M V E , Inc.

January 10, 2025

El Paso County
Planning and Community Development Department
2880 International Circle, Suite 110
Colorado Springs, CO 80910

Attn: Brad Walters
Inspection Supervisor

Re: Ellicott School Addition 2 Buildings *(PPR2250 & ASB2429)*
Stormwater Permanent Control Measures – Engineer's Letter
M.V.E. Project No. 61183

Dear Mr. Walters:

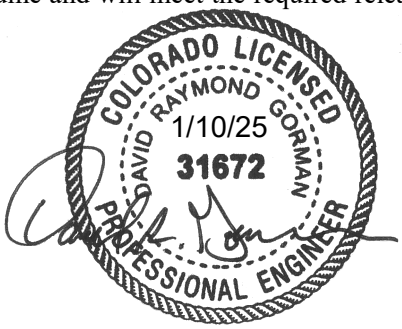
The stormwater Permanent Control Measures (PCMs) for the Ellicott School Addition 2 Bldgs project (PPR2250 & ASB2429) consists of the two (2) rain gardens with associated riprap inflow protection and riprap emergency spillways. Based upon information gathered during during the final project site visit and as-built survey data, M.V.E., Inc. is of the opinion that the stormwater Permanent Control Measures (PCMs) have been constructed in general compliance with the approved Grading and Erosion Control Plan prepared by M.V.E., Inc., as filed with the County. Spec Sheets and PO/Receipts for Rain Garden growing media and reseeding mixes are attached to this letter.

The original plans for the Phase 1 Rain Garden called concentrated inflow protection at the upstream inflow point. The flat bottom of the Rain Garden was enlarged by extending in the upstream direction and the inflow protection was deleted from the Rain Garden. The absence of the inflow protection will adverse effects because the flow rates are so small and the inflow swale very gradually widens at the connection to the Rain Garden. The inflow swale and Rain Garden are anticipated to remain stable with all sand and rain garden growing media remaining in the Rain Garden area.

Statement Of Engineer In Responsible Charge:
I, David R. Gorman, a registered Professional Engineer in the State of Colorado, in accordance with Sections 5.2 and 5.3 of the Bylaws and Rules of the State Board of Registration for Professional Engineers and Professional Land Surveyors, do hereby state and declare that I or a person under my responsible charge observed the constructed facilities of the above mentioned project. Based on the on-site field observations and review of pertinent documentation, it is my professional opinion that the public roadway improvements and the Permanent Control Measures have been installed and are in general compliance with the approved Roadway Construction Plans and approved Grading and Erosion Control Plan as filed with the El Paso County.

The site and adjacent properties (as affected by work performed under the County permit) are stable with respect to settlement and subsidence, sloughing of cut and fill slopes, revegetation or other ground cover, and

that the improvements (public improvements, common development improvements, site grading and paving) meet or exceed the minimum design requirements. Furthermore, the as-built facilities provide the required storage volume and will meet the required release rates as documented by the attached updated MHFD design forms.



David R. Gorman, P.E. Colorado No. 31672
For and on Behalf of M.V.E., Inc.

Z:\61183\Documents\Correspondance\61183 Civil Engineers PCM Facility Letter.odt

Additional Docuuments

1 Revised Calculations

Sub-Basin D (DP6) Runoff Calculations
MHFD Rain Garden Spreadsheet, “UD-BMP_v3.07” - AsBuilt Phase 1 Pond
MHFD Rain Garden Spreadsheet, “UD-BMP_v3.07” - AsBuilt Phase 2 Pond
SDI Worksheet – Phase 2 Pond

Sub-Basin D (DP6) Runoff Calculations - w/ Building Connection

Job No.:	**61183**	Date:	**12/3/2024 8:27**
Project:	**Ellicott D22 – GS & HS Addition**	Calcs by:	**O. Ali**
		Checked by:	
Jurisdiction	**DCM**	Soil Type	**A**
Runoff Coefficient	**Surface Type**	Urbanization	**Urban**

Basin Land Use Characteristics

	Area		Runoff Coefficient						%
Surface	**(SF)**	**(Acres)**	**C2**	**C5**	**C10**	**C25**	**C50**	**C100**	**Imperv.**
Pasture/Meadow	68,144	1.56	0.02	0.08	0.15	0.25	0.3	0.35	0%
Gravel	4,328	0.10	0.57	0.59	0.63	0.66	0.68	0.7	80%
Paved	2,963	0.07	0.89	0.9	0.92	0.94	0.95	0.96	100%
Roofs	20,580	0.47	0.71	0.73	0.75	0.78	0.8	0.81	90%
Combined	**96,015**	**2.20**	**0.22**	**0.27**	**0.32**	**0.40**	**0.44**	**0.48**	**26.0%**

96015

Basin Travel Time

Shallow Channel Ground Cover: Paved areas/shallow paved swales

$L_{max,Overland}$ 100 ft C_v 20

	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	537	7	-	-	-	-	
Initial Time	100	3	0.025	-	11.1	13.0	DCM Eq. 6-8
Shallow Channel	318	3	0.009	1.9	2.7	-	DCM Eq. 6-9
Channelized	119	1	0.008	0.9	2.2	-	V-Ditch
				t_c	**13.0**	**min.**	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.98	3.74	4.36	4.98	5.61	6.27
Runoff (cfs)	1.4	**2.2**	3.1	4.4	5.5	**6.7**
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	1.4	**2.2**	3.1	4.4	5.5	**6.7**

DCM: I = C1 * ln (tc) + C2

C1	1.19	1.5	1.75	2	2.25	2.52
C2	6.035	7.583	8.847	10.111	11.375	12.735

Notes

Design Procedure Form: Rain Garden (RG)

UD-BMP (Version 3.07, March 2018)

Designer: O. Ali
Company: M.V.E. Inc.
Date: December 2, 2024
Project: Ellicott School Addition 2 bldgs
Location: Phase I Addition SE Corner - AsBuilts

