



# Flood 101

City of Boulder

Floodplain Standards and Regulations  
Managing Risks to People and Property

Planning Board Presentation

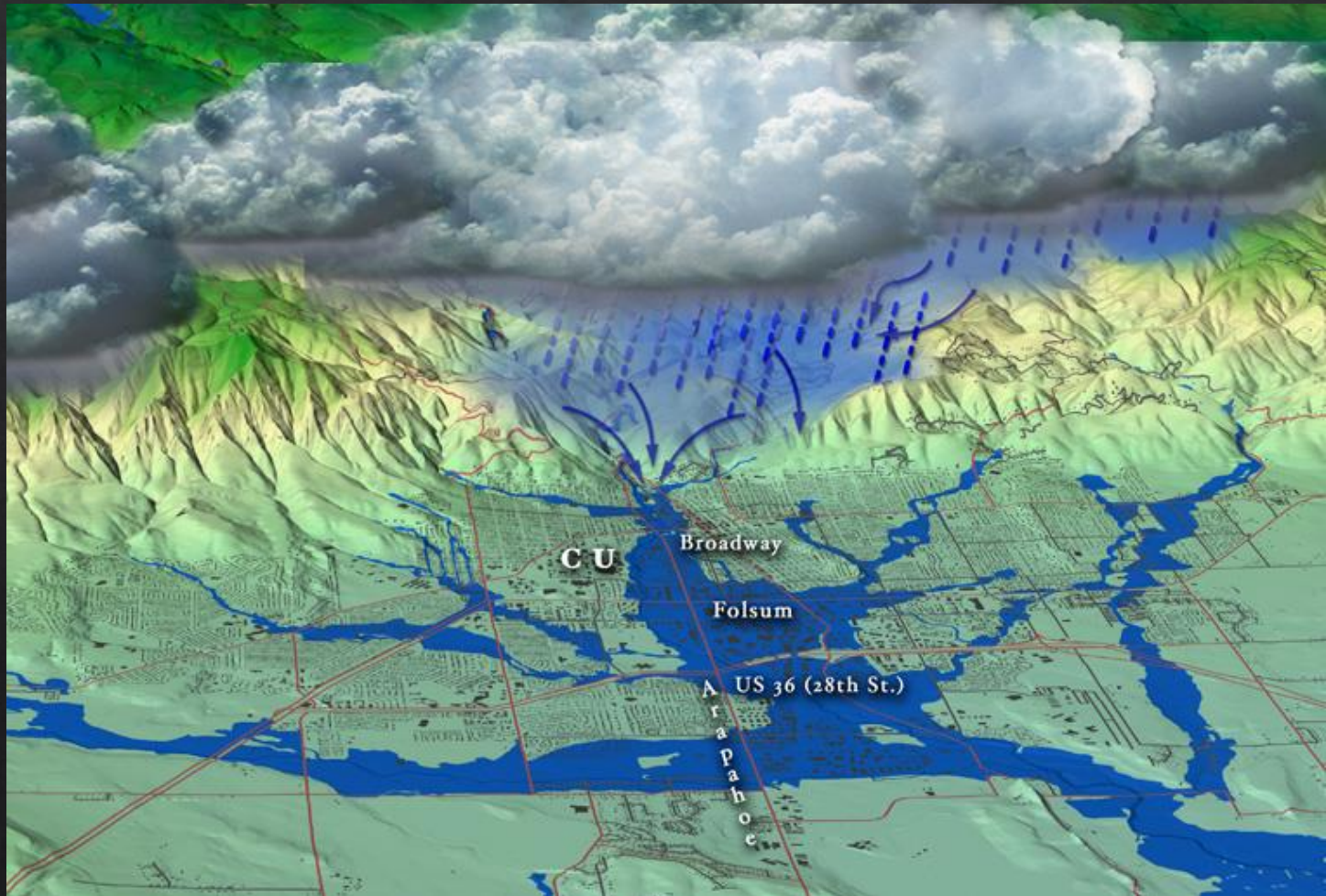
June 1, 2017

# Presentation Agenda

- ◇ Boulder's Flood Risk
- ◇ Floodplains and Risk Mapping
- ◇ Boulder's Flood Zones & Regulations
- ◇ Building in the Floodplain
- ◇ Floodplain Development Permits
- ◇ Questions

