Memo

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Date: February 13, 2007

To: Kevin Stewart, Chad Kudym

From: Markus Ritsch

Subject: **January 2007 ALERT Data Analysis**

I. ALERT Data Source

Raw ALERT data records extracted from the Urban Drainage and Flood Control District's Nova Star 4.0 base station (ALERT 2) were analyzed for the period January 1 through January 31, 2007.

II. General System Analysis Summary

A total of 164,551 individual data records were analyzed. Meteorological sensors account for 84 percent, water level sensors 6 percent, and rain sensors 3 percent of the total monthly transmissions.

Ninety-eight percent of the received data reports were flagged as "good" by the Nova Star validation process. Roughly 3,795 reports were flagged as "bad". Of these "bad" reports, 3,247 originated from the wind sensor (ID 2189 and 2187) at Squaw Mountain.

The system-wide radio traffic loading this month was 5,308 reports per day with an average hourly loading of 221 reports. The peak hourly traffic loading was 347 reports, which occurred on January 8th between 7:00 AM and 8:00 AM. A plot of monthly average and peak hourly traffic loading is provided.

A total of zero (0) reports were received from the Hayman gages this month. The Hayman gages were winterized toward the end of October, 2006. The sensors will be activated again in the spring 2007.

The sensors reporting most frequently this month include:

1. Salisbury Park (ID 2727) with 3,618 reports,
2. Ward C-1 (ID 4707) with 3,877 reports,
3. Urban Farm (IDs 1464, 1465, and 1466) with 2,882, 2,776, and 2,848 reports respectively.

The reports from the above sensors are distributed evenly throughout the month.

III. Rain Sensor Timer Reporting Summary

The following analysis assumes that each rain sensor has a 12-hour timer reporting interval. System-wide the ALERT 2 base station received approximately 93 percent of the non-incrementing timer reports. Those rain sensors with the worst timer reporting statistics for the month are summarized (Table 1).

Table 1. Monthly Summary of Sensors with Poor Timer Performance

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
750											
4470											
4560											
4240											
4510											

Quincy Res (750), Little Narrows (4470), Lyons Div. NSV (4560), Sunset (4240), and Pinewood Springs (4510)

Sensors identified as having poor timer performance in multiple months are shaded with unique colors. A developing trend can thus be identified from the color shading as the year progresses.

The non-incrementing count series was manually inspected for those sensors with a timer reporting percentage of less than 80%. A brief description of the results from the manual inspection is provided below.

1. Quincy Reservoir (ID 750)

This sensor is missing timer reports beginning 1/30/2007 through 1/31/2007. Timer reports are missing for the last two days of the month.

2. Little Narrows (ID 4470)

This sensor is missing 2 days of timer reports between 1/12/2007 through 1/15/2007. The timer reports begin again on the 15th and continue for the remainder of the month.

3. Lyons Diversion NSV (ID 4560)

This sensor is missing timer reports sporadically throughout the month. In addition a bit-flip in the count value occurred on 1/4/2007.

IV. Rain Sensor Event Reporting Summary

A. District-Wide Total Tip/Count Statistics

The incrementing reports from all 1-mm rain sensors that reported for the entire month were analyzed to quantify the District-wide statistical total monthly tip summary (Table 2).

Table 2. January District-Wide Total Tip/Count Statistical Summary

Statistical Parameter	Value	Comments
Mean	11.56	Only the 1-mm rain sensors were included in the analysis
Median	9.5	Only the 1-mm rain sensors were included in the analysis
Standard deviation	7.84	Only the 1-mm rain sensors were included in the analysis
Mean plus three standard deviations	35.09	Several sensors for the month are outside the Mean +/- 3 Std Dev
Minimum total count	1	Several sensors including: 900, 1440, 1480,
Maximum total count	38	Justice Center (ID 4360)

A monthly summary of the District-wide mean total tip/count is presented (Table 3).

Table 3. Monthly Summary of District-Wide Mean Total 1-mm Tip/Count

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
2006	4.62	5.92	18.39	20.47	19.44	13.75	74.03	46.89	24.17	41.13	5.04	16.45	24.19
2007	11.56												

The average precipitation experienced district-wide in January more than doubled from the same month in 2006.

