

**KILLEEN INDEPENDENT SCHOOL DISTRICT**  
SHERIDAN TRANSPORTATION FACILITY EXPANSION

# SCHEMATIC DESIGN PRESENTATION



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SHERIDAN TRANSPORTATION FACILITY EXPANSION

NOT FOR REGULATORY APPROVAL, PERMITTING, OR CONSTRUCTION

NATALIE WELCH TX #26186

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# KILLEEN INDEPENDENT SCHOOL DISTRICT

## SHERIDAN TRANSPORTATION FACILITY EXPANSION

### Project Introduction

Killeen Independent School District initiated a Long-Range Facility Needs Plan for Bus Facility Assignments to proactively respond to an internal audit conducted in 2019. A scenario evaluation analysis was utilized to identify facility needs within the district at both Main and Sheridan Transportation Facilities (as well as a third potential site) for the next 5-year, 10-year, and 20-year horizons. The need for the Sheridan Transportation Facility to grow significantly over the next several years prompted further studies regarding the development of additional parking and structures on-site.

### Sheridan Site

The site is approximately 6-acres within the 70-acre overall transportation facility property. The site is bound by undeveloped land to the south and east. Trimmer Rd is located to the west of the site. A residential home is to the north.

### Topography

The site slopes in two directions with the majority of the site sloping towards the northeast into an existing detention pond. The other part of the site is sloping into an empty field and drains into Trimmer Rd.

### Access and Site Circulation

Sheridan Transportation facility has an entrance/exit onto Trimmer Rd. No additional curb cuts are proposed. All traffic will continue to use the existing entrance/exit. District vehicles including buses and white fleet vehicles will be separated from staff parking by secured gate access.

### Drainage

There is an existing detention pond to the northeast side of the site. The existing detention pond will be modified to detain most of the increase in runoff. A proposed detention pond to the southwest of the site will be designed to capture the runoff currently flowing into Trimmer Rd.

### Storm Water Best Management Practices (BMPs)

City of Killeen requires stormwater BMPs to satisfy storm water quality requirements. The design team will evaluate the credit needed based on the final site plan. At this time, only limited BMP measures are anticipated.

### Pavement

Onsite drives and parking spaces will be concrete matching existing conditions. A geotechnical report will provide recommendations for pavement and subgrade thickness.

### Fueling Station

The existing Sheridan Transportation Facility has 4 fueling stations and based on studies, will expand for a total of 8 fueling stations. Overhead canopy to extend and match existing canopy. Additional fueling tank not required.

### Parking

The parking count at the Sheridan Transportation Facility increased significantly at the 5-year horizon and incrementally for the 10-year and 20-year horizons to allow for additional bus parking, white fleet parking, maintenance, and staff parking. Visitor parking is located in the first parking lot off of the access drive.

### Sheridan Building Designs

#### Existing Transportation Bus Maintenance Building Renovation and Expansion

The existing transportation building is a pre-engineered metal building which currently serves 101 buses with two maintenance bays, two office spaces, and restrooms, for a total 5,176 SF. At the 5-year horizon it is proposed to expand the facility by 6 additional bays at 6,600 SF to serve the estimated 253 buses. It is proposed that 4 additional maintenance bays plus additional storage be added at the 10-year horizon to serve the bus increase for the 10-year and 20-year horizons. Upon completion of the 20-year horizon, the building total square footage will equal 16,726 SF.

#### New Transportation Administration Building

With the recommendation to relocate and house the majority of the district's buses at Sheridan Transportation Facility at the 5-year horizon, the transportation office staff will also relocate to Sheridan. The new Transportation Administration building for a total of approximately 16,860 SF, is proposed to be constructed as a pre-engineered building housing office staff, Drivers Training Room, Driver Restrooms/ Lockers with shell spaces for future office growth with the 10-year and 20-year horizons.

### Facility Maintenance Department Analysis

The mileages between each campus and both the Sheridan and Main Transportation facilities were calculated, and the total mileage for each facility and distance between every campus equals to:

- Sheridan 440 miles
- Main 312 miles

These numbers only reflect the existing campuses, with adding future locations closer to Sheridan, the numbers will naturally adjust but Main would most likely not exceed Sheridan. The mileage savings seen with the buses is really more responsive to the number of vehicles each school needs and the distribution of the homes of the students they serve. These white fleet vehicles would not deal with those factors. As such, KISD has chosen to keep the Facility Maintenance Department at the existing facilities near the Administration complex.

### Building Envelopes

Pre-engineered metal building wall paneling to match district's standards. Standing seam roofing with 3:12 slope.

### Structural

The pre-engineered metal building design to be in accordance with the requirements of the following Construction Industry Codes and Specifications:

- International Code Council, International Building Code (IBC) 2018
- American Society of Civil Engineers. ASCE 7-16, Minimum Design Loads for Buildings and Other Structures
- The structure will be designed in accordance with all applicable building codes associated with IBC 2018.



# KILLEEN INDEPENDENT SCHOOL DISTRICT

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Foundation System: Per recommendations provided in the geotechnical report as well as final decisions made in the geotechnical conference.

Framing & Roof Framing System: Gabled clear-span pre-engineered metal building.

Lateral Stability: Wind and seismic analysis to be performed in accordance with the design codes listed above. The lateral force resisting design shall be based on the controlling load. Seismic resisting systems and special requirements as prescribed in IBC, ASCE 7, and AISC and to be taken into account. Lateral loads are transferred from the roof and second floor diaphragms to the foundation by use of brace frames and/ or moment frames.

### Mechanical

The office space HVAC systems to be designed to provide cooling and heating to maintain space temperatures of 72°F in cooling mode, 72°F in heating mode, and space relative humidity no greater than 50%. The building's HVAC equipment will be controlled via a building automation system. Ductless split systems will provide heating and cooling for IDF and MDF closets. Roof Mounted Exhaust fans will serve group and private restrooms.

### Electrical/Lighting

New electrical service will be provided to a new main switch to each building with 480/3-phase power. Typical offices will be provided with general receptacles located throughout each room. All interior and exterior lighting will be served with high efficiency LED luminaires. Lighting controls will allow dimming and daylight harvesting where required. Corridor lighting will be controlled via occupancy sensor only. Emergency lighting will be provided by normal fixtures powered from multiple centrally located emergency lighting inverters.

### Plumbing

New water closets will be wall mounted, with manual flush valves. Lavatories will be wall mount wash stations with tempered water metering type. Electric water coolers will have bottle fillers. Condensate for RTUs will be routed from the roof below the roof deck then collected and disposed of in an approved receptor. Exterior roof downspouts will be used.

### Fire Protection

All portions of the building to be protected by an automatic, wet-pipe fire sprinkler system; designed by a licensed fire protection designer as required by code. The fire alarm control panel will be a Silent Knight system.

### Technology

The scope will include the implementation of premise (pre-planned) distribution, Driver Training Room will have audio-video, all buildings to have an intercom system, infrastructure for surveillance cameras, and an access control system. The systems design and specifications will be based on recent projects with the district, district guidelines and client input, industry standards, and best practices.

### Proposed Third Location

Upon completion of the analysis, the design team ranked campuses in order of highest deadhead mileage, or miles traveled without student passengers. It was identified that roughly 40-50% of the highest mileage campuses were located in the western portion of the district. This identified that the most impactful location for a third transportation facility would be in this area. For the purposes of analysis, Shoemaker High School was utilized for the calculations until such time as an available property is identified. The bus routing analysis was completed again by assigning buses that would be best served from this location.

The project will be designed to the latest Killeen ISD district standards available at the time of design.



# KILLEEN INDEPENDENT SCHOOL DISTRICT SHERIDAN TRANSPORTATION FACILITY EXPANSION

## BACKGROUND

In 2019, the Killeen Independent School District (KISD) performed an internal audit of the transportation function of the district to review and improve efficiency and effectiveness of its services, as well as compliance with local, state, and federal requirements. The audit identified 31 recommendations for improvement, with one of the high-ranked priorities being that KISD should develop a long-term transportation facilities plan.

Several issues that KISD’s transportation services are facing or will be facing in the near future can be addressed by developing a plan for facility improvement over the next 20 years. At the Sheridan bus facility, the audit identified inadequacies in the size of parts and supplies storage, shop management and administrative office space, number of maintenance bays, parking spots, and number of restrooms. Without a plan to address these issues, the changing pattern of student population growth in KISD will require more use of the Sheridan facility and exacerbate the existing problems with its effectiveness and efficiency.

KISD is anticipating the need to expand the parking and maintenance facilities at the Sheridan facility to respond to the changing shape of the district’s student population. The district projects population growth of 1.2 percent per year through the 2025-26 school year. While this is slower than the historical growth rate from 2007 to 2018 of 1.5 percent, the projected growth is focused in the southern half of the district, closer to the Sheridan facility. This pattern of growth, as projected by the Killeen-Temple Metropolitan Planning Organization (KTMPO) for the development of the region’s Mobility 2045 Metropolitan Transportation Plan, is expected to continue for the next 20 years.

