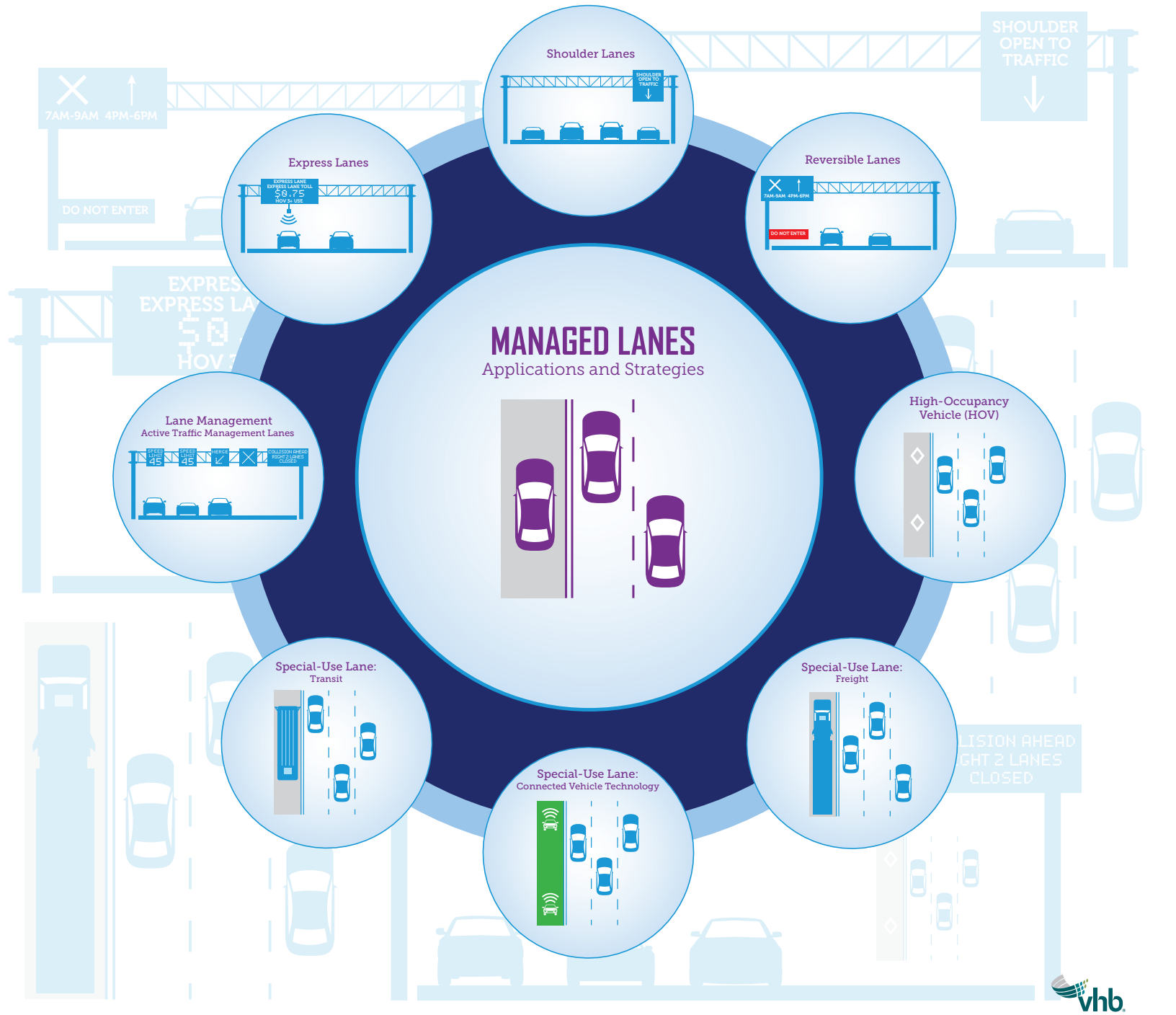
MANAGED LANES
GUIDELINES

February 2019



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CDOT COLORADO Department of Transportation

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Executive Summary

The Colorado Department of Transportation (CDOT) has established statewide guidelines for the evaluation of Managed Lanes. These Guidelines support Policy Directive 1603.0 (PD) to ensure that managed lanes are strongly considered during the planning and development of capacity improvements on state highway facilities.

Several factors contribute to the emergence of managed lane projects as a tactic for consideration in congested urban areas. With limited financial resources to build new infrastructure, right-of-way (ROW) needs associated with corridor expansion, and the recognition that we cannot build our way out of congestion, managed lanes provide a solution for enhancing mobility, mode choice, and public-private partnerships to accommodate Colorado's population and vehicle traffic growth. For the purpose of this document, "mobility" is defined as the efficient operation of the multi-modal transportation system infrastructure by maximizing the throughput of vehicles or people traveling in a given corridor.

> *"Managed lanes" are defined as highway facilities or a set of lanes where operational strategies are proactively implemented and managed in response to changing conditions.*

CDOT's Managed Lanes Guidelines are a tool designed to support project managers and other practitioners in addressing PD 1603.0 as well as determining the viability of managed lanes for new projects. The Guidelines are a collaborative effort between CDOT's Transportation Systems Management and Operations (TSM&O), the Division of Transportation Development (DTD), the Division of Transit and Rail (DTR), the Office of Policy and Government Relations, the High-Performance Transportation Enterprise (HPTE), and CDOT Region 1 and 2 staff representatives. The Guidelines were developed based on previous implementations within the state, national best practices, and oversight of a CDOT Leadership Team.

Within the Guidelines, an evaluation tool is provided to determine the appropriate level of analyses, as well as a toolbox of managed lane strategies, and performance measure targets to aid the decision-making process for each corridor under review. Using these Guidelines, managed lane alternatives will be evaluated consistently across the state, and justified when the strategy is shown to provide mobility, reliability, or safety improvements. When it is determined that managed lanes are not applicable for a corridor, these Guidelines also provide the appropriate procedures to document the consideration process.

List of Acronyms

AADT	Annual Average Daily Traffic
AV	Autonomous Vehicle
CatEx	Categorical Exclusion
CDOT	Colorado Department of Transportation
ConOps	Concept of Operations
CV	Connected Vehicle
DTD	Division of Transportation Development
DTR	Division of Transit and Rail
EA	Environmental Assessment
EIS	Environmental Impact Statement
ELMP	Express Lane Master Plan
FHWA	Federal Highway Administration
GP	General Purpose Lane
ITS	Intelligent Transportation Systems
HOV	High Occupancy Vehicle
HPTE	High-Performance Transportation Enterprise
LCS	Lane Control Signal
LOS	Level of Service
LOSS	Level of Service of Safety
LSL	Localized Shoulder Lanes
ML	Managed Lane
NEPA	National Environmental Policy Act
O&M	Operations and Maintenance
PD	Policy Directive
PEL	Planning and Environmental Linkage
P3	Private Public Partnership
PMT	Per Mile of Travel
PPHPL	Per Person Hour Per Lane
PPSL	Peak Period Shoulder Lanes
RACI	Responsible, Accountable, Consulted, and Informed
ROW	Right-of-way
RTD	Regional Transportation Director
RTP	Regional Transportation Plans
SMART	Specific, Measurable, Agreed, Realistic, Timebound
STIP	Statewide Transportation Improvement Program
TIP	Transportation Improvement Program
TSM&O	Transportation Systems Management & Operations
TRB	Transportation Research Board
V2V	Vehicle-to-Vehicle

Section 1: Introduction

The Colorado Transportation Commission approved the Managed Lanes Policy Directive 1603.0 on December 28, 2012. The purpose of the policy directive is "to ensure that the use of managed lanes is strongly considered during the planning and development of capacity improvements on state highway facilities within Colorado." The "Implementation Plan" in the policy directive requires the Colorado Department of Transportation (CDOT) to develop guidance to support the Policy Directive (PD 1603.0). The *Colorado Department of Transportation Managed Lanes Guidelines* (Guidelines) provide a framework for determining when managed lanes should be considered during corridor project planning for capacity improvements. The Guidelines define capacity improvements per PD 1603.0, the purpose of managed lanes, identify when managed lanes should be considered and when PD 1603.0 is not applicable. When managed lanes are considered, this guidance identifies strategies to evaluate managed lanes, and recognize the overall technical requirements for managed lanes (evaluation criteria, performance metrics and compliance factors). Although Policy Directive 1603.0 has been in effect since 2012, these Guidelines provide guidance to implement or support the policy directive.

The Federal Highway Administration (FHWA) Office of Operations defines managed lanes as "Highway facilities or a set of lanes where operational strategies are proactively implemented and managed in response to changing conditions."

The resources for this document are composed of CDOT Policy Directive 1603.0, previous implementations within the state, research of national best practices, oversight from a CDOT Leadership Team and professional planning, policy, and engineering expertise from a CDOT Technical Working Group.

The Guidelines were prepared by the Division of Transportation Systems Management & Operations (TSM&O) in collaboration with the Division of Transportation Development (DTD), the Division of Transit and Rail (DTR), the Office of Policy and Government Relations, the High-Performance Transportation Enterprise (HPTE), CDOT Region 1 and CDOT Region 2 staff representatives.

HPTE is responsible for financing any Express Lane project. Additional information regarding HPTE's authority and existing facilities can be found in Appendix A.

a. Background

The managed lane concept contains the following common elements:

- Creates a "roadway-within-a-roadway" highway where a set of lanes within the roadway highway cross section is managed differently than the general purpose lanes.
- Incorporates a high degree of operational flexibility so that, over time, operations can be actively managed to respond to growth and changing needs.

For example, posted speed limits could change dependent upon weather conditions and/or traffic volumes.

- Operation of and demand on the facility are managed using a combination of tools and techniques to continuously achieve an optimal condition, such as free-flow speeds, number of vehicles per hour, or person-throughput per hour.
- Principal management strategies can be categorized into four groups and may include one or more of these in management strategies: pricing, vehicle eligibility, access control, and technology.
    - *Pricing* - Includes both Express Lanes that use time of day pricing and Express Lanes that use congestion pricing, where the price varies during certain time periods to manage demand (e.g., peak-period surcharge or off-peak discount).
    - *Vehicle eligibility* - The lanes are managed by allowing certain vehicles or restricting others. For example, minimum vehicle occupancy is an example of an existing eligibility restriction. Providing restrictions for commercial motor vehicle use is another method of managing lanes. A potential future eligibility may apply to vehicles with specific connected or autonomous capabilities. For example, vehicles with Vehicle-to-Vehicle (V2V) communication and platooning capabilities may become an eligible vehicle type in certain project corridors.
    - *Access control* - The traffic flow in these lanes is maintained by limiting access. An example would be transit only lanes where all vehicles are allowed, but access is limited during peak hours to transit only, thus minimizing turbulence in the flow of vehicles.
    - *ITS (Intelligent Transportation Systems) and Technology* - The lanes are managed by in-vehicle or infrastructure technologies that allow for the optimized flow of traffic in the managed lane. For example, variable speed signs.

