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ENGINEERING GROUP

# TECHNICAL MEMORANDUM

For 137 S Wilson St– Commercial Lot

Burleson, TX

November 15, 2023

1600 W. 7th Street, Suite 400, Fort Worth, Texas 76102 | 817.810.0696
Shield Engineering Group, PLLC

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TBPE FIRM #F-11039 | TBPLS FIRM #10193890

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The purpose of this Drainage Study Technical Memo is to analyze the installation of synthetic turf within the patio space at 137 S Wilson St, Burleson, TX 76028. The existing patio is gravel and is proposed to be replaced with synthetic turf. The proposed area to be improved is approximately 0.10 acres, See Fig. 1: Site Aerial below.


Figure 1: Site Aerial

The following compares the pre-development and post-development runoff during a 100-year storm event as well as summarizes specifications of the proposed synthetic turf. Section 4.6 Drainage of the City of Burleson "Design Standards Manual" and the "iSWMM Technical Manual – Hydrology" were utilized to compare pre-development are post-development runoff conditions. Existing surface conditions were observed to be gravel and a runoff coefficient of 0.50 was selected as specified in Table 1.6 of the "iSWMM Technical Manual – Hydrology". Existing runoff was computed by the rational method and results are shown in Table 1 on the following page.

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**Table 1.6 Recommended Runoff Coefficient Values**

| Description of Area | Runoff Coefficients (C) |
|---|---|
| Lawns: | |
| Sandy soil, flat, 2% | 0.10 |
| Sandy soil, average, 2 - 7% | 0.15 |
| Sandy soil, steep, > 7% | 0.20 |
| Clay soil, flat, 2% | 0.17 |
| Clay soil, average, 2 - 7% | 0.22 |
| Clay soil, steep, > 7% | 0.35 |
| Agricultural | 0.30 |
| Forest | 0.15 |
| Streams, Lakes, Water Surfaces | 1.00 |
| Business: | |
| Downtown areas | 0.95 |
| Neighborhood areas | 0.70 |
| Residential: | |
| Single Family (1/8 acre lots) | 0.65 |
| Single Family (1/4 acre lots) | 0.60 |
| Single Family (1/2 acre lots) | 0.55 |
| Single Family (1+ acre lots) | 0.45 |
| Multi-Family Units, (Light) | 0.65 |
| Multi-Family, (Heavy) | 0.85 |
| Commercial/Industrial: | |
| Light areas | 0.70 |
| Heavy areas | 0.80 |
| Parks, cemeteries | 0.25 |
| Playgrounds | 0.35 |
| Railroad yard areas | 0.40 |
| Streets: | |
| Asphalt and Concrete | 0.95 |
| Brick | 0.85 |
| Drives, walks, and roofs | 0.95 |
| Gravel areas | 0.50 |
| Graded or no plant cover: | |
| Sandy soil, flat, 0 - 5% | 0.30 |
| Sandy soil, flat, 5 - 10% | 0.40 |
| Clayey soil, flat, 0 - 5% | 0.50 |
| Clayey soil, average, 5 - 10% | 0.60 |

Table 1: Predevelopment Runoff Calculations

| ID | AREA (AC) | C | CA | I100 (IN/HR) | TOTAL FLOW (CFS) |
|---|---|---|---|---|---|
| 1 | 0.10 | 0.5 | 0.05 | 11.6 | 0.58 CFS |

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For the purposes of this analysis, the proposed synthetic turf was assumed to be fully clogged, or impermeable, and a runoff coefficient of 1.0 was selected. Proposed conditions runoff results are shown in Table 2 below.

Table 2: Existing Runoff Calculations

| ID | AREA (AC) | C | CA | I100 (IN/HR) | TOTAL FLOW (CFS) |
|---|---|---|---|---|---|
| 1 | 0.10 | 1.0 | 0.10 | 11.6 | 1.16 CFS |

Fully clogged conditions would then generate an additional 0.58 cfs to S Wilson St; estimated to be less than 1% of the total capacity of the street and assumed to be a statistically insignificant change in the total runoff from the overall contributing watershed.

