



May 26, 2021  
Job No.: 21057

Nicholas Moreno, Executive Director  
Boston Conservation Commission  
City of Boston Environmental Department  
1 City Hall Square, Room 709  
Boston, MA 02201

Re: Showa Boston Institute- Athletic Field Renovations  
Notice of Intent Application  
Supplemental Information

Dear Mr. Moreno,

Thank you for hearing our Notice of Intent Application at the Conservation Commission meeting on 5/19/21. We appreciated the comments from you and the Commissioners. We have summarized the comments and provided supplemental responses to each item below.

**Nicholas Moreno Comments:**

1. Are any trees or other vegetation going to be removed for the installation of the field?  
***Response: There may be very minor clearing at the northeast corner of the field to accommodate construction of a small stone retaining wall. Approximately two to three trees of 6" to 8" caliper may need to be removed. This corner of the field is outside the wetland buffer zone [approximately 135' from the closest edge of the buffer]. No tree clearing is proposed along the south edge of the field within the wetland buffer zone.***
  
2. Staff is not fully convinced that the performance standards for Riverfront/provisions in the Ordinance for Riverfront area being met.
  - o Language from Ordinance states, "In reviewing activities within the riverfront area, the Commission shall presume the riverfront area is important to all the Resource Area Values unless demonstrated otherwise, and no permit issued hereunder shall permit any activities unless the Commission finds by preponderance of the evidence that there is no practicable alternative to the proposed project with less adverse effects, and that such activities, including proposed mitigation measures, will have no significant adverse impact on the areas or values protected by this Ordinance. The Commission shall regard as practicable an alternative which is reasonably available and capable of being done after taking into consideration the proposed property use, overall project purpose (e. g., residential, institutional, commercial, or industrial), logistics, existing technology, and other factors at its discretion. The Commission will also consider if the project proposes ecological enhancement of the Riverfront Area.

***Response: For the following reasons, the Applicant believes there is no significant adverse effects on Riverfront Area due to the proposed conversion of the existing athletic field to synthetic turf:***

- ***The proposed field does not further encroach towards the intermittent stream than the existing natural grass field. The proposed field improvements hold the limit of the existing chain link fence along the southern edge of the field.***

- *The playing dimensions proposed are required to meet the minimum standards for the National Federation of High School's playing dimensions for soccer, boy's lacrosse, and field hockey. The Applicant is providing the minimum of safety runout area (10' on the sidelines) and does not recommend a field width narrower than what is being proposed. Relocation of the field further north to completely stay out of the buffer zone would require extensive clearing, grading, and disturbance of the upslope vegetated hill habitat, an action that would be more detrimental to the existing habitats. Therefore, in order to provide a safe playing field dimension at the School's existing natural grass field location, it is not feasible to locate the field completely outside of the buffer zone. Additionally, due to the sloping nature of the Showa Campus property and the existing structures, there is no other feasible and practical alternative location on campus to install this playing field.*
  - *The area immediately south of the fence line that slopes down to the intermittent stream within the buffer area has extremely limited habitat value, since the majority of this slope is armored with stone.*
  - *With the conversion from grass to synthetic turf, no fertilizers, pesticides, or other lawn treatments will be used to maintain the safety/playability of the field. The conversion eliminates the amount of these products that currently could flow into the intermittent stream.*
  - *No additional impervious area or structures are being proposed that would change the nature of the stormwater runoff within this area.*
  - *The installation of the synthetic turf field will maintain the same use (recreational activities) that the area is currently being used for within the buffer zone.*
3. When the Commission last reviewed an application proposing artificial turf, the Commission expressed concern with leaching, stormwater contamination, maintenance issues, and the impact on climate change impacts (heat island effect). The NOI did not fully detail the specifications of the artificial turf that was being proposed. Since this was raised as an issue by the Commission, Staff has consulted colleagues in other municipalities regarding artificial turf. Staff is most concerned with the ecological impacts of the chemicals in artificial turf, specifically relating to the chemical levels of Perfluoroalkyl and polyfluoroalkyl substances (PFAS) and Polycyclic aromatic hydrocarbons (PAHs) in the proposed artificial turf fields. Additionally, Staff is concerned about the infill material used which can include lead and zinc, which are specifically cited by the Applicant in the NOI. While they state "elevated levels of zinc are comparable to concentrations in typical urban runoff and do not raise any significant concerns for groundwater quality or drinking water standards," it has been the practice of the Commission to improve water quality discharged from projects.

**Response:**

- *The technical specifications of the proposed turf and infill systems are included in this supplemental package.*
- *A letter from the turf manufacturer stating that no PFAS substances are used in the manufacturing of the turf product is included in this supplemental package.*
- *To address the Staff's and Commission's concern about the SBR rubber infill, the Applicant is proposing to use EPDM rubber for infill in lieu of the previously submitted SBR rubber. The EPDM rubber is a manufactured virgin rubber product, which is a more leach resistant product than SBR. As such, the EPDM rubber does not have the same leachate characteristics of SBR. Please see attached test reports that indicate all heavy metal levels are below the*

*limit criteria of each test referenced. Detail A8 on Sheet CI501 has been updated to reflect the change in infill material*

- *As an additional environmental improvement, the Applicant is proposing to plant grasses at the outlet of the rip rap plunge pool to provide a planted buffer between the stormwater outlet and the intermittent stream. Please refer to the updated Sheet CI101 included in this supplemental package.*

4. Staff recommends the Commission request the following information and continue the hearing:
  - o The specifications for the artificial turf and infill material being proposed.

*Response: As part of this supplemental information the Applicant is providing the specifications for the proposed turf and infill products.*

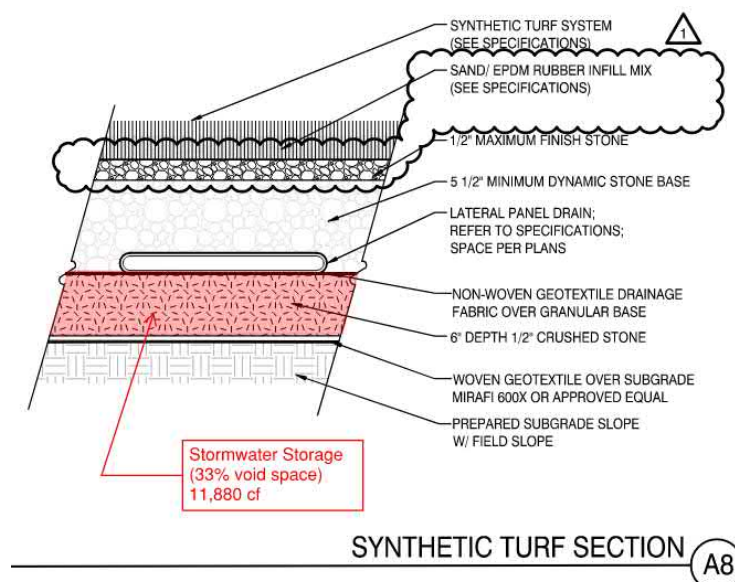
#### Commissioner John Sullivan Comments:

5. Commissioner Sullivan asked how airborne phosphorus that was landing on the field would be addressed. The Commissioner noted that no form of treatment was being provided.

*Response: As Commissioner Sullivan indicated, the project is located within the Charles River Watershed. The Charles River Watershed has a known phosphorus issue and mitigation measures within the watershed are being implemented to reduce the phosphorus load on the Charles River.*

*There are both structural and non-structural best management practices (BMPs) that can be used to reduce the phosphorus load. As part of the synthetic turf field conversion, the Applicant is reducing the phosphorus load on the intermittent stream in the following ways:*

- *Non-structural BMP: Studies in the Charles River Watershed indicate the significant role that fertilizer applications play in contributing to the region's phosphorus loading. As fertilizer use will be eliminated with the field conversion, the Applicant believes the water quality discharged from the project will be significantly improved.*
- *Structural BMP: One of the most efficient BMPs to reduce nutrient pollutants in stormwater runoff are infiltration basins. The 6" layer of crushed stone under the panel drains in the synthetic turf field section (highlighted below) will function as a large subsurface infiltration basin.*



*Stormwater flows into and is stored in the void space of this stone layer until the water level reaches the elevation of the panel drains. The crushed stone has a void ratio of approximately 33%, so the storage capacity under the panel drains is approximately 11,880 cf [200' wide x 360' long x 6" depth stone x 0.33]. This storage capacity allows for the majority of stormwater to infiltrate into the underlying soils. Reviewing the HydroCAD model, the stormwater runoff infiltrates the entire 2-year, 10-year, and 25-year storms, meaning there is no direct discharge to the intermittent stream during these storm events.*

<i>Design Storm</i>	<i>Storage</i>	<i>Peak Elevation</i>	<i>Primary Outflow from Field</i>
<i>2-year</i>	<i>3,406 cf</i>	<i>200.14</i>	<i>0.0</i>
<i>10-year</i>	<i>7,784 cf</i>	<i>200.33</i>	<i>0.0</i>
<i>25-year</i>	<i>11,056 cf</i>	<i>200.47</i>	<i>0.0</i>
<i>100-year</i>	<i>13,460 cf</i>	<i>200.57</i>	<i>0.2</i>

**\*\* Top of Field Elevation = 201.00**

**\*\* Invert Elevation of Panel Drains = 200.50**

*Since the entire runoff from the 2-, 10-, and 25-year storms infiltrates into the underlying soils, any airborne phosphorus that has fallen on the field from a rain event will not be discharged into the intermittent stream during these rainfall events.*

*With the inclusion of both structural and non-structural BMPs, the project is reducing the phosphorus load on the intermittent stream and therefore, helping reduce the overall load on the Charles River.*

**Commissioner Aldo Ghirin Comments:**

6. None

**Commissioner Alice Richmond Comments:**

7. Commissioner Richmond asked if there would any increased runoff due to the construction of the field and if the abutting neighbors would be negatively impacted.

*Response: Melissa Flynn responded that the post-construction peak flow runoff rate would be less than the pre-construction peak flow runoff rate, so there will be no impact on the abutting properties.*

**Commissioner Anne Herbst Comments:**

8. Commissioner Herbst asked if no-infill turf product that was recently approved could be used for this project. The Commissioner noted that the manufacturer provided documentation stating that no PFAS was used to produce the product.

**Response:**

- *The Applicant has provided the turf specifications for the proposed turf product.*
- *The turf manufacturer (Astroturf) has provided documentation that the turf is produced without the use of PFAS.*
- *To eliminate the concern of stormwater leachate, the Applicant is proposing to use an alternate infill (EPDM rubber) to avoid the use of SBR rubber.*

**Public Comment:**

9. Nick Moreno read a letter from the public that asked if the project would create stormwater runoff issues for the abutter properties.

***Response: As noted in the response to Commissioner Richmond, the post-development peak flow rates from the field are less than the pre-development rates, so there will be no negative stormwater runoff impacts at the abutter properties.***

Please do not hesitate to contact me at 978-287-6037 with any further questions or clarifications. Our team looks forward to continuing our review at the June 2<sup>nd</sup> meeting.

Sincerely,



Melissa A. Flynn, PE  
Civil Engineer

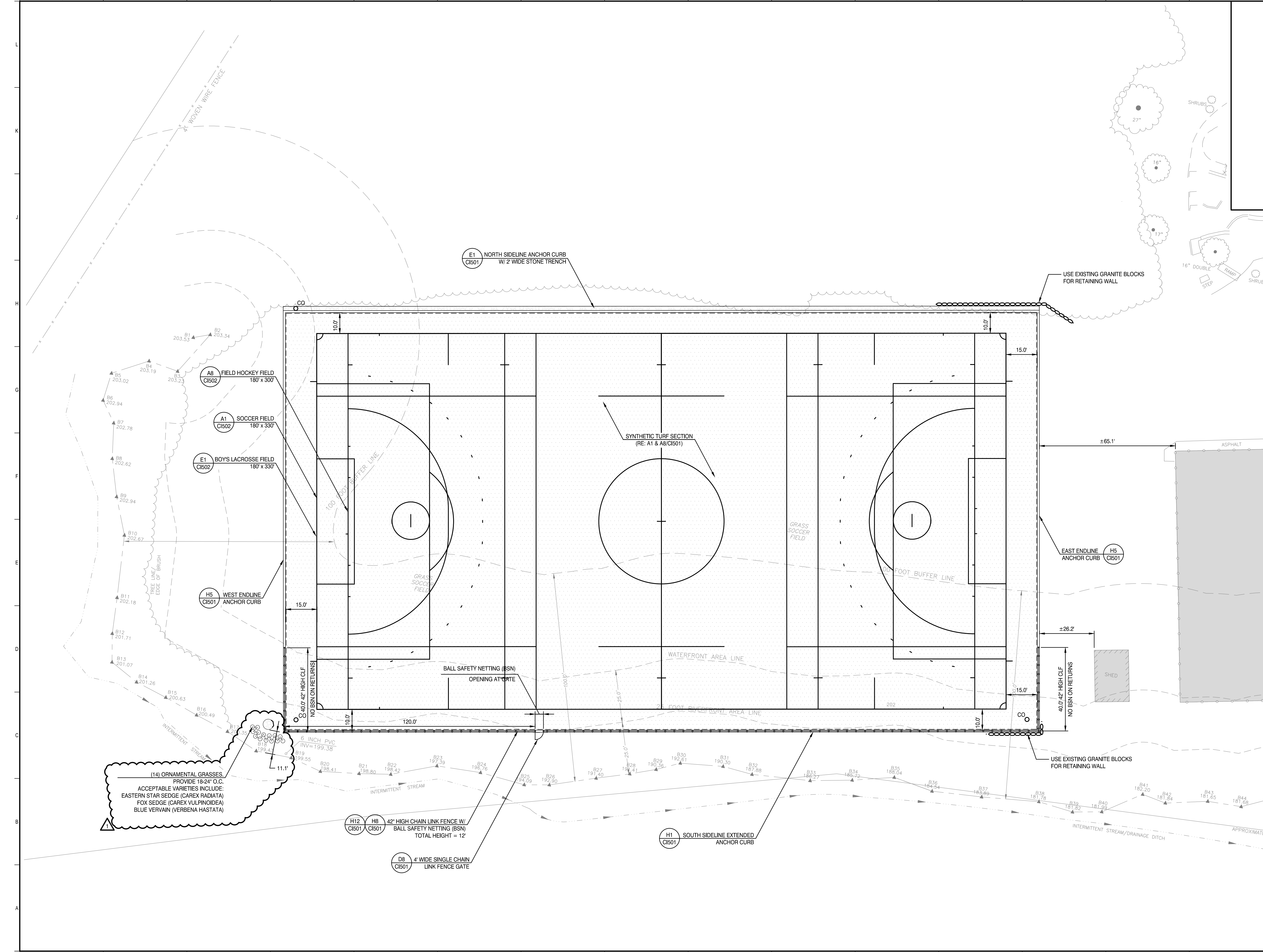
SMRT Architects and Engineers | 200 Brickstone Square, Suite 303 | Andover, MA 01810  
p 978.289.6037 | email: mflynn@smrtinc.com

