

FIRE HYDRANTS SHALL BE FROM THE FOLLOWING LIST, AS APPROVED BY THE CITY:

- MUELLER CENTURION FIRE HYDRANT, OPT-004 (5/8" BARREL) WITH MUELLER VALVE HARDWARE AND AUXILIARY VALVE 6" GATE VALVE NO. 2893-23-9022 MODIFIED WEDGE RESILIENT SEAT
- WATEROUS WB-67-250 HYDRANT (5/8" PACER) WITH SERIES 2500-1 RESILIENT WEDGE GATE VALVE

- PROVIDE CLASS II CONCRETE BASE AND BLOCKING AGAINST UNDISTURBED EARTH
- DRAIN SUMP TO BE 1/4 CUBIC YARD OF 3/4" WASHED STONE
- CONCRETE SUPPORT
- CONCRETE BLOCK OR BRICK SUPPORT
- PIPE AS REQUIRED TO MAINTAIN 2" SEPARATION AS SHOWN (DIRECT MECHANICAL JOINT CONNECTION IF APPROVED BY CITY)
- RUBBER VALVE BOX STABILIZER
- USE "CORTEN" STEEL TIE RODS BETWEEN AUXILIARY VALVE AND WATER MAIN (STAINLESS STEEL MAY BE REQUIRED BY THE CITY ENGINEER). ANY DISTANCE GREATER THAN 30" SHALL BE RODDED TO MEGA-LUG FLANGE. NO COUPLINGS ARE PERMITTED IN RODS.
- CONCRETE BLOCKING CAST IN PLACE 3000 P.S.I.
- 4 1/2" PORT TO FACE PAVEMENT OR AS DIRECTED BY CITY ENGINEER
- ALL NEWLY INSTALLED HYDRANTS MUST BE TOP COATED WITH RUST-OLEUM FIRE HYDRANT ENAMEL (COLOR = FIRE HYDRANT RED)
- MIN. 48" BETWEEN HYDRANT AND ANY VERTICAL OBSTRUCTIONS.
- MIN. 72" BETWEEN HYDRANT AND ANY LANDSCAPING WITH A MATURE HEIGHT GREATER THAN 12".
- ALL VALVE AND HYDRANT HARDWARE MUST BE STAINLESS STEEL INCLUDING NUTS, BOLTS, AND WASHERS.

Approved: City Engineer *[Signature]* Victor C. Ramirez, P.E., Director of Engineering and Building