Specifications and testing results of the proposed synthetic turf are attached for reference at the end of this document. Infiltration rates were observed to be 121 inches per hour, exceeding the estimated 100-year rainfall of 11.6 inches per hour. The turf was proposed to be installed over decomposed granite placed on non-woven geotextile fabric over native soil. That is, when unclogged would reduce direct runoff rates when compared to existing conditions.

In conclusion, it is in our professional opinion that proposed synthetic turf would not cause adverse effects offsite or downstream, both under the "unclogged" permeable and "clogged" impermeable conditions.

Sincerely,

Chandler Davis, P.E.
Shield Engineering Group, PLLC
Attn: Michelle McCullough

11/15/2023
STATE OF TEXAS
CHANDLER S. DAVIS
149398
LICENSED
PROFESSIONAL ENGINEER

# Appendix A: Test Report

TESTING SERVICES INC

## TEST REPORT

**CLIENT:**

| | | | |
|---|---|---|---|
| Company: | Global Syn-Turf | Report Number: | 679759 |
| Address: | 2482 Technology Drive | Lab Test Number: | 2835-8355 |
| | Hayward, CA 94545 | Test Completion Date: | 7/8/2016 |
| | | Report Date: | 7/20/2016 |
| | | Page: | 1 of 1 |
| Requested By: | Andrew Gao | | |

**TEST MATERIAL:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Material Type: | Synthetic Turf | | | | | Date Received: | 7/7/2016 |
| Material Condition: | EXCELLENT: | XXX | GOOD: | | POOR: | | REJECTED: |
| Turf ID: | Pot Turf | | | | | | |

**TESTING METHODS REQUESTED:**

*Testing Services Inc. was instructed by the client to test for the following...*

| | | | |
|---|---|---|---|
| Standard: | ASTM F1551 | Test Method: | Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials: Suffix-DIN 18-035, Part 6: Water Permeability of Synthetic Turf Systems and Permeable Bases |

**SAMPLING PLAN:**

Sampling Date: 7/7/2016

- Specimen sampling is performed in the sampling department at TSI.
- The sampling size of specimens is determined by the test method requirements.
- In the event a specific sampling size is not called for, a determination will be made based on previous testing experience, and approved for use by an authorized manager.
- All samples are subjected to the outside environmental conditions of temperature and relative humidity.
- Sample requiring pre-determined exposure to specified environmental conditions based on a specific test method, take place in the departments in which they are tested.

**DEVIATION FROM TEST METHOD:**

State reason for any Deviation from, Additions to, or Exclusions From Test Method.

none

**TEST SUMMARY:**

| TEST METHOD | TEST DESCRIPTION | TEST RESULT |
|---|---|---|
| ASTM F1551; Suffix-DIN 18-035, Part 5 | Average Rainfall Capacity (Water Permeability) | 121.4 inches/hour |

**Test data values represent drainage rates for the turf and infill only, and do not take into account the permeability properties of a sub base or padding.*

Infill System: 1.2 lbs/ft²Silica Sand
Tube: 10.75" OD 10.00" ID 8" Length (Beveled)
Flange: 9.375" Diameter

# of Specimens (3) 11.5" Diameter
Tube Index Mark: 6"
Tube Flow Head: 2 Gallons

Tube Weight: 39 lbs
Pre-Conditioning: none

We undertake all assignments for our clients on a best effort basis. Our findings and judgments are based on the information to us using the latest test methods available. TSI can only ensure the test results for the specific items tested.
Unless otherwise noted in the deviations sections of this report, all tests performed are in compliance with stated test method.