Several factors contribute to the emergence of managed lane projects as a tactic for consideration in congested urban areas. With limited financial resources to build new infrastructure, right-of-way (ROW) needs associated with corridor expansion, and the recognition that we cannot build our way out of congestion, managed lanes provide a solution for enhancing mobility, mode choice, and public-private partnerships to accommodate Colorado's population and vehicle traffic growth. CDOT continually seeks ways to maximize new investments and find flexible, cost-effective strategies for sustaining or enhancing the movement of people and goods. Managed lane strategies are proven methods to manage traffic flow and provide improved trip reliability.

This document provides a framework for: 1) identifying and documenting projects for when an evaluation of managed lanes is not applicable (per PD 1603.0), and 2) providing guidance for capacity projects where managed lanes are evaluated. For projects considering managed lanes, these Guidelines provide an overview of the evaluation components for assessing the viability of a potential managed lanes project. As in the case with most transportation infrastructure projects, no two projects are exactly the same and therefore the evaluation criteria should be specifically customized to the project, not

all of which will be suitable for a managed lane strategy. Implementation of managed lanes will have a project-specific operational impact dependent upon traffic, growth projections and mode split between passenger vehicles, and commercial motor vehicles and transit, in the corridor. The Guidelines recommend that each corridor develop thresholds and operational standards that allow for effective operations of the corridor, including the managed lane. Congestion pricing and operational strategies will be adjusted to maintain the minimum threshold for traffic flow, traffic level of service and mode split, pending the corridor objectives.

Section 2: Policy for Managed Lanes

The policies within the state, most applicable to these Guidelines are provided below. For the purpose of this document, "mobility" is defined as the efficient operation of the multi-modal transportation system infrastructure by maximizing the throughput of vehicles or people traveling in a given corridor. In addition, a "capacity improvement" is defined within this section to support of the existing managed lanes policy directive.

a. Colorado Authority

As stated in the Introduction, the Colorado Transportation Commission adopted the Managed Lanes Policy Directive on December 28, 2012, which requires that the use of managed lanes be strongly considered during the planning and development of capacity improvements (See Appendix B). The Colorado Authority and Applicability is provided below:

> Policy Directive 1603.0 adopted by the Transportation Commission
> PD 1603, Section V. POLICY, states the following:
>
> *The use of managed lanes shall be strongly considered during planning and development of capacity improvements on state highway facilities in Colorado. When applicable, the decision to not implement Managed Lanes shall be formally documented subject to Department guidance.*

b. Colorado Applicability

> PD 1603.0, Section III. APPLICABILITY, states the following:
> *This Policy Directive applies to all divisions, regions, offices and branches of CDOT and other entities intending to build capacity improvements on the state highway system.*

It should be noted that the Policy Directive does not apply to non-CDOT roads (e.g., E-470), or locally and privately-owned roadways.

c. Capacity Improvement Criteria

"Capacity improvements" are defined as any changes in the roadway element features which increase the maximum throughput for at least 1-mile, such as:

- Constructing a new or additional travel lane,
- Widening or restriping lanes and/or shoulders, which would allow the operation of an additional travel lane within the cross section, or
- Addition of transit facilities / operations (or other rapid speed travel).

Common examples of capacity vs non-capacity projects types are provided below:

Capacity

- New construction
- Roadway widening for greater than 1-mile
- Increasing / modifying roadway section which results in potential for additional travel lane within cross section
- Transit improvements

Non-Capacity*

- Restriping for less than a mile
- Resurfacing or pavement repair
- Signalization or operational improvements
- Bridge improvements
- Hazard mitigations
- Sidewalk and trail projects
- Safety projects
- Isolated interchange improvements

In non-capacity projects, the evaluation of managed lanes is optional if the Department recognizes a potential benefit by including a managed lane alternative. For example, an operational improvement at an interchange which connects two interstate corridors may benefit from a freeway-to-freeway Express Lane, similar to I-70 at I-25 in the Denver Metro Area.

Section 3: How to Plan for Managed Lanes

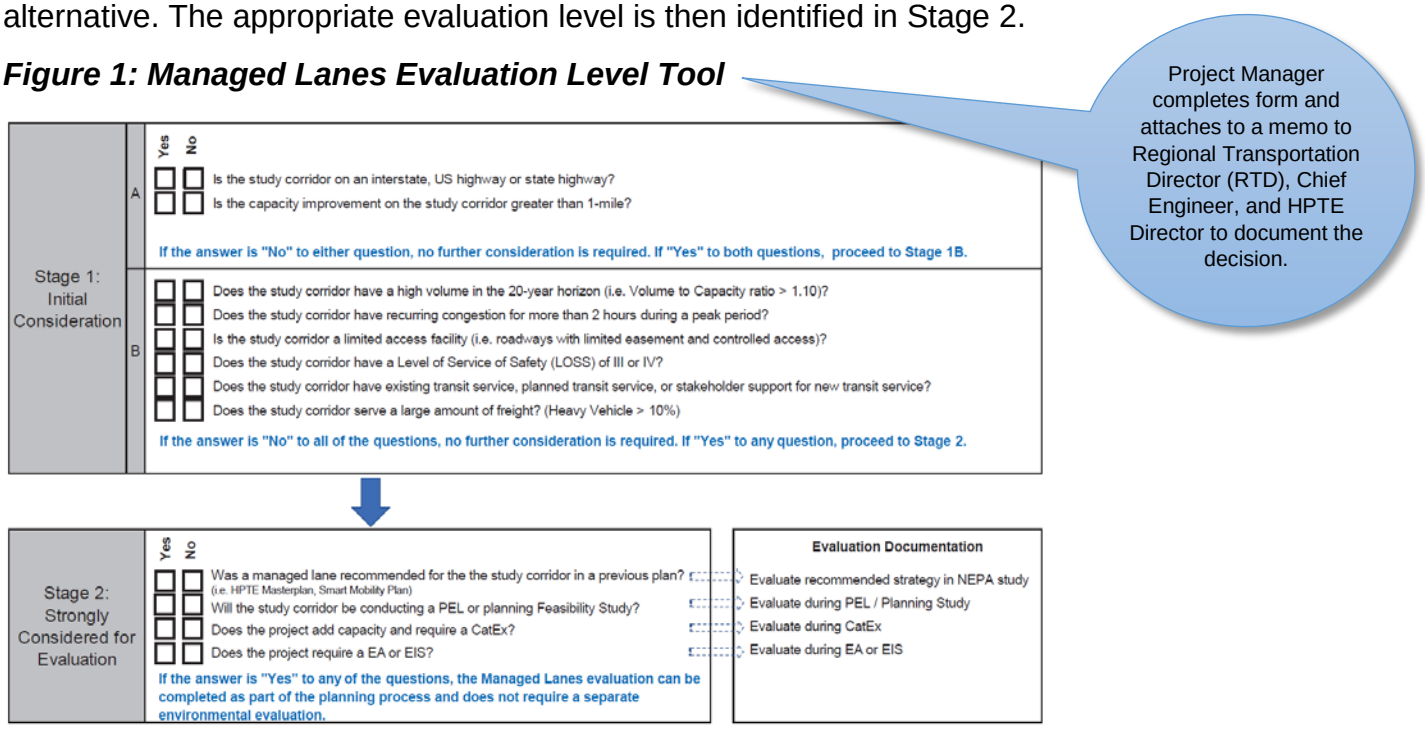
To help practitioners determine if managed lane strategies are appropriate for corridors with proposed capacity improvements, several steps should be taken. This Section outlines a tool to determine the appropriate evaluation level and a summary of the planning and project development process.

The Evaluation Tool is envisioned to be completed by a corridor Project Manager, with support from the Regional Environmental Planning Manager, the Resident Engineer and the Program Engineer. It should be completed during the pre-scoping step of project development, which should also include: (1) discussions in which the team strongly consider the use of managed lanes as a strategy for capacity projects, (2) discussions of whether corridor capacity improvements are part of the project, and (3) discussions regarding the type of planning document that will need to be completed for the corridor. The types of planning documents include, but are not limited to: a system operations plan, a Planning and Environmental Linkage (PEL) study, a corridor feasibility study, or an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) being prepared under the National Environmental Policy Act (NEPA).

a. Managed Lanes Evaluation Level Tool

The following Evaluation Tool should be utilized to determine the appropriate evaluation level for considering managed lanes in a study. As shown in Figure 1, the framework for the tool first screens corridors to determine the applicability of managed lane strategies through a series of profile and performance-related questions. If the study corridor satisfies the initial Stage 1 criteria, managed lanes should be strongly considered as an alternative. The appropriate evaluation level is then identified in Stage 2.

Figure 1: Managed Lanes Evaluation Level Tool



A project is never precluded from considering managed lanes as an option. However, when managed lanes have been evaluated in a previous study (e.g., PEL study), additional evaluation is not required within the subsequent study (e.g., EA or EIS).

If managed lanes are determined to be not applicable (based on the completion of this tool), the decision shall be formally documented within a memorandum to the Regional Transportation Director. Other entities that should be copied on the memorandum are the CDOT Chief Engineer, the HPTE Director, and the local MPO. This process will not impact a project's overall schedule as the project can continue to move forward, upon submission of the memorandum.

The Managed Lanes Evaluation Level Tool with project examples can be found in Appendix C and Appendix D.

b. Planning and Project Development

If managed lanes are recommended for evaluation, the planning process for a managed lane project will occur during the planning study: PEL, EA or EIS. The following steps are described throughout this document:

- Identification and collaboration for affected stakeholders and typical roles and responsibilities (See Section 4).
- Project goals and SMART objectives which are critical in choosing the most appropriate managed lane strategy to assess corridor characteristics (See Section 5).
- Identification of appropriate managed lane strategies based on project objectives and the ideal operating strategy for the facility (See Section 6).
- Evaluation strategies based on performance metrics and establishing planning and operating thresholds (See Section 7).
- Next steps of a managed lane project (See Section 8).

c. Evaluating Managed Lanes within an Operational Project

When a project does not fit the definition of a capacity improvement, operational managed lane strategies may be implemented, if warranted through a TSM&O Evaluation or if designated as a candidate for an Express Lane in the HPTE Express Lanes Master Plan. The intent of the Express Lane Master Plan (ELMP) is to serve as a comprehensive long-term strategy for the prioritization, planning, and development of express lane related projects based on considerations including mobility, system connectivity, financial planning, revenue generation, agency and stakeholder coordination, and public input. Ultimately, HPTE will identify and prioritize future corridors and connections that have potential to benefit from Express Lanes, estimate the potential revenue generating capacity of those corridors, identify which facilities could benefit from emerging transportation technologies, and outline operational policy options for those corridors.

