R.M. OF ST. CLEMENTS

STANDARDS FOR DESIGN AND CONSTRUCTION OF PUBLIC WORKS

March, 2019

(Adopted by Resolution 2015-413)

(Adopted by Resolution 2019-139)

WSP Project No: 151-08023-00

Revised: March 29, 2019

TABLE OF CONTENTS

Page No.

1.0 GENERAL 1

1.1 Applicable Specifications 1

1.2 Applicable Standards 1

1.3 Subdivision Classification 1

2.0 WATERWORKS 2

2.1 Approved Materials for Water Installations 2

2.2 Design and Construction 4

Drawing G01 – Typical Lot Servicing Layout 8

3 .0 WASTEWATER SEWERS 9

3.1 Approved Materials for Wastewater Sewers 9

3.2 Design and Construction 10

4 .0 LOW PRESSURE SEWERS 12

4.1 Materials 12

4.2 Design and Construction 13

Drawing G02 – Typical Low Pressure Sewer / Septic Tank Installation – Submersible Pump 16

5.0 DRAINAGE CRITERIA 17

5.1 Approved Materials For Drainage Installations 17

5.2 Design Criteria 18

6.0 ROADWAYS 20

6.1 General 20

6.2 Pavement Design Criteria 20

6.3 Subgrade 21

6.4 Road Sections 21

6.5 Geotextile Fabric 22

Drawing G03 – Typical Urban Residential Road Cross Section 23

Drawing G04 – Typical Rural Residential Road Cross Section 24

6.6 Surface 25

6.7 Road Construction Staging 25

6.8 Driveways 25

6.9 Cul-de-sac 26

6.10 Road Grade 26

7.0 SIDEWALKS / PATHS 27

7.1 Design 27

Drawing G05 – Typical Sidewalk / Pathway 28

8.0 OTHER UTILITIES 29

8.1 Hydro and Telephone 29

8.2 Road Signs 29

9.0 LOT GRADING 30

9.1 Lots 30

9.1.1 Urban Lots 30

9.1.2 Rural Lots 30

9.1.3 Lot Grade Permits 30

Drawing G06 – Urban Residential Back to Front Lot Drainage 31

Drawing G07 – Urban Residential Split Lot Drainage 32

Drawing G08 – Rural Residential Back to Front lot Grading 33

Drawing G09 – Rural Residential Split Lot Drainage 34

10.0 PARKS 35

10.1 Greenspace / Public Reserve 35

10.1.1 Urban Area Subdivisions 35

10.1.2 Rural Area Subdivisions 35

10.1.3 Public Reserves 35

11.0 SEWAGE PUMPING STATIONS 36

11.1 Materials 36

11.2 Design and Construction 37

12.0 QUALITY ASSURANCE 38

12.1 Installation 38

12.2 Testing 38

12.3 Restoration and Clean-up 39

13.0 PLANS 40

13.1 Preliminary Documents 40

13.2 Project Costs 40

13.3 Survey Monuments 40

13.4 Builders' Lien Act 41

13.5 As-Constructed Plans 41

13.6 Warranty Period 41

1.0 GENERAL

1.1 Applicable Specifications

(a) Manitoba Water Services Board (MWSB) Standard Construction specifications, latest edition. The current Specifications are available at: www.mbwaterservicesboard.ca/standard-construction-specs.html

Note that the MWSB does not provide financial or technical assistance for projects that are not directly under their jurisdiction.

(b) Manitoba Infrastructure (Highways), latest edition. These specifications are available on line at: www.gov.mb.ca/mit/contracts/manual.html

(c) The City of Winnipeg Standard Construction Specifications, latest edition. These specifications are available on line at www.winnipeg.ca/matmgt/spec/default.stm. These specifications shall only apply to 100mm and 150mm sub-base material.

1.2 Applicable Standards

AWWA – American Water Works Association
6666 West Quincy Avenue, Denver, Colorado

CSA International
178 Rexdale Boulevard
Toronto, Ontario M9W 1R3

ASTM – American Society for Testing Materials
100 Barr Harbor Drive
West Conshohocken PA 19428-2959 USA

CGSB – Canadian Government Specifications Board
Ottawa, Ontario K1A 0S5

WCU – Western Canadian Underwriters

The Standards referred to shall be the most recent edition.

1.3 Subdivision Classification

Subdivisions shall be classified as either urban or rural. Council shall determine whether a subdivision is classified as urban or rural.

2.0 WATERWORKS

2.1 Approved Materials for Water Installations

(a) General

All materials shall conform to the relevant Standard Approved listings of the Manitoba Water Services Board, unless otherwise specified by the R.M. of St. Clements.

All materials and specifications indicated in this section shall apply to all subdivisions, condominium developments, apartments, and mobile home parks that connect to the R.M's infrastructure.

(b) Watermain Pipe

Watermain shall be either:

- PVC Series 160 SDR 26 (CSA B.137.3)
- High Density Polyethylene (HDPE) DR 17 3608 or 4710. Joining of HDPE pipe shall be by thermal fusion
- Any other types shall require approval from the R.M. of St. Clements.

(c) Fittings

1) PVC fittings of similar type as pipe may be used on PVC Series 160 SDR 26 (CSA B.137.3) pipe (injection moulded or fabricated and FRP reinforced) Series 160 fittings with Series 160 pipe. Similarly for HDPE pipe, fittings shall be constructed of the same materials as the pipe.

(d) Valves

Gate valves shall be AWWA C509 Resilient Seat type with O-ring stem seals, non-rising spindle, left hand opening, with push-on joints (when used with PVC pipe), or flanged connection (when used with HDPE pipe) suitable for IPS dimension pipe (Mueller, resilient wedge gate valve A2360 Series, or approved equal).

(e) Valve Boxes

Gate valve boxes shall be telescoping type adjustable for bury depth. The upper section shall be ductile iron with a hinged cover with the mark "W" cast in. The lower section shall be PVC (DR 18 type). Each box shall have an extension spindle with a stone disc and 25 mm operating nut no more than one metre below proposed ground level.

(f) Hydrants

Hydrants shall be AWWA C502 type, with dry top bonnet, compression type main valve no less than 125 mm diameter, left hand opening, for off line service with a 150 mm push-on joint suitable for cast iron pipe, bronze-to-bronze seat ring, non-draining barrel no less than 175 mm in diameter, two hose and one pumper nozzle, all with caps and chains, Western Canadian/Manitoba Standard operating nuts and cap threads, a "break-away" ground line flange, and flat surfaces on the bottom and back of the boot. Hydrants shall be painted "Chinese Red" with reflective silver caps. Acceptable model shall be:

- Clow – D67M

(g) Service Pipe

Community water service pipe shall be either:

- HDPE Series 160 DR 9 (CTS) for 25mm, HDPE Series 160 DR 11 (CTS) for 38mm and 50mm.
- Cross linked polyethylene (“Municipex”)

Commercial water service lines shall be approved by the R.M. of St. Clements.

(h) Corporation Stops

Corporation stops shall be bronze, ball-type, with standard tapered threaded inlet suitable for tapping via service saddle to PVC watermains, with compression type outlet (Ford and Mueller), or approved equal.

(i) Curb Stops

Curb stops shall be bronze, ball-type, non-draining, with compression type joints (Ford), or approved equal.

(j) Curb Boxes

Curb boxes shall be PVC Schedule 40 (CSA B137.3) with a galvanized upper section and lower extensions and a PVC boot and a 2 to 3 metre adjustable depth, (no nuts on sliding portions) with an iron ribbed lid, with the word "water" cast in, five sided nut, 22 mm flat-to-point, 16 mm stainless steel rod, yoke to fit curb stops, and a brass cotter pin centred on the yoke. (Trojan, WDVB or approved equal).

(k) Service Saddles

Saddles shall be wide band type with minimum 10mm bolt, totally constructed of passivated 304 SS or 316 SS, with a rubber compression gasket and threaded outlet (Robar, Romac, and Ford, or approved equal).

(l) Couplings

Couplings shall be either double bell PVC (Series 160, CSA B.137.3) preferred or metal (all 304 SS or 316 SS) with virgin rubber (ASTM D2000 SBR) gaskets (Dresser, Robar, Rockwell, or approved equal).

(m) Backflow Preventor

Dual check valves shall be required on all residential services. They shall be inline and contain a replaceable cartridge with stainless steel spring (adjustable range 170 – 515 kPa), and be rated for a minimum inlet pressure up to 1035 kPa. Backflow preventors shall be installed inside the building, near the meter.

2.2 Design and Construction

(a) General

All design and construction shall conform generally to the Standard Specifications of the Manitoba Water Services Board, with any exceptions being specifically outlined herein.

Installation of all underground utilities (gas, hydro, telephone, cable) under proposed or existing roadways shall be by trenchless methods. No open cut excavation of roadways shall be permitted.

(b) Bury Depth

All watermains shall be provided with a minimum cover over the crown of the pipe as follows:

- 2.5 metres under deep, narrow ditches
- 2.75 metres under prairie, or shallow or wide ditches
- 3.0 metres under roads

All water service piping shall be provided with a minimum cover over the crown of the pipe, of at least 2.3 metres from finished ground, but shall not be deeper than 3.00 metres, unless otherwise approved by the R.M.

(c) Installation

Pipe bedding, joining and backfilling shall conform to the recommendations of the manufacturer, and shall conform to recognized Engineering practice. Bedding shall be tamped Class "B" (sand bedding) and backfill shall be compacted to a density equivalent to insitu material. All piping installed under proposed or existing roadways, shall be tunnelled (open trench is not permitted). All piping installed under existing driveways shall be tunnelled, or backfilled with compacted granular material.

Where watermains cross low pressure sewer lines, the low pressure sewer lines shall be installed under the watermains, with a minimum 450mm separation.

(d) Valves

A gate valve shall be provided; for each fire hydrant; at the end of each block; at Provincial Trunk Highway, railway and river crossings (both sides if pipeline can flow in both directions), at watermain tees (at least two gate valves), and at watermain cross (at least three). Main line gate valves shall be installed in line with intersecting street right-of-way lines, or property lot lines, wherever possible. Maximum spacing between valves shall be 150 metres, or a maximum of 20 services between valves, whichever is less.

(e) Thrust Blocks

Thrust blocking shall be of concrete construction conforming to MWSB standards. Thrust blocks are required for installation on polyethylene and PVC pipelines.

(f) Offset Lines

Normally, sewer and watermains shall be installed in separate trenches. The watermain shall be installed between the edge of pavement and property line, and the sewer shall be between the opposite pavement edge and property line. Watermains shall be installed (generally) 4 metres off the property line, unless otherwise approved by the R.M.

(g) Hydrants

Hydrants shall be installed "off-line" at an offset of 1.0 metre off the property line. Hydrants shall be located no more than 150 metres apart in residential areas. In business districts (as specified by Council) 100 metre maximum spacing shall prevail. Preference shall be given for hydrants to be installed at road intersections, and when at an intersection, for the hydrant to be set on the least busy street, where possible. Where

hydrants are located away from intersections, they shall be positioned between lots (i.e. opposite the lot line). Hydrant groundline flanges shall be either at or no more than 150 mm above finished ground grade. Pumper nozzles shall face the nearest roadway.