CC: British International School/Nord Anglia- John McCall, Darren Nicolas, Susan Burke  
Counsellor at Law- William McCarthy  
Showa Boston Institute- Michael Muldowney, Frank Schwartz, Ron Provost  
SMRT- Richard Webb

Encl: Sheets CI101 and CI501 revision dated 5-26-21  
Turf Product Specifications, PFAS Letter, and Turf Test Reports  
Infill Product Specifications and Infill Test Reports

Updated Sheets CI101 and CI501 dated 5-26-21

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FOR BWSO USE ONLY

REV	DESCRIPTION	DATE
1	SUPPLEMENTAL INFO FOR PERMITTING	5-26-21
0	ISSUED FOR PERMITTING	5-4-21

**SUPPLEMENTAL INFO FOR PERMITTING**  
5-26-21

CURRENT ISSUE STATUS:

PROJECT NORTH:

SMRT Architects and Engineers  
200 Brickstone Square, Suite 303  
Andover, Massachusetts 01810  
1.877.700.7678  
www.smrting.com

**SHOWA BOSTON INSTITUTE FOR LANGUAGE AND CULTURE  
BRITISH INTERNATIONAL SCHOOL OF BOSTON  
ATHLETIC FIELD RENOVATIONS**

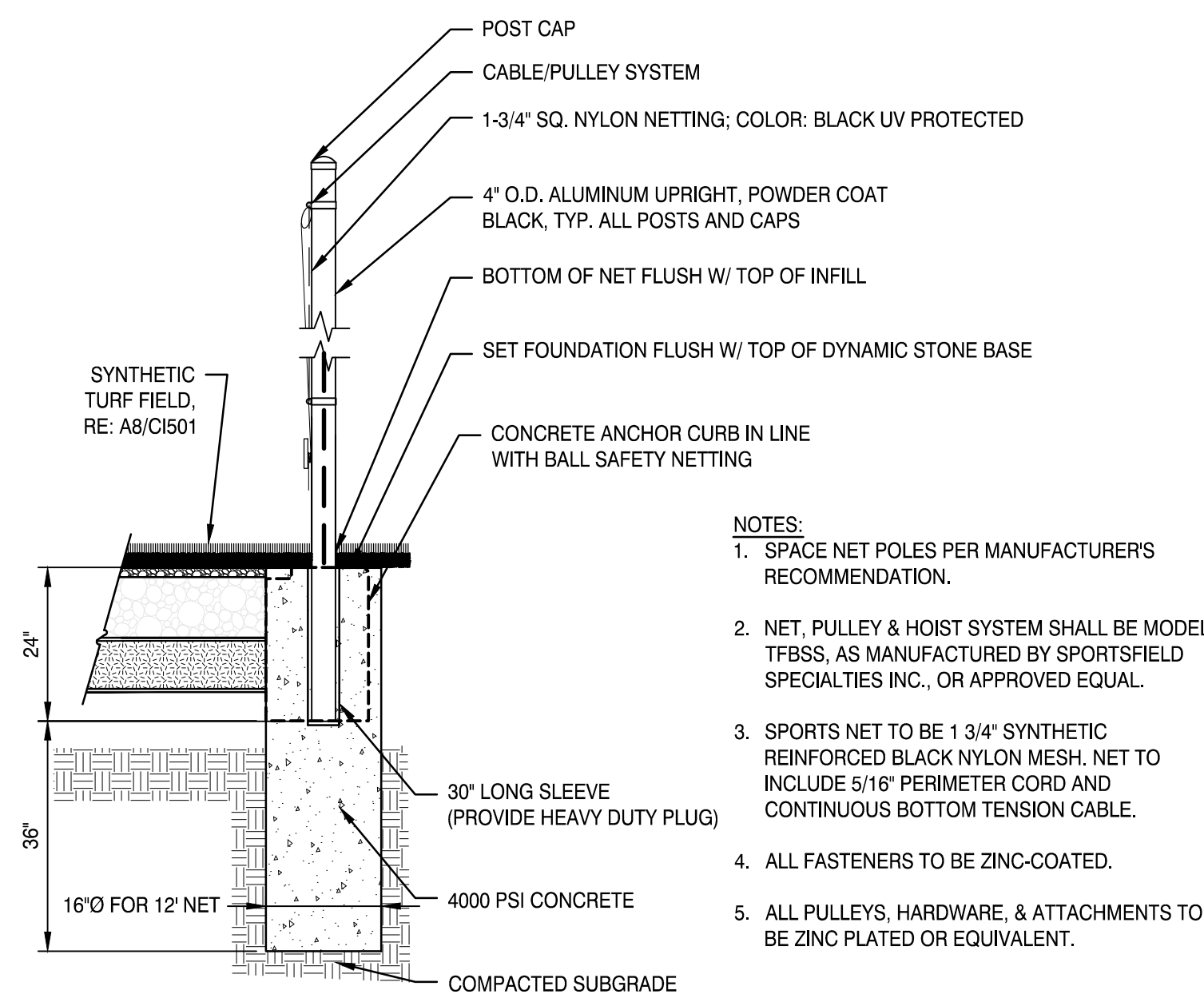
420 POND ST, BOSTON (JAMAICA PLAIN), MASSACHUSETTS

**SITE IMPROVEMENTS PLAN**

SHEET TITLE:

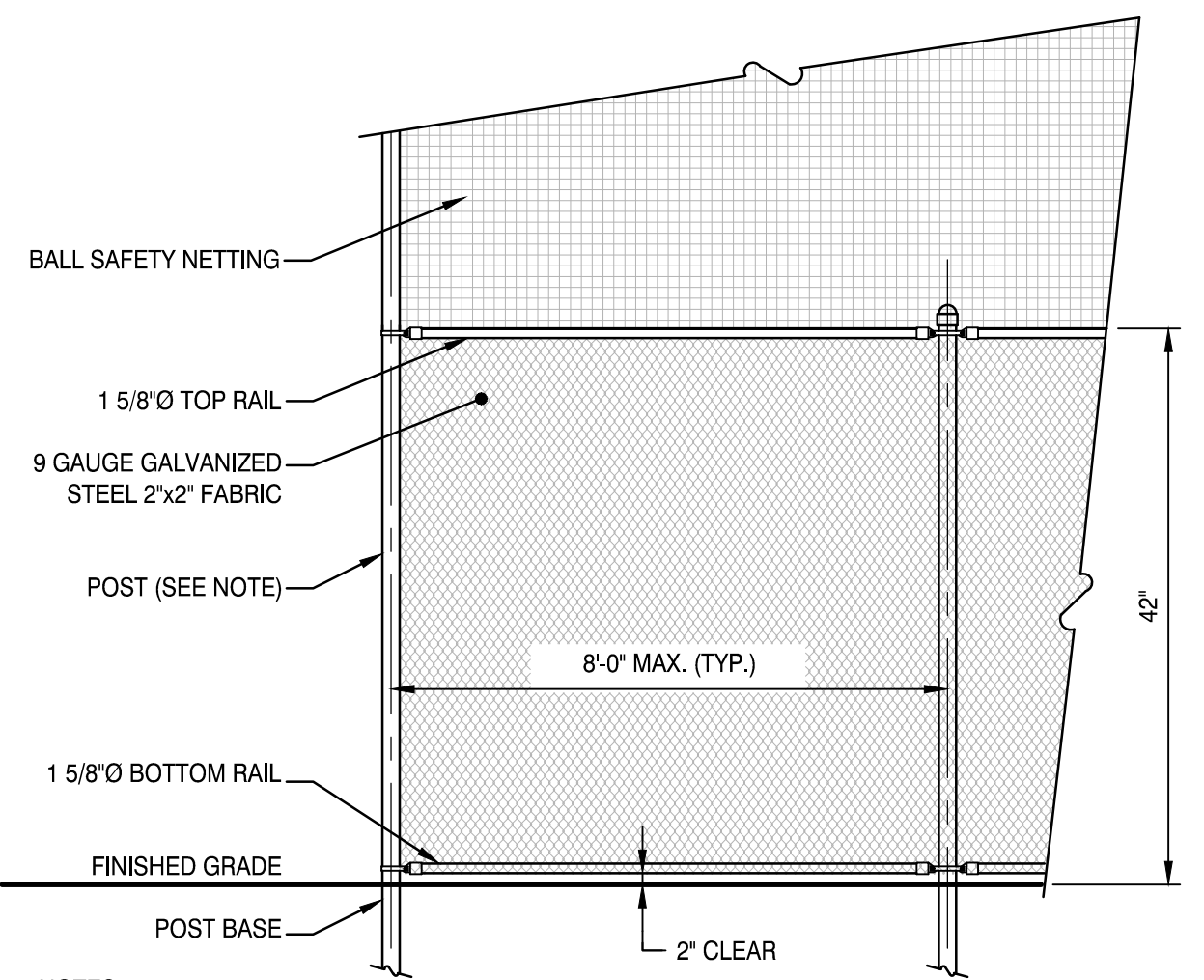
SCALE: 1"=20'

PROJECT MANAGER:	RFW	PROJECT NO.:	21057
A/E OF RECORD:	MAF		
JOB CAPTAIN:	--		
DRAWN BY:	MAF		
SMRT FILE:	CI101-21057.dwg	SHEET No.:	<b>CI101</b>



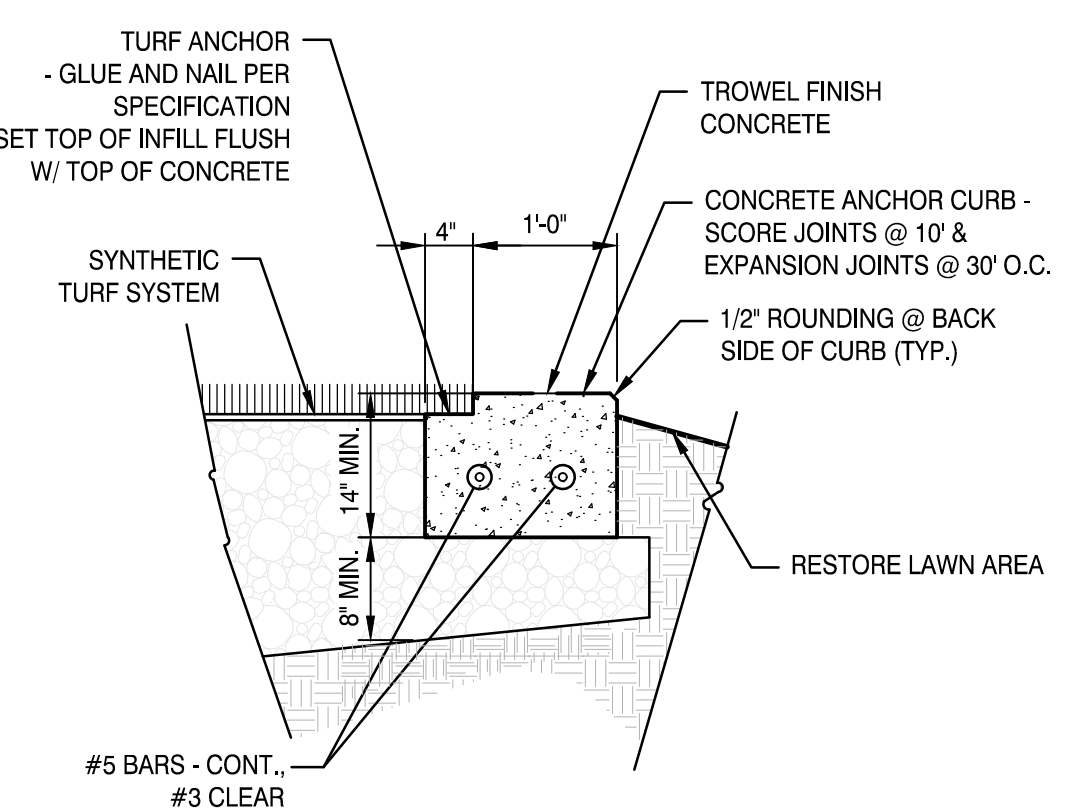
- NOTES:**
1. SPACE NET POLES PER MANUFACTURER'S RECOMMENDATION.
  2. NET, PULLEY & HOIST SYSTEM SHALL BE MODEL TBSS, AS MANUFACTURED BY SPORTSFIELD SPECIALTIES INC., OR APPROVED EQUAL.
  3. SPORTS NET TO BE 1 3/4\"/>