Test Report Approval:

Erle Miles, Jr. VP, Testing Services Inc

TSI Accreditation: Our laboratory is accredited by the US Dept of Commerce, National Institute of Standards and Technology: ISO/IEC 17025:2005. Our code # is: NVLAP 100108-0. TSI is a certified independent testing laboratory by the Synthetic Turf Council

| | | | |
|---|---|---|---|
| Form: | Rev: | Revision Date: | Page 1 of 1 |
| Release Date: | Control Type: Electronic – Expires 24 hours after this date: Jul. 21, 16<br>Printed copies are uncontrolled | | |



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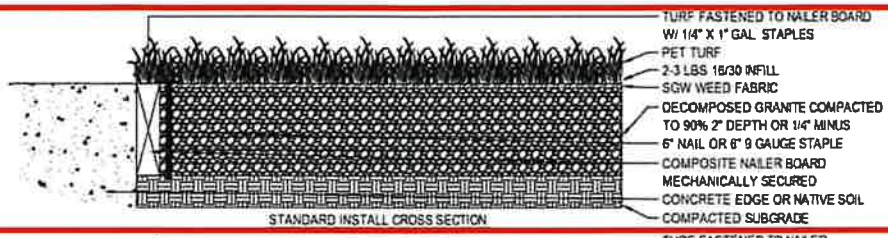
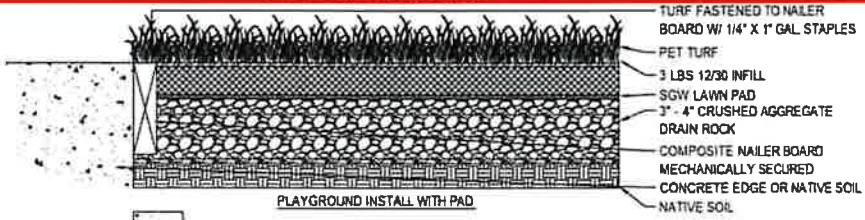
## Appendix B: Standard Installation

SGW
synthetic grass warehouse

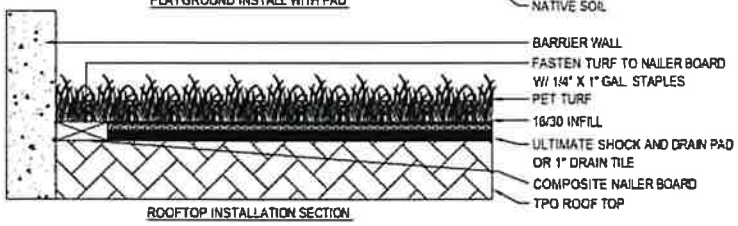
SYNTHETIC GRASS WAREHOUSE
1317 WEST ROYAL LANE
DALLAS, TX 75261
PHONE: (469) 206-7008
www.sgwcorp.com



STANDARD INSTALL CROSS SECTION



PLAYGROUND INSTALL WITH PAD



ROOFTOP INSTALLATION SECTION

**SPECIFICATIONS:**
**MODEL:** PET
**RECOMMENDED USE:** MODERATE TO HEAVY TRAFFIC
**YARN COLORS:** FIELD GREEN / LIME GREEN
**YARN TYPE:** MONOFILAMENT
**YARN COMPOSITION:** PE WITH THATCH
**THATCH COLOR:** BROWN
**YARN DENIER:** 9000 / 5000
**FACE WEIGHT:** APPROX. 60 OZ/YD
**TOTAL WEIGHT:** 87 OZ/YD
**PILE HEIGHT:** APPROX. 1"
**GAUGE:** 3/8"
**ROLL WIDTH:** 15'
**ROLL LENGTH:** 100'
**ROLL WEIGHT:** 945 LB
**RECOMMENDED INFILL:** 0 - 2 LBS/S F
**WEIGHT/SQ.FT:** 0.63 LB

NOTES
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS
2. DO NOT SCALE DRAWING
3. THIS DRAWING IS INTENDED FOR USE BY ARCHITECTS, ENGINEERS, CONTRACTORS, CONSULTANTS AND DESIGN PROFESSIONALS FOR PLANNING PURPOSES ONLY. THIS DRAWING MAY NOT BE USED FOR CONSTRUCTION
4. ALL INFORMATION CONTAINED HEREIN WAS CURRENT AT THE TIME OF DEVELOPMENT BUT MUST BE REVIEWED AND APPROVED BY THE PRODUCT MANUFACTURER TO BE CONSIDERED ACCURATE
5. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.CADdetails.com/info AND ENTER REFERENCE NUMBER 5028-015

SYNTHETIC GRASS WAREHOUSE
PET TURF

5028-015
REVISION DATE 14/03/2017


CADdetails.com