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TERMINAL PROGRAM CONCEPT REPORT

LAFAYETTE REGIONAL AIRPORT

RS&H

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LAFATETTE REGIONAL AIRPORT

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1.1 BACKGROUND

The Lafayette Airport Commission (LAC) has identified a need for improvements to the passenger terminal facilities at Lafayette Regional Airport (LFT) to properly serve the needs of the community and continue to serve as an economic engine for the region. The recent Airport Master Plan (2015) identified the need for new terminal facilities and the Airport selected the broad approach to build a new terminal located within the same general quadrant of the airport as the existing terminal building. The terminal facilities generally include the terminal building, aircraft apron, access roadway, vehicular parking, and the associated utilities and infrastructure required for a functional and efficient terminal complex.

The purpose of this report is to define the scope and scale of the terminal building and associated site improvements so the ensuing development is balanced with the needs of LFT and the community. The following sections describe the terminal programming and methodology that was used to determine the facility requirements. The Federal Aviation Administration's (FAA) 2016 Terminal Area Forecast (TAF) was used as the basis for the programming of the terminal facilities.

The overall terminal size and all of its components, including Airline Space, TSA Spaces/Security, Concessions, Public Spaces, Ground Transportation, and Utility and Support Space, were based on industry accepted methodologies for converting aviation activity into facility demands. Likewise, the airside and landside improvements also follow industry accepted methodologies for their respective facilities.

1.2 FORECASTS

Lafayette Regional Airport is a commercial service airport located in Lafayette Parish, LA that is classified by FAA as a non-hub airport, and is currently served by American Airlines, Delta Air Lines, and United Airlines through their subsidiaries or affiliate regional carriers.

Forecasts of future aviation activity are the basis for effective decisions in airport planning. These projections are used to determine the need for new or expanded facilities. Any activity that could potentially create a facility need should be included in the forecast. Typically, the forecasts for an airport terminal include aircraft operations and passengers. These can be further broken down to include elements that are of interest to a particular study. For commercial terminal studies, these forecasts typically focus on annual passenger enplanements, which can be broken down into enplaning and deplaning passengers to identity peak hour periods Successful forecasts also require the estimated aircraft fleet mix and the number of peak-hour and annual operations.

1.2.1 Annual Enplanement Forecast

The Airport Master Plan was completed in 2015. It used the 2012 TAF for its forecast of aviation activity, which was the most current TAF available at the time. Since the 2012 TAF, there has been significant variation in the activity experienced at LFT and more recent FAA forecasts reflect these fluctuations. The 2012 TAF was developed during a time when the energy markets were booming and aviation activity at LFT reflected this economic situation. Over the past few years, the energy markets have suffered and activity at LFT reflects this depressed activity. Realistically, the long-term aviation activity trend for LFT is somewhere in the middle, not necessarily as strong as was shown in the 2012 TAF, but not necessarily as weak as the 2016 TAF shows either. Table 1 illustrates the FAA's 2016 Terminal Area Forecast for commercial passenger enplanements.

TABLE 1
FAA TERMINAL AREA FORECASTS 2016 – LAFAYETTE REGIONAL AIRPORT / PAUL FOURNET FIELD

YEAR	AIR CARRIER	COMMUTER	TOTAL
2012	5,861	223,537	229,398
2013	1,390	224,795	226,185
2014	8,738	233,199	241,937
2015	31,920	220,302	252,222
2016	32,269	191,413	223,682
2017	32,893	195,205	228,098
2018	33,611	199,610	233,221
2019	34,260	203,590	237,850
2020	34,865	207,299	242,164
2021	35,453	210,917	246,370
2022	36,007	214,323	250,330
2023	36,558	217,677	254,235
2024	37,077	220,825	257,902
2025	37,611	224,090	261,701
2026	38,193	227,647	265,840
2027	38,760	231,070	269,830
2028	39,355	234,710	274,065
2029	39,977	238,503	278,480
2030	40,593	242,276	282,869
2031	41,188	245,926	287,114
2032	41,774	249,526	287,114
2033	42,367	253,185	295,552
2034	42,976	256,955	299,931
2035	43,612	260,901	304,513
2036	44,251	264,866	309,117
2037	44,877	268,767	313,644
2038	45,515	272,708	318,223
2039	46,160	276,680	322,840
2040	46,806	280,686	327,492
2041	47,445	284,639	332,084
2042	48,086	288,633	336,719
2043	48,746	292,743	341,489
2044	49,409	296,873	346,282
2045	50,083	301,072	351,155

Source: FAA

In Table 1 above, the years 2012 – 2015 are the actual enplanements experienced at LFT and the forecasts begin with 2016 and are extrapolated through the year 2045.

For the purposes of this report, it was decided that the 2016 TAF for annual activity would be used as the basis for the terminal programming. The reasoning was that the 2016 TAF forecasts provide context for timing of future activity, but actual activity experienced in the future could be and most likely will be different. If growth occurs at a higher rate than the 2016 TAF projects, then the resulting activity will occur sooner than the TAF projects. Likewise, a slower rate would result in later realization of activity levels. For the purposes of this study and report, it is believed that the 2016 TAF projections represent a conservative prediction of facility needs.

1.2.2 Peak Hour Forecast

Terminal facility demands are primarily determined by Peak Hour forecasts of aviation activity. Most of the facility components are sized based on a Peak Hour Enplanement projection that is converted into a facility demand. Accepted industry practice for the Peak Hour Forecast is not the absolute peak crowd during the course of a year, but the peak hour of the average day of the peak month. This allows the airport to operate with relative ease and efficiency during typical busy periods, but which may cause some crowding during the busiest times of the year. This is calculated as the peak hour of the average day of the peak month.

The Peak Hour Enplanement forecasts have been developed for several milestone years. The forecast milestones provided represent 5-Years, 10-Years, 20-Years and 25-Years beyond the approximate time that the terminal is expected to be open and be in use. Table 2 illustrates the Peak Hour Forecasts for LFT.

TABLE 2
PEAK HOUR ENPLANMENTS FORECASTS

ENPLANEMENTS DATA	2025	2030	2035	2040
Annual	261,701	282,869	304,513	327,492
Peak Month	23,904	25,837	27,814	29,913
Average-Day Peak Month	797	861	927	997
Peak Hour	224	243	261	281

Source: RS&H, Inc.

1.2.3 Design Forecast Year

Regional airports such as LFT do not have the same levels of activity, facility demands, and resources as larger airports and as a result only undertake significant terminal improvement projects every 25 years or so. LFT is consistent with this industry norm. The last significant improvement project to the terminal was completed in 1989, over 27 years ago, at which time the terminal was expanded to accommodate the passengers and aircraft that served the community at that time. By the time new terminal improvements are completed, it will be over 30 years since the last improvement program was completed. Overcrowding, bottlenecks, and a lack of modern amenities in the existing terminal are all signs that an improvement program is overdue.

The design year for the proposed terminal has been selected as 2040 for several reasons. The typical time between terminal improvement programs at regional airports is approximately 25 years from the opening of the new terminal. This allows the airports to finance the programs which require significant capital, without jeopardizing other capital improvements The incremental increase in terminal space that are needed with only a five or ten year increase in activity are too small to effectively construct and finance due to the small and incremental nature of the expansions. For instance, a 150 square foot (SF) expansion in one area, a 200 SF expansion in another and a 500 SF expansion in a third are fiscally irresponsible to construct when they are dispersed throughout the terminal. What may be a modest cost-per-SF to construct as part of a larger project becomes an inefficient use of funds when not part of a larger project.

In addition, a significant portion of the economy in the Lafayette area is tied to the energy industry. The 2016 TAF for LFT reflects a very conservative (slow growth) projection due to the recent depressed energy markets. By comparison the 2015 Airport Master Plan used the 2012 TAF that reflected a more optimistic (rapid growth) projection. The slower-growth 2016 TAF annual enplanement forecast for 2040 (327,492) is generally similar to the faster-growth 2012 TAF forecast for 2025 (323,704). The actual growth rate is realistically likely to be something between the two. If the growth occurs faster than the 2016 TAF forecasts, then the terminal facilities would achieve capacity sooner and another future expansion project would be needed sooner. As such, the selected design year is set as 2040 so the airport has a reasonable time before another major expansion would be needed.

1.3 TERMINAL BUILDING PROGRAM

The facility requirements analysis determines what facilities and in what quantities will be required by the Airport in the future in order to allow passengers to transition through the terminal in a timely and secure manner, while allowing the serving airlines to operate efficiently and cost effectively. In order to accomplish these goals the projections of facility requirements are made using arithmetical calculations and the annual enplanements, and the peak hour passenger forecasts presented previously.

The resulting facility requirements will provide an appropriate level of service to the passenger, airlines, and the Airport. There may be some periods of acceptable delays for short periods of time during peak periods of the year, but these will be the exception rather than the norm. While it is possible to build a terminal in which no delays are ever encountered, this usually results in building facilities that go unused much of the time.

For purposes of this report, the terminal has been broken down into various broad activity areas and then totaled. These major activity areas are the Airline Spaces, TSA Spaces/Security, Concessions, Ground Transportation, Public Spaces, Airport Administration/Ops, and Utilities & Support Spaces. These major component parts can then be further subdivided into specific subcomponents, which are analyzed below.

1.3.1 Airline / Ticketing Spaces

The ticketing areas of a terminal comprise the ticket counter, the ticket agent area, the active customer area, the passenger queuing and circulation corridor, the airline ticket offices, and the bag make-up area. The ticketing components are traditionally configured around the ticket counter. Current trends are for passengers to use self-service kiosks, print-at-home, or mobile devices in lieu of traditional staffed ticket counters. The number of ticket counters and kiosks must accommodate the peak hour enplanements by providing sufficient number of check-in facilities to ensure a maximum wait time of 30 minutes. It is assumed that some passengers will print their boarding pass at home, not check a bag, and by-passing the ticket lobby altogether. Some will prefer to use a kiosk and some will use the traditional counter. No more than 50% of the passengers are expected to use the traditional counter either for check-in or checking bags. The Passenger Check-in Profile assumptions for this analysis are shown in Table 3.

TABLE 3
PEAK HOUR PASSENGER CHECK-IN PROFILE

DESCRIPTION	2025	2030	2035	2040
Online Check-in / No Bags (10%)	15	16	18	19
Self-Service Kiosk Check-in (40%)	60	65	70	76
Conventional Check-in (50%)	76	82	88	95

Source: RS&H, Inc.

The development of the space required for the ticketing areas must differentiate between the users of the kiosks and the traditional counters. The average processing time for the kiosks is typically faster than the average processing time at a staffed counter. This is in part a result of the kiosk's efficiency. It is also due in part to the non-typical issues that force some passengers to the traditional staffed counter. Currently, checking baggage remains a function of the traditional counter, but may be handled by self-service drop zones in the future.

The Ticketing Area includes the Ticket Agent area, which is the space behind the counter for the airline employee and the baggage takeaway conveyor. The Passenger Processing area is the space in front of the counter occupied by the traveler and his or her baggage being served at the counter along with maneuvering space to exit when the transaction is completed. The Passenger Queuing area adjacent to the Passenger Processing area provides space for passengers and their baggage to line up waiting for a counter or self-serve kiosk to open.

Airline Ticket Offices (ATO) are typically located close to the Ticket Agent area for convenience and efficiency. This proximity is particularly important at non-hub airports where airline employees typically serve many roles, from ticketing to baggage handling. The Bag Make-Up Area (Outbound) at non-hub airports should also be relatively close to the ATO space so airline employees can switch between ticket counter and baggage handling roles. Lastly, the airlines typically require some operations space accessible to the aircraft apron for a variety of purposes. Table 4 provides the facility requirements for the Airline/Ticketing Areas of the terminal.

TABLE 4
AIRLINE / TICKETING AREA

DESCRIPTION	2025	2030	2035	2040
Ticket Agent Area (sf)	1,063	1,156	1,249	1,387
Passenger Processing (sf)	1,063	1,156	1,249	1,387
Passenger Queuing (sf)	2,657	2,890	3,123	3,468
Airline Ticket / Bag Offices (sf)	3,789	4,068	4,447	4,862
Baggage Make-up (sf)	3,200	3,200	3,200	4,000
Airline Operations Area (sf)	1,400	1,500	1,600	1,700
TOTAL	13,172	15,970	14,868	16,804

Source: RS&H, Inc.

1.3.2 Baggage Claim Spaces

The Inbound Baggage Claim areas of a terminal comprise the baggage claim display carousel, the claim lobby, the secure inbound bag operations area, and typically the rental car agency spaces. The baggage claim facilities must display the deplaning passengers' bags and provide sufficient space to retrieve the bags to avoid unacceptable delays to the arriving public and their "meeter-greeters". The claim device is typically a recirculating conveyor that may be configured in several ways to fit the building and provide the display frontage required. The recirculating conveyor allows bags to be retrieved in a small space, which makes it highly appropriate to serve the passenger base of Lafayette Regional Airport. The total lobby area, quantity of the claim devices, and the claim display frontage is a factor of the number of passengers and baggage arriving within a short time and the number of flight arrivals expected within a few minutes of each other.

For Baggage Claim Area purposes the facilities should be sized to deliver approximately 67% of the peak hour arriving baggage in a 30-minute span. At LFT, it is reasonable to expect that 60% of the passengers may have baggage to be claimed and a percentage of passengers claiming baggage will be accompanied by meeter-greeters who welcome them to Lafayette.

On the "secure" side of baggage claim, ground-handling employees transfer the baggage from the airplane to the claim device via tug and carts. Space must be provided for the claim device conveyor, an unloading area, and lanes for the tug and carts to park adjacent to the conveyor and for another tug and cart to pass by with enough clearance for a safe operation. The requirements for the Baggage Claim facilities are presented in Table 5.

TABLE 5
BAGGAGE CLAIM AREAS

DESCRIPTION	2025	2030	2035	2040
Baggage Claim Devices	2	2	2	2
Baggage Display Frontage (lf)	236	253	273	295
Baggage Claim Area (sf)	6,500	6,930	7,530	8,080
Inbound Baggage Ops area (sf)	4,720	5,060	5,460	5,900
TOTAL (sf)	11,220	11,990	12,990	13,980

Source: RS&H, Inc.

1.3.3 Gates / Passenger Holding Spaces

The Passenger Departure Lounges includes space for seating and waiting, airline ticket check and ticket lift, a space for queuing passengers and a corridor for deplaning passengers, space for circulation, and incidental amenities. The seating area assumes an industry standard 18 square feet per person for seating and 15 square feet per person for standing in the waiting areas. At each gate is an additional space for the airline gate counter and agent space, the passenger queue in front of the counter, the ticket lift counter and near the doorway to control access to the aircraft, and a corridor for boarding and de-boarding of passengers. Table 6 provides the areas for Gates and passenger Holding spaces.

TABLE 6
PASSENGER HOLDING / GATES

DESCRIPTION	2025	2030	2035	2040
Peak Hour Gates	4	4	4	5
Peak Hour Enplanements	225	242	262	282
Departure Lounge Waiting (sf)	4,356	4,672	5,060	5,436
Gate Counters, Queuing, Etc. (sf)	2,480	2,480	2,480	3,100
Circulation, Amenities (sf)	1,650	1,720	1,810	2,050
TOTAL (sf)	8,486	8,872	9,350	10,586

Source: RS&H, Inc.

1.3.4 Transportation Security Administration Spaces

Terminal buildings have a defined secure side and a non-secure side. The Transportation Security Administration (TSA) manages and controls the transfer of passengers and baggage from the non-secure side to the secure side to protect the traveling public and the nation's air transportation system. These TSA facilities include the Security Screening Checkpoint (SSCP), the Baggage Inspection Facilities, Baggage Screeners Area (CBRA), the Baggage Inspection Support Facilities, and the Administration and Support Offices. In addition to these areas, queuing and circulation needs to be added and included to the overall sizing of the TSA facilities. The security screening stations includes an X-ray machine for scanning bags and a body scanner and magnetometer for scanning people. The station needs space for the equipment, the security officers, a private search area, a space for passengers to divest themselves of items prior to screening and an area to recompose themselves afterwards, and an area for queued passengers waiting to be processed.

TABLE 7
SECURITY SCREENING CHECKPOINT AREAS

DESCRIPTION	2025	2030	2035	2040
No. Inspection Positions	2	2	2	2
No. TSA Agents	16	16	16	16
Passenger Queuing (sf)	2,500	2,680	2,900	3,120
Divest Area (sf)	800	800	800	800
Primary Inspection Area (sf)	1,376	1,376	1,376	1,376
Secondary Inspection Area (sf)	1,376	1,376	1,376	1,376
Search Rooms (sf)	112	112	112	112
Supervisor Station Area (sf)	275	275	275	275
Deplaning Sterile Corridor (sf)	264	264	264	264
TOTAL	7,055	7,235	7,455	7,675

Source: RS&H, Inc.

The space required for the TSA Baggage Inspection Facilities is also calculated by using the Peak Hour Enplaned passengers and a ratio of checked bag per passenger plus the facilities, equipment, and circulation and personnel needed to facilitate the screening process. TSA provides guidelines for checked baggage inspection systems (CBIS) and the equipment and staffing for airports depending upon the activity profiles of the airports. Table 8 defines the basic components that make up the TSA Baggage Inspection Facilities.

TABLE 8
BAGGAGE INSPECTION AREAS

DESCRIPTION	2025	2030	2035	2040
No. Explosion Detection Units	2	2	2	2
No. On Screen Resolution Stations	1	1	1	1
Checked Baggage Inspection Area (sf)	3,200	3,200	3,200	3,200
On Screen Resolution Area (sf)	100	100	100	100
Baggage Encoding Station (sf)	400	400	400	400
EDS Maintenance/Storage (sf)	400	400	400	400
Explosive Trace Detection Stations	4	4	4	4
Explosive Trace Detection Area (sf)	1,200	1,200	1,200	1,200
Conveyor Control/Support Area (sf)	240	260	280	290
TSA Admin./Support Area (sf)	3,697	3,697	3,697	3,697
TOTAL	9,238	9,258	9,278	9,288

Source: RS&H, Inc.

1.3.5 Concessions Spaces

The core concessions include food and beverages, and merchandise. Other potential concessions are not specifically calculated in this study. The reasonable sizing of concessions is a balance between the desire for amenities and convenience by the customers (primarily enplaned passengers) and the concessionaire's goal to generate sufficient sales and profits to justify the costs and expenses of running the operation. The goal of this planning effort has been to determine an optimum size considering both the financial and operational issues. A somewhat larger operation or smaller operation could be provided, but the result could reduce the overall gross revenues or the revenue-per-square-foot productivity of the space.

Food and beverage concessions typically generate more revenue per enplaned passenger than the merchandise concessions, but they also require a greater amount of space per enplaned passenger and therefore the financial productivity of the space is tempered. At LFT it is expected that the food and beverage concessions could generate $3.70 in sales per annual enplaned passenger and the merchandise concessions could generate $2.53 in sales per annual enplaned passenger. These numbers are similar to other regional airports similar to LFT and are supported by recent sales at the airport as reasonably achievable.

One critical aspect of these sales assumptions is that the concessions will be properly located and sized to maximize the sales potential in a new terminal. If the concessions are located with the majority of the space after the screening checkpoint and in the concourse convenient to all gates then these numbers should be achievable. A productivity rate for the food and beverage concession is expected to be $300 per square foot of space and the productivity rate for the merchandise concessions is expected to be $425 per square foot of space.

TABLE 9
CONCESSIONS AREAS

DESCRIPTION	2025	2030	2035	2040
Food/Bev. Gross Sales	$968,294	$1,046,615	$1,126,698	$1,211,720
Food/Bev. Total Area (sf)	3,228	3,489	3,756	4,039
Landside Area (sf)	484	523	563	606
Airside Area (sf)	2,743	2,965	3,192	3,433
Merchandise Gross Sales	$662,104	$715,659	$770,418	828,555
Merchandise Total Area (sf)	1,558	1,684	1,813	1,950
Landside Area (sf)	234	253	272	292
Airside Area (sf)	1,324	1,431	1,541	1,657
TOTAL	4,786	5,173	5,568	5,989

Source: RS&H, Inc.

1.3.6 Ground Transportation Spaces

The rental car agency area is typically located adjacent to the baggage claim area for the convenience of the traveling public and the enhancement of business for the agencies. The space for rental car services includes the customer counter, the employee space behind the counter, and the customer queue space on the opposite side. An office space for the rental car agency is also required, typically located immediately behind the counter staff area.
Rental car space demands are a direct link to the numbers of arriving passengers and how many rent cars upon arriving. At LFT approximately 1 square foot per 1,000 deplaning passengers is needed for the rental car agency and customer queue space. Approximately 1/3 of this space is for the public and 2/3 is for the rental car agency and its employees. The number of rental car companies and brands in an airport terminal has become somewhat ambiguous by the mergers of several rental car companies into conglomerates with multiple brands and price points. For example, formerly independent brands Enterprise, National, and Alamo are owned by a single company. Sometimes the multiple brands are handled from a single counter in the terminal and other times they exist as separate entities with separate counters. The number of rental car counters projected in this analysis is based on an average business model, but the airport could have requests for more or less counters to accommodate the rental car company's' desired operations.

TABLE 10
RENTAL CAR AREAS

DESCRIPTION	2025	2030	2035	2040
No. Agency Counters/Spaces	6	6	7	7
Counter / Employee Area (sf)	1,800	1,900	2,000	2,200
Customer Queue Area (sf)	1,000	1,000	1,100	1,200
TOTAL	2,800	2,900	3,100	3,400

Source: RS&H, Inc.

1.3.7 Miscellaneous Public Spaces

In addition to the specific functional space described in the paragraphs above, there are other public use spaces that fluctuate more depending on the specific building configuration. The largest of these areas is general public circulation. In airport terminal buildings, this can account for up to 40 percent or more of the facility. However, a well-designed terminal would require significantly less space. For LFT it is expected that the public circulation space would be lower than this. A more conservative planning factor of 0.075 square feet per peak hour enplaned passenger has been used for LFT. Of this amount, slightly more than half would be required on the non-secure side to accommodate greeters and well-wisher.

Public waiting space must also be provided for travelers who are not ready to proceed through the screening checkpoint either because they have well-wishers with them or simply prefer to wait before proceeding to the gate. - Greeters also need a gathering location to wait for the arrival of their expected traveler. While this number of individuals is somewhat low it is a necessary function for a properly functioning airport terminal. The analysis assumes 25% of the peak hour travelers will make use of this space with an equivalent number of meeter-greeters or well-wishers.

Airport restrooms require special considerations due to the surges in use immediately before boarding or after a flights arrival. Therefore, the number of toilet facilities generally exceeds code minimums. In addition, it is important to provide some redundancy of facilities so a restroom can be closed for servicing while leaving another restroom still open for use. This is especially important on the airside where the passengers are most likely to be in a hurry.

TABLE 11
MISCELLANEOUS PUBLIC SPACES

DESCRIPTION	2025	2030	2035	2040
Public Circulation Area (sf)	19,700	21,300	23,000	24,700
Public Waiting Area (sf)	2,000	2,200	2,400	2,500
Public Restrooms Area (sf)	3,800	4,400	4,400	5,000
TOTAL	25,500	27,900	29,800	32,200

Source: RS&H, Inc.

1.3.8 Airport Administration and Meeting Spaces

Airports are large and complex entities with a challenging mission to provide safe and efficient air transportation opportunities to the public. It requires a team of individuals to operate and manage an airport. Every airport's situation is different so how administration space is handled is usually a locally driven decision. In some cases, administrative staff is not in the terminal at all. However, at regional airports, airport administration offices are generally in the terminal so the typically lean staff can oversee the terminal while also performing their other duties. Currently at LFT, most of the administrative staff is located in a separate facility. However, as part of the new terminal plan, the administrative staff intends on relocating to the new terminal to be more visible and accessible to the traveling public.

The administrative spaces generally include office suites for employees, and meeting space for public Commission Meetings and other functions. Table 12 provides the breakdown of space for the airport administration and public meeting.

TABLE 12
AIRPORT ADMINISTRATION MEETING SPACES

DESCRIPTION	2025	2030	2035	2040
Administration / Ops Suite (sf)	4,120	4,370	4,630	5,000
Public/Shared Meeting Rooms (sf)	2,300	2,300	2,400	2,500
Security/Badging/Police (sf)	1,100	1,200	1,300	1,400
TOTAL	7,520	7,870	8,330	8,900

Source: RS&H, Inc.

1.3.9 Utility and Support Spaces

Terminal buildings require space for mechanical rooms, electrical rooms, communications rooms, custodial closets, and other support and storage spaces for the building to function as intended. These spaces require approximately 10%of the building area as utility and support space. Table 13 defines the utility and support space requirement of the terminal building.

TABLE 13
UTILITY AND SUPPORT SPACES

DESCRIPTION	2025	2030	2035	2040
Terminal Functional Program (sf)	89,776	95,168	100,740	108,822
Utility and Support Area (sf)	8,978	9,517	10,074	10,882

Source: RS&H, Inc.

1.3.10 Facility Requirements Summary

The programming for the new terminal facility at Lafayette Regional Airport has been sized based on a combination of historical and forecasted enplanement data. The 2016 Federal Aviation Administration's (FAA) Terminal Area Forecast (TAF) projects an annual enplanement activity of 327,492 by 2040, which serves as the target activity for this project and facility sizing. Each element of the terminal has been evaluated and sized using industry-accepted methodologies for regional airport terminals. These methodologies ensure that the terminal facilities are in balance with each other and that the terminal sizing is aligned with the activity projections. Table 14 summarizes the facility requirements of the main functional areas of the terminal. The overall terminal development size is targeted to be approximately 119,704 square feet.

TABLE 14
FACILITY REQUIREMENTS SUMMARY

DESCRIPTION	2025	2030	2035	2040
Ticket Agent Area (sf)	1,063	1,156	1,249	1,387
Passenger Processing Area (sf)	1,063	1,156	1,249	1,387
Passenger Queuing Area (sf)	2,657	2,890	3,123	3,468
Airline Ticket / Bag Offices (sf)	3,789	4,068	4,447	4,862
Baggage Make-up Area (sf)	3,200	3,200	3,200	4,000
Airline Operations Area (sf)	1,400	1,500	1,600	1,700
Baggage Claim Devices	2	2	2	2
Baggage Claim Area (sf)	6,500	6,930	7,530	8,080
Inbound Baggage Ops Area (sf)	4,720	5,060	5,460	5,900
Departure Gates	4	4	4	5
Departure Lounge Area (sf)	4,356	4,672	5,060	5,436
Gate Counters, Queuing, Etc. (sf)	2,480	2,480	2,480	3,100
Gate Circulation, Amenities (sf)	1,650	1,720	1,810	2,050
Passenger Screening (sf)	7,055	7,235	7,455	7,675
Baggage Screening (sf)	5,541	5,561	5,581	5,591
TSA Offices and Support (sf)	3,697	3,697	3,697	3,697
Concessions Landside (sf)	718	776	835	898
Concessions Airside (sf)	4,067	4,396	4,733	5,090
Rental Car Agency Area (sf)	1,800	1,900	2,000	2,200
Rental Car Customer Queue (sf)	1,000	1,000	1,100	1,200
Public Circulation (sf)	19,700	21,300	23,000	24,700
Public Waiting Area (sf)	2,000	2,200	2,400	2,500
Public Restrooms (sf)	3,800	4,400	4,400	5,000
Administration / Ops Offices (sf)	4,120	4,370	4,630	5,000
Shared/Public Meeting Rooms (sf)	2,300	2,300	2,400	2,500
Security/Badging/Police (sf)	1,100	1,200	1,300	1,400
Utilities & Support Space (sf)	8,978	9,517	10,074	10,882
TOTAL	98,754	104,685	110,814	119,704

Source: RS&H, Inc.

CHAPTER 2

INVENTORY OF EXISTING CONDITIONS AND EQUIPMENT

The development of concepts that meet the requirements determined and detailed in the previous chapter requires a process of investigation and evaluation of many aspects of the program to find the best balance between needs, operations, constructability, and cost. This chapter reviews and inventories the existing infrastructure to support the redevelopment described in the following chapters.

The program under study for Lafayette Regional Airport is to develop a new and expanded terminal and associated site infrastructure in accordance with the basic determination from the Airport Master Plan. This Master Plan identified the new terminal site to be generally east of the existing terminal in an area with road access, aircraft apron, and two old hangar structures. This general definition remains the basis of the study. The details of the development, however, are the objectives of this study.

Some of the advantages of the selected new terminal site also create some disadvantages. Keeping the new terminal in the same general area as the existing terminal allows the airport to maintain the same general public access, to tap into nearby existing utilities, and to mostly use the existing taxiway system for aircraft access and movement. Unfortunately, this site has been previously developed and building and equipment must be demolished, utilities and infrastructure relocated, and pavements either replaced or modified for a properly functioning terminal. A summary of the existing conditions are further described below. See Figure 2-1 for an overall map of the exiting site.

2.1 EXISTING LANDSIDE SITE CONDITIONS

2.1.1 Existing Roadways

The proposed terminal site is currently served by five different roadways: Blue Blvd., Borman Dr., Terminal Dr., John Glenn Dr., and Shepard Dr. The road network at Lafayette Regional Airport are considered Public Right of Ways (ROW) and are owned and maintained by the City of Lafayette.

Blue Blvd. is a four lane divided roadway that serves as the main entrance to the airport. It connects with the rest of the Lafayette City road network at an intersection with Surrey St. controlled by an eight phase traffic signal.

Borman Dr. is a two lane road and was previously the main entrance to the airport and also connects to Surrey St. However, it currently dead ends in a cul-de-sac short of Terminal Dr. The connection to Surrey St. is stop sign controlled.

John Glenn Dr. is also a two lane road and was also part of the old terminal loop and dead ends short of Terminal Dr. On the eastern end the public road terminates at AOA gate #11. The road also intersects Shepard Dr. a little over 600' from its dead end before Terminal Dr.

Shepard Dr. is the eastern boundary of the airport's publicly accessible area. It is a two lane road that connects John Glenn Dr. in the South with Grissom Dr. in the North. It is also the eastern termination of Blue Blvd.

Terminal Dr. is a two lane, one way road that serves the existing terminal building. It connects with Blue Blvd. at the start and end of the alignment and encircles the main public parking lot. A common complaint from passengers is that to access the Terminal Loop a driver needs to make an unexpected sharp right turn from Blue Blvd. onto Terminal Dr. This road is also the only public street on the airport that the airport maintains in any way. The airport maintenance is limited to the small section immediately in front of the terminal.