**BALL SAFETY NETTING (H12)**

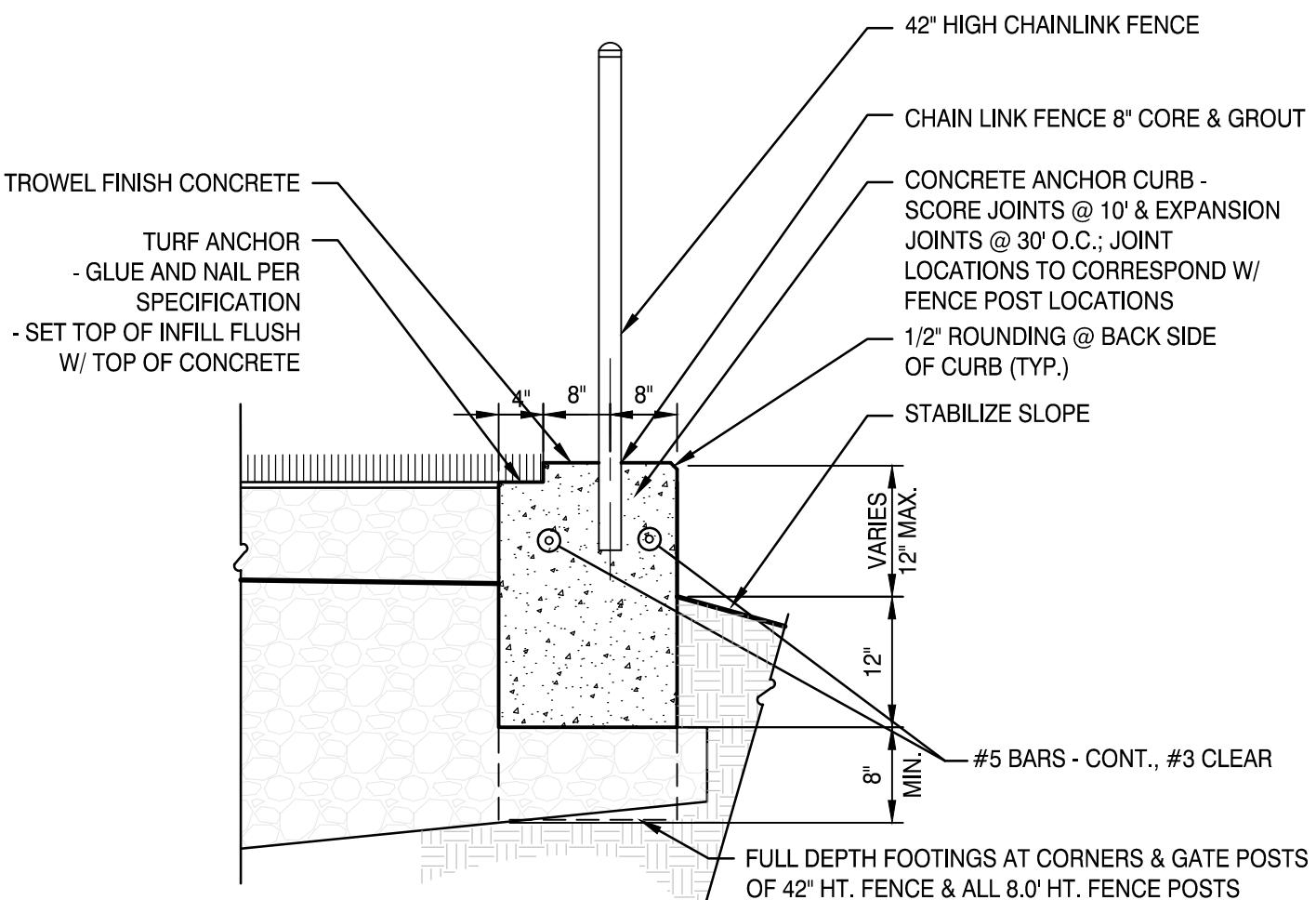


- NOTES:**
1. TERMINAL POST TO BE 4\"/>

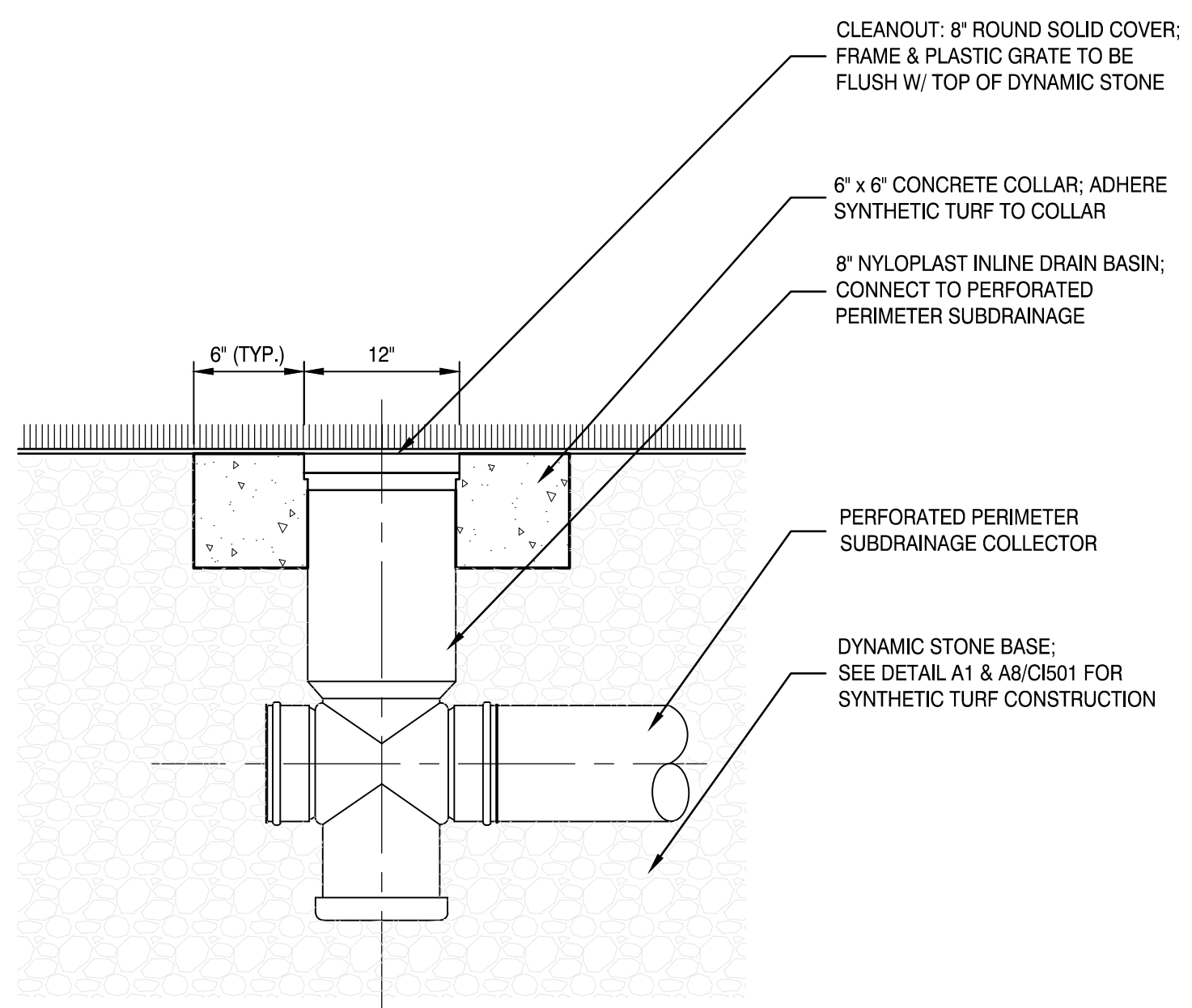
**42\"/>**



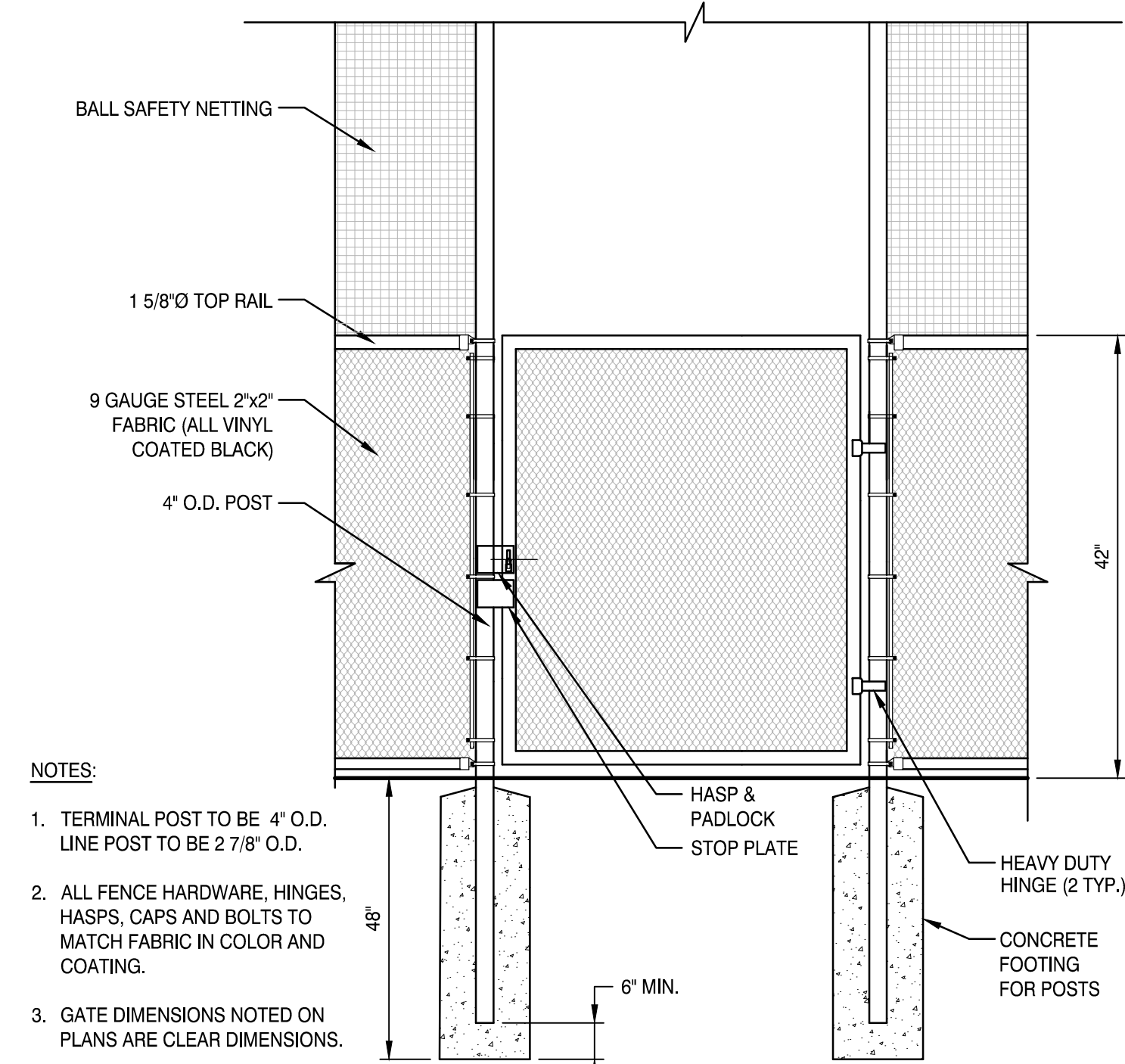
**EAST & WEST ENDLINE ANCHOR CURB (H5)**



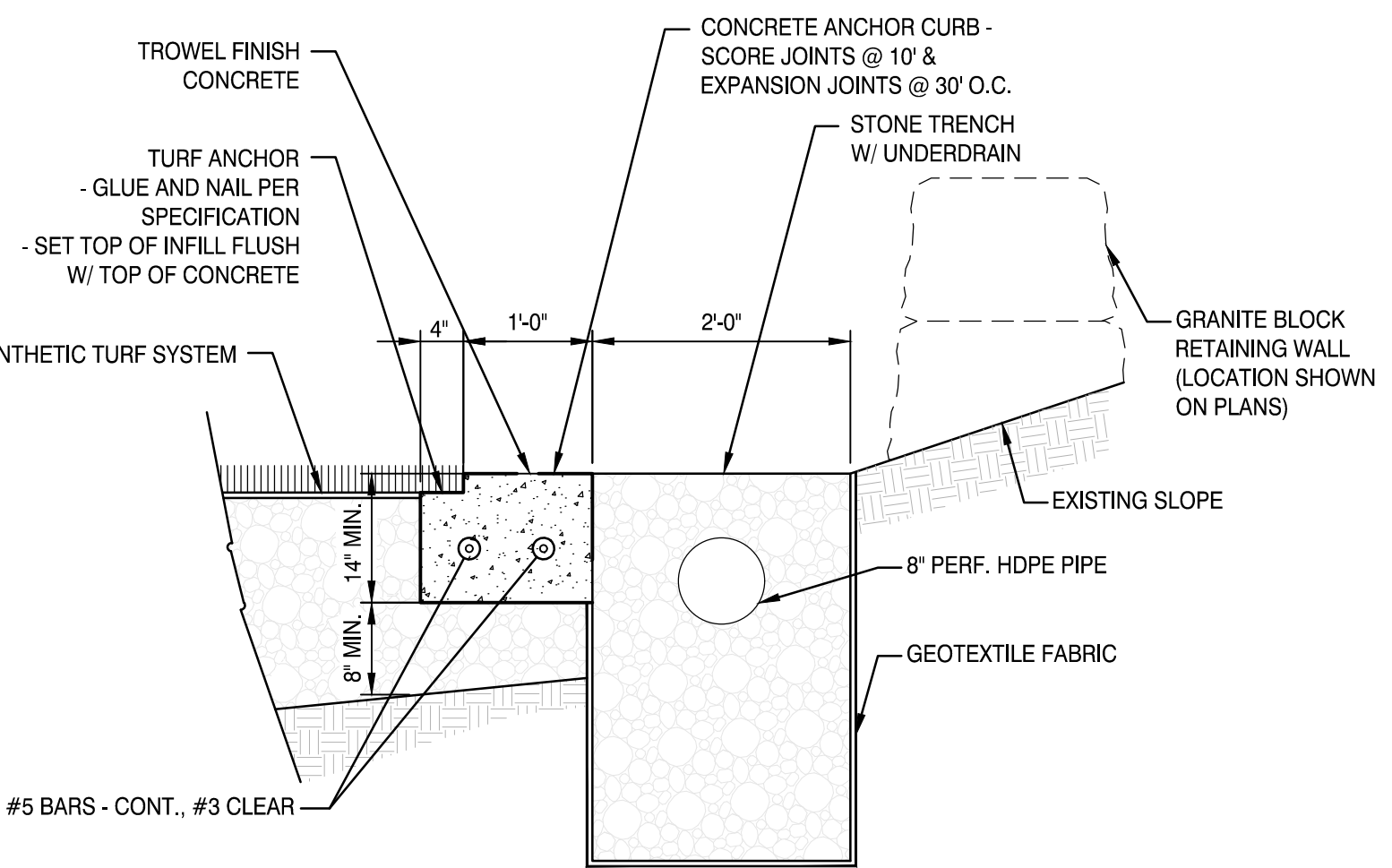
**SOUTH SIDELINE EXTENDED ANCHOR CURB (H1)**



