

**Brief history of the Stocker AstroScience Center  
Florida International University**

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### **Early Days**

I conceived the idea of a student observatory on FIU MMC campus shortly after arriving at FIU in 1991. Why did we need a student observatory? Student education. Teaching astronomy without an observatory is like teaching chemistry in a bathroom, sure you have water and drains, but the conditions are not great for teaching and inspiring students to learn about science.

- 1) When I arrived we were setting up telescopes on the roof of the OE building, no observing pad, just the roof. It was uncomfortable and dangerous and suffered from rooftop vibrations. The new CP building was in the planning stages and Dr. Van Hamme and I insisted on a rooftop observing pad. The observing pad on the roof of the new Chemistry and Physics building was a concrete pad with a simple concrete block room storage. The pad had stairs leading up from the 3<sup>rd</sup> floor, but no handicap access. I submitted minor project grants to get electricity to the observing pad and an air conditioner for the storage room where telescopes were stored. I also designed and installed light blinds to block out surrounding building lights and installed permanent piers for the Celestron C-8 telescopes used for the astronomy labs. It was not ideal, but was a functional observing area.
- 2) Then sometime in the fall of 2000, we were surprised to find the third floor chemistry lab air handling systems were being renovated and the construction company was using our observing pad as a staging area for the roof modifications. No warnings or information were provided to our department before construction began. It was a total mid-semester surprise. When they finished, the observing pad was surrounded by large exhaust stacks that vented toxic gases onto the observing deck twenty-four hours a day, seven days a week.

- 3) **The Quest for a Real Observatory.** It was at this time I began the quest for a real student observatory! I began lobbying Dean of Arts and Sciences Art Herriott, FIU president Mitch Maidique, and anyone who would listen, advocating the need for an on-campus student observatory. The vented fumes now exhausted onto our CP rooftop observing pad were a health hazard to students and teachers and were corroding our equipment on the observing pad. We had no choice but hold our astronomy labs on the lawn NE of the CP building. The long power extension cords to the telescopes posed a tripping danger, and trees hung over us restricting the amount of sky we could see. I identified a small ridge with fewer tree coverage on the NE lawn of the CP building. So I designed an observing pad complete with permanent piers and surrounded by a fence and submitted a minor project grant to the college and it was funded. The new observatory was a cement pad with electrical outlets and six permanent telescope piers for small telescopes. The pad was surrounded by a chain link fence and shrubbery to block the light. The pad once built worked very effectively. I never ceased to advocate that we needed a real observatory, and that the observing pad was just a stop-gap measure. I was contacted by Ms. Riki Altman, a writer from a Miami magazine who wanted to write an article on astronomy. She visited FIU and I described the unfortunate situation with the lack of observing facilities for the astronomy labs and I showed her the current observing pad which happened to be filled with debris from a passing tropical storm at the time. After I explained my vision for a real student observatory, she was so impressed that the quest for a student observatory became the focus of an article she wrote and published in magazine *Miami VIP* guide and titled “*Space Seeker: FIU’s professor of physics wishes on the stars for a \$1 million observatory*” in 2006. It was during that time that I began my tradition of meeting with the FIU president Mitch Maidique, the dean of arts and sciences and the VP of development to discuss the need for a real observatory for our students.
- 4) **Demise of observing pad #1** Unfortunately, around 2007, FIU decided to build a new nursing building and the location chosen would be directly on top of our observing pad. I designed a new observing pad, obtained another minor project grant and we built a new observing pad southeast of the CP building immediately in front of the Graham Center ballroom. Unfortunately this was a much brighter area due to the proximity of a parking lot. That observing pad still exists but is no longer useful for observing and is totally blinded by parking lot lights.

## Previous incarnations

- 1. Observing pad on roof of new CP building
  - Roof alterations killed it.
- 2. Observing pad on the ground NE of CP
  - AHC 3 built on to it.
- 3. Observing pad N of GC ballroom
  - Still exists but isn't needed since the Stocker building was finished.

