

Stormwater Drainage Project for HOA Properties in Red Rocks Valley Community

Please hold all questions until the end

Overview of Stormwater in Red Rocks Valley

Key Components of the Current Drainage System

Main Detention Pond

The main detention pond temporarily stores runoff to reduce peak flow rates and minimize sediment and flooding downstream.

Drainage Channel

The drainage channel which follows Trail Ridge Road, was designed with linear detention ponds at individual driveways temporarily storing runoff, reducing peak flow rates and minimize sediment flow through.

Culverts

Within the drainage channel, six driveways were designed with 15" culverts with the intent of holding back stormwater to slow flow rates and minimize silt from going down stream.

Overflow Driveways and Trail Ridge Road

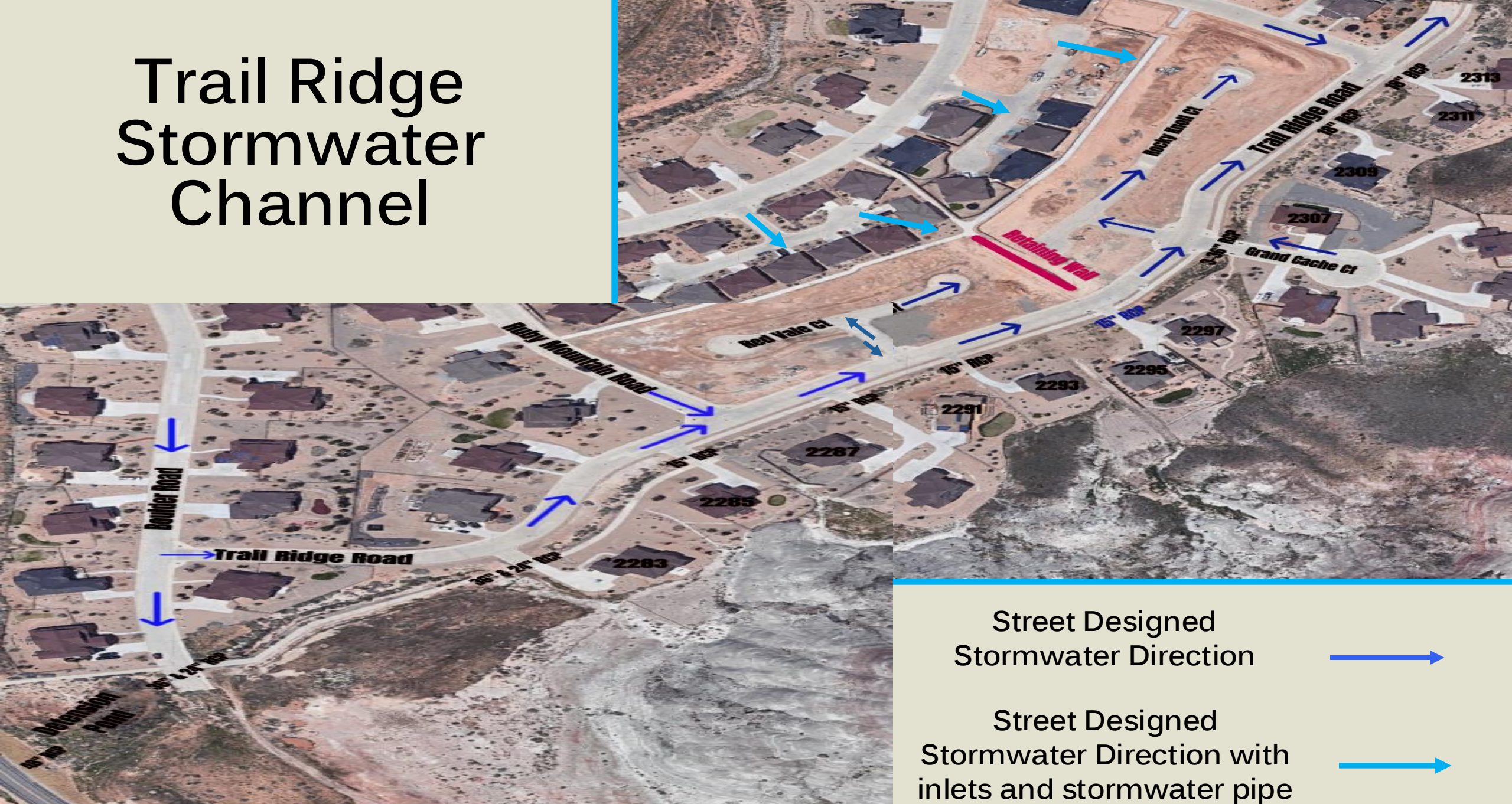
Driveways over the stormwater channel were designed lower so stormwater would overflow on top across the surface to the next channel segment and overflow going into Trail Ridge Road.

