

Milestone 2

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Project Overview

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Turf Field Water Supply Milestone 2

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Version 3

REPORT TITLE: Providing Further Access to Drinking Water at the First and Stadium Sports Multiplex

Our CEE 398 project based learning team recognized that the sports complex at First and Stadium was not capable of providing adequate water to those students who attended it on a daily basis due to its lack of drinking fountains and other related amenities, and furthermore, that students were not using the single water fountain present at the complex. At this point in time we have proposed the addition of several new drinking amenities there and are conducting a feasibility study on the ramifications of doing so. Other suggested courses of action included starting an advertising campaign on campus to alert students of the availability of drinking water at the First and Stadium Sports Multiplex and increasing signage at the fields to the same end. These alternatives were proposed as it was suggested that students might not be aware of the water fountains available to them, however, neither of these alternatives affectively addresses the issue of wether or not the fountains can accomodate the number of students attending the fields on a daily basis should they all suddenly start to use the srinking fountain there. Another alternative that was suggested consisted of adding bottle fillers as opposed to drinking fountains. This would be a cost effective solution however it does not address those students who do not have physical water bottles on them.

In order to improve our understanding of the issue we have conducted several observations of the Sports Multiplex on First and Stadium, we have analyzed the site design plans for our Sports Multiplex, we have reached out to the facilities managers of several promonent Universities in an effort to gather information on the amenities their athletic facilities have to offer, we have performed research on the various affects of chronic dehydration and heat related illnesses, and we have spoken withe several UIUC Recreational Facilities Management Staff lending us insight into the various design aspects of our athletic facilities. In performing our research it has become evident that there is a need for additional water amenities at the First and Stadium Sports Complex. This conclusion was arrived at from the following information. To begin with we have determined that other universities of the same caliber as the University of Illinois tend to have a greater acces to water at their outdoor recreation facilities; we have also determined that the average 785 students who attend the sports complex on a daily basis cannot be efficiently served by the single fountain. Additionally, we have observed that students simply do not use the water fountain present at the sports complex. Finally, we have linked chronic dehydration with a number of affects to include prolonging illness and a reduction in focus and mental capabilities. We are waiting on informaition pertaining to the number of dehydration and heat related illnesses that occur on campus in a given year.

Now the project team is attempting to determine wether or not this problem is large enough and wether or not it is cost effective to create additional fountains at the complex. To date we have not greatly deviated from our schedule save for begining work on our final report ahead of the scheduled date.

Intoduction and Background

As of 2015, the Princeton review has ranked the University of Illinois at Urbana-Champaign third in the nation with regards to its sports and recreational facilities. However, there is still room for improvement. Our assertion is that a more readily available supply of water by sports and recreational facilities at the University of Illinois Urbana-Champaign would increase the wellness and safety of our

students. It appears that students are not staying hydrated while using the First and Stadium Playfield Multiplex according to standards suggested by the 2013-2014 NCAA Sports Medicine Handbook. There are major concerns for dehydration that are often overlooked. Chronic dehydration can impair cognitive performance, cause headaches, fatigue, weight gain, digestive problems, kidney stones, depression, and kidney cancer. Dehydration combined with inflammation impairs the immune system, contributing also to autoimmune disease (New Vision, 2013). All these factors have a negative impact on the athleticism, wellness, and academic prowess of a given student. (Kempt et al. 2010) (Ottewell, 2002)

Research performed by the NCAA suggests that athletes need an average of eight ounces of water for every 15 minutes of exercise performed (NCAA Sports Medicine Handbook, 2013). In fact, there is only one water fountain at the Multiplex, and only two outdoor water fountains on the entire campus. Moreover, according to Campus Recreation Operations, an average of 785 individuals exercise UIUC outdoor recreational facilities daily, but only 25-30 bottles of water are collected from facility trash receptacles on any given day (Terry Elmore, email correspondence, October 2015). This low number of bottles suggests that athletes are possibly not staying hydrated. Most students attend the fields after class both for personal and structured (intramural) play between 4:00pm and 10:00pm. Therefore we observed two separate time periods, at opening and during maximum usage. In our observations at 5:00pm-5:30pm, approximately 10% of the First and Stadium Sports Multiplex's participants had used the single water fountain. In the second time period 7:30pm-9pm, we observed no usage. Again, our observations indicate that athletes are either not drinking enough water or are leaving prematurely due to the lack of adequate water facilities at the Multiplex.

