



**CITY OF WEST KELOWNA**  
**DEVELOPMENT PERMIT WITH VARIANCES**  
**DP24-10**

**TO:** Ryser Developments Ltd.  
c/o Damien Burggraeve  
2548 Pinnacle Ridge Dr  
West Kelowna, BC, V4T 0E3

1. This Permit is issued subject to compliance with all of the Bylaws of the City of West Kelowna applicable thereto, except as specifically varied or supplemented by this Permit.
2. This Permit applies to and only to those lands within the City of West Kelowna described below, and any and all buildings, structures and other developments thereon:

**Plan EPP8432 Lot C District Lot 3793 ODYD  
(2419 Mountains Hollow Lane)**

3. This **Multiple Family and Intensive Residential, Hillside, Aquatic, and Sensitive Terrestrial Ecosystem Development Permit Area** allows the construction of 46 townhouses contained in 12 buildings, subject to the following conditions and related Schedules:
  - a. The siting, form, exterior design, and finish of buildings is to be in accordance with Schedule 'A';
  - b. The landscape works to be in accordance with Schedule 'B';
    - i. Regarding pipe crossing of covenant CA2039127
      1. At time of construction, the civil contractor will survey the alignment of the pipe and establish the limits of disturbance on each side. Once established and staked out, the environmental monitor will walk the alignment, identify and establish a number of plants requiring removal. Once the number of plants has been established, the environmental monitor will prepare a monitoring report with the a count of all plants that had to be removed and a revegetation plan to ensure compliance with covenant CA2039127. The emphasis will be placed on visual buffer mitigation.
      2. Construction of a future emergency access and crossing (if required) would require public hearing for input.
    - ii. A chain-link fence is required at the rear of Building 1. Refer to bylaw 0265 for detail.
    - iii. SS denotes Snow Storage Locations
  - c. All civil construction activities are to be conducted on the land in accordance with Schedule 'C' and the following conditions;
    - i. Prior to any construction on the lands, the property owner is to install and maintain the required erosion and sediment control works.

- ii. All retaining walls are to match heights specified on drawing 23048-102 dated July 8, 2024.
    - iii. Site servicing is to be executed based on the site servicing plan drawing 23048-101, dated July 8, 2024.
  - d. All Recommendations as outlined in Schedule D associated with the sites Terrestrial Ecosystem are to be followed.
    - i. This includes the engagement of an environmental monitor (overview of restoration plantings & covenant crossing)
    - ii. This includes management of spill piles & hazardous materials
  - e. The following variances to Zoning Bylaw No. 0265 are included as part of this Development Permit:
    - i. Minimum required truck or van loading spaces be reduced from 4.0 to 3.0
- 4. As a condition of the issuance of this Permit, the City of West Kelowna is holding security set out below to ensure that development is carried out in accordance with the terms and conditions of this Permit. Should any interest be earned upon the security, it shall accrue to the Permittee and be paid to the Permittee if the security is returned. The condition of the posting of the security is that should the Permittee fail to carry out the development hereby authorized, according to the terms and conditions of the Permit within the time provided, the City of West Kelowna may use the security to carry out the work by its servants, agents or contractors, and any surplus shall be paid over to the Permittee, or should the Permittee carry out the development permitted by this Permit within the time set out below, the security shall be returned to the Permittee. There is filed accordingly:

**An Irrevocable Letter of Credit or Bank Draft in the amount of \$503,142.50 (Landscape Security); and**

- 5. The land described herein shall be developed strictly in accordance with the terms and conditions of this Permit and any plans and specifications attached to this Permit, which shall form a part hereof. Should any change be required to this permit, please ensure that you obtain written approval from the City of West Kelowna prior to making any changes.
- 6. If this Development Permit has not been issued within one year from approval, Development Permit with Variance DP24-10 shall be deemed to have been refused and the file will be closed.
- 7. A phased strata will require a subdivision application, complete with a Form P letter and proposed plan of subdivision indicating the number of phases. Each phase must meet the minimum R3 area requirements and must prove out the required setbacks for each phase proposed along with other requirements of the City's Zoning Bylaw.
- 8. Frontage improvements to the existing site access off of Paramount Drive will be required. This includes the provision of a sidewalk and street lighting.
- 9. The city's water systems can supply 90L/s to the property.
- 10. **This Permit is not a Building Permit.**
- 11. **This Permit is not a Municipal Highway Permit.**

**12. This is not an Archaeology Permit.**

A. All archaeological sites in B.C. are protected under the Heritage Conservation Act. This applies to whether sites are located on public or private land and whether the site is known or unknown. If you think you have uncovered an archaeological site during a building project or renovation, please do not disturb the site further and call B.C.'s Archaeology Branch immediately at (250) 953-3334. Branch archaeologists will review your project plans and make recommendations to manage site impacts and secure the required permitting.

13. Subject to the terms of the permit, where the holder of a permit issued under the Local Government Act does not substantially commence any construction with respect to which the permit was issued within two years after the date it is issued, the permit lapses.

AUTHORIZING RESOLUTION NO. (\_\_\_\_\_) PASSED BY THE MUNICIPAL COUNCIL ON  
(\_\_\_\_\_)

Signed on \_\_\_\_\_

\_\_\_\_\_  
Corporate Officer

**As received on \_\_\_\_\_, there is filed accordingly an Irrevocable Letter of Credit or Bank Draft deposit in the amount of \$503,142.50 for landscaping works outlined in the above permit.**

I hereby confirm that I have read and agree with the conditions of Development Permit with Variances DP24-10 and will ensure that copies of the Permit will be provided to onsite personnel at time of construction.

Signed on \_\_\_\_\_

\_\_\_\_\_  
Property Owner or Agent

ISSUED on \_\_\_\_\_

Attached Schedules:

Schedule A:

- Architectural Design Drawings, prepared by IHS Design., dated July 8, 2024 (29 pages).

Schedule B:

- Landscape Bond Letter, prepared by CTQ. dated July 5, 2024 (1 page).
- Landscape Estimate, prepared by CTQ. dated July 5, 2024 (2 pages).
- Landscape Plan, prepared by CTQ, dated July 10, 2024, (4 pages).

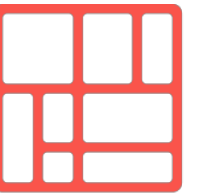
Schedule C:

- Civil Plans, Prepared by Protech Consulting, dated July, 2024, (7 pages).
- Functional Servicing Report, prepared by Protech Consulting, dated March 26, 2024 (27 pages).
- Geotechnical Report, prepared by Interior Testing Services Ltd., dated January, 25 2024 (34 pages).

Schedule D

- Environmental Assessment, prepared by Okanagan Environmental Ltd, April 1, 2024 (31 pages).

# SCHEDULE A



**IHS DESIGN**  
 #202-1470 ST. PAUL ST.  
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 250.212.7938  
 info@ihdesign.ca

**TALLUS RIDGE**  
 A STEP AWAY



**LOT C MULTIFAMILY**  
 TALLUS RIDGE ESTATES

SITE PLAN

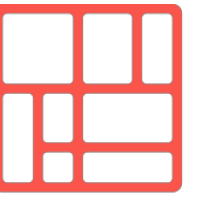
DATE: 8-Jul-24

SCALE: 1:1000  
 ISSUED FOR: REVIEW ONLY

DP1.0

**1 | SITE PLAN**  
 DP2.0 | 1:1000





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SITE PLAN

DATE: 8-JUL-24

SCALE: 1" = 50'-0"  
ISSUED FOR: REVIEW ONLY

DP1.1



1 | SITE PLAN

DP1.1 | 1" = 50'-0"



R3 LOW DENSITY MULTIPLE RESIDENTIAL ZONE	PERMITTED	PROPOSED
NET SITE AREA (R3 PORTION ONLY)	1000m2	45225.88m2
WALKOUT 1 FOOTPRINT AT GRADE		431.44m2
WALKOUT 2 FOOTPRINT AT GRADE (FOURPLEX)		444.82m2
WALKOUT 2 FOOTPRINT AT GRADE (TRIPLEX)		333.62m2
WALKUP 1 FOOTPRINT AT GRADE (FOURPLEX)		266.66m2
WALKUP 1 FOOTPRINT AT GRADE (TRIPLEX)		200.00m2
WALKUP 2 FOOTPRINT AT GRADE		396.20m2
PROPOSED DECK AREA W/O 1 (PER UNIT)		23.64m2
PROPOSED DECK AREA W/O 2 (PER UNIT)		26.01m2
PROPOSED PATIO AREA W/U 1 (PER UNIT)		20.07m2
PROPOSED PATIO AREA W/U 2 (PER UNIT)		24.67m2
<b>WALKOUT 1</b>		
W/O 1 BASEMENT FFA (PER UNIT)		62.62m2
W/O 1 MAIN FLOOR FFA (PER UNIT)		68.93m2
W/O 1 SECOND FLOOR FFA (PER UNIT)		95.60m2
W/O 1 TOTAL FFA (PER UNIT)		227.15m2
TOTAL BUILDINGS		5
TOTAL UNITS		20
<b>WALKOUT 2</b>		
W/O 2 BASEMENT FFA (PER UNIT)		71.91m2
W/O 2 MAIN FLOOR FFA (PER UNIT)		71.91m2
W/O 2 SECOND FLOOR FFA (PER UNIT)		75.44m2
W/O 2 TOTAL FFA (PER UNIT)		219.26m2
TOTAL BUILDINGS (FOURPLEX)		1
TOTAL BUILDINGS (TRIPLEX)		1
TOTAL UNITS		7
<b>WALKUP 1</b>		
W/U 1 FIRST FLOOR FFA (PER UNIT)		8.92m2
W/U 1 SECOND FLOOR FFA (PER UNIT)		69.77m2
W/U 1 THIRD FLOOR FFA (PER UNIT)		70.98m2
W/U 1 TOTAL FFA (PER UNIT)		149.67m2
TOTAL BUILDINGS (FOURPLEX)		3
TOTAL BUILDINGS (TRIPLEX)		1
TOTAL UNITS		15
<b>WALKUP 2</b>		
W/U 2 FIRST FLOOR FFA (PER UNIT)		50.54m2
W/U 2 SECOND FLOOR FFA (PER UNIT)		84.91m2
W/U 2 THIRD FLOOR FFA (PER UNIT)		86.86m2
W/U 2 TOTAL FFA (PER UNIT)		222.31m2
TOTAL BUILDINGS		1
TOTAL UNITS		4
TOTAL BUILDINGS		12
TOTAL UNITS		46
FAR	0.8	0.20
SITE COVERAGE	40.0%	11.9%
BUILDING HEIGHT *VARIANCE REQUESTED*	9m/3 STOREYS	9.75m/3 STOREYS

R3 ZONE PERMITTED	REQUESTED
FRONT (WEST) YARD SETBACK	4.500m
REAR (EAST) YARD SETBACK	7.500m
INTERIOR (SOUTH) YARD SETBACK	3.000m
	10.403m
	60.580m
	9.819m

### PARKING CALCULATIONS

REQUIRED PARKING	46 DWELLING UNITS	92 STALLS
VISITOR PARKING	10% OF REQUIRED	10 STALLS
SMALL CAR PARKING	30% OF REQUIRED	28 STALLS
ACCESSIBLE PARKING SPACES	21-100 UNITS	2 STALLS
LOADING SPACES	1 PER 15 DWELLING UNITS	3 STALLS
<b>TOTAL REQUIRED PARKING</b>		<b>107 STALLS</b>

### PROPOSED PARKING

FULL SIZED STALLS ALL BUILDINGS (2.75m X 6.0m)	2 PER DWELLING UNIT	92 STALLS
FULL SIZED VISITOR PARKING (ON-SITE)		10 STALLS
ACCESSIBLE PARKING SPACES (3.9m X 6.0m)		2 STALLS
LOADING SPACES (3.0m X 9.0m)		3 STALLS
<b>TOTAL PROPOSED PARKING</b>		<b>107 STALLS</b>

### BUILDING CODE REVIEW

THE FOLLOWING NOTES PROVIDE INFORMATION HIGHLIGHTING BUILDING DESIGN CRITERIA. IT IS NOT INTENDED TO DESCRIBE ALL DESIGN AND CONSTRUCTION REQUIREMENTS.

ALL CONSTRUCTION SHALL CONFORM TO ALL APPLICABLE SECTIONS OF THE BUILDING CODE.

- TOWNHOUSE BUILDING CONSTRUCTED UNDER PART 9 OF THE BRITISH COLUMBIA BUILDING CODE 2012.  
1.3.3.3 MAX 3 STOREYS, BUILDING AREA NOT EXCEEDING 600m<sup>2</sup>, MAJOR OCCUPANCY GROUP C
- MAJOR OCCUPANCIES:**  
TOWNHOUSE BUILDING: GROUP C - RESIDENTIAL (TABLE 3.1.2.1.)
- BUILDING HEIGHT:**  
3 STOREYS ABOVE GRADE
- OCCUPANCY LOAD:**  
2 PER SLEEPING ROOM  
2 X 3 = 6 PER DWELLING UNIT
- FIRE SEPARATIONS:**  
9.10.9.14 (1) 45 min.
- HEADROOM CLEARANCES:**  
STAIRS & LANDINGS: 1950mm  
ROOM CEILING HEIGHTS: 2100mm  
UNFINISHED BASEMENTS: 2000mm  
MINIMUM AREAS OF MINIMUM CEILING HEIGHTS TO CONFORM TO TABLE 9.5.3.1.
- MINIMUM SOUND TRANSMISSION CLASS RATING**  
9.11.2.1 (1) STC 50



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TALLUS RIDGE ESTATES

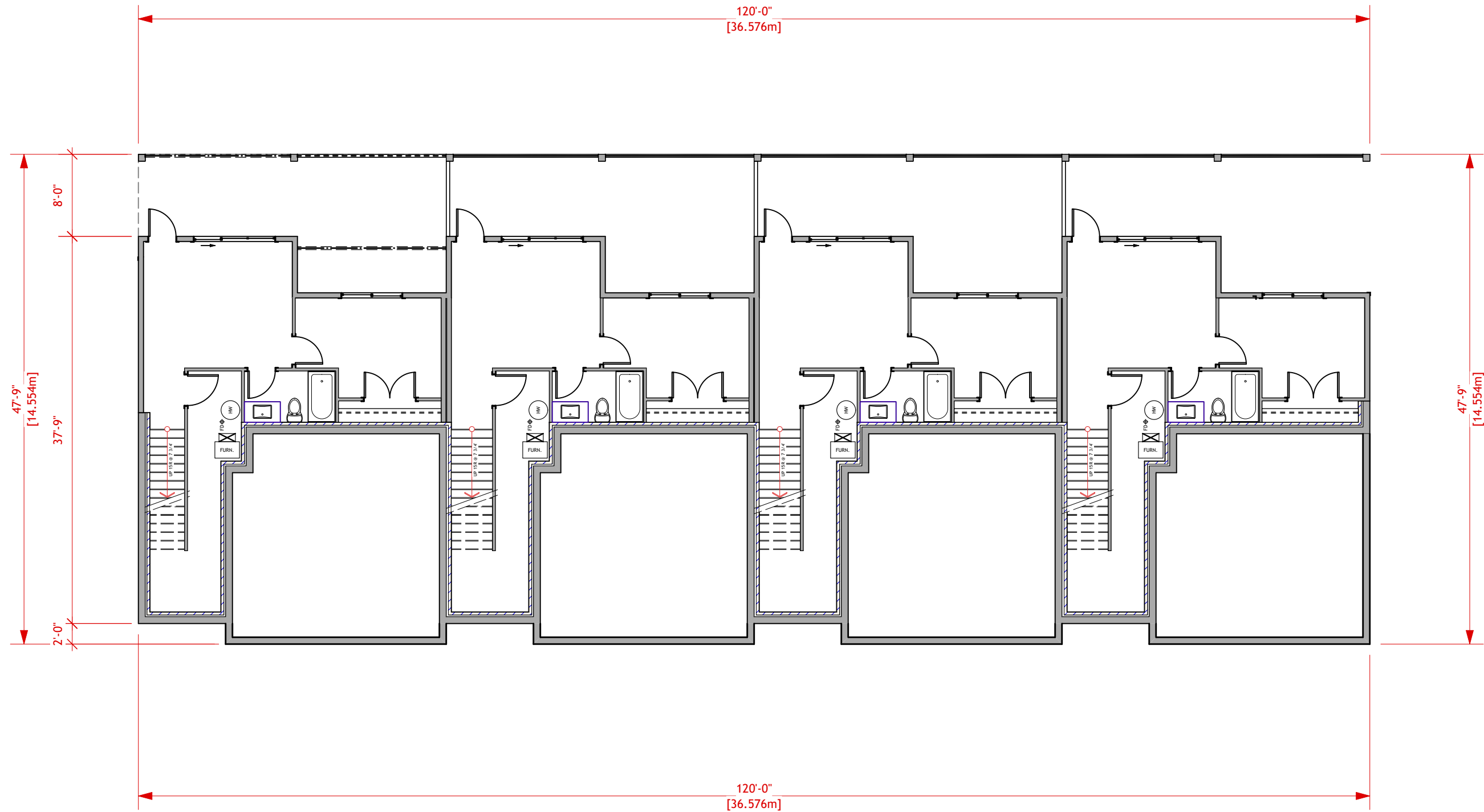
SITE CALCULATIONS

DATE: 8-Jul-24

SCALE: N/A  
ISSUED FOR: REVIEW ONLY

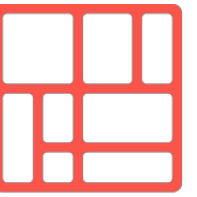
DP1.2





# 1 BASEMENT PLAN

DP2.0 | 3/32" = 1'-0"



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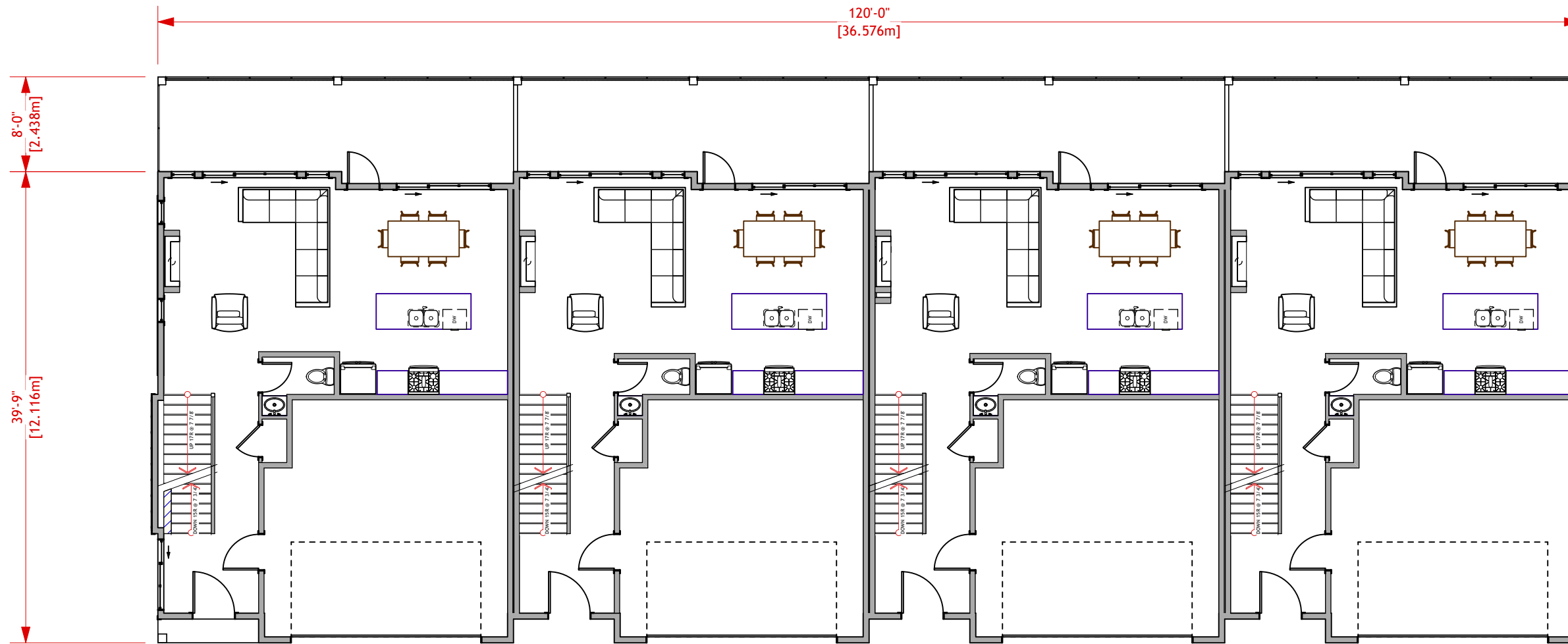
**LOT C MULTIFAMILY**  
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WALKOUT 1  
BASEMENT PLAN

DATE: 8-JUL-24

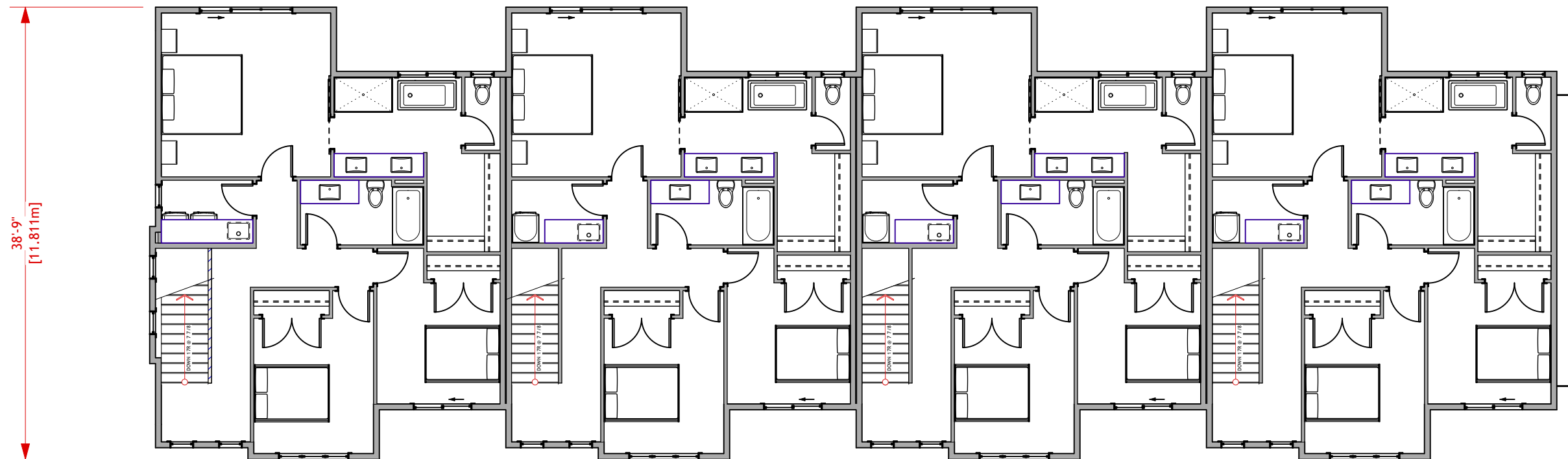
SCALE: 3/32" = 1'-0"  
ISSUED FOR: REVIEW ONLY

DP2.0



# 1 MAIN FLOOR PLAN

DP2.0 | 3/32" = 1'-0"



# 2 SECOND FLOOR PLAN

DP2.0 | 3/32" = 1'-0"



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A STEP AWAY



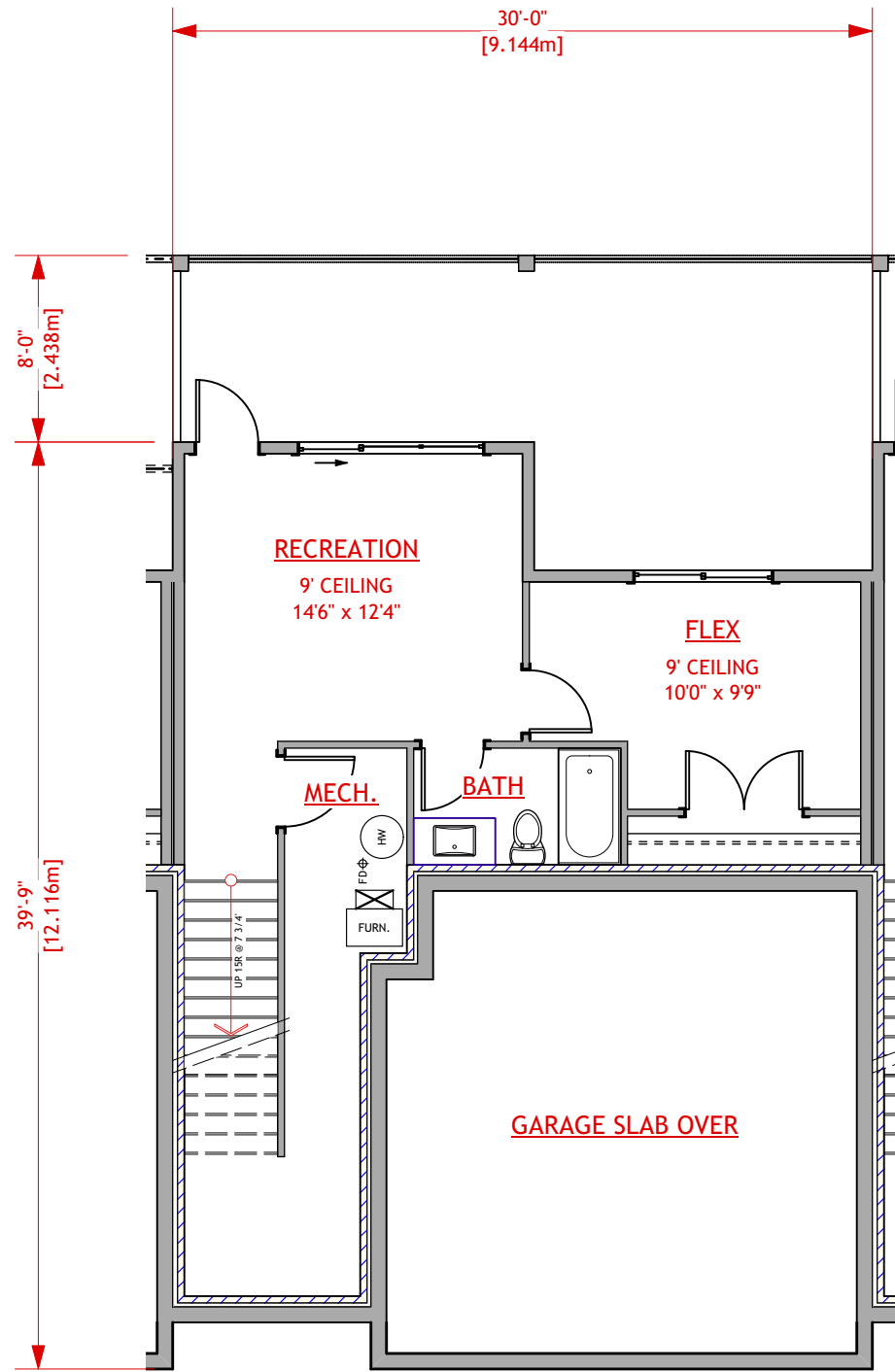
**LOT C MULTIFAMILY**  
TALLUS RIDGE ESTATES

**WALKOUT 1 MAIN  
AND SECOND  
FLOOR PLANS**

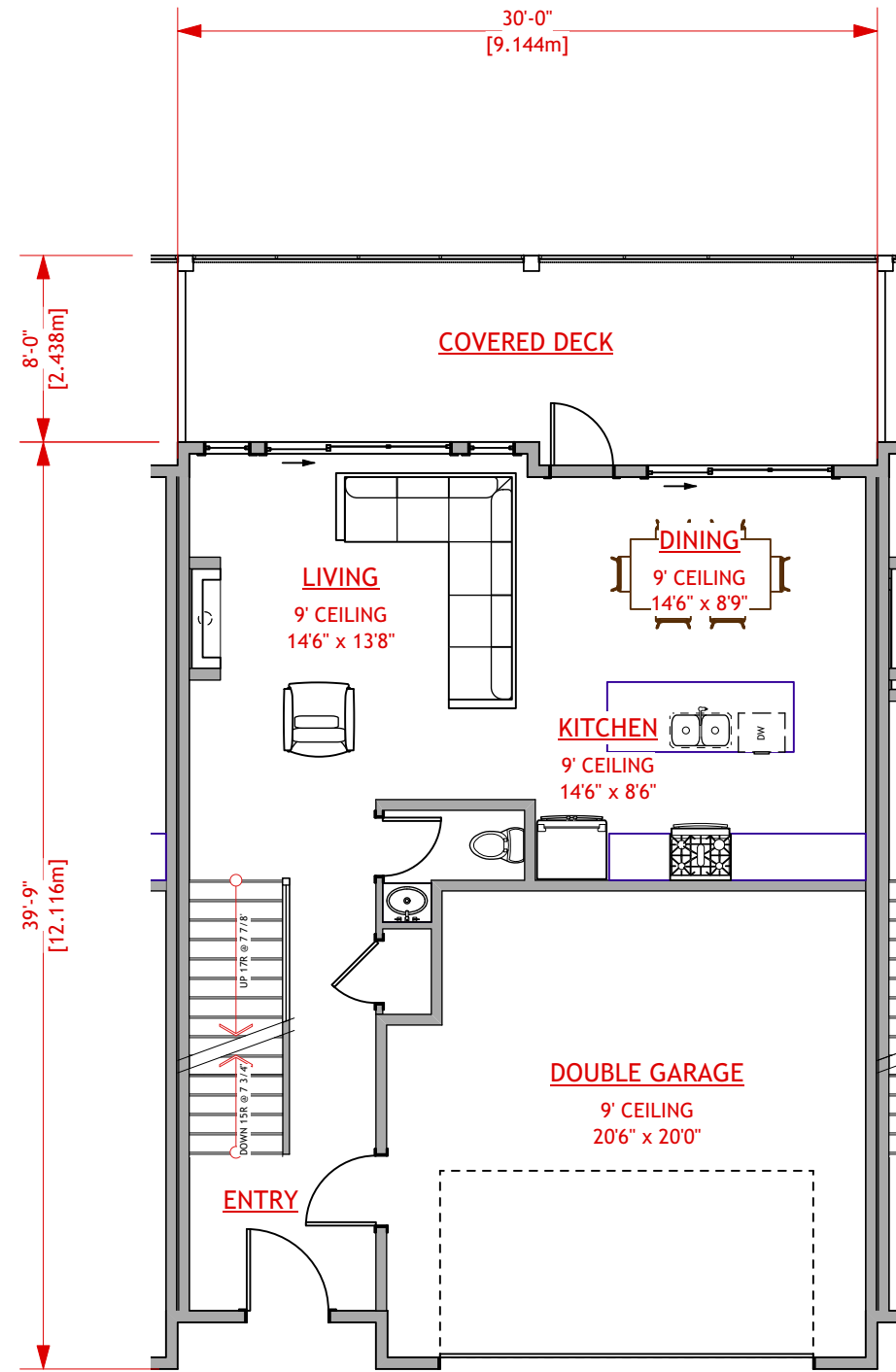
DATE: 8-Jul-24

SCALE: 3/32" = 1'-0"  
ISSUED FOR: REVIEW ONLY

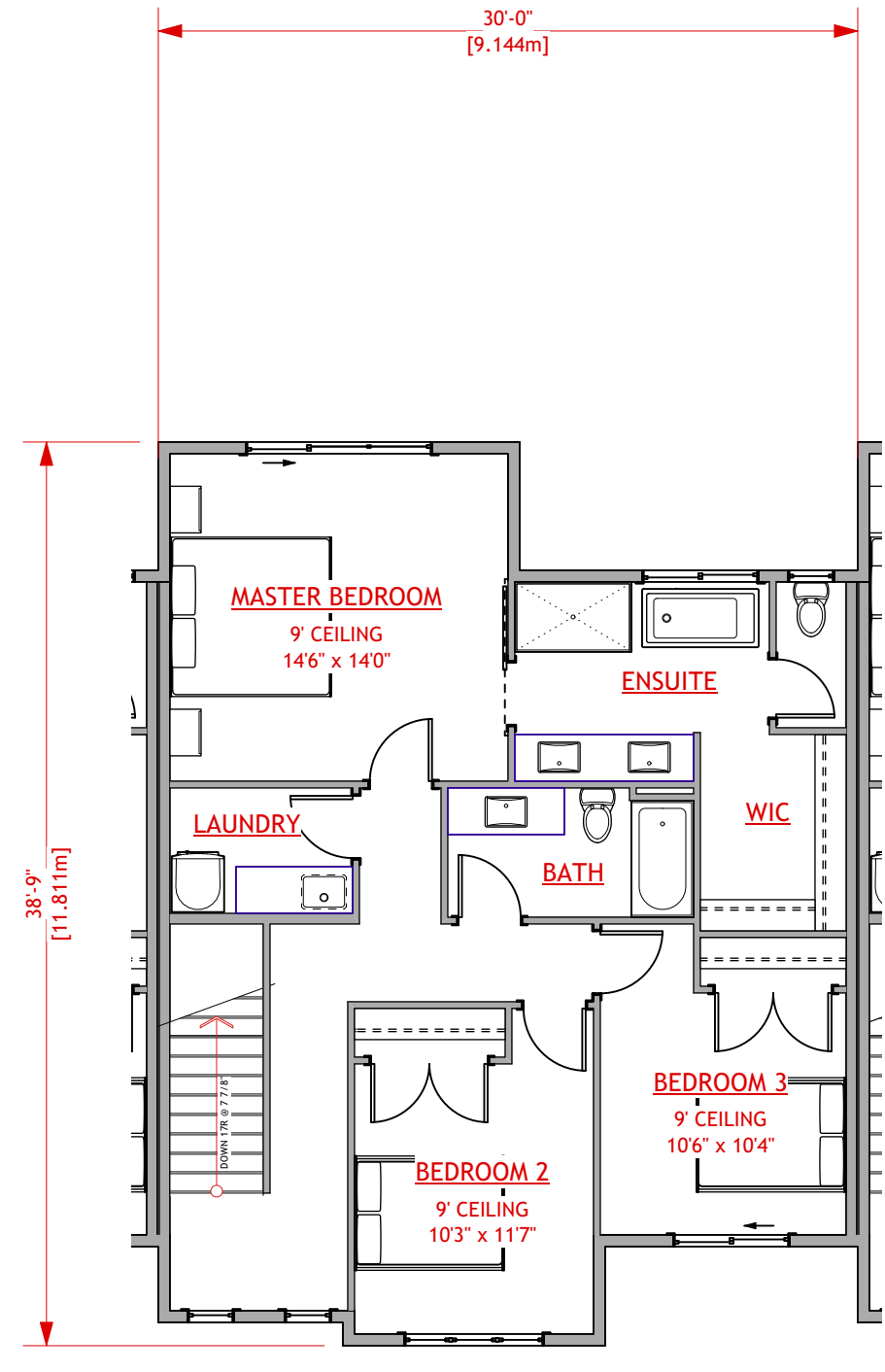
DP2.1



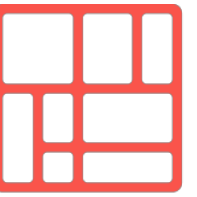
**1 BASEMENT PLAN**  
DP2.2 | 1/8" = 1'-0" | 674 SQ.FT. FFA/UNIT



**2 MAIN FLOOR PLAN**  
DP2.2 | 1/8" = 1'-0" | 742 SQ.FT. FFA/UNIT



**3 SECOND FLOOR PLAN**  
DP2.2 | 1/8" = 1'-0" | 1029 SQ.FT. FFA/UNIT



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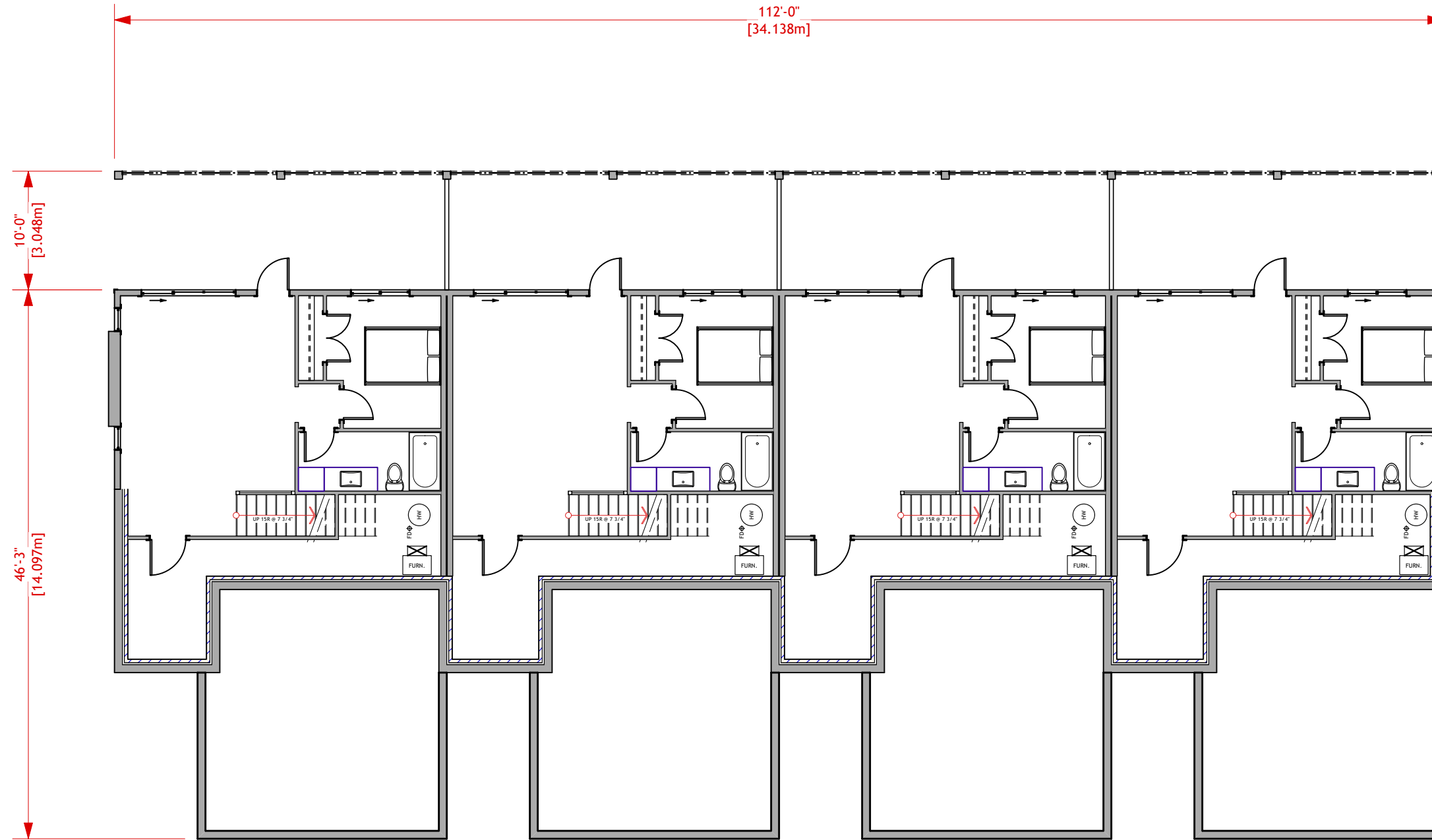
**LOT C MULTIFAMILY**  
TALLUS RIDGE ESTATES

**WALKOUT 1 LARGE SCALE FLOOR PLANS**

DATE: 8-Jul-24

SCALE: 1/8" = 1'-0"  
ISSUED FOR: REVIEW ONLY

**DP2.2**



# 1 BASEMENT PLAN

DP2.2 | 3/32" = 1'-0"



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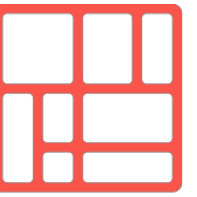
**LOT C MULTIFAMILY**  
TALLUS RIDGE ESTATES

**WALKOUT 2  
BASEMENT PLAN**

DATE: **8-Jul-24**

SCALE: 3/32" = 1'-0"  
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**DP2.3**



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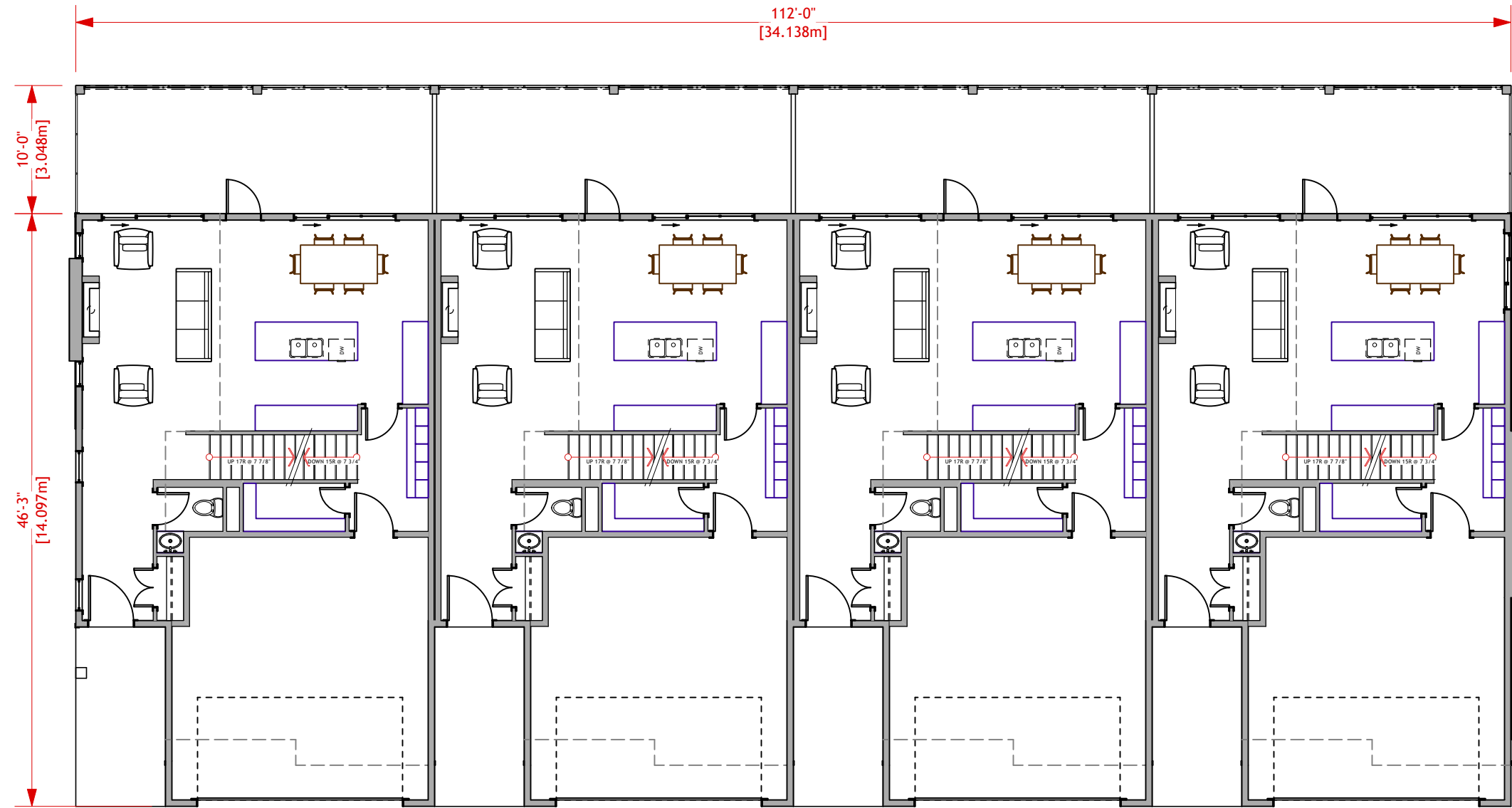
LOT C MULTIFAMILY  
TALLUS RIDGE ESTATES

WALKOUT 2 MAIN  
FLOOR PLAN

DATE: 8-Jul-24

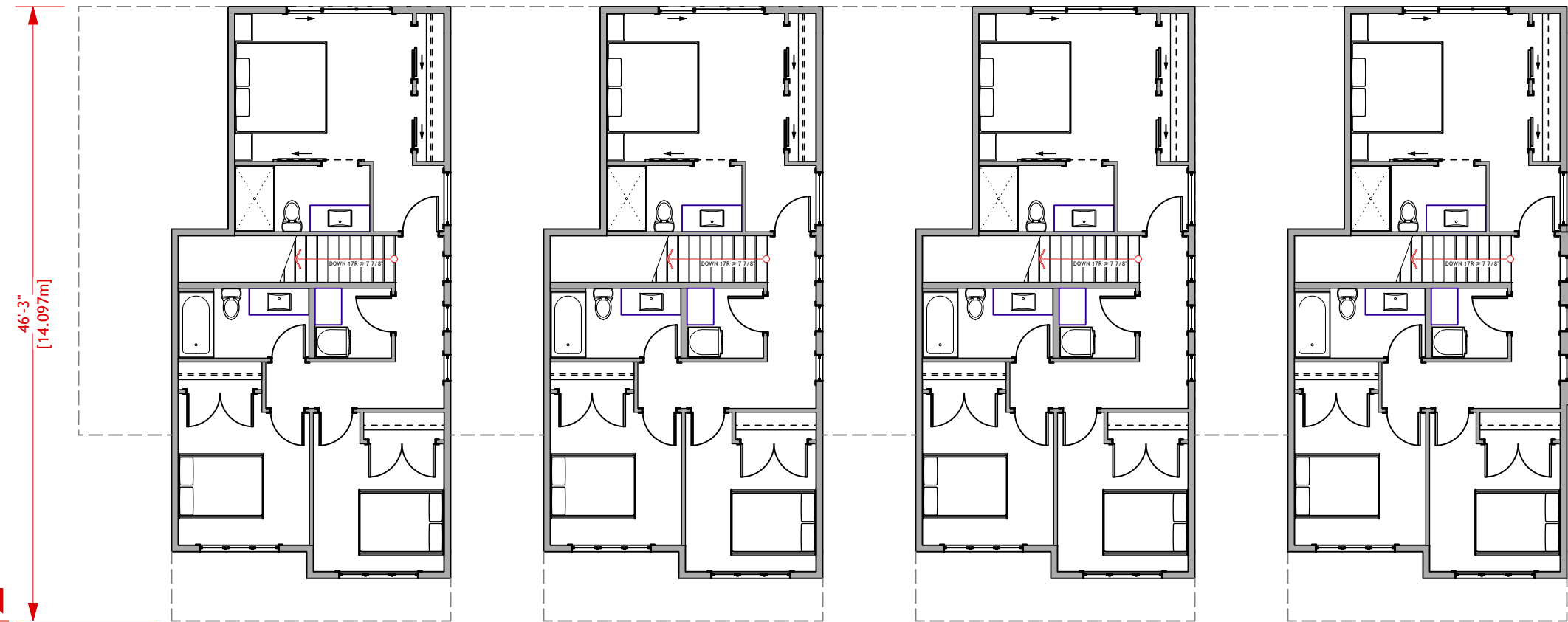
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ISSUED FOR: REVIEW ONLY

DP2.4



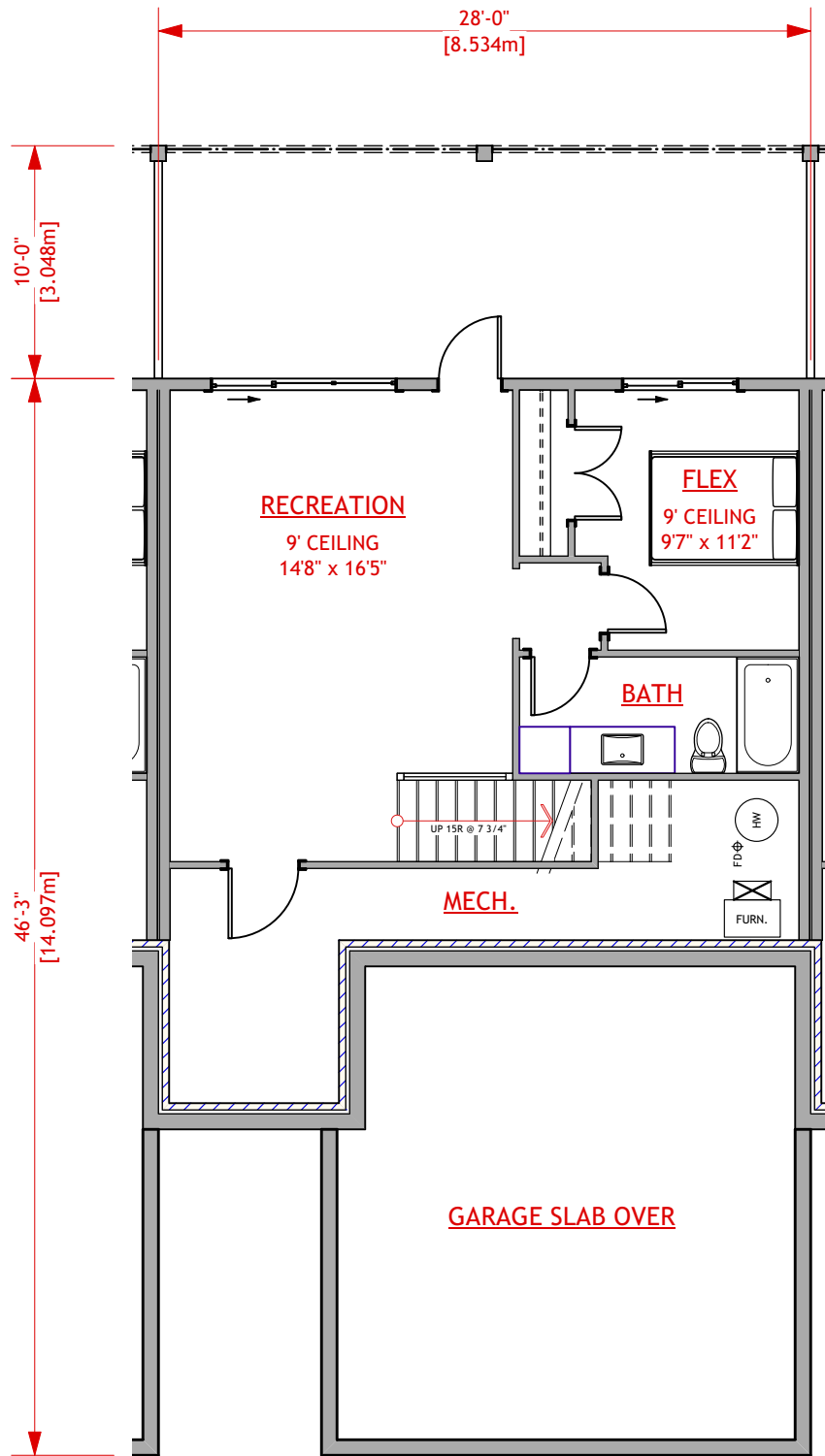
# 1 MAIN FLOOR PLAN

DP2.4 | 3/32" = 1'-0"

