CITY OF
SWIFT CURRENT
where life makes sense

RWP CONSTRUCTION STANDARD

JANUARY 2023

Contents

Appendices

Pipeline Design Criteria and Construction Methods

1.1 General

This section discusses various aspects of pipeline design standards along with installation methods and recommendations for pipe burial.

1.2 Routing

2.2.1 The City will determine the pipeline routing based on data collected in the field to determine the most practical path for pipeline installation. Factors considered when determining routing are:

- cost;
- topography;
- accessibility for maintenance crews;
- accommodating future development;
- avoiding utility and road crossings;
- mitigating disturbance to environmentally sensitive areas; and
- minimizing registering easements

2.2.2 Normally routing shall occur in such a way as to provide the shortest, most direct service from curbstop to the point of entry at the customers building.

2.2.3 In some circumstances the City may require routing in such a way as to provide looping of the main (see section 2.6).

2.2.4 No development prohibitive designs shall be approved by the City.

2.2.5 Although there will be consultation with all stake holders, ultimately it will be up to the City to decide and finalize the route of the pipeline.

1.3 Depth of Cover

2.3.1 Pipeline mains shall be installed at a minimum depth of 2.7 m from the crown of pipe. This depth shall be increased to 2.8 m when installing pipe beneath road/highway crossings

2.3.2 No pipe should be intentionally laid in water, on frozen foundations, or when trench conditions are unsuitable.

2.3.3 Generally, sand bedding of the pipe is not required except where the foundation is rocky or when backfill material consists of hard blocks of soil that are otherwise unsuitable. Sand bedding will be required if directed by the City.

1.4 Methods of Installation

In general, four types of pipeline installation methods are accepted and are outlined below:

1.4.1 Plough method - involves construction equipment with a plough shoe and pipe placing sleeve. This method minimizes ground disturbance.

1.4.2 Chain trencher method - involves construction equipment with a moving chain fit with tines. This method causes some ground disturbance, with excavated soil placed on each side of the trench. Care must be used when backfilling so that falling soil or rocks do not damage the pipe. Rocky soil conditions can hinder or prevent installation of pipe with a chain trencher.

1.4.3 Backhoe method - this method is common though may result in major ground disturbance depending on the soil being excavated. Extreme care must be used when backfilling so that falling soil or rocks do not damage the pipe. Soil may settle along the trench after construction with this method, therefore City may require compaction testing on backfilled trenches.

1.4.4 Directional bore method – may be required where access is limited and where no ground disturbance is tolerated (eg. At river/stream crossings, large deep sloughs, sensitive areas, and road or utility crossings).

1.4.5 The City may require the use of one installation method over another depending on the circumstances.

1.5 Flow and Pressure

1.5.1 The City RWP shall provide Customers with a minimum flow of 1 igpm. As is typical with rural water pipelines the City RWP is not designed to provide fire flow.

1.5.2 The operating pressure range for the pipeline is 138 kPa (20 psi) to 550 kPa (80 psi). The maximum pressure should never exceed 700 kPa (100 psi) in order to protect household piping. Under special circumstances where the main lines do exceed 700 kPa (100 psi), the adjacent lateral pipelines or services lines must be protected with pressure reducing valves (see section 4.8.2).

1.6 Line Looping

1.6.1 Line looping adds cost to installing the water main, however there are a number of benefits which outweigh the cost:

- Line looping allows water to refresh at a steady rate. Branch lines reduce the effectiveness of chlorine disinfectant due to intermittent flow and stagnation – possibly causing water quality to fall below parameters for safe drinking.

- Line looping helps relieve pressure and/or flow demands in areas that are experiencing marginal flow and pressure. Conditions may change as the Customer base grows which may make looping necessary to maintain the systems design requirements.

- Critical areas within branch lines may be in danger of depressurizing and developing negative pressure if left unchecked. In extreme cases, the main could be in danger of leeching groundwater.

1.6.2 In some scenarios, the City may require a new Customer or group of Customers to extend the main during construction to provide line looping.

