September 25, 2024

Town of Bristol
Attn: Community Development Department
235 High Street - 1st Floor
Bristol, RI 02809

Re: **Master Plan – Supplemental Information**
Mt. Hope High School
199 Chestnut Street
Bristol, RI
(Pare Project No. 23099.01)

Dear Members of the Planning Board:

On behalf of the Bristol Warren Regional School District (BWRSD), Pare Corporation is pleased to submit the supplemental information requested by the Planning Board during the September 12, 2024 Planning Board Meeting. BWRSD seeks Master Plan approval for the Mt. Hope High School (Mt. Hope) project, which includes demolition of the existing building and the construction of a new high school. The supplemental information consists of the following:

- Twelve (12) copies of the revised Master Plan sheets (11"x17")
- Twelve (12) copies of the Supplemental Information Documents
  - Attachment 1 - Parking Data prepared by PMA Consultants
  - Attachment 2 - Event Parking Figure prepared by Pare Corporation
  - Attachment 3 - Additional Irrigation, Well System Design and State Permitting Letter prepared by Aqueous Consultants
  - Attachment 4 - Rainwater Harvesting Memorandum prepared by Traverse Landscape Architects
  - Attachment 5 - Synthetic Turf Memorandum prepared by Traverse Landscape Architects

On September 12, 2024 the Mt. Hope High School project was presented to the Planning Board. Please see the responses below to answer the questions raised during the Planning Board Meeting.

OFF-STREET PARKING
In response to concerns regarding the proposed 240 off-street parking spaces, the revised Master Plan Sheet C3.0 proposes 248 parking spaces. The existing high school has 281 parking spaces. BWRSD has determined that 248 parking spaces satisfies the future high school needs for the school day by providing parking spaces for the 122 staff members, 10 visitors and 116 students who are permitted to park on site. BWRSD anticipates the Master Plan will provide adequate parking spaces for the high school's operations and special events. Supplemental information to support the number of proposed parking spaces is included below:

- The Owner's Representative performed two field reviews to note available on-site parking. Attachment 1 summarizes the parking data collected by the Owner's Representative on 09/13/2024 at 10:45AM and 09/19/2024 at 11:00AM.

- In an effort to reduce impervious surface, meet the Rhode Island Department of Education (RIDE) standards, and provide adequate parking distribution around the site, BWRSD determined that the 248 parking spaces is adequate for the operations of the school during the school day and special events.

- Per the Code of Ordinance section 28-252.c, the high school is required to have a minimum of 226 off-site parking spaces. Per the Town of Bristol Code of Ordinance section 28-252.a "the maximum number of off-street parking spaces allowed for any lot or use shall not exceed ten percent". Based on section 28-252.a the maximum parking spaces is 248 off-street parking spaces. The Master Plan is revised depicting an additional 8 parking spaces to be at the maximum capacity for the site per the Code of Ordinance.

- Attachment 2, presented in the Planning Board meeting on September 12, 2024, depicts the off-street parking available for the variety of anticipated athletic and cultural events.

- During events, additional parking is available on Chestnut Street and within a gravel lot at Paull Park. These two locations offer the public an additional 100 parking spaces.

FLOODPLAIN

The Master Plan dated September 4, 2024 depicts the limits of the regulatory floodplain as defined within the FIRM Panel xxx dated July 7, 2014. The Planning Board requested the design team confirm this is the latest available flood plain information and explore other published flood studies to determine whether additional information is available for use during the design.

- The flood limits depicted on the Master Plan, taken from FIRM Panel No. 44001C0014H, represent the latest available flood mapping and applicable per the Town of Bristol Code of Ordinances. Per the Town of Bristol Code of Ordinance Section 28-302 and Section 29-303 on "Developments in Areas of Special Flood Hazards" defines the applicable flood boundary as "the official map of a community on which the Federal Emergency Management Agency (FEMA) has delineated the limits of the regulatory floodway and 100-year floodplain". The FEMA effective floodplain map (Panel No. 44001C0014H) is the regulatory limit issued by FEMA and adopted by the Town of Bristol as defined as "the official map of a community on which the Federal Emergency Management Agency (FEMA) has delineated both the special flood hazard areas (100-year floodplain) and the insurance risk premium zones applicable to a community." The limits adopted by the Town on July 7, 2014 were established and published in the 2014 Flood Insurance Study (FIS) which is defined in section 29-303 as "the official study of a community in which the Federal Emergency Management Agency (FEMA) has conducted a technical engineering evaluation and determination of local flood hazards, flood profiles and water surface elevations. The flood insurance rate maps (FIRM), which accompany the FIS, provide both flood insurance rate zones and base flood elevations, and may provide the regulatory floodway limits."

