



Sports Park Turf Reduction Study

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Turf Reduction Analysis

The purpose of the turf reduction analysis is to evaluate the costs and water usage associated with the turf grass maintenance at the Sports Park and provide recommendations on methods that would reduce maintenance and water costs. Turf maintenance activities such as mowing, fertilizing, irrigation repairs, materials, etc. cost the City approximately \$16,600 per acre annually. The cost of turf irrigation water supplied from the Beaumont-Cherry Valley Water District (BCVWD) costs about \$4,400 per acre annually. BCVWD is currently increasing water rates 7% per year through 2024 and this upward trend in water costs is projected to continue. The increasing cost and scarcity of water will appreciably affect the park's maintenance budget. The following analysis' were applied to the Sports Park site to help determine if a turf reduction method would provide an effective decrease in turf maintenance costs and water usage while still providing an equal or greater level of user experience.

A. Conversion of Natural Turf to Synthetic Turf

The most intensely used turf areas at the Sports Park are the soccer and football fields. These areas would benefit from a conversion to a synthetic turf due to the heavy use and type of sports activity. The capital outlay to convert an area to synthetic turf is significant but the improvement costs will be offset over time with no on-going water use, reduced field maintenance costs and increased playable field time for the community.

Synthetic turf has a serviceable lifespan of about 10 years before a replacement of the turf mat is needed. Replacement costs are generally about 50-60% of the initial install. The breakeven cost point for a synthetic turf installation is approximately 36 years, this includes the replacement costs that would occur every ten years. If the initial installation cost for synthetic turf can be provided from outside sources such as grants, rebates, donations, etc, the breakeven cost point for the City decreases to 18 years. Refer to Pages 4 and 6 for a detailed summary of estimated costs of a synthetic turf compared to a natural grass field.

Synthetic turf installation will require an additional capital investment of \$12,000- \$18,000 for turf maintenance equipment. Equipment may include a sweeper, brush/broom for fluffing of the turf, tines for decompacting of the turf and cleaning equipment for sanitizing turf. This equipment can be shared among multiple sites with synthetic turf.

Refer to Appendix B for additional information regarding synthetic turf.

B. Conversion of Underused Passive Turf

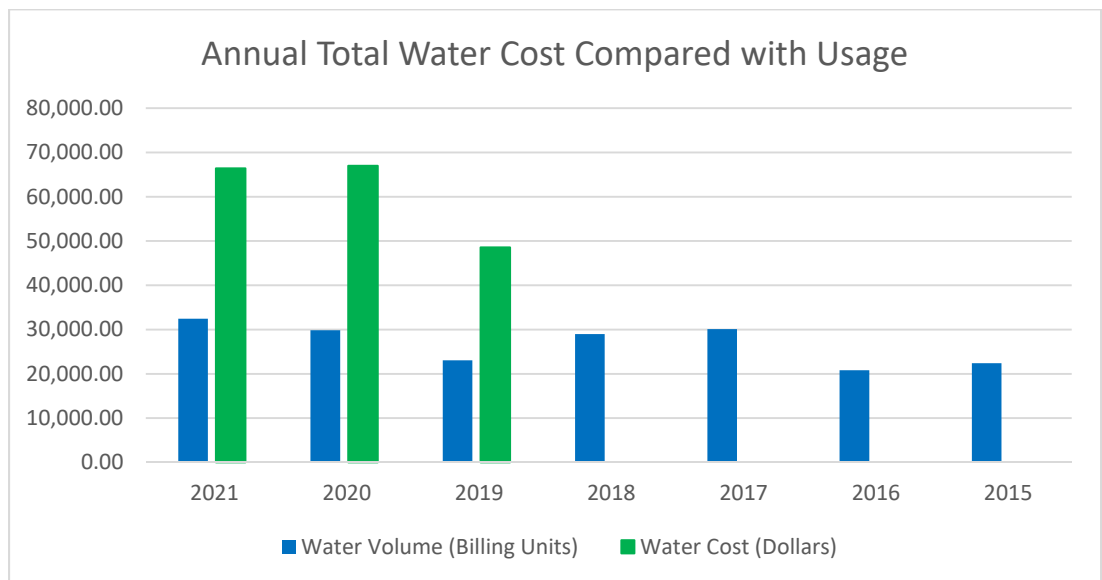
The replacement of underutilized turf grass areas with a decomposed granite groundcover is another method to reduce irrigation water use and maintenance costs. In evaluating the usable turf area at the Sports Park, a total of about 110,200 sq. ft was identified as areas that were underused as turf and could be effectively converted to decomposed granite without impacting sport activities. Low water use trees and shrubs could be planted in small masses throughout the decomposed granite to provide shade and color in these areas. The drought tolerate plantings can lower irrigation water demand by 50% over turf and reduce maintenance expenses by 75%. With the reduced water and maintenance costs, a decomposed granite conversion project can repay an investment in less than 12 years.

C. Renovate the Sports Fields with Natural Turf Sod

To provide an acceptable and safe playable turf field for the community sports teams, the natural turf fields require periodic repair or replacement. With the soccer and football fields receiving the hardest use, these fields can be left with areas of bare soil after a few seasons of play. The quickest method to repair worn and damaged turf is to replace with sod. Turf repair and replacement necessitates that the fields be closed from community use for a period of time while the new turf is established. Turf repair and replacement is a recurring maintenance expenditure.

Current Turf Irrigation Water Use at the Sports Park

Site Use	Current Turf Square Footage		Estimated Annual Water Usage		2021 Annual Water Costs
Soccer Fields	328,930 SF		15,110 units		\$33,243
Football Field	179,140 SF		8,229 units		\$18,104
Baseball Fields	147,165 SF		6,760 units		\$14,873
Totals	655,235 SF		30,100 units		\$66,220



Recommendations for Turf Reduction

Synthetic Turf - The installation of a synthetic turf sports field can be an enhancement to the City’s park recreation inventory. Synthetic fields can be used year round without the need to ‘rest’ the field turf, maintenance expenses are about one-third the cost of natural grass and the fields look green without the use of water or fertilizers. The capital outlay to convert the sport fields to synthetic turf is significant but the improvement costs will be offset over time with the decreased irrigation water use, reduced field maintenance labor costs and increased playable field time for the community users. With the appropriate funding, synthetic turf can be a viable option.

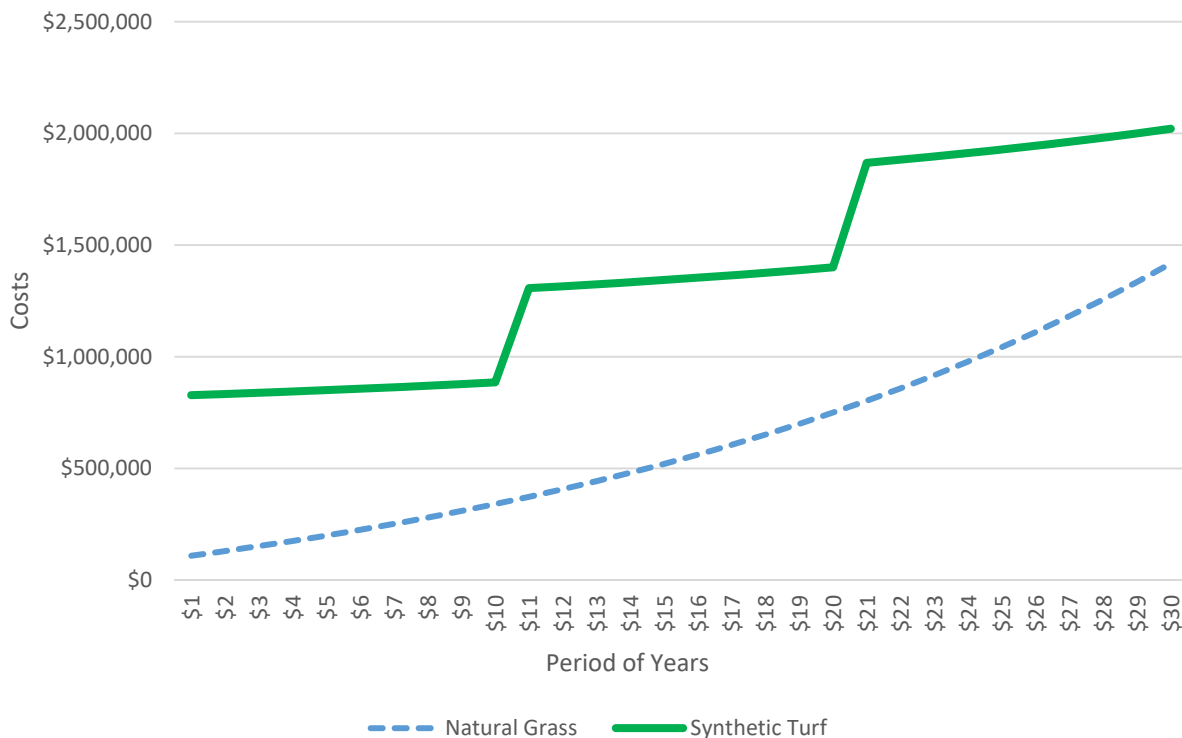
The proposed design plans for the synthetic turf fields can be found on pages 12 & 14.

