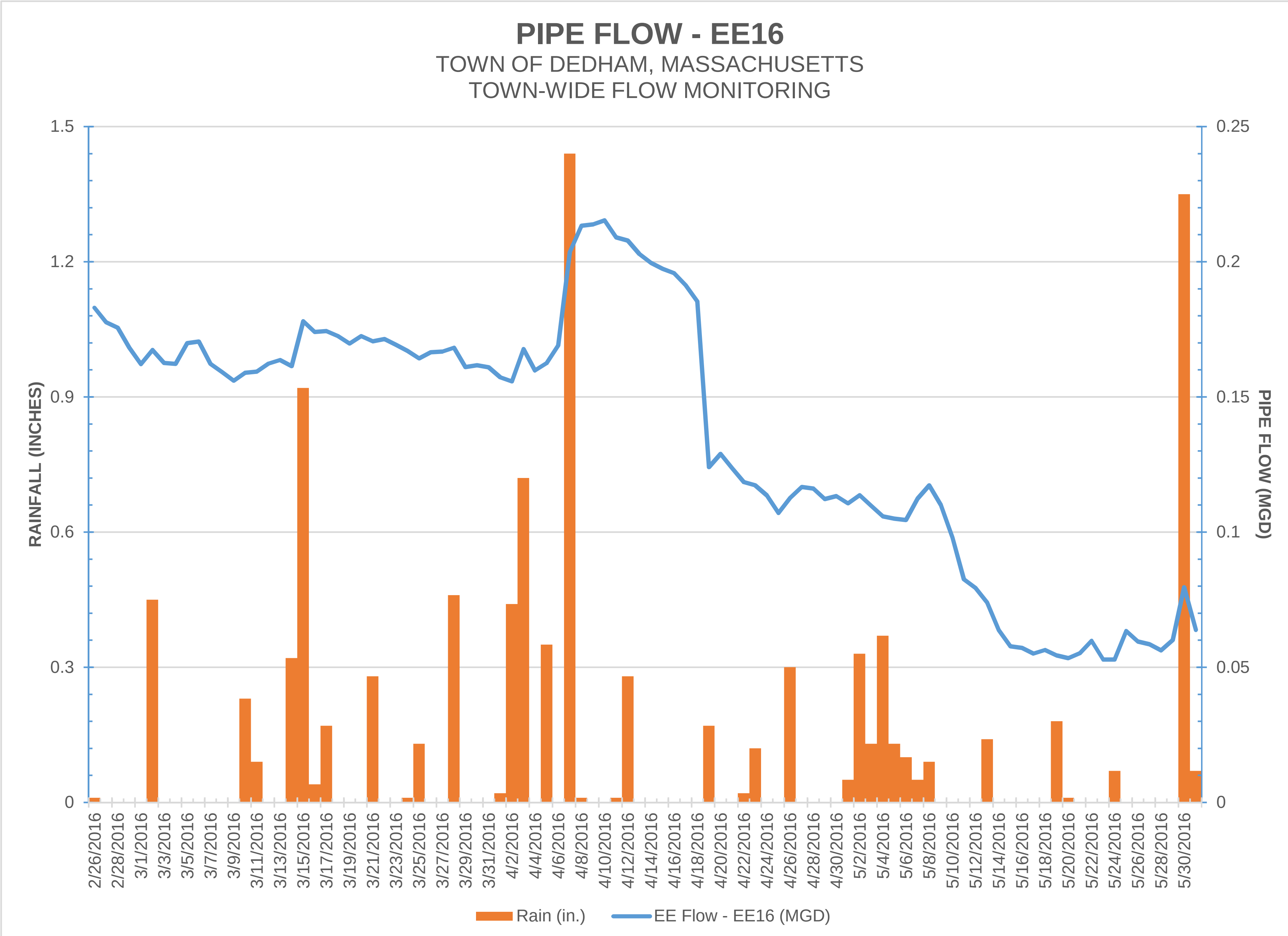
APPENDIX D

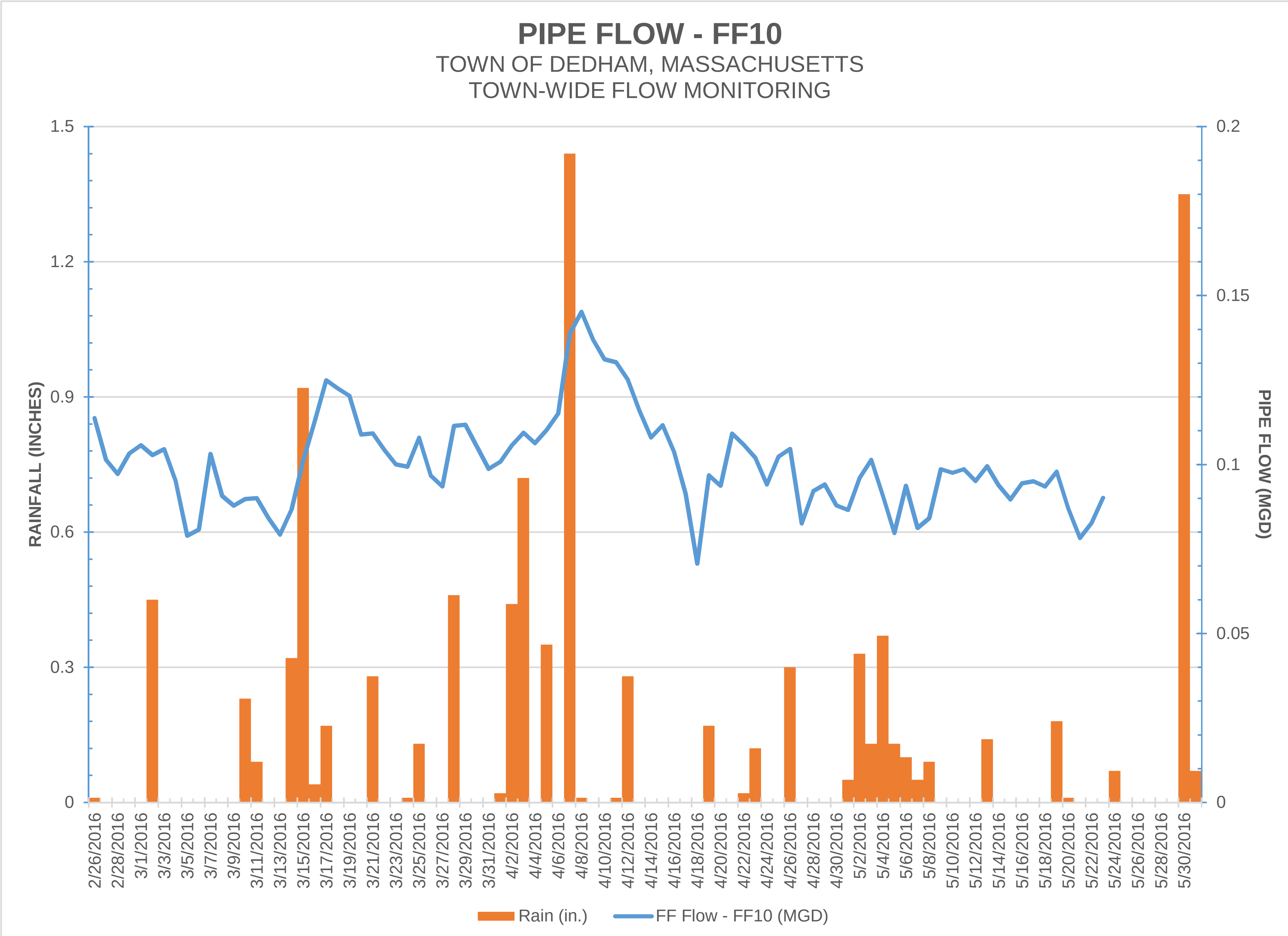
HYDROGRAPHS


PIPE FLOW - DE-BO-1C AA5
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
0.03
0.06
0.09
0.12
0.15
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
DE-BO-1C - AA5 (MGD)

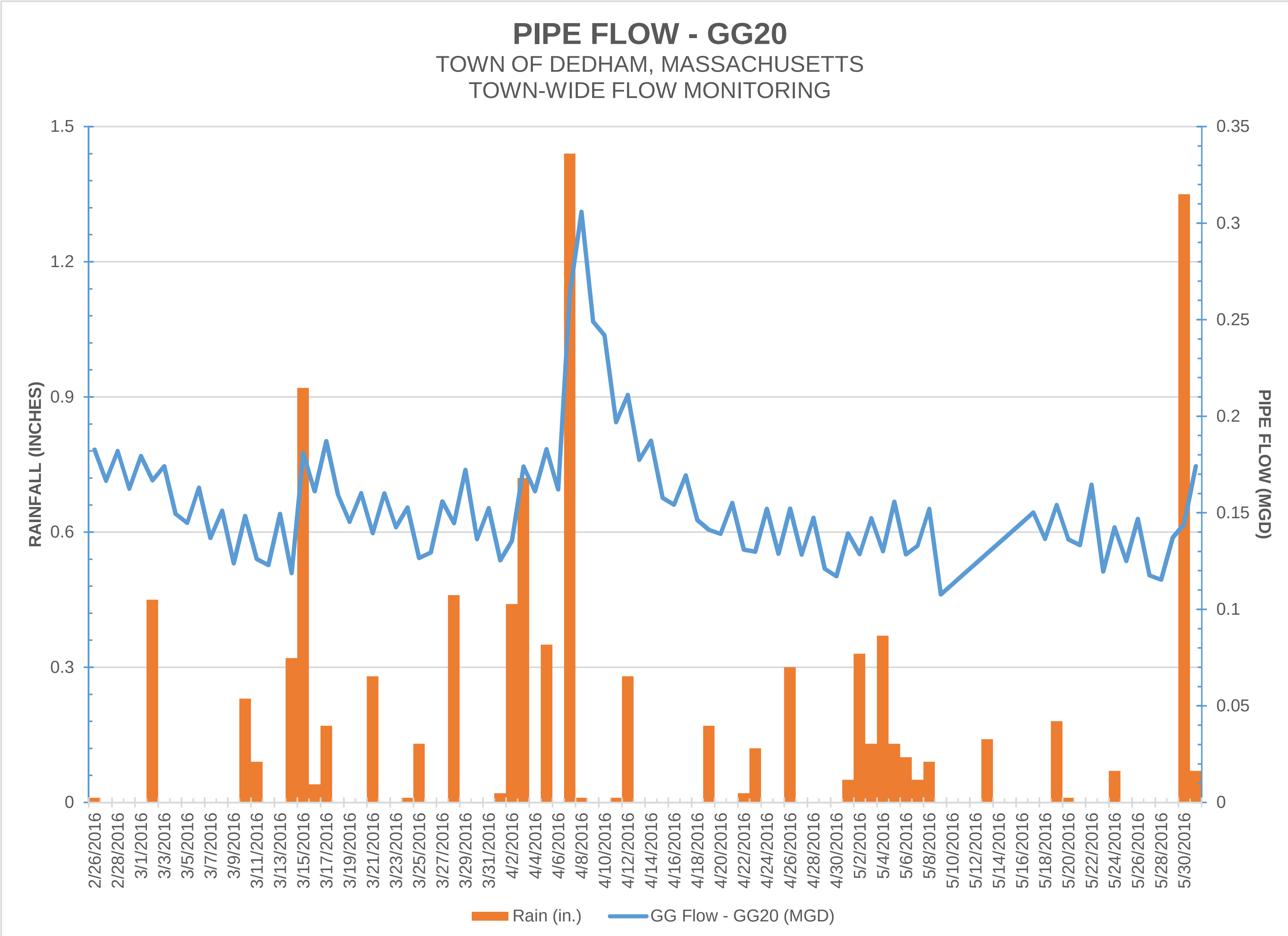

PIPE FLOW - CC110
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.15
0.12
0.09
0.06
0.03
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
CC Flow - CC110 (MGD)


PIPE FLOW - CC10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
DD Flow - CC10 (MGD)
Total Metered Flow - CC10 (MGD)

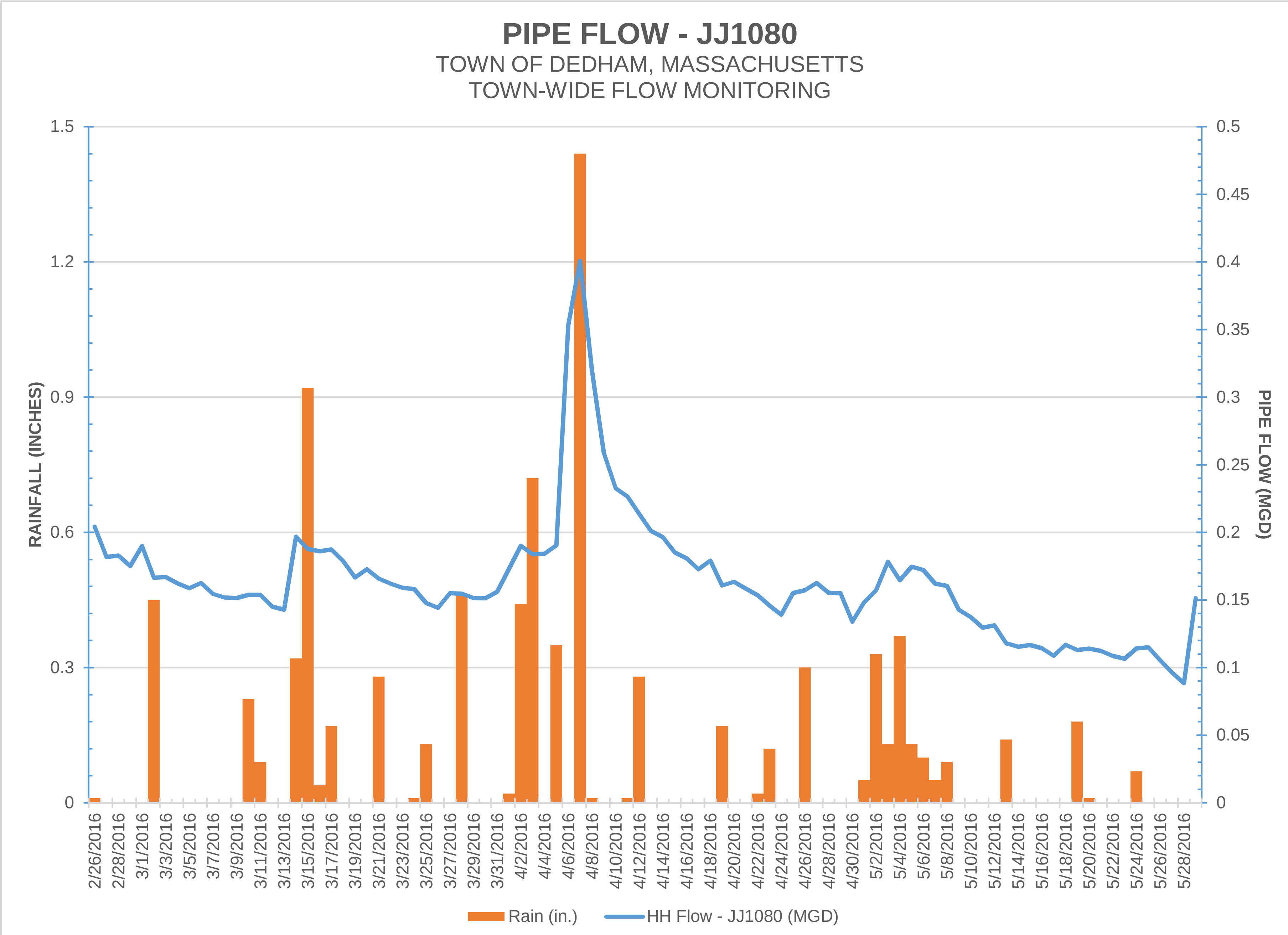

PIPE FLOW - EE16
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
0
0.3
0.6
0.9
1.2
1.5
0.05
0.1
0.15
0.2
0.25
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
EE Flow - EE16 (MGD)

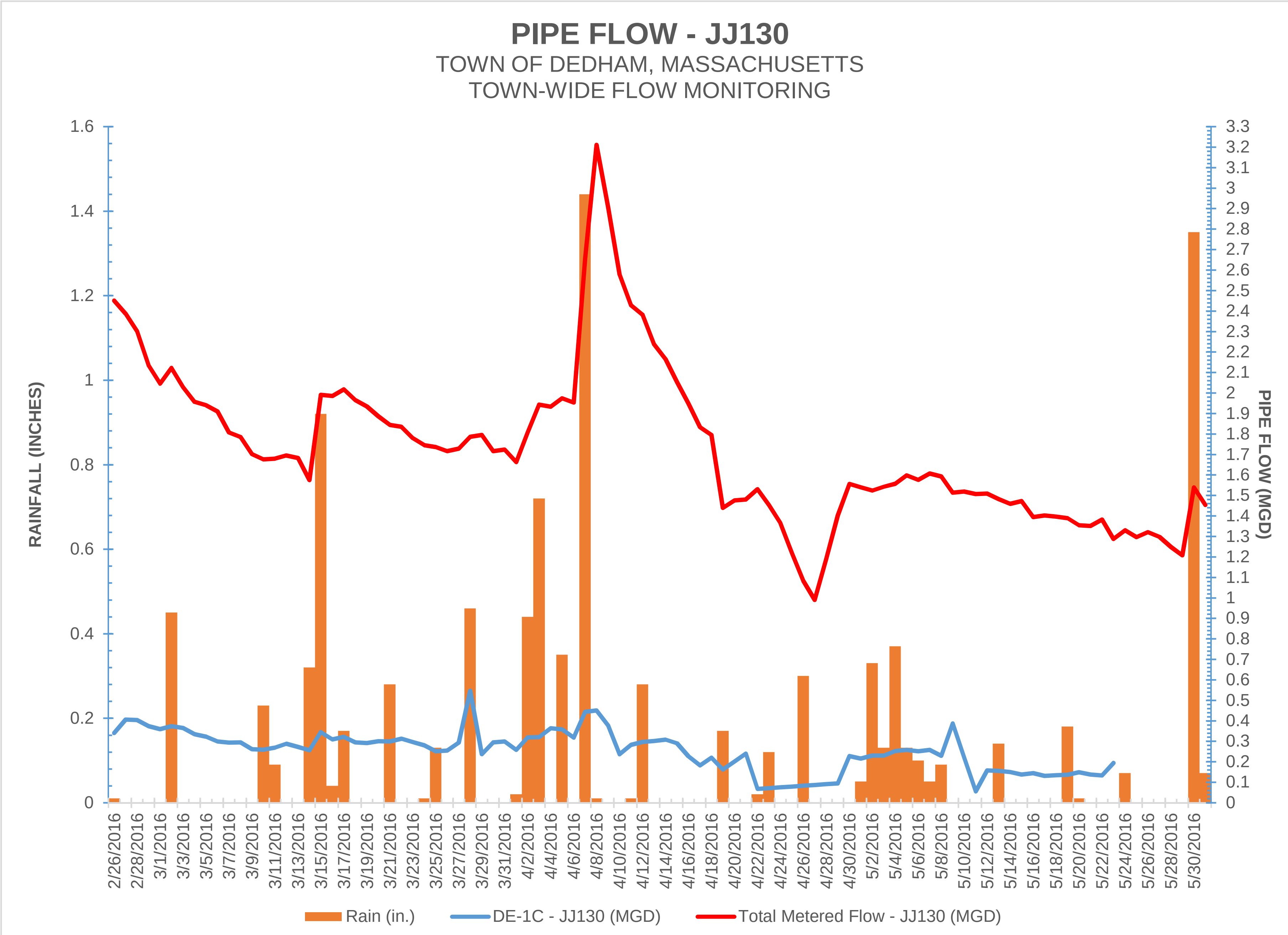


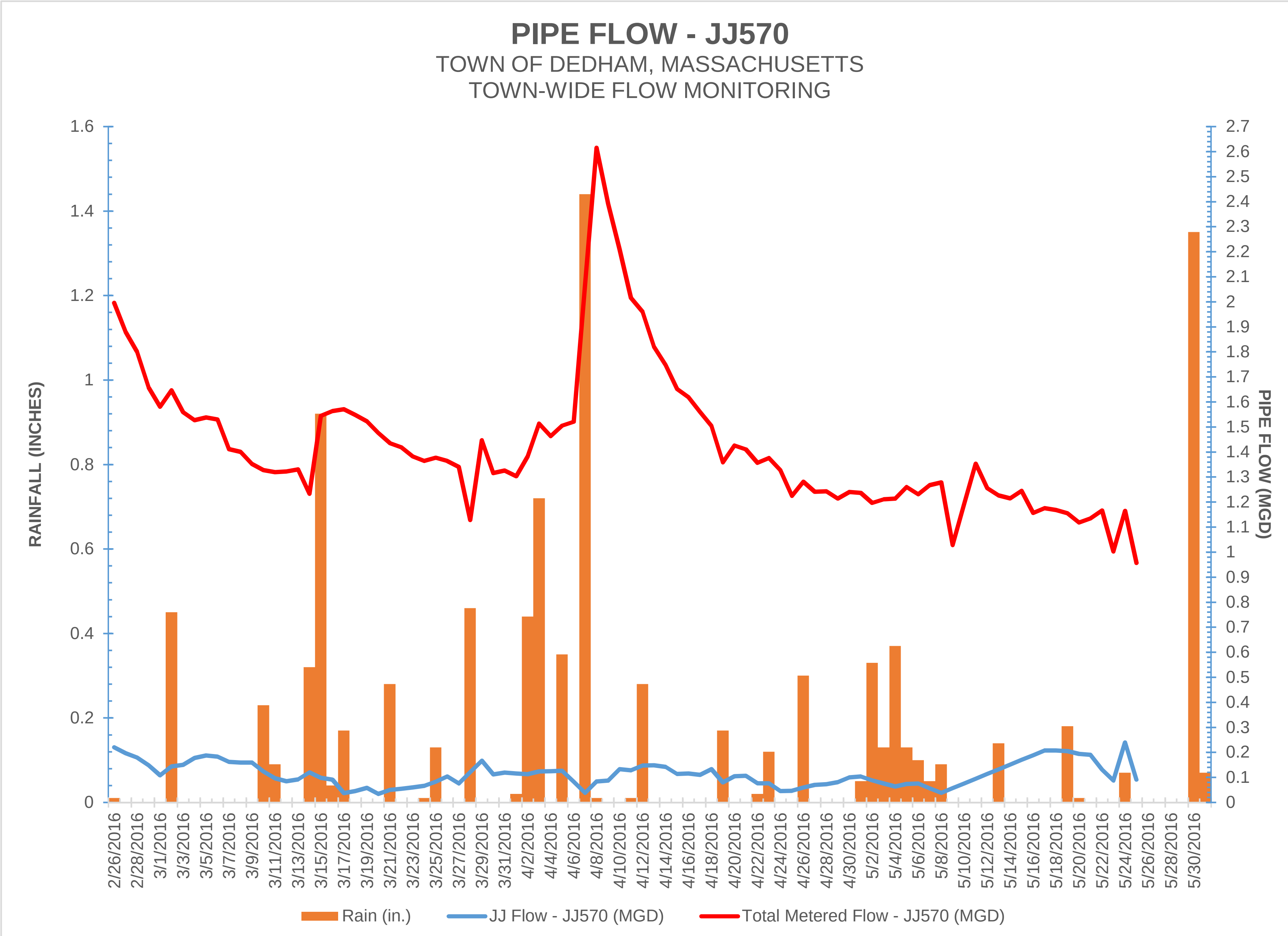
PIPE FLOW - FF10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
0.2
0.15
0.1
0.05
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
FF Flow - FF10 (MGD)

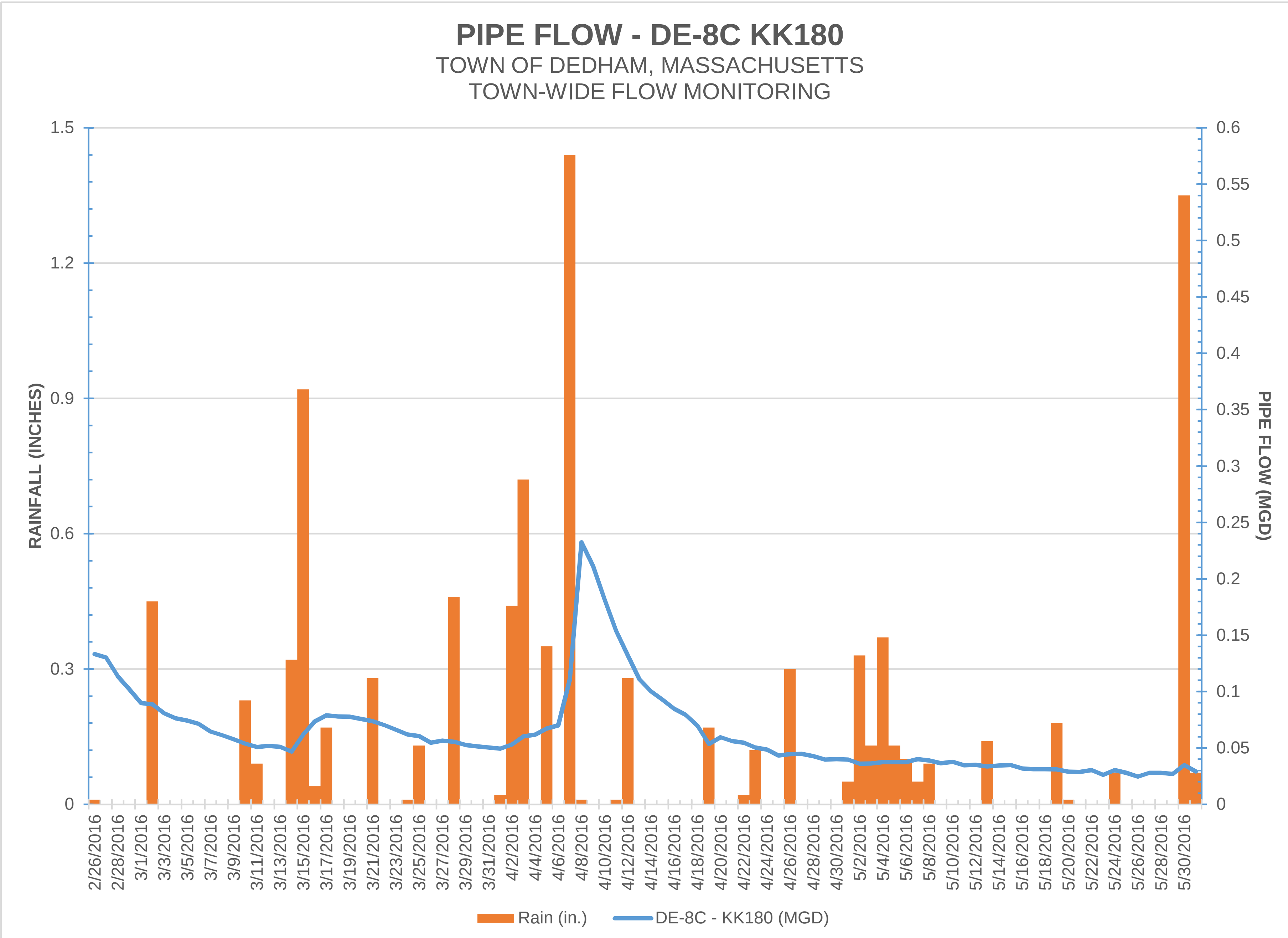


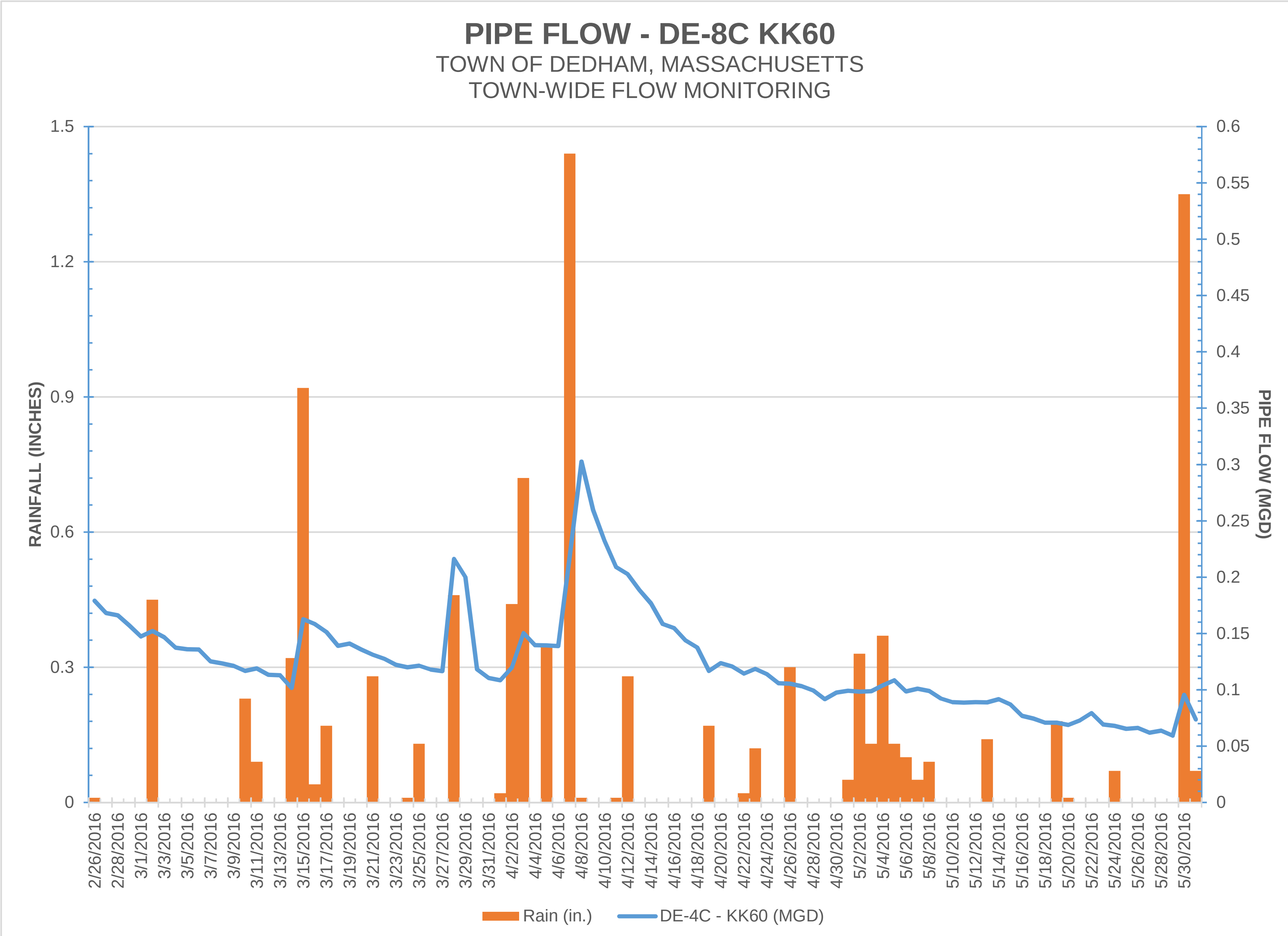
PIPE FLOW - GG20
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
GG Flow - GG20 (MGD)

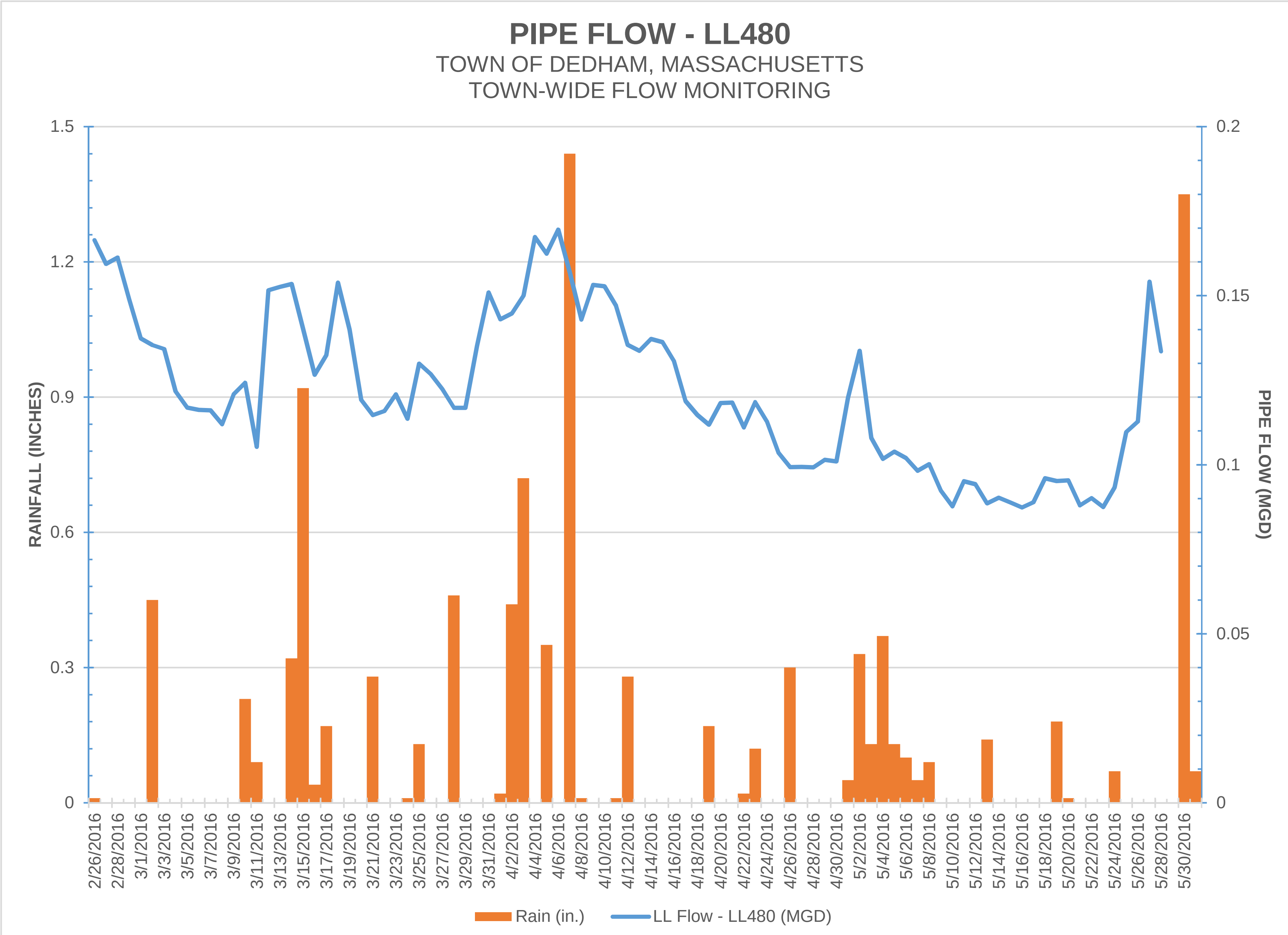

PIPE FLOW - JJ1080
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
Rain (in.)
HH Flow - JJ1080 (MGD)


