

**CITY OF SPOKANE,
WASHINGTON**

CSO FLOW MONITORING PROJECT

FLOW, FREQUENCY AND DURATION

SEWER MAINTENANCE

**Monthly Report
March 2016**

April 15, 2016
CSOMonthly2016-03

OVERFLOW EVENTS

Table 1 – Flow-Frequency-Duration, provides a summary of the flow volume calculated for the overflow pipes at each site for each event recorded. The flow calculations are based on flow monitor recorded level and velocity measurements.

Table 1 – Flow-Frequency-Duration

| Line No. | Regulator Location | CSO No. | Freq. | Date of event ¹ | Estimated Total Flow (Gallons) ² | Event Duration (Min. of Overflow) | Comments |
|----------|---------------------------|---------|-------|----------------------------|---|-----------------------------------|---|
| 1 | AL Parkway Storage (West) | 2 | None | | | | Missing data 03/16 08:10 to 03/16 08:15 |
| 2 | NW Blvd @ Kiernan | 6 | None | | | | Missing data 03/14 08:20 to 03/14 08:25 |
| 3 | Columbia @ Downriver | 7 | None | | | | |
| 4 | Nettleton @ York/Buckeye | 10 | None | | | | Missing data 03/30 10:30 to 03/30 10:35 |
| 5 | Nora @ Pettet | 12 | 6 | Total | 813,450 | 670 | Missing data 03/16 09:30 to 03/16 09:35 |
| | | | | 03/01 | 139,796 | 60 | |
| | | | | 03/06 | 50,105 | 85 | |
| | | | | 03/09 | 130,562 | 210 | |
| | | | | 03/13 | 53,176 | 40 | |
| | | | | 03/20 | 341,003 | 215 | |
| | | | | 03/27 | 98,808 | 60 | |
| 6 | Sherwood @ Summit | 14 | 3 | Total | 5,911 | 35 | |
| | | | | 03/01 | 2,670 | 15 | |
| | | | | 03/06 | 3,097 | 15 | |
| | | | | 03/22 | 144 | 5 | |
| 7 | Nettleton @ Ohio | 15 | None | | | | |
| 8 | A @ Linton | 16B | None | | | | |
| 9 | 7th @ Inland Empire | 19 | None | | | | |
| 10 | 3500 High Drive | 20 | None | | | | |
| 11 | Main @ Oak | 22B | None | | | | |
| 12 | Cedar @ Ide | 23 | 2 | Total | 8,459 | 115 | |
| | | | | 03/01 | 2,536 | 35 | |
| | | | | 03/21 | 5,923 | 80 | |

¹ Designation as an event means that both a level and velocity reading were recorded concurrently. Not all level and velocity readings that were coincident are included in this report, however. The level and velocity readings that appear to be “background noise” from the electronic equipment are not included in the table.

² The flows presented in this column are calculated from measurements of velocity and depth of flow by electronic devices inserted in the water stream. These measurements are subject to singular and possibly cumulative errors. These errors result from limitations inherent in the measuring devices and from the introduction of a measuring device in to the physical flow stream. Also, error in velocity and depth measurements may be and typically are introduced by the physical conditions of each site. The flow numbers presented in this table are estimates only.

