



## **Incorporating Resiliency into a Planning and Environmental Linkages (PEL) Study December 14, 2022**

This memo is intended to document the process of incorporating resiliency into a PEL. Once the South Powers Blvd. Extension PEL Case Study is complete, and there is a better understanding of the steps necessary to incorporate resiliency, a chapter describing the steps will be prepared and incorporated into the PEL Handbook.

### **Background:**

CDOT's Policy Directive 1905.0, "Building Resilience into Transportation Infrastructure and Operations" became effective November 15, 2018, which required implementation of the principles of resiliency into Colorado's transportation system practices. To help put this Policy into action, CDOT embarked on a project, "Integrating Resiliency at CDOT", to demonstrate how information about risk and resiliency can be incorporated into day to day CDOT activities and/or daily business practices.

CDOT established an Executive Oversight Committee (EOC) comprised of members of CDOT's Executive Management Team and FHWA to help guide the project and will play a key role in implementing any recommendations from this Case Study.

Subject Matter Experts (SMEs) were selected to participate in a Case Study to develop a process and document how resiliency should be incorporated into a PEL. They are using a current PEL Study (South Powers Blvd. Extension) as a test case to accomplish this task. By utilizing a current PEL, CDOT will be able to validate and provide a proof of concept for the process. This Case Study is ongoing as of the date of this memo and updates to the PEL Handbook will be made once the Case Study is completed.

### **Need:**

CDOT's goal is to proactively manage risks, minimize disruptions to their transportation system and adapt to changing conditions in order to provide continuous transportation service in Colorado. Natural hazards are the leading threat to CDOT's infrastructure both in cost to the assets CDOT owns as well as risks to the Users of their system. Given the increasing prevalence of extreme weather events in Colorado, planning for resiliency is the first step in reducing that risk and should be assessed as part of the PEL process.

### **Process:**

#### **Who starts resiliency discussion**

- The Agency managing the PEL should incorporate resiliency in the scope of work (if hiring a consultant) or the project workplan if being managed by the Agency.
- CDOT (if involved) and local agencies should be informed at the onset that resiliency will be considered to potential at risk assets so they can help provide guidance. The degree of incorporation will be determined through an analysis process described below.



- Information on how to handle a local agency-led PEL vs CDOT-led PEL is discussed in the PEL Handbook. More detailed information will be provided in the NEPA manual in the next few months.
- If a local agency is leading the PEL they should consider getting CDOT or an outside consultant to help lead the resiliency discussion.
- Agencies should understand that incorporating resiliency in a PEL is not a requirement and they won't be held accountable if they decide they don't want to incorporate a resiliency section. However, incorporating resiliency should be encouraged at all levels and understanding the benefits would establish a motive for people to WANT to incorporate resiliency

#### **When does the resiliency discussion start?**

- Resiliency should be first discussed as part of the Reason for doing the project. It may only be a small component of the reason for the study but having the discussion early will create a resiliency mindset within the Project team.
- Analyze and incorporate any evaluation criteria related to resiliency, either in the Purpose & Need or Goals to consider resiliency in the PEL documentation.
- Evaluation criteria should focus on the big picture of resiliency such as how it would benefit the overall corridor, structures, or alignment. Design details like culvert size or rockfall fence types should not be included.
- These discussions will document the high-level need so future project phases can dive further into the detailed analysis to determine the most cost beneficial options to reduce future risk.
- Make sure resiliency measures are included as part of the alternatives analysis.

#### **How are resiliency benefits calculated and documented?**

- You should perform a baseline cost benefit analysis using the R&R tool\* to assist you in determining, at a high level, if resiliency features should be carried forward into the next phase of the project. A baseline evaluation should be completed and included in the PEL document; a full analysis will be completed during scoping for design.
  - \* - The R&R tool determines benefit-cost ratios of different assets based on threat type, the likelihood of an event occurring and the consequence to the owner and user. The tool is a quantitative risk assessment to estimate the potential loss to an asset from a given risk and calculate the reduction in risk or benefit to the asset for mitigating that risk. The resulting benefit-cost ratios can be used to determine the best mitigation method for reducing risk to an asset before an event happens or for repairing an asset after it has been damaged.
- Examine and document potential opportunities for funding resiliency in construction such as PROTECT formula and Federal Grant opportunities.
- Use a matrix of resilient features to include in a library of real life examples. This library should be updated as projects are built so others can see what resilient options provided a benefit to the transportation system.



### **How should resiliency be documented in a PEL?**

- The resiliency study process and conclusions should be documented in the PEL if resiliency is a major item in the Purpose & Need or Goals.
- Include resiliency measures in the alternatives evaluation/analysis.
- Add a "was resiliency considered" column in the CDOT spreadsheet that documents the PELs that have been performed.
- In the PEL, be sure to specifically document any major resiliency alternatives considered for future reference and to assist other PEL teams.

### **Discussion (Implications, Considerations):**

#### **Next steps:**

- A Case Study is currently underway with CDOT's Resiliency Office that will document the resiliency process in a PEL. This will include examples that show how using resiliency measures, including a benefit cost analysis, could save money, harden assets to withstand future natural threats, and ultimately be used in the design and construction phases of projects to ensure both Owner and User risks are minimized.
- More guidance will be included in the PEL Handbook and the NEPA Manual.
  - This guidance will help Teams focus on the importance of including this information into a project specific scope that would focus on planning, environmental clearance, and preliminary design
  - Once the Case Study is complete the process will be documented as a section in the PEL Handbook, including a flow chart describing the steps needed to incorporate resiliency in a PEL. Similar documentation will also be incorporated into the NEPA Manual focusing on resiliency in the NEPA process. Below is a flow chart describing the steps currently developed. This chart will be updated upon completion of the Case Study.