One sensor experienced a change in tip count for the month that exceeded the system-wide mean plus three standard deviations. This sensor was the Justice Center. This was also the highest reporting rain sensor in November and December of 2006. The data record for this sensor was further inspected.

1. Justice Center (ID 4360)

Overall the series looks reasonable. Several periods of rainfall/snowmelt are evident (Figure 1). A significant jump in tip count occurs on January 5 and 6. All the sequential incrementing values are either single or double tips. No jump in the sequential tip count value exceeds 2 tips.

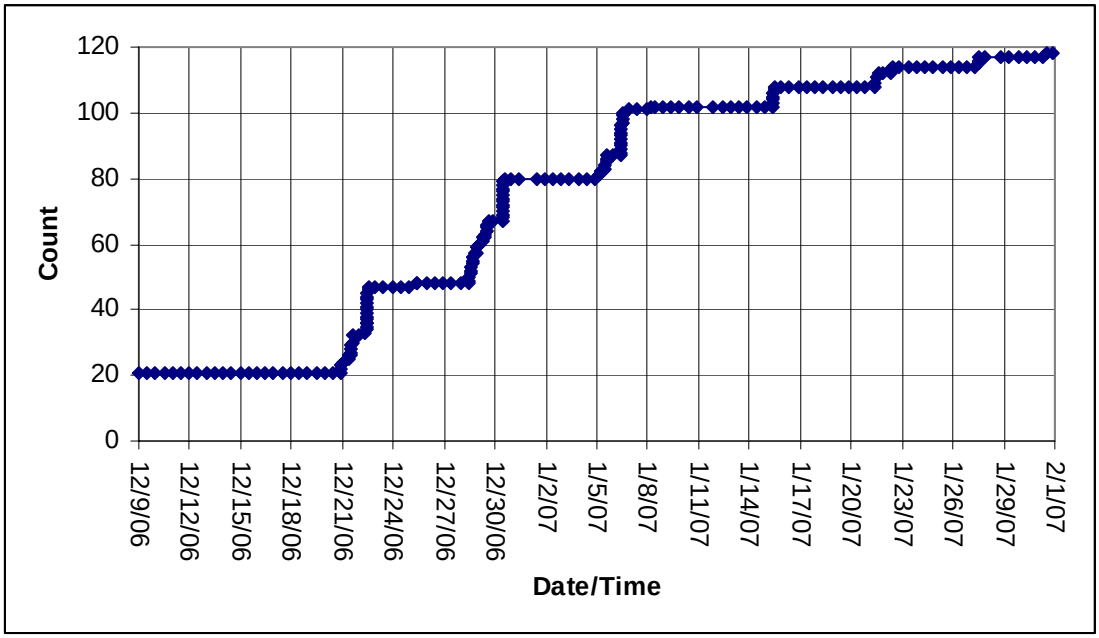


Figure 1. Rain Count Accumulation for Justice Center (ID 4360)

B. Sensors with a Jump of Six or More in the Sequential Count

No rain sensors experienced a jump in their sequential tip count of more than 6 this month. If there were, the tip count series for these sensors would be manually inspected and explored in the following paragraphs.

C. Sensor-by-Sensor Incrementing Count Summary

The system-wide reception rate of incrementing tip reports for the month was approximately 97 percent. A total of 843 incrementing reports were received and a total of 873 were expected. The total loss of incrementing reports for the month was approximately 3.44 percent. Those sensors with the worst rain event transmission characteristics are summarized (Table 4).

Table 4. Monthly Summary of Sensors with the Most Missed Tips

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2320											
2190											
4710											
4090											
4820											

*Choke Cherry Reservoir (2320), Squaw Mountain (2190), Ward C-1 (4710), Magnolia (4090), and Doudy Draw (4820)

Sensors identified as having poor event performance in multiple months are shaded with unique colors. A developing trend can thus be identified from the color shading as the year progresses.

The incrementing count series was manually inspected for those sensors that have an event performance of less than 80%. A brief description of the results from the manual inspection is provided below.

1. Squaw Mountain (ID 2190)

The base station recorded 9 single increment values and 3 double increment count values. A total of 15 incrementing reports were expected and 12 were actually received. The lost reports did not result in an incorrect accumulation of rainfall as tracked by NovaStar.

Nothing is evident in the series that would indicate a problem at the station.

