Texas A&M University
Parking Garage Master Plan and Feasibility Study
College Station, Texas

TRANSPORTATION SERVICES
TEXAS A&M UNIVERSITY

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Prepared for:

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EXECUTIVE SUMMARY

Introduction

Managed by the University's Transportation Services Department, the Texas A&M campus has over 33,000 parking spaces in surface lots and five (5) structured parking facilities. The University recognizes that parking is a foundational element of the campus' vitality. The total amount of parking available, its location, and how it is managed play important roles in promoting the University and attracting and accommodating students and faculty/staff. In order to enhance this vitality the University is exploring ways to provide additional structured parking on the campus. As development continues to occur and surface parking is lost, it is imperative for the University to understand how much structured parking should be added, where this parking should be added and at what time this structured parking should be added to support the core functions of campus.

Parking Garage Feasibility Study Results and Recommendations

Campus Supply / Demand Study

Kimley-Horn developed a Park+ scenario planning model which was used to define existing and five year parking deficiencies on campus, and evaluate the location and orientation of new parking facilities. The components of the Park+ model developed included advanced latent demand mapping, enhanced multi-modal evaluation, and parking permit restrictions. The results of the five year Master Plan build out scenario showed that a 650 space parking deficiency will exist near the engineering area of campus and an 800 space parking deficiency will exist near the Northside housing area of campus. Two garages, one on Lot 47 and one on Lot 30d are proposed to meet these future deficits.

Lot 47 Garage

The purpose of this study was to evaluate the existing Lot 47 / Lot 51 area's ability to accommodate an above grade parking structure to provide a net gain of approximately 650 parking spaces. Multiple configurations were studied that incorporated varying footprints, number of parking bays, number of levels and entry/exit locations. The best resulting schematic identified the total number of spaces created, site physical impacts (trees, architecture, constructability, etc.), site infrastructure, utility and stormwater impacts, traffic impacts and operational impacts. While multiple options are physically and functionally feasible with varying pros and cons, the committee reviewing the results identified one option deemed most feasible and requested Pre-Design pricing for this alternative.

This option is a 1,116 space above grade 4-bay parking structure with 1-level at grade and 4-levels above grade with access directly from the existing loop roads from the North and South. This option also incorporates approximately 27,250 SF of office space on the ground floor for Transportation Services offices. In keeping with the supply / demand study, this option provides a net gain of 674 spaces in the engineering area of campus. The cost of this option would be $21,171,986 ($18,113,994 for the parking area and $3,057,993 for the office area) or $16,231 per space (See Appendix B).

An above grade parking structure at Lot 47 is feasible. If the associated costs and impacts are deemed acceptable and the project moves forward in the capital improvement plan, it is recommended that a more detailed study effort be undertaken to determine the full project program before moving into final design.

Lot 30d Garage

The purpose of this study was to evaluate the existing Lot 30d / Lot 30c area's ability to accommodate an above grade parking structure to provide a net gain of approximately 800 parking spaces. Multiple configurations were studied that incorporated varying footprints, number of parking bays, number of levels and entry/exit locations. The best resulting schematic identified the total number of spaces created, site physical impacts (trees, architecture, constructability, etc.), site infrastructure, utility and stormwater impacts, traffic impacts and operational impacts. While multiple options are physically and functionally feasible with varying pros and cons, the committee reviewing the results identified one option deemed most feasible and requested Pre-Design pricing for this alternative.

This option is a 1,082 space above grade 4-bay parking structure with 1-level at grade and 3-levels above grade with access directly from the existing roads from the South. In keeping with the supply / demand study, this option provides a net gain of 870 spaces in the Northside housing area of campus. The cost of this option would be $15,840,683 or $14,640 per space (See Appendix B).

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INTRODUCTION

Campus Data

Founded more than 135 years ago, Texas A&M University is a teaching and research intensive university with 42,000-plus undergraduates and more than 10,500 graduate students.

Managed by the University's Transportation Services Department, the Texas A&M campus has over 33,000 parking spaces in surface lots and five (5) structured parking facilities. The University recognizes that parking is a foundational element of the campus' vitality. The total amount of parking available, its location, and how it is managed play important roles in promoting the University and attracting and accommodating students and faculty/staff. In order to enhance this vitality the University is exploring ways to provide additional structured parking on the campus. As development continues to occur and surface parking is lost, it is imperative for the University to understand how much structured parking should be added, where this parking should be added and at what time this structured parking should be added to support the core functions of campus.

As the campus continues to grow and buildings replace existing surface parking, a need to understand when and where to construct future parking structures was identified. Communicated information indicates that there is a "perceived" parking shortfall on the east side of campus. As a part of this study, two (2) potential sites for structured parking on the east side of campus were identified and evaluated. The site feasibility analysis for these sites can be seen in the following sections.

Objectives

The purpose of this parking garage Master Plan and feasibility study is to 1) define existing and five year parking deficiencies on campus, and evaluate the location and orientation of new parking facilities 2) evaluate the potential for a 650 space net gain above grade parking structure in the engineering area of campus, and 3) evaluate the potential for 850 net parking spaces in an above grade parking structure in the Northside student housing area of campus. Parking feasibility concepts will investigate physical impacts, infrastructure, utility, stormwater impacts, and traffic impacts to each proposed site.

Study Area

The study area for the parking garage Master Plan and feasibility study and resulting future parking deficiencies is as illustrated in **Figure 1**.

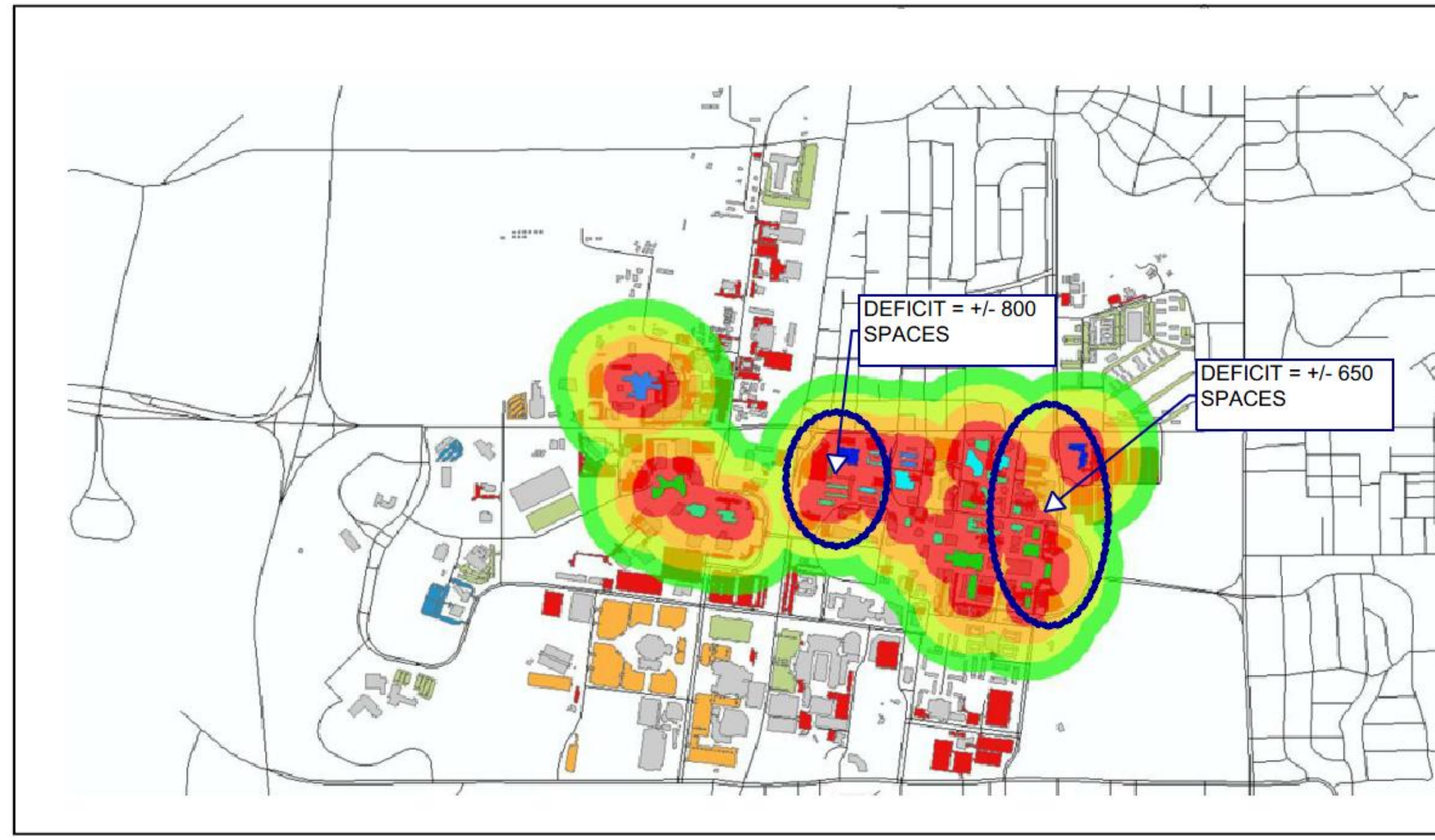


Figure 1 – Texas A&M University Campus Map, Study Area and Identified Parking Deficiencies

Guiding Study Principles and Assumptions

The following guiding principles were used in developing the requested scope of work:

- Recommendations should follow ongoing University Master Planning efforts.
- Recommended parking alternatives should provide for flexibility to control access between multiple uses at varying times.
- Effects to existing infrastructure and environment should be minimized.
- Provide a simple, easily understood parking environment with adequate way-finding.

