

Memo

Date: July 9, 2018
To: Kevin Stewart
From: Markus Ritsch
Subject: June 2018 ALERT Data Analysis

I. ALERT Data Source

Raw ALERT data records extracted from the Urban Drainage and Flood Control District's NovaStar 5 base station were analyzed for the period June 1 through June 30, 2018.

II. General System Analysis Summary

The District receives data through both the legacy ALERT channel and through the ALERT2 (concentrator plus A2 self-reports) channel. The following quantifies the data reports received by each channel at Diamond Hill (Table 1).

Table 1. Reception of Data at Diamond Hill (Legacy, ALERT2 and Concentrator Reports from Recdatalog)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
Legacy ALERT (line 1)	208,189	170,938	214,572	224,711	215,631	215,515							1,249,556
DHill Conc (line 2)	369,547	328,399	383,229	359,855	327,392	365,225							2,133,647
DHill ALERT2 (line 4)	608,216	474,112	513,779	511,112	563,921	562,145							3,233,285
Westy ALERT2 (line 8)		472,878	513,257	549,423	601,462	560,429							2,697,449
Westy Conc (line 6)		327,438	382,812	386,882	382,751	364,046							1,843,929
TOTAL	1,185,952	1,773,765	2,007,649	2,031,983	2,091,157	2,067,360	0	0	0	0	0	0	11,157,866
Con/Leg	1.78	1.92	1.79	1.60	1.52	1.69	0.00	0.00	0.00	0.00	0.00	0.00	1.71
DataChr	713,367	590,020	715,298	743,578	765,183	735,108							4,262,554

A new ALERT2 receiver/decoder was installed in Westy, Colorado in January of 2018. This redundant data feed was added to NovaStar5 in late January. The new data feeds (lines 6 and 8) were added to both the Diamond Hill base station and to the Greenhouse base station for backup. Data from this new source will be quantified as part of this report.

The District operates two NovaStar5 base stations: the primary (ns5a) at Diamond Hill and a redundant base (ns5b) at Greenhouse Data. Additional analyses are conducted on the data received by these two base stations (Table 2). The data received by both base stations for the month are shown below.

The battery charger powering the ALERT2 decoder at Diamond Hill failed on April 22, 2018. The charger was replaced by OneRain on April 26, 2018. The number of ALERT2 and concentrator reports through Diamond Hill is decreased in April due to the failure of the battery charger. The ratio between legacy reports and concentrator reports is also decreased for these four days.

Table 2. Comparison of Data Reception by ns5a and ns5b

NS5A (Diamond Hill)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
Legacy	208,189	170,938	214,572	224,711	215,631	215,515							1,249,556
Concentrator	369,547	328,399	383,229	359,855	327,392	365,225							2,133,647
ALERT2	608,216	474,112	513,779	511,112	563,921	562,145							3,233,285
Westy (Conc)		327,438	382,812	386,882	382,751	364,046							1,843,929
Westy (A2)		472,878	513,257	549,423	601,462	560,429							2,697,449
NS5B (Greenhouse)													
Legacy	207,991	167,936	176,780	223,474	212,628	213,434							1,202,243
Concentrator	369,370	297,198	289,542	357,805	322,706	361,904							1,998,525
ALERT2	608,348	437,957	389,787	510,718	557,093	557,214							3,061,117
Westy (Conc)		304,809	292,048	386,008	382,805	361,518							1,727,188
Westy (A2)		446,873	398,421	548,228	601,760	556,688							2,551,970
Diff (NS5a-NS5b)													
Legacy (Digi One)	198	3,002	37,792	1,237	3,003	2,081	0	0	0	0	0	0	47,313
Concentrator (B2010)	177	31,201	93,687	2,050	4,686	3,321	0	0	0	0	0	0	135,122
ALERT2 (B2010)	-132	36,155	123,992	394	6,828	4,931	0	0	0	0	0	0	172,168
Westy (Conc)	0	22,629	90,764	874	-54	2,528	0	0	0	0	0	0	116,741
Westy (A2)	0	26,005	114,836	1,195	-298	3,741	0	0	0	0	0	0	145,479
Comments		Network issues experienced this month at DH	New line numbers were assigned at GH	Data script updated									

The daily ratio of concentrator to legacy reports is shown (Figure 1).

In March, the system configuration for data reception at Greenhouse was changed so that unique line numbers could be used to quantify data reports received uniquely at each base station. The automated script used to quantify reports was not updated until April. That's why the large discrepancy in reporting was quantified in March between Diamond Hill and Greenhouse. The new line numbering convention is as follows:

Primary Node Diamond Hill Base Station

-) Line 1 = Legacy ALERT
-) Line 2 = Concentrator from Diamond Hill Decoder
-) Line 4 = ALERT2 from Diamond Hill Decoder
-) Line 6 = Concentrator from Westminster Decoder
-) Line 8 = ALERT2 at Westminster Decoder

Backup Node Greenhouse Base Station

-) Line 1 = Legacy ALERT
-) Line 3 = Concentrator from Diamond Hill Decoder
-) Line 5 = ALERT2 from Diamond Hill Decoder
-) Line 7 = Concentrator from Westminster Decoder
-) Line 9 = ALERT2 at Westminster Decoder

Ratio of Concentrator/Legacy for 2015, 2016, 2017, 2018

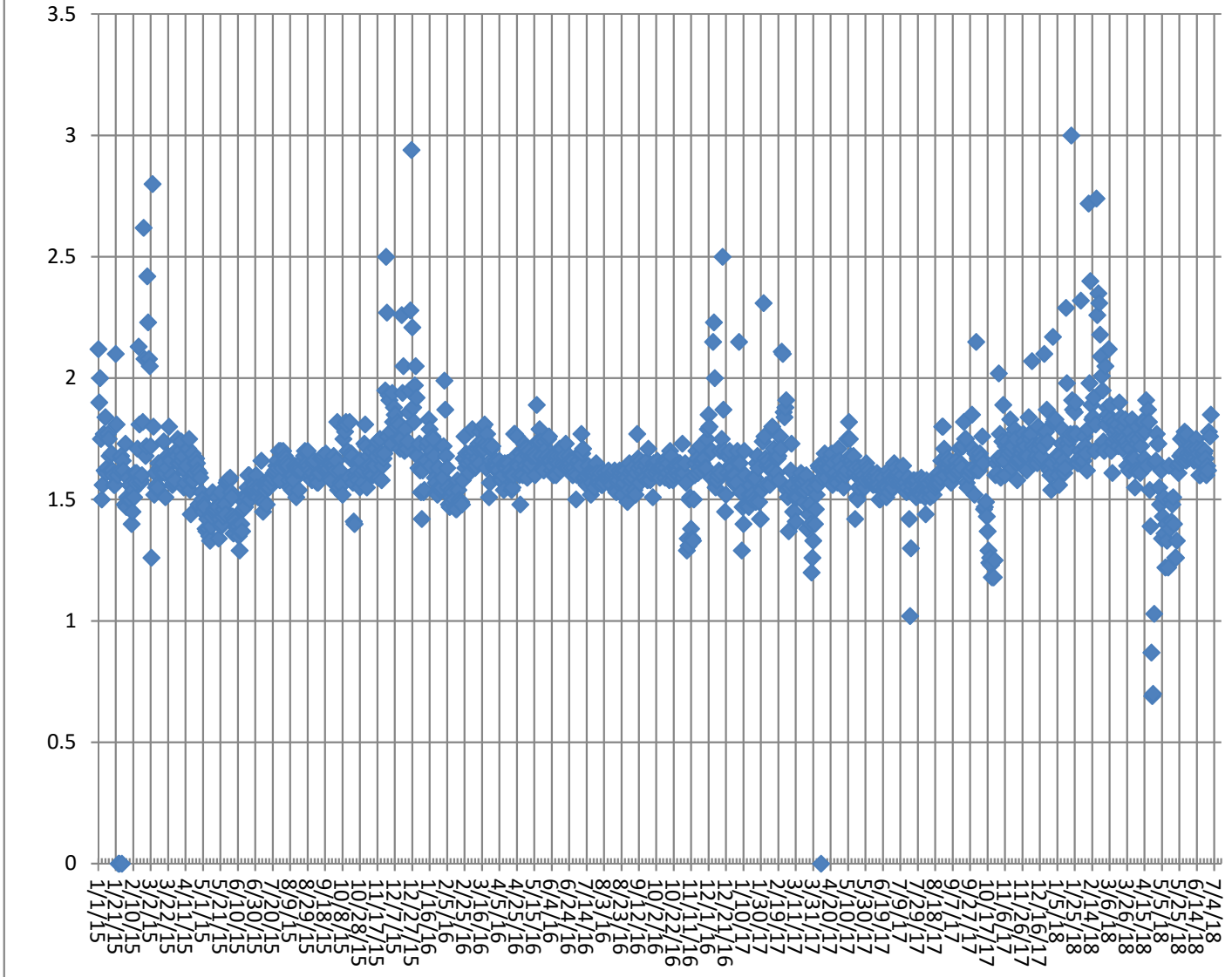


Figure 1. Daily Ratio of Concentrator Reports to Legacy Reports

The ratio becomes more volatile in the cold months as the Blue Mountain repeater has problems with legacy ALERT reporting when the temperature drops below zero.