2.1.2 Existing Parking Lots

Several parking lots serve the current terminal complex including two Employee lots, a Rental Car Ready/Return Lot, and public Short Term, Long Term, and Economy lots. In all, the system contains 847 stalls that are configured as follows:

2.1.2.1 Main Parking Lot

The main parking lot consists of 712 stalls and is bounded by Terminal Dr. and Blue Blvd. This parking lot is currently managed by Republic Parking on behalf of the Lafayette Airport Commission. The lot combines short and long term parking. Short term parking is currently located in the section of the lot closest to the terminal with 212 stalls. Long term parking makes up the remainder of the lot and consists of 500 stalls. Other amenities include the presence of a covered pedestrian walkway from the main terminal to the back of the parking lot. There is also a rounded metal guardrail around the perimeter of the parking lot intended to prevent parking fee evasion. Finally, the main lot has four entrances, three on Terminal Dr. and one on Blue Blvd. Two of the Terminal Dr. entrances are located after the main terminal. All traffic exits through a staffed toll plaza onto Terminal Dr. approximately 150' south of Blue Blvd.

2.1.2.2 Employee Parking

Employee parking for the existing terminal is provided by two separate parking lots. The first VIP lot is located adjacent to the existing terminal and is accessed via Terminal Dr. The lot contains approximately 20 parking stalls for high level airport staff, airport commissioners, and general managers for the terminal tenants. This parking lot is access controlled via a card reader and gate arm. The lot also features covered parking stalls.

The main employee parking lot is located off of Borman Dr. adjacent to the old Louisiana State Police building. This lot is also access controlled via a card reader and gate arm. The employee lot has approximately 120 stalls which is more than enough to support current operations even during shift changes. Employees reach the existing terminal by walking along Borman and Terminal Drives, approximately 700', to the existing terminal.

2.1.2.3 Economy Parking

During the height of the energy sector boom, Lafayette Regional Airport experienced a major public parking shortage. They quickly put into service an economy parking lot. The Economy lot is currently located just north of John Glenn Dr. and is accessed via a separate entrance off of Terminal Dr. This parking lot is intended for long term parking and accepts credit card payment only. It currently contains 135 stalls.

2.1.2.4 Rental Car Ready Return Lot

The existing rental car ready return lot is located on the south side of John Glenn Dr. Previously rental cars were located where short term parking is located in the main parking lot. However, the parking shortage during the energy boom resulted in the relocation of the rental cars. The current lot is shared between the rental car companies and at least one airfield tenant who has a hangar adjacent to the parking lot. The parking lot currently has 173 spaces; however, due to its shared nature only 136 are available for rental car use. Other lot users will either be moved elsewhere on the airport or relocated to an underused lot across the street. There is no access control to this parking lot.

FIGURE 2-1
EXISTING SITE CONDITIONS AND MAJOR ITEMS OF INTEREST

2.1.3 FAA RTR Facility

The airport's federally owned and operated remote transmitter/receiver (RTR) facility is located just north of Blue Blvd. next to the Enterprise quick turnaround facility and the airport's maintenance building (see Figure 2-1 for RTR location). An RTR is an unmanned communications facility that allows air traffic personnel to communicate with pilots. Figure 2-2 shows the equipment found on the site. The existing RTR is located close to 3,000' from the control tower. Redundant control cables run between the ATCT and the RTR. See Figure 2-1 for the location of the cables. The existing RTR and its support infrastructure conflict with proposed elements of the new terminal program.

As shown in Figure 2-1. One of the redundant cables runs directly under the West GA apron which is the proposed site for the new terminal. This run is in an old, previously abandoned, ductbank. The design team located the line by digging down to it and surveying its physical location and elevation, also known as a Level A locate. The ductbank was found approximately four feet beneath the surfaces and will interfere with terminal construction.

Furthermore, the RTR signal needs to reach aircraft operating on the airfield. The signals can travel in a straight line, which requires line of site, or can reflect and diffract off of nearby obstacles which results in a lower quality transmission. Numerous existing features encroach on the signal's existing line of sight including a building located on the West GA apron where the proposed terminal would go. In an effort to preemptively evaluate the effects of the terminal on the signal the design team submitted a FAA form 7460 requesting that the FAA provide input on the terminal location and preliminary design. The conclusion reached by the FAA in a determination letter dated February 1, 2017 is that the terminal will block the RTR line of site and a more technical study to determine the effects of diffraction will be required. At the time of publication the Program Manger is finalizing negotiations for two Small Scale Reimbursable Agreements (SSRA)'s that will provide the means for the FAA to review the plans and perform a signal analysis. Additionally, the design team will also perform a signal analysis that will allow for preemptive design decisions.

2.1.4 Existing Utilities

Domingue, Szabo, & Associates, Inc. (DSA) are responsible for the survey and subsurface utility engineering for the project. During this initial investigative phase DSA was tasked with performing the site survey and to inventory the existing subsurface utilities.

The existing topographic features in the project area were surveyed to include, building and structure limits, pavement limits, curbing, inlets, drainage structures and other surface features in the project limits. Survey included establishing surface elevations for all pavements as well as natural ground elevations within the survey area. Existing storm drainage inlets and structures were opened and the depths of the piping system were determined along with the size and routing of storm drain lines.

Utilities were located by utilizing Louisiana One Call system and surveying the field markings for each corresponding utility. ATMOS gas service was unable to field locate portions of their system due to apparent breakage of the tracer wire. ATMOS provided as-built maps of their system which were used to complete the gas system locations shown on the survey. The FAA was contacted and their technicians' field located the RTR cables and the Airport Surveillance Radar (ASR) cables that traverse through the project site. DSA surveyed the field locations and included the information on the survey. Lafayette Utility System (LUS) as a matter of policy does not field locate their lines. LUS was contacted directly and they provided electronic maps of their water, sewer, electrical, and fiber system in the

FIGURE 2-2
EXISTING RTR FACILITY

project area. DSA also compared new information gathered during the survey to historic utility line information maintained in DSA and Airport offices.

DSA further researched the utility easements and servitudes. DSA retained the services of an abstractor that researched the recorded agreements in the court house for the various names used by the Airport/Lafayette Parish Government to record Airport documents over time. The easement and servitude documents were separated from the other documents and were illustrated on the survey map. Exact location of some of the easements could not be determined from the limited information shown on the easement agreements. During the comparison of the easement/servitude agreements verses the utility locations, it is apparent that some of the easements/servitudes no longer containing active utilities. It is also apparent that many of the utilities are not in a recorded easement or servitude.

The Abstractor retained by DSA also researched the public right-of-ways within the project limits. The information was collected, reviewed, and illustrated on the map. It is anticipated that Terminal Drive as well as portions of John Glenn Drive and Blue Blvd will need to be abandoned and new rights-of-way will need to be dedicated.

The next step in the utility line verification process are the level A & B locates that are currently being performed by Quaternary Resource Investigations, LLC. (QRI). Level A locates entail digging down to the utility and exposing it then surveying its location and elevation. Level B locates are non-destructive and utilize a handheld sensor to pick-up an electronic signal sent through a tracer wire or the utility itself. The utility is then marked and the location surveyed. As QRI identified utility line locations and depths, DSA surveyed the locations so that the information can be collected and shown on the map. Once the locations are completed, DSA will provide each utility company with a copy of the survey showing the locations or their infrastructure and request that they verify the locations shown.

2.1.4.1 Security System

The airport also recently installed an upgraded security system. The system includes communication cable for security cameras and access control. Communication lines cross the airfield and enter the existing terminal. Three separate runs then connect to various points on the north half of the airport. The eastern run provides security access control to the West Cargo Ramp to support the Security Identification Display Area (SIDA). The north run provides security cameras to the existing central parking lot. The eastern line supports the access control system for the north general aviation area. This security network is an essential component of the airport's daily operations and will need to be protected and possibly rerouted during construction.

2.1.4.2 Airline Communication Antenna

The airlines maintain a communication antenna on John Glenn Dr. adjacent to the existing economy parking lot, see Figure 2-3. This antenna is used to by the airline station personnel to communicate with aircraft in flight and on the ground. It is not a federally owned facility. While this antenna is an important piece of infrastructure for the safe and efficient operation of aircraft at LFT it is not critical like the RTR array. This antenna will need to be relocated as it currently occupies land where the new terminal will go. The design team will work with the airport and the tenants to minimize disruptions caused by moving the antenna.

2.2 AIRSIDE SITE CIVIL

2.2.1 Apron

The existing apron at Lafayette Regional Airport consists of two separate areas; the existing terminal apron and the West General Aviation Apron.

The Existing Terminal Apron is the primary parking location for commercial aircraft at LFT. It is concrete with 12" thick concrete panels approximately 19,000 SY in size. The pending Pavement Condition Index report being developed by RS&H indicates that this pavement is in satisfactory condition. It is expected that little to none of this pavement will be needed to support operations at the proposed terminal.

This existing terminal causes several non-standard conditions in the vicinity of the terminal apron. The first is that aircraft parked on the apron do not have the required clearances for a taxiway object free area (See Section 2.2.2.2 Taxiway B). The second is that the aircraft are parked too close to the Runway 11-29 centerline. Per AC/5300-13A-Change 1 "Airport Design" (AC/5300-13A) Table A7-10, the aircraft parking areas does not comply with dimension G "Runway Centerline to Aircraft Parking Area." This section requires an aircraft parking area to be at least 500' from the runway centerline. However, the current separation is approximately 426' from the centerline to the tail of a parked aircraft. See Figure 2-1 for where these dimensions fall. Currently, there is no available space to relocate the terminal apron to gain the required clearances without also moving the terminal.

FIGURE 2-3
EXISTING AIRLINE COMMUNICATIONS ANTENNA AND POWER LINES TO BE RELOCATED PRIOR TO CONSTRUCTION

The West General Aviation apron currently occupies the site where the proposed terminal is to go. It is an asphalt apron approximately 40,000 SY in size. The PCI report indicates this pavement is in very poor condition. Preliminary analysis suggests that this pavement could not support the expected commercial traffic mix at the airport. Reconstruction of the pavement in this area will be required to support the aircraft loads imposed by aircraft using the new terminal.

2.2.2 Taxiways

Two taxiways are expected to be affected by the terminal program, Taxiway A and Taxiway B.

2.2.2.1 Taxiway A

Taxiway A creates the eastern boundary of the proposed construction site and connects to Taxiway B in front of the existing terminal. Current record drawings indicate that the taxiway is intended for use by aircraft design group (ADG) category IV and below. This taxiway is expected to be realigned to accommodate the new terminal.

2.2.2.2 Taxiway B

Taxiway B is the main parallel taxiway for Runway 11-29 and also serves the existing terminal apron. There are several non-standard conditions associated with Taxiway B in front of the existing terminal.

The first non-standard feature is the Runway 11-29 centerline to Taxiway B centerline separation. Per AC 150/5300-13A Table A7-10, Taxiway A does not meet the separation requirements for a Parallel taxiway centerline. The required minimum distance from Runway 11-29 is 400'; however, current measurements put this dimension at 386'.

There is also inadequate wing tip clearance along Taxiway B between Taxiways C and D. The FAA has identified this as a "Hot Spot" primarily due to the reduced clearance. See Figure 2-4 for the current FAA Airport Diagram. The FAA has also placed a restriction in the Airport Facility Directory (AFD) limiting the wingspan of aircraft traversing this area to 80'. However, per AC 150/5300-13A Table 4-1, the required Taxiway OFA is 259' for an ADG IV aircraft or 129.5' from a taxiway centerline to a fixed or movable object. Unfortunately, the current distance from the taxiway centerline to the ramp boundary marking is only 37'. Furthermore based on existing ramp markings it is likely that the wing tip of a parked aircraft is no more than 76' from the centerline. Utilizing the OFA formula found in AC 150/5300 Section 404-2 (Equation 1) Then the existing clearance of 37' allows for an aircraft with a wingspan of only 38'. This does not even allow for full unrestricted ADG I access.

$$Center\ Line\ to\ Object\ Clearance\ [ft] = 0.6 \times W_s + 10 \text{ [Equation 1]}$$
$$where\ W_s\ is\ wingspan\ in\ [ft]$$

As shown on the airport facility diagram in Figure 2-4 the FAA has identified two "hot spots" on the airfield in the vicinity of the existing terminal and are labeled as HS 1 and HS 2. The FAA defines hot spots as a "location on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary." HS 1 is highlighted because the Taxiways D and C may experience ramp congestion and a short taxi transition to Runway 11. HS 2 is identified because Taxiways B, J and F all cross a runway in close proximity and the FAA wants pilots to be aware of runway hold position markings. While the proposed terminal program can do nothing to address the underlying issues of HS 2, by moving the terminal further from Taxiways D

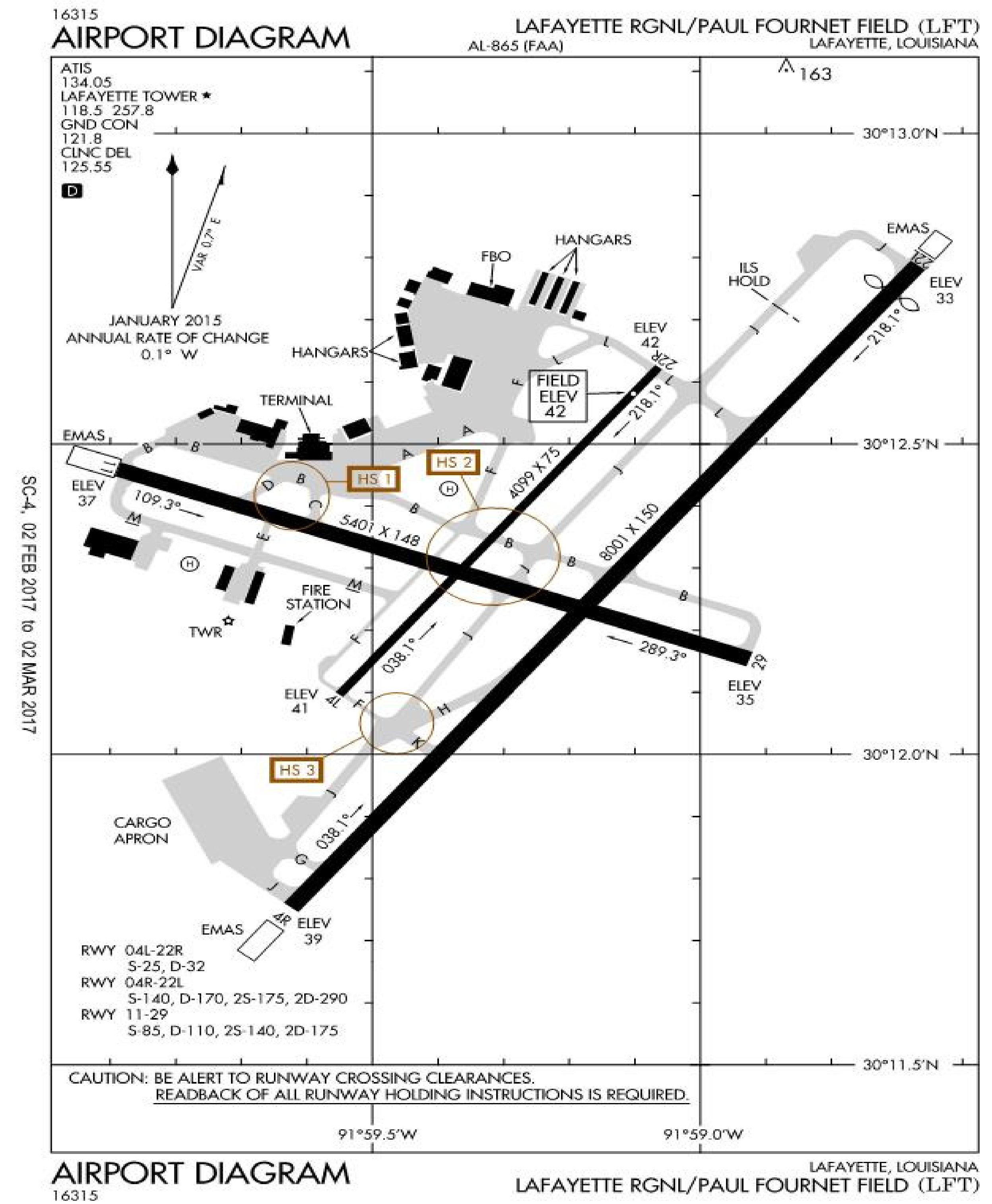


FIGURE 2-4
FAA PUBLISHED LAFAYETTE AIRPORT DIAGRAM

and C the relocated terminal should decrease congestion in that area. Further, pilots coming from the terminal apron would now be required to make a turn before entering the runway as required by AC 150/5300-13A.

The PCI report found that taxiway B is in satisfactory condition.

2.3 EXISTING TERMINAL CONDITIONS

The existing terminal building will be abandoned and demolished after the new terminal is complete and occupied. Therefore the details of the construction of the existing terminal are not particularly relevant to the conceptual development of the new terminal. However, some aspects of the existing facilities are important to know and understand for comparison.

The existing terminal building was built sometime circa 1930s or 1940s and later renovated and expanded in the 1960s. With the 1967 expansion it comprised approximately 42,000 square feet in area. As was typical of terminals of this early vintage the air traffic control tower was constructed as part of the structure. In the late 1980s and early 1990s the terminal was renovated and expanded again by another 20,000 square feet and the air traffic control tower was removed. This renovation and expansion was designed to accommodate growth through 2005. This was the last significant renovation/expansion of the terminal.

FIGURE 2-5
EARLY 1960'S TERMINAL BUILDING AT LAFAYETTE

The terminal is a two-story structure with an arrivals and departures road and curbside at grade. The Ticketing and Bag Claim functions are at the ground level of the terminal. The departure gates, concessions, and passenger screening functions are at the second level so passenger boarding bridges (PBBs) are used to link with aircraft for boarding. The terminal was designed for four gates with passenger boarding bridges, but due to aviation restrictions on the aircraft apron only three terminal gates are used and have passenger boarding bridges.

The “loop” of the existing terminal loop roadway is constricted by adjacent development so the “loop” narrows as it approaches the terminal. This limits the length of the arrivals and departures curb area so the road is split by a median to provide two curbs for pickup and drop off. A low” canopy covers the main curb and a portion of the adjacent parking lane while a larger, higher canopy covers the road in the middle where pedestrians cross to the parking lot across the road. Additional pedestrian canopies extend from this larger road and curbside canopy into the public parking lots for partial weather protection of passengers walking to their car.

FIGURE 2-6
CURRENT TERMINAL BUILDING AT LAFAYETTE

2.4 OTHER EXISTING BUILDINGS AND SIGNIFICANT EQUIPMENT

In addition to the existing terminal, various other structures are present on the site that must be dealt with in the overall program definition and concept development. Some of these are identified below.

2.4.1 Rental Car Wash and Maintenance Facilities

Two rental car companies have car wash and maintenance facilities on airport property, Avis Budget Group and Enterprise. The Enterprise facility is located on Chaplin road and abuts the west boundary of the RTR site. The Avis site is located on the corner of Chaplin and Shepard.

The Enterprise site consists of a light maintenance facility and an area to hand wash and vacuum cars with a small parking lot for vehicle storage. The Avis site is similar in size but has an auto wash on the grounds and has facilities for refueling vehicles as well.

It is important to note that the Avis Site was previously found to have contaminated soil in the vicinity. Most likely caused by the fueling system they had on site. Corrective action was taken by Avis to remediate the site. The remediation work was overseen by Tetra Tech, Inc. The corrective action plan (CAP) was approved by the Louisiana Department of Environmental Quality (LDEQ) on November 17, 2015. Corrective action was completed on August 3, 2016. Three areas of investigation were identified by Tetra Tech. Areas No. 1 and No. 2 were excavated and cleared of contaminated soil such that samples tested below the Risk Evaluation/Corrective Action Program (RECAP) limits.

Area No. 3 consists of ground water contamination and as of August 2016 quarterly sampling was still being conducted from a monitoring well. In a letter dated September 22, 2016 Tetra Tech requested the issuance of a "No Further Action Letter" for areas No. 1 and No. 2. Further sampling of the monitoring well was recommended for area No. 3.

2.4.2 Public Parking Toll Plaza and Revenue Control System

The existing revenue control system at LFT consists of five entrance gate arms and ticket machines and two exit gate arms and toll booths for the main lot. The economy lot has a single gate arm and ticket machine for the entrance and exist to the economy lot. This equipment is functional albeit dated. It is not planned to salvage the equipment for future use. However, the design team is evaluating the feasibility of creating one or more temporary lots for phasing purposes and the existing equipment might be temporarily relocated to the temporary lots.

2.4.3 Passenger Boarding Bridges

The terminal currently supports four Passenger Boarding Bridges (PBB) at three gates. Two of the boarding bridges, currently located at gate 1, were replaced in early 2012. Design drawings indicate that the installed model was a Jetway A3-58/110. The bridges included a new 30 ton preconditioned air (PCA) unit and a 90KVA 400Hz/28V ground power unit. The remaining two bridges, located at gates 2 and 3, are much older and according to the owner are out of date and would require refurbishment if salvaged.

Salvaging the two bridges at gate 1 would provide cost savings to the project; however, it may not be possible. The existing terminal has a finished floor elevation approximately 13.5' above the existing apron. However, the new terminal is expected to have a finished floor closer to 14' above the apron. In addition, changes in the fire code since the existing terminal building was constructed now require that the apron slope away from the building for the first 100'. New terminals are also expected to comply with ADA requirements for the passenger boarding bridges which limit the maximum slope to 8.33% or 1:12 (V:H).

Meeting these new code requirements is possible, provided the boarding bridges are long enough. The existing bridges are limited to a maximum extension of 110' and preliminary analysis indicates bridges slightly longer are needed to serve the smaller regional jets expected to operate at the airport. Further analysis is needed to determine how these bridges could be reused to serve the airport for years into the future. Possible solutions could be short, sloped fixed extensions between the building and the PBB rotunda, or a small dropped floor at the gate area doors before the PBBs.

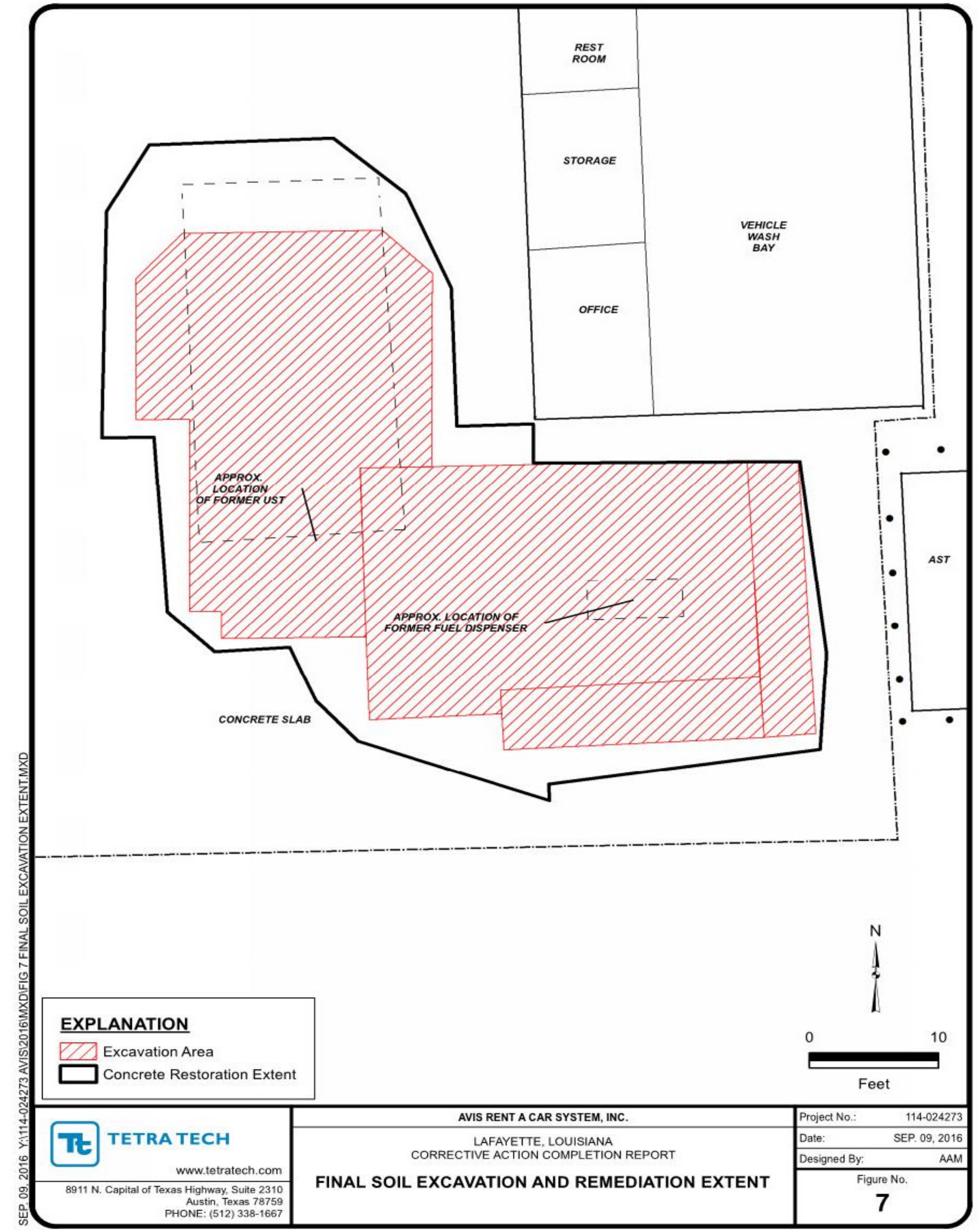
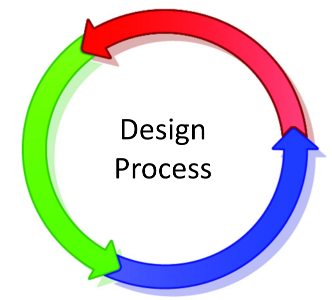


FIGURE 2-7
LIMITS OF CONTAMINATED SOIL EXCAVATION AT AVIS QTA SITE

CHAPTER 3

NEW DEVELOPMENT DEFINITION

The process to arrive at the best development concept for the airport requires an iterative approach. In the first step, the broad features of the development needs are studied and evaluated and overall decisions are made that establish the overall direction of the development. With subsequent steps, more details are developed from the broad concept to establish further definition. This process takes several steps and ultimately becomes architectural and engineering design and construction documents. This current scope of services will complete the concept design and definition and stop with partial schematic design of the terminal and site. Subsequent work orders will provide the services for finishing the design and into construction services. The proposed site layout can be seen in Figure 3-5.



3.1 CONCEPT APPROACHES

The first step in the development of the preferred concept identifies several Approaches that the development could take to provide the required facilities. Typically the site concept approaches and the terminal concept approaches take parallel efforts so the impacts of one on the other can be investigated.

3.2 TERMINAL APPROACHES

Several aspects of the terminal were established at the beginning that became consistent with all of the Concept Approaches. The terminal would be a two-story terminal with the Ticketing and Bag Claim at ground level so the access road could be at grade and an elevated road structure would not be needed. This is consistent with the Master Plan. The project site was considered to be too constricted by other surrounding development to allow for an elevated roadway and its associated ramps and the overall program budget to be too limited to afford an elevated roadway.

Terminal buildings typically follow one of four configurations: Linear, Pier, Satellite, or Transporter or a hybrid that may contain aspects of two or more. Figure 3-1 illustrates these basic configuration options.

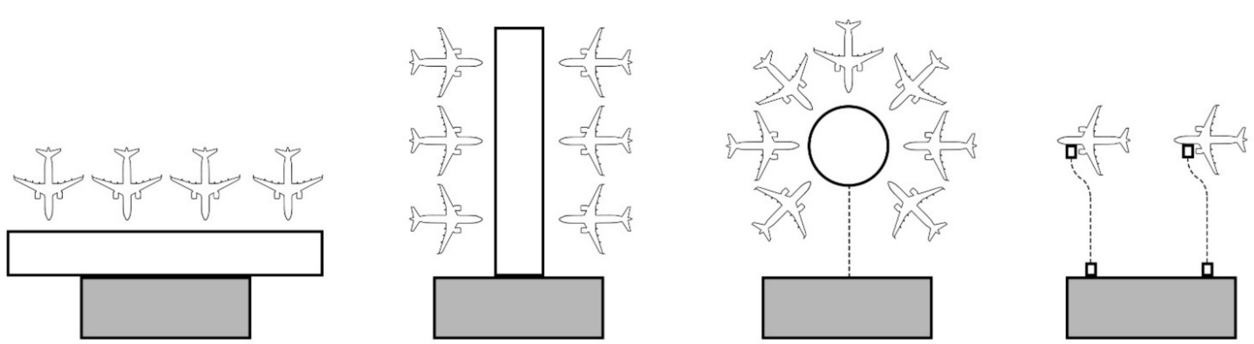


FIGURE 3-1
EXAMPLES OF COMMON TERMINAL BUILDING CONFIGURATIONS

The Linear configuration provides a concourse where the aircraft are parked along one side of the terminal all in a row. This configuration is best for non-hub and small hub airports with a limited number of gates and is generally appropriate where the site allows for building width, but not depth.

The Pier configuration provides a terminal structure where a concourse is connected to the main terminal in a roughly perpendicular manner and aircraft can park on both sides. This configuration can accommodate small-hub to large-hub airports, depending on how many piers are provided. This configuration requires more site depth since the pier concourse extends perpendicular into the apron area.

The Satellite configuration provides a remote concourse that is linked to the main terminal either at grade, below grade or above grade where the aircraft can generally park all the way around the concourse. This concept is best for medium- to large-hub airports. This concept may require even more depth than the pier to allow aircraft to park around the satellite and still provide taxilanes on both sides for aircraft movement.

At LFT the overall site limited the amount of terminal depth that could be reasonably accommodated. The runways and associated taxiways establish a basic boundary limit for the terminal and apron on the south and the area for the terminal loop road and parking facilities must be accommodated to the north of the terminal. The more depth the terminal configuration requires, the less space is available for the road and parking development. Therefore, Linear or hybrid-Linear were selected for LFT to provide adequate space for parking and roadway to the north. Figure 3-2 illustrates three terminal concept approaches that were developed for initial selection for a preferred terminal approach.

