



**COLORADO**  
Department of  
Transportation

# TSM&O Evaluation

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REGION TRAFFIC REPRESENTATIVE TRAINING

Welcome to TSM&O Evaluation training. We plan to spend about an hour and a half providing you with information you will need as a Region Traffic Representative to effectively execute this process.

This is a recorded session, so I'd like to remind people to submit questions via zoom. We will have a few check points along the way to answer live questions.

I'd like to introduce everyone in the room that will participating in the training today.



## Optional File Download

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Would you like a copy of this file to reference?



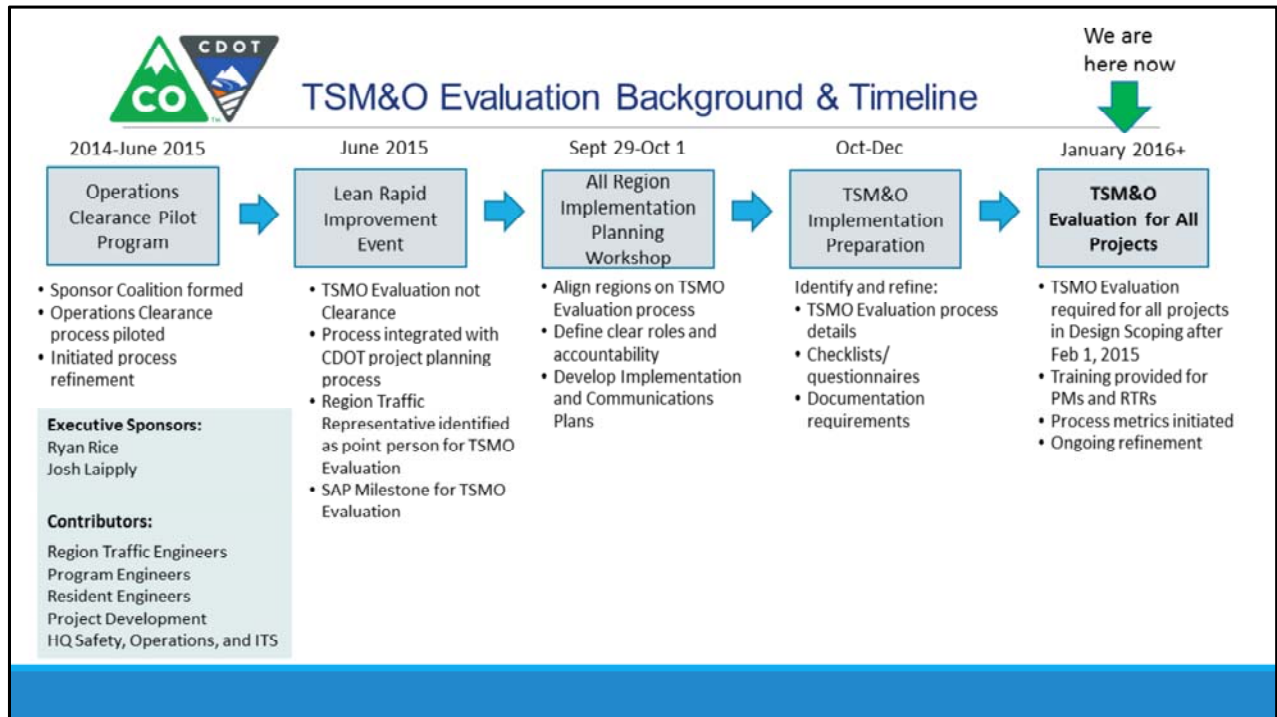
## Topics

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- TSM&O Evaluation Background & Timeline
- Why TSM&O Evaluation Process?
- What is the TSM&O Evaluation?
- Project Managers' Roles and Responsibilities
- Region Traffic Representatives' (RTR) Roles and Responsibilities
- Resources for the RTR

Please submit questions via  
Zoom to be addressed at  
the end of the section

Use Charles from PM training



Use PM training



## Why TSM&O Evaluation?



Colorado's front range population is projected to increase 50% by 2050 while freeways and older streets have little room for expansion.

-Sunday Denver Post, Dec. 20, 2015

- CDOT leaders have recognized that we cannot build our way out of future congestion and must employ new innovations, recognized improvement strategies and technology to safely move increased traffic volumes
- The purpose of the TSM&O Evaluation is to evaluate the project area and make recommendations to the project team that improves reliability, safety, quality of life, and traveler information
- Mobility and safety improvement and innovation is a national trend and CDOT is at the forefront of this movement

### TSM&O Video

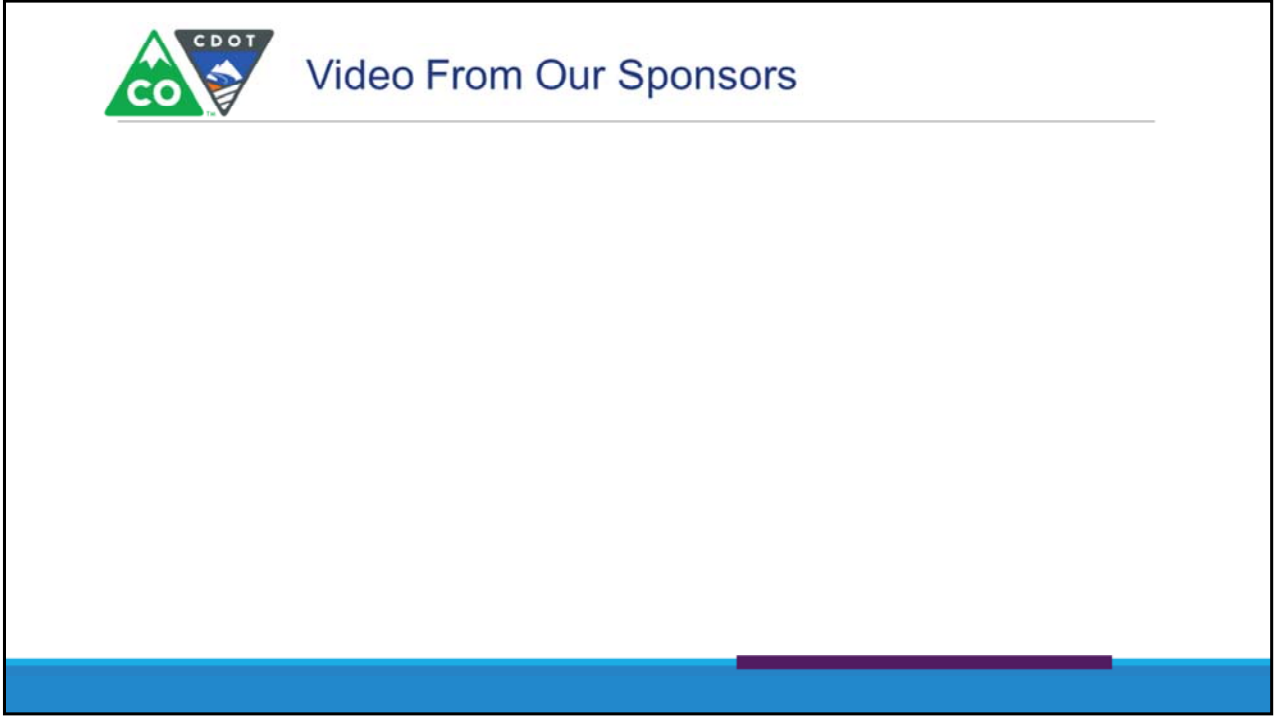
*Let's hear the perspective of CDOT executive sponsors Ryan Rice and Josh Laipply on this important initiative.*