- Pare contacted BETA Engineering (BETA) on September 20, 2024 regarding the 2007 Silver Creek Drainage Study. Per BETA, the Study did not include submitting a Letter of Map Revision to FEMA for the Silver Creek Watershed or updated floodplain limits at the Mt. Hope property. The study provides a one-dimensional, steady-state HECRAS model developed to identify potential hydraulic restrictions along Silver Creek. The Study does not include information that would supersede the FEMA Flood Mapping depicted in the Master Plan.

- The Design Team reached out to Shelia Warren from the U.S. Army Corps of Engineers (USACE) New England District regarding the Floodplain Management Services Program's special study of the Silver Creek Watershed. In correspondence on 09/20/2024, the USACE stated they recently began the project and will share preliminary data if available. At this time, the Study does not include information that would supersede the FEMA Flood Mapping depicted in the Master Plan.

The project proposes to remove the existing building from the floodplain and build the new high school outside of the floodplain. By removing the building from the floodplain this will reduce the risk of property damage for BWRSD, improve site conditions for community members and provide a more resilient design for a community building.

The development proposed within the floodplain will result in no net loss of storage volume within the floodplain. Currently 12,700 SF of the baseball field is proposed within the existing floodplain. Compensatory storage will be provided to ensure no volume capacity is lost within the floodplain. Grades within the floodplain will be provided at the Preliminary Plan Submission.

STORMWATER MANAGEMENT

The proposed development depicted on the Master Plan will significantly improve the quality of stormwater management discharged from this site and will result in improvements to the Silver Creek Watershed. The existing conditions include large impervious parking areas with no water quality treatment, limited groundwater recharge, and minimal peak flow mitigation. There is one stormwater best management practice, a detention basin, designed to manage peak flows for the drainage patterns to the west of the site. Currently stormwater discharged from the eastern portion of the site flows directly to Silver Creek. The proposed conditions will significantly improve stormwater quality, reduce peak flow, and manage runoff volume up to the 10-year storm as required by the Town of Bristol's Subdivision and Development Review Regulations for the Silver Creek Watershed through the following:

- Providing water quality treatment for impervious surfaces, including roof, parking areas, walks track, and synthetic turf field. This will be a great benefit to the health of Silver Creek and the natural resources by removing pollutants.
- Providing groundwater recharge through filtering best management practices (BMPs) and underground infiltration chambers. Infiltrating stormwater runoff where possible will reduce runoff volume discharged to Silver Creek and be a great benefit to the project site by infiltrating stormwater runoff to help remove stormwater volume.
- Providing peak flow mitigation through BMP's that will hold water during storm events and slowly release over time. Attenuating peak flows will be achieved using BMPs such as detention basins, gravel wet vegetated treatment systems, and underground infiltration systems.

All new stormwater collection, storage, and treatment systems will be designed and constructed in accordance with the State of Rhode Island Storm Water Design and Installation Standards Manual (RISDISM) prepared by the Rhode Island Department of Environmental Management (RIDEM) dated December 2010 and amended March 2015 and the Town of Bristol's Subdivision and Development Review Regulations section F.2.I.2.e "To the maximum extent practicable as agreed upon by the Planning Board Engineer and the applicant's engineer, any increase in storm runoff volume, up to and including the 10-year storm event, shall be retained and recharged on site as close as feasible to its place of origin by

means of detention ponds or basins, seepage areas, subsurface drains, porous paving, or similar low impact design techniques. This shall be required within the Tanyard Brook and Silver Creek watersheds and encouraged to the extent practicable in other areas of Bristol."

The Master Plan is revised depicting a large underground infiltration system comprised of chambers, pipe, and crushed stone that will store and slowly infiltrate stormwater into the underlying soils. The underground infiltration system, combined with infiltration in other BMP's, will result in no increase to runoff volume in the 10-year design storm.