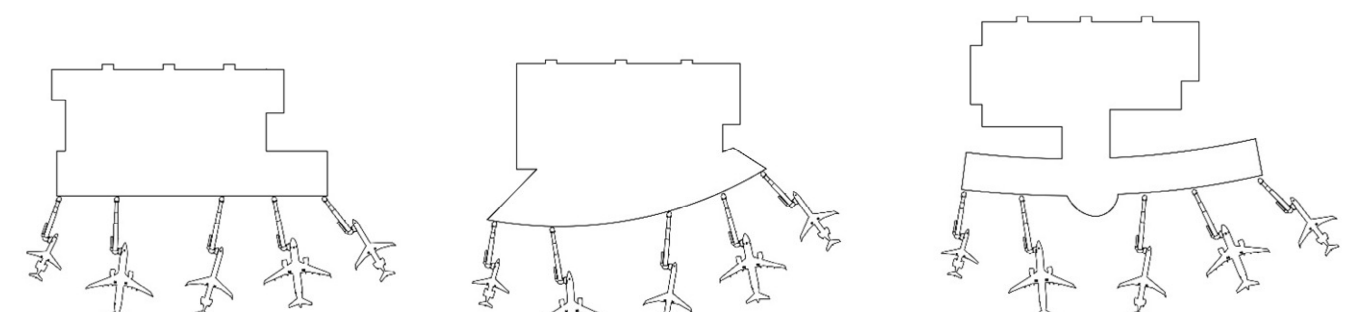


FIGURE 3-2
INITIAL TERMINAL CONCEPT APPROAHCES

From the three Terminal Concept approaches that were developed and studied, the Elongated Approach was selected as the favored approach for continued design development. While the elongated Approach requires a small amount of additional floor space to separate the major functions, it also offered the LAC the most flexibility for future expansion, and ability to adapt to future changes in the aviation industry.

3.3 TERMINAL PLAN LAYOUT

The Elongated Terminal Concept Approach was further developed into a floor plan that included the elements from the terminal Program in Chapter 1. Major elements such as ticketing and bag claim, passenger and baggage screening, departure lounges, TSA and airport administration offices, circulation and support functions are all included following clear and simple airport terminal organizational norms. The terminal is a two-story structure with the ticketing and baggage functions at the ground level and passenger screening, departure lounges and concessions primarily on the second level. See Figure 3-3 and Figure 3-4 for the terminal floor plans.

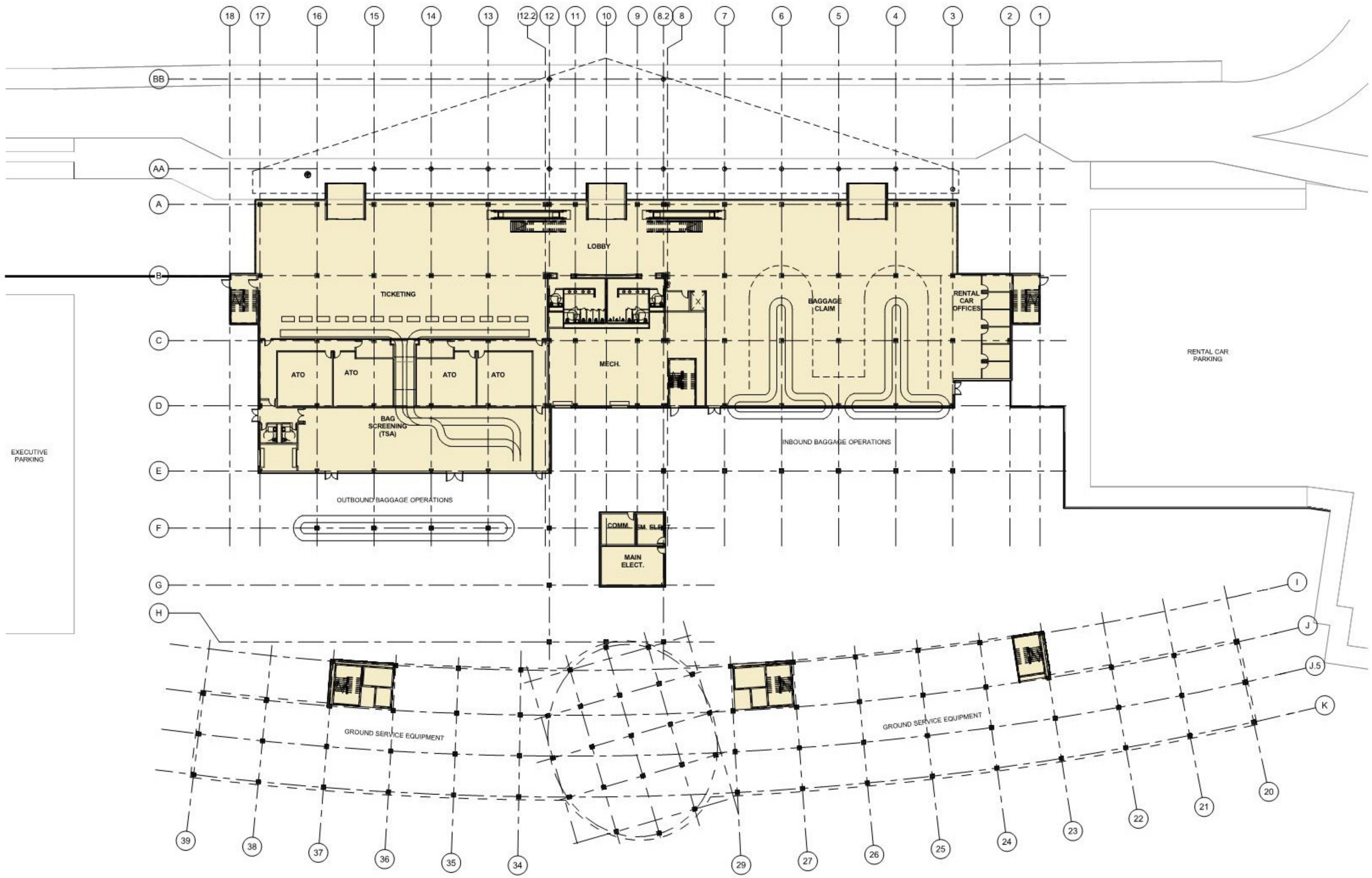


FIGURE 3-3
TERMINAL CONCEPT - GROUND FLOOR

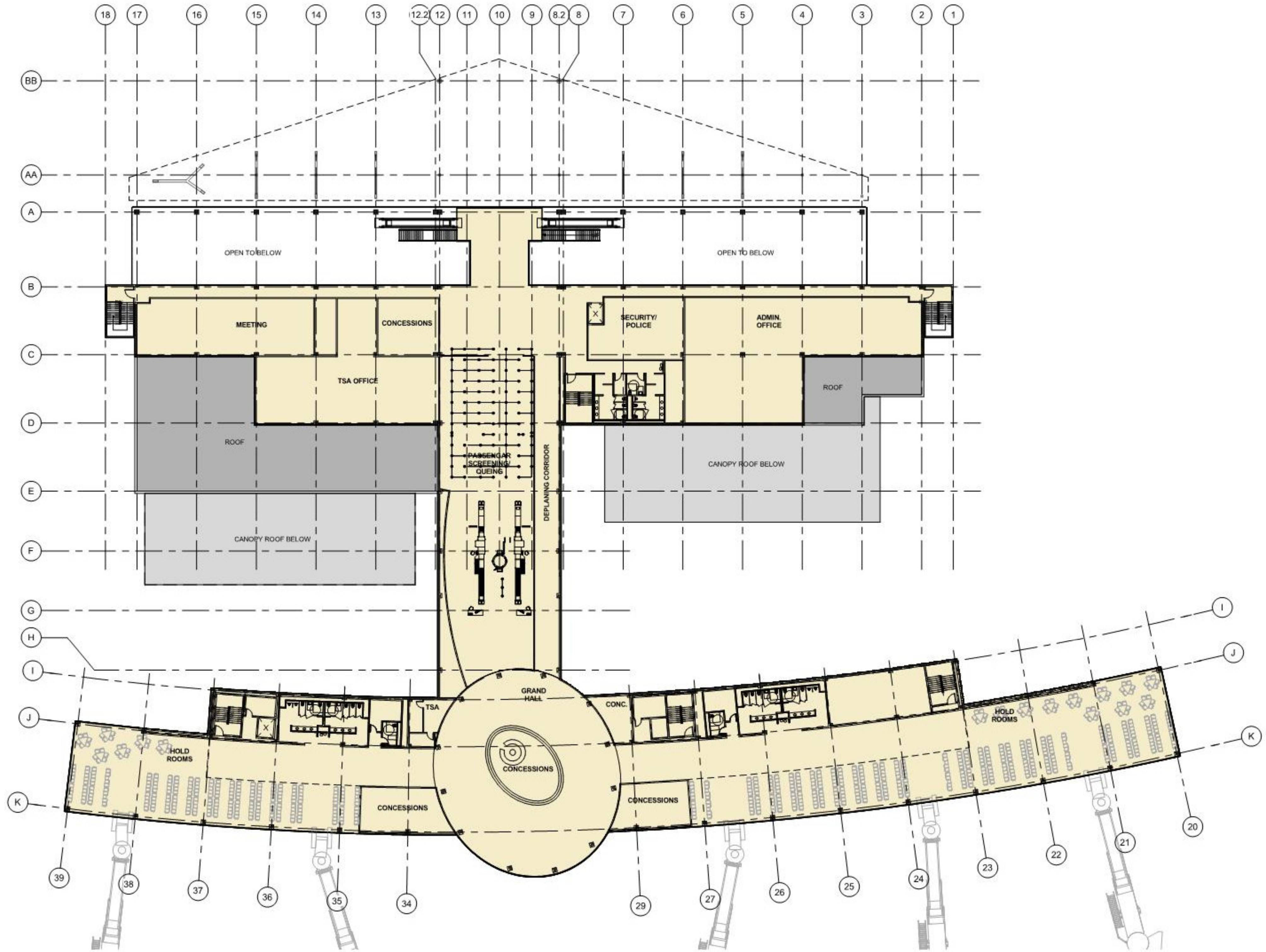


FIGURE 3-4
TERMINAL CONCEPT - SECOND FLOOR

The terminal is organized to provide a non-secure "landside" and a secure "airside". This reflects the FAA and TSA security requirements of restricting access to the aircraft to people who have been screened for weapons or other destructive devices. The passenger screening checkpoint is generally the dividing line between these two "halves" of the terminal.

The terminal is also organized to separate the arriving and departing passenger and baggage. This separation allows for a highly efficient and functional terminal in a reduced space. As a vehicle approaches the terminal along the road system, the first part of the terminal is the departure side with ticketing, airline offices, baggage screening and baggage make-up. The far side of the terminal along the roadway is the arrival side. This side includes baggage claim, airline ground handling for baggage off-loading, and rental car offices. At the airside on the departures concourse, the concessions are located in the center immediately after the passenger screening process for convenience to all passengers regardless of which gate is their destination. Restrooms and other support functions are dispersed throughout the terminal to provide convenient access from any point in the facility.

Airport administration and operations offices are located on the second level on the landside to remain accessible to the public. The LAC public meeting room is also on the landside, second level for easy public access.

The Elongated concept approach has the specific benefit of offering the most flexibility for future expansion of adapting to unknown and unanticipated industry changes. Passenger gates can be added by extending the concourse. Ticketing or Bag Claim can be expanded with simple additions to either side of the landside structure. The passenger checkpoint can be expanded by widening the structure in the middle. The architectural and engineering design will recognize this benefit and develop details to allow these future expansions to occur easily.

Table 15 illustrates the spaces in the proposed terminal layout as compared to the 2035 and 2040 terminal program demands provided in Chapter 1. Some of the spaces are a little over and some are a little under the program areas from Chapter 1. This is common and is a function of the imprecision of planning and programming and fitting a complex building together so that there is an efficient and cost effective organization. As long as each space is relatively close to the programming effort's calculated demands then the layout is considered to be on target. Since this Elongated concept stretches the building a little to allow for more future flexibility one area of the terminal that is over the programming estimate is the public circulation. To some degree, open areas that are adjacent to the circulation space that are a little under the program calculation can spill into the somewhat larger circulation space. It is part of the nature of passenger terminals where its occupants are constantly moving around.

TABLE 15
FACILITY REQUIREMENTS VS PROPOSED PLAN COMPARISON

DESCRIPTION	2035	2040	Proposed Plan
Ticket Agent Area (sf)	1,249	1,387	1,480
Passenger Processing Area (sf)	1,249	1,387	1,410
Passenger Queuing Area (sf)	3,123	3,468	2,185
Airline Ticket / Bag Offices (sf)	4,447	4,862	4,917
Baggage Make-up Area (sf)	3,200	4,000	5,443
Airline Operations Area (sf)	1,600	1,700	incl. above
Baggage Claim Devices	2	2	2
Baggage Claim Area (sf)	7,530	8,080	7,614
Inbound Baggage Ops Area (sf)	5,460	5,900	4,258
Departure Gates	4	5	5
Departure Lounge Area (sf)	5,060	5,436	6,575
Gate Counters, Queuing, Etc. (sf)	2,480	3,100	2,850
Gate Circulation, Amenities (sf)	1,810	2,050	2,100
Passenger Screening (sf)	7,455	7,675	7,068
Baggage Screening (sf)	5,581	5,591	4,111
TSA Offices and Support (sf)	3,697	3,697	3,873
Concessions Landside (sf)	835	898	780
Concessions Airside (sf)	4,733	5,090	5,203
Rental Car Agency Area (sf)	2,000	2,200	1,420
Rental Car Customer Queue (sf)	1,100	1,200	516
Public Circulation (sf)	23,000	24,700	29,802
Public Waiting Area (sf)	2,400	2,500	2,176
Public Restrooms (sf)	4,400	5,000	4,815
Administration / Ops Offices (sf)	4,630	5,000	4,946
Shared/Public Meeting Rooms (sf)	2,400	2,500	2,260
Security/Badging/Police (sf)	1,300	1,400	1,260
Utilities & Support Space (sf)	10,074	10,882	12,596
TOTAL	110,814	119,704	119,658

Source: RS&H, Inc.

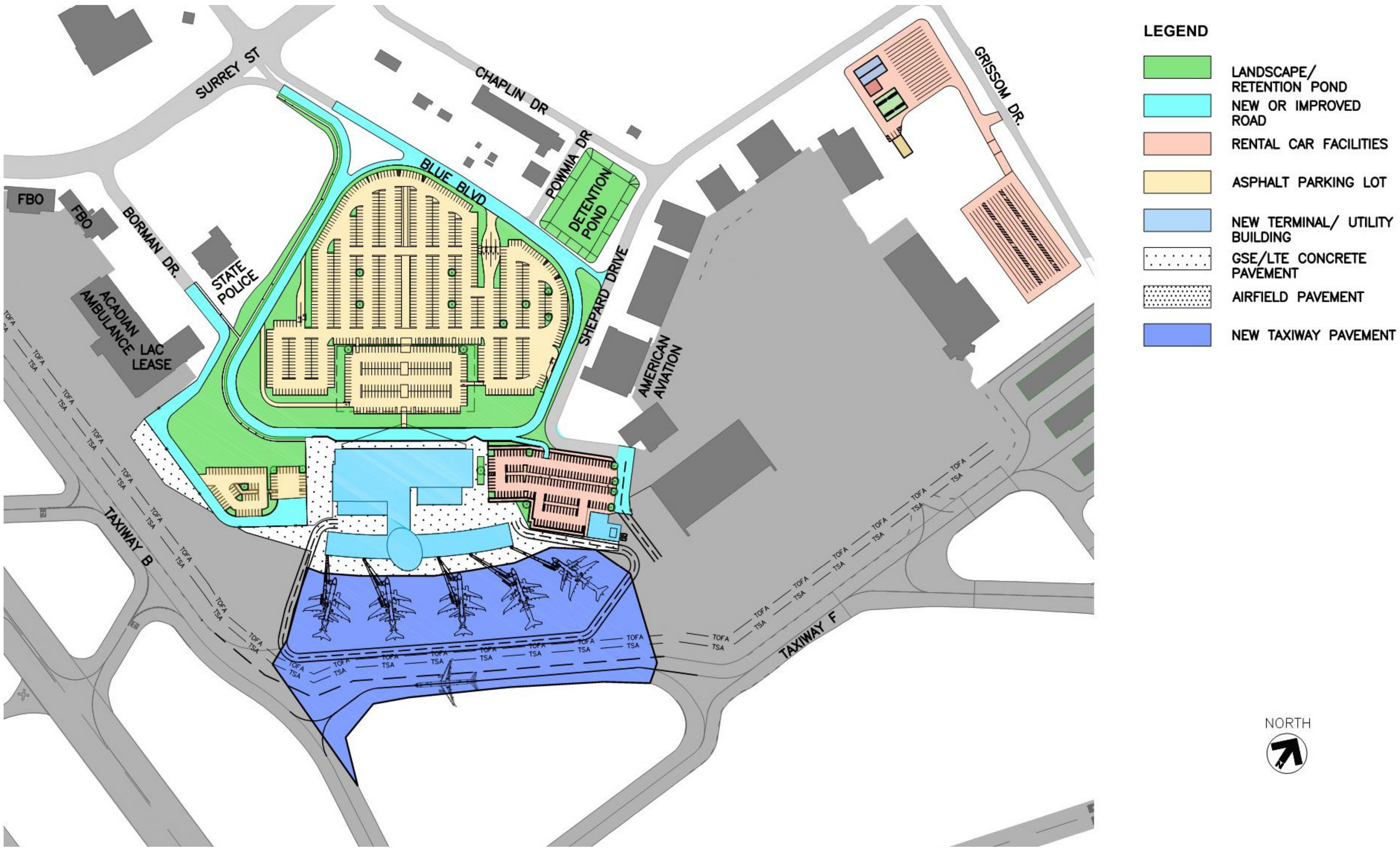


FIGURE 3-5
PROPOSED SITE PLAN AT END OF CURRENT PROGRAM ~2021

3.4 SITE APPROACHES

The most critical aspect of the entire program was the ultimate location of the terminal. As a developed airport LFT is short on available land and new terminal locations are limited due to existing infrastructure. The general site location recommended by the Master Plan is the most feasible location. Refining the location was the main focus of this exercise.

Originally, the design team believed that a utility corridor existed roughly along the John Glenn Dr. alignment. During the utility location process the design team found that few major utilities actually existed in the corridor and the few that were there could easily be relocated.

This opened up the options for locating the terminal and meant that the ultimate location depended on finding the balance point between the airside and landside infrastructure. To evaluate these interconnected choices the design team brought all three of the original terminal concepts into computer models in order to evaluate how the landside and airside infrastructure affected each other. The exact positioning of the terminal either more landside or more airside affects the apron, the road and parking or both. Striking the optimum balance is the goal of the study.

3.4.1 Landside Considerations and Assumptions

In general, airports can be stressful places. Because he majority of people only fly a few times a year and are often unfamiliar with the layout of even their local airport. Thus airport planning and design attempts to minimize the number of decisions a driver has to make while they navigate the airport road system. What results is that many airport are laid out in basically the same ways as designers rely on passenger habits and expectations to help guide them through the airport complex.

On the landside this equates to making parking easily accessible and located in expected places. Further, it means that the loop road itself must be easy to navigate, minimize decisions, and give drivers plenty of time to react to signs. An early concept of this theory applied to the Lafayette Terminal Program can be seen in Figure 3-6. The best way to do this is to make the loop road unidirectional and any design should attempt to separate terminal traffic from other airport users. It also means that the most logical location for the main parking lots is inside the loop road. Other parking lots, like rental car ready return, should also be located close to the terminal and inside the main loop road if space allows.

The team attempted three different loop road configurations for the terminal complex that can be summarized as follows:

1. Maximize the size of the loop road.
2. Save the existing building on the corner of John Glenn Dr. and Sheppard Dr.
3. Reuse as much of the existing road network as possible.

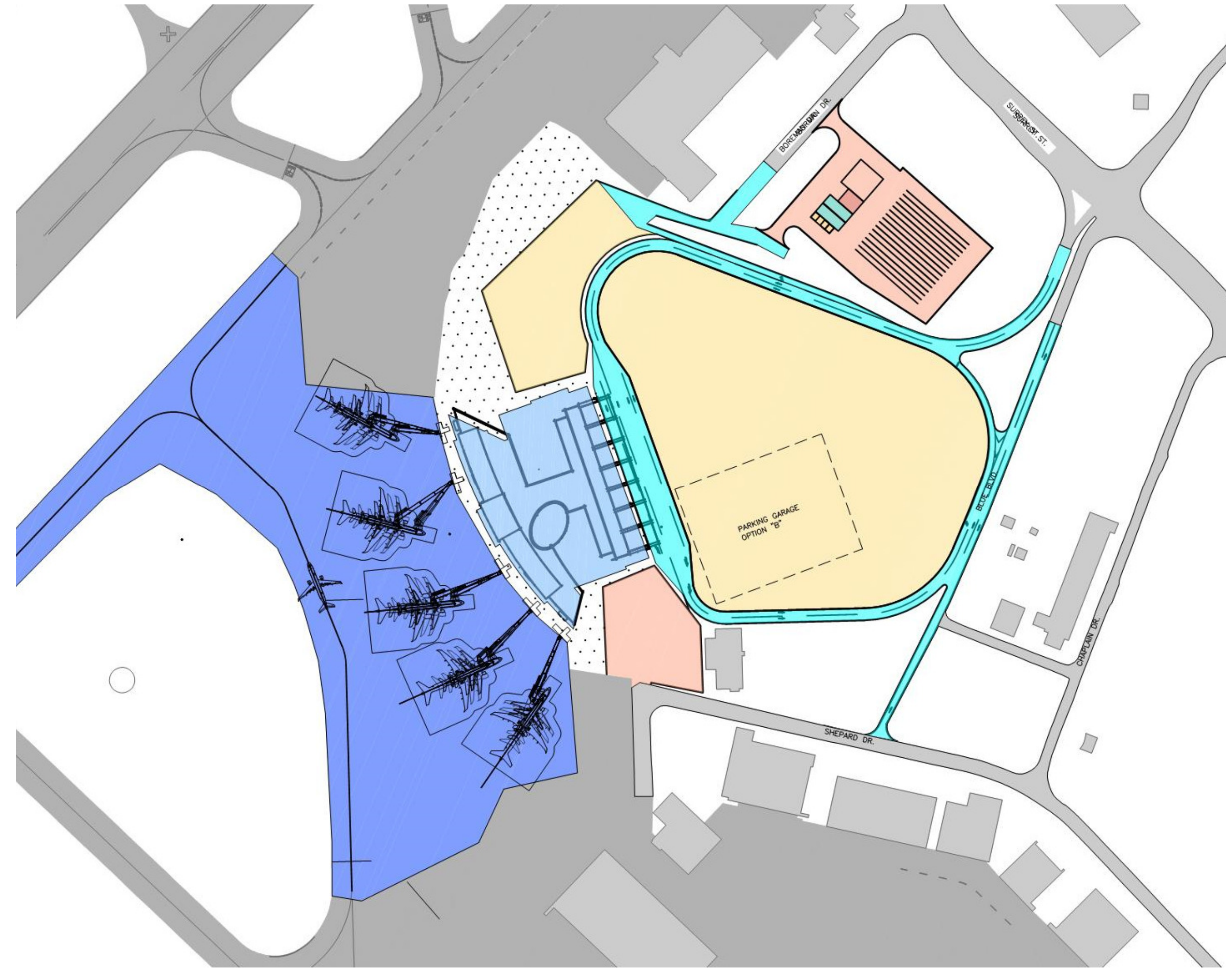


FIGURE 3-6
AN EARLY SITE CONCEPT INTENDED TO SAVE THE BUILDING AT THE CORNER OF SHEPPARD DR. AND JOHN GLENN DR.

3.4.2 Airside Considerations and Assumptions

The airside is subject to fewer considerations because it is primarily used by pilots and other airport employees who are familiar with the airport and its operation. Further the airside is subject to federally mandated design standards which makes all airside areas at any airport operate in substantially similar fashions. Therefore the airside assumptions are primarily operational in nature. Specifically, LFT indicated that they desired:

- A five gate terminal
- All aircraft parking stands could service all aircraft
- The Boeing 757 is the design aircraft

3.5 SITE REFINEMENT

With the assumptions and for the site in hand the design team focused on sizing and developing preliminary concepts for the main components of the terminal complex including the overall site aesthetics, parking lots, roadways, airside infrastructure, and the rental car facilities.

3.5.1 Landscaping

Airports are unique to any other community development because they serve a unique purpose. They attract large numbers of people to a relatively industrial setting that must account for the operation and security of the facility while also accommodating the comfort of the passengers. Lafayette Consolidated Government (LCG) has established a landscaping code based on their zoning requirements. Since the airport is within the geographical jurisdiction of LCG the airport is subject to these requirements just like any other property owner or developer. However, due to the airport's unique purpose, its aviation regulatory restrictions, and its interconnected campus development, the design team anticipates that meeting each of the requirements for each piece of the terminal development will not be feasible from a security and operational perspective. However, the team desires to create a world class, sustainable, visually appealing facility that complies with LCG's requirements for landscaping.

Therefore the design team proposes to develop a master landscaping plan for the terminal area as a whole such that the spirit and intent of the zoning rules are met while accommodating the unique needs of the facility. This may mean that certain areas of the facility have a high concentration of landscaping, especially in public facing areas, while those areas that are considered back of house or are subject to security or operation needs may be more utilitarian in nature.

3.5.2 Parking Lots

During the boom in the energy markets the airport experienced a major growth in traffic. At the same time they also experienced a severe parking shortage. Thus a new, expanded parking lot was desired from an early stage. RS&H commissioned Walker Parking and Associates to perform a demand study in order to properly program the size of the parking infrastructure. Walker was also responsible for identify best practices for the efficient layout of all parking lots with an adequate Level of Service (LOS).

Parking efficiency is traditionally defined as stalls per square foot of paving. An often overlooked criteria of a parking facility is Level of Service (LOS), which can impact perceived 'efficiency' but isn't any less important to the proper operation of the lot. Typically, an airport parking facility is designed based on a LOS A criteria. The LOS of a parking lot is dependent on several variables including the actual stall size (LxW), drive aisle width, queue times at entrances and exits, and adequacy of turn radii at the end of the rows.

LCG has attempted to simplify parking lot design into standard parking module dimensions found in local ordinances and given in their infrastructure design manual. For a 90 degree stall, LCG requires a 63'-0" parking module. However, an analysis that utilizes the Ford F-150 as a design vehicle shows that modules are only required to be 61'-6" for LOS A and 60'-6" for LOS B. Walker believes that the intent of the ordinance is to accommodate larger than normal vehicles. In Lafayette Louisiana, this is probably a prudent design assumption. However, Walker utilized a Ford F-150 pick-up as the design vehicle which should address this concern. Furthermore, Walker believes that the resulting 27' drive aisle specified by the code is too wide and will allow drivers to drive faster than is prudent and create a safety hazard for pedestrians. As mentioned previously, airport passengers are infrequent visitors to the airport and parking is often one of the first challenges they must overcome in their journey. For this reason, Walker believes that the wider drive aisle, combined with the stress of making a flight, would encourage people to drive faster in the parking lot then they would under normal conditions at their local grocery store. Therefore, Walker Parking strongly recommends that the team attempt to get a variance from LCG for the parking lot design. The team believes that a variance would allow for a more economical parking lot that will save money, space, and provide a safer facility for the general public. However, for the purposes of the schematic design the proposed parking lot is laid out per LCG standards.

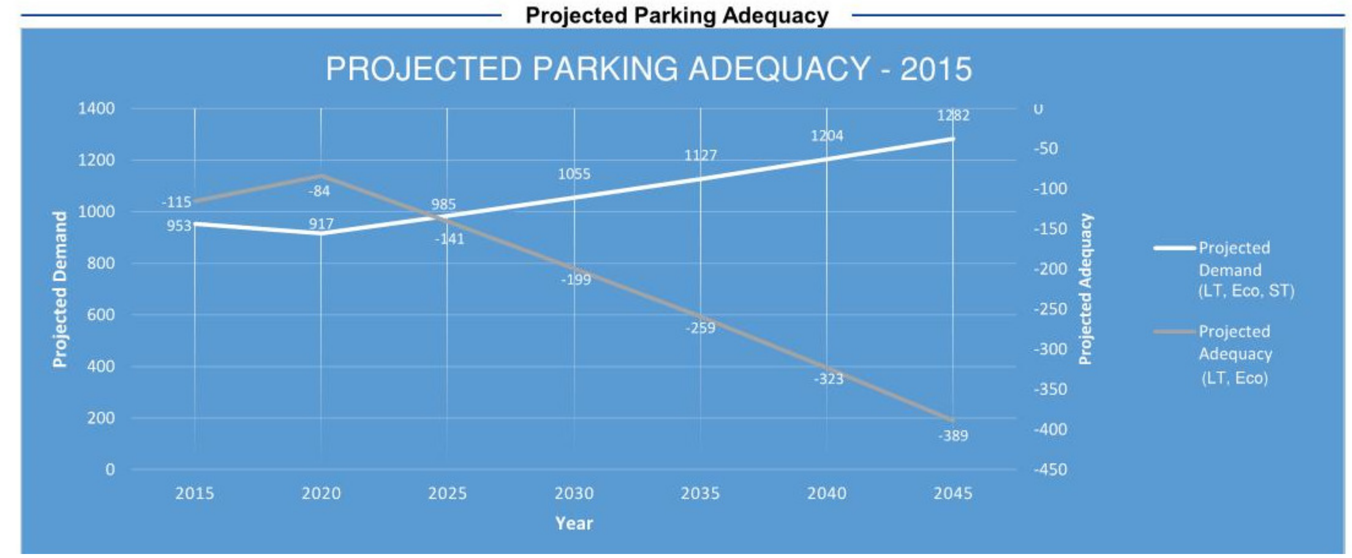


FIGURE 3-7
PROJECT PARKING DEMAND AND ADEQUACY BASED ON 2013 DATA FROM REPUBLIC PARKING

The airport also expressed an interest in providing a parking garage; however, they were aware of the high construction costs and asked that the design team evaluate the need for such a structure. Walker Parking's study indicated that the necessary parking could be provided by surface lots for until at least 2030. Figure 3-7 is the projected parking demand and the project parking adequacy based on the existing parking stall count.

