EAGLE COUNTY
Regional Airport


EAGLE COUNTY REGIONAL AIRPORT
MASTER PLAN

CHAPTER 5

5.0 ALTERNATIVES ANALYSIS AND DEVELOPMENT PLAN

The purpose of this chapter is to identify, present, and evaluate various development alternatives for the Eagle County Regional Airport (EGE or the Airport). These alternatives were designed to meet projected levels of aviation demand and associated facility and design requirements over the 20-year planning period. The result of this evaluation is a preferred development plan for the Airport that will support its evolution and growth to meet future aviation needs in a safe, efficient, and sustainable way. The recommended development plan is the culmination of the planning process detailed in the previous chapters and will serve as the basis of the remaining chapters.

The Recommended Development Plan is the culmination of analysis, laying out the Airport's vision for the next 20 years.

5.1 DEVELOPMENT GOALS

To assist in conducting the alternatives analysis, several development goals were identified to direct the planning effort and establish continuity in the future development of the Airport. These goals were designed to account for the short- and long-term Airport needs over a range of important considerations, including safety, land use compatibility, financial and economic conditions, public interest and investment, community values, and environmental sustainability. While all goals are important to the future of the Airport and are project-oriented, some represent more tangible activities than others. These goals are intended to augment the AMP study objectives defined in Chapter One, *Introduction*. The development goals include:

- Preparation of a logical development program for the Airport that provides a realistic vision to meet future aviation-related demand.
- Accommodate EGE's forecasted demand for aviation activity (operations, based aircraft, and enplaned passengers) in a safe and efficient manner by providing necessary Airport facilities and services.
- Prepare a plan that enables the Airport to fulfill the mission of facilitating and enhancing local, regional, and national general aviation services.
- Develop future development alternatives based upon the most efficient and cost-effective methods.
- Continue to develop and operate the Airport in a manner that is consistent with local ordinances and codes, federal and state statutes, federal grant assurances, federal agency regulations, and FAA design standards.
- Ensure responsible environmental stewardship and alignment with related Eagle County goals.
- Ensure that Airport development remains compatible with the surrounding community and the environment on and near Airport property.
- Preserve the development potential of the Airport beyond the forecasted aviation demand to account for possible future aviation services and facility demand increases resulting from unforeseen economic development initiatives and associated aviation uses.

- Encourage and protect public and private investment in land and facility development near the Airport.
- Sustain and enhance the EGE's role within the Colorado Airport System and National Airspace System.

5.1.1 Sustainability

The Airport is committed to being an active team member in the County's pursuit of GHG reduction. As discussed in Chapter Four, *Facility Requirements*, the Airport has numerous opportunities to integrate sustainability throughout all facets of the Airport - from administration, through design, construction and operations. Of the recommendations provided, one of the most valuable projects the Airport may choose to purse is the completion of a sustainability plan.

Sustainability plans can range in scope and depth but serve the basic purpose of assisting an airport in identifying and implementing sustainability initiatives that promote greater financial, environmental, and community-oriented well-being. In addition to the recommendation of a sustainability plan, the following recommendations were evaluated in terms of sustainability. Projects that contribute to the Airport's sustainability are denoted with a leaf (🍃) and a brief text discussing the sustainability contribution.

Additionally, through coordination with the Airport, the following goals have been established for EGE:

- Continue active participation in Eagle County's Climate Action Plan
- Continue integration of sustainability, resiliency, and GHG reduction goals into EGE operations
- Develop a formal Airport sustainability plan
- Integrate sustainability language into Airport contracts/lease agreements
- Develop climate action policies (green procurement, benchmarking, etc.) in partnership with Eagle County Resiliency
- Contribute to Energy Smart Colorado's ECO Credits program to offset airport GHG emissions
- Reduce airport drought related impacts by adopting innovative indoor and outdoor water efficiency programs and strategies
- Provide power supply for electrification of vehicles
- Pursue on-site and off-site renewable energy sources - wind, solar, geothermal
- Develop and implement an energy/carbon reduction plan, including consumption monitoring, reduction targets and auditing to monitor progress
- Support the development of alternative fuels for aircraft including SAF and supporting infrastructure
- Implement benchmarking for airport buildings to monitor, manage and report on energy uses and GHG emissions

5.2 ALTERNATIVES ANALYSIS

Airfield and landside development alternatives were identified based on the analyses and data in previous chapters. Development alternatives were created that meet identified facility requirements in four major functional areas:

- Airfield
- Commercial Passenger Terminal
- Roadway, Circulation, and Parking
- Miscellaneous Airport Development

The Alternatives Analysis is a regimented process by which development options are identified and the final Recommended Plan is established. The Recommended Plan is what is ultimately included on the resulting Airport Layout Plan (ALP).

5.2.1 Evaluation Criteria

To facilitate the selection of a preferred development plan, a set of evaluation criteria were identified in conversations with Airport Management, staff, and stakeholders. Through an assessment that incorporates these criteria, the potential benefits and impacts of the various alternatives were compared to aid in the selection process. The criteria used to assist in evaluating development alternatives included:

- **Safety/Operational Factors** – Each alternative was evaluated on its ability to safely accommodate future demand for aircraft, vehicles, and other relevant traffic. This criterion evaluated alternative development concepts based on anticipated improvements to operational safety, capacity, and delay, as well as tenant convenience, and ability to meet or enhance FAA design standards.

- **Economic Factors** – This criterion considered historic infrastructure investment, the remaining useful life of existing Airport facilities, anticipated "order of magnitude" project costs, and property acquisition, among others. These factors provided a basis for comparing the cost-effectiveness and economic ramifications of various development scenarios.

- **Environmental Factors** – Relevant environmental factors associated with development was part of the review and comparison of alternatives. Relevant environmental factors include those stipulated in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*. Additional considerations include potential physical impacts to the surrounding area and community as well as the ability of the project to impact Eagle County's goal of reducing GHG emissions 50 percent by 2030.

- **Implementation Feasibility** – Qualitative and quantitative factors can impact an airport's ability to implement certain development schemes. Community and political acceptance are examples of implementation feasibility factors considered in this criterion.

Where appropriate, development alternatives were evaluated based on these factors. In addition, selected improvements were presented to the Airport and Project Advisory Committee (PAC) to receive feedback and input on the demand for and preferred location of each facility. The results of this analysis were used to identify a recommended development plan.

5.3 AIRFIELD

The facility requirement analysis examined the potential need for airfield development projects to enhance the Airport's ability to accommodate current and projected aircraft activity safely and efficiently. Key considerations included airfield capacity and congestion, design standards, and facilities and equipment providing navigational and visual aid.

Inclusion of a project on the ALP is not a guarantee of federal funding support. It simply protects airport land and airspace for a project's potential construction.

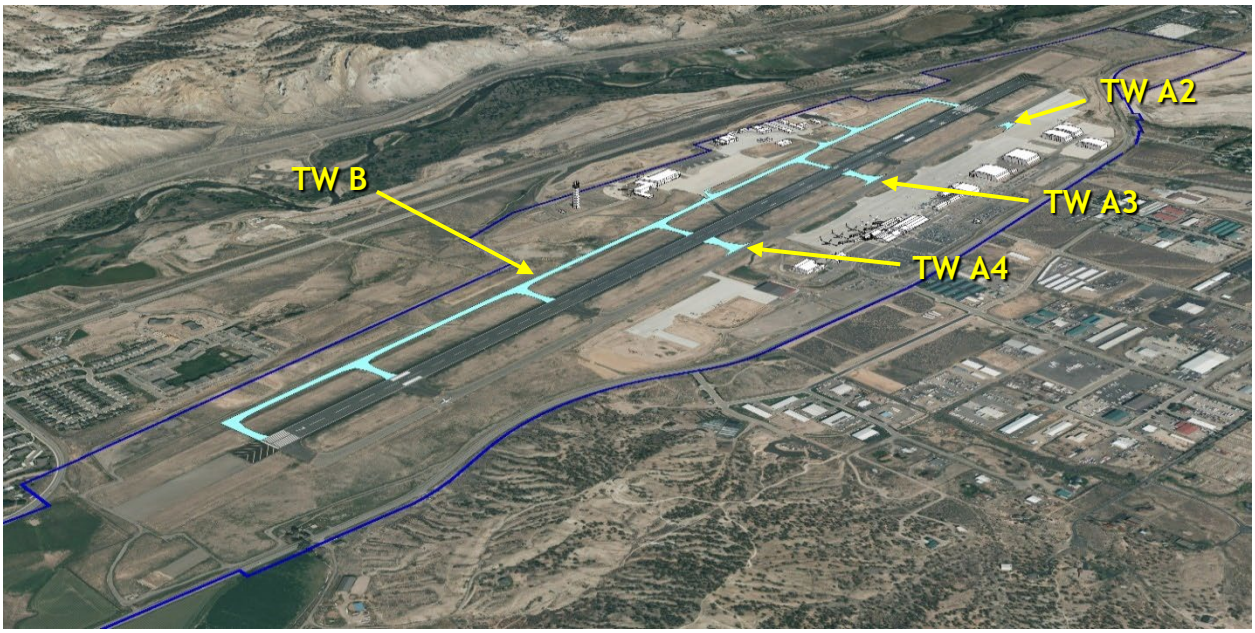
5.3.1 Runway and Taxiway System

The analysis of EGE's runway and taxiway system indicated that the existing airfield configuration provides sufficient capacity, but recommended several improvements:

- Taxiway Improvement – New Taxiway B: Currently, aircraft located on the north side of the Airport do not have access to the runway ends without having to first cross the Runway 7-25. To improve airfield operational safety and efficiency, it is recommended that a new partial parallel taxiway (designated as Taxiway B) be constructed to the north of Runway 7-25 to remedy this issue. (Note that the phased construction of Taxiway B is currently listed on EGE's existing Capital Improvement Plan.) **Figure 5-1** graphically shows the new Taxiway B. It should be recognized that Taxiway B is only planned to access the threshold of Runway 25 and not the actual runway end. This limitation was established as an alternative due to severe grade impacts, costs, and environmental impacts that would be realized if the future taxiway were to be extended to the runway end. Ultimately, this was determined to be the recommended plan through conversations with key stakeholders that included the FAA.
- Taxiway Improvement – Geometry Improvements: The FAA's most recent airport design guidance stipulates that taxiways that currently provide direct access between an apron and a runway be eliminated and/or shifted to create an indirect access (i.e., aircraft are forced to make at least one 90-degree turn prior to accessing the runway environment). This has been required by FAA to reduce the potential for runway incursions (i.e., any occurrence involving the incorrect presence of an aircraft, vehicle, or person on the protected areas of a runway) occurring and thereby improving the level of airfield safety. Based on this, it is recommended for EGE that existing Taxiway A2, Taxiway A3, and Taxiway A4 be shifted to eliminate direct access to the runway from the southern aircraft aprons. A minor shifting of Taxiway A2 on the apron is also required to rectify this issue. **Figure 5-1** and **Figure 5-2** graphically shows the recommended relocation of the connector taxiways. Note that no alternatives were required for this action.
- Runway Improvement – Extend Runway 7: It is recommended that a future 1,000-foot runway extension on the approach end to Runway 7 continue to be planned for and shown on the ALP (this extension was also shown on the 2014 EGE Airport Master Plan). Continued inclusion of this potential project protects the land and airspace in the event that future demand warrants the need for this extension. Also note that this extension would likely require that the Runway 7 threshold remain in its current location due to airspace limitations associated with terrain; thus, the 1,000-foot extension would

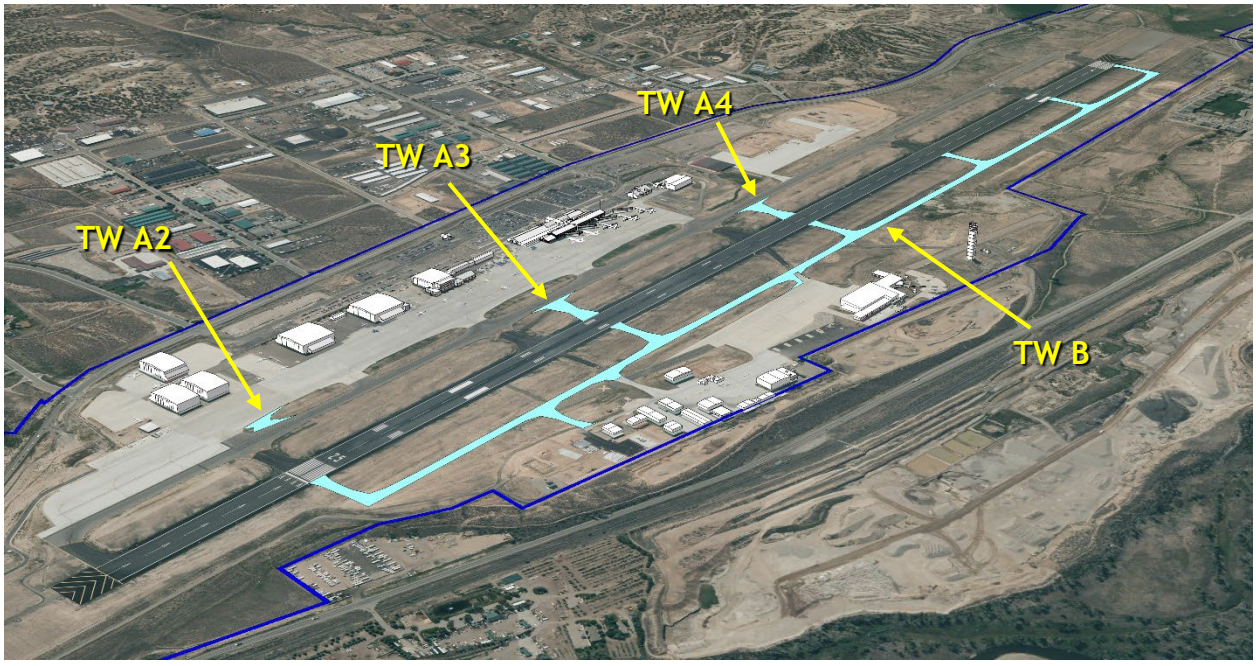
likely only be available for use for aircraft departing on Runway 7 or for aircraft arriving on Runway 25 (i.e., it would not be available for aircraft landing on Runway 7). **Figure 5-3** graphically shows the recommended 1,000-foot runway extension along with the associated extension of Taxiway A and future Taxiway B. Note that no alternatives were required for this action.

Figure 5-1: Taxiway Improvements (TW B, TW A2, TW A3, and TW A4) – Southwest Perspective



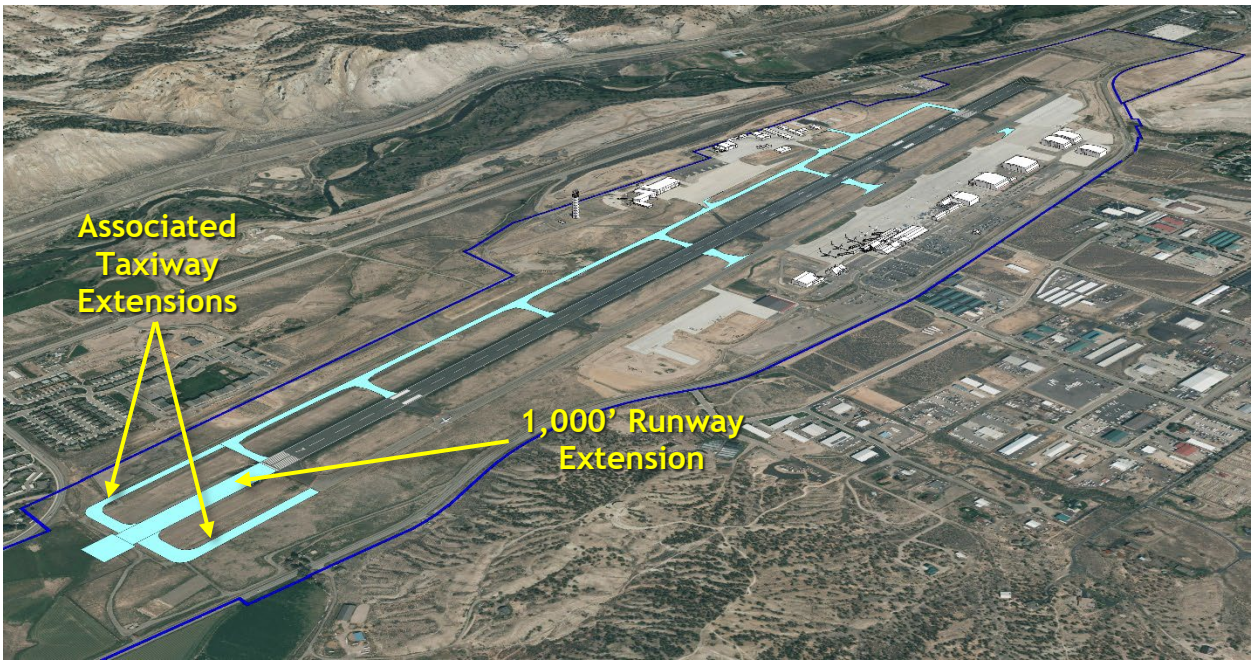
Source: Jviation, a Woolpert Company

Figure 5-2: Taxiway Improvements (TW B, TW A2, TW A3, and TW A4) – Northeast Perspective



Source: Jviation, a Woolpert Company

Figure 5-3: Runway Improvements (1,000' Extension)



Source: Jviation, a Woolpert Company

Although the extension of Runway 7-25, the establishment of Taxiway B, and the realignment of the taxiway connectors will create construction-related emissions as they are being built, once they are operational, they will provide net emissions benefits over the long term. Specifically, the taxiway improvements will provide flexibility and efficiency for aircraft movement and will reduce overall taxiing times and associated fuel burn, particularly for those aircraft utilizing the north aprons. Additionally, a longer runway length will allow aircraft to operate at lower speeds which also reduces fuel burn associated with departing aircraft. Both of these improvements reduce fuel burn that will result in reduced carbon emissions.

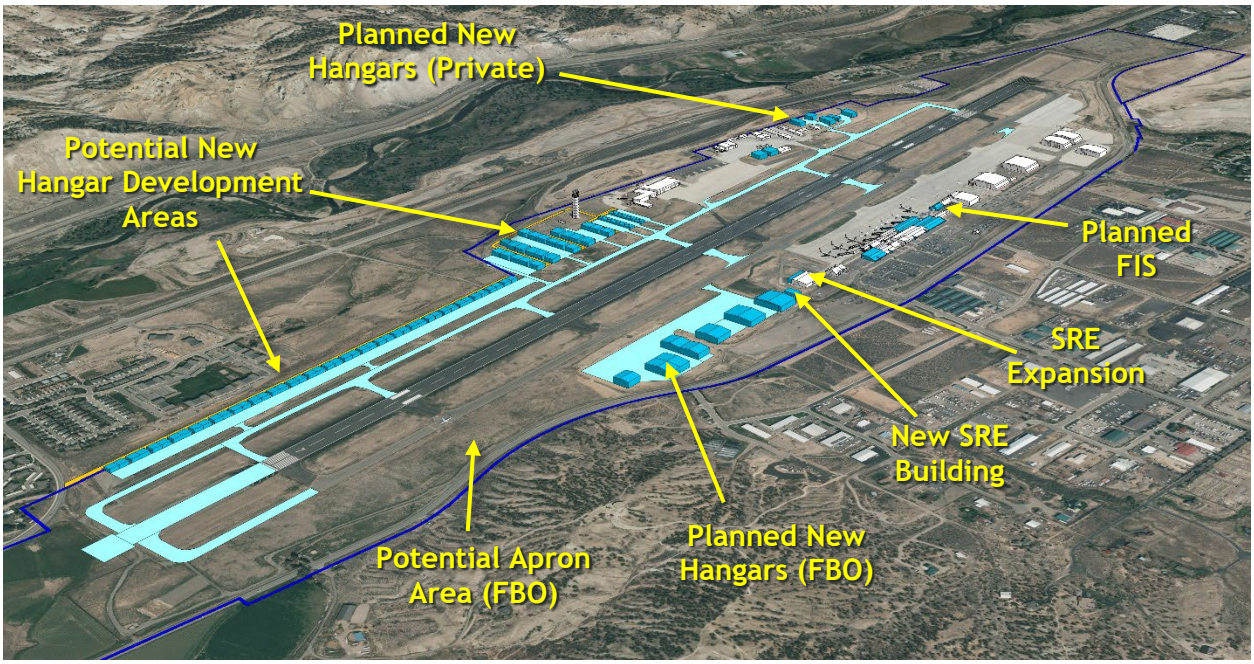
5.3.2 Hangars and Airport Support Facilities

Numerous development alternatives were explored to address EGE's existing and future needs for aircraft storage, hangars, and airport support facilities. Recommended improvements with respect to these facilities include the following (see **Figure 5-4** for a graphical portrayal of the proposed potential improvements). Specific to hangars, it must be recognized that hangar development is almost nearly entirely demand-based and rooted in the individual needs of the developer; so, hangar development will typically occur based on meeting those specific needs. Thus, the hangar development concepts presented in the following section should be considered to be examples of how development could occur as well as to provide an approximation of how much hangar space could be realized within a given area. Future hangar development should consider these concepts and must abide by federal airport design standards associated with them, but they can deviate some from these concepts upon approval of the Airport.