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a (100% if all paved and roofed areas upstream of rain garden): I_a = 55.1 %

B) Tributary Area's Imperviousness Ratio ($i = I_a/100$): i = 0.551

C) Water Quality Capture Volume (WQCV) for a 12-hour Drain Time ($WQCV = 0.8 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i)$): WQCV = 0.18 watershed inches

D) Contributing Watershed Area (including rain garden area): Area = 26,999 sq ft

E) Water Quality Capture Volume (WQCV) Design Volume, Vol = (WQCV / 12) * Area: V_{WQCV} = cu ft

F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm: d_6 = 0.42 in

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume: $V_{WQCV\ OTHER}$ = 388 cu ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired): $V_{WQCV\ USER}$ = cu ft

2. Basin Geometry

A) WQCV Depth (12-inch maximum): D_{WQCV} = 12 in

B) Rain Garden Side Slopes (Z = 4 min., horiz. dist per unit vertical) (Use "0" if rain garden has vertical walls): Z = 3.00 ft / ft Z < 4:1

C) Mimimum Flat Surface Area: A_{Min} = 298 sq ft

D) Actual Flat Surface Area: A_{Actual} = 954 sq ft

E) Area at Design Depth (Top Surface Area): A_{Top} = 1889 sq ft

F) Rain Garden Total Volume ($V_T = ((A_{Top} + A_{Actual}) / 2) * Depth$): V_T = 1,422 cu ft

3. Growing Media

Choose One
- (•) 18" Rain Garden Growing Media
- ( ) Other (Explain):

4. Underdrain System

A) Are underdrains provided?

Choose One
- ( ) YES
- (•) NO

B) Underdrain system orifice diameter for 12 hour drain time

i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice: y = N/A ft

ii) Volume to Drain in 12 Hours: Vol_{12} = N/A cu ft

iii) Orifice Diameter, 3/8" Minimum: D_O = N/A in

Design Procedure Form: Rain Garden (RG)

Designer: O. Ali
Company: M.V.E. Inc.
Date: December 2, 2024
Project: Ellicott School Addition 2 bldgs
Location: Phase I Addition SE Corner - AsBuilts

5. Impermeable Geomembrane Liner and Geotextile Separator Fabric A) Is an impermeable liner provided due to proximity of structures or groundwater contamination?	Choose One ○ YES ◉ NO
6. Inlet / Outlet Control A) Inlet Control	Choose One ○ Sheet Flow- No Energy Dissipation Required ◉ Concentrated Flow- Energy Dissipation Provided
7. Vegetation	Choose One ◉ Seed (Plan for frequent weed control) ○ Plantings ○ Sand Grown or Other High Infiltration Sod
8. Irrigation A) Will the rain garden be irrigated?	Choose One ○ YES ○ NO

Notes: Rain garden to be temporarily irrigated until vegetation cover is established as per Alternative Landscape Plan.
While 4:1 side slopes are recommended, the location of the rain garden only allows enough space for 3:1 side slopes. As the hazard of erosion for the soil in that portion of the site is slight to moderate, 3:1 side slopes is sufficient.

Design Procedure Form: Rain Garden (RG)

UD-BMP (Version 3.07, March 2018)

Designer: O. Ali
Company: M.V.E., Inc.
Date: December 3, 2024
Project: Ellicott School Addition 2 bldgs
Location: Phase II Addition SE Corner - AsBuilt

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a (100% if all paved and roofed areas upstream of rain garden): I_a = 26.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a/100$): i = 0.260

C) Water Quality Capture Volume (WQCV) for a 12-hour Drain Time ($WQCV = 0.8 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i)$): WQCV = 0.11 watershed inches

D) Contributing Watershed Area (including rain garden area): Area = 96,015 sq ft

E) Water Quality Capture Volume (WQCV) Design Volume, Vol = (WQCV / 12) * Area: V_{WQCV} = cu ft

F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm: d_6 = 0.42 in

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume: $V_{WQCV\ OTHER}$ = 865 cu ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired): $V_{WQCV\ USER}$ = cu ft

2. Basin Geometry

A) WQCV Depth (12-inch maximum): D_{WQCV} = 5 in

B) Rain Garden Side Slopes (Z = 4 min., horiz. dist per unit vertical) (Use "0" if rain garden has vertical walls): Z = 4.00 ft / ft

C) Mimimum Flat Surface Area: A_{Min} = 499 sq ft

D) Actual Flat Surface Area: A_{Actual} = 2300 sq ft

E) Area at Design Depth (Top Surface Area): A_{Top} = 2638 sq ft

F) Rain Garden Total Volume ($V_T = ((A_{Top} + A_{Actual}) / 2) * Depth$): V_T = 1,029 cu ft

3. Growing Media

Choose One
- (•) 18" Rain Garden Growing Media
- ( ) Other (Explain):

4. Underdrain System

A) Are underdrains provided?

Choose One
- ( ) YES
- (•) NO

B) Underdrain system orifice diameter for 12 hour drain time

i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice: y = N/A ft

ii) Volume to Drain in 12 Hours: Vol_{12} = N/A cu ft

iii) Orifice Diameter, 3/8" Minimum: D_O = N/A in

Design Procedure Form: Rain Garden (RG)

Designer: O. Ali
Company: M.V.E., Inc.
Date: December 3, 2024
Project: Ellicott School Addition 2 bldgs
Location: Phase II Addition SE Corner - AsBuilt

5. Impermeable Geomembrane Liner and Geotextile Separator Fabric A) Is an impermeable liner provided due to proximity of structures or groundwater contamination?	Choose One ○ YES ◉ NO
6. Inlet / Outlet Control A) Inlet Control	Choose One ○ Sheet Flow- No Energy Dissipation Required ◉ Concentrated Flow- Energy Dissipation Provided
7. Vegetation	Choose One ◉ Seed (Plan for frequent weed control) ○ Plantings ○ Sand Grown or Other High Infiltration Sod
8. Irrigation A) Will the rain garden be irrigated?	Choose One ○ YES ○ NO

Notes: Rain garden to be temporarily irrigated until vegetation cover is established as per alternative landscape plan.