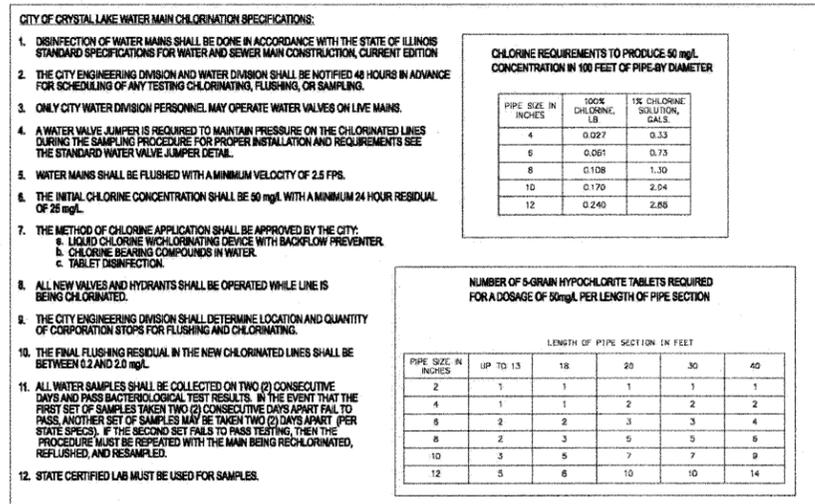
Drawing Name: **FIRE HYDRANT**

Drawing Number: **UW-06**

Date: 11/2/2007

Drawn: EM, Checked: JN

CRYSTAL LAKE ILLINOIS Engineering Division



- CITY OF CRYSTAL LAKE WATER MAIN CHLORINATION SPECIFICATIONS:
- DISINFECTION OF WATER MAINS SHALL BE DONE IN ACCORDANCE WITH THE STATE OF ILLINOIS STANDARD SPECIFICATIONS FOR WATER AND SEWER MAIN CONSTRUCTION, CURRENT EDITION FOR SCHEDULING OF ANY TESTING CHLORINATING, FLUSHING, OR SAMPLING.
 - THE CITY ENGINEERING DIVISION AND WATER DIVISION SHALL BE NOTIFIED 48 HOURS IN ADVANCE FOR SCHEDULING OF ANY TESTING CHLORINATING, FLUSHING, OR SAMPLING.
 - ONLY CITY WATER DIVISION PERSONNEL MAY OPERATE WATER VALVES ON LINE MAINS.
 - A WATER VALVE JUMPER IS REQUIRED TO MAINTAIN PRESSURE ON THE CHLORINATED LINES DURING THE SAMPLING PROCEDURE FOR PROPER INSTALLATION AND REQUIREMENTS SEE THE STANDARD WATER VALVE JUMPER DETAIL.
 - WATER MAINS SHALL BE FLUSHED WITH A MINIMUM VELOCITY OF 2.5 FPS.
 - THE INITIAL CHLORINE CONCENTRATION SHALL BE 50 mg/L WITH A MINIMUM 24 HOUR RESIDUAL OF 25 mg/L.
 - THE METHOD OF CHLORINE APPLICATION SHALL BE APPROVED BY THE CITY:
 - LIQUID CHLORINE WITH CHLORINATING DEVICE WITH BACKFLOW PREVENTER
 - CHLORINE BEARING COMPOUNDS IN WATER
 - TABLET DISINFECTION
 - ALL NEW VALVES AND HYDRANTS SHALL BE OPERATED WHILE LINE IS BEING CHLORINATED.
 - THE CITY ENGINEERING DIVISION SHALL DETERMINE LOCATION AND QUANTITY OF CORPORATION STOPS FOR FLUSHING AND CHLORINATING.
 - THE FINAL FLUSHING RESIDUAL IN THE NEW CHLORINATED LINES SHALL BE BETWEEN 0.2 AND 2.0 mg/L.
 - ALL WATER SAMPLES SHALL BE COLLECTED ON TWO (2) CONSECUTIVE DAYS AND PASS BACTERIOLOGICAL TEST RESULTS. IN THE EVENT THAT THE FIRST SET OF SAMPLES TAKEN TWO (2) CONSECUTIVE DAYS APART FAIL TO PASS, ANOTHER SET OF SAMPLES MAY BE TAKEN TWO (2) DAYS APART (PER STATE SPECS). IF THE SECOND SET FAILS TO PASS TESTING, THEN THE PROCEDURE MUST BE REPEATED WITH THE MAIN BEING RECHLORINATED, REFRESHED, AND RESAMPLED.
 - STATE CERTIFIED LAB MUST BE USED FOR SAMPLES.

CHLORINE REQUIREMENTS TO PRODUCE 50 mg/L CONCENTRATION IN 100 FEET OF PIPE-BY DIAMETER

PIPE SIZE IN INCHES	100% CHLORINE, LB	1% CHLORINE SOLUTION, GALS.
4	0.027	0.33
6	0.061	0.73
8	0.108	1.30
10	0.170	2.04
12	0.240	2.88

NUMBER OF 5-GRAN HYPOCHLORITE TABLETS REQUIRED FOR A DOSAGE OF 50mg/L PER LENGTH OF PIPE SECTION

PIPE SIZE IN INCHES	LENGTH OF PIPE SECTION IN FEET				
	UP TO 13	18	20	30	40
2	1	1	1	1	1
4	1	1	2	2	2
6	2	2	3	3	4
8	2	3	5	5	6
10	3	5	7	7	9
12	5	6	10	10	14

Approved: City Engineer *[Signature]* Victor C. Ramirez, P.E., Director of Engineering and Building