Hydrants shall be installed, at a minimum, for flushout purposes regardless if fireflows are not available.

(h) Service Connections

All water service connection boxes shall be supplied and installed by the Developer for new subdivision developments. Service lines shall be installed 5.0 metres inside the property and plugged. The end of each installed service line shall be marked with a 50 x 100 x 900 mm pressure treated construction grade fir wooden marker, driven in to the ground, with top painted blue. A 1.0 metre length of 20 mm rebar is to be placed next to the wooden marker, with the top being flush with the ground surface. The curb stop box shall be marked with a 2.0 metre length of 50 x 2400 mm wood marker, driven 1.0 metre into the ground with the top painted blue. Curb boxes shall be located 300 mm from the front property line in the right-of-way. Curb stops shall be located 3.0 metres from the side yard property line. Typical lot servicing layout is shown at the end of this section, as drawing G01.

(i) Water Main Design criteria

For domestic flow calculations, average per capita consumption of 250 L per day multiplied by the appropriate Harmon peaking factor shall be used to determine peak hour rates. Population density shall be assumed to be 3 persons per residential unit. Watermains shall be looped where possible to provide better pressure and eliminate stagnant water at "dead- ends". Where a main line is installed as a dead-end, a hydrant shall be installed. Watermains shall be designed so as to provide at a minimum the following distribution residual water pressures, when pumping station output pressure is 65 psi (450 kPa):

- domestic (community) - 30 psi (205 kPa)
- fireflow (class 1) - 20 L/s @ 140 kPa
- fireflow (class 2) - 30 L/s @ 140 kPa
- fireflow (class 3) – 60 L/s @ 140 kPa)

Fireflows for each development shall match the fireflow classification of the existing mains where connections are being made.

(j) Minimum Service Size

Water service lines shall be no smaller than:

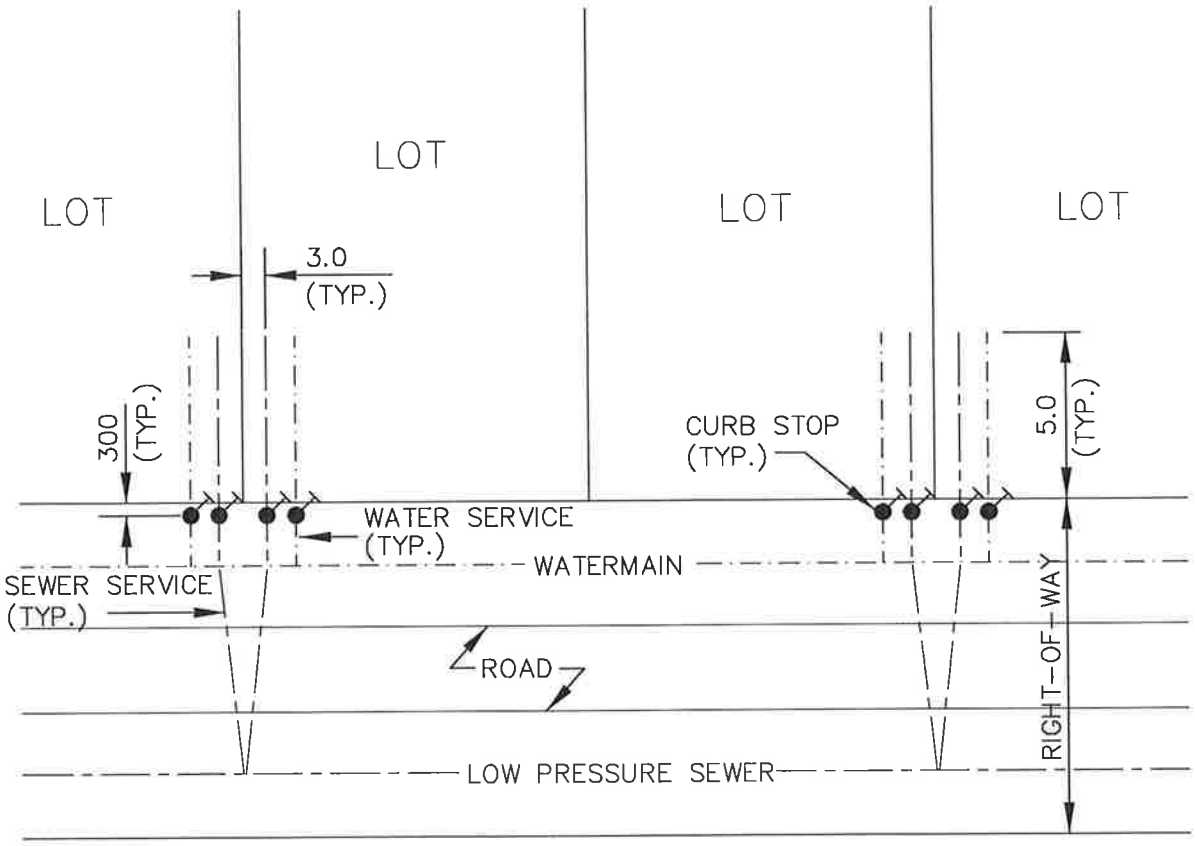
Single family homes	19 mm Municipex or 25 mm HDPE
Duplex	25 mm
Multiple unit block (8 unit max)	38 mm
Multiple unit block (20 unit max)	50 mm
Small commercial establishment	25 mm

Other - As determined by engineer according to individual requirements.

(k) Testing and Disinfection

All completed works shall be tested, flushed, disinfected and reflushed to the appropriate MWSB Standards. Water service lines shall be flushed at full operating capacity to achieve three water changes, if the lines are brought into buildings.

Watermains, water lines and any pipelines installed by directional drilling methods shall be “polypigged” (i.e. swabbed) as part of the preliminary flushing process, to ensure full removal of sediment.



TYPICAL FRONT LOT SERVICING LAYOUT

WSP
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

PROJECT:	R.M. OF ST. CLEMENTS SERVICING STANDARDS
TITLE:	TYPICAL LOT SERVICING LAYOUT
DRAWN BY:	M.P.M.
SCALE:	N.T.S.
CHECKED BY:	M.P.M.
PROJECT NO:	151-08023-00

SUPPLEMENTAL:	
ADDENDUM:	ADD_#☒
DIRECTIVE:	DIR_#☒
CHANGE ORDER:	CHG_#☒
REVISION:	0
DATE:	2015/07/28
SUPPLEMENTAL NO:	G01

3 .0 WASTEWATER SEWERS

3.1 Approved Materials for Wastewater Sewers

(a) General

All materials shall conform to the relevant standard Approval Listings of the MWSB Standard Construction Specifications, most recent edition, with any exceptions being specifically outlined herein.

All materials and specifications indicated in this section shall apply to all subdivisions, condominium developments, apartments, and mobile home parks that connect to the R.M.'s infrastructure.

(b) Sewermain Pipe

Gravity sewer pipe shall be PVC -SDR 35 (ASTM D2241, CSA B.182.2).

(c) Service Pipe

Gravity sewer service pipe, 100 mm and 150 mm shall be PVC SDR 28 or SDR 35 (ASTM D2241, CSA B.182.1).

(d) Saddles/Tees

Service tees shall be used in new installations, and saddles in existing installations only. However, saddles may also be used in new installations where services are installed on the radius of a cul-de-sac.

Gravity sewer service tees shall be injection moulded or fabricated and FRP reinforced. Acceptable models shall be Ipex – Ring Tite, or Royal Pipe Systems.

Gravity sewer service saddles shall be PVC (ASTM D2241, CSA B.182), compatible with the type of sewermain being used. Straps shall be stainless steel.

(e) Manholes

Manholes shall be precast reinforced concrete (ASTM C76 Class II) with flexible bituminous gaskets between sections. Cement shall be CSA A-5M Type 50, sulphate resistant. Units shall have cast-in-aluminum MSU Daymond manhole ladder rungs at 305 mm spacing. Standard base sections shall be 1200 mm diameter, with 1200 mm diameter riser sections. Larger base sections required for influent / effluent piping greater than 525 mm.

(f) Frame & Covers

Manholes on a gravity sewer line shall be complete with a cast grey iron frame and cover, true to the required pattern, free of cracks, gas holes, flaws, excessive shrinkage, and roughness. Frames shall weigh 103 kg and covers 76 kg.

Mating surfaces shall be machined for a close fit. Covers shall be solid, excepting two holes provided for lifting (Titan TF 101 M or approved equal).

(g) Sewermain Couplings

Couplings shall be flexible transition sewer coupling, c/w stainless steel straps and shear rings. Acceptable model shall be Mission Rubber Co. – Flex Seal.

3.2 Design and Construction

(a) Bury Depth

The minimum depth of gravity sewermains shall be 2.4 metres measured from finished ground level to pipe invert. Council approval required for cover less than the minimum bury depth criteria.

All sewer service piping shall be not less than 1.8 metres below finished ground at the building line, and not less than 2.15 metres at the finished front property line.

(b) Minimum Slope

Sanitary sewers shall be designed to permit a full or half full scouring velocity of 0.60 m/sec. Typical slopes required for Manning's Roughness Coefficient of n= 0.013 are as follows:

	PVC
200 mm	0.35%
250 mm	0.25%
300 mm	0.20%

(c) Installation

Bedding, joining and backfilling shall be in accordance with manufacturer's recommendations and with recognized engineering practice, as per Section 2.2(c).

(d) Manholes

Manholes shall be located such that there is a manhole at every intersection between pipes 200 mm and larger, and such that the recommended linear spacing between manholes does not exceed 120 m where there are service connections, with a maximum spacing of 150 m.

(e) Location of Sewers

Sewermains shall be installed (generally), 2.5 metres off the edge of the road, on the opposite side of the street to the watermain.

(f) Minimum Sewer Main size

Gravity sewermains shall have a minimum inside diameter of 200 mm. Sewers shall be designed to convey the peak hour wastewater flow, as computed by use of an average daily per capita consumption of 250 L multiplied by the appropriate Harmon peaking factor, plus allowable infiltration and extraneous flows. Note that for all new developments, weeping tiles shall not be connected to sanitary sewers.

(g) Minimum Sewer Service Size

Gravity sewer services lines shall be no smaller than:

Single family home or duplex	100 mm
Small to medium apartment block (up to 12 units)	150 mm
Commercial establishment	150 mm
Other commercial as determined by Engineer according to individual requirements	

(h) Minimum Sewer Service Slope

The minimum slope for a 100 mm PVC Sewer Service shall be 0.90%, and 0.50% for a 150 mm service.

(i) Service Connections

All sewer service lines shall be installed 5.0 metres inside the property line and plugged. The lines shall enter the lot beside the water service, 3.0 metres from the side lot line. If there is no water service line installed, the end of the service line shall be marked as per section 2.2 (h).

4 .0 LOW PRESSURE SEWERS

4.1 Materials

(a) General

All materials and construction methods for low pressure sewers shall conform to the relevant sections of the Manitoba Water Services Board (MWSB) Standard Construction Specification, latest edition.