To accommodate the expected growth over the next 20 years, KISD developed this scenario evaluation analysis to identify facility needs and determine size and functionality of its bus facilities. This analysis uses KTMPO household projections, KISD student population trends, anticipated future school locations, and existing route and vehicle performance metrics to determine the bus fleet and facility needs at the Main and Sheridan facilities in the next 5-, 10-, and 20- year horizons to inform the district’s Master Facilities Plan.

## METHODOLOGY

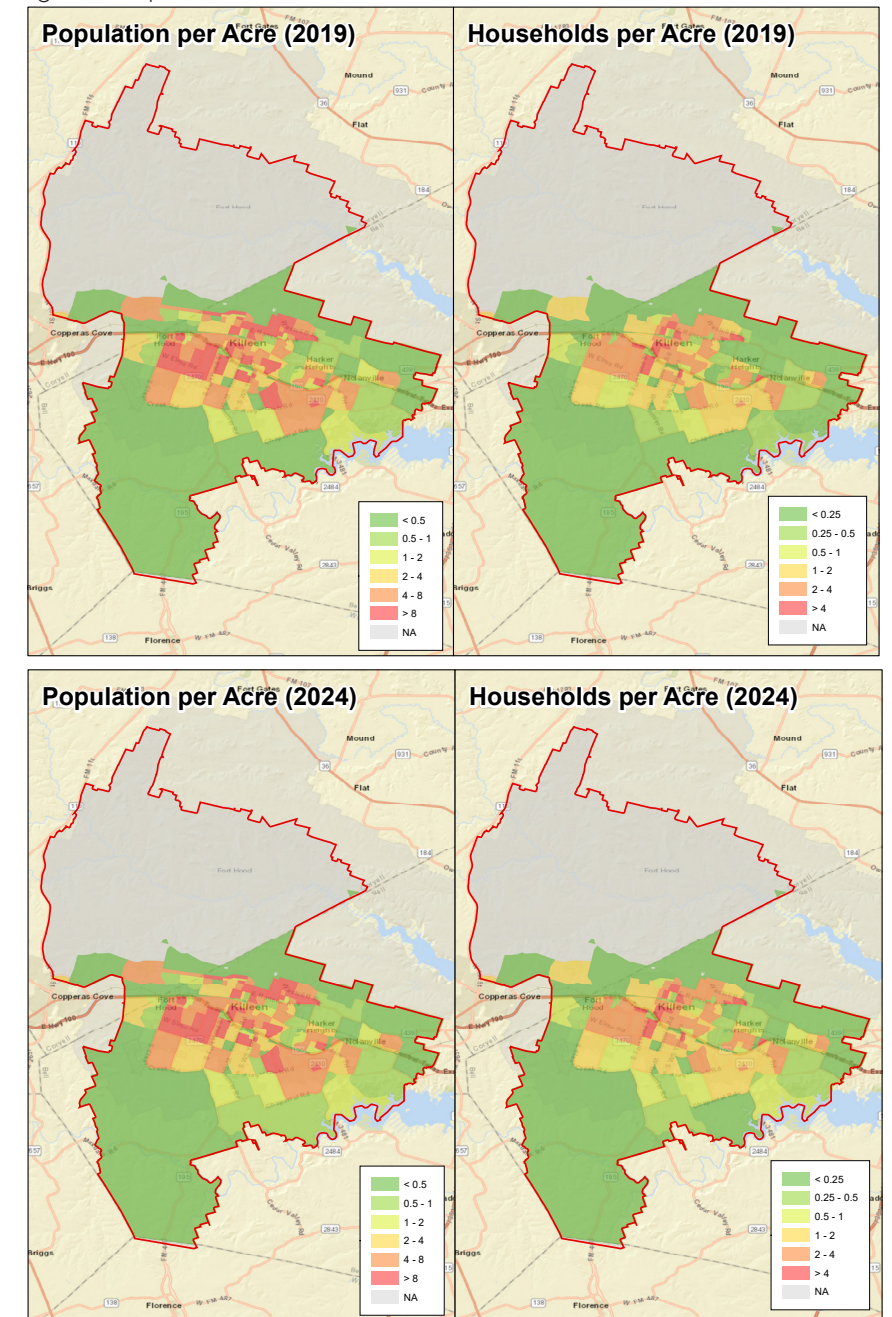
This scenario evaluation analysis uses population and household growth projections developed by the KTMPO and demographic metrics related to student attendance per household developed by KISD to estimate the geographic distribution of the enrolled student body of KISD using its regular bus services in the 5-, 10- and 20-year future horizon years. Based on this estimate of where students will be living in the future, as well as approximate locations of future schools, KISD’s bus routing software, Transfinder, was used to estimate the number of buses needed to serve its regular education needs and the optimal assignment of buses to the Main and Sheridan bus facilities in the future horizon years.

## STUDENT PROJECTIONS

By 2045, KTMPO estimates that the region, which includes communities within KISD, as well as Temple, Belton, and Copperas Cove, will add more than 206,000 people and 105,000 jobs. Within the KISD boundaries alone, approximately 59,000 new residents will live in 29,000 new households by 2045. Populations and households will continue to be more densely clustered in the city of Killeen, but as new development is built to accommodate additional residents, growth in population is anticipated to shift east to Harker Heights and Nolanville and south toward the Lampasas River and Stillhouse Hollow Lake. Fort Hood’s facilities restrict growth to the north and west of Killeen.

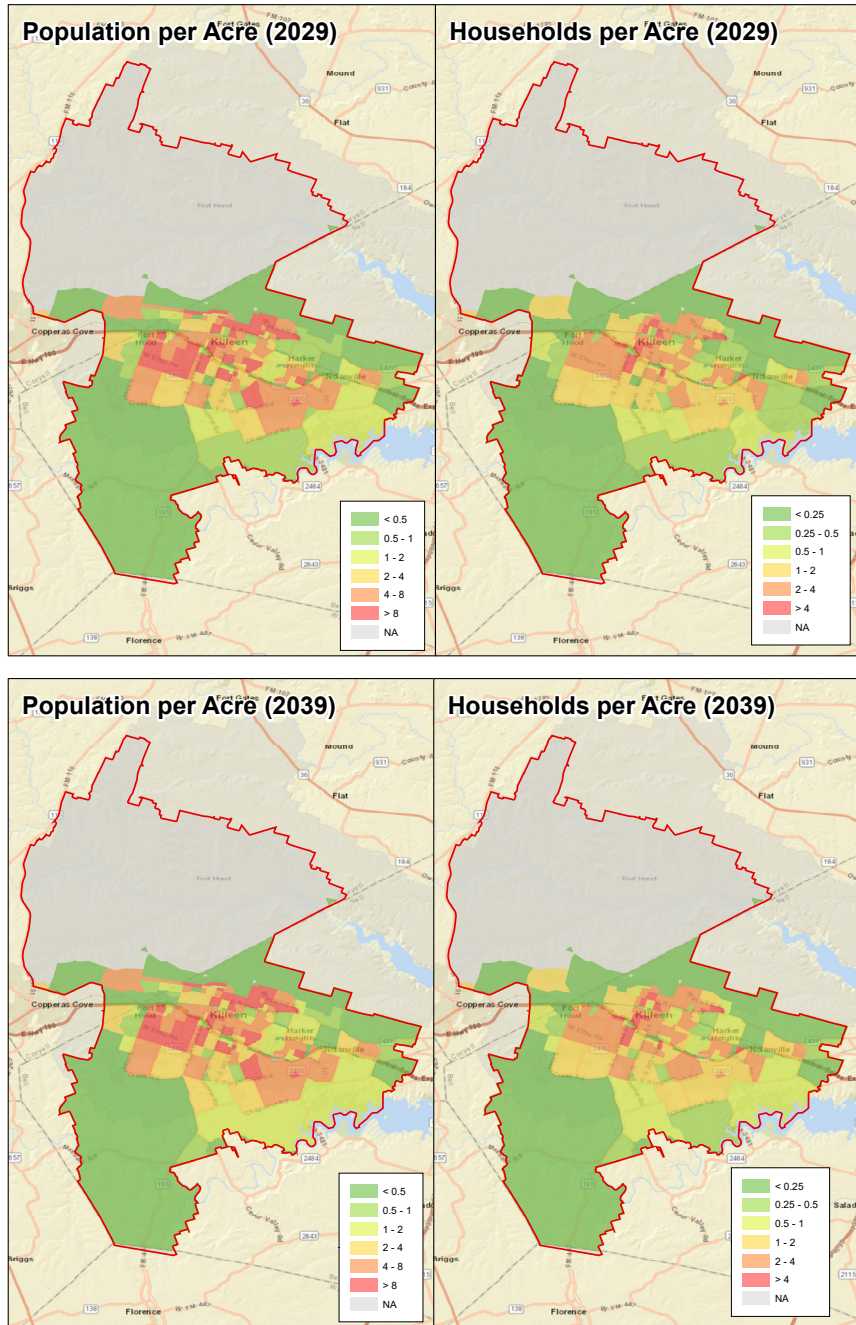
Using KTMPO’s 2045 projections and estimates for existing population and households in the region, the distribution of growth and density in the present year and 5-, 10-, and 20-year future horizons were developed based on an assumed pattern of consistent annual growth. As shown in **Figure 1** below, the change in expected population and household density gradually shifts to the south and east of the current cluster of density in Killeen.

