FUNCTIONAL SERVICING REPORT

Residential Development

242 West Side Road (Highway 58)
Port Colborne, Ontario

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242 West Side Road
Port Colborne, Ontario

FUNCTIONAL SERVICING REPORT

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Drawing: 22138-CSS Conceptual Site Servicing

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Appendix A: Fire Flow Calculations
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1.0 Introduction

This functional servicing report (FSR) serves to demonstrate how servicing of the subject development can be appropriately achieved and to provide a basis for detailed engineering. This FSR will discuss the following key aspects of municipal design:

- Water Supply and Distribution
- Sanitary Sewerage
- Drainage and Stormwater Management
- Roadway
- Utility Servicing
- Servicing Locations

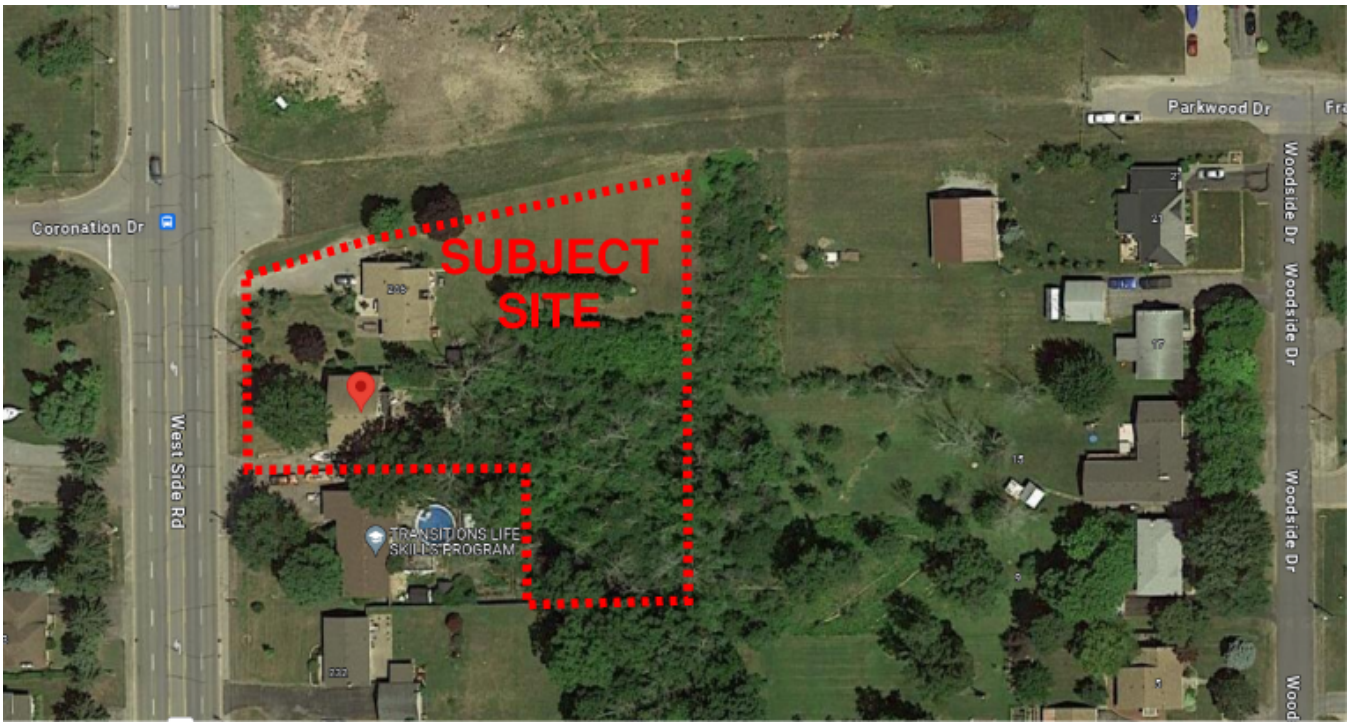
2.0 Background

The subject lands are located on the east side of West Side Road and south side of the Franklin Ave. road allowance.