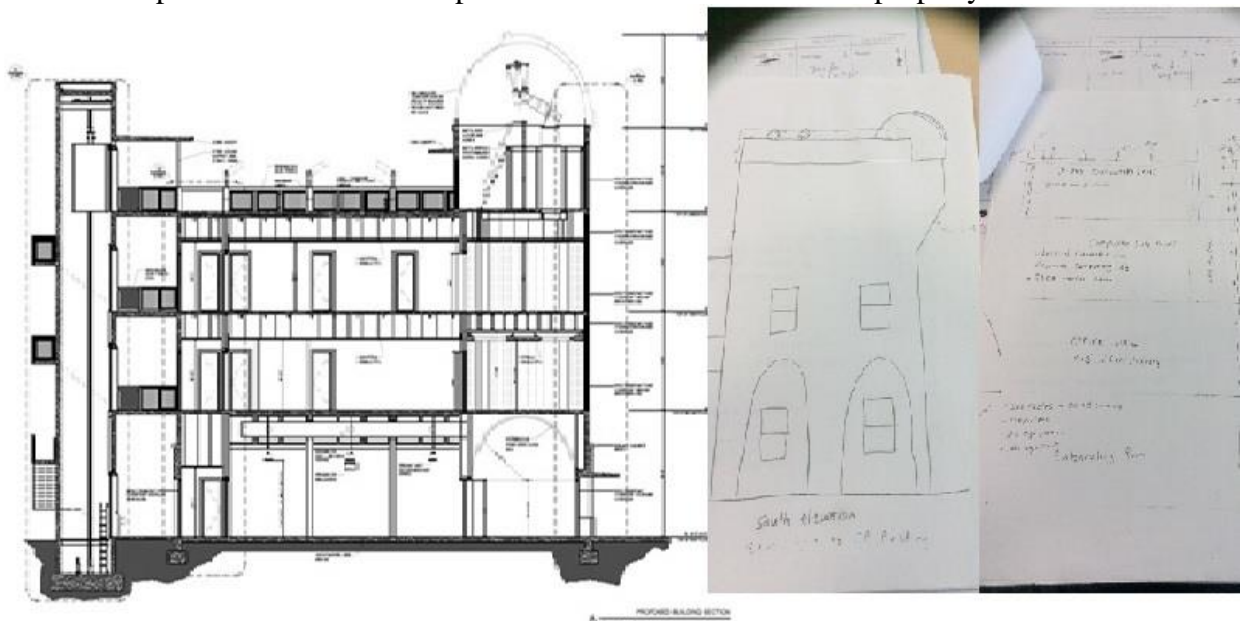


### 5) Funding for the new student observatory (“Space Seeker” and the gift)

Unsatisfied with the location of the new observing pad, I conceived of and hosted a fundraiser to raise funds for a real student observatory, the fundraiser called “*Guitars under the Stars*” was held at the new conference center on FIU’s North campus. I organized the event, sent out invitations and funded it solely on my own, no help from FIU Advancement or the Deans office. It was a solo effort. I invited some musician friends to play and I gave a talk about the need for a real student observatory. The musicians donated their time and talent because they knew it was a worthy cause. We raised \$20,000, but more importantly a grand public promise from FIU President Mitch Maidique to match any amount of money I could raise for the observatory. Although the funds from the event was very small, the promise to match any funds I could raise was an important result. Dr. Carl Stocker saw the “Space Seeker” article and was inspired to contribute to building the observatory. Dr. Stocker called me and said he wanted to donate \$1,000,000 for the observatory. At the time the State of Florida had a program called the Cortellis matching fund, which matched any private donations to universities. Dr. Stocker’s donation matched by the State and again by Dr. Maidique would be enough to build the observatory! Unfortunately, the Cortellis matching program was cancelled in 2011, before it could be used to match Dr. Stocker’s donation.

- 6) **Design phase** -The promised match for Dr. Stocker’s donation was put on the 2011 FIU PECO fund list and fortunately was approved by the Florida Governor, thanks to the work of FIU governmental liaison Steve Sauls, assistant Dean Ken Furton, and new FIU President Mark Rosenberg. The PECO funds for \$1,600,000, along with the \$800,000 from Dr. Stocker was enough to build a real student observatory. I chaired the building definition committee and *single handedly* wrote the building definition document in 2010. I served on the FIU committee to choose an architectural firm to design the building. I advocated the special features needed in an observatory, in particular the need for a pier for the primary telescope in the dome and a vibration-less rooftop observing pad where student telescopes were to be set up! The architectural firm of Portondo-Perotti along with Siddiq-Khan engineering company, were selected to design the observatory. I was able to convince the FIU architect selection committee to accept the Perondo-Pierotti’s proposal because their application contained a complete simulation and analysis of vibrations that could

affect the telescopes. The building was to be based on my original designs shown in Figure 1 (right panel). The final design phase (left panel of figure 1) began in 2012 and continued into 2013. The building was built by the Stobs Brothers Construction Company, and was designed to be LEED silver and was supposed to be finished and open by September 2013. I closely supervised the construction as I had heard horror stories of construction companies tying in support beams to the telescope pier and introducing vibrations into the telescope. I visited the construction site during every concrete pour around the telescope area to insure it was installed properly.