All materials and specifications indicated in this section shall apply to all subdivisions, condominium developments, apartments, and mobile home parks that connect to the R.M.'s infrastructure.

(b) Sewermain Pipe

Low Pressure Sewer (LPS) mains shall be either PVC SDR 32.5 Series 125 (CSA B.137.3) or high density Polyethylene (HDPE) DR 17.

(c) Fittings

LPS fittings shall be made of the same material and to the same specifications as the sewermain pipe.

(d) Valves and Boxes

75 mm and larger - (See 2.1(d) and (e)). Iron hinged box covers shall be cast with the mark "S".

(e) Service Pipe

LPS service pipe shall be 38 mm, either low density PE Series 75 (CSA B.137.1), or HDPE DR 17.

(f) Curb Stops and Boxes (and 50 mm valves)

(See Section 2.1(i) and (j)). The letter "S" shall be cast into the iron box lid.

(g) Couplings

For P.E. mains, P.E. fittings shall be of same quality and pressure rating as pipe. Injection moulded or fabricated with FRP reinforcement for both thermal butt fusion and socket fusion application. Acceptable models shall be Ford FC-1 (to have ESH designation) or Viking Johnson / Mueller "Maxi-fit" or "Maxi-step" (c/w all stainless steel nuts, bolts and washers, or approved equal.

(h) Cleanouts

Unless otherwise approved by the R.M., cleanout assemblies shall be offline and include an isolation valve. All vertical piping and 90° bends shall be HDPE or PVC Schedule 80. The cleanout size and diameter shall match main line piping. The pipe, valve and fittings shall conform to the relevant section of this specification. Cleanouts shall include a blind flange.

All cleanouts installed in urban locations shall consist of the riser pipe terminating 100 mm below finished ground. A standard manhole frame and cover and concrete riser section shall be installed over the cleanout, with a gravel sump.

(i) Service Saddles

Service connection saddle/clamp assemblies shall be compression type with a rubber gasket that fully contacts the pipe surface. Saddles shall be wide band stainless steel. Electrofusion tapping sleeves will be acceptable on P.E. mains. Acceptable models shall be Robar "Series 1616", Ford Stainless Steel FS303. Ford Brass S70 and S90, or approved equal.

4.2 Design and Construction

(a) General

Subsections (a), (b), (c) and (e) of Section 2.2 shall apply.

(b) Valves

Valves shall be provided where branch mains connect to a main collector. Main collectors shall be provided with a valve and box upon entering a sewage pumping station, or a stabilization pond; at Provincial Trunk Highway, railway and river crossings; and at significant points (i.e. tees and crosses).

(c) Location of Low Pressure Sewers

Low pressure sewer mains shall be installed (generally), 4.0 metres off the property line, on the opposite side of the street to the watermain.

(d) Discharge

A low pressure sewermain shall only discharge to the following:

- another low pressure sewermain with sufficient capacity
- sewage pumping station
- stabilization pond
- gravity sewer manhole, with approval from the R.M.

(e) Cleanouts

Cleanouts should be provided at 90 degree bends or intersections where there is a change in pipe diameter, and at the end of branch lines, but may be omitted if the branch line will serve no more than three houses or if the branch line is certain to be extended within three years, as determined by the R.M. Cleanouts should be provided along LPS mains where significant low points occur (i.e. river crossings). Maximum spacing between cleanout locations shall be 500 metres.

(f) LPS Main Design criteria

While sophisticated pressure analysis models may be employed to determine precisely the anticipated flows/pressure losses for line sizing, the minimum size, in relation to the maximum potential number of service connections, is as follows:

Main size	Max. No. of Services
50 mm	40
75 mm	70
100 mm	120

These numbers assume no weeping tiles are connected. For pressure loss/flow calculations, the performance characteristics of the Little Giant model WS50M (submersible) shall be used. End suction centrifugal pumps shall not be used. "Wastewater production" rates shall be as per Section 3.2(f).

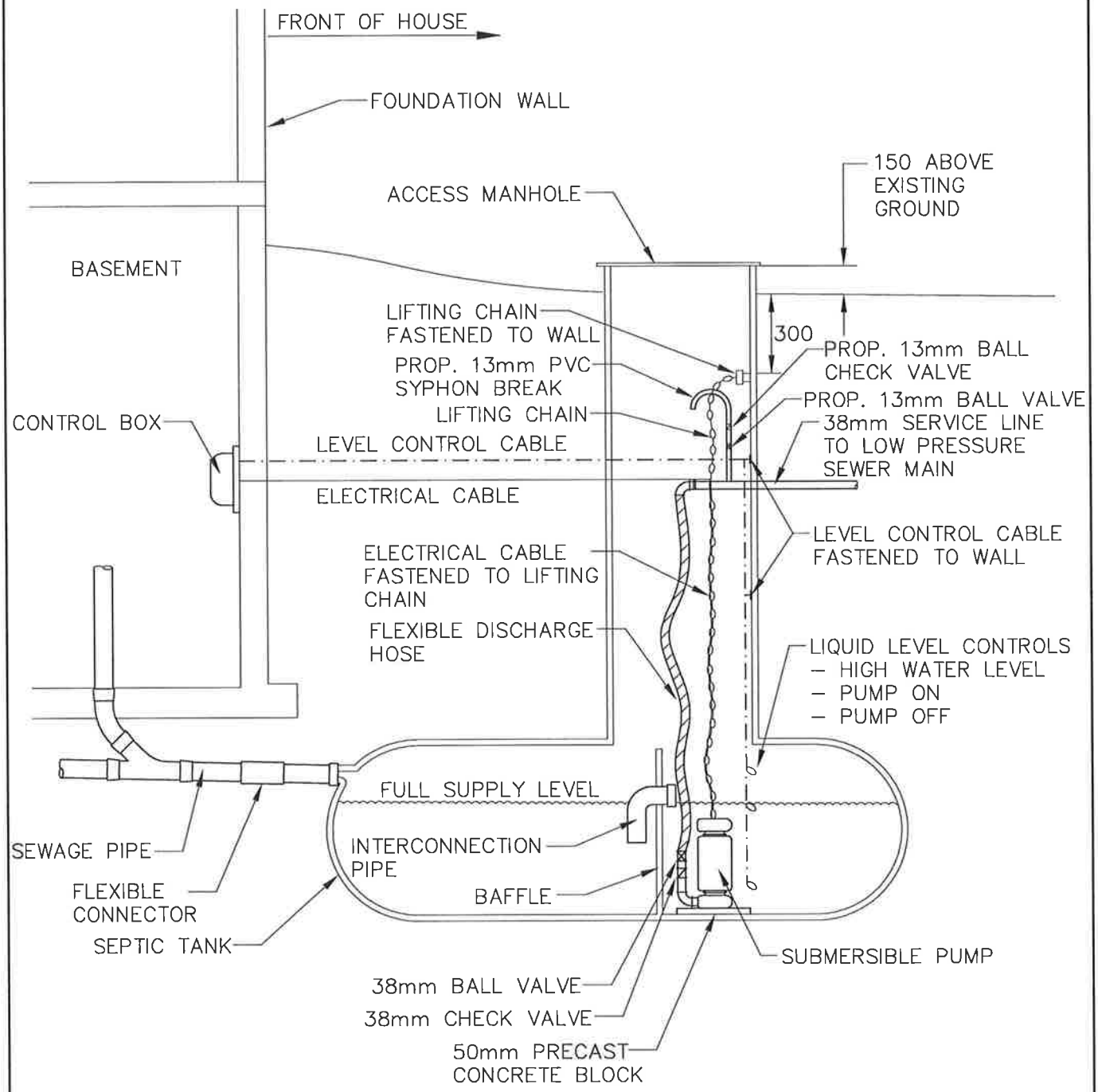
(g) Testing

All completed works shall be tested to MWSB standards except that the test pressure shall be 75 psi (500 kPa).

Low pressure sewers installed by directional drilling methods shall be “polypigged” (i.e. swabbed) as part of the preliminary flushing process, to ensure full removal of sediment.

(h) Service Connections

All rural and urban low pressure sewer service lines shall be installed 5.0 metres inside the property line and plugged. If there is no water service line installed, the end of the low pressure sewer line and curb stop box shall be marked as per section 2.2 (h). A typical low pressure sewer and septic tank installation is shown at the end of this section, as drawing G02. The R.M. shall review the installation of the entire system installed on private property, prior to backfill.



METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INIDICATE METRES

WSP
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

PROJECT: R.M. OF ST. CLEMENTS SERVICING STANDARDS		SUPPLEMENTAL: ADDENDUM: ADD_#☒ DIRECTIVE: DIR_#☒ CHANGE ORDER: CHG_#☒
TITLE: TYPICAL LOW PRESSURE SEWER/SEPTIC TANK INSTALLATION – SUBMERSIBLE PUMP		REVISION: 0
DRAWN BY: M.P.M.	SCALE: N.T.S.	DATE: 2015/07/28
CHECKED BY: M.P.M.	PROJECT NO: 151-08023-00	SUPPLEMENTAL NO: G02

5.0 DRAINAGE CRITERIA

5.1 Approved Materials For Drainage Installations

All materials and specifications indicated in this section shall apply to all subdivisions, condominium developments, apartments, and mobile home parks that connect to the R.M.'s infrastructure.

(a) Culverts

Drainage culverts shall be corrugated steel pipe, minimum 16 gauge (1.6mm total thickness), coated with 2 oz, zinc per square foot (610 grams per square metre), joined with annular corrugated couplers. Minimum size shall be 450 mm diameter. **All driveway culverts will require a municipal permit before installation.**

(b) Storm Sewer Piping

Storm sewer pipe shall be:

- Corrugated HDPE (Boss 2000, or approved equal) to CSA B182.6 storm sewer, for shallow bury installations only.
- Concrete pipe up to and including 375 mm diameter shall be Class 3 pipe as designated by ASTM Standard C14.
- Concrete pipe greater than 375 mm diameter shall be the class specified by the engineering consultant and as approved by the R.M. Classes shall conform to ASTM Standard C14 and C76.
- PVC SDR 35 (ASTM D3034 or F679).

(c) Manhole and Catch Basin

Storm sewer manholes and catch basins shall be precast reinforced concrete (ASTM C76 Class II). Manhole sections shall have flexible bituminous gaskets between sections. Cement shall be CSA A5M Type 50, sulphate resistant. Units shall have cast-in-place aluminum or galvanized steel ladder rungs at 305 mm spacings. Standard manhole base sections shall be 1200 mm diameter with a 1200 mm diameter riser section. Maximum spacing of manholes shall be 150 metres. Catch basins shall be 900 mm diameter and have 600 mm sumps and hinged cast iron or PVC hoods.

(d) Manhole and Catch Basin Covers/Inlets

Catch basin and storm sewer manhole framing and cover units shall be cast grey iron, true to the required pattern, free of cracks, gas holes, flaws, and excessive roughness. Minimum frame weight shall be 103 kg and minimum cover weight shall be 76 kg. Patterns shall be Titan TF101M.

