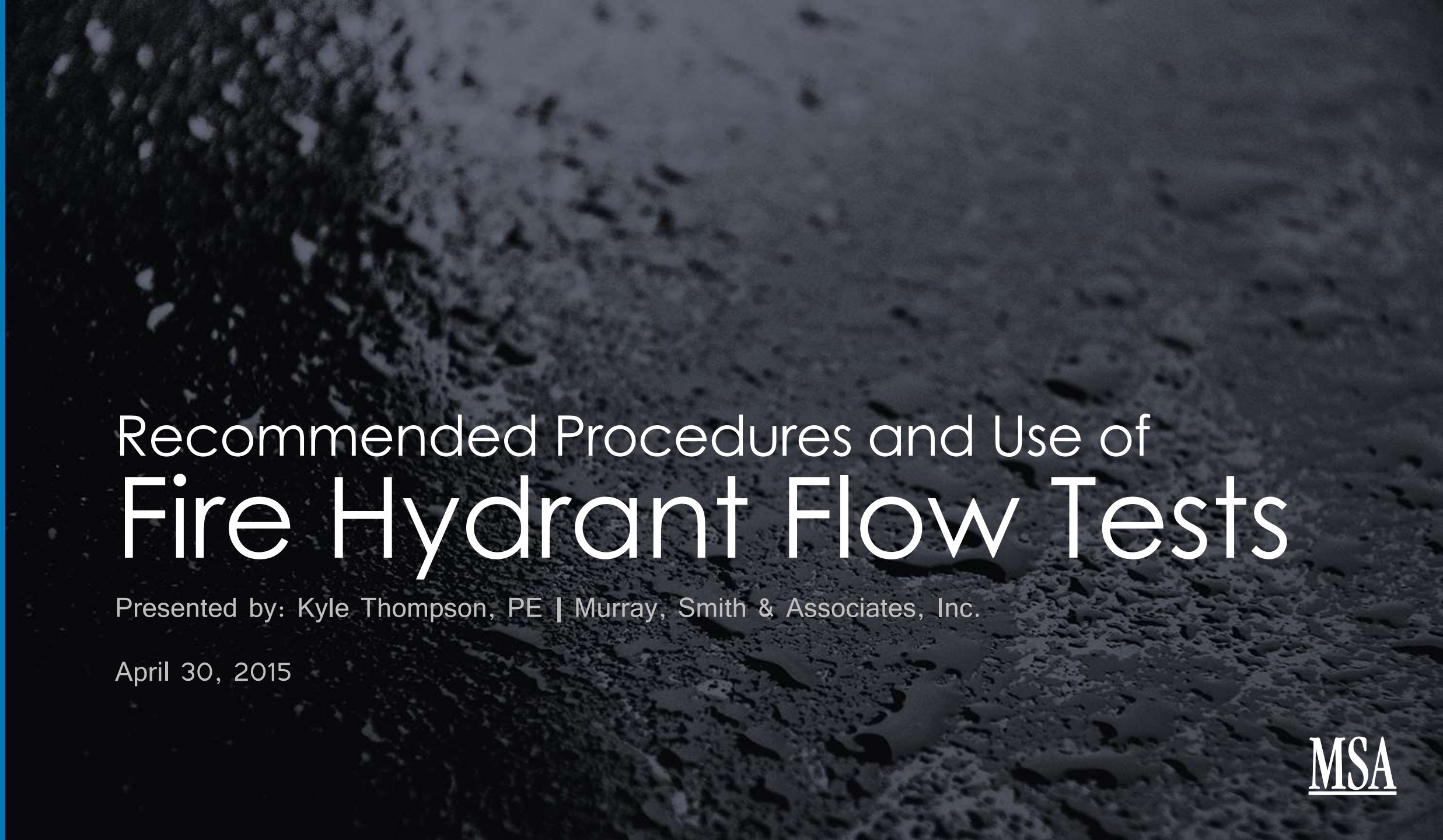

Recommended Procedures and Use of Fire Hydrant Flow Tests

Presented by: Kyle Thompson, PE | Murray, Smith & Associates, Inc.