Common Design Features and Assumptions for Alternative Parking Concepts

While each of the parking structure layouts is unique, common design elements were assumed during the development of the conceptual layouts. The following list provides a summary of the common design elements used in the functional layouts for each parking structure alternative.

- Parking Efficiency: The garage target parking efficiencies for multi-level and multi-bay parking structures are between 330 to 350 square feet per space. With long span construction and parking on the ramps, this target efficiency is within the industry standards and provides a quantitative measure on how effectively the built square footage is utilized.
- Parking Orientation: Most alternatives utilize one-way drive aisles and 70-degree parking bays.
- Stall Size: Parking stalls are 9-ft wide and 18-ft long. This equates to parking Level of Service (LOS) A design criteria.
- Parking Bay Dimensions: All one-way parking alternatives utilize 58-ft wide parking bays which include a 22-ft one-way drive aisle. This equates to parking Level of Service A design criteria.
- Entrance/Exit Conditions: Accommodations for revenue control equipment similar to existing standard configurations have been considered in the geometrics of entry/exit lanes.
- Accessible Parking: Each of the alternatives includes accessible parking stalls distributed throughout the parking structure. Each alternative has been allocated the required number of accessible spaces to meet current code requirements considering each structure as a standalone parking facility.
- Ramp Slopes: Parkable ramp slopes were limited to 6% to remain within industry standards.
- Floor-to-Floor Heights: In the Lot 47 garage alternative, the floor-to-floor heights were maintained at 12’-0” for floors 2 through 4. The floor-to-floor height for level 1 to level 2 was 14’-0” to allow for clearance in the proposed office space. These heights allow for an 8’-2” clearance for van accessible parking on all floors with a maximum structural depth of 36-inches. In the Lot 30d garage alternative the floor-to-floor heights were maintained at 12’-0” for all floors. These heights allow for an 8’-2” clearance for van accessible on all floors with a maximum structural depth of 36 inches.
- Stair/Elevator Towers: Locations for stairs and elevators are shown for each alternative. The location and design of these elements must provide efficient circulation and access to all floors of the facility, as well as complement the location of vehicle entrances and exits to provide proper sight distance and safety for pedestrians.
- Above Grade Parking: The garages alternatives are placed above ground and all levels are assumed to have open perimeters. No mechanical ventilation or full-coverage sprinklering is required and the stair/elevator cores can be open.
- Framing System: Conceptual layouts are based on cast-in-place post-tensioned concrete construction. The parking structure overall dimensions are sized to maximize the efficiency of this construction method. The garage alternatives are based on long span one-way post-tensioned flat slab and beam construction with column grids on an approximately 25-ft by 62-ft spacings. Expansion joints were indicated for structural lengths over 280-ft.
- It is assumed that each option can be constructed by limited and phased closing of adjacent streets such that existing campus circulation system and bus routes can be maintained.

Sustainable Design Features and Assumptions for Alternative Parking Concepts

Below is a list of sustainable features that will likely be incorporated into the design criteria for the parking garages to reduce the environmental impact of initial construction and promote efficient operations and management of the garages in the future.

- Locate and connect the parking structure with other modes of mass transportation.
- Include designated bike lockers to promote alternative means of transportation.
- Incorporate preferred parking spaces for low-emission and fuel-efficient vehicles to encourage use of alternative fuels and to reduce pollution and land development impacts from automobile use.
- Incorporate preferred parking spaces for carpools or vanpools to encourage eco-friendly behavior and to reduce negative environmental impacts from single-occupant vehicles.
- Reuse stormwater runoff as on-site irrigation prior to discharging it into the storm system.
- Implement efficient landscaping that minimizes site disturbances, while reducing or eliminating the use of potable water for irrigation.
- Reduce the building footprint by maximizing the efficiency of the parking layout, while maintaining an acceptable level of service for patrons. This approach also can reduce the heat island effect when coupled with roof level reflectivity.
- Maximize the amount of daylight at each level to reduce artificial lighting required during daytime hours of operation. Includes consideration of building orientation, incorporation of long-span construction to minimize the number of columns, and openness of the parking deck perimeter.
- Use lighting controls to eliminate spillover of perimeter fixtures onto adjacent properties, and turn off lights in specific zones of the parking structure that are well-lit during daytime hours to decrease lighting power requirements.
- Incorporate the use of energy efficient lighting systems to reduce power requirements, as well as the long-term maintenance costs required for re-lamping the garage over the life of the structure.
- Incorporate fly-ash (a waste by-product) and air-entrainment into the concrete mix-design to increase durability. This technique provides a productive use for a waste product and reduces the amount of cement required. The result is a reduction in the amount of new materials and fuel consumed in cement production.
- Design structural members as finished products to reduce the number of materials needed in the overall project.
- Specify local suppliers so materials can be shipped and installed using regional resources.

- Require a minimum percentage of recycled content for construction materials to reduce the need for newly processed and manufactured materials.
- Specify low volatile organic compound (VOC) limits for adhesives, sealants, primers, paints, and traffic coatings to reduce negative impacts to air quality in the facility.
- Minimize the amount of paint specified on the structures.
- Use photovoltaic cells on the parking structure's rooftop. These panels provide energy for the parking structure's lighting and provide shade for vehicles parked on the roof. (Not currently included in the Opinions of Cost)
- Design and install facility count systems to provide owners real-time information on the status of their facilities and to proactively manage their parking facilities. For example, when a facility nears full occupancy, the owner should be ready to close the facility and divert patrons to another facility where parking is available. (Not currently included in the Opinions of Cost)
- Design and install dynamic wayfinding/parking guidance systems to alert patrons to available parking thereby reducing the amount of cruising and searching resulting in less drive time for patrons to find available parking. (Not currently included in the Opinions of Cost)

Data Collection

Parking data for the campus was provided by the Texas A&M University Facilities Engineering and Planning Department, the Transportation Services Department and other Texas A&M University online resources. Received and reviewed information included the following:

- Campus survey information in PDF and CAD formats including utility mapping and tree locations from the Texas A&M University Facilities Engineering and Planning Department.
- Campus Master Plan information for the five-year build out condition from Texas A&M University Facilities Engineering and Planning Department and http://campusplan.tamu.edu/.
- Campus parking supply and occupancy data from Texas A&M University Transportation Services Department.
- Campus GIS information from Texas A&M University Campus Maps Center and Office of Facilities Coordination (FCOR).
- Campus Building data from Office of Facilities Coordination (FCOR).
- Campus Master Plan information from http://campusplan.tamu.edu/.

Kimley-Horn relied upon the accuracy and completeness of all documents, surveys, reports, plans and specifications provided by the University or by others for whom Kimley-Horn is not legally responsible. Texas A&M University acknowledges that verifying the accuracy and completeness of such items is not part of the Kimley-Horn scope of services.

Supply / Demand Study

The Park+ Model is largely modeled after traditional supply and demand evaluations, which includes a multi-step process for evaluating parking demand conditions for a development, community, or campus. The multi-step process typically includes gathering data, defining assumptions or characteristics, selecting generation rates, applying reduction factors, creating scenarios, and evaluating results.

The Park+ Model allows the user to consolidate gathered data, define assumptions and characteristics through a user friendly interface, develop unique generation factors through the Park+ Proximity Parking Approach, apply reduction factors related to multi-modal and demand management assumptions, create and run scenarios using the models predictive gravity modeling algorithm, and evaluate the results on multiple levels using Park+ selection sets that can drill down from the study area level to a specific block, node, or intersection.

The Park+ Model is built on the principle of proximity parking, which assumes that parking demands are generally handled within a specific walking radius of a demand generator. This methodology is founded on the relationship between walking distance, price, attractiveness of facility, and general user decision making. The result of this methodology is localized parking generation rates that are predictive of actual demand conditions, which are representative of realistic parking generation characteristics for individual land uses throughout the specified study area.

This principle of proximity parking is used in both the initial calibration process as well as the predictive allocation process, which defines how many people need to park and where they want park. While the general methodology of the Park+ Model follows traditional shared use parking generation concepts, it differs from how generation rates are calculated.

