TOWN OF VAIL

Memorandum

TO: Vail Town Council

FROM: Public Works Department

DATE: December 17, 2019

SUBJECT: Replace Transit Buses Update

I. PURPOSE

The purpose of this memo is to update the Town Council regarding the purchase of up to 7 battery electric buses per the bus replacement plan and recommend modifications to the battery electric bus rollout.

II. BACKGROUND

The TOV owns and operates 32 transit buses, 30 of the buses are on a 12-year replacement plan, which is consistent with Federal Transit Agency (FTA) requirements that a transit bus be designed and operate for a minimum of 12 years. The current fleet of buses includes:

(2) 2006 Gillig 35' buses (back up)
(8) 2019 Gillig Low floor 40' buses
(7) 2018 Gillig Low floor 40' buses
(7) 2008 Gillig Low floor 40' hybrid buses
(6) 2011 Gillig Low floor 40' buses
(2) 2012 Gillig Low floor 40' hybrid buses

The two oldest buses are not on the replacement schedule and are used as backup buses.

The current lead time to start a bus build is 14 months from the date of order. The bus replacement plan has seven buses to be replaced in 2020 that will be battery electric. On August 6 of this year the department obtained approval for replacing up to 7 buses with Battery Electric buses and has received grant funding in the amount of $525,287 toward this purchase. The staff placed an order for one of the electric buses and was waiting for conclusion of grant funding for the remaining 6 buses. At the end of November, the town was informed we were not successful in obtaining additional grant funds for the capital bus purchase. In the time between August and November staff began to analyze the roll out of electric buses on current transit operations. In addition, staff was able to test drive and have town mechanics inspect a Gillig battery electric bus. Gillig LLC is in the final stages of testing its demo bus with the Federal Transit Agency. The first edition production assembly will begin this May. The town's bus will be within the first 30 buses produced.

After testing many different vendors of battery electric buses, our team continues to recommend that we purchase Gillig battery electric buses. This will allow the Town to keep bus options the same and have the bus drive very similar to what our drivers are used to. Also, most of our spare parts inventory will transfer over to these new buses keeping inventory costs down. Gillig is using

Cummins for their electric drive system, with support available on this new technology in Denver and Grand Junction. The other bus manufacturers are either over seas or across the country. The Town has a strong relationship with Cummins as 95% of our current diesel engines are Cummins.

III. ANALYSIS

The staff analysis identified a number of concerns with a full deployment of battery electric buses. First edition production without any real time experience of operations is not ideal. Secondly, any bugs or issues are corrected in subsequent year productions to address problems which arise with the first edition. The town was not able to demo a bus for a week or more under winter conditions, as the bus was not available before an order was placed. Because the town has no real-time experience, determining what actual mileage range in Vail during the winter is problematic.

In order to better analyze the situation. the Town of Vail was able to gather some real-life experiences from Park City which has been operating a competitor electric bus for two winters. Some of their experiences would cause some significant logistical problems for the town transit operations to overcome.

IV. ISSUES INDENTIFIED

The due diligence by the staff as to the original 7 Battery Electric rollout in 2020 has raised some issues listed below. These issues have resulted in a staff recommendation to take a slightly different approach to the Battery Electric bus purchase and rollout for 2020.

1) Range of operation: Even though bus manufacturers have claimed mileage ranges of over 200 miles, actual mileage is in the 140-160-mile range in good weather. The town intended to replace the intown route with the Battery Electric buses. In planning for this, town staff used a range of 125 miles or 80-85% of capacity. Currently we deploy six buses per day. If the fleet were all electric, we would need to adjust from 6 buses to 10 buses as 4 of the buses were exceeding the 125-mile range.
2) Cold weather impacts: Park City's mileage rapidly dropped around 25 degrees Fahrenheit and they went to all non-electric buses at 0 degrees Fahrenheit. Heaters and the ability to charge were two of the biggest concerns. When Park City deployed their first 6 buses, they were not replacing existing rolling stock. This allowed them to experiment and still have bus back up.
3) Auxiliary heater reliability: The Town of Vail has not had the best luck with auxiliary heaters being reliable. This is due to the ignition computers installed to meet air quality standards which causes issues in operating and heating as required due to thinner air at altitude. Electric auxiliary heaters would dramatically drain down the mileage range.
4) Backup buses: The Town of Vail original approach was to replace 7 buses with 7 electric buses. In addition, the Town has carried 2 phantom (non-budgeted replacement buses) in the fleet as backup over a period of the last 10 years. This is in some ways fiscally prudent; however, if this becomes common practice it is best to budget for the asset. Typically, when buses are replaced, you keep the newest model year as a backup. The buses being replaced are the hybrid electric buses. These buses have been reliable; however, over the last year we are seeing a significant amount of failures to various components. This past summer the buses were placed out of service for a significant period to ensure we can run the buses this winter. In addition, battery replacement is a large capital expense. We were originally told to plan on battery replacement at mid-life; to date we have not replaced a battery. It would not be prudent to keep these buses as back-up as this battery cost alone would be 55K per bus.