1.7 Storage Requirements

1.7.1 The City requires that Customers have local storage and pressure systems installed in a secure, heated building on their property.

1.7.2 It is recommended that Customers have a minimum of two days water supply when sizing storage tanks. Storage volume should be based on the Customers need for an uninterrupted supply of water but consideration should be given to stagnation and dissipating chlorine residuals. If a reservoir size is too large, it could lead to problems due to water not being refreshed often enough.

1.7.3 Storage tanks are to be assembled in such a manner that a suitable air gap is maintained to prevent backflow contamination (see section 4.4.5 and drawing A 100).

1.7.4 Below ground cisterns are not permitted due to the inability to maintain a sufficient air gap.

1.8 Service Lines

1.8.1 Service lines are the portion of the line installed on the Customer's property. The installation of the service is not within the scope of work provided when applying for a connection to the City's RWP.

1.8.2 Routing of the service shall be at the owner's discretion and should be discussed with the City prior to design. Typically, the curbstop shall be installed on the Customer's property line in such a manner as to provide the shortest, most direct service to the point of entry into the Customer's building.

1.8.3 Maintenance and repairs of the service line shall be the responsibility of each individual Customer.

2 Water Mains

2.1 General

This section discusses various material characteristics and sizing requirements for the water main.

2.2 Pipe Material

3.2.1 Two pipe materials shall be accepted for the mains in the City RWP: polyvinyl chloride (PVC) and high density polyethylene (HDPE).

3.2.2 Polyvinyl Chloride (PVC)
All PVC pipes that are used for the City's RWP applications must be certified suitable for potable water by the CSA Testing Laboratory, and conform to the requirements of CSA:B137.3-M1990 and also the latest standards issued by the American Water and Wastewater Association (AWWA) and the Canadian General Standards Board (CGSB).

3.2.3 High Density Polyethylene (HDPE)
All PE pipe used for water pipelines must be certified suitable for potable water by the CSA Testing Laboratory, and conform to the requirements of the latest edition of B137.0-1986 standards for polyethylene pipe, tubing and fittings for cold water pressure services, and the latest standards issued by AWWA and CGSB. The CSA B137.1 Standard covers pipe up to and including 150 mm (6 inch) nominal diameter.

2.3 Series Selection (Pressure Rating)

2.3.1 Mains within the RWP shall be designed to handle the operating pressure and any surge as well as pump shut off conditions. These pressures shall be determined by hydraulic modelling completed by the City's consultant.

2.3.2 The Series rating shall not change in the middle of a section of pipeline, but should be made at defined points such as valves, tee, pump houses, etc.

2.3.3 The minimum Series rating for PVC pipe 75mm diameter and smaller shall be 1103 kPa (160 psi).

2.3.4 The minimum Series rating for HDPE pipe will be 689 kPa (100 psi)

2.4 Line Sizing

2.4.1 The number of Customers along a main and potential for future development govern line sizing. All sizing shall be determined by hydraulic modelling completed by the City.

2.4.2 In general, the minimum size of mainline serving three or more connections, should not be less than 50 mm (2 in) nominal diameter.

2.4.3 Typically, 25 mm CTS PE Series 200 pipe is installed from the Customer side of the curbstop to the Customer's building.

3 Pipeline Mechanical Appurtenances

3.1 General

This section discusses various mechanical appurtenances along with their required locations. The City maintains the right to require any appurtenance to be included in pipeline construction for new Customers depending on the circumstances of the extension.

3.2 Isolation Valves

4.2.1 Intersecting main lines should be equipped with isolation or shut-off valves to minimize disruptions during construction, repairs, testing or flushing. 'T' intersections typically require two valves and cross intersections require three.

4.2.2 Isolation valves shall be installed as per design requirements.

3.3 Curbstops

3.3.1 Curbstop valves are required to isolate each Customer connection from the main line.

3.3.2 The location of the curbstop shall be determined by the City in consultation with the Customer.

3.3.3 Curbstops are typically placed at the property line and should be identified with a marker such as a painted 4x4 post, metal, plastic or fiberglass rod. Markers should have reflectors or conspicuity tape on them with identifying numbers which correspond to map drawings or records. If valve placement is consistent and easy to locate, property damage can be avoided during emergencies.

