

MEMORANDUM



To: City of Lone Tree

From: JR Engineering

Date: 11/1/22

Subject: Snow Storage Design for Thrive Townhomes Site Improvement Plan (West & East Site)

JR Engineering has provided the required snow storage area for the west and east sites for the Thrive Townhomes Site Improvement Plan (SIP). Since that the City of Lone Tree does not have a design standards for snow storage design areas, JR Engineering has provided calculations for the snow storage areas based on the average and maximum snowfall depths.

In order to get volume for the snow storage areas, the average and maximum snow fall depths were used. The average snowfall depth used is 4" and the maximum snow depth used was 12". For the average snow fall depth, the snow compaction that is used will be 20% (with 80% remaining). The maximum compaction for the maximum snow depth would be 80% (with 20% remaining).

The table below provides the calculations for the average snowfall of 4" and 20% compaction.

Location	Area (SF)	Calculations (SF)	Storage (CF.)
East Site	7434.45	7434.45 SF x (4/12) F x 0.8	1982.52
West Site	14548	14548 SF x (4/12) F x 0.8	3879.47

The table below provides the calculations for the average snowfall of 12" and 80% compaction.

Location	Area (SF)	Calculations (SF)	Storage (CF.)
East Site	7434.45	7434.45 SF x (12/12) F x 0.2	1486.89
West Site	14548	14548 SF x (12/12) F x 0.2	2909.60

The table below provides the calculations for the average snowfall.

Location	Average (CF.)	Storage (CF.)
East Site	(919.37 CF. + 689.53 CF.)/2	1734.71
West Site	(3879.47 CF. + 2909.60 CF.)/2	3394.53

Knowing the total volume of snowfall for each site, the required storage can now be determined. The height was determined by using the formula for the trapezoidal prism. The table below summarizes the results.

Location	Storage (CF.)	Trapezoidal Calculations*	Storage Req. (SF)*	(Storage Provided (SF.))
West Site (SA1)	800.00	b1 =5.26' b2=3.26' l= 27.4' h=6.85'	144.12	162.88
West Site (SA2)	1100.00	b1 =14.2' b2=8.4' l= 15.8' h=6.16'	224.36	258.42
West Site (SA3)	672.95	b1 =7.19' b2=1.19' l= 22.11' h=7.26'	158.97	169.28
West Site (SA4)	848.63	b1 =4.09' b2=2.09' l=36.92' h=7.20'	151.00	166.64
East Site (SA5)	350.00	b1 =1' b2=5' l= 21.84' h=5.34'	109.20	109.2
East Site (SA6)	550.00	b1=2' b2=4' l=40' h=4.58'	160.00	160
East Site (SA7)	325.00	b1=2' b2=5' l=18.92' h=5.73'	94.60	94.6
East Site (SA8)	510.00	b1=2' b2=4' l= 40' h=5.73'	160.00	160.7

* $V = 0.5(b_1 + b_2) * h * l$ $V = 0.5 * (5.26' + 3.26') * 27.4' * 7.27' = 800.0 \text{ CF.}$