- Hangar development in the northeast corner of the Airport is planned to continue until all area developable space has been utilized. These hangars are being financed privately and will be required to pay ground lease rates to the Airport. Based on the development concept presented, this area has a minimum of an estimated additional 65,000 square feet of hangar development potential beyond its current development.
- Hangar development in the south-central section of the Airport, west of the Airport's snow removal equipment (SRE) building, is planned to continue until all area developable space has been utilized. The current development plan maximizes the limited space available within the site that is bounded to the west by the existing bend in Cooley Mesa Road. Hangars and associated aprons currently planned for this area are to be financed by the Airport's Fixed Base Operator (FBO) (Signature EGE) who will pay ground lease rates to the Airport. Based on the development concept presented, this area has a minimum of an estimated additional 173,300 square feet of hangar development potential beyond its current development. Beyond this development or in lieu of some of this hangar development, it should be recognized that this area also has potential in being developed as an apron area for the storage of transient aircraft. While there are constraints within this area in the form of the Taxiway A Object Free Area, the localizer critical areas, and Cooley Mesa Road, there is room for potential transient aircraft parking that would likely be managed by the FBO. An example concept for the development of this area with a combination of hangars and apron is shown below in **Figure 5-5**.
- Potential future hangar development is available on Airport property that spans from west of the High Altitude Army National Guard (ARNG) Aviation Training Site (HAATS) facility in areas around the Air Traffic Control Tower (ATCT) to the approach end of Runway 7. The development potential of this area will be greatly enhanced by the future construction of Taxiway B. Based on the development concept presented, this area has a minimum of an estimated additional 358,500 square feet of hangar development potential beyond its current development.
- With respect to overall hangar development on the Airport based on the presented concepts in the three areas detailed above, EGE currently has an overall hangar development potential of over 623,000 square feet or a 57% increase in hangar space over the Airport's existing level of 329,000 square feet.
- A Federal Inspection Services (FIS) facility is planned for construction adjoining the Signature EGE building, east of the commercial passenger terminal building. This will allow for the inspections and clearance of inbound international commercial passengers and their belongings. The new FIS facility is planned to be approximately 20,000 square feet in size.
- Ground Support Equipment (GSE) storage and maintenance area needs are important requirements for EGE. These will be addressed in a subsequent section of this chapter.
- The Airport needs expanded storage capacity for SRE, airfield equipment, and associated support materials. It is proposed that the existing SRE

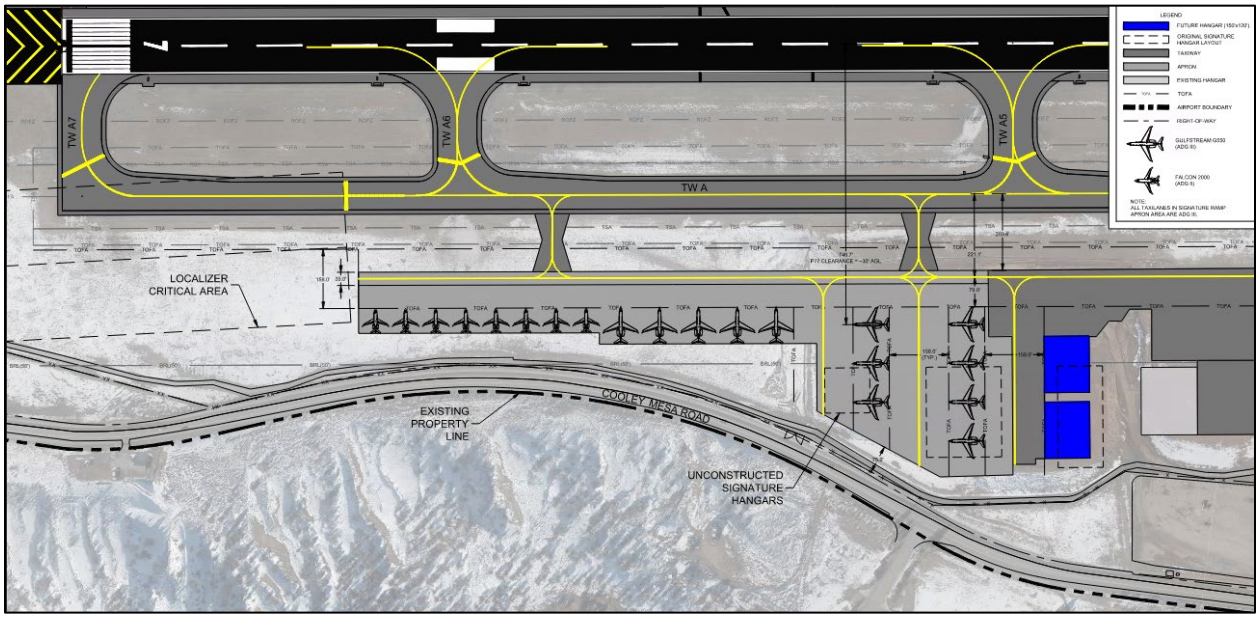
building be expanded a total of approximately 10,000 square feet to the west and to the north (note that the existing building was originally designed to be able to be expanded to the north). Additionally, construction of a new 6,000 square foot storage building is recommended to the west of the SRE building.

Figure 5-4: Hangar and Airport Support Facility Improvements



Source: Jviation, a Woolpert Company

Figure 5-5: Southwest Development Area Concept

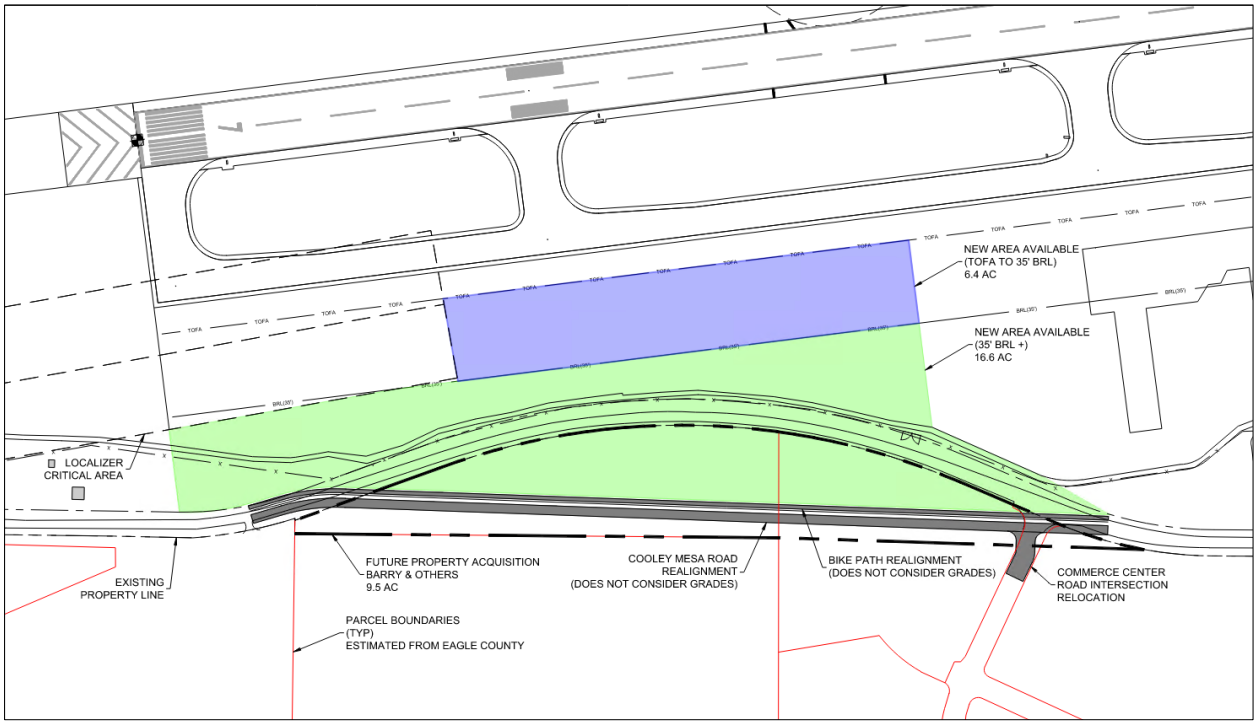


Source: Jviation, a Woolpert Company

Cooley Mesa Road Realignment Development Concept

Historically, there have been conversations between EGE and other interested stakeholders regarding the potential of straightening of a bend in Cooley Mesa Road on the southwest side of the Airport. This bend exists due to terrain issues in the form of a large hill that lies south of the road. For both auto-related safety and efficiency reasons, it would be beneficial for the bend in the road to be removed by straightening it. If this were to ultimately occur, this straightening would result in the potential of adding property currently within the Cooley Mesa Road right-of-way and beyond to the south being made available for aeronautical and Airport use on the north. As noted above, the hangar development area located west of the existing SRE building is currently bounded on the west by the existing bend in Cooley Mesa Road. However, if that bend were to be removed by acquiring land to the south and then straightening the road, an additional 7.6 acres of developable land could be directly added to EGE. This would also have an additional benefit of converting 15.4 acres (of which 6.4 acres would likely have height restrictions) of existing Airport property that is currently unusable into developable lands; thus, the straightening of Cooley Mesa Road would result in EGE realizing a total of 23.0 acres of additional area available for aeronautical-related development (see **Figure 5-6**).

Figure 5-6: Cooley Mesa Road Realignment Concept



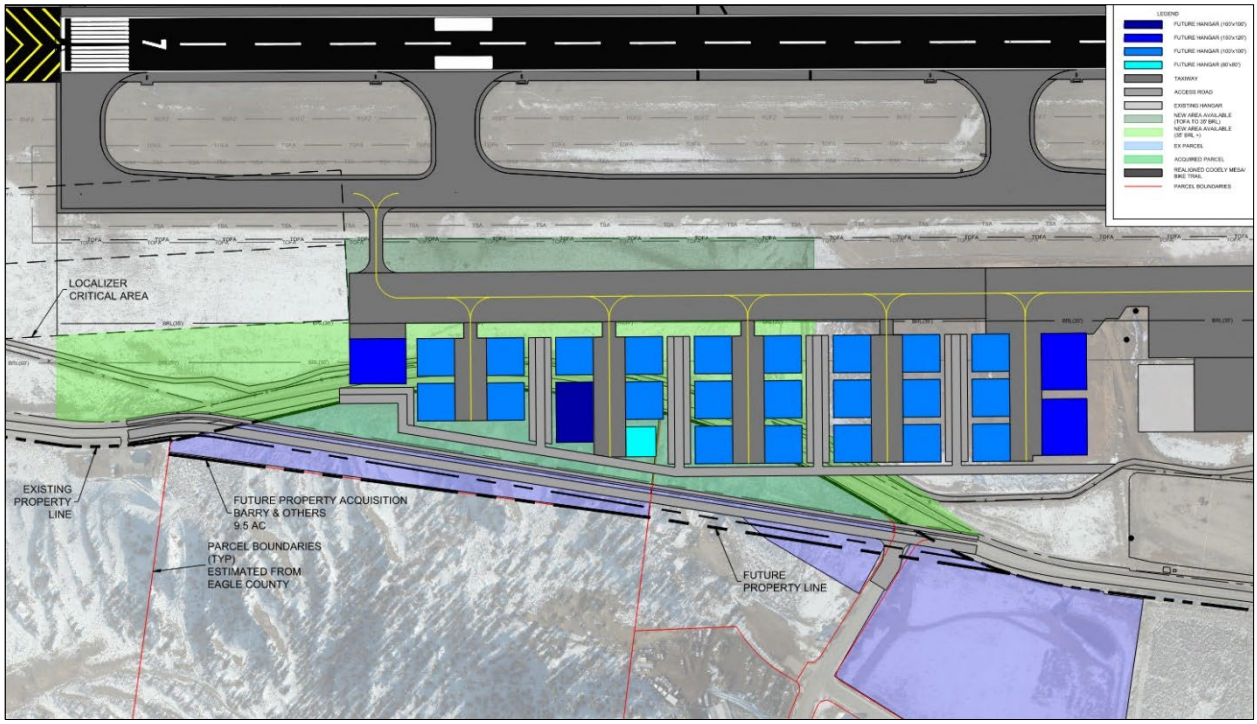
Source: Jviation, a Woolpert Company

If that 23.0 acres were to be made available to continue hangar development similar to the planned development area to the east, EGE could realize more than 206,000 square feet of additional hangar space (see example hangar development in **Figure 5-7**). It should be noted that hangar development within the overall 23.0 acres would be limited by airport design standards (e.g., object free areas), airspace restrictions,

and NAVAID critical areas, as well as by the requirements of appropriate hangar development criteria. Nevertheless, those areas within those 23.0 acres could ultimately be utilized for some other uses such as remote parking, construction staging, etc.

When incorporating the Cooley Mesa Road straightening option into the previously described 623,000 square feet of existing hangar development potential, EGE would have an overall hangar development potential of over 829,000 square feet or over double the Airport's existing hangar quantity of 329,000 square feet.

Figure 5-7: Cooley Mesa Road Realignment Hangar Concept



Source: Jviation, a Woolpert Company

5.4 COMMERCIAL PASSENGER TERMINAL

Multiple Commercial Terminal needs were identified in the facility requirements analysis. (Note that the focus of this analysis was placed on the primary terminal facility that accommodates all domestic commercial service operations as well as international departures; international arrivals will be accommodated in the future by the new FIS facility.) These needs reflect current demand levels as well as the forecasted increase in enplaned passengers over the planning period. Increased passengers will place further strain on the existing terminal facilities that are already often at or near capacity. Additionally, other terminal area deficiencies were identified through communications with Airport staff, tenants, and passengers as well as through direct observations, including:

Curbside Experience

- Capacity and vehicular flow issues
- Lack of expansion for Sky Cap
- Extraneous number of crosswalks and a large expanse between pedestrian traffic and terminal entries
- First impressions of terminal are very important; “front door” is critical

Baggage Claim

- Capacity and passenger flow issue
- Separation of large item claim, requiring additional tug trips
- Operational efficiency issues in back-of-house; tug operation challenges

Ticketing, Security Screening Checkpoint (SSCP) and Airline Ticketing Office (ATO)

- Ticketing counters and passenger flow is an issue, ticketing capacity may be an issue in future with additional airlines
- Based on Transportation Security Administration (TSA) throughput equipment estimates, additional capacity (lanes) needed for future SSCP
- ATO space is confusing due to back-of-house configuration
- Potential integration of automated exit lanes in improving efficiency and to help compensate for EGE and TSA staffing limitations

Restrooms

- Accessibility
- Limited quantity and location issues
- Finishes and Fixtures

Concessions

- Overall amount of airside concession leasable area is lacking for supporting existing concessions; customer queuing areas are deficient; concession storage areas are inadequate; food preparation and delivery areas are not optimal and can be confusing
- Overall amount of airside concession leasable area is lacking for the introduction of new concessions
- Landside concessions not in ideal location, prefer towards baggage claim

Baggage Makeup and Screening / Process

- Amount of bag jams problematic, mostly due to inclined belts and two-story condition
- Operational efficiency could be improved; tug operation challenges

Relocation of GSE

- Need more GSE storage capacity
- Currently surface parked and uncovered
- Prefer covered areas to house GSE fleet; future electrification

- Lack of vehicle maintenance facility

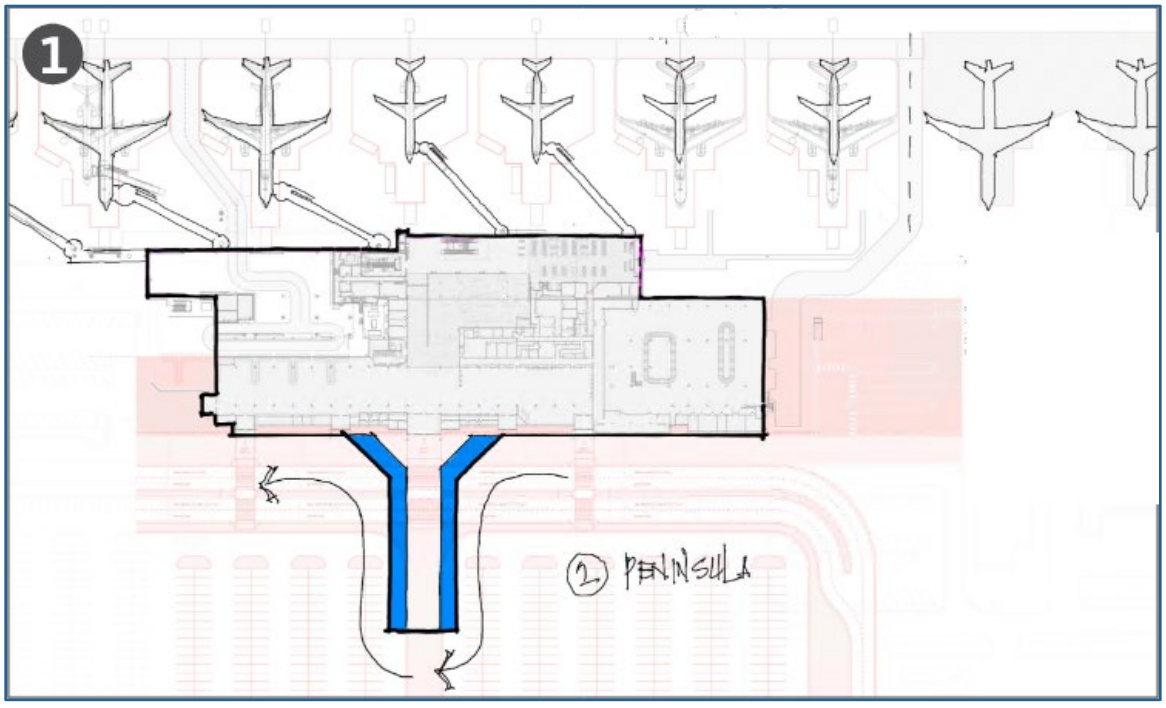
5.4.1 Commercial Passenger Terminal Alternatives

Two primary development alternatives were generated as potential future models for the long-term expansion of the commercial passenger terminal building, each of which present concepts designed to meet facility needs throughout the planning period. These two alternatives differ in the way the terminal building could be expanded and in the manner in which landside elements are addressed, particularly with respect to the terminal curb frontage, the loop road, and auto parking areas.

Peninsula Alternative

The first alternative (**Figure 5-8**) is based on a building addition to the south of the existing terminal building and into the existing parking facilities, in the shape of a peninsula. This would create a division between departures and arrivals based on road access and side of the peninsula, but it would potentially create a larger focal point and gathering space for terminal drop-off and pickup. This alternative also features a second level boarding concourse that would add gates and loading bridges along with an increase in space to facilitate expansion of the holdrooms, circulation, and secured concessions. This alternative would create significant disruption to existing terminal and landside operations during construction. It would also not rectify some of the current issues inherent to the terminal building, including deficient baggage handling systems, and would likely require customized systems to effectively incorporate the peninsula.

Figure 5-8: Peninsula Alternative

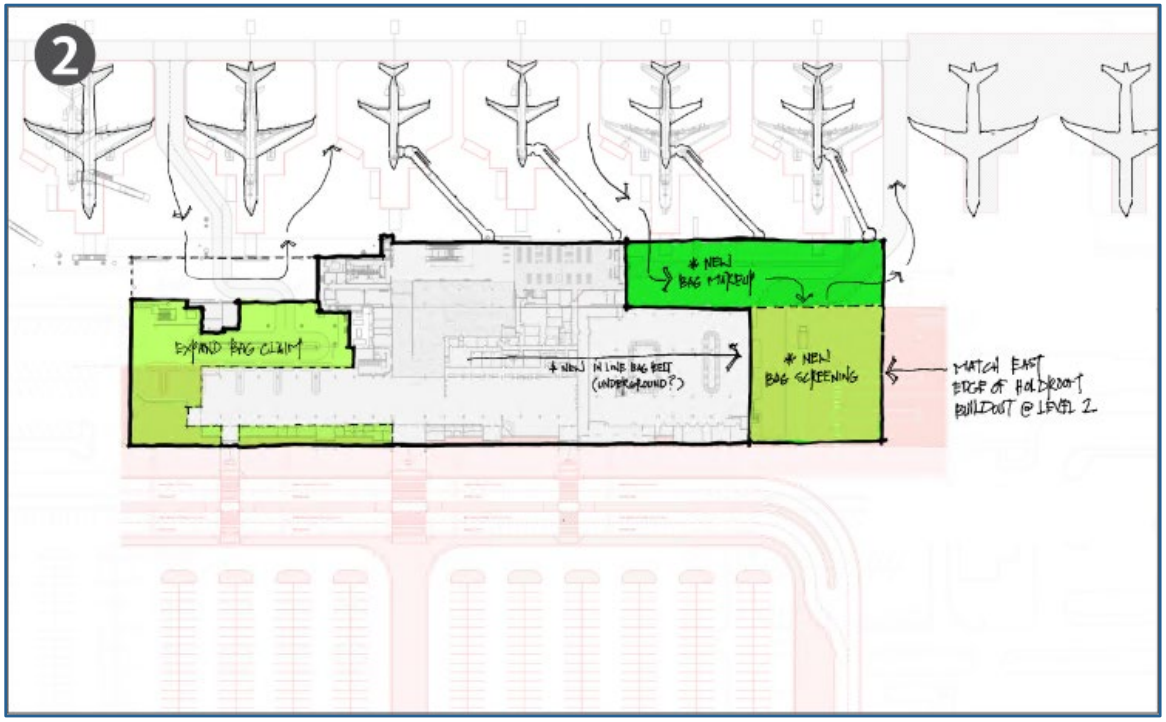


Source: Gensler

Linear Alternative

The second terminal alternative (**Figure 5-9**) is based on expansions/additions on each end of the terminal, stretching the existing experience out linearly. It would create a new bag screening and makeup area to the far east that would free up necessary space for all other areas to expand to meet future square footage forecast needs. Additionally, the baggage claim areas would be extended to the far west, which would also provide the opportunity for airport administration offices to be relocated to a second level of the expansion. As in the other alternative, this features a second level boarding concourse that would add gates and loading bridges along with an increase in space to facilitate expansion of the holdrooms, circulation, and secured concessions. If sequenced properly, this alternative would offer the least potential disruption to existing operations during construction since the overall building program could be broken up into at least three primary phases (west side expansion, east side expansion, and airside expansion). Additionally, such phasing would provide the Airport with greater financial flexibility since none of the potential phases are directly dependent on each other.

Figure 5-9: Linear Alternative



Source: Gensler

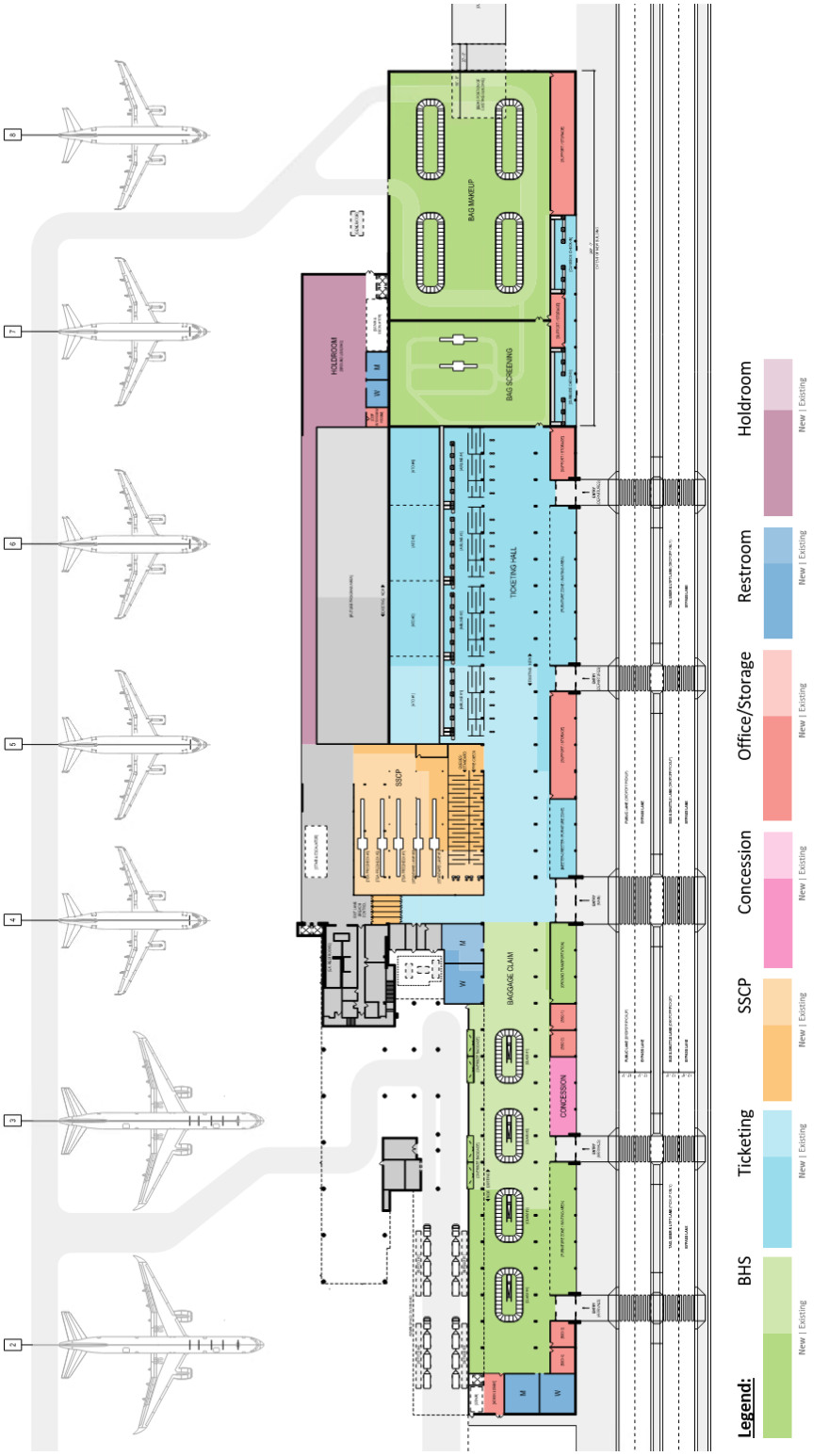
5.4.2 Preliminary Recommended Commercial Terminal Alternative

The Linear Alternative was identified as the Preliminary Recommended Commercial Passenger Terminal Alternative as it reconciles all previous terminal area planning efforts undertaken by the Airport, considers the terminal improvements made thereafter, can structure the future program based on the Planning Activity Levels, will integrate with the result of the roadway circulation and parking plan, and meets the Facility Requirements. **Figure 5-10** and **Figure 5-11** depict the overall terminal planning layouts of the recommended improvements at Planning Levels 1 and 2. The suggested approach is to expand the terminal to both the west and east, elongating the overall footprint linearly. The details of the various terminal areas are described in the sections that follow.