PIPE FLOW - JJ130
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
3.3
3.2
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
DE-1C - JJ130 (MGD)
Total Metered Flow - JJ130 (MGD)

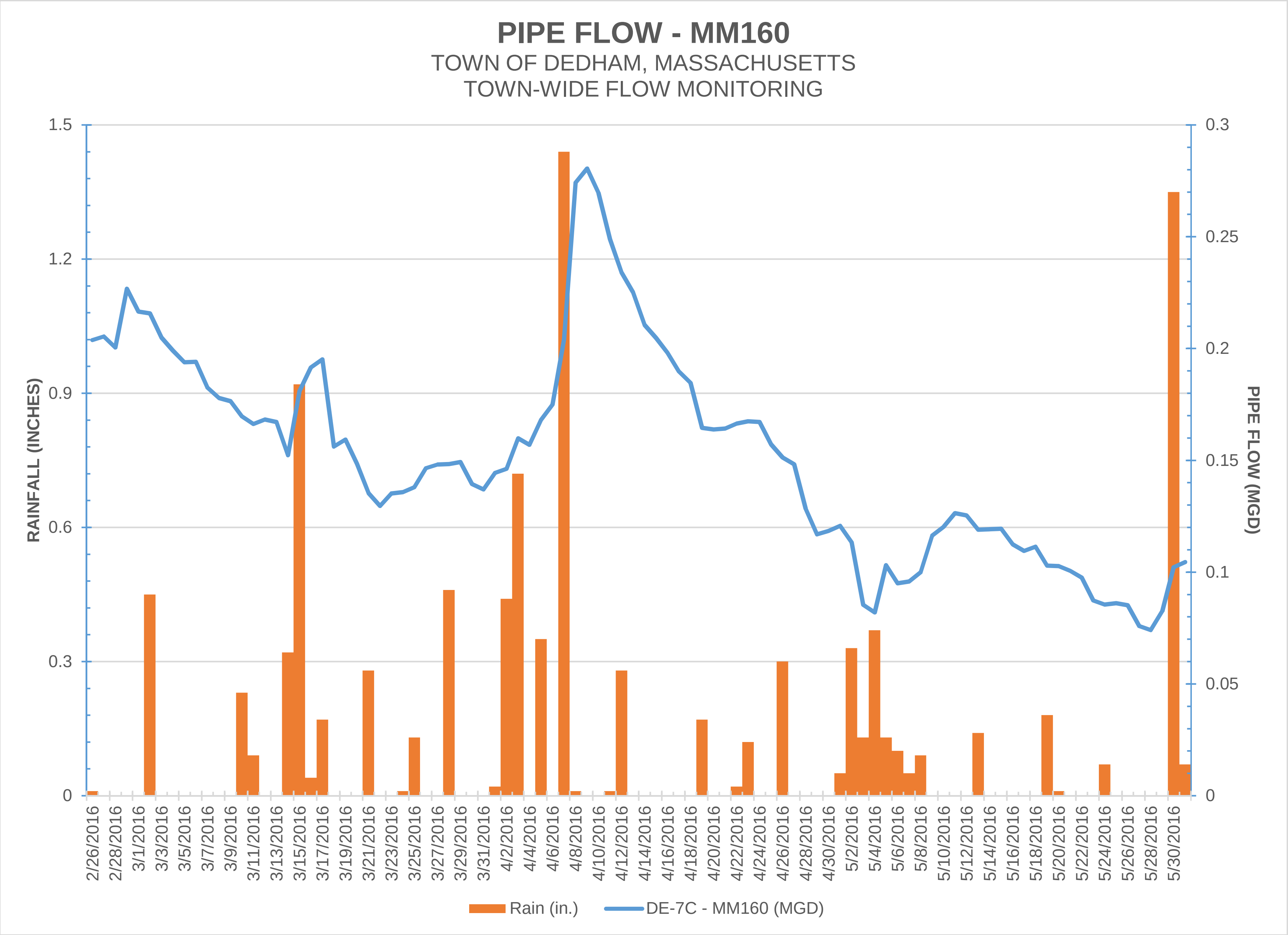

PIPE FLOW - JJ570
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
0.1
0.3
0.5
0.7
0.9
1.1
1.3
1.5
1.7
1.8
1.9
2
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
JJ Flow - JJ570 (MGD)
Total Metered Flow - JJ570 (MGD)

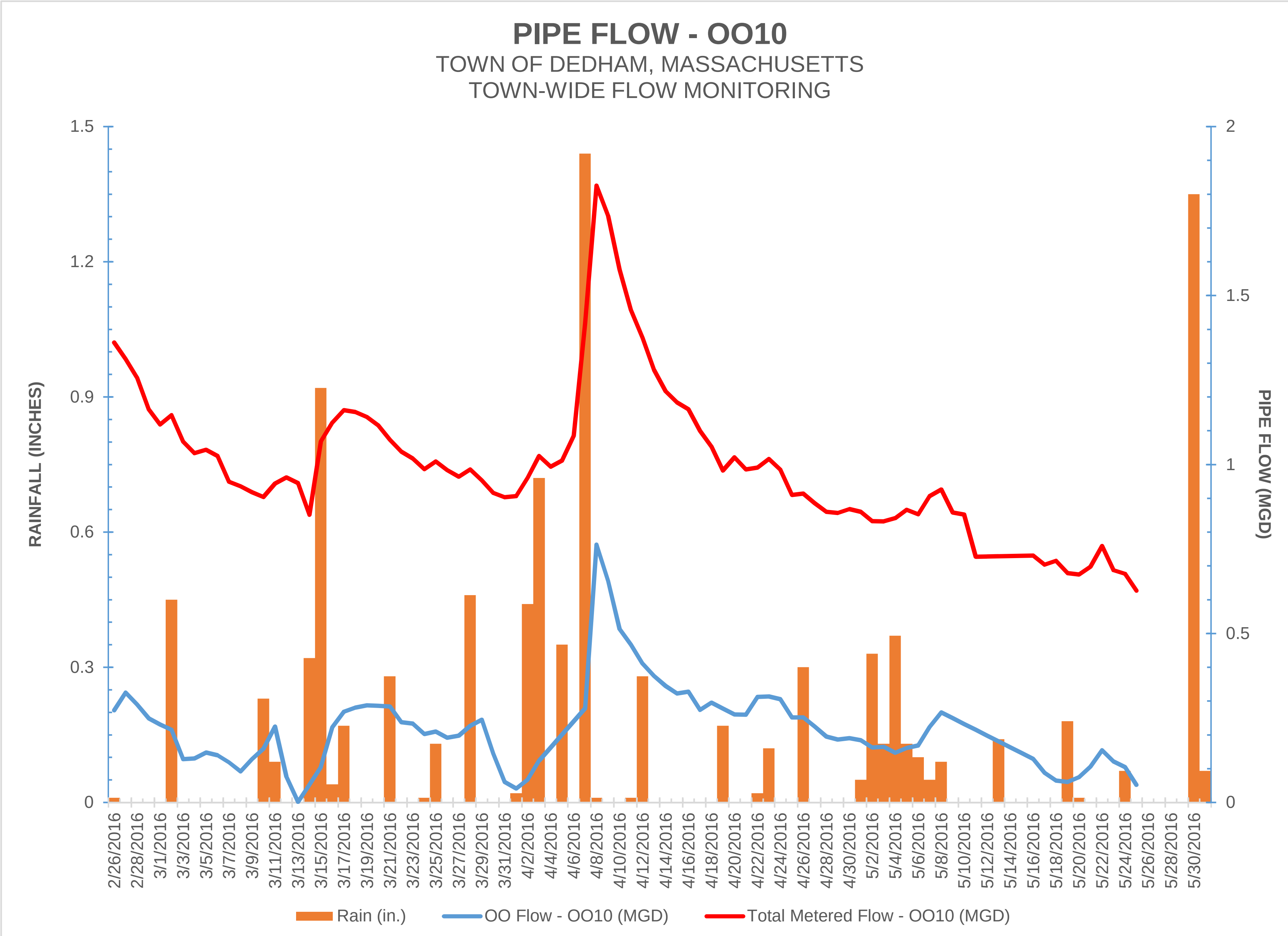

PIPE FLOW - DE-8C KK180
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
0
0.3
0.6
0.9
1.2
1.5
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
DE-8C - KK180 (MGD)


PIPE FLOW - DE-8C KK60
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
0
0.3
0.6
0.9
1.2
1.5
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
DE-4C - KK60 (MGD)

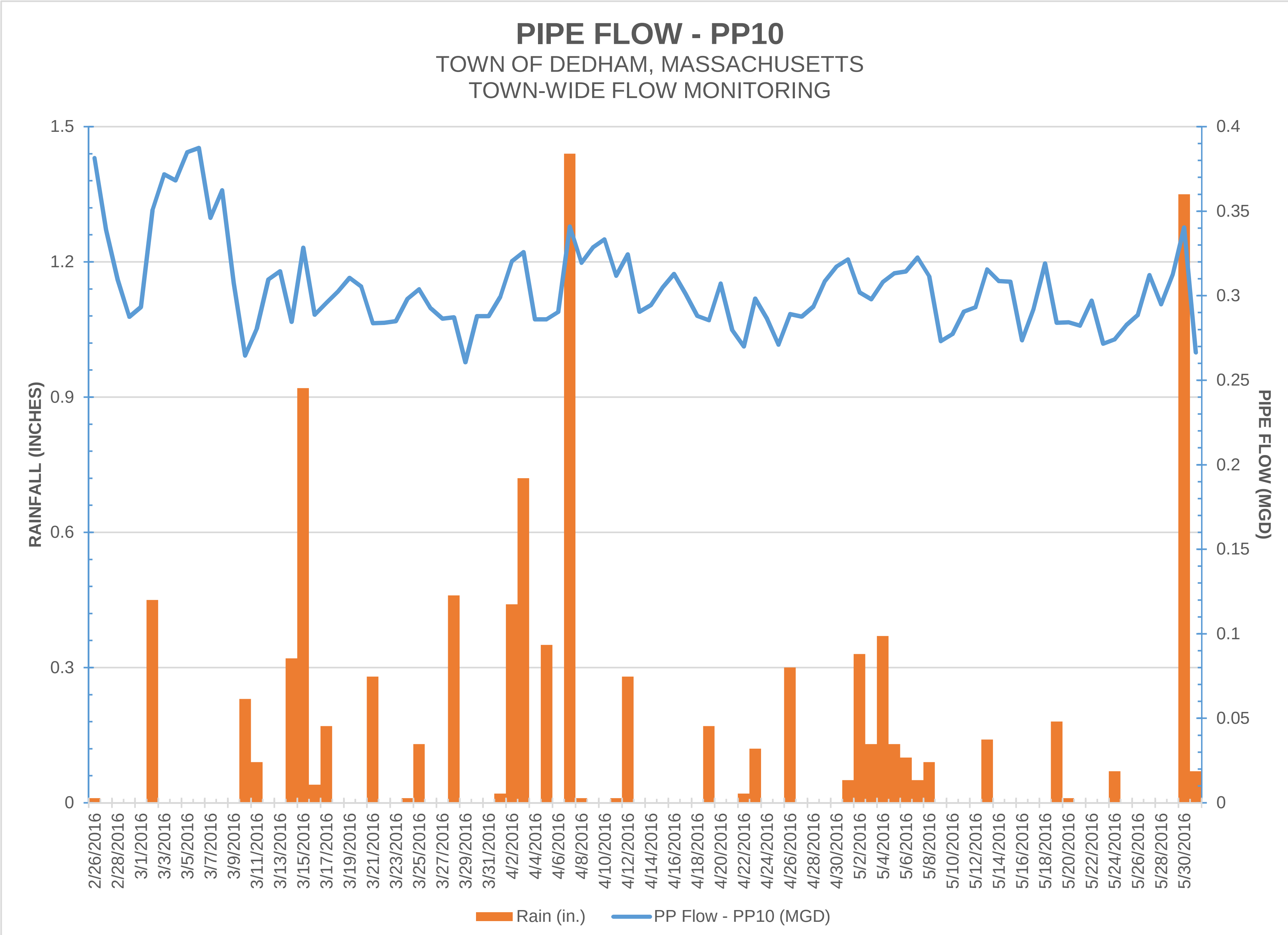


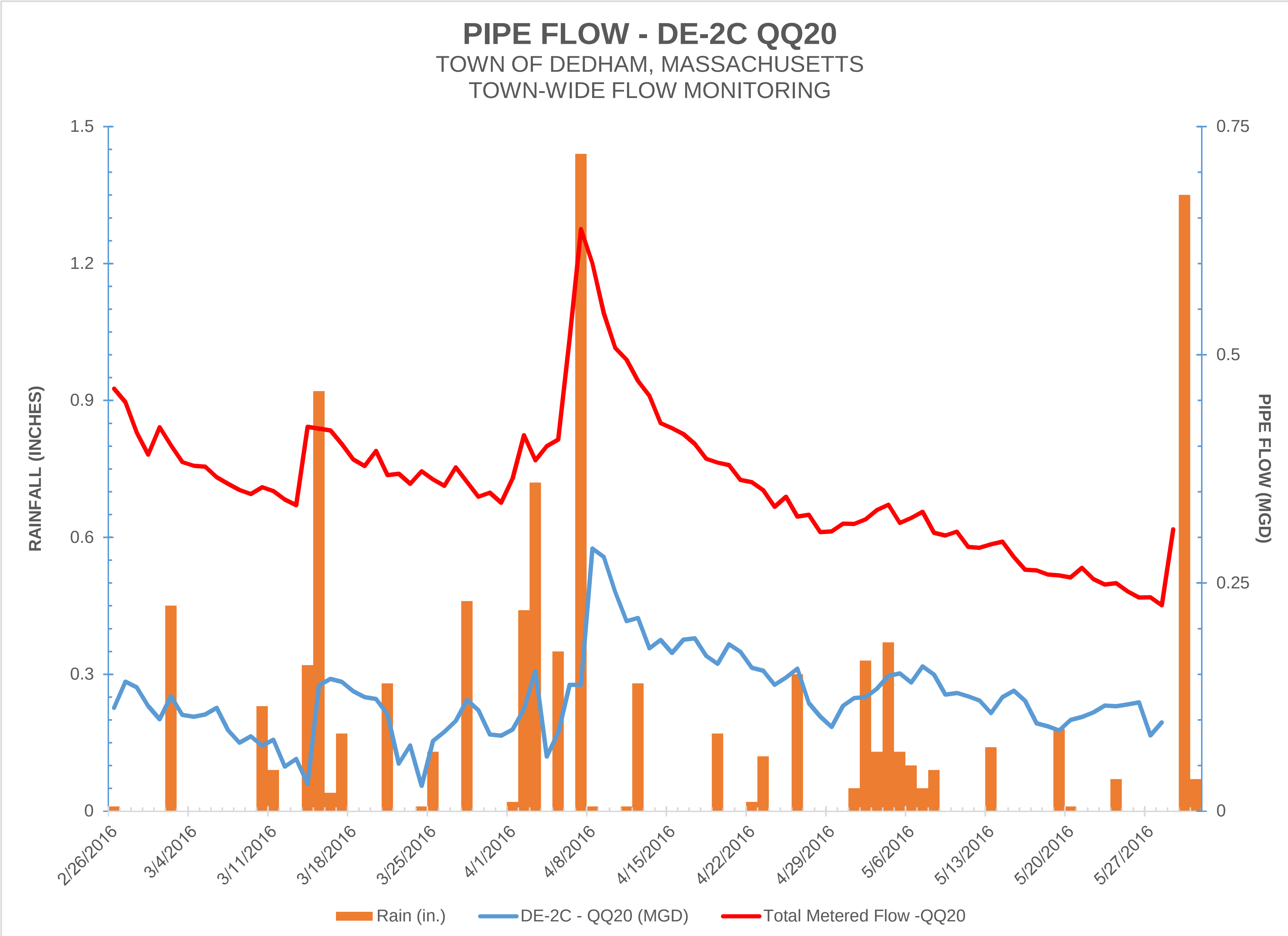
PIPE FLOW - LL480
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
0.2
0.15
0.1
0.05
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
LL Flow - LL480 (MGD)

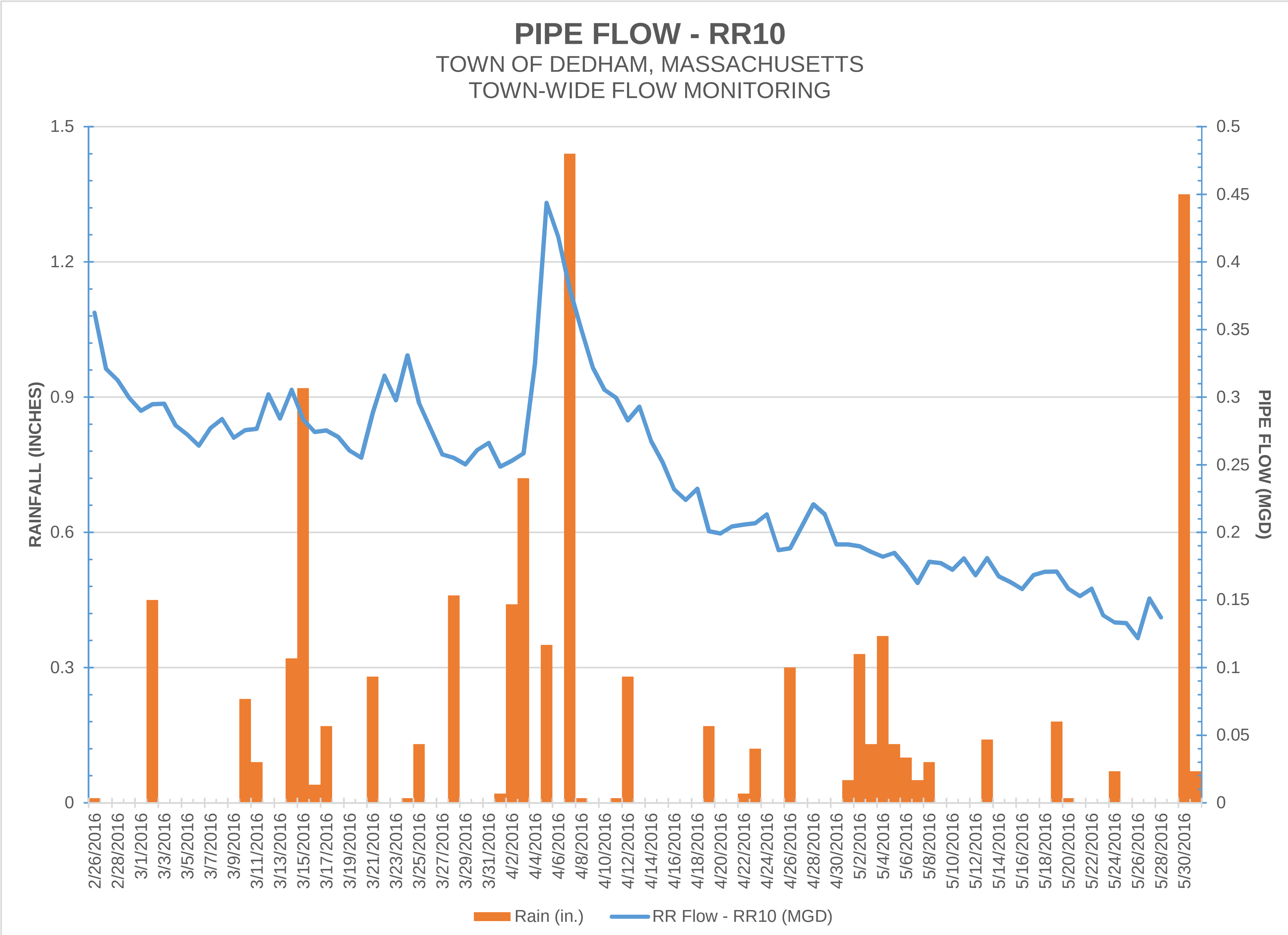

PIPE FLOW - MM160
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
0.3
0.25
0.2
0.15
0.1
0.05
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
DE-7C - MM160 (MGD)



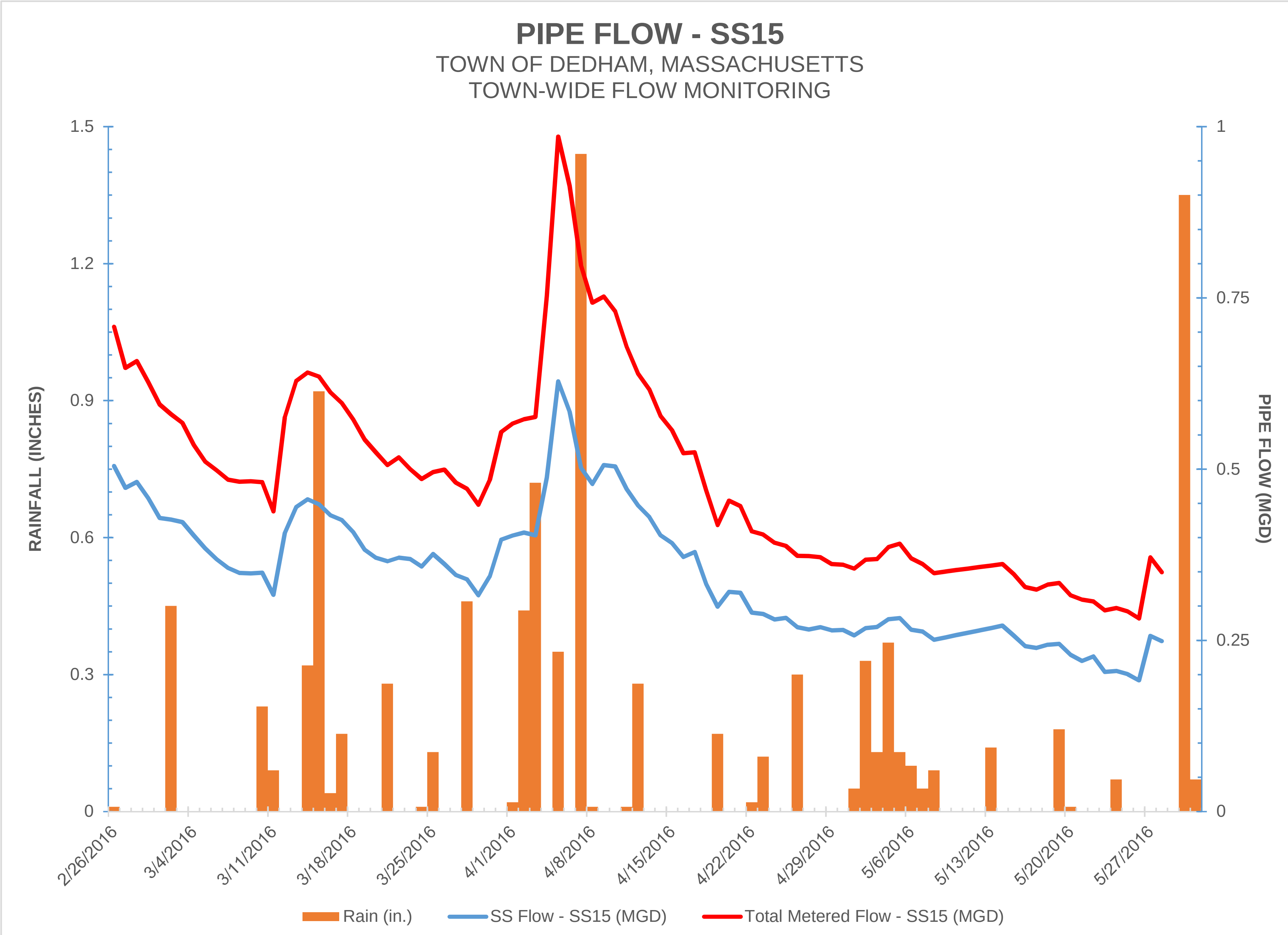
PIPE FLOW - OO10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
2
1.5
1
0.5
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
OO Flow - OO10 (MGD)
Total Metered Flow - OO10 (MGD)


PIPE FLOW - PP10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
PP Flow - PP10 (MGD)

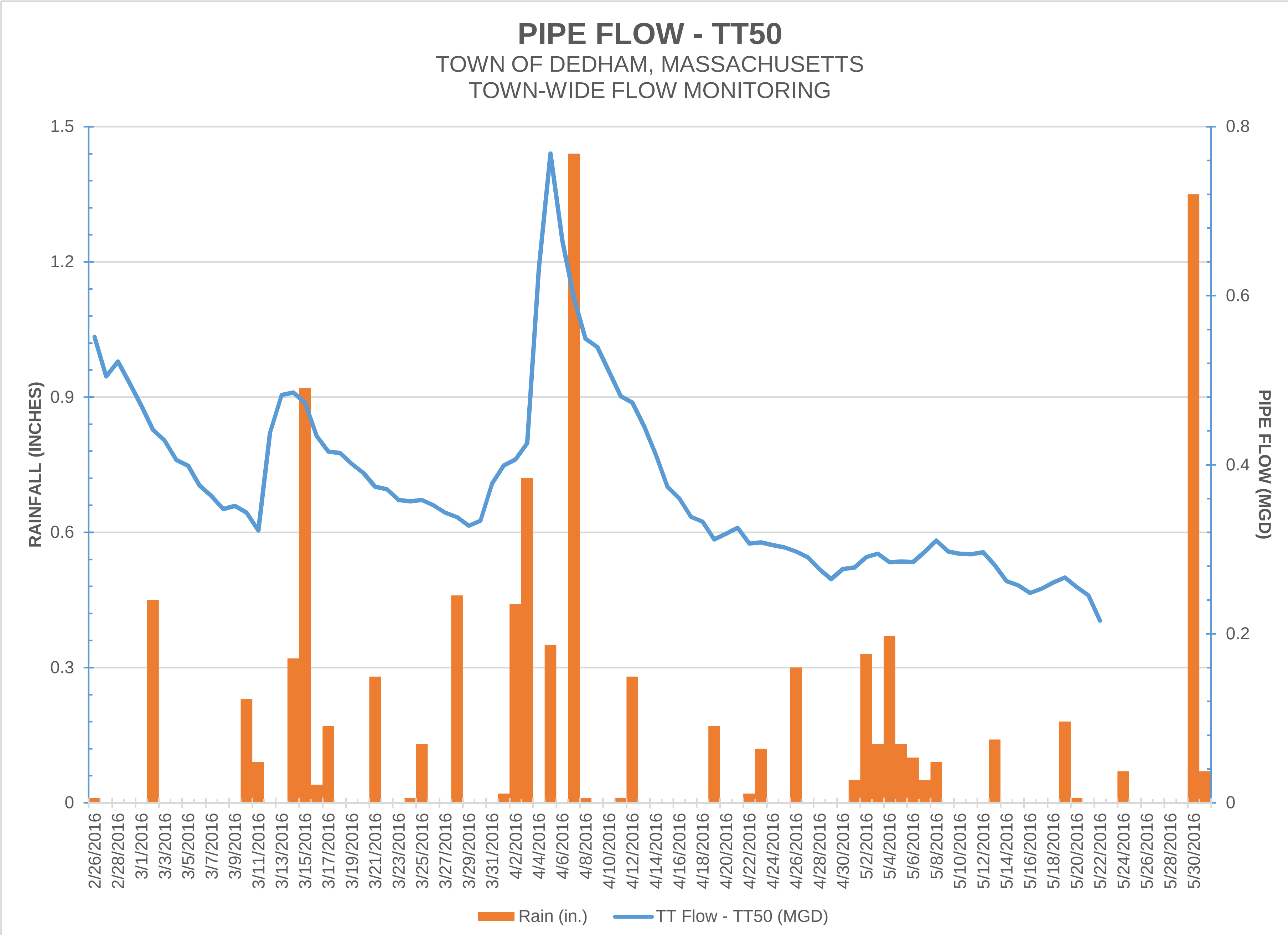

PIPE FLOW - DE-2C QQ20
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
0.75
0.5
0.25
0
2/26/2016
3/4/2016
3/11/2016
3/18/2016
3/25/2016
4/1/2016
4/8/2016
4/15/2016
4/22/2016
4/29/2016
5/6/2016
5/13/2016
5/20/2016
5/27/2016
Rain (in.)
DE-2C - QQ20 (MGD)
Total Metered Flow -QQ20



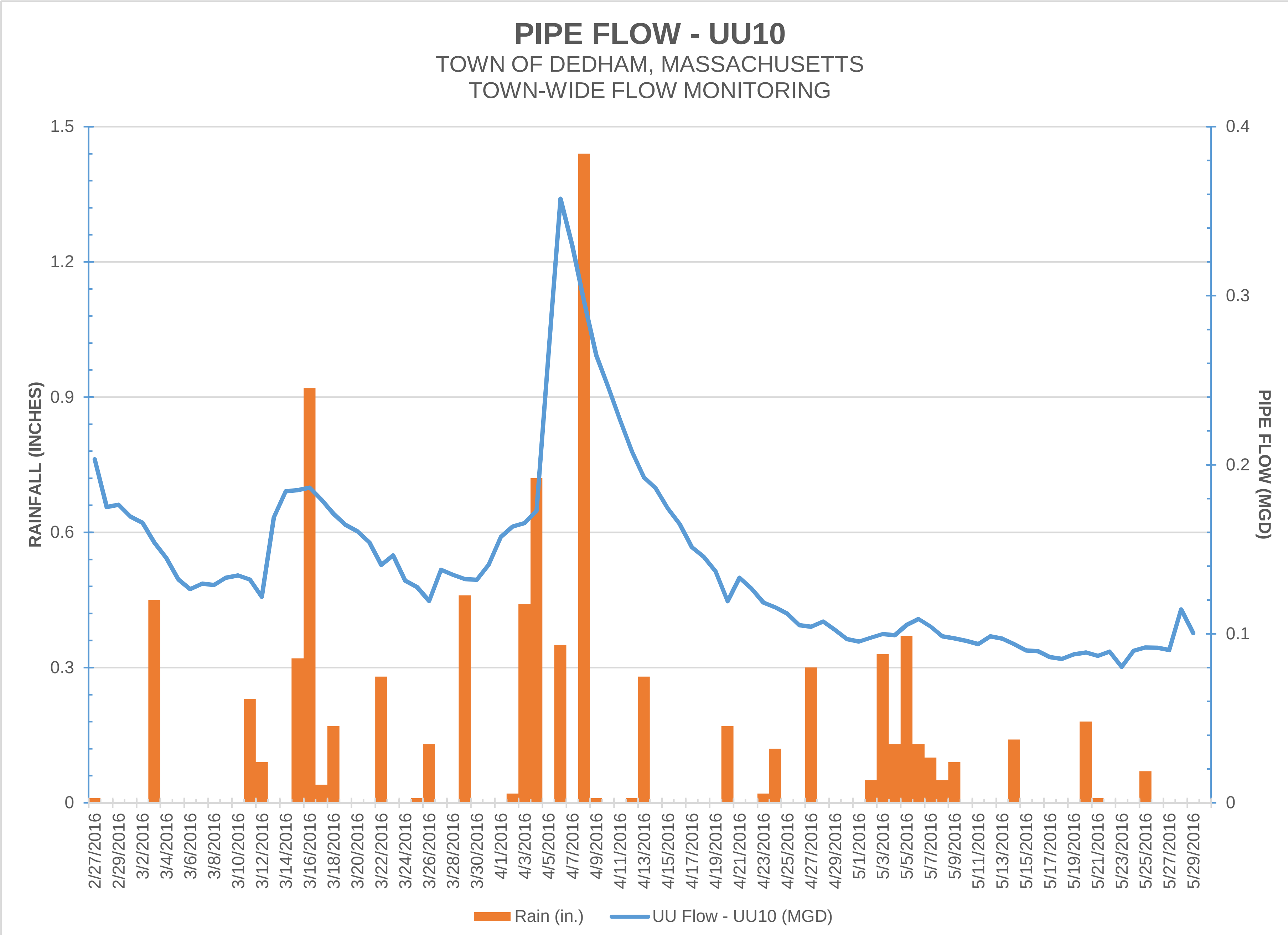
PIPE FLOW - RR10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
RR Flow - RR10 (MGD)