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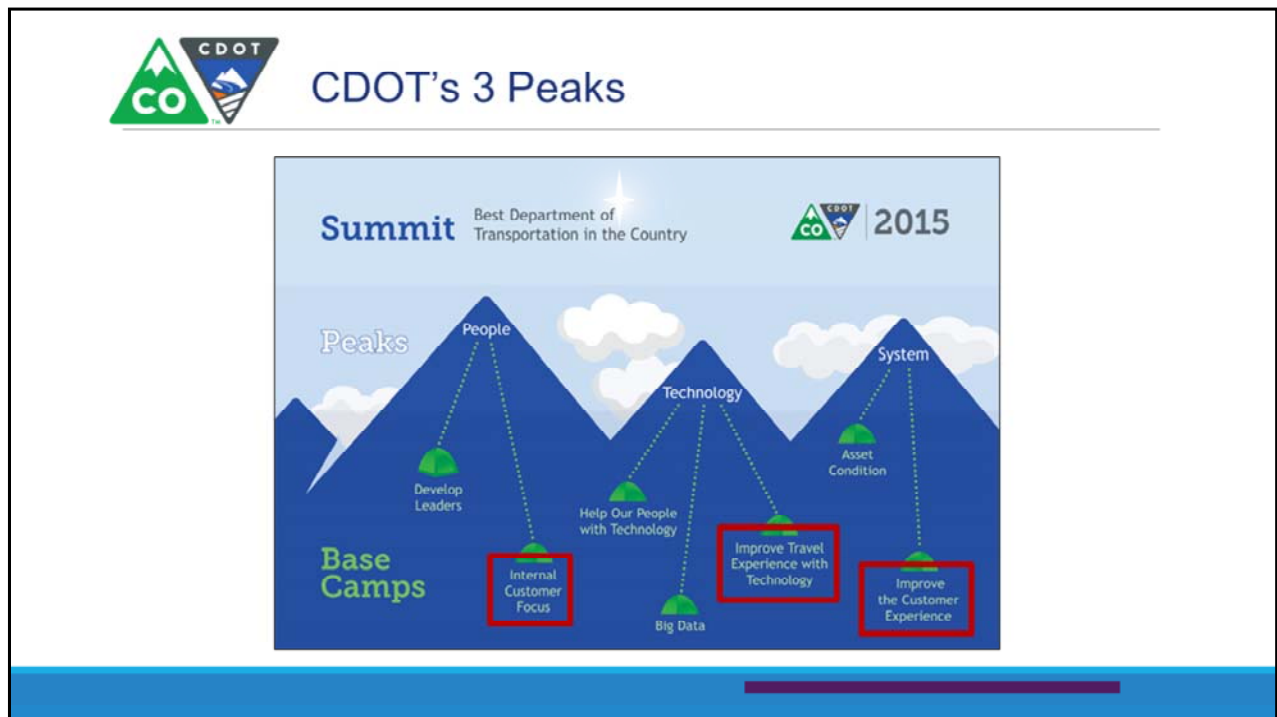


## Video From Our Sponsors

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We have all been hearing about CDOT's 3 Peaks. The TSM&O Evaluation spans across many initiatives and here is how they relate

Under the People Peak, improving upon our internal customer focus will expand the skills of our people by providing an understanding each others roles and responsibilities.

Under the Technology peak, recommendations will move us towards improving the travel experience using technology

Finally, under the System peak, the Evaluations will help improve the customer experience. Examples include better real-time travel information, improved reliability, and moving toward zero deaths

By considering safety, ITS, and operations early and throughout the design process, CDOT will optimize its limited resources to make the right decisions for transportation improvements and deliver the best projects possible for the public.



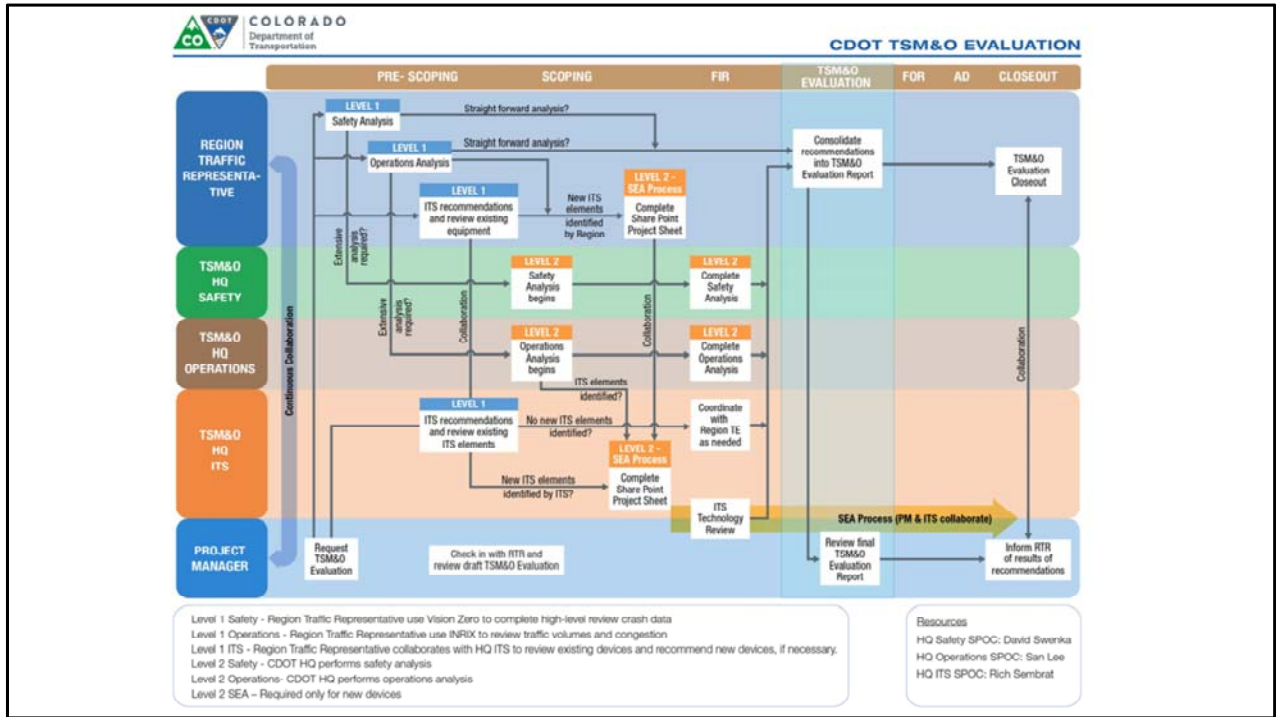
## What is a TSM&O Evaluation and when does it start?



