



MEMORANDUM

TO: HIGH PERFORMANCE TRANSPORTATION ENTERPRISE BOARD
FROM: KELLY BROWN, TOLLING OPERATIONS MANAGER, HPTE
DATE: APRIL 17, 2019
SUBJECT: C-470 EXPRESS LANE CORRIDOR TOLLING OPERATIONS STAFFING ANALYSIS

Purpose

The purpose of this memorandum is to provide the HPTE Board with a staffing analysis for the C-470 Express Lanes.

Requested Action

Staff is asking the HPTE Board for feedback and direction based on the options presented in the attached analysis.

Background

At the HPTE Board retreat in February 2019, staff presented a white paper that outlined gaps within HPTEs current tolling program that need to be addressed in order to improve the management of existing Express Lanes and ensure the long term viability of the Express Lanes network. Specifically, discussed was the operations of C-470 Express Lanes which are slated to open **by end of calendar year 2019**. Given the imminent need to address this corridor, the Board requested further analysis of the available options to provide the necessary staffing to support operations on this corridor prior to toll commencement.

Current Details

Since the February, HPTE has completed an internal analysis of the staffing options available and provided them for Board consideration in Attachment A: C470 Express Lanes Staff Needs Memo. Background on topic is presented as well as two different staffing models that could be used for the C-470 Express Lanes: *Option 1: Use Internal Staff Positions* and *Option 2: Use of Contractors*.

Staff Recommendation

Based on the analysis presented staff recommends *Option 2 - Use of Contractors* as the model to provide the necessary staff C-470 Express Lanes operations. HPTE feels that the ability to staff the different positions with specialized contract workers within the C-470 Go Live time frame is critical. Moving forward, the C-470 corridor can serve as a pilot program to determine if it is a viable model to consider as part of the comprehensive staffing plan recommendation for all Express Lanes currently in construction.

Next Steps

By the end of summer 2019, HPTE will develop a comprehensive staffing plan recommendation that includes the staffing needs anticipated for all Express Lanes currently in construction.

Attachment

Attachment A: C-470 Express Lanes Staffing Needs Memo
Attachment B: C-470 Express Lanes Staffing Presentation

To: Kelly Brown, HPTE

From: Atkins Email: Rami.harb@atkinsglobal.com

Phone: 303-221-7275 Date: April 12, 2019

Ref: HPTE Staffing & Maintenance Plan cc: Rami Harb

Subject: **DRAFT:** C470 Express Lanes Staffing Needs

1. Background

Since 2015, HPTE has been building its capacity for Express Lane operations and currently has 69 lane miles of Express Lanes in operation and 143 lane miles of Express Lanes under construction or in development which will open for tolling by 2022. As the Express Lane Network grows to 212 lane miles, HPTE needs to address immediate gaps within its tolling operations program to improve the management of the Express Lanes network and begin investing in the areas of IT support, operations staff and maintenance in order to protect its capital investment. Addressing these areas now will ensure the long-term viability of Express Lanes operations.

With the forthcoming implementation of these new Tolle Express Lane facilities, operations and maintenance staff will be needed on a **24x7- basis, which is a key operational change**, at the Colorado Transportation Management Center (CTMC) in Golden, Colorado. The High Performance Transportation Enterprise (HPTE) is acutely aware of the importance of CTMC staffing to the efficient operation of each of the HPTE Tolle Express Lanes. Furthermore, additional maintenance of the Intelligent Transportation Systems (ITS) and Electronic Tolling Equipment infrastructure will be required, necessitating additional maintenance staff. In anticipation of these needs, HPTE staff has developed a preliminary staffing plan based on simple calculations and our peer's experience with the operations, staffing, and maintenance of other Transportation Management Centers (TMCs) across the United States.

