

**CITY OF BOULDER  
WATER RESOURCES ADVISORY BOARD  
INFORMATION ITEM**

**MEETING DATE: July 21, 2014**

**AGENDA TITLE:** Information Item – South Boulder Creek Flood Mitigation Planning Study Status Update

**FROM:**

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**EXECUTIVE SUMMARY**

The purpose of this memorandum is to provide a general summary of the history and progress made to date on the South Boulder Creek flood mitigation planning study. This mitigation plan was initiated in 2010 after the floodplain mapping was updated in 2007. Since the study was initiated, multiple flood mitigation alternatives have been evaluated to address flooding associated with South Boulder Creek. A consultant recommendation has been developed and is described in this memorandum. A more detailed description of the recommended alternative will be presented and a request for a motion from the WRAB will be made at a meeting scheduled on August 18. **Attachment A** shows the location of the study area.

Hydraulic modeling indicates that a major storm event will cause water from South Boulder Creek to overtop US36 near Table Mesa Drive and result in flooding through the West Valley (area generally located west of South Boulder Creek, north of US36, east of Foothills Parkway and south of Arapahoe Avenue). The September 2013 flood event did overtop US36, causing an estimated \$45 million in flood damage. A flood mitigation planning study began in early 2010 with a focus on developing and evaluating alternatives designed to mitigate flood hazards affecting structures and areas along South Boulder Creek and the West Valley within the current incorporated city limits.

Conceptual alternatives were initially developed by problem area in a matrix format that included a wide range of mitigation measures. These concepts were then presented at a public meeting and subsequently combined into 15 Alternative Plans. These alternatives were

evaluated and nine Best Alternative Plans were developed and presented at a second public meeting and to WRAB in late 2010.

Four of the nine Best Alternative Plans were further refined and analyzed and the consultant team selected an engineering recommendation. Major components of the consultant recommended alternative include construction of a regional stormwater detention facility south of US36, a smaller detention facility at Manhattan Middle School and one at Flatirons Golf Course.

The recommended alternative would provide significant flood protection within the West Valley area, including eliminating the 100-year floodplain designation that currently affects approximately 700 structures. The estimated cost of the alternative is approximately \$46 million, but the project could be constructed in three phases. Construction of the project would require numerous permits, agreements with the University of Colorado and Boulder Valley School District, disposal of Open Space and Mountain Park land and would be regulated by the State as a high hazard dam. Construction of the regional detention facility at US36 would result in significant impacts to wetlands, habitat for threatened and endangered species and other environmental and aesthetic resources.

## **BACKGROUND**

In the mid-1990s the University of Colorado (CU) was evaluating the purchase of the South Campus located at US36 and Table Mesa. During this evaluation, inaccuracies in the 1986 regulatory flood mapping were discovered. In 1997, the city, Boulder County, the Urban Drainage and Flood Control District (UDFCD) and the Colorado Water Conservation Board commissioned a flood study to verify the results of the CU study and to compare the results to the adopted floodplain mapping.

The 1997 study was not approved and a new flood study, using more advanced hydraulic modeling and hydrology techniques, was commissioned by the city and the UDFCD in 2002. The 2002 study included a Climatology and Hydrology Report and was reviewed by an independent review panel, citizen advisory group and a hydrology advisory panel. The study was completed in 2007 and resulted in a new flood map and formally identified the flood hazard that would impact the West Valley neighborhoods west of South Boulder Creek and north of US 36. The updated floodplain mapping determined that about 700 structures (with a total of approximately 1,200 dwelling units) are located in the 100-year floodplain. The majority of these structures are located within existing developed areas of the city within the West Valley area. A Risk Assessment completed in June 2009 estimated a 100-year event would result in \$215 million in property damages.

South Boulder Creek has flooded in the past, including in 1938, 1950s, 1969 and in 2013. The flood events in 1969 and 2013 resulted in overtopping of US36 and substantial flooding in the West Valley. South Boulder Creek had the greatest reported property damage from the 2013 flood of all the city's 15 major drainageways at \$45.3 million. The 2013 flood is estimated to

have resulted in flows above a 50-year event but below the 100-year flow used in the Risk Assessment to estimate damages.

## **ANALYSIS**

The South Boulder Creek Flood Mitigation Planning Study began in early 2010 and is being funded by the city and the UDFCD. A consulting team from CH2M Hill was selected to perform the study. The study is focused on developing and evaluating alternatives designed to mitigate flood hazards affecting structures and areas within the current incorporated city limits, primarily within the West Valley area (**Attachment A**).