# Flash Flooding

- ◆ Boulder is # 1 flash flood risk in Colorado

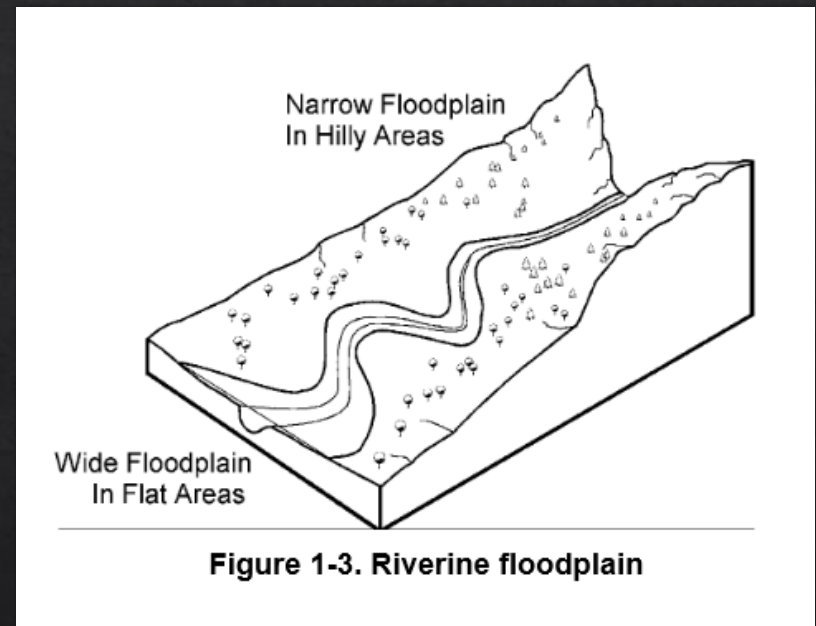
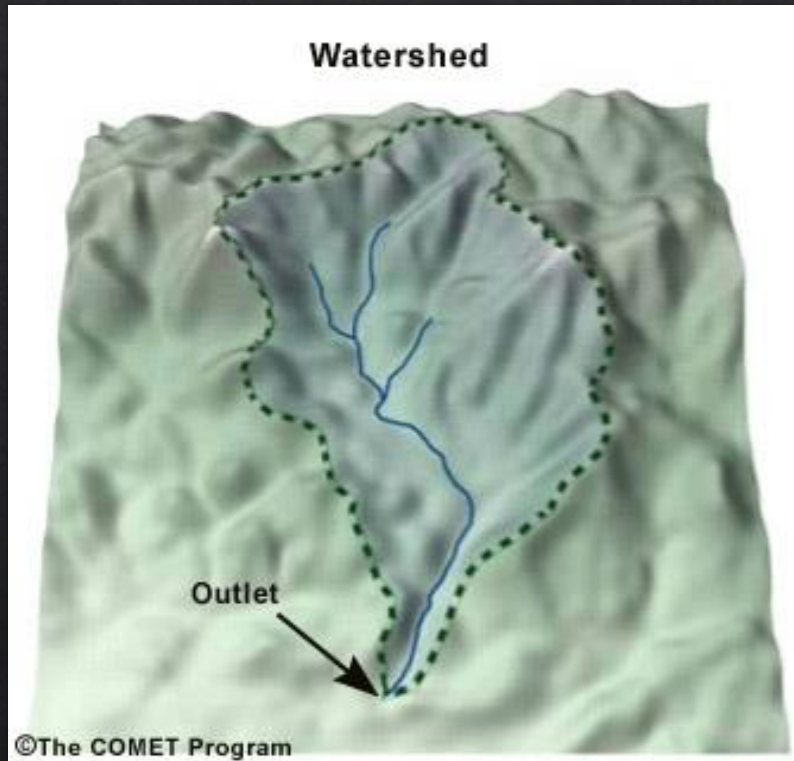