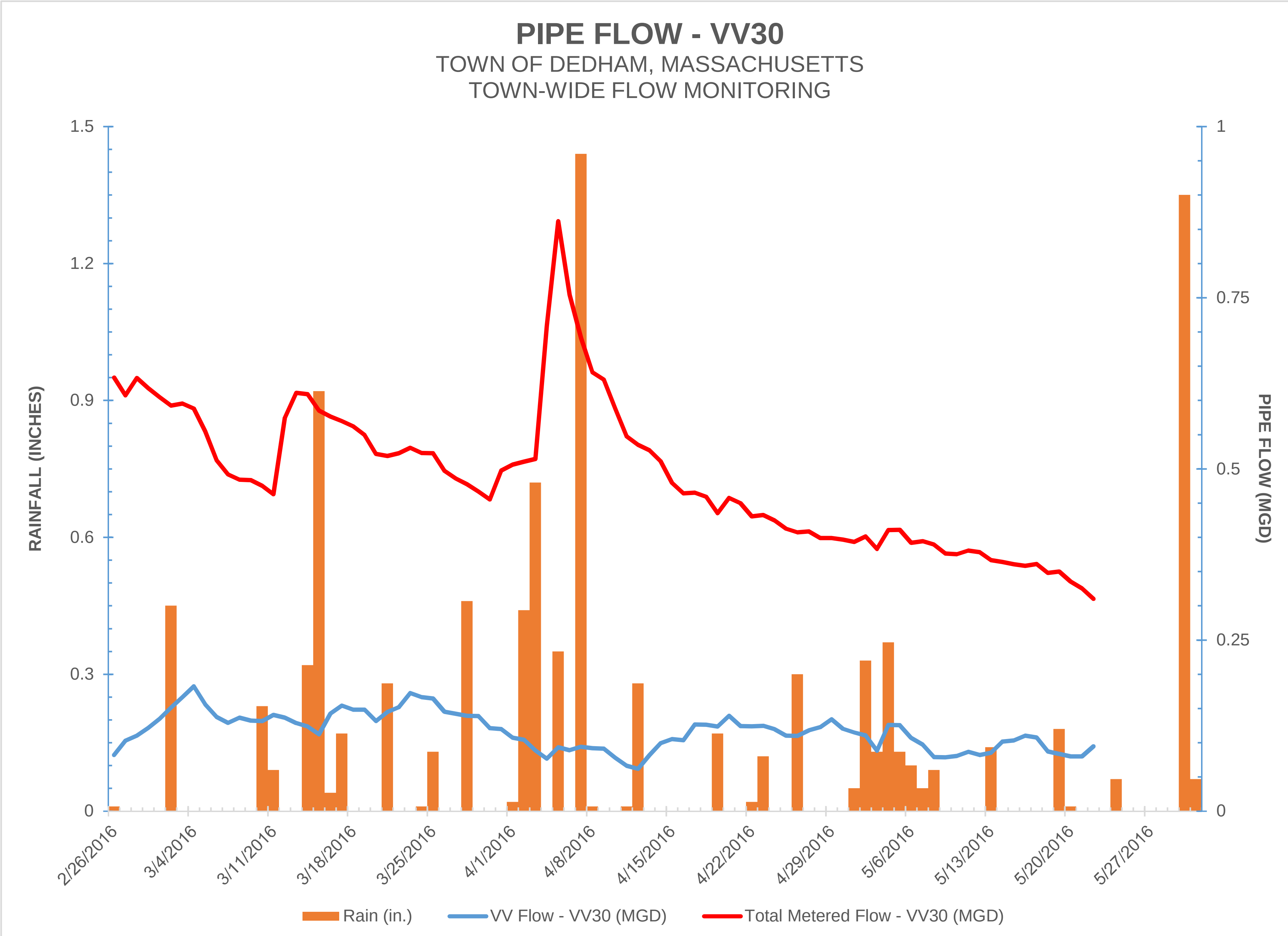


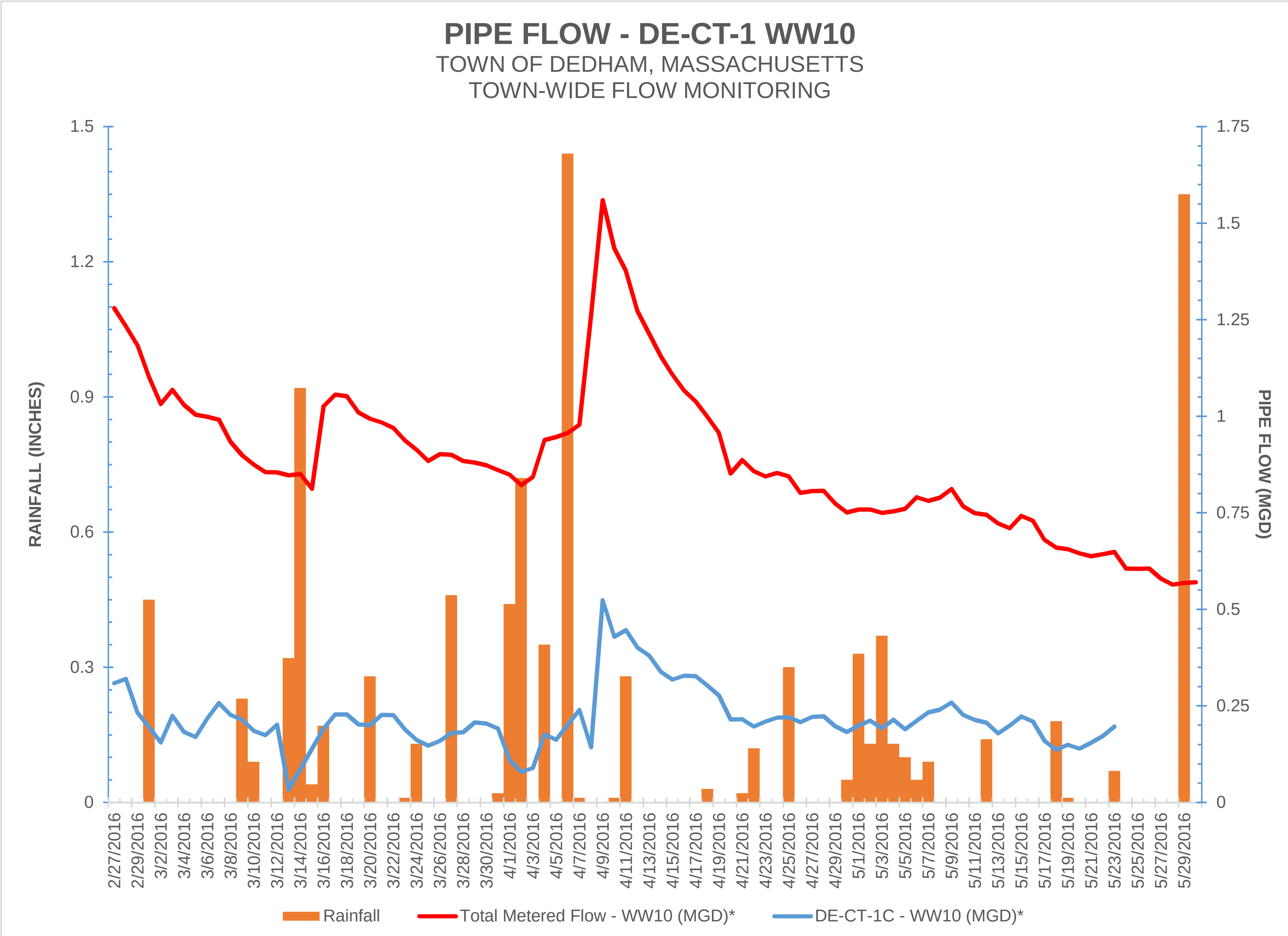
PIPE FLOW - SS15
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
1
0.75
0.5
0.25
0
2/26/2016
3/4/2016
3/11/2016
3/18/2016
3/25/2016
4/1/2016
4/8/2016
4/15/2016
4/22/2016
4/29/2016
5/6/2016
5/13/2016
5/20/2016
5/27/2016
Rain (in.)
SS Flow - SS15 (MGD)
Total Metered Flow - SS15 (MGD)

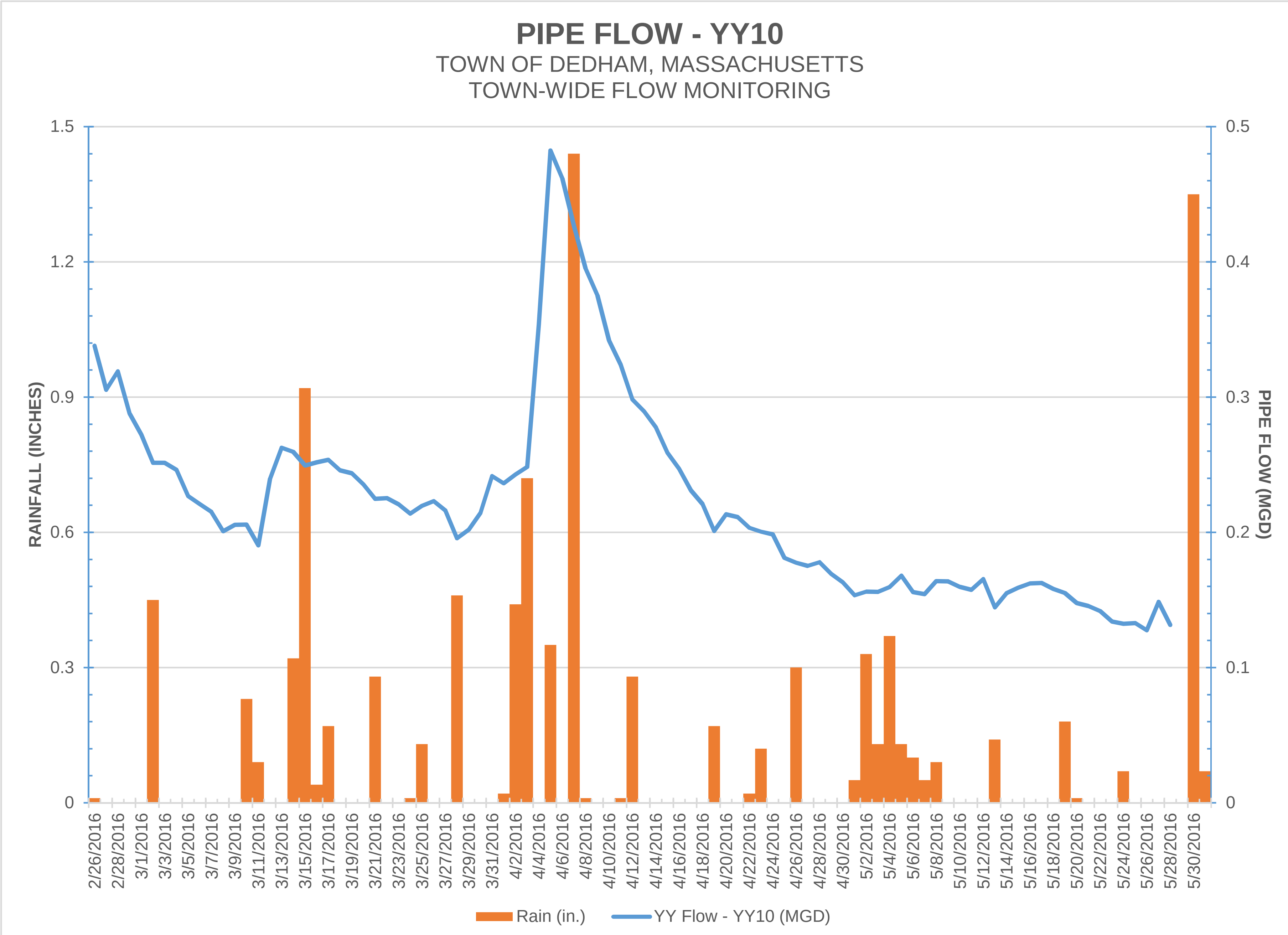


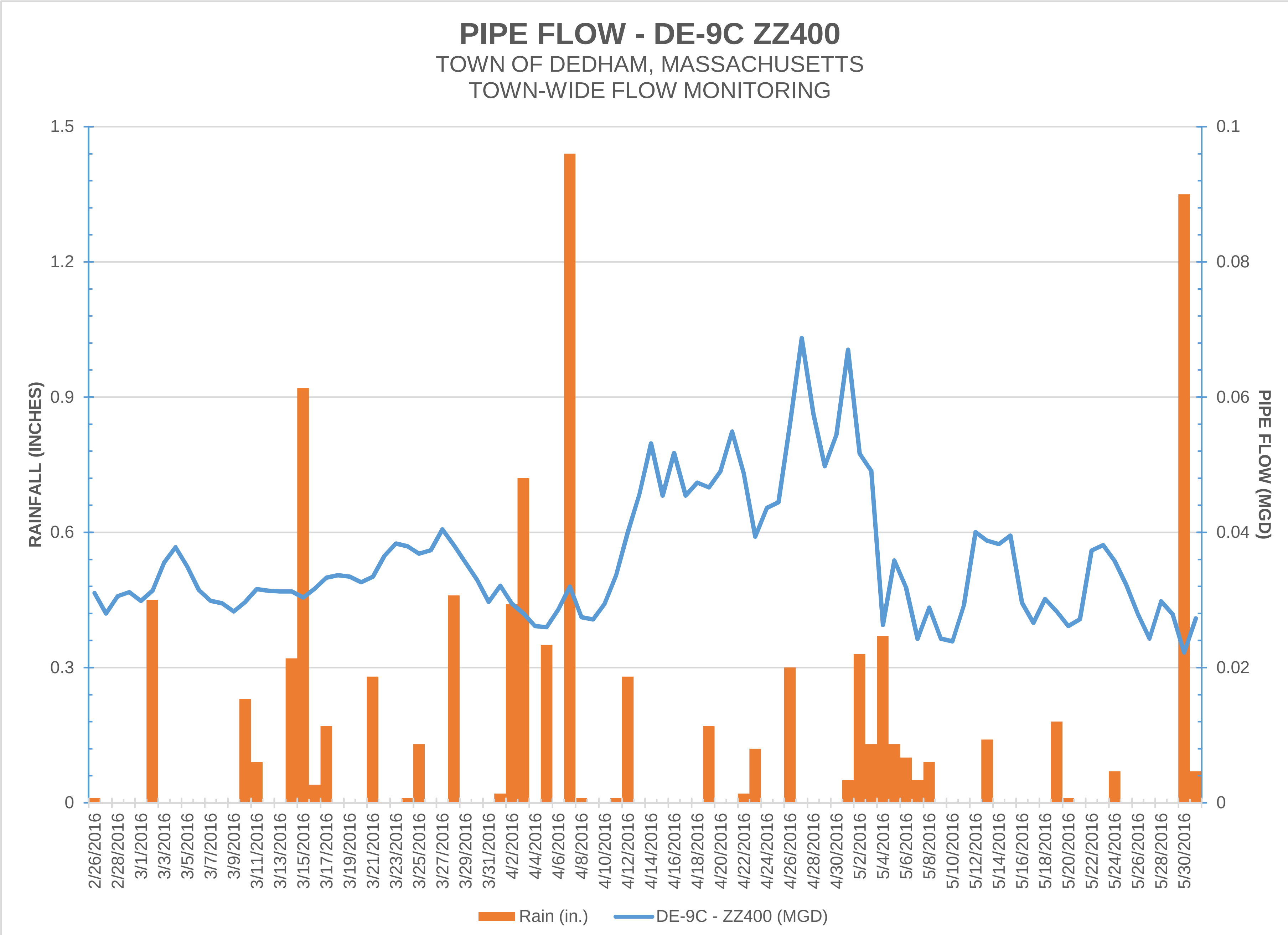
PIPE FLOW - TT50
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
0.8
0.6
0.4
0.2
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
TT Flow - TT50 (MGD)


PIPE FLOW - UU10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
0.4
0.3
0.2
0.1
0
2/27/2016
2/29/2016
3/2/2016
3/4/2016
3/6/2016
3/8/2016
3/10/2016
3/12/2016
3/14/2016
3/16/2016
3/18/2016
3/20/2016
3/22/2016
3/24/2016
3/26/2016
3/28/2016
3/30/2016
4/1/2016
4/3/2016
4/5/2016
4/7/2016
4/9/2016
4/11/2016
4/13/2016
4/15/2016
4/17/2016
4/19/2016
4/21/2016
4/23/2016
4/25/2016
4/27/2016
4/29/2016
5/1/2016
5/3/2016
5/5/2016
5/7/2016
5/9/2016
5/11/2016
5/13/2016
5/15/2016
5/17/2016
5/19/2016
5/21/2016
5/23/2016
5/25/2016
5/27/2016
5/29/2016
Rain (in.)
UU Flow - UU10 (MGD)


PIPE FLOW - VV30
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
1
0.75
0.5
0.25
0
2/26/2016
3/4/2016
3/11/2016
3/18/2016
3/25/2016
4/1/2016
4/8/2016
4/15/2016
4/22/2016
4/29/2016
5/6/2016
5/13/2016
5/20/2016
5/27/2016
Rain (in.)
VV Flow - VV30 (MGD)
Total Metered Flow - VV30 (MGD)

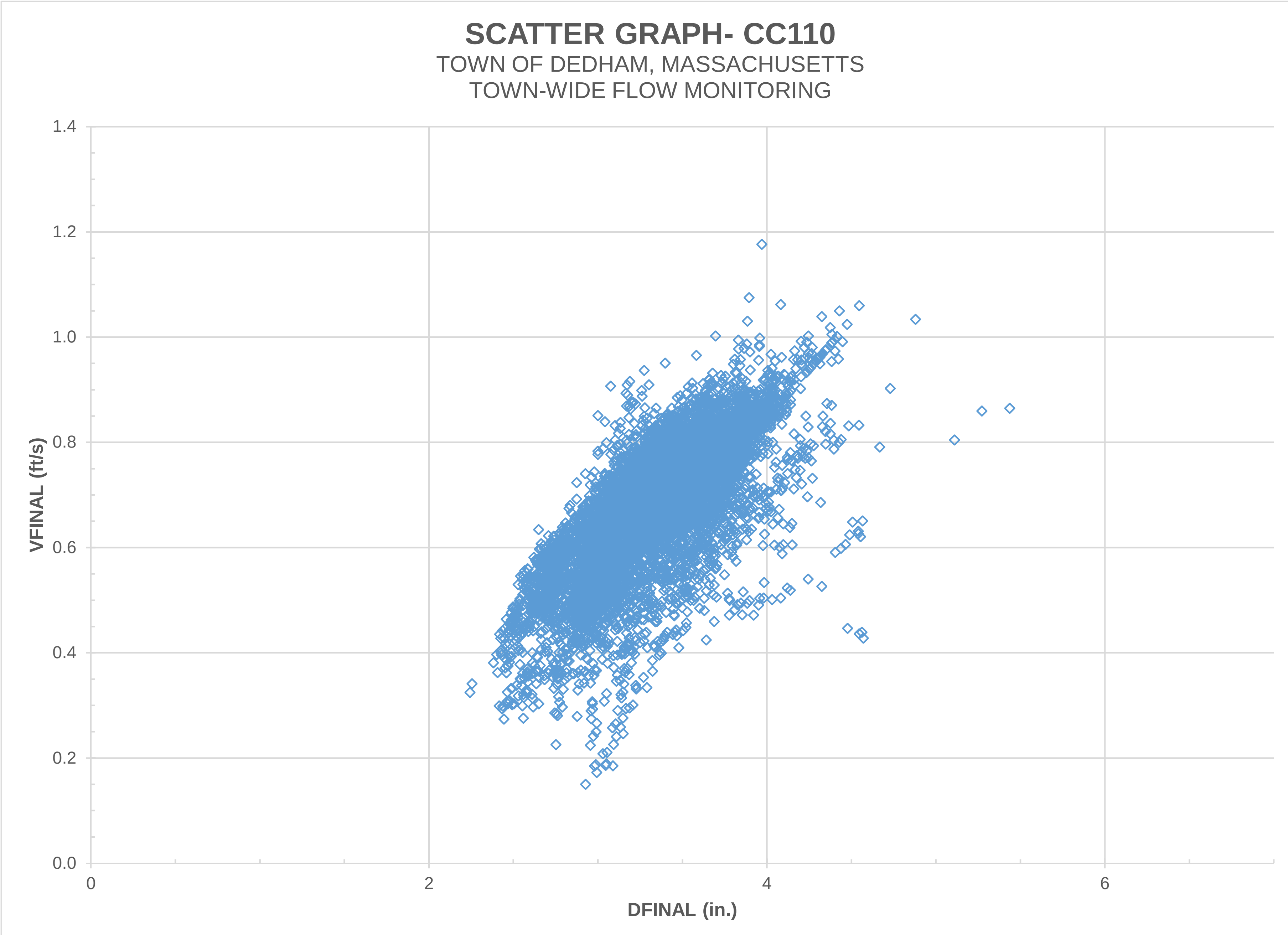

PIPE FLOW - DE-CT-1 WW10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
1.75
1.5
1.25
1
0.75
0.5
0.25
0
2/27/2016
2/29/2016
3/2/2016
3/4/2016
3/6/2016
3/8/2016
3/10/2016
3/12/2016
3/14/2016
3/16/2016
3/18/2016
3/20/2016
3/22/2016
3/24/2016
3/26/2016
3/28/2016
3/30/2016
4/1/2016
4/3/2016
4/5/2016
4/7/2016
4/9/2016
4/11/2016
4/13/2016
4/15/2016
4/17/2016
4/19/2016
4/21/2016
4/23/2016
4/25/2016
4/27/2016
4/29/2016
5/1/2016
5/3/2016
5/5/2016
5/7/2016
5/9/2016
5/11/2016
5/13/2016
5/15/2016
5/17/2016
5/19/2016
5/21/2016
5/23/2016
5/25/2016
5/27/2016
5/29/2016
Rainfall
Total Metered Flow - WW10 (MGD)*
DE-CT-1C - WW10 (MGD)*

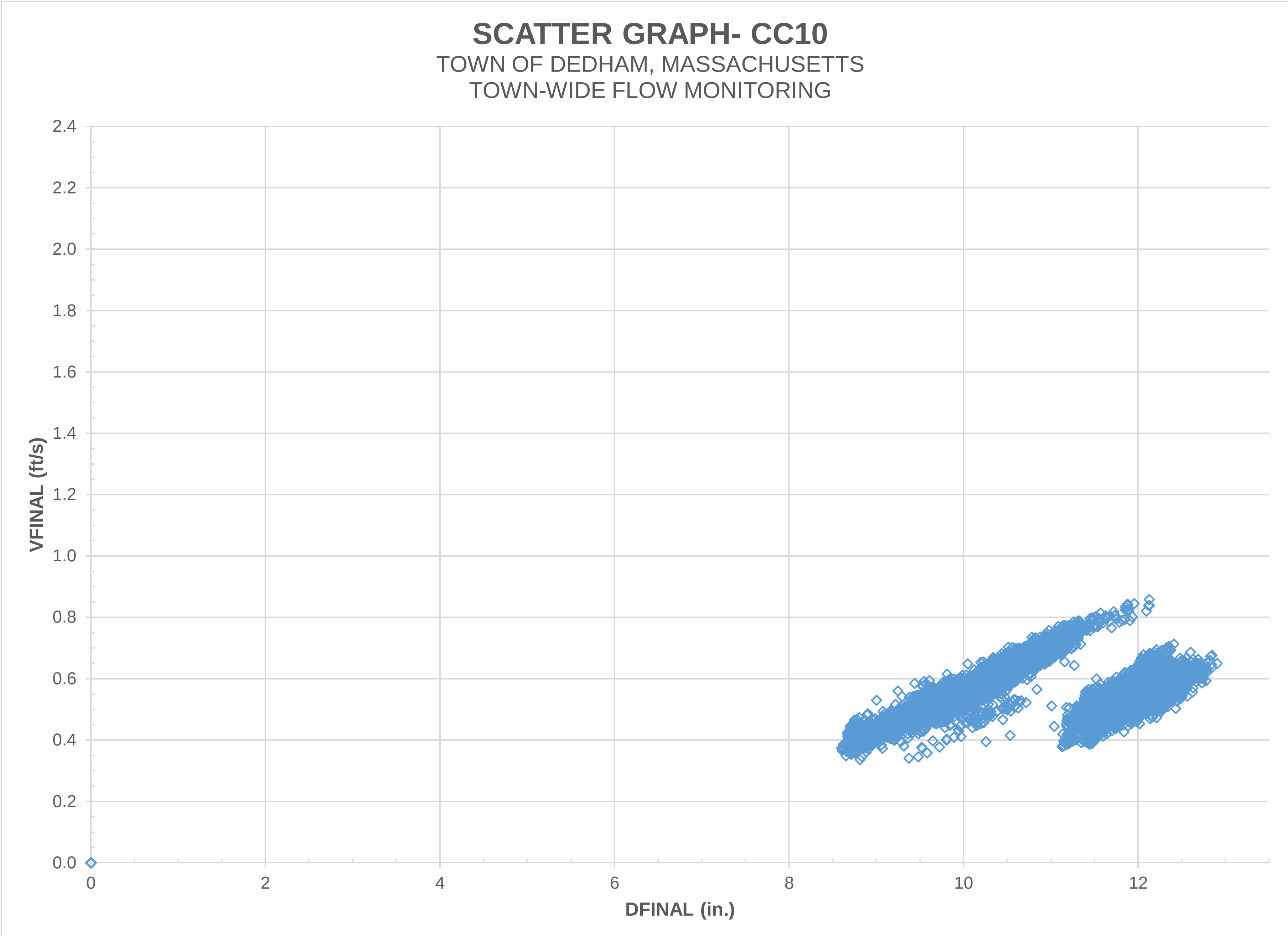

PIPE FLOW - YY10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
1.5
1.2
0.9
0.6
0.3
0
0.5
0.4
0.3
0.2
0.1
0
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
YY Flow - YY10 (MGD)

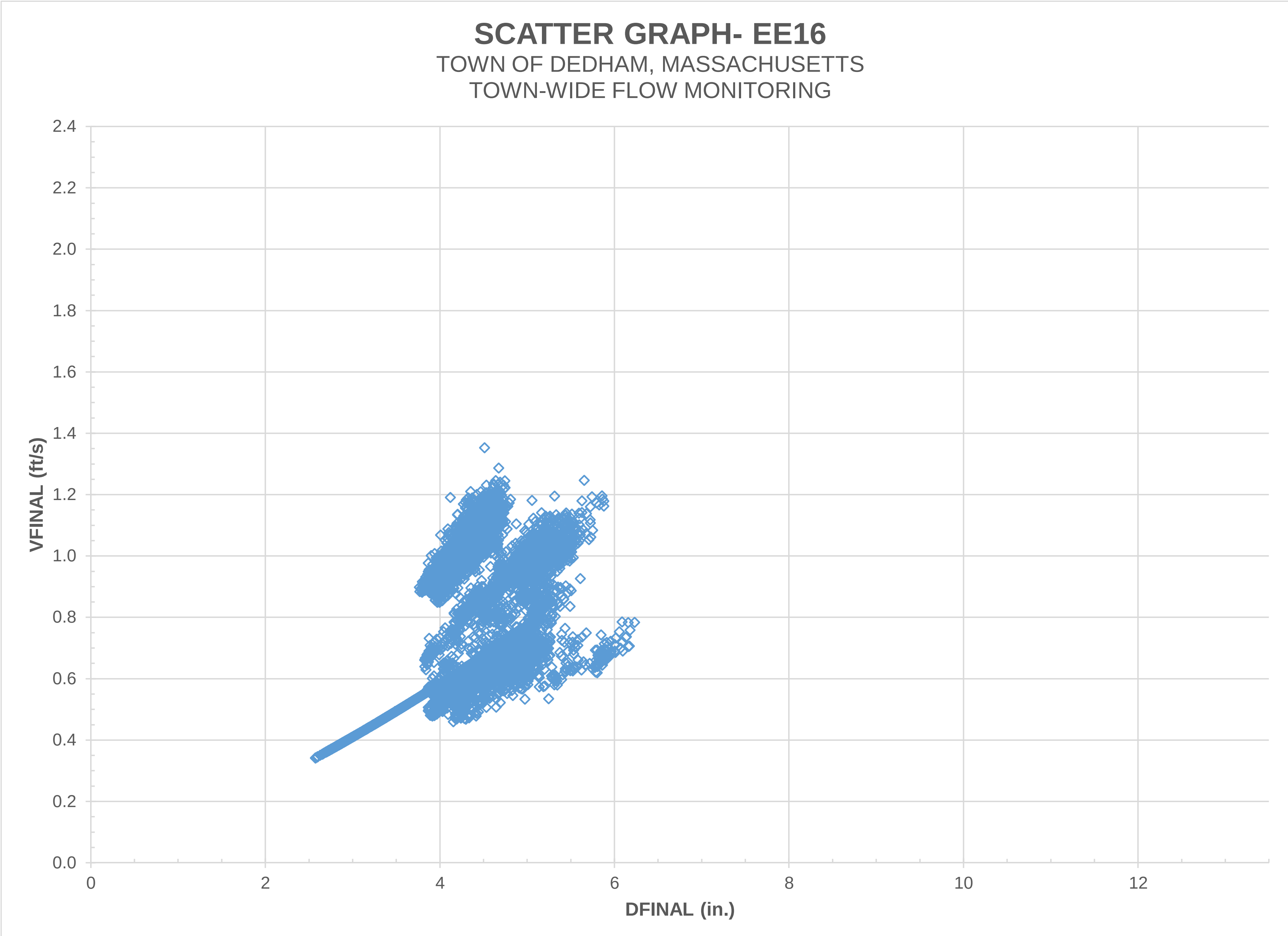

PIPE FLOW - DE-9C ZZ400
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
RAINFALL (INCHES)
PIPE FLOW (MGD)
0
0.3
0.6
0.9
1.2
1.5
0
0.02
0.04
0.06
0.08
0.1
2/26/2016
2/28/2016
3/1/2016
3/3/2016
3/5/2016
3/7/2016
3/9/2016
3/11/2016
3/13/2016
3/15/2016
3/17/2016
3/19/2016
3/21/2016
3/23/2016
3/25/2016
3/27/2016
3/29/2016
3/31/2016
4/2/2016
4/4/2016
4/6/2016
4/8/2016
4/10/2016
4/12/2016
4/14/2016
4/16/2016
4/18/2016
4/20/2016
4/22/2016
4/24/2016
4/26/2016
4/28/2016
4/30/2016
5/2/2016
5/4/2016
5/6/2016
5/8/2016
5/10/2016
5/12/2016
5/14/2016
5/16/2016
5/18/2016
5/20/2016
5/22/2016
5/24/2016
5/26/2016
5/28/2016
5/30/2016
Rain (in.)
DE-9C - ZZ400 (MGD)

APPENDIX E

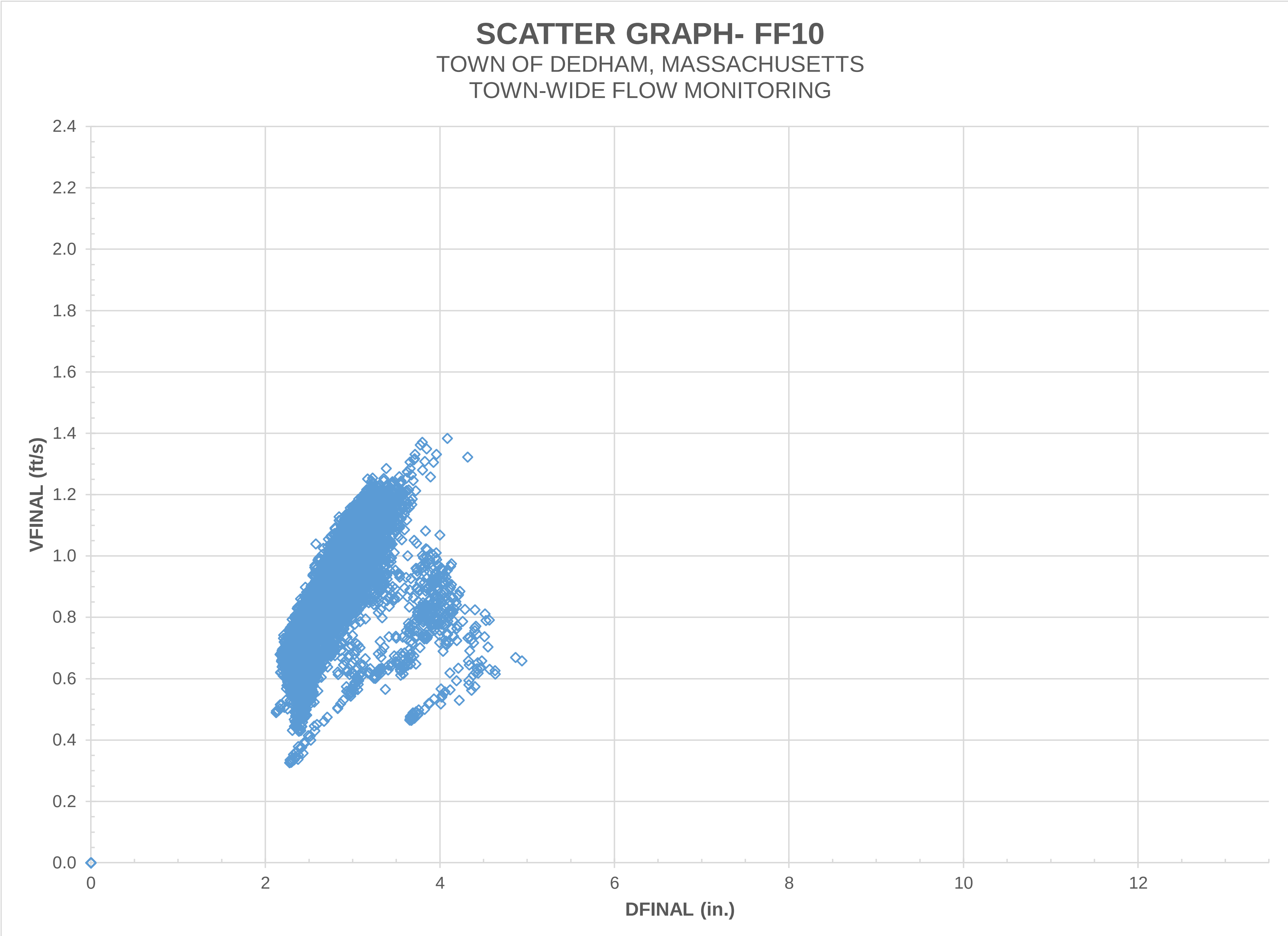
SCATTER GRAPHS

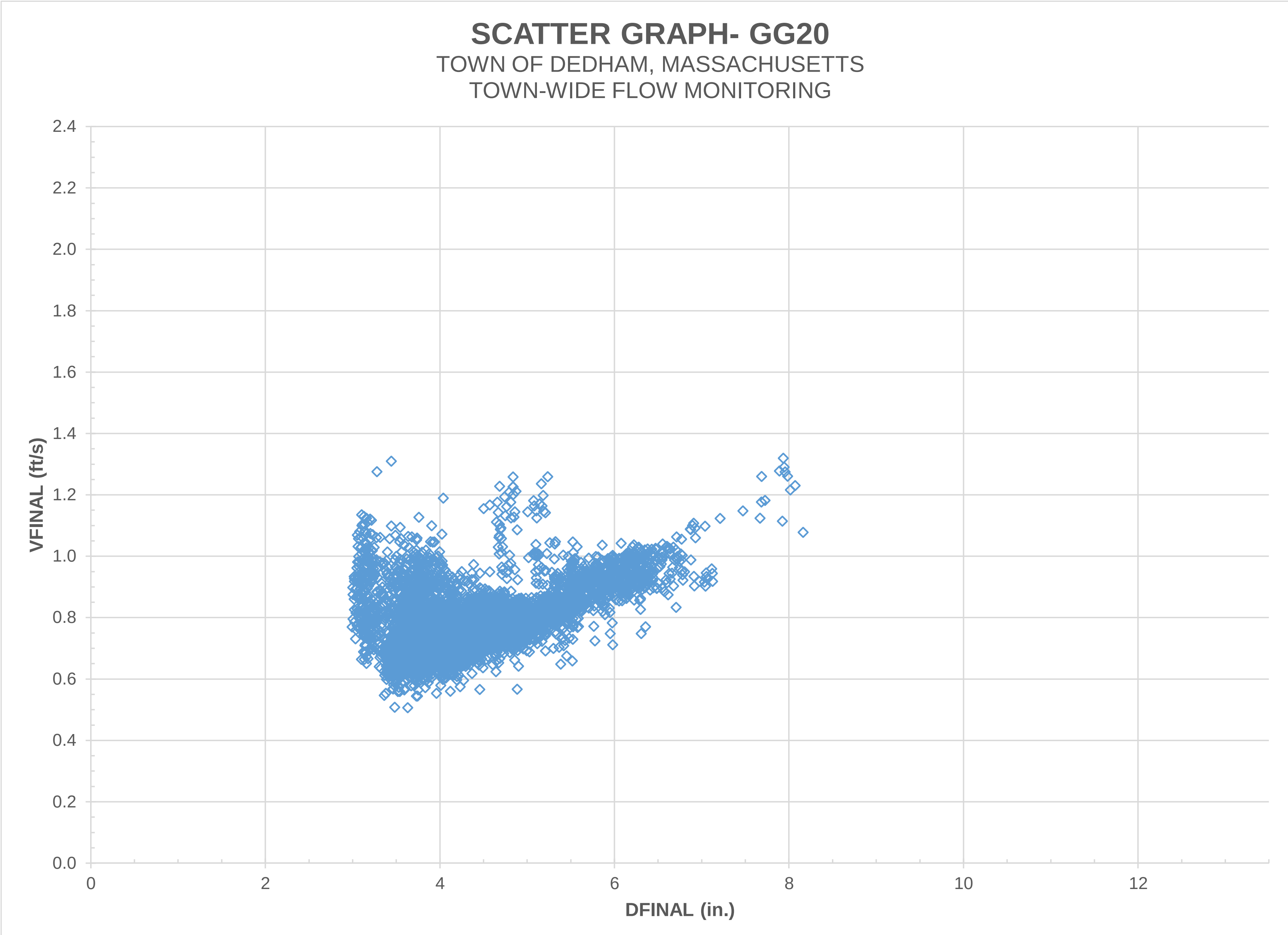

SCATTER GRAPH- CC110
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
DFINAL (in.)


