

DATE: February 5, 2015
TO: HPTE Board of Directors
FROM: Office of Major Project Development
SUBJECT: **HOV Program Dual Position Switchable Transponders**

Beginning in June 2015 the US 36 Express Lanes will be the first in the metro-area to use all electronic tolling for an HOV vehicle. Under all electronic tolling an HOV vehicle will require a Dual Position Switchable Transponder to participate in the US DOT HOV Program. Dual Position Switchable Transponders are substantially more expensive than the single occupancy sticker transponder (\$11.75 vs. less than \$1.00).

Questions for Discussion:

- Determine funding source of \$375,000 to purchase and pay distribution costs for the initial 25,000 units.
- A discussion and direction on whether to charge a fee to the HOV user for the 25,000 units. If a fee is charged the revenues could go back into an account that could repay the source of the funds.
- Should the transponder expense be a HPTE Tolling Expense or a CDOT expense as a cost of participation in the US DOT HOV Program?

Background:

Several of the metro-corridors (I-25 Segment 1, I-25 Segment 2, US 36 Phase 1 and US 36 Phase II) will participate in the CDOT / US DOT HOV Program.

To utilize the HOV program on an all-electronic tolling corridor, the HOV user is required to use a special dual position transponder. The driver self-declares and if there are sufficient passengers to comply with the HOV requirements the transponder is switched to HOV and the driver is not charged a toll. If the driver does not qualify for HOV status the driver self-declares by switching the transponder to Toll and the vehicle account is charged the appropriate toll. Without the dual position transponder the vehicle will be charged a toll regardless of how many passengers are in the vehicle.

The 6C dual position switchable transponders have been newly developed and are just entering the market in response to the US DOT's mandate for national interoperability. The unit (see attachment) received its ISO 18000 6C Compliance Certificate in June 2014 and the company began accepting orders in August 2014.

The cost per unit for these dual position switchable transponders is \$11.75 per unit, plus administrative and mailing expenses which brings the anticipated overall cost to \$15.00 per unit.

Washington DOT, Virginia DOT and CDOT have all placed initial orders as a result there is a sixteen week lead time for delivery.

In late November, CDOT placed an initial order of 10,000 units and OMPD / HPTE staff debated on whether to charge a fee for these units. In this case the discussion of a fee amount to be charged not only focused on recovering the cost of the units but also how to lessen the demand that a no-charge (give the \$11.75 units away) or a low charge fee for customers that may choose the switchable transponders, just in case they may have the opportunity to utilize the HOV program over the course of a year. The existing sticker type transponders are distributed without charge but the cost of the sticker transponder is less than \$1.00.

We have asked our Tolling Services Consultant to assist us in determining how many units to order. The Consultant has recommended an immediate order be placed for an additional 15,000 units (25,000 total) and a fee of \$15-\$25 be assessed the HOV user. Considering the peak period toll for a single occupant vehicle exceeds \$5 per trip the ROI for a daily HOV user paying this fee is less than one week. This analysis anticipates 25,000 as an initial demand with an expectation that over the course of the first twelve months the total units ordered will likely approach 100,000 units.

As CDOT is a participant in the US DOT HOV Program and when used as intended the HOV transponder ensures that HPTE receives no revenue, one of the questions under consideration is, "Should the expense of the special HOV transponder be considered a CDOT expense?"

Under a no-charge business plan the Tolling Services Consultant could not quantify how many transponders to purchase only to give them away. Given that E-470 has more than one million transponder accounts that use the existing toll facilities at least once per year and a free give-away program encourages potential HOV users to get the free transponder just in case they might qualify to use the HOV program someday, the number of units to order could not be quantified.

