



SOIL AND WATER CONSULTING

PRODUCT SELECTION REPORT

2022- 2023



ROOTZONE OPTIONS



	WCS&G Straight Sand	WCS&G 90/10(BLINC)	WCS&G 90/10(TDI)	Lab Mix 80/20	USGA Recommendations
Silt and Clay	1.60	2.40	<3.0	2.90	<= 8.0%
Sand	98.10	97.10	97.10	95.40	94 - 100%
Gravel	0.30	0.50	0.00	1.70	
Organic Material	<0.10	0.49	0.58	3.96	
<u>Sieve #:</u>					
Fine Gravel 10	0.30	0.50	0.00	1.70	2.0mm <= 3.0%
Very Coarse Sand 18	7.50	9.60	6.20	7.60	2.0mm + 1.0mm <= 10%
Coarse Sand 35	37.70	39.20	41.00	34.70	
Medium Sand 60	38.70	36.00	37.30	38.20	0.5mm + 0.25mm >= 60%
Fine Sand 100	10.90	9.20	9.30	11.40	0.15mm <= 20%
Very Fine Sand 140	2.40	2.30	n/r	2.50	0.106mm + 0.053mm <= 5.0%
Very Fine Sand 270	0.90	0.80	3.30	1.00	
Saturated Hydraulic Conductivity in/hr	38.4"	6.9"	21.1"	7.3"	Greater than 6" per hour
Coefficient of Uniformity	2.91	3.11	3.0	3.07	1.8 to 3.5 for peat and sand mixes
Recommended Depth	12.5"	13.3"	9.8"	??	

- This is where things are debatable and up for discussion. The base material is a good sand. Once blended with Dakota Peat at different amounts it can become more of what we want in terms of organic material, but we need to know. ***"What do we want for DragonRidge CC?"*** (10-15-23)
- ***WCS&G 90/10 Greensmix was chosen.*** The Turf Diagnostics and Brookside Labs testing were similar except for Infiltration Rate and Depth of sand. Both are effected by the same methods of testing so I don't see the TDI sample results stopping you from using the WCS&G 90/10 (3-15-23)

