

Memorandum

To: City of Lone Tree - Public Works

From: EVstudio

Date: September 8, 2023

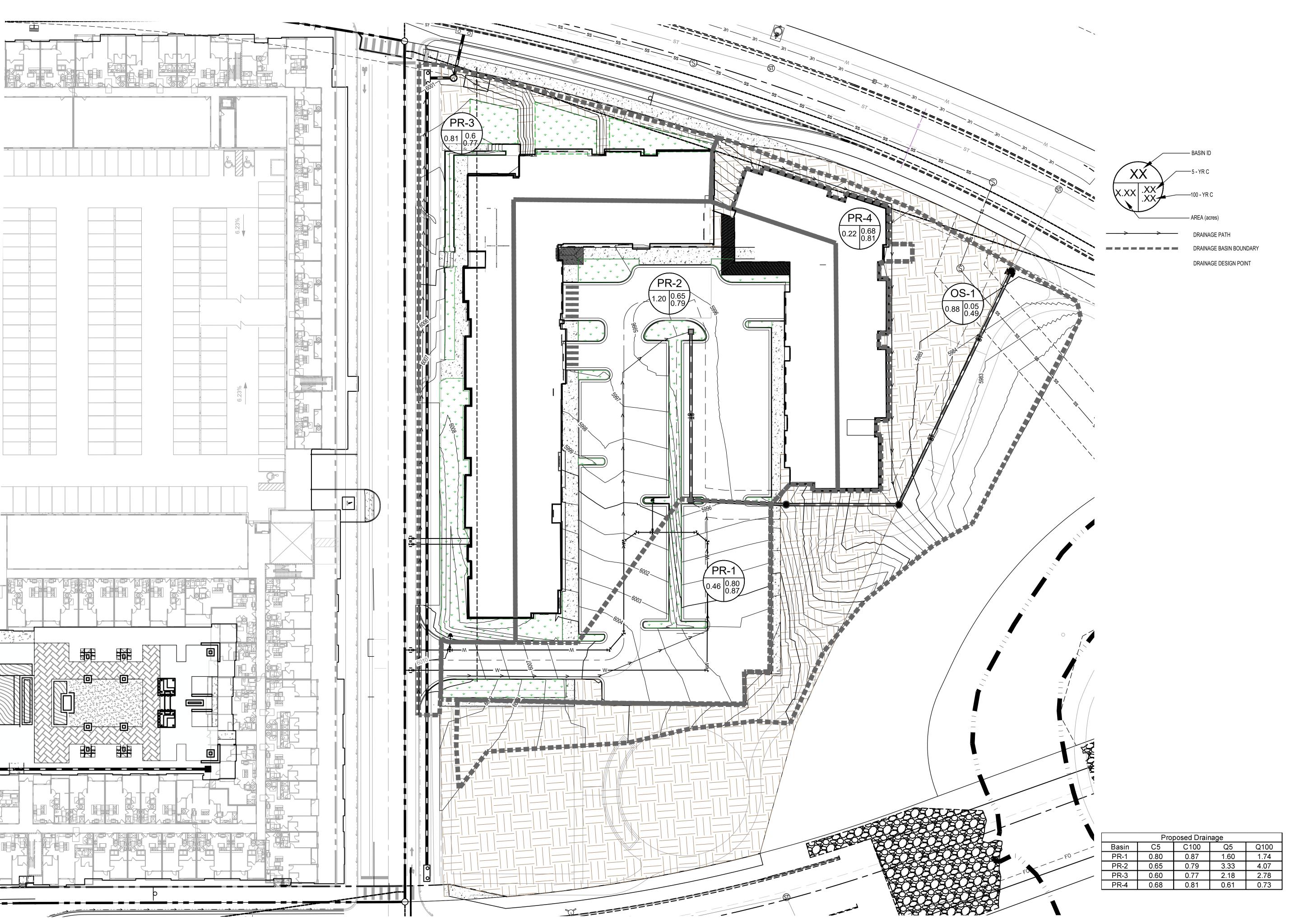
Re: Ridgegate Senior Living

Drainage Compliance Letter

The project Site is approximately 2.86 acres and is located between the north and south Ridgegate Parkway couplet in the City of Lone Tree, Douglas County, Colorado. The project site is currently undeveloped and zoned MU/COM. The project comprises two buildings that will be constructed in two phases. Phase I will consist of 101 units, while Phase II will have 64 units, along with a total of 165 parking stalls.