We believe that it is imperative that the University install more water fountains at the First and Stadium Sports Multiplex or further advertise the existence of the single fountain there to ensure that students stay adequately hydrated. Water must be convenient and readily available. Should additional water fountains be created, participants will be less apt to rely on water brought from home. This is important as personal water bottles can not hold enough water to sustain prolonged periods of exercise without being refilled; an activity that has not been observed with high frequency at the First and Stadium Sports Multiplex. Based on the evidence provided in this feasibility study our team also recommends that a minimum of one drinking fountain should be added to the sports complex, however, we feel that the addition of fountains should be limited to a maximum of two fountains. Furthermore, these fountains would be best utilized by including them in separate locations from the first. To clarify it would be most prudent to include one additional fountain at the northern most fields of the complex and possibly another on the southern end of the complex near the existing drinking fountain there instead of placing all additional fountains in the same location.

Project Objectives

- Research Practicality of Water Fountains: Clearly depict the benefits and detriments of including additional drinking fountains at the First and Stadium Sports Multiplex as well as addressing any alternative solutions that might remedy the lack of available water there.
- Provide Adequate Water for Exercise: Provide the basis for the creation of both a sufficient and recognizable water source for the First and Stadium Sports Multiplex, and in addition, ensure that student athletes at the field have ample access to water. With adequate water, students can exercise for extended periods of time and avoid dehydration as well as any heat related illnesses. The University has responsibility to the safety and wellbeing of its students. We aim to build a solution depicting an atmosphere conducive for both physical and academic excellence, in correspondence with University responsibilities. Again we hope to achieve this by paving the way for the addition of water fountains at the First and Stadium Sports Multiplex, or, at the bare minimum, the improvement in both quality and recognizability of the existing *fountain* (singular).
- Protect Student Health: Attempt to increase student health in general as well as reduce the amount of students on campus subject to seasonal illnesses caused by chronic dehydration. Chronic dehydration has been linked to prolonging the length of and increasing the intensity of many illnesses. Chronic dehydration also impairs cognitive ability. Improved water access can combat these health issues. (Kempt et al. 2010) (NCAA Sports Medicine Handbook, 2013) (Ottewell, 2002)
- Improve Multiplex Quality: Improve value and standard of the Multiplex at First and Stadium. As additional fountains are constructed into the facility, we hope the complex becomes more attractive. This will provide two distinct benefits. First, it will encourage infrequent exercisers to visit and partake in the recreational activities available. Secondly, it will attract prospective students to apply to the University of Illinois at Urbana Champaign for its superb sports facilities, among other attributes. We also hope that additional fountains will raise UIUC athletic facility rankings on peer review services, such as the Princeton Review. By improving access to water, the facilities will have more to boast of, which may become statistically available online. Princeton Review is a highly referenced source. (Princeton Review, 2015)
- Encourage Sustainable Efforts: Eliminate the need disposable water bottles at the First and Stadium Sports Multiplex. Installation of water fountains will be part of a global effort towards sustainability. Further access to water would discourage the use of disposable water bottles, lower litter and municipal waste in landfills, resulting in a smaller carbon footprint. (Schuler 2015)

Project Scope

Breakdown of Scope:

1. Data Collection

- Find basic facts of turf field sizes, capacities, and attendance rates.
- Field observations of water use and of athletes
- Email coordination with athletic facility professionals
- Online research on dehydration

2. Site Plan Review and City Code Review

- Identifying current utilities at multiplex
- Find out if installation of new fountains is legal
- Learn about city and university code

3. Material Analysis

- Research different materials
- Discuss best material based on cost, durability, availability
- Use this information for cost estimation

Detailed Description of Scope:

With regards to the scope of our project, increasing access to water resources at the turf fields, our team would begin by collecting datum in relation to the turf fields and their capacity, use, and attendance rate. This can be accomplished by meeting with the facility coordinator, by performing a physical analysis of the guests entering and exiting the facility between key hours, and by researching documentation and any previous work performed on the capacity, use, and attendance rates of the field. In person data collection of this variety involves visiting the fields and counting both the number of people in attendance and noting the approximate number of individuals utilizing the fountain there. Wherein meeting with facility coordinators involves scheduling and attending meetings with those responsible for the proper functioning of the facilities which provides a platform to gain personal knowledge on the functioning of the facilities. Individuals that we would meet with include but are not limited to Mrs. Robyn Deterding, the facility coordinator for this campus; and Ms. Terry Elmor, another member of the staff responsible for student recreational activities. In an effort to broaden our knowledge of other contemporary athletic facilities we will also reach out to the recreational and facility staff through email and phone call to ascertain what level of access to drinking water other universities contain at their outdoor facilities. Finally, research involves both utilizing personal connections created in meeting with facility coordinators, and scowering the documentation contained in the engineering library among other places to find documents detailing any past projects undertaken at the fields.

The second task would involve previous site plan review and city code review with relation to the turf fields as to identify what utilities exist, the location of various aspects of the fields, and any regulations or codes pertaining to the turf fields as to identify whether or not it is physically and legally possible to construct additional water amenities at the location. Review of these sets of data would help to determine if there are some factors affecting the way in which this project would be completed and how to work around those roadblocks should they exist. The municipal code for Champaign is available online which would contain information as to the legal specifications of the addition of amenities. Both Champaign and Urbana's municipal code will be utilized in our research, we also possess the capabilities to inspect the municipal code of other college towns to cross-reference their standards with our own. The site plans can be found by contacting Ms. Morgan Johnston or some other member of the Facilities and Services staff here. While reviewing the First and Stadium Sports Multiplex site plans we will specifically be looking at the existing utilities there in order to identify where it is impossible to place water lines due to spacing conflicts, and where water lines exist that we could possibly tie new drinking amenities into.

The final task that would need to be completed would be an analysis of the materials that would meet a given budget while remaining durable and giving the final project some longevity thus making the project feasible from an economic standpoint. This would require researching the various physical objects that would be required to build the addition, as well as what the market has to offer in terms of the variation in material, texture, production quality, among other things for those specific objects. This information can be gathered directly from various producers by telephone, email, or website. Compiling this information would allow for a basic estimate of the cost of undertaking such a project.

Alternative Solutions Under Consideration (Similar Projects)

Several other rather simple alternatives have been suggested to meet the goals of both: encouraging students to stay active by making the First and Stadium Sports Multiplex more attractive through the addition of water fountains; and ensuring the wellness of those students while they exercise through increased access to drinking water. The first alternative is to simply advertise the existing fountain there more thoroughly by word of mouth and pamphlet. As our observations show students tend to avoid the single fountain present at the sports complex perhaps because they are unaware of its existence. Proper advertisement could alert students to the existence of the fountain thus nullifying the need for additional fixtures. However, should this endeavour be highly successful the single fountain might not be able to adequately support the daily average of 785 students that attend the fields. Another form of advertisement that could be utilized is to add signage to the facility indicating the existence of the water fountain, however, this also similarly fails to improve the existing fountain should the increase in traffic to the fixture be large.

A second alternative which adequately increases the supply of readily available water at the First and Stadium Sports Multiplex would be the addition of bottle fillers as opposed to drinking fountains, this is considered slightly more cost effective as bottle fillers tend to be cheaper to install and purchase than their drinking fountain counterparts. There is, however, the issue of addressing students who might not carry water bottles with them as they would not be able to effectively use a bottle filler.

It is the opinion of this team that the most effective alternative solution would be to combine the solutions listed above as well as to incorporate an additional fountain. To do so would not only increase access to water but also raise public awareness of these amenities presence at the fields.

Preliminary Results and Discussion

In our project, we began by conducting several observations of the Sports Multiplex on First and Stadium. To deepen our understanding, we analyzed the site design plans for the Sports Multiplex, reached out to facilities managers of prominent Universities to gather information on their athletic facilities amenities, we have performed research on the various affects of chronic dehydration and heat related and we and spoke with several UIUC Recreational Facilities Management Staff about design aspects of UIUC athletic facilities. Finally we have performed academic research into the various effects of chronic dehydration on athletes.