April 30, 2015

MSA

Background

- My Experience with Hydrant Flow Tests
  - Small Water Systems
  - Large Water Systems
- Reasons for My Interest
  - Using the Data
  - Challenges Calibrating Hydraulic Models
  - Hope to Minimize Inefficiencies

Outline

Reasons for Hydrant Flow Tests

Use and Importance of Accurate Data

Hydrant Flow Test Procedures

Conclusions

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Reasons for Hydrant Flow Tests

Fire Fighting Agencies

Water System Planning and Design

Reasons for Hydrant Flow Tests

Fire Fighting Agencies

- Fire Fighting Purposes

Water System Planning and Design

Reasons for Hydrant Flow Tests

Fire Fighting Agencies

- Fire Fighting Purposes

Water System Planning and Design

- Water System Plans
- Evaluating Development Main Extensions
- Evaluating System Improvements and Replacements
- Detect Closed Valves

Outline

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Use and Importance of Accurate Data

Accuracy vs. Precision

Accurate

:free from error or defect; consistent with a standard, rule, or model
http://dictionary.reference.com/browse/accurate?s=t

Precise

:exact in measuring, recording, etc. *http://dictionary.reference.com/browse/precise*

Use and Importance of Accurate Data

Fire Fighting Agencies

- Training
- Planning
- Marking Hydrants

Use and Importance of Accurate Data

Water System Planning and Design

- Simulate High Flow Conditions
- Determine Pressure and Flow-Producing Capabilities of the Distribution System
- Calibration of Hydraulic Model

Use and Importance of Accurate Data

Water System Planning and Design – Model Calibration

- Assumptions
- Communication
- Minimize Sources of Error

Outline

Reasons for Hydrant Flow Tests

Use and Importance of Accurate Data

Hydrant Flow Test Procedures

Conclusions

Hydrant Flow Test Procedures

Standards / Recommendations

- AWWA Manual M17; *Installation, Field Testing, and Maintenance of Fire Hydrants*
- National Fire Protection Association (NFPA) 291; *Recommended Practice for Fire Flow Testing and Marking of Hydrants*

Hydrant Flow Test Procedures

Hydrant Capacity Test

- Single Hydrant Test

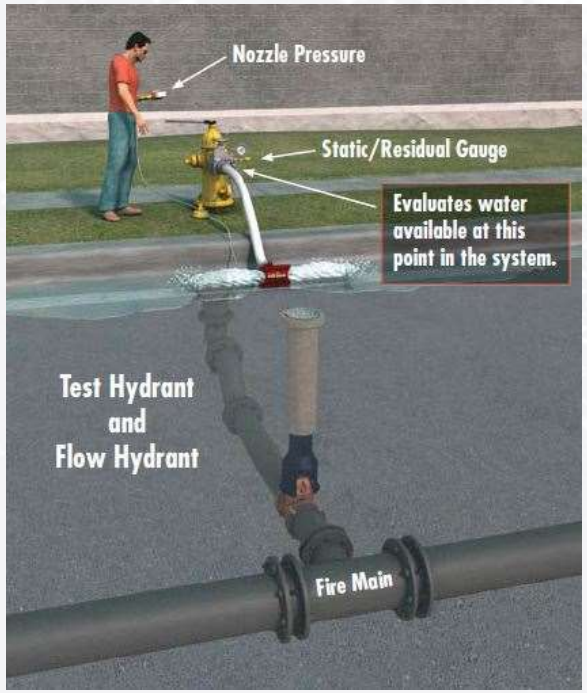


Image: Hydro Flow Products, Inc.