Section 4: Roles and Responsibilities

Multi-disciplinary and agency collaboration is key to the success of a managed lane evaluation and implementation. As with most transportation processes, several parties are primarily responsible for different deliverables in each stage of a project. This section of the document provides an overview of the roles and responsibilities of various disciplines throughout the stages of a managed lanes project. The level of involvement of each discipline and agency fluctuates over time; in one stage a certain discipline / agency may be leading, and in another stage, it may only provide support. The level of involvement for CDOT may also vary, pending the specific managed lane type. For example, an Express Lane project would result in HPTE being responsible for financing, whereas with other managed lane strategies, CDOT would be responsible for all tasks.

A RACI Matrix (defined below) should be utilized to identify the stakeholder roles throughout the cycle of a managed lane project. The matrix categorizes agency roles in each step of the process in the following four levels.

- **Responsible**: Under this level of involvement, the discipline / agency will be responsible for moving the project forward under the appropriate phases as they own task completion. The *Responsible* discipline / agency are the experts and authority for their respective phase(s). They are also responsible for the inclusion of other disciplines during this phase, when appropriate.
- **Accountable**: For this level of involvement, the discipline / agency will play an active role in shaping the project during specific phases. While they are not responsible for the task, they play a key supporting role, as they approve or are ultimately accountable for the task.
- **Consulted**: The discipline / agency under this level of involvement should be periodically consulted during specific phases to ensure that the project will not impede or adversely affect any other efforts, processes, or projects. While the involvement of *Consulted* disciplines / agencies is not required to see the completion of a given phase, consulting with these disciplines will likely lead to improved results over the project lifecycle, potentially even identifying fatal flaws early in the project lifecycle before it reaches them in a later phase. Consulted implies that the discipline / agency is involved in completing the task, perhaps as a Subject Matter Expert. They do not need to actively contribute to the details of a project, but should still play a role in determining the approach and direction of a project.
- **Informed**: *Informed* disciplines / agencies should be notified and informed about the subject task. The scope of their role is founded in informational purposes to be made aware of the project or task at-hand.

Table 1, on the next page, provides a RACI template of project delivery stakeholders and typical CDOT roles for managed lane projects without a tolling component.

Table 1: RACI Matrix Template for Project Delivery Stakeholders

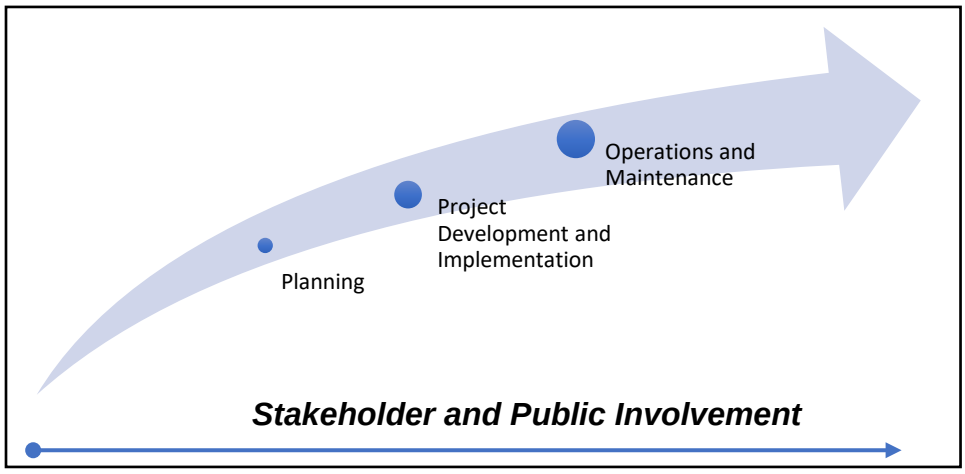
(R) Responsible: owns completing the task (one "R" per task, unless split activity) *(A) Accountable: approves or is ultimately accountable for the task* *(C) Consulted: involved in completing the task (i.e. Subject Matter Expert)* *(I) Informed: notified and informed about the task*	Planning		Project Development and Implementation				O&M		
Role	**System-wide Planning**	**Planning Study**	**Concept Development**	**Project Funding**	**Design**	**Implementation**	**Operations**	**Monitoring**	**Maintaining**
CDOT	R	R	R	R/A	R/A	R/A	R/A	R/A	R/A
HPTE Tolling Operations									
FHWA									
Federal Transit Administration									
Regional Agencies (MPO/TPR)[1]									
Local Agencies and Elected Officials									
Transit Providers									
Appointed Bodies: STAC, FAC, Transportation Commission									
Professional Conglomerates: CASTA, CMCA, TMAs, TMOs									
Colorado State Patrol									
Law Enforcement									

Notes:

DOT - Colorado Department of Transportation
HPTE - High-Performance Transportation Enterprise
FHWA - Federal Highway Administration
MPO - Metropolitan Planning Organization
TPR - Transportation Planning Region
STAC - Statewide Transportation Advisory Committee
AC - Freight Advisory Council
CASTA - Colorado Association of Transit Agencies
CMCA - Colorado Motor Carriers Association
TMA - Transportation Management Agency
TMO - Transportation Management Organization

[1] *Refer to https://drcog.org/sites/default/files/resources/TPO-RP-TRANSPLAN-18-06-26-V1.pdf for more information on the roles and responsibilities of DRCOG*

Figure 2: Project Life Cycle



As shown in Figure 2, the three major phases of the project's life-cycle are as follows:

- **Planning Phase**: During the planning phase, important elements that will define potential strategies and alternatives are established. These include developing system-wide goals and objectives, project funding, prioritizing strategies, and refining purpose and need.

- **Project Development and Implementation Phase**: The project development and implementation phase follows the planning phase. It encompasses concept of operations (ConOps) development, environmental review, clearances and permitting, ROW acquisition, utility coordination, preliminary and final design, construction, and testing. The project development and implementation phase also includes procurement, which is typically a substantial effort for managed lane projects.

- **Operations and Maintenance (O&M) Phase**: After the completion of a project, it is recommended that performance monitoring be carried out to: 1) assess whether the completed project's purpose and need have been fulfilled, 2) to assess if triggers or thresholds are met, 3) to provide real time adjustments to the operations of the managed lane to achieve optimal performance, and 4) to feed lessons learned and strategic information into future managed lane projects.

It is imperative for the project team to work with the Region Communication Manager to develop a Communications Plan for the corridor. The team should consult the CDOT Office of Communications during all phases of the project. The communications staff will offer ideas of how to convey the need, the benefits, and the operations of the managed lane to the public. Additional resources for communications are provided in the "CDOT

Public Involvement Guidance Document"[1] and "A Guide to the Transportation Planning and Programming Public Involvement Process"[2]. If the project team is considering Express Lanes, coordination with HPTE will be required as well.

CDOT's typical roles for each task within the life cycle of a managed lane is summarized below. Additional guidance for HTPE roles on Express Lane projects are provided in the HPTE Program website[3].

System-wide Planning and Planning Study: The Planning phase encompasses both system-wide, and project-level studies. CDOT's typical role is to define the problem, goals, and objectives and evaluate options to prioritize alternatives. This task is generally led by planning staff with input from local planning departments. Systems-level planning involves the development of system-wide evaluations, long range plans, congestion management plans, Planning and Environmental Linkage (PEL) studies, and documents that comply with NEPA and other applicable state and federal environmental laws. The CDOT NEPA Manual[4] should be referenced for guidance on alternatives development and analysis. Planners also fulfill key roles at the project-level by supporting planning-level traffic studies, concept development, ConOps, Systems Engineering, Management Plans, ITS Architecture, and the development of the performance metrics for monitoring purposes. Transportation planners are key to the success of managed lanes, as they play important roles in the system planning, project development, and operations and maintenance stages.

- **Concept Development:** The project management team (planning, environmental, and engineering staff) support the Concept Development phase. During this phase, traffic operations professionals will work with planners to develop a feasibility assessment or ConOps. Each discipline can provide input as a stakeholder and technical advisor. At the system-level, traffic operations staff can provide valuable access to data, provide technical assistance on system-wide improvements, and assist in the establishment of performance measures to be carried forward in the managed lanes lifecycle. The team will also coordinate on the assumptions of the project prior to the design and construction process.
    - **Enforcement:** Colorado State Patrol and Local Law Enforcement should be consulted during the concept development of managed lanes in order to address their ideas and concerns for the operation of the managed lanes. In certain cases, additional design elements may be considered to foster the ability of law enforcement to address unlawful driving behavior.
- **Design:** Design staff play a key role in the project development process. As such, they are an important part of any managed lanes project. However, the

[1] CDOT. 2016. *Public Involvement Guidance Document*. Retrieved via https://www.codot.gov/programs/planning/planning-process/public-involvement.html
[2] CDOT. 2016. A Guide to the Transportation Planning and Programming Public Involvement Process. Retrieved via https://www.codot.gov/programs/planning/documents/planning- process/PubInvolvementGuide2015.pdf
[3] Available at https://www.codot.gov/programs/high-performance-transportation-enterprise-hpte
[4] CDOT. 2017. CDOT NEPA Manual. https://www.codot.gov/programs/environmental/nepa-program/nepa-manual

involvement of design staff should go beyond the design stage; their expertise is hugely beneficial at the system-wide and concept planning stages. Design staff can provide valuable input at the planning stages, and then proceed to lead the design of the selected alternative(s). Similarly, design staff can continue to contribute to a managed lanes project beyond the completion of final design plans. Providing support to the construction and maintenance professionals can make their jobs easier—and can result in valuable feedback on the actual performance of the design and ROW impacts of the selected alternative. During the design process, a TSMO Evaluation [5] occurs which includes an operations assessment.

- **Project Funding**: The cost, size, and complexity of transportation projects, combined with limited available funding, often result in transportation projects being funded and implemented over a lengthy period of time rather than all at once. Options for funding a managed lane include revenue sources identified in Regional Transportation Plans (RTP), Transportation Improvement Program (TIP), and Statewide Transportation Improvement Program (STIP) as well as the option for tolling through HTPE. HPTE uses three main "innovative finance" tactics as part of its overall strategy to deliver surface transportation projects. According to the Federal Highway Administration, innovative finance specifically includes using loans and other financing mechanisms to leverage additional funds, public private partnerships, and user fee based systems. FHWA also considers loan programs, like TIFIA, to be part of the innovative financing toolbox.

  FHWA and CDOT have specific requirements, based on statutes and regulations, for the demonstration of fiscal constrained projects prior to final NEPA approval.

  In addition, The DRCOG Board adopted by resolution in January 2009 criteria for the review of proposed projects with a tolling component for inclusion in the DRCOG Fiscally Constrained RTP.[6]

- **Implementation**: Staff supporting the Implementation phase carry out the design and plans for project implementation. These professionals aid planners and designers in gauging the constructability and cost of alternatives. They should be involved in a minor role as a stakeholder during early planning and concept development. It is important on critical projects for construction engineers to review

[5] The purpose of the TSM&O Evaluation is to ensure a consistent and inter-disciplinary approach between Maintenance, Access, Regions, Operations, Safety, ITS, and the FHWA to identify operational elements are conscientiously considered early in the project lifecycle. This will help provide the ability to implement new or additional operational measures. It provides the ability for increased cross-functional collaboration and knowledge sharing between involved parties. Additionally, it creates enhanced opportunities to provide safety improvements, accountability to stakeholders, increased ability to document and reference lessons learned, and streamline business processes while providing increased system reliability.