5.2 Design Criteria

(a) System Capacity And Drainage Design

Stormwater drainage works, including ditches, culverts, and storm sewers, shall be designed on the basis for rainfall intensity statistically equivalent to a five year return interval, with duration equivalent to the time of runoff concentration to any given point in the system. Based on this calculated intensity, the rate of storm runoff shall be determined by the Rational Formula for drainage areas less than 40 hectares (100 acres). For larger areas, or alternate means of calculating peak discharge, approval must be received by the R.M.

Storm runoff from a development shall not be permitted to enter, or cross, an adjacent property. For developments larger than 10 lots, the rate of post development runoff shall not exceed the rate of runoff that existed in pre-development conditions. Appropriate retention is required to control the rate of runoff.

(b) Storm Sewers

- Storm sewers to be designed to accommodate a 5 year return design rainfall.
- Storm sewers to accommodate estimated peak flows under surcharged conditions and as identified within section (a) above.
- Under design conditions, the maximum permissible surcharge level shall be the finished rim elevation within the drainage basin.
- Storm sewers shall have a minimum diameter of 300 mm. Catchbasin lead piping shall have a minimum diameter of 250 mm.
- Storm sewers shall be designed with a slope to provide minimum velocities when flowing full of 0.9 metres per second, using the Manning roughness coefficient ‘n’=0.013.
- Minimum depth of cover shall be as per the manufacturer’s recommendations for the type pipe being installed and loading requirements.
- Where storm sewer are designed to be permanently surcharged, minimum depth of cover from the crown of the pipe to ground elevation shall be 2.15 metres when installed under boulevards or landscaped areas, and 2.44 metres when installed under roads.

(c) Drainage Ditches

Subdivisions shall be classified as either urban or rural. Council shall determine whether a subdivision is classified as urban or rural. Drainage ditches shall be graded at a longitudinal slope of 0.20% or greater in urban locations, and 0.10% or greater in rural locations. Typical side slopes shall be no steeper than 4:1 unless otherwise approved by the R.M. Ditch bottoms shall be at least 1.0 metre wide. "V" ditches shall not be accepted. Ditches, which includes the entire area between the edge of the road and the property line, shall require a minimum of 75mm of topsoil, and be seeded with grass.

6.0 ROADWAYS

6.1 General

Roadways shall be classified as either urban or rural. Council shall determine whether a subdivision is classified as urban or rural.

All roadway construction shall conform to the appropriate Municipal Standards and Manitoba Infrastrucutre. Compaction requirements shall be based on Standard Proctor Dry Density (ASTM D698) at 90-130% of optimum moisture content. Material supply of 100 mm and 150 mm subbase material shall conform to the City of Winnipeg Construction Standards.

All materials and specifications indicated in this section shall apply to all subdivisions, condominium developments, apartments, and mobile home parks that connect to the R.M.'s infrastructure.

All private developments, such as condominiums, apartments, and mobile home parks, shall have driveway access off internal roads, and not municipal roads.

6.2 Pavement Design Criteria

(a) Crossfall

The highpoint of the pavement shall be the centre-line of the road (crown). The crossfall between crown and edge of pavement shall be graded at 3.0%.

(b) Width

Urban residential roadways shall have an asphalt width of 7.5 metres, with 450mm gravel shoulders. Rural residential roads shall have a gravel width of 8.40 metres. Corners shall have a minimum 7.5 metre radius.

Where there is a right-of-way widening on curves, the outside road radius shall be the stipulated inside corner radius, plus the width of the road, plus 2.0 metres. The radius point for the outside of the road shall be the same as the radius point for the inside corner. Transition from the outside radius shall be made with 19.0 metre radius curves.

Developers shall ensure that right-of-way widths are adequate to accommodate the appropriate utilities, infrastructure piping, road width,

and ditches stipulated in these standards. However, minimum right-of-way widths shall be 24.0 metres for urban and rural residential roads.

6.3 Subgrade

(a) Excavations for roadways shall be, at minimum, 0.9 metre wider than the outside design width of the pavement. Excavation shall be sufficiently deep to permit the required subgrade preparation, base course and pavement thickness. Subgrade preparation shall generally consist of removing a 150 mm layer of subgrade (under bottom subbase course level) and recompacting it into place to minimum 95% density with a sheeps foot roller and/or vibrating compactor. Any unsuitable material (organics, silty soil, etc.) as may be exposed shall be excavated and removed, to a maximum depth of 900 mm below finished top of road, and replaced with approved subbase material. Approved subbase materials shall be either:

1. Clean compacted clay
2. Crushed gravel (50 mm)
3. Crushed gravel or limestone (100 mm and 150 mm). This material to be used only if the thickness of the material to be placed is a minimum of 2.5 times the diameter of the aggregate to be placed

6.4 Road Sections

Road sections shall consist of a minimum asphalt (if required), subbase and base course thickness as indicated:

a) Residential (urban)
- 100 mm asphalt
- 150 mm base course
- 300 mm sub base

b) Residential (rural)
- 150 mm base course
- 300 mm sub base

Granular materials shall be placed and compacted in lifts to achieve a minimum 98% density throughout the subbase pavement structure. The subbase and base course materials shall be crushed aggregate to meet Manitoba and Infrastructure “C” and “A” standards. 100 mm and 150 mm subbase material may be used providing it conforms to City of Winnipeg Construction Standards for gravel or limestone, and the thickness of the material to be placed is a minimum of 2.5 times the diameter of the aggregate to be placed.

6.5 Geotextile Fabric

.1 A separation / reinforcement geotextile fabric shall be placed between the sub-grade and sub-base materials for urban and rural residential roads, and shall be a woven fabric.

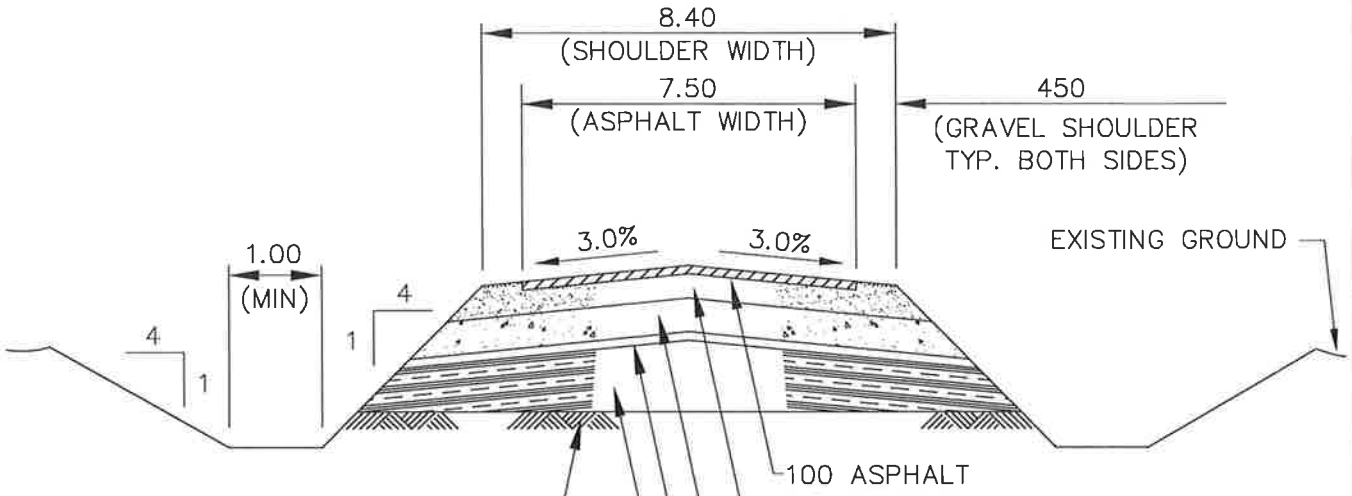
.2 All physical property requirements are minimum average roll values determined according to ASTM D4759. The separation / reinforcement geotextile fabric shall meet or exceed the standards identified as follows:

Property	Standard	Test Method
Grab Tensile Strength	1400 N – minimum	ASTM D4632
Puncture Strength	530 N – minimum	ASTM D4833
Trapezoid Tear	500 N – minimum	ASTM D4522
Apparent Opening Size	0.430 mm – maximum	ASTM D4751
Permittivity	0.06 sec – 1 – maximum	ASTM D4491
UV Resistance	70% per 500 hrs - minimum	ASTM D4355

.3 All joints shall be overlapped a minimum of 1.0 m in the direction of the sub-base placement.

.4 Minimum cover over the geotextile on the edges shall be 150 mm.

.5 Standard of acceptance: Propex 315 ST, or approved equal.



NOTES

REMOVE ALL TOPSOIL, SILT, ORGANICS, AND UNSUITABLE MATERIAL FROM SUBGRADE TO A MAXIMUM DEPTH OF 900

DO NOT USE TOPSOIL, SILT, ORGANICS, OR OTHER UNSUITABLE MATERIAL FOR CONSTRUCTION OF SUBGRADE (EMBANKMENT)

SIDESLOPES AND BOTTOM OF DITCHES TO BE GRASS SEEDED

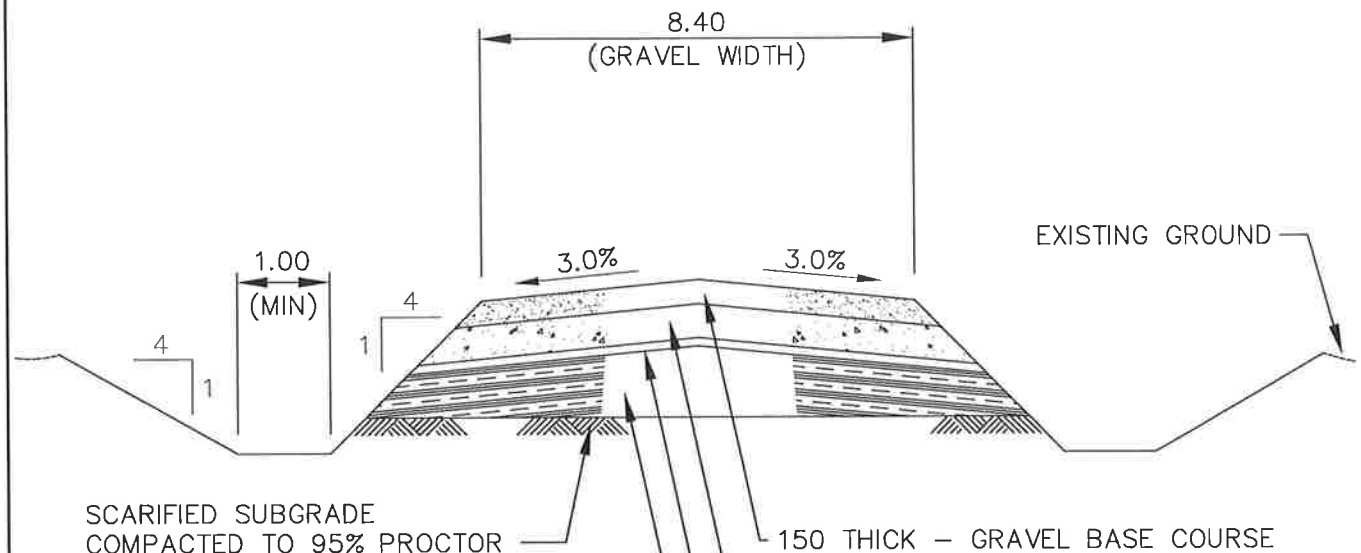
TYPICAL URBAN RESIDENTIAL ROAD CROSS SECTION

