



CITY OF MORDEN

**STANDARDS FOR DESIGN AND
CONSTRUCTION**

Project No: 221-07026-00

December, 2023



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1.0 GENERAL

1.1 Applicable Specifications

- (a) The City of Winnipeg Standard Construction Specifications, latest edition. These specifications are available on line at www.winnipeg.ca/matmgt/spec/default.stm.
- (b) Manitoba Water Services Board (MWSB) Standard Construction specifications, latest edition. A copy of this document is available on line 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.

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

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.

2.0 WATERWORKS

2.1 Approved Materials for Water Installations

(a) General

All materials and installation shall conform to the relevant Standard Approved listings of the Manitoba Water Services Board, unless otherwise specified by the City of Morden.

(b) Watermain Pipe

Watermain shall be either:

- PVC Series 160 SDR 26 (CSA B.137.3), or PVC AWWA C900, Class 150 (only Rehau, Iplex, and Royal pipe are approved).
- High Density Polyethylene (HDPE) DR 17 4710 for pipe size 150mm or greater and DR11 for pipe size less than 150mm. Joining of HDPE pipe shall be by thermal fusion, or as approved by the City.
- Any other types shall require approval from the City of Morden

(c) Fittings

- 1) PVC fittings of similar type as pipe may be used on PVC Series 160 SDR 26 (CSA B.137.3) and PVC C900 Class 150 pipe (injection moulded or fabricated and FRP reinforced). 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 (only Canada Valve, Mueller, and Clow gate valves are approved).

(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 meter below proposed ground level (only Titan and WD Valve Boxes are approved).

(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, Western Canada threads for two 65mm hose and one 100mm Stortz 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 black caps. Acceptable model shall be:

- McAvity – Brigadiere M67B
- Mueller Centurion

All hydrants shall be approved by the City of Morden before ordering to allow for continuity in subdivisions.

(g) Service Pipe

Community water service pipe shall be either:

- HDPE Series 160 DR 9 (CTS) for 19mm and 25mm, HDPE Series 160 DR 11 (CTS) for 38mm and 50mm.
- Cross linked polyethylene ("Municipex")

All water service pipe shall be installed with tracing wire.

(h) Corporation Stops

Corporation stops shall be bronze, ball-type, with standard tapered threaded inlet suitable for tapping via service saddle to watermains, with compression type outlet, or I.P. thread. For connection to PVC C900 watermains, a direct tap is permitted. (only Cambridge and Mueller corporation stops are approved).

(i) Curb Stops

Curb stops shall be bronze, ball-type, non-draining, with compression type joints, or I.P. thread (only Cambridge and Mueller curb stops are approved).

(j) Curb Boxes

Curb boxes shall be cast or black iron, galvanized or steel, with an arch type polymer plastic boot, and a 2 to 3 meter 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. (only Trojan, WDVb, or Mueller curb boxes are approved).

(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 (only Robar, Romac, and Ford are approved).

(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 (Robar, Romac, and HyMax, are approved).

(m) Backflow Preventor

For all commercial applications or residential applications that have in-floor heating, the backflow preventer shall be a reduced pressure principle backflow preventer to CAN/CSA-B64.4. Standards of acceptance: Watt, Wilkins. In these applications, the backflow preventer is to be certified annually by a licenced tester.

For all other residential applications, the backflow preventer shall be a dual check valve that contains a replaceable cartridge with a stainless steel spring to CAN/CSA-864.6. Standard of acceptance: Wilkins model 700. 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.

(n) Water Meters

Water meters shall be provided by the City at a fee to the Developer or Owner.

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:

Urban Grade (Curb and Gutter Roads)

- 2.75 meters below the finished centreline of the road and under boulevards

Rural Grade (Open Ditches)

- 2.5 meters under deep, narrow ditches
- 2.75 meters under prairie, or shallow or wide ditches

All water service piping shall be provided with a minimum cover over the crown of the pipe, of at least 2.5 meters from finished ground, but shall not be deeper than 3.00 meters, unless otherwise approved by the City. If minimum 2.5 meter depth cannot be maintained, insulation is to be provided.

(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, unless otherwise approved by the City).

(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 shall be a maximum of 20 services between valves.

(e) Thrust Blocks

Thrust blocking shall be of concrete construction conforming to MWSB standards.

(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. Offset of the watermains will vary depending on the width of the right-of-way, but shall be as indicated on **Drawings G08 – G11**, unless otherwise approved by the City.

(g) Hydrants

Hydrants shall be installed "off-line" at a distance as detailed in the applicable road section drawing off the property line, depending on the right-of-way. Hydrants shall be located no more than 90 meters apart in residential areas. In industrial or business districts (as specified by Council) 60 meter 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 meters 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 meter 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 on the front property line. Curb stops shall be located in the side 1/8th of the lot, and a minimum of 1.0 meters from side lot lines. Curb stops for adjacent lots should preferably be installed within 1/8th of the lot width from the common 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 275 L per day multiplied by the appropriate Harmon peaking factor shall be used to determine peak hour rates. 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 60 psi (415 kPa):

- domestic - 50 psi (345 kPa)
- fireflow (residential) - 60 L/s @ 20 psi (140 kPa)
- fireflow (commercial) - 100 L/s @ 20 psi (140 kPa)

(j) Recommended Service Size

Type of Service	Size of Service Line	Material for Service Pipe		
		HDPE DR 9	HDPE DR 11	Municipex
Single Family Homes	19mm	✓		✓
Duplex	25mm	✓		✓
Multiple Unit Block (8 Unit Max.)	38mm		✓	✓
Multiple Unit Block (20 Unit Max.)	50mm		✓	✓
Commercial Establishment	25mm**	✓		✓
Other – As Determined by the Engineer According to Individual Requirement	T.B.D.			

** Or as determined by the Developer's Consultant

(k) Water Meter

Water meters shall be installed as shown in either **Drawing G03** or **G04**. The water meter may be one size smaller than the service line size.

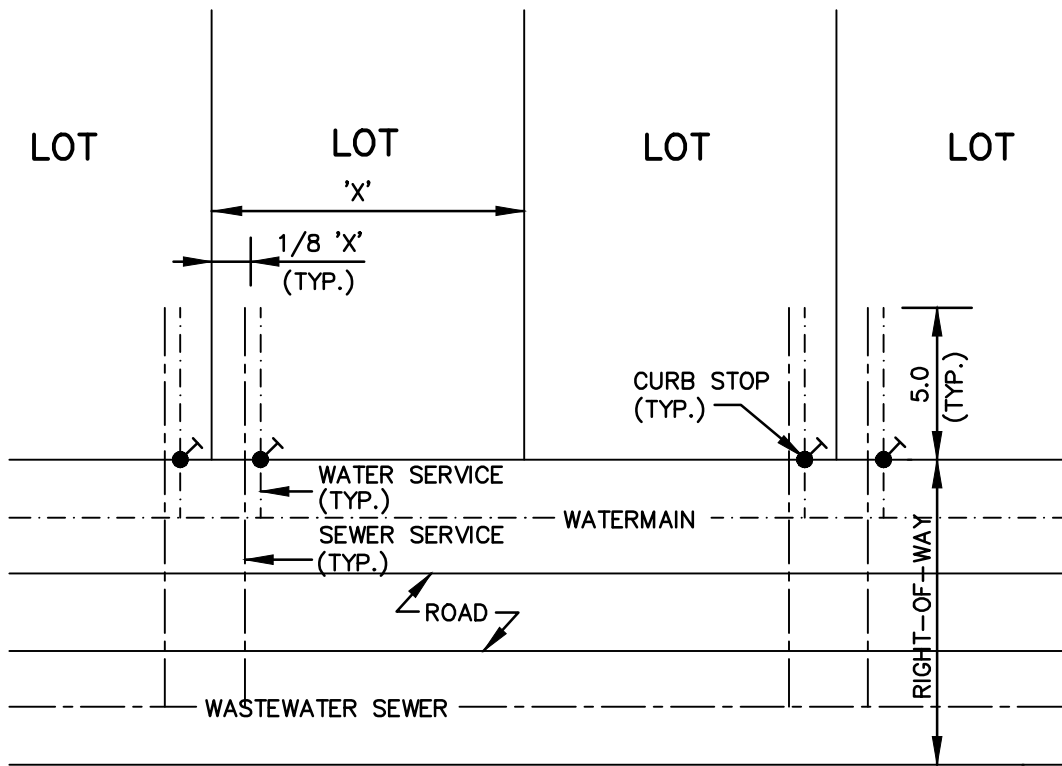
(l) Testing and Disinfection

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.

(m) Sprinklers and Standpipes

The requirement for sprinklers and/or standpipes in buildings shall be as outlined in the Manitoba Building Code (MBC).




TYPICAL FRONT LOT SERVICING LAYOUT

NOTE:
SERVICES TO BE LOCATED IN THE SIDE
1/8 OF THE LOT, AS SHOWN

METRIC

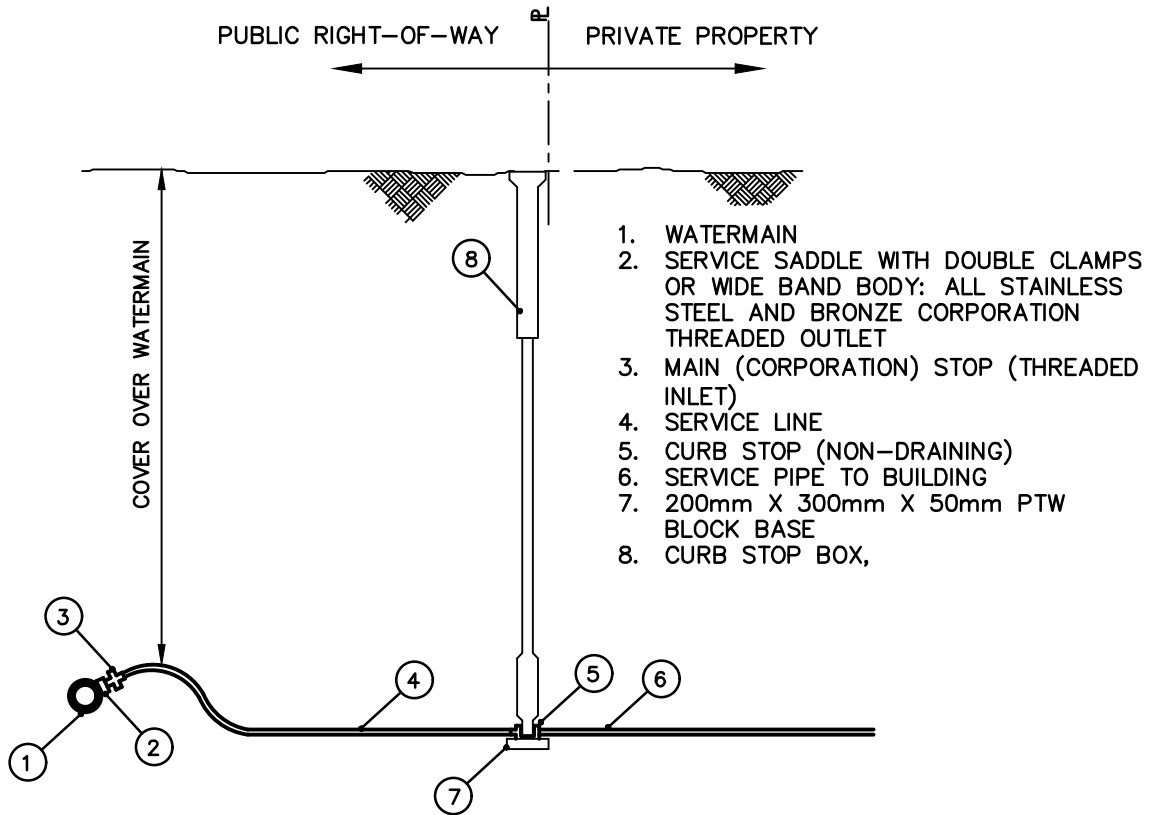
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

 <p>1600 BUFFALO PLACE WINNIPEG, MANITOBA CANADA R3T 6B8 PHONE: 204-477-6650 FAX : 204-474-2864 WWW.WSP.COM</p>	PROJECT: CITY OF MORDEN		SUPPLEMENTAL:		
	TITLE: TYPICAL LOT SERVICING LAYOUT		ADDENDUM: ADD_# <input checked="" type="checkbox"/>	DIR_# <input checked="" type="checkbox"/>	
	DRAWN BY: M.P.M.		SCALE: N.T.S.	CHANGE ORDER: CHG_# <input checked="" type="checkbox"/>	REVISION: REV_#
	CHECKED BY: M.P.M.	PROJECT NO: 221-07026-00	DATE: 2022/11/24	SUPPLEMENTAL NO: G01	

XREF

STAMP

EXTEND / ABANDON EXISTING WATER SERVICE



1. WATERMAIN
2. SERVICE SADDLE WITH DOUBLE CLAMPS OR WIDE BAND BODY: ALL STAINLESS STEEL AND BRONZE CORPORATION THREADED OUTLET
3. MAIN (CORPORATION) STOP (THREADED INLET)
4. SERVICE LINE
5. CURB STOP (NON-DRAINING)
6. SERVICE PIPE TO BUILDING
7. 200mm X 300mm X 50mm PTW BLOCK BASE
8. CURB STOP BOX,

ABANDON WATER SERVICE

- EXCAVATE TO EXISTING WATERMAIN AND LOCATE CORPORATION STOP FOR SERVICE TO BE ABANDONED.
- TURN CORPORATION STOP TO OFF POSITION AND CUT WATER SERVICE PIPE TO A MAXIMUM OF 300MM FROM THE WATERMAIN. CRIMP END OF SERVICE PIPE FLAT (IF COPPER), OR SECURELY PLUG.
- LOCATE CURB STOP AND REMOVE TOP CASING OR CUT-OFF CASING A MINIMUM OF 900MM BELOW GROUND.

EXTEND WATER SERVICE

- IF UTILIZING EXISTING SERVICE LINE AND CONNECTION TO EXISTING SERVICE LINE IS BEING MADE ON PRIVATE PROPERTY, EXISTING AND PROPOSED LINE SIZE MUST CORRESPOND TO MINIMUM WATER SERVICE SIZE AS INDICATED IN THE CITY'S SERVICING STANDARDS.
- CONNECT REQUIRED LENGTH OF NEW WATER SERVICE TO EXISTING WATER SERVICE PIPE WITH COMPRESSION CONNECTOR WITH STAINLESS STEEL INSERTS (URBAN), OR BRASS NIPPLES AND STAINLESS STEEL HOSE CLAMPS (RURAL), AND INSTALL INTO BUILDING.

METRIC

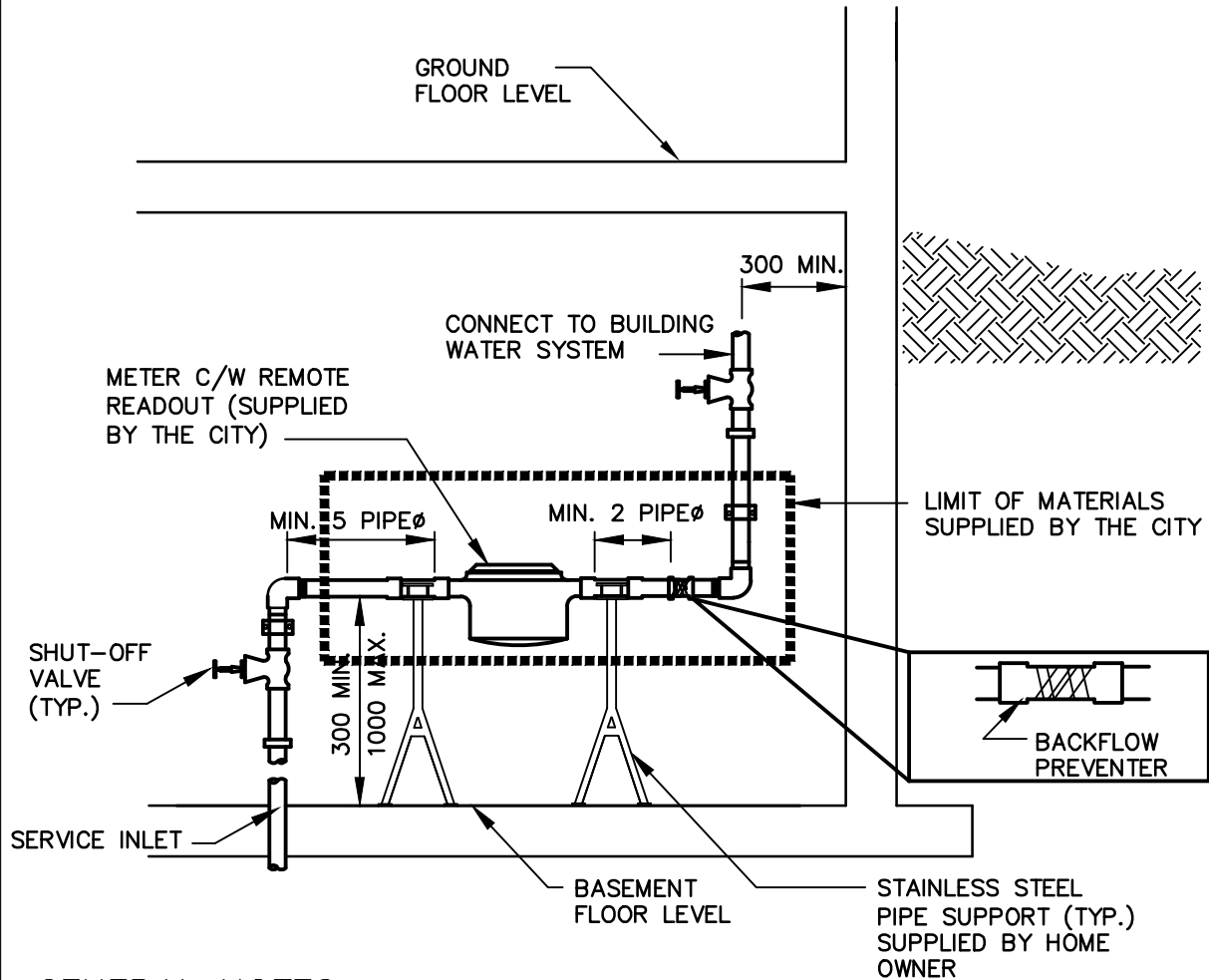
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

<p style="font-size: small;">1600 BUFFALO PLACE WINNIPEG, MANITOBA CANADA R3T 6B8 PHONE: 204-477-6650 FAX : 204-474-2864 WWW.WSP.COM</p>	PROJECT:	SUPPLEMENTAL:	
	CITY OF MORDEN		ADDENDUM: ADD_# <input checked="" type="checkbox"/>
	TITLE: EXTEND OR ABANDON EXISTING WATER SERVICE LINE		DIRECTIVE: DIR_# <input checked="" type="checkbox"/>
			CHANGE ORDER: CHG_# <input checked="" type="checkbox"/>
DRAWN BY:		REVISION:	
M.P.M.	SCALE:	REV_#	
CHECKED BY:	N.T.S.	DATE:	
M.P.M.	PROJECT NO:	2022/11/24	
	221-07026-00	SUPPLEMENTAL NO:	
		G02	

XREF

STAMP

TYPICAL URBAN WATER METER INSTALLATION



GENERAL NOTES

- FOR ALL COMMERCIAL APPLICATIONS OR RESIDENTIAL APPLICATIONS THAT HAVE IN-FLOOR HEATING, THE BACKFLOW PREVENTER SHALL BE A REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER TO CAN/CSA-B64.4. STANDARD OF ACCEPTANCE: WATT, WILKINS. IN THESE APPLICATIONS, THE BACKFLOW PREVENTER IS TO BE CERTIFIED ANNUALLY BY A LICENSED TESTER.
- FOR ALL OTHER RESIDENTIAL APPLICATIONS, THE BACKFLOW PREVENTER SHALL BE A DUAL CHECK VALVE THAT CONTAINS A REPLACEABLE CARTRIDGE WITH A STAINLESS STEEL SPRING TO CAN/CSA-B64.6. STANDARD OF ACCEPTANCE: WILKINS MODEL 700.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



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

PROJECT:

CITY OF MORDEN

TITLE:

WATER METER INSTALLATION

DRAWN BY:

M.P.M.

SCALE:

N.T.S.

CHECKED BY:

M.P.M.

