



# CAMPUS MASTER PLAN

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## TEXAS A&M UNIVERSITY AT GALVESTON

2020 UPDATE  
APRIL 2020

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SECTION A  
INTRODUCTION  
AND PRINCIPLES





Texas A&M University at Galveston (TAMUG) is a unique campus: not only does it have a clear and focused mission, but its physical setting is tailored precisely to its needs. In the lifecycle of universities, TAMUG is still young. The first 50 years of the history of the university have been focused on building up a physical infrastructure which can support a critical population mass. Established initially as little more than an outpost of the main Texas A&M campus, TAMUG now offers a range of programs and amenities worthy of a complete campus. This first phase of growth at the campus has seen the campus expand to around 2,500 full-time equivalent students, with a variety of programs to match. The campus has transitioned from one building on a hard-baked flat with a pier for the training ship, to a complete campus featuring academic, research, housing, and recreational facilities.

As the campus continues to grow and mature, the next 50 years of TAMUG must focus on how the campus can become a place which encourages collaboration and closer connections between its mission and physical setting. No longer should solutions which are merely good enough be accepted. To become fully actualized as a national leader in maritime and marine programs, TAMUG must implement facilities and campus spaces which knit together those programs with the waterfront and natural spaces offered by the campus's unique setting.

Master plans are often described as roadmaps. That is most frequently intended to imply that they lay out a sequence of steps, to be followed in order, to arrive at a destination. But inherent in that analogy is the implication that a master plan actually offers multiple routes to a destination, and it is in that sense that this master plan is offered. That destination is laid out most succinctly in the principles described on the next pages, as well as in greater detail in the full campus program, renderings, and supporting materials.

## Principles

### INTRODUCTION AND PRINCIPLES

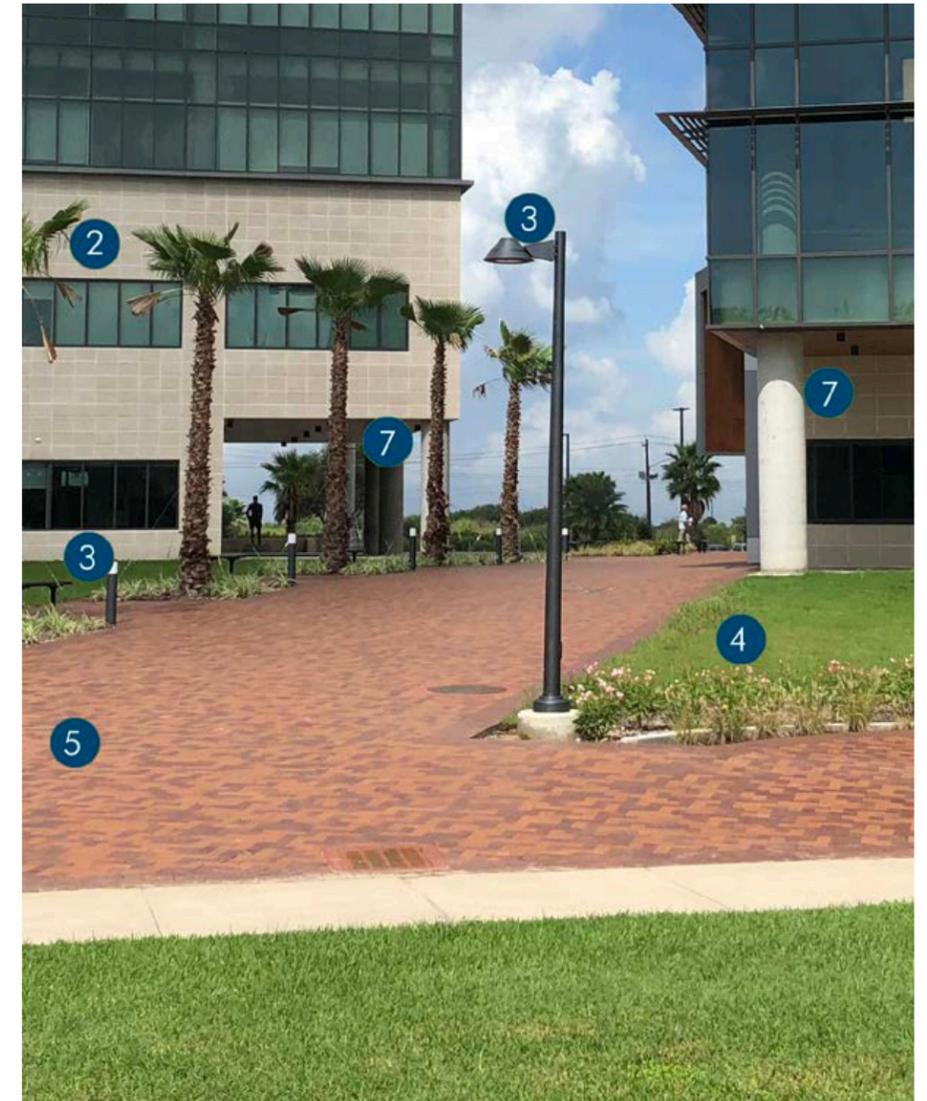
Vision is at the core of this plan. That vision is the destination, although in truth, the ever-changing nature of modern universities means that the destination is rarely reached. Rather, the vision represents what the administration is striving towards.

Strong principles are the best way to ensure that that vision is carried out. They are a means of charting decisions – and results – against specific criteria. Campuses are not just collections of buildings: they have character, and they affect students, faculty, and staff in myriad ways that are not always obvious. These principles, developed through several rounds of input and feedback with the master planning committee, reflect the intended impacts of the master plan on the university.



## 1 Facilitate a Collaborative Environment

Collaboration is the heart of the collective enterprise of a university. Bringing students, faculty, and staff together is the key to successful learning and research. The physical campus environment should support that collaboration in thoughtful ways. This first and foremost goal is really an umbrella over the following goals: it is an overarching pursuit which is wider and deeper than just architecture. The rest of the goals support it.



## 2 Heal Campus Spaces

TAMUG has seen tremendous building growth over the past ten years. Development and refinement of campus spaces has not kept pace with that growth, and as seen in analysis sections later, many parts of campus are actively detrimental to the feeling and character of the university. Those issues should be addressed and healed.



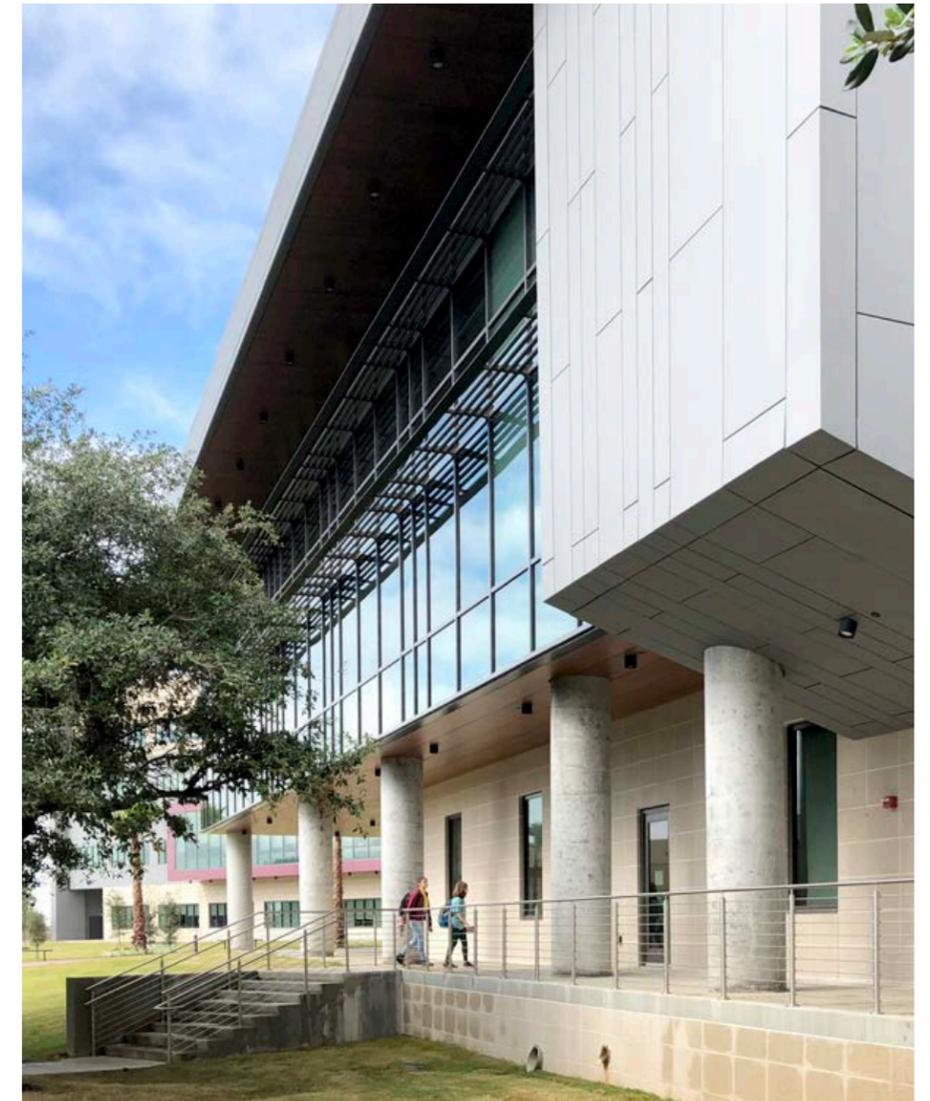
### 3 Strengthen Connections to Waterfront and Natural Areas

Celebrating and building on strengths and unique characteristics is a critical part of placemaking, which is itself at the heart of places people love. TAMUG's proximity to the working waterfront and barrier island natural areas is a tremendous strength, but the campus does not currently reflect and build upon those opportunities. The master plan must correct that.



### 4 Create Opportunities for Traditions

While not a directly physical trait, as other campus characteristics are, tradition runs deep in the heart of the Aggie. Establishing ways for existing Aggie traditions and new traditions to be kept and built will create connections between Galveston and College Station. Further, it will build life-long connections between the campus and its students.



### 5 Improve Impressions for Visitors

Successful universities display the best version of themselves to prospective students, visitors, and others on the campus. TAMUG has made great strides in doing so, but much work remains. Improving the way in which people experience the campus should remain a strong goal.

## Executive Summary

### INTRODUCTION AND PRINCIPLES

The next 50 years of TAMUG will focus on how the campus can become a place which encourages collaboration and closer connections between its mission and physical setting. TAMUG will implement facilities and campus spaces which knit together maritime and marine programs with the waterfront and natural spaces offered by the campus's unique setting.

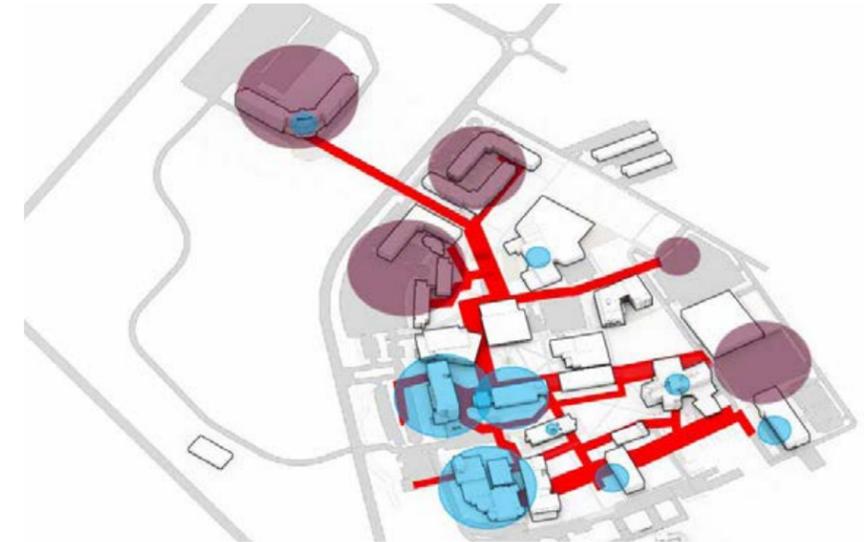
#### The Importance of Spaces

Spaces root the campus to its place. The place, in the case of TAMUG, is a special one, and campus spaces must reflect this identity. Spaces are the true experience of the campus. Nice though buildings may be, they do not connect to us as people in the same way that walking through a campus does. For TAMUG to become more meaningfully rooted to its place, campus spaces are critical.

Many of the concepts of TAMUG's current strategic plan relate to building the sorts of connections and opportunities that benefit directly from creating collaborative environments. Implementing this strategy must be accomplished in multiple dimensions on campus, from how programs and classes are structured, to student and faculty support and organization, to how buildings and spaces are designed. This master plan is built around changes which will accomplish the physical parts



of those strategies: new campus elements have been designed to drive pedestrian traffic along common corridors – and not necessarily the shortest corridors – which interface with gracious outdoor spaces.



Pelican Island Bridge

The projected realignment of the Pelican Island Bridge is at once a tremendous benefit to the campus – no longer will industrial traffic route directly through the middle of campus – as well as a challenge: the campus has been planned and built around the current alignment and reorienting the campus to the new alignment will mean disruption. Fully addressing the impacts of this change will not occur within the 30-year long-term planning horizon of this master plan, but the plan will begin to adapt to the long-term future within the next five-year period, anticipating that the bridge will be completed in the next ten years.



### Waterfront and Building Types

Development of and investment in the waterfront have always been important facets of campus planning for TAMUG. The changes called for in this master plan are for increased focus and different relationships between buildings, usage, and the waterfront itself. One major component of this will be facilities purpose-built to combine the waterfront operations components of academic programs with the labs, classrooms, and offices that those programs need.

But new buildings on the waterfront should offer more than functional space. Just like OCSB and the Waterfront Pavilion, gathering and casual spaces should be included in each building. Views to the waterfront from these spaces should be emphasized.

### Parking and Traffic

TAMUG has benefitted from ample and well-deployed surface parking over the years. As the campus becomes more populous and increases in density, parking must densify along with the rest of the campus environment in order to maintain current standards of proximity and walking times from parking to campus destinations.

The solution is a parking structure. Structured parking can not only provide for the growth in supply in parking but can also create additional building sites by making parking more compact. Properly sited, a garage will have a positive effect on campus spaces and on campus pedestrian traffic.







SECTION B  
FOCUS AREAS

## Overall Master Plan

### FOCUS AREAS

The plan on this page shows the overall master plan at build-out in 2050, including all new facilities, site improvements, and associated work. Following pages will explore the main concepts of the new master plan in detail.

- 01 Engineering Building
- 02 Academic/Vessel Operations Building
- 03 Academic Building
- 04 Academic Building
- 05 Student Life Center
- 06 Structured Parking
- 07 Police Headquarters & Physical Plant
- 08.1 Central Plant (New)
- 08.2 Central Plant (Addition)
- 09 Residence Hall
- 10 The ISLE
- 11 Sea Turtle Center
- 20 Surface Parking
- 21 Surface Parking
- 22 Surface Parking
- 23 Boat Basin
- 24 Ship's Green
- 25 ISLE Quad
- 26 Kirkham Quad
- 27 Recreational Fields and Pavilions
- 28 Reserved Space
- 29 Recreational Trails and Site Preservation



## The Importance of Spaces

### FOCUS AREAS

Spaces, not buildings, should be the measure of future development

Spaces must be designed to encourage interaction and enjoyment



A campus perceived as a series of buildings will never have the cohesive character of a campus perceived as a series of spaces. Spaces root the campus to its place. The place, in the case of TAMUG, is a special one. Pelican Island is a place only lightly separated from the water. Campus spaces must reflect this identity. They must relate to the waterfront and to the natural areas on the island; their authenticity (and therefore success) is tied to that connection.

The plan on this page visualizes the campus in a very different way. Every plan drawing has a natural bias, just like every photograph has a natural focus. Most site plans place their focus on buildings. Because buildings have a fixed, determinate nature – and are large investments – this bias is natural. In many campus plans, buildings are what matter, and spaces are what is left over.

The bias of this plan is the spaces. Spaces are the true experience of the campus. Nice though buildings may be, they do not connect to us as people in the same way that walking through a campus does. No, experiences and places are our connections to our present and past. For TAMUG to become more meaningfully rooted to its place, campus spaces must be perceived as primary.

A great space has an identity. That can take many forms – the materials used, character of the vegetation, a grand building façade – but it is necessary. Further, that identity is a focus around which tradition and custom can cohere. Traditions root us to places: there is no better exemplar of this than College Station. Spaces at TAMUG must be shaped and seeded to create these opportunities.

## Campus Space and Collaboration

### FOCUS AREAS

The waterfront should become a focus for working, gathering, and study

Buildings should combine assignable, service, and recreation space

The center of the changes in this master plan is to alter how outdoor spaces on the campus are used. Critically, this approach is not superficial: it is woven deeply into the most significant decisions made in planning. New building locations, parking densities, and techniques of space development are all driven by how they impact how space is used. The force behind this is a desire to greatly enhance collaboration between all groups on campus. Recent building design has incorporated these philosophies, and now campus design on a macro scale incorporates them as well.

Many of the concepts of TAMUG's strategic plan relate to building the sorts of connections and opportunities that benefit directly from creating collaborative environments. Implementing this strategy must be accomplished in multiple dimensions on campus, from how programs and classes are structured, to student and faculty support and organization, to how buildings and spaces are designed. This master plan is built around changes which will accomplish the physical parts of those strategies.

Implementing this new direction is dependent on continuing the same level of thoughtful design that the new buildings represent out into campus walkways, plazas, green spaces, and connections. This is challenging – funding for these kinds of improvements can be more difficult to achieve than funding for building projects. Donor gifts, building space improvements into building projects, and similar strategies must be pursued.

