

**City of De Soto**  
**Fire Hydrant Flow Testing and Flushing Program Procedures**

<b>DATE:</b>	December 12, 2016
<b>EXHIBITS:</b>	Exhibit A: MAP: Fire Hydrant Flow Testing Group and Flush Sequencing Exhibit B: Fire Hydrant Inventory

**Summary:** Recognizing that De Soto’s water system must provide fire suppression and potable water to the community, it is important for the City water department wo work closely with the Northwest Consolidated Fire District personnel to maintain the system and acquire accurate system performance information. Toward that end, this document provides an outline for the flushing and flow testing of fire hydrants throughout the City aimed to ensure that the process is effective, efficient, and not disruptive to the patrons of the system.

- I. **System Definition:** Attached as *Exhibit A* is a map of the distribution system entitled “Fire Hydrant Flow Testing Group and Flush Sequencing” This map shows the locations of each hydrant in the system and serves as a guide for both programs.

Each hydrant on the map has three labels, as shown below:

**Label Key**

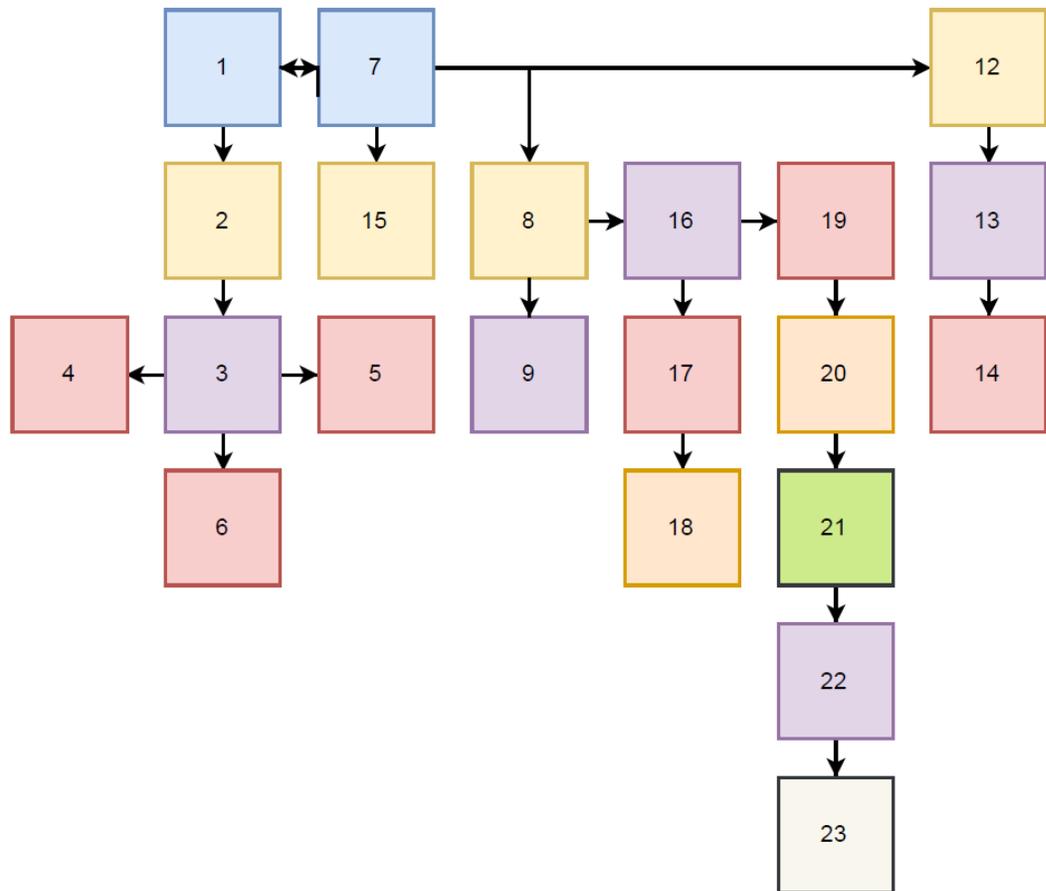
**Map Example**

- a. **Hydrant Flush Zones:** The distribution system is separated into 23 “Hydrant Flush Zones”, which are defined based on an area’s proximity to water storage or connections within the system. The purpose of flush zones is to properly sequence the flushing of hydrants to minimize system disruptions and brown water complaints.
- b. **Flush Numbers:** Each fire hydrant has been assigned a “Flush Sequence Number”, which is a two-digit sequencing number that defines the order for flushing hydrants within a flush zone. Again, flush numbers are intended to define a sequence for flushing hydrants within a neighborhood that minimizes disruption to the system.
- c. **Testing Groups:** Each hydrant is assigned a “Test Group Number”, which groups one of more fire hydrants with others who, by virtue of their location, elevation, and system connections, can be expected to exhibit nearly identical fire flow characteristics.
- d. **Inventory:** Attached as *Exhibit B* is an inventory of each hydrant in the system. This inventory is