Figure 1: Population and Household Growth in KISD





# KILLEEN INDEPENDENT SCHOOL DISTRICT SHERIDAN TRANSPORTATION FACILITY EXPANSION



KISD estimates the number of students to be enrolled in its schools in future years by household unit. The district develops a projection for the number of elementary, middle, and high school students per household unit across 13 different subareas within the district boundaries. On average, KISD projects 0.35 elementary school students per household, 0.13 middle school students, and 0.16 high school students.

Based on KTMPo household projections and KISD enrollment estimates, an additional 11,060 students will be enrolled in KISD’s regular education programs in 20 years. The majority of the additional students will be living in areas south and east of the current population center, many in areas not yet developed. **Table 1** shows the future estimates for which school level these additional students will be attending and when those students are projected to attend KISD schools.

Table 1: KISD Additional Students Enrolled by School Level and Horizon Year

	(2019) - 5-Year (2024)	5-Year (2024) - 10-Year (2029)	10-Year (2029) - 20-Year (2039)
Elementary	1,425	1,425	2,850
Middle	621	621	1,242
High	719	719	1,438
<b>Total</b>	<b>2,765</b>	<b>2,765</b>	<b>5,530</b>

### NETWORK PROJECTIONS

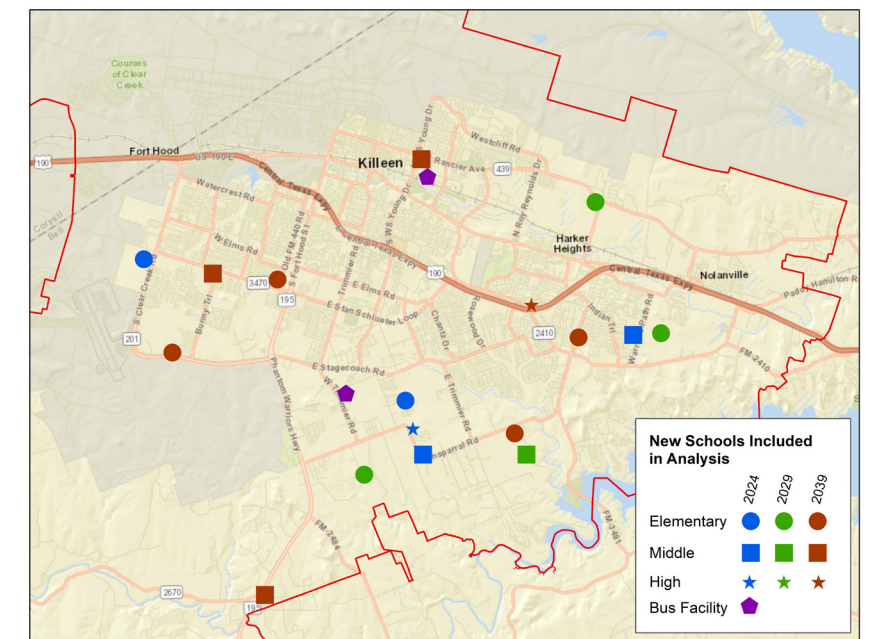
In addition to changes in student populations, the schools served and roadways traveled by KISD’s school buses will change over the next 5, 10, and 20 years. For school locations, KISD estimated that 17 new schools would be built by 2040. School locations through 2029 were determined by KISD staff, while the remaining school locations were determined based on the locations of overcapacity schools in 2039. Of the 17 new schools, five would be built by 2024, four between 2024 and 2029, and eight between 2029 and 2039. **Table 2** shows the school levels served by the new schools built by 2040 included in the analysis. **Figure 2** shows the locations of the new schools included in the analysis.

Table 2: New KISD Schools Built by 2040 Included in Analysis

	(2019) - 5-Year (2024)	5-Year (2024) - 10-Year (2029)	10-Year (2029) - 20-Year (2039)
Elementary	2	3	4
Middle	2	1	3
High	1	0	1

Modeled schools reflect anticipated construction schedule from Summer 2019 and may not reflect changes to anticipated construction schedule related to 2020 bond.

Figure 2: New School Locations Included in Analysis



With the addition of each new school in the Transfinder routing software, attendance zones were recalibrated to ensure nearby schools were no longer over their built capacity. Once the school attendance zones were developed, KISD used Transfinder to determine the bus service non-eligibility zones for each new school, resulting in students living within one mile (walking distance) of their assigned elementary school or two miles of their assigned middle or high school not eligible for regular bus service, unless a hazardous condition had been identified that would make the trip unwalkable for students.



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Along with new schools, plans for new or improved roadway and pedestrian facilities were integrated into the routing map within the Transfinder routing software. Planned facilities were assigned years for completion based on projections from the plans themselves or, in cases where no projected construction year was provided, derived from other nearby projects. Plans reviewed for future roadway projects included:

- KTMPO, Mobility 2045 Metropolitan Transportation Plan, 2019
- Bell County Thoroughfare Plan, 2001
- City of Harker Heights Comprehensive Plan, 2007
- City of Killeen Comprehensive Plan, 2010
- City of Harker Height Mobility 2030 Comprehensive Plan Update, 2014

**Figure 3** shows which planned roadway improvements were included in the routing map for each of the 5-, 10-, and 20-year future horizon years.

Figure 3: Planned Roadway Improvements

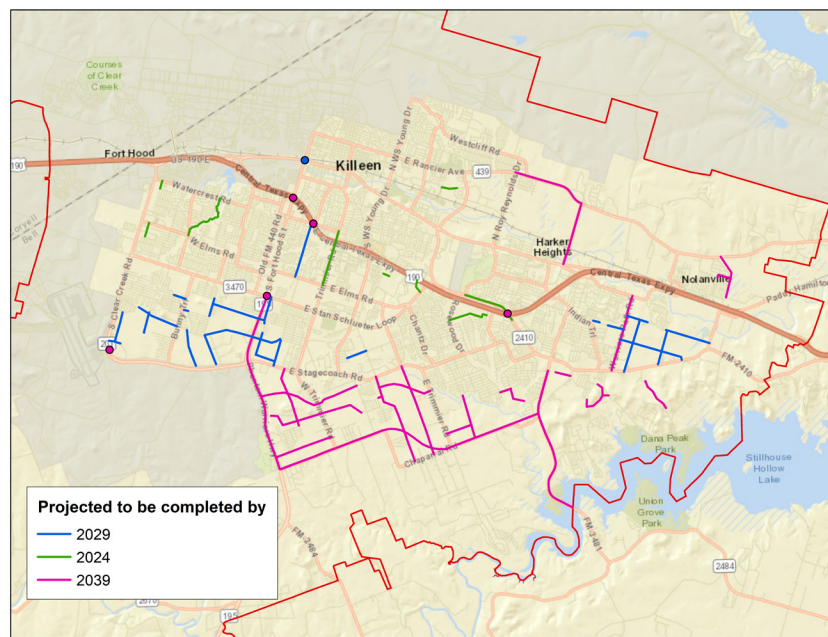


Table 4: KISD Facility Location of Vehicles

	Main	Sheridan	Total
Regular Program (total)	127	93	220
Regular Program	64	80	144
Regular Program - Alternative	7	0	7
Regular Program - Bilingual	10	2	12
Regular Program - Spares	46	11	57
Special Program (total)	83	8	91
Special Program	66	3	69
Special Program - Spares	17	5	22
<b>Trip</b>	<b>29</b>	<b>0</b>	<b>29</b>
<b>Total Buses</b>	<b>239</b>	<b>101</b>	<b>340</b>
White Fleet ( total)	39	0	39
Fleet Services	10	0	10
Float	7	0	7
Other	7	0	7
Transportation	2	0	2
Trip	13	0	13

Source: KISD Internal Audt, 2019.

### FACILITY OPTIMIZATION

To determine long-range fleet and facility needs, routes were developed in the Transfinder routing software for projected students and schools in the 5-, 10-, and 20-year horizon years. Once all eligible projected students were assigned to routes, the routes were scheduled to buses. To the extent possible, buses were scheduled with multiple tiers of schools in the morning and afternoon to minimize fleet requirements. Once all available existing buses were scheduled, new buses were generated within Transfinder. This process was used to estimate the total number of additional buses required for the regular program service only and estimates for other regular program buses (alternative and bilingual), special program buses, trip buses, and white fleet were scaled proportionally. To address the internal audit's recommendation that the fleet's spare ratio be reduced to 20%, regular and special program spare bus requirements were calculated based on 20% of estimated in-service vehicles.