The ratio on January 21, 2018 was very high with a value of 3. The system experienced a significant decrease in legacy ALERT reports on this day. The loss of ALERT legacy reports on January 21, 2018 are from Blue Mountain, Elbert, Urban Farm, and Marston Lake North. The most likely explanation is that the legacy ALERT output from the Blue Mountain repeater was down due to the cold weather experienced on both January 21 and January 15.

A cold spell in February likely contributed to the higher than expected ratio of concentration to legacy reporting.

The failure of the battery charger at the Diamond Hill ALERT2/Concentrator decoder for the period April 22 through April 26 is evident in the decreased ratios for these days.

A. Continuous Operation of Base Receiver/Decoder

Data was collected on a continuous basis for a total of 720 hours of operation. Outages of less than one hour are not identified.

B. Specific Issues Identified

Performance of the following sensors (Table 3) was questionable this month.

Table 3. Sensors with Poor Performance Characteristics

Sensor ID	Description	Comments
420	Expo Park	Poor timer performance
3090	Highland Heritage Park	Poor event performance
2330	Bear Creek below Cub Creek	Poor timer and event performance
0, 1, 2	Unknown	Unknown IDS transmitted on legacy ALERT

C. ALERT2 Repeater Loading

The District's ALERT2 architecture utilizes 5 repeaters with a single transmit frequency (170.300 MHz) to Diamond Hill. The repeaters utilize a 20 second frame where each repeater is allocated a slot of specific size and an offset within the frame. The slot allocated to each repeater is sized appropriately to accommodate the total number of existing and future remote sites routed through that repeater. Each repeater is shown along with its designated slot (Table 4). Currently there is no pass-listing for the ALERT2 repeaters. Any remote ALERT2 site can be received by all repeaters and re-broadcast to the base except for West Creek which has an input frequency unique to Douglas County.

Table 4. ALERT2 Repeater Architecture

Repeater	Slot Size (sec)	Slot Offset (sec)	Source Address	ALERT2 Input Frequency (MHz)	ALERT2 Output Frequency (MHz) – received at Diamond Hill
West Creek	2	0	6001	169.425	170.300
Smoky	3	2	6502	169.525	170.300
Blue Mt.	4	5	6503	169.525	170.300
Lee Hill	3	9	6505	169.525	170.300
Gold Hill	3	12	6506	169.525	170.300
Magnolia	5	15	6507		170.300
Frame Size	20				

The following tables summarize the total number of reports received through each repeater (Table 5). This helps to quantify repeater loading for the ALERT2 backbone.

Table 5. ALERT2 Reports Received through Each Repeater (Only A2 Self Reports)

Month-Yr	West Creek (6001)	Smoky (6502)	Blue Mt. (6503)	Lee Hill (6505)	Gold Hill (6506)	TOTAL
Jan-15	0	44,501	44,636	44,783	39,007	172,927
Feb-15	0	58,543	56,150	61,160	57,764	233,617
Mar-15	346	73,198	69,604	77,968	65,323	286,439
Apr-15	595	73,711	69,568	79,215	72,310	295,399
May-15	5,259	78,694	72,340	86,297	77,174	319,764
Jun-15	11,987	72,449	65,742	82,998	69,570	302,746
Jul-15	28,595	75,379	71,394	79,026	74,041	328,435
Aug-15	28,409	92,299	84,057	84,363	87,211	376,339
Sep-15	26,809	84,143	84,776	84,289	85,123	365,140
Oct-15	19,775	82,683	83,390	63,475**	84,825	334,148
Nov-15	6,438	62,615	61,477	50,888	58,004	239,422
Dec-15	9,835	72,886	72,465	73,431	47,996	276,613
Jan-16	4,034	38,348	36,826	37,168	19,768	138,160
Feb-16	11,732	93,120	99,206	96,284	99,188	399,530
Mar-16	12,533	126,123	134,329	140,226	139,536	552,747
Apr-16	13,262	128,473	130,223	135,499	133,197	540,654
May-16	27,002	125,098	124,280	138,033	130,513	544,926
Jun-16	30,405	117,877	111,309	133,036	122,798	515,425
Jul-16	37,492	108,334	102,335	115,028	110,577	473,766
Aug-16	48,323	130,666	123,827	136,746	131,957	571,519
Sep-16	49,555	122,625	115,898	129,454	127,606	545,138
Oct-16	51,170	111,105	110,038	116,087	116,489	504,889
Nov-2016	47,039	72,761	92,941	100,083	99,508	412,332
Dec-2016	48,946	102,329	97,321	79,274	102,097	429,967
Jan-2017	47,286	50,748	27,307	97,947	104,689	327,977
Feb-2017	45,366	96,629	94,065	88,239	98,411	422,710
Mar-2017	53,021	87,160	33,983	121,578	126,722	422,464
Apr-2017	49,833	110,418	116,486	122,506	120,727	519,970
May-2017	54,375	128,362	128,310	118,908	134,173	564,128
Jun-2017	60,671	131,745	124,019	146,333	138,056	600,824
Jul-2017	58,442	137,750	130,136	146,134	139,778	612,240
Aug-2017	60,322	136,739	128,716	145,280	139,257	610,314
Sep-2017	58,388	146,759	135,632	157,248	150,762	648,789
Oct-2017	48,644	148,071	149,899	159,639	157,788	664,041
Nov-2017	39,868	123,026	134,197	141,153	140,478	578,722
Dec-2017	38,801	138,219	137,672	142,389	141,303	598,384
Jan-2018	45,373	140,341	139,290	141,045	142,167	608,216
Feb-2018	30,490	110,604	109,467	111,922	111,629	474,112
Mar-2018	72,863	110,844	106,466	112,417	111,189	513,779
Apr-2018	71,726	120,656	114,768	125,831	116,442	549,423
May-2018	44,674	132,258	125,752	144,129	117,108	563,921
Jun-2018	95,030	115,819	110,643	124,698	115,955	562,145

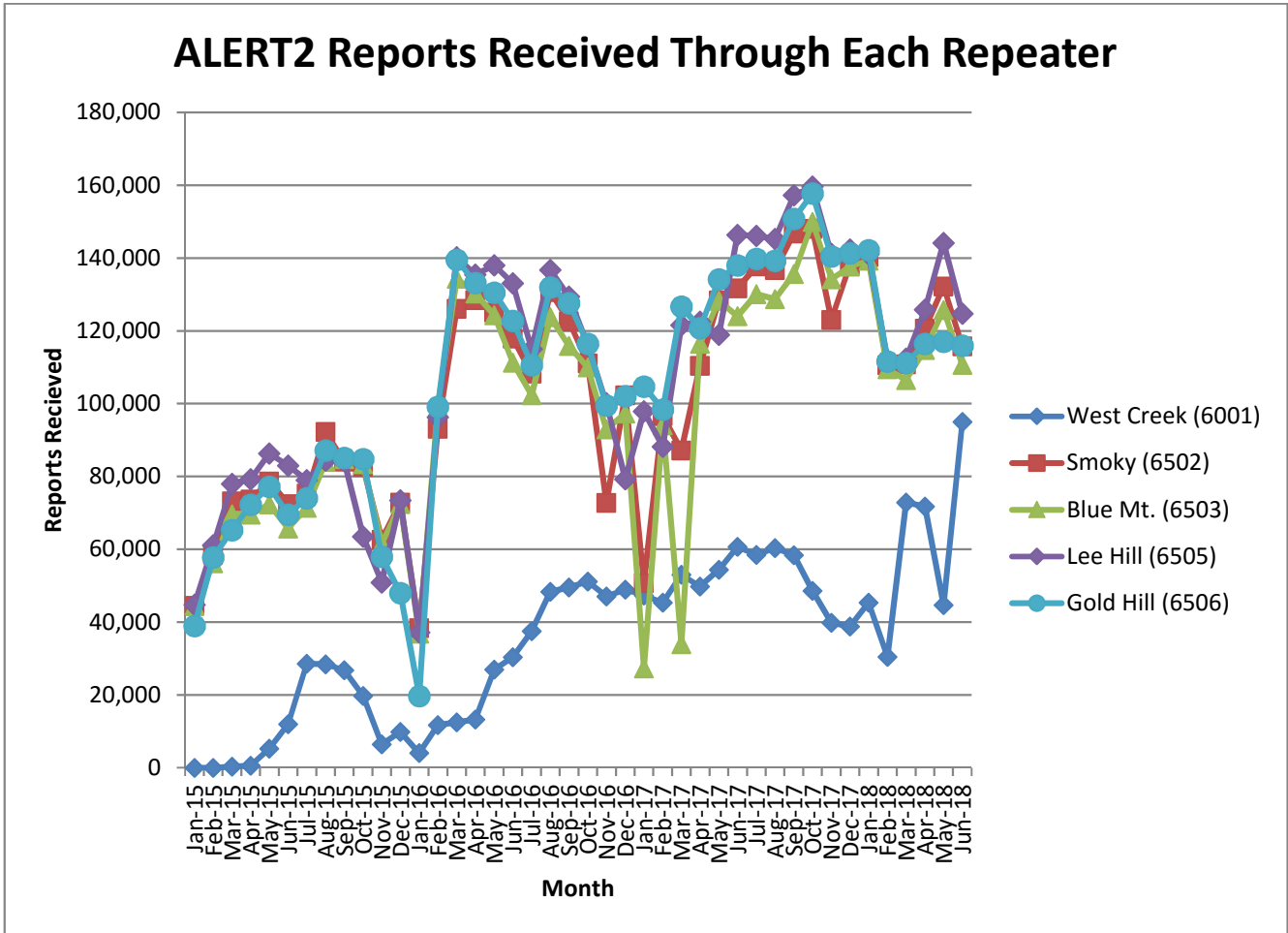


Figure 2. Reports received through each repeater (ALERT2 Only)

A convenient mechanism to track repeater performance throughout the year is to monitor total ALERT2 reports passed by each repeater. In general, each of the primary repeaters in the District process an equivalent number of ALERT2 reports because pass/block filtering is not being used. Several months are evident where the throughput of one repeater is not consistent with the other three.