Currently, HPTE relies on CDOT Intelligent Transportation Systems (ITS), CDOT Maintenance and the Traffic Operations Center (TOC) staff to provide daily operations support for the Express Lanes. Examples of work performed by CDOT includes monitoring the lanes at the TOC, opening and closing the I-70 Mountain Express Lane during peak periods and monitoring traffic volumes on the corridor to change toll rates. While this arrangement was able to support HPTE in its early years, this model is already unsustainable and demonstrating limitations because:

1. The primary Department focus has been to get systems in place to manage the growing congestion while the staffing levels required for office and field support of these investments has lagged behind. There is currently not enough CDOT staff and budget available to perform all of the activities

necessary to properly manage HPTE’s existing network of Express Lanes, therefore HPTE has determined that they will not be able to support C-470 Express Lanes operations.

- Day-to-day coordination between HPTE and the CDOT departments is challenging because they have fundamentally different priorities: HPTE is focused on its Express Lanes while CDOT is responsible for all lanes across an entire interstate. There are also competing work priorities and CDOT is not able to place the same level of importance on Express Lane operations as HPTE does.

Based on the existing limitations outlined above, HPTE must consider new options for how it will fill the positions needed for the C-470 Express Lanes operations. At this point in time, this technical memorandum will be limited to the **imminent** staffing needs for the C-470 Express Lanes. The recommended staffing will form the “C-470 Express Lanes Tolling Operations Team” and will perform the three main Express Lanes operations activities (a) Daily Operations of Express Lanes (b) Express Lanes Tolling Equipment Monitoring and Maintenance (c) Oversight and Reporting of Express Lanes Data and other Express Lane Related Activities. By the end of summer 2019, HPTE will develop a comprehensive staffing plan recommendation that includes the staffing needs anticipated for all Express Lanes currently in construction.

2. Comparative Peer Analysis

Eleven states operate Express Lanes in the United States. This analysis selected Georgia, Minnesota, Virginia and Washington State, which are the top four comparable states to Colorado in terms of express lanes miles and revenue as a baseline. Results of this analysis are shown in the table below.

Table 1: HPTE Peer Comparative Analysis

HPTE has used this peers’ comparative analysis above to inform its thinking and development of the staffing plan that HPTE is presenting for C-470 as well as the more comprehensive plan that will be submitted to the Board by summer’s end and define a plan **for each Express Lane corridor**.

State	Express Lane	Existing Lane Miles	Total Revenue	# Express Lanes Operations Staff	# Express Lane Maintenance Staff	# Staff Working on EL Related Tasks (Data, Reports, etc.)
GA	I-85 Express	16	\$ 18.0 M	6	1	1
	I-75 South	12	\$ 1.7 M	6	1	1
MN	I-35E	9	\$ 0.3 M	3	1	1
	I-35W	18	\$ 1.7 M	3	1	1
	I-394	11	\$ 1.4 M	3	1	1
VA	I-66	9	\$ 25.0 M	3.5	3	2.5
	I-64	8.4	\$ 2.5 M	3.5	1	1.5
WA	SR 167	10	\$ 1.4 M	2	1	1
	I-405	17	\$ 16.4 M	2	1	1

3. C-470 Express Lanes Tolling Operations Roles

Based on the comparative analysis of peers, staffing ranges between four and 10 support staff per Express Lane, with each support staff covering three key areas of operations work as shown in Table 2.

Table 2: Distribution of Staff per Activity

Staffing Role	Staff count
Daily Operations of Express Lanes	2 to 6
Oversight and Reporting of Express Lane Data	1
Express Lanes Equipment Monitoring and Maintenance	1 to 3
Total staff count per express lane corridor	4 to 10

In anticipation of the opening of the C-470 Express Lanes and based on an analysis of our tolling peers, HPTe is recommending staffing for the three main Express Lanes operations roles detailed below.

a) Daily Express Lane Operations:

This staffing plan calls for two full-time staff persons to be hired for Daily C-470 Express Lanes operations. Average training time will be 60 days. Table 3 shows the suggested draft staffing plan where one staff person will work the Daytime shift and the other staff person will work the Swing shift. Under this staffing plan, the Overnight shift will not have a staff person. The two staff persons will alternate being “on call” to handle any Overnight shift issues that come up.