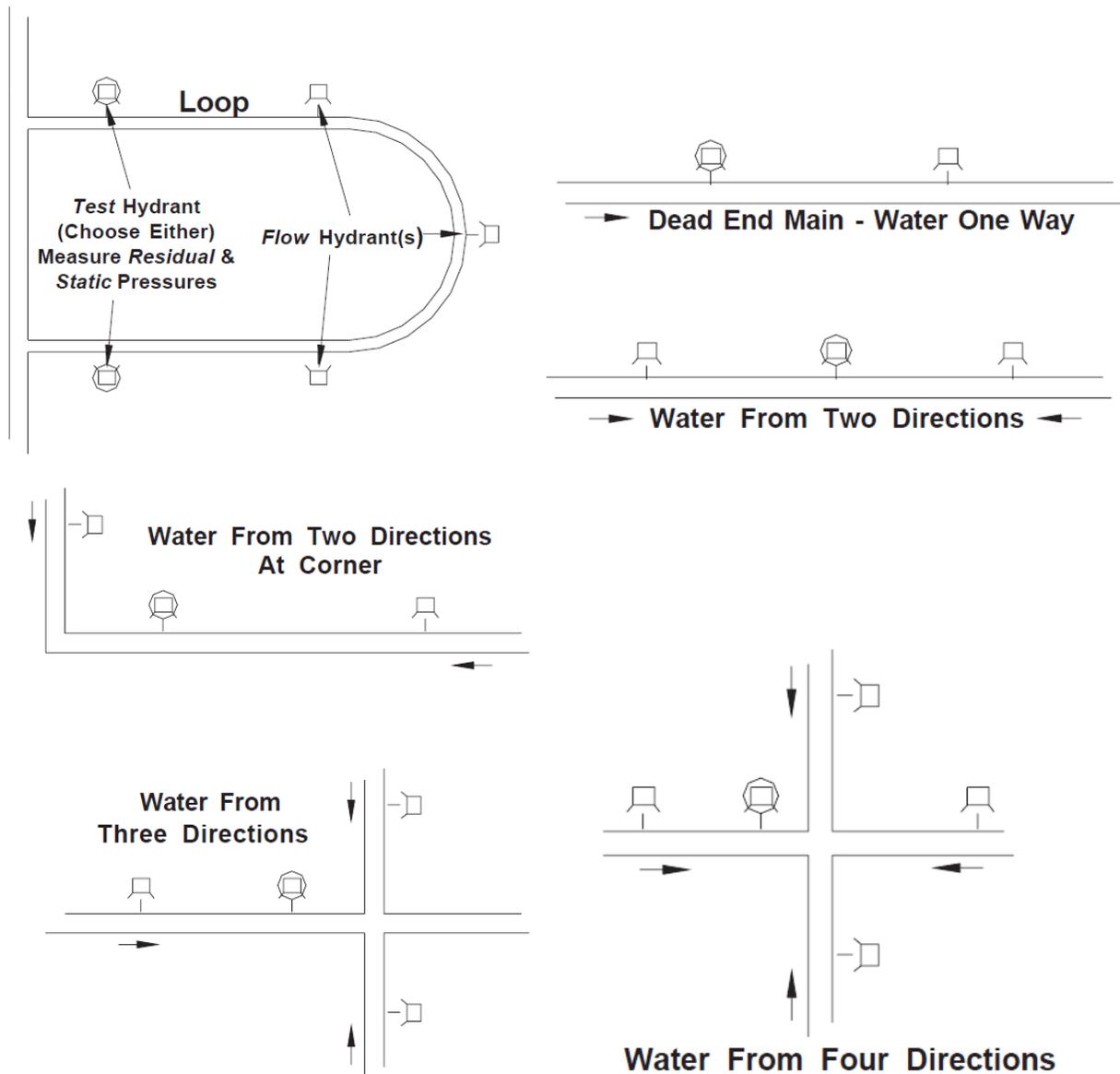
also shown on the left edge of the map. In total, there are 278 fire hydrants in the system. As maintenance and flow testing information is obtained, we will continue to add data fields to the inventory.

- II. **Flushing:** The practice of flushing hydrants serves to keep the system free of sediment and debris so it can perform at its best hydraulic potential. It also gives an opportunity for Fire Department crews to become familiar with the locations and operation of all the hydrants in the system. Each flushing situation brings its own set of problems which require a good knowledge of the distribution system to account for. Flushing operations often use large amounts of water, and have the potential to overload the system and cause significant disruption in the provision of service. We have developed flushing practices over the years that are intended to keep the system reasonably clear of deposits while maintaining service to our customers.
  - a. **Flush Zone Sequencing:** The flowchart below shows the order in which each flushing zone should be completed. In general, the sequence starts at the water towers or at higher system elevations and proceeds outward and toward lower elevations from there. This flowchart also appears on the map in *Exhibit A*. All hydrants within a particular flush zone should be flushed before moving on to the next zone.