Flow Through Culverts

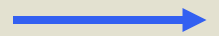
Larger culverts were designed for locations where stormwater is intended to go under driveways or streets.



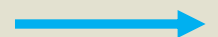
Trail Ridge Stormwater Channel



Street Designed
Stormwater Direction



Street Designed
Stormwater Direction with
inlets and stormwater pipe



Drainage Channel Size and Volume Flow

Channel Width

The stormwater channel is 45 feet wide from the back of the sidewalk and is intended to temporarily detain stormwater within the full width of the channel.

Stormwater Channel Overflow

The Stormwater channel is designed to detain water and overflow into Trail Ridge Road.

Sedimentation and Water Quality

The system's original design encourages sedimentation which improves water quality before it enters city stormwater system or natural waterways as required by the city of Grand Junction. .



Stormwater Challenges in the Community

Multiple Flash Floods Over the Years

These flood waters which come from all on and off property directions, have breached the drainage channel system into streets and homeowner lots within Red Rocks Valley.

Flooding and Property Damage

Flooding caused by stormwater has led to property damage including flooded crawl spaces, retaining wall collapse, and landscaping damage.

Environmental and Infrastructure Effects

Unmanaged stormwater infrastructure has caused soil erosion, and sediment buildup in the drainage channel and the main detention pond.



Existing System Limitations

Capacity and Sediment Issues

Extreme rainfall overwhelms current capacity and sediment buildup reduces pond volume, limiting effectiveness.

Flash Floods

These occur over a short duration 1-2 hours with as little as 1" of water can overwhelm the stormwater system.

Design Capacity

The stormwater system was designed for a 100 year flood that can occur over 24 hours with rainfall amounts of 2.01 inches for the 2007 original hydraulic analysis and updated in 2013 to 2.6 inches.