PROJECT NO:

221-07026-00

SUPPLEMENTAL:

ADDENDUM:

ADD_#

DIRECTIVE:

DIR_#

CHANGE ORDER:

CHG_#

REVISION:

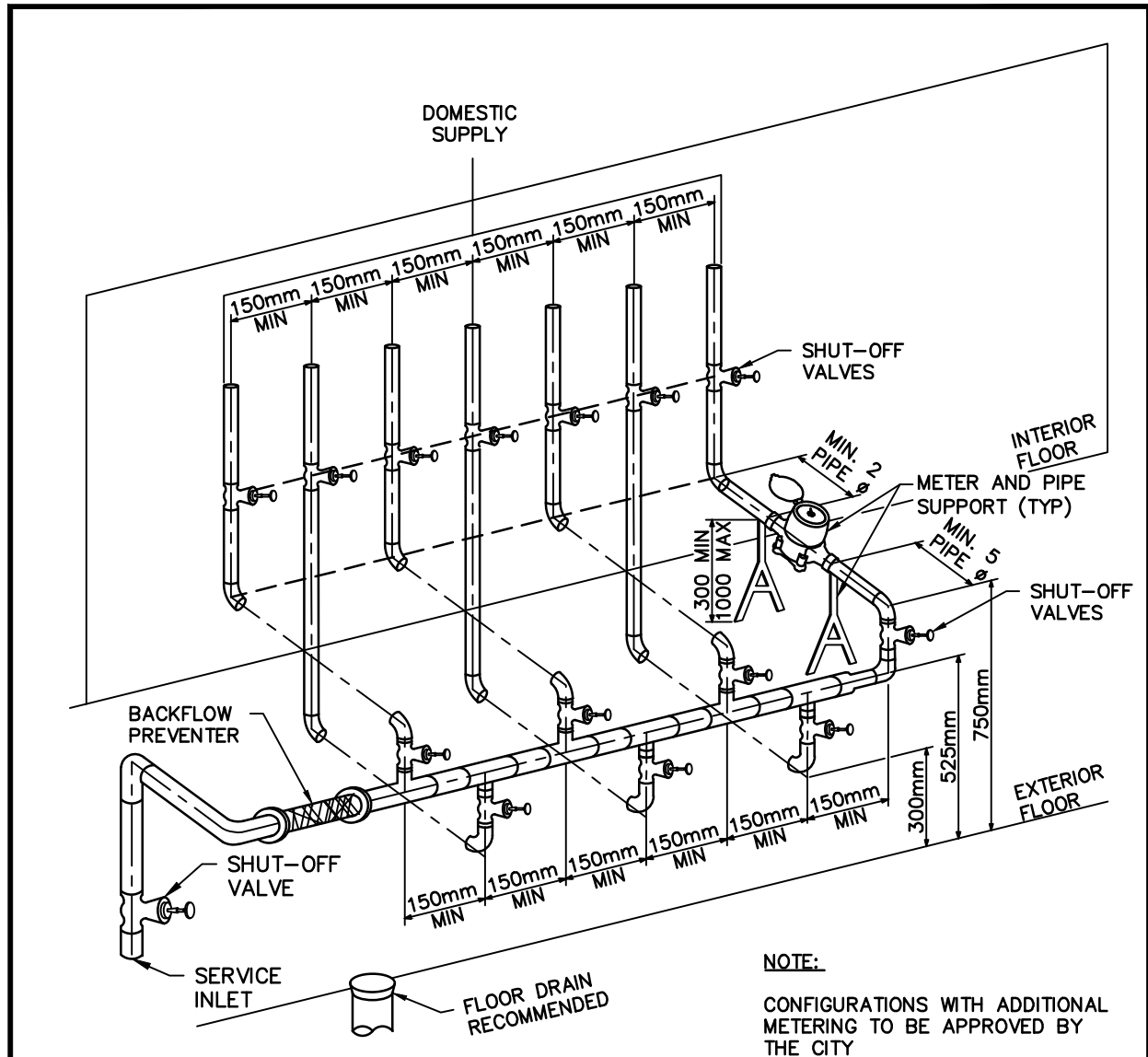
REV_#

DATE:

2022/11/24

SUPPLEMENTAL NO:

G03




NOTE:
CONFIGURATIONS WITH ADDITIONAL METERING TO BE APPROVED BY THE CITY

GENERAL NOTES

- THE BACKFLOW PREVENTER SHALL BE A REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER TO CAN/CSA-B64.4. STANDARD OF ACCEPTANCE: WATT, WILKINS. IN THESE APPLICATIONS, THE BACKFLOW PREVENTER IS TO BE CERTIFIED ANNUALLY BY A LICENSED TESTER.
- WATER METERS MUST NOT BE INSTALLED IN CONFINED SPACES (EG. CRAWL SPACES). WHERE A SERVICE PIPE ENTERS A CONFINED SPACE THE WATER METER MUST BE INSTALLED IN THE IMMEDIATE ADJACENT SPACE INTENDED FOR CONTINUOUS OCCUPANCY. ALL WATER SERVICE PIPE ENTERING THE BUILDING TO THE WATER METER MUST BE CLEARLY VISIBLE FROM THE WATER METER WITHOUT ENTRY TO THE CONFINED SPACE (EG. ACCESS DOOR)

METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

 <p>1600 BUFFALO PLACE WINNIPEG, MANITOBA CANADA R3T 6B8 PHONE: 204-477-6650 FAX : 204-474-2864 WWW.WSP.COM</p>	PROJECT: CITY OF MORDEN		SUPPLEMENTAL:		
	TITLE: MULTIPLE METERS (METER BANK) INSTALLATION		ADDENDUM: ADD_# <input checked="" type="checkbox"/>	DIR_# <input checked="" type="checkbox"/>	
	DRAWN BY: M.P.M.		SCALE: N.T.S.	CHANGE ORDER: CHG_# <input checked="" type="checkbox"/>	REVISION: REV_#
	CHECKED BY: M.P.M.		PROJECT NO: 221-07026-00	DATE: 2022/11/24	SUPPLEMENTAL NO: G04

XREF

STAMP

3.0 WASTEWATER SEWERS

3.1 Approved Materials for Wastewater Sewers

(a) General

All materials and installation shall conform to the relevant Standard Approved listings of the Manitoba Water Services Board, unless otherwise specified by the City of Morden.

(b) Sewermain Pipe

Gravity sewer pipe shall be PVC -SDR 35 (ASTM D2241, CSA B.182.2). (only Rehau, Ipex, and Royal pipe are approved).

HDPE DR 17 shall be acceptable under certain site conditions, but must be approved by the City of Morden.

(c) Service Pipe

Gravity sewer service pipe, 100 mm and 150 mm shall be either PVC SDR 35 (ASTM D2241, CSA B.182.1), or HDPE DR 17.

(d) Saddles/Tees

Service tees or saddles 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. (only Supercrete, Inland, and Lafarge are approved manholes)

(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.

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 sewer mains shall be 2.6 meters measured from finished street centre line to pipe invert. Approval by the City Engineer is required for cover less than the minimum bury depth criteria.

All sewer service piping shall be not less than 1.8 meters below finished ground at the building line, and not less than 2.15 meters at the finished front property line. Exceptions to be approved by the City.

(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:

	<u>PVC</u>
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 interconnection between pipes 200 mm and larger, and such that the recommended linear spacing between manholes does not exceed 90 m.

(e) Location of Sewers

Sewer mains shall generally be installed on the opposite side of the street to the watermain. Offset of the sewer mains will vary depending on the width of the right-of-way, but shall be as indicated on **Drawings G08 – G11**, unless otherwise approved by the City.

(f) Minimum Sewer Main size

Gravity sewer mains 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 275 L multiplied by the appropriate Harmon peaking factor, plus allowable infiltration and extraneous flows.

For commercial or industrial areas where the actual wastewater contribution is not known, sewers shall be sized to accommodate the following average daily dry weather flows, multiplied by the appropriate Harmon peaking factor, plus allowable infiltration and extraneous flows:

- Commercial – 16,800 L/ha/day
- Light Industrial – 22,500 L/ha/day

Allowance for infiltration and extraneous flows shall be calculated as follows:

- Infiltration – 20,800 L/ha/day
- Extraneous flows – 2200 L/ha/day

Note that for all new developments, weeping tiles shall not be connected to sanitary sewers.

(g) Minimum Sewer Service Size

Gravity sewer service 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 Other commercial as determined by Engineer according to individual requirements	150 mm

(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 meters inside the property line and plugged. Service lines on private property shall be located a minimum of 1.0 meters from side lot lines. If there is no water service line installed, the end of the service line shall be marked as per section 2.2 (h).

(j) Oil and Grit Separators

Any building/property that incorporates a wash bay will require an oil and grit separator. See typical detail on Drawing G07.

Any service station that is dispensing fuels requires an oil and grit separator(s) in the parking lot. Units to be StormCeptor, or WATTS, or approved equal. Contact the City of Morden for individual site requirements.

4.0 SEWAGE PUMPING STATIONS

4.1 Materials

(a) General

All materials and installation shall conform to the relevant Standard Approved listings of the Manitoba Water Services Board, unless otherwise specified by the City of Morden.

(b) Barrels

Barrels shall be either:

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

(c) Miscellaneous Metal

Rungs shall be MSU Daymond aluminum type. Frame and cover units shall be stainless steel.

(d) Pumps

Pumps shall be Flygt (Xylem) "C" or "N", or concertor type, or equivalent. 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. "C" type 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.

(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.

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

(f) Cleanout

Each lift station shall include a standpipe with an isolation valve, near the barrel and to the ground surface, as a cleanout for connecting a portable diesel pump.

(g) Control System

The specific type of level controls used shall be confirmed with the City. The electrical panel shall be Manco, or an approved equal. Power shall be 600 volt, three phase unless otherwise approved by the City. The instrumentation and control system to be used in all new sewage pumping stations is the Flygt Multismart. A manual transfer switch is required to accommodate a portable genset connection.

4.2 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 meter clearance be maintained between pipes and between appurtenances.

(c) Design Criteria

Design flows shall be calculated as per section 3.2(f).. 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 by the design engineer for proper operation, correct impeller rotation, amperage draw and specific pumping output (drawdown test).

(e) Genset

The requirement for a genset (permanent or portable), shall be as identified in the Development Agreement.

5.0 DRAINAGE

5.1 Approved Materials For Drainage Installations

All drainage construction methods and materials shall conform to the City of Winnipeg Standard Construction methods, most recent edition, with and exceptions being specifically outlined herein.

(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 meter), joined with annular corrugated couplers, or HDPE (Boss 2000, or ADS SaniTite). Minimum size shall be 450 mm diameter, but the City Engineer may approve a smaller diameter if conditions warrant. **All driveway culverts will require a municipal permit before installation.**

(b) Storm Sewer Piping

Storm sewer pipe shall be:

- Corrugated HDPE (Boss 2000, ADS SaniTite, or approved equal) to CSA B182.6 storm sewer, for shallow bury installations only.
- PVC SDR 35 (ASTM D3034 or F679).
- PVC Open Profile Ribbed Storm Sewer Pipe (CSA B182.4)

(c) Location of Storm Sewers

Storm sewers shall generally be installed on the opposite side of the street to the watermain. Offset of the storm sewers will vary depending on the width of the right-of-way, but shall be as indicated on **Drawings G08 – G11**, unless otherwise approved by the City.

(d) Manhole and Catch Basin

Storm sewer manholes and catch basins installed in roads 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. Catch basins shall be 900 mm diameter and have 600 mm sumps. No hinged cast iron or PVC hoods are to be installed.

Storm sewer manholes and catch basins installed in boulevards that are shallow bury (maximum bury 1.2 meters) shall be HDPE or PVC with plastic

covers/grates, and a 300 mm sump. Catch basins by ADS Canada and Harco are approved. Products by other manufacturers must be approved by the City of Morden.

(e) Manhole and Catch Basin Covers/Inlets

Catch basin and storm sewer manhole framing and cover units installed in roads, or are at a depth deeper than 1.2 meters, shall be cast grey iron, true to the required pattern, free of cracks, gas holes, flaws, and excessive roughness. Patterns shall be Titan TF101C (solid) and TF101G (grated) for manholes, and for catch basins TF 102 or TF 122 (rolled curb unit), TF 103-3 (barrier curb unit), as required, or approved equal. Cover openings shall be herring-bone or "V" style so as to be compatible with bicycle traffic. The design of HDPE catch basin covers is to be approved by the City.

5.1 Design Criteria

(a) System Capacity And Drainage Design

Stormwater drainage works, including culverts, and storm sewers, shall be designed to accommodate a runoff from a 5year storm with duration equal to the post development Time of Concentration (Tc). The ditches shall be designed to accommodate storm runoff from a 25yr storm of same duration. Rational or Modified Rational Formula can be used for drainage areas less than 100 acres. For larger areas, or alternate means of calculating peak discharge, approval must be received by the City. NRCS method shall be used to calculate Time of Concentration (Tc).

Development proposals with hard surface area exceeding the hard surface percentage proposed in the original drainage plan will need to make additional onsite storage provisions to restrict the runoff to drainage plan requirements, or pre-development conditions, whichever applies.

(b) Storm Sewers

- Storm sewers to be designed to accommodate runoff from a 5 year return design storm with duration equal to post development Tc.
- 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 gutter 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 meters per second, using the Manning roughness coeff
- Maximum spacing for storm sewer manholes is 90 meters.

- Storm sewers shall have a minimum depth of cover of 1.5 meter to invert below proposed ground elevation immediately above storm sewer alignment.
- Where storm sewers are designed to be permanently surcharged, minimum depth of cover from the crown of the pipe to ground elevation shall be 2.15 meters when installed under boulevards or landscaped areas, and 2.44 meters when installed under roads.

(c) Drainage Ditches

Drainage ditches shall be graded at a longitudinal slope between 0.20% and 0.5%. Typical side slopes shall be no steeper than 4:1 unless otherwise approved by the City. Ditch bottoms shall be at least 1.0 meter wide, unless otherwise approved by the City of Morden. "V" ditches shall not be acceptable unless approved by the City. Topsoil and seeding of the ditches shall be as per the City of Morden Parks and Landscape specifications.

(d) Concrete Swalk

Concrete swalks shall be constructed where required in accordance with the detailed drawings, but will generally be located in detention pond areas. Swalks shall be a minimum of 2.0 meters wide and have a minimum crossfall of 3.0% towards the centre of the swalk. Any silty or otherwise unsuitable subgrade material shall be excavated and removed, and then replaced with suitable compacted subbase.

Concrete swalks shall consist of 100 mm thick concrete over 150 mm of compacted base course, with geotextile over a compacted subgrade. The base course shall extend 150mm on either side of the swalk. Minimum longitudinal slope shall be 0.15%. Concrete swalk joints shall be saw cut every 1.5 meters.

(e) Land Drainage on Private Property

When installed on private property, land drainage service lines shall be located a minimum of 2.0 meters from side lot lines.

(f) Sump Pits and Pumps

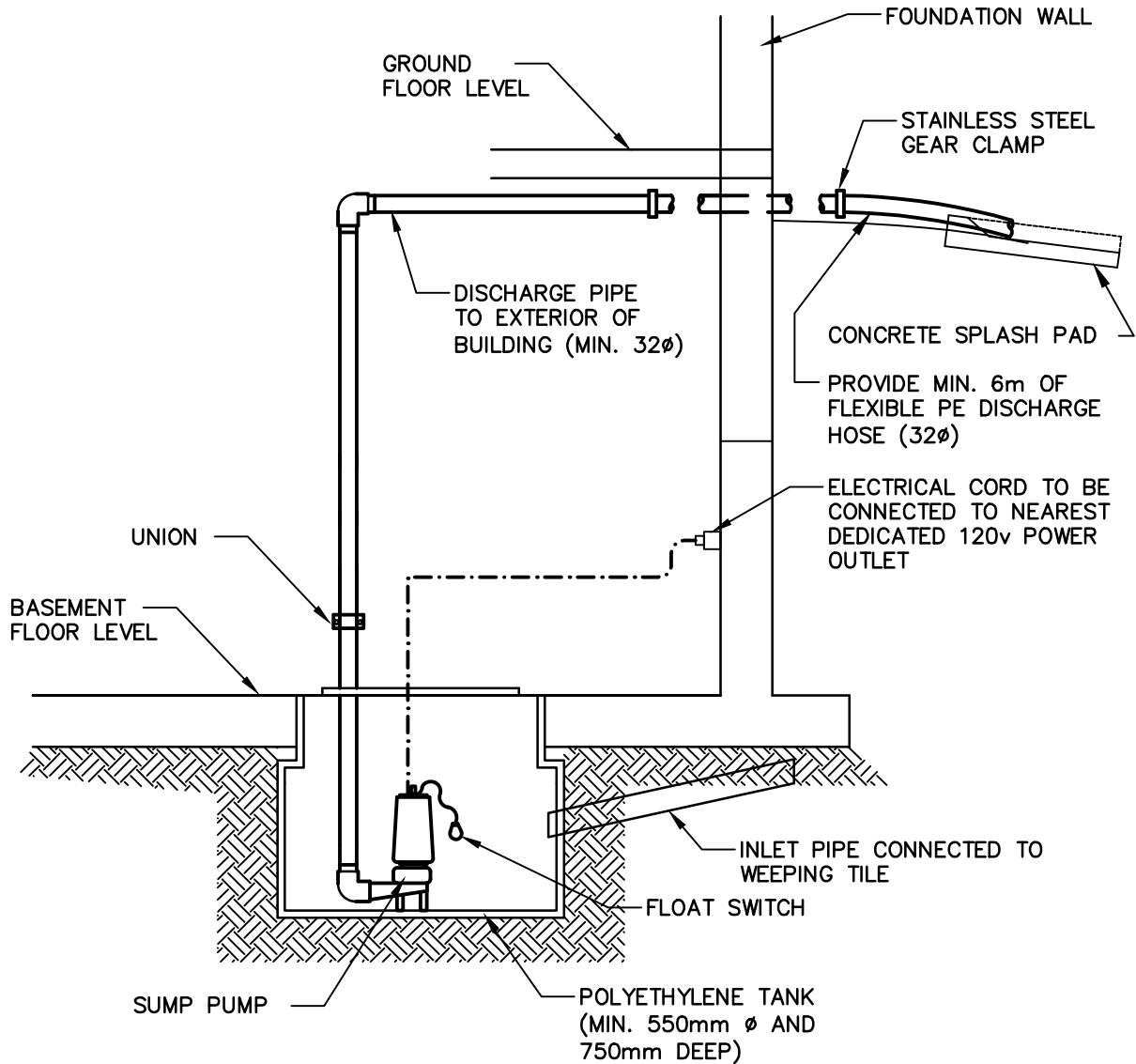
Any building that incorporates weeping tiles around the foundation will require a sump pit and pump to discharge the accumulated flow to the exterior of the buildings. In no circumstance will it be permissible to connect the discharge to the wastewater service pipe. Minimum size of the sump pit is to be 550mm diameter by 750mm deep, but the sump pit and pump are to be sized by the building owner and based on the size of the building. See typical detail on **Drawing G06**.

(g) Oil and Grit Separators

Any building that incorporates a wash bay will require an oil and grit separator. See typical detail on **Drawing G07**.

Any service station that is dispensing fuels requires an oil and grit separator(s) in the parking lot. Units to be StormCeptor, or approved equal. Contact the City of Morden for individual site requirements.

SUMP PUMP & PIT DETAIL



GENERAL NOTES

- PIPING OUTSIDE OF BUILDING TO DISCHARGE ONTO A SPLASH PAD WITHIN THE LIMITS OF THE PROPERTY TO MAINTAIN A MINIMUM 2 METRE (6.6 FT) SETBACK FROM ANY PROPERTY LINE TO DIRECT WATER TO THE NATURAL SURFACE DRAINAGE. DIRECT DISCHARGE INTO A DRAINAGE DITCH, SWALE, SANITARY SEWER, BEYOND THE PROPERTY LINES OR ONTO A MUNICIPAL ROADWAY SHALL NOT BE PERMITTED.