The total area of the parcel is 0.567 hectares. The site has been used as two single family detached homes and is now under one ownership. The existing homes will be demolished and a new 8-storey residential apartment building is proposed. The first floor will be used as parking area and the other 7 floors will used for residential purposes. Each residential floor will have sixteen (16) units for a total of 112 dwelling units, consisting of 70 2-bedroom units, 28 1-bedroom units and 14 bachelor units.

A conceptual site servicing plan, 22138-CSS, is shown in *Attachments.* An aerial map showing the subject property with aerial imagery from 2018 is found in Figure 1 on the following page.

Figure 1 Aerial Map of the Site



3.0 Water Supply and Distribution

Water supply will be taken from a municipal 300mm-diameter PVC (polyvinyl chloride) watermain on West Side Road at Franklin Ave.

There is an existing fire hydrant at the southwest corner of West Side Rd/Coronation Dr. (across from Franklin Ave.) across West Side Rd. from the subject site. In accordance with City requirements, a new hydrant is proposed on the south side of Franklin Ave. adjacent to the site, in order to provide adequate fire protection to satisfy Ontario Building Code requirements. The new hydrant will be well within 45m of the proposed fire department connection at the building.

Domestic water demand shall cater for the new residential units on the subject property.

Domestic water demand is based on the typical design criteria of 300 L/capita/day and occupancy of 2.28 persons per dwelling unit (see Table 3.1). This yields a max. hour domestic water demand of 4.8 L/s (see Table 3.2).

Table 3.1 Water Demand Criteria

Design Criteria:	300	L/cap/day residential and employment demand (Niagara Region, 2016 MSP)
	2.28	persons/household (Niagara Official Plan Table 4-1)
	0.75	m^2/seat assembly space (OBC, Table 3.1.17.1)
	36	L/seat/day demand for assembly hall w/ food service (OBC, Table 8.2.1.3.B Sewage)
	75	L/9.3m^2/day for office building (OBC, Table 8.2.1.3.B Sewage)
	1.1	m^2/seat for dining areas (OBC, Table 3.1.17.1)
	250	L/bedspace/day demand (OBC, Table 8.2.1.3.B Sewage)
	200	L/bedspace/day, commercial laundry (OBC, deductive method Table 8.2.1.3.B Sewage)
	5,000	L/1,000m^2/day shopping demand (MOECC Design Guideline DWS Table 3-2)
	60	L/seat/day, paper service restaurant (OBC, Table 8.2.1.3.B Sewage)
	125	L/seat/day, non-24hr restaurant (OBC, Table 8.2.1.3.B Sewage)
Assumptions:	2.4	occupied bed-spaces per room (industry statistic)
	35	L/m^2/day, annual production of 1 bbl (31gal) per sq.ft * 10 usage factor (industry statistic)
	40%	of restaurant gross floor space reserved for patron seating
Peaking Factors:	3.6	Max Day Peaking Factor (MOECC Design Guideline DWS Table 3-3)
	5.4	Max Hour Peaking Factor (MOECC Design Guideline DWS Table 3-3)

Table 3.2 Water Demand

WATER DEMAND ANALYSIS

242 West Side Road
Port Colborne

2024-01-31

	Building	Footprint m^2	Habitable Storeys	Gross Area m^2	Suites/Units	Population	Patron Seats	Bed Spaces	POTABLE DEMAND Avg. Daily Demand m^3	POTABLE DEMAND Max. Day Demand L/s	POTABLE DEMAND Max. Hour Demand L/s	FIRE DEMAND USGPM	FIRE DEMAND (L/sec)
1	Residential	1,590	7	11,130	112	*255*			76.6	3.19	4.79	960	59.9
SUM LINE		1,590		11,130		255	0	0	76.6	**3.2**	**4.8**	**960**	**60**

Max Hour = **4.8 L/s**
Max Day + Fire = **63.1 L/s**

Comments
Building assumed to be sprinklered with fire resistive construction

Utilizing a 150mm-diameter PVC watermain connected to the 300mm-diameter watermain at West Side Rd/Franklin Ave intersection, and assuming a water meter pressure loss of 3.0psi, worst-case dynamic headloss is anticipated to be approximately 7.5 psi (using C=130) using conservative node assignment. This degree of pressure loss is acceptable.