Main Capacity Test

- Two Hydrant Test

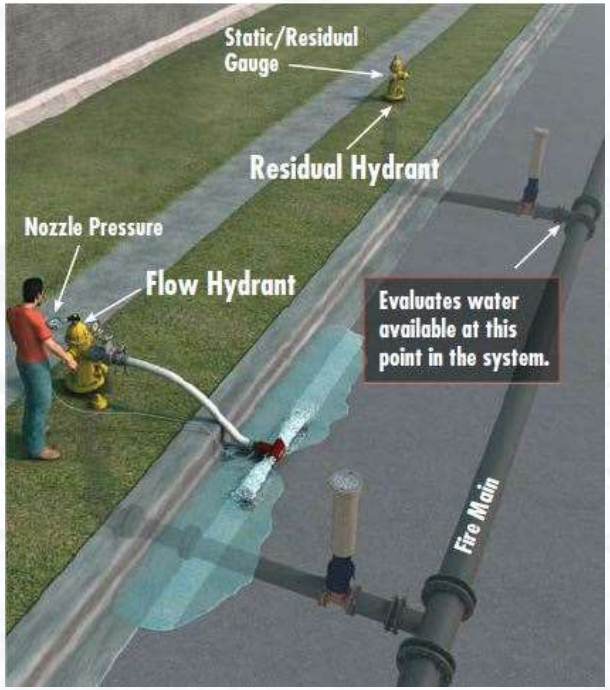


Image: Hydro Flow Products, Inc.

Hydrant Flow Test Procedures

Main Capacity Test – Equipment Needed

- Pitot Tube with Pressure Gauge
- Outlet-Nozzle Cap with Pressure Gauge
- Ruler
- Hydrant Wrench
- Discharge Diffuser
- Two People (minimum)
- Forms for Recording Data

Hydrant Flow Test Procedures

Main Capacity Test – Field Procedures

1. Provisions for Minimizing Traffic Interruptions
2. Provisions for Drainage of Water
3. Residual Hydrant
   a. Flush the Hydrant
   b. Install Nozzle / Gauge
   c. Vent Air; Open Main Valve Fully
   d. Read Static Pressure