The Park+ Model includes a predictive gravity demand modeling algorithm that allocates projected parking demand to adjacent parking facilities based on walking distance, price, and general attractiveness of each facility. The gravity modeling algorithm used in this model was developed specifically for the applications found in Park+. The algorithm uses the range of walking distances, price, and facility types in the model to define localized scores related to each facility and land use pair. These scores are then used to define the percentage of parking demand allocated to each parking facility, up to a user specified maximum occupancy percentage, which is defined as one of the user inputs to reflect the perceived effective capacity conditions within each Park+ community or campus.

The outputs of the Park+ Model include parking demand, parking supply, general surplus or deficit, met demand, latent (unmet) demand, and traditional parking demand required. The parking demand metric is a summary of the demand generated for the entire study area (or for the selection area). The parking supply metric is a summary of the parking capacity for the entire study area (or the selection area). The surplus or deficit metric is simply the difference between the demand and supply metrics for the given area. The met demand metric describes the amount of parking demand that is actually allocated using the proximity parking methodology, within the study area or for a given selection area. The latent demand represents the amount of demand that is not met within each localized walking radius defined within the model. While the overall supply and demand may be met within a given scenario, there may still be localized deficiencies within specific areas of the model – latent demand captures and identifies these areas.

The outputs from Park+ can be evaluated for the entire study area for a smaller subset, which can define localized demands at the zone, block, node, or intersection level. The benefit of this analysis tool is that it allows the Park+ Model to be free from zonal boundaries, allowing the user to define analysis areas as various development plans or master planned scenarios are evaluated.

Data for Park+

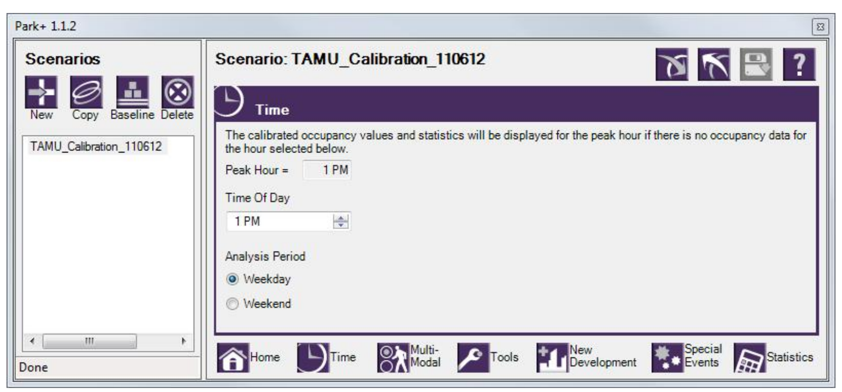
There are two primary data sources for the Texas A&M Park+ model – Land Use and Parking. The land use data includes use type and quantity (dwelling units, capacity, square footage, etc), in addition to facility information related to campus infrastructure. The land use layer was developed from existing shaepfiles provided the campus FCOR inventory. The parking layer includes capacity, occupancy, price, and type information, in addition to parking facility information maintained by the Transportation Services group. The parking layer was developed from existing shapefiles provided by the campus Transportation Services group.

Calibration Conditions

The Park+ Calibration process utilizes existing parking demands (collected by the project team) to calibrate parking generation rates for each individual land use within the study area. The result is a more accurate depiction of parking generation characteristics for the study area, rather than depending on city/county code or outdated national parking generation rates reported by the Institute of Transportation Engineers (ITE) or the Urban Land Institute (ULI). The Calibration process uses the previously described parking occupancy data, land use characteristics, multi-modal characteristics, public-private parking relationships, and area specific walking tolerances to define the adjusted generation rates.

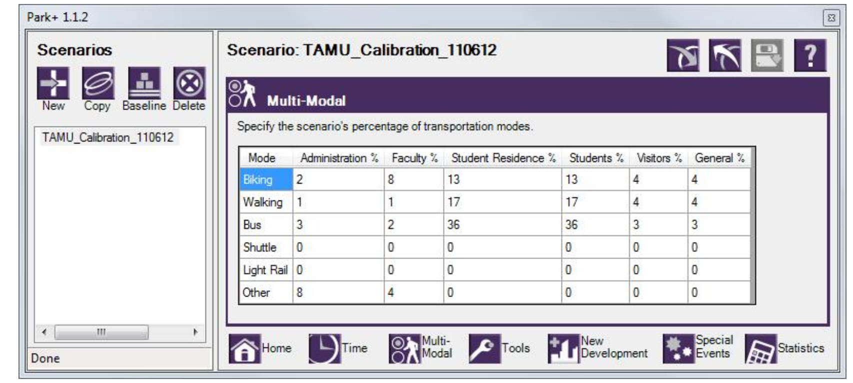
The following screenshots provided the various inputs from the calibration process, including time-of-day, multi-modal characteristics, parking and user type relationships, and user walking tolerances.

Peak Time of Day



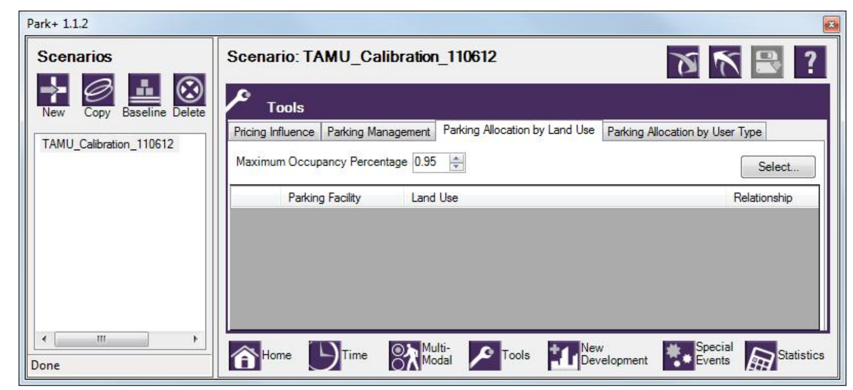
The peak time of day was derived from campus wide parking occupancy data provided by the Texas A&M Transportation Services. Peak occupancy was derived from peak permit sales and distributed over 24 hours based on the time of day trends provided by the University.

Multi-Modal Characteristics



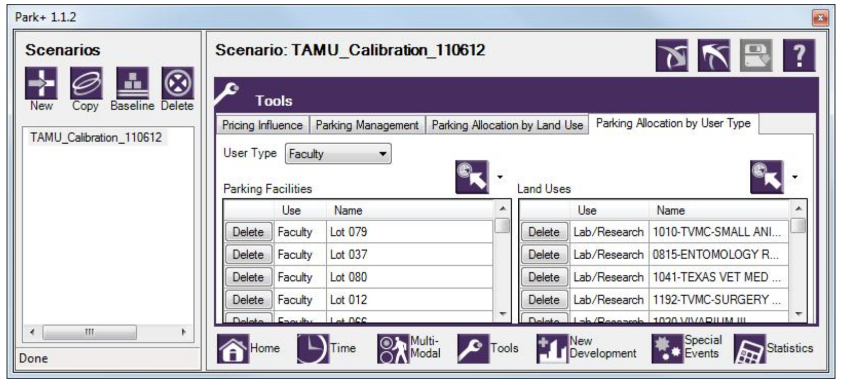
The multi-modal characteristics were derived from the 2011 commuter survey conducted by Texas A&M Transportation services. Additional visitor and general data was derived from 2010 U.S. Census data.

Peak Demand Characteristics



The peak demand characteristics represent the occupancy level at which parkers consider a facility full and begin to move to the next available parking facility within their specified walking radius and allocation patterns. This value is similar to the concept of effective parking supply or capacity, which states that a facility is effectively full when occupancy reaches 85-95 percent of capacity. For this model, the value was set at 95 percent, reflecting permit sales thresholds.

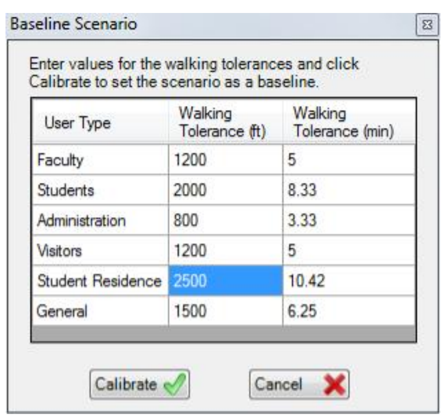
Allocation Relationship Characteristics



The parking allocation relationships represent specific restrictions by user type and lot availability. For example, student user demands should be allocated to student parking facilities. The relationships are stored internally to the model and drive many of the calibration and projection procedures that the Park+ model utilizes. The map to the right shows a general distribution of parking user type facilities (designated by user type).

User Walking Tolerance Characteristics

The user walking tolerances represent how far each user type is willing to walk between destinations and parking. Each specific user type can have a specific distance, allowing for more granular representation of campus demand distribution patterns. User walking tolerances were derived from an understanding of the user types on campus and an iterative calibration process.