Flush Zone Sequencing Flowchart



- b. Flush Number Sequencing: Within each flush zone, each hydrant is given a sequential number that should be followed when flushing. Generally, the flush sequence number starts at a point that is closest to the water tower or at the highest elevation of the flush zone and proceeds outward.
  - c. Flush procedures: The following outlines the procedures that should be followed to properly flush the system. It is usually not necessary or advisable to completely open a fire hydrant to effectively flush the system of debris. Along with cleaning the water mains, flushing a hydrant removes any accumulated sediment in the barrel and the valve. It is recommended that each hydrant in the system be flushed annually along with the regular inspection and maintenance. In all cases, the annual inspection and maintenance must be done before flushing.
    - i. Contact the appropriate De Soto Water Department personnel and inform them when and where hydrant flushing activities will be taking place.
    - ii. Perform routine maintenance on the hydrant including:
      - 1. Visually inspect the area around the hydrant. Hydrants are required to have a minimum clearance of 3 feet in all directions.
      - 2. Visually check the hydrant for any defects.
      - 3. Remove all caps and check the threads. Remove the first cap slowly to ensure there is no pressure on the hydrant. Clean threads with a wire brush. Lubricate the threads if necessary.
      - 4. Check for water or ice in barrel.
      - 5. Replace caps.
      - 6. If hydrant is equipped with safety chains, ensure the chains are loose and do not bind on the cap.
      - 7. Check the breakaway flange for damage or loose bolts.
      - 8. Lubricate the operating nut if required. Kennedy hydrants have grease fitting on the operating nut that requires grease.
      - 9. Replace any worn, cracked, or leaking gaskets.
      - 10. If necessary, paint the hydrant.
  - d. Flushing Regularity: Ideally, the entire system should be flushed once a year, but it is expected that the amount of debris in the system and time required to flush each location might delay the process in the early years of the program.
- III. **Testing**: Performing a fire hydrant flow test provides the actual static (non-flowing) pressure, residual (flowing) pressure, and the flow from the hydrant. In addition, it is also necessary to perform a flow test to properly design a fire sprinkler system for a commercial or residential structure. The goal of the hydrant testing program is to establish a database of system performance so we know where to direct future upgrades, and to increase the community score in the Fire Suppression Rating Schedule (FSRS).
- a. Test Groups: As explained previously, a test group is a set of one or more fire hydrants that can be reasonably expected to exhibit the same flow test results. Test groups have been established to streamline the system testing process because it is only necessary to test one hydrant in each test group. For De Soto's system, there are 278 hydrants, but only 147 test groups.
  - b. Flow Test Outline: It is best to use two hydrants for one test. The Test Hydrant will be the one where pressure measurements are taken, and the Flow Hydrant will be the one that is opened and flow readings are taken. The figures below illustrate the recommended positions of the Test and Flow hydrants relative to some of the most common system layouts.



NOTE: The Hydrant in the circle is the Test Hydrant. Any of the others can be the flow hydrant. Residual and Static flows are measured at the Test Hydrant, flow is measured at the Flow Hydrant.

- c. During the flow test, the following information should be collected:
- i. Date of hydrant test
  - ii. The Hydrant Number
  - iii. Hydrant location (street name)
  - iv. Time of day the hydrant was tested
  - v. Static reading at the test hydrant
  - vi. Residual reading at the test hydrant
  - vii. The Flow reading (using pitot gauge) at the flow hydrant

- viii. Water main diameter (in inches)
  - ix. Hydrant outlet size and type (coefficient of discharge)
  - x. Hydrant elevation
  - d. **Testing procedures:**
    - i. Decide which hydrant will be the Test hydrant and which will be your Flow hydrant. The Test hydrant will be used to measure both Static and Residual pressures. It should be closer to a feed main than the Flow hydrant.
    - ii. Contact the appropriate De Soto Water Department personnel and inform them that a test is about to take place.
    - iii. Flush the Test hydrant, in accordance with Section II of this document.
    - iv. Install pressure valve on test hydrant. Open hydrant slowly and fully and record the Static pressure.
    - v. Locate the Flow hydrant and record the inside diameter of the nozzle which will be flowed; generally one of the 2-1/2" nozzles. Insert your hand into the nozzle opening and feel the entrance shoulder to determine the nozzle coefficient.
    - vi. Open the Flush hydrant very slowly until the nozzle runs about 1/2 full, or until the pressure reading at the Test hydrant drops by at least 20 psi (or drops to no less than 3-psi if the static pressure is below 50 psi).
    - vii. While the Flow hydrant is flowing, record the pitot reading at the Flow hydrant in accordance with the pitot gauge manufacturer's recommendations.
    - viii. While the Flow hydrant is flowing, record the residual pressure at the Test hydrant.
    - ix. Only flow the Flow hydrant long enough to obtain the pitot and residual pressure readings.
    - x. Close the Flow hydrant slowly.
    - xi. The flow, in gallons per minute, is calculated based on the pressure reading obtained from the pitot gauge and the nozzle coefficient. Follow the manufacturer's guidance for the flow calculations.
- IV. **Jurisdictional Coordination:** That this program requires close coordination between the City and Fire District. Initial training, scheduling, and communication throughout the process are critical to its success.
- a. **Initial Training:** The program will start with one or more training sessions during which City Water Department personnel will instruct Fire District personnel on the methods outlined in this document. The instruction will include hands-on experience with the distribution system components, and provide an opportunity for discussion on the program.
  - b. **Ongoing Training:** After the program is put into practice, time should be set aside on a yearly basis for training and dialogue between the City and Fire District relating to the overall operation of the water distribution system. These sessions can be used to brush up on the testing and flushing program, train new employees of either department, coordinate maintenance efforts, or discuss issues of common interest.
  - c. **Scheduling:** At the onset of the program, and annually thereafter, a general schedule for flushing and testing will be established. City and Fire District personnel should communicate on a daily or weekly basis, as appropriate, as to the areas of town where maintenance will be taking place and coordinate these activities.
  - d. **Public Notification:** Before any flushing or testing activities take place, door hanger notifications should be distributed to any address that might be impacted. These hangers should be placed at least 24 hours in advance of the flushing. In addition, a public notification effort will be