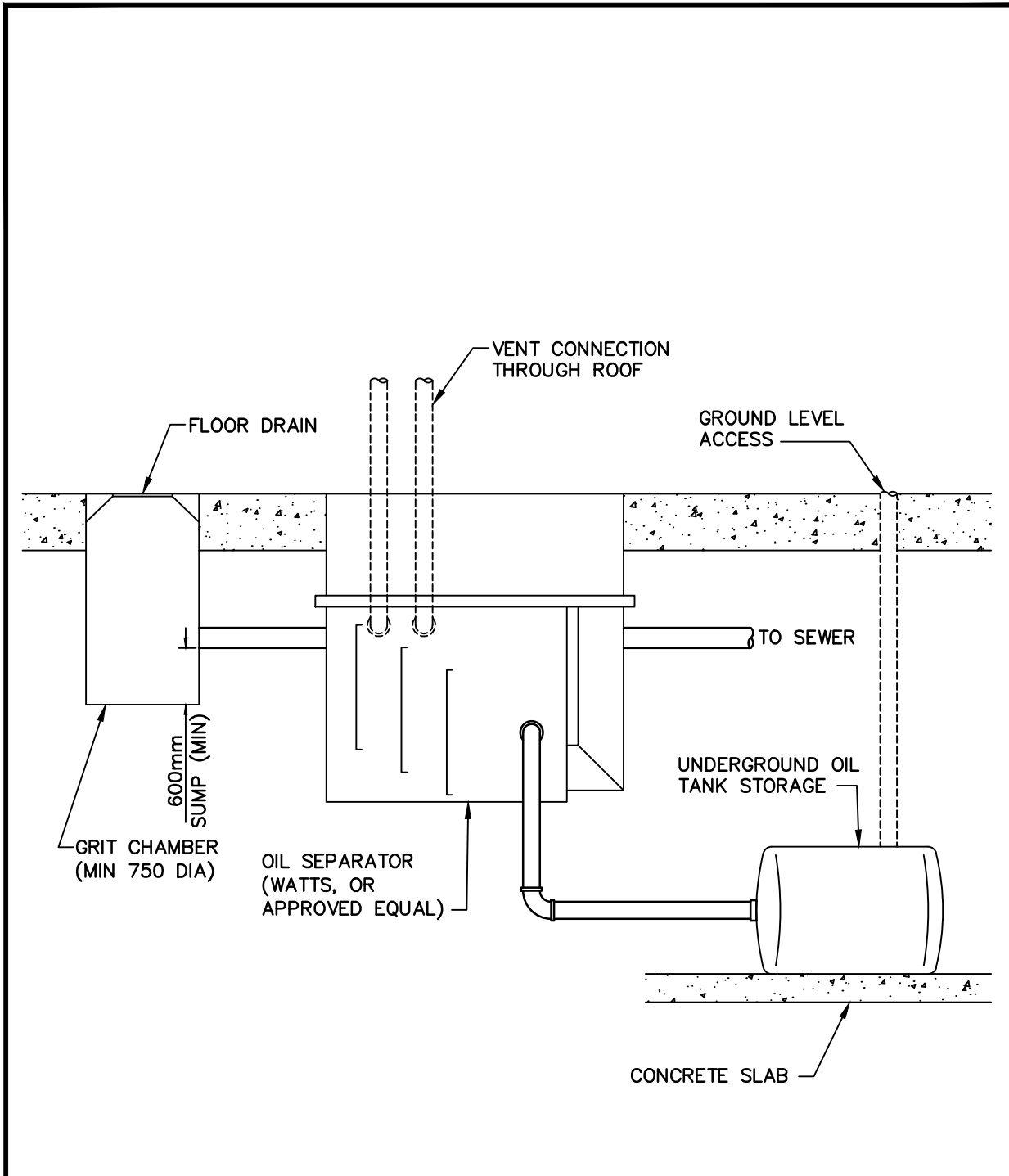
METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

 1600 BUFFALO PLACE WINNIPEG, MANITOBA CANADA R3T 6B8 PHONE: 204-477-6650 FAX : 204-474-2864 WWW.WSP.COM	PROJECT:		SUPPLEMENTAL:	
	CITY OF MORDEN		ADDENDUM:	ADD_# <input checked="" type="checkbox"/>
	TITLE:		DIRECTIVE:	DIR_# <input checked="" type="checkbox"/>
	SUMP PUMP AND SUMP PIT DETAIL		CHANGE ORDER:	CHG_# <input checked="" type="checkbox"/>
DRAWN BY:	SCALE:	REVISION:	DATE:	
M.P.M.	N.T.S.	REV_#	2022/11/24	
CHECKED BY:	PROJECT NO:	SUPPLEMENTAL NO:		
M.P.M.	221-07026-00	G06		

XREF


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METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
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— CONTACT CITY OF MORDEN FOR
 INDIVIDUAL USE REQUIREMENTS

 1600 BUFFALO PLACE WINNIPEG, MANITOBA CANADA R3T 6B8 PHONE: 204-477-6650 FAX : 204-474-2864 WWW.WSP.COM	PROJECT: <p style="text-align: center;">CITY OF MORDEN</p>	SUPPLEMENTAL: ADDENDUM: ADD_# <input type="checkbox"/> DIRECTIVE: DIR_# <input type="checkbox"/> CHANGE ORDER: CHG_# <input type="checkbox"/>	
	TITLE: <p style="text-align: center;">TYPICAL OIL / GRIT SEPARATOR IN WASH BAY</p>	REVISION: REV_#	
	DRAWN BY: A.L.M.	SCALE: N.T.S.	DATE: 2022/11/24
	CHECKED BY: M.P.M.	PROJECT NO: 221-07026-00	SUPPLEMENTAL NO: G07

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6.0 STORMWATER RETENTION

6.1 General Requirements

The rate of stormwater discharge from all new developments shall be limited to pre-development conditions. Hydraulic design calculations are to be provided for review using a design scenario that details how post development storm water runoff rates of the development property are to be equal to, or less than pre- development runoff rates subject to the following criteria:

- a) The site design must be able to handle a minimum of a 1-in-100 year storm event if there are walk-out basements, and a minimum of a 1-in-50 year storm event for other developments. Stormwater retention/detention facilities shall be designed to restrict the post development runoff outflow from a 25 year return storm (storm duration to be selected such that it results in maximum storage volume) to a pre-development runoff outflow from a 5 year storm (duration = predevelopment T_c). Water storage is typically accomplished through retention or detention ponds, or internal storage via ditches and drainage patterns.
- b) The rate of storm runoff shall be determined by the Rational or Modified Rational Formula for drainage areas less than 100 acres. However, other methods and software models can be used with prior approval from city especially for site area greater than 100 acres.

The design should detail:

- Pre-development catchment area runoff volumes and rate for design event.
- Post development catchment area runoff volumes and rate for design event.
- Volume of water to be stored, volume of retention available, and proposed outflow rate and infrastructure used for controlling the outflow.
- The storage area is to be confined to the pond area, and lots, boulevards, and roads shall not be used for retention or detention pond storage.

6.2 Linear Waterways

Linear waterways may form part of the storage / retention system and may consist of, but not limited to, culverts, ditches, concrete drains

(swalks), and sod as identified in the Development Agreement.

6.3 Retention Ponds

Retention ponds shall include the area of the pond at high water level, and all outlet and inlet structures and associated appurtenances.

All retention ponds are to be designed as naturalization ponds and shall include native grasslands and wetland plants. Ponds shall be designed by a certified consultant with experience in this field.

The following are to be considered when proposing the use of wetlands as a retention/detention facility. Wetland treatment will be subject to review by the City of Morden.

1. Generally, a constructed wetland is to be about 5% of the total watershed area or drainage area, depending on the volume and quality of runoff. It is recommended that, as a minimum, constructed wetlands should be considered for storm water management only if the drainage area is greater than 20 hectares. Using the 5% rule above, this translates to a minimum constructed wetland size of 1.0 hectares (2.5 acres).
2. It is recommended that a 1:1 ratio of shallow water vegetation to deep open water be considered to provide maximum habitat for waterfowl in constructed to natural wetlands intended for storm water management.
3. Screening from adjacent land uses may consist of a vegetated (naturalized) buffer, and a minimum width of 8 meters is recommended from normal water level. A portion of the buffer perimeter may be reforested or allowed to be reforested by a volunteer species.
4. Mosquitoes inhabit wetlands, and the highest populations tend to occur in stagnant, organically rich waters. Therefore, wetlands should be designed to preclude stagnant waters wherever possible. Shading the water surface will also help minimize the mosquito problem.
5. In general, the extended detention storage depth should be limited to 1.0 meters above the normal water level versus the normal water rise of 1.2 meters to 1.8 meters used in more conventional retention/detention facilities. Plant species normally found in wetland settings cannot withstand frequent water level fluctuations in excess of 1 meter.
6. The Developer will be required to provide appropriate signage at points around the facility and inform the general public and future homebuyers in the neighbourhood that the proposed facility is a

constructed wetland operated for storm water management. It is intended to be a low maintenance, natural facility.

7. Refer to the City of Morden Public Reserve Policy for land dedication.

6.4 Detention Ponds

Detention shall include the area of the pond at the high water level, a centre swalk, all outfall and inlet structures, and all landscaping of the entire area.

Detention ponds shall be designed to have 80% of the pond drained within 24 hours of a 1 in 25 year storm event. If directed by the City of Morden, a capture sump pump may be required to keep the pond dry.

Side slopes shall be no steeper than 4:1. The bottom section shall be a minimum 10.0 meters wide, and have a center swalk, and the bottom shall be graded towards the swalk with a minimum 1% grade. An alternative is to grade the bottom at a minimum 0.5% slope towards the outlet. The entire area of the detention pond shall be completed with native grasses.

Detention ponds for developments shall have a minimum size at normal water level of 4,000 square meters (1.0 acres) if the pond is to be maintained by the City. If the pond is to be maintained by the Developer, there is no minimum size.

7.0 ROADWAYS

7.1 General

Roadways shall be classified as either residential local, residential rural, minor collector, major collector, industrial collector, and arterial. The following material and construction specifications for City of Winnipeg (COW) shall apply, with any exceptions being specifically outlined herein:

- Earthwork and Grading – CW 3170
- Geotextile – CW 3130
- Geogrid – CW 3135
- Portland Cement Concrete Pavement – CW 3310
- Portland Cement Concrete Sidewalk – CW 3325
- Joint and Crack Maintenance – CW 3250

The following material and construction specifications for Manitoba Transportation and Infrastructure (MTI) shall apply, with any exceptions being specifically outlined herein:

- Culverts – 400
- Base Course – 900
- Concrete Curbing – 860(I)
- Bituminous Pavement – 800(I)
- Applying Prime Coat and Tack Coat – 806(I)
- Material Specifications for Aggregate – 901(I)

Compaction requirements shall be based on Standard Proctor Dry Density (ASTM D698) at 90-130% of optimum moisture content.

7.2 Pavement Design Criteria

(a) Gutter Grade

Where gutters are provided, they shall be graded at a minimum slope of 0.4%. The Developer may be required to provide a land drainage sewer to maintain the minimum slope if the terrain is flat.

(b) Crossfall

The highpoint of the pavement shall be the centre-line of the road (crown). The crossfall between crown and gutter shall be graded at 2.5%.

(c) Width

Where there is concrete curb and gutter, the width of the road, measured from the outside edge of the curb, shall be 8.5 meters for residential local roads, and 10.5 meters for minor collector, major collector, and industrial local roads. Corners shall be minimum 7.5 meter radius for residential local pavements, and 10.0 meter radius for minor collector, major collector, and industrial local pavements.

Where there are no curbs or gutters, the minimum top width of road shall be 8.5 meters for residential rural roads, and 10.5 meters for minor collector, major collector, and industrial local roads.

For minor collector, major collector, and industrial local roads only, 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 meters. The radius point for the outside of the road shall be the same as the radius point for the inside of the curve. Transition from the outside radius shall be made with 19.0 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. Minimum right-of-way widths shall be 20.0 meters for residential local, 22.50 meters for minor collector and industrial local roads, and 24.0 meters for major collector roads. Right-of-way widths will be based on the needs of the development.

Typical layout of the infrastructure and road widths for the various right-of-ways and types of road is provided in **Drawings G08 – G11**

(d) Cul-De-Sac

Road Classification	Right-of-Way Requirements	Road Surface Requirement
Residential	36.0 meter diameter	26.0 meter diameter

(e) Road Grade

Maximum road grade to be 10%. If sideslopes exceed 4:1, or the toe of the slope extends beyond the right-of-way, then alternatives, such as retaining walls, may be required, and approved by the City of Morden. Vertical curves are required if the difference in the algebraic difference between descending and ascending gradients is equal to or greater than 2%. The vertical curve is to be designed as per the latest TAC Geometric Design guidelines.

At intersections, the maximum road grade within 25m of the travelled lane of the intersecting road shall not be more than 5%.

7.3 Subgrade

- a) Excavations for roadways (width of curb and gutter plus base extension, shall be, at minimum, 0.6 meter 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 conform to City of Winnipeg practice. This generally consists 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, or as otherwise authorized by the City of Morden. Any unsuitable material (organics, silty soil, etc.) as may be exposed shall be excavated and removed, to a maximum depth of 450mm below the bottom of subbase, and replaced with approved subbase material. Approved subbase materials shall be either:
1. Clean compacted clay
 2. Crushed rock minus 100mm
 3. Pit run gravel with prior approval from city engineer
 4. 'C' Base gravel course

7.4 Road Sections

Road sections shall consist of a minimum asphalt (if required), subbase and base course thickness as indicated. Subsurface conditions may warrant additional material:

- a) Residential Local
- 100 mm asphalt or 150mm concrete
 - 150 mm base course ('A' Base)
 - 300 mm subbase for asphalt roads, 200mm subbase for concrete roads ('C' Base)
 - Geotextile
- b) Residential (rural)
- 150 mm base course ('A' Base)
 - 300 mm subbase ('C' Base)
 - Geotextile
- c) Minor Collector, Major Collector, Industrial Local
- 150 mm reinforced concrete
 - 150 mm base course ('A' Base)

- 300 mm subbase ('C' Base)
- Geogrid
- Geotextile

'A' Base and 'C' Base shall meet the following:

		SIEVE SIZE (mm)									
		37.5	25	19	16	12.5	9.5	4.75	2	0.425	0.075
'A' Base	min (%)			100.0	80.0	70.0	60.0	40.0	25.0	15.0	8.0
	max (%)			100.0	100.0	90.0	85.0	70.0	50.0	30.0	15.0
'C' Base	min (%)	100.0	85.0	70.0	70.0	70.0	50.0	25.0	25.0	15.0	8.0
	max (%)	100.0	100.0	100.0	100.0	95.0	95.0	80.0	60.0	40.0	18.0

All base course and subbase course shall be placed and compacted in lifts to achieve a minimum 98% density throughout the pavement structure. Base and subbase compaction shall be confirmed by onsite compaction testing. Maximum lineal distance between tests shall be 100 meters. Subgrade compaction may be determined by onsite compaction testing with the maximum distance between tests to be 100 meters, or by proof rolling. Compaction testing for 100mm stone/gravel used to strengthen subgrade shall be by proof rolling.

Proof rolling is the driving of a heavy pneumatic tired vehicle over the prepared surface, while observing for rutting or deformation. For proof rolling use a heavy (15-16 tonne) rubber tired roller having four wheels abreast on independent axles with heavy contact wheel pressures (550 kPa 1030 kPa) or a heavily loaded truck loaded to approximately 10 tonnes per axle with a minimum tire pressure of 550 kPa. This loading compares to 80% loading of a MTI 3S2 tractor trailer. Ground speed to be a maximum speed of 8 km/hour, with a recommended speed of 4 km/hour. Undertake proof rolling by two complete coverages of the area with proof rolling equipment in one direction. One coverage means every point of the proof rolled surface has been subjected to the tire pressure of the loaded wheel. The following tolerances shall apply:

1. Rutting less than 10mm - the grade is acceptable
2. Rutting greater than 10mm and less than 40mm- the grade needs to be scarified and re-compacted
3. Rutting greater and 40mm removal and replacement is recommended.

7.5 Geotextile Fabric

- .1 A separation / reinforcement geotextile fabric shall be placed between the sub-grade and sub-base materials for all roads and sidewalks and shall be a non-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:

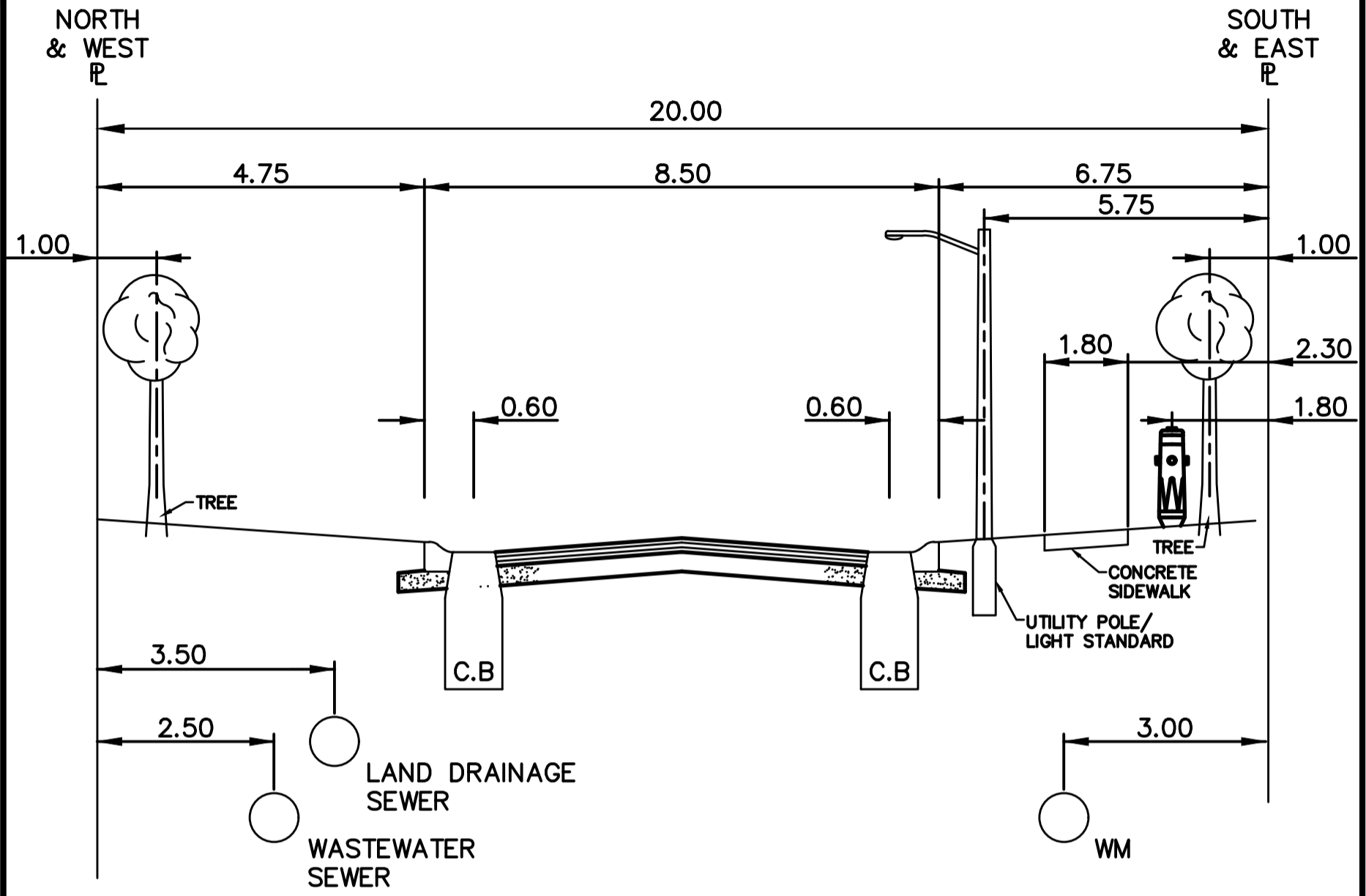
Property	Standard	Test Method
Grab Tensile Strength	1400 N – minimum	ASTM D4632
Puncture Strength	530 N – minimum	ASTM D4833
Trapezoid Tear	500 N – minimum	ASTM D4522
Apparent Opening Size	0.430 mm – maximum	ASTM D4751
Permittivity	0.06 sec – 1 – maximum	ASTM D4491
UV Resistance	70% per 500 hrs - minimum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

- .3 All joints shall be overlapped a minimum of 0.6 m on edges, and 1.0 m on ends, in the direction of the sub-base placement.
- .4 When installed with a geogrid, the geotextile shall be installed on the finished subgrade, and under the geogrid.
- .5 Acceptable products as indicated in the City of Winnipeg standards.