The development site is located within the Region's 223m pressure zone fed by Port Colborne Water Treatment Plant. The design elevation of the finished building floor is expected to be approximately 181.5 metre for the first floor. The static pressure is estimated at an average of 60 psi at the site. The Niagara Region Master Servicing Plan estimates existing peak hour pressures near 60psi for this area also.

Initial Estimate of Required Fire Flow:

Formula: F = 220 * C * SQRT (A)
F = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 for wood frame construction (structure essentially all combustible)
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
= 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls)
= 0.6 for fire resistive construction (fully protected frame, floor, roof)

A = the total floor area in square metres (include all storeys but not basements at least 50% below grade)
* for fire resistive buildings, consider the two (2) largest adjoining floors plus 50% of each of any floors immediately above them up to eight (8), when the vertical openings are inadequately protected. If the vertical openings and exterior vertical communications are properly protected (one hour rating), consider only the area of the largest floor plus 25% of each of the two (2) immediately adjoining floors.

In order to determine the total Design Water Demand, Fire Flow Demand has been estimated as per the Fire Underwriters Survey (FUS). It has been assumed that the building will be sprinklered with fire resistive construction and vertical openings properly protected. The Required Fire Flow Demand has been estimated to be 3,591 L/min (59.9 L/s or 960 USgpm) for the building (see Appendix for calculations).

Design parameters for water supply and distribution are outlined in the table below:

Population Density	2.28 persons/unit
Design Demand Method	300 L/cap/day
No. of Dwelling Units	112
Total Design Population	255
Fire Flow Min. Residual Pressure	20 psi (14.1m head)
Max-Hour Minimum Residual Pressure	40 psi (28.2m head)
Hazen-Williams 'C' Value	130
Design Pipe Specification	150mmØ PVC

The two nearby hydrants are colour-coded NFPA 'light blue' which indicates a flow of 1500 USgpm (95 L/s) or greater can be delivered at, or above, minimum residual pressure. Given this, water supply for fire protection is anticipated to be adequate.

4.0 Sanitary Sewerage

Sanitary flows will be collected from the building through a 150mm lateral service and conveyed to a new manhole on the property. The manhole will outlet to the existing 250mm sanitary sewer on West Side Road.

Key design data for sanitary sewage servicing is as follows:

Table 4.1 Sanitary Design Parameters

No. of Dwelling Units	112
Population Density	2.28 persons/unit
Total Design Population	255 persons
Peaking Factor	Harmon
Mean sewage flow	300 L/cap/day
Sewage shed area (total)	0.57 ha
Manning's 'n'	0.013
Infiltration Rate	0.286 L/ha•s

From the above, we estimate the peak sewage flow at 3.91 L/s, compared to an estimated existing peak flow of 0.24 L/s from the detached homes. Therefore, the additional flow to be added is 3.67 L/s. It is noted that the capacity of the receiving sewer, 250mm diameter PVC Pipe with a slope of 0.34% based on City drawings, is 34.6 L/s. This additional flow represents 10.6% of the sewer's capacity (assuming unsurcharged operation).

We expect that there will be no impediments to sanitary sewer servicing for the development using currently existing municipal sewage works.

5.0 Drainage and Stormwater Management

Review of topographical data shows that the existing lots drain overland by split drainage with the front yards draining toward the road and the rear yards draining primarily toward the east onto the unopened road allowance.