undertaken by the City to inform the public about the benefits and impacts of the program.

- e. **Communication of Results:** The City and Fire District will mutually share any available data relating to the distribution system. Flow test results, flushing and maintenance records will be entered into the hydrant inventory, and any information relating to mapping errors will be corrected and shared.

**End of Memo - Exhibits to follow.**



**Ordered By Test Group**

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HD607	923.0	1	1	1.01
HA102	923.0	1	2	1.01
HA103	874.0	1	3	1.02
HA104	942.0	1	4	1.03
HA603	908.0	1	6	1.04
HA604	902.0	1	7	1.04
HA602	872.0	1	5	1.05
HB610	848.0	1	7	1.06
HB608	874.0	1	9	1.07
HB604	872.0	1	10	1.07
HB605	875.0	1	11	1.07
HB607	873.0	1	12	1.07
HB603	847.0	1	13	1.08
HB602	832.0	1	14	1.08
HB601	820.0	1	15	1.08
HA101	919.0	2	1	2.01
HA225	899.0	2	2	2.02
HA222	903.0	2	3	2.02
HA223	919.0	2	11	2.02
HA224	928.0	2	12	2.02
HA217	916.0	2	4	2.03
HA215	906.0	2	5	2.03
HA216	910.0	2	6	2.03
HA219	920.0	2	7	2.03
HA220	924.0	2	8	2.03
HA218	911.0	2	9	2.03
HA221	922.0	2	10	2.03
HA223	919.0	2	11	2.02
HA224	928.0	2	12	2.02
HA225	899.0	2	2	2.02
HA602	872.0	1	5	1.05
HA603	908.0	1	6	1.04
HA604	902.0	1	7	1.04
HB201	874.0	5	23	5.09
HB202	876.0	5	28	5.12
HB203	850.0	5	27	5.10
HB204	888.0	5	24	5.09
HB204	0.0	5	32	5.13
HB205	864.0	5	25	5.11
HB205	0.0	5	31	5.13
HB206	847.0	5	26	5.10
HB206	0.0	5	30	5.14
HB207	884.0	5	16	5.09
HB207	0.0	5	29	5.14
HB301	847.0	5	15	5.05
HB302	866.0	5	14	5.05
HB303	872.0	5	7	5.05
HB304	876.0	5	6	5.05
HB401	880.0	5	3	5.01
HB402	896.0	5	2	5.02
HB403	888.0	5	1	5.15
HB404	886.0	3	14	3.05
HB501	910.0	3	1	3.01
HB502	908.0	3	2	3.01
HB503	880.0	3	8	3.01
HB410	910.0	3	3	3.02
HB411	903.0	3	4	3.02
HB416	894.0	3	5	3.02
HB408	908.0	3	6	3.02
HB409	901.0	3	7	3.02
HB504	871.0	3	9	3.03
HB415	873.0	3	10	3.03
HB414	877.0	3	13	3.03
HB413	894.0	3	11	3.04
HB412	903.0	3	12	3.04
HB404	886.0	3	14	3.05
HB405	872.0	3	15	3.05
HB406	863.0	4	2	4.01
HB407	858.0	4	1	4.02
HC413	868.0	4	3	4.03
HC414	858.0	4	4	4.04
HC415	844.0	4	5	4.04
HC409	852.0	4	6	4.05
HC325	876.0	4	7	4.05
HC407	839.0	4	8	4.05
HB401	880.0	5	3	5.01