# 2013 Flood

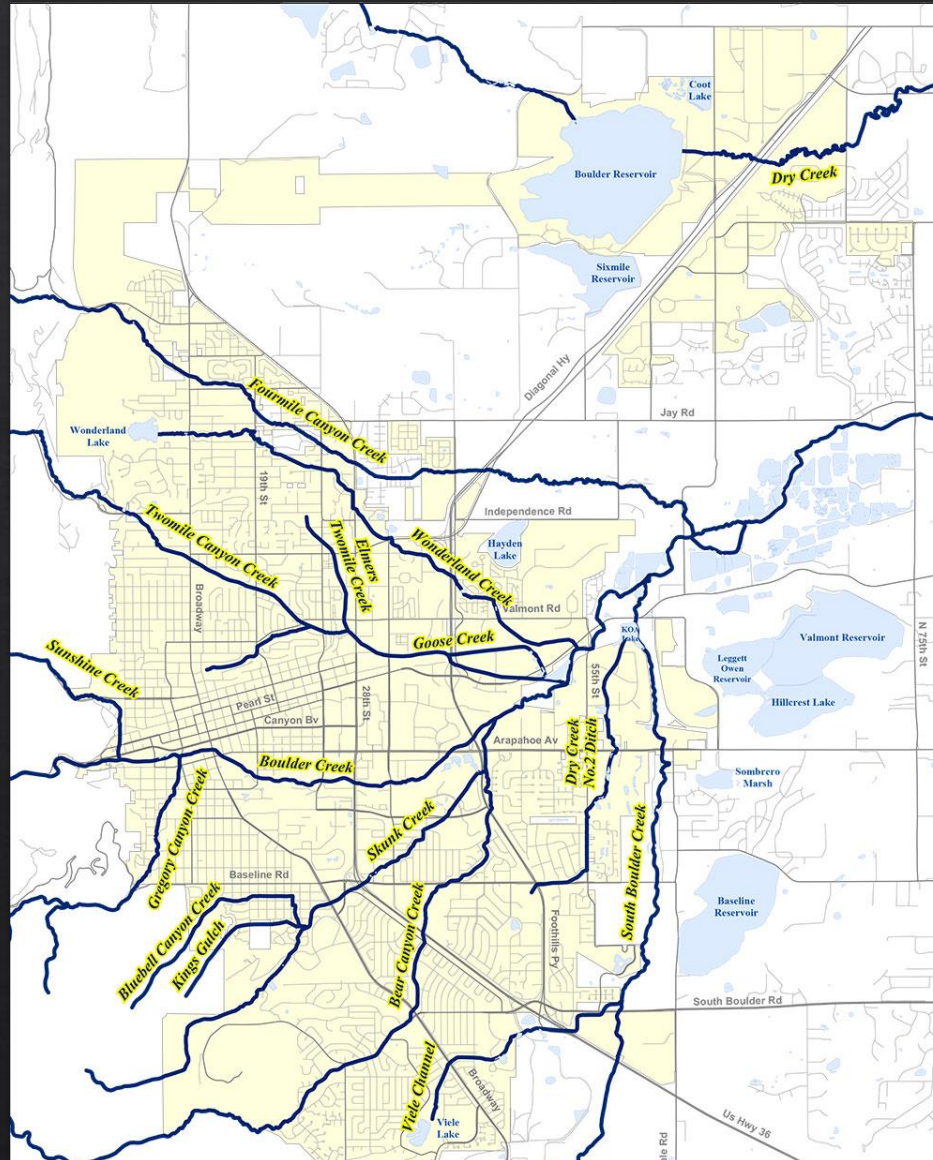
- ◇ 16 inches of rain between September 8<sup>th</sup> – 16<sup>th</sup>
- ◇ 1000-year rain event
- ◇ 25 - 100-year flood event along drainageways
- ◇ Damage
  - ◇ Major drainageway flooding
  - ◇ Local drainage
  - ◇ Groundwater
  - ◇ Wastewater backups



# Watershed



# Boulder's Major Drainageways



# Floodplains and Risk Mapping

Identifying the hazard

# FEMA

- ◆ Federal Emergency Management Agency
  - ◆ National Flood Insurance Program (NFIP) participation
  - ◆ Disaster Funding
- ◆ Community Rating System
  - ◆ Class 5 community for management and outreach – up to 25% off flood insurance