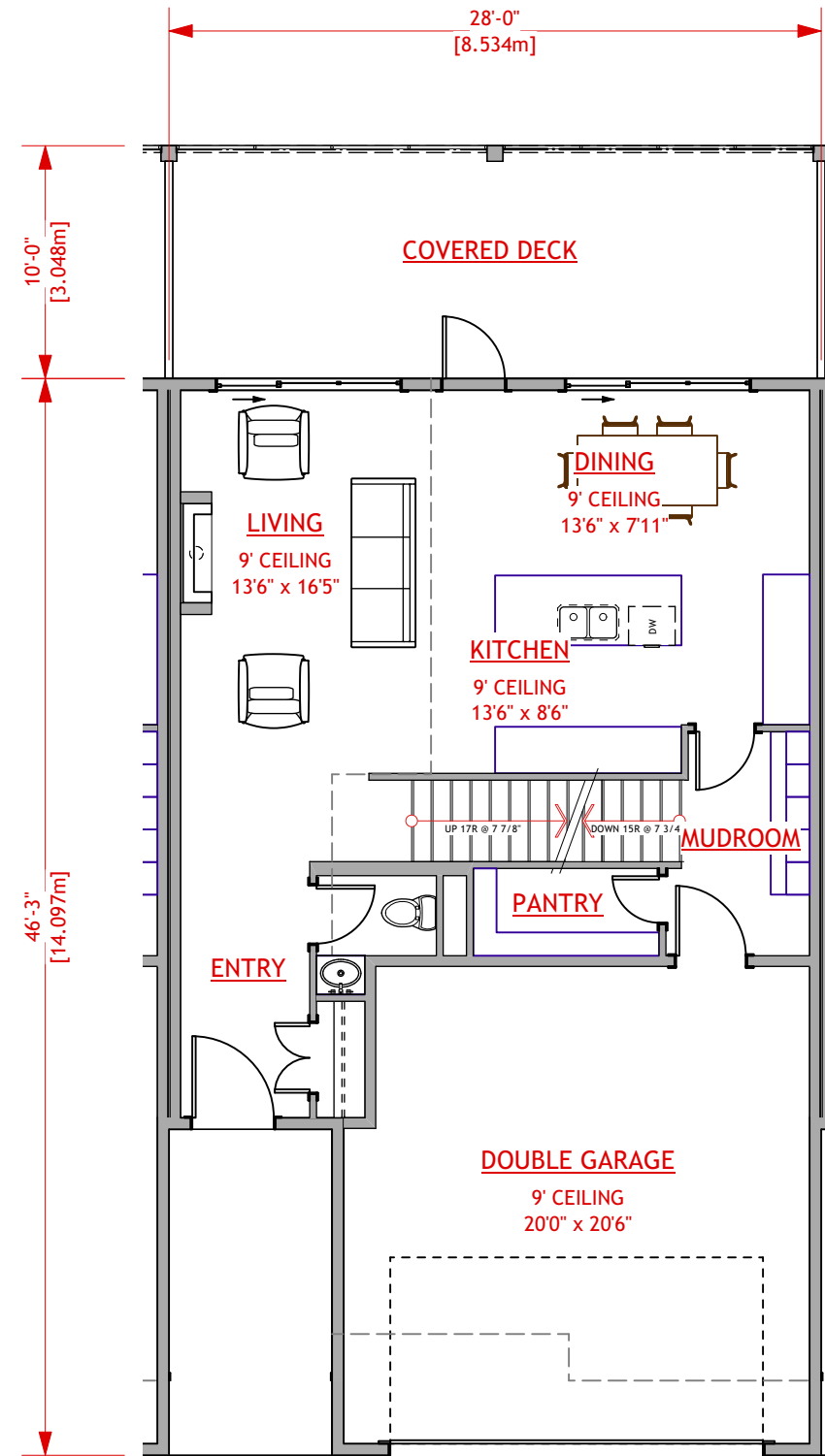


# 2 SECOND FLOOR PLAN

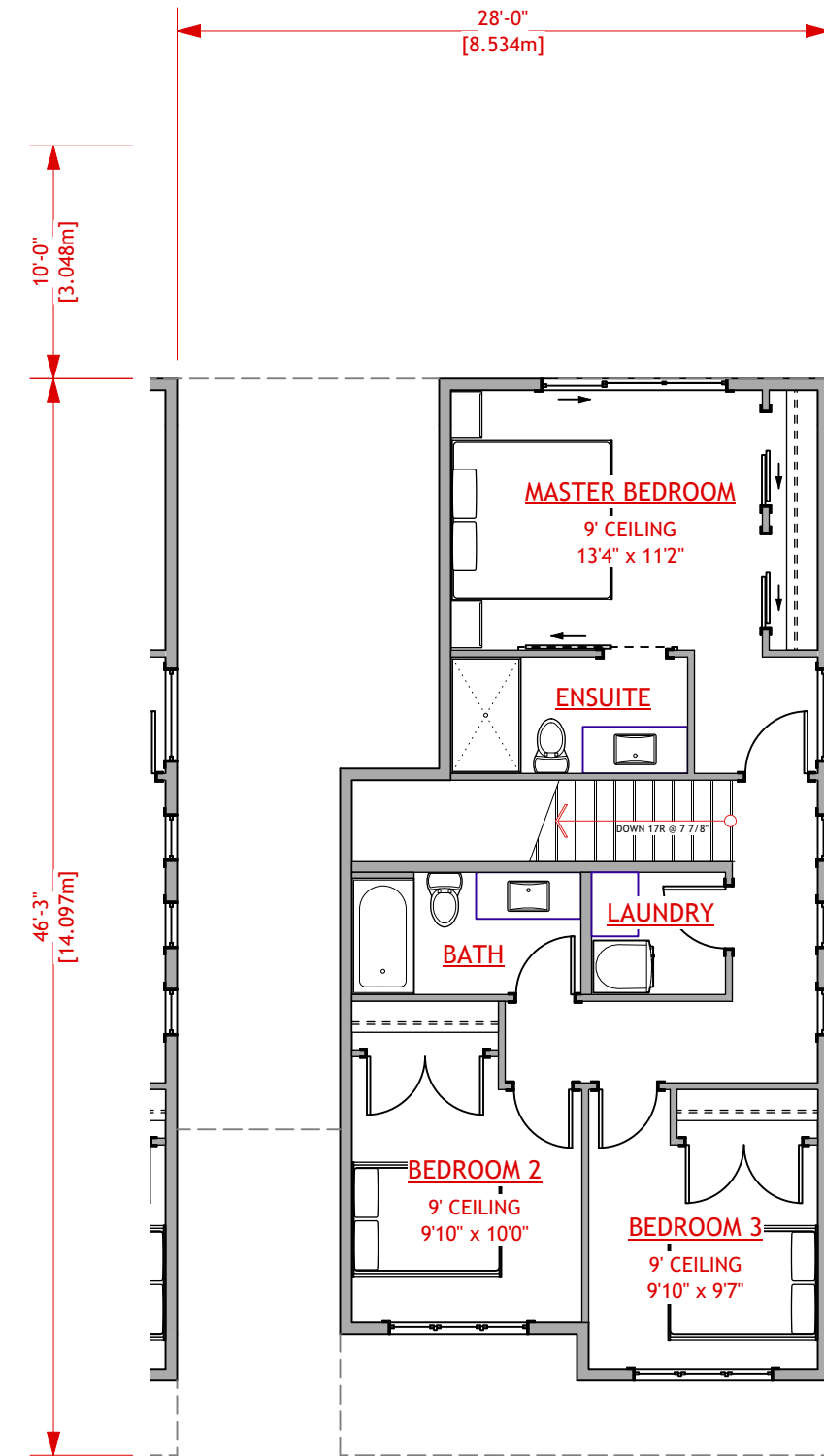
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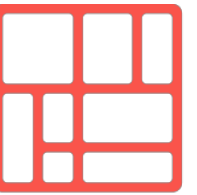
**1 BASEMENT PLAN**  
DP2.5 | 1/8" = 1'-0" | 774 SQ.FT. FFA/UNIT



**2 MAIN FLOOR PLAN**  
DP2.5 | 1/8" = 1'-0" | 774 SQ.FT. FFA/UNIT



**3 SECOND FLOOR PLAN**  
DP2.5 | 1/8" = 1'-0" | 812 SQ.FT. FFA/UNIT



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**TALLUS RIDGE**  
A STEP AWAY



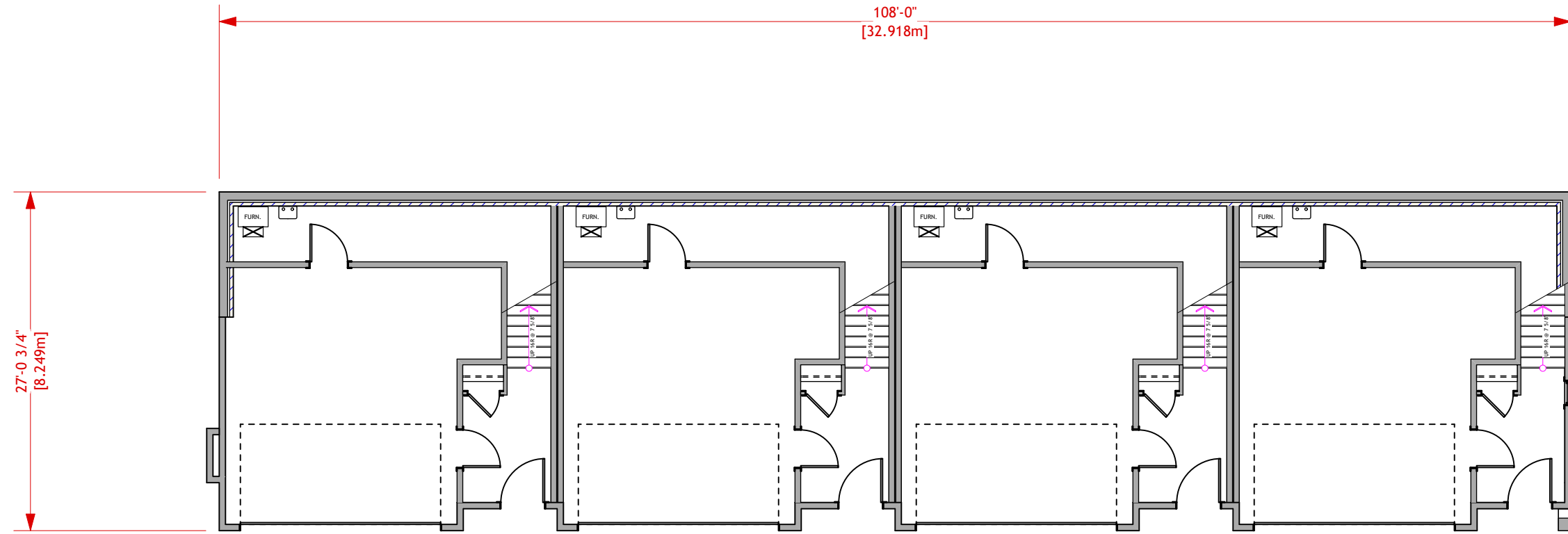
**LOT C MULTIFAMILY**  
TALLUS RIDGE ESTATES

**WALKOUT 2 LARGE SCALE FLOOR PLANS**

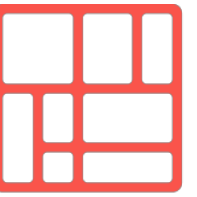
DATE: 8-Jul-24

SCALE: 1/8" = 1'-0"  
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**DP2.5**



**1 | FIRST FLOOR PLAN**  
 DP2.6 3/32" = 1'-0"



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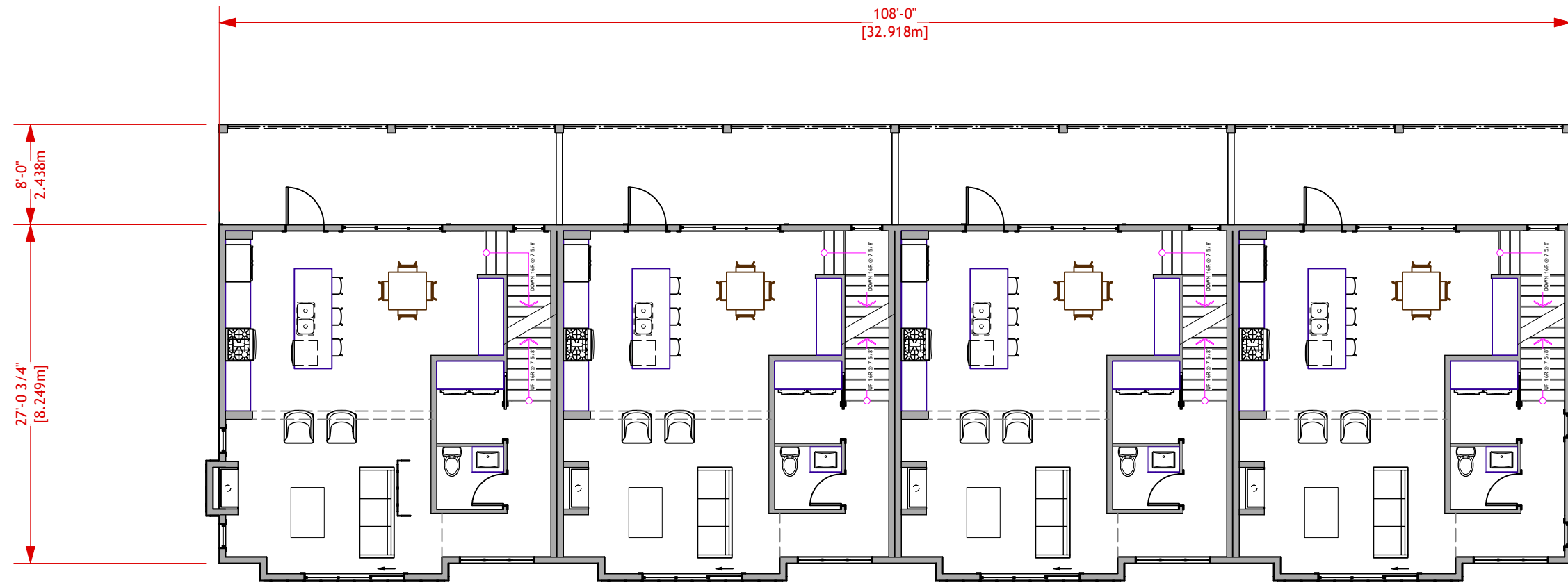
**LOT C MULTIFAMILY**  
 TALLUS RIDGE ESTATES

**WALKUP 1 FIRST FLOOR PLAN**

DATE: 8-Jul-24

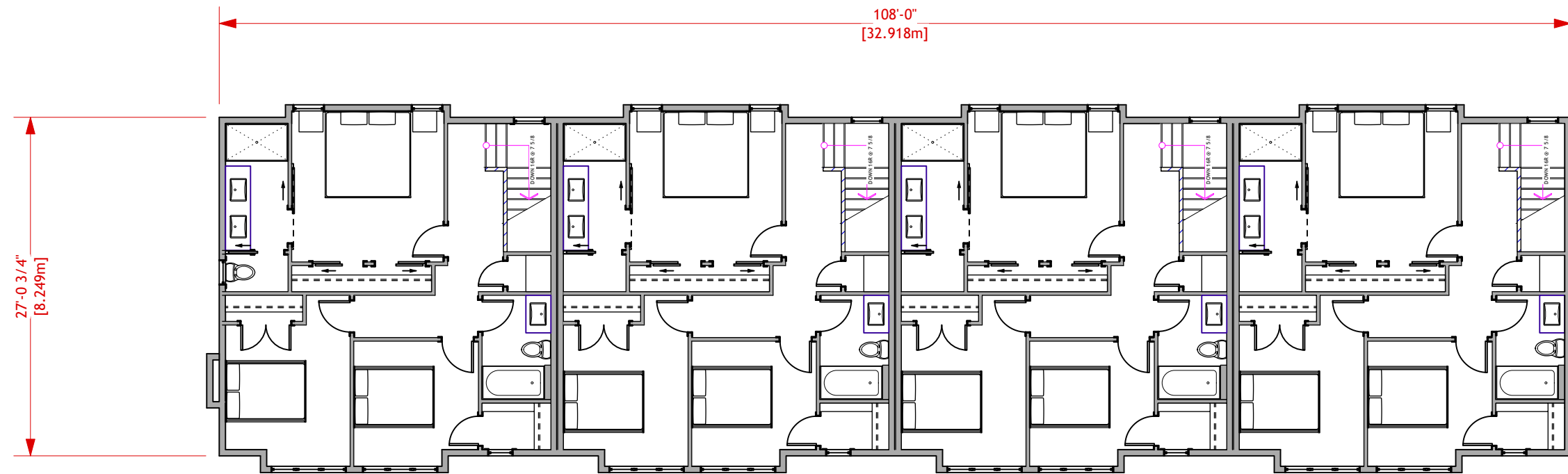
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 ISSUED FOR: REVIEW ONLY

**DP2.6**



## 1 SECOND FLOOR PLAN

DP2.7 | 3/32" = 1'-0"



## 2 THIRD FLOOR PLAN

DP2.7 | 3/32" = 1'-0"



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TALLUS RIDGE ESTATES

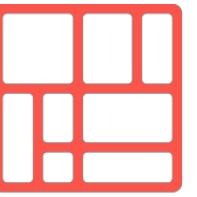
WALKUP 1 SECOND  
AND THIRD FLOOR  
PLANS

DATE:  
8-JUL-24

SCALE: 3/32" = 1'-0"  
ISSUED FOR: REVIEW ONLY

DP2.7





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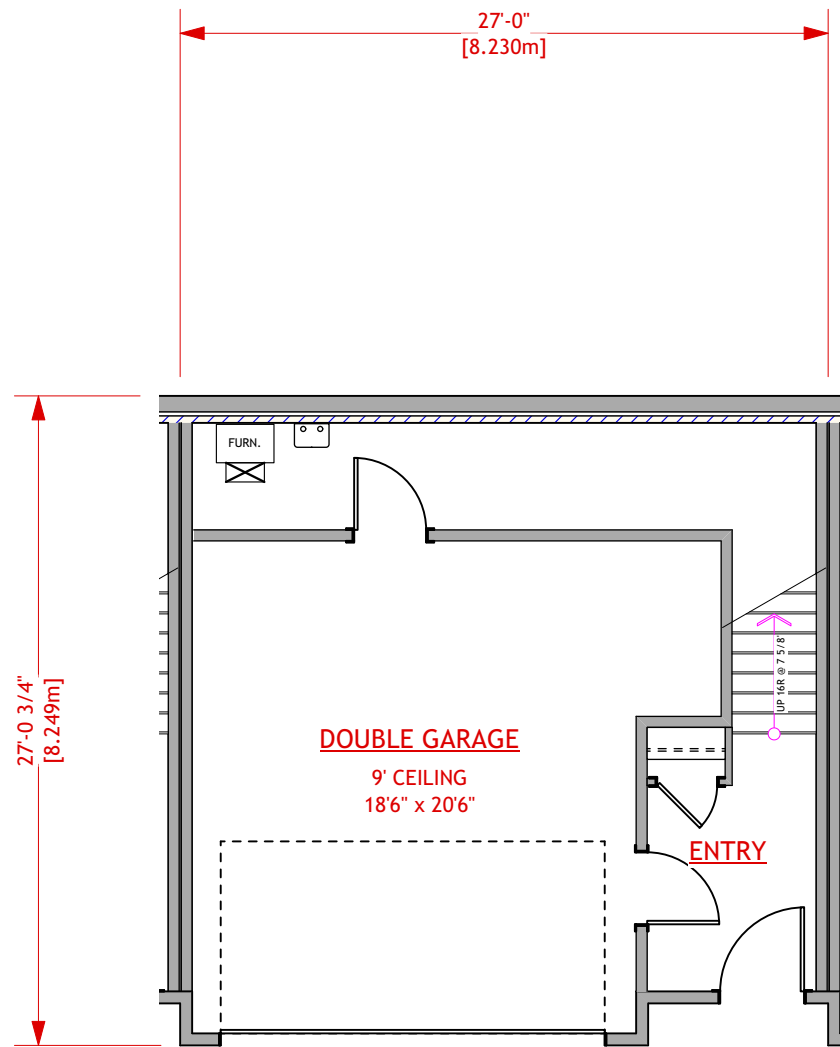
LOT C MULTIFAMILY  
TALLUS RIDGE ESTATES

WALKUP 1 LARGE  
SCALE FLOOR  
PLANS

DATE:  
8-Jul-24

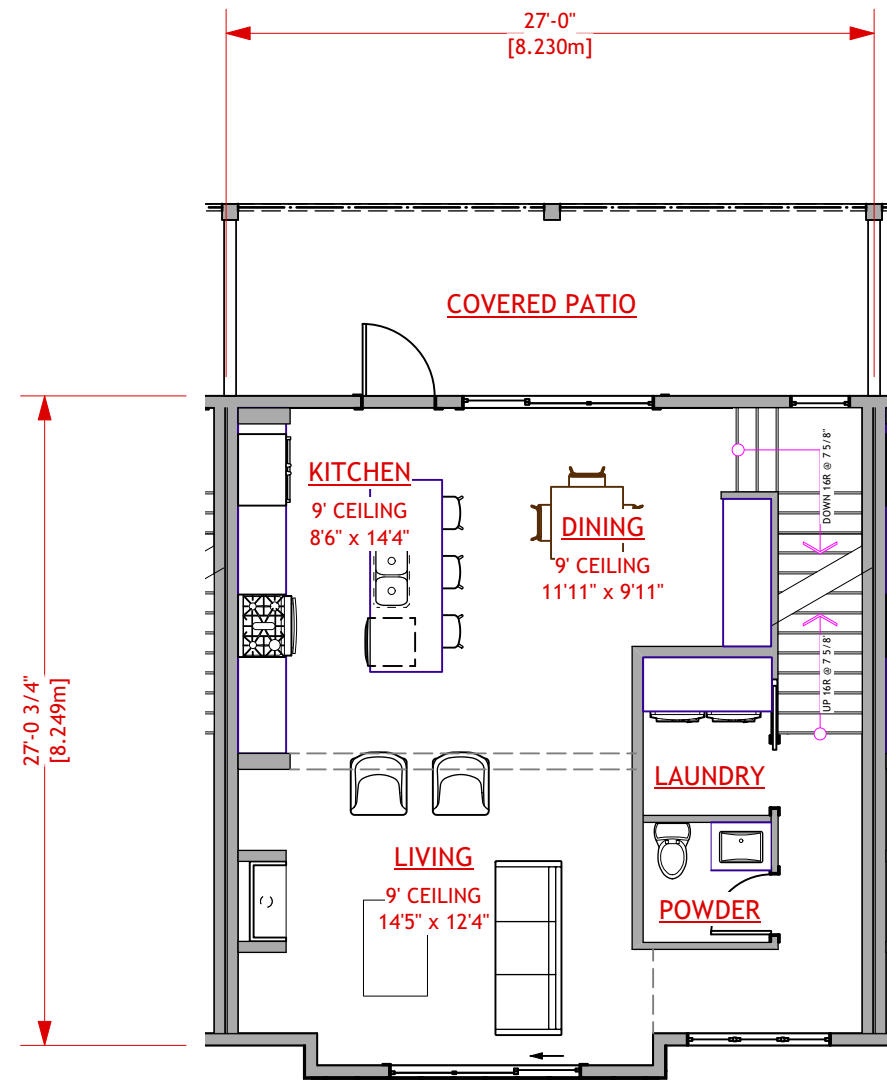
SCALE: 1/8" = 1'-0"  
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DP2.8



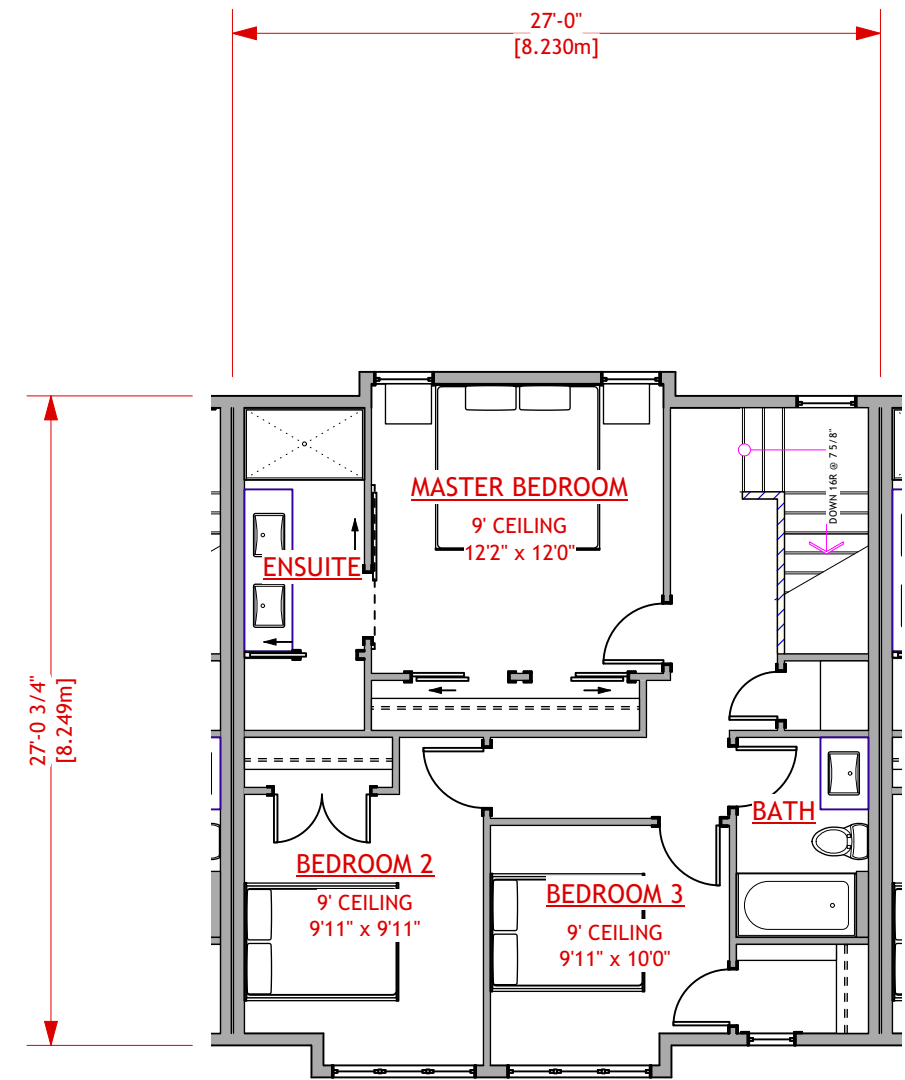
1 FIRST FLOOR PLAN

DP2.8 | 1/8" = 1'-0" | 96 SQ.FT. FFA/UNIT



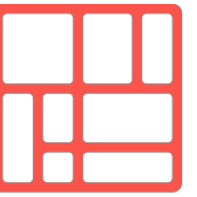
2 SECOND FLOOR PLAN

DP2.8 | 1/8" = 1'-0" | 751 SQ.FT. FFA/UNIT



3 THIRD FLOOR PLAN

DP2.8 | 1/8" = 1'-0" | 764 SQ.FT. FFA/UNIT



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TALLUS RIDGE  
A STEP AWAY



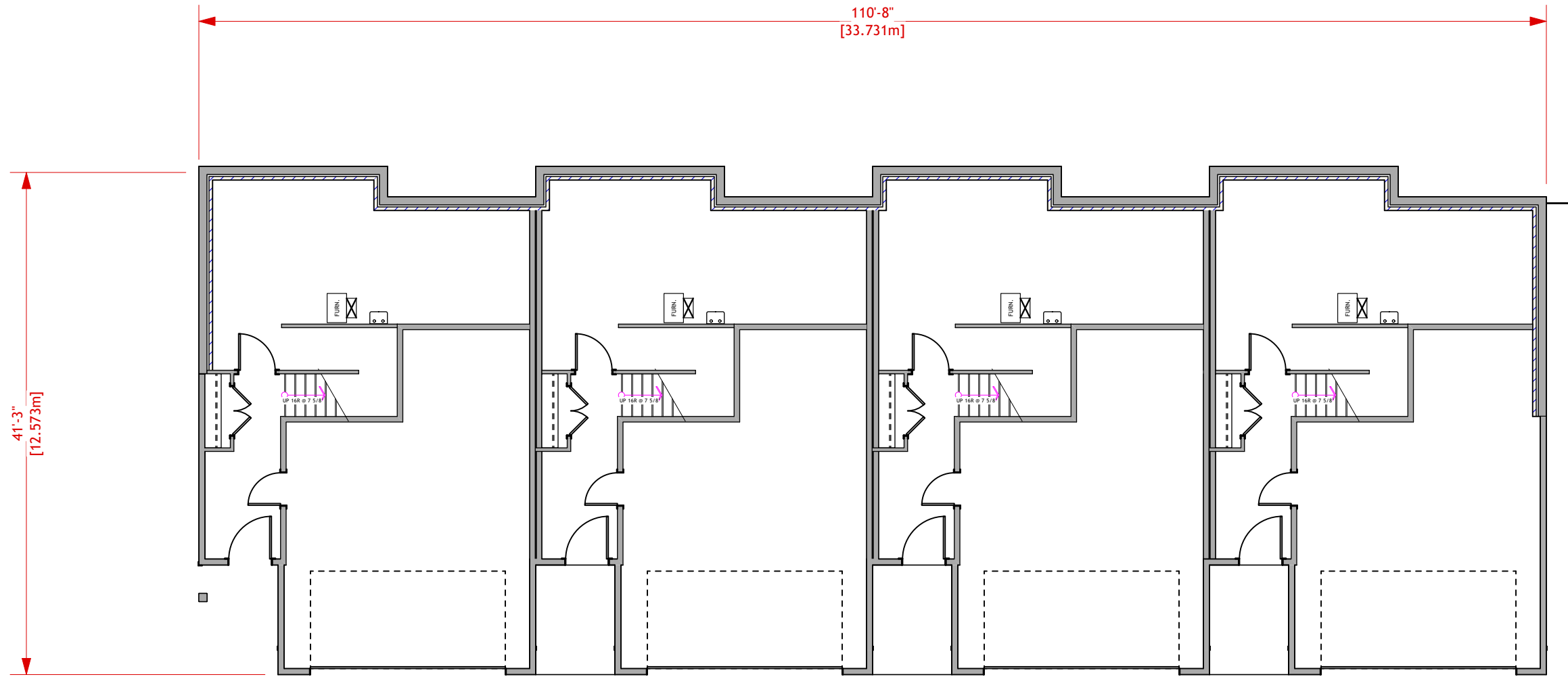
LOT C MULTIFAMILY  
TALLUS RIDGE ESTATES

WALKUP 2 FIRST  
FLOOR PLAN

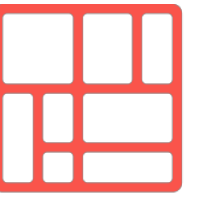
DATE:  
8-Jul-24

SCALE: 3/32" = 1'-0"  
ISSUED FOR: REVIEW ONLY

DP2.9



1 | FIRST FLOOR  
DP2.9 | 3/32" = 1'-0"



IHS DESIGN

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KELOWNA, BC  
250.212.7938  
info@ihdesign.ca

TALLUS RIDGE  
A STEP AWAY



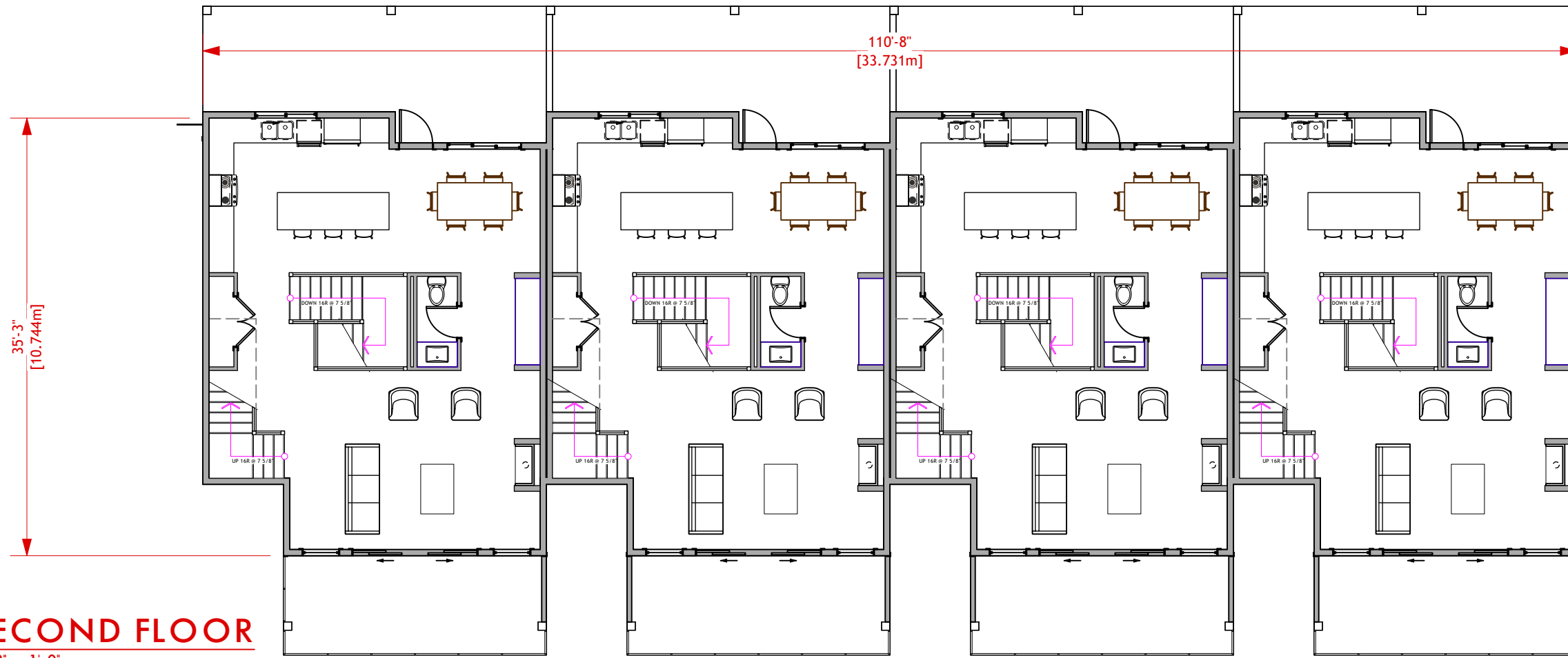
LOT C MULTIFAMILY  
TALLUS RIDGE ESTATES

WALKUP 2 SECOND  
AND THIRD FLOOR  
PLANS

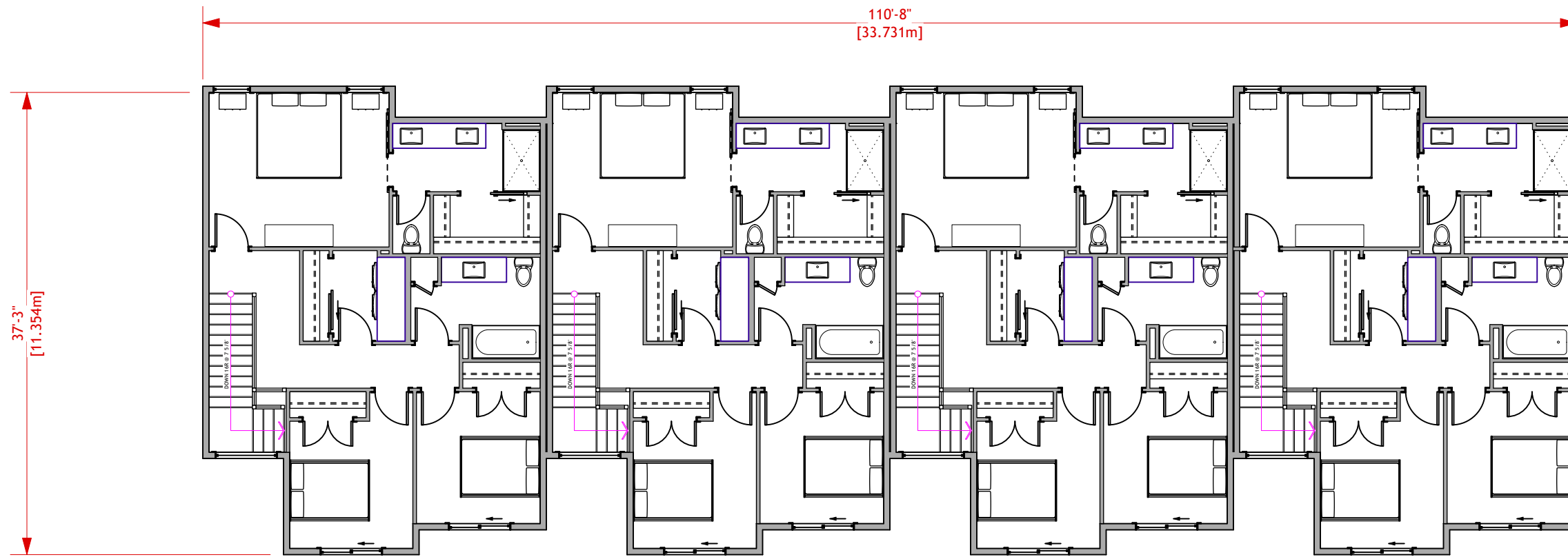
DATE: 8-Jul-24

SCALE: 3/32" = 1'-0"  
ISSUED FOR: REVIEW ONLY

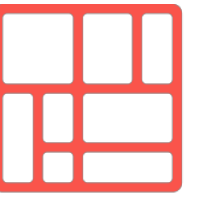
DP2.10



**1 SECOND FLOOR**  
DP2.10/3/32" = 1'-0"



**2 THIRD FLOOR**  
DP2.10/3/32" = 1'-0"



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250.212.7938  
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TALLUS RIDGE  
A STEP AWAY



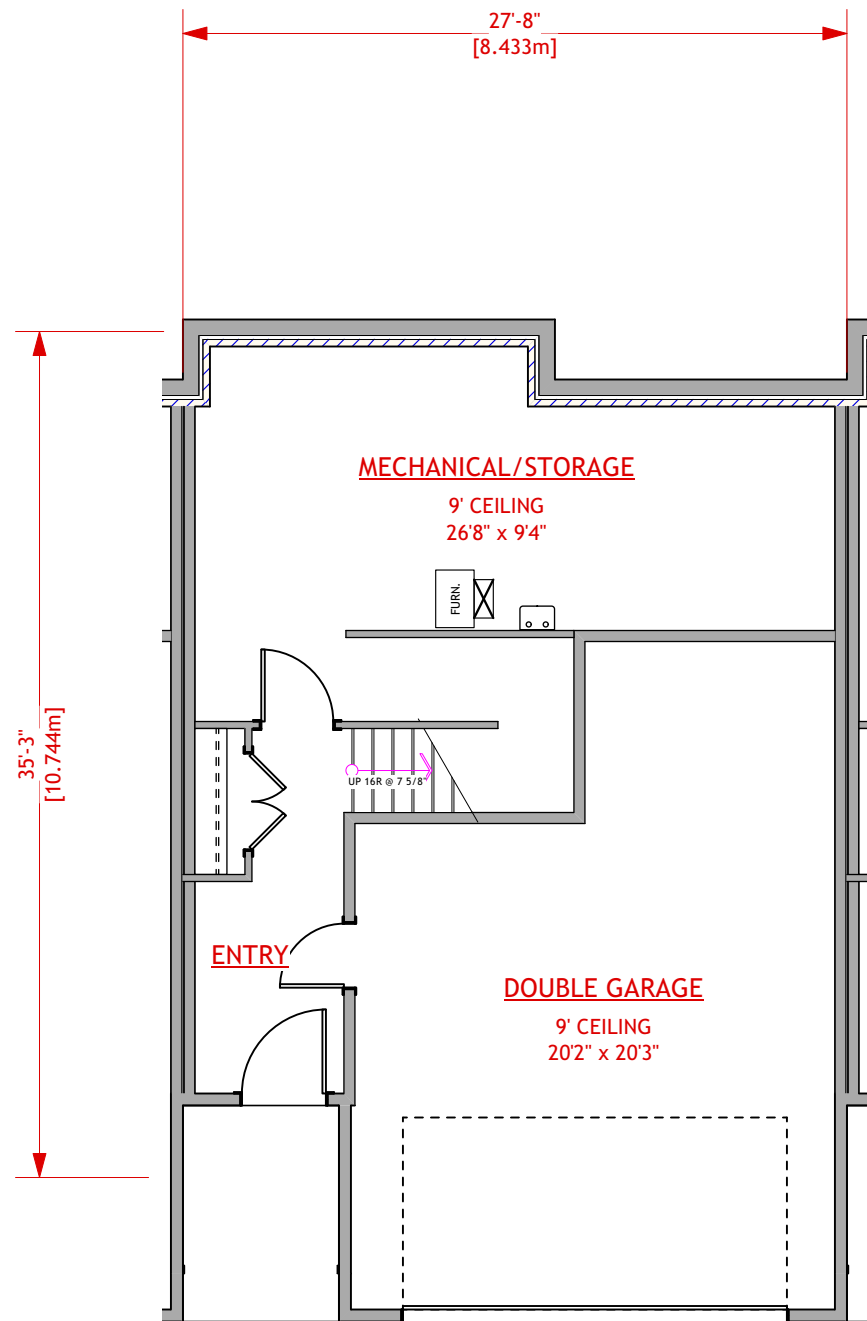
LOT C MULTIFAMILY  
TALLUS RIDGE ESTATES

WALKUP 2 LARGE  
SCALE FLOOR  
PLANS

DATE:  
8-Jul-24

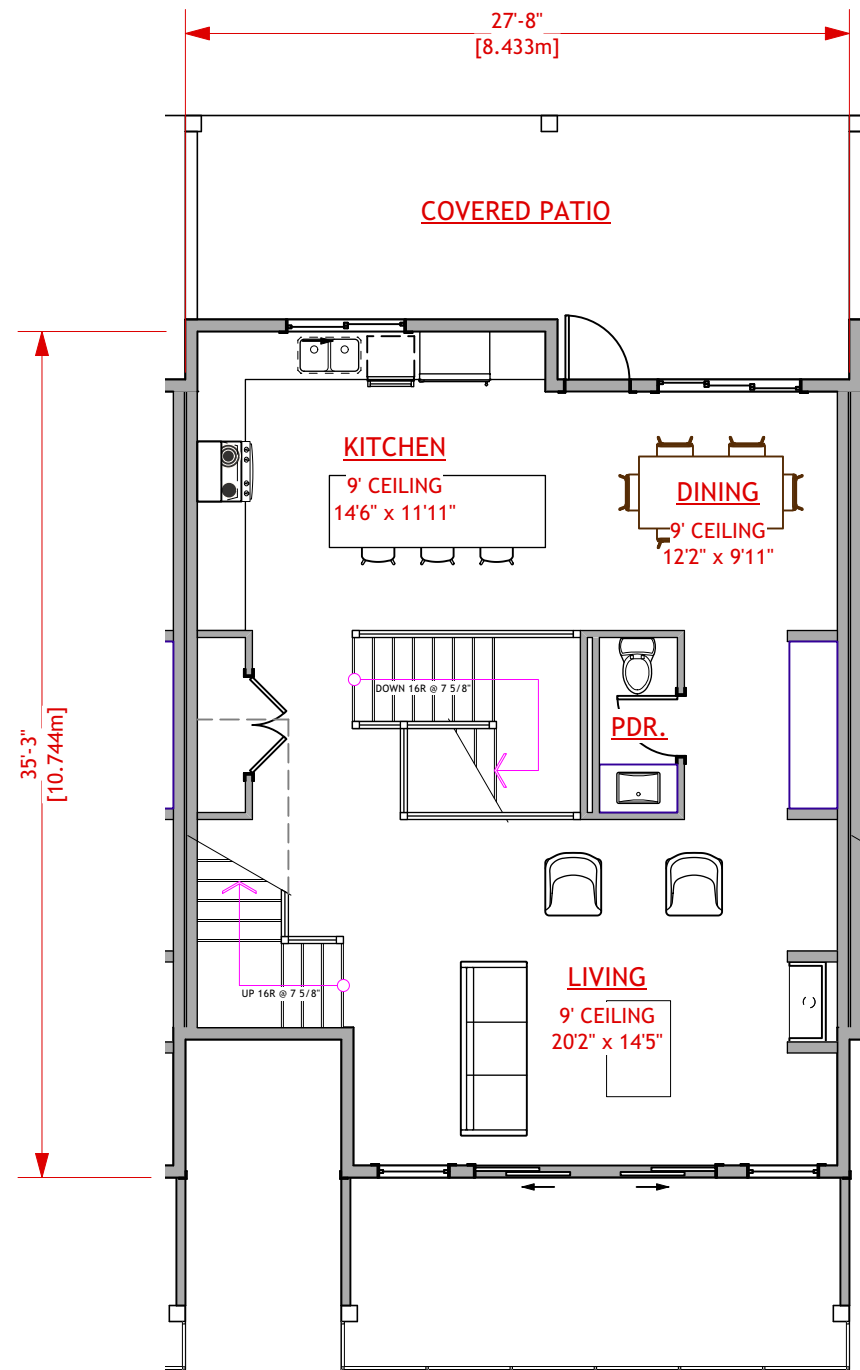
SCALE: 1/8" = 1'-0"  
ISSUED FOR: REVIEW ONLY

DP2.11



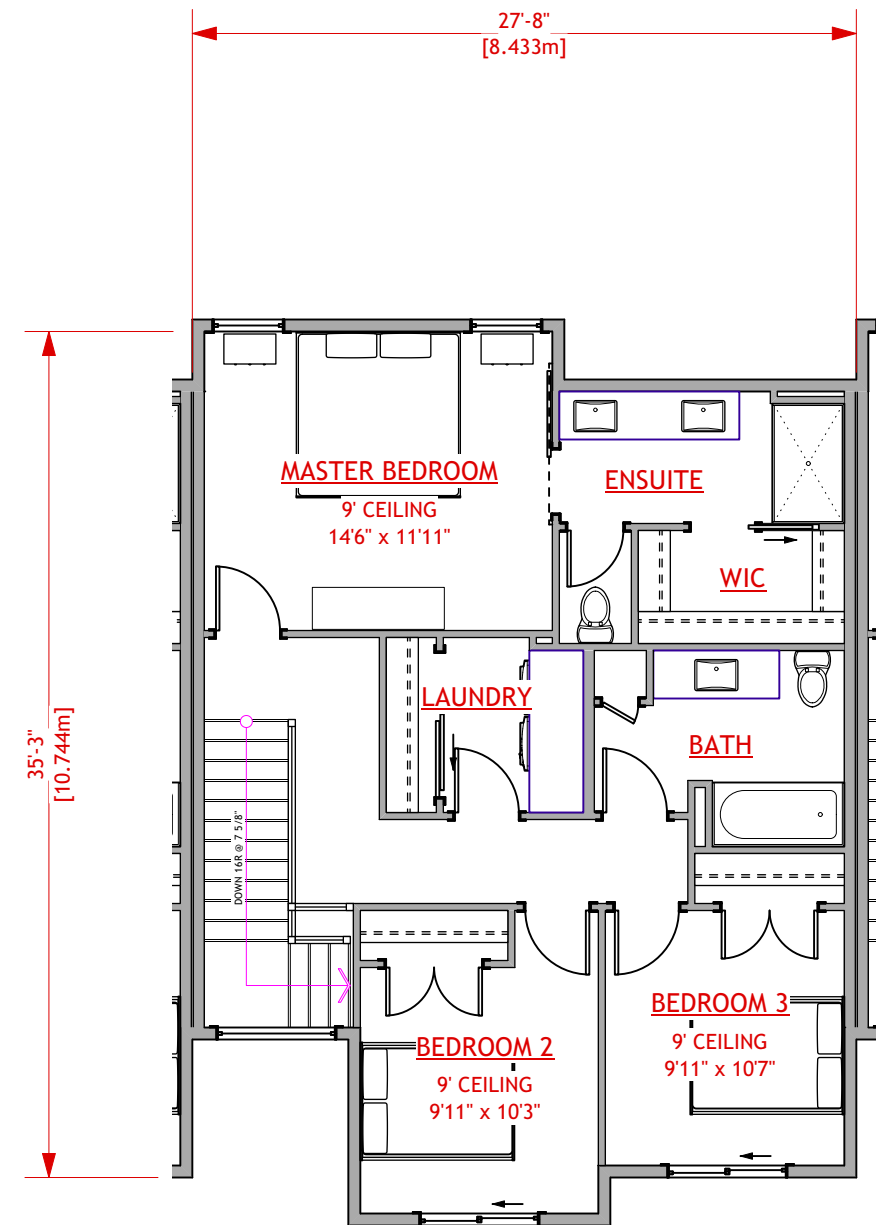
### 1 | FIRST FLOOR

DP2.11 | 1/8" = 1'-0" 544 SQ.FT. FFA/UNIT



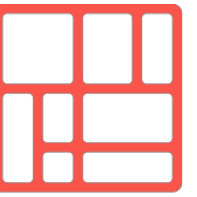
### 2 | SECOND FLOOR

DP2.11 | 1/8" = 1'-0" 914 SQ.FT. FFA/UNIT



### 3 | THIRD FLOOR

DP2.11 | 1/8" = 1'-0" 935 SQ.FT. FFA/UNIT



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TALLUS RIDGE  
A STEP AWAY



LOT C MULTIFAMILY  
TALLUS RIDGE ESTATES

WALKOUT 1  
NORTH & SOUTH  
ELEVATIONS

DATE: 8-Jul-24

SCALE: 3/32" = 1'-0"  
ISSUED FOR: REVIEW ONLY

DP3.0



## 1 | SOUTH ELEVATION

DP3.0 | 3/32" = 1'-0"



## 2 | NORTH ELEVATION

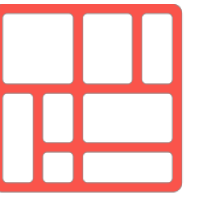
DP3.0 | 3/32" = 1'-0"



**1 | WEST ELEVATION**  
 DP3.1 | 1/8" = 1'-0"



**2 | EAST ELEVATION**  
 DP3.1 | 1/8" = 1'-0"



**IHS DESIGN**  
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 KELOWNA, BC  
 250.212.7938  
 info@ihsdesign.ca

**TALLUS RIDGE**  
 A STEP AWAY

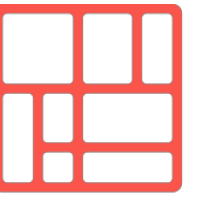


**LOT C MULTIFAMILY**  
 TALLUS RIDGE ESTATES

**WALKOUT 1**  
 EAST & WEST  
 ELEVATIONS

DATE: 8-Jul-24

SCALE: 1/8" = 1'-0"  
 ISSUED FOR: REVIEW ONLY



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TALLUS RIDGE  
A STEP AWAY



LOT C MULTIFAMILY

TALLUS RIDGE ESTATES

WALKOUT 1  
PERSPECTIVE VIEWS

DATE:  
8-Jul-24

SCALE: 1/8" = 1'-0"  
ISSUED FOR: REVIEW ONLY

DP3.2





**1 | SOUTH ELEVATION**

DP3.5 | 1/8" = 1'-0"



**2 | NORTH ELEVATION**

DP3.5 | 1/8" = 1'-0"



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**TALLUS RIDGE**  
A STEP AWAY



**LOT C MULTIFAMILY**  
TALLUS RIDGE ESTATES

**WALKOUT 2**  
NORTH & SOUTH  
ELEVATIONS

DATE: 8-Jul-24

SCALE: 1/8" = 1'-0"  
ISSUED FOR: REVIEW ONLY

**DP3.3**

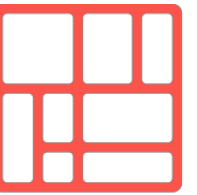




**1 | WEST ELEVATION**  
DP3.5 | 1/8" = 1'-0"



**2 | EAST ELEVATION**  
DP3.5 | 1/8" = 1'-0"



**IHS DESIGN**

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KELOWNA, BC  
250.212.7938  
info@ihdesign.ca

**TALLUS RIDGE**  
A STEP AWAY



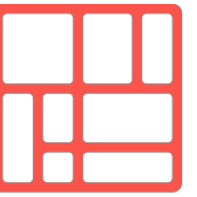
**LOT C MULTIFAMILY**  
TALLUS RIDGE ESTATES

**WALKOUT 2  
EAST & WEST  
ELEVATIONS**

DATE: 8-Jul-24

SCALE: 1/8" = 1'-0"  
ISSUED FOR: REVIEW ONLY

**DP3.4**



IHS DESIGN

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250.212.7938  
info@ihdesign.ca

TALLUS RIDGE  
A STEP AWAY



LOT C MULTIFAMILY  
TALLUS RIDGE ESTATES

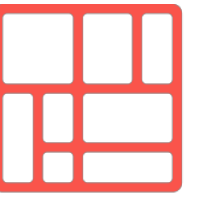
WALKOUT 2  
PERSPECTIVE VIEWS

DATE:  
8-Jul-24

SCALE: 1/8" = 1'-0"  
ISSUED FOR: REVIEW ONLY

DP3.5





IHS DESIGN

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KELOWNA, BC  
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info@ihdesign.ca

TALLUS RIDGE  
A STEP AWAY



LOT C MULTIFAMILY  
TALLUS RIDGE ESTATES

WALKUP 1  
NORTH & SOUTH  
ELEVATIONS

DATE: 8-Jul-24

SCALE: 1/8" = 1'-0"  
ISSUED FOR: REVIEW ONLY

DP3.6



## 1 | SOUTH ELEVATION

DP3.0 | 1/8" = 1'-0"



## 2 | NORTH ELEVATION

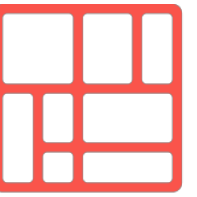
DP3.0 | 1/8" = 1'-0"



**1 | WEST ELEVATION**  
 DP3.8 | 1/8" = 1'-0"



**2 | EAST ELEVATION**  
 DP3.8 | 1/8" = 1'-0"



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 #202-1470 ST. PAUL ST.  
 KELOWNA, BC  
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 info@ihdesign.ca

**TALLUS RIDGE**  
 A STEP AWAY



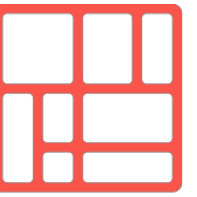
**LOT C MULTIFAMILY**  
 TALLUS RIDGE ESTATES

