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TECHNICAL MEMORANDUM No. 1

**Crown Isle Villas Mini Home Development
Pre-Design Servicing Report**

Silverado Land Corporation
399 Clubhouse Drive,
Courtenay, BC V9N 2N3
File 9109-193-TM1

Issued: June 25th, 2021

Previous Issue Date: April 9, 2021

Reference Drawings: 9109-193-P1, P2
Figures 1 - 3.

1. Objective

This Pre-Design Servicing Report is provided in support of the proposed 28-unit mini home development on **Lot 2, Plan VIP78417 and Rem Lot A Plan VIP78730**, located off Clubhouse Drive, east of the Crown Isle Clubhouse and Villas. Included with this submission are drawings 9109-193-P1, showing the proposed layout and 9109-193-P2, showing the site servicing concepts, and Figures 1 through 3 providing additional details.

2. Background

This development, bounded by the golf course first hole and Ryan Road, was partially pre-serviced in 2004, when it was planned to be an extension of the Crown Isle Villa development. The sanitary sewer was installed to the Majestic Pump Station and stubs were left for the future villa buildings. The storm sewer, watermain and hydro and telephone conduit were extended approximately 100 m past the eastern-most constructed villa building. Drawing 9109-193-P2 shows the existing sewer and water utilities that were pre-installed. The proposed development will utilize a portion of the existing storm and water utilities, and new services will be installed to complete this project.

3. Site Grading (See Drawing 9109-P2)

The site slopes from west to east at about 4.5%. It is anticipated that the proposed units will be constructed at a slightly higher elevation than the access road. The access road will slope down to the terminus near unit number 15. It is anticipated that the eastern portion of the site, including units 8 to 19 will require structural fill to raise the ground level and enable a gravity sanitary service.

../2

We understand that Silverado Land Corporation will have a geotechnical analysis prepared for this development to assess the subsurface geology, define the depths to suitable subgrade and identify areas where groundwater infiltration may be possible.

4. Road Works (See Drawing 9109-193-P1)

The 6.0m wide access road and parking areas will be gravel surfaced.

The hammerhead style turnaround at the end of the road conforms to the City's drawing CSSD R4. Details of the proposed road access and a typical section are shown on drawing 9109-193-P1.

5. Storm Drainage (See Figure 1)

An existing 250mm diameter pipe runs through the development, conveying drainage from the existing 1.2 ha Crown Isle Villa development, discharging to the ditch on the south side of Ryan Road. This pipe will be intercepted and re-routed around the north side of the proposed 8-plex, discharging into the existing ditch near the current outlet location. New structures within the proposed mini-home development will not connect to the existing pipe. A new storm sewer will be constructed from the west side of the site to the east side where it will connect to a new oil/grit separator before being routed to the existing infiltration area located on the golf course. An easement between the upstream property and the golf course property is anticipated to include the new piping draining to the infiltration area.

We understand that the existing infiltration drainwell structures located on the golf course near the east side of this proposed development have been successfully infiltrating runoff from the existing 9.3 ha catchment area over the last 30 years. The infiltration characteristics of this area will be reviewed to better understand the capacity of the subsoils to infiltrate.

It is anticipated that each building will have a separate storm sewer connection for foundation and roof drainage systems. We understand that the proposed 8-plex will have a common foundation, foundation drains and roof drainage system, so it is anticipated to have one storm connection for the 8-unit building.

Impacts on Downstream Infrastructure

The Impacts to the downstream drainage infrastructure will be reviewed during the investigation and design stage and refined with further storm water modelling. Although there is no direct connection between the infiltration area and the Ryan Road ditch, the topography suggests that if the depressed area around the infiltration drainwells overtopped, the drainage would flow towards Ryan Road. We understand that this infiltration area has never overtopped in the last 30 years. The Ryan Road ditch terminates at an existing 300 CSP culvert that crosses to the north side of the Ryan Road.

This culvert, presumably installed when Ryan Road was constructed, shows very little evidence that it conveys any drainage. There is no defined ditch at the outlet and little evidence of erosion or scour, even though the culvert's 7.6 ha catchment area includes the impervious surfaces of Ryan Road and the existing Villa development. This is further evidence that much of the runoff

from this catchment does not end up at this culvert and probably infiltrates into the ground before it reaches the inlet.

6. Sanitary Sewers (See Figure 2)

All of the buildings will be serviced by a new gravity sanitary sewer that will be connected to an existing private manhole and trunk sewer on the golf course that services the existing Villa development and conveys sewage to the Majestic Pump Station.