Beginning January 1, 2016 all projects with a Design Scoping Review on or after February 1, 2016 will require a Transportation Systems Management and Operations (TSM&O) Evaluation. The TSM&O Evaluation consists of three parts: a safety assessment, an operations assessment, and an ITS assessment. The TSM&O Evaluation will analyze the project area and make recommendations to the project team for improvements related to safety and mobility to the project.

[6] https://drcog.org/sites/default/files/resources/TPO-RP-TRANSPLAN-18-06-26-V1.pdf

project concepts for constructability concerns. Note that the Implementation role is not limited to the construction of roadway infrastructure but may include the installation of ITS equipment, the development of ITS software applications, or signal re-timing. This role includes testing or inspecting the newly-built project to ensure that it performs as expected.

- **Operations:** Traffic operations and ITS staff are typically engaged in the Operations phase. Involvement of ITS engineers early in the process will help to identify implementable alternatives that are consistent with the Regional ITS Architecture. During the early system planning stage, ITS engineers can also provide valuable access to data, lend their expertise on technology, and assist in the establishment of performance measures to be carried forward in the managed lanes project. In the project development process, professionals can work with planners to develop feasibility assessments and system engineering reports (e.g. ConOps). Finally, ITS engineers and traffic operations can work with transportation planners on the system verification and validation process that follows the completion of a project.
- **Monitoring:** CDOT engineers can all contribute their expertise to the Monitoring phase. ITS engineers can monitor ITS deployments and assist in data collection. Planning and traffic operations staff will actively monitor the operations of the system and can provide data / technical support for performance monitoring. Planners may also evaluate the strategy effectiveness to validate performance measures developed at the onset of the project.
- **Maintaining:** The maintenance role is critical in both the system and project-levels of a managed lanes project. As a stakeholder at the system level, maintenance staff can provide valuable information on the state of the physical system. Maintenance staff can contribute during all stages of the project by providing asset management and data expertise. They are primarily responsible for maintenance and upkeep needs after a project is complete. At the project-level, it is critical to engage maintenance staff in the planning phase to understand maintenance and regional architecture from a condition and asset management perspective. The maintenance role then takes the lead in keeping the newly built facilities in optimal conditions. Lessons learned by maintenance staff can also be valuable to future decision-makers as they seek to select the most cost-effective alternatives over a project's lifecycle.

Section 5: Goals and Objectives

The planning and evaluation of managed lanes within the state must be based on the goals and objectives of a specific project. Goals and objectives may differ on a project-by-project basis, depending on the specific issues the managed lane is intended to address or the user groups the managed lane is intended serve. To facilitate an assessment of managed lanes, a tiered set of goals and objectives is provided in Table 2. Tier 1 goals are based on *CDOT's Strategic Actions for the Statewide Plan* and each managed lane project should aim to address at least one goal area (See Table 5).

- **Mobility** – Improve mobility and connectivity with a focus on operations and transportation choice. Mobility is defined as the efficient operation of the multi-modal transportation system infrastructure by maximizing the throughput of vehicles or people traveling in a given corridor.
- **Reliability** – Enhance travel reliability and reduce congestion through the use of managed lanes.
- **Safety** – Move Colorado toward zero deaths by reducing traffic-related deaths and serious injuries.

The Department acknowledges that managed lanes may also be implemented to manage other impacts, transportation purposes, or transportation user groups. Therefore, Tier 2 goals were developed to evaluate the additional benefits which may further support the selection of a managed lane strategy:

- **Environmental Sustainability** – Enhance the performance of the transportation system while protecting and enhancing the natural environment.
- **System Preservation** – Preserve and maintain the existing transportation system.
- **Organizational Efficiency** – Increase overall efficiency without compromising the public's expectations for effective travel.
- **Project Financing** – Leverage funding opportunities with the private and public sector by pledging revenue sources to the repayment of debt issued to close a project's funding gap.
- **Technology & Innovation** – Investigate technology and innovation opportunities to make CDOT one of the most technologically advanced transportation systems in the nation.

The justification of a managed lane strategy must achieve the Tier 1 benefits, which maximize operational efficiencies of the transportation system. Other benefits recognized through the Tier 2 goals are recommended for the purposes of providing sustainable transportation choices, environmental benefits, revenues to help pay for the improvement, or advancement of innovative technologies.

In support of these goals, quantifiable objectives were developed to identify the specific purpose of the goal and identify the desired outcome of a managed lane.

Table 2: Goals and Objectives

Goal (We Manage for...)	Objective
Tier 1 Planning Goals (All Projects)	
Mobility	Increase throughput
	Increase mode choice
	Increase average travel speeds
	Decrease average travel time
	Decrease delay
	Maintain acceptable operating conditions
Reliability	Decrease unexpected delay between ML and GP lanes
Safety	Decrease the frequency and severity of crashes
	Reduce number of primary and secondary crashes
	Work zone management
	Enhance incident management activities
Tier 2 Planning Goals (Additional Benefits)	
Environmental Sustainability *Indicator(s): Anticipated Need or Benefit*	Decrease fuel consumption
	Increase air quality / decrease pollutants
System Preservation *Indicator(s):30-50 year life projects*	Implement long-term mobility solutions
Organizational Efficiency *Indicator(s):Funding constraints, high public involvement*	Increase customer satisfaction ratings
	Minimize costs
Project Financing *Indicator(s): Unfunded project*	Fill funding gap
Technology & Innovation *Indicator(s): CV/AV market penetration, surplus of short-term capacity*	Leverage managed lanes to deploy new technologies
	Design managed lanes to be adaptable for future technologies

Notes:

A managed lane alternative must accomplish at least one Tier 1 Goal for justification

The Tier 2 Goals provide additional benefits for justification. They should be included in a managed lane assessment if appropriate

Section 7 of this document aligns performance measures with the goals and objectives and identifies typical targets which should be achieved to justify a managed lane alternative. Since every project is different and must meet a defined purpose and need, the typical targets provide a base for developing objectives with "SMART" characteristics, as defined in Figure 3.

Figure 3: SMART Characteristics for Project Objectives

S	M	A	R	T
Specific Objective provides specificity to guide formulation of viable approaches to achieve the objective without dictating the approach.	**Measurable** Objective facilitates quantitative evaluation. Tracking progress against objectives enables an assessment of effectiveness of actions.	**Agreed** Planners, operators, and relevant planning partners come to consensus.	**Realistic** Objective can reasonably be accomplished within limitations of resources.	**Time-bound** Objective identifies a timeframe within which it will be achieved (e.g., "by 2020").

The "SMART" characteristics should be developed on a case-by-case basis, subject to the existing traffic conditions of the studied facility.

Section 6: Managed Lane Applications and Strategies

Once the needs and anticipated traffic impacts are determined, the next step in the evaluation process is to consider the appropriate managed lane strategy. Managed lane strategies should align with the identified needs of the corridor and support the established goals and objectives of a project. These strategies differ from a general purpose lane which should be evaluated and compared during a NEPA / planning study. Several managed lane strategies have been proven to enhance transportation system performance. A list of potential managed lane applications and strategies are presented in Table 3. These examples include the existing managed lane strategies within the state, as well as those envisioned for the future.

Table 3: Managed Lane Applications and Strategies

Lane Management: Active Traffic Management Lanes
Active Traffic Management is the ability to dynamically manage traffic flow based on prevailing traffic conditions. Examples from the Transportation Research Board (TRB) Joint Subcommittee on Active Traffic Management include: • Lane Control Signal (LCS): Lane-use control signals are fixed-grid changeable message indications that use both signal and pictogram symbols to convey lane-use information. LCSs are used for reversible-lane control and non-reversible highway lane applications (such as shoulder lanes) and for incident management. Gantry signs are used to direct travelers into specific lanes. • Value Pricing (also known as Congestion Pricing): Employs road pricing strategies, including the idea of charging motorists a toll or fee for travel during the most congested times or offering a discount for traveling in the off-peak. Value priced lanes use pricing as the primary mechanism to regulate demand. • Variable Pricing (also known as Time-of-Day Pricing): Price of the tolled lane or facility varies by time of day due to demand and therefore is higher during peak periods and lower during off-peak periods. It encourages use of the road during less congested periods and allows traffic to flow more freely during peak periods. • Dynamic Pricing: The price of the tolled lane or facility goes up as traffic volumes increase. Increasing pricing is designed to discourage congestion causing volumes of traffic in the tolled lanes. The price can increase at any time of day, but typically happens during the peak hour. • Variable Speed Limits (VSL): Dynamically and automatically reduces speed limits in or before areas of congestion, crashes, or special events to maintain flow, safety, and reduce risk of collisions due to speed differentials, short headways, and/or weather conditions.

Lane Management: Active Traffic Management Lanes (continued)

- Highway Ramp Metering: A network ITS architecture allowing for a controlled system to manage highway access and assist in preventing unstable traffic flows. Often coordination with mainline and arterial traffic flow is required. This strategy may also include priced queue jumps.
- Queue Warning: Used to warn motorists of downstream queues and direct through-traffic to alternate lanes to effectively utilize available roadway capacity and reduce the likelihood of collisions related to queuing.
- Junction Control: Using variable message traffic signs, dynamic pavement markings, and lane-use control to direct traffic to specific lanes (mainline or ramp) based on varying traffic demand, to effectively utilize available roadway capacity and manage traffic flows to reduce congestion.
- Incident and Emergency Management: Managing lanes to allow for emergency responders to address an incident, quickly clear the scene, and protect the safety of the responders and traveling public.
- Dynamic Re-Routing: Changing destination messaging on traffic signs to account for downstream traffic conditions.
- Traveler Information: Providing estimated travel time information, roadway weather conditions, roadway work zones, and other condition reports allowing for better pre-trip and en-route decisions by drivers and operators.
- Variable Lane Width: A strategy which may be implemented with the advent of connected and autonomous vehicles saturation into the national fleet. This strategy would adjust lane and/or shoulder widths in response to real time operational conditions and vehicle types to maximize throughput.

Special-Use Lanes

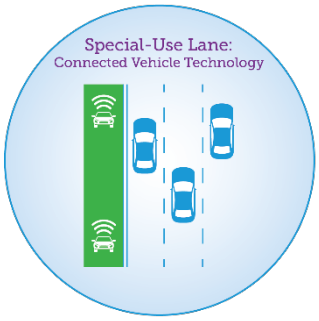
Lanes that provide certain vehicles, usually designated by vehicle type, an exclusive operational lane. These lanes may change use based on temporal or physical conditions. Examples include:

- Transit Management - A term applied to a variety of public transportation systems using buses to provide faster, more efficient, and more reliable transit service than an ordinary bus line. Often this is achieved by improving existing infrastructure, vehicles and scheduling. This may include dedicated lanes and slip ramps at interchanges for the transit vehicles. The goal of these systems is to approach the service quality of rail transit while still enjoying the cost savings and flexibility of bus transit.

