



The National Mall

A Review of the Turf Renovation

Presented by Norm Hummel, Eric Ervin, Steve LeGros and
Murray Cook

What is the National Mall

- The National Mall is located at the heart of Washington, DC and is considered America's Front Yard.
- The park is home to some of our nation's most recognizable monuments, memorials and major events: presidential inaugurations, social and political demonstrations, and historical commemorations.

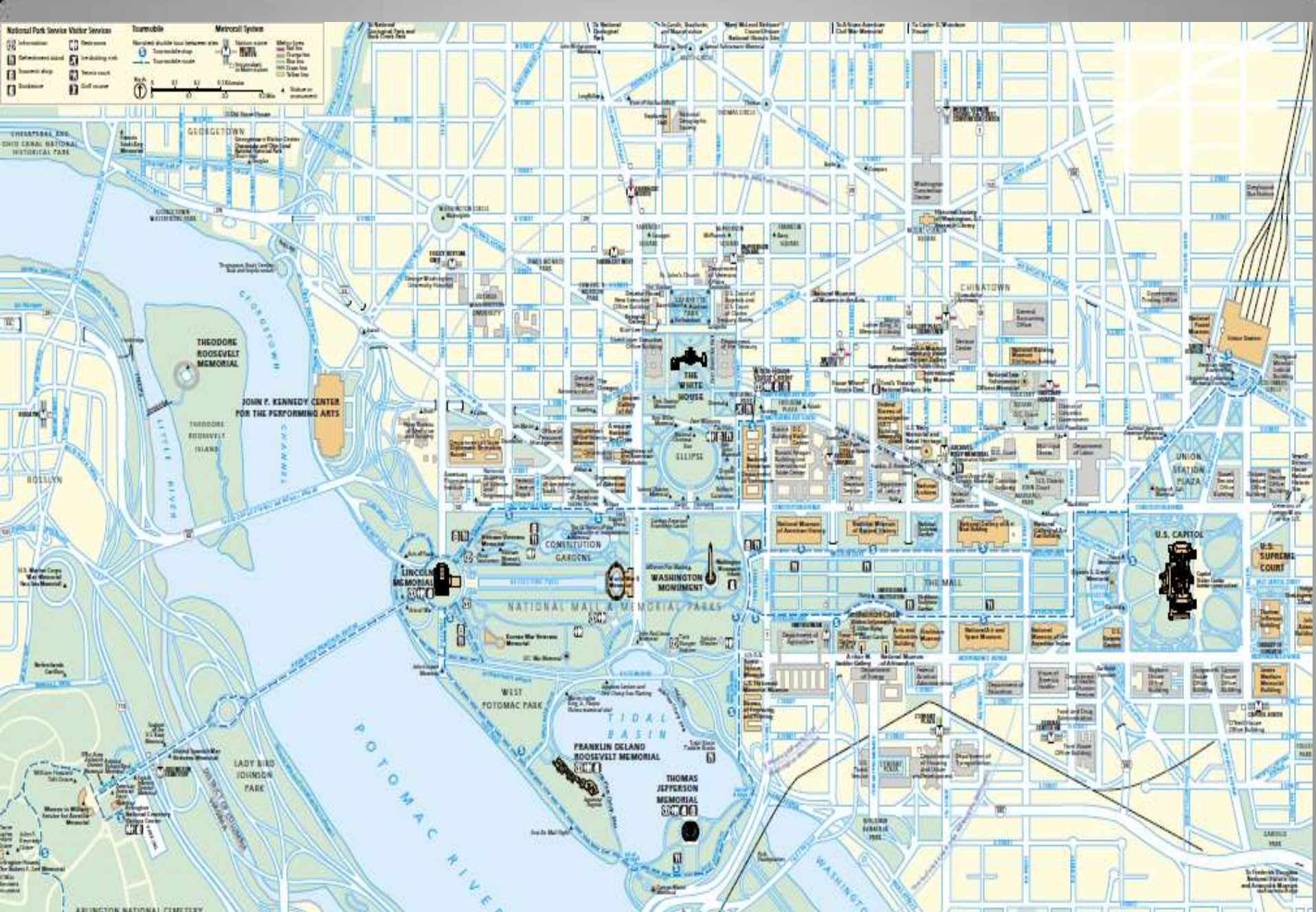


Major Events



National Mall Facts

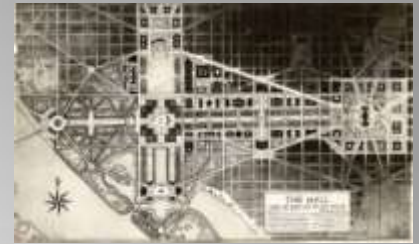
- Visitors per year: 25,000,000
- The National Mall has more visits than Yellowstone, Yosemite and Grand Canyon National Parks combined and hosts more than 3,000 permitted events each year.
- 600 total acres
- From the Capitol to the Lincoln Memorial is 2 miles







History



- The L'Enfant plan 1791 – GW's city planner
- The McMillan Plan 1901- continued with Pierre's vision
- The Legacy Plan 1997- Developing new areas for monuments and museums.
- The Capital Space Plan 2009 – a joint initiative with the NCPC, NPS and the district to upgrade public space across the board
- Studies were completed on *"Best Management Practices"* from Four sites in the United States —
 - Central Park in New York City,
 - Golden Gate Park in San Francisco,
 - Millennium Park in Chicago,
 - Piedmont Park in Atlanta.
 - Three park sites are in national capitals — Canberra, Australia (Parliamentary Triangle); Ottawa, Canada (National Capital Commission); and London, England (The Royal Parks).