**Ordered by Hydrant Number**

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HA101	919.0	2	1	2.01
HA102	923.0	1	2	1.01
HA103	874.0	1	3	1.02
HA104	942.0	1	4	1.03
HA201	842.0	5	19	5.07
HA202	868.0	5	22	5.09
HA203	855.0	5	18	5.07
HA204	860.0	5	21	5.08
HA205	860.0	5	17	5.07
HA206	860.0	5	20	5.08
HA207	871.0	5	11	5.06
HA208	868.0	5	13	5.06
HA209	880.0	5	10	5.06
HA210	883.0	5	12	5.06
HA211	891.0	5	9	5.03
HA212	898.0	5	8	5.03
HA213	901.0	5	5	5.03
HA214	902.0	5	4	5.03
HA215	906.0	2	5	2.03
HA216	910.0	2	6	2.03
HA217	916.0	2	4	2.03
HA218	911.0	2	9	2.03
HA219	920.0	2	7	2.03
HA220	924.0	2	8	2.03
HA221	922.0	2	10	2.03
HA222	903.0	2	3	2.02
HA223	919.0	2	11	2.02
HA224	928.0	2	12	2.02
HA225	899.0	2	2	2.02
HA602	872.0	1	5	1.05
HA603	908.0	1	6	1.04
HA604	902.0	1	7	1.04
HB201	874.0	5	23	5.09
HB202	876.0	5	28	5.12
HB203	850.0	5	27	5.10
HB204	888.0	5	24	5.09
HB204	0.0	5	32	5.13
HB205	864.0	5	25	5.11
HB205	0.0	5	31	5.13
HB206	847.0	5	26	5.10
HB206	0.0	5	30	5.14
HB207	884.0	5	16	5.09
HB207	0.0	5	29	5.14
HB301	847.0	5	15	5.05
HB302	866.0	5	14	5.05
HB303	872.0	5	7	5.05
HB304	876.0	5	6	5.05
HB401	880.0	5	3	5.01
HB402	896.0	5	2	5.02
HB403	888.0	5	1	5.15
HB404	886.0	3	14	3.05

Ordered By Test Group

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HB402	896.0	5	2	5.02
HA214	902.0	5	4	5.03
HA213	901.0	5	5	5.03
HA212	898.0	5	8	5.03
HA211	891.0	5	9	5.03
HB304	876.0	5	6	5.05
HB303	872.0	5	7	5.05
HB302	866.0	5	14	5.05
HB301	847.0	5	15	5.05
HA209	880.0	5	10	5.06
HA207	871.0	5	11	5.06
HA210	883.0	5	12	5.06
HA208	868.0	5	13	5.06
HA205	860.0	5	17	5.07
HA203	855.0	5	18	5.07
HA201	842.0	5	19	5.07
HA206	860.0	5	20	5.08
HA204	860.0	5	21	5.08
HB207	884.0	5	16	5.09
HA202	868.0	5	22	5.09
HB201	874.0	5	23	5.09
HB204	888.0	5	24	5.09
HB206	847.0	5	26	5.10
HB203	850.0	5	27	5.10
HB205	864.0	5	25	5.11
HB202	876.0	5	28	5.12
HB205	0.0	5	31	5.13
HB204	0.0	5	32	5.13
HB207	0.0	5	29	5.14
HB206	0.0	5	30	5.14
HB403	888.0	5	1	5.15
HC501	860.0	6	1	6.01
HC503	850.0	6	2	6.01
HC502	849.0	6	3	6.01
HC412	815.0	6	4	6.02
HC411	833.0	6	7	6.02
HD601	793.0	6	0	6.03
HD610	797.0	6	0	6.03
HD609	796.0	6	9	6.03
HD604	794.0	6	14	6.03
HD603	793.0	6	15	6.03
HD602	791.0	6	16	6.03
HD608	795.0	6	10	6.04
HD607	795.0	6	11	6.04
HD606	789.0	6	12	6.04
HD605	790.0	6	13	6.04
HC410	840.0	6	5	6.05
HC411	842.0	6	6	6.05
HG410	951.0	7	1	7.01
HF402	916.0	7	2	7.02
HF405	914.0	7	3	7.03

Ordered by Hydrant Number

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HB405	872.0	3	15	3.05
HB406	863.0	4	2	4.01
HB407	858.0	4	1	4.02
HB408	908.0	3	6	3.02
HB409	901.0	3	7	3.02
HB410	910.0	3	3	3.02
HB411	903.0	3	4	3.02
HB412	903.0	3	12	3.04
HB413	894.0	3	11	3.04
HB414	877.0	3	13	3.03
HB415	873.0	3	10	3.03
HB416	894.0	3	5	3.02
HB501	910.0	3	1	3.01
HB502	908.0	3	2	3.01
HB503	880.0	3	8	3.01
HB504	871.0	3	9	3.03
HB601	820.0	1	15	1.08
HB602	832.0	1	14	1.08
HB603	847.0	1	13	1.08
HB604	872.0	1	10	1.07
HB605	875.0	1	11	1.07
HB607	873.0	1	12	1.07
HB608	874.0	1	9	1.07
HB609	856.0	1	8	10.60
HB610	848.0	1	7	1.06
HC201	860.0	23	6	23.06
HC202	860.0	23	9	23.03
HC203	838.0	23	8	23.03
HC204	836.0	23	11	23.01
HC205	848.0	23	12	23.01
HC206	842.0	23	13	23.01
HC206	870.0	23	5	23.06
HC207	857.0	23	10	23.02
HC207	862.0	23	7	23.04
HC301	885.0	23	4	23.06
HC302	889.0	23	3	23.05
HC303	870.0	23	2	23.05
HC304	863.0	22	8	22.01
HC306	854.0	22	9	22.01
HC307	853.0	22	2	22.02
HC308	845.0	21	2	21.01
HC309	875.0	22	0	22.02
HC311	856.0	22	1	22.07
HC312	858.0	22	3	22.03
HC313	832.0	21	3	21.02
HC314	822.0	21	4	21.03
HC315	852.0	21	5	21.03
HC316	865.0	22	4	22.03
HC318	865.0	22	5	22.06
HC319	833.0	18	2	18.01
HC320	806.0	17	4	17.02