Network outages were experienced on February 22 and February 23 which decreased the reception of data at the base station from all repeaters.

The throughput at the West Creek repeater increased in June as the Hayman Burn stations came on-line and additional sites are converted to ALERT2.

The following tables summarize the system-wide latency of ALERT2 self-reports (Table 6 and Table 7).

Table 6. System-Wide Latency of ALERT2 Self-Reports (seconds)

Statistical Parameter	Value (sec)	Comments
Mean	63.90	The average time it took a report from the field to reach the base
Minimum	-46	The minimum time it took for a report to go from the field to the base
Maximum	43,300	The maximum time it took for a report to go from the field to the base

Table 7. Summary of ALERT2 System-Wide Latency (seconds)

Statistical Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	48.79	51.82	60.96	75.43	117.33	63.90						
Minimum	-34	-23	-23	-963	-23	-46						
Maximum	37,677	33,597	30,677	42,277	36,100	43,300						
Station with Minimum Latency	West Creek WX	West Creek WX	West Creek WX	West Creek WX	West Creek WX	East Cherry Creek at Russellville						

The negative latencies are observed only from the station West Creek WX. A new ALERT2 board was installed in mid May 2018 at this station.

The large latency observed in June is from Happy Canyon at North Surrey Drive (2880), SA 10059.

D. Rain Sensor Timer Reporting Summary

The following analysis assumes that each legacy rain sensor has a 12-hour timer-reporting interval and each A2 rain sensor has a 1-hour timer-reporting interval. The worst performing rain sensors for the month are summarized (Table 8).

Table 8. Monthly Summary of Sensors with Poor Timer Performance (Sensor ID)

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
2790	2790	2340	2790	700	420						
4550	3020	2360	2240	2330	2330						
1660	1110	2230	2340	2340	4870						
2330	3010	2250	2330	2850	330						
2980	1660	2270	3020	1620	940						
5940	4550	2350	5720	4870	1660						

*- Only sensors that operate year-round (weather stations and stations in Boulder County) are included for the analysis in these months.

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.

III. Rain Sensor Event Reporting Summary

A. District-Wide Total Tip/Count Statistics

The incrementing reports from all 1-mm rain sensors were analyzed to quantify the District-wide statistical total monthly tip summary (Table 9). For the months of January, February, March, October, November and December only the stations that operate year-round are included in the rain event analysis. These stations include all weather stations and the stations in Boulder County.

Table 9. District-Wide Total Tip/Count Statistical Summary

Statistical Parameter	Value	Comments
Mean	30.76	Only the 1-mm rain sensors were included in the analysis
Median	28	Only the 1-mm rain sensors were included in the analysis
Standard deviation	15.72	Only the 1-mm rain sensors were included in the analysis
Mean plus three standard deviations	77.90	Only the 1-mm rain sensors were included in the analysis
Mean minus two standard deviations	0	Only the 1-mm rain sensors were included in the analysis
Minimum total count	2	NREL South Table Mtn. (1030)
Maximum total count	125	Temple Pond at DTC (630)
Sensors showing NO rain for the month		None
Sensors greater than 3 SD (over reporting)	3	Utah Park (430), Temple Pond at DTC (630), Powers Park (1500)

B. Monthly Average Tip/Count Summary

A monthly summary of the District-wide mean total tip/count is presented (Table 10).

Table 10. 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	5.40	29.75	65.03	68.30	15.87	36.20	46.38	22.13	29.50	6.54	11.29	29.00
2008	4.05	7.38	12.26	20.57	54.82	26.06	16.43	90.20	37.54	19.59	2.82	9.24	25.08
2009	6.33	3.11	11.37	59.26	63.45	68.00	65.00	20.00	27.29	30.24	11.00	5.60	30.89
2010	5.97	11.90	32.54	70.57	39.63	56.04	50.23	31.01	4.18	18.31	8.30	3.31	27.67
2011	6.78	7.45	7.54	33.94	92.68	39.42	90.87	18.25	37.67	25.73	10.41	13.59	32.03
2012	4.89	13.57	2.35	30.17	38.97	19.35	73.03	11.31	48.81	22.32	2.98	4.18	22.66
2013	2.96	14.31	21.86	35.96	45.87	16.39	52.33	50.63	229.74	29.64	5.86	4.00	42.46
2014	6.88	11.86	25.91	29.30	77.30	29.16	99.73	43.59	50.96	29.26	13.36	8.11	35.45
2015	9.88	24.42	20.78	69.75	143.07	86.93	54.59	29.95	7.16	53.28	22.08	10.80	44.39
2016	4.68	9.91	32.30	52.10	49.40	40.50	24.20	31.00	8.86	7.51	8.56	8.74	23.23
2017	13.3	5.84	27.70	39.10	99.60	15.33	40.80	44.58	40.74	31.88	7.38	5.35	31.13
2018	4.70	8.34	29.1	24.53	64.17	30.76							
Ave	6.66	9.95	20.91	42.37	65.90	35.20	52.11	35.68	41.48	26.03	8.03	7.74	28.32

*- Only sensors that operate year-round (weather stations and stations in Boulder County) are included for the analysis in these months.

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

No sensors experienced a large jump in the sequential tip count (Table 11).

Table 11. Sensors with a Jump of 6 or More in Sequential Count

Sensor Description	Sensor ID	Comment
El Rancho	2340	All >6 tips were breaks in data
EPC at Hwy 105	3010	All >6 tips were breaks in data
Highland Heritage Park	3090	Missed 7 tips on 6/17
SBC @ SB Road	4870	All >6 tips were breaks in data

D. Sensor-by-Sensor Incrementing Count Summary

The system-wide reception rate of incrementing, 1-mm tip reports for the month was approximately 96 percent. A total of 5,912 incrementing reports were received and a total of 6,176 reports were expected. The total loss of incrementing reports for the month was approximately 4 percent. Those sensors with the worst event transmission performance are summarized (Table 12).

Table 12. Monthly Summary of Sensors with the Worst Performance

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
1700	2810	2270	2270	4470	3090						
2980	1110	2230	1620	2340	2340						
4790	540	4870	1710	2330	100260						
4320	2330	940	2240	4270	2330						
3010	4330	100140	4270	1620	3010						
3030	3020	1530	4870	100420	4040						

*-Only sensors that are operational year-round (weather stations and stations in Boulder County) are included for the analysis in these months.

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.

IV. Unknown Device Analysis – Received Data Log

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 or problems with the telemetry system. The reception of “unknown” device reports for the month is summarized (Table 13).

Table 13. Summary of Unknown IDs

Description	Concentrator	Legacy	A2
Total number of unknown IDs (IDs without a device definition)	204	172	0
Total reports from unknown IDs	484	559	0
Unknown IDs with only a single received report (potential noise)	146	134	0
Total reports from all IDs – RecData Log entire month	365,225	215,515	562,145
Unknown reports as a fraction of total reports	0.13%	0.26%	0.00%

The total number of reports from unknown sensors is very small relative to the total reports received for the month. Shown below (Table 14) are the total reports received from unknown sensor IDs for each month of the year.

Table 14. Monthly Summary of Total Reports from Unknown IDs (Concentrator)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	1,220	1,474	1,276	1,174	721	5,707	610	1,738	442	533	2,857	6,396
2011	1,231	2,165	3,065	1,254	2,051	439	489	456	191	683	747	861
2012	692	750	1,575	977	5,469	11,016	453	683	774	2,657	3,854	5,466
2013	4,265	994	1,100	2,589	3,623	6,973	5,230	1,070	4,429	781	13,459	1,213
2014	870	4,284	2,399	2,104	25,746	1,832	3,983	268	369	448	470	1,099
2015	542	9,137	1,524	1,007	946	699	1,179	1,860	1,153	1,063	600	619
2016	323	1,241	3,085	3,586	1,268	945	1,408	2,029	1,413	753	617	879
2017	11,875	844	1,207	3,700	2,693	642	610	6,678	780	5,097	3,532	3,282
2018	788	771	1,178	936	749	484						

The fraction of reports from unknown sensors relative to the total number of reports is shown below (Table 15).

