

**Summary of a Context Sensitive Solutions (CSS) and System Resilience
Peer Exchange (March 24, 2022)**

Sponsored by

**American Association of State Highway and Transportation Officials (AASHTO) Center
for Environmental Excellence in Partnership with the Federal Highway Administration
(FHWA)**

April 7, 2022

Moderators: Annika Ragsdale, WSP
Michael Meyer, WSP

Speakers: Faith Hill, FHWA
Melissa Savage, AASHTO
Scott Peterson, Florida Department of Transportation (FDOT)
Jamie Polidora, FDOT
James Cromar, Broward Metropolitan Planning
Organization (BMPO)
Vanessa Halladay, Colorado Department of Transportation
(CDOT)
Tyler Brady, CDOT

Notes by: Jordyn Gross, WSP
Christine Fanchi, WSP

Introduction

The American Association of State Highway and Transportation Officials (AASHTO) Center for Environmental Excellence in partnership with the Federal Highway Administration (FHWA) sponsored a virtual peer exchange on Context Sensitive Solutions (CSS)/Context Sensitive Design (CSD) and resilient transportation projects on March 24th, 2022. The two-hour peer exchange shared information among participants on how CSS/CSD and resilience considerations could be considered jointly in project planning and development, especially related to potential impacts from a changing climate. The primary question in the peer exchange was, how can CSS/CSD and resilience principles mutually support project development goals?

The peer exchange built upon prior FHWA-sponsored CSS technical assistance meetings and on peer exchanges held in 2017 on *Leveraging CSS/Design for Sustainable Transportation and Resilient Project Design*. The peer exchange was centered around two case studies: “Integration of Resilience and Context Sensitivity on a Mountain Corridor- Interstate 70 Floyd Hill to Veterans Memorial Tunnels Project” presented by Colorado DOT officials; and “Integration of Resilience and Context Sensitivity in a Coastal Environment- State Road A1A in Fort Lauderdale, Florida” presented by Florida DOT and Broward County MPO officials. The case study presentations were followed by a facilitated discussion period structured on five key questions.

The target audience was primarily state DOT officials although others attended as well. Invitations were sent to members of the AASHTO Committees on Design, Environment, and Transportation Security and System Resilience. Invitees were asked to complete a pre-peer exchange survey to understand better the current experience with collaborative CSS/CSD and resilience project development. At the end of the peer exchange, a poll was conducted of the participants focusing on desired further efforts on the part of AASHTO and FHWA in fostering a better understanding of this relationship.

The program agenda for the peer exchange is found in appendix A. A list of participants is found in appendix B. The peer exchange PowerPoint slides are provided in appendix C.

Pre-Peer Exchange Survey

The participants who registered for the peer exchange were asked to participate in a survey that was intended to describe the characteristics of CSS/CSD as well as resilience project design. The survey consisted of the following five questions:

1. Is your DOT currently working on any adaptation strategies or resilient transportation improvement projects?
2. Are you running into any challenges on the project which you would appreciate feedback or support on?
3. Have you had any major successes or lessons learned on the project which you would be willing to share with your peers?

4. Does your DOT apply Context Sensitive Solutions and/or Design principles in project planning and design?
5. Has your DOT applied CSS/CSD principles on any adaptation strategies or resilient transportation improvement projects?

A total of 16 participants responded to the survey. Of these 16, eight indicated that their agency was working on adaptation strategies and/or resilient transportation improvement projects. Very few (3) indicated that the projects were facing challenges, with four indicating they did not know (seven skipped this question suggesting the “don’t know” answer is much larger). Only one respondent indicated their agency has had a major success with the CSS/CSD and resilience project concepts; one indicated there was no major success and the rest did not respond. Nine respondents indicated that their agency does apply CSS/CSD principles in project planning and design; one indicated the agency did not; and one did not know. Two respondents indicated that CSS/CSD and resilience concepts were included jointly in a project, with eight not knowing if such was the case.

Peer Exchange Context Presentations

Melissa Savage, AASHTO, opened the peer exchange by welcoming the participants and providing AASHTO’s interest in and commitment to CSS/CSD and resilience principles. She noted that AASHTO’s Center for Environmental Excellence has been active in supporting these principles via references, meetings, peer exchanges, and in furthering research on these concepts in the National Cooperative Highway Research Program (NCHRP).

Faith Hall, FHWA, welcomed participants. She noted that the recent Federal transportation legislation provides funding for CSS/CSD and resilience projects, with the Complete Streets design concepts receiving a major focus. Reducing roadway fatalities and serious injury crashes is a major goal of this and other FHWA programs utilizing a Safe Systems Approach. She also provided a list of key references for Federal programs that would be relevant to the focus of this peer exchange such as [a link to the Complete Streets Design Model](#).

Annika Ragsdale, WSP, described the organization of the peer exchange. Importantly, she offered the following definitions of two key concepts as the foundation for the discussions that were to occur.

CSD is a design process that considers the physical aspects and community economic, social, and environmental resources that are served by a transportation project.

CSS is a collaborative approach to the development of transportation projects. The CSS process values equally the needs of agency and community, considering all trade-offs in decision-making.

Resilience is the ability to prepare and plan for, absorb, recover from, or successfully adapt to adverse events.

Case Study Presentations

Two case studies were presented where the connection between CSD/CSS and resilience considerations was part of project development. Summaries of these case studies are presented below.

I-70 Colorado DOT: Floyd Hill to Veterans memorial Tunnel- Vanessa Halladay, CDOT & Tyler Brady, CDOT

The goals of this project were to reconstruct failing bridge decks and increase traffic capacity while also improving access to recreation sites and protecting wildlife through improved wildlife crossings. The stretch of I-70, approximately seven miles, experiences significant congestion due to the merging of several lanes and an intense sun glare off the steep road-grade which slows traffic. In addition, a CDOT I-70 Corridor Risk and Resilience Pilot identified Floyd Hill as the section of the corridor at highest risk of damage and disruption from landslides. Travelers and emergency response vehicles often experience significant delays up to a few hours traversing this segment of the interstate. Existing landslide susceptibility and adverse weather events currently threaten this section of I-70, and these events could be exacerbated over time with climate change.

CDOT follows a “6-Step” CSS/CSD process, which involves assigning a team of stakeholders to work closely with the project team to identify core project goals and desired outcomes, establishing team roles and endorsing the CSS/CSD process, developing project evaluation criteria with affected parties, reviewing and evaluating alternatives with stakeholders and the public, and providing final documentation and debriefing on the process (the written case study is available online [here](#)). The project prioritized cooperation among multidisciplinary stakeholders with different perspectives. Through the CSS/CSD process, a Project Leadership Team (PLT) was established to guide all phases of the 6-Step process and the Floyd Hill project. The PLT also assembled a Technical Team (TT) to review proposed transportation improvements and project alternatives and Issue Task Forces (ITF), who are involved in the process for specific subjects such as wildlife, water quality, or any other issue requiring specific expertise.

The environmental assessment included two build alternatives and a no action alternative (replace bridges only). The preferred project alternative involves construction of a viaduct, the “Canyon Viaduct,” through Clear Creek Canyon, elevating the east and westbound lanes of I-70. This is critical to eliminating landslide concerns by moving the existing roadway from the landslide-prone area. The viaduct also reduces risk of flooding, forest fires, and rockslide impacts by elevating the roadway. The preferred project alternative involves construction of a viaduct, the “Canyon Viaduct,” through Clear Creek Canyon, elevating the east and westbound lanes of I-70. This is critical to eliminating landslide concerns by moving the existing roadway from the landslide-prone area. The viaduct also reduces risk of flooding, forest fires, and rockslide impacts by elevating the roadway.

The estimated \$700 million project was bid under a construction manager/general contractor (CM/GC) contract. A CM/GC contract means CDOT hires a general contractor for the project who can provide feedback during the design phase before the start of construction. This approach allowed multiple impact considerations and project consequences to be divided into

smaller elements as needed like wildlife crossings and greenway improvements (e.g., noise reduction).

The presenters noted the following CSS/CSD and resilience improvements.

- Improved trails/greenways
- Access to open spaces and recreational sites
- Enhanced wildlife crossings and migratory patterns
- Greater protection from landslides and flooding

At the end of the presentation, the following questions were asked by participants.

Q1: Are you using Federal dollars? If so, how can you go into design without environmental document approval?

The Colorado DOT process allows contracting of a CM/GC for the initial design only. Current design phase is 20% with final deliverable by this contractor to be 30% design. This improves CDOT decision making and streamlines the design process as it progresses.

Q2: Do open space areas allow pull-outs for parking?

Parking is being considered but not designed at this time.

Q3: Was wildfire resiliency part of project?

Yes, CDOT is partnering with the county who is responsible for the property adjacent to I-70. Another group just completed a Wildfire Priority Mapping effort, which identified sensitive areas. One of these areas is near Canyon Hill and the project will incorporate the recommended considerations into the design effort.

Florida State Route (SR) A1A Reconstruction: Scott Peterson, FDOT; James Cromar, BMPO

SR A1A in Fort Lauderdale, Florida, a four-lane major arterial road, provides access to key businesses, residential sites, and public beaches (the written case study is available online [here](#)). In 2012, Superstorm Sandy passed near the community but did not make a direct hit. The four-lane state highway and adjacent sidewalks, weakened by Superstorm Sandy, were further damaged one month later when another storm passed by the city. The immediate recovery efforts included installing a 44 feet sheet pile wall next to the beach to protect the road and re-establishing two temporary lanes of traffic on the functional remains of the existing roadway. Because the road had to be completely rebuilt, the partners also had a unique opportunity to rebuild it using CSS/CSD principles and resilience strategies. The damaged road was 1,300 feet in length, but the overall project was one mile long.

The goals of the project included: promoting the community vision, protecting the corridor against future extreme weather events, improving drainage, improving bike/ped accommodations, promoting aesthetics improvements, and protecting endangered species. The City of Ft. Lauderdale, FDOT, and BMPO met with the public and launched a website to collect input on what they thought the new road should look like and the functionality it should provide. FDOT also utilized an adopted City Greenway Plan as input into project design. The City had requested

that FDOT eliminate a lane in each direction, provide improved landscaping, develop a pedestrian promenade, reduce sign clutter, improve pedestrian lighting, design safer pedestrian crosswalks, and incorporation of the City's Complete Streets design elements.

The final project design had the following design characteristics:

- 44' deep sheet pile wall to withstand 20' of wave scour
- Reduced paved footprint- 4 lanes to 2 lanes
- Raised ocean-facing roadway elevation by 2' by changing road cross slopes
- Raised signal controllers (18") with foundations to reduce electrical washouts
- Added drainage inlets with center cross slope to decrease flooding
- New and enhanced crosswalks w/ signals
- Other median breaks to allow pedestrians to crossroads (but no crosswalk markings to signals)
- Custom bike racks/parking
- Removed sign clutter
- 8' clear pedestrian path with palm trees between pedestrians/cars
- New pedestrian lighting including specifications for direction and glare due to proximity of sea turtle nesting site
- Buried lighting pull boxes (watertight) to improve aesthetics
- Full landscaped median
- New aesthetic wall separating pedestrian path from beach with new openings protected by sand dunes and vegetation
- Partnered with Broward County to add planted sand dunes

FDOT and BMPO officials noted several challenges during project development. A very aggressive project schedule was adopted to repair storm damage to this critical mobility corridor in Ft. Lauderdale. There was conflicting public input on what was desired; most want a more context specific road design, others wanted a high-speed roadway, and others were primarily concerned about protecting the corridor from future storms. Project developers faced challenging permit requirements especially with respect to mitigating impacts to the sea turtle nesting sites. There were also serious physical constraints in redesigning the road—the beach on the eastern edge and resort homes on the western edge.

Even with these challenges, the officials were satisfied with how the different funding partners worked collaboratively and with the effectiveness of the coordination with City officials and residents. The presenters suggested efforts that could have occurred to improve the project development process: begin public outreach sooner, meet with permitting agencies earlier, and establish intermediate project development deadlines.

Q1: Was the speed changed on A1A?

The 30-mph speed limit was not changed, but the project design changed driver behavior due to a more sensitive design to surrounding land uses.

Q2: What was the required height of pedestrian wall?

The wall was a standard 2 feet height along the roadway except at one intersection where an adjacent parking lot could result in car lights shining directly onto the beach near the turtle nesting sites on the beach.

Q3: Were there any issues with the FDOT safety officer for median openings that were not designated as crosswalks?

No issues were raised as they were designed as drainage openings. Such openings can be utilized for non-standard pedestrian crossing.