**Figure 1.** Final architectural design

Dr. Webb's original hand drawn design

- 7) **Grand opening** As construction approached completion I planned a spectacular week of grand opening events for October 2013, even inviting Dr. John Mather to be special guest for the grand opening. Dr. Mather had recently won the Nobel Prize in Physics for his work with the COBE satellite which mapped the cosmic microwave background. I met him at an American Astronomical Society meeting because of my name! Dr. Mather was working on a new project, the James Webb Space Telescope at the time, and he looked me up because of my name and we became friends. I invited him to be guest of honor at the observatory opening ceremony and he accepted. The final construction of the building was significantly delayed and when the ribbon cutting ceremony occurred on November 2013, only some portions of the building were actually finished. Nevertheless, we had three days of events and celebrations for the opening of the observatory including concerts, talks and dinners all planned, hosted and mostly funded by me.



**Figure 2.** Stocker Ground-breaking ceremony

**8) Finishing the Observatory and Additional Funding** I then submitted and was awarded a tech fee grant in 2012 to acquire the main 24” telescope for the AstroScience Center (\$381,080.0) from Astronomical consultants and equipment (ACE). The 24” telescope was a research grade instrument and was the perfect size to maximize the observatory in its location. The operating system was identical to the operating systems used by the SARA telescopes, so the 24” local telescope would be an efficient training scope for future users of the SARA research telescopes. The 24” telescope was installed in 2014 by Dr. Peter Mack of ACE, and I was drafted as a helper for the installation. That turned out to be a valuable experience as I can now diagnose and even fix most problems that arise with the telescope. I submitted and was awarded more tech fee grants to purchase the needed lecture room electronics (\$40,645 Tech Fee 2012) and the control room electronics (\$140,000 Tech Fee 2014). The introductory astronomy laptops were purchased through a tech fee grant as well (\$92,000 Dr. Simpson Tech fee 2016). The local amateur astronomy club, the Southern Cross Astronomical Society donated \$2000 to fund the “Art in Public places” funding to realize my vision for the entryway/exhibition hall of the observatory. I had seen a beautiful 15’ glass tile floor mural at the Imiloa astronomy Center in Hawaii and fell in love with their Italian glass tile floor mosaic. So for our “art in public places” I commissioned a 6” diameter Italian glass mosaic of a painting I by the same artist as the Hawaiian mosaic for my observatory. The mosaic was made and installed in the entry way exhibition hall of the observatory.



**Figure 3.** Entryway exhibition hall italian glass tile mosaic.

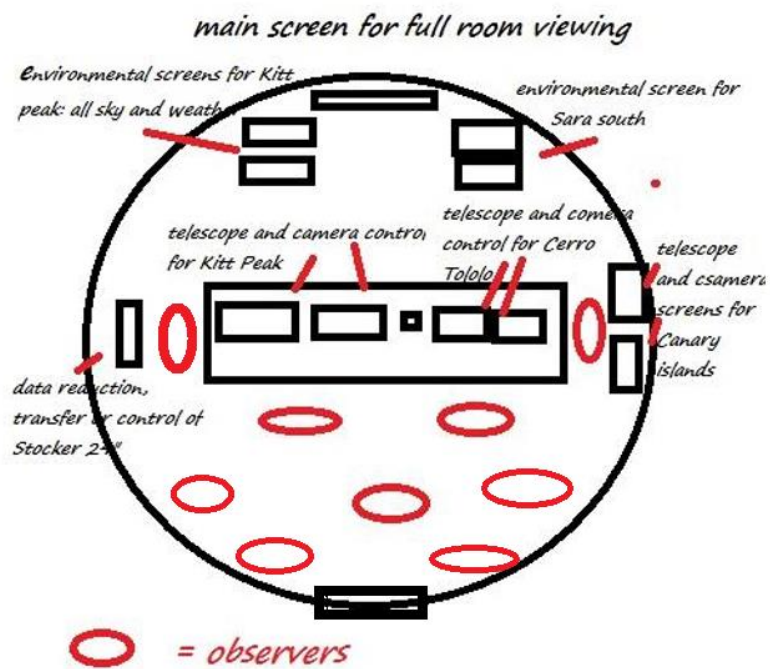
- 9) **Exhibition/entryway** I conceived of the idea to paint the domed ceiling of the exhibition hall to resemble the Hubble deep field image, displaying the most distant galaxies ever seen by humans. Exhibition hall, on the floor below then is the impressive Italian glass tile mosaic, and when they look above them they are gazing into the distant universe at galaxies billion of light years away and are looking at the universe as it looked billions of years ago. Further improvements in the exhibition hall included funding from Orbital ATK for a TV and a subscription to Hubble space telescope Viewspace, featuring a constantly changing lineup of 5-minute videos about astronomy and NASA space science. A grant of \$5,000 from the Lindner family funded a big screen TV and computer to run the “Stocker TV channel” featuring videos of images taken through the Stocker 24’ telescope. Anyone walking into the exhibition hall will be inspired to learn more about our universe.