The following two charts below illustrate the costs of installing and maintaining a synthetic field on a per acre basis as compared to a natural turf field.

Comparison Graph for Net Cost per Acre of Synthetic Turf versus Natural Grass

This graph illustrates the starting and annual cost difference between installing and maintaining an existing natural grass field compared to installing and maintaining a new synthetic turf field over a period of thirty years. See Page 4 for a chart of the cost figures associated to this graph.

Net Cost Comparison of Synthetic versus Natural per Acre of Turf



Synthetic turf has an initial installation cost of approximately \$827,640 per acre compared to a natural grass sod installation at \$108,900 per acre. The ten year replacement costs are shown for the synthetic turf, the cost is generally about 50-60% of the initial install. Maintenance costs were calculated assuming a 5% annual cost increase in maintenance expenditures.

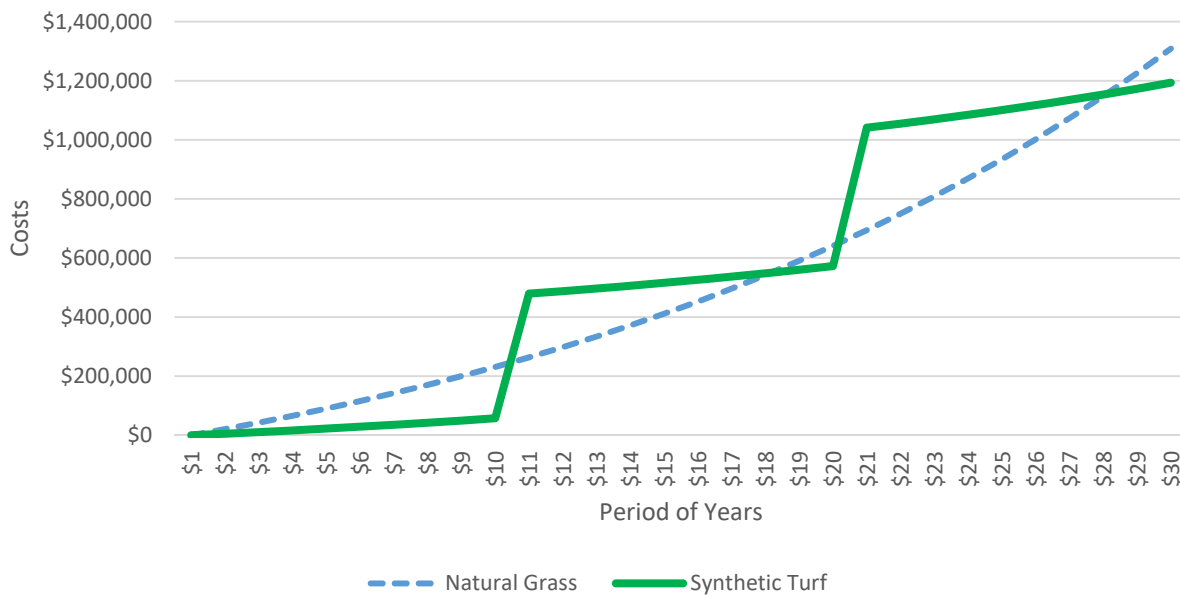
Comparison Chart for Net Costs per Acre of Synthetic Turf verse Natural Grass

	Natural Grass	Synthetic Turf
Initial Starting Costs		
Natural Turf Sod Renovation	\$108,900	\$827,640 Synthetic Field Construction
Irrigation Water and Maintenance	\$21,000	\$5,200 Annual Maintenance
	Year	
Annual Grass Maintenance Costs	1 \$21,000	\$5,200 Annual Field Maintenance Cost
with 5% annual cost increase	2 \$22,050	with 5% annual cost increase
	3 \$23,153	\$5,733
	4 \$24,310	\$6,020
	5 \$25,526	\$6,321
	6 \$26,802	\$6,637
	7 \$28,142	\$6,968
	8 \$29,549	\$7,317
	9 \$31,027	\$7,683
	10 \$32,578	\$8,067
Total Costs after 10 years*	<u>\$373,036</u>	<u>\$893,045</u> Total Costs after 10 years
		\$413,820 10yr Field Replacement
	11 \$34,207	\$8,470
	12 \$35,917	\$8,894
	13 \$37,713	\$9,338
	14 \$39,599	\$9,805
	15 \$41,579	\$10,296
	16 \$43,657	\$10,810
	17 \$45,840	\$11,351
	18 \$48,132	\$11,918
	19 \$50,539	\$12,514
	20 \$53,066	\$13,140
Total Costs after 20 years*	<u>\$585,485</u>	<u>\$1,413,403</u> Total Costs after 20 years
		\$455,202 20yr Field Replacement
	21 \$55,719	\$13,797
	22 \$58,505	\$14,487
*(Total Costs include	23 \$61,430	\$15,211
Maintenance, Renovation and	24 \$64,502	\$15,972
the Initial Starting Costs)	25 \$67,727	\$16,771
	26 \$71,113	\$17,609
	27 \$74,669	\$18,489
	28 \$78,403	\$19,414
	29 \$82,323	\$20,385
Total of all Costs after 30 years	30 <u>\$86,439</u>	<u>\$21,404</u>
	<u>\$1,504,116</u>	<u>\$2,042,144</u>

**Comparison Graph for Net Maintenance Cost per Acre of Synthetic Turf
Verse Natural Grass Without the Installation Costs**

This graph illustrates the annual cost difference associated with maintaining a new synthetic turf field compared to an existing natural grass field over a period of thirty years. For the synthetic turf, the initial construction installation costs would be funded by outside sources such as grants, donations, etc. See Page 6 for a chart of the cost figures associated for each turf type in this graph.

Synthetic Turf Versus Natural Grass
Net Cost Comparison per Acre of Turf



Maintenance costs for natural grass assume a 5% annual cost increase in maintenance expenditures. Annual costs include:

- \$16,600 for labor/overhead for mowing and aerating, material/overhead for fertilizing.
- \$4,400 for irrigation water costs (cost is an average of the usage at the Sports Park using the 2020 and 2021 billing rate of \$2.10 per unit).

The maintenance of synthetic turf assumes a 5% annual cost increase in expenditures. The annual cost \$5,200 includes but is not limited to: labor for brushing, grooming, decompaction and repairs of turf, and material costs for additional infill material as needed. The capital investment of grooming equipment is not included in the annual maintenance cost.