A master drainage study, prepared by Merrick & Company and dated May 2017, was conducted as part of the Ridgegate Happy Canyon Creek & Badger Gulch drainage basin improvements. This study served as the basis for the stormwater management plan for the project. The proposed stormwater management strategy involves implementing a private on-site storm system that includes curb, gutter, area inlets, and curb inlets. This system is designed to collect and convey the majority of the developed flows from the site. Any excess flows that are not captured within the system will be limited to specific areas where they will surface flow to existing storm inlets off-site, as outlined in the Master Study.

According to the master study, the project site is designated to be inside Basin E215 and is estimated to be 15.6 acres of 81% imperviousness. The site will have the proposed development is proposed to have an imperviousness of 76.5% Because the imperviousness of the site is lower than the master study the site is in general compliance with the previous design intent as outlined in the master study. We have ensured that the stormwater management plan will be appropriately incorporated into the existing drainage infrastructure.





Denver, CO Evergreen, CO

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303.670.7242 x50 UTILITY NOTIFICATION CENTER

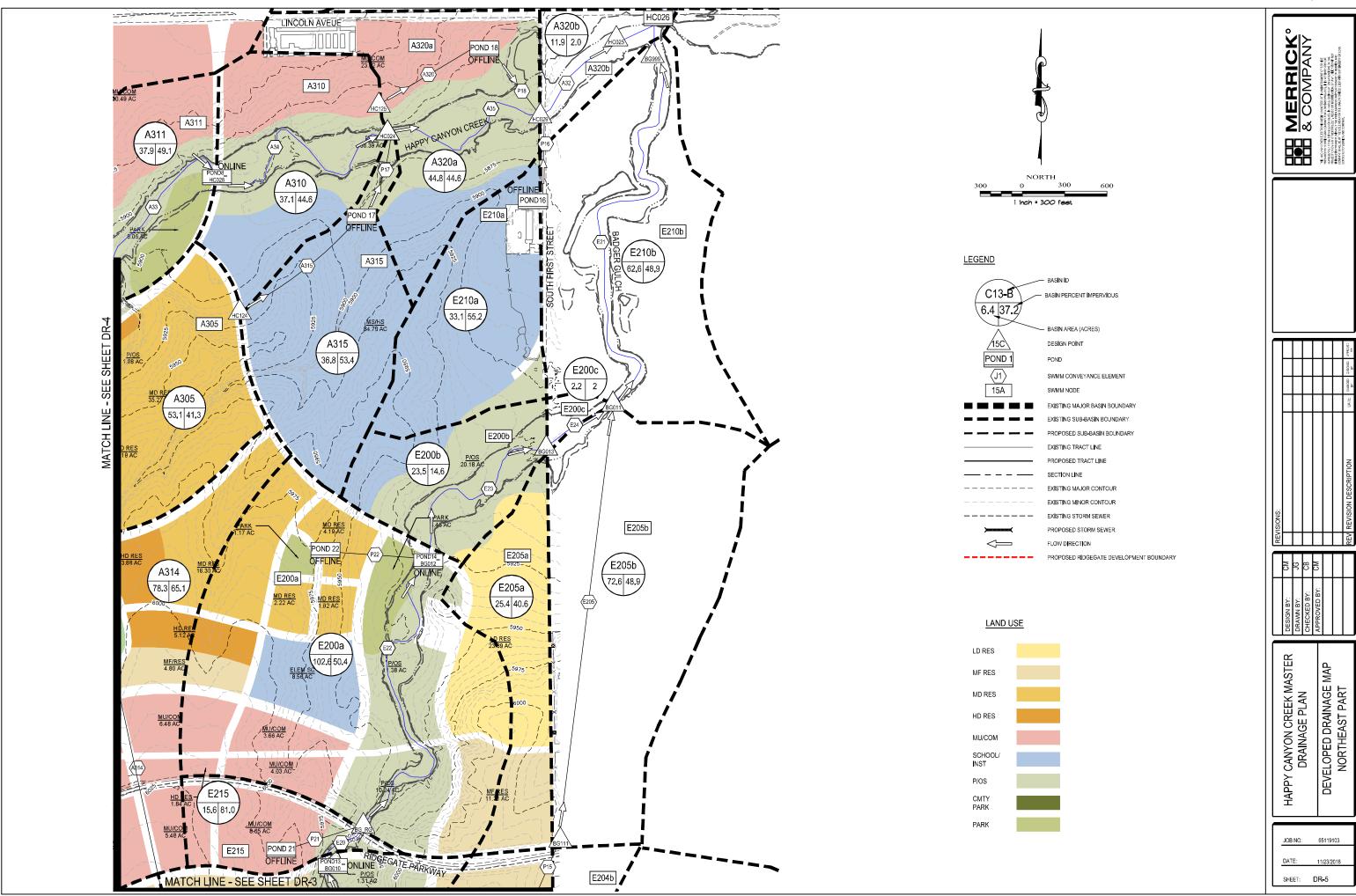
EVSTUDIO ASSUMES NO RESPONSIBILITY FOR UTILITY LOCATIONS. THE UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

