12/2/2015

West Side Interceptor (WSI) Deviation Status: In 2008, the need for a WSI was identified in the Sewer Facility Plan Update as a solution to the growth occurring on the north and west sides of Kalispell. Over the past several years the City has been moving forward with funding and construction planning of the WSI, and concurrently obtaining management deviations from Montana Department of Environmental Quality (MDEQ) to allow for continued sewer connections.

The first MDEQ deviation allowed approval of Municipal Facility Exclusions (MFEs) beyond the capacity of Grandview Lift Station (860 gpm), and was granted contingent upon pumping capacity triggers and annual monitoring. The second MDEQ deviation, granted in 2014, allows the City to manage flows from new developments north and west of the defined "Line A" bottleneck based on pipe capacity, providing the City commits to WSI construction triggers and monitoring.

Current status of the sewer flows, based on annual monitoring, at Grandview Lift Station and in "Line A", and DEQ WSI construction triggers are summarized below.

	Design Capacity	Current Flows	% of Capacity	Capacity Triggers
Grandview Lift Station	860 gpm	554 gpm[1]	64%	1. 80% begin WSI design 2. 90% secure WSI funding 3. 95% begin WSI construction 4. 100% stop issuing building permits until completion of WSI
Line A	1,696.5 gpm	897 gpm[2]	53%	1. 70% complete WSI design 2. 75% secure WSI funding 3. 80% begin WSI construction 4. 85% stop issuing building permits for areas upstream of the bottleneck. 5. These conditions will not override or void conditions previously placed on Grandview Lift Station.
1. Peak Hour Flows-9/27/2015, 2. Peak Hour Flows				

Construction Management: New development and redevelopment construction projects involving City utilities and infrastructure are continually active this winter season. Construction Management is participating in the oversight of the following active and recently completed projects:

1. The Juicery (Complete)
2. KRMC Parking Lot Addition (Complete)
3. Popeye's Chicken(Complete)
4. The Summit Parking Lot Addition (Complete)
5. Beehive Homes (Active)
6. Bloomstone (Active)
7. Canvas Church (Active)
8. Captain's Marine (Active)
9. Cliff View (Active)
10. Flathead County South Campus (Active)
11. Flathead County Juvenile Detention Center(Active)
12. Owl View Townhouses (Active)
13. Spring Prairie 4 (Active)
14. Springhill Suites (Active)
15. Town Pump (Active)
16. Treeline Village Apartments (Active)
17. Utility Relocates for US 93 Bypass (Active)

KALISPELL
PUBLIC WORKS DEPARTMENT

August 14, 2015

Emily Gillespie, PE
MDEQ Public Water and Subdivision Section
655 Timberwolf Pkwy, Suite 3
Kalispell, MT 59901