WALKUP 1  
 EAST & WEST  
 ELEVATIONS

DATE:  
 8-Jul-24

SCALE: 1/8" = 1'-0"  
 ISSUED FOR: REVIEW ONLY

DP3.7



IHS DESIGN

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info@ihdesign.ca

TALLUS RIDGE  
A STEP AWAY



LOT C MULTIFAMILY  
TALLUS RIDGE ESTATES

WALKUP 1  
PERSPECTIVE VIEWS

DATE:  
8-Jul-24

SCALE: N/A  
ISSUED FOR: REVIEW ONLY

DP3.8





**1 | SOUTH ELEVATION**

DP3.11 | 1/8" = 1'-0"



**2 | NORTH ELEVATION**

DP3.11 | 1/8" = 1'-0"



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KELOWNA, BC  
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**TALLUS RIDGE**  
A STEP AWAY



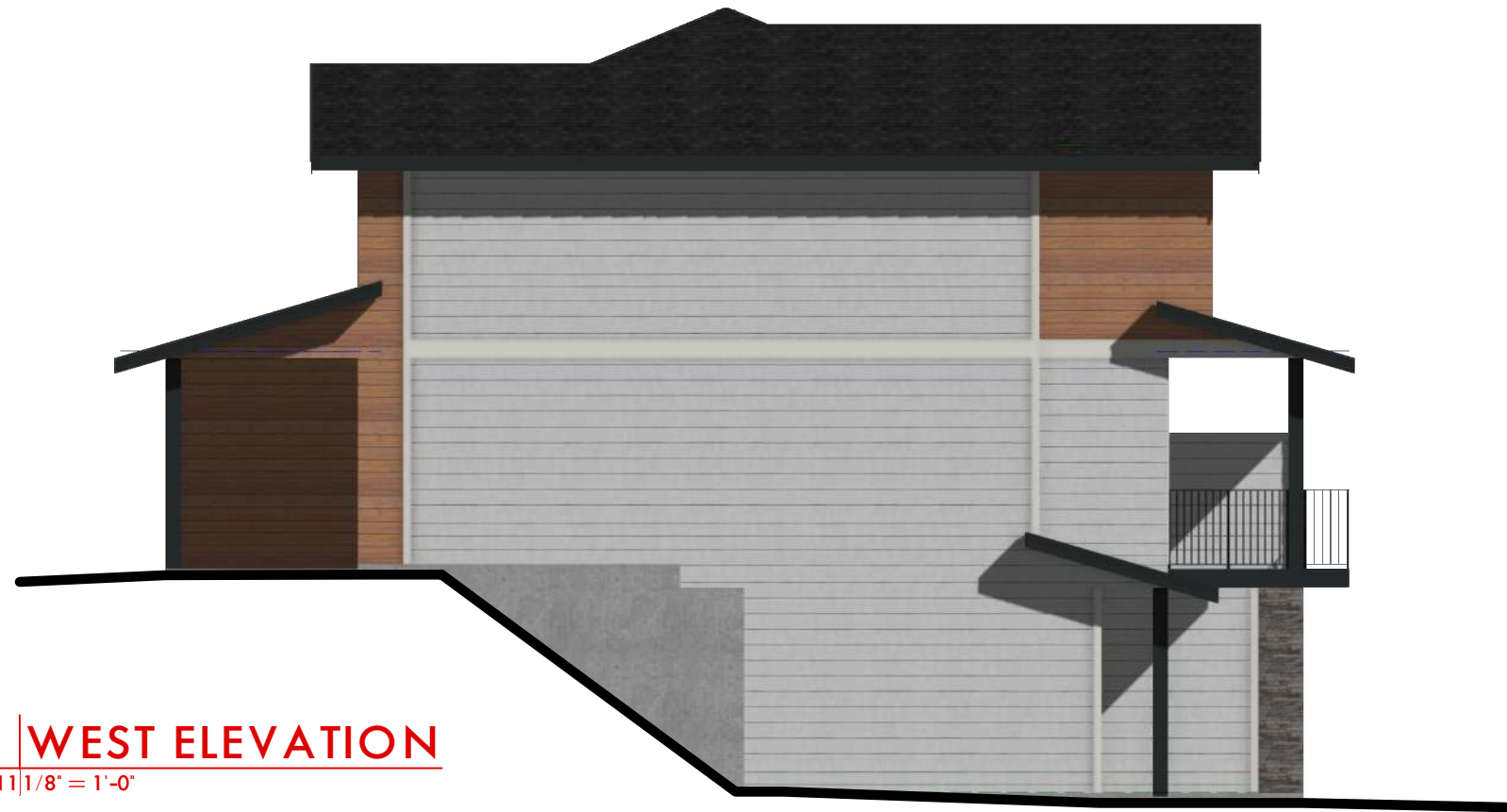
**LOT C MULTIFAMILY**  
TALLUS RIDGE ESTATES

WALKUP 2  
NORTH & SOUTH  
ELEVATIONS

DATE: 8-Jul-24

SCALE: 1/8" = 1'-0"  
ISSUED FOR: REVIEW ONLY

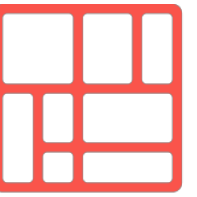
**DP3.9**



**1 | WEST ELEVATION**  
 DP3.11 | 1/8" = 1'-0"



**2 | EAST ELEVATION**  
 DP3.11 | 1/8" = 1'-0"



**IHS DESIGN**  
 #202-1470 ST. PAUL ST.  
 KELOWNA, BC  
 250.212.7938  
 info@ihdesign.ca

**TALLUS RIDGE**  
 A STEP AWAY



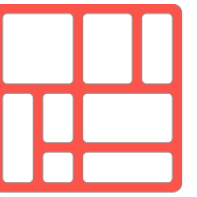
**LOT C MULTIFAMILY**  
 TALLUS RIDGE ESTATES

WALKUP 2  
 EAST & WEST  
 ELEVATIONS

DATE: 8-Jul-24

SCALE: 1/8" = 1'-0"  
 ISSUED FOR: REVIEW ONLY

DP3.10



**IHS DESIGN**

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info@ihdesign.ca

**TALLUS RIDGE**  
A STEP AWAY



**LOT C MULTIFAMILY**  
TALLUS RIDGE ESTATES

**WALKUP 2  
PERSPECTIVE VIEWS**

DATE: 8-Jul-24

SCALE: N/A  
ISSUED FOR: REVIEW ONLY

**DP3.11**





**EXTERIOR MATERIALS - COLOUR SCHEME 'A'**

BUILDINGS 1, 4, 6, 8, 10, 11

1. HORIZONTAL LAP SIDING - HARDIEBOARD LAP SIDING ARCTIC WHITE
2. HARDIEPANEL BOARD & BATTEN - ARCTIC WHITE
3. WOODTONE RUSTIC SERIES LAP SIDING - SUMMER WHEAT
4. TRIM - HARDIETRIM ARCTIC WHITE
5. FASCIA - SMART TRIM ABYSS BLACK
6. STONE VENEER - CULTURED STONE PROFIT ALPINE LEDGESTONE DARK RIDGE
7. GARAGE DOOR - WAYNE DALTON CONTEMPORARY 8300 BLACK
8. ALUMINUM DECK RAIL - BLACK W/ FROSTED PRIVACY GLASS
9. ALUMINUM GUTTER/SOFFIT - BLACK
10. VINYL WINDOW FRAMES - BLACK (EXTERIOR)
11. VINYL DECKING - GREY WOOD GRAIN
12. LAMINATE SHINGLES - IKO CAMBRIDGE DUAL BLACK

\*OR EQUIVALENT

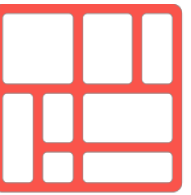


**EXTERIOR MATERIALS - COLOUR SCHEME 'B'**

BUILDINGS 2, 3, 5, 7, 9, 12

1. HORIZONTAL LAP SIDING - HARDIEBOARD LAP SIDING LIGHT MIST
2. HARDIEPANEL BOARD & BATTEN - LIGHT MIST
3. WOODTONE RUSTIC SERIES LAP SIDING - CASCADE SLATE
4. TRIM - HARDIETRIM LIGHT MIST
5. FASCIA - SMART TRIM ABYSS BLACK
6. STONE VENEER - CULTURED STONE PROFIT ALPINE LEDGESTONE DARK RIDGE
7. GARAGE DOOR - WAYNE DALTON CONTEMPORARY 8300 BLACK
8. ALUMINUM DECK RAIL - BLACK W/ FROSTED PRIVACY GLASS
9. ALUMINUM GUTTER/SOFFIT - BLACK
10. VINYL WINDOW FRAMES - BLACK (EXTERIOR)
11. VINYL DECKING - GREY WOOD GRAIN
12. LAMINATE SHINGLES - IKO CAMBRIDGE DUAL BLACK

\*OR EQUIVALENT



**IHS DESIGN**

#202-1470 ST. PAUL ST.  
KELOWNA, BC  
250.212.7938  
info@ihdesign.ca

**TALLUS RIDGE**  
A STEP AWAY



**LOT C MULTIFAMILY**  
TALLUS RIDGE ESTATES

**EXTERIOR MATERIALS**

DATE: 8-Jul-24

SCALE: N/A  
ISSUED FOR: REVIEW ONLY

**DP3.12**



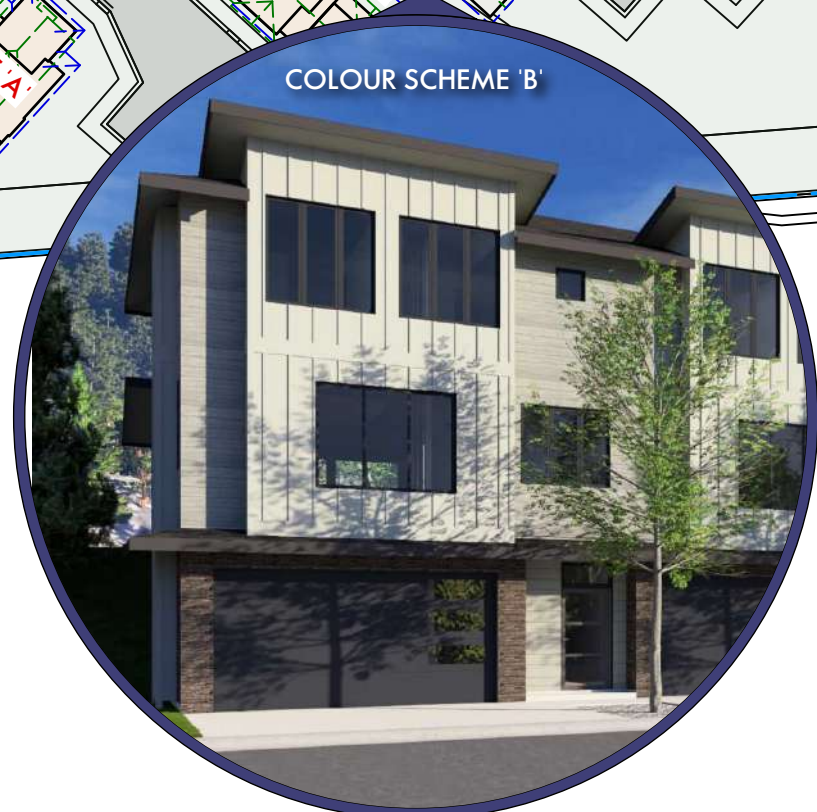
COLOUR SCHEME 'A'



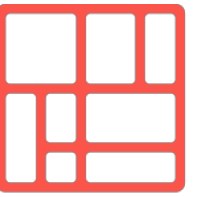
COLOUR SCHEME 'B'



COLOUR SCHEME 'A'



COLOUR SCHEME 'B'



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KELOWNA, BC  
250.212.7938  
info@ihsdesign.ca

TALLUS RIDGE  
A STEP AWAY



LOT C MULTIFAMILY  
TALLUS RIDGE ESTATES

RENDERINGS

DATE: 8-JUL-24

SCALE: N/A  
ISSUED FOR: REVIEW ONLY

DP3.13

# SCHEDULE B



ENGINEERING ▪ LANDSCAPE ARCHITECTURE ▪ URBAN PLANNING

July 5, 2024

City of West Kelowna  
2760 Cameron Road,  
West Kelowna, BC V1Z 2T6

Attention: Development Services

Re: TALLUS RIDGE LOT C, DEVELOPMENT PERMIT

As per our client's request, CTQ Consultants Ltd., estimates a landscape development cost of On-Site Improvements for Phase 1 to be \$402,514.00 and Phase 2 to be \$524,364.25.00 excluding applicable taxes for the above noted property. This price includes landscape materials and installation (trees, shrub, growing medium, fence, and irrigation).

Per City of West Kelowna - Development Permit Requirements, the bonding amount is 125% of the cost estimate. The bond amount for Phase 1 is \$503,142.50. The bond amount for Phase 2 is \$655,455.00.

Should you require any explanation of this letter, please contact the undersigned.

Sincerely,  
CTQ CONSULTANTS LTD.

A handwritten signature in black ink, appearing to read 'D. James', written in a cursive style.

David James, BCSLA CSLA

TALLUS RIDGE LOT C

Landscape Works - Development Permit

Estimate of Probable Costs - Reference: L1.0-L2.3

July 5, 2024

Description of Work	Unit	Estimated Amount	Estimated Value	Total Value
---------------------	------	------------------	-----------------	-------------

PHASE 1

1.0	Landscape Works On-Site				
1.1	Deciduous Trees (60mm Cal.)	ea.	32	\$750.00	\$24,000.00
1.2	Landscaped area planting - shrubs (#02)	ea.	300	\$20.00	\$6,000.00
1.3	Landscaped area planting - ornamental grasses & perennials (#01)	ea.	324	\$15.00	\$4,860.00
1.4	Sod planting	m <sup>2</sup>	1,457	\$8.00	\$11,656.00
1.5	Hydroseed planting	m <sup>2</sup>	2,534	\$8.00	\$20,272.00
1.6	Imported growing medium for trees in landscape areas (600mm depth)	m <sup>3</sup>	19	\$80.00	\$1,536.00
1.7	Imported growing medium for trees in boulevard areas (900mm depth)	m <sup>3</sup>	10	\$80.00	\$792.00
1.9	Imported growing medium for planting areas (450mm depth)	m <sup>3</sup>	499	\$80.00	\$39,888.00
1.10	Imported growing medium for sod areas (150mm depth)	m <sup>3</sup>	219	\$80.00	\$17,484.00
1.11	Rock mulch on planting areas (50mm)	m <sup>3</sup>	55	\$65.00	\$3,601.00
1.12	Crushed gravel walkway	m <sup>2</sup>	436	\$65.00	\$28,340.00
1.13	1.2m HT. black vinyl chainlink fence	lm	582	\$150.00	\$87,300.00
1.14	High efficiency irrigation system	m <sup>2</sup>	2,565	\$55.00	\$141,075.00
1.15	Revegetation of Covenant Crossing as required	ls	1	\$5,000.00	\$5,000.00
				SUBTOTAL	\$391,804.00

2.0	Landscape Monitoring & Inspections				
2.1	Installation monitoring	ls	1	\$1,050.00	\$1,050.00
2.1	Installation deficiency inspection	ls	1	\$420.00	\$420.00
				SUBTOTAL	\$1,470.00

3.0	Landscape Maintenance				
3.1	Monthly maintenance visit	ea	14	\$660.00	\$9,240.00
				SUBTOTAL	\$9,240.00

ESTIMATED TOTAL LANDSCAPE BUDGET - PHASE 1				TOTAL	\$402,514.00
--	--	--	--	-------	--------------

TALLUS RIDGE LOT C

Landscape Works - Development Permit

Estimate of Probable Costs - Reference: L1.0-L2.3

July 5, 2024

Description of Work	Unit	Estimated Amount	Estimated Value	Total Value
---------------------	------	------------------	-----------------	-------------

PHASE 2

1.0	Landscape Works On-Site				
1.1	Deciduous Trees (60mm Cal.)	ea.	17	\$750.00	\$12,750.00
1.2	Coniferous Trees (2m HT.)	ea.	6	\$750.00	\$4,500.00
1.3	Landscaped area planting - shrubs (#02)	ea.	205	\$20.00	\$4,100.00
1.4	Landscaped area planting - ornamental grasses & perennials (#01)	ea.	291	\$15.00	\$4,365.00
1.5	Sod planting	m <sup>2</sup>	1,660	\$8.00	\$13,280.00
1.6	Hydroseed planting	m <sup>2</sup>	6,299	\$8.00	\$50,392.00
1.7	Imported growing medium for trees in landscape areas (600mm depth)	m <sup>3</sup>	14	\$80.00	\$1,104.00
1.9	Imported growing medium for planting areas (450mm depth)	m <sup>3</sup>	427	\$80.00	\$34,164.00
1.10	Imported growing medium for sod areas (150mm depth)	m <sup>3</sup>	249	\$80.00	\$19,920.00
1.11	Rock mulch on planting areas (50mm)	m <sup>3</sup>	47	\$65.00	\$3,084.25
1.12	1.2m HT. black vinyl chainlink fence	lm	750	\$150.00	\$112,500.00
1.13	High efficiency irrigation system	m <sup>2</sup>	4,609	\$55.00	\$253,495.00
				<b>SUBTOTAL</b>	<b>\$513,654.25</b>

2.0	Landscape Monitoring & Inspections				
2.1	Installation monitoring	ls	1	\$1,050.00	\$1,050.00
2.1	Installation deficiency inspection	ls	1	\$420.00	\$420.00
				<b>SUBTOTAL</b>	<b>\$1,470.00</b>

3.0	Landscape Maintenance				
3.1	Monthly maintenance visit	ea	14	\$660.00	\$9,240.00
				<b>SUBTOTAL</b>	<b>\$9,240.00</b>

ESTIMATED TOTAL LANDSCAPE BUDGET - PHASE 2				<b>TOTAL</b>	<b>\$524,364.25</b>
--	--	--	--	--------------	---------------------

Costing does NOT include: Paving, Furniture

The estimate of costs provided herein is not a guaranteed amount but is to be used for Development Permit bonding purposes only. Estimate of costs are based on 2024 contractor pricing and are subject to change.

KEYPLAN:

COPYRIGHTS:

NOTES:

- ALL PLANT MATERIAL SUPPLIED AND PLACED BY THE CONTRACTOR MUST BE CERTIFIED TO BE FREE OF SUDDEN OAK DEATH (PHYTOPHTHORA RAMORUM), ACCORDING TO THE CANADIAN FOOD INSPECTION AGENCY (CFIA), OR CANADIAN LANDSCAPE STANDARDS. THE CONTRACTOR WILL BE HELD RESPONSIBLE TO THE OWNER FOR THE SUPPLY AND PLACEMENT OF DISEASED PLANTS RESULTING FROM HIS NEGLIGENCE. PLANT MATERIAL AND PRODUCTS SHALL BE AVAILABLE FOR OPTIONAL INSPECTION BY THE LANDSCAPE ARCHITECT AT SOURCE OF SUPPLY. THE CONTRACTOR SHALL PROVIDE A 1 (ONE) YEAR REPLACEMENT GUARANTEE ON ALL PLANT MATERIAL TO THE OWNER FROM THE DATE OF SUBSTANTIAL PERFORMANCE.
- THE DRAWING DEPICTS FORM AND CHARACTER AND IS TO BE USED FOR DEVELOPMENT PERMIT SUBMISSION ONLY. IT IS NOT INTENDED FOR USE AS A CONSTRUCTION DOCUMENT.
- ROCK MULCH WITH WEED BARRIER FABRIC, IS TO BE PLACED AT 100mm MIN. DEPTH AS SHOWN ON THE DRAWINGS.
- THE ROCK MULCH PRODUCT SHALL BE CLEAN, WASHED STONE MIN. 25-50mm DIA. AGGREGATE.
- SOIL DEPTH AS FOLLOWS:  
LAWN AREAS: 300mmD MIN.  
SHRUB AREAS: 450mmD MIN.  
TREES IN LANDSCAPE AREAS: 600mmD MIN.  
TREES IN BOULEVARD AREAS: 900mmD MIN.
- ALL PLANTING AREAS TO RECEIVE A FULLY AUTOMATED IRRIGATION SYSTEM DESIGNED BY A CERTIFIED IRRIGATION DESIGNER.
- ALL WORK TO BE CONSTRUCTED IN ACCORDANCE WITH THE CSLA STANDARDS, LATEST EDITION.



ISSUE	DESCRIPTION	DATE
2	RE-ISSUED FOR DEVELOPMENT PERMIT	2024-07-10
1	ISSUED FOR DEVELOPMENT PERMIT	2024-03-22

CLIENT NAME:  
**TALLUS RIDGE DEVELOPMENT LTD.**

PROJECT NAME:  
**TALLUS RIDGE LOT C**

DRAWING TITLE:  
**LANDSCAPE SITE PLAN**

DRAWN: NV	DRAWING NO.:
CHECKED: DJ	<b>L1.0</b>
PROJECT NO.: 24007-100	
SCALE: 1:450	

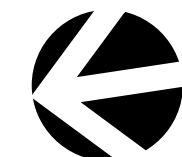
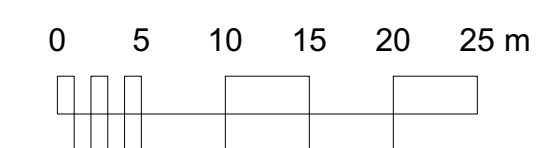


**Chain Link Fence Required per bylaw 0265**

**1. Re: covenant crossing CA2039127.**  
At time of construction, the civil contractor will survey the alignment of the pipe and establish the limits of disturbance on each side. Once established and staked out, the environmental monitor will walk the alignment, identify and establish a number of plants requiring removal. Once the number of plants has been established, the environmental monitor will prepare a monitoring report with the a count of all plants that had to be removed and a revegetation plan to ensure compliance with covenant CA2039127. The emphasis will be placed on visual buffer mitigation.

LEGEND:

- PROPOSED TREES
- SHRUB PLANTING
- PROPERTY LINE
- 1.2m HT. BLACK CHAIN LINK FENCE
- ASPHALT PAVING
- CONCRETE PAVING
- CRUSHED GRAVEL PATH
- SOD
- HYDROSEED



KEYPLAN:

COPYRIGHTS:

NOTES:

- ALL PLANT MATERIAL SUPPLIED AND PLACED BY THE CONTRACTOR MUST BE CERTIFIED TO BE FREE OF SUDDEN OAK DEATH (PHYTOPHTHORA RAMORUM), ACCORDING TO THE CANADIAN FOOD INSPECTION AGENCY (CFIA), OR CANADIAN LANDSCAPE STANDARDS. THE CONTRACTOR WILL BE HELD RESPONSIBLE TO THE OWNER FOR THE SUPPLY AND PLACEMENT OF DISEASED PLANTS RESULTING FROM HIS NEGLIGENCE. PLANT MATERIAL AND PRODUCTS SHALL BE AVAILABLE FOR OPTIONAL INSPECTION BY THE LANDSCAPE ARCHITECT AT SOURCE OF SUPPLY.
- THE CONTRACTOR SHALL PROVIDE A 1 (ONE) YEAR REPLACEMENT GUARANTEE ON ALL PLANT MATERIAL TO THE OWNER FROM THE DATE OF SUBSTANTIAL PERFORMANCE.
- THE DRAWING DEPICTS FORM AND CHARACTER AND IS TO BE USED FOR DEVELOPMENT PERMIT SUBMISSION ONLY. IT IS NOT INTENDED FOR USE AS A CONSTRUCTION DOCUMENT.
- ROCK MULCH WITH WEED BARRIER FABRIC, IS TO BE PLACED AT 100mm MIN. DEPTH AS SHOWN ON THE DRAWINGS.
- THE ROCK MULCH PRODUCT SHALL BE CLEAN, WASHED STONE MIN. 25-50mm DIA. AGGREGATE.
- SOIL DEPTH AS FOLLOWS:  
LAWN AREAS: 300mmD MIN.  
SHRUB AREAS: 450mmD MIN.  
TREES IN LANDSCAPE AREAS: 600mmD MIN.  
TREES IN BOULEVARD AREAS: 900mmD MIN.
- ALL PLANTING AREAS TO RECEIVE A FULLY AUTOMATED IRRIGATION SYSTEM DESIGNED BY A CERTIFIED IRRIGATION DESIGNER.
- ALL WORK TO BE CONSTRUCTED IN ACCORDANCE WITH THE CSLA STANDARDS, LATEST EDITION.



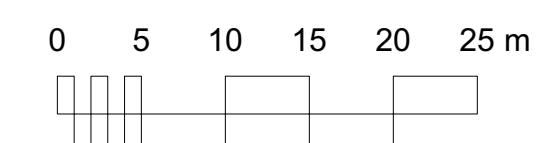
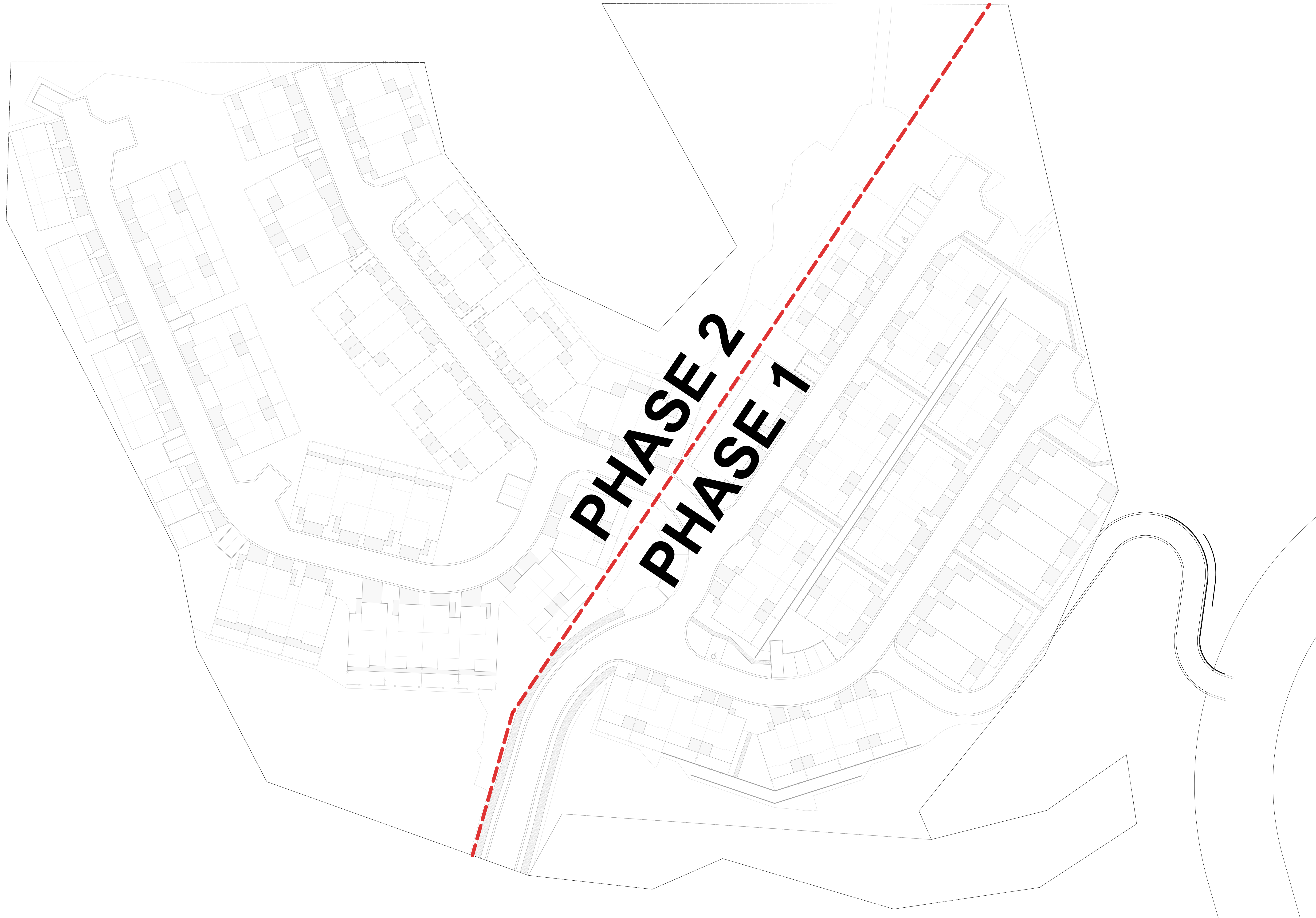
ISSUE	DESCRIPTION	DATE
2	RE-ISSUED FOR DEVELOPMENT PERMIT	2024-07-10
1	ISSUED FOR DEVELOPMENT PERMIT	2024-03-22

CLIENT NAME:  
**TALLUS RIDGE DEVELOPMENT LTD.**

PROJECT NAME:  
**TALLUS RIDGE LOT C**

DRAWING TITLE:  
**PHASING PLAN**

DRAWN:	NV	DRAWING NO.: <b>L1.1</b>
CHECKED:	DJ	
PROJECT NO.:	24007-100	
SCALE:	1:450	





PROPERTY LINE

LEGEND:

- PROPERTY LINE
- 1.2m HT. BLACK VINYL CHAINLINK FENCE
- TREE PLANTING
- SHRUB PLANTING
- SOD
- HYDROSEED AREA

KEYPLAN:



COPYRIGHTS:

NOTES:

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4. THE ROCK MULCH PRODUCT SHALL BE CLEAN, WASHED STONE MIN. 25-50mm DIA. AGGREGATE.
5. SOIL DEPTH AS FOLLOWS:  
LAWN AREAS: 300mmD MIN.  
SHRUB AREAS: 450mmD MIN.  
TREES IN LANDSCAPE AREAS: 600mmD MIN.  
TREES IN BOULEVARD AREAS: 900mmD MIN.
6. ALL PLANTING AREAS TO RECEIVE A FULLY AUTOMATED IRRIGATION SYSTEM DESIGNED BY A CERTIFIED IRRIGATION DESIGNER.
7. ALL WORK TO BE CONSTRUCTED IN ACCORDANCE WITH THE CSLA STANDARDS, LATEST EDITION.



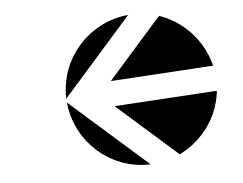
KEY	QTY	LATIN NAME	COMMON NAME	SIZE	ROOT
<b>Deciduous Trees</b>					
AG	10	<i>Acer glabrum</i> var. <i>douglasii</i>	Douglas Maple	#02	Potted
AR	12	<i>Acer rubrum</i> 'Armstrong Gold'	Armstrong Gold Maple	6cm Cal	B&B
FA	6	<i>Fraxinus americana</i> 'Autumn Purple'	White Ash	6cm Cal	B&B
QB	7	<i>Quercus bicolor</i> 'Bonnie and Mike'	Beacon Swamp White Oak	6cm Cal	B&B
QR	3	<i>Quercus robur</i> x <i>bicolor</i> 'Long'	Regal Prince Oak	6cm Cal	B&B
TC	11	<i>Tilia cordata</i> 'Greenspire'	Greenspire Linden	6cm Cal	B&B
<b>Coniferous Trees</b>					
PP	6	<i>Pinus ponderosa</i>	Ponderosa Pine	2m HT.	B&B
<b>Shrubs</b>					
Aa	77	<i>Amelanchier alnifolia</i>	Saskatoon Serviceberry	#02	Potted
Am	63	<i>Aster x frikartii</i> 'Monch'	Frikart's Aster	#02	Potted
Bv	105	<i>Buxus</i> 'Green Velvet'	Green Velvet Boxwood	#02	Potted
Cs	94	<i>Cornus stolonifera</i> 'Arctic Fire'	Redtwig Dogwood	#02	Potted
Ra	67	<i>Rhus aromatica</i> 'Gro-Low'	Fragrant Sumac	#02	Potted
Rr	30	<i>Rosa rugosa</i> 'Hansa'	Hansa Rose	#02	Potted
Rw	5	<i>Rosa woodsii</i> 'Kimberley'	Western Wild Rose	#02	Potted
Sp	23	<i>Salix purpurea</i> 'Nana'	Dwarf Arctic Willow	#02	Potted
Sm	40	<i>Syringa meyeri</i> 'Palibin'	Dwarf Korean Lilac	#02	Potted
<b>Ornamental Grass</b>					
Ca	59	<i>Calamagrostis x acutiflora</i> 'Overdam'	Variagated Reed Grass	#01	Potted
Hs	89	<i>Helictotrichon sempervirens</i>	Blue Oat Grass	#01	Potted
Ma	22	<i>Mahonia aquifolium</i>	Oregon Grape Holly	#01	Potted
Pv	129	<i>Panicum virgatum</i> 'Rotstrahlbusch'	Switch Grass	#01	Potted
<b>Perennials</b>					
Af	57	<i>Achillea filipendulina</i> 'Gold Plate'	Fern-Leaf Yarrow	#01	Potted
Em	36	<i>Eupatorium maculatum</i> 'Gateway'	Joe-Pye Weed	#01	Potted
Nf	79	<i>Nepeta x faassenii</i> 'Walker's Low'	Walker's Low Catmint	#01	Potted
Pb	60	<i>Parovskia</i> 'Blue Spire'	Russian Sage	#01	Potted
Rf	89	<i>Rudbeckia fulgida</i> 'Goldstrum'	Black-Eyed Susan	#01	Potted

REFER CIVIL DRAWINGS FOR GRADING

HYDROSEED- TO BE CONFIRMED WITH THE CITY OF WEST KELOWNA PRIOR TO CONSTRUCTION

SEE L2.0

SEE L2.3



NOT FOR CONSTRUCTION

2	RE-ISSUED FOR DEVELOPMENT PERMIT	2024-07-10
1	ISSUED FOR DEVELOPMENT PERMIT	2024-03-22
ISSUE	DESCRIPTION	DATE

CLIENT NAME:  
**TALLUS RIDGE DEVELOPMENT LTD.**

PROJECT NAME:  
**TALLUS RIDGE LOT C**

DRAWING TITLE:  
**PLANTING PLAN (2 OF 4)**

DRAWN: NV	DRAWING NO.:
CHECKED: DJ	<b>L2.1</b>
PROJECT NO.: 24007-100	
SCALE: 1:200	

KEYPLAN:



COPYRIGHTS:

NOTES:

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2	RE-ISSUED FOR DEVELOPMENT PERMIT	2024-07-10
1	ISSUED FOR DEVELOPMENT PERMIT	2024-03-22
ISSUE	DESCRIPTION	DATE

CLIENT NAME:  
**TALLUS RIDGE DEVELOPMENT LTD.**

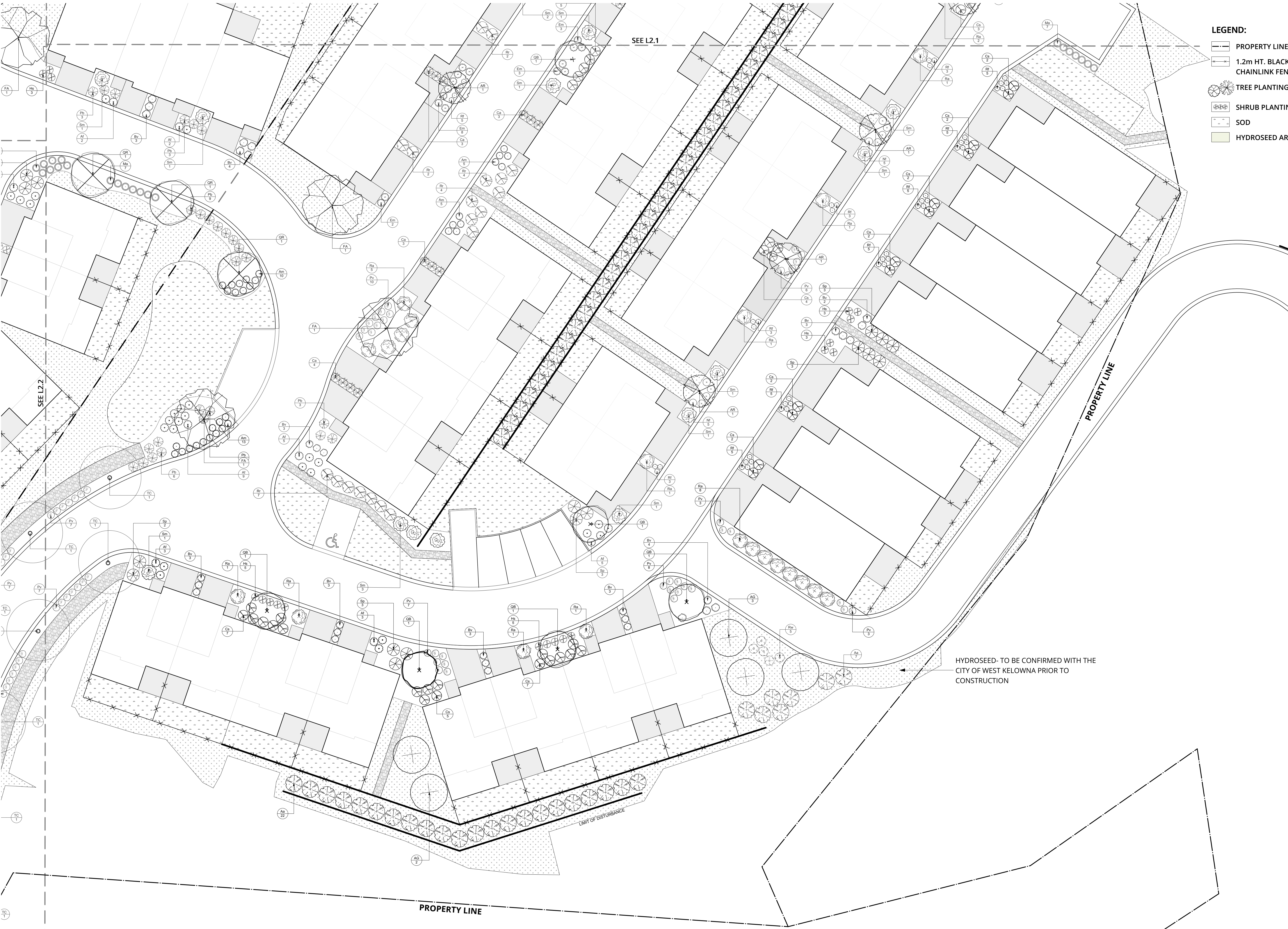
PROJECT NAME:  
**TALLUS RIDGE LOT C**

DRAWING TITLE:  
**PLANTING PLAN (4 OF 4)**

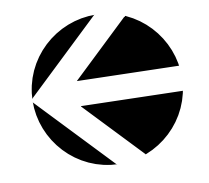
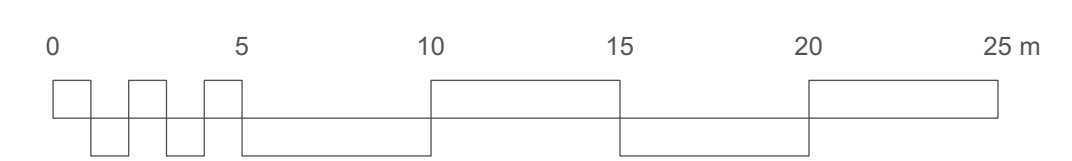
DRAWN:	NV	DRAWING NO.:	<b>L2.3</b>
CHECKED:	DJ	PROJECT NO.:	
PROJECT NO.:	24007-100	SCALE:	
SCALE:	1:200		

**LEGEND:**

- PROPERTY LINE
- 1.2m HT. BLACK VINYL CHAINLINK FENCE
- TREE PLANTING
- SHRUB PLANTING
- SOD
- HYDROSEED AREA

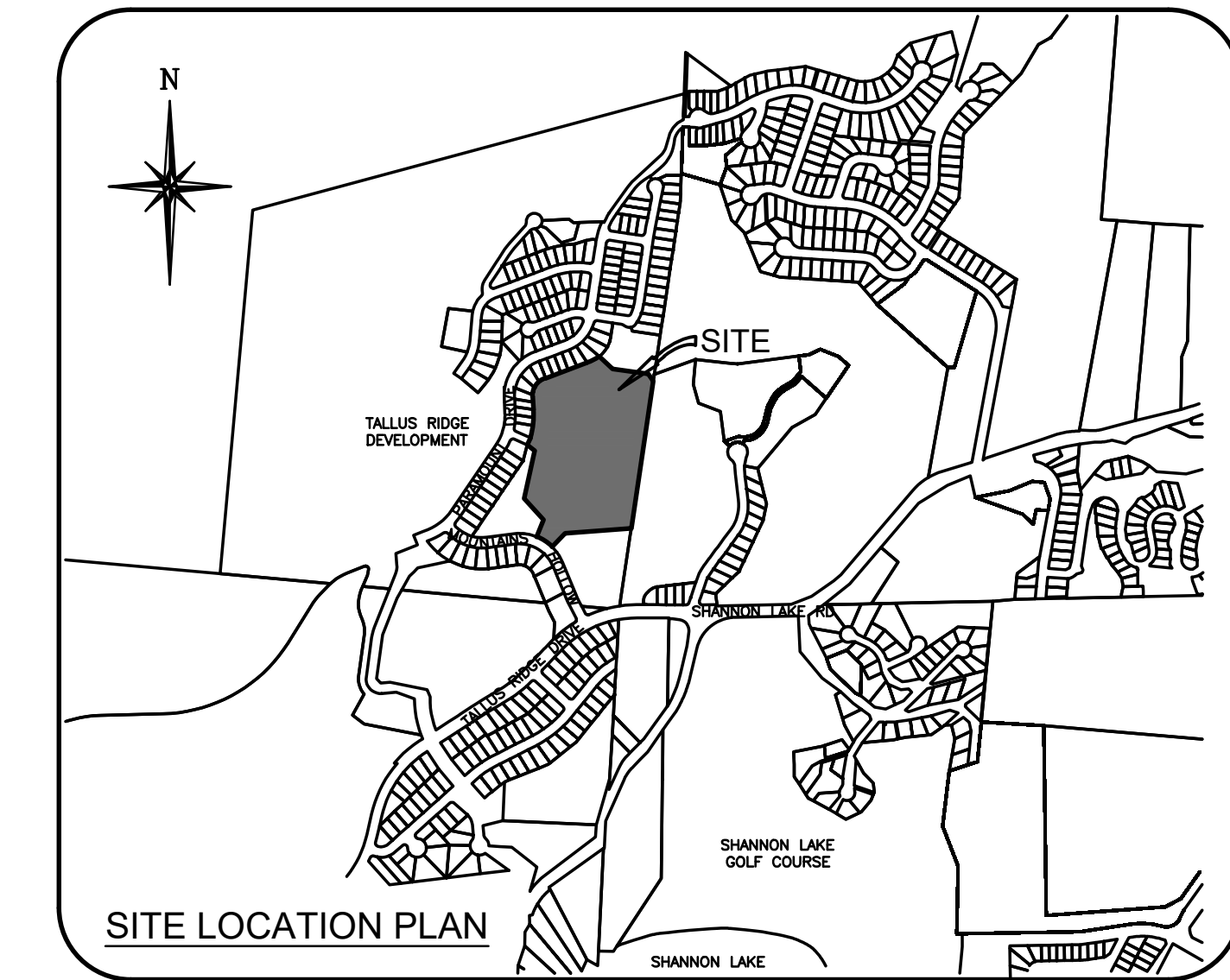


HYDROSEED- TO BE CONFIRMED WITH THE CITY OF WEST KELOWNA PRIOR TO CONSTRUCTION



# SCHEDULE C

# TALLUS RIDGE LOT C TALLUS DEVELOPMENTS LTD. ISSUED FOR DEVELOPMENT PERMIT 2024



**LEGAL DESCRIPTION:** LOT C DISTRICT LOT 3793  
OSOYOOS DIV OF YALE  
DISTRICT PLAN EPP8432

## MMCD STANDARD DETAILS

### GENERAL DETAILS

STD 04 UTILITY TRENCH  
STD 05 PAVEMENT RESTORATION

### STORM AND SANITARY SEWERS

STD S1 STANDARD AND SUMP MANHOLES

### CONCRETE AND MISCELLANEOUS DETAILS

STD C3 CONCRETE SIDEWALK AND ROLLOVER CURB  
STD C4 CONCRETE CURBS - NARROW BASE

## CITY OF WEST KELOWNA STANDARD DETAILS

### STORM AND SANITARY SEWERS

STD 401 MANHOLE FRAME AND COVER  
STD 501 ROADWAY TYPE PRECAST CONCRETE CATCH BASIN  
STD 503 CATCH BASIN GUTTER DETAIL  
STD 504 BICYCLE SAFE CATCH BASIN GRATE  
STD 506 DRAINAGE DRYWELL  
STD 507 DRAINAGE DRYWELL INSTALLATION  
STD 508 PIPE BED PERFORATION AND BEDDING DETAIL FOR GROUND WATER RECHARGE  
STD 509 CATCH BASIN TRAPPING HOOD

### GENERAL

STD 114 GATE

### GEOTECHNICAL REPORT

CALIBRE GEOTECHNICAL LTD. REPORT J16-02443,  
February 24, 2017

## GENERAL NOTES

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT FROM DIGITAL DESIGN INFORMATION. ACCURACY FROM DIGITAL FILES IS NOT GUARANTEED. LAYOUT TO CONFORM TO DISTANCES AND OFFSETS AS SHOWN ON THE CONTRACT DRAWINGS. CONTRACTOR TO CONFIRM THE ACCURACY OF THE LAYOUT PRIOR TO CONSTRUCTION.

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY PERMITS FOR CONSTRUCTION & ARRANGING FOR DISPOSAL OF GROUND WATER AS REQUIRED.

- THE CONTRACTOR SHALL COORDINATE ALL TESTING REQUIRED WITH THE TESTING FIRM SPECIFIED BY THE OWNER'S ENGINEER.

- INITIAL TESTING COSTS TO BE BORN BY THE DEVELOPER WITH THE COST OF RETESTS OF FAILED TESTS BORN BY THE CONTRACTOR.

- THE POSITION OF POLE LINES, CONDUITS, WATERMANS, SEWERS, UNDERGROUND, ABOVEGROUND UTILITIES & STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS. WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

- SEE UTILITY COMPANY DRAWINGS FOR DETAILED INSTALLATION PLANS. PRIOR TO STARTING SHALLOW UTILITY CONSTRUCTION THE CONTRACTOR MUST CONTACT THE INDIVIDUAL UTILITY COMPANIES (BC HYDRO, TELUS & SHAW CABLE) TO ENSURE THEY ARE IN POSSESSION OF THE MOST RECENT AS CONSTRUCTED OR DESIGN DRAWINGS. ANY CHANGES TO THE WORK IN THE FIELD MUST BE APPROVED BY THE UTILITY COMPANIES AND RECORDED BY THE CONTRACTOR FOR AS BUILT INFORMATION.

- THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN WORKING AROUND LEGAL PINS TO AVOID DISTURBANCE. IF THE CONTRACTOR IS UNABLE TO AVOID DISTURBANCE OF ANY PIN BECAUSE OF PHYSICAL CONSTRAINTS OF THE SITE, THE OWNER'S ENGINEER SHALL BE NOTIFIED PRIOR TO DISTURBING THE SURVEY PIN. ANY SURVEY PIN DISTURBED WITHOUT NOTIFYING THE OWNER'S ENGINEER, SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO HAVE IT REPLACED BY A BOLS.

- ALL HYDRO AND COMMUNICATION INSTALLATION TO CONFORM TO INDIVIDUAL UTILITY COMPANY STANDARDS & COWK STANDARDS.

- THE CONTRACTOR SHALL BE APPROVED BY THE CITY OF WEST KELOWNA ENGINEERING DEPARTMENT.

- ALL ROAD CONSTRUCTION AND RESTORATION TO BE IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE CITY OF WEST KELOWNA.

- SERVICES TO BE INSTALLED TO LOCATIONS SHOWN ON THE ISSUED FOR CONSTRUCTION DRAWINGS.

- ALL WATERLINES SHALL BE TESTED & CHLORINATED BEFORE TIE INTO COWK MAINS TO COWK STANDARDS.

- BEDDING MATERIAL AND PIPE COVER ON ALL PIPES TO BE CLEAN SAND OR 3/4" CRUSHED GRAVEL UNLESS OTHERWISE NOTED.

- BEDDING MATERIAL TO BE HAND TAMPED AROUND PIPES AND MACHINE TAMPED FROM 300mm ABOVE PIPE TO SURFACE.

- WATER SERVICES TO BE 25mm MUNICIPAL TUBING (S200).

- ALL WATER MAINS TO BE DR18 PVC C900 235 psi.

- ALL WATER MAINS TO BE PRESSURE TESTED TO 200psi

- ENSURE 0.45m CLEARANCE UNDER WATERMANS AT ALL SANITARY AND STORM CROSSINGS.

- TRACER WIRE TO BE INSTALLED AS PER COWK BYLAW

- ALL STORM SEWER MAINS TO BE ULTRA RIB PVC.

- STORM SEWER CATCH BASIN LEADS TO BE 200mm SDR35 PVC, USE 250mm SDR35 PVC FOR DOUBLE CATCH BASINS.

- INSPECTION CHAMBERS ARE REQUIRED ON ALL SANITARY SEWER SERVICES.

- SANITARY SEWER AND STORM SEWER MAINS TO BE VIDEO INSPECTED TO CITY OF WEST KELOWNA STANDARDS PRIOR TO PLACING ASPHALT.

- THE CONTRACTOR SHALL ADJUST ALL EXISTING MANHOLES HYDRANTS, SERVICE BOXES ETC. TO MATCH FINAL GRADES.

- ALL CATCH BASIN GRATE ELEVATIONS SHALL BE SET 40mm BELOW GUTTER ELEVATION.

- ALL SANITARY SEWER SERVICE CONNECTIONS TO HAVE 2x4 MARKERS AT INVERTS OF PIPES TO ABOVE GROUND SURFACE WITH MARKERS TO SHOW DEPTH TO INVERT, MARKED IN RED PAINT.

- ALL WATER SERVICE CONNECTIONS TO HAVE 2x4 MARKERS AT INVERTS OF PIPES TO ABOVE GROUND SURFACE WITH MARKERS TO SHOW DEPTH TO INVERT, MARKED IN BLUE PAINT.

- SANITARY SEWER SERVICES TO BE 100mm DR28 PVC INSTALLED AT MIN. 2% GRADE UNLESS OTHERWISE NOTED. RISER TYPE NOT APPROVED UNLESS OTHERWISE NOTED.

- ALL UTILITY TIE-INS TO EXISTING COWK MAINS TO BE DONE BY CONTRACTOR AND WITNESSED BY MUNICIPALITY AND OWNER'S ENGINEER. NOTIFY MUNICIPALITY AND OWNER'S ENGINEER 48 HOURS PRIOR TO WORK TAKING PLACE.

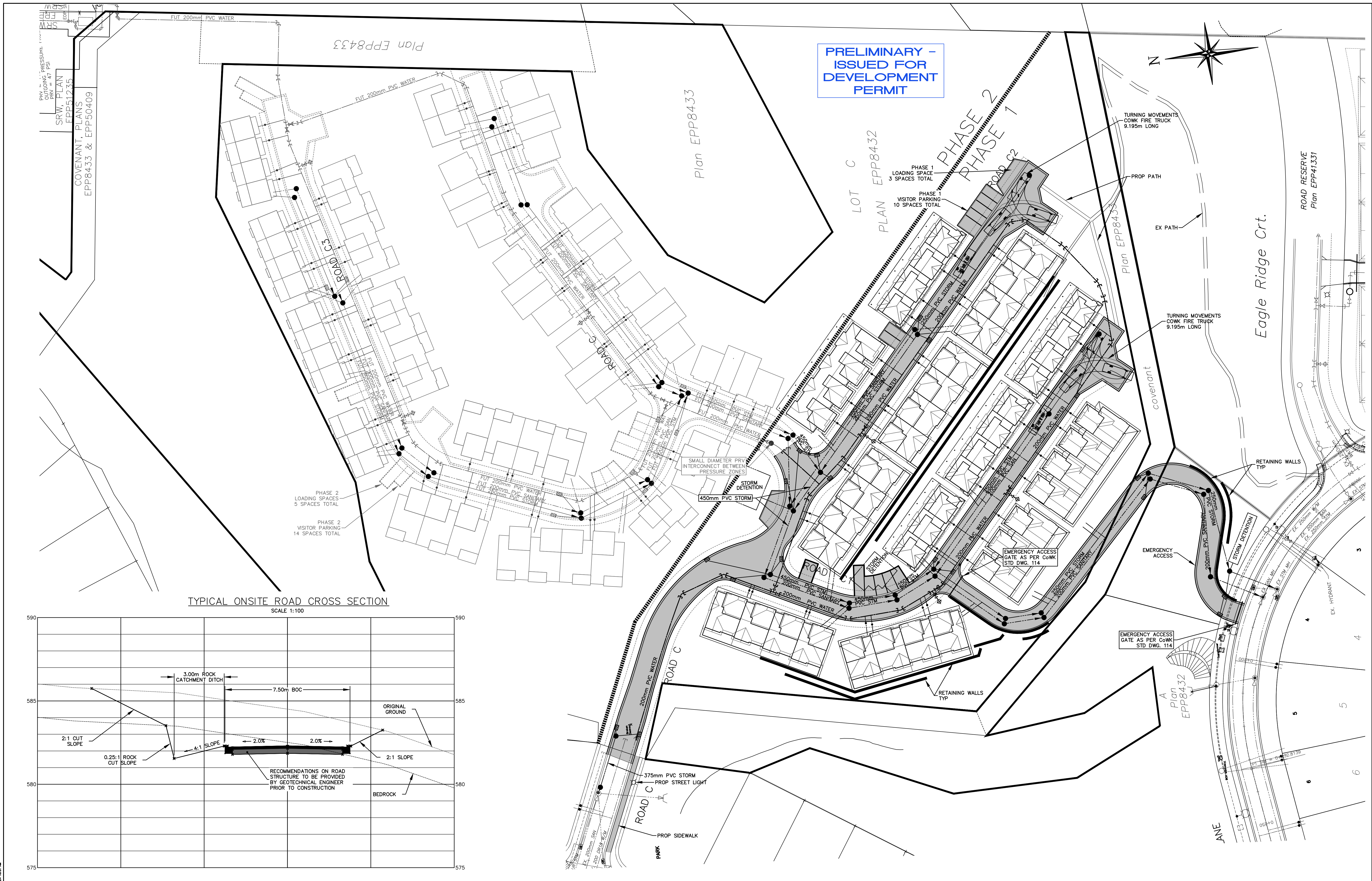
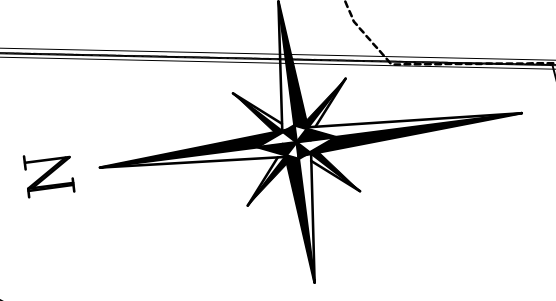
- ALL WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE PROVISIONS OF CITY BYLAW #0249 AND THE LATEST EDITION OF THE MMCD.