The existing and proposed sanitary sewer servicing concept is shown on Figure 2, and the Sanitary Sewer Analysis – Calculation Sheet is summarized in Table 1. The Table also includes the total population, catchment area and peak flows for the Majestic Pump Station.

For modelling purposes, the additional sanitary loading to the Majestic Pump Station is as follows:

- **City Design Criteria**

From Section 3.2 “Per Capita Flow” of the Bylaw 2929, the design flows applied to this development are as follows:

- Average Dry Weather Flow (ADWF): 360 L/c/d
- Population: 2.4 Capita per MF unit or SF lot

From MMCD Sections 3.4 to 3.6

- $PF = 3.2/p^{0.105}$ (P=population in thousand rounded to nearest thousand).
- Infiltration: 0.06 L/s/ha
- Design Flow $Q=(ADWF \times PF) + \text{Infiltration}$

City Criteria for Commercial Developments:

- Equivalent Residential Units (ERU) = 1 ERU per 1920 sq.ft.
 - Total Proposed Floor Area = 14,784 sq.ft.
 - Total ERU = $14784/1920 = 7.7$ ERU

- **Sanitary Loading from Proposed Development**

Up MH	Dn MH	Area (ha)	ERU	Pop	ADWF (L/day)	PF	Peak Flow (L/s)	I/I (L/s)	Design Flow (L/s)
Majestic PS	n/a	0.8	7.7	18.5	6653	4.9	0.38	0.05	0.43

- **Majestic Pump Station:**

(data from record drawing)

Type: Duplex Flygt NP 3127 HT 1
 Capacity: 9.7 lps @ 17.0 m total head. (Single pump)
 Peak Flow: 2.6 lps (including the Mini Home Development)

../4

With an anticipated post development peak flow of 2.6 lps and an estimated current capacity of 9.7 lps, the pump station will be operating below capacity at full build-out for this development.

Each unit will have a separate sanitary sewer service, sized in accordance with the BC Plumbing Code. It is anticipated that the 8-plex will have one sanitary service for the building.

7. Water System (See Figure 3)

The site will be serviced from the existing watermain that runs through the site.

Currently, we understand that each of the different building stratas within the Villa development have individual water meters that are read by the City.

A new master meter and double check valve assembly is anticipated to be installed at the west end of the Mini Home development as shown on drawing 9109-193-P1. Some of the existing watermain will be removed and replaced with a new watermain and a fire hydrant. Each unit will have a water service, sized in accordance with the BC Building code. It is not anticipated that these units will have fire suppression systems.

We understand that the City will run their water model with the proposed water system extension. The proposed water flows are as follows:

- **City Design Criteria**

From Section 2.3 "Per Capita Demand" of the Bylaw 2929, the per capita demands applied to this development are as follows:

- Average Daily Demand: 635 L/c/d
- Peak Day (also known as Maximum Day): 2100 L/c/d
- Peak Hour: 3000 L/c/d
- Population: 2.4 Capita per MF unit or SF lot

From MMCD Section 2.5 "Fire Flows"

- Fire flows should be determined in accordance with the requirements of the current edition of "Water Supply for Public Fire protection – A Guide to Recommended Practice", published by Fire Underwriters Survey (FUS)
- Single Family Residential: 60 L/s minimum
- Apartments, Townhouses: 90 L/s minimum

FUS calculations have been completed on both a single 14'x40' mini home and the 8 plex. The estimated fire flows for these building are 46 L/s and 105 L/s respectively (see attached FUS calculation forms). The largest fire flow (105 L/s) should be used as the design fire flow.

../5

11. Closing

Based on a review of site conditions, an assessment of the development requirements and an evaluation of servicing options, we feel that a viable conceptual design to form the basis of the detailed design work has been presented. We trust that this submission is suitable to support the development permit application for this development. If you have any questions, or require further information to support this application, please contact our office at your earliest convenience.

Yours truly,

KOERS & ASSOCIATES ENGINEERING LTD.



