Turf Replacement Project

Public Safety Committee

March 28, 2016

Today's Agenda

City

- Project Overview including location, history and funding
- Options for field replacement (rubber & other material)

ABYSA & Its Consultant

- Review of Soccer Complex Assessment
- Product Recommendation

City

- Committee Questions
- Options for Committee Direction
- Comment

Turf Replacement Project

- John B Lewis Soccer Complex opened in 2005
- Owned and operated by the City of Asheville
- Facility programmed through Community Partnership Agreement with ABYSA
- Serves over 7,000 youth and adult soccer players annually.
- Fields constructed in flood plain; approved use; what happens when fields flood?

Turf Replacement Project

CURRENT FIELD CONDITIONS

- Reaching end of useful life (10 years)
- Current in-fill use is crumb rubber

FUNDING

- Replacement currently funded by TDA grant to ABYSA ($1.1 Million)
- Prior to TDA funding, replacement was funded over a 5 year period in City's CIP (currently still listed)

Turf Replacement Project

RUBBER	OTHER
Rubber Crumb	Sand
Nike Grind	Coconut Husks
	Shredded Mulch
	Pea Gravel
	Non-infill
	Thermoplastic Elastomer
	Other materials to create a shock-absorbing surface under backyard and public playgrounds

Turf Replacement Project

RESEARCH REGARDING RUBBER MATERIALS

- Current Infill Material on JBL: Crumb Rubber
- Community concerns across the country about crumb rubber as material
- EPA commissioned study to address safety of recycled tire rubber on play fields and play grounds; anticipated complete in late 2016
- Recognizing community concern around materials, ABYSA hired a consultant to review and recommend material

Turf Replacement Project

ABYSA and CONSULTANT REPORT

- Mike Rottjakob, Executive Director, ABYSA
- Ryan Teeter, Consultant, LDD Sports
- LDD Sports hired by ABYSA

Turf Replacement Project

POSSIBLE OPTIONS FOR COMMITTEE DIRECTION

- Move forward and bid project with consultant's recommended product
- Move forward and bid project with a different product
- Request more research on options for other products
- Move forward to full Council for policy discussion
- Wait for EPA Report to be published
- Take action to commission a study
- Take no action

www.abysa.org

Asheville Buncombe Youth Soccer Association

John B. Lewis Soccer Complex Turf Replacement Project

City of Asheville Public Safety Committee

March 28, 2016

20 ABYSA YEARS ...AND STILL KICKIN'

WNC SOCCER FOUNDATION FIELDS OF DREAMS

www.abysa.org

Safety Comes First For ABYSA

- Safety 300 + days a year for 7,000 + players.
- The ABYSA and ABASA Boards of Directors have studied the safety issues and **unanimously endorse** the recommendations of Leading Design and Development.
- We trust the scientific evidence.
- **Delaying the project is the real and avoidable safety risk to our players.**

WNC SOCCER FOUNDATION FIELDS OF DREAMS

ABYSA 30 YEARS ...AND STILL KICKIN'

Asheville Buncombe Youth Soccer Association

www.abysa.org

The ABYSA And City Of Asheville Partnership - Our Role

- Park construction.
- Adding lights and retiring debt.
- The turf replacement project and plan.

WNC SOCCER FOUNDATION FIELDS OF DREAMS

30 ABYSA YEARS ...AND STILL KICKIN'

Asheville Buncombe Youth Soccer Association

Why The Hurry?

- The summer construction window.
- Over two years in planning. Paid for!
- Why did you wait?
- The current state of the fields.

Options, Decisions and Predictable Outcomes

- Using buoyant organic materials or other non-recommended products.
- Waiting on the EPA progress report.
- Moving forward with Leading Design and Development's recommendations.

We Ask From You Today

- Vote to move forward with the procurement process utilizing the products and design specifications presented by our consultant.
- Instruct City Staff to "fast track" the project, as much as is possible, to meet the summer of 2016 construction window.

WNC SOCCER FOUNDATION FIELDS OF DREAMS

ABYSA 30 YEARS ...AND STILL KICKIN'

Asheville Buncombe Youth Soccer Association

www.abysa.org

Thank you.

We are happy to answer your questions.

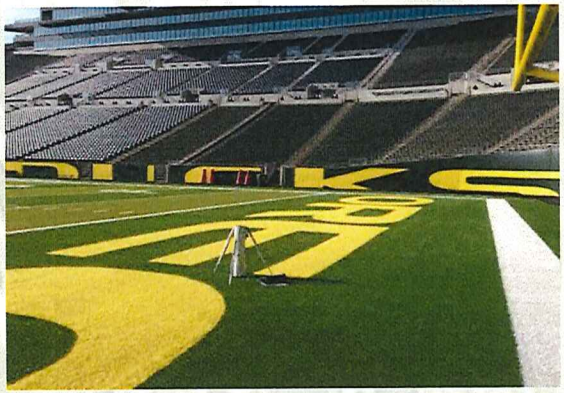
Asheville Buncombe Youth Soccer Association

SYNTHETIC TURF REPLACEMENT
JBL SOCCER COMPLEX

RYAN TEETER, PE, LEED® AP

ARTIFICIAL TURF TESTING, DESIGN AND CONSULTING

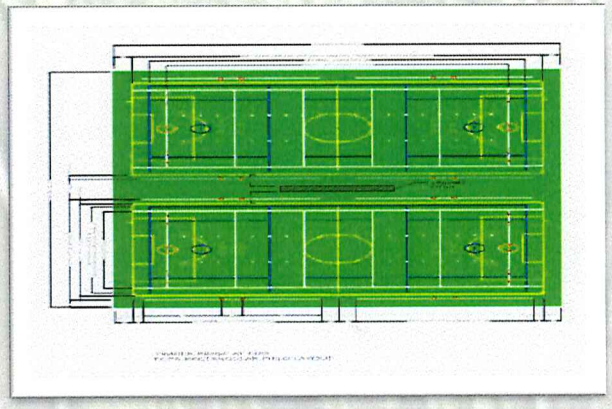
G-MAX TESTING



INFILTRATION TESTING

MAINTENANCE

ATHLETIC FACILITY DESIGN



G-MAX TESTING

SAFETY TEST – IMPACT TEST – BOUNCE TEST

- **HIGH G-MAX = HARDER SURFACE**
- **ASTM STANDARD = MAXIMUM 200 GMAX**
- **ASTM NEEDS IMPROVEMENT, ENGINEERS CAN MAKE MORE STRINGENT STANDARDS AND TESTING REQUIREMENTS, WE ARE GOING TO DO THIS BY SETTING THE MAXIMUM ALLOWABLE GMAX AT 165 FOR ANY LOCATION ON ANY OF THE FIELDS VIA INSURED WARRANTY.**

G-MAX TESTING

SYNTHETIC TURF FIELDS "FAIL" ALL THE TIME!!!

- **PER ASTM F1936-10**

6. Performance Requirements

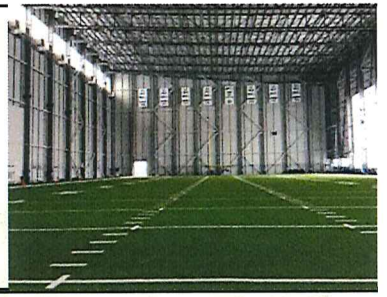
6.1 When tested in accordance with this specification, the average *g*-max at each test point shall be less than 200 *g*'s.

6.2 If a turf playing system is tested in accordance with this specification, and the reported average *g*-max of one or more test points is equal to or greater than 200 *g*'s, the turf playing system should be brought into compliance and should not be used in the interim.

6.3 Nothing in this specification is intended to keep an owner, architect, engineer or other specifier from establishing more stringent performance requirements for a turf playing system.

- ASTM CURRENTLY VOTING TO LOWER MAXIMUM ALLOWABLE GMAX TO 165

G-MAX TESTING



GMAX VALUES HAVE MANY VARIABLES

WHATS UNDER THE TURF IS THE BIGGEST VARIABLE

- SUBSURFACE MATERIAL (AGGREGATE/CONCRETE/ASPHALT)
- COMPACTION OF BASE AGGREGATE
- SHOCK PAD OR E-LAYER

- INFILL COMPACTION
- INFILL PARTICLE SIZE
- INFILL DEPTH
- INFILL COMPOSITION
- TURF TYPE AND HEIGHT (mono vs. slit film, dispersion)
- MAINTENANCE!!!

ARTIFICIAL TURF MAINTENANCE

REALITY IS ITS NEEDED BUT NOT OFTEN DONE ENOUGH/PROPERLY

- GROOMING (FIBER/INFILL)
- DECOMPACTION
- CLEANING
- IMPROVE SAFETY
- REDUCE LIABILITY
- PROTECT YOUR INVESTMENT

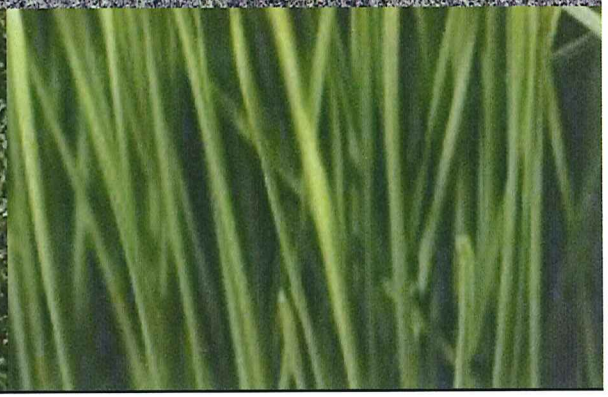
ARTIFICIAL TURF MAINTENANCE

MAINTENANCE VS USE

- HEAVILY USED FIELDS REQUIRE CONSTANT INSPECTION/MAINT. TO KEEP INFILL LEVELS AT PROPER LIMITS WHICH PROTECTS FIBER
- EXCESS OR IMPROPPER MAINTENANCE CAUSES FIBER WEAR
- LACK OF MAINTENANCE CAUSES FIBER WEAR
- AGGRESSIVE MAINTENANCE CAN SIGNIFICANTLY LOWER GMAX BUT CAN INCREASE WEAR ON SURFACE IF DONE TOO MUCH.
- FIELDS THAT ARE 2" AND ABOVE CAN MAINTAIN ACCEPTABLE GMAX WITHOUT SHOCK PADS WITH ROUTINE MAINTENANCE PRACTICES

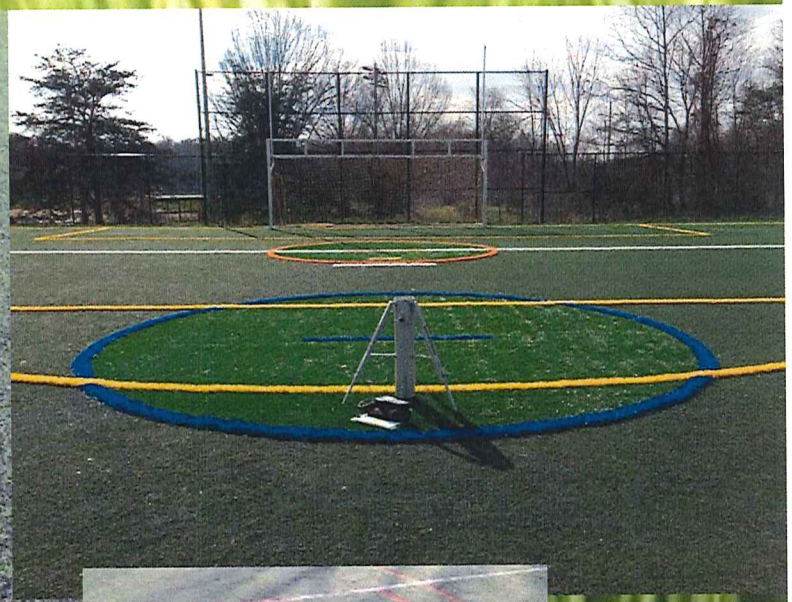
ARTIFICIAL TURF MAINTENANCE

WHY IS TURF MAINTENANCE IMPORTANT?

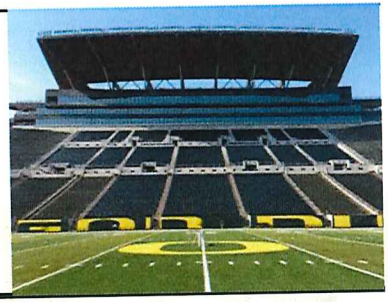


ARTIFICIAL TURF MAINTENANCE

WHY IS TURF MAINTENANCE IMPORTANT?