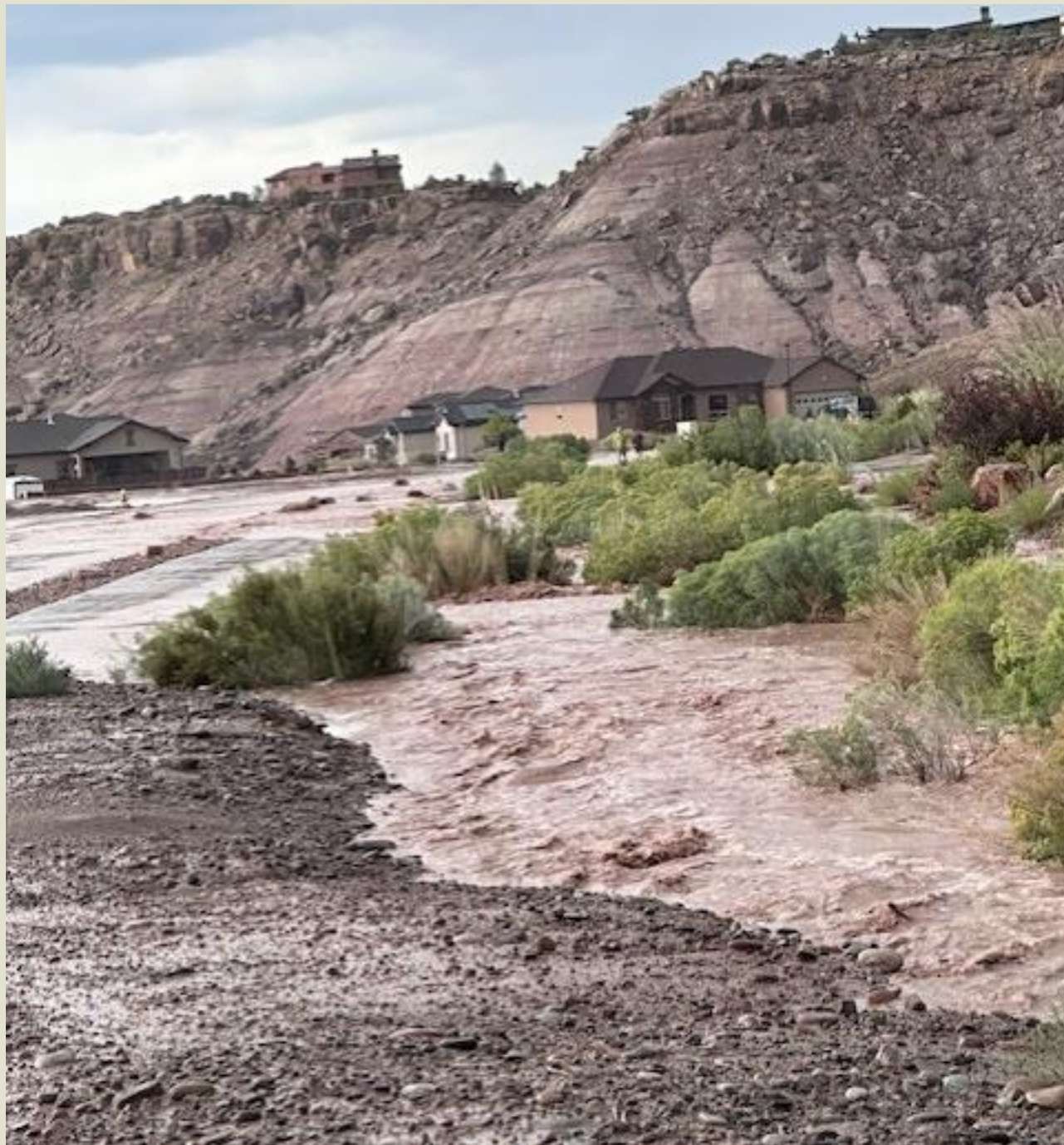
September 4th Flash Flood Event

Event Overview

The September 4th flash flood magnified critical weaknesses in the community's stormwater management systems due to intense rainfall.

Impact of Rainfall Intensity

Localized rainfall exceeded 4 inches within 2 hours which was the most measured to date. This caused infrastructure to overflow and resulting in flooding and damage.