Discussion Groups

Approximately one hour was available to discussion among the participants. The peer exchange participants were divided into two groups with the following questions serving as a consistent structure to both groups.

1. Given what you have heard from both case studies, what do you think are the key takeaways with respect to supportive CSS and resilience/adaption project development?
2. Are there examples in your state/region where similar efforts/approaches?
3. If your agency wanted to formalize this approach within your project development process, which steps, if any, would be needed?
4. What are the implications of such an approach for the types of expertise/skills needed within our agency?
5. What is the one thing that AASTHO or FHWA could do to enhance an understanding of this approach within your agency? Or for what matter within the profession?

Key Takeaways From Presentations

The participants noted the following individual observations and takeaways from the presentations (note: no attempt was made to obtain a consensus on this question).

1. Several participants noted the willingness and adaptability of DOT officials to consider all context factors, such wildlife protection, access to recreational sites, turtle nesting sites, and aesthetic enhancements.
2. The importance of getting all stakeholders involved in the process early was noted by several participants (as one participant called it a “robust” stakeholder involvement strategy). Defining the needs and priorities of these stakeholders, and then prioritizing project objectives in terms of achieving these needs and priorities was an important ingredient to the success of the project. Having local buy-in from the environmental agencies; other state agencies; MPO, county, and local agencies; other groups; and residents is important.

As noted by one participant, “it is important to balance the input and goals of many stakeholders while efficiently and decisively moving forward in the best direction.” In response, James Cromar noted that the goal is to not always have to respond to emergencies like they faced. In other words, develop resilience strategies that will protect

against future threats. The ideal is to plan ahead and as well figure out a way to educate the public in a way that is both motivating and not overwhelming. Noted this can be difficult when the “emergency” label is removed from a project, which drives the urgency of resilience efforts in some ways.

3. In concert with #2, one participant noted that one of the apparent ingredients of success for both case studies was the ability of transportation officials to convey in understandable terms what CSS/CSD and resilience meant. What opportunities existed in the confines of the project layout? and what were the constraints?
4. It was noted that this observation resulted in FDOT undertaking many different design efforts that were eventually not used. This was done in the interest of speeding the project development process; by responding to stakeholder interests, designers were able to show why some concepts worked and others did not.
5. The Florida target speed discussion was interesting. It showed that speeds could be kept down with CSS/CSD project characteristics.
6. Adopting an emergency response and management “lens” when considering project design is important. For example, the Colorado project focused on the implications of landslides and the Florida project focused on beach erosion and flooding. Understanding how one can respond quickly while also designing to avoid the need for emergency response is good practice.
7. Another takeaway was the benefit of having a GM/GC contractor on board early in the process to facilitate the implementation of resilience goals in a practical way.

Other Project Examples

Several examples of projects were offered where either CSS/CSD or resilience characteristics were part of the project design. Very few examples were offered where both concepts were integrated into a project. Some examples offered by the participants include:

1. Development of a new road positioned in sensitive wetlands next to a lake. The primary issue was rising lake levels potentially inundating the paved surface. This resulted in elevating the roadbed while considering the many other environmental and climate change-related factors that could contribute to inundation.
2. A coastal state is experiencing a lot of beach erosion. Corridors along floodplains have presented many issues on how to protect the road under potential future conditions.
3. One state is thinking about design of drainage structures given increased intensity of rainfall (used metadata). Considerations include sizing drainage structures as well as the impacts on wildlife and aquatic passing as well as how to build infrastructure without sinking into a marsh.

Steps to Formalize the CSS/CSD and Resilience Principles in Project Development

The experience among DOTs is mixed in terms of formalizing CSS/CSD and resilience principles in project development. There was a sense that CSS/CSD concepts have been incorporated into many DOTs’ project development approaches, especially as they relate to Complete

Streets. Others noted that considering CSS/CSD concepts in project development has occurred, but it has been a struggle to formalize these concepts in design manuals. For example, one DOT official noted that it is a struggle remaining flexible in design while still following design steps, especially respect to culvert design. It was also noted, and agreed to by many in the meeting, that CSS/CSD and resilience concepts do not have to be competing in terms of project goal achievement and funding. They can reinforce each other and certainly help achieve overall project goals. Another DOT official noted that although her agency is not making many connections to CSS/CSD or resilience, but that the connection to the peer exchange topics is their desire to best manage public expectations and developing commitments that fosters further movement along the project development timeline.

It was suggested that adding a 'resilience or CSS/CSD criterion' to project prioritization will garner attention from project advocates and designers. Not having such a criterion could account for lack of support and insufficient design standards, lack of data, ill-trained staff, inadequate funding resources, and the like.

Implications on Staff Expertise/Skills

Participants concluded that the CSS/CSD and resilience nexus requires an interdisciplinary staff that can cross functional boundaries, having abilities to explain and communicate often complex concepts. As noted, this interdisciplinary staff would span agency functional areas. For example, it is important to have early and regular involvement of planners to understand broader, systems-level impacts and connections. Depending on the context, desired skills could range from geotechnical hazards (e.g., landslides as in the Colorado case study) to wildlife and species expertise (e.g., turtle nesting area in the Florida case).

There was a sense that the interdisciplinary nature of the CSS/CSD and resilience concerns should lead to more involvement of younger transportation professionals in the project development process, the logic being that they are more sensitive to a wide range of impacts. This was considered especially the case with concerns relating to climate change.

Recommended Further Actions

There was a consensus on the types of actions that AASHTO and FHWA should take to further the CSS/CSD and resilience connection.

1. Numerous participants recommended that there be more peer exchanges such as this one. One person noted that such peer exchanges really need to reach out to the most appropriate audiences: planners, project developers, environmental engineers, community relations staff, and partner agencies such as MPOs and cities.
2. More educational material was desired on how project resilience and CSS/CSD characteristics can be considered to achieve project goals. This material should focus on practical examples and lead to concrete recommendations on how these characteristics can be achieved.
3. Provide information on how CSS/CSD and resilience principles can be incorporated into system, corridor, and project planning. The intent is to showcase how agencies can

support timely and effective planning to be more proactive in CSS/CSD and resilience concepts (identifying/anticipating opportunities for betterments, etc.) than being reactive.

4. More case studies are desired with special focus on factors of success and lessons learned.
5. Better information on the latest science behind the climate stressors and asset vulnerability is needed to supplement why resilience actions are important and necessary.
6. More material is needed on why system and project resilience are important so more people can get “on board.” What is really meant by resilience?
7. From an asset management perspective, information is needed on the relative costs of CSS/CSD, and resilience design characteristics as compared to their costs. It would be beneficial to do before and after studies to better understand the benefit/cost comparison.
8. With a large turnover in DOT staff, materials are needed to inform staff on what CSS/CSD, and resilience actions are. There is a need within DOTs to be consistent across divisions and units.

Polling Exercise

At the end of the peer exchange, the participants participated in a poll. The poll was used to identify agencies who would like to receive further information on CSD/CSS and resilience, and to determine the need for further research and technical assistance on these topics. Regarding the latter, of the 26 participants who responded to the poll, half said that research was needed to better understand the concepts and half similarly said that technical assistance would be welcomed on the topics as well.

Conclusion

Many of the participants noted that they enjoyed the peer exchange and learned a lot about CSS/CSD and resilience principles as they can be considered in project development. Melissa Savage, AASHTO, thanked the participants for their participation in the peer exchange, and noted again the resources that are available through the AASHTO Center for Environmental Excellence. Faith Hill, FHWA closed the meeting by noting that FHWA has developed many staff capacity enhancement opportunities for transportation agencies (see [here](#)). In addition, she noted that there many CSS/CSD and resilience tools and project funding opportunities soon coming from FHWA.

The presentations and other peer exchange materials can be found on the AASHTO Center for Environmental Excellence website [here](#).

Appendix A: Peer Exchange Agenda

- Welcome: Melissa Savage, American Association of State Highway and Transportation Engineers (AASHTO)
Faith Hill, Federal Highway Administration (FHWA)
- Overview of Peer Exchange: Annika Ragsdale, WSP
- Colorado Case Study: Vanessa Halladay, Colorado DOT (CDOT) and Tyler Brady, CDOT
- Florida Case Study: Scott Peterson, Florida DOT (FDOT), Jamie Polidora, FDOT, and James Cromar, Broward Metropolitan Planning Organization (BMPO)
- Facilitated Small Groups: Annika Ragsdale (WSP) and Michael Meyer (WSP), Facilitators
- Ending Thoughts: Faith Hill (FHWA) and Melissa Savage (AASHTO)

Appendix B: Attendees

Attendees:

Adham Naiem, FDOT

Ali Hangtul, TDOT

Andy Paul, MassDOT

Angelo Papastamos, UDOT

Bob Pearson, WisDOT

Bradford Foley, Maine DOT

Carey Coxe, Louisiana DOT

Carol Zoff, MnDOT

Cassandra Gascon, MassDOT

Chris Goodson, GDOT

Christine Spangler, PennDOT

Cole Carnahan, Alaska DOT

David Clodgo, NCDOT

David Clodgo, NCDOT

Derrick Weaver, NCDOT

Eileen Phifer, Michigan DOT

Elizabeth Hilton, FHWA

Fred Doehrig, UDOT

Fred Doehring, UDOT

George Rogerson, Virginia DOT

Jamie Polidora, FDOT

Lars Gregovich, Alaska DOT

Levi Stewart-Figueroa, Broward MPO

Maria Mutuc, VDOT

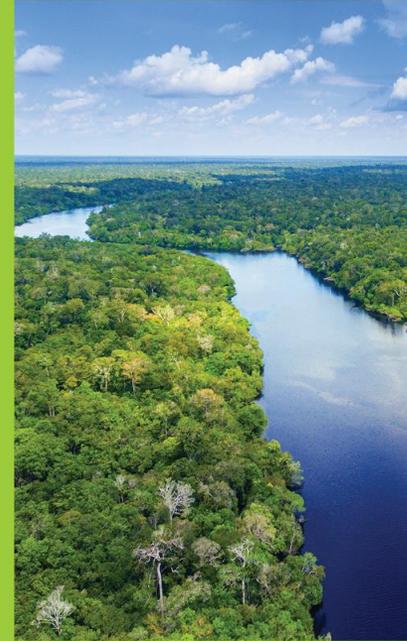
Mark Snyder, Idaho DOT

Mike Fugett, Arkansas DOT

Phil Harris, NCDOT
Robert Ruiz, SCDOT
Ross Hironaka, Hawaii DOT
Steven Bodge, Maine DOT
Susannah Kniazewycz, TDOT
Syraya Motsinger, FHWA
Tatia White, NCDOT
Vaughn Nelson, VDOT
Verrol McLeary, NCDOT
Wade Henry, ALDOT
William Anderson, WiDOT
Billy Scott
Chris Roy
Cole Carnahan
David Holstein
George Rogerson
Elizabeth Mouser
Fleming El-Amin
Garret O'Brady
Harry Capers
Jean Parlow
Jeffery Shaw
John Martin
Kelly Cornell Lew
Kimberly Clark
Kris McKirdy
L Wetherell
Larry Hymowitz
Laura Hilden

Li Jiang
Marisabel Ramthun
Mark Gaydos
Matthew Perlik
Matthew York
Melissa Savage
Michael DenBleyker
Michael Fugett
Michael Shepard
Mike Kisse
Noel Ardoin
Patrick Cowley
Paul OBrien
Raoul Desy
Rebecca Mowry
Rich Crossler-Laird
Robert Pearson
Ryan Drendel
Stan Biddick
Stephen Morgan
Steve Sisson
Suraiya Motsinger
Susan Lindsay
Tim Lattner
William Dean
Zac Appleton

Appendix C: PowerPoint Slides



Context Sensitive Solutions Virtual Peer Exchange

March 24th, 2022



Welcome!



- Please put your name and affiliation in the chat box.

Welcome from the AASHTO Center for Environmental Excellence

Melissa Savage, Center for Environmental Excellence, AASHTO

The Center



- Developed in cooperation with FHWA
- Promotes environmental stewardship and encourages innovative ways to streamline the transportation delivery process
- The Center's website has resources for professionals, including case studies, webinar recordings, and Practitioner's Handbooks



Agenda for Today's Virtual Peer Exchange



- **CSS/CSD Resources from FHWA** (10 minutes)
- **Introduction to Presentations and Topics** (5 minutes)
- **Presentation on the I-70 Floyd Hill to Veterans Memorial Tunnels Improvements** (30 minutes)
 - With Tyler Brady (CDOT), Vanessa Halladay (CDOT)
 - Q&A
- **Presentation on the Highway A1A Hurricane Sandy Response and Roadway Improvements** (30 minutes)
 - With Scott Peterson (FDOT), James Cromar (Broward MPO)
 - Q&A
- **Discussion on Challenges and Successes of Applying CSS/CSD to Resilience Projects** (20 minutes)
- **Closing Thoughts** (5 minutes)
 - Polling Exercise (What would you like to see as part of the next peer exchange?)