Comparison of Basic Site Characteristics

	Size	Annual Number of Visitors	Landownership	Management	Annual Number of Event Permits (avg.)*	Events Required by Law
National Mall, Washington, D.C.	600 acres	26 million	Federal Government	National Park Service	3,000 permitted activities	First Amendment demonstrations, annual celebrations, concerts, and festivals
U.S. Parks						
Central Park, New York City	843 acres	25–30 million	NYC Parks Department	Central Park Conservancy	Six major events/year on Great Lawn, with maximum of 50,000 attendees	None, although many recurring events.
Golden Gate Park, San Francisco	1,017 acres	11–15 million	City and County of San Francisco	San Francisco Recreation and Park Department	N/A	None, although many recurring events.
Millennium Park, Chicago	24.5 acres	3 million	City of Chicago	City and Contractors	N/A	None, although many recurring events.
Piedmont Park, Atlanta	180 acres	3 million	City of Atlanta	Piedmont Park Conservancy	Mo more than five events with more than 100,000 attendees	None, although many recurring events.
Parks in National Capitals						
Canberra, Australia	2,965 acres	300,000	Australian Government	National Capital Authority	N/A	None, although many recurring events.
Ottawa, Canada	7,767 acres total (126 ac. for core parks)	2 million (event attendance)	Federal Government	Crown Corporation	200 events of various sizes permitted	None, although many recurring events.
The Royal Parks, London, England	350 acres	5 million	The Crown	Department for Culture, Media and Sports	N/A	Yes, plus ad hoc events, such as the Queen's 50th Anniversary.

Funding for the National Mall

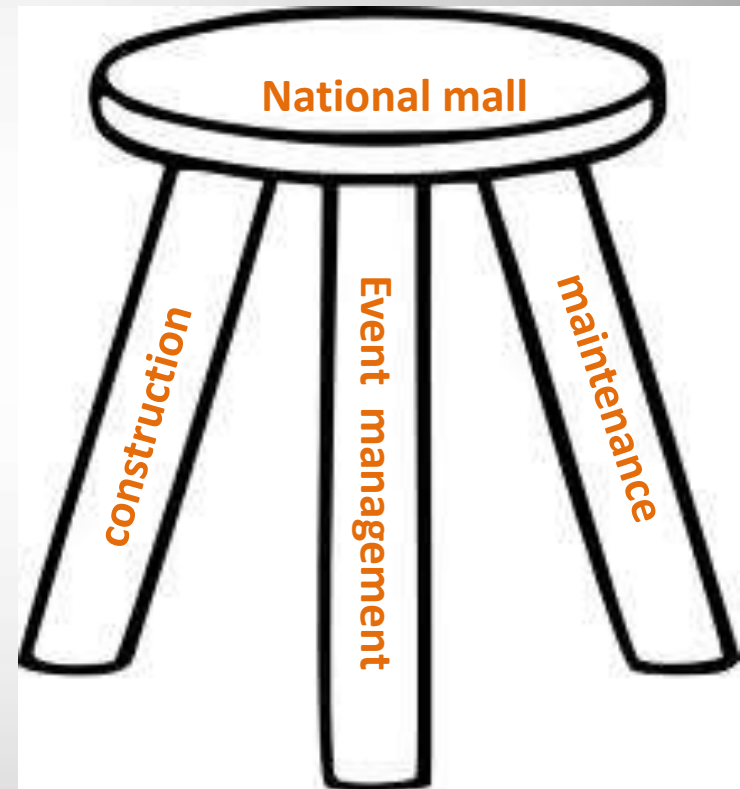
- It is stated that The National Park Service is facing billion's in repair and maintenance.
- There is a backlog of repairs for all national parks and an estimated \$400 million for the National Mall.
- Therefore the Trust was created in 2009 to engage America to donate services, products and funding.

The Mall Team

- The Trust for the National Mall
- National Parks Service
 - Sean Kennealy - Chief, Division of Facility Management
 - Alice McLarty - Landscape Architect
 - Michael Stachowicz – Turf Manager
- HOK Architectural Group
- Contractors: Clark Construction & Valley Crest
 - Brent Weber – Area Superintendent

The 3-legged Stool

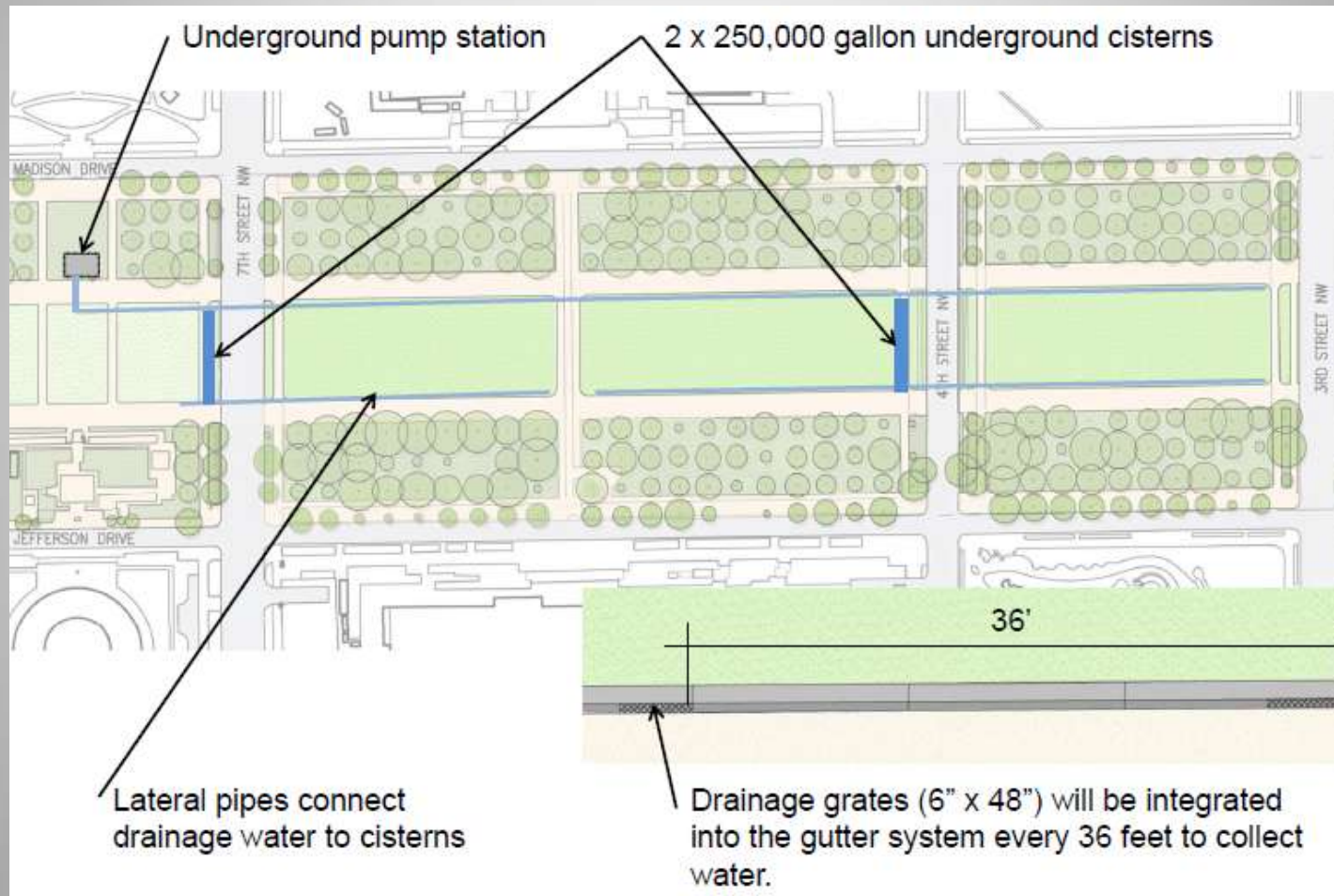
- Improve the Soil structure and the ability to grow grass
- Upgrade the methods used to plan and manage events
- Invest in staff and equipment to provide more consistent maintenance operations.



