



BUILDING INNOVATION

Conference

Getting Fired Up About Being Resilient to Wildfires

DR-4634-CO Marshall Fire

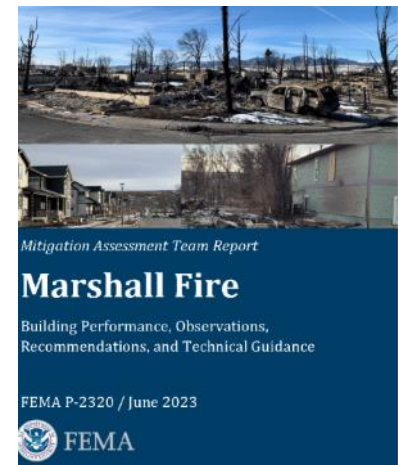
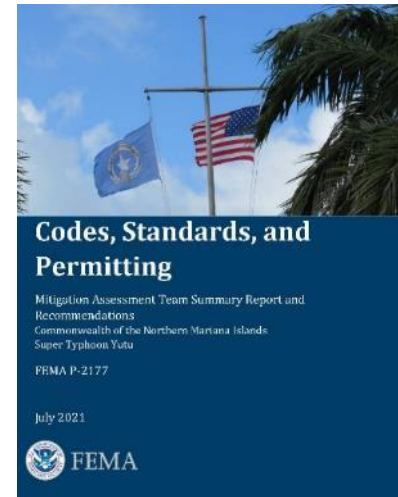
September 6, 2023

Outline

- Building Science Disaster Support (BSDS) Program
- Marshall Fire
- Key Mitigation Assistance Team (MAT) Observations
- Marshall Fire MAT Products

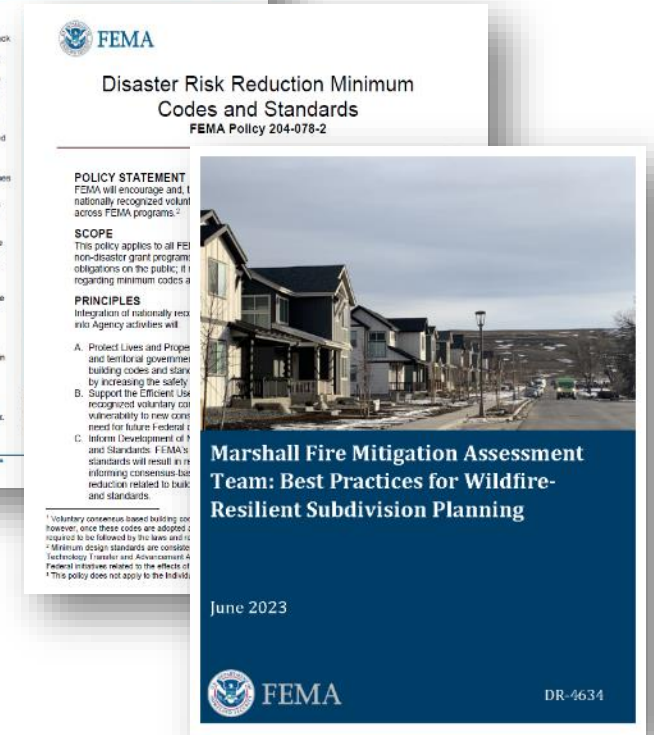
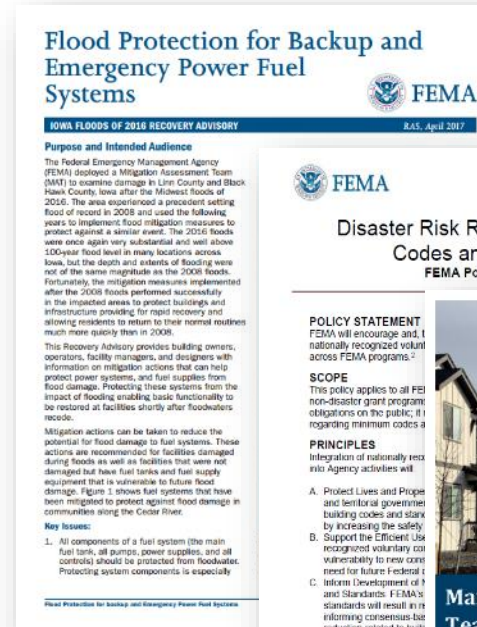
Building Science Disaster Support Program (BSDS)