SCATTER GRAPH- CC10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12

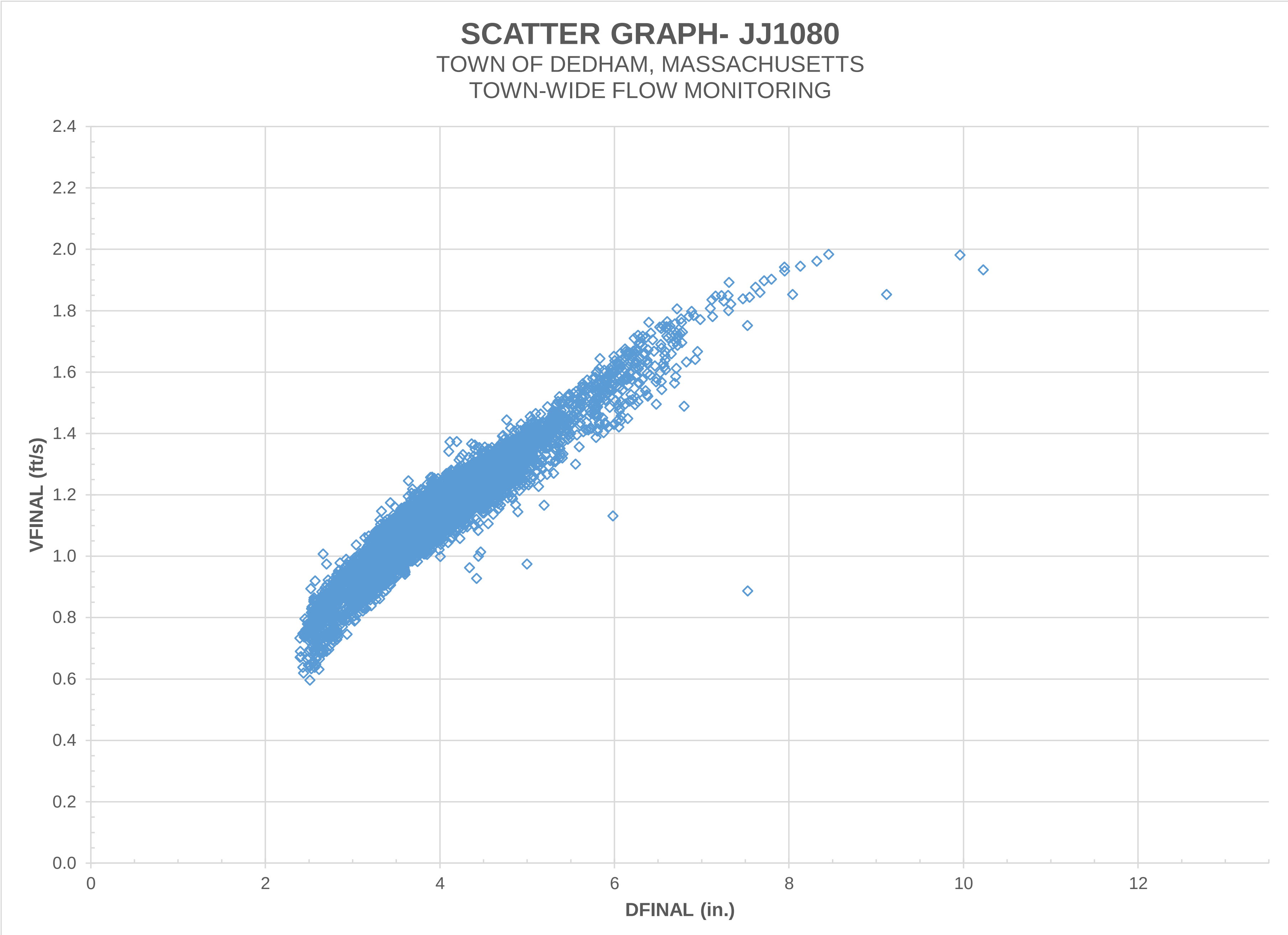


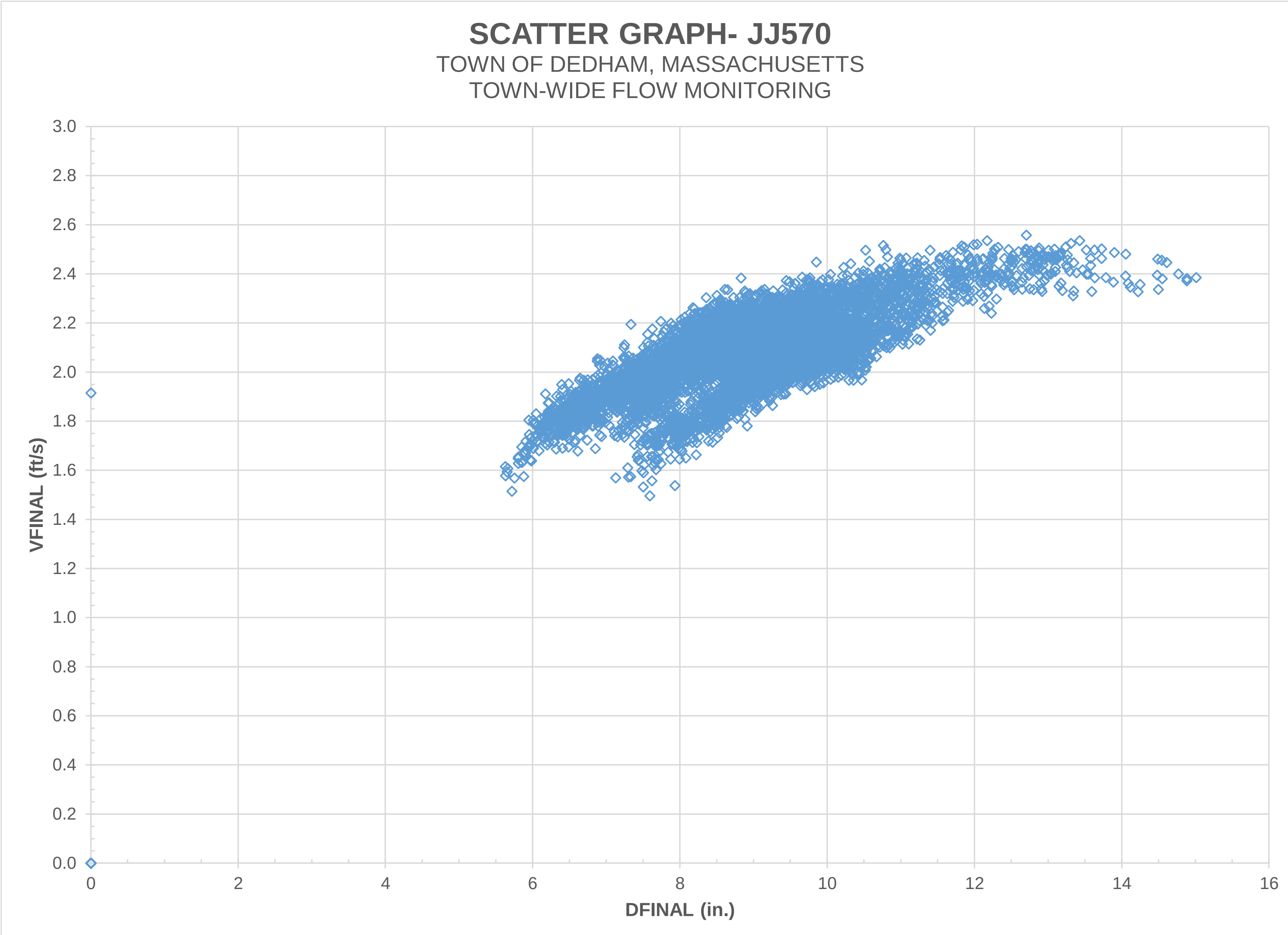
SCATTER GRAPH- EE16
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
DFINAL (in.)

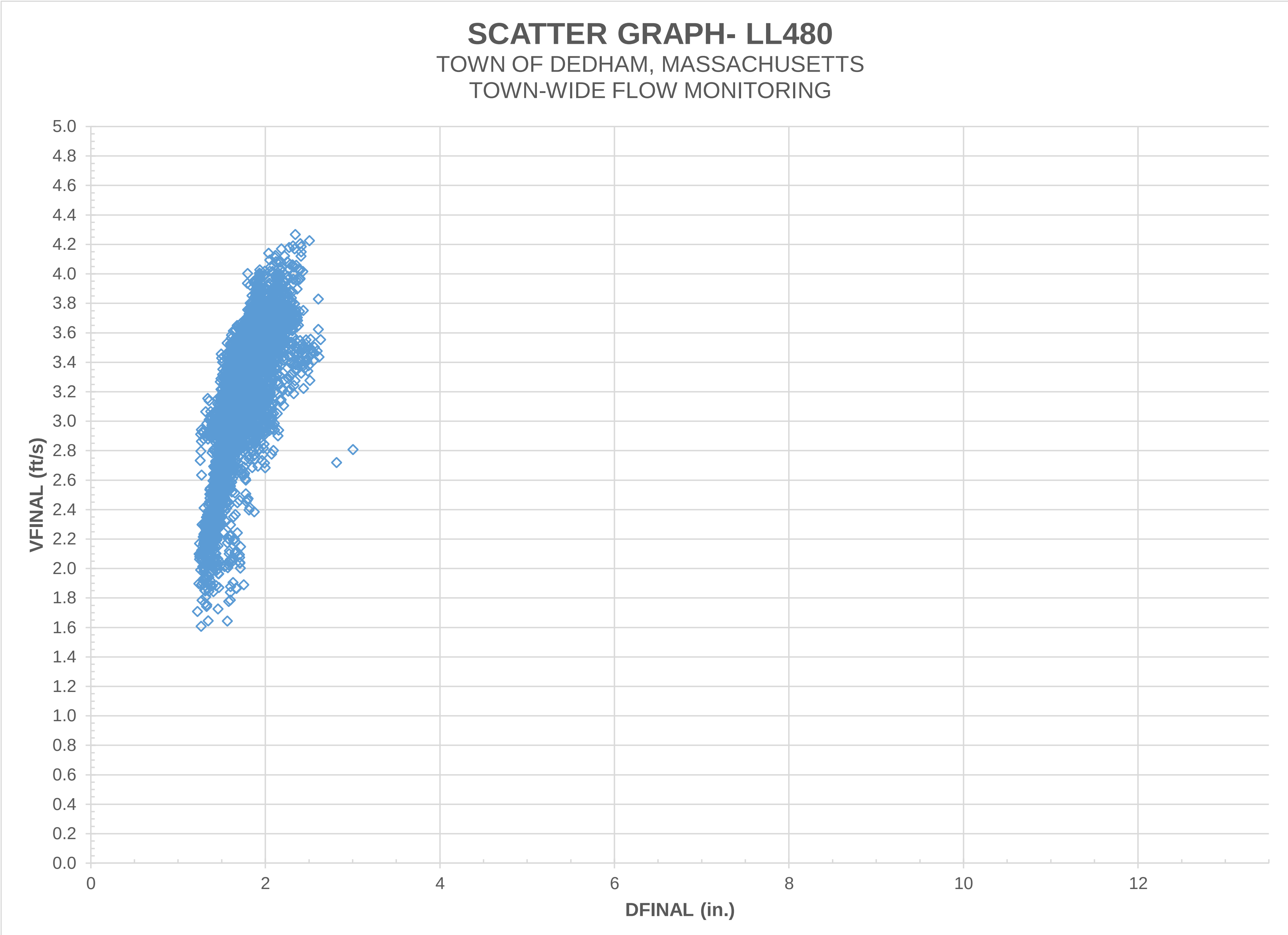

SCATTER GRAPH- FF10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
DFINAL (in.)

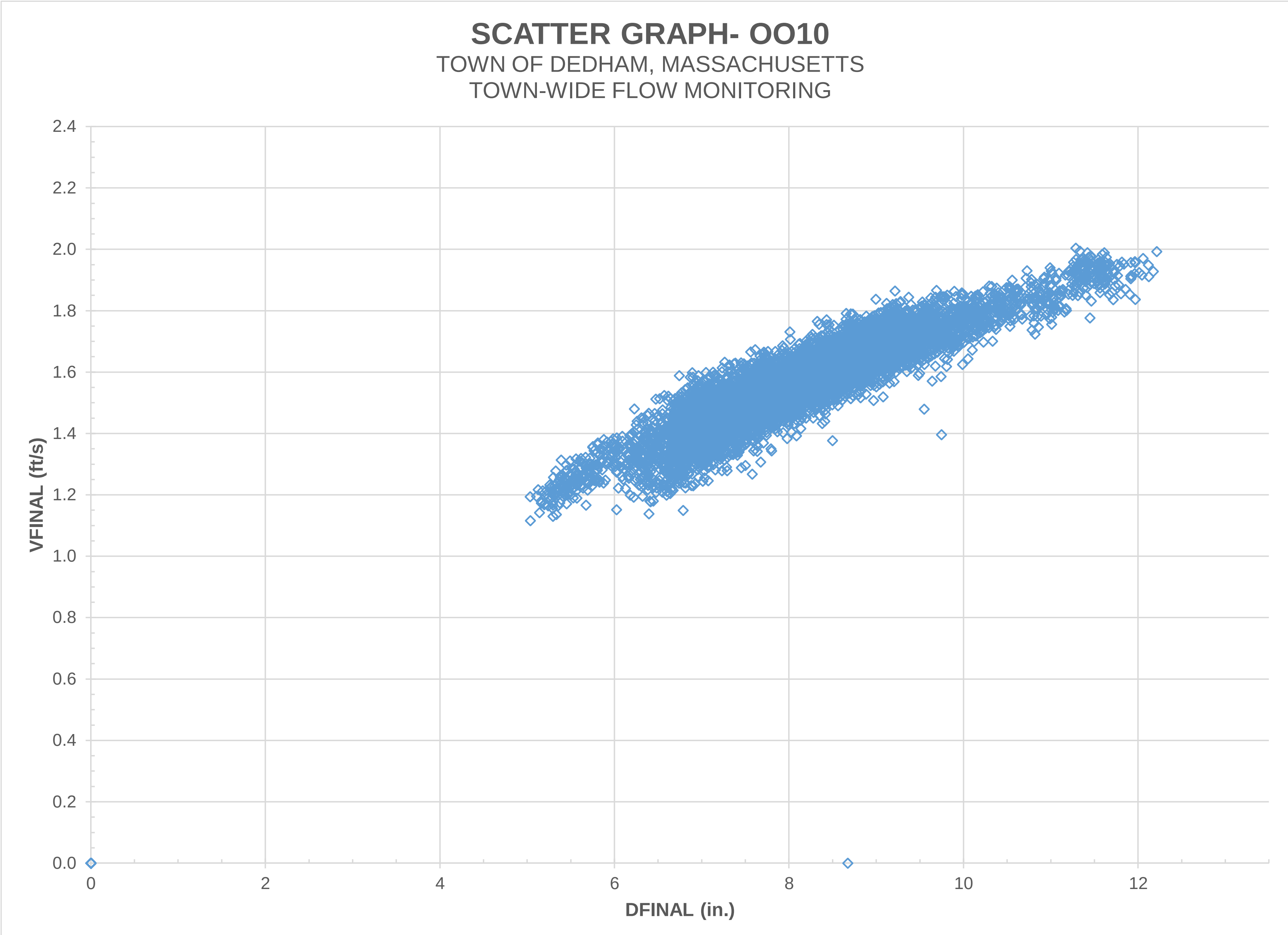


SCATTER GRAPH- GG20
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
DFINAL (in.)

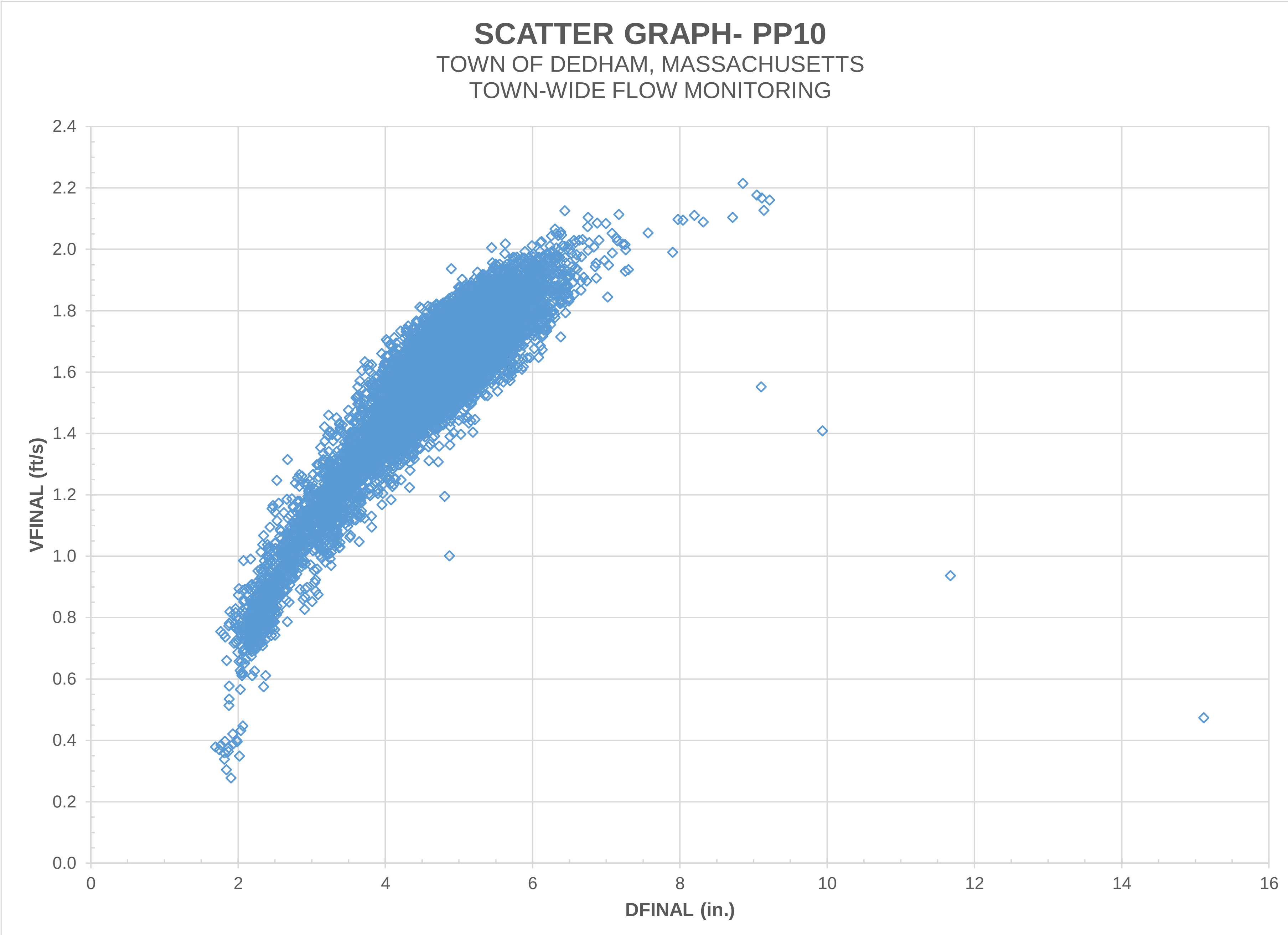

SCATTER GRAPH- JJ1080
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
0
2
4
6
8
10
12

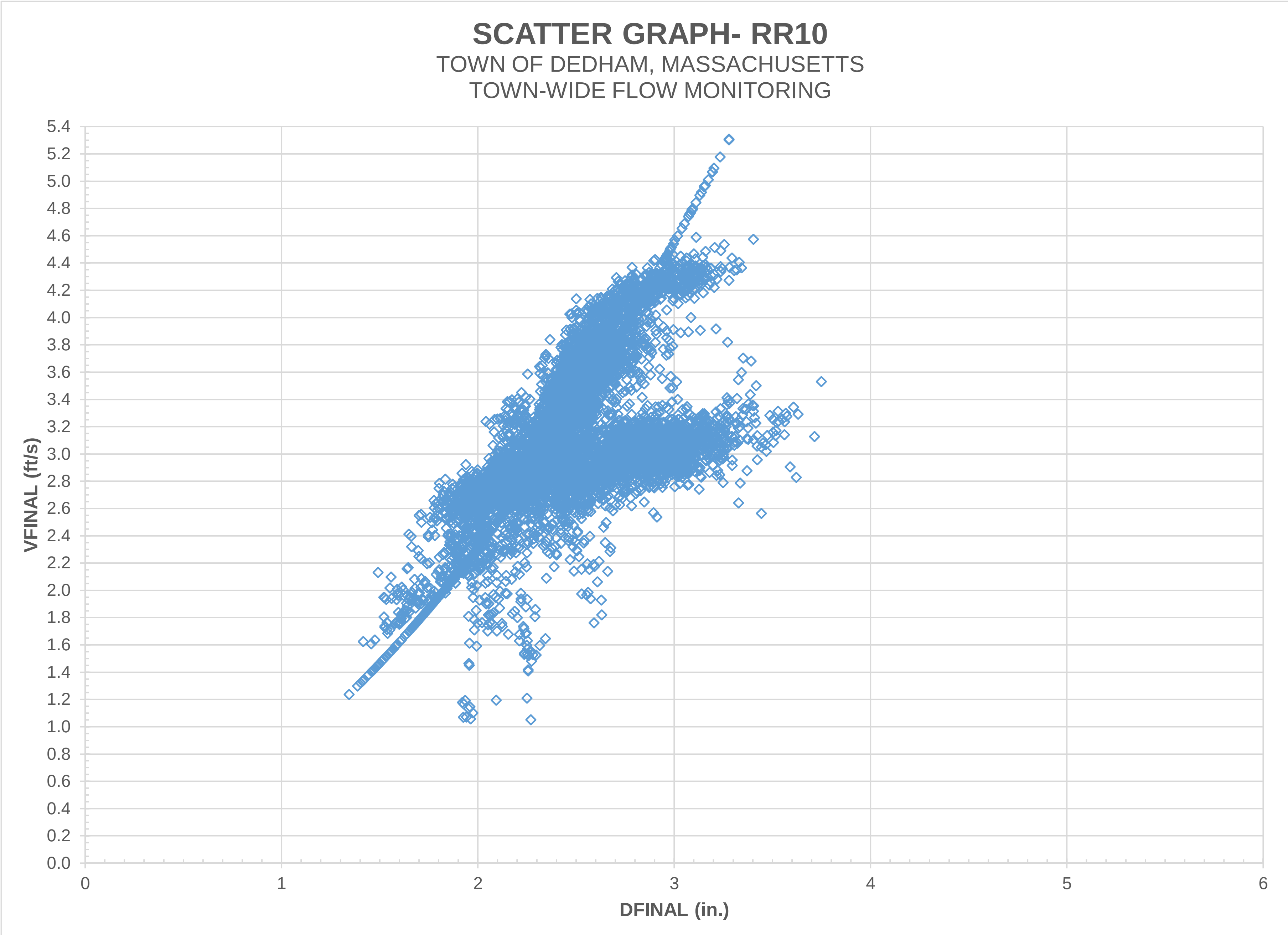

SCATTER GRAPH- JJ570
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
14
16

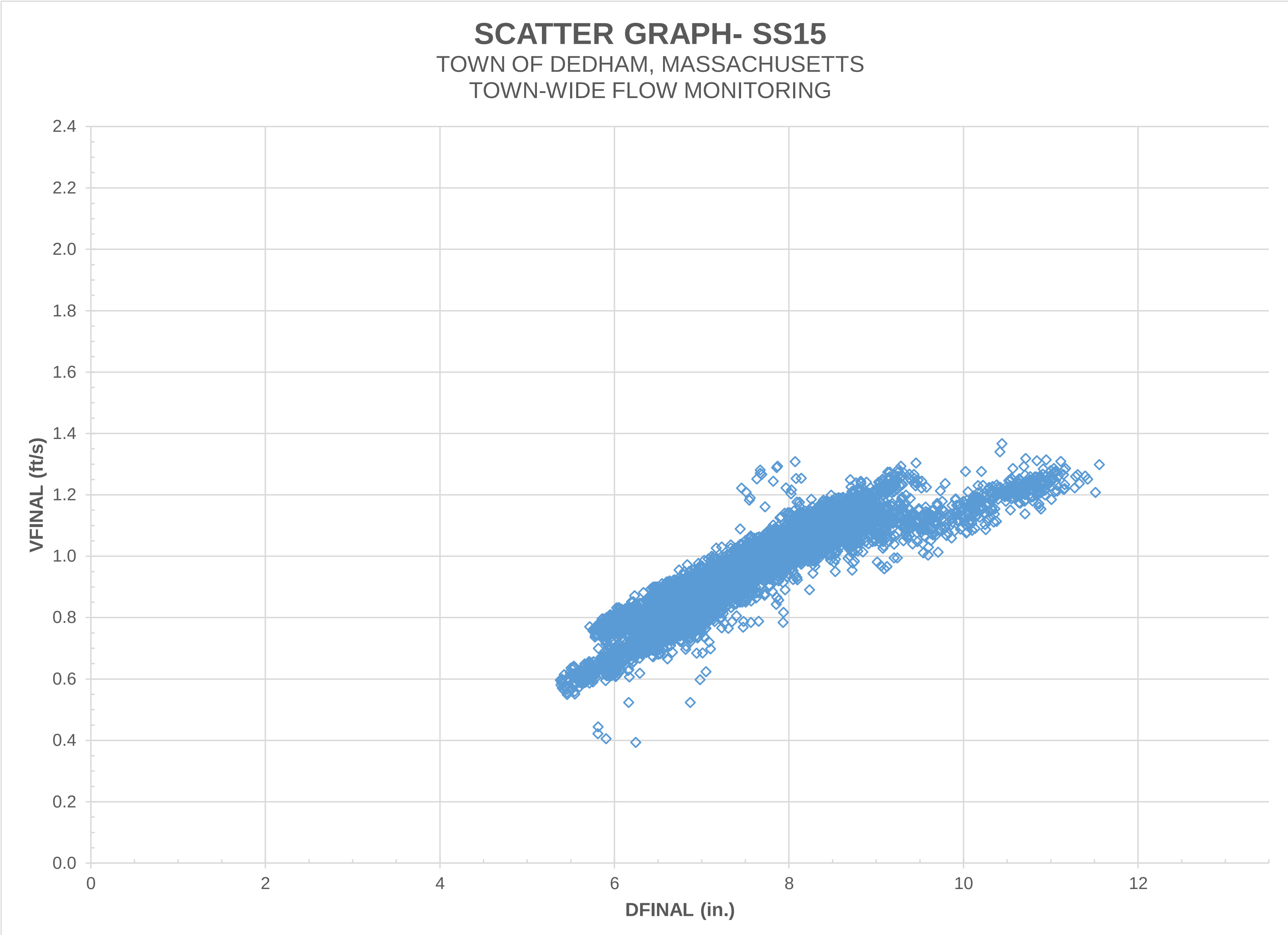

SCATTER GRAPH- LL480
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
5.0
4.8
4.6
4.4
4.2
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12

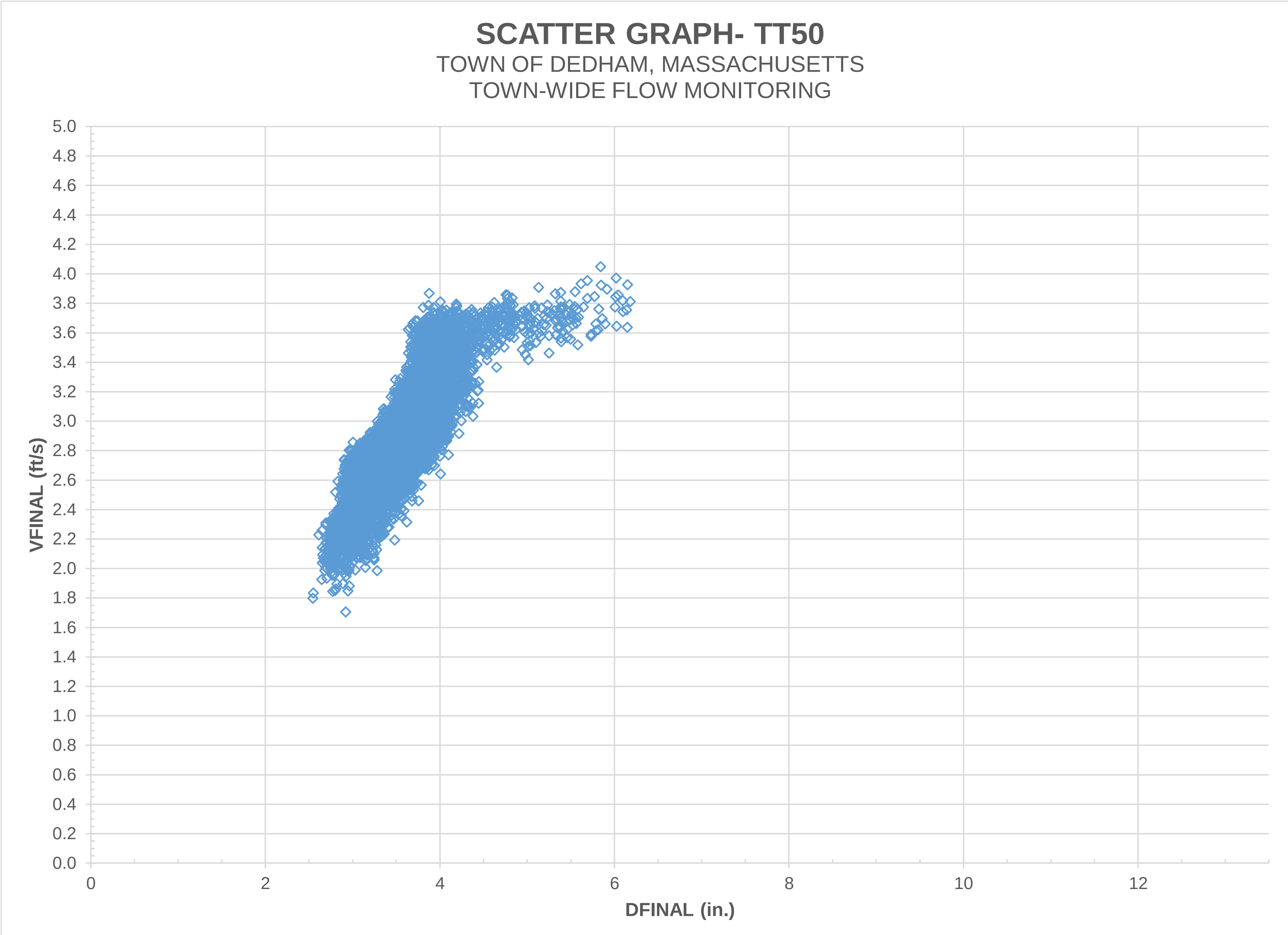


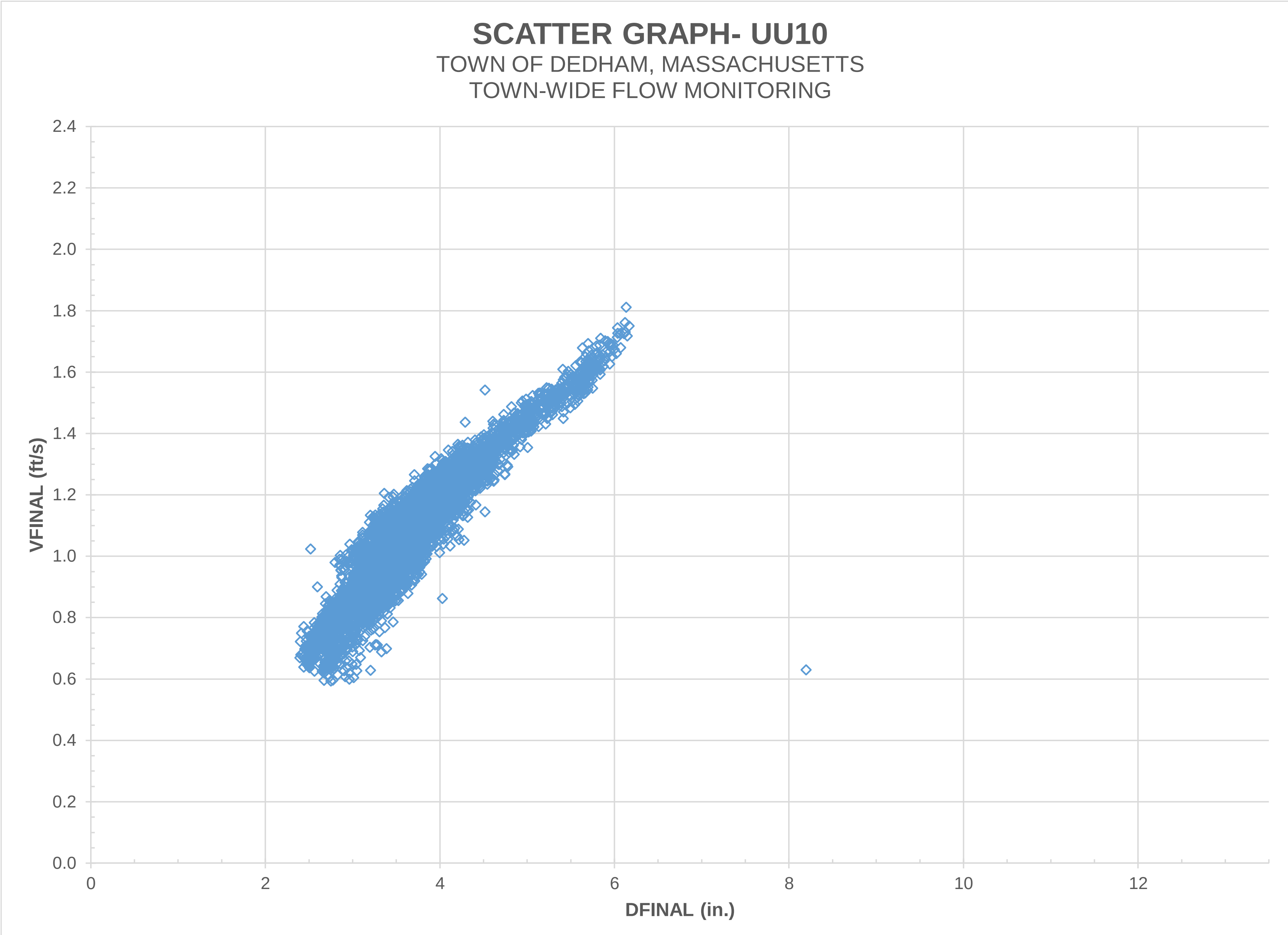
SCATTER GRAPH- OO10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12