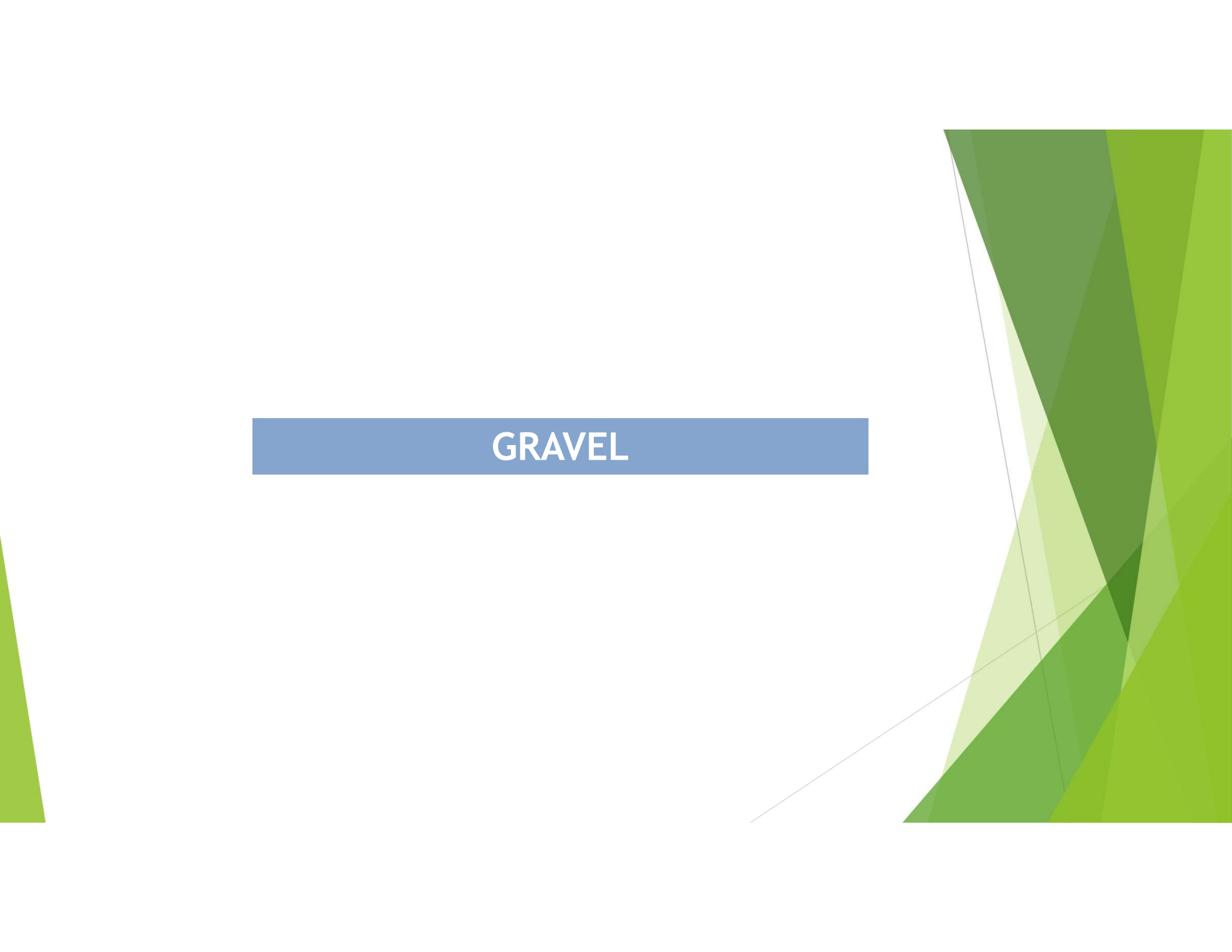
	WCS&G 90/10 (10-2022)	WCS&G 90/10 (4-2023)	USGA Recommendations
Silt and Clay	2.40	2.40	<= 8.0%
Sand	97.10	97.60	94 - 100%
Gravel	0.50	0.00	
Organic Material	0.49	0.56	
<u>Sieve #:</u>			
Fine Gravel 10	0.50	0.00	2.0mm <= 3.0%
Very Coarse Sand 18	9.60	7.30	2.0mm + 1.0mm <= 10%
Coarse Sand 35	39.20	49.00	
Medium Sand 60	36.00	33.60	0.5mm + 0.25mm >= 60%
Fine Sand 100	9.20	6.30	0.15mm <= 20%
Very Fine Sand 140	2.30	1.10	0.106mm + 0.053mm <= 5.0%
Very Fine Sand 270	0.80	0.30	
Saturated Hydraulic Conductivity in/hr	6.9"	10.6"	Greater than 6" per hour
Coefficient of Uniformity	3.11	2.68	1.8 to 3.5 for peat and sand mixes
Recommended Depth	13.3"	10.2"	

ROOTZONE QUALITY CONTROL



	WCS&G 90/10 QC #1 4/2023	WCS&G 90/10 QC #2 5/2023	WCS&G Straight Sand 5/2023	WCS&G 90/10 QC #2B 5/2023	WCS&G 90/10 QC #3 6/2023	WCS&G 90/10 QC #4 6/2023	<u>USGA Recommendations</u>
Silt and Clay	2.40	4.10	1.40	2.00	3.00	2.60	<= 8.0% 94 - 100%
Sand	97.60	95.90	98.60	97.90	96.90	97.30	
Gravel	0.00	0.00	0.00	0.10	0.10	0.10	
Organic Material	0.56	0.73	0.18	0.53	0.73	0.58	
<u>Sieve #:</u>							
Fine Gravel 10	0.00	0.00	0.00	0.10	0.10	0.10	2.0mm <= 3.0%
Very Coarse Sand 18	7.30	7.00	8.20	8.50	7.30	5.60	2.0mm + 1.0mm <= 10%
Coarse Sand 35	49.00	44.50	45.50	47.10	45.50	41.20	
Medium Sand 60	33.60	33.70	34.70	31.60	33.80	38.60	0.5mm + 0.25mm >= 60%
Fine Sand 100	6.30	8.10	7.90	8.10	8.10	9.20	0.15mm <= 20%
Very Fine Sand 140	1.10	1.80	1.70	1.70	1.70	2.10	0.106mm + 0.053mm <= 5.0%
Very Fine Sand 270	0.30	0.80	0.60	0.90	0.50	0.60	
Saturated Hydraulic Conductivity in/hr	10.6"	7.4"	57.3"	14.5"	15.3"	13.7"	Greater than 6" per hour
Coefficient of Uniformity	2.68	3.30	2.83	3.08	3.07	2.9	1.8 to 3.5 for peat and sand mixes