* Req. Area = $b_1 * l$ Req. Area = $5.26' * 27.4' = 144.1 \text{ SQ. FT.}$

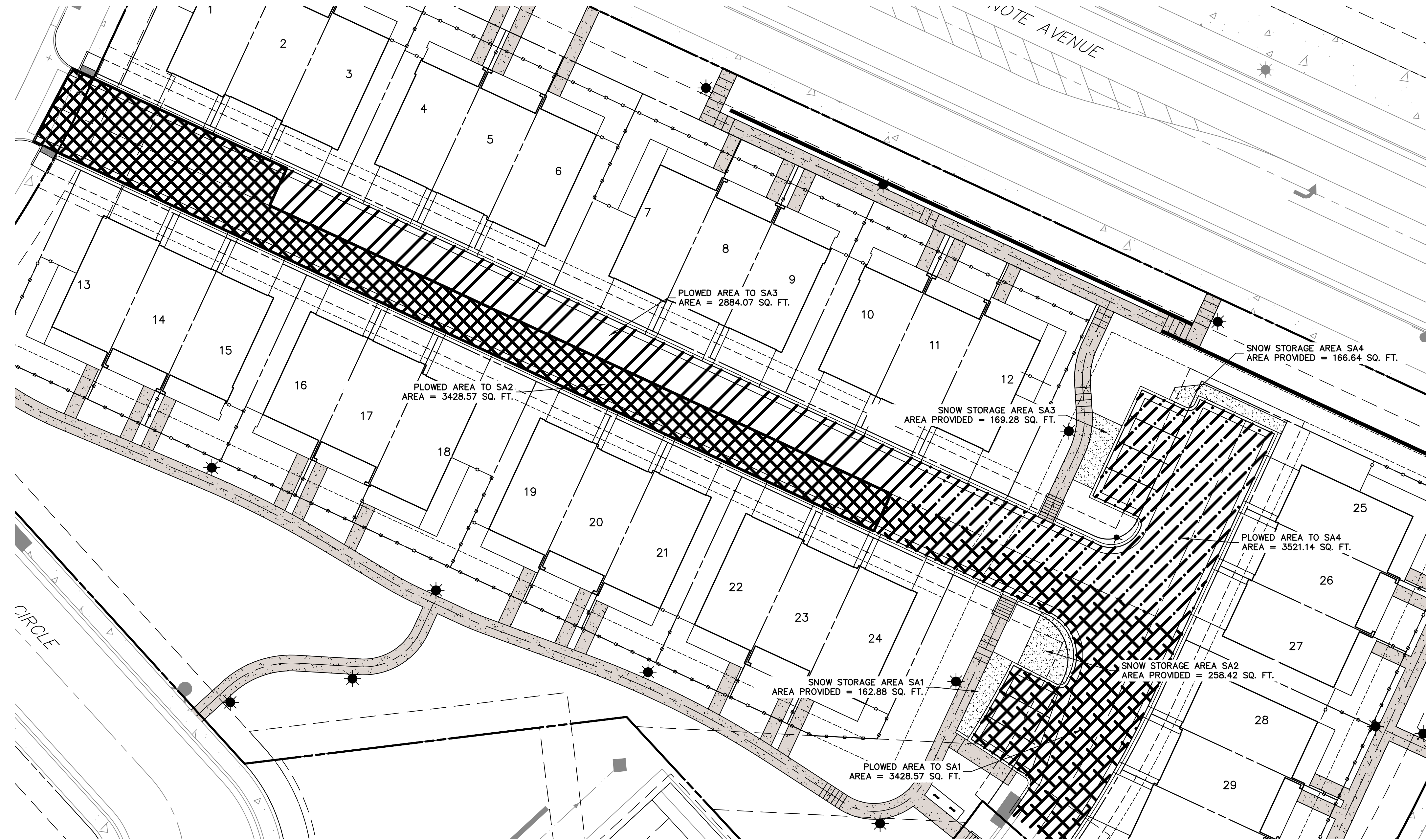
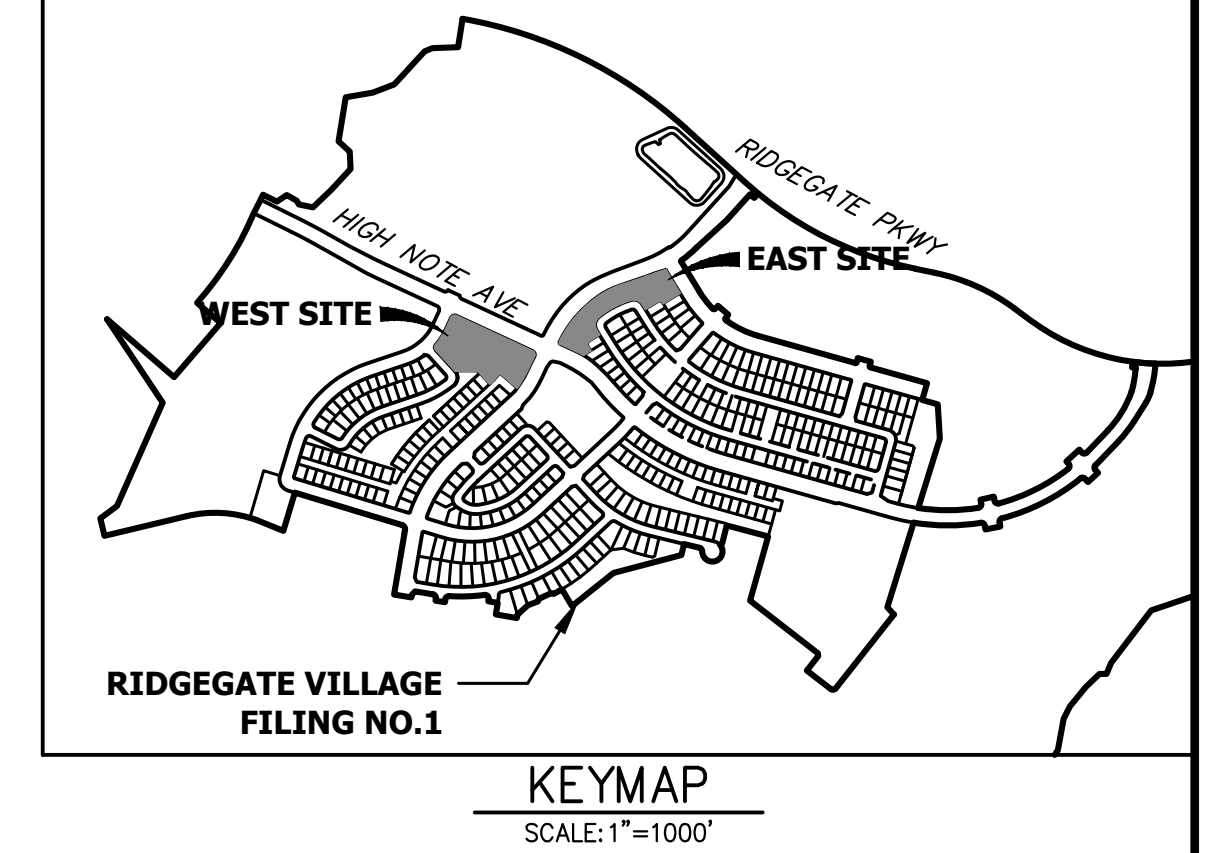
With the provided results, the snow storage areas provided are greater or equal than what is required. Please let us know if there are any questions.