5) Right sizing the fleet: The right size for the fleet as we roll out the electric buses would be initially to have dependable back-up buses. In addition, keeping a spare ratio allows flexibility and meets the demands of the fleet staff and the transit department. The town currently rolls out 22 buses on most winter days. In addition, if any special events, DEVO, holiday periods or overflow parking occur, additional buses are deployed. There have been times we have had close to a full fleet deployed. The initial introduction of electric buses requires an additional two to four buses be available each day. A ratio of 1:3-1.5 is optimal for the town's fleet for daily operations. We would be at 1.25.
6) Adjusting the budgeted fleet bus replacement numbers up to current practices: The town has operated 32 buses in the fleet over a period of time, this has defaulted to a standard practice, this practice should be recognized in budgets and assets.
7) Ability to expand bus service capacity: This past fall besides our concern on finding drivers to fill shifts, the need for an additional bus during peak times to offer East Vail Express service was a concern that hampered our ability to successfully roll out service enhancements.
8) Charging capability: The Town of Vail originally had the buses roll out and charge overnight at the bus barn. To eliminate the need for this additional charging capability, it may be best to add additional chargers at the Village Transportation Center and possibly the Lionshead Transit Center. This could provide not only use for the town, but ECO as well. Park City had a 45 min. loop with a 15 min. layover on each loop for on-route charging. They installed an on-route overhead charger at each end of the loop.
9) Upgrades to technology: The everchanging technology of electrification of transportation is dependent on two key issues: battery storage capacity and quickness of recharging batteries. In addition, future year production runs will have improvements over the first run. Taking a little more time to verses committing all at once is a more prudent approach.
10) Future electric bus conversion of outlying transit routes: In order to perform this review staff looked at the future conversion using the current electric bus operation assumptions. The best approach to make this transition would be to determine where at the Transportation Center on-route charging can occur. This has two impacts: capital construction dollars for the charging infrastructure and potentially additional buses and operational costs related to running additional buses. The staff assumed a model similar to Park City operations and for the Town of Vail, it would require an additional bus and driver for East Vail, an additional bus and driver for West Vail, an additional bus and driver for a West Vail Express/Sandstone route and an additional bus and driver for Lionsridge Loop/Golf Course/Intown routes. As technology changes and we have real experiences with operating electric buses, we would expect to improve on this roll out in the future; however, in 2023 if we have not seen technological progress, there is a chance these assumptions could be a reality.

V. Vendor Selection

The budget for this project is $6,525,000 in 2020. The Town is utilizing pricing based on a joint procurement plan with an FTA approved State of Virginia contract. The price of each battery electric bus based on the State of Virginia contract with adjustments made to meet TOV requirements is $859,465. The price for each diesel bus is approximately $453,000.

VI. PROPOSED CHANGE IN IMPLEMENTATION

Original Implementation Plan

Replace 7 electric hybrid buses with 7 battery electric busses and exchange the 2006 spares with the two best electric hybrids.

This does not work as the electric hybrids are not able to be phantom buses and it requires 4 reliable buses each day to supplement the range of the electric buses which the town does not have.

Revised Implementation Plan

Replace 4 electric hybrid buses with 4 battery electric buses

Replace 3 hybrid electric buses with 3 diesel buses

Recognize the current operation and replace 2 diesel phantom buses with 2 new diesel buses to be used to back up the battery electric buses

Add one additional diesel bus in order to provide expanded service as determined

The town will then in 2023 replace 6 buses; 2024 replace 2 buses; 2030 replace 7 buses; 2031 replace 8 buses; and in 2032 replace 10 buses, if all 10 are still needed.

This delays the initial conversion of 3 battery electric buses for 3 years and adds one additional year to full conversion in 2032 verses 2031.

For 7 battery electric buses, the total would be $6,016,255. The town currently has a grant for $525.287 for one bus which is being used for the initial one battery electric bus currently ordered.

The cost of 4 battery electric buses is $ 3,437,860. 6 diesel buses is $ 2,718,000. The combined purchase of Battery Electric and diesel is $6,155,860. We would like to use the remaining $ 369,140 for the bus charges required to operate these buses. We would like to put a place holder on these charger funds and present to Council at a later date for approval.

The revised implementation plan requires no budget modification.

VII. ACTION REQUESTED

Authorize the Town Manager to approve the purchase of an additional 3, 40’ Gillig battery electric low floor buses making a grand total of 4 battery electric buses and 6 40’ Gillig diesel low floor buses for a total order of 10 buses this year to take delivery in 2020. These funds are in the 5- year capital plan in 2020.

VIII. STAFF RECOMENDATION

Authorize the Town Manager to approve the purchase of an additional 3, 40’ Gillig battery electric low floor buses making a grand total of 4 battery electric buses and 6 40’ Gillig diesel low floor buses for a total order of 10 buses this year to take delivery in 2020. These funds are in the 5- year capital plan in 2020.