Project:	Transponder Ordering Plan	To:	CDOT
Subject:	Tolling Strategies	From:	ATKINS NA, Inc.
Date:	02 February 2015	cc:	Joe Mahoney, Rami Harb

1. Document Purpose

CDOT / HPTE are ordering dual position switchable transponders for use in Express Lanes designated for HOV. CDOT / HPTE have tasked Atkins with analysing the potential demand for the new switchable transponders by users of the HOV program, estimate an initial order volume and determine a pricing range to the HOV user, to recover associated switchable transponder costs. This document provides a descriptive background on the introduction of the new switchable transponders to Colorado as well as recommendations on transponder pricing and transponder quantities needed.

2. Background

Several managed lanes will be operational within the next 12-16 months in the Denver metro-area. Currently, Colorado uses the sticker “single position” AVI transponder for E470 toll roads, Northwest Parkway toll roads, as well as the existing reversible lanes of I-25. The current sticker transponder does not allow for HOV self declaration. The figure below shows the existing toll transponder, on the left, and the “future” switchable transponder on the right side. The switchable transponder device works by switching between two separate passive internal transponders; one designated as the HOV the other as the standard SOV EXPress Toll transponder.



E470 already has more than a 1 million accounts with an additional 3,000 new accounts created every month. E470's practice is to provide customers the single-position sticker transponders for free. The single-position Sticker type transponders have a tested history of providing highly accurate transaction reads.

It is important to consider that these express managed lanes will lead to creating new customers who currently don't have transponders, and those existing express toll customers that want to change their transponders to the switchable HOV type. In the overall metro tolling system the majority of the customers are typically SOV type customers which will not commonly be in HOV mode, and should there be a price differential between the two types of transponders many customers may choose a standard Express toll sticker. Without a price differential between the 2 transponder types, it is likely that the switchable transponder will be the transponder of choice for all new customers.

Switchable transponders will be provided by Neology. These are newly developed units that were only certified in August 2014. These switchable transponders, contain two unique 6C transponder chips, depending on the switch setting either the HOV or the TOLL (SOV) chip is activated for operations. The accuracy of the switchable transponders is advertised to be high, but is untested in actual use. E-470 has indicated they will be testing the switchable transponder in early 2015.

3. Transponder Pricing

3.1 Transponder Pricing, and Costs

The cost of the switchable transponder is estimated to be \$11.75 per unit plus an additional administrative fee to amount to \$15 per unit, depending on order volumes. It is understood that Neology requires 16 weeks for delivery of transponders, but the volume per order must be determined prior to developing estimated inventories.

Switchable Transponder	Standard AVI Transponder
\$11.75 - \$15/ unit based on order quantity	~\$1.00
Volume per orders vs. delivery schedule : 16 weeks delivery of 25,000 or less	UNKNOWN
0 transponders in current population	More than 1,000,000 active transponders in circulation

Transponder pricing to the consumer is important in managing CDOT costs as well as demand. Because of the significant higher cost of the switchable transponder, ideally CDOT should only want customers who will be using the switchable transponders to acquire them. If this higher pricing is possible from a public policy and an account management viewpoint with E470 back office system, it is suggested that the differential cost of the switchable transponder be passed on to the HOV user. However, reviewing how other states have handled the same issue no one practice or policy emerges. The following section describes VDOT's experience in transponder pricing.

3.2 Virginia DOT switchable transponder experience

VDOT began issuing switchable transponders in 2012 for use on the I-495 corridor. Their initial policy charged customers a monthly fee for the switchable E-ZPASS transponder. A change in political leadership brought about a change to this practice. Now if a customer has not used the HOV mode of the switchable transponder in the prior 6 months then, the customer is subject to \$10 fee, or can change back to standard transponder. A summary of Virginia's policies:

Customer price: same for both Flex (switchable) and standard E-ZPASS, the transponder is free but a prepaid deposit is required.