Conceptual alternatives were initially developed by problem area in a matrix format that included a wide range of mitigation measures. These concepts were then presented at a public meeting held in March 2010 and subsequently screened from input received at the meeting, hydraulic modeling and field visits. The concepts were then combined into 15 Alternative Plans. These alternatives were evaluated and nine Best Alternative Plans were developed and presented at a second public meeting in September 2010.

The nine conceptual alternatives were presented to WRAB in December 2010. Staff recommended five alternatives be selected for further refinement and analysis. WRAB motioned to move forward with four of the nine alternatives (a pipe alternative was eliminated) including:

1. Maintaining the status quo;
2. High hazard and critical facility protection;
3. Regional detention at US36 with downstream improvements; and
4. Distributed regional detention.

Based on further analysis of the four alternatives, the consultant team has selected the Regional detention at US36 with downstream improvements as the engineering recommendation. Four sub-alternatives were developed for the regional detention at US36 facility:

1. A wall centered on the US36 median barrier;
2. A detention facility located on some of the current US36 expansion project right-of-way;
3. A detention facility located outside of the current US36 expansion project; and
4. A detention facility located outside of the ultimate configuration of the future US36 corridor.

The US36 median barrier alternative was found to be technically infeasible and was eliminated from further consideration. A traditional earthen berm, concrete wall or combination could be used to contain the storm water for the regional detention at US36 facility.

The engineering recommended alternative includes the following major components:

- An approximately 75-acre (560 acre-feet of storage) regional flood detention facility located primarily on University of Colorado South Campus land (the concept does not impact the South Campus concept development plan) with a portion of the berm located on Open Space land.
- A 25 acre-foot stormwater storage facility at Manhattan Middle School, a nine acre-foot detention storage area at the intersection of Foothills Parkway and Baseline Road and

placing a segment of Dry Creek No. 2 Ditch in a 72-inch diameter pipe. It should be noted that the city recently commissioned an analysis of the potential for detention on the Hogan Pancost property as an alternative to or in addition to the Manhattan Middle School detention facility. This analysis should be available in August.

- A 58 acre-foot stormwater detention facility at Flatirons Golf Course by constructing earthen berms near Arapahoe Avenue.

The alternative would provide 100-year flood protection within the West Valley area at an estimated cost of approximately \$46 million. The mitigation project could be constructed in up to three separate phases:

1. Regional detention facility at US36 (\$23 million);
2. West Valley improvements (\$11 million); and
3. Arapahoe Avenue detention (\$12 million).

**Attachments B-D** graphically present the major components of the engineering recommendation.

Construction of the project would eliminate the overtopping of US36 and subsequent flooding in the West Valley during a major storm event, significantly reducing the flood risk including eliminating the 100-year floodplain designation that currently affects approximately 700 structures. Construction of the project would require numerous permits, agreements with the University of Colorado and Boulder Valley School District, disposal of Open Space and Mountain Park land and be regulated by the State as a high hazard dam. Construction of the regional detention at US36 facility would result in significant impacts to wetlands, habitat for threatened and endangered species (Preble's meadow jumping mouse, Ute Ladies'-tresses orchid) and other environmental and aesthetic resources. A 100-year event would result in inundation of approximately 37 acres of city Open Space lands for up to a 72-hour period of time.

The project website located at [www.southbouldercreek.com](http://www.southbouldercreek.com) provides additional information on the flood mitigation planning study along with a draft report. Information about the city's floodplain management program, floodplain regulations and flood insurance including how mitigation planning fits into the city's floodplain management process can be found at: [https://www-static.bouldercolorado.gov/docs/Floodplain\\_Management\\_Overview-1-201407141157.pdf](https://www-static.bouldercolorado.gov/docs/Floodplain_Management_Overview-1-201407141157.pdf)

## **NEXT STEPS**

A more detailed description of the recommended alternative will be presented and a request for a motion made at the August 18 WRAB meeting. Prior to the meeting, staff will hold an open house to provide an additional opportunity for the public to review study information, ask questions, and provide feedback. Due to the impacts of the recommended mitigation alternative on city Open Space, the Open Space Board of Trustees will also review the study and make a recommendation to City Council. A study session with City Council is tentatively scheduled for September 30.