V. Heavy Radio Traffic Hour Analysis

Beginning in 2007 every hour exceeding 600 messages will be analyzed independently. The heavy hour analyses will attempt to identify rain gage sequences where 2, 3, or more, sequential messages are lost. The loss of 3 or more sequential data reports forms a limit of data degradation that causes a serious problem in the evaluation of alarm threshold conditions to support the flood mitigation needs of emergency responders within the District.

There were no occurrences of hourly traffic exceeding 600 messages this month.

The peak hour of radio traffic loading occurred on 1/8/2007 between 7:00 AM and 8:00 AM when 347 reports were received. The data for this period was examined more closely to characterize the distribution of sensor traffic (Table 5). During this hour the radio traffic was dominated by wind reports.

Table 5. Peak Traffic Hour Sensor Report Distribution

Sensor Group	Reports	Percent
Wind Speed Average & Azimuth	88	25%
Wind Gust	54	16%
Relative Humidity	46	13%
Water Level PT-HSE	38	11%
Temperature	35	10%
Wind Speed Average	24	7%
Wind Direction	23	7%
Precipitation	11	3%
Battery Voltage HSE	5	1%
Solar Radiation	5	1%
Battery Voltage Digital	4	1%
Precipitation - Mean	3	1%
Water Level Float	3	1%
Barometric Pressure	2	1%
Fuel Moisture	2	1%
Fuel Temperature	2	1%
Battery Voltage Analog	1	0%
Repeater Pass List	1	0%
Total	**347**	**100%**

A summary of the past peak radio traffic hours is presented (Table 6) for the District's 1-mm rain sensors. The peak hour for January was analyzed and is shown. No single incrementing tip reports were lost during this peak hour. The rainfall accumulation totals as tracked by NovaStar for the peak hour were accurate. There were no sensors that under-reported rainfall due to the loss of sequential tip counts.

Table 6. Peak Traffic Hour Rain Reporting Summary – Annual Reporting

Heavy Traffic Period	Traffic Msgs/hr	Rain reports expected	Rain reports received	Loss of reports	Accurate rain totals
1/8/07 7:00 AM – 8:00 AM	347	2	2	0	Yes
12/24/06 12:00 PM – 1:00 PM	394	16	16	0.0%	Yes
11/14/06 1:00 PM – 2:00 PM	374	12	12	0.0%	Yes
10/29/06 1:00 AM – 2:00 AM	567	19	19	0.00%	Yes
9/21/06 3:00 AM – 4:00 AM	620	117	114	2.56%	Yes
8/13/06 9:00 PM – 10:00 PM	1,107	346	286	17.34%	Yes

The table above will be used to track the heavy hour radio traffic analysis for each month so that over a period of time a correlation can be developed between peak hour loading and loss of single increment reports.

VI. Unknown Device Analysis

The ALERT IDs present in the audio signal received by the decoder are compared against a list of "active" device IDs that are defined within NovaStar. Those IDs received by the decoder that are not defined within NovaStar are considered to be "unknown" and may be the result of radio noise. The reception of "unknown" device reports for the month is summarized (Table 7).

Table 7. Summary of Unknown IDs

Description	Quantity
Total number of unknown IDs (IDs without a device definition)	26
Total reports received from unknown IDs	429
Unknown IDs with only a single received report (potential noise)	11
Unknown IDs with multiple reports	15
Total reports from active "known" IDs	164,551
Unknown reports as a fraction of total active "known" reports	0.26 %

The total reports from unknown IDs is small relative to the total reports received for the month from the active sensors defined within NovaStar.

A number of "unknown" sensors had multiple reports which may indicate the existence of a transmitter that is sending information on an ID that is not currently defined within NovaStar. The unknown IDs including the number of reports received by each are quantified (Table 8).

Table 8. Reports Received by Unknown IDs

Unknown Sensor IDs	Received Reports
1446	1
1645	6
2232	1
2239	1
2251	1
2255	2
2754	174
4013	5
4031	1
4089	5
4262	1

4274	1
4365	6
4488	1
4544	6
4585	58
4595	68
4643	1
4740	1
4769	1
4793	24
8005	24
8010	16
8012	6
8015	6
8017	12
TOTAL	**429**

The “unknown” device reports are analyzed temporally to understand when they were received during the day (Table 9). The goal of this analysis is to determine a pattern of occurrence that may correspond to a source of noise in the system, such as the use of a wireless microphone nearby.