Table 15. Monthly Percent of Unknown Sensor Reports (Concentrator)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	0.42%	0.56%	0.38%	0.32%	0.20%	1.61%	0.17%	0.49%	0.13%	0.16%	0.93%	1.88%
2011	0.39%	0.73%	0.90%	0.37%	0.58%	0.12%	0.12%	0.05%	0.12%	0.18%	0.22%	0.26%
2012	0.30%	0.25%	0.43%	0.26%	1.37%	2.74%	0.11%	0.18%	0.20%	0.72%	1.15%	1.62%
2013	1.40%	0.31%	0.29%	0.60%	0.37%	0.61%	0.82%	0.21%	0.96%	0.31%	5.37%	0.23%
2014	0.14%	0.94%	0.40%	0.34%	3.95%	0.34%	0.66%	0.03%	0.03%	0.07%	0.11%	0.26%
2015	0.15%	2.25%	0.34%	0.22%	0.19%	0.14%	0.26%	0.42%	0.29%	0.24%	0.15%	0.15%
2016	0.10%	0.30%	0.69%	0.82%	0.28%	0.22%	0.33%	0.50%	0.36%	0.18%	0.17%	0.22%
2017	3.29%	0.23%	0.31%	0.97%	0.58%	0.16%	0.16%	1.16%	0.21%	1.40%	0.96%	0.87%
2018	0.21%	0.23%	0.31%	0.26%	0.23%	0.13%						

Any month shaded in yellow has an excessive number of reports from unknown sensors.

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 with multiple reports including the number of reports received by each are shown (Table 16).

Table 16. Reports Received by Unknown IDs

Concentrator		Legacy ALERT		Comment
Unknown ID	Reports	Unknown ID	Reports	
		0,1,2	57,56,95	Legacy reports for IDs 0,1,2 only
2271	56	2271	56	Cub Creek Below Blue Crk possibly sending invalid ID
2272	57	2272	56	Cub Creek Below Blue Crk possibly sending invalid ID
3071	23			Newlin Gulch at Jordan Road possibly sending invalid ID
3044	22			East Cherry Crk at Russellville Rd possibly sending invalid ID

V. Sensors with Invalid Reports

The sensors below (Table 17 and Table 18) have the largest number of invalid decodes as determined by the validation process defined at the District NovaStar5 base station. These invalid reports may indicate poor radio paths (bit flip/contention errors/random decode) or validation criteria that do not match the physical installation at the site.

Table 17. Rain Sensors with the Most Invalid Reports

Sensor ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1530-Bear Cr. At Lowell	10	5	3	4	1	--						
2810-Pine Cliff Rd.	14	10	10	6	6	3						
2880-Happy Canyon	--	--	47*	--	77*	--						
3010-Wx-EPC @ 105	3	5	7	5	1	4						
3050-E/W Trailhead	7	12	3	9	--	3						
4030-Red Garden	--	3	3	--	--	7						
4330-Hansen	--	3	--	--	1	3						
4240-Sunset	1	4	2	1	1	--						
4790-Wx-Button Rock	--	--	--	1	2	--						

*-Happy Canyon (2880) All invalid data points are because this station went through maintenance to upgrade to ALERT2.

Table 18. Level Sensors with the Most Invalid Reports

Sensor ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
413-Kelly Dam	--	--	5	--	12	3						
403-Montview Park	1171**	766**	411**	--	--	--						
213-Leyden Confluence	--	--	3	--	--	--						
723-WTG above Conf Pond	--	--	3	--	2	--						
1523-Marston Lake North	9	7	10	8	4	2						
1649-SPR at 19 th Street	--	--	1	4	--	--						
2223-Evergreen Lake	--	--	2	2	--	3						
2273-Cub Cr below Blue	--	--	3	--	--	2						
2803-Columbine Open Space	--	--	--	1	3	--						
2813-Pine Cliff Road	15	13	9	10	3	--						
3013-EPC@Hwy 105	18	20	8	10	9	13						
4383-Eldorado Springs	--	4	1	--	1	3						

** -Montview Park (403) All data values are marked as questionable data values because they exceeded an allowable upper boundary. Kate Malers developed a new rating for this site which needs to be incorporated into both NovaStar5 and Contrail in 2018.

VI. Rainfall Alarms and Intensity Analysis

The following rainfall rate alarms from the Urban Drainage and Flood Control District NovaStar 5.0 Web Server were identified this month.

Point Numid	Point Name	Trigger Name	Alarm Time
4840	SBC at S. Boulder D Precipitation-BO	Boulder County 10 minute rainfall	6/16/2018 13:37
2900	Russellville Gulch Precipitation-DG	Douglas County 10 minute rainfall	6/17/2018 14:31
3090	Big Dry Creek at Heritage Regional Park Precipitation-DG	Douglas County 10 minute rainfall	6/17/2018 15:02
3070	Newlin Gulch at Jordan Road Precip-DG	Douglas County 10 minute rainfall	6/17/2018 15:30
4080	Twin Sisters Precipitation-BO	FMC-BA 0.50" in 30 Min Rainfall	6/18/2018 17:37
4090	Magnolia Precipitation-BO	FMC-BA 0.50" in 30 Min Rainfall	6/18/2018 17:47
4100	Filter Plant Precipitation-BO	FMC-BA 0.50" in 30 Min Rainfall	6/18/2018 17:58
4090	Magnolia Precipitation-BO	FMC-BA 0.75" in 1 Hour Rainfall	6/18/2018 18:01
4100	Filter Plant Precipitation-BO	Boulder County 10 minute rainfall	6/18/2018 18:02
4100	Filter Plant Precipitation-BO	FMC-BA 0.75" in 1 Hour Rainfall	6/18/2018 18:02
4110	Betasso Precipitation-BO	FMC-BA 0.50" in 30 Min Rainfall	6/18/2018 18:03
4140	Logan Mill Precipitation-BO	FMC-BA 0.25" in 10 Min Rainfall	6/19/2018 11:58
1110	Gunbarrel Precipitation-BO	Boulder County 10 minute rainfall	6/19/2018 12:35
1110	Gunbarrel Precipitation-BO	Boulder County 1 hour rainfall	6/19/2018 12:53
100230	Havana Pond Precipitation	Plains 10 minute rainfall	6/24/2018 13:32
750	Quincy Reservoir Precipitation	Plains 10 minute rainfall	6/24/2018 13:42
750	Quincy Reservoir Precipitation	UDFCD 10 minute rainfall	6/24/2018 13:42
730	No Name @ Quincy Precipitation-AR	Plains 10 minute rainfall	6/24/2018 13:45
730	No Name @ Quincy Precipitation-AR	UDFCD 10 minute rainfall	6/24/2018 13:45
830	Side Creek Park Precipitation	Plains 10 minute rainfall	6/24/2018 13:46
830	Side Creek Park Precipitation	UDFCD 10 minute rainfall	6/24/2018 13:46
870	Murphy Creek Golf Course Precipitation-AR	Plains 10 minute rainfall	6/24/2018 13:47
870	Murphy Creek Golf Course Precipitation-AR	UDFCD 10 minute rainfall	6/24/2018 13:47
870	Murphy Creek Golf Course Precipitation-AR	Plains 1 hour rainfall	6/24/2018 13:53
870	Murphy Creek Golf Course Precipitation-AR	UDFCD 1 hour rainfall	6/24/2018 13:53

General System Analysis

Database Name P:\A207-UDFCD-Data-Analysis\2018\06-2018\2018Jun.mdb

Summarize

First Date in Database	6/1/18 12:00 AM	Total Days	30.0
Last Date in Database	7/1/18 12:00 AM	Total Hours	720.0

Total Records Analyzed 1,142,885

Records by Group	Legacy	Concentrator	ALERT2
Wind Data	70,610	140,760	136,334
Temperature	33,406	62,490	79,122
Relative Humidity	32,169	53,956	57,753
Water Level	16,291	17,717	71,764
Barometric Pressure	15,549	25,553	1,286
Precipitation	12,269	15,392	61,946
Battery Voltage	11,842	24,354	86,086
Fuel Temperature	5,432	5,517	0
Fuel Moisture	5,419	5,592	0
Solar Radiation	4,873	4,994	21,369
Soil Moisture	2,866	2,852	0
Repeater Status Report	2,271	1,822	0
ET-Hourly	622	715	0
Unknown	559	484	0
Repeater Pass List	532	60	0
12Hr Status Report	325	332	2,530
Not Used	269	290	0
Water Temp	120	120	0
Handar 585 ALARM Status	61	61	0
ET-Daily	29	30	0
Hayman Battery	1	1,999	0
GPS Lock	0	135	37,708
Flasher Status	0	0	6,247
Total	215,515	365,225	562,145

Traffic Loading Summary

Alert Reports	215,515	365,225	562,145
Average Daily Traffic	7,184	12,174	18,738
Average Hourly Traffic	299	507	781
Median Hourly Traffic	294	hour beginning 498	hour beginning 773
Peak Hourly Traffic	639	Jun 24, 1:00 PM 971	Jun 19, 7:00 PM 1,381
2nd Max	634	Jun 17, 11:00 PM 955	Jun 17, 4:00 PM 1,157
3rd Max	625	922	Jun 24, 1:00 PM 1,096
4th Max	614	Jun 19, 7:00 PM 893	Jun 17, 10:00 PM 1,066
5th Max	566	Jun 17, 10:00 PM 868	Jun 19, 6:00 PM 1,030