## DRAWING LIST

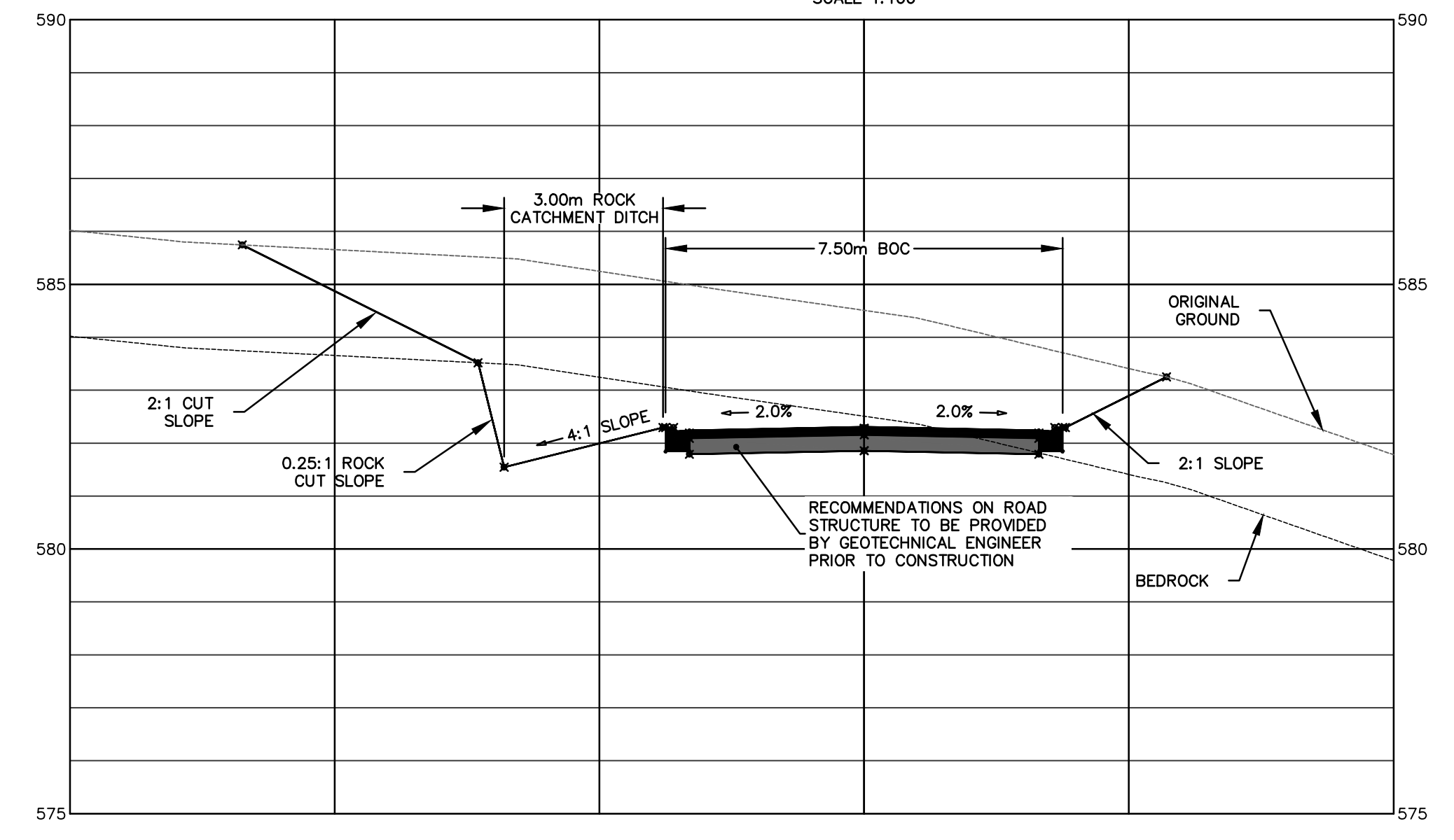
23048-101 SITE SERVICING PLAN  
23048-102 SITE GRADING PLAN  
23048-103 EROSION AND SEDIMENT CONTROL PLAN  
23048-SWBP STORMWATER BASIN PLAN  
23048-SWMP STORMWATER MANAGEMENT PLAN  
23048-301 GRADING CROSS SECTIONS

**PRELIMINARY -  
ISSUED FOR  
DEVELOPMENT  
PERMIT**

**PRELIMINARY -  
ISSUED FOR  
DEVELOPMENT  
PERMIT**



**TYPICAL ONSITE ROAD CROSS SECTION**  
SCALE 1:100



LEGEND	
WATER	MANHOLE
SANITARY SEWER	POWER POLE
STORM SEWER	LAMP STANDARD
GAS	CATCH BASIN
UG TELEPHONE	HYDRANT
UG ELECTRICAL	TREES
○ MH	I.C.
□ P.P.	C.S.
□ L.S.	LPT
□ C.B.	SERVICE BOX

No.	MM/DD/YY	BY	REVISION	Chk'd	No.	MM/DD/YY	BY	REVISION	Chk'd
9	07/08/24	RSB	REVISED PARKING, ADDED SIDEWALK & STREET LIGHT TO PARAMOUNT ENTRANCE	DRP	5	02/20/24	RSB	ISSUED FOR DEVELOPMENT PERMIT	DRP
8	05/01/24	RSB	ADDED LOADING SPACES	DRP	4	02/06/24	KTM	ISSUED FOR COORDINATION	DRP
7	04/24/24	RSB	ADDED FIRE TRUCK TURNING	DRP	3	01/12/23	RSB	ISSUED FOR APPROVAL	DRP
6	03/27/24	RSB	REVISED PHASE 1 UNITS	DRP	2	12/21/23	RSB	ISSUED FOR REVIEW	DRP
					1	10/12/23	RSB	ISSUED FOR REVIEW	DRP

PENG.	
DRAWN	KTM
DESIGN	RSB/DRP
APPROVED	DRP
DATE	FEB 2024
SCALE	
HORIZ.	1:500
VERT.	N/A

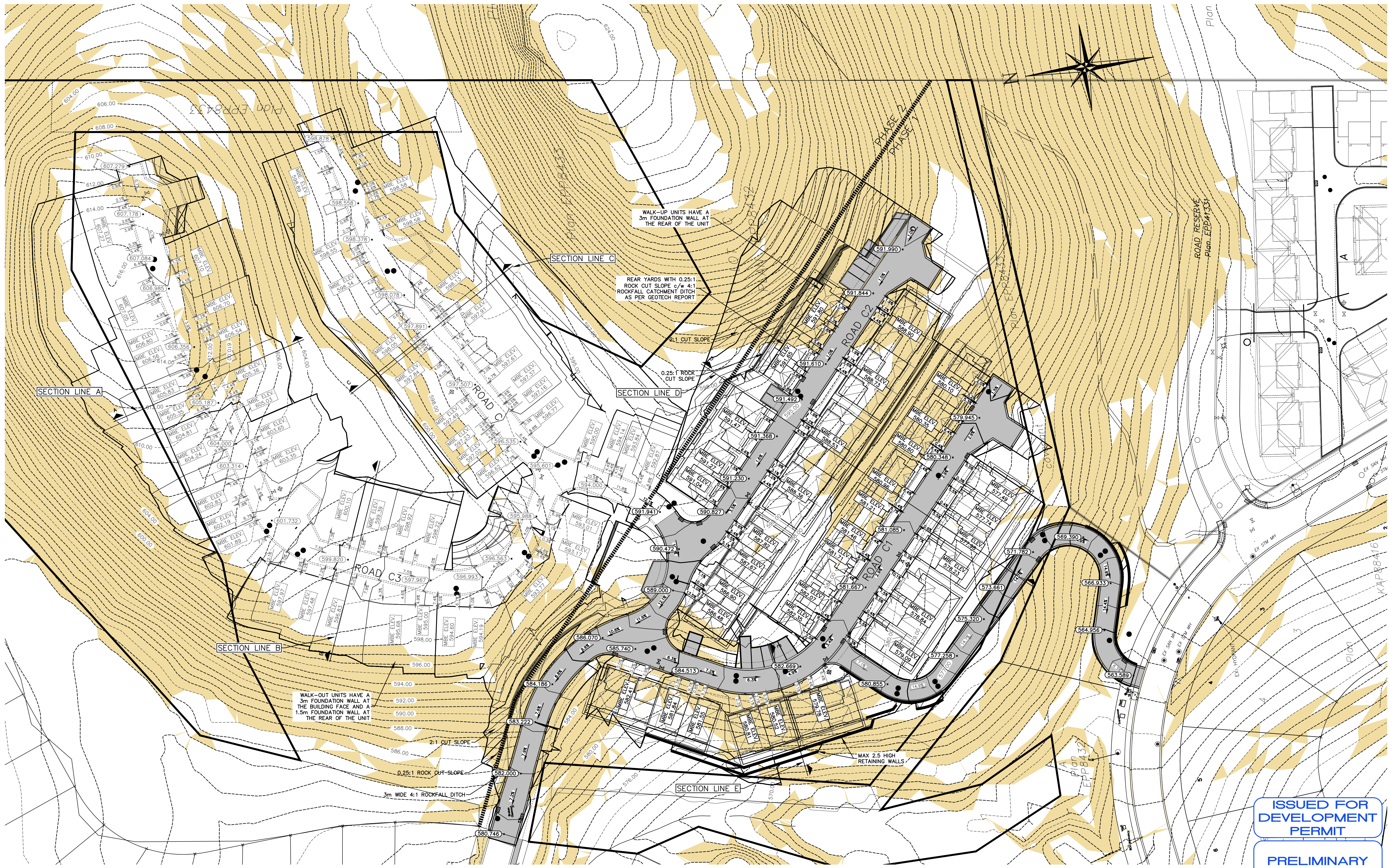


**PROTECH CONSULTING**  
300 - 3275 Lakeshore Rd Kelowna B.C. PERMIT TO PRACTICE NO.: 1001403  
Phone 860-1771

**TALLUS RIDGE LOT C  
TALLUS DEVELOPMENTS LTD.  
SITE SERVICING PLAN**

DRAWING NO. 23048-101  
REV. NO. 9

THE LOCATION, PLANS AND SPECIFICATIONS FOR THIS PROJECT ARE SHOWN ON THE PRELIMINARY DEVELOPMENT PERMIT (PDP) FOR THIS PROJECT. THE PDP IS A PRELIMINARY DOCUMENT AND IS NOT TO BE USED FOR CONSTRUCTION. THE PDP IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PDP IS NOT TO BE USED FOR ANY OTHER PURPOSE. THE PDP IS NOT TO BE USED FOR ANY OTHER PURPOSE. THE PDP IS NOT TO BE USED FOR ANY OTHER PURPOSE.



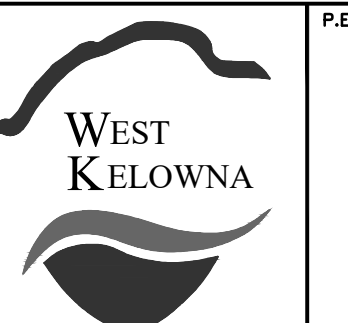
ISSUED FOR  
DEVELOPMENT  
PERMIT

PRELIMINARY

ORIGINAL GROUND SLOPES > 30%

LEGEND	
WATER	MANHOLE
SANITARY SEWER	POWER POLE
STORM SEWER	LAMP STANDARD
GAS	CATCH BASIN
UG TELEPHONE	HYDRANT
UG ELECTRICAL	TREES
○ MH	I.C.
● P.P.	C.S.
□ L.S.	LPT
⊕ C.B.	SERVICE BOX

No.	MM/DD/YY	BY	REVISION	CHK'd	No.	MM/DD/YY	BY	REVISION	CHK'd
5	02/21/24	RSB	ISSUED FOR DEVELOPMENT PERMIT	DRP	6	07/08/24	RSB	RE-ISSUED FOR DEVELOPMENT PERMIT	DRP
4	02/06/24	KTM	ISSUED FOR COORDINATION	DRP					
3	12/14/23	RSB	ISSUED FOR REVIEW	DRP					
2	11/16/23	RSB	ISSUED FOR REVIEW	DRP					
1	10/16/23	RSB	ISSUED FOR REVIEW	DRP					



DATE	BY	REVISION	CHK'd
02/21/24	RSB	ISSUED FOR DEVELOPMENT PERMIT	DRP
02/06/24	KTM	ISSUED FOR COORDINATION	DRP
12/14/23	RSB	ISSUED FOR REVIEW	DRP
11/16/23	RSB	ISSUED FOR REVIEW	DRP
10/16/23	RSB	ISSUED FOR REVIEW	DRP

<b>PROTECH CONSULTING</b> 300 - 3275 Lakeshore Rd Kelowna B.C. Phone 860-1771 PERMIT TO PRACTICE NO.: 1001403	DRAWN	KTM	<b>TALLUS RIDGE LOT C</b> <b>TALLUS DEVELOPMENTS LTD.</b> <b>SITE GRADING PLAN</b>	DRAWING NO.	23048-102
	DESIGN	RSB/DRP		REV. NO.	6
	APPROVED	DRP			
	DATE	FEB 2024			
	SCALE				
	HORIZ.	1:500			
	VERT.	N/A			

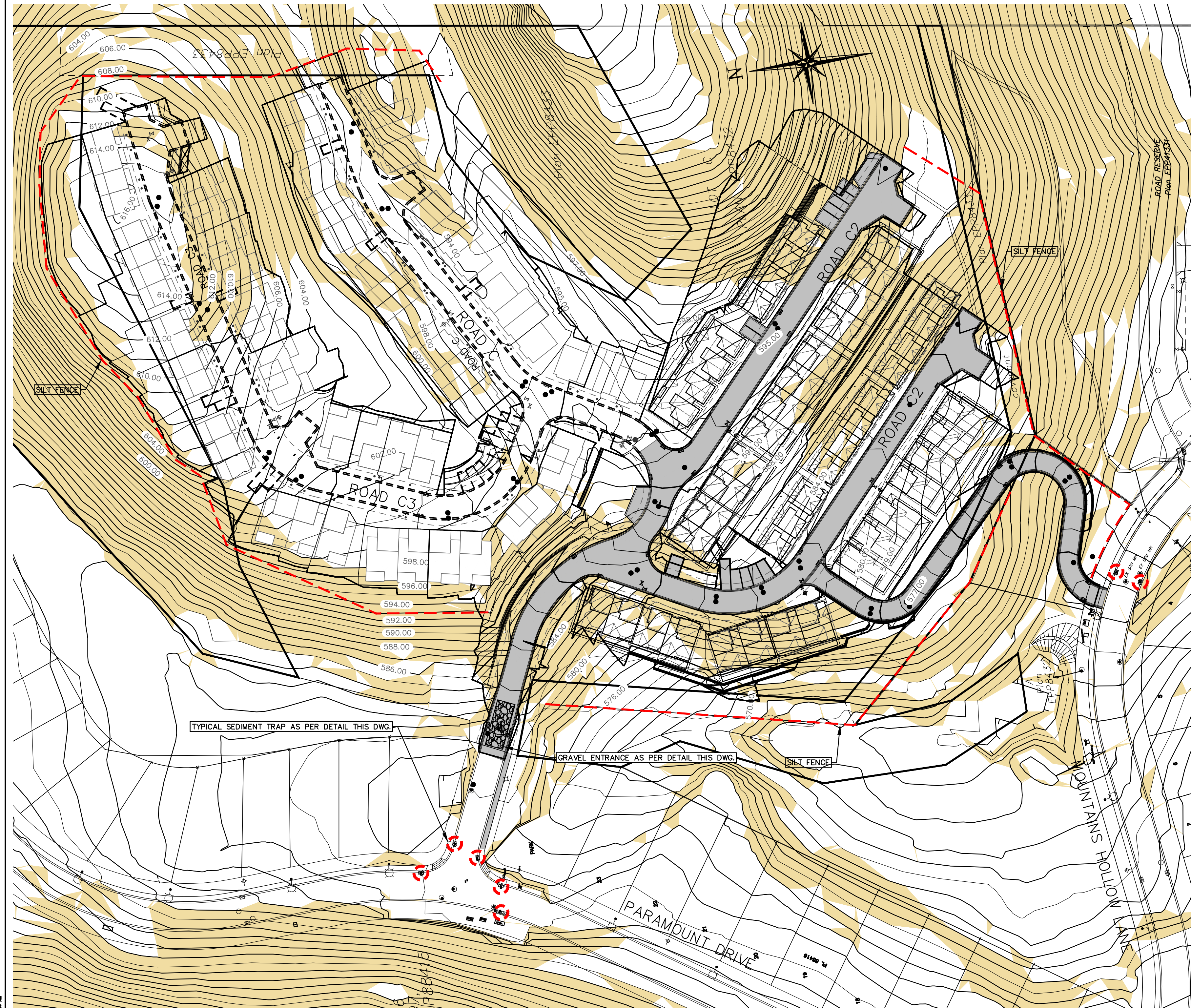
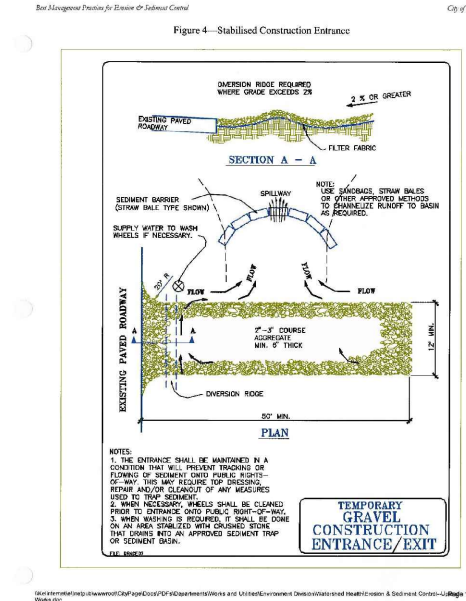
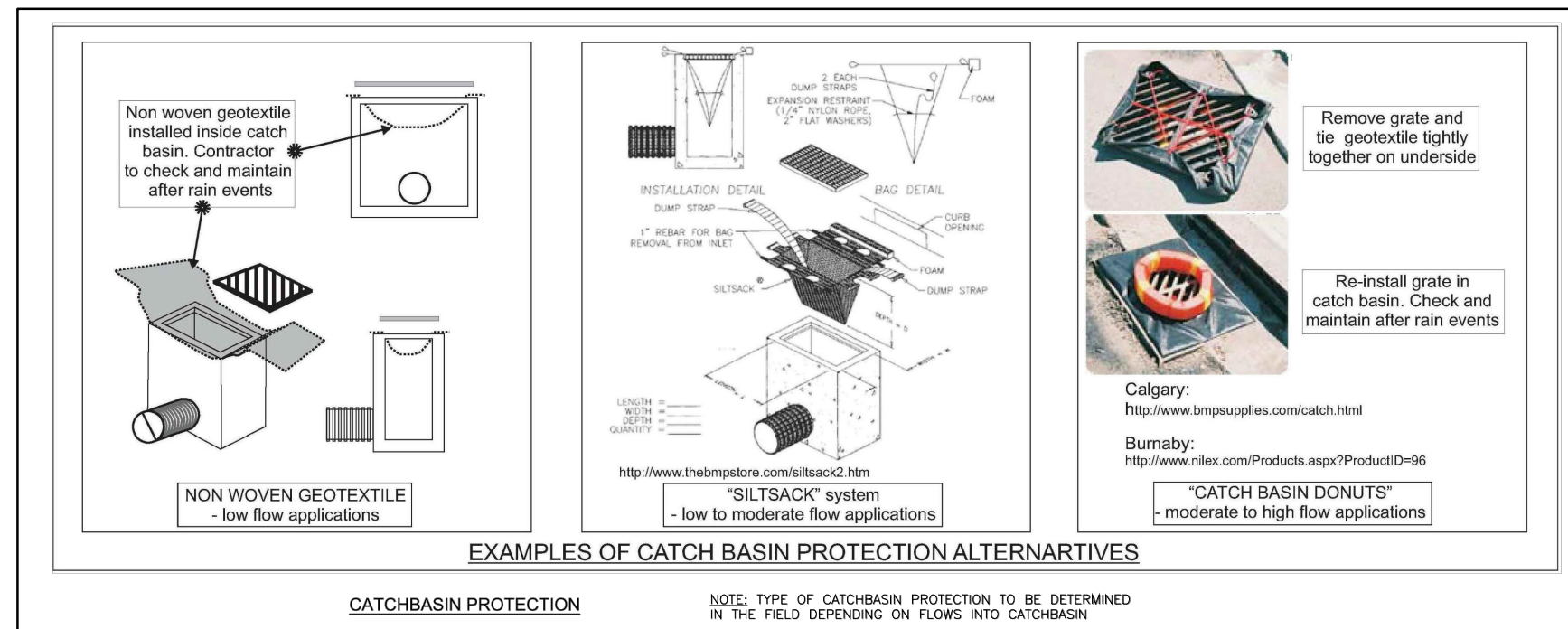
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**EROSION AND SEDIMENT CONTROL PLAN**  
**GENERAL NOTES:**

1. EROSION AND SEDIMENT CONTROL DRAWINGS MAY NOT INCLUDE ALL THE MEASURES REQUIRED. THE CONTRACTOR(S) SHALL COMPLY WITH ALL REGULATORY AUTHORITIES, MINISTRY OF THE ENVIRONMENT, DEPARTMENT OF FISHERIES AND OCEANS CANADA AND CITY OF WEST KELLOWNA IN THE PROTECTION OF FISH AND RECEIVING WATERBODIES DURING THE CONSTRUCTION OF THE WORKS AND SHALL BE RESPONSIBLE FOR ALL COSTS IN COMPLYING WITH THESE REQUIREMENTS. CONTRACTOR TO REFER TO CITY OF KELLOWNA BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL - UPLAND WORKS.
2. PRIOR TO, AND DURING CONSTRUCTION, THE CONTRACTOR SHALL TAKE ADEQUATE STEPS, INCLUDING BUT NOT LIMITED TO: DIVERTING FLOWS FROM EXPOSED AREAS, INSTALLATION OF SEDIMENT FENCES AROUND THE DEVELOPMENT PERIMETER AS SHOWN, AND SOIL STOCKPILES, INLET PROTECTION OF ALL CATCH BASINS, STABILIZED CONSTRUCTION ENTRANCES, AND ANY OTHER MEASURES AS MAY BE NECESSARY TO PREVENT SEDIMENT AND OTHER DELETERIOUS MATERIALS FROM THE WORKS ENTERING THE STORM SEWER SYSTEM AND RECEIVING WATER COURSE.
3. ALL WORK TO BE UNDERTAKEN AND COMPLETED BY THE CONTRACTOR IN SUCH A MANNER AS TO PREVENT THE RELEASE OF TURBID AND SEDIMENT LADEN WATER INTO ANY WATER COURSE AND STORM SEWER. THE QUALITY CRITERIA FOR THE SITE IS THAT ALL RUNOFF GENERATED FROM THE SITE IS TO CONTAIN LESS THAN 75mg/L TSS AFTER SIGNIFICANT RAINFALL EVENTS. TURBIDITY TO BE 25 NTU'S OR LESS DURING NORMAL WEATHER CONDITIONS (LESS THAN 25mm OF RAIN IN A 24 HOUR PERIOD).
4. ALL SEDIMENT CONTROLS FACILITIES TO REMAIN IN PLACE UNTIL 90% OF ON-SITE CONSTRUCTION IS COMPLETE.
5. WHILE CIVIL SITE CONSTRUCTION IS ONGOING, THE SITE SERVICING CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING SEDIMENT CONTROL FACILITIES ARE INSTALLED, MAINTAINED AND WORKING ADEQUATELY TO CONTROL ALL DISCHARGES FROM THE SITE. ALL FACILITIES SHALL BE INSPECTED BY THE ENVIRONMENTAL MONITOR ON A WEEKLY BASIS AND AFTER EVERY RAINFALL EVENT TO ENSURE PROPER OPERATION UNTIL REMOVAL.
6. DURING HOME CONSTRUCTION, AND ONCE ALL CIVIL SITE WORKS ARE COMPLETE, THE DEVELOPER IS RESPONSIBLE FOR ENSURING THAT SEDIMENT CONTROL FACILITIES ARE MAINTAINED AND WORKING ADEQUATELY TO CONTROL ALL DISCHARGES FROM THE SITE.
7. ANY IRREGULARITIES SHALL BE REPORTED TO THE ENGINEER OF RECORD IMMEDIATELY.
8. THE CONTRACTOR SHALL HAVE AN EMERGENCY SUPPLY OF EROSION CONTROL MEASURES ON SITE AT ALL TIMES INCLUDING PUMPING EQUIPMENT THAT CAN BE UTILIZED IN AN EMERGENCY SITUATION TO DIVERT FLOWS TO VEGETATED AREAS.

**MAINTENANCE OF GRAVEL ENTRANCE**

— THE ENTRANCE MUST BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH 5cm (2in) STONE, AS CONDITIONS DEMAND, AND REPAIR AND/OR CLEAN OUT OF ANY STRUCTURES USED TO TRAP SEDIMENT. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS, IS TO BE REMOVED IMMEDIATELY.



1. CONTRACTOR TO INSTALL SILT FENCE AT LOCATIONS AS SHOWN ON THIS DRAWING, AND WHERE REQUIRED AS PER EROSION CONTROL DETAILS.
2. CONTRACTOR SHALL INSTALL CATCH BASIN SEDIMENT TRAPS BY LAYFIELD (OR APPROVED EQUAL) AND INLET PROTECTION, AS PER DETAILS, IN EXISTING CATCH BASINS PRIOR TO COMMENCING CONSTRUCTION.
3. STOCKPILES OF EXCAVATED MATERIALS REMAINING ON SITE FOR A DURATION OF TIME (2-3 DAYS, OR OVER WEEKENDS) ARE TO BE COVERED AND PROTECTED WITH 6mm THICK POLYETHYLENE SHEETING (OR SIMILAR) AND SURROUNDED BY SILT FENCE TO MINIMIZE SOIL EROSION DUE TO RAINFALL EVENTS, AND DUST PREVENTION FROM WIND.
4. CONTRACTOR TO PROVIDE DUST CONTROL DURING CONSTRUCTION ON SITE. SPRINKLE WATER ON SITE UNTIL SURFACE IS WET AND REPEAT AS NECESSARY, OR SPRAY WITH DUST PALLIATIVE. OIL MUST NOT BE USED FOR DUST SUPPRESSION. CHECK WITH CITY TO DETERMINE WHICH OTHER DUST PALLIATIVES ARE ACCEPTABLE FOR USE IN THE AREA.
5. CONTRACTOR TO PROVIDE MECHANICAL SWEEPING OF ROADS TO REMOVE ANY ACCUMULATIONS OF SEDIMENT AS A RESULT OF CONSTRUCTION ACTIVITIES. SUCH OPERATIONS TO BE CARRIED OUT ON A WEEKLY BASIS (MIN) OR AS DIRECTED BY THE ENGINEER OF RECORD OR HIS REPRESENTATIVE, PARTICULARLY IN ADVANCE OF INCLEMENT WEATHER CONDITIONS. NO FLUSHING ALLOWED.

**STAGE 2- CONSTRUCTION OF ROADS AND UNDERGROUND UTILITIES**

1. FOLLOWING INSTALLATION OF CATCH BASINS, CONTRACTOR SHALL INSTALL CATCH BASIN SEDIMENT TRAPS BY LAYFIELD (OR APPROVED EQUAL) AND INLET PROTECTION, AS PER DETAILS.
2. STOCKPILES OF EXCAVATED MATERIALS REMAINING ON SITE FOR A DURATION OF TIME (2-3 DAYS, OR OVER WEEKENDS) ARE TO BE COVERED AND PROTECTED WITH 6mm THICK POLYETHYLENE SHEETING (OR SIMILAR) AND SURROUNDED BY SILT FENCE TO MINIMIZE SOIL EROSION DUE TO RAINFALL EVENTS, AND DUST PREVENTION FROM WIND.
3. DURING CONSTRUCTION, CONTRACTOR TO PROVIDE MECHANICAL SWEEPING OF ROADS TO REMOVE ANY ACCUMULATIONS OF SEDIMENT AS A RESULT OF CONSTRUCTION ACTIVITIES. SUCH OPERATIONS TO BE CARRIED OUT ON A WEEKLY BASIS (MIN) OR AS DIRECTED BY THE ENGINEER OF RECORD OR HIS REPRESENTATIVE, PARTICULARLY IN ADVANCE OF INCLEMENT WEATHER CONDITIONS. NO FLUSHING ALLOWED.

**DECOMMISSIONING**

DE-COMMISSIONING OF ALL SEDIMENT CONTROL FACILITIES: ON COMPLETION OF ALL BUILDING CONSTRUCTION ACTIVITIES AND 90% LANDSCAPING, SILT TRAPS ON THE CATCH BASINS AND DITCH INLETS CAN BE REMOVED. THE BALANCE OF SILT FENCE SHALL ALSO BE REMOVED. ANY TRAPPED SEDIMENT TO BE REMOVED OR STABILIZED ON SITE. DISTURBED AREAS AS A RESULT FROM REMOVAL MUST BE PERMANENTLY STABILIZED.

**EROSION AND SEDIMENTATION**

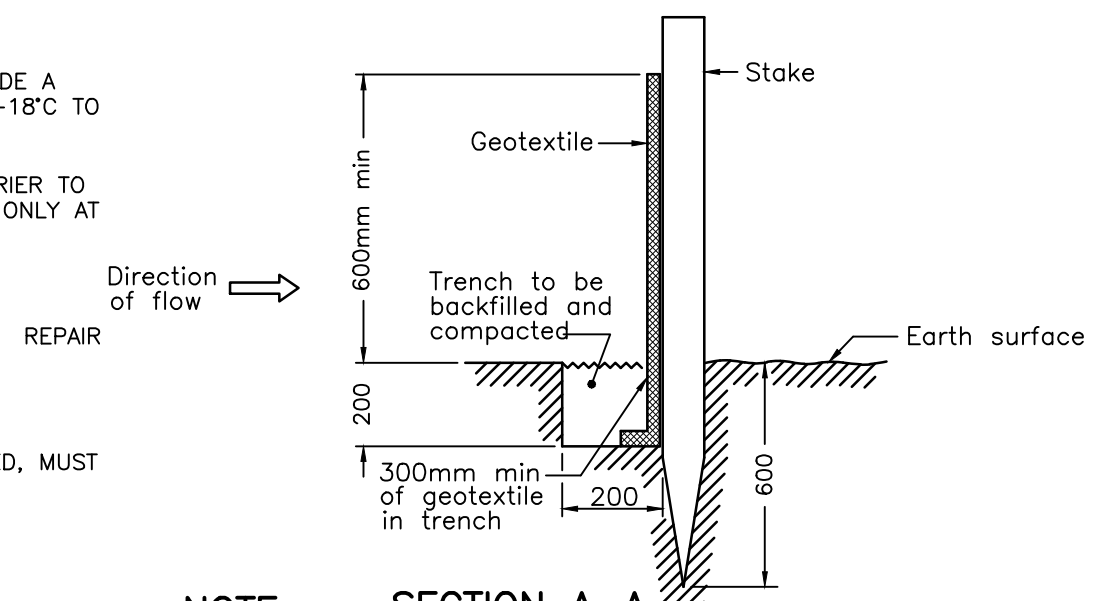
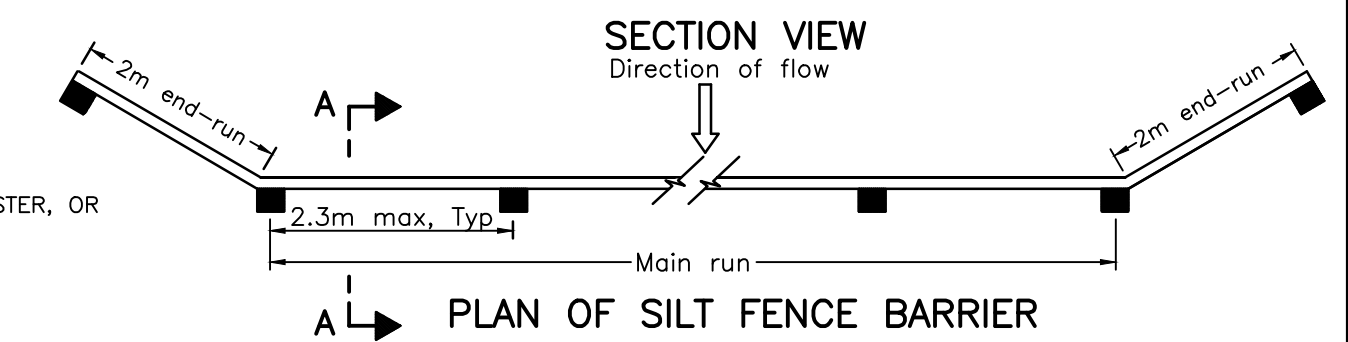
- 1) PRE-STAKED SILT FENCE TO BE INSTALLED AROUND PERIMETER AS SHOWN ON THE CONTRACT DRAWING PRIOR TO CONSTRUCTION AS DIRECTED BY THE ENGINEER.
- 2) TOPSOIL STRIPPED FOR REUSE TO BE STOCKPILED AWAY FROM PAVED ROADS AND PROPERTY LINES AND SHALL BE COVERED AND/OR SEEDED TO REDUCE EROSION.
- 3) EXISTING AND PROPOSED CATCH BASINS TO BE PROTECTED DURING CONSTRUCTION WITH THE USE OF DROP INLET AND CURB INLET SEDIMENT BARRIERS CURB INLETS ON EXISTING ROADS TO BE ADEQUATELY MARKED AT ALL TIMES.
- 4) ALL DISTURBED AREAS TO BE RESTORED AND LANDSCAPED AS SOON AS POSSIBLE FOLLOWING CONSTRUCTION OF THE BUILDING AND SITE SERVICING.
- 5) ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE INSPECTED AND MAINTAINED ON A REGULAR BASIS THROUGHOUT THE COURSE OF CONSTRUCTION.
- 6) CONTROLS TO FOLLOW REQUIREMENTS OF MMCD 01-57-01

**SILT FENCE NOTES:**

- ALL DIMENSIONS ARE IN MILLIMETRES OR METRES UNLESS OTHERWISE SHOWN.
- FILTER FABRIC MAY BE A PERVIOUS SHEET OF SLIT FILM WOVEN POLYPROPYLENE, NYLON, POLYESTER, OR ETHYLENE YARN HAVING THE FOLLOWING MINIMUM CRITERIA:  
 FILTERING EFFICIENCY 90%  
 FLOW RATE 0.012m<sup>3</sup>/m<sup>2</sup>/minute  
 GRAB TENSILE STRENGTH 700N  
 EQUIVALENT OPENING 0.15mm  
 SIZE
- FILTER FABRIC MATERIAL MUST CONTAIN ULTRAVIOLET RAY INHIBITORS AND STABILIZERS TO PROVIDE A MINIMUM OF SIX MONTHS OF EXPECTED USABLE CONSTRUCTION LIFE AT TEMPERATURE RANGE OF -18°C TO 49°C (0°F TO 120°F)
- FILTER FABRIC MUST BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH MUST BE SPLICED TOGETHER ONLY AT SUPPORT POSTS.

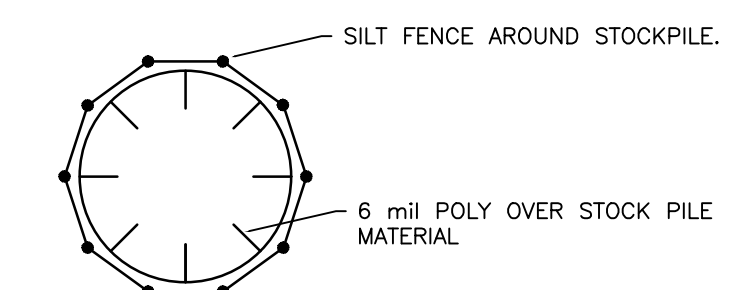
**MAINTENANCE:**

- INSPECT IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. REPAIR AS NECESSARY
- SEDIMENT MUST BE REMOVED WHEN IT REACHES ONE HALF THE HEIGHT OF THE FENCE.
- ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE FILTER FENCE IS NO LONGER REQUIRED, MUST BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED, AND SEEDDED.



NOTE: SECTION A-A  
 A All dimensions are in millimetres or metres unless otherwise shown.

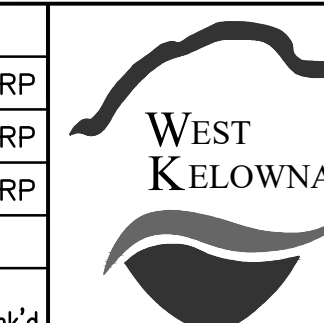
**SILT FENCE DETAIL**  
 NTS



**ISSUED FOR DEVELOPMENT PERMIT**

**PRELIMINARY**

- CATCH BASIN SEDIMENT TRAPS
- SILT FENCE



PENG.

DRAWN	KTM
DESIGN	RSB/DRP
APPROVED	DRP
DATE	FEB 2024
SCALE	
HORIZ.	1:750
VERT.	N/A

**PROTECH CONSULTING**  
 Phone 860-1771  
 300 - 3275 Lakeshore Rd Kelowna B.C. PERMIT TO PRACTICE NO.: 1001403

**TALLUS RIDGE LOT C**  
**TALLUS DEVELOPMENTS LTD.**  
**EROSION AND SEDIMENT CONTROL PLAN**

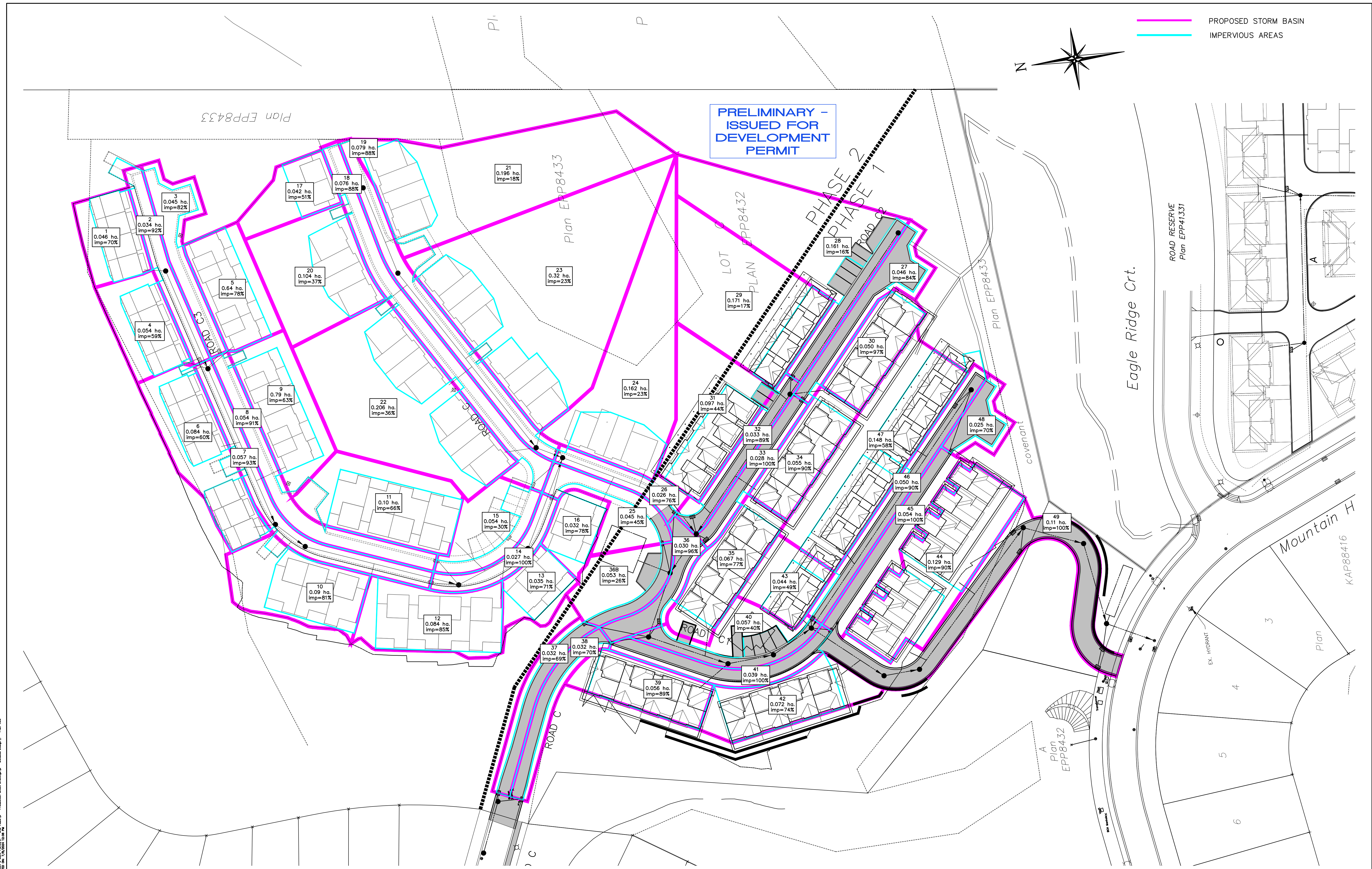
DRAWING NO. **23048-103**  
 REV. NO. **4**

**LEGEND**

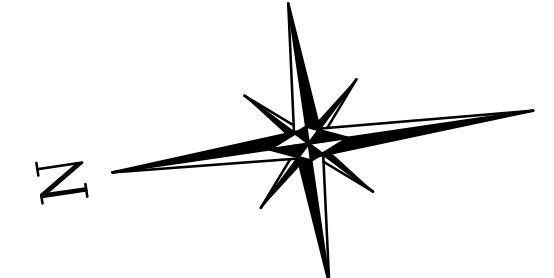
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SANITARY SEWER		POWER POLE		P.P.	C.S.	
STORM SEWER		LAMP STANDARD		L.S.	LPT	
GAS		CATCH BASIN		C.B.	SERVICE BOX	
UG TELEPHONE		HYDRANT				
UG ELECTRICAL		TREES				

No.	MM/DD/YY	BY	REVISION	Chk'd
4	07/08/24	RSB	RE-ISSUED FOR DEVELOPMENT PERMIT	DRP
3	02/20/24	RSB	ISSUED FOR DEVELOPMENT PERMIT	DRP
2	02/06/24	KTM	ISSUED FOR COORDINATION	DRP
1	01/09/24	KTM	ISSUED FOR REVIEW	

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PROPOSED STORM BASIN  
IMPERVIOUS AREAS



PRELIMINARY -  
ISSUED FOR  
DEVELOPMENT  
PERMIT

THE LOCATION, PLANNING AND DESIGN OF THIS PROJECT IS BASED ON THE INFORMATION PROVIDED TO THE CONSULTANT BY THE CLIENT. THE CONSULTANT HAS CONDUCTED VISUAL INSPECTIONS OF THE SITE AND HAS REVIEWED THE RECORD DRAWINGS AND SURVEY DATA PROVIDED TO THE CONSULTANT. THE CONSULTANT HAS NOT CONDUCTED ANY OTHER INVESTIGATIONS OR TESTS. THE CONSULTANT IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED TO THE CONSULTANT. THE CONSULTANT'S LIABILITY IS LIMITED TO THE SERVICES PROVIDED BY THE CONSULTANT. THE CONSULTANT'S LIABILITY IS LIMITED TO THE SERVICES PROVIDED BY THE CONSULTANT.

LEGEND	
WATER	MANHOLE
SANITARY SEWER	POWER POLE
STORM SEWER	LAMP STANDARD
GAS	CATCH BASIN
UG TELEPHONE	HYDRANT
UG ELECTRICAL	TREES
○ MH	○ I.C.
● P.P.	○ C.S.
□ L.S.	○ LPT
⊞ C.B.	○ SERVICE BOX

No.	MM/DD/YY	BY	REVISION	Chk'd	No.	MM/DD/YY	BY	REVISION	Chk'd
3	07/08/24	RSB	RE-ISSUED FOR DEVELOPMENT PERMIT	DRP					
2	02/20/24	RSB	ISSUED FOR DEVELOPMENT PERMIT	DRP					
1	02/06/24	TM	ISSUED FOR COORDINATION	DRP					



PLNG.	DATE	BY	REVISION	Chk'd

DRAWN TM DESIGN RSB/DRP APPROVED DRP DATE FEB 2024 SCALE HORIZ. 1:750 VERT. N/A	<b>PROTECH CONSULTING</b> 300 - 3275 Lakeshore Rd Kelowna B.C. Phone 860-1771 PERMIT TO PRACTICE NO.: 1001403	DRAWING NO. <b>23048 SWBP</b> REV. NO. <b>3</b>
<b>TALLUS RIDGE LOT C</b> <b>TALLUS DEVELOPMENTS LTD.</b> <b>STORMWATER BASIN PLAN</b>		



LEGEND

- 27 Lps 5 YEAR 1 HOUR IN PIPE
- 118 Lps 100 YEAR 1 HOUR IN PIPE
- CULVERT OR OUTLET
- EXISTING CONTOURS
- PROPOSED CONTOURS
- OVERLAND FLOW ROUTE
- 100 YR STORM ROUTING IN PIPE
- MAJOR OVERLAND FLOW BEYOND 1:100 YEAR

**PRELIMINARY -  
ISSUED FOR  
DEVELOPMENT  
PERMIT**



STORM TANK STORAGE PROVIDED 46m<sup>2</sup> X 2m = 92m<sup>3</sup>  
 MAX STORAGE REQUIRED BY SSA = 48m<sup>3</sup>  
 CONTROL MANHOLE PEAK RELEASE RATE = 23LPS (100 YEAR 1 HOUR)  
 C/W 98mm ORIFICE CONTROLLED RELEASE  
 AND OVERFLOW PIPE ELEVATION 562.85m

STORM TANK STORAGE PROVIDED 120m<sup>2</sup> X 3m = 360m<sup>3</sup>  
 MAX STORAGE REQUIRED BY SSA = 344  
 C/W 70mm ORIFICE CONTROLLED RELEASE  
 AND OVERFLOW PIPE ELEVATION 588.76m

STORM TANK STORAGE PROVIDED 120m<sup>2</sup> X 3m = 360m<sup>3</sup>  
 MAX STORAGE REQUIRED BY SSA = 226m<sup>3</sup>  
 C/W 60mm ORIFICE CONTROLLED RELEASE  
 AND OVERFLOW PIPE ELEVATION 582.50m

OVERSIZED STORM PIPE AND MANHOLES STORAGE PROVIDED = 7.3m<sup>3</sup>  
 MAX STORAGE REQUIRED BY SSA = 6.6m<sup>3</sup>  
 MAX STORAGE REQUIRED X 10% SF = 7.3m<sup>3</sup>  
 CONTROL MANHOLE PEAK RELEASE RATE = 2.2LPS (100 YEAR 1 HOUR)  
 C/W 24mm ORIFICE CONTROLLED RELEASE  
 AND OVERFLOW PIPE ELEVATION 580.60m

SUMMARY OF OVERALL STORAGE  
 TOTAL STORAGE REQUIRED BY SSA = 619m<sup>3</sup>  
 TOTAL STORAGE REQUIRED X 10% SF = 681m<sup>3</sup>  
 TOTAL STORAGE PROVIDED = 722m<sup>3</sup>

THE LOCATION, PLANNING AND DESIGN OF THIS PROJECT IS THE SOLE RESPONSIBILITY OF THE DESIGNER. THE DESIGNER HAS CONDUCTED VISUAL INSPECTIONS OF THE SITE AND HAS BEEN ADVISED THAT THE INFORMATION PROVIDED IS TRUE AND CORRECT. THE DESIGNER HAS NOT CONDUCTED ANY INVESTIGATIONS OR TESTS TO DETERMINE THE ACCURACY OF THE INFORMATION PROVIDED. THE DESIGNER HAS NOT CONDUCTED ANY INVESTIGATIONS OR TESTS TO DETERMINE THE ACCURACY OF THE INFORMATION PROVIDED. THE DESIGNER HAS NOT CONDUCTED ANY INVESTIGATIONS OR TESTS TO DETERMINE THE ACCURACY OF THE INFORMATION PROVIDED.