RE: Peak Hour Flows EQ#15-1574 Deviation and EQ#09-2299 Deviation

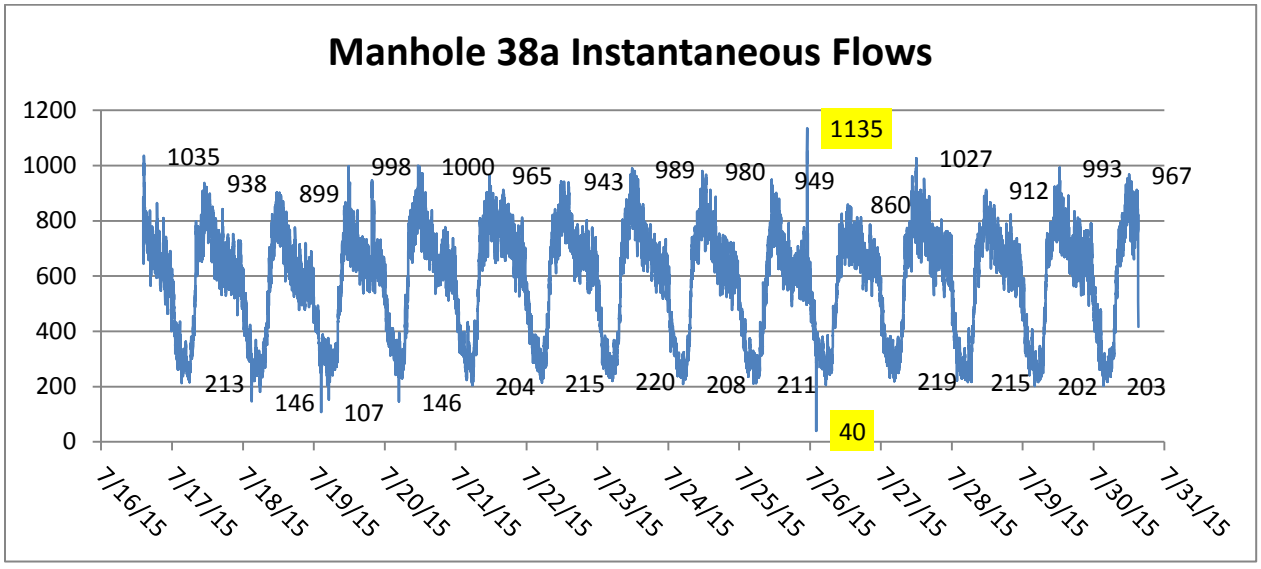
Dear Ms. Gillespie,

The purpose of this letter is to provide you a summary of sewer flows in accordance with the requirements of the deviations for Trunk Line A.

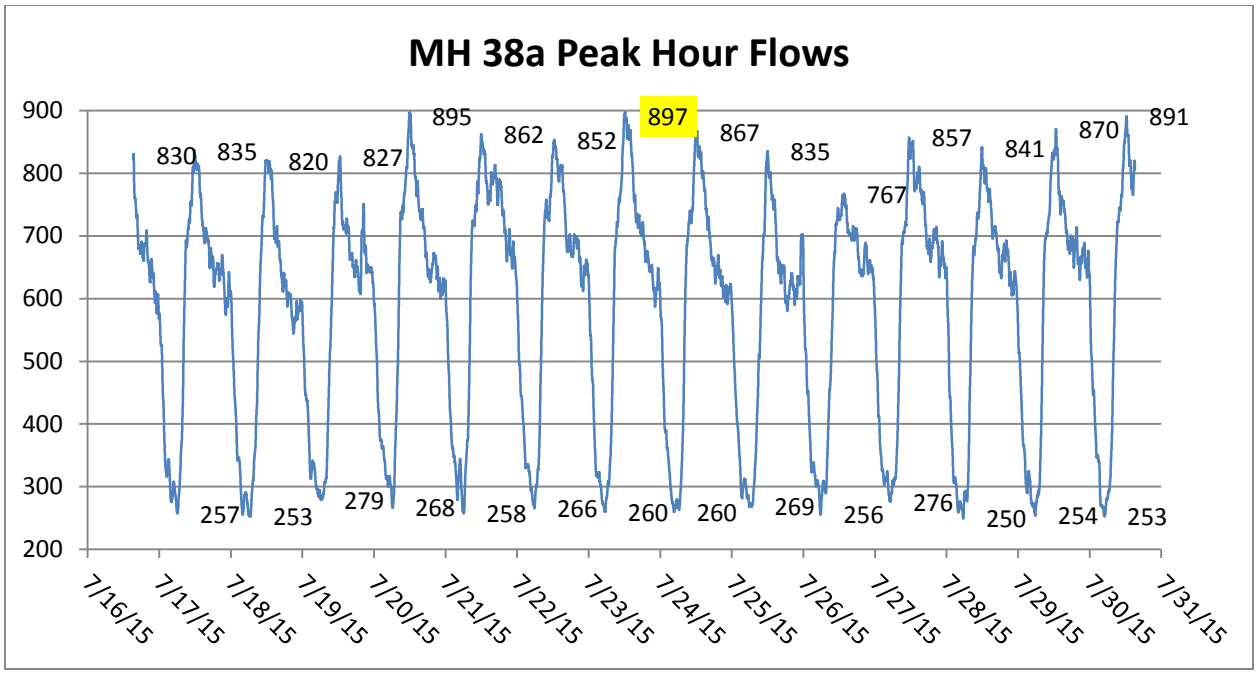
EQ#15-1574 Deviation – Flows from MH 38a

The flow data for EQ#15-1574 was collected by metering the inflow pipe to MH 38a over a two week period between July 16, 2015 and July 30, 2015. Flow velocity and depth were measured once every minute over this period by an ISCO Flow Meter. Data taken from the meter was downloaded and used to calculate flows in the main by calculating the area of the flow based on the measured flow depth and multiplying by the measured velocity inside the 18" clay pipe.