Drawing Name: **CHLORINATION SPECIFICATIONS**

Drawing Number: **UW-08**

Date: 4/15/2007

Drawn: EM, Checked: LZ

CRYSTAL LAKE ILLINOIS Engineering Division

PROJECT NAME:	PRESSURE TEST		CALCULATION FOR ACTUAL WATER VOLUME LOSS	
	2-HOUR	24-HOUR	2-HOUR	24-HOUR
CONTRACTOR:	TOTAL LENGTH OF MAIN (FEET)		SURFACE AREA OF SUPPLY VESSEL (FEET)	
WITNESS:	PIPE DIAMETER (INCHES)		MAXIMUM ALLOWABLE DROP IN WATER LEVEL (FEET)	
LINE PRESSURIZED DATE: TIME: AM/PM	TEST PRESSURE (PSI)		ACTUAL DROP IN WATER LEVEL (FEET)	
LINE TESTED DATE: TIME: AM/PM	TOTAL ALLOWABLE LEAKAGE IN ONE HOUR (GALLONS)		GALLONS	
	TOTAL ALLOWABLE LEAKAGE IN TIME FRAME (GALLONS)		INITIAL METER READING	
			24TH HOUR METER READING	
			TOTAL ALLOWABLE LEAKAGE (GALLONS)	
			ACTUAL LEAKAGE (GALLONS)	
			PASS OR FAIL	
			NOTES:	

LOCATION DIAGRAM:

Approved: City Engineer *[Signature]* Victor C. Ramirez, P.E., Director of Engineering and Building

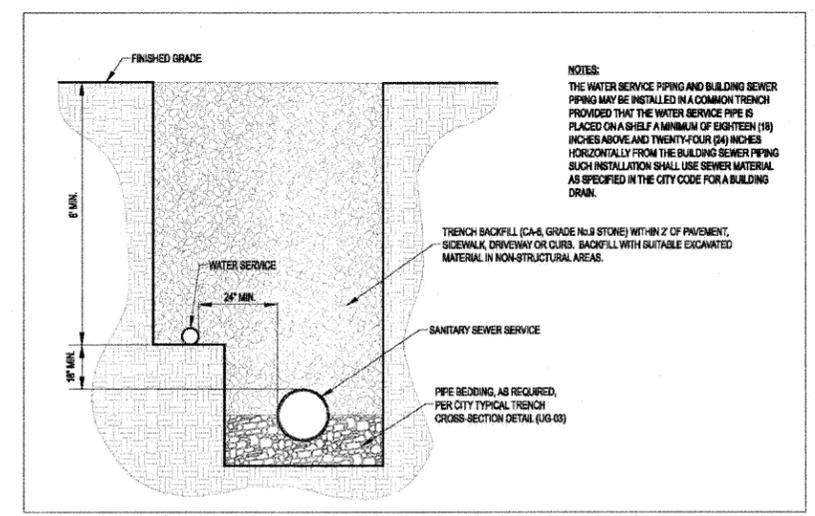
Drawing Name: **WATER MAIN TEST REPORT**

Drawing Number: **UW-09**

Date: 4/12/2007

Drawn: EM, Checked: LZ

CRYSTAL LAKE ILLINOIS Engineering Division



- NOTES:
- THE WATER SERVICE PIPING AND BUILDING SEWER PIPING MAY BE INSTALLED IN A COMMON TRENCH PROVIDED THAT THE WATER SERVICE PIPE IS PLACED ON A SHELF A MINIMUM OF EIGHTEEN (18) INCHES ABOVE AND TWENTY-FOUR (24) INCHES HORIZONTALLY FROM THE BUILDING SEWER PIPING SUCH INSTALLATION SHALL USE SEWER MATERIAL AS SPECIFIED IN THE CITY CODE FOR A BUILDING DRAIN.
 - TRENCH BACKFILL (CA-6, GRADE NO. 9 STONE) WITHIN 2' OF PAVEMENT, SIDEWALK, DRIVEWAY OR CURB. BACKFILL WITH SUITABLE EXCAVATED MATERIAL IN NON-STRUCTURAL AREAS.
 - PIPE BEDDING, AS REQUIRED, PER CITY TYPICAL TRENCH CROSS-SECTION DETAIL (UG-03)