Richard Cave ASCT
Project Technologist

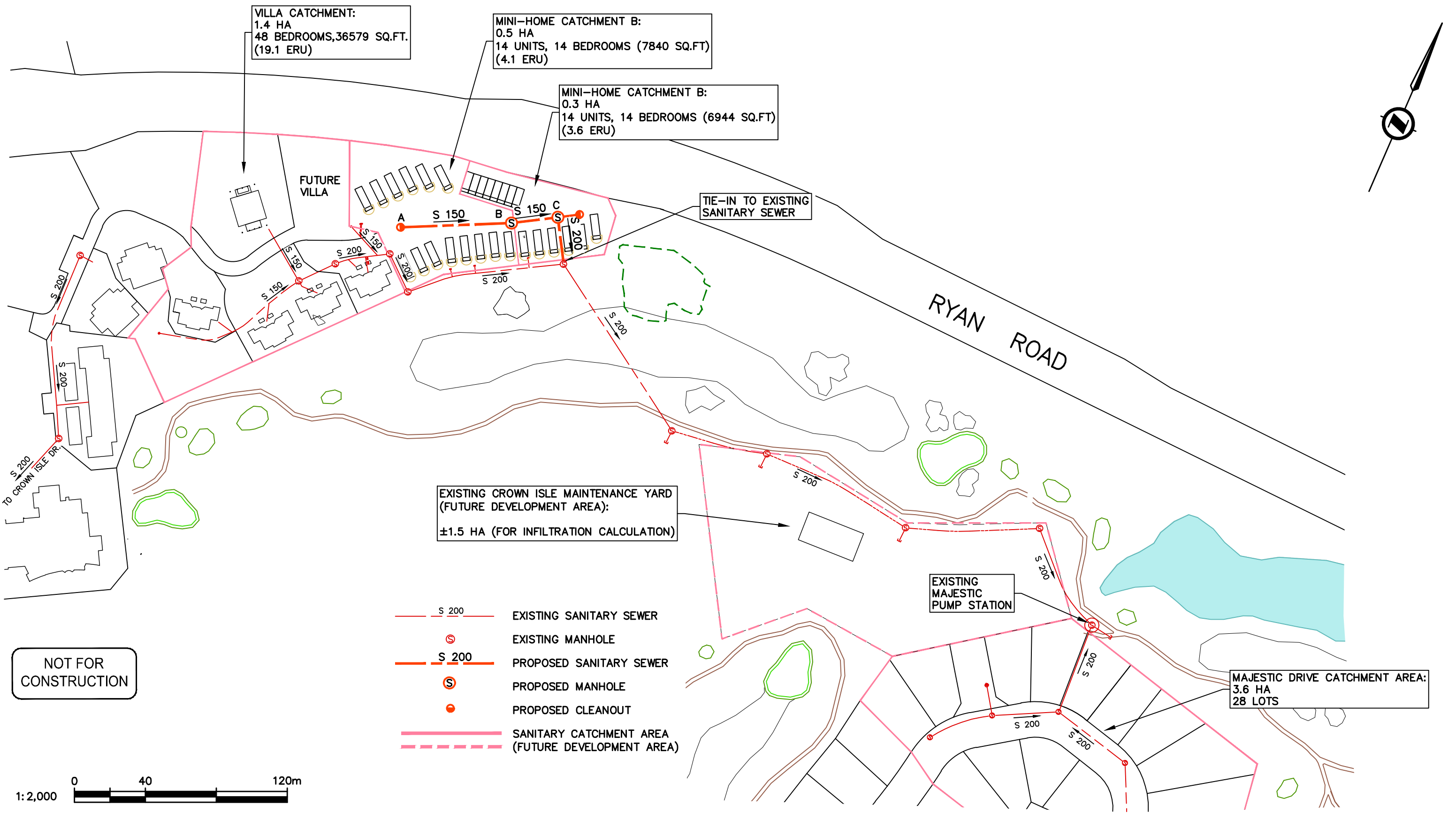
Enclosures: Drawings 9109-193-P1, P2,
Figures 1-3
Table 1
2 x FUS Calculation Forms