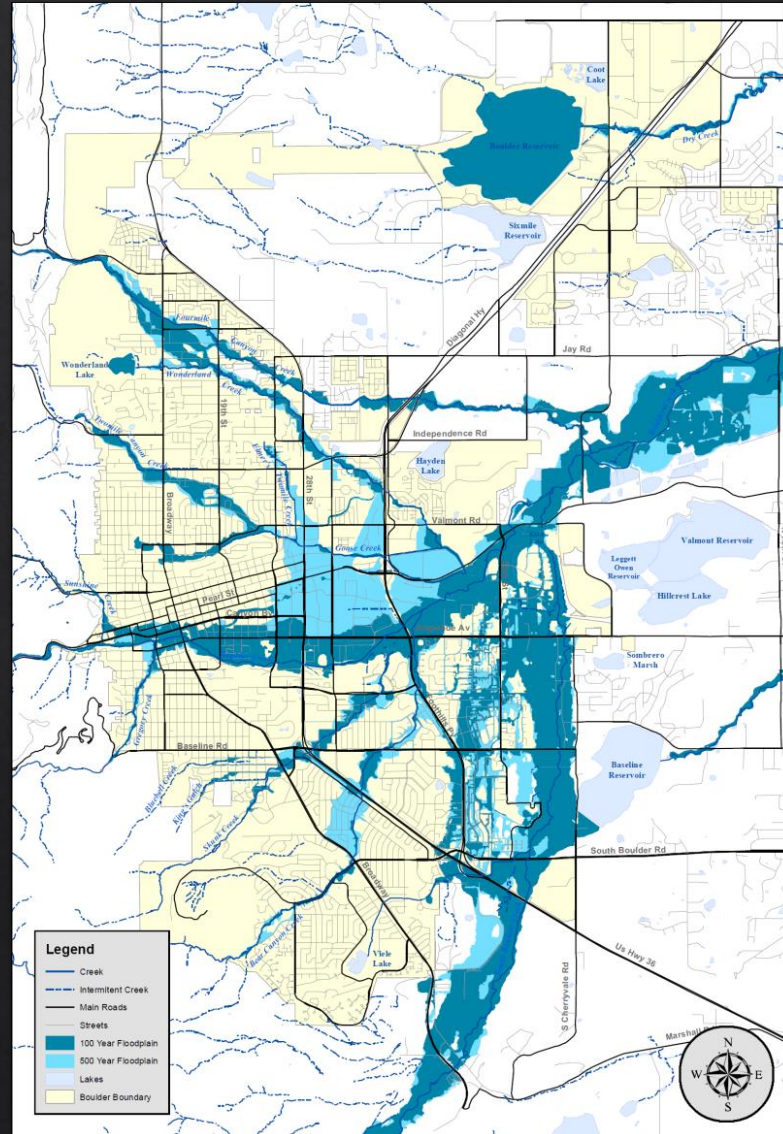




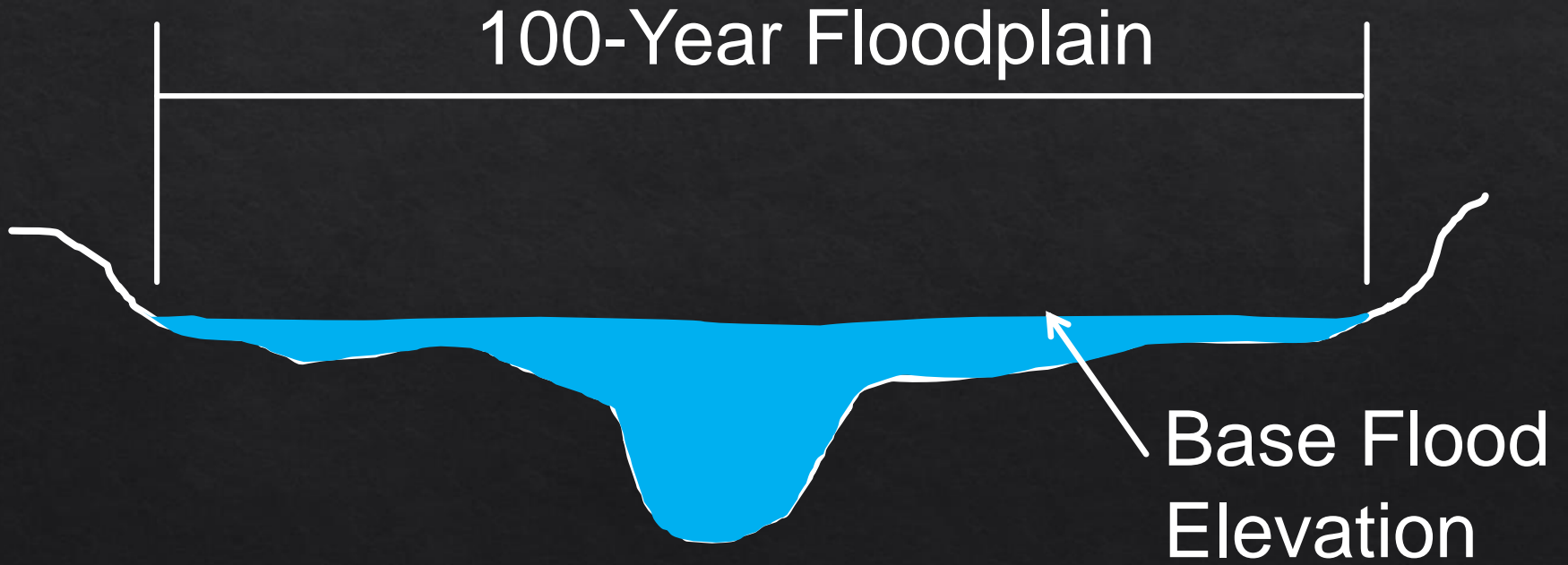
# Identifying Flood Risk - Mapping

- ◇ Floodplain Mapping
  - ◇ Required for participation in the National Flood Insurance Program
  - ◇ Completed by the City
  - ◇ Adopted by FEMA
- ◇ Demonstrates Risk
  - ◇ Accuracy limitations
    - ◇ Scale of mapping
    - ◇ Available Data