7.6 Geogrid

- .1 Where indicated for the road sections, a synthetic planar structure formed by a regular network of tensile strength elements with apertures of sufficiently large size to allow for interlocking with the surrounding soil to perform the primary function of reinforcement. A geogrid material shall be placed on top of the geotextile, and shall be a by-axial material in accordance with Class B geogrid properties as describe in COW Section CW 3135
- .2 Adjacent geogrid rolls should be overlapped along their sides and ends by 450mm – 900mm, as a function of the subgrade CBR strength.
- .3 Acceptable products as indicated in the City of Winnipeg standards.

TYPICAL RESIDENTIAL 20.00 LOCAL RIGHT-OF-WAY CROSS SECTION



METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



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

PROJECT:

CITY OF MORDEN

TITLE:

TYPICAL 20.00 LOCAL RESIDENTIAL
RIGHT-OF-WAY CROSS-SECTION

DRAWN BY:

M.P.M.

SCALE:

N.T.S.

CHECKED BY:

M.P.M.

PROJECT NO:

221-07026-00

SUPPLEMENTAL:

ADDENDUM: ADD_#

DIRECTIVE: DIR_#

CHANGE ORDER: CHG_#

REVISION:

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DATE:

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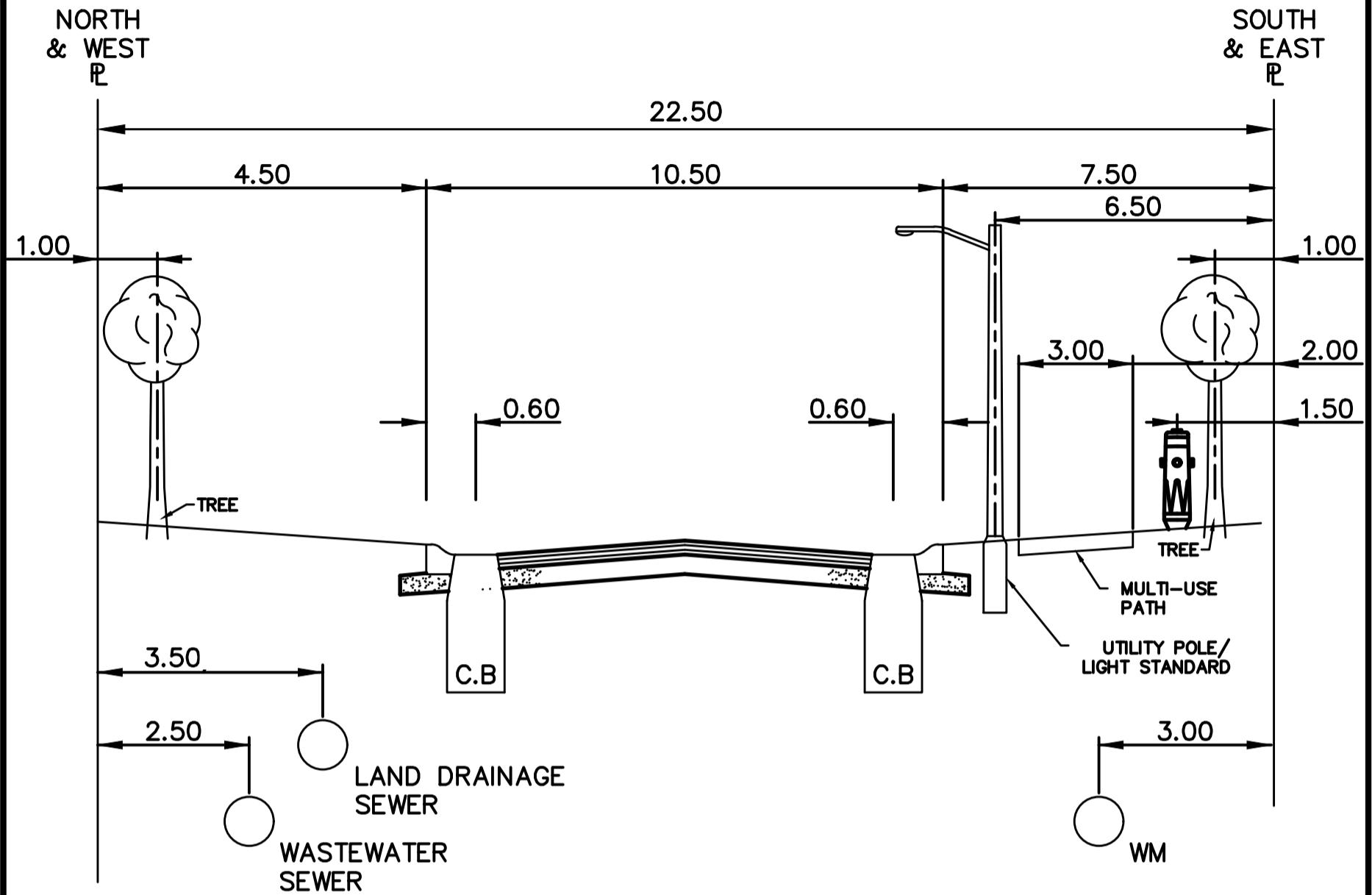
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G08

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TYPICAL MINOR COLLECTOR/INDUSTRIAL LOCAL RIGHT-OF-WAY CROSS SECTION



METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



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

PROJECT:

CITY OF MORDEN

TITLE:

TYPICAL MINOR COLLECTOR/INDUSTRIAL LOCAL
RIGHT-OF-WAY CROSS-SECTION

DRAWN BY:

M.P.M.

SCALE:

N.T.S.

CHECKED BY:

M.P.M.

PROJECT NO:

221-07026-00

SUPPLEMENTAL:

ADDENDUM: ADD_#

DIRECTIVE: DIR_#

CHANGE ORDER: CHG_#

REVISION:

REV_#

DATE:

2023/12/01

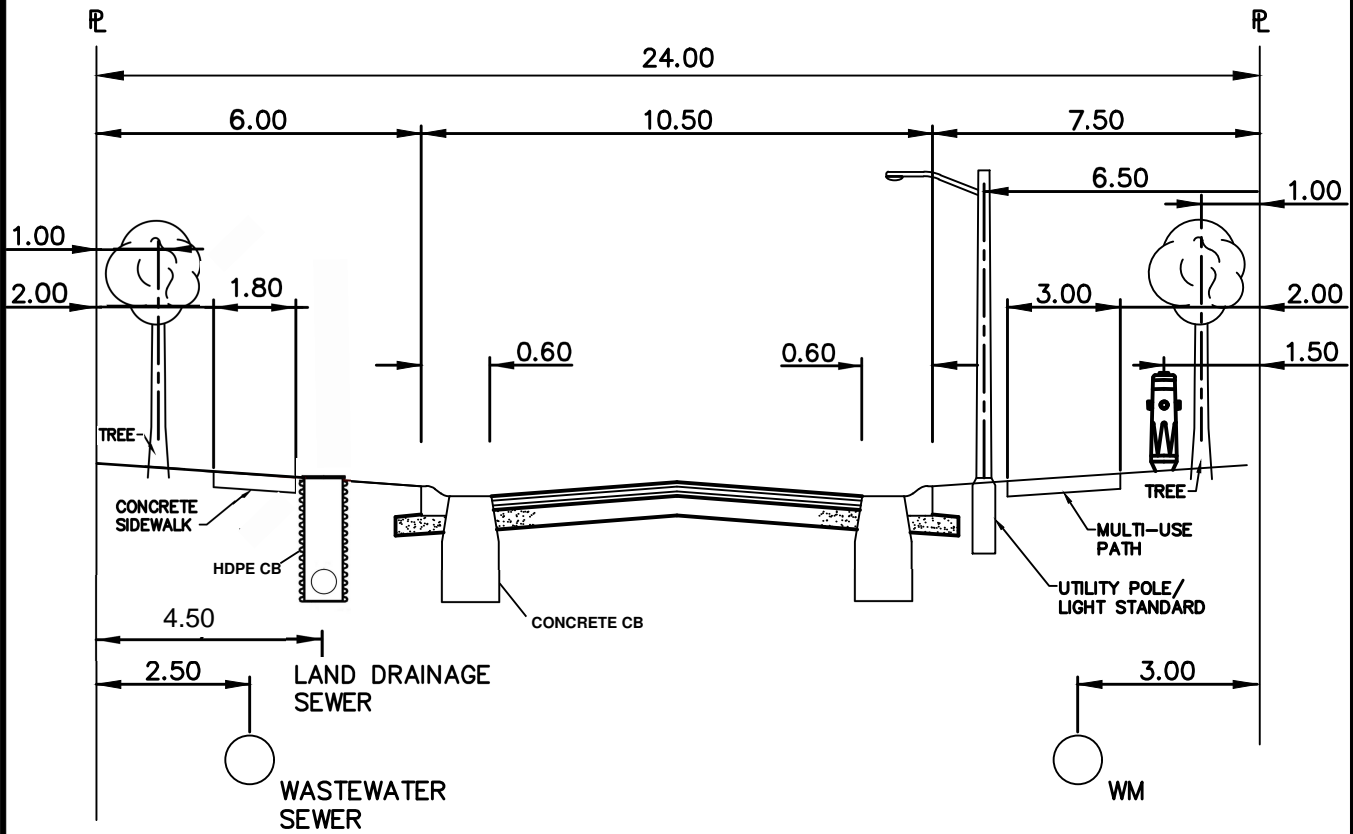
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G09

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STAMP

TYPICAL MAJOR COLLECTOR RIGHT-OF-WAY CROSS SECTION



METRIC

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DECIMALIZED NUMBERS INDICATE METRES



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

PROJECT:

CITY OF MORDEN

SUPPLEMENTAL:

ADDENDUM: ADD_#

DIRECTIVE: DIR_#

CHANGE ORDER: CHG_#

TITLE:

TYPICAL MAJOR COLLECTOR
RIGHT-OF-WAY CROSS-SECTION

REVISION:

REV_# A

DRAWN BY:

M.P.M.

SCALE:

N.T.S.

DATE:

2024/08/21

CHECKED BY:

M.P.M.

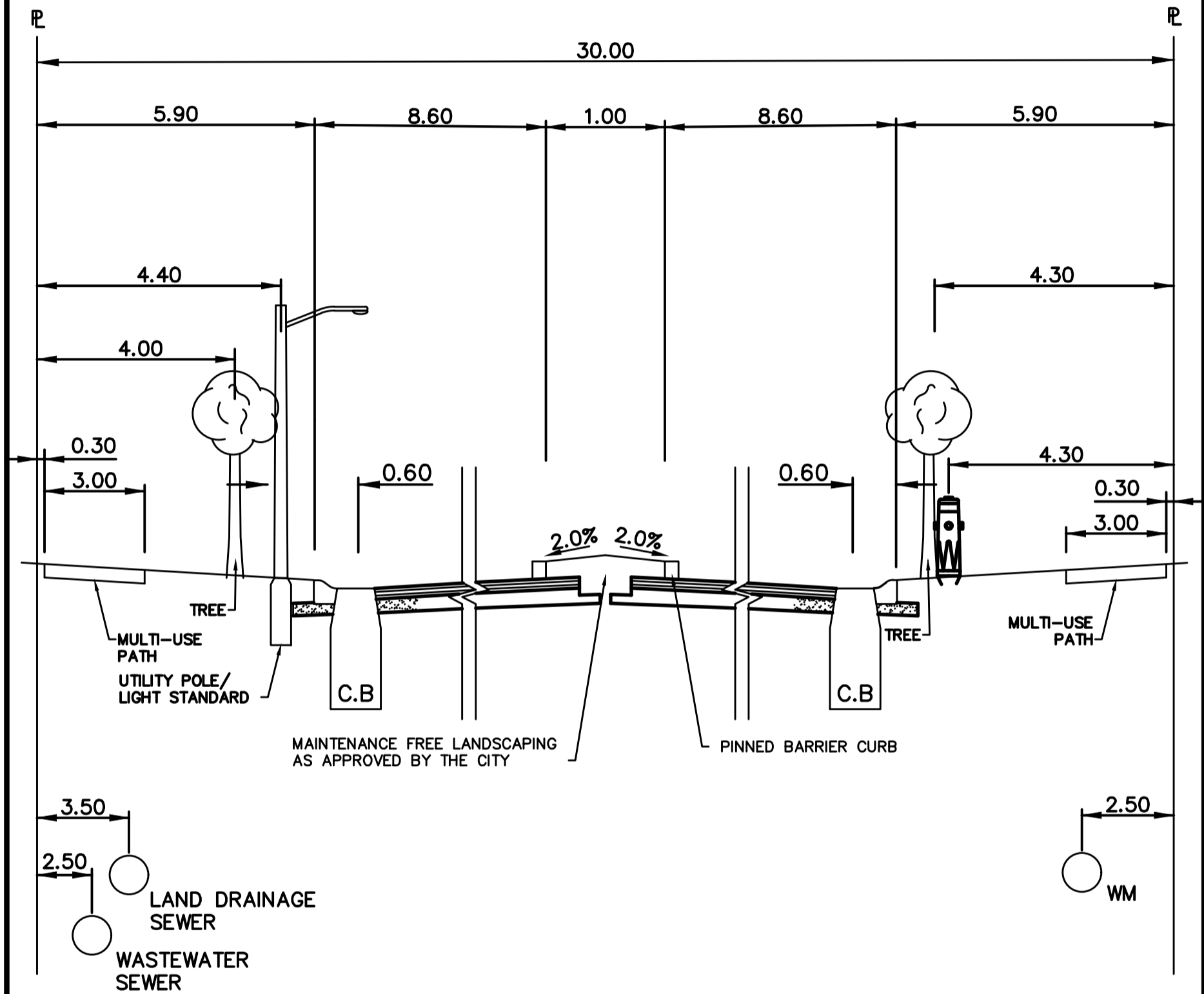
PROJECT NO:

221-07026-00

SUPPLEMENTAL NO:

G10

TYPICAL ARTERIAL DIVIDED RIGHT-OF-WAY CROSS SECTION (BY THE CITY OF MORDEN ONLY)



METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
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PROJECT:

CITY OF MORDEN

TITLE:

TYPICAL ARTERIAL DIVIDED
RIGHT-OF-WAY CROSS-SECTION

DRAWN BY:

M.P.M.

SCALE:

N.T.S.

CHECKED BY:

M.P.M.

PROJECT NO:

221-07026-00

SUPPLEMENTAL:

ADDENDUM: ADD_#
DIRECTIVE: DIR_#
CHANGE ORDER: CHG_#

REVISION:

REV_#

DATE:

2023/12/01

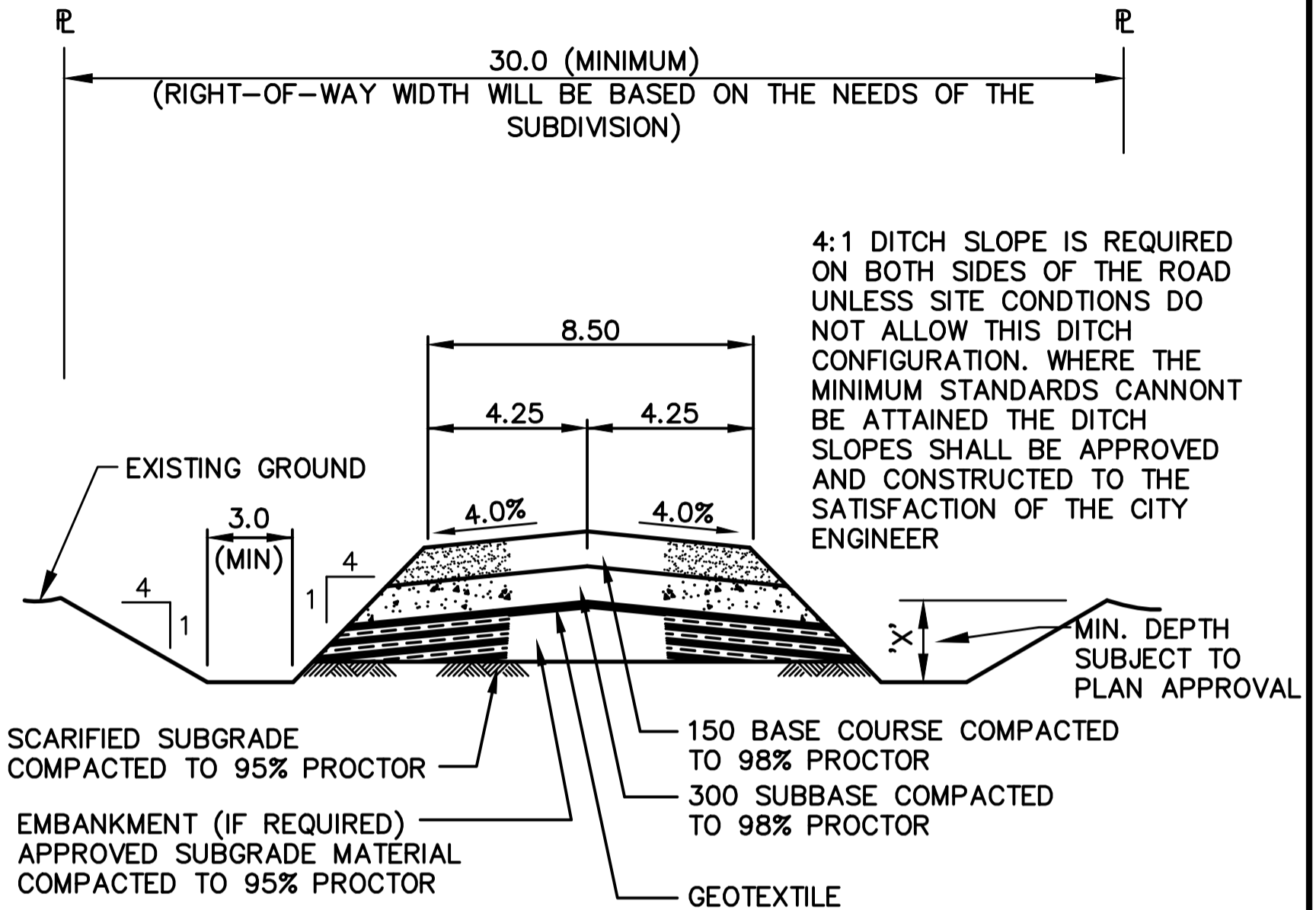
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G11

XREF

STAMP

TYPICAL RESIDENTIAL (RURAL) ROAD CROSS SECTION



GENERAL NOTES & ROAD SPECIFICATIONS

- REMOVE ALL TOPSOIL, SILT, ORGANICS AND UNSUITABLE MATERIAL (MINIMUM 150 DEPTH)

WHERE SITE CONDITIONS, TRAFFIC PATTERNS OR LOADING VARY (PAVEMENT STRUCTURE INDICATED IS FOR A TANDEM VEHICLE WITH A MAXIMUM GROSS WEIGHT OF 30 TONNES) FROM THE TYPICAL DESIGN CRITERIA FOR THE MUNICIPAL MINIMUM STANDARD, THE CITY MAY REQUIRE MORE STRINGENT ROAD CONSTRUCTION STANDARDS. INDIVIDUALS THAT ANTICIPATE NON-RESIDENTIAL TRAFFIC SHOULD CONTACT THE CITY ENGINEER FOR MORE INFORMATION.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



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PROJECT:

CITY OF MORDEN

TITLE:

TYPICAL RESIDENTIAL (RURAL)
ROAD CROSS-SECTION

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SCALE:

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CHECKED BY:

M.P.M.