- Provide building science technical support to the Federal, State, Local, Tribal and Territorial disaster recovery operations
- The Mitigation Assessment Team (MAT)
 - Perform the work of the BSDS
 - Study building performance through a forensic A/E lens following natural disaster events
 - Evaluate what worked and what failed in the built environment to inform recovery, rebuilding and hazard mitigation
- Reinforce what works and develop improved design and construction techniques for what didn't



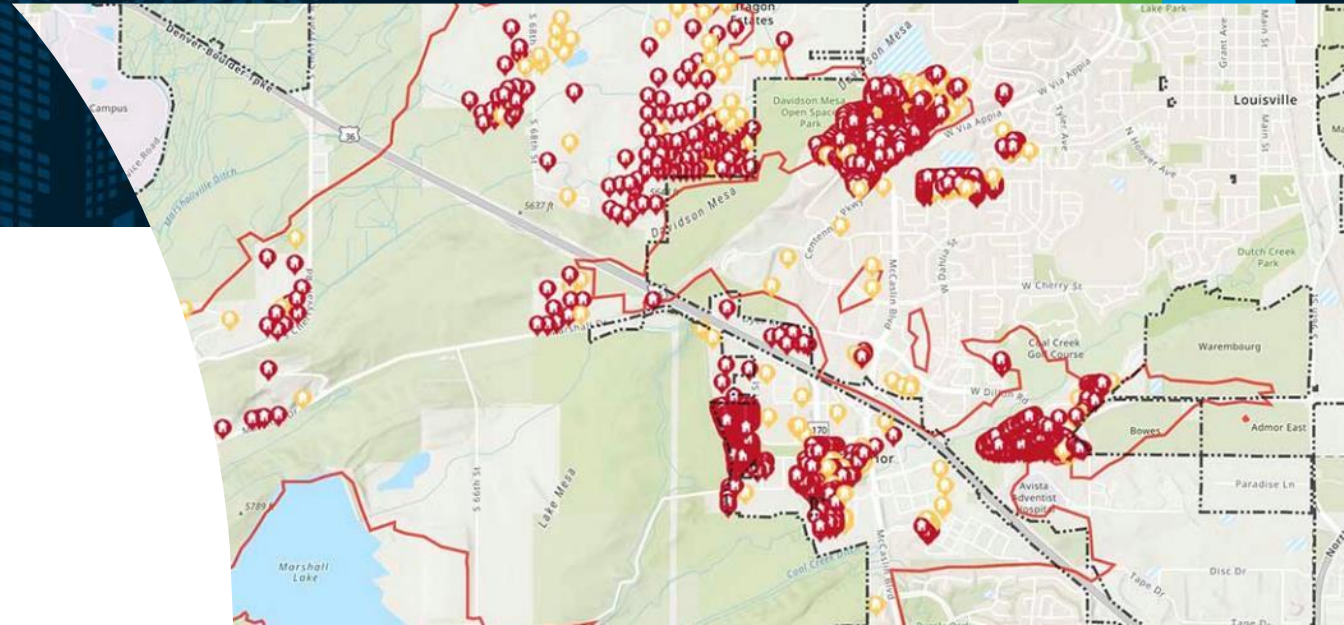
Typical Outcomes of FEMA BSDS / MATs

- Recovery guidance documents specific to the disaster
 - Technical Reports with topic specific resilient recovery recommendations and guidance
- Recommendations to local Code adoption and enforcement
- Regulatory guidance and support
- Education and awareness
- Mitigation guidance and best practices
- Recommendations for disaster risk reduction improvements to model codes and standards, guidance documents, and programs



Marshall Fire

- **Event Date:** December 30, 2021
- **Affected Areas:** Louisville, Superior and unincorporated Boulder County, CO
- Most destructive fire in CO
 - ~6,219 acres burned
 - ~1,084 buildings destroyed
 - ~98% residential
 - ~2% commercial
 - ~127 buildings damaged
 - Primarily residential
 - Multiple wildfire incidents simultaneously



Acknowledgements/Credits

- FEMA Headquarters
- FEMA Region VIII
- U.S. Fire Administration
- State of Colorado
- STARR II
- IBHS
- ICC
- Oregon State University
- University of Colorado Boulder



FEMA



COLORADO



U.S. Fire
Administration



University of Colorado **Boulder**



Oregon State
University

What is the WUI?