	WCS&G 90/10 QC #1 4/2023	WCS&G 90/10 QC #5 7/2023	WCS&G 90/10 QC #6 7/2023	WCS&G 90/10 QC #6 DEL. 8/2023	WCS&G 90/10 QC #7 8/2023	WCS&G 90/10 QC #7 DEL. 8/2023	<u>USGA Recommendations</u>
Silt and Clay	2.40	2.20	3.00	2.10	2.10	2.10	<= 8.0%
Sand	97.60	97.80	97.00	97.90	97.90	97.80	94 - 100%
Gravel	0.00	0.00	0.00	0.00	0.00	0.10	
Organic Material	0.56	0.64	0.69	0.71	0.48	0.72	
<u>Sieve #:</u>							
Fine Gravel 10	0.00	0.00	0.00	0.00	0.00	0.10	2.0mm <= 3.0%
Very Coarse Sand 18	7.30	7.20	7.10	9.20	7.20	8.70	2.0mm + 1.0mm <= 10%
Coarse Sand 35	49.00	44.00	43.30	44.10	43.60	44.90	
Medium Sand 60	33.60	35.40	34.70	33.80	36.00	33.50	0.5mm + 0.25mm >= 60%
Fine Sand 100	6.30	8.30	9.20	7.90	8.20	8.30	0.15mm <= 20%
Very Fine Sand 140	1.10	2.20	1.90	2.20	2.10	1.70	0.106mm + 0.053mm <= 5.0%
Very Fine Sand 270	0.30	0.70	0.80	0.70	0.80	0.70	
Saturated Hydraulic Conductivity in/hr	10.6"	12.8"	17.9"	9.1"	6.3"	19.3"	Greater than 6" per hour
Coefficient of Uniformity	2.68	3.00	3.15	3.05	2.96	3.02	1.8 to 3.5 for peat and sand mixes

The background features abstract green geometric shapes, including triangles and polygons, some of which are semi-transparent, creating a layered effect. A solid blue horizontal bar is positioned in the center-left area. The word "GRAVEL" is written in white, bold, uppercase letters within this bar.

GRAVEL

Gravel Compatibility for WCS&G 90/10

	LMSC 1.6	LMSC 1.7	LMSC 1.8	LMSC 1.9(3-2023)	LMSC 1.9(4-2023)
Bridging Number needs to be less than 7.20	2.68	7.33	3.05	6.66	5.95
Adequate Permeability Number needs to be greater than 1.35	2.68	7.33	3.05	6.66	5.95
Uniformity Coefficient Number needs to be less than 3.0	2.87	1.66	2.77	1.63	1.55

* Corresponding highlighted color represents the best product for a particular criterion.

Ranking- #1 - Bridging

Ranking- #1- Adequate Permiability

Ranking- #1- Uniformity of Coeficient

LMSC 1.9 is the selected Gravel for the project

- XXXX

GRAVEL QUALITY CONTROL

The background features abstract geometric shapes in various shades of green and blue. A prominent blue rectangle is centered horizontally, containing the title text. To the right, there are large, overlapping green triangles and polygons. A thin white line extends from the bottom right towards the center. The overall design is modern and minimalist.