This Preliminary Recommended Commercial Terminal Plan was submitted and presented as part of a collaborative process that included public outreach meetings, involvement of the Board of County Commissioners, key stakeholders, tenants, and Airport staff and Management, as well as the airlines, rental car companies, and concessionaires.

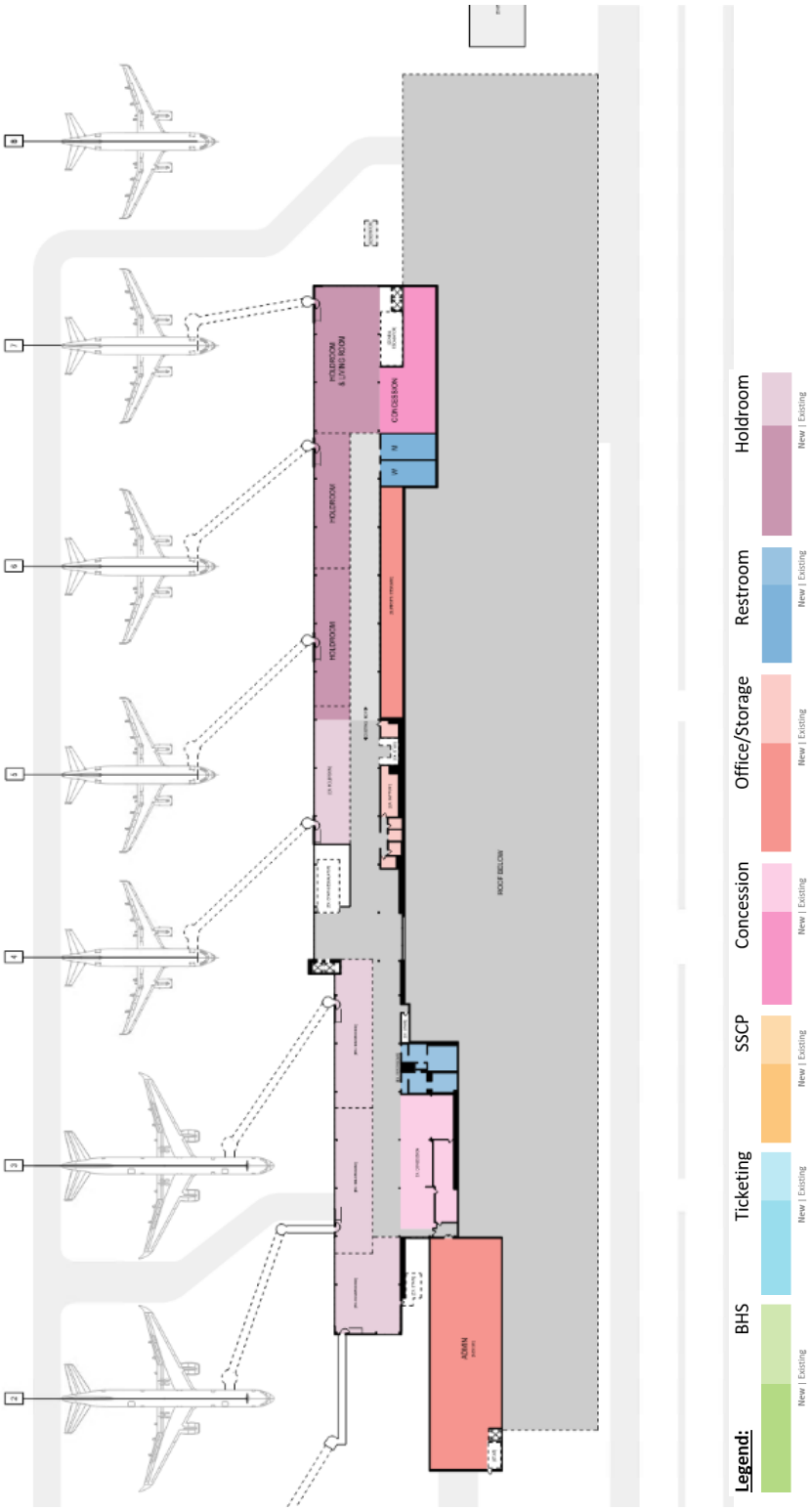
Although the expansion of the terminal building will create construction-related emissions as it is being built, once operational, the terminal will provide net emissions benefits over the long term. Specifically, the terminal expansion will be constructed in a manner that utilizes energy and water reduction design elements, allowing it to operate in an efficient manner and reducing the overall consumption of both energy and water – contributing to meeting the sustainability and resiliency goals of Eagle County.

Figure 5-10: Level 1, Overall Floor Plan



Source: Gensler

Figure 5-11: Level 2, Overall Floor Plan

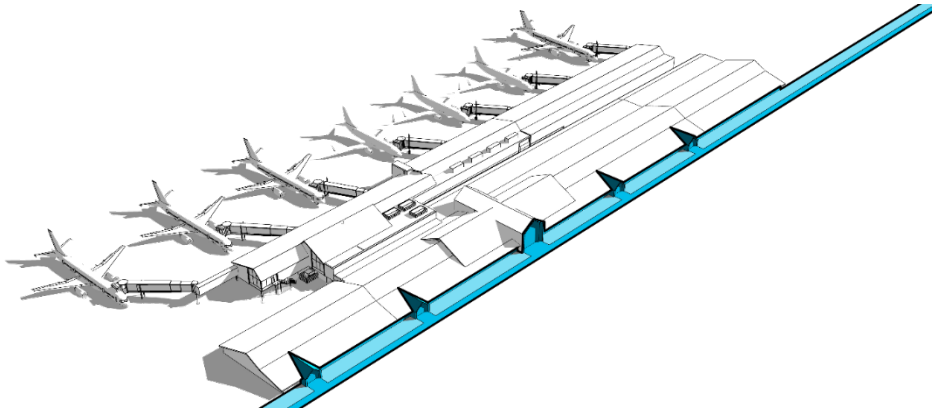


Source: Gensler

CURBSIDE

The existing vehicular and passenger approach to the terminal pickup and dropoff areas has been identified as a critical concern by the Airport staff and stakeholders. This is due to the congestion, lack of vehicle capacity, and the negative impact to the passenger experience. In essence, the curbside is not long enough nor is it wide enough to meet existing and future demand.

Figure 5-12: Curbside, Massing Diagram



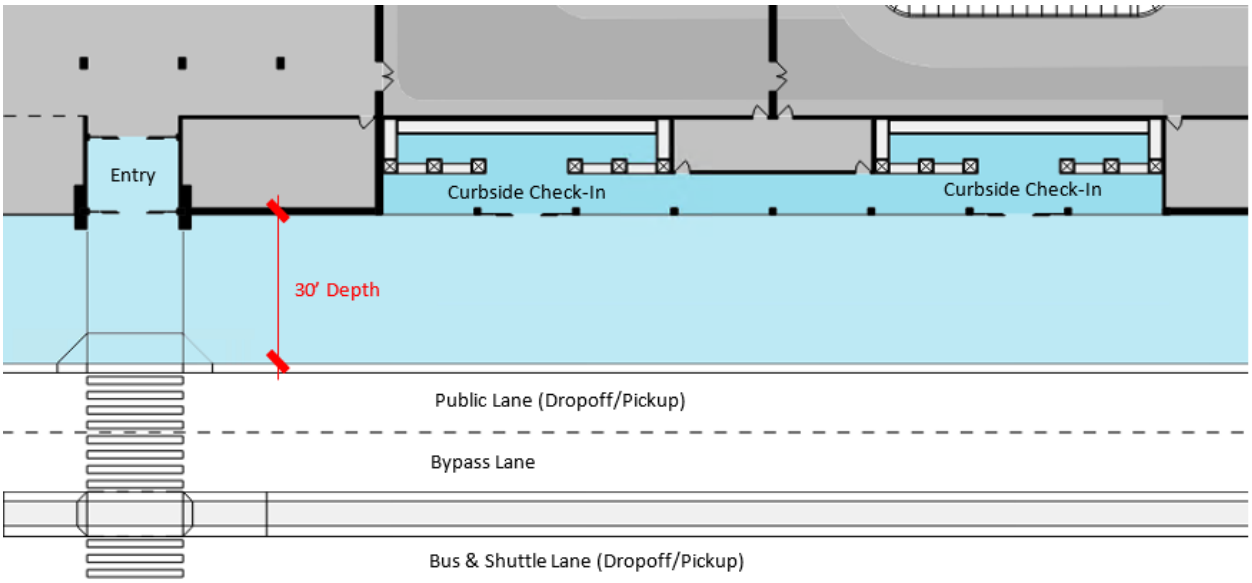
Source: Gensler

To address the lack of capacity, the preferred alternative stretches the curbside along the expanded frontage of the terminal, as well as increases the depth of space between the curb and the entrance doorways. Based on industry standards, the existing curb depth is too narrow for adequate circulation of passengers as they arrive at the Airport. The amount of linear frontage is squeezed too tightly between the existing curbside check-in area and the first entrance to the far east, which has created major traffic congestion of both vehicles and pedestrians. The existing depth condition varies, but is generally between 16 to 20 feet. The recommended future depth is 30 feet (**Figure 5-13**), which will almost double the capacity. The existing five points of entry will also be stretched out across the frontage of the expanded terminal to create longer pauses between curbside parking zones. The preferred alternative provides an additional 400 linear feet of curbside for a total of 1,000 linear feet.

In addition to the physical expansion of the curbside, the overall passenger experience associated with the area requires improvement. This requires enhancements to multiple facets associated with the curbside including modifying the roadways and parking lots to create better conditions through adequate vehicular queuing space. Clearer wayfinding and distinct zones for the various types of vehicular traffic (ie. general public, bus/shuttles, taxi/transportation network companies) are intended to simplify passenger flows. Another design improvement will be to increase the native landscaping at the curbside to be more welcoming to travelers, but also create and enhance the connection to the outdoors/curbside from the interior areas. This can be achieved by building out the areas between entrance vestibules with transparent glazing at the perimeter and inserting lounge seating groups to allow passengers to have line of sight to the curbside while waiting in the conditioned space inside. More intuitive wayfinding can be achieved simply by

creating hierarchy between the exterior building elements and making the curbside check-in area more prominent. A new enclosed curbside check-in area with glazing at the perimeter will also be more visible and inviting, providing relief from a capacity standpoint for the main ticketing hall and parking queue along the curb. These newly located curbside induction lines will provide nearly twice the curb frontage as existing and the new take-away conveyors transport baggage directly into the new screening area for processing.

Figure 5-13: Curbside, Program Layout

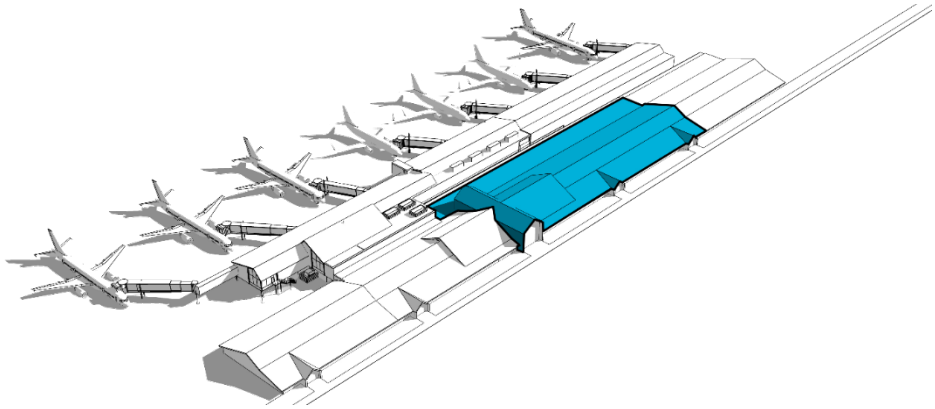


Note: Darker blue represents new construction.
Source: Gensler

TICKETING HALL AND CHECK-IN

The preferred alternative upgrades the ticket counter program to provide ample depth for modern industry standards (i.e., queuing, bag drops, remote kiosk zones). It also adds a lane and more queuing to the security checkpoint, while also building new ATO space that is simplified and organized.

Figure 5-14: Ticketing Hall, Massing Diagram



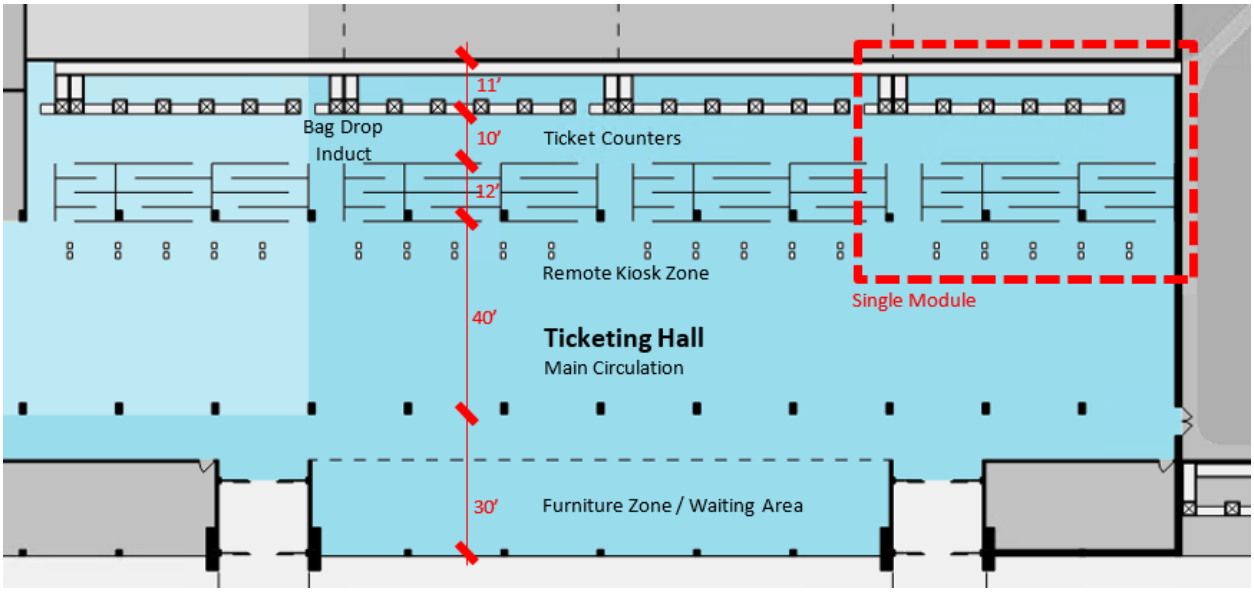
Source: Gensler

The proportions of the existing ticketing hall limit the ideal layout for queuing and circulation space, causing inefficiencies and congestion during periods of high demand. Capacity will be increased with additional counters available to airlines. A typical airline module is also being programmed, in order to properly plan the space needed to accommodate every type of traveler within these individual airline zones, which will give each airline an appropriate mix of full service counters, self-service kiosks, bag tag kiosks, bag drop inducts, and queuing space (**Figure 5-15**). Pushing the ticket counters further into the space, which currently houses the airline ticketing offices (being relocated) will allow the central corridor to become open for circulation, providing future flexibility to the Airport in the next 20 years.

The expanded ticketing area will be supported by back wall, take-away conveyors that will provide adequate capacity for the growing demand. Regular sized checked baggage will utilize these conveyors which will transport them to the baggage screening area. This route provides better throughput and capacity to handle these bags relative to the existing system, mitigating the starting and stopping of the conveyors. Catering to the large number of skis that EGE handles regularly in the winter months, dedicated oversize baggage handling is provided. Large radius (5') power turns are used so skis can be routed directly to a dedicated area for oversized baggage screening.

The increase in curbside check-in positions help to increase passenger flow through the terminal by distributing the options for where passengers may check-in.

Figure 5-15: **Ticketing Hall, Program Layout**



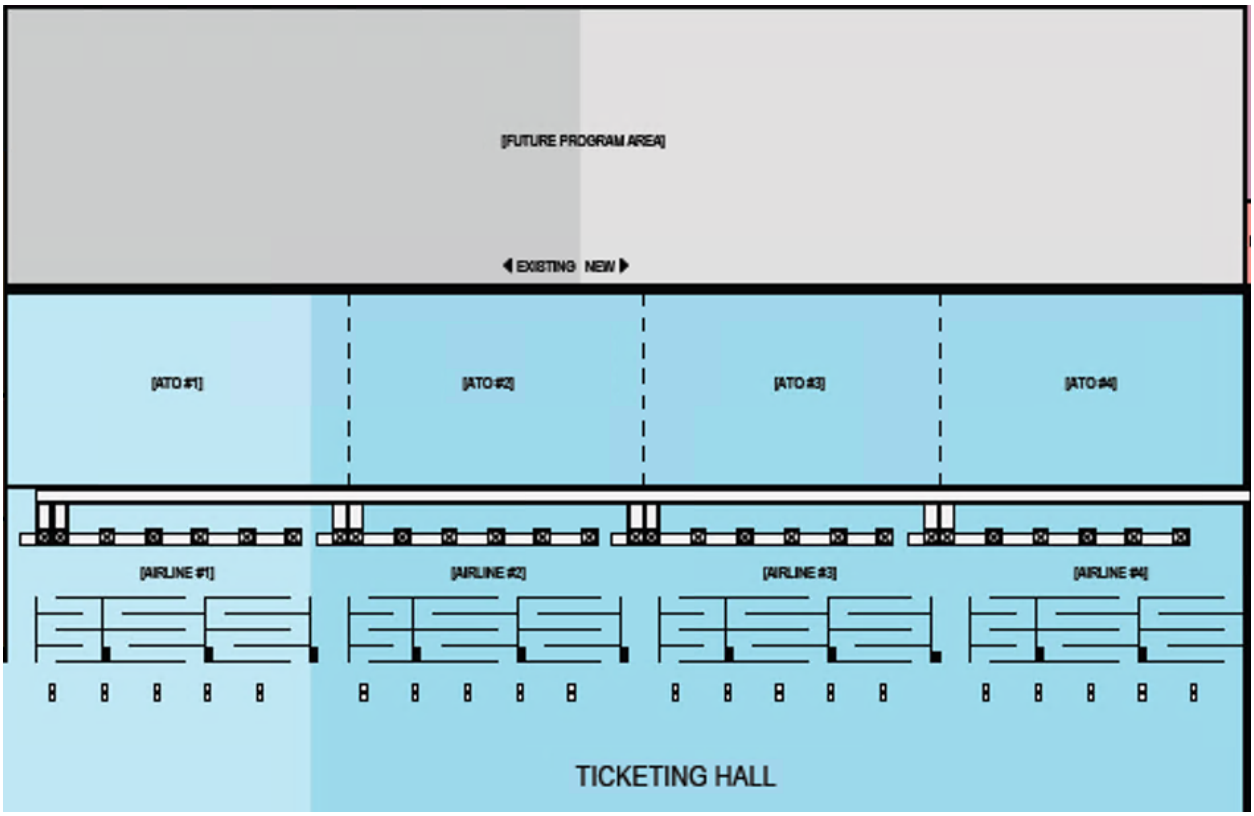
Note: Darker blue represents new construction.
Source: Gensler

AIRLINE TICKETING OFFICES (ATO)

The existing airline ticketing offices are undersized after years of incremental modifcations. Each airline zone of ticket counters will now receive its own dedicated

ATO space directly adjacent to it (**Figure 5-16**). Terminal areas located to the north of the ATOs will be reserved for future programing requirements. The preferred alternative provides 9,400 square feet of potential ATO area, compared to the 6,300 square feet of existing area.

Figure 5-16: **ATOs, Airline Modules, Future Program Area**

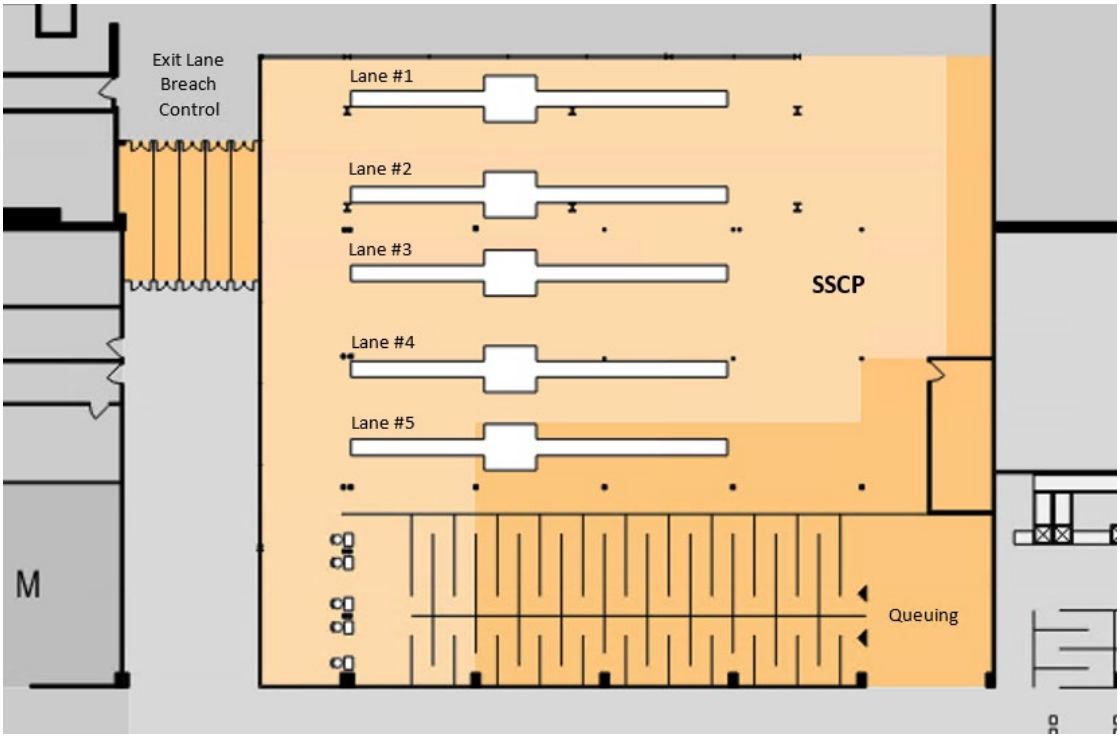


Note: Darker blue represents new construction.
Source: Gensler

SECURITY SCREENING CHECKPOINT (SSCP)

Although this checkpoint received significant upgrades in the 2019 Concourse Expansion project, there may need to be an additional lane introduced, in order to meet the forecast of activity expected in the next 20 years. The recommendation is to provide the flexibility to accommodate up to five lanes total. The existing four lanes can remain in their current loction and the relocation of the ticketing further east, allows for the SSCP to potentially expand south for the addition of a fifth lane. Reconfiguring the queing for this area to run east-west and be tucked behind a transparent glass partion will help ease the passenger flows in the main terminal hall. To reduce the need for additional TSA personnel to control security in and out of the secure areas, five lanes of automatic exit lane breach control are planned to the west of the SSCP for arriving passengers leaving the secure area. These lanes will also prevent departing passengers from entering the secure area through this zone which currently requires staffing and oversight.