3.4 Backflow Prevention

3.4.1 Backflow prevention devices vary but are generally designed for the purpose of reducing the risk of contamination entering the distribution system.

3.4.2 Dual Check Valves (DUC)
Dual Check Valves are a simple form of backflow prevention and are used in situations where there is a very low probability of it becoming a hazard.

3.4.3 Double Check Valves (DCVA)
Double Check Valves are the minimum standard for backflow prevention in most pipelines. They are usually part of the meter assembly and are located at the point of water delivery to the in-house reservoir. Generally, a Dual Check Valve is considered to be safe for any substance that

has a low probability of becoming a nuisance or be aesthetically objectionable if introduced to the domestic water supply.

3.4.4 Testable Double Check Valves (Testable DCVA)

Testable Double Check Valves are a requirement of most source connections and are designed to be tested in place by qualified technicians.

3.4.5 Air Gap

An air gap device is created in the Customer's storage tank and, if configured correctly, has a very high degree of backflow prevention. An air gap is achieved by ensuring that the elevation of the lowest point of the inlet or point where water is discharged into the storage tank is above the lip of the overflow. This means that if the float assembly in the storage tank fails and water continues to discharge into the tank, water in the tank will not rise above the overflow because it will take the path of least resistance and flow out the overflow and drain away. Therefore an "air gap" is created between the highest water level in the tank and the outlet. The lip of the overflow should be lower than the point of discharge into the tank by at least twice the diameter of the outlet into the tank. If the line discharging water into the tank is 1 inch, the lip of the overflow should be 2 inches below the point of discharge into the tank. The diameter of the overflow should also be a minimum of 1½ inches and configured so as to vent water away from the tank, preferably toward a floor drain. The overflow pipe shall not be connected into the existing plumbing, as this could allow the possibility of sewer gases backing up into the water storage. (See drawing A 100)

3.5 Flush out Assemblies

3.5.1 Flush out assemblies generally should be placed at the end of all mainlines. Flush outs can be used for purging air and flushing stagnant water.

3.5.2 Flush out assemblies should be accessible, and must have the approval of the property owner if located on private property. Additionally, the facilities should be marked and protected from accidental damage caused by vehicles and/or equipment operating within the vicinity. The flush out assembly should be locked or secured to prevent unauthorized entry and to reduce the risk of contamination entering the distribution system. Also, the site should be routinely monitored for suspicious activity and possible tampering.

3.6 Tees, Caps, Saddles, Etc.

3.6.1 Tees, caps or plugs can be used in locations of possible future expansion. A minimum length of 2 meters of pipe should be installed at the tee to facilitate locating and installing pipe in the future. If it is an HDPE pipeline, future expansion can continue by attaching the new line and using heat fusion as a method of connecting the existing line.

3.6.2 Stainless steel service saddles can be used for 75 mm or greater size pipe.

3.7 Tracer Wire

3.7.1 Tracer wire shall be installed with the pipe to assist with locating the line. Care should be taken when installing tracer wire to make sure the ends of the wire are accessible and easy to find. If the tracer wire has been buried or cut off below the ground it has no value, therefore the Contractor shall run the tracer wire up the curbstop valve or isolation valve and attach the end of the wire to the top of the curb valve with tape.

3.7.2 Tracer wire shall be attached to the building at the point of entry or in a consistent manner that will be easily located by the user.

3.8 Pressure Reducing Valves

3.8.1 Pressure Reducing Valves (PRV) are generally installed as part of the meter assembly or manifold in the house. Leakage from household mechanical systems could result if PRVs are not installed and line pressure in the distribution system exceeds the mechanical systems pressure rating.

3.8.2 Under special circumstances where the main lines are allowed to exceed 700 kPa (100 psi), the adjacent lateral lines must be protected with PRVs. In such cases the City may require PRV's to be incorporated with the cost of extending a main to new users.