Gravel Compatibility for WCS&G 90/10

	LMSC 1.9 QC #1	LMSC 1.9 QC #2
Bridging Number needs to be less than 7.20	5.16	5.38
Adequate Permeability Number needs to be greater than 1.35	5.16	5.38
Uniformity Coefficient Number needs to be less than 3.0	1.75	1.69

- LMSC 1.9 Q.C. #1 is approved
- LMSC 1.9 Q.C #2 is approved

BUNKER SAND

	LMSC Bunker Sand 7/2022	LMSC Bunker Sand 4/2023	50W Bunker Sand 8/2022	<u>USGA/Brown and Thomas Recommendations</u>
Silt and Clay	2.30	3.10	3.10	<i>Less than or equal to 3%</i>
Sand	95.10	92.30	95.20	<i>Greater than or equal to 95%</i>
Gravel	2.60	4.60	1.70	<i>Less than or equal to 2%</i>
Organic Material	0.20	0.18	0.11	
<u>Sieve #:</u>				
Fine Gravel 10	2.60	4.60	1.70	<i>Less than or equal to 2%</i>
Very Coarse Sand 18	25.30	27.20	21.60	<i>Less than or equal to 15%</i>
Coarse Sand 35	28.90	30.80	43.60	<i>35+60+100+ 140 between 78% and 100%</i>
Medium Sand 60	21.00	20.60	27.70	
Fine Sand 100	10.90	7.20	1.00	
Very Fine Sand 140	5.30	3.50	0.60	
Very Fine Sand 270	3.70	3.00	0.70	<i>Less than or equal to 5%</i>
Saturated Hydraulic Conductivity in/hr	14.4"	13.1"	103.9"	
Coefficient of Uniformity	5.68	5.57	2.77	
Recommended Depth	11"	11"	6.7"	
Ball Lie Rating	2.5	n/r	2.5	<i>Greater than 2.4</i>
Visual Classification	subangular to subrounded	n/r	subangular to subrounded	<i>Subrounded/Mixed or Angular</i>

- LMSC Bunker Sand was chosen for the project and a depth of 10" has been budgeted.

BUNKER SAND QUALITY CONTROL

	LMSC Bunker Sand 7/2022	LMSC Bunker Sand Q.C #1 7/2023	<u>USGA/Brown and Thomas Recommendations</u>
Silt and Clay	2.3	3.50	<i>Less than or equal to 3%</i>
Sand	95.1	93.40	<i>Greater than or equal to 95%</i>
Gravel	2.6	3.10	<i>Less than or equal to 2%</i>
Organic Material	0.2	0.14	
<u>Sieve #:</u>			
Fine Gravel 10	2.60	3.10	<i>Less than or equal to 2%</i>
Very Coarse Sand 18	25.30	20.10	<i>Less than or equal to 15%</i>
Coarse Sand 35	28.90	29.40	<i>35+60+100+ 140 between 78% and 100%</i>
Medium Sand 60	21.00	24.70	
Fine Sand 100	10.90	10.20	
Very Fine Sand 140	5.30	5.30	
Very Fine Sand 270	3.70	3.70	<i>Less than or equal to 5%</i>
Saturated Hydraulic Conductivity in/hr	14.4"	11.3"	
Coefficient of Uniformity	5.68	5.53	
Recommended Depth	11"	10.6"	
Ball Lie Rating	2.5	2.5	<i>Greater than 2.4</i>
Visual Classification	subangular to subrounded	subangular to subrounded	<i>Subrounded/Mixed or Angular</i>

- LMSC Bunker Sand Q.C. #1 is approved on 7/6/23

GREENS SURROUND “NEW” MIX

	Greens Surround "New" Mix #1	Greens Surround "New" Mix #7	Greens Surround "New" Mix #12
Silt and Clay	13.40	14.90	13.60
Sand	69.60	70.80	67.80
Gravel	17.00	14.30	18.60
Organic Material	4.42	4.88	3.81
<u>Sieve #:</u>			
Fine Gravel 10	17.00	14.30	18.60
Very Coarse Sand 18	5.60	4.90	4.90
Coarse Sand 35	6.20	5.50	4.00
Medium Sand 60	13.10	9.40	11.00
Fine Sand 100	23.10	27.10	24.20
Very Fine Sand 140	12.50	13.70	13.30
Very Fine Sand 270	9.20	10.10	10.30
Coefficient of Uniformity	5.69	4.57	4.88

- Although there are no standards for a soil, these three tests show a consistent product through tilling the top OM layer with the Red Dirt Material.
- Sodium is high as we'd expect, like fairways, and the "new" mix will recompact, but you should get off to a good start with the sod.
- Apply gypsum at the rate I suggested in the report on fairways to the Greens Surrounds.