Figure 5-17: SSCP, Program Layout

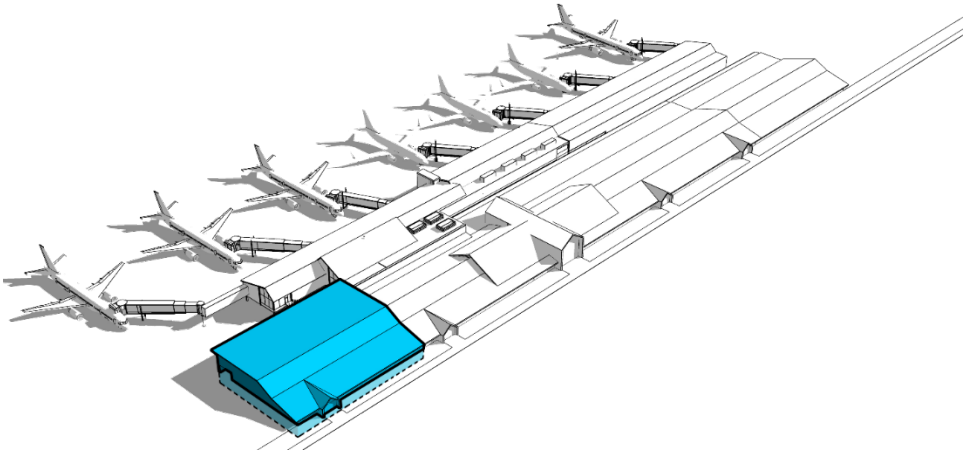


Note: Darker orange represents new construction.
Source: Gensler

BAGGAGE CLAIM

The preferred terminal alternative expands the building to the west for additional baggage capacity and improved operational efficiency by having intermediate oversize bag slides between claim carousels. New administration space will be added to the second floor of the west end. There is space underneath the footprint of this expanded area to store GSE.

Figure 5-18: Baggage Claim, Massing Diagram

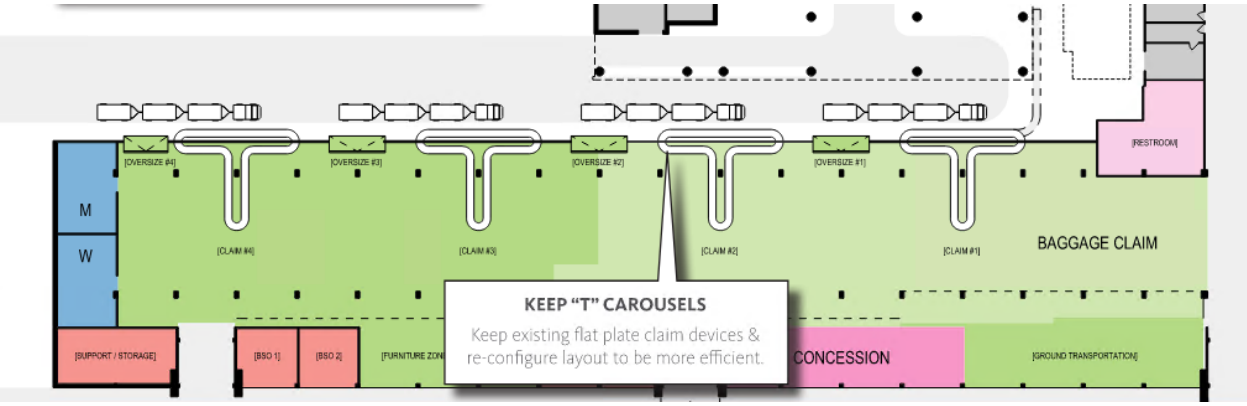


Source: Gensler

Specifically, baggage claim needs additional capacity, in terms of bag carousels and linear presentation, but also circulation and seating which will ease passenger congestion and provide enhanced passenger experience at the peak demand. An addition is being recommended to the west of the existing baggage claim area, which include expanded baggage claim as well as an administration lobby, restrooms, baggage service offices (BSO), and ample furniture zones adjacent to the main carousel space. Oversize baggage areas will also be relocated to a more ideal position for passengers and improving back of house operational efficiency. The restrooms to the far east of baggage claim will be expanded for additional capacity as well as additional leaseable space for a concessionaire, conveniently located near where the longest wait times occur.

In association with the preferred terminal alternative, three additional baggage alternatives (see **Figure 5-19**, **Figure 5-20**, and **Figure 5-21**) were considered during this study. These all provide an equivalent amount of claim frontage for passengers to pick up their bags from the claim devices. The devices have 120 linear feet of frontage and have been sized to accommodate the largest plane that is projected to be within the fleet mix at EGE.

Figure 5-19: Baggage Claim Device Alternative 1: Flat Plate



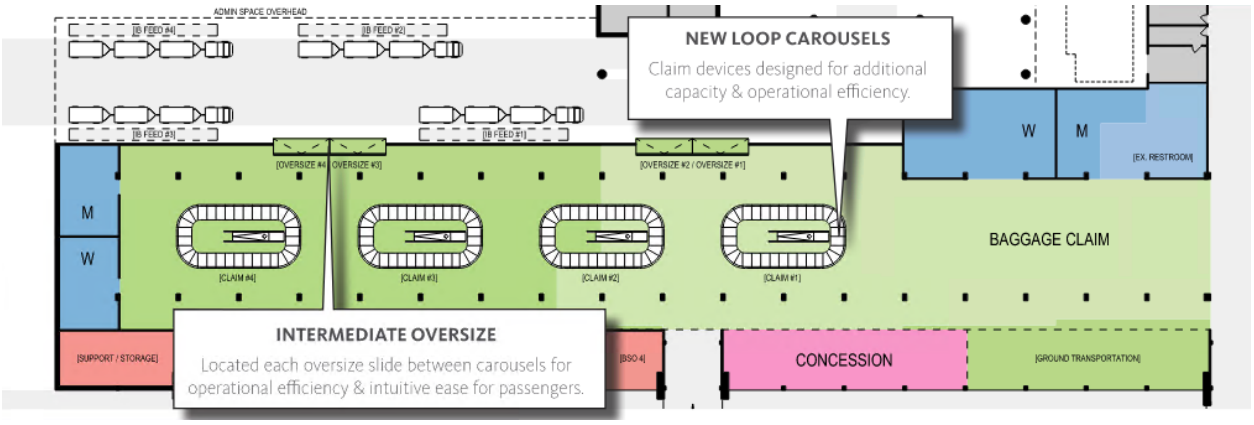
Source: Gensler

Baggage Claim Device Alternative 1: Flat Plate

This option resembles the current baggage operations in place. The existing claims are replaced with new flat plate claim devices that are larger to accommodate a better level of service compared to what is available today. The claims are further spaced out than existing, which allows for more passenger circulation as well as better tug and cart circulation for the baggage handlers. Oversize slides are located between each flat plate claim device, which improves the operation and traffic flow for tug drivers so that the drop off of regular and oversize baggage can be done more efficiently. This option still requires doors at each end of the claim device to be open as bags are waiting to be claimed by the passengers, which is not ideal for thermal comfort of waiting passengers and poses some Security Identification Display Area (SIDA) security risk.

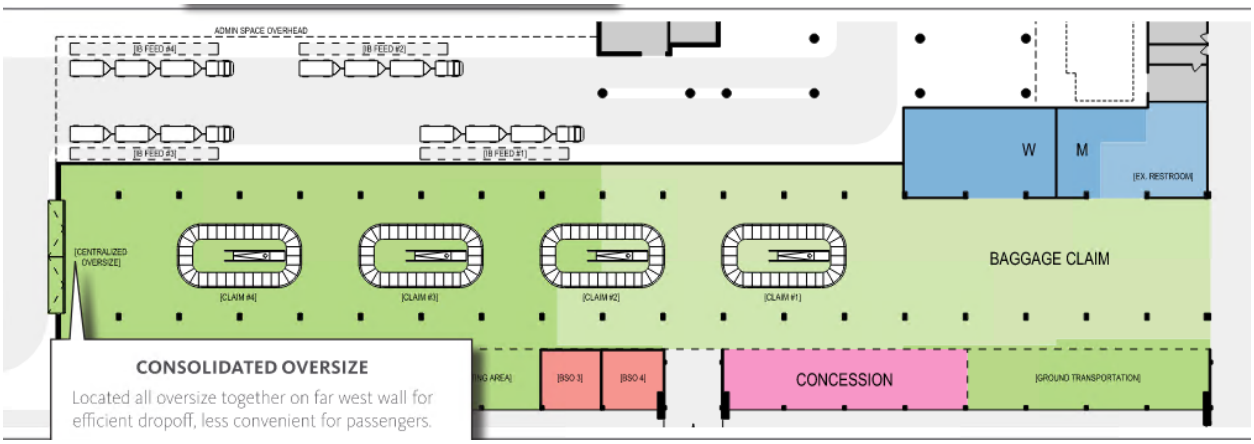
The drive path has been optimized to provide flow between loading standard luggage versus oversize items. New oversize slides are located past the load belts and provide a centralized pickup location for passengers to claim their skis and other large items.

Figure 5-20: Baggage Claim Device Alternative 2: Incline Plate Option 1



Source: Gensler

Figure 5-21: Baggage Claim Device Alternative 3: Incline Plate Option 2



Source: Gensler

Baggage Claim Device Alternative 2 & 3: Incline Plate Options

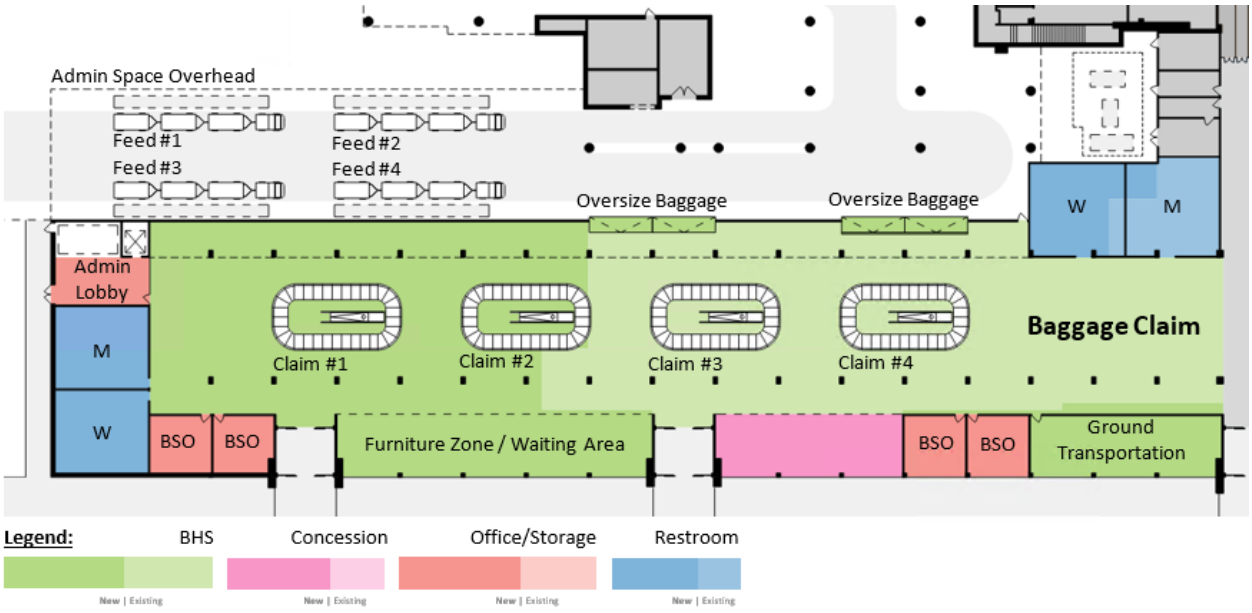
The incline plate claim device option is reflected in two alternatives that also reflect two additional design options. Alternative 2 incorporates incline plates but maintains oversized baggage claim areas generally in their current locations and configuration. Maintaining that also allows space within the footprint for additional bathrooms on the west end. However, the existing dispersed oversized baggage configuration could create tug and cart operational challenges and congestion as passenger bags and oversized baggage would need to be deposited in different locations that also has the potential of interfering with other passenger bag drops on the abutting bag drop belt. Additionally, the separated oversized baggage locations could create some confusion in the passenger bag claim area.

Alternative 3 likewise incorporates incline plates but consolidates oversized baggage operations on the west end of the terminal. This would eliminate the potential for additional bathrooms but locate these operations in a single, larger area. Challenges with this design include potential tug and cart congestion by the claim area as well as tug turning radius requirements on both the west side of the terminal and the radius required to access the passenger baggage drop belts. Additionally, as single oversized bag claim area could promote congestion on the west side of the baggage area.

The recommended design is a combination of these two options, as reflected below in **Figure 5-22**. This replaces the existing claim devices with inclined plate claim devices which can store more baggage with the same linear frontage. Four dedicated load belts are located external to the building. The load belts are spaced from each other so that tug and carts can maneuver into and out of each one without interfering with each other. One of the advantages of the incline plate option is that the load belts separate themselves from the claim hall using shuttered roll up Baggage Handling System (BHS) specific doors. These doors are open as bags are loaded onto the load belt, once all bags have been inducted and are enroute to the claim devices, the doors are shut. This provides better climate separation between the outside air and the baggage claim hall as well as improved SIDA-related security conditions. In addition, the tug drivers once done offloading bags can shut the door and drive away, they are not required to stay at the load belt while the claim is in motion and passengers are claiming their bags.

In this alternative, oversized baggage is consolidated but separated into two separate claim areas to allow for more efficient tug and cart operations that are less likely to create operational conflicts, as well as improved passenger claim recognition and experience. It also allows space for additional bathrooms.

Figure 5-22: Baggage Claim Device Preferred Alternative

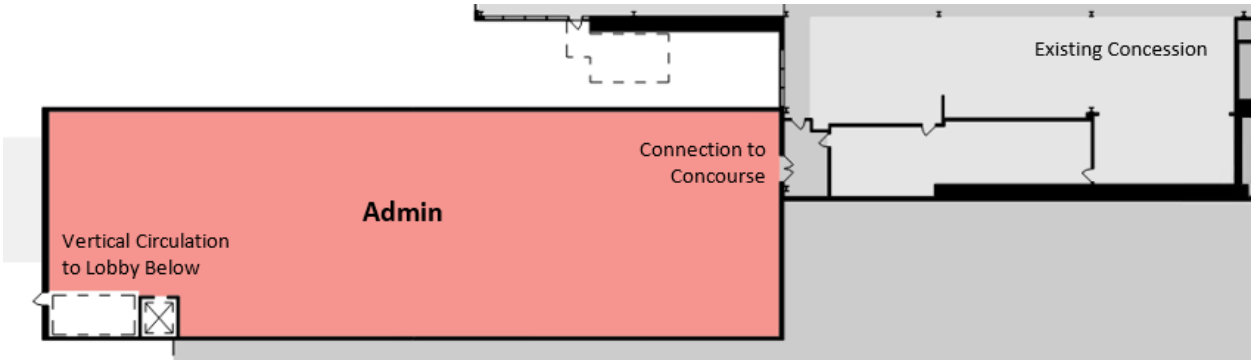


Source: Gensler

ADMINISTRATION

Relocating the administration space into the terminal was requested by Airport staff and stakeholders to increase operational efficiency, direct oversight, immediacy of situational awareness as well as convenience. Locating this new administrative space on the second level above the expanded baggage claim will provide convenient adjacency to the Level 2 concourse area as well as Level 1 access through a new lobby to the west side exterior. This new building area serves a secondary purpose of covering the Level 1 baggage loading operations below. The preferred alternative provides 9,000 square feet of potential administration area, compared to the 5,000 square feet of existing area located in the Aircraft Rescue Firefighting Facility (ARFF) facility.

Figure 5-23: Administration, Level 2 Program Layout

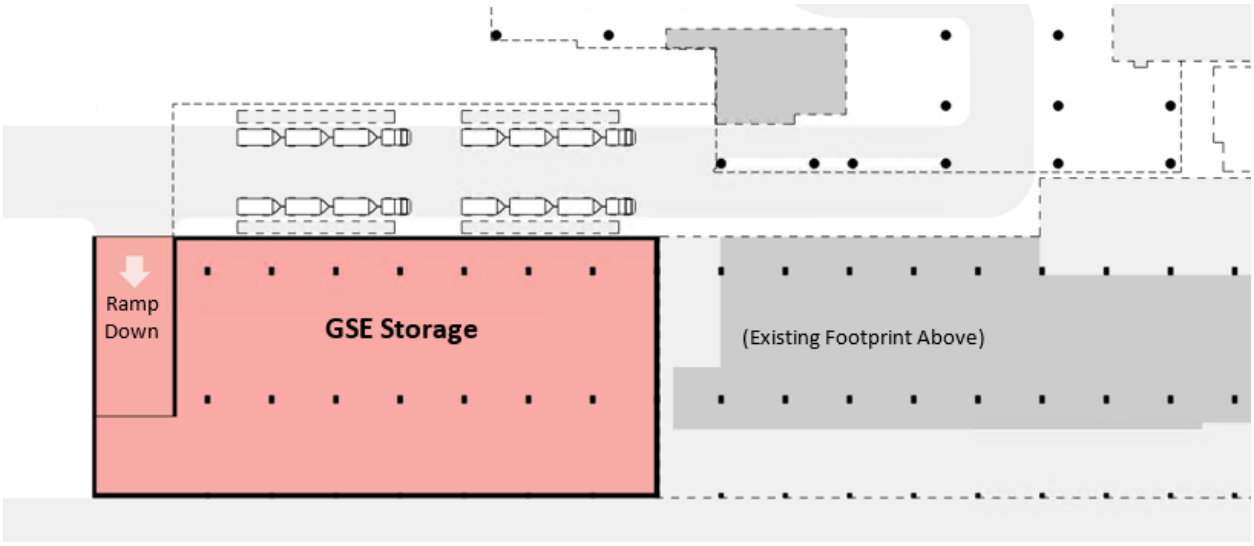


Source: Gensler

GROUND SUPPORT EQUIPMENT (GSE) STORAGE

There exists an opportunity to also construct a GSE storage area underneath the expanded baggage claim area on the west side terminal. This lower level could be consructed with the same footprint of the expanded baggage claim area to store GSE equipment for a variety of purposes including to protect GSE during adverse weather conditions, to use as potential charging areas for electrical powered GSE, for GSE maintenance, among other uses. Access to the baggage feeds into the claim devices will also be an advantage to this space being carved out below. The preferred alternatives provides 9,000 square feet of potential underground storage area with flexible to grow further west if desired. This area would have to be accessed by a ramp and would have columns throughout to support the levels above. This functionality would be a significant improvement and asset for GSE operations that are currently stored on the east side of the aircraft apron in a constrained area and in an uncovered fashon.

Figure 5-24: GSE Storage, Level 0 Program Layout

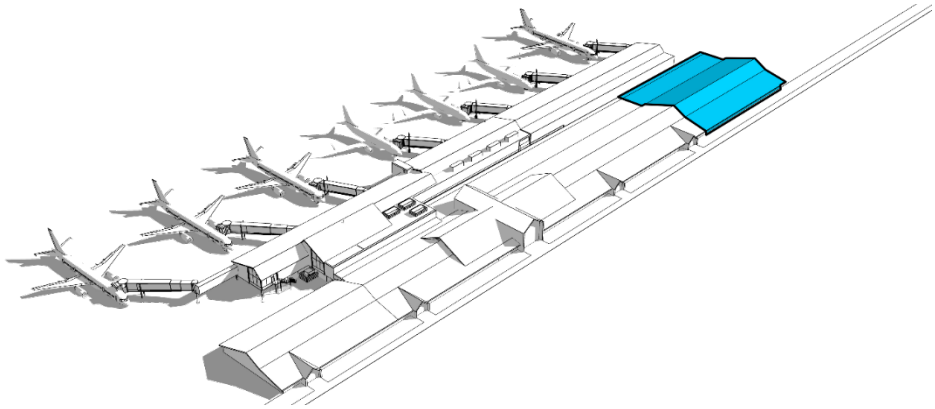


Source: Gensler

BAGGAGE SCREENING AND MAKEUP

The recommended alternative builds a separate new addition to the east of the current screening and makeup area. Once operational, the existing equipment would be decommissioned and the space used for the expansion of public terminal spaces. (See **Figure 5-25** and **Figure 5-26** below.)

Figure 5-25: Baggage Screening and Makeup, Massing Diagram



Source: Gensler

Baggage Screening

EGE provides ease of transport to the Rocky Mountains, ski slopes, and golf courses, and as such, the Airport experiences a significant influx of skis, snowboards and snow gear during ski season, and golf clubs and other outdoor gear during the summer months. Special considerations have been made to ensure that screening of this unique bag mixture can be handled in a seamless manner.

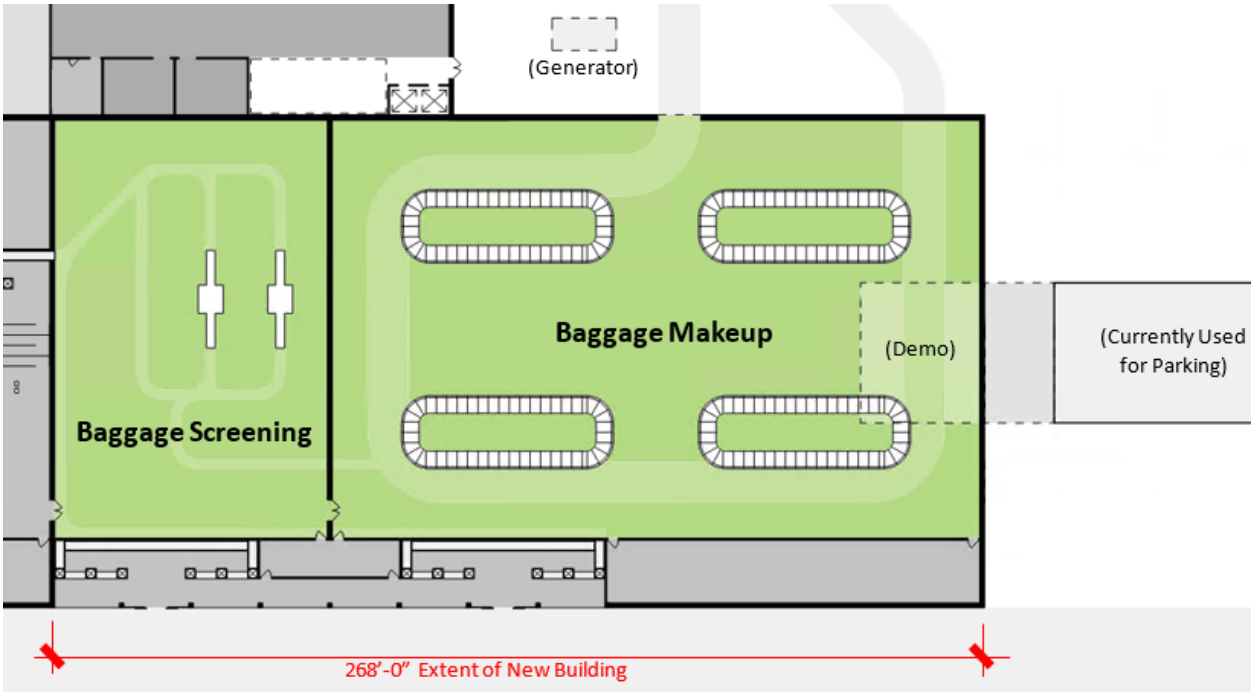
The specified BHS is directly associated with the operation of the TSA's Explosive Detection System (EDS) machines for the security screening of all originating passengers. The existing system is classified as a mini in-line Checked Baggage Inspection System (CBIS). The proposed CBIS is sized to utilize CT-80DR+ XL machines for skis and two higher throughput fully in-line EDS machines. The proposed outbound baggage screening area is to the east of the expanded ticketing hall at the same floor level. This configuration allows for convenient access into and out of the space for TSA, as well as providing easy handling of oversize baggage. A baggage dimensioning device will be utilized to measure the size of the bags and route the bags accordingly to either CT-80DR+XL machines (utilized today), or to one of the two fully in-line EDS machines, depending on bag size. The new in-line configuration will operate as follows:

In-Line EDS Subsystem Descriptions

The inline EDS subsystems can be grouped into three primary levels described below:

- Level 1: Refers to an EDS device operating in a fully automated mode. All regular sized bags will be routed to the new higher throughput Level 1 EDS machines. These machines can process 651 bags per hour (BPH) each, which is significantly higher than the 120 BPH per machine rate that the existing system has. Then the EDS will scan the bag(s) before exiting the device. The EDS will pass the bag back to the BHS with the appropriate bag status (e.g., clear, suspect, decision pending) and the corresponding bag identifier. The BHS will maintain Programmable Logic Controller (PLC) tracking of the bag at both input and output interfaces with the EDS. If the bag is successfully cleared at Level 1 prior to the decision point, then it will be sorted to its final sortation destination. If a "suspect" or "fault" bag decision is received from the Level 1 EDS, the BHS shall advance the bag, and the bag image will be sent to the remotely located staffed workstation/Level 2 where the operator will review the bag image.
- Level 2: Known as a "manually" operator workstation where the TSA agent will decide after reviewing the image. The operators are stationed in a dedicated On-Screen Resolution Room where they will then determine whether the bag is a threat or not. If the bag is successfully cleared, then it will be sorted to its final sortation destination. If the decision is that the bag requires further screening, then the bag is routed for Level 3 screening procedures.
- Level 3: The Checked Baggage Reconciliation Area (CBRA) refers to a location where failed Level 2 bags are routed by the BHS in order to be cleared per airport/airline/TSA protocols. Once the bag has been cleared at the CBRA it will be placed on a dedicated clear baggage conveyor and transported to the make-up area. Bags that have been cleared by the CBIS system (automatically or manually), will be transported onto a dedicated clear line to the baggage make up area.