LEGEND		MANHOLE		I.C.	
WATER					
SANITARY SEWER					
STORM SEWER					
GAS					
UG TELEPHONE					
UG ELECTRICAL					

No.	MM/DD/YY	BY	REVISION	Chk'd	No.	MM/DD/YY	BY	REVISION	Chk'd
3	07/08/24	RSB	RE-ISSUED FOR DEVELOPMENT PERMIT	DRP					
2	02/20/24	RSB	ISSUED FOR DEVELOPMENT PERMIT	DRP					
1	02/06/24	TM	ISSUED FOR COORDINATION	DRP					

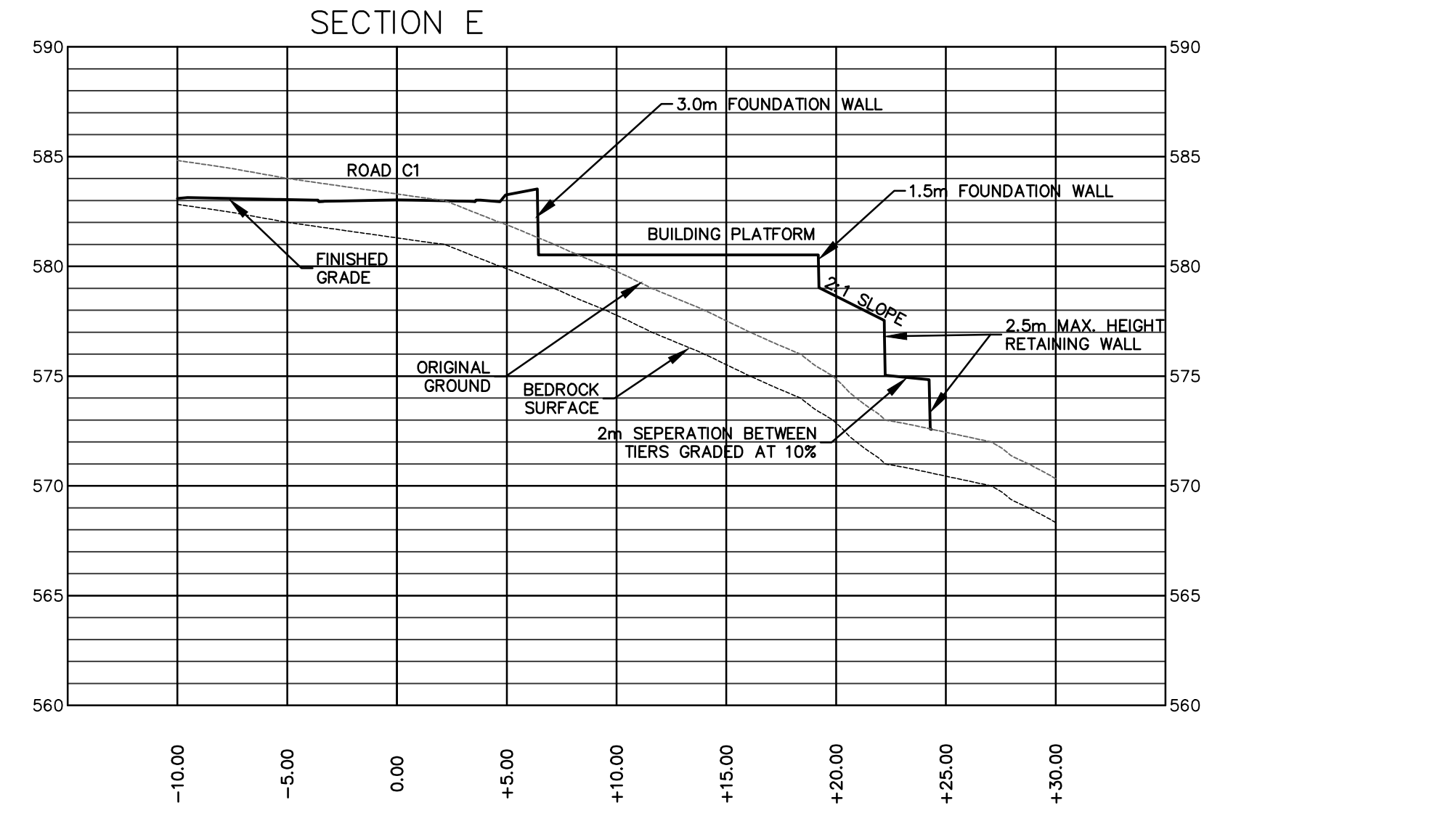
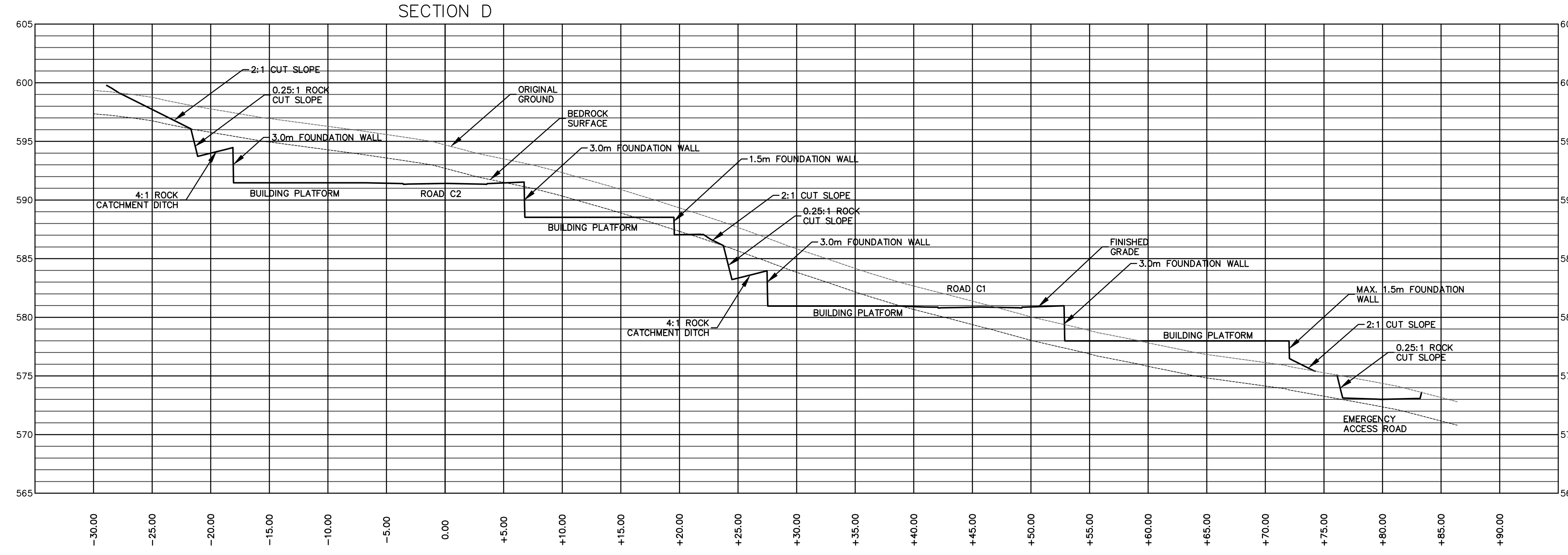
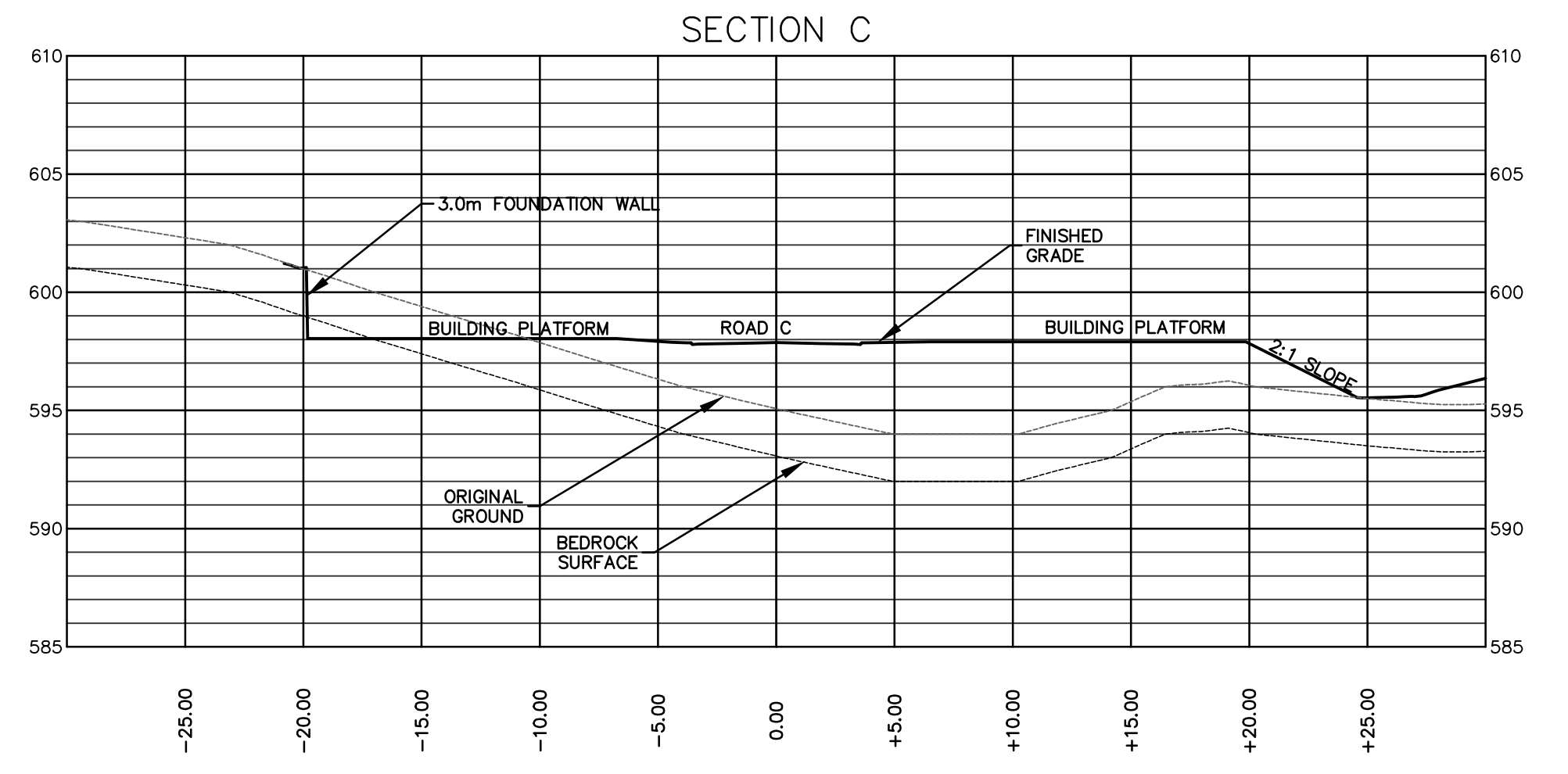
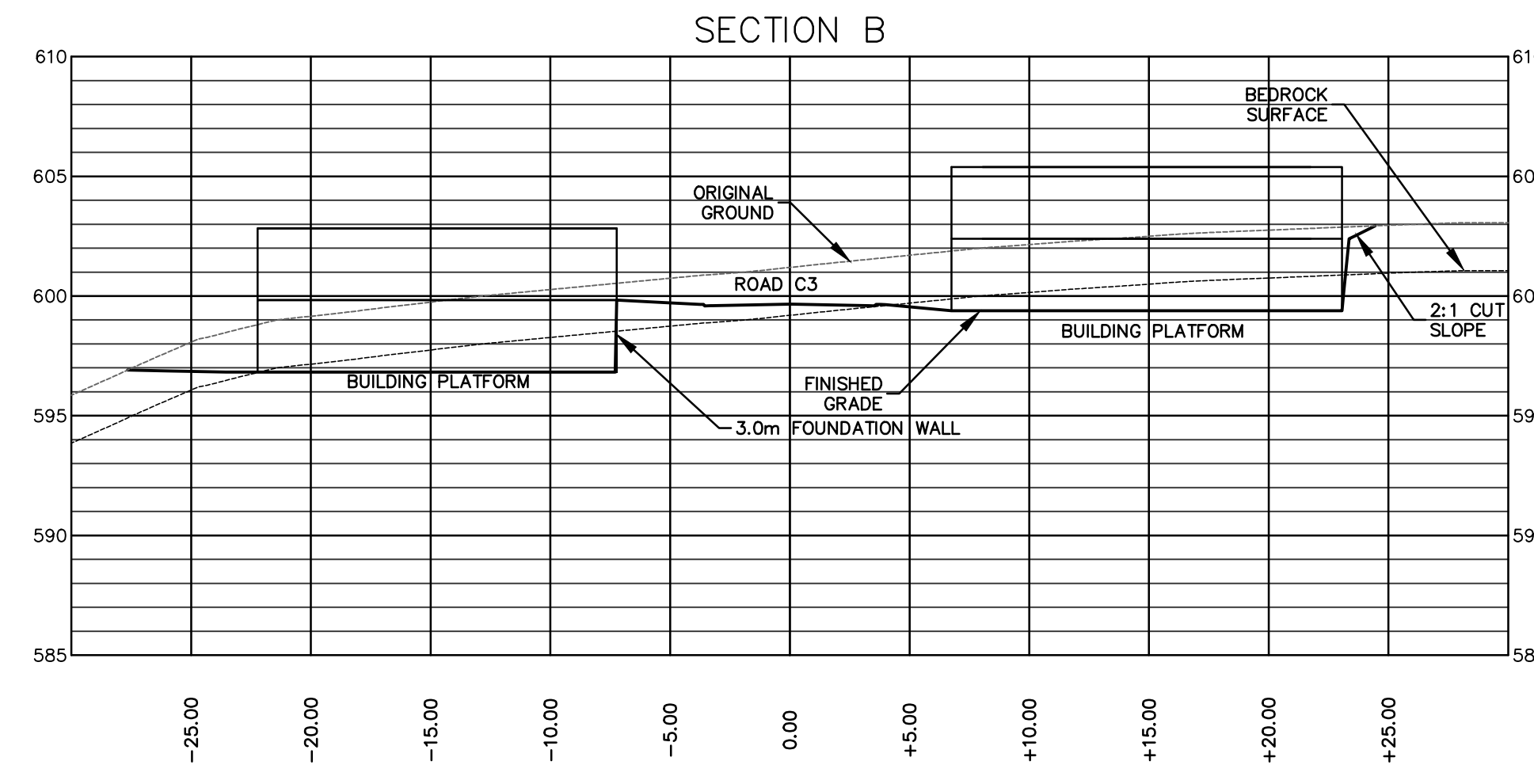
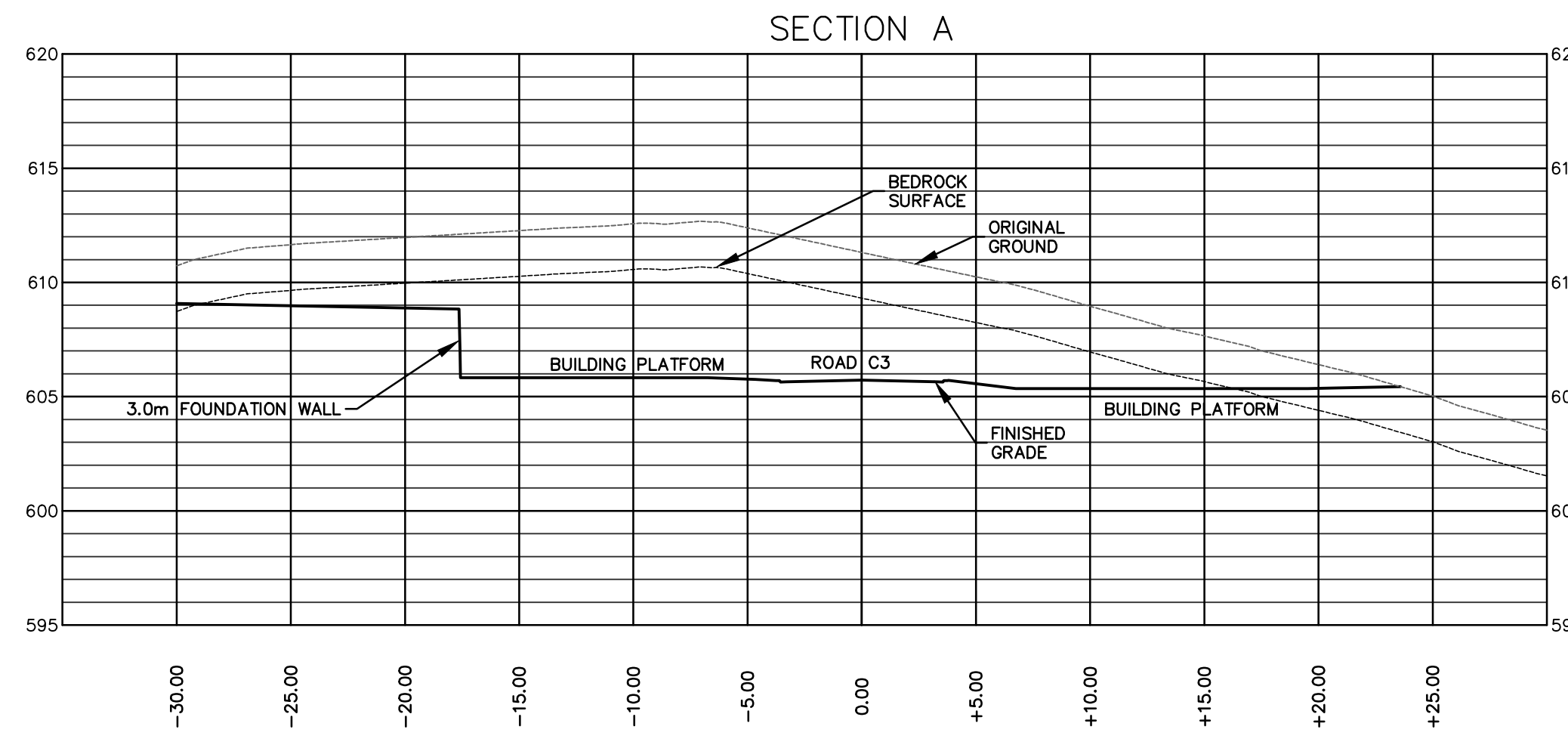


DRAWN		DESIGN		APPROVED		DATE		SCALE		HORIZ.		VERT.	
TM		RSB/DRP		DRP		FEB 2024		1:750		N/A			

**PROTECH CONSULTING**  
 300 - 3275 Lakeshore Rd Kelowna B.C. PERMIT TO PRACTICE NO.: 100143  
 Phone 860-1771

**TALLUS RIDGE LOT C**  
**TALLUS DEVELOPMENTS LTD.**  
**STORMWATER MANAGEMENT PLAN**

DRAWING NO. **23048**  
**SWMP**  
 REV. NO. **3**



ISSUED FOR  
DEVELOPMENT  
PERMIT

PRELIMINARY

FILE LOCATION: P:\Projects\23048 - Tallus Ridge Lot C\23048-01-Grading\23048-01-Grading.dwg - Date: 02/21/24 - 10:52 AM

Symbol	Description
	WATER
	SANITARY SEWER
	STORM SEWER
	GAS
	UG TELEPHONE
	UG ELECTRICAL
	MANHOLE
	POWER POLE
	LAMP STANDARD
	CATCH BASIN
	HYDRANT
	TREES
	MH
	I.C.
	P.P.
	C.S.
	L.S.
	C.B.
	LPT
	SERVICE BOX

No.	MM/DD/YY	DATE	BY	REVISION	Chk'd
4	07/08/24		RSB	RE-ISSUED FOR DEVELOPMENT PERMIT	DRP
3	02/21/24		RSB	ISSUED FOR DEVELOPMENT PERMIT	DRP
2	02/06/24		KTM	ISSUED FOR COORDINATION	DRP
1	01/08/24		KTM	ISSUED FOR REVIEW	DRP



P.ENG.	DATE	BY	REVISION	Chk'd

DRAWN	KTM
DESIGN	DRP
APPROVED	DRP
DATE	FEB 2024
SCALE	
HORIZ.	1:500
VERT.	N/A

**PROTECH CONSULTING**  
300 - 3275 Lakeshore Rd Kelowna B.C. PERMIT TO PRACTICE NO.: 1001403  
Phone 860-1771

**TALLUS RIDGE LOT C  
TALLUS DEVELOPMENTS LTD.  
GRADING CROSS SECTIONS**

DRAWING NO.	23048-301
REV. NO.	4



March 26, 2024  
Our File 23048

City of West Kelowna  
2760 Cameron Road  
West Kelowna, B.C.  
V1Z 2T6

Re: Tallus Ridge – Lot C– Preliminary Functional Servicing Report  
Lot C, Plan EPP8432, DL 3793, ODYD, PID# 028-788-044

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## **Infrastructure Report Scope**

Please find our preliminary report requested during the pre-application meeting with CWK staff on September 11-2023. We present a discussion of development items including in the order below:

- Housing initiative, OCP and Zoning,
- Location and Layout,
- Environment and Topography,
- Roads and Accessibility,
- Geotechnical
- Sanitary Sewer,
- Storm Water Management and Storm System,
- Water System,
- Fire Protection System,
- Service pipes,
- Shallow Utilities,
- Strata works

The development is referred to in two phases with respect to the pressure zones of the water system and perhaps for its buildout, however it is proposed to be handled as one project with respect to the DP approvals for the total 113 MF units.

Additional design details will supplement the functional servicing report once the development permit is approved.

### **Housing initiative, OCP and Zoning**

The Tallus Ridge development is nearing buildout of the original concept that was rezoned in accordance with a CDP area mapped in the OCP. This Lot C property was included in the concept and then slated for 84 MF units compared to the presented development of 113 units to be sold as condos with any rental portion control by strata and discouraged. Townhouse ground entry units in mostly fourplexes buildings have formed the layout. A few triplex and duplex buildings are cited to best fit the road layout.

Mobility for occupants is characterized with garages for vehicles to the local road and little emphasis on pedestrian access since the development is not within walking distance or on a bus route to any community amenities.

Visitors will find 24 parking stalls required and shown to be provided. Units on Road C2 have the longest walk, nearly 100 m to a visitor stall.

The site is zoned R3. The zoning regulations are a FAR of 0.75, a site coverage of 40% maximum, a front yard setback of 4.5m, a rear yard setback of 7.5m, a side yard setback of 3.0m and a maximum building height of 3 stories or 10m.

### **Location and Layout**

The R3 zoned (multi-family townhouse) site occupies approximately 6.6 ha east of Paramount Drive and north of Mountain Hollows Lane. The property is appropriately zoned with existing multi-family developments to the south and north and west, and existing single-family development to the east.

The site is presently undisturbed except for the existing entrance from Paramount Drive, but five Development Permit Areas are mapped on the property for consideration including Aquatic, Wildfire, Form and Character, Hazardous Slopes and Terrestrial.

The proposed hillside layout is fitted with 30% basement walkout units and the rest as walk-up from garage levels on:

- access roads C1, C2 traversing the hillside with units stepped on the slope with walk-up above and basement walkout below the roads.
- Access road C and C3 levelling the knobs and gulleys with less cross slope and walk-up units of similar section and no basements on each side of the road.

The hillside topography will have more soil to be wasted off-site as cut, then be moved or imported as fill. Road structure materials will be manufactured from the rock cut and gravels where possible to reduce the amount of material to be hauled from the site. However approximately 30,000 cu meters of overburden is anticipated to be removed from the site.

The site having an overall number of units more than 100, by NFPA requires two accesses. Therefore a restricted emergency access (gated) with no flanking units, will egress traffic at 15% down to Mountain Hollows Road for emergencies as required.

## **Environment and Topography**

Covenant EPP8433 and EPP50409 were established approximately 10 years ago to protect environmentally sensitive and steep areas. The grading plan for development of Lot C affecting these covenant areas are reviewed and mitigated with fencing, retaining walls, and restoration of slopes to the requirements of the QEP (Shannon of Okanagan Environmental Health & Safety).

Some decisive evaluations are necessary to retain the value of the protected areas while creating livable and accessible residential occupancies. These include:

- batter and setbacks of rock cuts depending on rock stability
- slope and restored cover depending on stability of soil
- occupancy setbacks and fencing requirements for top of slope
- rock fall protection swales, berms and fencing depending on occupancy setback
- value of yard space versus natural deciding disturbance or restoration or retaining of slopes
- vehicular and fire truck clear zones along accesses

The grading plan presented for DP illustrates the above design tradeoffs with:

- demarcation of the extent of cut and fills
- Mapped rock cut and soil slopes
- proposed adjustments of protection covenant work and boundaries. (this is supplemented with the QEP report)

## **Geotechnical**

Interior Testing Services Ltd (itsl) logged 10 test pits averaging 2 m deep to classify and map the types of soil and rock to be encountered. Their report Jan 25 2024 was used to design the roads, building excavations, retaining and toe/top of slope shown on the Protech Design for DP.

They will review the final drainage plan and guide the construction of the roads, sites and foundations with material testing and site reviews.

## **Roads and Accessibility**

All proposed roads are strata/development owned, operated, and maintained and therefore designed to the building code requirements for fire truck access, and the City of West Kelowna bylaws 0249 for garbage truck maneuverability. A minimum 6 m clearance width is required to facilitate emergency vehicles, but most roads have a 7 m pavement width and are fully urbanized with curb and gutter. Garbage truck maneuverability should be greater than required for the fire trucks, so only the location and handling of garbage containers is shown. If curbside pickup by the CWK is available, it may introduce additional considerations.

Roads C1, C2 traversing the hill have easy grades approximately 3 % to easily access units and route drainage. Road C and C3 running up and down the topography have grades of 9 and 12 % (maximum for multi-family) and will be more challenging to grade to garages. Buildings may need to be stepped or garage grades lowered and fitted with a few stairs to main floor elevations.

Road alignment allows full firetruck movements with all curves greater than 12 m radius including the emergency access. The combined tight curve and max grade on Road C intersecting with Road C2 has been reviewed to assure safe design. The emergency access runs at a grade of 15% but will only be used to egress vehicles downhill in special circumstances. A locked gate will allow fire access and egress as needed but no uphill movements are anticipated even for emergencies.

Typical road sections are similar for roads C1, C2 and C3 with roads crowned to curbs and catch grates picking up the gutter line flows. Full details of curb-returns and geometry will be drawn up for the building permit stage.

### **Sanitary Sewer**

Downstream pipe capacity has been verified previously during rezoning and OCP planning of the overall Tallus Ridge Area under file Z12-04. The 6.6 ha R3 site was at that time and for the current layout, calculated to generate a peak design flow of approx. 2.51 Lps and 3.22 Lps respectively. The initial planning had the total Talus Ridge community at 612 equivalent residential units (ERU) and the current count, inclusive of this property, now at only 540 (ERU), still 72 units short of the initial plan. The slight increase in units at Lot C, therefore, does not affect the sanitary capacity.

The minimum sized 200 mm diameter sewer main flowing full at a minimum slope of 1%, has a flow capacity of 35 lps at a velocity of approx. 1.4 m/s. The peak flow calculated from the development is only 9% of this capacity and will flow slightly higher than scouring velocity at 0.75 m/s, adequate to meet the Works and Services bylaw #0249.

### **Storm Water Management and Storm System**

In accordance with the city of west Kelowna #0249, developments requiring storm water detention must use a computer model to demonstrate the expected runoff rates, infiltration volumes and stormwater storage requirements. Input and output sheets from the Autodesk Storm and Sanitary Analysis software are presented to:

- Set up modelling parameters for sub-basin, inlets, and channel flow.
- calculate flow rate hydrographs in pipes and channels during various storm events.
- set up of orifice inverts and diameters, detention depths and sizes.
- calculate storage and release rate hydrographs for various storm events.

Results are reported to establish those short duration storms that generate peak flows and longer duration storms that maximize storage. Other events have been analyzed, for which the data is not included in this report but can be submitted upon request. Pre-development flow rates were estimated to the bylaw at 25 liters per second, using the rational method as reported in Appendix 1: Storm Water Calculations.

The city of West Kelowna bylaw #0249 requires storage to detain runoff rates to predevelopment levels for up to the 100-year event (plus 10% safety factor). The CWK objectives are achieved by utilizing both oversized piping and 3 storm tanks. The results of the modelling are tagged at significant works on the drawings and tabulated in Appendix 1.

In summary:

Total storage required by SSA plus 10% = 688 m<sup>3</sup>

Storage provided in pipes near Paramount with 2.2 lps release = 7 m<sup>3</sup>

Storage provided in tank 1 = 360 m<sup>3</sup>

Storage in tank 2 = 360 m<sup>3</sup>

Storage in tank 3 = 92 m<sup>3</sup>

Total storage provided = 819 m<sup>3</sup>

Pre-development release rate = 25LPS (by rational method of exiting topography and soils.)

Most of the storm runoff is stored and released to Mountains Hallow Lane and only a very small portion of Road C to Paramount Park. Multiple control manholes with appropriately sized orifices will diminish current runoff to the downstream infrastructure. All stormwater design objectives set out in the City of West Kelowna bylaw #0249 will be satisfied in the proposed development detailed design.

The peak 5-year post development runoff rates required to be routed in pipes is calculated at the inlet to detention tank #1 to be 140LPS. A 450 diameter PVC storm pipe at 1 % has a capacity of 247LPS. The peak flow from the 100-year post development flow carried by pipes is calculated to be 272 LPS.

There is sufficient room onsite for adjustment of the detailed design in coordination with Geotechnical soil parameters of the detailed geotechnical report. Generally, runoff from hard surfaces from front yards and roofs will be detained and released to storm infrastructure. Drainage from surfaces in rear spaces, difficult to access, and from perimeter drains in soil and rock, will be assessed to either infiltrate or be collected to discharge to downstream infrastructure. No storm water is expected to be pumped.

### **Water System**

The water main within the road system inclusive of the curb stops and metering for each unit is proposed to be owned and maintained by the strata development but with the CWK community utility administering the monthly billing and collection in the manner of the rest of the Talus Ridge development.

The proposed site elevations vary from 607m to 580m and thereby the upper proposed units are not served by the PZ 625 pressure zone pipe at the entry off Paramount Drive. It is therefore proposed to feed the site from two pressure zones. Phase 1, 49 units below 597 m, from the 625m PZ and the 64 units of phase 2 from the 675m PZ. An interconnect between the two to prevent stagnant water at the end of the upper system could be provided, as has been done in the past in the Tallus Ridge community most recently from stage 11 to stage 10.

The site is provided with a water main stub from the zone directly off the reservoir which could service the entire site. However, a second stub is available from Paramount at the existing entrance using the 625m PZ which is also to be used to keep pressure on the lower units from being too high.

The 45 units of phase 1 vary in elevations from 594m to 580m and if supplied from PZ 625 will result in pressures from 50 psi to 64 psi (based on the proposed finished ground design).

The 68 units of phase 2 vary in elevations from 607m to 594m if supplied from PZ 675 will result in pressures from 97psi to 114 psi (based on the proposed finished ground design).

The reservoir capacity was reviewed during the rezoning exercise in 2012 with this property proposed to contain 84 MF units instead of the unit count now to be 113 units. However, the initial planning had the total Talus Ridge community at 612 equivalent residential units (ERU) and the current count, inclusive of this property, now at only 540 (ERU), still 72 units short of the initial plan. The slight increase in units at Lot C, therefore, does not affect the reservoir capacity.

IHA policies require the dead end to be looped to maintain water quality and therefore a small diameter PRV is proposed to bleed fresh water to the lower pressure zone located near the phase 1 and 2 boundary at Road C and Road C3.

### **Fire Protection System and Wildfire**

The reservoir is sized and situated to provide Maximum Day Demand and Fireflow of 90 l/s to the zoning requirement for the multi-family townhouse development. The two 200 mm diameter PVC stubs can supply 125 l/sec at the maximum recommended velocity of 4 m/sec. Each townhouse 4 plex building will need to be sized and designed to fit to this fireflow under the guidelines of the Fire Underwriters Survey as stated in bylaw #0249. Adding fire walls and fire sprinklers can greatly reduce the required fireflow to the building and bring the building to comply with the available 90 l/s MDD plus fireflow.

Wildfire potential has been assessed and mitigated in previous phases. The development of this remaining forested block of land inclusive of hydrants will lessen the risk of wildfire spread for the entire Tallus Ridge.

### **Service pipes**

Each building (fourplex, triplex or duplex) will be serviced with:

- a single 100 mm sanitary pipe to generate flushing velocities at a minimum grade of 0.75 %.
- a single 150 mm storm pipe fitted to pick up each roof leader and surface cbs.
- Rock pits to infiltrate perforated foundation drains or small ground floor conc aprons.

Each unit will be serviced with a 19 mm poly water service with a water meter at each unit.



**Shallow Utilities**

It is the intention of the developer to fully service the site with natural gas, power, and communications. A 1.75m wide corridor is thereby allocated on each side of on-site roads for shallow utilities with units set back to accommodate the corridor for maintenance. The subject property is in the electrical service range for BC Hydro, and natural gas range for Fortis BC. Communication and coordination of our overall design will commence as we receive a Development Permit.

Environmental demarcation and for excavation can start once the grading plan has preliminary approval. Civil work can be approved thru a plumbing permit with each set of building units or separately with a plumbing permit for civil works. Shallow utility design and layout is the responsibility of each individual provider; however, Protech Consulting will facilitate ongoing communication and coordination throughout the design process.

A bank of Gas and Power meters will lash to the side of each multi-unit building.

**Landscaping**

The landscaping plan and security requirement can be assessed and put up with the building permit for each building block or phase of project as also associated with the anticipated area of site disturbance/ restoration. This will lessen the burden of a large security for the entire project while protecting the District with the ability to restore any broken landscape.

**Strata Works**

The strata, once formed, will be responsible for snow storage, onsite lighting, and landscaping maintenance. Canada Post will require a set of boxes near the access entry off Ponderosa.

We trust this report facilitates an expedient review.

Yours truly,

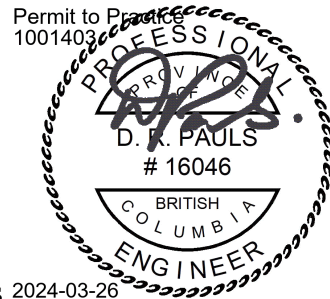
PROTECH CONSULTING

*Ron Boyer*

Ron S. Boyer  
Senior Design Technologist

Enclosure:

Reviewed by:



David R. Pauls 2024-03-26  
Consulting Engineer

Engineer's Seal

Appendix 1 – Storm Water Modelling Results

PRE-DEVELOPMENT CALCULATIONS

**STORM DETENTION DESIGN SHEET**  
**Modified Rational Method**



Date: 2024-01-03  
 Project Name: TALUS LOT C  
 File Number: 23048  
 Calculations By: TWJM  
 Engineer of Record: DRP

**PRE DEVELOPMENT FLOW RATES**

$Q=0.0028CIACa$   
 WHERE Q=FLOWRATE  
 C=WEIGHTED RUNOFF COEFFICIENT  
 I=RAINFALL INTENSITY  
 A=AREA  
 Ca=ANTECEDENT PRECIPITATION COEFFICIENT

**Pre Development Weighted Runoff Coefficient**

38150 m <sup>2</sup>	Unimproved	C=	0.10
0 m <sup>3</sup>	Asphalt	C=	0.80
0 m <sup>2</sup>	Building	C=	0.80
0 m <sup>3</sup>	Other	C=	0.00

**Weighted C = 0.10**  
**Total Area = 3.82 ha**

**Pre Development Rainfall Intensity**

$I = a \times (T)^b$

WHERE I = Rainfall Intensity (mm/hr)  
 a = 12.2  
 b = -0.723

$T = \frac{3.26 (1.1 - C) L^{0.5}}{S_w^{0.33}}$  Airport Formula (Time of Concentration, min)

WHERE C= 0.10 Weighted Runoff Coefficient  
 L= 344 m Watershed Length  
 S<sub>w</sub>= 17.5 % Watershed Slope  
 T<sub>c</sub>= 23.5 min.

**Rainfall Intensity (I) = 24.0 mm/hr**

Q<sub>pre</sub>= 0.0028 x C x I x A  
 Q<sub>pre</sub>= 0.0028 x 0.10 x 24.02 x 3.82

**Q<sub>pre</sub> = 0.025 m<sup>3</sup>/s**

5 YEAR MODEL RUNS

## Project Description

File Name ..... 23048-SSA STORM TANKS.SPF

## Project Options

Flow Units ..... LPS  
 Elevation Type ..... Elevation  
 Hydrology Method ..... EPA SWMM  
 EPA SWMM Infiltration Method ..... Horton  
 Link Routing Method ..... Hydrodynamic  
 Enable Overflow Ponding at Nodes ..... YES  
 Skip Steady State Analysis Time Periods ..... YES

## Analysis Options

Start Analysis On ..... 00:00:00      0:00:00  
 End Analysis On ..... 00:00:00      0:00:00  
 Start Reporting On ..... 00:00:00      0:00:00  
 Antecedent Dry Days ..... 0      days  
 Runoff (Dry Weather) Time Step ..... 0 01:00:00      days hh:mm:ss  
 Runoff (Wet Weather) Time Step ..... 0 00:05:00      days hh:mm:ss  
 Reporting Time Step ..... 0 00:05:00      days hh:mm:ss  
 Routing Time Step ..... 5      seconds

## Number of Elements

	Qty
Rain Gages .....	1
Subbasins .....	50
Nodes.....	37
<i>Junctions</i> .....	31
<i>Outfalls</i> .....	3
<i>Flow Diversions</i> .....	0
<i>Inlets</i> .....	0
<i>Storage Nodes</i> .....	3
Links.....	34
<i>Channels</i> .....	0
<i>Pipes</i> .....	30
<i>Pumps</i> .....	0
<i>Orifices</i> .....	4
<i>Weirs</i> .....	0
<i>Outlets</i> .....	0
Pollutants .....	0
Land Uses .....	0

## Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (mm)	Rainfall Distribution
1	COK Rainfall Data	Time Series	COK 5yr 1hr	Cumulative	mm				0.00	

## Subbasin Summary

Subbasin ID	Area (ha)	Impervious Area (%)	Average Slope (%)	Equivalent Width (m)	Impervious Area Manning's Roughness	Pervious Area Manning's Roughness	Total Rainfall (mm)	Total Infiltration (mm)	Total Runoff (mm)	Total Runoff Volume (liters)	Peak Runoff (lps)	Time of Concentration (days hh:mm:ss)
Sub-01	0.05	70.00	2.0000	28.37	0.0150	0.3000	12.20	3.6600	7.27	3342.82	2.57	0 00:10:25
Sub-02	0.03	92.00	0.7000	5.72	0.0150	0.3000	12.20	0.9760	9.51	3233.06	1.94	0 00:14:06
Sub-03	0.05	82.00	0.7000	5.17	0.0150	0.3000	12.20	2.1960	8.46	3807.00	2.05	0 00:28:50
Sub-04	0.05	59.00	2.0000	31.68	0.0150	0.3000	12.20	5.0020	6.12	3306.96	2.55	0 00:12:57
Sub-05	0.06	78.00	2.0000	35.57	0.0150	0.3000	12.20	2.6840	8.10	5185.28	3.98	0 00:09:13
Sub-06	0.08	60.00	2.0000	51.10	0.0150	0.3000	12.20	4.8800	6.23	5230.68	4.03	0 00:12:29
Sub-07	0.06	93.00	9.0000	5.68	0.0150	0.3000	12.20	0.8540	9.66	5504.49	3.96	0 00:08:16
Sub-08	0.05	91.00	9.0000	5.80	0.0150	0.3000	12.20	1.0980	9.45	5105.16	3.72	0 00:09:12
Sub-09	0.08	63.00	2.0000	43.43	0.0150	0.3000	12.20	4.5140	6.54	5166.60	3.98	0 00:12:40
Sub-10	0.09	81.00	2.0000	48.76	0.0150	0.3000	12.20	2.3180	8.42	7573.50	5.81	0 00:08:34
Sub-11	1.00	66.00	2.0000	46.68	0.0150	0.3000	12.20	4.1480	6.80	68020.00	34.06	0 00:52:54
Sub-12	0.08	85.00	2.0000	42.17	0.0150	0.3000	12.20	1.8300	8.83	7420.56	5.68	0 00:07:47
Sub-13	0.04	71.00	2.0000	23.34	0.0150	0.3000	12.20	3.5380	7.37	2579.50	1.99	0 00:09:45
Sub-14	0.03	100.00	7.5000	5.51	0.0150	0.3000	12.20	0.0000	10.40	2807.73	2.12	0 00:04:38
Sub-15	0.05	30.00	7.5000	16.72	0.0150	0.3000	12.20	8.5400	3.13	1688.04	1.30	0 00:17:38
Sub-16	0.03	78.00	2.0000	21.76	0.0150	0.3000	12.20	2.6840	8.10	2591.04	1.99	0 00:08:10
Sub-17	0.04	51.00	2.0000	16.92	0.0150	0.3000	12.20	5.9780	5.30	2224.32	1.71	0 00:18:04
Sub-18	0.08	88.00	10.0000	6.09	0.0150	0.3000	12.20	1.4640	9.13	6941.08	4.91	0 00:12:38
Sub-19	0.08	88.00	10.0000	5.72	0.0150	0.3000	12.20	1.4640	9.13	7211.12	5.01	0 00:13:25
Sub-20	0.10	37.00	2.0000	33.77	0.0150	0.3000	12.20	7.6860	3.84	3994.64	3.07	0 00:23:55
Sub-21	0.20	18.00	2.0000	25.13	0.0150	0.3000	12.20	10.0040	1.87	3665.20	2.81	0 00:48:56
Sub-22	0.21	36.00	2.0000	65.65	0.0150	0.3000	12.20	7.8080	3.74	7698.22	5.93	0 00:24:25
Sub-23	0.32	23.00	2.0000	61.02	0.0150	0.3000	12.20	9.3940	2.39	7641.60	5.88	0 00:37:08
Sub-24	0.16	23.00	2.0000	33.97	0.0150	0.3000	12.20	9.3940	2.39	3868.56	2.98	0 00:35:04
Sub-25	0.05	45.00	8.0000	7.73	0.0150	0.3000	12.20	6.7100	4.67	2102.85	1.62	0 00:21:19
Sub-26	0.03	76.00	8.0000	5.70	0.0150	0.3000	12.20	2.9280	7.90	2053.74	1.57	0 00:11:11
Sub-27	0.05	84.00	1.0000	5.22	0.0150	0.3000	12.20	1.9520	8.68	3990.50	2.29	0 00:24:19
Sub-28	0.16	16.00	2.0000	5.33	0.0150	0.3000	12.20	10.2480	1.66	2674.21	1.90	0 01:51:53
Sub-29	0.17	17.00	2.0000	31.76	0.0150	0.3000	12.20	10.1260	1.76	3016.44	2.32	0 00:39:28
Sub-30	0.05	97.00	2.0000	37.08	0.0150	0.3000	12.20	0.3660	10.07	5036.50	3.87	0 00:03:07
Sub-31	0.10	44.00	2.0000	41.22	0.0150	0.3000	12.20	6.8320	4.57	4429.99	3.41	0 00:18:58
Sub-32	0.03	89.00	1.0000	5.44	0.0150	0.3000	12.20	1.3420	9.21	3039.63	1.94	0 00:15:31
Sub-33	0.03	100.00	1.0000	6.16	0.0150	0.3000	12.20	0.0000	10.36	2901.08	1.94	0 00:08:08
Sub-34	0.06	90.00	2.0000	39.28	0.0150	0.3000	12.20	1.2200	9.35	5139.75	3.95	0 00:04:56
Sub-35	0.07	77.00	2.0000	46.53	0.0150	0.3000	12.20	2.8060	7.99	5355.31	4.12	0 00:08:16
Sub-36	0.03	96.00	8.0000	5.48	0.0150	0.3000	12.20	0.4880	9.98	3194.24	2.40	0 00:04:56
Sub-36B	0.05	26.00	8.0000	19.81	0.0150	0.3000	12.20	9.0280	2.73	1445.31	1.10	0 00:15:58
Sub-37	0.03	69.00	8.0000	5.93	0.0150	0.3000	12.20	3.7820	7.17	2295.36	1.75	0 00:14:26
Sub-38	0.03	70.00	8.0000	5.79	0.0150	0.3000	12.20	3.6600	7.28	2328.64	1.78	0 00:14:21
Sub-39	0.06	89.00	2.0000	41.00	0.0150	0.3000	12.20	1.3420	9.24	5174.96	3.98	0 00:05:09
Sub-40	0.06	40.00	7.0000	13.65	0.0150	0.3000	12.20	7.3200	4.15	2366.64	1.82	0 00:19:09
Sub-41	0.04	100.00	7.0000	5.60	0.0150	0.3000	12.20	0.0000	10.39	4052.49	2.98	0 00:05:51
Sub-42	0.07	74.00	2.0000	66.75	0.0150	0.3000	12.20	3.1720	7.68	5531.04	4.26	0 00:07:29
Sub-43	0.04	49.00	2.0000	21.64	0.0150	0.3000	12.20	6.2220	5.09	2237.84	1.72	0 00:16:25
Sub-44	0.13	90.00	2.0000	64.82	0.0150	0.3000	12.20	1.2200	9.36	12067.95	9.23	0 00:06:06
Sub-45	0.05	100.00	3.0000	7.29	0.0150	0.3000	12.20	0.0000	10.37	5597.10	3.80	0 00:07:50
Sub-46	0.05	90.00	3.0000	5.68	0.0150	0.3000	12.20	1.2200	9.33	4662.50	3.12	0 00:13:11
Sub-47	0.15	58.00	2.0000	72.76	0.0150	0.3000	12.20	5.1240	6.02	8912.56	6.86	0 00:14:37
Sub-48	0.03	70.00	3.0000	5.79	0.0150	0.3000	12.20	3.6600	7.28	1819.75	1.38	0 00:16:37
Sub-49	0.11	100.00	15.0000	6.48	0.0150	0.1000	12.20	0.0000	10.36	11400.40	7.70	0 00:07:57

## Link Summary

Pipe ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (m)	Average Slope (%)	Diameter or Height (mm)	Manning's Roughness	Peak Flow (lps)	Design Flow Capacity (lps)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (m/sec)	Peak Flow Depth (m)	Peak Flow Depth/Total Depth Ratio	Total Time Reported Surcharged Condition (min)
Link-04	Pipe	MH-4	MH-3	11.15	-15.4000	250.000	0.0150	20.74	202.27	0.10	2.03	0.07	0.26	0.00 Calculated
Link-06	Pipe	MH-24	MHCNTRL25	23.24	25.2700	250.000	0.0150	37.41	259.08	0.14	3.66	0.15	0.59	0.00 Calculated
Link-08	Pipe	MHCNTRL25	Stor-03	1.00	-9.3000	450.000	0.0150	514.68	753.57	0.68	3.33	0.44	1.00	0.00 Calculated
Link-09	Pipe	CNTRL25DUMMY	EXMANHOLEMOUNTAINSHALLOW	14.57	0.6900	450.000	0.0150	14.11	204.72	0.07	0.70	0.08	0.19	0.00 Calculated
Link-11	Pipe	Stor-02	MHCNTRL18	7.85	2.4800	250.000	0.0150	20.26	81.14	0.25	0.72	0.25	1.00	503.00 SURCHARGED
Link-12	Pipe	MHCNTRL18DUMMY	MH-19	12.85	14.0900	250.000	0.0120	7.45	241.80	0.03	1.25	0.06	0.25	0.00 Calculated
Link-13	Pipe	MH-10A	MH-9	8.49	-20.3400	250.000	0.0150	28.15	232.47	0.12	1.84	0.09	0.36	0.00 Calculated
Link-14	Pipe	MH-14	MH-CNTRL15	14.13	15.3400	450.000	0.0150	139.25	967.96	0.14	1.32	0.28	0.63	0.00 Calculated
Link-15	Pipe	MH-21	MH-19	26.11	-2.0800	250.000	0.0150	20.85	74.31	0.28	1.56	0.08	0.32	0.00 Calculated
Link-16	Pipe	MH-CNTRL15	Stor-01	15.42	-0.3400	450.000	0.0150	134.74	143.50	0.94	1.06	0.45	1.00	257.00 SURCHARGED
Link-17	Pipe	CNTRL15DUMMY	MH-16	18.53	11.3700	450.000	0.0120	12.36	1041.33	0.01	2.16	0.04	0.08	0.00 Calculated
Pipe - (13)	Pipe	MH-17	MHCNTRL18	13.92	5.5900	450.000	0.0120	15.18	730.20	0.02	1.02	0.29	0.65	0.00 Calculated
Pipe - (14)	Pipe	MH-16	MH-17	25.21	10.1200	450.000	0.0120	13.41	982.61	0.01	2.13	0.07	0.16	0.00 Calculated
Pipe - (17)	Pipe	MH-10A	MH-11	33.87	7.4100	450.000	0.0120	111.73	840.72	0.13	3.47	0.11	0.26	0.00 Calculated
Pipe - (18)	Pipe	MH-6	MH-10A	29.22	1.0000	250.000	0.0120	78.89	64.43	1.22	1.64	0.24	0.95	0.00 > CAPACITY
Pipe - (19)	Pipe	MH-5	MH-6	23.51	6.1600	250.000	0.0120	73.55	159.92	0.46	2.73	0.19	0.74	0.00 Calculated
Pipe - (2)	Pipe	EXMHROADC	ROADCOUTFALL	19.45	5.0400	375.000	0.0120	1.21	426.36	0.00	0.84	0.01	0.04	0.00 Calculated
Pipe - (20)	Pipe	MH-4	MH-5	47.56	7.7000	250.000	0.0120	34.04	178.84	0.19	2.74	0.08	0.30	0.00 Calculated
Pipe - (22)	Pipe	MH-2	MH-3	51.00	8.0900	250.000	0.0120	12.84	183.26	0.07	2.13	0.05	0.18	0.00 Calculated
Pipe - (3)	Pipe	MH-26	MHCNTRL27	16.86	5.0900	375.000	0.0120	3.52	428.60	0.01	0.59	0.25	0.67	0.00 Calculated
Pipe - (51)	Pipe	MH-20	MH-19	70.28	1.0000	250.000	0.0120	8.16	64.43	0.13	0.59	0.08	0.33	0.00 Calculated
Pipe - (60)	Pipe	MH-1	MH-2	32.17	3.7200	250.000	0.0120	6.48	124.22	0.05	1.31	0.04	0.16	0.00 Calculated
Pipe - (62)	Pipe	MH-8	MH-9	66.92	0.5000	250.000	0.0120	16.74	45.58	0.37	0.84	0.10	0.42	0.00 Calculated
Pipe - (62) (1)	Pipe	MH-7	MH-8	27.69	0.5000	250.000	0.0120	4.50	45.65	0.10	0.53	0.07	0.27	0.00 Calculated
Pipe - (67)	Pipe	MH-23	MH-24	17.30	11.8500	250.000	0.0120	37.43	221.81	0.17	3.17	0.07	0.29	0.00 Calculated
Pipe - (69)	Pipe	MH-13	MH-14	50.58	0.4800	250.000	0.0120	17.24	44.70	0.39	0.84	0.11	0.44	0.00 Calculated
Pipe - (71)	Pipe	MH-11	MH-14	13.92	5.4100	450.000	0.0120	114.85	718.13	0.16	2.87	0.13	0.30	0.00 Calculated
Pipe - (75)	Pipe	MH-22	MH-23	50.25	13.6200	250.000	0.0120	29.81	237.81	0.13	3.25	0.06	0.24	0.00 Calculated
Pipe - (76)	Pipe	MH-21	MH-22	10.85	12.2500	250.000	0.0120	20.84	225.51	0.09	2.69	0.05	0.21	0.00 Calculated
Pipe - (79)	Pipe	MH-12	MH-13	58.37	0.5000	250.000	0.0120	3.90	45.56	0.09	0.57	0.05	0.20	0.00 Calculated
Link-07	Orifice	MHCNTRL25	CNTRL25DUMMY			98.000		15.56						
Link-10	Orifice	MHCNTRL27	EXMHROADC			24.000		1.21						
Pipe - (12)	Orifice	MHCNTRL18	MHCNTRL18DUMMY			60.000		7.45						
Pipe - (70)	Orifice	MH-CNTRL15	CNTRL15DUMMY			70.000		12.37						

## Pipe Input

Pipe ID	Length (m)	Average Slope (%)	Pipe Diameter or Height (mm)	Manning's Roughness	Entrance Losses	Exit/Bend Losses
Link-04	11.15	-15.4000	250.000	0.0150	0.5000	0.5000
Link-06	23.24	25.2700	250.000	0.0150	0.5000	0.5000
Link-08	1.00	-9.3000	450.000	0.0150	0.5000	0.5000
Link-09	14.57	0.6900	450.000	0.0150	0.5000	0.5000
Link-11	7.85	2.4800	250.000	0.0150	0.5000	0.5000
Link-12	12.85	14.0900	250.000	0.0120	0.5000	0.5000
Link-13	8.49	-20.3400	250.000	0.0150	0.5000	0.5000
Link-14	14.13	15.3400	450.000	0.0150	0.5000	0.5000
Link-15	26.11	-2.0800	250.000	0.0150	0.5000	0.5000
Link-16	15.42	-0.3400	450.000	0.0150	0.5000	0.5000
Link-17	18.53	11.3700	450.000	0.0120	0.5000	0.5000
Pipe - (13)	13.92	5.5900	450.000	0.0120	0.5000	0.5000
Pipe - (14)	25.21	10.1200	450.000	0.0120	0.5000	0.5000
Pipe - (17)	33.87	7.4100	450.000	0.0120	0.5000	0.5000
Pipe - (18)	29.22	1.0000	250.000	0.0120	0.5000	0.5000
Pipe - (19)	23.51	6.1600	250.000	0.0120	0.5000	0.5000
Pipe - (2)	19.45	5.0400	380.000	0.0120	0.5000	0.5000
Pipe - (20)	47.56	7.7000	250.000	0.0120	0.5000	0.5000
Pipe - (22)	51.00	8.0900	250.000	0.0120	0.5000	0.5000
Pipe - (3)	16.86	5.0900	380.000	0.0120	0.5000	0.5000
Pipe - (51)	70.28	1.0000	250.000	0.0120	0.5000	0.5000
Pipe - (60)	32.17	3.7200	250.000	0.0120	0.5000	0.5000
Pipe - (62)	66.92	0.5000	250.000	0.0120	0.5000	0.5000
Pipe - (62) (1)	27.69	0.5000	250.000	0.0120	0.5000	0.5000
Pipe - (67)	17.30	11.8500	250.000	0.0120	0.5000	0.5000
Pipe - (69)	50.58	0.4800	250.000	0.0120	0.5000	0.5000
Pipe - (71)	13.92	5.4100	450.000	0.0120	0.5000	0.5000
Pipe - (75)	50.25	13.6200	250.000	0.0120	0.5000	0.5000
Pipe - (76)	10.85	12.2500	250.000	0.0120	0.5000	0.5000
Pipe - (79)	58.37	0.5000	250.000	0.0120	0.5000	0.5000