SPORTS FACILITY DESIGN



CIVIL ENGINEERS SPECIALIZING IN SPORTS FACILITY DESIGN

- ATHLETIC FIELDS GRASS/TURF
- TRACK EVENTS
- PLAYGROUNDS

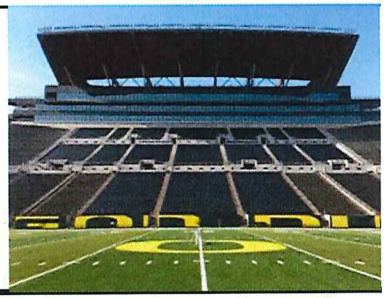
- WHO WE WORK FOR
  - PUBLIC SCHOOLS/PARKS
  - PRIVATE ENTITIES
  - OTHER A/E
  - CONTRACTORS

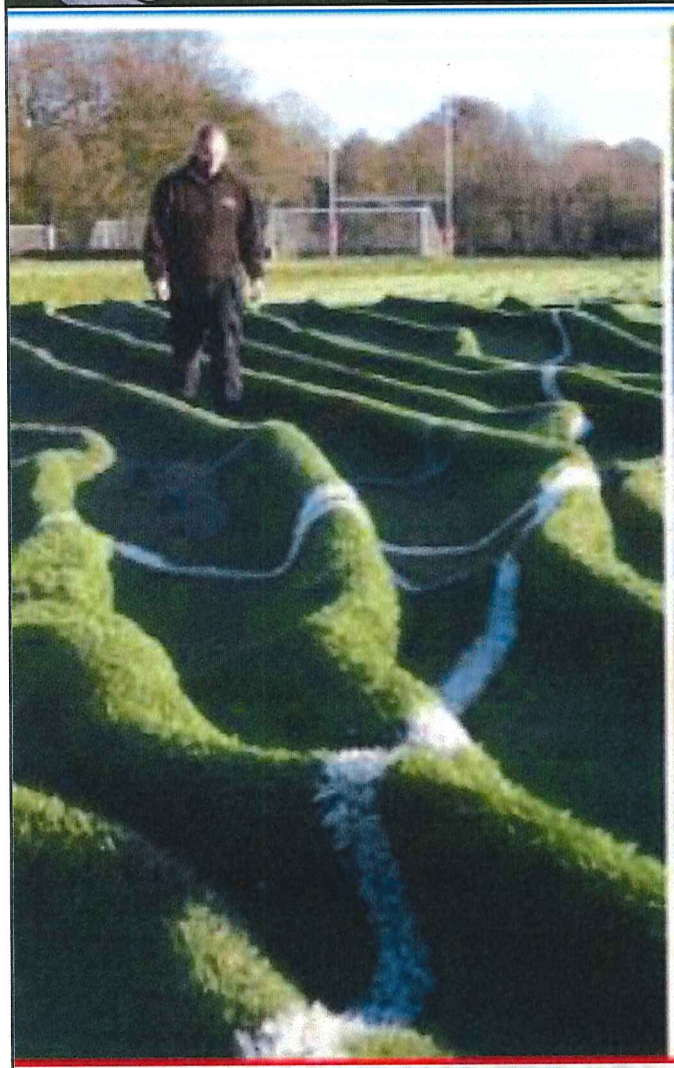
SPORTS FACILITY DESIGN

DESIGN FIELD AROUND PRIMARY USES

- EACH SPORT HAS PREFERRED TYPE OF SURFACE
- EACH SPORT IMPACTS FIELD DIFFERENTLY
- EACH AGE GROUP WILL IMPACT SURFACE DIFFERENTLY
- EVERY SITE IS DIFFERENT – ESPECIALLY IN THIS CASE!!!!!!

What we are trying to avoid!



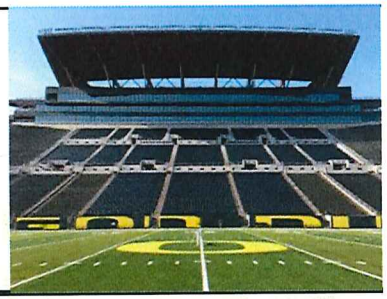


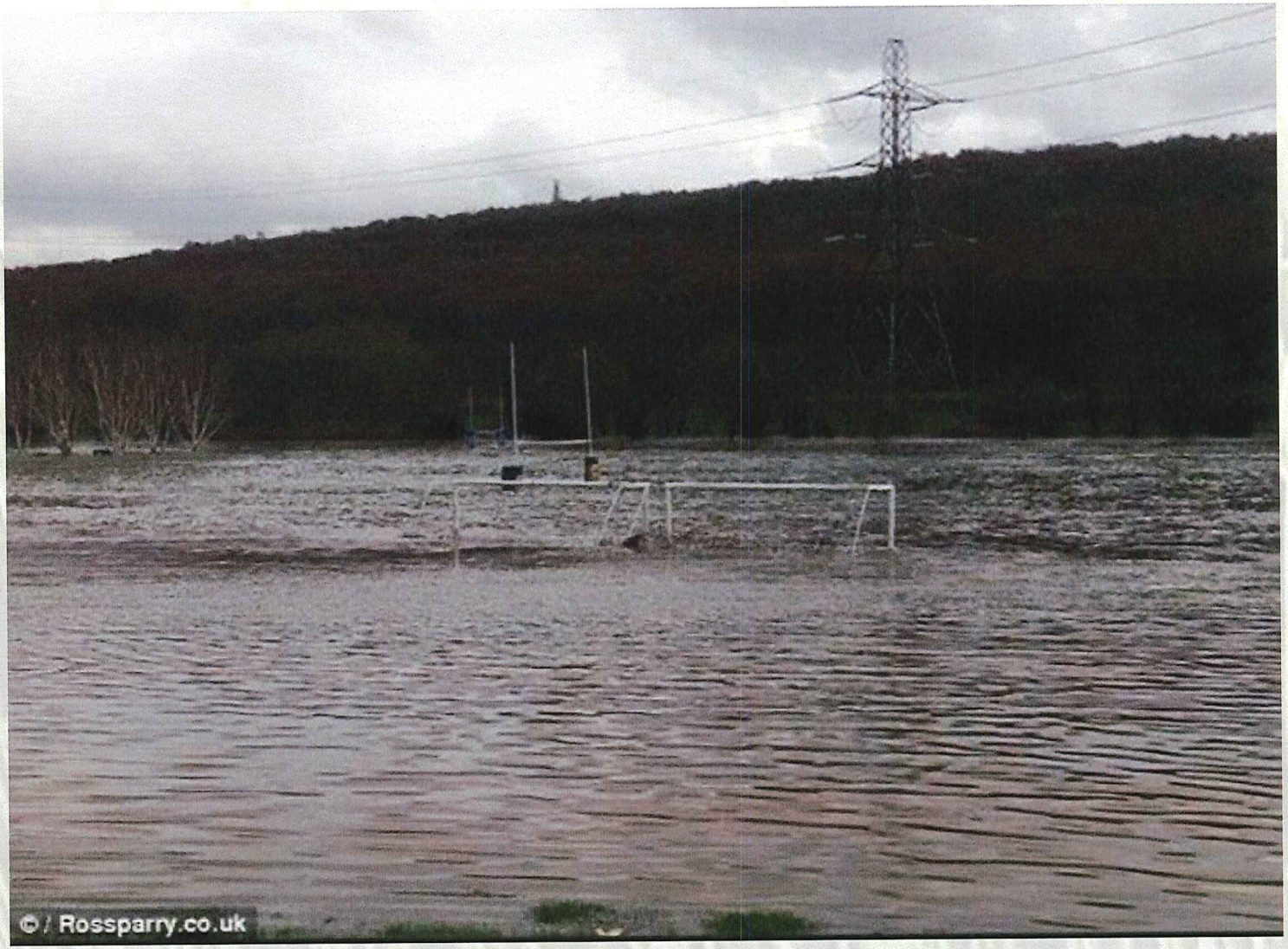
NEWS

Floods turn school's artificial pitch into bizarre rippling wasteland

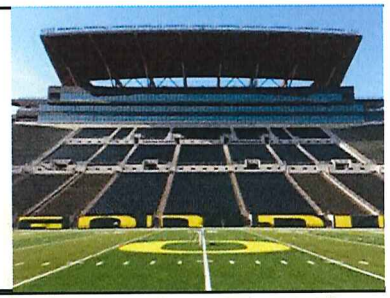
The AstroTurf rippled under 5ft of water after the River Aire burst its banks on Boxing Day

Because this will happen again!





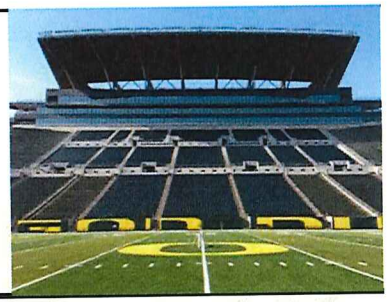
SPORTS FACILITY DESIGN



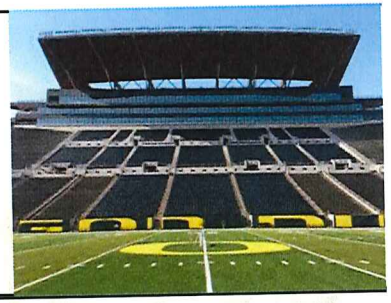
JBL TURF REPLACEMENT AND DESIGN

- TURF – FIBER TYPE, HEIGHT, GAUGE, FACE WEIGHT, ECT.
- INFILL – MATERIAL TYPE, SIZE, AMOUNT

TURF FIBER
OVER THE LAST 10 YEARS



- FULL CIRCLE – SLITFILM ➡ MONOFILAMENT ➡ SLITFILM/COMBO
- SLIT FILM (FIBERS TRAP INFILL)
  LESS DISPERSION, INFILL PROTECTED = LESS MAINTENANCE
  GREAT FOR MULTI-USE & HIGH USE FACILITIES
- MONOFILAMENT (FIBERS LEAVE INFILL EXPOSED)
  MORE DISPERSION = MORE MAINTENANCE
  EARLY AESTHETICS ARE GREAT, MORE EXPENSIVE
- DUAL FIBER = COMBO SLIT FILM AND MONOFILAMENT
- NYLON FIBERS = THATCH ZONES OR INTEGRATION OF NYLON FIBERS TO INCREASE DURABILITY
- WOVEN PRODUCT = 100% RECYCLEABLE WITH HIGH TUFT BIND
- INFILL SYSTEMS = CLEANER, ENGINEERED SYSTEMS, ALTERNATIVE PRODUCTS, RECYCLING



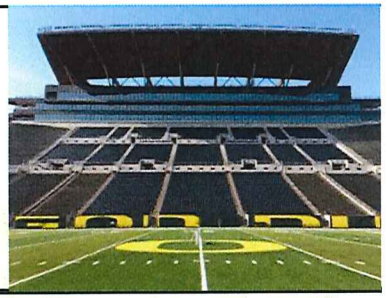
RECOMMENDATION FOR JBL

2.25" SLIT FILM FIBER WITH TEXTURED MONOFILAENT THATCH – WHY?

SLIT FILM IS MOST DURABLE FIBER AND THE PROVEN WORK HORSE
SLIT FILM FIELDS LAST LONGER
SLIT FILM FIBER CURLS UP AND TRAPS INFILL – KEEPING IT IN SYSTEM
SLIT FILM WILL PROTECT THE SYSTEM FROM CONTAMINATION

THATCH ZONE PROTECTS INFILL
THATCH ZONE TRAPS INFILL – KEEPS IT IN SYSTEM LESS MAINTENANCE
THATCH ZONE DENSE LAYER PROVIDES ADDS DURABILITY
THATCH ZONE WILL PROTECT SYSTEM FROM SILT CONTAMINATION

SYSTEM HAS PROVEN SUCCESS AT THIS SITE LOCATION



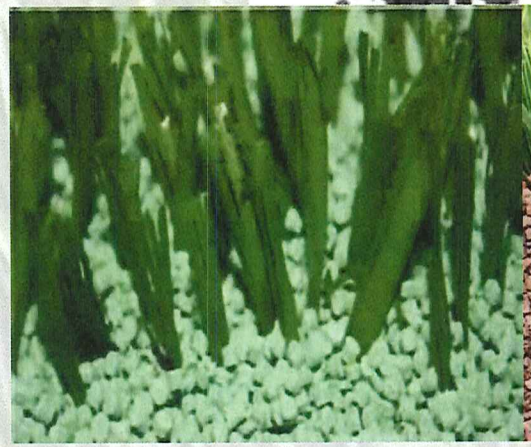
INFILL SYSTEMS AVAILABLE

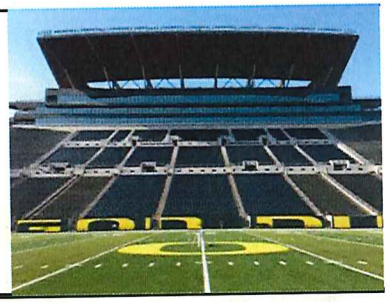
STANDARD INFILLS

- SBR ALL RUBBER
- SAND AND RUBBER SYSTEMS

ALTERNATIVE INFILLS

- TPE – THERMOPLASTIC ELASTOMER
- ORGANIC – CORK, COCONUT HUSK
- NIKE GRIND
- COATED SAND - ENVIROFILL
- EPDM – TRACK SURFACES
- NON INFILL
- NEED SHOCK PADS





ISSUES AT JBL

- FLOODPLAIN
- EXISTING BASE COMPACTED WITH NO VERTICAL DRAINAGE EXCEPT AT THE SIDELINES
- EXCESSIVE SILTATION AFTER FLOOD EVENTS

INFILL PRODUCT CONSIDERATIONS

- SHOCK PADS – REDUCE INFILL => SHOCK PADS FLOAT
- ORGANIC INFILL – MATERIAL FLOATS – REQUIRES SHOCK PAD
- TPE – MATERIAL FLOATS – REQUIRES SHOCK PAD
- EPDM, COATED SAND, NON-INFILL – REQUIRES SHOCK PAD
- NIKE GRIND – HARDER THAN SBR, RESILIENCY REDUCES OVER TIME

RECOMMENDATION FOR JBL = SBR CRUMB RUBBER

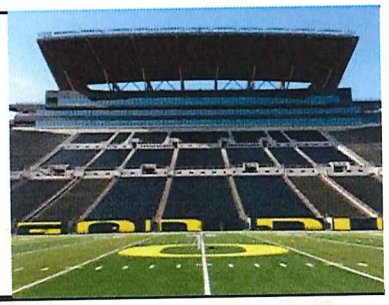
RECOMMENDATION FOR JBL

SBR CRUMB RUBBER INFILL – WHY?