- The Transportation Safety Management & Operations (TSM&O) Evaluation consists of three parts; Safety, Operations, and ITS analyses
- The TSM&O Evaluation Process is aligned with the CDOT Project Development Process and will be included in the manual
- The TSM&O Evaluation will evaluate the project area and make recommendations to the project team for improvements related to Safety, Operations, and ITS
- Beginning January 1, 2016 all projects with a Design Scoping Review on or after February 1, 2016 will require a TSM&O Evaluation.

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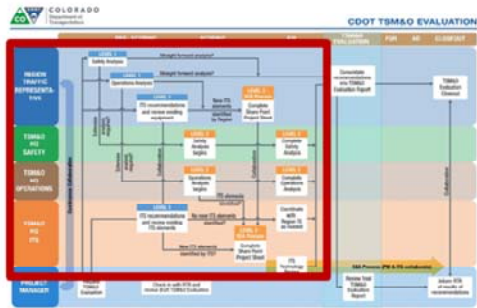




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## Who performs a TSM&O Evaluation?

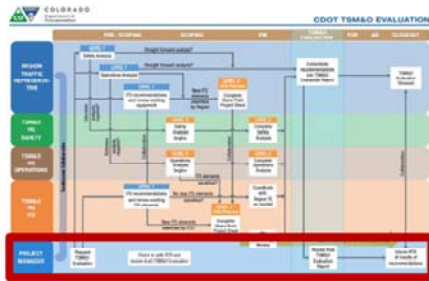


- The Region Traffic Representative (RTR) for a particular project will complete a Level 1 TSM&O Analysis
- Based upon the Level 1 analysis, the RTR may initiate a Level 2 analysis from HQ Support Groups
- If new or existing ITS devices are identified, a Level 2 ITS analysis will be required. For new ITS devices, a Level 2 ITS analysis may include a Systems Engineering Analysis (SEA), in accordance with FHWA requirements

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## Project Manager Responsibilities



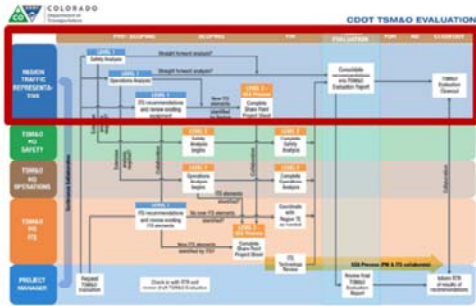
- Establish the TSM&O milestone in SAP
- Request TSM&O Evaluation
- Collaborate with RTR and review final TSM&O Evaluation Report
- Coordinate with RTR to complete TSM&O closeout

Note: See TSM&O Design Bulletin for details on how to establish the SAP milestone

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## RTR Responsibilities



- Setup the TSM&O Evaluation
- Perform Level 1 Safety, ITS, and Operations Analyses
- If the Region desires new ITS elements, then the RTR initiates the SharePoint project sheet.
- If necessary, request Level 2 Safety, ITS, or Operations Analysis
- Consolidate Recommendations into TSM&O Evaluation Report and transmit to PM
- TSM&O Evaluation Closeout

Start of Section 2.

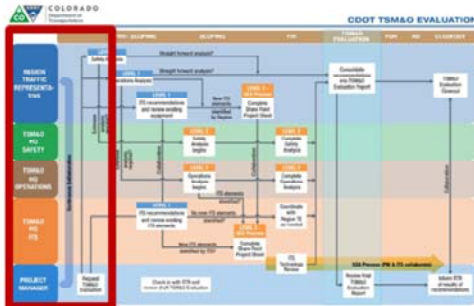
Script:

All right, let's get back to it. This is the start of the RTR specific training. In this section, we'll go over all of the RTR responsibilities during the TSM&O Evaluation process and how to conduct them. Check out the top row of the flow chart. First we'll tell you how to initiate and set up the TSM&O Evaluation, then how to perform the Level 1 Safety, ITS, and Operations Analyses, how to request a Level 2 Analysis and consolidate all recommendations into the final TSM&O Evaluation report. Finally, we will describe the TSM&O Evaluation closeout process that you as the RTR will conduct in cooperation with the project manager.

As a reminder, we will have a few check points along the way, so please keep submitting your questions. Here we go!



## Setup the TSM&O Evaluation



- PM will request TSM&O Evaluation via email
- The email request will be sent to the RTR Point of Contact (RTR POC) for the region, as well as the ITS POC
- The RTR POC will assign an RTR to conduct the TSM&O Evaluation



RTR POC: Copy the PM on the email assigning an RTR so the PM knows who is conducting the TSM&O Evaluation. If the RTR POC is conducting the TSM&O Evaluation, notify the PM.

- In SAP Timesheets, document all TSM&O Evaluation time spent by including Rec Order 200664
  - This is for tracking purposes only

The first step for the RTR is to set up the TSM&O Evaluation.

During the pre-scoping stage of the project, the Project Manager will send a TSM&O Evaluation Request to the Region Traffic Engineer Point of Contact (RTR POC). This will come to the RTR POC in the form of an email attachment. The RTR POC may act as the RTR and conduct the evaluation themselves, or may assign a different person.

It is important for the PM to know who is conducting the TSM&O Evaluation. We ask that the RTR POC notify the PM if they are conducting the TSM&O Evaluation themselves, or copy the PM on the email that assigns an RTR to the TSM&O Evaluation.

Additionally, please use the Rec Order 200664 in your timesheet any time you are working on the TSM&O Evaluation.



## Setup the TSM&O Evaluation

Create a TSM&O Evaluation Folder in the HQ TSM&O (TRAFTSMOEVAL) shared drive at:

<\\public\traftsmoeval\evaluations>

Folder Structure:

SHXXX\SHXXXX\_YYYYY-YYYYY\_(ZZZZZ)

XXX = State Highway Number

XXXX = State Highway Number and Section (e.g. SH070A, SH285D)

YYYYY = Milepoint Limits (e.g. MP 0.00 to MP 1.52 = 00000-00152, MP 90.50 to 112.00 = 09050-11200)

ZZZZZ = Project Sub Account Number (if not available, folder name will be SHXXXX\_YYYYY-YYYYY)

Save the TSM&O Evaluation Request in this folder



It is important to create the project folder and save the TSM&O Evaluation Request and TSM&O Evaluation spreadsheet upon receipt of the Request so that ITS is able to begin their analysis.

Once the RTR is assigned and the RTR receives the TSM&O Evaluation Request from the PM, the process can be initiated.

The first step is for the RTR to create the folder where ALL TSM&O Evaluation related materials will be saved. This folder will be used throughout the TSM&O Evaluation lifecycle.