## **ATTACHMENTS**

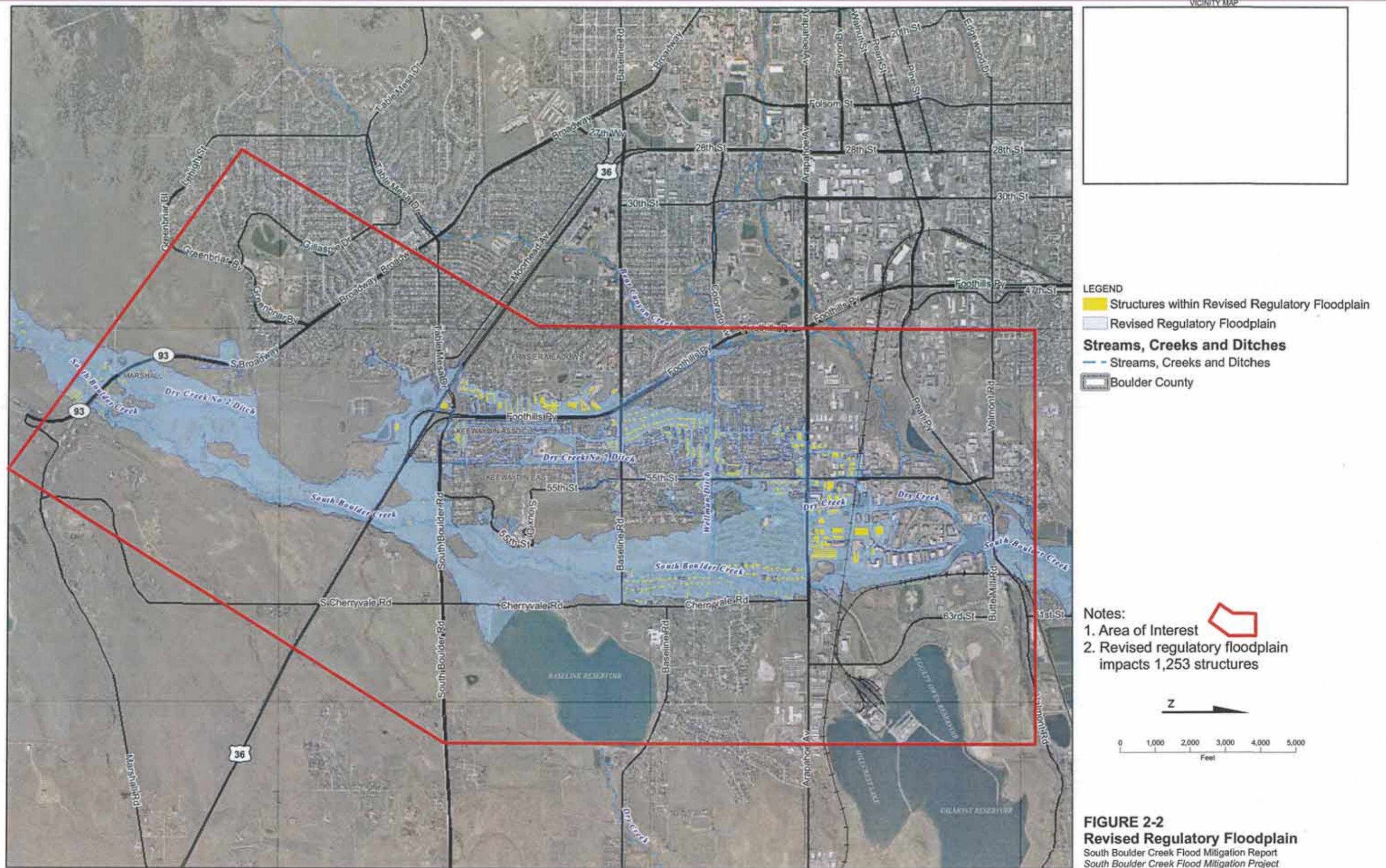
Attachment A – Study Area

Attachment B – Consulting recommendation overview