Renovation Details

- Drainage system
- An irrigation and cistern system
- Engineered Soils
- Sod
 - First choice seed - then it became sod project
 - 400,000 sq ft of Tall type fescue from Tuckahoe. 30% Faith, 30% Tarheel II, 30% Wolfpack II, 10% Abbey Bluegrass
- Granite Curbing upgrades
- Enhanced roadways for event usage

Cistern Placement



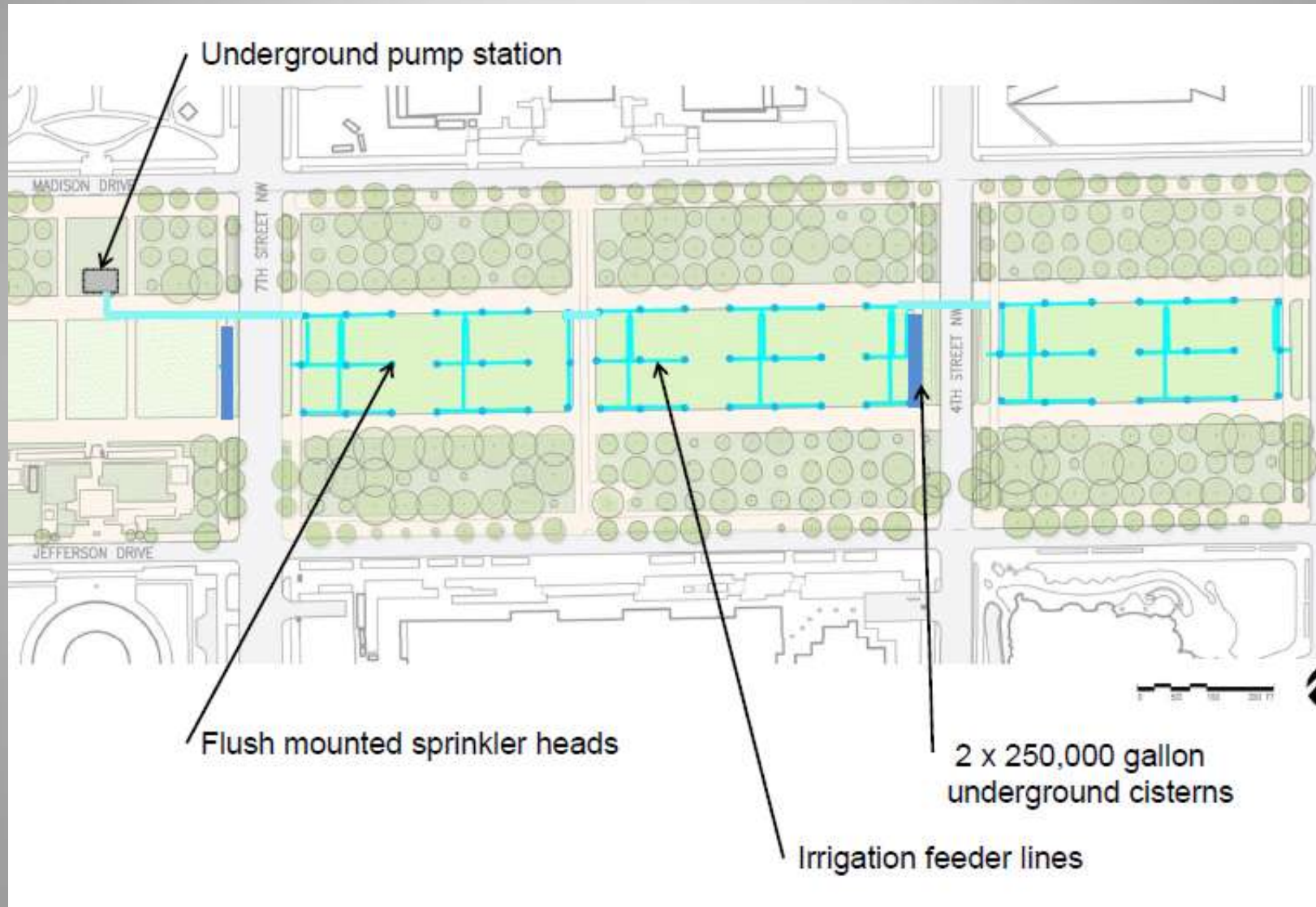
Underground Pump House



Pump House Completed



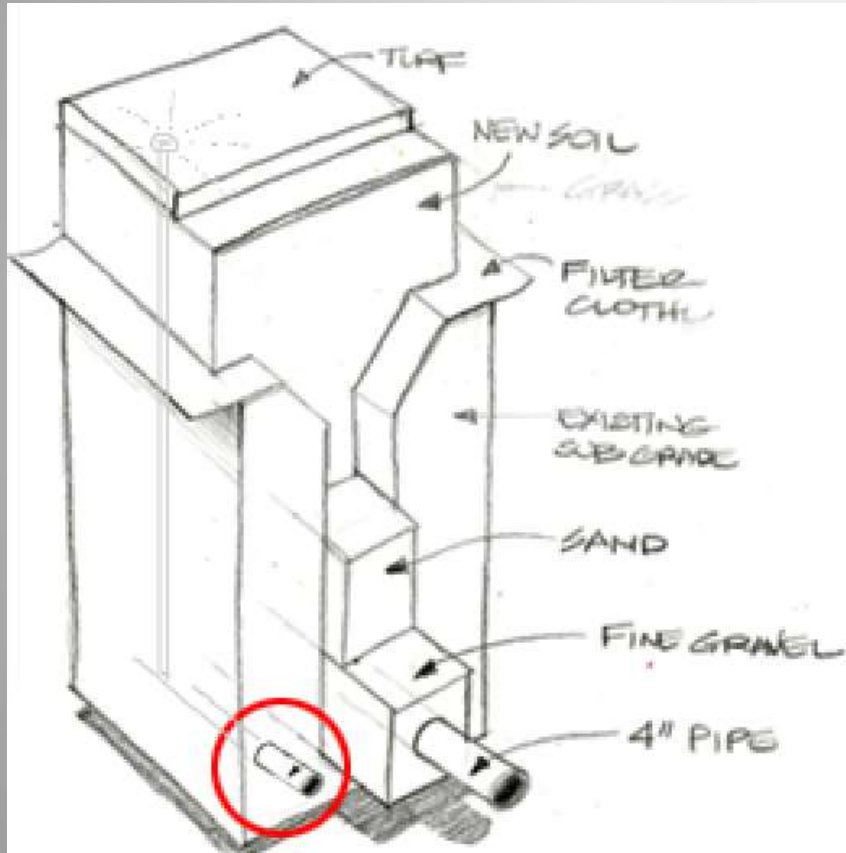
Irrigation Design



Irrigation Layout



Profile design



- 12" native soil blend
- 4" sand blanket
- 4' drain trenches with Perforated pipe
- Trench lined with Geo
- Compacted sub-base

Drain Clean outs



Trees of the Mall



New Granite Curbing



Spreading topsoil



Types of Soils Used





National Mall Renovation – The Soils

Norman W. Hummel Jr, President
Hummel & Co. Inc.
(www.turfdactor.com)