The Design Team revised the Master Plan with reduced impervious surfaces to help mitigate concerns regarding stormwater runoff. The reduction is achieved by reducing sidewalk widths, providing compact parking spaces where allowed by the Town of Bristol Code of Ordinances, and minimizing pavement where feasible.

PUBLIC OUTREACH

Since Fall 2023, BWRSD implemented various methods of community outreach, engagement and meetings with neighboring properties. Below is a list of past meetings that allowed abutters and community members opportunities to learn about the progress of the Mt. Hope High School project and discuss concerns.

- Community Forum I – October 2, 2023
- Abutters Meeting I – October 11, 2023
- Community Forum II – November 1, 2023
- Public Meeting – September 12, 2024
- PMA Consultants Property walk – September 13, 2024
- Abutters Meeting II – September 16, 2024

During the Community Forums and Abutter's Meeting , abutters voiced concerns with floodplain management, stormwater management, construction activities, and site feature locations. BWRSD, with the support of the Design Team, will continue the public outreach effort. The Master Plan reflects the concerns of the abutters at this level of design. Following Master Plan, more details regarding the stormwater management system will be available to support more specific discussions.

On behalf of BWRSD, we would like to request a Technical Review Committee meeting on October 2, 2024 to discuss the project and supplemental information provided in more detail. Should you have any questions or require additional information, please feel free to contact our office at (401) 334-4100.

Sincerely,

David L. Potter, P.E.
Vice President

DLP/ACB/dp

Attachments

Bristol Warren Regional School District

MT. HOPE HIGH SCHOOL

Attachment 1

Parking Data prepared by PMA Consultants

Data point #2:

9/19/24 @ ~11:00AM

107 vacant spaces, (74 student + 33 teacher)

Chad Crittenden
PMA Consultants
p: 781.519.1076

From: Chad Crittenden <ccrittenden@pmaconsultants.com>
Sent: Friday, September 13, 2024 12:22 PM
To: Lisa Pecora <L.Pecora@perkinseastman.com>; Joe Drown <j.drown@perkinseastman.com>; David Potter <DPotter@parecorp.com>; Annelise Boylan <aboylan@parecorp.com>; 'Kris Bradner' <kbradner@traversela.com>
Cc: Bristol Warren <BristolWarren@pmaconsultants.com>
Subject: BWRSD - MHHS Parking Counts

9/13/24 @ ~10:45AM

Photos/data from this morning courtesy of Chris Loeffler

84 vacant spaces, (63 student + 21 teacher)

Chad Crittenden
Managing Director

PMA Consultants
35 Braintree Hill Office Park, Suite 300
Braintree, MA 02184
p: 781.519.1076 | f: 781.794.1405
www.pmaconsultants.com

1PG 186

STOP

SANTA FE
3.5L
Rhode Island
EG 38
Ocean State

Bristol Warren Regional School District

MT. HOPE HIGH SCHOOL

Attachment 2

Event Parking Figure prepared by Pare Corporation

Event Parking Figure

Special Event Parking Table

Special Event Use	Seats	Parking Rate	Unit	Total Parking Spaces	Source
Theater	402	0.33	per seat	133	Bristol Zoning Ordinance 28-252 (theater and auditorium)
Football Bleachers*	1446	0.2	per seat	290	Bristol Zoning Ordinance 28-252 (outdoor recreation facility)
Baseball Bleachers	150	0.2	per seat	30	Bristol Zoning Ordinance 28-252 (outdoor recreation facility)
Softball Bleachers	150	0.2	per seat	30	Bristol Zoning Ordinance 28-252 (outdoor recreation facility)
Gym (basketball)	456	0.2	per person	92	Bristol Zoning Ordinance 28-252 (outdoor recreation facility)
Gym (graduation)	960	0.33	per seat	317	Bristol Zoning Ordinance 28-252 (theater and auditorium)

*Actual capacity of bleachers is to be determined as Athletic Field design progresses

PARKING SUMMARY			
	REQUIRED**	EXISTING	PROVIDED
STANDARD SPACES (10'x18')	219	275	236***
ACCESSIBLE SPACES*	7	6	12
TOTAL SPACES	226	281	248