SBR DOES NOT FLOAT OR EASLIY DISPERSE
SBR PROVIDES LONG TERM SHOCK ABSORBSION SAFETY
SBR CAN BE CLEANED AFTER FLOOD EVENTS AND SILTATION
SBR CAN BE EASILY MAINTAINED
SBR MATERIAL STAYS WITHIN THE SYSTEM DURING FLOODS

SBR HAS BEEN ABUNDANTLY TESTED - RESEARCH SHOWS IT IS SAFE

Crumb Rubber Safety



www.sportslabsusa.com

LABORATORY TESTING
HEAVY METALS & PAH ANALYSIS

PAH Results Table

PAHs	Analytical Method	Suggested Concentration Limit (mg/kg)	Sample Detection Limit (mg/kg)	PASS / FAIL
Naphthalene 2	S 8270D	n/a	<17.0	PASS
2-Methylnaphthalene	S 8270D	n/a	<17.0	PASS
1-Methylnaphthalene	S 8270D	n/a	<17.0	PASS
Acenaphthylene	S 8270D	n/a	<17.0	PASS
Acenaphthene	S 8270D	n/a	<17.0	PASS
Dibenzofuran	S 8270D	n/a	<17.0	PASS
Fluorene	S 8270D	n/a	<17.0	PASS
Anthracene	S 8270D	n/a	<17.0	PASS
Phenanthrene	S 8270D	n/a	<17.0	PASS
Fluoranthene	S 8270D	n/a	<17.0	PASS
Pyrene	S 8270D	n/a	<17.0	PASS
Benzo(a)anthracene	S 8270D	*50	<17.0	PASS
Chrysene	S 8270D	*50	<17.0	PASS
Benzo(b)fluoranthene	S 8270D	*50	<17.0	PASS
Benzo(k)fluoranthene	S 8270D	*50	<17.0	PASS
Benzo(a)pyrene	S 8270D	*50	<17.0	PASS
Indeno(1,2,3-cd)pyrene	S 8270D	*50	<17.0	PASS
Dibenzo(a,h)anthracene	S 8270D	*50	<17.0	PASS
Benzo(g,h,i)perylene	S 8270D	n/a	<17.0	PASS

*Highlighted rows indicate a PAH that is classified by the EPA as a "probable human carcinogens". The concentration limits of the carcinogenic PAHs provided in the table above are based on a human risk assessment study using a soccer recreational use scenario with a target risk level of 1E-05

Crumb Rubber Safety

www.sportslabsusa.com

LABORATORY TESTING
HEAVY METALS & PAH ANALYSIS

Heavy Metals Results Table

Heavy Metal	Analytical Method	*Suggested Concentration Limit (mg/kg)	Sample Result (mg/kg)	PASS / FAIL
Antimony	EPA 6010B	30	<2.00	PASS
Arsenic	EPA 6010B	3.4	<2.00	PASS
Barium	EPA 6010B	5200	36.5	PASS
Beryllium	EPA 6010B	16	<0.500	PASS
Cadmium	EPA 6010B	1.7	<0.500	PASS
Chromium	EPA 6010B	17	1.91	PASS
Cobalt	EPA 6010B	660	<0.500	PASS
Copper	EPA 6010B	3000	40.2	PASS
Lead	EPA 6010B	80	5.30	PASS
Mercury	EPA 6010B	18	<0.0250	PASS
Molybdenum	EPA 6010B	380	<1.00	PASS
Nickel	EPA 6010B	1600	8.60	PASS
Selenium	EPA 6010B	380	<2.00	PASS
Silver	EPA 6010B	380	<0.500	PASS
Thallium	EPA 6010B	5	<1.00	PASS
Vanadium	EPA 6010B	530	<0.500	PASS
Zinc	EPA 6010B	23000	8060	PASS

*The suggested concentration limits shown are based on screening levels per California OEHHA Soil Screening Numbers (mg/kg) for Nonvolatile Chemicals Based on Total Exposure to Contaminated Soil. Inhalation, Ingestion and Dermal Absorption. Residential Scenario. These limit have been included for reference and are not project specific.

End of Report

Standard / Regulation:

The STC suggests that any toxicological test and analysis of infill for synthetic turf fields be performed according to European Standard EN 71-3 – Safety of Toys Part 3: Migration of certain elements. The analytical method for each metal can be found in the results table below.

Requirements:

The target detection limits for each metal can be found in the results table below. The limits shown are per European Standard EN 71-3 – Safety of Toys Part 3: Migration of certain elements.

www.sportslabsusa.com

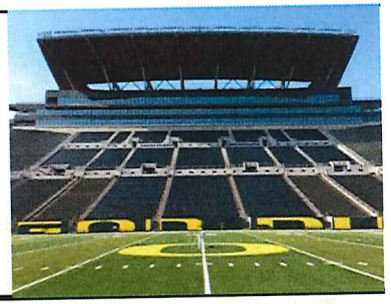
LABORATORY TESTING
HEAVY METALS ANALYSIS

Results Table:

Analyte	Analytical Method	*Target Detection Limit (mg/kg)	Sample Detection Limit (SDL) Based Result	PASS / FAIL
Aluminum	NF EN ISO 11885	70,000	<50 mg/kg	PASS
Antimony	NF EN ISO 11885	560	<10 mg/kg	PASS
Arsenic	NF EN ISO 11885	47	<5 mg/kg	PASS
Barium	NF EN ISO 11885	18,750	<50 mg/kg	PASS
Boron	NF EN ISO 17294-1 et 2	15,000	<50 mg/kg	PASS
Cadmium	NF EN ISO 11885	17	<1 mg/kg	PASS
Chromium III	NF EN ISO 11885	460	<10 mg/kg	PASS
Chromium VI	NF T 90-043	0.2	<0.1 mg/kg	PASS
Cobalt	NF EN ISO 11885	130	<10 mg/kg	PASS
Copper	NF EN ISO 11885	7,700	<50 mg/kg	PASS
Lead	NF EN ISO 11885	160	<10 mg/kg	PASS
Manganese	NF EN ISO 11885	15,000	<50 mg/kg	PASS
Mercury	NF EN 13506	94	<10 mg/kg	PASS
Nickel	NF EN ISO 11885	930	<10 mg/kg	PASS
Selenium	NF EN ISO 11885	460	<10 mg/kg	PASS
Strontium	NF EN ISO 17294-1 et 2	56,000	<50 mg/kg	PASS
Soluble Tin (Sn)	NF EN ISO 17294-1 et 2	180,000	<50 mg/kg	PASS
Soluble Organic Tin	NF EN ISO 17294-1 et 2	12	<0.2 mg/kg	PASS
Zinc	NF EN ISO 17294-1 et 2	46,000	<50 mg/kg	PASS

*Limits per European Standard EN 71-3 – Safety of Toys Part 3: Migration of certain elements.

Crumb Rubber Safety From STC



PRESENTED BY SYNTHETIC TURF COUNCIL (STC)

The STC believes that reliable scientific data should be the foundation of any discussion regarding the safety of synthetic turf with crumb rubber infill. During the past two decades, there have been more than 60 technical studies and reports that review the health effects of crumb rubber as it pertains to toxicities from inhalation, ingestion and dermal contact, as well as cancer. These studies and reports were performed during the past 22 years by independent organizations such as: Connecticut Department of Health, Hofstra University, New York State Department of Environmental Conservation, The New York City Department of Health and Mental Hygiene and University of California Berkeley. The preponderance of evidence shows no negative health effects associated with crumb rubber in synthetic turf. As NBC factually reported, "there is no research directly linking crumb rubber exposure to cancer."

According to a peer-reviewed report prepared for the Rubber Manufacturers Association by Cardno Chemrisk, Inc., an independent global scientific consulting firm, "regular exposure (e.g. regular play on ground rubber filled athletic fields) to ground rubber for the length of one's childhood does not increase risk of cancer above levels considered by the state of California to be *de minimus* (i.e., a lifetime excess cancer risk of 1 in 1 million)." (August 1, 2013, page 14).

Crumb Rubber Safety From Toxicologist

A Tale of Two Infills—Which is Safer?

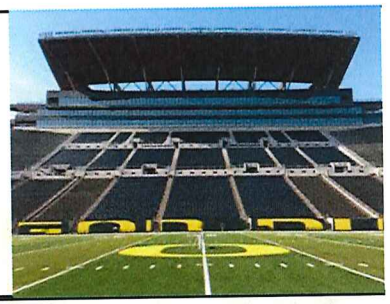
Chemical	Crumb Rubber (mg/kg)	Natural Soil (mg/kg)

PRESENTED BY BOARD CERTIFIED TOXOCOLOGIST

MICHAEL K. PETERSON, MEM, DABT – GRADIENT CORP. WA

- **DOSE**
- **EXPOSURE**

Crumb Rubber Safety From Toxicologist



A Tale of Two Infills—Which is Safer?

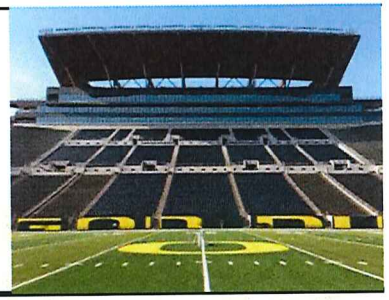
Chemical	Crumb Rubber (mg/kg)	Natural Soil (mg/kg)
Arsenic	0.12	20
Cadmium	0.54	2
Chromium	2.7	30
Lead	26	100
Mercury	<0.017	0.3
Carcinogenic PAHs	1.31-3.13	0.93-4.60

Data are only a subset of chemicals found in crumb rubber/soil.
Crumb rubber data (and c-PAH data) are from Teter Engineering, 2015; data from chemical composition studies, and do not consider bioaccessibility
Natural soil data are from MADEP, 2002 (90th percentiles).

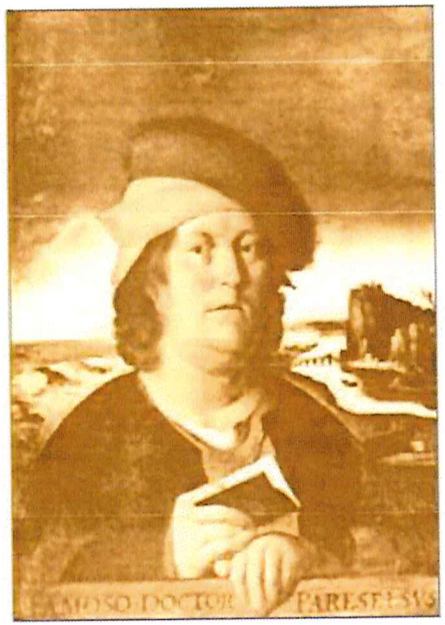
GRADIENT

Copyright Gradient 2015

Crumb Rubber Safety From Toxicologist



Dose - THE KEY CONCEPT in Toxicology



Father of Modern Toxicology
Paracelsus—1564

"All things are poisonous, only the dose makes it non-poisonous."