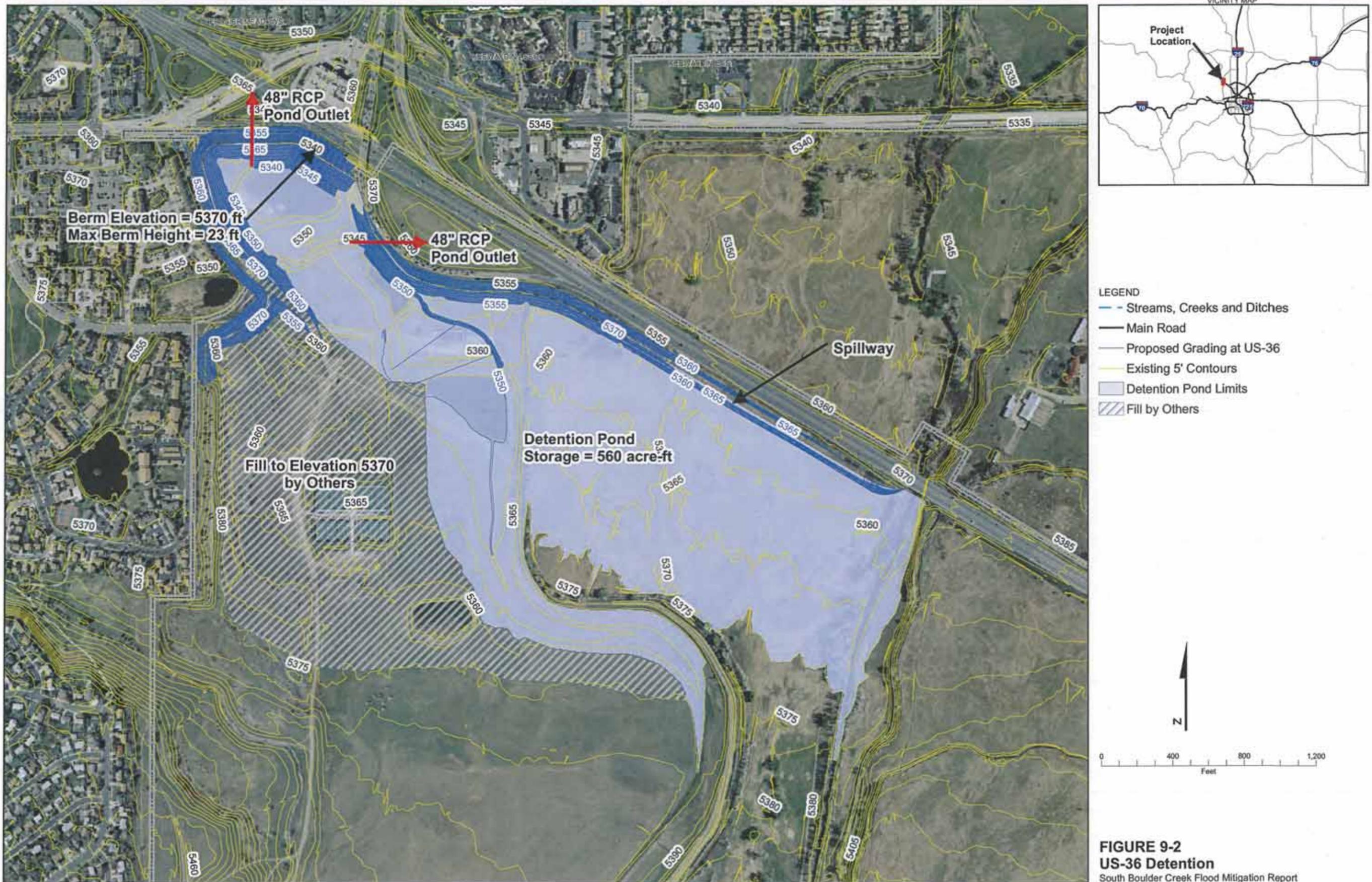
Attachment C – Conceptual plan of the regional detention at US36 facility