23A037

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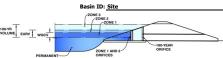
DRAWN BY: CHECKED BY:

PROPOSED DRAINAGE PLAN



DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



Watershed Information

100-YR EURY WQCV	ZONE 3 ZONE 2 ZONE 1	
Ţ	ZONE 1 AND 2	100-YEAR ORIFICE
PERMANENT—	ORIFICES	
POOL Exa	mple Zone Configurat	ion (Retention Pond)

Project: Ridgegate Senior

tershed Information		
Selected BMP Type =	EDB	
Watershed Area =	2.69	acres
Watershed Length =	550	ft
Watershed Length to Centroid =	120	ft
Watershed Slope =	0.007	ft/ft
Watershed Imperviousness =	76.53%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1 br Bainfall Donths -	Hoor Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure

the embedded Colorado Urban Hydro	ıgraph Procedu	ire.
Water Quality Capture Volume (WQCV) =	0.069	acre-feet
Excess Urban Runoff Volume (EURV) =	0.202	acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	0.172	acre-feet
5-yr Runoff Volume (P1 = 1.43 in.) =	0.250	acre-feet
10-yr Runoff Volume (P1 = 1.66 in.) =	0.301	acre-feet
25-yr Runoff Volume (P1 = 1.86 in.) =	0.348	acre-feet
50-yr Runoff Volume (P1 = 2.26 in.) =	0.439	acre-feet
100-yr Runoff Volume (P1 = 2.6 in.) =	0.519	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	0.641	acre-feet
Approximate 2-yr Detention Volume =	0.162	acre-feet
Approximate 5-yr Detention Volume =	0.238	acre-feet
Approximate 10-yr Detention Volume =	0.272	acre-feet
Approximate 25-yr Detention Volume =	0.283	acre-feet
Approximate 50-yr Detention Volume =	0.314	acre-feet
Approximate 100-yr Detention Volume =	0.343	acre-feet
		-

Optional Use	r Overrides
	acre-feet
	acre-feet
1.06	inches
1.43	inches
1.66	inches
1.86	inches
2.26	inches
2.60	inches
	inches