Rob Hoffman, P. Eng.
Project Manager

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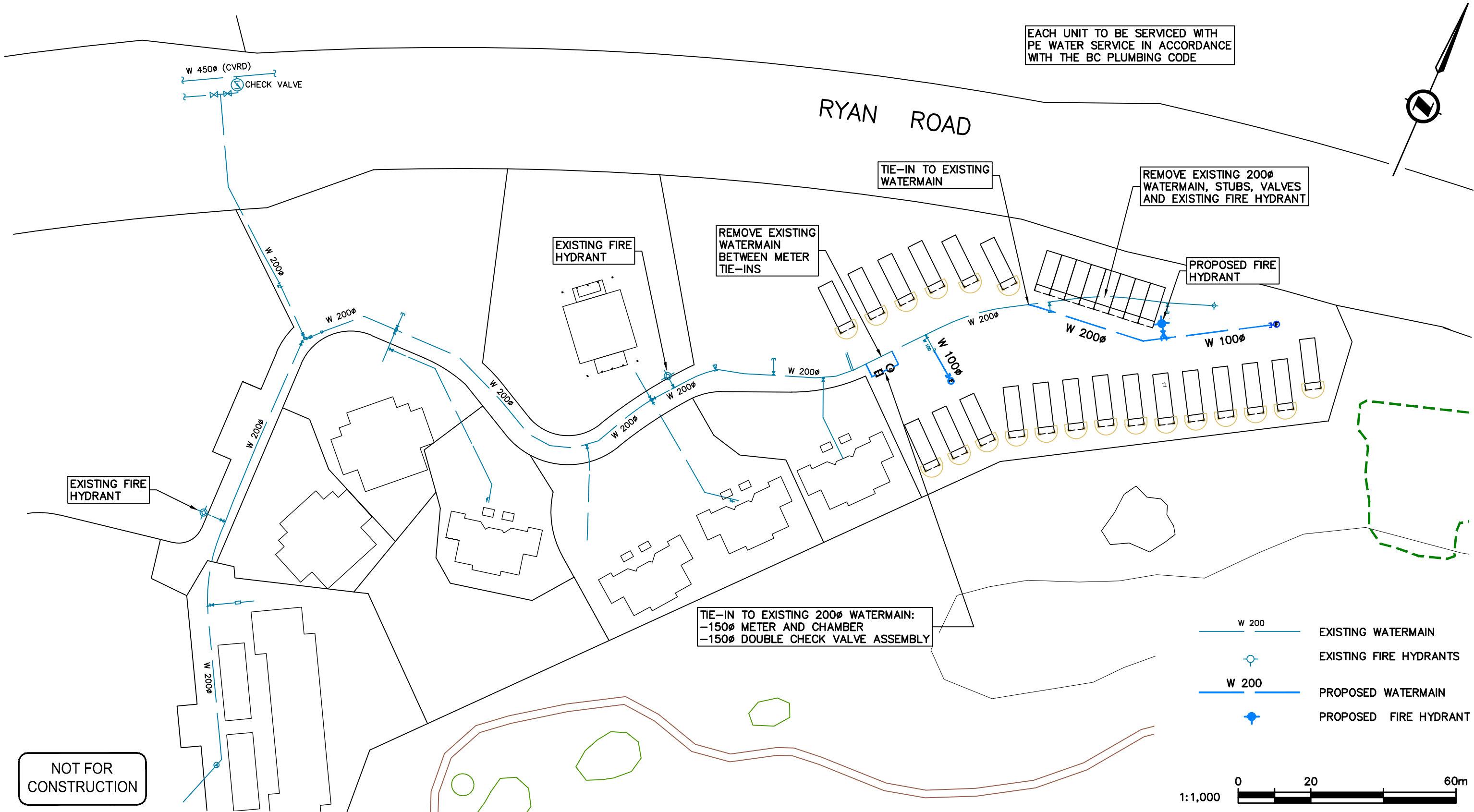
- S 200 EXISTING SANITARY SEWER
- ⊙ EXISTING MANHOLE
- S 200 PROPOSED SANITARY SEWER
- ⊙ PROPOSED MANHOLE
- PROPOSED CLEANOUT
- SANITARY CATCHMENT AREA
- (FUTURE DEVELOPMENT AREA)

1:2,000
0 40 120m

CLIENT	SILVERADO LAND CORPORATION
PROJECT	CROWN ISLE MINI HOME DEVELOPMENT

TITLE		PRELIMINARY DESIGN SANITARY SEWERS	
APPROVED		SCALE	1:2000
DATE	JANUARY 2021	DWG No.	FIGURE 1
PROJECT No.	9109-193		

File: H:\7255 Silverado Land Corp\9109\193 Villas Mini Homes\03 Drawings\Prelim Design\9109-193 PreDesign.dwg Plot Time: Mar 01, 2021 - 11:57am User: rcave