Stormwater Detention and Infiltration Design Data Sheet

SDI-Design Data v2.00, Released January 2020

Stormwater Facility Name: **Phase-II: Ellicott School Addition 2 bldgs (Water Quality only) - AsBuilt**

Facility Location & Jurisdiction: **322 S Ellicott Highway, El Paso County**

User Input: Watershed Characteristics

Rain Garden (RG) - Bioretention	RG	
Watershed Area =	2.20	acres
Watershed Length =	537	ft
Watershed Length to Centroid =	293	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	26.0%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	12.0	hours

Location for 1-hr Rainfall Depths (use dropdown):

User 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.

Once CUHP has been run and the Stage-Area-Discharge information has been provided, click 'Process Data' to interpolate the Stage-Area-Volume-Discharge data and generate summary results in the table below. Once this is complete, click 'Print to PDF'.

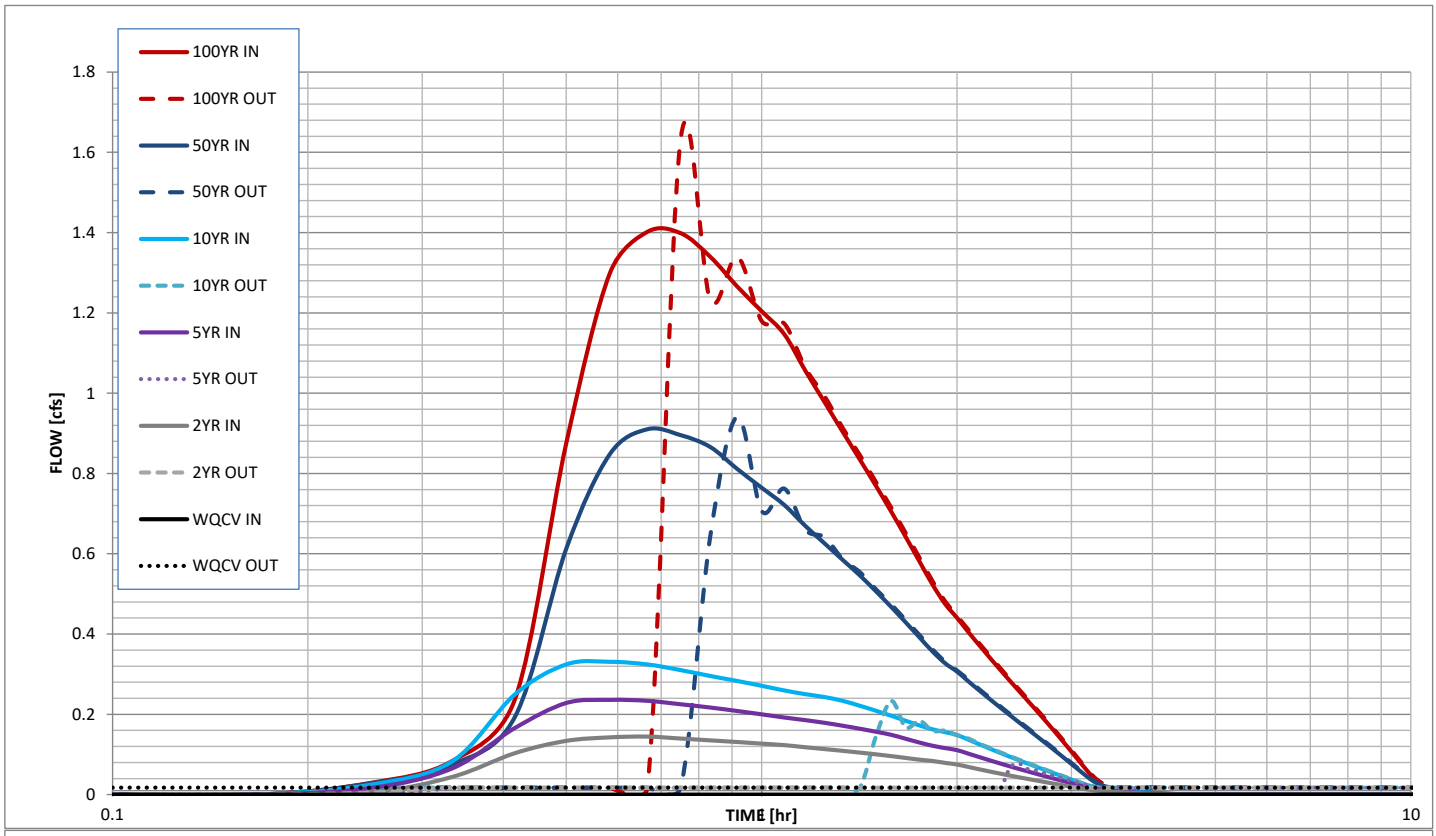
User Defined Stage [ft]	User Defined Area [ft^2]	User Defined Stage [ft]	User Defined Discharge [cfs]
0.00	2,300	0.00	0.02
0.42	2,638	0.42	0.02
0.67	3,247	0.67	14.47
0.92	4,100	0.92	20.00