Figure 4. Hubble Dep Field image painted on domed ceiling in exhibition hall.

- 10) **Starship Control Room** When I was designing the observatory I envisioned a dedicated telescope control room to be a special room where I could control the SARA research telescopes and the local 24” telescope all at the same time. I also wanted it to be optimized to teach advanced astronomy classes for students. Each telescope requires 3 screens, a telescope control screen, camera control screen and a weather screen, so I planned for a total of 4 computers, 12 screens and seating where at least 10 people can comfortably be in the determine the most efficient placement of the screens and controls so everyone could participate in the observing using our telescopes. In order to design the room I researched the layouts of emergency management control rooms, NASA control rooms and other scientific control rooms. I found an article about a multimillion-dollar renovation of the Newport New linear collider control room and felt the layout would be appropriate for our control room. So when transcribing this basic layout into the round room on the 2<sup>nd</sup> floor, I noticed something familiar. When I drew the screen layout in the round room it reminded me of something he grew up with: a Star Trek *starship bridge*! I worked with the FIU AV

tech guru Bob Werner (whom I called Scotty: a Star Trek reference) and designed the starship telescope control room. I described the functionality I wanted, and Bob found the equipment that made it work. The furniture budget was gobbled up with specialized furniture to build the control room but further grant funding filled the gap. To date the control room is not only an efficient control room for the operation of four remotely controlled telescopes, but an excellent teaching space and a highlight of the observatory tours. When I teach the observational astronomy lab class, my students participate in using the SARA telescopes to take images of interesting astronomical objects and reduce the data. The functionality built into the control room, is that when I control the telescope, the telescope control computer monitor is projected onto the 81" main screen and everyone in the room can see the commands and the results. Then when the camera is operated, the camera control monitor is switched to the main monitor so everyone in the room can see the commands and the results. Not only is it a superefficient telescope control room capable of controlling telescopes located across the globe, in Arizona, Chile, and Canary Islands simultaneously, it is also a superefficient teaching tool allowing up to 20 students to participate in observing simultaneously.





**Figure 4.** Starship control room final design.

11) **Public Outreach and Education** The first floor lab room is busy daily with Descriptive astronomy labs, where non-science major students are exposed to hands-on learning of astronomical concepts and principles. They build telescopes, do computer labs, and other hands-on labs to learn firsthand the principles they are taught in the classroom. The enrollment in all of the sections of that class is approximately 400 students per semester, thus over 8,000 student use have used the facility for classwork since its opening in 2013. The advanced image processing laboratory on the third floor is home to the Observational astronomy lab and houses 10 computers with all for the imaging processing software needed to analyze images taken with our telescopes. Advanced students learn to turn images into science in this lab, educating future astronomers.