Context Sensitive Solutions/Design Resources from FHWA

Faith Hall, Office of Human Environment, FHWA

Overview

- Federal Highway Administration CSS/D Resources
- Significant provisions in the Bipartisan Infrastructure Law
- Complete Streets – FHWA's design default for non-access controlled roadways
- Safe System Approach
- National Roadway Safety Strategy
- Funding Opportunity – National Scenic Byways Notice of Funding Opportunity
- References

CSS/D at FHWA

Context Sensitive Solutions and Design

- What is CSS/D?
- Benefits of CSS/D
- Applying CSS/D
- CSS/D Process
- CSS and Design
- Case Studies
- Webinars
- Resources
- Key References
- History



Contacts

For more information, please contact:

- Fleming El-Amin
- Carolyn Nelson
- Faith Hall

FHWA → Planning → Context Sensitive Solutions and Design

Benefits of CSS/D



[Project Delivery](#)



[Sustainability](#)



[Performance-Based Practical Design](#)



[Placemaking & Healthy Communities](#)



[Complete Streets](#)



[CSS and Environmental Justice](#)

www.fhwa.dot.gov/planning/css/

CSS/D Factsheet

Livability

- Fact Sheets
- Case Studies
- Newsletter
- Human Environment Digest
- Resources
- Tools
- Community Impact Assessment
- Related Links
- Division & Federal Lands Contacts

Contacts

For more information, please contact [Fleming El-Amin](#).

FHWA → Livability → Resources

Context Sensitive Solutions and Design (CSS/D) in Practice

Also available in [PDF](#) (228KB)

What is CSS?

The use of CSS to achieve CSD outcomes is referred to as Context Sensitive Solutions and Design (CSS/D). The information below provides additional details and the timeline shown on the right sidebar highlights some recent CSS/D milestones and resources.

Context Sensitive Design (CSD) is a design process that considers the physical setting and design criteria of a transportation facility, as well as the economic, social, and environmental resources in the community being served by that facility. A CSD approach helps to ensure projects:

1. Are safe for all users
2. Use a shared stakeholder vision as a basis for decisions and for solving problems that may arise.
3. Meet or exceed expectations of both designers and stakeholders, thereby adding lasting value to the community, the environment, and the transportation system.
4. Demonstrate effective and efficient use of resources.

The Context Sensitive Solutions (CSS) process is a collaborative, interdisciplinary, and holistic approach to the development of transportation projects. The CSS process involves all

CSS Timeline

1969	National Environmental Policy Act enacted
1988	National Highway System (NHS) Task Force established
1991	Intermodal Surface Transportation Efficiency Act enacted
1994	FHWA policy statement on avoidance, mitigation, and compensation
1995	American Association of State Highway Transportation Officials (AASHTO) publishes design criteria and process for NHS roadways, safety, environmental, and community
1997	NHS Designation Act
1998	Flexibility in Highway Design (FHWA) and AASHTO
1998	Thinking Beyond the Pavement sponsored by FHWA and AASHTO

NEW – Context Sensitive citations from the Bipartisan Infrastructure Law (BIL)

§11122 Vulnerable Road User Research

... roadway safety improvements, including traffic calming techniques and vulnerable road user accommodations appropriate in a suburban arterial context;

§11403 Carbon Reduction Program (\$6.4 B Formula)

... be appropriate to the population density and context of the State, including any metropolitan planning organization designated within the State.

§11509 Reconnecting Communities Pilot Program (\$1 B Discretionary)

... sensitive to the context of the surrounding community; and ... the degree to which the eligible facility is out of context with the current or planned land use;

§24112 Safe Streets and Roads for All Grant Program (\$5 B Discretionary)

... supports local initiatives to prevent death and serious injury on roads and streets, commonly referred to as “Vision Zero” or “Toward Zero Deaths” initiatives. – Comprehensive Safety Action Plan [planning, design, and development]

NEW – Climate & Resilience in the BIL

§ 11403 Carbon Reduction Program (\$6.4 B Formula)

§ 11405 Promoting, Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) program Grants (\$7.3 B Formula and \$1.4 B Discretionary)

§ 11401 Charging and Fueling Infrastructure (\$2.5 B Discretionary)

Division J, National Electric Vehicle Formula Program (\$5 B Formula and Discretionary)

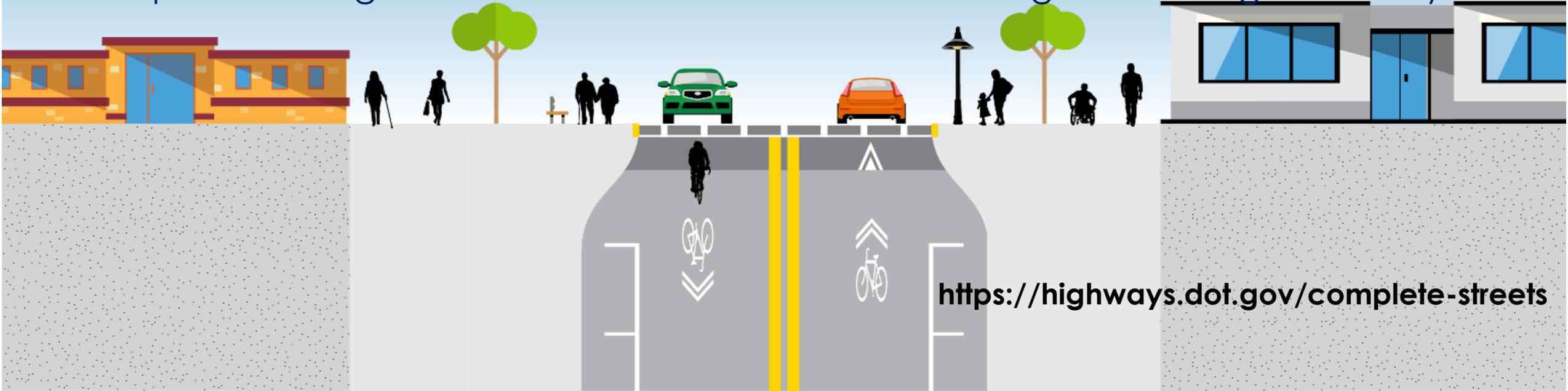
§ 11404 Congestion Relief Program (\$250 M Discretionary)

Other Climate and Resilience Provisions: EV charging station standards; Report on emerging alternative fuel vehicles and infrastructure; Conditions & Performance report to include resilience

Complete Streets

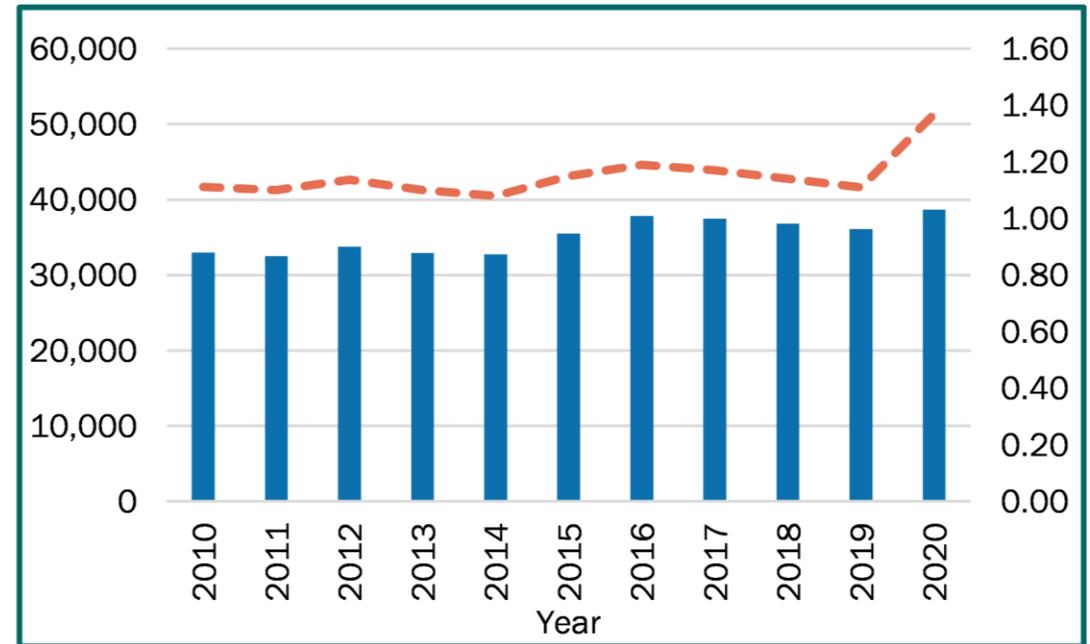
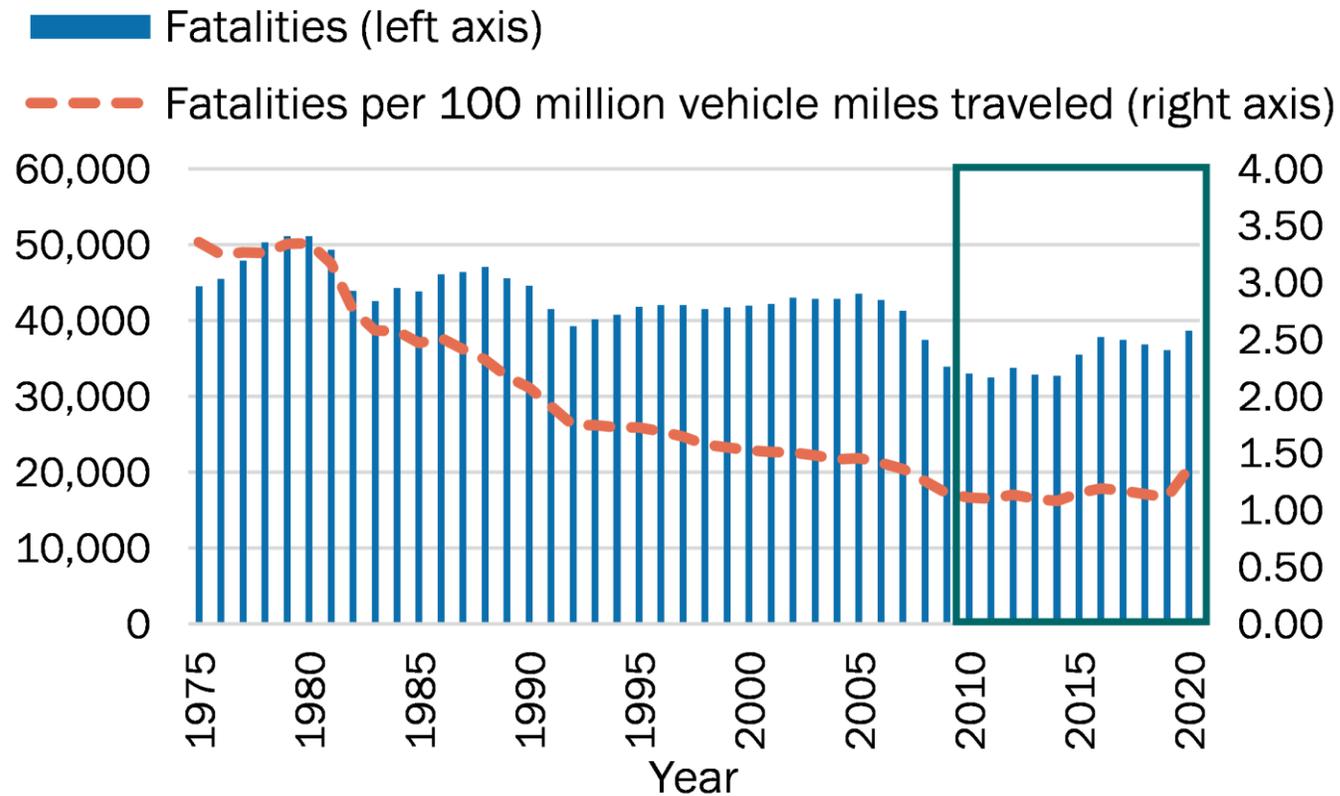
Increasing Safe and Accessible Transportation Options (§11206)

- “A complete street is safe, and feels safe, for everyone using the street.” - FHWA Deputy Administrator Stephanie Pollack
- Complete Streets create a *safe, connected, and equitable* transportation network for travelers of all ages and abilities, particularly those from underserved communities facing historic disinvestment.
- Report to Congress addresses “Context-Sensitive Design and Design Flexibility”



<https://highways.dot.gov/complete-streets>

Roadway fatalities and the fatality rate declined consistently for 30 years...