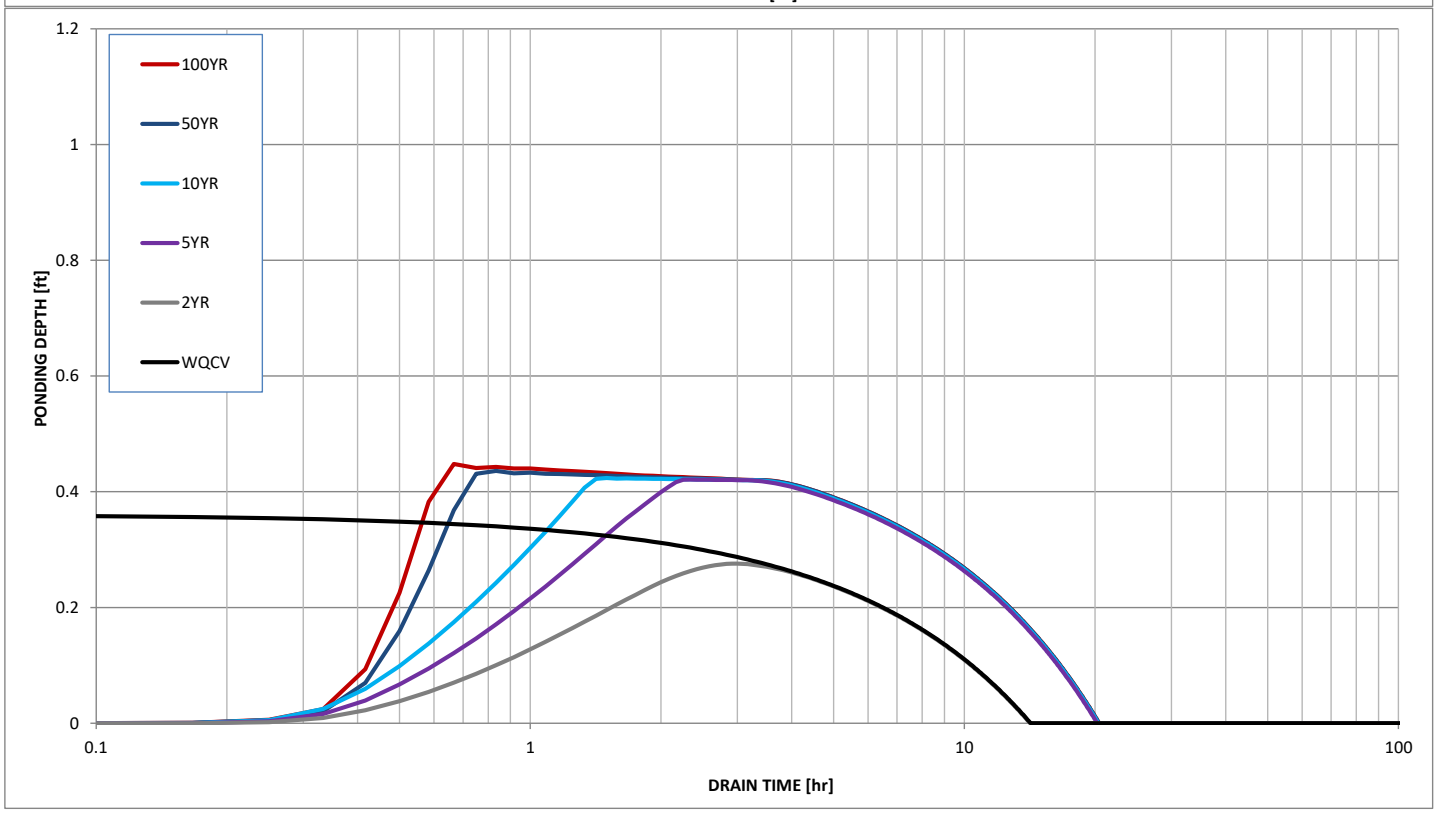
After completing and printing this worksheet to a pdf, go to:
https://maperture.digitaldataservices.com/gvh/?viewer=cswdif
Create a new stormwater facility, and attach the PDF of this worksheet to that record.

Routed Hydrograph Results

Design Storm Return Period =	WQCV	2 Year	5 Year	10 Year	50 Year	100 Year	
One-Hour Rainfall Depth =	N/A	0.83	1.09	1.33	1.99	2.31	in
CUHP Runoff Volume =	0.020	0.020	0.031	0.042	0.098	0.148	acre-ft
Inflow Hydrograph Volume =	N/A	0.020	0.031	0.042	0.098	0.148	acre-ft
Time to Drain 97% of Inflow Volume =	13.8	13.8	**19.7**	19.5	18.4	17.3	hours
Time to Drain 99% of Inflow Volume =	14.1	14.1	20.1	20.1	19.8	**19.4**	hours
Maximum Ponding Depth =	0.36	0.28	0.42	0.42	0.44	0.45	ft
Maximum Ponded Area =	0.06	0.06	0.06	0.06	0.06	**0.06**	acres
Maximum Volume Stored =	0.020	0.015	0.024	0.024	0.025	0.025	acre-ft

Stormwater Detention and Infiltration Design Data Sheet





2 Supplemental Information

Material Receipts

Delivery Ticket

Ticket Number	Truck Number	Order Number
		CSCPSC1189131

Delivery Details

Address: **Site Contact:**

PSI1862707 06/30/2024

Account Details

Ed Green Construction

$3,826.73

Invoice Details

Order #: CSCPSC1189131
Date: 05/31/2024
Terms: Net 30
PO: BIORETENTION PU
Job:

Delivery Details

Ed Green Construction

Account Details

Ed Green Construction
Account Number: 10013561

Number	Description	UOM	Quantity	Sell Price	Total Price
RC9903	Bio Retention	YD	26.00	$35.00	$910.00
	Delivery Ticket #1 of #4				
RC9903	Bio Retention	YD	26.00	$35.00	$910.00
	Delivery Ticket #2 of #4				
RC9903	Bio Retention	YD	25.00	$35.00	$875.00
	Delivery Ticket #3 of #4				
RC9903	Bio Retention	YD	27.00	$35.00	$945.00
	Delivery Ticket #4 of #4				

Subtotal: $3,640.00
Tax: $186.73

DELIVERY TICKET

Sales Order Number: **CSCPSC1189777**
Requested Delivery Date: 05/31/24
Delivery Window:
Dispatch: Pick Up at a Pioneer L
Store Number: CSC
Sales Person: Chad Howell
P.O. Number **BIORETENTION PU**