The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetation fuels. An area where mitigation actions can assist in preventing damage or loss from wildfire.



National Wildfire Coordinating Group (NWCG)

Key Factors for Marshall Fire Impacts

- Extreme winds (100mph+ gusts)
 - Long-term drought
 - Unseasonably high temperatures (60-70°F)
 - Primarily a fast-moving grassland fire
 - Limitations in WUI code adoption
 - Limitations in WUI planning
- 1st FEMA wildfire MAT
 - Better understand nature of wildfire-built environment interactions
 - Better inform wildfire resiliency planning and implementation for planners, developers, government officials, and the public-at-large

Key Observations by the MAT

1. Structure/House Density and Separations (structure-to-structure fire spread)
2. Competing multi-hazard mitigations
3. Unmanaged or poorly maintained common and public open spaces

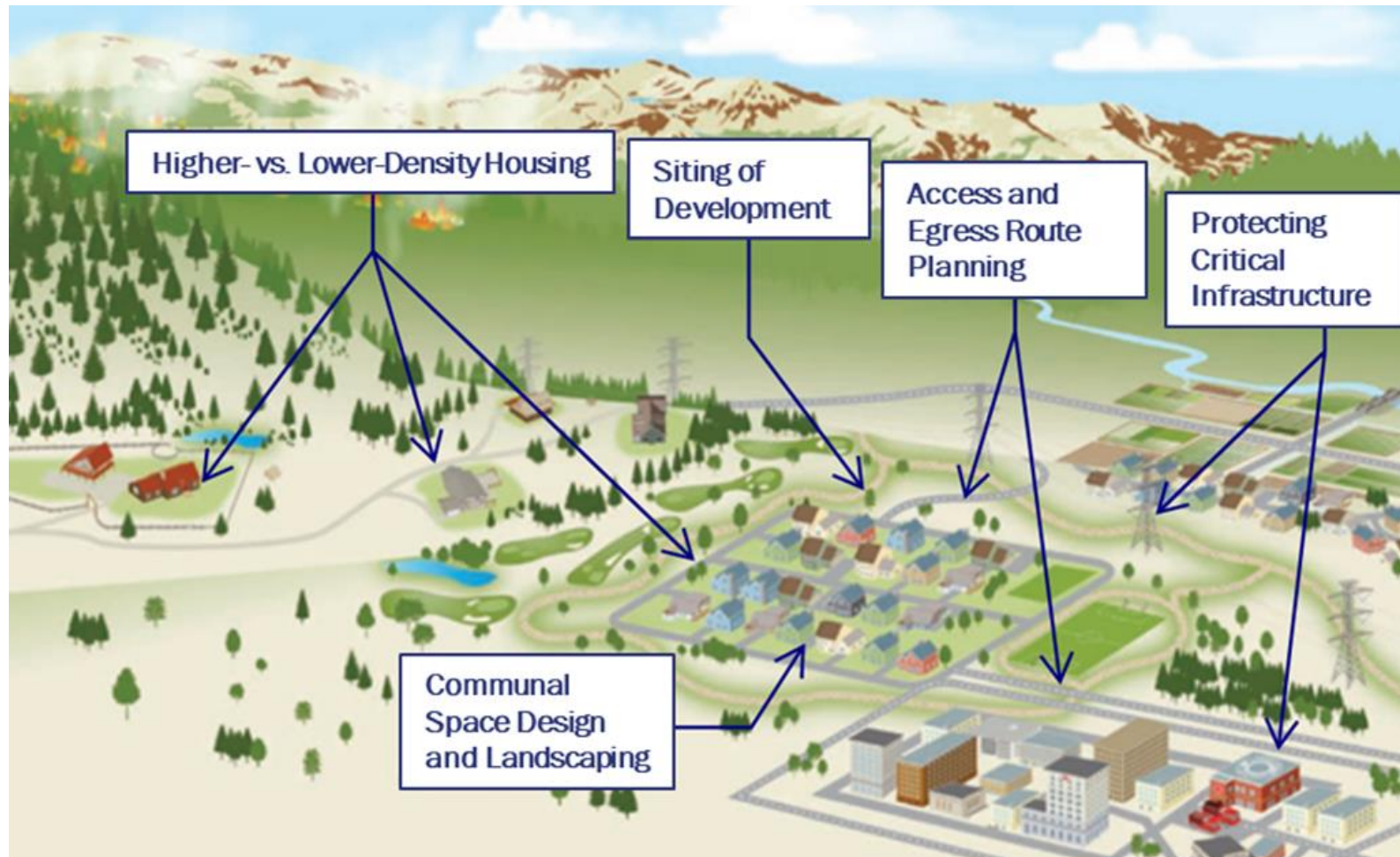


Key Observations by the MAT

4. Insufficient parcel-level vegetation management (e.g., mulch, trees, hedges)
5. Non-structural combustible attachments or “wicks” (e.g., decks, fences, outbuildings, vegetation)
6. Lack of ember protection/resistance for vents, joints, edges