Table 9. Temporal Distribution of Unknown Reports

Hour (AM)	Reports	Hour (PM)	Reports
0:00-12:59	16	12:00-12:59	11
1:00-1:59	13	1:00-1:59	3
2:00-2:59	8	2:00-2:59	2
3:00-3:59	21	3:00-3:59	47
4:00-4:59	18	4:00-4:59	47
5:00-5:59	9	5:00-5:59	14
6:00-6:59	15	6:00-6:59	11
7:00-7:59	33	7:00-7:59	17
8:00-8:59	22	8:00-8:59	11
9:00-9:59	23	9:00-9:59	26
10:00-10:59	7	10:00-10:59	12
11:00-11:59	20	11:00-11:59	23

Unknown reports were received during each hour and are generally distributed evenly throughout the day. The hours between 3:00 PM and 5:00 PM did see more unknown reports than other hours of the day.

VII. Issues Continued from Previous Month

The following issues were identified last month.

1. Quincy Reservoir, (ID 750): This sensor had poor timer reporting in December.
2. Justice Center (ID 4360): This sensor reported the highest tip count accumulation for the month. This was the second month in a row that this sensor experienced the highest tip count. The series for this sensor should continue to be watched in upcoming months.

VIII. Issues Identified this Month

Further investigation into the following issues is recommended:

1. Quincy Reservoir, (ID 750): Timer reports are missing for the last two days of the month. The data series for this sensor should be tracked into February to confirm the proper reception of timer reports from this sensor.

2. Lyons Diversion, (ID 4560): This sensor is missing timer reports sporadically throughout the month. In addition a bit-flip in the count value occurred on 1/4/2007. The count series for this sensor should be confirmed next month.
3. Little Narrows (ID 4470): This sensor is missing 2 days of timer reports between 1/12/2007 through 1/15/2007. Continue to monitor and asses the timer performance from this sensor.
4. Justice Center (ID 4360): For the **third month in a row** this sensor reported the highest monthly tip count accumulation. It seems highly suspicious that the same sensor would have the highest rainfall accumulation for three months in a row.
5. Squaw Mountain (ID 2190): A number of sequential tip count values were lost for this sensor. A total of 15 incrementing reports were expected and 12 were actually received. The lost reports did not result in an incorrect accumulation of rainfall as tracked by NovaStar. The data for this sensor should be tracked into February.
6. The following unknown sensor IDs had multiple reports (these may be active ALERT transmitters deployed in the field that are configured incorrectly or these are active IDs that should be defined on the ALERT2 base station):
    a. 2754 (is there barometric pressure at Castle Rock weather?)
    b. 4585 (battery from a HSE transmitter?)
    c. 4595 (battery from a HSE transmitter?)
    d. 4793 (data values are all zeros, is there a Button Rock stage?)
    e. 8005 (data values are all 1, repeater status?)
    f. 8010 (West Creek Repeater Battery and repeater status report from another location)
    g. 8012
    h. 8015 (data values are all 1, repeater status?)
    i. 8017

General System Analysis

Database Name P:\A207-UDFCD-Data-Analysis\2007_Jan\Novastar_extract_2007Jan.mdb

First Date in Database	1/1/07 12:00 AM	**Total Days**	31.0
Last Date in Database	1/31/07 11:59 PM	**Total Hours**	744.0

Total Records Analyzed 164551

Records by Group

Wind Gust	31077	19%
Relative Humidity	26843	16%
Temperature	25961	16%
Wind Speed Average & Azimuth	20435	12%
Wind Direction	16883	10%
Wind Speed Average	11398	7%
Water Level PT-HSE	7405	5%
Precipitation	5326	3%
Solar Radiation	3770	2%
Battery Voltage HSE	2859	2%
Barometric Pressure	2572	2%
Battery Voltage Digital	2419	1%
Water Level Float	1961	1%
Fuel Moisture	1476	1%
Fuel Temperature	1457	1%
Repeater Pass List	618	0%
Battery Voltage Analog	490	0%
Precipitation - Mean	460	0%
Water Level PT	363	0%
Precipitation - Test	247	0%
Longmont Flow Gage	181	0%
12Hr Status Report	111	0%
Battery	77	0%
Soil Moisture	61	0%
Longmont Water Level PT	53	0%
Handar 585 ALARM Status	46	0%
Precipitation-Old	2	0%
Total	164551	