Special-Use Lanes (continued)

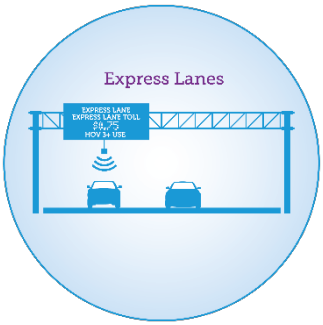
- Exclusive freight lanes - Lanes / roadways that primarily serve commercial motor vehicle's needs, although general-purpose traffic may be permitted to use these lanes
- Truck bypass lanes – Lanes that provide a physical separation of trucks from passenger vehicles at a freeway interchange in order to eliminate weaving between passenger cars traveling at high speeds and trucks traveling at lower speeds.
- Connected vehicle technology lanes / roadways - Similar to special-use lanes, connected vehicle technology lanes service certain vehicles, designated by their connected or autonomous technologies. Examples include:
  - Lanes or roadways dedicated to only connected vehicles and/or platooning vehicles
  - Lanes or roadways dedicated to only autonomous vehicles

  Legislative revisions may be necessary for implementation of these strategies.
- Lanes / roadways dedicated to implementing new innovative technology or three-dimensional travel (air taxi or personal air travel)
- Lanes or roadways dedicated to alternative fueling vehicles



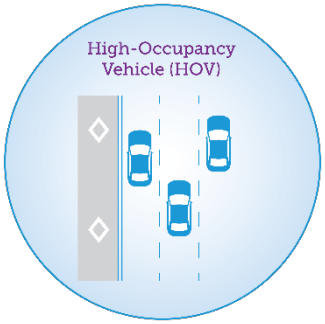
Express Lanes

Lanes separated from general purpose lanes by a striped buffer or a raised-median barrier. Lanes whose demand is managed to maintain reliable, fast operation even during peak periods. Express Lanes are tolled. In Colorado, tolls are collected by transponders / stickers on the vehicle or computer-controlled image recognition and license plate tagging systems. For more information and travel benefits, see Appendix A.



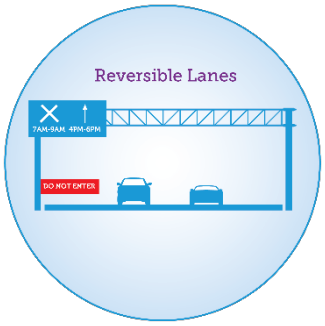
High-Occupancy Vehicle (HOV) Lanes

A highway or street lane for high-occupancy vehicles usually marked with large diamond shapes on the pavement. HOV is also the term used for carpool vehicles. The October 2015 Colorado Transportation Commission Policy Directive on HOV guidance included a resolution that all CDOT HOV Express Lanes would change from HOV 2 to HOV 3 on Jan. 1, 2017, requiring a minimum occupancy of three passengers[7].



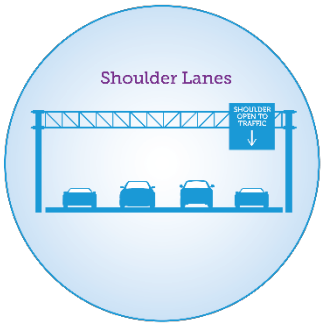
Reversible Lanes (also known as Counterflow lanes or Contraflow lanes)

Reversible lanes allow one or more lanes on a facility to shift direction throughout the day to accommodate traffic patterns, such as morning and evening peaks. By utilizing additional lanes in the direction that demands more capacity, congestion can be reduced and overall capacity can be increased. Lane control, signs, ramp meters, and special pavement markings are used to inform motorists of lane direction and movements. Reversible lanes may operate as tolled or non-tolled.



Shoulder Lanes

Using the shoulder as a travel lane for a limited duration or under specific conditions, typically during peak periods to minimize recurrent congestion. Shoulder Lanes can also be used to manage traffic and associated congestion immediately after an incident. It is typically applied with variable speed limits and can be tolled or non-tolled. Examples include:



- Peak Period Shoulder Lanes (PPSL): Peak Period Shoulder Lanes can operate either as non-tolled or as a tolled express lane, meaning that during highly congested times, highways are given an extra lane by using the shoulder.
- Localized Shoulder Lanes (LSL): Non-tolled LSLs can be used to manage traffic and associated congestion during and immediately after an incident and as an incident bypass.

[7] https://www.codot.gov/about/transportation-commission/documents/2015-archive-of-agendas-and-supporting-documents/october-2015/05-hov-policy-workshop.pdf

Shoulder Lanes (continued)
• Bus on Shoulder Lane: Dedicated shoulder lane on which buses operate when mainline speeds are less than a specified operating speed and buses are generally prohibited from exceeding the speed of mainline traffic by more than 15 miles per hour, up to a maximum speed of the specified operating speed. • Connected Vehicle (CV), Autonomous Vehicle (AV), or Rapid Speed Transportation Shoulder Lane: Dedicated shoulder lane on which connected and/or autonomous vehicles or other Rapid Speed Transportation operate when mainline is highly congested.

Each of the managed lane applications or strategies previously described is designed to accomplish a number of goals and objectives. Table 4 aligns the potential managed lane strategies to their overall goals and objectives. Practitioners considering the use of managed lanes for their project should correlate their goals and objectives to the application of the following managed lane strategies.

Table 4: Goals, Objectives, and Strategies

		Managed Lane Applications / Strategies							
Goal (We Manage for...)	**Objective**	**Active Traffic Management Lanes**	**Special-Use Lane: Transit**	**Special-Use Lane: Freight**	**Special-Use Lane: Connected Vehicle Technology***	**Express Lanes**	**High-Occupancy Vehicle**	**Reversible Lanes**	**Shoulder Lanes**
Tier 1 Planning Goals (All Projects)									
Mobility	Increase throughput	◉	●	○	●	●	●	●	●
	Increase mode choice	○	●	○	○	●	○	○	○
	Increase average travel speeds	●	●	◉	◉	●	●	●	●
	Decrease average travel time	●	●	◉	◉	●	●	●	●
	Decrease delay	●	◉	◉	◉	●	●	●	●
	Maintain acceptable operating conditions	●	◉	◉	◉	●	○	●	●
Reliability	Decrease unexpected delay between ML and GP lanes	●	●	●	●	●	●	●	●
Safety	Decrease the frequency and severity of crashes	●	○	◉	◉	◉	○	○	○
	Reduce number of primary and secondary crashes	●	○	◉	◉	◉	○	○	○
	Work zone management	●	○	◉	◉	◉	○	○	○
	Enhance incident management activities	●	○	●	●	●	○	○	◉
Tier 2 Planning Goals (Additional Benefits)									
Environmental Sustainability *Indicator(s): Anticipated Need or Benefit*	Decrease fuel consumption	○	●	◉	●	◉	●	○	○
	Increase air quality / decrease pollutants	○	◉	○	◉	◉	◉	○	○
System Preservation *Indicator(s):30-50 year life projects*	Implement long-term mobility solutions	○	◉	○	○	●	◉	●	◉
Organizational Efficiency *Indicator(s):Funding constraints, high public involvement*	Increase customer satisfaction ratings	◉	◉	◉	◉	◉	◉	◉	◉
	Minimize costs	◉	◉	◉	◉	◉	◉	◉	◉
Project Financing *Indicator(s): Unfunded project*	Fill funding gap	○	○	○	○	●	○	◉	◉
Technology & Innovation *Indicator(s): CV/AV market penetration, surplus of short-term capacity*	Leverage managed lanes to deploy new technologies	◉	◉	●	●	●	○	○	◉
	Design managed lanes to be adaptable for future technologies	○	◉	●	●	●	○	○	◉

Notes:

● - Managed lane type directly accomplishes objective

◉ - Managed lane type generally accomplishes objective

○ - Managed lane type does not directly address objective

* - To be re-evaluated upon CV/AV deployment

Section 7: Performance Measures for Managed Lanes

The FHWA Office of Operations defines performance measurement as "the use of statistical evidence to determine progress toward specific defined organizational objectives.[8]"

As mentioned in Section 5, performance measures were identified to develop a consistent set of evaluation metrics for managed lane assessments throughout the state. As illustrated in Table 5, example performance measures were aligned with the appropriate goals and objectives and were utilized as a basis for target-setting (refer to previous section on "SMART" objectives) to assess managed lane alternatives for a 20-year planning horizon consistent with NEPA planning studies. The performance measures and targets should also be utilized after the implementation of a managed lane to assess the progress toward meeting the stated objectives, continually evaluate the effectiveness of the strategy, and support real-time traffic operations.

The performance measures were identified based on the following criteria:

- **Understandable**: Measures that use consistent definitions and interpretations to address the needs of a wide-ranging audience, while still achieving the necessary precision, accuracy, and detail to facilitate system or program improvement
- **Widely Accepted**: Measures were selected based on best practices of previous managed lane projects within Colorado and around the country
- **Data Readily Available or Efficient to Obtain**: Measures which use data that is captured automatically or using technologies with minimal data entry and processing to produce usable results

A review of the identified performance measures was also conducted to ensure that the measures collectively address the four factors or congestion:

- Intensity – Severity of congestion
- Duration – Amount of time the congested conditions persist
- Extent – Number of users impacted by congestion
- Variability – Different timeframes of congestion

Example performance measures and typical targets are provided in Table 5 to identify when a managed lane strategy may be appropriate. When the targets are achievable through a managed lane alternative, the managed lane is justified. When the targets are not obtainable, the study should proceed with evaluating alternative capacity improvements. If evaluating through a NEPA process, the final decision to implement a managed lane alternative should always be made through the alternative analysis process within the NEPA planning study.