Community/Neighborhood Level Considerations



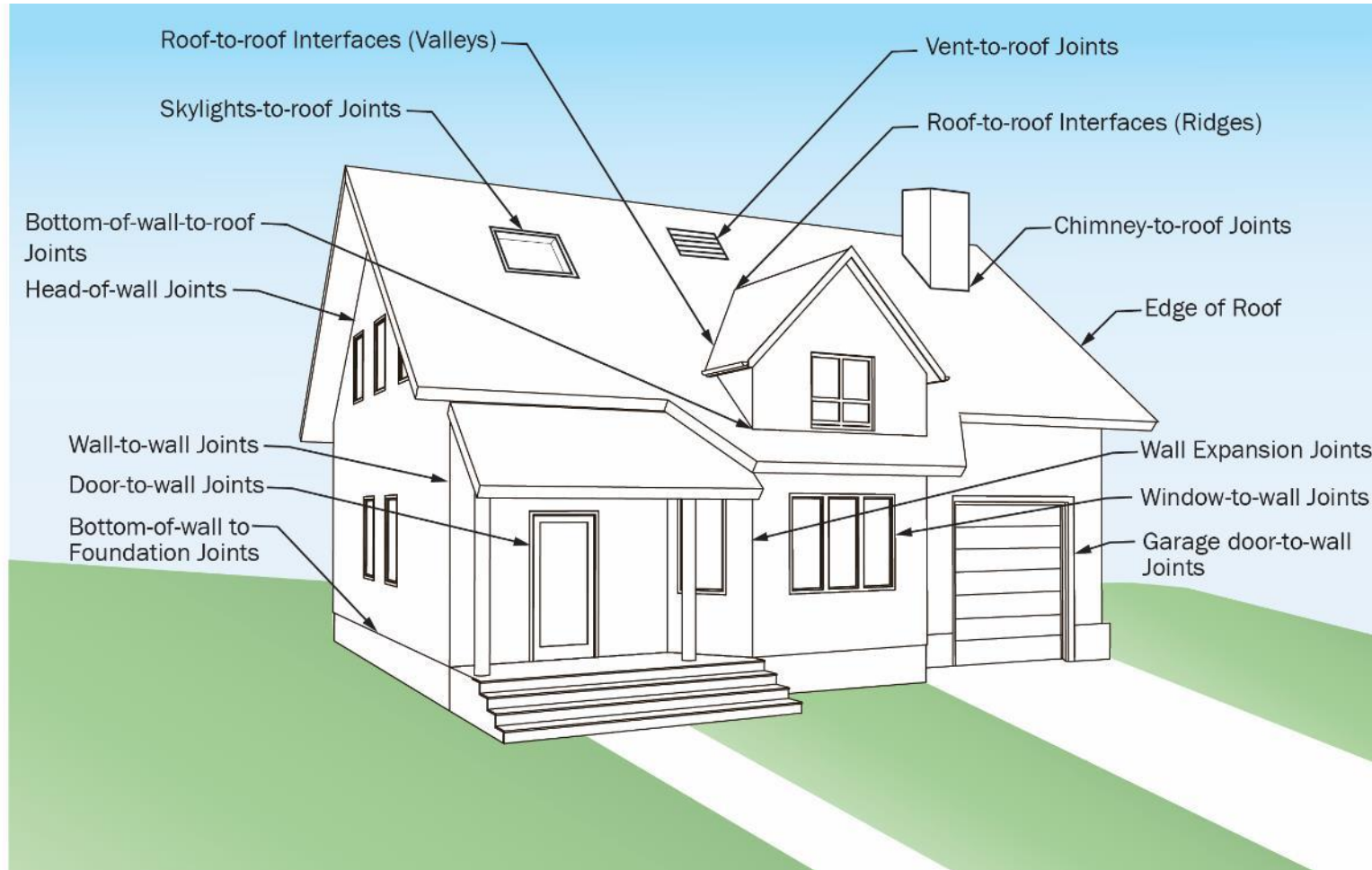
Parcel Level Considerations