These staff persons would be located in the CDOT Traffic Operations Center in Golden. Their Daily Operations of Express Lanes activities include but are not limited to:

- I. Incident Management / Toll Voiding
- II. Toll Equipment & Transaction Auditing
- III. Real-Time Traffic Condition Monitoring
- IV. Toll Rate Setting & Adjustment
- V. Enforcement Management
- VI. Toll Asset Management

This is the specialized skill set required for the Daily Operations staff: minimum requirements High school diploma (or equivalent) plus eight years related experience OR an Associate’s Degree in a related technical field plus six years related experience is required. This level may be achieved by candidates with experience traffic operations centers, call centers, dispatch centers, incident management, traffic advisory, safety officers, peace officers, etc.

Table 3: Suggested Draft C-470 Traffic Operations Center Staffing Schedule

Shift	Sun (hrs)	Mon (hrs)	Tues (hrs)	Wed (hrs)	Thurs (hrs)	Fri (hrs)	Sat (hrs)	Number of Staff Persons	Total Hours Per Week
Daytime	4	6	6	6	8	6	4	2	80
Swing	4	6	6	6	8	6	4		
Overnight	0	0	0	0	0	0	0		

b) Toll Equipment Monitoring and Maintenance Activities:

This staffing plan calls for two (2) full-time staff persons to be hired for C-470 Toll Equipment Monitoring and Maintenance activities. Average training time will be 60 days. Table 4 shows the suggested draft staffing plan where one staff person will work the Daytime shift and the other staff person will work the Swing shift. Under this staffing plan, the Overnight shift will not have a staff person. The two staff persons will alternate being “on call” to handle any Overnight shift issues that come up.

These staff persons would be located in the CDOT Traffic Operations Center in Golden and monitor the traffic on the C-470 Express Lane Corridor. Express Lanes Equipment Monitoring and Maintenance activities include but are not limited to:

- I. Routine and preventative maintenance
- II. Reactive maintenance
- III. Equipment monitoring and reporting
- IV. Maintenance management
- V. Spare parts management

This is the specialized skill set required for the Toll Equipment Maintenance staff: minimum requirements High school diploma (or equivalent) plus eight years related experience OR an Associate’s Degree in a related technical field plus six years related experience is required. This level may be achieved by candidates with experience in electronics, electrical circuits, ITS and tolling equipment, computers, video systems, computer hardware and software, toll collection systems.

Table 4: Suggested Draft C-470 Toll Equipment Monitoring and Maintenance Staffing Schedule

Shift	Sun (hrs)	Mon (hrs)	Tues (hrs)	Wed (hrs)	Thurs (hrs)	Fri (hrs)	Sat (hrs)	Number of Staff Persons	Total Hours Per Week
Daytime	4	6	6	6	8	6	4	2	80
Swing	4	6	6	6	8	6	4		
Overnight	0	0	0	0	0	0	0		

c) Oversight and Reporting of Express Lanes Data and Other Express Lane Related Activities:

This staffing plan calls for one full-time staff person to be hired for Oversight and Reporting of Express Lanes Data and Other Express Lane Related Activities. Table 5 shows the suggested draft staffing plan where this staff person works the Daytime shift. Under this staffing plan there is no need for a person to work the Swing or Overnight shifts, but could be used on an “as needed basis” for lane testing QA/QC activities and training of Swing Shift employees outside of the Daytime shift hours.

Currently, HTPTE does have support in this area using a contractor who was hired in March 2019. This staff person is located at the contractor’s office located in the Denver Tech Center and is also assigned a cubicle in the HTPTE office at the CDOT Headquarters in Denver. This staff person is currently working on the C- 470 SOP Manual. Oversight and Reporting of Express Lane Data and other Express Lane Related Activities includes but is not limited to:

- I. Ad-hoc data requests from media
- II. Data requests from project team
- III. Data requests from HTPTE team
- IV. Data request from CDOT Region
- V. Data request from CDOT Public Information Officer
- VI. Data request from special interest groups
- VII. Weekly performance reports
- VIII. Yearly Express Lane Annual reports
- IX. Training Express Lanes Staff
- X. QA/QC Testing Oversight (FAT, TAP)

This is the specialized skill set required for the Data, Reporting and Other Express Lane Related Activities staff: minimum requirements B.S. degree in Civil Engineering or a toll related subject such as Computer Science, Electrical Engineering, Transportation Planning, Traffic Engineering, Statistics, Business Administration. This level may be achieved by candidates with four (4) years’ experience since Bachelor’s or three (3) years since Master’s. Relevant work experience would provide exposure to information and communication technologies, toll operations, and/or intelligent transportation systems (ITS), including fiber-optic communication design, video systems, computer hardware & software, toll collection systems and sub-systems, toll infrastructure, electronic payment, or traffic management.

