

2023-08-03
Project: (230366)

Mountainview DAC Inc.
9-3350 Merrittville Highway
Thorold ON L2V 4Y6

**RE: MOUNTAIN ROAD AT ST. PAUL AVENUE, NIAGARA FALLS -
SIGHT DISTANCE REVIEW**

Introduction and Background

The subject site is located on the south side of Mountain Road and generally west of St. Paul Avenue in Niagara Falls. The property owner proposes to construct a six-storey condominium building containing 70 units. Vehicle access is proposed through a new driveway connection to Mountain Road located at the western terminus of the property. For the application, the Niagara Region requires a sight distance analysis to be submitted to confirm that a driveway entrance can be safely incorporated. **Appendix A** contains the reduced-scale site plan.

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct a sight-distance review of the proposed driveway connection. This assessment confirms whether any visibility issues are present for vehicles at the proposed driveway location. As part of the investigation, a site visit was undertaken to gather sight distance measurements and to document any potential sight line obstructions.

Roadway Characteristics

Mountain Road (Regional Road 101) is an arterial under the jurisdiction of the Niagara Region. The roadway has a two-lane urban cross-section; it is noted within vicinity of the proposed driveway the cross-section widens to account for an eastbound left turn lane at the intersection of Mountain Road/St. Paul Avenue.

Sidewalks are provided on both sides of the roadway, and on-street cycling lanes appear to be provided. Parking is prohibited on the south side of the roadway. The posted speed limit is 50 kilometres per hour. A crest vertical curve along Mountain Road creates a significant grade along the frontage of the proposed development.

Proposed Driveway

The driveway to the proposed development is noted as follows:

- ▶ Access will be provided through a driveway connection with Mountain Road located approximately 105 metres east of the Mountain Street and Lucia Drive/January Drive intersection (curb return to curb return), and approximately 195 metres west from the Mountain Road and St. Paul Avenue intersection (curb return to curb return). The access is noted to be located near the peak of the crest curve along Mountain Road.

The Transportation Association of Canada, Geometric Design Guide for Canadian Road (TAC-GDGCR),¹ has been reviewed to determine the sufficiency of the corner clearance from a major intersection.

TAC-GDGCR Chapter 8.8 (Corner Clearances at Major Intersection), Section 8.8.1 (General) states, "Corner clearance is the distance from an intersection to the nearest access upstream or downstream of it. Corner clearance is measured from the nearest curb of the cross roadway to the near edge of the access throat. It consists of three components: the curb return radius at the intersection, the length of the tangent, and the curb return radius or flare dimension at the driveway. Inadequate corner clearance between accesses and intersections along a major road, such as a major arterial, can create operational issues." The suggested corner clearance, as stipulated by TAC, is as follows:

- ▶ Arterial Roads
 - 70 metres (curb return to curb return) downstream and upstream of a signalized intersection.
 - 35 metres (curb return to curb return) downstream and upstream of a stop-controlled intersection.

The proposed driveway to Mountain Road is noted to exceed the corner clearance requirements stipulated by TAC. From a spacing perspective, the proposed location is suitable.

Sight Distance Review

The proposed driveway to Mountain Road has been reviewed to determine sight distance, sight line availability, and provisions. The assessment has been carried out based on the methodology in the TAC-GDGCR.

Approaching Sight Distance

Crest vertical curves have to be flat enough to provide the required sight distance. As an object comes into view on a crest curve, the line of sight from the driver's eye to the top of the object is tangential to the curve. Typically, the curve should be sufficiently flat so that the distance from a driver's eye to an object equals the required sight distance.

¹ Transportation Association of Canada Geometric Design Guide for Canadian Roads, 2017



Sight distance requirements are considered for vehicles approaching the driveway (approach sight distance) along Mountain Road. The sight distance requirements for a 60 km/h design speed (i.e., 10 km/h over the posted maximum speed limit) have been utilized.