EACH UNIT TO BE SERVICED WITH PE WATER SERVICE IN ACCORDANCE WITH THE BC PLUMBING CODE

EXISTING FIRE HYDRANT

EXISTING FIRE HYDRANT

REMOVE EXISTING WATERMAIN BETWEEN METER TIE-INS

TIE-IN TO EXISTING WATERMAIN

REMOVE EXISTING 200 WATERMAIN, STUBS, VALVES AND EXISTING FIRE HYDRANT

PROPOSED FIRE HYDRANT

TIE-IN TO EXISTING 200 WATERMAIN:
-150 METER AND CHAMBER
-150 DOUBLE CHECK VALVE ASSEMBLY

- W 200 EXISTING WATERMAIN
- EXISTING FIRE HYDRANTS
- W 200 PROPOSED WATERMAIN
- PROPOSED FIRE HYDRANT

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1:1,000 0 20 60m

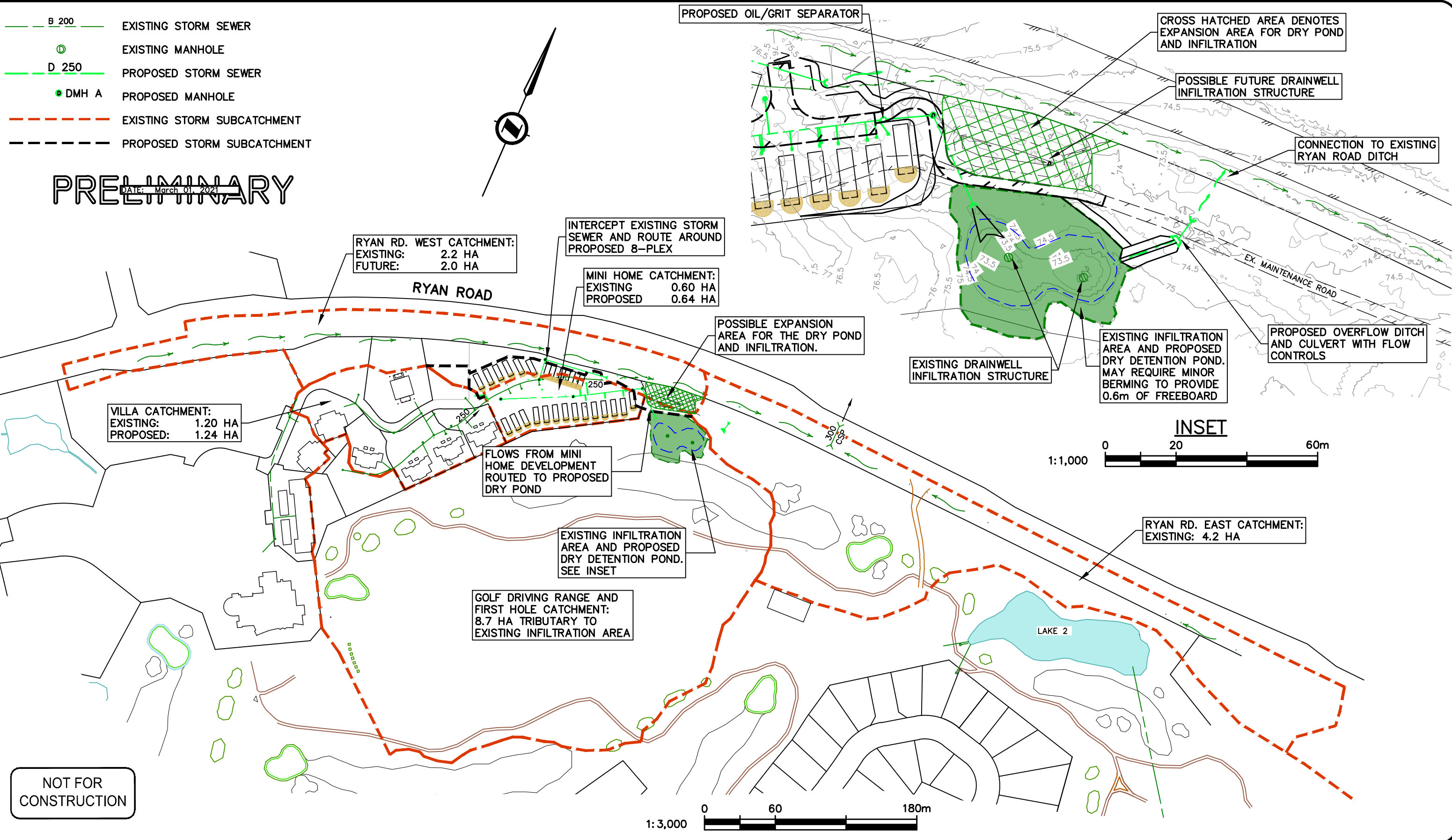


CLIENT SILVERADO LAND CORPORATION
PROJECT CROWN ISLE MINI HOME DEVELOPMENT

TITLE PRELIMINARY DESIGN WATERMAIN
APPROVED
DATE JANUARY 2021
PROJECT No. 9109-193
SCALE 1:1000
DWG No. FIGURE 2

- B 200 EXISTING STORM SEWER
- ⊙ EXISTING MANHOLE
- D 250 PROPOSED STORM SEWER
- DMH A PROPOSED MANHOLE
- - - EXISTING STORM SUBCATCHMENT
- - - PROPOSED STORM SUBCATCHMENT