Figure 5-26: Baggage Screening and Makeup, Program Layout



Source: Gensler

Baggage Makeup

Once bags have been cleared by the TSA, they are routed along a single sortation line equipped with an Automatic Tag Reader (ATR). The ATR scans the bag tag and routes the baggage to one of the four new baggage make up devices based on the carrier and flight information read from the tag. The make-up devices will be inclined plate make up devices to be more efficient storing baggage. The make-up devices have been sized to accommodate the cart presentation requirements determined as part of this study. Considerations were made when sizing the baggage make up room to allow for ease of tug and cart traffic throughout the space.

Design Criteria

The proposed design incorporates the specific characteristics described below:

- The BHS top of belt clearance for all the conveyor lines will be designed with a clearance of 30" from top of belt to the bottom of the lowest obstruction (e.g., beam, conduit, etc.) for all outbound baggage and 30" clearance for all new curbside conveyor lines. BHS controls will be specified with a particular programming to ensure that all baggage processed through the EDS units does not exceed the EDS supplier maximum height restriction - complying with the EDS supplier's documentation.

- The weight range for standard conveyors is 120 lbs. maximum and 1lb minimum per bag. The maximum length by width by height for standard baggage is: 54” by 33” by 34” and the minimum dimensions are 12” by 12”

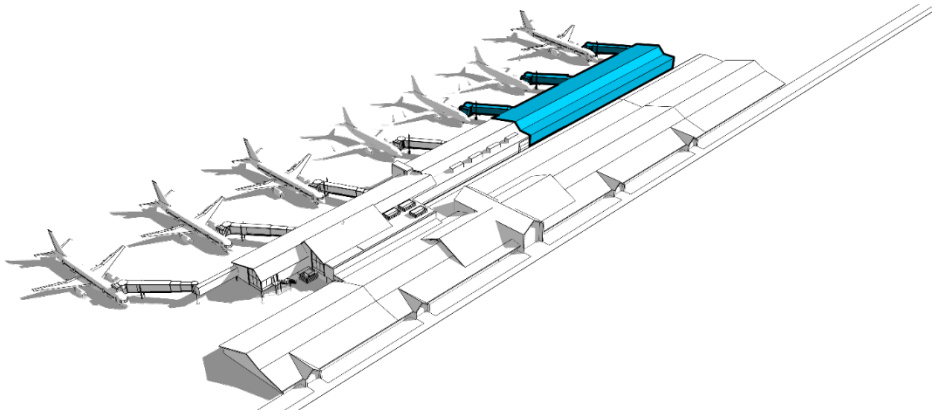
by 12”. Large radius (5’) power turns are used so skis can be routed directly to a dedicated area for oversized baggage screening. This allows for longer items such as skis to be inducted into the BHS.

- It must be recognized that the 268-foot extension of the terminal building for baggage screening and makeup (as shown in **Figure 5-26**) will directly impact an existing building currently utilized by the Airport’s FBO for client automobile storage. The extension of the terminal building will require a minimum of 65 feet of the existing FBO building to be demolished to account for both the extension as well as a minimum of 20 feet for access circulation around the building. Through preliminary conversations, the FBO recognized the importance of the terminal expansion and has indicated that it would be amenable to working with the Airport to come to an agreement that would enable it to forgo its rights to the structure and allow for its demolition.

GATES AND GATE LOUNGES

By extruding the concourse volume east, three new holdrooms with jetbridges can be added to the upper level. One ground loaded gate remains on the lower level and open shell space provides future flexibility.

Figure 5-27: Gates and Gate Lounges, Massing Diagram

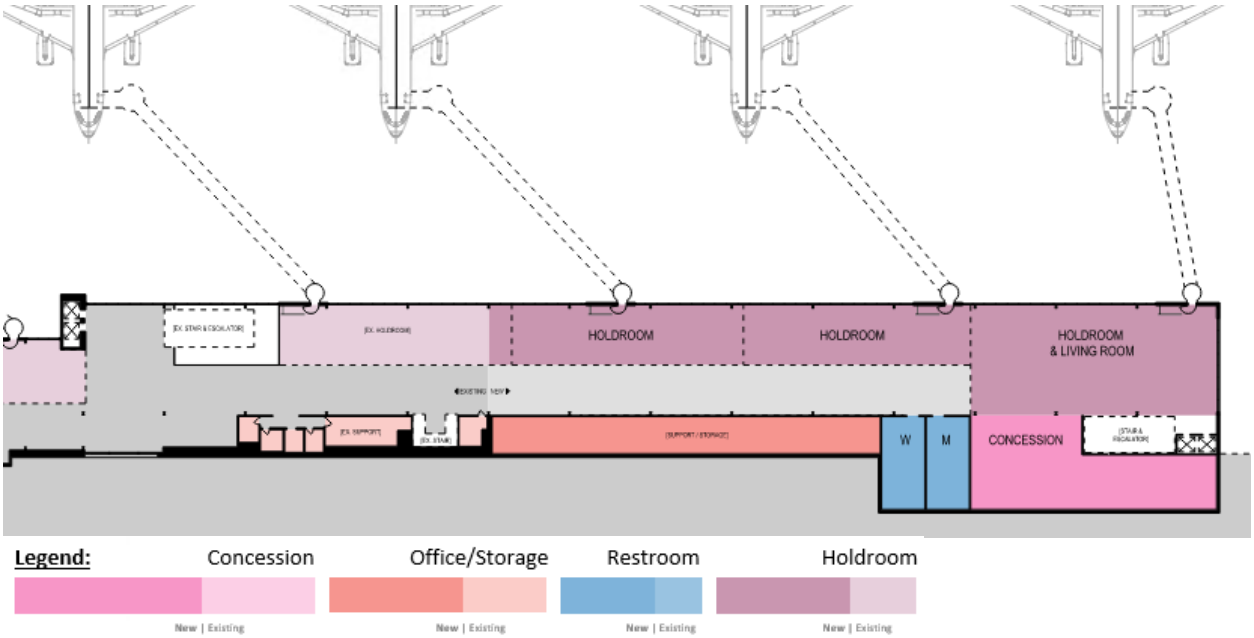


Source: Gensler

Airside development will see the concourse receiving three new jetbridge positions to serve three additional Level 2 holdrooms, which will increase capacity significantly, but also make for a more flexible, uniform experience for the airline carriers to park at, potentially used as common use. This eastern expansion will be a mirrored experience to the recent expansion on the west side, which includes a primary concession, restrooms, living room and support/storage space.

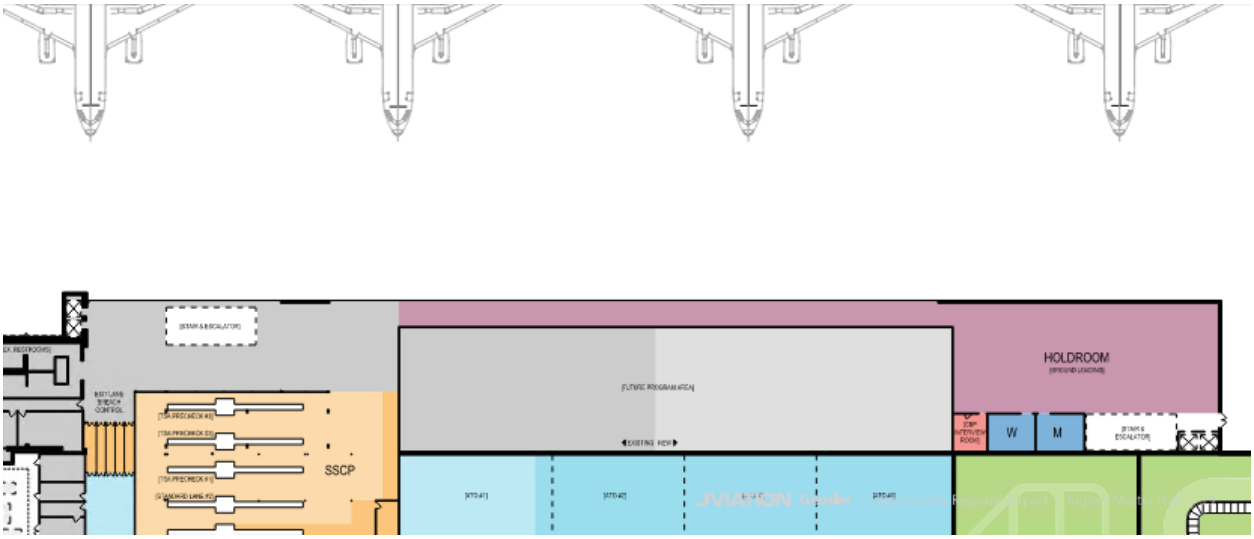
On the ground level, a ground loaded gate will be relocated to the far east of the new expansion, along with additional restrooms, vertical circulation, as well as a potential U.S. Customs and Border Protection (CBP) screening room that could serve international flights. The build out of this Level 1 area, underneath the new Level 2 holdrooms, provides a significant area of flexiblity programming for future use. There is approximately 13,000 square feet of area that could be used for storage, airline ticket offices (ATO), administration, or other uses as Airport needs evolve.

Figure 5-28: Gates and Gate Lounges, Level 2 Program Layout



Source: Gensler

Figure 5-29: Gates and Gate Lounges, Level 1 Program Layout



Source: Gensler

RENTAL CAR FACILITIES

An immediate need for additional rental car ready/return capacity has been identified. The assumption is that a new consolidated rental car facility will be built outside of the terminal, potentially off-site, and not a consideration in the programming of this terminal planning study. The spaces continuing to be accomodated within the terminal include the ground transportation counters and meeter/greeter area.

5.4.3 Evaluation and Recommended Plan

This Preliminary Recommended Commercial Terminal Alternative was submitted and presented as part of a collaborative process that included public outreach meetings, involvement of the Board of County Commissioners, key stakeholders, tenants, and Airport staff and management, as well as the airlines, rental car companies, and concessionaires. Through these various meetings and conversations, consensus was established to endorse the adoption of the Preliminary Recommended Commercial Terminal Alternative as being the Recommended Commercial Terminal Plan.

5.5 ROADWAYS AND PARKING

Alternatives for vehicular access roadways, circulation, and parking were developed to meet landside requirements throughout the 20-year planning period. These alternatives were designed to address existing challenges that impede safe, clear, and functional use of the landside transportation system. Based on communications with Airport staff, passengers, operators, airlines, and other stakeholders, the following list of challenges were considered:

- Congestion at the terminal frontage (curbside)
- Insufficient curbside space for all types of surface transportation
- Unclear or missing wayfinding signage
- Non-intuitive and disconnected parking/lot usage
- Insufficient accessible parking
- Substandard pedestrian and bicycle facilities
- Need for long-term vehicle electrification capabilities

The general themes and improvements that were identified in response to these challenges included the following:

- Curbside Access
  - Organize dual columns of curbside access with two lanes each (a parking lane and a bypass lane)
- Traffic Calming
  - Evaluate considerations to manage speeds across the property (e.g. raised crosswalks, mini traffic circles, medians, curb extensions, and/or landscaping)
- Wayfinding
  - Improve wayfinding to direct people as clearly as possible around the property
- Intersection Improvements at Cooley Mesa Road
  - Evaluate intersection improvements, including installation of roundabouts
- Multimodal

  - Improve sidewalks, bicycle access, and bus stop location/access to allow people to safely walk, bike, and ride transit to/from the Airport and improve safe access to the terminal from the parking areas
- Electric Vehicle (EV) Charging Considerations
  - Expand number of current EV charging facilities on-property
  - Identify additional opportunities for rental vehicles, employees, and those using long term parking
  - Consideration of covered solar parking and/or garage

5.5.1 Roadway and Parking Design Goals

In response to the above-mentioned challenges, collaboration efforts were undertaken with Airport staff and management to identify the following items for further feasibility and applicability evaluation:

- Separation of vehicles for arrivals and departures, and/or type of surface transportation users
- Two-way and/or one-way roads
- Adding an additional access to the Airport from Cooley Mesa Road
- Implementation of traffic calming strategies
- Optimization of curbside access
- Improvements to and organization of parking
  - Making parking organization as intuitive as possible
  - Consolidation of some lots
  - Develop pricing strategies for all lots
  - Consider phased deployment of revised parking organization
  - Provide uninterrupted space for certain types of parking
- Consideration of structured parking to consolidate surface lots
- Intentional deployment of pedestrian and bicycle infrastructure
- Improvements to onsite wayfinding (signage and intuitive design)
- Maximize time drivers have to process signage and make driving decisions
- General improvement to site circulation:
  - Minimize turning conflicts
  - Allow queueing space
  - Identify parking organization based on right-in/right-out access to reduce conflicts
  - Accommodate bus, fire, delivery, and other unique vehicles in logical and safe patterns and locations

5.5.2 ROADWAY AND CIRCULATION ALTERNATIVES

Four alternatives were developed to address the existing and future access road and circulation needs at EGE. These are summarized in the following sections.

Alternative 1 and 1A - Double Terminal Frontage with FIS Loop

Alternatives 1 maintains much of the Airport's existing infrastructure while significantly improving curbside access and capacity (see **Figure 5-30**). The two existing entrance points to the Airport located at the east and west ends of the terminal area are maintained, with the option of a four-way intersection or roundabout at each. The main roadway (shown in purple) is two-way and has two adjoining one-way loops heading west. The smaller loop on the east of the commercial terminal is specifically designed to accommodate arrivals for the new FIS facility. The larger loop in front of the terminal building has two one-way roads for enhanced curbside access and capacity for passenger pick-up and drop-off. All loops connect back to the main roadway, providing traffic the option to exit at either end of the terminal area.

This alternative offers the following benefits:

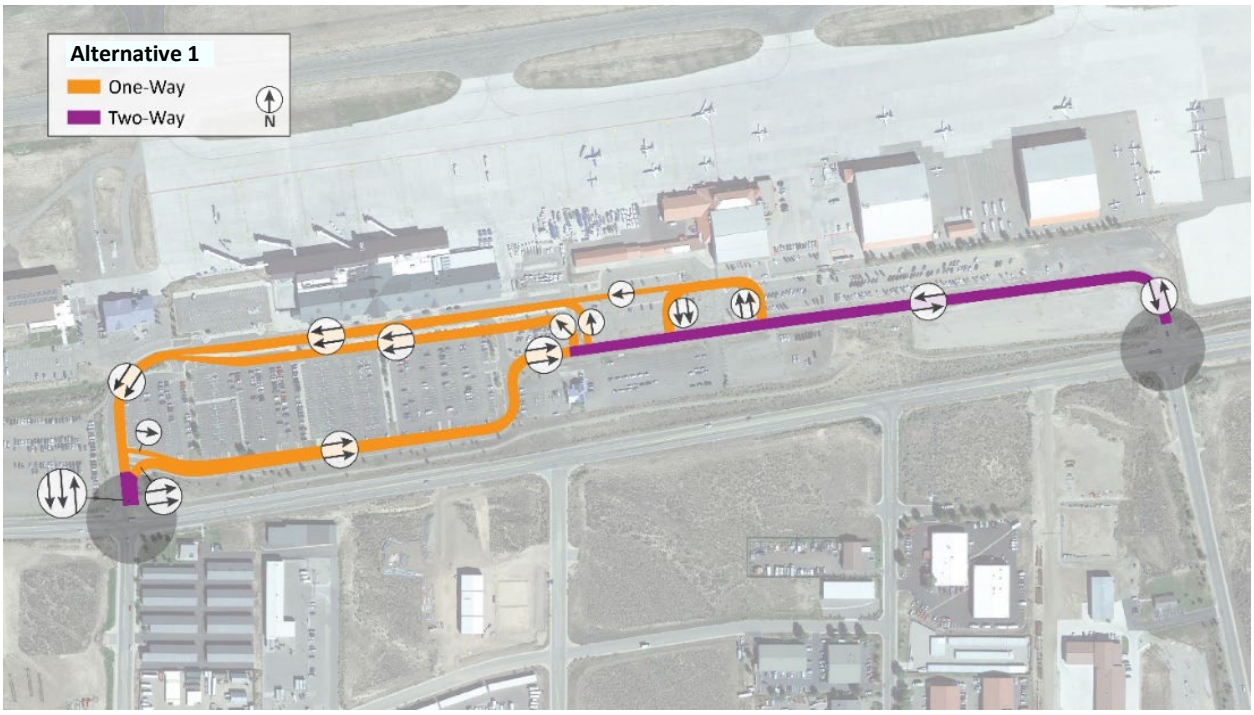
- Double curb access with two expanded curbside access areas immediately in front of the terminal
- Maintains much of the existing infrastructure, including access points to Cooley Mesa Road, resulting in cost efficiency and ease of user acclimation
- Loop specifically for FIS access
- Alternative 1 allows the rental car quick turnaround facility (QTA) and a portion of rental car activity to remain immediately adjacent to the terminal
- Alternative 1A supports the relocation of the QTA to an offsite location.

This alternative offers the following challenges:

- Existing access points to Cooley Mesa Road likely require upgrading to roundabouts
- Reduces available parking immediately in front of terminal; may result in some existing parking operations being relocated offsite to meet increased demand
- Circulation loop in front of the terminal is not continuous and requires left-hand turns.

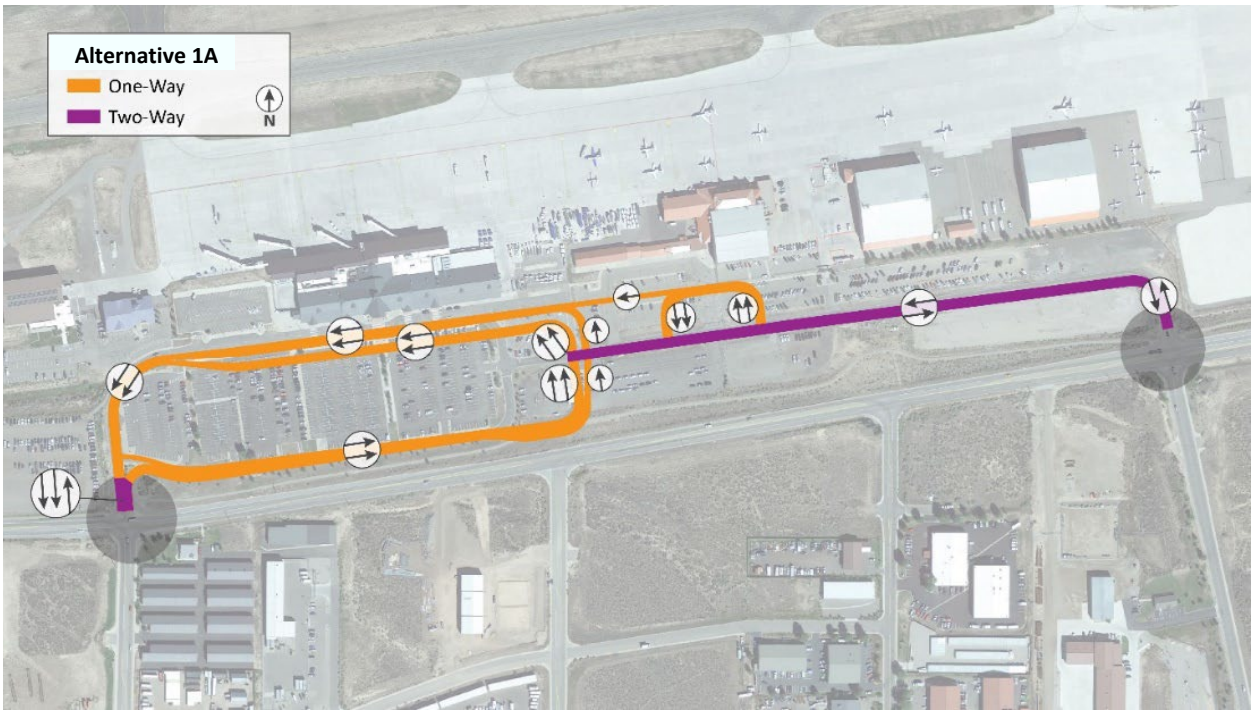
There is a variation to Alternative 1 that has been identified as Alternative 1A (see **Figure 5-31**). This alternative is nearly the same as Alternative 1, including its benefits and challenges, with the exception that this design does not avoid the existing rental car QTA facility and fully completes the circulation loop. The benefit of this alternative is that it creates a more appropriate and intuitive loop operation in front of the terminal. The challenge of this alternative is that it would require the phased relocation of rental car activities, including QTA, to another location away from the terminal area. This relocation potential is discussed further in later sections.

Figure 5-30: Roadway and Circulation Alternative 1



Source: DEA

Figure 5-31: Roadway and Circulation Alternative 1A



Source: DEA

It should be noted with respect to Alternative 1A through the project engagement process, the QTA operator was understanding of and amenable to the ultimate relocation of the facility to a location away from the front of the terminal building. However, it was also recognized that such a relocated facility would also result in additional vehicle movements as returned rental cars at the terminal would have to be shuttled back and forth to the relocated QTA facility.

Alternative 2 - Double Terminal Frontage with Expanded FIS Loop

Alternative 2 is similar to the previous two alternatives with the exception that it provides an additional Airport entrance point to Cooley Mesa Road (see **Figure 5-32**). The main two-way roadway, shown in purple, provides access to the FIS loop and larger main terminal loop. The FIS loop connects to Cooley Mesa Road through a new four-way intersection or roundabout. Traffic can connect from this loop directly to the larger loop or return to the main roadway. The larger loop on the west side of the terminal area is one-way and has two drives for accessing the curbside drop-off/pick-up and short-term parking. Traffic in this loop can exit at the west end of the terminal area or merge back with the option to exit in the center or at the east end of the terminal area. The exits at the west and east ends of the terminal area would likely have to be converted to roundabouts.