# City of Boulder Floodplains

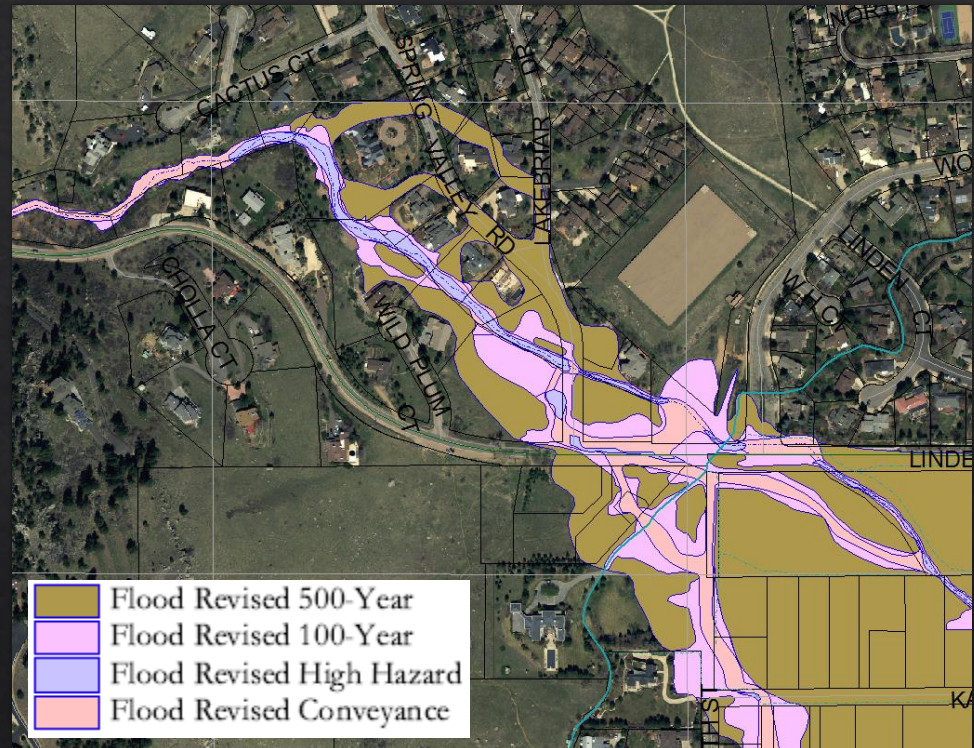


# 100-Year Floodplain



# Boulder's Flood Zones & Regulations

- ◇ 500-year floodplain
- ◇ 100-year floodplain
- ◇ Conveyance zone
- ◇ High hazard zone
  
- ◇ Boulder Revised Code
  - ◇ 9-3-2 through 9-3-6



# 500-year floodplain

- ◇ 0.2 percent annual risk event
- ◇ Boulder regulates critical and lodging facilities in this zone
- ◇ Used for planning purposes
- ◇ Flood insurance is recommended