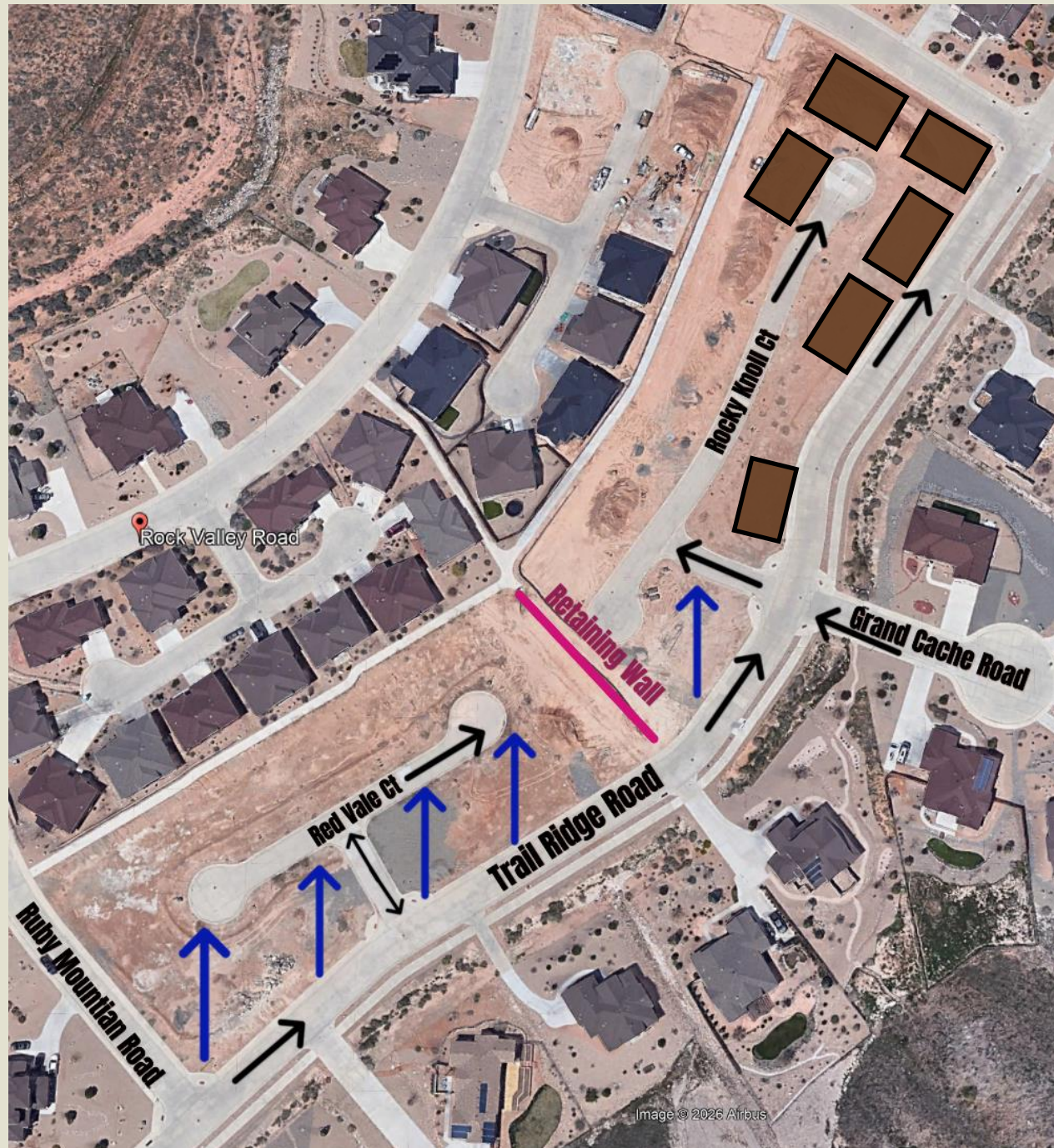
September 4th Flash Flood Event Cont.

Areas of Impact

- Detention system overflowed onto street and properties along Trail Ridge Road.
- Stormwater sheet flowed onto undeveloped Red Vale Ct and Rocky Knoll Ct properties knocking down retaining wall.
- Several crawlspaces were flooded
- Landscaping was washed away
- Walking paths washed away
- Additional substantial sediment and mud inundated stormwater system

Home Damage

- No homes interiors were flooded





Lessons Learned From Past Stormwater Incidents

Flash Floods

The original design was for a 100 yr floods which can occur over 24 hours which is still standard design today for most municipalities. However, RRV damage has occurred from flash floods which occur within a couple of hours

Lack of Maintenance

Existing channels and culverts were overgrown with vegetations, added silt build up, and clogged culverts.