Hydrant Flow Test Procedures

4. Flow Hydrant
    a. Measure / Record I.D. of Nozzle
    b. Determine Outlet Nozzle Coefficient

Hydrant Flow Test Procedures

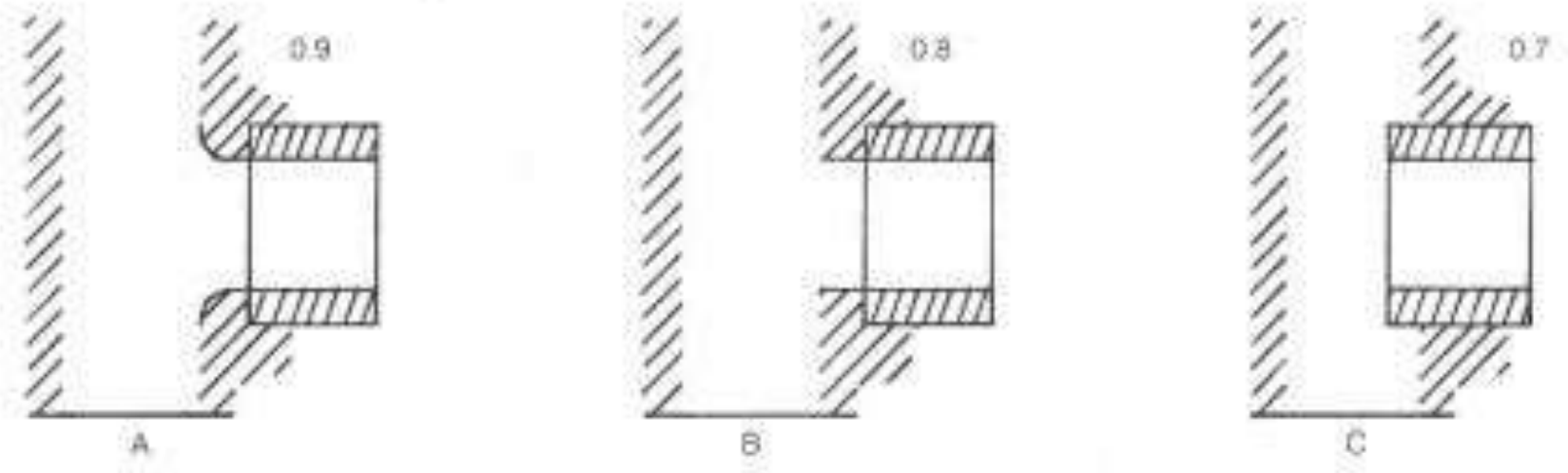
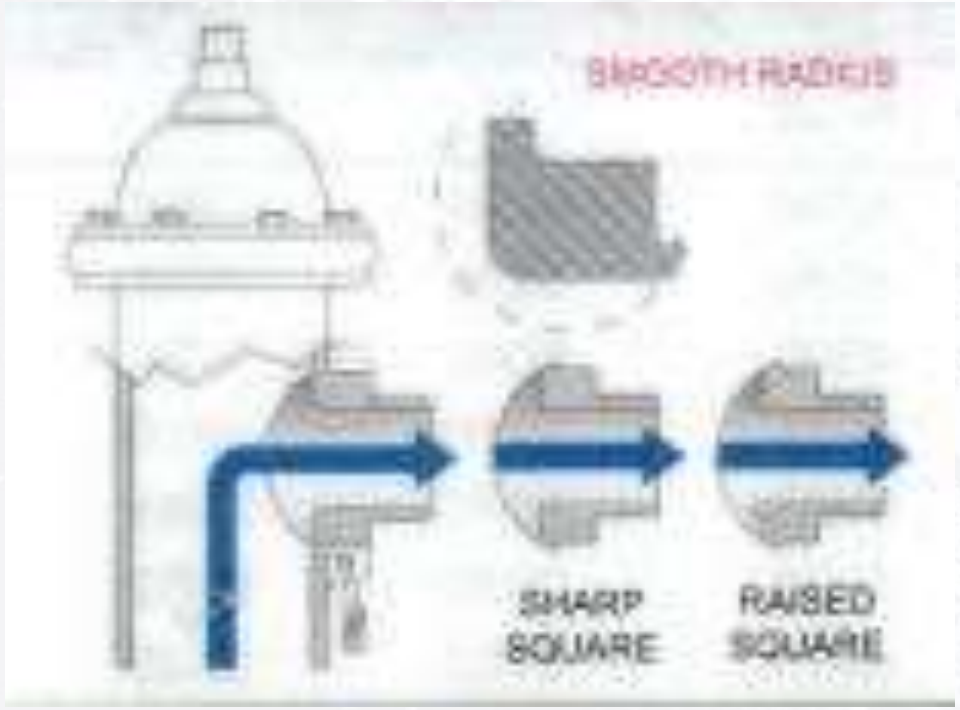


Figure 6-3 Outlet-nozzle coefficients.

Source: AWWA Manual M17

Hydrant Flow Test Procedures



Source: Pollard Water

No Coefficient for Smooth Radius
0.77 Coefficient for Raised Square Lip
0.88 Coefficient for Sharp Square Edge
1.10 Coefficient for Open End Pipe

Hydrant Flow Test Procedures

4. Flow Hydrant
   a. Measure / Record I.D. of Nozzle
   b. Determine Outlet Nozzle Coefficient
5. Conduct the Flow Test
   a. One Person at Residual Hydrant, One at the Flow Hydrant
   b. Open Flow Hydrant Fully
   c. Take Readings Simultaneously after Pressure at the Residual Hydrant has Stabilized
   d. Record the Readings; Close Hydrants Slowly, One at a Time