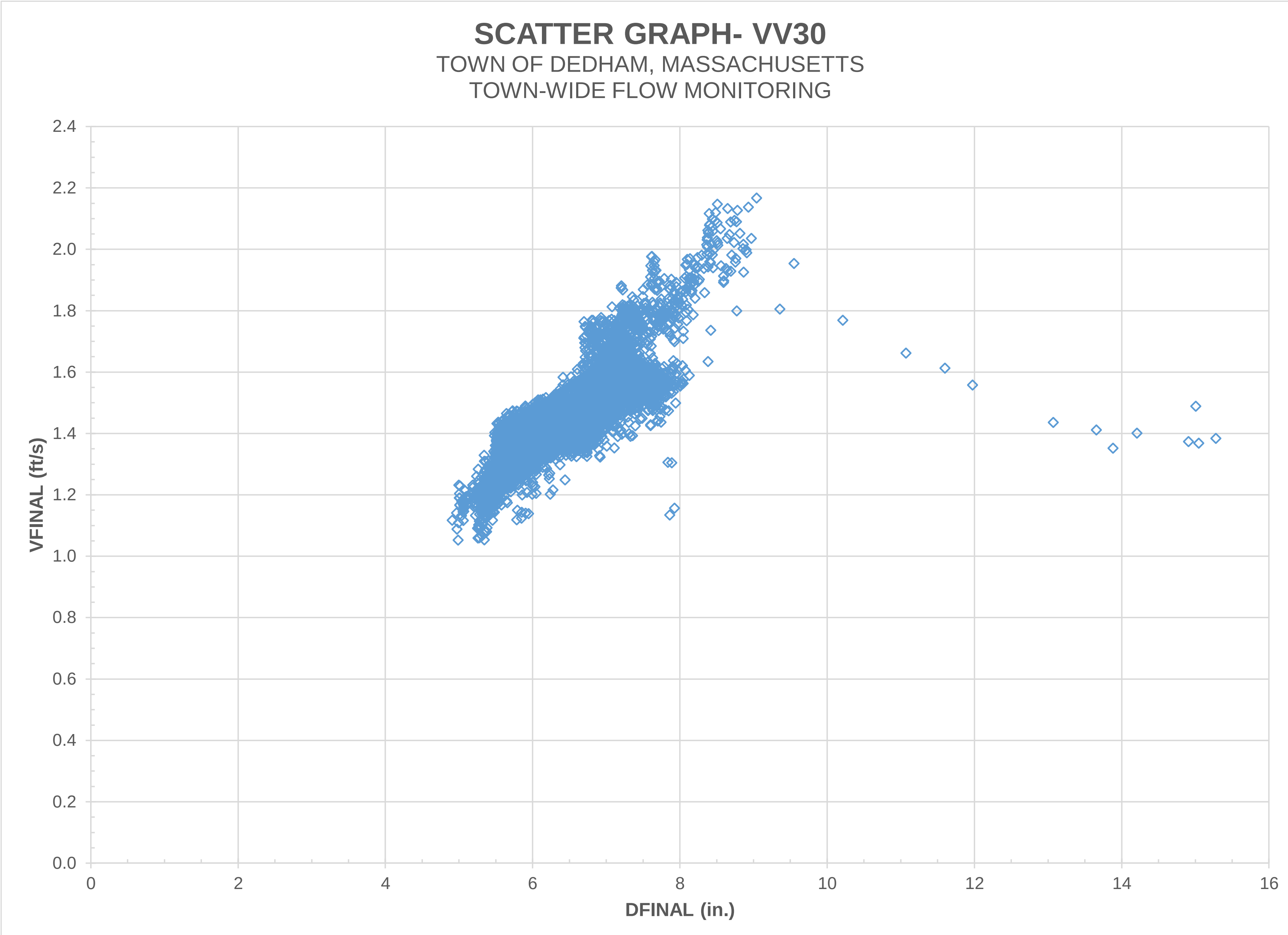

SCATTER GRAPH- PP10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
0
2
4
6
8
10
12
14
16

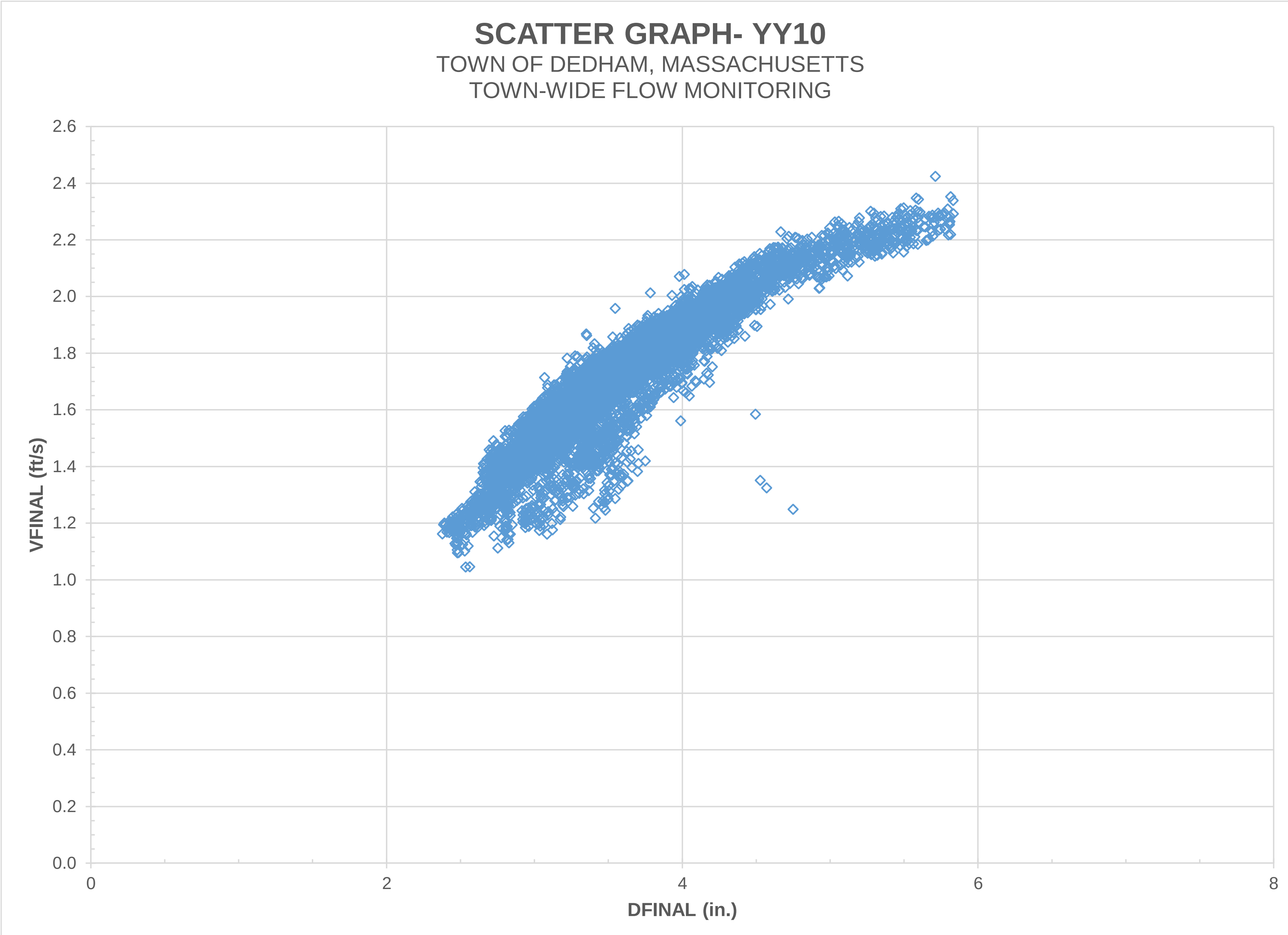

SCATTER GRAPH- RR10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
5.4
5.2
5.0
4.8
4.6
4.4
4.2
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
1
2
3
4
5
6
DFINAL (in.)


SCATTER GRAPH- SS15
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
0
2
4
6
8
10
12

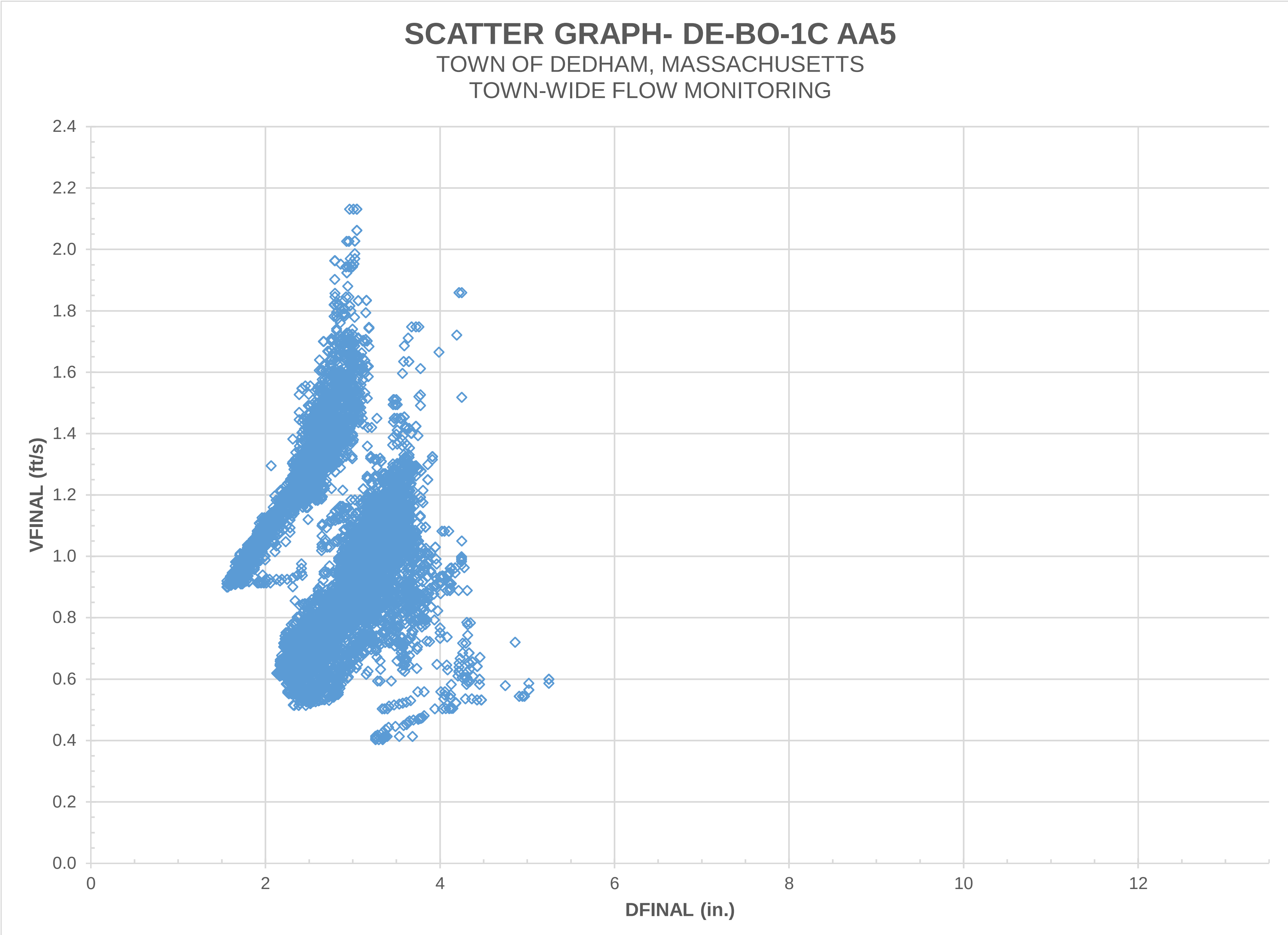

SCATTER GRAPH- TT50
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
0
2
4
6
8
10
12

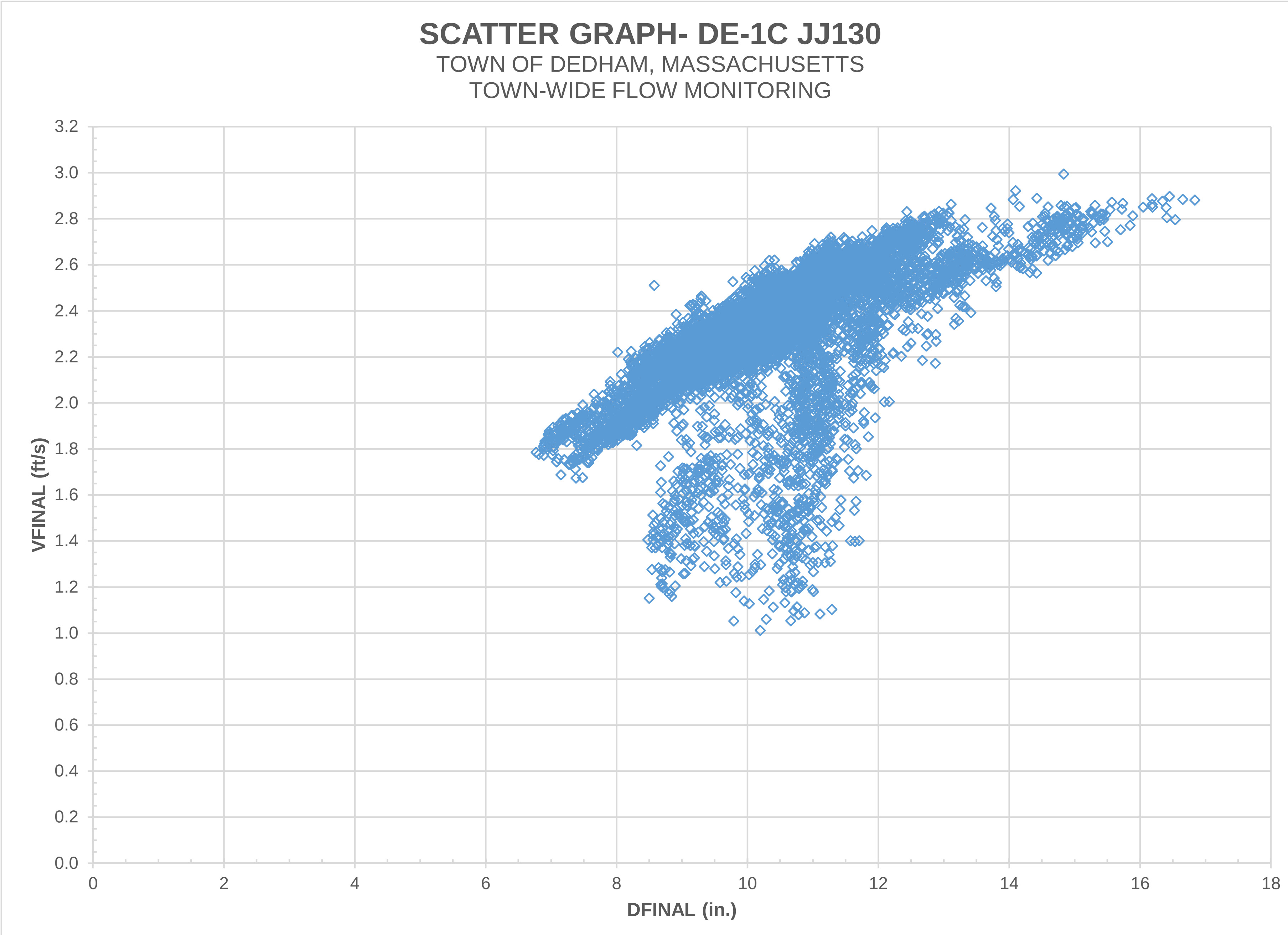

SCATTER GRAPH- UU10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12

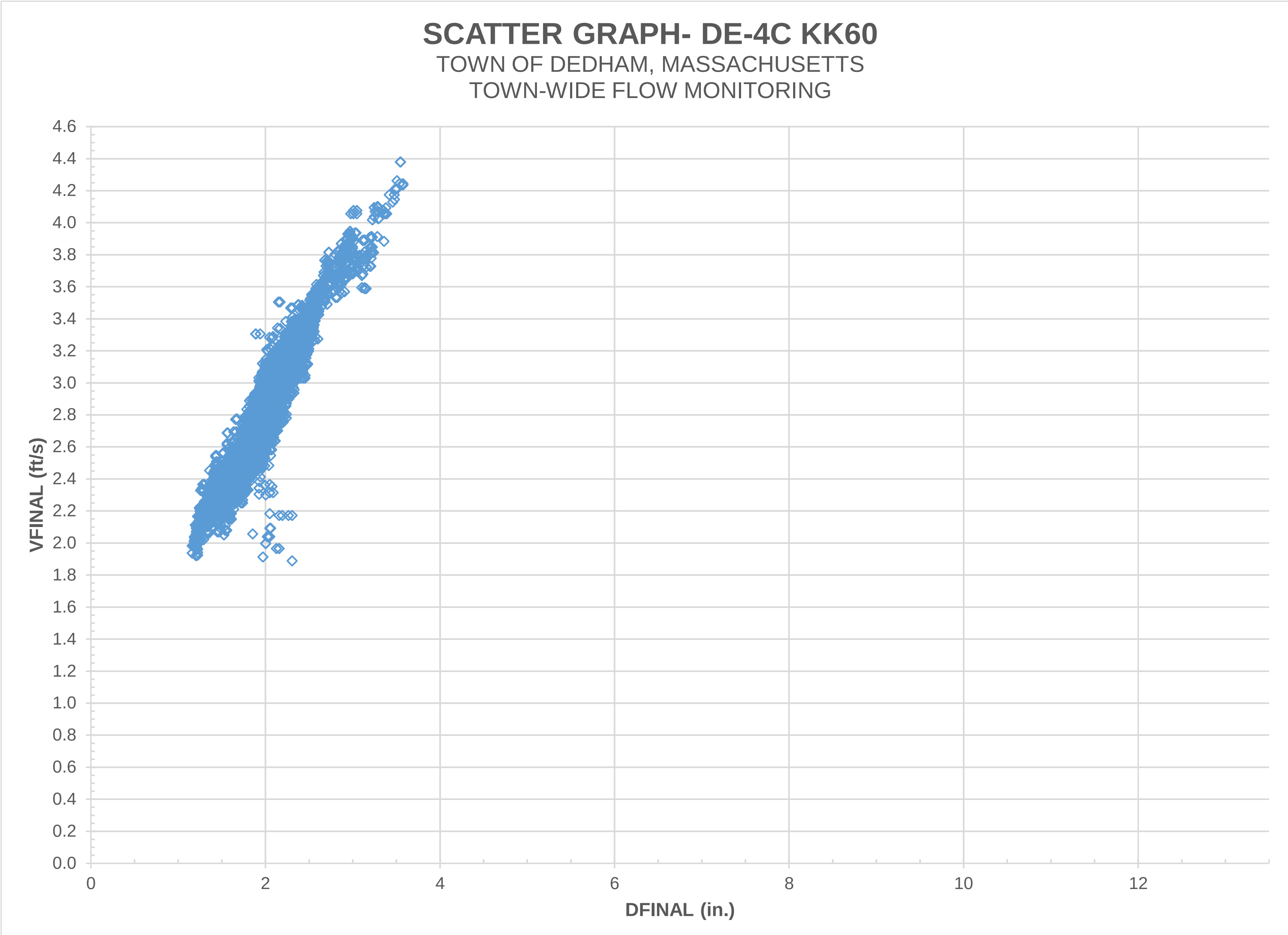

SCATTER GRAPH- VV30
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
14
16

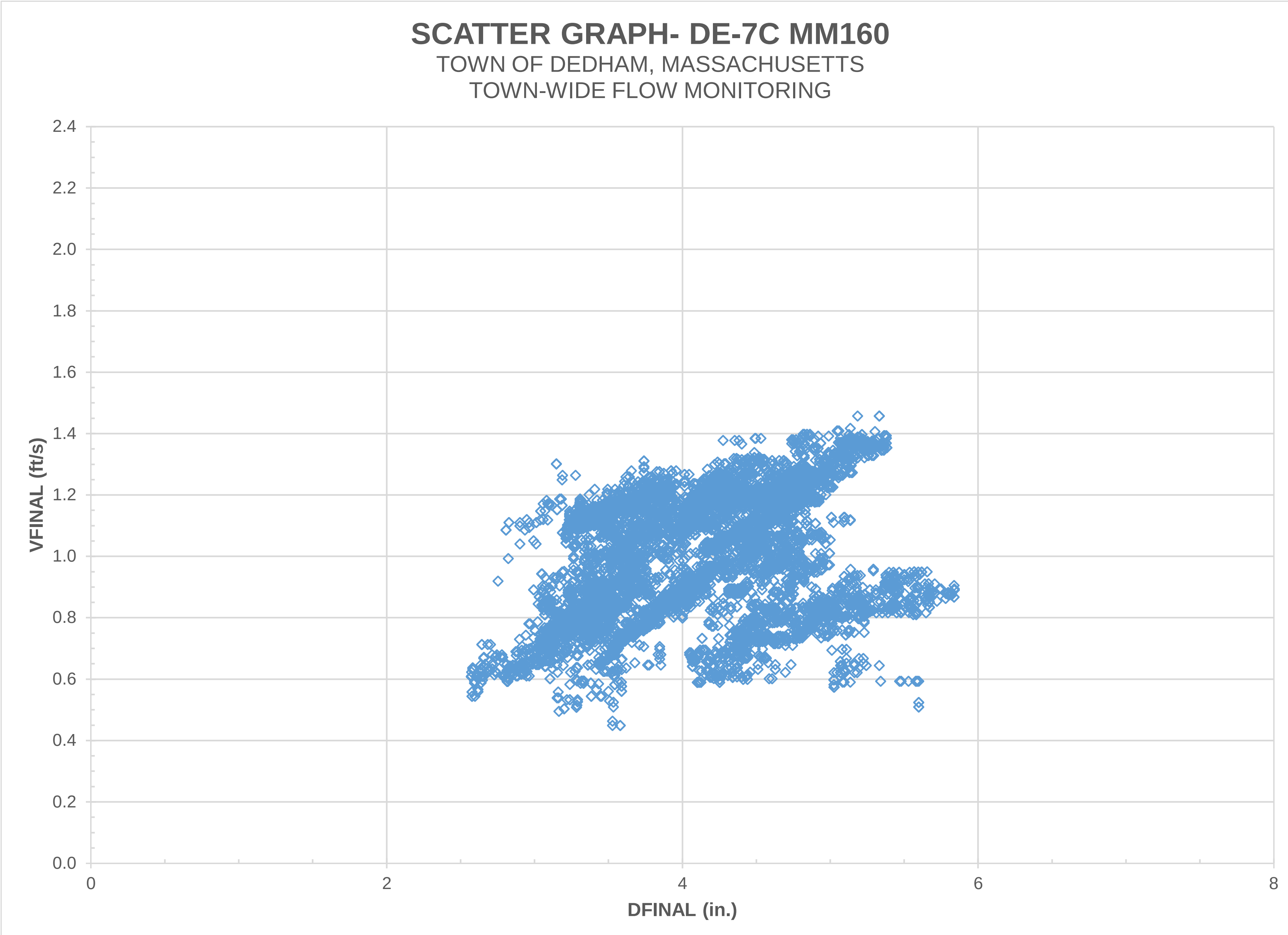


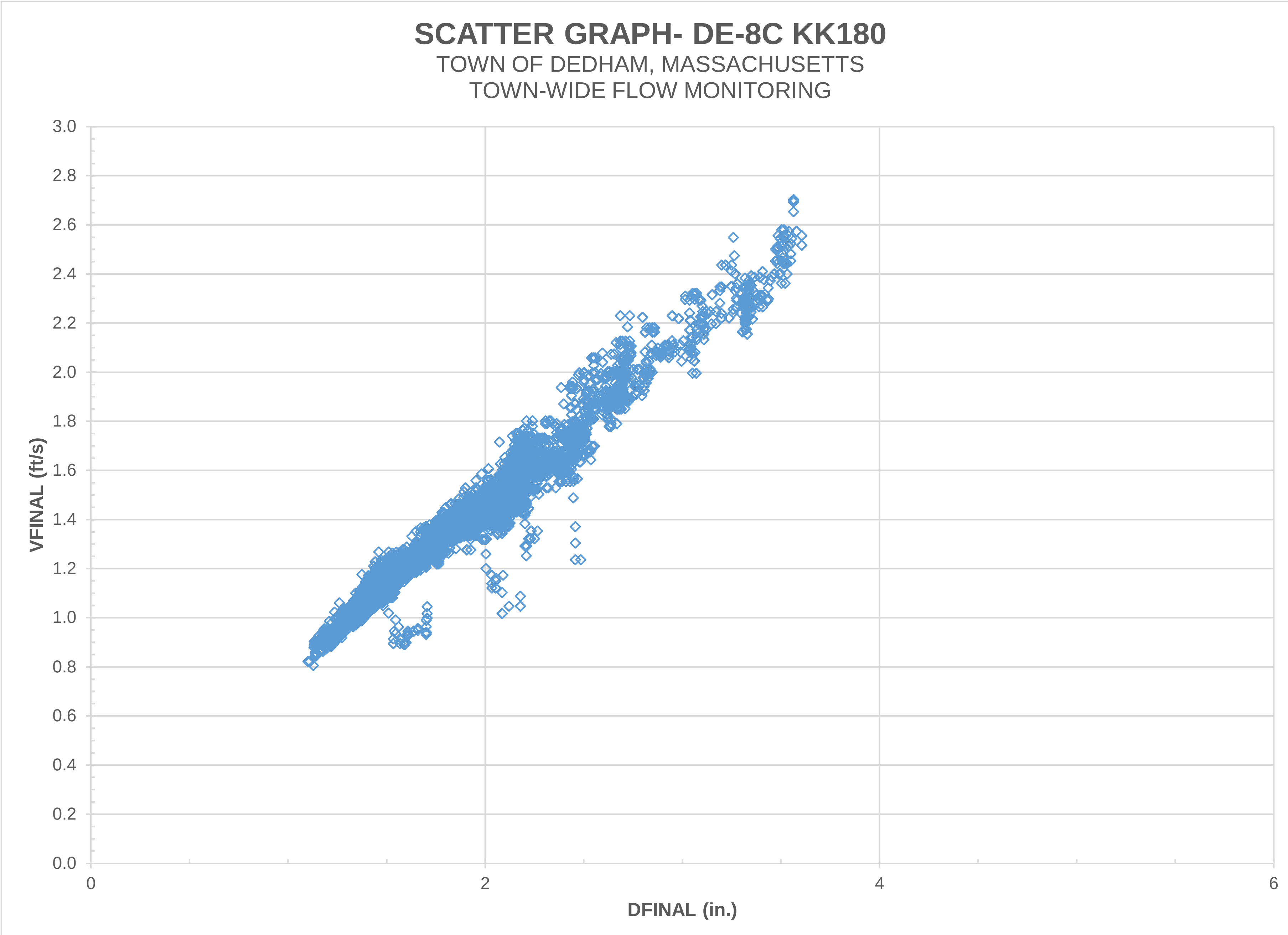
SCATTER GRAPH- YY10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8

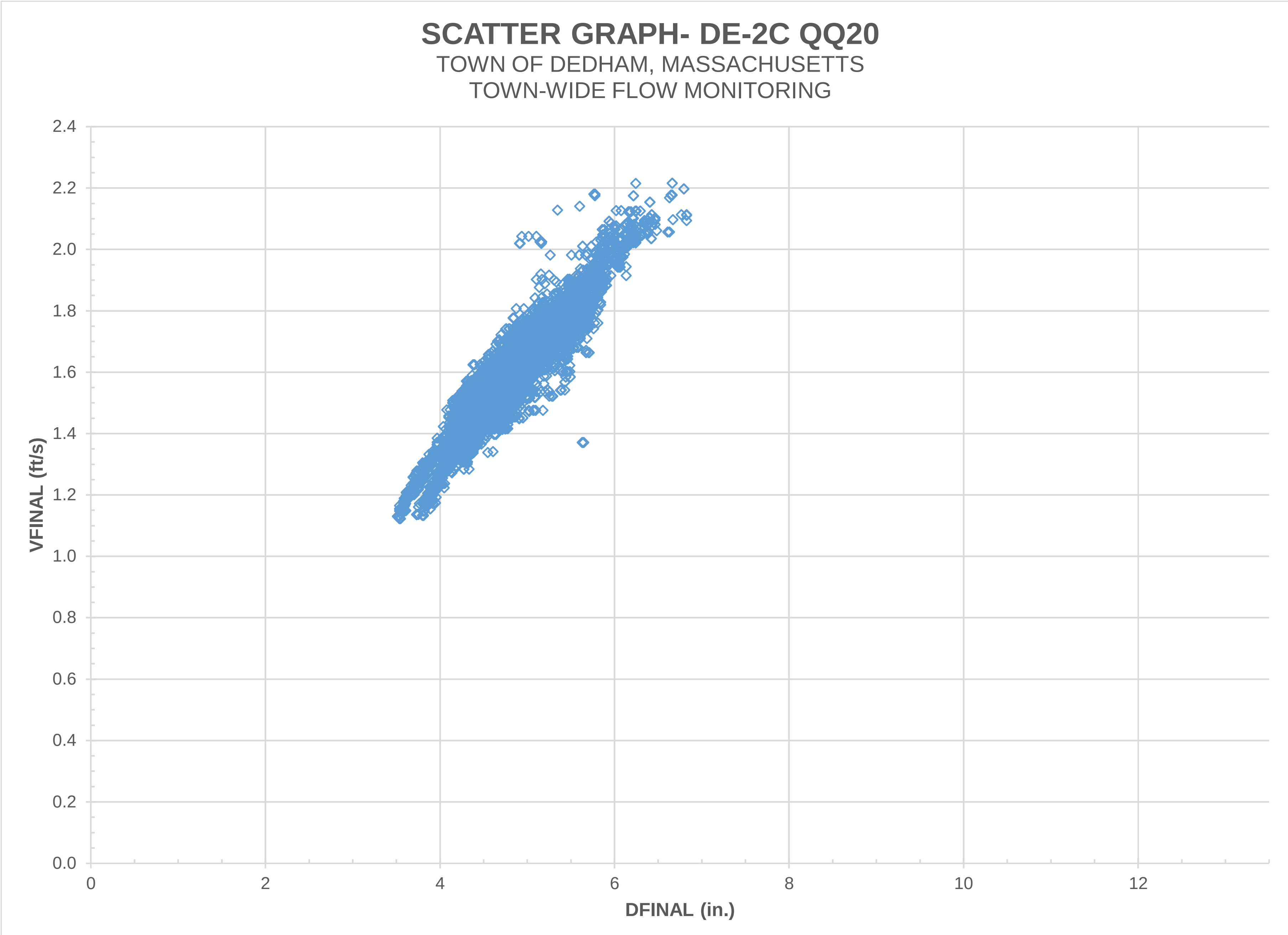

SCATTER GRAPH- DE-BO-1C AA5
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
DFINAL (in.)