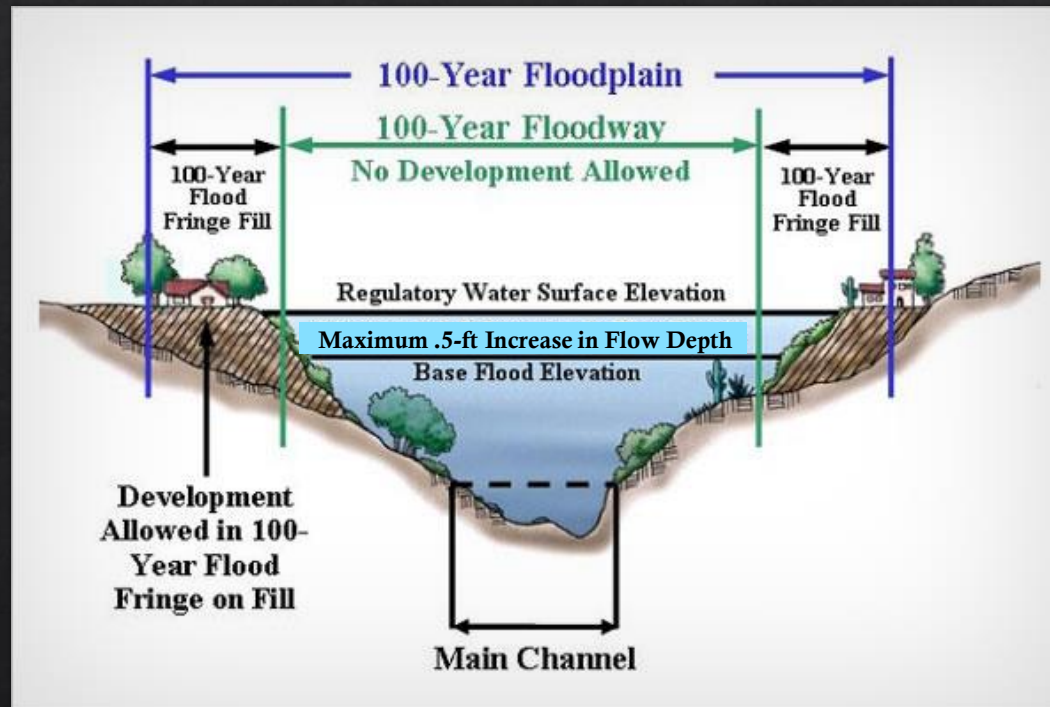
# 100-year floodplain

- ◇ 1 percent annual risk of flooding
- ◇ 26 percent risk over a 30 year time period
- ◇ Development restrictions
  - ◇ Building Requirements
  - ◇ Parking only in less than 18 inches flood depth
- ◇ Flood insurance required for certain mortgages



# Conveyance Zone

- ◇ Also called floodway
- ◇ Reserved for main passage of flood waters
- ◇ Cannot cause a rise in the flood water elevation



# High Hazard Zone

- ◇ Portion of the floodplain with greatest risk to people and property
- ◇ Defined as area where depth times velocity exceeds 4
- ◇ Boulder's Regulations (9-3-5):
  - ◇ No new structures intended for human occupancy
  - ◇ No additions or substantial improvements to existing structures



# Building in the Floodplain

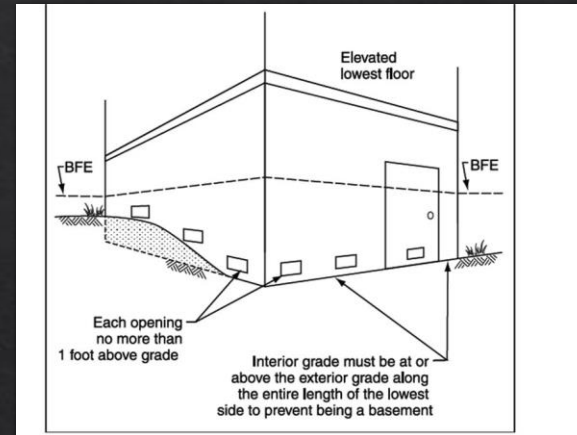
Boulder's Regulatory Requirements

# Flood Elevations

- ◇ Base flood elevation
  - ◇ 100-yr floodplain water surface, where defined
- ◇ Flood protection elevation
  - ◇ 100-yr floodplain
    - ◇ 2 feet above 100-yr floodplain
    - ◇ 2 feet above highest adjacent grade to structure
  - ◇ 500-yr floodplain, the lower of
    - ◇ 1 foot above 500-yr water surface or
    - ◇ 2 feet above 100-yr water surface

# Residential Structures

- ◆ Elevate Lowest floor  $\geq 2$  feet above BFE
- ◆ Flood vents for below grade spaces
- ◆ No basements



# Non-Residential Structures

- ◆ Elevated or floodproofed to Flood Protection Elevation

# Mixed-Use Structures

- ◆ FEMA and city definition - 25% or more non-residential uses
- ◆ Residential uses elevated to Flood Protection Elevation
- ◆ Floodproof or elevate non-residential portions of structure