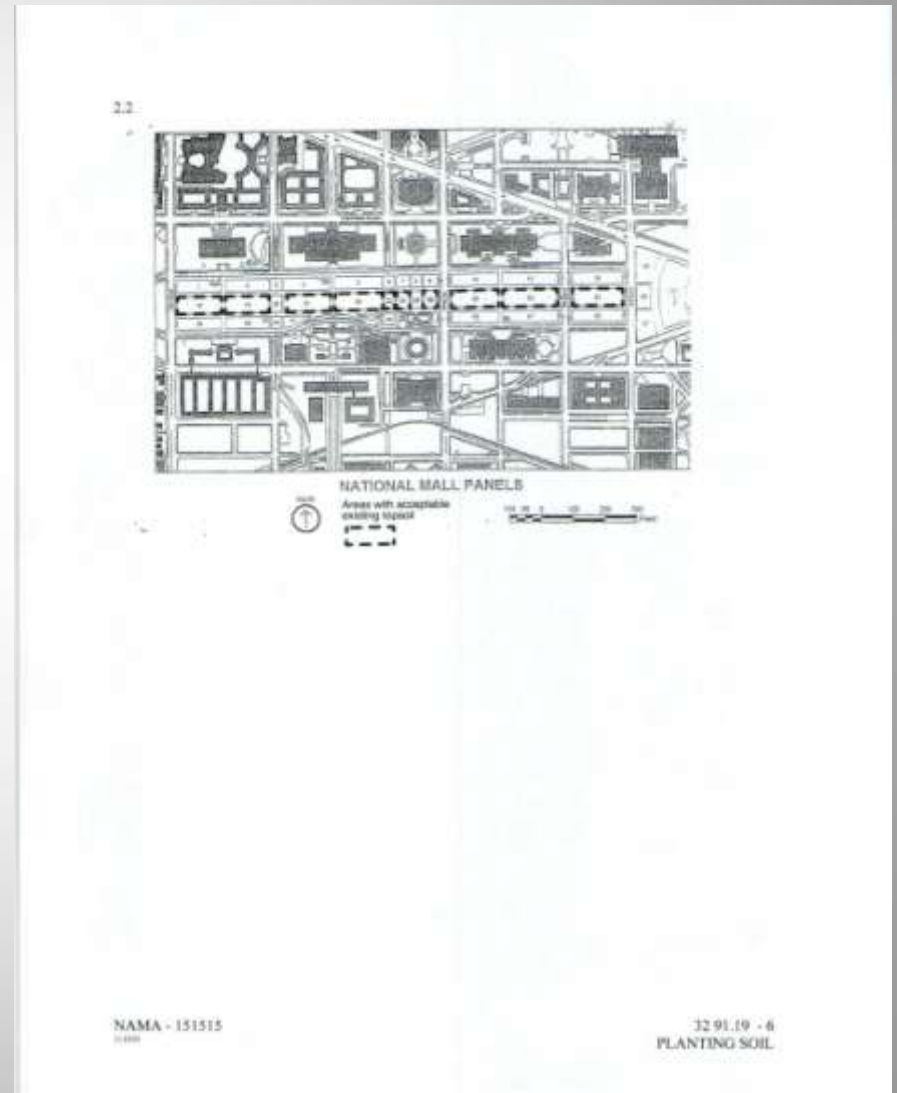


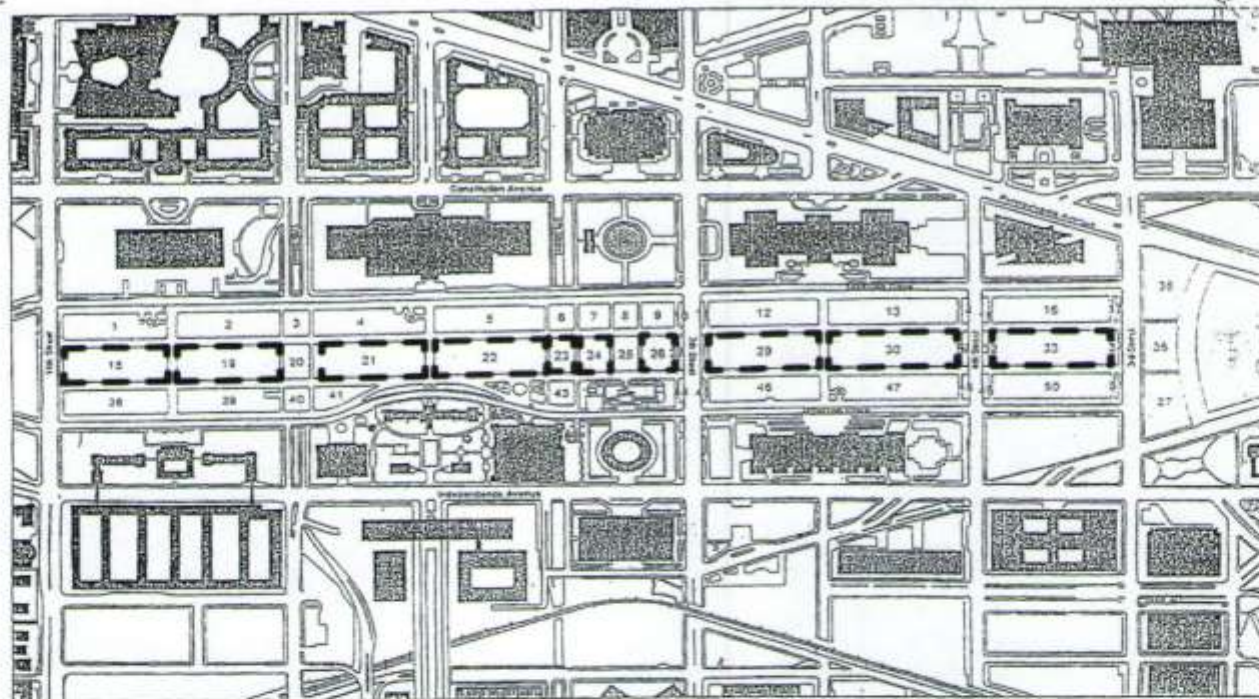
Design Considerations

- Desire of client (National Park Service) that lawn be “sustainable”
 - Economically feasible, ecologically viable, socially desirable.
- Desire of client to reuse as much of existing soil and/or local materials as possible.
 - Reduced capital costs
 - Community goodwill

Preliminary Work

- Soil samples taken from each panel in 2010 to see what soils present on site were like.
- Areas with acceptable soil for reuse were identified.





NATIONAL MALL PANELS



Areas with acceptable
existing topsoil



100 50 0 100 200 300
Feet



Hummel & Co., Inc. • 35 King Street • P.O. Box 606 • Trumansburg, New York 14886 • Phone: (607) 387-5694 • Fax: (607) 387-9499 • Web Site: www.hummelandco.com

MATERIALS TEST REPORT FOR
National Mall

REPORT TO:	Suzette Goldstein	DATE RECEIVED:	August 9, 2010
	HOK	TEST DATES:	August 9 - 17
	Canal House, 3223 Grace St. N.W.	REPORT DATE:	August 20, 2010
	Washington, DC 20007	CONDITION OF SAMPLE:	Normal

PARTICLE SIZE ANALYSIS (ASTM F-1632)

Lab ID No.	Sample	Gravel %		Soil Separate %			Sieve Size/Sand Fraction Sand Particle Diameter % Retained				
		1/2"	No. 10 2 mm	Sand	Silt	Clay	No. 18 V. coarse 1 mm	No. 35 Coarse 0.5 mm	No. 60 Medium 0.25 mm	No. 140 Fine 0.10 mm	No. 270 V. fine 0.05 mm
27884-1	#1	5.4	2.2	37.0	43.9	19.1	1.5	3.2	8.7	15.2	8.5
27884-2	#2	0.0	1.2	43.2	38.0	18.9	2.5	4.7	10.5	16.8	8.7
27884-3	#3	0.0	1.0	39.8	41.6	18.6	0.8	2.8	8.2	18.7	9.3

Dispersion Method: Reciprocating shaker

TEXTURAL CLASS /ORGANIC MATTER/pH

Lab ID No.	Sample	pH ¹	Organic Matter ² (%)	Textural Class (USDA)
27884-1	#1	5.4	4.13	Loam
27884-2	#2	5.5	4.18	Loam
27884-3	#3	5.4	4.06	Loam

1 ASTM D4972, method A, CaCl₂ 25 g sample used. pH is water available on request.

2 ASTM F1647, method 1

Design Considerations

- Core out, design and build sand-based lawn
- Advantages
 - Easy design, predictable outcome
- Disadvantages
 - Cost
 - Sustainable?
 - Will maintenance be adequate?
 - Is it best for projected use
 - Multiday festivals – no irrigation
 - Lack of soil strength in wear areas