Define	7ones	and	Rasin	Geometry

VQCV) = 0.069 acre-fee	Zone 1 Volume (WQCV) =
one 1) = 0.169 acre-fee	Zone 2 Volume (5-year - Zone 1) =
1 & 2) = 0.105 acre-fee	Zone 3 Volume (100-year - Zones 1 & 2) =
olume = 0.343 acre-fee	Total Detention Basin Volume =
e (ISV) = 9 ft 3	Initial Surcharge Volume (ISV) =
(ISD) =	Initial Surcharge Depth (ISD) =
(H _{total}) =	Total Available Detention Depth (H _{total}) =
I (H _{TC}) =	Depth of Trickle Channel $(H_{TC}) =$
I (S _{TC}) = ft/ft	Slope of Trickle Channel $(S_{TC}) =$
(S _{main}) = H:V	Slopes of Main Basin Sides (Smain) =
(R _{L/W}) =	Basin Length-to-Width Ratio (R _{L/W}) =
$(A_{ISV}) = ft^2$	Initial Surcharge Area $(A_{ISV}) =$
(L _{ISV}) =	Surcharge Volume Length $(L_{ISV}) =$
W _{ISV}) =	Surcharge Volume Width $(W_{ISV}) =$
FLOOR) = ft	Depth of Basin Floor $(H_{FLOOR}) =$

Basin Length-to-Width Ratio (R _{L/W}) =	
Initial Surcharge Area $(A_{ISV}) =$	ft²
Surcharge Volume Length $(L_{ISV}) =$	ft
Surcharge Volume Width $(W_{ISV}) =$	ft
Depth of Basin Floor $(H_{FLOOR}) =$	ft
Length of Basin Floor (L_{FLOOR}) =	ft
Width of Basin Floor $(W_{FLOOR}) =$	ft
Area of Basin Floor $(A_{FLOOR}) =$	ft²
Volume of Basin Floor (V _{FLOOR}) =	ft ³
Depth of Main Basin $(H_{MAIN}) =$	ft
Length of Main Basin $(L_{MAIN}) =$	ft
Width of Main Basin (W _{MAIN}) =	ft
Area of Main Basin $(A_{MAIN}) =$	ft²
Volume of Main Basin (V_{MAIN}) =	ft ³
Calculated Total Basin Volume (V_{total}) =	acre-feet

Depth Increment = Stage - Storage Description Top of Micropool	Stage (ft)	ft Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft²)	Optional Override Area (ft ²)	Area (acre)	Volume (ft ³)	Volume (ac-ft)

MHFD-Detention_v4-06-.xlsm, Basin 9/8/2023, 2:11 PM



PROJECT: Ridgegate Senior SUBJECT: Imperviousness

JOB #: DATE: BY: 21195 9/8/2023

TRO

			Lawns/	Lawns/	Asphalt/	Asphalt/	Roofs	Roofs	Gravel	Gravel	Soil Type "C" Composite Runoff Fa			f Factors
Basin	Square		Landscaped	Landscaped	Concrete	Concrete								
Name	Footage	Acres	(sf)	(Acres)	(sf)	(Acres)	(sf)	(Acres)	(sf)	(Acres)	C ₅	C ₁₀	C ₁₀₀	1%
PR-1	19,892	0.46	1,352	0.03	18,540	0.43	0	0.00	0	0.00	0.80	0.82	0.87	93.34
PR-2	52,465	1.20	11,624	0.27	20,982	0.48	19,859	0.46	0	0.00	0.65	0.68	0.79	74.50
PR-3	35,470	0.81	9,530	0.22	11,137	0.26	14,803	0.34	0	0.00	0.60	0.64	0.77	69.50
PR-4	9,385	0.22	1,199	0.03	0	0.00	8,186	0.19	0	0.00	0.68	0.71	0.81	78.76
PR-TOTAL	117212	2.69	23704	0.54	50659	1.16	42849	0.98	0	0.00	0.66	0.70	0.80	76.53
OS-1	38,333	0.88	38,333	0.88	0	0.00	0	0.00	0	0.00	0.05	0.15	0.49	2.00
Totals:	155,545	3.57	62,037	1.42	50,659	#VALUE!	42,849	0.98	0	0.00	0.51	0.56	0.72	58.16

Lans Use	Imp., I %
Lawns/landscaped	2%
Asphalt/Concrete	100%
Packed Gravel	40%
Roofs	90%



PROJECT: All-Star RV
SUBJECT: TIME OF CONCENTRATION

Ridgegate Senior

JOB #:

DATE:

9/8/2023

21195

BY: TRO

TIME OF CONCENTRATION

								TRAVEL TIME							Tc CHECK			FINAL	Time	
				TIME (Ti)	[Max. 300	7				(Tt)					(Urbanized Basins)			Тс	to	
Basin	Area	5Yr.	Eleva	ations	Dist.	Slope	Ti	Elevations		Dist.	Slope		Vel.	Tt		Length	Тс		Peak**	Remarks
No.	(acres)	co-eff.	Upstream	Downstream	(ft)	(%)	(min)	Upstream	Downstream	(ft)	(%)	*	(fps)	(min)	Тс	(ft)	(min)	(min)	Flow	
PR-1	0.46	0.80	6006.56	6006.09	26	1.8	2.3	6006.09	5996.12	312	3.2	6	3.66	1.4	3.7	338	10.5	3.7	10.5	Developed
PR-2	1.20	0.65	5997	5997.46	74.7	1.5	6.2	5997.46	5995.57	190.12	1.0	6	2.00	1.6	7.8	265	11.5	7.8	11.5	Developed
PR-3	0.81	0.60	5997	6006.13	56.93	1.5	5.9	6006.13		10	4.0	6	4.30	0.0	6.0	67	10.4	6.0	10.4	Developed
PR-4	0.22	0.68	5997	5986.39	34.7	30.6	1.4	5986.39	5986.53	303.42	4.0	6	4.30	1.2	2.6	338	11.9	2.6	11.9	Developed

1 = Heavy Meadow 2.5 0 2 = Tillage / Field 2 5 3 = Short pasture & lawns 3 7 4 = Nearly bare ground 4 10 5 = Grassed waterway 5 15 6 = Paved areas and shallow paved swales 6 20

TC P-DRN-DOUGLAS xlsx 9/8/20234-48 PM



STANDARD FORM SF-3 STORM DRAINAGE SYSTEM DESIGN (RATIONAL METHOD PROCEDURE)

JOB NO:

21195

Ridgegate Senior 5 Year

Ridgegate Senior

CALCULATED BY: TRO

DATE: 9/8/

CHECKED BY:

9/8/23 PROJECT: DESIGN STORM:

			DIRECT RUI						TOTAL	RUNOF	F	
BASIN	DESIGN POINT	AREA DESIG.	AREA (Acres)	RUNOFF COEFF	Tc (min)	C A (Acres)	l (in/hour)	Q (cfs)	Tc (min)	(CA) (Acres)	l (in/hour)	Q (cfs)
PR-1	1	PR-1	0.46	0.80	10.54	0.36	4.40	1.60				
PR-2	2	PR-2	1.20	0.65	11.47	0.78	4.28	3.33				
PR-3	3	PR-3	0.81	0.60	10.37	0.49	4.45	2.18				
PR-4	4	PR-4	0.22	0.68	11.88	0.15	4.20	0.61				

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STANDARD FORM SF-3 STORM DRAINAGE SYSTEM DESIGN (RATIONAL METHOD PROCEDURE)

Ridgegate Senior

CALCULATED BY: TRO

DATE:

9/8/23

CHECKED BY:

JOB NO: 21195 PROJECT:

Ridgegate Senior 100 YEAR **DESIGN STORM:**

PIPE STREET TRAVEL TIME

		DIRECT RU							TOTAL RUNOFF			
BASIN	DESIGN POINT	AREA DESIG.	AREA (Acres)	RUNOFF COEFF	Tc (min)	C A (Acres)	l (in/hour)	Q (cfs)	Tc (min)	(C A) (Acres)	l (in/hour)	Q (cfs)
PR-1	1	PR-1	0.46	0.87	10.54	0.40	4.40	1.74				
PR-2	2	PR-2	1.20	0.79	11.47	0.95	4.28	4.07				
PR-3	3	PR-3	0.81	0.77	10.37	0.62	4.45	2.78				
PR-4	4	PR-4	0.22	0.81	11.88	0.17	4.20	0.73				

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