Detention System Design

The design of the stormwater channels are now better understood knowing they are designed to detain water

Incorrect Driveway Construction

One driveway was not constructed to design and created a major choke point

Sheet Stormwater Flow Occurred at Undeveloped Parcels

Stormwater sheet flowed across the undeveloped property, creating additional flooding



Stormwater Maintenance Project

First Steps

After reviewing the initial damage from the Sept 4th flash flood, the following plan was approved by the HOA Board, and a contractor was hired to:

- Repair work needed to occur prior to the next rain season
- After verifying with city, the existing stormwater system needed vegetation removed
- Remove sediment and regrade
- Clean all culverts



Maintenance Project to Main Detention Pond & Stormwater Channel

Surveying

Surveyor was hired to establish property lines between drainage channel, detention pond, and landowners.

Vegetation Removal

Most Rabbitbrush, and all evasive vegetation removed

Sediment Dredging, Excavation, and Grading

- Dredging removed sediment buildup, restoring the pond's original water storage capacity.
- Excavating beyond original design where possible to add greater capacity.
- Berms added and repaired at main detention pond and open space sidewalk below.
- End of drainage channel has been cleared and open graded into adjacent property

Culverts Cleaned out

All culverts were jetted and cleaned out as previously they were up to 75% blocked.



Rock Reinforcement and Landscaping Repairs



Rip Rap

Rip rap (jagged rock) was added at culverts and sides of driveway to slow erosion.

Check Dams

Check dams (linear rock) was added to slow down and help control water flow.

Landscaping Rock

Most areas replaced where wash out occurred

Note: Large area at top of Trail Ridge Road is pending until funding is available





Impacts

- In flash floods, this channel location is more quickly overwhelmed.
- Additional stormwater breaches into Trail Ridge and across to cul-de-sacs
- Stormwater flooded adjacent homeowner lots up to front door

Culvert Addition

Culvert was unique to entire stormwater system

- Designed as a linear detention pond & 15" culvert
- However, driveway was constructed incorrectly over drainage channel at a substantially higher elevation
- Street stormwater outlet is directly above upstream culvert adding stormwater volume
- Major stormwater channel is within 100 feet
- Main Choke Point in the Drainage Channel





Purpose and Design of the New Culvert

Engineer Review and Recommendation

Working with the contractor and the engineer during construction it was determined that adding culverts to this location would provide the greatest impact for stormwater flood reduction in the system.