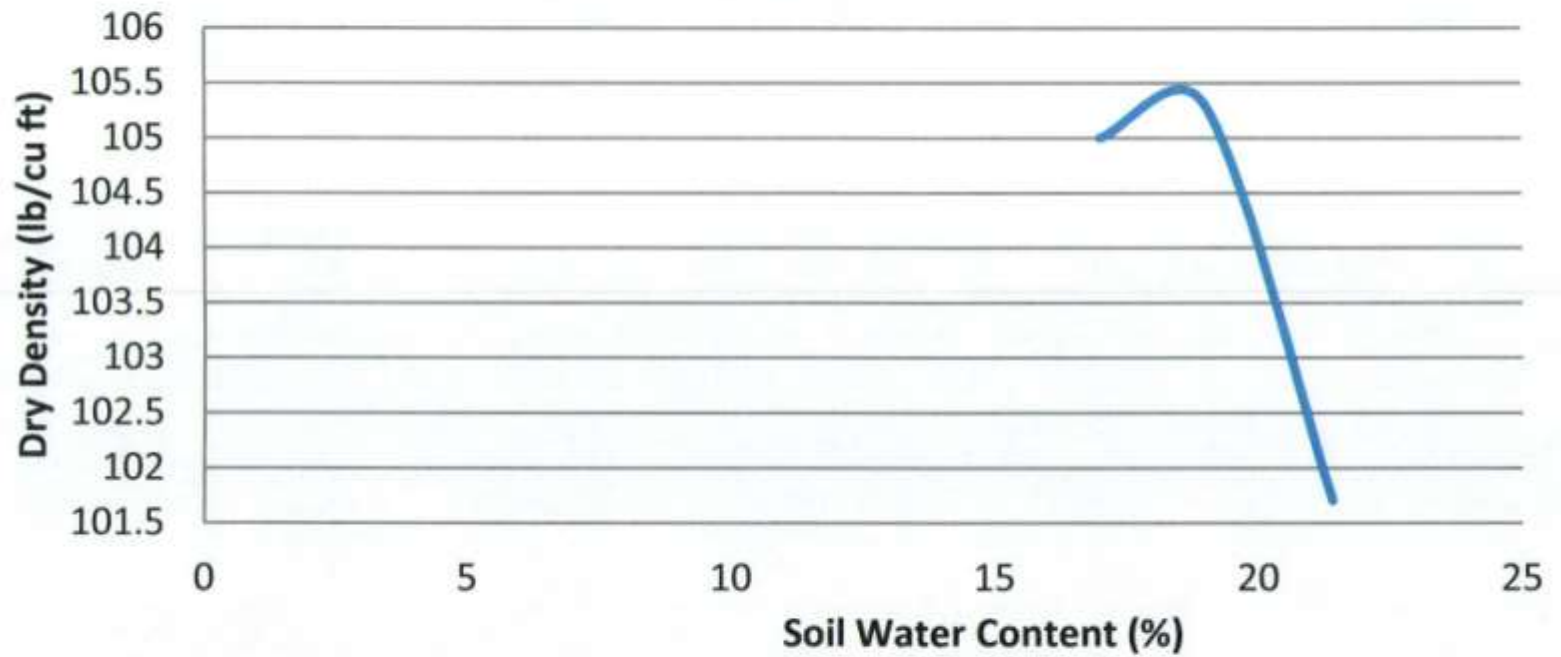


Design – Modified Soil

- Amend soil with coarse uniform sand to bring sand content to 65 to 75%.
 - Sand – C-33 sand with FM of 2.5 to 3.2 and Cu of less than 4.
- Amend with stable compost to achieve organic matter content of 4.5 to 6.5% by weight.
- Infiltration rate of 3 to 6 inches per hour with soil compacted to 85% maximum proctor density.



Moisture Density Relationship of Stancill's 4-2-3 Mix (Lab ID No. 30699-1)





MATERIALS TEST REPORT FOR National Mall

REPORT TO:	Erik Nickolas Valley Crest Landscape Dev. 1227 Ritchie Road Capitol Heights, MD 20743	DATE RECEIVED: March 30 & April 12, 2012 TEST DATE: March 30 - April 4, April 12 - 17 REPORT DATE: April 17, 2012 CONDITION OF SAMPLE: Normal
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30628-1	Stancills 4-2-3	11.2	80.2	12.0	7.9	12.7	20.8	29.5	13.5	3.7
Suggested Tolerance ranges*		9 - 14	77 - 83	17 - 23		10 - 16	18 - 24	26 - 33	11 - 16	2 - 6

* In addition, combined fine and very fine sand shall not exceed 25% of total sand content.

TEXTURAL CLASS /ORGANIC MATTER/pH

Lab ID No.	Sample	Infiltration Rate ¹ (in/hr)	Density (lb/cu ft)	EC dS/m	pH ¹	Organic Matter ² (%)	Textural Class (USDA)
30628-1	Stancills 4-2-3			0.89	6.9	4.75	Loamy sand
30699-1	4-2-3 at 85% of maximum density	10.2	89.2				
30699-1	4-2-3 at 90% of maximum density	5.9	93.0				
Suggested Tolerance ranges						4.5- 5.5	
Specifications		3 - 6					

1 Determined at listed percentage of maximum standard proctor density (ASTM D698)

2 ASTM D4972, Method A, CaCl₂, 25 g sample used. pH in water available on request.

3 ASTM F1647, method 1

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² ASTM D4972, Method A, CaCl₂, 25 g sample used. pH in water available on request.

³ ASTM F1647, method I

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Design

- Panels designed with crown of 1 to 1.5% for surface drainage.
- Infrastructure 4 feet deep (drainage and irrigation)
- Amended soil placed 12 inches deep on 4 inches of drainage sand blanket.
- Sand used for drainage blanket same as used to amend soil.







Quality Control

- One sample for every 500 yards
- Particle size and organic matter content determined.





Evaluation of Event Covers for Sports Turf

Erik Ervin, Ph.D.

Turfgrass Culture and Physiology

Virginia Tech

Solar house decathlon on National Mall



Master's thesis project of John Royse supported by National Park Service and Virginia Tech Athletics

Determine best covers to use on cool-season turf for turf protection and recovery; provide seasonal estimates of turf longevity

1. Plywood
2. Plywood over Enkamat
3. Matrax LD
4. Terratile



07/23/2010

Trial Details

- Tested over multiple seasons on mature stands of tall fescue; silt loam soil, 2.5 inches
- Each test cycle lasted for 20 days, with a set of covers removed every 2 days for 20 days to answer question:
 - Was the breaking point for unacceptable turf recovery at 2, 4, 6, 8, or more days of cover?
- All covers driven over once a day with a pickup truck
- No mowing, watering, fertilizing during 20-day cycles

Cover details



Treatments	Description	Light Transmission
Plywood	Standard $\frac{3}{4}$ inch	0%
Plywood over Enkamat	$\frac{3}{4}$ inch over spongy mat	0%
Terratile	Opaque polypropylene, open bottom with foot pads and air holes	25%
Matrax LD	Opaque polypropylene, flat bottom, no air holes	5%
Control	Uncovered	100%