* ADA REQUIREMENTS FOR PARKING LOT: 201 TO 300 TOTAL SPACES = 7 ADA SPACES

** PARKING SPACES REQUIRED BY ZONING ORDINANCE:
"HIGH SCHOOL": ONE PER EIGHT STUDENTS AND ONE PER EMPLOYEE
THE REQUIRED PARKING PER THE CODE OF ORDINANCES:
SCHOOL (832 STUDENTS) 104 SPACES
EMPLOYEES 102 SPACES
TOTAL REQUIRED SPACES = 206 SPACES
MAXIMUM NUMBER OF PARKING SPACES ALLOWED:
206 PARKING SPACES + (206 PARKING SPACES x 10%) = 248 PARKING SPACES

*** PER SECTION 28-251.2.C OF THE CODE OF ORDINANCES, UP TO 25% OF THE TOTAL PARKING SPACES WILL BE SIZED FOR SMALL CAR PARKING SPACES WITH PROPER SIGNAGE

NOTE: THERE ARE AN ESTIMATED 88 ONSTREET PARKING SPACES ALONG THE PROPERTY FRONTAGE ON CHESTNUT STREET

MULTI PURPOSE FIELD
30

PRACTICE FIELD
10

SOFTBALL FIELD
30

DUMPSTER AREA
38

SERVICE AREA

BUS QUEUE
73

GYMNASIUM
92

PARENT DROP-OFF / PICK-UP AREA
82

BUS DROP-OFF / PICK-UP AREA

AUDITORIUM
133

MULTI PURPOSE FOOTBALL/SOCCER TRACK AND FIELD
290

PARENT QUEUE

PARENT ENTRANCE
17

TENNIS COURT
16

BUS ENTRANCE
38

LOAM AND SEED FOLLOWING REMOVAL OF THE BUILDING AND FOUNDATIONS

BASEBALL FIELD
30

LOD/CFS

CHESTNUT STREET

LEGEND

XX = ESTIMATED MAXIMUM NUMBER OF PARKING SPACES

(XX) = PARKING SPACES PROVIDED

88 ON STREET PARKING SPACES ON CHESTNUT STREET ALONG MT. HOPE HIGH SCHOOL PARCEL LIMITS

GRAVEL LOT IN PAULL PARK APPROXIMATELY 12 SPACES

Scale: 1"=60'
0 30' 60' 120'

PARE

OWNER/APPLICANT:
BRISTOL WARREN REGIONAL SCHOOL DISTRICT
235 HIGH STREET
BRISTOL, RI 02809
401-253-4000

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING

MT. HOPE HIGH SCHOOL
199 Chestnut Street
ASSESSOR'S PLAT 117, LOTS 3, 4, 5, 6, & 7
Bristol, Rhode Island

REVISIONS:

1	9-04-2024	MASTER PLAN REV
2	~~09-25-2024~~	**MASTER PLAN REV**

PROJECT NO.:	23099.01
DATE:	AUGUST 2, 2024
SCALE:	1"=60'
DESIGNED BY:	ACB
CHECKED BY:	
DRAWN BY:	AKL
APPROVED BY:	

DRAWING TITLE:
OVERALL CONCEPT PLAN

DRAWING NO.:
C3.0

SHEET NO. 5 OF 10

Bristol Warren Regional School District

MT. HOPE HIGH SCHOOL

Attachment 3

Additional Irrigation, Well System Design and State Permitting Letter prepared by Aqueous Consultants

September 19, 2024

Traverse Landscape Architects, Inc.
150 Chestnut Street, 4th Floor
Providence, RI, 02903

RE: Additional Irrigation, Well System Design and State Permitting
Mount Hope High School, Bristol, RI

Please allow this memorandum to briefly outline what Aqueous believes is necessary to achieve a permit and functioning well to supply an irrigation water supply for Mount Hope High School:

- Preliminary Testing of Already Scheduled Geothermal Well Test Program
  - While the already scheduled geothermal well testing pilot program is in operation, log the drilling borehole to demarcate the varying geological strata and understand the extent of the water bearing sedimentary (sandstone) bedrock aquifer.
  - While rigging is already in place subsequently provide preliminary and rudimentary flow testing to assess the response of the underlying sedimentary (sandstone) aquifer.
  - Take results of logs and tests to prepare for pre-construction meeting with RIDEM.