3.5.2.1 Main Lot

The ultimate results of the Walker Parking study showed that the new central lot needed to contain 1055 stalls to meet expected demand in 2030. This was preliminarily divided between 879 Long term stalls and 176 short term stalls. The preliminary layout shown in Figure 3-8 is flexible enough to meet operational needs and also expandable in the event parking demand exceeds the forecasted values sooner than expected.

The lot can be expanded either by adding a parking garage or expanding the surface parking. The additional capacity provided by a parking structure is not immediately required because space outside the loop road was found for the rental cars and the parking lot has appropriate capacity for several years after the terminal is completed. However, the central lot has been conceived with a future three story parking structure in mind. The proposed surface lot also has room for expansion and could expand to accommodate an additional 100-200 vehicles. Based on the projections in Figure 3-7, a garage would not be necessary from a capacity perspective until the 2040 to 2045 timeframe. A three story structure located as indicated in Figure 3-8 would bring the total parking count to approximately 1,475.

Until the design team can obtain a variance from LCG. All parking lots have been laid out per the Lafayette Infrastructure design standards. This means the parking lot has 63′ modules that allow for a 9′x18.5′ parking stall and a 27′ drive aisle. Additional features of the new parking lot are anticipated to include a covered walkway as well as a new revenue control system.

3.5.2.2 Other Lots

Additional parking lots include the rental car Ready Return Lot, Employee Lot, VIP Employee Lot, and a possible Economy Lot required by one of the phasing options. The parking lots are designed to LCG Standards to include stalls that are 18.5′ in depth and 9′ wide. Other design factors accounted for should result in parking lots with a level of service of B. The paving is assumed to be 4″ asphalt on 10″ of soil cement base. Where curbs are present the design team intends to include wheel stops to prevent undue wear and tear on the curb. In addition, the parking lots will be appropriately lighted based on the results of a lighting study however, for now the design team assumes light poles will be required every 300′-400′ with their associated infrastructure. All parking lots will feature new drainage.

3.5.3 Roadway

New or realigned roadways will be designed per the Lafayette Infrastructure Design Standards as well as the standard details. The roads will also comply with the Uniform Manual on Traffic Control Devices (UMTCD) as adopted by the state of Louisiana. Further, the design team will utilize the Airport Cooperative Research Program's Report 40 "Airport Curbside and Terminal Area Roadway Operations" to further refine the terminal roadways to accepted industry standards.

Initial schematic roadway design was completed based on accepted roadway design practices supplemented by capacity calculations specific to airports as described in ACRP report 40. Utilizing the peak hour enplanement forecasts as described in Table 2, the roadway network must accommodate peak hour enplanements of 224 passengers per hour in 2025 up to 281 passengers per hour in 2040. Adequacy of transportation facilities is often described by the term Level of Service (LOS) which is commonly described with a letter grade from A to E or F. The exact metrics used to grade a facility vary by the facility type. In the case of terminal roadways the passenger will encounter two different facilities. The first is the access road itself and the second is the terminal drive which is defined here as the roadway serving the airport curbside.

In terms of the access road, ACRP report 40 states "LOS C is considered the common standard for planning new airport facilities." The primary metric for determining LOS of the access road is the maximum vehicle flow per hour. Several other factors relating to road geometry also affect LOS but for the purposes of schematic design the terminal loop road is expected to be a unidirectional roadway consisting of a minimum of two 12′ lanes at all times and includes curb and gutter for drainage. One of the design goals was to remove the sharp right turn necessary to enter the terminal loop.

FIGURE 3-8
PROPOSED MAIN PARKING LOT LAYOUT

To do this the design team reconfigures Blue Blvd. in such a way as to create a smooth turn onto the terminal loop. The team also reconfigures Blue Blvd. so that other airport vehicle traffic is separated from the terminal vehicle traffic. The expected design speed for this road is planned to be 25 mph. The road section is expected to be 6″ of asphalt on a 12″ soil cement base. No sidewalk is to be installed along the roadway except for a 5′ wide section that will run from the intersection of Blue Blvd. and Surrey St. along the new terminal loop road to the existing terminal. A lighting study has not been performed at this time but the design team does anticipate including streetlights and their associated infrastructure approximately every 200′ along the new terminal road.

With the assumptions listed above one can use Table 4-1 of ACRP Report 40 to estimate the vehicle flow rate and the corresponding LOS. With a 25 mph free flow speed the maximum flow rate ranges from 250 VPH per lane for LOS A to 1,010 VPH per lane for LOS E. If we compare this value to our peak hour forecasts we can determine the expected LOS for the terminal roadway. However, one would not usually do a direct comparison because the forecast is based on enplanements, i.e. every passenger who boards a flight. In actuality every passenger who boards a flight at a typical airport does not arrive for the flight by the same means. Thus a direct comparison would typically be overly conservative. However, in this case the number of enplanements are relatively few and would require a significantly smaller and simpler road then would be prudent to design. Therefore, in the peak hour in 2040, LFT can conservatively be assumed to have 281 VPH use the access road. Utilizing the values from Table 4-1 in the ACRP report a LOS A two way roadway has a maximum capacity of 500 VPH which means the proposed LFT roadway can be classified as LOS A.

A similar procedure can be applied to the terminal drive itself. Similar to the loop road above the LOS uses the passenger enplanement forecast to determine LOS. Similarly not all of the enplanements would be expected to use the terminal loop drive. However, we can make the overly conservative assumption and assume that all enplaned passengers arrive in an individual vehicle and are dropped off at the terminal drive. Using the equation:

$$R_a = V \times \frac{D_i}{60} \times L$$

where

$R_a = average\ curbside\ length\ to\ accomodate\ the\ vehicles\ stopping\ at\ the\ curbside$
$V = the\ hour\ volume\ of\ vehicles\ stopping\ at\ the\ curbside$
$D_i = the\ average\ vehicle\ dwell\ time\ (in\ minutes)$
$L = the\ average\ vehicle\ Length$

Using the peak hour enplanements for V and assuming L=20' and $D_i = 3$ minutes we arrive at an average required curbside length of 281' Current schematic designs show a terminal curbside area of approximately 360'. This gives an effective curbside ratio of 0.78. This means that the curbside will have an LOS of B. However, we also need to verify through lane capacity. Using the 2040 peak enplanements, and assuming that all enplanements equate to vehicles, we get a through lane capacity ratio of 0.12 which equates to a LOS of A for the through lanes. The overall LOS for the terminal drive is the poorest of the curbside and through lane LOS. This means that during the peak hour the curbside will have an LOS B with a one curb three lane configuration.

Should traffic levels exceed expectations the design team has allowed space for up to two additional lanes and a secondary curb for passenger loading. A second curb may also become necessary as the airport grows and passengers change how they travel to the airport. For example, LFT currently has very few commercial vehicles, (taxis, buses, airport shuttles) serving the airport. However, should this change in the future these vehicles often require longer dwell times at the curb and it is typical practice to separate these vehicles from normal automobile traffic. A secondary curb would easily accommodate the change in traffic under this scenario.

As mentioned previously the road network at LFT is somewhat unique for the airport in that nearly all the roads are not owned by the airport. Instead they are owned and maintained by the city and are designated public right of ways. This means that the airport roads must generally comply with the LCG Public Works standards for roadways including requirements for landscaping, sidewalks, etc. However, given the nature of the road some of these things do not make sense on an airport campus. For example, a sidewalk on both sides of all roads is unusual because most individuals do not walk to the airport. Instead airports typically provide safe walking routes between specific points on the campus. The intent of the LCG rule is to allow safe pedestrian access for any development along the right of way. Therefore the design team will seek a variance to install a sidewalk only from Surrey St. to the terminal and save the expense and space of a sidewalk along the rest of the new loop road.

3.5.3.1 Utilities

The design will conform to LCG standards. Generally, subsurface utilities are to be constructed at the same time that surface infrastructure is built. Due to the phased nature of the project many pipes may need to be temporarily capped in the field and then reconnected during a later phase. The design team anticipates removing most existing utilities and rerouting them through more opportune areas to allow for future planned construction, such as a future parking garage.

The existing water and sewer infrastructure in the area appears to be adequate to serve the proposed development. LUS will be contacted to obtain records of flow rates and pressures of the water lines in the area for use in designing the fire sprinkler system for the development. It is anticipated that the existing water and sewer lines will be in conflict with the proposed development. It is anticipated that portions of the existing lines in the current Terminal Parking Lot will remain and portions will be rerouted and extended to serve the development.

Overhead electrical systems and power poles have been surveyed and shown on the topographic map. It appears that some of the overhead electrical infrastructure will be in direct conflict with the Terminal Development especially, along John Glenn Drive. Complicating the issue is Entergy and LUS both have systems within the project limits and both utilities provide service to buildings in the area.

The existing gas system is owned and maintained by ATMOS Gas. It is anticipated that the existing gas system will need to be removed and replaced since the records indicate that the lines were constructed of steel. It appears that the system was modified over the years as the area developed and the routing of the lines is not optimal. ATMOS will be contacted to coordinate and begin the process of evaluating their system.

The existing drainage system has been surveyed and identified. It appears that some of the large lines along Shepard, Chaplin, POW-MIA and Blue Blvd can remain or are compatible with the new development. Much of the smaller drainage structures and piping along Terminal and John Glenn Drive appear to be in conflict with the proposed development and will need to be removed. The ultimate drainage system will utilize as much of the existing infrastructure as possible but will include a substantial amount of new structures and piping.

3.5.4 Airside Facilities

3.5.4.1 Terminal Apron

The biggest driver of the apron size is the required length of the passenger boarding bridges which is driven by the finished floor height and the fleet mix. The design team intends to fully comply with ADA requirements which will limit the boarding bridges to 8.33% maximum slope. The apron design will also comply with the requirements of NFPA 415 which require the apron to slope away from the terminal for 100'. This typically requires longer boarding bridges which means the aircraft are further from the building, ultimately requiring more apron pavement. However, by manipulating the aircraft parking positions the design team has been able to minimize the amount of new pavement required for the apron. The design team has also ensured that appropriate safety clearances have been met and will ensure the apron complies with AC 150/5300-13A.

Concrete is proposed for the aircraft parking apron due to the potential for fuel spills and pavement rutting. The pavement design shall conform to AC 150/5320-6F and all markings will conform to AC 150/5340-1L.

3.5.4.2 Taxiway A

Asphalt is process for Taxiway A because it is not subject to the same static loads as the terminal apron, nor is there the same potential for fuel spills. The pavement design will conform to AC 150/5320-6F and the markings to 150/5340-1L. Taxiway A is also expected to include edge lighting but no centerline lighting. The airfield lights will conform to AC 150/5340-30H. Any signs that are added or relocated will conform to AC 150/5340-18F.

The geometry of taxiway A is intended to follow AC 150/5300-13A. In an effort to reduce pavement costs the design team made the decision to use a Boeing 757 as the design aircraft. This means that the taxiway geometry is laid out per the TDG IV requirements in AC/150/5300-13A Table 4-7. The design team also intends to terminate taxiway A at taxiway B with a standard intersection, preferably at a 90º angle.

The object free area marked in Figure 3-5 is based on the taxilane clearance standards based on the following assumptions.

1. Taxiway A will primarily be used to access the commercial apron at the new terminal or the new East General Aviation area.
2. A pilot will also always need to make a turn from Taxiway A onto another taxiway before entering a runway.

Based on these assumptions Taxiway A should be considered a taxilane for the purposes of object clearance requirements.

In addition to using the taxilane object clearance standards, the design team determined that reducing the TOFA to accommodate only a Boeing 757 would be acceptable. This determination was made primarily as a cost saving effort. Per direction from the airport the largest aircraft expected to use the new terminal is a Boeing 757. However, a 757 is on the small side of the ADG IV design group. Aircraft in the ADG IV category have wingspans as large as 171' but the 757 wing span is only 125'. Thus a full ADG IV design would be inefficient because the extra space would not be used. Therefore, the width of the TSA is taken as the wingspan of the aircraft, in this case the Boeing 757. The width of the TOFA is equal to $1.2 \times W_s + 20$ which works out to 170'. By designing for a reduced TOFA the project is expected to save approximately 3,000 SY and about $200,000.

The project would also add a shoulder to the taxiway that conforms to the requirements of the AC 150/5300 section 417. Currently no taxiways shoulders exist at LFT; however, they are required for taxiways supporting ADG IV operations. Thus adding a shoulder would be another improvement to a nonstandard condition. In terms of geometry the design team intends to include the fillets as specified in AC 150/5300.

3.5.4.3 Taxiway B

While not technically required as part of the terminal program, the design does allow for the partial reconstruction of a portion of taxiway B. Currently the taxiway has a "kink" immediately prior to the existing terminal ramp. This is a nonstandard geometry feature and was identified in the master plan to be corrected. Since the re-aligned taxiway A

FIGURE 3-9
OVERALL MAP OF POTENTIAL QTA SITES IN RELATION TO NEW TERMINAL

would tie into taxiway B very near to the "kink" the design team assumed that this program may be the best opportunity to correct the issue.

However, taxiway A could be made to tie into the existing taxiway B. It would require a nonstandard geometry and may require a mod to standard be granted by the FAA. Further upgrades should also be completed at this time. The most important would be the addition of a paved shoulder per AC 150/5300-13A.

3.5.5 Rental Car

3.5.5.1 Background

During the early meetings with airport stakeholders, several rental car companies expressed an interest in a quick turnaround facility (QTA). These washing, fueling, and light service facilities consolidate all rental car agencies into a single site and allow for efficiencies with regards to size, operations, and staffing. Airport operator's find the consolidated QTA's offer several benefits, Including increased revenue and consolidation of several separate facilities into one. The latter is a major benefit where existing developable land is at a premium as is the case at LFT.

Rental car companies can also benefit from the arrangement because they are no longer required to maintain their own offsite facilities for vehicle cleaning and maintenance. The rental car companies can also benefit from combining ancillary facilities such as fuel, maintenance, and cleaning facilities to achieve higher equipment utilization rates then they could on their own. Finally, staff can be combined for some or all functions to reduce overhead. A QTA Facility can be located adjacent to the customer processing center or may be some distance from it.

3.5.5.2 Design Assumptions

To determine the best possible site for the rental car QTA lot, a site study was conducted of developable land at LFT. This study was conducted in conjunction with the terminal concept refinement. The three sites identified by the report became known as the Borman, Chaplin, and Shepard sites as shown in Figure 3-9.

During the early design development meetings with stakeholders the design team solicited information on the rental car operations via a questionnaire. The results of the questionnaire are summarized in Table 16.

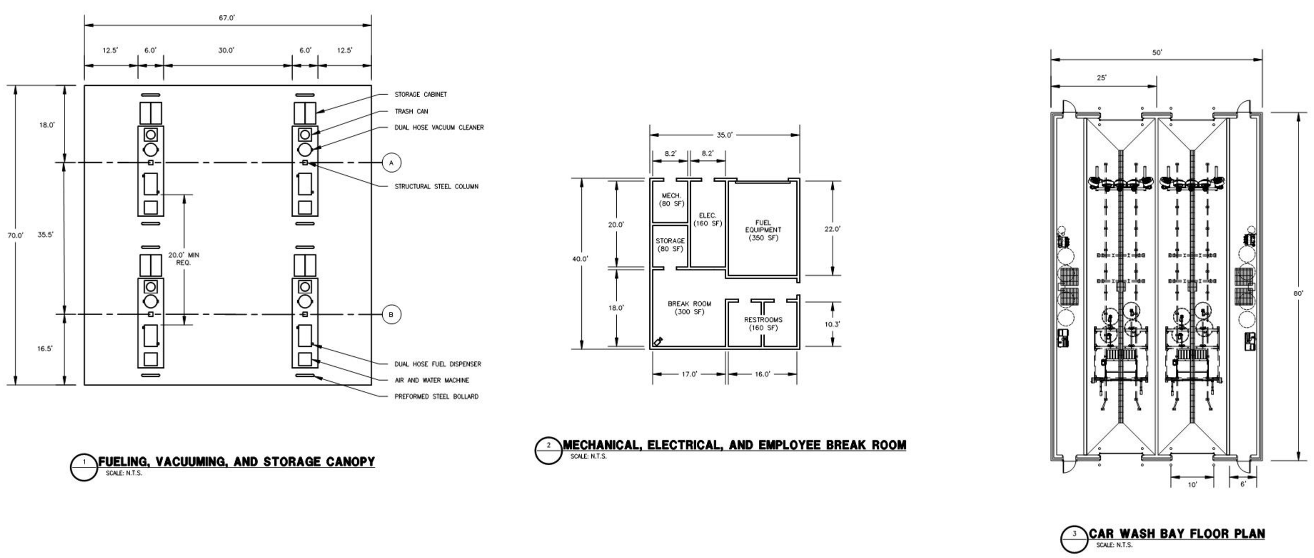


FIGURE 3-10
ASSUMED BUILDING FLOOR PLANS FOR QTA PLANNING

TABLE 16
SUMMARY OF RENTAL CAR QUESTIONAIRE

DESCRIPTION	Present	2020	2030
Ready Stalls	118	135	164
Return Stalls	42	54	75
Storage Stalls	163	218	280
Fueling Positions	4	5	7
Cleaning Positions	6	7	8
Wash Bays	2	3	4

FIGURE 3-11
EXISTING PARKING LOT TO BE PART OF SHEPARD QTA SITE

The design team desired to provide the airport and the rental car companies with a facility with a long useful life so the team opted to utilize the 2030 values from the survey. This means that the ready return lot was planned to have 239 stalls, the QTA 280 stalls and 8 fuel/clean positions with a 2 bay auto wash. The design team elected to use a gas station style pump configuration instead of drive through fueling lanes because of its ability to service more cars at a given time.

There are several alternatives for the arrangement of the employee break room and storage area. For the purpose of the QTA site study, the employee break room, restrooms, fuel canopy equipment storage, and mechanical and electrical service rooms were combined into a single building separate from the car wash. A layout of the floor plans used in the analysis can be seen in Figure 3-10.

Several configurations of the rental car facilities were explored for each site in order to maximize efficiency of rental car flow in the QTA. In general, the desired configuration consists of a U shaped flow with the entrance and facilities at opposite ends of the site. This would allow for staging of dirty cars as they enter the site, which can then be ran through the fueling and car wash facilities and staged in reverse order ready to exit the QTA.

Since developable space at LFT is at a premium the design team determined that they would be unable to accommodate all of the needs of the rental car companies without modifying the proposed sites. To aid in this effort the airport proposed several modifications to some of the sites that would help free up space. They were:

1. Relocate the maintenance building from the Chaplin site to the Shepard site. This would open up more developable space at the Chaplin site.
2. Utilize an unused parking lot on the other side of the fuel farm at the Sheppard site to expand capacity at the Sheppard site (Figure 3-11).
3. Relocate the RTR facility to expand the Chaplin site.
4. Demolish the old Louisiana State Police Building to expand the Boreman site.

Unfortunately, options 1, 3, and 4 would have significantly increased project costs and were deemed fiscally non-feasible by the airport and the design team. However, option 2 was identified as a plausible option because it would significantly increase capacity while utilizing existing pavement and therefore was the most efficient use of program money.

The design team also had to make several assumptions about how the various rental car companies would use the facility. The biggest assumption is that the rental car companies will have a large amount of shared space. In many cases things like parking, employee rest areas, and fueling bays are leased to individual companies. This simplifies the leasing process and the landlord tenant relationship but results in inefficiencies within the facility as the capacity for a facility must be rounded up to the nearest whole number i.e. 1.5 required fuel pumps becomes 2 for leasing purposes. Ultimately the design team assumed that all facilities i.e. car wash, fuel pumps, vacuums, etc. will be card access controlled which will allow the airport to bill the car rental companies appropriately.

The QTA also presents a unique situation from a permitting perspective, specifically landscaping. The QTA is not a public parking lot; however, its primary purpose is to serve as storage space for cars, AKA a parking lot. Currently the LCG standards make no exception for use, if the pavement is used to park cars it is considered a parking lot and subject to the parking lot landscaping requirements. However meeting these requirements would be detrimental to the purpose of the facility. This is a prime example of why the design team proposes to work with the city to develop a master landscaping plan that provides the total amount of landscaping required for all development but concentrated in key areas that achieves the most benefit in lieu of meeting the code as written.

Ultimately, selection of the QTA site was driven primarily by cost and the expected facility capacity. Descriptions of the various sites as well as the criteria for evaluation and selection are described below.

3.5.5.3 Ready Return Lot

During the early concept development the design team identified three possible locations for the airport ready return lot. The first site was inside the loop road. However, during the parking study this site was removed from consideration because it would have required the use of a parking garage. The remaining sites were identified as the

FIGURE 3-12
BORMAN QTA SITE ACCESS

East and West Ready Return Lots. These lots are located on the east and west sides of the terminal respectively. The eastern lot was selected for a number of reasons.

The first goes back to passenger familiarity. Almost all airport's place rental car counters in the baggage claim area. This is because the rental car customers are arriving passengers. The ready return lot is typically located immediately adjacent to ready return to make a single unidirectional flow of passengers through the terminal. If the lot were placed on the west side it would have been located as far as physically possible from the rental car counters in baggage claim. This would mean that the building would need to expand to accommodate the increased passengers in the ticketing area who are trying to get to their rental cars. It also would have been a bad idea to flip the layout of the building because ticketing is traditionally located first on the terminal drive and baggage claim is second. Changing this tried and true layout would have disoriented both arriving and departing passengers unnecessarily.

The second reason had to do with site access. Given the space constraints of the terminal site and a strong desire to keep unnecessary traffic off of the terminal drive, the rental cars would have needed to exit the airport via the Borman/Surrey intersection Figure 3-12. In a meeting with LCG traffic engineers the design team found that they would have been strongly opposed to this arrangement due to the increased traffic at this un-signalized intersection. They would have required a right turn only at this intersection. They also opposed building a signal to control traffic at the Borman/Surrey intersection due to its proximity to the Blue Blvd/Surrey traffic signal.

Ultimately the eastern ready return lot was selected as the ideal site. Like all parking lots developed as part of this program, the parking lots are being laid out per LCG standards. An unusual aspect of this particular lot is that nearly every parking spot will have a sidewalk immediately adjacent to it. This will allow for easy baggage loading into vehicles and protect pedestrians in the parking lot. The Airport also has the option to cover the sidewalks to protect the pedestrians from the elements or go a step further and provided covered parking stalls as well. However, one of the downsides of this arrangement is that it takes a lot of additional space and decreases the number of available stalls. The current preferred lot configuration has approximately 158 stalls. Furthermore, the lot has no additional space to expand meaning that future expansion is not an option. However, preliminary planning indicates that if a parking garage is built there should be plenty of space to expand rental car ready return operations into the first floor of the parking garage while still providing adequate capacity.

3.5.5.4 QTA

3.5.5.4.1 Borman

The Borman site has the potential to be the largest site if the old State Police building and the existing employee lot were demolished. If the western ready return lot were selected this combination would the most efficient rental car operation.

However, several different factors drove the selection of the eastern ready return lot including the terminal design and the increased vehicle traffic at the Borman/Surry intersection. Unfortunately this led to a long, circuitous route between the eastern ready return and the Borman site. The two potential routes to and from the eastern ready return to the Borman site would either route traffic onto the terminal loop road or force them on a long route utilizing Surry, Chaplin, and Shepard, as shown in Figure 3-12.

3.5.5.4.2 Chaplin

The Chaplin site required the demolition of the existing Enterprise QTA along with a mobile office building. However, a large portion of the site was relatively undeveloped space. Initially the Chapin site was a less than ideal choice because it was smaller than the Borman site, was remote from either the eastern or western ready return lots, and required substantial improvements in order to develop the site. However, where the Borman site suffered from the selection of the eastern ready return lot the Chaplin site benefited. The eastern lot provided for easier access to the Chaplin site which kept all traffic off of the terminal loop road. In order to do this the site would have needed access to Chaplin Dr. The problem is that the existing Chaplin Dr. is a 24' wide, two lane road with an existing open ditch to the north for storm water drainage. The school board offices across the street have limited parking which often results in vehicles parked along the side of the road. The road is also not in the best condition Therefore, the widening and improvement of Chaplin Drive would have to be included in the project if the Chaplin site were chosen. The improved Chaplin Drive would include a parking lane and sidewalk for pedestrian convenience.

In addition to the drawbacks of Chaplin Drive, the Chaplin site also contains an FAA direct buried cable that connects to the RTR adjacent the site. Final survey data indicated that the cable runs through the southeastern corner of the site, which affected the layout of facilities on the site as well as constructability. The cable also presents a large unknown with regard to costs and schedule that would be impossible to predict this early in the design process. Ultimately, the uncertainty with regards to cost and schedule made the site Chaplin site less appealing and is one of the reasons it was passed over as the future QTA site.

3.5.5.4.3 Shepard

The Shepard site was initially the smallest of the three options. Existing site grades also severely limited the developable area. Due to existing grades the Shepard site initially provided the least developable area. However, with

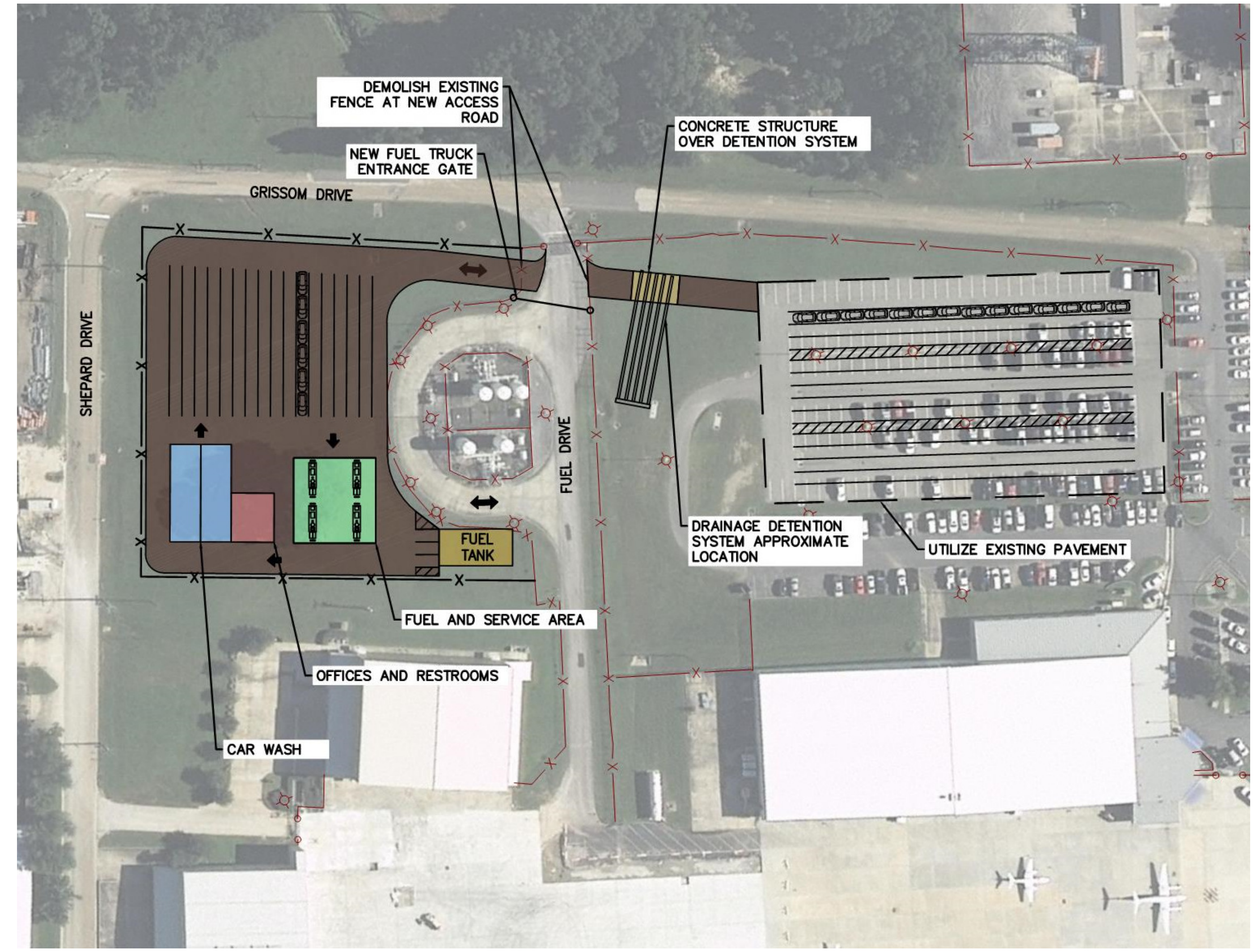


FIGURE 3-13
PREFERED SHEPARD SITE LAYOUT

the addition of an unused parking lot to the east of the proposed site, the Shepard site quickly improved in standing. See Figure 3-13 for the preferred QTA layout at the Shepard site. Like the Chaplin site, the Shepard site also benefits from the selection of the eastern ready return lot. While it is a slightly longer drive than Chaplin, it is a direct route and the existing roads are sparsely used. However, Shepard Dr. will likely be one of the main construction haul routes for the terminal program and will likely be heavily damaged over the course of construction. However, the LCG, in anticipation of this, does plan to resurface the road at the conclusion of the project.

3.5.5.4.4 Selection

Ultimately the design team based the QTA site selection on several factors listed in the Table 17. In order to normalize all the factors and directly compare the sites on their merits the design team gave each site a score from 1-5 for each of the factors. Points were assigned by ranking the sites in each category with the best site receiving 5 points, the second 3, and last received 1. The results of this analysis can be seen in Table 18

TABLE 17
COMPARISION OF QTA SITES

CRITERIA	Borman	Chaplin	Shepard
Storage (# of cars)	170	160	264
Cost ($ Million)	6.4	6.9	6.3
Access (ft. to/from Ready Return)	4,445	3,070	4,085

TABLE 18
QTA SITE COMPARISON SCORING SUMMARY

CRITERIA	Borman	Chaplin	Shepard
Storage	3	1	5
Cost	3	1	5
Access (Round Trip)	1	5	3
TOTAL SCORE	7	7	13

Based on the results summarized in Table 18 the Shepard site is the preferred alternative having the highest score for both storage and cost and the 2nd best site access. The Shepard site is therefore the design team's preferred QTA site.

