

Shock Absorbance of Different UNH Artificial Turf Fields and Implications for Student Athletes



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Background

- GMAX testing is an impact test to test shock absorption, and quantify the hardness, of different artificial turf surfaces.
 - The higher the score is, the less shock is absorbed and the harder the surface is.
- The maximum safety threshold is 200 g's, any score above that is deemed unsafe^{1,2}.
 - There is no minimum safety limit.
- This study compares the GMAX testing scores for six UNH artificial turf fields and discusses practical safety implications for students.

Methods

- GMAX testing was performed on the North, Middle, and South Student Recreation Fields, Bremner Field, Tucker Field, and Wildcat Stadium field by Thomas Testing Inc. on September 3rd, 2024³. Scores were obtained from these reports, and implications researched through a peer-reviewed literature search.

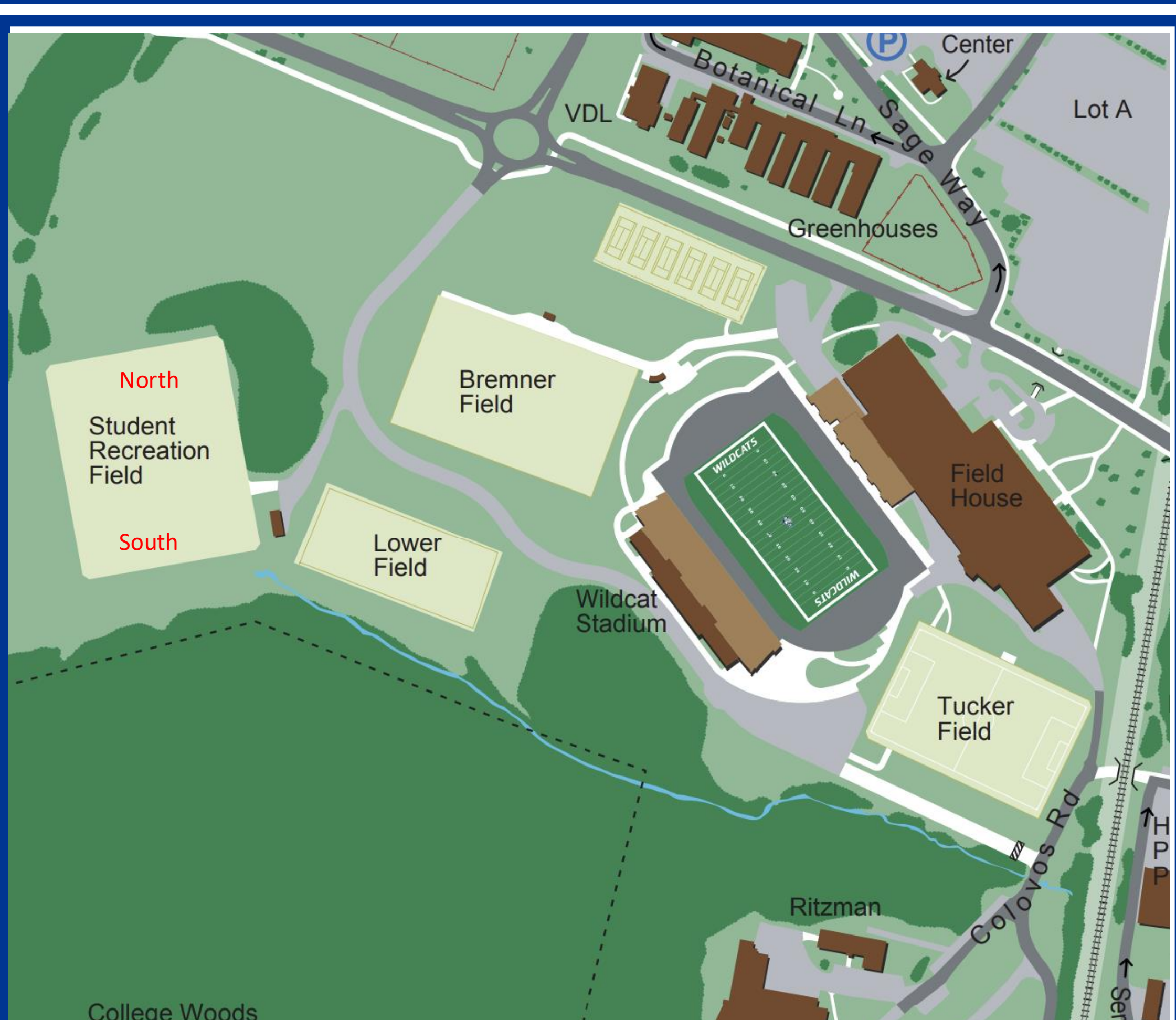
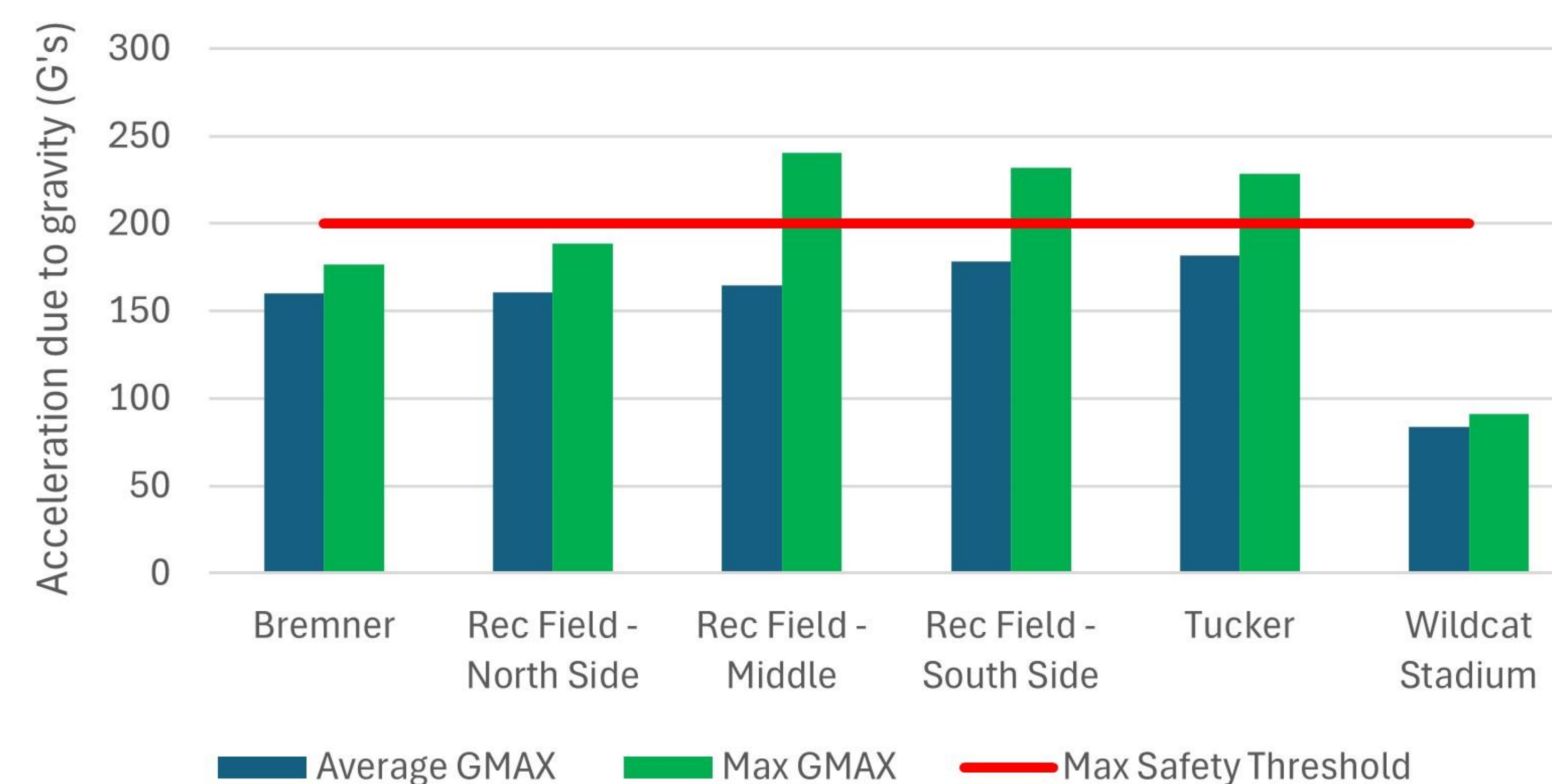