Thank you,

Daniel Raetzman, EIT

RIDGEGATE SW VILLAGE THRIVE SIP (WEST SITE)

A PORTION OF THE RIDGEGATE PLANNED DEVELOPMENT DISTRICT, EAST SIDE PROPERTY
 LOCATED IN THE NORTHEAST QUARTER OF SECTION 23, TOWNSHIP 6 SOUTH, RANGE 67 WEST
 OF THE 6TH P.M., CITY OF LONE TREE, COUNTY OF DOUGLAS, STATE OF COLORADO
SNOW STORAGE AREAS



4" Snowfall			
Location	Area (SF)	Calculations (SF)	Storage (CF.)
West Site	14548	14548 SF x (4/12) F x 0.8	3879.47

12" Snowfall			
Location	Area (SF)	Calculations (SF)	Storage (CF.)
West Site	14548	14548 SF x (12/12) F x 0.2	2909.60

Average		
Location	Average (CF.)	Storage (CF.)
West Site	(3879.47 CF. + 2909.60)/2	3394.53

Location	Storage (CF.)	Trapezoidal Calculations*	Storage Req. (SF)*	(Storage Provided (SF.))
West Site (SA1)	800.00	b1 = 5.26' b2 = 3.26' l = 27.4' h = 6.85'	144.12	162.88
West Site (SA2)	1100.00	b1 = 14.2' b2 = 8.4' l = 15.8' h = 6.16'	224.36	258.42
West Site (SA3)	672.95	b1 = 7.19' b2 = 1.19' l = 22.11' h = 7.26'	158.97	169.28
West Site (SA4)	848.63	b1 = 4.09' b2 = 2.09' l = 36.92' h = 7.20'	151.00	166.64