PROJECT NO:

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SUPPLEMENTAL:

ADDENDUM:

ADD_#

DIRECTIVE:

DIR_#

CHANGE ORDER:

CHG_#

REVISION:

REV_#

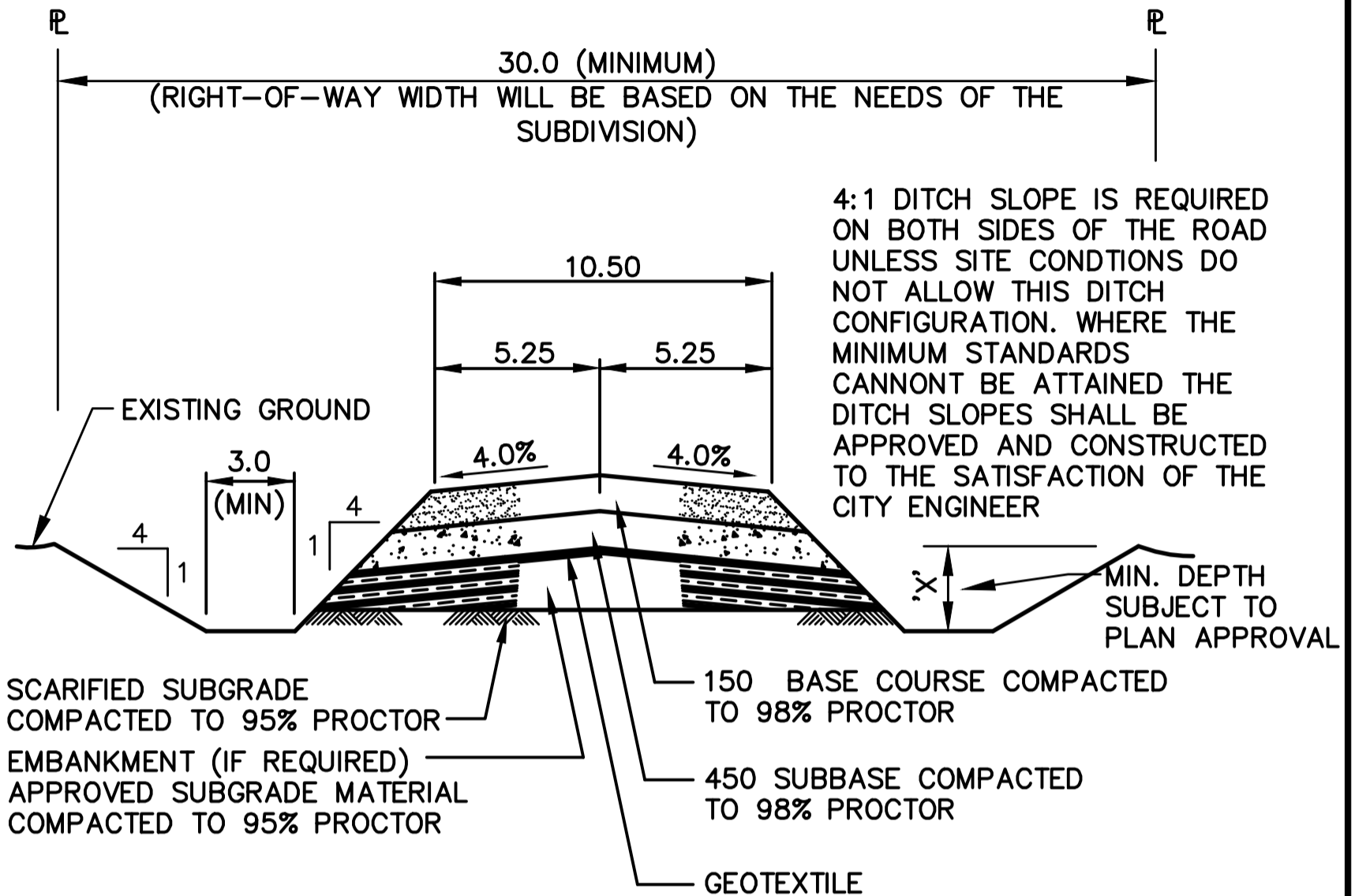
DATE:

2023/06/21

SUPPLEMENTAL NO:

G12

TYPICAL INDUSTRIAL GRAVEL ROAD CROSS SECTION



GENERAL NOTES & ROAD SPECIFICATIONS

- REMOVE ALL TOPSOIL, SILT, ORGANICS AND UNSUITABLE MATERIAL (MINIMUM 150 DEPTH)

WHERE SITE CONDITIONS, TRAFFIC PATTERNS OR LOADING VARY FROM THE TYPICAL DESIGN CRITERIA FOR THE MUNICIPAL MINIMUM STANDARD, THE CITY MAY REQUIRE MORE STRINGENT ROAD CONSTRUCTION STANDARDS. INDIVIDUALS THAT ANTICIPATE NON-TYPICAL TRAFFIC SHOULD CONTACT THE CITY ENGINEER FOR MORE INFORMATION.

METRIC

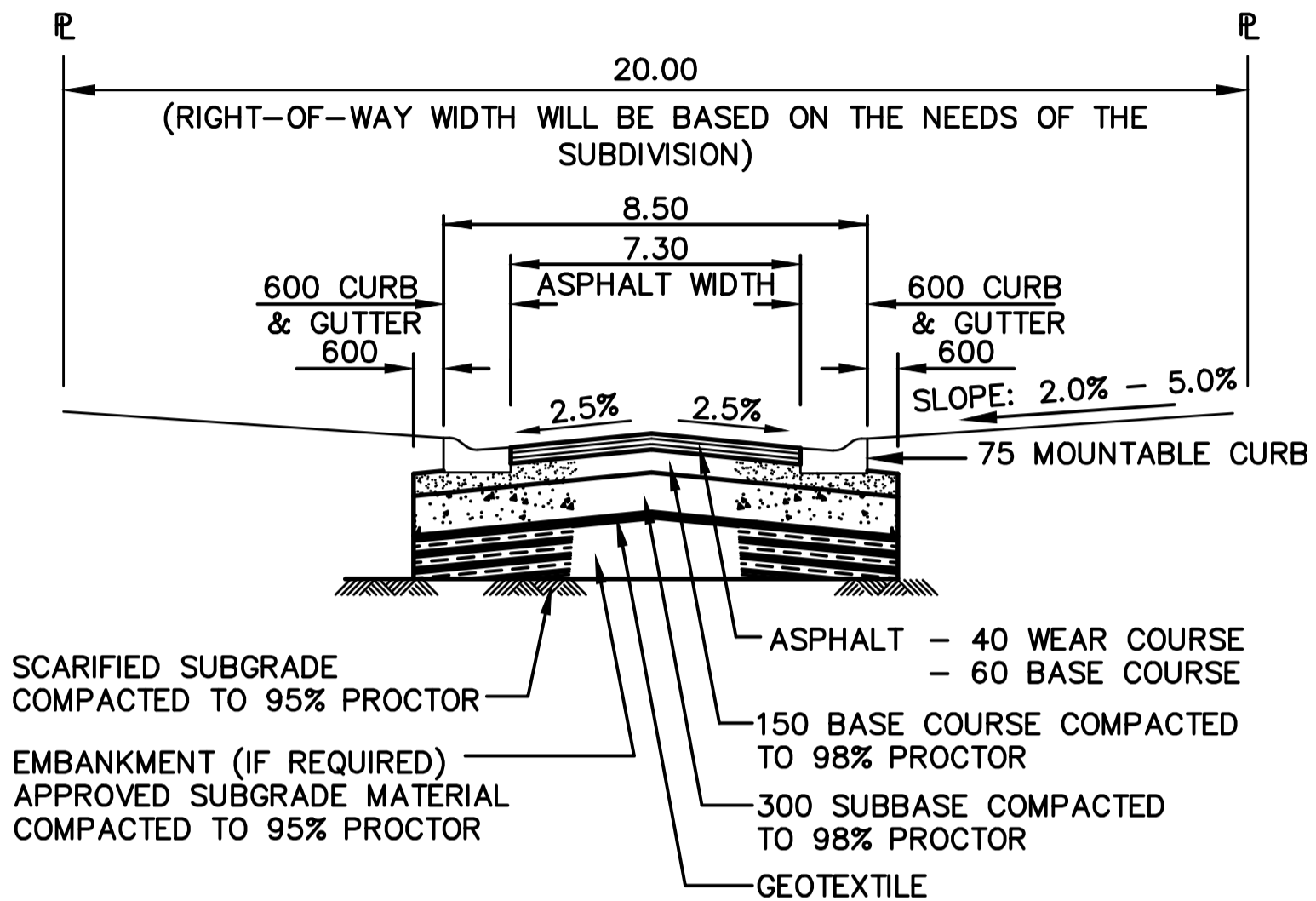
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



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PROJECT: CITY OF MORDEN		SUPPLEMENTAL: ADDENDUM: ADD_# <input checked="" type="checkbox"/> DIRECTIVE: DIR_# <input checked="" type="checkbox"/> CHANGE ORDER: CHG_# <input checked="" type="checkbox"/>
TITLE: TYPICAL INDUSTRIAL GRAVEL ROAD CROSS-SECTION		REVISION: REV_#
DRAWN BY: M.P.M.	SCALE: N.T.S.	DATE: 2023/06/21
CHECKED BY: M.P.M.	PROJECT NO: 221-07026-00	SUPPLEMENTAL NO: G13

TYPICAL RESIDENTIAL LOCAL PAVEMENT ROAD CROSS SECTION



GENERAL NOTES & ROAD SPECIFICATIONS

- REMOVE ALL TOPSOIL, SILT, ORGANICS AND UNSUITABLE MATERIAL (MINIMUM 150 DEPTH)

WHERE SITE CONDITIONS, TRAFFIC PATTERNS OR LOADING VARY FROM THE TYPICAL DESIGN CRITERIA FOR THE MUNICIPAL MINIMUM STANDARD, THE CITY MAY REQUIRE MORE STRINGENT ROAD CONSTRUCTION STANDARDS. INDIVIDUALS THAT ANTICIPATE NON-RESIDENTIAL TRAFFIC SHOULD CONTACT THE CITY ENGINEER FOR MORE INFORMATION.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



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PROJECT:

CITY OF MORDEN

TITLE:

TYPICAL RESIDENTIAL
CURB & GUTTER ROAD CROSS-SECTION

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M.P.M.

PROJECT NO:

221-07026-00

SUPPLEMENTAL:

ADDENDUM: ADD_#

DIRECTIVE: DIR_#

CHANGE ORDER: CHG_#

REVISION:

REV_#

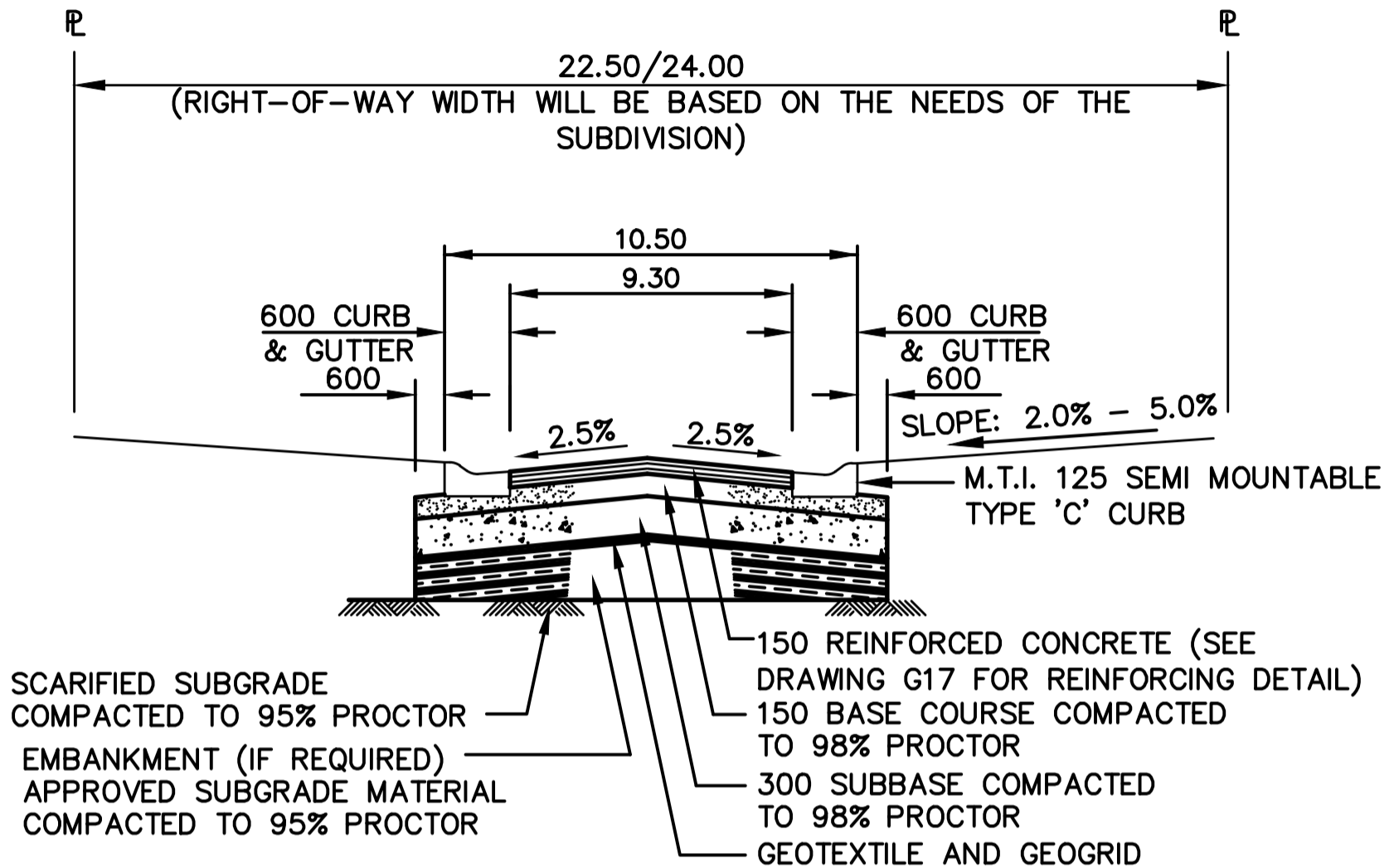
DATE:

2023/06/21

SUPPLEMENTAL NO:

G14

TYPICAL MINOR COLLECTOR/MAJOR COLLECTOR/INDUSTRIAL LOCAL CONCRETE ROAD CROSS SECTION



GENERAL NOTES & ROAD SPECIFICATIONS

- REMOVE ALL TOPSOIL, SILT, ORGANICS AND UNSUITABLE MATERIAL (MINIMUM 150 DEPTH)

WHERE SITE CONDITIONS, TRAFFIC PATTERNS OR LOADING VARY FROM THE TYPICAL DESIGN CRITERIA FOR THE MUNICIPAL MINIMUM STANDARD, THE CITY MAY REQUIRE MORE STRINGENT ROAD CONSTRUCTION STANDARDS. INDIVIDUALS THAT ANTICIPATE NON-TYPICAL TRAFFIC SHOULD CONTACT THE CITY ENGINEER FOR MORE INFORMATION.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



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

PROJECT:

CITY OF MORDEN

TITLE:

TYPICAL MINOR COLLECTOR/MAJOR
COLLECTOR/INDUSTRIAL COLLECTOR
CONCRETE ROAD CROSS-SECTION

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M.P.M.

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SUPPLEMENTAL:

ADDENDUM:

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CHANGE ORDER:

CHG_#

REVISION:

REV_#

DATE:

2023/06/21

SUPPLEMENTAL NO:

G15

7.7 Surface

The following specifications are provided as information. Unless otherwise stipulated in a development agreement, hard surface paving shall be installed to full depth during initial installation.

(a) Pavement

1.35 litres per square meter 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 all roads (placed in two lifts) after compaction.

Hot mix asphalt is to be placed only when forecast temperatures are a minimum of 3 degrees C and rising.

1. Hot mix asphalt is to be used, and is to be reflected on the asphalt tickets.
2. Upon completion, asphalt cores are required, indicating depth and compaction, at a maximum horizontal spacing of 75 meters.
3. If any areas do not meet compaction requirements, these areas may be subject to additional work, or additional warranty, at the discretion of the City of Morden.

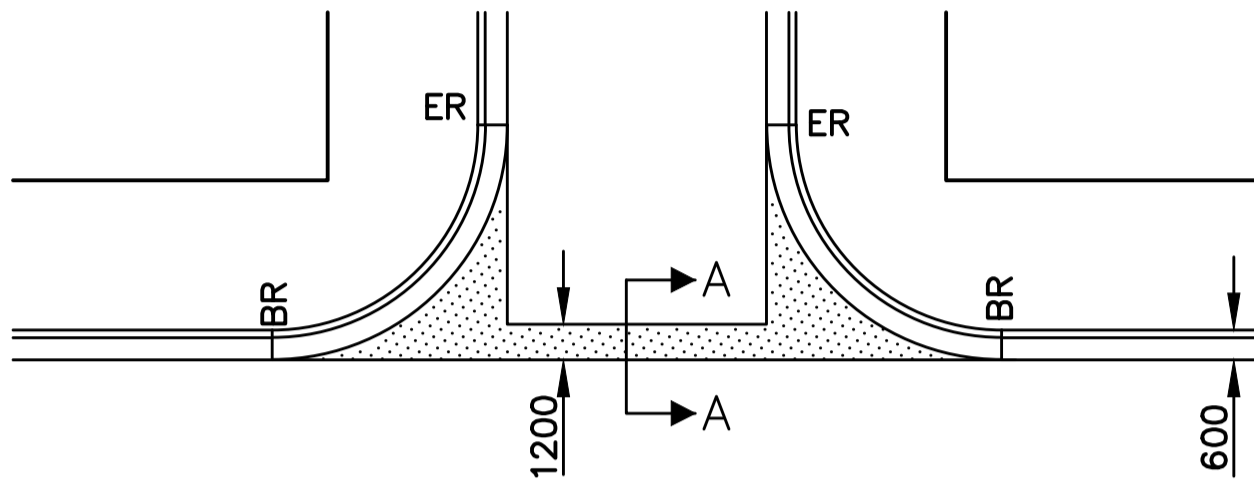
For concrete works, see Section 9 of these specifications for concrete requirements.

(b) Curb and Gutter

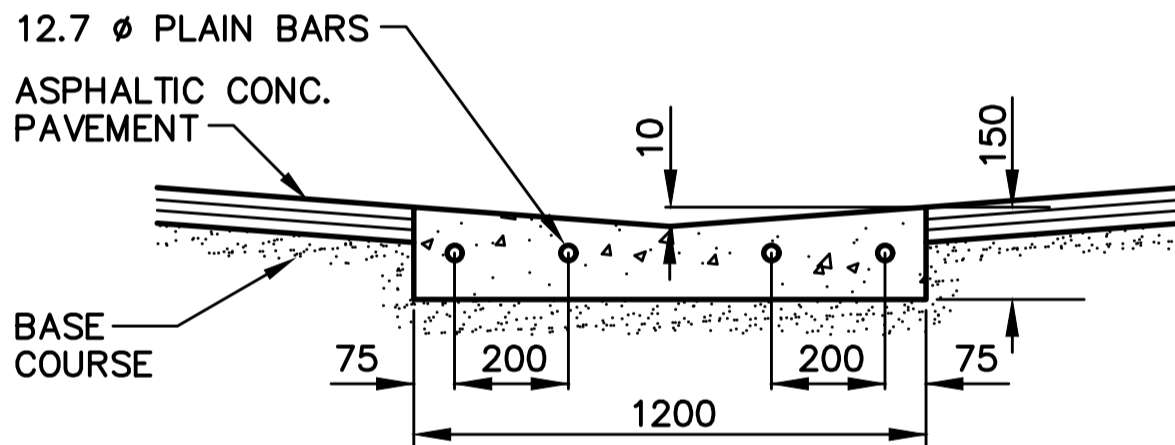
All urban roadways shall be designed with concrete curb and gutter drainage (with storm sewers as required), unless otherwise permitted in writing by the City Engineer. Where curbs and gutters are stipulated, roadways shall have a rolled style curb and gutter, in accordance with either a semi-mountable Type 'C' as stipulated in the MTI specifications, or a 75mm mountable curb. Semi-mountable curb is to be used for arterial, minor collector and collector road, and mountable curb is to be used for residential and commercial local roads. Details for the two curbs are provided on **Drawing G17**.

(c) Concrete Carry Through

Where required, a 1200 mm wide concrete carry through shall be constructed with reinforced concrete. A concrete carry through shall only be constructed at an intersection, and only along the gutter that is perpendicular to the road that would have a stop sign. A typical concrete carry-through detail is shown at the end of this section, as **Drawing G16**.



CONCRETE CARRY-THROUGH
N.T.S.



SECTION A-A

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



1600 BUFFALO PLACE
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CANADA R3T 6B8
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PROJECT:

CITY OF MORDEN

TITLE:

TYPICAL CONCRETE CARRY-THROUGH

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M.P.M.

SCALE:

N.T.S.

CHECKED BY:

M.P.M.