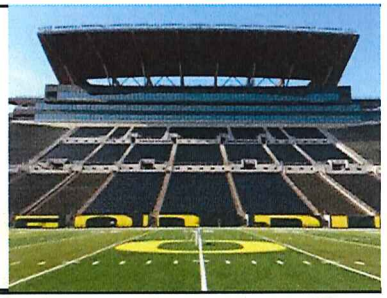
Dose alone determines toxicity

All chemicals—synthetic or natural—have the capacity to be toxic

Copyright Gradient 2015

GRADIENT

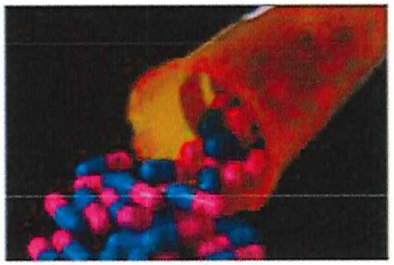
Crumb Rubber Safety From Toxicologist



Dose

Determines Whether a Chemical Will Be Beneficial or Poisonous

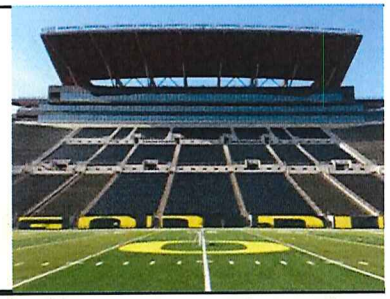
	Beneficial Dose	Toxic Dose
Aspirin	300 – 1,000 mg	1,000 – 30,000 mg
Vitamin A	5,000 units/day	50,000 units/day
Oxygen	20% (Air)	50 – 80% (Air)



Copyright Gradient 2015

GRADIENT

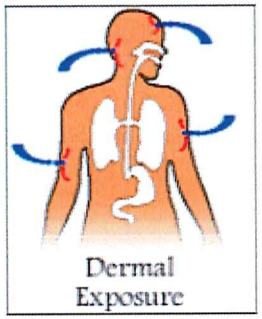
Crumb Rubber Safety From Toxicologist

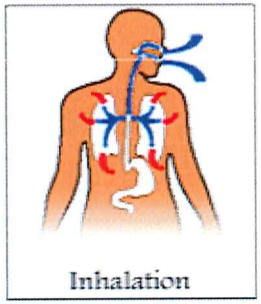


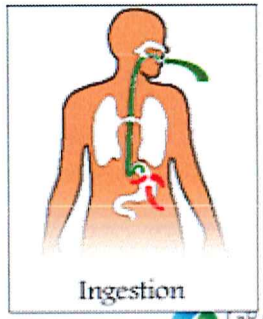
Exposure

Route of Exposure

- The **route** (site) of exposure is an important determinant of the ultimate **dose**—different routes may result in different rates of absorption.
  - Dermal (skin)
  - Inhalation (lung)
  - Oral ingestion (Gastrointestinal)
- The route of exposure may be important if there are tissue-specific toxic responses.
- Toxic effects may be local or systemic.



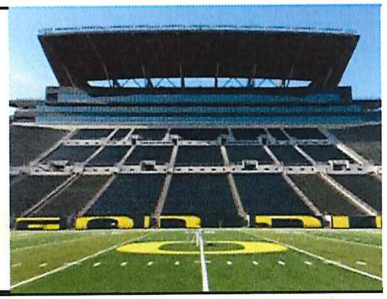




GRADIENT

Copyright Gradient 2015

Crumb Rubber Safety From Toxicologist



Context: Coach Griffin's Cancer List

- Details below are oversimplified—actual list is not public!
- Washington Department of Health currently studying
- 209 athletes; 160 soccer players; 97 goalies; 45 Washington residents who played both recreationally and year-round
- 3,000,000 US youth soccer players; 100,000 in WA
- Expected background cancer rate: 16.1 per 100,000/yr
- In other words, over 15 years we would expect there to be:
  - 7,245 US soccer cancer cases (2938 leukemia/lymphoma)
  - 241 WA soccer cancer cases (98 leukemia/lymphoma)

Copyright Gradient 2015

GRADIENT

Crumb Rubber Safety From Toxicologist

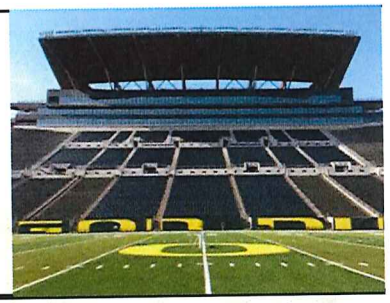
PRESENTED BY BOARD CERTIFIED TOXOCOLOGIST

Dr. Laura C. Green, MEM, DABT - Works Independently

Dr. Green has been retained by schools and municipalities to advise them on the health aspects of synthetic turf athletic and recreation facilities.

Dr. Green has reviewed the available literature and studies on the safety of synthetic turf conducted both in the United States and abroad. She also evaluated the epidemiological literature regarding cancer in children and adolescents. Utilizing this background, as well as generally accepted toxicological principles, Dr. Green examined the claims being made by a vocal and small minority in the media about the alleged risks of cancer associated with synthetic turf fields. Dr. Green also reviewed the limited information that those individuals and organizations have used to support their claims.

Crumb Rubber Safety From Toxicologist



PRESENTED BY BOARD CERTIFIED TOXOCOLOGIST

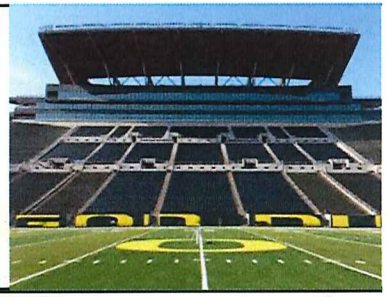
Dr. Laura C. Green, MEM, DABT - Works Independently

Dr. Green has focused on reports of a possible "cancer cluster" of young, female soccer players whose cancers were allegedly caused by an exposure to the crumb-rubber infill used on synthetic turf athletic fields.

The following are some of the highlights of Dr. Green's report:

- There is no reliable evidence to indicate that the reported cases of cancer in soccer players constitute an actual cancer cluster, since no reports have been made regarding the ages, sexes, or races of the individuals, the particular diseases at issue, the number of cases expected in any given population, or the particular exposures of the group.
- The types of cancers reported, lymphomas and leukemias, are among the most common types of cancer that develop in children and adolescents.
- The federal Centers for Disease Control and Prevention (CDC) has investigated more than 100 cancer clusters, many of them involving children, and has never found an environmental cause. Instead, these clusters appear to arise due to chance.

Crumb Rubber Safety From Toxicologist



PRESENTED BY BOARD CERTIFIED TOXOCOLOGIST

Dr. Laura C. Green, MEM, DABT - Works Independently

The following are some more of the highlights of Dr. Green's report:

- The type of leukemia most prevalent in childhood (namely acute lymphocytic leukemia – ALL), all types of lymphomas, and brain tumors are *not* known to be caused by cigarette smoking. Since smoking does not cause these cancers, it is highly unlikely that the small exposures to chemicals from synthetic turf athletic fields could do so.
- Lymphomas are not known to be caused by environmental exposures to chemicals.
- The leukemia most prevalent in children (ALL) is not known to be caused by environmental exposures to chemicals.
- No type of cancer in adolescents is known to be caused by exposure to chemicals.
- Scientific studies have shown that the quality of outdoor air in contact with synthetic turf athletic fields is not materially different from outdoor air in general.

Crumb Rubber Safety From Toxicologist

PRESENTED BY BOARD CERTIFIED TOXOCOLOGIST

Dr. Laura C. Green, MEM, DABT - Works Independently

After reviewing the literature and the claims being made that synthetic turf can cause cancer in children and adolescents, Dr. Green comes to the same conclusion that many scientists before her have reached:

I find no reliable basis for the notion that crumb rubber in-filled synthetic turf fields pose a significant risk of cancer. Several groups of investigators, from academia, government, and consulting firms, have performed environmental monitoring and/or modeling studies of crumb rubber and synthetic turf fields, and have reached the same conclusion.

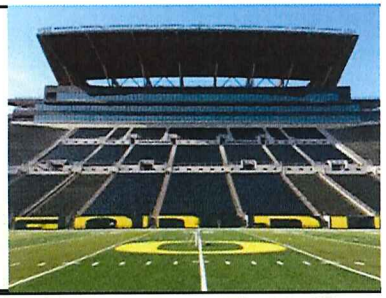
Crumb Rubber Safety From Toxicologist

PRESENTED BY SYNTHETIC TURF COUNCIL (STC)

The STC believes that reliable scientific data should be the foundation of any discussion regarding the safety of synthetic turf with crumb rubber infill. During the past two decades, there have been more than 60 technical studies and reports that review the health effects of crumb rubber as it pertains to toxicities from inhalation, ingestion and dermal contact, as well as cancer. These studies and reports were performed during the past 22 years by independent organizations such as: Connecticut Department of Health, Hofstra University, New York State Department of Environmental Conservation, The New York City Department of Health and Mental Hygiene and University of California Berkeley. The preponderance of evidence shows no negative health effects associated with crumb rubber in synthetic turf. As NBC factually reported, "there is no research directly linking crumb rubber exposure to cancer."

According to a peer-reviewed report prepared for the Rubber Manufacturers Association by Cardno Chemrisk, Inc., an independent global scientific consulting firm, "regular exposure (e.g. regular play on ground rubber filled athletic fields) to ground rubber for the length of one's childhood does not increase risk of cancer above levels considered by the state of California to be *de minimus* (i.e., a lifetime excess cancer risk of 1 in 1 million)." (August 1, 2013, page 14).

Crumb Rubber Safety From Toxicologist



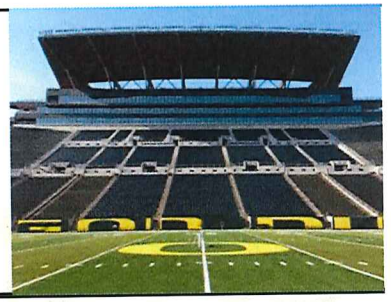
WHAT IS THE EPA DOING?

- CONTINUE COMPILING AND EVALUATING TEST DATA
- WORK WITH OTHER STATES AND RESEARCH INSTITUTES
- ASSIST IN FUNDING ONGOING RESEARCH
- BY THE END OF THIS YEAR THEY WILL ANNOUNCE A PLAN, NOT A FINAL VERDICT…

WHAT DO WE DO?

- PROCEED WITH THE INFILL PRODUCT THAT HAS BEEN TESTED AND VERIFIED BY MEDICAL PROFESSIONALS, RESEARCHERS, AND INDEPENDENT LABORATORIES TO BE SAFE!

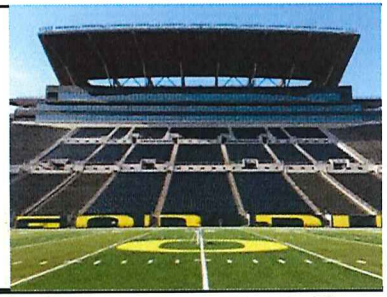
NOT ALONE!



Projects that have recently gone out to bid or are bidding now with SBR crumb rubber spec:

- Erwin HS and North Buncombe High School - Buncombe County, NC
- CASL (3 fields) - Raleigh, NC
- Bryan Park Soccer Complex – Greensboro, NC –Crumb rubber in their base bid, with non SBR options as an alternate
- UNC Chapel Hill- Chapel Hill, NC –Replacing Recreation Fields with crumb rubber spec
- University of Mt. Olive, Mt. Olive, NC - Starts next week with SBR crumb rubber specified and approved

NOT ALONE!



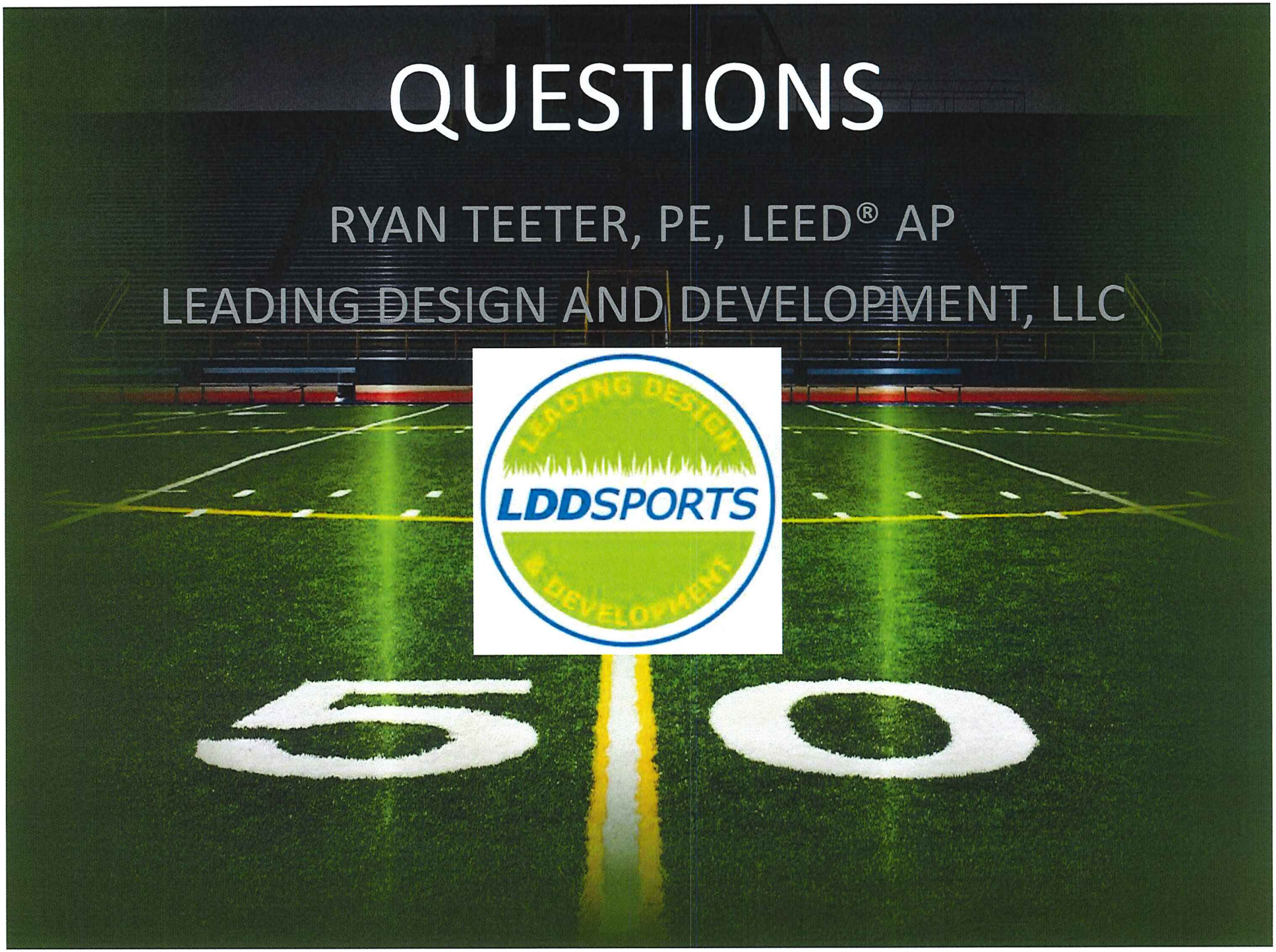
Projects built in North Carolina or South Carolina in the last year:

- AC Reynolds HS – Asheville NC
- Cannon School - Concord, NC
- CM Herndon Park - Durham, NC
- Pine Lakes Prep - Mooresville, NC
- Wilmington Hammerheads Indoor - Wilmington, NC
- Hedrick Stadium - Ft. Bragg, NC
- Hercules Stadium - Ft. Bragg, NC
- Greensboro YMCA - Greensboro, NC
- Joe Gibbs Racing - Charlotte, NC
- North Augusta HS - North Augusta, SC
- Clemson Intramurals - Clemson, SC
- Coastal Carolina Brooks Stadium - Conway, SC
- Clover Memorial Stadium - Clover, SC
- Ridgeview HS - Columbia, SC
- Westside HS – Anderson, SC
- TL Hanna HS – Anderson, SC
- Emerald HS – Greenwood, SC
- Greenwood HS – Greenwood, SC

QUESTIONS

RYAN TEETER, PE, LEED® AP

LEADING DESIGN AND DEVELOPMENT, LLC

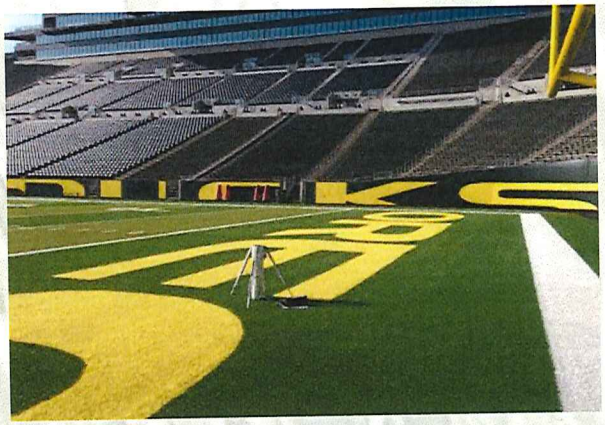


SYNTHETIC TURF REPLACEMENT
JBL SOCCER COMPLEX

RYAN TEETER, PE, LEED® AP

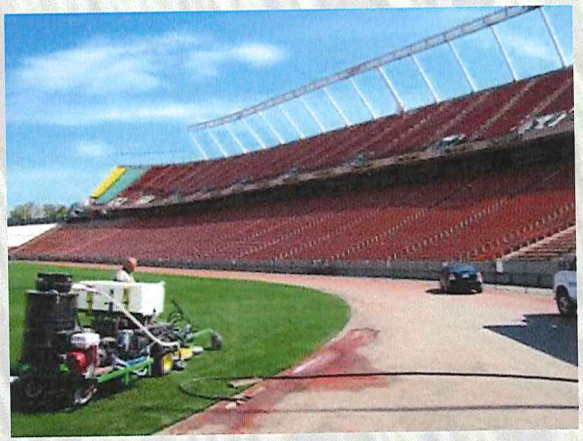
ARTIFICIAL TURF TESTING, DESIGN AND CONSULTING

G-MAX TESTING

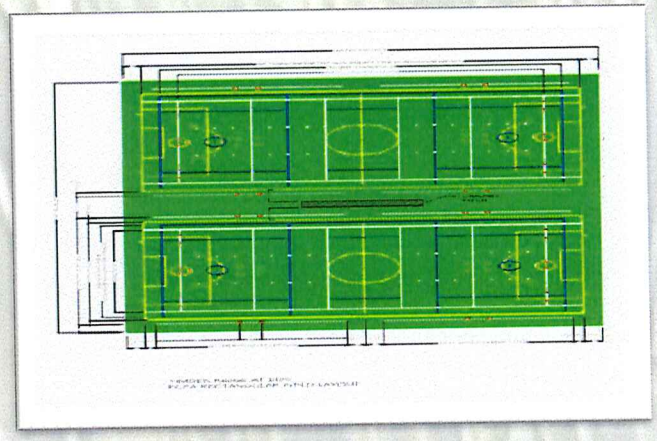


INFILTRATION TESTING

MAINTENANCE



ATHLETIC FACILITY DESIGN



G-MAX TESTING

SAFETY TEST – IMPACT TEST – BOUNCE TEST

- **HIGH G-MAX = HARDER SURFACE**
- **ASTM STANDARD = MAXIMUM 200 GMAX**
- **ASTM NEEDS IMPROVEMENT, ENGINEERS CAN MAKE MORE STRINGENT STANDARDS AND TESTING REQUIREMENTS, WE ARE GOING TO DO THIS BY SETTING THE MAXIMUM ALLOWABLE GMAX AT 165 FOR ANY LOCATION ON ANY OF THE FIELDS VIA INSURED WARRANTY.**

G-MAX TESTING

SYNTHETIC TURF FIELDS "FAIL" ALL THE TIME!!!

- **PER ASTM F1936-10**

6. Performance Requirements

6.1 When tested in accordance with this specification, the average *g*-max at each test point shall be less than 200 *g*'s.

6.2 If a turf playing system is tested in accordance with this specification, and the reported average *g*-max of one or more test points is equal to or greater than 200 *g*'s, the turf playing system should be brought into compliance and should not be used in the interim.

6.3 Nothing in this specification is intended to keep an owner, architect, engineer or other specifier from establishing more stringent performance requirements for a turf playing system.

- ASTM CURRENTLY VOTING TO LOWER MAXIMUM ALLOWABLE GMAX TO 165

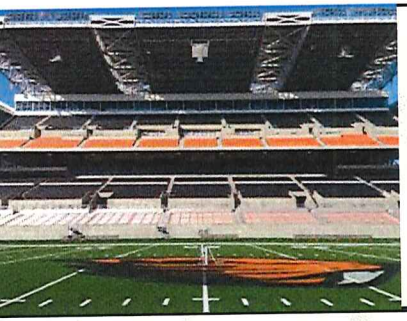
G-MAX TESTING

GMAX VALUES HAVE MANY VARIABLES

WHATS UNDER THE TURF IS THE BIGGEST VARIABLE

- SUBSURFACE MATERIAL (AGGREGATE/CONCRETE/ASPHALT)
- COMPACTION OF BASE AGGREGATE
- SHOCK PAD OR E-LAYER

- INFILL COMPACTION
- INFILL PARTICLE SIZE
- INFILL DEPTH
- INFILL COMPOSITION
- TURF TYPE AND HEIGHT (mono vs. slit film, dispersion)
- MAINTENANCE!!!



ARTIFICIAL TURF MAINTENANCE

REALITY IS ITS NEEDED BUT NOT OFTEN DONE ENOUGH/PROPERLY

- GROOMING (FIBER/INFILL)
- DECOMPACTION
- CLEANING
- IMPROVE SAFETY
- REDUCE LIABILITY
- PROTECT YOUR INVESTMENT

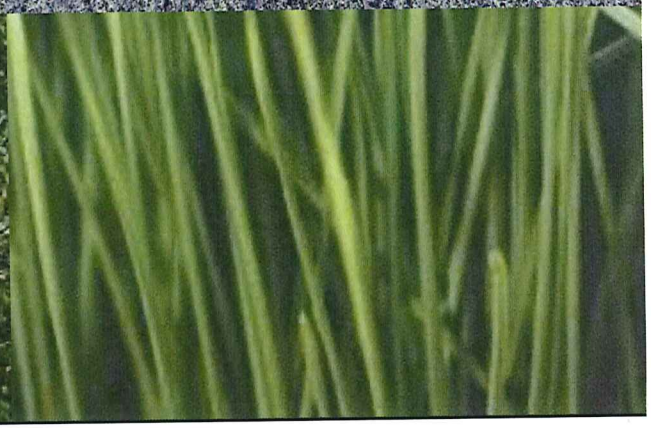
ARTIFICIAL TURF MAINTENANCE

MAINTENANCE VS USE

- HEAVILY USED FIELDS REQUIRE CONSTANT INSPECTION/MAINT. TO KEEP INFILL LEVELS AT PROPER LIMITS WHICH PROTECTS FIBER
- EXCESS OR IMPROPPER MAINTENANCE CAUSES FIBER WEAR
- LACK OF MAINTENANCE CAUSES FIBER WEAR
- AGGRESSIVE MAINTENANCE CAN SIGNIFICANTLY LOWER GMAX BUT CAN INCREASE WEAR ON SURFACE IF DONE TOO MUCH.
- FIELDS THAT ARE 2” AND ABOVE CAN MAINTAIN ACCEPTABLE GMAX WITHOUT SHOCK PADS WITH ROUTINE MAINTENANCE PRACTICES

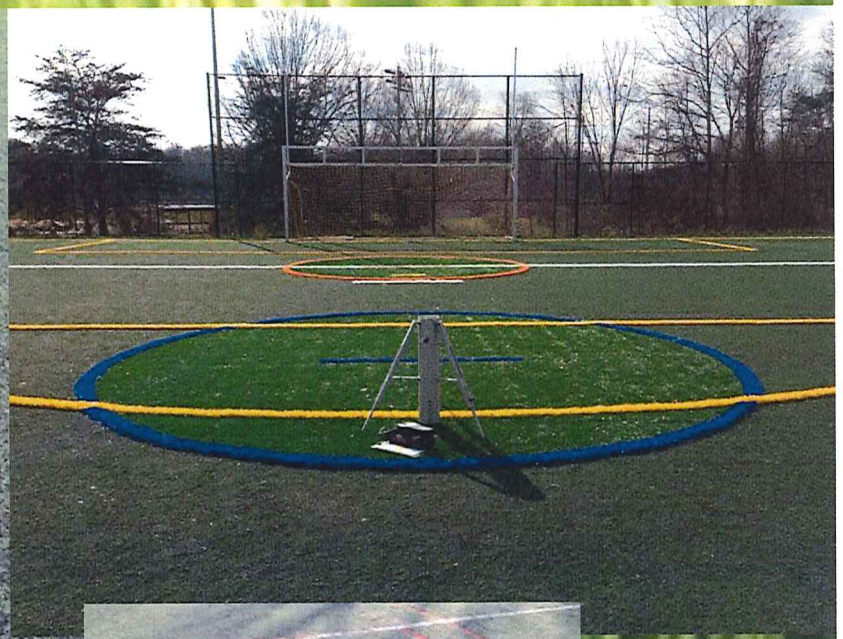
ARTIFICIAL TURF MAINTENANCE

WHY IS TURF MAINTENANCE IMPORTANT?

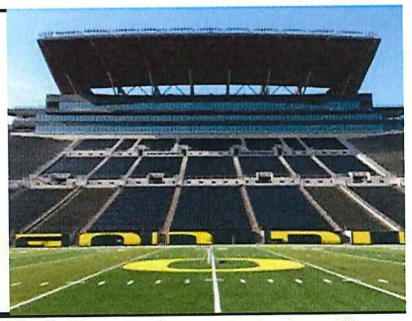


ARTIFICIAL TURF MAINTENANCE

WHY IS TURF MAINTENANCE IMPORTANT?