Multiplex Water Fountain Use Patterns:

While conducting observations on the sports multiplex, we found that the fields are busiest on weekends and weekdays between 4:00pm and 10:00pm. Field observation shows that approximately one-hundred guests are in attendance at the fields at a time during peak hours. From 5:00-6:00pm, approximately 10% of the students used the drinking fountain. During our 9:00 to 10:00pm observations, no students were seen utilizing the drinking fountain. This could be for any number of reasons, however, though cause and effect might not be easily determined it is in our best interest to attempt to remedy the situation perhaps starting with some of the solutions offered in this feasibility study. Images of our observations between 9:00 and 10:00 are included below.



South-Eastern Field



South-Western Field



North-Western Fields



North-Eastern Fields



Seating Area Between Southern Most Fields

University of Illinois at Urbana-Champaign in Comparison to Other Universities:

In reaching out to the facilities management of other universities we have discovered that most other universities have significantly more access to water at their outdoor recreational fields. After polling several universities with highly rated facilities, we found some interesting information about how the facilities of University of Illinois stand with comparable universities. Most universities had very similar attendance and student usage as us if not more. Most were within the range of 800-1000 users a day. This number is slightly larger than our 765 attendance. The water supply of these universities were

varying, but all of the answers we received had the same if not more than what we offer at the First and Stadium turf fields. Indiana University has two bottle fillers and restrooms that provide amenities for one of their outdoor facilities. The other outdoor facilities only has one water fountain, but it is directly adjacent to their primary recreational facility. The University of Maryland and Wisconsin are two other examples of having more access to water than the University of Illinois (Mayer, Lax, and Whittaker, email correspondence, November 2015). See the figure below for a graphic of the compiled responses pertaining to the number of drinking amenities present at various universities. Both have areas where water is not directly provided by means of drinking fountains, but these facilities are adjacent to dormitories that can provide resources to these fields. The closest common student area that offers these amenities to the First and Stadium facilities would be Ikenberry Commons. It is too far to be convenient at all. In assessing all of this information, it is clear that some measures must be taken to stay competitive with other Universities in regards to the care and well being of recreational sports.