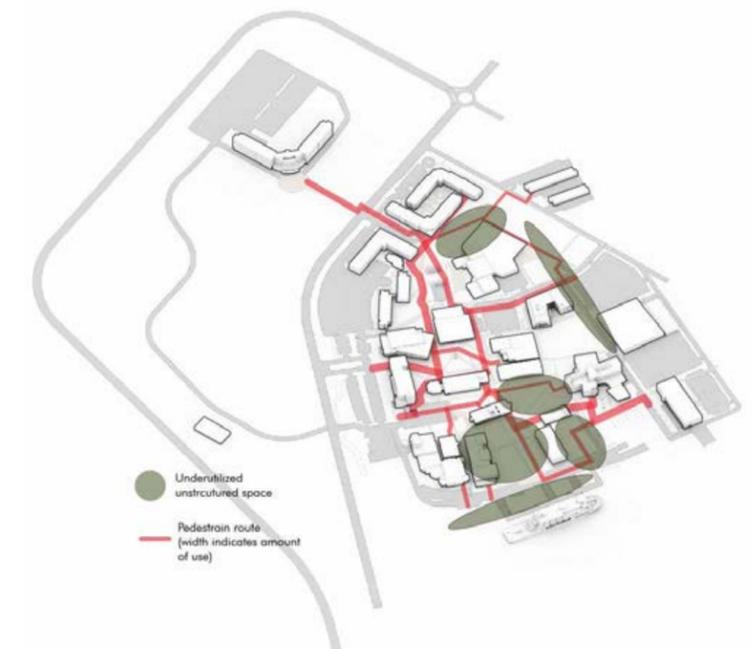
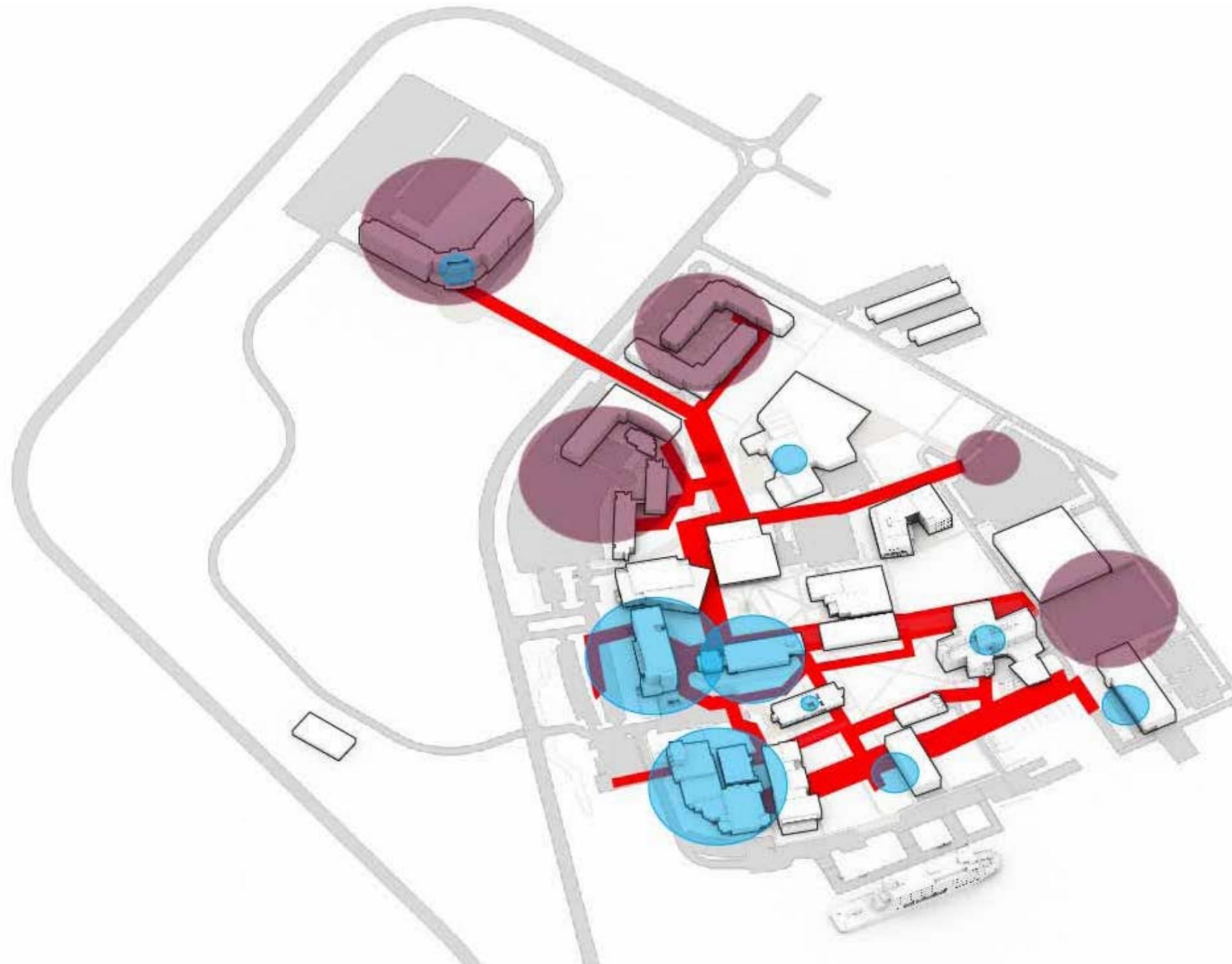


## Campus Space and Collaboration

### FOCUS AREAS

The diagram on this page shows a detailed example of how this has been accomplished. One part of collaboration involves creating opportunities for people to interact, meaning that patterns of pedestrian traffic and locations of outdoor spaces are critical components. Those patterns are set by the placement of buildings, parking, and housing.

With this master plan update, new campus elements have been designed to drive pedestrian traffic along common corridors – and not necessarily the shortest corridors – which interface with gracious outdoor spaces. The diagram clearly shows where people are coming from and going to, along with the routes and density of pedestrian traffic along them. Comparison with a similar diagram derived from existing conditions reveals that opportunities for interaction will be greatly increased.



## Pelican Island Bridge

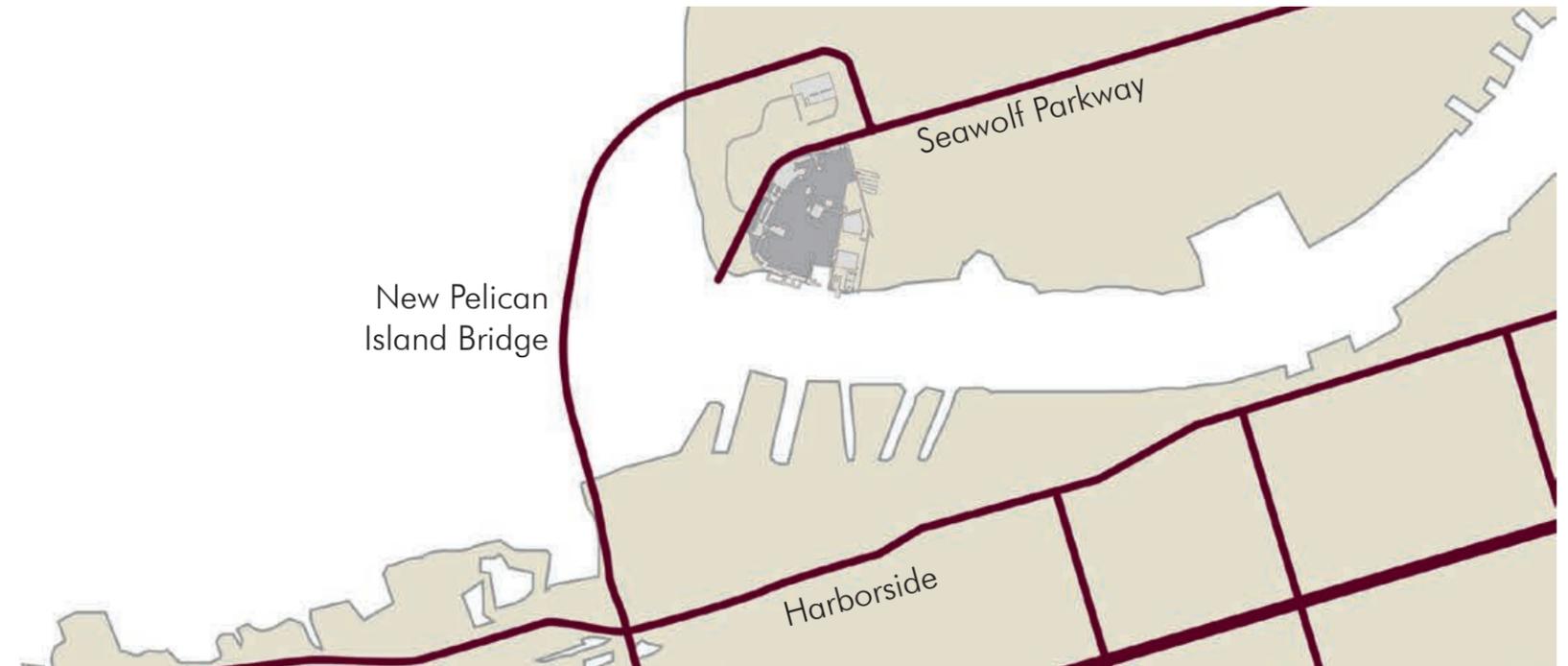
### FOCUS AREAS

The campus has faced no bigger external change than the projected realignment of the Pelican Island Bridge. It is at once a tremendous benefit to the campus – no longer will industrial traffic route directly through the middle of campus – as well as a challenge: the campus has been planned and built around the current alignment and re-orienting the campus to the new alignment will mean disruption.

Fully addressing the impacts of this change will not occur within the 30-year long-term planning horizon of this master plan, but the plan will begin to adapt to the long-term future within the next five-year period, anticipating that the bridge will be completed in the next ten years.

The campus has been built around a specific sequence of arrival, predicated upon the current placement of the bridge. The future alignment will flip-flop the arrival direction and de-emphasize the role of Seawolf Parkway within the campus: it will become an internal circulator, not a conduit for traffic on and off the island.

To this point, Seawolf Parkway is a slash cut through campus. Its traffic and noise have forced buildings, and therefore the campus itself, to set back significantly, limiting space and curtailing building sites. When the bridge moves, this will change. Buildings can edge closer and the scar tissue – the bar ditches and buffer space – along the road can be healed.



## Waterfront Building Types

### FOCUS AREAS



A new building type, purpose-built to combine waterfront operations with labs, classrooms, and offices, should be implemented

Buildings should combine assignable, service, and gathering space

Development of and investment in the waterfront have always been important facets of campus planning for TAMUG. The changes called for in this master plan are for increased focus and different relationships between buildings, usage, and the waterfront itself.

One major component of this will be facilities purpose-built to combine the waterfront operations components of academic programs with the labs, classrooms, and offices that those programs need. Rather than an isolated waterfront operations building and separated storage facilities, all of those facilities should be combined in the ground level of new waterfront buildings, with academic space above.

But new buildings on the waterfront should offer more than functional space. Just like OCSB and the Waterfront Pavilion, gathering and casual spaces should be included in each building. Views to the waterfront from these spaces should be emphasized.

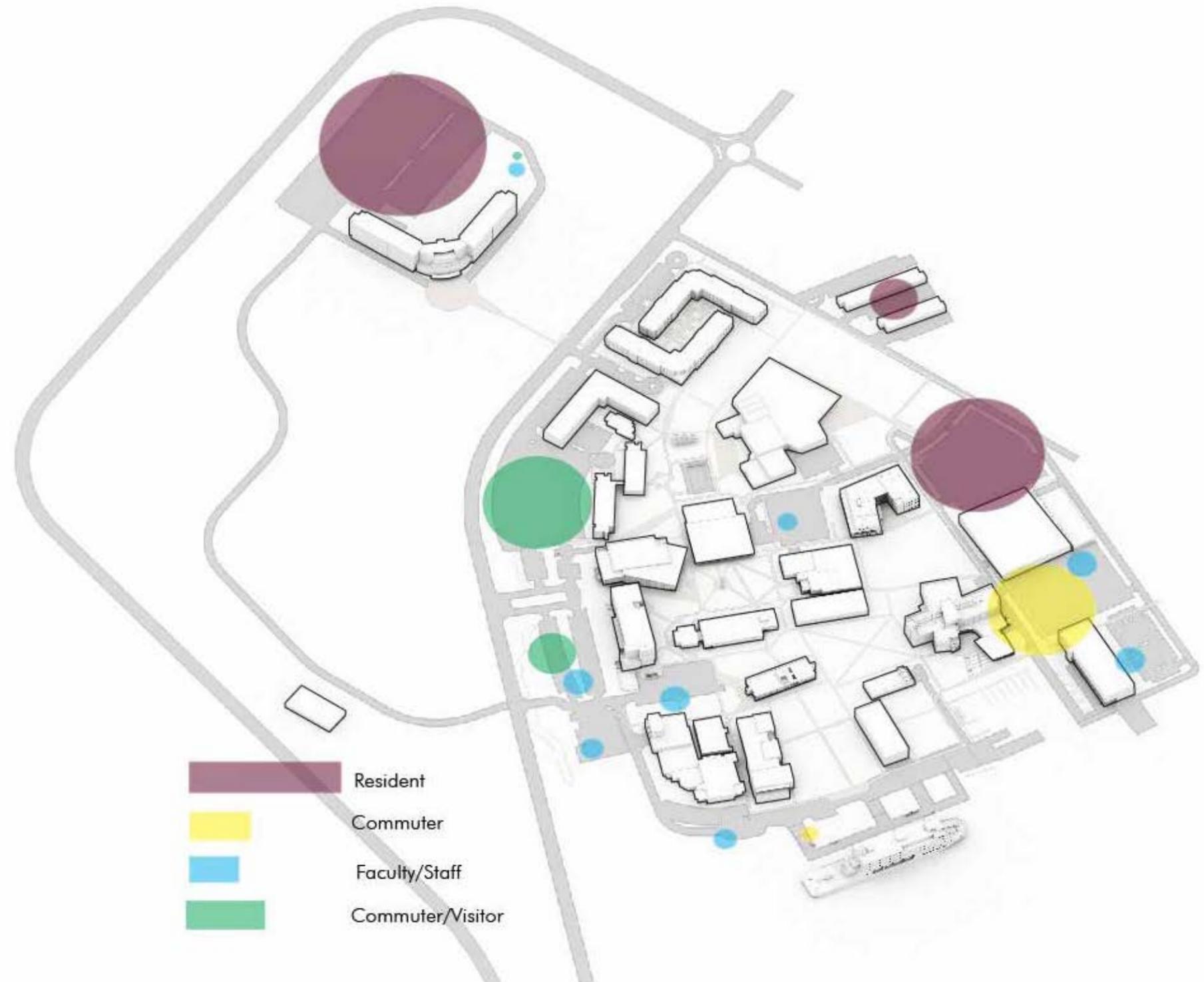
## Parking and Traffic

### FOCUS AREAS

TAMUG has benefitted from ample and well-deployed surface parking over the years. As the campus becomes denser, however, parking must densify along with the rest of the campus environment in order to maintain current standards of proximity and walking times from parking to campus destinations.

Just as important as convenience and efficiency, however, is the impact of parking on the campus environment. Growth in the campus population, given TAMUG's island location, will translate into the need for an equivalent growth in parking. If that supply is provided exclusively in the form of surface lots, a very significant portion of campus area will be occupied by parking lots: a sea of asphalt which is not conducive to the atmosphere called for in the principles established for this master plan.

The solution is a parking structure. Structured parking can not only provide for the growth in supply in parking but can also create additional building sites by making parking more compact. Properly sited, a garage can have a positive effect on campus spaces and on campus pedestrian traffic.



## Waterfront: The Role of the Waterfront FOCUS AREAS

The waterfront should become a focus for working, gathering, and study

Facilities along the waterfront should maximize the limited waterfront space



TAMUG has no more important physical asset than its waterfront. Facilities along the waterfront must be efficiently and thoughtfully designed and deployed to maximize this limited space. This is a key differentiator from previous planning: the boat basin and the working waterfront must be understood as limited resources, and investments must be made which maximize those resources.

Great waterfront areas are working waterfront areas. Harbor areas across the nation have seen surges in redevelopment and subsequent popularity over the past several decades; the most successful of these are where amenities (food, seating, shade, and promenades) and working facilities are well balanced.

TAMUG should undergo this same type of revitalization. The waterfront areas on campus must continue to support TAMUG's mission, as they have since the campus's inception, but they must also offer opportunities for collaboration between disciplines and across groups. The waterfront should be redeveloped to allow for more gathering opportunities while also densifying usage for academic and research uses.

## Waterfront: Pier and Boat Basin Areas

### FOCUS AREAS

The heart of the waterfront is the pier, adjoined by the boat basin. These two components are the working features of the waterfront operations, and as such are key to integrating campus functions with campus appearance. As home of the training ship, the pier is arguably the reason why TAMUG's campus is located where it is, and this primacy of mission should be reflected in how the campus is designed.

The master plan proposes a future expansion of the boat basin to accommodate the university's fleet. This improvement will be needed in one of the longer-term planning phases, not immediately. However, the master plan has been designed to allow for that expansion; new building sites have been placed to allow for both construction and future operation of the enlarged boat basin. Activity around the boat basin will be reinforced by the construction of new buildings on the waterfront designed to support waterfront operations.



## Waterfront: Ship's Green FOCUS AREAS



As the only major green space opening on to the working waterfront, the Ship's Green will gain new importance. The green is somewhat overscaled now, and given the future scarcity of space in this area, it will be framed by new buildings on both the west (in front of the Powell Marine Engineering Complex) and the east (replacing the current Oceanography Building and a portion of the existing Central Services Building, jutting towards the pier).

The two new buildings will sharpen the focus of the Ship's Green towards the waterfront. Views from Kirkham – particularly through the portal in that building – are remnants of the origins of the campus. They will be protected while incorporating tens of thousands of new square feet of academic and service space in the area.

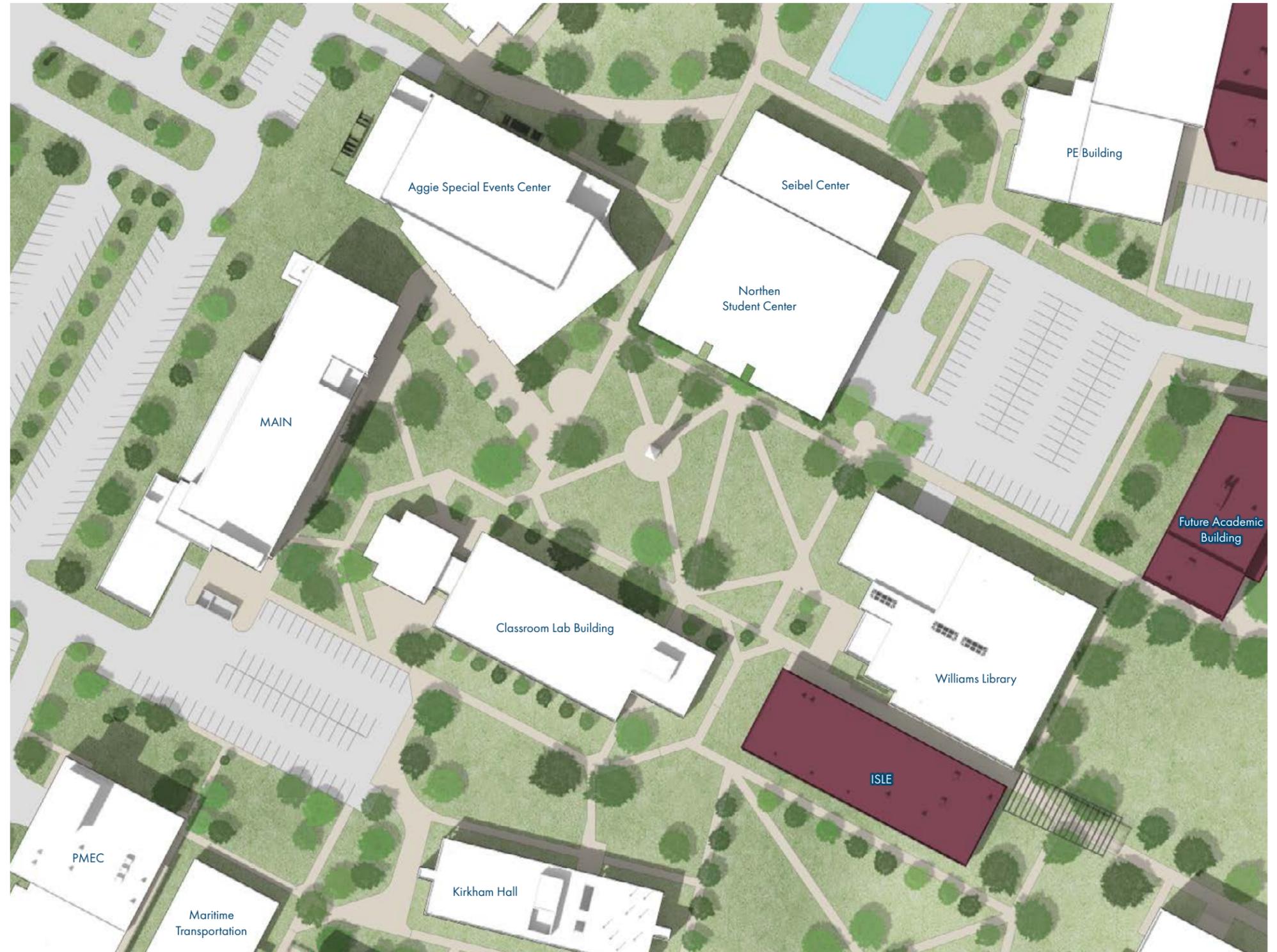
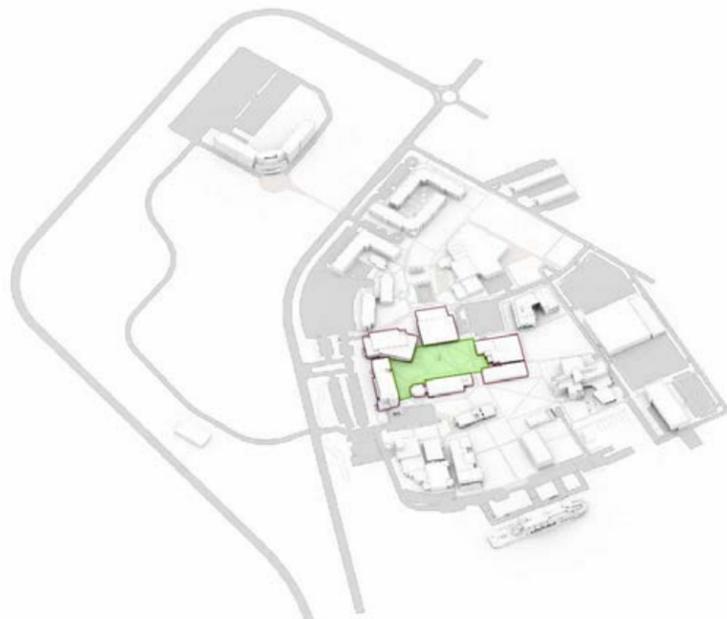


## Campus Core: Core Identity

### FOCUS AREAS

Previous iterations of the campus master plan, especially the 2013/2014 updates, called for strengthening the campus entrance sequence through the construction of what has become MAIN and ASEC. That goal has been accomplished, and the campus has benefitted greatly from that reorganization, the new facilities themselves, and the refinements to the Central Quad completed at the same time.