Sold To:
Ed Green Construction
719-475-0922
Pat Combs Ext 101
1180 Transit Drive
Colorado Springs, CO 80903

Ship To:
Ed Green Construction

Payment Method: **On Account**
Payment Terms(Subject to Change): **Net 30**

Delivery Comments:

Item No.	Description	Unit	Quantity	Tare Weight	Gross Weight
RC9903	Bio Retention	YD	26	32,560	82,800
RC9903	Bio Retention	YD	21	32,560	74,500

REMIT TO: **Pioneer**
630 Plaza Dr., Ste. 150
Highlands Ranch, CO 80129

800-777-8139

Conditions of Sale

Although we strive to minimize color and size variations in our products, you acknowledge and agree that we assume no responsibility and make no guarantees that the products you are purchasing do not contain certain color, size, or other cosmetic variations. Many of our products contain naturally occurring colored minus material known as fines. Sized products typically contain 20-30% fines, Screened 30-50% fines, Minus 50-80% fines and Rip Rap 50% fines.

You understand and agree that risk of loss to the products you are purchasing will pass to you upon delivery of the products to your delivery address, with or without obtaining your signature on delivery. Title to the products will only pass to you upon our receipt of your payment in full for the products. You also acknowledge and agree that we will not be responsible for any property damage or personal injury that may occur while loading or unloading the product, including with respect to your vehicle or any damage or injury that may occur during the placement of any products and hereby release and agree to idemnify and hold harmless Pioneer from any and all liability for any such damage or injury

You may request a return within 30 days of purchase if you have received defective or damaged products, or if you have received wrong or missing products. Please note that bagged products and special order items cannot be returned. We do not offer a pick-up service for returned products. All returns must be returned in their original condition and will be subject to a 25% restocking fee.

Palletized products are subject to a $17.00 pallet deposit. We will issue you a $15.00 refund for pallets that, in our discretion, are returned in good condition.

TO THE FULLEST EXTENT PERMITTED UNDER APPLICABLE LAW, PIONEER MAKES NO OTHER WARRANTY WHATSOEVER WITH RESPECT TO ANY PRODUCT, WHETHER ARISING BY LAW, COURSE OF DEALING,COURSE OF PERFORMANCE, USAGE OF TRADE, OR OTHERWISE, INCLUDING WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

I have read the above and accept the terms and Conditions of Sale.

X: _____ **DATE:** _____

Turf & Soil Diagnostics

ACCREDITED TESTING Cert #0797.01

All American Sports Material
Bill Schell
10100 Dallas St.
Henderson, CO 80640

Date Received Jan-30-2023
Date Reported Feb-06-2023
Facility Product Development

Particle Size Evaluation*

								% Retained mm (US sieve)					
Lab ID#	**Sample Name**	**% Gravel (mm/US sieve)**			**% Sand**	**% Silt**	**% Clay**	**V. Coarse**	**Coarse**	**Medium**	**Fine**	**Fine**	**V. Fine**
		6.3 (1/4")	**4.0 (5)**	**2.0 (10)**	**2.0 - 0.05 mm**	**0.05-0.002mm**	**< 0.002mm**	**1.0 (18)**	**0.50 (35)**	**0.25 (60)**	**0.15 (100)**	**0.10 (140)**	**0.05 (270)**
23010082-1	Bioretention Soil	0.9	0.2	2.0	84.2	8.6	7.3	16.8	25.5	20.7	7.2	4.8	9.3

Lab ID#	**Sample Name**	**Combined Fractions < 0.25 mm**	**D50 mm**	**USDA Textural Classification**	**Uniformity Coefficient Cu**	**Acid Reaction**	**% Organic Matter Dry Wt.*** **
23010082-1	Bioretention Soil	37.0	0.40	Loamy Sand	87	None	3.8

*ASTM F1632 Method B & Determination of Size Factors SOP

***ASTM F1647 Method A

Samples were tested as received and comments pertain only to the samples shown.
This report may not be reproduced in part, but only in full.
Sample condition upon receipt was normal.
Samples were received with a transmittal letter.

Reviewed by Sam Ferro Digitally signed by Sam Ferro Date: 2023.02.06 16:04:33 -06'00'