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INIDICATE METRES

WSP
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

PROJECT: R.M. OF ST. CLEMENTS SERVICING STANDARDS		SUPPLEMENTAL: ADDENDUM: ADD_#☒ DIRECTIVE: DIR_#☒ CHANGE ORDER: CHG_#☒
TITLE: TYPICAL URBAN RESIDENTIAL ROAD CROSS SECTION		REVISION: 0
DRAWN BY: M.P.M.	SCALE: N.T.S.	DATE: 2015/07/28
CHECKED BY: M.P.M.	PROJECT NO: 151-08023-00	SUPPLEMENTAL NO: G03



NOTES

REMOVE ALL TOPSOIL, SILT, ORGANICS, AND UNSUITABLE MATERIAL FROM SUBGRADE TO A MAXIMUM DEPTH OF 900

DO NOT USE TOPSOIL, SILT, ORGANICS, OR OTHER UNSUITABLE MATERIAL FOR CONSTRUCTION OF SUBGRADE (EMBANKMENT)

SIDESLOPES AND BOTTOM OF DITCHES TO BE GRASS SEEDED

TYPICAL RURAL RESIDENTIAL ROAD CROSS SECTION

(GRAVEL SURFACE)

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INIDICATE METRES

WSP
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

PROJECT: R.M. OF ST. CLEMENTS SERVICING STANDARDS		SUPPLEMENTAL: ADDENDUM: ADD_#☒ DIRECTIVE: DIR_#☒ CHANGE ORDER: CHG_#☒
TITLE: TYPICAL RURAL RESIDENTIAL ROAD CROSS SECTION		REVISION: 0
DRAWN BY: M.P.M.	SCALE: N.T.S.	DATE: 2015/07/28
CHECKED BY: M.P.M.	PROJECT NO: 151-08023-00	SUPPLEMENTAL NO: G04

6.6 Surface

The following specifications are provided as information. Unless otherwise stipulated in the development agreement for urban roads, only the first 50 mm of asphalt shall be installed during initial installation. In single phase developments, the top 50 mm of asphalt shall be installed when 65% of the lots have been developed and occupied. In multi-phase developments, the top 50 mm of asphalt shall be installed two years after the start of the subsequent phase of development.

(a) Pavement

1.35 litres per square metre of liquid asphalt MC-O prime coat shall be applied at a temperature of 32-68 degrees C to the compacted base course. A sufficient thickness of asphalt concrete (cement penetration 150/200), plant mixed and heated to 127-155 degrees C, shall be placed to permit a uniform minimum pavement thickness of 100 mm on residential roads (placed in two lifts) after compaction.

6.7 Road Construction Staging

Asphalt pavement shall not be installed during the same construction year as the underground services, unless no services are installed across the roadways by open cut excavation. A minimum of one winter season (one complete freeze / thaw season) must pass before pavement construction may begin. If required for access purposes, the developer may install the sub-base material immediately after the installation of the underground services, for a temporary driving surface.

6.8 Driveways

Driveway top width on the right-of-way shall be between 4.0 metres and 8.0 metres on residential roads, unless otherwise approved by Council. A minimum 5.0 metre radius shall be maintained at approaches onto the main thoroughfare. Unless otherwise approved by the R.M., the edge of the driveway shall be a minimum of 1.5 metres from the property line, and 3.0 metres on corner lots. If an adjacent lot is constructing a driveway near the same property line, then the separation between the ends of the two driveway culverts shall be a minimum of 3.0 metres. Where open ditches prevail, a crown with 2% crossfall shall be provided and a culvert shall be installed under the driveway. Culvert size shall be as calculated by the Engineer as necessary for ditch design flows, but shall not be less than stipulated in Section 5.1(a). Headwalls or ornamentation shall not be permitted. Driveway side-slopes to ditch bottoms shall be graded no steeper than 4:1. No driveway shall fall within 9.0 m (as measured edge to edge) of an intersection between roadways, and 3.0 metres from any hydrant.

6.9 Cul-de-sac

Road Classification	Right-of-Way Requirements	Road Surface Requirement
Residential	40.0 metre diameter	24.0 metre diameter

If a temporary cul-de-sac is required between phases for a subdivision, the road surface requirements indicated above are to apply. Adequate ditch drainage around the cul-de-sac is required. As an alternative, a “T” type turnaround may be incorporated, with dimensions and configuration to be approved by the R.M.

6.10 Road Grade

Maximum road grade to be 5%. Vertical curves are required if the difference in the algebraic sum between descending and ascending gradients is equal to or greater than 2%.

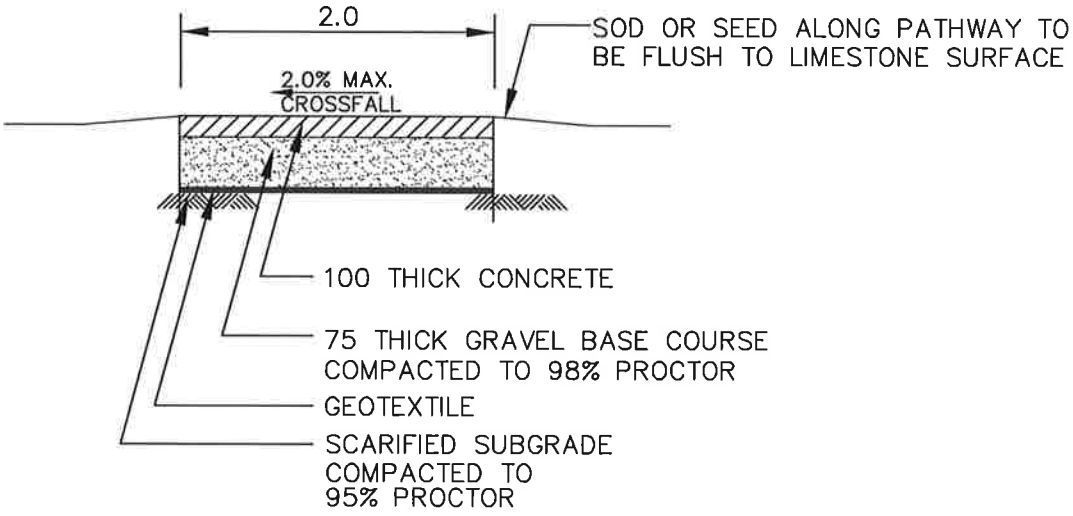
7.0 SIDEWALKS / PATHS

7.1 Design

Where required by the development agreement in urban subdivisions, sidewalks shall be minimum 2.0 metres wide, unless otherwise approved. Sidewalks shall be minimum 100mm concrete over 75mm of compacted base course material. Geotextile shall be installed between the subgrade and the compacted base course material. A 5mm wide, 35mm deep transverse joint shall be provided every 1.5 metres.

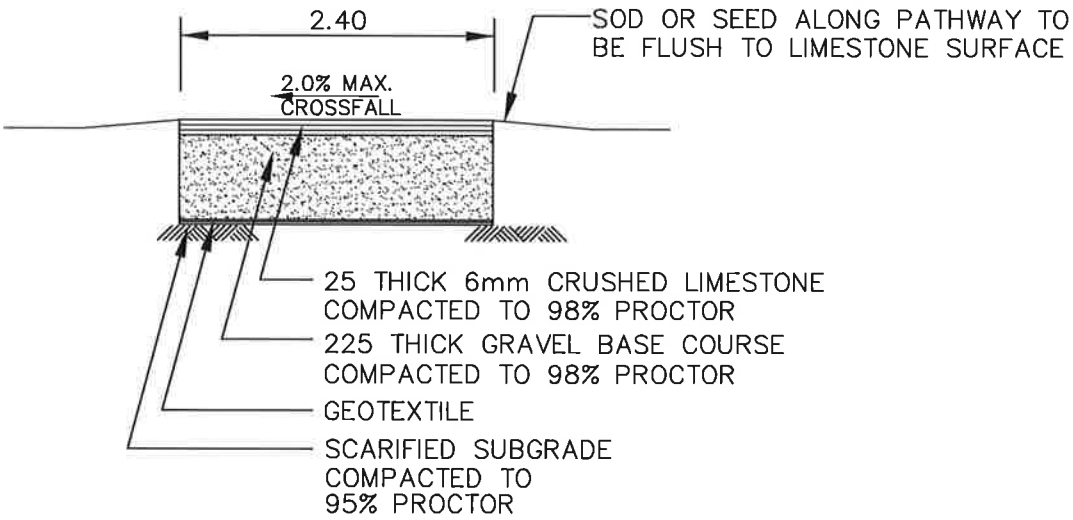
Where required by the development agreement in rural subdivisions, crushed limestone pathways shall be 2.4 metres wide, and constructed with 25 mm thick of 6 mm crushed limestone over 225 mm thick compacted base course material. Geotextile shall be installed between the subgrade and the compacted base course material.

The requirement for paths to be paved or gravel shall be at the discretion of Council.



TYPICAL CONCRETE SIDEWALK

(URBAN SUBDIVISIONS)



TYPICAL CRUSHED LIMESTONE PATHWAY

(RURAL SUBDIVISIONS)

GENERAL NOTES

- REMOVE ALL TOPSOIL, SILT, ORGANICS AND UNSUITABLE MATERIAL (MINIMUM 150 DEPTH)
- GRADE PATHWAY TO DRAIN
- MAX. 5% LONGITUDINAL SLOPE

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INIDICATE METRES

WSP
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

PROJECT: R.M. OF ST. CLEMENTS SERVICING STANDARDS		SUPPLEMENTAL: ADDENDUM: ADD_#☒ DIRECTIVE: DIR_#☒ CHANGE ORDER: CHG_#☒
TITLE: TYPICAL CONCRETE SIDEWALK TYPICAL CRUSHED LIMESTONE PATHWAY		REVISION: 0
DRAWN BY: M.P.M.	SCALE: N.T.S.	DATE: 2015/07/28
CHECKED BY: M.P.M.	PROJECT NO: 151-08023-00	SUPPLEMENTAL NO: G05

8.0 OTHER UTILITIES

8.1 Hydro and Telephone

Manitoba Hydro and Manitoba Telephone services shall be underground type for all urban developments. Street lighting shall be ornamental with LED type luminaires, located at a linear spacing no greater than 105 metres in rural developments, and 75 metres in urban developments, with the provision that there shall be a street lighting unit at each roadway intersection and at each road bend in excess of 45 degrees, or as recommended by the utility.

Installation of all underground utilities (gas, hydro, telephone, cable) under proposed or existing roadways shall be by trenchless methods. No open cut excavation of roadways shall be permitted.

8.2 Road Signs

The Developer shall supply and install all road signs (traffic control and street signs), in accordance with the Manitoba Infrastructure and Transportation requirements, and as authorized by the R.M.. Signs shall be high intensity grade. Unless otherwise specified by the R.M., all signs shall be mounted on U or square channel 3.65 metre long galvanized steel posts. Type of signs (i.e. stop signs, end of road signs, curve signs, etc.) and location to be determined by the R.M.