| Line No. | Regulator Location | CSO No. | Freq. | Date of event ¹ | Estimated Total Flow (Gallons) ² | Event Duration (Min. of Overflow) | Comments |
|-----------|-----------------------------------|------------|-------------|----------------------------|---|-----------------------------------|--|
| 13 | Riverside @ Cedar (West) | 24A | 5 | Total | 3,326,104 | 850 | |
| | | | | 03/01 | 762,986 | 100 | |
| | | | | 03/06 | 91,930 | 115 | |
| | | | | 03/06 | 759,761 | 265 | |
| | | | | 03/20 | 1,535,898 | 305 | |
| | | | | 03/27 | 175,529 | 65 | |
| 14 | Riverside @ Cedar (East) | 24B | 2 | Total | 1,273 | 20 | |
| | | | | 03/01 | 285 | 10 | |
| | | | | 03/21 | 988 | 10 | |
| 15 | Cedar @ Main | 25 | 5 | Total | 84,245 | 365 | Missing Data 03/14 09:00 to 03/14 09:55 |
| | | | | 03/01 | 17,236 | 40 | |
| | | | | 03/09 | 8,822 | 105 | |
| | | | | 03/13 | 9,414 | 25 | |
| | | | | 03/20 | 41,611 | 175 | |
| | | | | 03/27 | 7,162 | 20 | |
| 16 | Riverside @ Lincoln | 26 | 6 | Total | 7,176,916 | 1,335 | |
| | | | | 03/01 | 1,145,640 | 120 | |
| | | | | 03/05 | 636,051 | 310 | |
| | | | | 03/09 | 1,508,379 | 300 | |
| | | | | 03/13 | 584,377 | 90 | |
| | | | | 03/20 | 2,702,303 | 425 | |
| | | | | 03/27 | 600,166 | 90 | |
| 17 | Arthur @ 5th | 33A | 4 | Total | 6,274 | 70 | |
| | | | | 03/01 | 2,597 | 25 | |
| | | | | 03/13 | 1,376 | 15 | |
| | | | | 03/21 | 2,117 | 25 | |
| | | | | 03/27 | 184 | 5 | |
| 18 | Perry @ 3rd | 33B | 3 | Total | 866,100 | 85 | Missing data 03/19 12:55 to 03/19 13:00 |
| | | | | 03/01 | 425,971 | 30 | |
| | | | | 03/13 | 76,073 | 15 | |
| | | | | 03/22 | 364,056 | 40 | |
| 19 | Arthur @ 3rd | 33C | 4 | Total | 14,987 | 125 | Missing data 03/15 07:50 to 03/15 08:55 |
| | | | | 03/01 | 7,067 | 30 | |
| | | | | 03/13 | 1,727 | 20 | |
| | | | | 03/21 | 3,877 | 45 | |
| | | | | 03/27 | 2,316 | 30 | |
| 20 | Arthur @ 1st | 33D | None | | | | |
| 21 | Riverside @ Napa/Crestline | 34 | 5 | Total | 489,654 | 515 | |
| | | | | 03/01 | 188,586 | 75 | |
| | | | | 03/09 | 54,223 | 205 | |
| | | | | 03/13 | 79,364 | 60 | |
| | | | | 03/22 | 116,722 | 120 | |
| | | | | 03/27 | 50,759 | 55 | |
| 22 | S. Riverton @ Magnolia | 38 | None | | | | |
| 23 | Rebecca @ Upriver | 41 | 5 | Total | 52,313 | 215 | |
| | | | | 03/01 | 14,966 | 50 | |
| | | | | 03/10 | 239 | 25 | |
| | | | | 03/13 | 7,276 | 45 | |
| | | | | 03/22 | 24,935 | 60 | |
| | | | | 03/27 | 4,897 | 35 | |

March 2016

| Line No. | Regulator Location | CSO No. | Freq. | Date of event ¹ | Estimated Total Flow (Gallons) ² | Event Duration (Min. of Overflow) | Comments |
|----------|--------------------------|---------|-----------|----------------------------|---|-----------------------------------|---|
| 24 | Riverton @ Surro | 42 | None | | | | Missing data 03/15 09:10 to 03/15 10:10 |
| 25 | RPWRF CSO-Related Bypass | N/A | None | | | | Permit Section S13.H |
| | Monthly Total | | 50 | | 12,845,686 | 4,400 | No Dry Weather Overflows No RPWRF CSO-Related Bypasses |