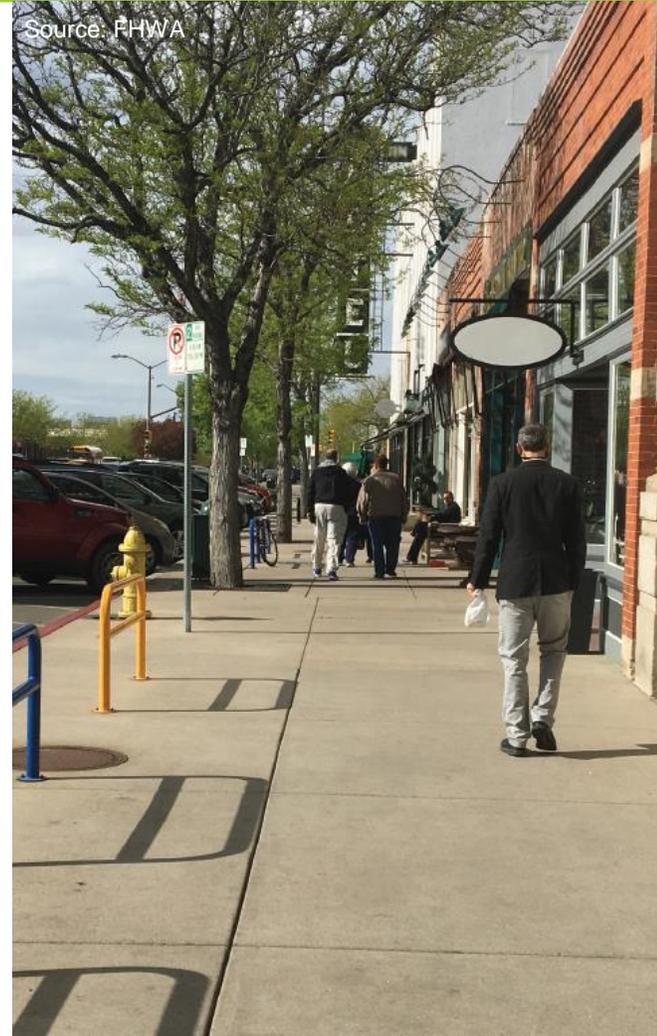
...but progress has stalled over the last decade.

Complete Streets is...



A Safety Strategy

Addresses the national crisis of traffic deaths by implementing the Safe System Approach.

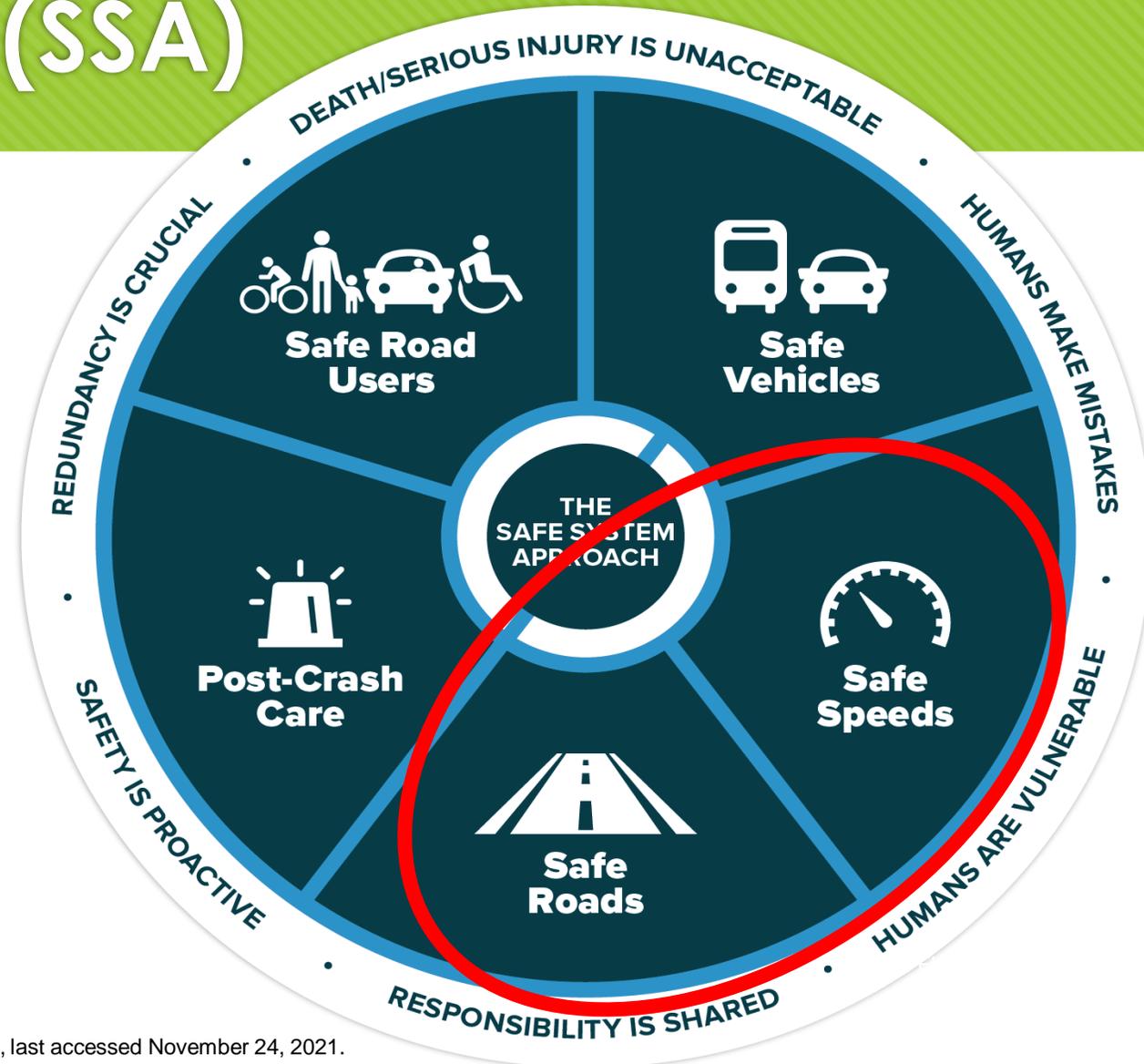


A Connectivity Strategy

Allows people to travel safely and comfortably by whatever mode they choose or rely on.

Complete Streets implements the Safe System Approach (SSA)

- ▶ **Death/serious injury is unacceptable.**
- ▶ Humans make mistakes.
- ▶ **Humans are vulnerable.**
- ▶ Responsibility is shared.
- ▶ **Safety is proactive.**
- ▶ Redundancy is crucial.





National Roadway Safety Strategy

The United States Department of Transportation National Roadway Safety Strategy (NRSS) outlines the Department's comprehensive approach to significantly reducing serious injuries and deaths on our Nation's highways, roads, and streets. This is the first step in working toward an ambitious long-term goal of reaching zero roadway fatalities. Safety is U.S. DOT's top priority, and the NRSS represents a Department-wide approach to working with stakeholders across the country to achieve this goal.

[READ THE NATIONAL ROADWAY SAFETY STRATEGY](#)

LEARN ABOUT THE NATIONAL ROADWAY SAFETY STRATEGY



The Roadway Safety Problem



What is the Safe System Approach?



How does safety impact U.S. DOT's work in other priority areas?

<https://www.transportation.gov/NRSS>

Select FHWA CSS/D Points of Contact

Office of Human Environment “Livability Team”

Faith Hall – Faith.Hall@dot.gov

Office of Natural Environment

Suraiya Motsinger – Suraiya.Motsinger@dot.gov

Office of Planning

Mack Frost - Mack.Frost@dot.gov

Jill Stark - Jill.Stark@dot.gov

Office of Project Development & Environmental Review

Carolyn Nelson - Carolyn.Nelson@dot.gov

Office of Infrastructure

Elizabeth Hilton - Elizabeth.Hilton@dot.gov

Resource Center (for Complete Streets)

Brooke Struve - Brooke.Struve@dot.gov

Office and Program Websites

- **Planning, Environment, and Realty:** www.fhwa.dot.gov/hep/
 - CSS/D Considerations: Resiliency; Environmental Toolkit; Environmental Justice Communities; Quality of Life; Multimodal Networks
- **Safety:** www.safety.fhwa.dot.gov
 - National Roadway Safety Strategy
 - Proven Safety Countermeasures for Bicycle and Pedestrian Safety
- **Complete Streets:** <https://highways.dot.gov/complete-streets>
- **Infrastructure (Design):** www.fhwa.dot.gov/design/
 - Performance Based Practical Design
 - Transportation Performance Management
 - Design Flexibility
- **Resource Center** www.fhwa.dot.gov/resourcecenter/technical-assistance.cfm
 - CSS/D Training and Technical Assistance
- **Key Partner:** TRB Subcommittee on Context Sensitive Solutions - AFB00(1)

BIL References

FHWA BIL Summary:

<https://www.fhwa.dot.gov/bipartisan-infrastructure-law/summary.cfm>

BIL Text:

<https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf>

Changes to Federal Lands Access Program (FLAP)

Funding	\$1.5 B (FY 22-26) in Contract Authority from the HTF
Other key provisions	<ul style="list-style-type: none">• Adds new eligibility for context-sensitive solutions, interpretive panels in or adjacent to parking areas, wayfinding markers, landscaping, and cooperative mitigation of visual blight• Changes the Federal share to up to 100% (as opposed to being determined based on 23 U.S.C. 120)• Increases the amount of FLAP and FLTP funds to be set aside each FY for transportation planning from 5% to 20%• Requires FLAP projects to consider, to the maximum extent practicable, use of locally adapted native plants and designs that minimize runoff and heat generation

§ 11403

[NEW] Carbon Reduction Program (formula)

Purpose	Provide funding for projects to reduce transportation emissions or the development of carbon reduction strategies.
Funding	\$6.4 B (FY 22-26) in Contract Authority from the HTF
Recipients	<ul style="list-style-type: none">• States (including DC)
Distribution formula	<ul style="list-style-type: none">• Apportioned to States by formula• 65% of funds are suballocated (reserved for use in certain areas of the State, based on population)
Other key provisions	<ul style="list-style-type: none">• Requires State, in consultation with MPOs, to develop (and update at least every 4 years) a carbon reduction strategy and submit it to DOT for approval.• DOT must certify that a State's strategy meets the statutory requirements.

[NEW] Reconnecting Communities Pilot Program (discretionary)

Purpose	Restore community connectivity by removing, retrofitting, or mitigating highways or other transportation facilities that create barriers to community connectivity, including to mobility, access, or economic development
Funding	<p>\$1 B (FY 22-26), including—</p> <ul style="list-style-type: none"> • \$500 M (FY 22-26) in Contract Authority from the HTF; and • \$500 M (FY 22-26) in advance appropriations from the GF
Eligible entities	<p><u>Planning grants:</u></p> <ul style="list-style-type: none"> • State • MPO • Local government • Tribal government • Nonprofit organization <p><u>Capital construction grants:</u> Owner of an eligible facility (may partner with any of the eligible entities for a planning grant)</p>
Eligible activities	<ul style="list-style-type: none"> • Planning grants (\leq\$2M) • Grants ($\geq$\$5M) for capital construction projects, including the removal and replacement of eligible facilities

[NEW] Safe Streets and Roads for All (discretionary)

Purpose	Support local initiatives to prevent transportation-related death and serious injury on roads and streets (commonly referred to as “Vision Zero” or “Toward Zero Deaths” initiatives).
Funding	\$5.0B (FY 22-26) in advance appropriations from the GF
Eligible entities	<ul style="list-style-type: none"> • MPO • Political subdivision of a State (e.g., local governments) • Tribal government
Eligible projects	<ul style="list-style-type: none"> • Comprehensive safety action plan (planning grant) • Planning, design, and development activities for infrastructure projects and other strategies identified in a comprehensive safety action plan
Other key provisions	<ul style="list-style-type: none"> • Sets aside not less than 40% of total funding each FY for planning grants. • Requires considering, among other factors, the likelihood of a project significantly reducing or eliminating fatalities and serious injuries involving various road users, including pedestrians, bicyclists, public transportation users, motorists, and commercial operators.