The RTR should access the intranet and navigate to the folder shown in the slide. In the "Evaluations" folder, there is already a folder created for each state highway in Colorado. Navigate to the state highway for your TSM&O Evaluation. This is signified with the SHXXX forward slash in the folder path shown in the slide.

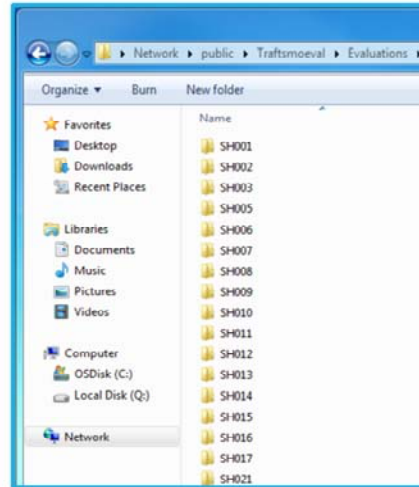
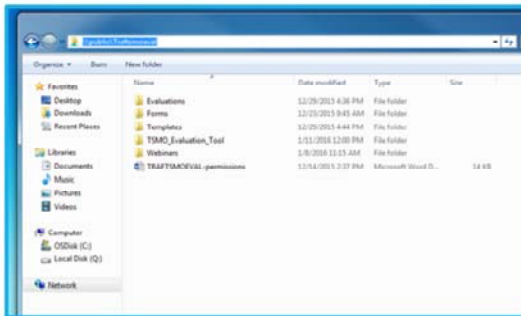
In the appropriate SHXXX folder, create a new folder for the TSM&O Evaluation. The folder naming convention is shown in the slide. It is important to follow this naming convention and use the Highway, Section, Milepoint limits, and Project Subaccount number, because this folder name will be used to search and find TSM&O evaluation recommendations.

Once the folder is created, save the TSM&O Evaluation Request in the folder. Next

step!



## Setup the TSM&O Evaluation



Here are some screenshots of the headquarters folder structure. If you follow the link on the main page, you will be taken to the folder structure on the left. The folder structure on the right shows the state highway folders where the RTR will create the TSM&O Evaluation Folder





## Setup the TSM&O Evaluation

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Download the latest version of the TSM&O Evaluation spreadsheet tool at:

<http://cdot.dot.state.co.us/business/tsm-o/evaluation/resources>



Always download the latest version. The tool will be updated as corrections are identified.

Save the **TSM&O Evaluation Spreadsheet Tool** in the **TSM&O Evaluation Folder**

Script: Once the project folder has been created, you will need to download the TSM&O Evaluation spreadsheet tool. We ask that you download a new copy of this spreadsheet from the CDOT website before beginning a new project because we will be placing new versions online as it is refined over time. Next, save a copy of the spreadsheet tool in your project folder.



## Setup the TSM&O Evaluation

Open the TSM&O Evaluation Tool

Review and reference the Instructions Tab as needed throughout the process



**Make sure the TSM&O Evaluation Request is saved in the same folder and closed**

- Click on the Project Information Tab
- Click “Retrieve Data”
- Navigate to current folder
- Click “OK”
- Data fills in automatically
- Fill in the Request Date (the date of the request email)

Transportation Systems Management & Operations  
Evaluation Request Form

Request Date: \_\_\_\_\_

Region: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Email Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Subaccount #: \_\_\_\_\_

Project Description: \_\_\_\_\_

Project Type: \_\_\_\_\_

Scoping Date: \_\_\_\_\_

Highway: \_\_\_\_\_

Section: \_\_\_\_\_

Begin MP: \_\_\_\_\_

Ending MP: \_\_\_\_\_

Program Engineer: \_\_\_\_\_

Resident Engineer: \_\_\_\_\_

Region Traffic Representative: \_\_\_\_\_

ITS Representative: \_\_\_\_\_

Provide project scope and any special notes: \_\_\_\_\_

Primary funding sources/provider codes: \_\_\_\_\_

Participating (federal) funds: \_\_\_\_\_

Existing ITS devices: \_\_\_\_\_

New/replace ITS devices: \_\_\_\_\_

Description of existing or new ITS devices: \_\_\_\_\_

Retrieve data

Clear data

Instructions Project Information **Safety Review** ITS Review Operations Review Operations Level 2 Cover Recommendations

Now it is time to open the TSM&O Evaluation spreadsheet tool. The first tab holds instructions for using the tool that can be referenced at any time throughout the process.

The second tab, “Project Information” is shown on the screen. In order to avoid duplicating work, you can pull in the information from the TSM&O Evaluation Request Form that the Project Manager sent you into this sheet automatically. Simply click the blue “Retrieve data” button and navigate to your project folder where you saved the TSM&O Evaluation Request Form. Click on that folder and click “OK.” The information from the Request Form should automatically fill in the blanks. The last step on this page is to fill in the Request Date, which is highlighted in orange. You should use the date on the email where you received the TSM&O Evaluation Request Form.



## Setup the TSM&O Evaluation

Populated Project Information Tab

Transportation Systems Management & Operations Evaluation Request Form	
Request Date:	10/15/2015
Region:	3
Project Manager:	John Doe
Email Address:	john.doe@state.co.us
Phone:	111-111-1111
Subaccount #:	10124
Project Description:	Project Number STU 1211-085 is a resurfacing project from 19th Avenue to 4th Avenue (MP 8.5 - MP 12.2) in Lakewood, CO.
Project Type:	Resurfacing
Starting Date:	1/7/2016
Highway:	121
Section:	A
Begin MP:	8.5
Ending MP:	12.2
Program Engineer:	Jane Doe
Resident Engineer:	Ben Kane
Region Traffic Representative:	St. Clair Roberts, Alizar Terfay, Levi Roguier Rich Sembert
ITS Representative:	
Provide project scope and any special notes:	Resurfacing project from 19th Avenue to 4th Avenue (MP 8.5 - MP 12.2) in Lakewood, CO. This contract includes all possible design disciplines potentially needed as this design project progresses. The Department may elect to perform portions of the design in-house. Design work for this corridor shall be completed under this contract; however, CDOT anticipates the corridor may be divided into smaller projects for design and construction, as determined by the design team and available funding. The project is located in Jefferson County.
Primary funding sources/provider codes:	Unkington
Participating (Federal) funds:	No
Existing ITS devices:	Yes
New/replace ITS devices:	No
Description of existing or new ITS devices:	CCTV-6-04-121-Alameda-MM 8.85

Retrieve data

Clear data

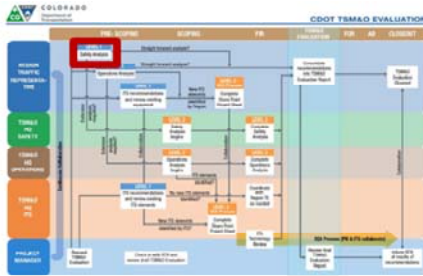
Script:

This is what the populated project information tab should look like.

You are now ready to begin your evaluation!



