

August 10, 2020

Melissa Teichman  
Senior Director  
OAC Services, Inc.  
2200 1st Ave S. Suite 200  
Seattle, WA 98134

c: Aaron Bert, King County Facilities Management Division  
Eric Friedli, City of Shoreline Parks  
Dan Johnson, City of Shoreline Parks  
Kirk Peterson, City of Shoreline Parks

Re: Shoreline Park Synthetic Turf Soccer Field Assessment

Melissa:

D.A. Hogan & Associates is pleased to submit an assessment of the current field conditions for the synthetic turf playing surface of at Shoreline Park. This assessment included a field inspection on July 27, 2020 to review the conditions of Field B on the south side of the park that was used for temporary medical structures. The assessment was requested by King County Facilities Management Division following the removal of the temporary medical structures that had been installed in March 2020 and removed in July 2020.

The existing field profile is comprised of several components including the following:

1. Infilled synthetic turf surface with a combination of cork and granular sand infill materials. The depth of the turf system with infill materials is approximately 1-1/2 inches.
2. A paved elastic layer pad system is below the synthetic turf surface. This is comprised of a mixture of granulated rubber and small pea gravel held together with a polyurethane binder. The depth of this pad is approximately 1 inch.
3. An aggregate base comprised of 1-1/4" minus crushed rock with limited fines is below the supplemental pads system. This material is permeable and provides stability for the field surfacing system. This has a depth of approximately 6 inches.
4. The aggregate base is underlaid with a permeable geotextile fabric that was installed over the pre-existing permeable sand base layer. The depth of the sand layer varies but is typically greater than 6 inches.
5. The field includes a subsurface drainage system with 4" perforated pipe in washed pea gravel trenches. The trench depth varies depending on location but typically ranges from 2 to 3 feet below the field's surface.

Our understanding is equipment such as forklifts, flat bed trucks, and other vehicles were present for installation and removal of the temporary medical structures. Some plywood was placed at the field perimeters to mitigate this traffic but did not fully cover all areas of the field allowing vehicles to travel directly on the synthetic turf. Generators and HVAC units were placed directly on the field. Temporary restroom facilities were present on site as well.

The buildings themselves had vinyl flooring panels that were screwed together and were placed directly on the synthetic turf. The structural supports consisted of columns with anchor plates. Each plate was secured by driving four, a 3/4 inch diameter by 3 foot long metal stake through holes in each plate. The following is a compilation of issues observed and noted during the site inspection along with recommended course of action.

### 1. Damaged Field Base

The removal of the support column stakes has damaged the underlying field base profile. Primarily the base damage appears limited to the elastic layer pad with minor displacement of aggregate materials located below the pad. Numerous support column locations across the length and width of the field require repair work. The anchor stake removal process has pulled the aggregate base material and elastic layer pad upward and has left protrusions in the surface synthetic turf.



This is one of several dozen locations, each consisting of four stake locations.



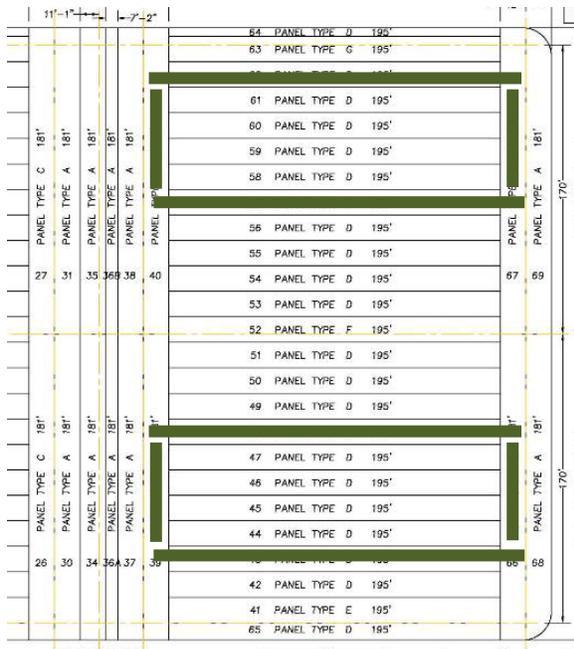
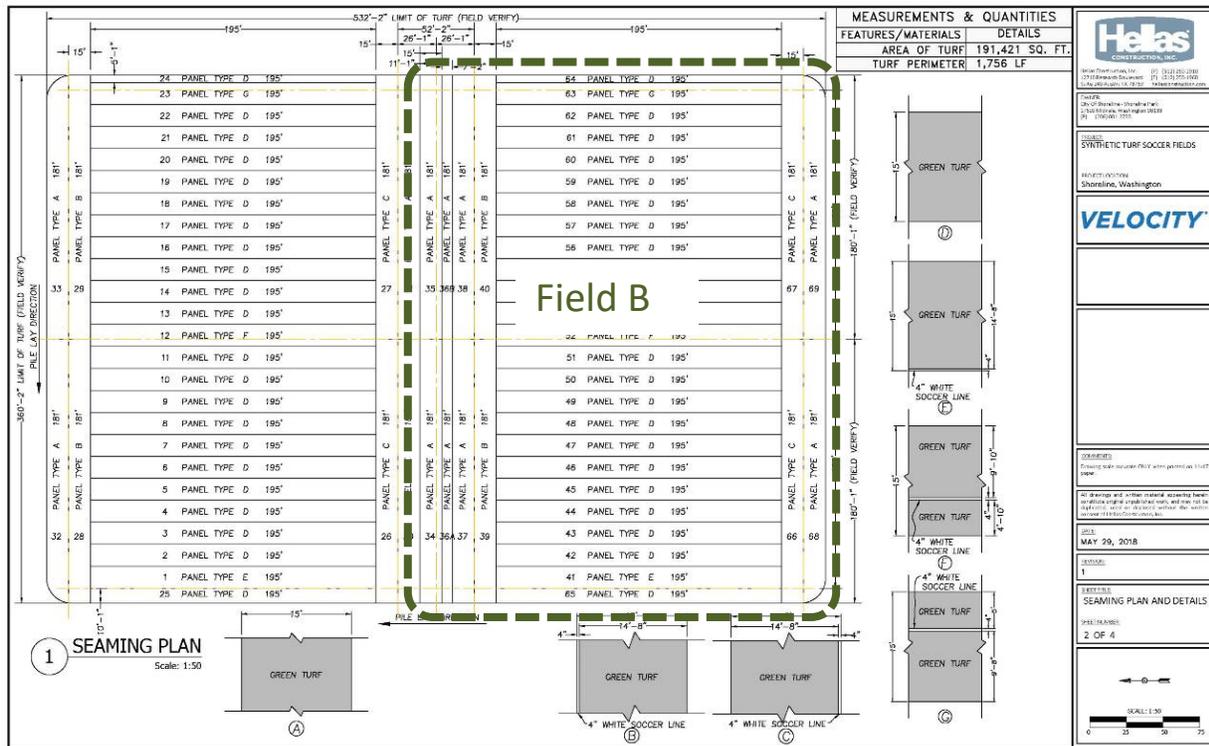
**Corrective Action: Re-level existing base aggregate and cut and patch elastic layer pad**