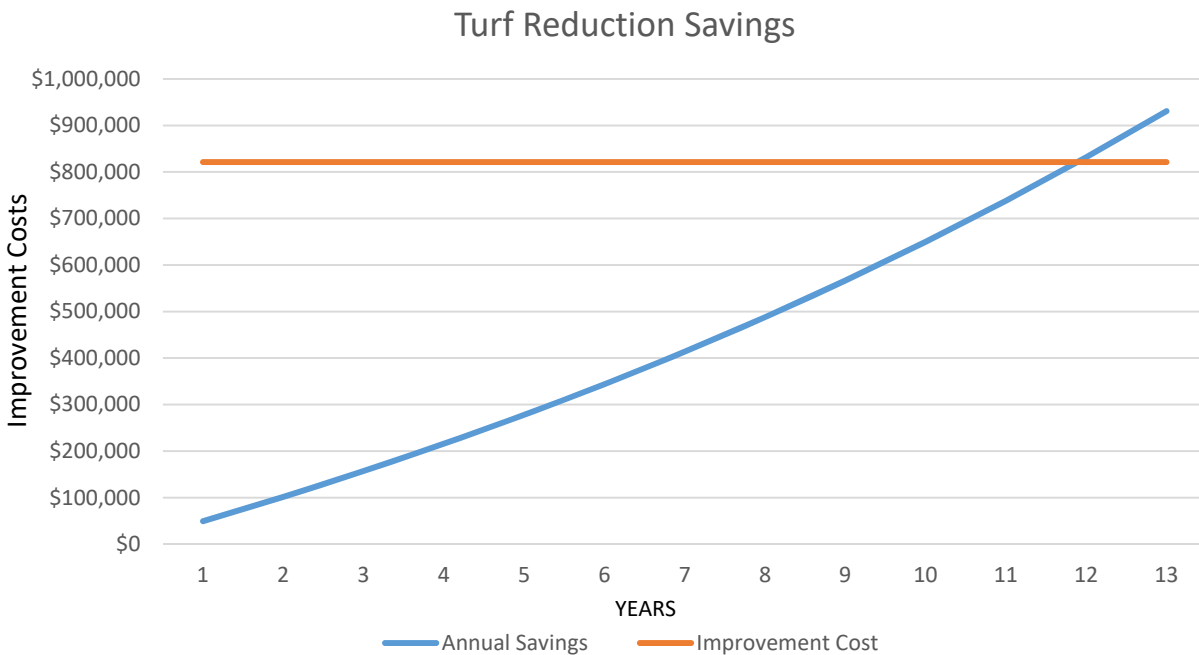
**Comparison Chart for Maintenance Costs per Acre of Synthetic Turf verse
Natural Grass Without the Installation Costs**

	Natural Grass		Synthetic Turf	
	Initial Starting Costs			
Existing Natural Grass Field	\$0		\$0 Synthetic Field Construction	
Irrigation Water and Maintenance	\$21,000		\$5,200 Maintenance	
	Year			
Annual Grass Maintenance Costs	1	\$21,000		\$5,200 Annual Field Maintenance Cost
with 5% annual cost increase	2	\$22,050		with 5% annual cost increase
	3	\$23,153		\$5,733
	4	\$24,310		\$6,020
	5	\$25,526		\$6,321
	6	\$26,802		\$6,637
	7	\$28,142		\$6,968
	8	\$29,549		\$7,317
	9	\$31,027		\$7,683
	10	\$32,578		\$8,067
Total Costs after 10 years*		<u>\$264,136</u>		<u>\$65,405</u> Total Costs after 10 years
			<u>\$413,820</u> 10yr Field Replacement	
	11	\$34,207		\$8,470
	12	\$35,917		\$8,894
	13	\$37,713		\$9,338
	14	\$39,599		\$9,805
	15	\$41,579		\$10,296
	16	\$43,657		\$10,810
	17	\$45,840		\$11,351
	18	\$48,132		\$11,918
	19	\$50,539		\$12,514
	20	\$53,066		\$13,140
Total Costs after 20 years*		<u>\$694,385</u>		<u>\$585,763</u> Total Costs after 20 years
			<u>\$455,202</u> 20yr Field Replacement	
	21	\$55,719		\$13,797
	22	\$58,505		\$14,487
	23	\$61,430		\$15,211
*(Total Costs include	24	\$64,502		\$15,972
Maintenance, Renovation and	25	\$67,727		\$16,771
the Initial Starting Costs)	26	\$71,113		\$17,609
	27	\$74,669		\$18,489
	28	\$78,403		\$19,414
	29	\$82,323		\$20,385
	30	\$86,439		\$21,404
Total of all Costs after 30 years		<u>\$1,395,216</u>		<u>\$1,214,504</u>

The costs for the ten year synthetic turf replacements are assumed to be funded from the City's budget.

Passive Landscape - The next recommendation would be to convert about 110,200 sq. ft. of underused, passive grass areas to a decomposed granite groundcover. Groupings of appropriate, low water use trees and plants could be placed throughout the areas. A conversion to a more drought tolerant landscape will not only save \$45,550 annually in water and maintenance costs, it will also be a practical demonstration of the City's commitment to conserving water in the landscape. Converting areas to decomposed granite will not affect the overall sports recreation space in the park. Refer to page 14 for the detailed improvement costs and page 15 for the proposed design plan. An alternate proposed design on pages 16 & 17 would increase water and maintenance savings to \$75,942 per year but there would be a decrease in playable turf area.

The chart below shows how the projected water and maintenance cost savings will repay the improvement costs within a twelve year period.

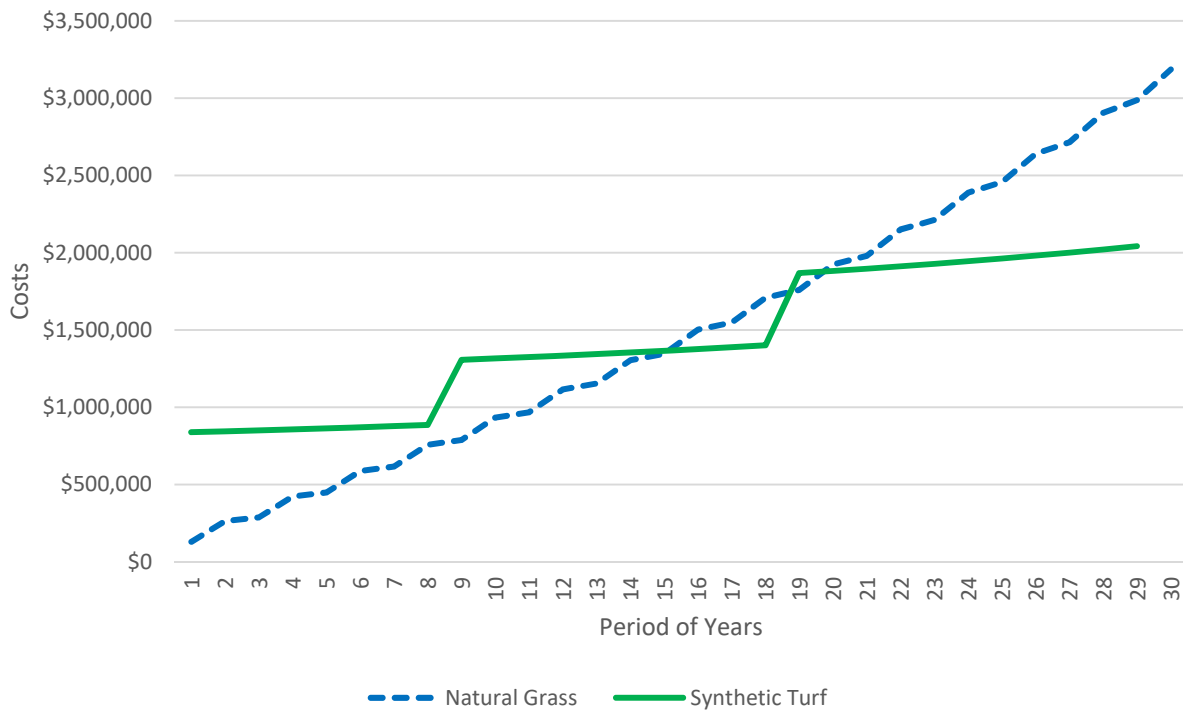


The annual maintenance saving costs for natural grass assume a 5% annual cost increase in the maintenance expenditures.