Stopping sight distance is required for a vehicle approaching an intersection from either direction to perceive, react and come to a complete stop to avoid colliding with an object in the road. In this respect, stopping sight distance can be considered the minimum visibility criterion for the safe operation of an unsignalized intersection/driveway.

Table 1 summarizes the sight distance requirements for a 60 km/h design speed.

TABLE 1: REQUIRED SIGHT DISTANCE CRITERIA

Sight Distance Criteria	Sight Distance Requirement
	Design Speed (60 km/h)
Minimum Stopping Sight Distance ¹	85
<i>Notes:</i>	
<i>1 TAC Guide. June 2017. Table 2.5.2: Stopping Sight Distance on Level Roadways for Automobiles</i>	

Grade Impacts

It is further noted that Mountain Road has a decline in the road along the frontage of the proposed development. When braking on an upgrade, as would be the case for vehicles travelling westbound along Mountain Road toward the proposed driveway, the effect of the grade decreases the sight distance requirements.

The TAC Guide further outlines stopping sight distance requirements for various design speeds with grades of 3%, 6% and 9%. **Table 2** summarizes the sight distance criteria for various grades of a road. Mountain Road would appear to fall within the 9% threshold with respect to the road's gradient.

TABLE 2: REQUIRED SIGHT DISTANCE CRITERIA WITH GRADE

Sight Distance Criteria	upgrades %	Sight Distance Requirement Design Speed (60 km/h)
Minimum Stopping Sight Distance ¹	3	80
	6	77
	9	75
<i>Notes:</i>		
<i>1 TAC Guide. June 2017. Table 2.5.3: Stopping Sight Distance on Grades</i>		



Analysis

Stopping sight distance is the sum of a motorist's distance during the perception, reaction time, and braking distance. Stopping sight distance is measured from the standard driver eye height of 1.05 metres to a fixed object 0.60 metres off the roadway's surface. The main measurements for approaching traffic were taken from within the center of either travel lane of Mountain Road, assuming a vehicle position perpendicular to the theoretical access location. The distance for vehicles travelling eastbound along Mountain Road is based on the requirements for a level roadway (**Table 1**). In contrast, for westbound drivers, the analysis was based on an upgrade of 9% (**Table 2**).

Table 3 summarizes the available and TAC-recommended sight distances for an approaching vehicle with a 60 km/h design speed. **Figure 1** includes sight distance measurements, and **Figures 2-3** include photos.

TABLE 3: APPROACHING SIGHT DISTANCE ANALYSIS SUMMARY

Driveway	Approaching Movement	Available Sight Distance Measured (m)	TAC Sight Distance Requirement (m)	Sight Distance Summary
Access	Eastbound Vehicle	200+	85	Adequate
	Westbound Vehicle	200+	75	Adequate

The following summarizes the review:

- ▶ Approaching from the east (westbound drivers), the proposed driveway meets the approaching sight distance requirement.
- ▶ Approaching from the west (eastbound drivers), the proposed driveway meets the approaching sight distance requirement.

Summary

The subject site is located on the south side of Mountain Road and generally west of St. Paul Avenue in Niagara Falls. The property owner proposes to construct a six-storey condominium building containing 70 units.

Access will be provided through a driveway connection with Mountain Road approximately 105 metres east of the Mountain Street and Lucia Drive/January Drive intersection (curb return to curb return) and approximately 195 metres west from the Mountain Road and St. Paul Avenue intersection (curb return to curb return). The access is noted to be located near the peak of the crest curve along Mountain Road. From a spacing perspective the proposed location is suitable.



For vehicles approaching a driveway, the minimum stopping sight distance is the distance required for the approaching vehicle to stop safely and avoid a collision. Mountain Road has been assessed with a design speed of 60 kilometres per hour, yielding a stopping sight distance requirement of 85 metres along level roadways. However, as Mountain Road's grade declines along the proposed development's frontage, the upgrade would impact the amount of stopping sight distance required for westbound drivers. For a 9% upgrade and a design speed of 60 kilometres per hour, the stopping sight distance requirement for westbound drivers is decreased to 75 metres.