Spring season results, 70 F average high

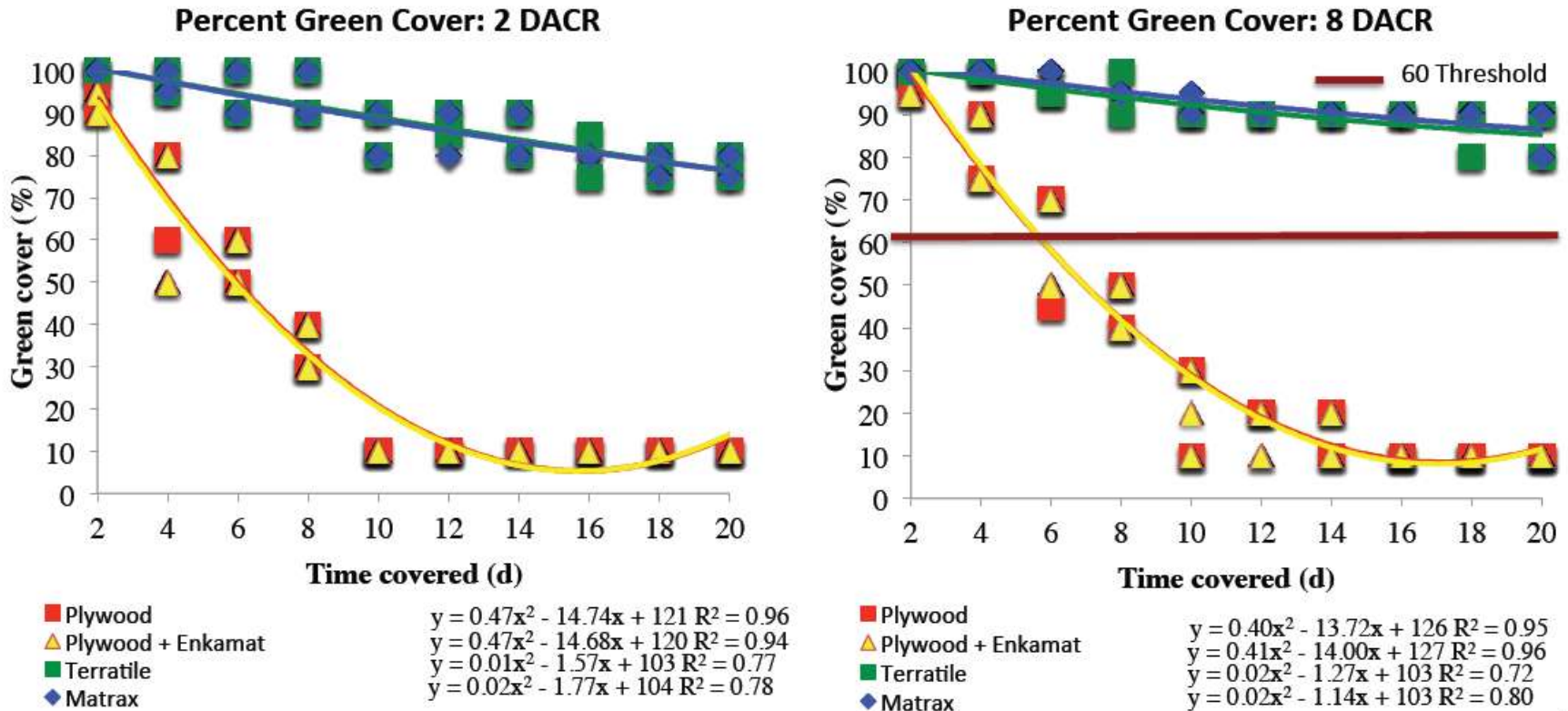


Figure 7. Percent green cover as affected by time covered and cover type when assessed at 2 and 8 days after cover removal (DACR) in the spring. Data pooled over two years.