PROJECT NO:

221-07026-00

SUPPLEMENTAL:

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DIRECTIVE: DIR_#

CHANGE ORDER: CHG_#

REVISION:

REV_#

DATE:

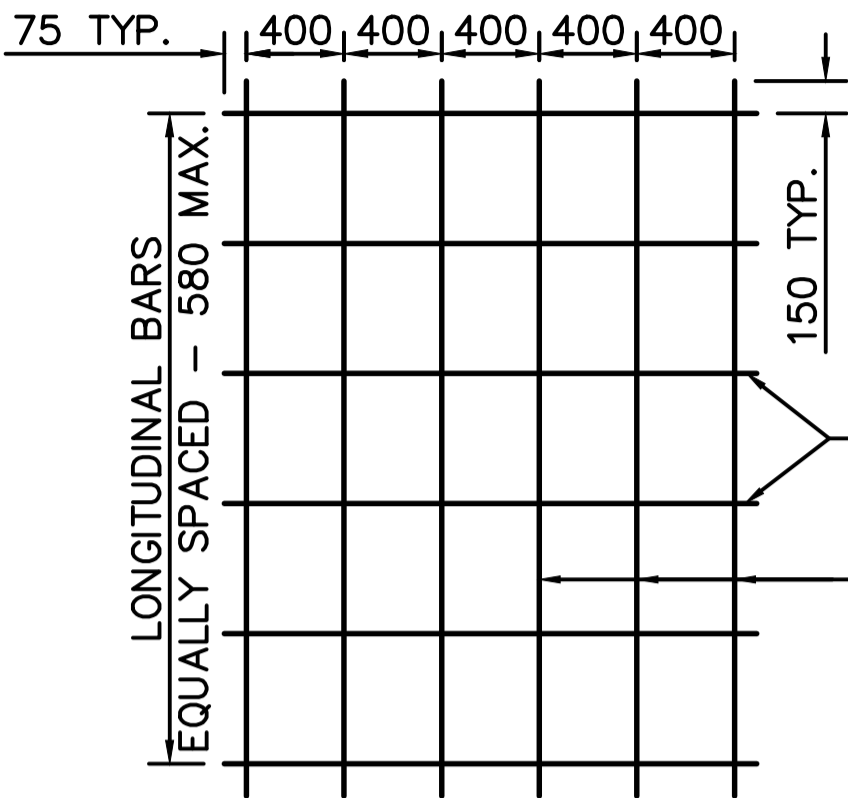
2023/06/21

SUPPLEMENTAL NO:

G16

XREF

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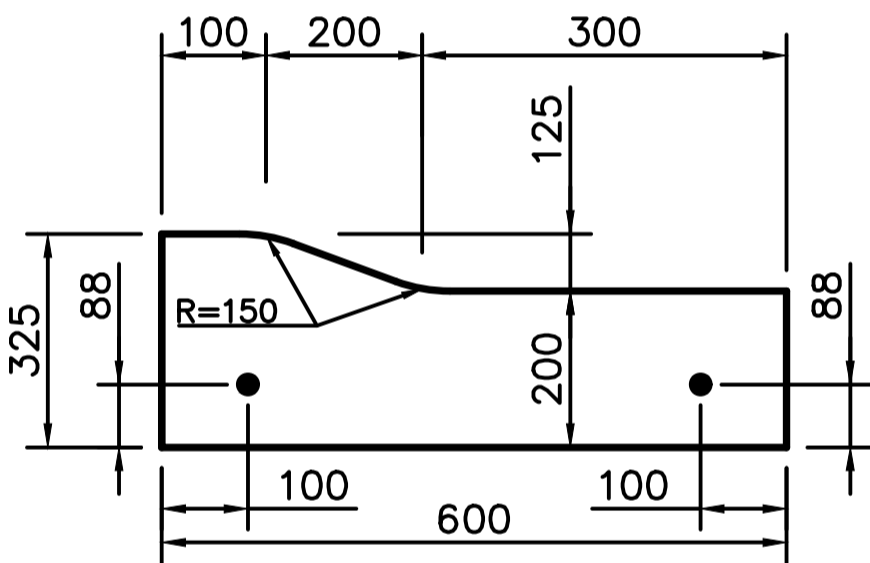
NOTE:

1. ALL BAR MATS MUST BE CHAIRED IN THE CENTRE OF THE CONCRETE
2. ALL DIMENSIONS ARE TO CENTRES OF BARS

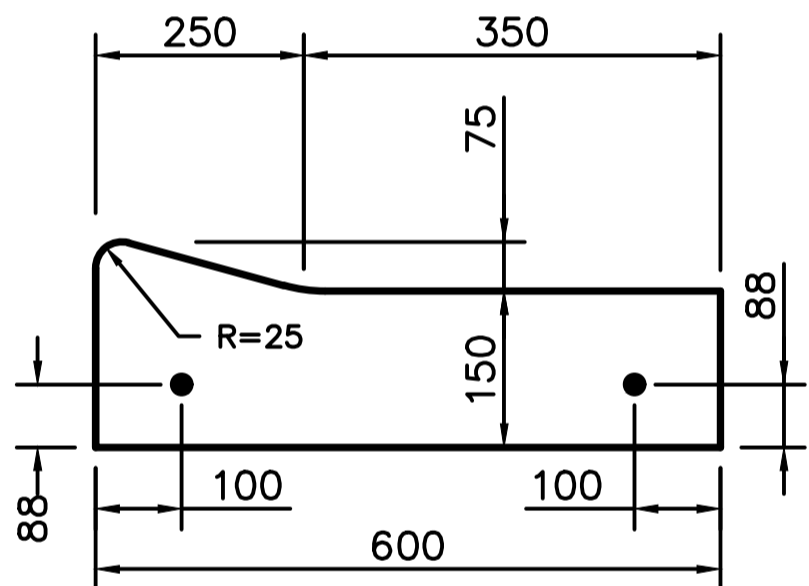
12.7mm LONGITUDINAL PLAIN BARS, 2500 LONG

12.7mm TRAVERSE PLAIN BARS, LENGTH OF BARS = SLAB WIDTH - 150

BAR MAT



SEMI-MOUNTABLE CURB AND GUTTER "TYPE C"



MOUNTABLE CURB AND GUTTER

NOTE:

- REPRESENTS CONSTRUCTION JOINT DOWELS (SMOOTH OR DEFORMED) WHICH SHALL BE 15.88mm IN DIAMETER AND 600mm LONG AND EPOXY COATED. TOLERANCE FOR MOLD DIMENSIONS WILL BE ±5mm.



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PROJECT:

CITY OF MORDEN

TITLE:

CONCRETE REINFORCING AND CURBS

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SCALE:

N.T.S.

CHECKED BY:

M.P.M.

PROJECT NO:

221-07026-00

SUPPLEMENTAL:

ADDENDUM:

ADD_#

DIRECTIVE:

DIR_#

CHANGE ORDER:

CHG_#

REVISION:

REV_#

DATE:

2023/06/21

SUPPLEMENTAL NO:

G17

XREF

STAMP

7.8 Driveway Width

Driveway width shall be measured at the curb and at the property line and shall adhere to the following chart:

Type of Development	Minimum	Maximum
• Single Family, incl. 3 Car Garage	3m	8m
• Multi-Family (Row Housing) Separate Driveways	3m	3.5m *
• Multi-Family (Row Housing) Shared Driveways	7m	8m
• Multi-Family (Apartment Blocks / Condo Units)	3.5m	8m
• Non-residential	3.5m	8m

* Row housing with double car garage for individual dwelling units can be allowed 8.0m wide driveway

7.9 Driveway Grades and Horizontal Alignment

- a) It is preferred that new driveways be aligned with existing opposing driveways, or be offset to the left of the existing opposing driveway in order to minimize left turn conflicts on the streets.
- b) No driveway shall be to the travelled portion of the road allowance at an angle of less than seventy degrees or more than 110 degrees.
- c) Driveways within the municipal right of way shall have a slope between 1% and 5% where sidewalks are to be installed. Otherwise, driveway shall have a slope between 1% and 7%.
- d) Grade beyond right of way shall not exceed 10%.
- e) Driveways for underground garages and loading bays, if heated, may have a maximum slope of up to 15%.

7.10 Driveway Setback, Spacing, & Offset from Intersections and Driveways

Chart below shows recommended (desirable) and minimum (required) values:

	Street Function Type where the driveway is located		Land Use Category		
			Single Family / Row Housing	Multi-family / Non-residential	
			Minimum	Recommended	Minimum
Setback From Intersections	Local		12m	20m	15m
	Collector	Unsignalized	n/a	20m	15m
		Signalized	n/a	30m	20m
	Arterial	Unsignalized	n/a	30m	25m
		Signalized	n/a	45m	30m
HAL		n/a	60m	45m	
Spacing Between Driveways	Local		2.4m	12m	9m
	Collector		n/a	n/a	n/a
	Arterial		n/a	n/a	n/a

No direct access to single family and duplexes or row housing will be permitted from Collector or Arterial streets. No direct access to multifamily and commercial/industrial properties will be permitted from Arterial streets. However, the City may allow direct access to an Arterial or Collector street if there is no other means of access.

7.11 Driveway Setback From Property Lines and Obstructions

- a) A minimum of 0.5m clearance must be provided to all obstructions, e.g. utility poles, hydrants.
- b) A minimum of 1.2m clearance must be provided to the side property lines (this may be relaxed in cul-de-sac bulbs to allow shared driveways within the City road allowance).
- c) Driveway aprons cannot cross the projection of the side lot lines where it intersects the surfaced edge of the road, except in the case of Cul De Sac properties.
- d) Driveways should be located outside of any underground utility connections.

7.12 Driveway Culverts

- a) In ditched right-of-ways, driveway culverts are required, other than at highpoints. All culverts shall be new; corrugated/ribbed steel, or HDPE (Boss 2000 or ADS SaniTite) pipe; diameter and length, slope to be

specified on the permit. Concrete culverts are to be used if cover is less than 300mm, or if CSP culvert is to be used, it must be capped with 1.2m wide, 150mm reinforced concrete.

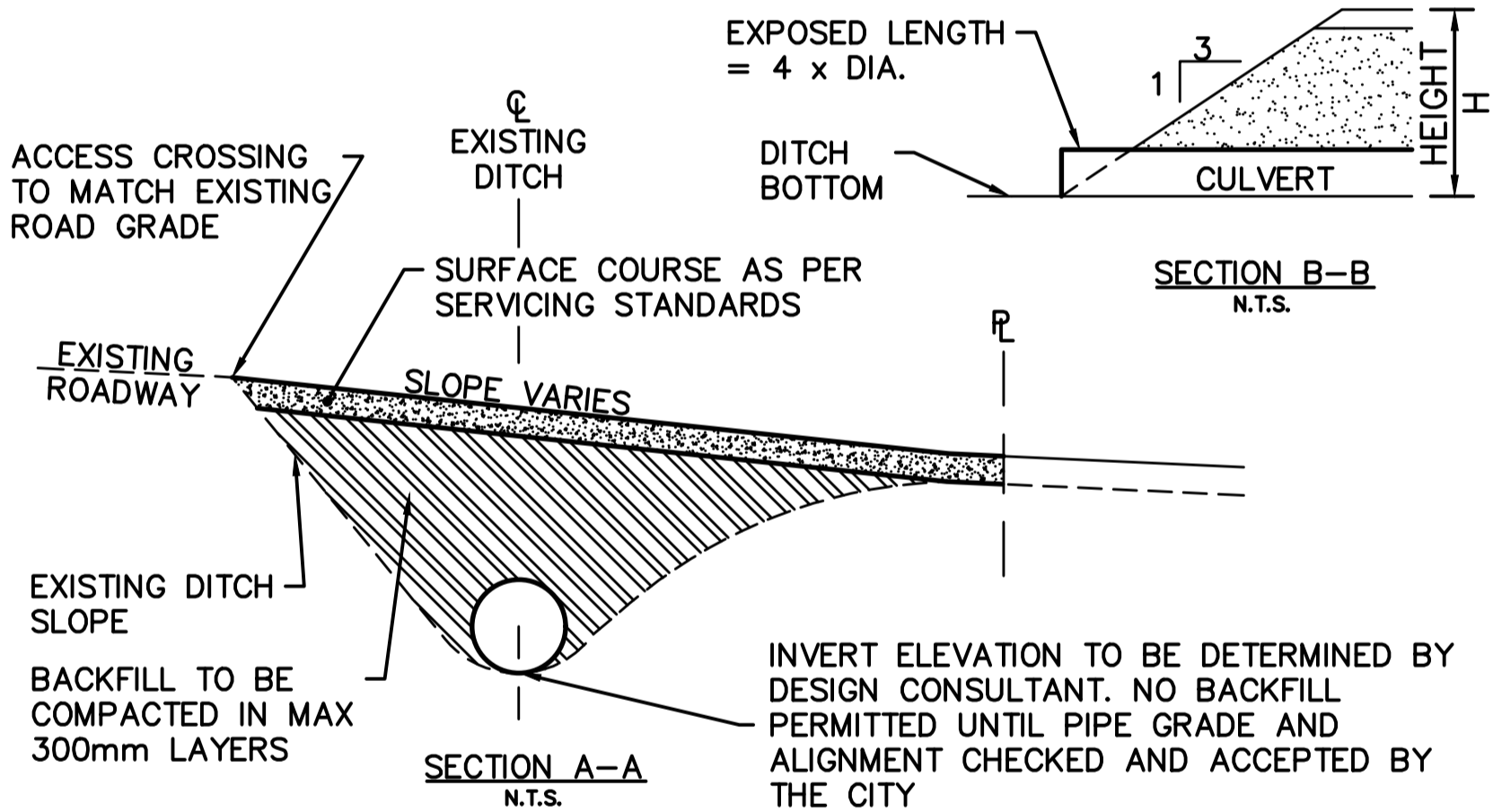
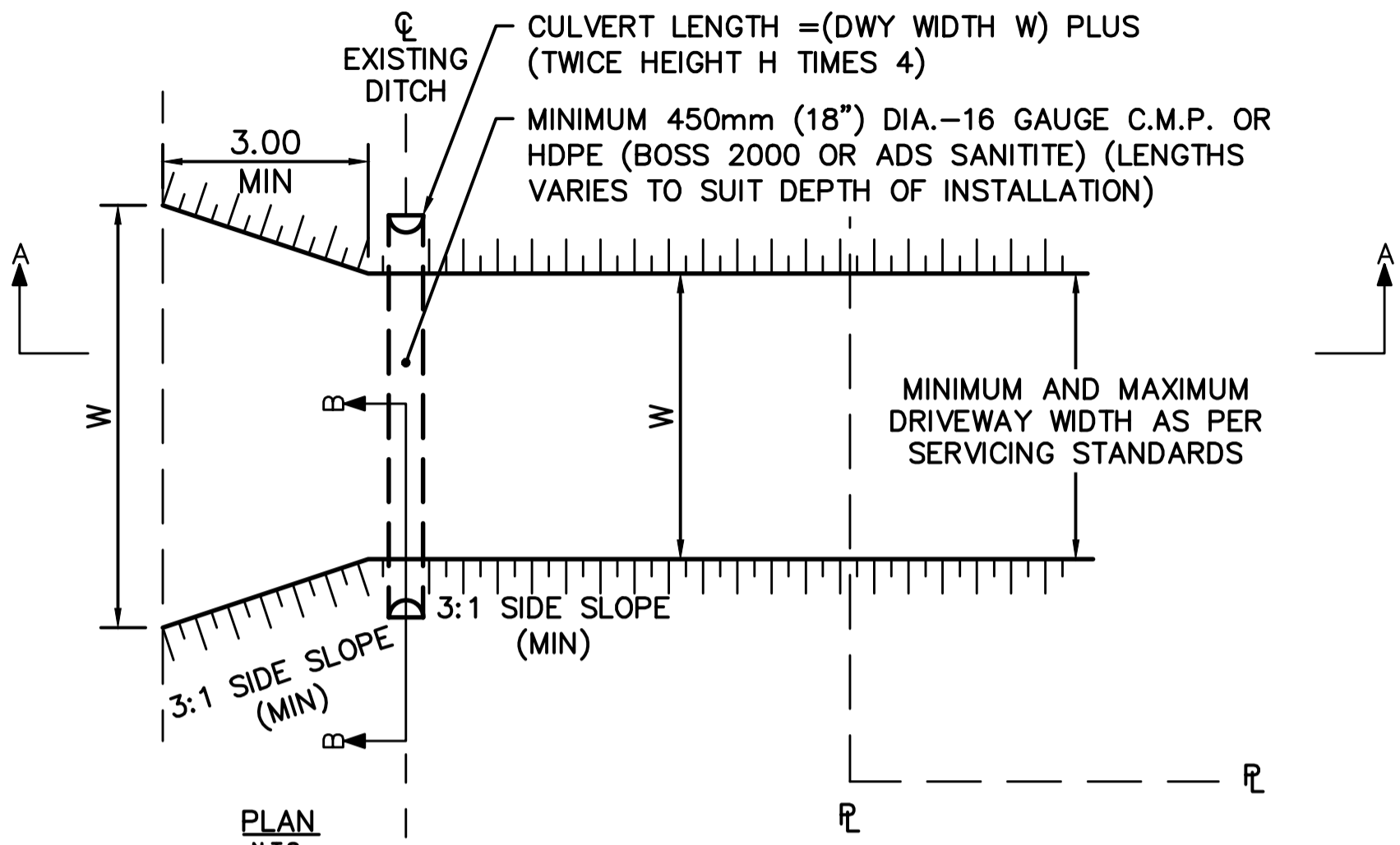
- b) Culverts shall be backfilled with a minimum cover of 300mm.
- c) Driveway sideslopes should be graded to a maximum of 3:1 from the entrance platform to the ends of the culvert invert at the bottom of the ditch with 100 mm topsoil and sodded. Headwalls will be approved at the City's discretion. Rip rap may be required at the City's discretion.

7.13 Driveway Surface, Materials, and Construction

- a) The driveway surface shall match or exceed the road surface it is connecting to within the City's right-of-way.
- b) Compacted granular base for a residential (rural) driveway within the right-of-way shall be minimum 150mm of gravel base course ('A' Base), or 19mm limestone crusher run.
- c) Compacted hotmix asphalt for a residential driveway shall be a min. 75mm, over a minimum of 150mm base course ('A' Base).
- d) Concrete driveways shall be a minimum thickness of 100mm.
- e) Paving stones (for residential driveways only) shall be placed over 30mm of levelling sand and 200mm base course ('A' Base).

7.14 Driveway Pairing

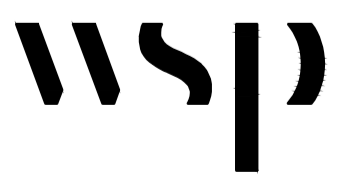
- a) Driveways should preferably be paired for properties with less than 15m of frontage to accommodate on-street parking.