# Perform Level 1 Safety Analysis



**SAFETY ANALYSIS - General Information**

Name of ERS being put this form: \_\_\_\_\_  
 Project ID/ID# \_\_\_\_\_

**Level 1 Safety Analysis**

	Begin Mile	End Mile	Ramp	Comments	Recommendations	Check Box if Level 2 Analysis is Recommended
<p>The following seven questions are standard recommendations that are found in all safety assessments. Please answer these questions based on your review of the corridor. If you answer any two or more of the questions, add detail in the recommendations column.</p> <p>Does the roadway need to be resurfaced to maintain good condition and drainage of the roadway surface? <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A</p> <p>Does the existing guardrail need to be adjusted, repaired, or upgraded to meet current standards? <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A</p> <p>Does a safety edge need to be applied to eliminate pavement edge drop-offs? <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A</p> <p>Does the super-elevation or crown need to be corrected? <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A</p> <p>Do existing pavement markings, signing, and delineation need to be replaced or improved? <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A</p> <p>Do alternate warning signs for curves need to be installed? <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A</p> <p>Do the bottom reflectors and guardrail reflectors need to be replaced to ensure good exposure and reflectance whether they are: (a) retro-reflective, (b) reflective, or (c) non-reflective? <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A</p> <p>Did you add crash data from recent years? Remember to save the Project Data report in the project folder. <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A</p> <p>Did you investigate any patterns in the data that you can solve in the Level 1 Safety Analysis? <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A</p> <p>Use comments in the recommendations column (see # 6) to add detail and recommendations for improvement in the recommendations column (see # 6) to add detail or to remove any detail.</p> <p>If Level 2 Safety Analysis necessary? If so, please describe specific items you would be studied in the assessments column.</p>						
<p><b>Level 2 Safety Analysis</b></p> <p>Subtotal: <input type="text"/> Safety Analysis: <input type="text"/> TSM&amp;O: <input type="text"/> Project Information: <input type="text"/> Other: <input type="text"/></p>						

Let's now turn our attention to each analyses in the TSM&O Evaluation Process.

We'll begin with the the Safety Analysis portion of the TSM&O Evaluation. This is the 3<sup>rd</sup> tab on the spreadsheet tool. Ideally, the Level 1 Safety Analysis will be completed before scoping.



## Perform Level 1 Safety Analysis

- Fill out your name and the date the form was started
- Answer each question with “Yes”, “No”, or “N/A”
- Pull crash data from Vision Zero and store the report in the TSM&O Evaluation Folder
- Add specific Recommendations in the “Recommendations” column
- Other relevant information may be added to the “Comments” column
- If you would like a Level 2 Safety Analysis for any of the topics:
  - Check the box in the last column
  - Write **specific** topics for analysis in the “Comments” column

Project Name	End Date	Route	Comments	Recommendations	Check box if Level 2 Analysis is necessary

Split into two slides with different graphics?

Any specific instructions besides pull crash data from vision zero? Do you want to tell them to perform the analysis?

You will start the Level 1 Safety Analysis by filling out your name and the date that the analysis was started. We ask that you complete these boxes for project tracking purposes.

Next, answer each question using the option buttons for “Yes,” “No,” or “Not Applicable (N/A).” Add specific recommendations for the project in the “Recommendations” column. A special feature that is only present in this tab is that if you click “Yes” to any of the first seven questions, a recommendation auto-populates in the recommendations column. You are free to change the text or remove it if you’d like to. Any other relevant information that is not a recommendation can be added under the “Comments” column.

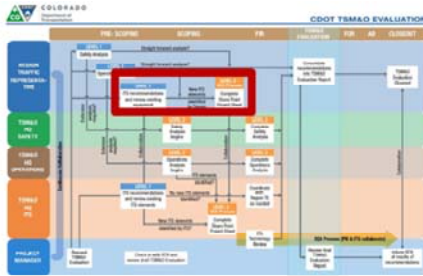
The first seven questions in the Level 1 Safety Analysis relate to typical recommendations that could be found on most Safety Assessments. They ask about

topics like guardrail, existing pavement markings, roadway surface, etc. The last two questions ask about the VisionZero reports. To answer these questions, you'll need to study the existing crash data in VisionZero and identify any crash patterns, if possible.

If you would like to initiate a Level 2 Safety Analysis (which would be similar to an existing Safety Assessment), check the box in the far right column. Any specific topics that you would like studied in the Level 2 Safety Analysis should be noted in the "Comments" column. From here, you will need to work with CDOT Headquarters Staff to determine who will complete the report.



## Perform Level 1 ITS Analysis



The screenshot shows the 'Level 1 ITS Analysis' form. It includes a table for recording information and a section for recommendations.

Begin MP	End MP	Ramp	Comments	Recommendation	Check box for inclusion in Level 2 analysis
The following information has been pre-filled based on the TSM&O Evaluation Request.					
Please update and add details as necessary.					
Are there existing ITS infrastructure/devices (including traffic signals or ramp meters) within the project limits? If yes, Level 2 ITS Review is required.					
If yes or unknown, begin Project information sheet in Recommendation for Level 2 ITS Review.					
Is the project implementing or replacing new ITS infrastructure/devices (including traffic signals or ramp meters)? If yes or unknown, begin Project information sheet in Recommendation for Level 2 ITS Review.					
Add existing or new ITS devices in spreadsheet column. Click to add text or to remove extra text.					
<b>THE FOLLOWING SECTION IS FOR ITS TO FILL OUT</b>					
Are there existing ITS devices in the comments column? * to add text or to remove extra text.					
<input type="checkbox"/> Yes <input type="checkbox"/> No					
Are there any ITS infrastructure/devices that are being recommended (including traffic signals or ramp meters)?					
<input type="checkbox"/> Yes <input type="checkbox"/> No					
List the recommended infrastructure/devices in the recommendations column. Click to add text or to remove extra text.					
Level 2 ITS Analysis					
Add the recommendations from the Level 2 ITS analysis in the recommendations column. Click to add text for each recommendation.					

Script: Now we will move on to the ITS Analysis portion of the TSM&O Evaluation. This is the 4<sup>th</sup> tab on the spreadsheet tool. Similar to the Safety Analysis, the Level 1 ITS Analysis should be completed as soon as possible. With this analysis, it is imperative to get it done in advance because FHWA may need to review the project and provide additional comments or recommendations.