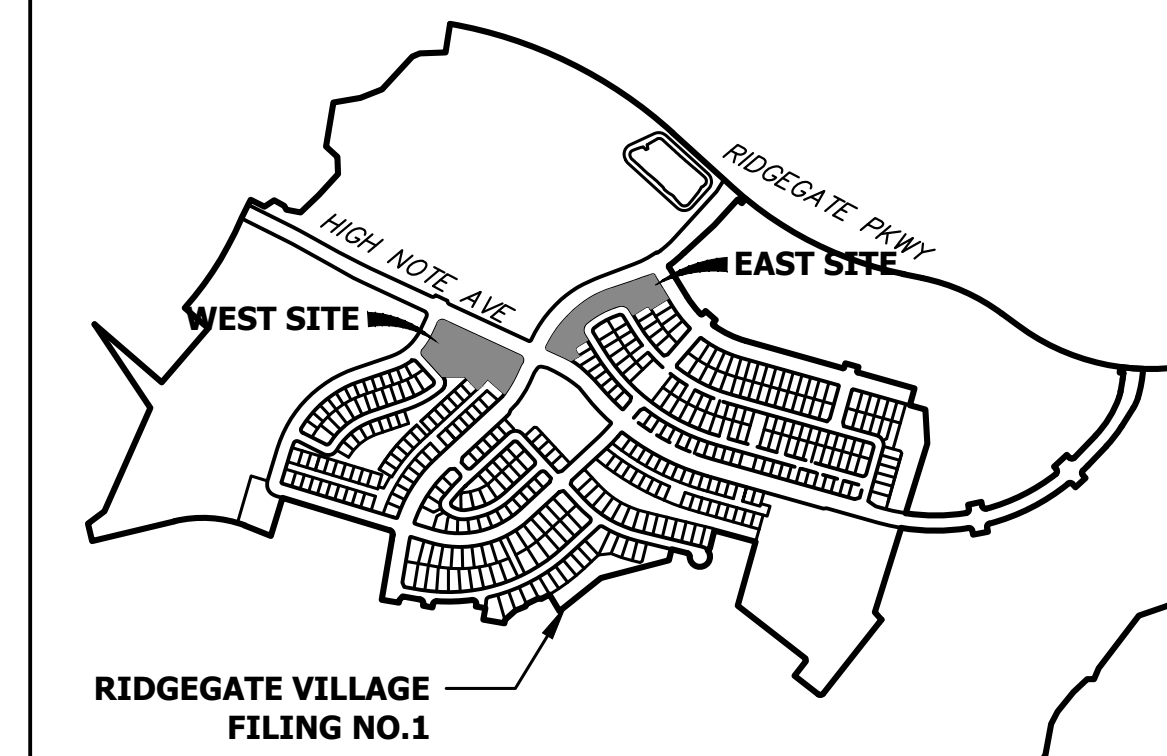
* V = 0.5*(b1 + b2)*h*l V = 0.5*(5.26+3.26) * 27.4' * 7.27' = 848.63 CF.
 Req. Area = b1*l Req. Area = 5.26' * 27.4' = 144.15 SQ. FT.