Removal of the synthetic turf is required to access the underlying aggregate and pad. Turf removal should occur parallel with the entire synthetic turf panel. The width of the removal strip should be a minimum 3 feet wide in order to allow access to the elastic layer pad below. The cutting of the existing turf will require hand tools in order to preserve the existing fibers bundles that are stitched in the backing. Where ever possible, the cutting should occur between the tufted fiber rows so as to reduce fiber loss and to make the seams less visible after the repairs are completed. We are recommending re-installation of the existing turf as a "patch" to maintain consistent fiber texture and color.

Where there is a series of repair areas are in alignment with the longitudinal direction of the synthetic turf panels, a strip of synthetic turf can be cut on two sides and removed to provide access to the underlying elastic layer pad. This will include the areas that are aligned in a north/south direction across the width of the field that match the direction of the panels. As there are quarter-turned panels adjacent to the soccer field sidelines that are aligned east/west this may also be the case for the north and south building limits. The panel diagram for the field is shown on the following page and can be referenced for confirmation of the cut strip locations.

For individual repair areas or repair areas that are not aligned with the longitudinal panel direction cutting long strips is not recommended. These repair areas may be accessed by cutting flap on three sides and rolling the turf back while it is still connected on the fourth side.

Again, where ever possible, the cutting should occur between the tufted fiber rows so as to reduce fiber loss and and to make the seams less visible after the repairs are completed.



*Approximate pattern and location of turf panel removal and replacement, to access the underlying e-layer and aggregate.*

Once the strips of synthetic turf are fully removed and set aside for reinstallation, a 3' x 3' square of elastic layer pad should be cut and removed at each anchor plate location. Access to the underlying aggregate base materials would be established and allow re-compaction of any disturbed materials. The elastic layer in these locations must be patched with new material to create a level base. In some cases, it may be possible to salvage the elastic layer pad and forego aggregate remediation if the spikes did minimal damage and if the underlying aggregate was not loosened or displaced. However, if the surface is not uniformly level or if the aggregate is no longer consolidated the elastic layer will need to be cut and patched.

## 2. Damaged Synthetic Turf Backing



The stakes utilized at the anchor plates have created perforations, holes, and tears in the synthetic turf backing. These areas will create uneven footing and traction and will need to be repaired. They are also unsightly with some residual dirt and rust.

### **Corrective Action: Re-adhere turf were damaged or torn, clean, and trim tall fibers**

The fibers and turf backing material that was displaced and pushed down in these areas when the stakes were driven in must be brought back up to the surface. This can only be achieved from the underside of the turf backing. Once the turf in these areas is rolled back, the displaced fiber and backing will need to be pushed back in place. The In some cases the stake removal resulted in tears in the turf backing or sections of turf that were pulled up. Any tears should be re-adhered to a supplemental backing material (seam tape) to restore the backing integrity. The fiber in these areas should be trimmed as required to provide a uniform relative pile height. The rust and soil staining should be cleaned off of the fibers with a brushing and a mild detergent or soap product. The cork infill cork at locations will need to be re-leveled to provide a uniform and planar surface.