Turf Renovation - Sod replacement costs about \$108,900 per acre to remove the existing grass and install new turf. In addition to the costs, the fields must be closed to all activity for a period of several weeks in order to let the grass establish. The chart below compares the costs of a biannual turf replacement with a synthetic turf installation.

Comparison Graph for Net Cost per Acre for a Turf Renovation Program Verse Synthetic Turf

This graph illustrates the cost difference between maintaining an acre of natural grass field with a biannual sod replacement program as compared to installing and maintaining an acre of new synthetic turf field over a period of thirty years. See Page 9 for a chart of the cost figures associated for each program in this graph



**Comparison Chart for Net Cost per Acre for a Turf Renovation Program
Verse a Synthetic Turf**

	Initial Starting Costs		
Natural Turf Sod Renovation	\$108,900		\$827,640 Synthetic Field Construction
Irrigation Water and Maintenance	\$21,000		\$5,200 Annual Maintenance
	Year	Biannual renovation	
Annual Grass Maintenance Costs	1	\$21,000	\$5,200 Annual Field Maintenance Cost
with 5% annual cost increase	2	\$22,050	\$5,460 with 5% annual cost increase
	3	\$23,153	\$5,733
	4	\$24,310	\$6,020
	5	\$25,526	\$6,321
	6	\$26,802	\$6,637
	7	\$28,142	\$6,968
	8	\$29,549	\$7,317
	9	\$31,027	\$7,683
	10	\$32,578	\$8,067
Total Costs after 10 years*		\$968,546	\$893,045 Total Costs after 10 years
			\$413,820 10yr Field Replacement
	11	\$34,207	\$8,470
	12	\$35,917	\$8,894
	13	\$37,713	\$9,338
	14	\$39,599	\$9,805
	15	\$41,579	\$10,296
	16	\$43,657	\$10,810
	17	\$45,840	\$11,351
	18	\$48,132	\$11,918
	19	\$50,539	\$12,514
	20	\$53,066	\$13,140
Total Costs after 20 years*		\$1,120,608	\$1,413,403 Total Costs after 20 years
			\$455,202 20yr second Field Replacement
	21	\$55,719	\$13,797
	22	\$58,505	\$14,487
	23	\$61,430	\$15,211
	24	\$64,502	\$15,972
	25	\$67,727	\$16,771
	26	\$71,113	\$17,609
	27	\$74,669	\$18,489
	28	\$78,403	\$19,414
	29	\$82,323	\$20,385
	30	\$86,439	\$21,404
Total of all Costs after 30 years		\$1,501,146	\$2,042,144

In the Comparison Chart, the initial starting costs for natural grass would be for the removal of the existing turf, minor irrigation upgrades and the installation of new sod. For synthetic turf, the construction costs include removal of the existing natural grass and installation of the synthetic turf system (new base material, turf fabric and infill material).

Turf Reduction Improvement Costs by installing Synthetic Turf fields:

Replace the existing natural turf fields with a synthetic turf and install DG with some trees in the underutilized areas. Refer to the plan on page 11 for an illustration of the proposed design. Below is a cost breakdown of construction costs and water cost savings:

Turf Square Footage:	421,900 sf
D.G. Square Footage:	<u>110,200 sf</u>
Total Demolition Square Footage:	532,100 sf
Demolition Cost: (remove irrigation and sod)	\$239,445
Synthetic Turf Installation Cost: (grading, subbase, turf)	\$8,016,100
D.G. Installation Cost: (grading, decomposed granite)	<u>\$771,400</u>
Total Costs:	\$9,026,945
Annual Turf Water Cost Savings:	\$42,612
Annual Turf Maintenance Savings:	\$153,150
Annual DG Water Cost Savings:	\$11,130
Annual DG Maintenance Savings:	<u>\$39,837</u>
Annual Maintenance Savings:	\$246,729

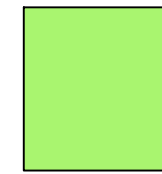
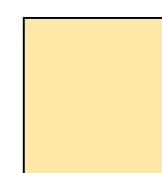
**Return on Investment (R.O.I.) for synthetic turf and decomposed granite –
Water & Maintenance Cost Savings / Install Costs = 21 years**

Refer to Pages 3 – 6 for the Cost Comparison Charts


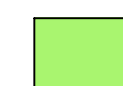

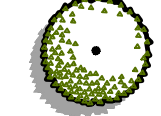

Assume a 5% annual cost increase in the maintenance expenditures



REPLACEMENT WITH SYNTHETIC TURF:

	REPLACEMENT AREA	REPLACEMENT COST PER SQUARE FOOT	TOTAL REPLACEMENT COST	ANNUAL IRRIGATION WATER USE REDUCTION	ANNUAL WATER COST SAVINGS
 REMOVE EXISTING FIELD TURF & REPLACE WITH SYNTHETIC FIELD TURF	421,900 SQ. FT.	\$19.00	\$8,016,100	18,460 B.U. (B.U. = 748 GAL) <small>NOTE: WATER REDUCTION BASED ON WATER BUDGET CALCULATIONS</small>	\$42,612
 REMOVE EXISTING TURF & REPLACE WITH DECOMPOSED GRANITE	110,200 SQ. FT.	\$7.00	\$771,400	6068 B.U.	\$11,130

LEGEND

-  NEW DECOMPOSED GRANITE GROUNDCOVER (110,200 SQ. FT.)
-  NEW SYNTHETIC TURF (421,900 SQ. FT.)
-  EXISTING TURF TO REMAIN (123,100 SQ. FT.)
-  EXISTING TREE TO REMAIN
-  NEW TREE



Beaumont Sports Park

Synthetic Turf Site Plan



Alternate Design for Turf Reduction

Improvement Costs by installing Synthetic Turf fields:

Replace the existing natural turf fields with a synthetic turf and install DG with some trees in the underutilized areas. Refer to the plan on page 13 for an illustration of the proposed design. Below is a cost breakdown of construction costs and water cost savings:

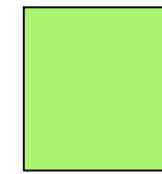
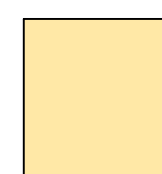
Turf Square Footage:	362,415 sf
D.G. Square Footage:	<u>169,685 sf</u>
Total Demolition Square Footage:	532,100 sf
Demolition Cost: (remove irrigation and sod)	\$239,445
Turf Installation Cost: (grading, subbase, turf)	\$6,885,885
D.G. Installation Cost: (grading, decomposed granite)	<u>\$1,187,795</u>
Total Costs:	\$8,313,125
Annual Turf Water Cost Savings:	\$36,604
Annual Turf Maintenance Savings:	\$131,557
Annual DG Water Cost Savings:	\$17,138
<u>Annual DG Maintenance Savings:</u>	<u>\$61,341</u>
Annual Maintenance Savings:	\$246,640

**Return on Investment (R.O.I.) for synthetic turf and decomposed granite –
Water & Maintenance Cost Savings / Install Costs = 20 years**