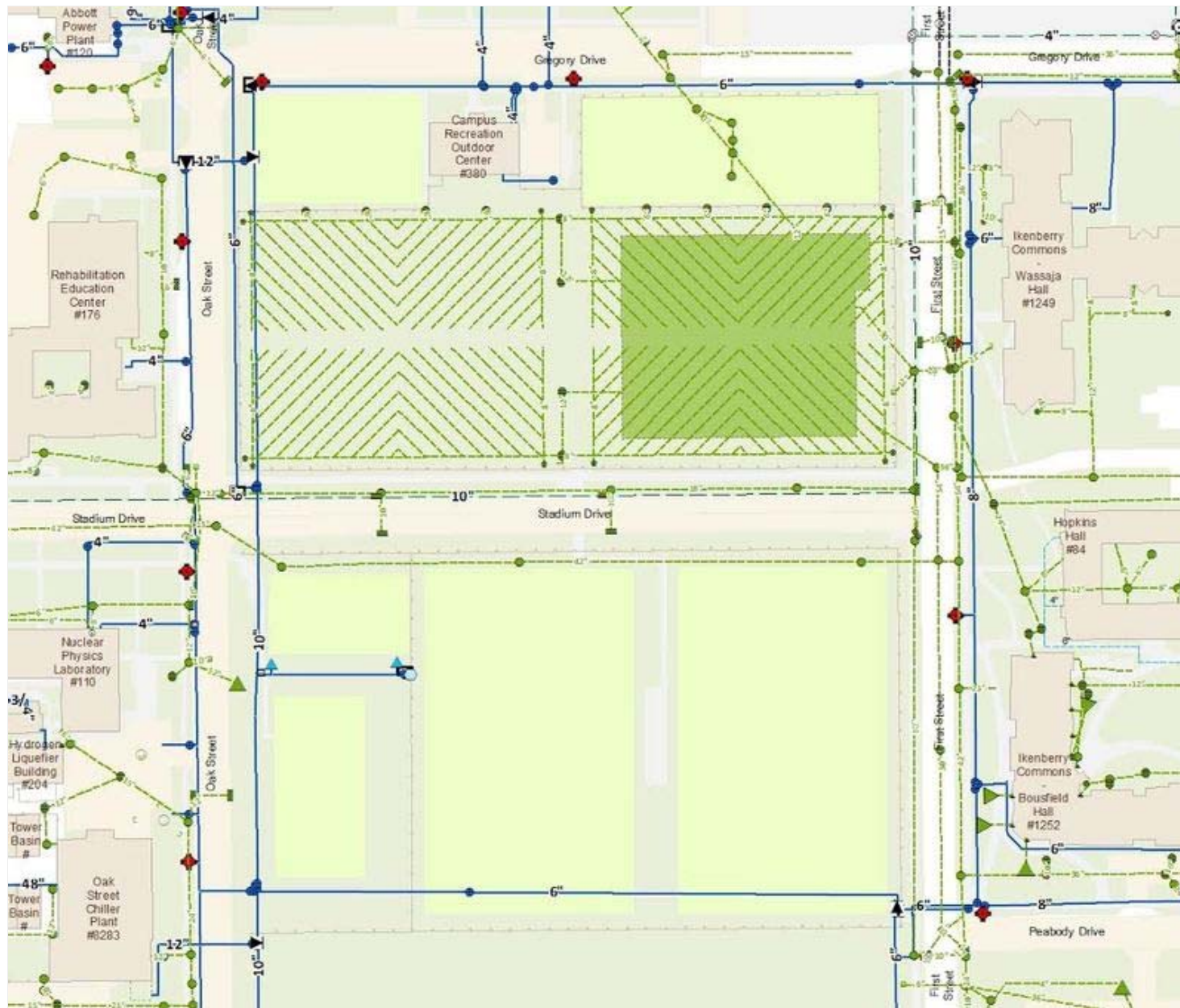
School/Facility	Potable Water	Number of Drinking Fountains	Usage (People)
Maryland Outdoor Facility 1	Yes		4 80,000 /yr
Maryland Outdoor Facility 2	Yes		1 20,000 /yr
Maryland Outdoor Facility 3	No		0 17,000 /yr
Wisconsin Outdoor Facility 1	No		0 350/ night
Wisconsin Outdoor Facility 2	Yes		1 350 /night
Wisconsin Outdoor Facility 3	Yes		2 400 /night
Indiana Outdoor Facility 1	Yes		2 Unspecified
Indiana Outdoor Facility 2	Yes		1 Unspecified
Kenyon College Outdoor Tennis Facility	No	Unspecified but indicated as nearby	Unspecified
Kenyon College Recreational Complex	Yes	Unspecified number but indicated as abundantly present	900 /day
Michigan State Outdoor Tennis Facility	Yes	Unspecified number but indicated as present at the facility	Unspecified
Michigan State Miscellaneous Outdoor	No		0 Unspecified
UIUC First and Stadium Multiplex	Yes		1 765 / day

(Figure A) Compiled Responses Pertaining to Water Availability on Various Campuses

In speaking with the Recreational Facilities Management Staff here, we have determined that an average number of 785 participants a day attend the outdoor fields on campus from the beginning of fall semester this year. We have also learned that 25-30 plastic water bottles are recycled from the field every night (Elmore, email correspondence, October 2015). This information combined with our observations moves us to believe that students are simply not drinking the NCAA recommended eight ounces of water per 15 minutes of exercise or are leaving from the fields early due to water being the limiting factor of their exercise. Also, from correspondence with Robyn Deterding, Director of Campus Recreational Facilities, we have learned that steps were taken in the past by to assess where drinking fountains could be placed with regards to our outdoor facilities. The student government was heavily involved in this process, however, progress halted sometime in the preliminary stages of the process.