Recommendation: Turf will recover even when covered for 20 straight days with Terratile and Matrax; 6 day limit for plywood

Fall results

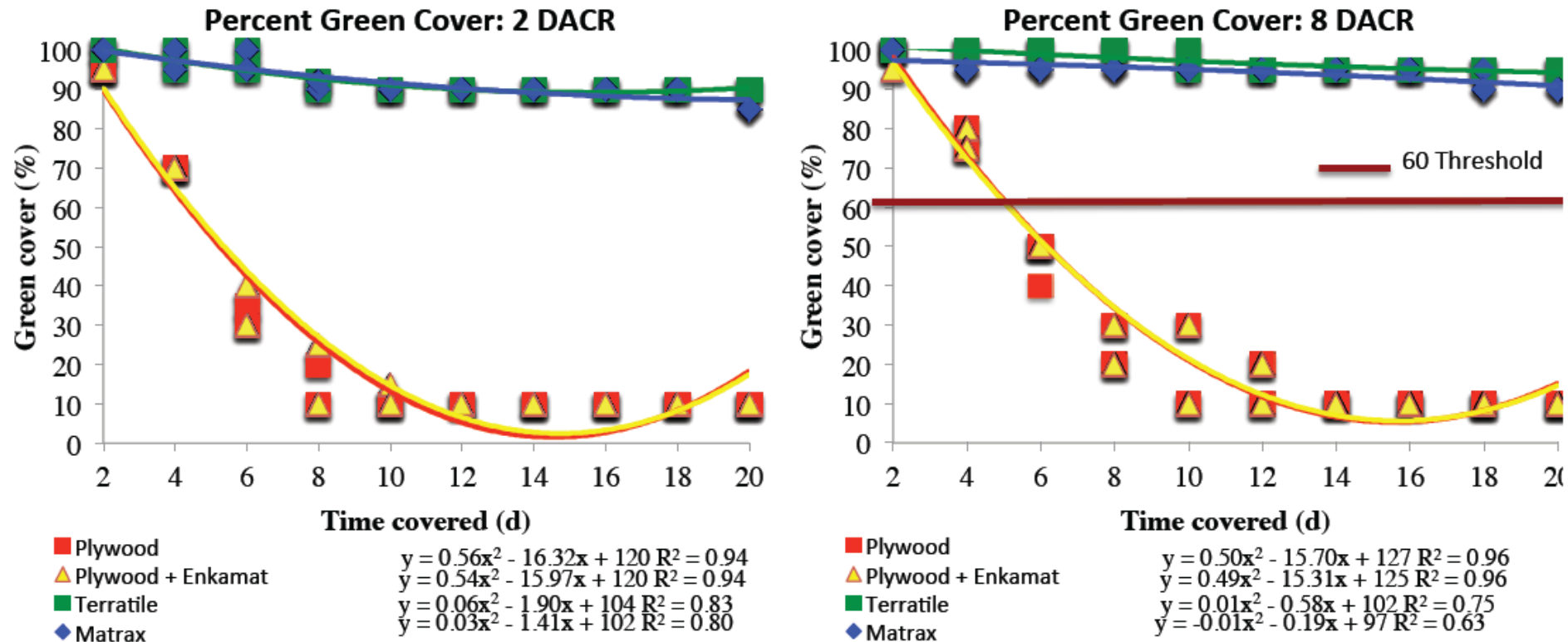
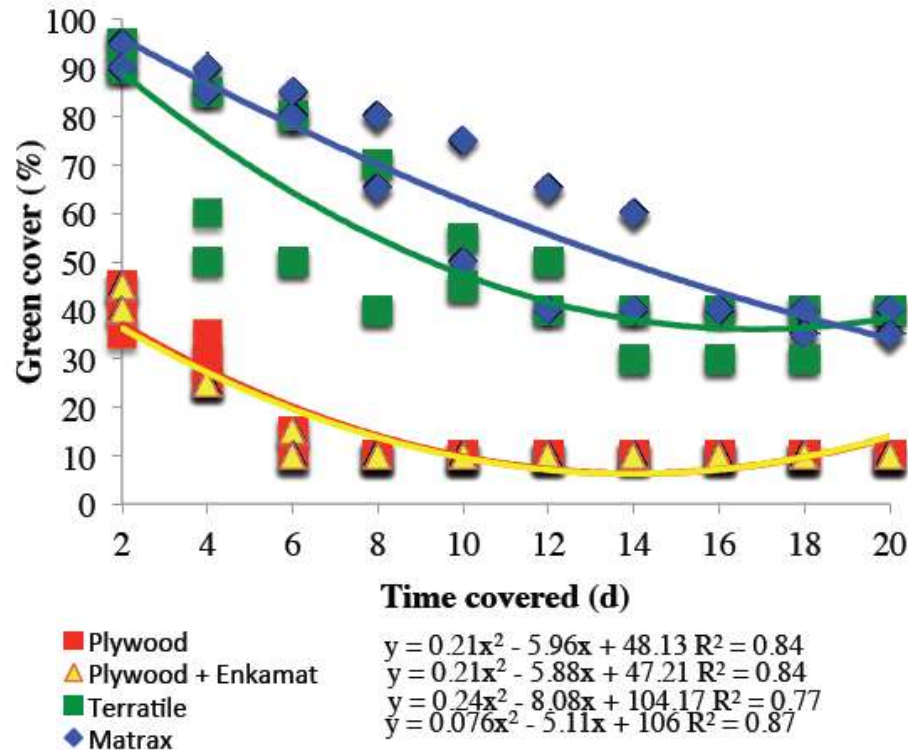