## Pipe Results

Pipe ID	Peak Flow (lps)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (lps)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (m/sec)	Travel Time (min)	Peak Flow Depth (m)	Peak Flow Depth/Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
Link-04	20.74	0 00:25	202.27	0.10	2.03	0.09	0.07	0.26	0.00	0.21	Calculated
Link-06	37.41	0 00:25	259.08	0.14	3.66	0.11	0.15	0.59	0.00	1.82	Calculated
Link-08	514.68	0 01:14	753.57	0.68	3.33	0.01	0.44	1.00	0.00	0.01	Calculated
Link-09	14.11	0 01:05	204.72	0.07	0.70	0.35	0.08	0.19	0.00	0.36	Calculated
Link-11	20.26	0 00:22	81.14	0.25	0.72	0.18	0.25	1.00	503.00	0.16	SURCHARGED
Link-12	7.45	0 04:33	241.80	0.03	1.25	0.17	0.06	0.25	0.00	0.92	Calculated
Link-13	28.15	0 00:25	232.47	0.12	1.84	0.08	0.09	0.36	0.00	0.11	Calculated
Link-14	139.25	0 00:25	967.96	0.14	1.32	0.18	0.28	0.63	0.00	0.07	Calculated
Link-15	20.85	0 00:25	74.31	0.28	1.56	0.28	0.08	0.32	0.00	0.93	Calculated
Link-16	134.74	0 00:25	143.50	0.94	1.06	0.24	0.45	1.00	257.00	0.21	SURCHARGED
Link-17	12.36	0 01:10	1041.33	0.01	2.16	0.14	0.04	0.08	0.00	1.31	Calculated
Pipe - (13)	15.18	0 00:19	730.20	0.02	1.02	0.23	0.29	0.65	0.00	0.71	Calculated
Pipe - (14)	13.41	0 00:19	982.61	0.01	2.13	0.20	0.07	0.16	0.00	1.19	Calculated
Pipe - (17)	111.73	0 00:25	840.72	0.13	3.47	0.16	0.11	0.26	0.00	0.57	Calculated
Pipe - (18)	78.89	0 00:25	64.43	1.22	1.64	0.30	0.24	0.95	0.00	0.41	> CAPACITY
Pipe - (19)	73.55	0 00:25	159.92	0.46	2.73	0.14	0.19	0.74	0.00	0.63	Calculated
Pipe - (2)	1.21	0 00:42	426.36	0.00	0.84	0.39	0.01	0.04	0.00	0.09	Calculated
Pipe - (20)	34.04	0 00:25	178.84	0.19	2.74	0.29	0.08	0.30	0.00	0.29	Calculated
Pipe - (22)	12.84	0 00:25	183.26	0.07	2.13	0.40	0.05	0.18	0.00	0.25	Calculated
Pipe - (3)	3.52	0 00:25	428.60	0.01	0.59	0.48	0.25	0.67	0.00	0.01	Calculated
Pipe - (51)	8.16	0 00:25	64.43	0.13	0.59	1.99	0.08	0.33	0.00	0.01	Calculated
Pipe - (60)	6.48	0 00:25	124.22	0.05	1.31	0.41	0.04	0.16	0.00	0.20	Calculated
Pipe - (62)	16.74	0 00:25	45.58	0.37	0.84	1.33	0.10	0.42	0.00	0.10	Calculated
Pipe - (62) (1)	4.50	0 00:25	45.65	0.10	0.53	0.87	0.07	0.27	0.00	0.04	Calculated
Pipe - (67)	37.43	0 00:25	221.81	0.17	3.17	0.09	0.07	0.29	0.00	1.73	Calculated
Pipe - (69)	17.24	0 00:25	44.70	0.39	0.84	1.00	0.11	0.44	0.00	0.12	Calculated
Pipe - (71)	114.85	0 00:25	718.13	0.16	2.87	0.08	0.13	0.30	0.00	0.53	Calculated
Pipe - (75)	29.81	0 00:25	237.81	0.13	3.25	0.26	0.06	0.24	0.00	1.84	Calculated
Pipe - (76)	20.84	0 00:25	225.51	0.09	2.69	0.07	0.05	0.21	0.00	1.75	Calculated
Pipe - (79)	3.90	0 00:26	45.56	0.09	0.57	1.71	0.05	0.20	0.00	0.10	Calculated

## Storage Nodes

### Storage Node : Stor-01

#### Input Data

Invert Elevation (m) .....	585.77
Max (Rim) Elevation (m) .....	588.77
Max (Rim) Offset (m) .....	3.00
Initial Water Elevation (m) .....	0.00
Initial Water Depth (m) .....	-585.77
Ponded Area (m <sup>2</sup> ) .....	0.00
Evaporation Loss .....	0.00

#### Output Summary Results

Peak Inflow (lps) .....	134.74
Peak Lateral Inflow (lps) .....	0
Peak Outflow (lps) .....	11.54
Peak Exfiltration Flow Rate (cmm) .....	0
Max HGL Elevation Attained (m) .....	587.14
Max HGL Depth Attained (m) .....	1.37
Average HGL Elevation Attained (m) .....	585.83
Average HGL Depth Attained (m) .....	0.06
Time of Max HGL Occurrence (days hh:mm) .....	0 01:10
Total Exfiltration Volume (1000-m <sup>3</sup> ) .....	0
Total Flooded Volume (ha-mm) .....	0
Total Time Flooded (min) .....	0
Total Retention Time (sec) .....	0

## Storage Node : Stor-02

### Input Data

Invert Elevation (m) .....	579.99
Max (Rim) Elevation (m) .....	582.99
Max (Rim) Offset (m) .....	3.00
Initial Water Elevation (m) .....	579.99
Initial Water Depth (m) .....	0.00
Ponded Area (m <sup>2</sup> ) .....	0.00
Evaporation Loss .....	0.00

### Output Summary Results

Peak Inflow (lps) .....	20.26
Peak Lateral Inflow (lps) .....	0
Peak Outflow (lps) .....	5.09
Peak Exfiltration Flow Rate (cmm) .....	0
Max HGL Elevation Attained (m) .....	580.76
Max HGL Depth Attained (m) .....	0.77
Average HGL Elevation Attained (m) .....	580.06
Average HGL Depth Attained (m) .....	0.07
Time of Max HGL Occurrence (days hh:mm) .....	0 04:33
Total Exfiltration Volume (1000-m <sup>3</sup> ) .....	0
Total Flooded Volume (ha-mm) .....	0
Total Time Flooded (min) .....	0
Total Retention Time (sec) .....	0

## Storage Node : Stor-03

### Input Data

Invert Elevation (m) .....	560.85
Max (Rim) Elevation (m) .....	562.85
Max (Rim) Offset (m) .....	2.00
Initial Water Elevation (m) .....	560.85
Initial Water Depth (m) .....	0.00
Ponded Area (m <sup>2</sup> ) .....	0.00
Evaporation Loss .....	0.00

### Output Summary Results

Peak Inflow (lps) .....	514.68
Peak Lateral Inflow (lps) .....	0
Peak Outflow (lps) .....	323.66
Peak Exfiltration Flow Rate (cmm) .....	0
Max HGL Elevation Attained (m) .....	561.29
Max HGL Depth Attained (m) .....	0.44
Average HGL Elevation Attained (m) .....	560.86
Average HGL Depth Attained (m) .....	0.01
Time of Max HGL Occurrence (days hh:mm) .....	0 01:05
Total Exfiltration Volume (1000-m <sup>3</sup> ) .....	0
Total Flooded Volume (ha-mm) .....	0
Total Time Flooded (min) .....	0
Total Retention Time (sec) .....	0

100 YEAR MODEL RUNS

## Project Description

File Name ..... 23048-SSA STORM TANKS.SPF

## Project Options

Flow Units ..... LPS  
 Elevation Type ..... Elevation  
 Hydrology Method ..... EPA SWMM  
 EPA SWMM Infiltration Method ..... Horton  
 Link Routing Method ..... Hydrodynamic  
 Enable Overflow Ponding at Nodes ..... YES  
 Skip Steady State Analysis Time Periods ..... YES

## Analysis Options

Start Analysis On ..... 00:00:00      0:00:00  
 End Analysis On ..... 00:00:00      0:00:00  
 Start Reporting On ..... 00:00:00      0:00:00  
 Antecedent Dry Days ..... 0      days  
 Runoff (Dry Weather) Time Step ..... 0 01:00:00      days hh:mm:ss  
 Runoff (Wet Weather) Time Step ..... 0 00:05:00      days hh:mm:ss  
 Reporting Time Step ..... 0 00:05:00      days hh:mm:ss  
 Routing Time Step ..... 5      seconds

## Number of Elements

	Qty
Rain Gages .....	1
Subbasins .....	50
Nodes.....	37
<i>Junctions</i> .....	31
<i>Outfalls</i> .....	3
<i>Flow Diversions</i> .....	0
<i>Inlets</i> .....	0
<i>Storage Nodes</i> .....	3
Links.....	34
<i>Channels</i> .....	0
<i>Pipes</i> .....	30
<i>Pumps</i> .....	0
<i>Orifices</i> .....	4
<i>Weirs</i> .....	0
<i>Outlets</i> .....	0
Pollutants .....	0
Land Uses .....	0

## Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (mm)	Rainfall Distribution
1	COK Rainfall Data	Time Series	COK 100yr 1hr	Cumulative	mm				0.00	

## Subbasin Summary

Subbasin ID	Area (ha)	Impervious Area (%)	Average Slope (%)	Equivalent Width (m)	Impervious Area Manning's Roughness	Pervious Area Manning's Roughness	Total Rainfall (mm)	Total Infiltration (mm)	Total Runoff (mm)	Total Runoff Volume (liters)	Peak Runoff (lps)	Time of Concentration (days hh:mm:ss)
Sub-01	0.05	70.00	2.0000	28.37	0.0150	0.3000	21.30	6.3900	13.80	6349.84	4.61	0 00:08:20
Sub-02	0.03	92.00	0.7000	5.72	0.0150	0.3000	21.30	1.7040	18.00	6120.34	4.08	0 00:11:16
Sub-03	0.05	82.00	0.7000	5.17	0.0150	0.3000	21.30	3.8340	16.02	7209.45	4.54	0 00:23:04
Sub-04	0.05	59.00	2.0000	31.68	0.0150	0.3000	21.30	8.7330	11.63	6282.36	4.57	0 00:10:22
Sub-05	0.06	78.00	2.0000	35.57	0.0150	0.3000	21.30	4.6860	15.38	9843.20	7.15	0 00:07:22
Sub-06	0.08	60.00	2.0000	51.10	0.0150	0.3000	21.30	8.5200	11.83	9938.04	7.22	0 00:10:00
Sub-07	0.06	93.00	9.0000	5.68	0.0150	0.3000	21.30	1.4910	18.27	10411.62	7.45	0 00:06:37
Sub-08	0.05	91.00	9.0000	5.80	0.0150	0.3000	21.30	1.9170	17.88	9655.74	6.94	0 00:07:21
Sub-09	0.08	63.00	2.0000	43.43	0.0150	0.3000	21.30	7.8810	12.42	9814.96	7.13	0 00:10:08
Sub-10	0.09	81.00	2.0000	48.76	0.0150	0.3000	21.30	4.0470	15.97	14373.90	10.44	0 00:06:51
Sub-11	1.00	66.00	2.0000	46.68	0.0150	0.3000	21.30	7.2420	12.88	128830.00	77.73	0 00:42:20
Sub-12	0.08	85.00	2.0000	42.17	0.0150	0.3000	21.30	3.1950	16.76	14074.20	10.22	0 00:06:13
Sub-13	0.04	71.00	2.0000	23.34	0.0150	0.3000	21.30	6.1770	14.00	4900.35	3.56	0 00:07:48
Sub-14	0.03	100.00	7.5000	5.51	0.0150	0.3000	21.30	0.0000	19.69	5315.76	3.85	0 00:03:43
Sub-15	0.05	30.00	7.5000	16.72	0.0150	0.3000	21.30	14.9100	5.91	3188.70	2.32	0 00:14:06
Sub-16	0.03	78.00	2.0000	21.76	0.0150	0.3000	21.30	4.6860	15.38	4922.24	3.58	0 00:06:32
Sub-17	0.04	51.00	2.0000	16.92	0.0150	0.3000	21.30	10.4370	10.06	4223.94	3.07	0 00:14:27
Sub-18	0.08	88.00	10.0000	6.09	0.0150	0.3000	21.30	2.5560	17.27	13128.24	9.35	0 00:10:06
Sub-19	0.08	88.00	10.0000	5.72	0.0150	0.3000	21.30	2.5560	17.27	13640.14	9.66	0 00:10:44
Sub-20	0.10	37.00	2.0000	33.77	0.0150	0.3000	21.30	13.4190	7.30	7587.84	5.51	0 00:19:08
Sub-21	0.20	18.00	2.0000	25.13	0.0150	0.3000	21.30	17.4660	3.55	6956.04	5.05	0 00:39:09
Sub-22	0.21	36.00	2.0000	65.65	0.0150	0.3000	21.30	13.6320	7.10	14623.94	10.62	0 00:19:32
Sub-23	0.32	23.00	2.0000	61.02	0.0150	0.3000	21.30	16.4010	4.54	14515.20	10.54	0 00:29:42
Sub-24	0.16	23.00	2.0000	33.97	0.0150	0.3000	21.30	16.4010	4.54	7348.32	5.34	0 00:28:04
Sub-25	0.05	45.00	8.0000	7.73	0.0150	0.3000	21.30	11.7150	8.87	3993.30	2.90	0 00:17:03
Sub-26	0.03	76.00	8.0000	5.70	0.0150	0.3000	21.30	5.1120	14.98	3894.80	2.83	0 00:08:57
Sub-27	0.05	84.00	1.0000	5.22	0.0150	0.3000	21.30	3.4080	16.42	7555.04	4.91	0 00:19:27
Sub-28	0.16	16.00	2.0000	5.33	0.0150	0.3000	21.30	17.8920	3.14	5057.01	3.61	0 01:29:31
Sub-29	0.17	17.00	2.0000	31.76	0.0150	0.3000	21.30	17.6790	3.35	5731.92	4.17	0 00:31:34
Sub-30	0.05	97.00	2.0000	37.08	0.0150	0.3000	21.30	0.6390	19.13	9564.00	6.95	0 00:02:30
Sub-31	0.10	44.00	2.0000	41.22	0.0150	0.3000	21.30	11.9280	8.68	8415.72	6.12	0 00:15:10
Sub-32	0.03	89.00	1.0000	5.44	0.0150	0.3000	21.30	2.3430	17.43	5752.56	3.94	0 00:12:25
Sub-33	0.03	100.00	1.0000	6.16	0.0150	0.3000	21.30	0.0000	19.60	5489.12	3.83	0 00:06:30
Sub-34	0.06	90.00	2.0000	39.28	0.0150	0.3000	21.30	2.1300	17.75	9761.40	7.09	0 00:03:57
Sub-35	0.07	77.00	2.0000	46.53	0.0150	0.3000	21.30	4.8990	15.18	10173.28	7.39	0 00:06:37
Sub-36	0.03	96.00	8.0000	5.48	0.0150	0.3000	21.30	0.8520	18.89	6045.44	4.38	0 00:03:57
Sub-36B	0.05	26.00	8.0000	19.81	0.0150	0.3000	21.30	15.7620	5.11	2708.83	1.98	0 00:12:46
Sub-37	0.03	69.00	8.0000	5.93	0.0150	0.3000	21.30	6.6030	13.60	4351.36	3.16	0 00:11:33
Sub-38	0.03	70.00	8.0000	5.79	0.0150	0.3000	21.30	6.3900	13.79	4414.08	3.20	0 00:11:29
Sub-39	0.06	89.00	2.0000	41.00	0.0150	0.3000	21.30	2.3430	17.55	9828.56	7.14	0 00:04:07
Sub-40	0.06	40.00	7.0000	13.65	0.0150	0.3000	21.30	12.7800	7.89	4495.02	3.27	0 00:15:19
Sub-41	0.04	100.00	7.0000	5.60	0.0150	0.3000	21.30	0.0000	19.66	7665.84	5.52	0 00:04:41
Sub-42	0.07	74.00	2.0000	66.75	0.0150	0.3000	21.30	5.5380	14.59	10501.92	7.64	0 00:05:59
Sub-43	0.04	49.00	2.0000	21.64	0.0150	0.3000	21.30	10.8630	9.66	4251.28	3.09	0 00:13:08
Sub-44	0.13	90.00	2.0000	64.82	0.0150	0.3000	21.30	2.1300	17.74	22883.31	16.61	0 00:04:52
Sub-45	0.05	100.00	3.0000	7.29	0.0150	0.3000	21.30	0.0000	19.61	10589.40	7.44	0 00:06:16
Sub-46	0.05	90.00	3.0000	5.68	0.0150	0.3000	21.30	2.1300	17.64	8821.50	6.16	0 00:10:32
Sub-47	0.15	58.00	2.0000	72.76	0.0150	0.3000	21.30	8.9460	11.44	16928.24	12.30	0 00:11:42
Sub-48	0.03	70.00	3.0000	5.79	0.0150	0.3000	21.30	6.3900	13.78	3445.75	2.50	0 00:13:18
Sub-49	0.11	100.00	15.0000	6.48	0.0150	0.1000	21.30	0.0000	19.61	21568.80	15.11	0 00:06:22

## Link Summary

Pipe ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (m)	Average Slope (%)	Diameter or Height (mm)	Manning's Roughness	Peak Flow (lps)	Design Flow Capacity (lps)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (m/sec)	Peak Flow Depth (m)	Peak Flow Depth/ Total Depth Ratio	Total Time Reported Surcharged (min)	Reported Condition
Link-04	Pipe	MH-4	MH-3	11.15	-15.4000	250.000	0.0150	38.87	202.27	0.19	2.43	0.10	0.39	0.00	Calculated
Link-06	Pipe	MH-24	MHCNTRL25	23.24	25.2700	250.000	0.0150	67.02	259.08	0.26	4.10	0.17	0.67	0.00	Calculated
Link-08	Pipe	MHCNTRL25	Stor-03	1.00	-9.3000	450.000	0.0150	1972.60	753.57	2.62	12.40	0.45	1.00	218.00	SURCHARGED
Link-09	Pipe	CNTRL25DUMMY	EXMANHOLEMOUNTAINSHALLOW	14.57	0.6900	450.000	0.0150	20.77	204.72	0.10	0.78	0.10	0.23	0.00	Calculated
Link-11	Pipe	Stor-02	MHCNTRL18	7.85	2.4800	250.000	0.0150	31.41	81.14	0.39	0.87	0.25	1.00	820.00	SURCHARGED
Link-12	Pipe	MHCNTRL18DUMMY	MH-19	12.85	14.0900	250.000	0.0120	10.12	241.80	0.04	1.36	0.08	0.33	0.00	Calculated
Link-13	Pipe	MH-10A	MH-9	8.49	-20.3400	250.000	0.0150	52.50	232.47	0.23	2.13	0.13	0.52	0.00	Calculated
Link-14	Pipe	MH-14	MH-CNTRL15	14.13	15.3400	450.000	0.0150	271.83	967.96	0.28	2.19	0.45	1.00	56.00	SURCHARGED
Link-15	Pipe	MH-21	MH-19	26.11	-2.0800	250.000	0.0150	35.85	74.31	0.48	1.75	0.11	0.43	0.00	Calculated
Link-16	Pipe	MH-CNTRL15	Stor-01	15.42	-0.3400	450.000	0.0150	264.09	143.50	1.84	1.66	0.45	1.00	460.00	SURCHARGED
Link-17	Pipe	CNTRL15DUMMY	MH-16	18.53	11.3700	450.000	0.0120	17.43	1041.33	0.02	2.37	0.04	0.09	0.00	Calculated
Pipe - (13)	Pipe	MH-17	MHCNTRL18	13.92	5.5900	450.000	0.0120	26.05	730.20	0.04	1.01	0.45	1.00	479.00	SURCHARGED
Pipe - (14)	Pipe	MH-16	MH-17	25.21	10.1200	450.000	0.0120	20.59	982.61	0.02	2.37	0.24	0.54	0.00	Calculated
Pipe - (17)	Pipe	MH-10A	MH-11	33.87	7.4100	450.000	0.0120	220.62	840.72	0.26	4.09	0.17	0.37	0.00	Calculated
Pipe - (18)	Pipe	MH-6	MH-10A	29.22	1.0000	250.000	0.0120	159.45	64.43	2.47	3.25	0.25	1.00	12.00	SURCHARGED
Pipe - (19)	Pipe	MH-5	MH-6	23.51	6.1600	250.000	0.0120	149.73	159.92	0.94	3.05	0.25	1.00	11.00	SURCHARGED
Pipe - (2)	Pipe	EXMHROADC	ROADCOUTFALL	19.45	5.0400	375.000	0.0120	2.20	426.36	0.01	1.00	0.02	0.05	0.00	Calculated
Pipe - (20)	Pipe	MH-4	MH-5	47.56	7.7000	250.000	0.0120	63.49	178.84	0.36	3.03	0.19	0.75	0.00	Calculated
Pipe - (22)	Pipe	MH-2	MH-3	51.00	8.0900	250.000	0.0120	24.64	183.26	0.13	2.56	0.06	0.25	0.00	Calculated
Pipe - (3)	Pipe	MH-26	MHCNTRL27	16.86	5.0900	375.000	0.0120	5.83	428.60	0.01	0.85	0.38	1.00	50.00	SURCHARGED
Pipe - (51)	Pipe	MH-20	MH-19	70.28	1.0000	250.000	0.0120	14.70	64.43	0.23	0.70	0.11	0.44	0.00	Calculated
Pipe - (60)	Pipe	MH-1	MH-2	32.17	3.7200	250.000	0.0120	13.11	124.22	0.11	1.60	0.06	0.22	0.00	Calculated
Pipe - (62)	Pipe	MH-8	MH-9	66.92	0.5000	250.000	0.0120	31.66	45.58	0.69	1.00	0.15	0.62	0.00	Calculated
Pipe - (62) (1)	Pipe	MH-7	MH-8	27.69	0.5000	250.000	0.0120	8.08	45.65	0.18	0.54	0.10	0.41	0.00	Calculated
Pipe - (67)	Pipe	MH-23	MH-24	17.30	11.8500	250.000	0.0120	67.03	221.81	0.30	3.64	0.10	0.40	0.00	Calculated
Pipe - (69)	Pipe	MH-13	MH-14	50.58	0.4800	250.000	0.0120	33.18	44.70	0.74	0.99	0.25	1.00	17.00	SURCHARGED
Pipe - (71)	Pipe	MH-11	MH-14	13.92	5.4100	450.000	0.0120	226.30	718.13	0.32	3.28	0.26	0.59	0.00	Calculated
Pipe - (75)	Pipe	MH-22	MH-23	50.25	13.6200	250.000	0.0120	52.06	237.81	0.22	3.79	0.08	0.32	0.00	Calculated
Pipe - (76)	Pipe	MH-21	MH-22	10.85	12.2500	250.000	0.0120	35.83	225.51	0.16	3.07	0.07	0.29	0.00	Calculated
Pipe - (79)	Pipe	MH-12	MH-13	58.37	0.5000	250.000	0.0120	8.40	45.56	0.18	0.68	0.10	0.40	0.00	Calculated
Link-07	Orifice	MHCNTRL25	CNTRL25DUMMY			98.000		25.44							
Link-10	Orifice	MHCNTRL27	EXMHROADC			24.000		2.20							
Pipe - (12)	Orifice	MHCNTRL18	MHCNTRL18DUMMY			60.000		10.11							
Pipe - (70)	Orifice	MH-CNTRL15	CNTRL15DUMMY			70.000		17.43							



## Pipe Input

Pipe ID	Length (m)	Average Slope (%)	Pipe Diameter or Height (mm)	Manning's Roughness	Entrance Losses	Exit/Bend Losses
Link-04	11.15	-15.4000	250.000	0.0150	0.5000	0.5000
Link-06	23.24	25.2700	250.000	0.0150	0.5000	0.5000
Link-08	1.00	-9.3000	450.000	0.0150	0.5000	0.5000
Link-09	14.57	0.6900	450.000	0.0150	0.5000	0.5000
Link-11	7.85	2.4800	250.000	0.0150	0.5000	0.5000
Link-12	12.85	14.0900	250.000	0.0120	0.5000	0.5000
Link-13	8.49	-20.3400	250.000	0.0150	0.5000	0.5000
Link-14	14.13	15.3400	450.000	0.0150	0.5000	0.5000
Link-15	26.11	-2.0800	250.000	0.0150	0.5000	0.5000
Link-16	15.42	-0.3400	450.000	0.0150	0.5000	0.5000
Link-17	18.53	11.3700	450.000	0.0120	0.5000	0.5000
Pipe - (13)	13.92	5.5900	450.000	0.0120	0.5000	0.5000
Pipe - (14)	25.21	10.1200	450.000	0.0120	0.5000	0.5000
Pipe - (17)	33.87	7.4100	450.000	0.0120	0.5000	0.5000
Pipe - (18)	29.22	1.0000	250.000	0.0120	0.5000	0.5000
Pipe - (19)	23.51	6.1600	250.000	0.0120	0.5000	0.5000
Pipe - (2)	19.45	5.0400	380.000	0.0120	0.5000	0.5000
Pipe - (20)	47.56	7.7000	250.000	0.0120	0.5000	0.5000
Pipe - (22)	51.00	8.0900	250.000	0.0120	0.5000	0.5000
Pipe - (3)	16.86	5.0900	380.000	0.0120	0.5000	0.5000
Pipe - (51)	70.28	1.0000	250.000	0.0120	0.5000	0.5000
Pipe - (60)	32.17	3.7200	250.000	0.0120	0.5000	0.5000
Pipe - (62)	66.92	0.5000	250.000	0.0120	0.5000	0.5000
Pipe - (62) (1)	27.69	0.5000	250.000	0.0120	0.5000	0.5000
Pipe - (67)	17.30	11.8500	250.000	0.0120	0.5000	0.5000
Pipe - (69)	50.58	0.4800	250.000	0.0120	0.5000	0.5000
Pipe - (71)	13.92	5.4100	450.000	0.0120	0.5000	0.5000
Pipe - (75)	50.25	13.6200	250.000	0.0120	0.5000	0.5000
Pipe - (76)	10.85	12.2500	250.000	0.0120	0.5000	0.5000
Pipe - (79)	58.37	0.5000	250.000	0.0120	0.5000	0.5000

## Pipe Results

Pipe ID	Peak Flow (lps)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (lps)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (m/sec)	Travel Time (min)	Peak Flow Depth (m)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
Link-04	38.87	0 00:25	202.27	0.19	2.43	0.08	0.10	0.39	0.00	0.21	Calculated
Link-06	67.02	0 00:25	259.08	0.26	4.10	0.09	0.17	0.67	0.00	1.41	Calculated
Link-08	1972.60	0 02:20	753.57	2.62	12.40	0.00	0.45	1.00	218.00	0.02	SURCHARGED
Link-09	20.77	0 03:10	204.72	0.10	0.78	0.31	0.10	0.23	0.00	0.41	Calculated
Link-11	31.41	0 00:25	81.14	0.39	0.87	0.15	0.25	1.00	820.00	0.17	SURCHARGED
Link-12	10.12	0 06:07	241.80	0.04	1.36	0.16	0.08	0.33	0.00	1.04	Calculated
Link-13	52.50	0 00:25	232.47	0.23	2.13	0.07	0.13	0.52	0.00	0.10	Calculated
Link-14	271.83	0 00:25	967.96	0.28	2.19	0.11	0.45	1.00	56.00	0.05	SURCHARGED
Link-15	35.85	0 00:25	74.31	0.48	1.75	0.25	0.11	0.43	0.00	1.04	Calculated
Link-16	264.09	0 00:25	143.50	1.84	1.66	0.15	0.45	1.00	460.00	0.21	SURCHARGED
Link-17	17.43	0 01:10	1041.33	0.02	2.37	0.13	0.04	0.09	0.00	1.52	Calculated
Pipe - (13)	26.05	0 00:25	730.20	0.04	1.01	0.23	0.45	1.00	479.00	0.64	SURCHARGED
Pipe - (14)	20.59	0 00:25	982.61	0.02	2.37	0.18	0.24	0.54	0.00	0.91	Calculated
Pipe - (17)	220.62	0 00:25	840.72	0.26	4.09	0.14	0.17	0.37	0.00	0.57	Calculated
Pipe - (18)	159.45	0 00:25	64.43	2.47	3.25	0.15	0.25	1.00	12.00	0.41	SURCHARGED
Pipe - (19)	149.73	0 00:25	159.92	0.94	3.05	0.13	0.25	1.00	11.00	0.62	SURCHARGED
Pipe - (2)	2.20	0 00:41	426.36	0.01	1.00	0.32	0.02	0.05	0.00	0.11	Calculated
Pipe - (20)	63.49	0 00:25	178.84	0.36	3.03	0.26	0.19	0.75	0.00	0.28	Calculated
Pipe - (22)	24.64	0 00:25	183.26	0.13	2.56	0.33	0.06	0.25	0.00	0.26	Calculated
Pipe - (3)	5.83	0 00:20	428.60	0.01	0.85	0.33	0.38	1.00	50.00	0.01	SURCHARGED
Pipe - (51)	14.70	0 00:25	64.43	0.23	0.70	1.67	0.11	0.44	0.00	0.01	Calculated
Pipe - (60)	13.11	0 00:25	124.22	0.11	1.60	0.34	0.06	0.22	0.00	0.21	Calculated
Pipe - (62)	31.66	0 00:25	45.58	0.69	1.00	1.12	0.15	0.62	0.00	0.11	Calculated
Pipe - (62) (1)	8.08	0 00:25	45.65	0.18	0.54	0.85	0.10	0.41	0.00	0.04	Calculated
Pipe - (67)	67.03	0 00:25	221.81	0.30	3.64	0.08	0.10	0.40	0.00	1.98	Calculated
Pipe - (69)	33.18	0 00:25	44.70	0.74	0.99	0.85	0.25	1.00	17.00	0.10	SURCHARGED
Pipe - (71)	226.30	0 00:25	718.13	0.32	3.28	0.07	0.26	0.59	0.00	0.47	Calculated
Pipe - (75)	52.06	0 00:25	237.81	0.22	3.79	0.22	0.08	0.32	0.00	2.12	Calculated
Pipe - (76)	35.83	0 00:25	225.51	0.16	3.07	0.06	0.07	0.29	0.00	2.01	Calculated
Pipe - (79)	8.40	0 00:25	45.56	0.18	0.68	1.43	0.10	0.40	0.00	0.09	Calculated

## Storage Nodes

### Storage Node : Stor-01

#### Input Data

Invert Elevation (m) .....	585.77
Max (Rim) Elevation (m) .....	588.77
Max (Rim) Offset (m) .....	3.00
Initial Water Elevation (m) .....	0.00
Initial Water Depth (m) .....	-585.77
Ponded Area (m <sup>2</sup> ) .....	0.00
Evaporation Loss .....	0.00

#### Output Summary Results

Peak Inflow (lps) .....	264.09
Peak Lateral Inflow (lps) .....	0
Peak Outflow (lps) .....	15.63
Peak Exfiltration Flow Rate (cmm) .....	0
Max HGL Elevation Attained (m) .....	588.53
Max HGL Depth Attained (m) .....	2.76
Average HGL Elevation Attained (m) .....	585.95
Average HGL Depth Attained (m) .....	0.18
Time of Max HGL Occurrence (days hh:mm) .....	0 01:09
Total Exfiltration Volume (1000-m <sup>3</sup> ) .....	0
Total Flooded Volume (ha-mm) .....	0
Total Time Flooded (min) .....	0
Total Retention Time (sec) .....	0

## Storage Node : Stor-02

### Input Data

Invert Elevation (m) .....	579.99
Max (Rim) Elevation (m) .....	582.99
Max (Rim) Offset (m) .....	3.00
Initial Water Elevation (m) .....	579.99
Initial Water Depth (m) .....	0.00
Ponded Area (m <sup>2</sup> ) .....	0.00
Evaporation Loss .....	0.00

### Output Summary Results

Peak Inflow (lps) .....	31.41
Peak Lateral Inflow (lps) .....	0
Peak Outflow (lps) .....	6.93
Peak Exfiltration Flow Rate (cmm) .....	0
Max HGL Elevation Attained (m) .....	581.55
Max HGL Depth Attained (m) .....	1.56
Average HGL Elevation Attained (m) .....	580.2
Average HGL Depth Attained (m) .....	0.21
Time of Max HGL Occurrence (days hh:mm) .....	0 06:12
Total Exfiltration Volume (1000-m <sup>3</sup> ) .....	0
Total Flooded Volume (ha-mm) .....	0
Total Time Flooded (min) .....	0
Total Retention Time (sec) .....	0

## Storage Node : Stor-03

### Input Data

Invert Elevation (m) .....	560.85
Max (Rim) Elevation (m) .....	562.85
Max (Rim) Offset (m) .....	2.00
Initial Water Elevation (m) .....	560.85
Initial Water Depth (m) .....	0.00
Ponded Area (m <sup>2</sup> ) .....	0.00
Evaporation Loss .....	0.00

### Output Summary Results

Peak Inflow (lps) .....	1353.18
Peak Lateral Inflow (lps) .....	0
Peak Outflow (lps) .....	1972.6
Peak Exfiltration Flow Rate (cmm) .....	0
Max HGL Elevation Attained (m) .....	561.97
Max HGL Depth Attained (m) .....	1.12
Average HGL Elevation Attained (m) .....	560.93
Average HGL Depth Attained (m) .....	0.08
Time of Max HGL Occurrence (days hh:mm) .....	0 03:10
Total Exfiltration Volume (1000-m <sup>3</sup> ) .....	0
Total Flooded Volume (ha-mm) .....	0
Total Time Flooded (min) .....	0
Total Retention Time (sec) .....	0



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Tallus Development Ltd.  
2548 Pinnacle Ridge Drive  
West Kelowna, BC V4T 0E3

January 25, 2024  
Job 23.371

Attention: Mr. Damien Burggraeve

Re: **Geotechnical Report**  
**Proposed Residential Development**  
**2419 Mountains Hollow Lane (Lot C – Tallus Ridge)**  
**West Kelowna, BC**

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As requested, and further to our email proposal of November 20, 2023, Interior Testing Services Ltd. (ITSL) has carried out a geotechnical investigation for the above noted project. Please see attached to this report the following:

- Site Plan and Schematic Logs : Drawing 23.371-1
- Test Hole Logs : Drawings 23.371-2 to 23.371-11
- California Bearing Ratio : Drawing 23.371-12
- Sieve Analysis : Drawings 23.371-13 to 23.371-14
- Modified Proctor : Drawing 23.371-15
- Site Grading Plan (By Others) : Drawing 23.371-16
- Slope Cross Sections (By Others) : Drawing 23.371-17

As Appendix A, ITSL attaches a completed copy of a *Landslide Assurance Statement* as taken from the Engineers and Geoscientist British Columbia (EGBC) Guideline *Landslide Assessments in British Columbia* (the Guideline).

At the end of this letter report, ITSL attaches a copy of our standard two-page *Terms of Engagement* that governs our work on this project, which has been previously accepted and signed.

ITSL anticipates that this report will be used as part of your permit applications and we acknowledge the City of West Kelowna (City) as authorized users of this report, also subject to our standard *Terms of Engagement*.

## **1.0 INTRODUCTION**

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ITSL understands that a residential development consisting of approximately 70 units is planned for the subject property. ITSL further understands onsite roadways will be constructed, and that typical site servicing will also be provided to each lot.

The purpose of our investigation was to identify the underlying soil and groundwater conditions with respect to general geotechnical comments for site development.

The following report presents our investigation results, along with general geotechnical comments and preliminary recommendations for site preparation, foundation design, drainage and onsite pavement structure.

## **2.0 SITE DESCRIPTION**

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The subject property is located in the existing "Tallus Ridge" neighbourhood in West Kelowna, BC, and is roughly 6.6 hectares (16.3 acres) in area. In general, the site slopes down from north to south with localized flat areas throughout. Slopes up to approximately 50% were observed. Site cross sections (by others) are shown on Drawing 23.371-16. ITSL noted that the property is well-vegetated with mature pine trees and native bushes and grasses, and appears to not have been previously developed.

## **3.0 FIELD and LABORATORY WORK**

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### **3.1 Desktop Review**

A desktop review was carried out which included examination of aerial photographs and topographic maps of the area. The desktop review provided information of the physical terrain on and surrounding the site to aid in the identification of potential geotechnical hazards and areas requiring additional review.

### **3.2 Field Work**

On December 19, 2023, a tracked excavator operated by Tallus Development Ltd. was used to advance a total of 10 test pits (TP) across the site to as much as 2.7 m below current site grades. The soil profile of each test hole was continuously logged in the field and occasional, representative samples were recovered and returned to our laboratory for further testing. In addition, a total of two field percolation tests (PT) were carried out within TP1 and TP9.

The locations of all the test holes are approximately shown on the attached site plan (Drawing 23.371-1), which was adapted from the site plan provided by Protech Consulting.

### 3.3 Soil Profile and Groundwater Conditions

The schematic logs of the test holes are shown on Drawing 23.371-1. Detailed soil descriptions are shown on Drawings 23.371-2 to 23.371-11, which we recommend be used in preference to the generalized soil descriptions that follow.

In general, all test holes encountered approximately 0.2 m of surface topsoils. Below the surface topsoil layer, the natural soils encountered consisted of predominantly SILTs, SANDs, GRAVELs and COBBLEs. Within TP2 to TP4, TP6, and TP8 to TP10, natural, granular soils were encountered to the base of the test holes at 1.4 to 2.7 m. Within TP1, TP5 and TP7, BEDROCK was encountered at depths ranging from approximately 1.1 to 1.2 m below surface grades.

Groundwater was not observed during our investigation. A total of two standpipes were installed at approximately 2.4 to 2.7 m below surrounding site grades within TP8 and TP10. On January 10, 2024, ITSL did not observe groundwater in the standpipes.

The regional groundwater table is expected to be significantly deep on the site; although runoff and perched groundwater is expected to vary seasonally and will be affected by drainage and infiltration conditions. During the spring freshet and after rainy weather, shallow groundwater courses on the bedrock and dense till-like layers are expected. To that end, potential for groundwater “breakout” should be anticipated where the proposed site grading interrupts the bedrock and till layers. While the installation of roads and underground utilities, including storm sewer servicing, is expected to capture and redirect some of the groundwater seepage for the post-development condition, “breakout” should be considered by your civil engineer and/or hydrogeologist. Additional infiltration drains may be recommended during construction to control the post-development groundwater conditions.

### 3.4 Field Percolation Tests

To provide a preliminary assessment of the permeability characteristics of the natural soils, a total of two field percolation tests (PT) were carried out. The locations of the field percolation tests are approximately shown on the attached site plan (Drawing 23.371-1). The results are as follows:

Test No. 1 (Within TP1)

Depth of Test:	0.6 m below surface grade.
Soil Type:	Natural, SAND, GRAVEL and COBBLE, some silt.
Percolation Rate:	25 minutes per 25 mm (approximate)
Calculated Coefficient of Permeability:	$2 \times 10^{-5}$ m/s (approximate)
Theoretical Range of Coefficient of Permeability:	on the order of $10^{-4}$ to $10^{-5}$ m/s



Test No. 2 (Within TP9)

Depth of Test:	0.6 m below surface grade.
Soil Type:	Natural, silty SAND, some gravel.
Percolation Rate:	15 minutes per 25 mm (approximate)
Calculated Coefficient of Permeability:	$3 \times 10^{-5}$ m/s (approximate)
Theoretical Range of Coefficient of Permeability:	on the order of $10^{-4}$ to $10^{-5}$ m/s

**3.5 Laboratory Work**

Regular, representative samples were recovered during the investigation for further testing in our laboratory. A brief summary of the laboratory work completed is discussed below.

**i. Water Content**

The water content of all recovered samples was determined in our laboratory by oven-drying. These results are shown on Drawings 23.371-2 to 23.371-11. The water content of the granular soils ranged from roughly 4 to 12%.

**ii. California Bearing Ratio Test**

A California Bearing Ratio (CBR) test was completed on a sample of the natural SANDS, GRAVELS and COBBLES encountered within TP1 at approximately 0.8 m below grade. The CBR is an estimate of the subgrade strength and is useful for pavement structure design. The results are shown on Drawing 23.371-12, and indicate a soaked CBR value greater than 10.

**iii. Sieve Analysis**

To provide additional information with respect to soil type, we carried out sieve analyses on samples of natural soils recovered from TP1 and TP9. The results are shown on Drawings 23.371-13 and 23.371-14. The results indicate predominantly granular soils with varying amounts of fines (ie, SILT / CLAY).

**iv. Modified Proctor Analysis**

In addition to the CBR and sieve analyses, a Modified Proctor was completed on the CBR sample from TP1. The results of the Modified Proctor test are shown on Drawing 23.371-15, and indicate an optimum dry density of roughly  $2082 \text{ kg/m}^3$  at an optimum water content of roughly 9.4%.

**4.0 GENERAL SITE DEVELOPMENT**

---

**4.1 Site Grading**

In order to achieve the desired site and road grades, we understand some cut / fill work will be required. Prior to site grading work, stripping of the surface vegetation and topsoil is recommended.

We recommend soil cut and engineered FILL slopes be finished at no steeper than 2 Horizontal to 1 Vertical (2H:1V), as per the guidelines of the *City of West Kelowna Official Community Plan*. Soil cut and engineered FILL slopes should be protected against surface erosion by means of rock armoring, hydro-seeding, landscaping or similar. All slopes may require some degree of maintenance with the passing of time, including replanting of vegetation which may die-off, maintaining concentrated discharge of water above/on the slope which may cause erosion, etc.

#### **4.2 Temporary Excavations**

Conventional Worksafe BC (OHS Regulation Part 20) slopes of 3 Horizontal to 4 Vertical (3H:4V) should be reasonable for trench work up to a total excavated height of 3 m, in satisfactorily dry conditions. Where steeper slopes or deeper excavations are proposed and / or if groundwater is encountered, ITSL recommends that a geotechnical engineer be given the opportunity to review conditions at the time of construction.

#### **4.3 Rock Cut Slopes**

Due to the presence of BEDROCK on the subject property, ITSL anticipates that the removal of BEDROCK may also be necessary to achieve the desired site grades. We suggest smooth wall, controlled blasting techniques (pre-splitting) and scaling as minimum slope and stabilization techniques.

We understand that you are contemplating rock cut slopes of 0.25H:1V. Where blasted rock cut slopes are highly fractured, additional scaling and/or flatter inclinations may be recommended. The rock cut slopes should be reviewed after scaling has been carried out, as well as periodically at an interval of roughly every 5 years after initial blasting or in the event of significant changes. Additional review by a rock mechanics specialist may be recommended if large blast rock cut slopes are planned.

Above the top of the rock cuts, a 3 m wide (horizontal) area should be cleared of the surface overburden and/or any loose weathered rock, and chain link fencing should be installed above the rock cuts (designed by others). Signage, warning of rock fall hazard, would also be prudent below rock cut slopes.

ITSL understands that for residential construction below the rock cuts, you intend to abut the rock face with foundation walls and backfill material.

With respect to residential construction below the rock cut slopes where foundations will not abut the rock face, a setback from the toe of the rock cut slope is recommended to provide adequate rockfall runoff. Preliminarily, a 1.5H:1V rockfall shadow projected below the crest of the rock cut slope is recommended for residential construction; although this could be further reviewed by ITSL at the time of individual house construction.

In addition, a rockfall catchment area (delineated with a chain link fence) should be provided in front of the rock cut faces in excess of 3 m tall, as outlined below.

- i. Provide a 3 m wide catchment area for rock cuts less than 6 m in height.
- ii. Provide a 4 m wide where the rock cut exceeds 6 m in height. Rock cuts in excess of 10 m are not recommended above residential homes.

Where rock cut slopes taller than 3 m will exist above the local roadways, rock fall catchment areas are recommended, including:

- i. Provide a 3 m wide, 0.75 m deep catchment ditch (sloped at 4H:1V) for rock cuts less than 9 m in height.
- ii. Provide a 4 m wide, 1 m deep catchment ditch (sloped at 4H:1V) for rock cuts between 9 and 12 m. Rock cuts in excess of 12 m are not recommended.
- iii. Sidewalks should be constructed on the opposite side of the roadway (not adjacent to the rock fall catchment areas).

Ongoing maintenance of the rock cuts should include removing the accumulated rock fall debris in the catchment area on an as needed basis. Scaling may also be required as part of the maintenance program and should be evaluated by a geotechnical engineer every roughly 5 years or in the event of significant changes. Slope covering with mesh may be recommended in the future if the rock face erosion becomes significant.

#### **4.4 Engineered FILL**

Where engineered FILL is required to achieve the design foundation elevations, granular or blasted rock, FILLs (placed and compacted in lifts) may be used to achieve the desired grades. The onsite soils are not suitable for re-use as compacted engineered FILL below building foundations. Instead, clean (less than 8% fines), well-graded, granular and blasted rock materials (approved by ITSL) should be used as engineered FILL below building areas. The onsite soils could be considered for re-use as grading FILL below roads, provided some tolerance for settlement potential is acceptable. Where the onsite soils are suitably mixed with blast rock, they may be suitable for use below foundations. ITSL recommends additional review at the time of construction.

ITSL recommends that the engineered FILL be placed and compacted in maximum 300 mm thick, level lifts to at least 95% Modified Proctor Density (MPD) and within 2% of optimum moisture content. Maximum particle diameters should be maintained at 200 mm within the FILL materials. Additional care will be required to 'key' the FILLs into the natural slopes. Field density testing and / or proof roll observations should be carried out on every second lift of FILL placed (every 600 mm) to confirm suitable compaction is being achieved.

**4.5 Utility Service Installation**

Depending on final design invert elevations (per the civil engineer); we anticipate that the proposed utility services will likely be set on suitable natural soils, such that pipe support is expected to be satisfactory. Where conditions vary from those discussed above, ITSL recommends additional geotechnical review at the time of construction.

ITSL recommends that the backfill material consists of clean sands and gravels (ie MMCD Pit-Run or similar) and that ITSL review the proposed material to confirm suitability. ITSL recommends that all trench backfill work be carried out as per the local bylaw. Alternatively, trench backfill can be placed and compacted as outlined in 4.4 above.

Based on our test holes and laboratory testing, it generally appears reasonable to use the excavated granular soils or blast rock as trench backfill, provided particles in excess of 200 mm are removed.

**4.6 Pavement Structure**

Upon completion of stripping of TOPSOILs, the underlying natural granular soils are expected to be adequately suited for the support of onsite roadways. Considering a CBR value greater than 10 for the natural soils, the following pavement structure is expected to be sufficient for support of the onsite roadways.

Thickness (mm)	Material
50	Hot Mix Asphalt
100	Crushed Gravel Base (19 mm minus) – compacted to a minimum of 95% of MPD
300	Granular Subbase (75 mm minus) – compacted to a min. of 95% of MPD
Overlying	Suitable Subgrade – proof rolled to check for soft spots

**Table 1 – Onsite Pavement Structure**

The pavement structure above is expected to be reasonable from a frost protection perspective as well. In areas of tight turning and / or heavier traffic loading, increasing the asphalt thickness to 100 mm could be contemplated to improve long-term performance.

Where the placement of the subbase layer involves removal of bedrock, the above noted pavement structure can be reduced, with only a thicker layer of base gravel required. Additional review at the time of construction is recommended.

Pavement structure gravels should be placed and compacted as outlined in 4.4 above.

**4.7 Site Drainage**

From the results of our field percolation testing, we estimate the coefficient of permeability for the natural, SILT, SAND and GRAVEL soils encountered during our investigation to be on the order of

$10^{-5}$  m/s. No factor of safety has been applied to these values. Application of an appropriate factor of safety, if any are required, is the responsibility of the designer.

Where onsite disposal is considered, in order to limit the potential for saturation induced settlements or break-out at the down slope bedrock outcrops, ITSL recommends drainage be directed to suitable natural soils and not to FILL materials.

Where subgrade materials encountered during excavation are not as described above, ITSL can provide additional percolation testing as required.

## **5.0 RESIDENTIAL FOUNDATION PREPARATION and DESIGN**

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### **5.1 Foundation Preparation**

Prior to placement of engineered FILL materials or concrete footings, we recommend that the building areas be cleared of all vegetation, TOPSOIL, and any other unsuitable materials. Based on the results of our field investigation, natural, granular soils and / or BEDROCK are anticipated to be within 0.3 m of the existing site surface grades. ITSL recommends that we review the subgrade soils after the excavation work is completed, prior to placing engineered FILL materials or concrete footings, to confirm that conditions are satisfactory or to provide additional geotechnical guidance as needed.

Where site grades need to be raised to achieve the design foundation elevations, engineered FILL materials is to be placed and compacted, as outlined in 4.4 above. We recommend that engineered FILL extend beyond the edge of the building foundations a distance at least equal to the depth of fill placed to provide an adequate 1H:1V load spread through the fills to the underlying natural soils.

In general, the foundation bearing soils may consist of bedrock, natural granular soils, or engineered FILL. Where the individual homes span between soil and bedrock conditions, the bedrock should be over-blasted to allow for a minimum 0.3 m of replacement engineered FILL below the foundations and provide a more consistent bearing surface.

We note that even good-quality, well compacted, engineered FILL has potential for settlement on the order of 1% of the total fill thickness, with additional risk of settlement in the event of water infiltration. This risk is a function of the economic decision to construct foundations on FILL soils, and should not be misconstrued as an error or omission on the part of ITSL. If this risk is not tolerable, the building footings should be dropped to bear on suitable natural soils (and taller foundation walls constructed to achieve the desired building main floor level). To attempt to limit settlement potential of the engineered FILL to within normal geotechnical design objectives (on the order of 25 mm), we recommended FILL depths (after site stripping is carried out) be limited to 2.5 m or less. This is particularly important where the proposed buildings span areas of engineered FILL and dense, natural soils to limit differential settlement potential.

## 5.2 Preliminary Foundation Design

For footings set on suitable, natural soil, BEDROCK or adequately compacted engineered FILL material, an allowable bearing pressure of 150 kPa (3000 psf) may be assumed for foundation design purposes, subject to the following considerations.

- a) Bearing surfaces to be clean, dry, free of any TOPSOIL and in a well compacted condition.
- b) Minimum footing width to be 400 mm (16 inches).
- c) Minimum depth of footing to be 600 mm (24 inches) below final adjacent grade, or as per local by-law, for frost protection.

The above allowable bearing pressure can also be taken as the Service Limit State resistance. For the factored geotechnical resistance at the Ultimate Limit State, a resistance of 225 kPa (4500 psf) can be assumed for foundation design purposes, using a resistance factor of 0.5 as taken from the *Canadian Foundation Engineering Manual* (CFEM, 4<sup>th</sup> Ed).

We recommend that residential foundations (including any proposed rear deck pads) be set below and behind a 2 Horizontal to 1 Vertical (2H:1V) plane projected up from the toe of adjacent soil (natural or engineered FILL) slopes. Where deck pads are planned above sloping grades, connecting the pads back to the main building foundation with a continuous footing and frost wall is recommended. If bedrock bearing surfaces are exposed, bearing the footings below and behind a 1H:1V plane projected up from the rock cut or slope toe is recommended.

## 5.3 Site Class

Based on the result of our test pits and bedrock conditions exposed, Site Class C, as taken from Table 4.1.8.4.A of the *2018 BC Building Code* (BCBC), be assumed in foundation design.

## 5.4 Lateral Earth Pressures

If required, lateral earth pressures are provided below for design of buried foundation walls. The foundation walls are expected to be relatively stiff and unyielding, so that at-rest conditions have been preliminarily assumed. We recommend that the walls be backfilled with free-draining granular soils such that drained conditions are assumed. ITSL also recommends that the finished backfill be sloped away from the building.

Lateral earth pressures have been estimated based on an assumed friction angle of 35° and a unit weight of 20 kN/m<sup>3</sup> for the expected granular backfill material. As noted, we have assumed at-rest conditions and a corresponding equivalent fluid pressure,  $y_{eq}$ , of 8.5 kN/m<sup>2</sup> per metre of wall height can be used in design. To account for any surcharge pressures, a uniform lateral pressure coefficient,  $K_o$ , of 0.43 times the estimated load should also be applied to the wall for at-rest conditions.

For active conditions, an equivalent fluid pressure,  $y_{eq}$ , of 5.4 kN/m<sup>2</sup> per metre of wall height can be used in design and to account for any surcharge pressures, a uniform lateral pressure coefficient,  $K_a$ , of 0.27 times the estimated load should also be applied to the wall.

Please note that heavy compaction within roughly 1 m of the foundation walls is not recommended. Where heavy compaction is to be applied, then a minimum tabular pressure of 20 kN/m<sup>2</sup> should be assumed in design, until it intersects with the equivalent fluid pressure provided above.

### **5.5 Building Drainage**

For typical slab on grade structures where the interior slab elevations are above the exterior elevations, conventional foundation drainage can be omitted if desired, as the drainage system will likely not reduce the potential of water infiltration into the building, resulting in an unnecessary system.

Where interior slabs are below exterior grades (ie basements or crawl spaces), typical foundation drainage is to be provided and directed to the local storm collection system (designed by others).

ITSL recommends that the roof drainage be directed to the local storm collection system (designed by others).

Further review and discussion should be provided at the time of site design and house construction.

## **6.0 SITE SUITABILITY**

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Upon completion of site preparation subject to the recommendations in this report, the site is anticipated to be suitable for proposed residential development and appears adequate for the intended purpose. Given the hillside nature of the property, slope stability is a governing design concern for the proposed development and the development plans should be designed to suit the sloping site grades.