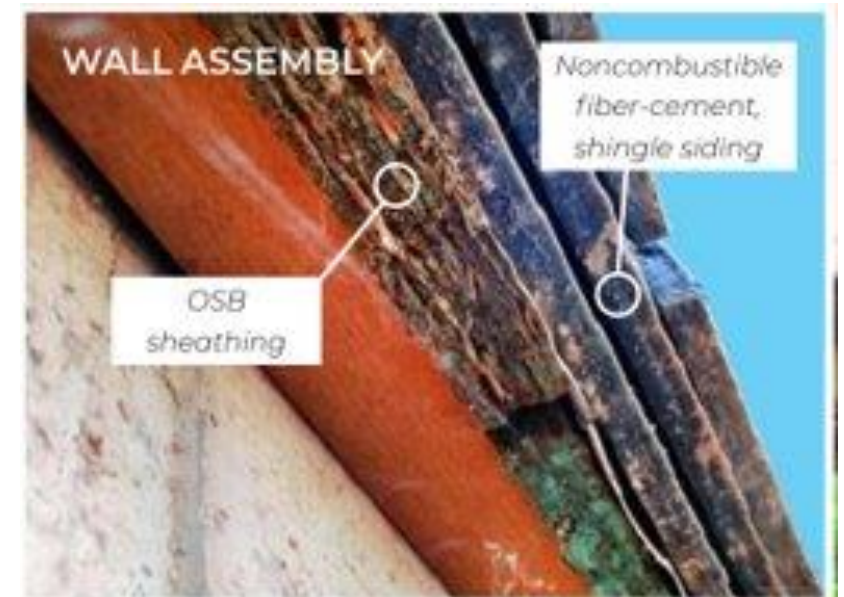
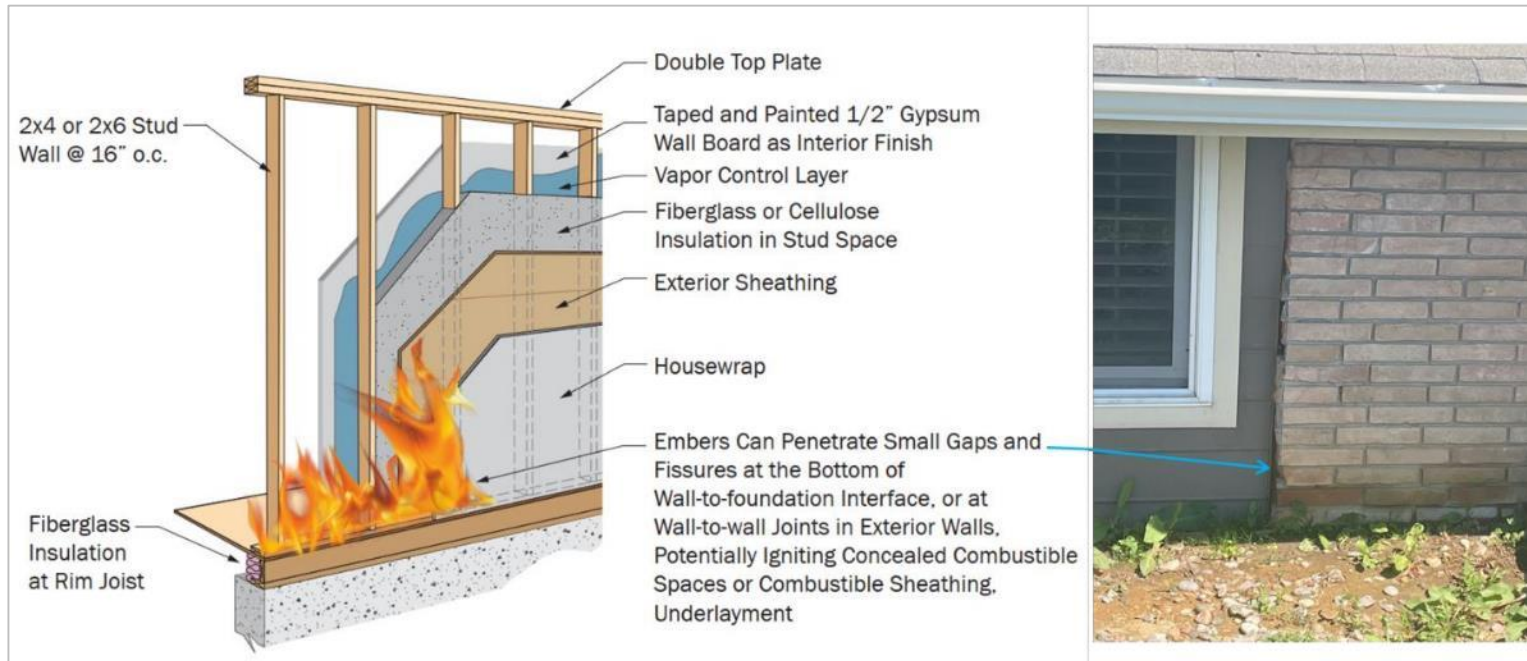
Building Level Mitigation