613 E. 1st St. Linwood, Kansas 66052 ■ Phone: 855-769-4231
E-mail: lab@turfdiag.com ■ Website: http://www.turfdiag.com

SOIL ANALYSIS

Submitted by 6605210
Turf & Soil Diagnostics
613 E. 1st
Linwood, KS 66052-4556

Submitted for
ALL AMERICAN SPORTS

AgSource LABORATORIES

Laboratory Sample #
CN18157

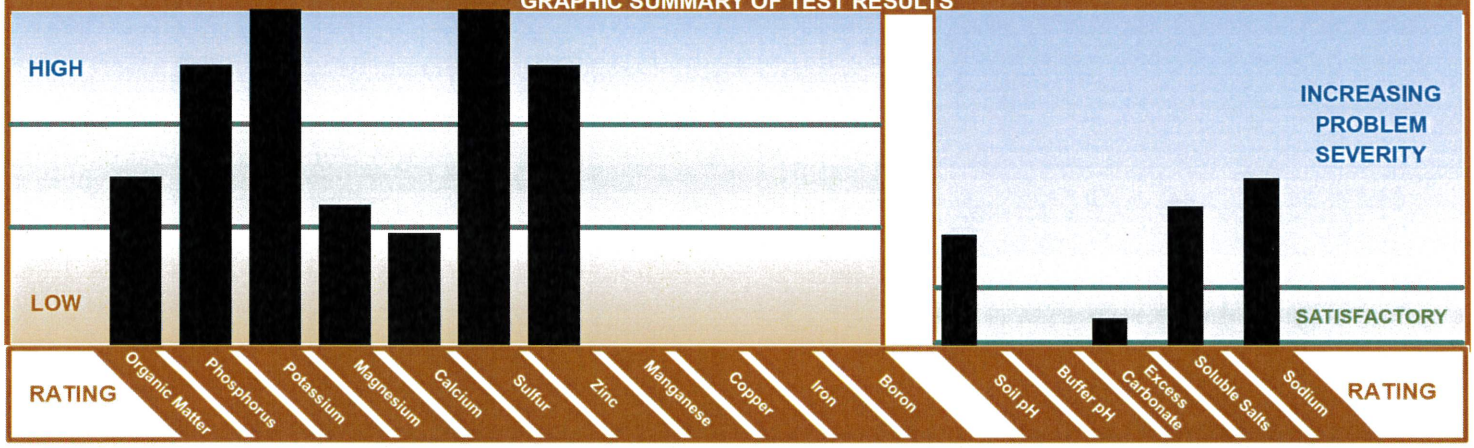
Date Received
3-Feb-2023

Date Reported
06-Feb-2023

Information Sheet #
525367

Laboratory Turnaround **3 Days** | Samples Will Be Stored Until **18-Feb-2023** | Field Identification

GRAPHIC SUMMARY OF TEST RESULTS



REPORT OF ANALYSIS

YOUR SAMPLE NUMBER	BLORET SOIL
Soil pH	7.4
Buffer Index	--
Excess Carbonate	L - 0.1%
Soluble Salts mmhos/cm	1.7
Sodium ppm	389.0
% Organic Matter	4.2
ANALYSIS OF NUTRIENT ELEMENTS IS IN PARTS PER MILLION (ppm)	
Nitrate N	15.3
Phosphorus Bray 1 / Olsen	49
Potassium	812
Magnesium	349
Calcium	2247
Sulfate Sulfur	389
Zinc	9.8
Manganese	17.3
Copper	1.1
Iron	60.7
Boron	--
Bulk Density	1.5

FERTILIZER GUIDELINES IN: Lbs/1000 sq ft

1st Option Intended Crop	2nd Option Intended Crop	3rd Option Intended Crop
Lawn		
Yield Goal	Yield Goal	Yield Goal
Preceding Crop	Preceding Crop	Preceding Crop

PLANT FOOD GUIDELINE RANGES		CROP REMOVAL RATES	PLANT FOOD GUIDELINE RANGES		CROP REMOVAL RATES	PLANT FOOD GUIDELINE RANGES		CROP REMOVAL RATES
N	1.1	3	N			N		
P_2O_5	0.0	1	P_2O_5			P_2O_5		
K_2O	0.0	1	K_2O			K_2O		
MgO	0.0		MgO			MgO		
S	0.0		S			S		
Zn	0.0		Zn			Zn		
Mn	0.0		Mn			Mn		
Cu	0.0		Cu			Cu		
Fe	0.0		Fe			Fe		
B			B			B		
Gypsum	33		Gypsum			Gypsum		

Lime Guidelines are for 100% Effective Calcium Carbonate (ECC) with a 6" Incorporation Depth.

ACTUAL AND SUGGESTED PERCENT OF TOTAL CEC (BASE SATURATION)

Actual % Hydrogen	Suggested Hydrogen	Actual % Potassium	Suggested Potassium	Actual % Magnesium	Suggested Magnesium	Actual % Calcium	Suggested Calcium	ESTIMATED Actual % Sodium	ESTIMATED Suggested Sodium	ESTIMATED CEC for Your Soil
0.0	0 - 5	11.6	4.1 - 7	16.2	15 - 20	62.7	65 - 75	9.4	0 - 5	17.9

300 Speedway Circle, Unit 2 • Lincoln, NE 68502 • P: 402.476.0300 • lincoln@agsource.com

CTL | THOMPSON INCORPORATED

December 7, 2018

Pioneer Sand Company, Inc.
5000 Northpark Drive
Colorado Springs, Colorado 80907

Attention: Mr. Jason Ulmer

Subject: Gradation Analysis, -200 Wash
Concrete Sand - Solberg Quarry
Colorado Springs, Colorado
Project No. CS14925.001-400

Gentlemen:

As requested, we performed a gradation analysis, and -200 wash on a sample of concrete sand material from the Solberg Quarry submitted on December 5, 2018. Testing was performed in accordance with applicable ASTM Standards. The test results are presented below:

Sieve Size	Percent Passing
3/8"	100
No. 4	98
No. 8	75
No. 16	51
No. 30	33
No. 50	18
No. 100	7
No. 200	2.0
F.M.	3.17
Moisture%:	8.0
Date Sampled:	12/05/2018

If we can be of further service, please call.

Very truly yours,

CTL | THOMPSON, INC.

Mark Coppeak
Senior Engineering Technician

MC:vc
Via Email: jason.ulmer@pioneerco.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

A-1 Organics - Colorado
Chris Skelton
16350 WCR 76
Eaton
CO 80615

Product Identification Compost
RR004 121118 BIOCOMP

Date Sampled/Received: 11 Dec. 18 / 13 Dec. 18

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	***Reported as*** *(units of measure)*	***Test Results***	***Test Results***
Plant Nutrients:	%, weight basis	Not reported	Not reported
Moisture Content	%, wet weight basis	22.9	
Organic Matter Content	%, dry weight basis	23.9	
pH	units	6.53	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	3.0	
Particle Size or Sieve Size	maxium aggregate size, inches	0.38	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	2.4	Stable
	mg CO_2-C/g TS/day	0.58	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	94.6	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Dec18B Laboratory Number: 8120462-1/1