SPORTS FACILITY DESIGN



CIVIL ENGINEERS SPECIALIZING IN SPORTS FACILITY DESIGN

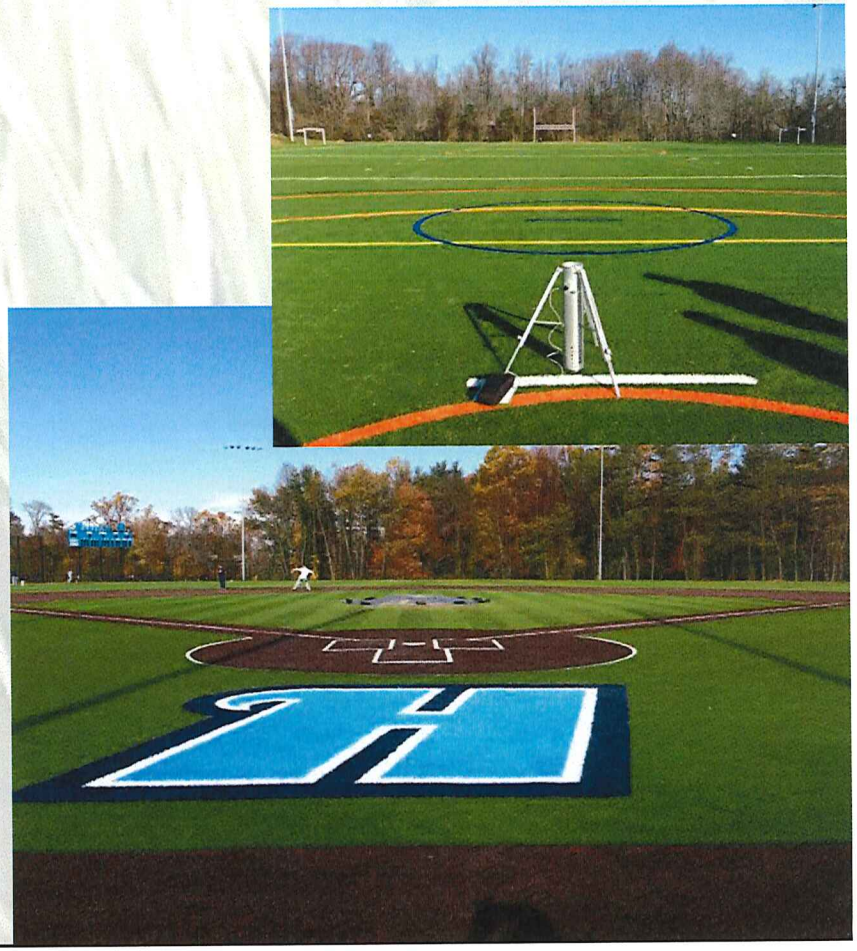
- ATHLETIC FIELDS GRASS/TURF
- TRACK EVENTS
- PLAYGROUNDS

- WHO WE WORK FOR
  - PUBLIC SCHOOLS/PARKS
  - PRIVATE ENTITIES
  - OTHER A/E
  - CONTRACTORS

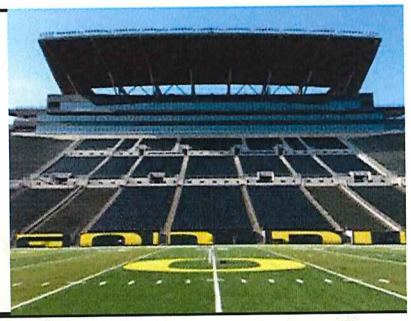
SPORTS FACILITY DESIGN

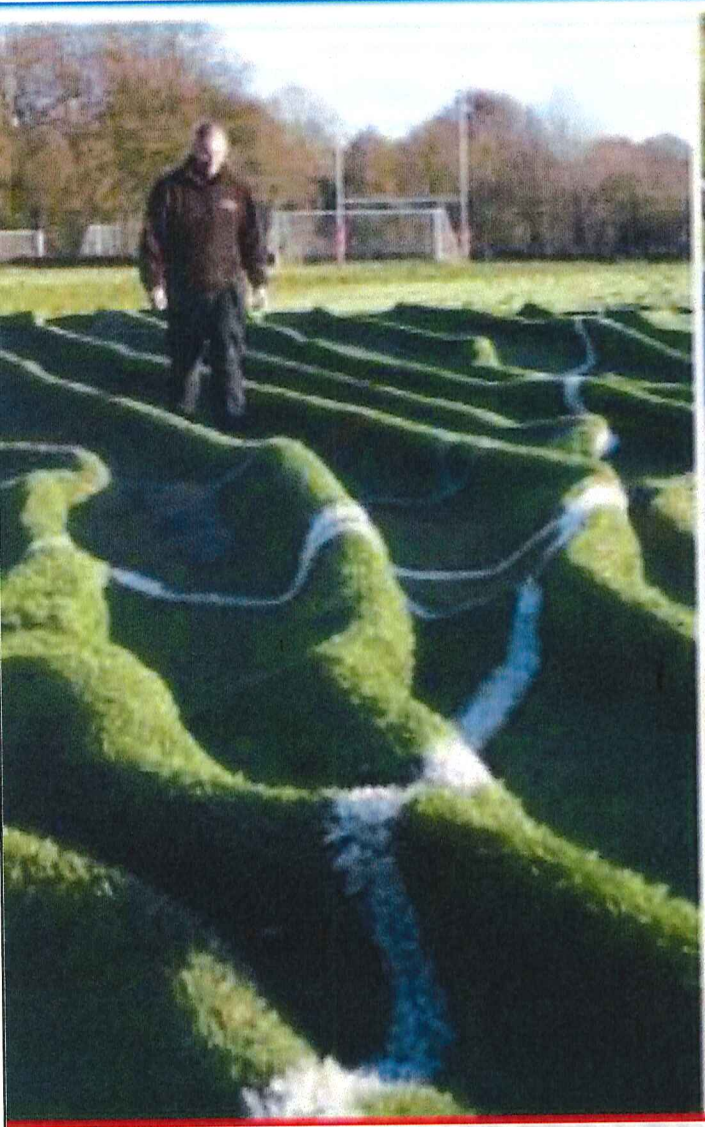
DESIGN FIELD AROUND PRIMARY USES

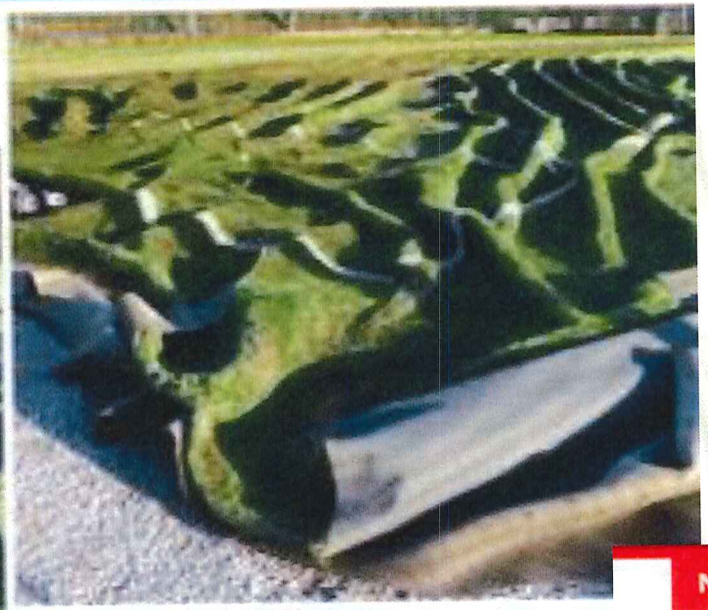
- EACH SPORT HAS PREFERRED TYPE OF SURFACE
- EACH SPORT IMPACTS FIELD DIFFERENTLY
- EACH AGE GROUP WILL IMPACT SURFACE DIFFERENTLY
- EVERY SITE IS DIFFERENT – ESPECIALLY IN THIS CASE!!!!!!



What we are trying to avoid!







NEWS

Floods turn school's artificial pitch into bizarre rippling wasteland

The AstroTurf rippled under 5ft of water after the River Aire burst its banks on Boxing Day

Because this will happen again!

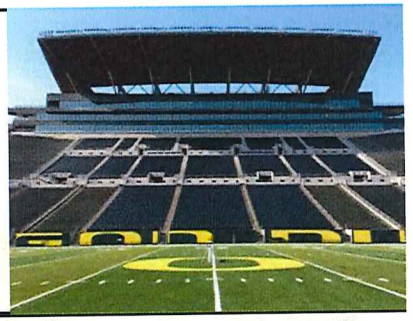
SPORTS FACILITY DESIGN

JBL TURF REPLACEMENT AND DESIGN

- TURF – FIBER TYPE, HEIGHT, GAUGE, FACE WEIGHT, ECT.
- INFILL – MATERIAL TYPE, SIZE, AMOUNT

TURF FIBER
OVER THE LAST 10 YEARS

- FULL CIRCLE – SLITFILM ➡ MONOFILAMENT ➡ SLITFILM/COMBO
- SLIT FILM (FIBERS TRAP INFILL)
  LESS DISPERSION, INFILL PROTECTED = LESS MAINTENANCE
  GREAT FOR MULTI-USE & HIGH USE FACILITIES
- MONOFILAMENT (FIBERS LEAVE INFILL EXPOSED)
  MORE DISPERSION = MORE MAINTENANCE
  EARLY AESTHETICS ARE GREAT, MORE EXPENSIVE
- DUAL FIBER = COMBO SLIT FILM AND MONOFILAMENT
- NYLON FIBERS = THATCH ZONES OR INTEGRATION OF NYLON FIBERS TO INCREASE DURABILITY
- WOVEN PRODUCT = 100% RECYCLEABLE WITH HIGH TUFT BIND
- INFILL SYSTEMS = CLEANER, ENGINEERED SYSTEMS, ALTERNATIVE PRODUCTS, RECYCLING



RECOMMENDATION FOR JBL

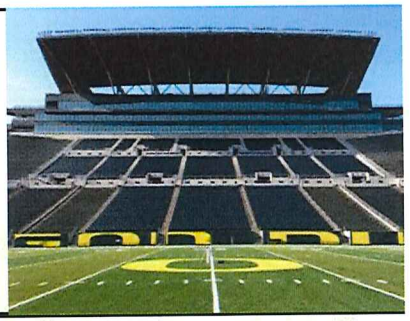
2.25" SLIT FILM FIBER WITH TEXTURED MONOFILAENT THATCH – WHY?

SLIT FILM IS MOST DURABLE FIBER AND THE PROVEN WORK HORSE
SLIT FILM FIELDS LAST LONGER
SLIT FILM FIBER CURLS UP AND TRAPS INFILL – KEEPING IT IN SYSTEM
SLIT FILM WILL PROTECT THE SYSTEM FROM CONTAMINATION

THATCH ZONE PROTECTS INFILL
THATCH ZONE TRAPS INFILL – KEEPS IT IN SYSTEM LESS MAINTENANCE
THATCH ZONE DENSE LAYER PROVIDES ADDS DURABILITY
THATCH ZONE WILL PROTECT SYSTEM FROM SILT CONTAMINATION

SYSTEM HAS PROVEN SUCCESS AT THIS SITE LOCATION

LEADING DESIGN LDDSPORTS & DEVELOPMENT



INFILL SYSTEMS AVAILABLE

STANDARD INFILLS

- SBR ALL RUBBER
- SAND AND RUBBER SYSTEMS

ALTERNATIVE INFILLS

- TPE – THERMOPLASTIC ELASTOMER
- ORGANIC – CORK, COCONUT HUSK
- NIKE GRIND
- COATED SAND - ENVIROFILL
- EPDM – TRACK SURFACES
- NON INFILL
- NEED SHOCK PADS

ISSUES AT JBL

- FLOODPLAIN
- EXISTING BASE COMPACTED WITH NO VERTICAL DRAINAGE EXCEPT AT THE SIDELINES
- EXCESSIVE SILTATION AFTER FLOOD EVENTS

INFILL PRODUCT CONSIDERATIONS

- SHOCK PADS – REDUCE INFILL => SHOCK PADS FLOAT
- ORGANIC INFILL – MATERIAL FLOATS – REQUIRES SHOCK PAD
- TPE – MATERIAL FLOATS – REQUIRES SHOCK PAD
- EPDM, COATED SAND, NON-INFILL – REQUIRES SHOCK PAD
- NIKE GRIND – HARDER THAN SBR, RESILIENCY REDUCES OVER TIME

RECOMMENDATION FOR JBL = SBR CRUMB RUBBER

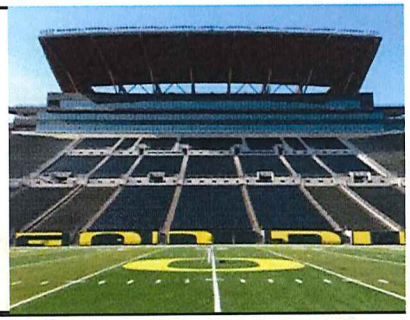
RECOMMENDATION FOR JBL

SBR CRUMB RUBBER INFILL – WHY?