- Use non-combustible or ignition-resistant materials
- Detailing can be a key vulnerability - limit avenues for ember intrusion
 - All edges, joints and pockets created in roof design, creates a location for ember and debris accumulation
 - Unprotected openings (e.g., vents, skylights, joints, gaps) in roofs can lead to ember penetration into combustible attic spaces
 - All plumbing stacks, attic, crawlspace, basement, soffit, and ridge vents should have noncombustible corrosion-resistant metal wire mesh having opening sizes no larger than 1/16-inch square for new or retrofit construction.

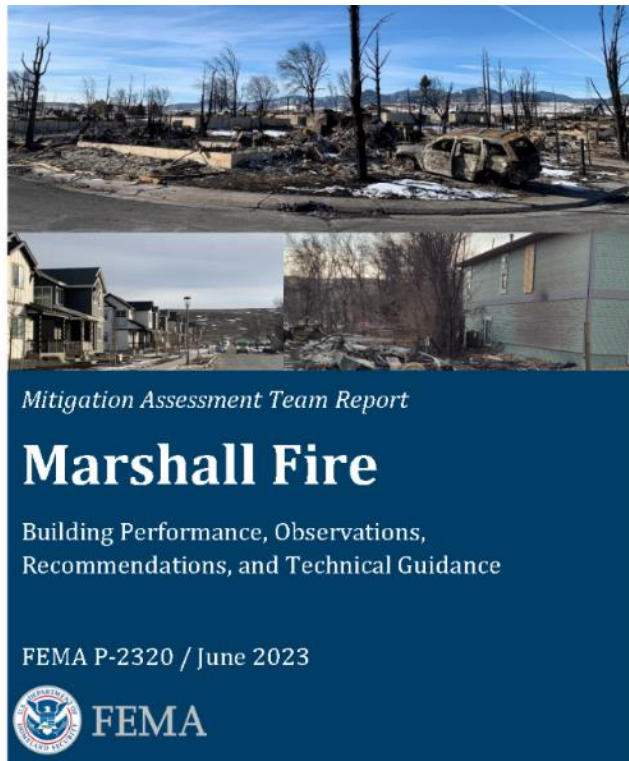
Building Level Considerations



Building Level Considerations

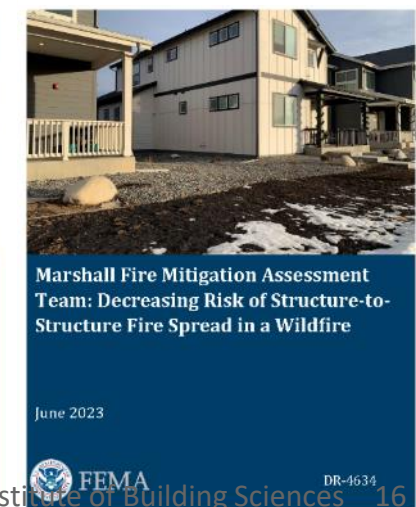
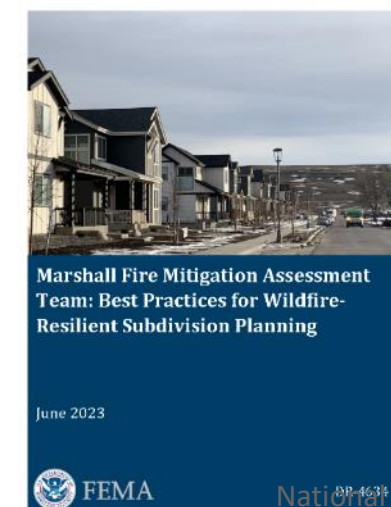
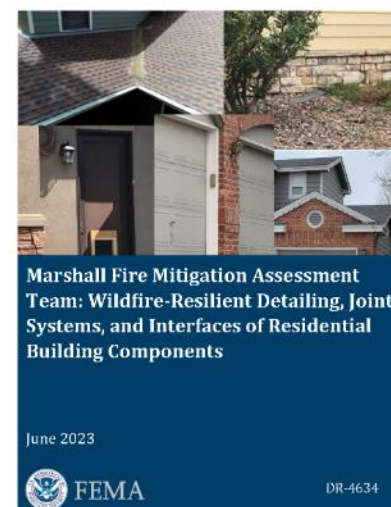
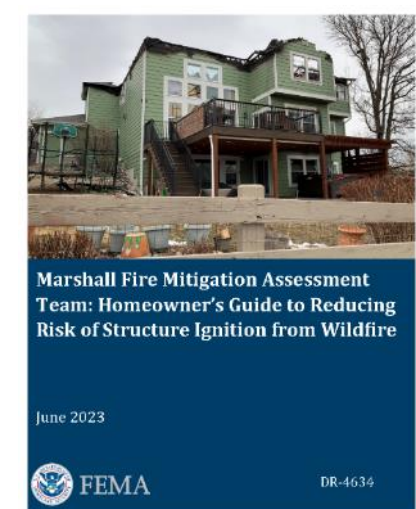


Marshall Fire MAT Products



<https://www.fema.gov/emergency-managers/risk-management/building-science/publications?name=Marshall+Fire>

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Other Resources

- Insurance Institute for Business & Home Safety (IBHS) Full-Scale Fire Testing <https://ibhs.org/risk-research/wildfire/>
- Fire Safety Research Institute (FSRI) <https://fsri.org/about>