[NEW] Healthy Streets Program

SEC. 11406. HEALTHY STREETS PROGRAM.

(25 U.S.C. 5131)

The Secretary shall establish a discretionary grant program, to be known as the “Healthy Streets program”, to provide grants to eligible entities— (1) to deploy cool pavements and porous pavements; and (2) to expand tree cover.

GOALS.—The goals of the program are— (1) to mitigate urban heat islands; (2) to improve air quality; and (3) to reduce:

- (A) the extent of impervious surfaces;
- (B) stormwater runoff and flood risks; and
- (C) heat impacts to infrastructure and road users.

National Scenic Byways Program

FHWA Announced First Availability of National Scenic Byways Program Funding Since 2012

\$22 Million

Closes May 16, 2022

Notice of Funding Opportunity:
<https://www.grants.gov/web/grants/view-opportunity.html?oppld=338707>

U.S. Department of Transportation
Federal Highway Administration

About Programs Resources Briefing Room Contact

AMERICA'S BYWAYS®

HOME AMERICA'S BYWAYS ABOUT US

come CLOSER.

Choose from the map or list below to find byways in a State.

● All-American Roads ● National Scenic Byways

AK, HI, PR NOT TO SCALE

Jump to a State:

To view the 2021 America's Byways designations, read [Scenic Byways](#)

Find Byways

Search near any U.S. location:

Nearby Byways

■ Finding your location...

America's Byways

America's Byways® is the umbrella term we use for the collection of **150 distinct and diverse roads** designated by the U.S. Secretary of Transportation. America's Byways include the National Scenic Byways and All-American Roads.

America's Byways are gateways to adventures where no two experiences are the same. The National Scenic Byways Program invites you to **Come Closer to America's heart and soul...**

25



Today's Discussion

Today's peer exchange will focus on how Context Sensitive Solutions (CSS)/Context Sensitive Design (CSD) can be applied to resilient and climate adaptive transportation improvement projects.

CSS/CSD Background

- **CSS** is a collaborative approach to the development of transportation projects. The CSS process values equally the needs of agency and community, considering all trade-offs in decision-making.
- **CSD** is a design process that considers the physical aspects and community economic, social, and environmental resources that are served by a transportation project.



Resilience

The ability to prepare and plan for, absorb, recover from, or successfully adapt to adverse events.

Today's Presenters



Vanessa Halladay,
Colorado DOT



Tyler Brady, PE,
Colorado DOT



Scott Peterson, PE,
Florida DOT



James Cromar,
Broward MPO

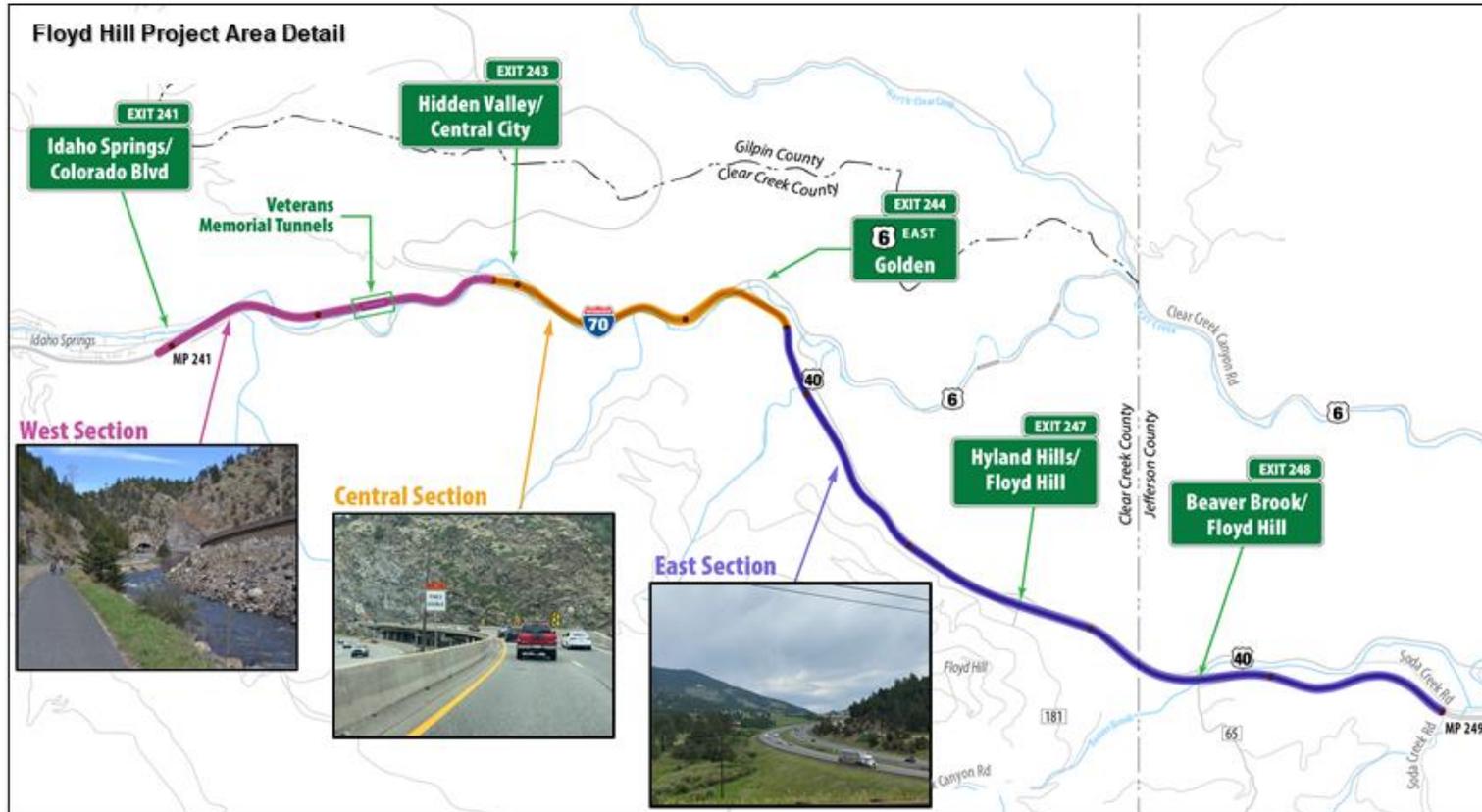
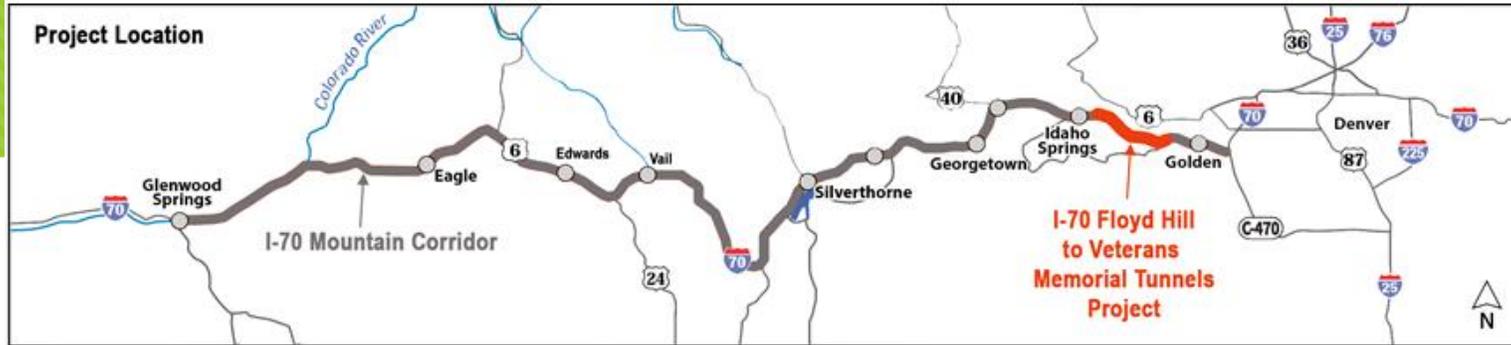


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Department of Transportation

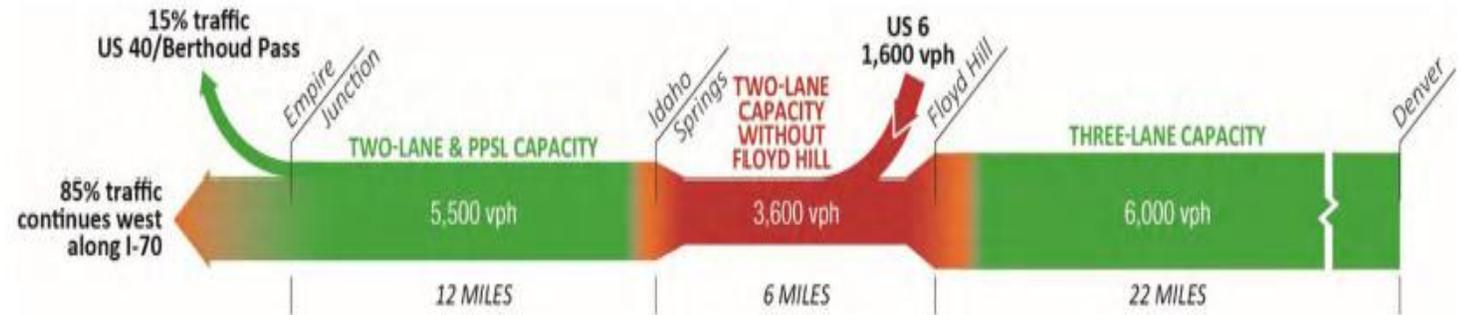
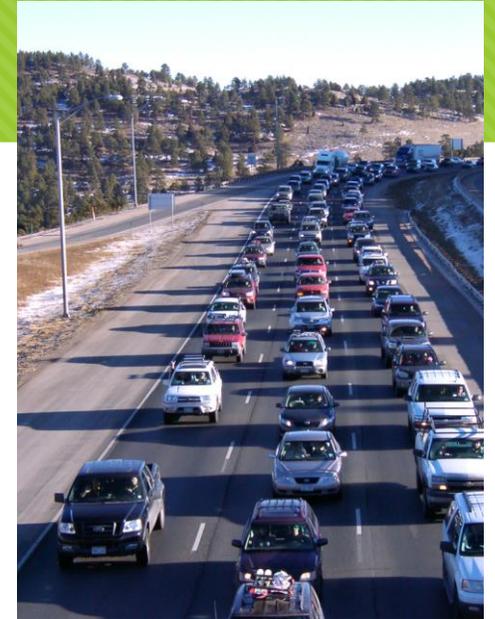
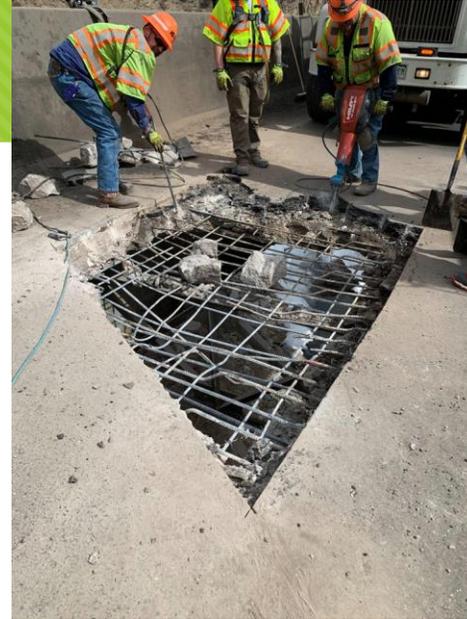
Floyd Hill to Veterans Memorial Tunnels
AASHTO CSS/D Peer Exchange
March 24, 2022

Project Location



Description of Floyd Hill Project

Project Purpose



vph = vehicles per hour



Project Overview

- Project Major Features
 - Westbound I-70 reconstruction with addition of third travel lane
 - Replacement of two Bridge Enterprise eligible bridges
 - Westbound and eastbound I-70 curve flattening and safety improvements
 - Interchange and intersection improvements throughout project
 - Greenway improvements
 - Frontage road addition between Central City Parkway and US 6 Interchanges
 - Wildlife safety mitigation improvements, including wildlife crossings and fencing
 - Eastbound I-70 climbing lane for heavy commercial or slow-moving vehicles