Fees: initially the Flex transponder carried a \$1.00 monthly fee as compared to the standard transponder \$0.50 fee monthly fee. The fees were eliminated by the new Governor of Virginia. A new policy was developed as a result of the removal of the monthly fee. Beginning July 1, 2015, users who have not used their Flex transponder for HOV transactions on Express Lanes for any prior

six month period will be required to exchange their Flex transponder for a standard transponder (at no cost) or be subject to a one-time transponder functionality upgrade fee of \$10. This only applies to transponders issued after October 1st 2014 which previously carried the monthly fee.

Method of distribution: same as existing E-ZPass transponders. Flex Transponder is offered as the same no cost to customers as the standard E-ZPass transponders. Transponders are also available in select retail stores in E-ZPass On-the-Go Kits for \$35. Both Flex and Standard E-ZPass transponders are available in Northern Virginia retail stores. The \$35 payment for an On-the-Go transponder includes \$15 of prepaid toll balance for immediate use plus an additional \$20 prepaid toll balance after the transponder is registered to an account.

	Switchable Transponder	Users Upfront Cost / Monthly Fees
MNDOT	YES (MnPass)	Upfront cost: None (Need to deposit \$40 to open an account. Balance goes towards tolls. Monthly Fees: \$1.50 Regardless of use
VDOT	YES (FLEX PASS)	Current: Upfront cost: None (Need to deposit \$35 to open an account. Balance goes towards tolls. Monthly Fees: \$1.00 Regardless of use (regular tags are at \$0.50 month) As of July 2015: Upfront cost: None (Need to deposit \$35 to open an account. Balance goes towards tolls. Monthly Fees: None. If switchable transponder not used in HOV mode in a prior six month period the user must pay a \$10 upgrade fee.
UDOT	YES (Express PASS)	Upfront cost: Users will be charged \$33.75: \$8.75 for the Express Pass and \$25.00 in prepaid toll funds Monthly Fees: None.
WSDOT	YES (Good To Go!)	Upfront cost: \$12 for switchable transponder compared to \$5 for sticker transponder Monthly Fees: None

3.3 Suggestion for CDOT Transponder Pricing:

It is suggested that CDOT either charge a fee of \$15-\$25 plus a prepaid balance for the switchable transponder; or consider adding a monthly fee for switchable transponder users of \$0.50 to \$1.00 to recover the additional cost of the transponders and ensure it is being distributed to probable users of the lanes. It is suggested to price the new switchable transponder based on the actual increased cost of the switchable transponder as compared to the standard sticker transponder.

If it is necessary to offer the transponders for no additional cost due to public policy or the desire to highly promote the use the HOV feature, then it is suggested to ensure the transponders are used by HOVs. In this case we suggest a usage criteria is created whereas a customer must use the HOV setting one or more time over a 6 month rolling time frame to avoid a cost, otherwise they will be notified that they may either replace the switchable transponder to a standard Express toll transponder for no cost, or will be charged a one time

cost functionality upgrade fee of \$15-25 (this is consistent with the VDOT Policy).

Selling the transponders requires additional accounting, sales tax issues, and coordination with E470 to ensure the system can accommodate the pricing model. Selling the transponders can potentially supply CDOT with a revenue stream to continue to purchase transponders.

4. Transponder Quantities

4.1 Proposed Transponder Volume

The central question is “How many of the switchable transponders should CDOT order and what are the logistics of ordering from the user point of view”? Currently there are roughly 225,000 transponders that have used the existing I-25 managed lanes over the past twelve months, and more than one million ExpressToll accounts that have been active in the overall metro tolling system over the past twelve months. E470 typically opens 3,000 new accounts each month. It has been indicated that CDOT has plans to order 10,000 transponders to 100,000 for the new managed lanes facilities. Depending on the price point and marketing campaign of the transponders, these volumes may be insufficient. Failure to have sufficient inventory to meet customer demand can lead to serious public relations issues and questions towards the agencies preparation. Below are the pros and cons of ordering a large amount of transponders from CDOT’s perspective.