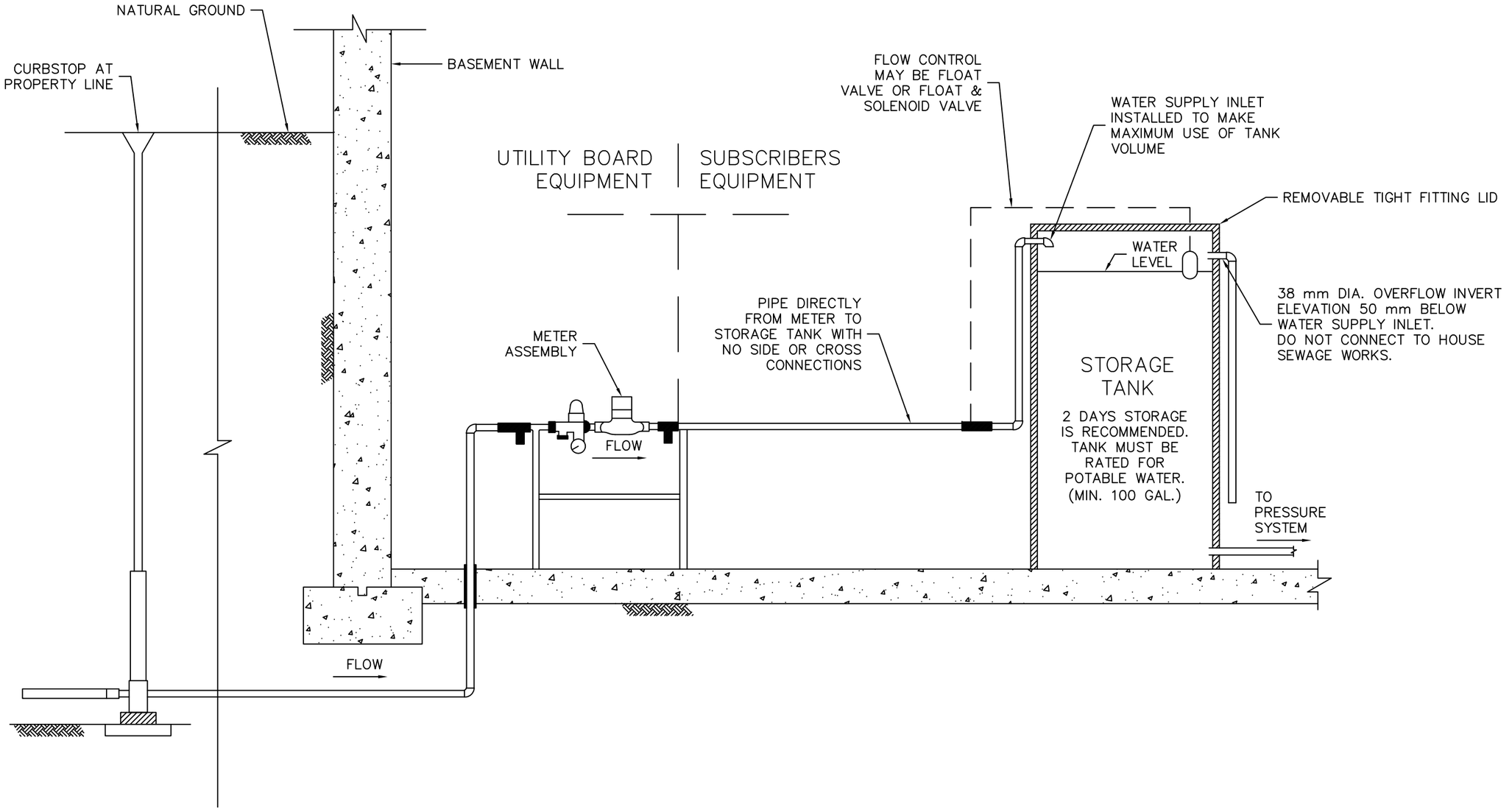
3.9 Meter Assembly

3.9.1 A typical meter assembly will include a meter with remote read, a pressure reducing valve with pressure gauge, and some type of shutoff or ball valve. Most assemblies will also have a backflow prevention device such as a check valve.