Table 5: Suggested Draft C-470 Oversight and Reporting of Express Lanes Data Staffing Schedule

Shift	Sun (hrs)	Mon (hrs)	Tues (hrs)	Wed (hrs)	Thurs (hrs)	Fri (hrs)	Sat (hrs)	Number of Staff Persons	Total Hours Per Week
Daytime	0	8	8	8	8	8	0	1	40
Swing	0	0	0	0	0	0	0		
Overnight	0	0	0	0	0	0	0		

4. C-470 Express Lanes Staffing Analysis

HPTE has analyzed two different models that could be used to staff the C-470 Express Lanes Tolling Operations Team. Each model is described below.

a) New Staffing Model Option 1 - Use Internal Staff Positions

Within the Department, employee positions are referred to as Full Time Equivalents (FTE). Each Division has a certain number of FTE that they are allotted. The status of those FTE, whether they are filled or currently vacant, varies Division to Division. Currently, HPTE has two open and available FTE positions (excluding the Executive Director) that *could* be used to fill some of the positions needed for the C-470 Express Lanes Tolling Operations Team. To fill the other staff positions needed for C-470 and future corridors, HPTE would need to start by requesting additional FTEs for its Division. If granted additional FTE, HPTE would then need to work with CDOT Human Resources (HR) to draft formal position descriptions (known as Position Description Questionnaire or PDQ) for those new roles, post position openings, conduct interviews and complete the hiring process. Once hired, onboarding and specific training would need to be provided.

The process to acquire FTEs is time consuming and HPTE will be competing with other Divisions who are also requesting additional FTE. There is no guarantee that HPTE would be granted its initial request for an additional FTE. Additionally, given the specialized nature of the skills HPTE is seeking for tolling operations, it may take longer to attract and secure a qualified candidate given the salary constraints of state positions. Taking into consideration these factors as well as the timeline for C-470 opening, HPTE does not feel that this process can be completed in a feasible amount of time.

Outside of C470, HPTE is not considering internal FTEs at this time because it has not yet analyzed what other positions might be needed for the Division outside of tolling operations. Internally, HPTE has identified other needs in the areas of contracts/procurement, project development/procurement and non-tolling project management.

HPTE will revisit the model of how to best utilize current FTEs for the entire Division, including other Express Lanes corridors that are not due to Go Live until 2021 or 2022. This model option will be fully analyzed and presented as part of the comprehensive staffing plan recommendation for all Express Lanes currently in construction that will be presented to the board in Summer 2019.

b) New Staffing Model Option 2 - Use of Contractors

The second option available to resolve the **imminent** staffing needs for the C-470 Express Lanes Tolling Operations Team within the timeframe before Go Live is through the use of contractor staffing.

Currently, HPTE has a variety of contractors under contract to provide services on an on-call basis. HPTE is able to use said contracting mechanism to staff with contractors for express lanes operations in a timely manner. HPTE will issue a task order under its existing contracts. The contractor will then be responsible for recruiting, hiring, and training contracted staff as needed. Upon the expiration date of the task order, HPTE will have the option to issue another task order to continue the services provided by the contractor or not issue another task order and terminate the services provided by the contractor.

HPTE recognizes that the use of contractors to staff the C-470 tolling operations team will cost more than using HPTE FTEs, however, HPTE feels that the ability to staff the different positions with specialized contract workers within the C-470 Go Live time frame more than offsets the additional expense. Table 9 presents key pros and cons of New Model Option 1 and New Model Option 2 for the C-470 staffing needs.