Baseline Scenario

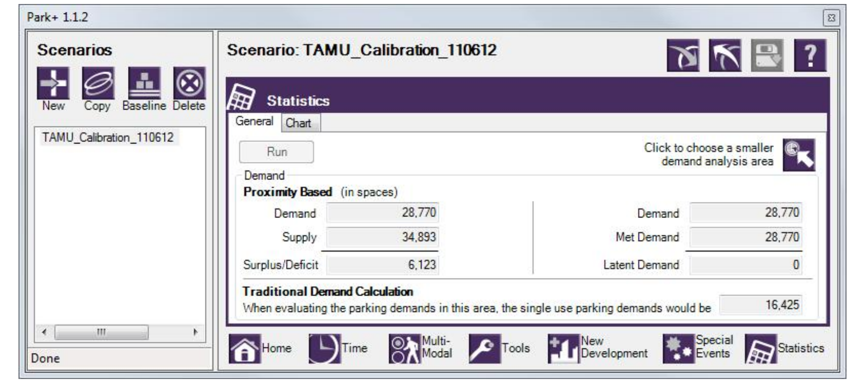
Enter values for the walking tolerances and click Calibrate to set the scenario as a baseline.

User Type	Walking Tolerance (ft)	Walking Tolerance (min)
Faculty	1200	5
Students	2000	8.33
Administration	800	3.33
Visitors	1200	5
Student Residence	2500	10.42
General	1500	6.25

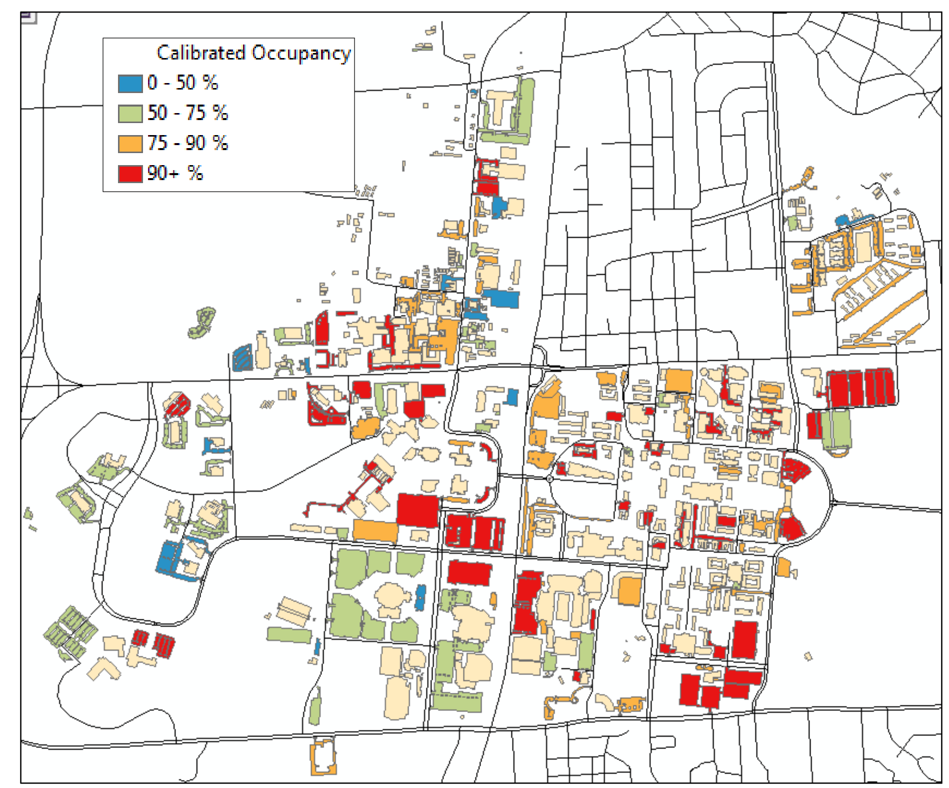
Calibrate Cancel

Calibration Results

The following output shows the calibration results, based on the land use and occupancy data provided by the University, and the calibration settings discussed in the previous sections.



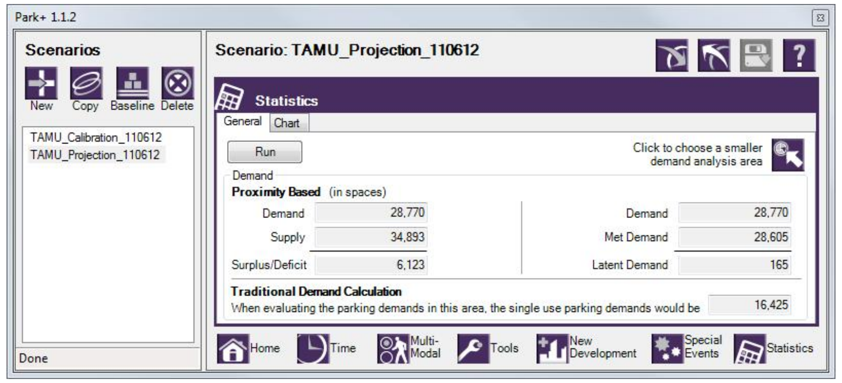
The results show that there is an approximate 6,000 space surplus on campus. These values represent the global parking supply and demand on campus. The graphic on the following page provides a representation of the parking demands on a lot by lot basis.



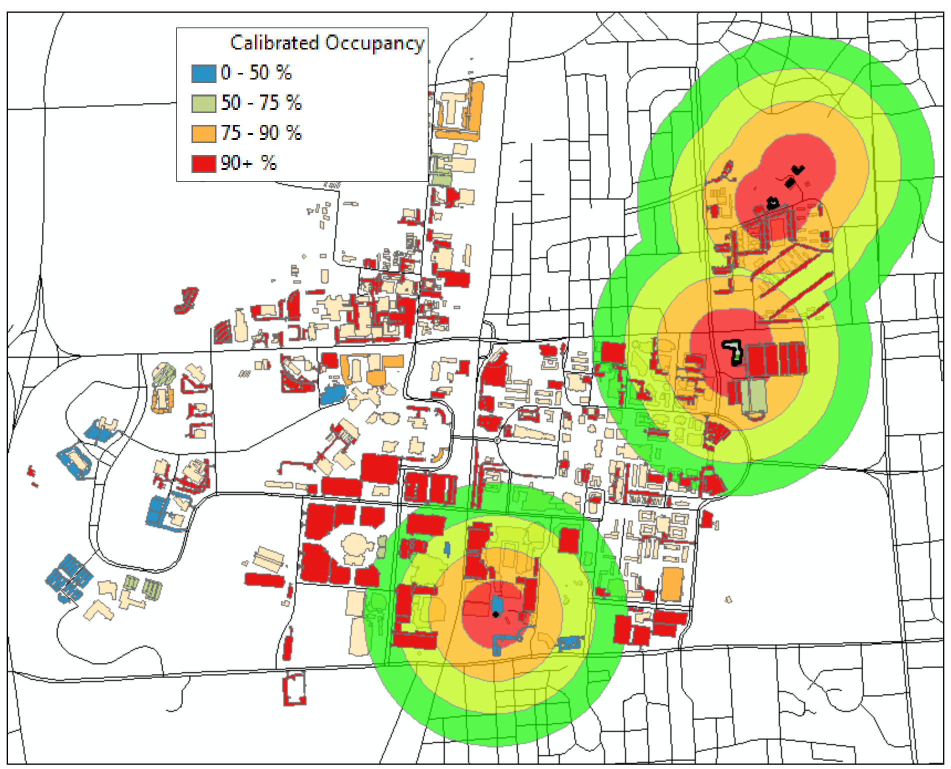
Projection Results

In addition to the calibration settings, the Park+ model is able to run projected conditions for the existing scenario, as well as additional scenarios. The projected conditions differ from calibration because the adjust for design-day conditions and predict where parkers would prefer to park if given the choice – based on the relationship between walking distance, price, and attractiveness of parking.

The output below provides the initial existing conditions projection from the model. The results do not differ from the calibration process, because none of the inputs were changed. The results do show a latent demand of 165 spaces on campus – representing areas which may have localized deficiencies that restrict parking demand from being allocated within the criteria and characteristics set by the user.



However, parking demands were allocated based on the Park+ principles of proximity parking, which is represented by the graphic below. Additionally, the latent demand discussed about is shown with buffer rings which symbolize the overall latency of an area. Heavy concentrations of red indicate a presence of latent demand(s), with the outer buffers representing walking distances that must be traversed to overcome the latent demands.