With overall fleet needs established, vehicle assignment to the Main and Sheridan facilities was optimized by comparing the total and deadhead mileage of each bus based on three scenarios:

- Scenario 1 assumed vehicles would stay at their present location for the next 20 years. Any new vehicles would be located in the Main facility.
- Scenario 2 moved all vehicles to the Sheridan facility to identify any vehicles currently located at the Main facility that experienced improvement to deadhead or route mileage by moving to the Sheridan facility.
- Scenario 3 moved vehicles to the facility with the lower deadhead and/or total mileage.

Mileage results for the overall fleet from Scenario 1 and Scenario 3 were compared to determine whether the addition of fleet parking and related infrastructure at the Sheridan facility would result in performance efficiencies over the next 20 years. Mileage results only account for performance efficiencies that would be realized by regular program routes, as mileage performance of special program routes is highly dependent on the needs of student populations they serve and the locations of school programs, both of which can be highly variable and difficult to project over a 20-year horizon.

### THIRD FACILITY ALTERNATIVE

The facility optimization analysis determines the best locations for vehicles between two existing facilities to assist in the development of expansion and improvement plans for those facilities. However, KISD's consultant also conducted analysis to determine if a third location would improve fleet efficiency to a degree that would be, in the long term, more cost effective to develop than facility expansion plans at the existing Main and Sheridan facilities.

To identify a potential location for a third facility, vehicles assigned to their optimal location in Scenario 3 of the facility optimization were sorted by deadhead mileage, from highest mileage to lowest. The school locations served by vehicles with the top third of high deadhead mileage were categorized to determine if there was a trend connecting mileage inefficiency to school service areas. Given that both the Main and Sheridan facilities are between the western and eastern halves of the district, arranged along an approximate north-south axis, vehicles were categorized by whether the schools they served were on the western side of the district (delineated as west of Fort Hood Street), eastern side of the district (delineated as east of Rosewood Drive and Roy Reynolds Drive), or central portion of the district.





# KILLEEN INDEPENDENT SCHOOL DISTRICT

## SHERIDAN TRANSPORTATION FACILITY EXPANSION

Once a trend in school service areas was determined, vehicles serving that portion of the district were assigned to the new facility location in that portion. This location was selected for the purposes of modeling only, based on relative proximity to all served schools in the determined portion of the district and adequate conformity with existing land uses.

Results of vehicle projections and mileage results were determined for the third facility location, as well as the Main and Sheridan facilities to establish the required sizing for the third facility, as well as any facility expansions at the existing facilities that would need to occur in future years, despite the construction of a third facility.

### RESULTS

The following results indicate optimal fleet sizing and facility assignments through 2039. These results will be used as inputs to planning and engineering efforts to determine the facility space and amenity requirements KISD will develop for its transportation function over the long term.

### VEHICLE PROJECTIONS

With the addition of 11,060 students and 17 new schools, the regular program bus service in KISD is expected to require a large increase in the number of buses by 2039. However, due to the reduced need for spare vehicles, as recommended by the 2019 internal audit, some of the overall fleet growth will be offset. In fact, spare buses used for both regular and special program services will be at approximately the same numbers in 2039 as they are today. Despite the relative growth of number of schools and students served, the growth in regular program service is also controlled due to the proliferation of non-eligibility zones around the new schools, leading to a potentially larger proportion of students walking or bicycling to schools. **Table 5** provides the number of anticipated buses that will be required in the 5-,10-, and 20-year horizon years, based on existing service levels.

Table 5: Overall Bus Fleet Projections

Bus Fleet	(2019)	5-Year (2024)	10-Year (2029)	20-Year (2039)
Regular Program (total)	220	241	276	315
Regular Program	144	177	203	232
Regular Program-Alternative	7	9	10	11
Regular Program- Bilingual	12	15	17	19
Regular Program- Spares	57	40	46	53
Special Program (total)	91	102	116	133
Special Program	69	85	97	111
Special Program-Spares	22	17	19	22
Trip	29	36	41	47
<b>Total</b>	<b>340</b>	<b>379</b>	<b>433</b>	<b>495</b>

The white fleet will also see substantial growth over the next 20 years. To serve the growing number of buses, additional fleet service employees will need to be employed and will need access to vehicles to perform roadside service and towing. Additional students and schools will require greater numbers of float and trip vehicles. KISD anticipates that, along with moving administration of the transportation function to the expanded Sheridan facility, white fleet vehicles serving the transportation function will also be located at the Sheridan facility, rather than their current location at the Main facility. **Table 6** provides projections of the number of white fleet vehicles that are anticipated to be required in the 5-, 10, and 20-year horizon years, based on existing service levels.

Table 6: Overall White Fleet Projections

White Fleet	(2019)	5-Year (2024)	10-Year (2029)	20-Year (2039)
Fleet Services	10	12	14	16
Float	7	9	10	11
Other	7	9	10	11
Transportation	2	2	3	3
Trip	13	16	18	21
<b>Total</b>	<b>39</b>	<b>48</b>	<b>55</b>	<b>63</b>

As student populations are expected to grow faster in the southern and eastern portions of the district and new schools are constructed to meet the demands of that growth, the optimal location for more buses in the future will be at the Sheridan facility. Some buses currently located at the Main facility would be more optimally located at Sheridan, but fleeting parking and facility constraints do not allow for this reassignment. In future years, these constraints will have a greater impact to service efficiency without the expansion of the Sheridan facility. Growth in buses optimally assigned to the Sheridan facility between 2024 and 2039 is nearly 40 percent, while buses assigned to the Main facility is below 15 percent. The number of buses optimally assigned to the Main facility in 2039 is well below the 239 buses currently parked at the Main facility (see **Table 4**), whereas the Sheridan facility would require space for an additional 150 buses in the next five years to house its optimal assignment. **Tables 7, 8, and 9** detail the optimal locations of regular and special program service buses between the Main and Sheridan facilities.



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## SHERIDAN TRANSPORTATION FACILITY EXPANSION

Table 7: 2024 Bus Fleet Projected Optimized Facility Assignments

Bus Fleet	Main	Sheridan
Regular Program (total)	79	162
Regular Program	58	119
Regular Program-Alternative	3	6
Regular Program- Bilingual	5	10
Regular Program- Spares	13	27
Special Program (total)	34	68
Special Program	28	57
Special Program-Spares	6	11
Trip	12	24
<b>Total</b>	<b>125</b>	<b>254</b>

Table 8: 2029 Bus Fleet Projected Optimized Facility Assignments

Bus Fleet	Main	Sheridan
Regular Program (total)	85	191
Regular Program	63	140
Regular Program-Alternative	3	7
Regular Program- Bilingual	5	12
Regular Program- Spares	14	32
Special Program (total)	36	80
Special Program	30	67
Special Program-Spares	6	13
Trip	13	28
<b>Total</b>	<b>134</b>	<b>299</b>

Table 9: 2039 Bus Fleet Projected Optimized Facility Assignments

Bus Fleet	Main	Sheridan
Regular Program (total)	90	225
Regular Program	67	165
Regular Program-Alternative	3	8
Regular Program- Bilingual	5	14
Regular Program- Spares	15	38
Special Program (total)	38	95
Special Program	32	79
Special Program-Spares	6	16
Trip	14	33
<b>Total</b>	<b>142</b>	<b>353</b>

### MILEAGE PROJECTIONS

Bus mileage from regular program service will grow over the next 20 years, but the impact of that growth will be lessened by the optimal assignment of buses to the Main and Sheridan facilities, given the provision of adequate fleet parking and amenities. In **Table 10**, the mileage of regular program bus service shows this increase, but is based on the assumption that no additional space will be provided at the Sheridan facility for new or existing buses that would be optimally house there, and as such, would be located at the Main facility.

Table 10: Annual Regular Program Mileage Performance with Existing Facility Assignments

	Deadhead Mileage	Route Mileage	Total Mileage
(2019)	1,370,584	1,074,133	2,444,717
5-Year (2024)	1,538,040	1,039,439	2,577,479
10-Year (2029)	1,679,491	1,061,190	2,740,680
20-Year (2039)	1,793,049	1,059,625	2,852,673

**Table 11** and **Table 12** show that, while regular program mileage still grows in the next 20 years, the optimal location of buses can save thousands of deadhead miles. The proportion of this savings will continue to grow as student populations and new schools becoming increasingly found in the southern portion of the district. Given the \$3.95 cost per odometer mile reported in the 2019 internal audit for regular program service, these saved miles resulting from optimal facility location of buses could save as much as \$126,000 annually based on existing conditions and as much as \$564,000 annually based on conditions in 2039.

The sum of this annual savings resulting from the reduction in miles by optimally assigning buses to each facility would be approximately \$6.65 million by 2039, if capacity would be available at the expanded Sheridan facility beginning in 2024.