The natural slopes on and uphill from the property generally appear stable in their existing, pre-development condition; our reconnaissance did not encounter evidence of significant slope instability. Development on the site is not expected to have negative or adverse effects on the overall stability of the site or surrounding areas both within and beyond the subject property boundaries. We anticipate no new or increased risk of landslide, or other geotechnical hazard would result because of development on the site, subject to the recommendations in this report.

In reference to Sections 488 to 491 of the *Local Government Act* (formerly Sections 919.1 and 920 as referenced on the EGBC (formerly APEGBC Appendix D form)), in our opinion, the land may be used safely for the use intended, conditional to our recommendations provided within this report. We define "safe" based on the levels of safety adopted by the City, including a 10% probability of failure occurring in a 50 year period (1 in 475) for damaging events and a 0.5% probability of failure occurring in a 50 year period (1 in 10,000) for life-threatening or catastrophic events.

In accordance with the EGBC Guidelines for Legislated Landslide Assessments for Residential Developments, we have included an Appendix D: Landslide Assessment Assurance Statement.

## 7.0 CONCLUSIONS

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As requested, ITSL has carried out a geotechnical investigation for the proposed residential development project. Geotechnical comments and recommendations for site preparation, preliminary foundation design, drainage and onsite pavement structure have been provided in the previous sections of this report.

ITSL recommends additional geotechnical review at the time of detailed design to confirm our recommendations and comments above.

At the time of construction, field reviews by ITSL of the natural subgrade soils are recommended to confirm conditions are suitable prior to the placing engineered FILL materials or concrete.

We trust the above comments are sufficient at this stage. After your review, please feel free to call and discuss if you have any questions.

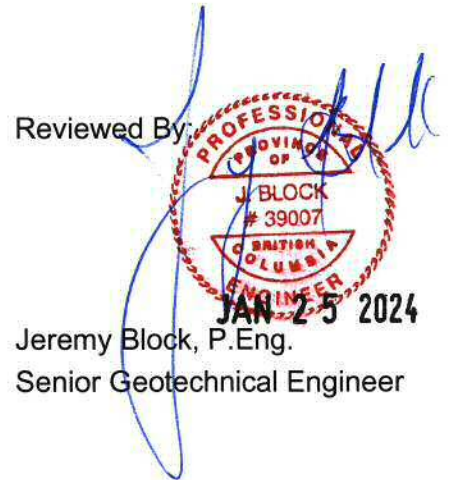
Best Regards,  
Interior Testing Services Ltd  
Permit to Practice Number: 1001971

Prepared By:



Darien Folk, B.A.Sc.

Reviewed By:

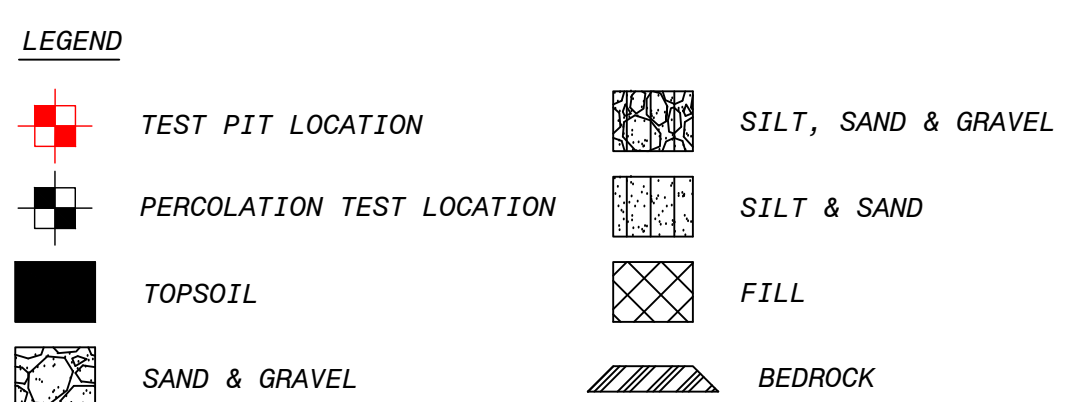
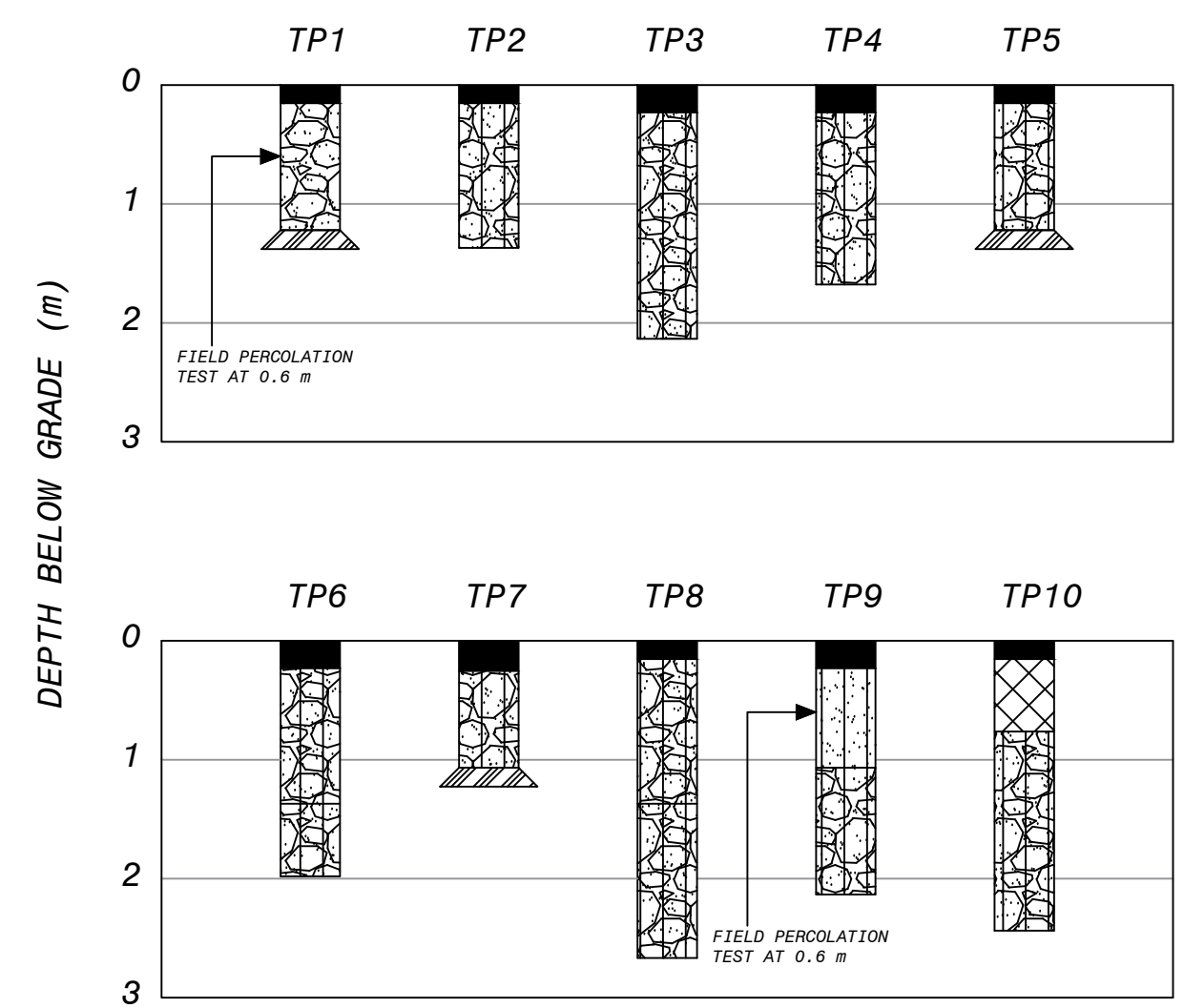
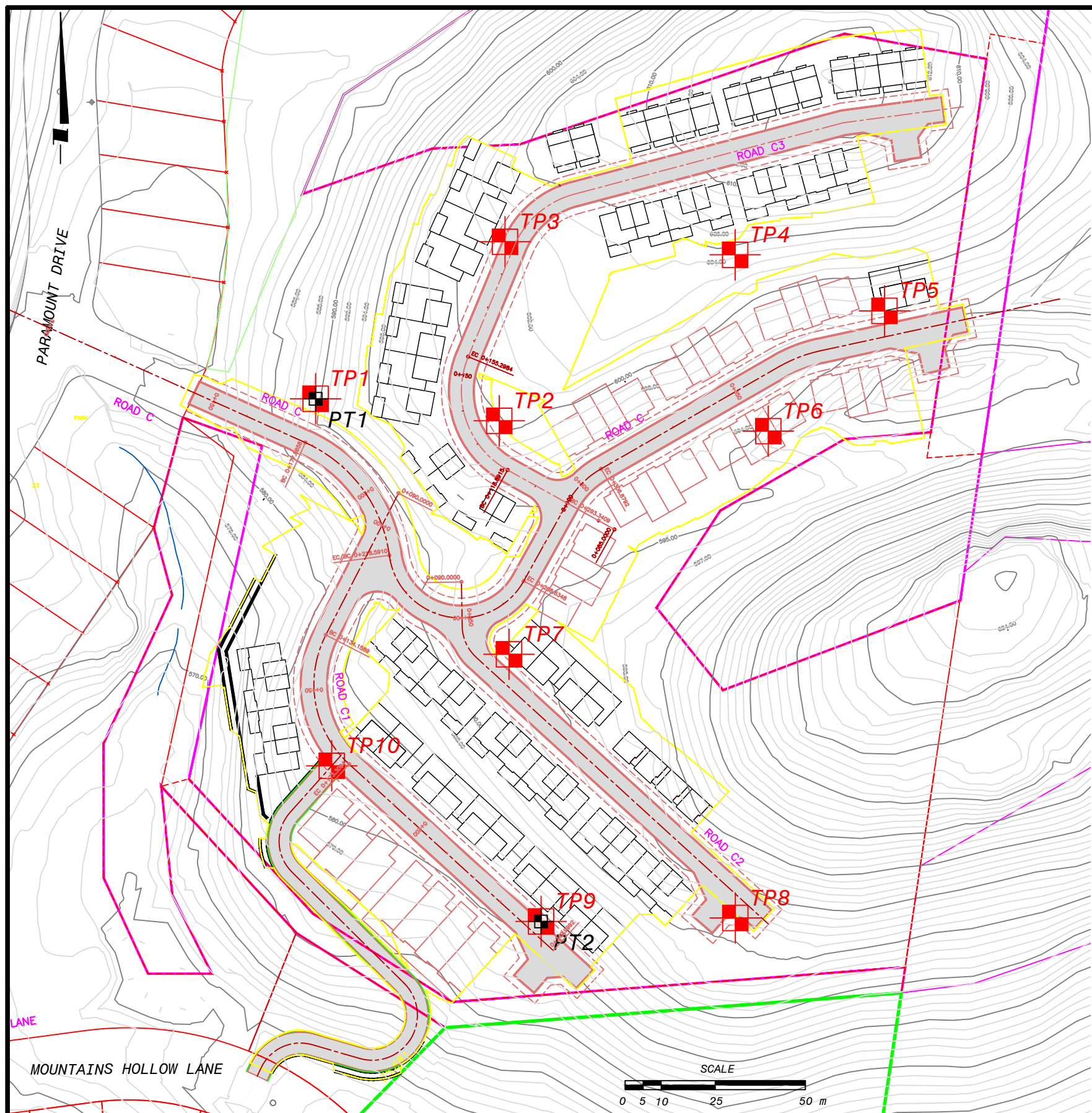


J. BLOCK  
# 39007  
BRITISH COLUMBIA  
ENGINEER  
JAN 25 2024

Jeremy Block, P.Eng.  
Senior Geotechnical Engineer

Revision No.	Date	Comments
0.0	January 25, 2024	Issued for use.





**NOTES**

1. REFERENCE PLAN SUPPLIED BY PROTECH CONSULTING.
2. TEST PIT LOCATIONS ARE APPROXIMATE AND MAY VARY FROM THAT SHOWN.
3. FOR DETAILED SOIL DESCRIPTIONS REFER TO TEST PIT LOGS (DRAWINGS 23.371-2 TO 23.371-11).

TALLUS DEVELOPMENT LTD  
 GEOTECHNICAL INVESTIGATION  
 PROPOSED RESIDENTIAL DEVELOPMENT  
 LOT C - TALLUS RIDGE  
 WEST KELOWNA, BC

**SITE PLAN  
 &  
 SCHEMATIC LOGS**

INTERIOR TESTING SERVICES LTD  
 1-1965 MOSS COURT, KELOWNA, BC V1Y 9L3  
 PH: 250-860-6540 EM: info@interiortesting.com  
 DATE OF INVESTIGATION: DECEMBER 19, 2023  
 JOB NUMBER: 23.371 DRAWING NUMBER: 23.371-1



# LOG OF TEST BORING TP 1

Interior Testing Services Ltd  
 1 - 1965 Moss Ct  
 Kelowna, BC V1Y 9L3  
 ph: (250) 860 - 6540  
 em: info@interiortesting.com

Project : 23.371 Method : Excavator  
 : Proposed Development Driller : Tallus Development Ltd  
 : Lot C - Tallus Ridge Logged By : DF  
 : Kelowna, BC Date : December 19, 2023  
 Location : See Dwg. No. 23.371-1 Checked By : JB

Depth in Meters	% Moisture	Water Level	REMARKS	GRAPHIC	Sample Number	Sample Type	Legend	Depth in Meters
							<input checked="" type="checkbox"/> Water Noted During Drilling <input type="checkbox"/> Disturbed Sample	
							DESCRIPTION	
0			Approximate Surface Elevation: +/- 590 m  No groundwater noted.  Percolation Test at 0.6 m (25 minutes / inch).  S3: CBR Test (Drawing 23.371-12) S3: Sieve Analysis (Drawing 23.371-13) S3: Modified Proctor (Drawing 23.371-15)		S1 S2 S3	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	TOPSOIL.  Brown, SAND, GRAVEL and COBBLE, some silt.	0
1	4%							1
2								2
3								3
4								4
							Base of test pit at 1.2 m. Refused on BEDROCK.	



# LOG OF TEST BORING TP 2

Interior Testing Services Ltd  
 1 - 1965 Moss Ct  
 Kelowna, BC V1Y 9L3  
 ph: (250) 860 - 6540  
 em: info@interiortesting.com

Project : 23.371 Method : Excavator  
 : Proposed Development Driller : Tallus Development Ltd  
 : Lot C - Tallus Ridge Logged By : DF  
 : Kelowna, BC Date : December 19, 2023  
 Location : See Dwg. No. 23.371-1 Checked By : JB

Depth in Meters	% Moisture	Water Level	REMARKS	GRAPHIC	Sample Number	Sample Type	Legend	DESCRIPTION	Depth in Meters
							<input type="checkbox"/> Water Noted During Drilling <input type="checkbox"/> Disturbed Sample		
0			Approximate Surface Elevation: +/- 600 m No groundwater noted.					TOPSOIL.	0
0.5	5%				S1	<input type="checkbox"/>		Brown, SILT, SAND, GRAVEL and COBBLE.	0.5
1.2	6%				S2	<input type="checkbox"/>			1.2
1.4								Base of test pit at 1.4 m. Refused on dense material.	1.4
2									2
3									3
4									4



# LOG OF TEST BORING TP 3

Interior Testing Services Ltd  
 1 - 1965 Moss Ct  
 Kelowna, BC V1Y 9L3  
 ph: (250) 860 - 6540  
 em: info@interiortesting.com

Project : 23.371 Method : Excavator  
 : Proposed Development Driller : Tallus Development Ltd  
 : Lot C - Tallus Ridge Logged By : DF  
 : Kelowna, BC Date : December 19, 2023  
 Location : See Dwg. No. 23.371-1 Checked By : JB

Depth in Meters	% Moisture	Water Level	REMARKS	GRAPHIC	Sample Number	Sample Type	Legend		DESCRIPTION	Depth in Meters
							▼ Water Noted During Drilling	☐ Disturbed Sample		
0			Approximate Surface Elevation: +/- 602 m No groundwater noted.						TOPSOIL.	0
0.5	4%				S1	☐			Brown, SILT, SAND, GRAVEL and COBBLE, some roots noted.	0.5
1.8	5%				S2	☐				1.8
2.1									Base of test pit at 2.1 m. Refused on dense material.	2.1
4										4



# LOG OF TEST BORING TP 4

Interior Testing Services Ltd  
 1 - 1965 Moss Ct  
 Kelowna, BC V1Y 9L3  
 ph: (250) 860 - 6540  
 em: info@interiortesting.com

Project : 23.371 Method : Excavator  
 : Proposed Development Driller : Tallus Development Ltd  
 : Lot C - Tallus Ridge Logged By : DF  
 : Kelowna, BC Date : December 19, 2023  
 Location : See Dwg. No. 23.371-1 Checked By : JB

Depth in Meters	% Moisture	Water Level	REMARKS	GRAPHIC	Sample Number	Sample Type	Legend	DESCRIPTION	Depth in Meters
							<input type="checkbox"/> Water Noted During Drilling <input type="checkbox"/> Disturbed Sample		
0			Approximate Surface Elevation: +/- 605 m  No groundwater noted.					TOPSOIL.	0
1	6%				S1	<input type="checkbox"/>		Brown to grey, SILT, SAND, GRAVEL and COBBLE.	1
2	6%				S2	<input type="checkbox"/>		Base of test pit at 1.7 m. Refused on dense material.	2
3									3
4									4



# LOG OF TEST BORING TP 5

Interior Testing Services Ltd  
 1 - 1965 Moss Ct  
 Kelowna, BC V1Y 9L3  
 ph: (250) 860 - 6540  
 em: info@interiortesting.com

Project	: 23.371	Method	: Excavator
	: Proposed Development	Driller	: Tallus Development Ltd
	: Lot C - Tallus Ridge	Logged By	: DF
	: Kelowna, BC	Date	: December 19, 2023
Location	: See Dwg. No. 23.371-1	Checked By	: JB

Depth in Meters	% Moisture	Water Level	REMARKS	GRAPHIC	Sample Number	Sample Type	DESCRIPTION	Depth in Meters
0	0      20      40		<p>Approximate Surface Elevation: +/- 597 m</p> <p>No groundwater noted.</p>		S1	<input type="checkbox"/>	<p>TOPSOIL.</p> <p>Brown, SILT, SAND, GRAVEL and COBBLE.</p> <hr/> <p>Base of test pit at 1.2 m. Refused on BEDROCK.</p>	0
1	● 7%							1
2								2
3								3
4								4



# LOG OF TEST BORING TP 6

Interior Testing Services Ltd  
 1 - 1965 Moss Ct  
 Kelowna, BC V1Y 9L3  
 ph: (250) 860 - 6540  
 em: info@interiortesting.com

Project : 23.371 Method : Excavator  
 : Proposed Development Driller : Tallus Development Ltd  
 : Lot C - Tallus Ridge Logged By : DF  
 : Kelowna, BC Date : December 19, 2023  
 Location : See Dwg. No. 23.371-1 Checked By : JB

Depth in Meters	% Moisture	Water Level	REMARKS	GRAPHIC	Sample Number	Sample Type	Legend	DESCRIPTION	Depth in Meters
							<input type="checkbox"/> Water Noted During Drilling <input type="checkbox"/> Disturbed Sample		
0			Approximate Surface Elevation: +/- 595 m  No groundwater noted.					TOPSOIL.	0
1	4%				S1	<input type="checkbox"/>		Brown, silty, SAND and GRAVEL, some cobble.	1
2	10%				S2	<input type="checkbox"/>		Brown, SILT, SAND, GRAVEL and COBBLE (till-like).	2
2	12%				S3	<input type="checkbox"/>		Base of test pit at 2.0 m. Refused on dense material.	2
3									3
4									4



# LOG OF TEST BORING TP 7

Interior Testing Services Ltd  
 1 - 1965 Moss Ct  
 Kelowna, BC V1Y 9L3  
 ph: (250) 860 - 6540  
 em: info@interiortesting.com

Project : 23.371 Method : Excavator  
 : Proposed Development Driller : Tallus Development Ltd  
 : Lot C - Tallus Ridge Logged By : DF  
 : Kelowna, BC Date : December 19, 2023  
 Location : See Dwg. No. 23.371-1 Checked By : JB

Depth in Meters	% Moisture	Water Level	REMARKS	GRAPHIC	Sample Number	Sample Type	Legend	Depth in Meters
							<input type="checkbox"/> Water Noted During Drilling <input type="checkbox"/> Disturbed Sample	
							DESCRIPTION	
0			Approximate Surface Elevation: +/- 594 m				TOPSOIL.	0
			No groundwater noted.				Brown, silty, SAND, GRAVEL and COBBLE.	
1	4%				S1	<input type="checkbox"/>		1
							Base of test pit at 1.1 m. Refused on BEDROCK.	
2								2
3								3
4								4





# LOG OF TEST BORING TP 8

Interior Testing Services Ltd  
 1 - 1965 Moss Ct  
 Kelowna, BC V1Y 9L3  
 ph: (250) 860 - 6540  
 em: info@interiortesting.com

Project : 23.371 Method : Excavator  
 : Proposed Development Driller : Tallus Development Ltd  
 : Lot C - Tallus Ridge Logged By : DF  
 : Kelowna, BC Date : December 19, 2023  
 Location : See Dwg. No. 23.371-1 Checked By : JB

Depth in Meters	% Moisture	Water Level	REMARKS	GRAPHIC	Sample Number	Sample Type	Legend		Depth in Meters
							▼ Water Noted During Drilling ▽ Water Noted In Standpipe	<input type="checkbox"/> Disturbed Sample — Standpipe Installation Depth	
							DESCRIPTION		
0			Approximate Surface Elevation: +/- 592 m No groundwater noted.						0
0.5	5%				S1	<input type="checkbox"/>		TOPSOIL.	0.5
1.5	7%				S2	<input type="checkbox"/>		Brown, silty, SAND, GRAVEL and COBBLE.	1.5
2.5	8%				S3	<input type="checkbox"/>		Brown, SILT, SAND, GRAVEL and COBBLE (till-like).	2.5
2.7			Standpipe installed at 2.7 m.					Base of test pit at 2.7 m. Refused on dense material.	2.7
4									4



# LOG OF TEST BORING TP 9

Interior Testing Services Ltd  
 1 - 1965 Moss Ct  
 Kelowna, BC V1Y 9L3  
 ph: (250) 860 - 6540  
 em: info@interiortesting.com

Project : 23.371 Method : Excavator  
 : Proposed Development Driller : Tallus Development Ltd  
 : Lot C - Tallus Ridge Logged By : DF  
 : Kelowna, BC Date : December 19, 2023  
 Location : See Dwg. No. 23.371-1 Checked By : JB

Depth in Meters	% Moisture	Water Level	REMARKS	GRAPHIC	Sample Number	Sample Type	Legend	DESCRIPTION	Depth in Meters
							<input type="checkbox"/> Water Noted During Drilling <input type="checkbox"/> Disturbed Sample		
0			Approximate Surface Elevation: +/- 582 m  No groundwater noted.  Percolation Test at 0.6 m (15 minutes / inch).  S1: Sieve Analysis (Drawing 23.371-14)		S1	<input type="checkbox"/>	TOPSOIL.	0	
1	5%							Brown to grey, silty SAND, some gravel.	1
2	4%							Brown, silty, SAND, GRAVEL and COBBLE.	2
3								Base of test pit at 2.1 m. Refused on dense material.	3
4									4



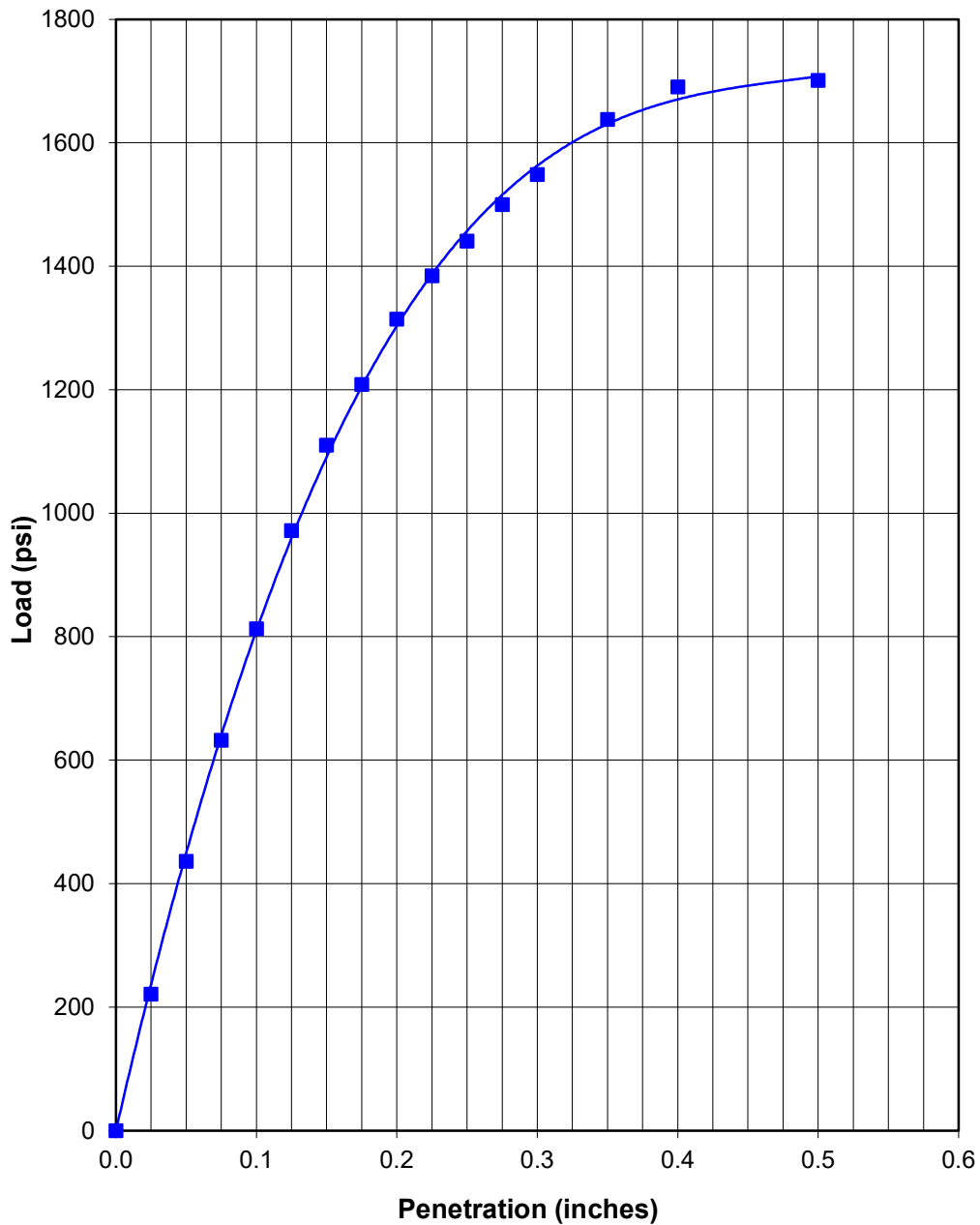
# LOG OF TEST BORING TP 10

Interior Testing Services Ltd  
 1 - 1965 Moss Ct  
 Kelowna, BC V1Y 9L3  
 ph: (250) 860 - 6540  
 em: info@interiortesting.com

Project : 23.371 Method : Excavator  
 : Proposed Development Driller : Tallus Development Ltd  
 : Lot C - Tallus Ridge Logged By : DF  
 : Kelowna, BC Date : December 19, 2023  
 Location : See Dwg. No. 23.371-1 Checked By : JB

Depth in Meters	% Moisture	Water Level	REMARKS	GRAPHIC	Sample Number	Sample Type	Legend		Depth in Meters
							▼ Water Noted During Drilling ▽ Water Noted In Standpipe	<input type="checkbox"/> Disturbed Sample — Standpipe Installation Depth	
							DESCRIPTION		
0			Approximate Surface Elevation: +/- 582 m No groundwater noted.						0
0.5	6%				S1	<input type="checkbox"/>		TOPSOIL. Brown, sand, gravel and cobble, probable FILL.	0.5
1.5	4%				S2	<input type="checkbox"/>		Brown, SILT, SAND, GRAVEL and COBBLE.	1.5
2.4			Standpipe installed at 2.4 m.					Base of test pit at 2.4 m. Refused on dense material, possible BEDROCK.	2.4
4									4

## CALIFORNIA BEARING RATIO TEST



RE-COMPACTED SAMPLE: 97.6% of MPD (Drawing 23.371-15)

SAMPLE: TP1 S3 - SAND and GRAVEL, some silt

SAMPLE MOISTURE: 12.0%

CBR AT 0.1 INCHES (AFTER SOAKING): 81.3

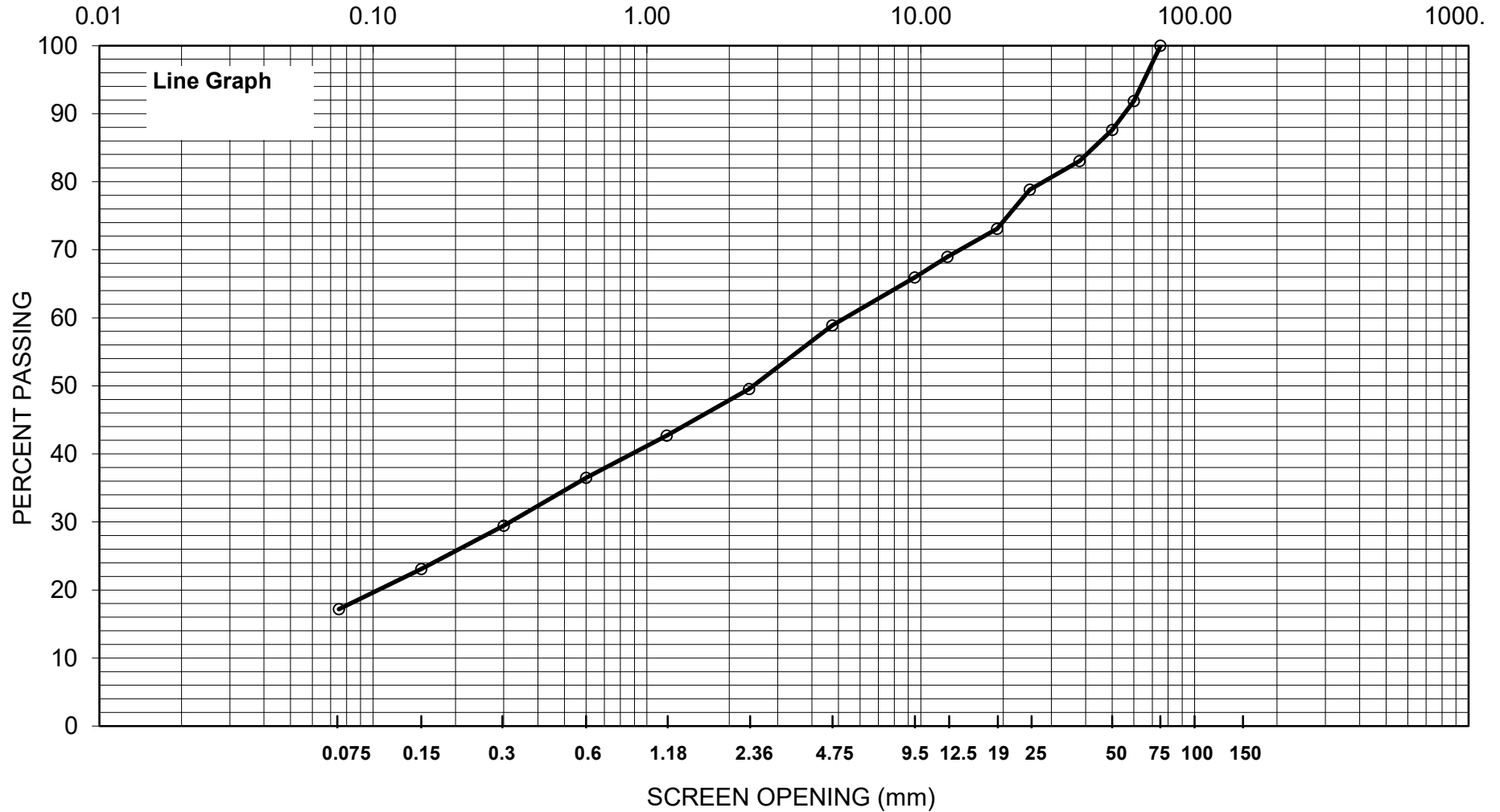
CBR AT 0.2 INCHES (AFTER SOAKING): 87.6

TALLUS DEVELOPMENT LTD  
Proposed Residential Development  
Lot C - Tallus Ridge  
West Kelowna, BC

**CBR TEST  
RESULTS**

INTERIOR TESTING SERVICES LTD. soils - concrete - asphalt	
TEST DATE:	JOB NO. 23.371
January, 2024	DWG NO. 23.371-12

# AGGREGATE CHART

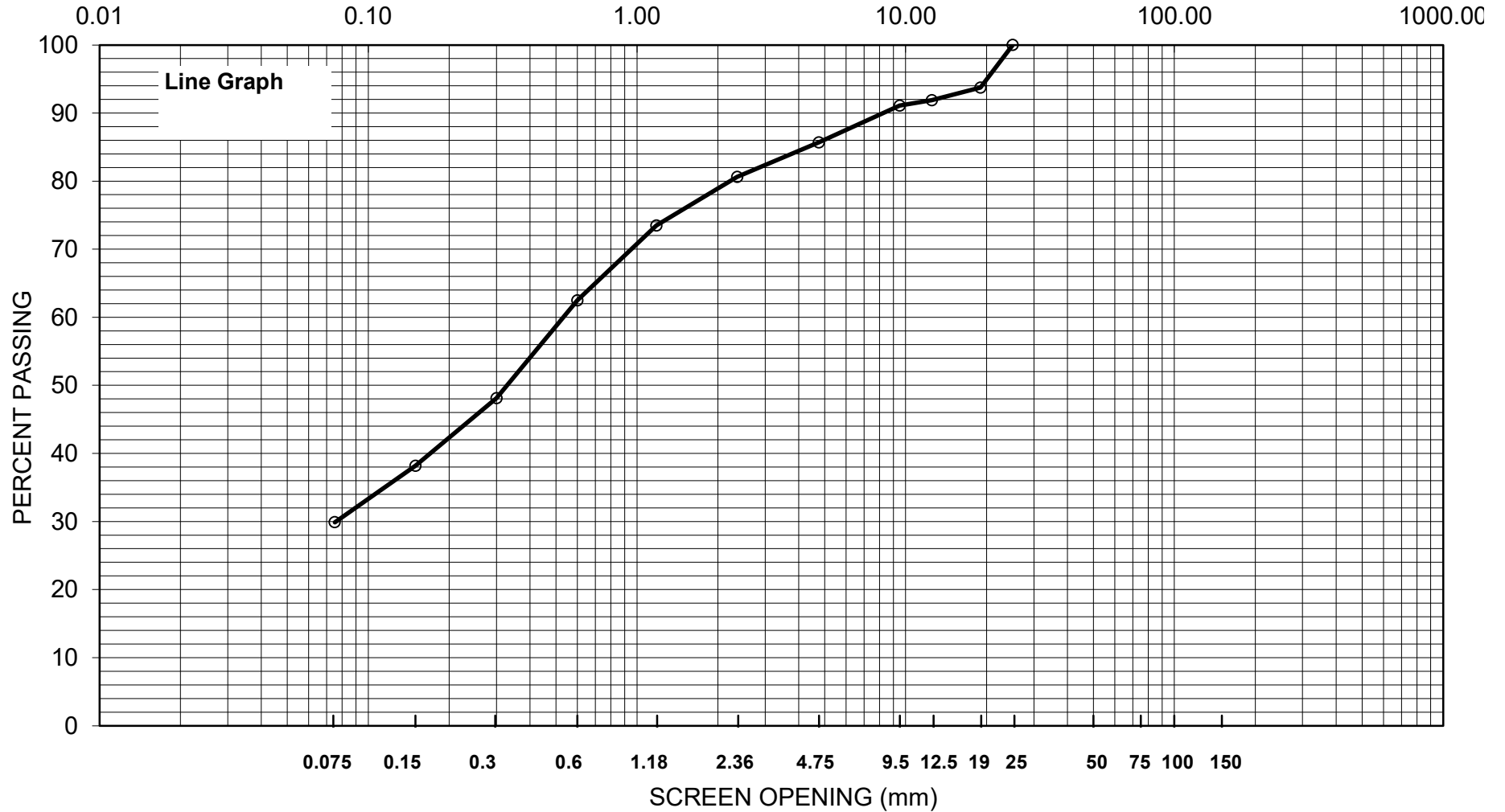


Sieve Size (mm)	Specification	Total % Passing
75		100
38		83.0
19		73.1
9.5		65.9
4.75		58.9
2.36		49.5
1.18		42.7

Sieve Size (mm)	Specification	Total % Passing
0.600		36.5
0.300		29.4
0.150		23.1
0.075		17.2

Client:	<b>Job 23.371</b>	
Sample Description:	<b>SAND and GRAVEL, some silt</b>	
Location:	<b>TP1 S3 0.8 m</b>	
Specification:	<b>Line Graph</b>	
Sampled by:	<b>DF</b>	DATE: <b>23-12-19</b>
Screen Analysis:	<b>KC</b>	DATE: <b>23-12-21</b>
Reviewed By:	<b>JB</b>	<b>Job 23.371</b>
		<b>Drawing 23.371-13</b>

# AGGREGATE CHART

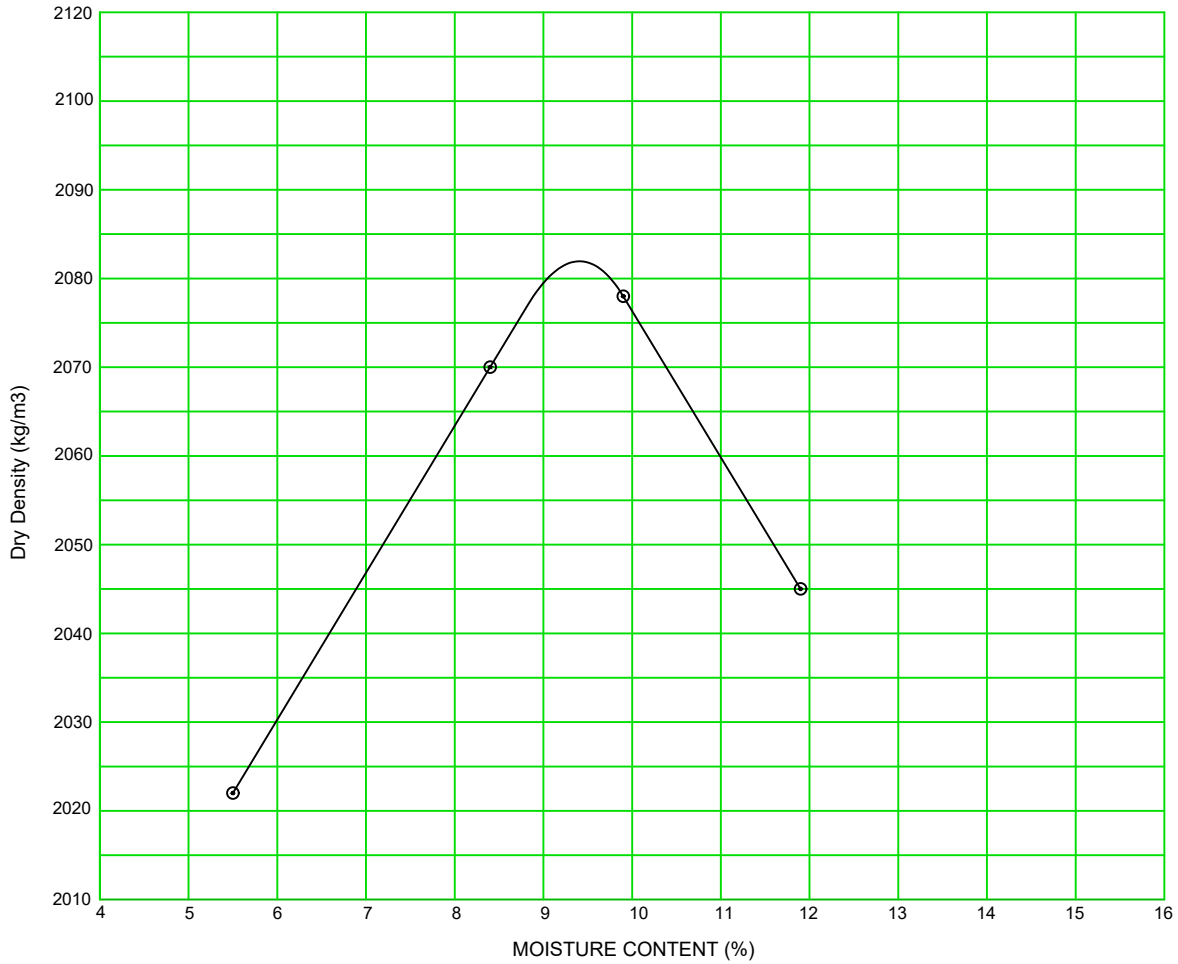


Sieve Size (mm)	Specification	Total % Passing
38		100.0
19		93.8
9.5		91.1
4.75		85.7
2.36		80.6
1.18		73.5
0.600		62.5

Sieve Size (mm)	Specification	Total % Passing
0.300		48.1
0.150		38.2
0.075		29.9

Client:	<b>Job 23.371</b>	
Sample Description:	<b>Silty SAND, some gravel</b>	
Location:	<b>TP9 S1 0.6 m</b>	
Specification:	<b>Line Graph</b>	
Sampled by:	<b>DF</b>	DATE: <b>23-12-19</b>
Screen Analysis:	<b>DD</b>	DATE: <b>24-01-16</b>
Reviewed By:	<b>JB</b>	<b>Job 23.371</b>
		<b>Drawing 23.371-14</b>

## MAXIMUM DRY DENSITY



TEST METHOD: ASTM D1557 (MODIFIED PROCTOR)

JOB 23.371 - TP1 S3

DRAWING 23.371-15

SOIL DESCRIPTION: SAND and GRAVEL, some silt

OPTIMUM DRY DENSITY: 2082 kg/m<sup>3</sup>    ROCK CORRECTION (RC): 20% RC - 2179 kg/m<sup>3</sup>    30% RC - 2231 kg/m<sup>3</sup>

OPTIMUM MOISTURE CONTENT: 9.4%    ROCK CORRECTION (RC): 20% RC - 7.7%    30% RC - 6.9%

SAMPLED BY: DF

DATE: 23-12-19

TESTED BY: KC

DATE: 23-12-22

**INTERIOR TESTING SERVICES LTD.**  
 1-1965 MOSS COURT, KELOWNA, B.C. V1Y 9L3  
 PH: 250-860-6540  
 E: info@interiortesting.com



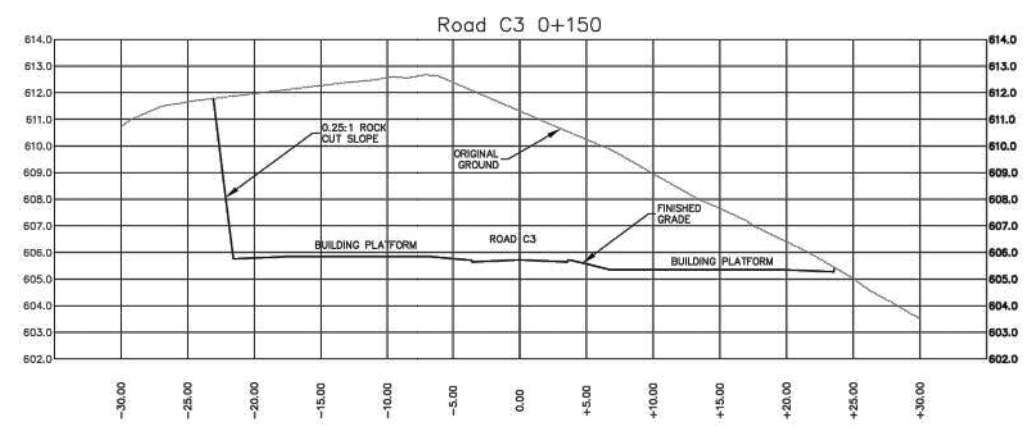
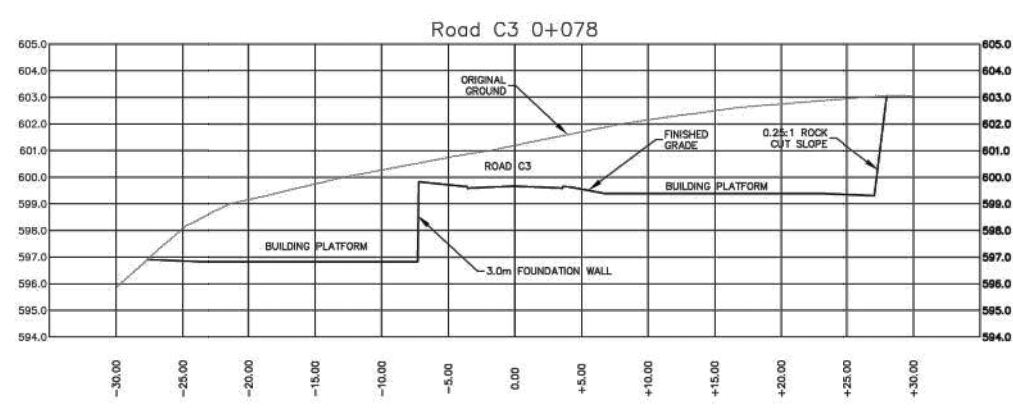
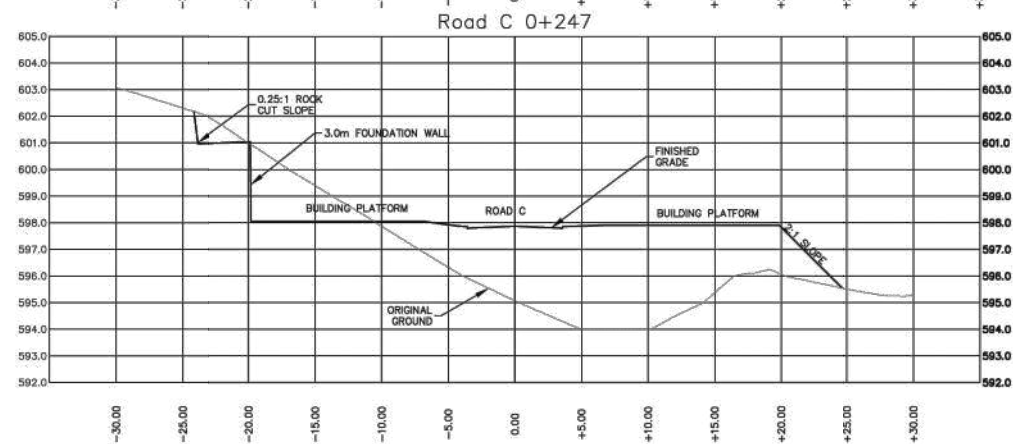
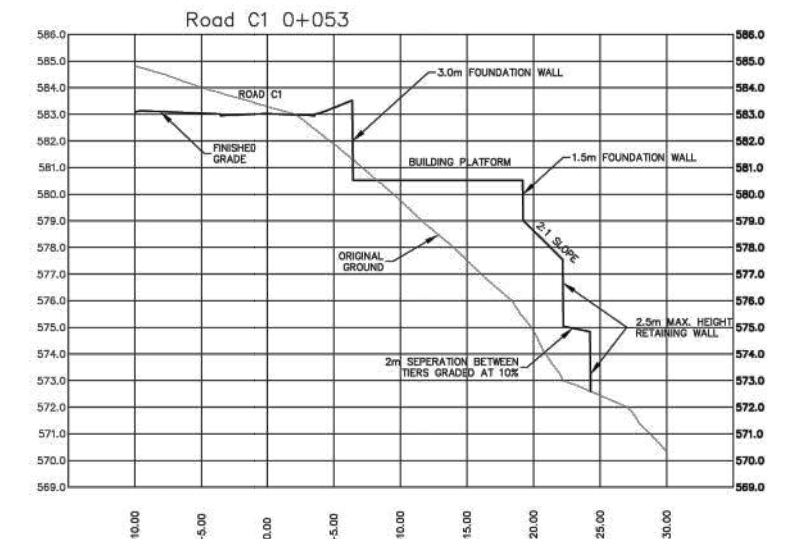
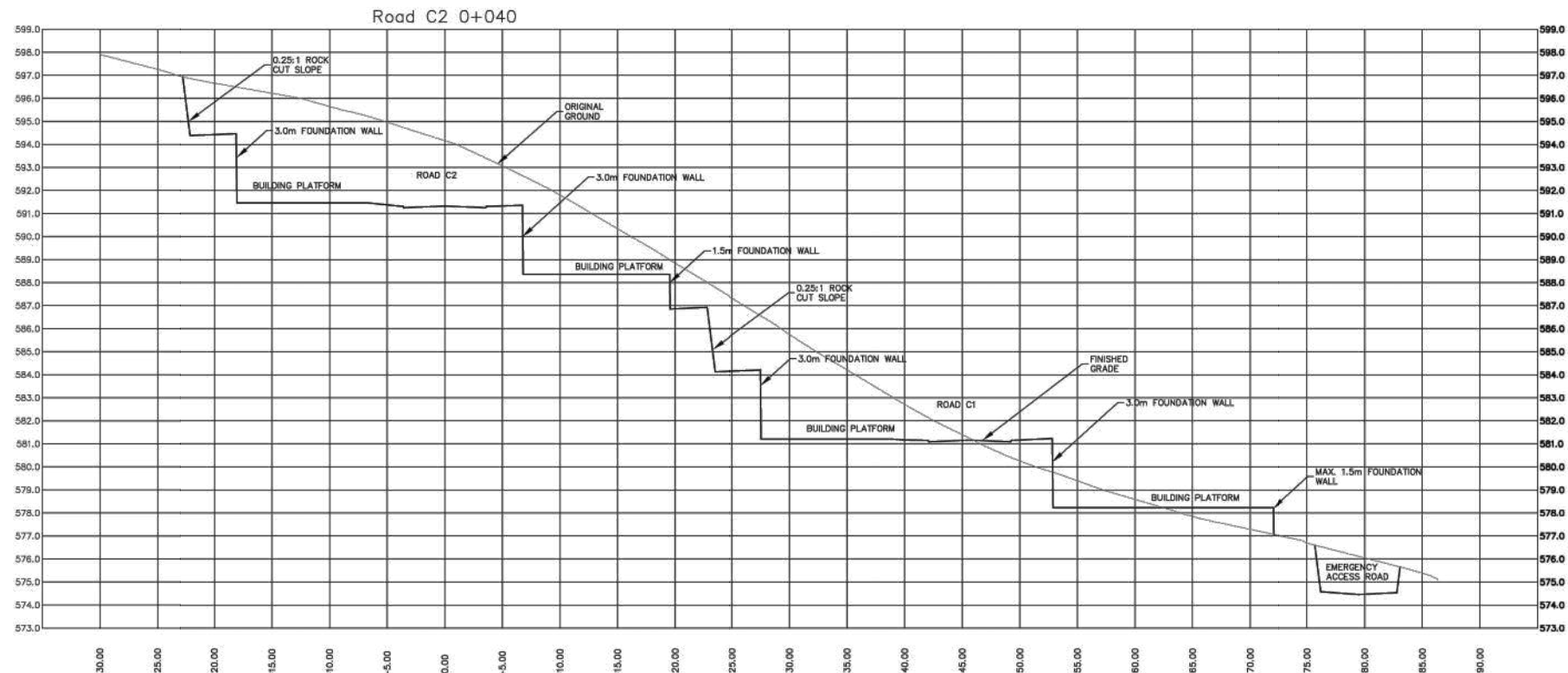
**NOTES**  
 1. PLAN SUPPLIED BY PROTECH CONSULTING.