- Perform Fracture Trace Analysis
  - Provide studies by hydrogeologist (subconsultant to Aqueous) to identify potential well locations for options for Owner and RIDEM to consider.
  - Location of potential wells where fractures in bedrock occur will dictate impact on RIDEM Permitting for Water and Wetlands.
    - Wells Closer to Wetlands may impact dewatering more.
  - Fracture Trace Analyses are not guarantees to find water—drilling, development, and testing are required to estimate flow potential.

- Multiple wells may need to be drilled; however, analysis will rank drilling sites by potential to mitigate some of the unknowns.

- **Pre-Application Meeting with RIDEM for a Water Withdrawal Permit**
  - Permit required for withdrawals more than 10,000 gallons per day
    - Mount Hope High School irrigation will require 40,000 – 5,0000 gallons per day
  - Submit Preliminary Log and Testing Information for RIDEM for review
  - Complement preliminary information with a project and objective narrative
  - Collaborate with LEC (Wetland Permitting) to Identify Potential Impacts to Regulated Areas.
  - Convey to RIDEM that irrigation demand is not the same level of demand as a municipal drinking water supply (which is generally the basis of the regulations).
  - After the meeting, RIDEM gives us the parameters for well design, testing information and data required, and path forward.
  - Design of well and testing program takes place after path forward from RIDEM.

- **Well Drilling and Testing Design**
  - Design for an 8-Inch Irrigation Well based on Fracture Trace Analysis and Comments from RIDEM
  - Design for a 2-inch Monitoring Well in Close Proximity to Wetlands to understand:
    - Impact of drawdown of groundwater table with long-term pumping
    - Responsiveness and yield of aquifer to pumping
  - Design Test Program based on RIDEM Comments
    - Drawdown Test
    - Long-Term (48-Hour) Pump Test
    - Water Quality Test
  - Hire Well Drilling Contractor to Drill Wells and Perform Testing (with Portable/Temporary Power and Temporary Well Pumps).
  - Collect and Analyze Data and Prepare Final Report to RIDEM.
  - RIDEM reviews data and, depending on results, allows desired pumping rate based on internal analysis or allows some percentage of tested flow rate.

- Well Pump, Accumulation/Stormwater Tank, and Irrigation Connection Design
  - In order to meet 100% Construction Documents for Public Bid in January 2025, this work needs to start immediately, taking the chance by designing concurrently while permitting with RIDEM.
  - RIDEM approves the well testing performed and dictates the flow rates allowed, Aqueous can pivot to modify the design accordingly for the drilled 8-inch well.
  - Coordination is required between Aqueous (Irrigation and Wells), Traverse (Landscape Architect and Sports Field Designer), Pare Corporation (Civil/Stormwater Engineer), and Electrical Engineer (Power to Equipment).
  - Drawings, details, and specifications are required for Well Pump System and Accumulation/Stormwater Tank.

In essence, to have a chance of having a well, well pump, and tanking system within the final bid construction document package for the end of January 2025, design work needs to be concurrent with permitting, using some base assumptions. These processes must start **immediately**. After permitting and testing, the design can be modified based upon the results (including total denial of well drilling and pumping–forcing the use of domestic water only).

If you have any questions, please do not hesitate to contact me. We appreciate the opportunity to pursue well water for the irrigation system at Mount Hope High School but want to again stress that much is required to do in a very short period of time before construction bid documents are due.

Sincerely,

Michael Igo, PE, LEED AP, CID
President

Bristol Warren Regional School District

MT. HOPE HIGH SCHOOL

Attachment 4

Rainwater Harvesting Memorandum prepared by Traverse Landscape Architects

TRAVERSE
landscape architects

Memorandum
Project: Mt Hope High School
Subject: Narrative for Rainwater Harvesting
Date: 9/25/2024
To: David Potter, PARE Corporation

This memo has been prepared to provide information to the Technical Review Committee of the Town of Bristol, RI. It is the intent that the information will ultimately be presented at the October 10, 2024 Planning Board Meeting for Master Plan Approval for the new Mt. Hope High School building project.

In addition to the Mt. Hope High School stormwater management design and calculations provided by your office and the irrigation well testing and design provided by our subconsultant Aqueous Consultants; there is another approach that we would like to identify here that can have added value to the project as it relates to water management.