Convert to Flow Through

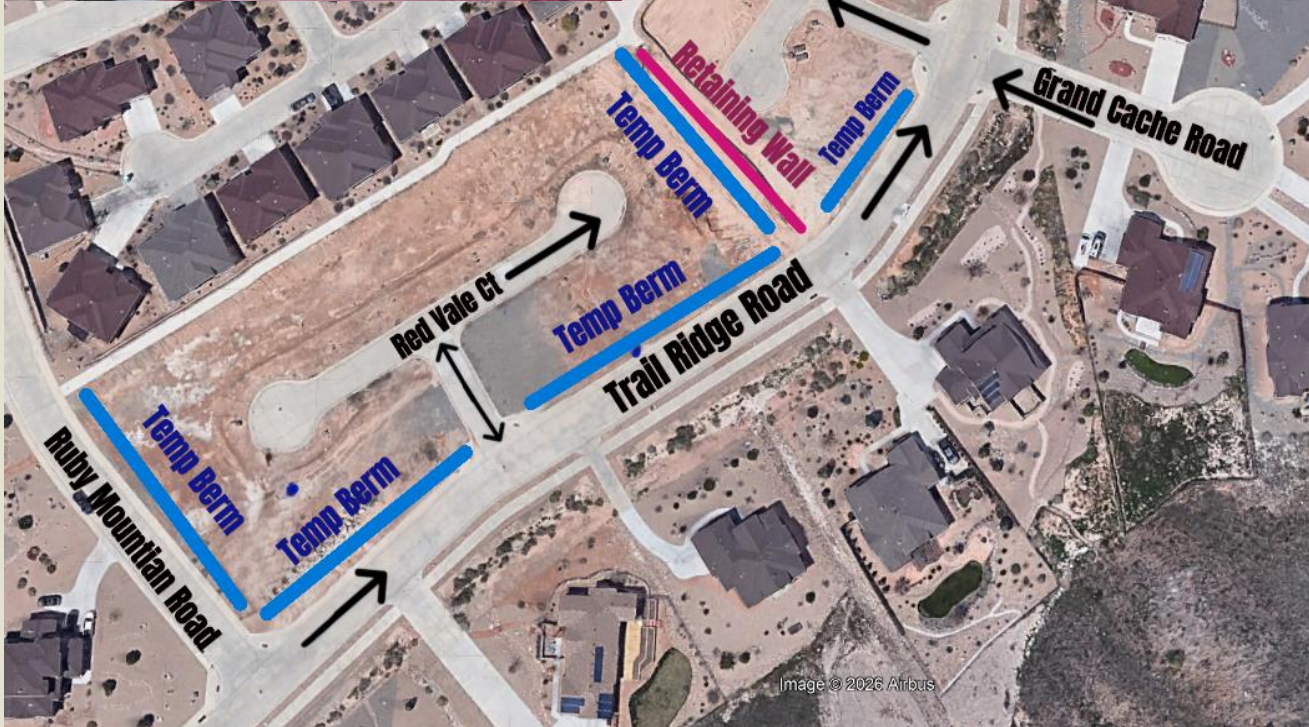
Added 2 - 30" culverts and concrete headwall to existing 15" culvert to allow stormwater to easily flow underneath driveway and not overflow into street and adjacent property.

Cost Efficiency While on Site

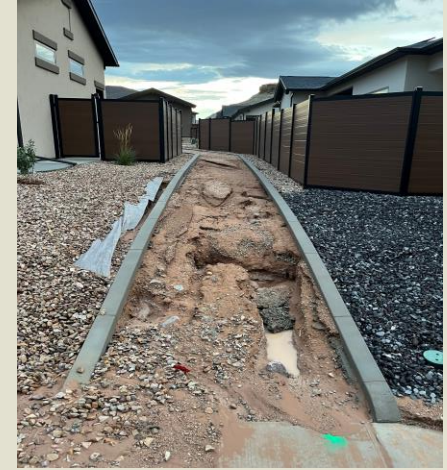
Work was approved by the HOA Board to take advantage of contractor on site and immediate improvement to the system.



Permanent Berm



Miscellaneous Repairs to HOA property



Retaining Wall Repaired

Wall was repaired

Walking Paths

Stormwater erosion required regrading and landscaping rock replacement

Temporary Berms

These have been added all around the undeveloped property to better channel future stormwater on to Trail Ridge road

- Future housing build out will permanently raise grades and channel water on to Trail Ridge Road

Note: Miscellaneous repairs completed and paid by Conquest

Annual Maintenance Program

Implement Routine Maintenance Procedures and Schedules

Sediment and Debris Removal

Periodic removal of sediment and debris from detention pond, draining channels, and culverts to prevent blockages and maintains flow capacity.

Culvert Inspections

Biannual inspections of culverts ensure structural integrity and proper water flow before and after storm seasons.

Vegetation Management

Managing vegetation around water infrastructure prevents obstruction and supports long-term functionality.

Routine Maintenance Funding

Money will be added to the annual budget dedicated to routine maintenance activities to ensure system reliability.

HOA Board to ensure maintenance occurs as necessary





Expected Improvements in Stormwater Management

Flood Reduction Benefits

Removing vegetation, silt buildup, cleaning culverts, and new culverts will reduce flooding frequency and severity in critical areas by improving water flow capacity.