## Perform Level 1 ITS Analysis

- Fill out your name and the date the form was started
- Some of the cells will auto populate from the Project Information tab. These may be overridden at the discretion of the RTR.
- List all existing ITS infrastructure on the corridor
- If there is new or existing ITS infrastructure, a Level 2 review is required.
- If a Level 2 ITS review is required, provide specific instructions in the Comments column
- If the Region would like new ITS infrastructure, the RTR will initiate the Sharepoint project information sheet

ITS ANALYSIS - General Information						
Name of ITS Form: _____						
Form start date: _____						
Level 1 ITS Analysis						Check box for inclusion in Level 2 analysis
	Begin date	End date	Rating	Comments	Recommendations	
The following information has been pre-filled based on the TMS&I Evaluation Request. (Please update and add details as necessary.)						
Are there existing ITS infrastructure/devices (including traffic signals or ramp meters) within the project limits? (Yes, Level 2 ITS Review is required) / No, Level 2 ITS Review is not required. (If you are uncertain, begin Project Information Sheet in Sharepoint for Level 2 ITS Review)						<input type="checkbox"/>
Is the project implementing or replacing new ITS infrastructure/devices (including traffic signals or ramp meters)? (If yes or uncertain, begin Project Information Sheet in Sharepoint for Level 2 ITS Review)						<input type="checkbox"/>
Let existing or new ITS devices in comments column. Use + to add rows or - to remove extra rows.						
<b>THE FOLLOWING SECTION IS FOR ITS TO FILL OUT</b>						
Are there existing ITS infrastructure/devices (including traffic signals or ramp meters) within the project limits?						<input type="checkbox"/> Yes <input type="checkbox"/> No
Let the existing ITS devices in the comments column. Use + to add rows or - to remove extra rows.						
Are there any ITS infrastructure/devices that are being recommended (including traffic signals or ramp meters)?						<input type="checkbox"/> Yes <input type="checkbox"/> No
Let the recommended infrastructure/devices in the recommendations column. Use + to add rows or - to remove extra rows.						
Level 2 ITS Analysis						
Add the recommendations from the Level 2 ITS analysis in the recommendations column. Use + to add rows for each recommendation.						

As with the Safety Analysis, begin the Level 1 ITS Analysis by filling out your name and the date that the analysis was started.

The Level 1 ITS Analysis asks about the presence of existing ITS infrastructure or devices, or if the project plans to install or replace infrastructure or devices. These questions will be initially answered by the PM in the Evaluation Request Form, so the answers the PM provided will autopopulate in this tab. As the RTR, you can change the answers to these questions, as necessary. If you know of any existing or proposed devices within the project limits, you are required to begin the SharePoint Project Sheet. This includes existing or proposed signals or ramp meters – if there are any signals or ramp meters within project limits, you will need to begin the SharePoint Project Sheet for these types of devices as well.

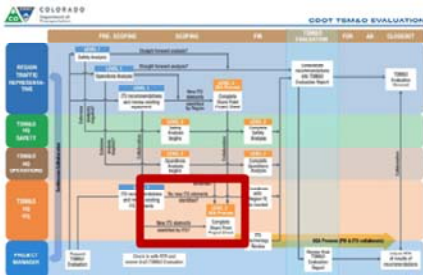
Next you can add specific recommendations for the project in the “Recommendations” column. Any other relevant information that is not a recommendation can be added under the “Comments” column.





## Perform Level 1 ITS Analysis

- ITS will report if there are existing infrastructure/devices within project limits and find out if anyone within their group would like to recommend any new devices.
- A SharePoint Project Sheet must be started by the RTR if there are existing infrastructure/devices within project limits. ITS will complete the SharePoint Project Sheet if there are any new devices they are recommending
- The SharePoint Project Sheet can be found at: <http://connects/sites/TSMO/ITSEval/SitePages/Home.aspx>



THE FOLLOWING SECTION IS FOR ITS TO FILE ONLY	
Are there existing ITS infrastructure/devices (including traffic signals or ramp meters) within the project limits?	<input type="radio"/> Yes <input type="radio"/> No
List the existing ITS devices in the comments column (use + to add rows or - to remove extra rows)	
Are there any ITS infrastructure/devices that are being recommended (including traffic signals or ramp meters)?	<input type="radio"/> Yes <input type="radio"/> No
List the recommended infrastructure/devices in the recommended row column (use + to add rows or - to remove extra rows)	

### Script:

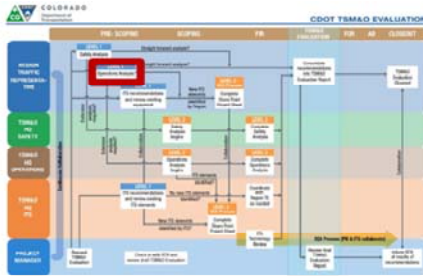
Looking back at the process flowchart, the PM sends the TSM&O Evaluation Request to ITS at the same time that they send it to the RTR. ITS will consult with their database and report any existing infrastructure or devices within the project limits in the gray section of this sheet. If there are known existing devices, ITS will also notify you to begin the SharePoint Project Sheet.

They will also circulate the Evaluation Request within their group to see if any managers want to suggest adding a device. They will be given 5 business days to provide comments or recommendations in the spreadsheet.

Again, if there are any existing devices or infrastructure within project limits, you, the RTR, are required to begin the SharePoint Project Sheet. However, if ITS recommends any new infrastructure or devices, they will begin the SharePoint Project Sheet. If ITS managers do not want to add a device, ITS will notify you that Level 1 Analysis for ITS has no elements identified.



# Perform Level 1 Operations Analysis



The screenshot shows the 'OPERATIONS ANALYSIS - General Information' form. It includes a 'Project Info' section with fields for 'Project Name', 'Project Number', and 'Project Location'. Below this is the 'Level 1 Operations Analysis' section, which contains a 'Purpose' statement and a 'Checklist for Data and Modeling'. The checklist includes items such as 'Are there any special events in the area that might affect peak traffic?' and 'Are there any traffic design issues that may impact operations?'. Each item has radio buttons for 'Yes', 'No', or 'N/A'. The form also includes a table for 'Data and Modeling' with columns for 'Item ID', 'Item Name', 'Comments', 'Recommendations', and 'Check Item to include in final report?'. The bottom of the form features a navigation bar with buttons for 'Project Information', 'Safety Analysis', 'ITS Analysis', 'Operations Analysis', 'Performance of Level 1', and 'Recommendations'.

Let's move on to the Operations Analysis portion of the TSM&O Evaluation. This is the 5<sup>th</sup> tab on the spreadsheet tool. Once again, it is important to get the Level 1 Analysis complete by scoping.



## Perform Level 1 Operations Analysis

- Fill out your name and the date the form was started
- Answer each question with “Yes”, “No”, or “N/A”
- Save relevant traffic data (INRIX, OTIS, etc) in the **TSM&O Evaluation Folder**
- Add specific Recommendations in the “Recommendations” column
- Other relevant information may be added to the “Comments” column
- If you would like a Level 2 Operations Analysis for any of the topics:
  - Check the box in the last column
  - Write **specific** topics for analysis in the “Comments” column
- The tab titled “Operations Level 2 Cover” will be used as the cover page to the Level 2 Operations Analysis

Once again, you will start the Level 1 Safety Analysis by filling out your name and the date that the analysis was started.

Just like the Safety Analysis, answer each question using the option buttons for “Yes,” “No,” or “Not Applicable (N/A).” Add specific recommendations for the project in the “Recommendations” column. Any other relevant information that is not a recommendation can be added under the “Comments” column.