9.0 LOT GRADING

9.1 Lots

Lots (meaning all properties beyond the road right-of-ways) shall be rough graded to provide positive drainage, prior to Substantial Completion of the surface works. However, all lot swales are to be graded to within 50 mm of finished elevation, and the front property line, and all areas of the lot within 5.0 metres of the front property, shall be graded to within 150 mm of required finish elevations, as per the approved grading plan prepared by the Developer's Consultant, prior to issuing Substantial Completion of the surface works.

Under no circumstances shall the lot be rough graded to permit the ponding of water within the lots. Fine grading shall be the responsibility of the homeowner / house builder, and shall be required prior to the issuing of an Occupancy Permit. Finish elevations shall ensure adequate drainage away from buildings toward drainage ditches, or swales, as applicable. The building grades shall be designed such that there is relative uniformity within the development, for aesthetic purposes. Storm runoff from a property shall not be permitted to enter, or cross, an adjacent property.

9.1.1 Urban Lots

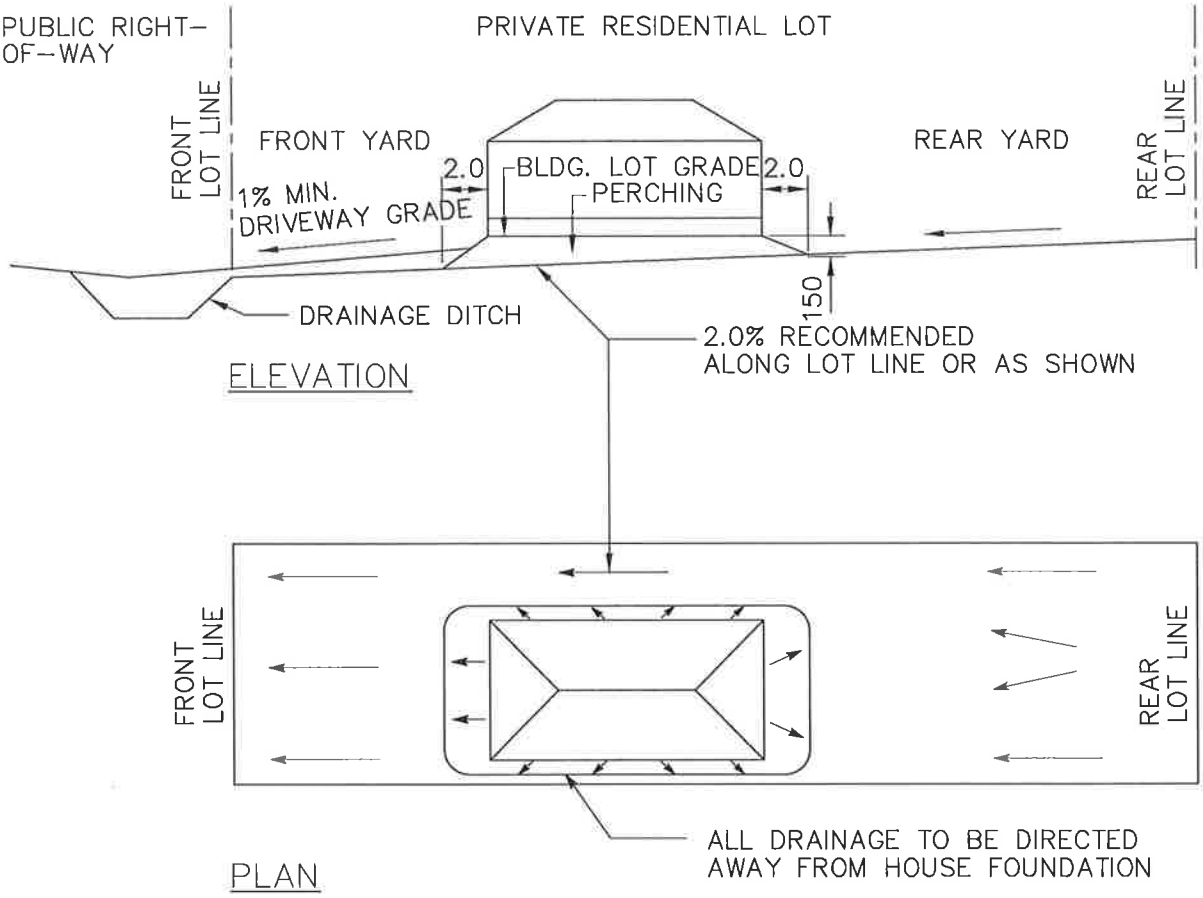
Council shall determine whether a subdivision is classified as urban or rural. Houses shall be "perched" with a minimum 150 mm berm around the foundation, and 1.5% min., 4% max (unless otherwise approved by the R.M.), grade the lot to the ditch. All lot grading shall be sloped back to front, or split lot, where the back of the lot drains to either a road, lane or public reserve, or swale easement. Swale easements shall be a minimum of 3.0 metres wide, with a minimum slope of 0.2%. Typical lot grading criteria is shown as drawing G06 and G07.

9.1.2 Rural Lots

Council shall determine whether a subdivision is classified as urban or rural. Houses shall be “perched” with a minimum 250 mm berm around the foundation. All lot grading shall be sloped back to front or split lot, or rear and/or side lot swales shall be utilized. Side or rear lot swales shall be centred on the property line, and a minimum 3.0 metre allowance, 1.5 metre each lot, shall be provided. Minimum slope for side and rear lot swales shall be 0.1%.

9.1.3 Lot Grade Permits

For urban and rural subdivisions, the home owner / house builder is required to obtain a Lot Grade Permit from the R.M., prior to construction and before a building permit will be issued. This will establish the finished grade of the lot and building.



URBAN RESIDENTIAL BACK TO FRONT LOT DRAINAGE

NOTES:

1 BUILDING TO BE SURROUNDED WITH "PERCHING".

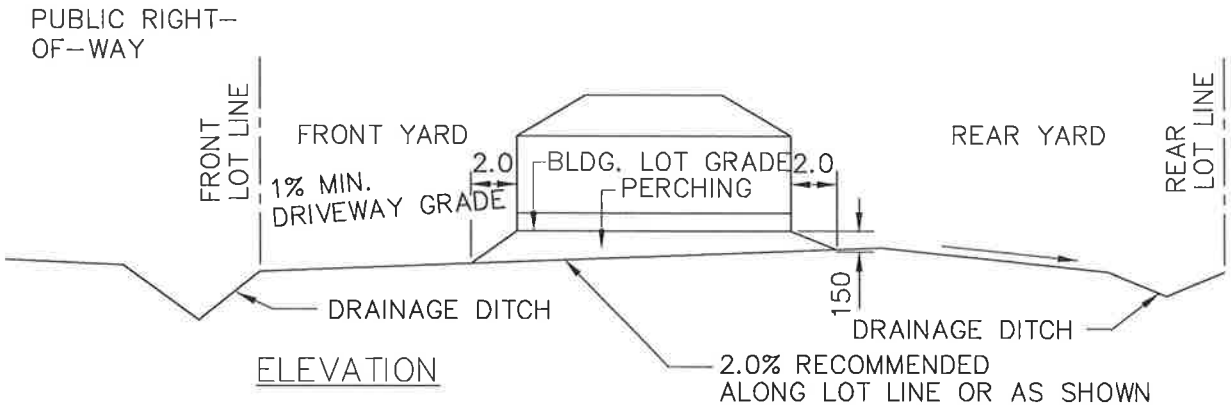
2 BUILDING LOT GRADE TO BE FINISHED LANDSCAPE ADJACENT TO BUILDING.

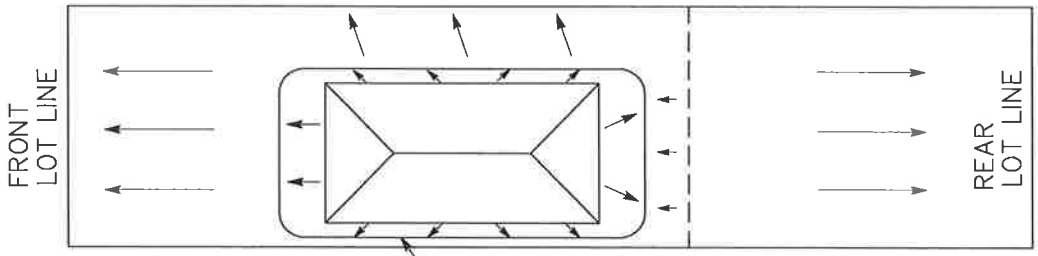
3 PERCHING TO EXTEND BEYOND BUILDING AS FOLLOWS:
A) FRONT & REAR – 2.0 METRE (MIN.)
B) SIDE – 1.0 METRE (MIN.)

4 SIDE YARD SLOPE ALONG LOT LINE – 2.0% RECOMMENDED

WSP
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

PROJECT: R.M. OF ST. CLEMENTS SERVICING STANDARDS	SUPPLEMENTAL: ADDENDUM: ADD_#☒ DIRECTIVE: DIR_#☒ CHANGE ORDER: CHG_#☒
TITLE: URBAN RESIDENTIAL BACK TO FRONT LOT GRADING	REVISION: 0
DRAWN BY: M.P.M. / SCALE: N.T.S.	DATE: 2015/07/28
CHECKED BY: M.P.M. / PROJECT NO: 151-08023-00	SUPPLEMENTAL NO: G06





URBAN RESIDENTIAL SPLIT LOT DRAINAGE

NOTES:

1 BUILDING TO BE SURROUNDED WITH "PERCHING".

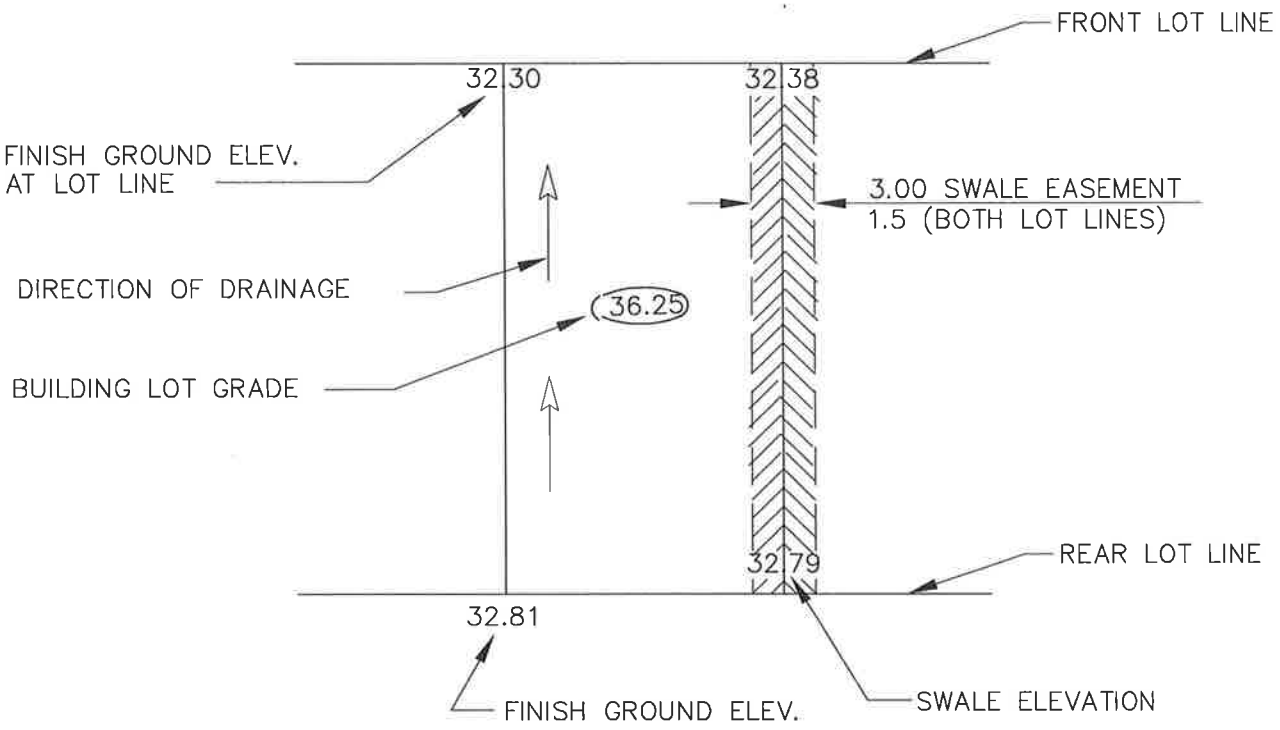
2 BUILDING LOT GRADE TO BE FINISHED LANDSCAPE ADJACENT TO BUILDING.

3 PERCHING TO EXTEND BEYOND BUILDING AS FOLLOWS:
A) FRONT & REAR – 2.0 METRE (MIN.)
B) SIDE – 1.0 METRE (MIN.)

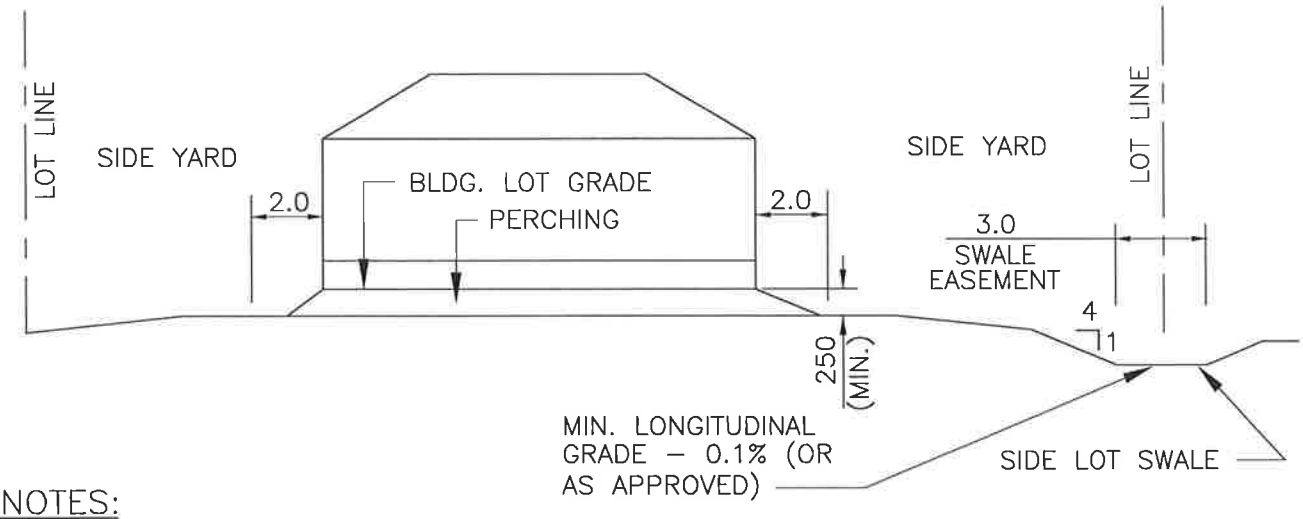
4 SIDE YARD SLOPE ALONG LOT LINE – 2.0% RECOMMENDED

WSP
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

PROJECT: R.M. OF ST. CLEMENTS SERVICING STANDARDS		SUPPLEMENTAL: ADDENDUM: ADD_#☒ DIRECTIVE: DIR_#☒ CHANGE ORDER: CHG_#☒
TITLE: URBAN RESIDENTIAL SPLIT LOT GRADING		REVISION: 0
DRAWN BY: M.P.M.	SCALE: N.T.S.	DATE: 2015/07/28
CHECKED BY: M.P.M.	PROJECT NO: 151-08023-00	SUPPLEMENTAL NO: G07



PLAN



NOTES:

1. SIDE LOT SWALE EASEMENTS REQUIRED FOR LOTS LARGER THAN 1.0 ACRE IN SIZE
2. SWALE EASEMENT SHALL BE MAINTAINED AND REMAIN FREE OF OBSTRUCTIONS
3. TREES AND FENCES ARE NOT PERMITTED WITHIN 1.5 METRES OF THE SIDE LOT WALE EASEMENT

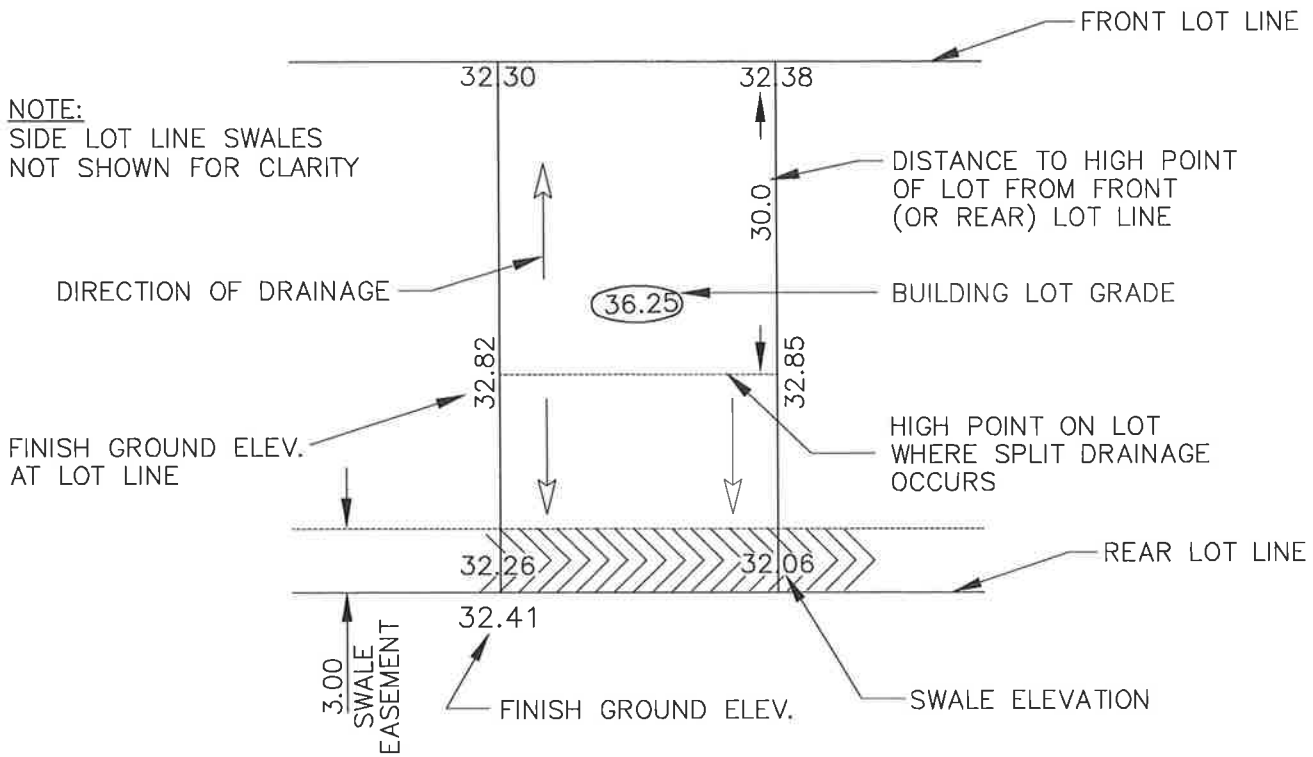
SECTON

METRIC

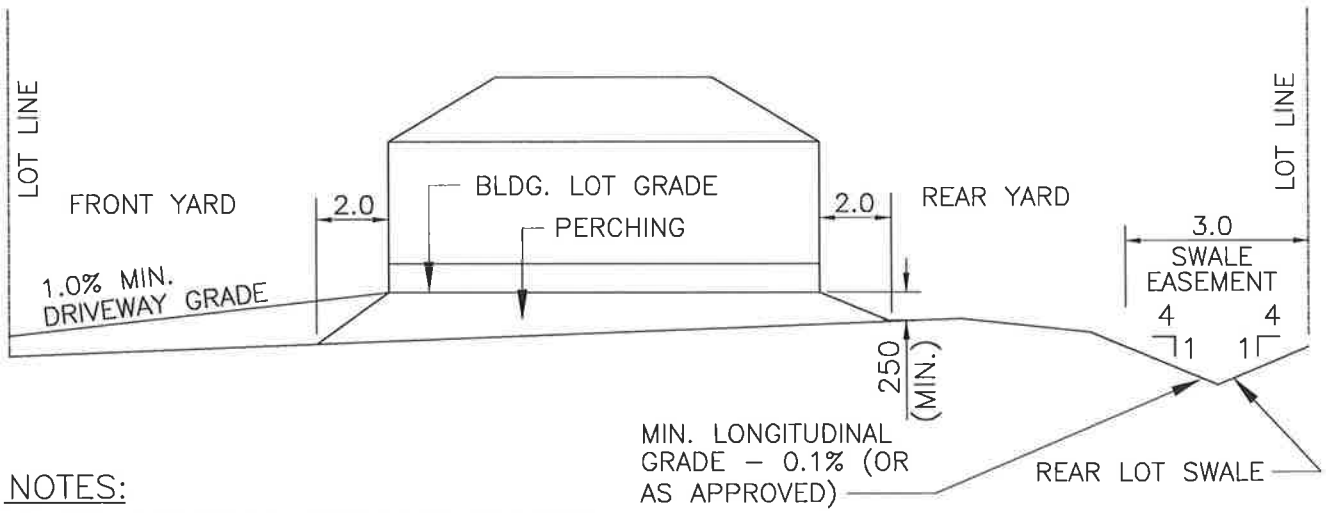
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INIDICATE METRES

WSP
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

PROJECT: R.M. OF ST. CLEMENTS SERVICING STANDARDS		SUPPLEMENTAL: ADDENDUM: ADD_#☒ DIRECTIVE: DIR_#☒ CHANGE ORDER: CHG_#☒
TITLE: RURAL RESIDENTIAL BACK TO FRONT LOT DRAINAGE		REVISION: 0
DRAWN BY: M.P.M.	SCALE: N.T.S.	DATE: 2015/07/28
CHECKED BY: M.P.M.	PROJECT NO: 151-08023-00	SUPPLEMENTAL NO: G08



PLAN



NOTES:

1. SIDE LOT SWALE EASEMENTS REQUIRED FOR LOTS LARGER THAN 1.0 ACRE IN SIZE
2. SWALE EASEMENT SHALL BE FREE OF OBSTRUCTIONS
3. NO TREES TO BE LOCATED WITH 4.5 METRES OF REAR LOT LINE

SECTION

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INIDICATE METRES

WSP
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

PROJECT:	R.M. OF ST. CLEMENTS SERVICING STANDARDS
TITLE:	RURAL RESIDENTIAL SPLIT LOT DRAINAGE
DRAWN BY:	M.P.M.
SCALE:	N.T.S.
CHECKED BY:	M.P.M.
PROJECT NO:	151-08023-00
SUPPLEMENTAL:	
ADDENDUM:	ADD_# ☒
DIRECTIVE:	DIR_# ☒
CHANGE ORDER:	CHG_# ☒
REVISION:	0
DATE:	2015/07/28
SUPPLEMENTAL NO:	G09

10.0 PARKS

10.1 Greenspace / Public Reserve

Subdivisions shall be classified as either urban or rural. Council shall determine whether a subdivision is classified as urban or rural.