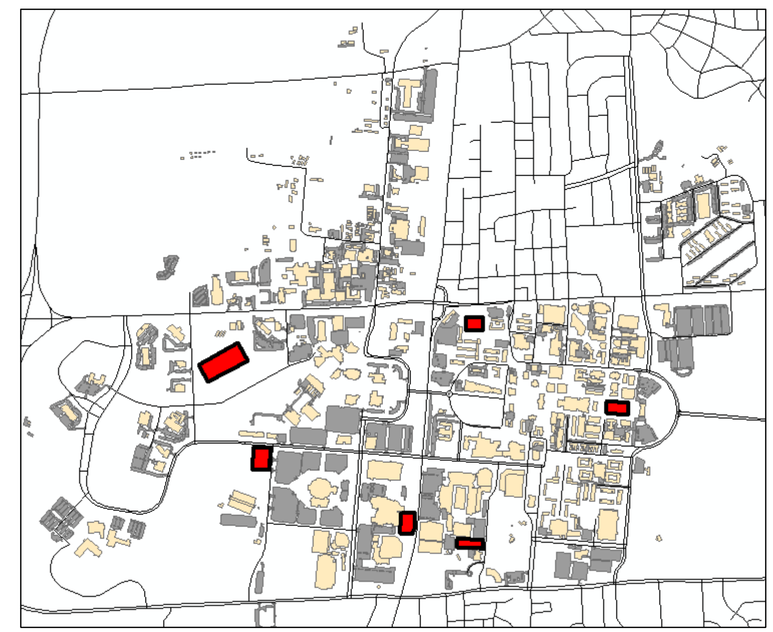


Five-Year Projections

Following the existing conditions projections, the Park+ model was used to review parking demands with the addition of Master Plan committed campus projects (without the addition of new parking). The new developments included:

- West Campus Housing – 1,000 dwelling units
- North Campus Housing – 640 dwelling units
- PEAP – 115,028 square feet
- Student Recreation Center Expansion – 70,000 square feet
- Player Development – 19,804 square feet
- Liberal Arts – 100,000 square feet

The location of the new developments is shown on the map below.



The results of the five year Master Plan scenario are shown below. The addition of the five new developments resulted in an increase of latent demand by more than 2,500 spaces. This demand is directly attributed to the new demand generated by the six new developments on campus.

A Park+ scenario planning model was developed and used to define existing and five year parking deficiencies on campus, and evaluate the location and orientation of new parking facilities. The components of the Park+ model developed included advanced latent demand mapping, enhanced multi-modal evaluation, and parking permit restrictions. As seen in **Figure 1** the results of the five year master plan build out showed that a 650 space parking deficiency will exist in near the engineering area of campus and an 800 space parking deficiency will exist in the Northside housing area of campus. Two garages, one on Lot 47 and one on Lot 30d are proposed to meet these future deficits.

ANALYSIS

Approach

For both the Lot 47 and the Lot 30d garage options, varying footprints, number of parking bays and number of levels were investigated to provide an amount of parking as required for each configuration and area. Options were compared to each other based on the number of spaces they provide, the parking efficiency, and impacts to the site and traffic. The resulting preferred option for each areas is detailed below.

Lot 47 Garage Feasibility Option

Garage Schematics

The following summary provides a general description of the preferred alternative.

Lot 47 Structure (Figures 2-3)
1,116 spaces, 336 sf/space, 5- levels above grade, 4-bay Parking Structure with ± 27,250 SF of proposed office space. 674 net spaces are provided

Summary of Lot 47 Structure:
- Five parking levels at and above existing Lot 47 and a portion of Lot 51.
- Four 58-ft wide parking bays (double loaded).
- Two-way head in visitor or VIP parking utilizing 10' wide spaces
- One-way angled controlled access parking.
- Segregated visitor or VIP entry / exit from the North and South loop roads.
- Single controlled access entry /exit from the North loop road.
- Parking on the ramp with flat end bay parking.

"Pros" of Lot 47 Structure:
- Provides efficient long-span construction parking that meets the future deficiency needs.
- Entry / exit location is off two-way loop roads and adjacent to the existing engineering area surface lots.
- Allows for a flexible and usable office space component on the ground floor.
- Provides for segregated and separately controlled visitor parking in excess than what is currently provided.
- Apparent consistency with the University Master Plan.
- Avoids major existing utilities.

"Cons" of Lot 47 Structure:
- Potential pedestrian/vehicular conflict at the entry / exit gates.
- Parking on sloped ramps.
- Integrating office space into existing parking area is more costly than standalone office space in another building type.

Lot 30d Garage Feasibility Option

Garage Schematics

The following summary provides a general description of the preferred alternative.

Lot 30d Structure (Figures 4-5)
1,082 spaces, 331 sf/space, 4- levels above grade, 4-bay Parking Structure. 870 net spaces are provided

Summary of Lot 30d Structure:
- Four parking levels at and above existing Lot 30d and a portion of Lot 30c.
- Four 58-ft wide parking bays (double loaded).
- One-way angled controlled access parking.
- Single controlled access entry /exit from the Sorth loop road.
- Parking on the ramp with flat end bay parking.

"Pros" of Lot 30d Structure:
- Provides efficient long-span construction parking that meets the future deficiency needs.
- Entry / exit location is off two-way loop roads and adjacent to the existing Northside area surface lots.
- Provides parking on the perimeter of campus.
- Apparent consistency with the University Master Plan.
- Avoids major existing utilities.

"Cons" of Lot 30d Structure:
- Minor utilities (water, storm sewer, and sanitary sewer will need to be relocated).
- Existing trees will need to be removed.
- The existing storm drainage area will need to be "structured" and "spanned" by the proposed garage.
- Potential pedestrian/vehicular conflict at the entry / exit gates.
- Parking on sloped ramps.

Site Physical Impacts

For both the Lot 47 and the Lot 30d parking garage options, the proposed parking areas are completely above grade. For each garage option a number of large and small existing trees will need to be removed and/or relocated. Also for each option a number of modifications to the exiting loop roads will need to be constructed. From a constructability standpoint, it is assumed with existing construction techniques, each of the garage options can be constructed while keeping the loop roads open at all times with minimal single lane closures.

Site Infrastructure, Utility and Stormwater Impacts

Lot 47 Garage

The proposed parking structure is located on the site of the existing parking area 47. Lot 47 is an existing asphalt parking lot that is in moderate to good condition and is accessed from Polo Road. Because the proposed garage structure is located on an existing paved lot, increases to storm water runoff will be minimized if not completely eliminated. The subject site has several large diameter storm sewers adjacent to the proposed location. These include a 72" diameter reinforced concrete pipe and 7'x4' concrete box culvert running in Bizzell Street west and south of the proposed garage. There is also a 30" diameter rcp north of the proposed garage which currently captures runoff from the existing parking lot. It is anticipated that an underground storm system to capture roof drainage from the garage will be required. This system will be able to connect to the surrounding storm drainage.

Domestic water and sanitary sewer are both available to the site. An existing 12" diameter water main is located west of the proposed garage on the east side of Bizzell Street. A new water service line will be required along the southern end of the structure to provide additional fire coverage. A 15" sanitary sewer main is located south of the proposed garage location and can be tied into with a service connection for the proposed office space.

KHA is not aware of the availability of thermal utilities, including chilled water, heating water, and domestic hot water, to this site location to serve the proposed office space.

Lot 30d Garage

The proposed parking structure is located partly on the existing parking area 30d and partly on green space. Because the proposed structure will be adding impervious cover to the area, detention mitigation will be required for the proposed structure. There are limited opportunities to locate surface detention in the area without significantly impacting the remaining green space. We would anticipate an underground detention system connected to the roof drain system for the building will be required. Additionally, the proposed structure is located over the current storm sewer outfall for the northwest portion of main campus. The building is located over an open channel that leads to an existing 8'x4' box culvert under Wellborn Road. A new storm sewer system will need to be installed from Wellborn Road to the east side of the proposed structure. This storm sewer can be located under the proposed garage structure.

There are also existing water and sanitary sewer mains located within the proposed footprint of the garage structure. These include 12" and 8" diameter water mains and an 18" sanitary sewer main. These utilities will need to be relocated around the proposed structure.

Site Traffic Impacts

Lot 47 Garage

Based on the anticipated increase of 674 parking spaces, an estimated 325 vehicles can be expected in the vicinity of the garage during a peak hour. This will increase traffic on both Ross Street and Bizzell Street. A study should be conducted to verify the increase in traffic will not create operational issues at near-by intersections. It is anticipated that any resulting traffic considerations can be resolved in this area during final design. The location of the garage on site also allows the future modification of access to Polo Road and incorporation of an east-west internal collector.

Lot 30d Garage

Based on the anticipated increase of 870 parking spaces, an estimated 400 vehicles can be expected in the vicinity of the garage during a peak hour. This will increase traffic on the access street between Jones Street and Wellborn Road. It is anticipated that a portion of Jones Street between the garage entrance and Albritton Circle will need to be converted to two-way traffic. A study should be conducted to verify the increase in traffic will not create operational issues at near-by intersections or queuing issues on Jones Street or Wellborn Road. It is anticipated that any resulting traffic considerations can be resolved in this area during final design.

Parking Services Impacts

Accommodations for entrance/exit revenue control equipment have been considered in the geometrics of entry/exit configurations. As such the proposed parking structure can be operated in a similar manner to the other controlled parking facilities on campus.