SBR DOES NOT FLOAT OR EASLIY DISPERSE
SBR PROVIDES LONG TERM SHOCK ABSORBSION SAFETY
SBR CAN BE CLEANED AFTER FLOOD EVENTS AND SILTATION
SBR CAN BE EASILY MAINTAINED
SBR MATERIAL STAYS WITHIN THE SYSTEM DURING FLOODS

SBR HAS BEEN ABUNDANTLY TESTED - RESEARCH SHOWS IT IS SAFE

Crumb Rubber Safety



www.sportslabsusa.com

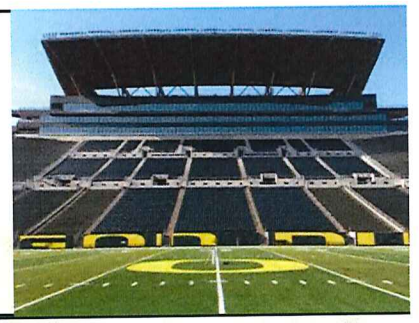
LABORATORY TESTING
HEAVY METALS & PAH ANALYSIS

PAH Results Table

PAHs	Analytical Method	Suggested Concentration Limit (mg/kg)	Sample Detection Limit (mg/kg)	PASS / FAIL
Naphthalene 2	S 8270D	n/a	<17.0	PASS
2-Methylnaphthalene	S 8270D	n/a	<17.0	PASS
1-Methylnaphthalene	S 8270D	n/a	<17.0	PASS
Acenaphthylene	S 8270D	n/a	<17.0	PASS
Acenaphthene	S 8270D	n/a	<17.0	PASS
Dibenzofuran	S 8270D	n/a	<17.0	PASS
Fluorene	S 8270D	n/a	<17.0	PASS
Anthracene	S 8270D	n/a	<17.0	PASS
Phenanthrene	S 8270D	n/a	<17.0	PASS
Fluoranthene	S 8270D	n/a	<17.0	PASS
Pyrene	S 8270D	n/a	<17.0	PASS
Benzo(a)anthracene	S 8270D	*50	<17.0	PASS
Chrysene	S 8270D	*50	<17.0	PASS
Benzo(b)fluoranthene	S 8270D	*50	<17.0	PASS
Benzo(k)fluoranthene	S 8270D	*50	<17.0	PASS
Benzo(a)pyrene	S 8270D	*50	<17.0	PASS
Indeno(1,2,3-cd)pyrene	S 8270D	*50	<17.0	PASS
Dibenzo(a,h)anthracene	S 8270D	*50	<17.0	PASS
Benzo(g,h,i)perylene	S 8270D	n/a	<17.0	PASS

*Highlighted rows indicate a PAH that is classified by the EPA as a "probable human carcinogens". The concentration limits of the carcinogenic PAHs provided in the table above are based on a human risk assessment study using a soccer recreational use scenario with a target risk level of 1E-05

Crumb Rubber Safety



www.sportslabsusa.com

LABORATORY TESTING
HEAVY METALS & PAH ANALYSIS

Heavy Metals Results Table

Heavy Metal	Analytical Method	*Suggested Concentration Limit (mg/kg)	Sample Result (mg/kg)	PASS / FAIL
Antimony	EPA 6010B	30	<2.00	PASS
Arsenic	EPA 6010B	3.4	<2.00	PASS
Barium	EPA 6010B	5200	36.5	PASS
Beryllium	EPA 6010B	16	<0.500	PASS
Cadmium	EPA 6010B	1.7	<0.500	PASS
Chromium	EPA 6010B	17	1.91	PASS
Cobalt	EPA 6010B	660	<0.500	PASS
Copper	EPA 6010B	3000	40.2	PASS
Lead	EPA 6010B	80	5.30	PASS
Mercury	EPA 6010B	18	<0.0250	PASS
Molybdenum	EPA 6010B	380	<1.00	PASS
Nickel	EPA 6010B	1600	8.60	PASS
Selenium	EPA 6010B	380	<2.00	PASS
Silver	EPA 6010B	380	<0.500	PASS
Thallium	EPA 6010B	5	<1.00	PASS
Vanadium	EPA 6010B	530	<0.500	PASS
Zinc	EPA 6010B	23000	8060	PASS

*The suggested concentration limits shown are based on screening levels per California OEHHA Soil-Screening Numbers [mg/kg] for Nonvolatile Chemicals Based on Total Exposure to Contaminated Soil: Inhalation, Ingestion and Dermal Absorption. Residential Scenario. These limit have been included for reference and are not project specific.

End of Report

Standard / Regulation:

The STC suggests that any toxicological test and analysis of infill for synthetic turf fields be performed according to European Standard EN 71-3 – Safety of Toys Part 3: Migration of certain elements. The analytical method for each metal can be found in the results table below.

Requirements:

The target detection limits for each metal can be found in the results table below. The limits shown are per European Standard EN 71-3 – Safety of Toys Part 3: Migration of certain elements.

www.sportslabsusa.com

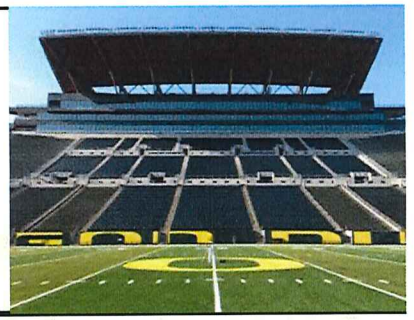
LABORATORY TESTING
HEAVY METALS ANALYSIS

Results Table:

Analyte	Analytical Method	*Target Detection Limit (mg/kg)	Sample Detection Limit (SDL) Based Result	PASS / FAIL
Aluminum	NF EN ISO 11885	70,000	<50 mg/kg	PASS
Antimony	NF EN ISO 11885	560	<10 mg/kg	PASS
Arsenic	NF EN ISO 11885	47	<5 mg/kg	PASS
Barium	NF EN ISO 11885	18,750	<50 mg/kg	PASS
Boron	NF EN ISO 17294-1 et 2	15,000	<50 mg/kg	PASS
Cadmium	NF EN ISO 11885	17	<1 mg/kg	PASS
Chromium III	NF EN ISO 11885	460	<10 mg/kg	PASS
Chromium VI	NF T 90-043	0.2	<0.1 mg/kg	PASS
Cobalt	NF EN ISO 11885	130	<10 mg/kg	PASS
Copper	NF EN ISO 11885	7,700	<50 mg/kg	PASS
Lead	NF EN ISO 11885	160	<10 mg/kg	PASS
Manganese	NF EN ISO 11885	15,000	<50 mg/kg	PASS
Mercury	NF EN 13506	94	<10 mg/kg	PASS
Nickel	NF EN ISO 11885	930	<10 mg/kg	PASS
Selenium	NF EN ISO 11885	460	<10 mg/kg	PASS
Strontium	NF EN ISO 17294-1 et 2	56,000	<50 mg/kg	PASS
Soluble Tin (Sn)	NF EN ISO 17294-1 et 2	180,000	<50 mg/kg	PASS
Soluble Organic Tin	NF EN ISO 17294-1 et 2	12	<0.2 mg/kg	PASS
Zinc	NF EN ISO 17294-1 et 2	46,000	<50 mg/kg	PASS

*Limits per European Standard EN 71-3 – Safety of Toys Part 3: Migration of certain elements.

Crumb Rubber Safety From STC



PRESENTED BY SYNTHETIC TURF COUNCIL (STC)

The STC believes that reliable scientific data should be the foundation of any discussion regarding the safety of synthetic turf with crumb rubber infill. During the past two decades, there have been more than 60 technical studies and reports that review the health effects of crumb rubber as it pertains to toxicities from inhalation, ingestion and dermal contact, as well as cancer. These studies and reports were performed during the past 22 years by independent organizations such as: Connecticut Department of Health, Hofstra University, New York State Department of Environmental Conservation, The New York City Department of Health and Mental Hygiene and University of California Berkeley. The preponderance of evidence shows no negative health effects associated with crumb rubber in synthetic turf. As NBC factually reported, "there is no research directly linking crumb rubber exposure to cancer."

According to a peer-reviewed report prepared for the Rubber Manufacturers Association by Cardno Chemrisk, Inc., an independent global scientific consulting firm, "regular exposure (e.g. regular play on ground rubber filled athletic fields) to ground rubber for the length of one's childhood does not increase risk of cancer above levels considered by the state of California to be *de minimus* (i.e., a lifetime excess cancer risk of 1 in 1 million)." (August 1, 2013, page 14).

Crumb Rubber Safety From Toxicologist

A Tale of Two Infills—Which is Safer?

Chemical	Crumb Rubber (mg/kg)	Natural Soil (mg/kg)

PRESENTED BY BOARD CERTIFIED TOXOCOLOGIST

MICHAEL K. PETERSON, MEM, DABT – GRADIENT CORP. WA

- **DOSE**
- **EXPOSURE**

Crumb Rubber Safety From Toxicologist

A Tale of Two Infills—Which is Safer?

Chemical	Crumb Rubber (mg/kg)	Natural Soil (mg/kg)
Arsenic	0.12	20
Cadmium	0.54	2
Chromium	2.7	30
Lead	26	100
Mercury	<0.017	0.3
Carcinogenic PAHs	1.31-3.13	0.93-4.60

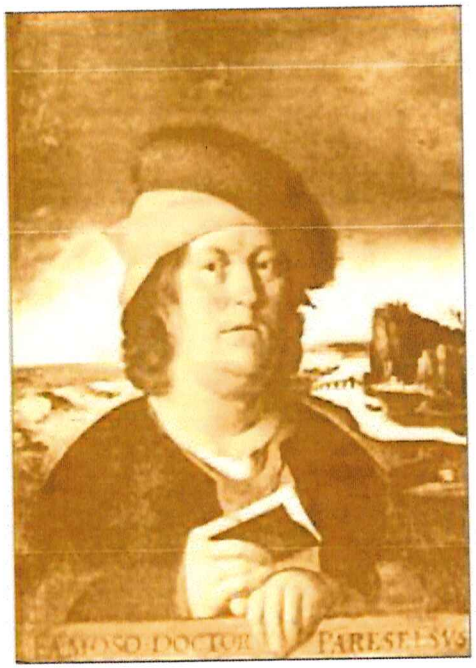
Data are only a subset of chemicals found in crumb rubber/soil.
Crumb rubber data (and c-PAH data) are from Teter Engineering, 2015; data from chemical composition studies, and do not consider bioaccessibility
Natural soil data are from MADEP, 2002 (90th percentiles).

Copyright Gradient 2015

GRADIENT

Crumb Rubber Safety From Toxicologist

Dose - THE KEY CONCEPT in Toxicology



Father of Modern Toxicology
Paracelsus—1564

"All things are poisonous, only the dose makes it non-poisonous."

Dose alone determines toxicity

All chemicals—synthetic or natural—have the capacity to be toxic

GRADIENT

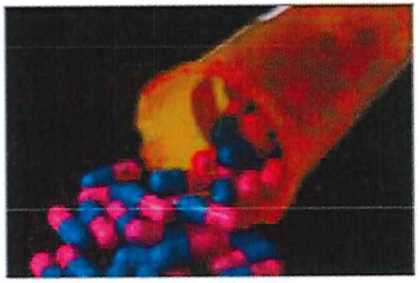
Copyright Gradient 2015

Crumb Rubber Safety From Toxicologist

Dose

Determines Whether a Chemical Will Be Beneficial or Poisonous

	Beneficial Dose	Toxic Dose
Aspirin	300 – 1,000 mg	1,000 – 30,000 mg
Vitamin A	5,000 units/day	50,000 units/day
Oxygen	20% (Air)	50 – 80% (Air)



GRADIENT

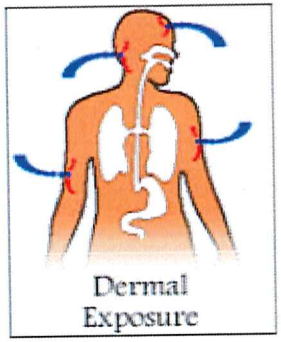
Copyright Gradient 2015

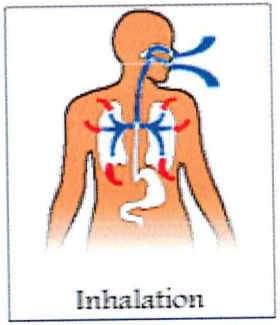
Crumb Rubber Safety From Toxicologist

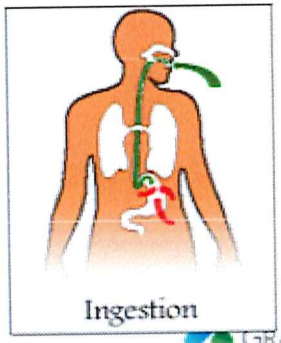
Exposure

Route of Exposure

- The **route** (site) of exposure is an important determinant of the ultimate **dose**—different routes may result in different rates of absorption.
  - Dermal (skin)
  - Inhalation (lung)
  - Oral ingestion (Gastrointestinal)
- The route of exposure may be important if there are tissue-specific toxic responses.
- Toxic effects may be local or systemic.



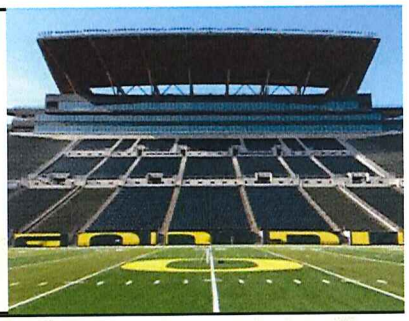




GRADIENT

Copyright Gradient 2015

Crumb Rubber Safety From Toxicologist



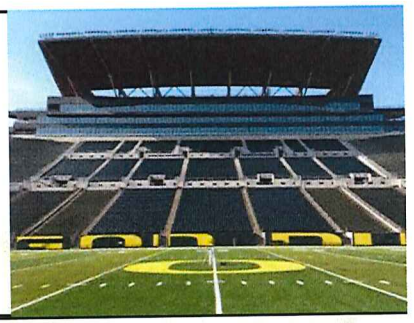
Context: Coach Griffin's Cancer List

- Details below are oversimplified—actual list is not public!
- Washington Department of Health currently studying
- 209 athletes; 160 soccer players; 97 goalies; 45 Washington residents who played both recreationally and year-round
- 3,000,000 US youth soccer players; 100,000 in WA
- Expected background cancer rate: 16.1 per 100,000/yr
- In other words, over 15 years we would expect there to be:
  - 7,245 US soccer cancer cases (2938 leukemia/lymphoma)
  - 241 WA soccer cancer cases (98 leukemia/lymphoma)

Copyright Gradient 2015

GRADIENT

Crumb Rubber Safety From Toxicologist



PRESENTED BY BOARD CERTIFIED TOXOCOLOGIST

Dr. Laura C. Green, MEM, DABT - Works Independently

Dr. Green has been retained by schools and municipalities to advise them on the health aspects of synthetic turf athletic and recreation facilities.