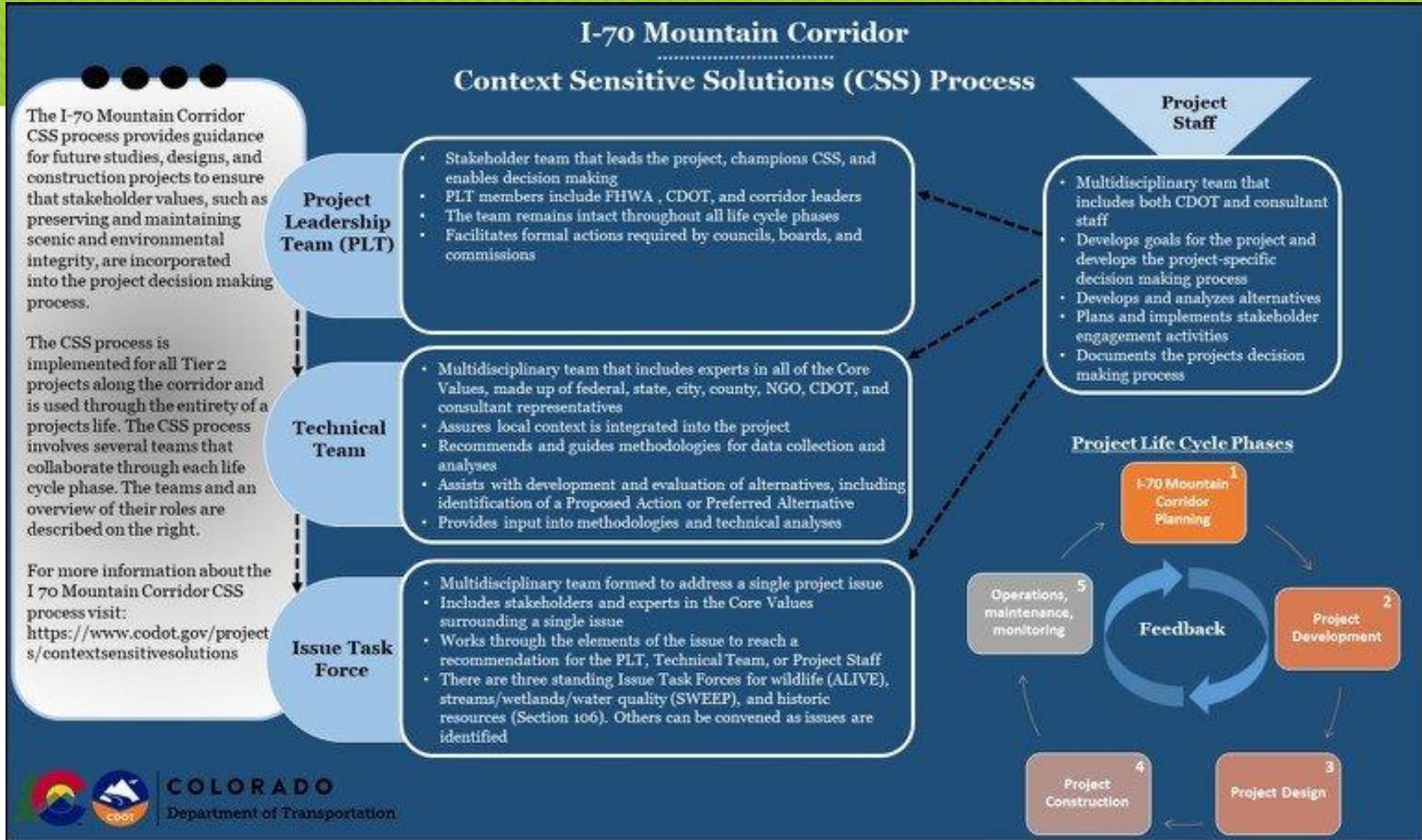
Project Overview and Status

- Two alternatives plus the No Action Alternative evaluated in the Environmental Assessment (EA)
 - Canyon Viaduct Alternative (Preferred Alternative)
 - Tunnel Alternative with two design options
 - South Frontage Road
 - North Frontage Road
- Project Status
 - Project total cost for either alternative is estimated at \$700M
 - Construction Manager/General Contractor Delivery
 - Strong stakeholder and public support



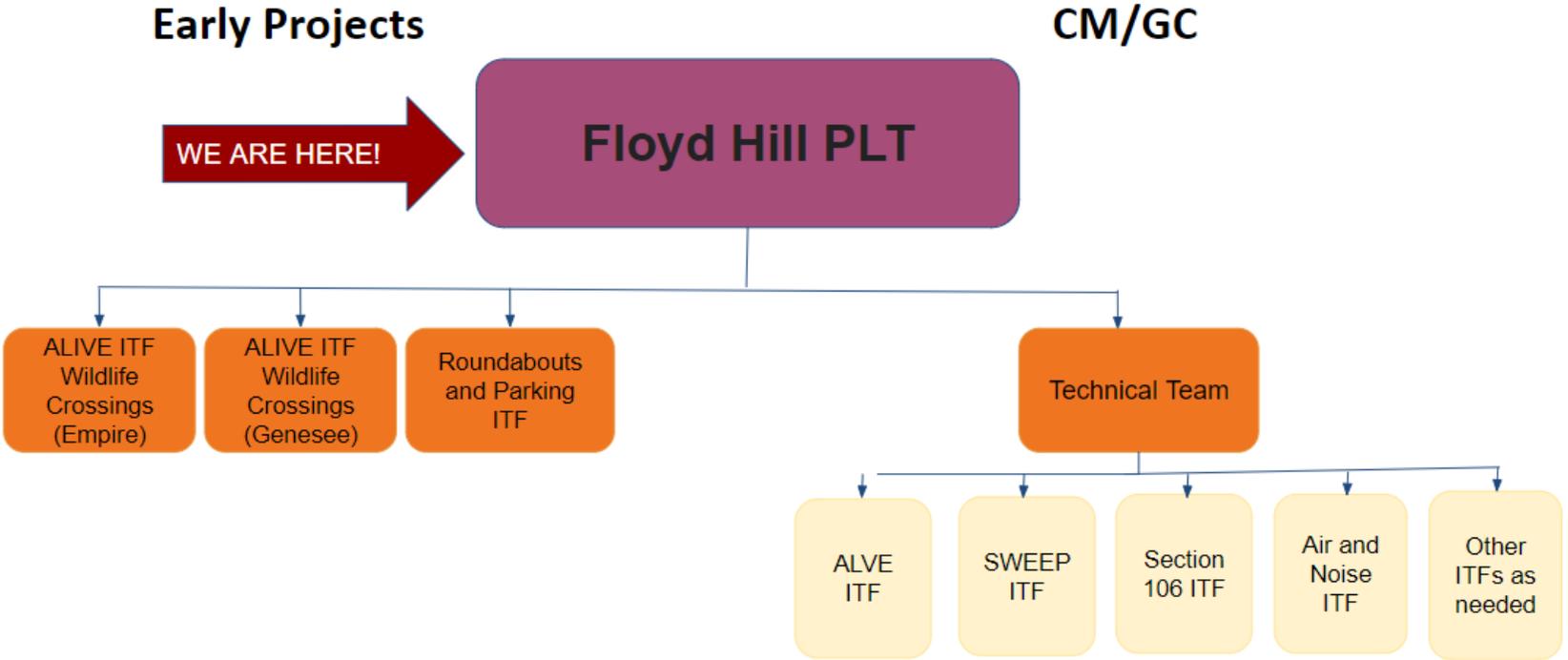
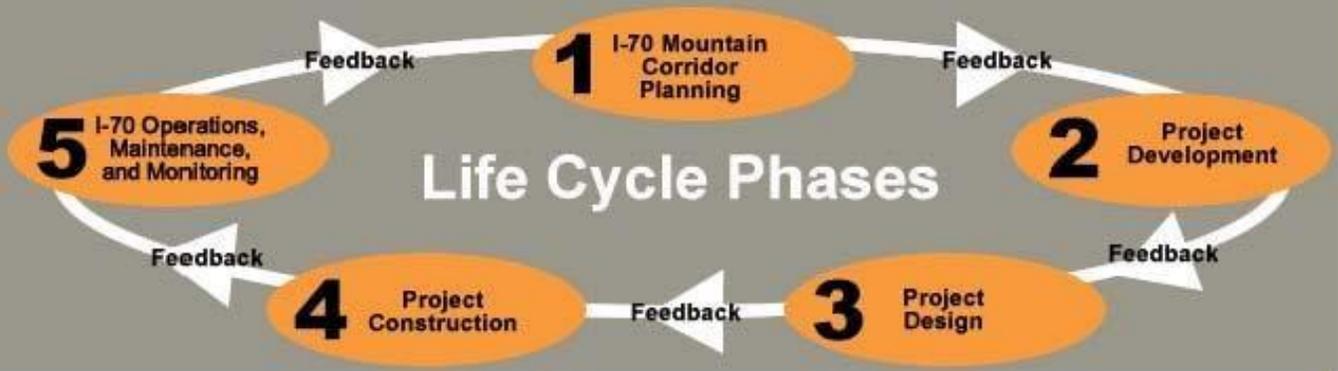
Overview of CSS Process

I-70 Mountain Corridor - CSS Overview



COLORADO
Department of Transportation

Floyd Hill Project - CSS Overview



Overview of Resiliency Elements

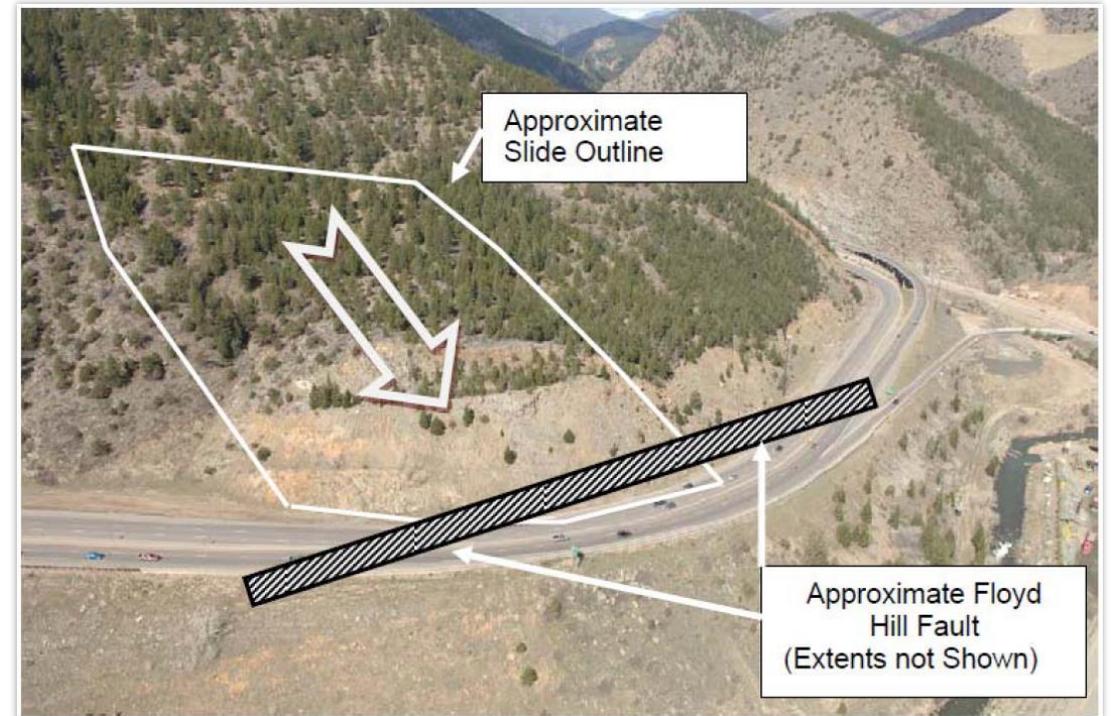


East Section: Floyd Hill to US 6



I-70 Corridor Risk & Resiliency

- Floyd Hill landslide area
 - AADT = 40,000 with 6% truck traffic
 - 20 acres with a moderate frequency of movement
 - 500-700 linear feet of I-70 impact area
 - \$15M in estimated losses, including 25 days of total roadway closure and 25 days of head-to-head traffic operations



Floyd Hill – Historic Landslide



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Department of Transportation