Approved: City Engineer *[Signature]* Victor C. Ramirez, P.E., Director of Engineering and Building

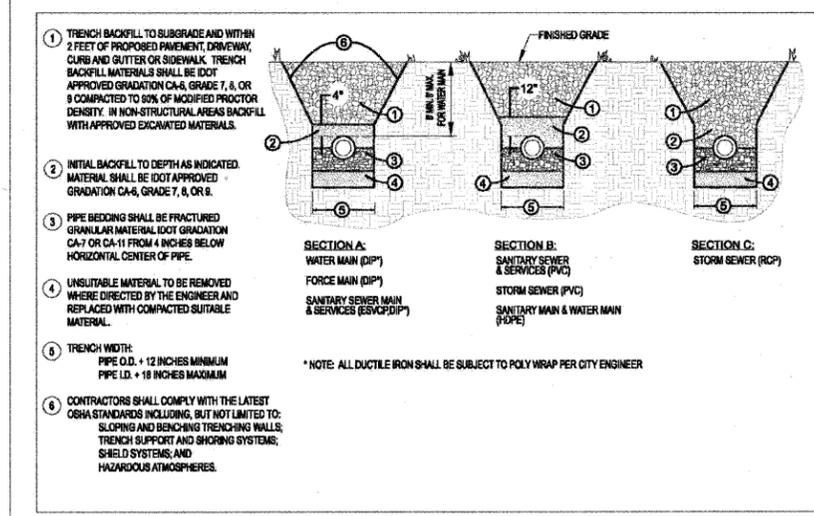
Drawing Name: **COMMON WATER/SANITARY SERVICE TRENCH**

Drawing Number: **UG-02**

Date: 4/15/2007

Drawn: EM, Checked: LZ

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- TRENCH BACKFILL TO SUBGRADE AND WITHIN 2 FEET OF PROPOSED PAVEMENT, DRIVEWAY, CURB AND GUTTER OR SIDEWALK. TRENCH BACKFILL MATERIALS SHALL BE DOT APPROVED GRADATION CA-6, GRADE 7, 8, OR 9 COMPACTED TO 90% OF MODIFIED PROCTOR DENSITY. IN NON-STRUCTURAL AREAS BACKFILL WITH APPROVED EXCAVATED MATERIALS.
- INITIAL BACKFILL TO DEPTH AS INDICATED. MATERIAL SHALL BE DOT APPROVED GRADATION CA-6, GRADE 7, 8, OR 9.
- PIPE BEDDING SHALL BE FRACTURED GRANULAR MATERIAL DOT GRADATION CA-7 OR CA-11 FROM 4 INCHES BELOW HORIZONTAL CENTER OF PIPE.
- UNSATURABLE MATERIAL TO BE REMOVED WHERE DIRECTED BY THE ENGINEER AND REPLACED WITH COMPACTED SUITABLE MATERIAL.
- TRENCH WIDTH: PIPE O.D. + 12 INCHES MINIMUM PIPE I.D. + 18 INCHES MAXIMUM
- CONTRACTORS SHALL COMPLY WITH THE LATEST OSHA STANDARDS INCLUDING, BUT NOT LIMITED TO: SLOPING AND BENCHING TRENCHING WALLS; TRENCH SUPPORT AND SHORING SYSTEMS; SHIELD SYSTEMS; AND HAZARDOUS ATMOSPHERES.

Approved: City Engineer *[Signature]* Victor C. Ramirez, P.E., Director of Engineering and Building

Drawing Name: **TYPICAL TRENCH CROSS SECTION**

Drawing Number: **UG-03**

Date: 6/12/2007

Drawn: EM, Checked: LZ

CRYSTAL LAKE ILLINOIS Engineering Division

NOTE: THESE CITY DETAILS ARE ALSO LOCATED ON THE CITY OF CRYSTAL LAKE WEBSITE.