JOB NO. 15950.05
 11/1/22
 SHEET 1 OF 1

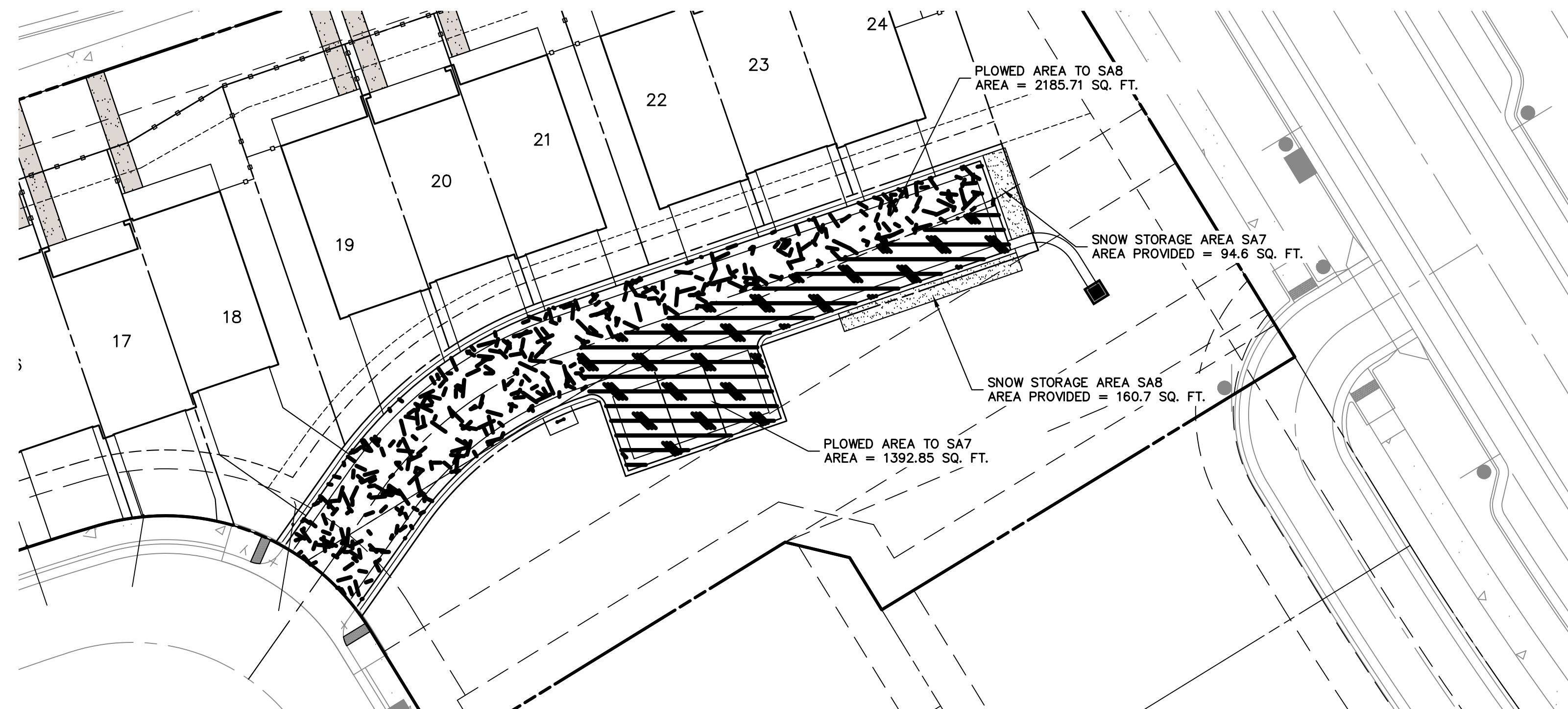
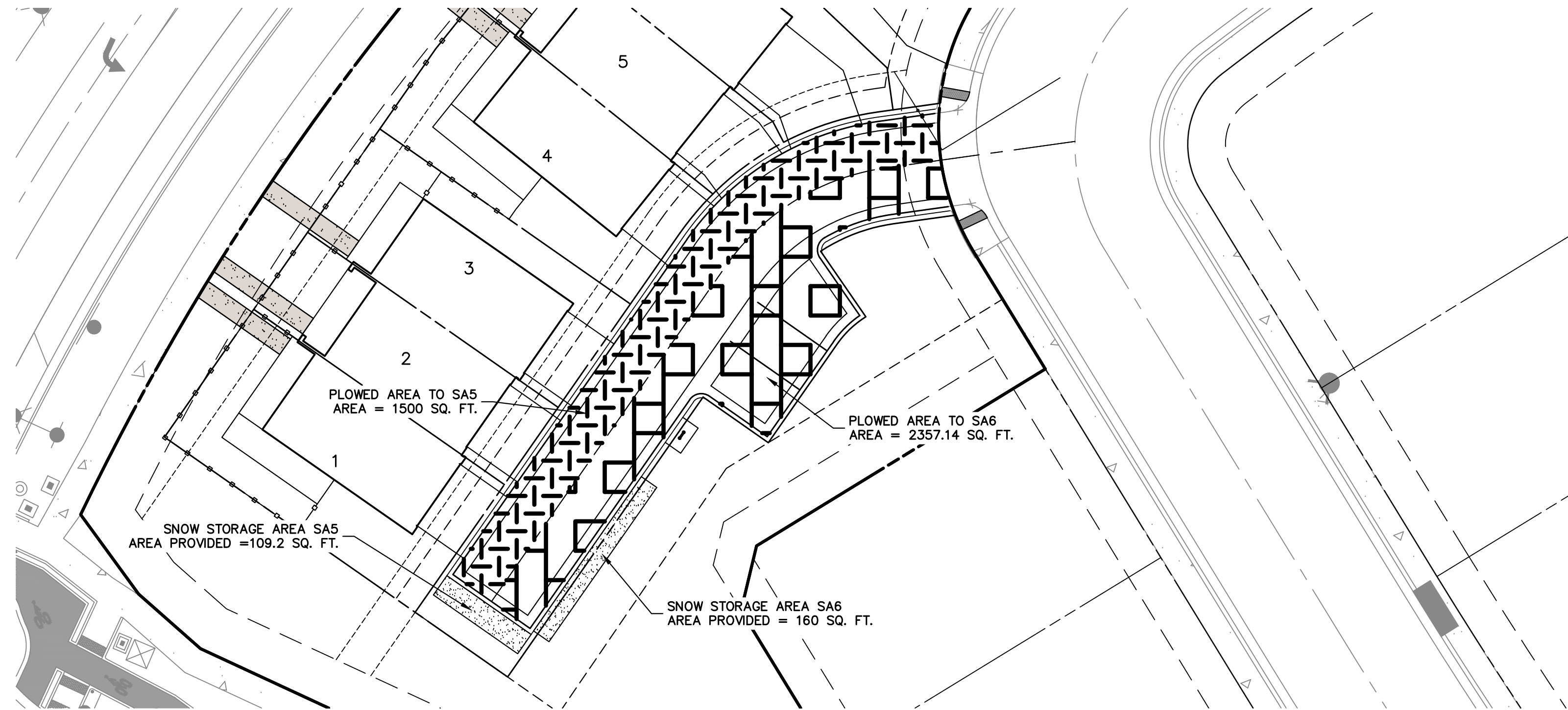
RIDGEGATE SW VILLAGE THRIVE SIP (EAST SITE)