10.1.1 Urban Area Subdivisions

Where new development area encompasses an area equal to or greater than 4.0 hectares, the R.M. requires either a land contribution equal to 10% of the total development area for green space, or alternatively the R.M. may accept a financial contribution equal to a 10% green space contribution.

Prior to the commencement of construction of each phase of the development, the designated area shall be approved by the R.M. The area shall be left rough graded, with final landscaping to be completed by the R.M., or as specified in the development agreement.

All new subdivisions will be subject to policies adopted by Council regarding green space horticulture, as indicated in the development agreement.

10.1.2 Rural Area Subdivisions

In rural area subdivisions, the development agreement may require a developer to provide greenspace.

Prior to the commencement of construction of each phase of the development, the designated area shall be approved by the R.M. The area shall be left rough graded, with final landscaping to be completed by the R.M., or as specified in the development agreement.

All new subdivisions will be subject to policies adopted by Council regarding green space horticulture, as indicated in the development agreement.

10.1.3 Public Reserves

Public reserves shall be cleared of all debris resulting from construction projects. No earth borrow pits shall be excavated on a public reserve without the written permission from the R.M. No debris shall be buried on any public reserve, lot, or road right-of-way.

11.0 SEWAGE PUMPING STATIONS

11.1 Materials

(a) General

All materials shall conform to the relevant standard Approval Listings for the Manitoba Water Services Board.

(b) Barrels

Precast concrete barrels shall conform to ASTM C76 Class II with reinforced top and floor slabs.

(c) Miscellaneous Metal

Rungs shall be MSU Daymond aluminum type, however PVC type shall be used for low pressure sewers (LPS). Frame and cover units shall be stainless steel.

(d) Pumps

Pumps shall be Flygt "C" or “N” type, or Barnes pumps. Where conventional gravity sewers are used, the impellers shall be capable of passing 75 mm solids, and the minimum acceptable motor power rating shall be 2.5 hp. All pumps shall incorporate a minimum 75 mm throughlet. Three-phase pumps shall be used if power is available.

Pumps shall be complete with slide-away discharge elbows, guide rails and couplings. Barnes pumps shall incorporate a Flygt slide away system and discharge.

(e) Valves

Each pump shall have an HDL ball check valve mounted directly on the discharge elbow. For conventional gravity sewer lift stations, each pump shall have a stainless steel knife gate valve mounted near the junction tee. For LPS systems, a plug valve shall be used in place of the knife gate.

A C509 resilient seat gate valve and box shall be provided on each incoming sewer line to permit shutting off flow into the station.

(f) Electrical

Milltronics level controls shall be used. The electrical panel shall be Manco, or an approved equal. Power shall be 600 volt, three phase unless otherwise approved by the R.M. Each station shall be equipped

with a mag meter to register outlet flows in cubic metres. Radio telemetry shall also be included and shall match the R.M.'s system.

11.2 Design and Construction

(a) General

All design and construction shall conform generally to the standard specifications of the Manitoba Water Services Board.

(b) Forcemains

Bury depth, installation, and alignment shall conform generally to Section 2.2. Forcemains may be installed in a common trench with sewer mains provided that a minimum 0.3 metre clearance be maintained between pipes and between appurtenances.

(c) Design Criteria

Design flows shall be calculated as per section 3.2(f) (gravity) or 4.2(e) (LPS), as applicable. Provision shall be made in the structure and piping to permit installing larger pumps capable of increasing net output capacity by 50% without structural or mechanical alterations.

(d) Testing

The completed facility shall be tested in the presence of the design engineer for proper operation, correct impeller rotation, amperage draw and specific pumping output (drawdown test).

12.0 QUALITY ASSURANCE

12.1 Installation

All public works shall be installed to recognized engineering standards (Manitoba Water Services Board, Manitoba Infrastructure and Transportation, AWWA, ASTM, etc.) and to the recommendations of the respective manufacturer or supplier of materials. All piping works shall be bedded, laid, joined, and back-filled to such standards and recommendations. All workmanship shall be first class and all materials shall be new and of best quality. Excavation permits shall be obtained, and all utilities shall be notified.

12.2 Testing

Waterworks shall be flushed, disinfected and pressure tested for no less than two hours at 150 psi (1000 kPa), and leakage and pressure loss shall fall within allowable MWSB limits. Where watermains, low pressure sewers, and forcemains are installed by directional drilling, they shall be swabbed. Utilize a "poly pigging" program (running a minimum of three swabs through simultaneously) to ensure effective removal of debris and other deteriorated materials from the pipeline. All valves and hydrants shall be tested for proper operation. Gravity sewers shall be Mandrel Tested and closed circuit television tested with a video cassette of the testing being provided for review by the R.M. Low pressure sewers shall be tested as above, to 75 psi (525 kPa). All municipal water used for aforementioned operations shall be metered and purchased from the R.M. Pressure testing shall incorporate a certified recording chart system.

The roadway subgrade adequacy, sub-base and base course thickness and density, asphalt thickness and quality, and concrete shall be checked and tested by the design Engineer or testing laboratory, as applicable. Density testing shall be taken at a maximum spacing of 100 metres.

For urban subdivisions, to ensure quality, there shall be on the site, throughout the construction, the registered professional engineer who was responsible for the design, or an authorized representative of that engineer. For underground works, full time attendance on site is required, and for surface works, part time attendance is required. The R.M. shall also provide a designated representative to perform periodic site reviews, attend meetings, and review plans and specifications. Time requirements of the designated representative will be at the discretion of the R.M. The cost of the R.M.'s representative shall be borne by the Developer.

The Engineer responsible for the design of the project shall certify at completion that all work has been done in conformance with the specifications, that all necessary tests have been done and that the results are adequate. Certification and copies of all relevant documentation (i.e. test results, video reviews, weekly site reports, etc.) shall be provided to the R.M.

12.3 Restoration and Clean-up

All existing works and properties affected by construction shall be restored to the condition in which they existed prior to commencement of construction. All areas affected by construction shall be cleaned up and all excess or unused material shall be hauled away.

13.0 PLANS

13.1 Preliminary Documents

The Developer shall supply a plan(s) completed by a professional engineer, where applicable. Such plans shall indicate:

- All plans shall be prepared in electronic format using AutoCAD software, or approved equal, and submitted in hard copy.
- Proposed road and drainage grades, grade direction and elevations.
- Proposed water, wastewater, and land drainage sewer plans indicating pipe sizes, grades, direction of flow, hydrants, valves, and elevations.
- Where the subdivision drainage may affect other properties outside the subdivision a drainage impact study completed by a professional engineer shall be required.
- Culvert sizes for roads and approaches.
- All drainage ditches or swales must be within the road allowances or on registered easements.
- Developer must obtain applicable approvals from all regulatory agencies for all construction (i.e. water rights licence for drainage, Water Stewardship, M.I.T., Office of Drinking Water, Manitoba Conservation, etc.). Copies of all approvals shall be provided to the R.M.
- Existing topography of area.

The Engineer responsible for the design of the project shall submit to the R.M.'s designated municipal engineer, for review for conformance to the R.M.'s standards, all plans and specifications for the proposed construction of public works. The municipality's engineer shall retain the right to require changes as deemed necessary. Subsequent to review, no significant deviations shall be permitted without the express consent of the municipality. Construction shall not commence until all relevant plans and specifications have been so reviewed and approved.

13.2 Project Costs

The Developer or the Developer's Consultant shall supply the R.M. with pre-construction cost estimates, as well as actual post construction costs (including engineering and Public Reserve costs) for all tangible assets that are to be transferred to the R.M. The pre-construction cost estimates will be used to determine the Letter of Credit for the Development Agreement.

13.3 Survey Monuments

The Developer shall pay the full cost of installing and maintaining all survey monuments within the planned area, to the satisfaction of the Municipality. In the

event that the survey monuments have been disturbed, moved, covered or mutilated in any way or destroyed, the Developer shall cause the monument to be replaced at their own expense by a licenced Manitoba Land Surveyor, to the satisfaction of the Municipality.

Immediately prior to issuing the Final Acceptance Certificate, the Developer shall cause to be prepared, at their own expense, a sworn certificate by a licenced Manitoba land Surveyor (MLS) attesting that he/she has rechecked all of the survey monuments within the respective developments (or phases thereof) and that the monuments are all located in the proper location.

13.4 Builders' Lien Act

The Developer shall and does agree to indemnify and save the Municipality from and against all loss, claims, costs (including Court costs), expenses and professional fees paid or incurred by the Municipality arising out of or related to any duty or obligations imposed on the Municipality by the Builders' Lien Act in respect of any work carried out or on behalf of the Developer pursuant to the Development.

13.5 As-Constructed Plans

After construction is complete, the Engineer responsible for the design of the project shall take such measurements and surveys as necessary, and shall prepare "Record Drawing" plans to show the actual layout of all constructed works. Such plans will indicate the type of materials incorporated in the works. Three hard copies of such plans, as well as pdf and AutoCad files, shall be submitted to Council prior to the expiration of the warranty period.

13.6 Warranty Period

All Public Works, both above and below ground shall be warranted by the Contractor against defects in products incorporated in the Works and against defects in execution for a period of **two years**, extending from the date of total performance of the Work as certified by the design engineer with the consent of Council. Council, or Council's designated representative shall be the sole judge as to the nature and cause of any defect and shall stipulate appropriate means by which the Contractor or design engineer must remedy any defect.

Prior to the expiration of the warranty period, a final site review will be conducted with all parties present. The warranty period will only be terminated if the R.M., or their designated representative, is satisfied that all deficiencies have been rectified. Site reviews shall only be conducted when climatic conditions are satisfactory to perform a thorough review of all constructed works.