3.5.6 Miscellaneous Facilities

3.5.6.1 Aircraft Lavatory Dump

Aircraft Lavatory dumps are required for the servicing of aircraft lavatories. These facilities can be as simple as a paved area with a connection to a sewer line or extremely complex waste processing facilities. Given the size of LFT and the expected traffic it is expected that this Lavatory Dump can be on the simpler end of the spectrum.

The main requirements are a connection to the LCG sewer system and a source of potable water for cleaning and rinsing equipment. The surrounding area is typically paved to ensure adequate drainage and easy clean-up of any spills. Ultimately the design of the facility will need to conform to LCG public works standards for a sewer system.

This may require the installation of a triturator. This device is sued to grind up solids so that they do not clog downstream pipes or cause undue wear and tear on the equipment at the main waste processing plant. Ultimately, the need for one would be determined after consultation with LCG engineers based on the expected composition of the waste material and the capabilities of the existing LCG sewer system.

3.6 TERMINAL CONCEPT REFINEMENT

The development of the terminal includes two primary aspects that impact costs: the size and functional configuration and the architectural character and quality of the spaces. Floor plans generally define the size and functional configuration while elevations and renderings define the character and quality of the spaces. The basic floor plan was established at the conclusion of the Concept Approaches effort. This Refinement effort provides further conceptual develop of the plan based on the comments of the Owner and the additional resolution of issues that are not resolved in the early broad-brush assessment. Layered onto the base 2-D terminal plans must be the creative architectural process to define the building in 3-D.

The citizens of the area agreed to impose a short-term tax on themselves to help fund the project and, therefore, the Lafayette Airport Commission has expressed a strong desire for the terminal to represent the community of Lafayette and the Acadian region. The architectural team has conducted research to identify the essence of the Lafayette area and its people so that the terminal can adequately convey the unique and special characteristics that define the community. Creative inspiration comes from the history, culture, natural environment, and the warmth of the people. Multiple architectural "Themes" were developed to represent some aspects of the uniqueness of the Lafayette area.

3.6.1 Conceptual Development of the Terminal

The terminal layout provides a configuration that allows passengers and airport employees to move through the terminal in simple and efficient paths for their respective purposes. The terminal is generally two stories with the Ticketing and Bag Claim functions on the first floor with the Concessions and Gate areas on the second floor. Offices for airport staff, the Transportation Security Administration (TSA), and other special tenants are generally on the second floor. The landside (non-screened travelers) portion of the terminal and the airside (screened passengers) portion of the terminal area separated by a passenger screening checkpoint at the second level that allows airport employees and baggage tugs and other ground service vehicles to drive underneath and access both sides of the terminal. The passenger Gate areas are also on the second floor so that passenger boarding bridges can connect directly parked aircraft. Most operational aspects of the terminal are hidden from the public view to leave a clean and tidy impression on visitors and the traveling public.

An important aspect of proper passenger terminal design is to make the layout easy to understand by the passenger moving through the building. Terminal layouts that are confusing or require multiple indirect pathways for processing create unnecessary stress on travelers, even those who use the facility frequently. The terminal concepts for LFT uses a direct and easily discernable pathway for its travelers. Travelers can see where the next point in their progression is located by the simple configuration and through architectural techniques that make things clear.
Another aspect of the terminal conceptual development is to be fiscally responsible with the public's funds while providing a facility that is worthy of the community. The provide the right balance of environmental quality within the terminal and cost, some areas of the terminal are intended to be low cost while others are intended to be high impact areas. The creative application of a few high impact areas within the terminal leaves travelers with a good impression of the airport and the region without having to spend top-dollar in all areas. The overall cost of the terminal remains reasonable while the community and travelers gain a high-quality experience.

3.6.2 Lafayette Architectural Character and Theme

Through a process or research and interviews with local representatives, the architectural design team undertook an effort to understand the uniqueness of Lafayette and the surrounding area. This region is rich in history and tradition and its culture reflects this richness. Cultural elements that rose to the top include the food and music, the sense of fun, and the significance of family and friends to the people of Lafayette. The deep ties to the energy industry was also a prominent fixture. And the stunning natural environment of this low lying land and its ties to water. From these three overall "ideas" three architectural themes were developed and presented to the LAC. The three architectural themes all used the same basic floor plan that was developed and presented earlier in this report. Nuances were different that reflect the differences in the concepts' architectural character, but the overall layout and functional configuration was the same for all three "themes".

Journey

Spirit

Water Rhythm

FIGURE 3-14
TERMINAL CONCEPT THEME OPTIONS

The options were narrowed to "Journey" and "Spirit" by the LAC and these were produced for presentation to the public. Public input was gathered over a two week period from the residents on their preferences of the two options. The public preferred the "Journey" concept and the LAC concurred at a Board meeting on February 15, 2017 when it was selected as the preferred architectural design.

3.6.3 Building Systems

3.6.3.1 Architectural Systems

The terminal building's look and feel and its durability and functionality must all be in balance with the airport's fiscal constraints. The design must reflect the goals and objectives of the program at a cost that is attainable by the LAC. To achieve this, LAC's resources must be used smartly and efficiently. The architectural approach to achieving these sometimes conflicting demands is to vary the level of architectural impact in different areas to provide maximum impact at a reasonable cost. Similar to how an office building may have a dramatic lobby space to achieve a perception of luxury, but more ordinary offices behind, the terminal design will follow a similar pattern. The terminal design will have some areas, both interior and exterior, of high-impact design, other areas of medium-impact, and others still of low-impact or utilitarian design. Specific area expecting to receive the high impact experience is the landside façade and canopy and the airside façade, the center landside zone between ticketing and bag claim and the center airside with the concessions mall. Medium-impact areas are expected to be the ticketing and bag claim lobbies, and the gate spaces. Other areas will have varying levels of lesser impact or utilitarian look and feel. A few exceptions may exist where key other spaces have higher impact designs due to the specific use of the space, such as the LAC's public meeting room.

Building Exterior:

Lafayette Louisiana lies within a humid subtropical region that experiences mild winters and hot, humid summers with higher than average rainfall. Given these environmental conditions, the materials and systems used for the terminal's exterior must be able to withstand heavy rainfall and heat penetration, while resisting degradation due to mildew, rust, and solar exposure. Additionally, exterior cladding must be durable and require minimal cleaning in order to minimize maintenance costs. Based on these requirements, the following materials and systems were chosen for each portion of the terminal's exterior envelope. The exterior envelope will be composed of three wall types, a glazing system, two roof types, and three canopy systems.

The three wall types utilized on the terminal's exterior will include insulated metal panels, masonry wall systems, and smooth or split face concrete masonry units. Insulated metal panels are weathertight wall systems composed of rigid insulation sealed between layers of metal available in a multitude of finishes and colors, and will be used on a portion of the public facades of the terminal. The remainder of the public facades will be clad with a masonry wall system, such as stone veneer, brick masonry units, and/or terra cotta panels, which provide a higher level of exterior finish. Smooth or split face concrete masonry units are large concrete blocks with either a flush, smooth surface or rough, textured surface that provides a more cost effective, utilitarian level of finish for the exterior walls of non-public, service areas.

The terminal's exterior glazing will be an insulated glass and aluminum curtain wall system. Curtain wall systems are made up of an aluminum frame infilled with insulated glass panels, attached to the building structure and/or an independent curtain wall structure. Due to its light-weight construction, this system provides a continuous glazed exterior requiring minimal structural supports. As a result, it offers opportunities for increased daylighting and access to exterior views. The use of insulated glass greatly reduces thermal heat gain during the summer, and heat loss in the winter. Additional glazing treatments and shading elements can be incorporated into the curtain wall system's framing and glass to further reduce thermal heat gain and the damaging effects of solar exposure.

The terminal will have two roof types, a pitched roof and a flat, or low-sloped roof condition. For the pitched roof application, a standing seam metal roof will be used. A standing seam metal roof is comprised of thin metal panels whose seams are mechanically folded and crimped together to form a continuous weathertight surface that provides durable, long-lasting weather protection. Standing seam metal roofs are also available in a variety of colors and seam profiles. The flat, or low-sloped roofs will utilize a single-ply roofing membrane system. This system is made up of a sheets of synthetic rubber or thermoplastic material that is fused at the seams to form a continuous waterproof membrane. This membrane is then secured to a layer of protection board and rigid insulation, which is directly attached to the roof's structure. Roofing membrane systems are also available in several colors, such as white or grey, that reflect sunlight, reducing solar heat gain.

Two canopy systems will provide shade and shelter from inclement weather at two different areas; above the terminal's landside roadway that includes the passenger arrivals / departures curbside, and over airside baggage operations. The canopy above the landside roadway not only to provides protection from the elements, but also serves as a signature, sculptural element that helps shape the look and feel of the terminal as you approach the passenger arrivals / departures curb. This canopy will incorporate aluminum, steel, and glass to provide a unique and dynamic appearance. These elements will be supported by a steel superstructure on painted steel columns. The steel structure provides the strength needed to cantilever over the curbside and roadway while minimizing the need for columns in order to provide a clear line of site for both pedestrians and cars. At airside baggage operations, where weather protection is more important than aesthetics, the canopies will be constructed of a more cost-effective, pre-engineered aluminum canopy system.

FIGURE 3-15
CONCEPTUAL RENDERING - CURBSIDE

FIGURE 3-16
CONCEPTUAL RENDERING - LANDSIDE

FIGURE 3-17
CONCEPTUAL RENDERINGS - AIRSIDE

Building Interior:
The terminal's interior is divided into six distinct areas, which include the ticket lobby, baggage claim lobby, security screening checkpoint (SSCP), airside concessions hall, departure lounges, and back of house areas.

Passengers will access the ticket lobby through an entry vestibule with an aluminum and glass storefront system and incorporate automatic sliding glass doors. The vestibule's side walls are planned to be clad in a metal panel system on the exterior for durability and low maintenance. The lobby's interior will be composed of a double height lobby and circulation space, and a single height ticket counter area with offices above. The double height circulation space will have terrazzo floors with integral decorative patterns, exposed painted steel structure, and suspended ceilings. The terrazzo floors will provide a smooth, extremely durable & seamless surface for both walking and rolling baggage, while the suspended ceilings will provide acoustic material to mitigate excess noise. The single height ticket counter area will have carpet floors, gypsum board walls finished with paint as well as suspended acoustic ceilings. This area will contain much of the ticket counter queuing and the ticket counters, therefore acoustics will be of utmost importance to ensure comfort. The carpet floors and acoustic ceilings will significantly reduce excess noise.

The baggage claim lobby will be similar to the ticket lobby, utilizing the same materials and finishes. The double height lobby / circulation space will continue the terrazzo floors with integral decorative patterns, exposed painted steel structure, and suspended ceilings from the ticket lobby. The single height space will be occupied by the baggage claim conveyors and will incorporate carpet floors, painted gypsum walls, and a suspended acoustical ceiling. The carpet will provide a softer surface for standing passengers waiting for baggage, while the acoustical ceiling will help to mitigate excess noise as passengers gather around the bag claim conveyors. The baggage conveyors will be two sets of recirculating flat plate devices clad with stainless steel, which will provide a durable, low maintenance surface.

Between the ticket lobby and baggage claim lobby within the two-story space is an open second floor "mezzanine" that serves as the link between the landside functions and airside functions. Open escalators and stairs lead passengers from the first level to the second and back to first in this area. In the single height space below the "mezzanine", is the center entry vestibule from the curbside, circulation space, and access to landside restrooms. Terrazzo flooring continues through this space, while a suspended ceiling provides acoustical control.

At the second level on the "mezzanine" is a meeter-greeter area within the two-story landside lobby that provides access to the security screening checkpoint. Passengers ascend to this area using a set of escalators and stairs, or an elevator. The escalators and stairs use glass guard rails to allow maximum visibility through the space. These glass guard rails continue along either side of the "mezzanine" meeter-greeter area allowing passengers an unobstructed view of the landside lobby below. The elevator will provide an alternative means for passengers to reach the second level. The terrazzo flooring from the stairs will continue into the meeter-greeter area, but will be balanced with areas of softer carpet and seating for those waiting for arriving passengers.

From the meeter-greeter area, the passengers will continue into the security screening checkpoint, which is divided into a passenger screening area and an arriving passenger exit corridor. The passenger screening area will screen departing passengers and will incorporate rubber flooring, which will provide a softer, more comfortable surface for both passengers and TSA employees. Although this surface is softer, it is durable, easy to clean, and will allow passengers to easily roll their bags. A translucent glass wall divides the passenger screening area from the arrivals exit corridor. The arrivals exit corridor allows arriving passengers to exit to the landside lobby and will continue the terrazzo flooring to provide a smooth, seamless surface for circulation. The overall security screening checkpoint area will be enclosed by a combination of painted gypsum board walls with architectural accents. The ceiling will be composed of partially exposed, painted steel structure and suspended ceiling system to reduce noise and also to hide building systems infrastructure that connects the airside and landside terminal.

As passengers leave the security screening checkpoint, they will enter the airside concession hall. Terrazzo flooring with integral decorative patterns will fill this space, providing a surface that again will be smooth and seamless for both walking and rolling bags, but will also be extremely durable and impenetrable to spilled liquids and dropped food items. The exterior, airside wall will be glazed with the aluminum and insulated glass curtain wall, providing uninterrupted views of the airfield and aircrafts at each gate. The ceilings will be a balance of exposed, painted steel structure and an acoustical architectural system, which will help to mitigate excess noise while providing a surface to incorporate needed lighting as well as hide mechanical and fire safety components. Within the concessions hall, each area will have space for display, queuing, and transaction counters and a combination of concession-specific and common seating areas, finished out with materials and signage as required. Coordination with the airport's concessionaire may be appropriate for a more specific configuration of the concessions spaces.

The departures concourse will extend out on either side of the central concessions hall and contain the departure lounges for each gate. The terrazzo floors continue from the central hall into the circulation spines along the back wall of the concourses, which are clad in painted drywall with architectural accents, and a durable material for impact protection along the low portions. Along the exterior, airside curtain wall are the departure lounge seating areas for each gate. Airport holdroom seating with integrated power & data will rest on carpet floors with acoustical ceilings above. The carpet will provide a softer surface for standing and sitting passengers, while the acoustical ceilings will help to minimize excess noise while providing opportunities for additional lighting as well as hiding needed mechanical and fire safety components. Each gate will have a portal housing the doors that provide access to each boarding bridge and an airline gate counter with associated monitor displaying flight information.

Back of house spaces, such as offices for TSA, airport operations & administration spaces, and airline ticket offices, will, for the most part, utilize carpet and vinyl flooring, painted gypsum board walls, and drop ceilings with lay-in acoustical tiles & light fixtures. Concession support spaces, such as kitchens and storage spaces will use durable and easily maintained porcelain or quarry tiles.

3.6.4 Structural Systems

The architectural concepts are similar enough in a broad sense that the conceptual structural system definition is similar for all.

3.6.4.1 Structural Codes and References

Compliance: The structural system design shall comply with the latest edition of applicable codes, ordinances and regulations in effect at time of design and anticipated to be in effect for year of permitting including, but not limited to the following:

- 2012 International Building Code
- ASCE 7-10 - Minimum Design Loads for Buildings and Other Structures

- ACI-318-11 - Building Code Requirements for Structural Concrete
- AISC 360-10 - Specifications for Structural Steel Buildings
- AISC 341-10 - Seismic Provisions for Structural Steel Buildings
- AWS D1.1-06 - Structural Welding Code

3.6.4.2 Proposed Structural Systems

The structural system will be in conformance with the selected architectural elements and minimum design loads as required by the building code. A steel-framed structural system is recommended to minimize foundation costs and provide flexibility for future modifications. Level 2 floor framing will be a composite steel beam system consisting of steel beams with welded headed studs supporting a steel deck and concrete floor slab.

Roof framing will be steel beams and girders supported by wide-flange steel columns. The recommended lateral systems for the terminal are moment and braced frames, which will be strategically located for the structural system to accommodate architectural elements.

Building expansion joints at maximum 350 foot spacing will be required at landside and concourse areas due to the length of the building to accommodate normal expansion and contraction of the structure. Expansion joints will be located to minimize the number of joints through architectural elements in public areas and will be commonly located at changes in roof elevations.

Forthcoming geotechnical investigation will determine existing soil conditions and provide foundation design recommendations. If unsuitable soils are encountered during excavations the unsuitable soils will need to be excavated and replaced with properly compacted structural backfill. Based on the existing terminal being supported on a deep foundation system, the new terminal foundation system is expected to be drilled concrete piers or driven piles depending on actual subgrade conditions and economy of foundation system type. Level 1 floor construction is expected to be slab-on-grade consisting of minimum 5 inches of reinforced concrete on base course of fine aggregate fill and vapor barrier over compacted subgrade throughout the footprint of the building.

3.6.5 HVAC Systems

3.6.5.1 HVAC Systems General

The intent of this section is to document the basis of design for the Lafayette Regional Airport. Information developed and presented in this section represents the interpretations of the project goals and the application of these goals into an analysis that is meant as a basis for refining the implementation of the owner project requirements with respect to the mechanical systems.

The intent of the recommended HVAC systems is to provide the facility with heating, cooling and ventilation systems in compliance with current codes and standards while simultaneously representing reliable and energy efficient systems which meet the airport’s goals

Considerations and recommendations in the design of the HVAC system for the airport terminal were based on multiple factors. Initial and capital costs, as well operation and maintenance costs, replacement costs, equipment life and serviceability were evaluated against annual energy consumption to provide the best benefits and solutions to the airport.

The emphasis and importance of energy, water and operating costs are significant challenges faced by the facility. To overcome these challenges it is recommended that the facility will utilize a stand-alone centralized cooling and heating plant. A water cooled chiller with variable speed drive centrifugal compressor located in a centralized cooling plant will provide the best energy results and will provide the best life cycle cost solution. High efficiency condensing gas fired boilers will be used for generating heating hot water for space heating.

3.6.5.2 Codes and References

The proposed mechanical HVAC system for the airport terminal building will be designed to meet the requirements of all applicable codes:

3.6.5.3 Applicable Building Codes and Standards:

- 2012 International Building Code (IBC)
- 2012 International Mechanical Code (IMC)
- 2009 International Energy Conservation Code (IECC)
- 2012 International Plumbing Code (IPC), with Louisiana State amendments
- 2012 International Fuel Gas Code (IFGC)
- ASHRAE 90.1-2007
- ASHRAE 62.1-2007 Ventilation Standards
- ASHRAE Standard 55- Thermal Comfort
- ASHRAE 15-2001: Safety Code for Mechanical Refrigeration
- NFPA 90A: Installation of Air Conditioning and Ventilation Systems
- NFPA 90B: Installation of Warm Air Heating and Air Conditioning Systems
- NFPA 92: Smoke Control Systems
- ASHRAE Handbooks: 2005-2015
- SMACNA HVAC Duct Construction Standards, Metal and Flexible, 1995 Edition

The mechanical system will be chosen strategically to address and overcome energy, water and sustainability challenges. All of these recommendations and measures will be evaluated in more detail during design development phase for implementation into the construction documents.

3.6.5.4 Energy Code Evaluation

The energy code requirements for this facility are defined by the 2009 International Energy Conservation Code and ASHRAE Standard 90.1-2007. The code prescriptive requirements for thermal performance criteria were used as a basis for developing the HVAC loads and will be used as the minimum basis for selecting exterior envelope components such as: glazing for windows and skylights and insulation for walls, floors and roof decks. Final selection of building envelope systems will be made to comply with the 2009 IECC energy code requirements for the building envelope. Other aspects of 2009 IECC, and ASHRAE Standard 90.1 - 2007, such as HVAC equipment, insulation and controls will be selected with consideration given to the referenced energy standards requirements.

3.6.5.5 Chilled Water and Condenser Water Systems Description

Based on life cycle cost analysis results, a central cooling plant using high efficiency, water cooled chillers with variable speed centrifugal compressor, and open cooling towers with variable frequency drive fans, has been selected based on lowest life cycle cost compared to other cooling system alternatives. The other cooling systems that were evaluated included:

Air cooled chiller with variable speed screw compressor and condenser fans
Air cooled chiller with oil free, magnetic bearing variable speed centrifugal compressor and condenser fans
Water cooled chiller with variable speed screw compressor

The summary of results of the life cycle cost analysis can be seen in Figure 3-18. The first costs represented in the Life Cycle cost summary are not fully indicative of the final costs estimation included for the project. They are however similar between the alternatives in specific areas for the purpose of the study, thus the Life Cycle Cost Analysis results are representative of the proper system selection.

Life Cycle Cost Analysis (LCCA) Summary Of Results- Chilled Water Cooling Plant Systems					
	Cost				3.0% energy Escalation
System	First cost(S)	Percentage First Cost Increase (%)	Annual recurring uniform Energy Cost ($)	Percentage Annual Total Energy Cost Saving (%)	Life Cycle Cost-PV (S)
Water Cooled Chillers with Screw Variable Speed Compressor, and Cooling Tower with VFD fans	543,000	91	308,238	15	5,348,290
Water Cooled Chillers with Centrifugal Variable Speed Compressor, and Cooling Tower with VFD fans	483,000	70	289,777	20	5,013,662
Air Cooled Chiller with Oil Free Magnetic Bearing, Variable Speed Centrifugal Compressor and condenser fans	594,000	109	356,984	2	5,919,377
Air Cooled Chiller with Variable Speed Screw Compressor and condenser fans	284,800	Base	363,787	Base	5,711,374

LCCA Parameters
1. Energy Escalation Rate 3.0%
2. Inflation Rate 2.0%
3. Nominal discount rate 5.0%
4. Real discount rate 3.0%
5. Electric utility Rate US$0.0943 per KWH
6. Natural gas utility rate US$1.664 per therm
7. Water supply rate US$3.1 per 1000 gallons
8. Study period 20 years(2017 base/service date)

FIGURE 3-18
LIFE CYCLE COST ANALYSIS SUMMARY OF RESULTS

For the initial build out including gate 6 and 7 future expansion, the estimated number of chillers required is two. Each chiller has a nominal cooling capacity of 500 Tons. One chiller will be duty and other will be standby. For the final build out, there is space reserved for a third chiller with maximum capacity of 500 tons. Maximum estimated number of chillers that will be operated is two. In the final build out, two chillers will be duty and one will be standby. The chillers will utilize variable speed compressors to increase energy efficiency during part load conditions, and utilize HFC refrigerants to avoid any potential refrigerant phase out concerns, or refrigerant availability concerns.

The central plant will be located in a remote area from the main terminal and will consist of a standalone central chiller plant building to house the chillers, boilers, pumps, and accessories for the chilled water and heating hot water systems. Adjacent to the chiller plant building will be a cooling tower yard to locate the open cooling towers. The location and heights of the cooling towers and central plant building will be coordinated with any runway approach surfaces in the area to avoid conflicts.

Chilled water will be distributed to the terminal building by a variable primary flow chilled water system to save pumping energy, and reduce initial capital expenditure costs. Two (2) variable primary chilled water pumps will be provided with one as standby for the initial build out. Three (3) variable primary chilled water pumps will be required with one as standby for the final build out. Chilled water piping will be routed underground back to the Terminal to serve air handling units located throughout the terminal.

Condenser water for the chilled water plant will be circulated by a constant flow condenser water system. Two (2) constant speed condenser water pumps will be provided with one as standby for this program. Space will be provided for a third constant speed condenser water pump for future expansion of the system beyond the anticipated 2040 demands.

The central chilled water plant will contain the following chilled water supply equipment:

- Two (2), 500 ton, Variable Speed Compressor Centrifugal Chillers, with space allocated for a third, future chiller.
- Base mounted horizontal split case centrifugal pumps for both chilled water and condenser water systems. Chilled water pumps will have variable frequency drives.
- Open Cooling towers of Galvanized Steel construction with Stainless Steel basin
- Chemical treatment systems for both chilled water and condenser water systems to maintain proper water quality in these systems, extend piping and equipment life, and maintain equipment performance.

Chilled water pumps will be provided with variable frequency drives (VFD's) to provide energy savings by modulating chilled water flow to match the terminal building's cooling demands. The pumps will be configured in a variable primary flow pumping arrangement.

Cooling towers for the chillers will be located outdoors in the cooling tower yard adjacent to the chiller plant building. Two (2) cooling towers will be provided with one as standby for this program. Space will be provided for three (3) open cooling towers for future expansion of the system beyond the 2040 anticipated requirements. Condenser water pipe will be run aboveground back to the chiller plant room. Open type cooling towers are recommended instead of closed circuit fluid coolers because of efficiency and space benefits.

One (1) chiller will operate to provide chilled water supply temperature at 44°F and chilled water return temperature at 56 degree F with a total scheduled plant cooling capacity of 500 tons to accommodate the initial build out cooling demands. Two (2) chillers will be operated in a parallel configuration to provide chilled water supply temperature at 44°F and chilled water return temperature at 56 degree F to accommodate the final build out demands. Space has been reserved for a third chiller for system expansion beyond the anticipated 2040 demands.

Chilled water will be supplied from the cooling plant to the air handling units in a closed loop piping configuration through variable flow primary pumps. The design intent of the chiller plant and the HVAC system as a whole is to optimize the operation and performance in order to minimize energy costs, and achieve a sustainable high performance facility. Chilled water distribution piping will be insulated, Type L copper for piping 2-1/2 inches and smaller and insulated Schedule 40 steel for piping 3 inches and larger. Copper piping will be joined by soldering or with press-fit type fittings. Steel piping will be joined with mechanical couplings.

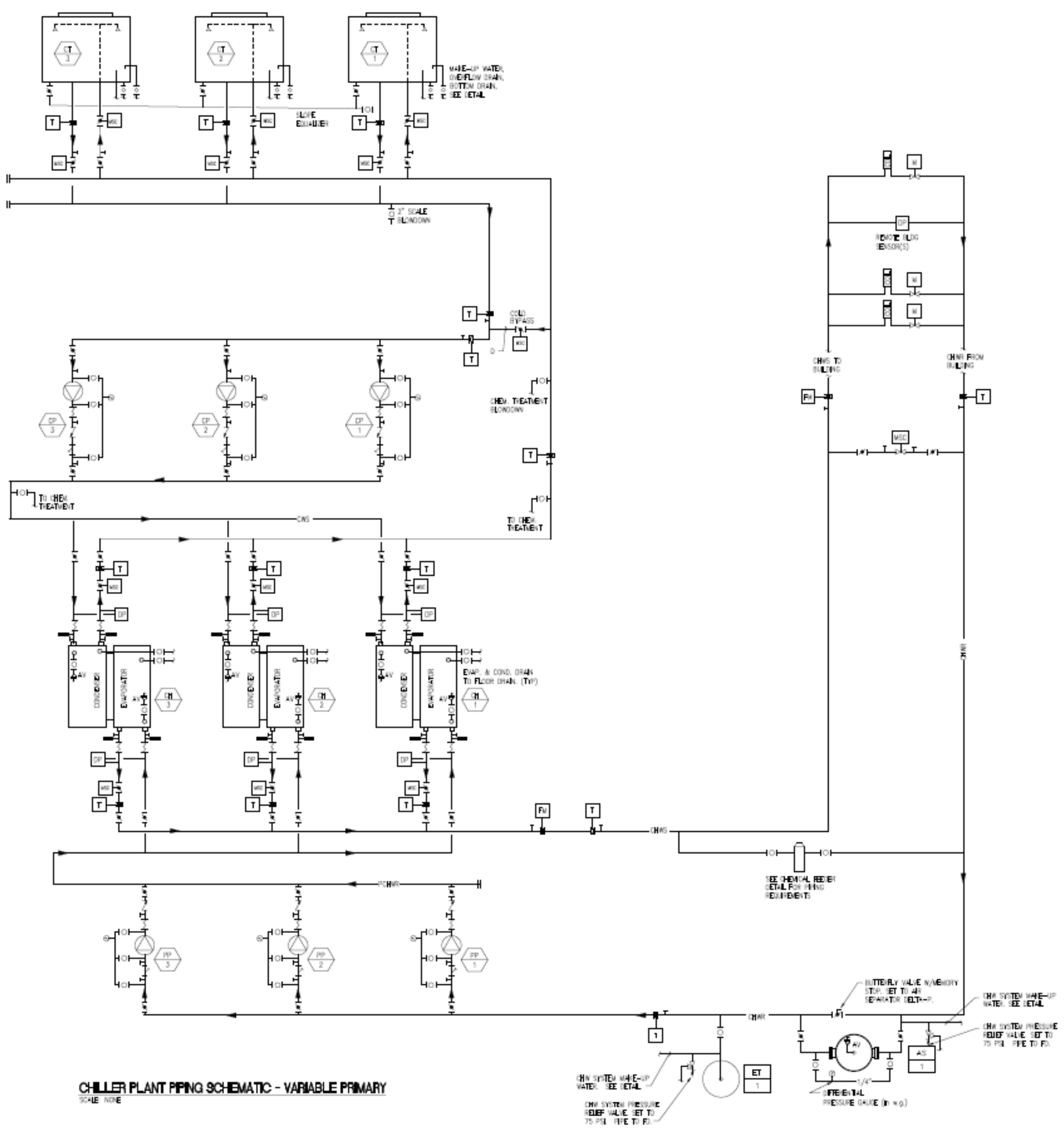


FIGURE 3-19
TYPICAL CHILLED WATER AND CONDENSER WATER SYSTEM CONCEPTUAL SCHEMATIC

3.6.5.6 Heating Hot Water Systems Description

Under the initial build out including gate 6 and 7 future expansion, the estimated number of compact, modular, gas fired, high efficiency, condensing boilers required is two (2). Three (3) variable speed primary flow heating hot water pumps will be operated (two duty and one standby) to distribute heating hot water at 140 degree F supply and at 100 degree F return temperature to each air handling unit and unit heaters. Each boiler has a maximum output heating capacity of 2790 MBH and input heating capacity of 3000 MBH. Both boilers will be running to meet maximum total heating demand of 4200 MBH. Built in boiler sequencing controllers will be provided to control boiler loading and unloading and capacity to maximize the efficiency and optimize the runtime of each boiler.