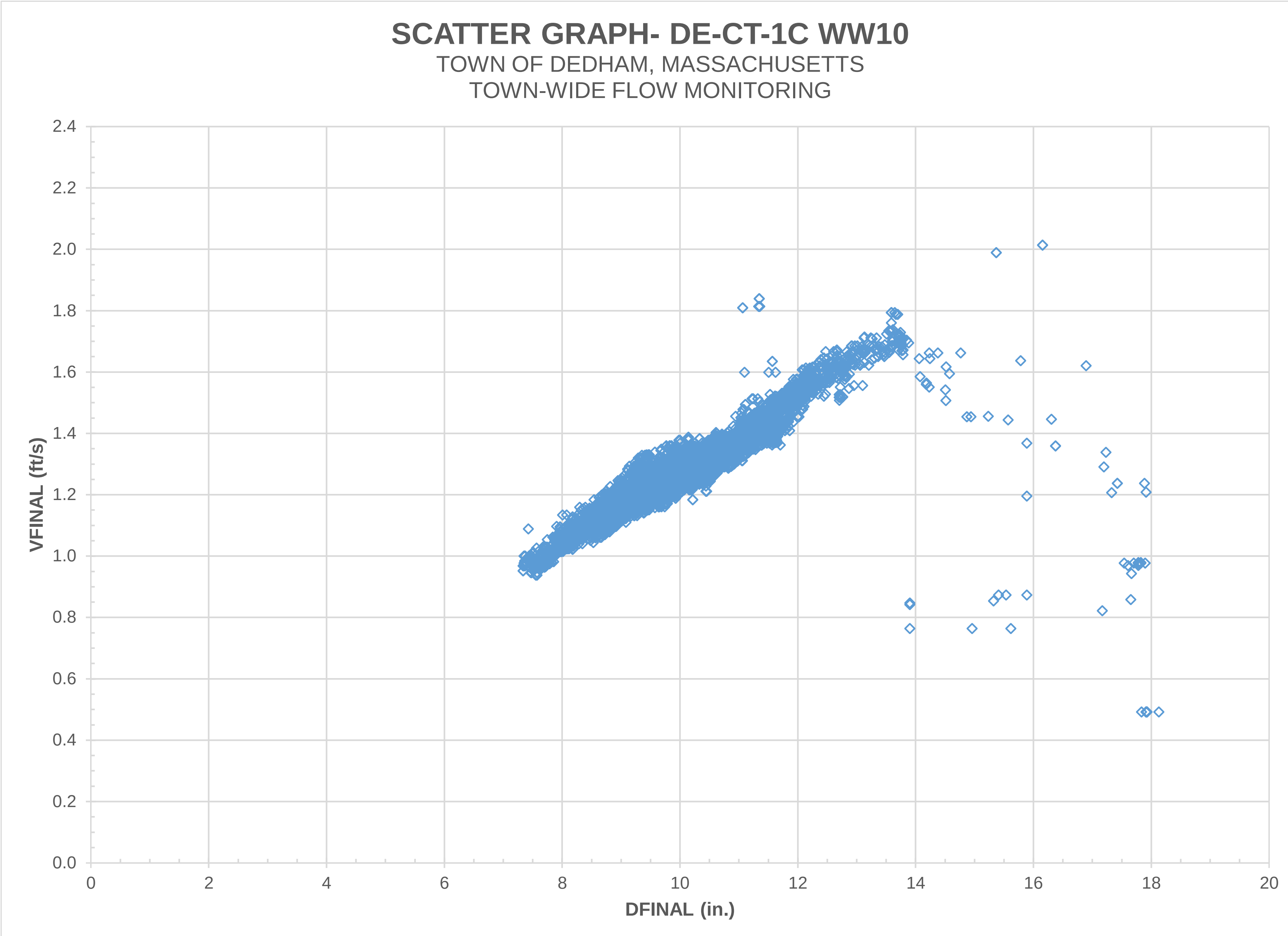

SCATTER GRAPH- DE-1C JJ130
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
14
16
18
DFINAL (in.)

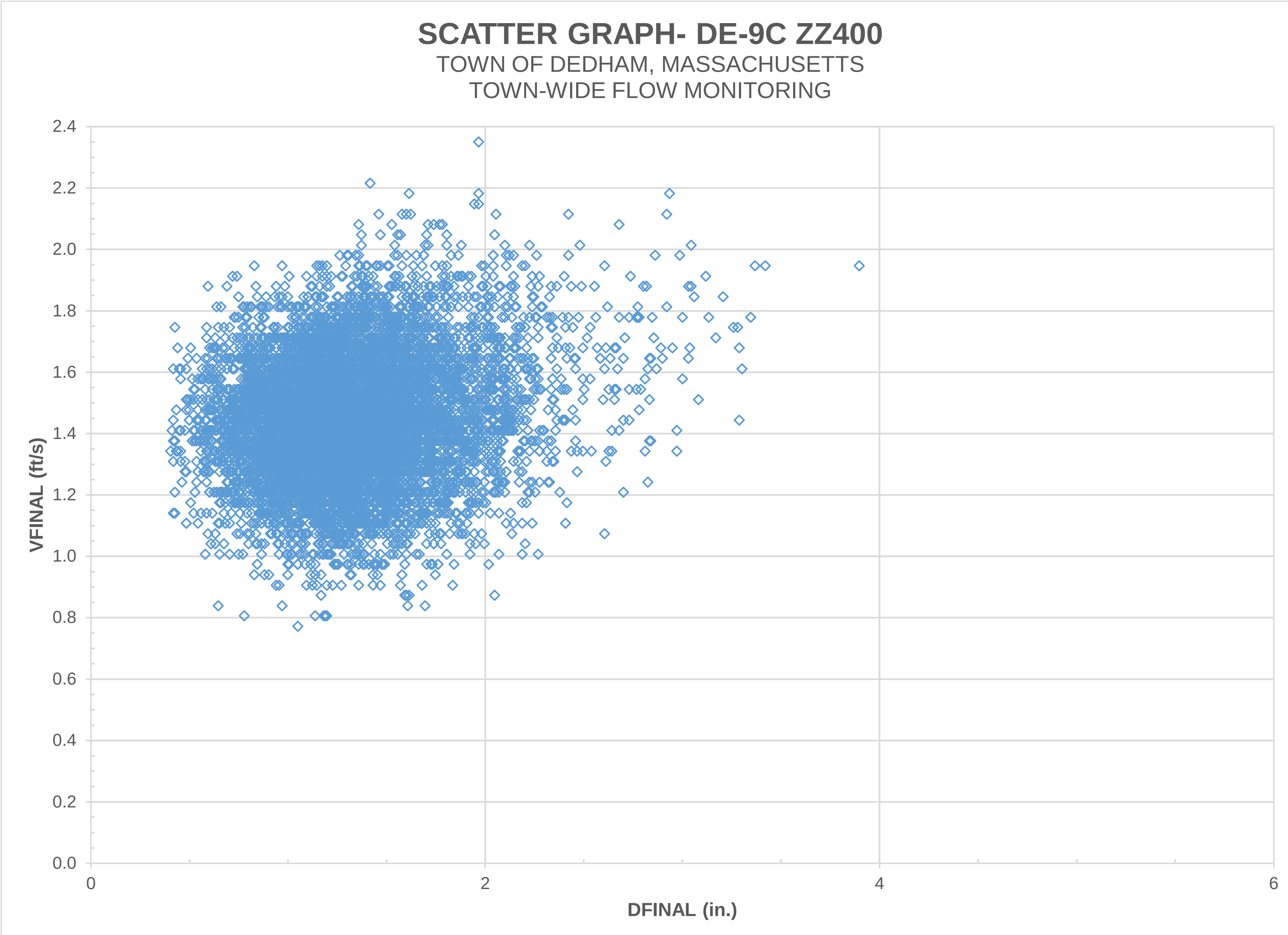

SCATTER GRAPH- DE-4C KK60
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
4.6
4.4
4.2
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12


SCATTER GRAPH- DE-7C MM160
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8


SCATTER GRAPH- DE-8C KK180
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
DFINAL (in.)

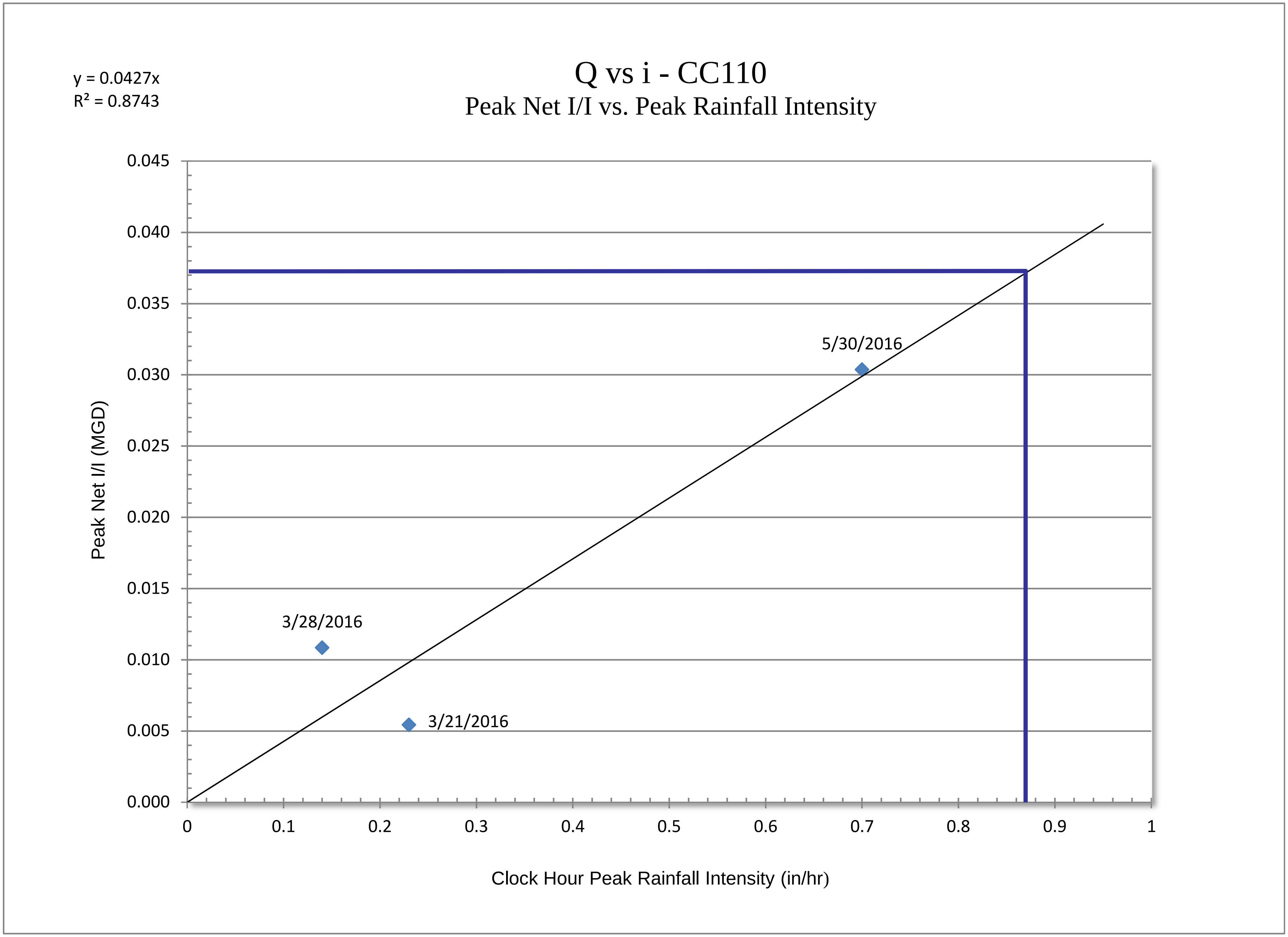

SCATTER GRAPH- DE-2C QQ20
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12


SCATTER GRAPH- DE-CT-1C WW10
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
0
2
4
6
8
10
12
14
16
18
20

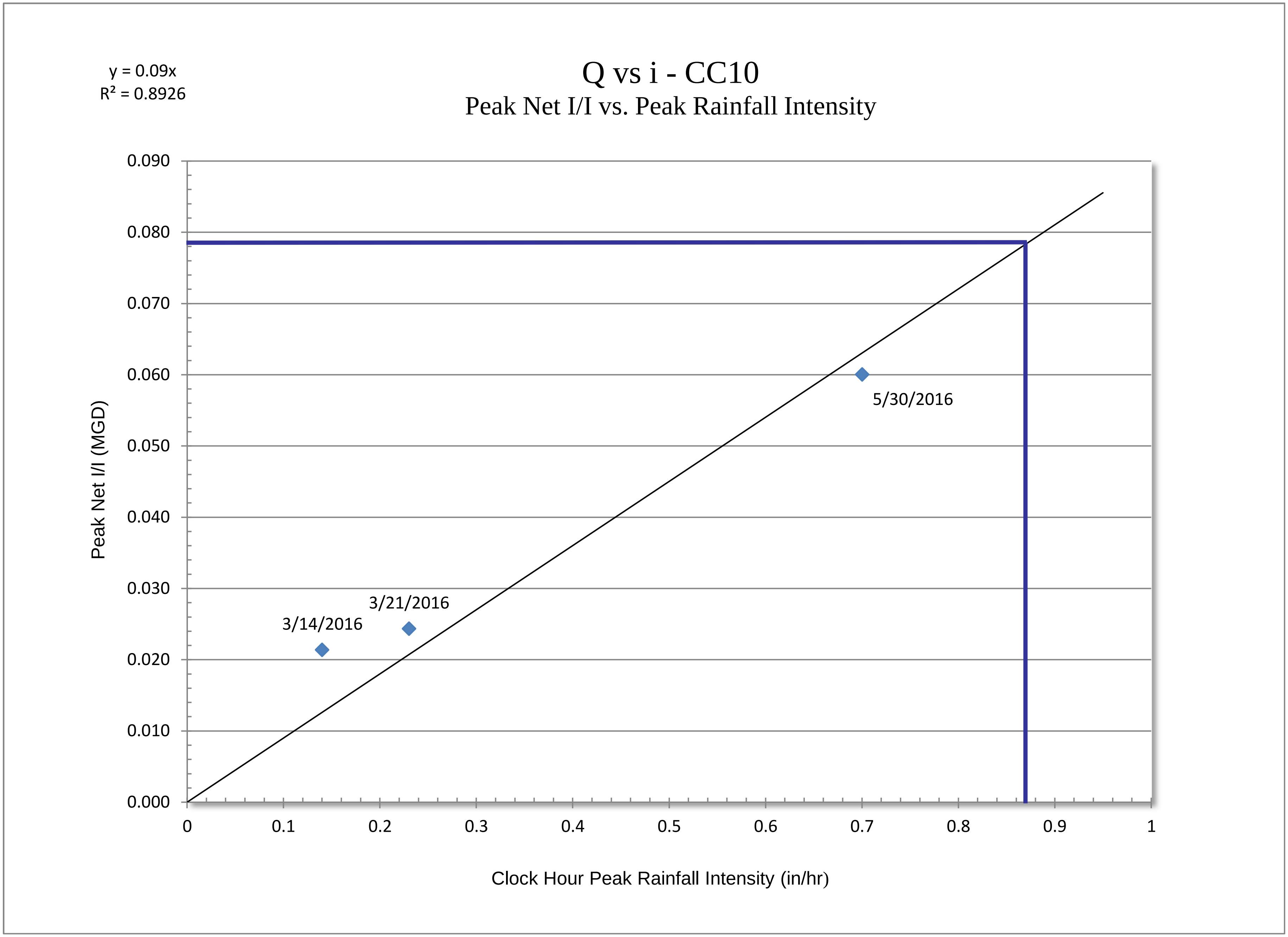

SCATTER GRAPH- DE-9C ZZ400
TOWN OF DEDHAM, MASSACHUSETTS
TOWN-WIDE FLOW MONITORING
VFINAL (ft/s)
DFINAL (in.)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
0
2
4
6

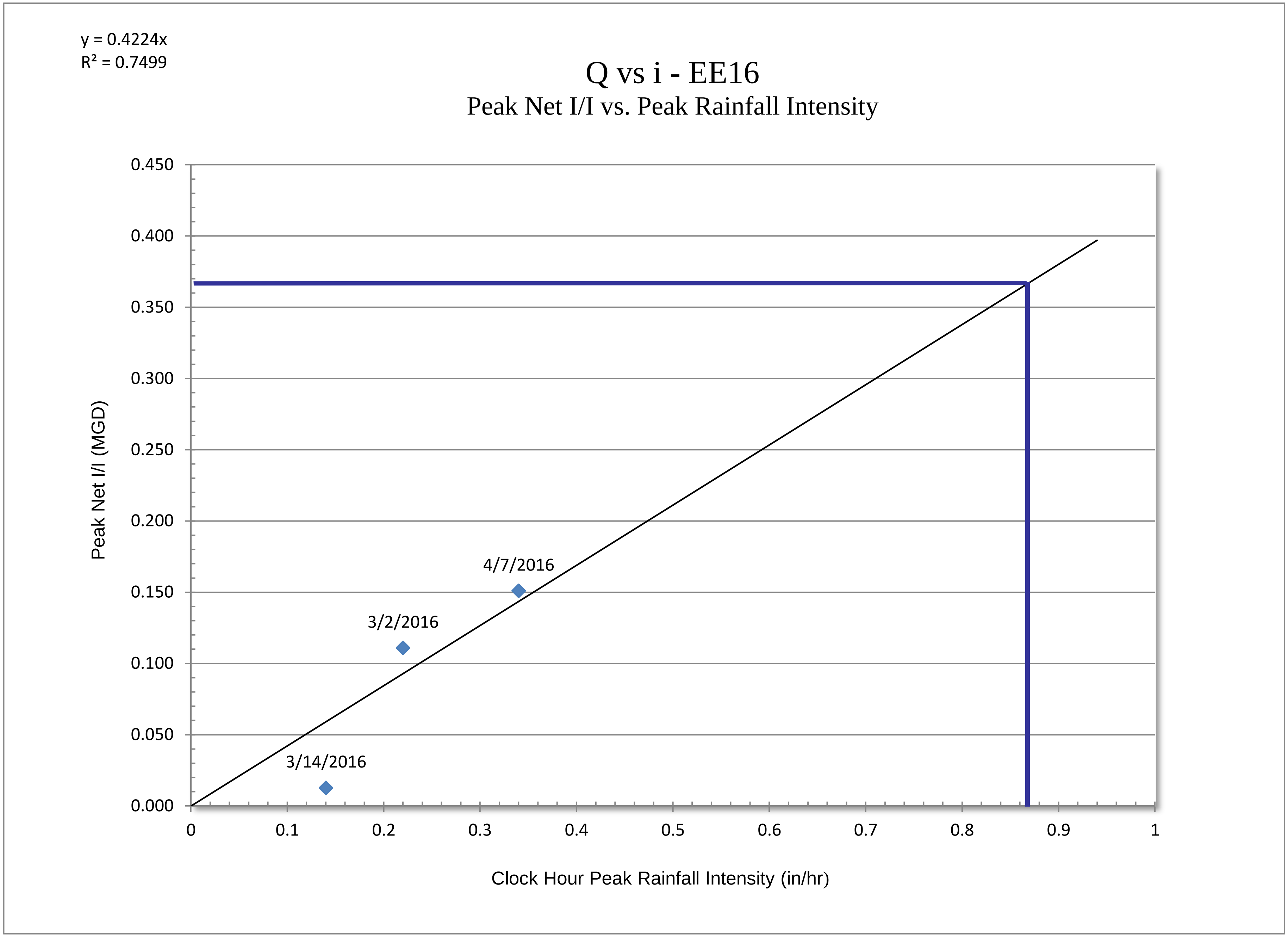
APPENDIX F

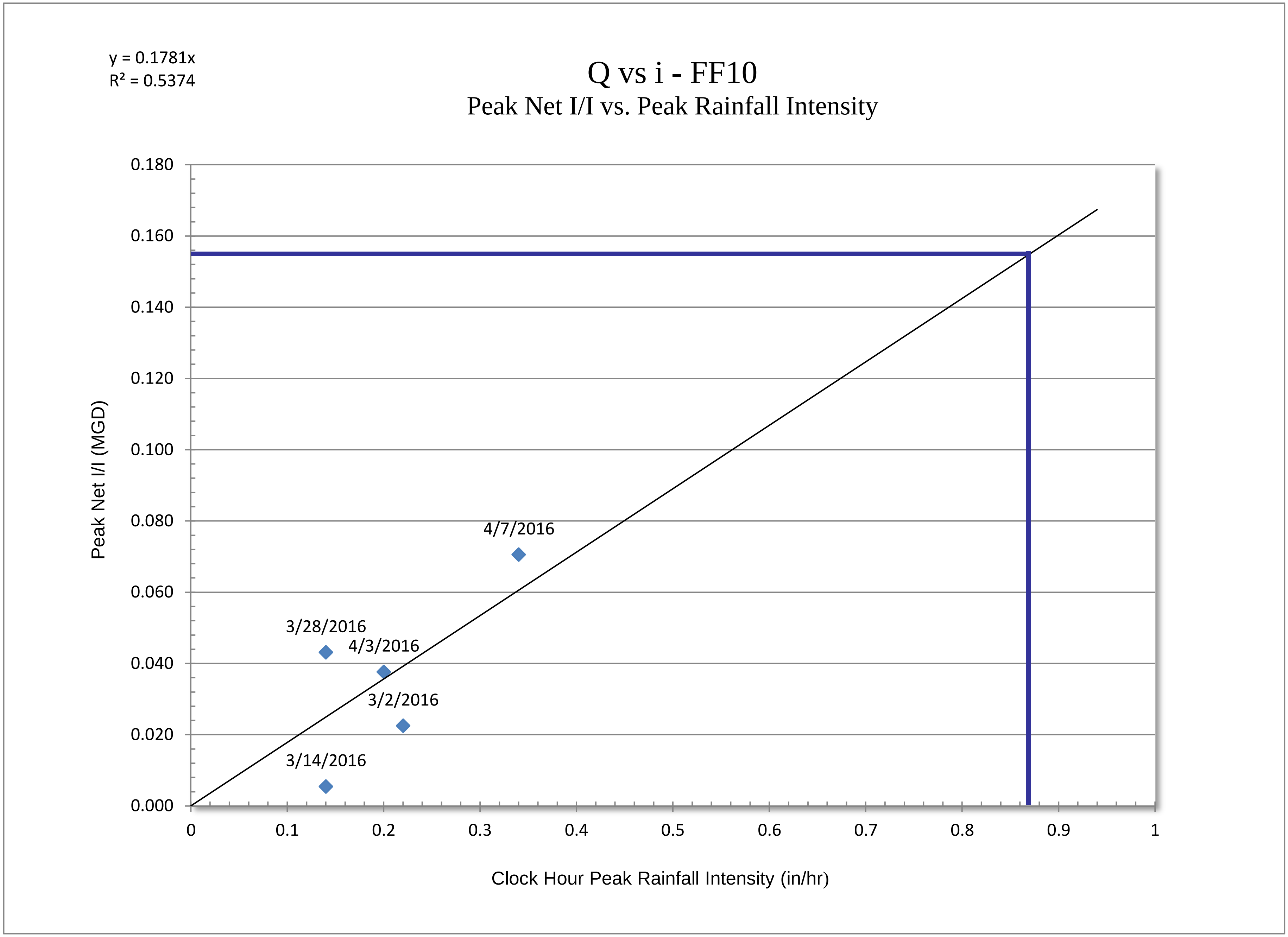
LINEAR REGRESSION ANALYSIS



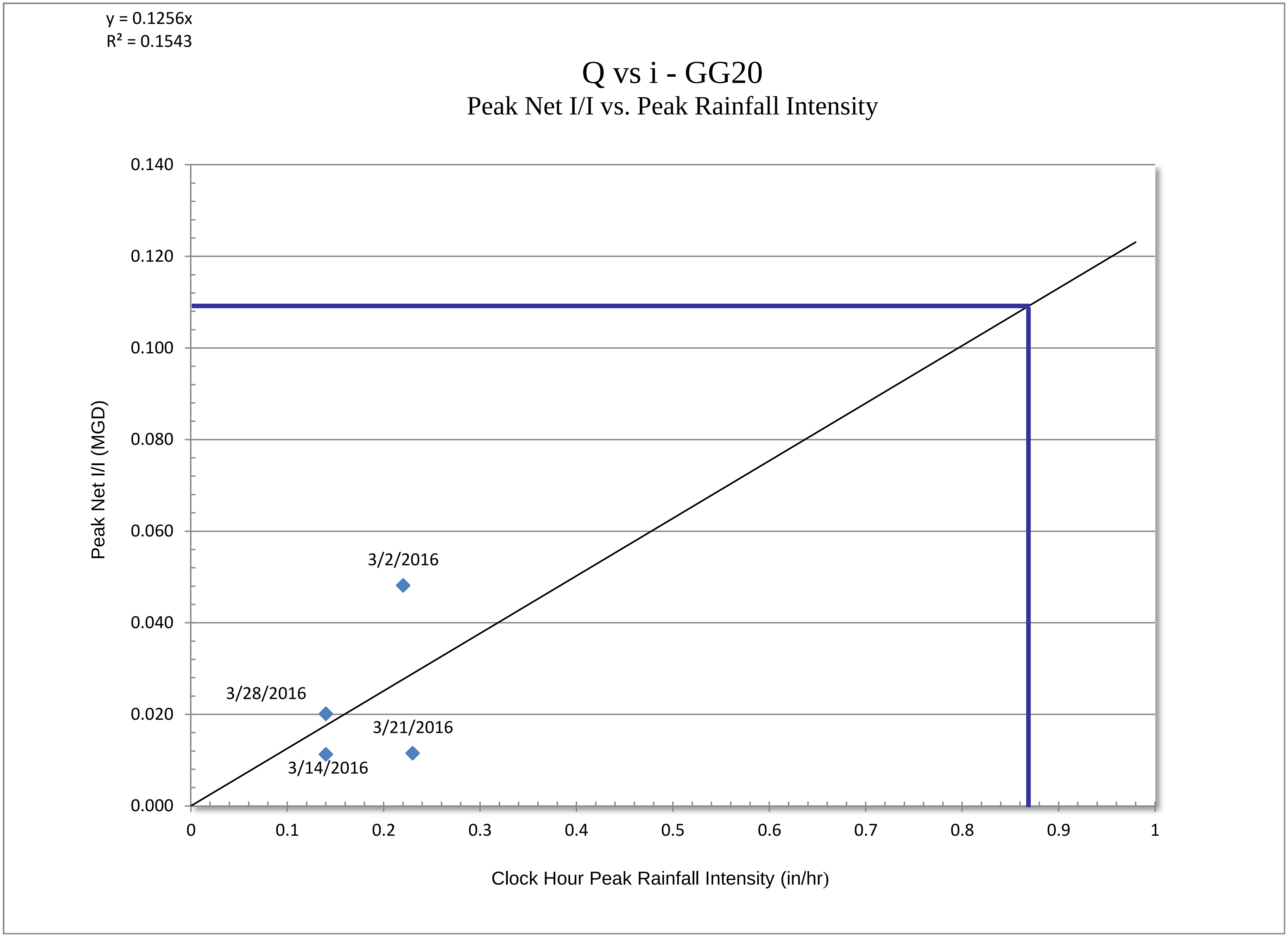
Q vs i - CC110
Peak Net I/I vs. Peak Rainfall Intensity
y = 0.0427x
R² = 0.8743
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Peak Net I/I (MGD)
5/30/2016
3/28/2016
3/21/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

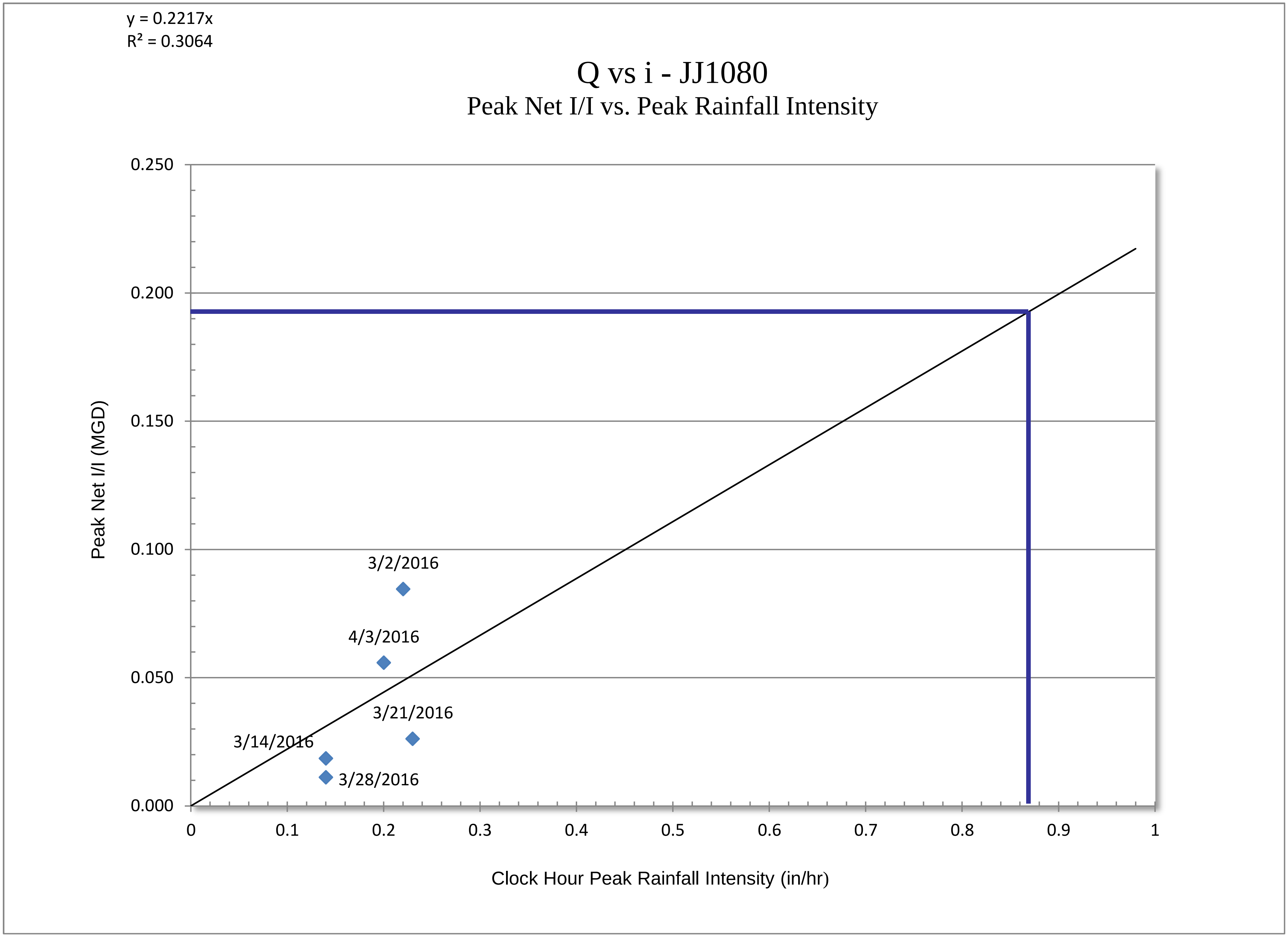

y = 0.09x
R^2 = 0.8926
Q vs i - CC10
Peak Net I/I vs. Peak Rainfall Intensity
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
Peak Net I/I (MGD)
5/30/2016
3/21/2016
3/14/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)


y = 0.4224x
R^2 = 0.7499
Q vs i - EE16
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
4/7/2016
3/2/2016
3/14/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