Central Section: US 6 to Hidden Valley CANYON VIADUCT ALTERNATIVE



Central Section: US 6 to Hidden Valley CANYON VIADUCT ALTERNATIVE



Open Space Access

Trail ADA
Improvements

Existing
Greenway Trail

New Frontage
Road Connection

Central Section: US 6 to Hidden Valley CANYON VIADUCT ALTERNATIVE



West Section: Hidden Valley to Veterans Memorial Tunnels



Realign ~1,200
feet of Clear
Creek

Frontage Road
and Greenway

Benefits of Incorporating CSS into Resilience Projects



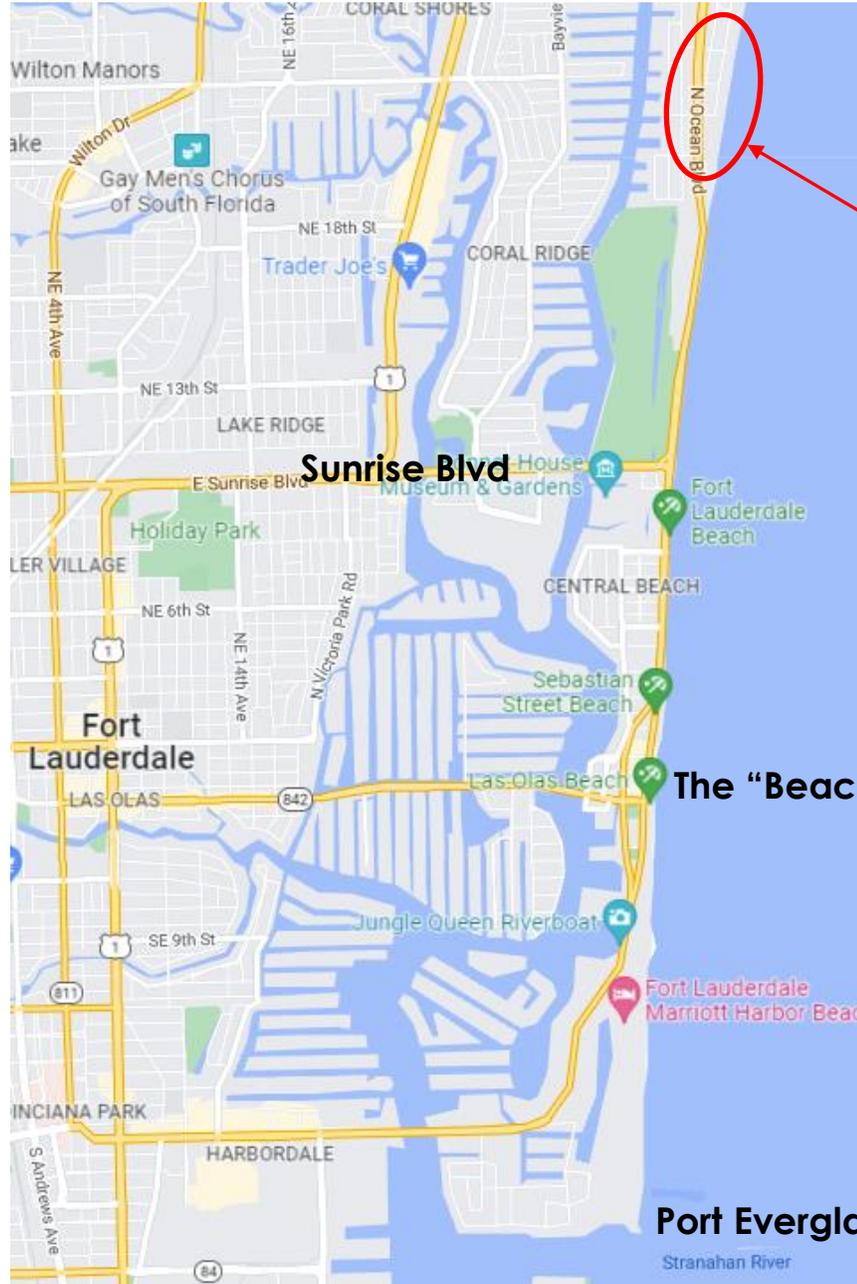
Questions and Comments?



SR A1A Reconstruction Ft. Lauderdale

Damage caused by “pre” Hurricane Sandy

Project Area

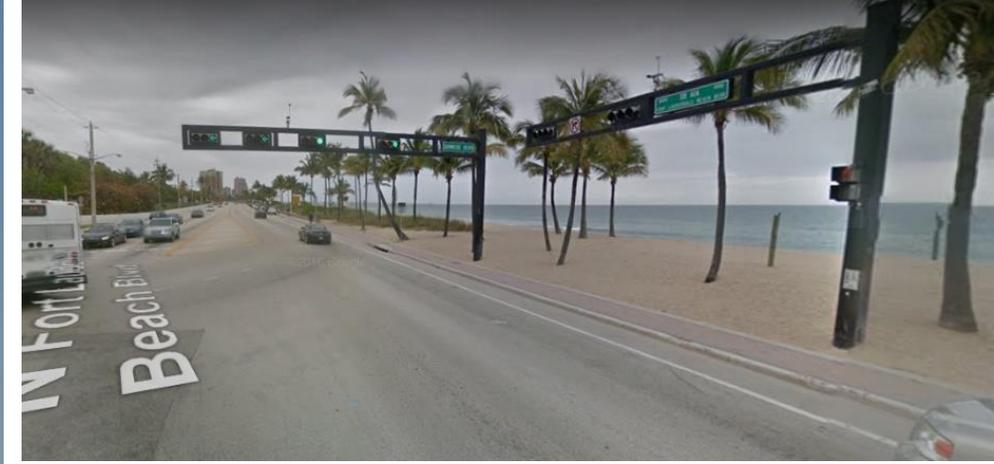


Area of damage

Port Everglades



Before Hurricane Sandy





Sandy Visits Fort Lauderdale











PAY METER
5:00AM TO 11:00PM
NO PARKING
11:00PM TO 5:00AM

**SMART
PARK
ZONE**
FL 16

BOB'S BARRICADES
800 432 5031

BOB'S BARRICADES
TOLL FREE NO. 1-800-432-5031















Problem!



Emergency Repair

- Prevent further undermining of roadway
- Protect against future erosion events
- Re-establish travel ways for vehicles, bicyclists, & pedestrians



Emergency Repair









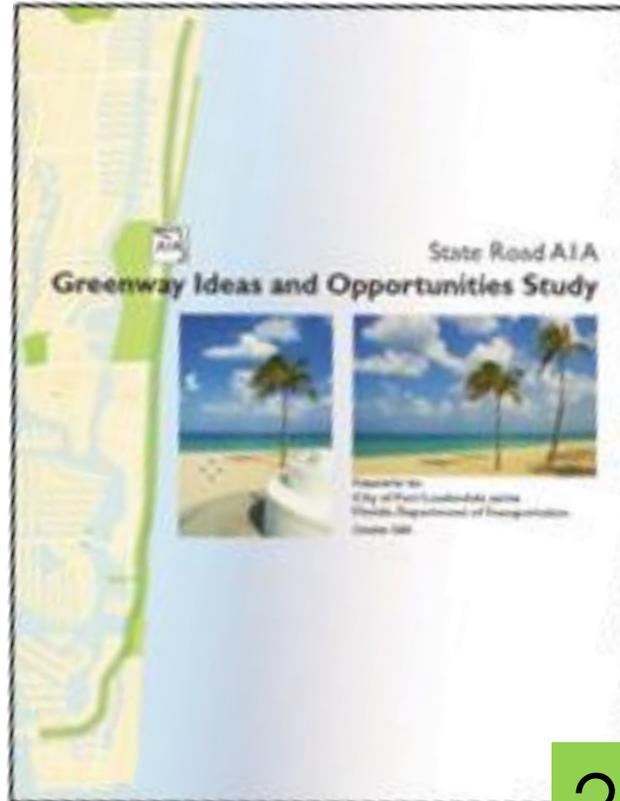
Redesigning The Corridor

PROJECT GOALS

- Incorporate community vision
- Protect against future events
- Improve drainage
- Improve bicycle and pedestrian accommodations
- Aesthetic improvements
- Address environmental concerns

Redesigning The Corridor

INCORPORATING COMMUNITY VISION



2009

Redesigning The Corridor

INCORPORATING COMMUNITY VISION

- Ongoing coordination with city, county, residents
- City requests:
 - Lane elimination
 - Landscaping
 - Pedestrian promenade
 - Reduce sign clutter
 - Pedestrian lighting
 - Pedestrian crosswalks



Redesigning The Corridor

CHALLENGES

- **Aggressive schedule**
 - Political commitments to complete repairs
- **Conflicting public input**
 - Lane elimination not universally supported
- **Permitting restrictions**
 - Sea Turtle nesting habitat
- **Physical constraints**
 - Private residences on west, protected beach on the east

Redesigning The Corridor

INFORMING THE PUBLIC

- Flyers
- Graphics
- Public meetings
- One on one meeting with HOA



CONTACT
For the following information, please refer to the project number listed below.

**FDOT Public Information Officer:
Amanda Galtner**
Phone: (352) 217-4006
E-Mail: Amanda.Galtner@fdot.state.fl.us

**FDOT Project Manager:
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**City of Palm Beach
Office of Transportation & Mobility
Diana Morton**
Phone: (561) 825-0753
E-Mail: dmorton@palmbeachfl.gov

For Spanish:
FDOT Project Designer: Eduardo Williams
Phone: (352) 217-4076
E-Mail: eduardo.williams@fdot.state.fl.us

FDOT
Florida Department of Transportation
State Road Planning Group
300 West University Avenue
Tallahassee, FL 32302-3212



**COMMUNITY
AWARENESS MEETING
Wednesday,
April 9, 2014**

FDOT 433688-4-52-01
**SR A1A
Reconstruction
Sunrise Blvd to NE
18th St**



Project Summary:

What are we building?

- Sunrise Road #1A - from current position to NE 18th Street
- Breakout Curb, City of Palm Beach

What are we doing?

- Reconstructing Sunrise Road #1A with one lane in each direction
- Constructing a wide boulevard promenade on the east side consisting of a paved sidewalk, a landscaped area with water lighting, and landscaping
- A paved landscaped median will be constructed in front of South State Park
- Median islands and left turn lanes will be provided in the residential section
- Adding decorative, warm friendly pedestrian lighting on both sides of the street
- Adding bicycle lanes on both directions
- Constructing two signalized pedestrian crossings at front of South State Park and change of NE 10th St and NE 17th St

When will this happen?

- Construction scheduled to begin approximately August 2014
- Anticipated completion March 2016
- Estimated construction cost is \$16.1 million

Join Us and Learn More

View the site plan and project information on the proposed plans at the

Community Awareness Meeting

OR

**Wednesday,
April 9, 2014**

Plans displayed and staff available from 5:00 pm - 7:00 pm

at the
Beach Community Center
located at
8051 NE 22 Avenue
Palm Beach Gardens, FL 33408
(561) 825-4510

Department of Transportation project representatives will be available to explain the proposed improvements and to answer your questions on an individual basis.

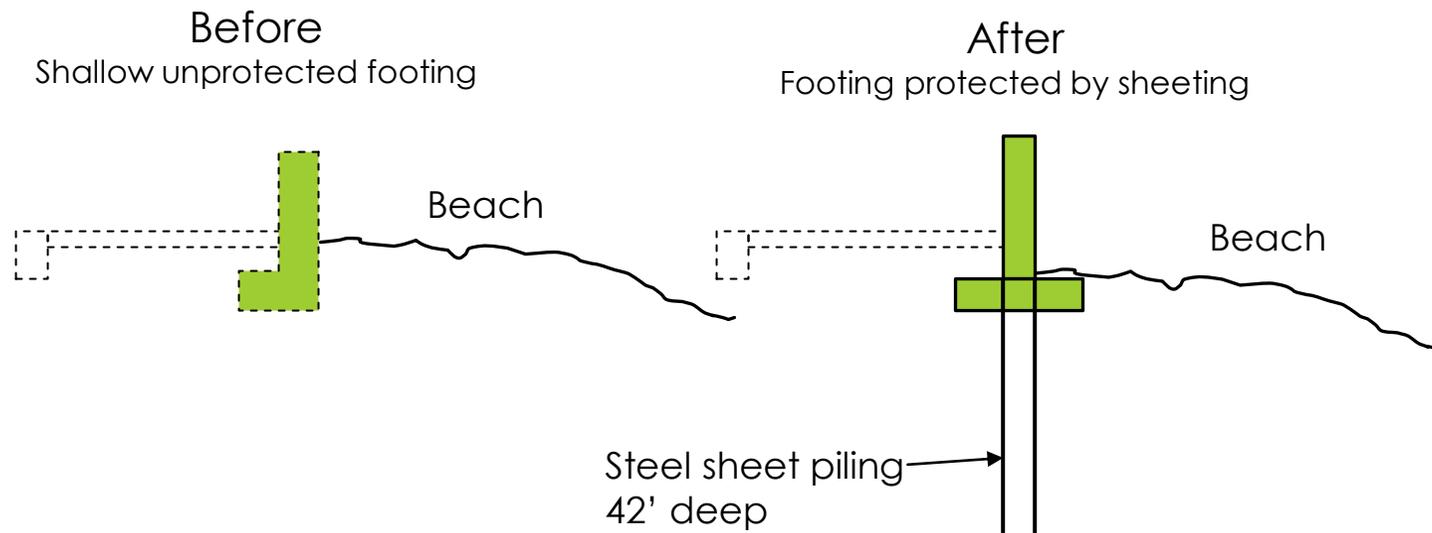
Resiliency

WHY NOT RAISE THE WHOLE ROAD?