Under the final build out scenario, the estimated number of compact, modular, gas fired, high efficiency condensing boilers required is three (3). Four (4) variable speed primary flow heating hot water pumps will be operated (Three duty and one standby) to distribute heating hot water at 140 degree F supply and at 100 degree F return temperature to each air handling unit and unit heaters. Each boiler has a maximum output heating capacity of 2790 MBH and input heating capacity of 3000 MBH. In the final build out configuration, all three boilers will be running to meet the maximum total heating demand.

The thermal efficiency of the new boilers will be up to 93% in condensing mode. The new high efficiency condensing boilers will exceed the latest International Energy Conservation Code IECC 2009 requirements and will be connected and integrated with Building Management System (BMS). A condensing type flue stack will be routed and terminated at roof level directly above the boilers in the central plant. Combustion air shall be provided by an outside air louver system. The new boilers will be environmentally friendly, low NOx, sealed combustion type. Water treatment will be provided for the heating hot water systems to meet the manufacturer's criteria recommendation.

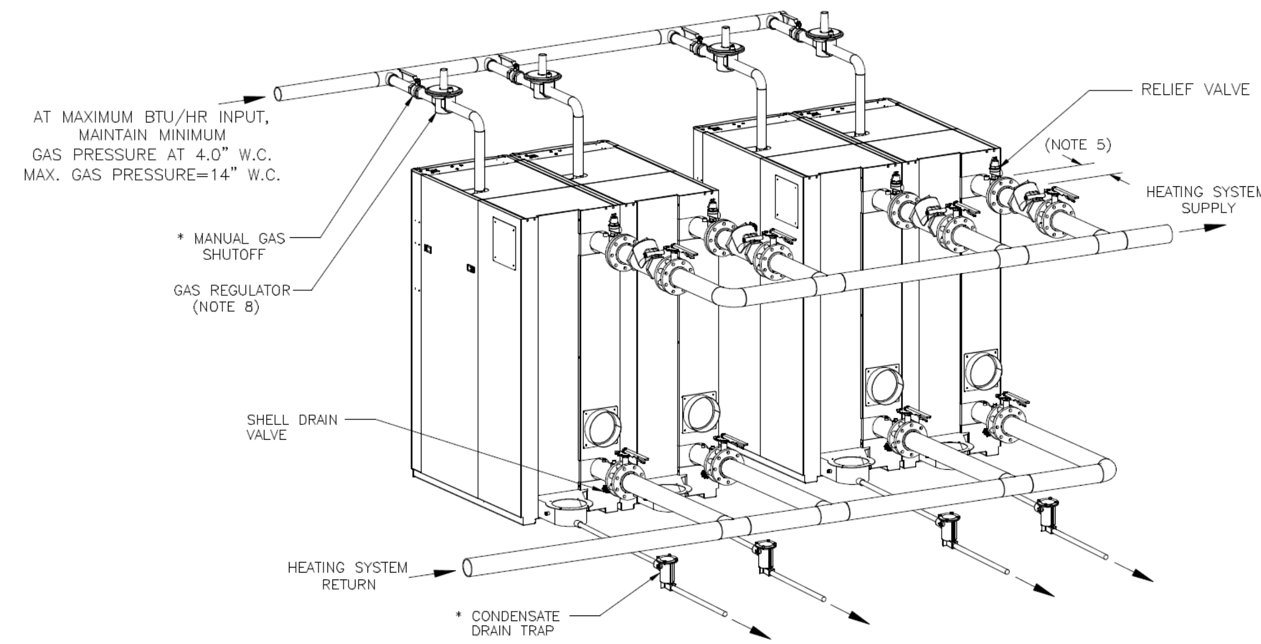


FIGURE 3-20
TYPICAL GAS FIRED CONDENSING BOILER CONFIGURATION

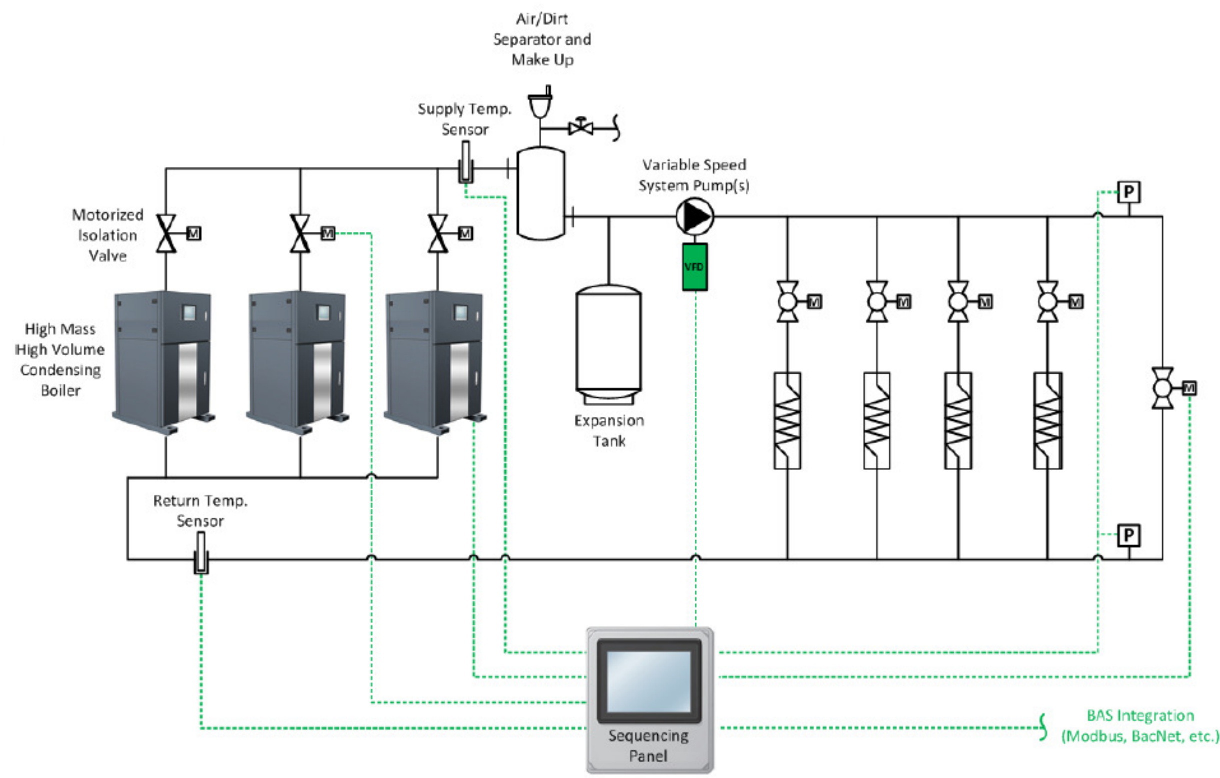


FIGURE 3-21
TYPICAL VARIABLE PRIMARY FLOW HEATING HOT WATER PIPING DIAGRAM

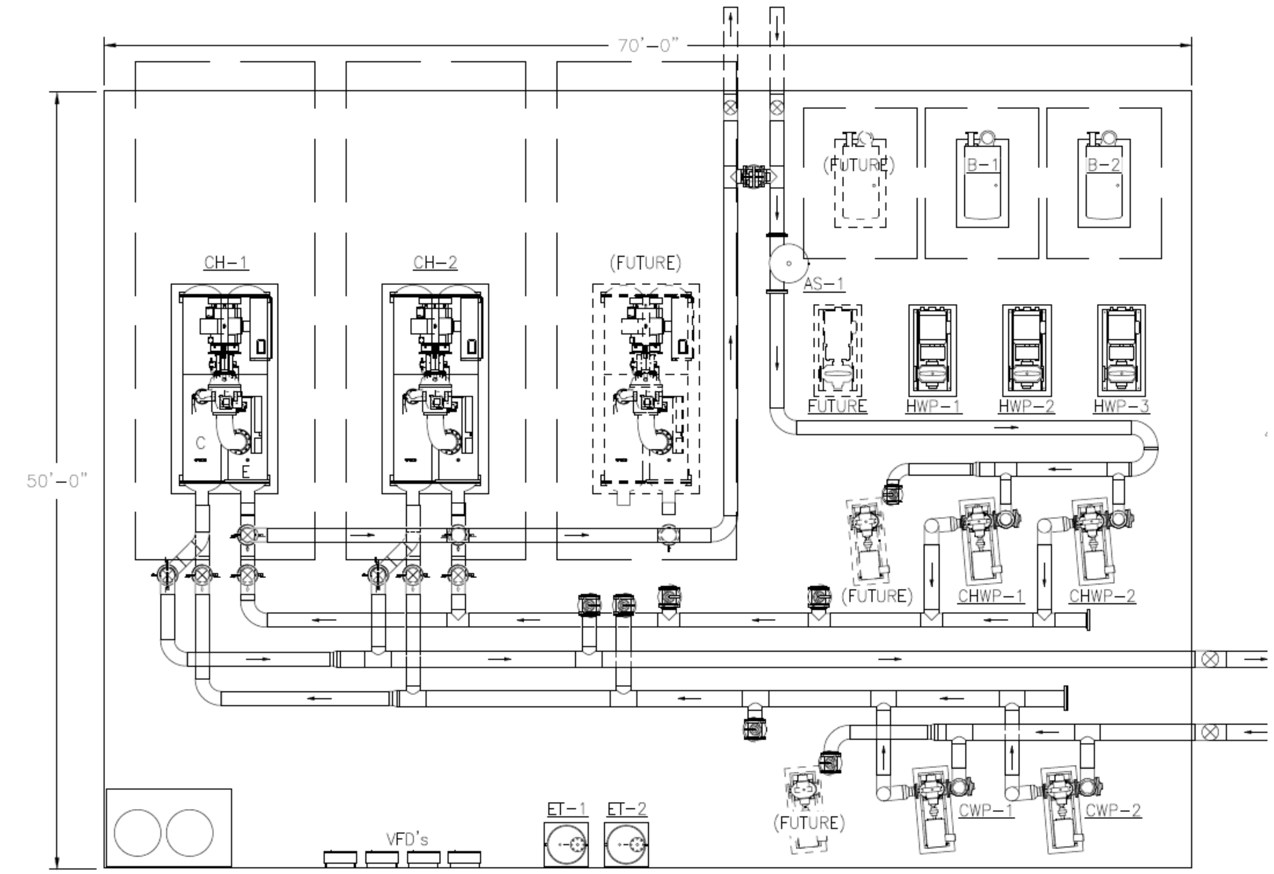


FIGURE 3-22
PRELIMINARY CENTRAL PLAN BUILDING EQUIPMENT LAYOUT

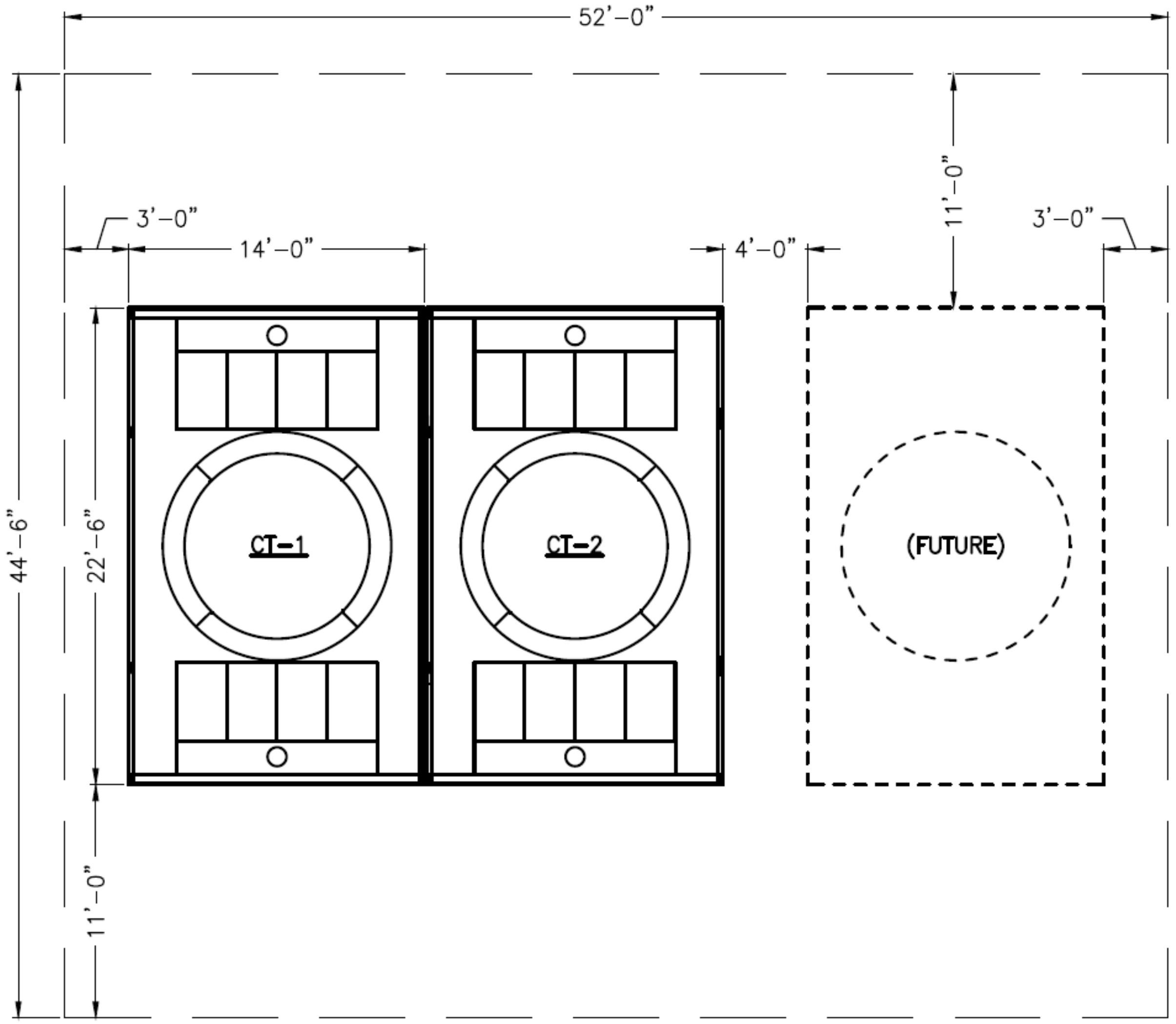


FIGURE 3-23
PRELIMINARY COOLING TOWER YARD EQUIPMENT LAYOUT

3.6.5.7 Air Handling Systems

Traditional Variable Air Volume (VAV) systems are recommended for the new terminal building. The system will provide ventilation and outside air for all building areas in accordance with 2012 International Mechanical Code and ASHRAE standard 62.1-2007 requirements.

It is proposed to use Parallel Fan Terminal Units for perimeter zoning control and Single Duct Variable Air Volume Terminal Units for interior space zoning control. The terminal units will be served by Variable Air Volume (VAV) Air Handling Units (AHU) to provide cooling to the space. It is anticipated that six (6) indoor AHUs will be located on the first level, in air handling unit mechanical rooms and will serve first and second level spaces. Two (2) outdoor AHUs will be located on the second level roof and will serve second level spaces. These VAV AHUs will have a preliminary capacity range from 10,000 CFM to 30,000 CFM each, without economizer capability based on ASHRAE 90.1-2007 along with high efficiency MERV 8 pre-filter and MERV 13 final filters, electronic air purification device, a heating hot water coil, a chilled water cooling coil and a fan wall array with variable speed drives for system redundancy and energy savings. The air handling units do not require seismic rating.

The system will provide conditioned air to each zone at a constant temperature, typically 55°F. The amount of air supplied to each zone varies to match the heat gain from equipment, lights, exterior and people. At part load conditions, VAV systems supply only the necessary amount of conditioned air to each zone.

The system will consist of a high velocity supply duct that will connect the new air handling units with the terminal units and a return duct from the plenum to the air handling unit. Air distribution systems will consist of galvanized sheet metal ducts with external insulation. High velocity ducts upstream of the terminal units will be constructed to a 4" w.g. pressure class. Ductwork downstream of terminal units will consist of galvanized sheet metal ducts construction at 2" w.g. pressure class with external insulation. Flexible duct runouts to diffusers less than 8 feet in length will be provided. Four pipe fan coil units will be provided for all vestibules on the first level.

TABLE 19
PRELIMINARY COOLING/HEATING LOAD AND AHU'S SUMMARY AT CONCEPT DESIGN PHASE

LF-Preliminary Cooling/Heating Load and AHU's Summary at CONCEPT Design Phase										
System	Area served	Total air conditioning space area(Sq. Ft)	Peak Supply Air Flow (CFM)	Peak total cooling coil load (MBH)	Peak total heating coil load (MBH)	Number of 30,000 CFM AHU	Number of 25,000 CFM AHU	Number of 20,000 CFM AHU	Number of 15,000 CFM AHU	Number of 10,000 CFM or less AHU
Final Future Build Out		121,129	174,000	5,970	4,135	2	2	1	2	2
AHU-1-1	Baggage claim/restrooms/support	14,560	15,000	570	340	0	0	0	1	0
AHU-1-2	Airlines Office/baggage screening/ticketing check-in	15,620	15,000	400	350	0	0	0	1	0
AHU-1-3	Lobby	10,600	20,000	600	550	0	0	1	0	0
AHU by Tenants	Oval concession and adjacent concessions- Air side	12,800	30,000	900	700	1	0	0	0	0
AHU-1-4	Air side circulation/restrooms/retails/hold rooms G1 to 5	24,755	30,000	1,200	650	1	0	0	0	0
AHU-1-5	Future Air side circulation/restrooms/retails/hold rooms G6 to 7	15,500	25,000	1,000	600	0	1	0	0	0
AHU by Tenants	Land side concessions	2,000	4,000	150	85	0	0	0	0	1
AHU-R-1	M&G/Admin office	9,351	10,000	335	280	0	0	0	0	1
AHU-R-2	SSCP and exit corridors and TSA offices	15,943	25,000	815	580	0	1	0	0	0

3.6.5.8 Ventilation Only Systems

Areas of the terminal building that do not require mechanical space conditioning, will be provided with a minimum ventilation system to maintain proper air quality in the space and to remove heat from these areas. These areas include:

- Baggage Handling System area
- Electrical panel rooms without heat generating equipment (transformers)

- Other baggage system areas that do not require mechanical cooling

These areas will be provided ventilation only via wall or roof mounted mechanical exhaust fans that are thermostatically controlled, or through large diameter, low velocity, high flow (LVHF) circulation fans mounted in the space

3.6.5.9 Direct Expansion Split Systems

Dedicated direct expansion split systems are recommended to provide 100% redundant back-up systems for the building IT data and Telecomm rooms. These systems will consist of an exterior mounted condensing unit and an interior ductless split system unit.

3.6.5.10 Elevator Machine Room Cooling and Ventilation

Elevator machine rooms shall be ventilated per ASHRAE 62.1 and manufacturer's standard and recommendation. Cooling and dehumidification shall also be provided to remove heat dissipated from the elevator machine room to maintain manufacturer's indoor air operation criteria. A Chilled water FCU outside the elevator machine room is recommended to provide supply air from the FCU to cool the elevator machine room with OA duct connected to the return air plenum.

3.6.5.11 Exhaust and Relief Air Systems

Exhaust systems for the terminal building will extract air from the following areas:

- Toilet Rooms
- Janitor closets and mop sink rooms

Generally, these systems will consist of an independent duct network from the building supply and return air systems. Multiple local exhaust fans will be located in or near areas where these spaces are concentrated. These fans can be an in-line duct mounted fan or a roof mounted exhaust fan.

Relief air systems for the building will be provided to maintain proper positive pressure in the terminal building. There will be local instances for relief air systems, which will be provided through either barometric relief devices or local pressure relief fans. These devices can be mounted on the roof or in exterior walls.

3.6.5.11.1 Seismic Requirements for Mechanical Systems

The building seismic design category for the terminal has been determined to be either Category A or B. Therefore, all mechanical systems will be not required to be seismically braced because they fall within the exemptions allowed to delete seismic bracing.

3.6.5.12 Acoustic and Vibration Control Requirements

Noise and vibration control criteria for mechanical systems will be based on ASHRAE recommendations and guidelines. Noise and vibration control components such as sound attenuators and vibration isolators shall be provided to achieve indoor design noise and vibration criteria.

Measures to reduce noise and vibration in ductwork and piping systems are described below:

Ductwork. Reduce fan-generated noise immediately outside any mechanical room wall by acoustically coating or wrapping the duct. The ductwork design shall appropriately consider and address airborne equipment noise, equipment vibration, duct borne fan noise, duct breakout noise, airflow generated noise and duct borne crosstalk noise. All ductwork connections to equipment having motors or rotating components shall be made with 6-inch length of flexible connecters. All ductwork within the mechanical room shall be supported with isolation hangers.

Piping Hangers and Isolation. Isolation hangers should be used for all piping in mechanical rooms and adjacent spaces, up to a 50-foot distance from vibrating equipment. The pipe hangers closest to the equipment should have the same deflection characteristics as the equipment isolators. Other hangers should be spring hangers with .75 inch deflection. Positioning hangers should be specified for all piping 8 inches and larger throughout the building. Spring and rubber isolators are recommended for piping 2 inches and larger hung below noise sensitive spaces.

Floor supports for piping may be designed with spring mounts or rubber pad mounts. Anchors and guides for vertical pipe risers usually must be attached rigidly to the structure to control pipe movement. Flexible pipe connectors should be designed into the piping before it reaches the riser.

Vibration isolation design criteria, shall refer to "Selection Guide for Vibration Isolation," ASHRAE Application Handbook Vibration Isolators. Isolators should be specified by type and by deflection. See ASHRAE Guide for Selection of Vibration Isolators and Application Handbook for types and minimum deflections. Specifications should be worded so that isolation performance becomes the responsibility of the equipment supplier.

The recommended NC levels for various spaces throughout the terminal building are shown in the table 20 below.

TABLE 20
RECOMMENDED NC LEVELS FOR SELECT BUILDING SPACES

SPATIAL AREA TYPE	RECOMMENDED NC LEVEL (NC CURVE)	EQUIVALENT SOUND LEVEL (DBA)
Public Hall, Corridor, Lobby	35-40	50-55
Administration Open Office	35-40	45-50
Concessions / Dining Area	40-45	50-55
Conference / Meeting Rooms	25-30	35-40

3.6.5.13 Building Automation System

The Building Automation System (BAS) shall provide an interface among all the DDC logic controllers, the BAS central Server, and user work-stations. The BAS shall integrate and provide global supervisory control functions over the new control devices connected to the BAS via control logic panels on the internal building LAN. It shall be capable of executing application control programs to provide: Calendar functions, Scheduling, Trending, Alarm monitoring, Point override, and Set point change capability. The BAS shall be capable of supporting standard Web browser access via the Intranet/Internet. The BAS system will interface all HVAC equipment and systems, the emergency generator, lighting control systems, passenger boarding bridges, PC Air units, 400 Hertz power units, domestic water system metering, and electrical power metering.

3.6.6 Plumbing Systems

The purpose of this section is to describe the conceptual approach and design philosophies for the Plumbing systems to serve the new terminal building. The section will:

- Indicate the proposed design criteria basis for the design and selection of the systems.
- Include preliminary sizing of equipment and the system network.
- Describe the major components and systems for the plumbing systems in the new terminal building.

The intent of the concept narrative report for the plumbing systems is to provide sufficient design philosophy, selected systems descriptions, and additional design criteria for systems and equipment to provide direction for the final design to meet the requirements of the owner and project.

3.6.6.1 Plumbing Design Criteria

The basis of design criteria for sizing the plumbing systems inside the terminal will be based on the sizing requirements provided in all applicable codes, ordinances and local regulations of authorities having jurisdiction.

The latest edition of applicable codes, ordinances, and regulations in effect at time of design and anticipated to be in effect for the year of permitting include, but are not limited to the following:

- International Building Code (IBC), 2012 Edition
- International Mechanical Code (IMC), 2012 Edition
- International Plumbing Code (IPC), 2012 Edition with Louisiana State Amendments
- International Fuel Gas Code (IFGC), 2012 Edition
- International Energy Conservation Code (IECC), 2009 Edition
- Utility companies requirements

Additional design criteria as established by the American Society of Plumbing Engineers (ASPE) latest Handbook volumes 1 through 4 will be used for specific systems, such as Grease Traps, Hot water heaters, and other plumbing systems.

Plumbing fixtures shall have the following maximum flow rates:

- Water Closets – Maximum 1.6 Gallons per flushing cycle
- Urinals – Maximum 1.0 Gallons per flushing cycle
- Lavatories, public (metering) – Maximum 0.25 gallons per metering cycle
- Lavatories, public (other than metering) – Maximum 0.5 Gallons per minute at 60 psi

3.6.6.2 Plumbing Technical Systems

The plumbing system recommendations are intended to meet all minimum code requirements and to provide the maximum flexibility to adapt to owner and project requirements as the design of the project progresses.

All materials shall be new. The work will include, but not be limited to, the following principal items:

- Plumbing fixtures and equipment
- Soil, waste and vent piping
- Roof drains; overflow drains, and rainwater piping
- Cold water piping
- Sleeves, hangers and brackets for piping systems. Provide special hangers to isolate transmission of sound and vibration from pipes and equipment
- Piping testing
- Disinfection of potable water piping
- Piping insulation
- Extend water, waste, and storm drain piping outside of the terminal building and make final connections to site piping

3.6.6.3 Plumbing Fixtures

As described above, all plumbing fixtures will be low flow, water conserving type fixtures. Additional criteria for plumbing fixtures is described below:

Water Closets: Wall mounted in public restrooms, vitreous china construction, with appropriate water closet support system designed to support minimum load of 300 lbs. Water closets may be floor mounted in single fixture restrooms or family assist restrooms. Flushing systems will be automatic flush valve type, with battery powered or hard wired, concealed style automatic flush valves.

Lavatories: Lavatories will be coordinated with the architectural design in the restrooms. It is anticipated that lavatories will be vitreous china construction, either wall mounted or under mount countertop style as required to coordinate with architectural design. Lavatories will be provided with automatic faucets, either battery powered or hard wired. Wall mounted lavatories will be provided with appropriate lavatory support frame.

Drinking fountains: Drinking fountains will be provided throughout the terminal. Drinking fountains are anticipated to be recessed wall types with integral bottle fillers. Drinking fountains will have separate, additional water filters installed as part of the drinking fountain or independent, at each drinking fountain. Drinking fountains, water coolers and bottle water dispensers shall not be installed in public restrooms per IPC.

3.6.6.4 Sanitary Drainage and Venting Systems

Domestic sanitary drainage systems shall be provided in the terminal building for all public and private restrooms, janitor closet rooms, break rooms, drinking fountains, and other areas that provide typical commercial drainage. The domestic sanitary drainage systems will connect to the site utilities drainage system described under the civil engineering chapter of this report. At this stage of the design, it is the intent that there will be no requirement for sanitary pumping or lift stations inside the terminal building. This will be confirmed as the final design is completed.

Drainage systems that collect waste from food service areas or cooking areas will be routed through local grease interceptors provided by the individual tenant, as well as through underground "central" grease interceptors provided as part of the terminal drainage system, prior to connecting to the main drainage system for the building. The "central" interceptors will collect multiple drain lines from tenants and concessions in the area. It is anticipated that there will be a maximum of three (3) "central" grease interceptors in series installation configuration. The anticipated maximum flow is 100 gpm and with maximum capacity for each grease interceptor: Liquid-275 gallons, grease-1076 Lbs (147.4 gallons), Soldis-105 gallons. This will be confirmed as the final design is completed.

Venting systems will be provided for all drainage systems. Venting system shall terminate to open air through the terminal roof. The use of Air Admittance Valves (AAV's) in lieu of a vent thru the roof (VTR) is not recommended.

Drainage and vent system piping will be constructed of cast iron, or PVC. It is anticipated that below grade piping material will be PVC. Piping above grade will be hub-less cast iron. PVC piping will not be installed in areas that are used as return air plenums.

It is anticipated that one 6-inch waste pipe main will connect the air side portion of the building to the site sanitary drainage system. The main size for the building air side is based on an assumed load of 350-450 drainage fixture units.

Another 6-inch waste pipe main will connect the land side of the building to the site sanitary drainage system. The main size for the building land side is based on an assumed load of 300-400 drainage fixture units.

Preliminary fixture unit estimation includes capacity to support the future expansion for gates 6 and 7. Sanitary piping sizes will be confirmed as the final design is completed.

3.6.6.5 Domestic Potable Water Systems

Potable water will be supplied from the Lafayette Water Utilities System. At this stage of the design, it is the intent that there will not be a requirement for a water booster pump set inside the terminal building. This will be confirmed as the final design is completed.

Potable water will be provided to each fixture that requires a water connection. In tenant and concession areas, a capped line with shut-off valve and consumption meter will be provided for the tenant's use to connect their fixtures. The meter shall be connected to the building automation system to allow for measurement of the tenant water usage. Systems which require backflow prevention will be provided with reduced pressure principle backflow preventers to prevent cross contamination with the building water supply.

Piping for the potable water systems will be either polypropylene piping or copper piping. Ball valves will be provided for shut-off duty and throttling duty. Shut-off valves will be provided at each branch connection that supplies 2 or more fixtures and will be located in easily accessible areas. Shut off valves will be provided at each restroom bank to allow for easy isolation of restrooms for repairs.

The potable water system for the terminal will have two service entrance points: one at air side and one at land side of the terminal building. Each of these service entrances will be provided with a backflow preventer and main meter that will be monitored by the building automation system. Additional shut-off valves and water flow meters will be provided in multiple zones throughout the terminal to monitor consumption(to assist in leak detection), and to enable adequate areas for service shut down without affecting the entire terminal domestic water supply. The water flow meters will be monitored by the building automation system.

One 4-inch water pipe main will connect the air side of the building to the site water supply system. The main size for the building air side is based on an assumed load of 550-650 total water supply fixture units. The estimated maximum flow is 180 gpm.

Another 4-inch water pipe main will connect the land side of the building to the site water supply system. The main size for the building land side is based on an assumed load of 450-550 total water supply fixture units. The estimated maximum flow is 150 gpm.

Preliminary water supply fixture unit estimation includes capacity to support the future expansion for gates 6 and 7. The demand loads and piping sizes will be confirmed as the final design is completed.