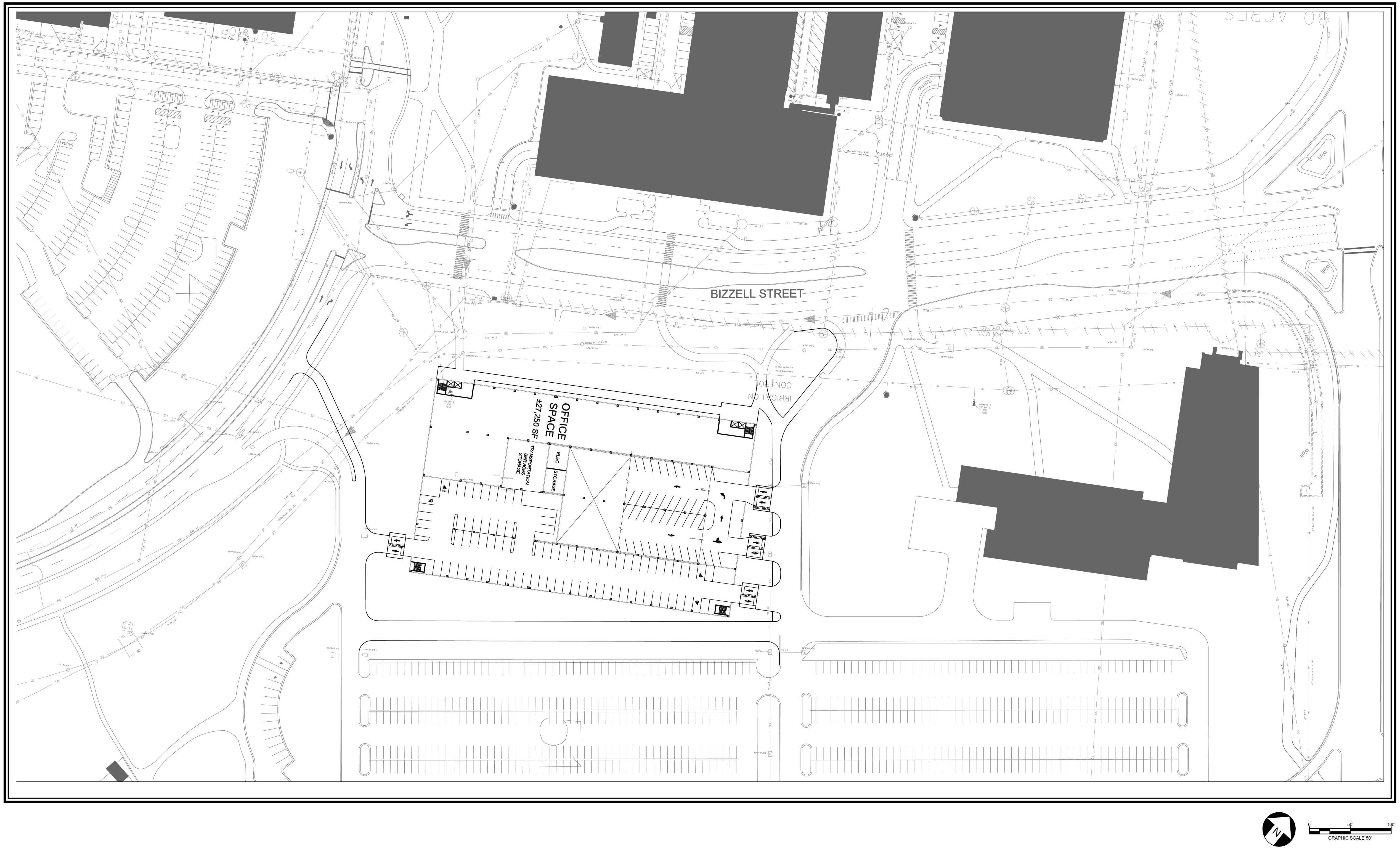
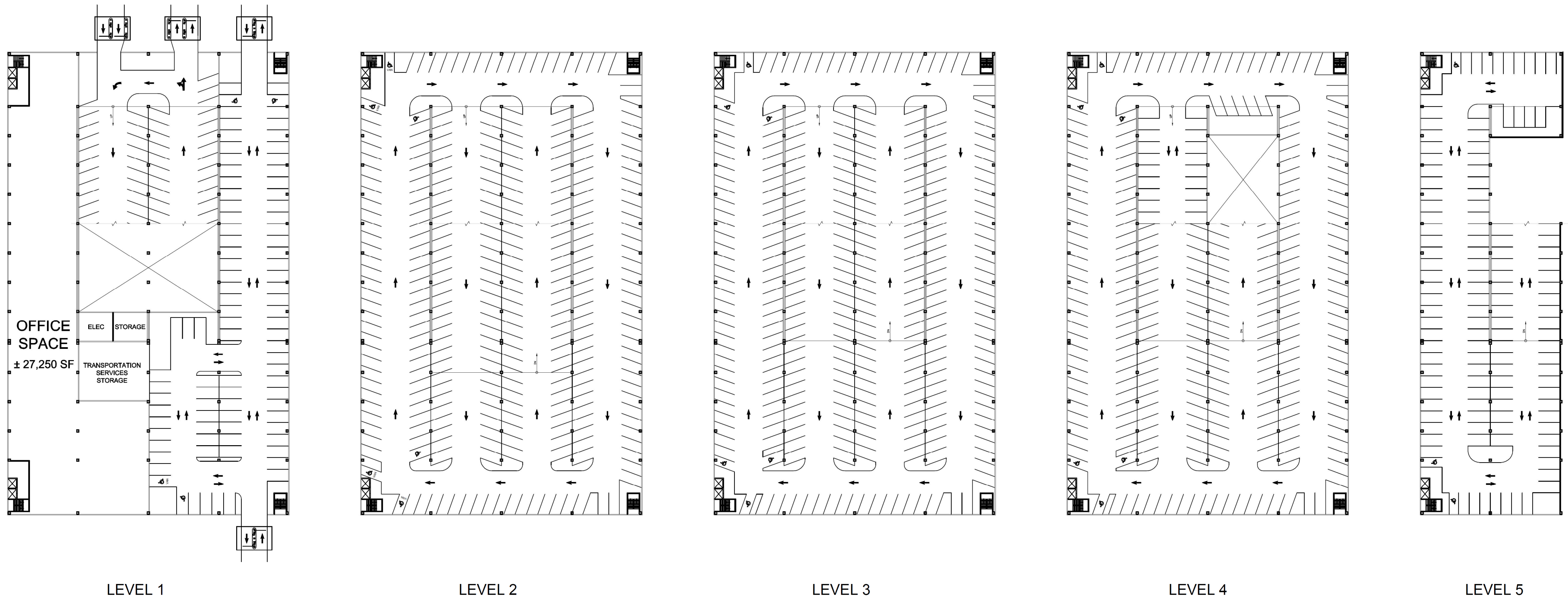


Figure 2 – Lot 47 Garage – Site Schematic



PARKING SPACE TABULATION CHART - LOT 47/51

LEVEL	STANDARD	VISITOR/VIP	ADA	VAN ADA	TOTAL	SQ. FT.
1	44	82+4ADA=86	-	-	130	55,500
2	287	-	2	4	293	93,750
3	287	-	6	-	293	93,750
4	270	-	6	-	276	89,250
5	121	-	3	-	124	43,000
TOTAL	1,009	82+4ADA=86	17	4	1,116	375,250