- National Institute of Standards and Testing (NIST) <https://www.nist.gov/fire>
- Quarles, S. et. al. “Home Survival in Wildfire-Prone Areas: Building Materials and Design Considerations”. May 2010. <https://anrcatalog.ucanr.edu/pdf/8393.pdf>
- CAL FIRE Building Materials Listings <https://osfm.fire.ca.gov/divisions/fire-engineering-and-investigations/building-materials-listing/bml-search-building-materials-listing/>
- CAL FIRE Fire and Resource Program. <https://www.fire.ca.gov/what-we-do/fire-resource-assessment-program>
- NFPA Firewise – <https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA>
- University of California, Agriculture and Natural Resources. <https://ucanr.edu/sites/fire/>
- SFPE Foundation Virtual Handbook on WUI Risk Assessments <https://www.sfpe.org/wuihandbook/home>
- NFPA “Assessing Structure Ignition Potential from Wildfire” training. <https://nfpa.org>
- Fire Adapted Communities Learning Network. <https://fireadaptednetwork.org/>

Questions?

Building Science Disaster Support Program:

- FEMA-BuildingSciencedisastersupport@fema.dhs.gov
- <https://www.fema.gov/emergency-managers/risk-management/building-science/mitigation-assessment-team>

Building Science Branch:

- <https://www.fema.gov/emergency-managers/risk-management/building-science>



Thank you



FEMA