3.6.6.6 Domestic Hot Water Systems

Hot water systems in the terminal building will be located in close proximity to the loads they serve in order to minimize time for hot water to be available at the outlets, and to eliminate the requirement for hot water recirculation systems. Temperature mixing valves or temperature limiting devices will be provided to limit tempered water temperatures to a maximum of 110 degree F in public areas per IPC 2012. Hot water will be provided for janitor sinks, showers, and lavatories. Preliminary estimation of 40 gallon storage type water heaters to be provided in each janitor's closet. These systems will be either gas or electric source. This will be confirmed as the final design is completed. Tank-less under the counter type electric hot water heaters will be provided for remote lavatories or sinks.

It is anticipated that concessionaires that require hot water will provide their own hot water heating source for their use. These systems will be either gas or electric source.

Piping for hot water systems will be either copper piping, or polypropylene. Hot water piping will be insulated.

3.6.6.7 Storm/Rain Water Systems

Roof drains, overflow drains, and leaders will be designed for 4.8 inches per hour based on a storm of 1-hour duration and 100-year period rainfall rate. Roof drainage piping will be either no-hub coupling cast iron piping, or PVC. It is anticipated that PVC piping will be installed below grade, and cast iron piping will be installed above grade. PVC piping will not be installed in ceiling return air plenums.

Two 12-inch storm water drains will connect the air side of the building to the site storm water drainage system. The pipes size for the building air side is based on an assumed horizontally projected roof area 50,000 to 55,000 square feet. Two 12 –inch storm water drain will connect the land side of the building to the site storm water drainage system. The pipes size for the building land side is based on an assumed horizontally projected roof area 55,000 to 60,000 square feet.

Preliminary storm water drainage estimation includes projected roof area to support the future expansion for gates 6 and 7. The projected roof area and all piping sizes will be confirmed as the final design is completed.

3.6.6.8 Condensate Drainage Systems

The drainage of condensate from HVAC systems will be routed to floor drains installed near the air handling units in the mechanical rooms. The floor drains will be connected to the domestic sanitary drainage system. In instances where equipment is installed above ceilings or in locations outside of main mechanical rooms, the condensate shall be piped to either a nearby floor drain or janitor sink. Condensate drainage piping will be copper. All condensate drainage piping will be insulated to prevent condensation on the piping surface. The collection of condensate drainage for re-use in irrigation systems or toilet flushing systems is not recommended at this time due to increased capital expenditure with low reductions in operating expenses.

3.6.6.9 HVAC Make-Up Water Systems

The central chilled water plant systems will require make-up water supply to replace water in the systems that is lost due to evaporation at the cooling towers for the condenser water system, and due to leaks or maintenance in the closed chilled water system. The make-up water for these systems will be provided from a potable water supply. The make-up water supply for the condenser water system will be connected to the cooling tower basins and will be controlled via level controls in the cooling tower basins. The make-up water supply for the chilled water system will be connected to the closed loop system via connection to the expansion tank. Make-up water for this system will be controlled by system pressure. All make-up water systems will be provided with backflow prevention, shut-off valves, and metering systems. The water flow meters will be connected to the building automation system to monitor consumption.

3.6.6.10 Aircraft Potable Water Systems

The domestic water supply system to provide domestic potable water to the aircraft will be an independent supply and piping system. Piping will be either copper or polypropylene, and will be routed to an independent potable water cabinet, located at each aircraft gate.

3.6.6.11 GAS PIPING SYSTEMS

Gas piping in the terminal will be routed from a gas meter through the terminal to serve natural gas fired condensing boilers and appliances in the building. One meter will be provided for the general building gas service. Tenant concessionaires will be provided with independent meters to measure consumption per tenant. Gas piping in the building will be copper piping or ASTM A53 black steel with copper or steel fittings. Shut-off valves will be provided at each appliance and at each branch serving more than two appliances. Tenant spaces which may require gas service will be provided with a capped pipe stub out and shut-off valve.

3.6.6.12 Calculations

As stated above, the minimum required quantity of plumbing fixtures quantities will be calculated based on the requirements of the 2012 International Plumbing Code, Chapter 4, Table 403.1, for Assembly classification; Passenger Terminals and transportation facilities. Based on the number fixtures calculated and incorporated into the building design the sanitary drainage, sanitary vent, and domestic water supply systems will be sized based on the requirements and sizing tables included in criteria described above.

Piping for sanitary drainage systems inside the terminal will be sized based on a minimum slope of 2% for piping equal and less than 2 ½" In diameter. Sanitary piping between 3" to 6" in diameter will be sized based on a minimum slope of 1%.

Piping for water supply systems inside the terminal will be sized based on providing 35 psig minimum residual pressure at the most remote fixture in the supply system or fixture manufacturer residual pressure requirement whichever is greater, and maintaining maximum water velocity in the pipe between 5.0 and 8.0 feet per second.
Natural gas piping shall be sized based on a supply pressure of 2 to 5 psig delivery pressure in the terminal building. Maximum total pressure drop shall meet the following 2012 IFGC code requirement.
Allowable pressure drop. The design pressure loss in any piping system under maximum probable flow conditions, from the point of delivery to the inlet connection of the appliance, shall be such that the supply pressure at the appliance is greater than or equal to the minimum pressure required by the appliance.

3.6.7 Fire Protection Systems

The purpose of this section is to describe the conceptual approach and design philosophies for the fire protection systems to serve the new terminal building. The section will:

- Indicate the proposed design criteria basis for the design and selection of the systems.
- Include preliminary description of the system configuration.
- Describe the major components and systems for the fire protection systems in the new terminal building.

The intent of the concept narrative report for the fire protection systems is to provide sufficient design philosophy, selected systems descriptions, and additional design criteria for systems and equipment to provide direction for the final design to meet the requirements of the owner and project.

3.6.7.1 Design Criteria

The basis of design criteria the fire protection systems will be based on all applicable codes and local regulations of authorities having jurisdiction.
The latest edition of applicable codes, ordinances, and regulations in effect at time of design and anticipated to be in effect for the year of permitting include, but are not limited to the following:

- International Building Code (IBC), 2012 Edition with Louisiana modifications
- NFPA 1, Fire Code, 2012 Edition
- NFPA 10, Portable Fire Extinguishers, 2013 Edition
- NFPA 13, Installation of Sprinkler Systems, 2013 Edition
- NFPA 14, Installation of Standpipes and Hose Systems, 1013 Edition
- NFPA 101, Life Safety Code, 2012 Edition

The building is classified as a "covered mall" in accordance with the IBC and a mall building in accordance with NFPA 101. The IBC covered mall criteria requires automatic sprinkler protection and manual hose stations capable of providing 250 gpm.

3.6.7.2 Automatic Sprinkler System

The building will be fully-sprinklered in accordance with NFPA 13. Wet-pipe systems with quick response sprinklers will be utilized inside of the terminal building. Dry-pipe systems will be utilized in exterior areas without heat protection, including the areas under the airside hold rooms. At the concept phase, it is anticipated that IT Server Rooms and Data rooms will be served by Pre-Action systems, this approach will be confirmed as the design progresses. In general, canopies, including the front passenger drop off/pick up canopy will not be protected with sprinklers as exempt by NFPA 13.

Under the IBC covered mall provisions, each tenant space sprinkler system will have independent control valves.
The maximum sprinkler system zone size will be 52,000 sq. ft.
The systems will be designed to facilitate future expansion.

3.6.7.3 Hose Stations

2-1/2" hose stations will be provided at the main building entrances/exits and in stairways as required by the IBC for fire department use. The IBC does not require the system to provide the required pressure, which will be provided by the fire department through the fire department connections (FDCs).

3.6.7.4 Portable Fire Extinguishers

Portable fire extinguishers will be provided in accordance with NFPA 10.

3.6.7.5 Other Fire Protection Systems

Wet-chemical suppression systems will be provided for kitchen exhaust hoods where grease-laden vapors are produced.

3.6.7.6 Preliminary System Configuration

The water supply will be from the utility company. A flow test will be obtained to confirm the adequacy of the water supply. Given that the facility is a 2-story building, neither a water storage tank nor a fire pump are anticipated, but will be confirmed upon receipt of flow test data.

The system will be fed by a single underground main with backflow prevention as required by state and local requirements. A combined sprinkler and standpipe bulk main will be run throughout the building. This combined main will allow flexibility for riser locations and future expansion. It also allows for FDCs to be located on both landside and airside as necessary.

All flow, pressure and tamper switches will be monitored by the fire alarm system.

3.6.8 Electrical Systems

The purpose of this section is to describe the conceptual approach and design philosophies for the electrical and technology systems serving the new terminal building. The section will:

- Identify the design criteria used in the design and selection of the systems.
- Include preliminary sizing of equipment and the system network.
- Describe the major components and subsystems comprising the electrical and technology systems.

The intent of the concept narrative report is to provide information in sufficient detail to establish a design direction that meets the owner's program and budgetary requirements. This concept will serve as the guiding framework for all subsequent design phases.

3.6.8.1 Power Systems

The design basis for sizing the electrical systems inside the terminal will be based on the sizing requirements provided in all applicable codes, ordinances and local regulations of authorities having jurisdiction.

The latest edition of applicable codes, ordinances, and regulations in effect at the time of design and anticipated to be in effect for the year of permitting include, but are not limited to the following:

- International Building Code (IBC), 2015 Edition
- National Electrical Code (NFPA 70), 2014 Edition
- Life Safety Code (NFPA 101), 2015 Edition
- National Fire Alarm and Signaling Code (NFPA 72), 2013 Edition
- Standard for Emergency and Standby Power Systems (NFPA 110), 2013 Edition
- Lafayette Utility System requirements
- American National Standards Institute (ANSI)
- Institute of Electrical and Electronic Engineers (IEEE)
- Occupational Safety and Health Administration (OSHA)

3.6.8.2 Technology Systems

The design basis for the technology systems inside the terminal will be based on the requirements provided in all applicable standards, ordinances and local regulations of authorities having jurisdiction.
The latest edition of applicable standards, ordinances, and regulations in effect at the time of design and anticipated to be in effect for the year of permitting include, but are not limited to the following:

- ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunication Cabling and Components Standard.
- ANSI/TIA-568-C.3, Optical Fiber Cabling Components Standard.
- ANSI/TIA-569-C, Telecommunication Pathways and Spaces
- ANSI/TIA 606-B, Administration Standard for Commercial Telecommunications Infrastructure.
- TIA-TSB-162-A, Telecommunications Cabling Guidelines for Wireless Access points.
- IEEE 802.3at, Power over Ethernet enhancements Standard. (25.5 W)

3.6.8.3 Power Distribution System (Normal)

The normal power distribution system will have the following major components:
Site power distribution: The present electric service is provided by LUS and consists of an underground 13.8Kv medium voltage lateral terminating in a pad mounted transformer located at the terminal building. This service will remain in operation during the construction of the new terminal. To accommodate this requirement, a new, underground 13.8 Kv service will be provided. Interconnection with LUS's medium voltage grid will occur upstream of the existing terminal's service at a primary switch located adjacent to manhole 2003-03. The primary underground run will be installed per LUS requirements. The new electrical service will terminate in a new, 13.8Kv-480/277 volt pad mounted transformer located on the apron level north of baggage claim. (Refer to the plans for the location) Preliminary analysis projects a load of approximately 3-3.5 MVA. From initial conversations with LUS, a 1500 or 2000 KVA transformer with a 48" x 48"secondary tap box will be provided for the terminal. Physical barriers (bollards) will be provide around the transformer per LUS requirements.

Site communications: Communication service is provided to the site by AT&T. Similar to the site power distribution concept, new underground service will be extend to the new terminal communications room located on the apron level north of baggage claim. (Refer to the plans for the location.)

The service entrance equipment will consist of a new 4000A, 480/277v , 3 phase, 4 wire low voltage switchgear with draw out breakers. The gear will be UL 1558 compliant and wired to accept Ethernet Modbus TCP-IP protocol. The power distribution system will serve the building loads as follows:

General Power: Individual 480/277 volt feeder runs will be provided to each electrical closet. 480/277 volt panelboards will serve lighting, mechanical air distribution equipment and 120/208 volt equipment via dry type transformers located in each closet.

Retail/concession loads will be served from a dedicated distribution panel located in the main electric room. Revenue sub-metering will be provided on each tenant service.

Central utility plant: A dedicated 480 volt feeder will be run to the central utility plant. Power will be distributed to all mechanical equipment via a low voltage switchboard. The switch board breakers will be fixed mounted and will contain electronic trip units. The switchboard will be wired to accept Ethernet Modbus TCP-IP protocol.

Baggage Handling System (BHS): A dedicated 480 volt feeder will be provided for the BHS system.

PC Air/PBB/400 HZ power: A dedicated 480 volt feeder will be run to the apron level electrical room located under the concourse. Power will be distributed to all aircraft ground power and passenger boarding bridge equipment via a low voltage switchboard. The switch board breakers will be fixed mounted and will contain electronic trip units. The switchboard will be wired to accept Ethernet Modbus TCP-IP protocol.

Normal Feeds to Emergency System Automatic Transfer Switches: Dedicated 480 volt feeders will be provided to each automatic transfer switch. See the emergency system narrative below for further information.

3.6.8.4 Power Distribution System (Emergency)

The emergency generators serving the existing terminal building are dual fuel source units. (Natural gas-propane) This dual fuel source concept will be used for the new terminal. The fuel source supply must accommodate a 72 hour run time. Options to be considered for emergency generation capacity are as follows:

Option 1: Sufficient capacity for all airport loads: As stated previously, the projected load for the new terminal is 3-3.5 mva. The maximum KVA rating for natural gas units varies between manufacturers. Depending on the manufacturer, 2 or 3 units configured for parallel operation will be needed.

Option 2: Sufficient capacity to sustain airport operations: It is projected that load limiting strategies can reduce the overall emergency loads by approximately 50%. Proposed electrical load limits are as follows:

- Central plant/AHU equipment: 60% loading (ia BMS control system)
- Lighting and general power (receptacles): 50% loading
- Baggage handling: 100% loading
- Aircraft 400 HZ power: 100% loading
- PBB power: 100% loading
- Aircraft PC Air: 0% loading
- Vertical transportation: 100% loading
- Concessions: 0% loading
- CBIS: 100% loading
- Technology: 100% loading

Depending on the manufacturer, 1 unit or 2 units configured for parallel operation will be needed.

The main emergency distribution equipment will consist of a new 2000A, 480/277v, 3 phase, 4 wire low voltage switchgear with draw out breakers. The gear will be UL 1558 compliant and wired to accept Ethernet Modbus TCP-IP protocol. The emergency distribution system will be configured as follows:

Emergency System

Loads Served: Egress lighting, fire detection/alarm, elevator, fire pump, communication system

Legally Required Stand-by

Loads Served: Sewage disposal, security/access control/CCTV

Optional Standby

Loads Served: Technology Network, CBIS, PBB/400 HZ.

Individual, open transition automatic transfer switches will be provided for each branch of the emergency distribution system. Emergency panelboards (480/277volt & 208/120volt) and associated dry type transformers will be provided as required in each emergency electrical closet.

3.6.8.5 Interior Lighting System

In general, the lighting system will use the LED source for energy efficiency.

Interior lighting systems will consist of energy efficient fixtures controlled using a variety of means that are specific to the area being controlled. Building management control will be included that has area override capability. Energy efficiency will be achieved using a combination of fixture types and lamp types, as well as automatic control where appropriate. Lighting level transitions will be achieved using dimmers, occupancy, photosensors, and/or bi-level switching.

Luminaire type(s):

- Office, other back of house, corridor – volumetric recessed troffer; LED
- Public spaces – specialty wall or ceiling mounted and wall/downlights; LED.
- Restrooms – perimeter wall slots/ down light; LED
- Utility spaces – gasketed and lensed pendant; LED
- Parking lot: 20-30’ pole mounted LED

Lamp type:

- LED lamps with electronic drivers.

Control type:

- Office spaces will be vacancy sensor controlled with dual technology sensors.
- Other back of house and corridor spaces will be controlled with occupancy sensors.
- Restrooms will be occupant sensor controlled with dual technology sensors.
- Utility spaces will be vacancy sensor controlled with passive IR technology sensors.
- All spaces will be controllable via the BMS system with override capability by area.
- Public areas that have exposure to daylight will incorporate photosensor controlled, daylight harvesting technology

Proposed illumination levels can be found in table 21.

TABLE 21
PROPOSED ILLUMINATION LEVELS

Space Type	Illumination Design (Lighting Power Density)	ASHAE 90.1 LPD Limit (Watts/Ft2)	Illumination Design Target* IES**(FC)
Baggage Area	0.9	1.0	20
Concession – Family Dining	1.5	2.1	30
Concession – Bar/Leisure	1.1	1.4	20
Concession - Retail	1.5	1.7	40
Corridor	0.5	0.5	5
Concourse/Circulation	0.6	0.6	10
Entry Lobby	0.9	1.3	10
Meeter/Greeter	0.9	1.3	15
Multipurpose	0.9	1.3	40
Office >250 SF	0.9	1.1	40
Office < 250 SF	0.9	1.1	40
Restroom	0.8	0.9	15
Stairs	0.6	0.6	5
Storage	0.8	1.2	10
TSA Passenger Screening	1.3	1.5	40
Ticket Counters	1.2	1.5	40
Gate Counters	1.2	1.5	30
Janitor	0.7	0.8	10
Electrical, Mechanical	0.8	1.5	20
Waiting - Holdroom	0.9	0.9	15

*As determined using values for horizontal planes and visual ages of observers between 25 and 65 years, inclusive.

The Lighting Handbook, Tenth Edition; Illuminating Engineering Society (IES)

3.6.8.6 Fire Alarm system:

A new, addressable fire alarm system meeting the requirements of NFPA 72 will provided for the Terminal Building.

3.6.8.7 Lightning Protection System:

The modernized facility will be provided with a lightning protection system in accordance with NFPA 780.

3.6.9 Communication / Information Technology Systems

3.6.9.1 Premise Distribution System:

The new main service entrance facility (MDF) from AT&T will be located in the apron level communications room located north of baggage handling. Four (4) 4" conduit with inner duct will provided to facilitate service entrance infrastructure cabling from the service providers. Communication rooms will be as indicated on the drawings. Communication spaces and pathways will be provided in compliance with ANSI/TIA-569-C. System backbone will consist of single mode and multi-mode fibers, multi pair copper cabling (50-100 pr.) and coaxial cable (RG-11). Horizontal cabling will be CAT6A. Each outlet will consist of a minimum of (2) CAT6A cables. Multi compartment ladder type cable tray will be provided for cable management between the MDF and IDF and from the IDF to the point of use outlet.

3.6.9.2 Network System

A system consisting of switches, routers etc. will be provided for shared use by the Access Control Systems (ACS), Public Address System (PA System), Multi-User Flight Information Display Systems (MUFIDS), and Closed Circuit Television (CCTV) systems. Equipment type, performance etc. will meet Airport IT standards.

3.6.9.3 Public Address System

A new PA system will be provided to create a modular network based system. Speakers will be provided and zoned to provide complete coverage in the terminal building. Headend equipment will be installed in the MDF room. Equipment will be rack mounted and will consist of amplifiers, equalizers, processors and rack mounted UPS as required. Additional rack mounted equipment will be provided in the IDF rooms to provide an efficient, distributed system. Ambient noise sensors will be installed in the ticketing, gate and baggage claim areas to provide automatic volume control.
IP based intelligent microphones will be used. Each gate counter will be provided with a microphone. The locations of the microphones at the check-in counter will depend on the layout of the counter space. Typically one microphone will be provided between two to three check-in positions.

3.6.9.4 Security (Access Control & CCTV System Design)

An access control system (ACS) will consist of card readers, servers, battery backup, photo ID/badging and associated software platform. Card readers will be HID SE, I Class Series or approved equal. Biometric readers will be provided in accordance with TSA approved airport security plan. Servers will be fault tolerant to enhance system reliability. Photo ID/badging system, consisting of a camera, photo ID workstation and a printer will be provided. The ID system will be integrated into the access control system software.

A CCTV system will consist of IP cameras, network video recorders (storage capacity of 30 days or as required by the airport security plan). CCTV camera types will be provided to accommodate each respective location and application. Fixed camera will be provided to view all security portals (both sides). In addition, fixed cameras will be provided for the TSA check point, baggage claim and the aircraft apron level. Adjustable PTZ cameras, provided in accordance with the airport security plan, will be utilized to augment the fixed camera coverage. The CCTV system will be integrated with the Access Control System to facilitate automatic alarm call ups.

3.6.9.5 MUFIDS System (MUFIDS)

A complete system will be provided including application software and display monitors. 55" monitors will be provided at strategic locations to provide FIDS information to the travelling public. Additional monitors will be provided in airport offices, TSA checkpoints and CBIS area. Baggage information will displayed on monitors located in the baggage claim area. MUFIDS input station will be provided in airline and airport offices.

3.6.9.6 WIFI

Cable infrastructure will be provided for an owner provided WIFI system.

CHAPTER 4

PROJECT PHASING

4.1 PHASING

Since this program is a redevelopment of an existing site, construction phasing is a critical component of the project. The main purpose of the phasing plan is to keep the existing terminal functioning while the new terminal is constructed. This means that things like road access, parking, rental car pick-up and return, and aircraft operations must continue to operate while the site is redeveloped. Unfortunately, there is no way to cause absolutely no disruptions and all parties will need to be understanding while the facility realigns itself for the future. The design team has developed two basic phasing concepts that attempt to minimize cost, disruptions, and construction time as much as possible.

There are several aspects of the project that all phasing options must address. These are:

1. The terminal must remain active
    a. Provide an acceptable number of parking stalls
    b. Provide access to the terminal
    c. Support rental car operations
    d. Protect Utilities to existing terminal
    e. Protect the FAA RTR cable until it can be relocated.

4.2 OPTION 1

Phasing option 1 can generally be defined by using the proposed terminal site and existing West GA Apron as a temporary parking lot so all existing public parking can be moved from the current location inside the terminal loop road to allow for its reconstruction and expansion. The intent of this option is to allow the new central lot to be completed at one time. The parking operation can then be shifted back to the new central lot while the terminal is under construction. One of the biggest challenges to phasing this project is that the FAA RTR cable runs right through the proposed terminal site and down the center of the proposed parking lot. Due to safety and security concerns, the FAA is very protective of the cable and typically does not allow extensive construction work to occur in the immediate vicinity. The cheapest and easiest solution to this problem is to simply move the cable before starting work on the terminal and parking lot. Since the parking lot is so large other work can be completed while protecting the cable and once the cable is relocated the entire parking lot can be completed at one time which is beneficial from a cost and schedule perspective.

However, the biggest drawback to this proposal is that it delays the terminal groundbreaking for 6-12 months because the temporary parking lot is in the way. The major benefit of this option is that it reduces the number of construction phase changes and contractor mobilizations which will decrease cost. It also causes minimum disruptions to the traveling public because temporary detours and facilities stay in place for a year or more; which creates a sense of familiarity for the traveling public. A simple bar chart schedule illustrates the phasing and sequencing of activities for Option 1 in **Error! Reference source not found.**.

A detailed explanation of each phase can be found in the following sections

4.2.1 Phase 1

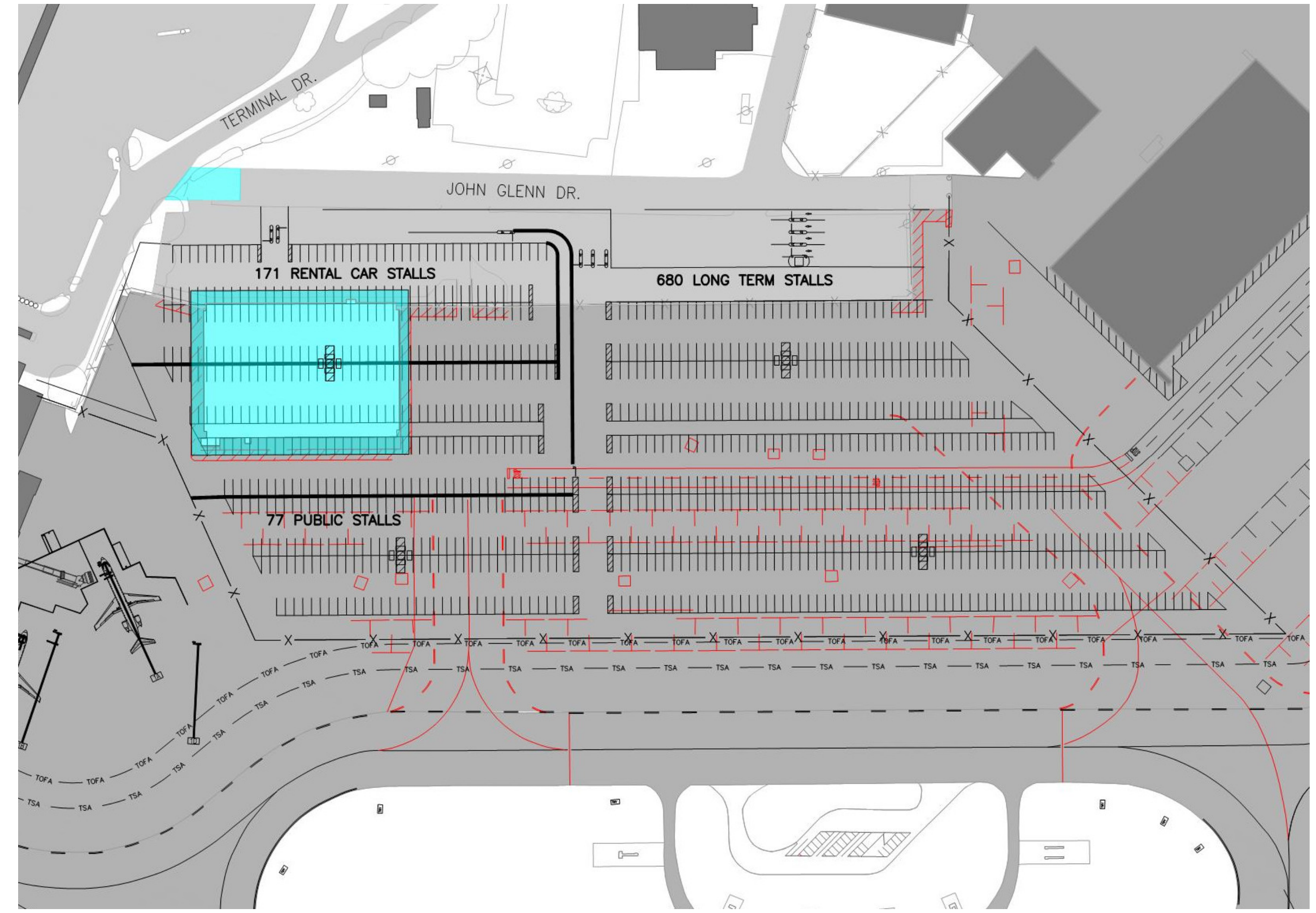


FIGURE 4-1
OPTION 1 - PHASE 1 TEMPORARY PARKING LOT

Phase 1 is primarily an enabling phase which allows for construction in future phases to occur. It can be summarized as the demolition of surplus buildings and the conversion into a temporary parking lot to support the airport's public parking operation. The first component of this phase is the demolition of the existing Hangar 11. The resulting hole is to be filled in with backfill and topped with approximately 4" of asphalt on 10" of soil cement base to meet the existing apron grade.

Next a temporary security fence is to be installed on the apron as indicated in the phasing drawings and a temporary parking lot is to be created. This will include the obliteration of existing airfield markings as indicated and restriping the area to create a temporary parking lot as seen in Figure 4-1. In order to make the parking lot fully functional temporary lights will need to be brought in for the duration of the temporary parking lot's useful life. In addition, the revenue controls from the existing parking lot, to include the gate arms and ticket machines, will need to be relocated to the entrances and exits of the temporary lot. Power and data will need to be supplied for the revenue control system and temporary power will be needed for the light plants. It is the intent of the design team that minimal pavement cutting or trenching be

FIGURE 4-2
PHASING OPTION 1 PRELIMINARY SCHEDULE

required for power and data. Previous projects have been successful with encasing the conduit in asphalt on the surface of the exiting pavement that can also serve as speed bumps in the lot.

TABLE 22
OPTION 1 PARKING COUNT BY PHASE

CRITERIA	Present	1-4	5	6-8
Short Term	212	165	0	191
Long Term	500	680	886	886
Economy	135	0	0	0
TOTAL Public	**847**	**845**	**886**	**1077**
Rental Car Ready Return	150	171	135	158
QTA Storage	-	-	264	264
TOTAL Rental Car	**150**	**171**	**399**	**422**

In order to access the temporary lot a short section of temporary roadway (less than 100') will need to be created to connect the existing terminal loop to John Glenn Drive. A 10' wide temporary sidewalk will also be required to connect the parking lot to the existing terminal. These improvements will require minor modifications to the existing Terminal Dr. and the removal of a small amount of landscaping along the edge of Terminal Dr.

Apart from the necessary power and data, no additional modifications to utilities is expected during this phase.

4.2.2 Phase 2

Construction of the new Rental Car Quick Turn Around (QTA) Facility occurs in Phase 2. The public interaction with rental car pick up or drop off will occur in the Rental Car Ready Return Lot which is to be completed in Phase 5. The preferred Rental Car QTA lot, however, can begin construction in Phase 2 because the proposed site is located at the corner of Grissom and Shepard Drive. The QTA facilities consist of a fueling and service canopy, car wash, and small mechanical building with an employee break room and restrooms. An estimated 6-8 light poles will be included throughout the parking lot, depending upon lighting generated from the proposed buildings. The new lot provides storage capacity for 171 rental cars, roughly meeting the projected growth for the year 2040.

4.2.3 Phase 3

Phase 3 includes construction of most of the new parking lot and approximately 80% of the new terminal loop road. See Figure 4-3 for the approximate phase boundaries in the parking lot. The phase begins with traffic exiting the terminal being diverted onto the John Glenn Dr. via the temporary road connection constructed in Phase 1. Traffic will then use Shepard Dr. and Blue Blvd. to exit the airport campus.

Unfortunately, not all of the parking lot can be constructed at this time. A swath of land approximately 10' wide centered on the existing FAA cable that runs through the parking lot must be protected during this phase. However, demolition of existing parking lot structures, pavement, and utilities can continue as long as the cable is adequately protected. At this time, construction of the majority of subsurface utilities that are under the parking lot will occur. Most of the existing parking lot drainage system will be and replaced with new drainage. Other utilities will also be moved or installed as long as they do not require the disruption of the public road network or interfere with the FAA cable. Some utilities may need to be capped until a later phase when the alignment can be completed.