Rain Timer Performance

Analyze Rain Sensors

0.50

0.953

Rain Sensors	Description	Rcv	Timer	Exp	Performance
420	Expo Park	29	11:58	60	48%
2330	Morrison	43	16:12	60	72%
4870	SBC @ SB Road	45	14:20	60	75%
330	Van Bibber @ Hwy 93	47	13:43	60	78%
940	Aurora Regional Pond	47	12:54	60	78%
1660	SPR at Henderson	47	14:17	60	78%
1710	Shop Creek	47	14:20	60	78%
100260	Wx-A2-Trumbull (Hayman) - Precip	570	1:00	720	79%
5720	Four Mile Creek	48	14:30	60	80%
1370	West Metro FS13	49	12:14	60	82%
1620	Slaughterhouse Glch	49	13:38	60	82%
2340	El Rancho	49	12:29	60	82%
2360	Indian Hills	49	13:40	60	82%
4270	Cannon Mountain	49	13:52	60	82%
4490	Apple Valley	49	14:23	60	82%
840	Fire Station 12	51	11:43	60	85%
2280	Kinney Peak	51	13:03	60	85%
4470	Little Narrows	51	13:19	60	85%
540	Parker/Mississippi	52	13:31	60	87%
2230	Bear Cr below Cub	52	13:40	60	87%
2210	Wx-Hiwan G.C.	53	11:48	60	88%
2980	Dakan Rd	53	12:44	60	88%
4040	Martin Gulch	53	12:43	60	88%
4510	Pinewood Springs	53	13:16	60	88%
5940	Log Jumper	53	13:13	60	88%
2900	Russelville Gulch-Douglas	54	12:57	60	90%
4790	Wx-Button Rock	54	13:02	60	90%
2270	Cub Cr below Blue	55	12:44	60	92%
2320	Choke Cherry Resvr	55	12:14	60	92%
3030	WX-Bingham Lake Park	55	12:59	60	92%
4030	Red Garden	55	12:14	60	92%
4290	Red Hill	55	12:11	60	92%
310	Guy Hill Ranch	56	12:27	60	93%
1060	Heritage Square	56	12:26	60	93%
1100	Louisville Rec Ctr	56	12:28	60	93%
1350	Chatfield COE	56	12:43	60	93%
1900	Niver Detention	56	12:12	60	93%
2890	Spruce Mt - Douglas	56	12:28	60	93%
4310	Johnny Park	56	12:27	60	93%
4330	Hansen Rain	56	12:11	60	93%
5730	West Creek	56	12:43	60	93%
5880	Hackett Mountain	56	12:41	60	93%
100150	A2-Sellers Gulch at Haystack Precip	672	1:00	720	93%
500	Havana Park	57	12:12	60	95%
530	Fire Station #19	57	12:25	60	95%
620	Quincy/Highline	57	12:25	60	95%
720	Confluence Pond	57	12:13	60	95%
1360	Denver Zoo	57	12:11	60	95%
1480	Third Creek at DIA	57	12:27	60	95%
1500	Powers Park	57	11:57	60	95%
1520	Wx-Marston Lake North	57	12:28	60	95%
1530	Bear Creek @ Lowell	57	12:11	60	95%
1570	Wx-Brighton Ditch	57	12:29	60	95%
2350	Idledale	57	12:14	60	95%

2860	CC at Stroh Rd	57	12:12	60	95%
2950	DC Public Works	57	12:13	60	95%
2960	Indian Creek	57	12:13	60	95%
3010	WX-EPC at Hwy 105	57	12:45	60	95%
4160	Sunshine	57	12:24	60	95%
4190	Slaughterhouse	57	12:12	60	95%
4200	Lazy Acres	57	12:14	60	95%
4220	Fling's	57	12:27	60	95%
4300	Big Elk Park	57	12:12	60	95%
4320	Lee Hill Rain 2012	57	12:13	60	95%
4350	Conifer Hill	57	12:12	60	95%
4770	Wx-Cal-Wood Ranch	57	12:15	60	95%
4820	Doudy Draw	57	12:12	60	95%
4840	SBC@S Boulder Ditch	57	12:11	60	95%
110	Ralston Reservoir	58	11:58	60	97%
120	West Woods	58	12:11	60	97%
220	Upper Leyden	58	12:13	60	97%
320	Sports Complex	58	12:11	60	97%
410	Kelly Dam	58	12:11	60	97%
440	Fire Station #7	58	12:12	60	97%
510	Virginia Court	58	11:58	60	97%
520	Jewell Detention	58	12:11	60	97%
650	Iloff Pond	58	11:59	60	97%
810	Granby Ditch @ 6th	58	12:12	60	97%
1040	Lena @ U.S. Hwy 6	58	12:12	60	97%
1050	Jeffco Fairgrounds	58	12:11	60	97%
1110	Gunbarrel	58	12:12	60	97%
1200	Broomfield 3207	58	12:11	60	97%
1400	Upper Sloan Det.	58	11:58	60	97%
1550	Lakewood CC	58	12:11	60	97%
1700	Cherry Cr @ Champa	58	11:59	60	97%
2240	Cold Sprg Glch conf	58	12:12	60	97%
2250	Rosedale	58	11:57	60	97%
2840	Sulphur Gulch	58	11:59	60	97%
2850	Cherry Cr bl Bayou Glch	58	12:00	60	97%
2920	West Cherry Head-Douglas Cnty	58	12:13	60	97%
2940	Willow Creek - DougCnty	58	12:13	60	97%
4010	Crescent	58	12:12	60	97%
4050	Walker Ranch	58	12:10	60	97%
4060	Lakeshore	58	11:58	60	97%
4070	Bear Peak	58	12:12	60	97%
4100	Filter Plant	58	12:00	60	97%
4110	Betasso	58	12:14	60	97%
4230	Golden Age	58	12:12	60	97%
4250	Geer Canyon	58	12:26	60	97%
4520	Eagle Ridge	58	12:13	60	97%
4530	Winiger Ridge	58	12:11	60	97%
4550	Boulder Jail	58	12:11	60	97%
4570	St. Antons	58	11:59	60	97%
4710	Wx-Ward C-1	58	12:00	60	97%
4830	SBC @ San Souci	58	12:25	60	97%
4860	Fairview Peak	58	12:15	60	97%
5740	Trail Creek	58	12:13	60	97%
5810	Stump Bump	58	12:00	60	97%
100110	A2-ETG @ Hampden Precip	58	12:00	60	97%
2800	Columbine Open Space	703	1:00	720	98%
100290	A2-PlumCr at Sedalia - Precip	703	1:00	720	98%
2810	Pine Cliff Road	704	1:00	720	98%
140	Wx-Blue Mountain	59	12:00	60	98%

210	Leyden Confluence	59	11:58	60	98%
400	Montview Park	59	12:00	60	98%
600	Harvard Gulch Park	59	11:58	60	98%
630	Temple Pond at DTC	59	11:57	60	98%
700	Toll Gate @ 6th	59	12:00	60	98%
710	Horseshoe Park Drop	59	11:58	60	98%
730	No Name @ Quincy	59	11:58	60	98%
750	Wx-Quincy Reservoir	59	12:00	60	98%
760	Mission Viejo Park	59	11:57	60	98%
800	Sable Ditch @ 18th	59	11:57	60	98%
820	ETG @ Buckley	59	11:57	60	98%
830	Side Creek Park	59	12:00	60	98%
850	Flying J	59	12:00	60	98%
920	Wx-Aurora Town Hall	59	12:00	60	98%
950	Piney at Liverpool	59	11:57	60	98%
970	Pump Sta 3	59	12:00	60	98%
1010	Denver West	59	11:57	60	98%
1030	NREL/S. Table Mtn.	59	11:57	60	98%
1300	Hidden Lake	59	11:58	60	98%
1420	Wx-A2-Diamond Hill	59	12:00	60	98%
1440	Wx-Elbert	59	12:00	60	98%
1460	Wx-Urban Farm	59	12:00	60	98%
1600	Englewood Dam	59	11:57	60	98%
1640	SPR at Union Ave.	59	11:57	60	98%
1720	Cherry Cr @ Steele	59	11:57	60	98%
1800	Sand Creek Park	59	11:58	60	98%
1920	Wx-Brighton	59	12:00	60	98%
2260	Brook Forest	59	11:58	60	98%
2310	Genesee Village	59	11:58	60	98%
2370	Red Rocks Park	59	11:57	60	98%
2820	Haskins Gulch Conf	59	12:00	60	98%
2910	East Cherry Cr-Douglas	59	12:00	60	98%
2990	Wx-Tomah Rd-DougCnty	59	12:00	60	98%
4020	Rio Grande	59	11:58	60	98%
4080	Twin Sisters	59	11:57	60	98%
4090	Magnolia	59	11:57	60	98%
4130	Swiss Peaks	59	11:57	60	98%
4140	Logan Mill	59	11:58	60	98%
4150	Gold Hill	59	11:58	60	98%
4180	Gold Lake	59	11:58	60	98%
4240	Sunset	59	11:58	60	98%
4340	Riverside	59	11:58	60	98%
4360	Justice Center	59	11:57	60	98%
4730	Wx-Sugarloaf	59	12:00	60	98%
4750	Wx-Louisville Lake	59	12:00	60	98%
4880	Whispering Pines	59	11:57	60	98%
5860	Cedar Mountain	59	12:00	60	98%
100200	Wx-A2-OneRain Weather - Precipitation	59	12:00	60	98%
6601	Wx-A2-Magnolia WX-Precip	177	4:00	180	98%
3050	East/West Trailhead	709	1:00	720	98%
100140	A2-Upper Sellers Gulch Precip	710	1:00	720	99%
3020	Wx-West Creek WX	711	1:00	720	99%
100270	Wx-A2-WestCreek (Hayman) - Precip	713	1:00	720	99%
100320	A2-Weir Gulch - Precip	714	1:00	720	99%
100420	A2-Thorncreek - Precip	715	1:00	720	99%
3040	CC @ Russelville Road Precip	716	1:00	720	99%
3060	Fire Sta 47	716	1:00	720	99%
100500	Upper Coal Creek at Camp Eden Rd - Precipitation	716	1:00	720	99%
870	A2-Murphy Creek GC	717	1:00	720	100%