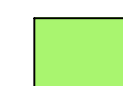

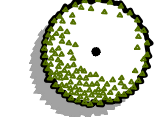

Refer to Pages 3 – 6 for the Cost Comparison Charts
Assume a 5% annual cost increase in the maintenance expenditures



REPLACEMENT WITH SYNTHETIC TURF:

	REPLACEMENT AREA	REPLACEMENT COST PER SQUARE FOOT	TOTAL REPLACEMENT COST	ANNUAL IRRIGATION WATER USE REDUCTION	ANNUAL WATER COST SAVINGS
 REMOVE EXISTING FIELD TURF & REPLACE WITH SYNTHETIC FIELD TURF	362,415 SQ. FT.	\$19.00	\$6,885,885	18,460 B.U. (B.U. = 748 GAL) <small>NOTE: WATER REDUCTION BASED ON WATER BUDGET CALCULATIONS</small>	\$36,604
 REMOVE EXISTING TURF & REPLACE WITH DECOMPOSED GRANITE	169,685 SQ. FT.	\$7.00	\$1,187,795	6068 B.U.	\$17,138

LEGEND



-  NEW DECOMPOSED GRANITE GROUNDCOVER (169,685 SQ. FT.)
-  NEW SYNTHETIC TURF (362,415 SQ. FT.)
-  EXISTING TURF TO REMAIN (123,100 SQ. FT.)
-  EXISTING TREE TO REMAIN
-  NEW TREE



Beaumont Sports Park

Synthetic Turf Site Plan (Alternate Design)

September 14, 2022

RHA# 22138

13

Turf Reduction Improvement Costs by Replacing Turf with Decomposed Granite:

Replace selected areas of the existing natural turf with Decomposed Granite and add some spaces with drought tolerant plantings thus reducing the annual water cost by 85% and maintenance cost by 75% in that area. Refer to the map on page 15 for an illustration of the proposed design. Below is a cost breakdown of the construction costs and water cost savings:

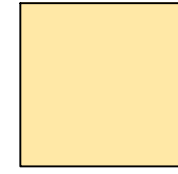

Conversion Square Footage:	110,200 sf
Demolition Cost: (remove irrigation and sod)	\$49,590
Installation Cost: (drip irrigation, soil prep & plants)	\$771,400
Total Costs:	\$820,990
Annual Water Cost Savings: (irrigation reduced 85%)	\$9,460
Annual Turf Maintenance Savings: (maintenance reduced 75%)	\$39,837
Annual Savings:	\$49,297

R.O.I. – Water Cost Savings / Replacement Costs = 12 years
Assuming an 5% annual cost increase in maintenance expenditures

<u>Year</u>	<u>Annual Costs</u>	<u>Cumulative Savings</u>
1	\$49,297	\$49,297
2	\$52,255	\$101,552
3	\$55,390	\$156,942
4	\$58,714	\$215,655
5	\$62,236	\$277,892
6	\$65,971	\$343,862
7	\$69,929	\$413,791
8	\$74,124	\$487,915
9	\$78,572	\$566,487
10	\$83,286	\$649,774
11	\$88,283	\$738,057
12	\$93,580	\$831,637

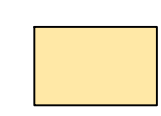
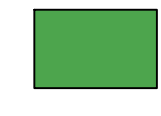
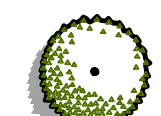



TURF REDUCTION:

	REPLACEMENT AREA	REPLACEMENT COST PER SQUARE FOOT	TOTAL REPLACEMENT COST	ANNUAL IRRIGATION WATER REDUCTION	ANNUAL WATER COST SAVINGS
 REMOVE EXISTING TURF AND REPLACE WITH DEPOSED GRANITE	110,200 SQ. FT.	\$7.00	\$771,400	8,500 B.U.	\$18,093
 REPLACE REMAINING EXISTING TURF WITH A HYBRID BERMUDA TURF	485,450 SQ. FT.	\$2.50	\$1,213,625		

NOTE: WATER REDUCTION BASED ON WATER BUDGET CALCULATIONS

LEGEND

-  NEW DECOMPOSED GRANITE GROUNDCOVER (110,200 SQ. FT.)
-  RESOD WITH NEW TURF (485,450 SQ. FT.)
-  EXISTING TREE TO REMAIN
-  NEW TREE

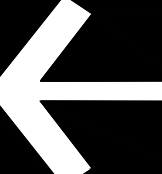


Beaumont Sports Park

Turf Reduction Site Plan



September 14, 2022
RHA
 LANDSCAPE ARCHITECTS PLANNERS, INC.

RHA# 22138

 15

Alternate Design for Maximizing Turf Reduction

Improvement Costs by Replacing Turf with Decomposed Granite:

Replace larger areas of the existing natural turf with Decomposed Granite and drought tolerant plantings in order to maximize annual water savings and maintain the most useable turf space. Refer to the map on page 17 for an illustration of the proposed design. Below is a cost breakdown of the construction costs and water cost savings:

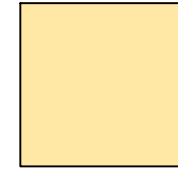

Conversion Square Footage:	169,760 sf
Demolition Cost: (remove irrigation and sod)	\$76,392
Installation Cost: (drip irrigation, soil prep & plants)	\$1,188,320
Total Costs:	\$1,264,712
Annual Water Cost Savings: (irrigation reduced 85%)	\$14,574
Annual Turf Maintenance Savings: (maintenance reduced 75%)	\$61,368
Annual Savings:	\$75,942

R.O.I. – Water Cost Savings / Replacement Costs = 12 years
Assuming an 5% annual cost increase in maintenance expenditures

<u>Year</u>	<u>Annual Costs</u>	<u>Cumulative Savings</u>
1	\$75,942	\$75,942
2	\$80,499	\$156,441
3	\$85,328	\$241,769
4	\$90,448	\$332,217
5	\$95,875	\$428,092
6	\$101,628	\$529,720
7	\$107,725	\$637,445
8	\$114,189	\$751,634
9	\$121,040	\$872,674
10	\$128,302	\$1,000,976
11	\$136,001	\$1,136,976
12	\$144,161	\$1,281,137


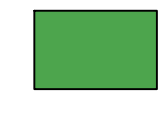
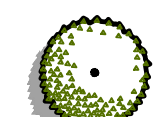



TURF REDUCTION:

	REPLACEMENT AREA	REPLACEMENT COST PER SQUARE FOOT	TOTAL REPLACEMENT COST	ANNUAL IRRIGATION WATER REDUCTION	ANNUAL WATER COST SAVINGS
 REMOVE EXISTING TURF AND REPLACE WITH DEPOSED GRANITE	169,760 SQ. FT.	\$7.00	\$1,188,320	8,500 B.U.	\$18,093
 REPLACE REMAINING EXISTING TURF WITH A HYBRID BERMUDA TURF	485,450 SQ. FT.	\$2.50	\$1,213,625		

NOTE: WATER REDUCTION BASED ON WATER BUDGET CALCULATIONS

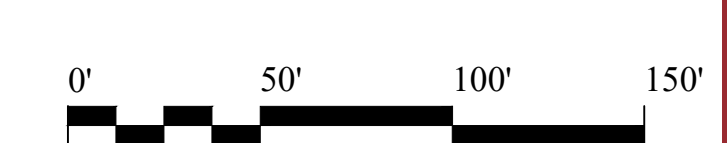
LEGEND

-  NEW DECOMPOSED GRANITE GROUNDCOVER (169,760 SQ. FT.)
-  RESOD WITH NEW TURF (485,450 SQ. FT.)
-  EXISTING TREE TO REMAIN
-  NEW TREE



Beaumont Sports Park

Turf Reduction Site Plan (Alternative Design)



Improvement Cost for Renovating all the Turf Fields:

Replace existing turf grass at a schedule interval with a Bermuda hybrid turf. Refer to map on page 19 for a map illustration of proposed design. Below is a cost breakdown of grass replacement costs:

Square Footage:	655,350 sf
Demolition Cost: (remove sod)	\$294,900
Installation Cost: (irrigation repair, soil prep & sod)	<u>\$1,409,000</u>
Total Costs:	\$1,703,900



TURF SOD RENOVATION:

	AREA	REPLACEMENT COST PER SQUARE FOOT	TOTAL REPLACEMENT COST	ANNUAL IRRIGATION WATER BUDGET	ANNUAL WATER COST
REPLACE ALL EXISTING TURF WITH A HYBRID BERMUDA TURF	655,350 SQ. FT.	\$2.50	\$1,638,375	30,100 B.U. (B.U. = 748 GAL.)	\$66,220

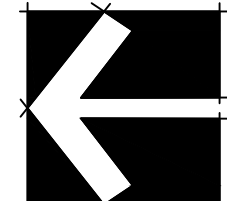
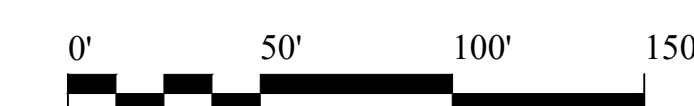
LEGEND

- RESOD WITH NEW TURF (655,350 SQ. FT.)
- EXISTING TREE TO REMAIN



Beaumont Sports Park

Turf Renovation Site Plan



APPENDIX

Landscape Improvement and Maintenance Costs	Appendix A
Synthetic Turf Guide	Appendix B

Appendix A

Landscape Improvement and Maintenance Item Costs

Itemized breakdown of costs related to the removal of existing turf grass, installation costs related to new turf sod, decomposed granite and synthetic turf. Maintenance costs are annual expenditures for turf irrigation water, turf grass maintenance (mowing, fertilizers, repairs, etc.) and maintenance for a synthetic turf field (labor for brushing, grooming, decompaction and repairs of turf, and material costs for additional infill material as needed). The costs shown are for budget estimation, actual improvement costs may vary.

<u>Item:</u>	<u>Cost per Square Foot</u>	<u>Cost per Acre</u>
Demolition Cost (remove irrigation and sod)	\$0.45	\$19,602
Turf Sod Installation Cost (soil prep & sod)	\$2.15	\$93,654
Decomposed Granite Installation Cost	\$7.00	\$304,920
Synthetic Turf Installation Cost	\$19.00	\$827,640
Annual Turf Irrigation Water Cost	\$0.101	\$4,400
Annual Turf Maintenance Cost	\$0.381	\$16,600
Annual Synthetic Turf Maintenance Cost	\$0.119	\$5,200

Appendix B

Synthetic Turf Guide



Synthetic Turf 360°

A Guide for Today's Synthetic Turf



Synthetic Turf 360°

A Guide for Today's Synthetic Turf

2011

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Why Synthetic Turf?

There are many reasons why synthetic turf has become so popular.

A heightened sense of environmental awareness prompts interest in its ability to conserve billions of gallons of water each year. Increased user requirements and intense competition have given rise to a new generation of synthetic turf systems that replicate the look and playability of natural, lush grass.

Athletes enjoy significantly more playing time without the need for resource-intensive maintenance. Homeowners, businesses, parks, municipalities and government entities use synthetic grass as an attractive landscape solution that saves time, money and water.

The Synthetic Turf Council (STC) created this guide to showcase the numerous uses and benefits of synthetic turf. It features information about athletic fields and the growing landscape and recreation category, which includes parks, playgrounds, homes, businesses, golf courses and more.



Athletic Fields

Popular, versatile solution

At the beginning of 2011, more than 6,000 synthetic turf fields were being used in North America by a growing number of high school and collegiate athletes playing and practicing football, soccer, hockey, baseball, rugby, lacrosse and many other sports.

About half of all NFL teams currently play their games on synthetic turf and, since 2003, over 70 FIFA U-17 and U-20 World Cup matches have been played on synthetic turf soccer fields.



Significant environmental benefits

Depending on the region of the country, one full-size synthetic turf sports field saves 500,000 to 1,000,000 gallons of water each year. During 2010, between 3 billion and 6 billion gallons of water were conserved through its use. According to the EPA, the average American family of four uses 400 gallons of water a day.¹ Therefore, a savings of 3 billion to 6 billion gallons of water equates to the annual water usage of over 20,000 to 40,000 average American families of four.

For a multi-use field in Texas, where there is little rain, the water savings is much greater. School officials with the El Paso Independent School District stated that their 10 new synthetic turf sports fields will save more than 80 million gallons of water every year, or 8 million gallons of water per field.



The estimated amount of synthetic turf currently installed has eliminated the need for nearly a billion pounds of harmful pesticides and fertilizers, which has significant health and environmental implications.

Example:

In a July 7, 2007, article entitled "Grass Warfare," the Wall Street Journal states, "The pesticides used in lawn-care products found on shelves nationwide are considered legal by government standards. But broader research on health risks from such chemicals has prompted general warnings. The EPA, which regulates pesticide use, notes on its own website that kids are at greater peril from pesticides because their internal organs and immune systems are developing."²

According to the North Carolina Department of Environment and Natural Resources polluted storm water run-off is the No. 1 cause of water pollution in their state, with common examples including over-fertilizing lawns and excessive pesticide use.³

The EPA has identified run-off of toxic pesticides and fertilizers as a principal cause of water pollution. According to that federal agency, approximately 375,000 acres of lakes, 1,900 miles of rivers and streams and 550 square miles of estuaries in Florida are known to be impaired by nutrient pollution, a primary source of which is excess fertilizer.⁴

¹ WaterSense, an EPA publication, www.epa.gov/watersense/pubs/indoor.html

² Gwendolyn Bounds, "Grass Warfare" (Wall Street Journal, July 7, 2007)

³ Stormwater FAQs, (North Carolina Department of Environment and Natural Resources website)

⁴ Public Q&A Index - Florida (EPA website)



Most of the 6,000-plus synthetic turf sports fields in use today use crumb rubber infill recycled from used tires, keeping more than 105 million tires out of landfills.

Synthetic turf helps reduce noxious emissions.

According to the EPA, "lawn mowers emit high levels of carbon monoxide, a poisonous gas, as well as hydrocarbons and nitrogen oxides that contribute to the formation of ground level ozone, a noxious pollutant that impairs lung function, inhibits plant growth and is a key ingredient of smog."⁵ The EPA also reports that a push mower emits as much pollution in one hour as 11 cars and a riding mower emits as much as 34 cars.⁶

In 2010, a BASF Corporation Eco-Efficiency Analysis, which compared synthetic turf athletic fields with professionally installed and maintained grass alternatives, concluded that synthetic turf can lower consumption of energy and raw materials and generation of solid waste depending on field usage. BASF also found that the average life-cycle costs over 20 years of a natural grass field are 15 percent higher than the synthetic turf alternatives.

A synthetic turf company and STC member has forged a recycling partnership with Yellowstone National Park to divert nearly 300 million plastic bottles from landfills each year. The plastic bottles will be recycled into select synthetic turf products and backing for carpet.

Using synthetic turf can help environmentally conscious builders and specifiers with LEED[®] (Leadership in Energy and Environmental Design) project certification from the U.S. Green Building Council in the areas of Water Efficient Landscaping, Recycled Content, Rapidly Renewable Material and Innovation in Design.



"With synthetic turf, we use a lot less water. It used to be 3 million gallons of water each year with regular grass and now we probably use a tenth of that amount."