TALLUS DEVELOPMENT LTD  
 GEOTECHNICAL INVESTIGATION  
 PROPOSED RESIDENTIAL DEVELOPMENT  
 LOT C - TALLUS RIDGE  
 WEST KELOWNA, BC

**SITE GRADING PLAN**

INTERIOR TESTING SERVICES LTD  
 1-1965 MOSS COURT, KELOWNA, BC V1Y 9L3  
 PH: 250-860-6540 EM: info@interiortesting.com  
 DATE OF INVESTIGATION: DECEMBER 19, 2024  
 JOB NUMBER: 23.371 DRAWING NUMBER: 23.371-16





**NOTES**  
 1. SECTIONS SUPPLIED BY PROTECH CONSULTING.

<b>TALLUS DEVELOPMENT LTD</b> GEOTECHNICAL INVESTIGATION PROPOSED RESIDENTIAL DEVELOPMENT LOT C - TALLUS RIDGE WEST KELOWNA, BC	<b>CROSS SECTIONS</b>	<b>INTERIOR TESTING SERVICES LTD</b> 1-1965 MOSS COURT, KELOWNA, BC V1Y 9L3 PH: 250-860-6540 EM: info@interiortesting.com	
		DATE OF INVESTIGATION: DECEMBER 19, 2024 JOB NUMBER: 23.371      DRAWING NUMBER: 23.371-17	

**Tallus Development Ltd**  
**Proposed Residential Development**  
**2419 Mountains Hollow Lane, West Kelowna, BC**

**Job 23.371**

**APPENDIX A**

**Landslide Assurance Statement – 3 pages**

# LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

Notes: This statement is to be read and completed in conjunction with the Engineers and Geoscientists BC *Professional Practice Guidelines – Landslide Assessments in British Columbia* (“the guidelines”) and the current *BC Building Code (BCBC)*, and is to be provided for Landslide Assessments (not floods or flood controls), particularly those produced for the purposes of the *Land Title Act*, *Community Charter*, or *Local Government Act*. Some jurisdictions (e.g., the Fraser Valley Regional District or the Cowichan Valley Regional District) have developed more comprehensive assurance statements in collaboration with Engineers and Geoscientists BC. Where those exist, the Qualified Professional is to fill out the local version only. Defined terms are capitalized; see the Defined Terms section of the guidelines for definitions.

To: The Approving Authority (or Client)  
City of West Kelowna c/o

Date: January 25, 2024

Tallus Ridge Development Ltd

Jurisdiction/name and address

With reference to (CHECK ONE):

- A. *Land Title Act* (Section 86) – Subdivision Approval
- B. *Local Government Act* (Sections 919.1 and 920) – Development Permit
- C. *Community Charter* (Section 56) – Building Permit
- D. Non-legislated assessment

For the following property (the “Property”):

2419 Mountains Hollow Lane, West Kelowna, BC

Civic address of the Property

The undersigned hereby gives assurance that they are a Qualified Professional and a professional engineer or professional geoscientist who fulfils the education, training, and experience requirements as outlined in the guidelines.

I have signed, authenticated, and dated, and thereby certified, the attached Landslide Assessment Report on the Property in accordance with the guidelines. That report must be read in conjunction this statement.

In preparing that report I have:

[CHECK TO THE LEFT OF APPLICABLE ITEMS]

- 1. Collected and reviewed appropriate background information
- 2. Reviewed the proposed Residential Development or other development on the Property
- 3. Conducted field work on and, if required, beyond the Property
- 4. Reported on the results of the field work on and, if required, beyond the Property
- 5. Considered any changed conditions on and, if required, beyond the Property
- 6. For a Landslide Hazard analysis or Landslide Risk analysis, I have:
  - 6.1 reviewed and characterized, if appropriate, any Landslide that may affect the Property
  - 6.2 estimated the Landslide Hazard
  - 6.3 identified existing and anticipated future Elements at Risk on and, if required, beyond the Property
  - 6.4 estimated the potential Consequences to those Elements at Risk
- 7. Where the Approving Authority has adopted a Level of Landslide Safety, I have:
  - 7.1 compared the Level of Landslide Safety adopted by the Approving Authority with the findings of my investigation
  - 7.2 made a finding on the Level of Landslide Safety on the Property based on the comparison
  - 7.3 made recommendations to reduce Landslide Hazards and/or Landslide Risks

## LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

8. Where the Approving Authority has **not** adopted a Level of Landslide Safety, or where the Landslide Assessment is not produced in response to a legislated requirement, I have:

- 8.1 described the method of Landslide Hazard analysis or Landslide Risk analysis used
  - 8.2 referred to an appropriate and identified provincial, national, or international guideline for Level of Landslide Safety
  - 8.3 compared those guidelines (per item 8.2) with the findings of my investigation
  - 8.4 made a finding on the Level of Landslide Safety on the Property based on the comparison
  - 8.5 made recommendations to reduce Landslide Hazards and/or Landslide Risks
9. Reported on the requirements for future inspections of the Property and recommended who should conduct those inspections

Based on my comparison between:

[CHECK ONE]

- the findings from the investigation and the adopted Level of Landslide Safety (item 7.2 above)
- the appropriate and identified provincial, national, or international guideline for Level of Landslide Safety (item 8.4 above)

Where the Landslide Assessment is not produced in response to a legislated requirement, I hereby give my assurance that, based on the conditions<sup>1</sup> contained in the attached Landslide Assessment Report:

### A. SUBDIVISION APPROVAL

- For subdivision approval, as required by the *Land Title Act* (Section 86), "the land may be used safely for the use intended"  
[CHECK ONE]
  - with one or more recommended additional registered Covenants
  - without an additional registered Covenant(s)

### B. DEVELOPMENT PERMIT

- For a development permit, as required by the *Local Government Act* (Sections 488 and 491), my report will "assist the local government in determining what conditions or requirements it will impose under subsection (2) of [Section 491]"  
[CHECK ONE]
  - with one or more recommended additional registered Covenants
  - without an additional registered Covenant(s)

### C. BUILDING PERMIT

- For a building permit, as required by the *Community Charter* (Section 56), "the land may be used safely for the use intended"  
[CHECK ONE]
  - with one or more recommended additional registered Covenants
  - without any additional registered Covenant(s)

<sup>1</sup> When seismic slope stability assessments are involved, Level of Landslide Safety is considered to be a "life safety" criteria, as described in Commentary JJJ of the *National Building Code of Canada (NBC) 2015*, Structural Commentaries (User's Guide – NBC 2015: part 4 of division B). This states:

"The primary objective of seismic design is to provide an acceptable level of safety for building occupants and the general public as the building responds to strong ground motion; in other words, to minimize loss of life. This implies that, although there will likely be extensive structural and non-structural damage, during the DGM (design ground motion), there is a reasonable degree of confidence that the building will not collapse, nor will its attachments break off and fall on people near the building. This performance level is termed 'extensive damage' because, although the structure may be heavily damaged and may have lost a substantial amount of its initial strength and stiffness, it retains some margin of resistance against collapse."

# LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

Jeremy Block, P Eng

Name (print)

January 25, 2025

Date

Interior Testing Services Ltd

Address

1 - 1965 Moss Court, Kelowna, BC V1Y 9L3

(250) 860-6540

Telephone

info@interiortesting.com

Email



(Affix PROFESSIONAL SEAL and signature here)

The Qualified Professional, as a registrant on the roster of a registrant firm, must complete the following:

I am a member of the firm Interior Testing Services Ltd

(Print name of firm)

with Permit to Practice Number 1001971

(Print permit to practice number)

and I sign this letter on behalf of the firm.

## TERMS OF ENGAGEMENT

### GENERAL

Interior Testing Services Ltd. (ITSL) shall render the Services performed for the Client on this Project in accordance with the following Terms of Engagement. ITSL may, at its discretion and at any stage, engage subconsultants to perform all or any part of the Services. Unless specifically agreed in writing, these Terms of Engagement shall constitute the entire Contract between ITSL and the Client.

### COMPENSATION

Charges for the Services rendered will be made in accordance with ITSL's Schedule of Fees and Disbursements in effect from time to time as the Services are rendered. All Charges will be payable in Canadian Dollars. Invoices will be due and payable by the Client within thirty (30) days of the date of the invoice without hold back. Interest on overdue accounts is 18% per annum, compounded monthly (19.6%)

### REPRESENTATIVES

Each party shall designate a representative who is authorized to act on behalf of that party and receive notices under this Agreement.

### TERMINATION

Either party may terminate this engagement without cause upon thirty (30) days' notice in writing. On termination by either party under this paragraph, the Client shall forthwith pay ITSL its Charges for the Services performed, including all expenses and other charges incurred by ITSL for this Project.

If either party breaches this engagement, the non-defaulting party may terminate this engagement after giving seven (7) days' notice to remedy the breach. On termination by ITSL under this paragraph, the Client shall forthwith pay to ITSL its Charges for the Services performed to the date of termination, including all fees and charges for this Project.

### ENVIRONMENTAL

ITSL's field investigation, laboratory testing and engineering recommendations will not address or evaluate pollution of soil or pollution of groundwater. ITSL will co-operate with the Client's environmental consultant during the field work phase of the investigation.

### PROFESSIONAL RESPONSIBILITY

In performing the Services, ITSL will provide and exercise the standard of care, skill and diligence required by customarily accepted professional practices and procedures normally provided in the performance of the Services contemplated in this engagement at the time when and the location in which the Services were performed. ITSL makes no warranty, representation or guarantee, either express or implied as to the professional services rendered under this agreement.

### LIMITATION OF LIABILITY

ITSL shall not be responsible for:

- (a) the failure of a contractor, retained by the Client, to perform the work required in the Project in accordance with the applicable contract documents;
- (b) the design of or defects in equipment supplied or provided by the Client for incorporation into the Project;
- (c) any cross-contamination resulting from subsurface investigations;
- (d) any damage to subsurface structures and utilities;
- (e) any Project decisions made by the Client if the decisions were made without the advice of ITSL or contrary to or inconsistent with ITSL's advice;
- (f) any consequential loss, injury or damages suffered by the Client, including but not limited to loss of use, earnings and business interruption;
- (g) the unauthorized distribution of any confidential document or report prepared by or on behalf of ITSL for the exclusive use of the Client.

The total amount of all claims the Client may have against ITSL under this engagement, including but not limited to claims for negligence, negligent misrepresentation and breach of contract, shall be strictly limited to the lesser of our fees or \$50,000.00. Increased liability limits may be negotiated upon the Client's request in consideration of an additional fee.

No claim may be brought against ITSL in contract or tort more than two (2) years after the Services were completed or terminated under this engagement.

**PERSONAL LIABILITY**

For the purposes of the limitation of liability provisions contained in the Agreement of the parties herein, the Client expressly agrees that it has entered into this Agreement with ITSL, both on its own behalf and as agent on behalf of its employees and principals.

The Client expressly agrees that ITSL’s employees and principals shall have no personal liability to the Client in respect of a claim, whether in contract, tort and/or any other cause of action in law. Accordingly, the Client expressly agrees that it will bring no proceedings and take no action in any court of law against any of ITSL’s employees or principals in their personal capacity.

**THIRD PARTY LIABILITY**

This report was prepared by ITSL for the account of the Client. The material in it reflects the judgement and opinion of ITSL in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. ITSL accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This report may not be used or relied upon by any other person unless that person is specifically named by us as a beneficiary of the Report. The Client agrees to maintain the confidentiality of the Report and reasonably protect the report from distribution to any other person.

**INDEMNITY**

The client shall indemnify and hold harmless ITSL from and against any costs, damages, expenses, legal fees and disbursements, expert and investigation costs, claims, liabilities, actions, causes of action and any taxes thereon arising from or related to any claim or threatened claim by any party arising from or related to the performance of the Services.

**DOCUMENTS**

All of the documents prepared by ITSL or on behalf of ITSL in connection with the Project are instruments of service for the execution of the Project. ITSL retains the property and copyright in these documents, whether the Project is executed or not. These documents may not be used on any other project without the prior written agreement of ITSL.

**FIELD SERVICES**

Where applicable, field services recommended for the Project are the minimum necessary, in the sole discretion of ITSL, to observe whether the work of a contractor retained by the Client is being carried out in general conformity with the intent of the Services.

**DISPUTE RESOLUTION**

If requested in writing by either the Client or ITSL, the Client and ITSL shall attempt to resolve any dispute between them arising out of or in connection with this Agreement by entering into structured non-binding negotiations with the assistance of a mediator on a without prejudice basis. The mediator shall be appointed by agreement of the parties. If a dispute cannot be settled within a period of thirty (30) calendar days with the mediator, the dispute shall be referred to and finally resolved by an arbitrator appointed by agreement of the parties.

**CONFIRMATION OF PROFESSIONAL LIABILITY INSURANCE**

As required by by-laws of Engineers & Geoscientists British Columbia (EGBC), it is required that our firm advises whether or not Professional Liability Insurance is held. It is also required that a space for you to acknowledge this information be provided.

Our professional liability insurance is not project specific for the project and should not be regarded as such. If you require insurance for your project you should purchase a project specific insurance policy directly.

Accordingly, this notice serves to advise you that ITSL carries professional liability insurance. Please sign and return a copy of this form as an indication of acceptance and agreement to the contractual force of these Terms of Engagement.

PRINT NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

ACKNOWLEDGEMENT: \_\_\_\_\_

# SCHEDULE D



Environmental Assessment Report  
2419 Mountain Hollow Ln, West Kelowna, BC

Prepared for:  
Tallus Developments Ltd.  
2688 Ridgemount Drive  
West Kelowna, BC  
V4T 3A6

April 1, 2024

Prepared by:  
Okanagan Environmental  
7-2070 unit 295 Harvey Ave  
Kelowna BC V1Y 8P8



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## **1.0 Introduction & Project Description**

Okanagan EHS Services Ltd. (OKGN) was retained by Tallus Developments Ltd. to conduct an environmental assessment for the proposed development at 2419 Mountain Hollow Ln, West Kelowna, BC.

- Legal description; Plan EPP8432, Lot C, District Lot 3793, Osoyoos Division of Yale Land District, PID: 028-788-044 (**Figure 1**).

The purpose of this report is to document the existing conditions of the project area, confirm the presence/absence of watercourses and other sensitive environmental features, and to identify potential environmental impacts of proposed development. This document will also provide recommendations and mitigation measures, where appropriate, to maintain or improve the ecological integrity of both the project site and surrounding natural areas.

## **2.0 Regulatory Framework**

### **2.1 City of West Kelowna**

The project is within the City of West Kelowna (CoWK) and must follow the guidance in the Official Community Plan Bylaw No. 0100. Sensitive Terrestrial Ecosystem, Aquatic Ecosystem, and Hillside Development Permit (DP) areas apply to this project and their associated objectives refer to the following:

#### Hillside – DP 4

1. Protect people and property from hazardous conditions in the natural environment.
2. Prevent the creation of hazardous conditions resulting from development on hillsides.
3. Protect the natural environment, its ecosystems and biological diversity on hillsides.
4. Preserve significant natural features and landscapes within the Community (e.g., rock outcroppings, talus slopes, ravines, hilltops and ridgelines).
5. Ensure that development on hillsides is monitored for DP compliance and that an adequate level of safety is maintained during the construction phase of an approved development plan.

#### Aquatic Ecosystem – DP 5

1. To broadly protect, restore and enhance aquatic ecosystems (water, wetland, riparian and broadleaf woodland).

2. To protect vital fish and wildlife features and functions, including, but not limited to, habitat, travel corridors, places of refuge and breeding areas.
3. To implement the Provincial Riparian Area Regulations for the protection of fish habitat.
4. To protect water quality and quantity.
5. Discourage development in areas that are susceptible to flooding as a result of proximity to a watercourse that could flood, as identified by the province.

#### Sensitive Terrestrial Ecosystem – DP 6

1. To identify, protect and minimize the disturbance of sensitive terrestrial ecosystems within the City.
2. To preserve rare and endangered native vegetation, wildlife, and wildlife habitat.
3. To ensure that land development is carefully planned to protect environmentally sensitive areas.
4. To ensure that wildfire management strategies are implemented in an ecologically sensitive manner which mimics the effect of historic natural fire cycles in the region.
5. To conserve sensitive terrestrial ecosystems in a relatively natural state while supporting rural and urban land uses.

This environmental assessment report has been developed in accordance with the CoWK Standardized Terms of Reference for Professional Reports and Technical Studies (2015).

### **2.3 Environmental Sensitive Areas**

The CoWK Terms of Reference document defines environmental sensitive areas (ESAs) as:

**ESA-1 (High):** Polygons delineated as ESA-1 contain rare and/or significant physical features, plants and animals or include ecologically functioning natural systems. ESA-1 areas include vegetation and wildlife characteristics representing a diverse range of sensitive habitat. These features contribute significantly to the overall connectivity of habitat and ecosystems. Various types of habitats will qualify as ESA-1 based on sensitivity, vulnerability, connectivity, and biodiversity. All wetlands, high value foreshore, locally/regionally rare plant communities, animals and habitats will be considered as Very High.

Areas given an ESA -1 rating are considered the highest priority for protection of ecosystem function and values and therefore avoidance and conservation of ESA-1 designations should be the primary objective. If development is required and justified within these areas mitigation to reduce or eliminate environmental impacts shall be required as well as compensation to promote no net loss to the habitat (typically with a 3:1 replacement of equivalent functioning habitat). Only when residual, permanent loss of habitat is unavoidable and after it proves impossible or impractical to maintain the same level of ecological function, will compensation be considered.

**ESA-2 (Moderate):** Polygons delineated as ESA-2 contain physical features, plants, animals, and habitat characteristics which contribute to the overall diversity and contiguous nature of the surrounding natural features. ESA-2 may also include areas used to buffer ecological functions of ESA-1 areas. Areas given the classification of ESA-2 are only of slightly lower priority for protection of ecosystem function and values than ESA-1 areas. Therefore, a clear rationale shall be provided to clarify the distinction between assigning the ESA-2 criteria instead of the ESA-1 areas.

Some degree of development may be considered in ESA-2 areas as long as the development does not have any potential negative impact on ESA-1 areas. If development is pursued in ESA-2 areas, portions of the habitat should be retained (40-80%) and integrated to maintain the contiguous nature of the landscape. Any loss to the ESA-2 areas shall be offset by habitat improvements to the remaining natural areas found on the property and must ensure habitat function is maintained or improved in the retention areas.

**ESA-3 (Low):** Polygons delineated as ESA-3 represent disturbed habitats or fragmented features that are not locally or regionally rare. However, these areas still contribute to the diversity and connectivity of the landscape and may contain natural habitats, and some features of interest (i.e., tree patches, rock outcroppings, drainages, and corridors), although based on the condition and adjacency of each habitat the significant function within the landscape is limited. If development is pursued in these areas, the impacts should be offset by habitat improvements in other more sensitive natural areas found on the property. There may also be portions of the area that have significant ecological functions within the landscape (i.e., buffers to ESA 1 and/or ESA 2, or corridors) that should be retained.

**ESA-4 (Not Sensitive):** Polygons delineated as ESA - 4 contribute little or no value to the overall diversity of vegetation, soils, terrain, and wildlife characteristics of the area.

These areas have generally experienced anthropogenic disturbances (i.e., a driveway or other approved land clearing but does not include land cleared for agriculture) with little or no possibility for recovery or rehabilitation. Development is therefore encouraged to be focused in these sites before consideration of using higher-rated sites within the planning area. These areas shall not be considered as areas for restoration and enhancement or as recruitment as higher value ESA to offset development in other areas.

## **2.4 Provincial and Federal Legislation**

### **2.4.1 Wildlife Act**

The B.C. *Wildlife Act* will apply to this project and controls the timing of vegetation clearing to protect nesting and fledging birds. The *Wildlife Act* protects birds, eggs, all active nests and inactive nests of eagles, peregrine falcons, gyrfalcons, osprey, herons, and burrowing owls. All native wildlife is property of the government and therefore to study, destroy or relocate wildlife, a permit or license is required. No nests of native protected wildlife were identified in the project area.

### **2.4.2 Water Sustainability Act**

The *Water Sustainability Act (WSA)* is the principal law for managing the diversion and use of water resources, including ground water and surface water (wetlands, streams, and lakes). A WSA permit will be required to perform any changes in and about a stream. No changes in and about a stream are proposed at this time.

### **2.4.3 Riparian Areas Protection Regulation**

The Riparian Areas Protection Regulation (RAPR) protects all riparian areas of waterbodies in the province. Any development proposed within 30m of a waterbody must have an assessment and report submitted by a QEP to the province. The RAPR assessment and report will determine the appropriate stream protection and enhancement area (SPEA) which will provide a setback and measures for the proponent to follow throughout development. RAPR does not apply to this project, according to the CoWK.

## **2.5 Applicable Federal Legislation**

### **2.5.1 Species at Risk Act**

The *Species at Risk Act (SARA)* provides for the legal protection of wildlife species and the conservation of their biological diversity. The purposes of the *Act* are to; prevent Canadian indigenous species, subspecies, and distinct populations from becoming extirpated or extinct, to provide for the recovery of endangered or threatened species

and encourage the management of other species to prevent them from becoming at risk.

The Act has established the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as an independent body of experts responsible for assessing and identifying species at risk, from which prohibitions are created to protect listed threatened and endangered species and their critical habitat. Known species at risk occur in the area of the project, however no individuals or critical habitat was identified within the project area.

### **2.5.2 Migratory Birds Convention Act**

Migratory birds, their eggs and nests are protected everywhere in Canada by the *Migratory Birds Convention Act* (MBCA) and its supporting Regulations. There is no regulatory provision to allow for limited take of migratory birds during construction activities. Construction timing is not known at the time of this report, general recommendations are made for avoidance and mitigation of this legislation in this report.

## **3.0 Background**

OKGN has prepared this report in accordance with local, provincial, and federal requirements. A desktop and field assessment have been conducted to inventory and identify environmentally sensitive species and features within the study area.

## **4.0 Methods**

### **4.1 Desktop Assessment**

The desktop assessment process involved a review of existing information for the study area:

- Conservation Data Centre (Species and Ecosystems at Risk)
- Biodiversity Conservation Strategy
- Critical Habitat Mapping
- Committee on the Status of Wildlife in Canada
- Sensitive Ecosystem Inventory
- Terrestrial Ecosystem Mapping
- Habitat Wizard

### **4.2 Field Assessment**

The site assessment was conducted on October 27<sup>th</sup> and 28<sup>th</sup> 2023, by Rachel Pidduck, B.Sc., B.I.T. During the site visit all desktop assessment results mapped polygons within



the project area were visited and assessed for accuracy of initial boundary positioning, ecosystem condition, and identification of potential species at risk (and their habitat features). At this point they were also assigned ecological condition values based on the level of anthropogenic disturbance, adjacency to linear disturbances, and the level of invasive species presence.

## **5.0 Assessment Results**

### **5.1 Project Climate Setting**

The project area is located within the Okanagan Very Dry Hot variant (xh1) of the Ponderosa Pine (PP) bio-geoclimatic zone. The ponderosa Pine zone is located at low elevations along the very dry valleys of British Columbia's Southern Interior. PP is the driest of the forested zones. July mean temperatures range from 17 to 22 C and precipitation ranges from 250-450 mm per year with December and January being the wettest months on average (Lloyd *et al* 1990).

### **5.2 Land Use**

The subject property is zoned as Low Density Multiple Residential Zone (R3) and Parks and Open Space Zone (P1) and the current land use of the subject property is Multi-Family (vacant).

Adjacent land uses include:

- North: Compact Single Detached Residential Zone (RC3) and Parks & Open Space (P1)
- East: Agricultural Zone (A1), R3, and P1
- South: Single Detached Residential Zone (R1), A1, P1
- West: Forest Resource Zone (F1) and P1

### **5.3 Species At-Risk**

A review of the British Columbia Conservation Data Centre (CDC), Committee on the Status of Wildlife in Canada (COSEWIC) and Critical Habitat for Federally Listed Species at Risk identified two potential sensitive species within 2 km of the project area (**Table 1**).

Though bordered by recent residential developments, the 6.6 hectare study area is currently in an undeveloped state and contains areas of connectivity to a substantial amount of natural area which indicates a 'moderate' potential for species at risk to occur. Several environmental and wildlife habitat features that provide cover, refuge, hunting and foraging habitat, as well areas functioning as a movement corridor for a

range of wildlife species were identified during the site assessment, however, no species at risk were observed.

**Table 1. Species at Risk**

Common Name	Scientific Name	Provincial Status <sup>1</sup>	COSEWIC Status <sup>2</sup>
American Badger	Taxidea taxus jeffersonii	Red	Endangered
Great Basin Gophersnake	Pituophis catenifer deserticola	Blue	Threatened

<sup>1</sup> Provincial Status: Blue-listed species are Vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Red-listed species have or are candidates for Extirpated, Endangered, or Threatened status in British Columbia.

<sup>2</sup> Committee on the Status of Wildlife in Canada (COSEWIC) status:

Endangered = facing imminent extirpation in Canada or extinction

Threatened = likely to become endangered in Canada if limiting factors are not reversed

Special Concern = particularly sensitive to human activities or natural events

## 5.4 Ecosystem Classification

### 5.4.1 Terrestrial Ecosystem

Sensitive ecosystem inventory (SEI) mapping identified coniferous woodlands, sparsely vegetated, and riparian areas as the three main sensitive ecosystems found within the subject property. Polygons representing 8 terrestrial communities (**Figure 3**) associated with the sensitive ecosystems were identified. These communities are summarized in **Table 2** and **Figure 3** shows the spatial distribution within the subject property. During the site assessment these distinct community types were reviewed and assessed for accuracy.

**Table 2. Ecological Communities**

Site Unit Symbol	Site Series Name	Provincial Status <sup>1</sup>
CL	Cliff	-
DM	Douglas-fir – Water birch / Douglas maple	Red
DS	Douglas-fir / Common snowberry – Birch-leaved Spirea	Blue
PC	Ponderosa Pine / Bluebunch Wheatgrass - Cheatgrass	Blue
PF	Ponderosa Pine / Bluebunch Wheatgrass – Rough Fescue	Red
PT	Ponderosa pine – Red three-awn	Blue
RZ	Road Surface	-
SB	Selaginella – Bluebunch wheatgrass rock outcrop	Yellow

<sup>1</sup> Conservation Data Center. Government of British Columbia. Accessed on August 20, 2023.

<sup>2</sup> Committee on the Status of Wildlife in Canada. Government of Canada. Accessed on August 20, 2023.

SO	Saskatoon – Mock orange talus	-
SP	Douglas-fir – Snowberry - Pinegrass	Red
TA	Talus	-

<sup>1</sup> Provincial Status: Blue-listed species are Vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Red-listed species have or are candidates for Extirpated, Endangered, or Threatened status in British Columbia.

### Riparian

The distinct class of riparian area found along the northwest perimeter of the subject property, adjacent to the unnamed stream, is fringe (RI:ff). Douglas-fir – Water birch / Douglas maple (DM) is the ecological community associated with the riparian ecosystem. DM is a provincially Red-listed community and is considered endangered or threatened.

The DM ecosystem community is a moisture-receiving area found within gullies and adjacent to intermittent or permanent streams. Vegetation here is comprised of mixed coniferous and deciduous overstories of Douglas-fir (*Pseudotsuga menziesii* var. *Glauca*), trembling aspen (*Populus tremuloides*), water birch (*Betula occidentalis*), and a dense understory of saskatoon (*Amelanchier alnifolia* spp.), common snowberry (*Symphoricarpos albus* var. *Albus*), Nootka rose (*Rosa nutkana*), Douglas maple (*Acer glabrum* var. *Douglasii*), mock-orange (*Philadelphus lewisii*), and red-osier dogwood (*Cornus stolonifera*).

The riparian habitat associated with the stream segment in the southwest corner of the property includes an artificial stormwater pond that was developed some time when the Mountain Hollow Road was constructed.

### Coniferous Woodlands

Coniferous woodland ecological communities that extend throughout the subject property include Douglas-fir / Common snowberry – Birch-leaved Spirea (DS), Ponderosa Pine – Bluebunch Wheatgrass – Cheatgrass (PC), Ponderosa Pine – Bluebunch Wheatgrass – Rough Fescue (PF), Ponderosa pine – Red three-awn (PT), and Douglas-fir – Snowberry - Pinegrass (SP). DS, PC, and PT are provincially Blue-listed ecological communities, while PF and SP are provincially Red-listed.

DS and SP are described as moisture receiving coniferous woodland communities and were observed along the steeply sloping cool aspects along the north to northwest of the property boundary and in depressions or low-lying areas in the middle of the subject

property. Overstories are Douglas-fir (*Pseudotsuga menziesii* var. *Glauca*) dominant with shrubby understories of common snowberry (*Symphoricarpos albus*), Oregon grape (*Mahonia aquifolium*), birch-leaved spirea (*Spirea betulifolia*), and saskatoon (*Amelanchier alnifolia*).

The remainder of the coniferous woodland ecosystem is represented as areas of mixed PC, PF, and PT ecological communities. PF is a Red-listed community characterized by a moderately closed canopy of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii* var. *Glauca*) with an understory dominated by bluebunch wheatgrass (*Pseudoroegneria spicata*), rough fescue (*Festuca arundinacea*), and pinegrass (*Calamagrostis rubescens*). PF was noted on west to southwest-facing slopes whereas PC and PT are both ponderosa pine dominant, open-story communities' representative of the coniferous woodlands with warmer south facing aspects.

The understories of these communities were comprised of a variety of native vegetation, including snowberry (*Symphoricarpos albus*), Oregon grape (*Mahonia aquifolium*), saskatoon (*Amelanchier alnifolia*), yarrow (*Achillea millefolium*), bluebunch wheatgrass (*Pseudoroegneria spicata*), red three-awn (*Aristida purpurea* var. *Longiseta*), pinegrass, (*Calamagrostis rubescens*) rough fescue (*Festuca arundinacea*), arrowleaf balsamroot (*Balsamorhiza sagittata*), and selaginella (*Selaginella* spp.). Mature trees with blown-out tops, cavities, as well as snags were identified within the PT and PC ecological communities. These snags and wildlife trees have high ecological value and should be retained where possible.

### **Sparsely Vegetated**

CL, SB, SO, and TA are the four ecological communities associated with the sparsely vegetated sensitive ecosystem located to the southeast corner of the subject property. SO is characterized by scattered shrubs including mock-orange (*Philadelphus lewisii*), snowberry (*Symphoricarpos albus*), and ocean spray (*Holodiscus discolor*) growing out of rock fractures, whereas SB is dominated by selaginella (*Selaginella* spp.) and mosses with some scattered forbs. Shrubs within SB are uncommon due to the lack of fractures within the bedrock.

Sparsely vegetated talus slopes and rocky outcrops play a pivotal role in preserving ecological balance and fostering biodiversity within natural landscapes. These unique habitats serve as crucial refuges for a myriad of plant and animal species, especially those adapted to arid or harsh environments. The rocky terrain and minimal soil cover offer sanctuary and potential hibernacula for reptiles and small mammals. These

habitats also facilitate natural processes such as erosion control, sediment filtration, and groundwater recharge, contributing significantly to watershed health. Though these ecological communities do not have a provincial conservation ranking, apart from the Yellow-listed SB community, they do contain environmental, and habitat features that should be considered areas of value.

#### 5.4.2 Fish and Aquatic Habitat

A stream, ID: Davidson Creek Tributary 2, according to Sensitive Habitat Inventory Mapping (SHIM), flows northeast to southwest along the northwest project boundary and is a tributary to Davidson Creek which discharges into Shannon Lake approximately 670 m south of the subject property. There are no documented Fish species to occur in this stream, however, fish species documented for Shannon Lake are summarized in **Table 3.**

**Table 3. Fish Species documented to occur within Shannon Lake.**

Common Name	Scientific Name	Provincial Status <sup>1</sup>
Rainbow Trout	<i>Oncorhynchus mykiss</i>	Yellow
Largemouth Bass	<i>Micropterus salmoides</i>	Exotic
Slimy Sculpin	<i>Cottus cognatus</i>	Yellow
Yellow Perch	<i>Perca flavescens</i>	-

<sup>1</sup> Provincial Status: Blue-listed species are Vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Red-listed species have or are candidates for Extirpated, Endangered, or Threatened status in British Columbia.

The southwest corner of the subject property is associated with a wetland. Tributary 2 (stream) discharges into this wetland area via a culvert under a road access towards the stream's south end. A small periphery of this wetland protrudes into the southwest subject property boundary.

Riparian setback requirements for the subject property are regulated under the City of West Kelowna Official Community Plan (OCP) and the Provincial Riparian Areas Protection Regulation (RAPR). A restrictive covenant exists on the property, protecting the identified waterbodies and no development is proposed within the covenant, therefore the project is exempt from a RAPR assessment and the CoWK Sensitive Aquatic DPA requirements.

#### 5.5 Wildlife, Wildlife Features & Movement Corridors

The subject property is comprised of a diverse range of forested and riparian communities. Significant environmental features observed within the subject property

include veteran trees, snags, gullies, densely vegetated riparian areas, and potential wildlife corridors. Mature trees within the forested areas offer essential habitat features for birds of prey and other wildlife, serving as foraging, cavity-nesting, and perching sites. Additionally, the connection of the property to neighboring natural areas facilitates the movement and dispersion of deer and other large mammals, as evidenced during site visits.

While herptiles (reptiles and amphibians) were not directly observed during the site assessments, suitable habitat for them was identified, particularly in areas with shallow soils, evident within the riparian area. Western Rattlesnake have been observed on the adjacent property to the east.

Coarse woody debris scattered across the subject property, associated with the coniferous woodlands, supports small mammals, herptiles, and other wildlife. Furthermore, the presence of rocky outcrops, cliffs, and talus slopes, are essential for biodiversity, hosting a wide array of invertebrates, reptiles, rodents, and their predators.

Several bird species were identified using visual and auditory methods, including pygmy nuthatch (*Sitta pygmaea*), Steller's Jay (*Cyanocitta stelleri*), Pacific wren (*Troglodytes pacificus*), and house sparrow (*Passer domesticus*). Also, a large veteran Douglas-fir with a blown-out top was seen at the top of the cliff (CL) polygon which provides high value nesting habitat for various birds and bats. Several white-tailed deer were also observed utilizing the DM and DS areas.

No other wildlife species were observed, however, suitable habitat and signs of wildlife such as dig sites, wildlife trails, scat, and potential hibernacula for small mammals, snakes and other species were observed throughout the riparian and woodland communities.

### **5.6 Environmental Sensitive Areas**

Environmental Sensitive Areas (ESAs) have been determined for the project area. The assessment criteria utilized in this analysis, guided by the definitions outlined by the CoWK, included provincial CDC status, habitat suitability for rare or endangered species, landscape condition, connectivity, fragmentation, and the extent of disturbance. The results are summarized in **Table 4** below (refer to **Figure 4**).

**Table 4: Determination of Environmental Sensitive Areas**

ESA Value	ESA Area (m <sup>2</sup> )	Percentage of Property (%)
High (ESA1)	16,969	25.7
Moderate (ESA2)	41,904	63.4
Low (ESA3)	6,861	10.4
Not Sensitive (ESA4)	325	5
<b>Total ESAs</b>	<b>66,059</b>	<b>100</b>

The analysis of environmental sensitivity reveals that the subject property is comprised of approximately 5% Not Sensitive (ESA4), 10.4% Low (ESA3), 63.4% Moderate (ESA2), and 25.7% High (ESA1) value areas. The Not Sensitive polygon is characterized by a road surface (RZ). The Low-value areas include blue-listed ecosystems without any observed environmental or habitat features.

Moderate-value regions encompass Red-listed ecosystems affected by disturbances like walking paths, trails, and anthropogenic activities such as fire pits, garbage, tents, and forts. Other Moderate-value sections feature undisturbed, Blue-listed ecosystems with connectivity to neighboring natural areas and essential habitat elements like potential hibernacula. The remaining High-value zones consist of undisturbed functional, Red-listed riparian ecosystems, Blue-listed undisturbed ecosystems on steep slopes containing several habitat features, and serving as a buffer to adjacent, Red-listed riparian communities.

Additionally, there are areas with significant habitat features like veteran trees, snags, and rocky outcrops, making them suitable as high-value compensation areas.

## 6.0 Impact Assessment Analysis and Recommendations

A summary of the potential negative impacts to the natural environment is presented in **Table 5 & 6** below.

**Table 5: Environmental Impact Analysis**

ESA	Disturbance Area (m <sup>2</sup> )	Disturbance Area (%)	Hydroseeding Area (m <sup>2</sup> )	Hydroseeding Area (%)	Total Net Loss (m <sup>2</sup> )	Total Net Loss (%)
ESA-1	557	3	511	3	46	<1
ESA-2	29,817	71	6,376	15	23,441	79
ESA-3	4,856	71	1,914	28	2,942	61
ESA-4	273	84	32	10	52	19
<b>Total</b>	<b>35,503</b>	<b>54</b>	<b>8,833</b>	<b>25</b>	<b>26,670</b>	<b>75</b>

**Table 6: Environmental Impacts and Recommendations**

Risk / Impact	Recommendations
Removal of natural ecosystem, native wildlife habitat, fragmentation of the ecosystem from adjacent naturalized areas	<ul style="list-style-type: none"> <li>- Avoid development of the ESA-1. A 557m<sup>2</sup> area is presented as being impacted by the proposed development area. The majority of the disturbed area will be revegetated post-development.</li> <li>- Avoid development of the ESA-2, if this is unavoidable, consider habitat restoration off-site to improve ESA to a higher value ecosystem under advisement of a QEP.</li> <li>- Retain sensitive habitat features (wildlife trees, burrows, foraging sites) where possible.</li> <li>- Avoid development of walking trails and recreational access through the remaining ESA-1 and ESA-2 polygons to prevent further degradation to the natural ecosystem.</li> <li>- Install permanent fencing (cedar post and rail) at the eastern boundary of the development footprint to prevent encroachment and access for recreational purposes.</li> <li>- Install permanent fencing (cedar post and rail) along the ESA-1 boundaries to prevent encroachment and human access.</li> </ul>



Risk / Impact	Recommendations
Destruction / harassment of wildlife during development activities	<ul style="list-style-type: none"> <li>- Conduct active construction during the least sensitive period for wildlife, if possible (Sep 6 – Feb 4), if unavoidable, conduct pre-disturbance wildlife survey during sensitive activity period (Feb 5 – Sep 5)</li> <li>- If wildlife are encountered during development activities, work shall be temporarily halted, QEP notified and mitigation measures developed/implemented</li> <li>- Make all development personnel aware that it is illegal to harass or destroy wildlife including feeding of wildlife</li> </ul>
Release of deleterious substance to land or water	<ul style="list-style-type: none"> <li>- Ensure hazardous materials are stored a minimum of 30m from any waterbody or environmental sensitive features</li> <li>- Ensure hazardous materials are stored in regulatory-compliant containers and secondary containment</li> <li>- Report all unplanned release of any substance to the QEP and project manager</li> <li>- If a spill occurs, halt work temporarily, contain and cleanup the spilled material as soon as possible</li> </ul>
Stormwater management	<ul style="list-style-type: none"> <li>- Develop a construction stormwater management plan ahead of starting work</li> <li>- Ensure no stormwater enters environmental sensitive areas or waterbodies</li> </ul>
Topsoil handling and invasive weeds	<ul style="list-style-type: none"> <li>- Identify high-density weed areas and treat for invasive noxious weeds prior to stripping of soil</li> <li>- Stockpile topsoil separate to subsoil (especially if restoration is proposed)</li> <li>- Ensure all mobile equipment is free of excessive organic matter prior to work</li> <li>- Monitor and mitigate invasive weeds post-development for a minimum of 3 years</li> </ul>
Erosion and sedimentation	<ul style="list-style-type: none"> <li>- Develop and implement a construction erosion and sediment control plan prior to starting work</li> <li>- Ensure environmental sensitive areas are adequately protected from runoff events</li> <li>- Conduct environmental monitoring after significant rain fall / precipitation events (&gt;10mm/24 hours) and following spring melt</li> </ul>
Restoration/Revegetation	<ul style="list-style-type: none"> <li>- Restore/revegetate as per landscape plan provided by CTQ Consultants Ltd.</li> <li>- Monitor restoration success for 3-years post-development and mitigate invasive weeds</li> </ul>

### **6.1 Environmental Monitoring**

Environmental monitoring should occur on the following intervals/frequency:

- 1) Kick-off meeting with proponent and prime contractor to review the ESAs in the field, encroachment prevention and confirm erosion and sediment control measures implementation, protection of the SPEA.
- 2) Monthly during active development activities to monitor ESC and environmental protection measures effectiveness.
- 3) Pre-disturbance wildlife survey during peak wildlife activity period (Feb 1 – Aug 15) to identify potential species denning/nesting within the proposed disturbance area and develop/implement temporary mitigation measures.
- 4) Following significant rainfall events (>10mm / 24 hours) to inspect ESC measures effectiveness.
- 5) Upon substantial completion (after lots are registered AND revegetation of manufactured slopes/ proposed restoration efforts have been made) to confirm that an adequate effort was made to restore the natural areas of the site according to this EA report recommendations.
- 6) Annually for three-years post-development to monitor success of restoration efforts and identify / mitigate any ESC or invasive weed propagation concerns

### **6.2 Habitat Restoration and Bonding Estimate**

CTQ Consultants Ltd. has prepared a detailed restoration plan and bonding estimate.

### **7.0 Closure**

This environmental assessment was conducted to assess, inventory and map sensitive environmental areas in the project area.

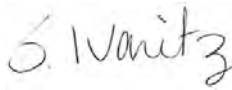
We trust this report and accompanying figures meet your needs in this regard.

Please contact the undersigned with any inquiries.

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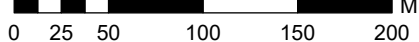
**APPENDIX I - FIGURES**

***Figure 1 Project Location***

# Legend

 Project Area (PID: 028-788-044)



SCALE 1:4,000  
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## Figure 1: Project Location

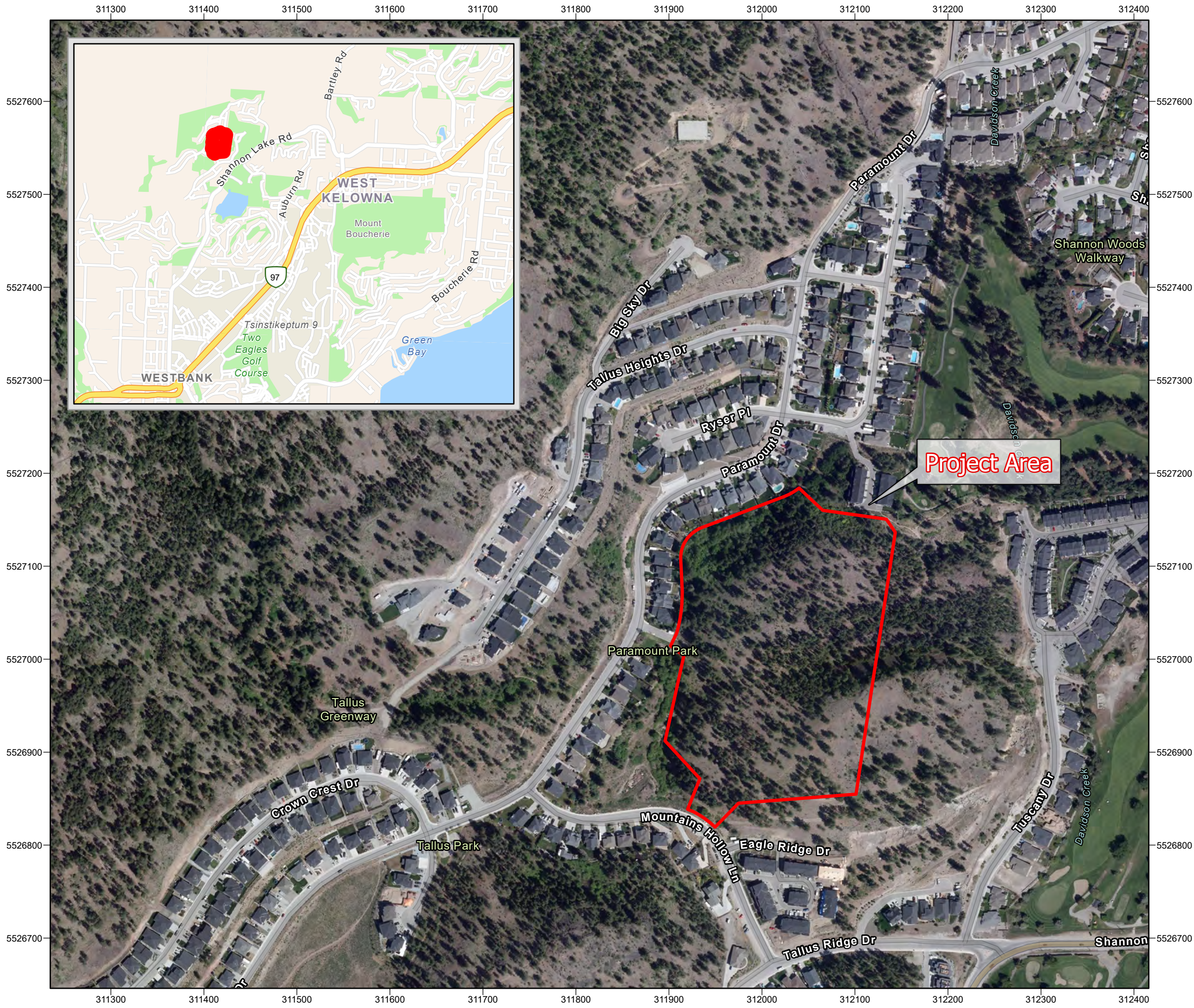
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 CLIENT: Tallus Development Ltd  
 CONSULTANT: Okanagan EHS Services Ltd.

DATE: November 7 2023  
 FILE NAME: 231019\_Lot\_C\_Tallus\_Ridge.aprx  
 COORDINATE SYSTEM: NAD 83 UTM Zone 11N

Approved By:



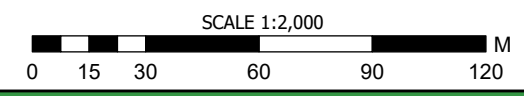
Source Data provided by OKGN EHS Services, ESRI, DataBC. The data used in these maps does not originate from legally recorded surveys. It is part of a GIS database system which may contain errors and/or omissions and is subject to change, therefore accuracy cannot be guaranteed.





## Legend

- Project Area (66,059m<sup>2</sup>)
- Great Basin Gophersnake
- === Road
- Top of bank
- Stream
- Culvert
- Veteran df



## Figure 2: Environmental Features

PROJECT: 231019\_Lot\_C\_Tallus\_Ridge  
 CLIENT: Tallus Development Ltd  
 CONSULTANT: Okanagan EHS Services Ltd.

DATE: November 7 2023  
 FILE NAME: 231019\_Lot\_C\_Tallus\_Ridge.aprx  
 COORDINATE SYSTEM: NAD 83 UTM Zone 11N

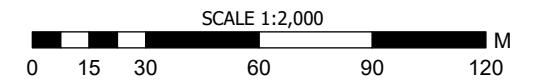
Approved By:



Source Data provided by OKGN EHS Services, ESRI, DataBC. The data used in these maps does not originate from legally recorded surveys. It is part of a GIS database system which may contain errors and/or omissions and is subject to change, therefore accuracy cannot be guaranteed.

# Legend

- Project Area (66,059m<sup>2</sup>)
- DM
- DS
- PC
- PC / PT
- PF
- PT
- RZ
- SB
- SO / TA / CL
- SP
- Wetland
- Stream Boundary
- Road
- Top of bank



## Figure 3: Ecological Communities

PROJECT: 231019\_Lot\_C\_Tallus\_Ridge  
 CLIENT: Tallus Development Ltd  
 CONSULTANT: Okanagan EHS Services Ltd.

DATE: November 9 2023  
 FILE NAME: 231019\_Lot\_C\_Tallus\_Ridge.aprx  
 COORDINATE SYSTEM: NAD 83 UTM Zone 11N

Approved By:



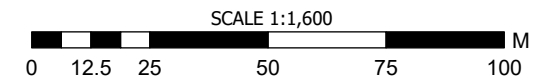
Source Data provided by OKGN EHS Services, ESRI, DataBC. The data used in these maps does not originate from legally recorded surveys. It is part of a GIS database system which may contain errors and/or omissions and is subject to change, therefore accuracy cannot be guaranteed.





# Legend

- Project Area (66,059m<sup>2</sup>)
- ESA-1 (16,969m<sup>2</sup>)
- ESA-2 (41,904m<sup>2</sup>)
- ESA-3 (6,861m<sup>2</sup>)
- ESA-4 (325m<sup>2</sup>)
- Stream Boundary
- Road



**Figure 4: Environmental Sensitive Areas**

PROJECT: 231019\_Lot\_C\_Tallus\_Ridge  
 CLIENT: Tallus Development Ltd  
 CONSULTANT: Okanagan EHS Services Ltd.

DATE: December 21 2023  
 FILE NAME: 231019\_Lot\_C\_Tallus\_Ridge.aprx  
 COORDINATE SYSTEM: NAD 83 UTM Zone 11N

Approved By:

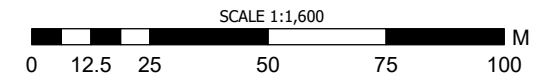


Source Data provided by OKGN EHS Services, ESRI, DataBC, Protech Consulting. The data used in these maps does not originate from legally recorded surveys. It is part of a GIS database system which may contain errors and/or omissions and is subject to change, therefor accuracy cannot be guaranteed.



# Legend

- Project Area (66,059m<sup>2</sup>)
- Grading Extents (35,503m<sup>2</sup>)
- Planting-Rock Mulch
- SOD
- Hydroseed Area (8,833m<sup>2</sup>)
- Surface-Rock Mulch
- Asphalt
- Concrete
- Building
- ESA-1 (16,969m<sup>2</sup>)
- ESA-2 (41,904m<sup>2</sup>)
- ESA-3 (6,861m<sup>2</sup>)
- ESA-4 (325m<sup>2</sup>)
- Covenant Lines
- Stream Boundary
- Boundary
- Road



## Figure 5: Impact Analysis

PROJECT: 231019\_Lot\_C\_Tallus\_Ridge  
 CLIENT: Tallus Development Ltd  
 CONSULTANT: Okanagan EHS Services Ltd.

DATE: April 1 2024  
 FILE NAME: 231019\_Lot\_C\_Tallus\_Ridge.aprx  
 COORDINATE SYSTEM: NAD 83 UTM Zone 11N

Approved By:



Source Data provided by OKGN EHS Services, ESRI, DataBC, Protech Consulting. The data used in these maps does not originate from legally recorded surveys. It is part of a GIS database system which may contain errors and/or omissions and is subject to change, therefore accuracy cannot be guaranteed.

Total Disturbance Area - ESA's	Hydroseeding Area - ESA's
ESA-1: 557m <sup>2</sup> (3.28%)	ESA-1: 511m <sup>2</sup> (3.01%)
ESA-2: 29,817m <sup>2</sup> (71.16%)	ESA-2: 6,376m <sup>2</sup> (15.22%)
ESA-3: 4,856m <sup>2</sup> (70.78%)	ESA-3: 1,914m <sup>2</sup> (27.90%)
ESA-4: 273m <sup>2</sup> (84%)	ESA-4: 32m <sup>2</sup> (9.85%)



**APPENDIX II – SITE PHOTOS**

Picture 1 Ponderosa pine – Bluebunch wheatgrass – Cheatgrass (PC) ecosystem representative of the southeast perimeter of study area.



Picture 2 View of trails transecting the coniferous woodlands.



Picture 3 Representative photo of the Ponderosa pine – Bluebunch wheatgrass – Rough fescue (PF) ecological community.



Picture 4 Veteran Douglas-fir with blown-out top observed at the top of the cliff.



Picture 5 Douglas-fir – Snowberry – Pinegrass (SP) community observed within a moisture receiving depression within the middle of the subject property.



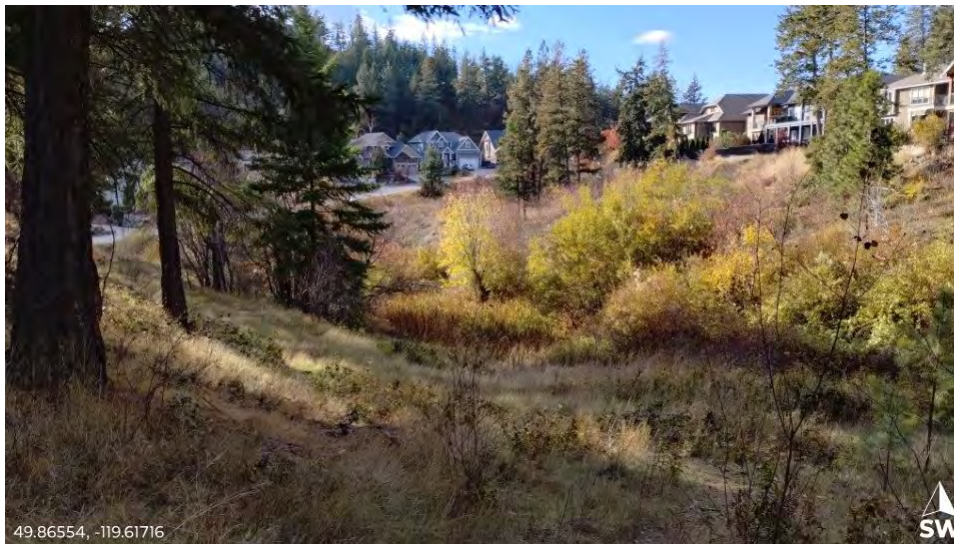
Picture 6 Representative photo of the Saskatoon – Mock-orange, Talus, and Cliff (SO/TA/CL) polygon.



Picture 7 Representative photo of mixed PC/PT area with several snags and downed logs.



Picture 8 Wetland area located towards the southwest corner of the subject property.



Picture 9 Densely vegetated Douglas-fir – Water birch – Douglas maple (DM) riparian area with stream.



Picture 10 Representative photo of the Ponderosa pine – Red three-awn (PT) community found along the southeast facing slopes.