1310	LDC at 64th	717	1:00	720	100%
100240	A2-Westerly Cr Dam Precip	717	1:00	720	100%
100	A2-Carr Street	718	1:00	720	100%
1000	A2-Maple Grove Resv.	718	1:00	720	100%
1340	Sanderson at Xavier	718	1:00	720	100%
3070	A2-Newlin Gulch Precip	718	1:00	720	100%
100300	A2-CoalCreek at McCaslin - Precip	718	1:00	720	100%
100410	A2-Brantner Gulch - Precip	718	1:00	720	100%
3090	A2-Highland Heritage Park	719	1:00	720	100%
4850	Porphory Mtn	719	1:00	720	100%
100160	A2-Sand Creek at Colfax Precip	719	1:00	720	100%
100490	Coal Creek at Twin Spruce Rd - Precipitation	719	1:00	720	100%
150	Nott Creek	60	11:57	60	100%
200	Leyden Reservoir	60	11:57	60	100%
300	Van Bibber Park	60	11:44	60	100%
610	Harvard @ Jackson	60	11:57	60	100%
640	Goldsmith @ Eastman	60	11:57	60	100%
1320	SPR at 3rd Ave	60	11:44	60	100%
2710	Wx-Highlands Ranch WTP	60	12:00	60	100%
2730	Wx-Salisbury Park	60	11:53	60	100%
2870	Cottonwood (Apache)	60	12:01	60	100%
3080	Tallman Gulch	60	11:33	60	100%
4170	Pine Brook	60	11:57	60	100%
4260	Taylor Mountain	60	11:58	60	100%
4810	Shanahan Ridge	60	11:57	60	100%
430	Utah Park	61	11:58	60	100%
2750	Wx-Castle Rock	61	11:34	60	100%
2930	Wx-Spring Valley Rd-DougCnty	61	11:44	60	100%
100100	A2-Blackstone Precip	61	11:22	60	100%
2970	Rampart Range Rd-Satellite	202		202	100%
2880	Happy Canyon at N Surrey Dr	720	1:00	720	100%
100230	A2-Havana Pond Precip	720	1:00	720	100%
5900	Horse Creek-Satellite	939		939	100%

Rain Event Performance	Reports Received	Reports Received	5,912	Analyze Rain Sensors						<<show stations with zero rain (1=yes, 0=no)									
	Systemwide Avg	Total Tips	6,176																
	95.24%	Data Loss	4.27%																
Description	Sensor	Performance	1-tips	2-tips	3-tips	4-tips	5-tips	6-tips	>6-tips	Rcv	Exp	Miss	Hold	Bucket					
A2-Highland Heritage Park	3090	53%	19	0	0	0	0	0	1	19	26	0	4	0.0393701					
El Rancho	2340	64%	3	4	0	0	0	0	1	7	11	4	0	0.0393701	Mean			30.76	
Wx-A2-Trumbull (Hayman) - Precip	100260	68%	10	2	0	0	1	0	0	13	19	6	0	0.0393701	Median			28	
Morrison	2330	70%	14	6	0	1	0	0	0	21	30	9	1	0.0393701	St. Dev			15.7	
WX-EPC at Hwy 105	3010	72%	16	3	1	1	0	0	2	21	29	8	0	0.0393701	Mean plus 3 SD			77.88	
Martin Gulch	4040	73%	19	2	2	1	0	0	0	24	33	9	0	0.0393701	Mean minus 2 SD			0	
Sunshine	4160	75%	2	1	0	0	0	0	0	3	4	1	0	0.0393701	Min			2	
Indian Hills	2360	76%	14	4	1	0	0	0	0	19	25	6	0	0.0393701	Max			125	
Spruce Mt - Douglas	2890	76%	16	1	1	1	0	0	0	19	25	6	0	0.0393701					
Choke Cherry Resvr	2320	79%	24	4	2	0	0	0	0	30	38	8	0	0.0393701					
SPR at Henderson	1660	80%	15	5	0	0	0	0	0	20	25	5	0	0.0393701					
Eagle Ridge	4520	80%	19	4	1	0	0	0	0	24	30	6	0	0.0393701					
Gold Lake	4180	82%	22	6	0	0	0	0	0	28	34	6	0	0.0393701					
Fire Sta 47	3060	83%	23	6	0	0	0	0	0	29	35	6	0	0.0393701					
Red Hill	4290	84%	32	4	0	1	0	0	0	37	44	7	0	0.0393701					
SBC @ SB Road	4870	85%	32	7	0	0	0	0	2	39	46	7	0	0.0393701					
Cherry Cr @ Steele	1720	85%	24	3	1	0	0	0	0	28	33	5	0	0.0393701					
Dakan Rd	2980	86%	16	1	1	0	0	0	0	18	21	3	0	0.0393701					
Van Bibber @ Hwy 93	330	86%	18	0	0	1	0	0	0	19	22	3	0	0.0393701					
Pine Cliff Road	2810	88%	6	1	0	0	0	0	0	7	8	1	0	0.0393701					
Iliff Pond	650	88%	19	1	1	0	0	0	0	21	24	3	0	0.0393701					
Apple Valley	4490	88%	26	0	2	0	0	0	0	28	32	4	0	0.0393701					
Hansen Rain	4330	88%	38	2	2	0	0	0	0	42	48	6	0	0.0393701					
Cannon Mountain	4270	89%	27	4	0	0	0	0	0	31	35	4	0	0.0393701					
Broomfield 3207	1200	89%	14	2	0	0	0	0	0	16	18	2	0	0.0393701					
Wx-Highlands Ranch WTP	2710	89%	14	2	0	0	0	0	0	16	18	2	0	0.0393701					
Russelville Gulch-Douglas	2900	89%	31	2	1	0	0	0	0	34	38	4	0	0.0393701					
Aurora Regional Pond	940	90%	23	3	0	0	0	0	0	26	29	3	0	0.0393701					
Flying J	850	90%	54	0	0	2	0	0	0	56	62	6	1	0.0393701					
Cherry Cr bl Bayou Glch	2850	91%	44	5	0	0	0	0	0	49	54	5	0	0.0393701					
Idledale	2350	91%	27	3	0	0	0	0	0	30	33	3	0	0.0393701					
Genesee Village	2310	91%	40	0	0	0	1	0	0	41	45	4	0	0.0393701					
A2-Thorncreek - Precip	100420	91%	28	3	0	0	0	0	0	31	34	3	0	0.0393701					
West Woods	120	91%	20	0	1	0	0	0	0	21	23	2	0	0.0393701					
Toll Gate @ 6th	700	92%	20	2	0	0	0	0	0	22	24	2	0	0.0393701					
Chatfield COE	1350	92%	20	2	0	0	0	0	0	22	24	2	0	0.0393701					
Indian Creek	2960	92%	20	2	0	0	0	0	0	22	24	2	0	0.0393701					
Rampart Range Rd-Satellite	2970	92%	20	2	0	0	0	0	0	22	24	2	0	0.0393701					
Third Creek at DIA	1480	92%	21	2	0	0	0	0	0	23	25	2	0	0.0393701					
Riverside	4340	92%	32	3	0	0	0	0	0	35	38	3	0	0.0393701					
Denver Zoo	1360	92%	22	2	0	0	0	0	0	24	26	2	0	0.0393701					
Wx-Spring Valley Rd-DougCnty	2930	92%	22	2	0	0	0	0	0	24	26	2	0	0.0393701					
Crescent	4010	92%	22	2	0	0	0	0	0	24	26	2	0	0.0393701					
Sulphur Gulch	2840	93%	23	2	0	0	0	0	0	25	27	2	0	0.0393701					
Wx-West Creek WX	3020	93%	25	0	1	0	0	0	0	26	28	2	0	0.0393701					
Wx-Tomah Rd-DougCnty	2990	93%	13	1	0	0	0	0	0	14	15	1	0	0.0393701					
Lakeshore	4060	93%	26	2	0	0	0	0	0	28	30	2	0	0.0393701					
Wx-Button Rock	4790	93%	26	2	0	0	0	0	0	28	30	2	0	0.0393701					
Quincy/Highline	620	94%	14	1	0	0	0	0	0	15	16	1	0	0.0393701					
Upper Sloan Det.	1400	94%	14	1	0	0	0	0	0	15	16	1	0	0.0393701					
Slaughterhouse Glch	1620	94%	14	1	0	0	0	0	0	15	16	1	0	0.0393701					
A2-Brantner Gulch - Precip	100410	94%	28	2	0	0	0	0	0	30	32	2	2	0.0393701					
St. Antons	4570	94%	28	2	0	0	0	0	0	30	32	2	0	0.0393701					
Coal Creek at Twin Spruce Rd - Precipitation	100490	94%	29	0	1	0	0	0	0	30	32	2	0	0.0393701					
Conifer Hill	4350	94%	29	2	0	0	0	0	0	31	33	2	0	0.0393701					
Lee Hill Rain 2012	4320	94%	30	2	0	0	0	0	0	32	34	2	0	0.0393701					
SBC @ San Souci	4830	94%	31	2	0	0	0	0	0	33	35	2	0	0.0393701					