If you would like to initiate a Level 2 Operations Analysis check the box in the far right column for any specific topics that you would like studied in the Level 2 Operations Analysis. Please add detail on what you would like studied in the “Comments” column. We will discuss the Level 2 Analysis more later in the training.



# Perform Level 1 Operations Analysis

- Data and Modeling

Data and Modeling	Begin Mile	End Mile	Name	Comments	Recommendations	Check box to include in Level 1 analysis
Are there any count stations in the area that highlight specific peak traffic times?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
Are there any traffic design issues that may impact operations identified in Form 400?	<input type="radio"/> Yes <input type="radio"/> No					<input type="checkbox"/>
If Yes, list here and identify if they were addressed (describe in comments column and/or add recommendations in recommendations column). Use + to add rows or - to remove extra rows.						
Review existing and future proposed traffic data using <a href="#">OTIS</a> .						<input type="checkbox"/>
<b>CONDS and <a href="#">CDOT</a> are there</b>						
Identify any patterns in the project area?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
Recurring, daily congestion patterns?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
Recurring, seasonal congestion patterns?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
Non-recurring or special event congestion?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
Operational issues related to heavy vehicles (e.g., turning, lane changes)?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
Operational issues related to specific turning movements?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
Directional peak hour traffic volumes that represent one another?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
Significant queue and reposition users present or other issues?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
Planning Time Index values higher than expected compared to similar facilities?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
Travel Time Index values higher than expected compared to similar facilities?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
Other (describe in comments column and/or add recommendations in recommendations column). Use + to add rows or - to remove extra rows.						
Does the scope and complexity of the project warrant further analysis of traffic, including, data, and CD with any of the following tools?	<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> N/A					<input type="checkbox"/>
If Yes, list data here						
Traffic Analysis Software: <a href="#">Synchro</a> , <a href="#">Traffic</a> , <a href="#">Vissim</a>	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					
	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A					

Let's look closer at the Level 1 Operations Analysis.

The Level 1 Operations Analysis is broken up into 4 sections and is based on the original operations checklist that was created early in the formation of this process.

The first section is Data and Modeling. These questions refer to the existing traffic data and if there are any recognizable patterns. Throughout this tab, there are links to helpful website that may aide in answering these questions. In this section there is a link to OTIS and INRIX. Both of these sites have different and valuable traffic data that can help indicate peak travel times, potential bottlenecks, and more. We will have additional training on these sites, and others mentioned today, in the future.



# Perform Level 1 Operations Analysis

- Operational, Geometric, and Road User Conditions

Operational, Geometric, and Road User Conditions	Begin MP	End MP	Ramp	Comments	Recommendations	Check box to include in Level 2 analysis
Can improvements to lane geometry be made to better serve existing and future traffic demand?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A			<input type="checkbox"/>
Can the current project incorporate signing and striping improvements to improve positive guidance (see <a href="#">CDOT Signing and Striping Handbook</a> )?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A			<input type="checkbox"/>
Can intersection or roadway geometry and cross-section elements be enhanced to better accommodate unique users (heavy trucks, tractors, recreational vehicles)?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A			<input type="checkbox"/>
Can improvements to the roadway specific to <a href="#">Bikes and Pedestrians</a> be included within the scope of the project?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A			<input type="checkbox"/>
Can improvements to how the roadway connects/integrates into the existing roadway, i.e., lane configurations and lane merge/diverge with existing upstream and downstream traffic be incorporated into the project?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A			<input type="checkbox"/>
Has appropriate consideration been given to the limits at each end of the project?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A			<input type="checkbox"/>
Is there an opportunity to incorporate transit improvements (bus pullouts, concrete pads) with the project?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A			<input type="checkbox"/>
Are there opportunities to improve or modify railroad crossings or bridges within the project boundaries?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A			<input type="checkbox"/>
Are there opportunities to provide or improve the following features: Turn-Around points, Staging areas, Debris Flow areas, Avulsion (delta) areas, and Slopes for vegetation?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A			<input type="checkbox"/>
Are there elements of the project that warrant consideration of the <a href="#">CDOT Work Zone Safety and Mobility</a> procedures as part of the signing efforts? <small>If yes, please explain and describe if they were addressed?</small>	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A			<input type="checkbox"/>
Other (describe in comments column and/or add recommendations in recommendations column). Use + to add rows or - to remove entire row.						<input type="checkbox"/>

The next section is Operational, Geometric, and Road User Conditions.

The questions in this section relate to the existing geometric conditions and ask if there are opportunities to improve, in order to solve operational issues on the project. Some examples of improvement opportunities that could be leveraged on your project are bike and ped upgrades, staging or debris flow areas, intersection geometry, etc.



## Perform Level 1 Operations Analysis

- Operational Strategies
  - Click on the green + button to view additional strategies will appear under that category

Operational Strategies (Refer to Strategies List)						Begin MP	End MP	Ramp	Comments	Recommendations	Check box to include in Level 2 analysis
<p>Please review the following list of operational improvement types, which includes example projects and strategies that could potentially be initiated as a part of the project. The following strategies may require additional study that may not be possible to complete until later in the scoping process.</p> <p>If applicable to the current project, or if they would apply to a future project, should the following strategies be considered? <b>Click the green button to see more strategies or the gray button to remove rows.</b></p>											
Traffic Signal Optimization <span style="float:right">- +</span>											<input type="checkbox"/>
Select one of the following:											
<b>Expand the following:</b>											
Retime corridor						<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="checkbox"/>
Remove unnecessary signal phases						<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="checkbox"/>
Adaptive control						<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="checkbox"/>
Right-turn overlays						<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="checkbox"/>
PIA						<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="checkbox"/>
Lane Assignment <span style="float:right">- +</span>											<input type="checkbox"/>
Road Diets <span style="float:right">- +</span>											<input type="checkbox"/>
Shoulder Widening <span style="float:right">- +</span>											<input type="checkbox"/>

The 3<sup>rd</sup> section, operational strategies, hold a series of strategies that Muller Engineering created that could help traffic operations in your project. The bold text is a topic and by clicking on the green plus button you can see additional strategies that relate to the main topic.

If you think any of these strategies could help improve traffic operations within the project limits, on this project or a future one, select it from the drop down list and add comments and recommendations. If you would like any of the topics to be studied as part of the Level 2 Operations Analysis, click the box on the right.

...Nate expand here?



## Perform Level 1 Operations Analysis

- Coordination and Collaboration

Coordination/Collaboration	Region MP	State MP	Range	Comments	Recommendations	Check box for include in Level 2 analysis
<p>This field from applicable internal CDOT stakeholders related to capacity, safety, mobility, and maintenance on the project corridor have been requested and documented?</p>						
Incident Manager at Project Area	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="checkbox"/>
Operations Operations Manager	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Region Access Manager	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
OTAC (or other operations centers, if applicable)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Maintenance Supervisor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Public Information Officer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Project Managers of Adjacent Projects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Special Events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Varies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Region Area & Districtal Representatives*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
<p>Other (describe in comments column and/or recommendations or recommendations column). Use + to add rows or - to remove entire rows.</p>						
<p>Considering the scope and complexity of the project, the field from applicable external stakeholders been requested and documented?</p>						
City and County Agencies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			<input type="checkbox"/>
Transport Agencies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
MPO and TPO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
School Districts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Local Businesses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Local Businesses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Special Events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Varies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
<p>Other (describe in comments column and/or recommendations or recommendations column). Use + to add rows or - to remove entire rows.</p>						

The last section is coordination and collaboration. This section lists potential stakeholders (internal and external to CDOT) that may have input for the project to improve capacity, safety, mobility, and/or maintenance along the project.