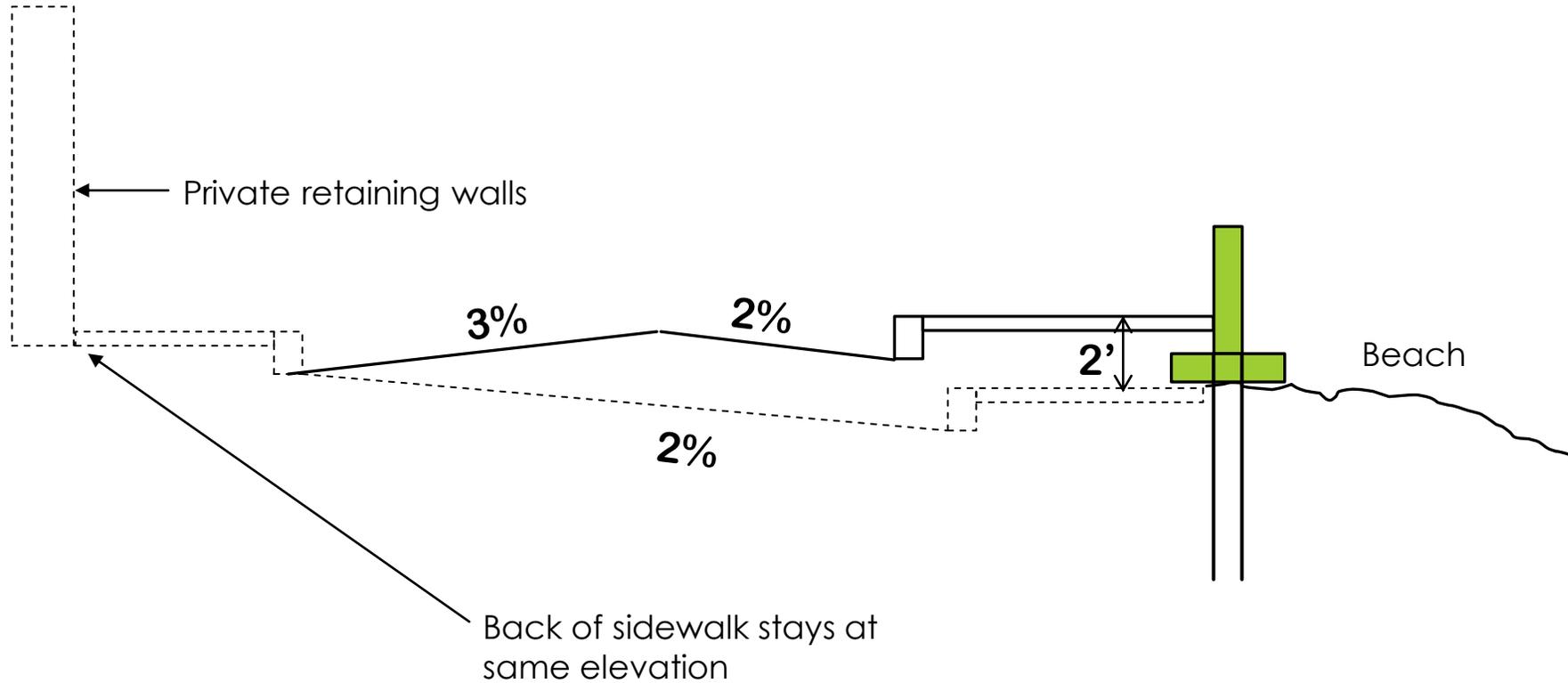
Resiliency

MORE SECURE WALL



Resiliency

CHANGE CROSS SLOPE



Resiliency

RAISE SIGNAL CONTROLLERS

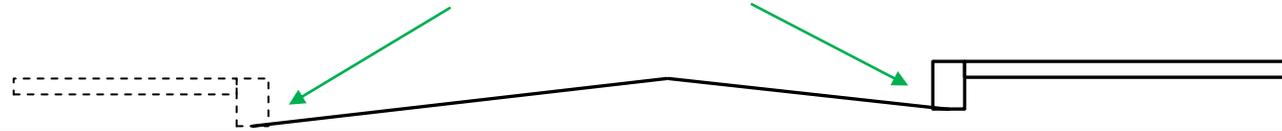


Elevated
off ground

Resiliency

ADD INLETS

Water collects on both sides of road



Community Vision

ENHANCED CROSSWALKS

Before



Community Vision

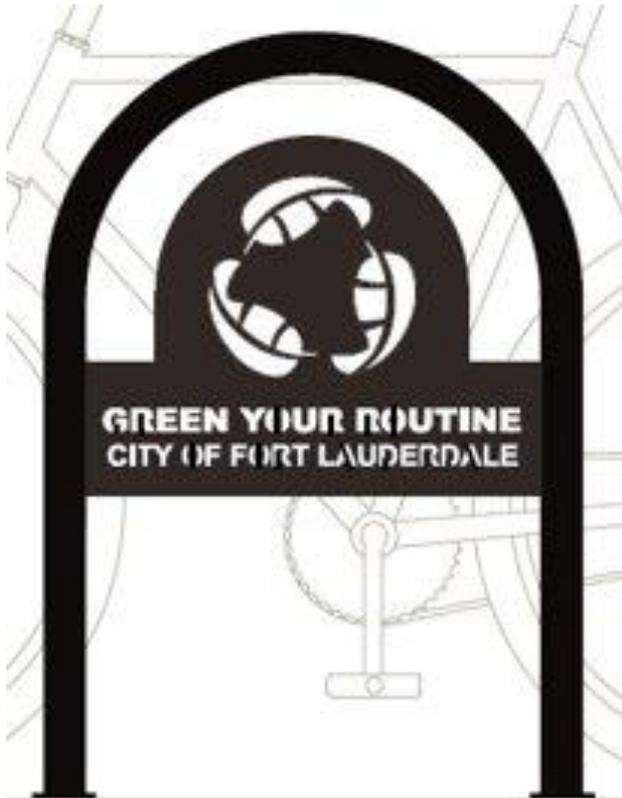
ENHANCED CROSSWALKS

After



Community Vision

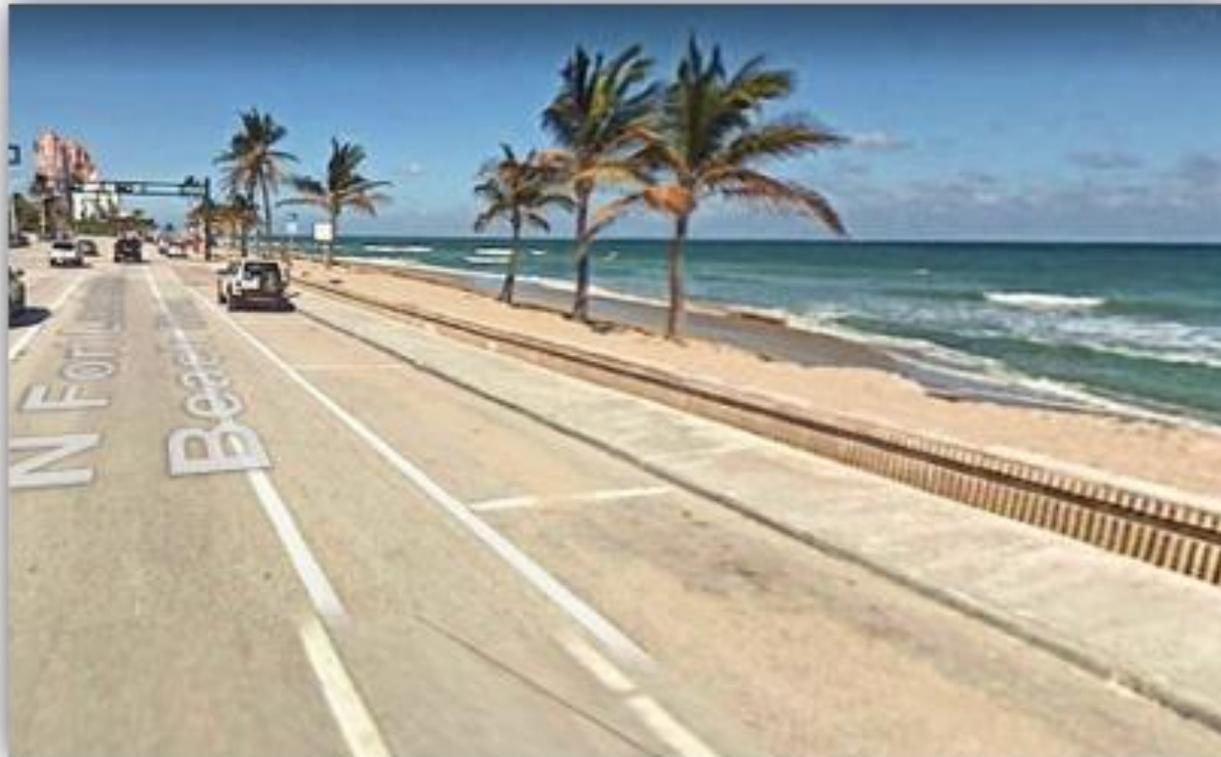
BICYCLE RACKS



Community Vision

SIDEWALK

Before



Community Vision

SIDEWALK

Before -- sign clutter!



Community Vision

SIDEWALK

After



Community Vision

WALL

Before



Community Vision

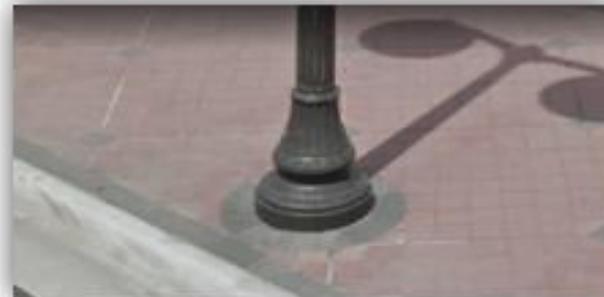
WALL

After



Community Vision

PEDESTRIAN LIGHTING



Community Vision

LANDSCAPING



Environmental Concerns



2012 Turtle
Nesting Locations

Environmental Concerns

BACKWALLS



Environmental Concerns

DUNES AS BACKWALLS



Environmental Concerns

MISSING SECTION OF WALL



Environmental Concerns

MISSING SECTION OF WALL



Environmental Concerns



Transformation



Transformation



What Went Well?

- All funding partners fully committed
 - **FDOT, MPO, City**
- Coordination with city and residents
 - **Results of many meetings for input and feedback**
- FDOT and City unified front in supporting design decisions

Lessons Learned?

- **Begin public outreach ASAP!**
 - **Preferably before design begins, wasn't possible in our case**
 - **Be willing to listen to and incorporate feedback into design**
- **Earlier coordination with permitting agencies**
 - **Narrow the range of options for public consideration**
- **Establish firm deadlines for decisions**
 - **Non-timely decisions caused delays and re-work**

Questions?



Discussion

1. Given what you have heard from both case studies, what do you think are the key take-aways with respect to supportive CSS and resilience/adaptation project development?
2. Are there examples in your state where similar efforts/approaches have occurred?

Discussion

3. If your agency wanted to formalize this approach within your project development process, which steps, if any, would be needed? (Even if such an approach is doable within your current procedures, what in addition would be necessary to further enhance the consideration of such an approach?)
4. What are the implications of such an approach for the types of expertise/skills needed within your agency?
5. What is one thing that AASHTO and/or FHWA could do to enhance an understanding of this approach within your agency? Or for that matter within the profession?



Polling Exercise

Questions



environment.transportation.org

Contact us:

- Melissa Savage, Program Director for Environment: msavage@ashto.org
- Kelly Cornell-Lew, Program Manager for Environment: kclew@ashto.org
- Jenn Billo, Program Specialist for Environment: jbillo@ashto.org
- Dave Peters, Program Specialist for Environment: dpeters@ashto.org