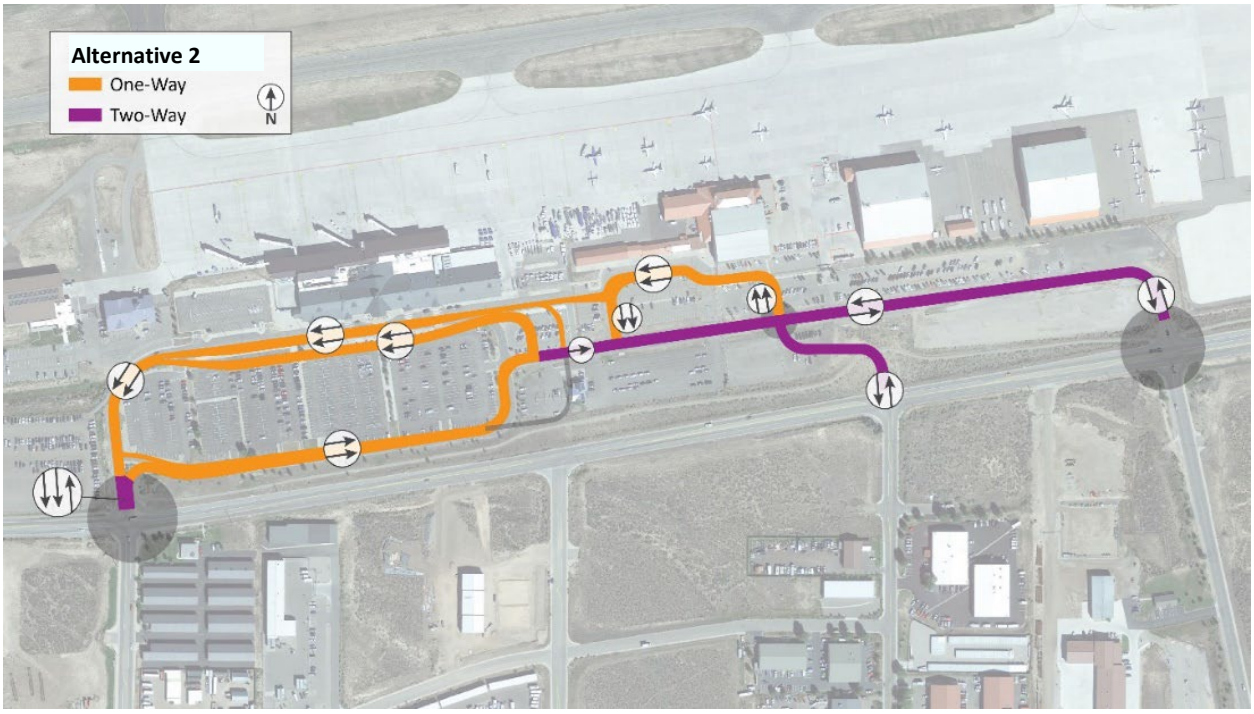
This alternative offers the following benefits:

- Double curb access with two expanded curbside access areas immediately in front of the terminal
- Loop specifically for FIS access
- Additional terminal area access point from Cooley Mesa Road that aligns with existing Airpark Drive
- Supports phased implementation if/when the QTA and rental car operations move off-site

This alternative offers the following challenges:

- Additional Airport access points may confuse people about where/how to enter/exit the Airport
- Existing grade changes would make constructing third access point very difficult
- Presence of existing electrical utility infrastructure would make constructing third access point would increase the cost significantly
- Reduces available parking immediately in front of terminal

Figure 5-32: Roadway and Circulation Alternative 2



Source: DEA

Alternative 3 - Peninsula Loops with FIS Loop

Alternative 3 was established to further examine the potential viability of the Terminal Building Peninsula alternative (see Figure 5 7). It maximizes curbside access and has three entrances to the terminal area located at the east end, in the center, and at the west end where there is an option of a four-way intersection or a roundabout (see **Figure 5-33**). The main two-way roadway provides access to the FIS loop and attaches to one of the main terminal loops. This larger loop provides one-way access to curbside drop-off/pick-up and parking. This loop returns traffic to the FIS loop or main roadway with the options to exit through the east or center access points to the terminal area. The west entrance to the terminal area gives access to the western-most loop which provides additional curbside pick-up/drop-off and parking access. Traffic from this loop can exit at the western access point, continue to the other loops, or connect to the main roadway to exit.

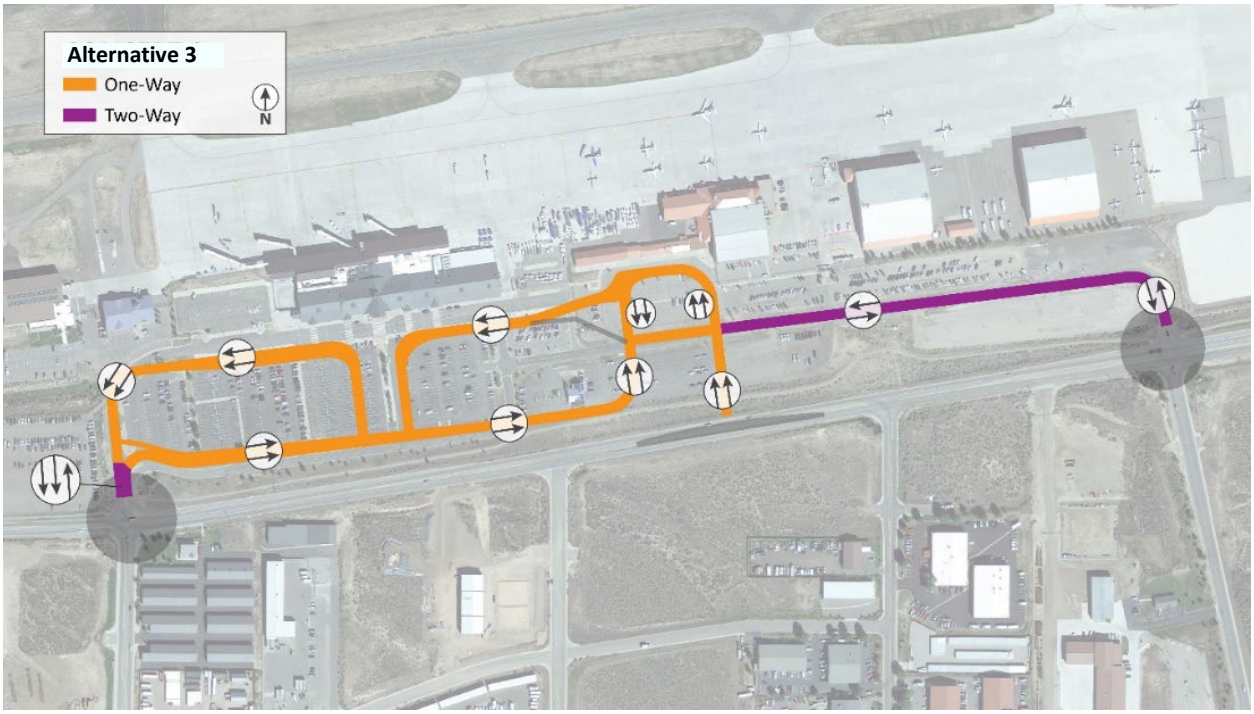
This alternative offers the following benefits:

- Expands curbside access
- Clearly separates arrivals and departure traffic
- Loop specifically for FIS access
- Allows rental car companies to be more centrally located to where customers where access the vehicles
- Additional Airport access point

This alternative offers the following challenges:

- Additional Airport access point may confuse people on how to enter/exit the Airport
- Existing grade changes would make constructing third access point difficult
- Does not allow for a phased improvement to transition from current conditions to future conditions if moving the QTA off-site
- Reduces available parking immediately in front of terminal

Figure 5-33: Roadway and Circulation Alternative 3



Source: DEA

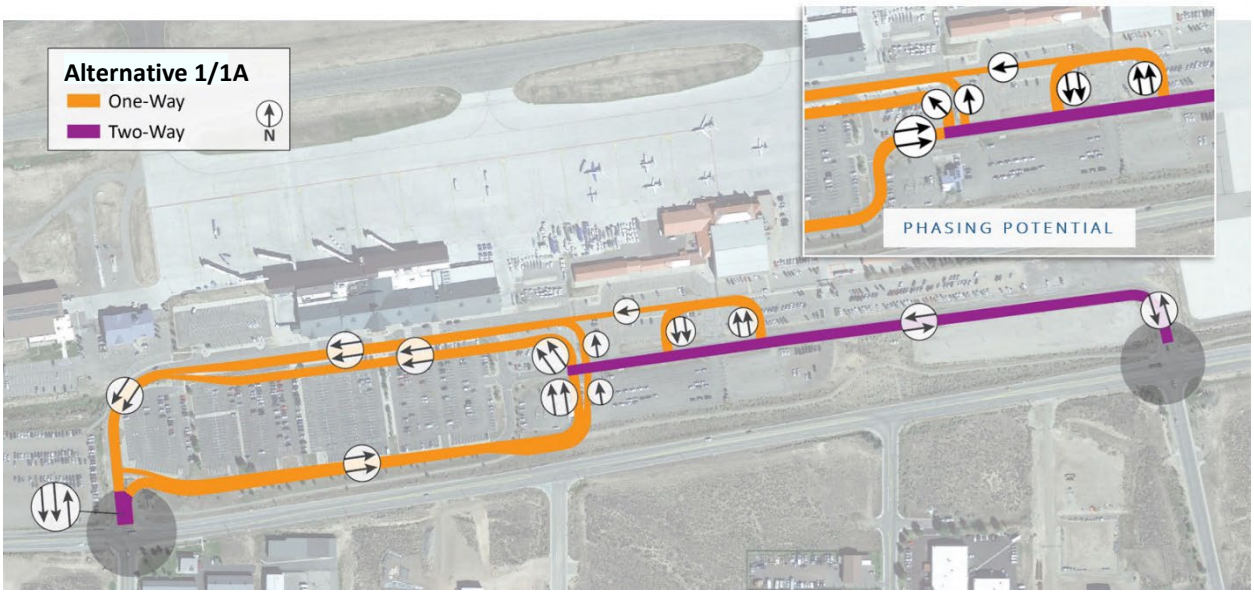
Evaluation and Recommended Plan

A thorough review of each alternative's benefits and challenges was undertaken through a collaborative process that included public outreach meetings, involvement of the Board of County Commissioners, key stakeholders, tenants, and Airport staff and management, as well as the airlines, rental car companies, and concessionaires. Through these various meetings and conversations, consensus was established to endorse Alternative 1 (and its variation, Alternative 1A), Double Terminal Frontage with FIS Loop, as being the Recommended Roadway and Circulation Plan (**Figure 5-34**). This alternative was selected for multiple reasons, chief among those being that it supports phased implementation, maintains much of the existing roadway and parking areas, allows for parking flexibility in the interim and structured parking over the long term, and would work with or without the potential relocation off-site of parking operations like rental cars and associated QTA.

The construction of the roadway and circulation would produce construction-related emissions as they are being built and the vehicles using them would continue to produce emissions once operations. However, more efficient and effective vehicle

circulation would reduce vehicle idle time and the subsequent emissions, which would help to meet the sustainability and resiliency goals of Eagle County.

Figure 5-34: Roadway and Circulation Preferred Alternative



Source: DEA

5.5.3 Automobile Parking Area Improvements

Multiple parking improvements within the Airport's terminal area were considered with the context of the circulation development alternatives discussed above as these are closely related to each other. Based on that, potential approaches to automobile parking were identified and analyzed within the context of circulation Alternatives 1 and 1A. Specifically, parking strategies, goals, and limited alternatives were established with the understanding that they are subject to the final determination of the circulation alternative.

Approaches to Automobile Parking Area Improvements

Three potential approaches for parking area improvements were developed that considered the following primary elements:

- Location of rental car operations, including QTA – either remaining onsite with the terminal building or being relocated off-site to another location.
- Potential for GSE storage, primarily in the area immediately west of the new FIS exit
- FBO (Signature EGE) parking
- Waiting area ("cell phone lot")
- Covered and structured parking opportunities
- Reducing the number of types of passenger parking lots, primarily by combining short-term parking with "less than 30-minute use" parking

Note that the three parking area approaches presented in the following sections are broader in concept than the circulation alternatives; the approaches are generalized concepts that are focused on major themes that influence how parking could be organized at EGE.

Parking Area Improvement Approach 1 – Maintain Rental Car Operations Onsite with Improved Surface Parking Lots

This approach keeps rental car operations onsite near the terminal. While the organization of where the ready lot and rental car storage parking lots may change, the operations would remain the same from the user perspective - picking up and returning vehicles close to the terminal building. This approach would also allow the current QTA to remain in place.

This parking area improvement approach offers the following benefits:

- Ease of access for picking up and dropping off rental cars
- QTA remains in place
- Shuttle service not required

This parking area improvement approach offers the following challenges:

- The QTA requires a significant amount of space in a highly desirable location relatively close to the terminal
- Increasing rental car operational requirements will add pressure on finite landside automobile operational areas

Parking Area Improvement Approach 2 – Maintain Rental Car Operations Onsite with Improved Surface Parking Lots and with Additional Structured Parking

This approach involves constructing parking structures (i.e., parking garage) in existing parking areas to improve capacity and operational flexibility. For parking areas in the terminal area, a preliminary high-level assessment was conducted that determined there are several locations that could be appropriate for structured parking. As the Airport has very limited landside area available for parking with many competing uses vying for these areas, a parking structure would increase parking capacity by building vertically.

This parking area improvement approach offers the following benefits:

- Structured parking efficiently utilizes the limited available space(s)
- Inclusion of rental car operations within the structure(s) would allow them to remain close to the passenger terminal and remove the potential need for an offsite CONRAC.
- Phased structured parking can be made compatible with whatever alternative is preferred and when certain thresholds are met
- Potential to integrate Advanced Air Mobility (AAM) or electric vertical takeoff and landing (eVTOL) aircraft

This parking area improvement approach offers the following challenges:

- Higher construction costs/increased Airport investment
- Potentially aesthetically less appealing

Parking Area Improvement Approach 3 – Relocate Rental Car Operations Offsite

This approach involves moving rental car operations offsite to an Airport-owned parcel to the southeast of the terminal on Cooley Mesa Road. This would move the rental car counters, offices, QTA, storage, returns, ready lots, and maintenance operations to an offsite consolidated rent-a-car (CONRAC) facility (**Figure 5-35**). This operation would require shuttle busses moving passengers from the terminal to the CONRAC and vice versa. The relocation would redesignate limited parking areas at the terminal from rental car use to other operations whose demand will increase over time.

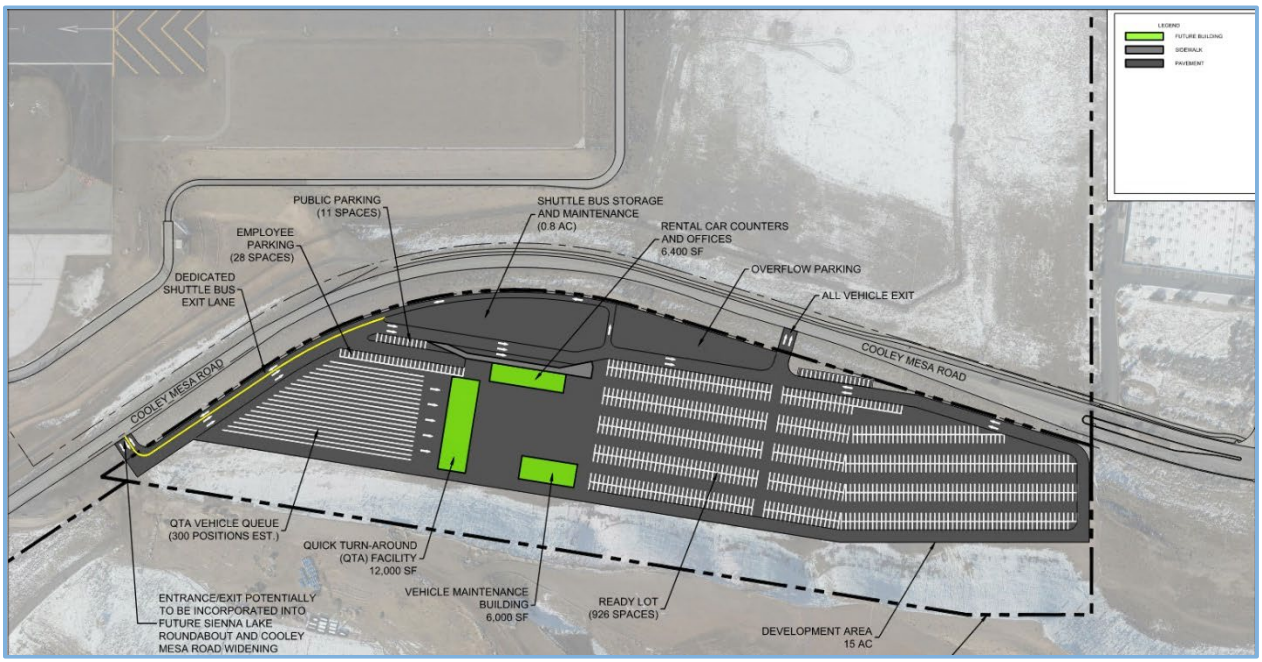
This parking area improvement approach offers the following benefits:

- Makes existing rental car parking areas available for reuse for other parking purposes
- A CONRAC would group all operations in a single location with expanded capacities, providing some commercial passenger improvements through ease of single location
- Provides additional space inside the terminal, and allows for terminal expansion, by relocating rental car offices and counters
- Would help reduce congestion on the loop road
- The CONRAC area could provide area for the replacement of covered automobile parking for the FBO that would be lost with the construction of the baggage screening and makeup area as part of the terminal expansion.

This parking area improvement approach offers the following challenges:

- Will require a shuttle service to be put in place to access the CONRAC; this could negatively affect the commercial passenger experience
- Could be confusing/inconvenient to customers that are used to accessing the existing rental car ready lot
- Will conflict with traditional perceptions and understandings of EGE clientele regarding the nature, character, and convenience of the Airport (i.e., EGE is not a big airport and should not require an off-site CONRAC).

Figure 5-35: Conceptual CONRAC Layout



Source: Jviation, a Woolpert Company

Integration of Parking Area Approaches with Circulation Alternatives

As described previously, the Recommended Roadway and Circulation Plan (Alternative 1, Double Terminal Frontage with FIS Loop) was based on the assumption that rental car operations would remain near the terminal building, including maintaining the existing QTA facility. Based on this assumption, Parking Area Improvement Approach 1 and 2 were applied to this alternative. Alternative 1A was based on the assumption that rental car activities, including QTA, would be relocated to another location off-site; thus, Parking Area Improvement Approach 3 was applied to this alternative. The following sections and tables lay out potential parking organizational concepts given the main themes presented in the three parking approaches presented above.

Parking areas were defined by use (long-term, rental, etc.) and square footage to determine the appropriate number of parking spaces. All parking spaces were estimated with the assumption of 350 square feet including aisles and organization unless otherwise indicated. (Note that parking space spatial requirements can range from 300 to 350 square feet per space; the latter as selected for planning purposes to be conservative in estimations.) Complete provision of accessible spaces will be evaluated in more detail once a preferred alternative has been selected.

Recommended Roadway and Circulation Plan Alternative 1 - Rental Car Operations Onsite

Parking area assumptions associated with Alternative 1 are presented in **Figure 5-36** and specific details for this parking area approach for Alternative 1 are presented below in **Table 5-1.** Maintaining rental car operations onsite reduces available parking but provides easy access for customers who are picking up and dropping off rental cars. It is assumed that this will remain in place for the near term with future plans to adjust operations if rental car operations demonstrate the need for a larger area.

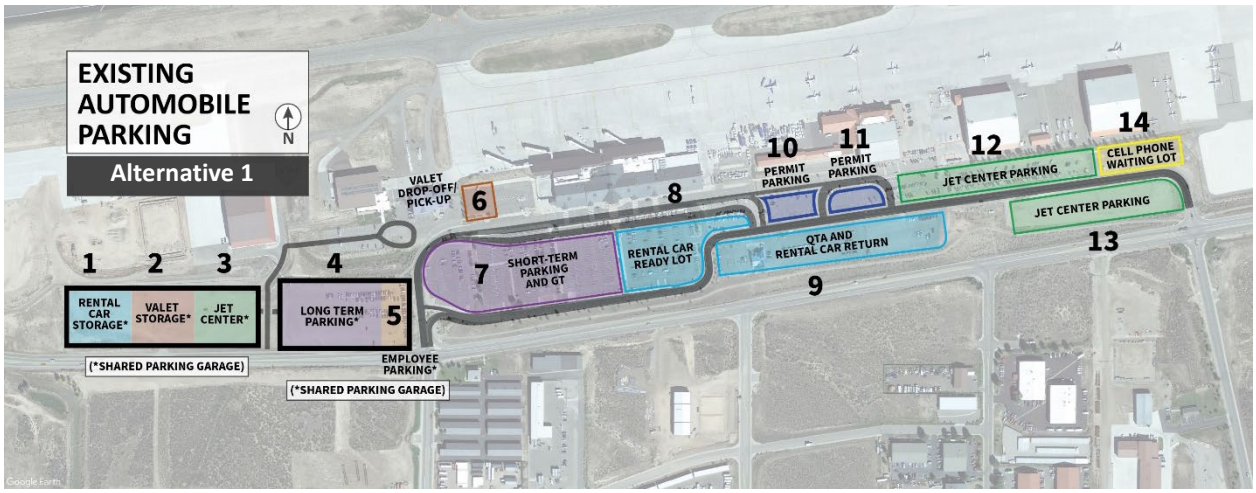
Key features of this plan include the following:

- Short-term passenger and general transportation parking are located in front of the terminal building nearest to arrivals. It should be noted that the eastern boundary of this parking area could be adjusted to increase the area available. This area is also a candidate for the construction of structured parking.
- Long-term passenger and employee parking are located in the existing long-term parking lot. Note that pedestrian walkways from the parking lot to the terminal would be improved and made safer by relocating the access road to the ARFF and SRE buildings away from the existing loop road to a new configuration with direct access to Cooley Mesa Road. This area is also a candidate for the construction of structured parking.
- Rental car operations would remain onsite with the ready lot being located in front of the terminal building nearest departures and close to the rental car return area and QTA facility. Depending on demand levels for short-term passenger parking, the western edge of the ready lot could be adjusted.
- Rental car return operations would be co-located with the QTA facility to create operational efficiencies in both processing cars to the ready lot as well as in reducing area traffic by eliminating the existing separate rental car return lot. Significant improvements to pedestrian walkways from this lot to the terminal building would have to be made to ensure safety and convenience.
- With respect to structured parking, in addition to the short-term/rental car ready lot and the long-term parking lot, the area west of the long-term parking lot would be a candidate for a parking structure. It should be recognized that constructing a parking structure immediately in front of the terminal building would provide the most convenient benefits but would be the most aesthetically challenging. Such a structure in this area would also likely be limited to one level given the visual impact. Parking structures located to the west of the terminal area in the long-term parking lot and beyond would be much less visually impactful and would have the potential of being taller than one level. They would also be much less convenient for passengers with respect to walk to and from the terminal building.
- A potential valet parking services operational area would be located away from general parking, separate from the loop road traffic flow, and west of the terminal building and near arrivals. The valet parking lot would be

located west of the long-term parking lot. This is a potential new service that could be adopted by the Airport in the future.