In fact, the Central Quad is now by far the strongest, best-organized campus space and easily one of the most pleasant to occupy. This master plan calls for improvements to other campus spaces to bring them up to – and beyond – the standard set by the Central Quad. The quality of campus space at TAMUG should be consistent with spaces at other Texas A&M component campuses, and the improvements incorporated into this master plan will accomplish that.



## Campus Core: Central Quad

### FOCUS AREAS



The Central Quad is the perceived heart of campus, and that will not change as the campus develops. It is bordered by some of the university's most heavily used buildings and is on the path between housing and the waterfront, so its central nature will remain unchanged.

The clock tower, as at many campuses, marks the acknowledged center. The tower is under-scaled, however, for what the campus has become. It is dwarfed by the buildings around it, and it does not anchor the quad the well. Opportunities should be explored to find ways to correct this scaling issue, perhaps by using parts of the tower in a new structure which is properly scaled but which still holds the memorial significance intended by the original donors.



## Campus Core: ISLE Quad

### FOCUS AREAS

This area has long been neglected. It is now no more than a shapeless space, bordered haphazardly by buildings which do not face it or form its edges. It is defined in negative, rather than actively shaped and developed.

Many of the future campus spaces will be formed or refined by new buildings. The Immersive Scholarship Learning Environment Building (ISLE) will create one edge of this quad, but other interventions are necessary to define character and create an identity for the space. This plan proposes a light shade structure along one side of the space to do several things. First, it defines an edge of the quad, and in doing so, it also creates a gathering space, where tables and chairs can be placed.

If possible, ISLE should have minor food service – a coffee shop or snack bar – available, and seating should spill onto the plaza outside. The plaza should bridge between the Library Quad and the Campus Quad, making a connection between the two spaces.



## Campus Core: Kirkham Quad

### FOCUS AREAS



This comparatively minor space is an opportunity to strengthen connections between the Campus Quad and the waterfront. It is edged on one side by Kirkham Hall, the oldest campus academic building, and this relationship should be emphasized and formalized. The eastern and western edges of the spaces should be more clearly defined so that the space is focused and sharpened.

The unusual design of Kirkham Hall, which incorporates an open portal, creates a natural means of connection between the Kirkham Quad and the Ship's Green to the south. Walkways connecting the two campus spaces as well as the Central Quad are some of the most important and most heavily traveled on campus. Landscaping should be emphasized here, particularly shade trees. Amenities such as lighting, benches, and improved paving are all critical parts of improving the pedestrian experience in this area.



## Campus Core: Housing and Student Life Complex

### FOCUS AREAS

Housing capacity at TAMUG has reached a stable point. Until existing residence halls reach replacement age/condition or student population grows to the point that additional capacity is required – which is not anticipated within the period of this master plan – no new housing will be needed. However, plans and needs can change in unanticipated ways, so as a future-proofing measure, a site has been identified for a future residence hall.

This site is near existing residence halls in order to maintain adjacencies to amenities and services. There are other potential sites in the immediate area, as well as across Seawolf Parkway, which could work equally well.

Campus recreational facilities have fallen behind current standards. The PE Building no longer offers sufficient facilities for campus needs. To address this,

a new Student Life Center is proposed which will offer facilities for fitness and recreation in support of an improved quality of life – all part of larger strategies for student/faculty/staff retention.

The center has been sited in a location adjacent to the PE Building. This will allow for shared uses but is also well located to allow for use by the wider Galveston community: the secondary campus entrance is nearby, as is ample parking (and the future parking

garage). Adjacencies to the pool, sand volleyball pit, and other areas proposed to be landscaped and developed as campus spaces will help create a student-centric face on the campus side of the complex.



## North Campus: Natural Complications

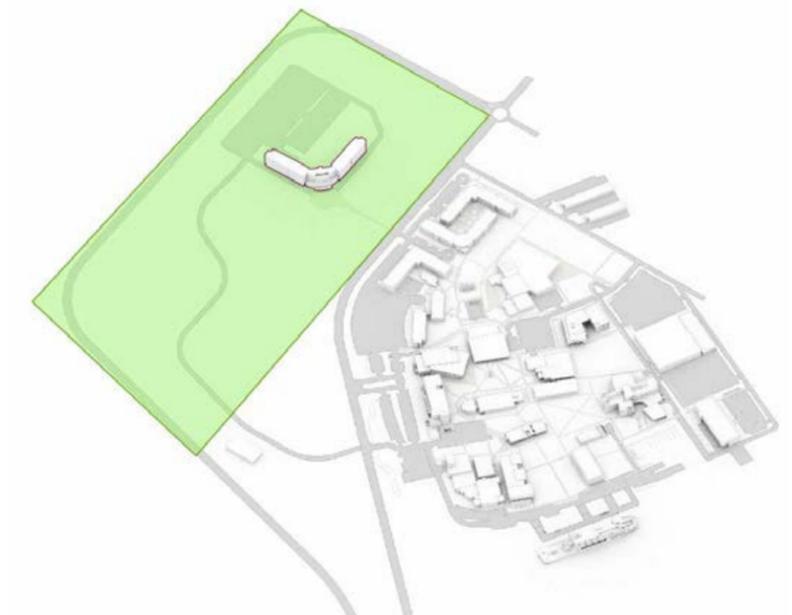
### FOCUS AREAS



Seawolf Parkway was a barrier to campus growth for many decades. It was finally bridged by the construction of the Texas A&M Maritime Academy Hall, but it remains largely undeveloped. However, it has other challenges as well: not only is it perceptually remote from the rest of campus, but it also is pocked with wetlands and other undevelopable area. This means that the land is both difficult to develop as well as a natural amenity.

This master plan, like those before it, calls for a measured approach to development in the natural area. Uses like recreational fields and walking trails have an innate suitability to the area, and future development of that type is shown there.

However, in the ten-year timeframe, the new bridge and subsequent recharacterization of Seawolf Parkway as an internal roadway will open up new opportunities for building sites. Campus currently sets back significantly from Seawolf because of the busy, loud character of it now; that will change and buildings can move closer to the road alignment. In fact, the portion of Seawolf nearest the existing bridge can likely be demolished entirely, allowing for a future building site there.

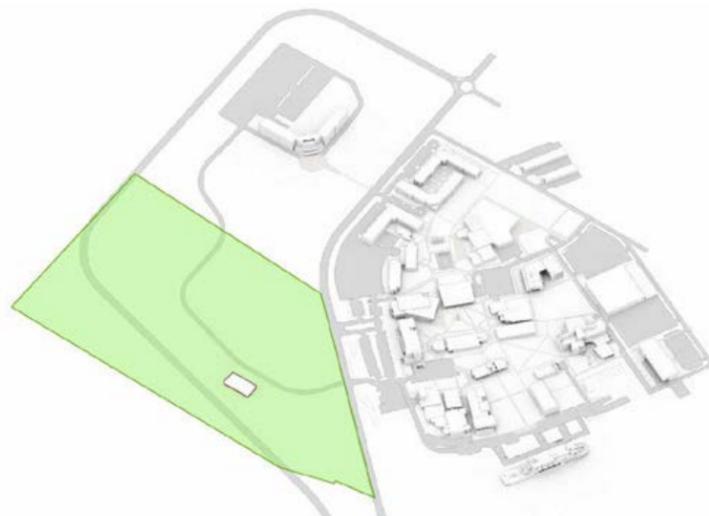


## North Campus: Western Shore FOCUS AREAS

The area west of the road to the Texas A&M Maritime Academy Hall is home to the new sewage treatment plant, dredge spoils areas, TAMUG's Wetlands Center, and several National Wetlands Inventory-identified wetlands areas. It is projected to be the landing spot for the future Pelican Island Bridge as well, which will dramatically alter the appearance of the area.

The Sea Turtle Center will be located here to take advantage of adjacency to the shoreline, wetlands, and other natural areas. This area will also be the site of walking trails and recreational fields – both uses which can be woven into the natural landscape with relatively limited disruption. In fact, the precise location and size of recreational fields should be fine-tuned in the field to limit disruption. Regulation field sizes are not necessary for all recreational fields, and that flexibility should be used to advantage here. Further, new roadways in this area should be limited – in fact, access to all new facilities, including the Sea Turtle Center and recreational fields – should be via existing roads.

Trails should connect from the TAMUG working waterfront, to the existing fishing pier, to a re-imagined Pelican Island Bridge pier, and then into the trails that will weave through the natural area.



## North Campus: TMMA and Framing the Entrance

### FOCUS AREAS



The Texas A&M Maritime Academy Hall was by far the most important step in establishing the presence of the university on the north side of Seawolf Parkway, which in turn has been critical in the larger conversation regarding the location of the future bridge. With the projected course of the bridge and its associated roadways intersecting Seawolf Parkway just east of the campus, TMMA now has an important new role: anchoring what will become the new entrance into campus.

The most important change from a visual perspective will be that the campus will have a true gateway entrance for the first time. Instead of being split by a public road, TAMUG will have a true perimeter, creating the opportunity for a more traditional and significant entrance. The rendering on this page shows that new entrance, with design features inspired by those along Texas Avenue at the main campus as well as the new signage concepts recently adopted by TAMUG.





# SECTION C SYSTEMS AND INFRASTRUCTURE

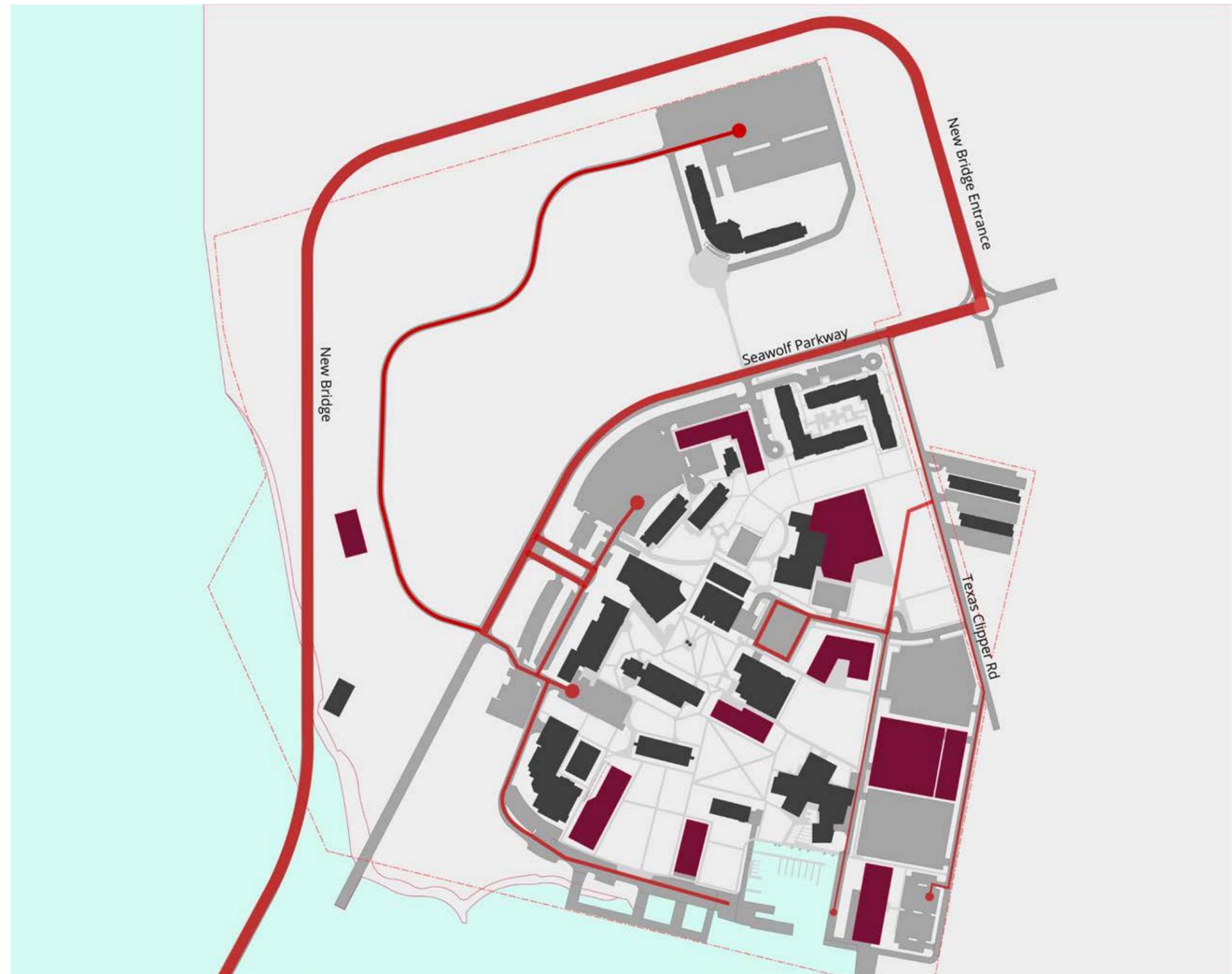
## Vehicular Circulation

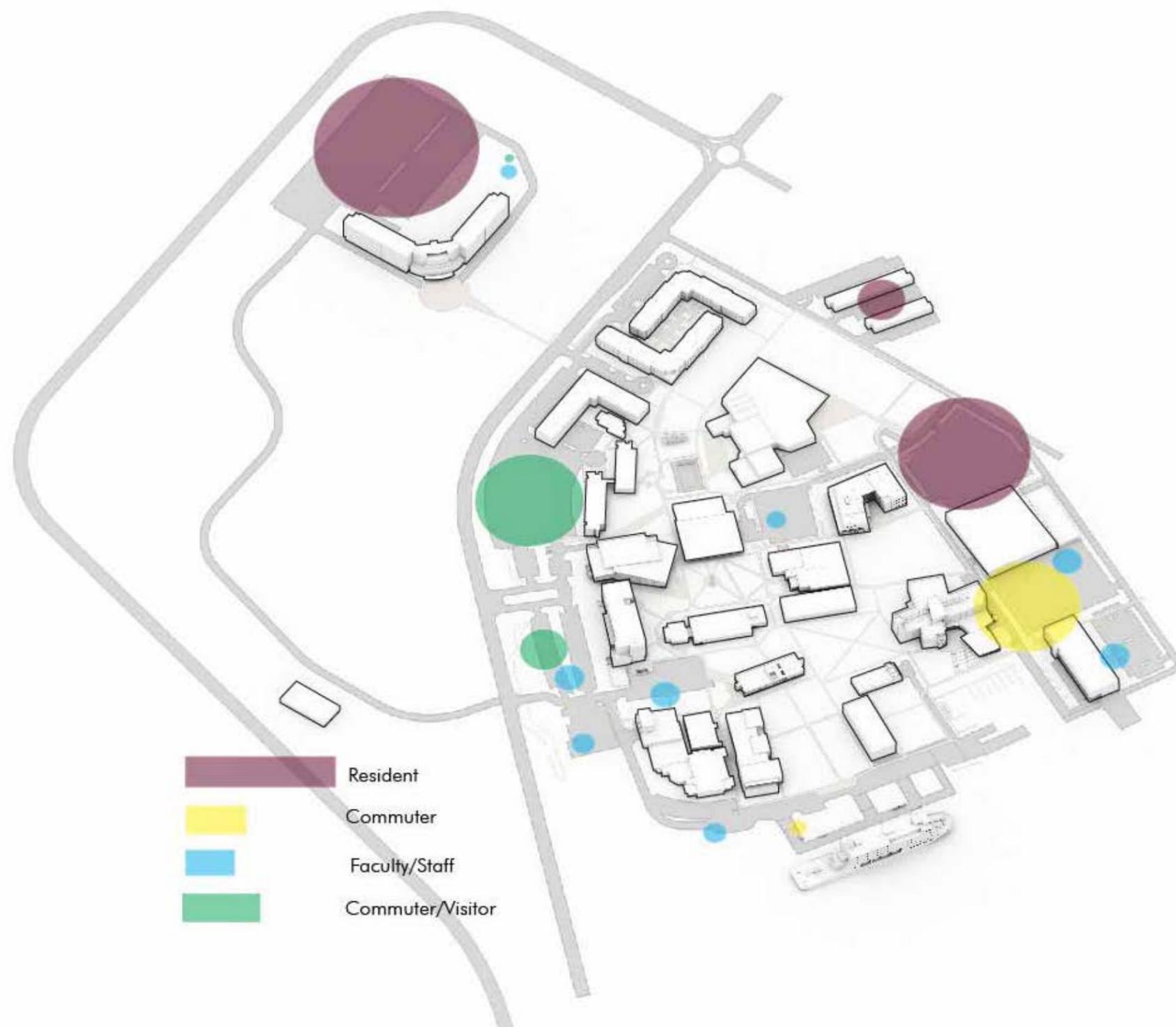
### SYSTEMS AND INFRASTRUCTURE

The major change to vehicular circulation will be, of course, the new bridge alignment. No longer will the campus be effectively cut in two by a highway; instead, the portion of Seawolf Parkway will become an interior circulator.

Drivers arriving at campus will be directed along one of two routes where the new bridge access intersects Seawolf: either straight ahead, to access the bulk of campus parking and many of the future waterfront facilities; or right, to go directly to the administrative and special events complex. This dichotomy mirrors the Harborside/Broadway split as people navigate towards campus: the former for those who have been to campus before and know their destination and route; the latter for visitors and others who need special direction.

Fully adapting to the new bridge route is a very long-term issue. Even within the 30-year term of this master plan, it is not likely that the campus will be fully adapted. Seawolf Parkway within campus limits must be reconstructed to make it an internal campus circulator, which will allow for additional parking. Drainage must be reconstructed, and agreements worked out with agencies regarding property disposition. This master plan will begin that process, but it may take 50 years or more to complete.





Parking is an opportunity – where it is placed can shape how people walk across campus, either creating more lively spaces or removing the potential for interaction. This has been a primary consideration as new spaces and a new parking structure have been located. As now, parking will primarily be located around the perimeter of campus, but a new division will be developed: one traffic route and set of parking options for visitors, and another route and set of options for those familiar with campus.

The parking structure will be the primary initiator of pedestrian trips across campus. It is likely that it will serve all campus groups: staff, students, and faculty. Flexible payment strategies, such as the extension of the current payment mechanisms, will allow visitors to park in the garage as well.

On the northwest side of campus, the existing lots will continue to be used as they are now, but should be augmented to allow for more capacity for events at ASEC. Signage will direct visitors to this area as the main campus entrance.

## Wayfinding & Identity SYSTEMS AND INFRASTRUCTURE

At the core of this wayfinding and signage master plan is the desire to create and reinforce a sense of place: to make the campus, public areas or buildings more memorable to inhabitants and visitors. To identify, as well as inform, within the context of a flexible and expansive graphics system, is only part of the intent. The other part is to celebrate those characteristics which make the campus unique — history, architecture, natural resources, events, community relationships, and curriculum.

The objectives are as follows:

- Reinforce site boundaries and identity
- Identify key entry points into the site
- Define pathways for vehicular traffic
- Define pathways for vehicular traffic to parking areas
- Define pathways for pedestrians from parking areas to the individual buildings
- Create an awareness of destinations and promote those destinations
- Emphasize special aspects of the site which make it unique and interesting
- Reduce the visual clutter or overuse of signs to reduce confusion
- Enhance the perception of the site as a safe, clean, and welcoming environment
- Create a system consisting of simple components that are easily fabricated and easily maintained



## Wayfinding & Identity SYSTEMS AND INFRASTRUCTURE



The purpose of a wayfinding system is to promote the use of public facilities, building uses, campus amenities and parking for the campus. It consists of the four components outlined below.