## 3. Damaged Soccer Goal Anchor Cable Boxes

Construction traffic over the soccer goal anchor boxes has resulted in damage. The hardware within the box such as locks and cables would be salvageable however new boxes and lids are required.

**Corrective Action:** Cut existing synthetic turf and elastic layer pad around each box to allow access to box and concrete embedment that exists at both locations. Remove concrete material and damaged box. Place new box, pour concrete, compact aggregate, patch elastic layer pad, glue synthetic turf, and secure turf to edge anchor.



#### 4. Damaged Quick Coupling Valve Boxes



Construction traffic over quick coupling valve locations has depressed and damaged some of the boxes around the perimeter of the field. Potential damage to the valve, riser assembly, and mainline could exist.

**Corrective Action:** Cut existing synthetic turf and elastic layer pad around each box to allow access to box at each location. Remove damaged box. Examine valve for damage and replace if required. Conduct pressure test for field and visual observation of valves to determine integrity of riser assembly and main line pipe. Repair pipe system if leaks observed at valve locations. Place new box, pour concrete, compact aggregate, patch elastic layer pad, glue synthetic turf, and secure turf to edge anchor.

#### 5. Check Field for Other Surface Irregularities or Depressions

With the equipment traffic driving directly on the field surface it is possible that the aggregate base could have been displaced resulting in surface depressions or irregularities. The areas where this traffic may have occurred should be closely inspected to ensure the field has remained uniformly flat. Special attention should be given to the field marking and lines where even small deviation become very visible. If these types of areas are observed, it is likely there was some compaction of the aggregate base below the elastic layer pad or minor compression of the pad itself.

**Corrective Action:** Surface depressions that do not exceed 3/8 inch should be addressed by placement of fine sand below the turf but on top of the elastic layer pad. This method of leveling is typical industry standard to repair minor depressions after the installation of a synthetic turf field. These repairs required a small cut in the turf, hand placement of clean free draining sand (often infill sand), and gluing with seam tape to close the cut. Areas where the irregularities or depressions exceed 3/8 of an inch should be considered as a “Damaged Field Base” and will require corrective work to the elastic layer pad as described in Item 1 above.

#### 6. Surface Cleaning

The entire field should be subjected to a supplemental cleaning process. The synthetic contractor will typically have an approved cleaning product recommended for the synthetic turf system. All products and proposed procedures should be thoroughly reviewed prior to utilization to ensure compliance city and county requirements.

Areas where there were any concentrated spills including the field area where the portable toilets were staged should be closely reviewed and delineated. The organic cork infill in this area should be removed and replaced.

## 7. Compacted Infill and Fibers Matting

The building locations with the vinyl flooring along with construction vehicle traffic has resulted in compaction of the synthetic turf system. The infill depths measured between 1.00" and 1.25" for the synthetic turf. For reference the infill depths on Field "A" were in the range of 1.25" to 1.5". The fibers for the field have also been matted down across the majority of the field. Significant impact was noted at the construction entry area where infill also contained high amounts of dirt and debris.



**Corrective Action:** Several steps require implementation to improve the synthetic turf.

**Infill Decompaction:** Addressing the compaction of the cork and sand infill within the synthetic turf requires metal tine drag treatment in order to reduce to compacted condition of the infill materials.

**Infill cleaning and debris removal:** Some vacuuming of the turf around anchor plate locations has occurred. A small magnet drag was wheeled across the field to collect screws and other deleterious materials. Removal and infill extraction with specialized equipment, such as a SMG Sportchamp, needs to be conducted to across the field to provide supplemental cleaning with particular attention required at the construction entry. Another pass with a magnet should be included.



**Brushing of synthetic turf fibers:** The matted fibers can be brought back to a near vertical orientation with additional brushing of the field. The same specialized equipment Sportchamp can be utilized for this function.

**Top dressing the field:** Additional infill cork is likely required to bring infill level up after the cleaning and brushing. Cork infill can be placed in incremental lifts after the supplemental cleaning and brushing measures.

Final grooming: Once the infill placement has been completed a final leveling of the infill can be performed with conventional maintenance equipment such as a drag brush and sweeper.

Final inspection: Upon completion of all of the steps noted above, a final inspection of seaming, field marking inlays, infill depth, and fiber condition should be performed on the field surface.

## **8. Longevity of the Synthetic Turf**

There has been impact to the synthetic turf system due to the building installation, temporary placement, and removal procedures. While an impact to the lifespan of the synthetic turf cannot be specifically quantified in days, months, or years, the synthetic turf fibers and infill on south field (Field B) has been subject to additional wear. Additionally the use of the field as a temporary building location could bring any future potential warranty claims on the south field into question with regards to the synthetic turf and elastic layer pad systems. These factors should be considered when evaluating repair and replacement costs.

The goal of the corrective action plan is to restore the turf to an equivalent condition that was present prior to structures being located on site.

Please do not hesitate to contact me if you need further information and we thank you for the opportunity to be of service to King County and City of Shoreline.



D.A. Hogan & Associates, Inc.