Pre-Consultation comments from City staff require that any storm sewers should be designed to convey the 5-year storm event, and that the 100-year post-development runoff shall be controlled to the allotted capacity of the storm sewer, or, if the capacity is unknown, to the 5-year pre-development peak flow.

The synthetic 3-hr Chicago Storm Distribution is used for preliminary conceptual modelling with precipitation based on the nearby Buffalo rainfall data, provided by the City of Port Colborne.

Chicago Storm Rainfall Intensity Equation:

$$I = a/(b+t)^c$$

Where: I = rainfall intensity

t= time

a, b,c unitless coefficients

The Coefficient numbers have been generated for the 5, 10, 25, 50, and 100-year design storm events derived using the IDF curves as well as the return period Rainfall Amounts. All flows are modeled using the 3-hour Chicago Storm event, which is typically used in urban areas and is representative of high intensity summer convective storms. Key parameters are summarized in Table 5.1 below.

Table 5.1: City of Port Colborne 3-Hour Chicago Design Storm Parameters

Return Period (year)	Defining Parameters*		
	a	b	c
5	722.830	6.180	0.762
10	795.086	6.069	0.749
25	883.040	5.618	0.733
50	966.970	5.621	0.729
100	1043.560	5.615	0.724

**rainfall intensity, $I = a/(b+t)^c$, where t = time of concentration (min.)*

The minor storm drainage system will be designed to collect and convey the storm runoff from the entire developed area to the discharge location, where the discharge will be controlled to pre-development peak flow rates prior to discharging to the existing storm sewer on Franklin Ave. Excess runoff will be stored temporarily on site and released at the allowable rate to meet the established criteria. Storage could include surface wedge storage on the parking lot and underground oversized pipes or other storage chambers.

Preliminary conceptual modelling suggests that a storage volume of up to approximately 200 cubic metres may be required, but this is subject to verification in the design process. Adequate area is available on site to accommodate this storage, either on or under the parking area, and adequate grade is available for discharge to the existing storm sewer.

6.0 Parking and Roadways

Per attached site plan drawing, the intent is to construct an extension of Franklin Ave. as a local municipal road to provide access to the site. This proposed road extension will eventually connect West Side Road to the existing Franklin Ave. to the east, and will provide two entrances to the site as shown. Parking will be accommodated on site at ground level under the proposed building and

other open parking areas. Concrete barrier curb, 150mm height, is generally proposed within the new development complying with OPSD 600.110.