3.9.2 Meter assemblies may require periodic attention and could develop a leak due to fatigue or corrosion. Each of the components is subject to failure such as the pressure reducing valve which could lead to further problems. Generally, the Customer will notify the City of any leaking or abnormal noises that they have noticed. All reported abnormal conditions should be investigated as soon as possible to prevent further damages and possibly a major line leak or flood.

3.9.3 Authorized City personnel will perform meter maintenance on a bi-annual basis. As a utility provider, City personnel must be permitted access to the meter assembly. If service personnel are not able to access the meter for a service call, a card will be left for you to contact the City of Swift Current.

3.9.4 Customers are requested to keep clear access to meters (both located inside and outside the premises) for the purpose of servicing of the meters. There needs to be adequate space around the meter so that removal for repairs or replacement may be carried out easily and without damage to existing walls or structures.



CITY OF SWIFT CURRENT

PROJECT: CITY OF SWIFT CURRENT - RURAL WATER PIPELINE GUIDELINE	SCALE: NTS
	DRAWN BY: ELE
TITLE: TYPICAL STORAGE REQUIREMENT	UNITS: METERS
	DATE: 15/6/2017
	DRAWING NO: A 100

LEGEND

- MUNICIPAL BOUNDARY
- CURBSTOPS
- VALVES
- 19mm HDPE
- 25mm HDPE
- 38mm HDPE
- 50mm HDPE
- 75mm HDPE
- 100mm HDPE
- 150mm PVC
- 200mm PVC

0 500 1000 Meters

Swift Current

CITY OF SWIFT CURRENT

This PLAN is to be used as a reference only and is NOT a LEGAL document. All information on this plan may be subject to change without notification.

This PLAN shows only a general layout and may not represent as-built conditions.

Any unauthorized distribution is prohibited.

For more information please contact the City of Swift Current.

PROJECT

RURAL WATER PIPELINE

DRAWING NAME

WEST PIPELINE

SCALE	1:20,000
DRAWN BY	CJS
UNITS	METERS
DATE	20/04/03
DRAWING	B 100

Swift Current

End Of Line Capped

City Connection

End Of Line

End Of Line

Lateral Shut Off

Shut Off Valve

Isolation Valve

Main Reduces 100mm to 75mm

Isolation Valve

Line Pulled Through Existing 152.4 mm Pipe

Shut Off Valve

Lateral Shut Off

Lateral Shut Off

Lateral Shut Off

Lateral Shut Off

0 500 1000 Meters

LEGEND

- MUNICIPAL BOUNDARY
- CURBSTOPS
- VALVES
- 19mm HDPE
- 25mm HDPE
- 38mm HDPE
- 50mm HDPE
- 75mm HDPE
- 100mm HDPE
- 150mm PVC
- 200mm PVC

CITY OF SWIFT CURRENT

This PLAN is to be used as a reference only and is NOT a LEGAL document. All information on this plan may be subject to change without notification.

This PLAN shows only a general layout and may not represent as-built conditions.

Any unauthorized distribution is prohibited.

For more information please contact the City of Swift Current.