Figure 12. Percent green cover as affected by time covered and cover type when assessed at 2 and 8 days after cover removal (DACR) in the fall. Data pooled over two years.

Recommendation: Turf will recover even when covered for 20 straight days with Terratile and Matrax; 4 day limit for plywood

Summer Results, 94 F average high

Percent Green Cover: 2 DACR



Percent Green Cover: 8 DACR

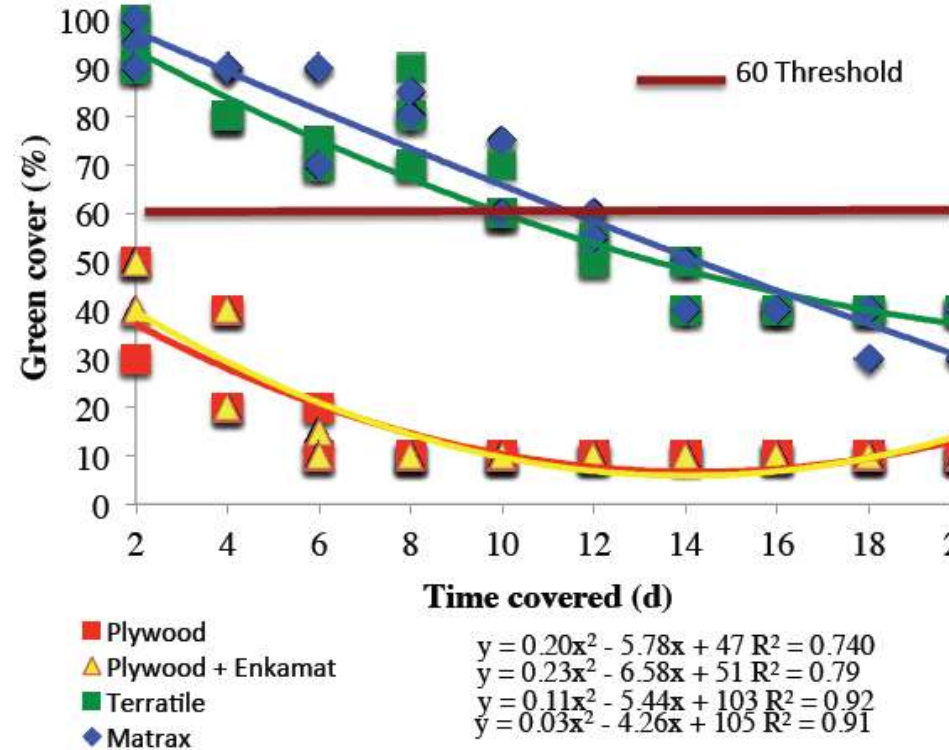


Figure 9. Percent green cover as affected by time covered and cover type when assessed at 2 and 8 days after cover removal (DACR) in the summer. Data pooled over two years.

Recommendation: Turf will recover even when covered for 12 straight days with Matrax, 10 for Terratile; not even 2 days for plywood

Terratile



Matrax



Figure 10. Symptoms of high temperature stress on tall fescue after eight days under Terratile (left) and Matrax (right) in summer

Matrax

Terratile

Plywood + Enakmat

Plywood



Figure 8. Effects of cover left on for 14 days on tall fescue quality during summer of 2011.

Summer temperatures under covers, running average

Cover	Light transmission	High temp	Low temp
Terratile	25%	111 F	69 F
Matrax	5%, air space	101 F	70 F
Plywood + Enka	0%, air space	101 F	71 F
Plywood	0%	106 F	69 F

Light transmission is important to keep photosynthesis occurring, but more in the summer caused more heat build-up

Some air space helps to moderate temperatures, but the 5% light transmission was essential for turf survival!

Operations and Management

Developing the Manual

Steve LeGros and Murray Cook

Goals

- Improve the event management tracking system
- Develop operational strategies for the different types of events.
- Develop more strict guidelines for users
- Upgrade maintenance equipment
- Increase staff knowledge and skills by hiring a Turf Manager



The O. & M. Elements

- **Permitting guidelines**
- **Turf Manager and staff responsibilities**
- **Post Events/Recovery Period**
- **Integrated Pest Management/Prep for Events**



Thank You for your time

- On Behalf of the NPS, Trust and National Mall Turf Team