Table 6: Pros and Cons Analysis of Staffing Options:

	Pros	Cons
Staffing with Contractors	<ul style="list-style-type: none"> ● Fulfill different specialized position types needed ● Training provided by contractor ● Fast ramp-up ● Easier position termination ● Includes use of needed equipment (bucket trucks) 	<ul style="list-style-type: none"> ● Higher overall costs ● Potentially politically sensitive ● Adds an additional layer of management between the contractor and HPTE tolling services manager
Staffing with Internal FTEs	<ul style="list-style-type: none"> ● Lower direct cost ● Could attract existing qualified CDOT staff as applicants ● Keeps overall professional services costs down ● Direct supervisory control 	<ul style="list-style-type: none"> ● Existing FTE restrictions ● Lack of control over the staffing & hiring process ● Lengthy hiring process (four to six months) ● Salary limitations to attracting needed skills

Based on the pros and cons as well as the analysis laid out above, the HPTE Staff recommendation is to implement *Staffing Model Option 2 - Use of Contractors*. HPTE also feels that using contractors to staff the C-470 Tolling Operations Team can serve as a pilot program to determine if it is a viable model to consider as part of the comprehensive staffing plan recommendation for all Express Lanes currently in construction, due to be presented to the HPTE Board this summer.

5. C-470 Staffing Plan Timeline

Table 6 shows the timeline for identifying the contract staff and training in preparation for the C-470 Go-Live.

Table 6: C-470 Staffing Timeline

EXPRESS LANES OPERATIONS ACTIVITY	# of Staff	ACTIVITY	Month 1	Month 2	Month 3	Month 4	Month 5
Daily Operations Staff	2	Hiring Process					
		Training					
		C-470 Go Live					
Toll Equipment Monitoring and Maintenance Staff	2	Hiring Process					
		Training					
		C-470 Go Live					
Oversight and Reporting of Express Lane Data	1	Hiring Process					
		Training					
		C-470 Go Live					

6. C470 Staffing Cost Analysis

As shown in Tables 7 and 8, the total cost of operating and maintaining C-470 Express Lanes by contractors is estimated at \$1,083,000 a year and \$493,395 by HPTE FTEs. It should be noted that maintenance contractor cost includes bucket trucks but the HPTE cost does not include bucket trucks. The staffing cost reflects the higher workforce skill level needed to operate and maintain the C-470 express lanes.

Table 7: C-470 Estimated Staffing Budget by Contractors

Express Lanes Operations Activity	# of positions needed	Loaded Cost per Contractor	Total
Daily Operations	2	\$160,000	\$320,000
Toll Equipment Monitoring and Maintenance	2	\$260,000	\$520,000
Oversight and Data Reporting	1	\$243,000	\$243,000
TOTAL	5	\$663,000	\$1,083,000

Table 8: C-470 Estimated Staffing Budget by Internal Staff

Express Lanes Operations Activity	Equivalent CDOT Position	# of positions needed	Average Annual Salary	Average Total Compensation	Total
Daily Operations	Administrator V	2	\$88,440	\$110,550	\$221,100
Toll Equipment Monitoring and Maintenance	Electronics Specialist III	2	\$66,936	\$83,670	\$167,340
Oversight and Data Reporting	Professional Engineer I	1	\$83,964	\$104,955	\$104,955
TOTAL		5	\$239,340	\$299,175	\$493,395
All salaries are based on current Jan 2019 State of Colorado Pay Plan					
Average of 25% of total salary is used to calculate total compensation					