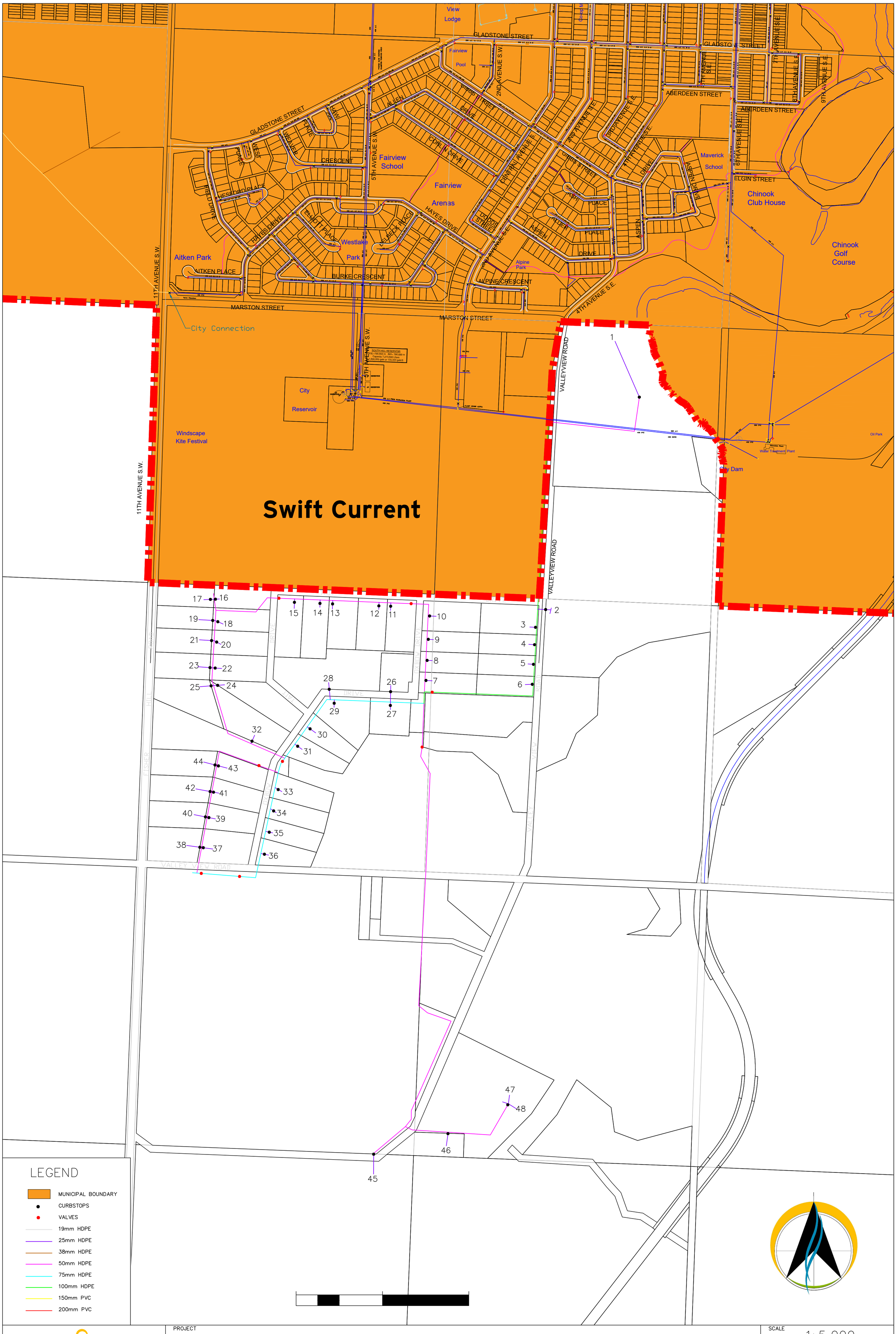
PROJECT

RURAL WATER PIPELINE

DRAWING NAME

EAST PIPELINE

SCALE	1:15,000
DRAWN BY	CJS
UNITS	METERS
DATE	20/03/30
DRAWING	B 200



LEGEND

- MUNICIPAL BOUNDARY
- CURBSTOPS
- VALVES
- 19mm HDPE
- 25mm HDPE
- 38mm HDPE
- 50mm HDPE
- 75mm HDPE
- 100mm HDPE
- 150mm PVC
- 200mm PVC

CITY OF SWIFT CURRENT

PROJECT

RURAL WATER PIPELINE

DRAWING NAME

OXBOW PIPELINE

SCALE	1:5,000
DRAWN BY	CJS
UNITS	METERS
DATE	20/03/31
DRAWING	B 300