PARKING EFFICIENCY = 336 SF/CAR
1,116 GARAGE - 442 LOST IN EXISTING LOTS = 674 SPACES NET GAIN

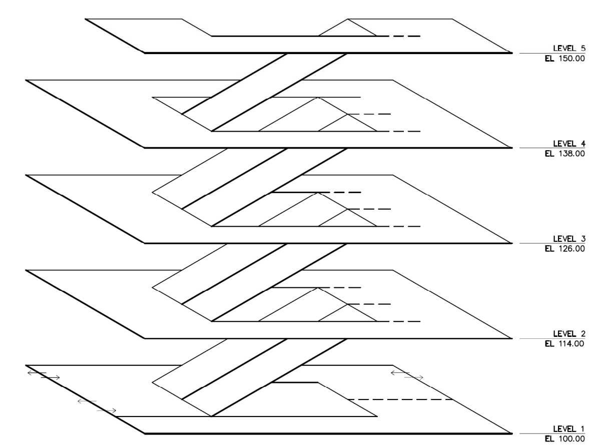


Figure 3 – Lot 47 Garage – Schematic Plans

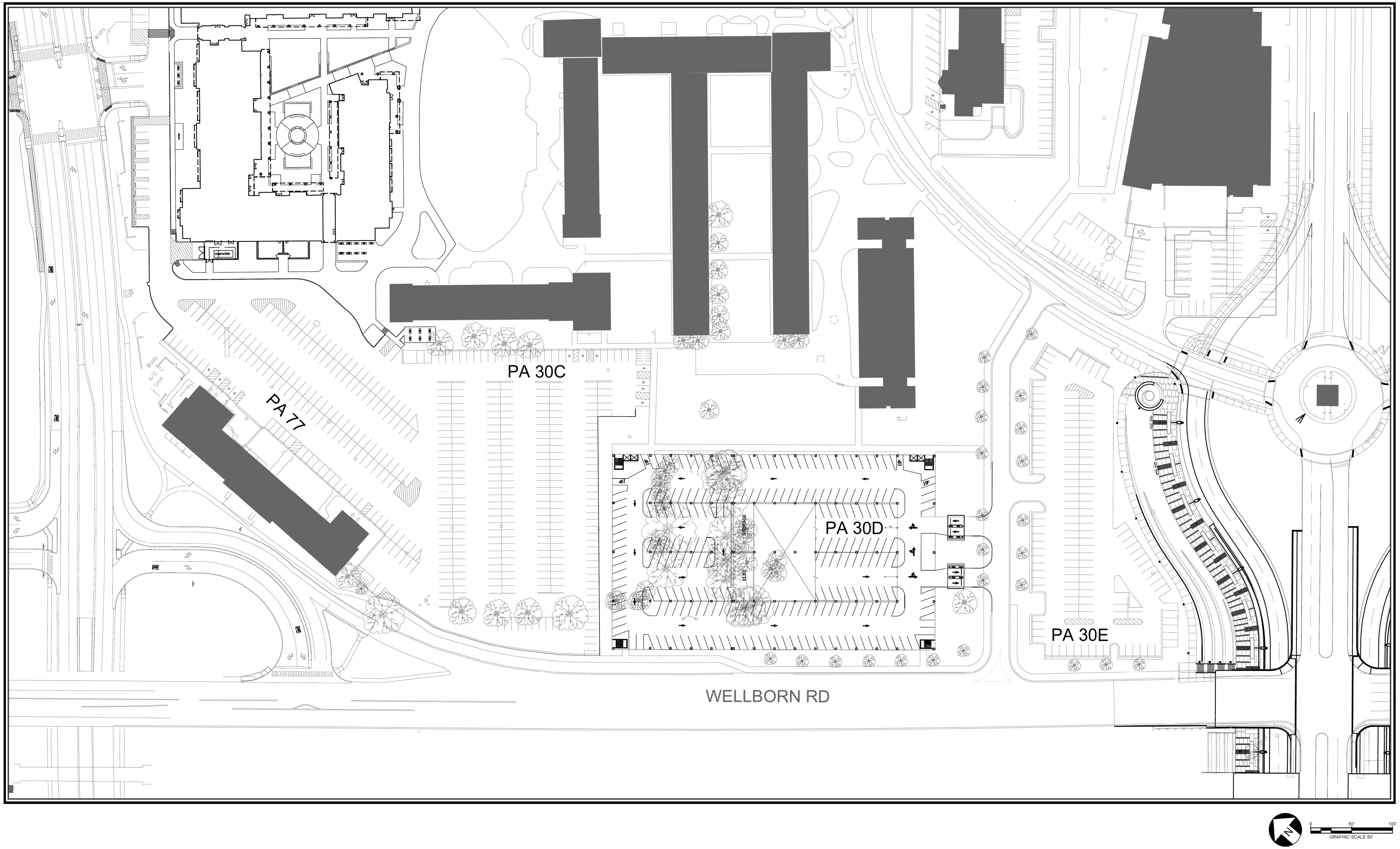
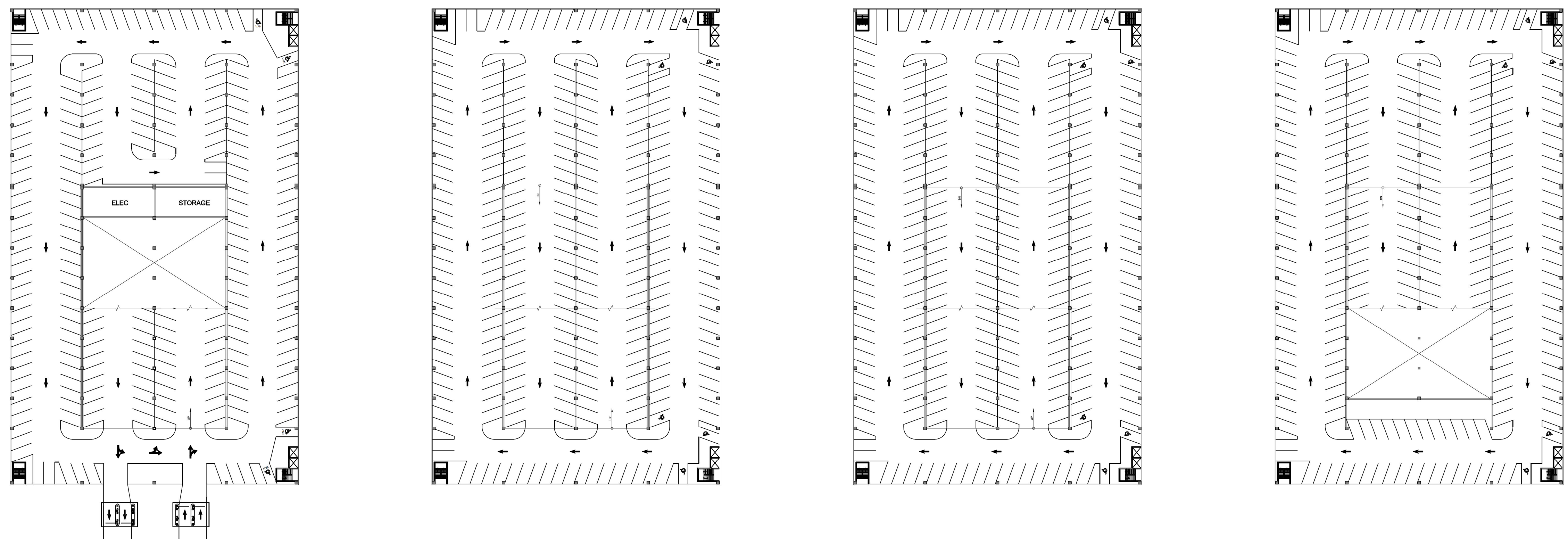


Figure 4 – Lot 30d Garage – Site Schematic



PARKING SPACE TABULATION CHART - LOT 30c/30d

LEVEL	STANDARD	VISITOR	ADA	VAN ADA	TOTAL	SQ. FT.
1	227	-	-	4	231	85,250
2	287	-	6	-	293	93,750
3	287	-	6	-	293	93,750
4	260	-	5	-	265	85,000
TOTAL	1,061	-	17	4	1,082	357,750

PARKING EFFICIENCY = 331 SF/CAR
1,082 GARAGE - 212 LOST IN EXISTING LOTS = 870 SPACES NET GAIN

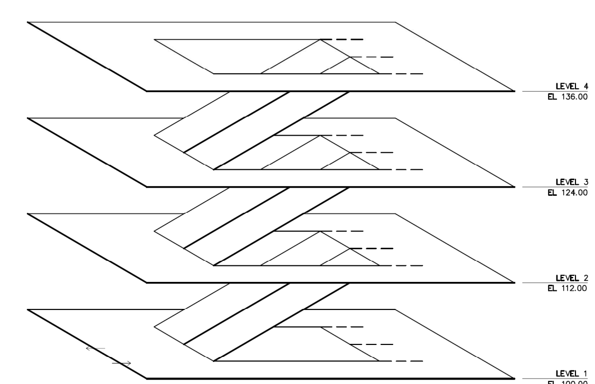


Figure 5 – Lot 30d Garage – Schematic Plans

Adherence to Existing Campus Master Plan

As seen in **Figure 6** both proposed parking structure locations adhere to the potential parking plan outlined in the current Campus Master Plan. The garage proposed on Lot 47 generally serves the same area as the two parking structures shown along University Drive (the sites currently occupied by the Mitchell Physics building and the proposed expansion of the Zachary building). The garage proposed on Lot 30d is in the exact location of a proposed garage site shown in the Master Plan.