The highest instantaneous flow was calculated to be 1,135 gpm on July 25, 2015 at 11:00 pm. The lowest instantaneous flow occurred only a few hours later on July 26, 2015 at 2:06 am and was calculated to be 40 gpm. A graph of these calculated instantaneous flows is shown below.



Peak hour flows are used as the triggers in this deviation. Peak hour flows are calculated by summing each instantaneous flow with the 59 previous flows and dividing by 60. This method provides a continuous calculation of the peak hour flow throughout the data collection (starting at the 60th minute of data collection). Additionally, the data is normalized, removing some of the variation from point to point which is most likely attributable to flow surge influences from upstream lift stations. According to the data collected over the two week period of flow metering, the current peak hour flow is 897 gpm.



In order to determine the flow capacity of the existing main, the slope of the main is required. The inverts of the main are unknown and were not collected as part of the metering. However, based on the calculated flows and the measured flow depths, the hydraulic radius and wetted perimeter can be calculated and used to determine the slope of the main using Manning's Equation. The average slope for all data points is calculated as 0.15%, using an n-value for vitrified clay pipe of 0.014. This is slightly steeper than the minimum allowable slope for 18 inch main of 0.12%. Using the slope of 0.15%, the full flow capacity of the main is calculated as 1,696.5 gpm.

The first trigger for Deviation EQ#15-1574 requires the City to "complete any remaining portions of design for the West Side Interceptor" when measured flows reach 70% of pipe capacity. Using the calculated peak hour flow of 897 gpm, the pipe is currently at 53% of its flow capacity and has not yet met this first trigger.

EQ#09-2299 Deviation – Flows from Grandview Lift Station (Lift Station 3)

The flow data for EQ#09-2299 was collected from 7/1/14 to 6/31/15 using the installed Mission Communications M-800. The M-800 is a Remote Terminal Unit (RTU) that is used to collect real-time data from the lift station. One of the items the unit tracks is pump run times. There are two pumps installed in Lift Station 3, both equipped with Variable Frequency Drives (VFD). According to the design report for the pumps installed, the pumps are capable of pumping at a rate of 1,009 gpm each. However, the pumps have been dialed back to 860 gpm using the installed VFD's.

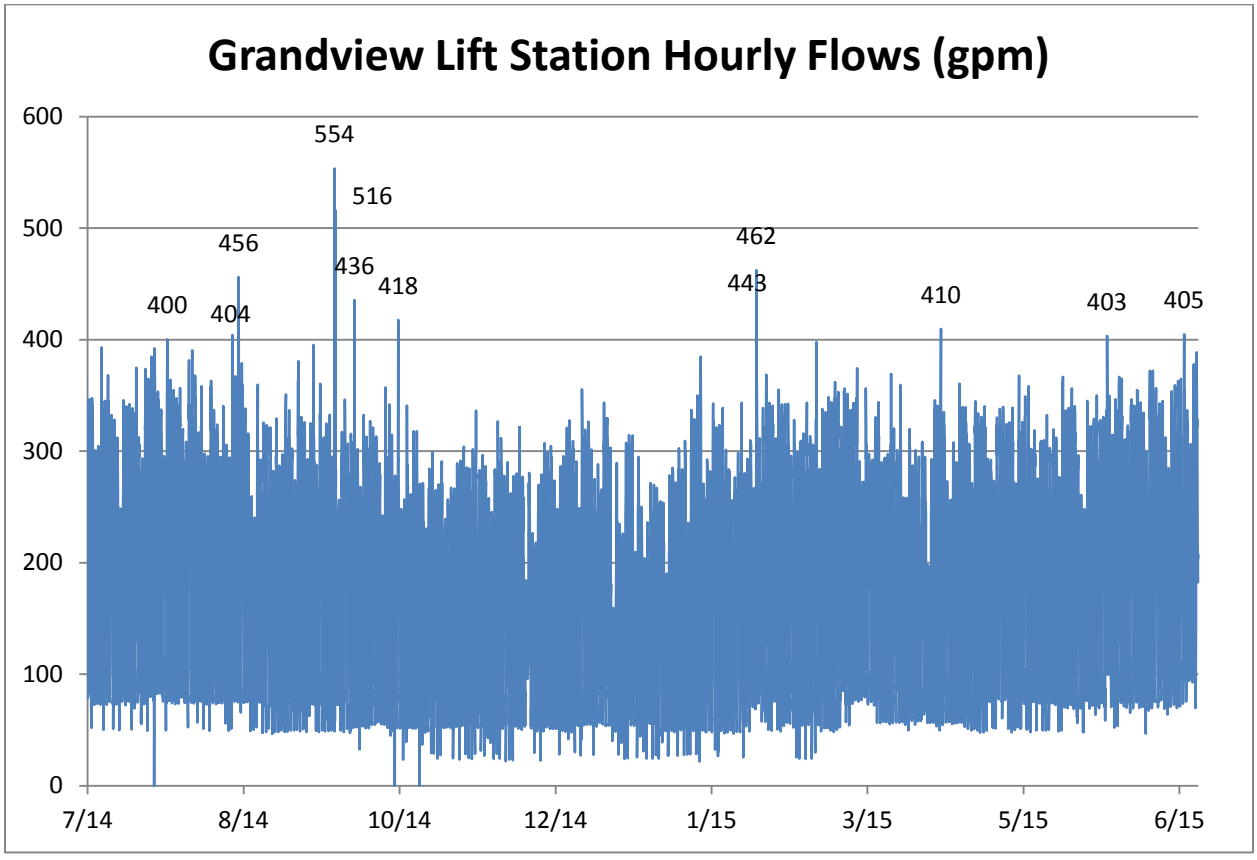
Pump run times are tabulated for each of the two pumps for every hour of service. The corresponding volumes are also tabulated based on the 860 gpm flow rate of the pumps. Therefore, the peak hour can easily be identified for the year of data analyzed.