### 1. Identification System

Gateway signage is placed at the most important edges of the campus to welcome the visitor and to set the tone for the rest of the sign standards. Consistent use of graphic elements, logos, colors and structural components is key to reinforcing TAMUG's identity.

### 2. Vehicular Directional System

This system helps lead vehicles from major traffic spines leading into the campus to major destinations and to parking areas along preferred routings. The vehicular directional system focuses on occasional users and first-time visitors. The vehicular directionals are located at key decision-making intersections.

### 3. Pedestrian Directional System

For the pedestrian leaving the vehicle at a parking destination, the pedestrian directional system reinforces direction and orientation. This level of signing includes specific destinations that are within walking distance, as well as map elements to help orient the user. The pedestrian system includes directional signs, information kiosks or directories with orientation maps, and identity signs for the buildings and entrances.

### 4. Interpretive and Decorative/Seasonal Graphics

As a supplement to the other elements, these can take any number of forms and help to create a visually exciting environment. Banners can be used to promote special events, or to simply reinforce campus entrances. These may be changed frequently to continually refresh the image of the university. Other temporary enhancements, such as construction barricade fences, provide an excellent backdrop for graphics and a palette for community involvement.

## Deliveries and Service

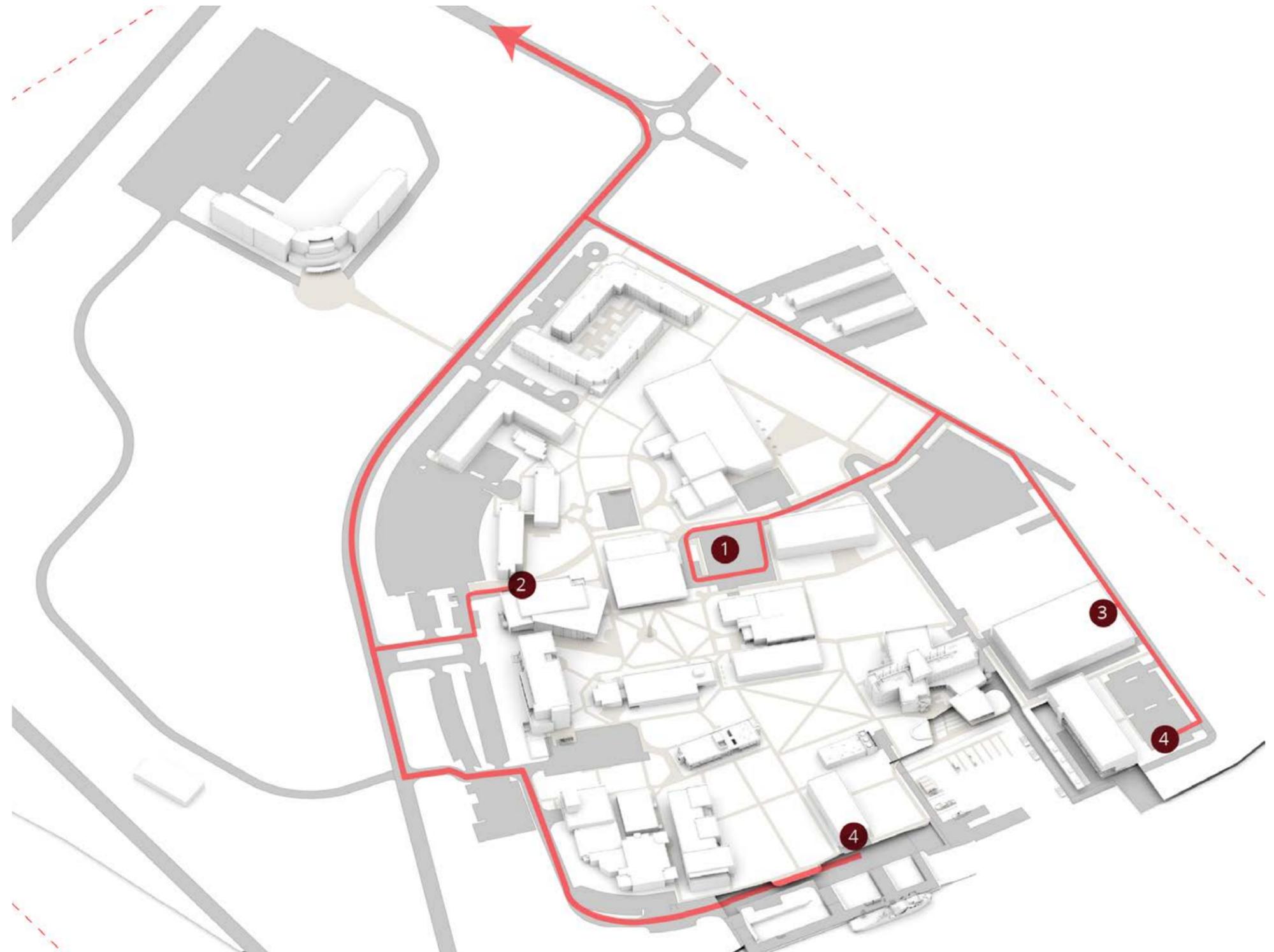
### SYSTEMS AND INFRASTRUCTURE

Service access is a critical consideration for any campus, especially growing campuses. The back side of the Student Center (labeled 1 on the adjacent diagram) is the single most significant service spot thanks to the daily food deliveries to the cafeteria and dumpster pickup, but there is also a service dock at the library. Currently, general campus parking blends with the service drive, but this creates hazards where the busy service traffic and the general public intersect.

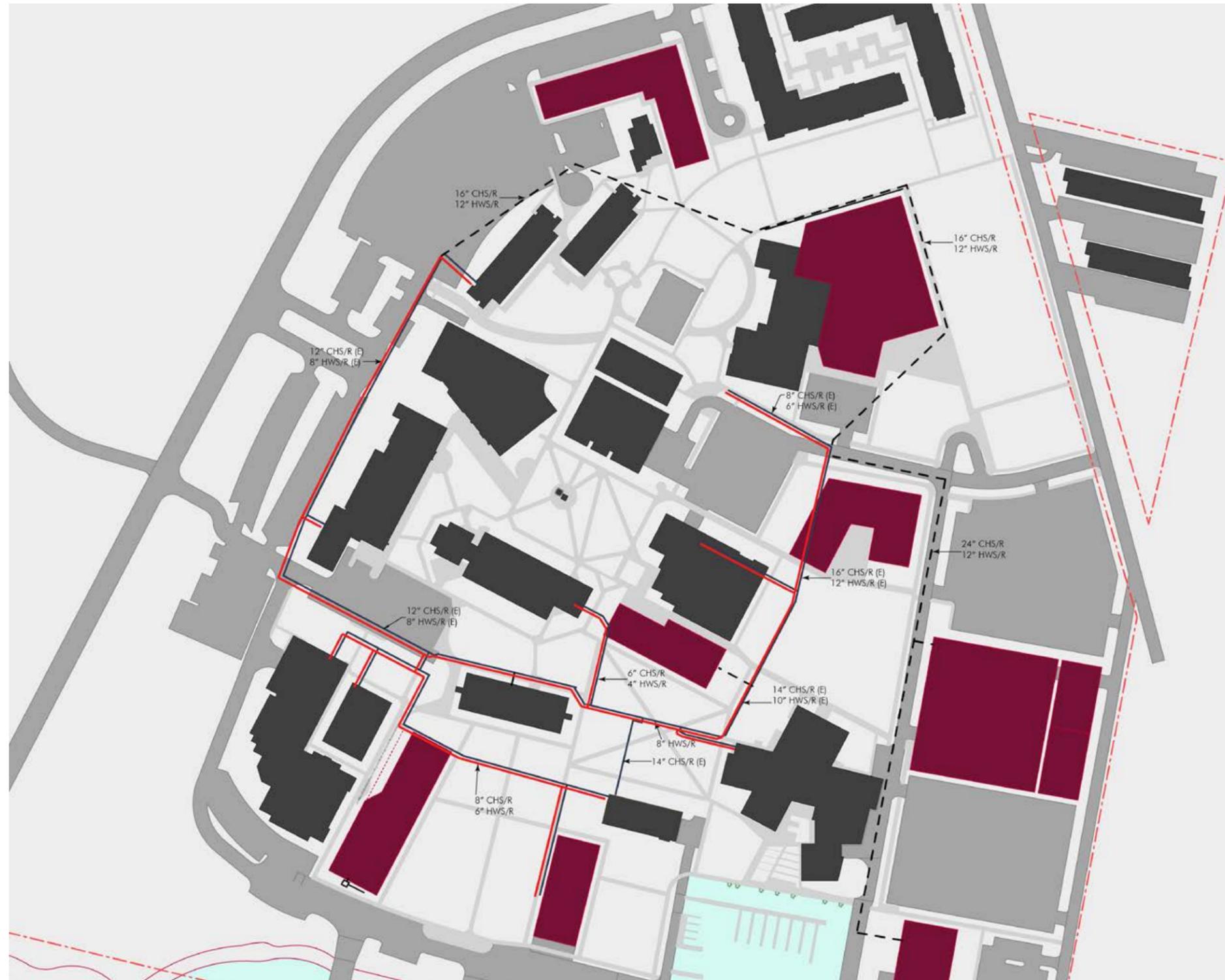
As changes are made to the back side of campus, roadways will be simplified to clarify routes in and out of the area behind the Student Center. Parking will be relocated to other areas in order to separate delivery and trash pickups from general traffic, and dedicated dock space and turnaround areas will be incorporated.

Formalizing the delivery court behind the Mary Moody Northern Student Center will benefit the campus in a number of ways: deliveries will be more easily managed and more efficient, general pedestrian traffic which currently transits the area (and will do so in the future, though to a more limited extent) can be directed to more appropriate and welcoming pathways which will be built as part of the changes, and the unattractive back-of-house nature of this area can be screened. By reducing pedestrian/traffic conflicts, safety will be improved as well.

Deliveries will continue to ASEC for special events, to the new location of the Physical Plant, as well as to the waterfront, including new waterfront operations facilities. Access to all of these locations is either unchanged (ASEC) or improved (Physical Plant) by the changes in the master plan.



## Thermal Utilities SYSTEMS AND INFRASTRUCTURE



The campus currently has only 300 tons of firm capacity available. A new central plant or major expansion of the existing plant will be necessary to add any significant additional load to the campus loop. The build-out of the master plan requires a minimum of 3,200 tons for cooling and 14,000 MBH for heating, meaning that significant additional capacity will be needed.

Future buildings will have the following projected loads. Cooling is indicated in tons, and heating units are MBH.

Description	Size (SF)	Cooling	Heating
New Academic Building	80,000	250	1,600
New Vessel Operations	80,000	250	1,600
Academic Building	45,000	150	900
New Academic Building	80,000	250	1,600
Student Life Center Addition	100,000	350	2,000
New Residence Hall	80,000	250	1,600
ISLE	20,000	50	400
New Physical Plant Facility	19,000	50	285
Academic Building Complex*		1,200	4,000
Training Ship Shore Cooling		400	N/A
<b>New Demand</b>		<b>2,000</b>	<b>9,985</b>
<b>Total Plant Requirements</b>		<b>3,200</b>	<b>13,985</b>

\* The Academic Building Complex is an existing facility, but it is served by air-cooled chillers with a relatively short anticipated service life. Figures indicated are what are required to serve those buildings from the main campus distribution loop.

The master plan indicates two potential locations for future central plant capacity: an expansion of the existing plant and/or a new facility constructed as part of the new parking garage. Depending on funding availability, timing, and overall cost, either or both of those options may be utilized. Additionally, the existing plant facility is reaching the end of its service life. Major renovations should be planned to allow the facility to continue to serve the campus.

## Electrical System

### SYSTEMS AND INFRASTRUCTURE

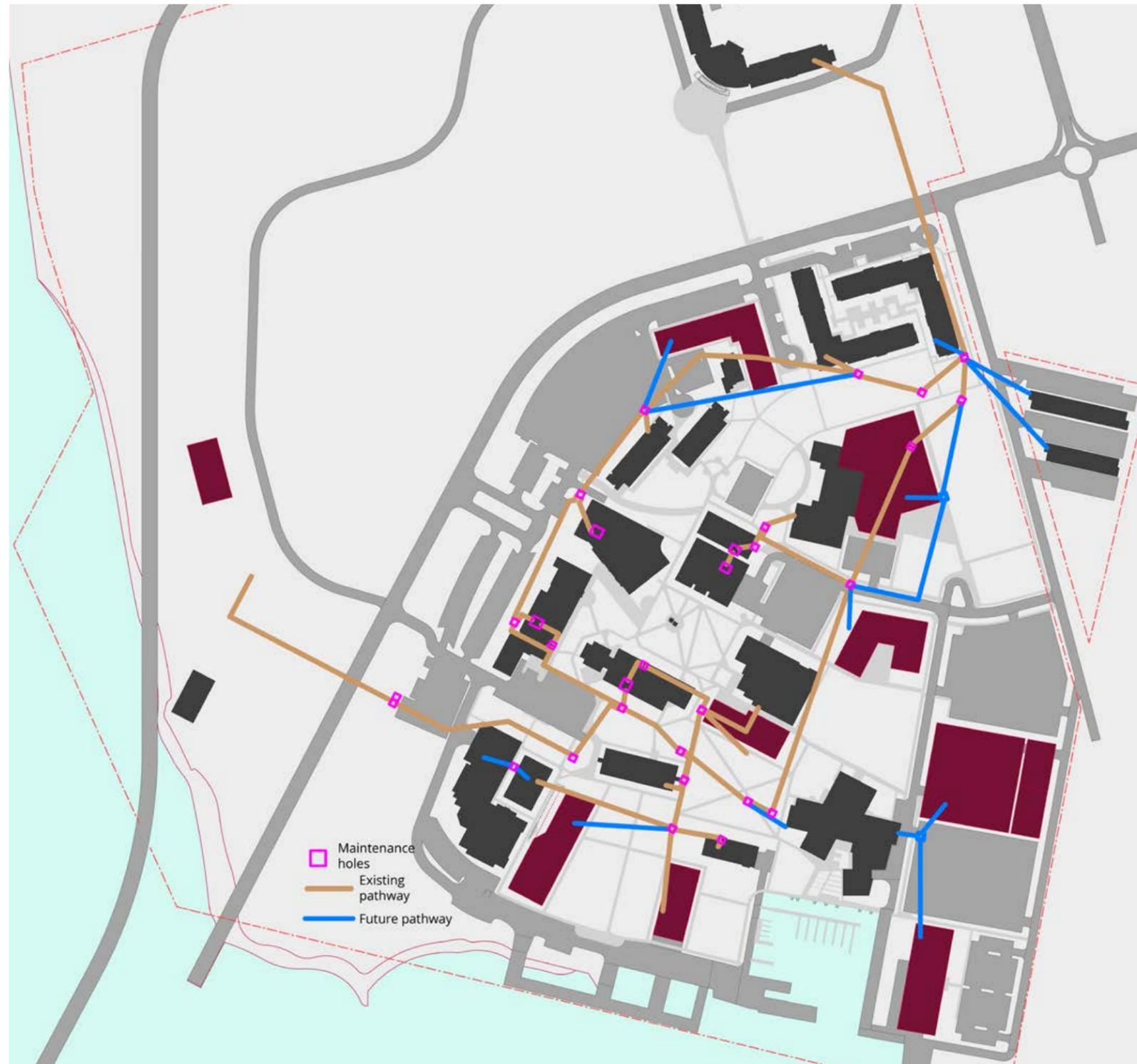
The campus's existing electrical service is rated for approximately 6400 kVA, with a current demand load of approximately 3600 kVA. There is some spare capacity in the circuit to add future buildings but capacity is not sufficient to serve the entire campus development.

As part of expansions of the campus thermal utilities, a new campus electrical service should be included to serve the new and/or expanded central plant, new campus buildings, and ultimately the existing campus electrical distribution system. New electrical ductbanks should be included when planning new thermal piping distribution. The new electrical distribution will be routed adjacent to Sea Wolf Parkway as the campus is expanded.

The new service will have new 12.47 kV switchgear in a main-tie-main configuration and will serve a new distribution loop for campus and central plant loads. The new loop will tie into the existing loop at the existing service entrance location. The new service in the central plant will serve as the main service for the campus distribution. Future building requirements are as follows:

Description	Size (SF)	Electrical Demand (kVA)
New Academic Building	80,000	400
New Vessel Operations	80,000	400
Academic Building	45,000	225
New Academic Building	80,000	400
Student Life Center Addition	100,000	500
Parking Garage with Central Plant		6500
New Residence Hall	80,000	400
ISLE	20,000	100
Central Plant Expansion	3,500	6100
Sea Turtle Center	15,000	75
New Physical Plant Facility	19,000	100
Total New Demand		15200
Existing Demand		6400
<b>Total Electrical Requirements</b>		<b>21600</b>





### Outside Plant

Recent construction efforts have provided an underground campus communications duct bank which provides a direct fiber feed to most of existing campus facilities. The installation of additional fiber optic cabling (seen to the left) is recommended to allow for technology connectivity to all existing buildings and to provide redundancy to each building on campus. Campus currently has a secondary fiber pathway off island/ campus which provides true campus redundancy.

A campus study found that existing duct bank system (conduits and maintenance holes) are filled with legacy copper cables which are no longer in use. These cables should be removed, if possible, to free existing pathway for new fiber optic infrastructure.

### In-Building Recommendations

The latest codes and university standards require installation of Distributed Antenna Systems (DAS). A campus standard must be implemented to include cellular DAS planning and public safety DAS Systems supporting first responder radio frequencies for future construction and renovation projects.

Campus should standardize on higher bandwidth Category 6E cable to provide a robust wireless and wired network both indoor and throughout exterior campus spaces. Campus telecom room sizes should be updated to minimum 11' x 14'.

The current data center contains outdated equipment and requires modernization. The space has additional capacity for new electronics but requires a redundant cooling system. Campus should follow Tier III Data Center Guidelines TIA-942 for renovations and expansions.

## Safety and Security and Audio/Video Standards SYSTEMS AND INFRASTRUCTURE

Recent renovation and construction projects have standardized on the Lenel Access Control Mercury platform. HID multi-class RP40 and RP15 card readers are to be used for electrified hardware entry locations.

The use of emergency phone stanchions or callboxes has been ruled out at this time.

The current video management software is ONSSI. The video system is currently integrated with the access control system, and this integration should be included in future projects. Storage for the video surveillance system is ONSSI NVR software that is placed on an owner-provided Windows-based server.

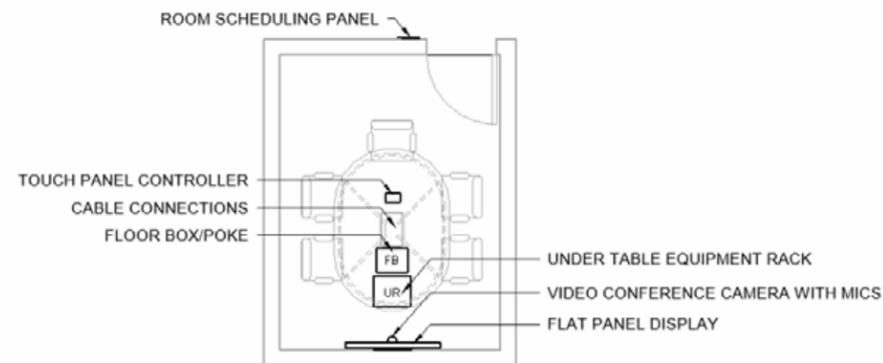
Future video surveillance should implement AXIS IP Dome megapixel cameras, viewing all exterior entrances with added coverage at parking lots and building utility equipment locations. Additional surveillance coverage over boat docks is also recommended.

The campus should also investigate future active shooter monitoring systems that can tie into the existing security system.

TAMUG has nine primary AV room types that are utilized in normal classroom buildings. The appendix contains full information for each room type; the following is an excerpt covering several of the most commonly used types.