Table 11: Annual Regular Program Mileage Performance with Optimized Facility Assignments

	Deadhead Mileage	Route Mileage	Total Mileage
(2019)	1,343,463	1,069,304	2,412,767
5-Year (2024)	1,464,633	1,045,376	2,510,009
10-Year (2029)	1,583,119	1,061,380	2,644,500
20-Year (2039)	1,650,587	1,059,242	2,709,828

Table 12: Comparison of Annual Regular Program Mileage Performance

	Deadhead Mileage	Route Mileage	Total Mileage	Annual Savings
(2019)	-27,121 (-1.98%)	-4,829 (-0.45%)	-31,950 (-1.31%)	\$126,000
5-Year (2024)	-43,407 (-4.77%)	5,937 (0.57%)	-67,470 (-2.62%)	\$267,000
10-Year (2029)	-96,371 (-5.74%)	191 (0.02%)	-96,181 (-3.51%)	\$380,000
20-Year (2039)	-142,462 (-7.95%)	-383 (-0.04%)	-142,845 (-5.01%)	\$564,000



# KILLEEN INDEPENDENT SCHOOL DISTRICT

## SHERIDAN TRANSPORTATION FACILITY EXPANSION

### THIRD LOT ALTERNATIVE

With the expansion of the Sheridan facility, optimal bus location assignments will save deadhead mileage and improve fleet efficiency in future years. However, a third facility location has the potential to save a greater amount of deadhead mileage. The location of this potential third facility was determined by identifying buses with the highest deadhead mileage and the school locations that they serve. As shown in **Table 13**, these high deadhead mileage buses serve school predominantly in the western portion of the district, west of Fort Hood Street. This trend is continuous through each horizon year and is largely related to buses serving schools in or near Fort Hood. Schools in this area that were frequently served by buses with higher deadhead mileages included:

- Shoemaker High School
- Early College High School
- Audie Murphy Middle School
- Roy J. Smith Middle School
- Iduma Elementary School
- Dr. Joseph A. Fowler Elementary School
- Oveta Culp Hobby Elementary School
- Venable Village Elementary School

Table 13: Buses with High Deadhead Mileage School Assignment Locations

	West	Central	East
(2019)	43%	21%	36%
5-Year (2024)	49%	20%	31%
10-Year (2029)	53%	15%	32%
20-Year (2039)	48%	19%	34%

While overall vehicle numbers would remain the same as previously projected, the optimal assignment of buses between the Main, Sheridan, and potential West location would shift fleet parking and amenity requirements at each facility. **Tables 14, 15, and 16** provide the optimal locations for regular and special program buses given the construction of a third location in the western portion of the district. For purposes of modeling, Shoemaker High School was used as the location of the western third facility location.

Table 14: 2024 Bus Fleet Projected Optimized Facility Assignments – Third Location

Bus Fleet	Main	Sheridan	West
Regular Program (total)	61	119	61
Regular Program	45	88	45
Regular Program-Alternative	2	4	2
Regular Program- Bilingual	4	7	4
Regular Program- Spares	10	20	10
Special Program (total)	25	50	25
Special Program	21	42	21
Special Program-Spares	4	8	4
Trip	9	18	9
<b>Total</b>	<b>95</b>	<b>187</b>	<b>95</b>

Table 15: 2029 Bus Fleet Projected Optimized Facility Assignments – Third Location

Bus Fleet	Main	Sheridan	West
Regular Program (total)	67	146	61
Regular Program	50	108	45
Regular Program-Alternative	2	5	2
Regular Program- Bilingual	4	9	4
Regular Program- Spares	11	24	10
Special Program (total)	29	62	26
Special Program	24	52	22
Special Program-Spares	5	10	4
Trip	10	22	9
<b>Total</b>	<b>106</b>	<b>230</b>	<b>96</b>

Table 16: 2039 Bus Fleet Projected Optimized Facility Assignments – Third Location

Bus Fleet	Main	Sheridan	West
Regular Program (total)	72	174	69
Regular Program	53	128	51
Regular Program-Alternative	3	6	2
Regular Program- Bilingual	4	11	4
Regular Program- Spares	12	29	12
Special Program (total)	30	73	30
Special Program	25	61	25
Special Program-Spares	5	12	5
Trip	11	26	10
<b>Total</b>	<b>113</b>	<b>273</b>	<b>109</b>

Given the optimal assignment of buses among the three facility locations, total mileage would continue to increase over the next 20 years, but as a much slower rate compared to the optimal scenario with only the Main and Sheridan locations. **Table 17** provides annual mileages associated with the optimal assignment of regular program buses among the three facility locations.

Table 17: Annual Regular Program Mileage Performance with Optimized Facility Assignments – Third Location

	Deadhead Mileage	Route Mileage	Total Mileage
5-Year (2024)	1,365,897	1,022,347	2,388,243
10-Year (2029)	1,482,227	1,043,963	2,526,190
20-Year (2039)	1,546,648	1,034,163	2,587,947



# KILLEEN INDEPENDENT SCHOOL DISTRICT

## SHERIDAN TRANSPORTATION FACILITY EXPANSION

Table 18: Comparison of Annual Regular Program Mileage Performance between Existing Assignments and Optimized Assignments at Three Facilities

	Deadhead Mileage	Route Mileage	Total Mileage	Annual Savings
5-Year (2024)	-172,144 (-11.19%)	-17,092 (-1.64%)	-189,236 (-7.34%)	\$747,000
10-Year (2029)	-197,263 (-11.75%)	-17,227 (-1.62%)	-214,490 (-7.83%)	\$847,000
20-Year (2039)	-246,400 (-13.74%)	-25,462 (-2.40%)	-264,726 (-9.28%)	\$1,046,000

Table 19: Comparison of Annual Regular Program Mileage Performance between Optimized Assignments at Two and Three Facilities

	Deadhead Mileage	Route Mileage	Total Mileage	Annual Savings
5-Year (2024)	-98,736 (-6.74%)	-23,030 (-2.20%)	-121,766 (-4.85%)	\$481,000
10-Year (2029)	-100,892 (-6.37%)	-17,418 (-1.64%)	-118,310 (-4.47%)	\$481,100
20-Year (2039)	-103,938 (-6.30%)	-25,079 (-2.37%)	-121,881 (-4.50%)	\$481,400

**Table 18** compares the mileage savings of optimizing bus assignments between three facilities against the existing assignment of buses at the Main and Sheridan facilities. Given the \$3.95 cost per odometer mile reported in the 2019 internal audit for regular program service, building a third facility could result in as much as \$747,000 of annual savings based on conditions in 2024 and as much as \$1.05 million annually based on conditions in 2039, when compared to costs of existing assignments of buses only at the Main and Sheridan facilities. The total sum of this annual savings resulting from the reduction in miles by optimally assigning buses among three facilities would be approximately \$14.35 million by 2039, if capacity would be available at the expanded Sheridan facility and a new third facility near Shoemaker High School beginning in 2024.

**Table 19** compares the two optimal assignment scenarios to determine the degree of annual mileage savings between expanding the Sheridan facility or building a new third location. Given the \$3.95 cost per odometer mile reported in the 2019 internal audit for regular program service, building a third facility could result in as much as \$481,000 of annual savings based on conditions in 2024 and as much as \$481,400 annually based on conditions in 2039, when compared to the savings of optimally assigning buses only to the Main and Sheridan facilities. The incremental difference in saving between only expanding the Sheridan facility versus building a new third facility near Shoemaker High School and expanding the Sheridan facility would be the sum of these annual savings, which would be approximately \$7.70 million if capacity would be available at the expanded Sheridan facility and a new third facility near Shoemaker High School beginning in 2024.

### CONCLUSIONS

Developing additional capacity at the Sheridan bus facility and shifting fleet assignments to the expanded facility will be the most effective way of addressing projected population growth patterns. With the majority of KISD's fleet based in the Sheridan bus facility, the growth of deadhead mileage of school bus routes would be limited, with greater savings in deadhead mileage and associated operating costs to be realized as the student populations continue to grow in the southern portions of the school district. Based on existing operating costs per mile, shifting buses to Sheridan facility in a manner that optimally distributes the fleet between the Main and Sheridan facilities would save a projected \$6.65 million in operating costs over the next 20 years.

Building a third bus facility in the western portion of the district, in an area near Shoemaker High School, would save additional operating costs; however, the optimal assignment of buses between three facilities would still require the expansion of the Sheridan facility as soon as 2024 to house the majority of the KISD fleet. Despite the potential for an additional \$7.70 million in operational cost savings that would result from the construction of a third facility, capital costs associated with constructing a third facility while also expanding the Sheridan bus facility would likely cancel out any savings. Developing a third facility location, in addition to construction costs, would require identifying and purchasing an amount of land sufficient for bus and employee parking near Shoemaker High School, in an area where available land would likely be constrained by Fort Hood and residential development. Along with these costs, potential operating efficiencies gained from locating dispatching, maintenance, and administrative functions at the improved Sheridan bus facility would be complicated by the addition of a third facility.