— Bob Sube, Director of Facilities and Construction, Fillmore Unified School District, California

⁵ Your Yard and Clean Air, EPA Office of Mobile Sources, (Fact Sheet OMS-19, May 1996)
⁶ Small Engine Rule to Bring Big Emissions Cuts, (EPA News Release, April 17, 2007)

Increased playing time and safety

Synthetic turf can be utilized around 3,000 hours per year with no “rest” required, more than three times that of natural grass. This creates increased practice and play time as well as the valuable flexibility to use your field for other events. The opportunity to be active and participate in sports is critical for the fitness, mental health, self-esteem and leadership development of youth.

It is a smart solution for playing fields that have become unsafe from overuse or severe climatic conditions. A grass field simply cannot remain lush and resilient if it is used more than three to four days a week, in the rain, or during months when grass doesn’t grow. Rain-outs are eliminated since highly permeable synthetic turf quickly drains excess water off the field.

Made with resilient materials for safety, synthetic turf sports fields provide a uniform and consistent playing surface.



Traction, rotation and slip resistance, surface abrasion and stability meet the rigorous requirements of the most respected sports leagues and federations. Some of the published studies of the comparative safety of synthetic turf include:

- A 2004 NCAA study among schools nationwide comparing injury rates between natural and synthetic turf; the injury rate during practice was 4.4% on natural turf, and 3.5% on synthetic turf.
- An analysis by FIFA’s Medical Assessment and Research Centre of the incidence and severity of injuries sustained on grass and synthetic turf during two FIFA U-17 World Championships. According to FIFA, “The research showed that there was very little difference in the incidence, nature and causes of injuries observed during games played on artificial turf compared with those played on grass.”⁷

- Three 2010 long-term studies published by researchers from Norway and Sweden comparing acute injuries on synthetic turf and grass. The studies examined the type, location and severity of injuries sustained by hundreds of players during thousands of hours of matches and training over a four-to-five-year period. Many types of acute injuries to men and women soccer players, particularly knee injury, ankle sprain, muscle strains, concussions, MCL tears and fractures were evaluated. The researchers concluded that the injury risk of playing on artificial turf is no greater than playing on natural grass.⁸

These studies and many more, including the FIFA comparative results of its exhaustive research, are posted on the Synthetic Turf Council’s website under Research & Latest Thinking.

⁷ “Very Positive Medical Research on Artificial Turf” (Turf Roots Magazine 01, pp. 8-10, FIFA)

⁸ Bjørneboe J, Bahr R, Andersen TE (2010) Risk of injury on third generation artificial turf in Norwegian professional football. *British Journal of Sports Medicine*, 44: 794-798. Ekstrand J, Häggglund M, Fuller CW (2010) Comparison of injuries sustained on artificial turf and grass by male and female elite football players. *Scandinavian Journal of Medicine and Science in Sports*, DOI: 10.1111/j.1600-0838.2010.01118.x

Soligard T, Bahr R, Andersen TE (2010) Injury risk on artificial turf and grass in youth tournament football. *Scandinavian Journal of Medicine and Science in Sports*, DOI: 10.1111/j.1600-0838.2010.01174.x

Cost-effectiveness

According to Cory Jenner, a landscape architecture professional in Syracuse, N.Y., the cost of installing and maintaining a synthetic turf sports field over a 20-year period (including one replacement field) is over three times less expensive per event than the cost of a grass field over the same period of time. This is because many more events can be held on a synthetic turf sports field. This cost-per-event advantage is validated by other authorities and field owners.



Because synthetic turf can withstand so much wear and tear, many schools rent their fields to local sports teams and organizations to bring in extra funding. At Cincinnati's Turpin High School, the field is rented 80 percent of the evenings between January and October — raising \$40,000/year for the last two years from rental fees.

"The synthetic field completely revolutionized our sports program. We now have a multi-dimensional facility with activities scheduled year-round, nearly around the clock. Along with football, Newman Field now hosts an incredible range of activities — intramural sports, lacrosse sports, lacrosse playoffs, soccer leagues, local high school events, such as sports camps, cheerleading competitions and much more."

— Rob Coleman, Athletic Director, Whittier College, California

Landscape and Recreation

Various applications

Beautifully landscaped synthetic turf can often be installed in places where grass can't grow or be effectively maintained.

Applications include:

- Airport grounds
- Businesses/commercial developments
- Golf courses
- Highway medians
- Homes/residential communities
- Municipalities
- Parklands
- Pet parks
- Playgrounds
- Rooftops
- Tennis courts
- Closed landfills



Closed Landfill

Eco-friendly solution

From Disneyland and the Wynn Hotel to the Twentynine Palms Marine Corps Base and your neighbor's yard, thousands of homes, businesses, golf courses and public spaces have turned to synthetic grass to provide a lush, attractive landscape solution that requires minimal resources and maintenance.

Water conservation is a necessity. In March 2011, Wharton published a report about the growing scarcity of water. It references a prediction by the 2030 Water Resources Group that by 2030 global water requirements will be "a full 40 percent above the current accessible, reliable supply." Further, less than 3 percent of all available water is fresh and drinkable. Underground aquifers hold almost all the potable water available in liquid form, and their rate of depletion more than doubled between 1960 and 2000.⁹ Yet, the EPA states that nationwide landscape irrigation is estimated to account for almost one-third of all residential water use, totaling more than 7 billion gallons per day.¹⁰

Synthetic turf promotes greater utilization of land, as you can do more with the same space surfaced with synthetic turf than with natural grass. Rooftops once deemed unusable for high-rises and residential buildings can now feature inviting green areas. Hotels that had to restrict the use of the lawns for parties and events can now schedule as many functions as they can book.

The Southern Nevada Water Authority estimates that every square foot of natural grass replaced saves 55 gallons of water per year.¹¹ If an average lawn is 1,800 square feet, then Las Vegas homeowners with synthetic turf could save 99,000 gallons of water each year or about \$400 annually. In Atlanta, homeowners could save \$715 a year, not including much higher sewer charges.

In its report, "Municipal Solid Waste in the United States, 2009 Facts and Figures," the EPA estimates that 33.2 million tons of yard trimmings were generated in 2009, the third largest component of Municipal Solid Waste in landfills.¹² As yard trimmings decompose, they generate methane gas, an explosive greenhouse gas and acidic leachate.¹³

A June 2008 National Public Radio report called "Water-Thirsty Golf Courses Need to Go Green" reported "Audubon International estimates that the average American golf course uses 312,000 gallons of water per day. In a place like Palm Springs, where 57 golf courses challenge the desert, each course eats up a million gallons a day. That is, each course each day in Palm Springs consumes as much water as an American family of four uses in four years."¹⁴

Impermeable synthetic turf is being used as an economical and environmentally effective solution for the closure of landfills, mine spoils and hazardous sites. Among the many reasons: it provides a perennially green landscape cover; dramatically reduces construction and long-term maintenance costs; improves stability; prevents erosion; controls gas and odor; and reduces leachate.

"The inclusion of synthetic grass in our landscape has proven to be a smart choice for the resort and Mother Earth. Since the conversion, we are able to accommodate increased capacity and utilize a greater percentage of grassy areas, while providing an enhanced event experience, without damaging the grass. This year, there will be 8 million gallons of water conserved and our new synthetic lawn allows us to eliminate the use of fertilizers, pesticides and herbicides on ground in close proximity to the beach."

— Rodrigo A. Carrillo, Project Manager,
Fontainebleau Hotel, Miami Beach, Fla.

⁹ "Valuing Water: How Can Businesses Manage the Coming Scarcity?" (Wharton School of the University of Pennsylvania, March 2011)

¹⁰ Outdoor Water Use in the United States, (EPA-832-F-06-005, August 2008)

¹¹ Water Smart Landscapes Rebate (Southern Nevada Water Authority website)

¹² "Municipal Solid Waste in the United States, 2009 Facts and Figures," (EPA Office of Solid Waste, EPA530-R-10-012, December 2010)

¹³ Frequent Questions about Yard Trimmings, (EPA website, December 2010)

¹⁴ Frank Deford, "Water-Thirsty Golf Courses Need to Go Green," (National Public Radio, June 11, 2008)

Saves money

A growing number of tax credits and rebates are available since synthetic turf conserves water. For example, the Central Basin Municipal Water District in California reports that Golden State Water Company customers replacing their irrigated areas with synthetic turf can save \$1 per square foot, up to a \$1,000 rebate.