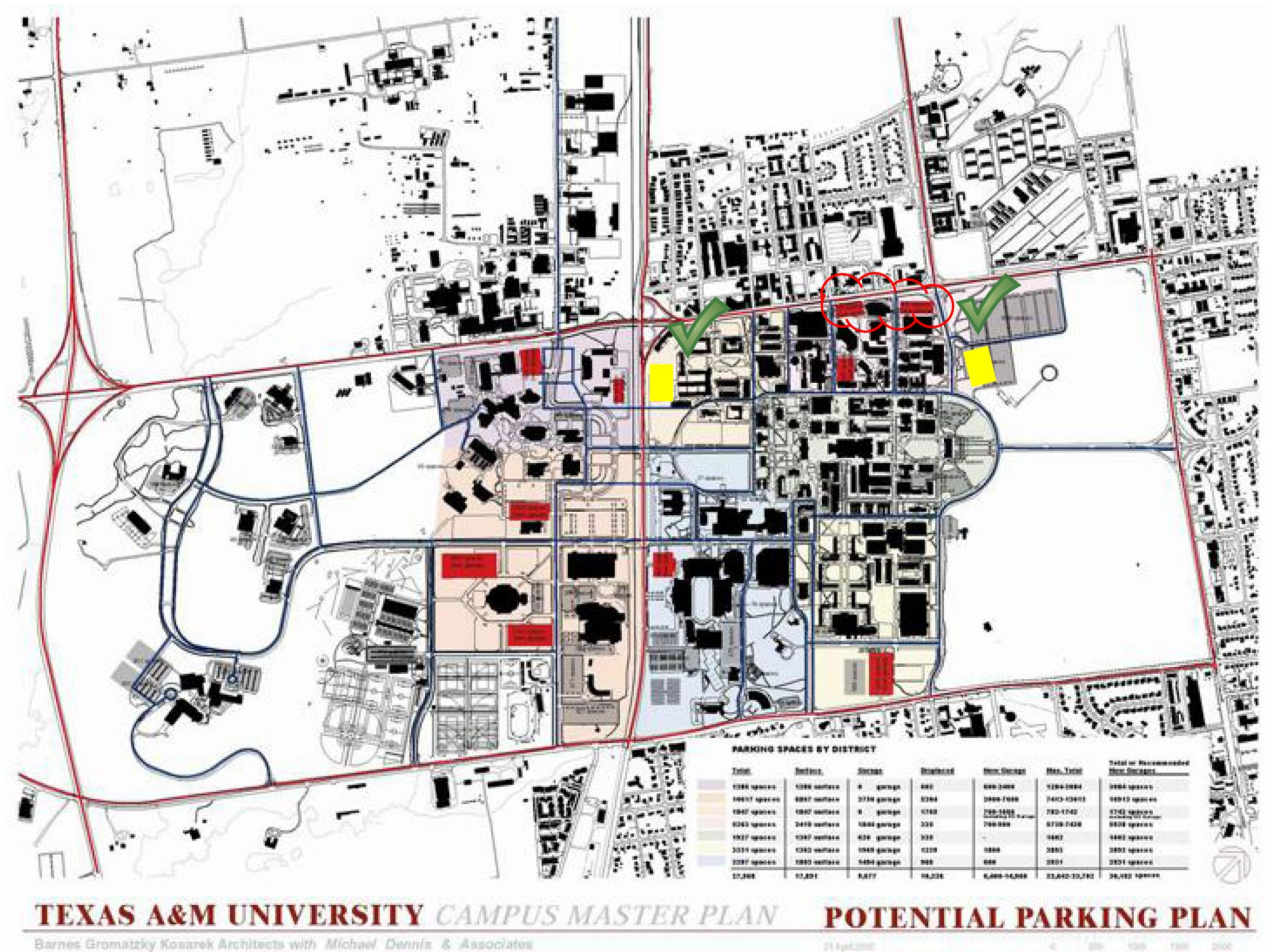


Figure 6 – Master Plan Potential Parking Plan

Recommendations

Lot 47 Garage

An above grade parking structure at Lot 47 is feasible. If the associated costs and impacts are deemed acceptable and the project moves forward in the capital improvement plan, it is recommended that a more detailed study effort be undertaken to determine the full project program before moving into final design.

Lot 30d Garage

An above grade parking structure at Lot 30d is feasible. If the associated costs and impacts are deemed acceptable and the project moves forward in the capital improvement plan, it is recommended that a more detailed study effort be undertaken to determine the full project program before moving into final design.

Next Steps

For the options deemed most appropriate, detailed study efforts be undertaken to determine the full project program before moving into final design or implementation.

APPENDIX A

TEXAS A&M UNIVERSITY
CAPITAL PLAN
SUMMARY INFORMATION

Project #	Projected FY Start Date	Project Name	Total Planning Amount	Cumulative Expenditures Prior Years to 5/31/12	PUF Debt Proceeds	RFS Debt Proceeds	Other
PROPOSED PROJECTS							
	2013	Student Recreation Center Addition	25,000,000			25,000,000 r	
	2013	FY13 Utility Production Upgrade	15,410,000			15,410,000 u	
	2013	Corps Dorm Renovation - Gainer	9,500,000			9,500,000 h	
	2013	Donald L. Houston Building Renovation	4,522,820			1,130,705 o	3,392,115 c
	2013	NCTM Core Retrofit	30,872,836			3,952,323 o	26,920,513 c
	2013	NCTM Live Virus Wing	53,526,039				53,526,039 c
	2014	FY14 Utility Production Upgrade	18,170,000			18,170,000 u	
	2014	Corps Dorm Renovation - Phase 5	9,800,000			9,800,000 h	
	2014	Kyle Field Renovation - Phase I	50,000,000				50,000,000 b
	2014	New Airport Tower	5,400,000				5,400,000 f,x
	2015	FY15 Utility Production Upgrade	9,745,000			9,745,000 u	
	2015	New Campus Parking Garage	32,500,000			32,500,000 p	
	2015	Student Health Center Building	40,000,000			40,000,000 s	
	2015	Corps Dorm Renovation - Phase 6	10,300,000			10,300,000 h	
	2015	Kyle Field Renovation - Phase II	50,000,000				50,000,000 b
		Physical Plant Projects/Equipment/Other	2,102,093			2,102,093	
		Total Proposed Construction/Acquisitions	366,848,788	-	-	177,610,121	189,238,667
TOTAL CAPITAL PLAN			952,118,066	208,445,505	176,004,363	314,004,171	253,664,027

APPENDIX B

Texas A&M University Parking Feasibility Study

Lot 47 Garage

PS&E		**$1,412,468**	
A/E Design Fees	$1,262,205		
Materials Testing Fees	$150,263		
Sub-Total PS&E	***$1,412,468***		
Construction Cost of Work		**$18,031,500**	
$ for Office	$2,725,000		
$ for Parking	$12,301,250		
Sub-Total Hard Cost of Work	*$15,026,250*		
Design Contingency	$1,502,625		
CM Construction Contingency	$751,313		
Escalation	$751,313		
Sub-Total Construction Cost of Work	***$18,031,500***		
Construction Management		**$676,181**	
Construction Phase Fee	$676,181		
Sub-Total CM	***$676,181***		
Administration / Other		**$1,051,838**	
Permitting	$150,263		
Owner Reserves	$901,575		
Sub-Total Other	***$1,051,838***		
		$18,113,994	= Parking Cost
		$3,057,993	= Office Cost
Total Project Cost Projection		**$21,171,986**	

Efficiency =	336		SF/Car using 9'-0" Stalls	
Total Spaces =	*1,116*	=	$16,231.18	per Car
Total Square Feet =	*402,500*	=	$52.60	per SF

Assumptions:

Estimated Construction $/SF for At Grade Parking	$20	
Estimated Construction $/SF for Elevated Parking	$35	
Estimated Construction $/SF for Office	$100	

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

A/E Design Fees	7.0%	of hard construction cost
Materials Testing	1.0%	of hard construction cost
Special Inspections	1.0%	of hard construction cost
Construction Manager Construction Phase Fees	4.5%	of hard construction cost
Design Contingency	10.0%	of hard construction cost
CM Construction Contingency	5.0%	of hard construction cost
Escalation	5.0%	of hard construction cost to mid-2014
Permitting	1.0%	of hard construction cost
Owner Reserves	5.0%	of total construction cost

Texas A&M University Parking Feasibility Study

Lot 30d Garage

PS&E		**$1,056,795**
A/E Design Fees	$944,370	
Materials Testing Fees	$112,425	
Sub-Total PS&E	***$1,056,795***	
Construction Cost of Work		**$13,491,000**
$ for Parking	$11,242,500	
Sub-Total Hard Cost of Work	*$11,242,500*	
Design Contingency	$1,124,250	
CM Construction Contingency	$562,125	
Escalation	$562,125	
Sub-Total Construction Cost of Work	***$13,491,000***	
Construction Management		**$505,913**
Construction Phase Fee	$505,913	
Sub-Total CM	***$505,913***	
Administration / Other		**$786,975**
Permitting	$112,425	
Owner Reserves	$674,550	
Sub-Total Other	***$786,975***	
Total Project Cost Projection		**$15,840,683**

Efficiency =	331		SF/Car using 9'-0" Stalls	
Total Spaces =	*1,082*	=	$14,640.19	per Car
Total Square Feet =	*357,750*	=	$44.28	per SF

Assumptions:

Estimated Construction $/SF for At Grade Parking	$20	
Estimated Construction $/SF for Elevated Parking	$35	

The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

A/E Design Fees	7.0%	of hard construction cost
Materials Testing	1.0%	of hard construction cost
Special Inspections	1.0%	of hard construction cost
Construction Manager Construction Phase Fees	4.5%	of hard construction cost
Design Contingency	10.0%	of hard construction cost
CM Construction Contingency	5.0%	of hard construction cost
Escalation	5.0%	of hard construction cost to mid-2014
Permitting	1.0%	of hard construction cost
Owner Reserves	5.0%	of total construction cost