Based on the sight distance review conducted, the proposed driveway location exceeds the stopping sight distance criteria for a 60-kilometre per hour design speed. In addition, the driveway also exceeds the corner clearance requirements (i.e., access is spaced adequately from the intersections of Mountain Road with Lucia Drive/January Drive and St. Paul Avenue).

Feel free to contact the undersigned with any questions or to discuss this further.

Yours truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED



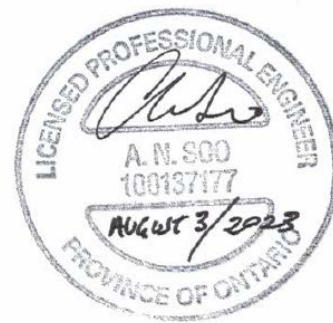
Adam J. Makarewicz
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B.E.S., MITE
Vice President



Adrian Soo
P.Eng.
Senior Project Manager



Attachments



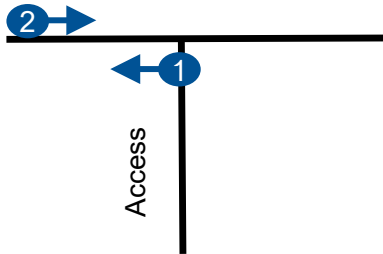


Driveway Eastbound Approaching Sight Distance



Location Plan

Mountain Road (RR 101)



1.



Access looking west along Mountain Road

2.



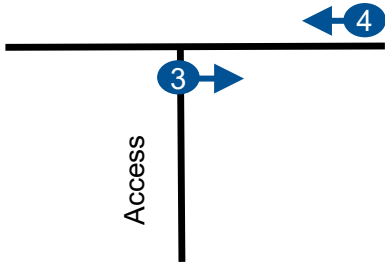
Mountain Street looking east from 200 metres back from Access



Mountain Street & Access Sight Distance Photos (1/2)

Location Plan

Mountain Road (RR 101)



3.



Access looking east along Mountain Road

4.



Mountain Street looking west from 200 metres back from Access



Mountain Street & Access Sight Distance Photos (2/2)

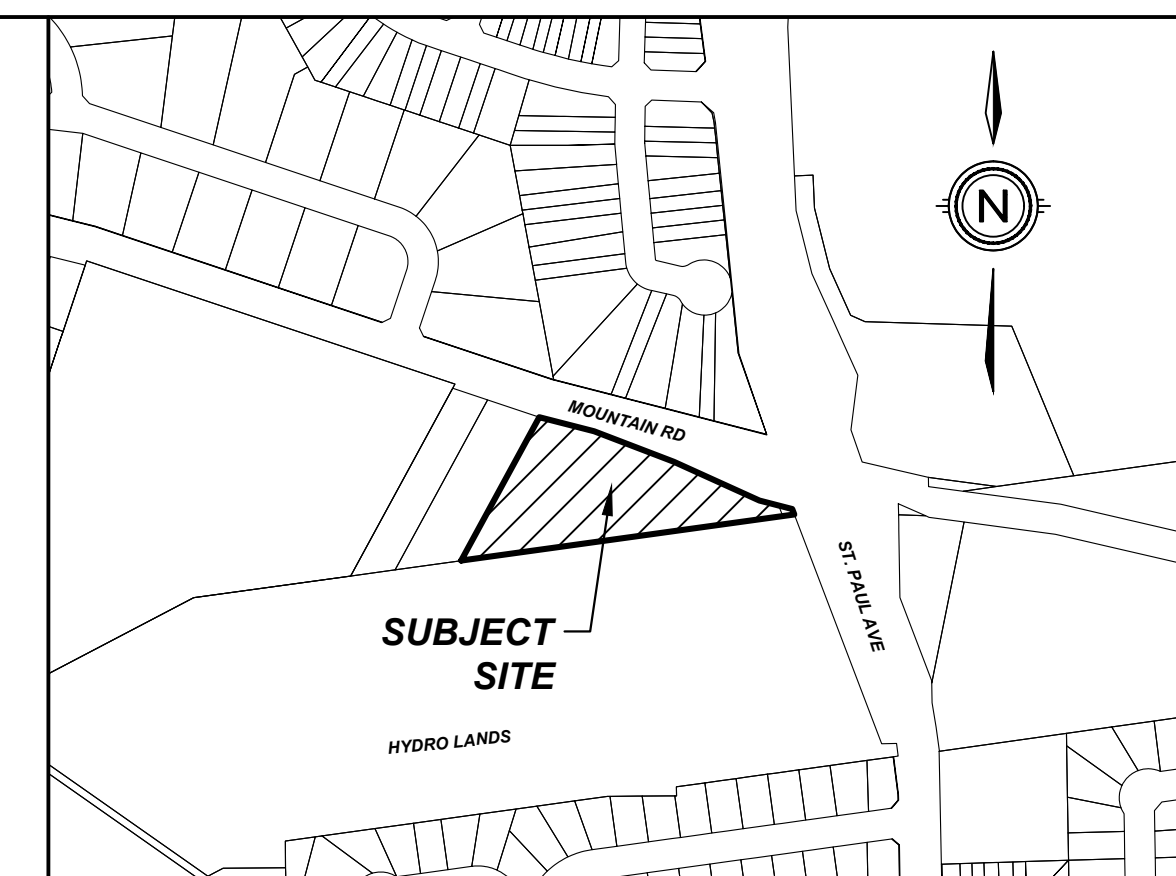
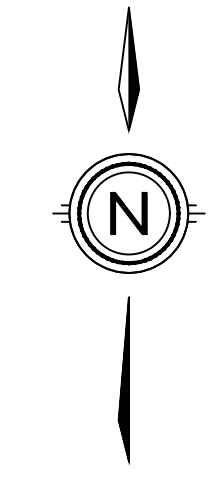
Appendix A