PRELIMINARY
DATE: March 01, 2021

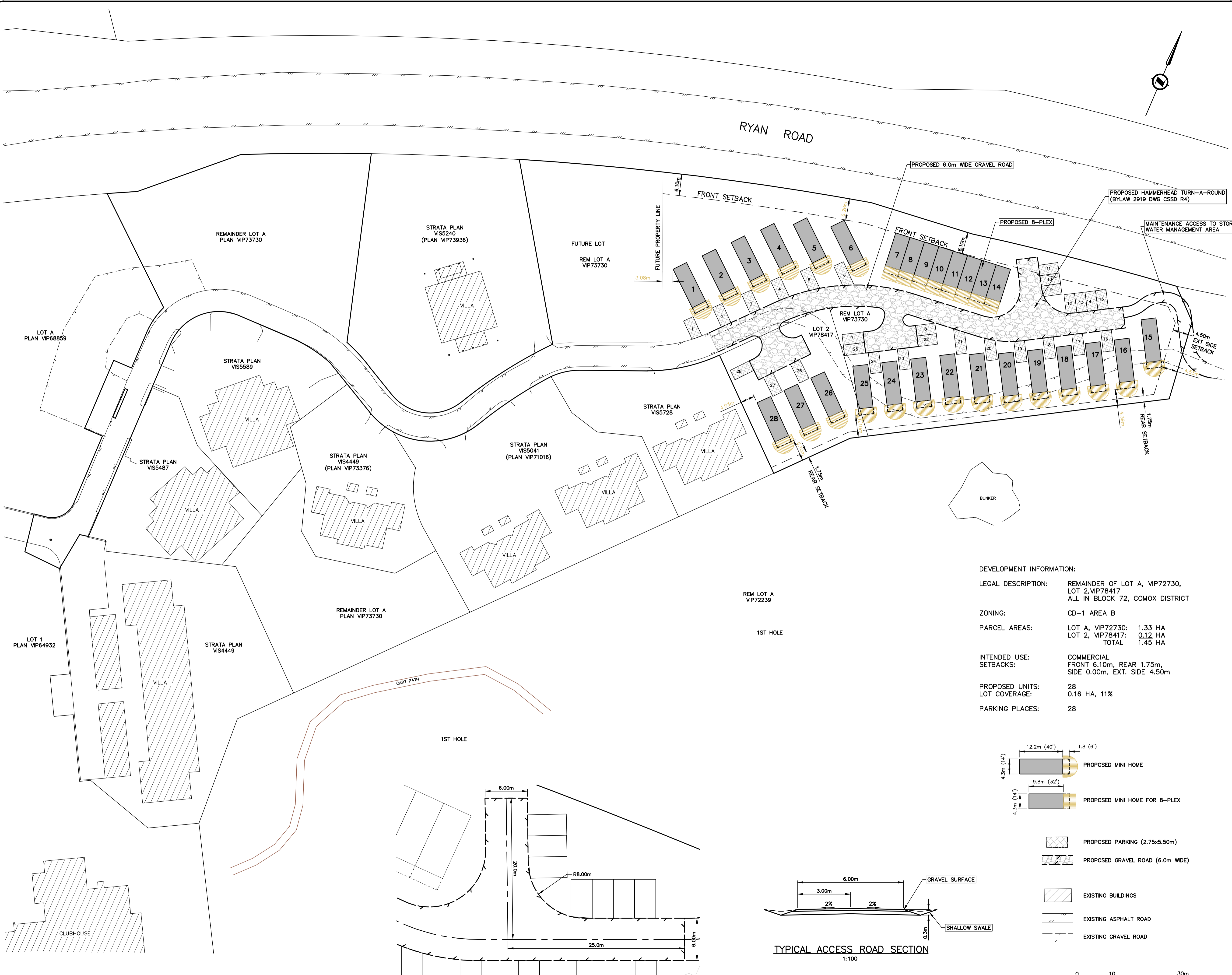
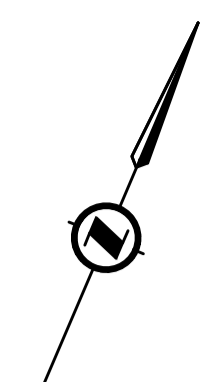