Installation Location:

In evaluating the site design plans collected from Facilities and Services, we have discovered that there are several factors limiting the possible locations for additional fountains. The most prevalent of those is the location of underground facilities at the First and Stadium Sports Multiplex. Two large stormwater reservoirs exist under the play fields on the north side of the multiplex these greatly reduce the physical space available to install new water lines that could possibly supply any fountains installed there. In the southernmost fields, there exists a single water line extending from the west directly to the center of the fields there, this limits the possibility of reducing cost by tying into existing water lines.



Site Plans Displaying Storm and Water Utilities at the First and Stadium Sports Multiplex

Dehydration Concerns:

So what can come about from the lack of water at the Multiplex? In the short term, at just about about 1.1% dehydration, researchers observed increased neural effort when performing common cognitive tasks, effecting short term memory, long term memory recall, arithmetic and general problem solving. (Thortz.com) Dehydration causes brain shrinkage and cognitive ability, although it is easily reversed by immediate hydration. Replacing fluid lost through exercise is easier said than done, as seen in our study. As student continuously and habitually fail to meet daily water needs at the Multiplex, they will fall prey to chronic dehydration. Chronic dehydration not only impairs cognitive performance but can lead to a whole host of other problems including constant headaches, fatigue, weight gain, digestive problems, kidney stones, depression, and cancer of the bladder, prostate and kidney. (Thortz.com) Another concern is immune system impairment and autoimmune disease, when a person's immune system will attack their own healthy cells. Being dehydrated increases suscetibility to illnesses and can cause a larger student body to be unproductive and unwell. Incresae rates of illness can have a negative chain effect on the entire campus.

Water Fountain Design and Materials:

In our ideal design, we wanted to construct a water fountain that would be durable in outdoor conditions, provide easy access for multiple water fountain users, and also boost overall aesthetics of the Multiplex. The best design in our research is a "Barrier-Free Tri-Level Concrete Square Pedestal Drinking Fountain." Its features include freeze resistance, in-ground anchor plate, sanitary products. It is made of concrete with a stainless steel bowl. Users would access the water by pushing on an activation button. This is the most logical unit to install as it is primarily designed for stand-alone outdoor use, in searching through various catalogues on the subject only minor changes in cost and design were noted in outdoor features. There is a large fluctuation in the cost of labor for this project, however, that cost can be minimized by choosing locations where the it is easy to tie any additional fixtures into an existing water line which exist along the North, West, and Eastern end of the facility; and by choosing a location where laborers will experience minimal interference with existing utilities.



Barrier-Free Tri-Level Concrete Square Pedestal Drinking Fountain

Funding from University Facilities and Services can begin installation of at least 2 fountains for each of the 6 outdoor playfields. Acorn sells tri-level, pedestal, concrete aggregate, sqature fountains for \$5,492.

Below is a table of some other viable options. (Water Coolers and Drinking Fountains Price Guide from Acorn Engineering Company)

Water Fountains

Fountain	Features	Materials	Cost/ Analy.
Barrier-Free Tri-Level Concrete Square Pedestal Drinking Fountain Figure A	Freeze Resistant Valve System Three Bubblers/ Points of Access In-Ground Anchor Plate Sanitary Products	Stainless Steel Bowl Concrete or Stone Aggregate	\$5,492 Aesthetically Pleasing Good for Quick Access for Athletes Many Points of Access
Wall Mounted Round Drinking Fountain Figure B	Concealed Support Carrier Above Ground Freeze Resistant Valve System Single Bubbler Fountain	Chrome Brass Support Lead-free Stainless Steel Bowl	\$2,005
Two Station Trough Drinking Fountain Figure C	Above Ground Freeze Resistant Valve System Double Bubbler Fountain Concealed Support Carrier	Cast Iron or Cast Aluminum Stainless-Steel Bowl Chrome Brass Support	\$2,514
Enhanced Vandal Resistance Wall Mounted Water Cooler, 8 GPH Figure D	Single Bubbler Vandal Resistance	Stainless Steel Flexible Brass	\$1,311
Compact Free Standing Water Cooler, 5 GPH Figure E	Free Standing Single Bubbler Foot Pedal High Polish For Stainless Steel	Granite Support Stainless Steel Bowl Chrome Brass	\$1,335