SITE PLAN



MOUNTAIN ROAD CONDO

CITY OF NIAGARA FALLS



KEY PLAN
N.T.S.

CONCEPT PLAN

LEGAL DESCRIPTION

PART OF TOWNSHIP LOT 25, STAMFORD
BEING PART 1, PLAN 59R-1558
CITY OF NIAGARA FALLS
REGIONAL MUNICIPALITY OF NIAGARA

ZONING MATRIX

PROVISION	ZONING RESIDENTIAL LOW DENSITY, GROUPED MULTIPLE DWELLINGS (R4-1050)	PROVIDED
MIN. LOT AREA	282m ² for each dwelling unit	145.07m ² for each dwelling unit
MIN. LOT FRONTAGE	7.5m	7.5m
MIN. FRONT YARD DEPTH	9.5m	126.30m
MIN. REAR YARD DEPTH	17m	27.59m
MIN. INTERIOR SIDE YARD	One-half height of building	3.00m
MIN. EXTERIOR SIDE YARD	15m	6.00m
MAX. LOT COVERAGE	12%	14.07%
MAX. BUILDING HEIGHT	23.5m	18.34m
MAX. STOREYS	6	6
MIN. LANDSCAPED OPEN SPACE	198m ² for each dwelling unit	92.88m ²
PARKING AND ACCESS REQUIREMENTS	1.9 parking spaces for each dwelling unit	1.44 parking spaces for each dwelling unit