7.0 Utilities

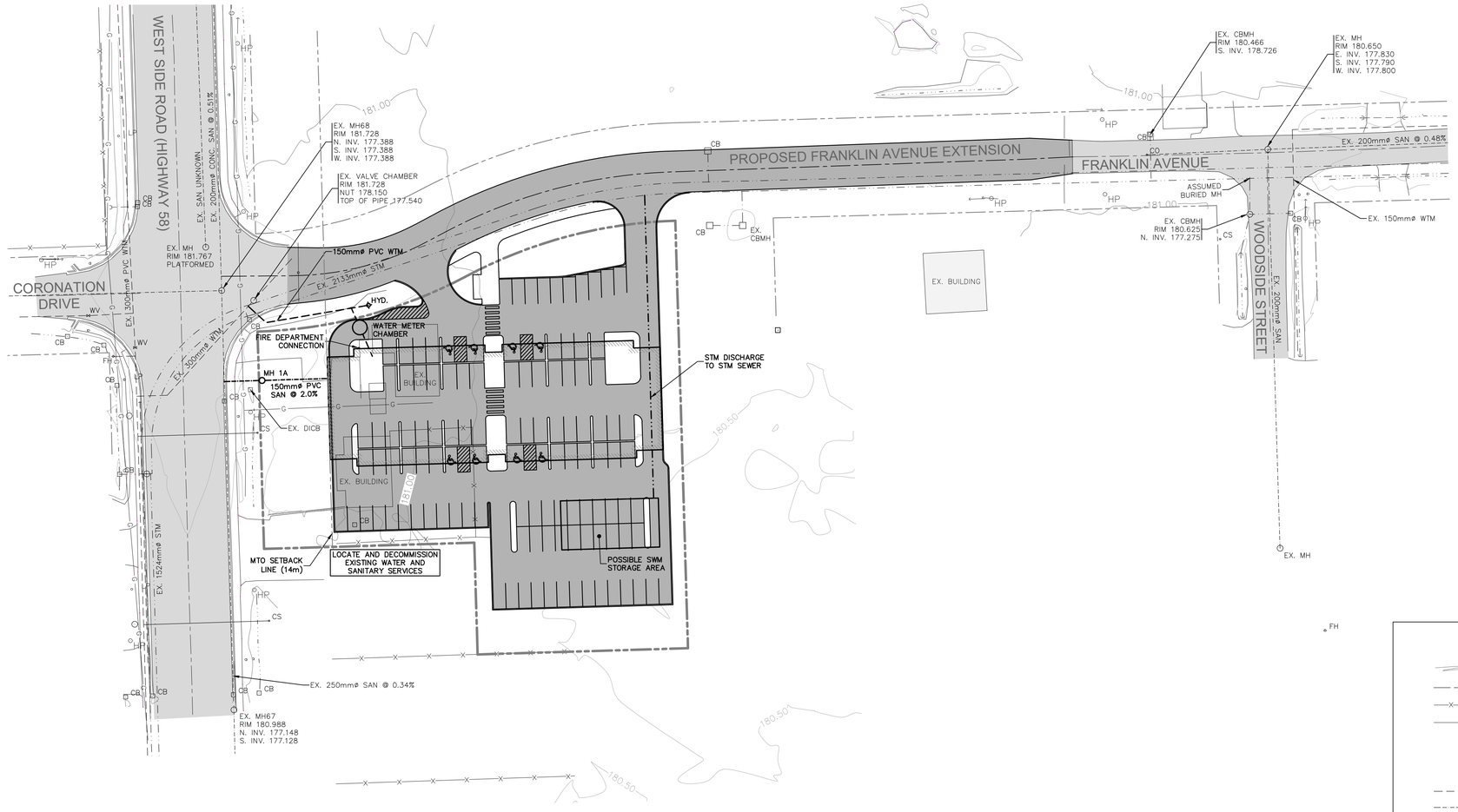
Hydro, Gas, and Bell services are located in the West Side Road right of way. Utilities have been notified of the proposed development plan and have not expressed any challenges to servicing this development.

8.0 Service Locations

Please refer to attached drawings for proposed and existing municipal services.

Prepared by:

Hank Klassen, Eng.
Senior Civil Engineer



LEGEND

- 108.00 — EXISTING GROUND CONTOUR
- PROPERTY LINE
- EXISTING FENCE
- EXISTING GAS
- EXISTING BUILDING
- EXISTING ASPHALT
- PROPOSED ASPHALT
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING CULVERT
- EXISTING DITCH
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- EXISTING MAINTENANCE HOLE
- EXISTING CATCHBASIN
- PROPOSED MAINTENANCE HOLE

02 May 2024
PRELIMINARY

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CLIENT LOGO

project title

WEST SIDE ROAD
INFILL LOTS

242 WEST SIDE ROAD
PORT COLBORNE, ON

drawing title

CONCEPTUAL SITE SERVICING

drawn by	designed by
RM / TC	HEK

scale	date
1 : 500	02 May 2024

job number	issue
22138	A

drawing number

22138-CSS

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Port Colborne, Ontario

APPENDIX A

Fire Flow Calculations

242 WEST SIDE ROAD, PORT COLBORNE

Estimated Fire Flow for the building (by FUS method)

Formula: F = 220 C √(A)

F = the required fire flow in litres per minute

C = coefficient related to the type of construction

= 1.5 for wood frame construction (structure essentially all combustible)

= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)

= 0.8 for non-combustible construction(unprotected metal structural components, masonry or metal walls)

= 0.6 for fire resistive construction (fully protected frame, floor, roof)

A = the total floor area in square metres (incl all storeys but not basements at least 50% below grade)

* for fire resistive buildings, consider the two (2) largest adjoining floors plus 50% of each of any floors immediately above them up to eight (8), when the vertical openings are inadequately protected. If the vertical openings and exterior vertical communications are properly protected (one hour rating), consider only the area of the largest floor plus 25% of each of the two (2) immediately adjoining floors.