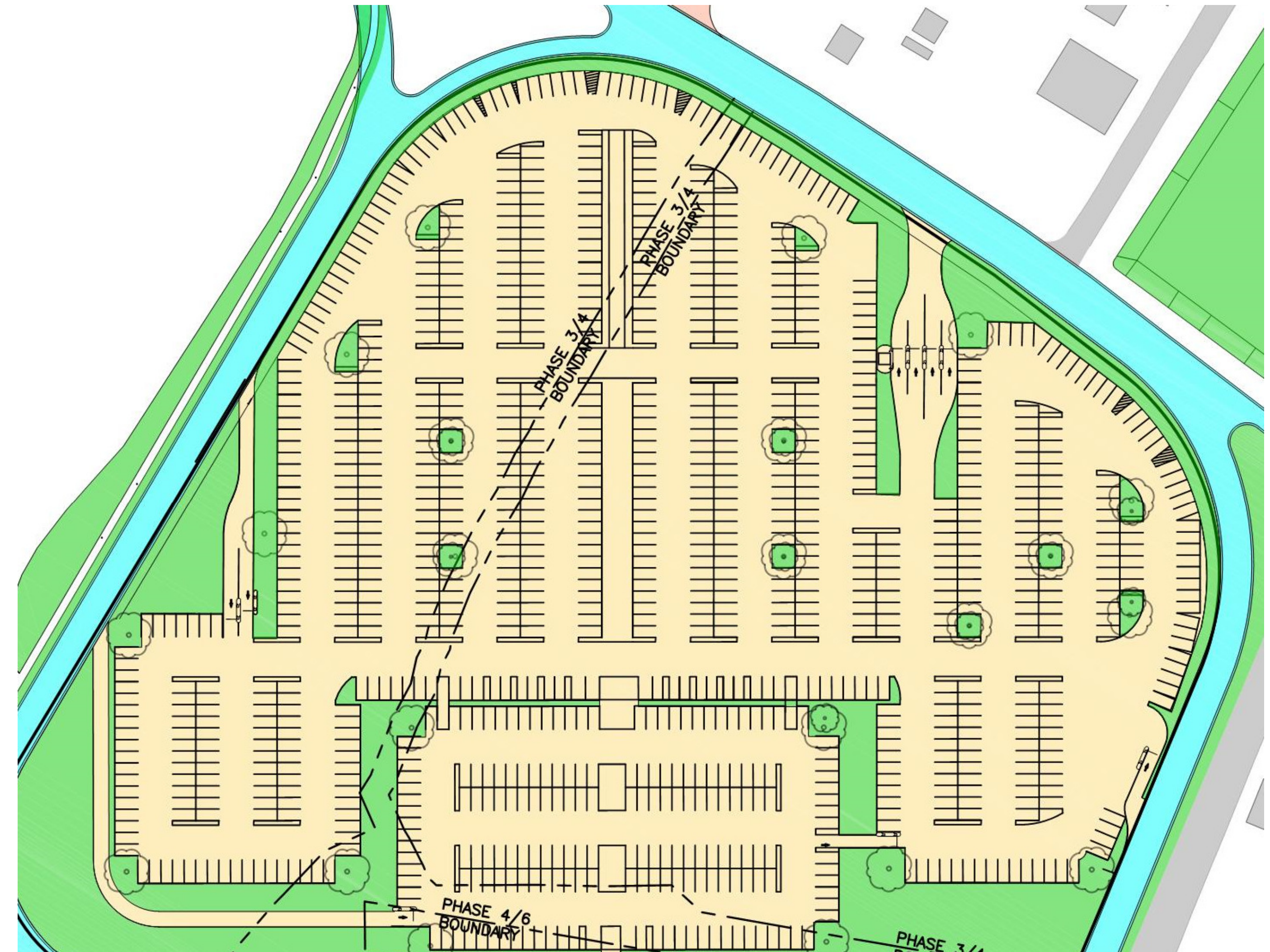


FIGURE 4-3
PARKING LOT PHASING IN OPTION 1

In addition to the parking lot, a campus detention pond will be constructed at the corner of Shepard and Blue Blvd. This pond cannot be constructed until the new rental car QTA facility is complete and the existing tenant, AVIS, has relocated their operation to the new QTA. This location was chosen because most of the water from the terminal complex already drains past this site in a 54" reinforced concrete pipe.

Finally, a concrete encased ductbank will be constructed along Shepard Drive in preparation for the FAA communication cable serving the RTR site being relocated out of the parking lot and into the new duct bank.

4.2.4 Phase 4

Phase 4 involves relocating the FAA cable that connects the RTR to the control tower. It should be noted that phase 4 does not necessarily follow phase 3, it may be concurrent. At this time the design team is working with the program managers, the airport and the FAA to quickly relocate the cable. However, a lot of pieces are still in play and the exact schedule is unknown at this point. Therefore the team shows this phase to follow for conservancy and to allow ample time to work through the various problems surrounding this complex issue. The critical component of these two phases is that the existing FAA cable in the parking lot MUST remain operational until the rerouted cable along Shepard Dr. is functional.

Currently the cable runs directly under the proposed terminal site and through the proposed parking lot. The design team proposes to move the cable such that it runs along Shepard Dr. and to the RTR. To reroute the cable the design team plans to directional drill under the existing apron to connect with John Glenn Dr. The cable would then run along John Glenn Dr. until it intercepts the concrete encased duct bank along Shepard Dr. constructed as part of phase 4. From there it will continue along Shepard and cross Blue Blvd. before running along the north side of Blue Blvd. to the RTR site. Any street crossings will be accomplished by directional drilling with a grout backfill. After the new cable has been commissioned by the FAA the contractor will remove the existing cable as well as the old duct bank in the parking lot. The contractor can then complete all but the short term portion of the parking lot.

4.2.5 Phase 5

Phase 5 is the largest phase and contains all of the terminal building work. These overall phasing plans assume that that terminal construction can proceed uninterrupted and unhindered for the duration of this phase. In addition to construction of the terminal building, a new parking lot east of the terminal will be constructed and the airfield apron will be expanded. This phasing plan also assumes that a temporary AOA fence will be erected around the site so that the terminal building and parking lot work can be performed on the non-secure side of the fence.

The east parking lot is intended to become the Rental Car Ready Return Lot. This lot will also include a mechanical building on the east edge of the lot. Subsurface utilities will be required to connect the mechanical building to the main terminal. Refer to the building systems sections for more information on this building and its connections to the main terminal.

The apron extension is the only work during this phase that the design team intends to take place inside the AOA fence and consequently be subject to FAA and TSA security guidelines for airfield construction. Airfield traffic to the existing terminal will need to be maintained during construction. Access will be via Taxiway B for the main terminal and general aviation traffic will continue to utilize taxiway F to access North apron. The only taxiway closure will be Taxiway A.

The current design calls for the terminal apron to be extended and Taxiway A to be reconstructed. The reconstruction of Taxiway B will take place at a later phase. Generally the terminal apron will be unreinforced concrete pavement and Taxiway A will be bituminous concrete pavement.

Further improvements to the existing terminal road will be also be made during this phase. Major changes include adjusting Blue Blvd. to three lanes on the west bound side and reconfiguring Blue Blvd. for one way traffic from Shepard to the western most intersection with Terminal Dr. At the end of phase 5 the new terminal opens to the public.

4.2.6 Phase 6

Phase 6 marks the opening of the new terminal and it is at this time that public access to the old terminal can be cut off. Final connections of the new terminal loop will be constructed as well as the final stages of the parking lot, specifically the new short term lot. The final road connections at the return to terminal spur and immediately in front of the terminal will likely need to occur in a phased, lane by lane manner. In addition, some or all of the canopy over the new terminal drive may need to be completed at this time.

4.2.7 Phase 7

Phase 7 is characterized by the demolition of the old terminal building and the construction of the west parking lot. A temporary AOA fence will be erected around the old terminal to move demolition work outside of the airport's secure area. Additional access will be required to ensure that delivery vehicles can also access the new terminal's service area located on the east end of the building. Demolition work will also include the removal of any subsurface utilities in this area that are no longer required. After the terminal is demolished and the site is clear the west parking lot and terminal service road can be constructed.

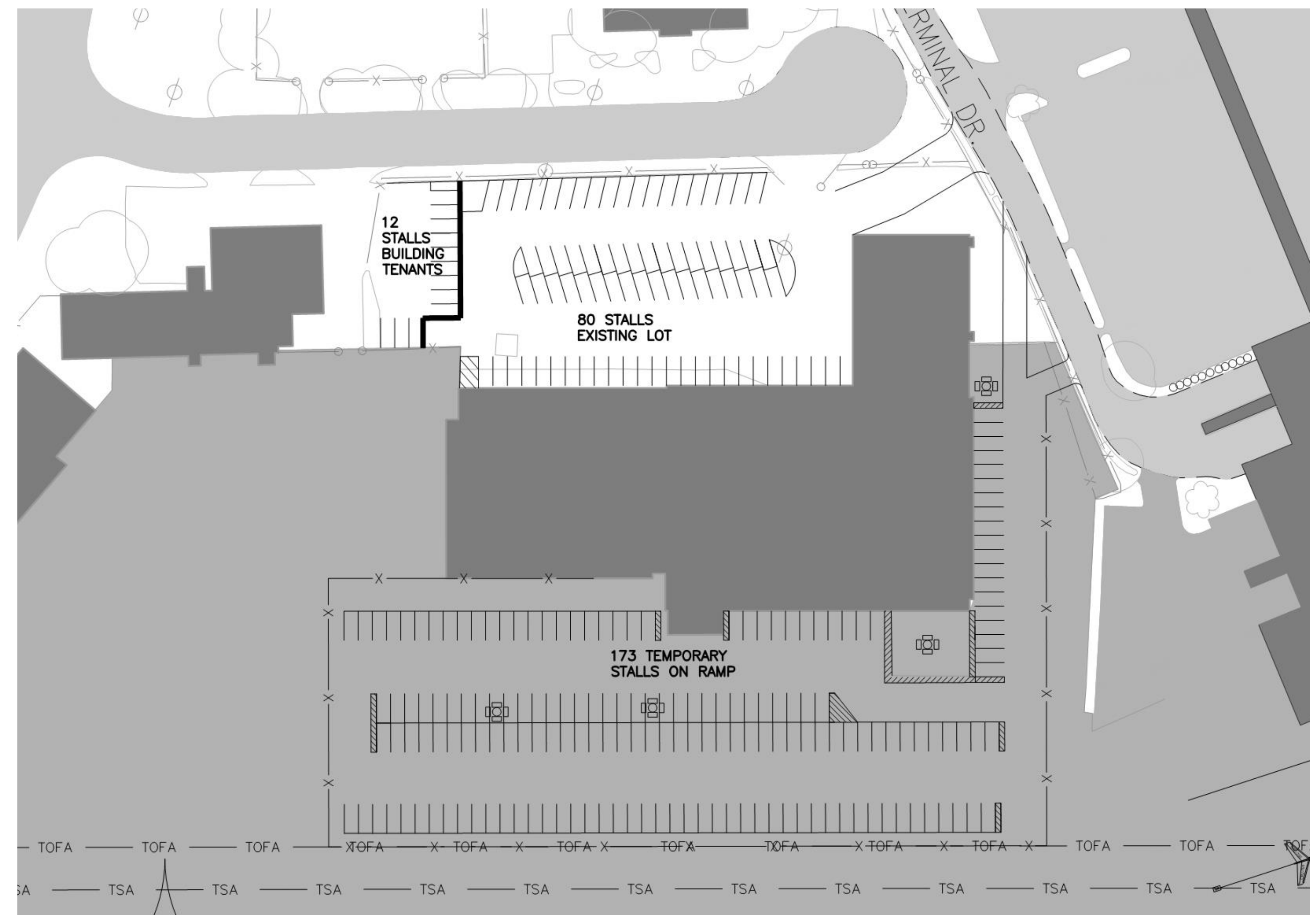


FIGURE 4-4
OPTION 2 - PHASE 1 TEMPORARY PARKING LOTS

4.2.8 Phase 8

Phase 8 is the straightening of taxiway B and will be entirely inside the AOA. All construction activities will be subject to the FAA rules regarding construction work on an airport. This phase will realign taxiway B and its centerline to remove the existing "kink" in the alignment. It will also ensure that the new taxiway A-B intersection is at a right angle to each other. Work here will include a full depth reconstruction of taxiway B on its new alignment. It will also install shoulders on taxiway B and improve drainage and lighting. There is an FAA duct bank that runs under taxiway B. It is expected that these lines will remain in place; however, hand holes or ductbank may need to be reconstructed to meet aircraft load ratings.

4.3 OPTION 2

Phasing option 2 can best be summarized as the accelerated terminal schedule. Instead of building most of the parking lot in one step the lot is instead built in a three phase process. Since a large temporary lot is not built on the apron, the terminal construction can proceed as soon as the FAA RTR cable is moved. Initial estimates suggest that this will bring the terminal groundbreaking forward approximately 6 months. See Figure 4-6 for the Option 2 preliminary schedule. However, one of the downsides to this schedule is that it removes a lot of the float and any delay between now and the groundbreaking results in a day for day delay.

This accelerated schedule is achieved at the expense of cost and convenience. The costs primarily come from the division of the parking lot into three sub phases. This means there will likely be more mobilization costs and an increase in temporary construction items needed to maintain operations. In terms of convenience, preliminary analysis suggests that parking may become an issue at the airport. Unlike in option 1, option 2 reduces the parking space count below the forecasted values, see Table 23. To alleviate this the design team proposes building a new economy lot on the west side of airport property but this would only be a partial solution and it is possible that at peak travel times the airport will run out of parking during the construction process. One way to mitigate this situation is to align the schedule such that the period of least parking availability occurs during the slow season for the airport. Another drawback is that due to the increased number of phases in the parking lot the public will perceive the airport to be constantly changing. This could cause congestion and passenger frustration as even the most frequent travelers would find themselves on unfamiliar ground. A detailed phase by phase explanation is described in the following sections.

4.3.1 Phase 1

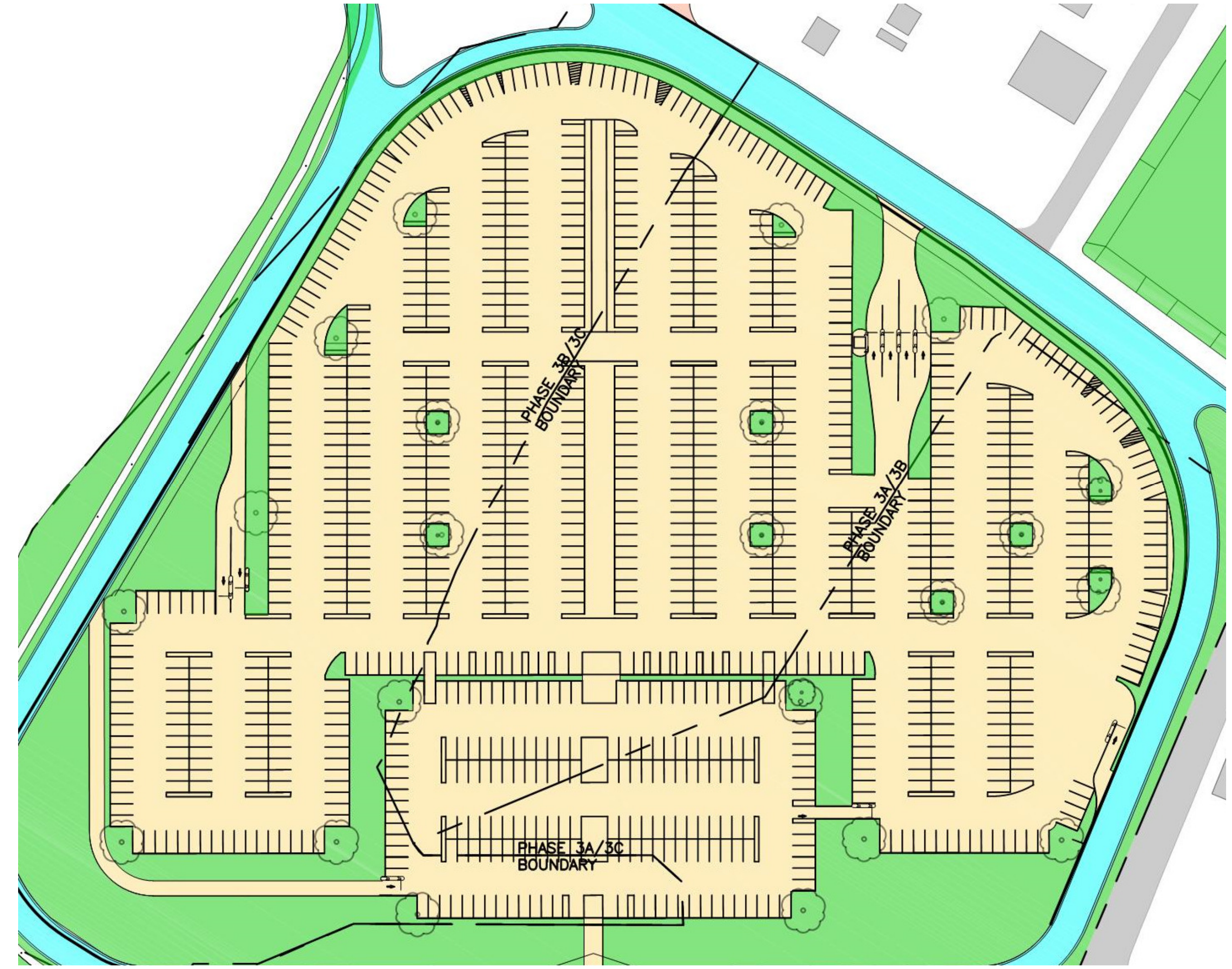
Phase 1 is an enabling phase. It consists of the demolition of several existing buildings as well as the construction of the economy lot west of the existing Terminal Dr. The first component of this phase is the demolition of the existing hangar 11.

Next a new parking lot would be constructed on the apron where the Fed-Ex Cargo operation is currently located. The rental car ready return lot would also be relocated to the public parking lot in front of the Hangar, see Figure 4-4. The construction and amenities available in this lot are substantially similar to those described in option 1.

4.3.2 Phase 2

Phase 2 is substantially similar to what was described in Option 1

4.3.3 Phase 3



OPTION 2 PARKING LOT PHASING

TABLE 23
OPTION 2 PARKING COUNT BY PHASE

Facility	Present	1	2	3A	3B	3C-4	5	6-8
Short Term	212	212	212	212	212	0	191	191
Long Term	500	500	500	500	563	591	886	886
Economy	135	135	171	171	171	171	171	0
TOTAL Public	**847**	**847**	**847**	**847**	**946**	**762**	**1248**	**1077**
Rental Car – Ready Return	150	150	80	80	80	80	80	158
QTA Storage	-	-	-	-	-	-	264	264
TOTAL Rental Car	**150**	**150**	**100**	**100**	**100**	**100**	**364**	**422**

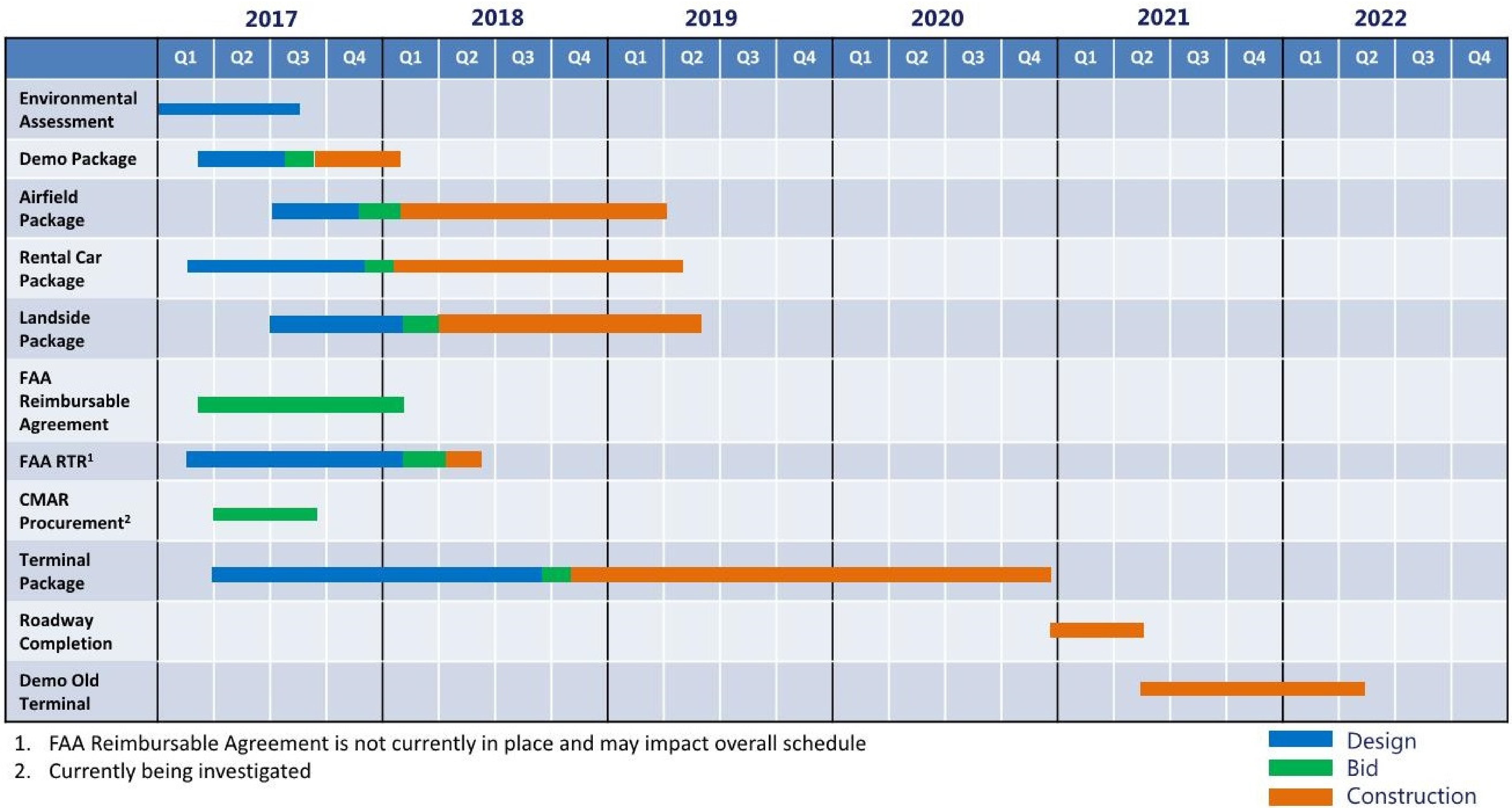


FIGURE 4-6
PHASING OPTION2 PRELIMINARY SCHEDULE

4.3.3.1 Phase 3A

Phase 3A is the easternmost portion of the parking lot and loop road. It is defined as the area between Terminal Dr. Shepard Dr. and John Glenn Dr. During this time the existing parking lot remains untouched and the airport has the benefit of the temporary economy lot. However, the existing rental car ready return lot will be relocated to a portion of the existing short term lot immediately in front of the terminal. This means that the airport will have lost about 95 stalls. This phase would also construct the eastern portion of the loop road as well as the new terminal's curbside drive. The parking count during this phase is expected to be 748 spaces.

4.3.3.2 Phase 3B

Phase 3B is the central portion of the new lot. Traffic from the existing terminal would be diverted onto the portion of the loop road constructed in phase 3A. The eastern portion of terminal Dr. could be demolished as well as the eastern half of the existing lot. The western portion of the old lot and the phase 3A section would be connected to serve as one parking lot. The new toll plaza would be constructed first, and once complete, the old toll plaza demolished. The expected usable parking stall count is expected to be 958 stalls.

4.3.3.3 Phase 3C

This would construct the final portion of the parking lot and the western portion of the terminal loop road. Parking during this phase is expected to be limited to approximately 730 stalls. This phase is also contingent on the relocation of the RTR in phase 4. However, preliminary schedules show that the cable will be relocated at this point in time.

4.3.4 Phase 4

Phase 4 involves relocating the FAA cable that connects the RTR to the control tower. It should be noted that phase 4 does not follow phase 3, in fact it is expected to be concurrent. At this time the design team is working with the program managers, the airport and the FAA to quickly relocate the cable. However, a lot of pieces are still in play and the exact schedule is unknown at this point. Therefore the team shows this phase to follow for conservancy and to allow ample time to work through the various problems surrounding this complex issue.

Currently the cable runs directly under the proposed terminal site and through the proposed parking lot. The design team proposes to move the cable such that it runs along Shepard Dr. and to the RTR. To reroute the cable the design team plans to directional drill under the existing apron to connect with John Glenn Dr. The cable would then run along John Glenn Dr. until it intercepts the concrete encased duct bank along Shepard Dr. constructed as part of phase 4. From there it will continue along Shepard and cross Blue Blvd. before running along the north side of Blue Blvd. to the RTR site. Any street crossings will be accomplished by directional drilling with a grout backfill. After the new cable has been commissioned by the FAA the contractor will remove the existing cable as well as the old duct bank in the parking lot. The contractor can then complete all but the short term portion of the parking lot.

4.3.5 Phase 5-8

Phase 5-8 are essentially the same as described in option 1. See Sections 4.2.5-4.2.8 for an explanation of the work done during this phase

CHAPTER 5

PROJECT COSTS AND BUDGET

The Terminal Program is a combination of terminal building and site improvements that will provide the commercial passenger facilities required to allow the Lafayette Regional Airport to grow and meet the demands placed on it by the community's growth and economic development. All of this development comes at a cost. The improvements defined in the earlier sections meet the demands. However, this step in the process is to define the conceptual cost of the program so it can be determined if the LAC has the resources available to afford the full program or if parts must be deferred or omitted.

5.1 PROGRAM COSTS

The Program was defined in the previous sections of this report. It can be divided into several component parts to aid in the understanding of the overall value of each part. The Program can be broken into terminal building and site. It can be further subdivided into terminal building, passenger boarding bridges, curbside canopy for the building and various parking lots, roadway, apron, utilities, etc. for the site. In addition, there are a few improvements that have been added to the overall terminal Program that are expected to have separate funding streams that are outside the original terminal budget. These include the Rental Car QTA, and a portion of the airside work. It is expected that a customer facility charge (CFC) could fund the QTA and the Ready Return Lot and that additional FAA AIP discretionary grants could fund some of the airfield improvements.

Connico Incorporated was hired to assist the design team in estimating the costs of the construction. Connico developed initial estimates based on drawings, notes, and conversations provided by the design team. These estimates revealed that the three architectural themes that were explored did not have significant differences in expected construction costs. The cost differential was approximately 5% between the highest priced option and the lowest priced option. Therefore, cost was not a significant driver in the selection of the terminal architectural themes. The major elements of the Terminal Program are listed in Table 24. The estimated costs below are inclusive of the contractor or construction manager's construction markups, a construction contingency, and design fees.

The terminal program was also expanded to provide new and enhanced facilities for the rental car companies operating on the airport. These facilities include a common-use Quick Turn Around facility for washing and fueling of vehicles, vehicle Storage and Ready Return Parking Lots and all the associated drainage and utility support components. The ready return lot also includes covered parking and additional sidewalks that are not included in the other parking lots for added customer convenience. These facilities can be financed through the use of a customer facility charge (CFC) added to each car rental.

The total of the conceptual Terminal Program is estimated to be approximately $122.4 million. The additional improvements for the Rental Cars to add the QTA and Storage and Ready/Return Parking is another $8.5 million. This Expanded Program is estimated to cost approximately $130.9 million. Appendix F provides the cost estimate provided by Connico. Minor adjustments to the overall program were made based on the costs presented in the Connico report so the costs presented here differ slightly from the Connico report.

Depending on which phasing option is selected, the breakdown of the construction packages changes slightly to include project elements in the package that best fits the phasing plan. The overall costs are considered to be similar and for comparison purposes are shown as equal. Table 25 below shows the conceptual breakdown of the construction packages that correspond with the schedule Option 1 shown in Chapter 4, Figure 4-2.

TABLE 24
TERMINAL PROGRAM COST ITEMS

DESCRIPTION	Cost (Millions)
Terminal Building	$82.1
Passenger Boarding Bridges	$6.3
Curbside Canopy	$3.1
Public Parking Lots	$7.9
Covered Walkways in Parking	$1.4
Covered VIP Parking	$0.1
RTR Cable Relocation	$1.6
Aircraft Apron	$11.3
Site Civil & Utilities	$3.9
Demo., Empl. Parking, Temp. Facilities	$4.7
Subtotal Terminal Program	**$122.4**
Rental Car Ready/Return & QTA	$8.5
Total Terminal & Rental Car Program	**$130.9**

TABLE 25
OPTION 1 PACKAGING ESTIMATED COSTS

OPTION 1 CONSTRUCTION PACKAGING	Cost (Millions)
Demolition Package	$1.6
Airfield Package	$7.4
Rental Car Package	$8.5
Landside Package	$10.9
FAA RTR	$1.6
Terminal Package	$96.8
Roadway Completion Package	$1.0
Old Terminal Demolition Package	$3.1
TOTAL	$130.9

Table 26 below shows the conceptual breakdown of the construction packages that correspond with the schedule Option 2 shown in Chapter 4, Figure 4-6.

TABLE 26
OPTION 2 PACKAGING ESTIMATED COSTS

OPTION 2 CONSTRUCTION PACKAGING	Cost (Millions)
Demolition Package	$1.6
Airfield Package	$11.4
Rental Car Package	$8.5
Landside Package	$11.4
FAA RTR	$1.6
Terminal Package	$92.8
Roadway Completion Package	$0.5
Old Terminal Demolition Package	$3.1
TOTAL	$130.9

Both Option 1 and Option 2 have the same package elements, but the makeup of some of the packages shifts some work elements from one package to the other to achieve the objectives of the respective schedules.

5.2 PROGRAM BUDGET

The LAC budget for the terminal Program is under development by the LAC, airport staff, and Heery, the program manager. The overall budget, including the expanded scope items, is assumed to be in the $130 million range. Through a cooperative approach between the design team, the Owner, and the program managers, the overall program will evaluated to determine LAC's highest priorities, what items might not provide the same value for the money as other elements of the program, and possible value engineering opportunities for either elimination or deferral until additional resources are available.