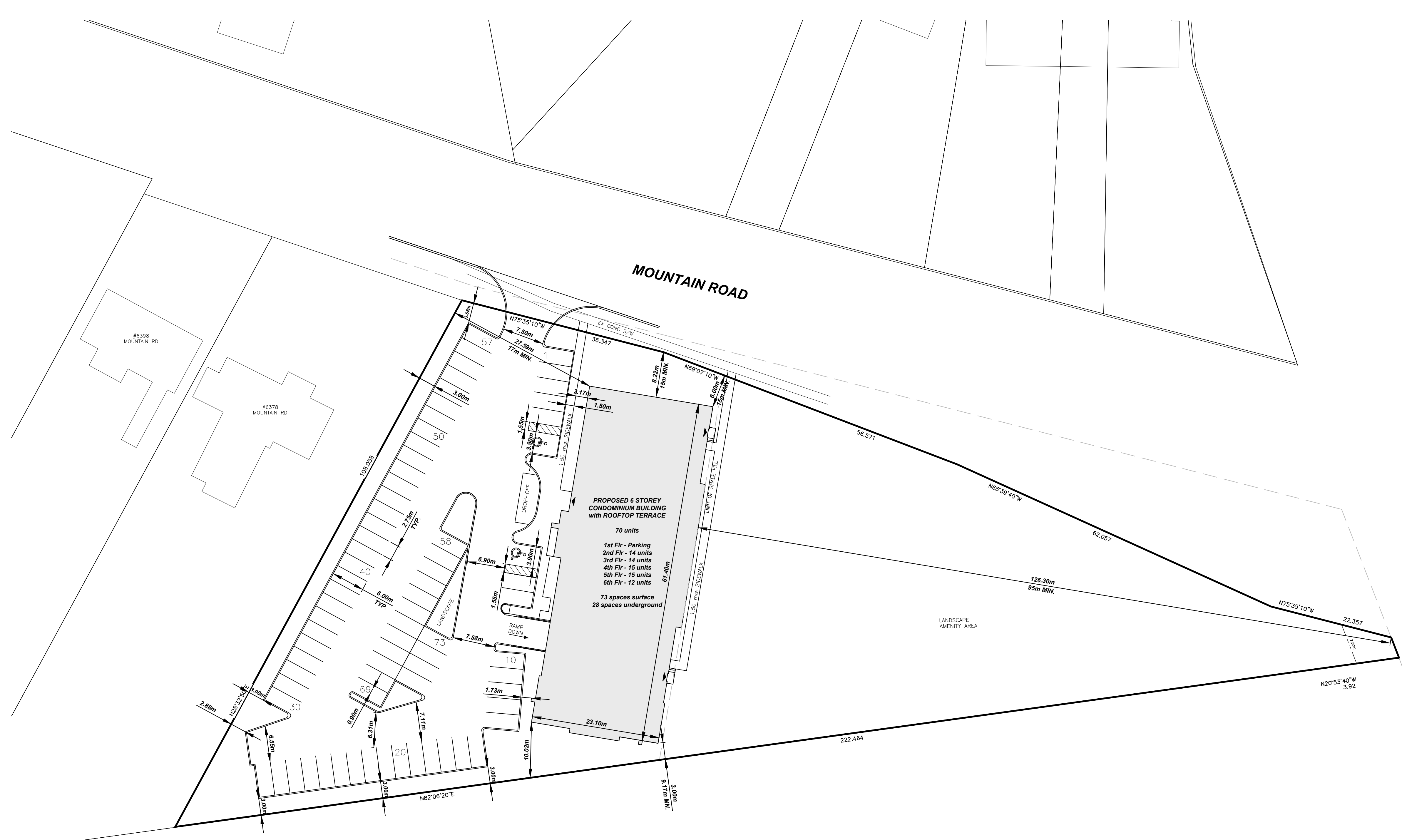
SITE STATISTICS

AREA	Ha.	% COVERAGE
BUILDING	0.143	14.07
ROAD/DRIVEWAY/PARKING	0.260	25.59
LANDSCAPING	0.613	60.33
TOTAL	1.016	100.00
UNITS		70
DEVELOPABLE AREA		1.016Ha.
DENSITY (UNITS/DEVELOPABLE AREA)		68.89u/Ha.
PARKING SPACES PROVIDED TOTAL		101
		SURFACE = 73
		UNDERGROUND = 28

#	REVISION	DATE	INIT
0	REVIEW	2022-12-21	



CONCEPT PLAN	DRAWING TITLE	DRAFTING	AM
		DATE	DECEMBER 21, 2022
		PRINTED	DECEMBER 21, 2022
		SCALE	1:400
	DWG No.	REV	
	2278-CP6	0	



PRELIMINARY