Date	Volume (gallons)	Peak Hour Flow (gpm)
7/14/14 12:00 PM	23,564	393
8/27/14 10:00 AM	27,377	456
9/27/14 3:00 AM	33,210	554
10/3/14 1:00 PM	26,130	436
11/11/14 12:00 PM	20,167	336
12/15/14 12:00 PM	21,328	355
1/22/15 1:00 PM	23,077	385
2/9/15 9:00 AM	27,749	462
3/13/15 3:00 PM	22,460	374
4/9/15 12:00 PM	24,582	410
5/4/15 1:00 PM	22,059	368
6/26/15 11:00 AM	24,295	405

As shown in the table to the left, the peak hour for the past year occurred on September 27, 2014. According to historic weather data for Kalispell, this peak flow does not correspond with a precipitation event. Therefore, this recorded flow event appears to accurately represent peak hour flows occurring at Lift Station 3.

According to the triggers placed on Lift Station 3, when the peak inflow rate reaches 80% (670 gpm), the City will begin design of the West Side Sewer Interceptor. Assuming the peak hour pumping rate corresponds with the peak hour inflow rate, the lift station is currently at 64% of its approved capacity.

As can be seen in the graph shown below, during the past year only two hours produced flows above 500 gpm, and only 12 hours had flows above 400 gpm. Predominately, most peaks occurred between 300 and 400 gpm except in the winter months, which had slightly smaller peaks.



Based on these findings, the city will continue with monitoring and yearly reporting as required. There are several commercial and residential developments proposed or currently under construction which, will affect flows at one or both of the monitoring locations when built and connected to city sewer.

These developments include:

- Spring Prairie Phase IV
- Bloomstone Phase 1A
- Town Pump (north of Home Depot)
- West View Estates (currently planning additional phases)
- Mountain Vista Phase IV
- Four Plex Units at Financial Drive

When the West Side Interceptor is completed to the intersection at 5th Ave W and 10th St W, both of the existing deviations will be satisfied. Currently, the city is negotiating land purchases and easements required for the construction of the first phase of the West Side Interceptor (WSI) which is expected to end west of Stillwater Road and north of Quarter Horse Estates. A lot has been purchased near the intersection of S Meridian Road and 7th Street W for the WSI lift station. The City plans to continue the design of the WSI with the first phase of construction expected to occur within the next 2 to 5 years, depending on pipe capacities and available funding.

I hope the information provided in this letter satisfies expected requirements for both existing deviations. However, if you require additional information, further clarification, or have any questions, please do not hesitate to contact me.

Sincerely,

Keith Haskins, PE
City Engineer