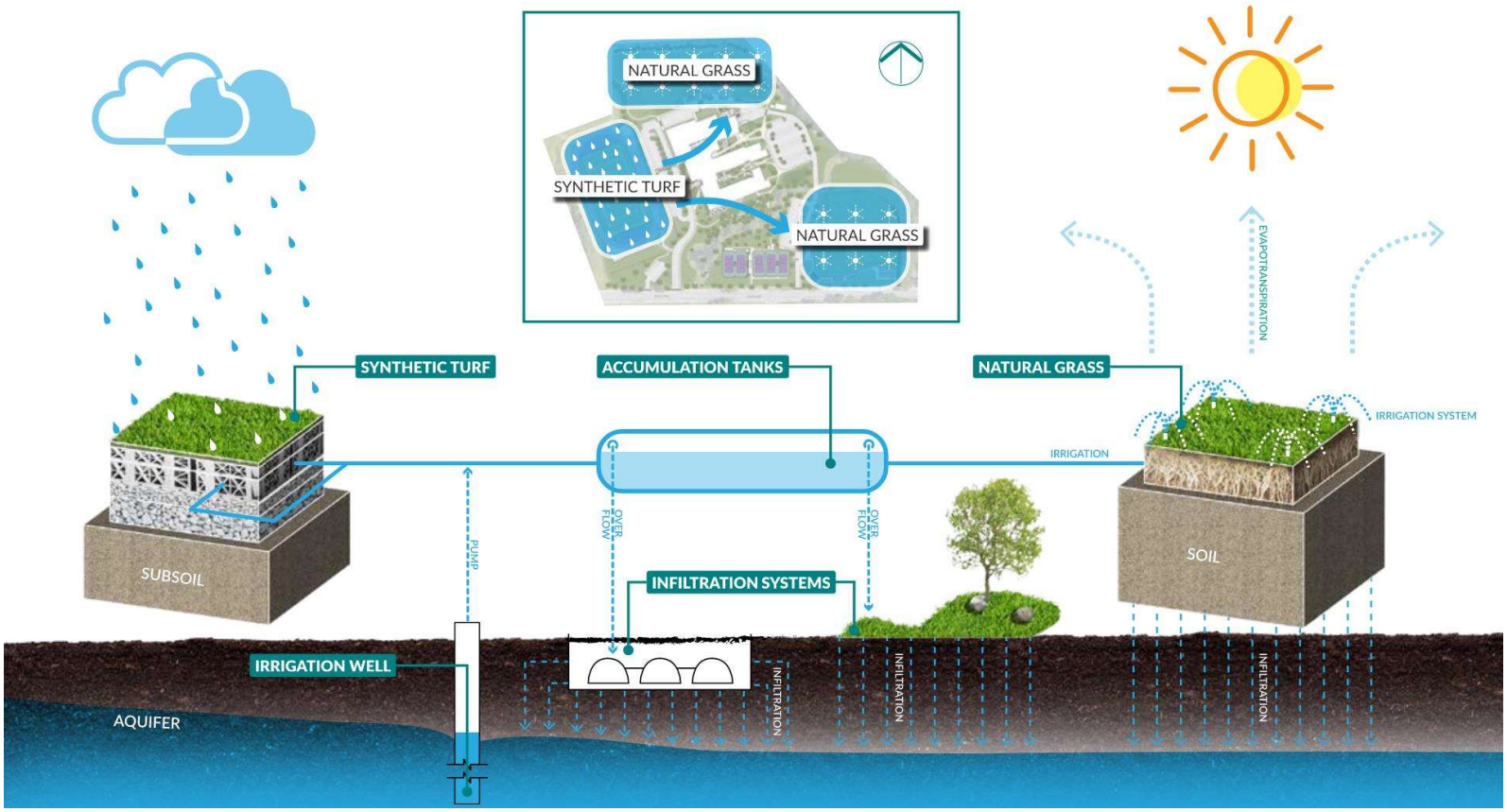
The concept involves harvesting rainwater also referred to as stormwater harvesting for the purpose of re-using or recycling the water for another important need – irrigating the natural turf athletic fields. This concept can provide several important benefits.