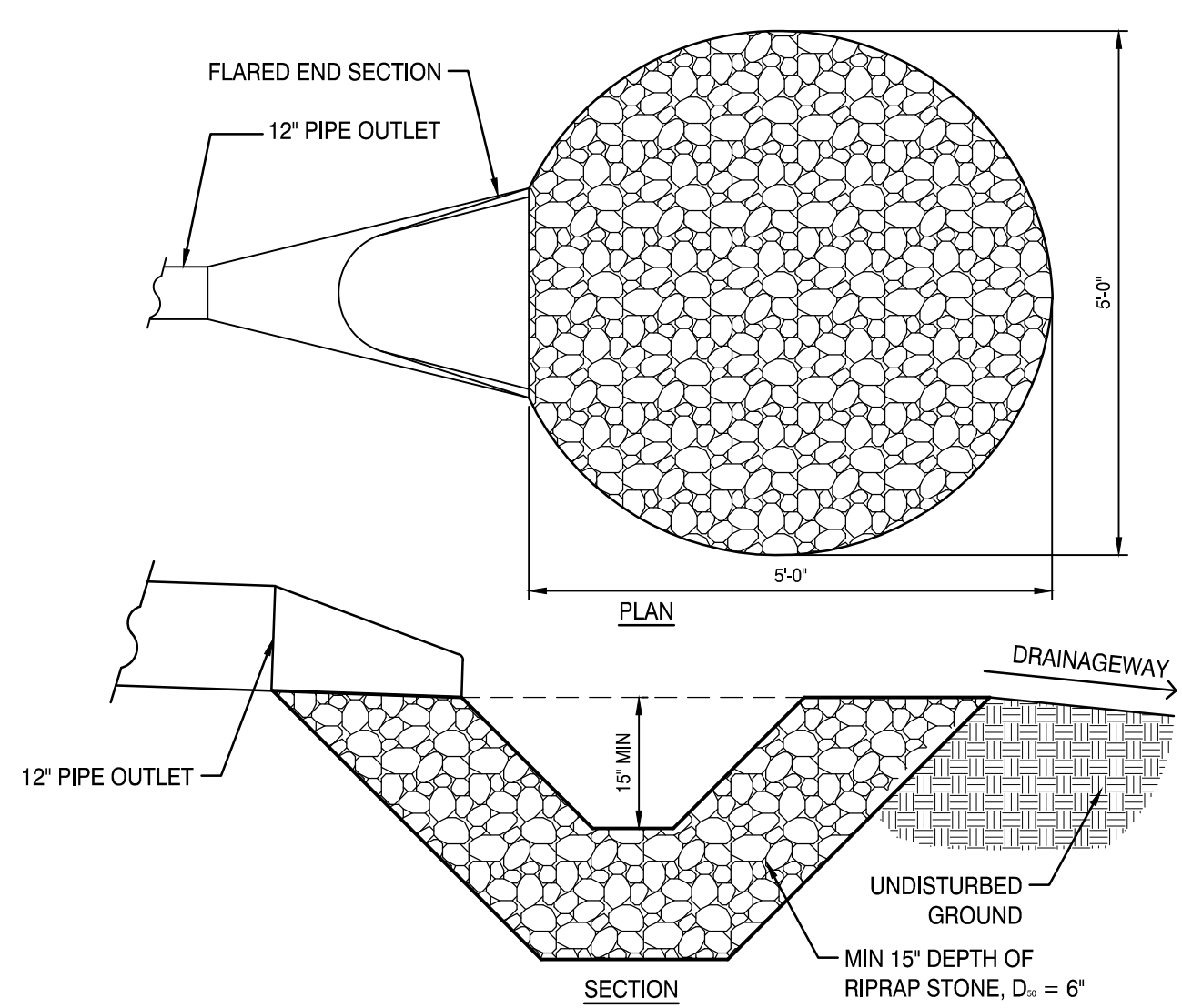
**CLEANOUT (D12)**



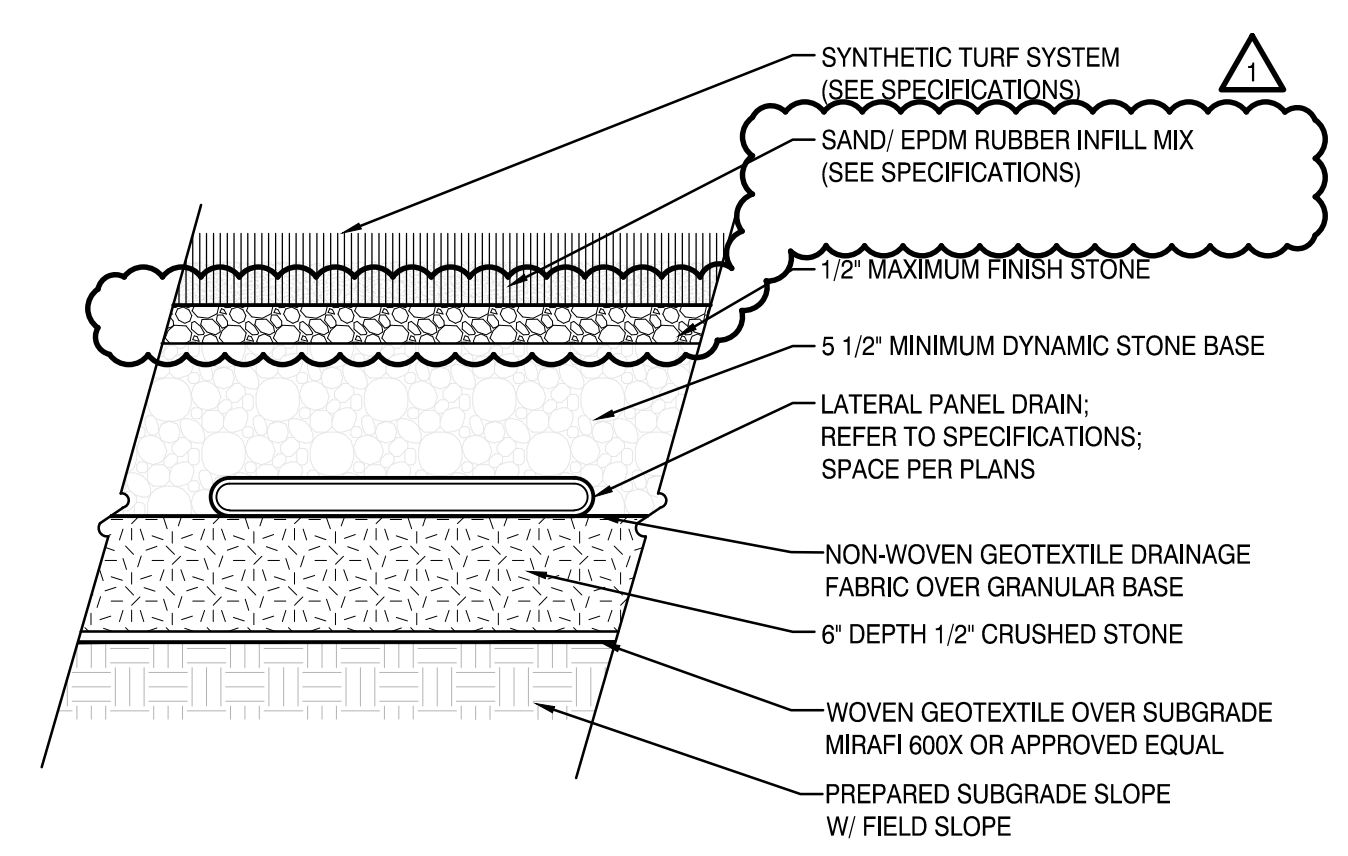
**SINGLE CHAIN LINK FENCE GATE (D8)**



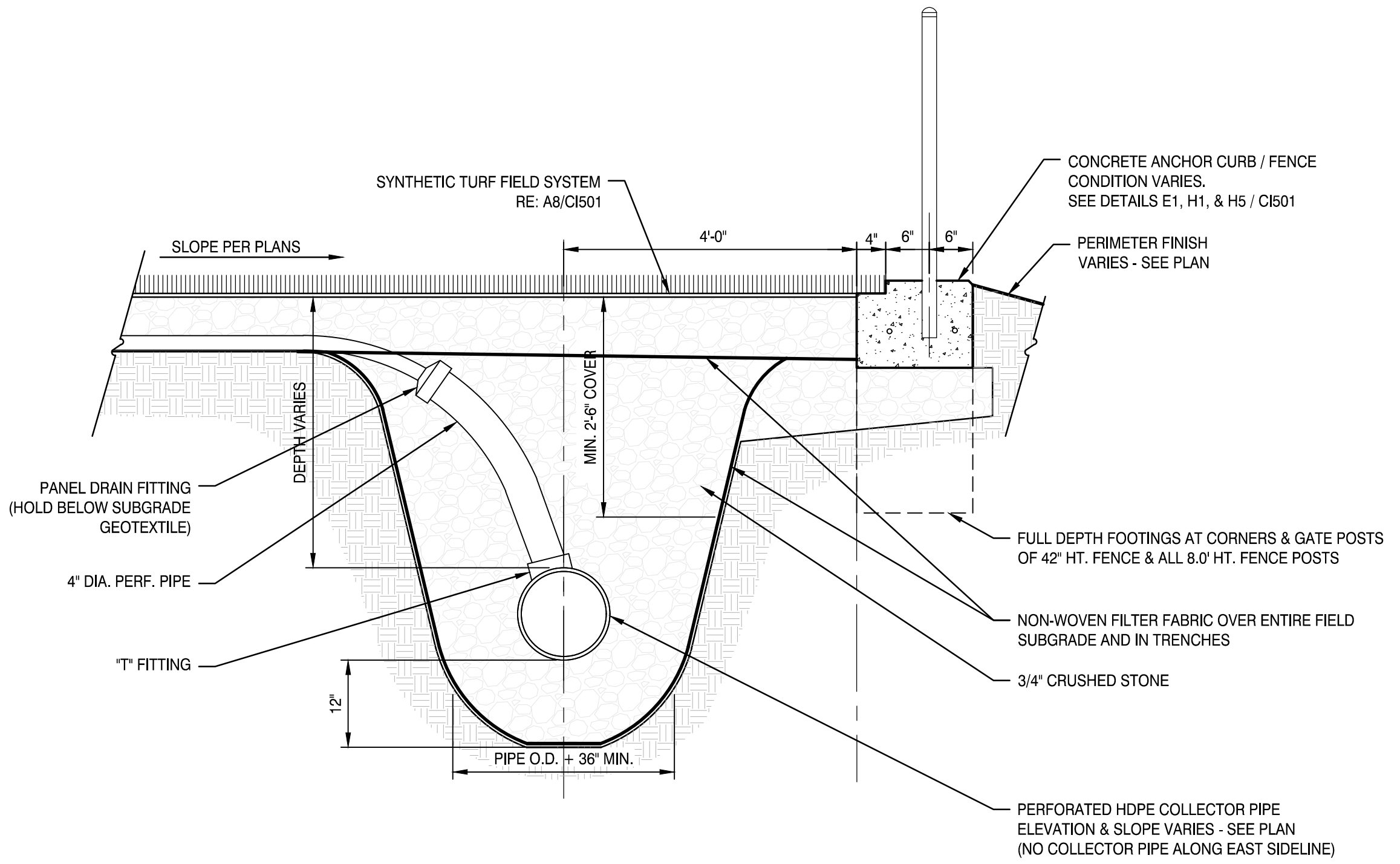
**NORTH SIDELINE ANCHOR CURB W/ 2\"/>**



**RIP RAP PLUNGE POOL (A12)**



**SYNTHETIC TURF SECTION (A8)**



**SYNTHETIC TURF SYSTEM & ANCHOR CURB (A1)**

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REV	DESCRIPTION	DATE
1	SUPPLEMENTAL INFO FOR PERMITTING	5-26-21
0	ISSUED FOR PERMITTING	5-4-21

**SUPPLEMENTAL INFO FOR PERMITTING**  
5-26-21

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420 POND ST, BOSTON (JAMAICA PLAIN), MASSACHUSETTS

**SITE DETAILS**

SHEET TITLE:

SCALE: AS NOTED

PROJECT MANAGER:	RFW	PROJECT NO.:	21057
A/E OF RECORD:	MAF		
JOB CAPTAIN:	--		
DRAWN BY:	MAF		

SMRT FILE: CI501-21057.dwg SHEET No. **CI501**



## Turf Product Specifications, PFAS Letter, and Turf Test Reports

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- AstroTurf Rhino Blend 46
- AstroTurf PFAS Letter
- PFAS Turf Test Reports



**AstroTurf**  
SINCE 1995  
**PRODUCT FACT SHEET**

# RHINO BLEND 46

AstroTurf’s Rhino Series synthetic sports turf is a good choice for clients who want to increase the playing time and performance of their sports fields. The Rhino Series systems benefit from AstroTurf’s legendary quality control protocols, industry-leading R&D efforts and start to finish control over manufacturing, civil construction and installation.

Rhino Series Blend products combine high quality Legend monofilament fibers and slit film fibers for resistance to wear and aesthetics for your field.

Rhino Series fields play and look so natural, yet provide the easy maintenance and exceptional durability we’ve become famous for over the past 50+ years.