Records by Major Group

Meteorologic Sensors	138939	84%
Water Level Sensors	9963	6%
Sensor Status Transmissions	6543	4%
Rain Sensors	5326	3%
Soil and Fuel Sensors	2994	2%
Total	163765	

Records by Validation Type

Good	0	160756	98%
Questionable	1	3795	2%
	Total	164551	

Sensors With Most Invalid Data

Description	**Sensor**	**Reports**
Squaw Mountain	2189	2152
Squaw Mountain	2187	1095
Elbert	1439	98
Cal-Wood Ranch	4774	48
Ward C-1	4704	33

Traffic Loading Summary

Alert Reports	164551	
Average Daily Traffic	5308	
Average Hourly Traffic	221	
Median Hourly Traffic	220	hour beginning
Peak Hourly Traffic	**347**	**1/8/07 7:00 AM**

Total Number of Sensors Defined	**Total Number of Sensors Reporting**
806	294

Reports per Sensor

Description	**Sensor**	**Reports**	**Fraction of Total**
Ward C-1	4707	3877	2%
Salisbury Park	2727	3618	2%
Urban Farm	1464	2882	2%
Urban Farm	1466	2848	2%
Urban Farm	1465	2776	2%
Salisbury Park	2724	2750	2%
Urban Farm	1467	2736	2%
Squaw Mountain	2187	2716	2%
Castle Rock	2744	2699	2%
Marston Lake North	1521	2689	2%
Elbert	1439	2660	2%
Hiwan G.C.	2208	2613	2%

Rain Timer Performance

Analyze Rain Sensors

systemwide average (days)	Systemwide Average
0.5180	93%

Rain Sensors	Description	Received Timer Reports	Timer Interval	Expected Timer Reports	Performance
750	Quincy Reservoir	46	14:34	62.00	74%
4470	Little Narrows	46	14:57	62.00	74%
4560	Lyons Diversion NSV	49	14:44	62.00	79%
4240	Sunset	52	12:56	62.00	84%
4510	Pinewood Springs	52	13:25	62.00	84%
4130	Swiss Peaks	53	13:14	62.00	85%
4530	Winiger Ridge	53	13:47	62.00	85%
4010	Cresent	54	13:27	62.00	87%
4090	Magnolia	54	13:39	62.00	87%
4170	Pine Brook	54	13:31	62.00	87%
4750	Louisville Lake	54	13:38	62.00	87%
4840	SBC@S Boulder Ditch	54	13:21	62.00	87%
1700	Cherry Cr @ Champa	55	13:12	62.00	89%
4060	Lakeshore	55	13:11	62.00	89%
4150	Gold Hill	55	12:57	62.00	89%
4180	Gold Lake	55	12:27	62.00	89%
4490	Apple Valley	55	12:55	62.00	89%
1000	Maple Grove Resv.	56	12:27	62.00	90%
1520	Marston Lake North	56	13:13	62.00	90%
4080	Twin Sisters	56	12:52	62.00	90%
4140	Logan Mill	56	12:26	62.00	90%
4710	Ward C-1	56	12:54	62.00	90%
4820	Doudy Draw	56	12:54	62.00	90%
900	Aurora Reservoir	57	12:52	62.00	92%
4190	Slaughterhouse	57	12:28	62.00	92%
4730	Sugarloaf	57	12:27	62.00	92%
700	Toll Gate @ 6th	58	12:00	62.00	94%
1420	Diamond Hill	58	12:28	62.00	94%
1440	Elbert	58	12:38	62.00	94%
1640	SPR at Union Ave.	58	12:31	62.00	94%
1920	Brighton	58	12:27	62.00	94%
2330	Morrison	58	12:42	62.00	94%
4030	Red Garden	58	12:29	62.00	94%
4330	Indian Ruins	58	12:25	62.00	94%
4360	Justice Center	58	12:27	62.00	94%
4520	Eagle Ridge	58	12:26	62.00	94%
4850	Porphory Mtn	58	12:14	62.00	94%
4860	Fairview Peak	58	12:13	62.00	94%
1480	Third Creek at DIA	59	12:25	62.00	95%
1810	Sand Creek at mouth	59	12:27	62.00	95%
2190	Squaw Mountain	59	12:00	62.00	95%
2220	Evergreen Lake	59	12:22	62.00	95%
4020	Rio Grande	59	12:11	62.00	95%
4250	Geer Canyon	59	12:25	62.00	95%
4270	Cannon Mountain	59	12:23	62.00	95%
4290	Red Hill	59	11:57	62.00	95%
4350	Conifer Hill	59	11:58	62.00	95%
4570	St. Antons	59	12:12	62.00	95%
4810	Shanahan Ridge	59	12:26	62.00	95%
4830	SBC @ San Souci	59	12:27	62.00	95%
1540	Sanderson at Xavier	60	11:57	62.00	97%
2820	Haskins Gulch Conf	60	11:59	62.00	97%
4040	Martin Gulch	60	12:12	62.00	97%
4070	Bear Peak	60	11:58	62.00	97%
4110	Betasso	60	12:12	62.00	97%
4160	Sunshine	60	11:58	62.00	97%
4220	Fling's	60	12:11	62.00	97%
4260	Taylor Mountain	60	12:11	62.00	97%
4300	Big Elk Park	60	12:10	62.00	97%
4340	Riverside	60	12:10	62.00	97%
140	Blue Mountain	61	12:00	62.00	98%
740	Smoky Hill	61	11:59	62.00	98%
2210	Hiwan G.C.	61	12:00	62.00	98%
2710	Highlands Ranch WTP	61	12:00	62.00	98%
2730	Salisbury Park	61	12:00	62.00	98%
2750	Castle Rock	61	12:00	62.00	98%
4050	Walker Ranch	61	11:58	62.00	98%
4100	Filter Plant	61	11:59	62.00	98%
4200	Lazy Acres	61	11:59	62.00	98%
4230	Golden Age	61	11:57	62.00	98%
4310	Johnny Park	61	11:57	62.00	98%
4770	Cal-Wood Ranch	61	12:00	62.00	98%
4790	Button Rock	61	12:00	62.00	98%
1660	SPR at Henderson	62	11:44	62.00	100%