- Finally, parking associated with the FBO, cell phone lot, and permits would be formalized in the areas defined.

Figure 5-36: Parking Areas – Alternative 1 (Rental Car Onsite)



Source: DEA

Table 5-1: Potential Parking Organization with Alternative 1 (Rental Car Onsite)

Parking Areas	Existing Type	Proposed Type	Change in Number of Parking Spots	Total Spaces (approximate)
1, 2, 3	Rental car overflow	Rental car, Valet storage, Signature EGE	No change / +1,040[1]	520 / 1,560[1]
4, 5	Long term parking	Long term parking and Employee parking	No change / +720[2]	360 / 1080[2]
6, 7, 8	Employee parking, GT, 30-minute parking, rental car ready lot	Valet drop-off & pick-up, GT, Short term parking, Rental car ready lot	-49 / + 690[3]	570 / 1260[3]
10	Rental car ready lot (mostly)/Signature EGE	Permit parking	-50	30
11	Rental car ready lot/Signature EGE	Permit Parking	-20	30
9	QTA, QTA storage, and Signature EGE	QTA, Rental car return	No change	Not typical parking facility
12, 14	Signature EGE and cell phone waiting lot	No change	No change	320
13	Rental car overflow	Signature EGE	No change	220
Total	**N/A**	**N/A**	**-119 / +2,331[123]**	**2,050 / 4,500[123]**

Source: DEA

[1] A three-level parking garage in this location would add approximately 1,040 spaces for a total of 1,560 spaces.
[2] A three-level parking garage in this location would add approximately 720 spaces for a total of 1,080 spaces.
[3] A single-level parking garage in this location would add approximately 690 spaces for a total of 1,260 spaces.

Based on the previous table, there would be a net reduction in the number of parking spaces available in the existing surface lots, largely due to improved roadway circulation and enhanced pedestrian walkways. However, it should again be noted

that this alternative incorporates the potential for a single deck parking structure in front of the terminal building and up to two, three-level parking structures to accommodate future parking requirements. The increased capacity that would be created from parking structure(s) would be capable of accommodating future parking demands as well as allowing rental car operations to remain onsite.

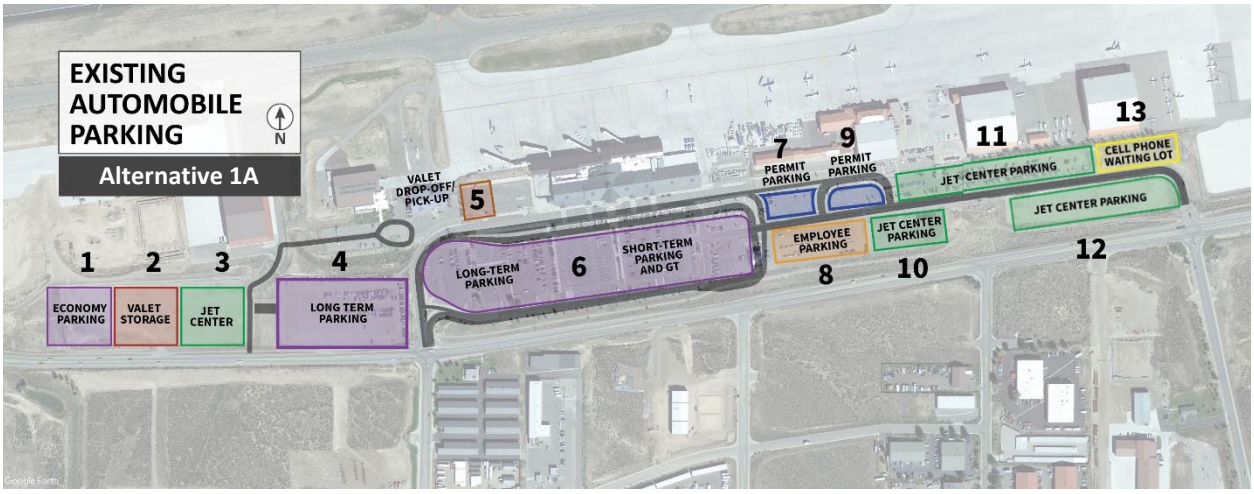
Alternative 1A-Rental Car Operations Offsite

Parking area assumptions associated with Alternative 1A are presented in **Figure 5-37** and specific details for this parking area approach for Alternative 1A are presented below in **Table 5-2.** This alternative assumes that rental car operations will be moved offsite, which would afford more space for surface parking close to the terminal building.

Key features of this plan include the following:

- With the relocation of rental car operations offsite and the loop road being completed as shown, the parking area in front of the terminal building can be dedicated passenger parking (both short-term and long-term) as well as general transportation needs. Short-term passenger and general transportation parking are located in front of the terminal building nearest to arrivals. The partition between long-term and short-term parking can be adjusted based on demand requirements.
- Employee parking would remain generally within the terminal area in the location of the previous QTA facility
- All other features described previously for Alternative 1 are generally applicable for this alternative as well including the new access drive to the ARFF and SRE facilities and the improved pedestrian walkway from long-term parking to the terminal building.
- It should be noted that while parking structures were only identified in associations with Alternative 1, these structures could similarly be applied

Figure 5-37: Parking Areas – Alternative 1A (Rental Car Offsite)



Source: DEA

Table 5-2: Potential Parking Organization with Alternative 1A (Rental Car Offsite)

Parking Areas	Existing Type	Proposed Type	Parking Change	Total Spaces (approximate)
1, 2, 3	Rental car overflow	Economy parking, Valet storage, Signature EGE	No change	580
4	Long term parking	Long term parking	No change	380
5, 6	Employee parking, GT, 30 minute parking, rental car ready lot	Valet drop-off & pick-up, GT, short term parking	-20	570
7, 9	Rental car ready lot / Signature EGE	Permit parking	-70	60
8, 10	QTA, QTA storage, and Signature EGE	Employee parking, Signature EGE	+340	340
11, 13	Signature EGE and cell phone waiting lot	Signature EGE (60%) and GT waiting area (40%)	No change	180 for Signature EGE/120 for waiting area
12	Rental car overflow	Signature EGE parking	No change	250
Terminal Area Sub-Total	**N/A**	**N/A**	**+250**	**2,480**
CONRAC Site	Undeveloped	CONRAC	+ 967	967
Total	**N/A**	**N/A**	**+1,217**	**3,447**

Source: DEA

Based on the previous table, there would be a net increase in the number of parking spaces available on the existing surface lots due to the relocation of rental car operations to an offsite location. This net increase could be enhanced with the potential construction of structured parking on the three sites identified in Alternative 1. In addition to this and as shown previously in **Figure 5-35**, it must be recognized that the proposed offsite CONRAC facility could accommodate over 960 parking spots in addition to an estimated 300 QTA rental car return positions.

5.5.4 Recommended Parking Alternative

As suggested above, the parking alternatives have inherent flexibility, and the details of their different uses can be refined even beyond the final Recommended Development Plan. However, specific to these alternatives and the parking approaches for each, **Table 5-3** presents a summary of the potential changes to the total number of parking spots for each alternative.

To summarize the results of the table, Alternative 1 would require the construction of at least one parking structure to meet the demand requirements within the planning period. It also has other options for additional structured parking that could be progressively added over time as required. Alternative 1A should meet the parking demand requirements within the planning period in the existing terminal area as long as rental car operations are relocated offsite to a new CONRAC facility.

Table 5-3: Parking Organization Summary

Alternative	Parking Change	Total Spaces
Alternative 1 - Rental Car Onsite	-119	2,050
Alternative 1 - Rental Car Onsite (with Garage 1)	+921	2,971
Alternative 1 - Rental Car Onsite (with Garage 2)	+601	2,651
Alternative 1 - Rental Car Onsite (with Garage 3)	+571	2,621
Alternative 1 - Rental Car Onsite (with Garage 1, 2 & 3)	+2,093	4,143
Alternative 1A - Rental Car Offsite	+250	2,480
Alternative 1A - Rental Car Offsite (with CONRAC)*	+1,217	3,447

Source: DEA
* Does not include QTA rental car return positions (approximately 300 positions)

Therefore, the decision point is based on whether rental car operations are to remain within the terminal area or if they are to be relocated offsite. If rental car operations were to remain within the terminal area, Alternative 1 augmented with structured parking would be identified as the recommended alternative. If rental car operations were to be relocated to an offsite CONRAC, Alternative 1A would be the recommended alternative.

Based on significant coordination with the Airport, the Eagle County Board of County Commissioners, the Project Advisory Committee, the public, and other stakeholders it was determined that EGE should strive to maintain rental car operations in front of the terminal building. This was largely based on the understanding that EGE is an airport of a particular size, character, and with service levels focused more higher-level quality that emphasized experience and convenience. It is understood that for rental cars to remain in front of the terminal, some compromises may have to be made over the long term, including the following:

- Construction of a structured parking facility to provide adequate capacity required auto parking throughout planning period. Note that this could ultimately result in more than just one facility over the very long term.
- A less efficient loop road that will have to still accommodate the existing QTA facility. This inefficiency could ultimately be eliminated and the loop road improved if the QTA facility were to be relocated offsite.
- The QTA facility should be ultimately relocated to an offsite site location. As this facility is privately maintained, this will require coordination and an agreement with the operator. Note that this will also require the rental car companies to adapt their standard operations to shuttle vehicles from the terminal area to the relocated QTA and back – this will require additional labor and will result in additional vehicle movements.

Based on these conversations Alternative 1 - Rental Car Operations Onsite with Structured Parking has been identified as being the Recommended Circulation and Parking Development Plan.

5.6 MISCELLANEOUS AIRPORT DEVELOPMENT

In addition to airfield improvements, the proposed expansion of the Commercial Terminal and the future associated roadway and parking improvements, EGE has several other important development factors that require consideration.

5.6.1 Ground Support Equipment (GSE) Storage

Ground Support Equipment (GSE) refers to all the machinery and tools used to service aircraft between flights while they are on the ground. This includes everything from tugs and baggage carts to fuel trucks as well as belt loaders, pushback tugs, lavatory service carts, aircraft stairs, deicing equipment, passenger vehicles, fuel tanks, and ground power units, among others. When not in use and given their primary functionality, it is important that this equipment be stored in close proximity to aircraft operations to provide the ability to respond immediately to operational needs. Additionally, proper mechanical maintenance of GSE is crucial for safety, operational efficiency, and cost-effectiveness.

Currently, EGE has over 160 pieces of GSE (much of that baggage carts) that are generally stored on an approximately 1.1 acre of ramp area near Gate 7 and in between the existing commercial terminal building and the FBO. GSE storage in this area is often very congested due to the limited space and volume of equipment with baggage carts often being stored within the limits of Gate 7. (Note that while airports in general will often allow airlines to store much of their GSE in the areas immediately abutting aircraft gates dedicated to that airline, most GSE at EGE is stored in this consolidated location.) There is no formal maintenance facility for GSE at EGE with such activities generally being provided by service technicians that arrive from off-airport and perform their activities directly on the Airport ramp, exposed to the weather.

Future challenges in accommodating GSE at EGE include storage locations and potential electrification. Based on the commercial terminal expansion proposed previously in this chapter, the area where GSE is currently stored will have to be converted into building, displacing GSE from its current location. Additional utilization of existing commercial passenger gates and new operators at the Airport will likely also require additional GSE. Finally, there is growing interest in the potential use of electrified GSE (EGSE) or other alternative fuels in an effort to reduce greenhouse gas emissions to promote sustainability efforts.

Addressing these future GSE challenges at the Airport will occur through several facility and service initiatives that include the following (see **Figure 5-38**):

- The loss of the approximate 1.1 aces of existing GSE storage space due to the future terminal expansion will have to be replaced and in fact expanded an estimated 20 percent to account for future growth in GSE volume. Accommodating that need around the expanded terminal will be accomplished through multiple means.
    - First, there is an existing area located on the airside front of the ARFF facility that is largely undeveloped and underutilized having been

previously used for the storage of deicing effluent. With the construction of the deicing ramp on the east end of the Airport, this area is just over one acre in size and could be repurposed and developed for GSE storage and support activities. Advantages of this site include its location immediately abutting the commercial service apron, the existence of an underground storage tank that could be utilized for lavatory waste storage (an important GSE operation) and the ability to consolidate much of the relocated GSE storage capacity into a single location. However, it must be recognized that any GSE development of this area cannot impede the existing ability of ARFF equipment stored in the ARFF facility to immediately access the airfield.

- Second, the future expansion of the baggage claim area incorporates the potential inclusion of a lower level that would provide an additional 9,000 square feet of GSE storage that would be completely enclosed and protected from the weather, which would be a significant benefit for GSE operations. (It should be recognized that this area is at a lower level and would require a ramp for GSE to access it. During winter weather conditions, consideration would have to be given to ensure the ramp does not freeze up.) Additionally, GSE would be stored outside and along the sides of the expanded baggage claim area.

- Third, the future expansion of the concourse area to allow for the installation of jet bridges will largely occur on the second floor of the expansion. As noted previously, ground floor areas of the expansion could be utilized for a variety of functions that include additional holding rooms, office space, and additional enclosed storage. However, some of that first floor could remain open to the ramp to allow for the storage of some GSE near the gates and under the cover of the second floor.

- While future GSE maintenance could continue to occur on the ramp, this would ideally happen within a dedicated structure having a controlled environment and protected from the weather. Options for this facility include the following:

  - A small maintenance shed could be constructed in the new GSE storage area near the ARFF facility described above. In siting this shed, consideration for the preservation of ARFF operations would be paramount. Incorporation of this shed within this site would reduce the GSE storage capacity of this area.

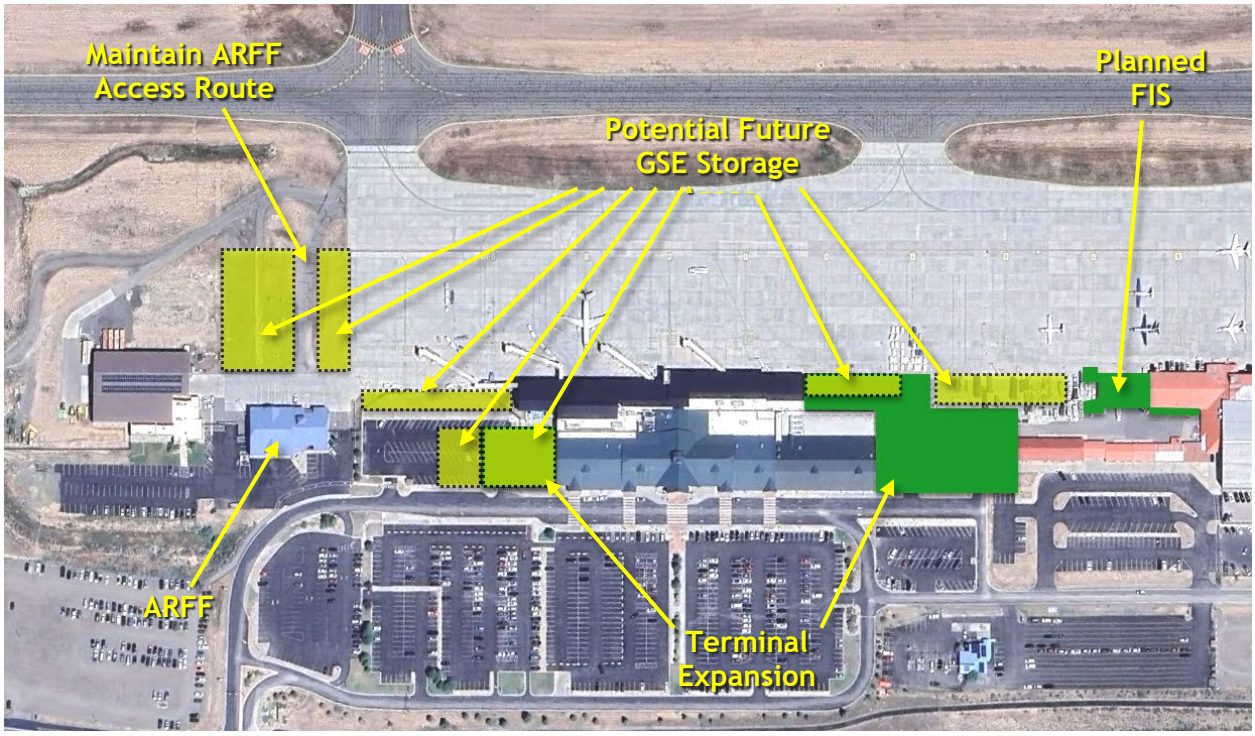
  - The previously discussed expansion of the terminal baggage screening and makeup area to the east would result in at least the partial demolition of the FBO's existing auto parking garage. Depending on the integrity of that structure after it is partially demolished, it may be possible to repurpose the remaining structure as a GSE maintenance area. As the FBO also has its own GSE

equipment, it may be advantageous to coordinate with the FBO for the establishment of a common use area for such operations.

- Finally, there may also be opportunities to repurpose older Airport-owned hangars located on the north side of the Airport for GSE maintenance. This would obviously not be ideal as these facilities are currently being utilized for other Airport-related storage purposes. Additionally, accessing these facilities would require GSE to be moved to the other side of the Airport for servicing.

- The potential integration of EGSE must be considered as part of future GSE storage. As battery technologies improve over time, the practicality of employing EGSE in a cold environment like EGE will become more viable and as such, EGSE charging stations must be planned. Given the alternatives previously presented, two options appear to be most reasonable, both of which would be associated with terminal expansion. First, the construction of a GSE garage under the expanded baggage claim would be an obvious location to install electrical chargers for EGSE. The area would have immediate access to newly improved electrical utilities and this enclosed area would enhance the effectiveness of charging. The second area would be associated with the future expansion of the concourse. Chargers could be installed on the airside face of the building or underneath the concourse if those areas were to be utilized for GSE storage as suggested previously.

Figure 5-38: Potential GSE Storage Areas



Source: Jviation, a Woolpert Company, a Woolpert Company.

5.6.2 Airline Passenger Lavatory Waste Management

An existing challenge at EGE is the handling, storage, and processing of biological lavatory waste generated by airline passengers. Note that the management of aircraft lavatory waste is a critical aspect of maintaining hygiene and operational efficiency at any commercial service airport. Currently, EGE does not provide capabilities to process such waste, which can be a significant challenge for those commercial airlines that operate there. Many of the flights that arrive at EGE carry full passenger loads and originate from distant airports (e.g., New York, Miami, etc.) resulting in flight times of up to four or more hours. Over that period, lavatories on aircraft will fill and if those aircraft cannot be serviced at EGE, they must return to their points of origin also potentially with a full load of passengers with lavatories that can reach capacity by the end of the trip. This is obviously not an ideal condition for the airlines that have requested that the Airport arrive at a solution to allow them to service their lavatories.

Generally, there are several options available for processing lavatory waste at an airport:

1. Aircraft Lavatory Service Trucks (Most Common). A vacuum truck connects to the aircraft's waste tank via a sealed hose and pumps out the waste into a secure holding tank. The truck then transports the waste to an on-site or off-site treatment facility or wastewater plant. Note that EGE's FBO currently provides such services for its private aircraft clients.
2. Direct-to-Facility Waste Systems (Less Common). Some airports have permanent underground waste disposal pipelines connected to aircraft parking areas. Instead of using trucks, waste is pumped directly into airport sewage treatment systems for processing.
3. On-Site Treatment Facilities. Some airports have their own waste treatment plants to process biological waste before releasing it into local sewage systems. This reduces strain on public wastewater plants and allows for better control of sanitation procedures.
4. Off-Site Disposal via Municipal Sewage Plants. Airports without treatment facilities transport the waste to local wastewater treatment plants for proper disposal. Waste must be treated to meet environmental standards before being released.

Through conversations with the Town of Gypsum, it was determined that the direct-to-facility option was not possible due to the Town's requirements for the quality of waste and the lack of chemical treatments typically utilized in airline lavatories. Additionally, the general lack of volume needed to be processed also precluded the construction of an on-site treatment facility due to a lack of cost-benefit.

Thus, it was determined that the airlines would conduct their own lavatory services through use of lavatory service units and that the Airport would provide a tank for the airline operators to use to store their waste for ultimate processing at an offsite location. For this storage and processing, the airlines would reimburse the Airport.

Fortunately, EGE has a large underground storage tank located near the ARFF station that was previously use for the storage of aircraft deicing effluent. With the construction of the new deicing pad on the east end of the Airport, this tank is not currently utilized. To help the airlines resolve this ongoing issue, EGE has committed to ensure that this tank is safe, secure, capable of storing lavatory waste, providing an appropriate facility to assist in the transfer of waste from the lavatory service vehicle to the tank, and then ultimately the removal of the waste for final processing offsite. It should also be recognized that there are multiple facilities within the region capable of receiving and processing this waste in compliance with all local, state, and federal regulatory requirements.

To facilitate the transferring of material from the lavatory service vehicles to the storage tank, the Airport should consider the construction of a small drive-through shed that could accommodate the service vehicle to connect with the offload point within the structure. This would assist efficiency and hygiene of the operations particularly during winter conditions. Additional consideration should be given to providing a frost-free spigot and water line for cleaning the service vehicles and the facility, electricity for lights and heat tape for the water line, as well as overhead doors to protect the inside of the facility during inclement weather.

5.6.3 Microgrid Technology

Commercial service airports like EGE rely heavily on continuous, reliable sources of power to maintain operations, safety, and passenger comfort. A power outage at an airport can lead to flight delays, safety and security risks, which could result in significant financial losses. Beyond basic airport operations, the continued development of electrically powered vehicles that operate at airports currently or in the future include automobiles (e.g., personal vehicles, rental cars, etc.), ground support vehicles (e.g., tugs, auxiliary power units, etc.), and aeronautical vehicles (e.g., advanced air mobility aircraft, electric private aircraft, drones, etc.) – all of which will significantly increase the demand for electricity on an airport.

In addition to electrical capacity upgrades by regional utility companies that directly support airports, many airports are exploring options for establishing a "microgrid" which is a localized energy system that can generate, store, and distribute electricity to a specific area like a neighborhood, hospital, industrial park, or an airport. Benefits of establishing a microgrid include the following:

- Energy Resilience & Reliability. Airports cannot afford power outages as they need uninterrupted electricity for air traffic control, security systems, baggage handling, and passenger services. A microgrid can help ensure energy independence, keeping critical systems running even during grid failures, extreme weather, or cyberattacks.
- Cost Savings & Energy Efficiency. By generating their own electricity, airports can reduce reliance on expensive utility power, especially during peak hours. Microgrids can integrate renewable energy (solar, wind) and store power in batteries, cutting long-term energy costs. As an example, Pittsburgh International Airport saves an estimated $1 million annually using its microgrid that is comprised of natural gas generators and a solar array.

- Sustainability & Carbon Reduction. Many airports have NetZero goals and need to cut emissions from traditional power sources. A microgrid using solar panels, wind turbines, or fuel cells helps reduce carbon footprints. As an example, John F. Kennedy International Airport's new Terminal One will be the largest airport microgrid in the U.S., supplying 50% of the terminal's energy through a 12-megawatt microgrid featuring over 13,000 solar panels, fuel cells, and battery energy storage.
- Protection Against Power Grid Instability. Airports are often located near cities with growing energy demands, increasing the risk of grid congestion and blackouts. A microgrid allows an airport to "island" itself, meaning it can operate independently from the main grid when needed.
- Emergency Preparedness. Airports are often disaster response hubs, assisting during fires, earthquakes, or power crises. Having a microgrid means the airport may remain operational for emergency services, medical flights, and rescue operations. As an example, the Redwood Coast Airport microgrid in California integrates a 2.2 MW solar array with a 2.3 MW, 8.9 MWh battery storage system to ensure reliable energy for emergency aviation services.
- Improved Public & Investor Perception. Investing in microgrid technology enhances an airport's reputation as a forward-thinking, sustainable, and resilient facility. Governments and airlines increasingly favor airports that adopt green and energy-secure infrastructure.