Analyst: Assaf Sadeh

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

A-1 Organics - Colorado
Chris Skelton
16350 WCR 76
Eaton
CO 80615

Product Identification Compost
RR004 121118 BIOCOMP

Date Sampled/Received: 11 Dec. 18 / 13 Dec. 18

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.88	1.1
Phosphorus	P_2O_5	0.86	1.1
Potassium	K_2O	0.30	0.40
Calcium	Ca	0.78	1.0
Magnesium	Mg	0.19	0.24
Moisture Content	%, wet weight basis	22.9	
Organic Matter Content	%, dry weight basis	23.9	
pH	units	6.53	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	3.0	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	100.0	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	2.4	Stable
	mg CO_2-C/g TS/day	0.58	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	94.6	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

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Laboratory Group: Dec18B Laboratory Number: 8120462-1/1

Analyst: Assaf Sadeh

www.compostlab.com

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY
WATSONVILLE
CALIFORNIA
95076
USA

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com

Account #: 8120462-1/1-2355
Group: Dec18B #17
Reporting Date: December 27, 2018

A-1 Organics - Colorado
16350 WCR 76
Eaton, CO 80615
Attn: Chris Skelton

Date Received: 13 Dec. 18
Sample Identification: RR004 121118 BIOCOMP
Sample ID #: 8120462 - 1/1

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.1	0.88	%
Ammonia (NH_4-N):	630	490	mg/kg
Nitrate (NO_3-N):	610	470	mg/kg
Org. Nitrogen (Org.-N):	0.98	0.76	%
Phosphorus (as P_2O_5):	1.1	0.87	%
Phosphorus (P):	5000	3800	mg/kg
Potassium (as K_2O):	0.40	0.31	%
Potassium (K):	3300	2500	mg/kg
Calcium (Ca):	1.0	0.78	%
Magnesium (Mg):	0.24	0.19	%
Sulfate (SO_4-S):	510	390	mg/kg
Boron (Total B):	14	11	mg/kg
Moisture:	0	22.9	%
Sodium (Na):	0.10	0.078	%
Chloride (Cl):	0.062	0.048	%
pH Value:	NA	6.53	unit
Bulk Density :	39	51	lb/cu ft
Carbonates ($CaCO_3$):	13	9.7	lb/ton
Conductivity (EC5):	3.0	NA	mmhos/cm
Organic Matter:	23.9	18.4	%
Organic Carbon:	13.0	9.9	%
Ash:	76.1	58.7	%
C/N Ratio	11	11	ratio
AgIndex	> 10	> 10	ratio

Stability Indicator:	
CO2 Evolution	Respirometery
mg CO_2-C/g OM/day	2.4
mg CO_2-C/g TS/day	0.58
Stability Rating	*stable*

Maturity Indicator: Cucumber Bioassay	
Compost:Vermiculite (v:v)	1:2
Emergence (%)	100
Seedling Vigor (%)	95
Description of Plants	*healthy*

Pathogens	Results	Units	Rating
Fecal Coliform	< 7.5	MPN/g	*pass*
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 13 Dec. 18

Physical Contaminants**	% by weight
Total Plastic	< 0.1
Film Plastic	< 0.1
Glass	< 0.1
Metal	< 0.1
Sharps	ND
Total	< 0.5

Metals	Dry wt.	EPA Limit	units
Aluminum (Al):	5100	-	mg/kg
Arsenic (As):	2.3	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	16	-	mg/kg
Cobalt (Co)	2.1	-	mg/kg
Copper (Cu):	71	1500	mg/kg
Iron (Fe):	8000	-	mg/kg
Lead (Pb):	5.5	300	mg/kg
Manganese (Mn):	180	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	3.0	75	mg/kg
Nickel (Ni):	8.0	420	mg/kg
Selenium (Se):	1.2	100	mg/kg
Zinc (Zn):	140	2800	mg/kg

Size Distribution	
MM	% by weight
> 50	0.0
25 to 50	0.0
16 to 25	0.0
9.5 to 16	0.0
6.3 to 9.5	1.3
4.0 to 6.3	4.3
2.0 to 4.0	10.8
< 2.0	83.6

**Greater than 4mm in size (Sharps greater than 2mm)

Analyst: Assaf Sadeh

*Sample was received and handled in accordance with TMECC procedures.

Account No.: 8120462 - 1/1 - 2355
Group: Dec18B No. 17

Date Received 13 Dec. 18
Sample i.d. RR004 121118 BIOCOMP
Sample I.d. No. 1/1 8120462

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate
2.4 mg CO2-C/ g OM/day

Biodegradation Rate of Your Pile

< Stable	>|<Moderately Unstable>|<	Unstable	>|< High For Mulch

Is Your Compost Mature?

AmmoniaN/NitrateN ratio
1.0 Ratio

VeryMature>|<	Mature	>|< Immature

Ammonia N ppm
630 mg/kg dry wt.

VeryMature>|<	Mature	>|< Immature

Nitrate N ppm
610 mg/kg dry wt.

< Immature	>|< Mature

pH value
6.53 units

< Immature	>|< Mature	>|< Immature

Cucumber Emergence
100.0 percent

< Immature	>|< Mature

Is Your Compost Safe Regarding Health?

Fecal Coliform
< 1000 MPN/g dry wt.

< Safe	>|< High Fecal Coliform

Salmonella
Less than 3 /4g dry wt.

<Safe (none detected)	>|< High Salmonella Count(> 3 per 4 grams)

Metals US EPA 503
Pass dry wt.

<All Metals Pass	>|< One or more Metals Fail

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
2.6 Percent dry wt.

<Low	>|< Average	>|< High Nutrient Content

AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
15 Ratio

Na & Cl	>|< Nutrient and Sodium and Chloride Provider	>|< Nutrient Provider

Plant Available Nitrogen (PAN) Estimated release for first season
3 lbs/ton wet wt.

Low Nitrogen Provider>|<	Average Nitrogen Provider	>|<High Nitrogen Provider

C/N Ratio
11 Ratio

< Nitrogen Release	>|< N-Neutral	>|< N-Demand	>|< High Nitrogen Demand

Soluble Available Nutrients & Salts (EC5 w/w dw)
3.0 mmhos/cm dry wt.