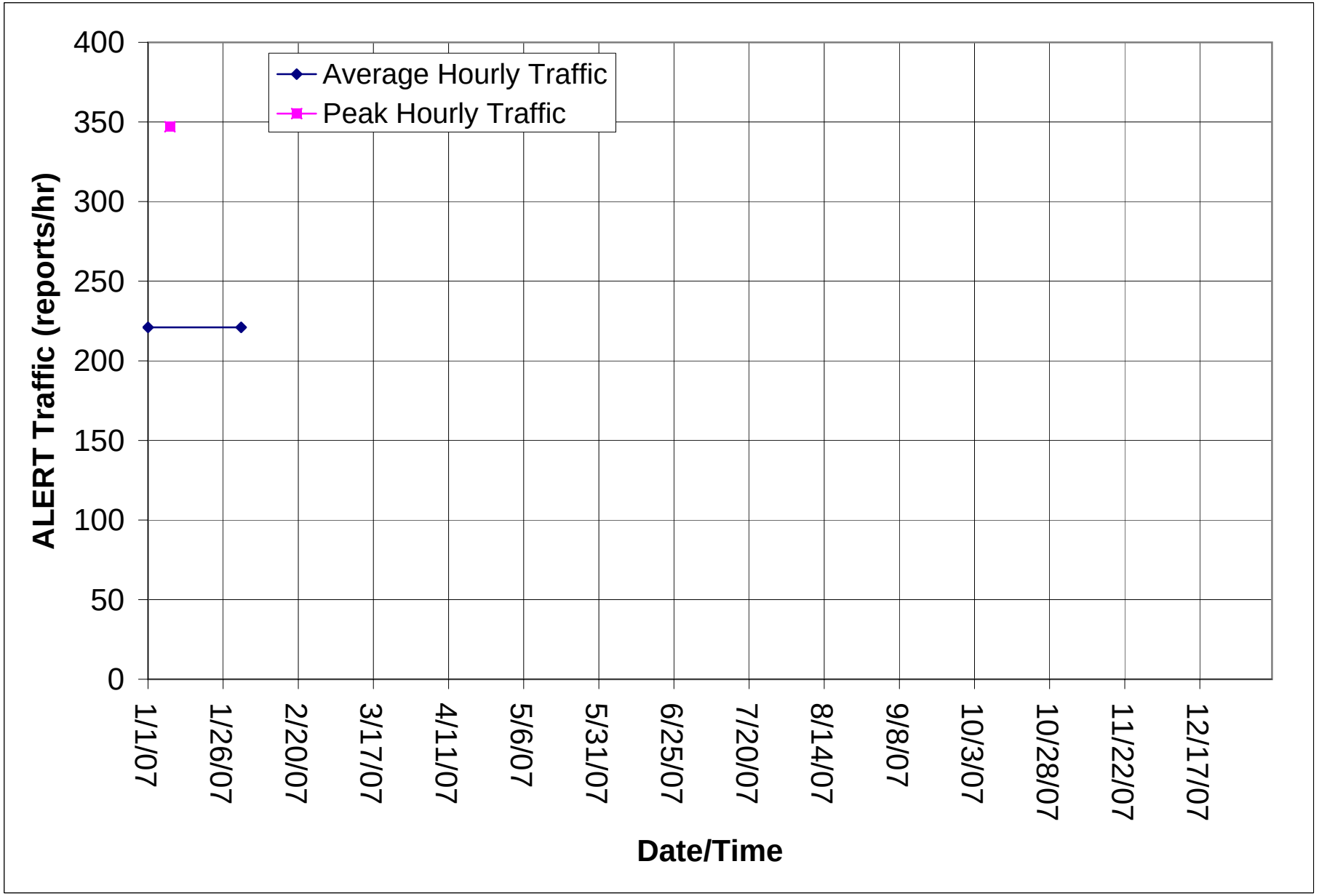
Rain Event Performance

Analyze Rain Sensors

	Reports Received	843	
Systemwide Avg	Total Tips	873	
97%	Data Loss	3.44%	

Rain Sensor	Performance	1-tips	2-tips	3-tips	4-tips	5-tips	6-tips	>6-tips	Received	Expected	Missed	Hold-off	Bucket
2320	75%	5	0	1	0	0	0	0	6	8	2	0	0.0393701
2190	80%	9	3	0	0	0	0	0	12	15	3	1	0.0393701
4710	80%	3	1	0	0	0	0	0	4	5	1	0	0.0393701
4090	86%	5	1	0	0	0	0	0	6	7	1	0	0.0393701
4820	88%	6	1	0	0	0	0	0	7	8	1	0	0.0393701
4130	90%	8	1	0	0	0	0	0	9	10	1	0	0.0393701
4170	90%	8	1	0	0	0	0	0	9	10	1	0	0.0393701
4510	90%	17	2	0	0	0	0	0	19	21	2	0	0.0393701
1640	91%	18	2	0	0	0	0	0	20	22	2	0	0.0393701
2330	91%	19	2	0	0	0	0	0	21	23	2	0	0.0393701
1660	92%	10	1	0	0	0	0	0	11	12	1	1	0.0393701
4160	92%	10	1	0	0	0	0	0	11	12	1	0	0.0393701
4350	93%	12	1	0	0	0	0	0	13	14	1	0	0.0393701
4530	93%	12	1	0	0	0	0	0	13	14	1	0	0.0393701
1000	93%	26	2	0	0	0	0	0	28	30	2	1	0.0393701
4140	93%	13	1	0	0	0	0	0	14	15	1	0	0.0393701
4070	94%	14	1	0	0	0	0	0	15	16	1	0	0.0393701
4040	94%	29	2	0	0	0	0	0	31	33	2	0	0.0393701
1520	94%	16	1	0	0	0	0	0	17	18	1	0	0.0393701
4190	94%	16	1	0	0	0	0	0	17	18	1	0	0.0393701
4860	94%	16	1	0	0	0	0	0	17	18	1	0	0.01
4360	97%	36	1	0	0	0	0	0	37	38	1	0	0.0393701
140	100%	8	0	0	0	0	0	0	8	8	0	0	0.0393701
700	100%	13	0	0	0	0	0	0	13	13	0	0	0.0393701
740	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