A	2385 m²	(fire resistive with openings protected)		
C	0.6			
F	6446.4	6500.0	108.3	L/s

Residential use falls into low hazard occupancy, so 0.85 is applied

F	5525.0	L/min		
Sprinkler	50%	2762.5	L/min	reduction

Exposure

The charge for any one side generally should not exceed the following limits for the separations shown

Separation	Charge	Building Wall	Separation Distance
0 to 3 m	25 to 20 %		Bld
3 to 10 m	20 to 15 %	Left	53
10 to 20 m	15 to 10 %	Right	67
20 to 30 m	10 to 5 %	Front	97
30 to 45 m	5 to 0 %	Back	16

Normally any unpierced party wall/firewall considered to form a boundary when determining floor areas may warrant up to a 10 % exposure charge.

Calculation of Fire Flow Increase Due to Proximity to Other Buildings (PB)

PB = PL+PR+PF+PRR	Charge
where,	North
PL = proximity charge for left side of building	0%
PR = proximity charge for right side of buildi	0%
PF = proximity charge for front of building	0%
PRR = proximity charge for rear of building	15%
PB = increase due to proximity	15%

Increase in Fire Flow (IF):

IF	828.75	L/min	increase

Final Fire Flow	3591	L/min
	59.9	L/s

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APPENDIX B

Sanitary Design Sheet

SANITARY SEWER DESIGN COMPUTATION SHEET

PROJECT: **242 West Side Road, Port Colborne** *FILE #:* **22138** *DATE:* **January 25, 2024** *COMPUTED BY:* **HEK** *CHECKED BY:* **JRP**

DRAINAGE AREA PLAN: **N/A** *REV #:* *OUTFALL:* **Sanitary Sewer on West Side Road**

EQUIVALENT AREA FACTORS: INDUSTRIAL: Persons/ha COMMERCIAL / INSTITUTIONAL: Persons/ha *MANNING'S `n':* **0.013**

POPULATION PER DWELLING: **2.28** *AVERAGE PER CAPITA DESIGN FLOW:* **300** L/capita/day *PEAKING FACTOR:* **Harmon, M = 1+ (14/(4+(Pop./1000)$^{0.5}$))** *INFILTRATION RATE:* **0.286** L/ha/s

LOCATION	FROM	TO	FLOW CALCULATION										DESIGN					
			AREA (ha)		Land Use	# Dwelling Units	Equivalent Population		Ave. Domestic Flow (L/s)	Peaking Factor	Peak Domestic Flow (L/s)	Peak Extraneous Flow (L/s)	Peak Design Flow (L/s)	PIPE Ø (mm)	SLOPE (%)	CAP. (L/s)	VEL. (m/s)	LENGTH (m)	
			Incremental	Total			Incremental	Total											
Proposed Development to City Sewer	MH1	New Tee	0.57	0.57	Residential	112	255	255	0.89	4.23	3.75	0.16	3.91	150	2.00	18.6	1.05	54	*
Existing Residences (to be abandoned)			0.57	0.57	Residential	2	5	5	0.02	4.46	0.08	0.16	0.24						
West Side Road (Hwy 58) (existing sewer)														250	0.34	34.6	0.71		
Totals			1.14			114	260											54	

* Indicates that proposed pipe slope is greater than critical slope and pipe capacity and velocity are calculated using critical slope.