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SNOW STORAGE AREAS



RIDGEGATE VILLAGE
 FILING NO.1

KEYMAP
 SCALE: 1"=1000'



4" Snowfall

Location	Area (SF)	Calculations (SF)	Storage (CF.)
East Site	7434.45	7434.45 SF x (4/12) F x 0.8	1982.52

12" Snowfall

Location	Area (SF)	Calculations (SF)	Storage (CF.)
East Site	7434.45	7434.45 SF x (12/12) F x 0.2	1486.89

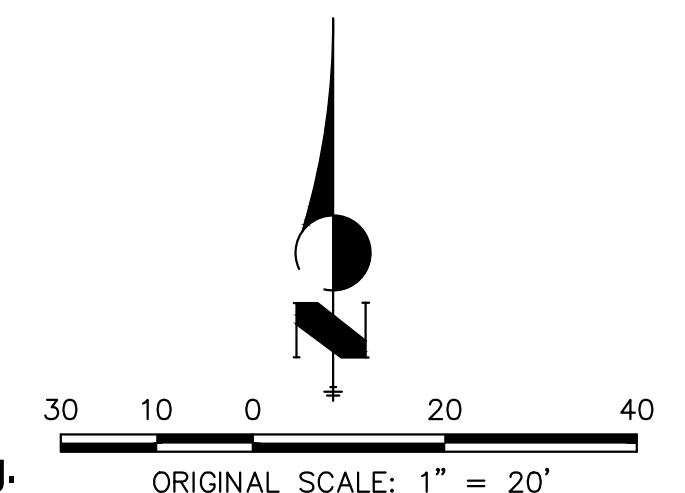
Average

Location	Average (CF.)	Storage (CF.)
East Site	(1982.52 CF. + 1486.89 CF.)/2	1734.71

Location	Storage (CF.)	Trapezoidal Calculations*	Storage Req. (SF)*	(Storage Provided (SF.))
East Site (SA5)	350.00	b1=1' b2=5' l=21.84' h=5.34'	109.20	109.2
East Site (SA6)	550.00	b1=2' b2=4' l=40' h=4.58'	160.00	160
East Site (SA7)	325.00	b1=2' b2=5' l=18.92' h=5.73'	94.60	94.6
East Site (SA8)	510.00	b1=2' b2=4' l=40' h=5.73'	160.00	160.7



Know what's below.
 Call before you dig.



RIDGEGATE SW VILLAGE THRIVE SIP
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 SHEET 1 OF 1



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