Figure Gallery:

Figure A



Figure B



Figure C



Figure D



Figure E



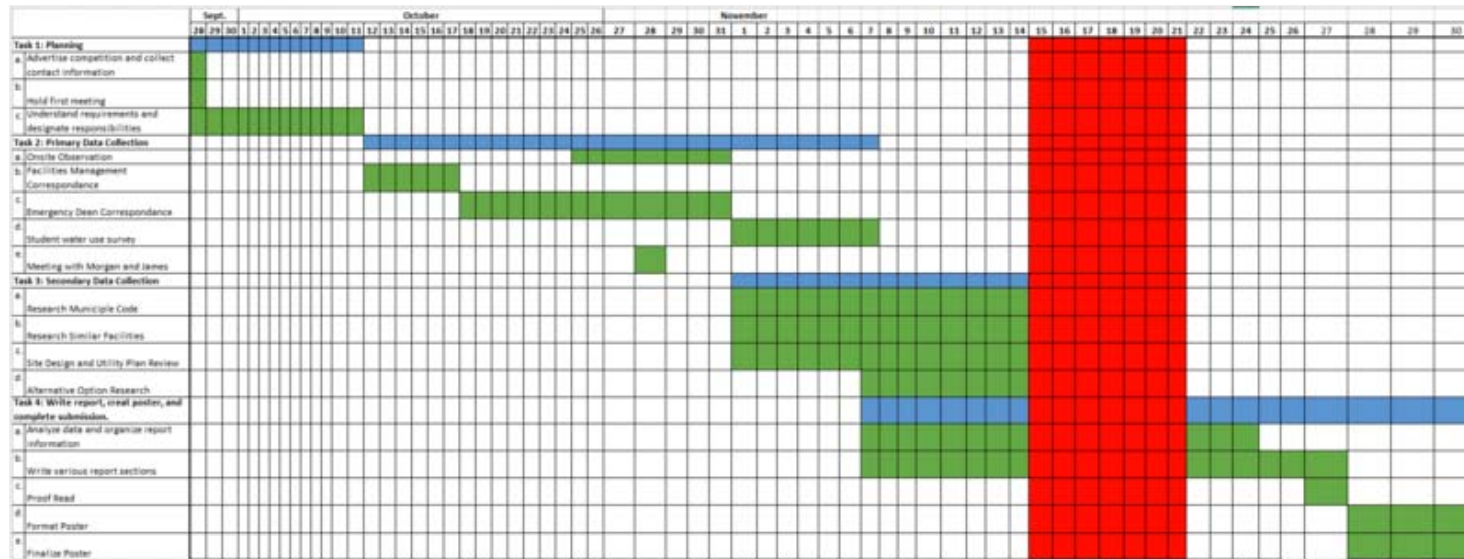
Final Discussion:

In conclusion, we suggest that the university install a minimum of one, but no more than two (preferably two) additional drinking fountains at the First and Stadium Sports Multiplex. We suggest also that these fountains are placed in locations such that they are separate from each other and are capable of serving the entire facility. This meets all of our objectives and has a reasonable cost for the derived benefit. Of course this is dependant upon on the level of construction management and prior planning placed into the design and positioning of the additional fixtures. Should these additional fixtures be installed the facility will be capable of supplying water to any guest that might attend which would ensure that athletes and fans alike stay well hydrated. In adding these fixtures provide another avenue through which to combat chronic dehydration and its deterrental affects to both health and intellect. Finally the addition of these fountains will reduce the usage of bottles at the complex while adding some form of aesthetic element to the fields.

Schedule Update

Deviations from the original schedule are limited to the Milestone and Report writing segments of the project. With regards to the report writing phase of the project we have started compiling and observing data ahead of schedule. See Figure 1 below for a graphic representation of the various work processes required prior to the completion of this feasibility study as well as for their sequencing. This is the current version of the schedule.

A link to the excel file has been included below that. You must click on the icon to access the excel file.



(Figure 1) Current Work Schedule Turf Field Water Supply Feasibility Study



Excel File of Figure 1

Reference Page

Citations:

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