- ◆ Exclusive, precise in-house fiber masterbatch formulations with cutting edge ultraviolet and heat stabilizers
- ◆ Legend-shaped monofilament fibers that refract light naturally for a grass-like appearance
- ◆ Trionic monofilament fibers are 330 microns thick for enhanced durability
- ◆ Exceptionally durable slit film fibers for resistance to wear
- ◆ Entanglement technology, wherein we entangle molecular side chains to reinforce the fiber and prevent splitting
- ◆ Multi-layer woven primary backing
- ◆ The latest polyurethane technology to enhance tuft lock, dimensional stability and fiber adhesion, with polymer formulations engineered in Germany and applied in our own American factory

## RHINO BLEND

**Rhino Series Blend products combine high quality Trionic monofilament fibers and slit film fibers for resistance to wear and aesthetics for your field.**



Colors to be manufactured with PE Legend Fiber

*“We’re extremely pleased with our new AstroTurf athletic fields. They represent an important part of a world-class multi-sport venue.”*

**Kerry Martin**, President of SOZO Sports (WA)



Allegheny Co. Sports & Athletic Complex – Montour Junction, PA



Lake Howell High School – Winter Park, FL



Mendota High School – Mendota, CA



University of Michigan – Ann Arbor, MI

FINISH FABRIC	VALUE	ASTM TEST METHOD
<b>Face Yarn Type</b>	Trionic PE/PA Co-Polymer Monofilament and Polyethylene Slit Film	N/A
<b>Yarn Denier</b>	10,400 (6 ends, 1,800 denier per end for Mono, 10,000 denier per end for Slit Film)	D-1577
<b>Yarn Thickness</b>	330 microns for Mono, 115 microns for Slit Film	D-3218
<b>Pile Weight</b>	46 oz per SY	D- 5848
<b>Finished Pile Height</b>	2.0"	D-5823
<b>Standard Field Color</b>	Field/Lime Green, Field Green	None
<b>Construction</b>	Tufted	None
<b>Turf Density</b>	828 oz/yd <sup>3</sup>	HUD 44d
<b>Gauge:</b>	3/8"	D-5793
<b>Primary Backing</b>	7.0 oz per SY Multilayer Polypropylene/Polyester	D- 5848
<b>Secondary Backing</b>	20 oz per SY Polyurethane	D- 5848
<b>Total Carpet Weight</b>	72.5 oz per SY (+/- 5%)	D-5848
<b>Turf Roll Dimensions</b>	15' wide by custom lengths up to 220'	N/A
<b>Perforations</b>	3/16" holes on staggered 4" (approximate) centers	N/A
<b>Turf Permeability</b>	> 30" +/- per hour	F-1551
<b>Tuft Bind</b>	> 8 lbs	D-1335
<b>Grab Tear Strength (Average)</b>	> 200 lbs	D-5034
<b>Lead Content</b>	< 50 ppm	F-2765
<b>Elongation to Break</b>	> 50%	D-2256
<b>Yarn Breaking Strength</b>	> 20 lbs	D-2256
<b>Yarn Melting Point</b>	248° F	D-789
<b>Flammability</b>	TEST PASSED	D-2859

**Some of our installations include:**

University of Akron (OH)  
 Albion College (MI)  
 Andover Schools (KS)  
 Artesia School District (NM)  
 Aurora University (IL)  
 Baldwin Wallace College (OH)  
 Baylor School (TN)  
 Berkeley High School (CA)  
 Bishop Verot High School (FL)  
 Blue Springs School District (MO)  
 Carroll County School District (GA)  
 Central Michigan University (MI)

Chartiers Houston High School (PA)  
 Cleveland State University (OH)  
 Colquitt County High School (GA)  
 Davenport University (MI)  
 Fort Scott High School (KS)  
 Gig Harbor High School (WA)  
 Glennville State College (WV)  
 Grand Canyon University (AZ)  
 The Harker School (CA)  
 Jenks High School Soccer Complex (OK)  
 Kalamazoo College (MI)  
 Kamehameha School (HI)

Kiski Area School District (PA)  
 Lakeville South High School (MN)  
 La Roche College Athletic Complex (PA)  
 Lutheran West High School Lynchburg City Stadium (VA)  
 Maize High School (KS)  
 Miss Porter's School (CT)  
 Mississippi State University (MS)  
 Mt. Lebanon High School (PA)  
 University of Oklahoma (OK)  
 Oviedo High School (FL)  
 Prince William High School (VA)

Ripley High School (WV)  
 Sacred Heart Preparatory School (CA)  
 Schurz High School (IL)  
 Soquel High School (CA) Southwest  
 Christian School (TX) Starfire Sports Complex (WA)  
 The Benjamin School (FL)  
 Troy University (AL)  
 United Sports Training Center (PA)  
 Villanova University (PA)  
 Waterloo CSD (IA)  
 Waukesha School District (WI)



Valid 01/01/2021 - 12/31/2021 Any change from the specified values is considered a special product that will require confirmation from manufacturing prior to ordering. All values are ± 5%. AstroTurf® has the right to modify technical specifications on the above-mentioned product. Delivered products can slightly differ from the technical data. AstroTurf® guarantees the technical quality of the proposed article. Updated 12/03/2020



2680 Abutment Rd, Dalton, GA 30721  
 (800) 723-TURF help@astroturf.com  
 www.astroturf.com @AstroTurfUSA



The first name in turf  ...and all that's around it.

May 25, 2021

Ladies/Gentlemen:

AstroTurf Corporation is submitting this letter stating that our corporation and our suppliers do not use PFAS (as defined in EPA Method 537 and California Proposition 65) in or as part of their manufacturing process for their turf fibers, primary backings, and urethane coatings or the assembly of any components of the system or system as a whole.

Should you require any further information, please do not hesitate to contact me. We certainly do look forward to working with you.

Sincerely,

*David Wheaton*

David Wheaton  
NE Regional Manager

State of Tennessee (ID #02034)

Alabama Dept. of  
Environmental Management  
(ID #40780)

Lab Report 320061

8540

AstroTurf

Attention: Zan Smith

421 Callahan Road, SE

Dalton, GA 30721

# AIRL, INC.

1550 37TH STREET, NE  
CLEVELAND, TENNESSEE 37312  
(423) 476-7766 Fax: (423) 476-7714  
ISO/IEC 17025:2017, PJLA-76332  
Testing Accreditation

**Scope of Accreditation:**

Wastewater, Surface Water, Ground Water,  
Drinking Water, Solids, Hazardous Waste, Soils,  
Sediments, and Sludges.

**Date Received** 12/26/2019

**Date Sampled** None Given

**Date Requested** 1 /10/2020

**Rush Status** Normal

**Phone** (706) 272-4292

**Extension**

**Fax**

**eMail:** zsmith@astroturf.com

**PO#**

### Sample Information

#2 B 48

**Lab Report: 320061**

**Result**

**LCL**

**Method**

**SDL**

**Date**

**Time Analyst**

PFAS

1 ug/Kg

1

ASTM D7968

1

1/17/2020 17:32

BVL

See Attached

No Per- & polyfluoroalkyl substances (PFAS) found above RDL.

Lowest Calibration Level [LCL] - reporting limit; Sample Detection Level [SDL] - Sample Specific

QA/QC Procedures required by the Method(s) were followed unless otherwise noted. Performance and acceptance standards for required QA/QC procedures were achieved unless otherwise noted. No significant modifications have been made to the Method(s). I attest that, based upon my inquiry of those individuals immediately responsible for reviewing the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

These results relate only to the items tested. This report shall not be reproduced except in full and with permission of this laboratory. The laboratory retains sole ownership of data until full reimbursement has been made.



TECHNICAL DIRECTOR

Report approved by:



Your C.O.C. #: na

**Attention: Roy Patterson**

AIRL, Inc.  
1550 37eth Street, NE  
Cleveland, TN  
USA 37312

**Report Date: 2020/01/20**  
Report #: R6043698  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BV LABS JOB #: C000300**

**Received: 2020/01/02, 12:38**

Sample Matrix: Solid  
# Samples Received: 2

Analyses	Date		Laboratory Method	Analytical Method
	Quantity Extracted	Date Analyzed		
PFAS in soil by SPE/LCMS (1)	2	2020/01/16	2020/01/17 CAM SOP-00894	ASTM D7968-17a m

**Remarks:**

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified as surrogates on the certificate of analysis represent the extracted internal standard.

U = Undetected at the limit of quantitation.

J = Estimated concentration between the EDL & RDL.

B = Blank Contamination.

Q = One or more quality control criteria failed.

E = Analyte concentration exceeds the maximum concentration level.

K = Estimated maximum possible concentration due to ion abundance ratio failure.



Your C.O.C. #: na

**Attention: Roy Patterson**

AIRL, Inc.  
1550 37eth Street, NE  
Cleveland, TN  
USA 37312

**Report Date: 2020/01/20**  
Report #: R6043698  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BV LABS JOB #: C000300**

**Received: 2020/01/02, 12:38**

Encryption Key

Patricia Legette  
Project Manager  
20 Jan 2020 15:22:07

Please direct all questions regarding this Certificate of Analysis to your Project Manager.  
Stephanie Pollen, Project Manager  
Email: Stephanie.Pollen@bvlabs.com  
Phone# (905)817-5830

=====  
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



**PERFLUOROALKYL SUBSTANCES (SOLID)**

BV Labs ID		LRK965	LRK966	LRK966			
Sampling Date							
COC Number		na	na	na			
	UNITS	320060	320061	320061 Lab-Dup	RDL	MDL	QC Batch
<b>Perfluorinated Compounds</b>							
Perfluorobutanoic acid	ug/kg	0.12 U	0.12 U	0.12 U	1.0	0.12	6541627
Perfluoropentanoic acid (PFPeA)	ug/kg	0.10 U	0.10 U	0.10 U	1.0	0.10	6541627
Perfluorohexanoic acid (PFHxA)	ug/kg	0.14 U	0.14 U	0.14 U	1.0	0.14	6541627
Perfluoroheptanoic acid (PFHpA)	ug/kg	0.18 U	0.18 U	0.18 U	1.0	0.18	6541627
Perfluorooctanoic acid (PFOA)	ug/kg	0.16 U	0.16 U	0.16 U	1.0	0.16	6541627
Perfluorononanoic acid (PFNA)	ug/kg	0.15 U	0.15 U	0.15 U	1.0	0.15	6541627
Perfluorodecanoic acid (PFDA)	ug/kg	0.31 U	0.31 U	0.31 U	1.0	0.31	6541627
Perfluoroundecanoic acid (PFUnA)	ug/kg	0.15 U	0.15 U	0.15 U	1.0	0.15	6541627
Perfluorododecanoic acid (PFDoA)	ug/kg	0.19 U	0.19 U	0.19 U	1.0	0.19	6541627
Perfluorotridecanoic acid (PFTRDA)	ug/kg	0.17 U	0.17 U	0.17 U	1.0	0.17	6541627
Perfluorotetradecanoic acid (PFTEDA)	ug/kg	0.15 U	0.15 U	0.15 U	1.0	0.15	6541627
Perfluorobutanesulfonic acid	ug/kg	0.14 U	0.14 U	0.14 U	1.0	0.14	6541627
Perfluoropentanesulfonic acid	ug/kg	0.20 U	0.20 U	0.20 U	1.0	0.20	6541627
Perfluoroheptanesulfonic acid	ug/kg	0.14 U	0.14 U	0.14 U	1.0	0.14	6541627
Perfluoroheptanesulfonic acid	ug/kg	0.087 U	0.087 U	0.087 U	1.0	0.087	6541627
Perfluorooctanesulfonic acid	ug/kg	0.21 U	0.21 U	0.21 U	1.0	0.21	6541627
Perfluorononanesulfonic acid	ug/kg	0.23 U	0.23 U	0.23 U	1.0	0.23	6541627
Perfluorodecanesulfonic acid (PFDS)	ug/kg	0.27 U	0.27 U	0.27 U	1.0	0.27	6541627
Perfluorooctane Sulfonamide (PFOSA)	ug/kg	0.19 U	0.19 U	0.19 U	1.0	0.19	6541627
EtFOSA	ug/kg	0.31 U	0.31 U	0.31 U	1.0	0.31	6541627
MeFOSA	ug/kg	0.28 U	0.28 U	0.28 U	1.0	0.28	6541627
EtFOSE	ug/kg	0.27 U	0.27 U	0.27 U	1.0	0.27	6541627
MeFOSE	ug/kg	0.17 U	0.17 U	0.17 U	1.0	0.17	6541627
EtFOSAA	ug/kg	0.32 U	0.32 U	0.32 U	1.0	0.32	6541627
MeFOSAA	ug/kg	0.30 U	0.30 U	0.30 U	1.0	0.30	6541627
4:2 Fluorotelomer sulfonic acid	ug/kg	0.22 U	0.22 U	0.22 U	1.0	0.22	6541627
6:2 Fluorotelomer sulfonic acid	ug/kg	0.13 U	0.13 U	0.13 U	1.0	0.13	6541627
8:2 Fluorotelomer sulfonic acid	ug/kg	0.33 U	0.33 U	0.33 U	1.0	0.33	6541627
Hexafluoropropyleneoxide dimer acid	ug/kg	0.33 U	0.33 U	0.33 U	1.0	0.33	6541627
4,8-Dioxo-3H-perfluorononanoic acid	ug/kg	0.20 U	0.20 U	0.20 U	1.0	0.20	6541627
9Cl-PF3ONS (F-53B Major)	ug/kg	0.19 U	0.19 U	0.19 U	1.0	0.19	6541627
11Cl-PF3OUdS (F-53B Minor)	ug/kg	0.20 U	0.20 U	0.20 U	1.0	0.20	6541627
<b>Surrogate Recovery (%)</b>							
13C2-4:2-Fluorotelomersulfonic Acid	%	95	93	90	N/A	N/A	6541627
13C2-6:2-Fluorotelomersulfonic Acid	%	142	144	140	N/A	N/A	6541627
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							





**PERFLUOROALKYL SUBSTANCES (SOLID)**

BV Labs ID		LRK965	LRK966	LRK966			
Sampling Date							
COC Number		na	na	na			
	UNITS	320060	320061	320061 Lab-Dup	RDL	MDL	QC Batch
13C2-8:2-Fluorotelomersulfonic Acid	%	117	114	108	N/A	N/A	6541627
13C2-Perfluorodecanoic acid	%	67	66	65	N/A	N/A	6541627
13C2-Perfluorododecanoic acid	%	49 (1)	51	52	N/A	N/A	6541627
13C2-Perfluorohexanoic acid	%	82	80	76	N/A	N/A	6541627
13C2-perfluorotetradecanoic acid	%	37 (2)	42 (2)	43 (2)	N/A	N/A	6541627
13C2-Perfluoroundecanoic acid	%	55	55	56	N/A	N/A	6541627
13C3-HFPO-DA	%	82	83	79	N/A	N/A	6541627
13C3-Perfluorobutanesulfonic acid	%	76	70	68	N/A	N/A	6541627
13C4-Perfluorobutanoic acid	%	86	83	81	N/A	N/A	6541627
13C4-Perfluoroheptanoic acid	%	80	77	74	N/A	N/A	6541627
13C4-Perfluorooctanesulfonic acid	%	54	49 (3)	51	N/A	N/A	6541627
13C4-Perfluorooctanoic acid	%	77	73	71	N/A	N/A	6541627
13C5-Perfluorononanoic acid	%	74	71	69	N/A	N/A	6541627
13C5-Perfluoropentanoic acid	%	84	80	77	N/A	N/A	6541627
13C8-Perfluorooctane Sulfonamide	%	41 (4)	51	56	N/A	N/A	6541627
18O2-Perfluorohexanesulfonic acid	%	65	63	60	N/A	N/A	6541627
D3-MeFOSA	%	36 (5)	45 (5)	49 (5)	N/A	N/A	6541627
D3-MeFOSAA	%	65	71	78	N/A	N/A	6541627
D5-EtFOSA	%	31 (6)	40 (6)	42 (6)	N/A	N/A	6541627
D5-EtFOSAA	%	65	76	83	N/A	N/A	6541627

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch  
 Lab-Dup = Laboratory Initiated Duplicate  
 N/A = Not Applicable

(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (Perfluorododecanoic acid - PFDoA).