**Ordered By Test Group**

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HG502	919.0	7	4	7.03
HG503	952.0	7	5	7.04
HG511	956.0	7	6	7.04
HG504	955.0	7	7	7.04
HG501	918.0	7	8	7.05
HG506	920.0	7	9	7.06
HG507	919.0	7	10	7.06
HG509	923.0	7	11	7.06
HG510	948.0	7	12	7.07
HG508	888.0	7	13	7.08
HG407	900.0	7	14	7.08
HG406	909.0	7	15	7.09
HF401	843.0	8	10	8.01
HE403	844.0	8	2	8.02
HE310	844.0	8	3	8.02
HE308	834.0	8	4	8.03
HE303	806.0	8	5	8.03
HE408	876.0	9	1	9.01
HE406	867.0	9	2	9.02
HE405	842.0	9	3	9.03
HD601	0.0	9	12	9.04
HD602	0.0	9	13	9.05
HD603	0.0	9	14	9.05
HD604	0.0	9	15	9.05
HD606	0.0	9	11	9.06
HD605	0.0	9	16	9.06
HD501	873.0	9	4	9.07
HD502	832.0	9	5	9.08
HD411	860.0	9	6	9.09
HE309	796.0	9	8	9.10
HE402	795.0	9	9	9.10
HE311	798.0	9	10	9.10
HE401	798.0	9	7	9.11
HF300	803.0	10	1	10.01
HF308	0.0	10	7	10.01
HF309	0.0	10	8	10.01
HF310	0.0	10	9	10.01
HF311	0.0	10	10	10.02
HF313	0.0	10	12	10.02
HF312	0.0	10	13	10.03
HF314	0.0	10	14	10.04
HF303	859.0	10	0	10.05
HF304	829.0	10	2	10.06
HF306	837.0	10	3	10.07
HF307	843.0	10	5	10.07
HF305	845.0	10	4	10.60
HB609	856.0	1	8	10.60
HF403	872.0	11	1	11.01
HF404	867.0	11	2	11.01
HG409	928.0	12	1	12.01
HG408	910.0	12	2	12.01

**Ordered by Hydrant Number**

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HC321	858.0	20	9	20.05
HC322	833.0	18	8	18.03
HC322	876.0	22	7	22.04
HC323	879.0	23	1	23.05
HC324	880.0	22	6	22.05
HC325	876.0	4	7	4.05
HC401	841.0	18	4	18.02
HC402	838.0	18	7	18.03
HC403	840.0	18	3	18.01
HC404	828.0	18	11	18.05
HC405	816.0	18	90	18.04
HC406	813.0	18	10	18.04
HC407	839.0	4	8	4.05
HC409	852.0	4	6	4.05
HC410	840.0	6	5	6.05
HC411	833.0	6	7	6.02
HC411	842.0	6	6	6.05
HC412	815.0	6	4	6.02
HC413	868.0	4	3	4.03
HC414	858.0	4	4	4.04
HC415	844.0	4	5	4.04
HC416	818.0	18	6	18.02
HC417	828.0	18	5	18.02
HC501	860.0	6	1	6.01
HC502	849.0	6	3	6.01
HC503	850.0	6	2	6.01
HD201	828.0	23	12	23.07
HD203	845.0	19	7	19.04
HD204	844.0	19	8	19.04
HD205	823.0	20	11	20.04
HD206	832.0	20	10	20.02
HD207	844.0	20	2	20.01
HD208	852.0	19	10	19.08
HD209	838.0	19	14	19.08
HD210	838.0	20	5	20.02
HD211	862.0	20	1	20.01
HD213	862.0	19	9	19.03
HD214	843.0	19	11	19.07
HD301	842.0	20	8	20.06
HD302	861.0	19	6	19.01
HD302	846.0	19	21	19.02
HD303	862.0	20	7	20.04
HD304	853.0	20	3	20.01
HD305	838.0	19	12	19.05
HD306	804.0	19	20	19.06
HD307	849.0	20	6	20.04
HD308	812.0	20	4	20.03
HD309	826.0	19	13	19.13
HD310	858.0	21	1	21.01
HD311	793.0	19	3	19.12
HD312	795.0	19	4	19.12