1. The Town of Bristol Regulations requires no increase in runoff for a 10-year storm event in the watershed where the project is located. This is a challenging site to infiltrate due to the poorly drained soils observed throughout the site. *Refer to the Master Plan Report provided by PARE Corporation.* Coming up with alternative and innovative solutions to infiltrate can benefit the project. Harvesting the stormwater and reusing it for irrigation allows for disposal and recharge of stormwater at a much more controlled rate across the site.

2. The School District has requested the A/E team to look into testing for and designing a well to pump water from below ground and use for irrigation to take the burden off of the district paying for water through the Bristol Water District. This requires applying for a withdrawal permit and ensuring that harvesting water from below ground will not impact nearby natural resources, wetlands and floodplain, and will not draw in seawater that will be deleterious to turfgrass fields. By harvesting water from rain events, we essentially put less pressure on withdrawing water from below ground.

3. The overarching, two-pronged approach noted above also has other added benefits including environmental and budget resourcefulness as well as meeting the athletic programming needs of the school. These include the following highlights:
    - An accumulation tank(s) will be required to store water and is included in scope for designing an irrigation well. This same tank(s) can be used to store harvested water.
    - There is a potential to reduce the amount of underground infiltration systems needed. **This benefit will not be realized until further design and testing and therefore not included in any permitting application at this time.*
    - On a rainy day, the irrigation system is not used the fields receive free water and the tank accumulates the excessive runoff to use for another day.
    - The synthetic turf field which is the primary rain water harvesting collector allows for over 3,000 annual hours of use, equating to the school being able to support a new field hockey team, can lead to revenue by renting the facility, and other programming needs outlined by the school.

4. The design of this system and all the other water systems noted herein will continue to be studied, tested and evaluated leading up to Preliminary Plan Approval for further review by your team. We greatly appreciate the opportunity to present these concepts that have a benefit to the school project and the community. Below is a graphic representing these systems conceptually.



End Memorandum

Bristol Warren Regional School District

MT. HOPE HIGH SCHOOL

Attachment 5

Synthetic Turf Memorandum prepared by Traverse Landscape Architects

TRAVERSE
landscape architects

Memorandum
Project: Mt Hope High School
Subject: Narrative for Synthetic Turf
Date: 9/25/2024
To: David Potter, PARE Corporation

This memo has been prepared to provide information to the Technical Review Committee of the Town of Bristol, RI. It is the intent that the information will ultimately be presented at the October 10, 2024 Planning Board Meeting for Master Plan Approval for the new Mt. Hope High School building project.

During the September 12, 2024 Planning Board Meeting there were a list of concerns that Board members had regarding the use of synthetic turf for the track and field replacement. Below outlines these items and further explanation. These items were reviewed at a recent School Building Committee as well where a few Planning Board members were present.

1. Concern about synthetic turf having PFAS (per and polyfluoroalkyl substances). The simple answer to this concern is that this project will fall under the laws meeting the State of Rhode Island General Assembly Legislation (2024-H 7356Aaa, 2024-S 2152Aaa). There are manufacturers who are now supplying turf carpet without ingredients containing PFAS responding to nation-wide demand.

2. Concern about metals and other contaminants from infill material leaching into natural resources. The crumb rubber infill, depending on it's source and makeup, is generally the source. This project will have a natural ingredient based infill called Brockfill (https://www.brockusa.com/athletes-matter-brockfill/). It's made up of harvested Southern Yellow Pine and has the added benefit of reduced heat on a field which was also a concern brought up by the Planning Board.

3. Concern about bacteria in fields. Several studies have been conducted relative to potential bacterium such as Staphylococcus aureus capable causing infections or diseases spread by contact with synthetic turf. Relative to infilled synthetic turf surfaces installed in outdoor environments the survival rate of bacteria is very low. This is due to the higher temperatures and the presence of Ultra Violet light in the outdoor environment. There are several products made to be applied topically to synthetic turf as a "disinfectant or anti-microbial" these have been shown to have no added benefit in outdoor environments because the bacteria can not survive long enough in the higher temperatures and UV exposure. Refer to the Penn State Study "Survival of Staphylococcus Aureus on Synthetic Turf" for more information. https://extension.psu.edu/survival-of-staphylococcus-aureus-on-synthetic-turf

4. Concern about higher incident of injuries on synthetic turf. Any synthetic turf system designed as part of the Mt. Hope High School project will be required to meet the standards of World Rugby Regulation 22, FIH and FIFA. These organizations have combined resources to identify best practice for multi-use long pile community-based fields and provide information to facility owners, managers and investors in ensuring that their fields reflect best practices in the areas of player welfare, performance, sustainability and longevity. This standard is known as "One Turf" and the testing documentation is attached. Many of these standards and tests are derived from and are also used for certification of natural grass fields.