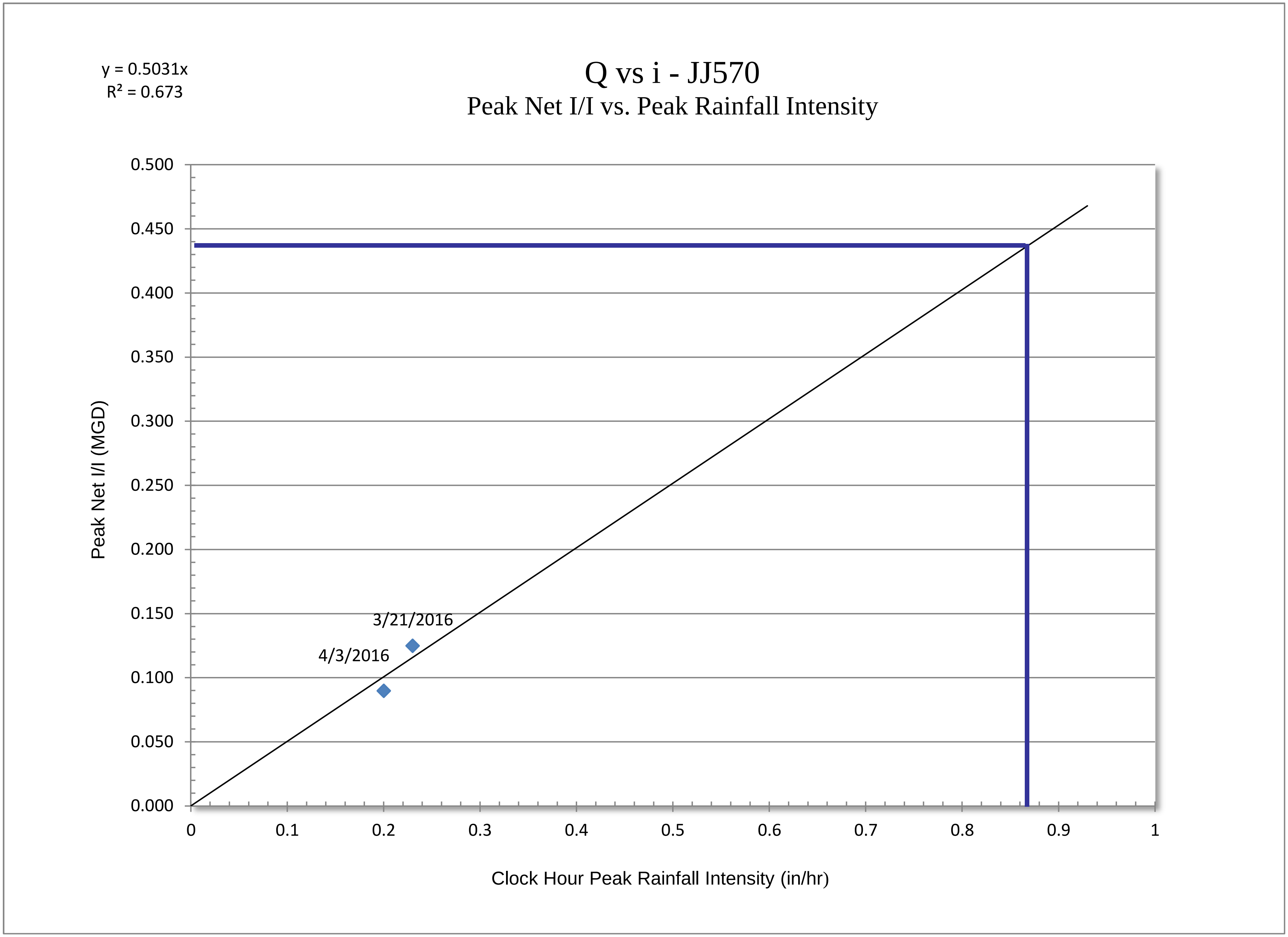


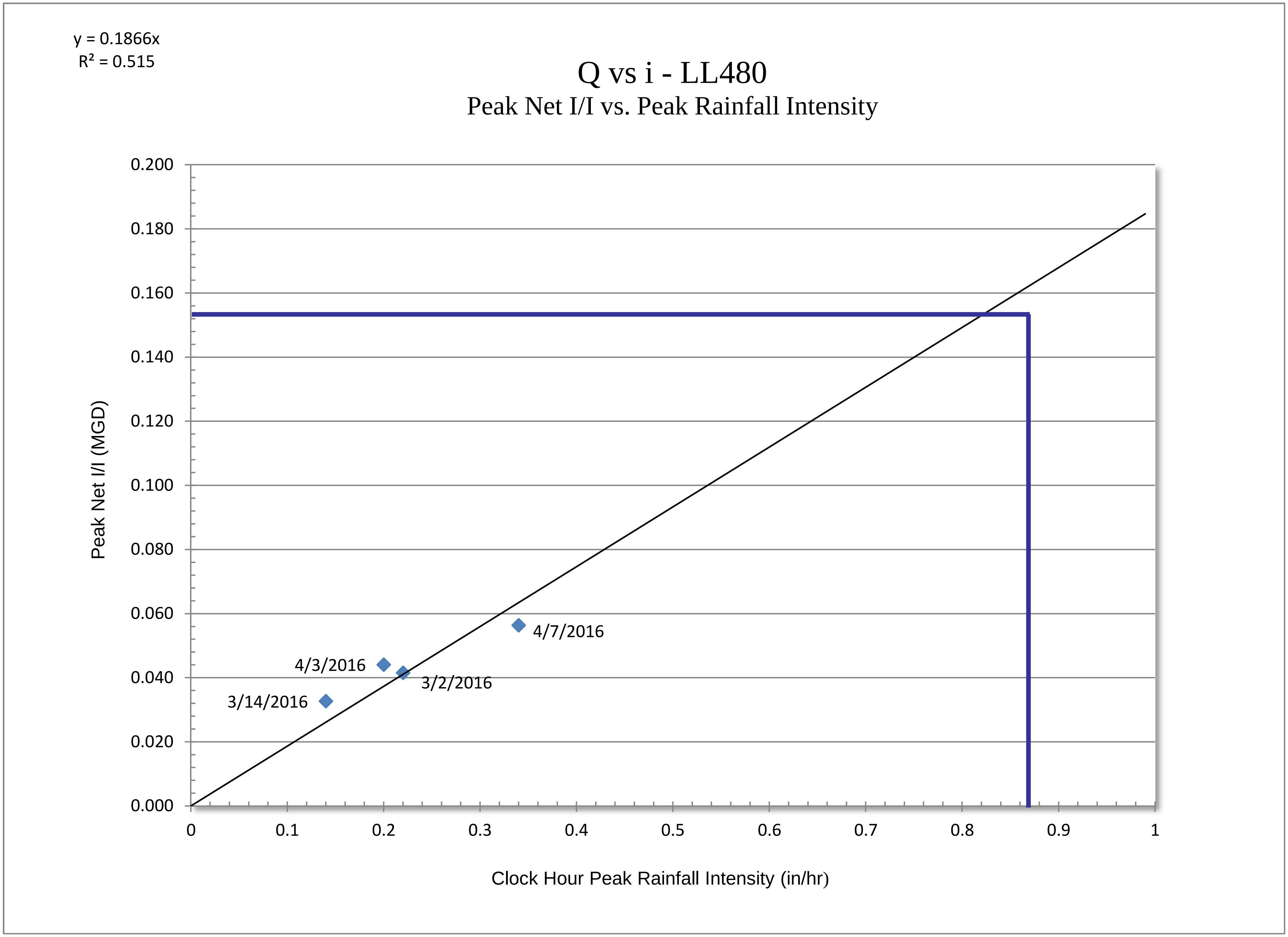
y = 0.1781x
R² = 0.5374
Q vs i - FF10
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.180
0.160
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
4/7/2016
3/28/2016
4/3/2016
3/2/2016
3/14/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

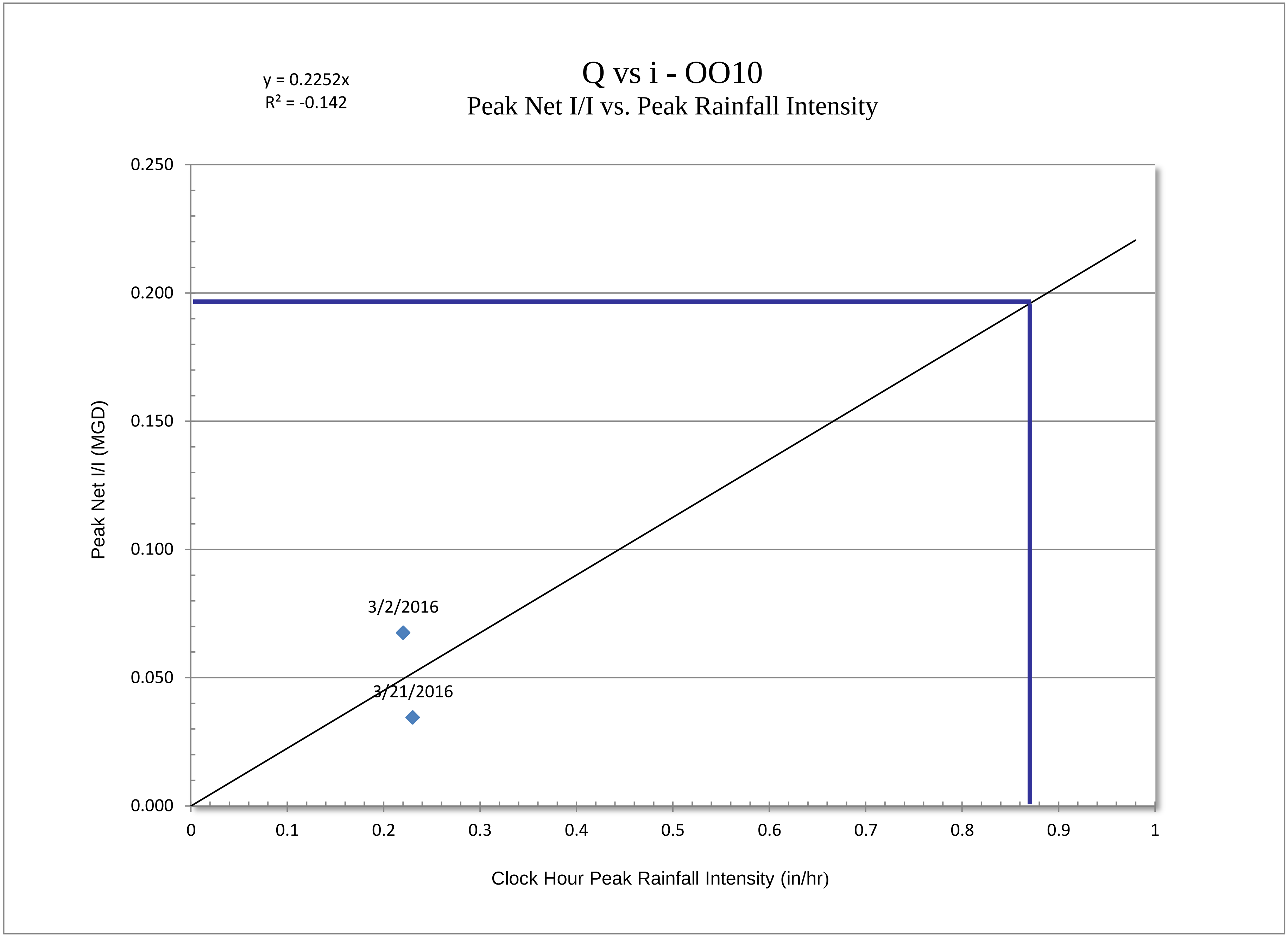

y = 0.1256x
R² = 0.1543
Q vs i - GG20
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
3/2/2016
3/28/2016
3/21/2016
3/14/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)



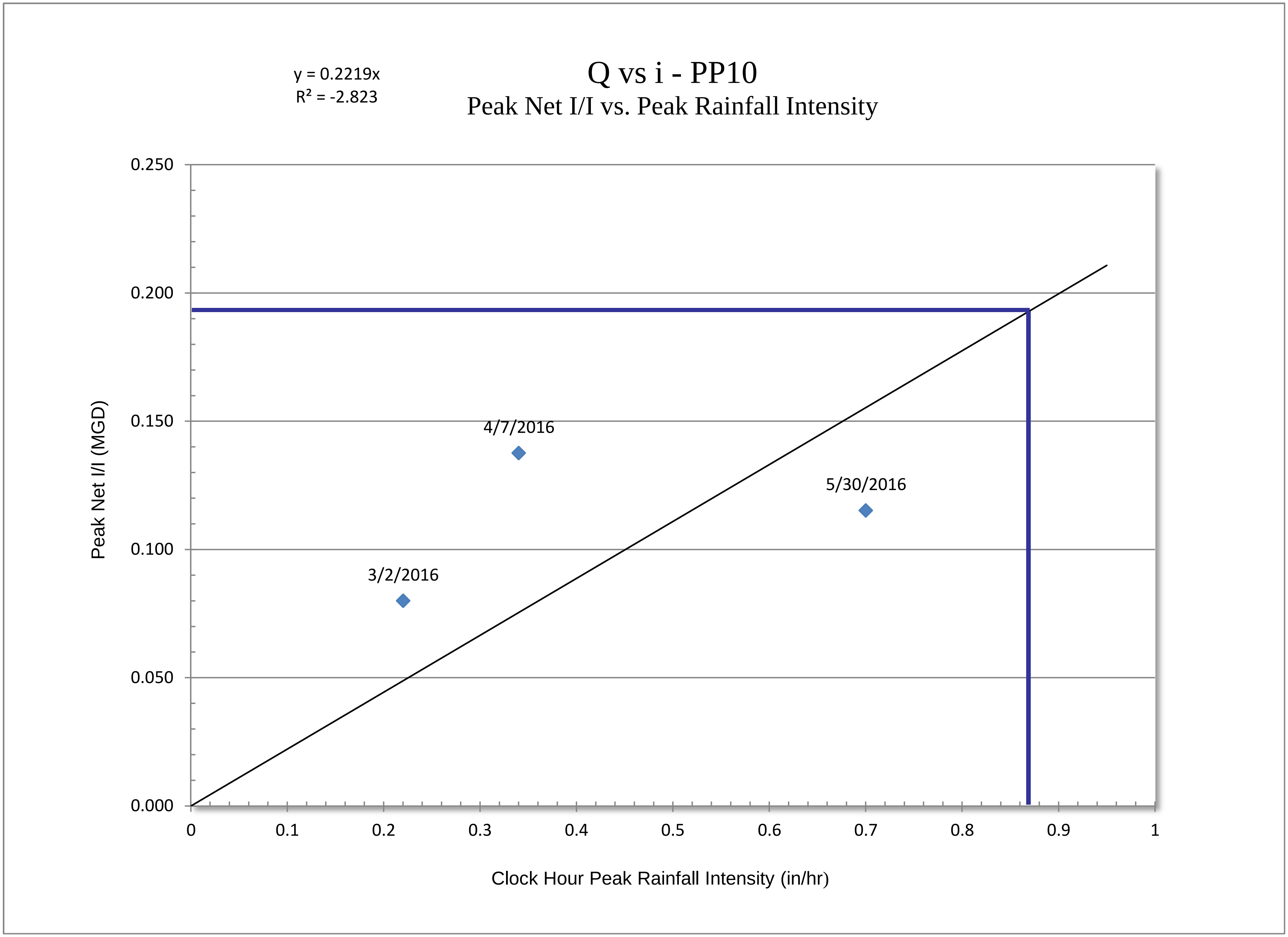
y = 0.2217x
R² = 0.3064
Q vs i - JJ1080
Peak Net I/I vs. Peak Rainfall Intensity
0.250
0.200
0.150
0.100
0.050
0.000
Peak Net I/I (MGD)
3/2/2016
4/3/2016
3/21/2016
3/14/2016
3/28/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)


y = 0.5031x
R^2 = 0.673
Q vs i - JJ570
Peak Net I/I vs. Peak Rainfall Intensity
0.500
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
Peak Net I/I (MGD)
3/21/2016
4/3/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

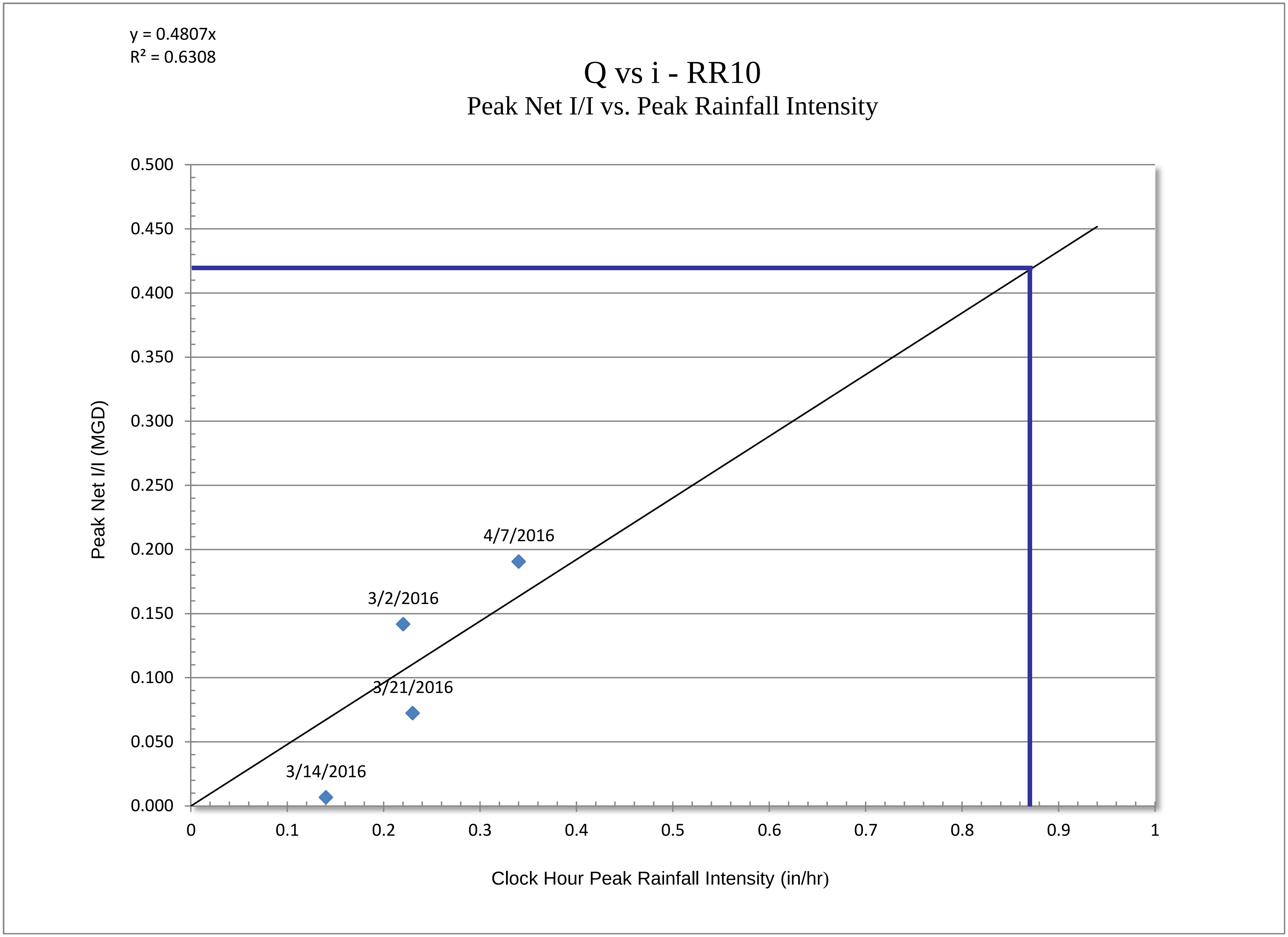

y = 0.1866x
R² = 0.515
Q vs i - LL480
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.200
0.180
0.160
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
4/7/2016
4/3/2016
3/2/2016
3/14/2016
Clock Hour Peak Rainfall Intensity (in/hr)

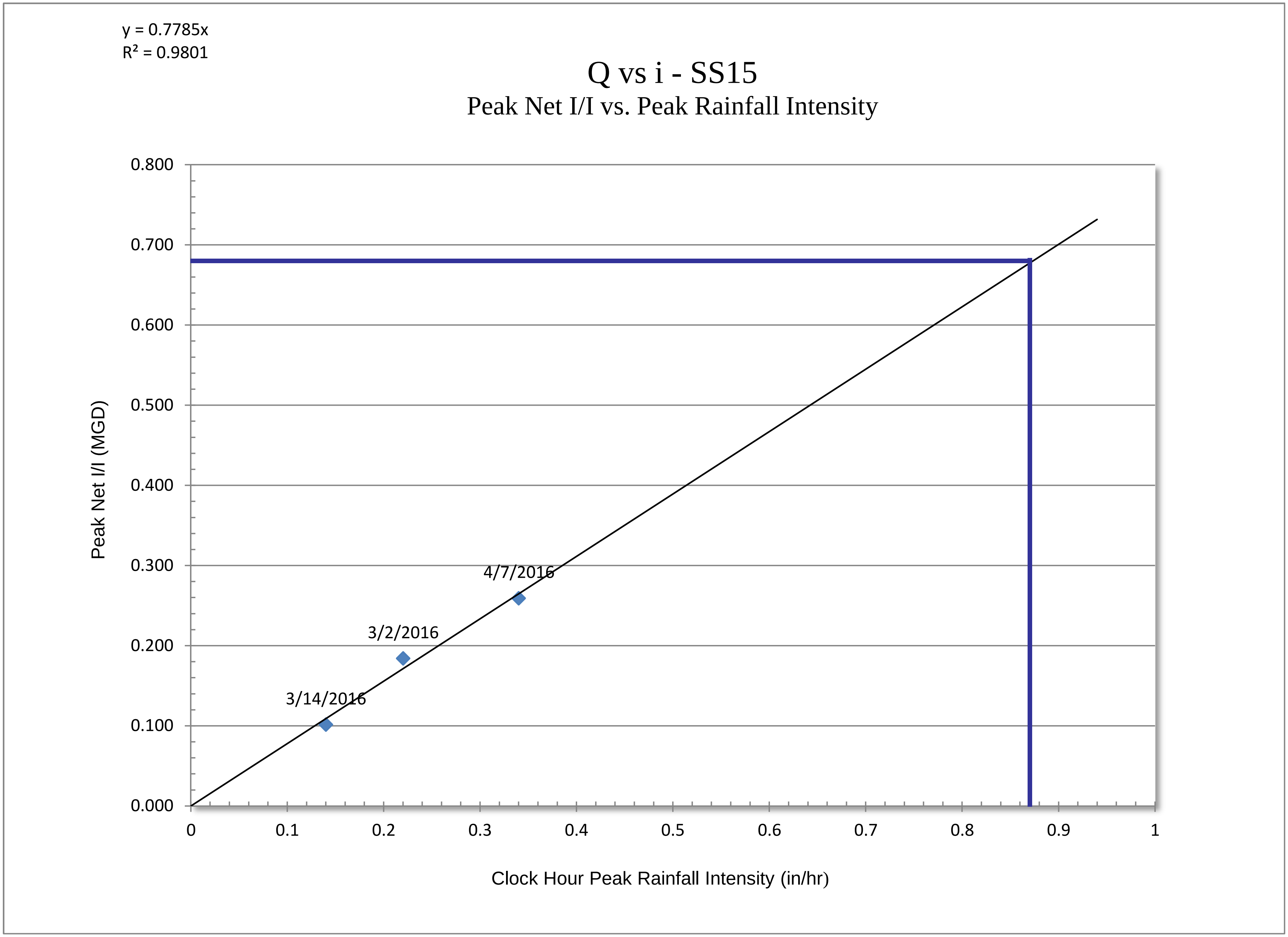


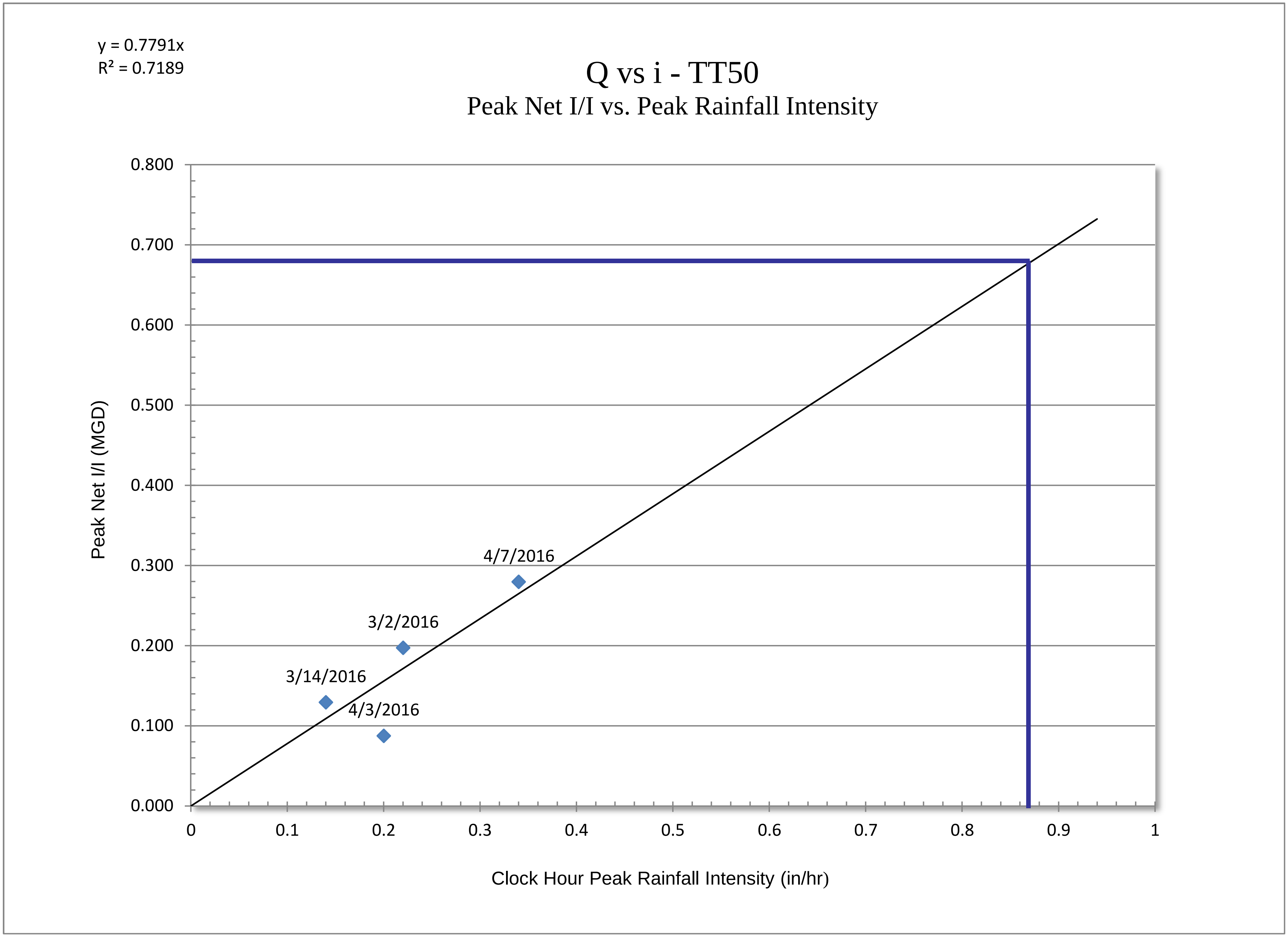
y = 0.2252x
R² = -0.142
Q vs i - OO10
Peak Net I/I vs. Peak Rainfall Intensity
0.250
0.200
0.150
0.100
0.050
0.000
Peak Net I/I (MGD)
3/2/2016
3/21/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

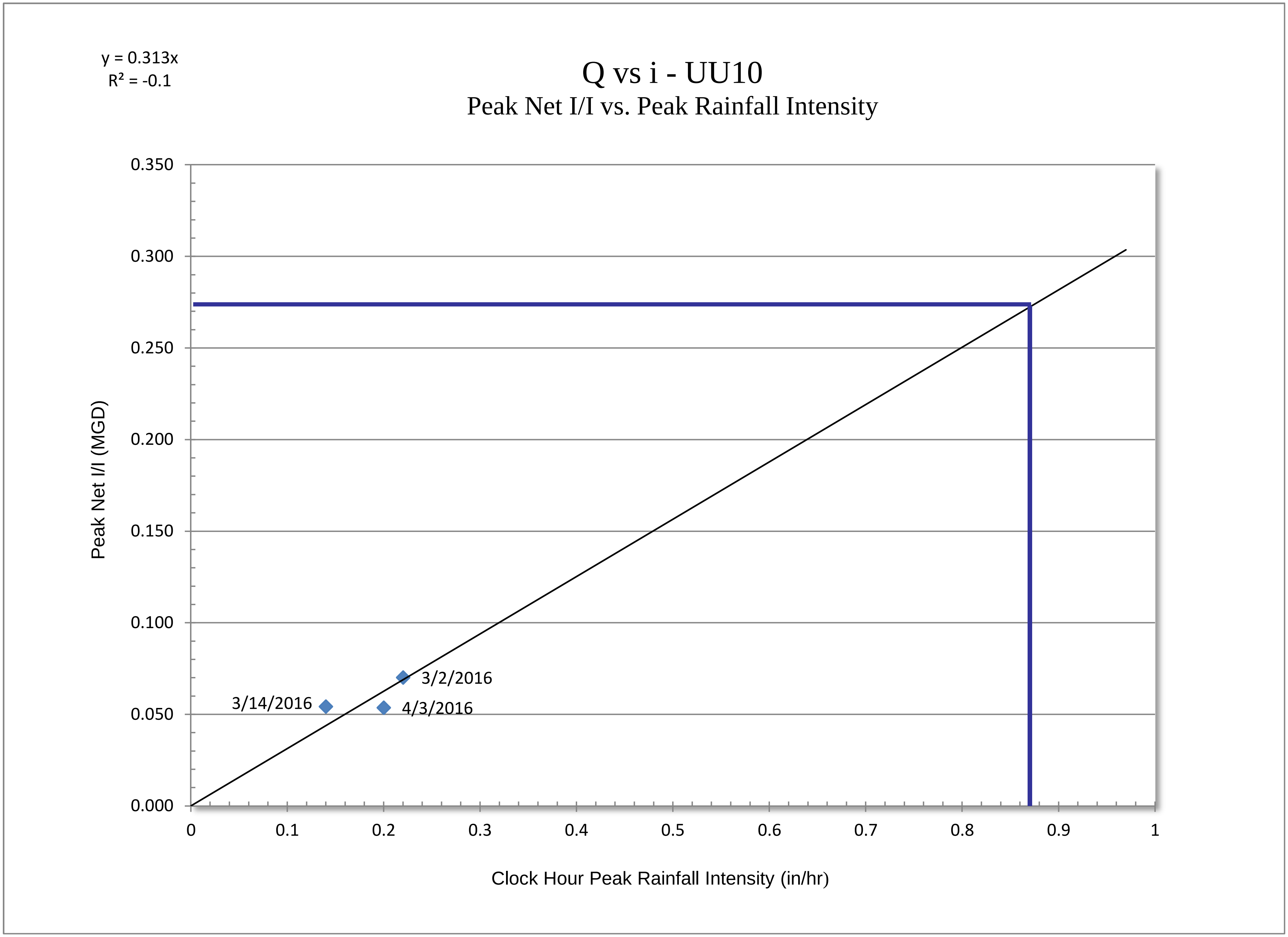


y = 0.2219x
R² = -2.823
Q vs i - PP10
Peak Net I/I vs. Peak Rainfall Intensity
0.250
0.200
0.150
0.100
0.050
0.000
Peak Net I/I (MGD)
4/7/2016
5/30/2016
3/2/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

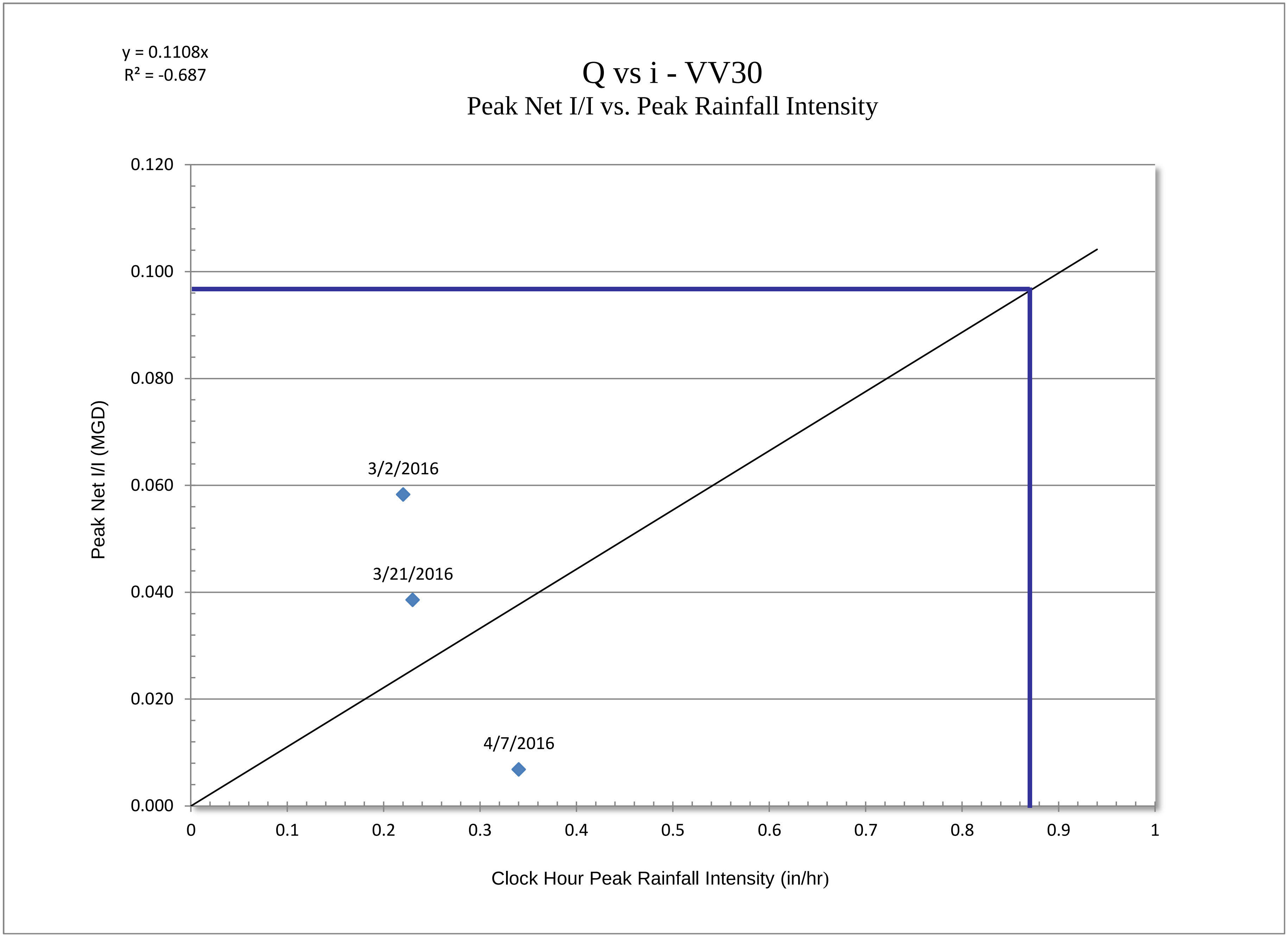

y = 0.4807x
R^2 = 0.6308
Q vs i - RR10
Peak Net I/I vs. Peak Rainfall Intensity
0.500
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
Peak Net I/I (MGD)
4/7/2016
3/2/2016
3/21/2016
3/14/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)


y = 0.7785x
R^2 = 0.9801
Q vs i - SS15
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
4/7/2016
3/2/2016
3/14/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