Hydrant Flow Test Procedures

Main Capacity Test – Record Keeping

- Standard Form

Hydrant Flow Test Procedures

MAINTENANCE 57

FLOW TEST REPORT

Location _____ Date _____

Test Made by _____ Time _____ M

Representative of _____

Witness _____

State Purpose of Test _____

_____

Consumption Rate During Test _____

If Pumps Affect Test, Indicate Pumps Operating _____

Flow Hydrants _____ A_1 _____ A_2 _____ A_3 _____

Size Nozzle _____

Pitot Reading _____ Total gpm _____

gpm _____

Static @ _____ psi Residual @ _____ psi

Projected Results at 20 psi Residual _____ gpm at _____ psi Residual _____ gpm

Remarks _____

_____

_____

_____

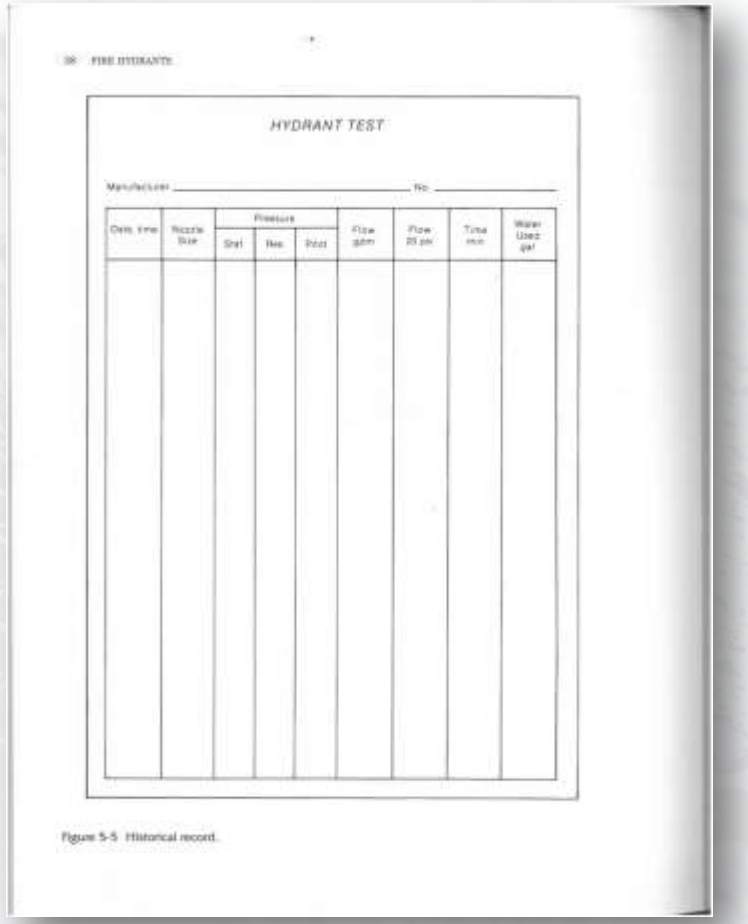
Location Map: Show line sizes and distance to next cross connected line. Show valves and hydrant branch size. Indicate North. Show flowing hydrants—label A_1, A_2, A_3. Show location of Static and Residual—label R

Indicate ⊕ Hydrant _____ Sprinkler _____ Other (identify) _____

Figure 5-4 Flow-test report.

Source: AWWA Manual M17

Hydrant Flow Test Procedures



HYDRANT TEST

Figure 5-5 Historical record.

Source: AWWA Manual M17

Hydrant Flow Test Procedures

Main Capacity Test – Record Keeping

- Standard Form
- Note Elevation of Hydrants Being Tested if Not Equal
- Calculate Flow Rate in the Field, Repeat Test if Necessary

$$Q = 29.83Cd^2\sqrt{p}$$

- Boundary Conditions

Outline

Reasons for Hydrant Flow Tests

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Conclusions

- Determine Appropriate Test Type
- Communicate
- Provide Support
- Follow Up

Questions

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