HPTE: FUTURE OF TOLLING OPERATIONS

C-470 Express Lanes Staffing
April, 2019



Outline

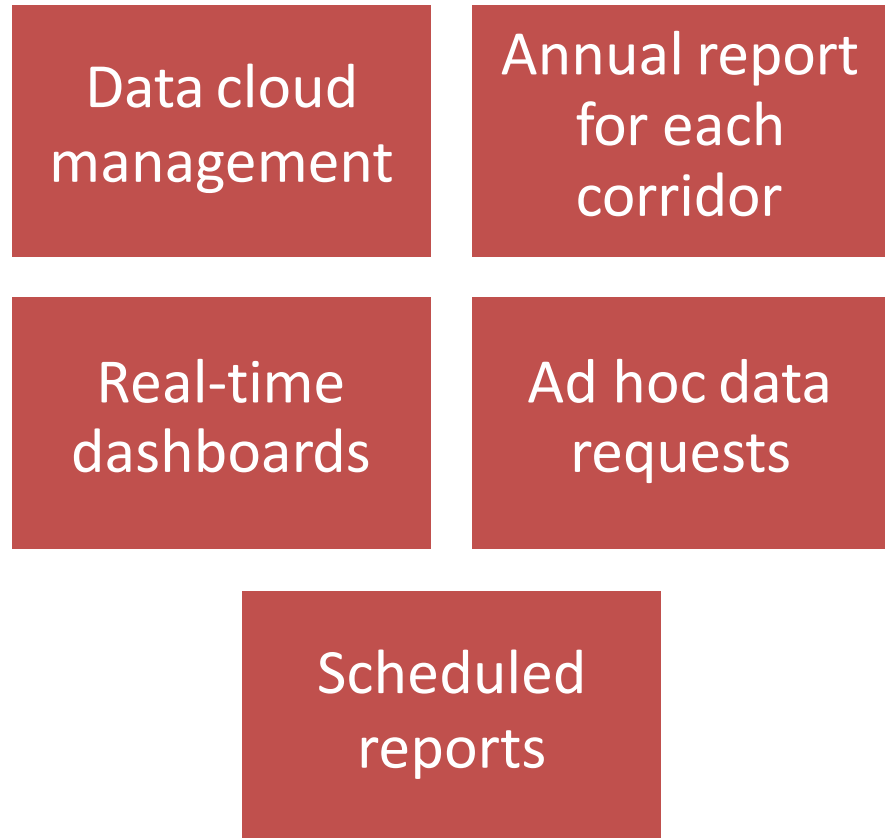
- C-470 Operations Needs
 - 1- Active Management of Express Lanes
 - 2- Data and Reporting
 - 3- Equipment Monitoring & Maintenance
- Staffing Needs
- Staffing Schedule for C-470 Express Lanes
- Staffing cost for C-470 Express Lanes
- Pros and Cons: Contractors vs. FTEs
- Questions?