(2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (Perfluorotetradecanoic acid - PFTeDA).

(3) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (Perfluorooctane sulfonic acid - PFOS).

(4) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (Perfluorooctanesulfonamide - PFOSA).

(5) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Methylperfluorooctanesulfonamide - MeFOSA).

(6) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Ethylperfluorooctanesulfonamide - EtFOSA).



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BV Labs Job #: C000300  
Report Date: 2020/01/20

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### PERFLUOROALKYL SUBSTANCES (SOLID)

BV Labs ID		LRK965	LRK966	LRK966			
Sampling Date							
COC Number		na	na	na			
	UNITS	320060	320061	320061 Lab-Dup	RDL	MDL	QC Batch
D7-MeFOSE	%	37 (1)	51	54	N/A	N/A	6541627
D9-EtFOSE	%	47 (2)	57	62	N/A	N/A	6541627

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch  
 Lab-Dup = Laboratory Initiated Duplicate  
 N/A = Not Applicable  
 (1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Methylperfluorooctanesulfonamidoethanol - MeFOSE).  
 (2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Ethylperfluorooctanesulfonamidoethanol - EtFOSE).



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BV Labs Job #: C000300  
Report Date: 2020/01/20

AIRL, Inc.

### TEST SUMMARY

**BV Labs ID:** LRK965  
**Sample ID:** 320060  
**Matrix:** Solid

**Collected:**  
**Shipped:**  
**Received:** 2020/01/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in soil by SPE/LCMS	LCMS	6541627	2020/01/16	2020/01/17	Patrick Yu Peng Li

**BV Labs ID:** LRK966  
**Sample ID:** 320061  
**Matrix:** Solid

**Collected:**  
**Shipped:**  
**Received:** 2020/01/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in soil by SPE/LCMS	LCMS	6541627	2020/01/16	2020/01/17	Patrick Yu Peng Li

**BV Labs ID:** LRK966 Dup  
**Sample ID:** 320061  
**Matrix:** Solid

**Collected:**  
**Shipped:**  
**Received:** 2020/01/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFAS in soil by SPE/LCMS	LCMS	6541627	2020/01/16	2020/01/17	Patrick Yu Peng Li



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BV Labs Job #: C000300

Report Date: 2020/01/20

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### GENERAL COMMENTS

Per- and polyfluoroalkyl substances (PFAS): Sample(s) analyzed using methodologies that have not been subjected to Bureau Veritas Laboratories' standard validation process for the submitted matrix. Analysis performed with client consent, however results should be used with discretion.

**Results relate only to the items tested.**



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BV Labs Job #: C000300  
Report Date: 2020/01/20

AIRL, Inc.

### QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
6541627	YPL	Matrix Spike(LRK966)	13C2-4:2-Fluorotelomersulfonic Acid	2020/01/17		87	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2020/01/17		143	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2020/01/17		112	%	50 - 150
			13C2-Perfluorodecanoic acid	2020/01/17		64	%	50 - 150
			13C2-Perfluorododecanoic acid	2020/01/17		52	%	50 - 150
			13C2-Perfluorohexanoic acid	2020/01/17		77	%	50 - 150
			13C2-perfluorotetradecanoic acid	2020/01/17		41 (1)	%	50 - 150
			13C2-Perfluoroundecanoic acid	2020/01/17		54	%	50 - 150
			13C3-HFPO-DA	2020/01/17		79	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2020/01/17		68	%	50 - 150
			13C4-Perfluorobutanoic acid	2020/01/17		83	%	50 - 150
			13C4-Perfluoroheptanoic acid	2020/01/17		74	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2020/01/17		48 (2)	%	50 - 150
			13C4-Perfluorooctanoic acid	2020/01/17		71	%	50 - 150
			13C5-Perfluorononanoic acid	2020/01/17		69	%	50 - 150
			13C5-Perfluoropentanoic acid	2020/01/17		79	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2020/01/17		60	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2020/01/17		60	%	50 - 150
			D3-MeFOSA	2020/01/17		51	%	50 - 150
			D3-MeFOSAA	2020/01/17		82	%	50 - 150
			D5-EtFOSA	2020/01/17		43 (3)	%	50 - 150
			D5-EtFOSAA	2020/01/17		86	%	50 - 150
			D7-MeFOSE	2020/01/17		55	%	50 - 150
			D9-EtFOSE	2020/01/17		63	%	50 - 150
			Perfluorobutanoic acid	2020/01/17		104	%	70 - 130
			Perfluoropentanoic acid (PFPeA)	2020/01/17		105	%	70 - 130
			Perfluorohexanoic acid (PFHxA)	2020/01/17		106	%	70 - 130
			Perfluoroheptanoic acid (PFHpA)	2020/01/17		105	%	70 - 130
			Perfluorooctanoic acid (PFOA)	2020/01/17		107	%	70 - 130
			Perfluorononanoic acid (PFNA)	2020/01/17		103	%	70 - 130
			Perfluorodecanoic acid (PFDA)	2020/01/17		108	%	70 - 130
			Perfluoroundecanoic acid (PFUnA)	2020/01/17		110	%	70 - 130
			Perfluorododecanoic acid (PFDoA)	2020/01/17		109	%	70 - 130
			Perfluorotridecanoic acid (PFTRDA)	2020/01/17		119	%	70 - 130
			Perfluorotetradecanoic acid(PFTEDA)	2020/01/17		112	%	70 - 130
			Perfluorobutanesulfonic acid	2020/01/17		106	%	70 - 130
			Perfluoropentanesulfonic acid	2020/01/17		87	%	70 - 130
			Perfluorohexanesulfonic acid	2020/01/17		108	%	70 - 130
			Perfluoroheptanesulfonic acid	2020/01/17		75	%	70 - 130
			Perfluorooctanesulfonic acid	2020/01/17		108	%	70 - 130
			Perfluorononanesulfonic acid	2020/01/17		59 (4)	%	70 - 130
			Perfluorodecanesulfonic acid (PFDS)	2020/01/17		65 (4)	%	70 - 130
			Perfluorooctane Sulfonamide (PFOSA)	2020/01/17		105	%	70 - 130
			EtFOSA	2020/01/17		108	%	70 - 130
			MeFOSA	2020/01/17		110	%	70 - 130
			EtFOSE	2020/01/17		89	%	70 - 130
			MeFOSE	2020/01/17		107	%	70 - 130
			EtFOSAA	2020/01/17		108	%	70 - 130
			MeFOSAA	2020/01/17		108	%	70 - 130
			4:2 Fluorotelomer sulfonic acid	2020/01/17		104	%	70 - 130
			6:2 Fluorotelomer sulfonic acid	2020/01/17		107	%	70 - 130
			8:2 Fluorotelomer sulfonic acid	2020/01/17		111	%	70 - 130
			Hexafluoropropyleneoxide dimer acid	2020/01/17		108	%	70 - 130



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BV Labs Job #: C000300  
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### QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
6541627	YPL	Spiked Blank	4,8-Dioxa-3H-perfluorononanoic acid	2020/01/17		105	%	70 - 130
			9Cl-PF3ONS (F-53B Major)	2020/01/17		67 (4)	%	70 - 130
			11Cl-PF3OUdS (F-53B Minor)	2020/01/17		65 (4)	%	70 - 130
			13C2-4:2-Fluorotelomersulfonic Acid	2020/01/17		90	%	50 - 150
			13C2-6:2-Fluorotelomersulfonic Acid	2020/01/17		89	%	50 - 150
			13C2-8:2-Fluorotelomersulfonic Acid	2020/01/17		88	%	50 - 150
			13C2-Perfluorodecanoic acid	2020/01/17		87	%	50 - 150
			13C2-Perfluorododecanoic acid	2020/01/17		81	%	50 - 150
			13C2-Perfluorohexanoic acid	2020/01/17		89	%	50 - 150
			13C2-perfluorotetradecanoic acid	2020/01/17		80	%	50 - 150
			13C2-Perfluoroundecanoic acid	2020/01/17		85	%	50 - 150
			13C3-HFPO-DA	2020/01/17		93	%	50 - 150
			13C3-Perfluorobutanesulfonic acid	2020/01/17		90	%	50 - 150
			13C4-Perfluorobutanoic acid	2020/01/17		90	%	50 - 150
			13C4-Perfluoroheptanoic acid	2020/01/17		88	%	50 - 150
			13C4-Perfluorooctanesulfonic acid	2020/01/17		89	%	50 - 150
			13C4-Perfluorooctanoic acid	2020/01/17		89	%	50 - 150
			13C5-Perfluorononanoic acid	2020/01/17		87	%	50 - 150
			13C5-Perfluoropentanoic acid	2020/01/17		89	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2020/01/17		74	%	50 - 150
			18O2-Perfluorohexanesulfonic acid	2020/01/17		93	%	50 - 150
			D3-MeFOSA	2020/01/17		46 (5)	%	50 - 150
			D3-MeFOSAA	2020/01/17		80	%	50 - 150
			D5-EtFOSA	2020/01/17		46 (3)	%	50 - 150
			D5-EtFOSAA	2020/01/17		76	%	50 - 150
			D7-MeFOSE	2020/01/17		63	%	50 - 150
			D9-EtFOSE	2020/01/17		62	%	50 - 150
			Perfluorobutanoic acid	2020/01/17		106	%	70 - 130
			Perfluoropentanoic acid (PFPeA)	2020/01/17		104	%	70 - 130
			Perfluorohexanoic acid (PFHxA)	2020/01/17		106	%	70 - 130
			Perfluoroheptanoic acid (PFHpA)	2020/01/17		105	%	70 - 130
			Perfluorooctanoic acid (PFOA)	2020/01/17		105	%	70 - 130
			Perfluorononanoic acid (PFNA)	2020/01/17		104	%	70 - 130
			Perfluorodecanoic acid (PFDA)	2020/01/17		104	%	70 - 130
			Perfluoroundecanoic acid (PFUnA)	2020/01/17		103	%	70 - 130
			Perfluorododecanoic acid (PFDoA)	2020/01/17		105	%	70 - 130
			Perfluorotridecanoic acid (PFTRDA)	2020/01/17		106	%	70 - 130
			Perfluorotetradecanoic acid(PFTEDA)	2020/01/17		106	%	70 - 130
			Perfluorobutanesulfonic acid	2020/01/17		104	%	70 - 130
			Perfluoropentanesulfonic acid	2020/01/17		109	%	70 - 130
Perfluorohexanesulfonic acid	2020/01/17		101	%	70 - 130			
Perfluoroheptanesulfonic acid	2020/01/17		104	%	70 - 130			
Perfluorooctanesulfonic acid	2020/01/17		103	%	70 - 130			
Perfluorononanesulfonic acid	2020/01/17		99	%	70 - 130			
Perfluorodecanesulfonic acid (PFDS)	2020/01/17		101	%	70 - 130			
Perfluorooctane Sulfonamide (PFOSA)	2020/01/17		104	%	70 - 130			
EtFOSA	2020/01/17		99	%	70 - 130			
MeFOSA	2020/01/17		102	%	70 - 130			
EtFOSE	2020/01/17		102	%	70 - 130			
MeFOSE	2020/01/17		105	%	70 - 130			
EtFOSAA	2020/01/17		106	%	70 - 130			
MeFOSAA	2020/01/17		110	%	70 - 130			
4:2 Fluorotelomer sulfonic acid	2020/01/17		108	%	70 - 130			