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CLIENT	SILVERADO LAND CORPORATION
PROJECT	CROWN ISLE MINI HOME DEVELOPMENT

TITLE		PRELIMINARY DESIGN STORM WATER MANAGEMENT PLAN	
APPROVED		SCALE	1:3000
DATE	JANUARY 2021	DWG No.	FIGURE 3
PROJECT No.	9109-193		



RECORD OF REVISIONS

REV	DATE	BY	ENG	DESCRIPTION

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A	25JUN21	RC	RH	FOR DP APPLICATION
ISS	DATE	BY	ENG	DESCRIPTION

RECORD OF ISSUE

SEAL

PROJECT NO.	9109-193
DRAWN	RC
DESIGNED	
CHECKED	
APPROVED	
DATE	
SCALE	1:500
CLIENT	

PROJECT	SILVERADO LAND CORPORATION
PROJECT	CROWN ISLE MINI HOMES
TITLE	PRELIMINARY SITE LAYOUT

DEVELOPMENT INFORMATION:

LEGAL DESCRIPTION: REMAINDER OF LOT A, VIP72730, LOT 2, VIP78417 ALL IN BLOCK 72, COMOX DISTRICT

ZONING: CD-1 AREA B

PARCEL AREAS: LOT A, VIP72730: 1.33 HA
 LOT 2, VIP78417: 0.12 HA
 TOTAL 1.45 HA