# KILLEEN INDEPENDENT SCHOOL DISTRICT SHERIDAN TRANSPORTATION FACILITY EXPANSION

SHERIDAN TRANSPORTATION FACILITY								
	Area per space (S.F.)	5-Year (2024)		10-Year (2029)		20-Year (2039)		
		5-Year # of Spaces	Area per space (S.F.)	10-Year # of Spaces	Area per space (S.F.)	20-Year # of Spaces	Area per space (S.F.)	
<b>NEW TRANSPORTATION ADMIN. BUILDING</b>								
Reception	200	1	200	1	200	1	200	
Director's Office	200	1	200	1	200	1	200	
Director's Secretary - Combined Office	100	1	100	1	100	1	100	
Time Keeper - Combined Office	100	1	100	1	100	1	100	
Operations Sr. Specialist Office	150	3	450	3	450	3	450	
Operations Sr. Foreman Office	150	1	150	2	300	3	450	
Operations Secretary - Bullpen	64	1	64	1	64	1	64	
Trip Foreman - Bullpen	64	2	128	2	128	2	128	
Trip Billing Clerk - Bullpen	64	1	64	1	64	1	64	
Discipline Liaison - Bullpen	64	2	128	2	128	2	128	
Dispatcher - Office in Bullpen	100	1	100	1	100	1	100	
Dispatcher - Office in Bullpen	100	1	100	1	100	1	100	
Routing Secretary - Bullpen	64	1	64	1	64	1	64	
Parent Liaison Office	150	1	150	1	150	1	150	
Routing Specialist Office	150	2	300	2	300	3	450	
Routing Foreman - Combined Office	64	5	320	7	448	10	640	
Transportation Support Tech Office	150	1	150	1	150	1	150	
Training Supervisor - Combined Office	100	1	100	1	100	1	100	
Training Secretary - Combined Office	100	1	100	1	100	1	100	
Trainers - Shared Space - Bullpen	64	11	704	13	832	15	960	
Support Supervisor Office	150	1	150	1	150	1	150	
Lead Video Office	150	1	150	1	150	1	150	
Administrative Restrooms - Unisex	65	2	130	2	130	2	130	
Kitchenette	200	1	200	1	200	1	200	
Restrooms/Locker Rms - Men (250)	1,200	1	1,200	1	1,200	1	1,200	
Restrooms/Locker Rms - Women (250)	1,200	1	1,200	1	1,200	1	1,200	
Drivers Training Room - Main & Sheridan	7	379	3,465	433	3,465	495	3,465	
Mechanical	150	1	150	1	150	1	150	
Electrical	150	1	150	1	150	1	150	
Riser Room	75	1	75	1	75	1	75	
Custodian	60	1	60	1	60	1	60	
MDF	150	1	150	1	150	1	150	
<b>SUBTOTAL NET AREA (sf)</b>			<b>10,752</b>		<b>11,158</b>		<b>11,778</b>	
Walls & Circulation Factor (% used)	<b>35%</b>		3,763		3,905		4,122	
Design Contingency (sf)	<b>5%</b>		538		558		589	
<b>TOTAL GROSS AREA (sf)</b>			<b>15,053</b>		<b>15,621</b>		<b>16,489</b>	

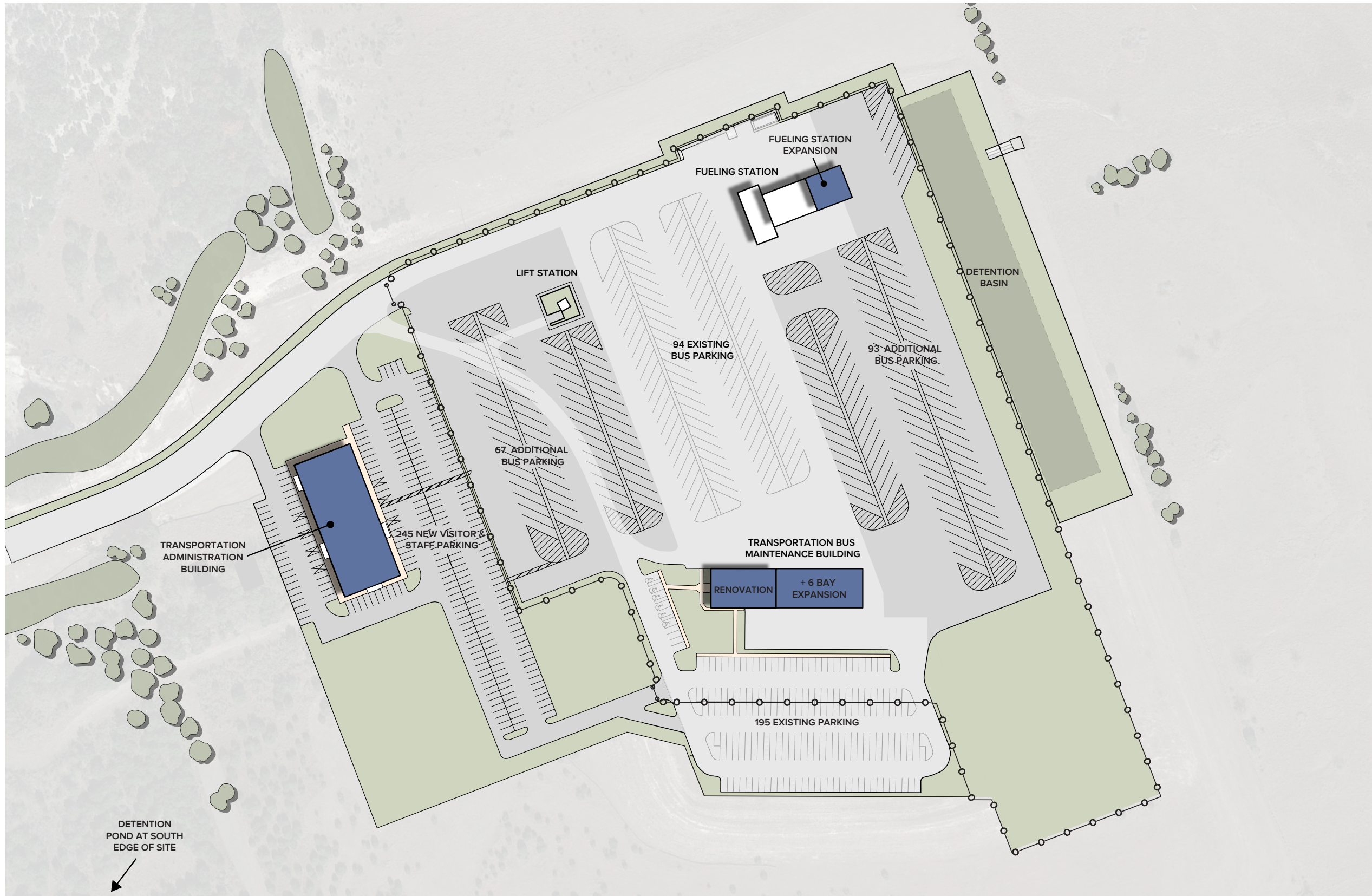
SHERIDAN TRANSPORTATION FACILITY				
	Existing	5-Year (2024)	10-Year (2029)	20-Year (2039)
<b>Bus &amp; Maintenance Bay Count</b>				
Bus - Main	239	125	134	142
Bus - Sheridan	101	254	299	353
<b>Total Bus Count</b>	<b>340</b>	<b>379</b>	<b>433</b>	<b>495</b>
Maintenance Bays Sheridan (Main 9)	2	8	10	12

COLOR LEGEND

- Grass
- Trees
- Existing Pavement/Drives
- New Pavement/Drives
- Existing Structures
- New Structures
- Fence
- +
 Gate