Pros of a large transponder order	Cons of a large transponder order
Better from the PR standpoint. CDOT PR does not want CDOT to run out of switchable transponders which would possibly create PR challenges.	More room for cheaters: CDOT does not want every user to have a switchable transponder to minimize potential cheating related to incorrect self-declaration
Less risk in developing incremental transponder ordering plan and corresponding concerns in manufacturing delays.	CDOT feels that the reliability of the switchable transponders is unknown. Therefore a small difference in the accuracy of the switchable transponders compared to the existing sticker will generate big losses in revenue.
	Capital Cost: CDOT is paying significantly more for new switchable transponders. This will amount to a large upfront capital cost.

4.2 The VA I-495 experience

One approach to determine the volume of transponders to order is to compare the CDOT managed lanes to other operators which use switchable transponders. The most relevant comparison would be VDOT issuance of the switchable FLEX E-ZPASS transponders in the metro D.C. area. This is an appropriate comparison because of the existing population of Existing E-ZPASS customers in the area.

- VDOT lane opening: November 2012, flex transponder users are HOV 3+.
- Transponder type: Kapsch switchable E-ZPASS transponders. Unlike the EXPress Toll transponders, these are active transponders which contain a switchable bit setting to designate HOV.

- Volume ordered: 200,000 (100,000 standard and 100,000 switchable).
- Volume in use: 120,000, target was 100K, after about 6 months of operations.
- Cost per Flex unit : \$20.00

I- 495 opened in Nov 2012, I-95 express a few months ago, both have very different traffic patterns. 120,000 tags were issued (900,000 total) market; 50,000 on I-495, 70,000 in last 6-9 months for I-95. Flex tag penetration is estimated at 6-8 % on I-495; 30-35% on I-95 (I-95 HOV conversion). VDOT issued 5,000 transponders per month before I-95 opened and 6,000-9,000 since opening I-95. Overall 30% Flex on I- 495, 80% Flex on I-95, because of fee and existing high HOV use on 95.

4.3 Suggested Transponder Quantities

CDOT will need sufficient quantities of transponders to initiate the distribution prior to the opening of the new manage lanes. Often times the transponder promotions will start with advertising campaign at least 2 months prior to opening with increased promotion advertisement in the weeks leading up to the opening. Another method to demonstrate the value of the lanes is to offer free use the first few weeks to a month in advance of the beginning of tolling. This could be limited to anyone that has a transponder, to promote transponder adoption in advance. The advertisement campaign should be tightly coordinated with the transponder distribution efforts and be known prior to ordering transponders.

To properly estimate the quantities of transponders an extensive effort of understanding the predicted trips, travel patterns and customer data base should be done in advance. This effort should be based on expected traffic and HOV utilization of the lanes. Other factors that affect the transponder demand include:

- Price of transponder to the driver (lower the price the greater the demand for switchable transponders)
- Toll Rate and value of HOV (greater the savings for HOV the greater the demand for switchable transponders))
- HOV eligibility (HOV 2+ will result in a greater demand for switchable transponders than HOV 3+ eligibility)
- Availability of a network of managed lanes (will result in a greater demand for switchable transponders)
- Amount and quality of a marketing program
- Ease of acquiring the transponder

Additionally, utilization of the current Express and HOV lanes volumes on I-25 should be used and evaluate to apply to the new corridors. Review of other locations that use switchable transponders such as VDOT, LA Metro, WSDOT, and UDOT should be performed. VDOT is probably the most likely comparison as they already had a large transponder population in the metro D.C area, similar to the Denver metro area Express toll usage.

A preliminary estimate of the number of transponders, based on the assumption that they will be priced in the range of \$10-25/device, is provided below.

Time from opening	Rough estimate of switchable transponder quantities
2 months in advance	10,000

0 - 2 months after opening	25,000
2 - 6 months after opening	40,000
6 - 12 months after opening	25,000
TOTAL FOR 12 MONTHS	100,000
Each month after 1 year	2,000