Many public spaces, from government grounds and highway medians to airport entrances, are turning to synthetic grass for appealing, water-saving landscape solutions that reduce operating and maintenance expenditures.



Rooftop Garden

Promotes accessibility

Play areas are among the public spaces covered by the Americans with Disabilities Act. The 2010 Standards for Accessible Design (Sections 240, 1008) addresses play areas designed, constructed and altered for children ages 2 and over in a variety of settings, including parks, schools, childcare facilities, shopping centers and public gathering areas. According to the standards, “the surfaces that are universally accessible and go beyond ADA to be actually usable for children with disabilities include artificial grass with rubber underneath. The benefit of these surfaces besides the accessibility is the maintenance. You do not need to do daily maintenance to ensure that safety is maintained.”¹⁵

Making recreation for the disabled as inclusive as possible is a growing priority. “Inclusive recreation is one of the fastest growing needs in more and more parks and recreation agencies across the United States,” said Elizabeth Kessler, 2009-2010 National Recreation and Park Association president, during the 11th annual National Institute on Recreation Inclusion conference in November 2010.

Synthetic turf creates more recreation opportunities for people with disabilities and physical challenges. Wheelchairs roll easily and crutches won’t sink into park and landscape surfaces, like those used by the Miracle League nationwide to help youth with physical disabilities play baseball.

Many retirement communities use extensive amounts of synthetic turf for landscaping to assist residents with mobility challenges. People using wheelchairs, canes or walkers can easily move across the turf. Because they are easy to maintain, synthetic turf surfaces also offer seniors the beauty of a decorative lawn without the expense, labor and time of weekly yard work during much of the year.



“Our new artificial lawn helps keep the dogs and the facility clean and the yard will be better for people in wheelchairs to use when practicing with their dogs. We are so thankful to have this big improvement.”

— Mo Maurer, founder and owner of Hawaii Canines for Independence

¹⁵ Fact Sheet, Adoption of the 2010 Standards for Accessible Design (ADA website)

Promotes safety and security

Local communities need accessible, versatile play surfaces for its youth and people of all ages. Parks and playgrounds that use synthetic turf allow kids to be active year-round on safe and resilient sports surfaces.

With synthetic turf, kids and parents don't have to worry about mildew and bacteria from wet mulch, allergies associated with natural grasses or other potential health irritants.

Owners of second homes that landscape with synthetic turf don't need a lawn maintenance crew that may be tempted by a vacant home.

"In 2009 the City of Lakeland opened Common Ground, our first inclusive playground featuring unique play experiences for children of varying physical and cognitive abilities. We utilized synthetic turf to cover over 25,000 square feet of play zones to connect our barrier free play elements. The surface creates the natural looking green environment so critical to our design, provides barrier free safety fall zones that protect our children, drains almost instantly even after a tropical torrential rain and it remains cooler than other safety surface options. Maximizing our children's outdoor play time, Common Ground is a community dream come true."

— Pam Page, Assistant Director of Parks & Recreation, City of Lakeland Parks & Recreation Department, Lakeland, Fla.



Common Ground Park, Lakeland, Florida



Community and lifestyle enhancement

By making continuous and safe play possible, synthetic turf promotes a healthy lifestyle, which enhances community well-being. It also helps increase childhood fitness, an important objective of the "Let's Move!" program championed by First Lady Michelle Obama, and the NFL's "Play 60" campaign.

Synthetic grass creates low-maintenance, pet-friendly lawns that keep man's best friend safe and healthy while controlling odors.

Homeowners remove the headaches of ongoing lawn care, adding more leisure time back into their already busy lives.



Synthetic turf can come in many colors, like the orange, blue and yellow grass at the Sunflower Preschool Playground at Barnett Family Park in Lakeland, Florida.



Pixie Hollow Fairy Garden, 2011 Epcot International Flower and Garden Festival, Disney World, Orlando, Florida



Ready to get started with synthetic turf?
Visit our [Online Buyers Guide and Member Directory at www.syntheticurfCouncil.org](http://www.syntheticurfCouncil.org).

THE SCIENCE BEHIND THE SURFACE

shaw
SPORTS TURF

WHAT IS GEOFILL?

Geofill is an organic material primarily composed of coconut husks and fibers. This completely natural material is the leading alternative infill in the synthetic turf market. Coconut fibers are 100% organic and are a rapidly renewable resource. They also have excellent water retention qualities, this helps keep surfaces cooler. The presence of water in Geofill has been shown to keep synthetic turf fields up to 40 degrees cooler.

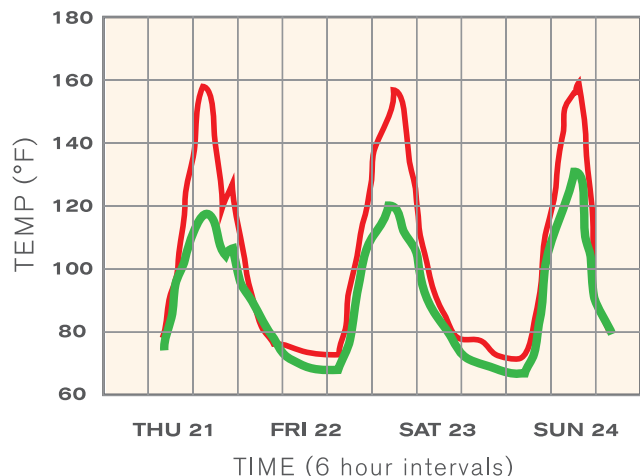
HOW DOES GEOFILL KEEP YOUR SURFACE COOL?

Geofill uses a process known as evaporative cooling to keep surfaces cooler. Evaporative cooling is the process in which liquid evaporates, decreasing the temperature of the surface. For example, when athletes sweat moisture evaporates from the surface of their skin causing a cooling effect, which regulates body temperature.

Heat and evaporation are key components to understanding the evaporative cooling process. Water can hold a lot of heat, the heat stored in water is known as latent heat. As water absorbs enough heat, it changes from liquid to gas, it evaporates. When it leaves the surface as gas it takes the heat with it, resulting in decreased surface temperature.

Geofill uses its water retention capabilities and the evaporative cooling process to create a cooler more comfortable playing surface for athletes. As the intensity of the sun increases, the amount of water evaporating in Geofill increases, this causes more of the cooling effect to take place.

STANDARD RUBBER & HYDRATED ORGANIC INFILL OVER THREE DAYS



- When compared to crumb rubber infilled fields, fields with Geofill have been seen to be 40° F cooler than traditional synthetic turf fields.
- Geofill does not absorb energy like other synthetic alternative fields, therefore it is naturally cooler. Other composite or synthetic alternatives cannot provide the cooling effect that Geofill can.

OTHER BENEFITS TO GEOFILL

Geofill's water retention and cooling capabilities also help to maximize your water resources. Geofill systems are the only infill systems that are capable of holding 6 to 8 times its weight in moisture. This means Geofill's water retention and cooling capabilities help to maximize your water resources and reduce your heat footprint.

While fields containing Geofill have the same natural ability to absorb and release moisture like natural soils and grass, Geofill does not require watering every day. In fact, many fields with Geofill rely solely on natural hydration to keep the fields biomechanical performance metrics at peak levels. For those who demand the highest performing surfaces on gameday, irrigation systems can be added to the design of the field, providing unmatched performance and a natural feeling only found on professional grass fields. Water savings from using Geofill will also reduce the cost of maintenance.