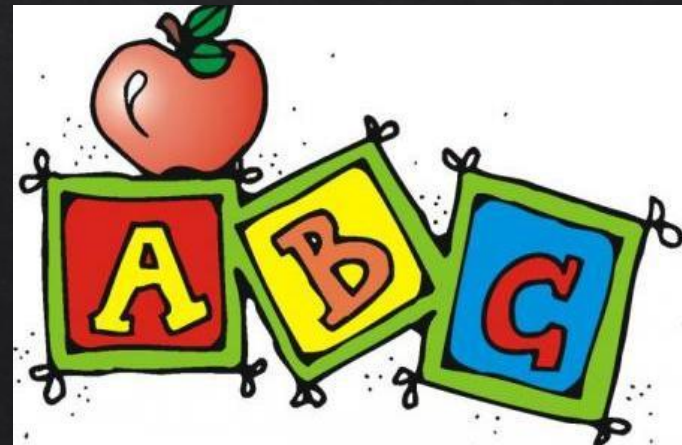
# Floodproofing

- ◆ Flood gates
- ◆ Flood doors
- ◆ Allowable leakage
- ◆ Testing required



# Critical Facilities

- ◆ Essential facilities
  - ◆ Fire, police, etc.
  - ◆ Hazardous materials facility
  - ◆ At risk population
    - ◆ Preschool, public and private school
    - ◆ Daycare center
    - ◆ Group home, residential or congregate care facility
- ◆ Lodging Facilities



# Modification to Existing Structures

Entire structure must be brought into compliance with the current floodplain regulations if:

- ◆ Substantial Damage

- ◆ Damages exceed 50% of value of structure

- ◆ Substantial Improvement

- ◆ Project cost exceeds 50% of value of structure (not land cost)

- ◆ Calculated by looking at previous 12 months

- ◆ Substantial Modification

- ◆ Expansion exceeds 50% of floor area

- ◆ Cumulative (cannot expand 50% each year)

# Floodplain Development Permits



# Floodplain permitting

- ◇ Required per B.R.C. 9-3-6 for development in the floodplain
  - ◇ Certain activities are exempt from permits
- ◇ Staff level approval
  - ◇ Development within the 100-yr and 500-yr floodplain
- ◇ Staff level approval subject to Planning Board Call-Up
  - ◇ Development within the Conveyance and High Hazard Zones

# Permit review and inspection

- ◆ Floodplain development permits are reviewed by engineering staff that are Certified Floodplain Manager (CFM) credentialed
- ◆ Flood inspections completed for all new construction, additions, substantial improvements and modifications

# Permit review and inspection


- ◆ Elevation Certificates
- ◆ Required for
  - ◆ New construction
  - ◆ Addition
  - ◆ Substantial improvement
  - ◆ Substantial modification


U.S. DEPARTMENT OF HOMELAND SECURITY FEDERAL EMERGENCY MANAGEMENT AGENCY National Flood Insurance Program		ELEVATION CERTIFICATE		OMB No. 1680-0008 Expiration Date: July 31, 2015	
Important: Read the instructions on pages 1-9.				FOR INSURANCE COMPANY USE	
SECTION A - PROPERTY INFORMATION				FOR INSURANCE COMPANY USE	
A1. Building Owner's Name: 1000 ROSEWOOD LLC				Policy Number:	
A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. 4484 9 <sup>th</sup> Street				Company NAIC Number:	
City: Boulder		State: CO		ZIP Code: 80304	
A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) Lot 11, 1000 ROSEWOOD SUBDIVISION					
A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.): Residential					
A5. Latitude/Longitude: Lat. 40.0567 Long. -105.2854 Horizontal Datum: <input type="checkbox"/> NAD 1927 <input checked="" type="checkbox"/> NAD 1983					
A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.					
A7. Building Diagram Number: 2					
A8. For a building with a crawlspace or enclosure(s):					
a) Square footage of crawlspace or enclosure(s)			A9. For a building with an attached garage:		
779.3 sq ft			a) Square footage of attached garage: N/A sq ft		
b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade: 4			b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade: 0		
c) Total net area of flood openings in A8.b: 639 sq in			c) Total net area of flood openings in A9.b: N/A sq in		
d) Engineered flood openings? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			d) Engineered flood openings? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION					
B1. NFIP Community Name & Community Number Boulder, City of 080024		B2. County Name Boulder		B3. State CO	
B4. Map/Panel Number 08D13C0391	B5. Suffix J	B6. FIRM Index Date 12/18/12	B7. FIRM Panel Effective/Revised Date 12/18/12	B8. Flood Zone(s) AE	B9. Base Flood Elevation(s) (Zone AO, use base flood depth) 5549.5
B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in item B9. <input type="checkbox"/> FIS Profile <input checked="" type="checkbox"/> FIRM <input type="checkbox"/> Community Determined <input type="checkbox"/> Other/Source: _____					
B11. Indicate elevation datum used for BFE in item B9: <input type="checkbox"/> NGVD 1929 <input checked="" type="checkbox"/> NAVD 1988 <input type="checkbox"/> Other/Source: _____					
B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Designation Date: _____ <input type="checkbox"/> CBRS <input type="checkbox"/> OPA					
SECTION C - BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)					
C1. Building elevations are based on: <input type="checkbox"/> Construction Drawings* <input type="checkbox"/> Building Under Construction* <input checked="" type="checkbox"/> Finished Construction *A new Elevation Certificate will be required when construction of the building is complete.					
C2. Elevations - Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, ARIA/E, ARIA1-A30, AR/AH, AR/AO. Complete items C2.a-h below according to the building diagram specified in item A7. In Puerto Rico only, enter meters. Benchmark Utilized: V-1 Vertical Datum: NAVD-88 Indicate elevation datum used for the elevations in items a) through h) below. <input type="checkbox"/> NGVD 1929 <input checked="" type="checkbox"/> NAVD 1988 <input type="checkbox"/> Other/Source: _____ Datum used for building elevations must be the same as that used for the BFE.					
Check the measurement used.					
a) Top of bottom floor (including basement, crawlspace, or enclosure floor)		5547.8		<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters	
b) Top of the next higher floor		5552.5		<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters	
c) Bottom of the lowest horizontal structural member (V Zones only)		N/A		<input type="checkbox"/> feet <input type="checkbox"/> meters	
d) Attached garage (top of slab)		N/A		<input type="checkbox"/> feet <input type="checkbox"/> meters	
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)		5552.5		<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters	
f) Lowest adjacent (finished) grade next to building (LAG)		5548.5		<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters	
g) Highest adjacent (finished) grade next to building (HAG)		5550.5		<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters	
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support		5548.4		<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters	
SECTION D - SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION					
This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information. I certify that the information on this Certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.					
<input type="checkbox"/> Check here if comments are provided on back of form. Were latitude and longitude in Section A provided by a licensed land surveyor? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Certifier's Name: John B. Guyton		License Number: PLS 16405			
Title: PLS		Company Name: Flatrons, Inc. (Job No. 13-60,491)			
Address: 3825 Iris Ave #395		City: Boulder		State: CO ZIP Code: 80301	
Signature: <i>[Signature]</i>		Date: 7/30/13		Telephone: 303-443-7001	
FEMA Form 086-0-33 (7/12) See reverse side for continuation. Replaces all previous editions.					