12) The rooftop observing pad which is the real reason the building was built allows our lab instructor to set up powerful 8-inch and 12-inch telescopes on the specially designed observing pad above most of the ground lights and see the remarkable sights of our universe. Between 20 and 30 students can use one of 6 telescopes to see the moon of Jupiter, the rings of Saturn or up close and personal views of the Moon with amazing clarity. I have always maintained that actually seeing these things with your own eyes makes them much more impactful than even the best pictures. This is why I spent so much time and energy to get this observatory. Every descriptive astronomy lab student must go to at least 2 observing sessions, and not just look through the telescopes but draw what they see and learn about the telescopes. An experience like this is transformational and needs to be protected. This experience for students has fueled my 10 year university wide project "Bring the Stars back to FIU" which is a concerted effort to reduce or eliminate light pollution on campus. Not make campus dark but make it lit correctly so it is safer, cheaper to operate (lower electric bill), reduces carbon footprint, and reduces unnecessary light pollution allowing us to see the star better. I call it a win, win, win, win situation. We made some progress over the 10 year span, but some losses as well.

13) The observatory has hosted five public star parties/lectures every semester since 2014. Attendees range from FIU students, faculty and their families to local community college students, high school students, and members of the Miami-Dade community. The observatory has hosted over 241 public events and approximately



14,417 visitors since its opening in 2013. The star parties feature NASA updates where I explain the most recent and exciting result in the world of astronomy and space travel. The public lectures feature 1-hour long talks about subjects in the world of physics and astronomy with Q and A sessions afterwards. They range from the history of astronomy (Hawaiian astronomy, Mayan astronomy, Native American astronomy, Chinese astronomy) to physics topics (the nature of space-time, the edge of physics, quarks and nuclear physics) to all aspects of astronomy (Black holes, space travel, supernova, the edge of the universe, the search for intelligent life).

### Later Days

14) Since music plays a large part in my public programs and I was teaching a “Physics of Music” course at the time I was designing the observatory, I decided to “tune” the 1<sup>st</sup> floor lab room so it would be a good concert hall when it wasn’t being used for labs. During the 10 years the observatory has been open, it has hosted nine professional concerts from 2015-2023, including performances by world famous guitarists Muriel Anderson, Tom Lumen, Federico Bonacossa, and folk singers like Grant Livingston and Jennings and Keller. Dr. Mesut Ozgen of the FIU music department has also used the observatory for performances during the annual GUITArt music festival. I regularly perform concerts of my original astronomy music during star parties.



**Figure 5.** Muriel Anderson and I performing *Imagine* in the observatory concert hall.

15) In addition to the public programs, the observatory hosted *Saturday Night Live*. No, it is not a comedy event, but an open house where students set up telescopes every clear Saturday night, so that anyone, students or the public, can wander up from sunset to 10:00 pm and look through our telescopes at the planets, the Moon, or nebulae. Dr. Susanna Rose and Dr. Van Hamme in the Arts and Sciences dean’s office found funding for our astronomy students who set up the telescopes. We aim to make the night sky accessible to anyone who wants to see it. We had 165 clear nights, but this program was discontinued in 2020 due to the COVID-19 pandemic. The observatory hosted an Eclipse watch star party in 2017. Over 1000 faculty, students and people from the community showed up to see the eclipse through the Stocker telescopes and solar filters. The lines extended from the observatory out to the parking garages. This event attracted much media attention and was covered in local news channels.

Our 10<sup>th</sup> year anniversary featured another visit by Dr. John Mather, and another solar eclipse! This one was in 2023. Once again 100's of students attended and we passed out eclipse glasses, had solar telescope set up, and Miami news media interviews.