Critical components of a microgrid typically include the following:

- Power generation sources. These can be solar panels, wind turbines, batteries, fuel cells, or even small generators fueled by natural gas or even possibly nuclear power in the near future.
- Energy storage. Usually in the form of batteries that help store excess electricity for later use.
- Control systems. Software and smart devices manage how electricity is distributed efficiently.
- Connection to the grid (optional). A microgrid can stay connected to the main power grid or "island" itself to function independently during an outage.

For EGE implementing a microgrid could be a strategic move to achieve these goals to enhance its energy resilience and sustainability. Currently, EGE has initiated the following energy initiatives:

- Electric Vehicle (EV) Infrastructure. The Airport has installed DC fast chargers to support an expanding fleet of electric rental cars. These chargers can replenish most EVs in about an hour, facilitating quick turnarounds for high-mileage and large fleet vehicles.
- Renewable Energy Projects. The Town of Gypsum has approved the construction of a solar array near the Airport capable of generating approximately 220,000 kilowatt-hours annually.

The development of a microgrid at EGE could result in the multiple benefits to the Airport and the surrounding area including the following:

- Enhanced Energy Resilience and Capacity. A microgrid would allow the Airport to maintain critical operations during power outages by operating independently from the main grid. It could also afford EGE additional capacity to support future electrical needs while reducing its reliance on the local utility.
- Cost Savings. By generating and managing its own electricity, the Airport could reduce energy costs, especially during peak demand periods.
- Sustainability. Integrating renewable energy sources into a microgrid aligns with Eagle County's commitment to reducing greenhouse gas emissions. The county has already seen a 38% decrease in emissions due to increased renewable energy usage.

For EGE to implement a microgrid to enhance its operational resilience, achieve cost savings, and contribute to Eagle County's sustainability objectives, it should consider the following factors for implementation.

1. Airport Characteristics and Energy Needs
    - Current Energy Usage: What is the Airport's average daily energy consumption? Are there any peak demand periods? What are its future energy requirements?
    - Critical Loads: What are the must-have power systems (e.g., air traffic control, security, lighting, baggage handling)?
2. Location & Renewable Energy Potential
    - Solar Availability: Does the Airport have enough rooftop space, parking areas, or unused land for solar panels? Can future expansion plans incorporate solar components to support a microgrid operation?
    - Wind Power Feasibility: Are wind turbines a viable option based on local weather patterns and/or can they be constructed away from critical airspace around the Airport?
    - Other Sources of Electrical Generation: Although they may not contribute to NetZero goals, what other opportunities are available to generate electricity on and around the Airport (e.g., natural gas, diesel, nuclear, etc.).
    - Energy Storage Needs: How much backup storage is required to keep operations running during outages? Is that need best met by battery storage (e.g., lithium-ion, flow batteries, etc.) or hydrogen fuel cells?
3. Grid Connection and Energy Independence
    - Existing Utility Dependence: Is the Airport frequently affected by power outages, grid instability, or high costs?

- Island Mode Capability: Should the microgrid operate fully independent of the grid or only during emergencies?
- Regulatory & Utility Partnerships: Are there any local regulations that impact grid integration or renewable energy incentives?

4. Funding and Business Case
    - Cost vs. Savings: What is the initial investment, and how much can be saved on energy costs over time?
    - Government Incentives: Are there grants, tax credits, or funding programs available for microgrid projects (e.g., U.S. Department of Transportation's Strengthening Mobility and Revolutionizing Transportation [SMART] Program can support the development of microgrids).
    - Public-Private Partnerships: Can airlines, government agencies, utilities, or private investors help fund the project?

5.6.4 Planning for Future in Advanced Air Mobility (AAM) Operations

Advanced Air Mobility (AAM) is an emerging air transportation concept primarily utilizing innovative electric vertical takeoff and landing (eVTOL) aircraft to move people and cargo. Note that AAM is not a single technology; rather, it is a collection of new and emerging technologies and new aircraft configurations being applied to the aviation system. It is anticipated that this emergent technology will be able to expand access to transportation and provide or improve connectivity to areas underserved by aviation, as well as to support enhanced levels of service for operations such as air ambulance, firefighting, law enforcement, and supporting special events.

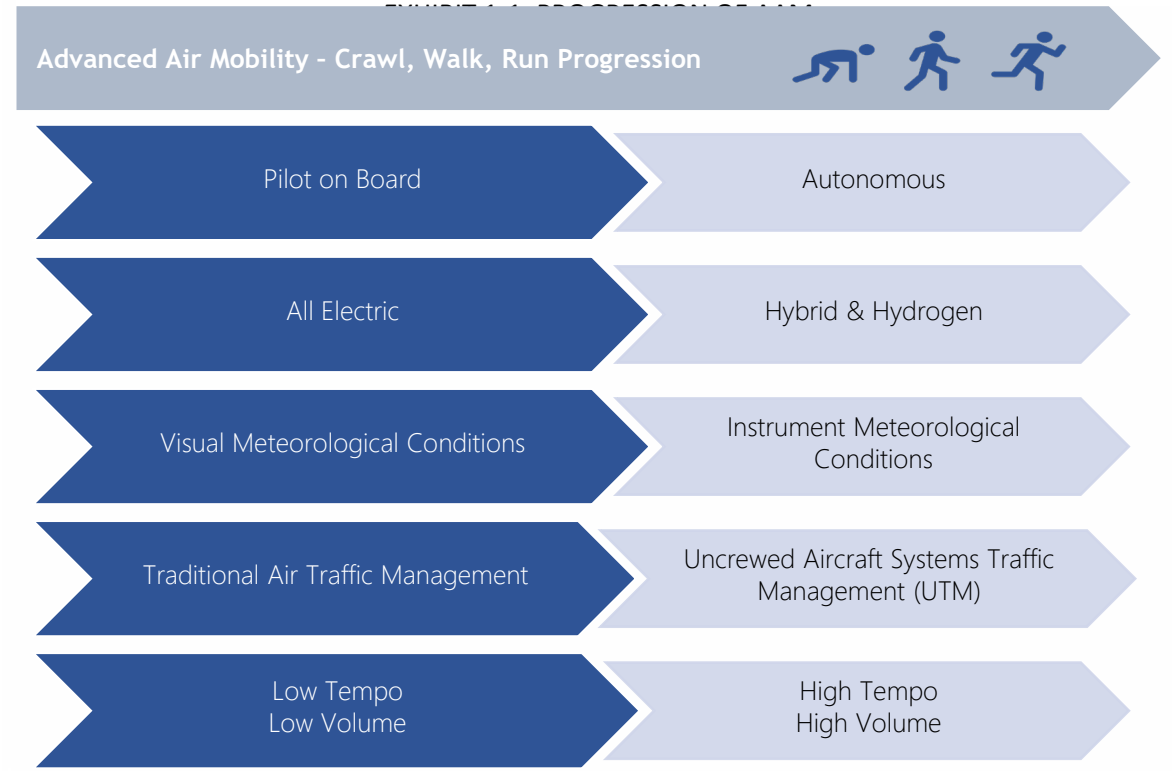
The initial aircraft will have a pilot on board, operate in visual meteorological conditions only, and work within the existing air traffic management system. As time and technology advance (see **Figure 5-39**), operations may become automated for both the pilot and air traffic management.

Media reports suggest that AAM could be the next big disruptor in aviation. The major technologies allowing this potential disruption revolve around distributed electric propulsion (DEP), which allows for lower operating costs, noise, and vertical lift complexity for electric vertical takeoff and landing (eVTOL). The Vertical Flight Society, which maintains a comprehensive database of eVTOL aircraft designs, includes more than 500 aircraft to date. This number grows almost weekly.

Morgan Stanley projects that advancements in technology and investment could create a $1 trillion global UAM market by 2040. However, several regulatory factors will impact the rate of adoption of this new form of transportation. To date, there is no certified eVTOL aircraft design, and in May 2022, the FAA changed course on their certification process for many of these aircraft from FAR Part 23 to Part 21.17(b). (4) Lilium, a prominent eVTOL original equipment manufacturer (OEM), recently added

"short running landing" capability to their design with the addition of a traditional landing gear, which some see as a potential result of failed transition tests for both wings from vertical to horizontal flight.

Figure 5-39: Anticipated Progression of AAM Development



Source: Jviation, a Woolpert Company, a Woolpert Company.

While some prognostications indicate that AAM will solve ground congestion in a sustainable manner and provide increased mobility choices for the masses, many challenges exist in implementing it into today's aviation system. The first challenge focuses on the infrastructure needed for the development of a potential vertiport. The FAA has provided only interim guidance for vertiport design in Engineering Brief (EB) 105, and it only covers piloted aircraft flying under visual meteorological conditions (VMC). The EB also requires the aircraft to have the ability to hover out of ground effect with a pure vertical takeoff and landing. This requires a substantial amount of the aircraft's energy capacity, and battery endurance remains a considerable challenge. The guidance the EB offers is also limited to the basic layout of a single takeoff and landing area. More information is needed to design large capacity vertiports that will handle multiple takeoffs and landings at once.

The information in the EB is limited because of the general lack of validated information regarding eVTOL aircraft characteristics and performance. Although more than 300 designs are in the making, no eVTOL aircraft has obtained any of the necessary certifications from the FAA. Historically, landing facilities for fixed wing and rotor aircraft have been designed around certified aircraft with a history of

performance and safety. Neither of those things exist for eVTOL aircraft, and the designs are continually changing. Most of the current eVTOL designs use lithium batteries for the power for the electric motors, which can be a hazard themselves. Fires from thermal runaway can be extremely difficult to control and even harder to put out. Powering entire aircraft fleets with these batteries comes with a hurdle never before cleared, and certification requirements and required mitigation measures will ultimately impact the aircraft's weight and performance. While most are propelled with power from lithium batteries, hydrogen is also currently being researched. Additionally, NASA has made improvements in the solid-state battery that may find its way into commercial use. The charging, safety, storage, and firefighting requirement for each of these energy sources will be different and require different rules, regulations, and codes.

Furthermore, the integration of eVTOL aircraft into the existing air traffic control system in the near term will increase air traffic controller workload and operating them near larger commercial airliners will require wake turbulence separation that will impact capacity at constrained airports.

Another challenge for AAM operations will be training and hiring pilots. eVTOL pilots do not exist currently, as they may require special training, which may exacerbate the existing pilot shortage. While autonomy will offer a future solution, it will not be here in time to eliminate the need for pilots for these new aircraft in the near to mid-term. Boeing projects the need for 128,000 pilots in North America alone through 2041 as well as the need for an additional 134,000 aircraft technicians.

AAM is currently in the crawl stage and will be for the next five to ten years. While there is room for optimism where this new technology is concerned, there remains some skepticism. eVTOL OEMs have stated their ability to scale eVTOL operations to extremely high tempos and volume, but many have little to no experience manufacturing aircraft, working with the FAA, or operating an air taxi service within our country's airspace system. Designing vertiports around uncertified aircraft in the prototype stages is an arduous task that should be approached with caution and due diligence.

It is evident that there remain significant uncertainties with respect to the ultimate viability of these aircraft. If it is assumed that ultimate viability will be realized, there remains today the challenge to track and anticipate the technological advancements to support these future aircraft in terms of their capabilities and operational requirements that are changing nearly on a daily basis. Within that dynamic environment, federal, state, and local regulatory agencies as well as individual airports are currently being challenged to anticipate the operational and physical requirements required to accommodate these new aircraft, assuming they will be viable. Given the profound uncertainties that currently exist, airports should proceed with planning for their ultimate integration into their operations in a conservative and thoughtful manner that advances physical development only as benchmarks are eventually met by the developing industry.

That said, airports like EGE can start to employ strategies that will help it anticipate and plan for the potential integration of AAM into its operations.

1. Specify an employee that will have some focus on AAM. AAM is still in its early stages of development, and it is constantly evolving. EGE should assign an employee to head up the Airport's efforts regarding AAM to serve as the main point person in these efforts. As the industry matures, or as deemed necessary by EGE, a dedicated AAM-focused employee may be required to help the Airport stay abreast of industry development and coordinate internal and external efforts. This employee can attend conferences and coordinate with airport operations staff, ATCT, and other on-airport staff, as well as coordinate with state and local economic development and planning officials.

2. Develop an internal working group focused on AAM. This working group should include Airport management, the FBO, passenger airlines, cargo operators, local ATCT, consultants, among others and should meet several times per year, or as deemed appropriate by EGE. The group should track AAM milestones, coordinate with new entrants, and guide the futureproofing of AAM-related development. The goal of the group is to bring these local players into the same room to gain a common understanding of AAM, EGE's values for AAM, and to keep participants informed about EGE efforts as related to AAM.

3. Plan for regional coordination. Outside of the internal working group, EGE should work with local planning authorities and municipalities to require coordination for any off-airport vertiport development proposals so that these proposals are in harmony with EGE values and do not impact the capacity of the Airport in a negative way. While greenfield vertiports in the area may be years away, EGE can work to educate these outside organizations about airport imaginary surfaces, airspace control, and other aeronautical complexities that could impact vertiport development in the region.

4. Engage with state and national officials for development. While the introduction of AAM operations at EGE may be years away due to issues related to technological development as well as those inherent challenges associated with a high altitude airport like EGE, this airport will be an attractive market for these types of operations. By coordinating with federal, state, and local regulatory agencies as well as those relevant economic development organizations that can help anticipate when these operations could be initiated, the Airport will position itself as best as it can. It is also important to recognize this coordination will be critical to ensure appropriate permitting and zoning for these future operations.

With respect to specific facility planning for AAM at EGE, it is simply too early to reasonably anticipate the possible requirements for this still-emerging industry and where those should be situated on an existing airport. Nevertheless, through discussions with industry leaders as well as EGE representatives, some common themes and understandings can be recognized at this point.

- Initiation of AAM Operations (Short-Term Planning). It is reasonable to assume the following upon the initiation of AAM operations at EGE:

- AAM aircraft would utilize the existing runway for approach and departure operations. Thus, they would have to be integrated into standard airport operational flows including appropriate separations as AAM aircraft are susceptible to turbulence generated by larger aircraft.
- AAM aircraft would utilize the existing taxiway system and an area on an existing apron would have to be designated to accommodate loading and unloading of AAM.
- If AAM aircraft were to be electrically powered, a charge station near the designated apron parking position would have to be installed.

- Maturation of AAM Operations (Long-Term Planning). The following could be assumed if AAM operations at EGE proved to not only be viable, but also expanded to a level that would create potential congestion concerns for the Airport.
  - AAM aircraft operations at a level that created capacity issues on the airfield could result in the need to develop a dedicated vertiport for these operations. As it would be assumed that there would be need to connect AAM passengers with commercial service or general aviation aircraft, a vertiport would be required to be established on the Airport. (Note that if passenger demand did not require that connectivity to other modes of aviation, a new vertiport could be established apart from EGE.)
  - AAM operations would still have to be integrated into EGE ATCT operational control.
  - Depending on the fuel source for the AAM, high-capacity electrical chargers, hydrogen fuel cells, etc. would need to be provided.
  - A future EGE vertiport would likely require a landing area, multiple AAM parking positions, hangar space for storage and servicing, passenger processing and hold rooms, landside access, and potential direct connection to the commercial terminal building and to the FBO.
  - Development of such a facility at EGE would ideally likely have to occur on the south side of the Airport. However, given the significant space constraints that currently exist in this area, thoughtful and creative planning would have to be employed to account for all of the potential requirements identified above. This could include the development of vertiport facilities in association with future parking structures.

5.7 DEVELOPMENT PLAN SUMMARY

Recommended airside and landside development concepts have been developed to align with forecasted operations, passenger enplanements, and based aircraft. Utilizing the evaluation of alternatives described in the previous sections, feedback from Airport staff, and the Project Advisory Committee (made up of key stakeholders), future improvements have been summarized in **Table 5-4**. These improvements also include key inputs for the ALP that will directly result from this Master Plan.

Table 5-4: Recommended Development Plan Summary

Development		Airport Master Plan Recommendations
Airside Development		
1	Airfield Demand Capacity	No action required.
2	Airport Design Standards	Shift Taxiways A2, A3, and A4 to prevent direct runway access
3	Runway Orientation / Wind Coverage	No action required.
4	Airport Design Requirements	No action required.
5	Runway Length	Explore options for extending Runway 7-25 to 1,000'.
6	Taxiways	Construct new Taxiway B
7	Airfield Pavement	Maintain existing pavement strengths as required.
8	Airfield Visual Aids	No action required.
9	Navigational Aids (NAVAIDs)	Pursue upgrades to instrument approach procedures.
10	Obstruction Removal	No action required; recommendations to be incorporated into ALP drawing set.
Landside Development		
11	Commercial Service Terminal Building	Expand commercial service terminal building to meet existing and future needs; Establish an FIS facility to facilitate international passenger service.
12	Aircraft Hangars	Construct new hangars on north and south sides based on demand requirements; Explore potential new development areas on the north side of the Airport
13	Aircraft Parking Aprons	Maximize capacity and efficiency of existing aprons; preserve areas for future potential construction of new aprons
14	Landside Access and Parking	Improve commercial service terminal area roadway, access, circulation, and auto parking to meet existing and future needs.
15	Airport Vehicle Service Road	Update vehicle service road as required to meet airport needs.
16	Fuel Storage	No action required; prepare for use of unleaded fuels
17	Airfield Maintenance	Expand existing airfield maintenance facility by 10,000 sf; construct new 6,000 sf maintenance building.
18	Airport Equipment	Secure use of fuel trucks; continue to inspect and maintain fuel farm as required.
19	Utilities	Pursue continued improvements to utilities as required including the extension of three-phase power around the Airport.

	Development	Airport Master Plan Recommendations
20	Airport Property Line	Explore potential relocation of Cooley Mesa Road and potential acquisition of associated lands; Maintain and update Exhibit-A as required
Other Airport Development		
21	GSE Storage	Establish a new GSE storage area near the ARFF facility; Identify a facility for accommodating GSE maintenance operations; Establish EGSE charging stations as needs demand
22	Airline Passenger Lavatory Waste Management	Repurpose old deicing effluent storage tank for airline passenger service lavatory waste storage and processing; Construct shed to facilitate operations.
23	Microgrid	Explore potential viability of establishing a microgrid for the Airport.
24	AAM Operations	Preserve and protect for future development of AAM operations over the short-term and long-term timeframes
25	Sustainability	Conduct an Airport Sustainability Plan to provide a roadmap for future sustainability efforts at EGE

Source: Jviation, a Woolpert Company, a Woolpert Company

This plan addresses airside, landside, and other development opportunities for the Eagle County Regional Airport for the 20-year planning period. The development proposed in the plan provides the Airport with ultimate flexibility moving forward as projects are developed in different phases, which are addressed in **Chapter 7, Implementation Plan.** The next chapter, Chapter 6, outlines the complete Airport Layout Plan set that is used when reviewing and planning for future projects.

5.8 ENVIRONMENTAL REVIEW

The analysis of potential environmental impacts that result from airport development projects is a crucial part of the master planning process in that environmental considerations must be weighed early to consider their potential impacts to future project budgets and schedules. This Airport Master Plan integrated the evaluation of environmental impacts throughout, specifically looking at the potential impacts future development projects may have on existing environmental resources previously defined in **Chapter 2**, **Inventory**. Through the environmental analysis completed as part of this AMP, potential environmental impacts were recognized and taken into consideration when assessing alternatives and identifying the Recommended Development Plan. Those potential environmental impacts associated with the final Recommended Development Plan are summarized below as well as the permits that will likely be required for its implementation.

Understanding environmental permitting requirements is crucial for airport development projects to avoid delays and ensure compliance. Early consideration of environmental issues during planning can prevent setbacks in regulatory agency decision-making and funding processes.

As the overarching environmental review of federally funded airport projects is the National Environmental Policy Act (NEPA), a summary of NEPA is provided here. In accordance with FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions, and FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, airport development projects must be evaluated for environmental impacts per criteria from the FAA. FAA Order 1050.1F specifically defines what level of environmental review is required. Typically, there are three levels of NEPA review depending on the scope and potential environmental

impacts of the proposed action. These include categorical exclusions (CATEX), environmental assessments (EA), and environmental impact statements (EIS):

- CATEX. Projects that can be categorically excluded per FAA Order 1050.1F; however, the FAA requires documented analysis of potential impacts to environmental resources.
- EA. Projects that can normally be categorically excluded but involve extraordinary circumstances; cannot be categorical excluded; do not require an EIS; that do not create significant environmental impacts; or may create significant impacts, but the impacts can be mitigated.
- EIS. Projects that were evaluated in an EA and it was found that the project would result in impacts greater than the allowable significance threshold and that mitigation would not reduce the impacts below the threshold. It is not anticipated that any projects at BPG will require an EIS.

Based on a review of projects in the Recommended Development Plan (see) and how that plan could potentially impact those environmental resources inventoried and presented in **Chapter 2**, **Table 5-5** provides a summary of the anticipated additional environmental analyses that may be required for each action. It should be noted that this is a high-level evaluation of environmental documentation requirements; all projects should be coordinated with the FAA who will make the final decision on the level of environmental documentation needed. Additionally, further design may be needed to definitively determine/quantify the amount and/or degree of impacts, and the type and level of permitting required.

Table 5-5: Recommended Development Plan Environmental Summary[1]

Environmental Categories	Projects[2]																								Recommended Action
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Air Quality	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*Potential impacts are not anticipated.*
Biological Resources	-	X	-	-	X	X	-	-	-	-	X	X	X	X	X	-	X	-	-	X	X	X	-	-	-	Biological survey recommended.
Climate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*Potential impacts are not anticipated.*
Coastal Resources	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not applicable.
Department of Transportation Act, Section 4(f) and 6(f) Resources	-	X	-	-	X	X	-	-	-	-	X	X	X	X	X	-	X	-	-	X	X	X	-	-	-	Historic Resource Survey recommended.
Farmlands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*Potential impacts are not anticipated.*
Hazardous Materials, Solid Waste, and Pollution Prevention	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	*Phase I Environmental Site Assessment (ESA) recommended.*
Historical, Architectural, Archeological, and Cultural Resources	-	X	-	-	X	X	-	-	-	-	X	X	X	X	X	-	X	-	-	X	X	X	-	-	-	Cultural Resource Survey recommended.
Natural Resources and Energy Supply	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*Potential impacts are not anticipated.*
Noise and Noise-Compatible Land Use	-	-	-	-	X	-	-	-	X	-	-	X	-	-	-	-	-	-	-	X	-	-	-	-	-	Noise analysis recommended.
Socioeconomic Impacts, Environmental Justice and Children's Environmental Health and Safety Risks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*Potential impacts are not anticipated.*
Light Emissions, Visual Resources, and Visual Character	-	X	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Special consideration should be given for additional light emissions.
Wetlands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Wetland delineation recommended.
Floodplain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*Potential impacts are not anticipated.*
Surface and Ground Waters	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*Potential impacts are not anticipated.*
Wild and Scenic Rivers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*Potential impacts are not anticipated.*
Recommended NEPA Review Level[3]																										
CATEX		X				X			X	X	X	X	X	X	X	X	X				X	X				
EA					X															X						
EIS																										

1 This table represents a general assessment and therefore recommends each individual project be evaluated on an individual basis.
2 Individual projects are listed in Table 5-4, Recommended Development Plan Summary
3 Level of NEPA review will be determined by the FAA.
Source: Jviation, a Woolpert Company, a Woolpert Company.