Wx-Urban Farm	1460	94%	16	1	0	0	0	0	0	0	17	18	1	0	0.0393701		
A2-Sellers Gulch at Haystack Precip	100150	94%	16	1	0	0	0	0	0	0	17	18	1	0	0.0393701		
Red Garden	4030	94%	32	2	0	0	0	0	0	0	34	36	2	0	0.0393701		
Fling's	4220	94%	32	2	0	0	0	0	0	0	34	36	2	0	0.0393701		
Golden Age	4230	94%	33	0	1	0	0	0	0	0	34	36	2	0	0.0393701		
WX-Bingham Lake Park	3030	94%	48	3	0	0	0	0	0	0	51	54	3	0	0.0393701		
Denver West	1010	95%	17	1	0	0	0	0	0	0	18	19	1	0	0.0393701		
Columbine Open Space	2800	95%	17	1	0	0	0	0	0	0	18	19	1	0	0.0393701		
Wx-Cal-Wood Ranch	4770	95%	36	2	0	0	0	0	0	0	38	40	2	0	0.0393701		
Pump Sta 3	970	95%	37	2	0	0	0	0	0	0	39	41	2	0	0.0393701		
CC @ Russelville Road Precip	3040	95%	57	1	1	0	0	0	0	0	59	62	3	0	0.0393701		
Sable Ditch @ 18th	800	95%	20	1	0	0	0	0	0	0	21	22	1	0	0.0393701		
A2-Upper Sellers Gulch Precip	100140	95%	20	1	0	0	0	0	0	0	21	22	1	0	0.0393701		
Cub Cr below Blue	2270	96%	41	2	0	0	0	0	0	0	43	45	2	0	0.0393701		
Virginia Court	510	96%	43	0	1	0	0	0	0	0	44	46	2	0	0.0393701		
Geer Canyon	4250	96%	42	2	0	0	0	0	0	0	44	46	2	0	0.0393701		
Horseshoe Park Drop	710	96%	22	1	0	0	0	0	0	0	23	24	1	0	0.0393701		
Fire Station 12	840	96%	22	1	0	0	0	0	0	0	23	24	1	1	0.0393701		
Shop Creek	1710	96%	22	1	0	0	0	0	0	0	23	24	1	0	0.0393701		
Big Elk Park	4300	96%	22	1	0	0	0	0	0	0	23	24	1	0	0.0393701		
Brook Forest	2260	96%	44	2	0	0	0	0	0	0	46	48	2	0	0.0393701		
East Cherry Cr-Douglas	2910	96%	24	1	0	0	0	0	0	0	25	26	1	0	0.0393701		
LDC at 64th	1310	96%	25	1	0	0	0	0	0	0	26	27	1	0	0.0393701		
Kinney Peak	2280	96%	25	1	0	0	0	0	0	0	26	27	1	0	0.0393701		
ETG @ Buckley	820	97%	27	1	0	0	0	0	0	0	28	29	1	0	0.0393701		
SPR at 3rd Ave	1320	97%	27	1	0	0	0	0	0	0	28	29	1	0	0.0393701		
Lazy Acres	4200	97%	27	1	0	0	0	0	0	0	28	29	1	0	0.0393701		
A2-Havana Pond Precip	100230	97%	27	1	0	0	0	0	0	0	28	29	1	1	0.0393701		
Fire Station #19	530	97%	28	1	0	0	0	0	0	0	29	30	1	0	0.0393701		
A2-Weir Gulch - Precip	100320	97%	28	1	0	0	0	0	0	0	29	30	1	0	0.0393701		
Parker/Mississippi	540	97%	29	1	0	0	0	0	0	0	30	31	1	0	0.0393701		
Lena @ U.S. Hwy 6	1040	97%	30	1	0	0	0	0	0	0	31	32	1	0	0.0393701		
Swiss Peaks	4130	97%	30	1	0	0	0	0	0	0	31	32	1	0	0.0393701		
Red Rocks Park	2370	97%	31	1	0	0	0	0	0	0	32	33	1	0	0.0393701		
Johnny Park	4310	97%	31	1	0	0	0	0	0	0	32	33	1	0	0.0393701		
Pinewood Springs	4510	97%	32	1	0	0	0	0	0	0	33	34	1	0	0.0393701		
Rio Grande	4020	97%	33	1	0	0	0	0	0	0	34	35	1	0	0.0393701		
Nott Creek	150	97%	35	1	0	0	0	0	0	0	36	37	1	0	0.0393701		
Bear Peak	4070	97%	35	1	0	0	0	0	0	0	36	37	1	0	0.0393701		
Slaughterhouse	4190	97%	36	1	0	0	0	0	0	0	37	38	1	0	0.0393701		
Wx-Brighton	1920	98%	39	1	0	0	0	0	0	0	40	41	1	0	0.0393701		
Willow Creek - DougCnty	2940	98%	39	1	0	0	0	0	0	0	40	41	1	0	0.0393701		
Bear Cr below Cub	2230	98%	43	1	0	0	0	0	0	0	44	45	1	0	0.0393701		
Utah Park	430	98%	86	2	0	0	0	0	0	0	88	90	2	0	0.0393701		
Rosedale	2250	98%	44	1	0	0	0	0	0	0	45	46	1	0	0.0393701		
No Name @ Quincy	730	98%	47	1	0	0	0	0	0	0	48	49	1	0	0.0393701		
Justice Center	4360	98%	51	1	0	0	0	0	0	0	52	53	1	0	0.0393701		
Temple Pond at DTC	630	98%	121	2	0	0	0	0	0	0	123	125	2	0	0.0393701		
Powers Park	1500	99%	100	1	0	0	0	0	0	0	101	102	1	0	0.0393701		
NREL/S. Table Mtn.	1030	100%	2	0	0	0	0	0	0	0	2	2	0	0	0.0393701		
Englewood Dam	1600	100%	4	0	0	0	0	0	0	0	4	4	0	1	0.0393701		
West Metro FS13	1370	100%	7	0	0	0	0	0	0	0	7	7	0	0	0.0393701		
Heritage Square	1060	100%	9	0	0	0	0	0	0	0	9	9	0	0	0.0393701		
Haskins Gulch Conf	2820	100%	9	0	0	0	0	0	0	0	9	9	0	0	0.0393701		
Happy Canyon at N Surrey Dr	2880	100%	10	0	0	0	0	0	0	0	10	10	0	0	0.0393701		
East/West Trailhead	3050	100%	10	0	0	0	0	0	0	0	10	10	0	0	0.0393701		
Little Narrows	4470	100%	10	0	0	0	0	0	0	0	10	10	0	0	0.0393701		
Wx-A2-Diamond Hill	1420	100%	12	0	0	0	0	0	0	0	12	12	0	0	0.0393701		
Goldsmith @ Eastman	640	100%	13	0	0	0	0	0	0	0	13	13	0	0	0.0393701		
Wx-Castle Rock	2750	100%	13	0	0	0	0	0	0	0	13	13	0	0	0.0393701		
Trail Creek	5740	100%	13	0	0	0	0	0	0	0	13	13	0	0	0.0393701		
A2-PlumCr at Sedalia - Precip	100290	100%	13	0	0	0	0	0	0	0	13	13	0	0	0.0393701		