GENERAL NOTES & ROAD SPECIFICATIONS

- AN IMPERVIOUS COMPACTED CLAY BEDDING SHALL BE PROVIDED AT BOTH ENDS OF CULVERT TO SEAL AGAINST SEEPAGE

METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

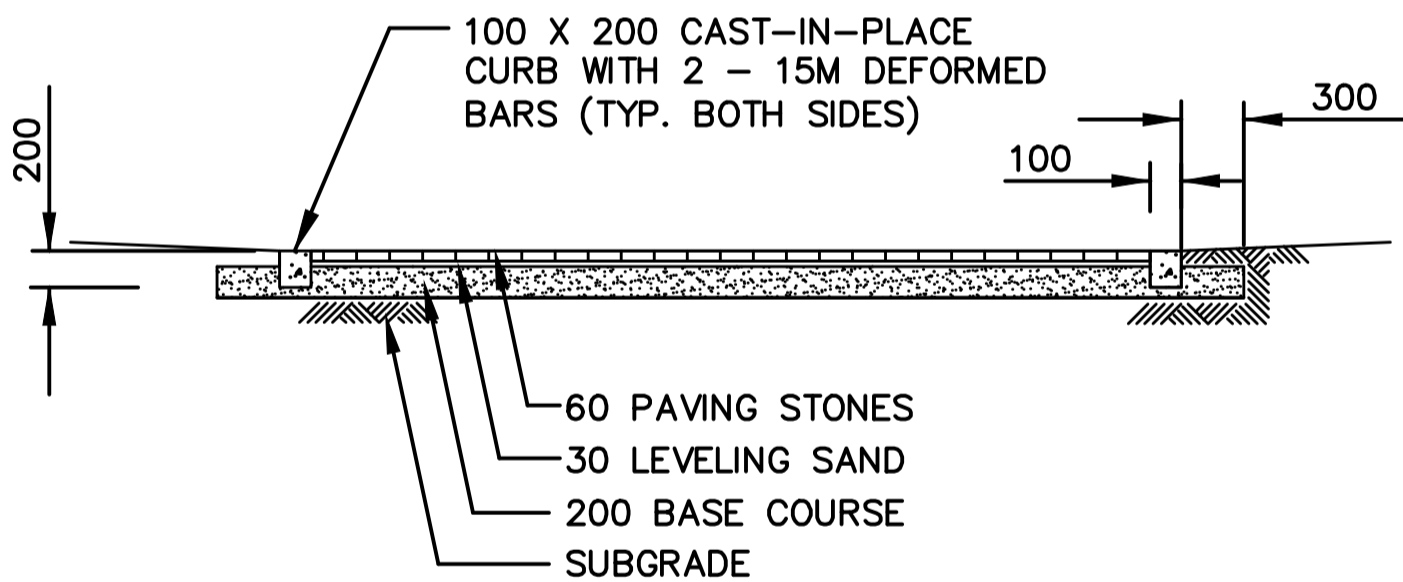
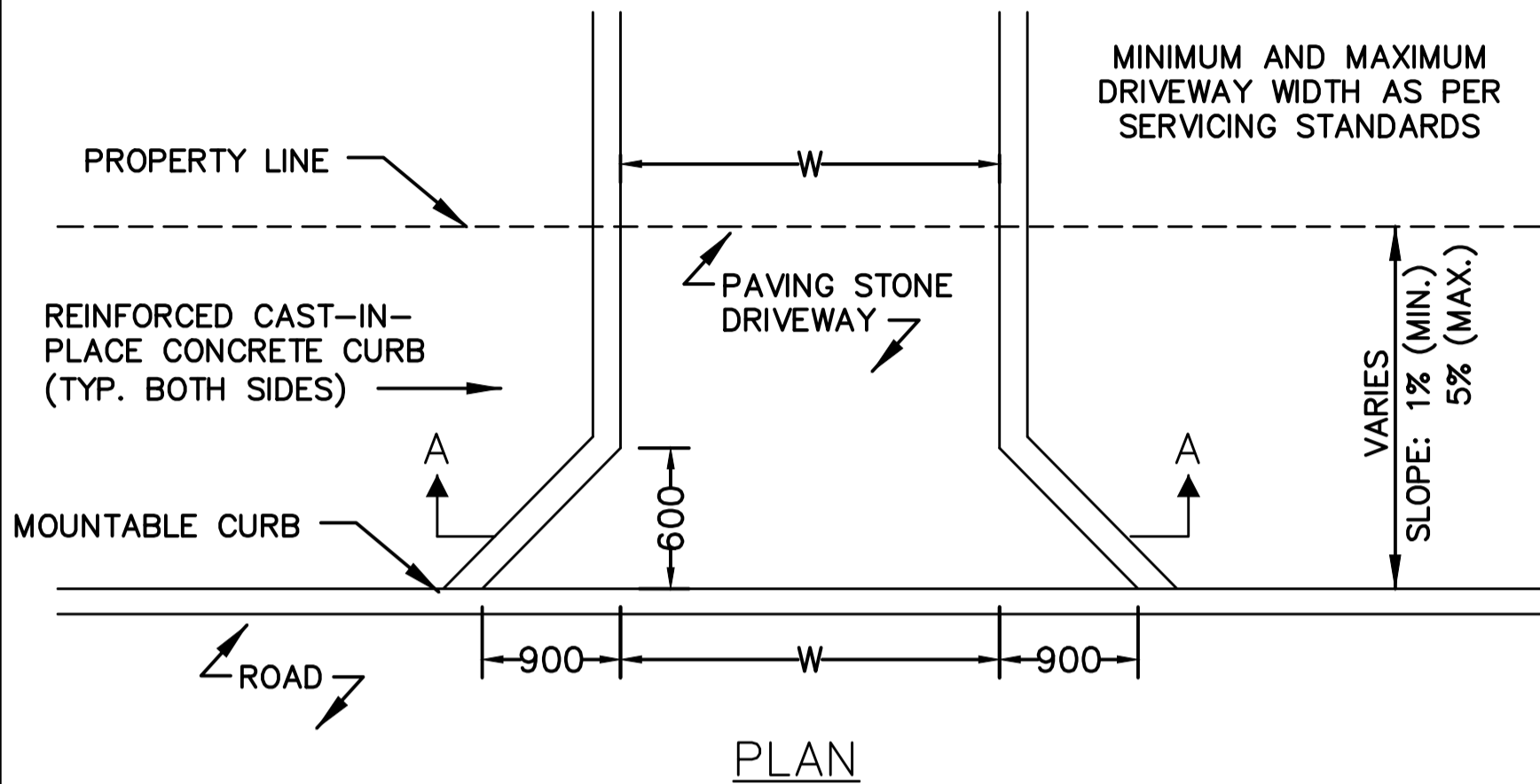


1600 BUFFALO PLACE
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PROJECT: CITY OF MORDEN		SUPPLEMENTAL: ADDENDUM: ADD_# <input checked="" type="checkbox"/> DIRECTIVE: DIR_# <input checked="" type="checkbox"/> CHANGE ORDER: CHG_# <input checked="" type="checkbox"/>
TITLE: GRAVEL (RURAL) DRIVEWAY APPROACH		REVISION: REV_#
DRAWN BY: M.P.M.	SCALE: N.T.S.	DATE: 2023/06/21
CHECKED BY: M.P.M.	PROJECT NO: 221-07026-00	SUPPLEMENTAL NO: G18

YREF

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NOTE:

PAVING STONE TO BE INSTALLED ONLY ON RESIDENTIAL DRIVEWAYS

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



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PROJECT:

CITY OF MORDEN

TITLE:

PAVING STONE DRIVEWAY
APPROACH

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SCALE:

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M.P.M.

PROJECT NO:

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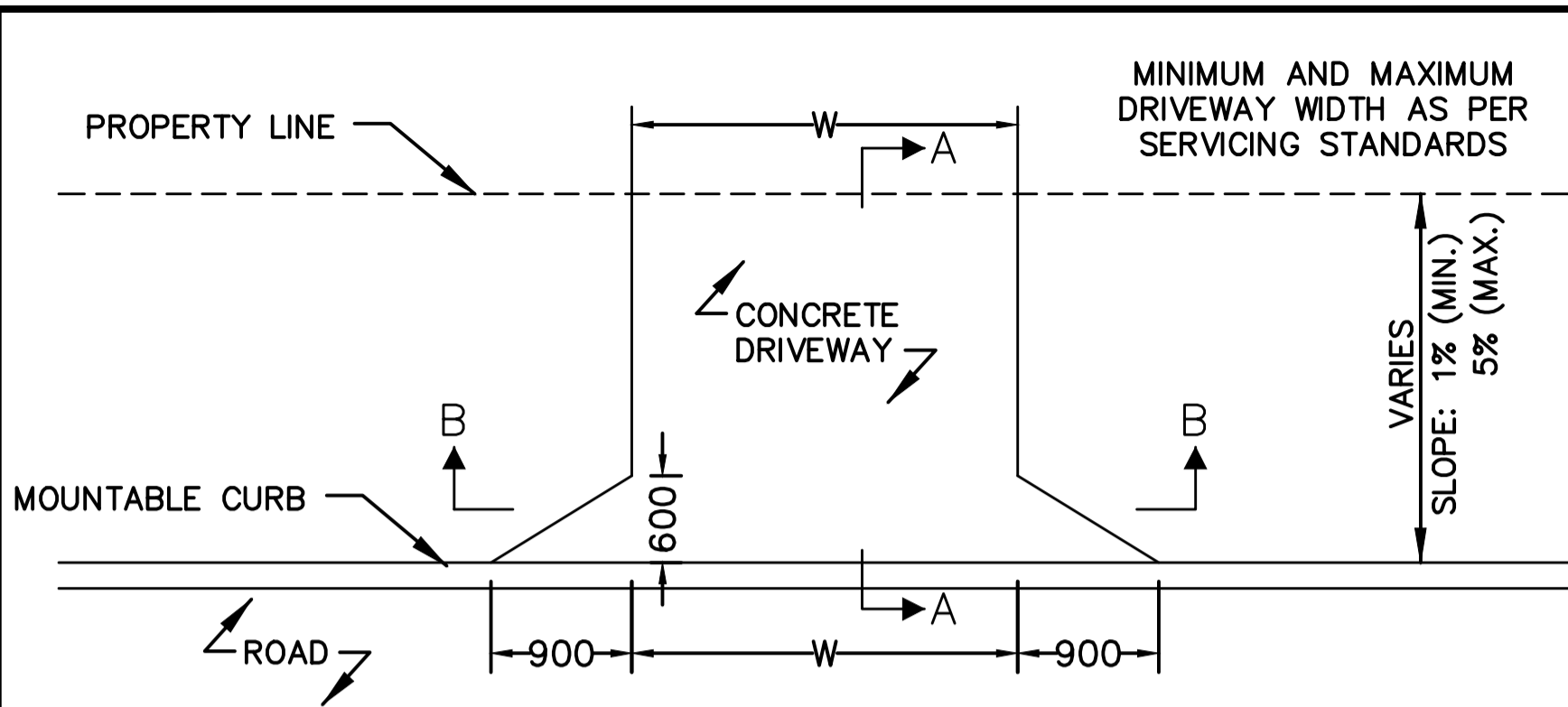
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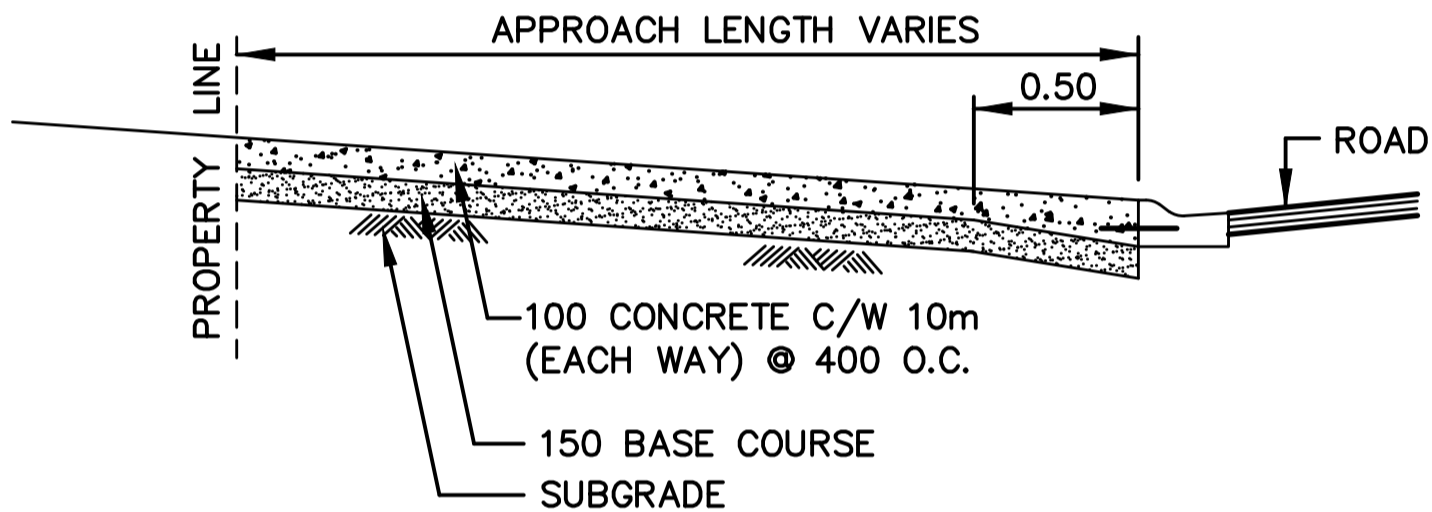
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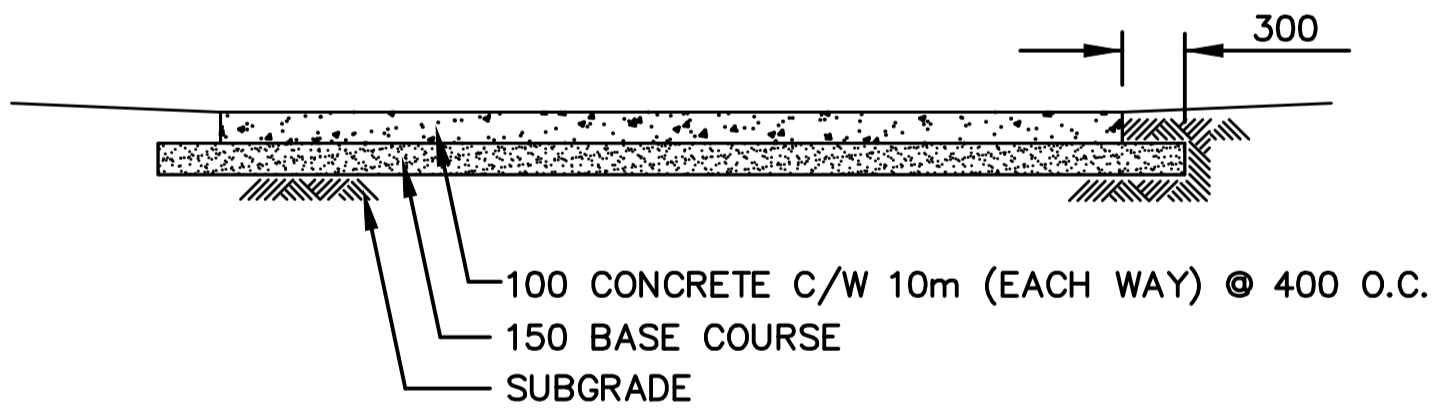
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PLAN



SECTION A-A



SECTION B-B

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

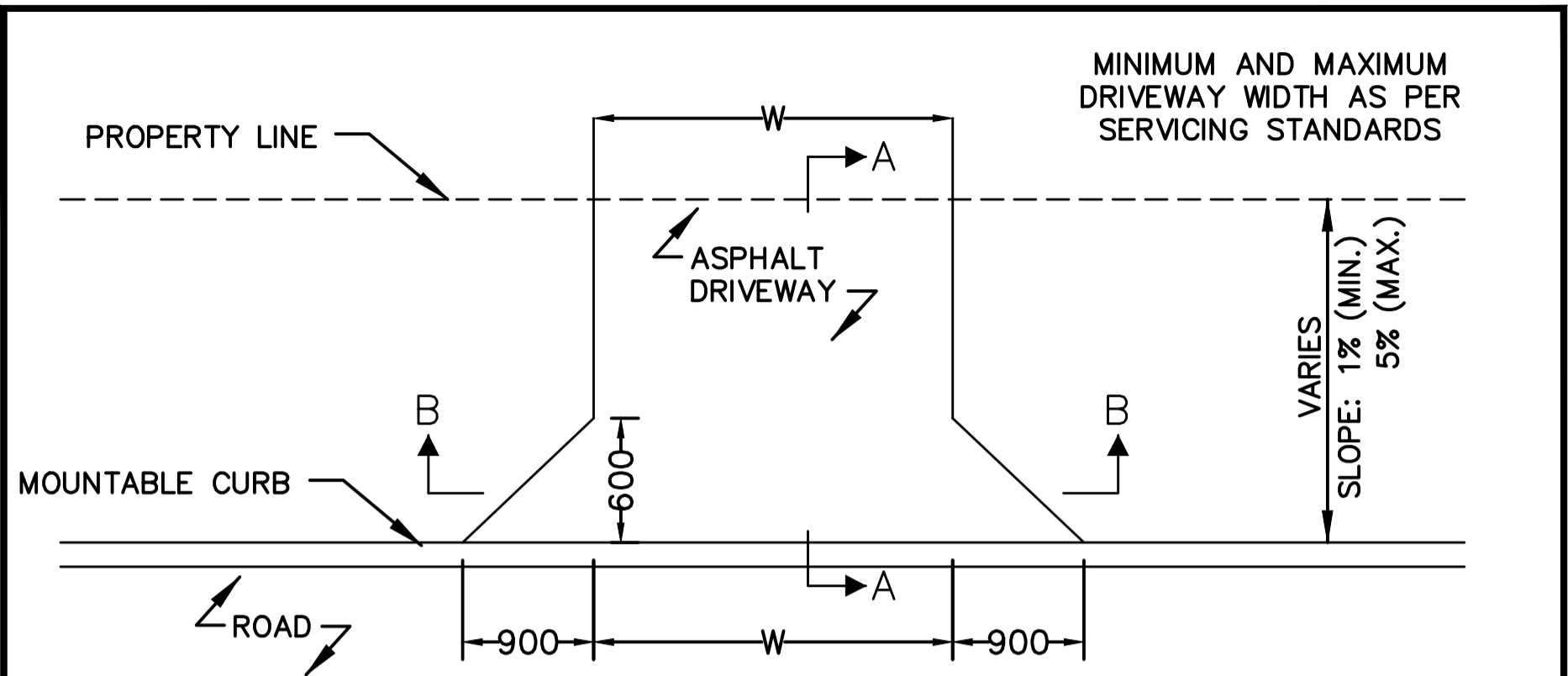


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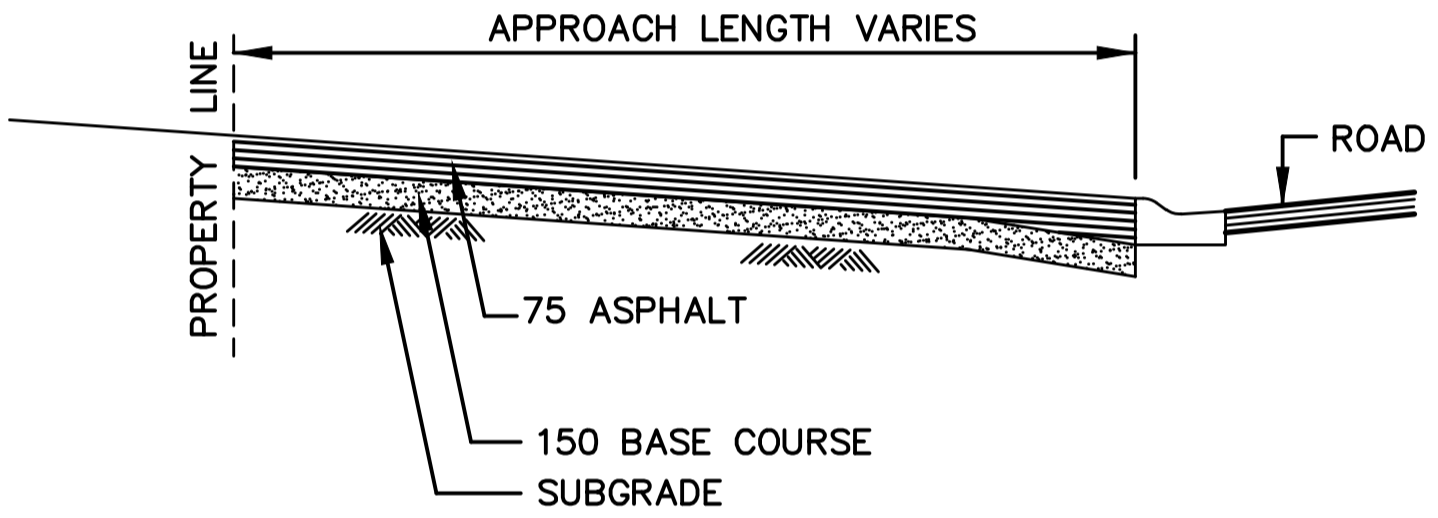
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DRAWN BY: M.P.M.	SCALE: N.T.S.	DATE: 2023/06/21
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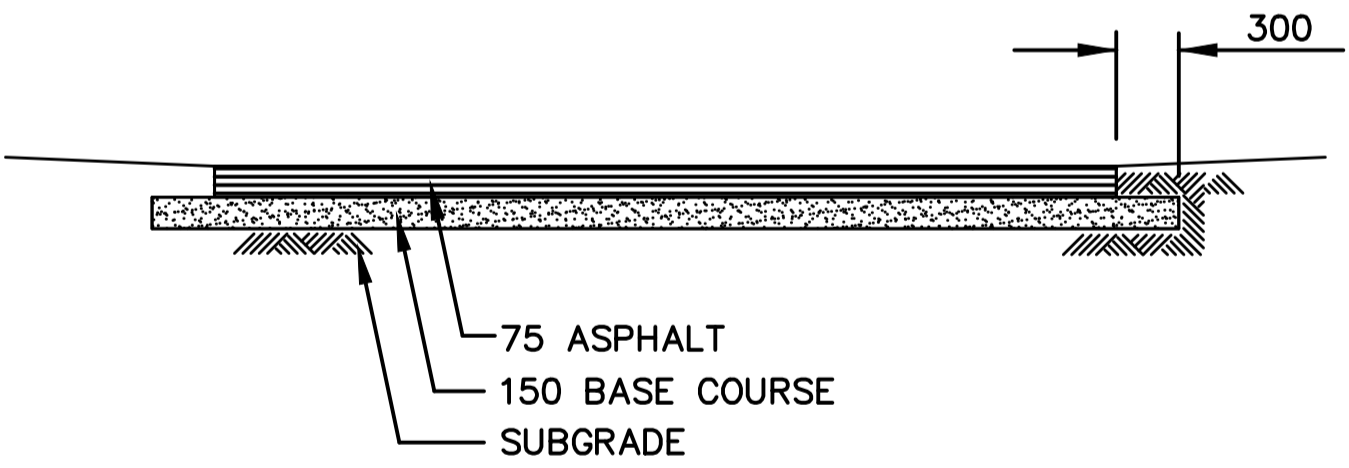
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PLAN



SECTION A-A



SECTION B-B

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



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

PROJECT: CITY OF MORDEN		SUPPLEMENTAL: ADDENDUM: ADD_# <input checked="" type="checkbox"/> DIRECTIVE: DIR_# <input checked="" type="checkbox"/> CHANGE ORDER: CHG_# <input checked="" type="checkbox"/>
TITLE: ASPHALT DRIVEWAY APPROACH		REVISION: REV_#
DRAWN BY: M.P.M.	SCALE: N.T.S.	DATE: 2023/06/21
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8.0 SIDEWALKS / MULTI-USE PATHS

8.1 Design

All construction methods and materials shall conform to the City of Winnipeg Standard Construction methods, most recent edition, with any exceptions being specifically outlined herein.