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### QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits	
6541627	YPL	Method Blank	6:2 Fluorotelomer sulfonic acid	2020/01/17		105	%	70 - 130	
			8:2 Fluorotelomer sulfonic acid	2020/01/17		107	%	70 - 130	
			Hexafluoropropyleneoxide dimer acid	2020/01/17		107	%	70 - 130	
			4,8-Dioxa-3H-perfluorononanoic acid	2020/01/17		106	%	70 - 130	
			9Cl-PF3ONS (F-53B Major)	2020/01/17		102	%	70 - 130	
			11Cl-PF3OUdS (F-53B Minor)	2020/01/17		102	%	70 - 130	
			13C2-4:2-Fluorotelomersulfonic Acid	2020/01/17		103	%	50 - 150	
			13C2-6:2-Fluorotelomersulfonic Acid	2020/01/17		95	%	50 - 150	
			13C2-8:2-Fluorotelomersulfonic Acid	2020/01/17		93	%	50 - 150	
			13C2-Perfluorodecanoic acid	2020/01/17		87	%	50 - 150	
			13C2-Perfluorododecanoic acid	2020/01/17		84	%	50 - 150	
			13C2-Perfluorohexanoic acid	2020/01/17		94	%	50 - 150	
			13C2-perfluorotetradecanoic acid	2020/01/17		82	%	50 - 150	
			13C2-Perfluoroundecanoic acid	2020/01/17		85	%	50 - 150	
			13C3-HFPO-DA	2020/01/17		94	%	50 - 150	
			13C3-Perfluorobutanesulfonic acid	2020/01/17		92	%	50 - 150	
			13C4-Perfluorobutanoic acid	2020/01/17		94	%	50 - 150	
			13C4-Perfluoroheptanoic acid	2020/01/17		94	%	50 - 150	
			13C4-Perfluorooctanesulfonic acid	2020/01/17		90	%	50 - 150	
			13C4-Perfluorooctanoic acid	2020/01/17		92	%	50 - 150	
			13C5-Perfluorononanoic acid	2020/01/17		90	%	50 - 150	
			13C5-Perfluoropentanoic acid	2020/01/17		92	%	50 - 150	
			13C8-Perfluorooctane Sulfonamide	2020/01/17		74	%	50 - 150	
			18O2-Perfluorohexanesulfonic acid	2020/01/17		91	%	50 - 150	
			D3-MeFOSA	2020/01/17		46 (5)	%	50 - 150	
			D3-MeFOSAA	2020/01/17		81	%	50 - 150	
			D5-EtFOSA	2020/01/17		41 (3)	%	50 - 150	
			D5-EtFOSAA	2020/01/17		80	%	50 - 150	
			D7-MeFOSE	2020/01/17		66	%	50 - 150	
			D9-EtFOSE	2020/01/17		64	%	50 - 150	
			Perfluorobutanoic acid	2020/01/17		0.12 U, MDL=0.12			ug/kg
			Perfluoropentanoic acid (PFPeA)	2020/01/17		0.10 U, MDL=0.10			ug/kg
			Perfluorohexanoic acid (PFHxA)	2020/01/17		0.14 U, MDL=0.14			ug/kg
			Perfluoroheptanoic acid (PFHpA)	2020/01/17		0.18 U, MDL=0.18			ug/kg
Perfluorooctanoic acid (PFOA)	2020/01/17		0.16 U, MDL=0.16			ug/kg			
Perfluorononanoic acid (PFNA)	2020/01/17		0.15 U, MDL=0.15			ug/kg			
Perfluorodecanoic acid (PFDA)	2020/01/17		0.31 U, MDL=0.31			ug/kg			
Perfluoroundecanoic acid (PFUnA)	2020/01/17		0.15 U, MDL=0.15			ug/kg			
Perfluorododecanoic acid (PFDoA)	2020/01/17		0.19 U, MDL=0.19			ug/kg			
Perfluorotridecanoic acid (PFTRDA)	2020/01/17		0.17 U, MDL=0.17			ug/kg			
Perfluorotetradecanoic acid(PFTEDA)	2020/01/17		0.15 U, MDL=0.15			ug/kg			
Perfluorobutanesulfonic acid	2020/01/17		0.14 U, MDL=0.14			ug/kg			



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BV Labs Job #: C000300  
Report Date: 2020/01/20

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### QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluoropentanesulfonic acid	2020/01/17	0.20 U, MDL=0.20		ug/kg	
			Perfluorohexanesulfonic acid	2020/01/17	0.14 U, MDL=0.14		ug/kg	
			Perfluoroheptanesulfonic acid	2020/01/17	0.087 U, MDL=0.087		ug/kg	
			Perfluorooctanesulfonic acid	2020/01/17	0.21 U, MDL=0.21		ug/kg	
			Perfluorononanesulfonic acid	2020/01/17	0.23 U, MDL=0.23		ug/kg	
			Perfluorodecanesulfonic acid (PFDS)	2020/01/17	0.27 U, MDL=0.27		ug/kg	
			Perfluorooctane Sulfonamide (PFOSA)	2020/01/17	0.19 U, MDL=0.19		ug/kg	
			EtFOSA	2020/01/17	0.31 U, MDL=0.31		ug/kg	
			MeFOSA	2020/01/17	0.28 U, MDL=0.28		ug/kg	
			EtFOSE	2020/01/17	0.27 U, MDL=0.27		ug/kg	
			MeFOSE	2020/01/17	0.17 U, MDL=0.17		ug/kg	
			EtFOSAA	2020/01/17	0.32 U, MDL=0.32		ug/kg	
			MeFOSAA	2020/01/17	0.30 U, MDL=0.30		ug/kg	
			4:2 Fluorotelomer sulfonic acid	2020/01/17	0.22 U, MDL=0.22		ug/kg	
			6:2 Fluorotelomer sulfonic acid	2020/01/17	0.13 U, MDL=0.13		ug/kg	
			8:2 Fluorotelomer sulfonic acid	2020/01/17	0.33 U, MDL=0.33		ug/kg	
			Hexafluoropropyleneoxide dimer acid	2020/01/17	0.33 U, MDL=0.33		ug/kg	
			4,8-Dioxa-3H-perfluorononanoic acid	2020/01/17	0.20 U, MDL=0.20		ug/kg	
			9Cl-PF3ONS (F-53B Major)	2020/01/17	0.19 U, MDL=0.19		ug/kg	
			11Cl-PF3OUdS (F-53B Minor)	2020/01/17	0.20 U, MDL=0.20		ug/kg	
6541627	YPL	RPD - Sample/Sample Dup	Perfluorobutanoic acid	2020/01/17	NC		%	30
			Perfluoropentanoic acid (PFPeA)	2020/01/17	NC		%	30
			Perfluorohexanoic acid (PFHxA)	2020/01/17	NC		%	30
			Perfluoroheptanoic acid (PFHpA)	2020/01/17	NC		%	30
			Perfluorooctanoic acid (PFOA)	2020/01/17	NC		%	30
			Perfluorononanoic acid (PFNA)	2020/01/17	NC		%	30
			Perfluorodecanoic acid (PFDA)	2020/01/17	NC		%	30
			Perfluoroundecanoic acid (PFUnA)	2020/01/17	NC		%	30
			Perfluorododecanoic acid (PFDoA)	2020/01/17	NC		%	30
			Perfluorotridecanoic acid (PFTRDA)	2020/01/17	NC		%	30
			Perfluorotetradecanoic acid(PFTEDA)	2020/01/17	NC		%	30
			Perfluorobutanesulfonic acid	2020/01/17	NC		%	30
			Perfluoropentanesulfonic acid	2020/01/17	NC		%	30
			Perfluorohexanesulfonic acid	2020/01/17	NC		%	30





## QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluoroheptanesulfonic acid	2020/01/17	NC		%	30
			Perfluorooctanesulfonic acid	2020/01/17	NC		%	30
			Perfluorononanesulfonic acid	2020/01/17	NC		%	30
			Perfluorodecanesulfonic acid (PFDS)	2020/01/17	NC		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2020/01/17	NC		%	25
			EtFOSA	2020/01/17	NC		%	30
			MeFOSA	2020/01/17	NC		%	30
			EtFOSE	2020/01/17	NC		%	30
			MeFOSE	2020/01/17	NC		%	30
			EtFOSAA	2020/01/17	NC		%	30
			MeFOSAA	2020/01/17	NC		%	30
			4:2 Fluorotelomer sulfonic acid	2020/01/17	NC		%	30
			6:2 Fluorotelomer sulfonic acid	2020/01/17	NC		%	30
			8:2 Fluorotelomer sulfonic acid	2020/01/17	NC		%	30
			Hexafluoropropyleneoxide dimer acid	2020/01/17	NC		%	30
			4,8-Dioxa-3H-perfluorononanoic acid	2020/01/17	NC		%	30
			9Cl-PF3ONS (F-53B Major)	2020/01/17	NC		%	30
			11Cl-PF3OUdS (F-53B Minor)	2020/01/17	NC		%	30

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference  $\leq 2x$  RDL).

(1) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (Perfluorotetradecanoic acid - PFTeDA).

(2) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (Perfluorooctane sulfonic acid - PFOS).

(3) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Ethylperfluorooctanesulfonamide - EtFOSA).

(4) Recovery of the matrix spike was below the lower control limit. Laboratory spiked soil resulted in satisfactory recovery of the compound of interest. When considered together, these QC data suggest that matrix interferences may be biasing the data low for this specific analyte.

(5) Extracted internal standard analyte recovery was below the defined lower control limit (LCL) which may result in increased variability of the associated native analyte result (N-Methylperfluorooctanesulfonamide - MeFOSA).



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BV Labs Job #: C000300  
Report Date: 2020/01/20

AIRL, Inc.

### VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

A handwritten signature in black ink, appearing to read "A. Robinson", written over a horizontal line.

Adam Robinson, Supervisor, LC/MS/MS

---

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

## Infill Product Specifications and Infill Test Reports

---

- Playsafe 65 Black EPDM Product Specification
- EPDM Test Reports

# SPECIFICATION SHEET





1. Produced in the USA
2. 100% virgin EPDM
3. Color: black
4. 10-18 gradation
5. Passes FIFA 2015 and World Rugby 2020 UVA 5000hr testing
6. Passes Heavy Metals EN71-3 European test method for children's toys
7. Passes Heavy Metals CAM 17 6020 ICP/MS
8. Passes Heavy Metals Req. for OEHS for CAM 17 metals
9. Passes Heavy Metals F3188
10. No agglomeration or stability loss at 365 °F
11. 89% rebound at 175 °C compression as per ASTM D395
12. Sulfur cured
13. Bulk density: 27-30 lbs per cubic ft
14. Dust free
15. Odorless
16. Not oily
17. 16 year manufacturer's warranty
18. Typical sieve specifications shown below:

Sieve Size	Min	Max
10	0	5
12	20	30
16	55	70
18	5	20
20	0	5

# LABORATORY TESTING HEAVY METALS ANALYSIS



## Project Information

<b>Project Name</b>	TTII PLAY-SAFE 65 EPDM Infill Toxicology EN 71-3 Heavy Metals Analysis	
<b>Client Information</b>	Target Technologies International Inc. 8535 Eastlake Drive Burnaby, BC V5A 4T7	
<b>Date</b>	February 26, 2016	
<b>Job no.</b>	90734/820	
<b>Report Status</b>	Final	
<b>Prepared by</b>	Jeffrey Gentile Laboratory Director	
<b>Checked by</b>	Kieran O'Donnell Field Operation Manager	

### Notes:

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3. This report shall not be used for engineering or contractual purposes unless signed by the Author and the Checker and unless the report status is "Final."

### 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.

### Results:

All results were found to be below the limit criteria referenced above.

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# LABORATORY TESTING HEAVY METALS ANALYSIS



## TTII PLAY-SAFE 65 EPDM Infill toxicology

### 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	1080 mg/kg	PASS

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

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## TEST REPORT

### Laboratory tests on an infill material for artificial turf system

Tests performed according to EN 71-3, DIN 18035-7 and US EPA 8270 standards

**Report Number** R19027CAN-A2

**Product** PLAY - SAFE 65 – EPDM  
Fleck Manufacturing

**Client** Henry Fleck  
Fleck Manufacturing

**Date** September 26<sup>th</sup>, 2019

*This report contains 3 pages in total. Reproduction of this report is authorized only in its entire form. Results reported are valid only for the products tested. To declare the conformity (or not), the uncertainty of the results was not taken into account. Detailed results are available on request.*

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[www.labosport.com](http://www.labosport.com)



## INFORMATION

Product description	Infill material for artificial turf system			
Product name	PLAY - SAFE 65 – EPDM			
Sample number	US002229			
Date of reception	March 18 <sup>th</sup> , 2019			
Date of tests	March to May 2019			
Temperature (°C)	MIN	22	MAX	24
Humidity (%)	MIN	49	MAX	51

## RESULTS

### Toxicological analysis of Heavy Metals – DIN 18035-7 (*lixiviation*):

Parameters	Units	Test method	Results	Requirements	Pass/Fail
Lead	mg/L	DIN 18035-7	< 0.01	< 0.025	Pass
Cadmium	mg/L	DIN 18035-7	< 0.001	< 0.005	Pass
Total Chromium	mg/L	DIN 18035-7	< 0.01	< 0.05	Pass
Tin	mg/L	DIN 18035-7	< 0.01	< 0.040	Pass
Chromium VI	mg/L	DIN 18035-7	< 0.008	< 0.008	Pass
Mercury	mg/L	DIN 18035-7	< 0.1	< 1	Pass
Zinc	mg/L	DIN 18035-7	0.65	< 0.5	Fail
COD	mg/L	DIN 18035-7	39.9	< 50	Pass

### Toxicological analysis of Heavy Metals – EN 71-3 (*migration*):

Element	Units	Test method	Results	Requirements (Material of Category III)	Pass/Fail
Aluminium	mg/kg DW	EN 71-3	25	< 70 000	Pass
Antimony	mg/kg DW	EN 71-3	< 0.5	< 560	Pass
Arsenic	mg/kg DW	EN 71-3	< 0.5	< 47	Pass
Barium	mg/kg DW	EN 71-3	< 0.5	< 18 750	Pass
Boron	mg/kg DW	EN 71-3	< 0.5	< 15 000	Pass
Cadmium	mg/kg DW	EN 71-3	< 0.5	< 17	Pass
Cobalt	mg/kg DW	EN 71-3	< 0.5	< 130	Pass
Copper	mg/kg DW	EN 71-3	< 0.5	< 7 700	Pass
Lead	mg/kg DW	EN 71-3	< 0.65	< 160	Pass
Manganese	mg/kg DW	EN 71-3	< 0.5	< 15 000	Pass
Mercury	mg/kg DW	EN 71-3	< 0.005	< 94	Pass
Nickel	mg/kg DW	EN 71-3	< 0.5	< 930	Pass
Selenium	mg/kg DW	EN 71-3	< 0.5	< 460	Pass
Strontium	mg/kg DW	EN 71-3	< 0.5	< 56 000	Pass
Tin	mg/kg DW	EN 71-3	< 0.5	< 180 000	Pass
Zinc	mg/kg DW	EN 71-3	1235	< 46 000	Pass
Chromium III	mg/kg DW	EN 71-3	< 0.5	< 460	Pass
Chromium VI	mg/kg DW	EN 71-3	< 0.2	< 0.2	Pass



## Toxicological analysis of PAH:

Element	Units	Test method	Results
Benzo (a) pyrene	mg/kg DW	US EPA 8270	< 0.2
Benzo (e) pyrene	mg/kg DW	US EPA 8270	0.39
Benzo (a) anthracene	mg/kg DW	US EPA 8270	< 0.2
Chrysene	mg/kg DW	US EPA 8270	< 0.2
Benzo (j+b) fluoranthene	mg/kg DW	US EPA 8270	< 0.2
Benzo (k) fluoranthene	mg/kg DW	US EPA 8270	< 0.2
Dibenzo (a,) anthracene	mg/kg DW	US EPA 8270	< 0.2
Indeno (1,2,3-cd) pyrene	mg/kg DW	US EPA 8270	< 0.2
Benzo (ghi) perylene	mg/kg DW	US EPA 8270	1.92
Naphtalene	mg/kg DW	US EPA 8270	< 0.2
Acenaphtene	mg/kg DW	US EPA 8270	< 0.2
Acenaphtylene	mg/kg DW	US EPA 8270	< 0.2
Anthracene	mg/kg DW	US EPA 8270	< 0.2
Fluoranthene	mg/kg DW	US EPA 8270	1.43
Fluorene	mg/kg DW	US EPA 8270	< 0.2
Phenanthrene	mg/kg DW	US EPA 8270	1.14
Pyrene	mg/kg DW	US EPA 8270	7.50
<b>Total of 17 PAHs</b>			<b>&lt; 14.78</b>