Small conference room – approximately: 12' x 14'

- Flat screen display
- Table mounted device connection
- Wall mounted or table control screen
- Floor box with interface plate for AV, data, and power
- Wireless device connection
- PTZ conference camera with integrated microphones
- Add soft codec if designated a video conference room (Zoom, Teams, G2M, etc.)
- Optional room scheduling panel

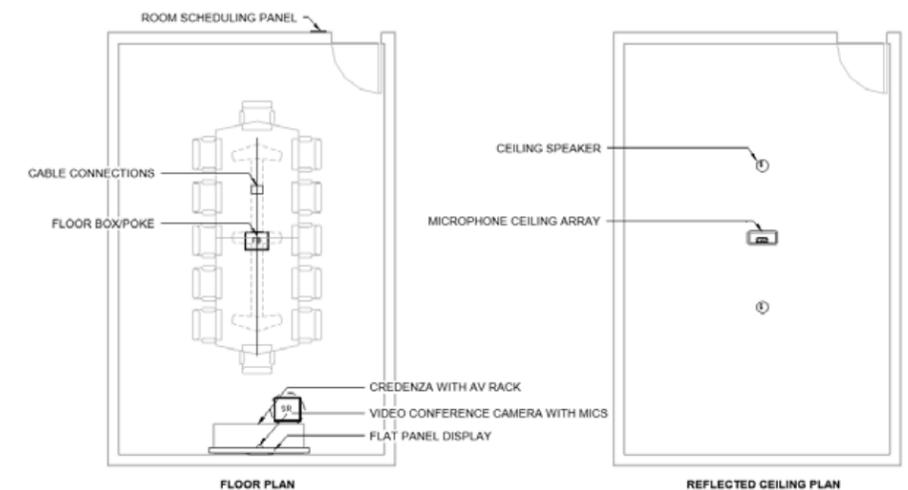


Small conference room

Large conference room – approximately: 25' x 17'

- Flat screen display
- Multiple table mounted device connection
- Wall mounted and table control screens
- Multiple floor boxes with interface plates for AV, data, and power
- Ceiling mounted speakers
- Wireless device connection
- PTZ conference camera
- Ceiling conference microphone(s)

- Add soft codec if designated a video conference room (Zoom, Teams, G2M, etc.)
- Optional room scheduling panel



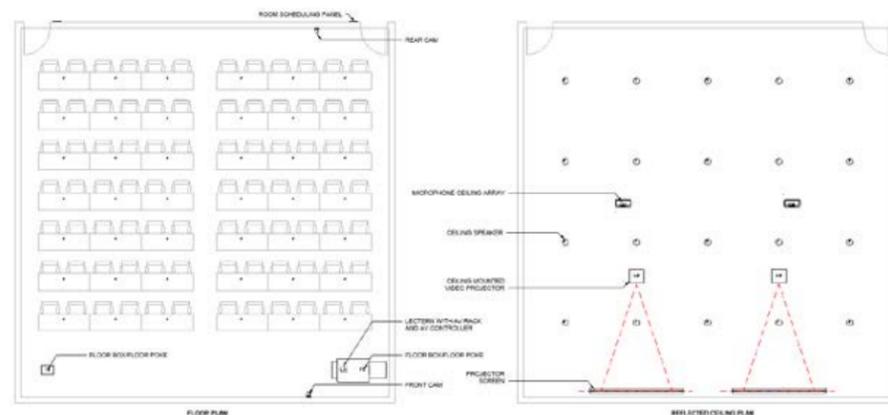
Large conference room

Medium classroom – approximately: 32' x 24'

- 16:9 electronic projector (ALR) tensioned screen with RS232 control (more if needed)
- 3500+ (depending on lighting) lumen laser video projector (more if needed)
- Ceiling mounted speakers
- Wall mounted or podium control screen
- Floor box with interface plates for AV, data, and power
- Lectern with room for AV equipment
- AV equipment includes desktop computer, DVD/Blu-Ray player, connection for a laptop, wireless device connection, document camera, amplifier, and AV switcher
- 2 PTZ conference cameras (instructor and audience) to desktop computer
- Ceiling microphone(s) to desktop computer
- Add soft codec if designated a video conference room (Zoom, Teams, G2M, etc.)

Large classroom – approximately: 42' x 42'

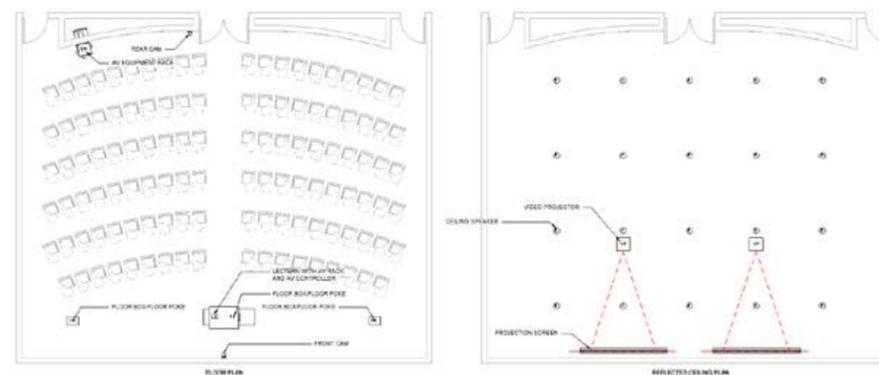
- 16:9 Electronic projector (ALR) tensioned screen with RS232 control (more if needed)
- 4500+ (depending on lighting) lumen laser video projector (more if needed)
- Ceiling mounted speakers
- Wall mounted and podium control screens
- 2 Floor boxes with interface plates for AV, data, and power
- 2 wireless microphone combos (lapel and handheld) to project to room and desktop computer
- Lectern with room for AV equipment and able to switch floor boxes easily
- AV in lectern includes podium microphone, desktop computer, DVD/Blu-Ray player, connection for a laptop, wireless device connection, and document camera
- AV Cabinet for additional switchers, amplifiers, etc...
- 2 PTZ conference cameras (instructor and audience) to desktop computer
- Add soft codec if designated a video conference room (Zoom, Teams, G2M, etc.)



Auditorium

Auditorium/amphitheater – approximately: 42' x 50'

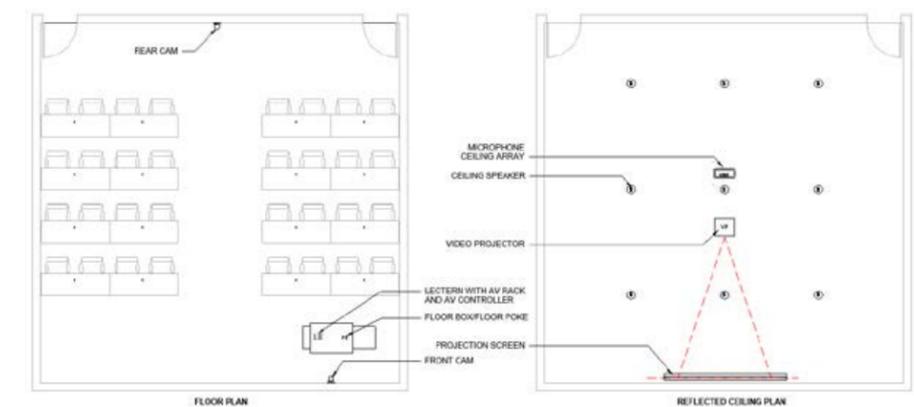
- Appropriate number of 16:9 Electronic projector (ALR) tensioned screens with RS232 controls
- Appropriate number of 6500+ (depending on lighting) lumen laser video projector
- Ceiling mounted speakers
- Wall mounted and podium control screens
- Two floor boxes with interface plates for AV, data, and power
- Three wireless microphone combos (lapel and handheld) to project to room and desktop computer
- Lectern with room for AV equipment and able to switch floor boxes easily
- AV in lectern includes podium microphone, desktop computer, DVD/Blu-Ray player, connection for a laptop, wireless device connection, and document camera
- AV Cabinet for additional switchers, amplifiers, and associated equipment
- Two PTZ conference cameras (instructor and audience) to desktop computer



Auditorium

Teaching Computer Lab approximately: 32' x 32'

- 16:9 Electronic projector (ALR) tensioned screen with RS232 control (more if needed)
- 3500+ (depending on lighting) lumen laser video projector (more if needed)
- Ceiling mounted speakers
- Wall mounted or podium control screen
- Podium Floor box with interface plates for AV, data, and power
- Lectern with room for AV equipment
- AV equipment includes desktop computer, DVD/Blu-Ray player, connection for a laptop, wireless device connection, document camera, amplifier, and AV switcher
- Floor boxes to accommodate 2 power and 1 data for each computer
- 2 PTZ conference cameras to (instructor and audience) to desktop computer
- Ceiling microphone(s) to desktop computer
- Add soft codec if designated a video conference room (Zoom, Teams, G2M, etc.)



Auditorium





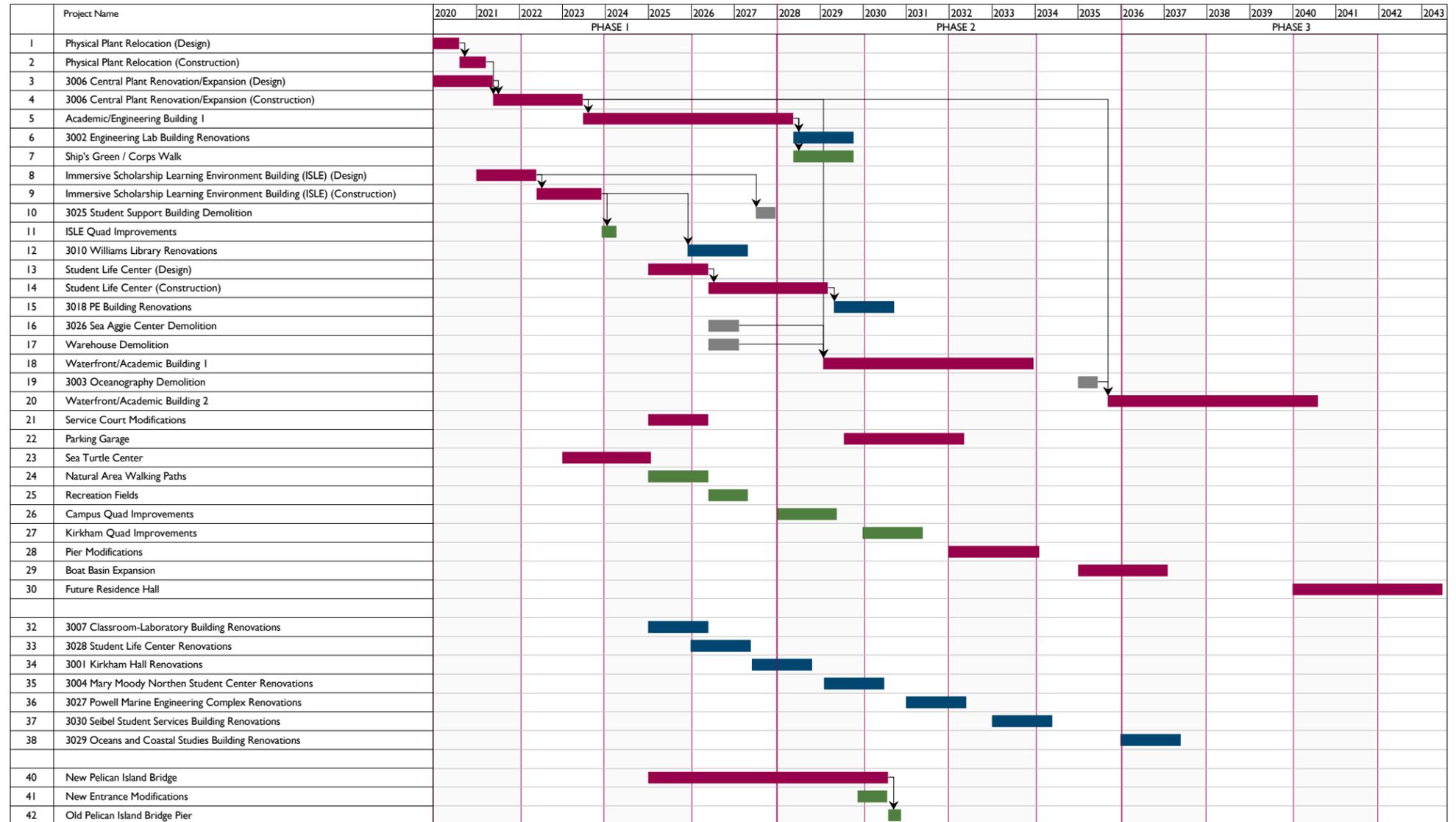
SECTION D  
IMPLEMENTATION

# Phasing IMPLEMENTATION

The master plan proposes a sequence of completion for new projects, including renovation, demolition, and new construction. Some of the projects are dependent upon the completion of others, while other projects can be completed without substantial preceding work. The master schedule depicts all projects and interrelationships between them.

Developing project phasing is an art, not a science. While there are some dependencies within projects (such as the necessity to clear the site for the Waterfront/Academic Building 1 through demolition of the existing warehouse), many projects are independent of such considerations. The phasing shown has been developed based on expectations of student population growth over time, information regarding external projects (such as construction of the new Pelican Island bridge), estimations of building service life, and similar concerns.

Master plans are developed with end goals in mind, and usually – as in this case – the strategies for phasing are generated after that. While this may seem like an overly flexible approach, it works to the advantage of institutions. Funding and other considerations inevitably require modifications to the timeline, sequence, and sometimes content of the master plan. The flexibility this offers with regards to achieving the end goal is critical.



**Phase 1: 2020 to 2028**  
IMPLEMENTATION



This phase has several major projects, both building projects and sitework, intended to begin the process of transforming the waterfront. As such, this is an interim phase: some of the changes will open up free space to enable critical building projects in later phases.

This phase also has elements which will dramatically improve the appearance and collaborative nature of campus. These are site-focused projects, including a complete update to the student life area, changes to the Ship's Green (in conjunction with the new Engineering Building), and improvements to the ISLE quad.

**New Buildings**

- Engineering Building
- ISLE
- Student Life Center
- Sea Turtle Center
- Central Service Building Demo/Expansion/Renovation

**New/Renovated Campus Spaces**

- Ship's Green
- Campus Life Quad / Recreational Fields
- Tennis Courts
- ISLE Quad

**Renovations**

- 3001 Kirkham Hall
- 3002 Engineering Lab Building
- 3007 Classroom-Laboratory Building
- 3010 Williams Library
- 3028 Student Life Center

**Demolitions**

- 3006 Central Service Building (partial)
- 3026 Sea Aggie Center
- Warehouse

## Phase 2: 2029 to 2036 IMPLEMENTATION

Phase 2 is when major changes to the waterfront begin to take shape, starting with the completion of the Academic/Vessel Operations Building. The second phase of Ship's Green renovations will be completed, both improving the campus's connection to the waterfront as well as preparing the way for work in Phase 3. The Parking Garage will be constructed as well, which will improve pedestrian patterns on campus and will create opportunities for more interaction between students and faculty.

Renovations of existing buildings continue as well, with the Powell Marine Engineering Complex and various student services buildings receiving renovations. No demolitions are slated to occur in this phase.

### New Buildings

Academic/Vessel Operations Building  
Parking Garage

### New/Renovated Campus Spaces

Ship's Green (Phase 2)  
Waterfront Area  
Recreational Field  
Old Pelican Island Bridge Pier

### Renovations

3027 Powell Marine Engineering Complex  
3004 Northern Student Center  
3030 Seibel Student Services Building  
3018 Physical Education Facility

### Demolitions

None





## Cost Estimates IMPLEMENTATION

Cost estimates have been created for each major project called for in the master plan. Where there are options – sizing options for the structured parking and location options for Central Plant and Physical Plant – both options are captured in the listing.

All line items include the following assumptions:

15% for contractor’s general conditions

25% for estimating/design contingency

5% for contractor’s bonds and insurance

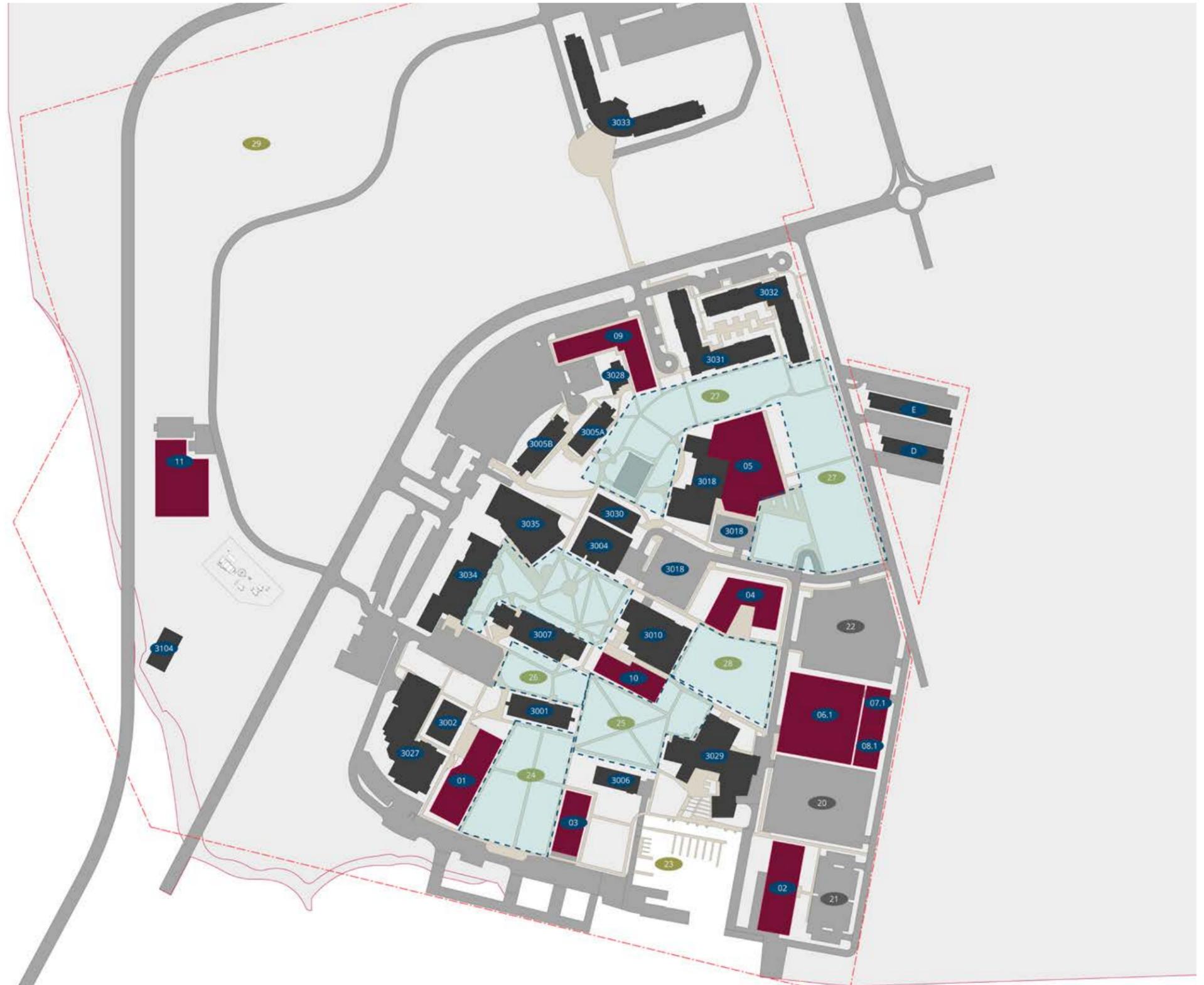
10% for contractor’s overhead and profit

All figures were generated as current cost estimates, but projected construction dates vary. To aid in future budgeting efforts, escalation (i.e., cumulative estimated inflation) has been applied to projects which will take place in the future, as seen in the “Projected Year Project Cost” column. This chart is synchronized with the phasing information shown on the previous pages.

While these figures are sufficient for general decision-making and conceptual budgeting efforts, specific projects should be more closely scoped and specifically budgeted prior to placement on CIP timelines or procurement of design services.