Sidewalks shall be required as follows:

- On one side of the street for all residential local roads
- Sidewalks are not required around cul-de-sacs.

Multi-Use Path shall be required as follows:

- On one side of the street for minor collector roads, major collector and industrial local roads, as a minimum, and an additional sidewalk on the opposite side if indicated in the development agreement
- Multi-use paths are not required around cul-de-sacs.

Sidewalks shall be constructed with concrete. Sidewalks shall be 1.8 meters wide and have a minimum crossfall of 2% toward the roadway. Any silty or otherwise unsuitable subgrade material shall be excavated and removed, and then replaced with suitable compacted subbase.

Concrete sidewalks shall consist of 100 mm thick concrete over 150 mm of compacted base course, with geotextile over a compacted subgrade. Compaction of subgrade and base course shall be accomplished using mechanical equipment. The base course shall be compacted to 98% Proctor.

The base course shall extend 150mm on either side of the sidewalk. A 5mm wide, and 35mm deep transverse joint shall be provided every 1.5 meters. A 15mm wide asphalt impregnated fiberboard filled joint shall be provided where sidewalks abut roadways or driveways.

Concrete sidewalks shall require repair or replacement if two or more of the following conditions exist for new sidewalks at the end of the maintenance period:

- a) If the sidewalk has a displacement/step of 19 mm or greater between any two sections of sidewalk at the saw/connection joints.
- b) If the sidewalk has a crack more than 5 mm in width.
- c) If any section of sidewalk is tilted more than 60 mm from edge to edge.
- d) If in any 1.5 m section of sidewalk has more than 50% of the surface scaled off to a depth of 5 mm or greater.

- e) If the sidewalk settled to a point that would allow water to pond to a depth of 19 mm or more.
- f) If a portion of the sidewalk is moved or damaged as a result of utility work.

Multi-use paths shall be constructed with an asphalt surface, unless otherwise specified in the development agreement. Paths shall be 3.0 meters wide and have a minimum crossfall of 2% toward the roadway. Any silty or otherwise unsuitable subgrade material shall be excavated and removed, and then replaced with suitable compacted subbase.

Multi-use paths shall consist of 75 mm thick asphalt over 200 mm of compacted base course, with geotextile over a compacted subgrade. Base course shall be compacted to 98% Proctor. Compaction testing requirements shall be the same as for an asphalt road surface.

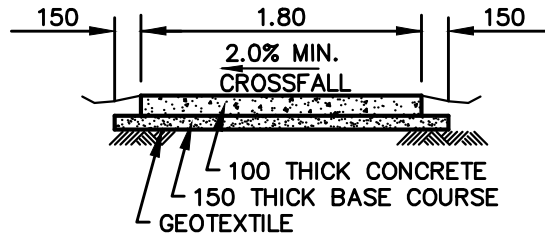
Typical details for Sidewalk / Multi-Use paths are provided in **Drawing G22**.

8.2 Detectable Warning Tiles

Install detectable warning surface tiles at all four corners of intersections within the project limits for new construction and reconstruction projects.

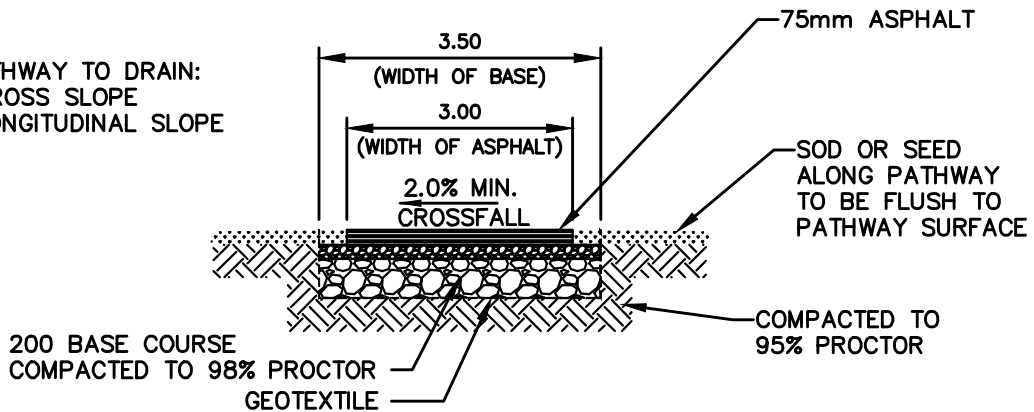
Detectable warning surface tiles shall be Safety Yellow. Tiles shall be cast in place type with ribs (anchored type is not allowed). Truncated domes on detectable warning tiles shall be in accordance with ADA Accessibility Guidelines (ADAAG). Domes shall be on a square grid (in line pattern). Detectable warning surface tile shall be 610mm x 1220mm cast in place.

All construction methods, placement, and materials shall conform to the City of Winnipeg Standard Construction Specifications, Section CW 3326.



TYPICAL CONCRETE SIDEWALK CROSS SECTION

NOTE:
 GRADE PATHWAY TO DRAIN:
 MAX 2% CROSS SLOPE
 MAX 5% LONGITUDINAL SLOPE



TYPICAL MULTI-USE PATH CROSS-SECTION

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
 DECIMALIZED NUMBERS INDICATE METRES



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PROJECT: CITY OF MORDEN		SUPPLEMENTAL: ADD.# <input checked="" type="checkbox"/> DIR.# <input checked="" type="checkbox"/> CHANGE ORDER: CHG.# <input checked="" type="checkbox"/>
TITLE: SWALE AND MULTI-USE PATHS		REVISION: REV.#
DRAWN BY: M.P.M.	SCALE: N.T.S.	DATE: 2022/11/24
CHECKED BY: M.P.M.	PROJECT NO: 221-07026-00	SUPPLEMENTAL NO: G22

9.0 CONCRETE

Concrete shall conform to the following:

	<u>Curb & Gutter, Bullnoses & Pavement</u>	<u>Sidewalks, Medians & Concrete Swales</u>
Compressive strength (28 day)	4640 psi (32 MPa)	4350 psi (30 MPa)
Minimum cement Content	575 lb/cu.ft. (335 kg/m ³)	(same)
Maximum / water cement ratio	0.49:1	(same)
Maximum slump	80 mm	100 mm
Aggregate size (normal)	20 mm	(same)
Air content	5 - 7%	(same)
Cement type	CSA A5-M Type 10	(same)
Air entraining agent	CSA A266-1-M	(same)
Water reducing agent	CSA A266-2-M	(same)
Joint sealer	ASTM D1751	-
Reinforcing steel	CSA G30.12M	-
Reinforcing mat	Grade 40 bars	-
Curing compound	CGAB 90-GP-Ia	-

10.0 OTHER UTILITIES

10.1 Hydro and Telephone

Manitoba Hydro, Bell/MTS, and Valley Fiber services shall be underground type for all urban developments. 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.

Submitted plans for approval by the City for servicing shall include pole and light standard locations with offset distances from the property line in accordance with **Drawings G08 – G11** of these specifications. The plans are to indicate pole height, deep set (DS), and proposed depth of DS poles, and must be clearly marked. The plans are also to indicate conduit locations with offset distances from the property line.

10.2 Street Lighting

Street lighting shall be ornamental with LED type luminaires. A street lighting unit shall be located at each roadway intersection and at each road bend in excess of 45 degrees, as well as the following spacing:

- For residential subdivisions or pathways with Post-Top BM Colonial light standards maximum spacing shall be 30 meters with a 4.7m pole.
- For residential subdivisions or pathways with Post-Top BM Contemporary light standards maximum spacing shall be 40 meters with a 6.1m pole.
- For residential subdivisions with Straight Shaft light standards maximum spacing shall be 50 meters with a 9.1m pole.

10.3 Road Signs

The Developer shall supply and install all road signs (traffic control and street signs), in accordance with the Manitoba Transportation and Infrastructure requirements, and as authorized by the City. Signs shall be high intensity grade. Unless otherwise specified by the City, all signs shall be mounted on 50 mm x 50 mm x 3.65 meter 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 City.

Setback of the signs from the back of curb and travelled lanes of major road shall be as specified in the TAC Manual of Uniform Traffic Control Devices for Canada (Figure A2-1), latest edition.

10.4 Mailbox Pads

Concrete pads for community mailboxes shall be provided as per the requirements of Canada Post.

11.0 BOULEVARD AND LOT GRADING

11.1 Boulevards

Boulevards shall be graded with positive slope from the front property line to the edge of road subsequent to utility and road construction (min. 2%, max. 5% crossfall where there are sidewalks, or maximum 7% if there is no sidewalk).

All boulevards, except where there is a private driveway, shall be finished with topsoil and seed. If any other landscaping is placed on the boulevards, such as rocks, stones, paving stones, edgings, etc., and the City is required to undertake any maintenance operations on the boulevards, restoration by the City will be limited to seeded grass. Topsoil and seeding shall be placed as per the Landscape Specifications.

11.2 Lots

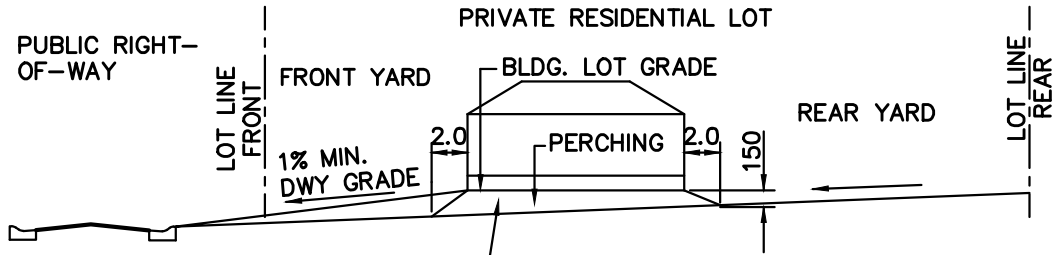
Lots (meaning all properties beyond the road right-of-ways) shall be rough graded to provide positive drainage, prior to Substantial Completion of the surface works. However, all lot swales and the front property line, and all areas of the lot within 4.0 meters of the front property, shall be graded 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 left rough graded to permit the ponding of water within the lots. Fine grading shall be the responsibility of the homeowner / house builder. Finish elevations shall ensure adequate drainage away from buildings toward drainage ditches, or gutters, 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.

11.2.1 Urban Lots

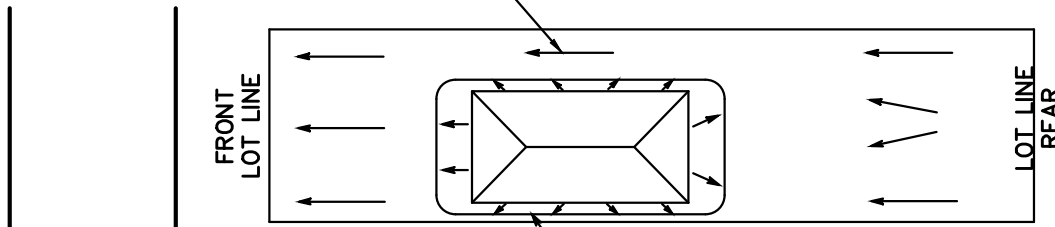
Houses shall be "perched" with a minimum 150 mm berm around the foundation, and 1.5% min., 4% max (unless otherwise approved by the City for walk out basements), grade along the lot line to the gutter. All lot grading shall be sloped back to front, or split lot, where the back of the lot drains to either a road, lane or public reserve, or a swale. Minimum longitudinal grade for rear lot swales shall be 0.15%, however if the rear lot swale discharges into a side lot swale, the minimum longitudinal grade of the side lot swale shall be 0.25%. Typical lot grading criteria is shown as **Drawing G23 and G24**.

RESIDENTIAL BACK TO FRONT LOT DRAINAGE



1.5% RECOMMENDED
MIN. ALONG LOT LINE
OR AS SHOWN

ELEVATION



ALL DRAINAGE TO BE DIRECTED
AWAY FROM HOUSE FOUNDATION

PLAN

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 - 1.5% RECOMMENDED (MIN.)



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PROJECT:

CITY OF MORDEN

TITLE:

RESIDENTIAL BACK TO FRONT LOT DRAINAGE

DRAWN BY:

M.P.M.

SCALE:

N.T.S.

CHECKED BY:

M.P.M.

PROJECT NO:

221-07026-00

SUPPLEMENTAL:

ADDENDUM:

ADD_#

DIRECTIVE:

DIR_#

CHANGE ORDER:

CHG_#

REVISION:

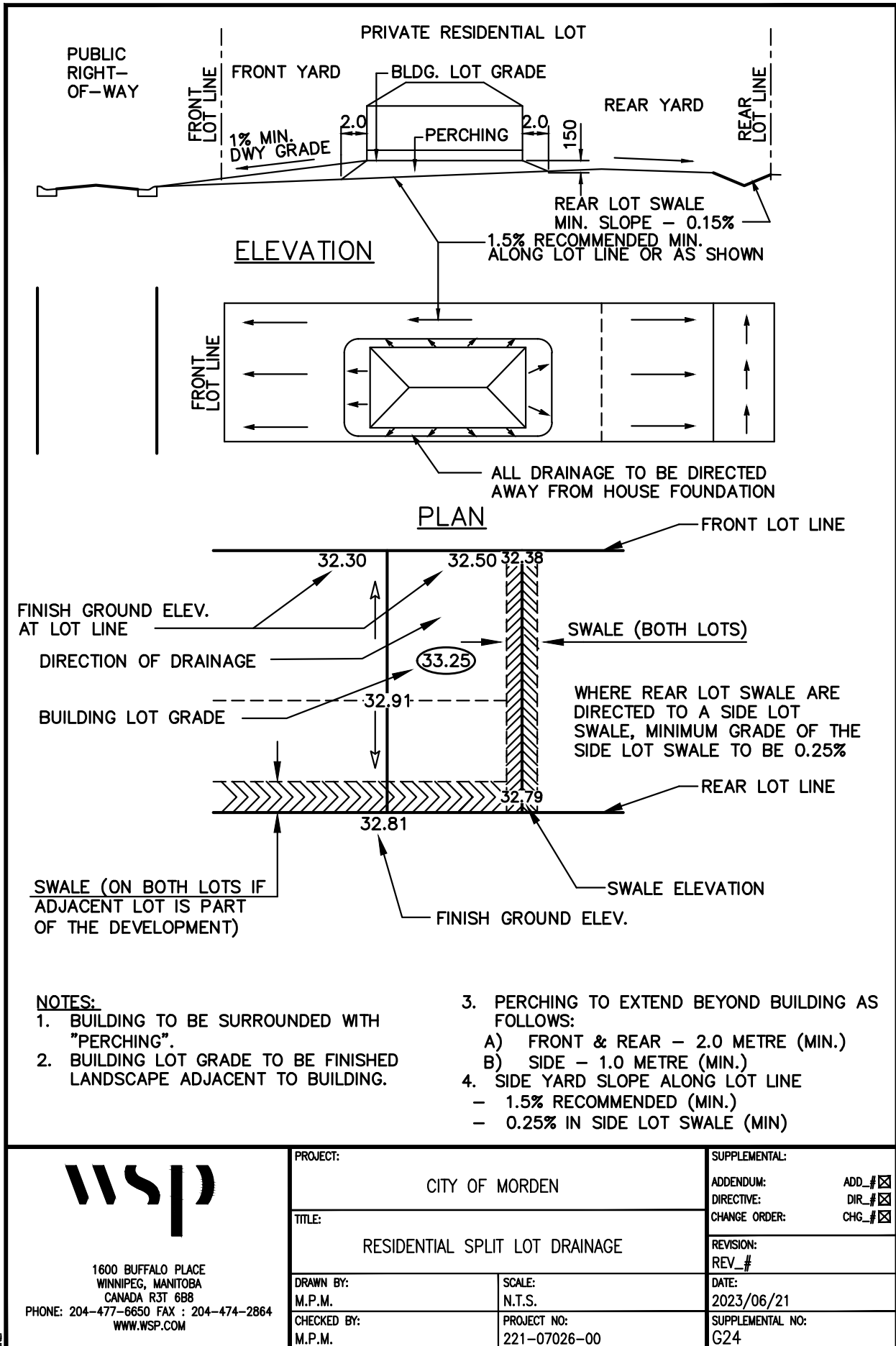
REV_#

DATE:

2023/06/21

SUPPLEMENTAL NO:

G23



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
 - 1.5% RECOMMENDED (MIN.)
 - 0.25% IN SIDE LOT SWALE (MIN)



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PROJECT: CITY OF MORDEN		SUPPLEMENTAL:	
TITLE: RESIDENTIAL SPLIT LOT DRAINAGE		ADDENDUM: <input checked="" type="checkbox"/>	DIR.# <input checked="" type="checkbox"/>
DRAWN BY: M.P.M.		CHANGE ORDER: <input checked="" type="checkbox"/>	CHG.# <input checked="" type="checkbox"/>
CHECKED BY: M.P.M.		REVISION: REV.#	DATE: 2023/06/21
SCALE: N.T.S.		SUPPLEMENTAL NO: G24	
PROJECT NO: 221-07026-00			

XREF

STAMP

12.0 PARKS AND PUBLIC RESERVE

Please refer to the City of Morden Landscaping Specifications and Public Reserve Policy.

13.0 QUALITY ASSURANCE

13.1 Installation

All public works shall be installed to recognized engineering standards (City of Winnipeg, Manitoba Water Services Board, Manitoba Transportation and Infrastructure, AWWA, ASTM, etc.) and to the recommendations of the respective manufacturer or supplier of materials. Each section of the servicing standards indicates the third party specifications that are applicable. All piping works shall be bedded, laid, joined, and backfilled 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.

13.2 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. Watermains shall be disinfected, and bacteriological testing completed as per MWSB requirements. Where watermains and forcemains are installed by directional drill methods, and are more than 1500 meters in length, they shall be swab bed. 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 coding report and video recording of the testing being provided on a USB stick for review by the City. All water used for aforementioned operations shall be metered and purchased from the City.

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 meters. For asphalt, Marshall Analysis shall be performed, and cores shall be taken every 75 meters to confirm compaction and thickness. Concrete pavement and curbs shall be tested in accordance with applicable City of Winnipeg specifications as Type 2 concrete.

To ensure quality, there shall be on the site, regularly or periodic during the construction, the registered professional engineer who was responsible for the design, or an authorized representative of that engineer. The City shall also provide a designated representative to perform periodic site reviews.

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 City.

13.3 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.

14.0 PLANS

14.1 Preliminary Documents

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

- All plans shall be prepared in electronic format using AutoCAD software, or approved equal, and submitted in hard copy. Minimum scale for base plans shall be 1:1000, and minimum scale for detail plans shall be 1:500.
- 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 or the City drainage system 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, M.T.I., Office of Drinking Water, Manitoba Sustainable Development, etc.).
- Existing topography of area.

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

14.2 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. Two sets of such plans shall be submitted to the City Engineer within six months of substantial completion of the work, as well as a .pdf and .dxf electronic files. All plans shall be geo-referenced.

14.3 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 (2) years**, extending from the date of total performance of the Work as certified by the design engineer with the consent of the City Engineer. City Engineer, or his/her 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.