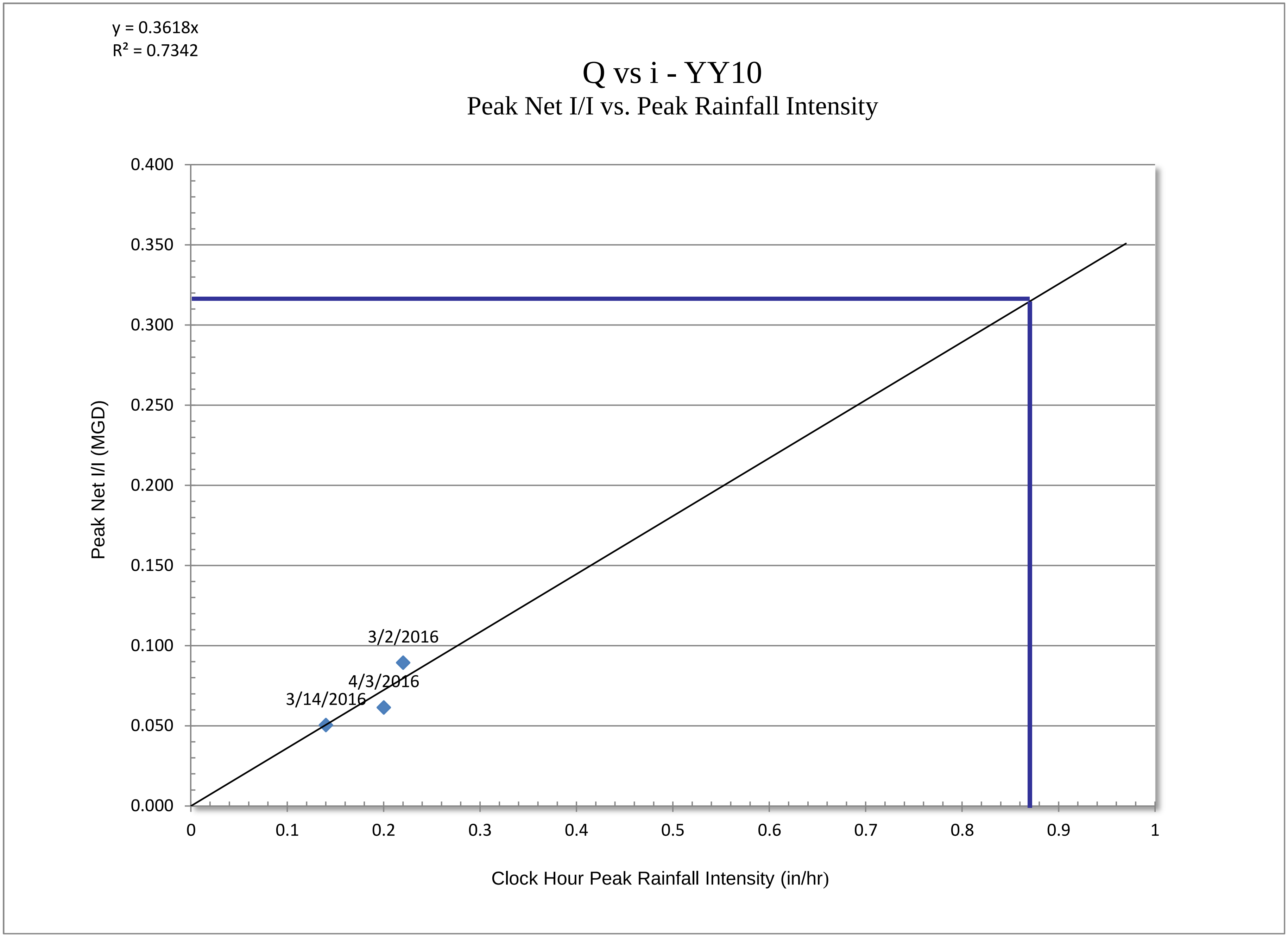

y = 0.7791x
R^2 = 0.7189
Q vs i - TT50
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
4/7/2016
3/2/2016
3/14/2016
4/3/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

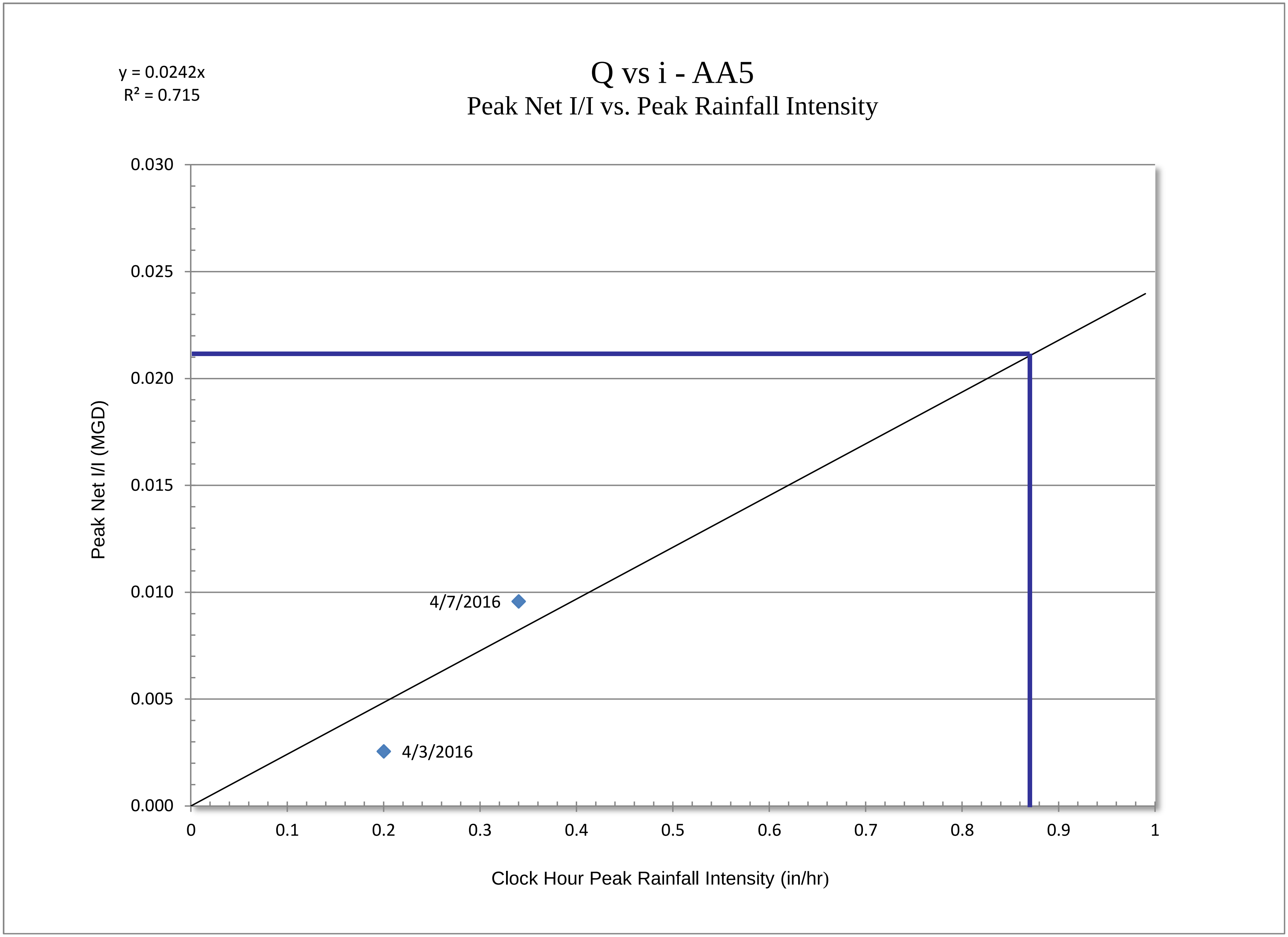


y = 0.313x
R² = -0.1
Q vs i - UU10
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
3/2/2016
3/14/2016
4/3/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

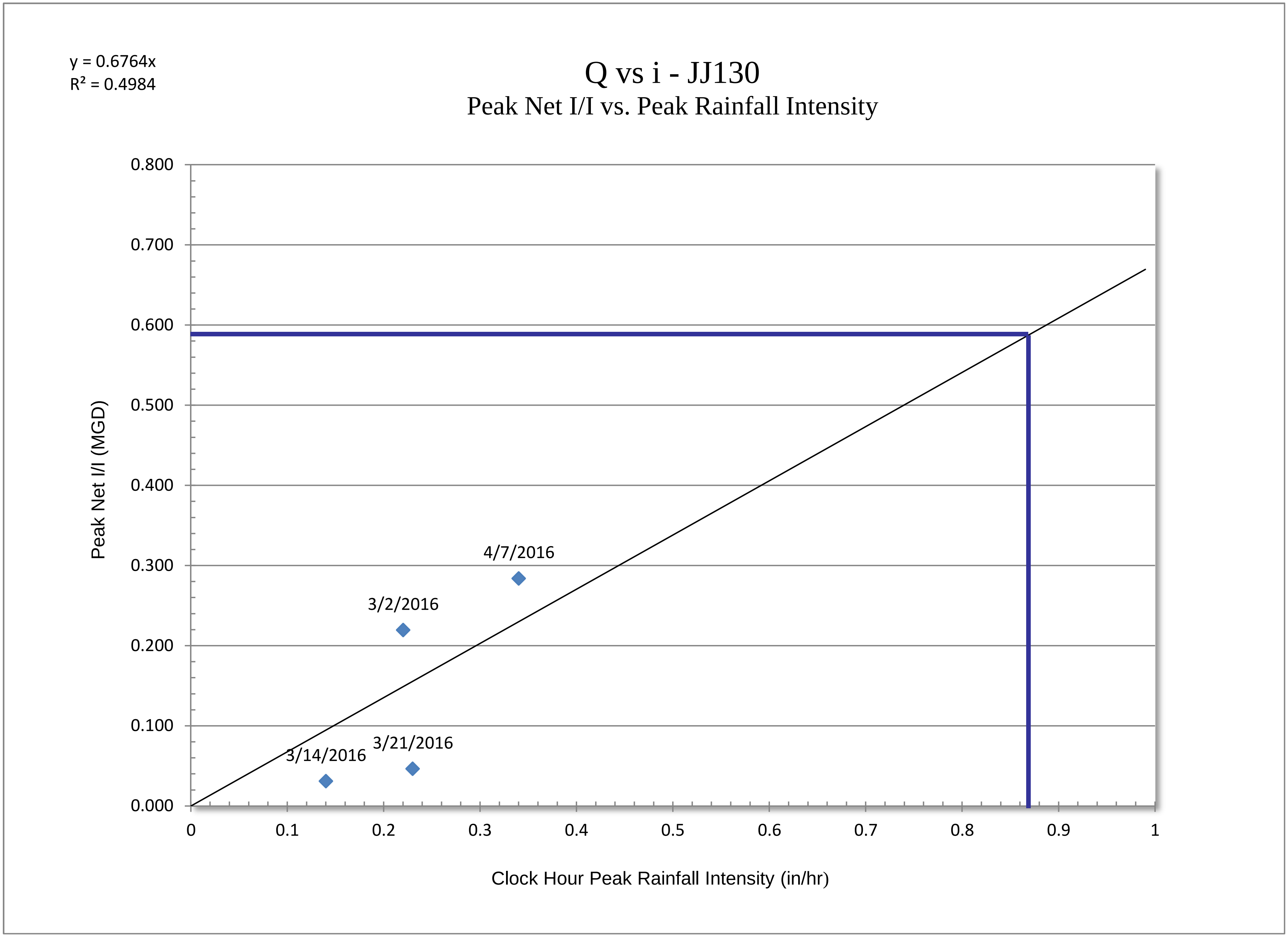


y = 0.1108x
R² = -0.687
Q vs i - VV30
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.120
0.100
0.080
0.060
0.040
0.020
0.000
3/2/2016
3/21/2016
4/7/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

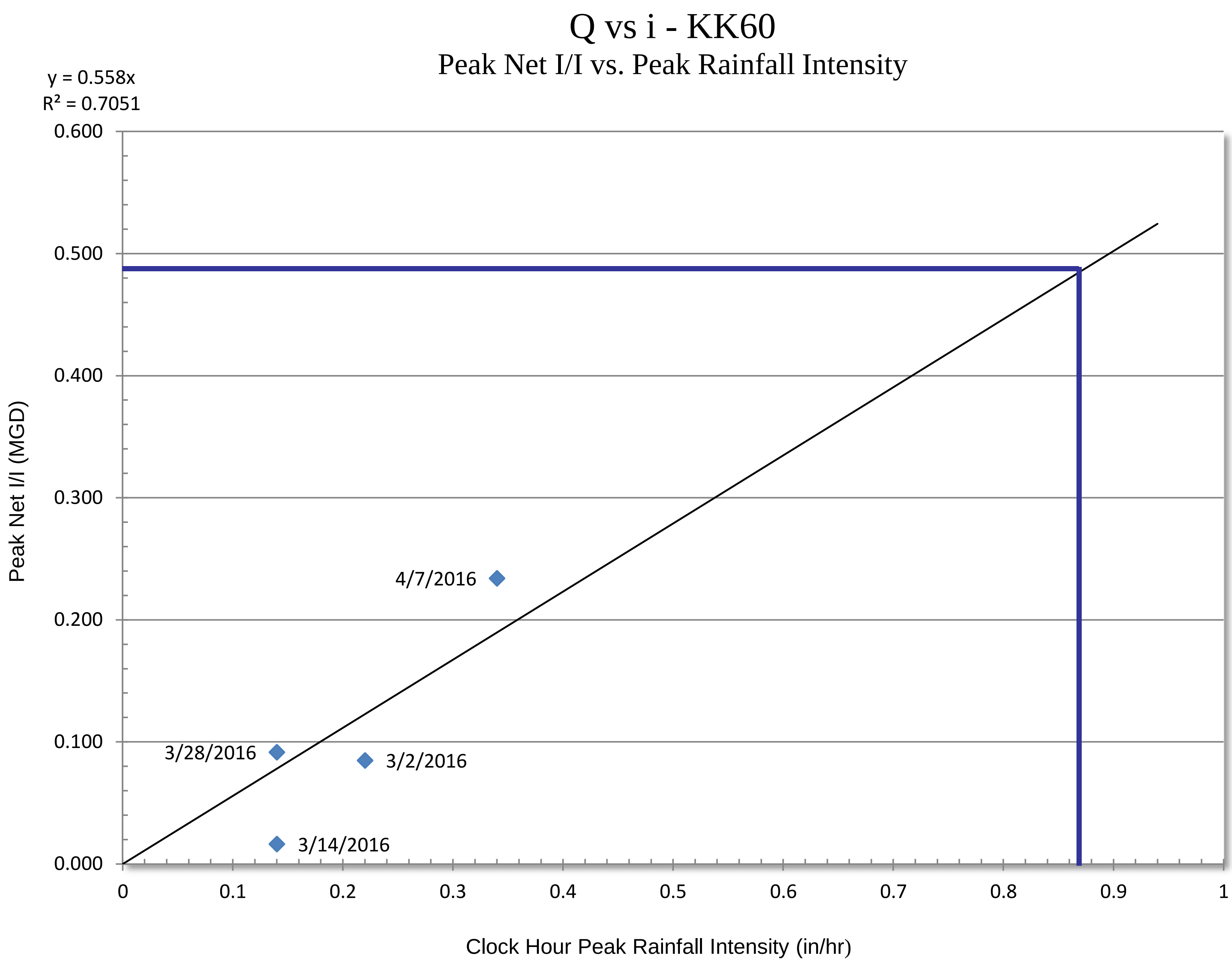

y = 0.3618x
R² = 0.7342
Q vs i - YY10
Peak Net I/I vs. Peak Rainfall Intensity
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
Peak Net I/I (MGD)
3/2/2016
4/3/2016
3/14/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

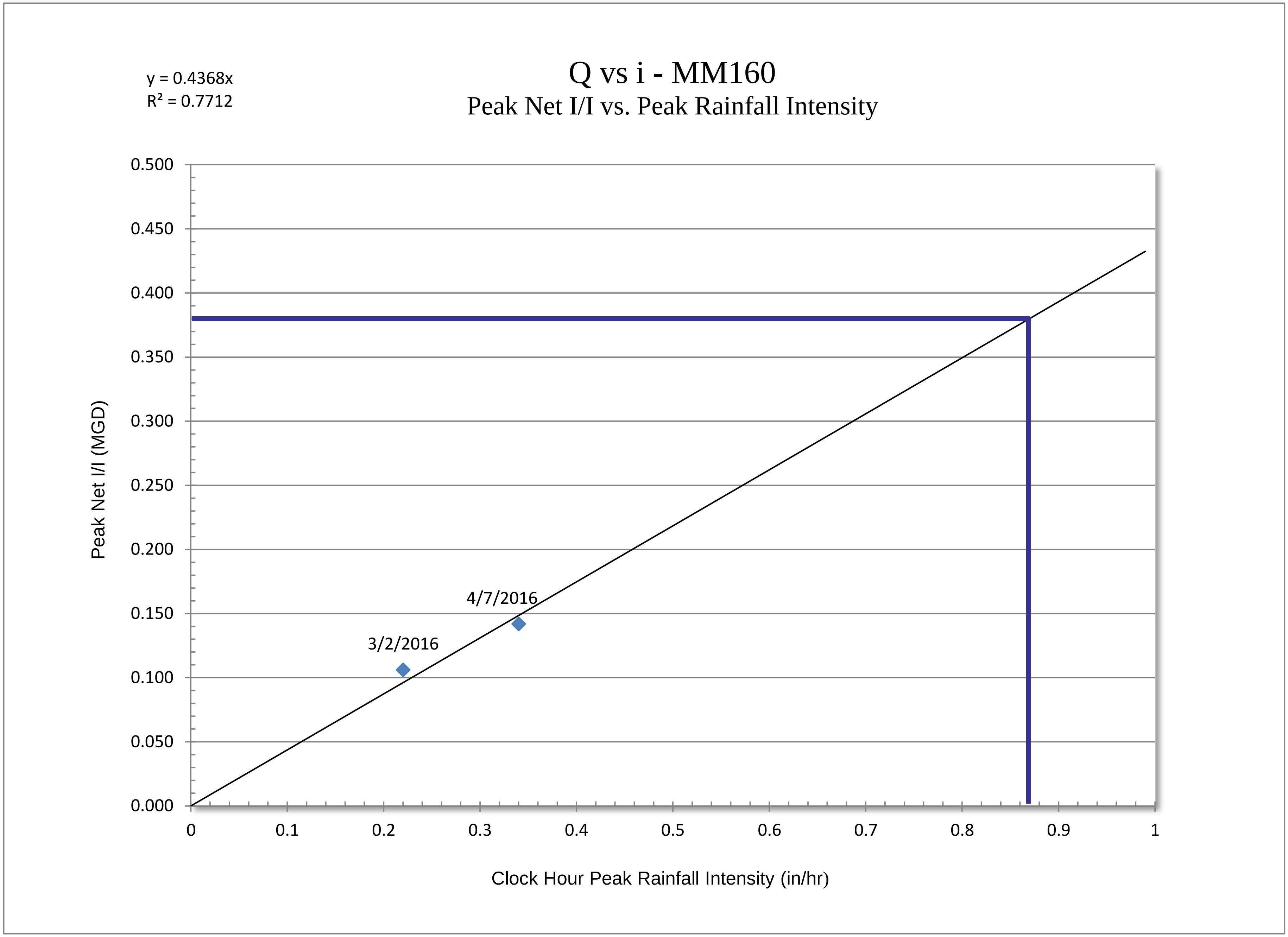


y = 0.0242x
R² = 0.715
Q vs i - AA5
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.030
0.025
0.020
0.015
0.010
0.005
0.000
4/7/2016
4/3/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

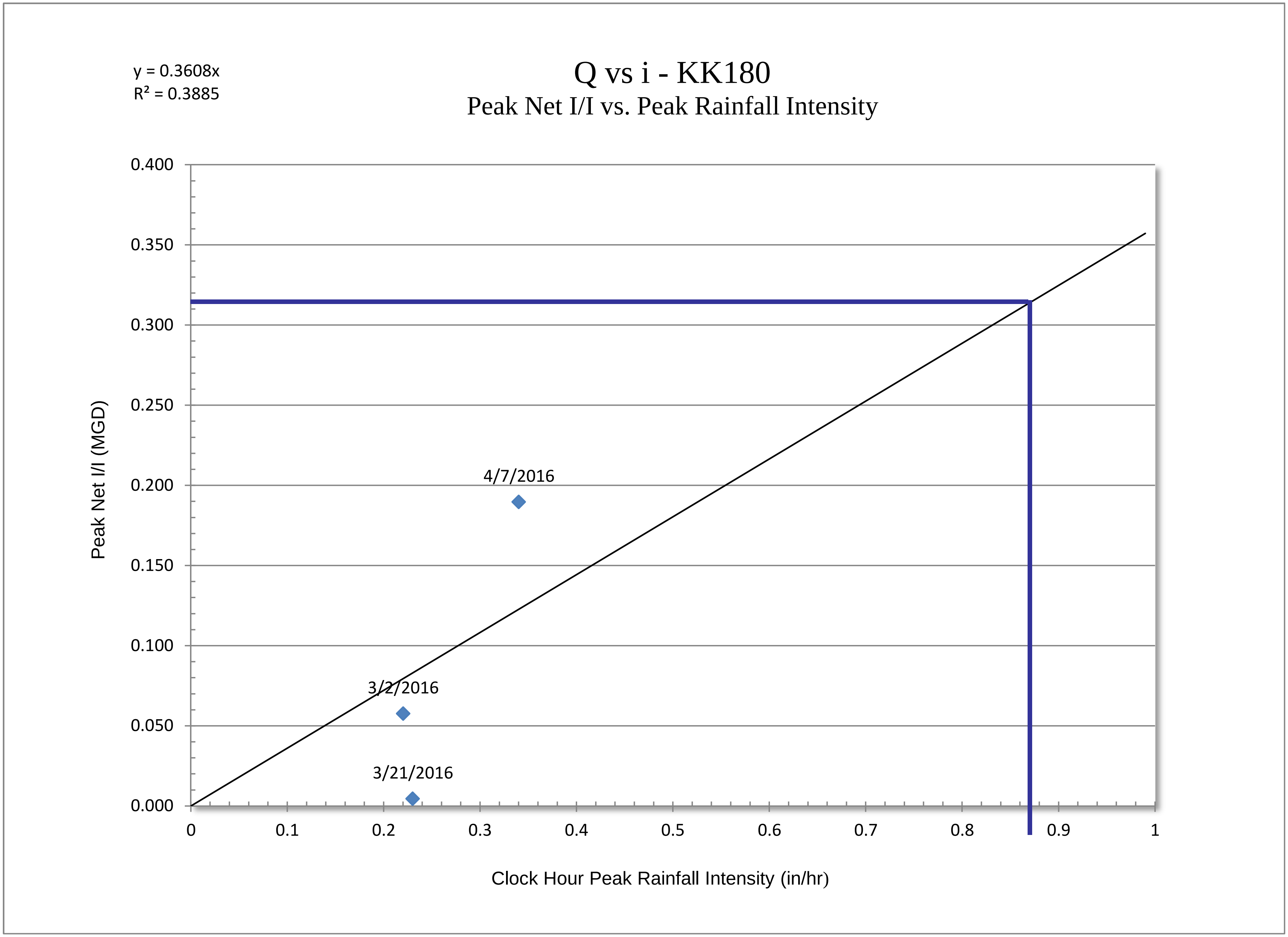


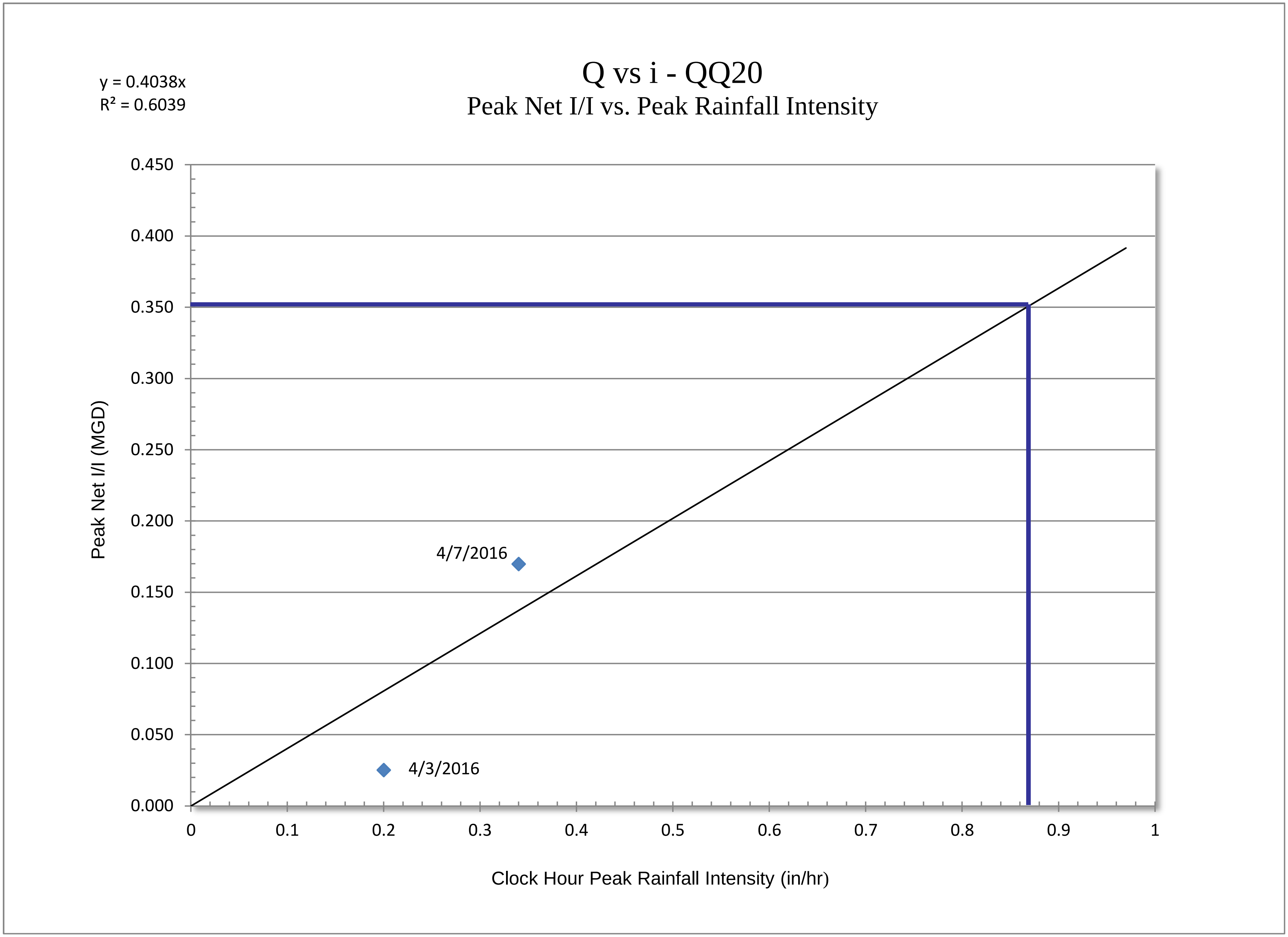
y = 0.6764x
R^2 = 0.4984
Q vs i - JJ130
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
4/7/2016
3/2/2016
3/14/2016
3/21/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

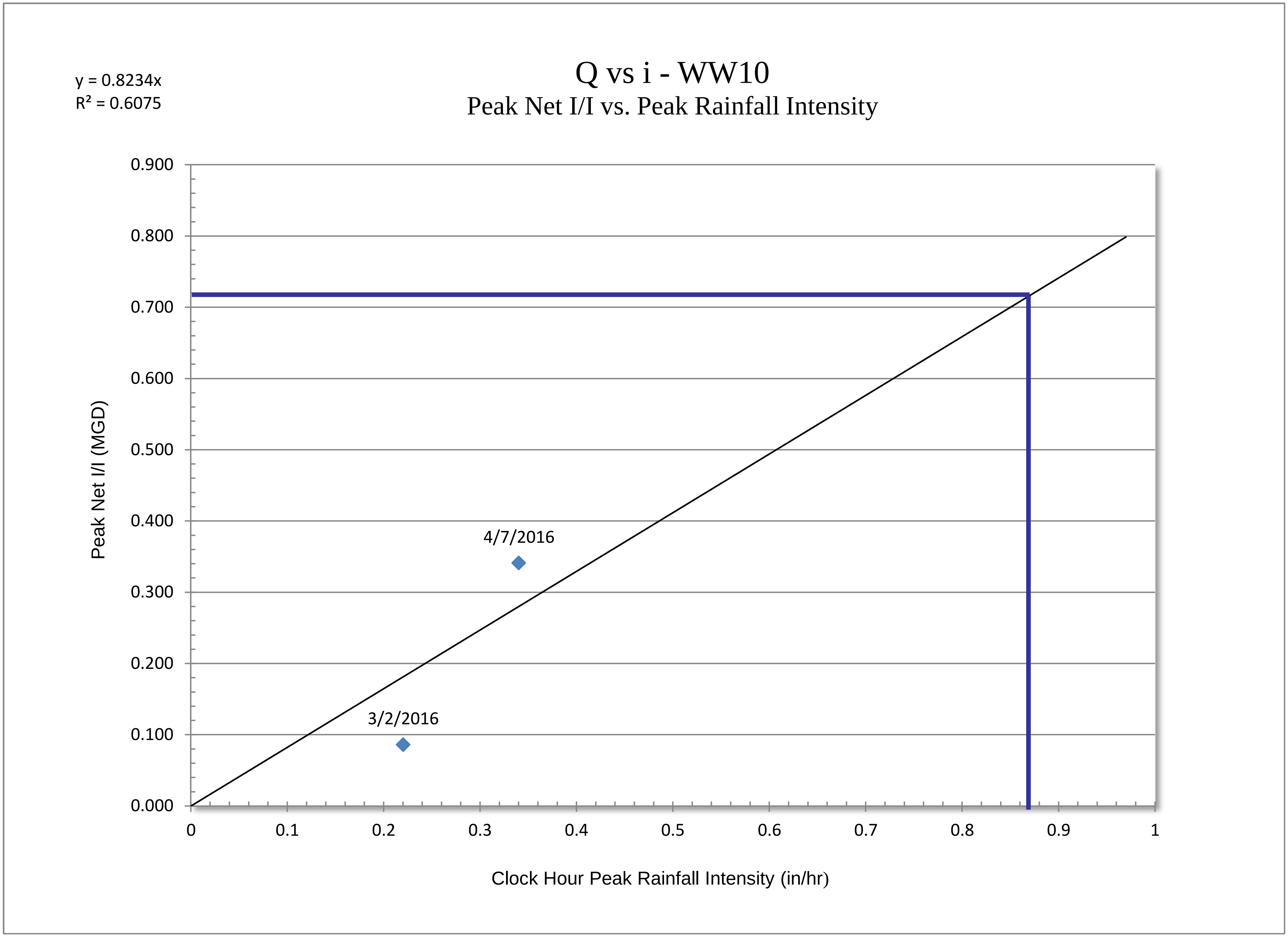

Q vs i - KK60
Peak Net I/I vs. Peak Rainfall Intensity
y = 0.558x
R² = 0.7051
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Peak Net I/I (MGD)
4/7/2016
3/28/2016
3/2/2016
3/14/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)

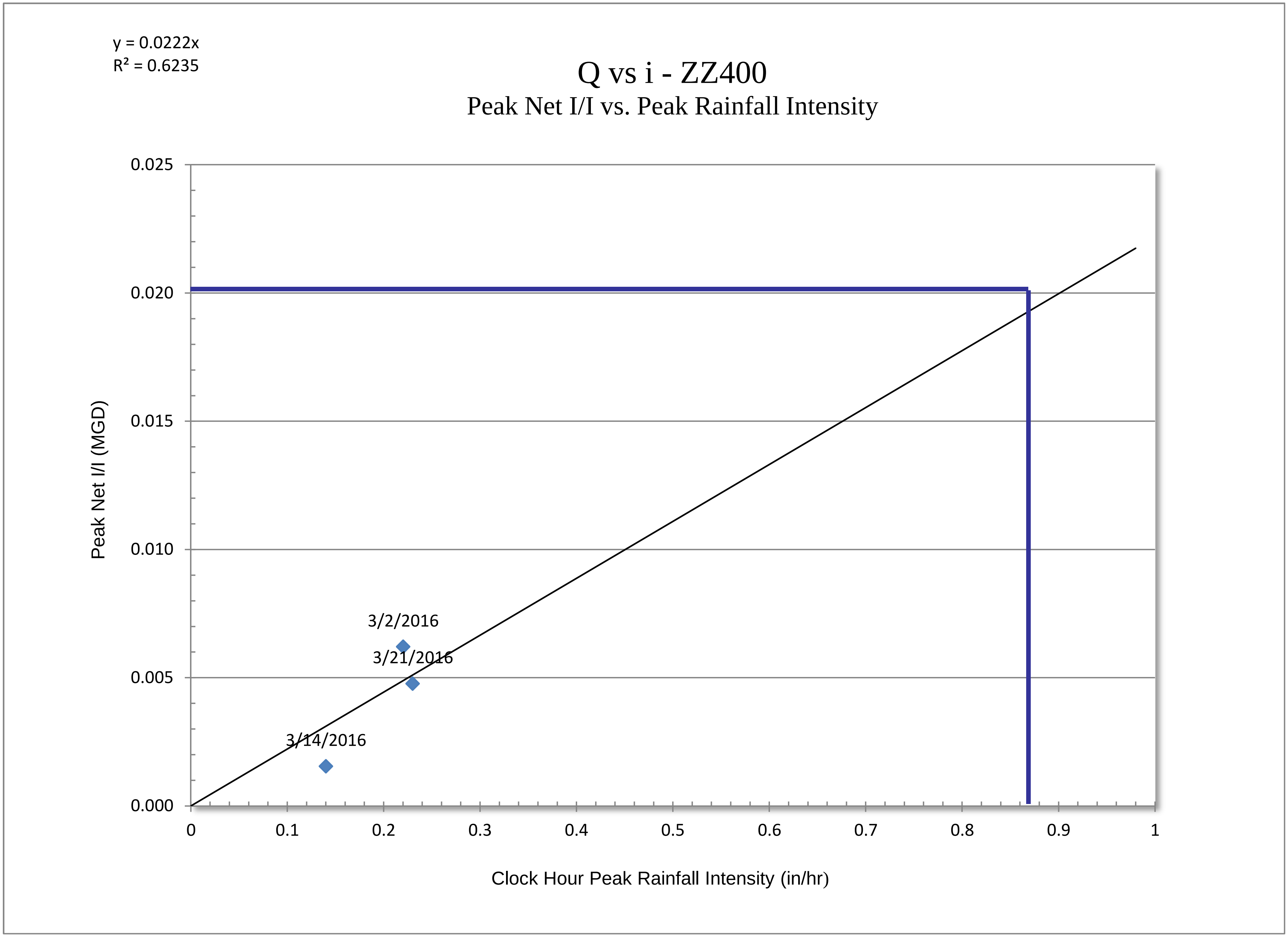


y = 0.4368x
R² = 0.7712
Q vs i - MM160
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.500
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
4/7/2016
3/2/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)


y = 0.3608x
R² = 0.3885
Q vs i - KK180
Peak Net I/I vs. Peak Rainfall Intensity
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
Peak Net I/I (MGD)
4/7/2016
3/2/2016
3/21/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)


y = 0.4038x
R² = 0.6039
Q vs i - QQ20
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
4/7/2016
4/3/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)


y = 0.8234x
R^2 = 0.6075
Q vs i - WW10
Peak Net I/I vs. Peak Rainfall Intensity
Peak Net I/I (MGD)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
4/7/2016
3/2/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)


y = 0.0222x
R² = 0.6235
Q vs i - ZZ400
Peak Net I/I vs. Peak Rainfall Intensity
0.025
0.020
0.015
0.010
0.005
0.000
Peak Net I/I (MGD)
3/2/2016
3/21/2016
3/14/2016
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Clock Hour Peak Rainfall Intensity (in/hr)