Full information, including more complete breakdowns of each component shown here, is available in the appendix.

Number	Item	Quantity	Unit	Unit Cost	2019 Construction Cost	2019 Project Cost	Projected Year	Projected Year Project Cost
	Demolition: 3003 Oceanography Building	5,750	SF	\$ 6.00	\$50,407	\$59,302	2024	\$70,719
	Demolition: 3006 Physical Plant/Storage	6,750	SF	\$ 6.00	\$59,174	\$69,616	2022	\$76,022
	Demolition: 3025 Student Support	6,000	SF	\$ 5.50	\$48,215	\$56,724	2026	\$73,870
	Demolition: Dockside Warehouse	35,000	SF	\$ 5.50	\$281,257	\$330,891	2022	\$361,341
	Demolition: 3026 Sea Aggie Center	67,000	SF	\$ 5.50	\$538,406	\$633,419	2020	\$633,419
01	Engineering Building	80,000	SF	\$ 320.26	\$25,620,941	\$34,161,255	2022	\$37,304,944
02	Academic/Vessel Operations Building	80,000	SF	\$ 314.41	\$25,153,148	\$33,537,531	2024	\$39,994,129
03	Academic Building	45,000	SF	\$ 354.14	\$15,936,128	\$21,248,171	2029	\$31,576,803
04	Academic Building	90,000	SF	\$ 347.55	\$31,279,306	\$41,705,741	2035	\$80,712,389
05	Student Life Center	100,000	SF	\$ 307.28	\$30,727,702	\$40,970,269	2026	\$53,353,948
06.1	Structured Parking (Option 1)	180,000	SF	\$ 94.10	\$16,938,508	\$22,584,677	2030	\$35,073,313
06.2	Structured Parking (Option 2)	200,000	SF	\$ 93.15	\$18,630,699	\$24,840,932	2030	\$38,577,208
07.1	Police Headquarters & Physical Plant	10,000	SF	\$ 412.99	\$4,129,903	\$5,506,537	2021	\$5,754,332
07.2	Police Headquarters & Physical Plant	10,000	SF	\$ 412.99	\$4,129,903	\$5,506,537	2021	\$5,754,332
08.1	Central Plant (New)	10,000	SF	\$ 392.15	\$3,921,534	\$5,228,712	2021	\$5,464,004
08.2	Central Plant (Addition)	3,500	SF	\$ 398.40	\$1,394,391	\$1,859,188	2021	\$1,942,851
08.3	Central Plant Equipment (Full Buildout)	1	LS	\$ 9,000,000	\$9,000,000	\$12,000,000	2023	\$13,693,994
09	Residence Hall	80,000	SF	\$ 339.63	\$27,170,012	\$36,226,683	2050	\$135,680,452
10	The ISLE	16,000	SF	\$ 404.91	\$6,478,564	\$8,638,085	2023	\$9,857,490
11	Center for Texas Beaches and Shores	15,000	SF	\$ 429.26	\$6,438,833	\$8,585,111	2023	\$9,797,037
20	Surface Parking	70,000	SF	\$ 13.40	\$937,947	\$1,250,596	2020	\$1,250,596
21	Surface Parking	35,000	SF	\$ 13.40	\$468,973	\$625,297	2024	\$745,679
22	Surface Parking	12,000	SF	\$ 13.40	\$160,816	\$214,421	2026	\$279,232
23	Boat Basin	1	LS	\$ 3,378,736	\$3,378,736	\$3,974,983	2040	\$9,586,523
24	Ship's Green	1	LS	\$ 1,091,455	\$1,091,455	\$1,284,065	2022	\$1,402,231
25	ISLE Quad	1	LS	\$ 1,028,068	\$1,028,068	\$1,209,492	2023	\$1,380,232
26	Kirkham Quad	1	LS	\$ 436,582	\$436,582	\$513,626	2022	\$560,892
27	Recreational Fields and Pavilions	1	LS	\$ 2,724,447	\$2,724,447	\$3,205,232	2026	\$4,174,045
28	Reserved Space	1	LS	\$ 100,000	\$100,000	\$117,647	2035	\$227,680
29	Recreational Trails and Site Preservation	1	LS	\$ 800,000	\$800,000	\$941,176	2023	\$1,074,039
	Miscellaneous Site Improvements	1	LS	\$ 1,858,895	\$1,858,895	\$2,186,935	2028	\$3,110,041
	Miscellaneous Roadway Improvements	1	LS	\$ 413,641	\$413,641	\$486,636	2028	\$692,046





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Buildings

- Colors and Materials ..... E.2
- Building Shapes and Forms ..... E.3
- Glazing and Shading ..... E.3

Exterior Spaces

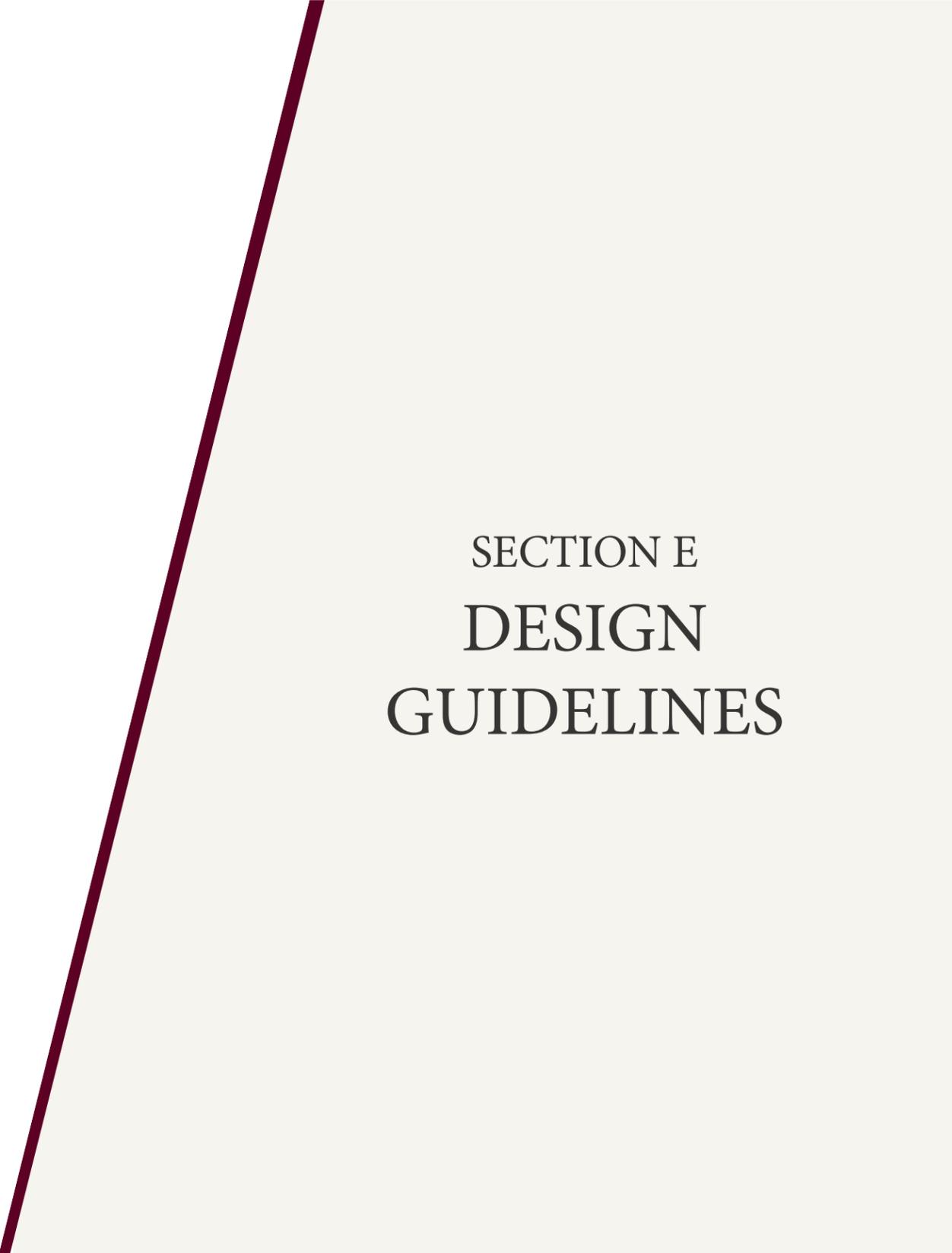
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SECTION E  
DESIGN  
GUIDELINES

## Buildings

### DESIGN GUIDELINES

#### Introduction

Design guidelines are meant to be a rulebook for how campuses are designed in order to establish consistency and to ensure that the goals of the master plan are met. They set expectations of designers for how campus spaces and buildings will appear as well as set performance criteria – usually loosely – for how buildings should perform.

Designers should study the guidelines which follow. New projects will generally require the interpretation of these guidelines, as not every situation can be anticipated, but in general, projects should relate to the existing campus while accomplishing the specific goals laid out here as well as in the discussions in the master plan itself.

#### Colors and Materials

Blues, blue-greens, greens, grays, and whites are all colors which are found in marine environments and maritime construction. Colors from that palette should be emphasized over the more land-oriented browns and earth tones which were used on early campus buildings. However, new buildings should include some colors which correspond to existing campus colors; new construction should not be entirely divorced from the existing campus. Additionally, colors which relate to the Texas A&M branding palette should be used sparingly, as they have been on MAIN and ASEC. New materials should be representative of TAMUG's involvement in technologically oriented fields. Glass, metals, and composite materials are visually consistent with TAMUG's programs and mission.

As new buildings are designed, designers should look primarily to MAIN, ASEC, and the new pavilion attached to OCSB for precedent for colors and materials.



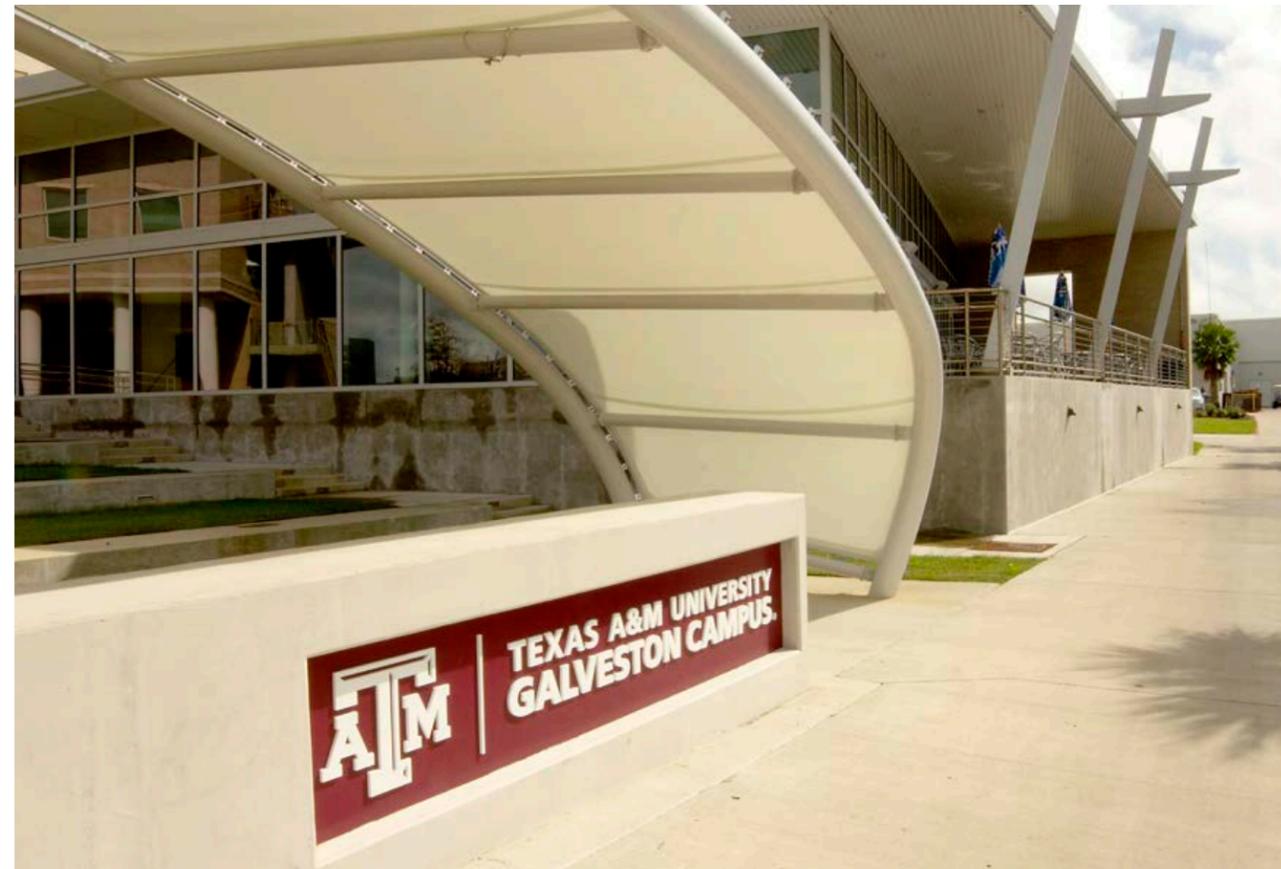
*Colors at MAIN and ASEC*



*Incorporation of tan at Atlantic Hall*



*MAIN showing grays, tans, and maroon accent*



*Curved fabric form near OCSB*



*Rendering of ISLE showing glazing and shading on the Central Quad*

### **Building Shapes and Forms**

Building forms should, where possible, refer to shapes which relate to maritime and marine settings as well as those which reflect TAMUG's advanced technological programs. References need not be literal; in fact, abstractions may be more useful in conveying the feel of the various referents without historical confusion. Copying the architectural language of a Galveston wharf-side building verbatim, for example, would not be faithful to the history or setting of that building, but an abstracted version of the language implies that building type as a precedent without creating a hollow imitation.

Original campus buildings were mostly one or two stories, but the campus has grown in density to three- and four-story buildings. New buildings should also be in the three- to four-story range.

### **Glazing and Shading**

Glazing should be used to activate the ground floor of buildings in order to emphasize connections between indoor and outdoor space. Much of the focus on this master plan is on how outdoor campus spaces can and should enhance opportunities to communicate and collaborate, and the way that building edges form space and make linkages between inside and outside are critical part of that.

Several buildings on campus have metal or concrete horizontal sunshades. Shades like these should be used on new buildings. Steel shades, in particular, are visually appropriate for the high-tech, maritime-inspired character which all new buildings should have. Window glass should be clear, un-tinted, low-e, double-pane glass.

## Exterior Spaces

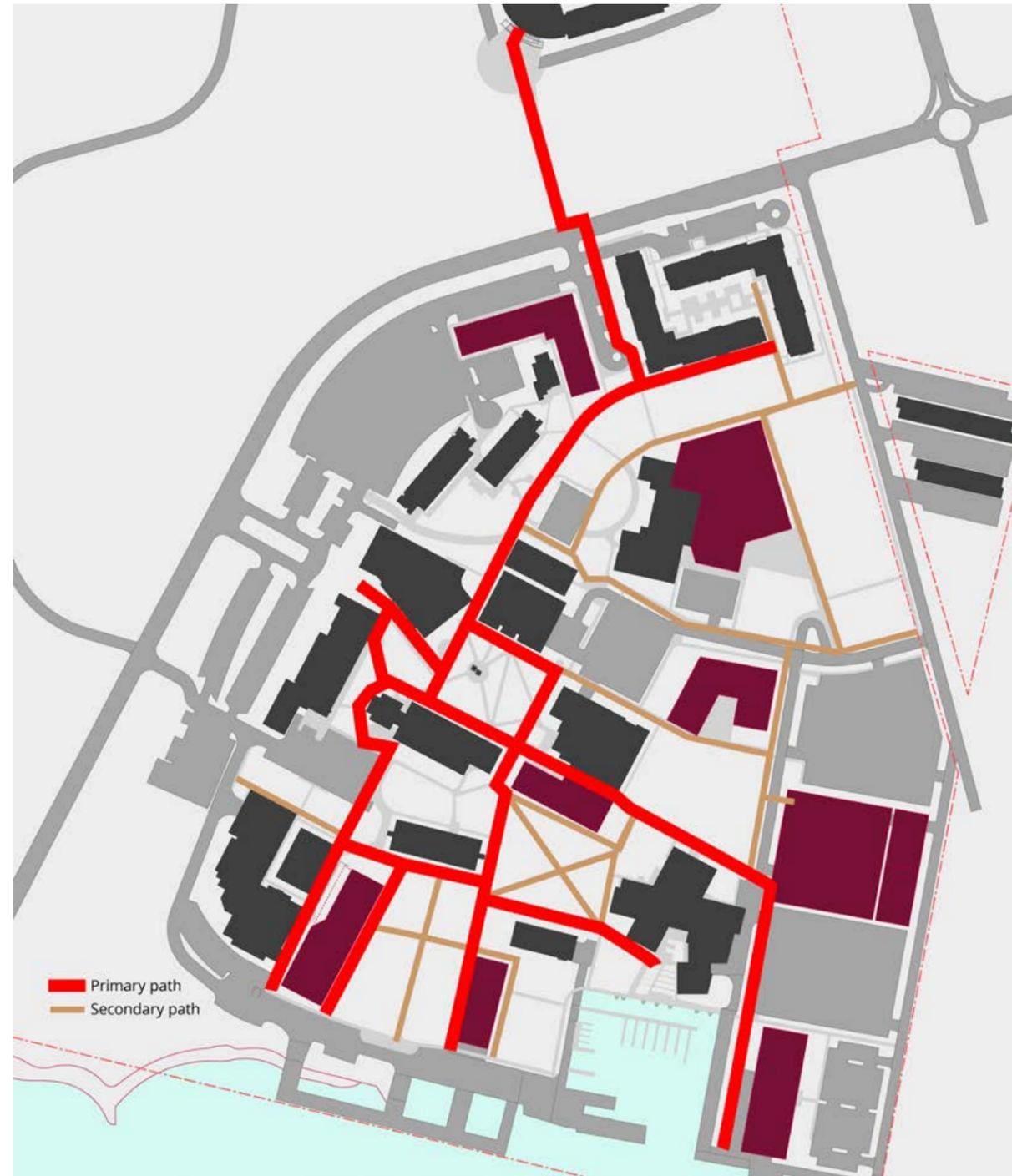
### DESIGN GUIDELINES

#### Walkways and Plazas

- Primary walkways should be given more visual importance and development than secondary walkways
- Primary walkways should be emphasized with double rows of trees, benches and litter receptacles, and special paving at plazas. Primary walkways may also be paved entirely with pavers matching those near MAIN and ASEC.
- Secondary walkways should have a single row of trees spaced appropriately to give shade and should have benches and litter receptacles at intersections with other paths
- Plazas and other gathering places should be paved with medium- to dark-colored pavers matching those near MAIN and ASEC
- Match new sidewalks to existing sidewalk materials

#### General Hardscape

New exterior furniture and furnishings, light fixtures, and paving installed as part of the MAIN and ASEC projects should be used as campus standards from this point forward. Exterior furniture and other furnishings are important components of a university's appearance and using a standard set of fixtures will help to knit the campus together visually. As campus spaces are developed according to the projects called for in this master plan, these standards should be used. Furthermore, deteriorated and aging furniture should be progressively replaced with the same selections.



Designation of primary and secondary campus walkways



Example of paving for primary walkways and plazas



Secondary walkway example, showing concrete, benches, and trees



### Landscape

The landscape character of the campus should support the overall maritime character of the campus through the use of plants that are native/adaptive and compatible with a coastal marine environment. Functionally it should provide a unifying landscape framework for the many individualized spaces and design elements that exist and are planned for the campus while strengthening the relationship between the built and native environments. The landscape should also reflect a campus goal of creating a pedestrian friendly atmosphere.

The campus is located in a sub-tropical climate zone that is characterized by hot summers, short mild winters, occasional heavy rains and dry spells, high humidity, and proximity to salt air and water from the gulf. Within certain limitations, conditions on campus should be favorable to a lush planting environment. One of the biggest limiting factors is that Pelican Island for the most part was built with dredged fill material which is very sandy and has a high salt content. Existing ornamental plantings on campus exhibit a wide range of adaption to the local conditions. Some appear to thrive while others appear to struggle for survival. Learn from which plants are successful and apply that knowledge to future plantings.