Table 2 – Rainfall Summary³

| | 1004 | 343 | 344 | Shadle | Hartson | CityHall | Joe_Albi | RkwdVsta | Station8 | W_Drive | Nora&Pet | GEG | | | NWS | | | SFF |
|----------|------|------|------|--------|---------|----------|----------|----------|----------|---------|----------|------|------|------|------|------|------|------|
| Date | Rain | Rain | Rain | Rain | Rain | Rain | Rain | Rain | Rain | Rain | Rain | Rain | Snow | Dpth | Rain | Snow | Dpth | Rain |
| 03/01/16 | 0.35 | 0.42 | 0.38 | 0.35 | 0.36 | 0.33 | 0.35 | 0.48 | 0.31 | 0.39 | 0.37 | 0.34 | T | - | 0.37 | T | - | 0.34 |
| 03/02/16 | - | 0.01 | - | - | - | - | - | - | - | - | - | T | - | - | T | - | - | - |
| 03/03/16 | 0.02 | 0.06 | 0.04 | 0.01 | 0.04 | 0.03 | - | 0.03 | 0.02 | 0.04 | 0.04 | 0.03 | M | - | 0.01 | - | M | 0.04 |
| 03/04/16 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | M | - |
| 03/05/16 | 0.21 | 0.18 | 0.16 | 0.16 | 0.14 | 0.13 | 0.17 | 0.20 | 0.11 | 0.17 | 0.14 | 0.26 | M | - | 0.28 | - | - | 0.20 |
| 03/06/16 | 0.47 | 0.35 | 0.34 | 0.42 | 0.33 | 0.42 | 0.37 | 0.51 | 0.32 | 0.53 | 0.47 | 0.36 | M | - | 0.39 | - | M | 0.26 |
| 03/07/16 | 0.03 | 0.02 | 0.01 | 0.01 | 0.02 | 0.03 | 0.02 | 0.01 | 0.02 | 0.03 | 0.01 | 0.03 | - | - | 0.02 | - | - | 0.01 |
| 03/08/16 | OP | 0.01 | - | - | - | - | - | - | - | - | - | T | T | - | T | - | - | 0.01 |
| 03/09/16 | 0.37 | 0.36 | 0.32 | 0.25 | 0.27 | 0.28 | 0.30 | 0.45 | 0.20 | 0.36 | 0.33 | 0.44 | - | - | 0.46 | - | - | 0.28 |
| 03/10/16 | 0.22 | 0.20 | 0.18 | 0.18 | 0.22 | 0.21 | 0.20 | 0.30 | 0.20 | 0.23 | 0.22P | 0.12 | - | - | 0.06 | - | - | 0.12 |
| 03/11/16 | 0.07 | 0.07 | 0.06 | 0.11 | 0.05 | 0.10 | 0.11 | 0.09 | 0.05 | 0.10 | 0.11 | 0.14 | - | - | 0.12 | - | - | 0.10 |
| 03/12/16 | 0.31 | 0.22 | 0.19 | 0.23 | 0.22 | 0.19 | 0.32 | 0.29 | 0.17 | 0.25 | 0.25 | 0.16 | - | - | 0.32 | - | M | 0.18 |
| 03/13/16 | 0.18 | 0.19 | 0.13 | 0.12 | 0.19 | 0.16 | 0.19 | 0.25 | 0.15 | 0.16 | 0.14 | 0.15 | - | - | 0.11 | - | - | 0.13 |
| 03/14/16 | - | - | - | - | - | - | - | - | - | - | - | T | T | - | T | T | - | T |
| 03/15/16 | - | - | - | 0.02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.01 |
| 03/16/16 | - | - | - | - | - | - | - | - | - | - | OP | T | - | - | T | - | - | - |
| 03/17/16 | OP | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 03/18/16 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 03/19/16 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 03/20/16 | 0.12 | 0.10 | 0.08 | 0.13 | 0.09 | 0.09 | 0.13 | 0.09 | 0.10 | 0.11 | 0.12 | 0.11 | - | - | 0.13 | - | - | 0.13 |
| 03/21/16 | 0.02 | 0.07 | 0.08 | 0.09 | 0.14 | 0.10 | 0.06 | 0.11 | 0.04 | 0.04 | 0.14P | 0.03 | - | - | 0.02 | - | - | 0.18 |
| 03/22/16 | 0.65 | 0.68 | 0.67 | 0.59 | 0.66 | 0.58 | 0.53 | 0.85 | 0.61 | 0.68 | 0.71 | 0.70 | - | - | 0.82 | T | - | 0.48 |
| 03/23/16 | 0.09 | 0.09 | 0.09 | 0.05 | 0.09 | 0.06 | 0.09 | 0.11 | 0.07 | 0.09 | 0.08 | 0.08 | - | - | 0.09 | - | - | 0.06 |
| 03/24/16 | 0.02 | 0.02 | 0.03 | 0.02 | 0.03 | 0.02 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | T | - | - | T | - | - | 0.02 |
| 03/25/16 | OP | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 03/26/16 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 03/27/16 | 0.19 | 0.24 | 0.27 | 0.22 | 0.39 | 0.31 | 0.23 | 0.42 | 0.35 | 0.33 | 0.50 | 0.26 | T | - | 0.36 | T | - | 0.49 |
| 03/28/16 | 0.07 | 0.30 | 0.19 | 0.14 | 0.21 | 0.11 | 0.06 | 0.16 | 0.14 | 0.15 | 0.11 | 0.09 | 0.60 | - | 0.06 | T | - | 0.18 |
| 03/29/16 | - | 0.01 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | M | - |
| 03/30/16 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 03/31/16 | - | - | - | - | - | - | - | - | - | - | OP | - | - | - | - | - | - | - |
| Total | 3.39 | 3.60 | 3.22 | 3.10 | 3.45 | 3.15 | 3.15 | 4.38E | 2.88 | 3.68 | 3.76 | 3.30 | 0.6 | | 3.62 | 0.0 | | 3.22 |

- E - Erroneous data
- M - Missing data
- P - Partial missing data
- T - Trace of rain/snow
- X - Out of Service

Table 3 – Rain Gauges

| | |
|----------|------------------------------------|
| 1004 | Airway Heights |
| 343 | 23 rd & Ray |
| 344 | Division & Manito |
| Shadle | Shadle Water Tower (was 345) |
| Hartson | Ray & Hartson (was 346) |
| CityHall | City Hall (was 347) |
| Joe_Albi | Joe Albi Stadium |
| RkwdVsta | Rockwood Vista |
| Station8 | Fire Station 8, Rebecca & Mission |
| W_Drive | West Drive Reservoir |
| Nora&Pet | Nora & Pettet |
| GEG | Spokane Airport |
| NWS | National Weather Service – Spokane |
| SFF | Spokane Felts Field |

³ Some rain gauges are heated. Consequently they will tend to record snow melt immediately as rain. The rain gauges that are not heated will typically register snow melt when it actually melts.