## Toxicological analysis of Phthalates:

Element	Units	Test method	Results
Di-methyl-phthalate	mg/kg DW	DIN 18035-7	< 1
Di-ethyl-phthalate	mg/kg DW	DIN 18035-7	< 1
Benzyl-benzoate	mg/kg DW	DIN 18035-7	< 1
Di-iso-butyl-phthalate	mg/kg DW	DIN 18035-7	< 1
Di-n-butyl-phthalate	mg/kg DW	DIN 18035-7	< 1
Bis-(2-methoxy-ethyl)-phthalate	mg/kg DW	DIN 18035-7	< 1
Benzyl-butyl-phthalate	mg/kg DW	DIN 18035-7	< 1
Bis-(2-ethyl-hexyl)-phthalate	mg/kg DW	DIN 18035-7	< 1
Di-n-octyl-phthalate	mg/kg DW	DIN 18035-7	< 1
Di-iso-nonyl-phthalate	mg/kg DW	DIN 18035-7	< 5
Di-iso-decyl-phthalate	mg/kg DW	DIN 18035-7	< 5

## REPORTED BY



Joris Delage  
(Laboratory Technician) - Writer



Thomas Amadei, T.P.  
(Laboratory Manager) - Approver

# LABORATORY TESTING THERMAL STABILITY



## Project Information

<b>Project Name</b>	TTII PLAY-SAFE 65 EPDM INFILL Thermal Stability Behavior	
<b>Client Information</b>	Target Technologies International Inc. 8535 Eastlake Drive Burnaby, BC V5A 4T7	
<b>Date Performed</b>	January 21, 2016	
<b>Report Status</b>	Final	
<b>Job No.</b>	90709/794	
<b>Prepared by</b>	<i>Kieran O'Donnell</i> Field Operation Manager	
<b>Checked by</b>	<i>Jeffrey Gentile</i> Laboratory Director	

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## Summary

Sports Labs USA was commissioned to perform infill thermal stability behavior testing. The purpose of this testing was to determine at which temperature the material will start to melt and agglomerate. Samples were received at the lab on January 13<sup>th</sup>, 2016.

## Procedure

The equipment used was a Quincy 20AF Hydraulic forced air gravity convection oven to heat the material and an Omega HH147U Data logger to track temperature. The oven heat was increased by 5 °C at a time and stabilized for 15 minutes at each interval until changes caused by the effect of the heat was observed.

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# LABORATORY TESTING THERMAL STABILITY



## Results

Temp °C	Temp °F	Remark
70	158	No agglomeration noticed
75	167	No agglomeration noticed
80	176	No agglomeration noticed
85	185	No agglomeration noticed
90	194	No agglomeration noticed
95	203	No agglomeration noticed
100	212	No agglomeration noticed
105	221	No agglomeration noticed
110	230	No agglomeration noticed
115	239	No agglomeration noticed
120	248	No agglomeration noticed
125	257	No agglomeration noticed
130	266	No agglomeration noticed
135	275	No agglomeration noticed
140	284	No agglomeration noticed
145	293	No agglomeration noticed
150	302	No agglomeration noticed
155	311	No agglomeration noticed
160	320	No agglomeration noticed
165	329	No agglomeration noticed
170	338	No agglomeration noticed
175	347	No agglomeration noticed, lightly smoky
180	356	No agglomeration noticed, moderate smoke
185	365	No agglomeration noticed, moderate smoke

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# LABORATORY TESTING THERMAL STABILITY



## Sample Photos



Pre testing





Post testing

# LABORATORY TESTING COMPRESSION TEST



## Project Information

<b>Project Name</b>	TTII PLAY-SAFE 65 EPDM INFILL Compression test	<b>Sample Received</b>	1/13/2016
<b>Client Information</b>	Target Technologies International Inc. 8535 Eastlake Drive Burnaby, BC V5A 4T7		
<b>Date</b>	March 2, 2016		
<b>Report Status</b>	Final		
<b>Job No.</b>	90744/830		
<b>Prepared by</b>	<i>Kieran O'Donnell</i> Field Operation Manager		
<b>Checked By</b>	<i>Jeffrey Gentile</i> Laboratory Director		

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## Summary

Sports Labs USA was commissioned to test three samples of infill to ensure that there was no change in the materials ability to rebound after undergoing compression testing of pre-baked and non-baked samples. Sample A was left as a constant and not heated before the compression testing. Samples B and C where pre baked before testing at 110°C for Sample B and 175°C for Sample C.

During testing all three samples were placed under 25% compaction and baked at a temperature of 70°C for a period of 22 hours per test method ASTM D395 method B. Afterwards the samples were allowed to rest for approximately 30 min before measurements were made to compare how much the material was able to rebound in comparison to each other.

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# LABORATORY TESTING COMPRESSION TEST



## Table Contents

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Summary .....	1
General Information .....	2
Results .....	2
Sample Photos .....	3
End of Report.....	3

## General Information

<b>Test Method</b>	ASTM D395		
<b>Testing Device</b>	Method B		
<b>Test Date</b>	2/23/16 thru 3/1/16	<b>Product Info</b>	TTII PLAY-SAFE 65 EPDM INFILL
<b>Weather Conditions</b>	Indoor	<b>Air Temp (° F)</b>	72
<b>Humidity %</b>	45	<b>Misc. Notes</b>	None

## Results

TTII PLAY-SAFE 65 EPDM INFILL		
Sample	Description	Rebound (%)
A	Not Heated before compression testing	88.14
B	Previously Heated to 110°C before compression testing	88.12
C	Previously Heated to 175°C before compression testing	89.14

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# LABORATORY TESTING COMPRESSION TEST



## Sample Photos



Pre Compression Sample A



Pre Compression Sample B



Pre Compression Sample C



Post Compression Sample A



Post Compression Sample B



Post Compression Sample C

End of Report

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# LABORATORY TESTING HEAVY METALS ANALYSIS



## Project Information

<b>Project Name</b>	TTII TRU-PLAY 57 COLORED EPDM INFILL Infill Heavy Metals Analysis	<b>Job no.</b>	91365/1459
<b>Client Information</b>	Target Technologies International Inc. 8535 Eastlake Drive Burnaby, BC V5A 4T7		
<b>Date of Report</b>	September 30, 2016	<b>Sample Arrival</b>	8/18/2016
<b>Report Status</b>	Final		
<b>Prepared by</b>	Jeffrey Gentile Laboratory Director		
<b>Checked by</b>	Kieran O'Donnell Field Operation Manager		

*Notes:*

1. This report has been prepared by Sports Labs USA with all reasonable skill, care and diligence within the terms of the contract with the Client and within the limitations of the resources devoted to it.
2. This report is confidential to the Client and Sports Labs USA accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.
3. This report shall not be used for engineering or contractual purposes unless signed by the Author and the Checker and unless the report status is "Final."

### Standard / Regulation:

Heavy metals analysis required by the OEHS for CAM 17 metals. 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 suggested concentration limits shown are based on screening levels per Human Health Risk Based Levels – HHSL 2015. The material tested was a tan colored EPDM.

### Results:

All results were found to be below the limit criteria referenced above.

INFORMATION, ADVICE & KNOW-HOW: FROM THE SYNTHETIC SPORTS SURFACE EXPERTS



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# LABORATORY TESTING HEAVY METALS ANALYSIS



## Results Table:

Analyte	Analytical Method	*Suggested Concentration Limit (mg/kg)	MDL (mg/kg)	Sample Result	PASS / FAIL
Antimony	HHSL 2015	31	5	ND	PASS
Arsenic	HHSL 2015	12	3.4	ND	PASS
Barium	HHSL 2015	15,000	10	ND	PASS
Beryllium	HHSL 2015	3	5	ND	PASS
Cadmium	HHSL 2015	4.5	1	ND	PASS
Chromium	HHSL 2015	36,000	5	ND	PASS
Cobalt	HHSL 2015	23	5	ND	PASS
Copper	HHSL 2015	3,100	5	ND	PASS
Lead	HHSL 2015	40	5	ND	PASS
Mercury	HHSL 2015	23	5	ND	PASS
Molybdenum	HHSL 2015	390	5	ND	PASS
Nickel	HHSL 2015	490	5	ND	PASS
Selenium	HHSL 2015	390	10	ND	PASS
Silver	HHSL 2015	390	5	ND	PASS
Thallium	HHSL 2015	.78	.78	ND	PASS
Vanadium	HHSL 2015	390	5	ND	PASS
Zinc	HHSL 2015	23,000	5	ND	PASS

Mg/kg= milligram per kilogram

MDL = method detection limit

ND = not detected (<MDL)

\* The suggested concentration limits shown are based on screening levels per Human Health Risk Based Levels – HHSL 2015.

End of Report

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# LABORATORY TESTING HEAVY METALS ANALYSIS



## Project Information

<b>Project Name</b>	Infill Heavy Metals Analysis F3188 TTII Play-Safe 65 Black EPDM	<b>Job no.</b>	93147/3277
<b>Client Information</b>	Target Technologies International Inc 8535 Eastlake Drive Burnaby, BC V5A 4T7		
<b>Date of Report</b>	March 22, 2018	<b>Sample Arrival</b>	3/9/2018
<b>Report Status</b>	Final		
<b>Prepared by</b>	Jeffrey Gentile Laboratory Director		
<b>Checked by</b>	Kieran O'Donnell Field Operation Manager		

**Notes:**

1. This report has been prepared by Sports Labs USA with all reasonable skill, care and diligence within the terms of the contract with the Client and within the limitations of the resources devoted to it.
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### Standard / Regulation:

ASTM F3188-16, Standard Specification for Extractable Hazardous Metals in Synthetic Turf Infill Materials

### Requirements:

This specification relates to the amount of certain metals that have the potential to be extracted from synthetic turf infill materials if ingested. The time, temperature, and pH of the extraction fluid approximate the conditions the infill material would experience in the stomach during the digestive process. The levels of extractable metals are compared to maximum levels allowed in children's toys.

This specification applies to all materials (man-made or natural) that are intended for use as infill materials for synthetic turf sports surfaces.

### Results:

All results were found to be below the limit criteria referenced above.

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# LABORATORY TESTING HEAVY METALS ANALYSIS



## Results Table:

Analyte	Analytical Method	*Suggested Concentration Limit (mg/kg)	Sample Result (mg/kg)	PASS / FAIL
Antimony	ASTM F3188	60	< 0.5	PASS
Arsenic	ASTM F3188	25	< 0.5	PASS
Barium	ASTM F3188	1000	0.65	PASS
Cadmium	ASTM F3188	75	< 0.5	PASS
Chromium	ASTM F3188	60	< 0.5	PASS
Lead	ASTM F3188	90	< 0.5	PASS
Mercury	ASTM F3188	60	< 0.02	PASS
Selenium	ASTM F3188	500	< 2.5	PASS

\*The suggested concentration limits shown are based on screening levels per ASTM F3188-16 Migration of Certain Elements. These limits have been included for reference and are not project specific.

End of Report

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Chain of Custody No. 103818  
 Multiple COC's Yes No



317 Elm Street Milford, NH 03055  
 (603) 673-5440 / Fax (603) 673-0366

**CUSTOMER INFORMATION PROJECT INFORMATION SAMPLE INFORMATION**

**CUSTOMER INFORMATION**  
 CUSTOMER: Sports Labs USA  
 ADDRESS: 155 River Rd, Unit #2  
 CITY/STATE/ZIP: Bow, NH 03304  
 TELEPHONE: 603 715-5453  
 REPORT TO: Carol Vincent  
 EMAIL TO: carol@sportslabsusa.com

**PROJECT INFORMATION**  
 JOB NAME: T111 PLAY-SAFE 65 BLACK EPDM  
 JOB NUMBER: 93191/3319  
 LOCATION:  
 INVOICE EMAIL: carol@sportslabsusa.com  
 INVOICE TO: Carol Vincent  
 P.O. NUMBER:

**SAMPLE INFORMATION**  
 TURNAROUND TIME: (CIRCLE ONE)  
 10 DAY STANDARD RUSH (MUST BE PRE-APPROVED)  
 7 day 5 day 4 day 3 day 2 day 1 day Same Day  
 MCP  YES  NO  GW1  GW2  GW3

STATION #	SAMPLE IDENTIFICATION & LOCATION	COLLECTED		SAMPLE TYPE	COM	MATRIX	# OF CONTAINERS	CONTAINER AND PRESERVATIVE	ANALYSIS
		DATE	TIME						
10-18 EPDM		3/9/18	1:50			S			F3188
		DATE	TIME						
		DATE	TIME						
		DATE	TIME						
		DATE	TIME						
		DATE	TIME						
		DATE	TIME						

**CUSTODY**  
 SAMPLER: Carol Vincent  
 SIGNATURE: *[Signature]*  
 DATE: 3/9/18  
 MILITARY TIME: 11:01

**RELINQUISHED:** Rose Davis  
 SIGNATURE: *[Signature]*  
 DATE:   
 MILITARY TIME:   
 RECEIVED:   
 DATE:   
 MILITARY TIME:   
 RELINQUISHED:   
 DATE:   
 MILITARY TIME:   
 RECEIVED FOR LAB: *[Signature]*  
 DATE: 3-19-18  
 TIME: 8:00

**SAMPLE CHECK LIST:**  
 RECEIVED WITHIN HOLD TIME:  YES  NO  
 RECEIVED IN GOOD CONDITION:  YES  NO  
 TEMP BLANK: 4/9°C  
 SHIPPED OR HAND DELIVERED:  YES  NO  
 SAMPLES WERE PROPERLY PRESERVED:  YES  NO  
 SAMPLES WERE FILTERED IN FIELD:  YES  NO  
 IF NO EXPLAIN:   
 LAB:  YES  NO  
 N/A

**FIELD READINGS & COMMENTS:**  
 GROUP # 18030138 #12