

## MEMORANDUM

**TO:** COLORADO TRANSPORTATION INVESTMENT OFFICE BOARD (CTIO) OF DIRECTORS  
**FROM:** KELLY BROWN, CTIO CHIEF TOLL OPERATIONS OFFICER  
**SUBJECT:** CTIO DASHBOARDS AND REPORTS  
**DATE:** OCTOBER 18, 2023

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### Purpose

To present the CTIO Board with an update on the contributions made by the CTIO Data Science intern, Anup Bhutada. Anup joined CTIO in April to help staff manage the large amount of data available due to the Next Generation Lane Tolling System (NGLTS) system going into operations.

### Action

No action is requested, and the purpose of the materials is informational only.

### Key Contributions to CTIO Tolling Operations

Below is a summary of key data solutions that Anup was able provide for CTIO:

- Performing data analytics to ensure Service Level Agreements (SLAs), Key Performance Indicators (KPIs) and general requirements are met and/or exceeded and assistance with inventory tracking and work order/ incident management. A key example is:
  - Lane Maintenance Report - The Lane Maintenance reports help Josh keep track of the times spent on each facility. The dashboard displays charts for times spent by each technician as well as the times spent on maintenance every day of the month. This provides a holistic view of the maintenance activities filtered by the time range of choosing.
- Monitor and report on accurate transaction generation at the roadside, timely data transmission and data validation of transactions. A key example is:
  - Trip Reconciliation Workflow - ETC creates, and processes trips based on transit events captured for vehicles on Express Lanes. This adds complexity to the tolling operations but makes it economical for the people using Express Lanes. The trip reconciliation workflow checks the trips generated by ETC to make sure that vehicles are correctly charged when the trips get sent to the back office. Anup worked with the Atkins team to refine the workflow to identify incorrectly built trips. To add the capabilities to automate/run the same workflow, CTIO would have required the purchase of an automation license that would cost CTIO about \$80k. Anup built an alternative workflow using Python like the reports described above and this alternative costs CTIO nothing and can theoretically run without human intervention at a cost of just below \$40 a month.
- Developing automated dashboarding to provide reliable self-service tools and insights. A key example is:
  - Anup is working with OIT and the Chief Data Office at CDOT to setup an infrastructure that leverages capabilities in Google Cloud Platform. Anup is in the process of setting up a Google Cloud Server to augment the work he has done in creating the dashboards and reports to make running of automated reports seamless.
- Produce presentations, charts, and summaries that clearly communicate findings. Some key examples are:
  - Traffic Report - The traffic reports show trends in traffic volumes and speeds over a week and times of days aggregated over previous months. These reports are helpful in tracking Express Lane capture rates and usage to understand if express lanes are functioning as expected and if any changes in rates

are required. These reports are scheduled to refresh everyday using data flowing in from ETC systems and helps keep track of usage and capture rates.

- C470 Operations Reports - These are received every week for Westbound and Eastbound directions in Microsoft Excel format and are processed and converted into a dashboard that enables an enhanced view of the data. This enables exploring data across several weeks in the same report and understand trends in Express Lane Traffic across the time range of choice. This report was created by compiling information from over 150 excel documents received from Cognos for C470 since the end of 2020 and are scheduled to refresh every week when the week's data is received from Cognos.
- Accident Report - This report was created to highlight the zones that were most prone to accidents to help Blissway prioritize installation of the safety enforcement equipment on I25 Segment 2 and 3. The report was compiled using data from Monthly Void summary reports for accidents maintained by staff since 2021.
- RTD Speed Report - This report was created to help CTIO understand if the usage of Express lanes had an impact on the average speeds of RTD buses. This report was an on-demand request and created using over 70 reports received in emails since April 2022.

### Conclusion

The exceptional work that Anup has done during his time as the CTIO Data Science Intern has created a foundation for the future full time CTIO Data Analyst to maintain and build upon. Anup will be with CTIO through December 2023 when he will graduate from University of Colorado Boulder with a Master of Science in Data Science degree.