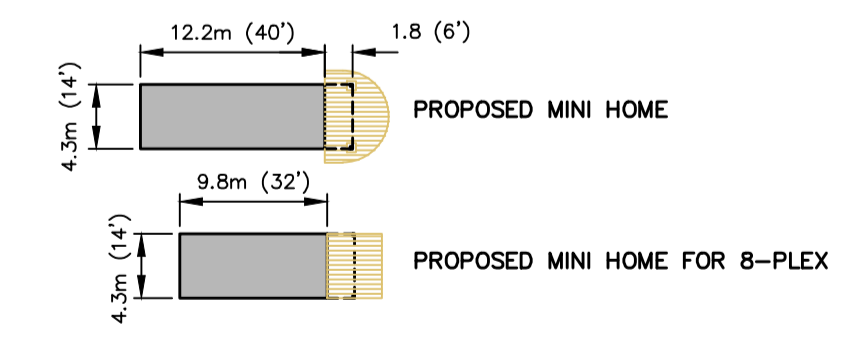
INTENDED USE: COMMERCIAL

SETBACKS: FRONT 6.10m, REAR 1.75m, SIDE 0.00m, EXT. SIDE 4.50m

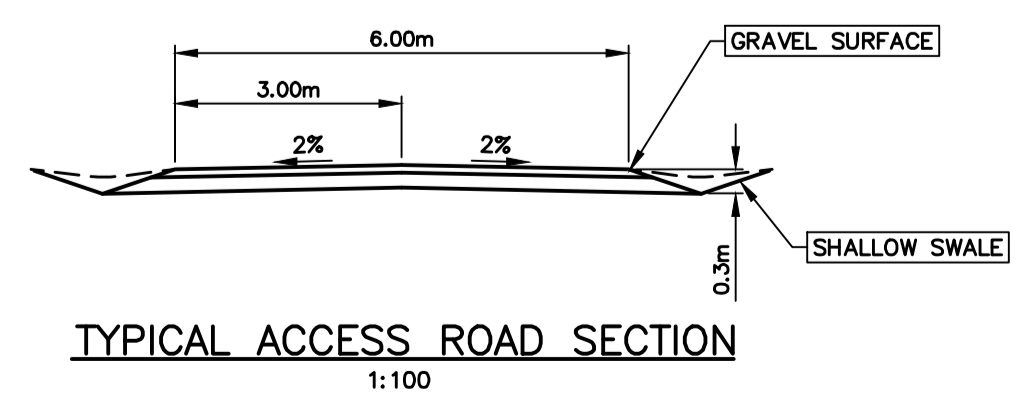
PROPOSED UNITS: 28

LOT COVERAGE: 0.16 HA, 11%

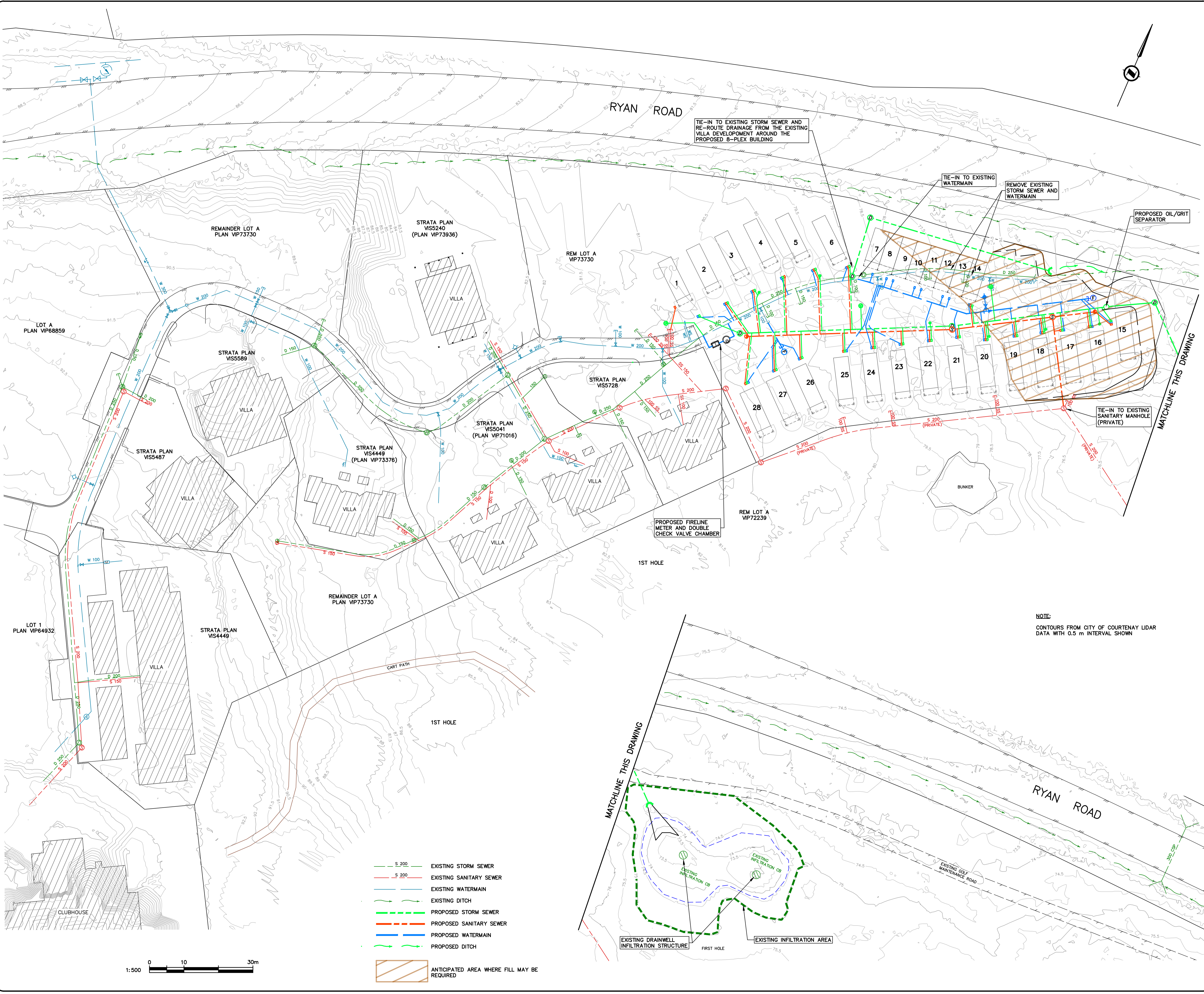
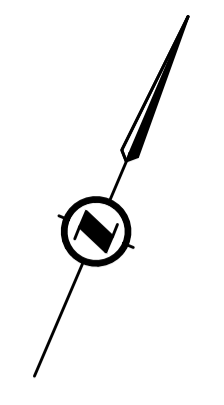
PARKING PLACES: 28



- PROPOSED PARKING (2.75x5.50m)
- PROPOSED GRAVEL ROAD (6.0m WIDE)
- EXISTING BUILDINGS
- EXISTING ASPHALT ROAD
- EXISTING GRAVEL ROAD



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RECORD OF REVISIONS

REV	DATE	BY	ENG	DESCRIPTION
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ISS	DATE	BY	ENG	DESCRIPTION

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SILVERADO LAND CORPORATION

PROJECT
CROWN ISLE MINI HOMES

TITLE
PRELIMINARY SITE SERVICING CONCEPTS

DRAWING No.	REV.	SHEET
9109-193-P2		2/2

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