Undeveloped cul-de-sac areas temporary stormwater improvement

Berms added on entire perimeter and retaining wall will help channel water into Trial Ridge Road

Long Term Build-out

Future Build-out of the cul-de-sac's will permanently raise grades and channel water on Trail Ridge Road.

Community Safety Enhancement

Flood risk reduction of at-risk properties enhances community safety and protects property values.

New implemented Maintenance Program

Will keep stormwater system in proper condition to maximize its ability to manage stormwater events.

Hiring Consulting Engineer for Future Planning and Recommendations

Consulting Engineer



Contracted

ZAO engineering has been selected to develop the stormwater report based on the scope of service developed by the Stormwater committee.

Background

ZAO is a licensed engineer in Colorado with extensive experience in stormwater design and management within the Grand Junction area.

Schedule

Started work on report mid April and is expected to be completed in 2-3 months

Scope and Objectives of the Engineer and Report

Review Community Survey Responses, Pictures, and Videos

Information to be used for detailed understanding of how stormwater and flash floods affect the community

Review Existing Stormwater Reports, and Construction Drawings

Will provide understanding of original design and its intent

Stormwater Overview

Provide overview of existing stormwater system.

Future Construction

Provide recommendations for input on stormwater in relation to adjacent future housing developments

Enhancing Resilience and Sustainability

Provide report that recommends upgrades to enhance flood resilience, optimize maintenance, and promote sustainable practices.



Engineering Report Continue

Some Specific Areas of Review

- Adding additional Culverts
- Cul-De-Sac's and undeveloped area around them
- Stormwater Control at Rocky Knoll Court
- Pathways and sidewalks

Future Work Risk-Reward

Any future work recommended by the engineer will be evaluated based on up-front cost compared to potential risk or damage.



Overall, 4 Month Progress

- Property lines permanently identified at homeowner properties, and main detention pond
- Drainage channel and detention pond cleared, and enlarged where possible
- Culverts cleaned
- Culvert improvement at major choke point
- Landscape rock, Rip rap, check dams added
- Temporary stormwater berms at sidewalks & cul-de-sacs
- Retaining wall repaired
- Walking paths repaired
- Maintenance program development and implemented
- Community outreach and feedback (provided to engineer)
- Engineer contracted for report & future recommendations

Costs and Financial Overview of the Stormwater Project

Summary of Expenditures to Date & Future

Capital Costs Overview

- Maintenance Project \$76,983
- Culvert Addition \$19,000
- Engineer Services \$1,500 (Original budget, \$20,000)

Total \$97,486

Projected Maintenance Costs

Supporting ongoing infrastructure upkeep and reliability

- Vegetation Control \$5K/year
- Stormwater mud and silt removal as needed \$10-\$20K
- Culvert Cleaning as needed \$5-\$7K



Funding Sources and Financial Planning for Future Work

Current Funding Sources

Funding is obtained from HOA dues.

Future Financial Planning

At this time future plans do not include HOA dues increases or special assessments.

Funding Allocation

Community contingency money needs to be managed not just for stormwater, but other community needs i.e. entry way, cul-de-sacs, streets, fencing, beautification, unknowns. etc.



Summary

- Together the multiple recent improvements completed, have made the Red Rocks Valley Stormwater system better overall than prior to Sept 4th.
- Future flash flood damage should be reduced due to the recent Stormwater system improvements.
- However, recent improvements will not always prevent flood damage in the future when floods exceed existing design capacity.
- It is now better understood that Red Rocks Valley is in a Flash Flood area which cannot always be accounted for in the stormwater system.
- As flash floods occur, damage will continue to be assessed on a case-by-case basis.

Next Steps

- Establishing on-line access to documentation
- When completed, the Stormwater Committee will review the Final Engineering report and make recommendations to the HOA board for them to review and determine next steps concerning the Stormwater System within Red Rocks Valley.

Questions