750	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
900	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393699
1420	100%	18	0	0	0	0	0	0	18	18	0	0	0.0393701
1440	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
1460	100%	5	0	0	0	0	0	0	5	5	0	0	0.0393701
1480	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
1540	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
1565	100%	1	0	0	0	0	0	0	1	1	0	0	0.0393701
1700	100%	11	0	0	0	0	0	0	11	11	0	0	0.0393701
1810	100%	9	0	0	0	0	0	0	9	9	0	0	0.0393701
1920	100%	12	0	0	0	0	0	0	12	12	0	0	0.0393701
2210	100%	10	0	0	0	0	0	0	10	10	0	0	0.0393701
2710	100%	7	0	0	0	0	0	0	7	7	0	0	0.0393701
2730	100%	3	0	0	0	0	0	0	3	3	0	0	0.0393701
2750	100%	5	0	0	0	0	0	0	5	5	0	0	0.0393701
2820	100%	19	0	0	0	0	0	0	19	19	0	0	0.0393701
4010	100%	8	0	0	0	0	0	0	8	8	0	0	0.0393701
4020	100%	11	0	0	0	0	0	0	11	11	0	0	0.0393701
4030	100%	15	0	0	0	0	0	0	15	15	0	0	0.0393701
4050	100%	5	0	0	0	0	0	0	5	5	0	0	0.0393701
4060	100%	7	0	0	0	0	0	0	7	7	0	0	0.0393701
4080	100%	5	0	0	0	0	0	0	5	5	0	0	0.0393701
4100	100%	6	0	0	0	0	0	0	6	6	0	0	0.0393701
4110	100%	12	0	0	0	0	0	0	12	12	0	0	0.0393701
4150	100%	14	0	0	0	0	0	0	14	14	0	0	0.0393701
4180	100%	8	0	0	0	0	0	0	8	8	0	0	0.0393701
4200	100%	14	0	0	0	0	0	0	14	14	0	0	0.0393701
4220	100%	7	0	0	0	0	0	0	7	7	0	0	0.0393701
4230	100%	6	0	0	0	0	0	0	6	6	0	0	0.0393701