**Ordered By Test Group**

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HG307	852.0	12	3	12.02
HG309	920.0	12	9	12.03
HG308	910.0	12	10	12.03
HG401	928.0	12	8	12.04
HG405	928.0	12	4	12.05
HG402	927.0	12	7	12.05
HG403	930.0	12	5	12.06
HG404	942.0	12	6	12.06
HH302	906.0	13	1	13.01
HH301	873.0	13	3	13.02
HG306	860.0	13	2	13.03
HG305	875.0	13	4	13.04
HG304	894.0	13	5	13.05
HG301	863.0	13	7	13.06
HG302	888.0	13	8	13.06
HG201	852.0	14	1	14.01
HH201	823.0	14	2	14.02
HH202	826.0	14	3	14.02
HH203	806.0	14	4	14.03
HH501	945.0	15	1	15.01
HH504	933.0	15	4	15.01
HH502	938.0	15	2	15.02
HH503	919.0	15	3	15.02
HH505	908.0	15	7	15.03
HH507	880.0	15	9	15.04
HH508	884.0	15	10	15.04
HH601	940.0	15	5	15.05
HH602	899.0	15	6	15.06
HH506	880.0	15	8	15.30
HE302	790.0	16	5	16.01
HE207	790.0	16	2	16.02
HE206	791.0	16	4	16.02
HE204	794.0	16	1	16.03
HE201	793.0	16	3	16.04
HD313	816.0	17	1	17.01
HD314	814.0	17	2	17.01
HD315	816.0	18	3	17.01
HD318	810.0	17	3	17.02
HC320	806.0	17	4	17.02
HD317	805.0	17	5	17.02
HD319	797.0	17	12	17.03
HD320	795.0	17	13	17.04
HD321	793.0	17	14	17.04
HD401	801.0	17	11	17.05
HD402	795.0	17	15	17.05
HD403	790.0	17	16	17.05
HD405	801.0	17	7	17.06
HD408	798.0	17	8	17.06
HD409	793.0	17	9	17.06
HD406	797.0	17	17	17.06
HD410	793.0	17	10	17.07

**Ordered by Hydrant Number**

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HD313	816.0	17	1	17.01
HD314	814.0	17	2	17.01
HD315	816.0	18	3	17.01
HD316	812.0	18	1	18.01
HD317	805.0	17	5	17.02
HD318	810.0	17	3	17.02
HD319	797.0	17	12	17.03
HD320	795.0	17	13	17.04
HD321	793.0	17	14	17.04
HD322	791.0	17	19	17.08
HD323	798.0	19	19	19.06
HD401	801.0	17	11	17.05
HD402	795.0	17	15	17.05
HD403	790.0	17	16	17.05
HD405	801.0	17	7	17.06
HD406	797.0	17	17	17.06
HD407	792.0	17	18	17.07
HD408	798.0	17	8	17.06
HD409	793.0	17	9	17.06
HD410	793.0	17	10	17.07
HD411	860.0	9	6	9.09
HD501	873.0	9	4	9.07
HD502	832.0	9	5	9.08
HD601	793.0	6	0	6.03
HD601	0.0	9	12	9.04
HD602	791.0	6	16	6.03
HD602	0.0	9	13	9.05
HD603	793.0	6	15	6.03
HD603	0.0	9	14	9.05
HD604	794.0	6	14	6.03
HD604	0.0	9	15	9.05
HD605	790.0	6	13	6.04
HD605	0.0	9	16	9.06
HD606	789.0	6	12	6.04
HD606	0.0	9	11	9.06
HD607	923.0	1	1	1.01
HD607	795.0	6	11	6.04
HD608	795.0	6	10	6.04
HD609	796.0	6	9	6.03
HD610	797.0	6	0	6.03
HE201	793.0	16	3	16.04
HE202	811.0	19	15	19.09
HE203	794.0	19	17	19.10
HE204	794.0	16	1	16.03
HE205	796.0	19	16	19.09
HE206	791.0	16	4	16.02
HE207	790.0	16	2	16.02
HE208	795.0	19	18	19.11
HE302	790.0	16	5	16.01
HE303	806.0	8	5	8.03
HE305	799.0	19	1	19.12

**Ordered By Test Group**

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HD407	792.0	17	18	17.07
HD322	791.0	17	19	17.08
HD316	812.0	18	1	18.01
HC319	833.0	18	2	18.01
HC403	840.0	18	3	18.01
HC401	841.0	18	4	18.02
HC417	828.0	18	5	18.02
HC416	818.0	18	6	18.02
HC402	838.0	18	7	18.03
HC322	833.0	18	8	18.03
HC406	813.0	18	10	18.04
HC405	816.0	18	90	18.04
HC404	828.0	18	11	18.05
HD302	861.0	19	6	19.01
HD302	846.0	19	21	19.02
HD213	862.0	19	9	19.03
HD203	845.0	19	7	19.04
HD204	844.0	19	8	19.04
HD305	838.0	19	12	19.05
HD323	798.0	19	19	19.06
HD306	804.0	19	20	19.06
HD214	843.0	19	11	19.07
HD208	852.0	19	10	19.08
HD209	838.0	19	14	19.08
HE202	811.0	19	15	19.09
HE205	796.0	19	16	19.09
HE203	794.0	19	17	19.10
HE208	795.0	19	18	19.11
HE305	799.0	19	1	19.12
HE307	798.0	19	2	19.12
HD311	793.0	19	3	19.12
HD312	795.0	19	4	19.12
HE312	799.0	19	5	19.12
HD309	826.0	19	13	19.13
HD211	862.0	20	1	20.01
HD207	844.0	20	2	20.01
HD304	853.0	20	3	20.01
HD206	832.0	20	10	20.02
HD210	838.0	20	5	20.02
HD308	812.0	20	4	20.03
HD307	849.0	20	6	20.04
HD303	862.0	20	7	20.04
HD205	823.0	20	11	20.04
HC321	858.0	20	9	20.05
HD301	842.0	20	8	20.06
HD310	858.0	21	1	21.01
HC308	845.0	21	2	21.01
HC313	832.0	21	3	21.02
HC314	822.0	21	4	21.03
HC315	852.0	21	5	21.03
HC304	863.0	22	8	22.01