# More Information

- ◇ [www.boulderfloodinfo.net](http://www.boulderfloodinfo.net)
- ◇ See Boulder Revised Code 9-3-2 through 9-3-7
- ◇ Flood Information Request for Specific Property
  - ◇ Available upon request
  - ◇ Applications at Planning and Development Services
  - ◇ Fee must be paid with application

 **City of Boulder  
FLOODPLAIN AND WETLANDS MANAGEMENT**  
Park Central Building  
1700 Broadway  
Boulder, CO 80506



**FLOOD INSURANCE RATE MAP INFORMATION**

Date: 8/31/2015

TO WHOM IT MAY CONCERN:


The property location at: 3155 Sterling Circle,  
has been located on the city's Flood Insurance Rate Map (FIRM). The following information is provided:  
City of Boulder's community number: 080024  
The property is located on map number: 08013C0041J  
The effective date of the FIRM: December 12, 2012

The property is located in FIRM zone: (circle one) AE, A, X (shaded),  Other:  
(X-shaded) = greater than 100 ft floodplain, X-shaded = less than 100 ft floodplain or 100 ft shallow flooding, A = up to 100 ft floodplain, no base  
flood elevation determined, AE = up to 100 ft floodplain, base elevation determined)

The main building on the property:

- is located in a Special Flood Hazard Area. Federal law requires that a flood insurance policy be obtained as a condition of a federally-backed mortgage or loan that is secured by the building. It is up to the lender to determine whether flood insurance is required for a property. Flood insurance is available in Boulder. More information on flood insurance is attached.
- is not located in a Special Flood Hazard Area. However, the property may still be subject to local damage problems or other unmaped flood hazard. Flood insurance is available and may be obtained at non-floodplain rates. A flood insurance policy may be required by a lender.
- A determination of the property or main building's exact location cannot be made on the FIRM. A copy of the Firm is attached for your information.
- is located in the Floodway (conveyance zone).
- is located in a City of Boulder High Hazard Zone.

NOTE: This information is based on the Flood Insurance Rate Map for the City of Boulder. This letter does not imply that the referenced property will or will not be free from flooding or damage. A property not in a Special Flood Hazard Area may be damaged by a flood greater than that predicted on the FIRM or from a local damage problem not shown on the map. This letter does not create liability on the part of the City, or any officer or employee thereof, for any damage that results from reliance on this information.

  
\_\_\_\_\_  
Floodplain and Wetlands Official

\_\_\_\_\_  
Date: 8/31/2015

Form Date: 3/30/15 1 of 2

Questions?