SloRelease>|< Average Nutrient Release Rate	>|<High Available Nutrients

Lime Content (CaCO3)
13 Lbs/ton dry wt.

< Low	>|< Average	>|< High Lime Content (as CaCO3)

What are the physical properties of your compost?

Percent Ash
76.1 Percent dry wt.

< High Organic Matter	>|< Average	>|< High Ash Content

Sieve Size % > 6.3 MM (0.25")
1.3 Percent dry wt.

All Uses	>|< Size May Restrict Uses for Potting mix and Golf Courses

Account No.:		Date Received	13 Dec. 18
8120462 - 1/1 - 2355		Sample i.d.	RR004 121118 BIOCOMP
Group:	Dec18B No. 17	Sample I.d. No.	1/1 8120462

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate

2.4 Low: Good for all uses mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

1.0 mature

Ammonia N ppm	
630	immature
Nitrate N ppm	
610	mature
pH value	
6.53	mature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions. For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent

Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt.

Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt.

Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass

The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

2.6 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

Account No.:		Date Received	13 Dec. 18
8120462 - 1/1 - 2355		Sample i.d.	RR004 121118 BIOCOMP
Group:	Dec18B No. 17	Sample I.d. No.	1/1 8120462

INTERPRETATION:

AgIndex (Nutrients/Na+Cl)

15 High nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

3 Low N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on the respiration rate, ammonia, and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to offset the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

11 Indicates maturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate. If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

3.0 Average salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

13 Average lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

76.1 High ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

1.3 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Appendix:

Plant Available Nitrogen (PAN) calculations:

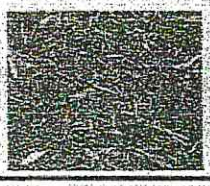
PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))

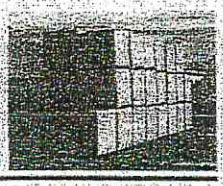
X value = If RR < 2 then X = 0.1
If RR =2.1 to 5 then X = 0.2
If RR =5.1 to 10 then X = 0.3
If RR > 10 then X = 0.4

Note: If C/N ratio > 15 additional N should be applied.
RR = Respiration rate

Estimated available nutrients for use when calculating application rates

	lbs/ton (As Rcvd.)
Plant Available Nitrogen (PAN)	3.5
Ammonia (NH4-N)	0.98
Nitrate (NO3-N)	0.94
Available Phosphorus (P2O5*0.64)	11.1
Available Potassium (K2O)	6.0





Western Red Cedar Bark Mulch

- Our bark mulch is made from 100% natural Western Red Cedar (Thuja plicata), which is found on the west coast of North America.

- Western Red Cedar Bark Mulch is the most aromatic and durable landscaping mulch on the market. This mulch is red-to-brown in color with a hint of orange. It maintains its color longer than any other type of mulch and has no dyes or additives to enhance its color. The shredded fiber bonds together making it one of the most wind resistant and its stringy characteristics allows it to hold together on slopes or during rainy weather.

- Cedar Bark Mulch has natural herbicide and anti-fungal properties and controls weeds making it an ideal landscaping mulch. Cedar has natural preservatives which makes it last longer and it can be used for more than one season. The bark mulch is beneficial to the roots of the plants by retaining water during summer months and providing insulation during the winter months. It is well suited for trees, shrubs and flower beds.

- We process the bark mulch by running it through a fixed hammer hog and screening it to a less than 2½" size. Our bark mulch is a blend of approximately 50% bark fiber and 50% wood fiber. Available in "bulk" or "5.5 cuyd bale" form.

- The Colorado State University conducted a study on cedar bark mulch and concluded that Western Red Cedar has no toxic qualities for young plants when used as a mulch (see Colorado State University Master Gardener – Mulching with Wood - GardenNotes #216).

RAIN GARDEN MIX
LOT: G-241055

Mixture/Variety:	Pure Seed %	Total Viable %	Origin:
SWITCHGRASS, DACOTAH	12.91%	93.00%	ND
SAND BLUESTEM, CHET	10.25%	99.00%	OK
SIDEOATS GRAMA, NATIVE	9.92%	88.00%	KS
WESTERN WHEATGRASS, ROSANA	9.87%	88.00%	WA
ALKALI SACATON, VNS	9.51%	91.00%	CO
PRAIRIE SANDREED, GOSHEN	9.44%	93.00%	MT
INDIAN RICEGRASS, NEZPAR	9.21%	95.00%	WY
SAND DROPSEED, VNS	8.87%	99.00%	CO
LITTLE BLUESTEM, CAMPER	8.81%	99.00%	NE

VNS = Variety Not Stated

Crop Seed: 0.06% Inert Matter: 11.10% Weed Seed: 0.08% Net Wt. 34.7#

Noxious Weeds: NONE FOUND Tested: 5/24

CUSTOM MIX FOR LL JOHNSON

Buffalo Brand Seed Greeley, CO 80631 (970) 356-4710

QUICK TO GROW MIX
LOT # : G-231114

Mixture/Variety:	Pure Seed %	Total Viable%	Origin:
ANNUAL RYEGRASS, GULF	29.83%	90.00%	OR
SHEEP FESCUE, BLUE MESA	24.71%	85.00%	OR
PERENNIAL RYEGRASS, VNS	24.60%	94.00%	WA
KENTUCKY BLUEGRASS, AVIATOR II	19.57%	91.00%	WA

Crop Seed: 0.16% Inert Matter: 1.11% Weed Seed: 0.02% Net Wt. 50#

SUGGESTED SEEDING RATE = 3 - 5 LBS PER 1000 SQ FT.

Noxious Weeds: NONE FOUND Tested: FEB 2023

04-300-50

Buffalo BRAND SEED

BUFFALO BRAND SEED Greeley, CO 80631 (970) 356-4710