**PARKING SPACES**  
 Total Bus Parking Spaces - 254  
 White Fleet Spaces - 64  
 Staff/Visitor Spaces - 376

Maintenance Bays - 8  
 Fuel Stations - 14

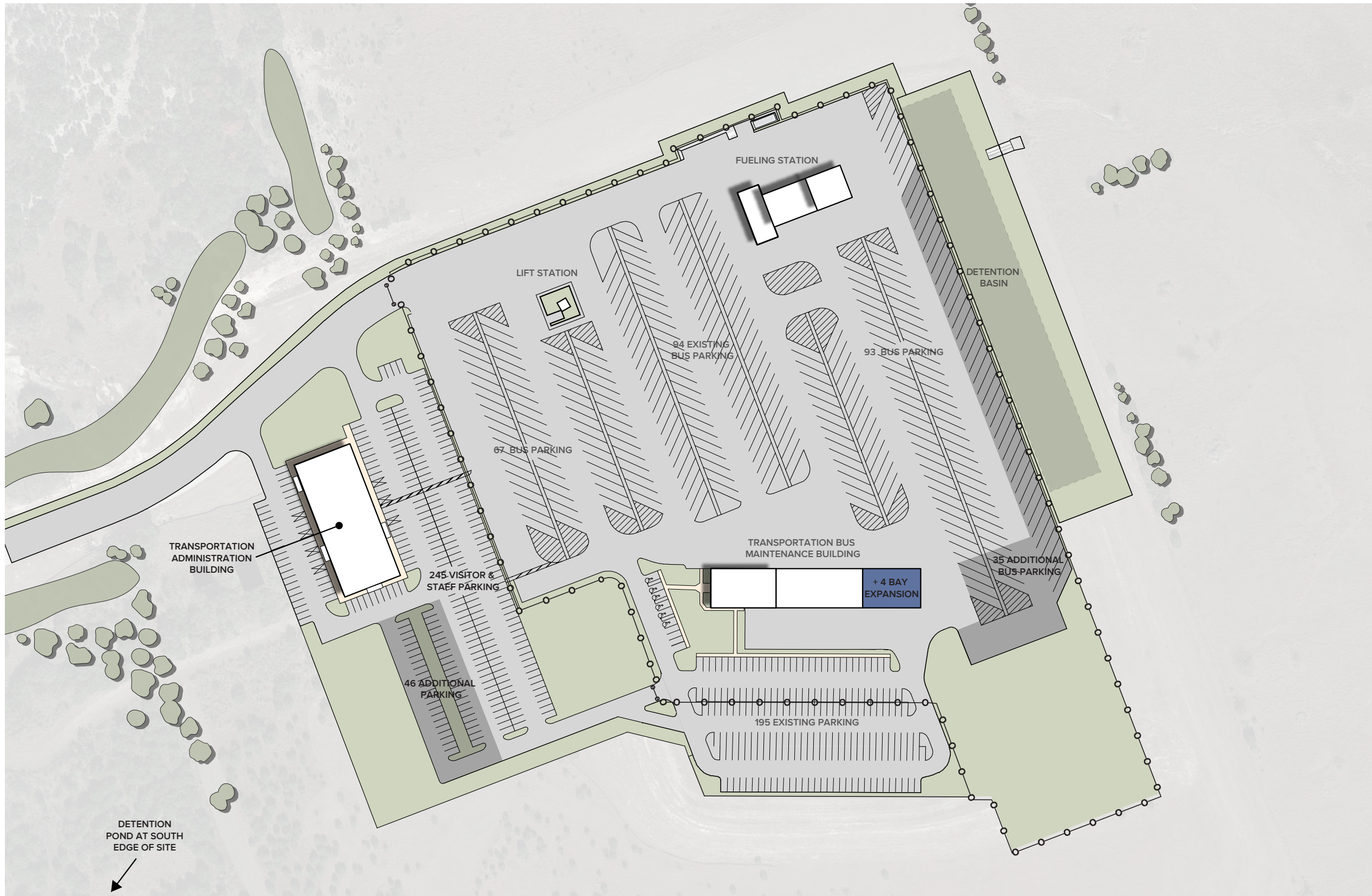


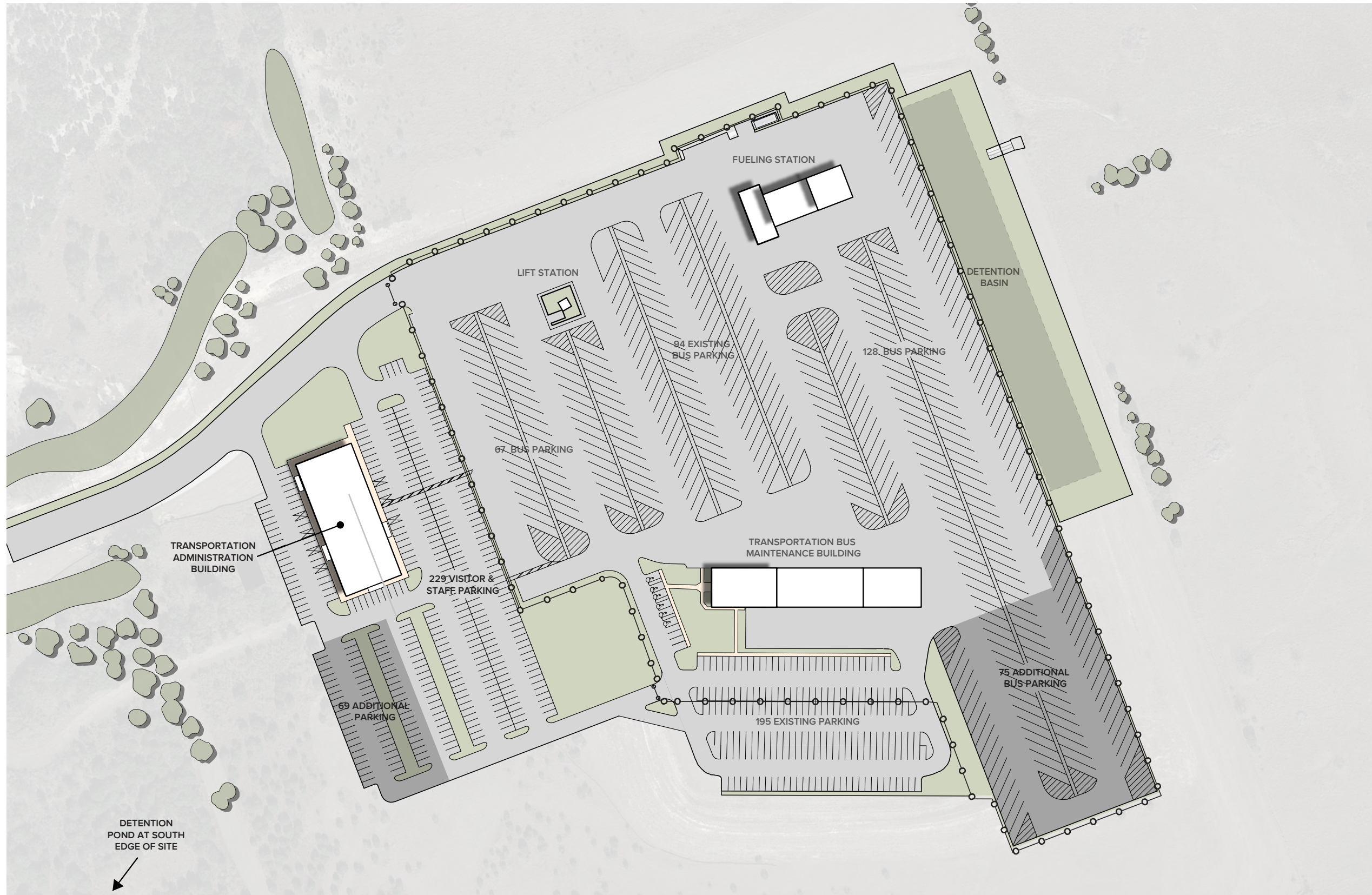
COLOR LEGEND

- Grass
- Trees
- Existing Pavement/Drives
- New Pavement/Drives
- Existing Structures
- New Structures
- Fence
- + Gate

**PARKING SPACES**  
 Total Bus Parking Spaces - 289  
 White Fleet Spaces - 64  
 Staff/Visitor Spaces - 422

Maintenance Bays - 12  
 Fuel Stations - 14





**COLOR LEGEND**

- Grass
- Trees
- Existing Pavement/Drives
- New Pavement/Drives
- Existing Structures
- New Structures
- Fence
- Gate

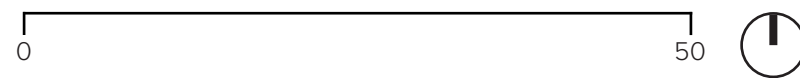
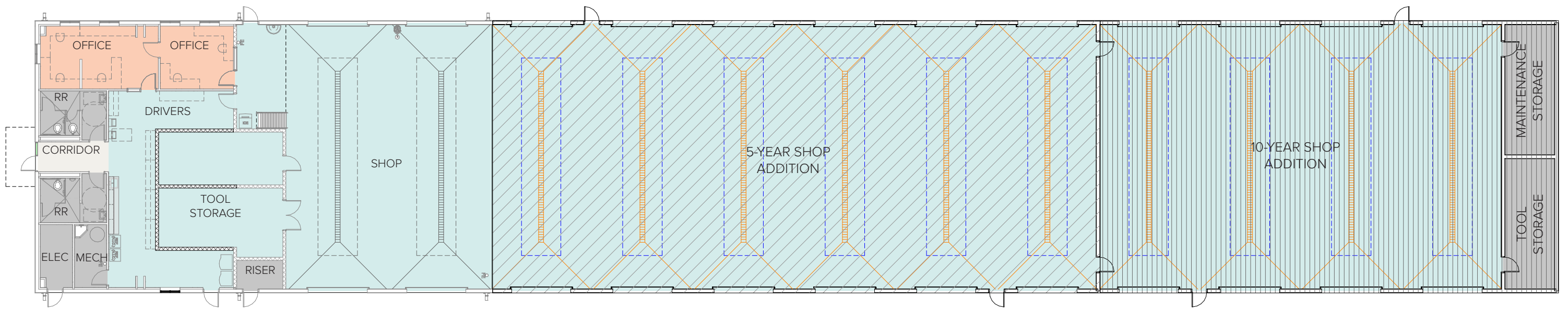
**PARKING SPACES**

