MEMORANDUM **DEPARTMENT OF ENGINEERING SERVICES**

DATE: March 17, 2008

TO: City of Spokane Design Standards Holders

FROM: Dan Buller, P.E., Senior Engineer - Design

VIA: Gary S. Nelson, P.E., Principal Engineer - Design

RE: City of Spokane Design Standards Amendment

This memorandum contains Amendment #1 to the February 2007 City of Spokane Design Standards which consists of 3 pages. The following have been updated:

1. 5.8 Force Mains
2. 5.11-5 Alarm System
3. 8.6-3 Pipe Thrust Restraint Design
4. 8.7 Depth of Pipes
5. 10.3-1 Cover Sheet

Please update your Design Standard notebooks.

Design standards\amendment 1 memo

5.8 Force Mains

Add the following after the first sentence of the first paragraph:

"A minimum of two brass continuity wedges shall be installed at each pipe joint."

Delete the last sentence of the first paragraph which begins "Alternative pipe materials…"

5.11-5 Alarm System

In the second sentence after the words "use of lag pump," **add** the words "high water level,"

8.6-3 Pipe Thrust Restraint Design

Replace this section in its entirety with following:

The City of Spokane does not allow the use of thrust blocks on water mains as a means of resisting thrust.

The City has developed a Restrained Pipe Length Table (Table 8-A) as a generically approved design standard for restraining pipe sizes 4", 6", 8", 10" and 12". The table is for ductile iron pipe not incorporating polyethylene encasement. The table was established from field experience by City Water Department construction and maintenance personnel and represents conservative results.

Alternatively, the designer is encouraged to exercise the option of designing the required pipe thrust restrained lengths for the specific project under design. In this case, the criteria and basis of design shall be as published by the Ductile Iron Pipe Research Association (DIPRA) entitled "Thrust Restraint Design For Ductile Iron Pipe," current edition.

For locations that are serviced by a Pressure Reducing Valve (PRV), restrained length shall reflect the maximum possible static pressure (i.e., pressures that would result if the PRV fails). Calculations for the DIPRA thrust restraint design method shall assume PRV failure and use the maximum possible static pressure to determine the design test pressure for the restraint calculations.

When using the Restrained Pipe Length Table the restrained length shall be adjusted for the maximum possible static pressure in excess of 85 psi in accordance with the table notes. Whenever the maximum static pressure exceeds 120 psi, restrained lengths shall be calculated using the DIPRA thrust restraint design method, and the use of the Restrained Pipe Length Table is not allowed.

Regardless of which method of restrained pipe length determination is used, the restrained pipe length shall be shown on the plans. The length of restrained pipe shall be clearly shown in the profile and labeled restraint as shown in the example plans in Appendix D.

The parameters to be used in the DIPRA thrust restraint design program shall be as follows:

- Valves, tees (branch direction only), and 90^{o} bends shall be designed as "dead ends".
- When designing a deflection utilizing multiple bends, determine the total angle of deflection and increase the angle design to that of the next standard bend for determining the angle to be restrained.
- Design test pressures shall be 175 psi or 1.5 times working pressure - whichever is greater.
- Factor of safety shall be as follows:
  12" and smaller water mains - 2.5
  18" water mains - 2.0
  24" and larger water mains - 1.5

When DIPRA is used for restraint design, so note this fact on the plans listing: DIPRA edition used along with design pressure, factor of safety, soil type, trench type, depth of cover, and any other assumptions or factors utilized.

In addition to DIPRA, a computer software program for pipe thrust restraint design has been developed by EBAA Iron Sales, Inc. entitled “Restrained Length Calculator,” current version. The program has been examined and utilized by City Engineering staff. The program is based on the same engineering principles, criteria, and analytical approach as the DIPRA design requirements. Thus, the use of the program by EBAA is hereby approved. The parameters to be used shall be the same as those listed above for DIPRA.

When the EBAA program is used for restraint design, so note this fact on the plans listing: version of program used along with design pressure, test pressure, factor of safety, soil type, trench type, depth of cover, and any other assumptions or factors utilized.

Replace Table 8-A Restrained Pipe Length Table with the following:

FITTING TYPE / SIZE	**PIPE SIZE**			
	12" & 10”	8"	6"	4"
	Length (feet) of Restrained Pipe Required in Each Direction:			
90^{o} bends, tee branches, valves and dead-ends	150’	107’	74’	53’
11-1/4^{o} bends	10’	8’	6’	4’
22-1/2^{o} bends	20’	14’	10’	8’
45^{o} bends	40’	28’	20’	14’

NOTE:

For static system pressures greater than 85 psi, adjust as follows:

- Add 1 foot of restraint length for each psi over 85 psi for all pipe diameters in the table.
- For locations that are served by a Pressure Reducing Valve (PRV) restrained lengths shall reflect PRV failure.

Restrained lengths shown are required each side of fitting
For pipe diameters greater than 12” restraint shall be calculated
For static pressures greater than 120 psi restraint shall be calculated

8.7 Depth of Pipes

Replace the first sentence with the following:

> "Water mains shall be installed with a minimum depth to invert of 5 ½ feet AND a minimum of 3 feet of cover over the pipe."

10.3-1 Cover Sheet

In subparagraph d):

- **replace** the words "Deputy Mayor" with "City Administrator"
- **replace** the words "Director – Public Works" with "Director – Public Works & Utilities"