Figure 1: Map of UNH with tested fields⁴

GMAX Scores

Figure 2: GMAX Rating of UNH Turf Fields



Field	Average GMAX	Max GMAX	Average Infill Depth (in)
Bremner	159.99	176.65	1.09
Rec Field - North Side	160.7	188.75	1.09
Rec Field - Middle	164.32	240.25	1.23
Rec Field - South Side	178.24	231.95	1.21
Tucker	181.91	228.2	1.29
Wildcat Stadium	83.78	91.3	1.18

Implications for Injuries

- Competitive athletes have a high prevalence of injuries
 - Average of 2.28 injuries/athlete with a 91% prevalence⁵
- GMAX score correlates very closely with the Head Injury Criteria (HIC; measure of the probability of a head injury occurring by an impact) score of that same surface^{6,7}, with higher scores corresponding to a higher chance of brain injury.
 - There is a reported correlation of 0.96 between GMAX and HIC scores⁸
- A harder surface (with a higher GMAX score), is also found to be a core reason behind "turf toe" (hyperextension of the metatarsophalangeal joint)



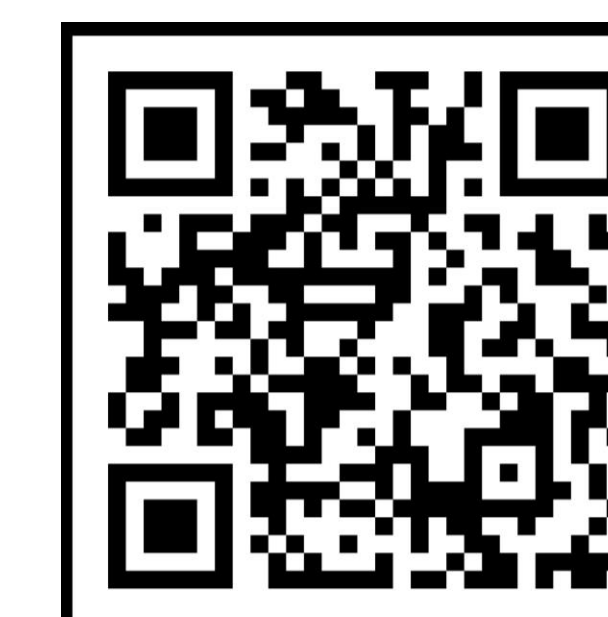
Discussion & Conclusions

- The **average GMAX score** for all the UNH fields are **below the safety threshold** of 200 g's.
- The safest (#1) to least safe (#6) fields from impact-related injuries are as follows:
 - 1.) Wildcat Stadium, 2.) Bremner Field, 3.) Rec Field – North Side, 4.) Rec Field - Middle, 5.) Rec Field – South Side, 6.) Tucker.
- Three fields (Rec Field – Middle, Rec Field – South Side, Tucker) have areas that **exceed the safety threshold** (200 g's), however, their averages are still under the safety threshold.
 - These fields have the **highest probability of impact-related injury** occurring in those specific areas.
- All three divisions of the **Student Rec Field** have a **higher average GMAX score** compared to other fields (besides Tucker). This is expected as these are the oldest fields (2009), and are not used by the varsity athletes, likely making them prioritized below other fields.
- **Tucker Field** has the **highest average GMAX score at 181.91**, which is surprising considering it is a newer field (2019) with a deep infill of 1.29 in.
- **Wildcat Stadium** is by far the **softest**, or most-shock absorbing, surface with the **lowest average GMAX score of 83.78**. This makes sense considering the purpose of the field-football and soccer are two very high-impact sports where a softer field can help prevent impact injuries, specifically head injuries.
- Competitive athletes already have a high prevalence of injuries and high impact turf fields may add to that prevalence.

Future Directions

- Directly test the HIC score of each UNH field and test for correlations between the GMAX and HIC scores.
- Calculate the coefficient of friction for each UNH field and consider implications for slip injuries.

Scan for References:



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