## Exterior Spaces

### DESIGN GUIDELINES

Landscaping should be utilized on the TAMUG campus in a manner that achieves several important objectives including:

- Defining campus open spaces
- Defining circulation systems
- Creating design interest
- Create continuity throughout campus with the use of a consistent, identifiable plant palette
- Providing protection from the elements
- Screening of undesirable views

There are specific zones identified in this campus master plan that provide opportunities to use specific landscape treatments that reinforce the distinct use and character of those zones.

#### Pier and Ship's Green

The pier and Ship's Green have the opportunity to become one of the campus' premier outdoor spaces, second only to the Central Quad. Ship's Green offers expansive lawns for passive use, pedestrian access and long views to the pier; home to one of the most distinctive landmarks on campus, the General Rudder. Currently, disjointed pedestrian connections coupled with the access road and on street parking make the pier an uninhabitable zone for pedestrians. Traffic should be limited on the access road and a generous promenade extending from the fishing pier to the boat basin should be provided to encourage pedestrian activity. The road paving in front of Ship's Green should be indistinguishable from the pedestrian paving causing the two areas to bleed into one contiguous space. The utilization of upright, high canopy trees along central circulation within Ship's Green will create a strong spine and powerful view from Kirkham Hall to the pier and General Rudder.





### ISLE Quad

The development of the ISLE building creates another opportunity for an iconic outdoor space on campus. The kite pattern proposed in this quad will create critical pedestrian links to the Central Quad and Ship's Green as well as parking on the east side of campus. The quad is punctuated in the center by a water feature. Formal planting and hardscape patterns radiate away from the middle of the quad in a circular pattern to mimic the ripples of water. Tree species reduce in mature height as you move to the center of the quad to reinforce a welcoming pedestrian scale. Seating integrated into planters and landscape walls provide a shaded respite for users. Planter and landscape wall materials should be of or compliment adjacent building materials. Flatwork materials shall be consistent with other areas of campus to reinforce continuity of the campus. Bookending the quad at Kirkham Hall and the Ocean & Coastal Studies Building are larger gathering areas that can serve as outdoor classrooms.

### Central Quad

The Central Quad is the symbolic center of campus. This quad also sees the heaviest pedestrian traffic due to its location in relation the surrounding building usages. The quad should be treated in a manner to mirror its significance to the campus. The clock tower, the most iconic landmark on campus, remains as the center piece of the space. As stated previously in this report, measures should be taken to increase the scale of the tower to better relate to surrounding architecture. Upgraded paving materials within the core of the quad should be utilized to reinforce the reverence of the space. The upgraded paving within this quad could also serve as an opportunity to recognize alums or faculty in the form of dedication plaques or pavers. A proposed compass rose in the center of the quad gives a nod to the maritime history of the campus and

## Exterior Spaces

### DESIGN GUIDELINES

provide some relatability to the existing ship's mast flag pole. Planting within the Central Quad should reflect the formality of the space. Double rows of oak trees to the north and south anchor the quad while sight lines are kept open to the Jack K. Williams Library, Academic Complex and Aggie Special Events Center.

#### Courtyards

Courtyard and ceremonial spaces function as formal and informal outdoor rooms for events, campus rituals, social encounters and unstructured recreation and relaxation. The central courtyard is symbolic heart of the campus and landscaping for this area should reflect the significance of the campus. The geometric space should be lined with double rows of canopy trees to define the space and provide shade for the walkways around the space. Landscaping at the Ships Green should reinforce a visual and physical connection to the waterfront and the General Rudder. The existing rows of trees in the middle of the space are poor condition and should be replaced with Live Oak trees that will provide a formal evergreen connection that enhances the Corps drill plaza.

#### Parking Lots

Planting islands for trees should be provided in all parking lots to breakup the expanse of paving, create shaded areas and reduce heat island effect. Planting islands with trees should be provided at the ends of all parking rows and along the interior of the parking lots. At a minimum the area of the parking islands should be equal to the size of two parking stalls for the healthy growth of a canopy tree.

Parking lots that are adjacent to streets or in view by the public should have a landscape buffer. The buffer should be bermed and/or landscaped in order to partially screen cars from view.





### Walkways

Pedestrian comfort and protection from weather is an important element of a successful campus design. Large shade trees should be planted along major pedestrian paths to protect pedestrians from the summer sun as well as provide a visual reference for pedestrian circulation through campus.

### Open Space/Nature Preserve

The land west of Seawolf Parkway is mostly undeveloped but has evolved over time to be a haven for native wildlife and plants and should continue to be preserved as such. The ecological and educational work of the TAMUG Wetland Center should be enhanced and expanded. The lagoon on the east side of the Pelican Island Bridge should be incorporated into the overall Wetland Center with trails and interpretive graphics. The trail under the bridge should be enhanced to provide better access to the trails on the east side of campus. Efforts should be taken to eliminate any invasive and/or non-indigenous plants from overtaking this natural environment.

### Security

The composition of landscaping should adhere to the principles of design for defensible space: clear visibility should be maintained at the ground plane, sight lines into the space from adjacent buildings and areas should be maintained and traffic patterns should avoid dead or isolated zones.

### Irrigation

An important goal for the campus should be the reduction of water usage for landscaping which can be accomplished using a combination of drought tolerant plants

## Exterior Spaces

### DESIGN GUIDELINES

and using a high efficiency irrigation system. All new planting beds should be a drip irrigated to target water to the plants and reduce waste due to overwatering, evaporation and runoff. Irrigation for lawn areas should be restricted to high profile areas and high activity areas. These lawn areas should utilize Matched Precipitation (MP) type spray heads and rotors. MP heads mimic rain more than conventional spray heads and allow for shorter watering times. It is recommended that a computer programmed central controller station to monitor and adjust all irrigation on campus. The irrigation system shall irrigate each area per the plant material selection according to a water-zoning concept, i.e. lowest water requiring plant zones should be irrigated less frequently than others.

#### Soil Amendments and Preparation

Poor sandy and salty soils due to the island being created from dredge fill have had a negative effect on many plantings on campus. While some have thrived others appear stressed and are underperforming. Any future plantings will need to address the soil conditions in which they are planted. Salt over time will be slowly leached from the soil. Until that time it is recommended to use imported topsoil, prepared planting mix and/or adding compost to build up a viable growing medium for general planting. Prior to adding any amendments or fertilizer determine whether there is a problem with the soil that is related to poor nutrition or poor physical property of the soil. Laboratory soil tests should be performed on existing campus soils to determine the proper amendments needed for the soil in appropriate ratios to best benefit the plantings.

#### Planting

To assist in creating design interest on the campus, plant material shall be carefully selected in order provide interesting color, form, texture and fragrance to all campus spaces.



## Exterior Spaces DESIGN GUIDELINES



Trees are critical to the quality of life on a campus for students and faculty. Large trees offer shade to pedestrians during warm weather. Use trees of a single variety to reinforce specific zones or features such as oaks along main pedestrian corridors. Otherwise it is recommended to use a variety of tree species to provide visual interest and prevent a monoculture of trees that are more susceptible to pests and disease.

Shrubs and smaller trees are more appropriate choices for prominent locations, courtyards, small spaces or corridors and around buildings to create a graceful transition from the vertical planes of the building to the horizontal plane of the site. Overly intricate plantings out of character and scale with the setting should be avoided. The preferred approach to shrub planting is to employ masses of low maintenance plants to direct pedestrian traffic, provide visual interest and screen unsightly views. Simplicity of plant character in keeping with the architectural palette will create a unified composition properly scaled to the size and style of the buildings and spaces.

Lawns are an important component to the campus landscape. They literally provide the ground plane between buildings. Provide good drainage to prevent standing water and breeding of mosquitoes.

## Exterior Spaces

### DESIGN GUIDELINES

Annual flower and perennial plantings are an important part of the landscape materials palette and can contribute greatly to the campus appearance. Because of high maintenance requirements, seasonal planting should be limited to few but larger areas to maximize visual impact. The most appropriate areas for seasonal plantings would include campus entries and visitor destinations.

All plant materials specified for future construction projects on the TAMUG campus shall be of the highest quality available. All trees, shrubs, and groundcover plants shall be container grown. Large trees shall be a minimum of four inches in caliper and shall be grown in a minimum of one-hundred gallon containers. Understory trees shall be a minimum of three inches in caliper and shall be grown in a minimum of sixty-five gallon containers. Shrubs shall be grown in a minimum of five-gallon containers and groundcover and vines shall be grown in a minimum of one-gallon containers. Lawn areas shall be solid sod in high activity areas and hydromulch in areas of lower activity. Lawn type shall be either St. Augustine or Common Bermuda. Select shade trees for the following characteristics: high clear trunk, broad spreading canopy, tolerance to salt and poor sandy soil conditions.



Recommended Plant Species

**Large Canopy Trees**

Acer rubrum 'drummondii'  
Magnolia grandiflora  
Pinus elliottii  
Pinus taeda  
Quercus shumardii  
Quercus virginiana  
Taxodium distichum  
Ulmus crassifolia  
Ulmus parvifolia

Drummond Red Maple  
Southern Magnolia  
Slash Pine  
Loblolly Pine  
Red Oak  
Live Oak  
Bald Cypress  
Cedar Elm  
Lacebark Elm

**Small/Medium Trees**

Bauhinia purpurea  
Callistemon citrinus  
Callistemon viminalis  
Cercis canadensis  
Cordia boissieri  
Eriobotrya japonica  
Feijoa sellowiana  
Ilex vomitoria  
Ilex attenuata "Savannah"  
Lagerstroemia indica  
Myrica pumila  
Prunus mexicana  
Vitex agnus-castus

Orchid Tree  
Bottlebrush  
Weeping Bottlebrush  
Redbud  
Mexican Olive  
Loquat  
Pineapple Guava  
Yaupon Holly  
Savannah Holly  
Crapemyrtle  
Wax Myrtle  
Mexican Plum  
Chaste Tree

**Large Shrubs**

Alpinia zerumbet  
Aralia papyrifera  
Bambusa, spp.  
Caesalpinia gilliesii  
Caesalpinia pulcherrima  
Cascabela thevetia  
Hibiscus coccineus  
Leucophyllum, spp.  
Malpighia glabra  
Michelia figo  
Musa ornata  
Myrica cerifera  
Nerium oleander  
Tecoma Stans

Variegated Shell Ginger  
Rice Paper Plant  
Bamboo (Clumping Only)  
Bird of Paradise  
Pride of Barbados  
Yellow Oleander  
Texas Star Hibiscus  
Texas Sage  
Barados Cherry  
Banana Shrub  
Dwarf Banana  
Wax Myrtle  
Oleander  
Yellow Bells

**Palms**

Butia capitata  
Chamaerops humilis  
Cycas revoluta  
Dioon edule  
Livisona chinensis  
Phoenix canariensis  
Phoenix dactylifera  
Phoenix roebelenii  
Phoenix sylvestris  
Raphis excelsa  
Sabal mexicana  
Sabal minor  
Sabal palmetto  
Serenoa repens  
Syagrus romanzoffiana  
Trachycarpus fortunei  
Washingtonia filifera  
Washingtonia robusta

Pindo Palm, Jelly Palm  
Mediterranean Fan Palm  
King Sago Palm  
Virgin Palm  
Chinese Fan  
Date Palm  
Medjool Palm  
Pygmy Date Palm  
Sylvester Date Palm  
Lady Palm  
Mexican Fan Palm  
Dwarf Palmetto  
Palmetto  
Saw Palmetto  
Queen Palm  
Windmill Palm  
Mexican Fan Palm  
Washington Fan Palm

**Vines**

Antigonon leptopus  
Bignonia capreolata  
Bougainvillea spp.  
Ficus pumila  
Gelsemium sempervirens  
Passiflora, spp.  
Pseudogynoxys chenopodioides  
Tecoma capensis  
Trachelospermum jasminoides  
Thunbergia grandiflora

Coral Vine  
Cross Vine  
Bougainvillea  
Creeping Fig  
Carolina Jasmine  
Passion Flower  
Mex. Flame Vine  
Cape Honeysuckle  
Confederate Star Jasmine  
Thunbergia

**Ground Cover**

Cupea hysopifolia  
Liriope gigantea  
Liriope spicata  
Ophiopogon japonicus  
Trachelospermum asiaticum

Mexican Heather  
Giant Liriope  
Lily Turf  
Mondo Grass  
Asian Jasmine

**Small/Medium Shrubs**

Abelia grandiflora  
Asparagus densiflorus "Myserii"  
Canna indica spp.  
Carissa macrocarpa "Fancy"  
Cyperus alternifolius  
Diets iridioides  
Hibiscus rosa sinensis "Cherie"  
Fatsia japonica  
Ilex vomitoria "Nana"  
Ixora sp.  
Lantana camara  
Lantana montevedinsis  
Loropetalum chinense "Nana"  
Malpighia puniceifolia  
Malvaviscus arboreus  
Nandina domestica  
Nerium oleander "Petite Salmon"  
Opuntia ficus-indica  
Philodendron selloum  
Philodendron 'xanadu'  
Plumbago auriculata  
Raphiolepis indica  
Rusellia equisetiformis

Abelia  
Foxtail Asparagus Fern  
Cannas  
Fancy Natal Plum  
Umbrella Plant  
Butterfly Iris  
Cherie Chinese Hibiscus  
Fatsia  
Dwarf Yaupon Holly  
Ixora  
Lantana  
Trailing Lantana  
Dwarf Loropetalum  
Dwarf Barbadoes Cherry  
Turk's Cap  
Nandina  
Petite Salmon Oleander  
Spineless Prickly Pear  
Cut-Leaf Philodendron  
Xanadu Philodendron  
Plumbago  
Indian Hawthorn  
Rusellia

**Grasses**

Miscanthus sinensis "Adagio"  
Muhlenbergia capillaris  
Spartina spartinae  
Uniola paniculata

Adagio Miscanthus  
Gulf Muhly  
Gulf Cord Grass  
Sea Oats

# Exterior Spaces

## DESIGN GUIDELINES

### Signage and Identification

Following are general guidelines for placement of vehicular and pedestrian signs as viewed when approaching the sign.

#### Vehicular Directionals

- Signs must be placed within the driver’s immediate cone-of-vision so that they do not have to turn their heads to see the sign.
- The sign face should be perpendicular to the approaching driver. It will be overlooked if it is parallel to the road.
- Signs should be placed on the right side of the road whenever possible. Drivers are conditioned to look to the right side of the road for signs with information.

An exception to this is when a sign is to be read from both directions of approaching traffic, as in the case of double-faced signs. If a double-faced sign is used instead of two single-faced signs on both sides of the road, the double-faced sign should be located for clear readability from both directions of approaching traffic. Also, if the messages require queuing to the left, the sign may be located to the left to provide advance warning.

- Signs which require drivers to turn must be placed well enough in advance of the intersection in order to allow for reaction time to slow down and turn.
- Signs should not overhang into the roadway if located on a sidewalk or street post.

#### Pedestrian Directionals

- Signs should be placed within a visible area along the path of travel. Signs should be located so as not to interfere with pedestrian traffic, nor should they

### PROJECT STANDARDS • TYPEFACE

ABCDEFGHIJKLMNOPQRSTUVWXYZ  
 abcdefghijklmnopqrstuvwxyz1234567890&  
 Open Sans Regular  
Open Sans Regular Adobe Postscript Font

ABCDEFGHIJKLMNOPQRSTUVWXYZ  
 abcdefghijklmnopqrstuvwxyz1234567890&  
 Open Sans Bold  
Open Sans Bold Adobe Postscript Font

#### PAINT

Bright White (Matte Finish) Matthews Paint MP281500SP <b>P1</b>	Aggie Maroon (Satin Finish) Matthews Paint To Match PMS 7421C <b>P2</b>	Pure Black Matthews Paint <b>P3</b>	Acrylic Clear Non-Glare Acrylite <b>A1</b>	Acrylic Milky White Acrylite 7328 <b>A2</b>	White Translucent 3M Scotchcal Electrocut 3630-20 <b>V1</b>	Light Gray Opaque 3M Scotchcal Electrocut 7125-121 <b>V2</b>
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#### ACRYLIC

#### VINYL

#### MATERIALS

Stainless Steel #4 Brushed Finish Alloy 316 <b>M1</b>	3Form Koda-XT <b>M2</b>	3Form Chroma XT White Ghost 30% W03 Vellum F04 Finish <b>M3</b>	3Form Chroma XT White Down 15% W02 Sandstone F01 Finish <b>M4</b>	Salt & Pepper Stone Polished Finish <b>M5</b>	Aluminum <b>M6</b>
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### PROJECT LOGOS



### PROJECT STANDARDS • COLORS • MATERIALS

REF. NO.	DESCRIPTION/ FINISH	MANUFACTURER
<b>PAINT</b>		
P1	Bright White (Matte Finish)	Matthews Paint MP 281.500 SP
P2	Aggie Maroon (Satin Finish)	Matthews Paint To Match PMS 7421C
<b>ACRYLIC</b>		
A1	Acrylic, Clear Non-Glare	Acrylite
A2	Acrylic, Milky White	Acrylite 7328
<b>VINYL</b>		
V1	White Translucent - 3M Scotchcal Electrocut	3630-20
V2	Light Gray Opaque - 3M Scotchcal Electrocut	7125-121
<b>MATERIAL</b>		
M1	Stainless Steel, #4 Brushed Finish - Alloy 316	
M2	3Form KODA XT	
M3	3Form Chroma XT — White Ghost 30% W03 w/Vellum F04 Finish	
M4	3Form Chroma XT — White Down 15% W02 w/Sandston F01 Finish	
M5	Salt & Pepper Stone Block — Polished Finish	
M6	Aluminum	

block important roadway signage or obstruct views of roadway traffic.

- Pedestrian signs have been designed to mount to existing structures, or to custom posts. Specific mounting heights are shown in the drawings for the individual sign types.
- Wall or fence-mounted signs should be placed high enough so as not to be blocked by cars and plants or other obstructions. This will generally range between 5' to 7' above the ground. Mounting height is measured from the ground level to the bottom of the sign panel.
- Consideration should be given to locating pedestrian signs in areas which receive ambient light from other light sources to create better visibility at night. For all signs, mounting locations should be carefully considered so that viewing is not obstructed by other signs, trees or structures. In some cases, it may be necessary to remove and/or consolidate information presented by other signs.
- Where a new sign is replacing an older sign which does not comply with the standards in this manual, the entire sign assembly should be replaced. Old sign posts should be removed and replaced with the new custom posts.

## Exterior Spaces

### DESIGN GUIDELINES

#### Harbor and Roads

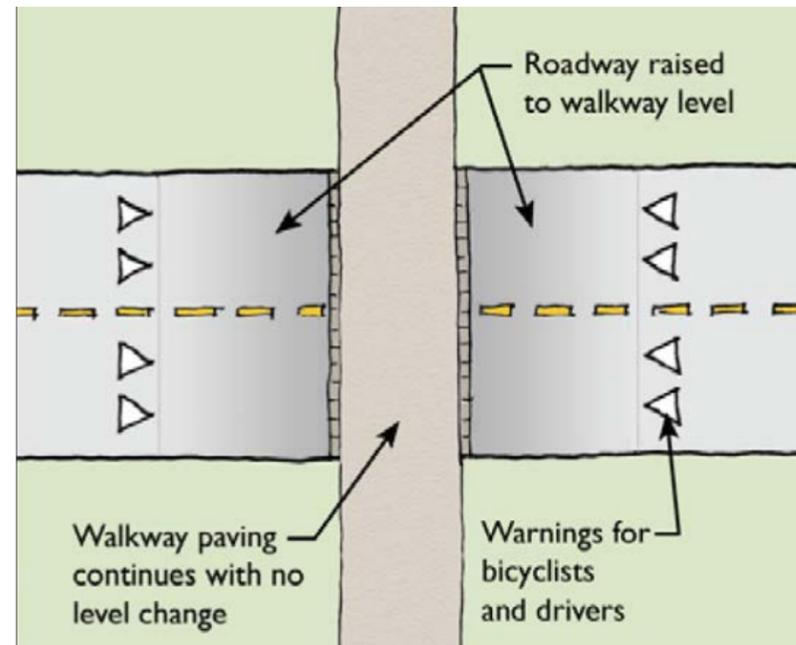
The utilitarian nature of working waterfronts means that they tend to accumulate various trailers, containers, and other equipment clutter more readily than other campus locations. This presents a dilemma: such equipment is required for the operations of the harbor and docks, but if care is not taken to organize and maintain the waterfront, then the activity around and connections to the waterfront which are such a critical part of this master plan will suffer.