Stump Bump	5810	100%	14	0	0	0	0	0	0	0	14	14	0	0	0.0393701		
Leyden Reservoir	200	100%	15	0	0	0	0	0	0	0	15	15	0	0	0.0393701		
Leyden Confluence	210	100%	15	0	0	0	0	0	0	0	15	15	0	0	0.0393701		
Cedar Mountain	5860	100%	15	0	0	0	0	0	0	0	15	15	0	0	0.0393701		
Log Jumper	5940	100%	15	0	0	0	0	0	0	0	15	15	0	0	0.0393701		
SPR at Union Ave.	1640	100%	17	0	0	0	0	0	0	0	17	17	0	0	0.0393701		
West Cherry Head-Douglas Cnty	2920	100%	17	0	0	0	0	0	0	0	17	17	0	0	0.0393701		
Horse Creek-Satellite	5900	100%	17	0	0	0	0	0	0	0	17	17	0	0	0.0393701		
Mission Viejo Park	760	100%	18	0	0	0	0	0	0	0	18	18	0	0	0.0393701		
Hackett Mountain	5880	100%	18	0	0	0	0	0	0	0	18	18	0	0	0.0393701		
Upper Leyden	220	100%	19	0	0	0	0	0	0	0	19	19	0	0	0.0393701		
DC Public Works	2950	100%	19	0	0	0	0	0	0	0	19	19	0	0	0.0393701		
A2-Blackstone Precip	100100	100%	19	0	0	0	0	0	0	0	19	19	0	0	0.0393701		
A2-CoalCreek at McCaslin - Precip	100300	100%	19	0	0	0	0	0	0	0	19	19	0	0	0.0393701		
Sports Complex	320	100%	20	0	0	0	0	0	0	0	20	20	0	0	0.0393701		
Montview Park	400	100%	20	0	0	0	0	0	0	0	20	20	0	0	0.0393701		
A2-Maple Grove Resv.	1000	100%	20	0	0	0	0	0	0	0	20	20	0	0	0.0393701		
Jeffco Fairgrounds	1050	100%	20	0	0	0	0	0	0	0	20	20	0	0	0.0393701		
Cherry Cr @ Champa	1700	100%	20	0	0	0	0	0	0	0	20	20	0	0	0.0393701		
Niver Detention	1900	100%	20	0	0	0	0	0	0	0	20	20	0	1	0.0393701		
Wx-A2-WestCreek (Hayman) - Precip	100270	100%	20	0	0	0	0	0	0	0	20	20	0	0	0.0393701		
A2-Carr Street	100	100%	21	0	0	0	0	0	0	0	21	21	0	0	0.0393701		
Harvard @ Jackson	610	100%	21	0	0	0	0	0	0	0	21	21	0	0	0.0393701		
Wx-Salisbury Park	2730	100%	21	0	0	0	0	0	0	0	21	21	0	0	0.0393701		
Havana Park	500	100%	22	0	0	0	0	0	0	0	22	22	0	0	0.0393701		
Piney at Liverpool	950	100%	22	0	0	0	0	0	0	0	22	22	0	0	0.0393701		
Sand Creek Park	1800	100%	22	0	0	0	0	0	0	0	22	22	0	0	0.0393701		
A2-Westerly Cr Dam Precip	100240	100%	22	0	0	0	0	0	0	0	22	22	0	0	0.0393701		
Ralston Reservoir	110	100%	23	0	0	0	0	0	0	0	23	23	0	0	0.0393701		
Hidden Lake	1300	100%	23	0	0	0	0	0	0	0	23	23	0	0	0.0393701		
Sanderson at Xavier	1340	100%	23	0	0	0	0	0	0	0	23	23	0	0	0.0393701		
Walker Ranch	4050	100%	23	0	0	0	0	0	0	0	23	23	0	0	0.0393701		
A2-Sand Creek at Colfax Precip	100160	100%	23	0	0	0	0	0	0	0	23	23	0	0	0.0393701		
Louisville Rec Ctr	1100	100%	24	0	0	0	0	0	0	0	24	24	0	0	0.0393701		
Wx-Marston Lake North	1520	100%	24	0	0	0	0	0	0	0	24	24	0	1	0.0393701		
Four Mile Creek	5720	100%	24	0	0	0	0	0	0	0	24	24	0	0	0.0393701		
Van Bibber Park	300	100%	25	0	0	0	0	0	0	0	25	25	0	0	0.0393701		
Kelly Dam	410	100%	25	0	0	0	0	0	0	0	25	25	0	0	0.0393701		
Fire Station #7	440	100%	25	0	0	0	0	0	0	0	25	25	0	0	0.0393701		
Confluence Pond	720	100%	25	0	0	0	0	0	0	0	25	25	0	0	0.0393701		
Granby Ditch @ 6th	810	100%	25	0	0	0	0	0	0	0	25	25	0	0	0.0393701		
Wx-Louisville Lake	4750	100%	25	0	0	0	0	0	0	0	25	25	0	0	0.0393701		
Jewell Detention	520	100%	26	0	0	0	0	0	0	0	26	26	0	0	0.0393701		
Lakewood CC	1550	100%	26	0	0	0	0	0	0	0	26	26	0	0	0.0393701		
Bear Creek @ Lowell	1530	100%	27	0	0	0	0	0	0	0	27	27	0	0	0.0393701		
CC at Stroh Rd	2860	100%	27	0	0	0	0	0	0	0	27	27	0	0	0.0393701		
Tallman Gulch	3080	100%	27	0	0	0	0	0	0	0	27	27	0	0	0.0393701		
Guy Hill Ranch	310	100%	28	0	0	0	0	0	0	0	28	28	0	0	0.0393701		
Gold Hill	4150	100%	29	0	0	0	0	0	0	0	29	29	0	0	0.0393701		
West Creek	5730	100%	29	0	0	0	0	0	0	0	29	29	0	0	0.0393701		
Cold Sprg Gich conf	2240	100%	31	0	0	0	0	0	0	0	31	31	0	0	0.0393701		
Sunset	4240	100%	31	0	0	0	0	0	0	0	31	31	0	0	0.0393701		
Whispering Pines	4880	100%	32	0	0	0	0	0	0	0	32	32	0	0	0.0393701		
Cottonwood (Apache)	2870	100%	33	0	0	0	0	0	0	0	33	33	0	0	0.0393701		
Doudy Draw	4820	100%	33	0	0	0	0	0	0	0	33	33	0	0	0.0393701		
Shanahan Ridge	4810	100%	34	0	0	0	0	0	0	0	34	34	0	0	0.0393701		
Upper Coal Creek at Camp Eden Rd - Precipitation	100500	100%	34	0	0	0	0	0	0	0	34	34	0	0	0.0393701		
Wx-Blue Mountain	140	100%	35	0	0	0	0	0	0	0	35	35	0	0	0.0393701		
Wx-Hiwan G.C.	2210	100%	35	0	0	0	0	0	0	0	35	35	0	0	0.0393701		
Logan Mill	4140	100%	35	0	0	0	0	0	0	0	35	35	0	0	0.0393701		
Taylor Mountain	4260	100%	35	0	0	0	0	0	0	0	35	35	0	0	0.0393701		
Wx-Ward C-1	4710	100%	43	0	0	0	0	0	0	0	43	43	0	0	0.0393701		

Wx-Sugarloaf	4730	100%	43	0	0	0	0	0	0	43	43	0	0	0.0393701		
A2-Newlin Gulch Precip	3070	100%	44	0	0	0	0	0	0	44	44	0	0	0.0393701		
A2-ETG @ Hampden Precip	100110	100%	45	0	0	0	0	0	0	45	45	0	0	0.0393701		
Side Creek Park	830	100%	46	0	0	0	0	0	0	46	46	0	0	0.0393701		
Winiger Ridge	4530	100%	46	0	0	0	0	0	0	46	46	0	0	0.0393701		
Boulder Jail	4550	100%	46	0	0	0	0	0	0	46	46	0	0	0.0393701		
Wx-Elbert	1440	100%	47	0	0	0	0	0	0	47	47	0	0	0.0393701		
Twin Sisters	4080	100%	49	0	0	0	0	0	0	49	49	0	0	0.0393701		
Pine Brook	4170	100%	49	0	0	0	0	0	0	49	49	0	0	0.0393701		
Expo Park	420	100%	50	0	0	0	0	0	0	50	50	0	0	0.0393701		
Betasso	4110	100%	50	0	0	0	0	0	0	50	50	0	0	0.0393701		
SBC@S Boulder Ditch	4840	100%	54	0	0	0	0	0	0	54	54	0	0	0.0393701		
Harvard Gulch Park	600	100%	55	0	0	0	0	0	0	55	55	0	0	0.0393701		
Wx-Quincy Reservoir	750	100%	55	0	0	0	0	0	0	55	55	0	1	0.0393701		
A2-Murphy Creek GC	870	100%	55	0	0	0	0	0	0	55	55	0	3	0.0393701		
Wx-Aurora Town Hall	920	100%	55	0	0	0	0	0	0	55	55	0	0	0.0393701		
Wx-Brighton Ditch	1570	100%	56	0	0	0	0	0	0	56	56	0	2	0.0393701		
Gunbarrel	1110	100%	60	0	0	0	0	0	0	60	60	0	1	0.0393701		
Magnolia	4090	100%	60	0	0	0	0	0	0	60	60	0	0	0.0393701		
Filter Plant	4100	100%	60	0	0	0	0	0	0	60	60	0	1	0.0393701		
		Total Tips	5692	188	22	8	2	0								
Wx-A2-OneRain Weather - Precipitation	100200	80%	86	21	3	0	0	0	0	110	137	27	12	0.01		
Wx-A2-Magnolia WX-Precip	6601	93%	182	2	0	1	1	1	0	187	201	14	12	0.01		
Fairview Peak	4860	97%	176	6	0	0	0	0	0	182	188	6	10	0.01		
Porphyry Mtn	4850	99%	115	1	0	0	0	0	0	116	117	1	1	0.01		

2018 Monthly Peak Hour ALERT Radio Traffic Summary