1- Active Toll Management: Real-Time Management

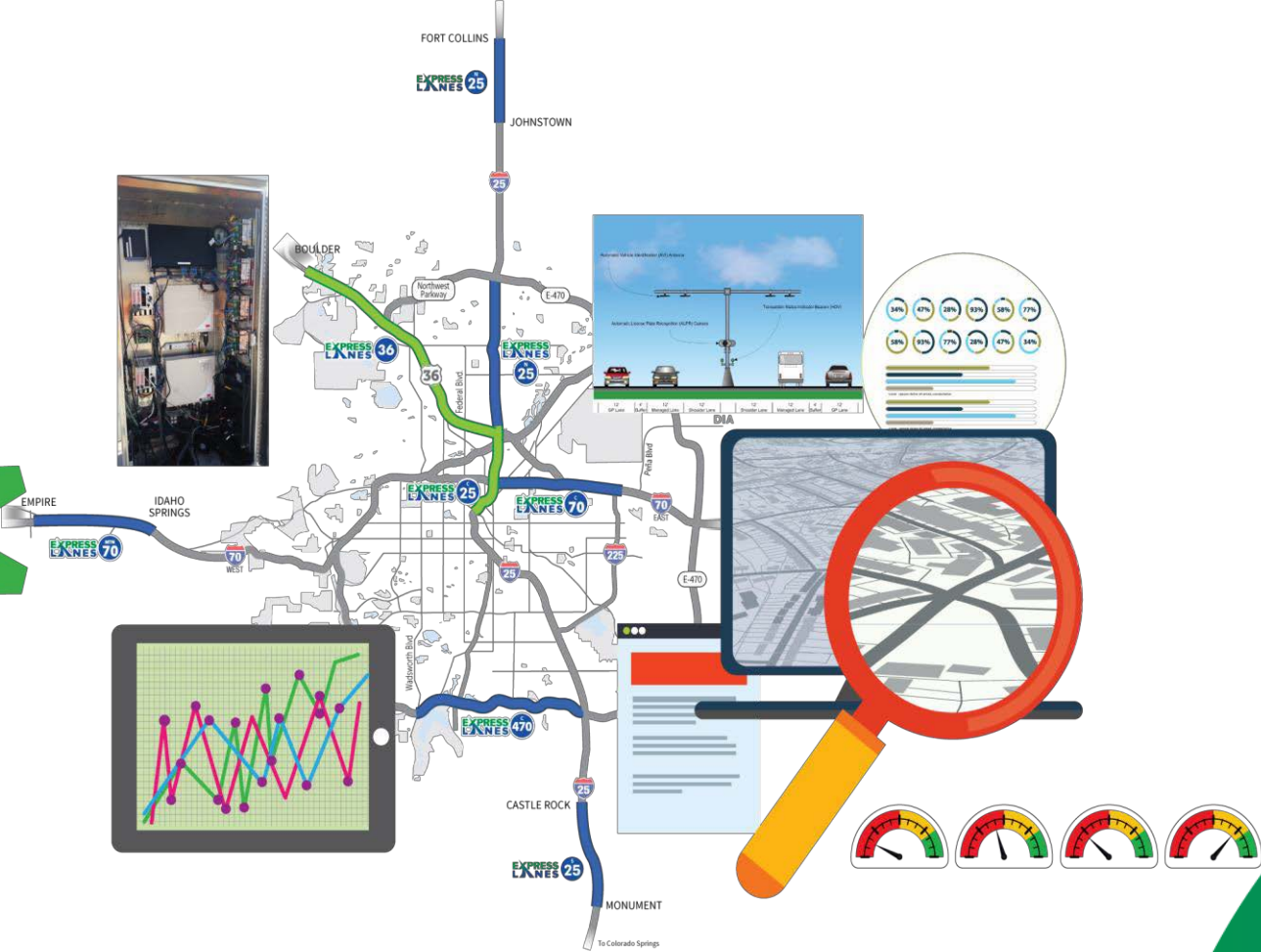
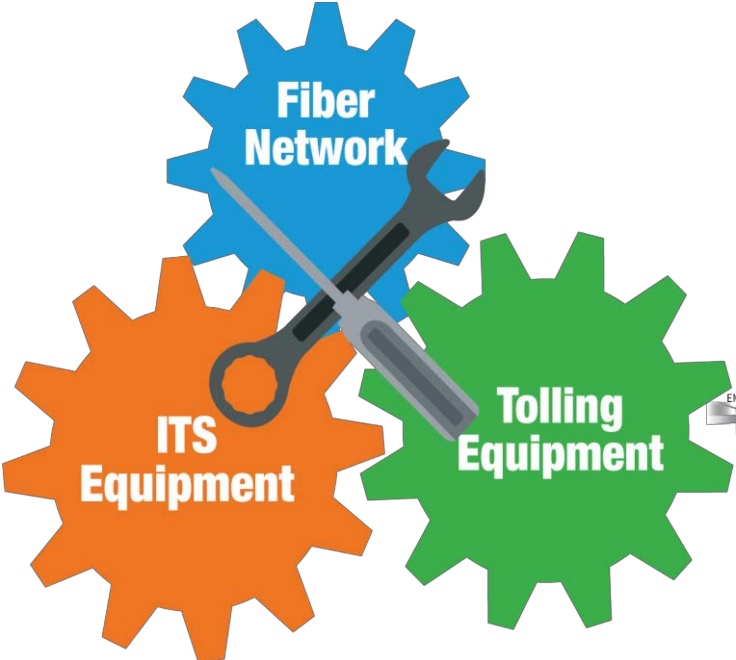
- Dynamic Tolling Management
- Incident Management / Toll Voiding
- Toll Equipment & Transaction Auditing
- Real-Time Traffic Condition Monitoring
- Toll Rate Setting & Adjustment
- Enforcement Management
- Toll Asset Management
- Tolling & ITS Equipment Monitoring