[8] FHWA. 2017. *Performance Measurement Fundamentals*. Retrieved via https://ops.fhwa.dot.gov/perf_measurement/fundamentals/

Table 5: Performance Measures, Targets, and Data Requirements

Goal (We Manage for...)	Objective	Performance Measures	Typical Target/Thresholds*	Data Requirements	Phase	
					Planning	Operations
Tier 1 Planning Goals (All Projects)						
Mobility	Increase throughput	Daily or hourly person volume on managed lane (ML) and general purpose lane (GP)	ML person volume 1.5x greater than GP (per lane average)	Before and after volume and occupancy counts	X	X
		Per lane efficiency (speed x pphpl)	Increase by 10%	Before and after speed and pphpl	X	X
	Increase mode choice	Transit on -time arrivals	> 95% on-time schedule adherence	Before and after on-time performance	X	X
		Carpool / Vanpool	> 20 % increase in carpools	Before and after vehicle and occupancy counts	X	X
		Average cost per seat-mile	Average is less than $100	Before and after vehicle and occupancy counts	X	X
	Increase average travel speeds	Average lane (ML and GP) and facility speed	Maintain an average travel speed of 45 mph 90% of the time during peak time **	Before GP travel speed and after GP and ML travel speed	X	X
	Decrease average travel time	Travel time	1 minute per ML facility mile of travel time savings, with a total savings of at least 5 minutes	Before GP travel time and after GP and ML travel time	X	X
	Decrease delay	Average delay (vehicle, person, and ton-mile)	1 minute per ML facility mile of travel time savings, with a total savings of at least 5 minutes	Before GP travel time and after GP and ML travel time	X	X
		Duration of congestion	Acceptable operating conditions 90% of time during peak period	Before and after level of service		X
	Maintain acceptable operating conditions	Level of service	ML LOS "D" or better for 20 years	Anticipated and actual volumes and capacities	X	X
		Hours per week that an express lane is in operation	Minimum 20 hours	Managed lane operational data	X	X
Reliability	Decrease unexpected delay between ML and GP lanes	Travel time reliability (95th percentile travel times)	ML > 95% on time, GP > 75% on time	Before GP travel speed and after GP and ML travel speed		X
		Stakeholder perceptions on reliability	> 75% stakeholder approval	Surveys of users, non-users, focus groups and general public		
		Operational level of service	Maintain minimum LOS "D" or better	Volume counts		X
Safety	Decrease the frequency and severity of crashes	Rate of fatalities and serious injuries	Decrease rate by 5%	Before and after crash data		X
		Rate of total crashes	Decrease rate by 5%	Before and after crash data	X	
	Reduce number of primary and secondary	Primary crash vs secondary crash	Decrease number of occurrence by 5%	Before and after crash data		X
	Work zone management	Hours of lane closures due to work zones	Decrease hours by 5%	Before and after hours of lane closures		X
		Incident /crashes in work zones	Decrease rate by 5%	Before and after incident / crash data		X
	Enhance incident management activities	Incident / crash rate	Decrease rate by 5%	Before and after incident / crash data		X
		Emergency responder transport times	Decrease time by 10%	Before and after emergency transport times		X
		Incident clearance times	Decrease time by 10%	Before and after incident clearance times		X
Tier 2 Planning Goals (Additional Benefits)						
Environmental Sustainability *Indicator(s): Anticipated Need or Benefit*	Decrease fuel consumption	Fuel consumption (per PMT)	Decrease fuel consumption by 10%	Before and after vehicle and occupancy counts and length of system	X	X
	Increase air quality / decrease pollutants	Air quality index	Positive impact as compared to no improvement or additional GP lane	Estimations based on vehicle and occupancy counts and travel times	X	X
System Preservation *Indicator(s):30-50 year life projects*	Implement long-term mobility solutions	Acceptable LOS for 20-year horizon	Maintain minimum LOS "D" or better for 20 years	Volume counts	X	X
		Maintenance costs per year (low, moderate, high, very high)	Low to moderate	Conceptual level probable maintenance costs	X	X
Organizational Efficiency *Indicator(s):Funding constraints, high public involvement*	Increase stakeholder satisfaction ratings	Stakeholder perception	> 75% stakeholder approval	Surveys of users, non-users, focus groups, general public, and other agency stakeholders	X	X
	Minimize costs	Benefit-cost ratio	B/C >1	Total costs, estimated benefits, actual benefits (based on travel time information)	X	X
Project Financing *Indicator(s): Unfunded project*	Fill funding gap	Overall net revenue	Revenue contributes to project cost and O&M	Anticipated and actual revenue	X	X
		Ability to fund project	Revenue contributes to project cost and O&M	Anticipated and actual revenue	X	X
		Private Public Partnerships (P3s)	P3 project	Project funding agreement	X	
Technology & Innovation *Indicator(s): CV/AV market penetration, surplus of short-term capacity*	Leverage managed lanes to deploy new technologies	Managed lane utilization	Operate at LOS "D" or better	Anticipated and actual volumes and capacities	X	X
		Technologies deployed	Deploy at least one innovative technology	Project design	X	X
		Stakeholder satisfaction	> 75% stakeholder approval	Surveys of users, non-users, focus groups, general public, and other agency stakeholders	X	X
	Design managed lanes to be adaptable for future technologies	Technologies deployed	Infrastructure is adaptable	Project design	X	X
		Stakeholder satisfaction	> 75% stakeholder approval	Surveys of users, non-users, focus groups, general public, and other agency stakeholders	X	X

* Consistent with NEPA planning studies, typical targets/thresholds must adhere to a 20-year planning horizon.

** FHWA. 2016. Federal-Aid Highway Program Guidance on High Occupancy Vehicle (HOV) Facilities. Retrieved via https://ops.fhwa.dot.gov/freewaymgmt/hovguidance/chapter3.htm

Section 8: Next Steps of a Managed Lane Project

In conjunction with the CDOT project planning and development process, including all system-level or corridor-level studies that evaluate alternatives for highway capacity through expansion or operational improvements, managed lanes must be considered in the context of any capacity improvement. Upon completion of the planning process as described within Sections 2-7 of these Guidelines, additional steps for project development, project procurement, and construction will follow. A high-level overview of the key areas of evaluation for a managed lane alternative are as follows:

1. **Project Design and Development**

- Project design and development includes access design, driver information and signing, enforcement to maintain compliance, intergovernmental agreements, and use of demand forecasting models.
- Coordination with the appropriate stakeholders is required to ensure acceptance and success. A coordinated communications plan is necessary to address the entire project through construction.

2. **Operations with Continual Monitoring**

- Concept of Operations (ConOps) – Developing a ConOps will set the stage for the remainder of the system development process and the document will be used continuously to validate the system when it becomes operational. In addition to identifying stakeholders and project characteristics, the ConOps will include a plan for:
    - Project flexibility— The ability to alter operations as conditions warrant and to change lane management strategies when operational triggers or thresholds are met.
    - Monitoring and evaluation— Continual monitoring of performance measures to ensure effective operation of the facility and to determine if adjustments should be made.

3. **Life-Cycle Considerations**

- Maintenance – The maintaining agency and anticipated maintenace needs of the managed lane must be identified. This will also aid the development of project benefit-cost assessments
- Expectations of the managed lane as it relates to performance and mobility contributions over the full life of the project must be identified to determine when thresholds constitute a long-term modification.

4. **Technology Infrastructure**

- Adding technology infrastructure to facilitate connected and autonomous vehicles or other transportation technologies, such as conduit, fiber optics, and wireless communication devices. This would trigger a Systems Engineering Analysis (S.E.A.) to identify how the technology fits into the greater ITS architecture. The performance metrics included within these Guidelines should be utilized in that analysis.

5. **Project Funding**

- For managed lane facilites which do not contain a tolling compoinent (i.e., not Express Lanes), project funding should be justified by presenting the benefit-cost of a managed lane alternative. This benefit-cost or return on investment should utilize the data from the performance measure assessment and compare it to the construction costs and anticipated operation and maintance costs of the facility.

CDOT will be developing a second document as a compendium to this Managed Lanes Guidelines which will provide detailed guidance for steps 1-5 above. The Guidelines will provide technical tools, day to day operational guidance, and suggested performance metrics to aid in the implementation of each managed lane strategy identified within Section 6 of this document. The second phase of the Managed Lanes Guidelines is anticpated to begin in early 2019.

Appendix A: HPTE's Authority and Existing Facilities

High Performance Transportation Enterprise (HPTE)

"The Funding Advancement for Surface Transportation and Economic Recovery Act (Part 8 of Article 4, Title 43, Colorado Revised Statutes), otherwise known as FASTER, created the HPTE in 2009 as an independent, government-owned business within CDOT.

The HPTE has the legal responsibility to aggressively seek out opportunities for innovative and efficient means of financing when delivering important surface transportation infrastructure projects in the state. It has the statutory power, among others, to impose tolls and other user fees, to issue bonds, and to enter into contracts with public and private entities to facilitate Public-Private Partnerships (P3s). The HPTE Board of Directors has the statutory power to set tolls on corridors, and to later make toll rate adjustments.

The HPTE Board consists of a three board members appointed by the Chair of the Transportation Commission and four appointed by the Governor from the different regional area of the state (North Front Range, Denver, Colorado Springs, and the Mountain Corridor) to provide expertise and guidance in analyzing P3 and other creative financing mechanisms.

The HPTE is an "enterprise" for purposes of Section 20 of Article X of the State Constitution, so long as it retains the authority to issue revenue bonds and receives less than 10% of its total revenues in grants from the state and local governments." The HPTE website includes additional information on Express Lane facilities throughout the state of Colorado.

COLORADO
Department of Transportation

Appendix B: CDOT Policy Directive on Managed Lanes 1603.0

(December 28, 2012)

Policy Brief

COLORADO DEPARTMENT OF TRANSPORTATION
Office of Policy & Government Relations
4201 East Arkansas Avenue, room 275
Denver, Colorado 80222
(303) 757-9772

January 2013

Managed Lanes Policy Directive

Summary:
In December of 2012 the Transportation Commission adopted Policy Directive 1603.0 requiring that managed lanes be strongly considered during the planning and development of capacity improvements on state highway facilities. This policy is limited to state highway facilities that are or will be congested and is effective immediately.

Background:
Given the limited opportunities to provide new capacity on the state highway system, CDOT is seeking ways to make the most out of new investments and find flexible, cost-effective strategies for sustaining or enhancing the movement of people and goods. Managed lanes are highway facilities where operational strategies are proactively implemented and managed in response to changing conditions and represent one strategy with the potential to increase system reliability, provide operational flexibility and efficient operation of the multi-modal transportation system.

Specifics of the Policy:

- Applies to all divisions, regions, offices and branches of CDOT and other entities intending to build capacity improvements on the state highway system.
- Is effective immediately and applies to all system or corridor level studies which evaluate alternatives for additional highway capacity through expansion or operational improvements. The Policy does not apply retroactively to signed decision documents or ongoing NEPA studies that are beyond the alternative analysis phase.
- Requires that managed lanes be strongly considered during the planning process for new capacity projects on state highways that are or will be congested. While the final adoption or implementation of managed lanes is not required, the decision to not include managed lanes must be documented.
- Managed lanes can include a range of operational strategies including tolled express lanes, Bus Rapid Transit, HOV-only requirements and others.

The final Policy Directive and Transportation Commission Resolution are attached to this document. Additional guidance to support the policy directive will be developed in the coming months by CDOT's Operations Division.

COLORADO DEPARTMENT OF TRANSPORTATION	☑ POLICY DIRECTIVE ☐ PROCEDURAL DIRECTIVE	
Subject Managed Lanes		Number 1603.0
Effective 12.28.12	Supersedes N/A	Originating Office Division of Transportation Development

I. PURPOSE

The Colorado Department of Transportation seeks to increase system efficiency and to provide multi-modal options for more reliable movement of people, goods and information in and through the state. The purpose of this Policy Directive is to ensure that the use of managed lanes is strongly considered during the planning and development of capacity improvements on state highway facilities within Colorado.