The campus should be a primarily pedestrian place. Pedestrian crossings should be prominently marked and designed to make drivers aware that they are crossing a pedestrian thoroughfare. Raised intersections and distinctive surfacing, as illustrated, may be used at heavily-used crossings. Care should be taken to avoid obstructing bicycle traffic, however, and all crossings must comply with the Texas Accessibility Standards.

#### Exterior Lighting

Lighting is an important part of the campus environment both for reasons of safety and of appearance. Good lighting heightens the interest of spaces at night, but it also makes people feel safe. Encouraging this feeling of safety is not simply a matter of increasing the amount of light in a space, which is the most common solution to a perceived lighting problem. In fact, high nighttime light levels often create glare and shadows which contribute to a feeling of insecurity. Safe lighting consists of applying low, but very even levels of light to areas like parking lots and walkways, and slightly higher levels of light to plazas and areas immediately outside buildings. Glare should be avoided in all locations. Higher light levels should be cast on building exteriors, as this provides the impression of brightness and enhances perceptions of safety without negatively affecting night-adapted vision.

Lamps should be selected for color-rendering performance and for efficiency. Lamps should have a color rendering



*Raised pedestrian crossings*



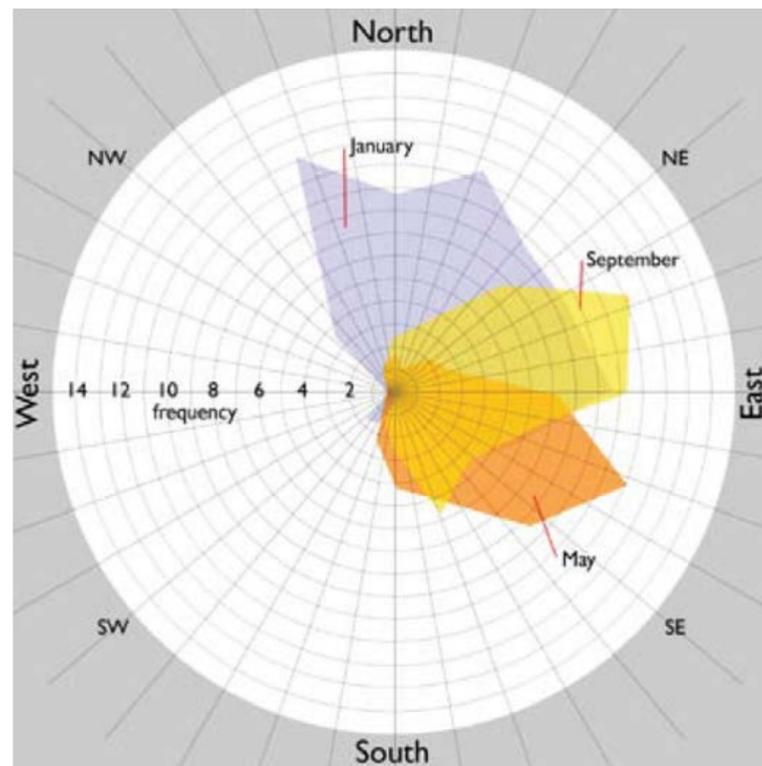
*Example of a raised crosswalk*



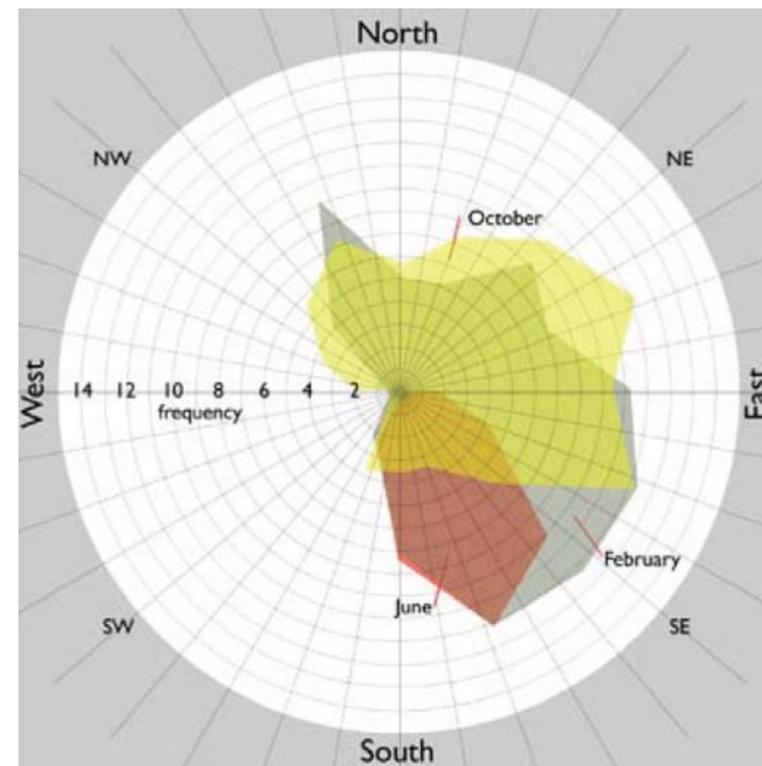
*Light fixture example*

## Environmental Considerations

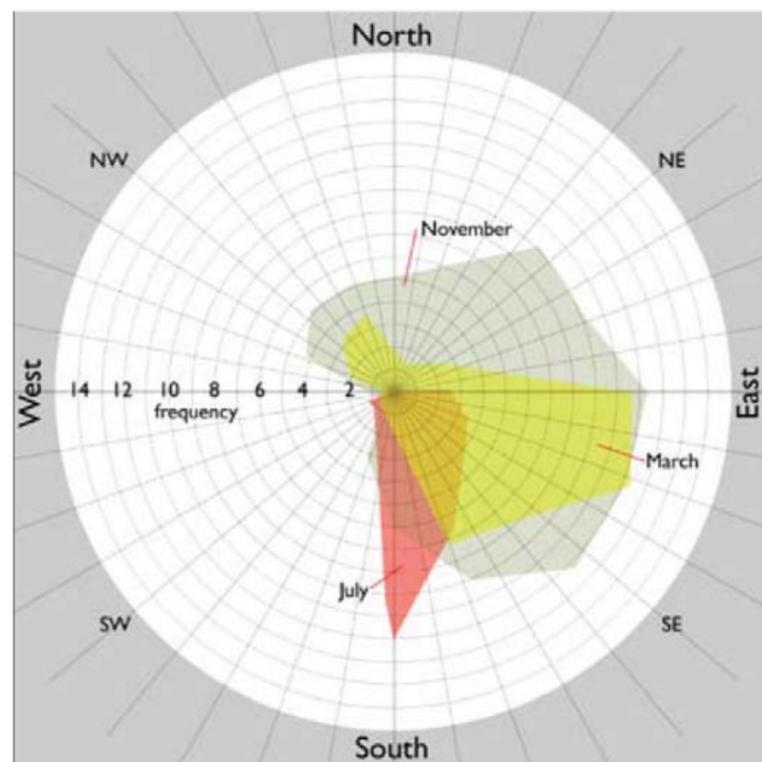
### DESIGN GUIDELINES



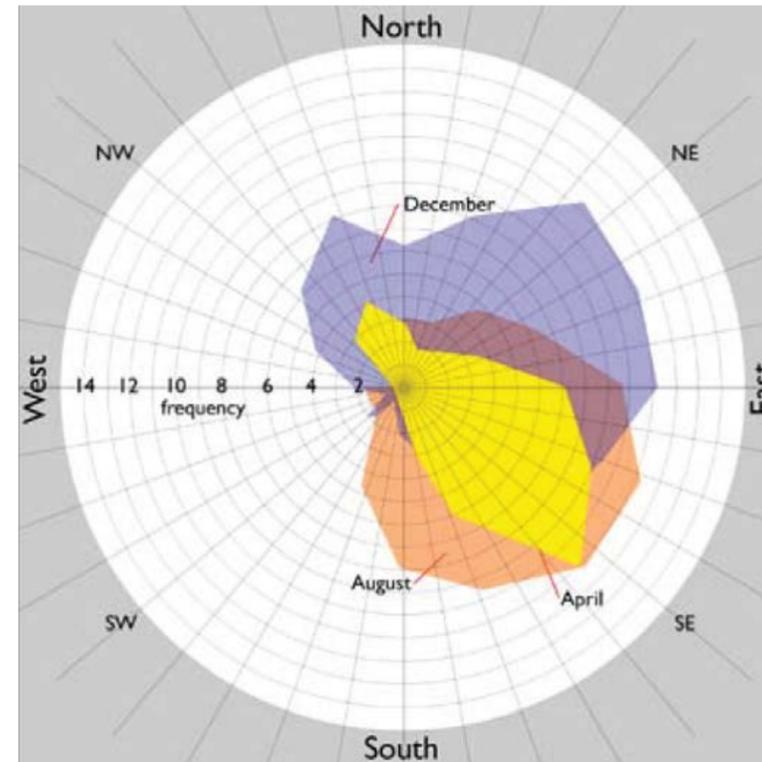
Wind graphs for January, May, and September



Wind graphs for February, June, and October



Wind graphs for January, May, and September



Wind graphs for February, June, and October

index value of 78 or above, and all new and retrofit fixtures should be LED. Lamp replacement should be done on a schedule, rather than on an as-needed basis, to ensure that replacements are all the same type.

Taller light standards with unobtrusive fixtures can be used to provide overall low fill light levels in large spaces, but pedestrian walks and plazas should be lit by fixtures on standards of twelve feet or less. Poles along walkways and in plazas should be spaced to achieve light levels which range from one to five footcandles. Light levels should at no point vary more than 4:1 within a 100 square foot area.

Most light fixtures on campus are some variant of a shoe-box type, as seen in the image. Future light fixtures should be similar. Where possible, aligning light poles with trees can help to disguise them, though spacing and tree type should be carefully done to avoid trees blocking light.

### Environmental Considerations

Awareness of environmental topics and interest in energy and resource conservation have become significant issues in building construction. The role of TAMUG as a leader in studying and working in the environment should be translated into the way that the university designs and constructs buildings. A thoughtful designer can and should adapt design responses to particular sites and programs.

### Energy Use

The state of Texas mandates that all new buildings meet the requirements of ASHRAE 90.1. This mandate requires that all new building use at least 14% less energy than a base building as described in ASHRAE 90.1 High efficiency glass and more energy efficient wall systems.

## Environmental Considerations

### DESIGN GUIDELINES

#### Alternative Transportation

As TAMUG's population grows, alternative means of transportation will become more important. Public transportation connections should be sought in order to provide connections to Galveston and the mainland. While bicycle traffic across the current Pelican Island bridge is unsafe and should be discouraged, residents of Pelican Island dormitories and apartments should be encouraged to bike to and around the campus. Additionally, the feasibility of using alternative fuel for campus vehicles should be investigated.

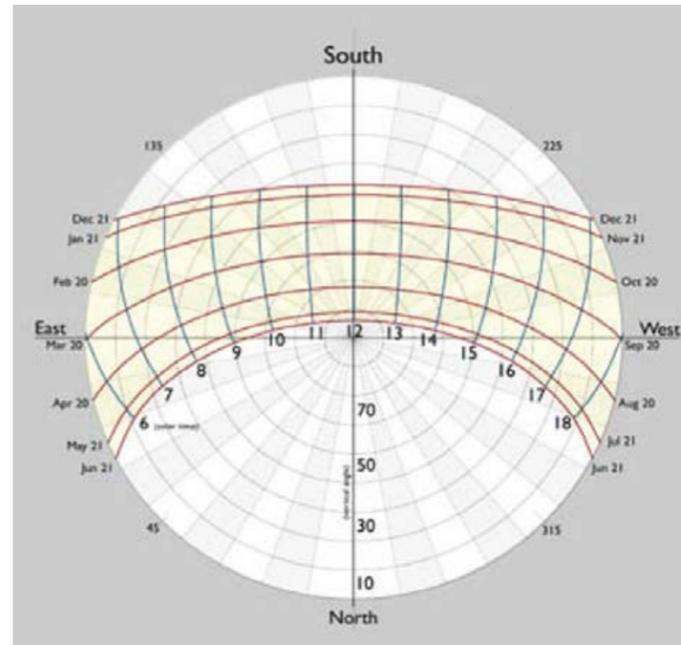
Parking capacity for the future campus has been sized based on current usage. As more students live on or close to campus, their need for personal vehicles may be diminished. TAMUG should encourage on-campus students to do without personal vehicles and off-campus students to carpool whenever possible. Preferred parking spaces for carpooling students should be established. If such programs are successful in reducing parking demand, fewer parking spaces than called for in the master plan should be built.

#### Site Development

Site disturbances should be limited as much as is feasible. While most of Pelican Island is the product of dumping dredge spoils and is therefore not natural in the purest sense, it is still worthwhile to protect undeveloped areas.

#### Stormwater Design

Limiting runoff is not as significant a concern on TAMUG's campus as at other institutions because of the campus's proximity to the sea. However, the quality of the runoff is every bit as important as at inland sites, if not more so. Impervious cover should be minimized, and techniques such as eliminating contaminants and performing water polishing via on-site vegetative filtration should be pursued.



Solar graph



Undeveloped campus area

## Environmental Considerations

### DESIGN GUIDELINES



Waterfront Pavilion, an example of a shading structure



Shade structure



Shade structure, photo by Daniel Prostack

#### Light Pollution Reduction

Minimizing light pollution will primarily benefit the school by reducing energy costs. Exterior lighting systems should be carefully designed to place light only where it is needed and only in the amounts which are required.

#### Condensate Collection

Galveston is a very humid climate, and all outside air used for HVAC is pretreated. This pretreatment removes the moisture, which should then be collected and utilized for irrigation or other non-potable water uses.

#### Shading Structures

Windows should be shaded wherever possible. Shading is the most effective way to reduce solar gain through windows, and it is also in keeping with the design guidelines which encourage steel and aluminum window shading. Shades can either be applied individually to windows or they can be large structures or extensions of roofs which shade a larger area of glass. Designers should investigate both horizontal and vertical shades, as they can both be effective depending on exposure. Wind uplift is a consideration – shades should be designed to resist hurricane-force winds.

#### Building Orientation

The footprints of buildings are somewhat determined by the master plan, but the massing and fenestration of those buildings are resolved by individual designers. The way that building masses are disposed and how windows are placed on those masses can have a considerable effect on building performance. Designers should investigate ways to locate the largest amounts of glass on north and shaded south faces.

Prevailing wind directions should also influence how build-

## Environmental Considerations

### DESIGN GUIDELINES

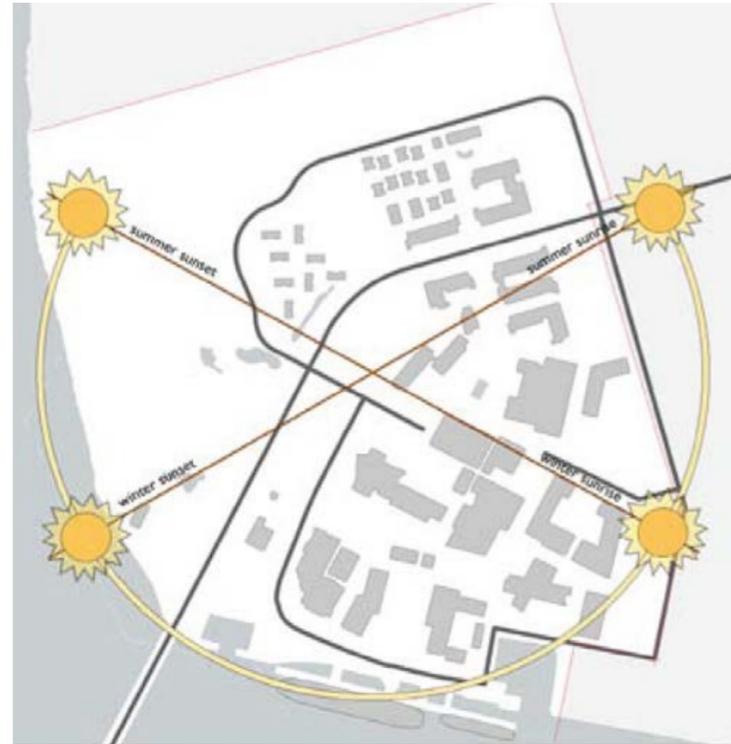
ings and outdoor spaces are oriented. Summer winds tend to come from the south and southeast, so those exposures should be open. Northwest exposures should also be open to allow for the free flow of those breezes from the south through spaces. Winter winds come from the north and northeast, so those exposures should be relatively closed to minimize cold winds.

### Rainwater Collection

Given Galveston's annual rainfall, there is a significant opportunity to collect rainwater for use in landscape irrigation. This issue can be pursued in individual buildings projects as well as in a campus-wide system. The designers of each project should research the viability, cost, and benefits of implementing rainwater collection, storage, and distribution for irrigation. One way to begin this process without overburdening any particular project with system-wide costs would be to require individual projects to collect enough water to supply most of the needs of the landscaping installed in that project. The lessons learned in those projects should dictate whether it is to TAMUG's benefit to implement campus-wide systems.

### Low-VOC, Recycled, and Locally-sourced Materials

Building projects should use materials which have a low environmental impact whenever possible. Materials which do not emit chemicals as they age contribute to healthier conditions inside buildings. Products which are made from recycled material encourage future recycling and, in many cases, require less energy to produce. Materials which are manufactured locally do not require expensive and pollution-causing transportation and are more cost-effective in many cases.



Sun angle diagram



Rainwater collection at the TAMU Agriculture and Life Sciences Complex, photo by Patrick Creighton



*Flood gates at the Port of Rotterdam, similar to those proposed for the Ike Dike*

### Disaster Readiness

The two primary hazards to facilities in a hurricane are wind and water. Proper planning and construction can avert problematic situations.

### Wind Issues

Current building codes have requirements regarding construction practices in areas of high winds. These codes should be regarded as minimum acceptable practices, and facilities should be examined on a case-by-case basis to decide whether more stringent standards should be applied.

### Flooding

There are two basic methods to protect equipment or areas from flooding. The first is a passive system – for example, placing critical equipment above flood level or using unbroken hydrostatically-designed walls. These solutions require no human intervention, nor do they rely on the proper operation of equipment. The second set of solutions, including various types of flood doors and flood barriers, are active systems. They must be operated in order to protect against flooding. These systems may be entirely automated, but they still depend on moving doors, seals, or some other type of mechanism.

It may also be useful to distinguish solutions by potential failure types (in all these cases, “failure” is taken to mean the loss of capability of the system to protect the equipment in question from floodwater). An active system may fail by improper or untimely operation, mechanical failure, poor design, or several other potentials. The set of passive solutions which use “bathtub” type passive protection basins may fail by breach of containment, whether that be by structural collapse, by penetration of the water-tight vessel, or by operational failure strictly related to the protection method itself. A passive system which relies on placing

## Disaster Readiness

### DESIGN GUIDELINES

equipment above flood level may fail only by structural collapse. Some of these failure modes, like structural failure, are simple and can be guarded against relatively easily. Others, like operational failure, can involve complexities which are not evident at first glance.

Flood protection in new construction should be passive in all cases, and where possible, it should be a passive type which does not rely on containment. Active solutions may be required in retrofitting existing buildings, but the use of those solutions should be minimized and passive solutions used wherever feasible.

Most facilities at the Mitchell Campus are near 15 feet above sea level, and this affords a significant level of protection from storm surges from the federal government-defined base flood of 11 feet MSL (equivalent to a 100-year flood, or a 1% probability of occurring in a given year). However, the possibility of storm surges in the range of 15 to 20 feet above sea level exists. Because of this, standard practice for infrastructure installations in this area is that utility and research equipment should be located above (or protected to) 20 feet MSL.