- 16) **Student projects** such as the Messier List project provided students an excellent opportunity to learn how to do astronomy. The project entailed using the 24" telescope and the attached CCD camera to make color image of all 110 Messier objects strewn across the sky. A FIU undergraduate student, a high school intern, and a middle school student all participated in using the 24" telescope to photograph all 110 Messier objects (Galaxies, nebula, and star clusters) in 3 colors using the CCD camera and associated LRGB or UBVRI filters, The images were then reduced and color combined in the MIRA image reduction program and compiled into a presentation that runs continuously on a TV in the Stocker exhibition hall. The students learned how use the telescope and to take images through filters with the CCD camera. Then they learned to reduce the images and color combine them. And finally they learned the astrophysics of every object in the list. A second student project was undertaken by a high school intern along with assistance from aa physics undergraduate student. The "Star of Star Trek", was a project I conceived after I read an interesting article in the magazine "Astronomy" that discussed every real star referred to in the Star Trek universe. This resulted in the 13 stars in their list accessible to the 24" telescope being photographed and studied for the suitability of life. The student learned about using telescopes, taking images, and the astrophysics of stars. Which stars are on the main sequence, which stars have planets detected and stars might have planets in their goldilocks zone.
- 17) **Research:** Although intended to be a teaching instrument, the excellent capabilities of the telescope and some efforts to reduce light pollution around the astroscience center enabled the 24" telescope to participate in research projects. I use it to monitor bright ( $M_R < 15$ ) Blazars in preparation for observing runs made on the SARA research telescopes. In brightness monitoring of bright Blazars, detecting outbursts, and monitoring other objects such as comets and asteroids. More than 8 papers in scientific journals contained blazar data from the Stocker 24" telescope. The 24" is a valued member of the WEBT (Whole Earth Blazar Telescope consortium). We participated in NASA satellite backup observations and even were the first to detect an outburst of Blazar PKS1156+295.
- 18) **The untimely potential Demise of the Observatory.**.. I first found out about aquatic center from the Panther Now article. I immediately realized the adverse effects on the observatory because of proximity to observatory (100 yards. I contacted President Jessell and VP of facilities John Cal and informed them of the effects on our observing program. I attended the public meeting on the master plan where a relocated pool (closer to the observatory). I presented a 6 page powerpoint describing the deleterious effect the Aquatic center would have on the observatory. No one disputed my evaluation of the situation. I attended the Trustee meeting and the updated masterplan was presented with the Aquatic center at site 11. No discussion of my concerns or the destruction of the observatory! At a coffee break I

mention the problems with site 11 for the observatory and they were completely unaware of the problems? I repeatedly asked the FIU administration to protect our observatory and remove site 11 from consideration with no success. I wrote a personal letter to each trustee delineating the adverse effects of the aquatic center at site 11. Requesting that they delete site 11 from consideration for the reasons outlined below. I presented the problem to the faculty senate and they voted unanimously to remove site 11 from consideration for the aquatic center because of the destruction of the observatory. Attended the trustee meeting on October 17, and they voted to put the pool at site 11 in spite of the effect on the observatory and the wishes of the faculty. I met with Ken Jessell and he told me not to worry, just because they approve it, it might not be built for 5 years and could even be moved. I wonder why the trustees would meet 3 times if it didn't mean anything. I know well the funding could arrive tomorrow! I don't want the observatory to have an expiration date, 5 years, 10 years, or 5 years! I attended the November trustees meeting where they approved the 2024-2035 Master plan with the aquatic center at site 11 with no objections from the FIU administration. I was allowed 2 minutes to speak to at the meeting but it didn't change the results. The pool will be built at site 11!

- 19) **My comments:** Dear Board members, I appreciate your passion for FIU. I understand you have a vision and want to make campus attractive for students like University of Miami and Tampa University. I love FIU as much as anyone and have spent my entire 30-year career here teaching students and trying to improve campus for everyone. Our students' on-campus experience is very important, and I don't want to destroy anyone's vision for the campus. However, the education students get while they are here is our prime directive. The Stocker AstroScience Center is the premier on-campus astronomical observatory in the State of Florida, nothing like it exists at any other Florida university. Our generous benefactor Carl Stocker gave us funding to build the ultimate student observatory. I have no objection to building an FIU aquatic center on MMC campus, just not at site 11 where it will destroy our student observatory. The observatory relies on a relatively dark environment as the main classroom is the outside observing pad. Being an outside classroom and laboratory, it is sensitive to the environment around it. Bright lights obscure the stars from our view and the noise from a pool will distract students trying to learn about our universe. Further, the warm pool will generate thermal currents of water and chlorine evaporating and rising into the sky that will affect our vision in the entire eastern part of the sky and corrode our sensitive optical instruments. Your vote to place the aquatic center at site 11, is a vote to **needlessly** destroy a valuable teaching, research and public outreach facility for FIU and our entire community that has proven its worth for over 10 years. It would betray the generous philanthropy of Dr. Stocker, the wishes of the FIU faculty, students, and the community and have a decidedly negative impact on the education of our students. The only value of putting the Aquatic center at site 11 over the other sites is that in your opinion it would look great for students to walk by. I urge you to vote to permanently **remove**

site 11 from the list of sites for the aquatic center. Please reconsider placing the Aquatic center at sites 7 or 24 which would not affect any academic programs or affect the students' experience of their student observatory. I would be happy to answer any questions from the board about the effect of the aquatic center on our observatory and its function. ***VOTE no for site 11.***

20)