II. AUTHORITY

Colorado Transportation Commission, § 43-1-106(8)(a), C.R.S.

III. APPLICABILITY

This Policy Directive applies to all divisions, regions, offices and branches of CDOT and other entities intending to build capacity improvements on the state highway system.

IV. DEFINITIONS

"Managed Lanes" are defined as highway facilities or a set of lanes where operational strategies are proactively implemented and managed in response to changing conditions. *See* (FHWA, "Managed Lanes: A Primer"), Federal Highway Administration, Publication No.: FHWA-HOP-05-031, EDL 14110, HOP/Aug. 2008/QE, available at: www.ops.fhwa.dot.gov.

V. POLICY

The use of managed lanes shall be strongly considered during planning and development of capacity improvements on state highway facilities in Colorado. When applicable, the decision to not implement Managed Lanes shall be formally documented subject to Department guidance.

Managed Lanes provide the ability for the Department to respond to changing traffic conditions and provide operational flexibility and efficient operation of the multi-modal transportation system infrastructure by maximizing the number of vehicles or the number of people traveling in a given corridor. As congestion increases in a corridor, managed lanes can provide greater reliability of travel and also promote alternative travel choices. The challenge for transportation planners and highway engineers is to maximize the operation of transportation infrastructure by considering flexible, cost effective strategies for sustaining or enhancing the movement of people and goods.

VI. FISCAL IMPACT

Implementation may have a fiscal impact to the study and analysis required of capacity improvement projects. The fiscal impact is indeterminate and will be project-specific.

VII. IMPLEMENTATION PLAN

1. This Policy is effective immediately upon approval and shall apply to all system or corridor level studies which evaluate alternatives for additional highway capacity through expansion or operational improvements. It shall not apply retroactively to signed decision documents or ongoing NEPA studies beyond the alternative analysis phase.

2. The Division of Transportation Development shall notify all CDOT Program Engineers and Regional Planning Environmental Managers of the Policy Directive within one week of adoption.

3. CDOT staff shall develop guidance to support this Policy Directive.

VIII. REVIEW DATE

This Policy Directive shall be reviewed within five years of the approval date.

Herman F. Stockinger III
Transportation Commission Secretary

12-28-12
Date of Approval

Resolution #TC-3039
Approval of the Managed Lanes Policy Directive 1603.0

Approved by the Transportation Commission on: December 20, 2012

WHEREAS, CDOT recognizes the importance of providing a transportation system for Colorado that most effectively moves people, goods, and information; and

WHEREAS, in accordance with provisions in Moving Ahead for Progress in the 21st Century Act (MAP-21), each State shall carry out a statewide transportation planning process that provides for consideration and implementation of projects, strategies, and services that will promote efficient system management and operation; and

WHEREAS, in accordance with MAP-21, the statewide transportation planning process shall use a performance-based approach to transportation decision-making to support national goals of system reliability and congestion reduction; and

WHEREAS, CDOT recognizes that Managed Lanes are highway facilities where operational strategies are proactively implemented and managed in response to changing conditions and represent one strategy with the potential to enhance efficient system management, improve system reliability and improve system operation, thereby making progress toward national goals; and

WHEREAS, CDOT acknowledges that Managed Lanes provide the ability for the Department to respond to changing conditions and provide operational flexibility and efficient operation of the multi-modal transportation system;

NOW, THEREFORE, BE IT RESOLVED that the Transportation Commission hereby adopts the Managed Lanes Policy Directive 1603.0 and directs the Department to strongly consider managed lanes during the planning and development of capacity improvements on state highway facilities within Colorado in compliance with all applicable federal and state laws and regulations.

Herman F. Stockinger III
Herman Stockinger, Secretary
Transportation Commission of Colorado

12-28-12
Date

Appendix C: Managed Lane Evaluation Level Tool

COLORADO
Department of Transportation

Managed Lanes Evaluation Level Tool

Date:

Project Name:

Corridor / Description:

Region:

Preparer:

Stage 1: Initial Consideration

	Yes	No	
A	☐	☐	Is the study corridor on an interstate, US highway or state highway?
	☐	☐	Is the capacity improvement on the study corridor greater than 1-mile?

If the answer is "No" to either question, no further consideration is required. If "Yes" to both questions, proceed to Stage 1B.

	Yes	No	
B	☐	☐	Does the study corridor have a high volume in the 20-year horizon (i.e. Volume to Capacity ratio > 1.10)?
	☐	☐	Does the study corridor have recurring congestion for more than 2 hours during a peak period?
	☐	☐	Is the study corridor a limited access facility (i.e. roadways with limited easement and controlled access)?
	☐	☐	Does the study corridor have a Level of Service of Safety (LOSS) of III or IV?
	☐	☐	Does the study corridor have existing transit service, planned transit service, or stakeholder support for new transit service?
	☐	☐	Does the study corridor serve a large amount of freight? (Heavy Vehicle > 10%)

If the answer is "No" to all of the questions, no further consideration is required. If "Yes" to any question, proceed to Stage 2.

Stage 2: Strongly Considered for Evaluation

Yes	No		Evaluation Documentation
☐	☐	Was a managed lane recommended for the the study corridor in a previous plan? (i.e. HPTE Masterplan, Smart Mobility Plan)	Evaluate recommended strategy in NEPA study
☐	☐	Will the study corridor be conducting a PEL or planning Feasibility Study?	Evaluate during PEL / Planning Study
☐	☐	Does the project add capacity and require a CatEx?	Evaluate during CatEx
☐	☐	Does the project require a EA or EIS?	Evaluate during EA or EIS

If the answer is "Yes" to any of the questions, the Managed Lanes evaluation can be completed as part of the planning process and does not require a separate environmental evaluation.

Note: When managed lanes have been evaluated in a previous study (e.g., PEL study), additional evaluation is not required within the following study (e.g., EA or EIS).

☐ Copy Chief Engineer and Regional MPO - Managed lanes are to be considered.

☐ Copy HPTE Director - Express Lanes are to be considered.

Additional Comments:

Note: Upon completion, if managed lanes are determined not to be applicable with respect to such capacity improvements, the decision shall be formally documented within a memorandum to the Regional Transportation Director.

Appendix D: Project Examples and Draft Memorandum

Two project examples are provided to illustrate the Managed Lanes consideration process. The examples utilize previous projects within the state (one which included managed lane alternatives and one which did not). For each scenario, the Managed Lane Evaluation Level Tool was completed based on the project characteristics.

Example 1: US 36 Managed Lanes Project – Managed Lanes were strongly considered

- Illustration of consideration process
- Applicable strategies based on project goals
- Managed Lane Evaluation Level Tool

Example 2: I-70 at Pena Boulevard Congestion Analysis – Managed Lanes were not an alternative

- Illustration of consideration process
- Managed Lane Evaluation Level Tool
- Example letter to RTD

Example Project 1 – US 36 Managed Lanes Project

Managed Lanes Guidelines

Project Example 1

US 36 Managed Lanes Project

US 36 Managed Lanes Project

Project Background

US-36 is the existing four-lane state highway that connects the Denver and Boulder metropolitan areas. It is a congested and rapidly growing corridor carrying between 80,000 and 100,000 vehicle trips per day. The corridor operates at nearly 90 percent capacity and experiences 3 to 4 hours of severe congestion in both directions daily.

- Project Goals
  - Improve mobility in the US-36 corridor
  - Improve travel time reliability (Bus and vehicles)
  - Accelerate the construction and completion of the US-36 corridor and to limit the public funds contributed to the Project

US 36 Managed Lanes Project

Stage 1 Assessment:

		Yes	No	
Stage 1: Initial Consideration	A	☑	☐	Is the study corridor on an interstate, US highway or state highway?
		☑	☐	Is the capacity improvement on the study corridor greater than 1-mile?
				If the answer is "No" to either question, no further consideration is required. If "Yes" to both questions, proceed to Stage 1B.
	B	☑	☐	Does the study corridor have a high volume in the 20-year horizon (i.e. Volume to Capacity ratio > 1.10)?
		☑	☐	Does the study corridor have recurring congestion for more than 2 hours during a peak period?
		☑	☐	Is the study corridor a limited access facility (i.e. roadways with limited easement and controlled access)?
		☑	☐	Does the study corridor have a Level of Service of Safety (LOSS) of III or IV?
		☑	☐	Does the study corridor have existing transit service, planned transit service, or stakeholder support for new transit service?
		☐	☑	Does the study corridor serve a large amount of freight? (Heavy Vehicle > 10%)
				If the answer is "No" to all of the questions, no further consideration is required. If "Yes" to any question, proceed to Stage 2.

The Project satisfies the initial consideration based on facility characteristics and existing/future traffic conditions

US 36 Managed Lanes Project

Stage 2 Assessment:

Stage 2: Strongly Considered for Evaluation	Yes	No		Evaluation Documentation
	☐	☑	Was a managed lane recommended for the the study corridor in a previous plan? (i.e. HPTE Masterplan, Smart Mobility Plan)	Evaluate recommended strategy in NEPA study
	☑	☐	Will the study corridor be conducting a PEL or planning Feasibility Study?	Evaluate during PEL / Planning Study
	☐	☑	Does the project add capacity and require a CatEx?	Evaluate during CatEx
	☑	☐	Does the project require a EA or EIS?	Evaluate during EA or EIS

If the answer is "Yes" to any of the questions, the Managed Lanes evaluation can be completed as part of the planning process and does not require a separate environmental evaluation.

Managed Lanes were strongly considered in the project's EA

Aligning Goals and Objectives to Strategies

Goal (We Manage for...)	Objective	Managed Lane Applications / Strategies: Active Traffic Management Lanes	Express Bus Lanes	Special-Use Lanes	Express Lanes	High-Occupancy Vehicle	Reversible Lanes	Shoulder Lanes	Connected Vehicle Technology
Tier 1 Planning Goals (All Projects)									
Mobility	Increase throughput	◐	●	◐	●	●	●	●	○
	Increase mode choice	○	●	●	●	○	○	○	○
	Increase average travel speeds	●	●	◐	●	●	●	●	◐
	Decrease average travel time	●	●	◐	●	●	●	●	◐
	Decrease delay	●	◐	◐	●	●	●	●	◐
	Maintain acceptable operating conditions	●	◐	◐	●	○	●	●	◐
Reliability	Decrease travel time variation (ML and GP lanes)	●	●	●	●	●	●	●	●
Safety	Decrease the frequency and severity of crashes	●	○	◐	◐	○	○	○	◐
	Reduce number of primary and secondary crashes	●	○	◐	◐	○	○	○	◐
	Work zone management	●	○	◐	◐	○	○	○	◐
	Enhance incident management activities	●	○	●	●	○	○	◐	●
Tier 2 Planning Goals (Additional Benefits)									
Project Financing *Indicator(s): Unfunded project*	Maximize funding	○	○	○	●	○	◐	◐	○

Notes:

● - Managed lane type directly accomplishes objective

◐ - Managed lane type generally accomplishes objective

○ - Managed lane type does not directly address objective

Based on the project goals, the selected strategies of Express Lanes and Express Bus are applicable solutions. This project included several strategies and components which also incorporate HOV strategies and Active Traffic Management.