Attachment D – Concept plan of the Manhattan Middle School detention facility

Attachment E – Concept plan of the Arapahoe Avenue detention facility



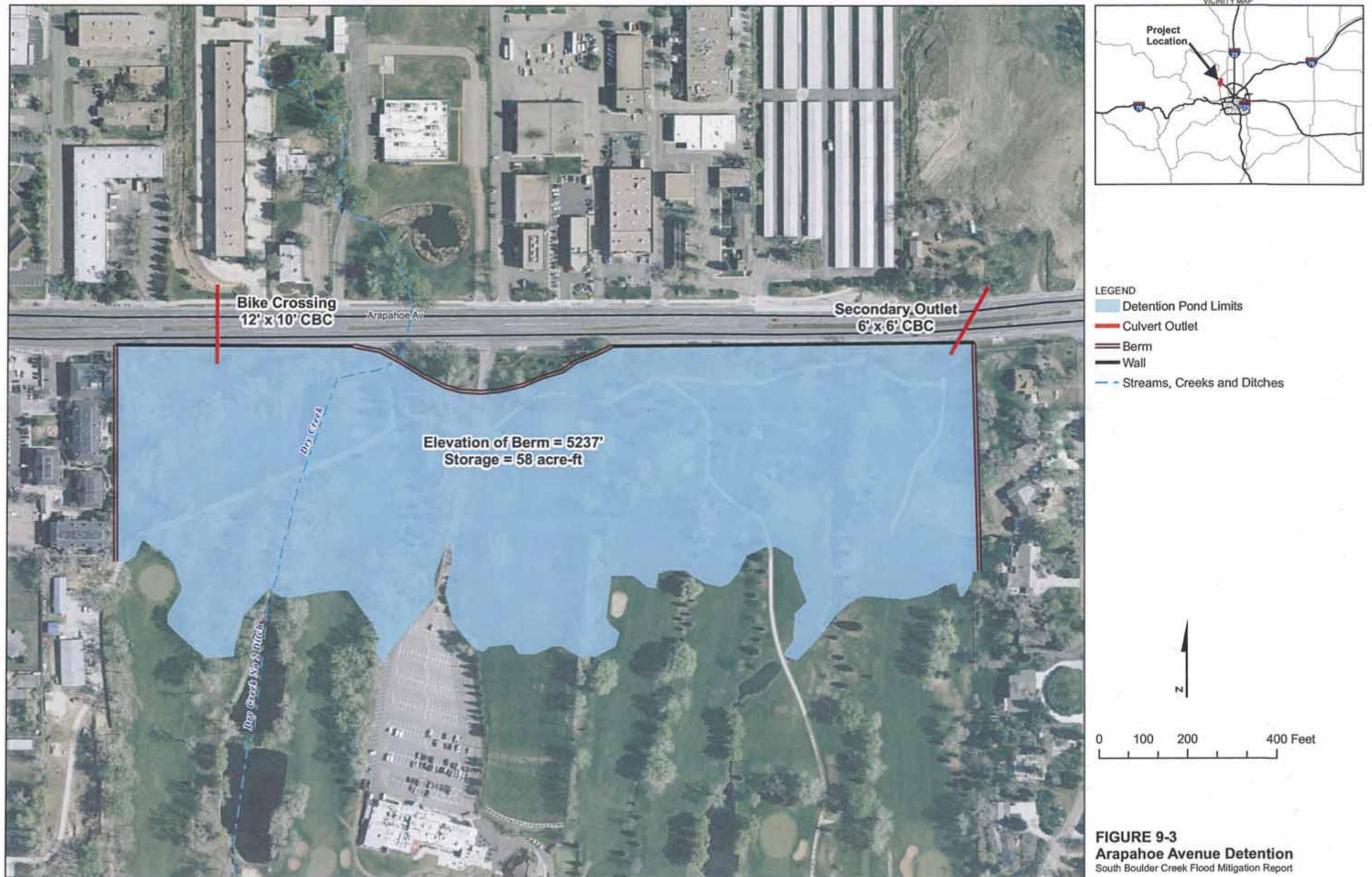




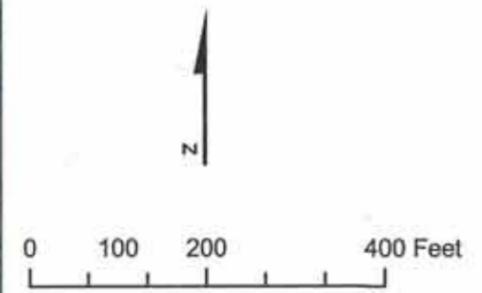
**FIGURE 9-2**  
**US-36 Detention**  
South Boulder Creek Flood Mitigation Report



**FIGURE 9-4**  
**Manhattan Middle School Detention**  
 South Boulder Creek Flood Mitigation Report



- LEGEND
- Detention Pond Limits
  - Culvert Outlet
  - Berm
  - Wall
  - - Streams, Creeks and Ditches



**FIGURE 9-3**  
**Arapahoe Avenue Detention**  
 South Boulder Creek Flood Mitigation Report