Total Bus Parking Spaces - 364  
 White Fleet Spaces - 64  
 Staff/Visitor Spaces - 491

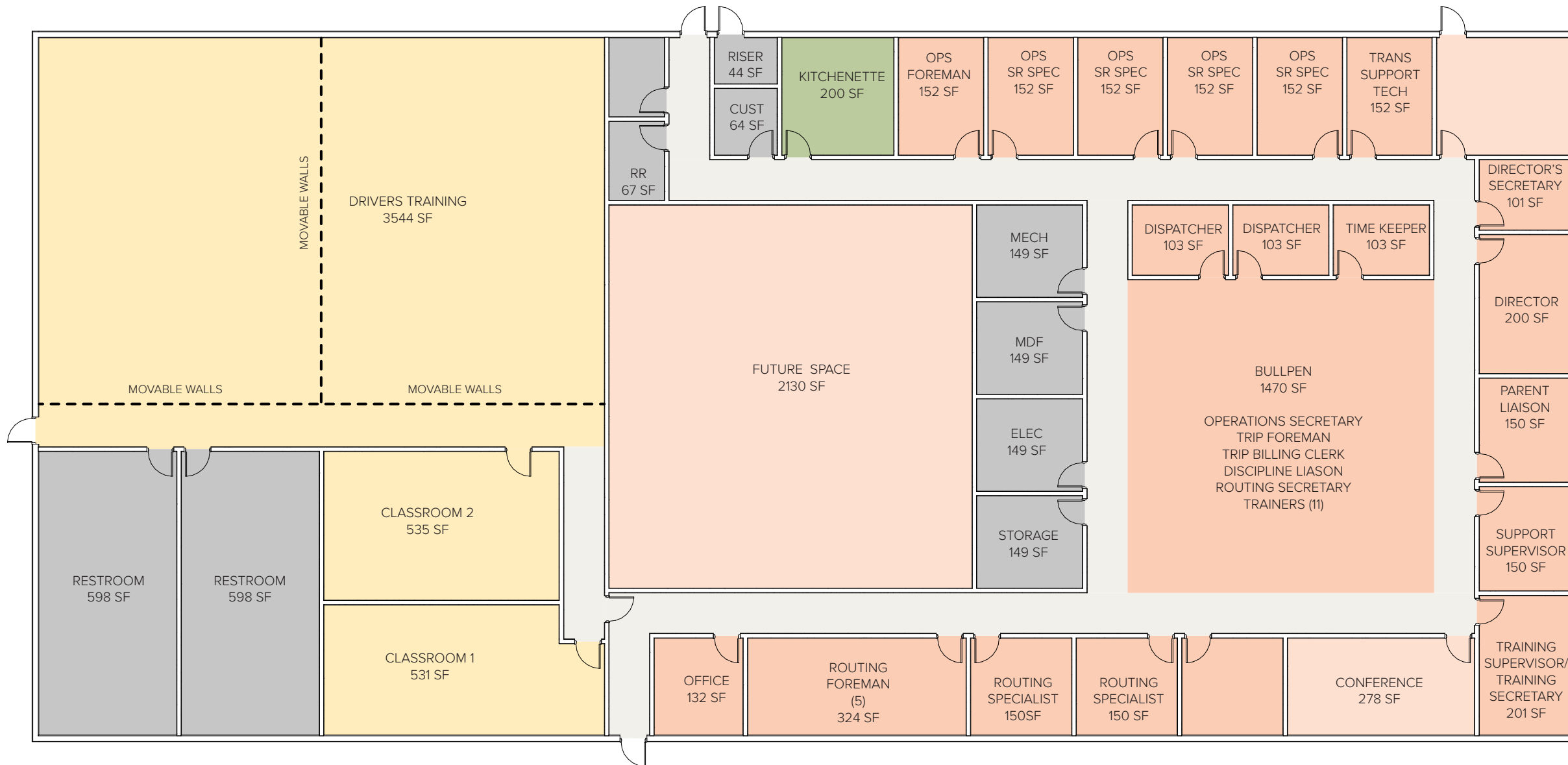
Maintenance Bays - 12  
 Fuel Stations - 14



- Administration
- Circulation
- Maintenance
- Support Space



- Administration
- Circulation
- Dining
- Drivers Space
- Support Space



SHERIDAN TRANSPORTATION FACILITY OPINION OF PROBABLE COST			
	5-Year* (2024)	10-Year* (2029)	20-Year* (2039)
Transportation Bus Maintenance Building Reno & Expansion	\$2,406,000	\$2,839,000	\$0
New Transportation Administration Building	\$4,486,000	\$296,000	\$0
Site Development - Staff/ District Parking & Drives	\$1,557,000	\$523,000	\$1,174,000
Site Development - Bus Parking & Drives	\$4,200,000	\$932,000	\$3,078,000
Fueling Station	\$779,000	\$0	\$0
<b>CONSTRUCTION COST</b>	<b>\$13,428,000</b>	<b>\$4,590,000</b>	<b>\$4,252,000</b>
<b>TOTAL PROJECT COST</b>	<b>\$17,141,000</b>	<b>\$5,908,000</b>	<b>\$5,473,000</b>

3RD LOCATION FACILITY OPINION OF PROBABLE COST			
	5-Year* (2024)	10-Year* (2029)	20-Year* (2039)
Buildings & Site Development (5-Year cost provides adequate facilities for both 10-Year & 20-Year)	\$10,275,000	-	-
Site Procurement Cost (\$25,000/Acre)	\$750,000	-	-
<b>CONSTRUCTION COST</b>	<b>\$11,025,000</b>	<b>-</b>	<b>-</b>
<b>TOTAL PROJECT COST</b>	<b>\$13,956,000</b>	<b>\$0</b>	<b>\$0</b>

SHERIDAN TRANSPORTATION FACILITY OPINION OF PROBABLE COST W/ 3RD LOCATION			
	5-Year* (2024)	10-Year* (2029)	20-Year* (2039)
Transportation Bus Maintenance Building Reno & Addition	\$1,804,000	\$2,129,000	\$0
New Transportation Administration Building	\$4,486,000	\$296,000	\$0
Site Development - Staff/ District Parking & Drives	\$1,168,000	\$393,000	\$880,000
Site Development - Bus Parking & Drives	\$3,150,000	\$699,000	\$2,309,000
Fueling Station	\$779,000	\$0	\$0
<b>CONSTRUCTION COST</b>	<b>\$11,387,000</b>	<b>\$3,517,000</b>	<b>\$3,189,000</b>
<b>TOTAL PROJECT COST</b>	<b>\$14,015,000</b>	<b>\$4,249,000</b>	<b>\$3,831,000</b>

3RD LOCATION & SHERIDAN COMBINED OPINION OF PROBABLE COST			
	5-Year* (2024)	10-Year* (2029)	20-Year* (2039)
<b>CONSTRUCTION COST</b>	<b>\$22,412,000</b>	<b>\$3,517,000</b>	<b>\$3,189,000</b>
<b>TOTAL PROJECT COST</b>	<b>\$27,971,000</b>	<b>\$4,249,000</b>	<b>\$3,831,000</b>

\*8% escalation factor/ year

RETURN ON INVESTMENT AT 20-YEARS			
	20-Year (2039) Total Project Cost	20-Year (2039) Operational Cost Savings	Yearly cost savings over 20 years
Sheridan Renovation	\$28,522,000	\$6,650,000	\$332,500
Sheridan Renovation + 3rd Location	\$36,051,000	\$7,700,000	\$385,000
<b>Cost Difference</b>	<b>\$7,529,000</b>	<b>\$1,050,000</b>	<b>\$52,500</b>
<b>Sheridan Renovation ROI</b>	<b>85.7 years</b>		
<b>Sheridan Renovation + 3rd Location ROI Cost Difference</b>	<b>143 years</b>		

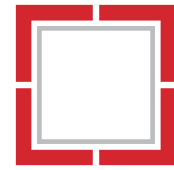
Note:

1. Opening of a third facility would require approximately 9 additional employees, with salary and benefits totaling approximately \$475,000. The salary costs are not factored into the ROI information.
2. Future student growth will require expansion of either the Sheridan or the Main Transportation facilities. The Main Transportation facility expansion is limited by available adjacent real estate.
3. Availability of land for a third location could limit the ability to locate the facility where recommended.

SHERIDAN TRANSPORTATION FACILITY EXPANSION OPC - NO MAIN OFFICE RELOCATION			
		10-Year* (2029)	
No Main Move Project - see below for scope		<b>\$5,400,000</b>	

Scope Notes and Assumptions:

1. \$4.4M estimated construction cost
2. 3,000sf office space addition (doubles what exists)
3. 3,500sf, 2 bay maintenance addition
4. 93 new bus parking spaces
5. 100 new car parking spaces
6. No new white fleet parking spaces
7. No new fueling stations
8. Schedule:
  - Start Design by August 2021
  - Start Construction by April 2022
  - Complete Construction by December 2022



**MORE THAN** ARCHITECTS