2 - Data and Reporting



3 - Equipment Monitoring & Maintenance



Staffing Needs Express Lanes

<i>Staffing Role</i>	<i>Staff count</i>
Daily Operations of Express Lanes	2 to 6
Oversight and Reporting of Express Lane Data	1
Express Lanes Equipment Monitoring and Maintenance	1 to 3
<i>Total staff count per express lane corridor</i>	<i>4 to 10</i>

Staffing Needs for C-470

Active Management of Express Lanes



Shift	Sun (hrs)	Mon (hrs)	Tues (hrs)	Wed (hrs)	Thurs (hrs)	Fri (hrs)	Sat (hrs)	Number of Staff Persons	Total Hours Per Week
Daytime	4	6	6	6	8	6	4	2	80
Swing	4	6	6	6	8	6	4		
Overnight	0	0	0	0	0	0	0		

Equipment Monitoring & Maintenance



Shift	Sun (hrs)	Mon (hrs)	Tues (hrs)	Wed (hrs)	Thurs (hrs)	Fri (hrs)	Sat (hrs)	Number of Staff Persons	Total Hours Per Week
Daytime	4	6	6	6	8	6	4	2	80
Swing	4	6	6	6	8	6	4		
Overnight	0	0	0	0	0	0	0		

Data and Reporting



Shift	Sun (hrs)	Mon (hrs)	Tues (hrs)	Wed (hrs)	Thurs (hrs)	Fri (hrs)	Sat (hrs)	Number of Staff Persons	Total Hours Per Week
Daytime	0	8	8	8	8	8	0	1	40
Swing	0	0	0	0	0	0	0		
Overnight	0	0	0	0	0	0	0		

Pros and Cons Contractors Vs. FTEs

	Pros	Cons
Staffing with Contractors	<ul style="list-style-type: none">• Fulfill different specialized position types needed• Training provided by contractor• Fast ramp-up• Easier position termination• Includes use of needed equipment (bucket trucks)	<ul style="list-style-type: none">• Higher overall costs• Potentially politically sensitive• Adds an additional layer of management between the contractor and HPTE tolling services manager
Staffing with Internal FTEs	<ul style="list-style-type: none">• Lower direct cost• Could attract existing qualified CDOT staff as applicants• Keeps overall professional services costs down• Direct supervisory control	<ul style="list-style-type: none">• Existing FTE restrictions• Lack of control over the staffing & hiring process• Lengthy hiring process (four to six months)• Salary limitations to attracting needed skills

Staffing Schedule for C-470

EXPRESS LANES OPERATIONS ACTIVITY	# of Staff	ACTIVITY	Month 1	Month 2	Month 3	Month 4	Month 5
Daily Operations Staff	2	Hiring Process					
		Training					
		C-470 Go Live					
Toll Equipment Monitoring and Maintenance Staff	2	Hiring Process					
		Training					
		C-470 Go Live					
Oversight and Reporting of Express Lane Data	1	Hiring Process					
		Training					
		C-470 Go Live					

Staffing Cost for C-470

Contractors



Express Lanes Operations Activity	# of positions needed	Loaded Cost per Contractor	Total
Daily Operations	2	\$160,000	\$320,000
Toll Equipment Monitoring and Maintenance	2	\$260,000	\$520,000
Oversight and Data Reporting	1	\$243,000	\$243,000
TOTAL	5	\$663,000	\$1,083,000

FTEs



Express Lanes Operations Activity	Equivalent CDOT Position	# of positions needed	Average Annual Salary	Average Total Compensation	Total
Daily Operations	Administrator V	2	\$88,440	\$110,550	\$221,100
Toll Equipment Monitoring and Maintenance	Electronics Specialist III	2	\$66,936	\$83,670	\$167,340
Oversight and Data Reporting	Professional Engineer I	1	\$83,964	\$104,955	\$104,955
TOTAL		5	\$239,340	\$299,175	\$493,395
All salaries are based on current Jan 2019 State of Colorado Pay Plan					
Average of 25% of total salary is used to calculate total compensation					

Questions about C-470 Express Lanes Tolling Operations Staffing Needs?