US 36 Managed Lanes Project

Summary

- Managed lanes was strongly considered in the EA
- The Concession Model was public private partnership
- The final alternative included:
  - One Managed Lane in each direction between I-25/Pecos St. and Foothills/Table Mesa Dr.
  - Reconstruction of two general purpose lanes in each direction- SOV are tolled and BRT/HOV are not tolled
  - Construction of Divergent Diamond Interchange at McCaslin Blvd

COLORADO
Department of Transportation

Managed Lanes Evaluation Level Tool

Date:

Project Name: US 36 Managed Lanes

Corridor / Description: I-25/Pecos St in Adams County to Foothills Pkwy/Table Mesa Dr in Boulder County

Region: Region 1

Preparer: CDOT / HPTE

Stage 1: Initial Consideration

	Yes	No	
A	☐	☐	Is the study corridor on an interstate, US highway or state highway?
	☐	☐	Is the capacity improvement on the study corridor greater than 1-mile?

If the answer is "No" to either question, no further consideration is required. If "Yes" to both questions, proceed to Stage 1B.

	Yes	No	
B	☐	☐	Does the study corridor have a high volume in the 20-year horizon (i.e. Volume to Capacity ratio > 1.10)?
	☐	☐	Does the study corridor have recurring congestion for more than 2 hours during a peak period?
	☐	☐	Is the study corridor a limited access facility (i.e. roadways with limited easement and controlled access)?
	☐	☐	Does the study corridor have a Level of Service of Safety (LOSS) of III or IV?
	☐	☐	Does the study corridor have existing transit service, planned transit service, or stakeholder support for new transit service?
	☐	☐	Does the study corridor serve a large amount of freight? (Heavy Vehicle > 10%)

If the answer is "No" to all of the questions, no further consideration is required. If "Yes" to any question, proceed to Stage 2.

Stage 2: Strongly Considered for Evaluation

Yes	No		Evaluation Documentation
☐	☐	Was a managed lane recommended for the the study corridor in a previous plan? (i.e. HPTE Masterplan, Smart Mobility Plan)	Evaluate recommended strategy in NEPA study
☐	☐	Will the study corridor be conducting a PEL or planning Feasibility Study?	Evaluate during PEL / Planning Study
☐	☐	Does the project add capacity and require a CatEx?	Evaluate during CatEx
☐	☐	Does the project require a EA or EIS?	Evaluate during EA or EIS

If the answer is "Yes" to any of the questions, the Managed Lanes evaluation can be completed as part of the planning process and does not require a separate environmental evaluation.

Note: When managed lanes have been evaluated in a previous study (e.g., PEL study), additional evaluation is not required within the following study (e.g., EA or EIS).

☐ Copy Chief Engineer and Regional MPO - Managed lanes are to be considered.

☐ Copy HPTE Director - Express Lanes are to be considered.

Additional Comments:

Managed Lanes will be strongly considered in the Project's EA.

Note: Upon completion, if managed lanes are determined not to be applicable with respect to such capacity improvements, the decision shall be formally documented within a memorandum to the Regional Transportation Director.

COLORADO
Department of Transportation

Example Project 2 – I-70 at Pena Boulevard Congestion Analysis

Managed Lanes Guidelines

Project Example 2

I-70 at Pena Blvd Congestion Analysis

I-70 at Pena Blvd Congestion Analysis

Project Background

A bottleneck reduction study was conducted along I-70, at Pena Blvd. The area was experiencing reoccurring delay in the pm peak hour. At Pena Blvd, I-70 has approximately 110,000 ADT and 9% heavy freight.

Project Goals

- Reduce Delay
- Eliminate conflict points

I-70 at Pena Blvd Congestion Analysis

Stage 1 Assessment:

		Yes	No	
Stage 1: Initial Consideration	A	☑	☐	Is the study corridor on an interstate, US highway or state highway?
		☐	☑	Is the capacity improvement on the study corridor greater than 1-mile?
				If the answer is "No" to either question, no further consideration is required. If "Yes" to both questions, proceed to Stage 1B.
	B	☐	☐	Does the study corridor have a high volume in the 20-year horizon (i.e. Volume to Capacity ratio > 1.10)?
		☐	☐	Does the study corridor have recurring congestion for more than 2 hours during a peak period?
		☐	☐	Is the study corridor a limited access facility (i.e. roadways with limited easement and controlled access)?
		☐	☐	Does the study corridor have a Level of Service of Safety (LOSS) of III or IV?
		☐	☐	Does the study corridor have existing transit service, planned transit service, or stakeholder support for new transit service?
		☐	☐	Does the study corridor serve a large amount of freight? (Heavy Vehicle > 10%)
				If the answer is "No" to all of the questions, no further consideration is required. If "Yes" to any question, proceed to Stage 2.

The Project does not satisfy Stage 1A, therefore, no further consideration is required.

I-70 at Pena Blvd Congestion Analysis

Necessary Documentation

If managed lanes are determined not to be applicable, the decision shall be formally documented within a memorandum to the Regional Transportation Director.

An example letter, for a mock project is provided within this Appendix.

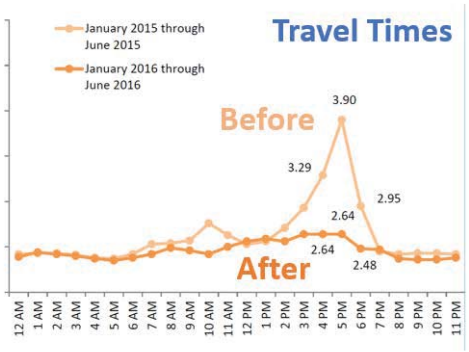
Once the letter is submitted, the project may move forward with other alternatives.

I-70 at Pena Blvd Congestion Analysis

Summary

- Managed lanes consideration would not be required beyond Stage 1A.
- A letter must be sent to the RTD
- The final alternative included:

Restriping and New Signs - move lane drop from left side to right side



Very successful low-cost project that mitigated conflict points and virtually eliminated delay.

$60,000 investment with over $700,000 in user benefits in first 6 months.

COLORADO
Department of Transportation

Managed Lanes Evaluation Level Tool

Date:

Project Name: I-70 at Pena Blvd

Corridor / Description: I-70 Mainline at Pena Blvd - Bottleneck Reduction

Region: Region 1

Preparer: CDOT / HPTE

Stage 1: Initial Consideration

	Yes	No	
A	☑	☐	Is the study corridor on an interstate, US highway or state highway?
	☐	☑	Is the capacity improvement on the study corridor greater than 1-mile?

If the answer is "No" to either question, no further consideration is required. If "Yes" to both questions, proceed to Stage 1B.

	Yes	No	
B	☐	☐	Does the study corridor have a high volume in the 20-year horizon (i.e. Volume to Capacity ratio > 1.10)?
	☐	☐	Does the study corridor have recurring congestion for more than 2 hours during a peak period?
	☐	☐	Is the study corridor a limited access facility (i.e. roadways with limited easement and controlled access)?
	☐	☐	Does the study corridor have a Level of Service of Safety (LOSS) of III or IV?
	☐	☐	Does the study corridor have existing transit service, planned transit service, or stakeholder support for new transit service?
	☐	☐	Does the study corridor serve a large amount of freight? (Heavy Vehicle > 10%)

If the answer is "No" to all of the questions, no further consideration is required. If "Yes" to any question, proceed to Stage 2.

Stage 2: Strongly Considered for Evaluation

Yes	No		Evaluation Documentation
☐	☐	Was a managed lane recommended for the the study corridor in a previous plan? (i.e. HPTE Masterplan, Smart Mobility Plan)	Evaluate recommended strategy in NEPA study
☐	☐	Will the study corridor be conducting a PEL or planning Feasibility Study?	Evaluate during PEL / Planning Study
☐	☐	Does the project add capacity and require a CatEx?	Evaluate during CatEx
☐	☐	Does the project require a EA or EIS?	Evaluate during EA or EIS

If the answer is "Yes" to any of the questions, the Managed Lanes evaluation can be completed as part of the planning process and does not require a separate environmental evaluation.

Note: When managed lanes have been evaluated in a previous study (e.g., PEL study), additional evaluation is not required within the following study (e.g., EA or EIS).

☐ Copy Chief Engineer and Regional MPO - Managed lanes are to be considered.

☐ Copy HPTE Director - Express Lanes are to be considered.

Additional Comments:

The facility is a limited access facility with public transit service and a congested 3 to 4 hour period. The Stage 1: Initial consideration was completed, however, no further consideration is required based on Stage 2 criteria.
The evaluation of this facility will continue by analyzing other bottleneck reduction alternatives.

Note: Upon completion, if managed lanes are determined not to be applicable with respect to such capacity improvements, the decision shall be formally documented within a memorandum to the Regional Transportation Director.

COLORADO
Department of Transportation
Region 1

Example Memorandum

To: John Doe, Region 1 Transportation Director
From: Jane Doe, Resident Engineer, North Program
CC: Jessica Doe, Chief Engineer
Jared Doe, Director of High Performance Transportation Enterprise
Date: October 1, 2018
Subject: State Highway Corridor 789: Decision on Managed Lanes
Attachment: Managed Lanes Decision Form

Project Definition:
State Highway Corridor 789 in Smith County, Colorado has experienced significant growth in traffic due to the opening of the new distribution center and regional airport. Additionally, the crash in 2017 involving a commercial motor vehicle gathered noteworthy media attention. Smith County Commissioners have asked CDOT to conduct analysis and recommend transportation improvements to the corridor.

Process:
Region 1 staff reviewed the County's 10-year development plan for the business park. Additionally, Region 1 staff have reviewed the 2040 Regional Transportation Plan for State Highway Corridor 789. A scoping meeting was held on September 1, 2018 to discuss corridor safety, mobility and operational needs. Attendees included the Program Engineer, the Resident Engineer, the Traffic Engineer, the Project Engineer, a representative from the Project Management Office and the Regional Environmental Planner. Preparation of a Planning and Environmental Linkage Study was recommended for completion in early 2019 from Milepost 10 to Milepost 25 on State Highway 789.

Decision:
The Managed Lanes Decision Form was completed for the corridor and has been included as an attachment. The recommendation is to further evaluate a managed lanes strategy in the PEL for State Highway 789 in Smith County. If you have further questions, please contact Jane Doe, Resident Engineer at: (999) 999-9999 or Jane.Doe@state.co.us.