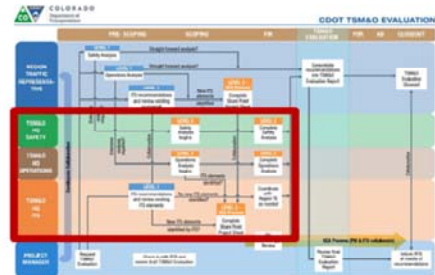
Depending on the scope and complexity of the project, it may or may not be necessary for you to contact all of the stakeholders listed in this section. Your project manager may have some insight into who would be valuable to connect with from this list as well.

That is the conclusion of the Level 1 Operations Analysis. Remember, if you would like to initiate a Level 2 Operations Analysis check the box in the far right column for any specific topics that you would like studied in the Level 2 Operations Analysis and work with HQ to determine who would be the best individual to complete this document.



## Requesting a Level 2 Analysis

- To request a Level 2 Safety Analysis, transmit the completed form to David Swenka
- To request a Level 2 ITS Analysis, transmit the completed form to Rich Sembrat
- To request a Level 2 Operations Analysis, transmit the completed form to San Lee
- Save completed Level 2 Analysis and supporting documentation in the TSM&O Evaluation folder.



In each section of the TSM&O evaluation, the RTR may want a more in depth analysis of a particular topic. As previously described, the RTR will check the box requesting a Level 2 analysis, and use the comments section to describe in what they would like analyzed.

The completed TSM&O Evaluation Tool is then transmitted to each appropriate party to initiate the Level 2 analysis. David Swenka for Level 2 safety, Rich Sembrat for Level 2 ITS, and San Lee for Level 2 Operations.

Level 2 analysis for Safety, ITS, and Operations will be supported by the TSM&O branch.

Once the completed Level 2 Analysis are received, the RTR should save the files and supporting documentation in the TSM&O Evaluation folder.





## Inserting Level 2 Analysis Recommendations

Level 2 Safety Analysis	Begin MP	End MP	Ramp	Comments	Recommendations
Add the recommendations from the Level 2 Safety Analysis in the <b>recommendations</b> column. Use + to add rows for each recommendation. <input type="button" value="+"/>					

Level 2 ITS Analysis	Begin MP	End MP	Ramp	Comments	Recommendations
Add the recommendations from the Level 2 ITS Analysis in the <b>recommendations</b> column. Use + to add rows for each recommendation. <input type="button" value="-"/> <input type="button" value="+"/>					

Level 2 Operations Analysis	Begin MP	End MP	Ramp	Comments	Recommendations
Add the recommendations from the Level 2 Operations Analysis to the <b>recommendations</b> column. Use + to add rows for each recommendation. <input type="button" value="+"/>					



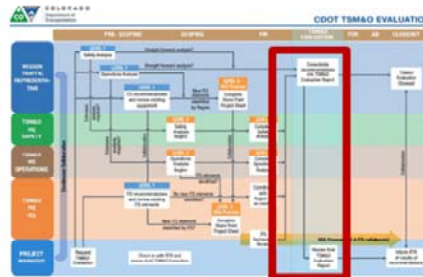
It is the responsibility of the RTR to insert recommendations from Level 2 Safety, ITS, and Operations recommendations into each tab in the **TSM&O Evaluation Tool**

It is the responsibility of the RTR to insert recommendations from Level 2 Safety, ITS, and Operations analysis into each tab in the **TSM&O Evaluation Tool**.

Safety, ITS, and Operations recommendations are inserted into the appropriate column, and rows may be added as necessary.



## Consolidate Recommendations into TSM&O Evaluation Report and transmit to PM



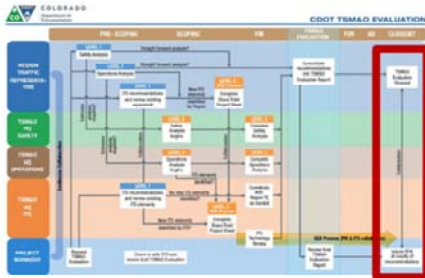
Now that all Safety, ITS, and Operations recommendations are inserted into each tab of the TSMO Evaluation Tool, we are ready to consolidate recommendations into the TSM&O Evaluation Report.

As you can see from the flow chart, we are nearing the end of the process. At this point, the RTR has conducted the necessary Level 1 analysis (using the tool), and the RTR has received all requested Level 2 Analysis from supporting staff at TSM&O.





## TSM&O Evaluation Closeout



- At project advertisement, the PM will notify the RTR of which TSM&O recommendations were incorporated into the project design
- The RTR will complete the TSM&O Evaluation and file it for future use

After receiving the completed TSM&O Evaluation, the PM will coordinate with all parties necessary to determine if recommendations can be funded and implemented. The RTR may be consulted during this process...so don't forget your recommendations too quickly!

Shortly after project advertisement, the PM will notify the RTR of which recommendations were funded, and which will be constructed.

The next slide shows what the RTR should do with this information.





## Resources to Support the RTR

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### HQ TSM&O:

Safety- David Swenka  
Operations- San Lee  
ITS- Rich Sembrat

Consultant support

### Project Development:

Neil Lacey  
Ryan Sorensen

There is a significant support group that has been involved in the development of the TSM&O Evaluation Process. That group isn't going away, and will be in place to support the RTRs as they start performing the TSM&O Evaluations.

Besides your respective traffic engineers, David Swenka, San Lee, and Rich Sembrat are available to assist with process related questions, as well as processing the Level 2 analysis requests.



## Wrap Up and Next Steps

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- Training acknowledgement
- Survey
- Next Steps
  - Consult the January 2016 TSM&O Evaluation Design Bulletin for detailed information
  - Be prepared to perform TSM&O Evaluations for projects in design scoping after Feb 1

Note: This training is required for all CDOT Region Traffic Representatives. We will record the names of participants to add to the CDOT training records following the session. Please make sure that we have your name as a participant.

Here are the next steps we are asking of you....

To take credit for this webinar, please take the survey that will be emailed out soon. We are also working to incorporate this in CDOT's SAP learning portal.

As your next steps, please print out the workflow for reference and consult the Design Bulletin for detailed information.

Also, please be prepared to perform the TSM&O Evaluations for all projects scoped after February 1<sup>st</sup> !

Charles, any final words before we proceed?



Thank You

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Thank you!

Insert Charles slide.