Dr. Green has reviewed the available literature and studies on the safety of synthetic turf conducted both in the United States and abroad. She also evaluated the epidemiological literature regarding cancer in children and adolescents. Utilizing this background, as well as generally accepted toxicological principles, Dr. Green examined the claims being made by a vocal and small minority in the media about the alleged risks of cancer associated with synthetic turf fields. Dr. Green also reviewed the limited information that those individuals and organizations have used to support their claims.

Crumb Rubber Safety From Toxicologist

PRESENTED BY BOARD CERTIFIED TOXOCOLOGIST

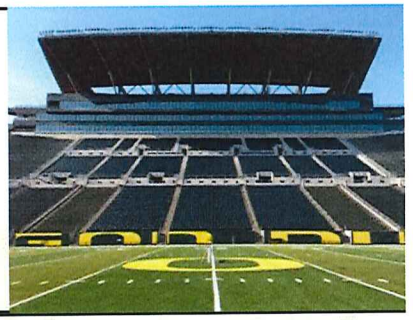
Dr. Laura C. Green, MEM, DABT - Works Independently

Dr. Green has focused on reports of a possible "cancer cluster" of young, female soccer players whose cancers were allegedly caused by an exposure to the crumb-rubber infill used on synthetic turf athletic fields.

The following are some of the highlights of Dr. Green's report:

- There is no reliable evidence to indicate that the reported cases of cancer in soccer players constitute an actual cancer cluster, since no reports have been made regarding the ages, sexes, or races of the individuals, the particular diseases at issue, the number of cases expected in any given population, or the particular exposures of the group.
- The types of cancers reported, lymphomas and leukemias, are among the most common types of cancer that develop in children and adolescents.
- The federal Centers for Disease Control and Prevention (CDC) has investigated more than 100 cancer clusters, many of them involving children, and has never found an environmental cause. Instead, these clusters appear to arise due to chance.

Crumb Rubber Safety From Toxicologist



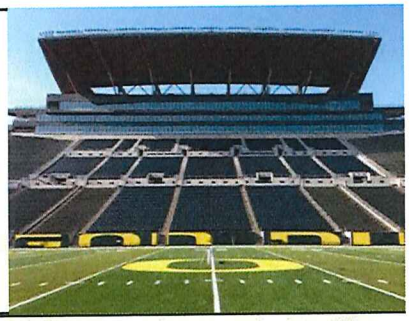
PRESENTED BY BOARD CERTIFIED TOXOCOLOGIST

Dr. Laura C. Green, MEM, DABT - Works Independently

The following are some more of the highlights of Dr. Green's report:

- The type of leukemia most prevalent in childhood (namely acute lymphocytic leukemia – ALL), all types of lymphomas, and brain tumors are *not* known to be caused by cigarette smoking. Since smoking does not cause these cancers, it is highly unlikely that the small exposures to chemicals from synthetic turf athletic fields could do so.
- Lymphomas are not known to be caused by environmental exposures to chemicals.
- The leukemia most prevalent in children (ALL) is not known to be caused by environmental exposures to chemicals.
- No type of cancer in adolescents is known to be caused by exposure to chemicals.
- Scientific studies have shown that the quality of outdoor air in contact with synthetic turf athletic fields is not materially different from outdoor air in general.

Crumb Rubber Safety From Toxicologist



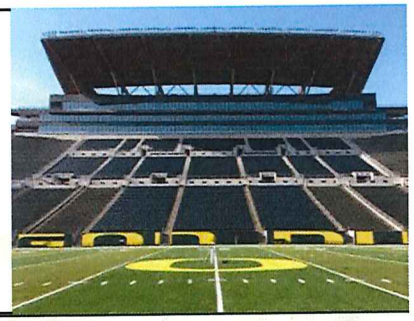
PRESENTED BY BOARD CERTIFIED TOXOCOLOGIST

Dr. Laura C. Green, MEM, DABT - Works Independently

After reviewing the literature and the claims being made that synthetic turf can cause cancer in children and adolescents, Dr. Green comes to the same conclusion that many scientists before her have reached:

I find no reliable basis for the notion that crumb rubber in-filled synthetic turf fields pose a significant risk of cancer. Several groups of investigators, from academia, government, and consulting firms, have performed environmental monitoring and/or modeling studies of crumb rubber and synthetic turf fields, and have reached the same conclusion.

Crumb Rubber Safety From Toxicologist

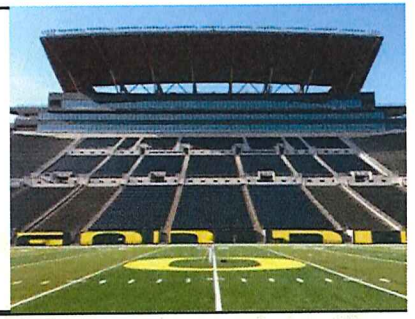


PRESENTED BY SYNTHETIC TURF COUNCIL (STC)

The STC believes that reliable scientific data should be the foundation of any discussion regarding the safety of synthetic turf with crumb rubber infill. During the past two decades, there have been more than 60 technical studies and reports that review the health effects of crumb rubber as it pertains to toxicities from inhalation, ingestion and dermal contact, as well as cancer. These studies and reports were performed during the past 22 years by independent organizations such as: Connecticut Department of Health, Hofstra University, New York State Department of Environmental Conservation, The New York City Department of Health and Mental Hygiene and University of California Berkeley. The preponderance of evidence shows no negative health effects associated with crumb rubber in synthetic turf. As NBC factually reported, "there is no research directly linking crumb rubber exposure to cancer."

According to a peer-reviewed report prepared for the Rubber Manufacturers Association by Cardno Chemrisk, Inc., an independent global scientific consulting firm, "regular exposure (e.g. regular play on ground rubber filled athletic fields) to ground rubber for the length of one's childhood does not increase risk of cancer above levels considered by the state of California to be *de minimus* (i.e., a lifetime excess cancer risk of 1 in 1 million)." (August 1, 2013, page 14).

Crumb Rubber Safety From Toxicologist



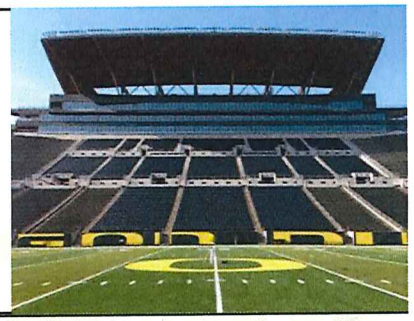
WHAT IS THE EPA DOING?

- CONTINUE COMPILING AND EVALUATING TEST DATA
- WORK WITH OTHER STATES AND RESEARCH INSTITUTES
- ASSIST IN FUNDING ONGOING RESEARCH
- BY THE END OF THIS YEAR THEY WILL ANNOUNCE A PLAN, NOT A FINAL VERDICT…

WHAT DO WE DO?

- PROCEED WITH THE INFILL PRODUCT THAT HAS BEEN TESTED AND VERIFIED BY MEDICAL PROFESSIONALS, RESEARCHERS, AND INDEPENDENT LABORATORIES TO BE SAFE!

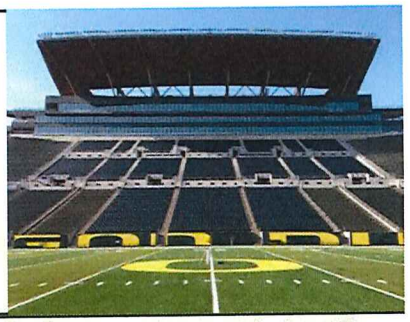
NOT ALONE!



Projects that have recently gone out to bid or are bidding now with SBR crumb rubber spec:

- Erwin HS and North Buncombe High School - Buncombe County, NC
- CASL (3 fields) - Raleigh, NC
- Bryan Park Soccer Complex – Greensboro, NC –Crumb rubber in their base bid, with non SBR options as an alternate
- UNC Chapel Hill- Chapel Hill, NC –Replacing Recreation Fields with crumb rubber spec
- University of Mt. Olive, Mt. Olive, NC - Starts next week with SBR crumb rubber specified and approved

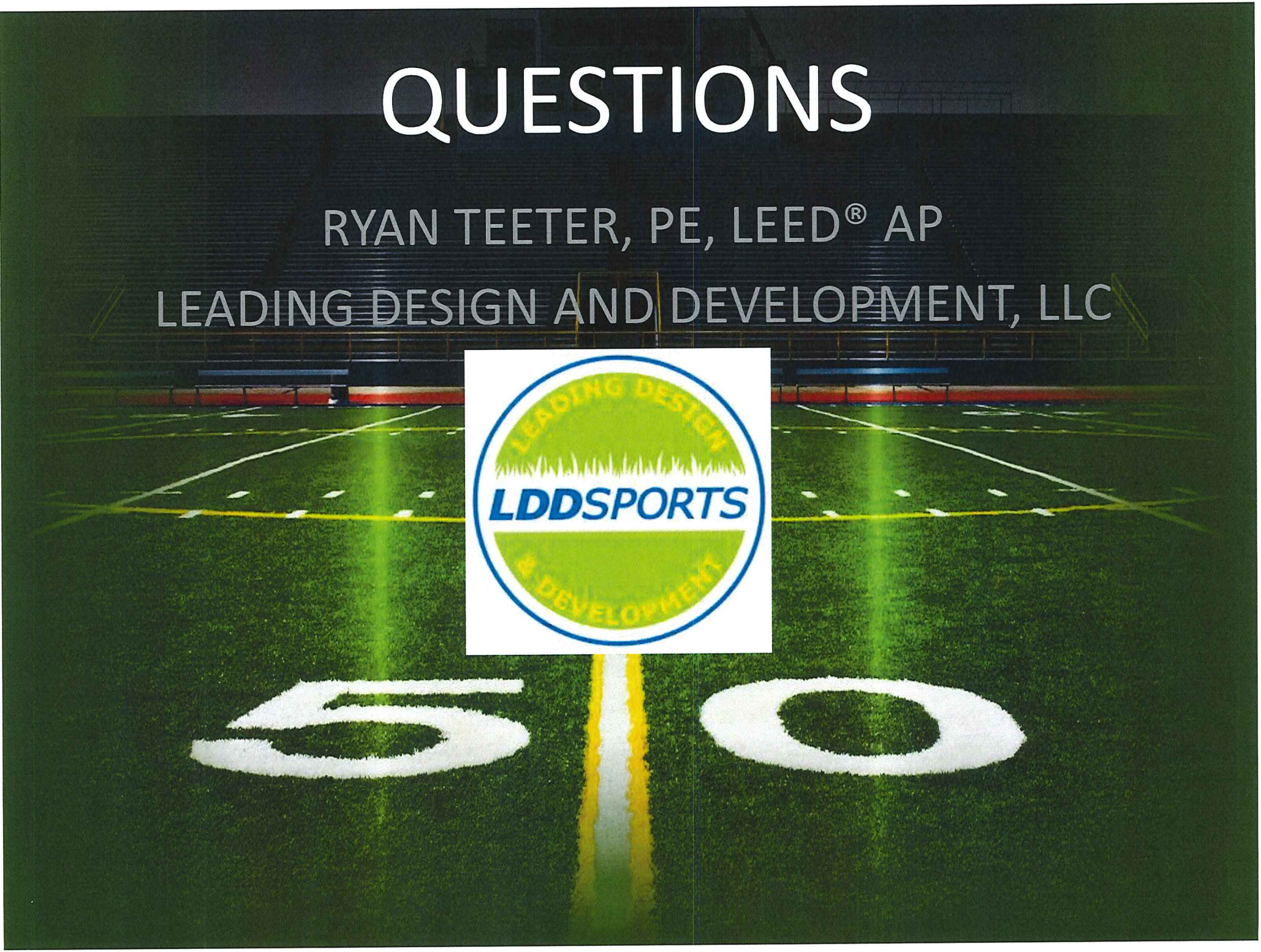
NOT ALONE!



Projects built in North Carolina or South Carolina in the last year:

- AC Reynolds HS – Asheville NC
- Cannon School - Concord, NC
- CM Herndon Park - Durham, NC
- Pine Lakes Prep - Mooresville, NC
- Wilmington Hammerheads Indoor - Wilmington, NC
- Hedrick Stadium - Ft. Bragg, NC
- Hercules Stadium - Ft. Bragg, NC
- Greensboro YMCA - Greensboro, NC
- Joe Gibbs Racing - Charlotte, NC
- North Augusta HS - North Augusta, SC
- Clemson Intramurals - Clemson, SC
- Coastal Carolina Brooks Stadium - Conway, SC
- Clover Memorial Stadium - Clover, SC
- Ridgeview HS - Columbia, SC
- Westside HS – Anderson, SC
- TL Hanna HS – Anderson, SC
- Emerald HS – Greenwood, SC
- Greenwood HS – Greenwood, SC

QUESTIONS

RYAN TEETER, PE, LEED® AP

LEADING DESIGN AND DEVELOPMENT, LLC