**Ordered by Hydrant Number**

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HE307	798.0	19	2	19.12
HE308	834.0	8	4	8.03
HE309	796.0	9	8	9.10
HE310	844.0	8	3	8.02
HE311	798.0	9	10	9.10
HE312	799.0	19	5	19.12
HE401	798.0	9	7	9.11
HE402	795.0	9	9	9.10
HE403	844.0	8	2	8.02
HE405	842.0	9	3	9.03
HE406	867.0	9	2	9.02
HE408	876.0	9	1	9.01
HF300	803.0	10	1	10.01
HF303	859.0	10	0	10.05
HF304	829.0	10	2	10.06
HF305	845.0	10	4	10.60
HF306	837.0	10	3	10.07
HF307	843.0	10	5	10.07
HF308	0.0	10	7	10.01
HF309	0.0	10	8	10.01
HF310	0.0	10	9	10.01
HF311	0.0	10	10	10.02
HF312	0.0	10	13	10.03
HF313	0.0	10	12	10.02
HF314	0.0	10	14	10.04
HF401	843.0	8	10	8.01
HF402	916.0	7	2	7.02
HF403	872.0	11	1	11.01
HF404	867.0	11	2	11.01
HF405	914.0	7	3	7.03
HG201	852.0	14	1	14.01
HG301	863.0	13	7	13.06
HG302	888.0	13	8	13.06
HG304	894.0	13	5	13.05
HG305	875.0	13	4	13.04
HG306	860.0	13	2	13.03
HG307	852.0	12	3	12.02
HG308	910.0	12	10	12.03
HG309	920.0	12	9	12.03
HG401	928.0	12	8	12.04
HG402	927.0	12	7	12.05
HG403	930.0	12	5	12.06
HG404	942.0	12	6	12.06
HG405	928.0	12	4	12.05
HG406	909.0	7	15	7.09
HG407	900.0	7	14	7.08
HG408	910.0	12	2	12.01
HG409	928.0	12	1	12.01
HG410	951.0	7	1	7.01
HG501	918.0	7	8	7.05
HG502	919.0	7	4	7.03

**Ordered By Test Group**

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HC306	854.0	22	9	22.01
HC309	875.0	22	0	22.02
HC307	853.0	22	2	22.02
HC312	858.0	22	3	22.03
HC316	865.0	22	4	22.03
HC322	876.0	22	7	22.04
HC324	880.0	22	6	22.05
HC318	865.0	22	5	22.06
HC311	856.0	22	1	22.07
HC204	836.0	23	11	23.01
HC205	848.0	23	12	23.01
HC206	842.0	23	13	23.01
HC207	857.0	23	10	23.02
HC203	838.0	23	8	23.03
HC202	860.0	23	9	23.03
HC207	862.0	23	7	23.04
HC323	879.0	23	1	23.05
HC303	870.0	23	2	23.05
HC302	889.0	23	3	23.05
HC301	885.0	23	4	23.06
HC206	870.0	23	5	23.06
HC201	860.0	23	6	23.06
HD201	828.0	23	12	23.07

**Ordered by Hydrant Number**

Fire Hydrant Number	Hydrant Elevation	Flush Area	Flush Number	Test Group
HG503	952.0	7	5	7.04
HG504	955.0	7	7	7.04
HG506	920.0	7	9	7.06
HG507	919.0	7	10	7.06
HG508	888.0	7	13	7.08
HG509	923.0	7	11	7.06
HG510	948.0	7	12	7.07
HG511	956.0	7	6	7.04
HH201	823.0	14	2	14.02
HH202	826.0	14	3	14.02
HH203	806.0	14	4	14.03
HH301	873.0	13	3	13.02
HH302	906.0	13	1	13.01
HH501	945.0	15	1	15.01
HH502	938.0	15	2	15.02
HH503	919.0	15	3	15.02
HH504	933.0	15	4	15.01
HH505	908.0	15	7	15.03
HH506	880.0	15	8	15.30
HH507	880.0	15	9	15.04
HH508	884.0	15	10	15.04
HH601	940.0	15	5	15.05
HH602	899.0	15	6	15.06