4240	100%	5	0	0	0	0	0	0	5	5	0	0	0.0393701
4250	100%	10	0	0	0	0	0	0	10	10	0	0	0.0393701
4260	100%	8	0	0	0	0	0	0	8	8	0	0	0.0393701
4270	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
4290	100%	18	0	0	0	0	0	0	18	18	0	0	0.0393701
4300	100%	4	0	0	0	0	0	0	4	4	0	0	0.0393701
4310	100%	25	0	0	0	0	0	0	25	25	0	0	0.0393701
4330	100%	14	0	0	0	0	0	0	14	14	0	0	0.0393701
4340	100%	8	0	0	0	0	0	0	8	8	0	0	0.0393701
4470	100%	21	0	0	0	0	0	0	21	21	0	0	0.0393701
4490	100%	5	0	0	0	0	0	0	5	5	0	0	0.0393701
4520	100%	5	0	0	0	0	0	0	5	5	0	0	0.0393701
4570	100%	2	0	0	0	0	0	0	2	2	0	0	0.0393701
4730	100%	8	0	0	0	0	0	0	8	8	0	0	0.0393701
4750	100%	5	0	0	0	0	0	0	5	5	0	0	0.0393701
4770	100%	6	0	0	0	0	0	0	6	6	0	0	0.0393701
4790	100%	9	0	0	0	0	0	0	9	9	0	0	0.0393701
4810	100%	29	0	0	0	0	0	0	29	29	0	0	0.0393701
4830	100%	21	0	0	0	0	0	0	21	21	0	0	0.0393701
4840	100%	24	0	0	0	0	0	0	24	24	0	0	0.0393701
4850	100%	22	0	0	0	0	0	0	22	22	0	0	0.01
	Total Tips	814	28	1	0	0	0	0	843	873			

Bucket Tip Data Analysis	
Mean	11.5641
Median	9.5
Std Deviation	7.843584
Mean + 3 st dev	35.09485
Mean - 3 st dev	-11.96665
Min	1
Max	38


Average Hourly Traffic
Peak Hourly Traffic
ALERT Traffic (reports/hr)
400
350
300
250
200
150
100
50
0
1/1/07
1/26/07
2/20/07
3/17/07
4/11/07
5/6/07
5/31/07
6/25/07
7/20/07
8/14/07
9/8/07
10/3/07
10/28/07
11/22/07
12/17/07
Date/Time