   We would recommend testing of the existing natural grass fields in the School District as a reference data set for comparison to synthetic turf (ie would your existing natural grass fields pass the One Turf standard)

   All of this testing for safety and performance represents a snapshot in time. Sporting surfaces are dynamic and their conditions change, sometimes quickly. Maintenance is as key with synthetic turf as it is with any sporting surface. Maintenance and proper footwear/equipment are the biggest factors in mitigating injury risk for student athletes.
   End of Memorandum (see Attachment)

One Turf – Tables of Testing

	Page
Performance for Existing Fields	1
Performance for new fields	2
Identification	3
Sport Specific Requirements	4

WORLD RUGBY

Parameter	Test Method	Minimum Value	Maximum Value
Shock Absorption	AAA Version (FIFA Method)	55%	70%
Vertical Deformation		5mm	11mm
Rotational Resistance	EN 15301-1 (football studs)	25Nm	50Nm
Impact Attenuation (HIC)	EN 1177	1.3m	-
Ball Roll (large ball)	FIFA Method	-	12m
Vertical Ball Rebound (large ball)	EN 12235 (absolute)	0.6m	1.0m
Evenness (Surface Regularity)	EN 13606 (3m straight edge)	-	10mm
Slope	Surveyor's Level		1%

Performance Tests

WORLD RUGBY

Parameter	Dry	Wet	Temperature Extremes	After Simulated Wear	Hot Water Immersion	UV Exposure	Laboratory Requirement		
							Min	Max	Units
Shock Absorption	X	X	X	X			57	68	%
Vertical Deformation	X	X	X	X			6	10	Mm
Rotational Resistance	X	X		X			32	43	Nm
Impact Attenuation (HIC)	X	X	X	X			1.3	-	m
Ball Roll (large ball)	X	X		X			-	12	m
Ball Roll (small ball)	X	X		X			5	-	m
Vertical Ball Rebound	X	X		X			0.6	1.0	m
Angled Ball Rebound	X	X		X			45	70	%
Skin/Surface Friction	X						0.3	0.75	
Skin Abrasion	X						-30	30	%
Tensile Strength – Yarn	X					X	30	.	N
Tensile Strength – Joints	X				X		2,500	.	N/100mm
Tensile Strength – Carpet	X						25	.	N/100mm
Tensile Strength – Shock pad	X						25	.	N/mm
Colour Change – Yarn	X					X	3	.	Grey Scale
Colour Change – Infill	X					X	3	.	Grey Scale
Water Permeability		X					500	.	mm/h

Performance Tests

WORLD RUGBY

Parameter	Laboratory ID Test	Field ID Test – On installation	Field ID Test – Subsequent testing
Carpet			
Mass per Unit Area	X	X	
Tufts per Unit Area	X	X	
Tuft Withdrawal Force	X	X	
Pile Height	X	X	X
Total Pile Weight	X	X	
Yarns (per yarn)			
Pile Yarn Characteristic (DSC)	X	X	
Pile Thickness	X	X	X
dTex	X	X	
Infills (per infill)			
Particle Size	X	X	X*
Particle Shape	X	X	X*
Bulk Density	X	X	
Thermogravimetric Analysis (TGA)	X#	X#	
Shock Pad			
Thickness	X	X	
Shock Absorption	X	X	
Vertical Deformation	X	X	

Performed on non-natural infills only
* Only required on performance infills

Identification Tests

	FIFA	FIH	World Rugby
Certification process in place	X	X	X
Licensee process in place	X	X	X
Certification limited to licensees	X	X	
Accredited Test Institute Process	X	X	X
Lisport XL used for simulated wear	X		X
Lisport used for simulated wear		X	
Large Ball Roll Requirement	X		
Small Ball Roll Requirement		X	
Splash Rating Requirement	X		X
Heat Rating Requirement	X		X
Minimum Pile Height Requirement			X
HIC requirement			X
Energy Restitution Requirement			X

Sport Specific Requirements